

single source machine control

motion

logic

data



DELTA TAU
Data Systems, Inc.

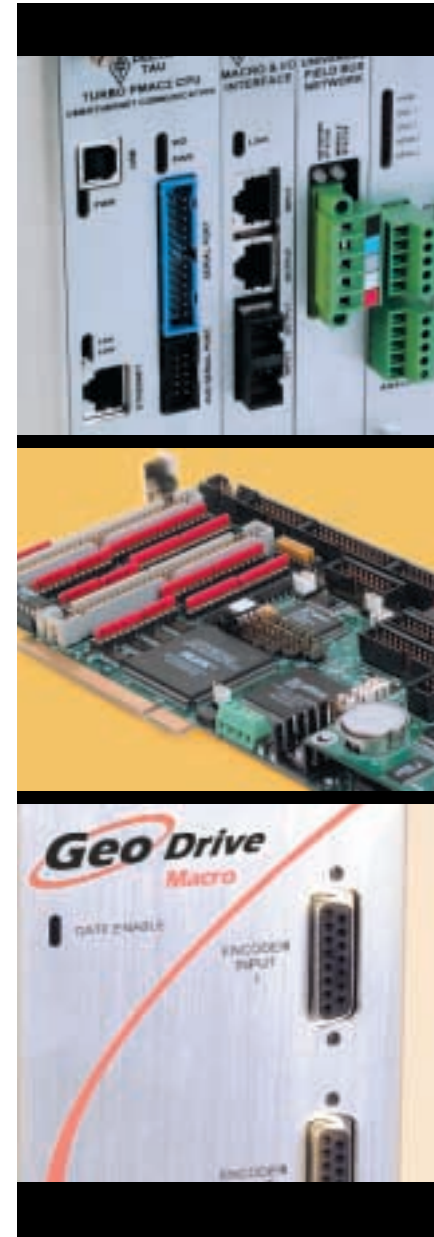


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Delta Tau – *Innovation in Motion*

Whether your application is a high-speed precision multi-axis system or a single-axis off-the-shelf component, we deliver solutions enabling increased throughput, precision and reliability. With the industry's widest selection of open architecture motion controllers, servo amplifiers, logic controls, HMI software and CNC systems, we deliver the exact combination of motion, logic and data control features you need: power, flexibility and ease of use.

Setup and integration are much easier and faster because you program in plain English. One language programs the most complex multi-axis application as well as the simplest single-axis application. So you don't have to learn multiple programming languages.

We provide the best application support in the industry. Our local application engineers are strategically located throughout the world. All are available to help, whenever and wherever you need it.

With over three decades of experience, our company is virtually a history of innovation in high performance motion control solutions. More than 1,000,000 axes of motion are controlled by our products in just about every industry imaginable. These applications include robotics, semiconductor manufacturing, aerospace, machine tool, medical equipment, packaging, material handling, test and measurement equipment, general automation and many more.

You can solve the simplest to the most complex next-generation application with our wide array of motion components and single source machine control products. We deliver easy-to-use and cost-effective solutions. The benefit to you includes a solution that increases market share and keeps you ahead of the competition.

Delta Tau Controllers

Power, Flexibility and Ease of Use

We've combined power, flexibility and ease of use with a full line of machine control products. So whatever your application needs and whatever your time constraints may be, we have a solution to keep you ahead of your competitors.

Power

Our motion controllers utilize the latest in DSP technology, including the Motorola 56k series DSP microprocessors. Its fast and precise calculation capabilities translate into a highly accurate and fast-paced motion trajectory calculation and control. In addition, we use a high-level BASIC-like language for performing real-time custom servo loop tasks in an Open Servo structure. Our continuously increasing computational speeds (40-160MHz) enable our motion controllers to have many advanced features, including:

- Advanced PID and pole placement servo algorithms (better control)
- Up to 32 axes of control in 16 coordinate systems (multi-axis trajectory control, multitasking)
- Dynamic multi-block lookahead for robust acceleration control (path fidelity at any speed)
- Forward and inverse kinematics (robotics and other non-Cartesian actuators)
- Reverse and retrace capability (welding, cutting, EDM)
- Acceleration and jerk control (smooth, jerk-free motion)
- Cascaded servo loops (tight coupling of velocity/force loop)
- True S-curve acceleration/splines (precise and smooth trajectory control)
- Coordinate translation and rotation (2D and 3D)
- Leadscrew and backlash compensation (automatic laser compensation for high precision)
- 24-bit hardware position capture and compare (precise coordination with real-time events)
- 48-bit floating-point and integer calculations (precision)
- User-written servo capabilities for custom servo algorithms (freedom to do your own advanced algorithm)
- Servo loop update rate up to 6.25 microseconds per axis (fast, precise calculations and positioning)
- Maximum encoder input rate up to 40 MHz (more encoder resolution for high response and stiff servo loop)
- Multitasking of up to 16 motion programs and 64 PLC with simultaneous execution (calculation power)

Flexibility

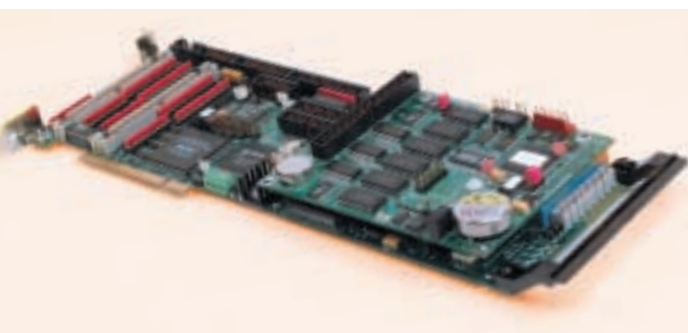
With six generations of proven in-the-field motion controllers, we offer a broad and diverse line of motion control products. From 1 to 32 axes of linear or rotary servo, stepper or hydraulic motion in any combination, including a variety of analog or digital I/Os, different types of encoder feedback, analog (+/-10V) and digital (direct PWM) outputs to servo amplifiers, as well as pulse and direction output for steppers. Also, RS232, USB and ethernet communication. We can provide the best solution for today, with the best upgrade path to the future.

- All motion controllers operate standalone or in multiple bus formats (ISA, PCI, VME and PC/104)
- Up to 32 axes of control in 16 coordinate systems
- Axis control - digital PWM, analog +/-10V or stepper
- Motor types: rotary & linear, AC induction, brush and brushless DC, stepper and hydraulic in any combination
- Analog or digital I/O - high/low power, sinking or sourcing
- Encoder inputs - A/B quad, sinusoidal with interpolation, absolute, R/D, SSI, MLDT
- Types of communications - USB, ethernet (UDP/TCP/IP) or RS232
- Field buses - DeviceNet, Profibus and MACRO (fiber-optic) protocol
- Amplifiers - a variety of linear and PWM brush and brushless motor drives

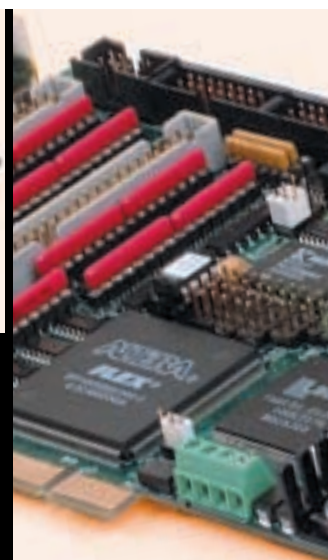
Ease of Use

We provide a complete suite of software tools using step-by-step instructions, allowing the user to quickly integrate our motion system. Our motion programming language is intuitive, using plain English command statements, such as WHILE, IF and ELSE. Move commands are simply programmed with an axis letter, such as X, Y, Z, followed by the move distance in inches, revolutions, millimeters or other units specified. Transparent to the user, simple-written motion programs are converted to very precise multi-axis motion trajectories. Since our motion controller is also a PLC device, it can run logic programs independently but concurrently with motion programs, simplifying the task of implementing I/O processes that are simultaneous with motion programs. PLC programs may be written in ASCII language, compiled, or by using IEC-1131 Relay Ladder Logic.

- Step-by-step, easy to follow set-up programs
- BASIC-like language for motion programming
- Motion and logic control combined in one product
- Product-specific wizards for hardware configuration
- Software tools for program development, project management, servo tuning and program debugging



PMAC - PCI



PMAC2A - PC/104 4 AXIS WITH USB



PMAC2-PC ULTRALITE

UMAC (UNIVERSAL MACHINE AND AUTOMATION CONTROLLER)



Board Level Solutions

PMAC Features

CPU

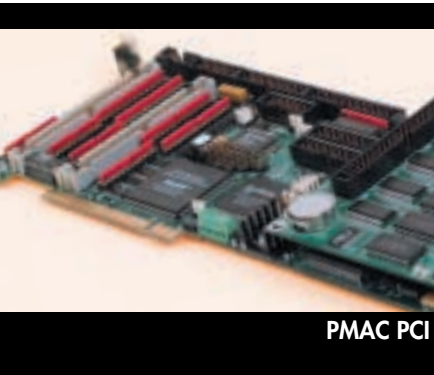
- Motorola DSP 56k digital signal processor. CPU speeds from 20 to 160 MHz
- Simultaneous execution of 16 motion programs and 64 PLC (logic) programs
- Up to 512k x 24 on-board memory for motion and logic programs
- Dual-ported RAM for fast data block transfers
- PID and advanced pole placement (32 parameters) servo algorithms
- Super-high accuracy clock crystal for precise timing
- Hard real-time operating system
- Stand-alone or host commanded operation
- Full synchronization of multiple boards

Axis Interface Signals

- Servo control from 1 to 32 axes in up to 16 independent coordinate systems
- +/-10V analog velocity, torque, sinewave modes
- Digital direct PWM or pulse and direction (stepper) command signals
- MACRO fiber optic ring commands

Feedback Interfaces

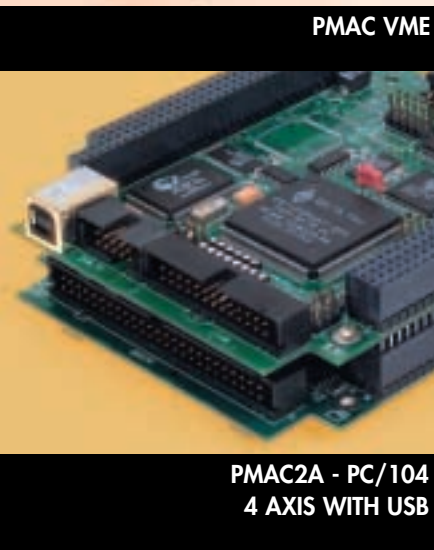
- Digital quadrature incremental encoder inputs
- 12/16-bit resolver-to-digital converter inputs
- Sinusoidal encoder feedback inputs with either 256x or 4096x interpolation
- 12/16-bit analog feedback inputs
- MLDT feedback inputs
- Absolute serial feedback: Hiperface, EnDat, SSI
- Parallel binary feedback inputs
- Laser interferometer feedback device inputs



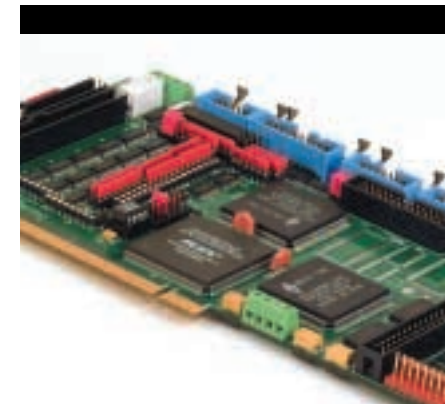
PMAC PCI



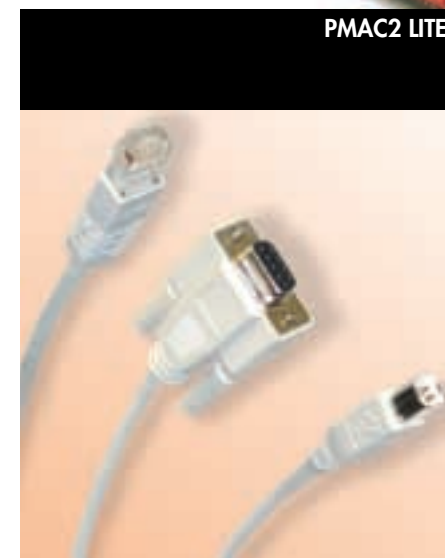
PMAC VME



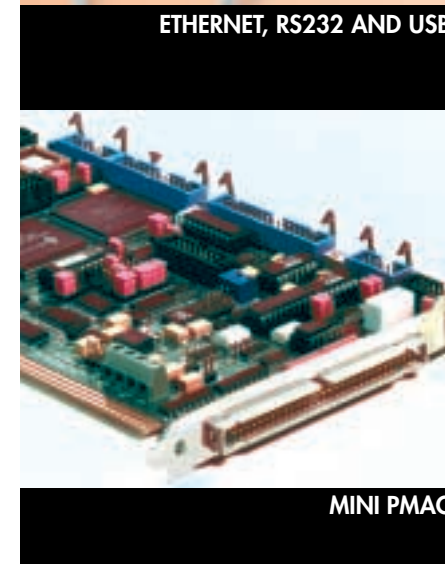
PMAC2A - PC/104
4 AXIS WITH USB



PMAC2 LITE



ETHERNET, RS232 AND USB



MINI PMAC

I/O Lines

- Up to a total of 2048 multiplexed I/O points
- Up to a total of 288 direct I/O points used for fast I/O or parallel feedback
- Sinking, sourcing or OPTO-22 compatible I/O
- Up to 100 meters remote I/O operation. Up to 3 kilometers I/O operation with MACRO link.
- Display port for LCD and VFD displays
- 12 or 16-bit analog-to-digital converted inputs

Communication Methods

- PCI, ISA, VME, PC/104, USB, Ethernet or RS-232/422
- Dual-ported RAM for fast data block transfers
- MACRO (fiber optic) for remote applications

Programming Features

- Multi-block lookahead for tight acceleration control and cornering profiles
- Forward and inverse kinematics for robotics applications
- 256 motion programs capacity
- Asynchronous PLC program capability
- Rotating buffer for large programs
- S-curve acceleration and deceleration based on true parabolic trajectories
- Cubic trajectory calculations, splines for accurate multi-axis path control
- Electronic gearing and cams, complete master-slave synchronization
- Leadscrew error and backlash compensation
- Hardware position capture and position compare
- Cascaded servo loops (tight coupling of velocity/force loop)

Selecting the appropriate PMAC board

Board Name	PCI	ISA	PC-104	VME	USB	MACRO Commands	RS-232 / 422	1-2 Axes	1-4 Axes	1-8 Axes	1-32 Axes	Analog ± 10 V Commands	Digital PWM Commands	Stepper Pulse Commands	Max to 80 Mhz CPU	Max to 160 Mhz CPU
PMAC-PCI	■				■		■	■	■	■		■				■
PMAC-PC		■			■		■	■	■	■		■				■
PMAC-Lite PCI	■				■		■	■	■			■				■
PMAC-Lite		■					■	■	■			■			■	
PMAC-Mini		■					■	■				■			■	
PMAC-VME				■	■		■	■	■	■		■				■
PMAC2 PCI	■				■		■	■	■	■		■	■	■		■
PMAC2A-PC/104			■		■		■	■	■	■		■	■	■		■
PMAC2-PC		■			■		■	■	■	■		■	■	■		■
PMAC2-Lite PCI	■				■		■	■	■			■	■	■		■
PMAC2-Lite		■					■	■	■			■	■	■	■	
PMAC2-Mini		■					■	■				■	■	■	■	
PMAC2-VME				■	■		■	■	■	■		■	■	■		■
PMAC2-PC Ultralite		■				■	■	■	■	■						■
PMAC2-VME Ultralite				■	■	■	■	■	■	■						■
Turbo PMAC-PCI	■				■		■	■	■	■	■	■				■
Turbo PMAC-PC		■			■		■	■	■	■	■	■				■
Turbo PMAC-Lite PCI	■				■		■	■	■			■				■
Turbo PMAC-VME				■	■		■	■	■	■	■	■				■
Turbo PMAC2-PC		■			■		■	■	■	■	■	■	■	■		■
Turbo PMAC2-Lite PCI	■				■		■	■	■			■	■	■		■
Turbo PMAC2-PCI	■				■		■	■	■	■	■	■	■	■		■
Turbo PMAC2-VME				■	■		■	■	■	■	■	■	■	■		■
Turbo PMAC2-PC Ultralite		■				■	■	■	■	■	■	■	■	■		■
Turbo PMAC2-PCI Ultralite	■					■	■	■	■	■	■	■	■	■		■
Turbo PMAC2-VME Ultralite				■	■	■	■	■	■	■	■					■

Delta Tau Applications

Semiconductor Manufacturing	Wafer Handling, Slicing, Stepping Inspection, Wire Bonding	Standard PID, Advanced PID and pole placement servo algorithms (better control) Dynamic Multi-block Segmented Lookahead (path fidelity at any speed) Forward and Inverse Kinematics (robotics) Cascaded servo loops (tight coupling of velocity/force loop) 48-bit Floating point and integer calculations (precision)
Aerospace	Flight Simulations, Turbine Blades, Manufacturing, Machine Tool	Dynamic Multi-block Segmented Lookahead (path fidelity at any speed) Forward and Inverse Kinematics (robotics) Reverse and retrace capability (Safe tool removal for EDM) Lead Screw and Backlash Compensation (automatic, laser compensation for high precision)
Machine Tool	Mills, Lathes, Grinder, EDM, Water Jet, Turning Center, Laser Cutting	Dynamic Multi-block Segmented Lookahead (path fidelity at any speed) Forward and Inverse Kinematics (5th axis capability) Reverse and retrace capability (Safe tool removal for EDM) Lead Screw and Backlash Compensation (automatic, laser compensation for high precision)
Robotics	Pick & Place, Process Production, Robot Control	Forward and Inverse Kinematics (robotics) Standard PID, Advanced PID and pole placement servo algorithms (better control) Cascaded servo loops (tight coupling of velocity/force loop) Coordinate Translation (2D & 3D) and Rotation (rectangular & polar coordinates)
Packaging & Assembly	Mixing, Cutting, Packaging, Sewing, Web Handling, Conveyor Belt Synchronization	Up to 32 axis of control in 16 coordinate systems (trajectory control, multitasking) Acceleration and Jerk control (precise, smooth and jerk-free trajectory control) 24-bit hardware Position Capture & Compare (precise coordination with real time events) Maximum encoder input rate up to 40 MHz (speedy motion)
Positioning	Telescope, Inspection, Sub-Micron, DNA Sampling	Standard PID, Advanced PID and pole placement servo algorithms (better control) True "S"-curve acceleration/splines (precise, smooth and jerk-free trajectory control) Position Capture & Compare (precise coordination with real time events) 48-bit Floating point and integer calculations (precision)
Medical	Robotic Surgery, M.R.I Machine, Laser Eye Surgery, Optical Surface Grinding	Forward and Inverse Kinematics (robotics) Cascaded servo loops (tight coupling of velocity/force loop) True "S"-curve acceleration/splines (precise, smooth and jerk-free trajectory control) User-written servo capabilities for custom servo algorithms (freedom to do your own thing) Redundant servo loops, using MACRO
Specialty	Hexapod, Robotics, Remote Machinery Control, Printing on the Fly, Vehicle Control	Up to 32 axis of control in 16 coordinate systems (trajectory control, multitasking) 24-bit hardware Position Capture & Compare (precise coordination with real time events) User-written servo capabilities for custom servo algorithms (freedom to do your own thing) Servo loop update rate up to 6.25 microseconds per axis (fast, precise calculations) Multitasking up to 16 motion programs and 64 PLC (Logic) with simultaneous execution (calculation power)

Ethernet Link to Factory



Host Computer

USB or Ethernet

UMAC or PMAC2 Ultralite



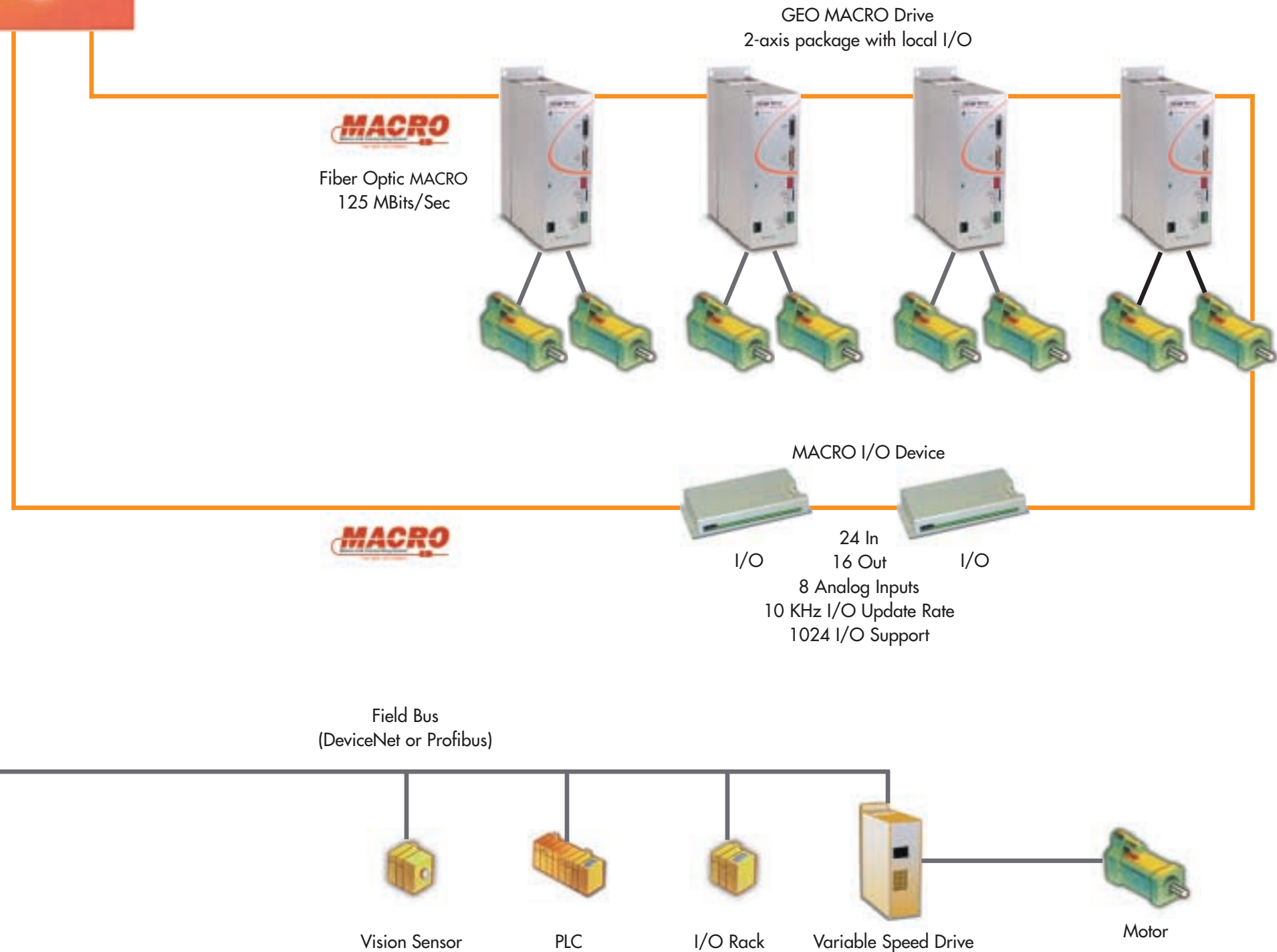
OR

One Turbo PMAC2 card or UMAC controller controls up to 32 axes and local I/Os.

Up to four Turbo PMAC2 control cards on MACRO Ring will control up to 128 axes.

Single Source Machine Control: Motion, Logic and Data

- Distributed hardware with highly centralized software
- Keep full capabilities of local control
 - Linear, circular, spline interpolation
 - Full S-curve acceleration
 - Coordinate system transformations
 - Forward and inverse kinematics
 - Hardware position capture and compare
 - Linear and rotary, brush, brushless, induction and stepper motors
 - Hydraulic proportional and servo valve control
- Deterministic ring update rate for servo and I/O
- Third-party field buses supported
- Up to 32-axes from single controller
- Multiple controllers on single ring (up to 128 axes)
- Synchronous real-time data gathering over MACRO ring
- Motion programmed in BASIC-like language
- Logic programmed in BASIC-like text language or IEC-1131 ladder logic/sequential function block
- Operator interface via powerful HMI program



System Level Solutions

The UMAC System

The UMAC (Universal Motion and Automation Controller) is a modular Turbo PMAC2 system built with a set of 3U-format Eurocards. The configuration of a UMAC system begins with the selection of a PMAC CPU or MACRO fiber optic interface and the addition of the necessary axis boards, I/O boards, communication interfaces (USB, Ethernet, etc.) and any other machine interface boards selected from the rich variety of available accessories. Accessory boards allow, for example, to connect with virtually any kind of position feedback sensor or to implement almost any kind of communication method with the host computer or external devices. In addition, a PC/104 computer can be installed inside the UMAC system rack yielding an incredibly powerful controller within a compact industrial package.

UMAC type boards mount inside 3U racks and the system is completed with a selection of power supplies and optional 3U servo amplifiers. UMAC 3U racks are available in many sizes, providing a CE compliant, rugged and integrated system, packaging the electronics, built-in breakout connectors and power supply in an enclosed system. Individual boards slide in and out of the rack, making configuration and troubleshooting easy.

We offer a large variety of accessories for axis boards, digital I/O boards, analog input boards, communication interfaces, feedback interfaces and many others. If a particular feature for the UMAC system is desired but not yet supported, we provide all the necessary information for development of new boards for UMAC's *UBUS* backplane bus. Examples of custom designed UMAC boards include vision input cards and temperature control cards and PC keyboard interface.

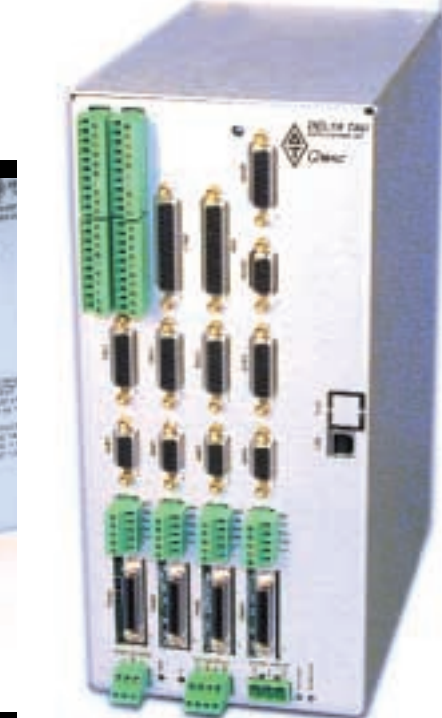
Each UMAC system is expandable and scalable by connecting multiple racks together via the MACRO fiber optic protocol. Our 3U and Geo servo amplifiers with a MACRO interface can also reside in a MACRO fiber optic ring.



TURBO UMAC WITH USB AND ETHERNET



UMAC MACRO



QMAC

Features

- Up to 32 axes of motion control, expandable to 128 axes
- Analog ± 10 Volts, digital PWM or pulse and direction (stepper) command signals
- Quadrature incremental encoder inputs
- Parallel binary feedback inputs
- Laser interferometer feedback device inputs
- Analog feedback inputs
- Sinusoidal encoder feedback inputs with 4096x interpolation
- SSI & Hiperface encoder inputs
- Yaskawa, Mitsubishi or Tamagawa absolute encoder inputs
- 16-bit resolver-to-digital converter inputs
- MLDT feedback inputs
- Hundreds of I/O points
- High-power, sinking, sourcing or OPTO-22 compatible I/O
- Up to 256 analog-to-digital converted inputs (12 or 16 bits resolution)
- Stand-alone or host commanded operation
- USB, Ethernet or RS-232/422 communication methods supported
- DeviceNet and Profibus protocols supported for I/O
- PC/104 computer interfaces directly to CPU and fits in rack.

The QMAC system

The QMAC system packages the Turbo PMAC2 controller, breakout connectors and power supply in a single system. A dedicated 4-axis controller with the same computation capabilities of the UMAC system, the QMAC provides a cost-effective 4-axis application specific solution.

The QMAC supports all common amplifier interfaces: pulse-and-direction for traditional stepper servo drives, ± 10 V analog for velocity and torque-mode drives, double analog for sine-wave drives, and direct PWM for digital power-block drives.

The QMAC features 16 in/8 out optically isolated general-purpose digital I/O. Options include 8 analog inputs with 12-bit digital conversion and 48 I/O points.

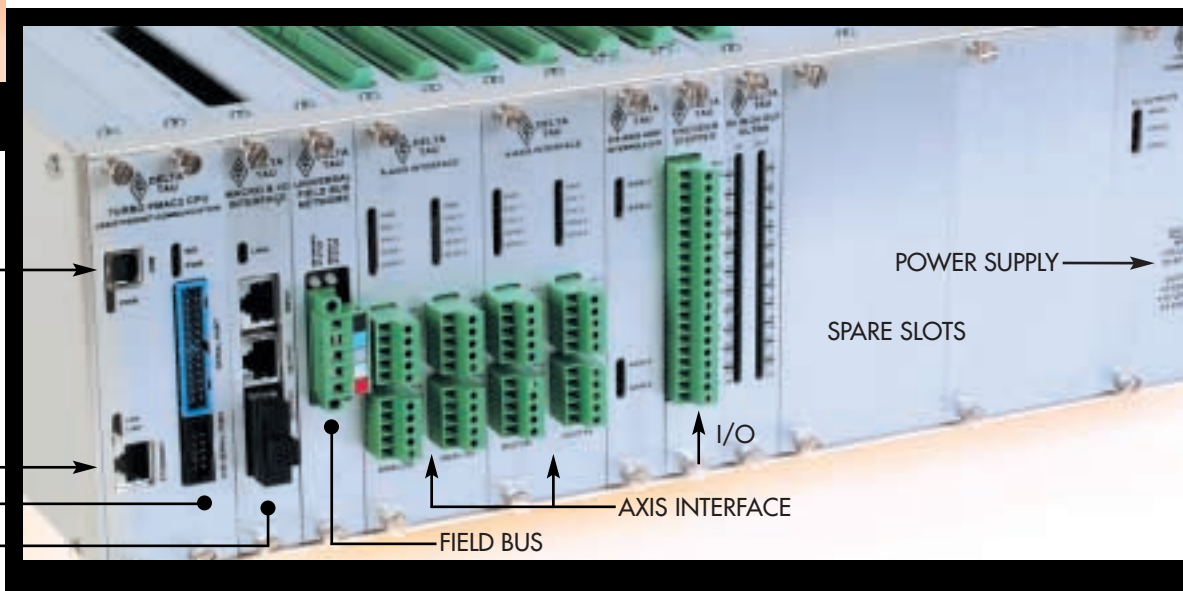
The QMAC system can communicate with other devices through its standard RS-232 port or optional USB/Ethernet. Also, MACRO, DeviceNet or Profibus interfaces can be used for field-bus expansion.



10 SLOT 8 AXIS 48/ I/O



15 SLOT 12 AXIS 48 I/O



USB

POWER SUPPLY

SPARE SLOTS

I/O

AXIS INTERFACE

FIELD BUS

ETHERNET

TURBO PMAC2 CPU

MACRO FIBER INTERFACE

Digital Connectivity

The MACRO link



Description

MACRO is an acronym for Motion and Control Ring Optical, which is a non-proprietary digital interface developed by Delta Tau Data Systems for connection of multi-axis motion controllers, amplifiers, and I/O on a fiber optic or twisted pair copper (RJ45 connector) ring. Since the fiber optic cable transmits light and not electricity, it is immune to electromagnetic noise, capacitive coupling, ground loops, and other wiring problems. In addition, the MACRO ring allows amplifiers and I/O devices to be connected with a single fiber optic strand, simplifying the wiring and assembly process.

The fiber optic MACRO Interface enables the PMAC to control multiple servo axes and I/O even when separated by a great distance. With the MACRO interface, the MACRO system can be up to 3 kilometers (2 miles) from the PMAC controller or other MACRO devices on the ring. With the RJ-45 electrical interface, the system can be up to 30 meters (100 feet) away.

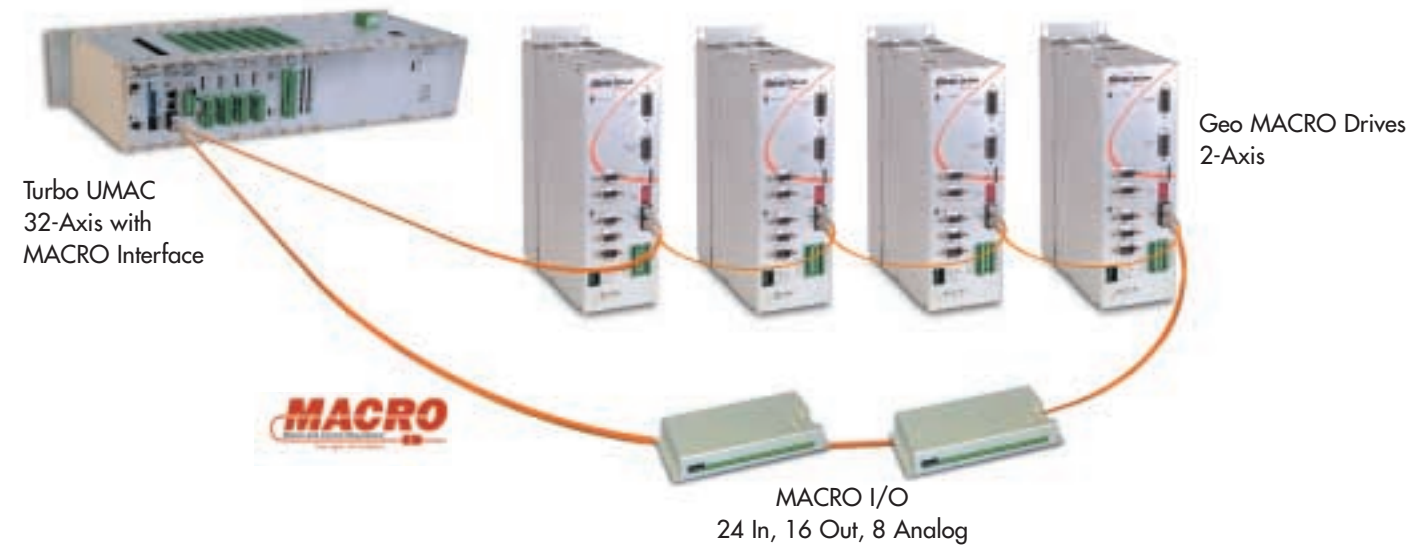
Features

- Multi-mode fiber optic (FDDI-PMD ISO/IEC 9314-3) 100-Base-FX
- Twisted pair copper (CAT5) 100-Base-TX
- 125 Mbits/sec data transmission rate
- MACRO is the only field bus capable of closing the servo loop over the fiber optic ring
- Up to 256 nodes supported.
- Supports 128 motion and 128 I/O nodes
- Up to 16 master controllers supported
- 3000 m (~ 10,000 ft) maximum distance between nodes with glass fiber
- 30 m (~ 100 ft) maximum distance between nodes with RJ-45 twisted pair
- Data update rate for 16 nodes at 40 KHz
- Centralized or distributed control
- Conversion interfaces for DeviceNet or Profibus devices

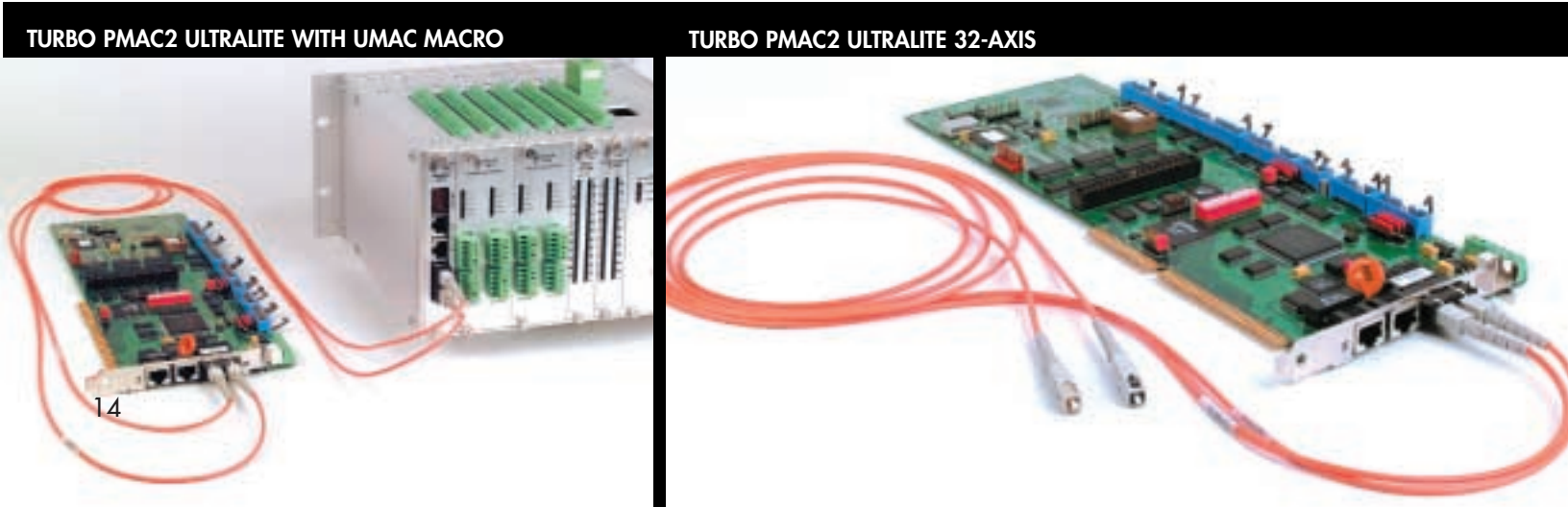
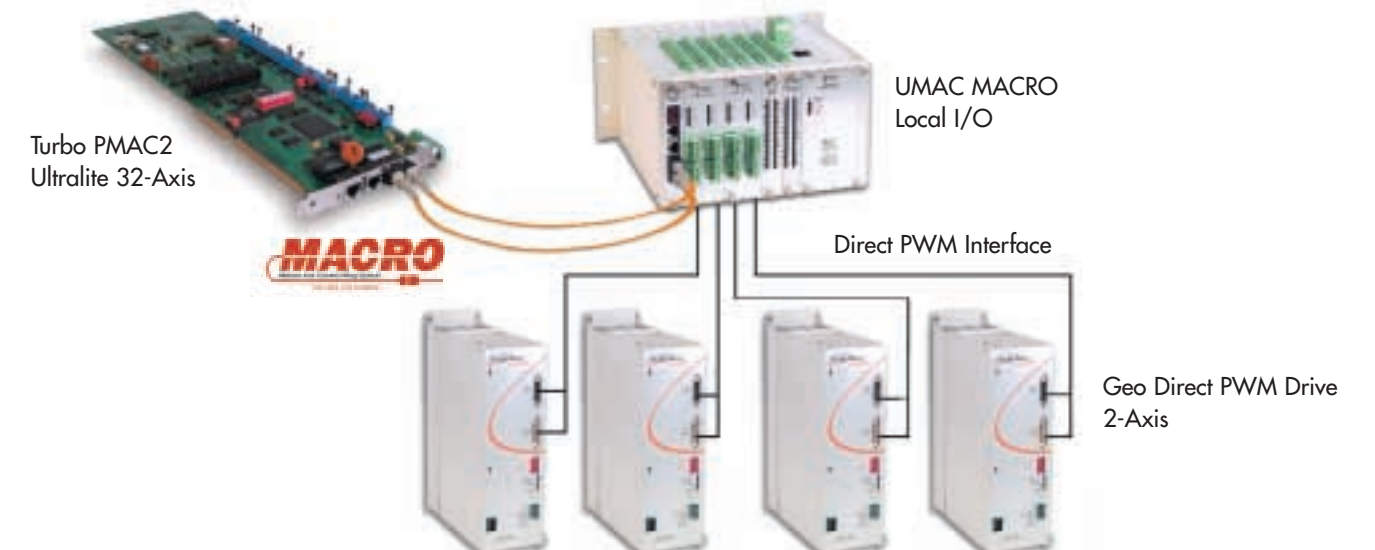
Board Level MACRO Ring



System Level MACRO Ring



Board/System Level MACRO Ring



Amplifiers

Geo Drives

The Geo Drive family of servo amplifiers provides many new capabilities for users. This family of 1 and 2-axis 3-phase amplifiers supports a wide variety of motors, power ranges, and interfaces. Geo Drives operate directly off the power main (100 to 480 VAC) for motor power and an external power supply of +24 volts DC for logic power.

Geo Direct PWM Drives

The direct PWM Interface version accepts direct PWM transistor control signals from the controller, while providing digital phase current feedback and drive status to the controller for closed-loop operation. Interface to the direct PWM drive amplifier is through a standard 36-pin Mini-D style cable, compatible with most power-block drives. The drive performs no control functions but has protection features. System installation and maintenance is reduced because there is less wiring (position feedback or I/O are not connected to the drive) and programming or variables are not set in the drive.

- Versatile input voltage range: 100-480 50/60 Hz
- Dual-Axis configurations are economical and save panel space and installation wiring
- Centralized Control: Programming is done in the PMAC eliminating redundant CPU issues
- Complete Protection: Over Voltage, Under Voltage, Over Temperature, PWM Frequency Limit, Minimum dead time, Motor Over Temperature, Short Circuit, Over Current
- Integrated Bus Power Supply Including Shunt Regulator (external resistor required)
- Full ratings to 45°C Ambient
- Wide Power Range

Geo MACRO Drives

The Geo MACRO Drive interfaces to the controller through the fiber-optic MACRO 125 Mbit/sec ring, accepting numerical command values and returning numerical feedback values over the ring. Normal ring operation allows a choice of sending PWM commands, torque commands, velocity commands or position commands. The Geo MACRO Drive accepts many types of motor position feedback for loop control and feedback to the master controller. I/O can be transmitted on the ring for high level integration such as limits, home and general-purpose I/O points. The Geo MACRO Drives are typically commanded by either a PMAC2 Ultralite board, UMAC or QMAC System, providing a convenient solution for distributed or centralized control using a fiber optics connection.

- 1 or 2 standard encoder input channels: A/B quad or sinusoidal with 1024x interpolation
- General-purpose I/O connections: 4 In, 4 Out, 24 VDC
- RS-232, USB or Ethernet port for communication drive configuration



GEO DIRECT PWM



GEO MACRO DRIVE

- Single digit status display and six LEDs for status information
- Supports resolver and absolute encoder feedback

Geo Analog Drives

The Geo Analog Drive accepts a +/-10V analog command into a 16-bit A/D converter, representing either a velocity or torque command. It can accept several styles of position feedback (required for commutation of a brushless motor), including single or dual quadrature or sinusoidal encoders (built-in interpolator x1024), resolvers and absolute serial encoders (SSI, EnDat, Hiperface). Regardless of the feedback, position information passes back to the controller as synthesized quadrature output. Options support Profibus, DeviceNet, USB and ethernet field buses.

Geo PMAC Drives

The Geo PMAC Drive is a standalone single-axis controller/drive with stored-program capability. It contains a Micro PMAC controller, providing full positioning and trajectory capabilities with synchronization to other drives and/or external encoders. The Geo PMAC Drive accepts many types of position feedback, including single or dual quadrature or sinusoidal encoders with interpolator, resolvers and absolute serial encoders (SSI, EnDat, Hiperface). It also provides an interface for flags (limits and home) and general-purpose I/O points. An option supports a CANBus interface as well as Profibus and DeviceNet Field Bus I/O. The MACRO ring can be used for high-speed communication.

Geo Family Amplifiers

SPECIFICATIONS:

RMS Amps Cont/Peak	Cont Pwr KW (HP) at 230VAC	Cont Pwr KW (HP) at 480VAC	# of Axes	Width (see below)
1.5/4.5*	0.6 (0.8)	1.2 (1.6)	2	84mm (3.3")
3/9*	1.2 (1.6)	2.4 (3.2)	2	84mm (3.3")
5/10	2.0 (2.6)	4.0 (5.3)	2	84mm (3.3")
10/20	4.0 (5.3)	8.0 (10.7)	1 or 2	84mm (3.3") 1-axis 168mm (6.6") 2-axis
15/30	6.0 (8.0)	12.0 (16.0)	1 or 2	84mm (3.3") 1-axis 168mm (6.6") 2-axis
23/46	9.0 (12.0)	18.0 (24.0)	1	168mm (6.6")
30/60	12.0 (16.0)	24.0 (32.0)	1	168mm (6.6")

} Call for availability.

All Drives universal input voltage 100-480V
 All ratings are specified @45 degrees C, Sinusoidal RMS
 *Rated 1 or 3 φ
 Dimensions: Height: 250mm (9.9")
 Depth: 206mm (8.1")
 Width: 84mm (3.3") or 168mm (6.6")



3U +/-10V 4-AXIS AMPLIFIER



3U AMPLIFIER RACK



3U PWM 2-AXIS

3U Format Amplifiers

Our series of 3U amplifiers can be conveniently installed inside a UMAC system, providing an integrated rack composed of the PMAC motion controller, I/O interface and amplifiers. In addition, the 3U amplifiers can be installed in a dedicated rack, receiving the command signals from the motion controller.

3U Family Amplifiers

SPECIFICATIONS:

Command Input/ Motor Type	RMS Amps Cont/Peak	# of Axes	# of Slots	Bus or Supply Voltage
±10V* or Stepper/Brush	0.5/1	4	2	12 to 24 VDC
±10V or Stepper/Brush	3/5	4	2	15 to 40 VDC
±10V or Stepper/Brush	8/12	4	3	15 to 65 VDC
Direct PWM Brushless 3F	4/8	2	4	115-230 VAC
Direct PWM Brushless 3F	8/16	1	5	115-230 VAC
Direct PWM Brushless 3F	15/30	1	3	115-230 VAC

*Linear Amplifier



QUAD AMPLIFIER

Quad Amplifier

Our family of 4-axis, 3-phase servo drives for 2 to 40 HP applications includes the Quad Amplifier. Commanded with direct PWM digital signals from the PMAC2 motion controller, the Quad Amp achieves a high level of performance in a compact integrated package. The Quad Amp design is particularly well-suited for the machine tool industry and other applications, requiring power for X, Y, Z axes and spindle drive.

QUAD Amplifiers

OUTPUT SPECIFICATIONS FOR 208/230 VAC AMPLIFIER

RMS Amps Cont/Peak	2 / 5	4/12	5/15	7/21	15/36	20/54	25/75	35/100	20/150	75/200
Cont Pwr KW (HP)	0.56 (0.75)	1.1 (1.5)	1.5 (2)	2.2 (3)	3.7 (5)	5.6 (7.5)	7.5 (10)	11 (15)	15 (20)	22.5 (30)

Up to four blocks (options) can be selected in any power combination.
The total combined package power cannot exceed 37 KW (50 HP).

OUTPUT SPECIFICATIONS FOR 380/460 VAC AMPLIFIER

RMS Amps Cont/Peak	2.5/7.5	3.5/10.5	6/18	12.5/40	25/75	35/105	75/150
Cont Pwr KW (HP)	1.5 (2)	2.2 (3)	3.7 (5)	7.5 (10)	15 (20)	22 (30)	37 (50)

Up to four blocks (options) can be selected in any power combination.
The total combined package power cannot exceed 37 KW (50 HP).
When operating at 380 VAC, de-rate the power rating by 20%.

Software

PMAC Set-up Software

The PMAC setup software provides a very simple method for the selection of motor parameters and overall check of the machine connections in a step-by-step sequence of setup screens. Several versions of the setup program are available for the different types of the PMAC motion controller.

PMAC Executive, Professional Suite

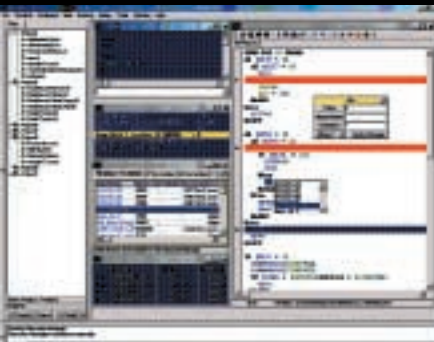
The PMAC Executive program is a host program environment for the PMAC controller, and it is intended as a development tool in creating PMAC applications. It provides a terminal communications screen, text editor for writing and editing PMAC motion and PLC programs, screen to jog motors, extensive tuning utilities, plotting capabilities, and various special screens for viewing all PMAC variables and status registers. The program consists of pull-down menus with descriptive but simple choices for performing different functions.

Features:

- Several methods of communication supported with multiple PMACs.
- Automatic configuration for communication with plug & play PMAC devices including PCI and USB type PMACs
- Enhanced text editor with colored functions and built-in debugger feature for PLC programs
- Rich set of tuning tools including auto-tuning, notch and low-pass filters setup and extended algorithm tuning
- Project management for grouping sets of motion programs, PLC programs and text files in a single project
- Extensive plot capabilities for displaying any PMAC parameter or register in either time or frequency domain
- Watch, position and status windows for real-time monitoring of any important PMAC register or parameter
- Resource manager providing extensive help in the management of free and used PMAC variables in a given project
- Operating Systems Supported: Windows® XP, 2000 and 98.



PE WIN 32 PRO SUITE



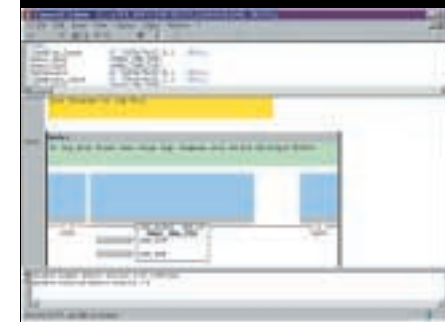
PE WIN 32 PRO SUITE



PMAC TUNING PRO



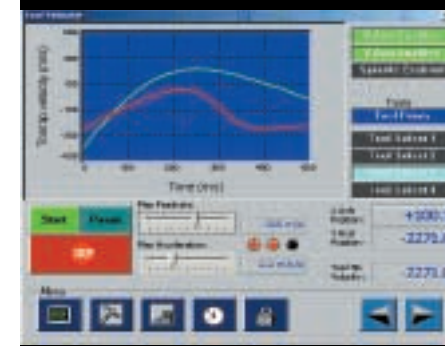
EZ PMAC



PMAC LADDER



PMAC LASER CALIBRATION



PMAC HMI

EZ PMAC

An easy to use set-up program for specific hardware packaging, the EZ PMAC is designed to take the user from out of the box to tuning and running servos with clear, graphical instructions. EZ-PMAC comes in three forms, including 4-axis PMAC Lite, 4-axis packaged QMAC system and 4-axis PC/104. This product includes motion controller, required accessories, and documentation along with the EZ-PMAC setup program.

PMAC Ladder

The PMAC Ladder IEC-1131 is an embedded programming development environment for the Turbo PMAC using the IEC-1131 standard American Ladder Logic with Function Block Diagram (FBD) and Sequential Function Chart (SFC) languages. Any code that can be implemented with the PMAC PLC programming method, including I/O control and motors jogging, can now be developed with the simplicity of the ladder logic environment.

PMAC Laser Calibration

PMAC Laser Calibration Software enables automatic laser calibration and compensation, ensuring positioning accuracy. Designed for use with quadrature feedback from laser calibration systems, the program automatically executes motion along the defined axis travel, measuring and recording precise distance for comparison to the encoder value on the fly. In seconds, a bi-directional compensation table is automatically generated from the measurements. This eliminates potential manual calculation errors and reduces calibration time.

PMAC HMI

PMAC HMI is a robust world-class operator interface design tool for the PMAC motion controller. With the PMAC HMI's comprehensive suite of ActiveX graphical control objects, including buttons, indicators, strip charts, bar graphs, gauges and sliders, etc., creating a custom operator interface display is much easier. The operator interface can be customized for any level of sophistication using a fully-integrated Visual Basic for applications development and runtime environment. Communications with the PMAC motion controller are based on the PCOMM32 set of communication libraries, which provide a reliable interface with one or more PMACs through any available communication port. In addition, multiple PMAC HMI interfaces can be linked over a network so that they will transparently work together as one.

Communication Libraries

Our communication libraries interface to the PMAC motion controller from most high-level languages, including C++, Visual Basic and LabView. A simple call to the implemented routines allows retrieval of PMAC register values, downloading or uploading programs, data collection, monitoring status and other processes requiring PMAC communication.

PMAC-NC

The Advantage 810 NC delivers an easy-to-integrate and cost-effective open architecture solution for OEM and retrofit applications. Consisting of an operator control panel with user-definable function keys and embedded PC in a slim line design, the Advantage 810 NC is preloaded with all required software, including the NC AutoPilot quick setup tool. Servo amplifiers for a wide range of power level and motor technologies are available. Integration and connectivity between the operator console and the motion controller is simplified by utilizing a single USB interface cable.

The Advantage 810U* series combines the power and flexibility of the UMAC control system with the Advantage 810 operator console for high speed machining. The UMAC features unlimited I/O and supports 6-axis machine tool applications and additional axes for specialty machines. The entire system fits in a single compact 3U size rack. High resolution interpolation enables accurate machining of complex surfaces, such as in moldmaking.

The Advantage 810Q* series combines the economy of the QMAC control system with the Advantage 810 operator console for low-cost applications. The QMAC offers the integrator or OEM an affordable 3-axis system complete with full spindle (including positioning as a 4th axis) and dedicated I/O control capability.

The NC AutoPilot setup utility makes the machine tool integration process easier, saving time and reducing costs. The NC AutoPilot makes it easier to perform just about every aspect of integration from tuning motors to customized machine configurations. The PMAC-NC for Windows® software allows interactive part programming or standard G-Code programs.

*Both the Advantage 810U and 810Q systems allow the use of existing motors and amplifiers.

Standard Features Include:

- Highest performance-to-cost ratio in the industry
- Easy-to-use operator interface designed for machinists
- Advanced dynamic block lookahead for high-speed machining
- Automated CNC AutoPilot setup utility
- Open-architecture PC-based network and USB connectivity
- 5 axis machining with built in inverse kinematics (gantry, rotary table or articulating head)
- Feedrate and rapid traverse limited only by machine dynamics
- Open/Closed loop spindle
- Leadscrew and backlash compensation tables (one or two dimensions)
- Tool radius/length/wear compensation



ADVANTAGE 810



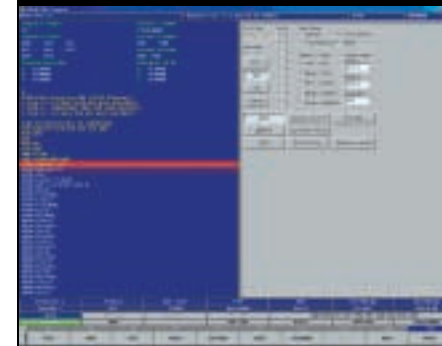
ADVANTAGE 810U



ADVANTAGE 810Q



PMAC NC SOFTWARE



PMAC NC SOFTWARE



- 3D cutter compensation for 3 to 5-axis systems
- Linear, circular, and helical interpolation
- Cylindrical interpolation capability
- User definable G-code capability
- Random tool changer capable

ADV 810 Operator Panel Components

- 15" LCD color display.
- Standard industrial grade computer keyboard.
- 8 unassigned customer keys for NC operation
- Rotary switch for axis selection and analog pots for override.
- USB (Universal serial bus) interface with the controller.
- Diskette drives interface.
- Additional external USB device attachment such as, printer, CD-ROM drives.

PMAC NC-Software

- User-friendly NC interface.
- Technology cycles for drilling, Tapping, Rigid Tapping, Boring.
- Dimension input inch/metric
- No limit on part program size, Hard disk space is the only limitation.
- Allows user to add application specific G, M, T codes other than standard codes.
- User programmable Error Trapping and Error display using PLC.
- Pop up message boxes for better interface.
- Application specific Diagnostic page for online monitoring.

Logic Programming:

- Integrated Boolean logic programming and high speed compiled logic programs.
- Simple BASIC style programming language for user application specific logic functions.
- IEC-1131 Ladder Logic programming and monitoring available as an option.

Worldwide Leadership in Motion Control



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