

Prodigy®/CME Machine Controller Board



Prodigy®/CME Machine Controller Boards

provide high performance motion control for medical, scientific, automation, industrial, and robotic applications. Available in 1, 2, 3, and 4-axis configurations, these boards support DC brush, brushless DC, and step motors and allow user-written C-language code to be downloaded and run directly on the board. The Prodigy/CME Machine Controller has on-board Atlas® amplifiers that eliminate the need for external amplifiers. To build a fully functioning system only a power supply, motors, and cabling are needed.

Built on the Magellan Motion Control IC

Based on PMD's industry-leading Magellan® Motion Processor, the Prodigy/CME Machine Controller boards provide user-selectable profile modes including S-curve, trapezoidal, velocity contouring, and electronic gearing with on-the-fly parameter change. Servo loop compensation utilizes a full 32-bit position error, PID with velocity and acceleration feedforward, integration limit and dual biquad filters for sophisticated control of complex loads.

On-Board Amplifiers

Up to four on-board Atlas amplifiers provide high performance amplification for even the most demanding applications. These compact and powerful units provide field oriented control, safety monitoring, and industry-leading drive efficiencies.

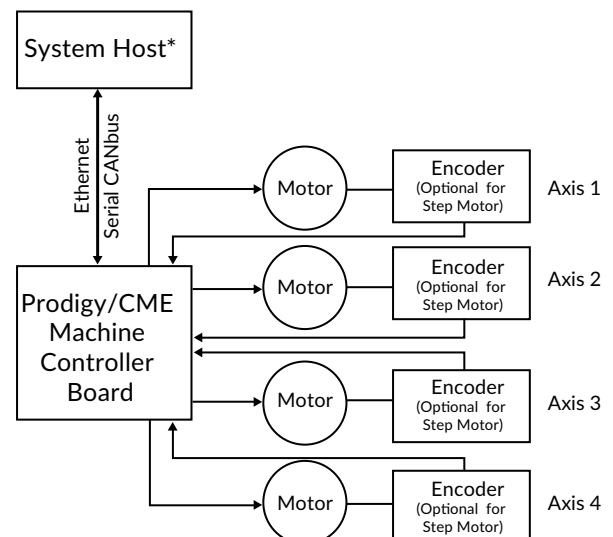
Easy to Use and Program

The Pro-Motion® GUI makes it easy to set-up and analyze system parameters and motion performance. PMD's C-Motion and VB-Motion® libraries simplify the program development process and allow the use of industry standard C/C++ or Visual Basic programming languages.

FEATURES

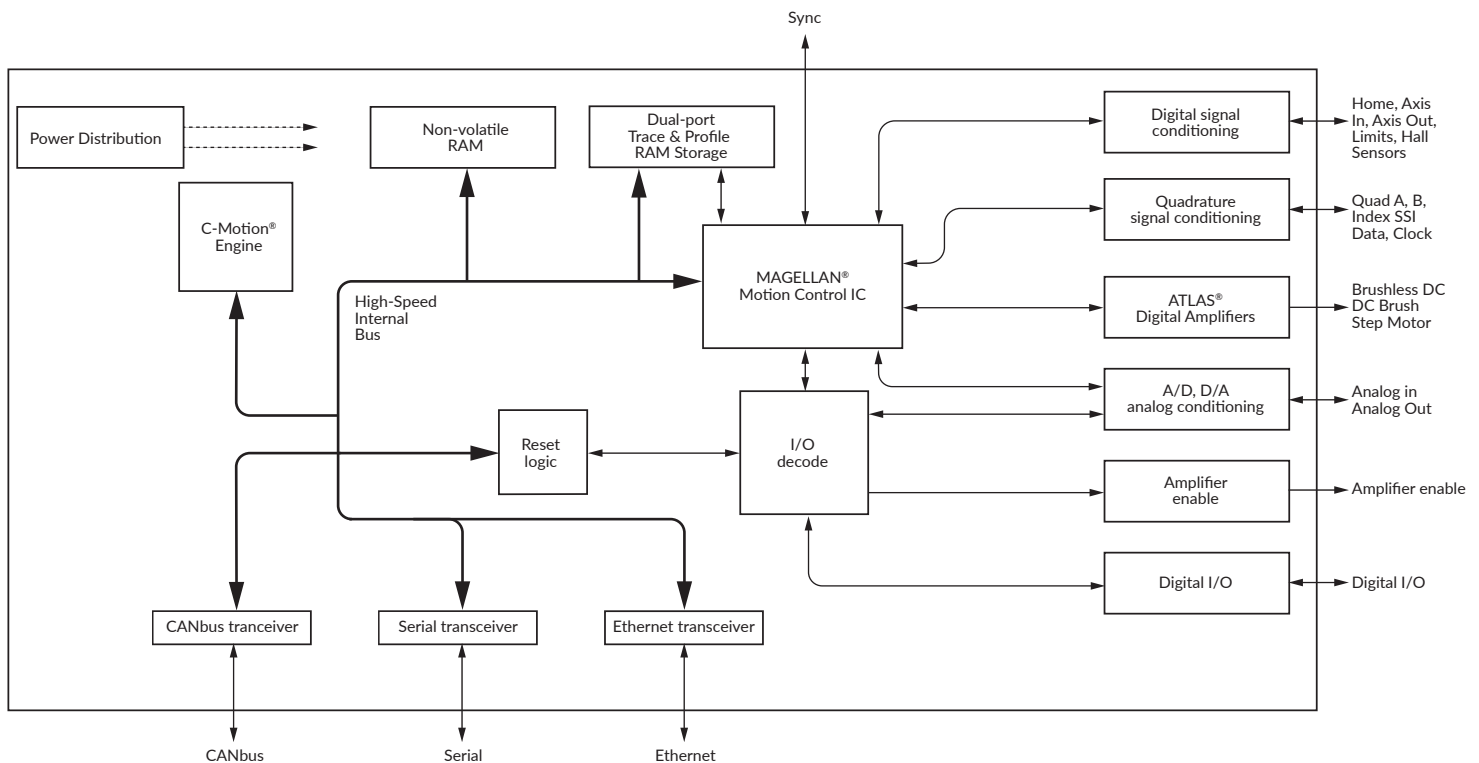
- Complete all-in-one machine controller
- Available in 1, 2, 3, and 4-axis configurations
- Uses PMD's advanced Magellan® Motion Processor
- Supports DC brush, brushless DC, and step motors
- On-board high performance Atlas® amplifiers
- S-curve, trapezoidal, electronic gearing, and velocity-contouring
- Ethernet, CANbus and serial communications
- Board-level execution of user application code at 96 MIPS
- High speed loop rate: 50 μ sec/axis
- Up to 256 microsteps per full step resolution
- Up to 1KW peak output power per axis
- Extensive fault detection including over and undervoltage, motor short, and overtemp
- Single voltage supply drives motors and board logic
- Incremental quadrature and Absolute SSI encoder support
- 6-step commutation and field oriented control modes
- Profile and servo changes on-the-fly
- Advanced PID filter with feedforward and dual biquad filters
- High-speed hardware performance trace (up to 468 KB)
- 8 channels of high precision 16-bit analog input and output
- 12+ channels of general purpose digital I/O
- Two directional limit switches, high speed index, and home inputs per axis
- C-Motion Engine development tools
- Support for external amplifiers via +/- 10V analog output
- Includes Pro-Motion®, C-Motion® and VB-Motion® development software

CONFIGURATION



*System host optional

Technical Overview



SPECIFICATIONS

| | Machine Controller |
|--|---|
| Number of axes supported | 1, 2, 3 or 4 axes |
| Supported motor types | DC Brush, Brushless DC, Step motor |
| Servo loop rates | 51.2 μ sec to 1.6 sec. Minimum depends upon number of enabled axes and use of trace |
| Encoder formats supported | Quadrature, Absolute SSI |
| Quadrature decode rate | 40 Mcounts/sec |
| Capability for onboard amplifier | Yes, Atlas Digital Amplifier |
| Motor output signals | Analog \pm 10V |
| General purpose digital I/O | 8 bi-directional, 4 input, 4 output |
| General purpose analog input | 8 16-bit channels (\pm 10V) |
| General purpose analog outputs | 8 16-bit channels (\pm 10V) |
| Limit switches | 2 per axis: one for each direction of travel |
| User program memory | 256 KB Flash / 8 KB RAM |
| User program stack memory | 8 KB RAM |
| Dual ported RAM | 128 KB or 468 KB (enhanced memory option) |
| Communication modes | Serial, CANbus, Ethernet |
| Dimensions | 7.80" x 4.88" x .78" (19.8cm x 12.4cm x 1.98cm) |
| On-board amplifier voltage range | 12 - 56V |
| On-board amplifier continuous current output | DC Brush Motor: 14 ADC Brushless DC Motor: 10 Arms Step motor: 9Arms |

ATLAS® Digital Amplifiers

ATLAS® Digital amplifiers are compact single-axis amplifiers that provide high performance torque control of DC brush, brushless DC, and step motors. They are packaged in a Compact or Ultra Compact solderable module and utilize standard through-hole pins for all connections.



| | |
|--------------------------|--|
| Voltage Input | 12-56 VDC |
| Microstepping resolution | 256 |
| PWM frequency | 20, 40, 80 kHz |
| Current Loop rate | 20 kHz |
| Power rating options | 75W, 250W, 500W |
| Mechanical Dimensions | Ultra Compact size 1.05" x 1.05" x .53" (27mm x 27mm x 13mm) |
| | Compact size 1.52" x 1.52" x .60" (39mm x 39mm x 15mm) |

Profile modes

| | |
|-----------------------------|--|
| S-curve point-to-point: | Position, velocity, acceleration, deceleration, jerk |
| Trapezoidal point-to-point: | Position, velocity, acceleration, deceleration |
| Velocity-contouring: | Velocity, acceleration, deceleration |
| Electronic gearing: | Encoder trajectory position of one axis used to drive a second axis. Master and slave axes and gear ratio parameters |

Filter modes

Scalable PID with Velocity, Acceleration feedforward, Integration limit, Offset bias, Dual biquad filter, Settable derivative sampling time, Output motor command limiting.

Development Tools

1

EASY START-UP Developers Kit

INCLUDES

- Prodigy Machine Controller Developer Kit
- Pro-Motion software
- Software Development Kit (SDK) with C-Motion
- Complete manual set
- Complete cable and prototyping connector set



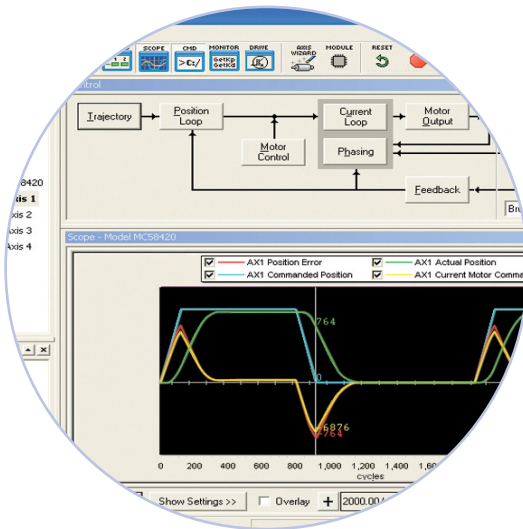
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TUNE & OPTIMIZE Pro-Motion® GUI

Pro-Motion is a sophisticated, easy-to-use Windows-based exerciser program for use with PMD motion control ICs, modules, and boards.

FEATURES

- Motion oscilloscope graphically displays processor parameters in real-time
- Autotuning
- Ability to save and load settings
- Axis wizard
- Distance and time units conversion
- Motor-specific parameter setup
- Axis shuttle performs programmable motion between two positions
- Communications monitor echoes all commands sent by Pro-Motion to the board
- Advanced Bode analysis for frequency machine response



3

BUILD THE APP C-Motion®

C-Motion is a complete, easy-to-use, motion programming language that includes a source library containing all the code required for communicating with PMD motion ICs, board, and modules.

C-MOTION FEATURES INCLUDE:

- Extensive library of commands for virtually all motion design needs
- Develop embeddable C/C++ applications
- Complete, functional examples
- Supports PC/104, serial, CAN, Ethernet, and SPI communications

```
// code for executing a profile and trace
// captured in this example could be used for tuning the Pro-Motion
// set the trace buffer wrap mode to a one time trace
PMDTraceMode(hAxis1, PMDTraceOneTime);

// set the processor variables that we want to capture
PMDSetTraceVariable(hAxis1, PMDTraceVariable1, PMDAxis1,
PMDSetTraceVariable(hAxis1, PMDTraceVariable2, PMDAxis1,
PMDSetTraceVariable(hAxis1, PMDTraceVariable3, PMDAxis1, P


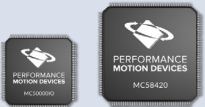

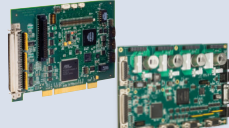

// set the trace to begin when we issue the next update command
PMDSetTraceStart(hAxis1, PMDTraceConditionNextUpdate);

// set the trace to stop when the MotionComplete event occurs
PMDSetTraceStop(hAxis1, PMDTraceConditionEventStatus,
PMDEventMotionCompleteBit, PMDTraceStateHigh);
PMDSetProfileMode(hAxis1, PMDTrapezoidalProfile);

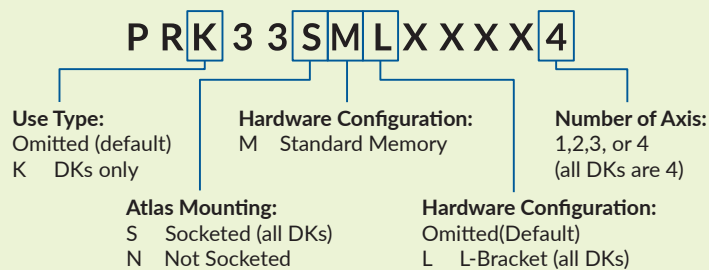
// set the profile parameters
PMDSetPosition(hAxis1, 200000);
PMDSetVelocity(hAxis1, 0x200000);
PMDSetAcceleration(hAxis1, 0x1000);
PMDSetDeceleration(hAxis1, 0x1000);

// motion
PMDMotion(hAxis1, PMDTraceOneTime);
```

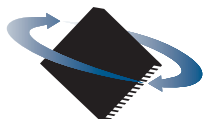
PMD PRODUCT FAMILY OVERVIEW

| | JUNO® VELOCITY & TORQUE CONTROL ICs  | MAGELLAN® MOTION CONTROL ICs  | ATLAS® DIGITAL AMPLIFIERS  | PRODIGY® MOTION BOARDS  | ION® DIGITAL DRIVES  |
|------------------------|---|---|--|---|---|
| No. Axes | 1 | 1,2,3,4 | 1 | 1,2,3,4 | 1 |
| Motor Types | <ul style="list-style-type: none"> Brushless DC DC Brush Step Motor | <ul style="list-style-type: none"> Brushless DC DC Brush Step Motor | <ul style="list-style-type: none"> Brushless DC DC Brush Step Motor | <ul style="list-style-type: none"> Brushless DC DC Brush Step Motor | <ul style="list-style-type: none"> Brushless DC DC Brush Step Motor |
| Format | <ul style="list-style-type: none"> 64-pin TQFP 56-pin VQFN | <ul style="list-style-type: none"> 144-pin TQFP 100-pin TQF | <ul style="list-style-type: none"> 20-pin solderable module 19-pin solderable module | <ul style="list-style-type: none"> PC/104 Standalone Machine Controller | <ul style="list-style-type: none"> Fully enclosed module |
| Voltage | 3.3 V | 3.3 V | 12-56 V | 5 V: PC/104 and Standalone 12-56 V: Machine Controller | 12-56 V / 20-195 V |
| Communication | <ul style="list-style-type: none"> Standalone RS232/485 CANbus SPI | <ul style="list-style-type: none"> Parallel RS232/485 CANbus SPI | <ul style="list-style-type: none"> SPI | <ul style="list-style-type: none"> Ethernet RS232/485 CANbus PC/104 bus | <ul style="list-style-type: none"> Ethernet RS232/485 CANbus |
| Features | <ul style="list-style-type: none"> Velocity control Torque/current control Field oriented control Multi-motor support | <ul style="list-style-type: none"> Position control Torque/current control Field oriented control Profile generation Multi-motor support Network communications | <ul style="list-style-type: none"> Torque/current control Field-oriented control Pulse and direction input Multi-motor support MOSFET amplifier | <ul style="list-style-type: none"> Position control Torque/current control Field oriented control Profile generation Multi-motor support Downloadable user code | <ul style="list-style-type: none"> Position control Torque/current control Field oriented control Profile generation Pulse and direction input MOSFET amplifier Downloadable user code |
| Motion Language | C-Motion® is the common motion language for all Performance Motion Devices products. | | | | |

FOR ORDERING PRODIGY MACHINE CONTROLLERS



To place an order email purchaseorders@pmdcorp.com. For questions email support@pmdcorp.com



**PERFORMANCE
MOTION DEVICES**

MOTION CONTROL AT ITS CORE

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About Performance Motion Devices

Performance Motion Devices (PMD) is a worldwide leader in motion control ICs, boards and modules. Dedicated to providing cost-effective, high performance motion systems to OEM customers, PMD utilizes extensive in-house expertise to minimize time-to-market and maximize customer satisfaction.

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