Prodigy® Motion Boards provide high performance board-level motion control for scientific, automation, industrial, and robotic applications. Available in PC/104, standalone, and machine controller configurations, these boards support multiple motor types including brushless DC, step, and DC brush motors, and are available in 1, 2, 3, and 4-axis configurations.

Programmable
CME versions of the board include PMD’s C-Motion Engine that allows user application code to run directly on the board, off-loading the system host or enabling stand-alone operation. The Machine controller version has on-board Atlas amplifiers that eliminate the need for external amplifier.

Powerful and Easy to Use
Based on PMD’s industry-leading Magellan® Motion Control IC, the Prodigy boards provide userSelectable 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.

Built on the Magellan Motion Control IC
The Pro-Motion GUI makes it easy to set-up and analyze system parameters and motion performance. PMD’s C-Motion library simplifies the program development process and allows the use of industry standard C/C++ or .NET programming languages.

FEATURES
- Uses PMD’s advanced Magellan® Motion Control IC
- PC/104, Stand-alone, and Machine-controller configurations
- Available in 1, 2, 3, and 4-axis configurations
- Supports brushless DC, step, and DC brush motors
- S-curve, trapezoidal, electronic gearing, and velocity-contouring
- PC/104 (ISA), Ethernet, CANbus or serial communications
- Advanced PID filter with feedforward and dual biquad filters
- High speed loop rate: 50 μsec/axis
- Up to 256 microsteps per full step resolution
- Incremental quadrature and Absolute SSI encoder support
- Includes Pro-Motion® and C-Motion® development software
- 6-step commutation and field oriented control modes
- High precision 16-bit DAC or PWM amplifier output
- General purpose digital I/O and analog I/O
- Two directional limit switches, plus high speed index, and home inputs per axis

C-MOTION® ENGINE VERSIONS
- Board-level execution of C-Motion code
- Downloaded user application code runs at 96 MIPS
- C-Motion Engine development tools

MACHINE CONTROLLER VERSION
- On-board high performance Atlas amplifiers
- Extensive fault detection including over and undervoltage, motor short, and overtemp
- Up to 1KW peak output power per axis
- Single voltage supply drives motors and board logic

CONFIGURATION

<table>
<thead>
<tr>
<th>System Host*</th>
<th>Encoder (Optional for Step Motor)</th>
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<tbody>
<tr>
<td>Ethernet</td>
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<tr>
<td>PC/104, Serial CANbus</td>
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<tr>
<td>Encoder</td>
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<tr>
<td>Axis 4</td>
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</table>

*System host optional for Prodigy Programmable PC/104 and Stand-Alone cards  
**External amp used with non-Machine Controller card
## Technical Overview

**Configurations**
- PC/104: Standard or CME
- CME: CME
- Machine Controller: CME

**Model**
- PR82 or PR83
- PR13
- PR33

**Number of axes supported**
- 1, 2, 3 or 4 axes

**Supported motor types**
- DC Brush, Brushless DC, Step motor

**Servo loop rates**
- 51.2 µsec to 1.6 sec. Minimum depends upon number of enabled axes and use of trace

**Encoder formats supported**
- quadrature, Absolute SSI

**Quadrature decode rate**
- 8 Mcounts/sec
- 40 Mcounts/sec

**Capability for onboard amplifier**
- No
- Yes, Atlas Digital Amplifier

**Motor output signals**
- Analog ± 10V, PWM, pulse & direction
- Analog ± 10V, PWM, pulse & direction
- Yes, Atlas Digital Amplifier

**General purpose digital I/O**
- 8 input, 8 output
- 8 input, 8 output
- 8 bi-directional, 4 input, 4 output

**General purpose analog input**
- 8 10-bit channels (0 to 3.3V)
- 8 10-bit channels (0 to 3.3V)
- 8 16-bit channels (-10V to +10V)

**General purpose analog outputs**
- N/A
- N/A
- 8 16-bit channels (-10V to +10V)

**Limit switches**
- 2 per axis: one for each direction of travel

**CME version user program memory**
- 256 KB Flash / 8 KB RAM

**CME version stack memory**
- 8 KB RAM

**Dual ported RAM memory**
- 40KB (standard), 64KB (CME)
- 64KB
- 128K or 468K (enhanced memory option)

**Communication modes**
- Standard: PC104 bus, serial, CANbus
- CME: PC104 bus, serial, CANbus, Ethernet
- CME: serial, CANbus, Ethernet

**On-board amplifier voltage range**
- N/A
- N/A
- 12-56V

**On-board amplifier max current, continuous**
- N/A
- Brushless DC Motor: 10 Arms, Step motor: 9 Arms, DC Brush Motor: 14 ADC

**Dimensions**
- 4.35” x 3.78” x 0.6” (11.1cm x 9.6cm x 1.5cm)
- 6.30” x 4.23” x .8” (16.0cm x 10.7cm x 2.0cm)
- 7.80” x 4.88” x .78” (19.8cm x 12.4cm x 1.98cm)
Development Tools

1 EASY START-UP
Developers Kit

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

2 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, boards, 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

Example C-Motion code for executing a profile and tracing processor variables in real-time:

```c
// set the trace buffer wrap mode to a one time trace
SetTraceMode(hAxis1, PMDTraceOneTime);

// set the processor variables that we want to capture
SetVariable(hAxis1, PMDTraceVariable1, PMDAxis1, PMDTracePosition);
SetVariable(hAxis1, PMDTraceVariable2, PMDAxis1, PMDTraceVelocity);
SetVariable(hAxis1, PMDTraceVariable3, PMDAxis1, PMDTraceActualPosition);

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

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

// set the profile parameters
SetProfileMode(hAxis1, PMDTrapezoidalProfile);
SetPosition(hAxis1, 200000);
SetVelocity(hAxis1, 0x200000);
SetAcceleration(hAxis1, 0x1000);
SetDeceleration(hAxis1, 0x1000);

// start the motion
Update(hAxis1);
```
PMD PRODUCT FAMILY OVERVIEW

<table>
<thead>
<tr>
<th>JUNO® VELOCITY &amp; TORQUE CONTROL ICS</th>
<th>MAGELLAN® MOTION CONTROL ICS</th>
<th>ATLAS® DIGITAL AMPLIFIERS</th>
<th>PRODIGY® MOTION BOARDS</th>
<th>ION® DIGITAL DRIVES</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. Axes</td>
<td>1</td>
<td>1.2.3.4</td>
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<td>• Brushless DC</td>
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<tr>
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<td>• DC Brush</td>
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<td>• Step Motor</td>
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<td>• 64-pin TQFP</td>
<td>• 144-pin TQFP</td>
<td>• 20-pin solderable module</td>
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<td>• 100-pin TQF</td>
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<td>12-56 V</td>
<td>5 V: PC/104 and Standalone</td>
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<td>• Position control</td>
<td>• Torque/current control</td>
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<td>• Field oriented control</td>
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<td>• Pulse and direction input</td>
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<td>• MOSFET amplifier</td>
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<td>• Network communications</td>
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<td>• Downloadable user code</td>
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<tr>
<td>Motion Language</td>
<td>C-Motion®</td>
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</table>

C-Motion® is the common motion language for all Performance Motion Devices products.

FOR ORDERING PC/104 OR STANDALONE VERSIONS

<table>
<thead>
<tr>
<th>Use Type: K DKs only</th>
<th>Card Type: 2 Standard 3 CME</th>
<th>Number of Axis: 1.2.3.4, or 4 (all DKs are 4)</th>
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<tbody>
<tr>
<td>Bus Type: 8 PC104 1 Standalone</td>
<td>Connector Orientation: Omitted PC104 H Horizontal (Standalone Only) V Vertical (Standalone Only)</td>
<td>Motor Type: 5 Step 8 Multi</td>
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</table>

FOR ORDERING MACHINE CONTROLLER VERSIONS

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<tr>
<td>Hardware Configuration: Omitted (Default) L L-Bracket (all DKs)</td>
<td>Hardware Configuration: Standard Memory</td>
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</tr>
<tr>
<td>Atlas Mounting: S Socketed (all DKs) N Not Socketed</td>
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</table>

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

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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