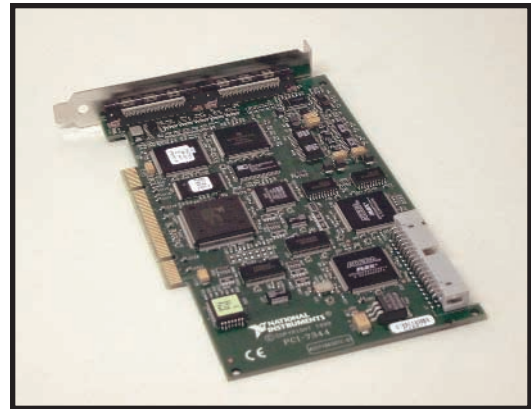




# PCI Board by National Instruments for NAI

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## High-Performance Motion Controllers

### Overview

The National Instruments 7344 motion controller is designed for end-users and machine builders who need to develop powerful applications quickly and easily. NI has optimized the software to help you get your advanced motion profiles up and running as quickly as possible. The 7344 motion controller is used for servo motor control; it is available for PCI, PXI/CompactPCI and IEEE 1394 buses. It also has four general-purpose analog inputs so that you can perform simple data acquisition.

The NI 7344 is a family of advanced technology controllers for all motion applications, bringing full-feature capability for the most sophisticated requirements. These controllers give you blended motion trajectory control and fully coordinated circular, linear, point-to-point, gearing, contouring, and vector space control in either embedded real-time motion operation or host-centric programming environments.

NI designed the 7344 with a high-performance motion controller architecture. The CPU and DSP components operate together to optimize closed-loop control, automation systems control, and motion command processing functions. The onboard CPU uses an embedded real-time operating system that has event-driven multitasking control. With this state-of-the-art approach, several motion control programs and processes can operate simultaneously on the controller, independent of the host PC and with no outside program interaction unless the host program or user configuration initiates it.

In this flexible, real-time motion control environment, you determine if commands run on the host PC (host-centric motion), or if entire programs are loaded into Flash memory on the board (embedded motion) for real-time control. In all operational modes, multi-axis control is coordinated with motion system I/O by the powerful, local CPU and DSP functions for unmatched performance.

The NI 7344 embedded real-time multitasking operating system and dual-processor architecture make it a true motion control computer that operates in a host PC environment as a motion coprocessor.

The NI-Motion programming tools make it easy to use, from system setup to programming. The software includes C-callable function libraries, DLLs motion VIs and free Windows™ configuration software.

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## **NI 7344**

- 4-axis controller
- PCI, PXI/Compact PCI and IEEE 1394 buses available
- PID and velocity/acceleration feed-forward loop control
- 62µs PID loop update rate
- Quadrature encoder or analog feedback
- Single-axis, multi-axis, and 2D/3D vector space control
- Advanced controller architecture:
  - Motorola real-time 32-bit CPU
  - Analog Devices DSP
  - Event-driven onboard multitasking RTOS
- FIFO host bus interface
- High-level commands offload complex motion functions from the host PC
- Onboard programming
- Upgradeable firmware
- RTSI
- Infinite trajectory control
- Position breakpoint and high speed capture
- 4 general-purpose analog inputs
- Digital I/O
- Per axis encoder inputs
- Per-axis limit inputs
- Point-to-point, per-axis, and multi-axis motion
- Circular, spherical, and helical interpolation
- Blended motion profiles
- 2D and 3D linear vector interpolation
- Contouring
- Velocity profiling
- Jog capability
- Find home/index
- Electronic gearing and multi-axis master/slave
- S-curve acceleration/deceleration

### **Driver Software**

NI-Motion for Windows 2000/NT/Me/9x

### **Application Software**

LabVIEW™

Measurement Studio

Visual Basic and Visual C++ libraries

Standard C motion libraries

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## Specifications

### Servo Performance

PID update rate range:	62.5 to 500 $\mu$ s/sample
Max PID update rate:	62.5 $\mu$ s/axis
4-axis PID update rate:	250 $\mu$ s total
Trajectory update rate:	Same as PID update rate
Multi-axis synchronization:	<1 update sample
Position accuracy	
Encoder feedback:	$\pm$ 1 quadrature count
Analog feedback:	$\pm$ 1 LSB
Long-term velocity accuracy:	Oscillator based, $\pm$ 100 ppm
Double-buffered trajectory parameters	
Absolute position range:	$\pm$ 2 <sup>31</sup> counts
Max relative move size:	$\pm$ 2 <sup>31</sup> counts
Velocity range:	1 to $\pm$ 20,000,000 counts/s
rpm range:	10 <sup>-5</sup> to 10 <sup>6</sup> revolutions/minute
Acceleration/deceleration:	4,000 to 128,000,000 counts/s <sup>2</sup>
rps/s range:	10 <sup>-1</sup> to 10 <sup>8</sup> revolutions/s <sup>2</sup>
S-curve time range:	1 to 32,767 samples
Following error range:	0 to 32,767 counts
Gear ratio:	$\pm$ 32,767:1 to 1:32,767
Servo control loop modes:	PID, PIVff, S-Curve, Dual Loop
PID (Kp, Ki and Kd) gains:	0 to 32,767
Integration limit (Ilim):	0 to 32,767
Derivative sample period (Td):	1 to 63 samples
Feedforward (Aff, Vff) gains:	0 to 32,767
Velocity feedback (Kv) gain:	0 to 32,767
Servo command analog outputs	
Voltage range:	$\pm$ 10V
Resolution:	16 bits (0.000305 V/ LSB)
Programmable torque (velocity) limits:	$\pm$ 10V (-32,768 to 32,767)
Negative limit:	$\pm$ 10V (-32,768 to 32,767)
Programmable offset:	$\pm$ 10V (-32,768 to 32,767)

### System Safety

Watchdog timer function:	Resets board to startup state
Watchdog timeout:	63 ms
Shutdown input	
Voltage range:	0 to 12 V
Input low voltage:	0.8 V
Input high voltage:	2 V
Control:	Disable all axes and command outputs

### Motion I/O

Encoder inputs:	Quadrature, incremental, single ended
Max count rate:	20 MHz
Voltage range:	0 to 12 V
Min. index pulse width:	60 ns
Forward, reverse, and home inputs	
Number of inputs:	12 (3 per axis) 0 to 12 V range, programmable polarity
Control:	Individual enable/disable, stop on input, prevent motion, find home
Trigger inputs:	4, programmable polarity
Max repetitive capture rate:	1 kHz

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Breakpoint outputs	
Number of outputs:	4, programmable polarity
Inhibit/enable output	
Number of outputs:	4 (1 per-axis) programmable polarity
Voltage range:	0 to 5 V
Analog inputs:	4, 12 bit resolution, $\pm 10$ V range, 50 $\mu$ s scan rate
Analog outputs:	4, 16 bit resolution, $\pm 10$ V range

### Onboard Programs

Onboard RAM:	64 KB
Onboard ROM:	128 KB
Max size of program: bytes/command	6400 commands with average size of 10

### Digital I/O

Ports:	4, 8 bit TTL ports, bit configurable, sink or Source
24 mA	
PWM outputs	
Number of PWM outputs:	2
Max PWM frequency:	32 kHz
Resolution:	8-bit
Duty cycle range:	0 to (255/256)%
Clock sources:	Internal or external

### Power Requirements

PCI-7344 and PXI-7344	
+5 V ( $\pm 3\%$ ):	1 A
+12V ( $\pm 3\%$ ):	30 mA
-12 V ( $\pm 3\%$ ):	30 mA
Power consumption	5.7 W, max
FW-7344	
Voltage range:	9 to 25 VDC
Power consumption:	30 W, max

### Physical

Dimensions (not including connectors)	
PCI:	17.5 x 9.9 cm (6.9 x 3.9 in.)
PXI:	16 x 10 cm (6.3 x 3.9 in.)
FW:	30.7 x 25.4 x 4.3 cm (12.1 x 10.0 x 1.7 in.)

### Connectors

Motion I/O connector:	68-pin female high density VHDCI type
Digital I/O connector:	68-pin female high density VHDCI type

### Environment

Operating temperature:	0 to 55°C
Storage temperature:	-20 to 70°C
Relative humidity range:	10 to 90% (noncondensing)

### Pricing

PCI-7344, 4 axis, 32 bit controller	\$1495.00
PXI-7344, 4 axis, 32 bit controller	\$1695.00
FW-7344, 4 axis, 32 bit controller	\$2195.00
NI SH68-C68-S cable	\$165.00
NI 68 to 50 pin adapter	\$35.00

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