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The ACR Family of Controls

Since the acquisition of Acroloop Motion Control Systems in 2002, the ACR family has been the highest performance motion controls in the Parker offering. Each of the five versions of the product is based on a 32-bit floating-point DSP producing unparalleled performance in the area of advanced multi-axis trajectory generation. Because the products are built upon a scalable platform, the same software set works on each of the controllers, providing easy upgrades and transfer of established application code between machines and applications. The hardware is also extremely flexible, allowing the design engineer to easily create the perfect controller configuration for his machine. The power of the ACR hardware is matched by an equally impressive array of software features allowing the design engineer the ability to solve any motion application.

Features:

- Backlash and ballscrew compensation
- Hardware and capture registers
- S-curve profiling
- String handling
- Time-based moves
- Synchronized master moves
- Segmented cams
- High-speed triggered cams
- Dual-feedback control (velocity and position)
- Analog or digital feedback
- Stepper or servo outputs
- Onboard diagnostics
- Onboard oscilloscope
- Software limits
- Torque limits
- Spline moves
- NURBS
- 3-D arcs
- Sinusoidal commutation
- Automatic tangential tool orientation

Controller Selection

	ACR8020	ACR8010	ACR2000	ACR1500	ACR1200
Motion Control					
32-bit floating-point DSP	YES	YES	YES	YES	YES
CPU speed	120 MFLOPS	60 MFLOPS	50 MFLOPS	40 MFLOPS	40 MFLOPS
Axes/controller	2-8 (expandable)	2-8	2-4	2-4	1-2
Servos	YES	YES	YES	YES	YES
Steppers	YES	YES	YES	YES	YES
Line/arc/splines/NURBS, 3D arc interpolation	YES	YES	YES	YES (except NURBS)	YES
Memory size STD (OPT)	512 K (2 MB)	512 K (2 MB)	512 K	128 K	128 K (512 K)
Flash for saving programs	512 KB (expan 2 MB)				
Pre-emptive multitasker	YES	YES	YES	YES	YES
Communications					
Interface	Binary, ASCII	Binary, ASCII	Binary, ASCII	Binary, ASCII	Binary, ASCII
COM1, COM2 serial	YES, optional	YES, optional	YES, optional	NO	YES, standard
Standalone option	N/A	YES	YES	NO	YES
PC-bus pluggable	YES, PCI	YES, ISA	YES, ISA	YES, ISA	N/A
Parallel (LPT) option	YES	YES	YES	NO	YES
Dual-port memory option	YES, standard	YES, optional	NO	NO	N/A
Bus mastering	YES	NO	NO	NO	N/A
Inputs/Outputs					
Encoder input	4-10 (expandable)	4-10	2-4	2-4	3
Encoder fault detection	YES, in hardware	YES, in hardware	NO	NO	YES, in hardware
D/A options	2-8 (expandable)	2-8	2-4	2-4	2
Uncommitted I/O	64 (exp. to 320)	64 (exp. to 320)	32 (exp. to 288)	48	32 (exp. to 160)
I/O type	24V Opto isolated	24V Opto isolated	24V Opto isolated	TTL	24V Opto isolated
I/O active hi/lo select	YES	YES	YES	YES	YES
AUX analog inputs 8 single Ended/4 differential	12 or 16 bits	12 or 16 bits	12 bits	12 or 16 bits	12 or 16 bits

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Real-Time Motion Control

With Floating-Point DSP

Ensuring the highest possible performance, ACR controllers use high-speed Digital Signal Processors (DSPs) from Texas Instruments for real-time calculations and motion control. TI DSPs feature:

- 40-120 MFLOPS
- Floating-point calculations
- Superior speed and accuracy (over fixed-point).

The ACR's processor-based controllers can quickly process floating-point calculations on-board, typically in the 100-500 usec range (products using software calculations are typically in the 5000-8000 usec range). This frees the controller to service a pre-emptive multi-tasker, with up to 24 programs at once, and service up to four communication channels concurrently. Thus, means you can communicate with an ACR controller for troubleshooting and still have the HMI on a production machine fully online and active!

Pre-Emptive Multi-Tasker

ACR controllers are true pre-emptive multi-taskers capable of performing multiple tasks simultaneously and toggling tasks based on the condition of a bit. A pre-emptive multi-tasker is the best choice when you have a program that need not always run, but needs to be available to run. For example, if you need to dress a wheel on a grinder based on an input or parametric equation, it would be a waste of time to have this program being serviced constantly. Without a pre-emptive multi-tasker, it would be necessary to allocate time for this little-used program. In a pre-emptive situation, the program would be dormant until called for, and only then would it require time to be serviced.

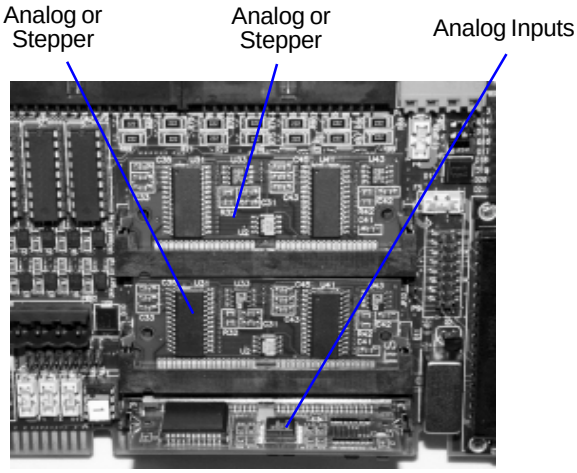
Because of the ACR controllers' standard on-board operating system, time-critical events can be off loaded to the controller. This is important, since the loading and therefore timing issues of the host PC CPU are variable and the programmer cannot be sure of real-time execution.

Pre-Emptive Multi-Tasker Features

- Perform up to 8 motion programs (25 usec/axis servo update rate).
- Perform up to an additional 8 programs (non-motion programs).
- Perform up to 8 PLC programs (1-5 msec scan time).
- Command up to 4 communication ports simultaneously
- Perform motion programs, PLC programs, and multi-threaded communications simultaneously.
- Troubleshoot from one port while the standard communication port is active with the HMI.
- Communicate over the PC-Bus, and two serial ports simultaneously.
- Real-time application programming can be off-loaded to the ACR controller to ensure real-time execution.

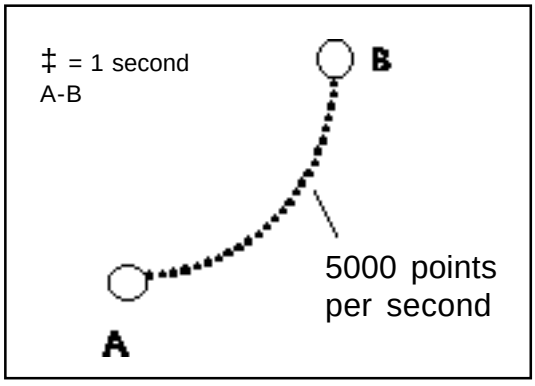
Analog/Stepper Flexibility

The Acroloop Motion Controllers can be set up to accommodate stepper or servo analog outputs. The controllers can be configured in combinations explained in the ordering matrix you find within each ACR category. Analog inputs at 12 or 16-bit resolutions are available as options. These may be field configured as single-ended or differential inputs.



Trajectory Calculation

The ACR's architecture permits extremely accurate trajectory calculations. Unlike other controllers, the ACRs calculate a new trajectory point with every interrupt; it can be calculated as frequently as every 100-1000 microseconds (compared to 5-10 milliseconds with other controllers).



Calculating a new trajectory every interrupt is the method of choice when the process consists of normal motion geometries.

Trajectory Calculation Table

Number of Axes	Calculation Bits	Trajectory Points/Second
2	64	5,000
4	64	3,333
6	64	2,500
8	64	2,000

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Cubic Splines

ACR controllers provide cubic spline interpolation. Highlights include :

- Smoothness of continuous first and second derivatives of position
- Ability to handle uniform and non-uniform data points
- Ability to define initial and final velocity to blend with other motion profiles
- Goes through data points precisely
- Spline interpolation can be time-based or velocity-based.

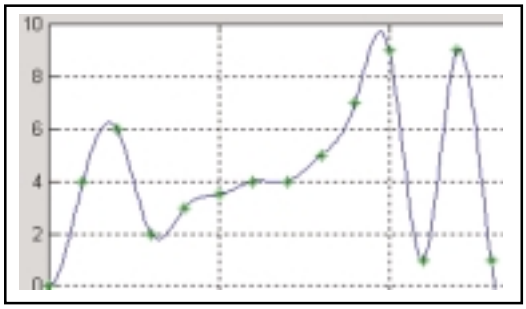


Figure 1. Example of how points can be randomly spaced in time, greatly reducing program length.

NURBS

ACR controllers provide Non-Uniform Rational Basis Splines, or NURBS. NURBS are industry standard tools for the representation and design of geometry. These give ACR controllers a mathematical method for defining an entire curve of up to eight axes. Highlights include:

- Free-form curves can be accurately defined
- Suitable for high-speed machining up to eight axes
- Gives better surface finish
- Shorter program and fewer data points
- No break between points at high speed
- No need for high-speed data transfer from the host
- No error due to approximating NURB curve by smaller linear line segments.

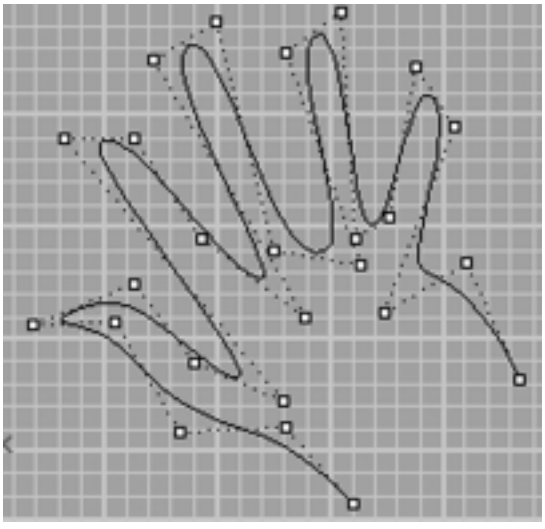


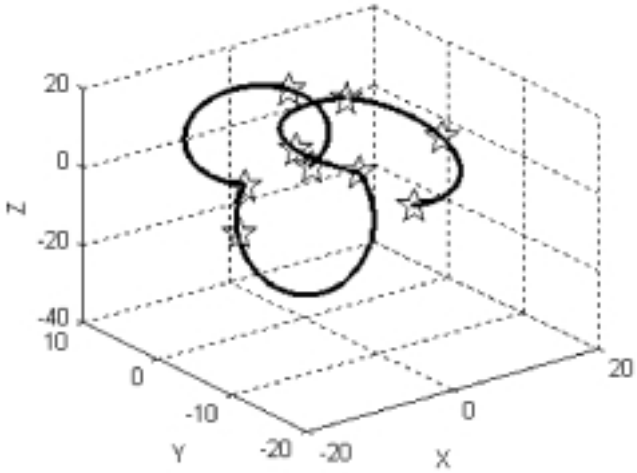
Figure 2. Example shows few control points needed to draw random shape and accompanying program.

Splines and NURBS Additional Features

- Dynamic Feed Rate override
- Feed Hold and Cycle Start facility, like normal moves
- Any source with source scaling, like normal moves
- Blending with other motion profiles; allows normal line/arc move at the beginning or end of spline/NURB segment
- Unique mix of modes only offered by Compumotor.

3-D Arc Generation

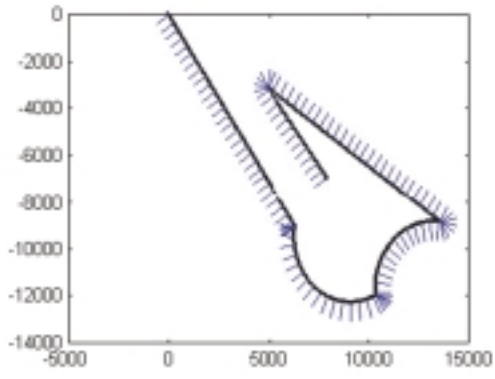
A three-dimensional arc-generation command built into the ACR controllers allows users to take 3D arc segments from a CAD system and create a three-dimensional circular interpolation using any three of the axes attached to the master. In this mode, the 3D arc is defined by a start point, an intermediate point and an end point of the arc. These points can be specified as incremental or absolute position. For successive 3D arcs, the end poimt of the arc is used as the start point of the next arc.



Automatic Tangential Orientation

The Automatic Tangential Orientation feature automatcially orients a theta axis to a user set angle along an X-Y path. Rather than jump at discontinuous geometries, the control delays the next move and waits for the theta axis to orient.

Tangential Orientation



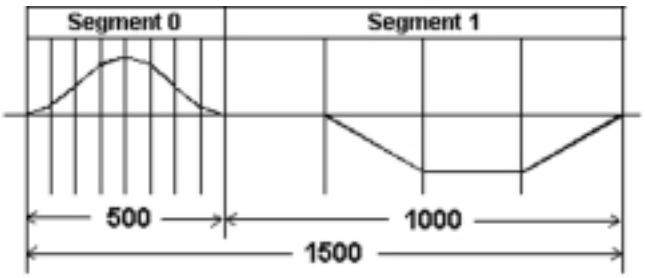
TANG Z X Y ANG 90
This command will hold the tool at 90 degrees along the path above.

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CAM – Electronic Cam

The CAM command is used to create motion that emulates a mechanical cam. The ability to segment the CAM gives the programmer flexibility. The CAM profiler will automatically linearly interpolate between any two points regardless of the density of the points.



TRG CAM – Triggered Cam

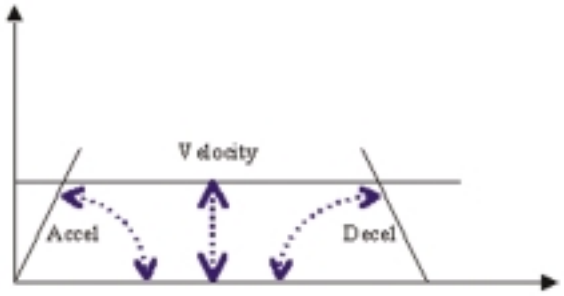
The TRG command solves the problem of following error due to the time delay between a triggered input and the actual start of physical motion. For example, if a web line is moving at 60 feet per second and there is a 2-microsecond hysteresis before motion takes place, the result will be an error:

60ft/sec x 12in/ft = 720in/sec x .002sec = 1.44 inches of error

The TRG CAM command negates this and therefore increases repeatability and accuracy to within on microsecond. Barring mechanical limitations, the electronic accuracy is now improved by a factor of 2000 to 0.007".

TMOV – Time-Based Move

The TMOV command allows moves to be completed in a specific amount of time. Prior to TMOV, the programmer would need to program with a calculator to determine the speed, acceleration and deceleration needed to arrive at a destination in a specific amount of time.

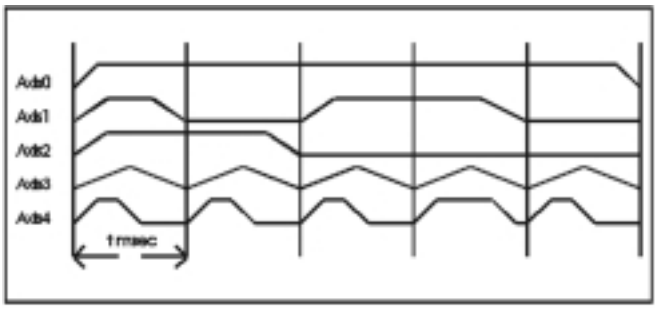


Once Velocity, Accel and Decel are set on the default settings, TMOV will calculate Velocity, Accel and Decel based on length and time of move.

SYNC – Master Synchronizing

It is sometimes necessary to run several coordinated groups of axes' masters in synchronization with another master. In sewing, for example, if an X-Y table is under a needle, the table can only move when the needle is up and out of the fabric. In this example, the SYNC command can be used to coordinate the movement of the needle to the movement of the table.

Using SYNC moves rather than coordinated moves gives users the flexibility of using different motion profiles for different masters while still keeping them in sync.



The figure above shows a velocity vs. time graph for five axes attached to different masters that move with independent accelerations and decelerations, yet are synchronized amongst themselves. They all complete their moves within the prescribed time interval of tmsec specified by the user. This mechanism can be useful in coil-winding applications when the wire feed moves continuously yet other axes must come and go at their own pace while remaining synchronized to the wire feed.

Backlash and Ballscrew Compensation

Backlash and Ballscrew Compensation allow the user to electrically compensate for the inherent inaccuracies of their mechanical systems. The Backlash Compensation simply takes into account the mechanical backlash when changing direction on the mechanical system. Once the backlash value is entered into the system, the ACR controller automatically compensates for lost travel due to backlash when changing direction, thus ensuring accurate positioning. The ballscrew compensation feature allows the user to map the inaccuracy of the mechanical actuator along the entire travel length required by the application. Once this inaccuracy is mapped, the ACR controller automatically compensates by cross-referencing the correction map and adjusting the commanded position of the axis to ensure the actual desired position is reached on the load itself. This capability allows the user to eliminate the costly linear encoder often used to compensate for mechanical variations along the travel of the actuator.

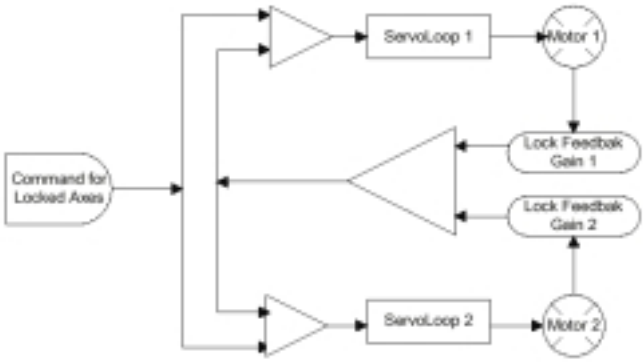
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Dual Feedback Control

The Dual Feedback capability of the ACR products allows the user to close two loops of feedback around a single mechanical axis. One encoder is found on the servo motor and another on the load itself. This allows the ACR controller to automatically compensate for the inherent mechanical compliance within the traditional screw driven actuator. The position loop is closed with the load encoder while the velocity loop is closed with the motor encoder. This ensures the most accurate positioning possible while maintaining stiffness required for aggressive acceleration and velocity moves.

LOCK – Gantry Lock Control

The LOCK command redirects one axis to follow the primary setpoint of a second axis. This command is essential for controlling a gantry system where two mechanical systems need to be coupled. Once the two axis are locked, a special control loop will minimize the error between the two axis assuring perfect coordination.

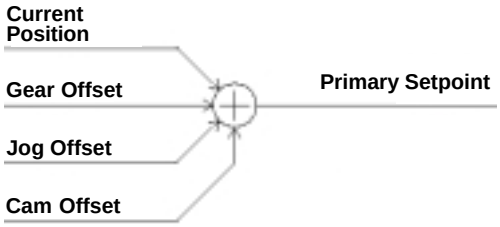


LOOK – Dynamic Multi-block Look Ahead

In many machining and assembly operations, it is essential that overshoot be minimized in order to maintain quality and finish in the part being produced. The LOOK ahead command dynamically analyzes upcoming move parameters to assure that the system can perform the desired move. If the moves are too demanding for the system to execute, the move profile will automatically be limited to the maximize speed that can complete the desired move.

Simultaneous CAM, Gear and Jog

The unique setpoint summation technique of the ACR controls allows up to 3 different move profiles to be superimposed onto a commanded move. This unique technique allows the machine builder to accommodate for changes in environmental conditions such as temperature and will allow a cam profile to be advanced or retarded very simply. ACR controllers allow easy integration into vision systems by allowing offsets measured by the camera to be superimposed “on the fly” without the need of changing a distance parameter and making an additional move.



Floating-Point Mathematics Precision

Provided with 64-bit precision floating-point math functions, ACR controllers give you:

- Six “decimal” digit numbers as standard and 16 “decimal” digit floating-point numbers to provide greater accuracy
- Global and local variable operation
- Simultaneous performance of intermediate calculations for trajectories, parametric evaluations, PLC operations, high-speed position captures and many other tasks.

Compare the 32-bit and 64-bit precision floating-point variables to other motion controllers; you won’t get rounding errors with the ACR controllers. For example, a simple electronic gearing ratio can be set to a floating-point number unlike other controllers with limited gear ratio ranges. If a PC host is used, it only requires updating the graphical display and feeding new operator information to the motion controller; the ACR controllers take care of everything else.

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Simultaneous Port Access

The ACR controllers are unique since they can communicate both ASCII and binary simultaneously. Benefits of this "two access doors approach" include:

- Unrestricted integration of front-end software designs
- Simple ASCII codes can be transmitted to the board over any of the on-board communications ports (COM1, COM2, LPT and the PC-bus)
- Communications can be increased dramatically to allow increased data throughput to and from the controller.

Hardware Parameter Access

ACR firmware is engineered for maximum flexibility with an open design allows designer complete access to virtually every possible motion control parameter and flag. There are up to eight masters and up to eight axes on an ACR controller. A master controls a group of axes; therefore, each master controls a unique group of variable that can be monitored or changed on-the-fly.

Table A: Master Parameters Examples

Position Parameters	Type	MASTER0
Vector Position	FP32	P8192
Vector Velocity	FP32	P8193
Vector Acceleration	FP32	P8194
Vector Jerk	FP32	P8195
Vector Length	FP32	P8196
Target Velocity	FP32	P8196
Target Acceleration	FP32	P8197

Table B: Axis Parameters Examples

Position Parameters	Type	AXIS0
Current Position	LONG	P12288
Target Position	LONG	P12289
Actual Position	LONG	P12290
Following Error	LONG	P12291
Hardware Capture	LONG	P12292
Software Capture	LONG	P12293
Primary Setpoint	LONG	P12294
Secondary Setpoint	LONG	P12295

Tables A and B illustrate the Master and Axis parameters. For example, the vector velocity for MASTERprofiler 0 is stored in hardware parameter number P8193. Variable P8193 is a 32-bit floating-point variable. If the programmer wanted to display the current position of AXIS0 on the operator display, a request would be made to the ACR controller to retrieve the 32-bit-long integer stored in hardware register P12288. There are approximately 15,000 parameters pre-programmed into the ACR controllers.

HSINT – High-Speed Uninterruptible Move

The HSINT command gives the programmer a way to initiate an incremental move based on an input. On webs it is common to initiate motion on the leading edge of a marker.

With the command, one needs to define a target position, then a window. Then point to an input and the controller will initiate the incremental move once it reaches the correct state. All this is accomplished at high speed due to the 1-microsecond latching of any input or parameter

PLS – Programmable Limit Switch

The PLS command allows sequencing an output parameter (usually physical I/O bits) based on the changing values of an input parameter (usually an encoder). The simpliest PLS is used in most drum sequencers found in washing machines to control wash cycles.

The ACR PLS allows user to:

- Select from a variety of output parameters
- Advance and retard the source parameter and mask and scale the output parameter
- Control the number of I/O bits the PLS operates on.

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PCI/PC Bus Operation

The ACR8020 is Compumotor's premier controller for PCI bus operation. It has the ability to run eight servo loops (16 with expansion board), DAC or Stepper outputs and 10 encoders (20 with expansion board) at 20 MHz counting rate. It can also be equipped with up to 8 analog (12- or 16-bit resolution) inputs. Multi-axis coordinated motion can be performed in multiple groups of axes. Because of the ACR8020's modular design, a combination of both servo and stepper axes can be applied on the same controller. All of Compumotor's Acroloop products utilize the same system software and programming language; this assures users complete flexibility in upgrading their hardware while maintaining their investment in program development.

The ACR8020's processing speed is unmatched in the industry at 120 Mega Floating-point Operations Per Second (MFLOPS)!

ACR8020 Exclusives

- 120 MFLOPS, 32-bit floating-point DSP
- 8 axes of servos or steppers (expandable to 16)
- 10 encoder inputs at 20 MHz (expandable to 20)
- User and system memory 512 KB (expandable to 2 MB) each
- Encoder loss and fault protection
- 64 optically isolated 24VDC I/O expandable to 320 I/O
- Dual-port memory standard
- Master PCI DMA interface
- Full-size PCI card
- Optional communications interface (includes 2 serial ports–RS232/RS422/RS485–and 1 parallel port)

ACR8020 (1- to 8-Axes) Ordering

8020 □ □ □ □ □ □ □

PC - PCI Bus Card
PS - PCI Bus Card w/ 2 Serial and and 1 Parallel Port

E0 - 0 Encoder Inputs
E4 - 4 Encoder Inputs
E5 - 5 Encoder Inputs
E8 - 8 Encoder Inputs
E10 - 10 Encoder Inputs

D2 00 - 2 Servo/Analog Outputs
D4 00 - 4 Servo/Analog Outputs
D4 D2 - 6 Servo/Analog Outputs
D4 D4 - 8 Servo/Analog Outputs
S2 00 - 2 Stepper Outputs
S4 00 - 4 Stepper Outputs
S4 S2 - 6 Stepper Outputs
S4 S4 - 8 Stepper Outputs
D2 S2 - 2 Analog and 2 Steppers
D4 S2 - 4 Analog and 2 Steppers
D2 S4 - 2 Analog and 4 Steppers
D4 S4 - 4 Analog and 4 Steppers

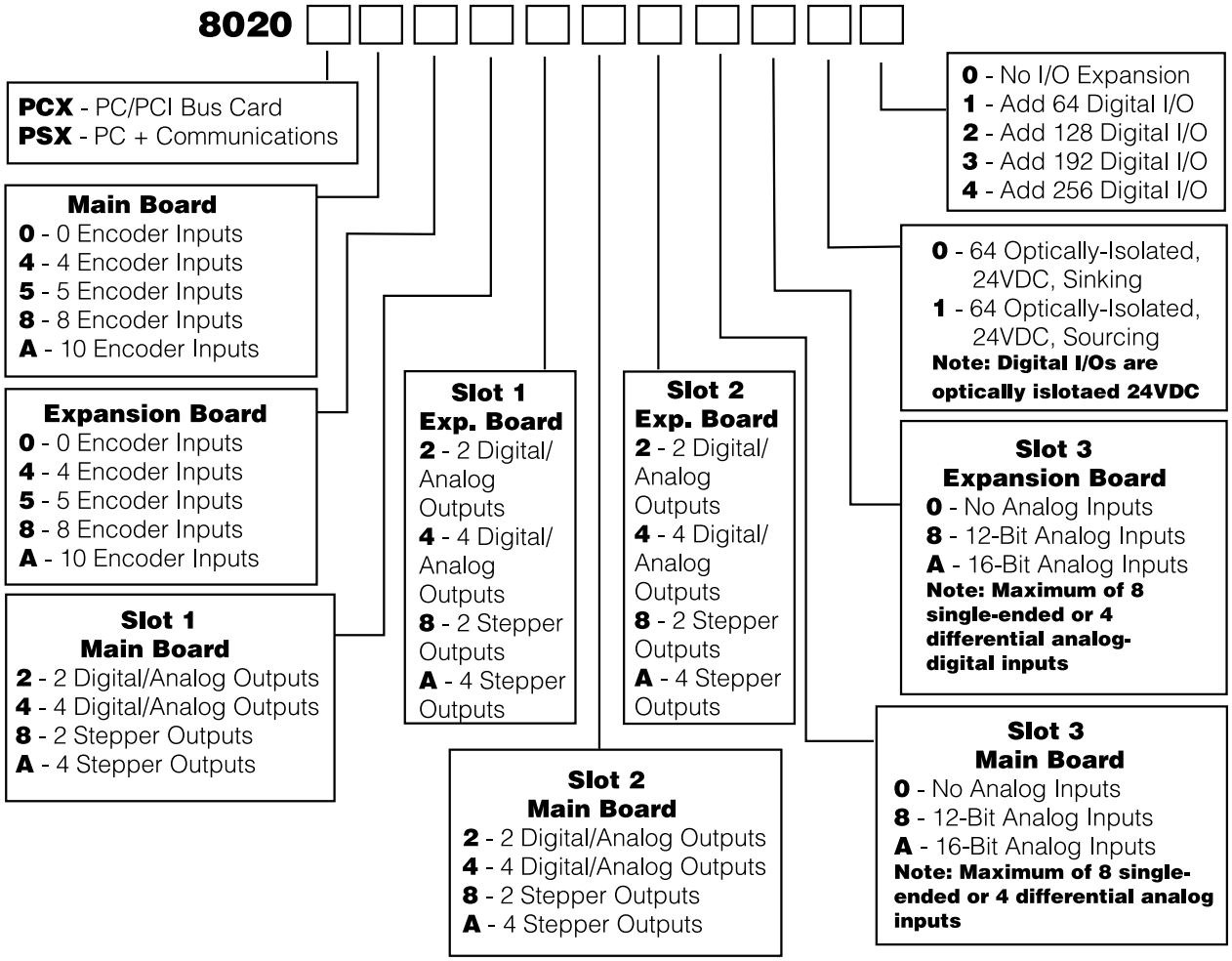
0 - No I/O Expansion
1 - Add 64 Digital I/O
2 - Add 128 Digital I/O
3 - Add 192 Digital I/O
4 - Add 256 Digital I/O

0 - 64 Optically-Isolated, 24VDC, Sinking
1 - 64 Optically-Isolated, 24VDC, Sourcing

A0 - No Analog Inputs
A8 - 12-Bit Analog Inputs
AA - 16-Bit Analog Inputs
Note: Maximum of 8 single-ended or 4 differential analog inputs

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ACR8020 (9- to 16-Axes) Ordering



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ACR8020 Specifications

	Value
Hardware	
Axes/controller	2-8 axes (Expandable to 16)
PC-Bus interface	PCI
Standalone option	NA
Processor	32- /64-bit floating-point DSP @ 120 MFLOPS / 60 MHz
Trajectory calculation	64-bit precision
User memory	512 KB (expandable to 2 MB); 2 MB (standard for 9- to 16-axes cards)
System memory	512 KB (expandable to 2 MB); 2 MB (standard for 9- to 16-axes cards)
Firmware	Flash-based
Flash memory	512 KB (expandable to 2 MB)
Size	Full-size PCI
Operating system	Multi-tasking RTOS
Performance	
Multi-tasking	16 coordinated systems, motion/PLC programs
Trajectory update	Every 100-500 usec
Servo update	25 usec/axis
Ladder Logic PLC	100-500 usec scan time
Interpolation	Linear, circular, sinusoidal, helical and elliptical, splines, NURBS, 3D arcs
Servo loop	PID, velocity feedforward, acceleration feedforward notch, LoPass filtering
Position regulation	Hardware, < 1usec
Communications	Simultaneous PCI, serial and LPT ports
Communications	
PC bus	Bus mastering PCI with dual-port memory
Optional interface	2 serial ports (RS232 and/or RS422), 1 parallel port (8 bits)
Inputs	
Encoder input	10 (expandable to 20) at 20 MHz post-quadrature
Analog input - Auxiliary	Up to 8 (12- or 16-bit)
Command Signal	
Analog outputs	Up to 16 (16-bit precision)
Stepper outputs	Up to 16 @ 1 MHz
Digital I/O	64, 24 VDC optically-isolated (expandable to 320)
Software Support	
Standard language	Visual Basic, Visual C++, C++
Program tools	AcroVIEW Motion/PLC Program
Development tools	ActiveX controls/OCX controls
Operating system	Windows® NT, 98, 2000, XP
Additional firmware highlights	Triggered floating point electronic GEARING Triggered segmented electronic CAM On-the-fly position and velocity matching Ladder Logic PLC Interruptible moves Either analog or digital feedback for position or velocity loops Dual-encoder feedback Data teach and learn functions Parameter-based with over 15,000 addressable pre-defined hardware registers Sinusoidal commutation NURBS and splines 3D arcs Automatic tangential tool operation

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PC-Bus Operation

The ACR8010 is Compumotor's feature-rich controller for ISA PC-bus Operation. The ACR8010 is capable of standalone or PC-bus operation. It has the ability to run up to eight servo loops, with up to 10 encoders at 20 MHz. It can be equipped with eight optional analog inputs through a 12- or 16-bit analog/digital converter (ADC) and introduce these inputs into servo loops. Because of the unit's modular design, it is possible to have several axes of servo with several axes of stepper on the same controller. All of Compumotor's Acroloop products utilize the same system software and programming language; this assures users complete flexibility in upgrading their hardware while maintaining their investment in program development.

The ACR8010 is Compumotor's answer to affordable high-performance control when flexibility, real-time speed and ease of programming are most needed.

This product is the successor to the very popular ACR8000 and offers plug compatibility with the older product.

ACR8010 Exclusives

- 8 axes of servo or stepper control
- 60 MFLOPS floating-point DSP
- Up to 10 encoder inputs at 20 MHz
- User and system memory 512 KB standard (each expandable to 2MB)
- Encoder loss and encoder fault protection
- 64 optically isolated 24 VDC inputs and outputs (expandable to 320 optically isolated 24 VDC inputs and outputs)
- Up to 4 communication channels (PC bus, 2 serial RS-232/RS-422, 1 parallel port)
- Dual-port memory option
- Single slot plug-and-play controller

ACR8010 Ordering

8010 □ □ □ □ □ □ □

PC - PC/ISA Bus Card
SA - Standalone Card
PS - PC and Standalone
Note: SA and PS options include 2 serial and 1 parallel port. Serial ports are programmable for RS232 or RS422 communications.

E0 - 0 Encoder Inputs
E4 - 4 Encoder Inputs
E5 - 5 Encoder Inputs
E8 - 8 Encoder Inputs
E10 - 10 Encoder Inputs

D2 00 - 2 Servo/Analog Outputs
D4 00 - 4 Servo/Analog Outputs
D4 D2 - 6 Servo/Analog Outputs
D4 D4 - 8 Servo/Analog Outputs
S2 00 - 2 Stepper Outputs
S4 00 - 4 Stepper Outputs
S4 S2 - 6 Stepper Outputs
S4 S4 - 8 Stepper Outputs
D2 S2 - 2 Analog and 2 Steppers
D4 S2 - 4 Analog and 2 Steppers
D2 S4 - 2 Analog and 4 Steppers
D4 S4 - 4 Analog and 4 Steppers

A0 - No Analog Inputs
A8 - 12-Bit Analog Inputs
AA - 16-Bit Analog Inputs

Note: Maximum of 8 single-ended or 4 differential analog inputs

0 - 64 Optically-Isolated, 24VDC, Sinking
1 - 64 Optically-Isolated, 24VDC, Sourcing

0 - No I/O Expansion
1 - Add 64 Digital I/O
2 - Add 128 Digital I/O
3 - Add 192 Digital I/O
4 - Add 256 Digital I/O

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ACR8010 Specifications

	Value
Hardware	
Axes/controller	1-8 axes
PC-Bus interface	ISA
Standalone option	Yes
Processor	32- /64-bit floating-point DSP @ 60 MFLOPS / 60 MHz
Trajectory calculation	64-bit precision
User memory	512 KB (expandable to 2 MB)
System memory	512 KB (expandable to 2 MB)
Firmware	2 128 KB x 16 EPROMs
Flash memory	512 KB (expandable to 2 MB)
Size	Full-size ISA board
Operating system	Real-time system independent of PC
Performance	
Multi-tasking	8 coordinated systems, motion/PLC programs
Trajectory update	Every 200-500 usec
Servo update	50 usec/axis
Ladder Logic PLC	200-500 usec scan time
Interpolation	Linear, circular, sinusoidal, helical and elliptical, splines, NURBS, 3D arcs
Servo loop	PID, velocity feedforward, acceleration feedforward notch, LoPass filtering and programmable filtering
Position regulation	Hardware, < 1usec
Communications	Simultaneous ISA, serial and LPT ports
Communications	
PC bus	Dual 512 x 8 hardware FIFOs
Optional interface	2 serial ports (RS232 and/or RS422), 1 parallel port (8 bits)
Inputs	
Encoder input	10 @ 20 MHz post-quadrature
Analog input - Auxiliary	Up to 8 (12- or 16-bit)
Command Signal	
Analog outputs	Up to 8 (16-bit precision)
Stepper outputs	Up to 8 @ 1 MHz
Digital I/O	64, 24 VDC optically-isolated (expandable to 320)
Software Support	
Standard language	Visual Basic, Visual C++, C++
Program tools	AcroVIEW Motion/PLC Program
Development tools	ActiveX controls/OCX controls
Operating system	Windows® NT, 98, 2000, XP
Additional firmware highlights	Triggered floating point electronic GEARING
	Triggered segmented electronic CAM
	On-the-fly position and velocity matching
	Ladder Logic PLC
	Interruptible moves
	Either analog or digital feedback for position or velocity loops
	Dual-encoder feedback
	Data teach and learn functions
	Parameter-based with over 15,000 addressable pre-defined hardware registers
	Sinusoidal commutation
	NURBS and splines
	3D arcs
	Automatic tangential tool operation

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ACR2000 Specifications

	Value
Hardware	
Axes/controller	1-4 axes
PC-Bus interface	ISA
Standalone option	Yes
Processor	32- /64-bit floating-point DSP @ 50 MFLOPS / 50 MHz
Trajectory calculation	64-bit precision
User memory	512 KB
System memory	512 KB
Firmware	2 128 K x 16 EPROMs
Flash memory	512 KB
Size	Half-size ISA board
Operating system	Real-time system independent of PC
Performance	
Multi-tasking	8 coordinated systems, motion/PLC programs
Trajectory update	Every 200-500 usec
Servo update	50 usec/axis
Ladder Logic PLC	200-500 usec scan time
Interpolation	Linear, circular, sinusoidal, helical and elliptical, splines, NURBS, 3D arcs
Servo loop	PID, velocity feedforward, acceleration feedforward notch, LoPass filtering and programmable filtering
Position regulation	Hardware, < 1usec
Communications	Simultaneous ISA, serial and LPT ports
Communications	
PC bus	Dual 512 x 8 hardware FIFOs
Standalone	2 serial ports (RS232 and/or RS422), 1 parallel port (8 bits)
Protocols	Binary (PC), string and ASCII
Inputs	
Encoder input	4 (32-bit registers), up to 8 MHz post quadrature
Analog input - Auxiliary	Up to 8 (12-bit)
Command Signal	
Analog outputs	Up to 4 (16-bit precision)
Stepper outputs	Up to 4 @ 1 MHz
Digital I/O	32, 24 VDC optically-isolated (expandable to 288)
Software Support	
Standard language	Visual Basic, Visual C++, C++
Program tools	AcroVIEW Motion/PLC Program
Development tools	ActiveX controls/OCX controls
Operating system	Windows® NT, 98, 2000, XP
Additional firmware highlights	Triggered floating point electronic GEARING
	Triggered segmented electronic CAM
	On-the-fly position and velocity matching
	Ladder Logic PLC
	Interruptible moves
	Either analog or digital feedback for position or velocity loops
	Dual-encoder feedback
	Data teach and learn functions
	Parameter-based with over 15,000 addressable pre-defined hardware registers
	Sinusoidal commutation
	NURBS and splines
	3D arcs
	Automatic tangential tool operation

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PC-Based, OEM-Priced

The ACR1500 is Compumotor's OEM 4-axes PC bus-based controller. The ACR1500 is a PC bus-based card only and offers no serial or LPT ports as an option. It has the ability to run up to four servo loops with up to four encoders at 8 MHz (post-quadrature). The ACR1500 can also be equipped with eight analog inputs through a 12- or 16-bit analog-to-digital converter and introduce these inputs into the servo loop. Because of the modular output design of the ACR family, it is possible to have two axes of servo with two axes of steppers on the same controller or all axes of one type. Unlike other members of the Compumotor Acroloop controller line, the ACR1500 utilizes a 16-bit bus, which reduces cost dramatically. With this feature, the ACR1500 provides a high level of control at roughly half the cost! All of Compumotor's Acroloop products utilize the same system software and programming language; this assures users complete flexibility in upgrading their hardware while maintaining their investment in program development.

The ACR1500 is Compumotor's answer to affordable, high-performance control in a standalone package when low cost, real-time speed and ease of programming are most needed.

ACR 1500 Exclusives

- 4 axes of servo or stepper control
- 40 MFLOPS floating-point DSP
- 4 encoder inputs at 8 MHz (post-quadrature)
- User and system memory 128 KB standard
- 48 TTL I/O with an industry standard Opto 22, 50-pin connector
- Low-cost 16-bit bus
- High performance at a low cost

Higher-Performance PCI Version Coming Soon

ACR1500 Ordering

1500 □ □ □ □ □ □ □

PC - PC/ISA Bus Card

E4 - 4 Encoder Inputs

D4 00 - 4 Servo/Analog Outputs
S4 00 - 4 Stepper Outputs
D2 S2 - 2 Servo/Analog Outputs/ 2 Stepper Outputs

A0 - No Analog Inputs
A8 - 12-Bit Analog Inputs
AA - 16-Bit Analog Inputs

Note: Maximum of 8 single-ended or 4 differential analog inputs

0 - No I/O Expansion

0 - 48 TTL Digital I/O
Note: Programmable as inputs or outputs in groups of 8

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ACR1500 Specifications

	Value
Hardware	
Axes/controller	1-4 axes
PC-Bus interface	ISA
Standalone option	NA
Processor	32- /64-bit floating-point DSP @ 40 MFLOPS / 40 MHz
Trajectory calculation	64-bit precision
User memory	128 KB
System memory	128 KB
Firmware	256 KB x 16 EPROM
Flash memory	128 KB
Size	Half-size ISA board
Operating system	Real-time system independent of PC
Performance	
Multi-tasking	8 coordinated systems, motion/PLC programs
Trajectory update	Every 200-750 usec
Servo update	75 usec/axis
Ladder Logic PLC	200-750 usec scan time
Interpolation	Linear, circular, sinusoidal, helical and elliptical, splines, NURBS, 3D arcs
Servo loop	PID, velocity feedforward, acceleration feedforward notch, LoPass filtering and programmable filtering
Position regulation	Hardware, < 1usec
Communications	ISA
Communications	
PC bus	Dual 512 x 8 hardware, FIFOs
Optional interface	NA
Protocols	Binary (PC), string and ASCII
Inputs	
Encoder input	4 (32-bit registers) up to 8 MHz post-quadrature
Analog input - Auxiliary	Up to 8 (12- or 16-bit)
Command Signal	
Analog outputs	Up to 4 (16-bit precision)
Stepper outputs	Up to 4 @ 1 MHz
Digital I/O	48 Opto 22-compatible, programmable as inputs or outputs in groups of 8
Software Support	
Standard language	Visual Basic, Visual C++, C++
Program tools	AcroVIEW Motion/PLC Program
Development tools	ActiveX controls/OCX controls
Operating system	Windows® NT, 98, 2000, XP
Additional firmware highlights	Triggered floating point electronic GEARING
	Triggered segmented electronic CAM
	On-the-fly position and velocity matching
	Ladder Logic PLC
	Interruptible moves
	Either analog or digital feedback for position or velocity loops
	Dual-encoder feedback
	Data teach and learn functions
	Parameter-based with over 15,000 addressable pre-defined hardware registers
	Sinusoidal commutation
	Automatic tangential tool operation

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2-Axes, Standalone Control

The ACR1200 is Compumotor's OEM two-axes standalone controller. The ACR1200 is a standalone controller card only and offers no PC port as an option. It comes with two serial ports–RS232 and RS422–and has the ability to run two servo loops with up to three encoders at 20 MHz. It can also be equipped with eight analog inputs through a 12- or 16-bit analog/digital converter and introduce these inputs into the servo loop. Because of the modular design of our outputs, it is possible to control 2 servo or 2 stepper axes on the same controller. This level of control has previously not been available at this price. All of Compumotor's Acroloop products utilize the same system software and programming language; this assures users complete flexibility in upgrading their hardware while maintaining their investment in program development.

The ACR1200 is Compumotor's answer to affordable, high-performance, standalone control when low cost, real-time speed and ease of programming are most needed.

ACR 1200 Exclusives

- 2 axes of servo or stepper control
- 40 MFLOPS floating-point DSP
- Up to 3 encoder inputs at 20 MHz
- Standard user and system memory of 128 KB each
- Encoder loss and encoder fault protection
- High performance at a low cost
- Standard 32 optically isolated, 24 VDC I/O (expandable to 160 optically isolated, 24 VDC I/O)

ACR1200 Ordering

1200 ☐ ☐ ☐ ☐ ☐ ☐ ☐

SA - Standalone Card

E3 - 3 Encoder Inputs

D2 00 - 2 Servo/Analog Outputs
S2 00 - 2 Stepper Outputs

A0 - No Analog Inputs
A8 - 12-Bit Analog Inputs
AA - 16-Bit Analog Inputs
Note: Maximum of 8 single-ended or 4 differential analog inputs

0 - 32 Optically-Isolated, 24VDC, Sinking
1 - 32 Optically-Isolated, 24VDC, Sourcing

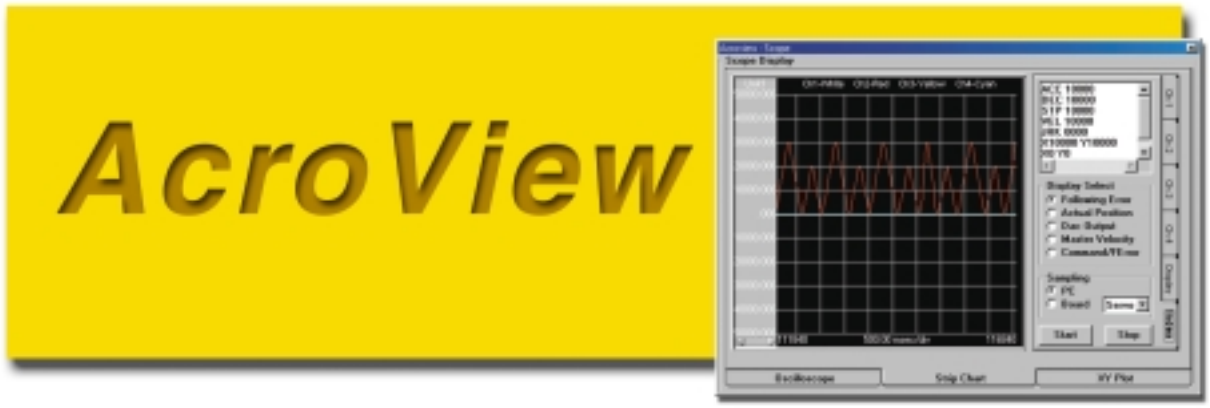
0 - No I/O Expansion
1 - Add 64 Digital I/O
2 - Add 128 Digital I/O
3 - Add 192 Digital I/O
4 - Add 256 Digital I/O

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ACR1200 Specifications

	Value
Hardware	
Axes/controller	2 axes
PC-Bus interface	NA (standalone only)
Standalone option	Yes
Processor	32- /64-bit floating-point DSP @ 40 MFLOPS / 40 MHz
Trajectory calculation	64-bit precision
User memory	128 KB
System memory	128 KB
Firmware	2 128 KB x 16 EPROMS
Flash memory	128 KB
Size	8” W x 5” H
Operating system	Real-time system independent of PC
Performance	
Multi-tasking	8 coordinated systems, motion/PLC programs
Trajectory update	Every 200-750 usec
Servo update	75 usec/axis
Ladder Logic PLC	200-750 usec scan time
Interpolation	Linear, circular, sinusoidal, helical and elliptical, splines, NURBS, 3D arcs
Servo loop	PID, velocity feedforward, acceleration feedforward notch, LoPass filtering and programmable filtering
Position regulation	Hardware, < 1usec
Communications	Simultaneous, serial ports
Communications	
PC bus	NA
Optional interface	2 serial ports (RS232 and/or RS422)
Protocols	String and ASCII
Inputs	
Encoder input	3 (32-bit registers), up to 20 MHz post quadrature
Analog input - Auxiliary	Up to 8 (12- or 16-bit)
Command Signal	
Analog outputs	Up to 2 (16-bit precision)
Stepper outputs	Up to 2 @ 1 MHz
Digital I/O	32, 24 VDC optically-isolated (expandable to 160)
Software Support	
Standard language	Visual Basic, Visual C++, C++
Program tools	AcroVIEW Motion/PLC Program
Development tools	ActiveX controls/OCX controls
Operating system	Windows® NT, 98, 2000, XP
Additional firmware highlights	Triggered floating point electronic GEARING
	Triggered segmented electronic CAM
	On-the-fly position and velocity matching
	Ladder Logic PLC
	Interruptible moves
	Either analog or digital feedback for position or velocity loops
	Dual-encoder feedback
	Data teach and learn functions
	Parameter-based with over 15,000 addressable pre-defined hardware registers
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	NURBS and splines
	3D arcs
	Automatic tangential tool operation

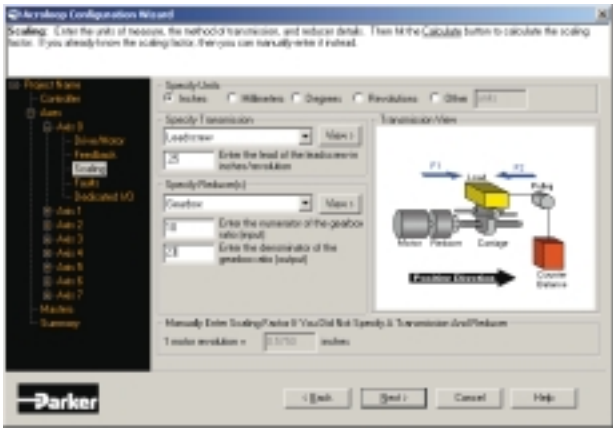
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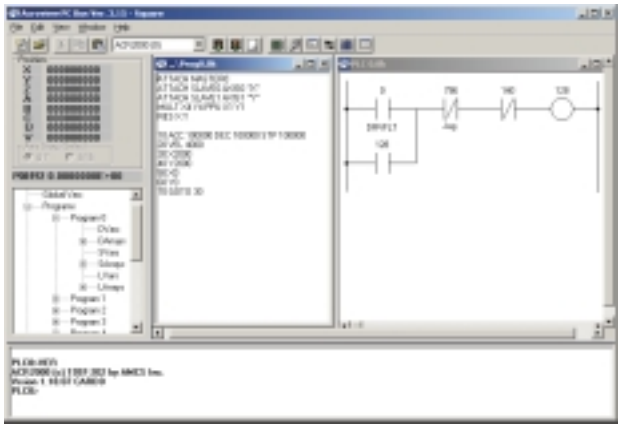


Diagnostic and Programming Tool

AcroView is a powerful code-development tool that assists the user of ACR family products in programming, debugging and commissioning their application. Several features are incorporated to assist both the novice and expert users in developing code.

Code development begins with the setup wizard, which quickly and easily guides the user through the setup and configuration of the ACR controller. Using the tuning tool along with the built-in oscilloscope function makes servo tuning a snap. Next, the program editor and ladder editor tools allow straightforward development of both motion and I/O application code. Finally, the diagnostic tools, included with AcroView, permit easy troubleshooting and optimization of the code to ensure the highest level of performance and reliability when using the ACR family of control products.



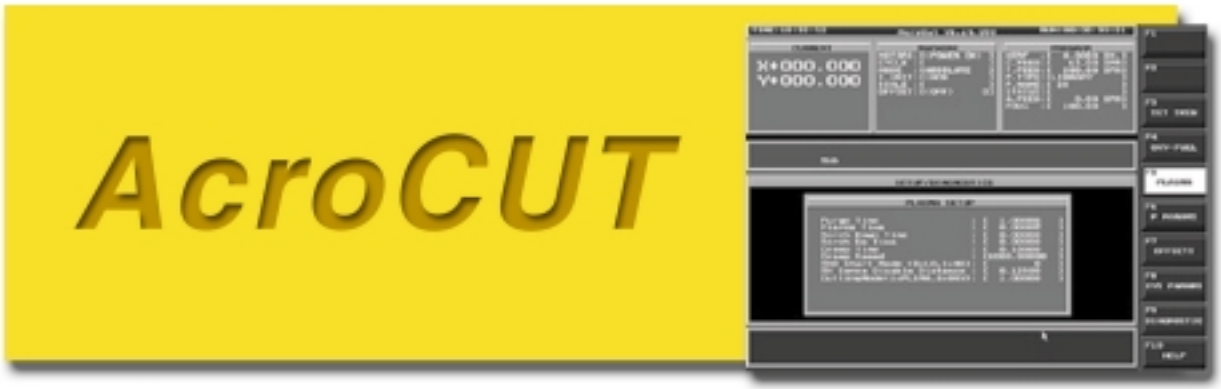


AcroView Features

- PC-bus or serial connection support
- Configuration wizard
- Tuning tool
- Built-in oscilloscope
- Structured text program editor
- Ladder logic program editor
- Real-time terminal interface
- Servo loop diagnostic tool
- CPU utilization tool

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Cutting-Edge Software

AcroCUT software is specifically designed to handle PLASMA, OXY-FUEL, LASER, and WATERJET machine tool cutting applications. Acroloop has worked extensively with manufacturers and machine tool operators to create a state-of-the-art PC cutting control software package. The PC software can be customized for the OEM or used to retrofit old cutting machines.

AcroCUT Features

Turnkey Solution - Implement AcroCUT with the Acroloop motion controllers, chassis, operator interfaces, enclosures, and customized front panels for a complete OEM solution for PC-based Plasma, Oxy-Fuel, Laser, and WaterJet machine tool control.

PC-Based - AcroCUT allows users to implement an open-architecture solution with the latest PC-based CNC motion controllers and incorporating standard off-the-shelf industrial PC components available from Acroloop.

G Codes - AcroCUT works with standard EIA RS-274 G codes. AcroCUT is also directly compatible with standard CAM packages.

M Codes - AcroCUT also uses standard M codes. The M codes in AcroCUT are completely programmable. M codes simply send customized files to the controller. The files could be PLC files or another complete multi-tasked motion program.

Gantry Control - AcroCUT features built-in gantry control (for controlling 2 servos on a single axis).

Home - A built-in homing routine is available for all axes (programmable).

Jog - AcroCUT provides continuous or incremental jog modes with optional joystick control.

Library Parts - Built-in user-definable library parts are included in the AcroCUT spftware package. Thirty different shapes are provided, and the user can create additional library parts.

Retrace - AcroCUT allows users to retrace the cut path to back up all the way to the beginning.

Kerf Compensation - AcroCUT includes automatic kerf compensation.

Cornering - AcroCUT provides automatic corner slowdown based on acute angle threshold.

Dripfeed Function - Allows large part files to be executed on-the-fly from an off-line PC using the serial link minimizing download time and maximizing machine cut time.

Pause and Resume - On, off, path, pause and resume features are included with AcroCUT. Machines can retrace, skip, resume, jog or home after the pause.

Plate Alignment - AcroCUT features automatic plate alignment for sheet placement.

Feedrate Override - AcroCUT includes a built-in feedrate override function. The feedrate override can be executed through software or from BCD input.

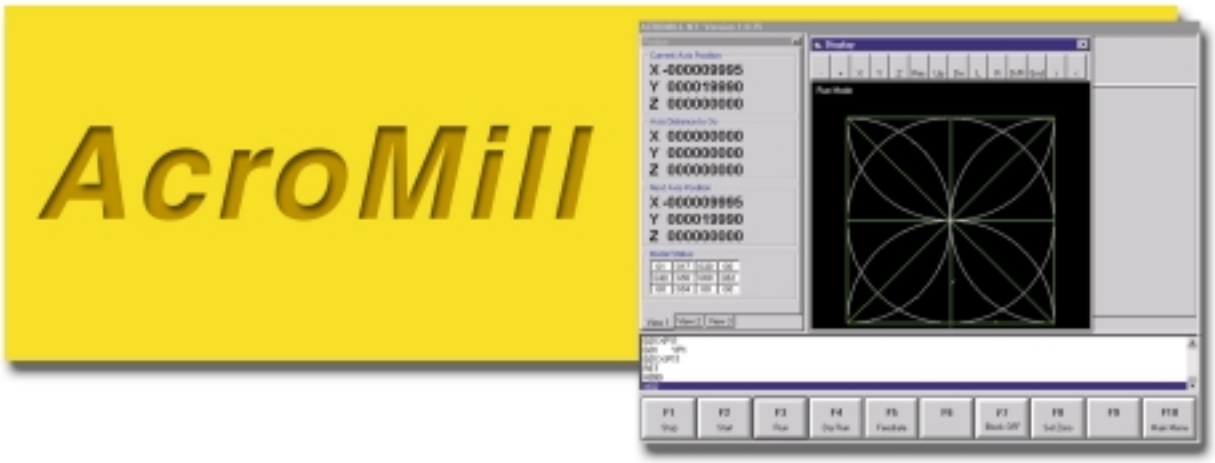
Mechanical Compensation - AcroCUT has built-in ballscrew or backlash compensation.

Displays - AcroCUT can display the user programmable information including current position, program status information and a graphical display of the part being processed. All of the displays are programmable (size, color, location) by the user.

Diagnostics - AcroCUT can diagnose electrical input/output conditions or to dynamically tune the servo system with AcroCUT's built-in 4-channel oscilloscope.

Customized - Don't see what you need? Have Compumotor customize the PC software specifically to meet your application requirements.

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1-8 Axes Machine Tool Software Package

AcroMill is a powerful machine tool software package designed to work with the ACR family of motion controllers. AcroMill software is specifically designed to handle machine tool applications and is capable of controlling from 1 to 8 axes. Compumotor has extensive CNC machine tool experience, which we have put to work to create an off-the-shelf software package that can easily be integrated into CNCs.

AcroMill Features

G Codes - AcroMill works with standard EIA RS-274 G codes. The basic G codes designed around the GE Fanuc OM controller works directly with AcroMill. AcroMill is also directly compatible with standard CAM packages and appropriate post files for machine execution.

M Codes - AcroMill also uses standard M codes. The M codes in AcroMill are completely programmable. M codes simply send customized files to the controller. The files could be PLC files or another complete multi-tasked motion program.

PC-Based - AcroMill allows users to implement an open-architecture solution with the latest PC-based CNC motion controllers and incorporating standard off-the-shelf industrial PC components available from Compumotor.

PLC - AcroMill can interface with the ACR controller's on-board PLC to create customized automatic tool change (ATC) operations.

Home/Jog - AcroMill provides a programmable homing routine for all axes, as well as programmable continuous or incremental jog modes.

Handwheel - AcroMill's external handwheel operation allows a handwheel to be programmed to any encoder input with a given axis selected through AcroMill.

Library Parts - Built-in user-definable library parts available in the AcroMill software package. Library parts are parametric G and M code files that can be customized (sized) by the user on the screen.

File Transfer - Files can be transferred to AcroMill via RS-232 from the hard disk drive or from a floppy disk drive. Users can also automatically convert DXF posts into the appropriate G and M codes with AcroMill.

Run/Dry Run - AcroMill gives users the ability to run or dry run a program. Programs can also be started from a user programmable block number.

Feedrate Override - AcroMill has a built-in feedrate override function that can be executed through the AcroMill software or from an external BCD input.

Spindle Override - AcroMill's built-in spindle override function permits spindle override commands to be executed through software or from an external BCD input.

MDI - AcroMill allows manual data input operation for immediate execution of blocks.

Displays - AcroMill can display the user programmable information including current position, program status information and a graphical display of the part being processed.

Diagnostics - AcroMill can diagnose electrical input/output conditions or dynamically tune the servo system with AcroMILL's built-in 4-channel oscilloscope.

Error Correction - AcroMill includes programmable ballscrew compensation, backlash compensation, tool radius compensation, and tool offset registers.

Block Processing Speed - AcroMill has a 2- to 4-millisecondblock-processing speed depending on the number of axes being controlled.

Customized - Don't see what you need? Have Compumotor customize the PC software specifically to meet your application requirements.

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AcroMill

AcroMill for Windows® NT is designed to work with a touch screen or mouse; therefore, all the menu selections are large enough to allow easy finger control and selection. New programs can be created while the machine is running a program. Full compliments of Can Cycles and Macro and Modal Macro ability are offered.

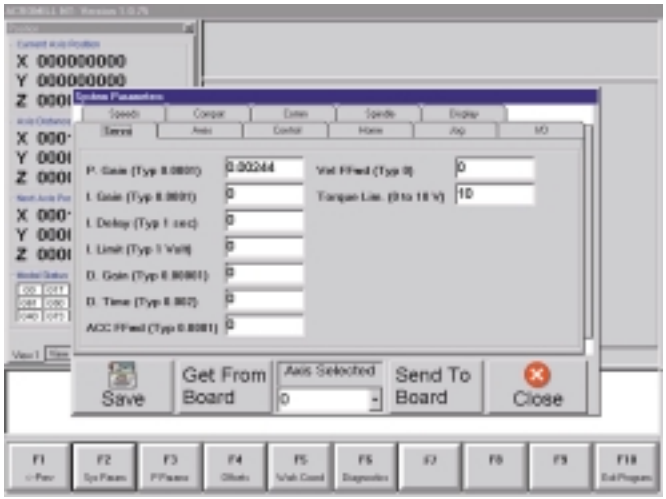
Probing cycle as well as NURBS, Splines and three-dimensional three-point arc generation are offered.

OEM users can access and pass variables in the SYSVAR storage area in the CNC from their own independent software application in case a custom installation is required. This means that the OEM can externally affect machine operation from their own piece of software on the fly. This can be very handy in applications like vision, grinding and welding.

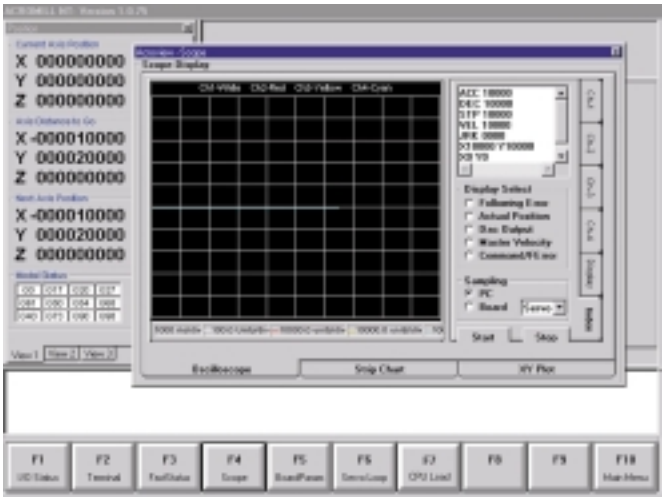
AcroMill's function-interface screens include . . .



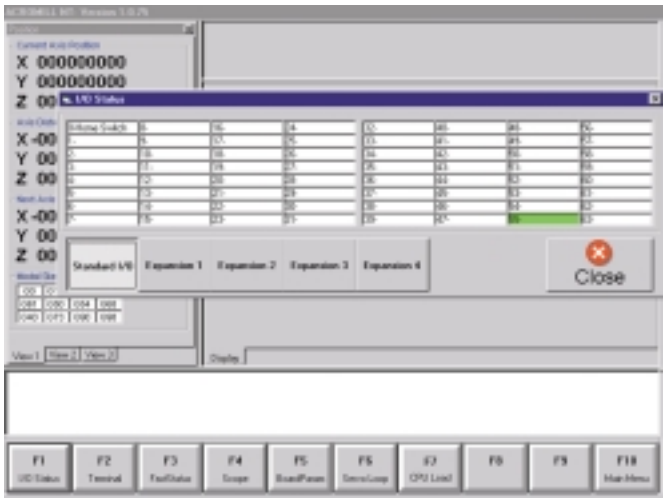
Selecting library parts



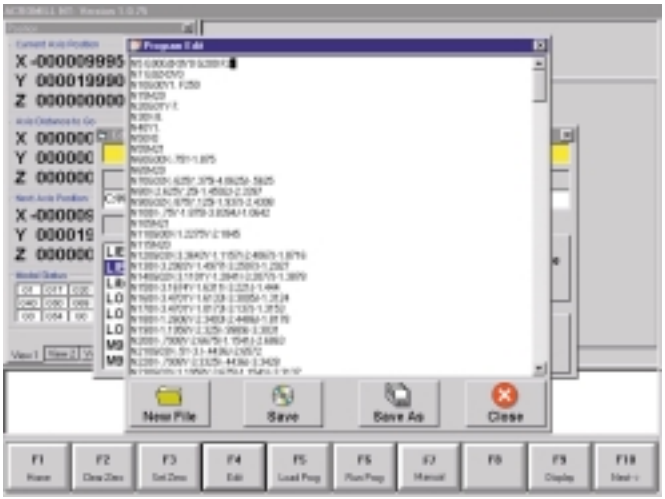
Setting up system parameters



Tuning axis servos using built-in four-channel oscilloscope

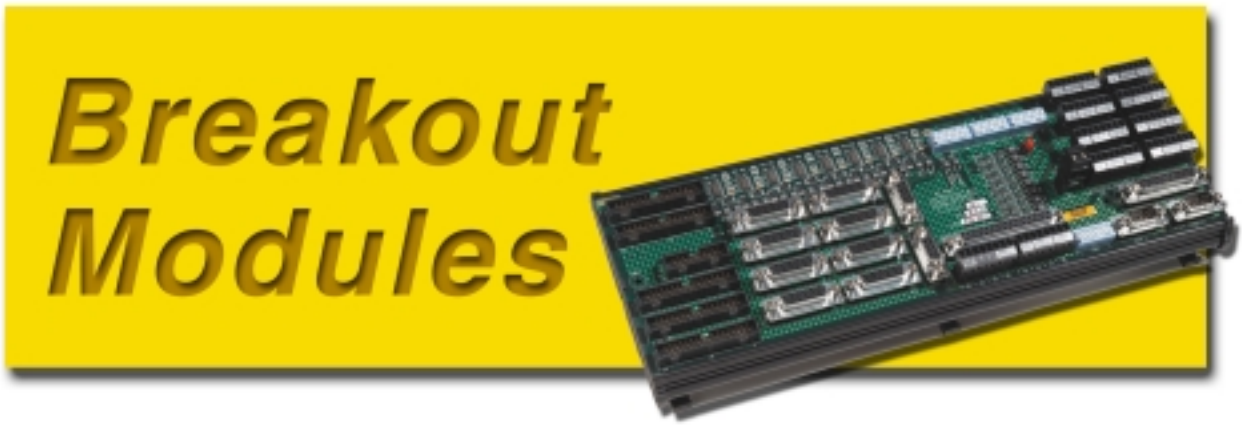


Monitoring status



And editing a program even while running a different program.

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Breakout Modules

RBC Features

- Compatible with the ACR2000, ACR8010 and ACR8020
- Easy controller connectivity to digital servo and stepper drives
- Provides 1 axis connector for each amplifier connection
- Simplified system wiring
- Screw terminals for digital I/O
- 2 serial and 1 parallel port DB connectors
- Cables available for all Parker drive families



RBD Features

- Compatible with the ACR2000, ACR8010 and ACR8020
- General application breakout board
- Screw terminals for encode feedback
- Screw terminals for digital I/O
- 2 serial and 1 parallel port DB connectors
- Status LEDs for encoder, digital I/O and communication diagnostics



RBB Features

- Low-cost breakout boards
- 4-inch SnapTrack mounting
- Individual boards for encoder, digital I/O and communications
- Screw terminals for all board signals
- DB connectors for communication signals
- Status LEDs for diagnostics



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ACH Controller Chassis

The ACH3120 controller chassis is a standard chassis, designed to accommodate a standalone ACR1200 controller. The ACH3120 is designed to support the standard digital I/O and 1 expansion digital I/O board.

The ACH3200 controller chassis is a standalone chassis and is designed to accommodate a standalone ACR2000 controller. The ACH3200 is designed to support the standard digital I/O and up to 2 expansion digital I/O boards.

ACH3121 Features

- For use with ACR1200 controller
- Industrial standalone chassis (4.38”W x 11”H x 6.75”D)
- Encoder feedback connector
- Digital I/O connector
- 2 serial and 1 parallel port connector
- Heavy duty power connector, 120 VAC
- Integral power supply (5VDC, +/- 12VDC)
- Cooling fan

ACH3200 Features

- For use with standalone ACR2000 controller
- Industrial standalone chassis (4.38”W x 11”H x 6.75”D)
- Encoder feedback connector
- Digital I/O connector
- 2 serial and 1 parallel port connector
- Digital I/O power supply connector
- Heavy duty power connector (120 VAC standard)
- Integral power supply (5 VDC, +/- 12 VDC)
- Cooling fan



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Complete Motion Box

The OPS1200 is an operator interface and ACR1200 2-axes controller built into one unit.

OPS1200 Features

- LED backlit 4-line x 40-character display
- 40-key, motion control sealed keyboard with 3 hidden keys and 9 programmable function keys
- Tactile membrane keypad
- Panel mountable
- NEMA 12 design
- 2 axes of stepper or servo DAC outputs
- 2 feedback encoder inputs with 20 MHz counting rate
- Built-in hardware encoder-fault detection
- 16 inputs, 16 outputs, all 24 volts optically isolated
- Expandable to 48 inputs and 48 outputs
- PRINT, INKEY$ functions in ACR1200 firmware to interface with KBD/Display
- Complete motion system for 1 or 2 axes of motion with ACR1200 as the main engine
- Canned software for various applications
- Power requirements: +5V, +12V, -12V
- Small package: 10.3”W x 6.6”H x 3.1”D
- Optional custom panel overlay
- 1 parallel port, 2 serial ports RS232/RS422

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Feature-Rich Controller Solves Unique Challenges

While developing its FAST™ series of fully-automated fiber automation machines, engineers at Palomar Photonics Automation (formerly Axsys Technologies) of Pittsburgh, Pennsylvania, turned to Parker Acroloop for a highly sophisticated motion controller. Beyond the typical requirements of a high-speed and PCI-bus platform that was powerful enough to handle multi-axis coordinated motion control, they had some very specific needs unique to their machine's application.



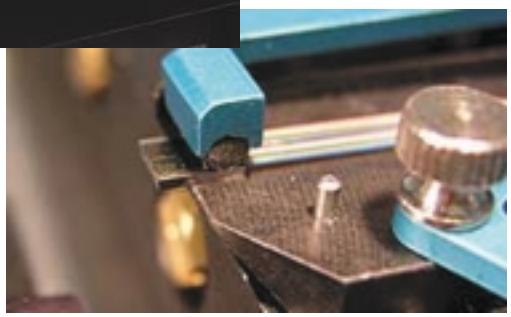
Palomar needed the ability to implement multi-dimensional inverse kinematics to control their six degrees of freedom fiber-alignment engine. Furthermore, the controller needed the ability to control multiple alignment engines simultaneously, creating a control system with up to 18 axes of tightly synchronized, high-precision motion.



When choosing a motion controller solution, users cannot always predict where their application needs are going to be even a few months down the road in a typical design cycle. Frequently, the needs start at some base level where most controllers can do the job. As the application nears completion, it often has gained functionality that was not in the original specification. It is common to end up hitting the top end several months into a design cycle because the controller that met the original specification cannot meet the new requirements.

"It became very clear at an early stage that thetypical motion controller wasn't sophisticated enough to handle our requirements," says John Bridgen, applications manager of Palomar Photonics Automation Division. "The ACR controller quickly became our controller of choice because of Parker Acroloop's extensive support, ease of use, technical expertise and willingness to work with us on our unique requirements."

Parker Acroloop teamed with Palomar to create the Feedback Transformation module. Optical alignment requires precise control in both Cartesian and polar coordinate systems; certain feedback and motion elements are thus non-linear to each other's work space.



To correlate the different reference frames required, the team added new input parameters to the standard firmware set of the ACR controller, which is at the heart of Palomar's FAST automation products. These parameters enabled Palomar to describe the non-linearities mathematically and allow the controller to perform the transformations in real-time to correlate the feedback signals to motion.

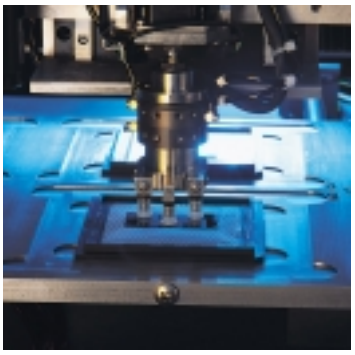
Palomar engineers began with alignment as their primary focus, so they could develop a standard system. "The nice thing about this platform

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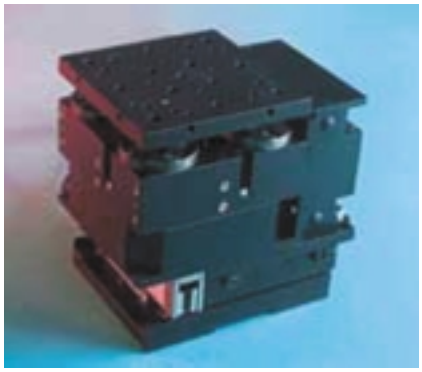
Feature-Rich Controller, continued

is a customer can easily configure it to work with a variety of parts," says Bridgen. "It is a nice system for development, as it relies on well-defined automation to develop processes."



Building upon its standard platform, Palomar provided the additional capacities of characterization and attachment of parts all on one turnkey production-grade system. This system can load, align and attach an input or output device (e.g., a planar light circuit) to a fiber or array of fibers. It can align to such a device in less than two minutes, from part load to peak power to final attach. It increases quality and saves time. "Doing the same job by hand would take at least an hour under the best of conditions," adds Mike Formica, vice president/general manager.

That kind of speed increase addresses the production bottleneck problems that optical alignment processes experience when an upstream wire bonder machine is clipping along at 10 bonds per second and frequently runs out of parts. This equipment isn't a complete cure, but it is a 30-fold improvement. "We're working on ways to increase speed even further," says Bridgen. "Because we also manufacture die bonders and wire bonders, we can balance the production line by controlling all of the critical assembly machines."



Repeatability is another advantage. "When you put a device on the system, you can be sure the system will find the same optical peak as it did a week ago," says Bridgen. Palomar continues to expand this line on the same basic platform, rather than reinventing the wheel. That means proven performance at lower costs to customers.

"The success of our project is built on the success of our suppliers, and Parker Acroloop has been no exception."

– John Bridgen, applications manager, Palomar Photonics Automation Division

Another key feature of Parker Acroloop's ACR controller for this application is high-speed servo loop closure. These high-speed loops run at 100usec for an eight-axes coordinated group, enabling the FAST products to make the real-time trajectory corrections necessary for high-speed optical fiber alignment. The standard dual-ported RAM, 32-bit wide PCI format, true multi-thread communication and advanced onboard PLC capability were critical in coordinating control of this complex machine.

These elements are controlled seamlessly, largely in part to the ACR's high flexibility and powerful features.

"Parker Acroloop's aggressive product development schedule and willingness to implement new features makes it obvious that they are committed to providing the industry's most advanced products," says Bridgen. "They have been, and will continue to be, a strong partner to us. The success of our project is built on the success of our suppliers, and Parker Acroloop has been no exception."

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