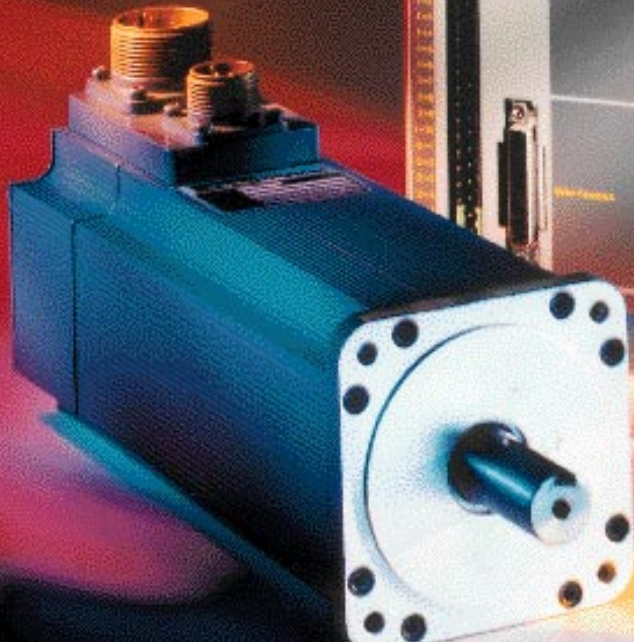


Making Moves

AN UPDATE OF AUTOMATION TRENDS

Motion Control for a Global Market: Compumotor's New CE-Marked Products. See Pages 2-3.



The New BD-E Series Brushless Servo System

Compumotor Introduces New CE-Marked Products

Motion Control For A Global Market

Introducing the BD-E & PD-E — Compumotor proudly welcomes two new product families to its complete line of motion control products—the BD-E Series and the PD-E Series. These high-quality products were designed and manufactured by Parker Hannifin's Digiplan Division (Poole, England) and are now available in North America.



FEATURE

Engineering Corner


CE Marking & You: Navigating the CE Maze

By Jennifer Potter, Product Planning Manager—Power Products Group

Understanding the complexity and scope of Europe's CE regulations can be a daunting task for even the most experienced OEMs. Compumotor and its ATC network can help you understand CE and its impact on your organization. The 3 primary CE Directives that affect electronic motion control equipment are listed below:

Machinery Directive:

Requires machines sold or brought into service in the European Community to meet a variety of safety guidelines. This directive has been in effect since January 1, 1995 and dictates that all machines bear the CE mark.

 **EMC Directive:** Deals mainly with electromagnetic noise emissions and susceptibility. This directive became mandatory January 1, 1996. A few key points to keep in mind about the EMC directive are as follows:

- Electronic motion control components are not required by law to be CE marked for EMC, though final machine

Continued on page 6

What Is CE-Marking?

Several years ago, the European Union (EU) issued various directives regarding Electro-magnetic Compatibility (EMC). Beginning in 1996, any *"apparatus liable to cause electromagnetic disturbance or whose performance is liable to be affected by such disturbance"* (Directive 89/336/EEC article 2.1) that is intended for an end-user must display a CE (Certificate European) Mark, which signifies that it complies with the EMC directive. The BD-E and PD-E Series comply with both the EMC and Low-Voltage Directives as defined by the EU. Products that do not comply with these directives are removed from, or denied access to, all EU markets.

Testing and Design

To earn CE marking, manufacturers must make a substantial investment in research, development, testing, and customer support. Digiplan built extensive on-site testing and development facilities within its manufacturing plant. Detailed emissions and air discharge immunity tests were painstakingly performed. Custom PCB layout and mechanical design rules are now employed to cover issues such as inter-track interference susceptibility, case apertures, and transformer positioning.

BD-E Series—Brushless Servo

The BD-E Series is a high-performance brushless servo system. Building on its BLH Series experience, Digiplan incorporated many improvements to produce an extremely

flexible drive/indexer system. One of the major advances is the introduction of direct-on-line operation at 230VAC without the additional size, weight and cost of a separate transformer. All line filter components necessary for EMC compliance are built into the drive—this eliminates all potential problems and cost associated with the mounting and wiring of external filter units.

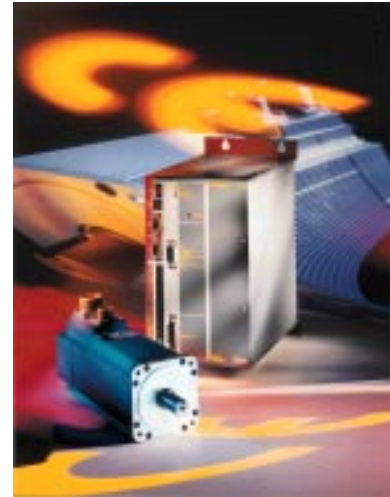
High-resolution sinusoidal commutation guarantees smooth rotation over the full speed range. The redesigned MD Series motors now have larger shafts with improved dimensional tolerances to aid the fitting of components such as precision gearboxes. The combined commutation/feedback encoder is available as a separate item to allow any suitable three-phase brushless motor to be used. All drive configuration is performed using switches located on the front panel.

BD-E Series Drives have comprehensive built-in monitoring systems to protect the drive and the motor. An I-t circuit limits the time for which any given motor current can flow before being clamped at the continuous rating of the drive. An additional monitor circuit guards against full drive current being delivered for an extended period at very low speeds. The drives also protect against supply overvoltage or undervoltage, partial supply failure, excess output current and overheating of the drive or motor (the BD-E also checks for overspeed conditions and loss of commutation or position feedback signals). With commutation data being derived from the incremental encoder, there is automatic tach fault protection since loss of the encoder signal will prevent commutation and therefore stop the motor.

PD-E Series—Mini-Stepping Drives & Packaged Drive/Indexers

The successful PD Series, featuring 4000-step resolution and a universal *"go anywhere"* power supply, has been expanded with the addition of a CE-marked version. Available either with a step-direction input or with a powerful built-in indexer, the drive incorporates all necessary line filter components—no external add-on units are required.

The PD-E Series retains all the performance features of the other models in the PD Series—a 70VDC bus, a peak output current of 3A or 5A/phase and 4000 step/rev resolution to give smooth rotation at all speeds. The drive operates from all AC supply voltages in the 100-240V range without adjustment. This is achieved using an integral switch-mode power supply that incorporates power factor correction. There is extensive built-in protection against overheating, short circuits and supply faults. For applications that need to rapidly decelerate high-inertia loads, an alternative version is available with a built-in regenerative power dump.



BD-E and PD-E Series Options and Features

PDS-E For Step & Direction Input

Designed primarily for use with an external controller, the PDS-E has fully OPTO-isolated inputs for TTL-level step and direction signals. Separate non-isolated inputs are provided for single-ended control signals operating at 12V levels. The drive also incorporates a dual-speed internal oscillator with adjustable ramping for manual positioning or simple on-off control. The PDS-E is available with two current levels—3A (PDS13E) and 5A (PDS15E).

PDHX-E Combined Drive/Indexer

The PDHX-E indexer is equipped with a powerful X150E controller that accepts motion commands via RS-232C or RS-485 serial links. The command language is based on an enhanced version of Compumotor's popular X-Code, which is user-friendly and extremely versatile. The indexer can store up to 64 complete motion programs in its non-volatile memory, and offers advanced programming features such as conditional branching and math functions. With flexible input and output circuits compatible with virtually all PLC systems and the option of thumbwheel switch or remote operator panel control, the PDHX-E can be integrated into a wide range of industrial applications.

PDS-E & PDHX-E Common Features

- ☆ CE marked with full EMC and LVD compliance
- ☆ 4 selectable resolutions between 400 and 4000 steps/rev
- ☆ Operates directly from 110V or 230VAC supplies without adjustment
- ☆ Selectable standby function for 80% or 50% of programmed current at standstill
- ☆ Short-circuit & overtemperature protection
- ☆ Optional regenerative power dump (5A version)

PDHX-E Packaged Drive/Indexer Features

- ☆ Up to 32 axes can be daisy chained or multidropped via one RS232C or RS485 port
- ☆ Non-volatile memory stores up to 64 motion programs
- ☆ 7-segment diagnostic display
- ☆ Dedicated inputs for end-of-travel and home position switches
- ☆ 10 user-definable inputs, 6 outputs
- ☆ Built-in NPN (sinking) and PNP (sourcing) outputs (software selectable)
- ☆ Optional remote panel or thumbwheel input
- ☆ High-speed (15µs) registration input

BD-E Analog Input & Torque Servo Models

The BD-E Series offers a choice of current ratings and is available in two versions—an analog-input velocity/torque servo or a complete positioning system incorporating the popular X150E controller. As well as being fully EMC-compliant, this controller offers the improved noise immunity of RS485 communication and is configurable entirely by software without the use of jumpers. The X150E is compatible with most PLCs—both NPN (sinking) and PNP (sourcing) outputs are software selectable. Inputs and outputs may be configured to operate at 5V or 24V.

BD-E Series Features

- ☆ Direct operation from 230V AC supply
- ☆ Fully EMC and LVD compliant with all line filter components built in
- ☆ Two current ratings—6A and 12A peak
- ☆ Peak torques up to 14Nm
- ☆ Speeds up to 5,000 rpm
- ☆ Commutation by integral incremental encoder, with separate initialization encoder
- ☆ High-efficiency recirculating PWM current control system
- ☆ Drive fully protected against overheating, short circuits and supply faults
- ☆ Velocity or torque mode operation
- ☆ Industry-standard differential analog inputs on BD-E
- ☆ Built-in incremental encoder provides velocity and position feedback
- ☆ Velocity and torque monitor outputs
- ☆ Integral regenerative power dump
- ☆ Simplified set-up & adjustment
- ☆ Rugged industrial housing
- ☆ All configuration either by switches or software
- ☆ BDHX-E positioner version with powerful built-in indexer



Now Available! The New Daedal **Manual & Motorized Positioning Systems Catalog** is Better Than Ever

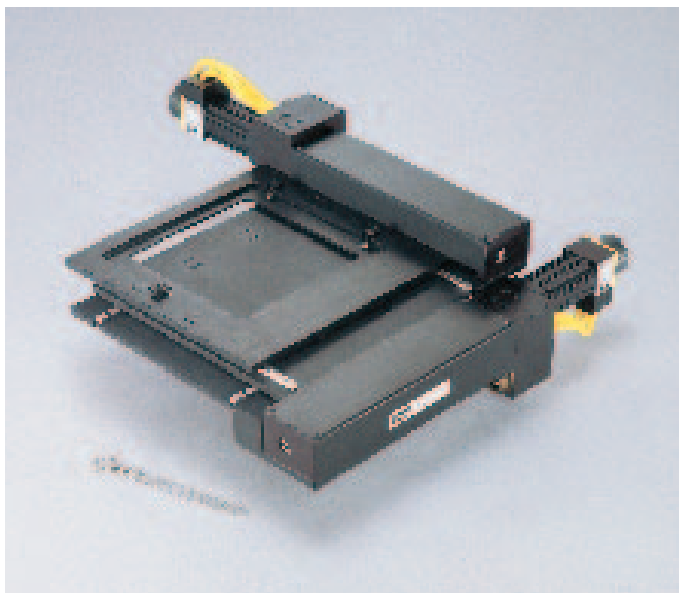
Great news! Our new catalog is now available and loaded with improvements. The catalog has been reformatted to improve "user friendliness". Improvements include:

- **Easier Product Selection:** With thousands of products, how do you select the right one? Each section begins with an index which uses photos and the primary product attributes enabling the user to quickly select products based on such characteristics as cross section, travel, and load capacity.
- **At-a-Glance Product Performance:** The specifications for each product have been formatted into a chart, based on travel. It is no longer necessary to hunt through dozens of pages to find the exact product you need.
- **Expanded Specifications:** We have reviewed the most commonly asked question about our products and included this information in the specification charts. Information on coefficient of friction, breakaway torque, duty cycle and maximum acceleration have been added among others.
- **Moment Load Capacity:** Moment load capacity charts have been included for all products including ball slides, cross roller slides and all motorized tables. This information will enable you to select the proper product for any loading condition.
- **New Products:** The 102000 and 402000 miniature motorized tables have been added along with a completely revised Control Section.
- **New Motorized Product Number System:** To make ordering the exact product you need easier, standard product offerings for each motorized product have been greatly expanded with a wide selection of couplings, home and limit switches, leadscrews, ballscrews, etc.

Daedal Catalog cover

These improvements will make specifying the right table for your application easier and faster. Request your free copy today by clipping out, marking, and returning the reply card found on the back page of this newsletter. For faster response, simply call 1/800/245-5903.

Daedal Introduces New Solutions for **X-Y Inspection**



The Daedal X-Y Precision Inspection Positioner incorporates low profile linear guide rail/bearings, precision ground ballscrews and limit/home optical switch assemblies to provide accurate and repeatable motion in a configuration which is ideal for challenging envelope restricted application. These positioners have been designed to fit various microscope bases (Nikon and Zeiss). Other applications for this device include wafer inspection, cell counting and analysis, video profilometry, coordinate measurement and machine vision test stations where high throughput is necessary and a service-free life is essential.

Travel: 6 x 6 in./8 x 8 in.
Repeatability: ± 2 micron
Motor Mount: NEMA 16 frame size
Drive: 5 mm precision ground ballscrew
Black Anodized Aluminum Base/Top



ParFrame Structural Framework Addresses the Needs of OEMs

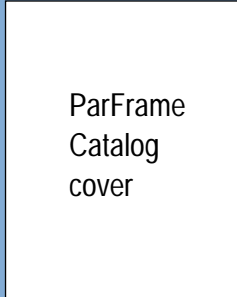
A new extrusion profile from Automation Actuator, the ESV4040, provides absolute minimum weight offering the builder a lower cost profile. Very price sensitive OEMs will appreciate this new profile. Among the new accessories are lift-off hinges, a 1/4-turn panel mounting black, cast gussets, a hinged support bracket, and a tighter T-slot cover. The functions of the new accessories are illustrated in the catalog photos. On many pages, the first picture shows the various options offered. The following pictures demonstrate how to apply the product. This format demonstrates the elegant, simpler, more versatile designs which make ParFrame the best choice for framework solutions.

New Products: In Stock for Immediate Delivery

Automation Actuator's new products are in stock for immediate delivery. Custom kitting service is also available. Standard delivery is five days. However, if you need better, ask us. Thirty percent of orders ship same day! For application assistance and quotations, please fax sketches and drawings to Joe Marangoni or Ben Vorndran at (330)334-3335.



CATALOG



ParFrame
Catalog
cover

New Catalog

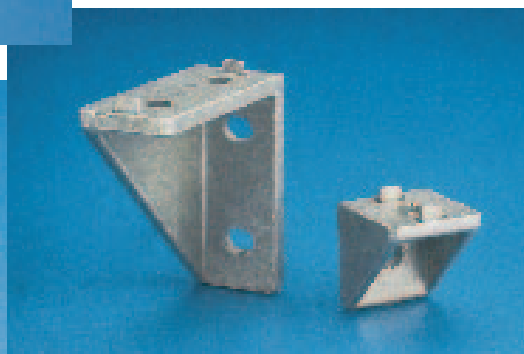
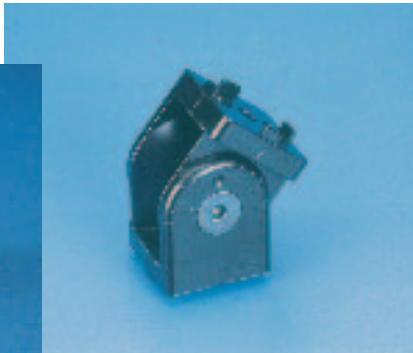
Automation Actuator Division is proud to release the new ParFrame Catalog 1814-2. The Catalog is expanded from 72 to 80 pages with a new extrusion profile and more than a dozen new accessories. Illustrations inside the catalog show numerous new guarding and framework solutions.

Metric made in the U.S.

All aluminum profiles are made to Metric Standards with connecting hardware and accessories available in both Metric and inch standards. So, when you ship your machine abroad, you can supply a fully compatible machine to your customer.

CAD Software

DXF format files are available covering the full line of structural extrusions and accessories. Request a disk from your local Motion & Control Distributor.



6000 Series Software Revisions 4.0 and 4.1

Common Features Enhance Functionality Across Servo & Stepper Product Lines

Recent revisions to Compumotor's popular and powerful 6000 Series Software have significantly increased the number of common features available in all 6000 Series products. Now all 6000 Series products, both stepper and servo, have position-based following, linear and circular interpolation (multi-axis versions), registration, compiled motion, and on-the-fly-changes. A summary of the improvements and common features added to servo and stepper products through software revisions 4.0 and 4.1 are listed below.

★ FEATURE

Engineering Corner continued from page 2

assemblies must meet EMC standards.

- An OEM may choose to install EMC compliant components in machines bound for Europe, but they should understand the cost trade-offs, verify the standards applied to each component, and install according to each manufacturer's guidelines.
- Compumotor has EMC installation guidelines available that are designed to assist with proper installation of drives and controls in machines going into service in Europe.

☞ Low Voltage Directive:

Covers electrical equipment rated 50-1000 VAC, and 75-1500 VDC. The standards covering this directive are similar to our UL Guidelines. This directive requires mandatory compliance starting January 1, 1997. There are many local testing and consulting services throughout the country that can answer your CE questions. Listed below are two organizations that offer CE support and guidance.

- Underwriters Laboratories Inc. (UL)—(847) 272-8800
- TÜV Product Service—(508) 777-7999.

common features added to servo and stepper products through software revisions 4.0 and 4.1 are listed below.

- ☐ On-the-fly changes of acceleration, deceleration, velocity, move distance, following ratio, and positioning mode (Rev. 4.0).
- ☐ Compiled Motion for CAM profiling, multi-tier profiling, and time sensitive applications (Rev. 4.0).
- ☐ Registration Enhancements (Rev. 4.0).
- ☐ Registration Lock-Out Distance
- ☐ Registration Single-Shot
- ☐ Registration for Servos—Registration is now available for all 6000 products (previous to 4.1, Registration was available only for stepper products).

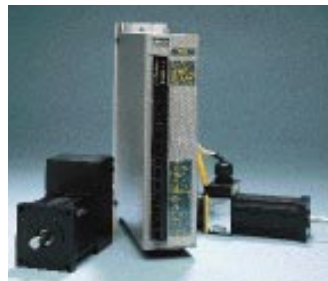
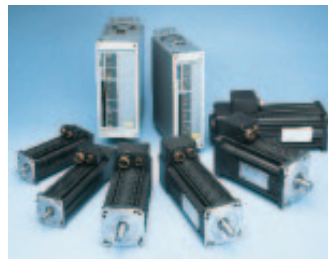


- ☐ Contouring for Servos—Contouring is now available for all multi-axis products (previous to 4.1, Contouring was available only for stepper products).
- ☐ Target Zone mode allows the user to define what the controller considers a *completed move* based on specified end-of-move distance, velocity, and settling time parameters. Encoder feedback is required for steppers for this feature (Rev. 4.0).
- ☐ Faster (16 MHz) hardware necessary to support the above changes.
- ☐ Stand alone 6000 Series products now have 150K bytes of standard memory (standard memory was 40K bytes).

The 6000 Series includes the following products.

Servos	Steppers
• 6250	• 6200
• OEM6250	• 6201
• AT6250	• OEM6200
• AT6450	• AT6200
• APEX6151	• AT6400
• APEX6152	• OEMAT6400
• APEX6154	• ZETA6104

Continuous Improvement. More Compumotor Products Receive UL Recognition



UL authorization is an important step in the growth and acceptance of a product. Underwriters Laboratories, Inc. recently authorized Compumotor to apply UL Recognized Marking (and C-UL Recognized Making) to the following products.

- ★ APEX10 & APEX6151
- ★ TQ10/TQ10SD/TQ10X
- ★ ZETA4 & ZETA6104

These products join many other Compumotor components (listed below) that have already earned UL recognition.



UL Recognized Compumotor Products

- S Series
- Z Series
- APEX20/40
- APEX6152/6154
- OEM350/350X
- OEM650/650X
- OEM300



Universal Tamped-In-Flex (TIF) Machine Packs a Powerful (and Accurate) Punch

Congratulations to Steve Willis, a system designer and project engineer (among other duties) for an electrical brush manufacturer in the Southeast U.S. These electrical brushes are used in vacuum cleaners, hair dryers, automobile starters, etc. Wire that extrudes from the brush is referred to as *flex*. The machine employed in this application drives the flex into a hole in the brush and packs an electrically conductive powder (tamping powder) around the flex to hold it firmly. (Mr. Willis says the process is similar to placing a post in the ground and packing dirt around it.)

The Universal TIF Machine replaced a machine that was expensive, inflexible, and required hours of setup time to perform part changeovers (4 to 6 hours). When the manufacturer adopted the Synchronous Manufacturing Process and implemented Parker Hannifin products, the following benefits were realized:

- ☆ Increased production throughput
- ☆ Improved output quality and system reliability
- ☆ Dramatic reduction of part changeover time requirement (from 4-6 hours to less than 30 minutes)
- ☆ Requires fewer operators due to system efficiency

The Universal TIF Machine is one part of a 4-part machine cell. The four machines are arranged in a rectangle with a computer

console in the center. The console is designed to allow

one operator to monitor and control all four machines from a single station. All motion routines in this centralized control scheme are executed from the multiaxis, PC-Based AT6400 Indexer. Highly powerful and customized task routines were written in Visual Basic (running under Windows™ 95). Mr. Willis' solution is a six-station rotary dial machine that is virtually free of pneumatic devices. This solution splendidly combines the following Parker Hannifin Motion & Control products.

- Compumotor AT6400 Indexer Cards
- AAD ER Series Ball Screw Cylinders
- Compumotor Dynaserv Servo Drives & Motors
- Daedal 2000 Series Rotary Tables
- Compumotor S Series Stepper Drives & Motors
- Daedal 4000 Series Precision Tables
- Digiplan PDS15 Drives

This tremendous application of Parker Hannifin motion control and positioning products has made a powerfully positive impact at this manufacturing site.



Runner-Up Winners

- 1st Runner-Up: *Mike Coulter* Business: Medical Products Application: Hypo Tube Drilling Machine
Parker Products Used: ZETA6104 Microstepping Drive/Indexer, PDX13 & PDX15 Ministepping Drive/Indexers, S57-102 and S83-135 Motors
- 2nd Runner-Up: *Troy Orr* Business: Wafer Manufacturer Application: Wafer Rinser/Dryer
Parker Products Used: OEM650X Microstepping Drive/Indexers, S57-83 Motors
- 3rd Runner-Up: *Gary Gunnell* Business: LCD Manufacturer Application: Computerized Display Testing
Parker Products Used: AT6200 Indexer, AT6400 Indexer, S Series Microstepping Drives, JS6000 Joystick, 105021 Linear Ball Bearing Table, 106041 Precision Cross Roller Table, Series 30000 Rotary Motion Position Table

You could be the next winner! See back page of the newsletter for instructions on how to enter and win.



Compumotor's Product Training Schedule

Expert Instruction By Product Specialists



Shorten the development time and improve the integrity and capability of your motion control application by attending a Compu-Course at Compumotor's facility in Northern California. Our hands-on, application-oriented training is conducted by Compumotor engineers. More than 100 designers, engineers, and users have benefitted from this unique training opportunity in the past year. Compumotor's trainers offer an invaluable experience and a wealth of motion control knowledge. Start your application development at a Compu-Course—you'll leave with solutions.

<p>CC-1: 6000 Series & Motion Architect (Stepper)</p> <p>Designed for users of stepper controllers from the 6000 Series family. This five-day course is held on the following dates: June 17-21, 1996 November 18-22, 1996</p>	<p>CC-2: 6000 Series & Motion Architect (Servo)</p> <p>Designed for users of servo controllers from the 6000 Series family. CC-2 is a four-day course to be conducted on the following dates: August 19-22, 1996 October 21-24, 1996 December 16-19, 1996</p>	<p>CC-3: SX & ZX Training (Servo & Stepper)</p> <p>CC-3 is a four-day course designed for SX and ZX users (applicable to Model 500 and most other X-language products, too). It will be held: September 17-20, 1996</p>	<p>CC-4: Model 4000 Training (Stepper)</p> <p>CC-4 is suitable for novice and experienced Model 4000 Controller users. November 4-7, 1996</p>	<p>CC-5: ZETA6104 Training (Stepper)</p> <p>NEW! This 5-day course is designed for user of the new ZETA6104 Microstepping Drive/Indexer. August 26-30, 1996 December 2-6, 1996</p>
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For more information on Compu-Course Training, call Gail McLaughlin at 1/800/358-9068 (ext. 2459) or request document #3500 from Compumotor's FaxBack System 1/707/586-8586.





Win a Free California Get-Away Weekend!

Compumotor Application Story Contest

It's simple and easy. Just complete a short entry form, briefly describe your Compumotor motion control application and include a picture of your machine/process. That's it! Any application can win. We'll select a winner during each issue and publish the winning entry in this publication.

Here's how it works:

1 Complete an *Official Compumotor Application Story Contest Entry Form* and return it to Compumotor. Get the form and detailed instructions by calling our new faxback system—(707) 586-8586

or call Compumotor's Marketing Communications Department at 707-584-2439.

2 Entrants must provide a completed form *and photo* of the application/machine. Entries for this issue must be postmarked by August 30, 1996. All entries shall become property of Compumotor. Compumotor ATCs are not eligible.

Here's what we're looking for:

- ☛ A complete and accurate description of your application and process
 - ☛ A good, clear photo of your machine
- The winner will receive a

California Get-Away Weekend compliments of Compumotor.

The grand prize includes the following:

- ☆ Two round-trip airline tickets to San Francisco (or vicinity)!
 - ☆ Accommodations for two nights at a Rohnert Park, CA inn or hotel (45 miles north of San Francisco).
 - ☆ A tour of Compumotor's manufacturing plant (lunch included) and a chance to meet the engineers who designed your product(s)!
 - ☆ A Compumotor Gift Pack (\$100 value)
 - ☆ A free California Bay Area vacation!
- First-place and second-place

runner-up winners will receive Compumotor Gift Packs and a voucher for a free Compu-School (technical training seminar—\$1,000 value). Compu-School is conducted at Compumotor. Runners-up pay for airfare and accommodations.

To get an official entry form, call our new faxback system. Request document #2222.



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Yes! I would like more information on the topics in this issue.

Please send me the following:

- 1996 Compumotor Systems Catalog
- 1996 Compumotor OEM Catalog
- 1996 Daedal Manual & Motorized Positioning Systems Catalog
- Hauser HLE & HZR Series Linear Drive Catalog
- Automation Actuator ParFrame Catalog
- Compumotor's New CE Brochure**

Please fill out the information below if your label is incorrect or to add a friend to our mailing list.

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 City _____ State _____ Zip Code _____
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For faster response, simply fax this page back to Compumotor 707/584-2446 — Attn: Newsletter Fulfillment, or mail it back to the address above.