DMC-40x0 Accelera Series Now Available with 2 Ethernet Ports

Galil has just released the latest model in the DMC-40x0 Accelera Motion Controller Series. There is now a -C022 option that provides two Ethernet ports for easy-daisy chaining of multiple controllers. The -C022 option is available for 1- through 8-axis versions of the DMC-40x0 motion controller. For example, DMC-4060-C022 specifies a 6-axis model with dual Ethernet ports.

The DMC-40x0 is part of Galil’s latest generation Accelera series. Based on a powerful RISC processor Accelera controllers provide ultra high-speed with 40 microsecond command processing, up to 32kHz servo update rates, and acceptance of encoder inputs up to 22MHz. Other features include optically isolated inputs and outputs, high power outputs for driving brakes and relays, uncommitted analog inputs, dual encoder inputs for each axis, and plenty of program memory for storing application programs.

The DMC-40x0 provides precise control of a variety of motors including brush servos, brushless servos, steppers and piezo ceramic motors. It can be easily connected to external drives of any size or to internal multi-axis drives contained within the DMC-40x0 controller. The DMC-40x0 controllers with internal drives reduce space, cost and wiring. Table 1 shows the multi-axis drive options available for the DMC-40x0 series.

(Cont. pg 2)
Introduction

The use of linear motors for precision motion applications has increased as technology has improved.

A linear motor typically uses a servo drive with sinusoidal commutation to minimize torque ripple and provide quiet smooth motion. It is also becoming more common for linear motor manufacturers to provide position feedback in the form of an analog sin/cos encoder as this method uses the signals from the motor magnets and is more cost-effective. Galil motion controllers now provide options for sinusoidal drives and interpolation of sin/cos analog feedback for smooth control of ultra-high performance applications.

Galil controllers use an intelligent interpolation algorithm allowing inexpensive sin/cos signals to be used successfully in high-precision applications. The AF command is used to set the analog feedback resolution at 2n counts/period. Galil drives perform sinusoidal commutation and are easily programmed using a choice of three different commutation methods. An example showing how to configure Galil controllers and sine drives for use with linear motors with sin/cos encoders is below.

An example of a Galil Controller used with a Copley ServoTube Linear Motor

Galil’s DMC-31012 motion controller with an internal 800W sinusoidal drive and sin/cos feedback interpolation option was used in an application with a Copley ServoTube linear motor with sin/cos encoder. The goal was to move a stage and maintain a position accuracy of .04mm. The stage manufacturer specified a 25.6 mm/sin feedback period for the encoder signals which is equivalent to the motor’s magnetic cycle.

The AF command was used to interpolate the analog feedback at 2n counts/period. N = 10 was used for this application. AF 10 provided an interpolation of 1024 counts/period. The system position resolution can be calculated using the equation below:

Resolution = 25.6mm /1024 counts = .025mm/count

.025mm/count resolution is within our target accuracy of .04mm.

It’s important to note that sin/cos feedback sensors are analog and more prone to noise compared to a digital signal. The DMC-31012 allows an AF of 12 but AF 10 was chosen because it met the accuracy specifications while minimizing the affect of noise.

There are three methods to initialize sinusoidal commutation with Galil sinusoidal drives, BI, BZ and BX. For this application, the BZ command method was selected because it was better for high static friction. The BI command, which uses

Table 1: Internal Multi-axis Drive Options for DMC-40x0 Series

<table>
<thead>
<tr>
<th>Model Number</th>
<th>Motor Type</th>
<th># of Axes</th>
<th>Current</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMP-43040</td>
<td>Servo</td>
<td>4</td>
<td>7A cont, 10A peak</td>
<td>20-80V</td>
</tr>
<tr>
<td>AMP-43020</td>
<td>Servo</td>
<td>2</td>
<td>7A cont, 10A peak</td>
<td>20-80V</td>
</tr>
<tr>
<td>AMP-43140</td>
<td>Servo</td>
<td>4</td>
<td>1A cont, 1A peak</td>
<td>±12-30VDC</td>
</tr>
<tr>
<td>AMP-43240</td>
<td>Servo</td>
<td>4</td>
<td>10A cont, 20A peak</td>
<td>20-80V</td>
</tr>
<tr>
<td>AMP-43520</td>
<td>Servo, sine communication</td>
<td>2</td>
<td>8A cont, 15A peak</td>
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<td>4</td>
<td>1A cont, 2A peak</td>
<td>15-30VDC</td>
</tr>
<tr>
<td>SDM-44020</td>
<td>1,2,4,16 step</td>
<td>2</td>
<td>1.4A/phase</td>
<td>12-30VDC</td>
</tr>
<tr>
<td>SDM-44040</td>
<td>1,2,4,16 step</td>
<td>4</td>
<td>1.4A/phase</td>
<td>12-30VDC</td>
</tr>
<tr>
<td>SDM-44140</td>
<td>64 microstep</td>
<td>4</td>
<td>3A/phase</td>
<td>12-60VDC</td>
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Model Number | Motor Type               | # of Axes | Current           | Voltage |
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halls to initially commutate, is ideal in most cases but the Copley motor did not provide Hall sensors.

Another parameter used for commutation was the BM command. BM is the brushless modulus of the system or the length for which one magnetic cycle completes. For the Copley ServoTube, the motor’s sin/cos period is the same length as the motor’s magnetic cycle. For AF 10, the setting for BM is 1024.

Once AF, BZ and BM were configured during initialization, the controller system was tuned for optimum performance using the GalilSuite tuning software.

GalilSuite Software is now available on Linux Red Hat 5.x

GalilSuite-Overview

GalilSuite Revision 1.0, released on Windows in January 2013, is now available on Linux Red Hat 5.x. GalilSuite is a powerful and flexible tool for configuring, analyzing and tuning Galil motion and I/O controllers. GalilSuite provides an impressive user interface, servo tuning capabilities with multiple tuning methods, real-time scopes, multiple device management, and simplified communications. In addition, a comprehensive GUI as well as automated help for all tools allows easy management of the complete system.

GalilSuite provides eight tools for managing Galil controllers:
- Launcher - manages controller connections
- Configuration - defines various controller parameters and provides backup/restore capability
- Terminal - for entering and receiving controller commands
- Editor - for writing, saving and executing application programs
- Viewer - provides a graphical display of controller and I/O status
- Scope - captures and plots controller data such as motor position and velocity
- Tuner - for selecting controller PID parameters for optimal servo system response
- Watch - displays controller and I/O status in tabular format - useful for debugging

Ordering Information

The GalilSuite Lite Revision 1.0 software is available for free to users of Galil controllers. GalilSuite Lite includes all of the tools except the Scope Tool and Tuner Tool. A software license for GalilSuite must be purchased to use the full set of tools.

Galil 2-day Live Training Coming in July 2013

Our next two-day product school for new distributors, reps and customers is Monday, July 15 through Tuesday, July 16, 2013. If you are new to Galil, sign-up now! The training will be at our headquarters in Rocklin, CA (near Sacramento).

This technical training provides an overview of Galil products, a description of system elements, tuning, motion programming, software, troubleshooting and hands-on labs with actual hardware. On the afternoon of the second day there is an opportunity to spend one-on-one time with the application engineers to ask additional questions or discuss individual applications. Past attendees have given us great reviews about our training.

To register go to the Galil website at http://www.galilmc.com/learning/training-at-galil.php or contact Ann Keffer at annk@galilmc.com or Mark Middleton at Mark.Middleton@galilmc.com. Please register by July 1, 2013!
Galil. We Move the World.

With over 500,000 controllers installed worldwide, Galil is the leading supplier of motion controllers. Galil’s legacy of innovation began in 1983 with the introduction of the first microprocessor-based servo motion controller. Today, Galil continues its leadership by offering the most powerful, cost-effective and easy-to-use controllers to accommodate all your motion and I/O needs.

Galil offers a broad array of motion controllers in a variety of formats: single and multi-axis, card-level and box-level, bus-based and stand-alone. Galil’s Ethernet/RS232 and PCI controllers are available in an Econo version for lowest cost and Accelera version for ultra high-speed performance. Plug-in, multi-axis drives for steppers and servos save space, cost and wiring. For intelligent I/O control, the RIO Pocket PLC is compact, low-cost and packed with analog and digital I/O.

At Galil, we share our expertise with our customers. You will find a wealth of information on our website at http://www.galilmc.com. Here you can view any of Galil’s free web-tutorials, read an application note or white paper, post a question on our bulletin board, or download the latest software and manuals.

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- MotionCode™ Toolkit, step-by-step solutions with downloadable code
- MotorSizer™ Tool for quick sizing of stepper and servo motion systems
- Interactive bulletin board with knowledge base for fast answers to your questions
- Customer stories and videos
  http://www.galilmc.com/support/smartmoves.php
- Product catalog with specs and pricing
  http://www.galilmc.com/support/catalog.php