

Your guide to practical products, technologies and applications

Automation NOTEBOOK™

Spring 2006

ISSUE 6

Cover Story

Dredging up the... *Future*



New Product Focus C-more™ touch panels

Technology Brief

C-more™ touch panels -
Q & A

Feature Story

It Takes Teamwork to
Launch Products

More Communications for DL05 & DL06 Micro PLCs



D0-DCM Dual Port Serial data communications module

- TWO extra communications ports for the DL05 & DL06 PLCs
- Baud rates from 300 bps to 115.2 Kbps
- Network interface to DirectNET & MODBUS RTU (master/slave)
- K-Sequence protocol (slave only)
- RS-232C, RS422/485 serial protocol support



H0-ECOM100 100Mb Ethernet communications module

- Ethernet communications for the DL05 & DL06 PLCs
- 10/100Mb transfer rates (autosense)
- MODBUS TCP/IP support
- DHCP support (obtain IP address automatically)
- HTML configuration from any Web browser



F0-CP128 Triple Port OverDrive CoProcessor module

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DL05 & DL06 Micro PLCs



DL05

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Automation NOTEBOOK

Your guide to practical products, technologies and applications

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Editor's Note

At one time or another, we have all said it. In fact, we've all said it so much it's become cliché. But, I'll say it anyway. "Another year has come and gone." And what a year it was.

2005 was not only an incredible year around the world, but also here at AutomationDirect. But we could not have done it without you, our customers. For 11 years now, our number one goal has been to offer high-quality automation products at low prices while providing superior service. According to you, once again we are doing just that.

One of the ways we hope to continue serving you is through informative articles in Automation Notebook. In this jam-packed edition, you will find more new products and user application stories. Read about ways customers are using the new *C-more* panel to gather information remotely using Ethernet. An article detailing how the University of Arizona is using automation would make even Shakespeare proud. To understand how important technology is in regards to the environment, read the cover story on coastline reconstruction after Hurricane Katrina. And be sure to see the Business Notes section and learn how AutomationDirect is supporting technical education.

It's going to be another exciting year. We are currently preparing our next catalog which, as you can expect, will have even more new products to make your applications run more smoothly. Here's to the New Year! Now, turn the page and enjoy...

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Table of Contents

New Product Focus <i>C-more™</i> touch panels	4
Product Snapshots <i>SureServo™</i> , Thin-finger Wire Duct, New Sensors, DO-DCM & FO-CP128, New Relays & Timers, 22mm pushbuttons without contact blocks	6
Cover Story Dredging up the... <i>FUTURE</i>	8
PLC Speaking The Latest in PLC Ladder Logic	10
Business Notes Goings-On in the Automation Industry	12
User Solutions DL205 Performs in Theatrics Box Manufacturing in Ohio	14 14 15
Feature Story It Takes Teamwork to Launch Products	18
Technology Brief Dealing with Low-voltage Power Issues	20
Tech Thread Answers to Questions about Our New <i>C-more</i> Operator Panel	22
Technical Review A Condensed Guide to Automation Control System Specification, Design and Installation Part 4: Build, Launch & Maintain	24
FYI PLC Tips from the Tech Team	28
The Break Room Royal Misunderstanding Brain Teasers	30

New Product Focus

what's New



New Generation HMI now available

AutomationDirect has released its totally new and radically improved operator touch panel line, *C-more*, manufactured by parent company Koyo Electronics, part of the multi-billion dollar Seiko group.



C-more touch panels are programmed using *C-more* programming software and provide power and flexibility through a vast set of features. The panel displays are available in either grayscale (15 shades of gray) or full color (256 to 65,536 colors, depending on model). STN grayscale and color displays are available in a 6-inch touch screen. Color TFT touch screens are available in 6, 8, 10, 12 or 15-inch versions. Prices start at \$425 for the 6-inch STN grayscale unit.

Hardware features include an analog touch screen that eliminates defined touch cell boundaries so objects can be placed, scaled and overlapped without limitation. Reliable 50,000 hour backlights for the touch screens are user replaceable on all but the 6-inch models. *C-more* 6, 8 and 10-inch units are equipped with 10MB project memory; 12 and 15-inch units contain 40MB of project space. A host of communication options are available, including serial RS232, RS422/485 and Ethernet 10/100BaseT ports. *C-more* has 2 USB ports, one type A, and one type B. The type B port uses a standard USB cable and connects the panel to a PC for fast

and easy project transfers. The type A port accepts devices such as a USB flash drive. Optional CompactFlash cards up to 1GB or USB memory devices can be installed in most models to accommodate alarm, event and message logging. An audio output port, when attached to an amplifier and speaker(s), can play warning sounds or pre-recorded messages. All touch panels are 24 VDC powered; an optional attachable AC power adapter will be available in the future to power the panels from a 100-240 VAC 50/60 Hz voltage source.

C-more is programmed with easy-to-use Windows-based configuration software that provides a powerful set of tools for developing projects. Touch panel to PC communications is established via the USB or high-speed Ethernet port. The configuration software includes 4,000 built-in symbols and 14 typefaces with hundreds of font sizes. Advanced graphic features include animation of bitmaps, overlapping objects and custom object creation. High-level communication capabilities include a built-in FTP server, FTP client, email client and Web server. Alarm and message logging can be configured to store data to an installed Flash or USB device and can be collected manually by simply removing the device from the *C-more* panel. Alarm and message log files can be emailed automatically from the panel and accessed via FTP as well. An Event Manager goes beyond simple alarm and message functions and allows *C-more* to take action based on events such as assigned state changes, schedules, PLC tag names or other events configured in a database. The event can also trigger a sound byte, initiate a screen capture, or perform other pre-defined communication actions. With the Web server feature, any networked PC with a browser can

request screen captures and retrieve log files from *C-more* panels on the network.

A standout feature of the *C-more* programming software is the project simulator, which allows the developer to view a *C-more* project on the PC screen exactly as it would appear on the touch panel. Without being connected to a *C-more* panel, all functions of the screens can be tested, including touch objects, entering data values and testing the functionality of display objects by changing data tag content. The simulator can save hours of programming and debugging time before ever downloading the project to the panel. The *C-more* programming software is priced at \$129.

For complete details on the *C-more* product line, visit <http://c-more.automationdirect.com>

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Thin-finger style now available

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Product Snapshots

Press Releases



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Cumming, GA---January 6, 2006

---AutomationDirect has released the SureServo family of fully digital AC brushless servo systems. The line includes eight standard servo motors, in both brake and non-brake models, that are operated in combination with one of three standard servo drives. The SureServo AC systems range in size from 100W to 3 kW continuous power, provide from 0.08 to 26.4 ft-lb of peak torque, and can be controlled in position, velocity or torque mode. Configuration and diagnostics of the servo drives is performed via the built-in keypad/display or the SureServo Pro™ software. All SureServo systems offer both a manual tuning mode and two adaptive auto-tuning modes. Low-inertia models range incrementally from 100W to 1 kW with speeds up to 5000 rpm, and medium-inertia models from 1 to 3 kW with speeds up to 3000 rpm. Motor pricing starts at \$319 and drives at \$479. Accessories include

motor feedback and power cables, and regeneration resistors.

Thin-Finger Wire Duct now available



Cumming, GA---October 12, 2005

---AutomationDirect now offers the T1E series thin-finger wire duct for applications requiring compact wiring. Available in white or gray in sizes ranging from 1.00 x 1.50 inches to 4.00 x 4.00 inches, the T1E series is made of rigid PVC and carries a UL 94V-0 flammability rating. The narrow thin-finger design is compatible with thin style screwless terminal blocks. The rounded, burr-free edges will not slice installers' hands or wire insulation, and the restricted slot design retains wires for fast, easy wire installation or removal. The duct is scored with two break lines, one for break-off and removal of sidewall finger segments only, and another for removal of sidewall finger and base segments. All wiring duct is sold in 2-meter lengths and comes complete with a non-slip flush cover. Duct with cover is available in cases or as single pieces, starting at \$14 for a single piece.

Sensor line extended



Cumming, GA---January 18, 2006

---AutomationDirect expands its sensor line with four new series. The UHZ

ultrasonic series is available with an 18-30 VDC input range and a NO or NC PNP or NPN transistor output. The UHZ series has a maximum sensing distance of 300 mm, is IP67 rated and features electrical protection from short circuit, overvoltage, and reverse polarity. The UHZ series is sold as a through-beam pair for \$159.

The FARS series, priced at \$45, are 18 mm non-metal tubular diffuse sensors featuring background suppression with a maximum sensing distance of 130 mm. All models are available with an 18-30 VDC input range in a choice of a NO or NC, or a Light On - Dark On PNP or NPN transistor output.

The MQ series AC diffuse photoelectric, with a unique 90-degree optic package, fits in a standard 18 mm mounting bracket or mounting hole. These 20-250 VAC sensors with background suppression feature an M12 disconnect, Light On - Dark On selectable NPN output and are priced at \$59.

The 8 mm tubular stainless steel HEE/HER series consists of through-beam sensor pairs available with an 18-30 VDC input range in a choice of a NO or NC PNP or NPN transistor output switch a one meter sensing distance. Prices start at \$80 for an emitter/receiver through-beam pair.

More communication modules for DL05 & DL06

Cumming, GA---September 29, 2005

---AutomationDirect has introduced two new communications modules for the DL05/DL06 micro PLC family. The D0-DCM module (\$129) adds two serial ports to any DL05 or DL06 PLC, using RS-232 or RS422/485 (only MODBUS supports RS485) data interfaces at baud rates up to 115.2 Kbps.



Port 1 supports MODBUS RTU, DirectNET, and K-Sequence slave protocols; Port 2 can also operate as a DirectNET or MODBUS master.

The F0-CP128 CoProcessor module (\$185) offers three serial communication ports that are configurable using the module's full BASIC programming capability. The module features a 100 MHz clock speed, RS-232 or RS485 data interface options, and baud rates up to 512 Kbps.

Either module can be installed in the option slot of the DL05 or in any of the four option slots available on the DL06 PLC models.

Relay line expanded



Cumming, GA---March 1, 2006

---AutomationDirect announces exciting additions to its line of relays. The AD-70-STM-1 Socket Timing Module (\$29) converts 783 and 784 series relays to time delay relays, creating a cost-effective alternative to integrated timers. The Socket Timing Module has selectable time scales ranging from 0.1 second to 10 days and can be fine adjusted with the built-in

potentiometer. The 784-4C-SKT-1 socket (S3) works with this module and the 784 series cube relays.

The new 783-3C (\$7) series cube relays, equipped with 24V AC/DC or 120/240 VAC coils and a 15A contact rating, require the 783-3C-SKT (\$4) socket.

The 755-2C single coil, 16A contact magnetic latching relays are available in 120 and 240 VAC. The 755-2CD-24D is a dual coil 24 VDC magnetic latching relay with 16A contact rating. These relays require the 750-3C-SKT 11-pin octal base, available for \$4.25. The 755 series relays start at \$8.

22mm metal pushbuttons offered without contact blocks



Cumming, GA---January 18, 2006

---AutomationDirect now offers black, red, and green 22mm metal pushbuttons without contact blocks. Both momentary flush and extended operators are available. These pushbuttons have 30mm actuators and mount in a 22mm hole. Each pushbutton includes the operator and support base only. Both pushbutton styles are CSA, IMQ (where specified), and UL approved. Normally open and normally closed contact blocks can be purchased separately in packs of two or five. The contact blocks can be mounted up to three deep and two wide. Price for the

new pushbutton operators is \$4.50.

DirectSoft5 Launch



Cumming, GA---March 1, 2006

---DirectSOFT5 PLC programming software from AutomationDirect contains many new features that make ladder logic programming faster and easier. The most important programming improvement is the addition of "IBoxes" which are modularized instructions that configure analog cards, CTRIO high-speed counters, ON/OFF delay timers, and equations. With DirectSOFT5, documentation can be exported to C-more touch panels to use as tag names in the panel project. Other new features include customizable point and click editing and automatic backup for the four most recently saved project changes. And, with a properly configured SMTP mail server, PLCs using an Hx-ECOM100 communications card can be enabled by DirectSOFT5 to send emails. Priced at \$395, DirectSOFT5 is available in a single package that supports the entire line of DirectLOGIC CPUs, eliminating the need for different packages for multiple PLCs. A free version of DirectSOFT5 allowing programming and downloading projects of up to 100 words is available for download at: www.automationdirect.com.

Cover Story

coastline reconstruction after Hurricane Katrina

Dredging up the...

FUTURE

by TJ Johns,
Senior Editor

People around the world are aware of the devastation caused by Hurricane Katrina along the coast of Louisiana, Mississippi, Alabama, and Florida. What started around the southeastern Bahamas on August 23, 2005 as Tropical Depression number 12, quickly became the fourth hurricane of the season just 48 hours later. When her catastrophic winds finally subsided, Katrina went into the record books as the deadliest hurricane in U.S. history since the Okeechobee Hurricane of 1928.

According to the National Weather Service, Katrina reached the maximum status of category five at 7am (CDT) on Sunday, August 28. By the next morning, the massive storm with maximum sustained winds of 125 mph had weakened to a category three just before making landfall near Buras-Triumph, Louisiana. But that did not lessen the impending damage.

Because the hurricane was a category five shortly before making landfall in the area of Bay St. Louis, Mississippi, the storm surge created by Katrina was the highest on record, where measurements of 34 feet were recorded. The devastating water damage, along with the wind damage, earned Hurricane Katrina the record for the costliest U.S. Atlantic hurricane of 2005. Estimates by the National Hurricane Center report \$75 billion in damages. Other estimates range from \$40 to \$120 billion. Michael Chertoff, Homeland Security Secretary, said the destruction and consequential flooding of New Orleans makes Hurricane

Katrina "probably the worst catastrophe, or set of catastrophes" in America's history.



Homes, businesses, schools, and hospitals were severely damaged, if not destroyed. When the flood waters peaked, eighty percent of the city of New Orleans was under water. With so many lives lost, Katrina was named among the top five deadliest hurricanes in history. However, one victim of Hurricane Katrina, the wetlands along the Gulf coast, is not part of that statistic. In fact, it is one that most would overlook, yet quite possibly it could be the most important.

The state of Louisiana is home to forty percent of U.S. wetlands. According to scientists with the U.S. Geological Survey, satellite data shows Katrina "transformed more than 30 square miles of marsh around the upper portion of Breton Sound to open water." That's the equivalent of 20 to 26 percent of the 133 square mile area.

With loss of wetlands averaging between 25 and 35 square miles each year, natural protection from storms is also lost. Wetlands create a "front line" of defense by acting as a "sponge" to soak up incoming flood waters and create friction to help lower the storm surge. For every mile of wetlands crossed, the storm surge can be lowered by up to a foot. If the wetlands are not saved or returned, scientists say effects from hurricanes will only worsen.

This is where technology is being

put to good use. Through dredging, a process that moves sand and sediment from one point to another, wetlands can be repaired and rebuilt.

Most dredging machines work well in deep water situations, using swing anchors to move the dredge from port to starboard. The dredge is able to move short distances, but then additional equipment is required to move and reset the anchors in another location before the dredging process can begin again. In more difficult situations, such as extremely shallow conditions, operators can find themselves "stuck in the mud."

There was a need to develop a dredge that could move freely between water and soft terrain. But where could anyone find such a machine? The answer has been found in Reserve, Louisiana. Dredging Supply Company and Wilco Marsh Buggies have developed the latest aid in coastline reconstruction, known as the amphibious dredge.

According to Bob Wetta, vice president of Dredging Supply Company, one problem was that with typical dredging machines, "to move the equipment around, you [need] a mobile crane."

Bob points out that with so many shallow areas along the coast of Louisiana, the situation might not be right for just a dredge, because it might be too shallow to actually float a boat. Operators could find themselves grounded, having to dig their own means of flotation. Sometimes, they could even run out of water, the number one requirement for dredge pump operation.

Through a joint venture, Dredging Supply Company and Wilco Marsh Buggies decided that wetlands coastal erosion was an area that needed to be addressed and developed the concept of

the amphibious dredge. After almost a year of design and development, a vehicle emerged with the capability to dredge one pond and then crawl unassisted to the next pond, eliminating the need for a crane.

The new vehicle is called the "Amphibian." This self-propelled amphibious dredge is a blending of Dredging Supply Company's swinging ladder dredge and Wilco's track and flotation amphibious undercarriage system. Weighing in at 95,000 lbs, the Amphibian works as well in soft terrain as it does in deeper water.



Wetta explains the Amphibian is capable of walking on the bottom of a shallow area, "and as it moves into deep areas, it converts into a floating style dredge using a typical dredging method." This versatile machine has sufficient power to pull up to 4,000 feet of 8-inch SDR Polyethylene discharge pipe behind it on the dredging site. Or, by eliminating the pipe and fitting the Amphibian with a side caster, an operator crew can deposit material locally onto a marsh area while deepening a drainage canal. This is also helpful when wetland creation projects require building access roads to the site. The side caster can be used to create and remove the access road.

The Amphibian is unique in its ability to dig in both forward and reverse directions. To accomplish that, "the ladder boom [must] be able to articulate and come back underneath the machine," Bob says. The dredge

is equipped with a swinging ladder boom with an off-center cutting width of 25 degrees port to starboard. This design provides stability for the dredge hull while the ladder is moved from side to side.

When working in deep water, the hull of the dredge is held in place by two forward spuds (large steel poles) and one aft spud. Each of these spuds has "power down" capability. Using the spud's winch system, the operator forces the spud into the bottom, obtaining maximum penetration and holding power. The aft spud is hydraulically manipulated. Mounted on the centerline of the dredge, this spud can pivot to move the dredge forward during the dredging process, eliminating the need for anchors. With just the push of a button, the Amphibian can move forward, back, and change directions.

The heart of the control system is an AutomationDirect DL205 PLC with a color touch screen operator panel. Feedback switches are connected to DC input modules that provide status to help control the ladder boom, spuds, pump, tracks and other components. Analog signals monitor the electronically controlled Caterpillar diesel engine's operating parameters, including torque, temperature, horsepower, fuel burn rate, and pressure. The touch panel displays the information and allows for operator control.

The Amphibian moves freely on land and in water using Wilco's undercarriage system. The wide chain-driven dozer style tracks are driven by two-speed hydraulic motors. With the track system, the Amphibian smoothly climbs and inclines up to 60 degrees.

Through the use of a Global Positioning System (GPS), accurate depth and position of the excavator can be maintained. Separate satellite receivers are mounted on the bow and

stern of the dredge. Coupled with ladder angle and depth transmitters, the satellite receivers send depth and position data when the dredge is stationary. The GPS software displays real-time data, preventing the operator from passing over material. It also permits leaving the dredging area and later returning to the exact spot.

By using the Dredging Supply Company's patented "Viscous Excavator," contaminated sediments with high solids concentration can safely be dredged with extremely low turbidity levels, resulting in the lowest level of re-suspended solids of any form of excavation currently in use today.



With the convenience and versatility of the Amphibian, restoring the wetlands in Louisiana is becoming less complicated. It plays an important role by deepening the drainage canals, which helps reduce erosion in other areas. When it digs the canals, it can dispose of the material in an area that needs to be filled. Since the material is fairly fertile, more vegetation can grow and replenish the wetlands. Although there is currently only one Amphibian in use for the Katrina clean-up, there is much interest in models ranging from 6 to 16 inch pump sizes.

We have all heard the saying, "Don't dredge up the past." Thanks to the people at Dredging Supply Company and Wilco Marsh Buggies, we can now say, "We're dredging up the...*FUTURE*." 🌱

PLC Speaking

Let's talk PLCs



The Latest in PLC Ladder Logic

by Jeff Payne,
AutomationDirect Product Manager
PLC, I/O and PC-Controls Group

Developed in the early 1990s to program *DirectLOGIC* PLCs, *DirectSOFT* programming software was one of the first Windows®-based ladder logic software packages on the market. Over the years, it has seen several major enhancements and improvements, but this year *DirectSOFT* is receiving the most dramatic makeover of its existence.

As users became more comfortable with the features Windows-based software could offer, they began asking for these features in our software. So we put our development team to work and they created features to customize the *DirectSOFT* workspace. *DirectSOFT5* has taken an enormous leap forward and targeted efficiencies such as ease of use, reduced programming time, flexibility, and a better value overall.

With *DirectSOFT5*, users will see new Tabbed Views designed to optimize the viewing area. When controlling multiple ladder, stage, mnemonic, PID and other views, the organization is very simple. You can also easily toggle between the new tabbed style and the original Multiple Document Interface (MDI) found in older versions of *DirectSOFT*.

Tool bars are now fully customizable, which allows you to configure the tools with your most commonly used functions.

New Dockable Views allow you to relocate, auto-hide or even tear away Dataviews and cross-reference views and place them outside the *DirectSOFT* work space to maximize the ladder area for full viewing.

There are user interface themes that let you give *DirectSOFT* the look and feel that you are most comfortable with. Choose from a Windows® 2003 style, Windows® XP style, or even a Macintosh style.

The "Tip of the Day" presents simple suggestions on how to learn new features of *DirectSOFT5*, as well as how to take advantage of short cuts. By default, this feature will show a new tip each time you start your programming software.

However, you can always go to Help -> Tip of the Day and view the entire list at your leisure.

Another area of *DirectSOFT* that underwent major improvements is at the instruction level. There are 66 new instructions to make programming faster and easier. These new instructions, called IBoxes, are fill-in-the-blank programming blocks designed to consolidate repetitive programming routines such as configuring an analog module, creating an on delay/off delay timer, solving complex math problems, setting up a network configuration, and more. For example, to perform a calculation previously, you might have multiple math instructions like Load, Add, Subtract, Out, Pop, Divide, Outd and so on. With the new IBox instruction, you select an instruction based on the data type, specify the result location, then enter a formula just like you would using Excel® or other programming languages.

IBox instructions are also used for sending e-mail through an ECOM100 Ethernet Communications module, or when setting up a CTRIO high-speed counter module.



A major change in the software family is the product offering has been reduced from the previous multiple versions down to one full version PC-DSOFT5, at a reduced price of \$395, and a new free version.

DirectSOFT100 (PC-DS100), the FREE programming package, offers ALL of the features of the FULL package with one limitation - you may only download a program up to 100 words in size. DS100 still allows you to take advantage of the new IBox instructions, and you still have the capability of configuring PID loops and programming with DRUM instructions. You may even develop a program larger than 100 words, but you can only save that program to your PC. DS100 does not allow you to re-open a project larger than 100 words. So if you create a project larger than 100 words, you will need to purchase a software key to install the FULL package, which then allows you have full use of the larger project.

Do you have a PLC family-specific version of *DirectSOFT*? AutomationDirect offers an upgrade package that can migrate your existing PLC family-specific package, with proof of previous purchase, to the Full version of *DirectSOFT5*. So if you have a *DirectSOFT* 205 only, or the BRICK package, the upgrade will give you access to ALL *DirectLOGIC* PLCs.

DirectSOFT5 will give you major improvements in ease of programming and efficiency. To download DS100 for a trial run, visit:

<http://support.automationdirect.com/demos.html>

INTRODUCING WWW.SURESERVO.COM FROM AUTOMATIONDIRECT



SureServo™

The new *SureServo* family of brushless servo systems from AutomationDirect is fully digital and offers a rich set of features at dynamite prices. Choose from eight standard servo motors that can be used in combination with one of three standard servo drives.

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WHY USE A SERVO?

The *SureServo* servo systems provide the highest possible level of performance for precise control of position, velocity, and torque. As compared to lower cost stepping systems, the *SureServo* servo products provide:

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- Higher response with closed-loop control



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Business Notes

Goinas-On in the Automation Industry



FIRST Robotics Team sponsored by AutomationDirect hits the ground running



The Forsyth Alliance is a team of Atlanta area high school students, sponsored by AutomationDirect, participating in the FIRST (For Inspiration and Recognition of Science and Technology) organization's 15th Annual Robotics competition. They spent the fall months of 2005

building the previous year's game robot to gain the experience needed to hit the ground running in January, when this year's competition was officially launched. Skills the students learned in those twelve weeks included microprocessor programming, principles of servos, hydraulics and pneumatics, welding, CAD and 3-D modeling programs, and more.

(See www.forsythalliance.com/photos.htm for pictures of the completed test robot in operation.)

At local Kickoff meetings in January, all teams were shown this year's game field for the first time and received a common parts kit and manual of game rules and regulations. Registered teams have 42 days to take the 300-lb. pile of parts and design, build, test and ship a 130-lb. man-sized robot to a FIRST regional competition in their area starting in March 2006. Over 1,100 teams of high school students from the U.S., Brazil, Canada, Ecuador, Israel, Mexico and the U.K. are expected to participate in this year's competition.

The game this year is named "Aim High", and is set up similar to a basketball court. On each end is a wall with three goals. The objective is simple - to shoot, push or roll balls through any of the goals for pro-rated points. The game consists of three periods in which two alliances of three robot teams each compete against each other. In the first period, one team alliance is on offense, the other is on defense. In the second period, the roles reverse. During the final period of the

game, both goals are turned back on and both alliances can score. During the last 40-second period, teams need to get all three robots in their alliance up on a platform in front of each station wall to obtain bonus points. Teams winning their regional competitions will move on to the World Championship event being held in April at the Georgia Dome in Atlanta.

For more information about FIRST and the competition, visit <http://www.usfirst.org>.

Alameda County Electrical JATC builds Drives Lab with AutomationDirect products



The Alameda County Joint Apprenticeship and Training Committee provides training for hundreds of electrical apprentices and thousands of journeyman wiremen through intensive courses and lab experiences at their facility in San Leandro, California. Courses offered include instruction in the National Electrical Code, OSHA, PLCs and motor controls. To develop an advanced technology lab in the motor control/drives area, Coordinator Mel Switzer utilized Programmable Logic Controllers and AC drives from AutomationDirect. The resulting lab (pictured) gives students taking the Advanced Motor Controls class the opportunity to program variable frequency drives and learn advanced motor control techniques. For more information on the Alameda County JATC, visit <http://www.595jatc.org>

AutomationDirect recognized by Readers Choice Awards for fifth year

For the fifth consecutive year, the Readers Choice Awards, an unbiased survey performed by Control Design magazine, has recognized AutomationDirect's products and service as being tops in the industry. AutomationDirect received the highest scores of any supplier for technical support in the categories of Operator Interface, PLCs, PLC software, Power Supplies, I/O and Motor Starters.



Discussion Forums a good way to get answers (or at least opinions!)

In the Internet-enabled world, users of automation products have a wealth of technical information available to them. Suppliers' sites typically offer data sheets, manuals, and selection guides for their own products, while industry sites tend to focus on technology and applications. Sometimes there are questions that just can't be answered by the published documents, and for that, many designers turn to their peers in the discussion forums that have sprung up on suppliers' and user sites. One of the earliest forums was the Automation List, and there are now literally hundreds of sites where topics from PLCs to PCs allow users to pose questions or problems and get ideas or solutions from others across the globe. A few of the more well-known sites are:

www.plcs.net - Site focuses on PLC training and PLC system/application questions

www.control.com - Online community of control and automation engineers with forum topics such as Applications, Automation Business, HMI and Open Control. Encompasses the Automation List. Go to extensive link page <http://www.control.com/links> for other informational sites.

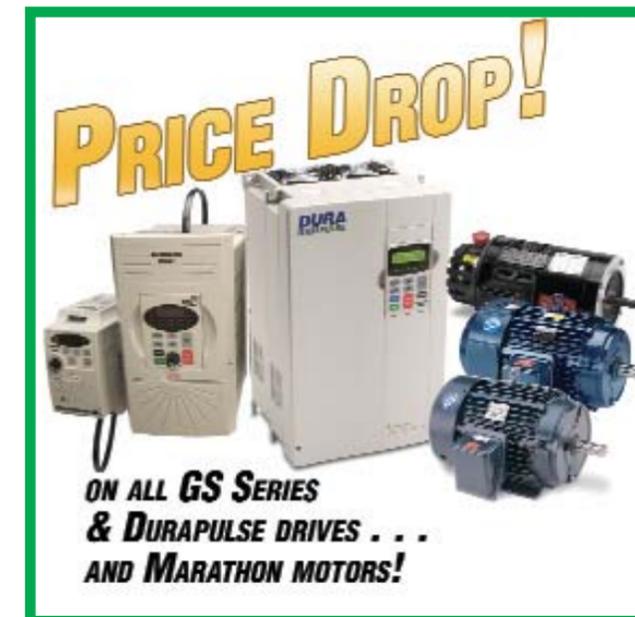
www.automation.com - Site that features new products and job listings for automation professionals, also has a technical discussion list

http://cr4.globalspec.com - Subsite of globalspec.com, encompasses a wide range of engineering and industry topics, including patents and engineering failures

Of course, suppliers such as AutomationDirect (<http://forum1.automationdirect.com>) and National Instruments (<http://forums.ni.com>) maintain forums

that focus on applications and questions regarding their own products.

Lower Prices on Drives and Motors



AutomationDirect announces lower prices on its GS1, GS2, and DURApulse drives and Marathon motors. Now save an average of 18% on the complete line of GS1, GS2, and DURApulse variable frequency drives. The Marathon lines of MicroMAX, Black Max, Blue Max, and Blue Chip inverter duty motors have been reduced 10%. Prices now start at \$99. 🇺🇸

"If I were required to guess off-hand, and without collusion with higher minds, what is the bottom cause of the amazing material and intellectual advancement of the last fifty years, I should guess that it was the modern-born and previously non-existent disposition on the part of men to believe that a new idea can have value."

- Mark Twain

User Solutions

Manufacturing

DL205 Performs in Theatrics

by TJ Johns
Senior Editor

Theatrical automation is a newly emerging field of technology. Through the use of automation, the University Of Arizona School Of Theatre Arts is enhancing the overall theatrical experience. Students Nathan Cross and Phillip Toussaint are using various types of AutomationDirect equipment to automate scenery. According to Nathan, the use of motors and computer control gives the technical crew the ability to create highly aesthetic and creative control systems. Operating in an environment typically powered by hand, the emergence of precise and safe control allows the movement of scenery and actors in a much more accurate and efficient way. Currently in his third year in the Masters Program, Nathan states, "High power motors and hydraulic systems allow us to smoothly move great amounts of weight in ways that are pleasing to the eye without detracting attention from the focus of the show."

Recently the School of Theatre Arts produced Shakespeare's *Henry IV parts I and II*.

The production needed a system capable of rapidly changing scenes as the dialogue quickly transitions from location to location. In order to achieve this, professor and scenic designer Peter Beudert devised a unique system that would easily be able to present different types of terrain and environments.

The basic set consists of an array of six hydraulic lifts placed on the central acting surface. Also at center stage, a wall, or "throne wall," rises up from the floor to a towering 16 feet

at only nine inches wide. In addition to the terrain, seven telescoping metal trees and two steel doors hanging from the ceiling all move independently to various positions.

The six hydraulic lifts are operated through AutomationDirect DL205 I/O with two 8-point relay output modules that send "up" and "down" signals to the valves operating each lift. To create the scene movements, each lift is equipped with multiple limit switches allowing it to stop precisely at several positions. The limit switches are sensed by a DC input module.

The throne wall, which rises from the floor, is placed in a room beneath the theater also known as "the trap room." The 300 pound wall is lifted by an 180V DC motor turning

a 13-inch steel drum. The DC motor is driven by a Minarik driver card and controlled with an 8-point relay output module as well as two limit switches wired to the DC

The metal trees and doors which descend from the ceiling are all suspended on cables connected to curtain movers. Using limit switches in a simple four wire configuration and two 220V relays wired to a DC output module, the curtain movers are designed to pull the curtains open or closed with the push of a button. Two DL205 I/O bases with Ethernet Base Controller (H2-EBC) modules are used to control two D2-08TR relay output modules, two D2-08ND3 DC input modules and one D2-32TD2 DC output module. The first EBC system is located under the stage to control the lifts, while the other is mounted above the stage on a grid to control the remaining elements.

The two DL205 I/O bases are connected to a computer through the Ethernet base controllers. The bases are networked through a router and connect to the PC, located in the theater's control booth, which uses Think & Do PC control software as the controller.



Electrical Engineering sophomore Phillip Toussaint focused on the Think & Do program, developing and testing for several weeks leading up to the show. The program contains arrays for positioning each tree and wall and for controlling the direction of each lift.

These arrays were designed throughout the course of rehearsals. Saving these arrays in "Cues" allows the computer to move all elements to the next position with the touch of a button located on the touch screen monitor. Since there are two parts to *Henry IV*, separate arrays were created in the program. For each part of the show, there were 30 or more separate transitions or cues.

Through the use of automation, the faculty and students of the School of Theatre Arts at the University of Arizona are excited about the endless possibilities available for set design. For more information on the Master of Fine Arts program at the University of Arizona in Tucson, check out <http://web.cfa.arizona.edu/theatre/>.

System Integrator Slashes Retrofit Price While Adding Value with AutomationDirect Products

by Chip McDaniel,
AutomationDirect

Box Making Machine Retrofit Project in Ravenna, OH.

CorrTech, Inc. is an industrial machinery services company that focuses on the corrugated paper and container industry. One of their customers, Smurfit Stone Enterprises in Ravenna, Ohio, recently requested the retrofit of a heavy-duty box-making machine built in the US circa 1970. The S&S ZLR Flexo Folder Gluer, which prints, folds, glues, and bundles boxes from flat corrugated sheets, was still in excellent mechanical condition, but over the years had developed electrical problems that were causing excessive amounts of downtime. Because of the antiquated relay and switch logic, pinpointing the root cause of the problem was very difficult and time consuming.

Tony Aman, maintenance manager at Smurfit Stone, asked CorrTech to upgrade the machine's electrical system to improve reliability and safety. "Other integrators had quoted this project in excess of \$75,000 -- without advanced features like a touch-panel operator interface," says Aman. "CorrTech leveraged their industry experience and the value of AutomationDirect equipment to complete the project for less than half that price, while adding features that are way beyond our expectations."

Because this machine is critical to Smurfit Stone's day-to-day operations, CorrTech agreed to undertake the project over the 2005 Thanksgiving holiday. The machine was gutted by removing all the control relays and wiring. CorrTech reconfigured the system using AutomationDirect's DL06 PLCs, newly released C-more touch-panel operator interfaces, a GS series variable speed drive, and a Marathon motor.

Enhanced Safety

One of the major concerns with the older system was the use of 480 VAC drum switches for controlling some of the motors. With focus on safety initiatives, CorrTech and Smurfit Stone considered this one of the prime justifications for the project. With the exception of a limited number of existing devices, the newly upgraded system is equipped with 24 VDC control wiring.

Simplified Operation and Maintenance

The operator controls were simplified with fewer buttons and more integrated functions. CorrTech selected a touch screen operator interface because it allows a myriad of controls

and indicators in a small physical space. The new design allows monitoring of every connected machine component for machine status, safety conditions, faults, and more, that would have required additional space and hardware on standard pushbutton control systems. Operators and maintenance technicians can now work from a single location to troubleshoot and operate the machine.

"We can't describe how pleased we are with the *C-More* touch panels. They have the clearest screens, most memory, enhanced functionality, and even more features than we could incorporate into the system," said Charles Lyle Adams, President of CorrTech. "The C-more panels were a last minute addition. We had been using AutomationDirect's older EZTouch screens, but the C-more panels became available a few days before we started the project. We obviously were not afforded a lot of time to learn the C-more programming language, but the panels turned out to be easy to program, easy to connect, and because of the standard Ethernet communications, we can troubleshoot and update the panel from our office in Georgia without having to travel to Ohio to plug in a special serial cable."

Increased Flexibility



CorrTech was able to reduce mechanical complexity and increase flexibility of the machine's bundle pusher assembly with the addition of the GS series AC variable

speed drive and Marathon inverter duty motor. In the original design, a mechanical gearbox was timed to the speed of the machine via a chain, controlling the size of the finished box bundles that were produced. Prior to the retrofit, operators used an electric clutch and mechanical linkage to literally 'shift gears', selecting from a limited number of bundle sizes. The variable speed drive (VSD) and motor combination replaced the shifting gearbox and the old electric clutch, and now any number of boxes-per-bundle can be selected using the C-more operator interface. The VSD solution also enables overload protection, machine speed tracking, and in conjunction with the C-more operator interface, a multitude of diagnostic features.

Ethernet Communication

CorrTech installed three AutomationDirect DL06 PLCs with 10/100Base-T Ethernet cards for networked communications. This allows control of over 150 I/O points with expansion capability. Any properly configured computer on the Smurfit Stone plant-wide network will be able to access the PLCs and the C-more panels. **Continued, p. 29 >>**



C-more & pay less!*



A complete touch panel line-up

Cost-conscious panels¹

- 6-inch STN, grayscale for \$425
- 6-inch STN, 256 colors for \$745

¹Does not include features requiring Ethernet, audio, CompactFlash (CF).

Vivid TFT panels with 65,536 colors²

- 6-inch for \$945
- 8-inch for \$1,065
- 10-inch for \$1,799
- 12-inch for \$2,099
- 15-inch for \$2,499

²Includes all the premium features!

*As compared to list prices for the three largest selling brands of PLC touch panels of similarly sized units with equivalent features.

**Note: "Past generation" refers only to the previous generation of PLC Touch panels sold only by Automationdirect under the name EZTouch. These comparisons are not relevant to any other company or their products even if they have similar names or part numbers.

It's totally new!

- **What is it?**
C-more is the latest offering in PLC touch panels from AUTOMATIONDIRECT.
- **What does it connect to?**
C-more connects to most leading brands of PLCs using built-in Ethernet or serial communication ports.
- **Who makes it?**
C-more is designed and manufactured by Koyo Electronics of Japan, a world class manufacturer of reliable and best value industrial products for over 50 years.
- **Why buy it?**
 - C-more offers over 200 improvements over our past generation** of touch panels.
 - C-more is backed by AUTOMATIONDIRECT's award winning service, voted #1 (in at least one product category) 5 years in a row in an independent magazine survey (Control Design).
 - C-more has one of the lowest costs of ownership when considering initial price, ease of use and technical support.

Premium features at a value price

Display

- 65K colors
- Bright TFT display
- Long-life replaceable bulb
- High resolution
- Improved temperature rating

Memory

- Minimum 10MB standard
- CompactFlash slot
- Supports USB memory devices

Programming

- Built-in simulator
- Background master screens
- Overlapping objects
- Advanced graphics
- Powerful animation
- Pop-up windows

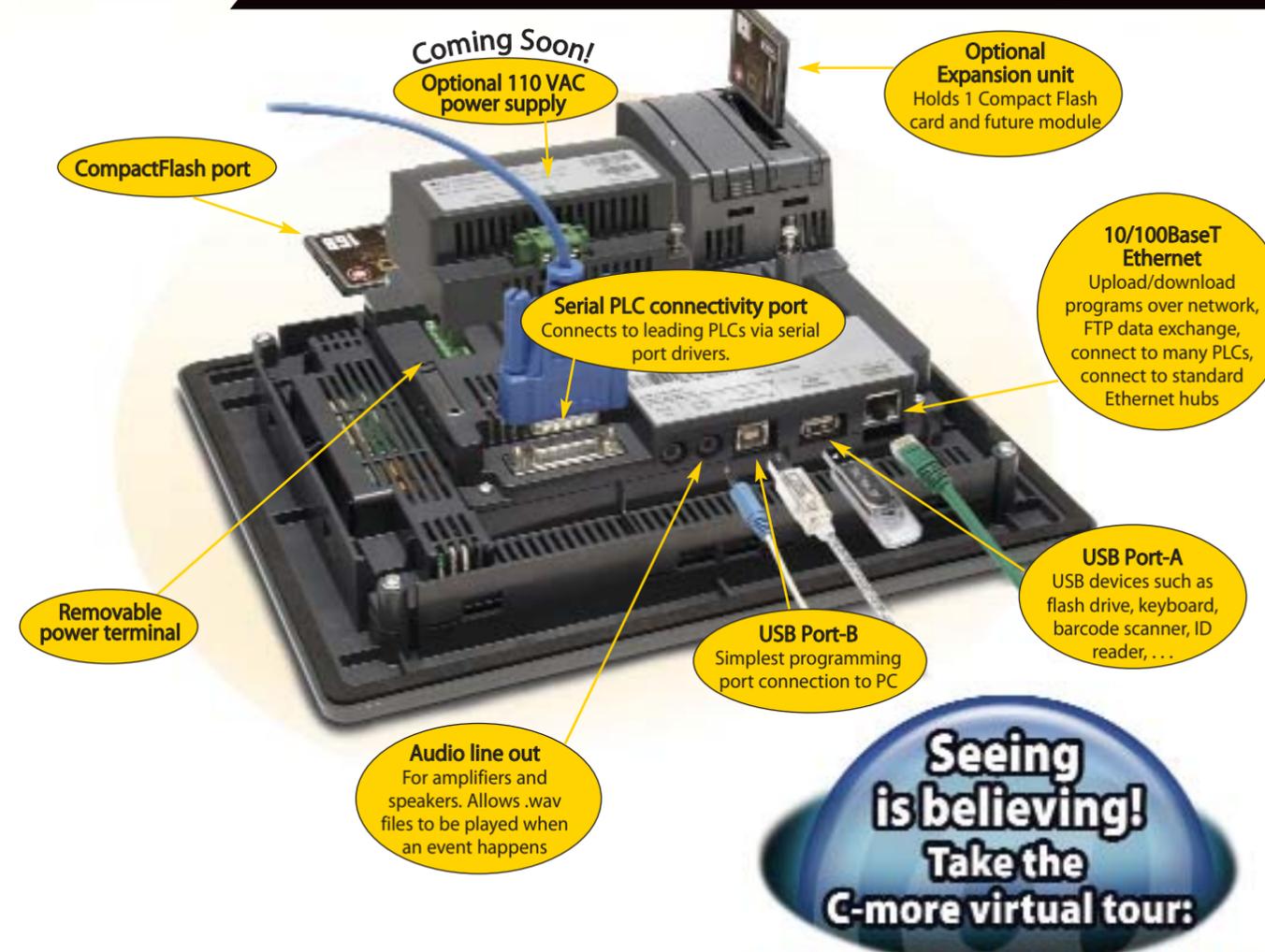
Compatibility

- Drop-in replacement for EZTouch**
- Converts existing EZTouch* (3.1a) projects
- Drivers for most major PLC brands

Communications

- Ethernet port
- Two USB ports
- Send e-mail
- FTP server/client
- Audio out

C-more's backside shows the power!



<http://c-more.automationdirect.com>



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Feature Story

Direct Catalog Automation Products

It Takes Teamwork to Launch Products

by Greg Philbrook,
AutomationDirect Product Manager

In the early 1990s, many automation suppliers thought that using a direct catalog channel to offer automation products was too risky to attempt. There were concerns such as getting customers to buy from a company they couldn't physically see, assisting them in selecting products, technical support, return and warranty issues and so on.

Because of these concerns, few automation suppliers wanted to risk the investment because they already enjoyed a large market share. To consider offering quality products at prices almost half of the industry average, free technical support, 30-day money-back guarantees, and in-stock products with same day shipping, would have made most suppliers think twice. It would take far more than they were willing to give - especially when customers were buying their products already.

A few people didn't see this as a risk, but as an opportunity, namely Tim Hohmann and Koyo Electronics. Tim knew that to create a company with the primary goal of serving the customer while offering quality products with pricing that would be too attractive to ignore required thinking outside the box. That is exactly what PLCDirect, now AutomationDirect, did when the company was founded over eleven years ago. Today, these same promises have remained the core reason for the success of AutomationDirect, a small PLC catalog company that turned into a successful automation superstore.



It's no easy task to make such a large operation flow smoothly. With the hard work and dedication of several self-winding teams, AutomationDirect has developed a process to get a product from the manufacturer to the shelf and out the door to the end user as quickly and accurately as possible.

Finding the Right Products

Very few products fit our business model. We continually search for quality automation products designed with the latest features and technology while still allowing us to offer the low prices that our customers have learned to expect. Our name brand products come from companies such as Eaton Cutler-Hammer, Marathon Electric, Hubbell/Wiegmann, and Koyo Electronics of Japan, our parent company. We also private label many brands from companies who manufacture products for other leading automation suppliers. Our products must meet the expectations of our customers in relation to price, quality, features, and availability. Finding products that fit all these requirements can be an arduous task, carried out by our teams of product managers in cooperation with product engineers. These teams are responsible for working with each product supplier to ensure they meet the AutomationDirect promise. Each product is tested to our standards, which includes compatibility with our existing products. To aid in determining the feasibility of a newly proposed product, several teams are included in the analysis to make sure it fits the AutomationDirect business model. The technical support team verifies that a product is user friendly, efficient to support, and that documentation and software may easily be applied by the customer. The product availability team fulfills our promise by making every effort to keep products available in our warehouse and ready for immediate shipping.



without slowing down our well-oiled machine. Since we stock most of our products, and ship customers' orders the same day they are received, we try to adhere to strict packaging and inventory specifications. Our logistics team has set a goal of fulfilling 100% of the orders processed each day. For this reason, the team verifies that each product has proper bar-coding, package size, and part numbering. Each product is bar-coded so it can be tracked and delivered as quickly as possible to each station in the highly automated warehouse. Inventory must be

Making it Fit

The product management team is also responsible for working with each product supplier to ensure products are properly introduced into our business model

stored in various locations and require as little manual handling as possible. Part numbers must be standardized for simplified labeling and processing. These are only a few of the specifications required for a product to be received from a manufacturer, placed into the warehouse system and shipped to the customer as quickly and efficiently as possible.

An enterprise-wide electronic order processing system in conjunction with an automated warehouse, which uses many of our own products for automation, allows us to take orders as late as 5 p.m. EST and ship the same day for products that are in stock.

Maintaining the Product

Once the product has been launched and is shipping to customers, product management works with each team to make sure the product continues to meet the expectations of the customer. In many cases, they receive direct feedback from customers on product functionality and requested enhancements. Occasionally, products will require firmware and software changes, as well as hardware changes, to introduce new or enhanced features. Product engineers work directly with the product supplier to make changes as quickly and accurately as possible. If while working with a supplier, we find they cannot conform to our customers' needs, we will search to find a new supplier that can. In this case, we work to make sure the product is as backward-compatible as possible with the product it replaces.



Case In Point

AutomationDirect is committed to offering automation products that deliver the latest features and quality that our customers need for their applications. In the case of our legacy operator interface product line, the market was changing and the features and quality of the product line were not meeting our customers' expectations or needs. As such, we realized we would have to turn to a new operator panel supplier. We needed a manufacturer with a history of

designing and manufacturing quality products with the ability to respond to our customer needs for continual improvements. This is why we chose our parent company, Koyo Electronics, to design and build the panel that would take us to the next level with our HMI product - *C-more*.

With Koyo as the designer and manufacturer, we have access to hardware and software engineers that help support the product and willingly make requested changes and improvements. We knew that Koyo could create a product that would offer the best combination of quality, features, and price. We asked them for an outstanding product. We received that and much more.

C-more was designed to give our customers one of the best costs of ownership when considering the initial price, features, ease of use, reliability and technical service. We started with a completely new design, and now have an operator panel that is more durable, with better performance, and more built-in communications options than our previous panel. We added extra interface features such as USB ports, CompactFlash slots, and an audio output for amplified speakers. We expanded to 10 or 40 MB of memory for those applications that require larger projects. Certain *C-more* panels offer built-in Ethernet communications with the ability to send event-driven e-mail or FTP a file to another computer on the network in HTML format.

If you are wondering why we chose a name like *C-more* for this new product line, it's simple. Once we saw all the features of the *C-more* panels, we began to realize that this newly designed panel had hundreds of improvements over our legacy operator interface line. Our customers would see more hardware reliability, see more features, see more color, see more productivity, and see more savings. *C-more* seemed to be the perfect name.

An important feature of the *C-more* product line is the ability for the *C-more* software to convert EZ-Touch programs from their legacy format to *C-more* format, which preserves the customer's work on their application, and allows them to get the latest technology without re-writing their program. Also, *C-more* was designed to be mechanically interchangeable (including cables) with equivalent EZTouch models.

So whether we are bringing on an entirely new product line, such as the *C-more* panel, or one as simple as a new sensor, it takes teamwork and a multitude of tasks to get the product to our customers with the AutomationDirect promise of quality, features, price, delivery and service. 🍏

"If you have an apple and I have an apple and we exchange these apples then you and I will still each have one apple. But if you have an idea and I have an idea and we exchange these ideas, then each of us will have two ideas."

- George Bernard Shaw

Technology Brief

Emergency Requirements



Dealing with Low-voltage Power Issues

by Lenny Filipkowski,
AutomationDirect Product Engineer

Voltage dip and power failure - these are two events that can cause everything in a manufacturing and processing facility to go dim. When a machine or processing line goes down due to a power failure, it can cost a company thousands of dollars in as little as an hour. Companies are investing a lot of money and resources to help prevent, or decrease the duration of, such failures.

As the number of 24 VDC powered control systems increases, machine builders and users are finding that a typical power supply may have some built-in capabilities to help during voltage dips and power failures, but a more robust system is needed to provide added protection.

With many machines controlled by PLCs and industrial PCs, a small power dip or internal power supply failure can render a system's controller useless. Through the years, several devices have been developed for the industrial control sector to help with power dips and power supply failures. Some of these devices are redundancy modules, buffer modules and battery backup type systems. All of these auxiliary modules help provide some level of protection if the main power system sees a temporary failure.

The most common question is "what type of protection would be good enough for my system?" There is no easy answer to the question, but understanding the functions of auxiliary

modules can help point you in the right direction.

Even a facility with good, stable incoming power with little occurrence of main power dips or voltage loss can have a high level of concern over losing an internal power supply. If there is a need for a solid redundantly protected system, then a redundancy module would be the best choice. A redundancy module is used to monitor the power being fed from two power supplies. If one supply should fail, or be completely removed for servicing, then the redundancy module will distribute the entire load to the properly working power supply. Most redundancy modules have an output contact which signals a failure, so any problem can be corrected in a timely manner. They also have an interconnecting communication link between the power supplies and the module, so the redundancy module knows the status of each power supply at all times. A good redundancy module should also be equipped with protection of the output voltage against short circuits and overloads. One concern when using this type of system is the redundancy module does not account for a loss of the main facility power system. In the event that the power system feeding the manufacturing facility fails, the redundant power control system would also fail.

In a system where there are ongoing short voltage dips or brownouts, a device called a buffer module would be beneficial to keep a control system running smoothly. A buffer module typically consists of large capacitive banks that can store and release energy as soon as a failure occurs. A buffer module is connected in parallel with the feeding power supply, so the load shift from the power supply to the buffer module is transparent to the load. The ability to quickly discharge the stored energy prevents loss of operation in the protected control system. Since typically there are no moving parts, the buffer module is maintenance free and its storage capability does not deteriorate

over the lifetime of the product. This type of protection has a big advantage over other protection modules for this type of fault.

In a remotely located system where there are frequent voltage dips, brownouts, and power outages, the battery backup is a system that can handle all of these situations. A battery backup system is comprised of a power supply, battery backup module, properly sized batteries, and any optional accessories, such as temperature probes, used to monitor the system. The battery backup system can keep the batteries continuously charged during normal conditions. This system, while the most complex, offers the most robust protection and covers the broadest range of power faults that can occur. If the supply should fail, lose incoming power, or experience voltage dips or brownouts, the load is transferred to the battery. One big advantage of a battery backup system is the ability to adjust the time duration the control system can run during a fault condition. By choosing a battery that has a larger storage capacity, the system stays active longer.

Another solution is to combine the auxiliary modules to provide a protection system that covers a variety of failures. If you have two power supplies feeding into a redundancy module, and the redundancy module is wired in parallel with the load and a buffer module, the user now has a redundant system that would also be able to ride through a short voltage dip or brownout, as well as handle a failure of one of the feeding power supplies.

As the demands on our existing power stations grow, interest will turn toward alternative methods of protecting the quality of control power. Incorporating devices such as auxiliary protection modules will help keep systems up and running to their fullest potential.

Small & Smart Ultrasonic Sensors



Check out our new line of miniature ultrasonic sensors,

which includes four models of rectangular through-beam units. Measuring only 30 mm x 20 mm, these sensors are designed for limited space applications. The low price of a UHZ series through-beam pair (\$159) makes it a competitive alternative to similarly priced but less accurate sensors.

- Sound wave technology sensors are ideal for applications in which the sensing object is made of clear or transparent materials, or has varying surface color
- Wide sensing range not affected by environmental factors such as dust
- 18-30 VDC input supply voltage
- Normally-open and normally-closed output configurations
- Maximum sensing distance of 300 mm
- Fast response time of 1 msec; 150 Hz switching frequency
- Complete electrical protection from shortcircuit, overvoltage, and reverse polarity
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AutomationDirect carries a wide range of sensors at low everyday prices

PROXIMITY

Popular I/O models (8, 12, 18, 30 mm) Starting at **\$20.50**

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Polarized reflective, DC supply, NPN/PNP output, 4-pin Euro (micro) quick disconnect	\$44 1451E-6547		\$98 42GRU-9200-0D
Clear object detector, AC/DC supply, solid state relay output, 4-pin micro quick disconnect	\$80 1452E-6543		\$160 42GRC-9203-0D1
Proximity Sensors			
5 mm three-wire DC shielded with pico Q/D	\$35 PD1-AP-1F		\$102 871C-D1NP5-P3
18 mm three-wire NPN DC shielded with 2 meter cable	\$20.50 AK1-AN-1A		\$67 872C-DH5NN18-E2
18 mm AC shielded with 2 meter cable	\$31 VK1-A0-1B		\$80 872C-A5N18-A2

All prices are U.S. list prices. AutomationDirect prices are April 2006 prices. Allen-Bradley prices taken from Sensor Publication C115-PL001B-EN-P September, 2005. Specifications may vary by dealer and configuration. AutomationDirect disclaims any proprietary interest in the marks and names of others. Prices subject to change without notice.



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Tech Thread

Q & A -Operator Touch Panels

Answers to Questions about Our New *C-more* Operator Panel

AutomationDirect's new operator panel is packed with lots of features. We've compiled a list of questions and answers that address some of these features:

Q: Can I use the serial port on my laptop or desktop computer to upload/download programs via the serial port on a *C-more* panel?

A: The *C-more* panel is designed to communicate with a computer via its USB or Ethernet port. The serial port located on the panel is for PLC communications only.

Q: Does *C-more* support multiple languages?

A: Yes, *C-more* software allows users to configure up to nine languages. First, go to Function Tab > Setup > Language and set up each language. Then, go to Object Tab > System > Set Language to configure the change language button(s). When pressed, this button will change the language of all objects on the panel. Configure one button for each language. The available languages and fonts are selectable. These change with updates to the software, so check your version. NOTE: To expedite configuring multiple languages, the Language Database can be exported to an Excel® spreadsheet, edited, and then imported back into the project.

Q: Can the *C-more* panel communicate to more than one PLC at a time?

A: Yes, *C-more* can communicate with multiple PLCs via a serial network, an Ethernet network, or both. To configure multiple PLC nodes go to Function Tab > Setup > Panel Manager. From the Panel Manager setup window, click on the Add button and select a New Device. NOTE: Not all PLCs can reside on the same network. *C-more* software only allows acceptable combinations.

Q: Can I create a common or master screen for the *C-more* panel?

A: Yes, *C-more* software allows any screen to be used as a Background Screen. You can configure one or several background screens, using them for one or more other screens' backgrounds. Just click on Background Screen and select from the drop-down list. NOTE: Once a screen is used as a background screen, it can only be edited on the screen where it was created and cannot be deleted if being used as a background.

Q: I imported an EZTouch project into a *C-more* project. Where is the Alarm Database located?

A: *C-more* software uses an Event Manager Database where users can set up different types of events, including events that activate an Alarm Action. To view, edit or add new alarms simply go to the Database menu > Event Manager Database and select Add to create a new Alarm, or select an existing Event (Alarm) to Edit.

Q: I know that I can send an email based on an Event, but I get "Email Services are not configured" error when selecting Mail as an action during configuration.

A: The Email feature requires at least one e-mail address to be set up in the Address Book. Go to the Database menu > Address Book and enter one or more Names and Addresses.

Q: I need to change a common property on more than one object. Is there a way to change it on multiple objects with only one edit?

A: Yes, by using the Property List feature located under View > Window > Property List (hotkey F4), you can select and edit common object properties. While holding down the Ctrl button, click on the objects to select them. Any common properties will be shown in the Property List for editing. NOTE: This feature allows editing of currently displayed objects only (current screen).

Q: Can I turn off the Beep sound on my *C-more* panel so it is silent when I press an object?

A: Yes, the panel Beep sound can be silenced by two methods. The first method is by going to the panels system screen Main Menu (press the upper left corner of the panel screen for three seconds) and set Enable Beeper to NO. The second method is by setting it up in the project. Go to Setup > Panel Manager and select OFF. Then save the project to the panel. NOTE: The default is Beeper enabled. The second method is recommended if the Beeper will need to always be OFF, as it is saved with the project.

Q: I get the error "A sharing violation occurred while accessing \\Mounted Volume\Prj\EARun.net" when downloading a project to my *C-more* panel. What does this mean?

A: When this message appears, there is more than one PC attempting to send a project to the same panel. Click OK on the violation message and retry the Project Send from only one source.

Q: What is the screen resolution for each size of *C-more* panels?

A: X=width, Y=height in pixels

6 inch: X=320, Y=240

8 inch: X=640, Y=480

10 inch: X=640, Y=480

12 inch: X=800, Y=600

15 inch: X=1024, Y=768

Q: How can I modify the Tag Data Type of a Tag Name that is assigned to an object? I would like to change from a Signed Integer to a BCD data type, but when I try to edit it, the Tag Data Type is no longer selectable.

A: Once a Tag Name is assigned to more than one object, the data type cannot be easily changed. To change it, you must assign a different Tag Name to all the objects that are using it. Start by making a TEMP Tag Name and use it to replace the one to be edited. Then, go to the Tag Name Database and edit the Tag Name Data Type. Now go to each object and replace the TEMP Tag Name with the edited Tag Name. HINT: Use the Tag Cross Reference (Tool) to locate any objects using the Tag Name.

Q: Can the databases in *C-more* be exported for use in other applications?

A: Yes, the Tag Name Database, Message Database and Address Book can be exported as an Excel (.xls) or comma separated values (.csv) file type.

Q: Can databases from other applications be imported into a *C-more* application?

A: Yes, Excel (.xls) file types can be imported into the Tag Name Database, Message Database and Address Book. To Import a Database from another *C-more* project, you must first Export it while in the other project.

Q: When configuring a screen using the *C-more* software, can an object be overlapped with another object?

A: Yes, objects can be placed overlapping each other anywhere on the screen. Objects can be stacked and accessed by using the visibility feature. This allows for efficient use of the work space.

Q: Does *C-more* support Floating Point data types, and if so, what types of objects can it be used with?

A: Yes, *C-more* supports Floating Point for use with Numeric Entry/Display, Meters, Bar and Line Graphs, PID Faceplates, Recipes, and Sliders.

Q: Why are some of the Discrete Tag Names in the Tag Name Database not selectable when configuring objects such as push-buttons, switches, etc?

A: Some of the predefined Internal Tags (panel) and user defined PLC Tags are Read Only addresses and are to be used for indication purposes only. Tag Names will be selectable only for the object type they support.

Q: I know I can change the default font on each object, but is there a way to change the default font so I don't have to do it on every object?

A: Yes, you can change the default font by going to Setup > Language and selecting a Font for each language used in the project.

Q: I would like to reorganize my screens in my project. Is there an easy way to do this?

A: Yes, select Tool > Screen Library to access the project screen list window with thumbnails of all the screens. Then simply click, drag and drop a screen into a new location. From this window you can also Add, Delete and Copy screens as well as save them to the Screen Library.

Q: Is there a limit to the number of screens that can be configured in a *C-more* project?

A: *C-more* panels are designed to provide a capacity of up to 999 maximum screens. This amount may vary depending on the memory usage of some objects such as bitmaps, animation, trending, etc.

Q: Is there a limit to the number of Events that can be configured in a project's Event Manager Database?

A: *C-more* panels are designed to provide up to 999 maximum Events.

Q: Is there a limit to the number of Messages that can be configured in a project's Message Database?

A: *C-more* panels are designed to provide up to 999 maximum Messages.

Q: What is the difference between an STN and TFT screen?

A: STN: Abbreviation for Super Twisted Nematic. This is a passive matrix LCD technology that provides better contrast than a Twisted Nematic (TN) screen. The STN display is limited by color range, viewing angle and slow screen update.

TFT: Abbreviation for Thin Film Transistor. The term typically refers to active matrix screens on laptop computers. Active Matrix LCD provides a sharper screen display and broader viewing angle than STN and Passive Matrix. The TFT screen offers true color, wider viewing angle, and faster screen updates.

Q: I have serial communication and programming cables from an EZTouch panel. Can I use these with the *C-more* panels?

A: Yes and no. The serial communication cables for a panel to PLC connection will work with all models of the *C-more* panels. Since *C-more* panels are programmed via Ethernet or USB connection, not serial, the EZTouch programming cables will not work.

Q: Can *C-more* convert projects that were created in other operator interface programming packages?

A: Yes, *C-more* programming software will convert an EZTouch project as long as it was created using AutomationDirect's version of EZTouch editor software version 3.1a. NOTE: Contact AutomationDirect's Technical Support Team if you have a project that was created in an earlier version.

Q: What is the Library feature and what are its limitations?

A: The Library is a storage area for custom and user created objects, graphics, and sound files; all which are limited only by PC hard drive space and your imagination.

Q: Can you use commercially available standard CompactFlash memory devices with the *C-more* panels?

A: Yes, but AutomationDirect offers a high-speed version of CompactFlash cards for applications where fast update speed is critical. In addition, it is an Industrial rated component unlike common office supply CompactFlash.

Q: When using the Project Simulator in the *C-more* software, is the simulated screen size the exact size as the operator panel it will be used with?

A: It is the same pixel size. The actual size in inches will vary depending on your monitor size and resolution.

Q: Does the *C-more* panel require an Internet connection in order to use the Email feature?

A: No, but it must have a connection to a SMTP server via Ethernet. Using the *C-more* software, go to Touch Panel Network > Email Client to configure the SMTP server information.

Q: Is there a limit to the number of objects that can be placed on a single screen?

A: The amount of objects that can be placed on a single screen is limited by the buffer size, object type, and the range of PLC addresses used on the screen.

Q: When configuring a Tag Name, there is a selection to make the Tag Name Retentive. What happens if I select this feature?

A: The Retentive feature is used to retain a tag status or data value during a power cycle or failure. The status or value will remain in the retentive state until one of the following happens:

1. The status or value is changed by an operation.
2. The battery fails or is removed without power to the panel.
3. A project is copied from or sent to the panel
4. The memory is cleared via *C-more* software or panel system screen. 🟢

Technical Review

Control System Design

A Condensed Guide to Automation Control System Specification, Design and Installation Part 4: Build, Launch & Maintain

by Tom Elavsky,
AutomationDirect

In Part 3 (Fall 2005 Issue 5), we covered how to design our automated control system and the importance of documenting the design. We discussed the various types of documents that would be typical for an automated control system design, why and how we would use these documents, and finally the tools that can be used to create the documents.

In Part 4, we will cover the steps needed to build, start up, and maintain our automated control system. The build section will include tips on the use of a subpanel, terminal blocks, grounding, shielded cable, etc. We will cover the steps to start up the system so that it is brought online in a safe and logical manner, and also give some suggestions for developing a plan to maintain the control system.

As stated in the previous articles, special expertise is generally required to design, wire, install, and operate industrial automation control systems. Persons without such expertise or guidance should not attempt control systems, but should consider seeking the services of a qualified System Integrator. Control systems can fail and may result in situations that can cause serious injury to personnel or damage to equipment. The information provided in this series of articles is provided "as is" without a guarantee of any kind.



Build:

During the design of our control panel, we pointed out the benefits of using a removable subpanel. In building the subpanel, it is best to secure the components from the front side. This will make it easier to replace any failed device or component in the future.

We can also make installation and maintenance easier by using terminal blocks mounted to the subpanel that will connect to all external devices. This will allow the installing electrician to quickly dress and terminate the field wires. Another terminating method that has added benefits is to design our control panel with mating connectors so that the field wiring could be plugged into connectors mounted on the panel.

Wiring Recommendations

The following guidelines provide general information on how to wire most automation equipment. For specific information on wiring a particular PLC or device refer to the

installation manual for that device or PLC.

- Each terminal connection can accept one 16 AWG or two 18 AWG size wires. Do not exceed this recommended capacity.
- Always use a continuous length of wire. Do not splice wires to attain a needed length.
- Use the shortest possible wire length.
- Use wire trays for routing where possible.
- Avoid running control wires near high energy wiring.
- Avoid running input wiring close to output wiring where possible.
- To minimize voltage drops when wires must run a long distance, consider using multiple wires for the return line.
- Avoid running DC wiring in close proximity to AC wiring where possible.
- Avoid creating sharp bends in the wires.
- Install a powerline filter to reduce power surges and EMI/RFI noise.

Important Wiring Safety Recommendations

Warning: Providing a safe operating environment for personnel and equipment is your responsibility and should be a primary goal during system planning and installation. Automation systems can fail and may result in situations that can cause serious injury to personnel or damage to equipment. Do not rely on the automation system alone to provide a safe operating environment. Use external electro-mechanical devices, such as relays or limit switches that are independent of the automation equipment, to provide protection for any part of the system that may cause personal injury or damage.

Warning: Every automation application is different. Therefore, there may be special requirements for your particular application. Be sure to follow all National, State, and local government requirements for the proper installation and use of your equipment.

Plan for Safety

As we have stressed in previous articles, the best way to provide a safe operating environment is to make personnel and equipment safety part of the planning process. Examine every aspect of the system to determine which areas are critical to operator or machine safety.

If you are not familiar with system installation practices, or your company does not have established installation guidelines, you should obtain additional information from the following sources:

NEMA¹: The National Electrical Manufacturers Association, located in Washington, D.C., publishes many different documents that discuss standards for industrial control systems. You can order these publications directly from NEMA. Some of these include:

- ICS 1: General Standards for Industrial Control and Systems
 - ICS 3: Industrial Systems
 - ICS 6: Enclosures for Industrial Control Systems
- NEC²: The National Electrical Code provides regulations concerning the installation and use of various types of electrical equipment. Copies of the NEC Handbook can often be obtained from your local electrical equipment distributor or your local library.

Local and State Agencies: Many local governments and state governments have additional requirements above and beyond those described in the NEC Handbook. Check with your local Electrical Inspector or Fire Marshall office for information.

Grounding

Why is grounding important? Electronic instrumentation such as PLCs and field I/O are typically surrounded by various types of electronic devices and wires. These electronic devices may include power supplies, input/output signals from other instrumentation, and even devices that are near the instrumentation enclosure. All these may present a risk of Electromagnetic Interference (EMI) or transient interference. This type of interference may cause erratic operation of components and cause failures.

In addition to device interference, automation equipment and devices could be damaged by powerful line surges. These line surges may come from common voltage fluctuations from a power supply, lightning, or unintentional contact with a high voltage line. A power surge will cause a temporary failure, fuse burn-up, or even very serious damage to the equipment.

Grounding provides a low impedance path that limits these voltages and stabilizes interference. Grounding is a must to protect your automation equipment and devices from serious damage, failures, and even potential risk to users.

Grounding is the foundation of achieving a reliable power distribution system. During the panel and control system build, it is important that a reliable grounding system be implemented. Poor grounding or improper or defective wiring may be the cause of most problems affecting power quality. The following is a list of existing grounding standards that may be used for reference:

- IEEE Green Book (Standard 142)
- IEEE Emerald Book (Standard 1100)
- UL96A, Installation Requirements for Lightning Protection Systems
- IAEA 1996 (International Association of Electrical Inspectors) Soars Book on Grounding
- EC&M - Practical Guide to Quality Power for Electronic Equipment
- Military Handbook - Grounding Bonding and

Shielding of Electronic Equipment

Once all the important considerations mentioned above have been determined, the mounting, bonding, and grounding of the chassis may be started. The following list provides a brief explanation of each of these terms:

- **Mounting:** refers to the actual physical installation of each device, instrument or component to either the subpanel or other connected equipment.
- **Bonding:** refers to the joining of metallic parts of a chassis such as; frames, shields, assemblies and enclosures. Joining or bonding these components properly reduces the interference from EMI and ground noise.
- **Grounding:** refers to a connection to a grounding conductor to provide overload and interference protection.

As mentioned before, grounding protects the instrumentation, devices, or components from power surges and reduces the effect of EMI and ground noise. *Figure 1* shows a typical method for grounding the subpanel to the enclosure cabinet to assure proper grounding.

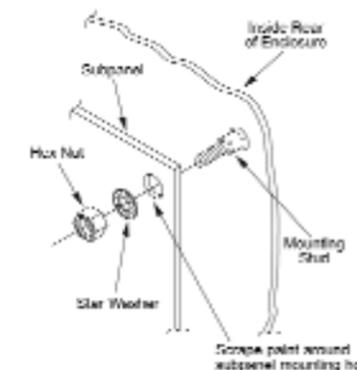


Figure 1



Note: Please remember that bonding and grounding are important safety requirements that are mandatory by local codes and regulations. The installer must verify the local codes to determine what grounding and bonding methods are permitted. Always make sure that power supplies are properly grounded to ensure elimination of electronic noise interference.



Note: When using ground lugs and installing more than one on the same stud, make sure to install the first lug between two star washers and tie it with a nut. Install the second lug over the nut of the first lug followed by a star washer and another tightened nut.

Continued, p. 26 >>

Technical Review

Control System Design Continued

Shielded Cables

A shielded cable is an insulated cable consisting of strands of copper or other material enclosed with a metallic shield underneath a jacketed sheath. Shielded cables are used to reduce the interference from electrical noise.

Some instrumentation requires the use of shielded cables for specific connections. When installing instrumentation, verify whether any connection requires a shielded cable. Failure to use the shielded cable will result in erratic readings or signals from the instrumentation. If the product being installed requires shielded cables, the grounding specifications provided by the manufacturer manual must be followed. Improper installation of shielded cables may cause a ground loop that will cause failure on a processor or would allow noise into the logic circuit.

There are various types of shielded cable available for different uses. The shielded cables listed below are the most commonly used for automation control systems and instrumentation:

- **Foil Shield:** These cables consist of aluminum foil laminated to a polyester or polypropylene film. The film provides mechanical strength and additional insulation. The foil shield provides 100% cable coverage for electrostatic shielded protection. Foil shields are normally used for protection against capacitive (electric field) coupling where shielded coverage is more important than low DC resistance.
- **Braided Shield:** These cables consist of groups of tinned, bare copper, or aluminum strands. One set is woven in a clockwise direction, then interwoven with another set in a counter-clockwise direction. Braided shields provide superior performance against diffusion coupling, where low DC resistance is important, and to a lesser extent, capacitive and inductive coupling.
- **Spiral Shield:** The spiral shield consists of wire (usually copper) wrapped in a spiral around the inner cable core. The spiral shield is used for functional shielding against diffusion and capacitive coupling at audio frequencies only.
- **Combination Shield:** These cables consist of more than one layer of shielding. The combination shield is used to shield against high frequency radiated emissions coupling and electrostatic discharge (ESD.) It combines the low resistance of braid with 100% coverage of foil shields and is one of the more commonly used types of shielded cable in today's industry.

Figure 2 shows a typical cross sectional area of a shielded cable that makes use of combination shields.

Mounting of Electronic Instrumentation

Electronic instrumentation is typically installed inside an enclosure with other devices. Therefore, the installation of the

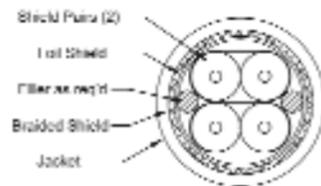


Figure 2

instrumentation must take into consideration that the panel layout accommodates all the necessary components. In addition to the panel layout, the following specifications should be considered:

Electronic instrumentation can be affected by interference from other electronic devices or EMI. This interference causes static that may interrupt communications or signals from other devices. Use these guidelines to prevent any possibility of interference with your equipment:

- Environmental specifications that cover the operating temperature, humidity, vibration, noise immunity, etc.
- Power requirements are specific to each piece of equipment. When installing instrumentation always make sure to follow the manufacturer's power requirement guidelines for your specific piece of equipment.
- Use components with Agency Approvals such as UL, CE, etc.
- Make enclosure selections based on component dimensions, recommended mounting clearances, heat dissipation and EMI.

If installing a PLC base or chassis which consists mainly of mounting, bonding, and grounding, it is very critical to the proper operation of the PLC and its related devices and components to closely follow the manufacturer's recommendations. There are many cases of a PLC experiencing "noise" problems, when the problem is found to be that the base wasn't grounded to the subpanel.

I/O Testing

The last item to consider at the completion of building your control system is to do a complete I/O checkout. This will assure that the point-to-point wiring between the I/O module terminals and the field wiring terminal blocks has been done correctly.

To start, create a list with each I/O point shown and include any details of what criteria is being tested. It is also helpful to include a check box that can be used to check off each point after it is tested. Normally this list can be created from an I/O list or tag name list that was created when designing your PLC ladder logic or HMI operator interface.

Include the test criteria for each point on the list. As an example, discrete input and output points would be listed as

normally "off" and then checked for their "on" state. Analog points, both input and output, could be checked at different values. For example, if using a current input module, you may want to simulate 4 mA (low value), 12 mA (middle value) and 20 mA (high value).

The actual testing normally requires a two-person team. One person uses a PC connected to the PLC to view the status of each point tested and to simulate outputs, and the other person physically applies a signal to inputs and monitors outputs with the use of an indicator on discrete outputs and a meter on analog outputs.



Start Up:

The startup of our automated control system begins once we have installed our control system enclosure and auxiliary equipment, terminated all field wiring, and completed required testing. This process is also called "commissioning" the automated control system and related equipment/process.

As a starting point, it is best to isolate the various sections of our control system power wiring by removing the fuses and/or opening circuit breakers. The best tool to use during commissioning is the schematic diagrams. We will want to start at the incoming power, and basically work our way through the entire schematic.

As a first step, we may want to apply power to the main circuit breaker or fused disconnect of our control system. Then, measure the voltage for proper values, phase-to-phase and each phase-to-ground, if the incoming power is three phase. Next, we can turn on the main circuit protector and check the voltage at each device that is fed from the main source. Then start turning the circuit breakers on or replace the fuses one circuit at a time and make additional voltage checks and test equipment operation that may be powered from the circuit.

Keep in mind that every control system will not be the same. Therefore, each system will require a different strategy to bring the equipment online safely. Consider having motors uncoupled from their respective loads, air pressure off, disabling hydraulics, and using Lockout/Tagout (LOTO) procedures. Measure voltages as you go. If using a PLC, connect a PC to it and monitor the ladder logic to make sure conditions, states, etc. are responding correctly.



Maintain:

It is important to develop a routine maintenance schedule for your automated control system. Having a routine schedule for checking critical components and devices in the system will increase the longevity of the system and more

importantly, it will help eliminate future problems. Set up the schedule based on a monthly or quarterly time period, depending on the item to be done. The following are some of the items you may want to consider in your maintenance schedule:

- Check and record voltages at various circuits
- Tighten all connections (with power removed)
- Check backup batteries, and/or replace on a routine schedule
- Check indicators and perform lamp tests
- Visually inspect for loose or frayed wiring, moisture in enclosure, etc.
- Check to make sure plug-in connectors are tight and secured
- Test all alarm systems, horns, sirens, etc.
- Check and record any configuration settings
- Perform and record calibrations
- Check all I/O points on a yearly basis
- Check and record power usage
- Check equipment run times for determining maintenance or replacement
- Measure device current to set a benchmark and compare for changes
- Review any diagnostic history, including events and alarms
- Check diagnostics that may be programmed into the HMI operator interface

This wraps up the series of articles on automated control system specification, design and installation. We hope you have found this information useful. Look for a downloadable complete guide, with additional details, on our technical web site sometime in the near future.

Footnotes:

1 Information for the National Electrical Manufacturer's Association (NEMA) can be found at their Web site at: <http://www.nema.org>. NEMA is also being harmonized with the International Electrotechnical Commission (IEC) (Web site: www.iec.ch/) and other European standards. Additional information can be found at Global Engineering Documents' Web site at: www.global.ihs.com. Global Engineering Documents is also the source for obtaining NEMA, IEC and CE documents.

2 The National Fire Protection Association (NFPA) produces the National Electrical Code (NEC), publication NFPA 70. Further information can be found at their Web site at <http://www.nfpa.org/>. Another good reference from the NFPA is Electrical Standard Industrial Machinery, publication NFPA 79. 📄

FYI

DirectLOGIC PLC Programming and Installation

PLC Tips from the Tech Team

by The Tech Team
AutomationDirect

AutomationDirect's Technical Support Team receives a vast array of inquiries on programming and installation of our DirectLOGIC PLCs. We asked the team to provide some Tips and Techniques to help make programming and installation easier for our users. Here are some of the topics that come up regularly.

Locating problem code: Having trouble locating a problem in your code? Try placing an END rung after the problem area. Move it up or down through the program until the problem is located.

Troubleshooting math: Are you using a rung with multiple math instructions that doesn't give the correct result? Try adding an OUT box instruction after each function (ADD, SUBTRACT, DIVIDE, etc.) and check the value in each OUT register to locate the problem.

Non-functional math: Do you get the same data out that you started with? This usually means that you have a data (BCD, BINARY, REAL, etc.) mismatch. DirectLOGIC PLCs use a BCD format for the default math instructions. Verify that all data being used is in BCD. If using BINARY, use the correct instructions (ADDB, SUBB, etc.). If using REAL numbers, use the correct instructions (LDR, ADDR, SUBR, etc.).

Outputs not executing: If one instruction, or a group of instructions, does not seem to be working correctly, the cause is often an addressing conflict with some other part of the program. Try isolating the problem section by creating a small test program with just the rung(s) in question and adding an END statement. If the section in question works correctly in the test program, then it could be a duplicate coil or register issue, meaning the same

output address is used in more than one rung. Use the Cross Reference View to see what other parts of your code may be using the same addresses and causing the conflict. Note that the Cross Reference View may not indicate all instances of a memory location being used. This can happen in the case of Pointers, Table Instructions, Network Communication Instructions, etc.

Incorrect timer accumulator values: Is a timer accumulator not working or showing erroneous values? Chances are the same timer is being used somewhere else in the program. Also, check for any TMRA(F) instructions. These timers consume two physical timers. For example, TMRA T1 also uses T2, so the next available timer is T3.

Slow network communications: Want to speed up your network? When configuring PLC memory locations that will be used for data transfer to another PLC, operator panel or PC, try using contiguous blocks of memory as much as possible. This will reduce the number of separate communications necessary to transfer all the data, making communications much faster.

Network cable selection: Want to help ensure that your network will be up and running smoothly? Make sure you use the correct cable type for your communications, even when testing shorter distances. For RS-485 or Remote I/O, use a Belden 9841 or equivalent. For RS-232 or RS-422, use a Belden 8102 or equivalent. Terminate the shields at one end only and add termination resistors as required.

Testing PLC network communications: When setting up networking with two or more PLCs, test each communication rung separately, starting at the slowest baud rate available, and hardwired directly to each other (no radios, serial converters, etc.). Then try all the communication rungs together to verify proper interlocking. Finally, add any necessary converters, radios, etc. This procedure may not always be possible, but by adding only one "link of the chain" at a time, it can be much easier to determine where any

communications errors are occurring.

Protecting PLC inputs: Did you know that AC inputs have a high inrush, as much as 3A, that can damage fragile reed switches? Putting a 1K ohm 0.5W resistor in series with the input can reduce the inrush current.

Backup power for AC inputs: Did you know that AC inputs will not work with most UPS systems? That's because a normal AC waveform is purely sinusoidal, with a frequency of 60Hz, and voltage peaks of about +/- 167 Volts. This is the type of wave form with which AC input circuits are designed to work. The waveform of the output of a typical UPS is not sinusoidal, but attempts to simulate the sinusoidal waveform by producing an intermittent, alternating square wave. A "sine wave" UPS does not use the intermittent alternating square wave of the standard UPS, but produces a very nearly sinusoidal waveform which will work with the AC inputs. You must have a "sine wave" UPS for AC inputs to function.

Protection against transient voltage spikes: Power Filters and Transient Voltage Suppressors are very cheap PLC system insurance. Power filters, such as AutomationDirect's APF filters by Cutler-Hammer, protect your PLC system from noise and voltage spikes on the incoming power lines. Be sure that all devices in your system (PLCs, DC power supplies, etc.) are powered from the load side of the power filter. Transient Voltage Suppressors like the ZipLink ZL-TD8-24 and ZL-TD8-120, Fuji coil suppression units, and packaged MOVs and diodes for the 75 and 78 series relays will drastically reduce voltage spikes that occur when de-energizing inductive loads.

RJ-type connector pin orientation: Ever have trouble determining which way to view an RJ-type connector for a pinout? Try doing this. Take the cable connector and hold it as if you were going to plug it into your eyeball, with the locking tab up. In this orientation, Pin 1 is on the left side of the connector. 📺

User Solutions cont.
Manufacturing Continued

"The Ethernet communication is so fast that we were able to use one of the PLCs as a 'Master' to control the outputs of the other two 'remote' PLCs across the Ethernet network. We weren't sure it would work initially and thought we might have to program the other two

PLC's with parts of the machine control logic," explains Adams. "But, not only does it work flawlessly, we saw no noticeable difference between the I/O speed in the Remote PLCs and the I/O update speed across the backplane in the Master PLC." For safety purposes a few rungs of ladder were used in each of the remote PLCs to verify the communications link and for setting the outputs to a known safe state if a communication loss is detected. "Ethernet communication is fast, universally accepted, and easy to implement," concluded Adams.

Data Collection and Productivity Analysis

By using *C-more* and Ethernet communications, CorrTech was able to incorporate productivity monitoring software into the system. This system monitors downtime causes and other performance data, and sends the information to a PC-based server for historical trending and further analysis.

Cost Savings

While the customer may not have been expecting all of the features that CorrTech incorporated into this machine upgrade, the promise of an affordable upgrade was what clinched the deal for CorrTech. "We know that by using AutomationDirect components we saved a considerable amount of money and gave the customer enormous expansion capabilities. To sum it up, the PLC hardware, for 150 IO points, expansion capability, and standard Ethernet communications, was around half the cost of other automation suppliers such as Allen-Bradley, Siemens, and other vendors we have used in the past," asserts Adams. "And that is without even mentioning the tremendous value of the C-more touch screen - Smurfit Stone never expected the level of operational ease and maintenance capability that the touch panel interface provides. We are convinced that there is no better value than AutomationDirect in the industrial automation market."

Service and Support

"The only items we used for this project that we did not obtain from AutomationDirect were wire, 2 safety switches, and some miscellaneous supplies. All other components were ordered online from AutomationDirect.com." In addition to the "one-stop-shopping" and the low prices, Adams was pleased with the support he received "after the sale."

CorrTech had planned to replace some manual 3-phase

drum switches with 24VDC motor starters to allow monitoring of the overloads and display specific fault conditions on the C-More panels. After arriving on site for the retrofit, they found that some of the overloads had been sized for 480V instead of the 230V units that were shown on the 30-year old schematics. "We made one call to AutomationDirect and arranged for new overload relays to be delivered to us on Saturday morning, so the start-up of the system would not be delayed. There just aren't many companies that offer that kind of service to their customers" asserts Adams.

Retrofit Kit

CorrTech is now preparing to standardize the process and offer their S&S Electrical upgrade in near "kit" form. While they will still offer their experience on-site to perform the retrofit, CorrTech hopes to market the upgrade to other Smurfit Stone locations, as well as the many other companies that still own and operate S&S made machinery. CorrTech is confident that the marriage of a modern AutomationDirect control system to the robust, 'heavy-metal' machinery of S&S will offer their customers true value, improve their box-making uptime, and extend the service life of their machines for decades to come.

Late Breaking News: As this article goes to press, the machine has just set a new production record, and Smurfit Stone has asked CorrTech to retrofit another of their S&S machines. 📺

Company Profile

CorrTech focuses primarily on the Paper, Packaging, & Corrugated Box Manufacturing Industry. They design and install mechanical and electrical retrofits, upgrades, & complete systems to help your machinery run faster and more efficiently.

Their main areas of expertise include Machine Control, Data Collection, and Motion Control.

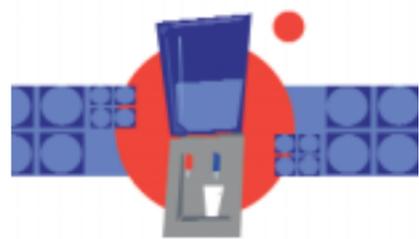
CorrTech, Inc. can be reached at 770-888-3336 or online at www.corrtechinc.com.

"Men give me credit for some genius. All the genius I have lies in this; when I have a subject in hand, I study it profoundly. Day and night it is before me. My mind becomes pervaded with it. Then the effort that I have made is what people are pleased to call the fruit of genius. It is the fruit of labor and thought."

— Alexander Hamilton

The Break Room

Humorous stories and Brainteasers



Royal Misunderstanding

Several years ago, the systems integration company where I was working decided to begin selling an internally developed software product. Never having sold any products before, we contracted a marketing firm to produce a brochure for our product. We had looked at countless "mock-ups" and redesigned the piece several times before we were ready to have a quantity printed. Rick, my contact with the marketing firm, told me that prior to printing 5,000 copies, we should spend a few more dollars and have a super-high-quality print made to look just like the finished product. Additionally, his artists could use these 'prints' to verify that everything would go smoothly once it went to press. Rick told me about a high-end digital printer called an "Iris", and recommended a service bureau that had an Iris machine and would make our printouts for a nominal fee. I asked him to send the graphic file to the bureau and obtain the prints.

The following day, I returned from lunch to find our office in turmoil. The receptionist was busy cleaning, and several other employees were straightening the offices and main conference room. Our maintenance man was even cleaning the windows. When I asked what the occasion was, the receptionist was noticeably upset with me and said, "You could have at least warned us! Rick called and left you a message while you were at lunch. He's picking up the Irish Prince, and he'll be here by 1:30

this afternoon!"

It took me a minute to realize what had happened, and much longer to calm everyone down and explain the misunderstanding. I'll never know why they didn't bother to question the idea of a prince visiting an automation systems integrator. When Rick arrived, we all had a good laugh, and admired the Iris prints. I think everyone was a little disappointed though, after having prepared for the royal visit.

Brainteasers

1. Light Weight

The AutomationDirect DL05 PLC weighs 4.5 ounces plus half its own weight. *How much does it weigh?*

2. A Puzzling Journey

I've been warned about a journey I must take in the next few years. The details are very sketchy, but I'm told that the whole trip can be mapped out using a familiar grid pattern. This is a grid everyone knows about and uses, but no one can alter.

I've been given starting coordinates of 7, 7, 7. First, I'm to travel 398 grid units to position 8, 8, 8. Then I must continue in the same direction another 397 units to 9, 9, 9. It's impossible to retrace my path, so I will travel another 396 units to 10, 10, 10. I'm only allowed to spend one day at each stop.

What is this grid, and how long will my journey last?

3. SuDoku

SuDoku is somewhat like a crossword puzzle, but it uses numbers instead of letters.

The rules are simple: *Fill in the empty squares so that every row, every column, and every 3x3 box contains the digits 1 through 9.*

No math is required. Logic is all you need.

Here is a "mild" SuDoku...

4		1		3		6	
5						4	
3				5			1
5			3	7			8
7		4				1	2
9			4	2			7
2				4			9
	3						7
	6		5		9		2

Check online for the answer, as well as additional and harder puzzles: www.automationnotebook.com/sudoku.html

"The trouble with being punctual is that nobody's there to appreciate it."

- Franklin P. Jones

"I was always taught to respect my elders and I've now reached the age when I don't have anybody to respect."

- George Burns (1896 - 1996)

Please visit www.automationnotebook.com for answers to brainteasers.

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Description	Price/part number	Price/part number	Price/part number
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10 hp	\$689 GS3-4010	\$2,965 BRF100-AA-EN	\$3,270 ID15H410-E
25 hp	\$1,299 GS3-4025	\$6,250 B025-AA-EN	\$6,175 ID15H425-EO
50 hp	\$2,289 GS3-4050	\$10,917 B050-AA-EN	\$11,817 ID15H450-EO

All prices are U.S. list prices. AutomationDirect prices are March 2006 prices. Allen-Bradley prices taken from Publication 1336F-PL001K-EN-P September 2005. Baldor prices taken from online store. <http://www.baldor.com> 01/24/06. Specifications may vary by dealer and configuration. All product names, trademarks, and registered trademarks not owned by AutomationDirect are the property of their respective manufacturers. AutomationDirect disclaims any proprietary interest in the marks and names of others. Prices subject to change without notice.



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