VOL 3 ISSUE 10

Summer 2004

Automation Service News

The Newsletter of Delta Automation Inc.

Tech Tip!

Electrical
Storms and effects on
Modbus Plus Systems

Operation of a Time Domain Reflectometer (TDR)

A brief explanation
Of
TDR operation

Modicon Trivia Question

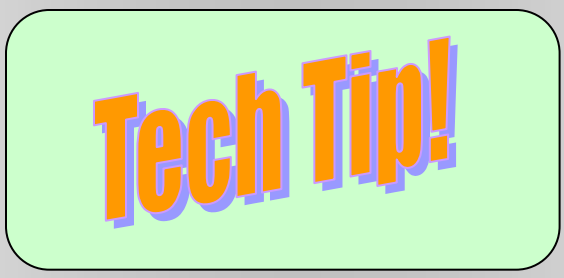
TWO WINNERS !!
Correctly answered last
Issue's Trivia question.

Important Info!

Important VFD
Grounding issues

Delta Automation Contact Info

Contact names, numbers and E-mail addresses



Summer Storms and Modbus Plus Systems

During the Summer months, especially in the southern states, late evening thunderstorms are an almost everyday occurrence. The violent lightning that typically accompanies these storms is a very real and sometimes destructive threat to communication systems.

Very recently, Delta Automation engineers were dispatched on an emergency basis to troubleshoot and repair several of these systems disrupted by lightning.

One such Modbus Plus system went down during a severe storm around midnight. The plant technicians began troubleshooting, and determined that the network was down and only a few of the nodes were communicating. They continued troubleshooting throughout the night and when the plant Engineers arrived the next morning, they placed a call for assistance to Delta Automation, Inc. Two engineers with test equipment were dispatched and arrived on-site within hours. As with most Modbus Plus systems, this system was an undocumented "as built" system. Luckily, the plant technicians knew where all of the various nodes were located. The test equipment was connected and immediately, an open circuit was discovered, this was repaired, and another was found, this repeated itself three more times, when a short was found. These opens and the short were caused by the process of inspecting and moving the various components of the system during troubleshooting. Once these faults were found and rectified, it was noticed that the overall system impedance was too low. A "slight short" was detected by the TDR several hundred feet away. This was investigated and was found to be an improperly set termination switch on an older model Phoenix tap (*See Deltas' Fall 2002 newsletter describing just such a possibility*). The switch was repositioned to the correct setting. The TDR still indicated another of the same type of discontinuity farther down the line. This was again found to be a termination switch in the wrong position. Once this was corrected, the system was put back into service.

Ultimately, no lightning damage of any kind was found. All of the faults were "man made". Apparently, the chain of events is thought to have been something like this: during the storm, a voltage surge disturbed the Modbus Plus communications possibly by shutting down one or more of the nodes. This could cause a "lockup" of the Modbus Plus processor on the affected card. (A power cycle would typically restore the communications.) With a loss of communications reported, the network itself was suspected.

This system was out of operation for almost 8 hours. Some of the issues located and repaired, would be very difficult to locate in a timely and efficient manor without use of the proper test equipment that Delta engineers are proficient on.

Delta Automation, Inc has emergency on call service, 24 hours a day. There is no extra charge for emergency service, and unless on weekends or holidays, no overtime is charged.

Operation of a Time Domain Reflectometer (TDR)

How a Time Domain Reflectometer (TDR) works

A TDR is a piece of test equipment designed to analyze and troubleshoot metallic cable systems. The TDR will display any discontinuities found along a given piece of cable. These discontinuities may be either shorts, opens, or somewhere in between. In order to get an accurate distance measurement to the discontinuity, it is necessary to setup the test equipment to match a certain parameter of the cable, provided by the manufacturer's specification sheets. For purposes of this discussion, the most important is the velocity of propagation or VP. It is usually represented as a percentage of the speed of light. For example, if the VP is .82, this means that the speed of the signal along this particular piece of copper travels at approximately 82% of the speed of light. This is sometimes referred to as the "speed of the cable". Using built in algorithms along with the setup information entered, the distance to an incident can then be calculated and displayed. The TDR sends out a radar like signal along the cable under test and measures the time it takes to get a reflection of an incident, such as an open. The TDR compares the speed of a signal traveling down a wire (VP) to the speed of light. This speed of light in a vacuum (300 million meters per second or 186,000 miles per second) is the standard by which all these signals are measured. VP between cables gives you some idea of which cables perform better at higher frequencies. A faster velocity means less frequency loss and flatter frequency response overall. In utilizing a TDR, you must be familiar with transmission line theory in order to interpret the displayed results. For example, in a perfect world, all power transmitted down a line is all absorbed by the end of line terminator. We all know that in practice the termination resister is not perfectly matched to the line and some impedance mismatch occurs. This causes some of the signal to be reflected back. On the TDR this is indicated as a discontinuity. By contrast, a complete open will reflect ALL of the signal back along the line. This too will be indicated by the TDR, however it will be a much larger graphic representation. A TDR is not a magical instrument that will immediately locate and tell you where a fault is. The displayed results are a graphic representation of anything along the line which disrupts the base line impedance, such as 75 Ohms and must be properly interpreted. Anything greater than, for instance, 75 Ohms, is indicated by a vertical rise in the graph. A short, by contrast, is indicated by a vertical drop in the graph. Everything else is somewhere in between, tap, splitters, splices and of course cable faults, fall into this category. It takes an experienced operator to determine whether any given disturbance displayed is a problem or not.

Delta Automations engineers have years of experience using these instruments and are highly skilled at locating faults with the types of communication systems utilized in control networks.

Examples of some of these types of networks are: Modicon remote I/O , Modicon Modbus Plus, Modicon Modbus II, Symax "Blue Hose", Siemans Profibus, A/B "blue hose", and A/B Data highway plus. Most any metallic type cable system can be tested using a TDR, given the proper VP. Even in instances where it is not available from a publication, it can be calculated on-site with great accuracy.

Modicon Trivia Question

TWO WINNERS !!!!!

There were two correct answers to the identity of this product.
It is an address pack for the original version of the J810 I/O adapter between the 584 controller and 800 series I/O. In the final models, the switches were moved on-board.
The two winners were:
Darin Fox of Graybar, Richmond, and
Mike Mellish formerly of Schneider Electric
Both will receive a dinner certificate from Applebees restaurant.

E-MAIL: PLC@DELTAAUTOMATION.COM

ModLink as a Troubleshooting Tool

Modlink as a Troubleshooting/Maintenance Tool

Savvy maintenance technicians have discovered that using software programs as aids in troubleshooting PLC problems greatly reduces the time to locate the problem. Modlink can connect to the PLC using Modbus, Modbus Plus, or TCPIP depending on the hardware available. Requested data from inputs, outputs, input registers, or output registers can then be linked to an Excel spreadsheet for monitoring. Conditional states of the data can then change color for visual recognition. Modlink files with their respective Excel spreadsheet can be saved for future use for a peculiar problem.
This is a cheap and effective troubleshooting method for maintenance personnel. This software can also be utilized as a "poor man's HMI". It can report values and data with the visual indicators available in Excel.

Important Info

Important VFD Grounding Issues

Recently, a large user of Square D Altivar drives began experiencing nuisance trips of various types on several large (150 HP) drives. The user had exchanged the drives with their spare, replaced it with another from the manufacturer and tried various other fixes. Delta Automation, Inc. was called in to investigate the problem. As in most cases, intermittent problems rarely show up when you want them to. The Delta Engineer, while on-site waiting to witness the failure, began evaluating the installation. These drives have been in service for several years with no problems. Plant personnel stated that no changes had been made to either of these systems. Upon further examination, by the Delta Engineer, it was discovered that several new smaller drives had been installed nearby on unrelated machinery. The grounds for these drives however, were tied to the ground bus of the larger drives in question, rather than continuing back to the MCC. These grounds were re-routed to the MCC and no further problems were experienced.

Delta Automation Contact Info

804-236-2800 **Toll free 1-888-PC-DELTA** **fax 804-236-2900**
(888-723-3582)

Bob Culley	President	bobculley@deltaautomation.com
Margarete Culley	Vice President	mculley@deltaautomation.com
Roy Caudle	Service	roycaudle@deltaautomation.com
Bernie Wieland	Sales	berniewieland@deltaautomation.com
Clark Jones	Sales	clarkjones@deltaautomation.com
Vann Barden	Outside Sales	vannbarden@deltaautomation.com
Mike Martinelli	Repair	marti@deltaautomation.com
Theresa Umbel	Accounting	plc@deltaautomation.com

For after hours

Emergency Service or Parts

Call our main number 888-723-3582

Extension 55

Leave a message and someone will respond within fifteen minutes to answer your call.

www.deltaautomation.com

2704 Charles City Road Richmond, VA. 23231