



LOGIC
Technologies, Inc.

October 2009

"Advanced and reliable technology solutions at an affordable cost"

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Ideas for Articles of Interest?

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The Controller

LOGIC Technologies, Inc. Publication

Volume 10, Issue 4

Our New Website is Online

by Russ Nagel

We are pleased to announce the release of our new corporate website. The site has a new look, and some new features to make our work days go a bit more smoothly. Some of the new features are available now, and the others will be available soon.

ECON Activation - After you login, look along the bottom row of options until you see ECON Activation. Select that link, and follow the instructions to activate ECON on a new computer. Remember, your license for ECON is good for all computers, desktops and laptops, at your facility.
Access to System Prints and Project Files - This feature hasn't changed.

Some features we are working on that will be available soon include the following:

Forum - This will be a feature where you can post questions you need answers to. Someone on staff will promptly answer your questions. The question, as well as the answer, will remain available for you and others to look at. I promise you, other people have the same questions you do. We answer the same question quite often!

Newsletter - A .pdf version of all our newsletters is now available for download.

Whitepapers - Several white papers have been written regarding various subjects related to our control system. These will be available for download.

I/O Maintenance Utility

by Russ Nagel

You may hear this page referred to as the forced I/O screen, or the 5,7,2 screen. This refers to the sequence of keystrokes needed to get to this screen. However you refer to it, it is a good page to be familiar with. This page is very useful when troubleshooting a problem. It allows you to see what signals the system is sending out to your plant, and what signals are coming in from the plant to the control system.

In order to get to this screen, you will need to press the following keys from the main screen: F5, F7, F2, then enter your lock code and press enter. Any changes made using this lock code, will require the same lock code to undo the changes. This screen shows the status of all your digital inputs and outputs as well as the raw value for all of your analog inputs.

This screen shows your inputs and outputs in sequential order. This allows you to see all the I/O's

(valves and fans) related to a particular valve group at one time. It allows you to see a motor start signal and the motor auxiliary signal together. You can also see the status of a high level cutout float switch.

The most useful function of the I/O maintenance utility screen is its ability to force on a certain output on or off. Once the output is turned on, you can then look at a fan, pump, or valve to see that it is actually on. This screen also shows the start signal for motors as well as the auxiliary signal for those motors. This allows you to manually turn on a condenser fan (or pump) and observe the corresponding auxiliary (next line) signal. If you don't get the auxiliary signal, the issue is most likely hardware related. The MOA switch for that output may be in the off position, the starter may not have engaged, or there could be an open 120VAC circuit somewhere.

Another useful feature of this screen is the ability to look at all of the analog inputs on one card at the same time. One analog input card has 16 inputs. You will have to refer to your system prints to determine which inputs are on the same card. Look for sensors that have the same POS number on the prints. If you are having a problem with a temperature sensor, you can find that sensor on the I/O Maintenance Utility screen and see if the value on that screen, for that sensor, is greatly different than the value for other temperature sensors. If one temperature sensor has a value that is greatly different than values of other temperature sensors on the same card, you have an issue with a single sensor. If all the

sensors on a single card have abnormal raw values, 4095 for instance, there may be an issue with the entire card. Keep in mind, if one temperature sensor has a short, it can overload the entire card. You can remove the sensors from the system one at a time to determine if this is being caused by a single sensor. The best way to accomplish this is by removing the 22K ohm resistor from the circuit one at a time. The 22 K ohm resistor is located on the terminal strip where all the field wiring for the analog sensors is connected.

Check Your Alarms!

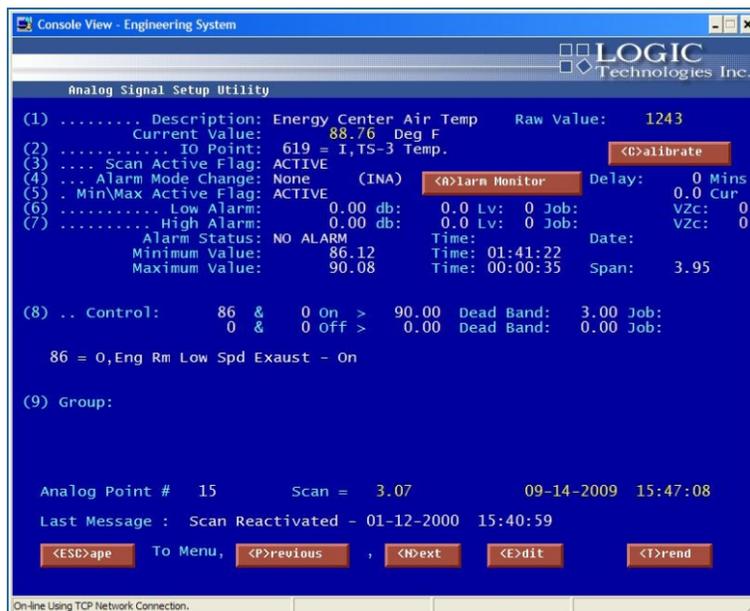
by Russ Nagel

Our operating system provides you with a convenient way to verify that your system activates alarms or

example for this article. The technique discussed will also work on other sensors such as your ammonia sensors. Be careful with what sensors you are playing around with. You wouldn't want to accidentally trigger a shunt trip!

To get started, select F1, F1 from your main screen. Then choose the sensor of your choice.

In this example, I have chosen the Energy Center Air Temp sensor. This is actually the temperature sensor in the engine room. Look at section 8 in the middle of the screen. You can see that output 86 has been 'programmed' to energize when the temperature of the engine room goes above 90 degrees F. The output will remain energized as long as the temperature remains above 87 degrees F. In this case, the temperature did get high



other outputs properly according to input levels on analog sensors, provided the analog input has been programmed to activate an output based on its input level. The easiest way to explain this is through an example. I will be using a temperature sensor as an

example for this article. The technique discussed will also work on other sensors such as your ammonia sensors. Be careful with what sensors you are playing around with. You wouldn't want to accidentally trigger a shunt trip!

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to force the issue. It's January, and the temperature in the engine room is cool, not high enough to cause the exhaust fan to turn on. If you need to verify the exhaust will work as planned, you need to trick the refrigeration system into thinking the temperature in the engine room is above 90 degrees F. Follow these steps:

1. Click on line 3, Scan Active Flag. The status will change from *ACTIVE* to *INACTIVE*.
2. Go up 2 lines and click on *Current Value*.
3. Enter the value you want to see how the system responds to. You will have to hit backspace to erase the existing value.

After observing your systems reaction to the forced value, reactivate the Scan Active Flag. Using this technique, you can verify you will get such conditions as high temp alarms and ammonia alarms. You may want to create a procedure to follow every six months and make it part of your PSM program.

Compressor not Starting?

by Russ Nagel

A compressor may not start the way you expect it to for several different reasons. I'm just going to talk about one of them. There is a parameter on your compressor definition screen called discharge start inhibit. If the pressure in the sump of your compressor is too high, your compressor will not start.

To get to this screen, press the following buttons: F5 System Utilities, F4 Process Master File Editors, F7 Compressor Control

Information. Use the mouse to select the compressor you are interested in.

This should get you to the (top line) Refrigeration (Compressor) Definition File Editor. Look in the bottom right hand section of the screen. One line will have the following words:

Disch. Start Inhibit ### Lbs.

The ### will be the value for this parameter. The value on this line is what the pressure in the sump must be less than to allow the compressor to start.

You may run into a problem with this when you have moved a swing compressor from the low side (or a booster compressor) suction to a high side suction. Take a look at that page on your system and make sure you are familiar with that parameter.

Let Me Hear From You.

Is there some particular aspect regarding our control system you want to know more about? Chances are, other people want to learn about the same thing. Don't hesitate to ask! Even if it's a beginner question. There are new people looking at our system all the time. Even experienced people can benefit by reading about something they are already familiar with. So if you have a question, send it in! I can answer that question for everyone at the same time. In fact, I'll send out a prize for the best question, per issue of THE CONTROLLER. So email me your question and you may be the winner!

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Training Info & Schedule

Operator-Level Sessions

This class session provides in-depth coverage of the use of our system to maintain the daily operations of a refrigerated facility. The class is conducted by Ralph Nodal who has many years of experience as a plant maintenance manager and refrigeration operator. The classes are taught in layman's terms by someone who fully understands the issues faced by refrigeration operators.

Wednesday, November 11 thru Friday, November 13

Wednesday, Dec. 9 through Friday, Dec 11

Advanced SST Sessions

This class session provides in-depth coverage of the screen and report development tools provided by our system. These classes also briefly cover the script language used to develop control algorithms. These classes are conducted by senior members of our engineering staff. Prior technical expertise is a pre-requisite for this course

Wednesday, Jan. 6 through Friday, Jan. 8

Training Enrollment

Operator training sessions are \$450 per person and advanced training sessions are \$750 per person. We provide lunch for each class day; however, all other travel expenses are your responsibility.

Seating is limited, so make your reservations early by contacting Kim Smith or Cindy Gaffney @ 770-389-4964

Our Control Theory

By Russ Nagel

I stole a few lines out of the new software manual that I'm working on.

This is a good time to explain how our staging control theory works. The concepts explained here for the staging of pumps and fans on the condensers is very similar to how we stage compressors. Four key parameters are used to control staging; **setpoint, deadband, rise rate** and **time**. An example is the best way to explain how these four parameters are used.

Example: A condensing system has two towers, EC-1 and EC-2. Each tower has two pumps and two fans. The head pressure set point is 150 Psig. It's midmorning in the

summer and all pumps have started. The head pressure starts to rise above the set point. Nothing happens until the head pressure rises above the setpoint **plus** the dead band of four lbs. Once the head pressure gets above 154 Psig, a timer starts. As long as the head pressure rise rate stays positive, (the pressure keeps going up) the timer will continue to count. Once the timer reaches a predetermined value, the next fan will start. If, at any time while the timer is counting, the rise rate goes negative, (pressure drops) the timer will reset to zero, and will not start counting again until the pressure is above the set point plus dead band. If the pressure is above 154 Psig, and the rise rate changes from positive to negative for one second, the timer will restart, provided the head pressure remains above 154 Psig.

Once the timer reaches its preset value, the next fan will start. Let's

assume that the second fan is enough to pull the head pressure down. As the head pressure falls below the set point **minus** the dead band of four lbs (146 Psig), the timer will start again. As long as the rise rate remains negative, (pressure dropping) the timer will continue to count. Once the timer has reached its predetermined value, the second fan will stage off, leaving you with one fan still running.

The dead band for the fans is +/- four lbs. The pumps have a dead band of plus four and minus fifteen lbs. The ending value of the stage up/stage down timer decreases the farther the pressure is from the set point. If the head pressure set point is 150 Psig, and the head pressure is 170 Psig, the timer's count will be reduced due to the higher head pressure.



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