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" Troubleshooting is not an frantic search for answers; it is an art and science performed in a logical sequence."

MODBUS PLUS NETWORKS

We've recently had a few instances of network problems. Symptoms are usually a failure of some part or all of the control system. This occurs when the CPU does not communicate with each Node in the network, causing a failure of the control furnished by that node. To troubleshoot this condition, please review the following:

I.) Modbus+ Network hookup– The network is a "T" configuration, the horizontal being the network itself and the vertical being the "node" (any input and /or output device).

> **1.) Cables–** Modicon uses standard network cable Pin-outs for the Modbus+ network, Modbus connections, and Ethernet networks.

> **2.) Network Rules-**

>> **A.)** The network needs an end resister in both the right and left end of the network.

>> **B.)** The network must fallow the "right to left" rule. Pay attention to this rule when going from one enclosure to another.

>> **C.)** You may not have more than 8 nodes in a cluster (a group of nodes connected with shorter than 10 ft. cables). You may have up to 8 clusters in one network

>> **D.)** The maximum length for a network is 1,500 ft.

> **3.) Modbus+ ACT–** This light is located in the upper left corner of the I/O nodes and next to the 9 pin connector on the S-85 com card on the computer.

>> **A.) 6 Flashes / Second-** This is the normal operating state for nodes in a network. Don't be fooled, however. You can have all the nodes flashing fast but not have a complete healthy network communicating to the PLC. You may have 2 or 3 networks since any two nodes that see each other produce the rapid flash indication.

>> **B.) 1 Flash / Second-** The node is off line or just powered up, after 5 seconds it will attempt to connect to a network.

>> **C.) 2 Flashes, then off for 2 seconds–** The node detects the token being passed among the other nodes but never receives it. Check the network for an open circuit or a terminator end

MODBUS PLUS NETWORKS (CON'T)

D.) 3 Flashes, then off for 1.7 seconds– The node is not detecting any tokens being passed among the other nodes. It periodically claims the token but can not find another node to pass it to. Check the network for an open circuit or a defective terminator end

E.) 4 Flashes, then off for 1.4 seconds– The node has detected a valid message from another node using a network address identical to its own address.

F.) ON Steady – Indicates an invalid address (00 or 65-99).

G.) OFF– Possible fault with the Modbus Plus port.

4.) Troubleshooting the network– Start at one end of the network and disconnect the "T" connector from each node. Reconnect the "Ts" to the first 2 nodes and check the condition of the Modbus Plus light on both nodes. If both show the "6 Flashes / Second," reconnect the next node in line. Continue this until you reconnect to a node in the network that shows a fault. The cable between this node and the previous node is suspect.

Helpful tools-A network tester can save you hours of frustration and an RJ-45 crimper will allow you to fix or even make cables.