MAGNUM & MCS-8 Micro Controller Systems

Simplified Description and Troubleshooting

Magnum and MCS-8 Micro Controller Systems
Simplified Description and Troubleshooting
Revision 2.03

The MCS Commitment

Our commitment is to provide practical solutions for the industry's needs and to be both a leader and a partner in the effective use of microprocessor controls.

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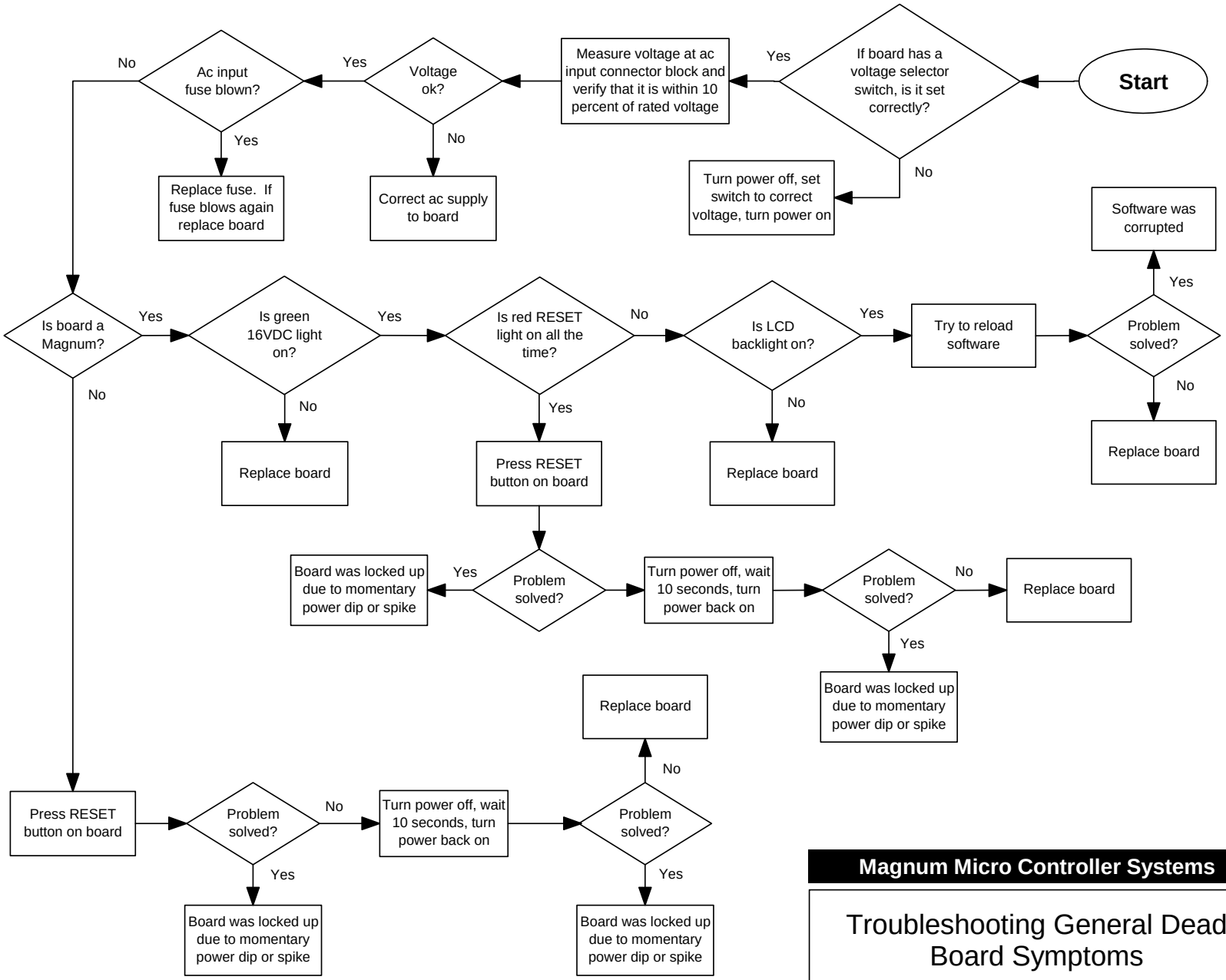
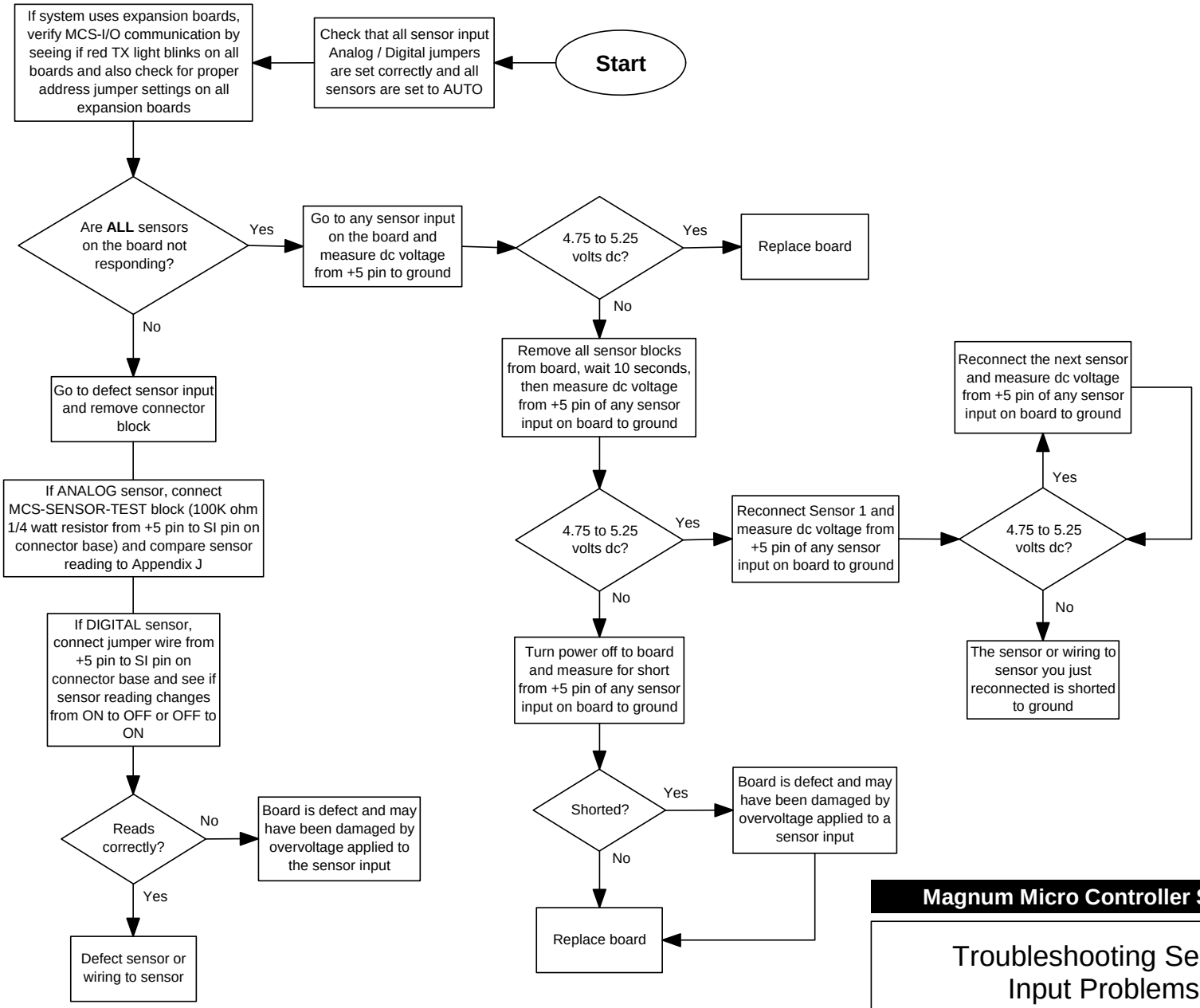
Section 1

MAGNUM Micro Controller Systems



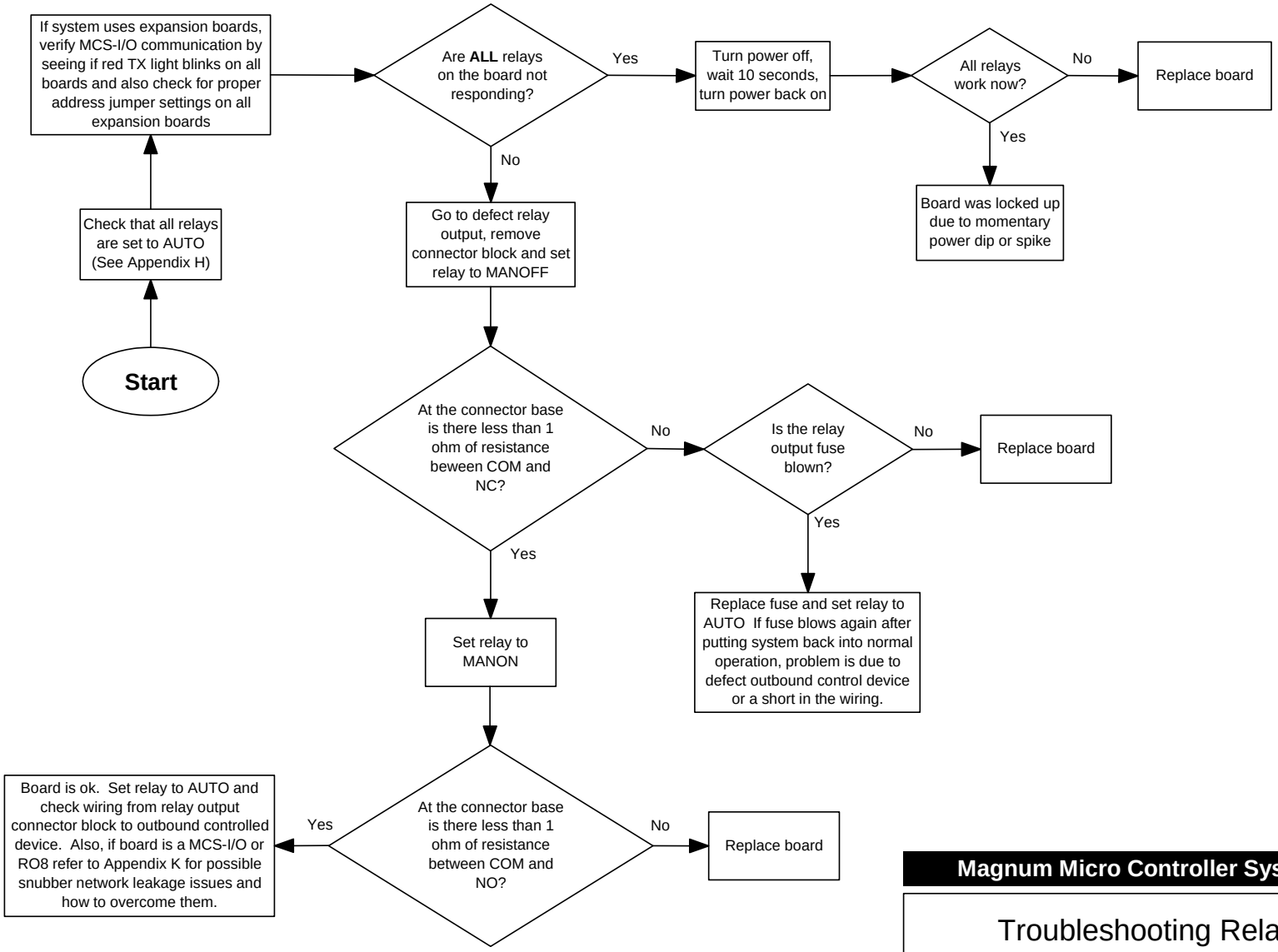
Magnum Micro Controller Systems

Troubleshooting General Dead Board Symptoms



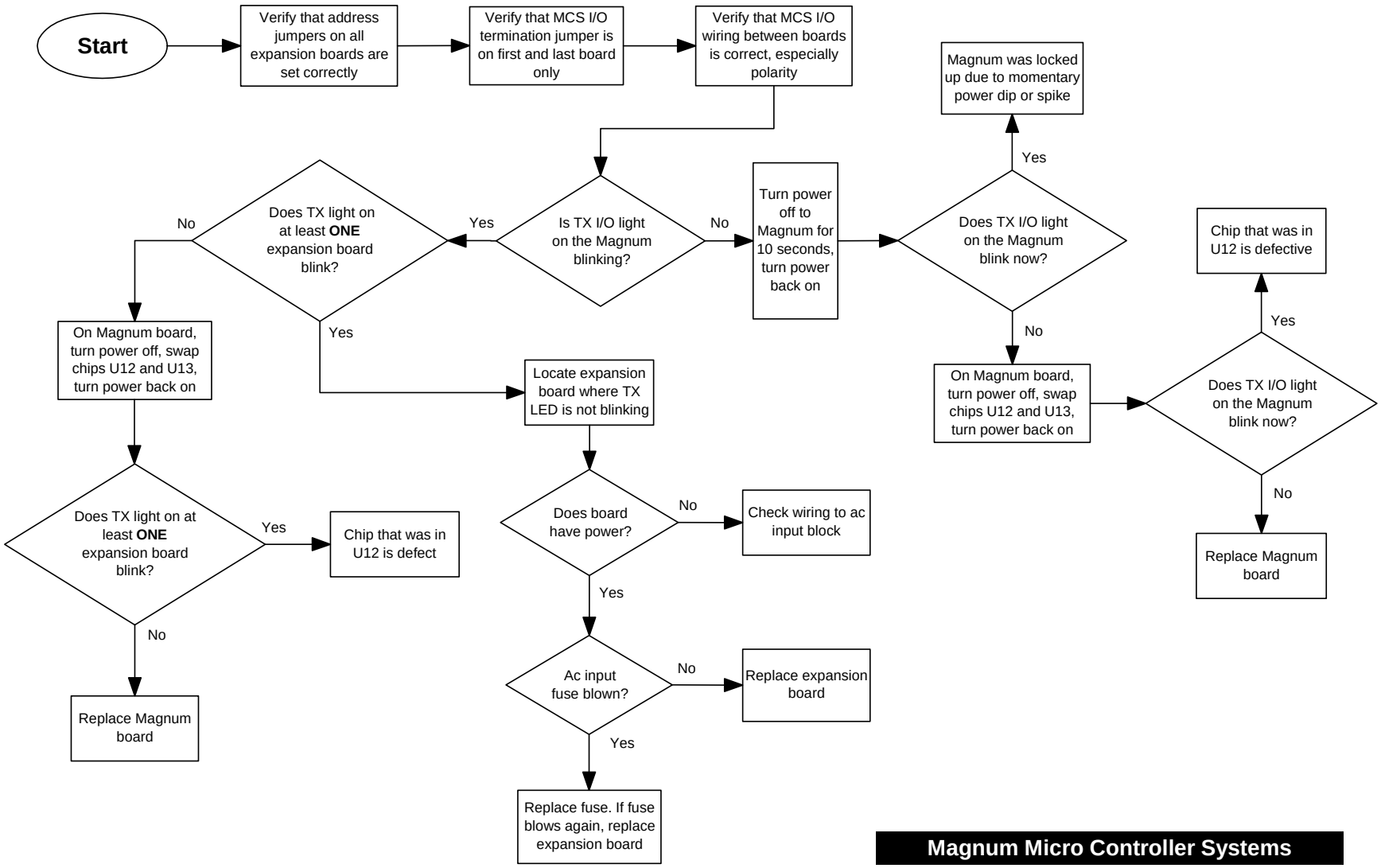
Magnum Micro Controller Systems

Troubleshooting Sensor Input Problems

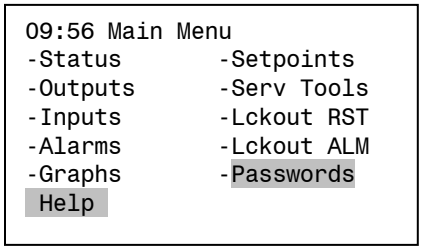
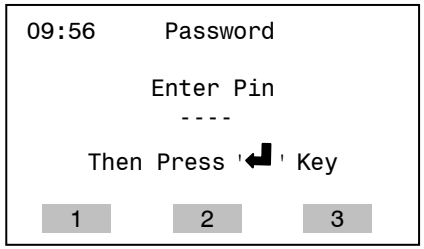
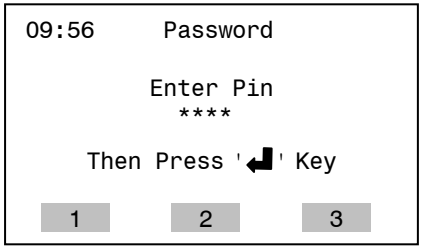


Magnum Micro Controller Systems

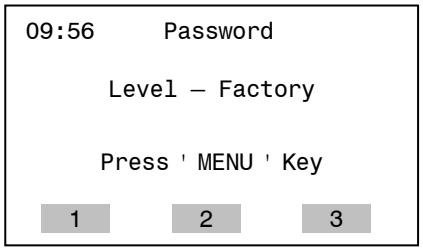
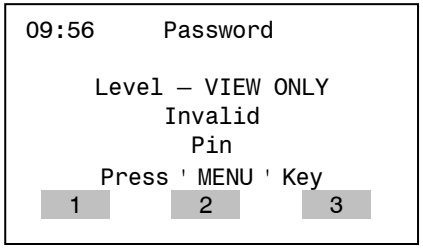
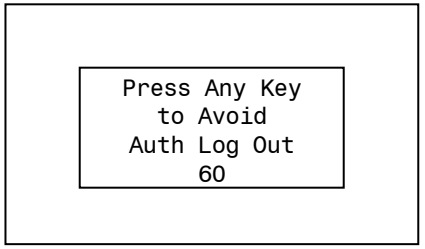
Troubleshooting Relay Output Problems


Start
Verify that address jumpers on all expansion boards are set correctly
Verify that MCS I/O termination jumper is on first and last board only
Verify that MCS I/O wiring between boards is correct, especially polarity
Is TX I/O light on the Magnum blinking?
Yes
No
Turn power off to Magnum for 10 seconds, turn power back on
Does TX I/O light on the Magnum blink now?
Yes
Magnum was locked up due to momentary power dip or spike
No
On Magnum board, turn power off, swap chips U12 and U13, turn power back on
Does TX I/O light on the Magnum blink now?
Yes
Chip that was in U12 is defective
No
Replace Magnum board
Does TX light on at least ONE expansion board blink?
No
Yes
On Magnum board, turn power off, swap chips U12 and U13, turn power back on
Does TX light on at least ONE expansion board blink?
Yes
Chip that was in U12 is defect
No
Replace Magnum board
Locate expansion board where TX LED is not blinking
Does board have power?
No
Check wiring to ac input block
Yes
Ac input fuse blown?
No
Replace expansion board
Yes
Replace fuse. If fuse blows again, replace expansion board
Magnum Micro Controller Systems
Troubleshooting Lost I/O Communication Problems

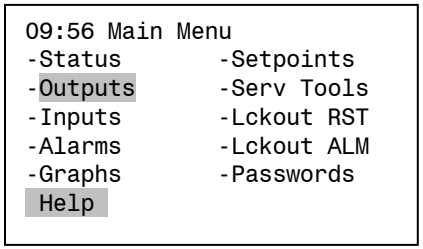
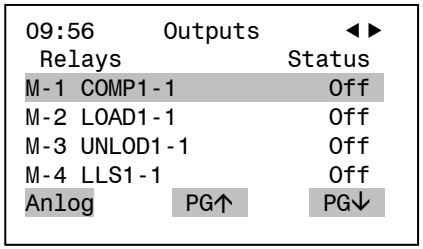
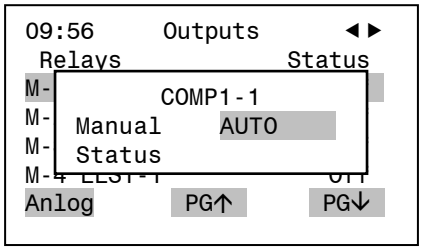
Appendix G
Entering Authorization Codes to Log In and Out of a Magnum

First, at the Main Menu use the arrow keys to navigate to **Passwords**:	
Next, press the Enter key. You will see the following:	
Now enter the proper four-digit authorization code. Each **-** is changed to a ***** as numbers are entered. After you have keyed in the numbers, press the Enter key.	

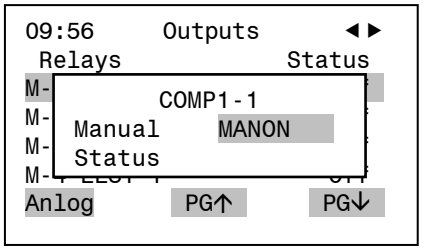
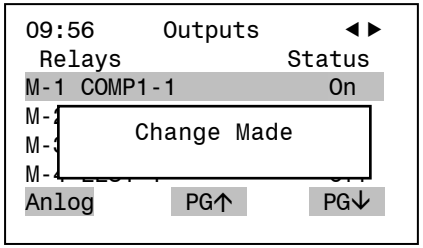
Appendix G (continued)
Entering Authorization Codes to Log In and Out of a Magnum

The Magnum will tell you if it accepted your code and the level of authorization. For example, if you entered a valid factory authorization code you will see the following:	
If you entered an invalid authorization code you will see the following:	
Once you are logged in you can log out immediately by simply entering any invalid authorization code. If you are logged in and no keys are pressed for more than 15 minutes the Magnum will automatically log you out, warning you shortly before with how many seconds remaining as shown here:	

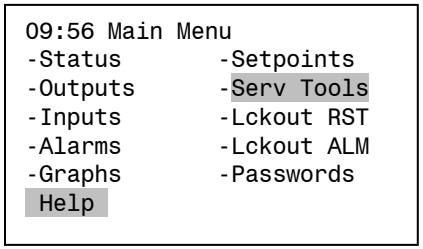
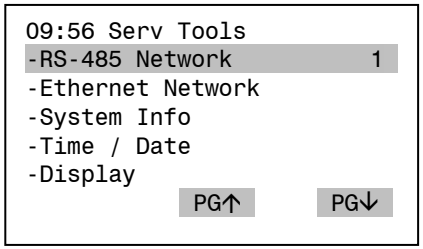
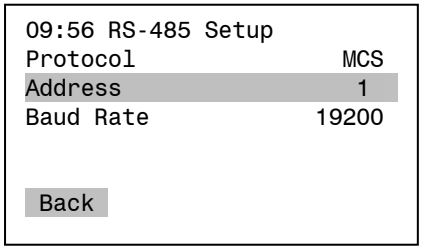
Appendix H
Manually Turning On and Off a Magnum, MCS-I/O or RO8 Relay Output

Note: If a relay is in a Lockout state you cannot manually turn it on or off. First, after logging into the Magnum with your authorization code (see Appendix G), use the arrow keys to navigate to **Outputs**:	
Next, use the up and down arrow keys to highlight the relay you want to turn on or off:	
Now press the Enter key. You should see something similar to the following:	

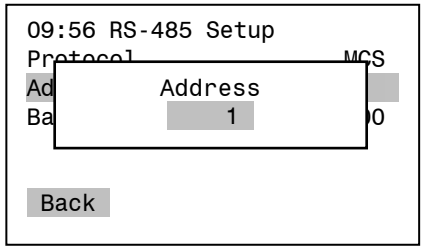
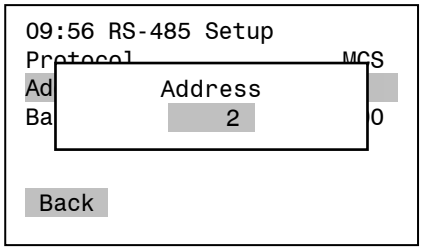
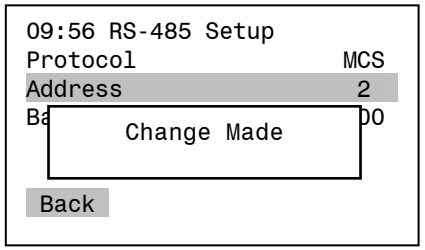
Appendix H (continued)
Manually Turning On and Off a Magnum, MCS-I/O or RO8 Relay Output

Use the up and down arrow keys to cycle through the three modes for the relay output: **AUTO**, **MANON** or **MANOFF** Stop when you reach the one you want:	
Finally, press the Enter key to make the change. In our example the relay output is now manually turned on as shown here: ***Remember to return the relay output to AUTO mode when you are done!***	

Appendix I
Determining and Changing the Network Address of a Magnum

First, at the Main Menu use the arrow keys to navigate to **Serv Tools**:	
Next, press the Enter key. You will see the following:	
Use the up and down arrow keys to highlight **Address**:	

Appendix I (continued)
Determining and Changing the Network Address of a Magnum

Now press the Enter key. You should see something similar to the following:	
Use the up and down arrow keys to select the Address number:	
Finally, press the Enter key to make the change. In our example the RS-485 network address has been changed from 1 to 2:	

Appendix J
Analog Sensor Input Reference Table

To troubleshoot analog sensor input problems and determine where the problem is, simply remove the sensor input connector block of the input you want to test and plug in a MCS-SENSOR-TEST block. If you do not have a MCS-SENSOR-TEST block you can connect a 100K ohm 1% ¼ watt resistor between the +5 and S1 pins of the suspect sensor input on the board with the original sensor connector block removed.

After you have done this, compare the reading displayed by the Magnum with the table of the most common sensor types on the right. If the reading is close to what is found in the table for that particular sensor type you can safely assume that the board is functioning normally and that the problem lies with the sensor itself of the wiring from the sensor to the board.

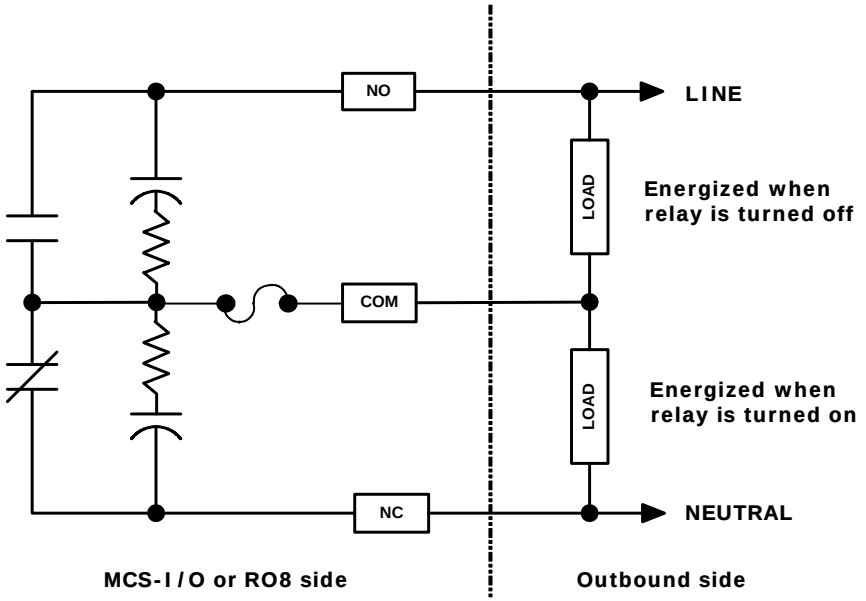
Sensor Type	Reading
CT100	57.0A
CT250	143.0A
CT500	287.0A
HUMD	54.0%
T100	77.0F
Ti150A	75.0P
Ti200	100.0P
Ti500	250.0P
Ti667A	334.0P

Appendix K
Resolving MCS-I/O and RO8 Snubber Network Leakage Issues

Each relay output on a MCS-I/O and RO8 board is protected by the use of on-board snubber networks. These networks consist of a resistor and capacitor in series connected from the common side of each relay to the normally open and normally closed sides. Its purpose is to suppress or "snub" the electrical arc that is produced when relay contacts open and close. Electrical arcs can shorten the useful life of a relay and can also cause the electronics on the controller board to malfunction.

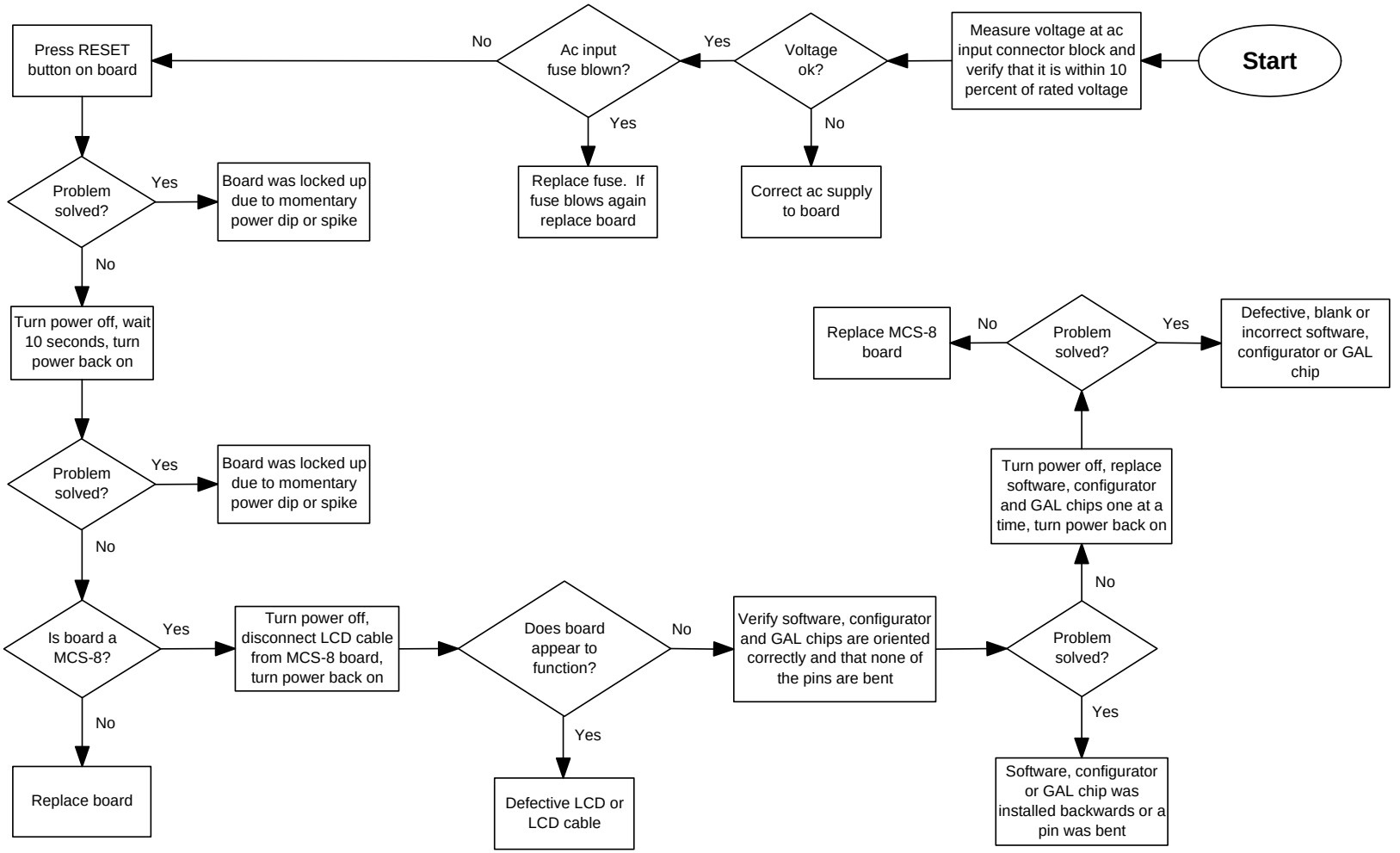
In some cases the use of these snubber networks can cause an outbound device, such as a relay, to stay on even when the controlling relay on the MCS-I/O or RO8 board is turned off. This can occur in situations where the outbound device requires very little ac current to keep it on once it is energized. Because snubber networks normally pass a small amount of current when the circuit it is protecting is switched off, enough current may pass through these networks to keep the outbound relay on, even though the controlling relay is turned off.

An easy solution to this problem is to rewire the relay output as shown in the diagram to the right. As you can see, wiring the circuit in this way causes the outbound device to have the same voltage potential on both sides when it is not energized.



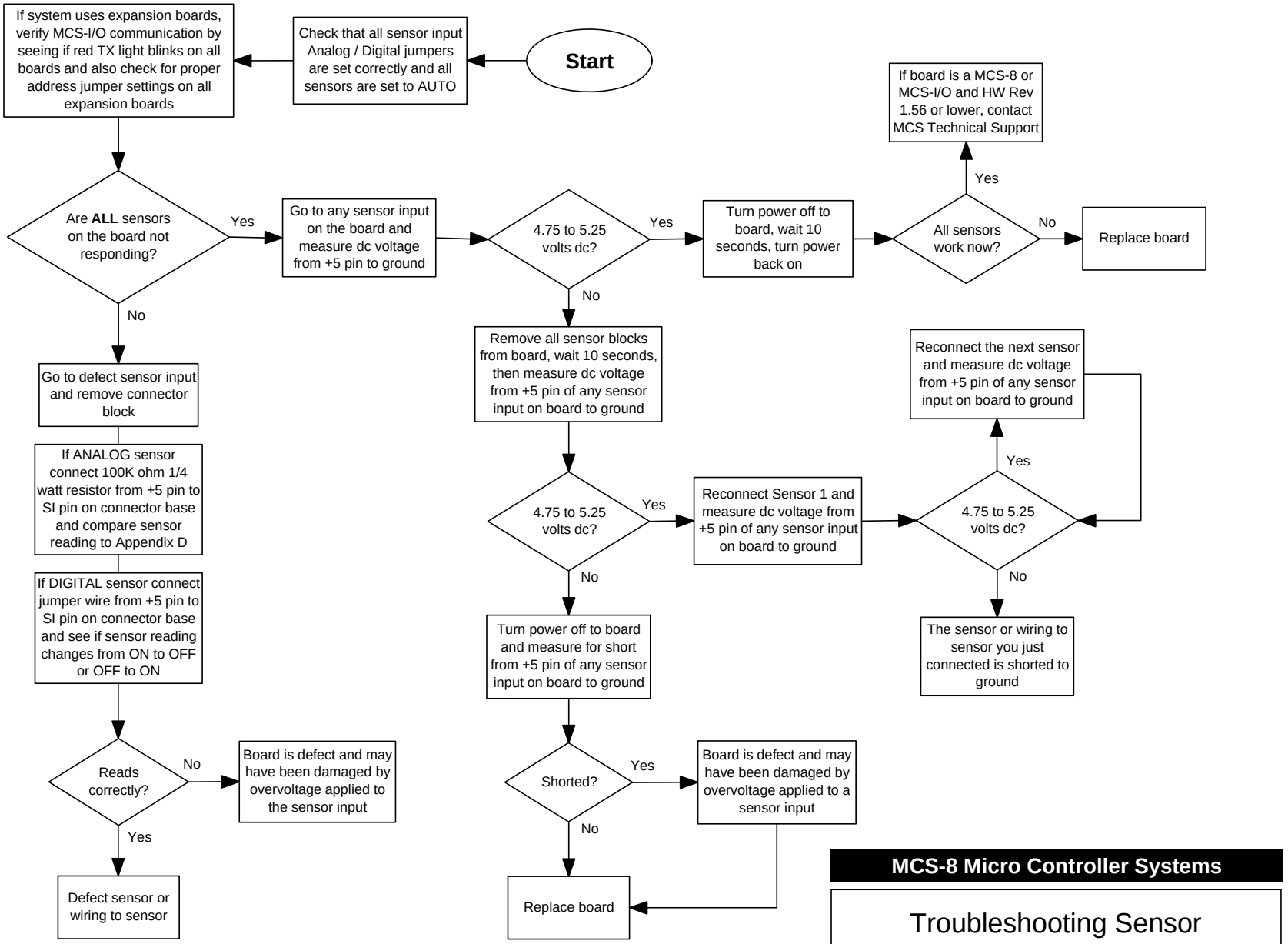
Section 2

MCS-8 Micro Controller Systems



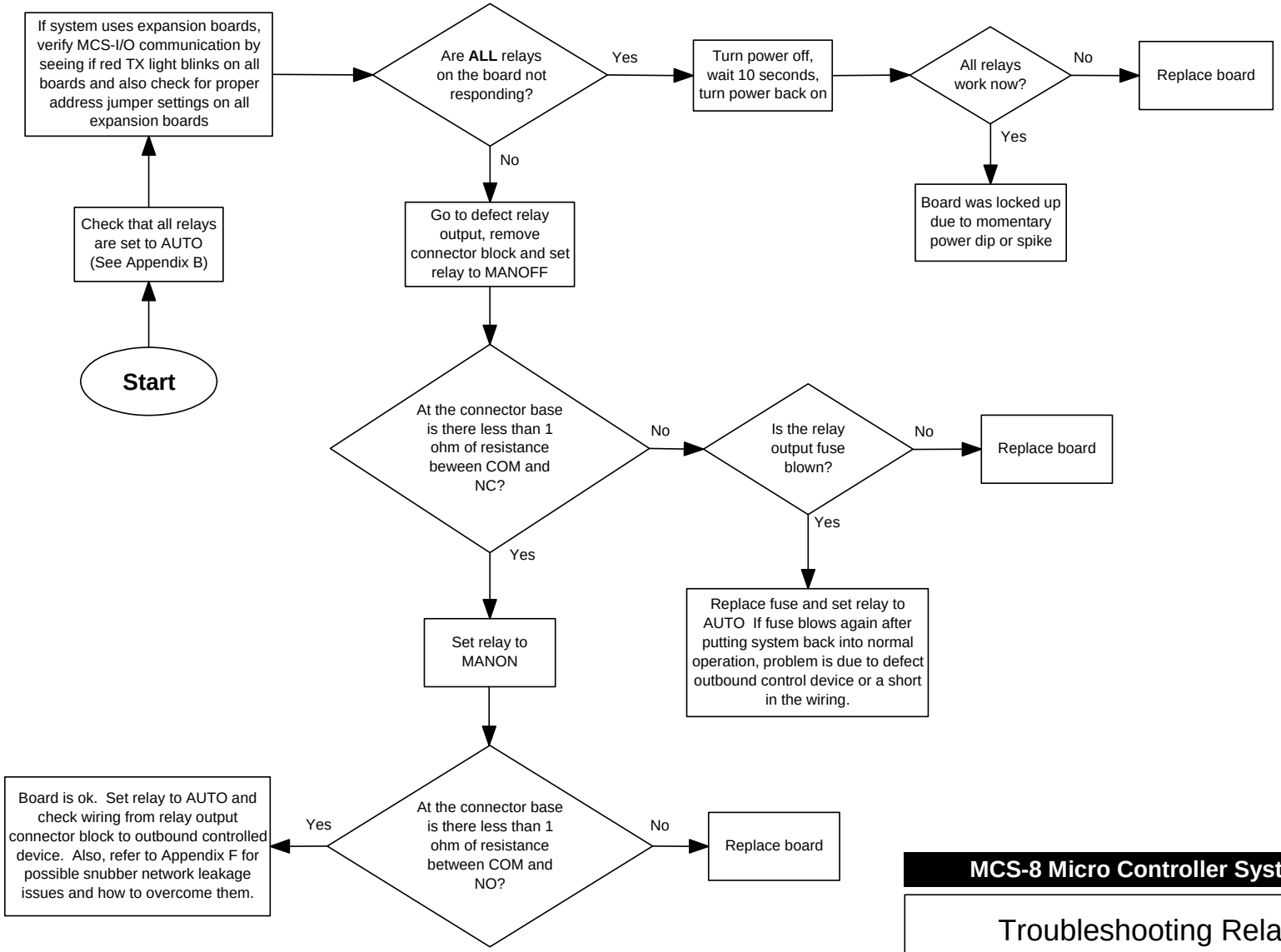
MCS-8 Micro Controller Systems

Troubleshooting General Dead Board Symptoms



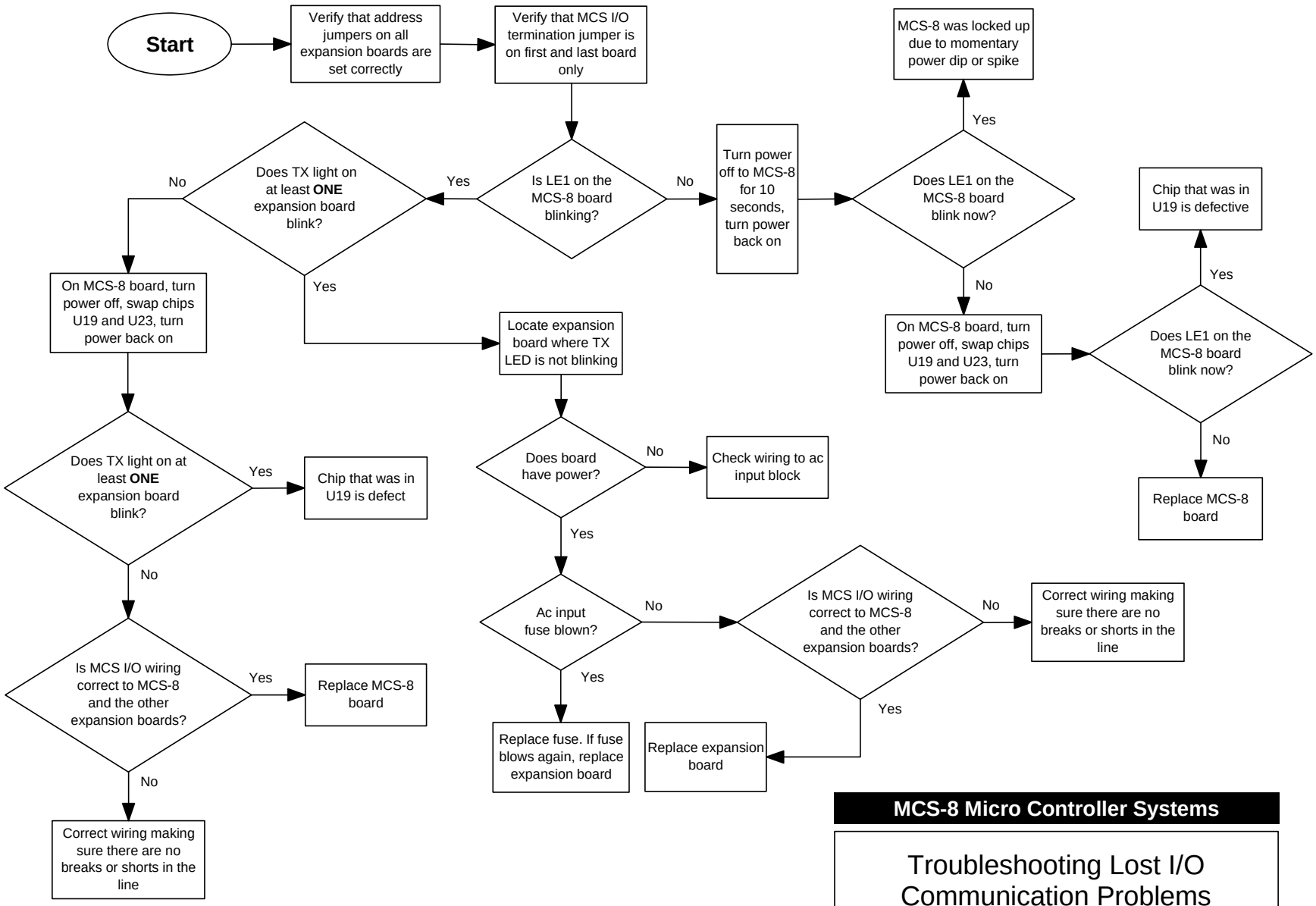
MCS-8 Micro Controller Systems

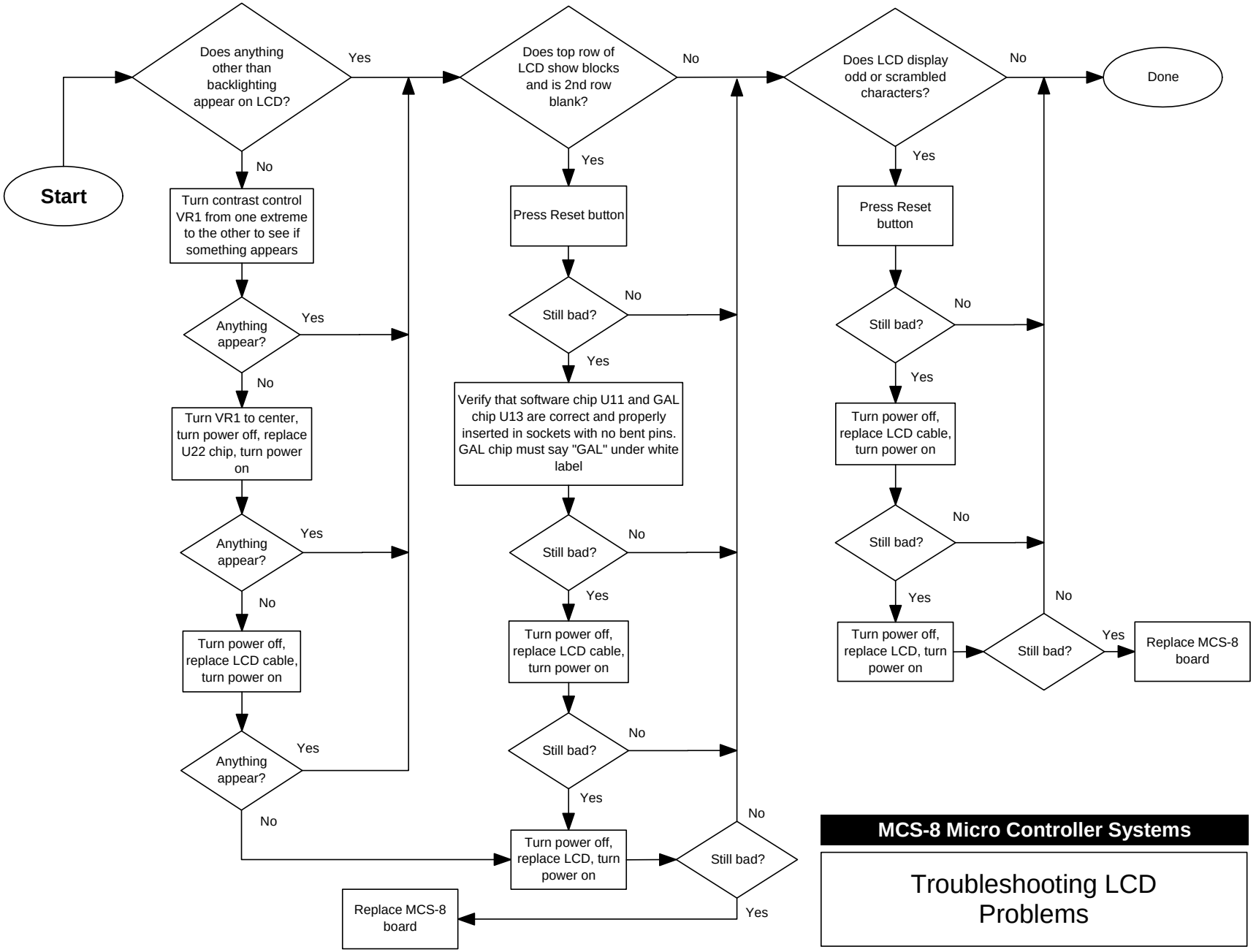
Troubleshooting Sensor Input Problems



MCS-8 Micro Controller Systems

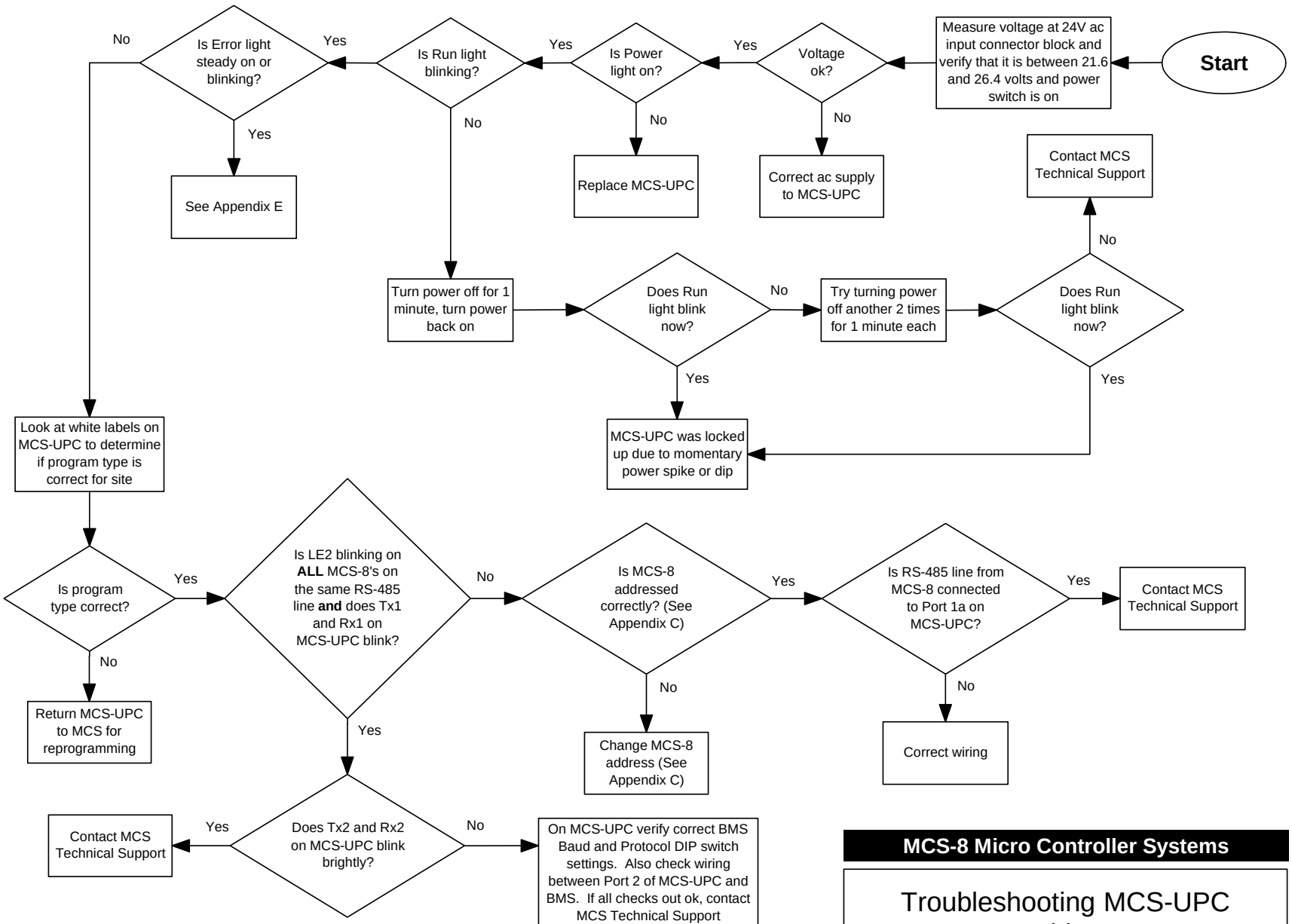
Troubleshooting Relay Output Problems


Start
Verify that address jumpers on all expansion boards are set correctly
Verify that MCS I/O termination jumper is on first and last board only
Is LE1 on the MCS-8 board blinking?
Yes
No
Does TX light on at least ONE expansion board blink?
No
Yes
Turn power off to MCS-8 for 10 seconds, turn power back on
Does LE1 on the MCS-8 board blink now?
Yes
MCS-8 was locked up due to momentary power dip or spike
No
On MCS-8 board, turn power off, swap chips U19 and U23, turn power back on
Does LE1 on the MCS-8 board blink now?
Yes
Chip that was in U19 is defective
No
Replace MCS-8 board
On MCS-8 board, turn power off, swap chips U19 and U23, turn power back on
Locate expansion board where TX LED is not blinking
Does board have power?
No
Check wiring to ac input block
Yes
Ac input fuse blown?
No
Yes
Replace fuse. If fuse blows again, replace expansion board
Is MCS I/O wiring correct to MCS-8 and the other expansion boards?
No
Correct wiring making sure there are no breaks or shorts in the line
Yes
Replace expansion board
Does TX light on at least ONE expansion board blink?
Yes
Chip that was in U19 is defect
No
Is MCS I/O wiring correct to MCS-8 and the other expansion boards?
Yes
Replace MCS-8 board
No
Correct wiring making sure there are no breaks or shorts in the line
MCS-8 Micro Controller Systems
Troubleshooting Lost I/O Communication Problems



MCS-8 Micro Controller Systems

Troubleshooting LCD Problems



MCS-8 Micro Controller Systems

Troubleshooting MCS-UPC Problems

Appendix A
Entering Authorization Codes to Log In and Out of a MCS-8

First, press the ***SERVICE DIAGNOSTICS*** key several times until the following screen appears:	AUTHORIZATION ENTER CHG/OPTION
Next, press the ***ENTER*** key. You will see the following screen:	ENTER AUTH #XXXX THEN 'ENTER' KEY
Now enter the proper four-digit authorization code. Each **X** is changed to a **0** as numbers are entered. After you have keyed in the numbers, press the ***ENTER*** key.	ENTER AUTH #0000 THEN 'ENTER' KEY
The MCS-8 will tell you if it accepted your code and the level of authorization. For example, if you entered a valid factory authorization code you will see the following:	AUTH= FACTORY SEL NEXT OPTION
If you entered an invalid authorization code you will see the following:	AUTH # INVALID SEL NEXT OPTION
If no keys are pressed for more than 15 minutes the MCS-8 will automatically log you out. To log out immediately simply enter any invalid authorization code. You will then see the following:	AUTH LOGGED OFF SEL NEXT OPTION

Appendix B
Manually Turning On and Off a MCS-8, I/O or RO8 Relay Output

Note: If a relay is in a Lockout state you cannot manually turn it on or off. First, after logging into the MCS-8 with your authorization code (see Appendix A), press the ***MANUAL OVERRIDES*** key until the following screen appears:	RELAY OUTs MANAL ENTER CHG/OPTION
Next, press the ***ENTER*** key. You will see something similar to the following, depending on what the first relay output is used for and what state it is currently in:	COMP1 OFF ENTER CHG/OPTION
Now press the ***INCREASE (+)*** or ***DECREASE(-)*** key until you have reached the desired relay output. Once there, press the ***ENTER*** key. For example:	FAN 1 OFF ENTER CHG/OPTION
Press the ***ENTER*** key to go into the change mode:	FAN 1 AUTO ENTER OR +-
Press the ***INCREASE (+)*** or ***DECREASE (-)*** key to cycle through the three modes for the relay output: **AUTO**, **MANON** or **MANOFF** Stop when you reach the one you want:	FAN 1 MANON ENTER OR +-
Finally, press the ENTER key to make the change. In our example the relay output is now manually turned on as shown here: ***Remember to return the relay output to AUTO mode when you are done!***	FAN 1 MANON CHG MADE/NXT-SEL

Appendix C
Determining and Changing the Network Address of a MCS-8

First, after logging into the MCS-8 with your authorization code (see Appendix A), press the ***SERVICE DIAGNOSTICS*** key until the following screen appears:	UNIT INFORMATION ENTER CHG/OPTION
Next, press the ***ENTER*** key. You will see which version of software the MCS-8 is currently running and the configurator type. For example:	SOFTWARE CFG CHL S08.23-B 6
Now press the ***INCREASE (+)*** or ***DECREASE(-)*** key until the NETWORK ADDRESS screen appears. Here you will see what the network address of the MCS-8 currently is. For example:	NETWORK ADDRESS MCS-8 ADDRESS 1
Press the ***ENTER*** key to go into the change mode:	NETWORK ADDRESS +-CHNG/ENTER 1
Press the ***INCREASE (+)*** or ***DECREASE (-)*** key to cycle through addresses. Stop when you reach the one you want.	NETWORK ADDRESS +-CHNG/ENTER 2
Finally, press the ENTER key to make the change. For example, as shown here the MCS-8 network address has been changed from 1 to 2:	NETWORK ADDRESS CHANGE MADE 2

Appendix D
Analog Sensor Input Reference Table

To troubleshoot analog sensor input problems and determine where the problem is, simply remove the sensor input connector block of the input you want to test and plug in a MCS-SENSOR-TEST block. If you do not have a MCS-SENSOR-TEST block you can connect a 100K ohm 1% ¼ watt resistor between the +5 and S1 pins of the suspect sensor input on the board with the original sensor connector block removed.

After you have done this, compare the reading displayed by the MCS-8 with the table of the most common sensor types on the right. If the reading is close to what is found in the table for that particular sensor type you can safely assume that the board is functioning normally and that the problem lies with the sensor itself of the wiring from the sensor to the board.

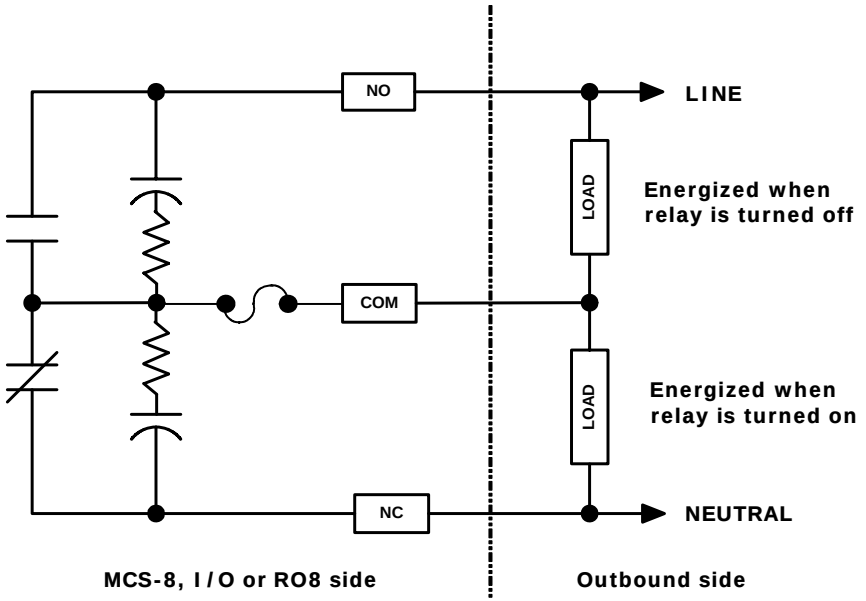
Sensor Type	Reading
CT100	57.0A
CT250	143.0A
CT500	287.0A
HUMD	54.0%
T100	77.0F
Ti150A	75.0P
Ti200	100.0P
Ti500	250.0P
Ti667A	334.0P

Appendix E
MCS-UPC Status LED Code Descriptions

Run LED	Error LED	Condition
2 flashes per second	Off	Normal
2 flashes per second	2 flashes alternating	Five minute auto-restart delay after system error
2 flashes per second	2 flashes in sync, then pause	Module is configured for a different baud rate that the rest of the network segment
2 flashes per second	3 flashes, then off	Module has just been formatted
2 flashes per second	4 flashes, then pause	Two or more devices on this network have the same ARC156 network segment address
2 flashes per second	On	Exec halted after frequent system errors or control programs halted
5 flashes per second	On	Exec start-up aborted, Boot is running
5 flashes per second	Off	Firmware transfer in progress, Boot is running
7 flashes per second	7 flashes per second, alternating	Ten second recovery period after brownout
14 flashes per second	14 flashes per second, alternating	Brownout

Appendix F
Resolving MCS-8, I/O and RO8 Snubber Network Leakage Issues

Each relay output on a MCS-8, I/O and RO8 board is protected by the use of on-board snubber networks. These networks consist of a resistor and capacitor in series connected from the common side of each relay to the normally open and normally closed sides. Its purpose is to suppress or "snub" the electrical arc that is produced when relay contacts open and close. Electrical arcs can shorten the useful life of a relay and can also cause the electronics on the controller board to malfunction.

In some cases the use of these snubber networks can cause an outbound device, such as a relay, to stay on even when the controlling relay on the MCS-8, I/O or RO8 board is turned off. This can occur in situations where the outbound device requires very little ac current to keep it on once it is energized. Because snubber networks normally pass a small amount of current when the circuit it is protecting is switched off, enough current may pass through these networks to keep the outbound relay on, even though the controlling relay is turned off.

An easy solution to this problem is to rewire the relay output as shown in the diagram to the right. As you can see, wiring the circuit in this way causes the outbound device to have the same voltage potential on both sides when it is not energized.