



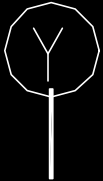
## Welcome To the AMR Online support Menu

Click on one of the links below to see information and or trouble shooting procedures for that device.

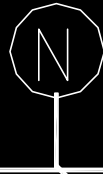
- [MC-4000 System](#)
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IS THE MASTER STATION  
COMMUNICATING WITH THE  
EQUIPMENT AT ALL?

THIS CAN BE CHECKED BY  
PRESSING F2 FOR SENSORS  
OR F4 FOR REMOTES  
AND CHECKING THE PERCENTAGE  
OF COMMUNICATIONS



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CHECK THE FUSES  
IN THE MC-4011

DISCONNECT THE POWER  
AND COMMUNICATIONS CABLE  
FROM THE MC-4011 GOING  
TO THE MINE AND CONNECT A  
SENSOR DIRECTLY TO THE MC-4011

DOES THE MASTER COMMUNICATE  
WITH THE SENSOR



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RECONNECT THE POWER AND COMMUNICATIONS CABLES TO THE MC-4011

CHECK THE FUSES AND COMMUNICATIONS CHIPS IN THE FIBER OPTIC BARRIER

IF THE PROBLEM IN THE FIBER OPTIC BARRIER CAN NOT BE FOUND IT WILL BE NECESSARY TO TEMPORARILY REMOVE IT FROM THE SYSTEM

DO YOU NOW HAVE COMMUNICATIONS WITH THE SYSTEM, AT LEAST PARTIALLY

RETURN TO THE BEGINNING OF THIS CHART

IF THERE IS A MC-4020 POWERING THE FIRST DEVICES INSTEAD OF THE MC-4011 MAKE SURE IT IS PICKED UP

CHECK THE CABLE FOR OPENS, SHORTS, AND POLARITY

N

Y

IN THE CONFIGURATION MENU  
UNDER SYSTEM PARAMETERES CHECK  
THE COM PORT AND BAUD  
RATE SETTINGS

CHECK THE DC OUTPUT  
OF THE MC-4011  
IS IT ABOUT 28V

N

THE DC POWER SUPPLY  
IN THE MC-4011 IS BAD  
P/N 271-0063

CHANGE THE COM CHIPS (LTC485)  
IN THE MC-4011. CAN YOU NOW  
COMMUNICATE WITH THE SENSOR

N

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PAGE 3

CHANGE THE COM BOARD (253-0212)  
IN THE MC-4011. CAN YOU NOW  
COMMUNICATE WITH THE SENSOR

N

SWITCH TO THE SPARE COM  
PORT ON THE MASTER STATION  
AND ALSO CHANGE THE PORT  
SETTINGS IN SYSTEM PARAMETERS  
YOU SHOULD BE ABLE TO  
COMMUNICATE WITH THE SENSOR

WERE ANY DEVICES ADDED TO THE SYSTEM, OR ANY CABLE SPLICES MADE, JUST BEFORE THE PROBLEM OCCURED

Y

CHECK THE FOLLOWING ITEMS:  
PROPER TERMINATION OF BRANCHES AT THE END OF A BRANCH THERE MUST BE A 120 OHM TERMINATING RESISTOR ACROSS THE COM LINE  
CHECK FOR PROPER POLARITY  
IF THE CABLE WAS CUT WITH POWER ON, FUSES AND COM CHIPS MAY HAVE BEEN DAMAGED WHERE COMMUNICATIONS PROBLEMS EXIST

WAS POWER TO THE MINE LOST WITHIN THE LAST SEVERAL HOURS

N

N

GO TO PAGE 6

Y

THE MC-4020(S) HAVE PROBABLY DROPPED OFF LINE DUE TO THE POWER LOSS AND NEED TO BE RESET. (REFER TO MC-4020 TROUBLE SHOOTING FOR DETAILS)

THE OBVIOUS PROBLEMS HAVE BEEN ELIMINATED. THE MC-4000 SYSTEM CAN BE TROUBLE SHOT BY STARTING AT THE FIRST DEVICE, DISCONNCETING EVERYTHING "INBY", (BE SURE TO PLACE A TERMINATING(120 ohm) RESISTOR ACROSS THE COM LINE) MAKE SURE THAT DEVICE WORKS, RECONNECTING "INBY" AND GOING TO THE NEXT DEVICE AND REPEATING THE PROCESS. THIS IS TIME CONSUMING AND UNNECESSARY. NOTE THAT IT MAY BE ONLY A FEW DEVICES OR EVEN ONE THAT HAS A PROBLEM, CAUSING PROBLEMS WITH THE ENTIRE SYSTEM. WE WILL NOW LOOK AT WAYS TO QUICKLY NARROW THE SUSPECT AREA

IS THE PROBLEM AFFECTING YOUR ENTIRE SYSTEM OR A BRANCH ONLY

ENTIRE SYSTEM

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BRANCH ONLY

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DOES THE SYSTEM HAVE MC-4040(s)  
OR MC-4020(s)

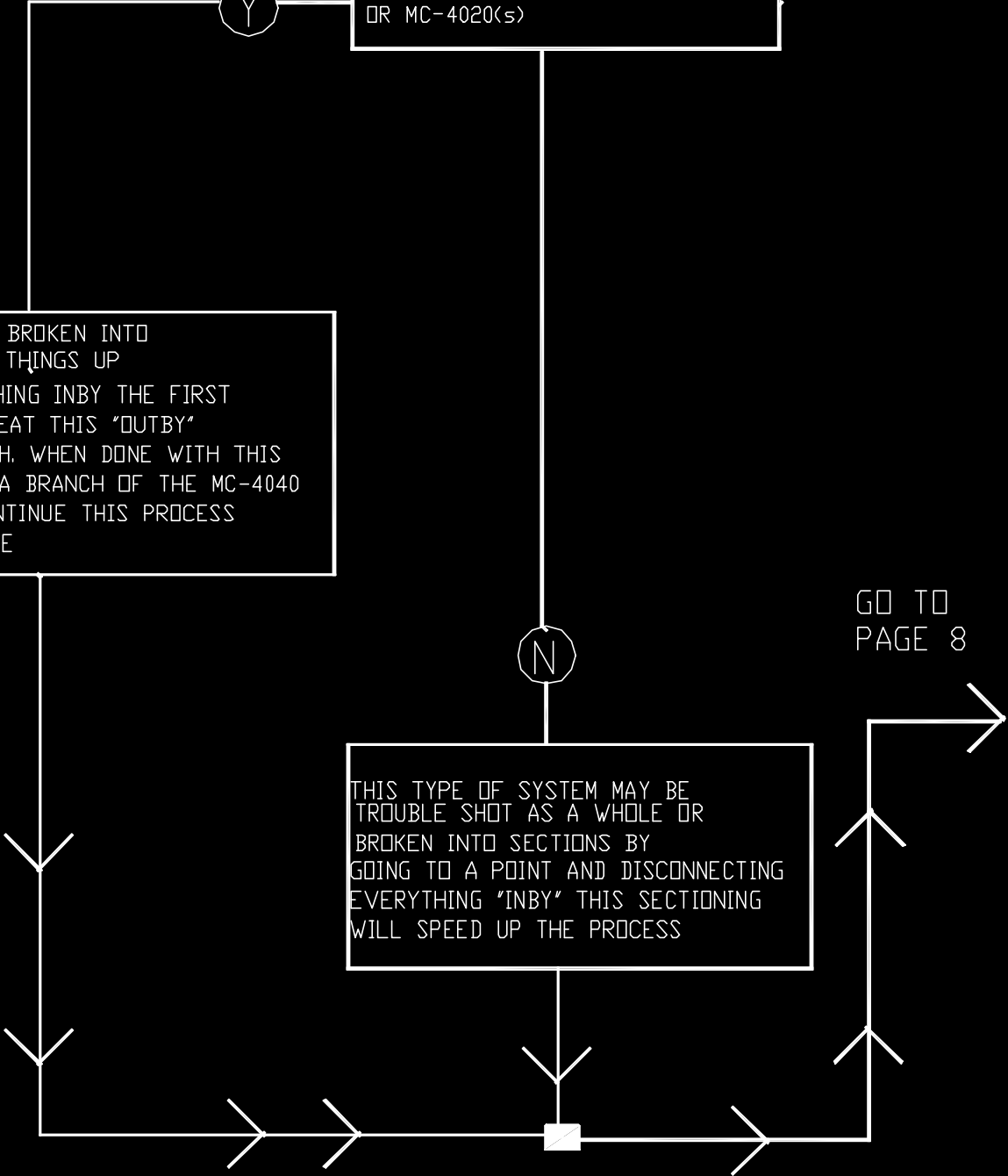
Y

THIS SYSTEM CAN BE BROKEN INTO  
BRANCHES TO SPEED THINGS UP  
DISCONNECT EVERYTHING INBY THE FIRST  
MC-4040 OR 4020 TREAT THIS "OUTBY"  
SECTION AS A BRANCH. WHEN DONE WITH THIS  
BRANCH, RECONNECT A BRANCH OF THE MC-4040  
OR MC-4020 AND CONTINUE THIS PROCESS  
FOR THE ENTIRE MINE

N

GO TO  
PAGE 8

THIS TYPE OF SYSTEM MAY BE  
TROUBLE SHOT AS A WHOLE OR  
BROKEN INTO SECTIONS BY  
GOING TO A POINT AND DISCONNECTING  
EVERYTHING "INBY" THIS SECTIONING  
WILL SPEED UP THE PROCESS



AT THE BRANCH POINT (A MC-4040 OR MC-4020) ENSURE THAT THE BRANCH HAS DC SUPPLY VOLTAGE AND COMMUNICATIONS

IS COMMUNICATIONS TOTALLY LOST OR IS THE COMMUNICATIONS PERCENTAGE AT OR ABOUT 50% FOR THE DEVICES ON THIS BRANCH

50%

AT THE LAST DEVICE ON THE BRANCH CHECK AND MAKE SURE THAT A 120 OHM TERMINATING RESISTOR IS ACROSS THE COMMUNICATIONS LINE

TOTALLY

CHECK THE BRANCH DC VOLTAGE ONCE AGAIN. CHECK THE CABLE FOR SHORTS, OPENS, AND POLARITY PROBLEMS  
DC VOLTAGE MAY BE LOST IF A DIRECT SHORT OCCURS IN A REMOTE OR SENSOR

HAS CABLE BEEN ADDED TO THIS BRANCH RECENTLY

Y

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N

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CHECK THE DC VOLTAGE AND COMMUNICATIONS FUSES AT EACH DEVICE ON THIS BRANCH

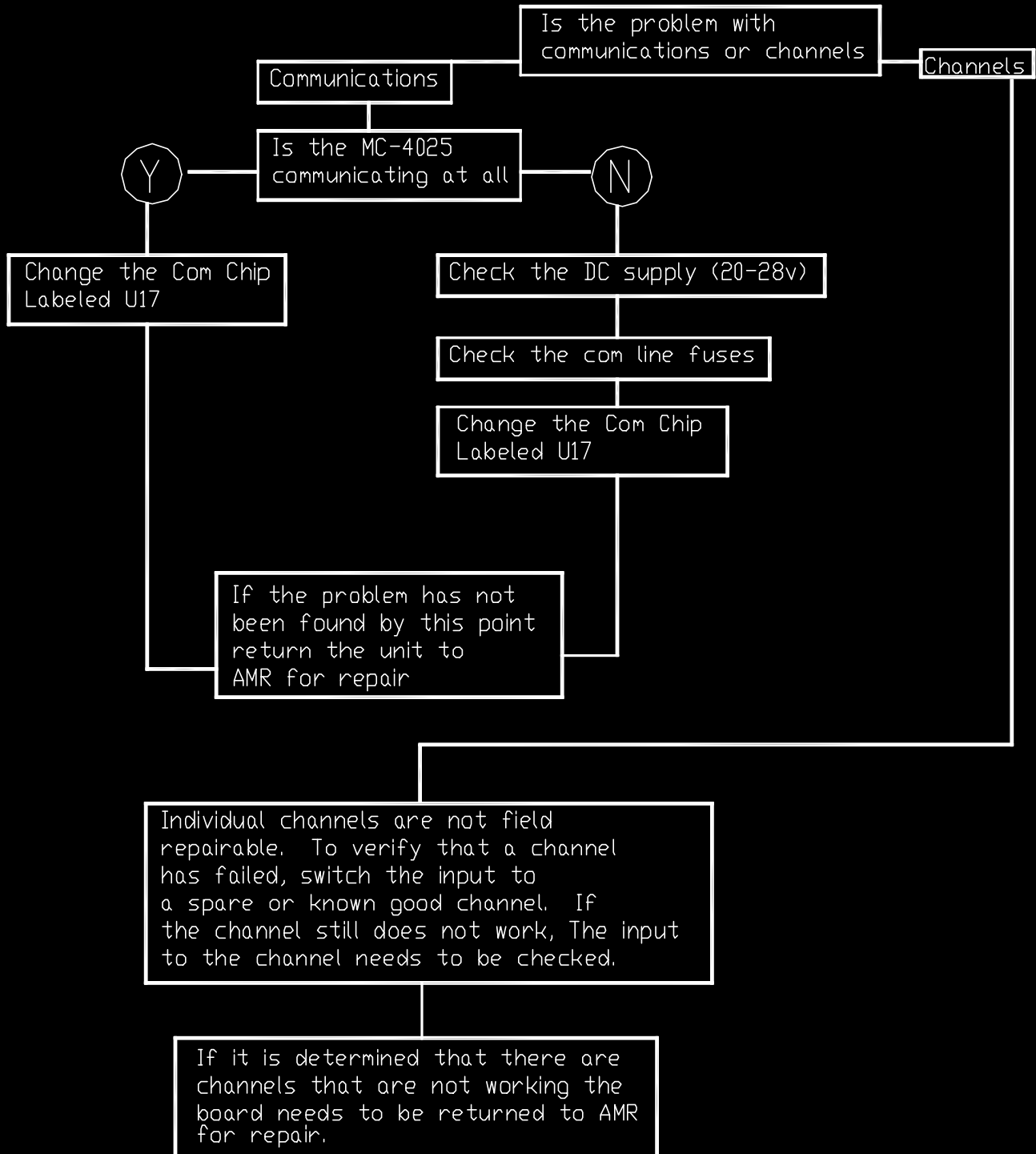
IF NO PROBLEM HAS BEEN FOUND TO THIS POINT CHANGE THE COMMUNICATIONS CHIP IN THIS DEVICE. DO NOT DISCARD THIS CHIP UNTIL CERTAIN THAT IT IS BAD. FOR MORE DETAILED INSTRUCTIONS FOR TROUBLE SHOOTING EACH DEVICE REFER TO THE TROUBLE SHOOTING GUIDE FOR THAT PARTICULAR DEVICE

NOTE IT ONLY TAKES ONE SENSOR OR REMOTE WITH SHORTED COMMUNICATIONS TO INHIBIT COMMUNICATIONS WITH AN ENTIRE BRANCH. SO, CHECK WITH THE SURFACE OFTEN TO MONITOR THE SYSTEM PERFORMANCE AS YOU WORK YOUR WAY THROUGH THE DEVICES PRESSING F2 FOR SENSORS AND F4 FOR REMOTES AT THE MASTER STATION WILL DISPLAY COMMUNICATIONS PERFORMANCE SCREENS. NOTE RESETTING THE PERFORMANCE SCREENS OCCASSIONALLY WILL MAKE IT EASIER TO UNDERSTAND THE INFORMATION

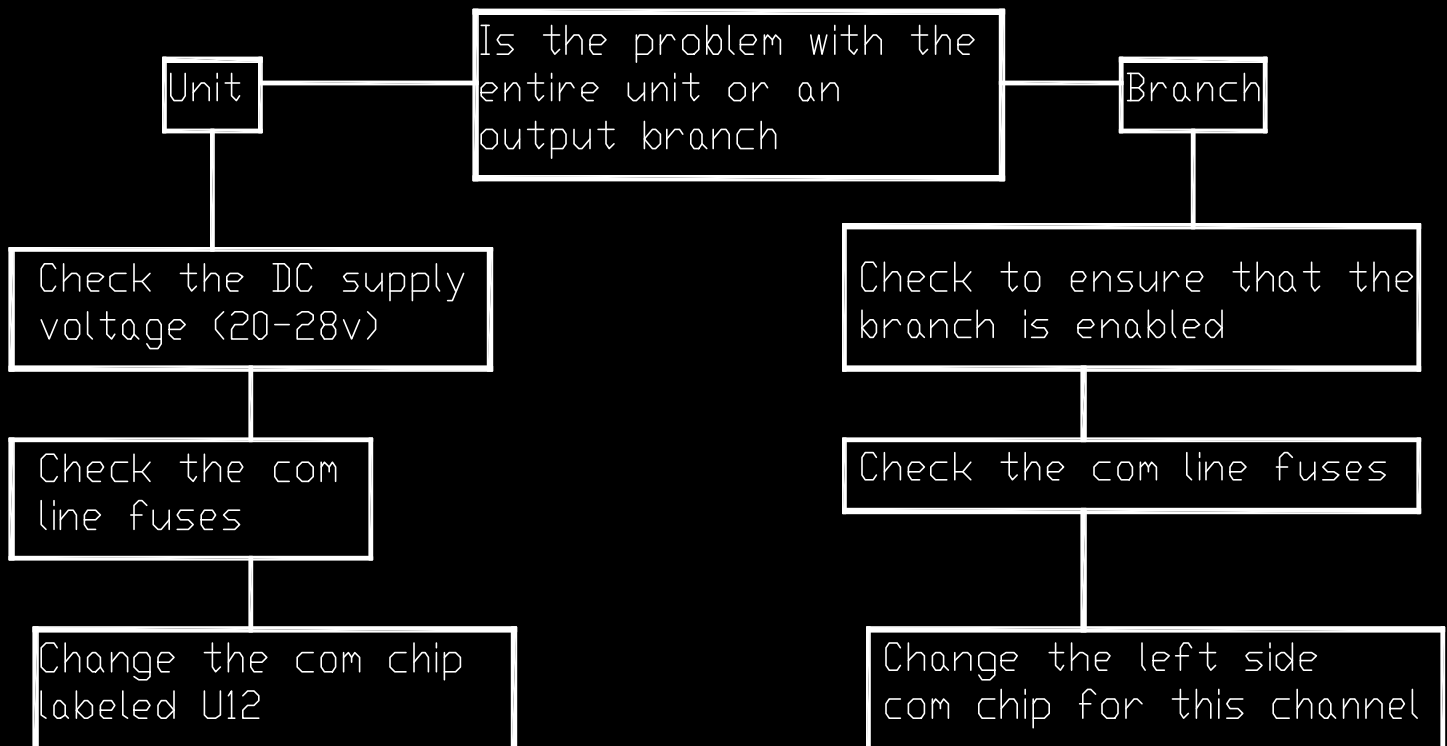
CHECK THE DC VOLTAGE AT  
THE END OF THE BRANCH  
IT SHOULD BE AT LEAST  
18VDC AT THIS POINT  
IF IT IS NOT, A MC-4020  
NEEDS TO BE ADDED TO THE  
SYSTEM TO REESTABLISH DC POWER

TO CONFIRM THIS AS THE PROBLEM  
GO "OUTBY" A FEW DEVICE LOCATIONS  
AND DISCONNECT BOTH THE DC SUPPLY  
AND COMMUNICATIONS LINES GOING  
"INBY". IF THE PROBLEM CLEARS UP  
THIS CONFIRMS A DISTANCE PROBLEM  
AND A MC-4020 IS NEEDED

# MC-4025 TROUBLE SHOOTING FLOW DIAGRAM



# MC-4040 TROUBLE SHOOTING FLOW DIAGRAM



MC-4210-CO  
OPERATION AND  
TROUBLE SHOOTING



AMERICAN MINE RESEARCH, INC.  
P.O. BOX 234, ROCKY GAP, VA 24366  
PH. 540-928-1712 FAX 540-928-1814

## Test

Briefly touch a magnet (1 sec) to the Test/Cal switch located on the right side of the monitor enclosure

The display will show the span value (usually 50) for about 5 seconds then change to a double bar (--) for about 2 seconds

The display will now show the warning trip point (usually 10) for about 5 seconds then change to a double bar (--) for about 2 seconds

The display will now show the alarm trip point (usually 15) for about 5 seconds then change to a double bar (--) for about 2 seconds

The display will now show the address of the sensor. If it (the address #) flashes, the sensor is communicating with the master station. If it stays solid, it is not communicating. The double bar (--) will again be displayed for about 2 seconds.

The monitor will now return to normal monitoring mode and the test is complete and will be logged by the Master Station

## Calibration

Apply zero grade air to the sensor head with a flow of about 0.3 lpm

Allow about 2 minutes for the sensor to stabilize

Place and hold a magnet on the Test/Cal switch

The monitor will now display a value and count down to zero, then flash 00 when the zero point has been set.

If the display flashes E00, set the test point (TP1) to 0.3VDC and repeat zero calibration.

Allow the display to flash 00 about 3 times then remove the magnet from the Test/Cal switch and the zero air from the sensor.

Apply span gas to the sensor and adjust for a flow of about 0.3 lpm

Allow about 2 minutes for the sensor to stabilize

Place and hold a magnet on the Test/Cal switch

The monitor will display a value and count up to the span value then flash when the value has been set

Allow the display to flash about 3 times then remove the magnet from the Test/Cal switch and the gas from the sensor. Be sure remove the calibration plug from the sensor.

If the display flashes E50, replace the sensor cell and repeat calibration.

The sensor reading will slowly drop back to normal and the calibration will be logged by the Master Station

Trouble Shooting

What appears to be the problem with the MC-4110-CO monitor

Blank display and no communications

This is a DC power problem

Check the DC supply supply (20-28v) If the supply is shorted check the DC source and the power cable

If the DC input is correct there is probably a short in the power supply of the 253-0284 board This is not field repairable, return the board to AMR for repair

The sensor reads CO values but will not communicate to the Master Station

Check the two 1/4 amp Fuses in the unit then using the test function check to see if the monitor communicates

Check the communications for short circuit

Change the right side communications chip (U14) (LTC 485) and again test for communications

If you are still unable to get the monitor to communicate return it to AMR for repair

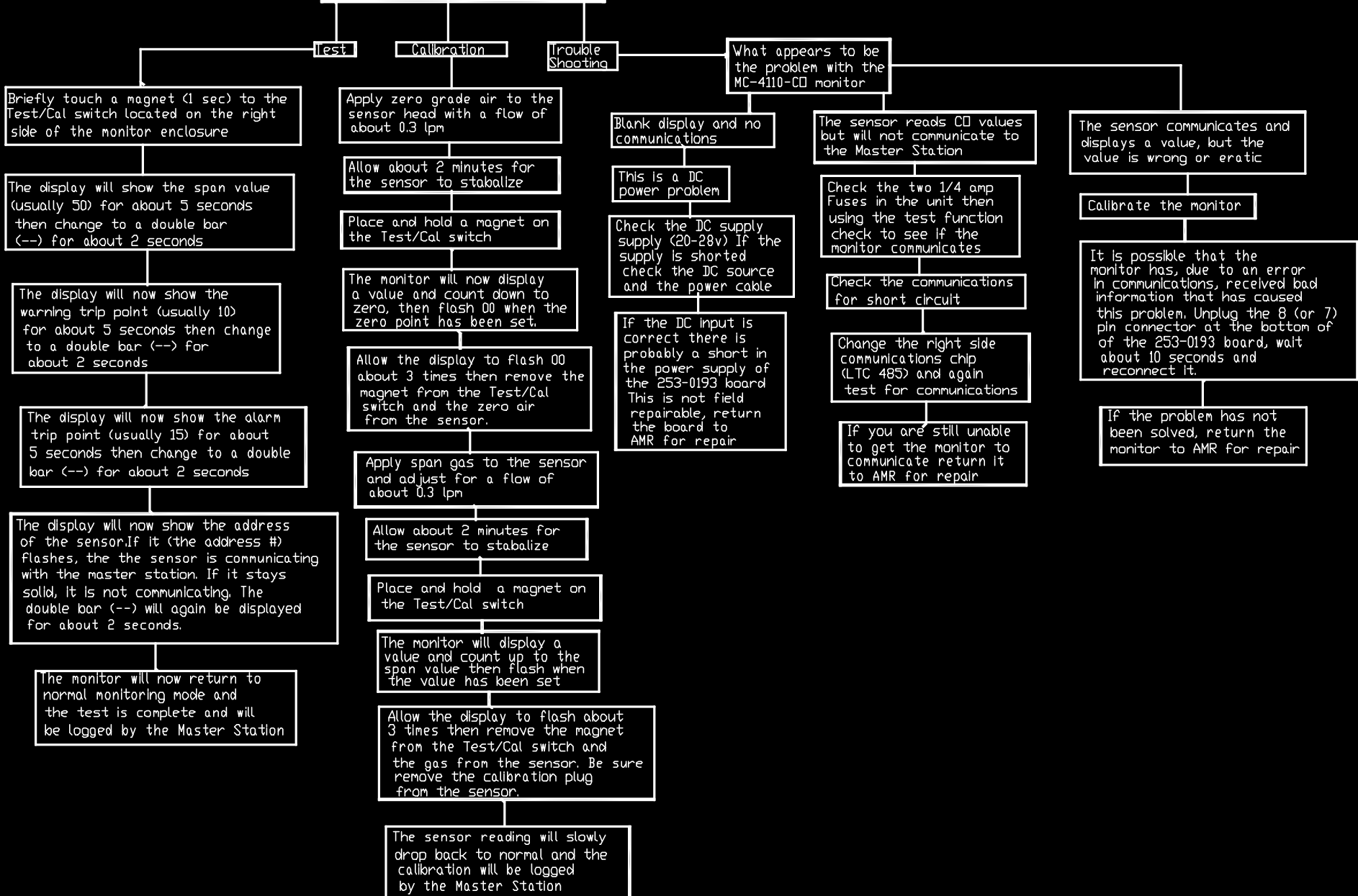
The sensor communicates and displays a value, but the value is wrong or erratic

Calibrate the monitor

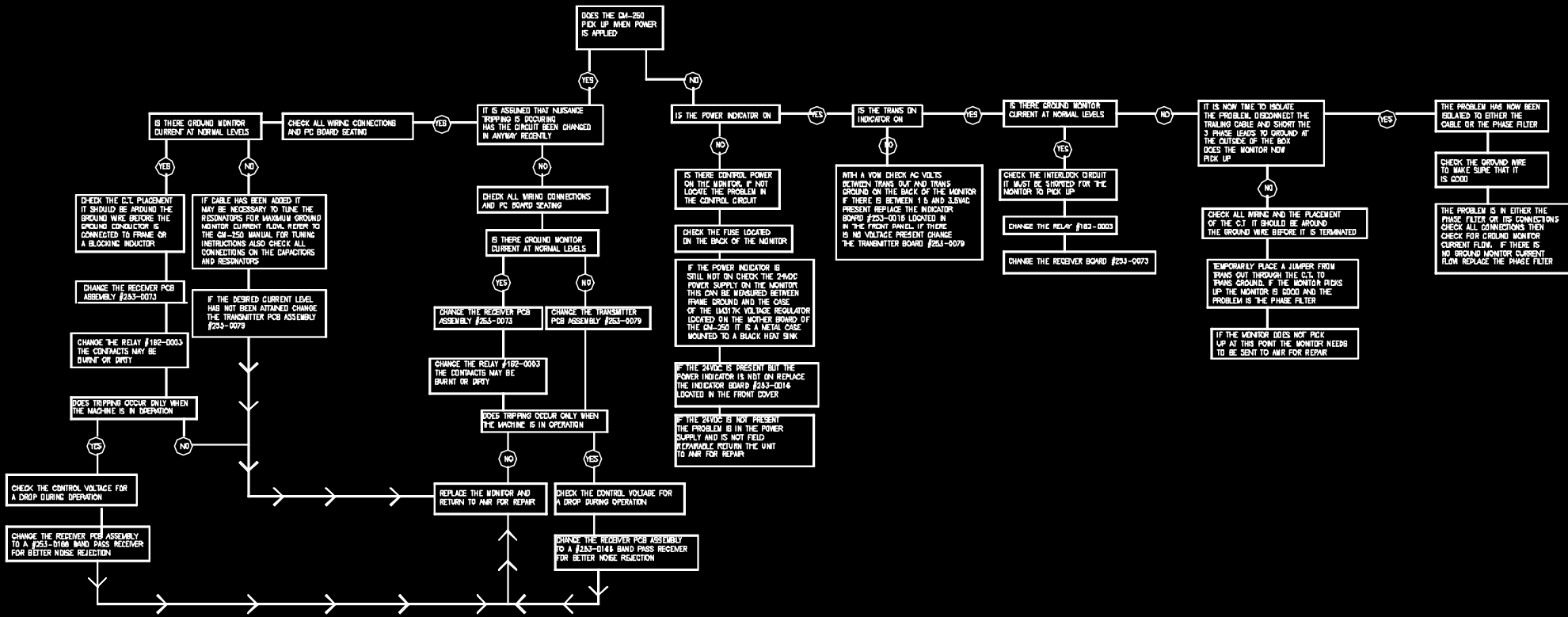
It is possible that the monitor has, due to an error in communications, received bad information that has caused this problem. Unplug the 8 (or 7) pin connector at the bottom of of the 253-0284 board, wait about 10 seconds and reconnect it.

If the problem has not been solved, return the monitor to AMR for repair

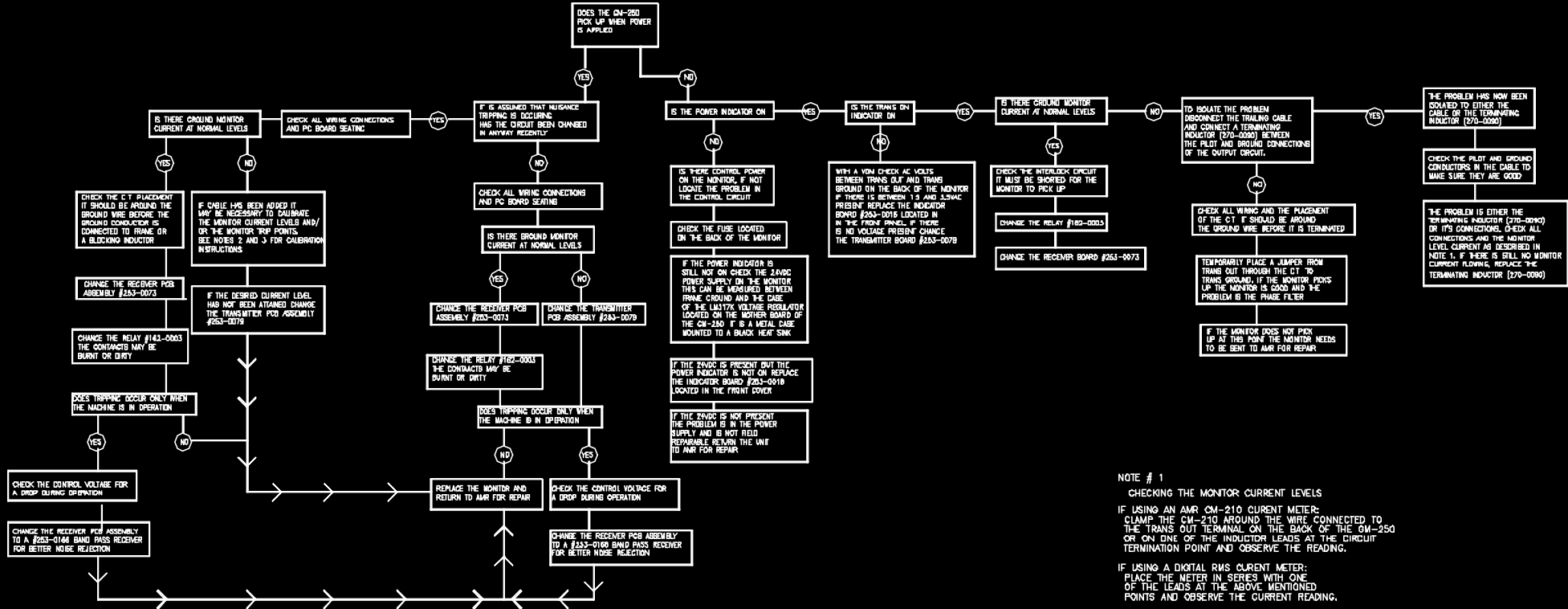
# MC-4110-CO OPERATION AND TROUBLE SHOOTING



### GM-250 TROUBLE SHOOTING



GM-250  
PILOT WIRE TROUBLE SHOOTING



NOTE # 1

CHECKING THE MONITOR CURRENT LEVELS

IF USING AN AMR CM-210 CURRENT METER:  
CLAMP THE CM-210 AROUND THE WIRE CONNECTED TO THE TRANS OUT TERMINAL ON THE BACK OF THE GM-250 OR ON ONE OF THE INDUCTOR LEADS AT THE CIRCUIT TERMINATION POINT AND OBSERVE THE READING.

IF USING A DIGITAL RMS CURRENT METER:  
PLACE THE METER IN SERIES WITH ONE OF THE LEADS AT THE ABOVE MENTIONED POINTS AND OBSERVE THE CURRENT READING.

MINIMUM CURRENTS  
CM-210 - 150 mA  
DIGITAL RMS CURRENT METER - 50 mA

NOTE # 2

ADJUSTING THE MONITOR TRIP POINT

1. PLACE A 50 OHM RESISTOR IN SERIES WITH THE TRANS OUT CONNECTION ON THE BACK OF THE GM-250.
2. REMOVE THE GM-250 FRONT COVER
3. LOCATE THE RECEIVER BOARD (# 263-0073) INSIDE THE MONITOR. IT IS A PLUG-IN BOARD BETWEEN THE TRANSMITTER BOARD AND THE RELAY.
4. LOCATE THE TRIP ADJUSTMENT ON THE RECEIVER BOARD IT IS A BLUE POT WITH A WHITE SCREW ADJUSTMENT (SEALED WITH RED PAINT) IT IS FACING OUTWARD
5. ADJUST THE TRIP ADJUSTMENT FOR THE RELAY TO BE PICKED UP.
6. REPLACE THE GM-250 FRONT COVER.
7. REMOVE THE 50 OHM RESISTOR AND RECONNECT THE TRANS OUT.

NOTE # 3

CALIBRATING THE MONITOR CURRENT LEVELS

1. MONITOR THE CURRENT AS DESCRIBED IN NOTE # 1.
2. THE CURRENT MUST BE AT OR ABOVE THE MINIMUMS IN NOTE # 1.
3. ADJUST THE TERMINATING INDUCTOR AT THE CIRCUIT TERMINATION POINT. (THE ADJUSTMENT IS LOCATED IN THE BOTTOM OF THE TERMINATOR)
4. THE TERMINATOR IS ADJUSTED FOR MAXIMUM CURRENT.
5. IF UNABLE TO ADJUST FOR AN ACCEPTABLE CURRENT LEVEL, CHANGE THE TAP DOWN ONE STEP AND REPEAT # 4 ABOVE.
6. IF NECESSARY, REPEAT # 5 ABOVE.
7. INDIVIDUALLY TAPE OFF ALL UNUSED TAPS.