ACC Decoder System Troubleshooting Guide

Issue: Finding a Break in the 2-Wire Path

Tools: Digital Multimeter (DMM) with Min/Max function (Fluke Model 12 or similar), known-good test solenoid, approved wire connectors

Diagnostics: Start with an as-built drawing if possible to aid in locating wire paths and decoders. Run a test program (press and hold Program button for about 3 seconds with dial in Run) from the facepack starting at the stations/decoders closest to the controller, or create and start a dummy program with the furthest station/decoder that is known to function properly. Let the test program run until you are able to verify the last known functioning, and the first faulting, stations/decoders.
Put the controller in the "OFF" position.
Check the voltage across the blue and red terminals of the ADM. Use the DMM in DC volts position and Min/Max function on.
The voltage should read between 32V to 36V. If not, check the controller source voltage.

Remove and inspect the connections at the last known functioning station/decoder.
Use the DMM with Min/Max function on, to check the voltage on the two-wire path from the controller. Should read between 20V to 36V (without the Min/Max feature, the voltage will appear as a pulsing value and is impossible to read accurately).
If the voltage is below the 20-36V level, see procedure for Finding Short on 2-Wire Path.
If voltage is correct, reconnect the decoder temporarily using wire nuts until diagnostics are complete.

Continue diagnostics by removing and inspecting the connections of the first faulting station/decoder.
Use the DMM to verify the voltage on the wires that come from to the controller read between 20V to 36V.
Reconnect the decoder to the two-wire path from the controller only and read the voltage. Again it should read between 20v to 36V. If not, the decoder is faulty. Replace the decoder.
If the voltage is within limits, disconnect the current decoder connections and twist the red and the blue wires together. Go back to the last known functioning station/decoder.
Disconnect all wiring connections.

ACC Decoder System Troubleshooting Guide

Put the DMM into resistance (Ω) reading mode (see DMM users manual). Read the resistance of the wire pair that connects the two decoders together. The readings should be between 0-60Ω depending on distance between decoders (see decoder wire resistance chart). If connection/wiring breaks are not visible, then use a cable tracer to track the wire issue.

Issue: A decoder or decoders do not activate a valve/relay

Tools: DMM, known-good test solenoid, approved wire connectors

Diagnostics: If a single decoder is not able to activate a valve/relay, verify that the decoder was programmed with the proper decoder station/address number. If address is correct, verify proper connections on the output side of the decoder (to the solenoid wires).
Disconnect the solenoid(s) from the decoder output. Check the resistance of the solenoid(s) with the DMM. A single solenoid will have 20 Ω – 35Ω of resistance depending on solenoid type.
If there are 2 solenoids attached to a single output, the resistance value will be ~ ½ of one solenoid. Remember each output is design to handle a maximum of 2 solenoids or 1 relay. If there is anything outside this resistance range, there is something wrong with the solenoid, and it should be replaced.
If the values are in range, reconnect the solenoid(s) and connect the probes of the DMM to the appropriately colored wire pair for the station number in question.
Set the DMM to DC volts, Min/Max mode, and check the voltage on the output of the decoder. Attempt to turn on the decoder from the controller (Manual Single Station or ICR remote).
Check the voltage on the output of the decoder. If the voltage did not change, verify that the decoder was programmed with the correct station number.

If the voltage is greater than 20V, replace the solenoid.
If the voltage is less than 5V, then remove the solenoid. Does the voltage increase to greater than 20V? If yes, then replace solenoid.
If the voltage remains the same, then replace the decoder.
If the decoder does not function properly after being replaced, go to issue 'Find a Short on the 2-Wire Path'.

Issue: Station Fault – (Overcurrent)

Tools:

Diagnostics: See 'A decoder or decoders do not activate a valve/relay'. If resistance in the field wiring is low, voltage is lower, and this can cause the Overcurrent message.

Issue: Station Fault – (Damaged)

ACC Decoder System Troubleshooting Guide

Tools: none

Diagnostics: Replace Decoder. This indicates non-repairable internal damage.

Issue: ADM / Decoder Module Alarm (Overcurrent)

Tools:

Diagnostics: If the 'Module/Line Status' LED is continuously flashing red for greater than 1 minute, go to section 'Find a Short on the 2-Wire Path'.

If the LED is flashing red only after a *group* of stations/decoders was turned on, activate the stations/decoders, one at a time.
Does each one of the stations/decoders activate the solenoid/relay?
If not, go to issue 'A decoder or decoders do not activate a valve/relay'.

If the LED is flashing red only after a station/decoder was turned on, go to issue 'A decoder or decoders do not activate a valve/relay'.

Issue: Find a Short on the 2-Wire Path

Tools: DMM, compatible Clamp-on Current Sensing Module, known-good test solenoid, approved wire connectors.

Diagnostics: Remove all wire paths from ADM (decoder output module in controller).
Use the DMM to check the resistance of each 2-wire path (Ohm or Ω position).
If the resistance reads less than 10kΩ (10,000) on any of the paths, continue troubleshooting that wire path. Resistance conditions lower than 15Ω will cause an Overcurrent message to appear in the controller display.
Connect one of the faulted paths to a 24VAC (100VA or greater) power source.
Do not use the 24VAC output of the Master Module in the ACC controller (insufficient current for this test).
Place the DMM in mV, AC mode.
Use the Clamp-on Current Sensor and the DMM combination to view the current on the wire path.
Start at the power source.
Note the current and continue down the wire path checking the current every 500 ft. The current should drop 3mA to 5mA for every decoder passed.
If the current drops off significantly, you have passed the shorted area. Work your way backwards until you find the shorted segment.
Check the wires leading to the decoder from the wire path to see if the decoder is shorted. Repair wiring as necessary.
Repeat diagnostics for each of the wire paths faulted.

ACC Decoder System Troubleshooting Guide

You may use a ground fault tester to find the location of the short- disconnect controller from two-wire path first!

Issue: Station Fault – Comm

Tools: none

Diagnostics: This issue may have several possible causes. The first possibility is an open circuit in the two-wire path. Are decoders after the decoder in question activating the station/relay and communicating? If not, see issue 'Finding a Break in the 2-Wire Path'.
The second possibility is the station/decoder number of the decoder. Is the decoder activating the solenoid/relay? If the solenoid/relay is not being activated, then remove the decoder from the system. Use the programming port to verify that the decoder is able to communicate by displaying the station number. Change the station number if it is not correct.
If the decoder is not communicating with the programming port, then see issue 'Decoder not Programming on Programming Port'
The third possibility is that the 2 wire path is shorted at or near the decoders with the Comm Fault. See issue 'Find a Short on the 2-Wire Path'.

Issue: Decoder not Programming on Programming Port

Tools: none

Diagnostics: The Programming Port is a useful tool to determine if a decoder is alive. Test the Programming Port voltage using a DMM in DC volts, with 'Min/Max' setting selected (the normal operating voltage pulses within a range).
Plug the probes into the Programming Port holes and measure the port voltage. If the voltage is between 13V and 16V Max and -13V and -16V Min, the Programming Port output is functioning.
If not, or if Min/Max readings are well outside the range, remove the ADM from the controller. Open the ADM and look at the spring contacts on the board assembly that align with ports, to see if they are clean and have tension. Reassemble the ADM and return to the controller. Retest the voltage.
If the voltage is within range, connect the decoder to Programming Port. Turn the facepack dial to the 'ADVANCED FEATURES' position and select 'Decoder Functions' then select 'Program Decoder'.
If the Programming Port does not detect the decoder, then try to program a known good decoder. If the known good decoder can be programmed, then replace the defective decoder.
If the Programming Port continues to fail, then replace the ADM.

ACC Decoder System Troubleshooting Guide

Issue	Cause	Fix
No decoder functions	Decoders are not Addressed	-Program Station Numbers in Decoders
	No ADM Output	-Check Power to Controller -Replace ADM
	Short Circuit in Two-Wire path	-Find Short and Repair
	Open Circuit in Two-Wire path	-Find Open and Repair
ADM Fault - Overcurrent	Short Circuit in Two-Wire path	-Find Short and Repair
	Decoder Output Short (seen only when decoder is active) May Happen within 3000ft	-Replace Solenoid -Find Short in Output Wiring and Repair -Replace Decoder
Station Fault – Comm	Decoder is not Addressed	-Program Station Number in Decoder
	Open Circuit in Two Wire Path	-Find Open and Repair
	Short Circuit in Two-Wire path	-Find Short and Repair
	ADM Receiver Not Functioning – no communications with field	-Replace ADM
Station Fault – Damaged	Decoder is Internally Damaged	-Replace Decoder
Station Fault – Overcurrent	Decoder Output Short (seen only when decoder is active) May happen further than 3000ft from controller	-Replace Solenoid -Find Short in Output Wiring and Repair -Replace Decoder
Decoder not Programming on Programming Port	Decoder is Damaged	-Replace Decoder
	Spring Contacts inside ADM are not making Contact	-Clean Contacts -Contacts are Bent
	ADM Programming Port Damaged	-Replace ADM
Line Status Light Blinking	Damaged ADM Output	-Replace ADM
Line Status Light Off	ADM Fault - Overload	-See 'ADM Fault – Overload'
	Controller Source Off	-Check Power to Controller
	Damaged ADM Output	-Replace ADM

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Rw = Wire Resistance

Cable (1 pair)	Rw ohm/1000ft	Rw ohm/km	Comment
#14-2	5.04	16.56	IDWIRE1
2.0mm-2	~	10.98	Metric Wire Gauge
#12-2	3.18	10.42	IDWIRE2
2.5mm-2	~	7.02	Metric Wire Gauge
#10-2	2.00	6.55	American Wire Gauge