

CONTROLLER DIAGNOSTIC GUIDE



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Control Assembly Identification

The control boards are marked with a white manufacturer's sticker which is about ¼" x 1.0" that carries information as to the assembly number, assembly revision, serial number and date code. The arrangement of information is depicted in the example below.

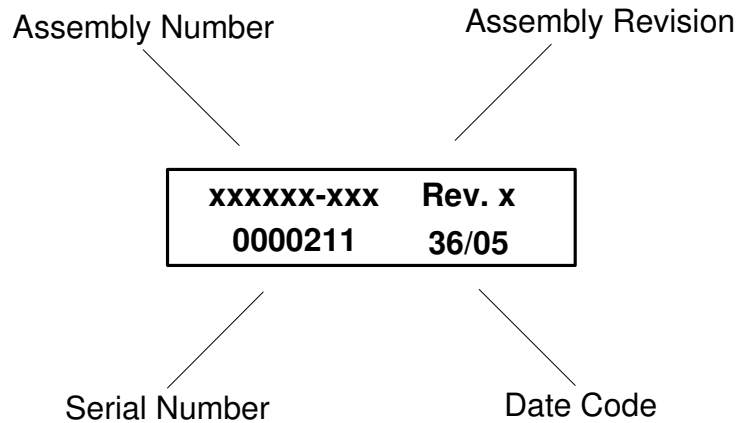


Figure 1 Serial Number and Date Code Tag

OPERATION

This interface module is designed to operate an RA500 Ramp System. This is done by interfacing to the three external connectors J1 to supply power, J2 for Ramp control, and J3 which is the vehicle connector for operator control and display.

Refer to the figure below to locate the following components.

Fuse F1 - Found on the board next to the power connector, F1 is the master fuse for the controller. This fuse is sized at 25 amps.

Fuse F3 – This fuse is found next to the display connector in the lower left hand corner of the board. This fuse is sized at 7.5 amps and is used to limit the current for the alarm and indicator relays.

Cycle Counter – This 6-digit counter is in the upper right hand corner of the board and is used to keep a running tally of the ramp cycles. This counter has onboard non-volatile memory and is non-resettable. The counter will increment with the completion of each full-out and full-in cycle.

Diagnostic Display – This is a 2-1/2 digit LCD which displays the status of the controller during operation. Various codes will be displayed depending on the ramp's current operational status. The codes are defined as follows:

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<u>CODE NUMBER</u>	<u>RA500 FUNCTION</u>
00	A power up reset has occurred
01	Ramp is fully retracted
02	Ramp is extending due to an active EXTEND switch.
03	Ramp is fully deployed
04	Ramp is retracting due to an active RETRACT switch.
05	Ramp is stopped between extents
06	Ramp is extending due to an active One-Touch switch.
07	Ramp is retracting due to an active One-Touch switch.
20	Manual Release Detected
21	Not operating due to Parking Brake.
22	Not operating due to Pressure Pad
23	Retract movement stopped – Obstruction detected
24	Extend movement stopped – Obstruction detected
25	Switch Fault – Full-in and Full-out both active
26	Not operating due to Ramp Enable

Indicator LEDs – There are 6 LEDs in the lower left hand corner of the control board which locally display the current status of the indicator control. These LEDs are powered from an on-board +12 volt supply.

The indicator circuitry is designed to allow the user to supply the reference. This will determine whether the indicator relay switches power or ground. Since the on-board LEDs are powered from 12 volts they will light up green if 24 volts is used as the reference. Conversely, the indicators will light red if ground is supplied as the reference.

Calibration System – The calibration system is used to adjust the obstruction sensitivity of the platform by allowing a technician to replace the “hard coded” obstruction preset for extension and retraction movements

The calibrate switch is a toggle function which means that pressing the switch is used to both enter and exit the calibration mode. A controller as supplied from the factory operates from its software default values for obstruction detection.

Care must be taken when making these adjustments since entering the calibration mode will change both extend and retract presets to the values associated with the adjustment pots R10 and R11. Upon entering calibration mode the initial position of these pots may effect significant changes in the platform so cycle testing is required for each change.

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As is discussed in the adjustment procedure, the digital value can be read through the serial diagnostic port if a computer is available. This greatly helps in making these adjustments.

At any time the controller can be returned to the factory setting by using the Calibration reset button. Use the calibration button to enter calibration mode but to exit calibration mode use the Cal Reset button. This will cause the processor to ignore any changes due to R10 and R11 and return to the internal default values.

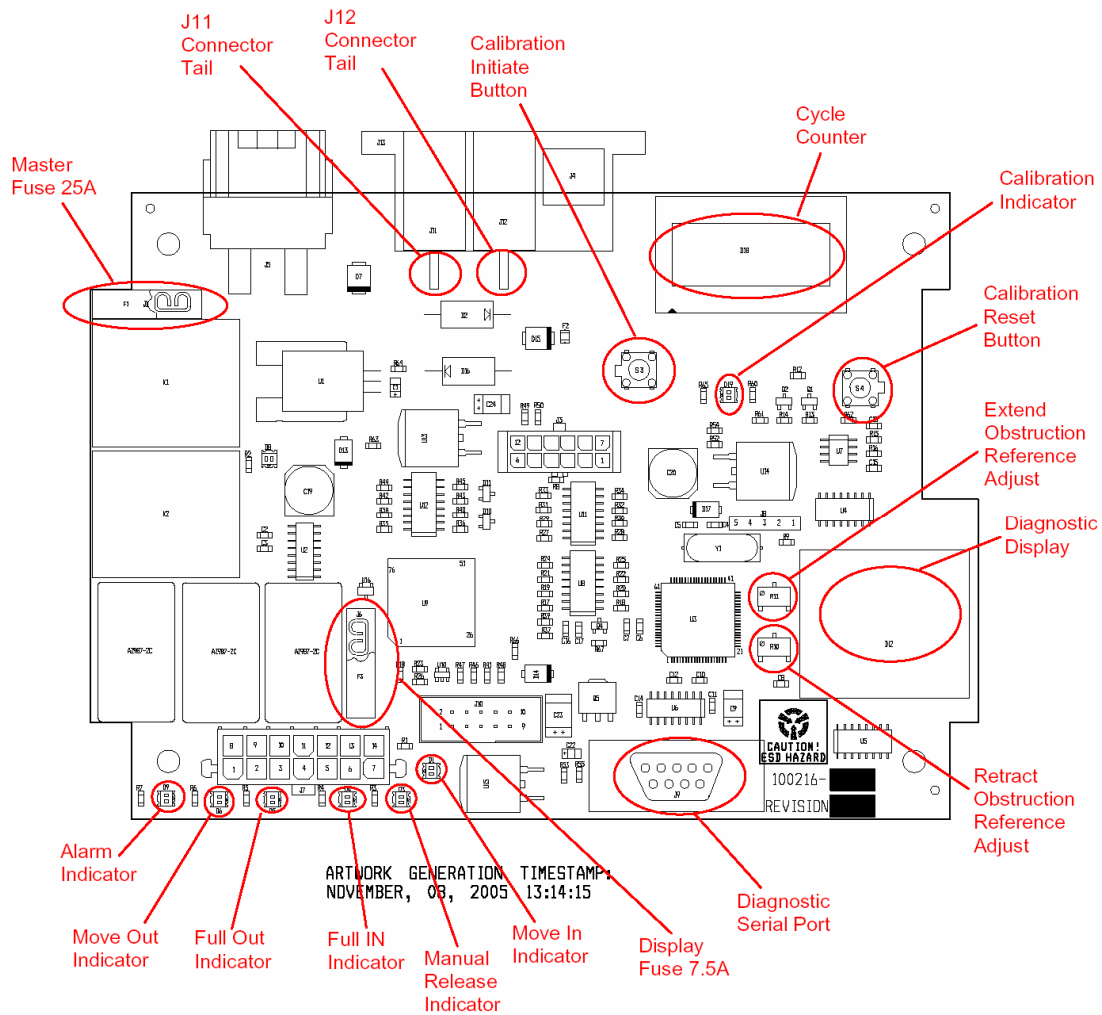


Figure 2 Component Location Diagram

A clear top is used on the module housing to allow visual access to the two displays built onto the control board.

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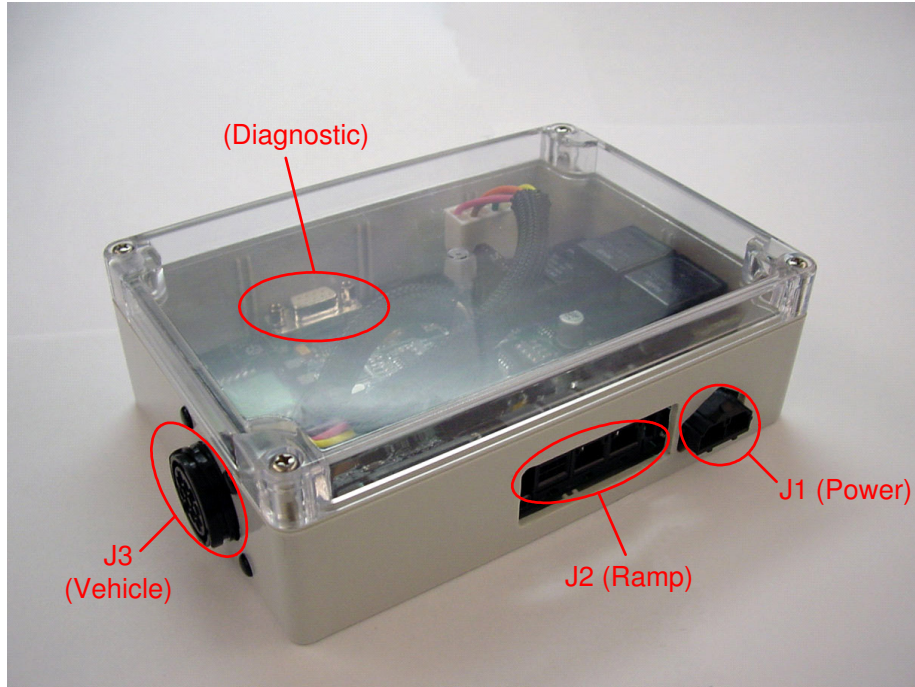


Figure 3 Module Connector Location

The top must be removed to access the calibrate buttons and the adjustment pots.

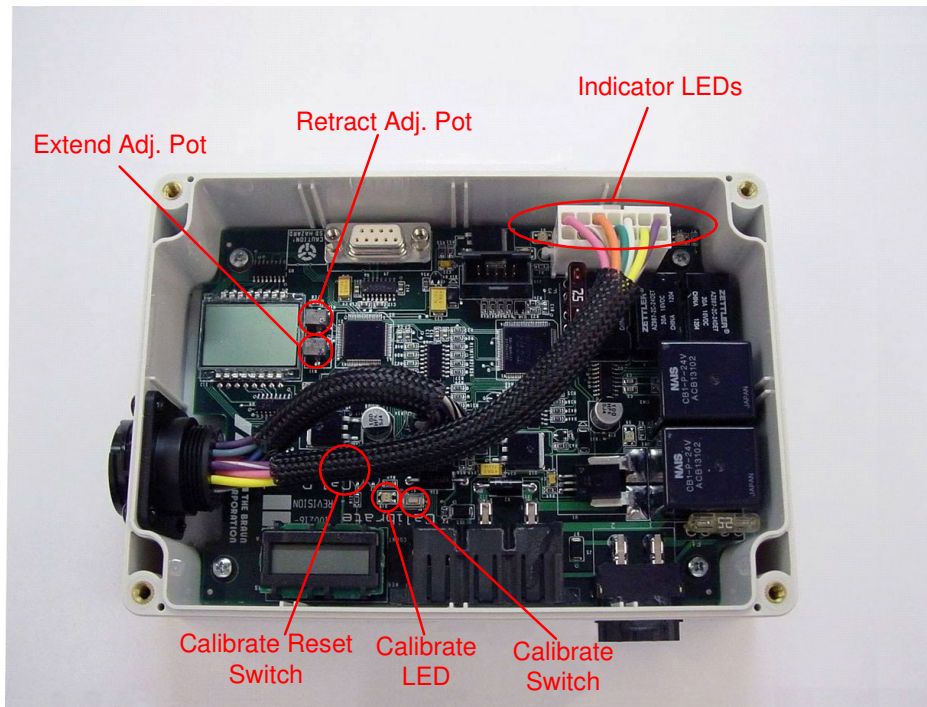


Figure 4 Calibration Component Locations

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CONNECTOR DEFINITIONS

J1 Power Connector –

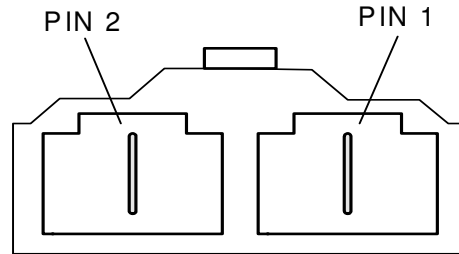
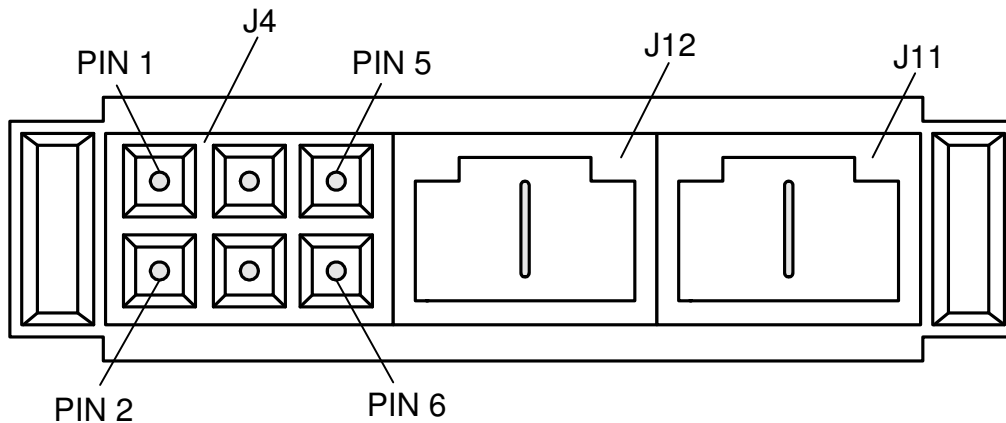


Figure 5 Power Connector

Pin #	Description
1	Vehicle System Power
2	Vehicle Ground

Table 1 Power Connector Pinout

J2 Ramp Connector – This connector is actually three connectors in a combining shell including J4 which is a 6-pin signal connector, J11 which is a single pin power blade, and J12 which is also a single pin power blade. The signals on these pins are as defined below.



J2 RAMP CONNECTOR

Figure 6 Ramp Connector

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J4 Ramp Signals

Pin #	Description
1	Full Out limit switch
2	Manual Release Limit Switch
3	Switch Reference voltage
4	Alarm Indicator
5	Pressure Pad Switch
6	Full In limit switch

Table 2 Ramp Connector Pinout

J11 Retract Motor – This pin will be grounded in its inactive state. When the ramp motor is powered to retract the ramp, this pin will be switched to the input voltage. In this case J12 will supply the return path for the motor.

J12 Extend Motor – This pin will be grounded in its inactive state. When the ramp motor is powered to extend the ramp, this pin will be switched to the input voltage. In this case J11 will supply the return path for the motor.

J3 Vehicle Connector – This connector contains all signal lines required to interface with a vehicle with the exception of power.

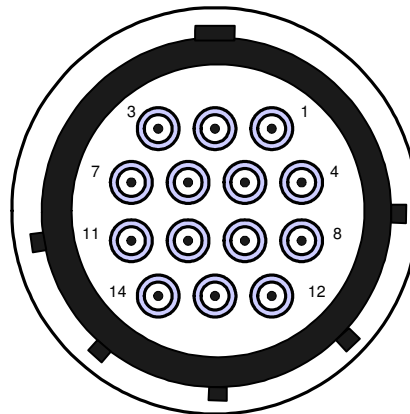


Figure 7 Vehicle Connector

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Pin #	Description
1	Move Out Indicator
2	Alarm Indicator
3	EXTEND Switch
4	ONE TOUCH Switch
5	Indicator Power
6	Manual Release Indicator
7	Ramp Enable
8	Switch Common
9	Full In Indicator
10	RETRACT Switch
11	Parking Brake Negative
12	Move In Indicator
13	Full Out Indicator
14	Parking Brake Positive

Table 3 Vehicle Connector Pinout

FAULT TREES

The following fault trees are designed to allow diagnosis of ramp problems with only a volt/ohm meter and the onboard LED indicators. The first tree labeled “Operational Check” can be used to determine the area the fault may be found. Subsequent fault trees will be used to allow the faults to be specifically isolated and repaired.

Some tests require the use of the Extend, Retract, or One-Touch buttons on the control switches. Since ramp installations will use either Extend and Retract switches or a single One-Touch switch motion, tests that require use of control switches need to be interpreted according to the configuration being tested.

The difference between the -001 and -002 versions of the RA500 controller have to do with the internal configuration of the diagnostic LEDs. Therefore the following diagnostic processes are segregated into three groups which are those which only address the -001 module, those which only address the -002 module, and those which apply to both modules. When following these diagnostic trees always be sure you are using the fault tree that addresses the module version of your particular ramp.

PROCESSES for 100218-001 Modules ONLY

The following diagnostic processes apply only to the 100218-001 module.

The -001 unit has the diagnostic LEDs (D1, D3, D4-D6 & D9) applied to the outputs of the indicator relays which allows them to be used to diagnose problems all the way out to and including the dash indicators in the vehicle. Since this configuration requires a trickle current through the dash indicator even when the indicator is off, it prohibits the

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use of LED type dash indicators. Only incandescent indicators can be used. This “continuous” indicator current is only present when the module is powered and not in its sleep mode.

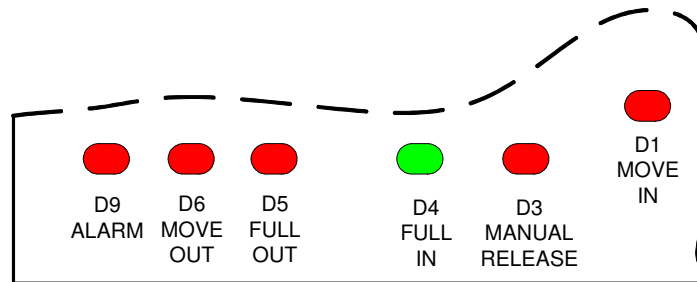


Figure 8 Ramp Fully Stowed (-001)

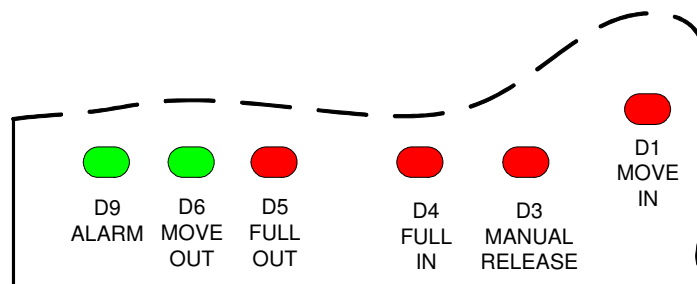


Figure 9 Ramp Extending (-001)

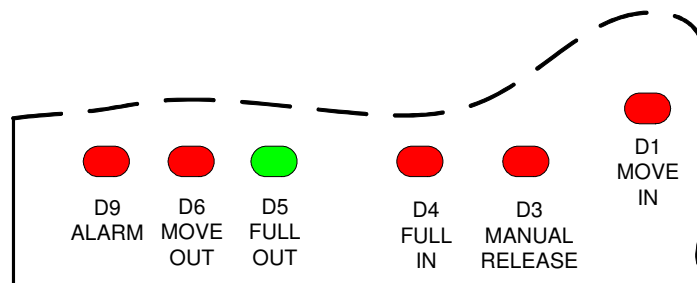


Figure 10 Ramp Fully Extended (-001)

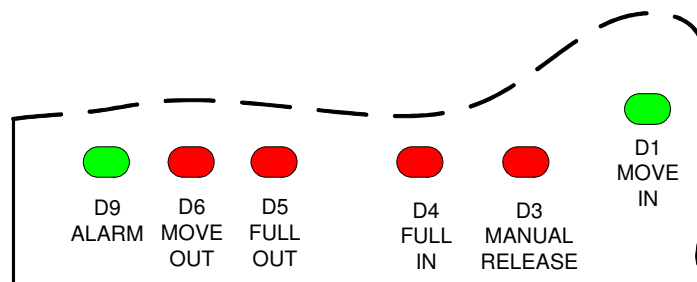
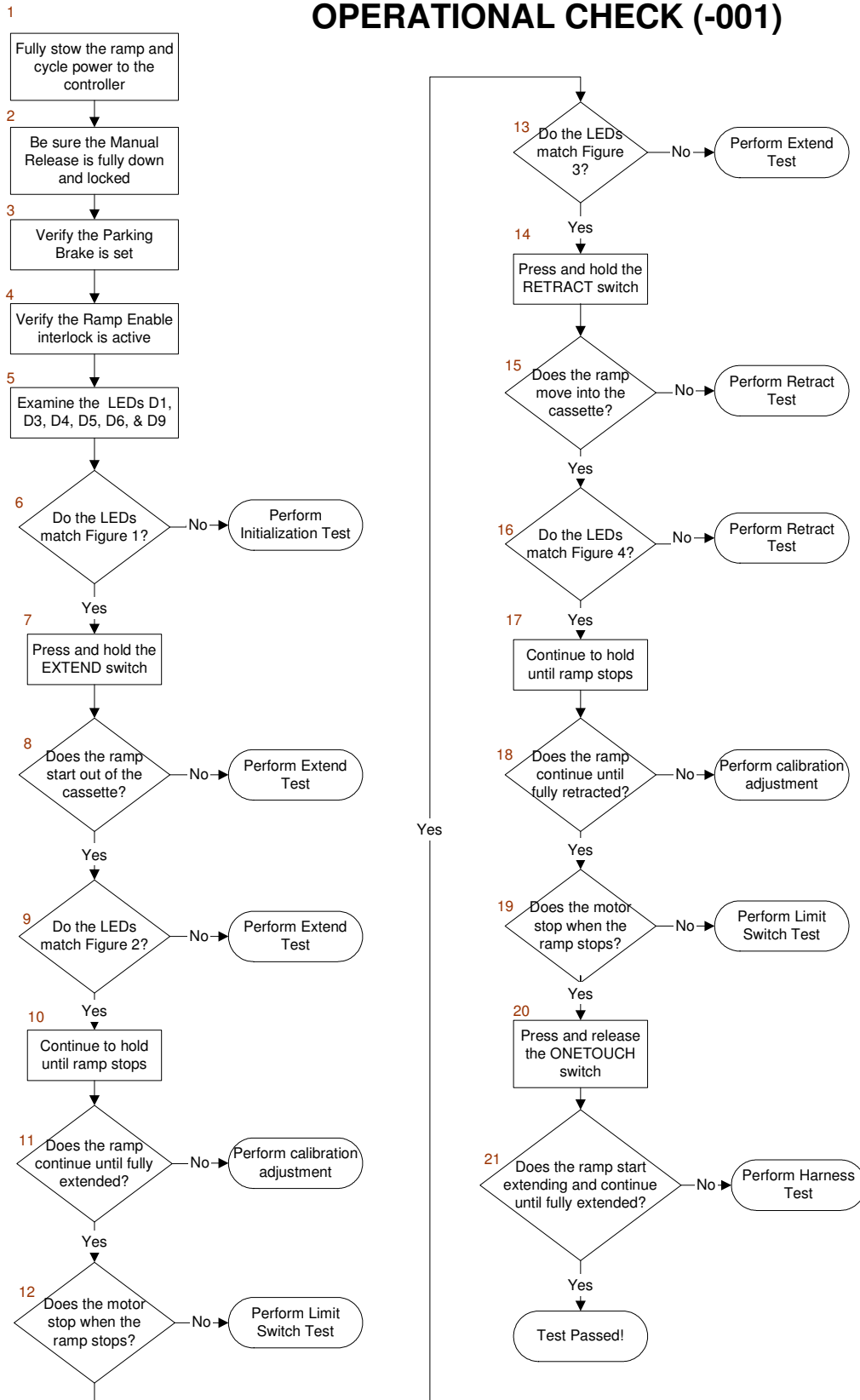


Figure 11 Ramp Retracting (-001)

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OPERATIONAL CHECK (-001)



Operational Check (-001)

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Step	Action	Description	Result
1	Fully stow the ramp and cycle power to the controller.	Resetting the system	Continue.
2	Be sure the Manual Release is fully down and locked.	Setting external input to known value (not active)	Continue.
3	Verify the Parking Brake Interlock is active	Setting external input to known value (active)	Continue.
4	Verify the Ramp Enable Interlock is active	Setting external input to known value (active)	Continue.
5	Compare the LEDs D1, D3, D4, D5, D6 & D9 to Figure 8	Figure 1 shows the indicator conditions for a ramp that is fully retracted. If indicator power is 28 volts LEDs will be green for active switches and will be red for inactive switches.	Continue.
6	Do the LEDs match Figure 8? (Assume J3 pin 5 is 28 volts)	Indicators other than D4 show Green or some are not lit. (FAULT)	Perform Initialization Test
		D4 is only green LED	If YES continue
7	Press the EXTEND Switch	Testing extend capability	Continue.
8	Does the ramp move out of the cassette?	Moving	Continue.
		Not Moving (FAULT)	Perform Extend Test
9	Do the LEDs match Figure 9? (Assume J3 pin 5 is 28 volts)	YES	Continue.
		NO	Perform Extend Test
10	Continue to hold EXTEND switch until ramp stops.	Ramp should auto stop when fully extended.	Continue.
11	Does ramp continue until fully extended?	Obstruction detection can cause premature halt.	If YES continue
			If NO perform Calibration Adjustment
12	Does the motor stop when the ramp stops	Full_Out Limit switch tells the controller to stop	If YES continue
			If NO perform Limit Switch Test
13	Do the LEDs match Figure 10? (Assume J3 pin 5 is 28 volts)	YES	Continue.
		NO	Perform Extend Test
14	Press the RETRACT Switch	Testing retract capability	Continue.
15	Does the ramp move into the cassette?	Moving	If YES Continue.
		Not Moving (FAULT)	If NO Perform Retract Test
16	Do the LEDs match Figure 11? (Assume J3 pin 5 is 28 volts)	YES	Continue.
		NO	Perform Retract Test
17	Continue to hold RETRACT switch until ramp stops.	Ramp should auto stop when fully retracted.	Continue.
18	Does ramp continue until fully retracted?	Obstruction detection can cause premature halt.	If YES continue
			If NO perform Calibration Adjustment

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19	Does the motor stop when the ramp stops	Full_In Limit switch tells the controller to stop	If YES continue
			If NO perform Limit Switch Test
20	Press and release the ONETOUCH switch	This function does not require the switch to be held active.	Continue.
21	Does the ramp start extending and continue until fully extended?	Ramp should auto stop when fully extended.	If YES continue
			If NO Perform Harness test
22	Press and release the ONETOUCH switch	The Ramp should begin to retract	Continue
23	Apply 33 lbs. pressure (15 kg) on the pressure mat.	This is the minimum weight required to activate the pressure switch	Continue.
24	Does the ramp stop once the pressure is applied?	The pressure switch tells the controller to stop regardless of operational mode	If YES Test Passes
			If NO perform Pressure Switch Test

Table 4 Operational Check

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INITIALIZATION TEST (-001)			
Step	Action	Description	Result
1	Fully stow the ramp and cycle power to the controller. Be sure the Manual Release is fully down and locked. (not active)	Resetting the system	Continue.
2	Compare the LEDs D1, D3, D4, D5, D6 & D9 to Figure 8	Figure 1 shows the indicator conditions for a ramp that is fully retracted. If indicator power is 28 volts LEDs will be green for active switches and will be red for inactive switches.	Continue.
3	Are all six LEDs lit? (either red or green)	All indicators must turn on.	If NO go to step 6.
		All on indicates basic functionality	If YES continue
4	Do the LEDs match Figure 8? (Assume J3 pin 5 is 28 volts)	Indicators other than D4 show active	If NO go to step 15
		D4 is only green LED	If YES continue
5	Initialization Test Passed!		
6	Are any LEDs ON?	Some still unlit	If NO go to step 16
		All are either red or green	If YES continue
7	For each unlit LED, check the associated dash lamp for infinite ohms. (open)	LEDs use dash lamps to provide ground path. Lamp need not be turned on to cause problem.	Continue.
8	Do <u>any</u> lamps show an open circuit?	All Dash lamps are OK.	If NO go to step 10
		Open is the failure mode for an incandescent lamp.	If YES continue
9	Replace failed lamps	Replace all lamps that correspond to unlit LEDs	Continue.
10	Are <u>all</u> LEDs lit?	All indicators must be lit either red or green	If NO continue
		Means all dash lamps are OK	If YES go to step 13
11	Check vehicle wiring from controller J3 to dash lamps and switches.	Look for poorly seated connectors & cut wires	Continue.
12	Are <u>all</u> LEDs lit now?	Bulbs and harness are good but some LEDs are still unlit	If NO go to step 22
		All are working now continue with test	If YES continue
13	Do the LEDs match Figure 8?	Assumes J3 pin 5 is 28 volts	If NO go to step 15
			If YES continue
14	Are the problem LEDs D3, D4 or D5?	These LEDs are affected by ramp limit switches	If NO go to step 22
			If YES continue

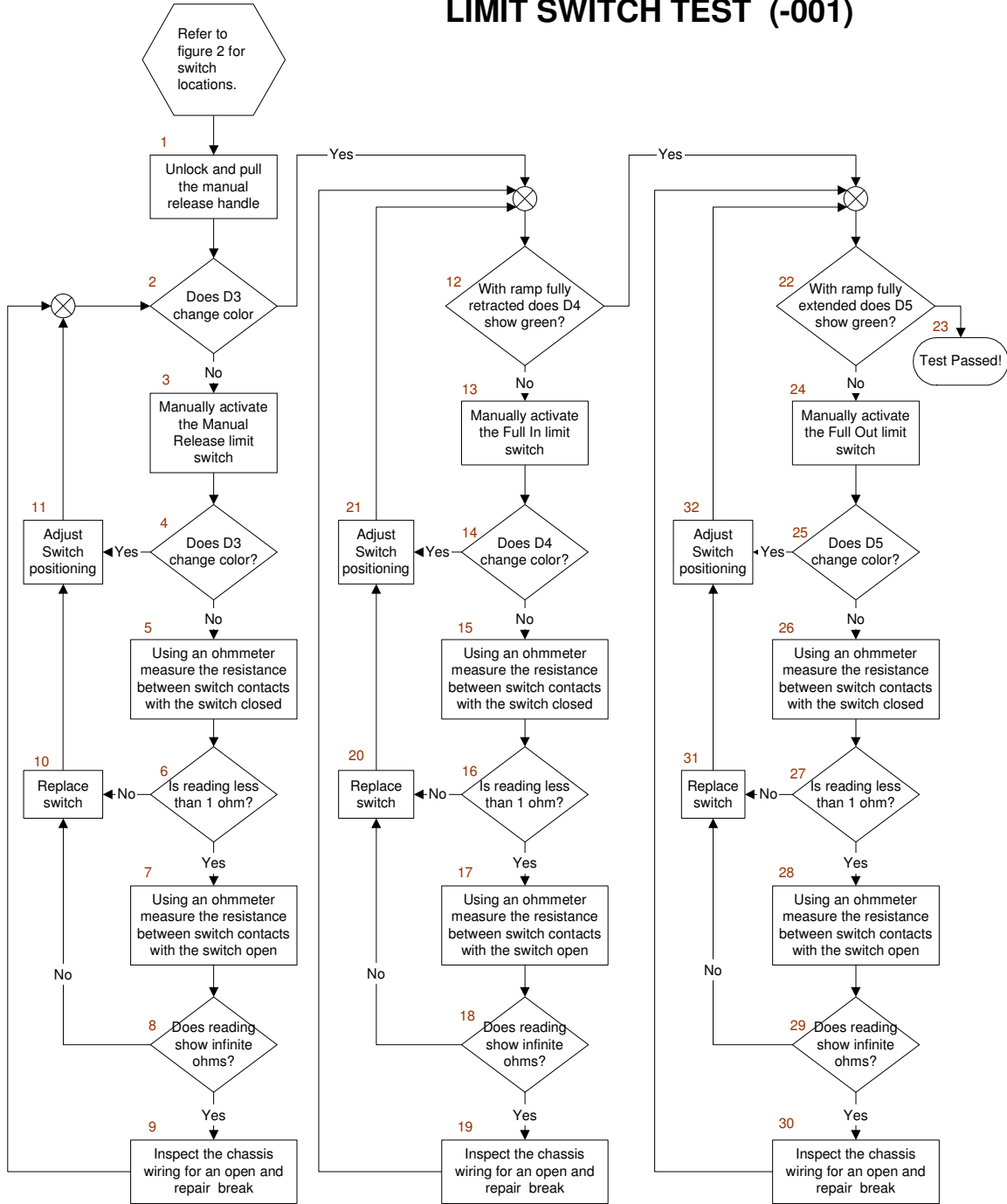
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15	Perform Limit Switch test	Refer to Figure 2 for limit switch locations	Go to step 29
16	Using a voltmeter measure the voltage on J2 pin 3	This is a 12 volt power output from the controller which will show whether the on-board regulator is operating correctly	Continue.
17	Is 12 V \pm 0.1 volts DC present?	LEDs cannot operate without 12v power.	If NO go to step 24
		LED supply is good	If YES continue
18	Verify wiring from dash lamps to controller J3 is correct.	Look for poorly seated connectors & cut wires	Continue.
19	Are any LEDs ON now?	Problem still effects all the indicators	If NO continue
		with at least one working the problem is improving.	If YES go to step 7
20	Reseat the J7 connector inside the controller module	J7 is the board's indicator connector	Continue.
21	Are any LEDs ON now?	LED operation is dependant on load presented by dash lamps.	If NO continue
			If YES go to step 7
22	Replace Controller	LED problem must reside in controller	Go to step 1
23	Restart test	Rerun test after correcting detected problems	Go to step 1
24	Check voltage on J1 pins 1&2	This checks the main power supplied to controller from the vehicle	Continue.
25	Is 28V dc present?	Nothing works without vehicle power.	If NO go to step 28
		Problem must be internal to the controller	If YES continue
26	Replace F1	With good supply power the only interruption can be F1	Continue.
27	Are any LEDs ON now?	Problem must be a component failure in the controller	If NO go to step 22
		We now have some LEDs working continue with test.	If YES go to step 2
28	No power to controller	Problem must reside in vehicle wiring or fusing	Go to step 23

Table 5 INITIALIZATION TEST (-001)

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LIMIT SWITCH TEST (-001)



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LIMIT SWITCH TEST (-001)			
Step	Action	Description	Result
1	Unlock and pull out the manual release handle	This action will disengage the motor and initiate the manual release signal	Continue.
2	Does the D3 (Manual Release) LED change color?	Switch may be out of adjustment	If NO continue
		Switching working properly	If YES go to step 12
3	Manually operate the manual release limit switch while observing D3.	This tests the switch and harness	Continue.
4	Does the D3 (Manual Release) LED change color?	There is a problem with the switch or the harness	If NO continue
		Switch is out of adjustment	If YES go to step 11
5	Using an ohmmeter measure the resistance between the common and the normally open terminal of the limit switch.	Be sure the switch is closed during the measurement	Continue.
6	Is the reading less than 1 ohm	Switch is bad! Stuck open!	If NO go to step 10
		Closed contacts will read less than 1 ohm	If YES continue
7	Using an ohmmeter measure the resistance between the common and the normally open terminal of the limit switch.	Be sure the switch is open during the measurement	Continue.
8	Does the meter read infinite ohms?	Switch is bad! Stuck closed!	If NO go to step 10
		Closed contacts will read less than 1 ohm	If YES continue
9	Inspect the chassis wiring for an open ckt or the connectors for a poorly mated connection	Since the switch checks OK the problem must be in the harness.	Go to step 2
10	Replace Limit Switch	Part number found in Bill of Material	Continue.
11	Adjust Limit switch position	Follow published adjustment procedures	Go to step 2
12	With the ramp fully retracted does the D4 LED show green?	Switch may be out of adjustment	If NO continue
		Switching working properly	If YES go to step 22
13	Manually operate the Full-In limit switch while observing D4.	This tests the switch and harness	Continue.
14	Does the D4 (Full-In) LED change color?	There is a problem with the switch or the harness	If NO continue
		Switch is out of adjustment	If YES go to step 21
15	Using an ohmmeter measure the resistance between the common and the normally open terminal of the limit switch.	Be sure the switch is closed during the measurement	Continue.

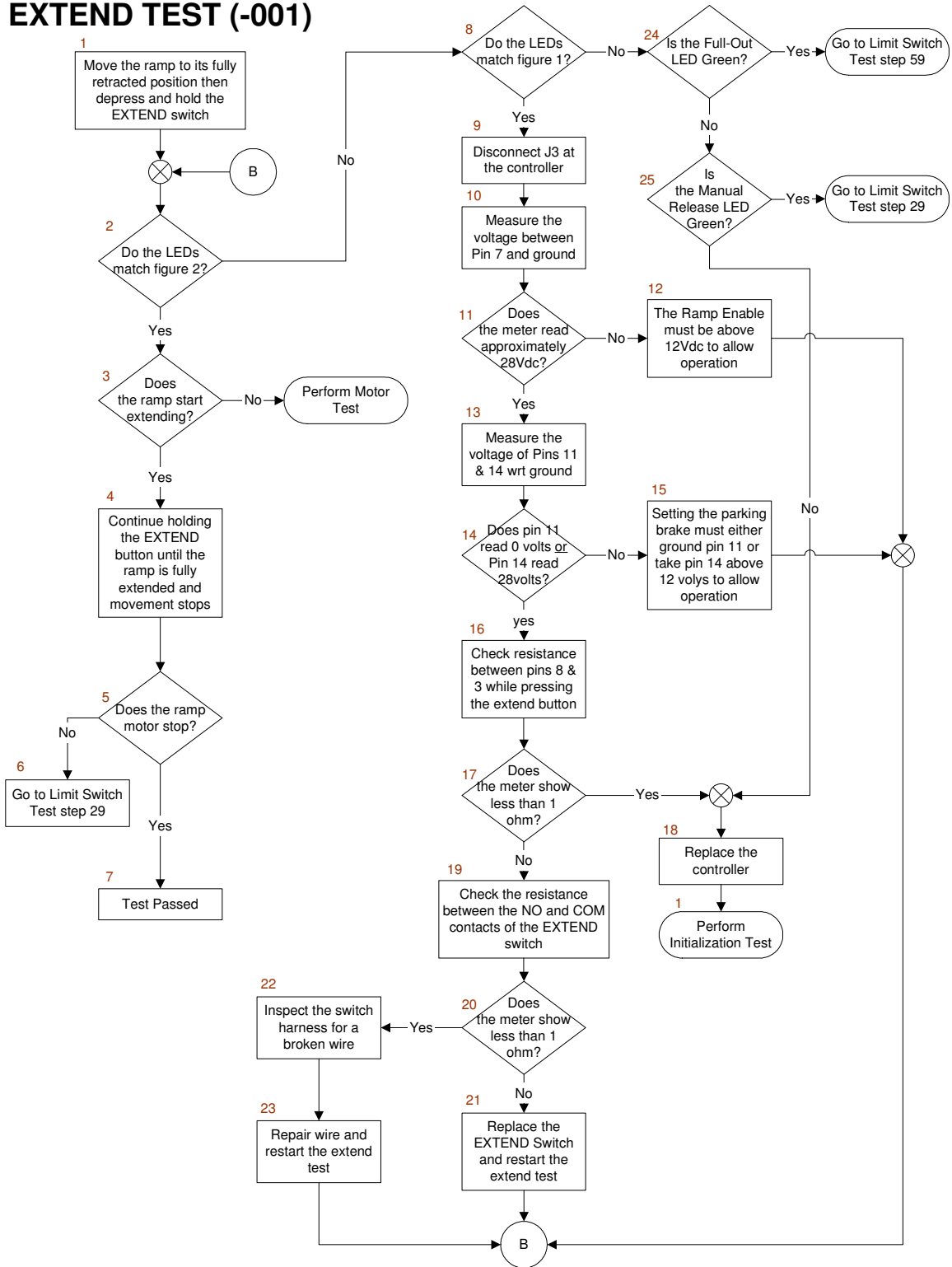
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16	Is the reading less than 1 ohm	Switch is bad! Stuck open!	If NO go to step 20
		Closed contacts will read less than 1 ohm	If YES continue
17	Using an ohmmeter measure the resistance between the common and the normally open terminal of the limit switch.	Be sure the switch is open during the measurement	Continue.
18	Does the meter read infinite ohms?	Switch is bad! Stuck closed!	If NO go to step 20
		Closed contacts will read less than 1 ohm	If YES continue
19	Inspect the chassis wiring for an open ckt and the connectors for a poorly mated connection	Since the switch checks OK the problem must be in the harness.	Go to step 12
20	Replace Limit Switch	Part number found in Bill of Material	Continue.
21	Adjust Limit switch position	Follow published adjustment procedures	Go to step 12
22	With the ramp fully extended does the D5 LED show green?	Switch may be out of adjustment	If NO continue
		Switching working properly	If YES go to step 23
23	Limit Switch Test Passed!		
24	Manually operate the Full-Out limit switch while observing D5.	This tests the switch and harness	Continue.
25	Does the D5 (Full-Out) LED change color?	There is a problem with the switch or the harness	If NO continue
		Switch is out of adjustment	If YES go to step 32
26	Using an ohmmeter measure the resistance between the common and the normally open terminal of the limit switch.	Be sure the switch is closed during the measurement	Continue.
27	Is the reading less than 1 ohm	Switch is bad! Stuck open!	If NO go to step 31
		Closed contacts will read less than 1 ohm	If YES continue
28	Using an ohmmeter measure the resistance between the common and the normally open terminal of the limit switch.	Be sure the switch is open during the measurement	Continue.
29	Does the meter read infinite ohms?	Switch is bad! Stuck closed!	If NO go to step 31
		Closed contacts will read less than 1 ohm	If YES continue
30	Inspect the chassis wiring for an open ckt and the connectors for a poorly mated connection	Since the switch checks OK the problem must be in the harness.	Go to step 22
31	Replace Limit Switch	Part number found in Bill of Material	Continue.
32	Adjust Limit switch position	Follow published adjustment procedures	Go to step 22

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Table 6 LIMIT SWITCH TEST (-001)

EXTEND TEST (-001)



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EXTEND TEST (-001)			
Step	Action	Description	Result
1	Depress and hold the EXTEND switch	Ramp should be started in the fully stowed position. EXTEND and RETRACT are momentary functions and must be held on to remain active.	Continue.
2	Do the LEDs match Figure 9?	First check to see if switch input was received by the controller	Go to step 8
		Figure 2 is proper indication for extending the ramp.	If YES continue
3	Does the ramp start extending?	Controller is not connecting to the motor	If NO perform the Motor Control Test
		Command was received and the operation was started.	If YES continue
4	Continue holding EXTEND switch until ramp movement stops.	Checking to see if ramp operation stops automatically	Continue.
5	Ramp has stopped. Has the motor stopped running?	Motor shut off properly	If NO go to 6
		Controller does not see the full out limit switch	If YES continue
6	Check the Full-Out limit switch	Determine if switch is out of adjustment or broken.	Perform the Limit Switch Test.
7	Extend Test Passed!		
8	Do the LEDs match figure 8?	A change was caused by the EXTEND switch or something else is wrong.	If NO go to step 25
		Yes indicates that the EXTEND command was not received or an interlock is not satisfied.	If YES continue
9	Disconnect J3 at the controller	First lets verify the interlocks	Continue.
10	Measure the voltage between pin 7 and ground.	This is the ramp enable signal. It must be above 12 volts dc to guarantee operation.	Continue.
11	Does the meter read above 12 volts dc?	Below 12v will inhibit operation	If NO continue
		Above 12v will allow operation	If YES go to step 13
12	Correct the ramp interlock	Restart this test	Go to step 1
13	Measure the voltage of pins 11 and 14 with respect to ground.	These are the Parking Brake input pins	Continue.
14	Does pin 11 read below 2 volts or pin 14 read above 12 volts?	At lease one must be active to allow operation	If NO go to step 15
			If YES continue

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15	Fix the parking brake input and restart the test	PBrake (pin 14) must be above 12 Volts DC or PBrake-n (pin 11) must be below 1 volt DC to allow operation.	Go to step 15
16	Check the resistance between pins 8 and 3 while pressing the EXTEND switch.	Testing the switch and the harness in this step	Continue.
17	Does the meter show less than 1 ohm?	Greater than 1 ohm would be a bad switch.	If NO go to step 19
		Less than 1 ohm is a good closed switch.	If YES continue
18	Replace the controller	Rerun all tests	Go to step 1
19	Check the resistance between the normally open (NO) and normally closed contacts of the switch while activating it.	This will check the switch without including the wire	Continue.
20	Does the meter show less than 1 ohm?	Greater than 1 ohm would be a bad switch.	If NO continue
		Less than 1 ohm is a good closed switch.	If YES go to step 21
21	Replace the EXTEND Switch	Restart this test	Go to step 1
22	Inspect the switch harness for a broken wire	Since the switch is OK the problem has to be in the harness.	Continue.
23	Repair the harness	Restart this test	Go to step 1
24	Is the Full-Out LED green?	The ramp should not show full out	If NO continue
		It appears the micro-switch is at fault.	If YES , go to the Limit Switch test
25	Is the manual Release LED green?	The manual release should not be engaged.	If NO go to step 18
		It appears the micro-switch is at fault.	If YES , go to the Limit Switch test

Table 7 EXTEND TEST (-001)

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RETRACT TEST (-001)			
Step	Action	Description	Result
1	Depress and hold the RETRACT switch.	Ramp should be started in the fully stowed position. EXTEND and RETRACT are momentary functions and must be held on to remain active.	Continue.
2	Do the LEDs match Figure 9?	First check to see if switch input was received by the controller	Go to step 8
		Figure 2 is proper indication for extending the ramp.	If YES continue
3	Does the ramp start retracting?	Controller is not connecting to the motor	If NO perform the Motor Control Test
		Command was received and the operation was started.	If YES continue
4	Continue holding RETRACT switch until ramp movement stops.	Checking to see if ramp operation stops automatically	Continue.
5	Ramp has stopped. Has the motor stopped running?	Motor shut off properly	If NO go to 6
		Controller does not see the full out limit switch	If YES continue
6	Check the Full-In limit switch	Determine if switch is out of adjustment or broken.	Perform the Limit Switch Test.
7	Retract Test Passed!		
8	Do the LEDs match figure 8?	A change was caused by the RETRACT switch or something else is wrong.	If NO go to step 25
		Yes indicates that the RETRACT command was not received or an interlock is not satisfied.	If YES continue
9	Disconnect J3 at the controller	First lets verify the interlocks	Continue.
10	Measure the voltage between pin 7 and ground.	This is the ramp enable signal. It must be above 12 volts dc to guarantee operation.	Continue.
11	Does the meter read above 12 volts dc?	Below 12v will inhibit operation	If NO continue
		Above 12v will allow operation	If YES go to step 13
12	Correct the ramp interlock	Restart this test	Go to step 1
13	Measure the voltage of pins 11 and 14 with respect to ground.	These are the Parking Brake input pins	Continue.
14	Does pin 11 read below 2 volts or pin 14 read above 12 volts?	At lease one must be active to allow operation	If NO go to step 15
			If YES continue

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15	Fix the parking brake input and restart the test	PBrake (pin 14) must be above 12 Volts DC or PBrake-n (pin 11) must be below 1 volt DC to allow operation.	Go to step 15
16	Check the resistance between pins 8 and 3 while pressing the RETRACT switch.	Testing the switch and the harness in this step	Continue.
17	Does the meter show less than 1 ohm?	Greater than 1 ohm would be a bad switch.	If NO go to step 19
		Less than 1 ohm is a good closed switch.	If YES continue
18	Replace the controller	Rerun all tests	Go to step 1
19	Check the resistance between the normally open (NO) and normally closed contacts of the switch while activating it.	This will check the switch without including the wire	Continue.
20	Does the meter show less than 1 ohm?	Greater than 1 ohm would be a bad switch.	If NO continue
		Less than 1 ohm is a good closed switch.	If YES go to step 21
21	Replace the RETRACT Switch	Restart this test	Go to step 1
22	Inspect the switch harness for a broken wire	Since the switch is OK the problem has to be in the harness.	Continue.
23	Repair the harness	Restart this test	Go to step 1
24	Is the Full-In LED green?	The ramp should not show full out	If NO continue
		It appears the micro-switch is at fault.	If YES , go to the Limit Switch test
25	Is the manual Release LED green?	The manual release should not be engaged.	If NO go to step 18
		It appears the micro-switch is at fault.	If YES , go to the Limit Switch test

Table 8 RETRACT TEST (-001)

CONTROLLER DIAGNOSTIC GUIDE

PROCESSES for 100218-002 Modules ONLY

The following diagnostic processes apply only to the 100218-002 module.

The -002 unit differs from the -001 unit only as far as the diagnostic LEDs are concerned. There are no operational differences between the two units.

The -001 unit has its diagnostic LEDs connected at the output of the indicator relays. Due to the fact that the Diagnostic indicators are illuminated in both the active and inactive states of the outputs, a small (approx. 10mA) current is always passing through the dash indicators even when they are not active. This current is not sufficient to illuminate an incandescent bulb but will illuminate an LED.

If dashboard LED indicators are preferred over incandescent, by the installer, the -002 controller should be used. The -002 controller moves its diagnostic LEDs back to the inputs of the indicator relays (K3-K5). This means there is no longer any voltage or current present at the indicator output of the controller when it is not active. This change in circuitry limits the effectivity of the LEDs to functions that are internal to the control module. They can no longer be used to validate connectivity to the dashboard indicators.

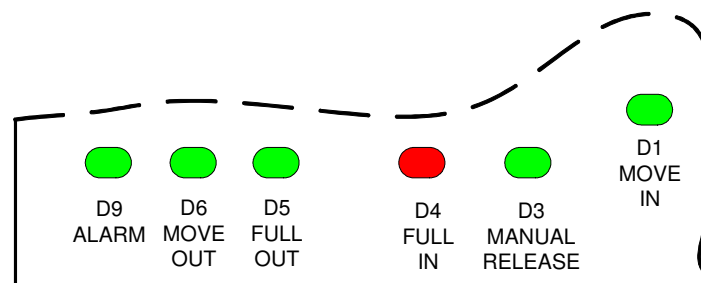


Figure 12 Ramp Fully Stowed (-002)

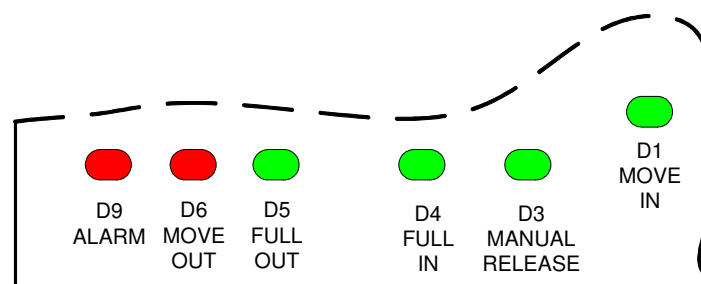


Figure 13 Ramp Extending (-002)

CONTROLLER DIAGNOSTIC GUIDE

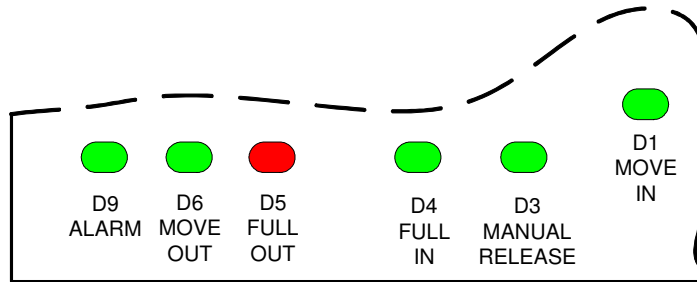


Figure 14 Ramp Fully Extended (-002)

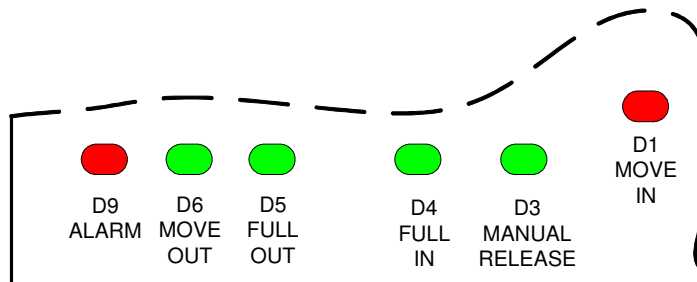


Figure 15 Ramp Retracting (-002)

CONTROLLER DIAGNOSTIC GUIDE

OPERATIONAL CHECK (-002)



CONTROLLER DIAGNOSTIC GUIDE

Operational Check (-002)			
Step	Action	Description	Result
1	Fully stow the ramp and cycle power to the controller.	Resetting the system	Continue.
2	Be sure the Manual Release is fully down and locked.	Setting external input to known value (not active)	Continue.
3	Verify the Parking Brake Interlock is active	Setting external input to known value (active)	Continue.
4	Verify the Ramp Enable Interlock is active	Setting external input to known value (active)	Continue.
5	Compare the LEDs D1, D3, D4, D5, D6 & D9 to Figure 12	Figure 12 shows the indicator conditions for a ramp that is fully retracted. The LEDs will be red for active switches and will be green for inactive switches.	Continue.
6	Do the LEDs match Figure 12 ? (Assume J3 pin 5 is 28 volts)	Indicators other than D4 show Green or some are not lit. (FAULT)	Perform Initialization Test
		D4 is only green LED	If YES continue
7	Press the EXTEND Switch	Testing extend capability	Continue.
8	Does the ramp move out of the cassette?	Moving	Continue.
		Not Moving (FAULT)	Perform Extend Test
9	Do the LEDs match Figure 13? (Assume J3 pin 5 is 28 volts)	YES	Continue.
		NO	Perform Extend Test
10	Continue to hold EXTEND switch until ramp stops.	Ramp should auto stop when fully extended.	Continue.
11	Does ramp continue until fully extended?	Obstruction detection can cause premature halt.	If YES continue
			If NO perform Calibration Adjustment
12	Does the motor stop when the ramp stops	Full_Out Limit switch tells the controller to stop	If YES continue
			If NO perform Limit Switch Test
13	Do the LEDs match Figure 14? (Assume J3 pin 5 is 28 volts)	YES	Continue.
		NO	Perform Extend Test
14	Press the RETRACT Switch	Testing retract capability	Continue.
15	Does the ramp move into the cassette?	Moving	If YES Continue.
		Not Moving (FAULT)	If NO Perform Retract Test
16	Do the LEDs match Figure 15? (Assume J3 pin 5 is 28 volts)	YES	Continue.
		NO	Perform Retract Test
17	Continue to hold RETRACT switch until ramp stops.	Ramp should auto stop when fully retracted.	Continue.
18	Does ramp continue until fully retracted?	Obstruction detection can cause premature halt.	If YES continue
			If NO perform Calibration Adjustment

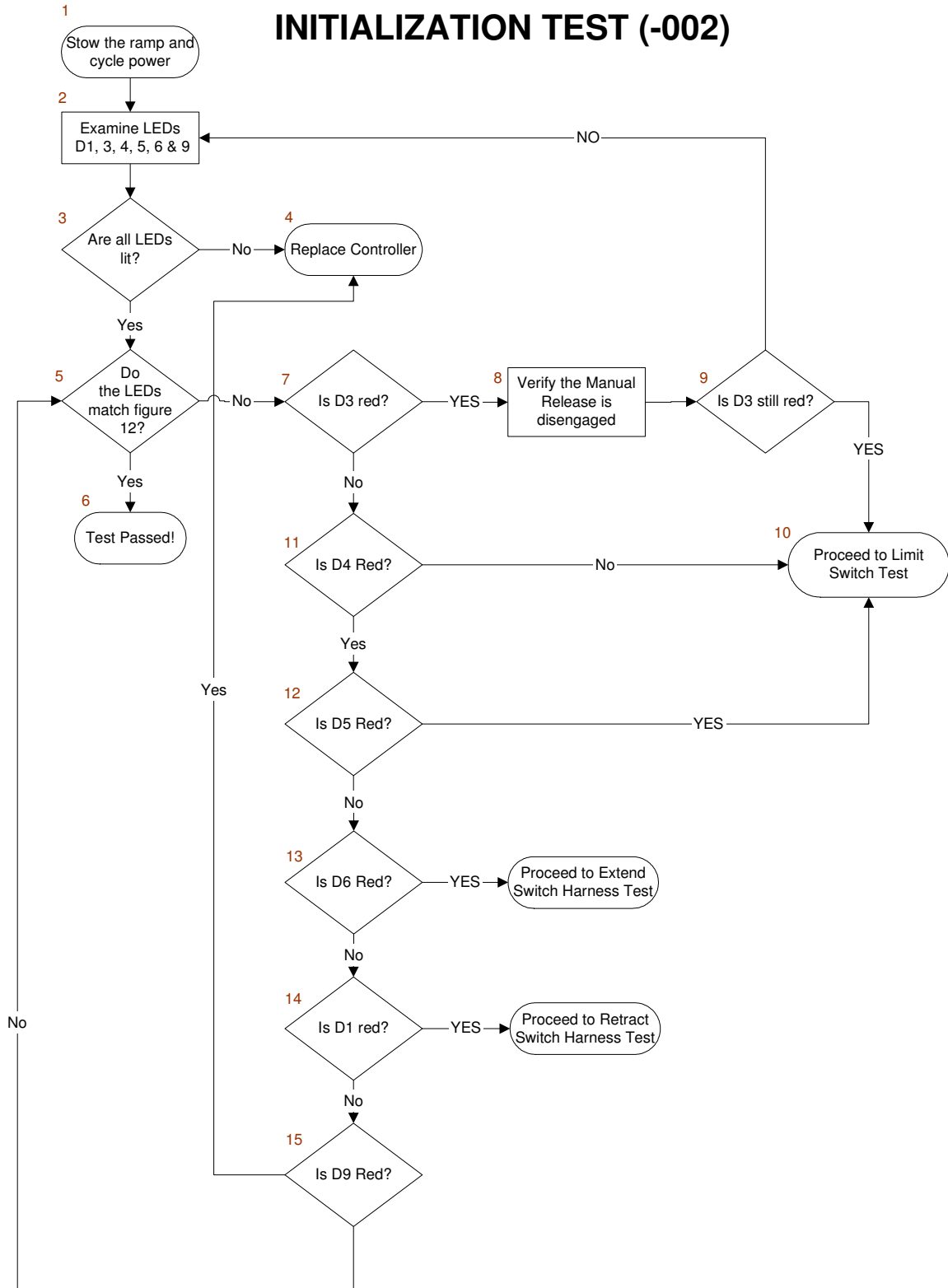
CONTROLLER DIAGNOSTIC GUIDE

19	Does the motor stop when the ramp stops	Full_In Limit switch tells the controller to stop	If YES continue
			If NO perform Limit Switch Test
20	Press and release the ONETOUCH switch	This function does not require the switch to be held active.	Continue.
21	Does the ramp start extending and continue until fully extended?	Ramp should auto stop when fully extended.	If YES continue
			If NO Perform Harness test
22	Press and release the ONETOUCH switch	The Ramp should begin to retract	Continue
23	Apply 33 lbs. pressure (15 kg) on the pressure mat.	This is the minimum weight required to activate the pressure switch	Continue.
24	Does the ramp stop once the pressure is applied?	The pressure switch tells the controller to stop regardless of operational mode	If YES Test Passes
			If NO perform Pressure Switch Test

Table 9 Table 9 Operational Check (-002)

CONTROLLER DIAGNOSTIC GUIDE

INITIALIZATION TEST (-002)



CONTROLLER DIAGNOSTIC GUIDE

INITIALIZATION TEST (-002)			
Step	Action	Description	Result
1	Fully stow the ramp and cycle power to the controller. Be sure the Manual Release is fully down and locked. (not active)	Resetting the system	Continue.
2	Examine the LEDs D1, D3, D4, D5, D6 & D9.	LEDs will be green for active switches and will be red for inactive switches.	Continue.
3	Are all six LEDs lit? (either red or green)	All indicators must turn on.	If NO continue
		All on indicates basic functionality	If YES go to step 5
4	Replace the controller	Diagnostic indicators are faulty	Restart tests.
5	Do the LEDs match Figure 12?	Indicators other than D4 show active (red)	If NO go to step 7
		D4 is only red LED	If YES continue
6	Initialization Test Passed!		
7	Is D3 red?	Green shows Manual Release inactive	If NO go to step 11
		Red shows the Manual Release is active	If YES continue
8	Check the Manual Release lever and make sure it is disengaged.	When Disengaged the LED should show green.	Continue.
9	Is D3 still red?	Green shows Manual Release inactive	If NO go to step 2
		Red shows the Manual Release is active	If YES continue
10	Proceed to Limit Switch Test	A bad switch or damaged harness can cause problem.	
11	Is D4 red?	Green indicates ramp partially extended.	If NO go to step 10
		Red indicates Full-In status (Stowed)	If YES continue
12	Is D5 red?	Green indicates ramp not fully extended	If No continue
		Red indicates ramp is fully extended	If Yes go to step 10

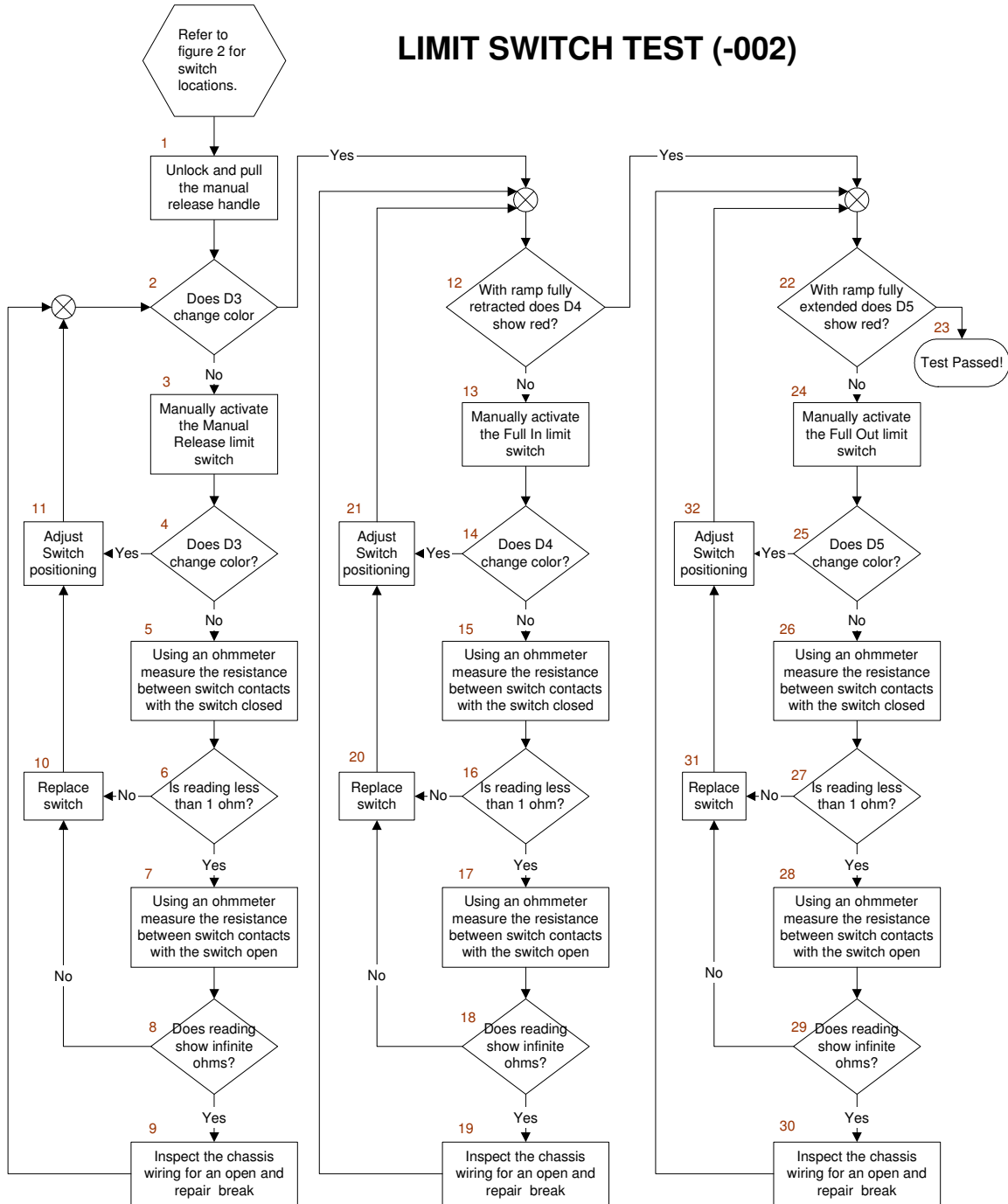
CONTROLLER DIAGNOSTIC GUIDE

13	Is D6 red?	Green indicates ramp not moving out	If No continue
		Red indicates ramp is moving out	If Yes go to Extend Switch Harness test.
14	Is D1 red?	Green indicates ramp not moving in.	If No continue
		Red indicates ramp is moving in	If Yes go to Retract Switch Harness test
15	Is D9 red?	Green indicates ramp not moving in.	If No go to step 5
		Red indicates ramp is moving in	If Yes go to step 4

Table 10 Initialization Test (-002)

CONTROLLER DIAGNOSTIC GUIDE

LIMIT SWITCH TEST (-002)



CONTROLLER DIAGNOSTIC GUIDE

LIMIT SWITCH TEST (-002)			
Step	Action	Description	Result
1	Unlock and pull out the manual release handle	This action will disengage the motor and initiate the manual release signal	Continue.
2	Does the D3 (Manual Release) LED change color?	Switch may be out of adjustment	If NO continue
		Switching working properly	If YES go to step 12
3	Manually operate the manual release limit switch while observing D3.	This tests the switch and harness	Continue.
4	Does the D3 (Manual Release) LED change color?	There is a problem with the switch or the harness	If NO continue
		Switch is out of adjustment	If YES go to step 11
5	Using an ohmmeter measure the resistance between the common and the normally open terminal of the limit switch.	Be sure the switch is closed during the measurement	Continue.
6	Is the reading less than 1 ohm	Switch is bad! Stuck open!	If NO go to step 10
		Closed contacts will read less than 1 ohm	If YES continue
7	Using an ohmmeter measure the resistance between the common and the normally open terminal of the limit switch.	Be sure the switch is open during the measurement	Continue.
8	Does the meter read infinite ohms?	Switch is bad! Stuck closed!	If NO go to step 10
		Closed contacts will read less than 1 ohm	If YES continue
9	Inspect the chassis wiring for an open ckt or the connectors for a poorly mated connection	Since the switch checks OK the problem must be in the harness.	Go to step 2
10	Replace Limit Switch	Part number found in Bill of Material	Continue.
11	Adjust Limit switch position	Follow published adjustment procedures	Go to step 2
12	With the ramp fully retracted does the D4 LED show red?	Switch may be out of adjustment	If NO continue
		Switching working properly	If YES go to step 22
13	Manually operate the Full-In limit switch while observing D4.	This tests the switch and harness	Continue.
14	Does the D4 (Full-In) LED change color?	There is a problem with the switch or the harness	If NO continue
		Switch is out of adjustment	If YES go to step 21
15	Using an ohmmeter measure the resistance between the common and the normally open terminal of the limit switch.	Be sure the switch is closed during the measurement	Continue.

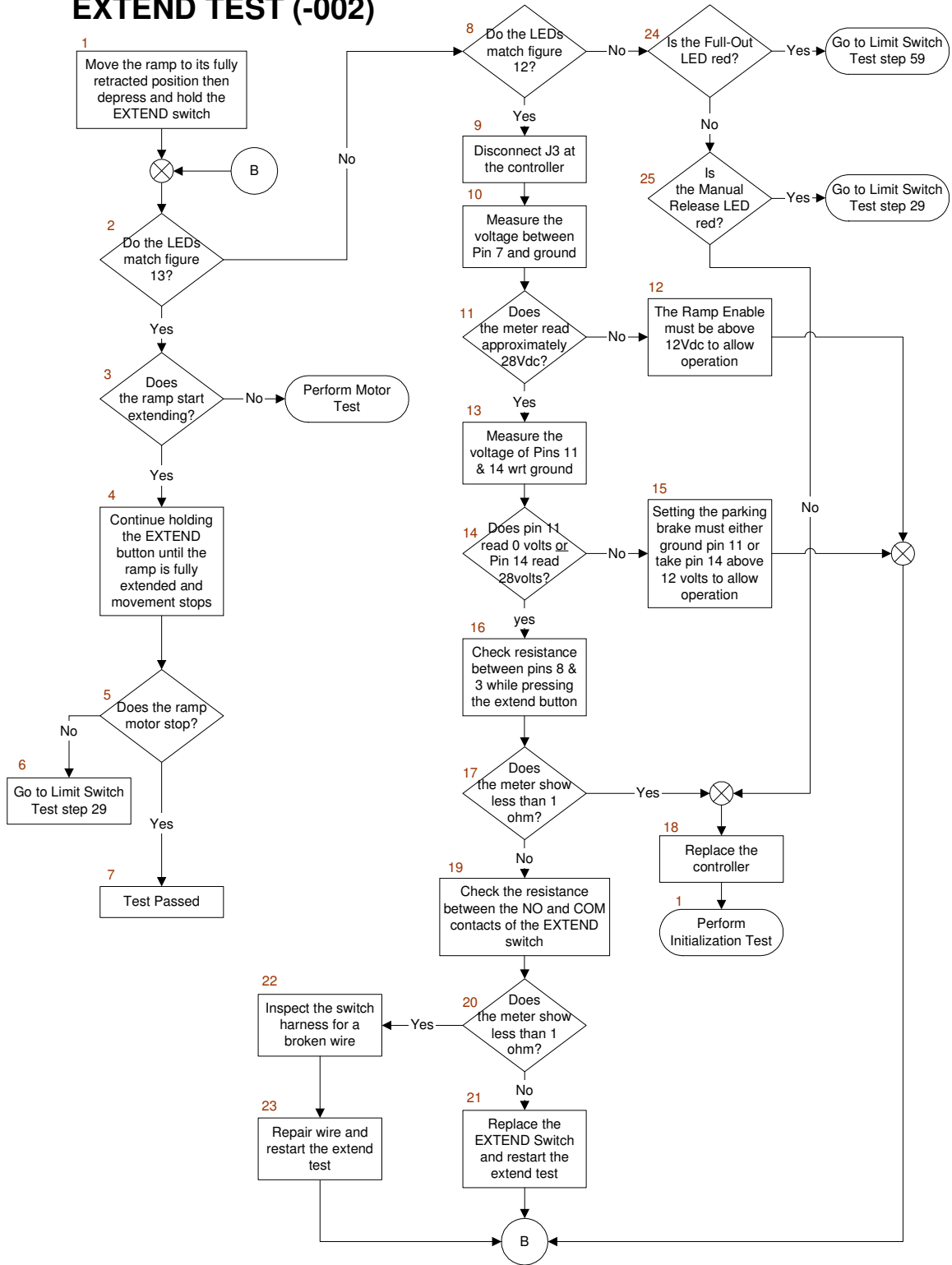
CONTROLLER DIAGNOSTIC GUIDE

16	Is the reading less than 1 ohm	Switch is bad! Stuck open!	If NO go to step 20
		Closed contacts will read less than 1 ohm	If YES continue
17	Using an ohmmeter measure the resistance between the common and the normally open terminal of the limit switch.	Be sure the switch is open during the measurement	Continue.
18	Does the meter read infinite ohms?	Switch is bad! Stuck closed!	If NO go to step 20
		Closed contacts will read less than 1 ohm	If YES continue
19	Inspect the chassis wiring for an open ckt and the connectors for a poorly mated connection	Since the switch checks OK the problem must be in the harness.	Go to step 12
20	Replace Limit Switch	Part number found in Bill of Material	Continue.
21	Adjust Limit switch position	Follow published adjustment procedures	Go to step 12
22	With the ramp fully extended does the D5 LED show red?	Switch may be out of adjustment	If NO continue
		Switching working properly	If YES go to step 23
23	Limit Switch Test Passed!		
24	Manually operate the Full-Out limit switch while observing D5.	This tests the switch and harness	Continue.
25	Does the D5 (Full-Out) LED change color?	There is a problem with the switch or the harness	If NO continue
		Switch is out of adjustment	If YES go to step 32
26	Using an ohmmeter measure the resistance between the common and the normally open terminal of the limit switch.	Be sure the switch is closed during the measurement	Continue.
27	Is the reading less than 1 ohm	Switch is bad! Stuck open!	If NO go to step 31
		Closed contacts will read less than 1 ohm	If YES continue
28	Using an ohmmeter measure the resistance between the common and the normally open terminal of the limit switch.	Be sure the switch is open during the measurement	Continue.
29	Does the meter read infinite ohms?	Switch is bad! Stuck closed!	If NO go to step 31
		Closed contacts will read less than 1 ohm	If YES continue
30	Inspect the chassis wiring for an open ckt and the connectors for a poorly mated connection	Since the switch checks OK the problem must be in the harness.	Go to step 22
31	Replace Limit Switch	Part number found in Bill of Material	Continue.
32	Adjust Limit switch position	Follow published adjustment procedures	Go to step 22

CONTROLLER DIAGNOSTIC GUIDE

Table 11 Limit Switch Test (-002)

EXTEND TEST (-002)



CONTROLLER DIAGNOSTIC GUIDE

EXTEND TEST (-002)			
Step	Action	Description	Result
1	Depress and hold the EXTEND switch	Ramp should be started in the fully stowed position. EXTEND and RETRACT are momentary functions and must be held on to remain active.	Continue.
2	Do the LEDs match Figure 13?	First check to see if switch input was received by the controller	Go to step 8
		Figure 2 is proper indication for extending the ramp.	If YES continue
3	Does the ramp start extending?	Controller is not connecting to the motor	If NO perform the Motor Control Test
		Command was received and the operation was started.	If YES continue
4	Continue holding EXTEND switch until ramp movement stops.	Checking to see if ramp operation stops automatically	Continue.
5	Ramp has stopped. Has the motor stopped running?	Motor shut off properly	If NO go to 6
		Controller does not see the full out limit switch	If YES continue
6	Check the Full-Out limit switch	Determine if switch is out of adjustment or broken.	Perform the Limit Switch Test.
7	Extend Test Passed!		
8	Do the LEDs match figure 8?	A change was caused by the EXTEND switch or something else is wrong.	If NO go to step 25
		Yes indicates that the EXTEND command was not received or an interlock is not satisfied.	If YES continue
9	Disconnect J3 at the controller	First lets verify the interlocks	Continue.
10	Measure the voltage between pin 7 and ground.	This is the ramp enable signal. It must be above 12 volts dc to guarantee operation.	Continue.
11	Does the meter read above 12 volts dc?	Below 12v will inhibit operation	If NO continue
		Above 12v will allow operation	If YES go to step 13
12	Correct the ramp interlock	Restart this test	Go to step 1
13	Measure the voltage of pins 11 and 14 with respect to ground.	These are the Parking Brake input pins	Continue.
14	Does pin 11 read below 2 volts or pin 14 read above 12 volts?	At lease one must be active to allow operation	If NO go to step 15
			If YES continue

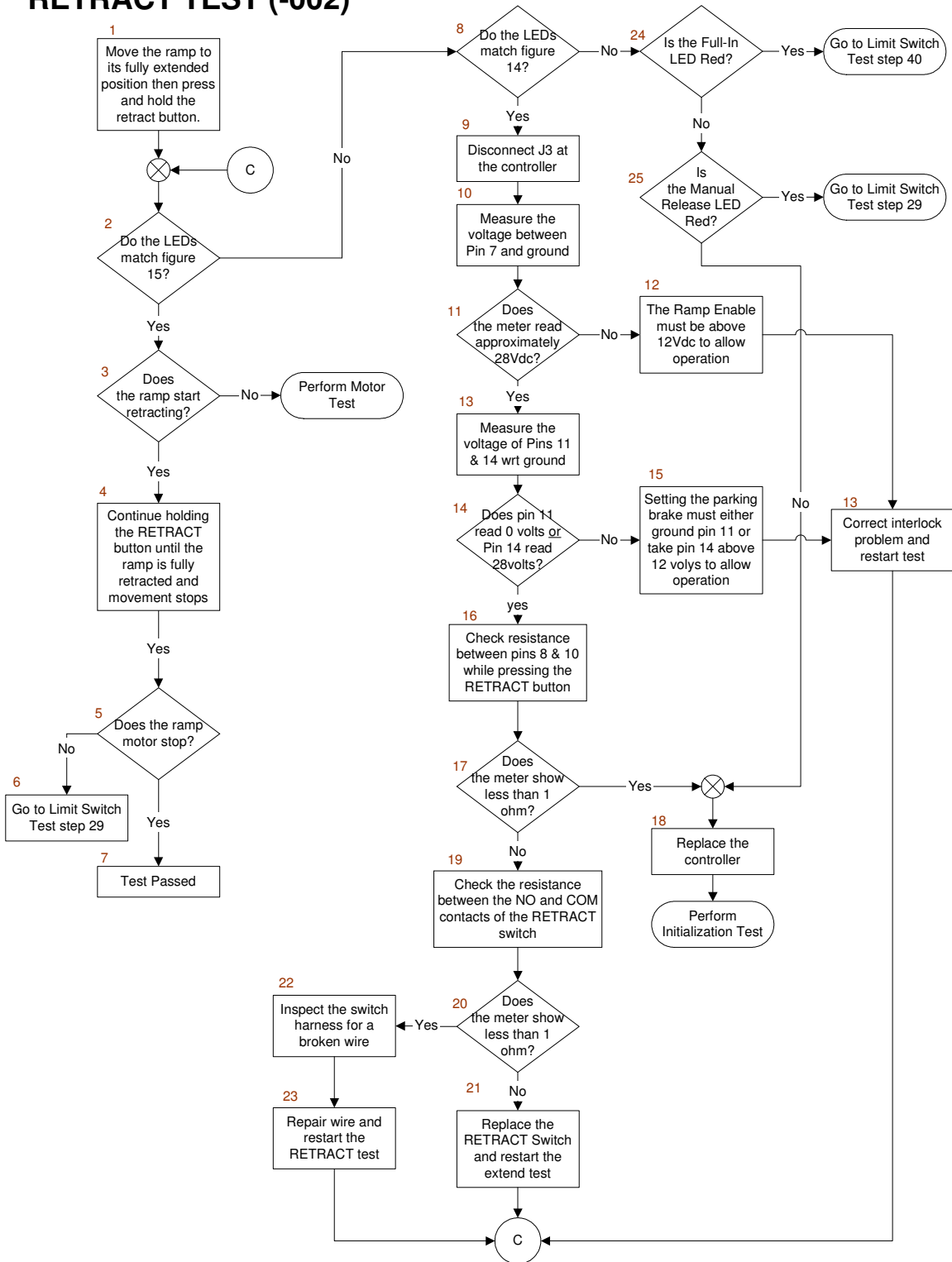
CONTROLLER DIAGNOSTIC GUIDE

15	Fix the parking brake input and restart the test	PBrake (pin 14) must be above 12 Volts DC or PBrake-n (pin 11) must be below 1 volt DC to allow operation.	Go to step 15
16	Check the resistance between pins 8 and 3 while pressing the EXTEND switch.	Testing the switch and the harness in this step	Continue.
17	Does the meter show less than 1 ohm?	Greater than 1 ohm would be a bad switch.	If NO go to step 19
		Less than 1 ohm is a good closed switch.	If YES continue
18	Replace the controller	Rerun all tests	Go to step 1
19	Check the resistance between the normally open (NO) and normally closed contacts of the switch while activating it.	This will check the switch without including the wire	Continue.
20	Does the meter show less than 1 ohm?	Greater than 1 ohm would be a bad switch.	If NO continue
		Less than 1 ohm is a good closed switch.	If YES go to step 21
21	Replace the EXTEND Switch	Restart this test	Go to step 1
22	Inspect the switch harness for a broken wire	Since the switch is OK the problem has to be in the harness.	Continue.
23	Repair the harness	Restart this test	Go to step 1
24	Is the Full-Out LED red?	The ramp should not show full out	If NO continue
		It appears the micro-switch is at fault.	If YES , go to the Limit Switch test
25	Is the manual Release LED red?	The manual release should not be engaged.	If NO go to step 18
		It appears the micro-switch is at fault.	If YES , go to the Limit Switch test

Table 13 Extend Test (-002)

CONTROLLER DIAGNOSTIC GUIDE

RETRACT TEST (-002)



CONTROLLER DIAGNOSTIC GUIDE

RETRACT TEST (-002)			
Step	Action	Description	Result
1	Depress and hold the RETRACT switch.	Ramp should be started in the fully stowed position. EXTEND and RETRACT are momentary functions and must be held on to remain active.	Continue.
2	Do the LEDs match Figure 15?	First check to see if switch input was received by the controller	Go to step 8
		Figure 2 is proper indication for extending the ramp.	If YES continue
3	Does the ramp start retracting?	Controller is not connecting to the motor	If NO perform the Motor Control Test
		Command was received and the operation was started.	If YES continue
4	Continue holding RETRACT switch until ramp movement stops.	Checking to see if ramp operation stops automatically	Continue.
5	Ramp has stopped. Has the motor stopped running?	Motor shut off properly	If NO go to 6
		Controller does not see the full out limit switch	If YES continue
6	Check the Full-In limit switch	Determine if switch is out of adjustment or broken.	Perform the Limit Switch Test.
7	Retract Test Passed!		
8	Do the LEDs match figure 8?	A change was caused by the RETRACT switch or something else is wrong.	If NO go to step 25
		Yes indicates that the RETRACT command was not received or an interlock is not satisfied.	If YES continue
9	Disconnect J3 at the controller	First lets verify the interlocks	Continue.
10	Measure the voltage between pin 7 and ground.	This is the ramp enable signal. It must be above 12 volts dc to guarantee operation.	Continue.
11	Does the meter read above 12 volts dc?	Below 12v will inhibit operation	If NO continue
		Above 12v will allow operation	If YES go to step 13
12	Correct the ramp interlock	Restart this test	Go to step 1
13	Measure the voltage of pins 11 and 14 with respect to ground.	These are the Parking Brake input pins	Continue.
14	Does pin 11 read below 2 volts <u>or</u> pin 14 read above 12 volts?	At lease one must be active to allow operation	If NO go to step 15
			If YES continue

CONTROLLER DIAGNOSTIC GUIDE

15	Fix the parking brake input and restart the test	PBrake (pin 14) must be above 12 Volts DC or PBrake-n (pin 11) must be below 1 volt DC to allow operation.	Go to step 15
16	Check the resistance between pins 8 and 3 while pressing the RETRACT switch.	Testing the switch and the harness in this step	Continue.
17	Does the meter show less than 1 ohm?	Greater than 1 ohm would be a bad switch.	If NO go to step 19
		Less than 1 ohm is a good closed switch.	If YES continue
18	Replace the controller	Rerun all tests	Go to step 1
19	Check the resistance between the normally open (NO) and normally closed contacts of the switch while activating it.	This will check the switch without including the wire	Continue.
20	Does the meter show less than 1 ohm?	Greater than 1 ohm would be a bad switch.	If NO continue
		Less than 1 ohm is a good closed switch.	If YES go to step 21
21	Replace the RETRACT Switch	Restart this test	Go to step 1
22	Inspect the switch harness for a broken wire	Since the switch is OK the problem has to be in the harness.	Continue.
23	Repair the harness	Restart this test	Go to step 1
24	Is the Full-In LED red?	The ramp should not show full out	If NO continue
		It appears the micro-switch is at fault.	If YES , go to the Limit Switch test
25	Is the manual Release LED red?	The manual release should not be engaged.	If NO go to step 18
		It appears the micro-switch is at fault.	If YES , go to the Limit Switch test

Table 14 Retract Test (-002)

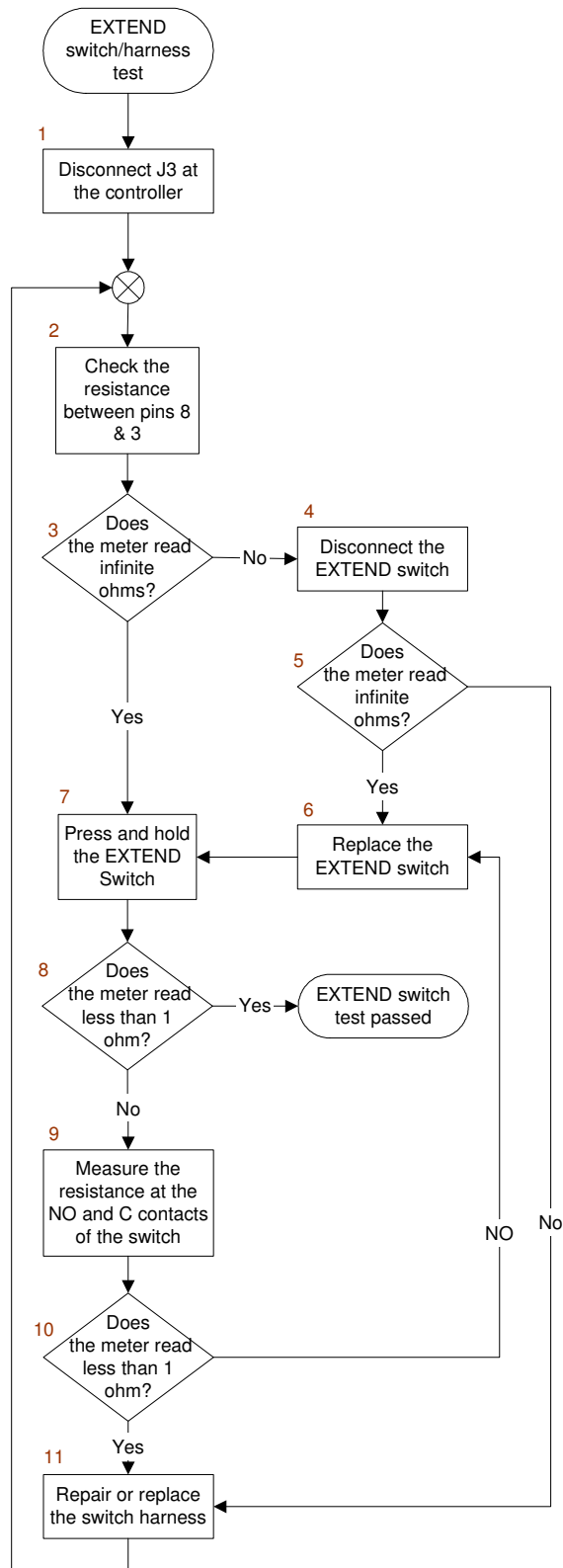
CONTROLLER DIAGNOSTIC GUIDE

MOTOR TEST (-001 & -002)			
Step	Action	Description	Result
1	Remove the cover to the ramp's cassette	to access the motor limit switches and wiring	Continue.
2	Is the motor turning?	Not turning could be jammed mechanism or no power	If NO continue
		Turning without movement indicates broken drive mechanism	If YES go to step 4
3	Does the ramp drive mechanism move freely?	Lack of platform movement is related to the motor	If NO continue
		The drive mechanism is jammed	If YES go to step 4
4	Inspect and repair the ramp drive mechanism	Must retest after corrections are made	Perform the Extend Test
5	Remove the controller lid and measure the voltage on the connector tails of J1 and J12	See diagram of Figure 2 for locations	Continue.
6	Does the meter read approximately 28 volts dc?	The controller is not powering the motor	If NO continue
		The controller is providing power for the motor	If YES go to step 8
7	Replace the controller	Rerun all tests	Perform the Initialization Test
8	Measure the voltage on the motor leads inside the ramp cassette	May need to penetrate the wire insulation to obtain a reading	Continue.
9	Does the meter read approximately 28 volts dc?	The problem appears to be in the harness	If NO go to step 11
		The Motor is receiving the proper power.	If YES continue
10	Replace the motor	Must retest after corrections are made	Perform the Extend Test
11	Inspect the motor harness for a faulty connector or a broken wire.	Need to determine why power is not getting to the motor	Continue.
12	Repair harness	Re-test	Perform the Extend Test

Table 15 Motor Test (-001 & -002)

CONTROLLER DIAGNOSTIC GUIDE

EXTEND HARNESS TEST (-001 & -002)



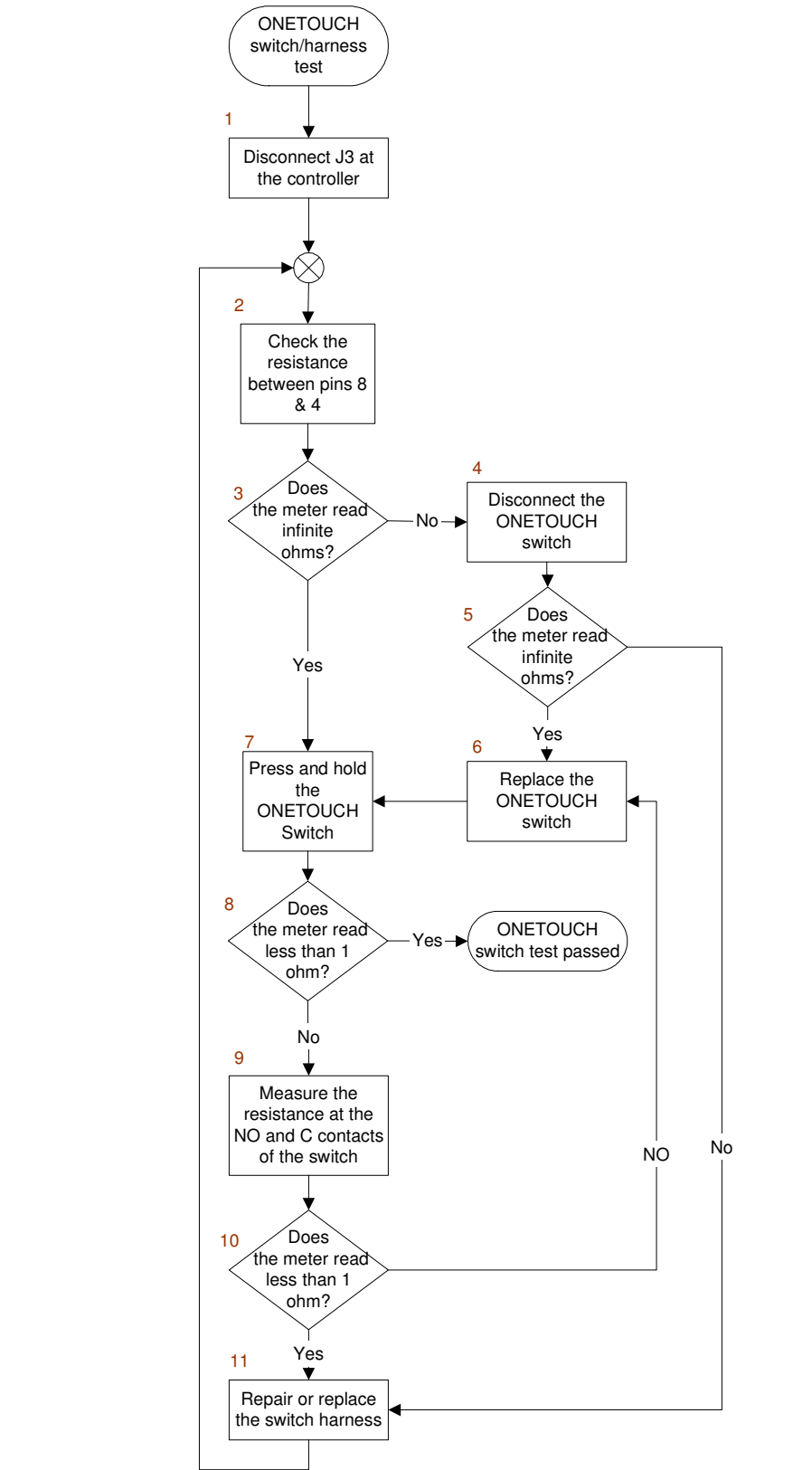
CONTROLLER DIAGNOSTIC GUIDE

EXTEND Harness TEST (-001 & -002)			
Step	Action	Description	Result
1	Disconnect J3 at the controller	This test requires an ohmmeter	Continue.
2	Check the resistance between pins 8 and 3 of the J3 harness connector.	First check the switch in the non-activated state	Continue.
3	Does the meter read infinite ohms?	A resistance reading indicates a switch problem	If NO continue
		Open switch must read infinite.	If YES go to step 7
4	Disconnect the EXTEND switch	Checking to see if the problem is in the switch or the harness	Continue.
5	Does the meter read infinite ohms?	A resistance reading indicates a harness problem	If NO go to step 11
		An infinite reading indicates the switch was the problem	If YES continue
6	Replace the EXTEND switch		Continue.
7	Press and hold the EXTEND switch	Now lets check the active state	Continue.
8	Does the meter read less than 1 ohm?	Near zero resistance indicates the switch closed	If NO continue
		An infinite or resistance reading above 1 ohm indicates a problem	If YES Test Passed!
9	Measure the resistance at the normally open and the common contacts of the switch.	this will tell us if the switch or the harness is at fault	Continue.
10	Does the meter read less than 1 ohm?	Near zero resistance indicates the switch closed properly	If NO go to step 6
		An infinite or resistance reading above 1 ohm indicates a problem with the switch	If YES continue
11	Repair the harness and retest	If you came here from Step 5 look for a short otherwise look for a break (open).	Go to step 2

Table 16 Extend Harness Test (-001 & -002)

CONTROLLER DIAGNOSTIC GUIDE

ONETOUCH HARNESS TEST (-001 & -002)



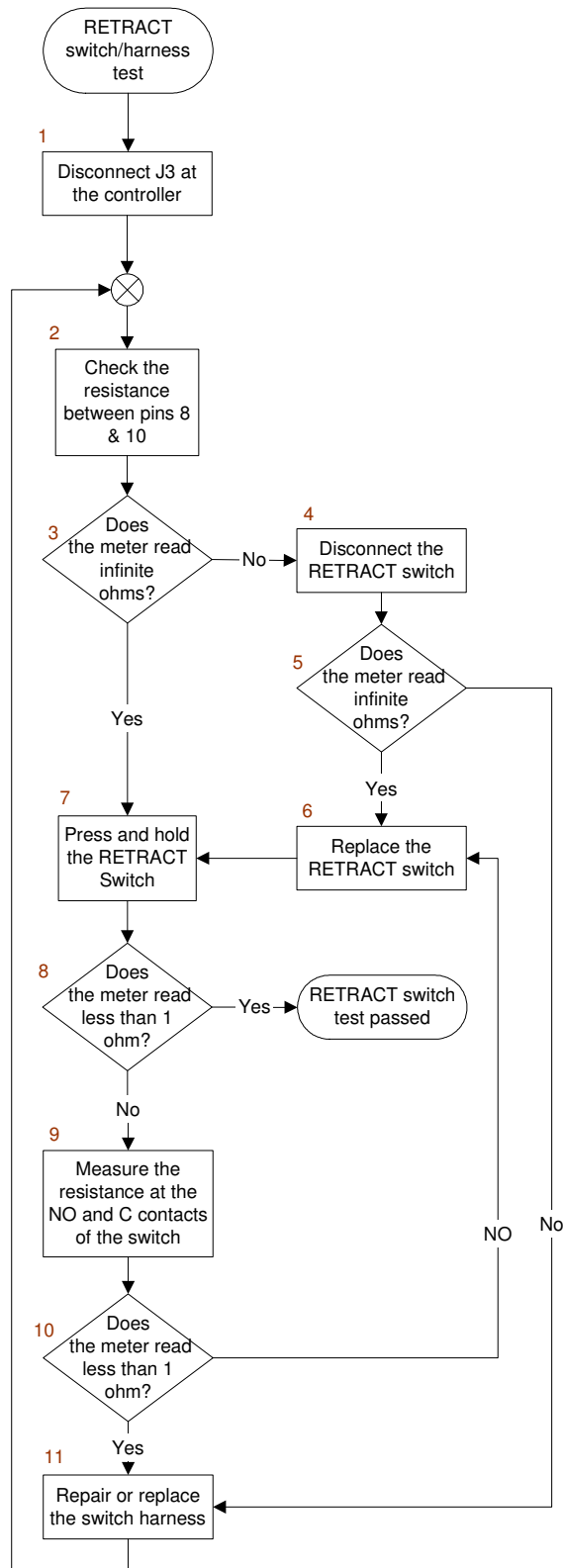
CONTROLLER DIAGNOSTIC GUIDE

ONETOUCH Harness TEST (-001 & -002)			
Step	Action	Description	Result
1	Disconnect J3 at the controller	This test requires an ohmmeter	Continue.
2	Check the resistance between pins 8 and 4 of the J3 harness connector.	First check the switch in the non-activated state	Continue.
3	Does the meter read infinite ohms?	A resistance reading indicates a switch problem	If NO continue
		Open switch must read infinite.	If YES go to step 7
4	Disconnect the ONETOUCH switch	Checking to see if the problem is in the switch or the harness	Continue.
5	Does the meter read infinite ohms?	A resistance reading indicates a harness problem	If NO go to step 11
		An infinite reading indicates the switch was the problem	If YES continue
6	Replace the ONETOUCH switch		Continue.
7	Press and hold the ONETOUCH switch	Now lets check the active state	Continue.
8	Does the meter read less than 1 ohm?	Near zero resistance indicates the switch closed	If NO continue
		An infinite or resistance reading above 1 ohm indicates a problem	If YES Test Passed!
9	Measure the resistance at the normally open and the common contacts of the switch.	this will tell us if the switch or the harness is at fault	Continue.
10	Does the meter read less than 1 ohm?	Near zero resistance indicates the switch closed properly	If NO go to step 6
		An infinite or resistance reading above 1 ohm indicates a problem with the switch	If YES continue
11	Repair the harness and retest	If you came here from Step 5 look for a short otherwise look for a break (open).	Go to step 2

Table 17 One-Touch Harness Test (-001 & -002)

CONTROLLER DIAGNOSTIC GUIDE

RETRACT HARNESS TEST (-001 & -002)



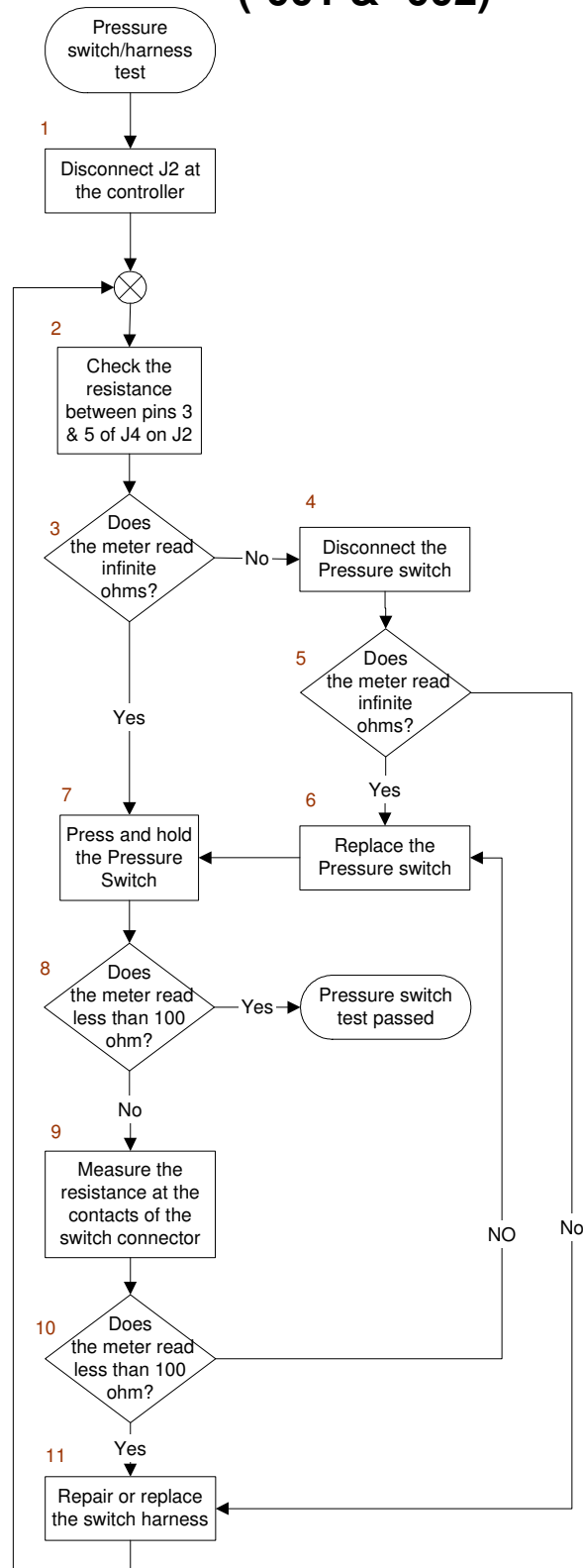
CONTROLLER DIAGNOSTIC GUIDE

RETRACT Harness TEST (-001 & -002)			
Step	Action	Description	Result
1	Disconnect J3 at the controller	This test requires an ohmmeter	Continue.
2	Check the resistance between pins 8 and 10 of the J3 harness connector.	First check the switch in the non-activated state	Continue.
3	Does the meter read infinite ohms?	A resistance reading indicates a switch problem	If NO continue
		Open switch must read infinite.	If YES go to step 7
4	Disconnect the RETRACT switch.	Checking to see if the problem is in the switch or the harness	Continue.
5	Does the meter read infinite ohms?	A resistance reading indicates a harness problem	If NO go to step 11
		An infinite reading indicates the switch was the problem	If YES continue
6	Replace the RETRACT switch		Continue.
7	Press and hold the RETRACT switch	Now lets check the active state	Continue.
8	Does the meter read less than 1 ohm?	Near zero resistance indicates the switch closed	If NO continue
		An infinite or resistance reading above 1 ohm indicates a problem	If YES Test Passed!
9	Measure the resistance at the normally open and the common contacts of the switch.	this will tell us if the switch or the harness is at fault	Continue.
10	Does the meter read less than 1 ohm?	Near zero resistance indicates the switch closed properly	If NO go to step 6
		An infinite or resistance reading above 1 ohm indicates a problem with the switch	If YES continue
11	Repair the harness and retest	If you came here from Step 5 look for a short otherwise look for a break (open).	Go to step 2

Table 18 Retract Harness Test (-001 & -002)

CONTROLLER DIAGNOSTIC GUIDE

PRESSURE SWITCH HARNESS TEST (-001 & -002)



CONTROLLER DIAGNOSTIC GUIDE

Pressure Harness Test (-001 & -002)			
Step	Action	Description	Result
1	Disconnect J2 at the controller	This test requires an ohmmeter	Continue.
2	Check the resistance between pins 3 and 5 of J4 in the J2 harness connector.	First check the switch in the non-activated state	Continue.
3	Does the meter read infinite ohms?	A resistance reading indicates a switch problem	If NO continue
		Open switch must read infinite.	If YES go to step 7
4	Disconnect the Pressure switch	Checking to see if the problem is in the switch or the harness	Continue.
5	Does the meter read infinite ohms?	A resistance reading indicates a problem	If NO go to step 11
		An infinite reading indicates the switch was the problem	If YES continue
6	Replace the Pressure switch		Continue.
7	Press and hold the Pressure switch (apply 33lbs. min.)	Now lets check the active state	Continue.
8	Does the meter read less than 100 ohms? (The Resistance of the mat may be as high as 90 ohm)	Near zero resistance indicates the switch closed	If NO continue
		An infinite or resistance reading above 100 ohm indicates a problem	If YES Test Passed!
9	Measure the resistance at the normally open and the common contacts of the switch.	this will tell us if the switch or the harness is at fault	Continue.
10	Does the meter read less than 100 ohms?	Near zero resistance indicates the switch closed properly	If NO go to step 6
		An infinite or resistance reading above 100 ohms indicates a problem with the switch	If YES continue
11	Repair the harness and retest	If you came here from Step 5 look for a short otherwise look for a break (open).	Go to step 2

Table 19 Pressure Harness Test (-001 & -002)

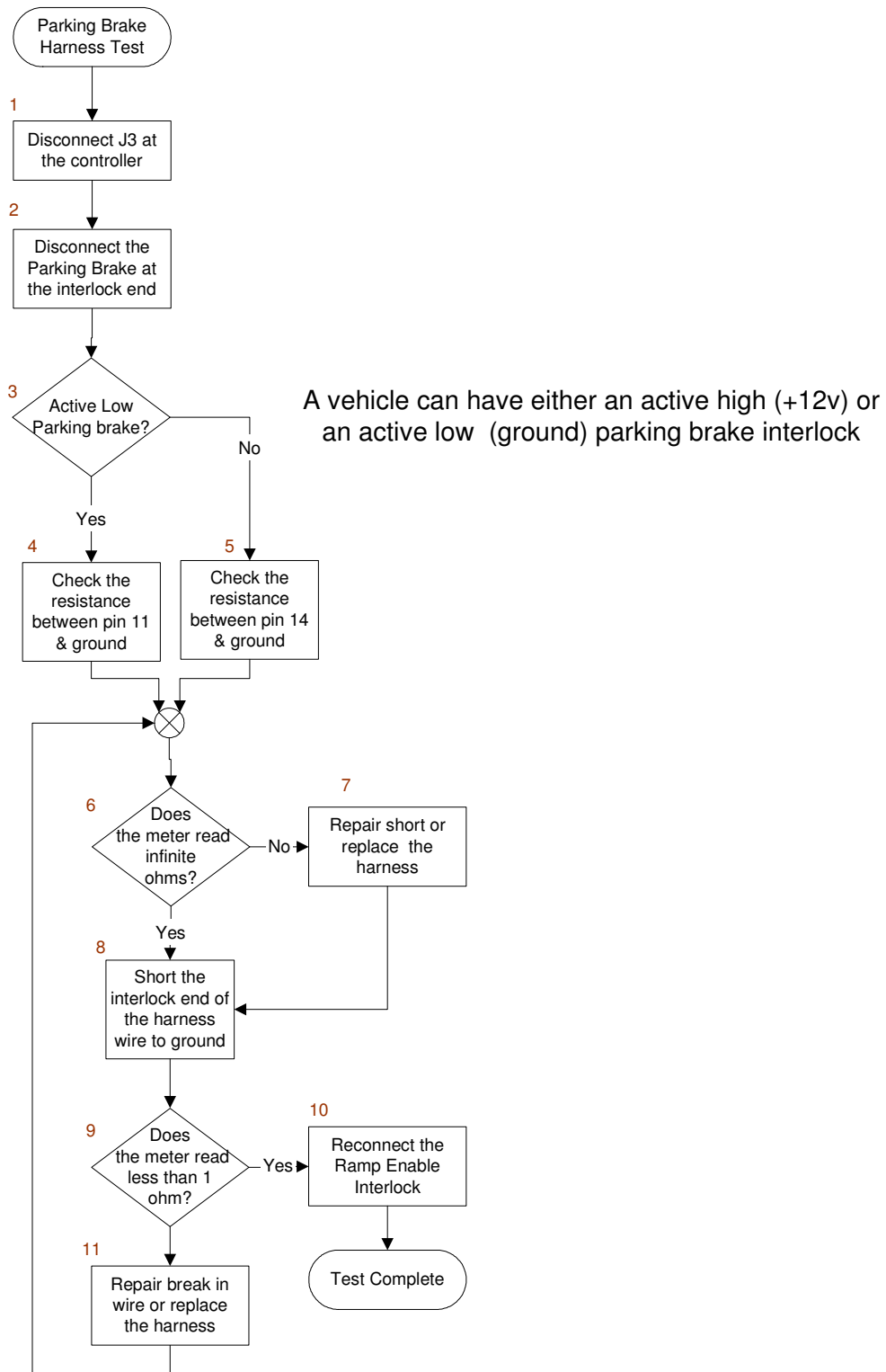
CONTROLLER DIAGNOSTIC GUIDE

Ramp Enable Harness TEST (-001 & -002)			
Step	Action	Description	Result
1	Disconnect J3 at the controller	This test requires an ohmmeter	Continue.
2	Disconnect the Ramp Enable wire from the interlock.	We need to isolate the ramp enable harness wire from its driving source	Continue.
3	Check the resistance between pin 7 and ground	First check the wire in the non-connected (open) state	Continue.
4	Does the meter read infinite ohms?	A resistance reading indicates a harness problem	If NO continue
		the open wire must read infinite.	If YES go to step 6
5	Repair the short or replace the harness.	Look for a pinched wire or a cut in the insulation.	Continue.
6	Short the interlock end of the wire to a chassis ground.	Checking for a break in the wire	Continue.
7	Does the meter read less than 1 ohm?	An infinite or resistance reading above 1 ohm indicates a problem	If NO continue
		Near zero resistance indicates the wire is good.	If YES go to step 9
8	Repair the break in the wire or replace the harness	A break in the conductor may not show through the insulation	Go to step 3
9	Reconnect the Ramp Enable interlock and the J3 connector	Restore vehicle configuration	Test passed

Table 20 Ramp Enable Harness Test (-002)

CONTROLLER DIAGNOSTIC GUIDE

PARKING BRAKE TEST (-001 & -002)



PARKING BRAKE Harness TEST (-001 & -002)

CONTROLLER DIAGNOSTIC GUIDE

Step	Action	Description	Result
1	Disconnect J3 at the controller	This test requires an ohmmeter	Continue.
2	Disconnect the parking Brake wire from the interlock.	We need to isolate the parking brake harness wire from its driving source	Continue.
3	Is the parking brake active high or active low output.	Active high means +12 volts minimum to enable the ramp	If high continue
		Active low means 0 volts (ground) to enable the ramp	If low go to step 5
4	Check the resistance between pin 14 and ground	First check the wire in the non-connected (open) state	Go to step 6
5	Check the resistance between pin 11 and ground	First check the wire in the non-connected (open) state	Continue.
6	Does the meter read infinite ohms?	A resistance reading indicates a harness problem	If NO continue
		An open wire must read infinite.	If YES go to step 8
7	Repair the short or replace the harness.	Look for a pinched wire or a cut in the insulation.	Continue.
8	Short the interlock end of the wire to a chassis ground.	Checking for a break in the wire	Continue.
9	Does the meter read less than 1 ohm?	An infinite or resistance reading above 1 ohm indicates a problem	If NO continue
		Near zero resistance indicates the wire is good.	If YES go to step 11
10	Repair the break in the wire or replace the harness	A break in the conductor may not show through the insulation	Go to step 3
11	Reconnect the Ramp Enable interlock and the J3 connector	Restore vehicle configuration	Test passed

Table 21 Parking Brake Harness Test (-001 & -002)