

## **Ace Controller Replacement Procedure for replacing C-Storm controller**

### **Installing the APN-0159/APN-0161**

Remove the C-Storm LMC30/LMC32 controller and replace it with the new APN-0159/APN-0161 controller. The APN-0159/APN-0161 plugs in exactly the same as the existing C-Storm controller and should fit in the same space.

Confirm the state of the LEDs on the controller. The seven segment display should either show a flashing number or 0.0. If the display shows flashing 11, then 11 amps is the CURRENT TRIPPING POINT, if it flashes 21, then 21 amps is the CURRENT TRIPPING POINT, if it displays 0.0 after being powered up, it is set at 21 amps and cannot be changed. Otherwise, the current trip point is the number flashing on the display. Make a note of this for later. The other LEDs should all be off.

### **Testing operation of the APN-0159/APN-0161**

After confirming that the APN-0159/APN-0161 is installed correctly, the next step is to confirm that the controller is operating correctly. To do so, press the switch to begin moving the slide out.

If the slide out moves in the wrong direction (for instance, moving in when it should be moving out), then you will need to rotate the switch 180 degrees. To do this, remove the panel holding the switch, release the switch from the panel, rotate the switch, and return it to the panel. The panel should now properly show the in and out directions.

If the slide out does not begin moving, have someone watch the APN-0159/APN-0161. If the slide out does not begin moving and no motoring current is present, but one of the motor LEDs is illuminated, check the wiring to the motor to confirm that there are no breaks in the wires. If the LEDs briefly illuminate before the seven segment display shows E8, check the motor wires for shorts. If the slide out does not begin moving, but some motoring current is present, then the motor LED should turn off after a few seconds. The switch should then be released for a second before being pressed in the original direction. See the Ace Controller Troubleshooting sheet for further diagnostic procedures.

After the operation of the slide out is confirmed, then test the operation of the lockout signal. Partially extend the slide out and then either disengage the parking brake (diesel) or turn the key to the on position (gas). Then press the switch in the out direction and verify that the slide out does not extend. If it does, confirm that the "RED: Lockout Signal" LED is illuminated. If it is not, verify that there is 12 volts between the LOCKOUT SIGNAL and GND wires. If the voltage is present, return the controller for replacement. If the voltage is not present, inspect the lockout signal system for faults. If the LED is on, then verify that the green LEDs illuminate when the slide out moves in the out direction. If they do not, then reverse the leads at the motor. If the

slide does not move, verify that you are able to move the slide out back in. If you are able to return to the in position, then you have confirmed the operation of the APN-0159/APN-0161.

### **Testing operation of the LED Strip (APN-0161 only)**

Press the lights on switch or apply 12 volts to the LIGHT SWITCH pin. Confirm that the bottom LED illuminates. Turn the switch off or remove the voltage and confirm that the LED does not illuminate. If the LED does not follow the switch input even when applying voltage directly, return the controller for replacement. Next, fully extend the slide out and confirm the middle LED next to the three pin plug is illuminated. If the slide out is fully extended, but the green LED does not illuminate, return the controller for replacement. Press the lights on switch or apply 12 volts and confirm that all three LEDs are illuminated and the LED strip lighting is on. If all three LEDs are illuminated, but the strip is not on, confirm that there is not a break in the wiring for the light strip. If no break is found, confirm that the LED strip is operational and installed correctly by directly applying 12 V. If the top light begins flashing, confirm that there is not a short in the wiring for the light switch. If no fault is found, but the LED continues flashing after cycling the switch, return the controller for replacement.

# Ace Controller Trouble Shooting

## APN-0159/APN-0161

What to do if the seven segment display does not show 0.0 or a flashing number.

If the seven segment display does not illuminate, confirm that power is going to the controller. If power is present between the +12V and GND wires, return the controller for replacement.

If the seven segment display is showing E1, allow the controller to cool off. If it is hot outside, perhaps bring the controller into an air conditioned area or apply a fan to the controller. If the fault does not go away after the controller is given a chance to cool, return the controller for replacement.

If the seven segment display is showing E2, confirm that the voltage going into the controller is above 9 volts. If the voltage is above 9 volts and the controller still displays E2, return the controller for replacement.

If the seven segment display is showing E4, confirm that the slide out control switch is not being held down. If the switch is not being held down, try removing the spade terminals from the switch. If this does not resolve the issue, confirm that there is not a short between any of the switch wires. If there is an open between the SWITCH wire and both GND and SW GND and the controller still displays E4, then return the controller for replacement.

If the seven segment display is showing E6, confirm that the voltage going into the controller is below 18 volts. If the voltage is below 18 volts and the controller still displays E6, return the controller for replacement.

If the seven segment display is showing E7 after trying to run the slide out and the slide out moved, watch the seven segment display while the slide out is moving. If the display stays at 0.0, return the controller for replacement. If the display shows some current and the slide is able to move, then ignore this fault. If the slide out does not move, then confirm that there is voltage present between the two MTR connections when the button is pressed. If there is no voltage, return the controller for replacement. If there is voltage, confirm that there is not a break in the motor wires. If there is not a break, then the motor may need to be repaired.

If the seven segment display is showing E8 after pressing the switch, confirm that there is not a short between the motor wires. If a short is found, remove the short and attempt to move the slide out again. If the E8 error persists and the short is gone, return the

controller for replacement. If there is not a short or if the fault shows up without the switch being pressed, return the controller for replacement.

What to do if any of the LEDs are illuminated.

If either the “GRN: Switch Out” LED or the “YEL: Switch In” LEDs are illuminated, confirm that the switch is not being pressed. If it is not, then test to see if there is an open between the SWITCH and both the SW GND and GND wires. If this is the case, return the controller for replacement.

If the “RED: Lockout Signal” LED is illuminated, then confirm that the RV’s key is not in the ON position if the RV is gas powered. If the RV is diesel powered, make sure the parking brake is engaged. If neither of these resolves the issue, measure the voltage between the LOCKOUT SIGNAL and GND wires. If there is 12 volts between the two, then the lockout signal needs to be repaired. If there is no voltage, return the controller for replacement.

If either the “GRN: Motor Out” LED or the “YEL: Motor In” LEDs are illuminated, confirm that the switch is not being pressed. If it is not, then test to see if there is an open between the SWITCH and both the SW GND and GND wires. If this is the case, return the controller for replacement.

What to do if the slide does not move

If the slide out does not begin moving, have someone watch the APN-0159/APN-0161. If any errors are present, see above for diagnosing or repairing the fault. While the switch is pressed in the opposite direction, either the “GRN: Switch Out” and the “GRN: Motor Out” LEDs or the “YEL: Switch Out” and the “YEL: Motor Out” LEDs should illuminate. If the slide out begins moving in the incorrect direction, see the instructions below. If the slide out does not begin moving and no motoring current is present, but one of the motor LEDs is illuminated, check the wiring to the motor to confirm that there are no breaks in the wires. If the LEDs briefly illuminate before the seven segment display shows E8, check the motor wires for shorts. If the slide out does not begin moving, but some motoring current is present, then the motor LED should turn off after a few seconds. The switch should then be released for a second before being pressed in the original direction. The LEDs should illuminate and if the slide out still fails to move, the brake should be inspected for fault. If the motor and brake are OK, the controller should be returned for replacement.

If the slide out does not move, release the switch and check the controller. If the display shows an error, see above for how to recognize and fix the error. If the “RED: Lockout Signal” LED is illuminated, then confirm that the RV’s key is not in the On position if the RV is gas powered or that the parking brake is engaged if the RV is diesel powered. If

neither of these resolves the issue, measure the voltage between the LOCKOUT SIGNAL and GND wires. If there is 12 volts between the two, then the lockout signal needs to be repaired. If there is no voltage, return the controller for replacement. If none of this is present, press the switch and confirm that either the green or yellow switch LED illuminates. If the corresponding motor LED does not illuminate, then press the switch in the other direction.

What to do if the slide moves but in the wrong direction

If the slide out moves but does not move in the correct direction, release the switch, wait approximately 1 second, and then press the switch in the other direction.

If the slide out moves in the wrong direction (for instance, moving in when it should be moving out), then you will need to rotate the switch 180 degrees. To do this, remove the panel holding the switch, release the switch from the panel, rotate the switch, and return it to the panel. The panel should now properly show the in vs out directions

If the slide out continues to move in the same direction, release the switch. Disconnect the motor wires from the controller and watch the APN-0159/APN-0161 as the switch is pressed. When pressed in one direction, the “GRN: Switch Out” and the “GRN: Motor Out” LEDs should illuminate. When pressed in the other direction, the “YEL: Switch Out” and the “YEL: Motor Out” LEDs should illuminate. (The seven segment display may show the E7 after the switch is released, this is to be expected with the motor removed.) If pressing the switch in both directions causes the same combination of LEDs to appear, measure the resistance between the SWITCH and SW GND wires. You should measure an open when the switch is released, 500 ohms in one direction, and a short in the other. If this is not the case, inspect the switch wiring for shorts or other defects that could cause this issue. If the switch is OK or if the controller shows one green and one yellow LED, then send the controller in for replacement.

What to do if the slide out moves in the correct direction when pressed, allow it to run until it is fully extended or one of the following conditions occur.

If the slide out reaches the fully extended position but does not shut off, release the switch. Run the slide out in the opposite direction for a few seconds before running back towards the failed stop point while someone watches either the display of the APN-0159/APN-0161 or some other means of monitoring the motoring current. If the current fails to reach the CURRENT TRIPPING POINT, investigate the mechanics of the system to try to find what is slipping to prevent the controller from seeing the necessary amps. If the current reaches CURRENT TRIPPING POINT but the controller still fails to stop, return the controller for replacement.

If the slide out stops before reaching the fully extended position, release the switch and check the seven segment display of the APN-0159/APN-0161. If the display shows an error (eg, E8), see above for instructions on how to diagnose and resolve the error. If the display shows 0.0, run the slide out in the opposite direction for a few seconds before running back towards the premature stop point while someone watches either the display of the APN-0159/APN-0161 or some other means of measuring motoring current. If the current reaches CURRENT TRIPPING POINT amps, then inspect the mechanics of the system to find what is causing the current spike. If neither displays CURRENT TRIPPING POINT amps, but the system still stops in the same place, investigate the mechanics for the cause of a spike. If no cause is immediately noticeable, unplug the controller and plug it back in and press the switch. This will provide a brief spike of higher current that may be able to solve whatever is causing the jam. **WARNING:** this step would leave the mechanics unprotected from higher than rated torques. Use caution to prevent damaging the system. If the issue is still not resolved, then return the controller for replacement.

If the slide out reaches the fully extended position and stops, press the switch in the same direction to ensure that the controller does not try to extend any further. Then release the switch for a second before pressing the switch in the opposite direction and begin the instructions above to verify the operation in both directions.