



## **ES50CSA-65N**

# **TROUBLESHOOTING AND REPAIR MANUAL**

**ALL REPAIRS SHOULD BE PERFORMED BY A QUALIFIED ELECTRICIAN**

The ES50CSA-65N is a field repairable switch. Warranty covers defective parts only. Do not return the complete switch unless instructed to do so. The only tools needed are slotted and Phillips screwdrivers, flexible nut driver and an AC (Volt, Ohm) meter. These tools are available at most hardware stores. If technical support or repair parts are needed, please call your OEM or ESCO at (574) 264-4156. All warranty claims must be directed back to the OEM.

**ALWAYS BE SURE POWER IS OFF AND DISCONNECTED**

Disconnect the shore cord, turn breakers off at the generator and disconnect the inverter if installed. Remove the lid from the enclosure and check for AC voltage at all terminals to be sure that power is disconnected. Refer to the wiring diagram at the end of this manual for test points. Check connections to make sure all wires are secured and not broken off or burned. Lugs L2, L5, T2 and T5 are neutral (white wires). Be sure there is no debris inside enclosure.

### **I. GENERATOR CONTACTOR WILL NOT OPERATE**

- A.** With generator power off, check the coil with the voltmeter set to measure ohms. Refer to the wiring diagram at the end of this document. Place the test leads at S12 and C3. The meter should read between 75 and 80 ohms. If the meter reads 0 ohms or open circuit, the coil needs to be replaced. Go to Section VI for instructions on replacing the coil.
- B.** Check the pc board to see if it is securely fastened to the contactors. Loosen screws S11 and S12 on the contactor coils. Be sure the pc board's fork

terminals are securely positioned under each screw and that the female terminals are attached to the four tabs on the contactors. Tighten terminal screws S11 and S12 to 20 lb-in.

- C. Check interlock switch **I1** for proper operation. **I1** is located next to the Shore contactor. Be sure the leads are securely fastened to the switch. Using an ohmmeter, attach the test leads to positions C6 and C7. The meter should read 0 Ohms. Push down on the interlock bar at the output end of the contactor. The ohmmeter should now read open circuit. If either test fails, the interlock switch is bad.
- D. The generator power leads must be connected to L4 and L6 with neutral at L5. If not, you must connect the power leads. If working with a 120-volt two wire generator system, install a jumper from L6 to L4. The jumper must be same wire gage as the generator cable.
- E. **WARNING: HAZARDOUS VOLTAGES.** With generator power on, check voltage between L4 & L5 and L6 & L5 using an AC voltmeter. There will be a 20-30 second delay before the pc board will engage generator contactor. **NOTE:** The pc board has a 105 VAC cutoff on the generator side which automatically turns off the generator contactor and energizes the shore contactor (if the shore cord is plugged in). The voltmeter must read above 105 volts and below 145 volts. If not, check the generator outputs and review procedure I.A above. Turn the generator off.
- F. If all the above procedures have been completed and the switch still does not work, replace the pc board by tagging and removing wires from L1 through L6. Remove the red wire from location C6. Loosen screws S11 and S12 and gently pull the pc board away from contactors. Install a new pc board following procedure I-B above. Reconnect the red wire to location C6. Reinstall power leads to lugs L1 through L6 and tighten to 40 lb-in.

## II. SHORE CONTACTOR WILL NOT OPERATE

- A. With shore power disconnected, check the coil with the voltmeter set to measure ohms. Place the test leads at C2 and S11. The meter should read between 75 and 80 ohms. If the meter reads 0 ohms or open circuit, the coil needs to be replaced. Go to Section VI for instructions on replacing the coil.
- B. The shoreline power leads must be connected to L1 and L3 with neutral at L2. If not, you must connect power leads. If working with a 120-volt two wire system, install a jumper from L1 to L3. The jumper must be same wire gage as the shoreline cable.
- C. Check interlock switch **I2** for proper operation. **I2** is located next to the Generator contactor. Be sure the leads are securely fastened to the switch. Using an ohmmeter, attach the test leads to positions C4 and C5. The meter should read 0 Ohms. Push down on the interlock bar at the output end of the contactor. The ohmmeter should now read open circuit. If either test fails, the interlock switch is bad.

- D. Is the PC board securely fastened to contactors? See procedure I-B.
- E. Check all control wires to be sure they are securely fastened in their proper locations. See the wiring diagram at the end of this document.
- F. **WARNING: HAZARDOUS VOLTAGES** . With shore power on, check the voltage between L1 & L2, and L3 & L2 with AC voltmeter. The voltmeter must read above 90 volts and below 145 volts. If not, check power source and disconnect power until the input voltage problem is solved.
- G. If all the above procedures have been completed and the switch still does not work, replace the pc board by tagging and removing wires from L1 through L6. Remove the red wire from location C6. Loosen screws S11 through S12 and gently pull the pc board away from contactors. Install a new pc board following procedure I-B above. Reconnect the red wire to location C6. Reinstall power leads to lugs L1 through L6 and tighten to 40 lb-in.

### III. CONTACTORS HUM OR CHATTER WHEN IN OPERATION

- A. Humming is an inherent problem with AC coils in all transfer switches. This may be caused by dust or moisture in the contactors or auxiliary switches. **Make sure the shore power cord is disconnected and the generator is off.** Using an air hose with a rag over end of hose to prevent moisture being blown into contactors, blow out the contactors and enclosure. Make sure you blow underneath the contactors and both auxiliary switches.
- B. Input voltages below 90 VAC on shore contactor could cause the contactor to hum and cause the coil to burn out. Check the voltage between L1 &, L2, and L3 & L2 as in procedure II-F above.

### IV. REMOVING AND INSTALLING CONTACTORS

**Make sure the shore power cord is disconnected and the generator is off.**

Refer to the wiring diagram to complete this procedure. Label and remove the wires from L1 through L6 and T1 through T6.

- A. In order to get to the contactor mounting screws, the pc board must be removed. . Remove the red wire from location C6. Loosen the pc board by loosening screws S11 and S12. Carefully pull the pc board straight back away from the four contactor tabs and set it aside.
- B. Loosen, but do not remove, screws S1, S2, S3, and S4 on the contactor mounting plate. Slide the assembly so the screw heads on the coil side of the contactors go through the holes in the contactor base. Lift the contactor assembly out of the enclosure.
- C. To re-install the contactors, slide the output side of the contactor assembly over the two screws at S3 and S4 on the mounting plate. The screw heads at S1 and S2 will fit through the holes in the contactor base. Tighten all four mounting screws.

Slide the forked tabs of the pc board onto the screws S11 and S12. Tighten them securely. Push the four female disconnects of the pc board onto the four tabs on the contactor. Re-connect the red wire to location C6.

Re-install the marked wire leads to positions L1 to L6 and T1 to T6. Make sure the white neutral wires are attached to L2, L5, T2, and T5. Check that all connections are securely fastened.

## V. EXPOSING THE CONTACTS

**Make sure the shore power cord is disconnected and the generator is off.**  
**NEVER OPERATE THE CONTACTORS WITH THE CONTACTS EXPOSED.**

Refer to the wiring diagram to complete this procedure.

- A. On the Shore contactor, remove screws S13 and S14 to lift the top cover off. On the Generator contactor, remove screws S15 and S16.

## VI. CHANGING THE CONTACTOR COIL

**Make sure the shore power cord is disconnected and the generator is off.**  
Refer to the wiring diagram to complete this procedure.

- A. Remove the contactor assembly as detailed in procedures IV-A and IV-B above.
- B. If you are working on the Shore contactor, remove the orange wire from location C1 and the brown wire from location C2.
- C. If working on the Generator contactor, remove the blue wire from location C3.
- D. Turn contactor assembly upside down. Locate and remove the four small Phillips head screws recessed into the contactor base. Holding the base with one hand, slide the contact enclosure off the base away from the mechanical interlock with other hand. Remove the mechanical interlock rod so the coil can be lifted out of the base.

Place the new coil in the base. Replace and tighten the interlock rod. Slide the contactor back on the base making sure the interlock rod lines up with pilot hole in the contact enclosure. Replace the four recessed screws and secure the contact enclosure to the base. Re-connect the orange, brown or blue wires removed in procedure VI-B or VI-C. Install the contactor assembly according to procedure IV-C above.

## **COMMON REASONS FOR FAILURE\*:**

### **(1) LOW VOLTAGE ON SHORE CORD -**

**Reasons:** Bad connection at park box, extension cord too long, defective adapters, operating too much load for power available.

**Potential Damage:** burned out coils and pitted contacts.

## (2) DIRTY POWER AND SPIKES -

**Reasons:** Storms (lightening), unbalance load at park, utility service at park is undersized or located next to an industrial environment.

**Potential Damage:** burned out coils, pc board damage, pitted contacts.

## (3) DEBRIS IN ENCLOSURE -

**Reasons:** Metal shavings, knock outs, saw dust caused by poor production control, moisture or dirt inside enclosure, transfer switch not installed in an airtight compartment.

**Potential Damage:** Chattering relays, burned out coils, damage to pc board. Metal particles could cause a fire.

## (4) GENERATOR OVERRUNS -

**Reasons:** Generator needs to be serviced, manual override of governor or throttle control, generator is undersized or is not properly installed.

**Potential Damage:** burned out coils, pc board damage, pitted contacts.

\*All of the above reasons can create damage in the R.V.

## REPLACEMENT PARTS

| PART NO       | DESCRIPTION                          | QUANTITY |
|---------------|--------------------------------------|----------|
| SPC8X8X4 1/2  | Metal Box 8x8x4                      | 1        |
| CR355ADY5A    | 50A two speed contactor              | 1        |
| B104-501      | PCB assembly 50A board               | 1        |
| ES50-COVER    | ES-50 cover label                    | 1        |
| ES50-65N-INST | Installation label for ES50 switch   | 1        |
| ES101-8BK7-1R | 50A 8ga black power wire with 1 ring | 2        |
| ES101-6WH7-2R | 6ga 65A white neutral with 2 rings   | 1        |
| QN2-6         | 6 hole ground bar                    | 1        |
| ES30-TORQUE   | Torque label                         | 1        |
| ES50-102BL    | 16ga blue wire for 50A switch        | 1        |
| ES50-102OR    | 16ga orange wire for 50A switch      | 1        |
| ES50-102BR    | 16ga brown wire for 50A switch       | 1        |
| CH1024-12     | 10x24x3/4" cinch stud                | 2        |
| 10-EXT-LW     | #10 external lock washer             | 2        |
| 90480A011     | 10-24 zinc hex nut                   | 2        |
| AD64BS        | Aluminum rivet, steel mandrel        | 3        |

# ES50CSA-65N Wiring Diagram

