



ES50-VOLT

ES50-VOLT-SURGE

TROUBLESHOOTING AND REPAIR

MANUAL

ALL REPAIRS SHOULD BE PERFORMED BY A QUALIFIED ELECTRICIAN

The ES50-VOLT and ES50-VOLT-SURGE are field repairable switches. 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 65 and 90 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 six 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 Shore contactor. The ohmmeter should now read open circuit. If either test fails, the interlock switch is bad. Contact ESCO for a replacement.
- 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 25-35 second delay before the pc board will engage Generator contactor. The voltmeter must read above 105 volts and below 140 volts. If not, check the Generator outputs and review procedure I.A above. **NOTE:** If the input voltage range is not 105 VAC to 140 VAC, the pc board will automatically turn off the Generator contactor and energize the Shore contactor (if the Shore cord is plugged in). After completing this test, 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. Remove the orange wire from location C5. 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 and the orange wire to location C5. 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 65 and 90 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 Generator contactor. The ohmmeter should now read open circuit. If either test fails, the interlock switch is bad. Contact ESCO for a replacement.
- 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. There will be a 25-35 second delay before the pc board will engage Shore contactor. The voltmeter must read above 105 volts and below 140 volts. If not, check the power source and disconnect power until the input voltage problem is solved. **NOTE:** If the input voltage range is not 105 VAC to 140 VAC, the pc board will automatically turn off the Shore contactor. The Shore contactor will remain off until the proper voltage level is established. After completing this test, remove the Shore power.
- 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 and the orange wire from location C5. 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 and the orange wire to location C5. Reinstall power leads to lugs L1 through L6 and tighten to 40 lb-in.

III. CONTACTORS HUM OR CHATTER WHEN IN OPERATION

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 get underneath the contactors and both auxiliary switches.

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 and the orange wire from location C5. Loosen the pc board by loosening screws S11 and S12. Carefully pull the pc board straight back away from the six contactor tabs and set it aside.

- B. Loosen, but do not remove, the contactor base plate mounting screws at locations S1, S2, S3, and S4. **NOTE:** The white 6 AWG wire located below T2 and T5 may have to be loosened or removed to gain access to S3 and S4. 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 six female disconnects of the pc board onto the six tabs on the contactor. Re-connect the red wire to location C6 and the orange wire to location C5.

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.
- B. Check to make sure there is no debris in the contact area. Push down and release the contact bar several times to make sure it moves freely.
- C. Reinstall the covers and secure them with the screws.

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 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 brown or blue wires removed in procedure VI-B or VI-C. Install the contactor assembly according to procedure IV-C above.

VII. OPTIONAL SURGE PROTECTION

Refer to the ES50-VOLT-SURGE Wiring Diagram to complete this procedure.

- A. The two black leads from the surge suppressor are connected to T4 and T6. The white wire is connected to T5. The green wire is connected to the ground bar. The orange, yellow and blue wires are not used and will be taped off.
- B. In normal operation, when either the Shore or Generator side of the transfer switch is energized, the two green LEDs on the surge suppressor should be on.
- C. Failure may occur due to excessive power line voltage transients (spikes), direct lightning strike or loss of power. If any of these events have occurred, the surge suppressor will give both visual and audible indication of the failure when the transfer switch is energized. One or both of the green LEDs will be off, the red LED will flash and an audible tone will be activated. If any of the above indications are observed, the surge suppressor must be replaced.

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.

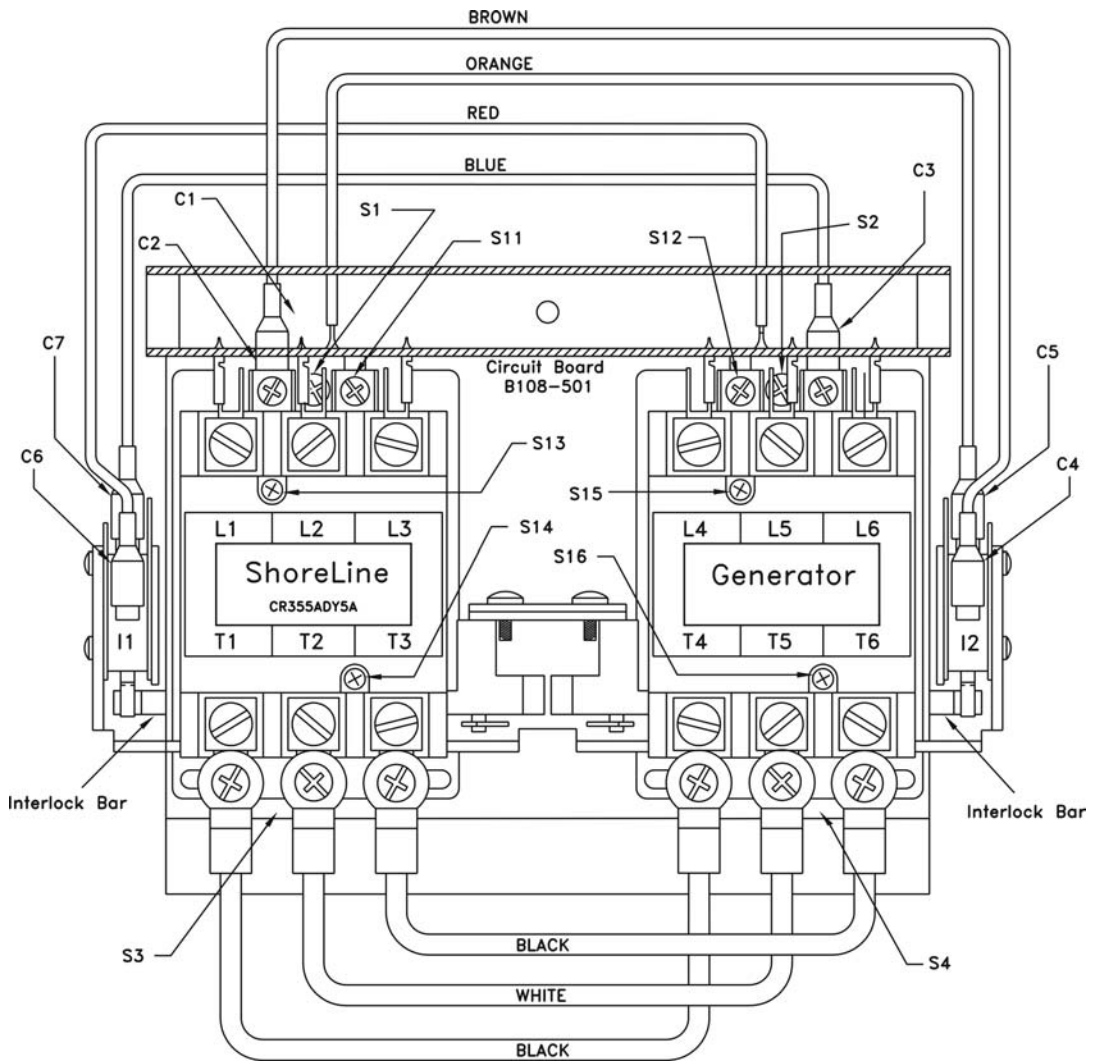
REPLACEMENT PARTS

PART NO	DESCRIPTION	QUANTITY
SPC8X8X4 1/2	Metal Box 8x8x4	1
CR355ADY5A	50A two speed contactor	1
B108-501	PCB assembly 50A board	1
ES50VOLT-COVER	ES-50-VOLT cover label	1
ES50-65N-INST	Installation label for ES50 switch	1
ES101-8BK7-2R	50A 8ga black power wire with 2 rings	2
ES101-6WH7-2R	6ga 65A white neutral with 2 rings	1
QN2-8	8 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

REPLACEMENT PARTS for ES50-VOLT-SURGE ONLY

WA132	Reducer washer 1x3/4 8122	2
LN102	802 3/4 locknut	1
32120-1	Surge suppressor	1

ES50-VOLT Wiring Diagram



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