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Electrical Safety



The Publisher’s Statements on [page i](#) of this Owner’s Manual apply to this chapter. Please read before proceeding.

Safety issues relating to the electrical system, and troubleshooting of electrical problems are covered in this chapter. Also a special section on the bilge pumps since their effective use depends on the electrical system.

Major Topics:

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AC Isolators

The information given here is to help you understand and troubleshoot possible problems with the 240 VAC. Only qualified technicians should work on the system.

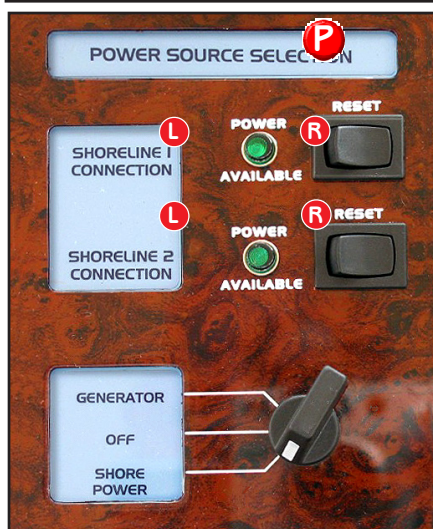
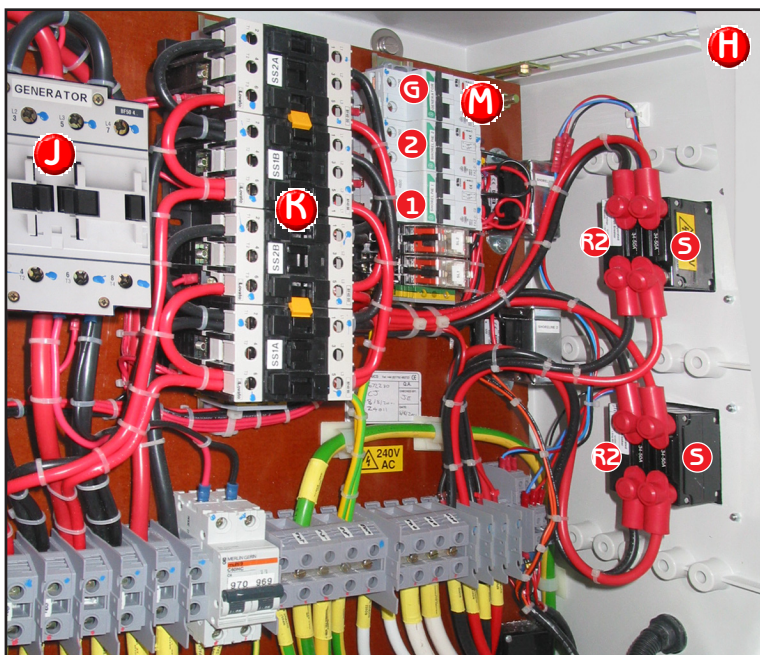
120/240 volt output from the isolation transformer goes directly through 4 heavy cables (red, black, & green) to the AC distribution cabinet **H** in the lazarette. Here, power goes to switching isolators (or contactors), **K**.

The four double-pole isolator boxes **K** (marked SS1A, SS2B, SS1B, SS2A), accommodate two shore power inputs and the facility of being able to use SHORE POWER 1 only if two plugs are unavailable at the marina. Isolators are interlinked to enable limited services to be run off one shore supply, depending on circuit loading amperage.

The big high power isolators respond to small low power switches on the AC panel, labeled POWER SOURCE SELECTION (photo **P**). Moving the small switches opens or closes isolators to power or depower the circuits. For example, if the generator is selected isolator **J** is energized and the contacts close. The switches are so wired that GENERATOR and SHORE POWER cannot both be selected at the same time.

There must be no load when changing power mode or connecting and disconnecting. Switching under load inevitably causes arcing in the isolators, which inevitably causes them to fail. If you select power and nothing happens, this may be why.

The three double-pole breakers **M** (0.5A - 2 A) are for energizing the coils of the isolators. In photo **H** they are marked **1** & **2** for SHORE 1 & 2 and **G** for the generator isolator. If an isolator fails to open or close it may be because these breakers have tripped. There is no way to manually open or close these isolators (as you can with the DC isolators). Another important function of these breakers **M** is to disable the AC circuits for the safety of technicians working on the system. With breakers **M** off, neither AC nor the generator can be selected.



AC isolators & AC disable breakers

*If you select power and nothing happens, and lights **L** are off, breakers may be tripped, the*

isolators stuck, or both. The symptom is a typical result of frequent switching under load.

Reset switches **R** on the AC POWER SOURCE SELECTION panel are for shoreline breakers 1 and 2 (photo **S**). For example, if the shoreline 2 breaker **S** has tripped it can be remotely be reset by switch **R**. To reset push switch **R** and HOLD for 2-3 seconds. This activates a solenoid **R2** to reset shoreline 2 breaker which, in turn, activates isolator **K** to allow AC to feed the 240VAC system.



Danger !
High AC voltage and amperage.
Switch off shore & generator power before working here.

If any breaker trips often the circuit is overloaded. Take steps to reduce load . The ammeter shows the load of an individual circuit if all other breakers are off.

If work is being done on the AC system ensure that reset is not used to activate the system.

Troubleshooting 240 VAC

At dock, no shore power 1 , 2, or both

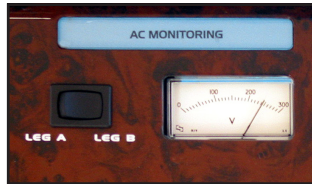
There are two 50 amp shore power inputs. Shore 1 supplies power to all AC services. Shore 2 (through a split busbar) serves ONLY the 240 volt air conditioning system.

If dock voltage is low (down to 210 VAC with no load) and shore #2 is available, there should be enough reserve amperage in the supply to not trigger a shut down. Note:- Low voltage causes amperage draw to increase, thus high loads from air conditioning and/or the cooktop can cause the main breaker to trip.

If operating on Shore #1 alone select two A/C compressors only, then you will have useable power remaining and available for other services.

Check that power selector switch **P** is set for **SHORE POWER**.

Check the AC voltmeter. It *should* read 240 volts, but dock voltage varies between 210 and 250 AC. The optional IsoBoost 50 transformers **A** correct low voltage, but only within limits.



If there is no voltage at all, the shore POWER AVAILABLE panel lights **E** & **F** will be off – normally both green lights would be on. If they are not a likely cause is the input breaker inside the AC distribution cabinet has tripped. This can be remotely reset from the helm (see previous page).

Check shore inputs and transformer output breakers **C** and **D**. These could have tripped, or been switched off.

Check BOTH shore plugs. Are they into each the socket securely? This is a likely cause. If the cable is only just long enough to reach the shore plug, it can have intermittent contact. This would likely be on one plug only, and only shore power 1 or 2 would be working.

Some marinas have a circuit breaker for the shore 50 A supply, check that as well.

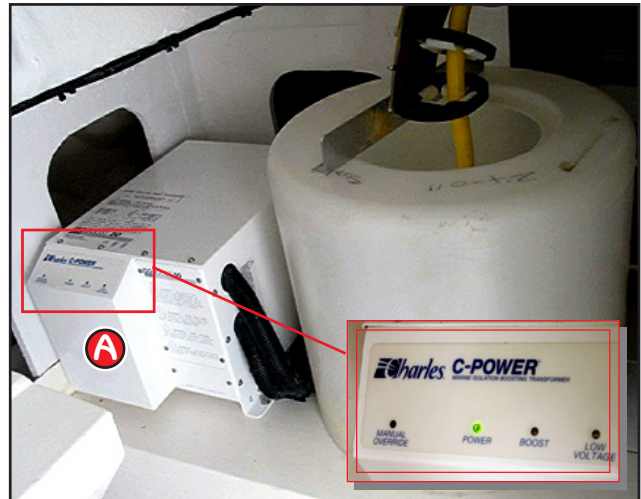


Do NOT make changes to the electrical system, it is designed as an integrated system, and protected with breakers to ABYC standards. Any work must be done by qualified Marine Electricians.



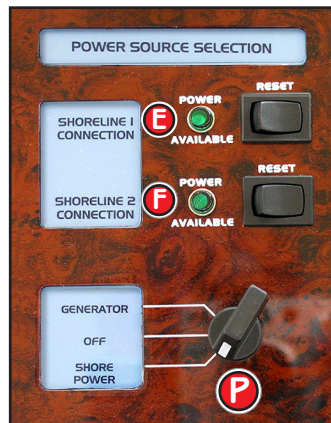
Shore power / transformer breakers

Each IsoBoost transformer has a pair of input/output breaker switches. Check they are on if you have no power.



Isolation transformers

Check that the **POWER** light is on – on BOTH transformers. If so, you have shore power on both inputs. If shore voltage is low the red low voltage indicator light will be on.



Power source selection, **P**

Do NOT change power source before switching off ALL AC breakers.

Reset switch held down for 2-3 seconds will reset shore input isolators if in the open position. See previous page for full details.



Shore plugs

Check that shore plugs are securely connected if the green transformer **POWER** light is not lit.

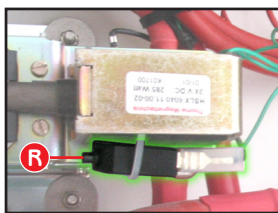
Troubleshooting 24 VDC

If you have a problem with the 24 VDC supply...

There are two individual systems: Engine Start and House. The Start battery supplies power to the engine and controls, snubbing winches, bow thruster, windlass, and engine room blowers. A "big ship" approach is used whereby small circuit breakers/switches on the helm panel energize large high amp remote isolators in the DC distribution box in the lazarette. These isolators are solenoid actuated caged switches.

When you switch on **K** for the Start batteries, isolator **B** is activated, allowing power from the Start battery to the services mentioned. Similarly, switch **L** activates isolator **C** for House (Aux.) services. Isolator **A**, activated by switch **W**, is for the windlass only. If any of these trips it can be reset (after correcting the cause and eliminating load) by pressing the panel switch to ON for a few seconds. Isolators **A**, **B**, **C** also have a small attached manual reset button **R**.

Fuses and breakers inside the DC distribution cabinet in the lazarette are numbered for identification (refer to map posted inside).



Regularly check battery connections and posts for corrosion, particularly the negative posts. Switch off **K** and **L** first.

Check Start battery voltage twice: – With battery charger ON voltage should be 26.8 if the charger has been on for some time, or 28.4 if it's in charge mode. Check this first if there's a DC problem. Then switch the charger OFF; put on some load (e.g., engine room blowers); then check battery voltage again. It should be no less than 25.2 if fully charged. With engines running voltage should be about 28.4 volts on both engines. This is the voltage at the BATTERY, as reduced by the X-split device. Check charging amperage on the ammeter.

Check House (Aux) battery the same way: – Switch on **L**, this activates isolator **C**. The battery charger is common to both Engine Start and House Batteries, so the test procedure is the same.

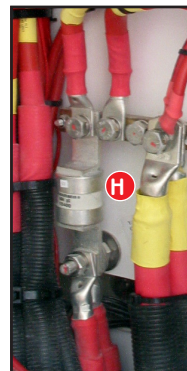
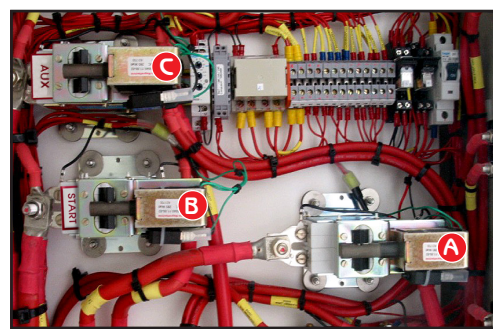
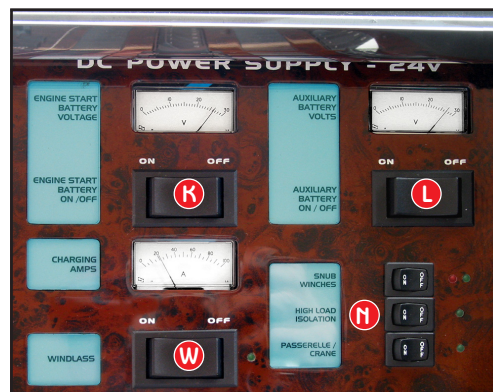
Windlass isolator / breaker

Isolator **A** is also a 120 amp circuit breaker. It serves the windlass ONLY. The isolator is energized by panel switch/breaker **W**, WINDLASS. When thus enabled the windlass will respond, up or down, to the anchor rocker switch on either Salon or bridge helm console. Mechanical safety lock **G** must be pushed and **held down** when lowering or raising the anchor.



If the anchor snags on the bottom attempts to bring it up may trip breaker/isolator **A**. The green LED will be dark and the anchor chain locked in the down position. Perhaps the vessel can be moved around to free the snag. Sometimes the bow thruster will move the bow enough to free it. Once it is free, switch OFF **W**, pause, then switch on again. This will reset isolator **A** and the anchor can be raised.

Never leave the windlass enabled UNLESS you are about to use it (this is the safe practice rule for all heavy equipment on the vessel).



Windlass isolator/breaker

Isolator/breaker **A** supplies power to, and protects the windlass. Fuse **H** is 400 amp.



DC isolators

These panel switches/breakers remotely energize the appropriate isolator. HIGH LOAD ISOLATION is primarily for the bowthruster. Glowing lights indicate an energized circuit. If breakers trip, reset by holding button in the ON position for several seconds. But tripping indicates overload – do not repeat the action that caused it.