

Electric Fuel Pumps (The Patty Wagon Way)

Or --- Why are my engines so hard to start after sitting for a week or so??

Your engines are hard to start because the carburetor fuel bowls are dry. Where did the fuel go?? It evaporated, either into the atmosphere, or into the engine's intake manifold. Either way, you have no fuel in the carburetor bowl and it isn't going to start until the engine's mechanical pump refills the carburetor bowl after considerable cranking. IMHO, there's only one cure – electric fuel pumps with a special circuit that allows you to run the pumps for approximately 10 - 15 seconds prior to attempting to start the engine. This pre-run refills the carburetor bowls. Now, after you pump the throttles about 6-8 times and hit the key – Blooey! They start immediately.

OK, let's install electric fuel pumps. Because electric pumps like to push rather than pull, it's preferable to mount the pumps aft by the tanks if possible, downstream from a primary filter . Your next choice is to run the electrics through the existing mechanical pumps (a series arrangement) or bypass the mechanicals and use the electrics exclusively. Most members today are bypassing the mechanical pumps and relying solely on the electrics.

Attached to this missive are two hand drawn circuit diagrams. Pump Schematic #1 is my preferred way of doing this. Following is this circuit's description for twin engine boats (use just half the schematic for single engine boats):

In addition to the pumps, Pump Schematic #1 requires 2 relays, 2 oil pressure switches, a couple of 10 amp fuses, and 1 special toggle switch. The circuit oil pressure switch prevents the fuel pump from running unless the engine oil pressure is above 7 psi or so. This stops the pump from running after an engine quits or stalls for any reason. It is an important requirement for marine electric fuel pumps. The relay provides a solid 12v supply to the pump without drawing its current from the ignition primary circuit. While not completely necessary, the relays are highly recommended to insure full voltage to the ignition coils. The DPDT, NO momentary contact, spring return toggle switch allows running the pump to fill the fuel bowls prior to attempting an engine start. This special "priming circuit" also has another nice feature. In the event of a relay or oil pressure switch failure, you could limp home by holding the prime switch in the on position for the affected engine. Its spring loaded and wants to return to the off position, but a tired finger beats a tow rope or long single engine trip for a twin engine boat.

The more electrically inclined might wonder why the "S" (start) terminal on the oil pressure switch is not used. Here's why – I'm paranoid about system failures and possible consequences, even if the chances are remote. If you were to connect the switch "S" terminal to the "S" terminal on the back of the ignition switch, the pump would now also run during the short period the engine starter is engaged ---

but you really don't need the pumps to run at this point. We have already filled the fuel bowls and are going to pump the throttles enough times so that the engine has adequate fuel for starting already in the intake manifold. My paranoid fear is that in the very, very remote chance the oil pressure switch would incur an internal failure and the "S" terminal became energized while the engine was running, it would try to engage the starter on a running engine. This would most likely destroy the starter gear and possibly the flywheel teeth would also be chewed up. To fix the latter would possibly require removing the engine . The chances of this happening are very remote, but my name is on this circuit design, and if 50 members ultimately use it and somehow #50 incurred the switch failure and subsequent damage, I would feel like crap if I hadn't warned you and explained why you don't need that pump run during start feature.

The wire colors shown on Pump Schematic #1 are for the sockets that came with some relays I bought on eBay. These were the only sockets I could find to fit the Carquest relays I bought at Advance Auto Parts. Without these sockets, you could use ¼ inch female spade connectors to wire the relays, but you would have to cobble up some method of mounting the relays. Go to eBay and search for “[Micro Relay & Socket - 4 Pin - 'Normally Open' - 20A / 30A \(Pack of 2pcs\)](#)”

As to where to mount the relays, I would mount them in the panel where you can access your boats 12V wiring. It's easy to pick up a good relay power source in here, as well as the ignition (or I) terminal lead from the ignition switch. You can also mount in the engine room as both the eBay relays and Carquest relays are sealed. The Carquest relay is completely silent which indicates it is solid state. The eBay relay clicks like a mechanical relay, but it also is sealed, so either one will work. I would buy and use the Carquest relays, and also buy a 2 pack of the eBay relays, use the sockets for mounting and stock the 2 eBay relays as spares.

Pump Schematic #2 is a variation of #1. It does not use relays, but picks up the run power for the fuel pumps from the ignition switch. Not my favorite way of doing it, but if you're not comfy with wiring relays, you can do it this way. This circuit uses diodes for the simple reason when priming the carburetor bowls using the toggle switch before attempting to start, the ignition circuit and low oil pressure alarm (if you have engine alarms) will be energized. If you don't have engine alarms you can eliminate the diodes. The coil, however, will still be energized when using the toggle switch to fill the carburetor bowls. Your choice. I would mount & wire the toggle switch so that pushing the toggle to the left runs the port pump and vice versa.

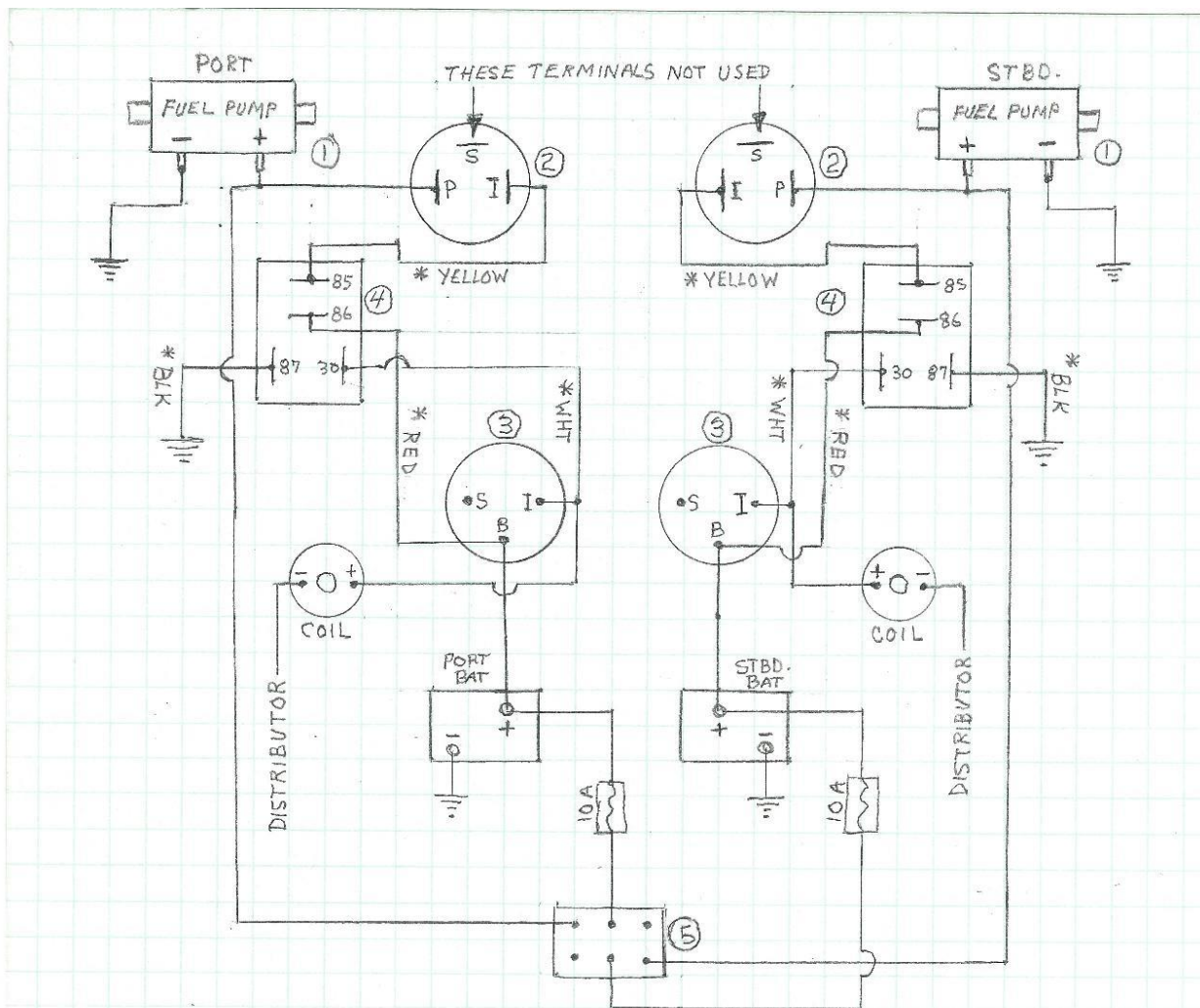
Here's another thing you don't need with either setup – carburetor chokes. The original heat operated chokes never did work worth a damn anyway. If set tight enough to really choke a cold engine, they stay on way too long. One cure is to convert to electric chokes, but we really don't start these boats in real cold weather anyway. Here's what I did on our 38 Commander to start cold engines. Almost immediately I had installed electric fuel pumps. Next I loosened the choke covers and rotated them CCW (I think) until the choke valves were wide open, then I rotated a bit more so they were really locked in the full open position. Now, for starting cold engines, I would run each pump for about 10 - 15 seconds. Next I would pump the throttles 8 – 10 times to about half throttle. Next, pull the throttles all the way back to idle, then crack them just a bit, about as much as would normally be required for 900 rpm or so. Next, hit the key. Blooey ! They'll start every time. Now pull the throttles back to a fast idle and let the engines warm up for a few minutes before departing. Once in a great while an engine would start, run for a few seconds and quit. Just repeat the procedure a second time and this time they always stayed running. This worked great for 22 years, and is still working for the new owner today. Trust me, you're not going to flood a cold engine by pumping the throttles that much as long as you don't have a closed choke valve also pulling a whole batch of extra fuel into the engine. Well, that's it – I hate excessive cranking of a cold engine that's been sitting a while, plus I hate chokes on a boat. I want to know just how much fuel my engine is getting during start. That's the Patty Wagon way. Use at your own peril

Dick Morland

Soon to be Past Chief Commander!!



Schematic 1



① ELECTRIC FUEL PUMP - TYPICAL, HOLLEY RED LINE MARINE FUEL PUMP 712-801-1
AMAZON, SUMMIT RACING, MOST AUTO PARTS CHAINS.

② OIL PRESSURE SWITCH, SIERRA # OP72533 (1/4 NPT) AMAZON, WEST MARINE
OR -- CARTER # A68301 (1/8 NPT) SUMMIT RACING

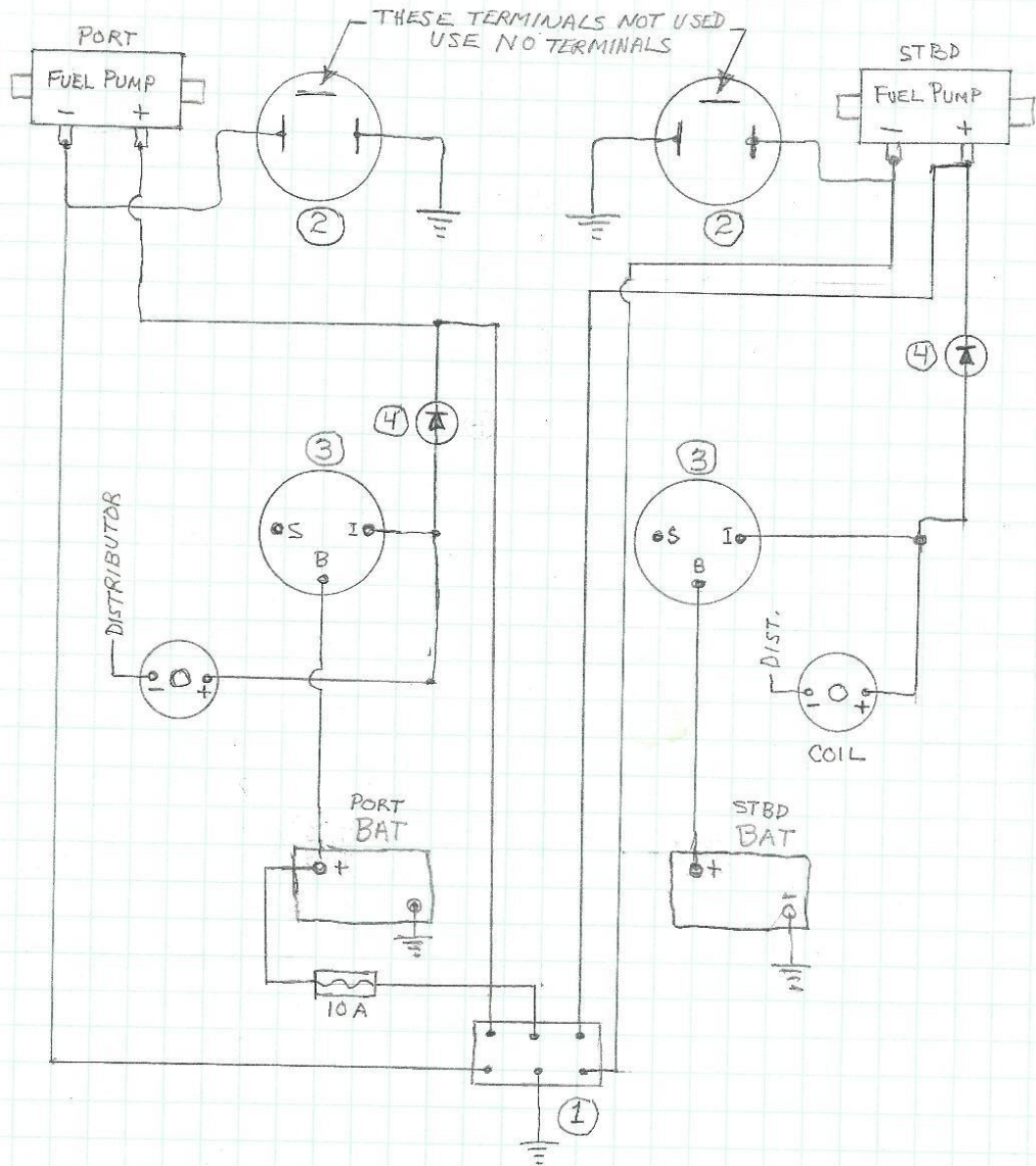
③ EXISTING BOAT IGNITION SWITCH. CC FUSES FOR IGNITION CIRCUIT NOT SHOWN.

④ RELAY, 12V SPST NO. CARQUEST R3154, ADVANCE AUTO PARTS

⑤ MORRIS PRODUCTS DPDT MOMENTARY TOGGLE SWITCH, NO, PN# 70300, AMAZON

* SEE SYSTEM EXPLANATION FOOTNOTE FOR WIRE COLOR REASON.

Schematic 2



- ① MORRIS DPDT MOMENTARY SWITCH, CAT.# 70300 (AMAZON)
- ② SIERRA OIL PRESSURE SWITCH, #OP72533, WEST MARINE OR JET, COM
- ③ BOAT'S EXISTING IGNITION SWITCH
- ④ SCHOTTKY DIODE, PN MBR1045-E3/45, AMAZON