Moyer Marine inc.

Suggestions for rewiring the ATOMIC 4 DC system

PARTS

GENERAL: The general distribution of engine DC power within the boat (external to the engine) is shown in the schematic included in this kit. The large battery connection on the starter solenoid functions as the "Battery Bus" from which all circuits within the engine DC power distribution originate. To insure the most reliable engine performance, we strongly recommend that no other circuits be integrated into the DC system servicing the engine. To do so, complicates troubleshooting and sets up the risk of some electrical apparatus malfunctioning and causing a problem within the engine.

If it is absolutely necessary to extend one of the circuits within the schematic, it's very important to continue the original wire color until the end of a circuit is reached, even if the circuit branches out to several different items. In this way, the color of a wire will always indicate from where the power within a particular circuit originated. Example: We continued the use of purple in our schematic for the ignition circuit, to the positive terminals of the gauges, even though the gauges are not really a part of the ignition system.

In designing the kit, and preparing these instructions, we relied heavily on **ABYC standards**, West Marine technical services, and a text by Nigel Calder: "Boat Owners Mechanical and Electrical Manual".

TYPICAL LAYOUT: The physical layout of the DC power distribution most often used by commercial boat builders is to gather all of the power and sensing leads originating at the engine into a harness. The harness then runs to the cockpit, where the wires again branch out and connect to the instruments and the ignition switch on the control panel. It's critically important that individual wires at each end of this harness be secured with wire ties, and otherwise protected until they are safely within the main harness. We include 10 feet of black split loom conduit in the kit for this purpose.

NOTE: We encourage you to visit our Atomic 4 Community Forum and check out each of our monthly "Pin-up" contest winners for great examples of tasteful and safe handling of electrical circuits.

We strongly recommend that household flexible water tight vinyl or PVC electrical conduit (available at most local home building supply stores) be installed to protect wires between the engine and the instrument panel, particularly if the wires are run under the cabin sole or through the bilge. If a tachometer is installed, there will be a total of 8 wires in the main bundle, which will require a 1" conduit.

The easiest approach to installing the main harness is to cut the water tight conduit to whatever length you need, and then to pull the wires through the conduit (leaving ample length of wire at each end of the conduit) before pulling the conduit through the boat between the cockpit and engine compartment. Each of the wires can then be connect to the appropriate terminals as per the enclosed diagram.

FUSING: Our kit includes one large and two smaller fuse holders. The large fuse holder (with a 40 amp fuse) is intended to protect the main power leg from the main battery terminal on the starter solenoid, to the cockpit; and one of the smaller fuse holders (with a 20 amp fuse) is intended to protect the primary ignition circuit leading back to the engine. This 20 amp fuse should be installed as close to the cockpit as possible, and the 40 amp fuse holder is partially pre-wired to be installed directly onto the large battery terminal on the starter solenoid.

The second small fuse holder is provided in the event that there is an electric fuel pump installed, without fuse protection. In this case, the second small fuse holder (with a 5 amp fuse) should be installed between the positive terminal of the coil and one side of the oil pressure safety switch.

This fuse protection is to be considered as minimum essential protection. There are a few other fusing issues that you may wish to consider, depending on your particular operating situation:

1) Main battery cables: ABYC standards do not require a large fuse to protect the main battery cables running to the starter itself, as long as a cut off switch is installed to disconnect the batteries when not in use. However, Nigel Calder and the people at West Marine do recommend fuse protection within the main positive battery cable, pointing to the devastating consequences resulting from a direct short (e.g., if a wrench were to fall on the main battery terminal of the starter solenoid). If you wish to pursue such protection, we believe that a 200 amp fuse would be a good choice to provide for starter operation, and to protect the circuit.

2) Charging circuit from alternator: ABYC recommends a fuse in the alternator circuit if it's unprotected by a conduit, or if it's more than 40" in length. Today, it's more and more common to use a voltmeter in the cockpit rather than an ammeter to monitor alternator performance (shown as optional/preferred in our drawing). In these cases, the charging circuit is connected directly to the big battery cable terminal on the starter solenoid which is only 8" or 9" inches from the alternator and a fuse is not required. Therefore, to save costs, we have not included fuse protection for the alternator circuit in our kits.

3) Fusing for standard 35 amp alternators: If you wish to install fuse protection for a standard 35 amp Motorola alternator, and the charging circuit exceeds 40 inches, we suggest at least a 40 amp fuse.

4) Fusing for high output alternators: If you plan to install a high out put alternator, it's especially convenient to connect the output directly to the large battery cable on the starter solenoid, which avoids the need for fusing, as well as long runs of very heavy gauge wire. If you do chose to run the output of a high output alternator to and from your cockpit, you will have to select fusing appropriate to the rating of the alternator, and you may also have to provide heavier gauge wire within the charging circuit. Standard 8 gauge orange wire (as provided in our kit) is adequate for up to 80 amps.

GROUNDING:

Black 8 gauge wire is provided to run a ground connection from one of the starter mounting bolts directly to the chassis of the instrument panel. It's best to connect this wire to the same starter mounting bolt to which the black battery cable is connected.

OTHER RELATED ISSUES:

1) Voltmeter: When a voltmeter is used to monitor alternator performance, the ammeter is usually eliminated so that it is not necessary to run the heavy gauge charging circuit all the way to the cockpit.

2) Separate starter button: The enclosed schematic assumes that a key type ignition switch is installed with a spring loaded starter switch (similar to those used in automobiles). If a push-button starter switch is used, a purple 12 gauge wire is run from the "Ign" terminal of the ignition switch to one side of the starter switch. A yellow wire with red stripe extends from the other side of the starter switch to the "S" terminal of the starter solenoid.

3) Soldering: While many people prefer soldered joints, soldering remains a rather controversial subject among our expert sources. ABYC regulations require that all joints have a mechanical means of connection other than solder, and the Nigel Calder text summarizes as follows: "The consensus among professionals is that a properly made crimp, done with the proper tools, is frequently a more reliable termination than soldering".

4) Electrical fuel pump: While the electrical fuel pump is not technically a part of the external DC power distribution, we offer the following suggestions in case it's necessary to "clean up" a shoddy electrical fuel pump installation. Primary power for an electric pump originates from the positive terminal of the coil, and is connected to one side of the oil pressure safety switch.

Use of a purple color will show that power to the pump has originated from the primary ignition circuit. This power lead should be protected by a fuse with a maximum rating of 5 amps. The fuel pump connects to the other side of the oil safety switch. It doesn't matter which side of the oil safety switch the two leads are connected.

The purpose of an oil pressure safety switch is to deactivate the fuel pump any time that the engine is not actually running (and producing oil pressure). These switches are a Coast Guard requirement to protect against the possibility of someone accidentally letting the ignition switch in the "On" position, which (without an oil pressure safety switch) would allow the fuel pump to pressurize the fuel system while the boat is left unattended.

On late model engines with Delco starters, there is an "R" terminal on the rear face of the starter solenoid which functions as an auxiliary contact; meaning that it is energized only during the time the starter is engaged to start the engine. By running a lead from the "R" terminal to the same terminal on the oil safety switch to which the pump connects, it's possible to supply power directly to the fuel pump while the engine is being started; otherwise, power to the pump will be provided in a second (or two) as oil pressure raises past 10 psi.

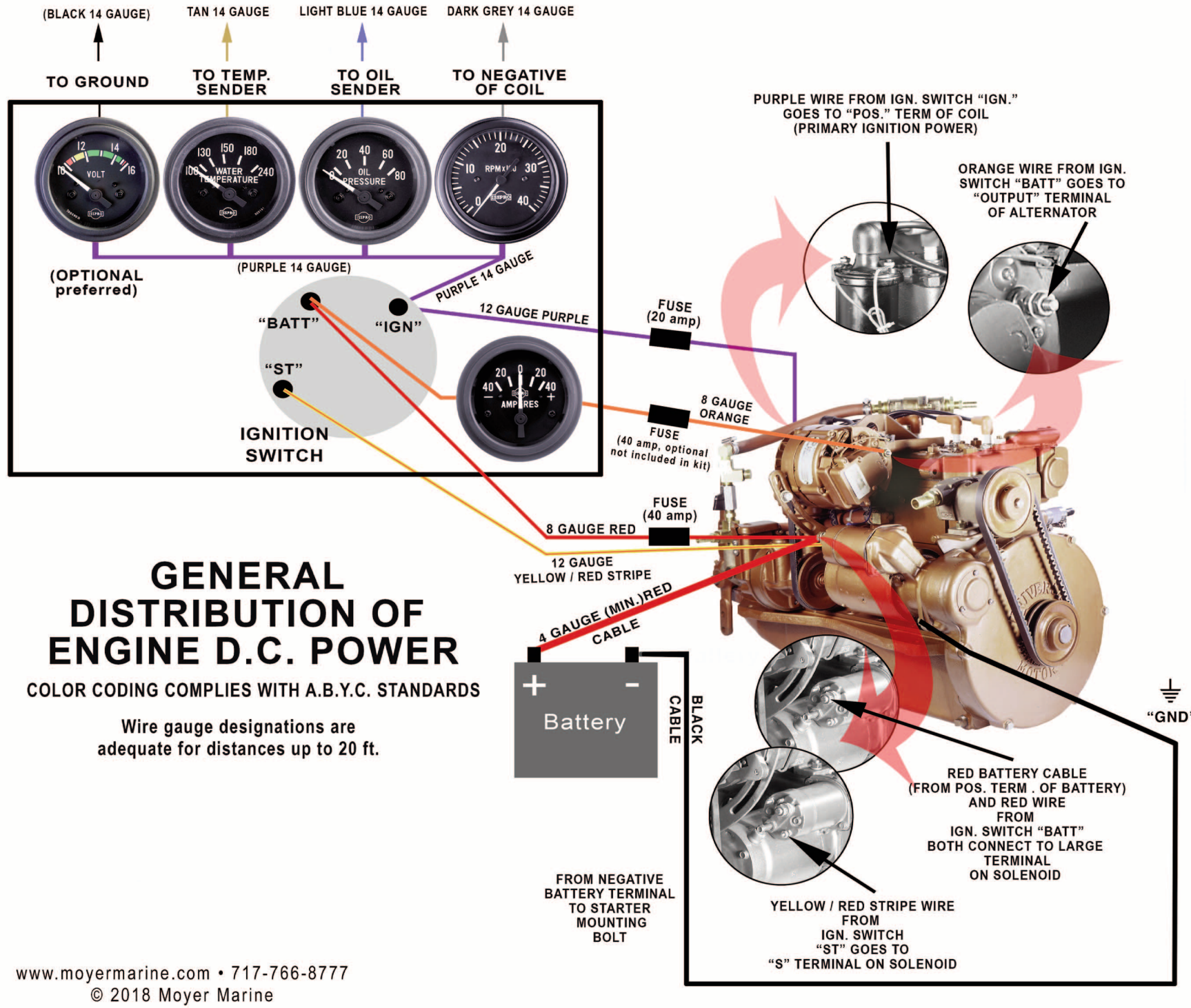
WIRE AND FUSE SIZING

Circuit Description	Wire Size	Fuse Size	Max Amps (Wire)
Main battery post on Starter solenoid to "Batt" Terminal on Ign. Switch.	8 gauge up to 1 8 feet	40 Amp	80
"Ign" terminal on Ign Switch to positive of coil.	12 gauge up to 18 feet	20 Amp	40
Positive terminal of coil to electric fuel pump.	14 gauge	5 Amp	30
Ignition switch to blower Circuit (optional)	14 gauge	10 Amp	30
Ignition switch to gauges	14 gauge	10 Amp	30
Alternator to Ammeter	8 gauge up to 18 feet	40 Amp	80

Wire included in this kit:

(NOTE: 4 gauge battery cable not included)

14 gauge		12 gauge		8 gauge	
Black	10 ft.	Purple	20 ft.	Black	20 ft.
Purple	10 ft.	Yellow / Red Stripe	20 ft.	Orange	20 ft.
Tan	20 ft.			Red	20 ft.
Light Blue	20 ft.				
Dark Gray	20 ft.				



GENERAL DISTRIBUTION OF ENGINE D.C. POWER

COLOR CODING COMPLIES WITH A.B.Y.C. STANDARDS

Wire gauge designations are adequate for distances up to 20 ft.

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