SpaCreek®

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AutoMAC™ MANUAL

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INTRODUCTION

AutoMAC is a Manual Alternator Control with an additional Automatic feature which prevents excessive charging current and battery overcharging. AutoMAC lets you select alternator output current for battery charging by turning the control knob. Alternator output current is displayed on the AutoMAC ammeter. If you forget the AutoMAC, it will switch itself off automatically when the batteries are full. When it is switched off manually or automatically, the alternator operates with its own voltage regulator. The AutoMAC can be used with all alternators in use on automotive and marine engines.

HOW THE AutoMAC WORKS

AutoMAC is connected to the field terminal of the alternator. When it is switched on, AutoMAC operates parallel to the voltage regulator and supplies additional field current to the alternator which temporarily gives you additional alternator output current for battery charging. At the same time, AutoMAC monitors the battery or system voltage which is dependent on the state of charge of the batteries and on the magnitude of charging current. If the current is too high for the size of battery, or if all batteries which are being charged have become full, the AutoMAC cuts off. This is indicated by the red light on the panel.

INSTALLATION

Select a location protected from direct spray and water. Best is a panel or bulkhead : make a cutout of about 4 X 5 inches and fasten flush with number 8 oval head screws and finishing washers.

WIRES

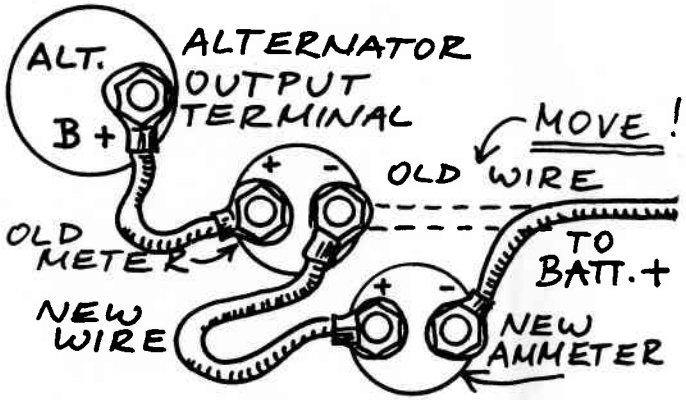
One wire connects the AutoMAC to the alternator. Use the separate Alternator File to identify your alternator, and connect a field wire as outlined with that alternator. The Alternator File will also tell you whether your alternator is a type P (for Positive) or type N (for Negative) by our Spa Creek designation.

Note the two different wiring sketches and use the one which corresponds to your alternator type which is either type P or type N . In each case, connect one wire to plus 12 Volt, for example at engine or ignition switch, one wire to the alternator, and one wire to minus or ground. Also install a jumper wire as shown in the sketch. Use number 18 stranded copper wire, for example type TFF . Use a test light to help identify suitable plus and minus terminals, see the section on test light.

To connect the AutoMAC ammeter, follow the sketch on the next page. Use number 10 stranded copper wire for lengths under 10 feet

9-24-98

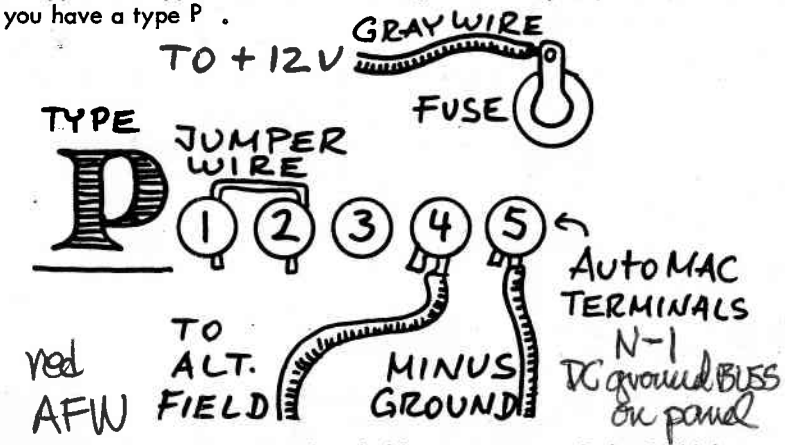
and alternators of 50 A or less. Use number 8 wire for longer wires and for larger alternators up to 75 A . Ammeters are connected in series :



A single wire runs from alternator output terminal to plus of first meter, minus of first meter to plus of second meter, minus of second meter to plus battery post. All terminals are at plus 12 V, ammeter terminals are marked plus for input, minus for output, do not short to ground. It does not matter which meter comes first. Wire from ammeters usually is connected to "C" of battery main switch or plus starter solenoid.

WIRING SKETCH FOR TYPE P ALTERNATORS

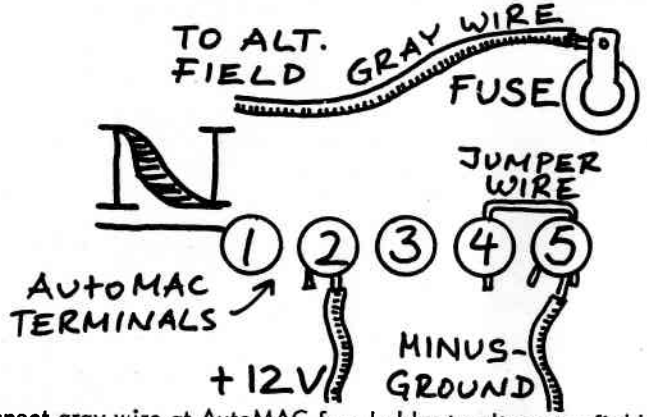
The separate Alternator File gives instructions how to connect a field wire to the proper terminal of your alternator and also tells whether the alternator is a type P or type N . Use this wiring sketch only if you are certain that you have a type P .



Connect gray wire at AutoMAC fuse holder to a source of plus 12 Volt, alternator field wire to terminal (4), ground to (5), and jumper as shown.

WIRING SKETCH FOR TYPE N ALTERNATORS

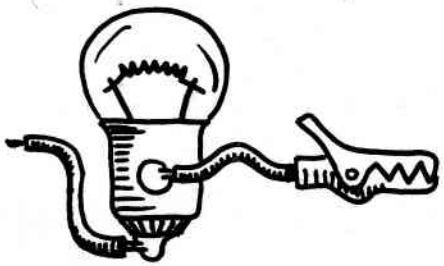
Connect wires to your AutoMAC as in this sketch if you have a type N alternator. If in doubt, use tests to verify the type of alternator.



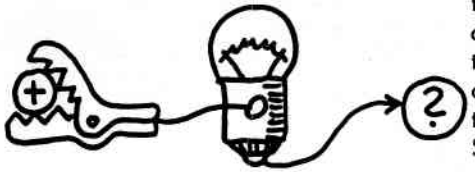
Connect gray wire at AutoMAC fuse holder to alternator field wire, connect terminal (2) to a source of 12 Volt such as at engine or ignition switch, connect the wire jumper (in bag with spare fuses) between terminals (4) and (5) as sketched, and connect terminal (5) to minus/ground.

HOW TO MAKE AND USE A TEST LIGHT

Start with a 12 Volt lamp of about 10 Watt, best is a single contact base as shown. Solder wires directly to the lamp base and alligator clips to the end of the wires. Suitable lamps are # 93, 1003, 1141, 1143, 1161 .



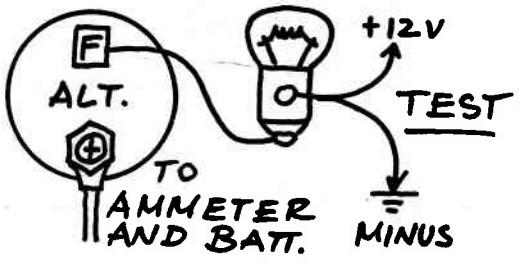
HOW TO USE : To find terminals which are at +12 Volt, clip one wire to a known minus , such as the minus/ground of a light or instrument. Touch the other test light wire other terminals : any at +12 Volt will make the lamp light up.
Or to find a minus/ground terminal, clip one test light wire to a known place with + 12 Volt, at the battery post if necessary, and probe around with the other test wire : all places which are connected to ground will make the test light become fully bright. See how to test your alternator and the AutoMAC with the light.



TEST THE ALTERNATOR FIELD WIRE

After you have connected a field wire to your alternator as outlined in the Alternator File, you can use this test to check correct connection, check alternator performance and verify type of alternator, P or N .

Disconnect the field wire from AutoMAC (the wire between alternator and AutoMAC) and instead connect a test light to the end of the alternator field wire as in the sketch.



Have alternator output connected to ammeter and a battery, have a helper watch the ammeter closely. Run the engine, wait until the initial current surge has fallen off and ammeter reading is steady.

While watching the ammeter, touch the other wire of the test light to plus 12 Volt or to ground, depending on your type of alternator, do both if you are not certain.

Note the TABLE and compare your test results. The light may be dark, glowing, or become fully bright. Most important is the change of the ammeter reading while you touch the test light wire to plus or minus :

TEST : ALTERNATOR FIELD WIRE, ALTERNATOR TYPE P OR N .

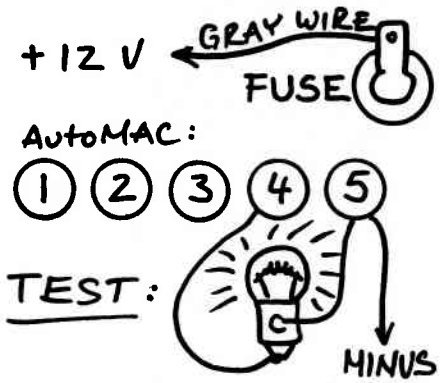
Light to	Light is	Ammeter reading	Alternator type is	Field wire connection at alternator is
+	GLOW	UP	P	CORRECT
+	BRIGHT	NC	P	WRONG
+	DARK	NC	N	WRONG
+	GLOW	NC	N	CORRECT
-	GLOW	NC	P	CORRECT
-	DARK	NC	P	WRONG
-	BRIGHT	NC	N	WRONG
-	GLOW	UP	N	CORRECT

Your alternator should give you two CORRECT tests, one with light to plus, the other with light to minus/ground. Light may or may not glow : important is ammeter UP response by 10 A or more with a test light of at least 10 Watt.

If test tells that field wire connection is WRONG, shift the connection to the other alternator brush or the other field coil terminal at the alternator, then run this test again. Make a note of your alternator type P or N and connect wires to AutoMAC accordingly.

HOW TO TEST THE AutoMAC

Disconnect all wires and the jumper wire from the AutoMAC terminals except connect the gray wire (on the fuse holder) to plus 12 Volt and terminal ⑤ to minus/ground. The sketch shows the terminals at the back of the AutoMAC. Connect the test light between ④ and ⑤ as in the sketch. Then turn AutoMAC toggle switch on and control knob up and down : as you turn the knob, the test light should become bright and dim. OK
If the test light remains dark, use it to test the source of plus 12 Volt (test light wires to base of fuse and separate reliable ground : bright, OK), test ground (test light to base of fuse and to terminal ⑤: bright, OK), test the fuse (test light wires to ⑤ and to ① : bright, fuse OK).



OPERATION

The AutoMAC ammeter will show alternator output current from either voltage regulator or AutoMAC. After starting the engine, current will be high but will fall off gradually within a few minutes. Switch the AutoMAC on after the initial current surge is over. Gradually turn the control knob clockwise up until the ammeter shows the selected output current. At first, limit current to about 2/3 of the alternator Ampere rating and feel the alternator. It is too hot if you cannot keep your hand on it for three seconds. CAUTION : watch belt, fan, pulleys. Then gradually try higher currents : alternator brands are rated differently, some can generate maximum current indefinitely, others will then overheat which is most likely if the batteries are large, as they usually are on boats.

THE AUTOMATIC CUTOFF

Note the adjustment marked ADJ on the AutoMAC panel. It allows to vary the cutoff voltage to the conditions on your boat, whether your alternator is small or large, battery capacity low or high and whether you are charging through splitter or charging diodes or not. Test the present cutoff setting and adjust it to make best use of the AutoMAC.

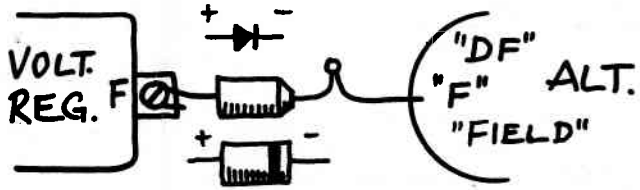
HOW TO ADJUST THE AUTOMATIC CUTOFF SETTING

Automatic cutoff should not occur too early but in time to avoid battery overcharging. Ideally, the cutoff should be triggered (indicated by the red pilot light) while all batteries are being charged simultaneously with a current which is typical for your alternator and your daily use when you want to recharge the batteries to the break-even point as fast as possible. See the paragraph on battery charging.

You can change the cutoff setting by first turning the cutoff control to its maximum : use a small screwdriver through the ADJ hole in the panel and turn the control fully clockwise, do not force, to the "high" setting. If the red light is on, reset the cutoff by momentarily switching off power to terminal (2) . Select a high charging current typical for more urgent daily recharging. Take several caps from the cells of the batteries. CAUTION : gases are explosive, electrolyte is corrosive, hazard to eyes. Wait until gassing changes from few occasional bubbles visible in each cell to a rate more like that in a recently poured glass of soda. Do not change the charging current but very slowly turn the cutoff control down, counter clockwise, through the ADJ hole, just until the red light comes on. Current will have fallen to near zero, the light will remain on. To try the new setting, shut down engine first and use some electricity from the batteries.

ELECTROMECHANICAL OR RELAY TYPE VOLTAGE REGULATORS

If your alternator has an external voltage regulator of the older kind with coils and contacts, install a blocking diode (supplied in the bag with spare fuses) in the wire between the regulator F terminal and alternator.



Note the sketch : diodes will have pointed end or band marking. Install as shown, connect the wire to the diode instead of to the regulator F terminal, solder recommended, insulate.

Without the blocking diode (or two diodes in parallel), the relay type regulator will ground any field current from the AutoMAC. The blocking diode will not affect voltage regulator performance but feel it to make sure it does not overheat (too hot to touch, immediately after starting engine), if so, use both diodes in parallel.

BATTERY CHARGING

Batteries can accept the greatest charging current when their state of charge is low. As they reach a more complete recharge, high charging current will cause excessive gassing which consumes some of the charging current to decompose water from the electrolyte. The AutoMAC automatic cutoff is designed to prevent excessive charging current : after cutoff, you can reduce the charging current and continue charging at lower current toward a more complete recharge.

It is important that you estimate your average daily electricity need in Ampere hours : this is the amount which you have to recharge to "break even" or to recharge the batteries to the level after yesterday's charging. If you cannot reach the break-even point in less than two hours, you can usually increase your battery capacity which will allow greater AutoMAC charging current . For example, you may connect another battery parallel to an existing battery to make a battery bank.

BATTERY MAINTENANCE

Use distilled water to make up the electrolyte level in the cells. If you have sealed batteries, note that only some of them are truely maintenance free : these have a catalyst in each cell which chemically recombines

oxygen and hydrogen gas to form water again. Other sealed batteries may carry just enough electrolyte to last through their warranty period when used in cars (where batteries are fully charged most of the time). With this kind of sealed battery on the boat , find the vent holes which may be hidden under a label, and use a syringe to replenish the electrolyte with distilled water.

EQUALIZING CHARGE

The cells and plates in a battery, and batteries connected in parallel, are never exactly alike. They can develop differences in their state of charge which can gradually increase. Cells or plates which are lower than the rest then come closer to complete discharge when the battery becomes nearly empty. To allow such cells to catch up, an equalizing charge is used : after most cells have reached full charge, a modest charging current (about 2 to 5 Ampere for 100 Ampere hours of capacity) is continued for several hours. This current allows lower cells or plates to reach full charge while it overcharges the others : check and add water. An equalizing charge once or twice each season probably is ample.

CHECK LIST

- ☐ Inspect alternator, note appearance, markings, labels, terminals, any attached or external voltage regulators. See Alternator File.
- ☐ Identify alternator, note your type, P or N and mark corresponding wiring sketch, page 5 or 6.
- ☐ Connect alternator field wire, see Alternator File. If uncertain, see tests on pages 8 and 9 before you connect the AutoMAC.
- ☐ If your alternator has a relay type, electromechanical voltage regulator, not solid state, see page 13.
- ☐ Test your installation. If necessary, test separately : alternator and field wire, page 8, AutoMAC test page 10.
- ☐ Test the Automatic Cutoff setting , see page 11. To change the cutoff setting, see page 12, then test the cutoff again.
- ☐ Gasoline engine : try your ignition switch. If AutoMAC with its switch on keeps engine running, install Caution label.

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Subj:	**Battery Sense Wire**
Date:	8/31/2005 3:35:59 PM Pacific Daylight Time
From:	*ronphylhill@adelphia.net (Ron Hill)*
To:	*mraquaq@aol.com (Stu Jackson*)*

Stu : FYI, when I added my SpaCreek alternator controller (Auto Mac) in 1989, the instructions call for a battery sense wire to the "on" pole of the key switch. It was done that way so that no current could flow when the key switch was "off".
I couldn't get that damn thing to work unless I held in the override (think that was the name) button. Couldn't figure it out as I was positive that it was wired correctly. I called Spa Creek when I was in Annapolis and asked if they made "house calls". Mike Hoffman (their Tec) arrived after I let the fridge on for 12 hrs to draw down the batteries. We started the engine and still couldn't get that controller to kick in the auto mode!!! Mike finally figured out that the sense wire was seeing the alternator output, because this was before the wiring harness upgrade!!!
Not knowing any better we moved the battery sense wire to the back of the Perko switch. That was great as the controller WORKED, but current was flowing thru that system when the key switch was off and Perko switch "on". Because the wire as connected to the center pole of the Perko. So, I wire in a micro switch that opened only when the key switch was turned on and it opened the circuit to the Auto Mac!! (what a jury rig).
I lived that way till 1991 when Catalina finally admitted that all of the amps from the alternator went direct to the key switch and them back to the batteries. Who would have thunk that!! Reason simple - Frank Butler had 2 box cars full of the old wiring harnesses for the old instrument panel with the ammeter. They stopped installing the ammeter in the engine instrument panel 1988, but used those old harnesses thru 1991 production. That was for over 1100 C34 hulls and 1000 C36 hulls and some C30 with the M25XP.

Still hard to believe, but that's why I went to duel output which connect direct to the batteries. Your Auto Mac probably has different circuitry that the older one I had!!

So, don't be surprised if these guys have mounted a sense wire to the keyswitch. End of story. Ron

Subj:	**Re: Battery Sense Wire AutoMac BACK**
Date:	8/31/2005 5:43:56 PM Pacific Daylight Time
From:	Mraquaq
To:	ronphylhill@adelphia.net

In a message dated 8/31/2005 3:35:59 PM Pacific Standard Time, ronphylhill@adelphia.net writes:

> Your Auto Mac probably has different circuitry that the older one I had!!