Fuxlvlqj#Htxlsp hqw#
For Cruising the World#

Cruising Equipment Alpha and Heart Interface Incharge

Alternator Regulators

Functionally the Alpha and Incharge are identical

Frequently Asked Questions

Installing the Alpha Regulat

Installing an **ALPHA** regulator will dramatically reduce battery recharging time
regulator. This means you'll run your engine less - saving you money over the
installation diagram below, installation of the ALPHA to your externally regula

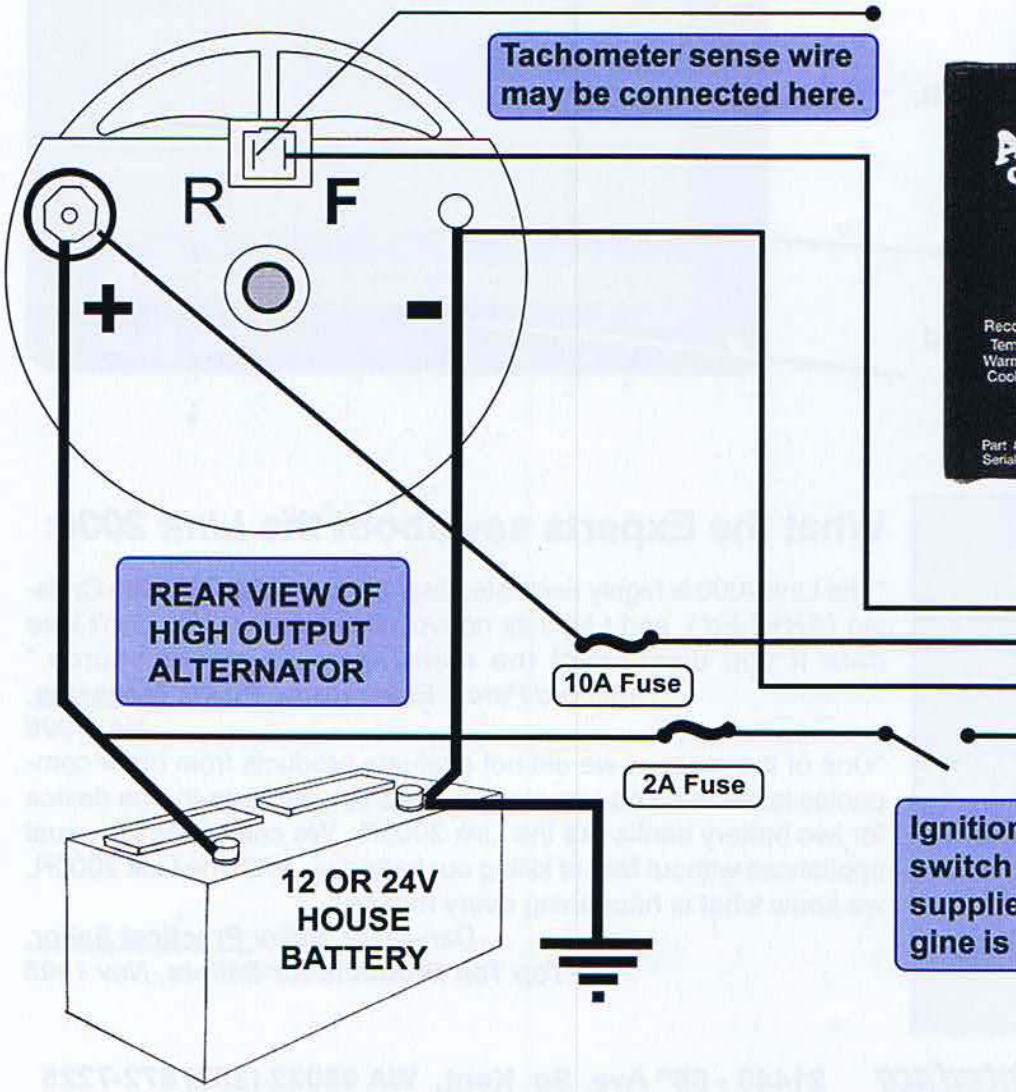
1) The field winding of the high output alternator is connected to the field out

2) Power for the ALPHA is obtained through a 10 Amp fuse from the alterna

3) A connection is made from the battery B (-) to the ground connection on t

4) Connect the Regulator On signal, fused at 2 Amps, to a point in your syster
when the engine is running. The oil pressure switch is the normal location

If you can follow simple step-by-step instructions, you can install an ALPHA.
ALPHA with a wiring harness to make installation even easier!

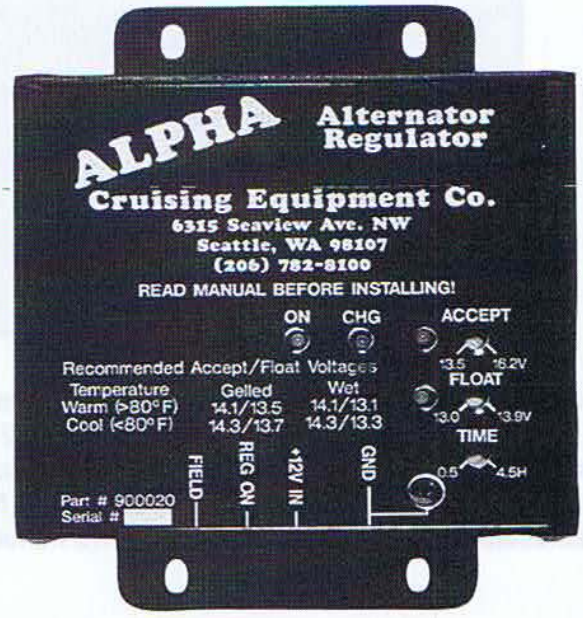


Alpha Alternator Regulat

The ALPHA is an automatic, multiple-cycle, fully adjustable, alternator re
nally regulated P-field alternator that requires a positive voltage to turn
tional wiring harness, it is plug compatible with most high-output alternato
Bullet, Lestek, Amptek, etc.) which require a maximum of 5 Amps field cu
most alternators below 200 Amps. The Alpha is available in both 12 and

Multiple Cycle Charging

The ALPHA begins with a **Charge Cycle** that supplies the maximum availab
the batteries reach 14.2 to 14.4V the **Acceptance Cycle** begins and the ba
batteries accept less and less current as they become charged. After they
voltage for two to three hours, they are normally fully charged and the **Fl**
Cycle the batteries are maintained at a lower voltage (13.2 to 13.8V
consumption or overcharging. The ALPHA is preset from the factory with
and Time-to-Float settings that will work for most systems. These setting
application. Four LEDs indicate operational status. There is a green LE
on, a red LED to indicate the Charge Cycle, a yellow LED to indicate the A
to indicate the Float Cycle has been reached. The ALPHA features ful
and Float Voltages for use with flooded or gel lead-acid cells.



Speci

Accept Ra
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IMPORTANT NOTE: **ALPHA** (Heart *InCharge*) re
externally regulated "P" type alternators. Internally regula
pensively modified by most alternator shops.

How does this regulator work?

Simply put, this regulator turns your alternator into a three-stage charger with adjustable controls for Acceptance voltage, Float Voltage and charging timer. You have four wires to connect to the supplied wiring harness. They consist of Ground, two 12V inputs and a single output for the alternator's Field.

The Field output (blue wire) will have battery voltage on it during the first charging stage. This allows the alternator to get the battery voltage up to the programmed Acceptance point as quickly as possible. When the Alpha reaches Accept (the second charge stage), it will slowly reduce the voltage to the field. This will in turn reduce how hard the alternator charges the batteries (less current to the batteries). It will do this slowly in order to maintain a constant voltage with less and less current. The main purpose of the Accept stage is to try to maintain the high voltage level with as little current as possible.

While in the Accept mode, the alternator will only supply as much current as the batteries want. It will not force-feed the batteries. So under normal conditions it is possible for the charger to back down on current where it is only supplying a few amps well before the timer expires. If this happens, the regulator will continue to supply the few amps and remain at the Accept voltage until the timer expires. In other words, the current does not drop at the same rate the timer is counting down. The two functions are independent of each other.

This also means that if your batteries were very discharged and you set the timer for 30 minutes, you may be forcing the regulator to prematurely Float before the batteries could be fully charged.

The red and brown wires will carry battery voltage to the regulator. The red wire's main function is to supply power to the Alpha's circuits. It is also setup as the default wire your regulator uses to sense the alternator output voltage.

The brown wire is used as a signal to tell the Alpha you want to charge the batteries from the alternator. This wire is normally routed through an Oil Pressure switch or from your Ignition. 12V from either of these places are an indication that the engine is on and that the Alpha should start regulating the alternator output voltage.

There are two possible ground connections at the regulator. One is through the plug in harness (black wire). Another ground connection can be made from a screw under the largest hole in the face of the unit. If you are using an existing wire harness with a ring terminal for the ground connection you can fasten it under the screw. The ground must come from either the alternator negative stud or the alternator case (if it is the negative, too).

What type of alternators will it work with?

The Alpha is designed to work with externally regulated 'P' type alternators.

An internally regulated type is what you have in your car - typically an 'N' type. It has a network of diodes called a "Diode Trio" that essentially feeds a portion of it's output to the field, which in turn generates significant current to the batteries. It is possible to convert an internally regulated type to an external type but it's something that should be done by an alternator shop. We have provided a document describing the procedures necessary to make the conversion here.

Besides internal and external types, there are also 'N' and 'P' types. This designates whether switching the Negative supply or Positive supply to the field provides the regulation. Most Japanese alternators and internally regulated alternators are the 'N' type. Most externally regulated alternators you'll

encounter are ‘P’ type. If in doubt have your alternator mechanic check it out.

Why is my voltage too high?

If the voltage from the alternator output is higher than expected, the first thing to try is turning the Accept potentiometer fully counterclockwise. This should bring the alternator output down to about 13.5V. If it works, then you probably had the potentiometers set too high.

Another common cause for this problem is having the regulator charge one battery bank but monitor a different bank that is isolated from the output of the alternator. Check to ensure all banks are online - or at least the bank the bank being monitored by the red or brown wires. There is a jumper on the circuit board that determines which wire the regulator uses to "sense" the chare voltage. The unit leaves the factory setup to sense the red wire.

If you have not changed the jumper then compare the volt then compare the voltage at the battery to the voltage at the wire you are sensing from. There should not be more than a 0.1 Volt difference. Turn off the engine and remove the top cover from the regulator (first you have to remove 2 screws). The top of the circuit board should be exposed now. With the harness plugged into the board, turn on the engine. The green and red LEDs should light up first. In a moment, the Yellow LED should light.

Now, with your handheld voltmeter, read the voltage between black and red. Is it higher than what you set the Accept pot for? If so, measure the voltage at the battery. If they are the same, measure between the black and blue. Does it read the same thing? If the all voltage readings are virtually the same you should contact us because the FET that controls the Field voltage is probably shorted. If the system is working normally, what you should see on the Field is a gradual decrease of the voltage from battery voltage down to about a volt.

Lastly, if you had set your unit to use the brown wire for voltage sensing, make sure the voltage from the black to brown wire reads the same as from the black to red wires. If it's significantly less than the black to red readings you may have resistance in the brown wire path or the brown wire may be sensing a different battery from the one you are charging.

Why is my charge rate too low?

If you have a battery monitor like the E-Meter to measure current to the batteries, and you think the batteries are not being fully charged, then there are a few things we need to verify.

First, it may be possible that the meter is out of sync with the State-of-Charge of the batteries. This means the regulator may be backing down on the current because the batteries are more charged than your meter is saying it is. The fact that the regulator is reducing the current is an indication that the batteries do not need so much current to maintain the Accept voltage. To resolve this, simply reset the meter's AH to zero the next time the regulator goes to Float. All this assumes you have the potentiometers at the regulator programmed properly for your battery bank.

Second, if the potentiometers are not set to the proper position, you may be fooling the regulator into thinking the battery bank is charged when in fact you may be under charging the batteries. You should adjust the Accept and Float settings based upon two factors. Battery type and ambient temperature in the battery compartment. The table below is used to determine where your potentiometers should be set. It's also in your owner's manual. For 24V systems double the voltage.

Temp	Wet Batteries		Gell Batteries	
	Accept	Float	Accept	Float
120 F	13.4	12.5	13.9	13.3

110 F	**13.6**	**12.7**	**14.0**	**13.4**
100 F	**13.8**	**12.9**	**14.1**	**13.5**
90 F	**14.0**	**13.1**	**14.2**	**13.6**
80 F	**14.2**	**13.3**	**14.3**	**13.7**
70 F	**14.4**	**13.5**	**14.4**	**13.8**
60 F	**14.6**	**13.7**	**14.5**	**13.9**
50 F	**14.8**	**13.9**	**14.6**	**14.0**
40 F	**15.0**	**14.1**	**14.7**	**14.1**
30 F	**15.2**	**14.3**	**14.8**	**14.2**

How come it's not charging?

There are several things that can cause the regulator to not control the alternator. The most common of which is a problem with the brown wire. Since that is the wire that carries the engine turn on signal, if it's not good, the regulator won't operate.

Check the fuses for the brown and red wires. If these are good, open up the unit and check its internal fuse. The fuse is made up of a single 26 AWG wire near the front middle section of the circuit board.

While you have the unit opened up, inspect on top and underneath the board for corrosion. The board is conformally coated to resist exposure to the elements, but common sense must still be used. If you think the unit has ever been exposed to water, at the next convenient opportunity, disconnect the unit electrically and try to clean it up.

Near the fuse is a jumper labeled "Red" on one side and "Brown" on the other. Verify that a jumper is in place.

A quick check to verify the regulator is generating a field voltage or not is to measure voltage at the blue wire terminal where it plugs into the alternator. With the engine off, pull the blue wire off the Field terminal of the alternator. Next, turn on the engine and measure the voltage at the end

of that blue wire you just disconnected. You need to measure between that plug and ground. If you read close to battery voltage at the blue wire with the engine on, then the regulator is not your problem. This check is because during the regulator's first charge stage it will develop a maximum field voltage to force the alternator to bring up your battery voltage to the Acceptance point. So if you read good voltage at the field and the alternator is still not putting out, you may have a problem with the alternator, its output cable or the field wire to the alternator may not be making a good connection. For instance, if there was a bad butt splice within the field wire it could read good when hardly any current flow is there, but when you attach it to the alternator almost nothing can make it through that wire. So give all your connections a tug to look for bad crimps, bad splices or corrosion.

If your voltage reading at the end of the blue wire shows no voltage with the engine on, make sure you are getting voltage through the brown and red wires. If those are good too, then either the blue wire is bad or you will need to call our Customer Support for assistance.

Another cause for not charging could be the transistor that develops the field voltage may be shutting off because it's too hot. If the unit, on its own, starts to work then immediately shuts down for several minutes and starts all over again, it may be due to stressing the transistor to the point that it needs to cool down. This condition is rare because the unit can handle 10Amps. The remedy is to either leave the engine off for at least an hour to allow the transistor to cool, or unplug the harness from the regulator. Your alternator will safely spin with no field voltage and no output while the transistor cools down.

Why is the Current/Tach fluctuating wildly?

An anomaly associated with the sense circuit is when the unit appears to oscillate on and off at

several second intervals. This can be caused if the brown wire is tapped off the ignition *and* the ignition circuit becomes loaded down, either due to bad connections or too many loads. Also, this can occur if the red wire is not making a good connection.

Here's what happens – the unit is shipped using the red wire to power the regulator as well as sense the output voltage from the alternator. If that wire has a voltage drop from one end to the other, or has a less than perfect connection, the regulator's sense circuit will misinterpret the output voltage. This is one cause for oscillations.

The REGON circuit can also cause it to oscillate. REGON is the brown wire that usually comes from the ignition but can also come from the oil pressure switch. If the ignition circuit is loaded down, or the wire has a resistive connection, it can cause the voltage through the brown wire to decrease to the point that the regulator may think you have turned off the engine. So when it backs the alternator output down, the sense circuit will not be as loaded down as before. This causes the brown wire voltage to rise back up to normal and then the sequence starts all over again. Fortunately, there is an easy remedy for this anomaly.

To prove whether this is the cause or not, simply disconnect the brown wire from the ignition, and string a wire directly from the harness pig tail brown wire back to a positive battery post that will be charged by the alternator. Caution- running the brown wire directly to the battery post is only for a test. After all testing is done, remove the brown wire from the battery and wire it according to the drawing supplied at the link below. Caution: Leaving the brown wire connected to the battery all day or overnight will cause the Field Effect Transistor to fail.

Next, follow the directions in your manual for switching the regulator's internal jumper from the "Red sense" to the "Brown sense". Even if you've

never done it before, the time to open the unit, switch the jumper and close the unit only takes a few minutes. Now turn on the engine and verify the regulator functions properly.

Why is my red light flashing?

The red LED (Light Emitting Diode) is simply an indication that the FET (Field Effect Transistor) is on. Since the FET is switched on and off very quickly to generate the field voltage, the red LED is going to switch on and off, too. This is not a problem.

I keep blowing fuses.

First make sure you are using properly rated fuses. The fuse in line with the red wire will draw the most current within the harness and the fuse should be rated for not more than 15 amps. The brown wire should have a 2 Amp fuse in line.

If the fuse is blowing as soon as you put it in place then a component may have shorted inside the regulator. The most common cause would be a blown protection diode at the red wire input.

The most common cause for blowing this diode is removal of the batteries from the alternator output while charging via the alternator. This can be due to an intermittent connection anywhere between the alternator positive output stud and the battery post. It can also happen if you switch between battery banks, momentarily isolating them from the alternator. These two things can cause the alternator output voltage to rise well over a hundred volts for a fraction of a second. Anything tied directly to the alternator output (such as your regulator) can suffer catastrophic failure.

If you have a handheld multimeter, set it to read resistance (Ohms) and measure resistance between the regulator circuit board ground spade terminal and the +12 or +24V spade terminal. These are the terminals that would be mating with the harness Black and Red wire respectively. The

harness needs to be disconnected while making this measurement.

If the diode is good you'll read about 12,000 Ohms or higher. If the diode is shorted, you'll read close to 0 Ohms.

How do I equalize my batteries with this regulator?

Periodic equalizing of your battery bank can help extend the life of your wet cell batteries. Repeated charging and discharging of your batteries slowly causes sulfates to build up and harden onto the plates within the batteries. This makes the battery less efficient and shortens its life. To equalize is a controlled over-charging of the batteries. This will return a lot of the sulfates back to the electrolyte almost breathing new life into them. There is no rule to tell you when you must equalize, but if you notice that the batteries don't last as long as they used to before needing a recharge, it may be time to equalize.

Equalizing will cause your batteries to gas so it is important that you keep an eye on things during the process. If you think there is a problem, stop the process by turning off the engine and reset the potentiometers to their normal position.

Before equalizing, your batteries must already be fully charged. Trying to equalize with discharged batteries is a waste of time and energy, so charge them first and refill the cells if the electrolyte level is low.

Turn the Accept and Time potentiometers to maximum (fully clockwise).

Start the engine.

The voltage will rise to about 15.5V (or 31V for 24V systems) so if you have any sensitive equipment you might want to turn it off for this process. During the process the batteries will be boiling or heavily gassing. This is normal and it will last for about 4.5 hours. Because of the gas, you should

provide plenty of ventilation in the battery compartment.

After the unit transitions to Float mode you can turn off the engine if you want, in order to let the boiling batteries settle down. Once they've cooled down, you should replace any lost water in the cells. Voila!

Will this alternator work on a dual alternator setup?

Yes.

Your regulator can supply up to 10 amps on the field, so find out what the total field current draw will be with both alternators on line. Some people run the split field wires through their own oil pressure switch, so if one engine is on and the other is off, the off engine's field wire will be isolated from the alternator as well as its own brown REGON wire.

As for the alternator output cables, if you want them to supply current to the same battery bank(s), simply tie the two output cables together at a common switch post or bus bar. Make sure the common cables, bus bar or switch can handle the combined current of both alternators.