

## Classic Fiat 500 Dynamo-to-Alternator Conversion v2.0

Summary: Converting your classic Fiat 500 from a dynamo/generator to an alternator is a relatively common modification, but surprisingly, one with little comprehensive, clear documentation available online (that I could find), particularly in English. To demystify this, I wanted to put together a tutorial about how to do this modification. Many people will just tell you to buy a 126 rear fan housing, but living in the US, classic Fiat parts are harder and more expensive to come by, so I decided to try the DIY route using the normal 500 housing.

Pictures are included where I thought necessary and, where I remembered to take them. I didn't go in expecting to compile this tutorial. Hopefully, it's largely self-explanatory.

### Parts Needed:

- Fiat 126 Alternator w/ integrated mount. I used a Magneti-Marelli 63300905, but there are other similar versions.
- Alternator-specific pulley hub
- Alternator-specific fan hub
- Alternator-specific woodruff keys (x2)
- M12x1.25 Nyloc nuts + washers (x2)
- M8x1.25, 35mm, countersink/panhead bolts
  - o I used a couple old rear main bearing bolts
- 10ga automotive wire, (red or brown)
- 18ga automotive wire, (green or other)
- 10ga ring clamp crimp fitting for 5/16" post (B+ starter lead)
- 18ga female spade connector (D+ charging lead)
- Appropriate heat shrink for wiring
- (Optional) Fiat 126 alternator rear cooling fan housing
  - o You can modify your 500-model cooling fan housing if you like, but 126 fan housings will bolt right on. These steps will show you how to modify yours, like I did.

### Tear Down Procedure:

1. Disconnect both positive AND negative battery leads from battery.
2. Remove engine from car. You probably don't have to, but this will make your life far, far easier.
3. Remove V-belt from dynamo & crank pulleys
4. Disconnect throttle linkage from fan housing top cover (if applicable).
5. Unbolt and remove fan housing top and front covers
6. Remove front, fan-retaining bolt from dynamo shaft and remove fan. Ensure that you set aside and save the domed washer and rubber washers from the dynamo fan assembly. You will reuse these for the alternator.
7. Unbolt and remove the rear fan housing shroud. Don't forget the two nuts on the dynamo body itself.
8. Unbolt and set aside the fuel pump.

9. Unbolt and remove the dynamo and dynamo mounting bracket from the crankcase.

*Fig 1. At this point, you should have everything removed from the left side of the engine crankcase and it should look something like this. Note: this was taken during an engine rebuild, so other components like the carb, rockers, valve cover, and exhaust were removed. It is not necessary to remove these for this job.*



### **While you're in there...**

I highly recommend removing the fuel pump mounting studs and replacing them with allen/hex head bolts (M8x1.25, 35-40mm). This will make replacing the fuel pump much easier in the future and allow you to use any Fiat 500 variant pump. If you stay with studs, you'll need at minimum, an alternator-specific fuel pump. Otherwise, you will have to remove the alternator (and all associated fan and housing pieces) to change the fuel pump. Even with the alt-specific pump, it's tight quarters.

I'm incredibly thankful I did this as, on the motor pictured above, the fuel pump failed during my initial pre-start checks.



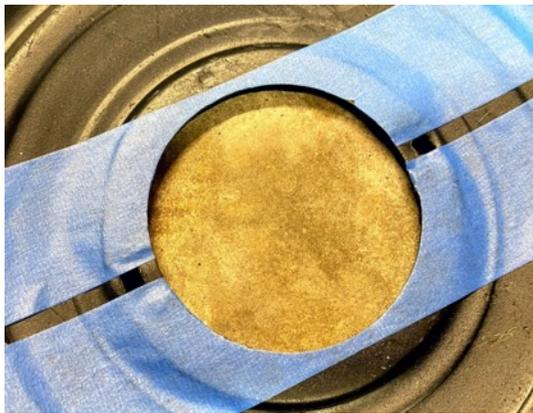
### **Rear Fan Housing Modification**

This is where the lion's share of the effort lies. The mounting stud spacing on the alternator is different (wider) than that of the dynamo. The original studs are press-fit into the fan housing and will require removal and reinstallation/replacement.

1. Once you have the rear fan housing separated, you should have a part that resembles the picture at right. The arrows are pointing to the dynamo mounting stud holes in step 2.



2. You will need to punch out the press-fit studs indicated by the arrow. Make sure to back up the metal with something like a deep socket to avoid denting it too badly. In this picture, the studs have already been removed (in actuality, they fell out during long-term storage and were lost).



3. To limit the work area, I taped off an area in line with the existing mounting holes. The alternator and dynamo mounting tabs are clocked in the same orientation, so this would help out with alignment.

4. Test fit the alternator to ensure your alternator tabs align and the mounting bracket is generally flush with the fan shroud portion where it mounts to the crankcase (arrow).





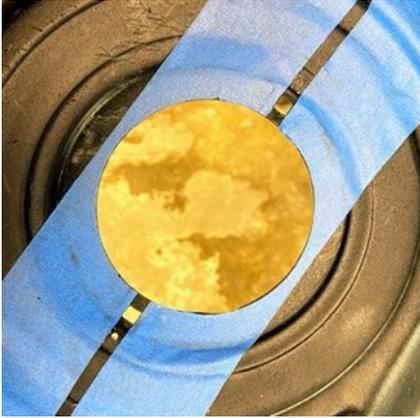
5. While holding the alternator centered in position on the shroud, use a centerpunch (pictured) to mark the exact position of the center of the mounting holes. For reference, the alternator is easily centered as its casing is nearly the same diameter as the shroud opening (pictured)



6. Remove the alternator and set aside somewhere safe.

7. For reference, my centerpunched marks were approx. 20mm from the interior edge of the shroud and 11mm from the center of the alternator mounting holes.





8. Drill a small (2-3mm) pilot hole on the centerpunched mark on each side.

*Aside: Here's where I ran into problems (of my own creation). I tried to re-engineer it and instead of using studs, tried to install riv-nuts. I did this mostly because I didn't have an easy way to affix studs in there. The problem with riv-nuts is that they will protrude too far into the fan housing and foul the fan itself. Riv-nut style studs may work, but I didn't have any to try and didn't want to go down that road again. The clearance between the fan shroud and the fan itself is very close and hidden in an installed position.*

9. If you were able to remove the dynamo mounting studs and they're in good condition, drill out the pilot holes to 5.5mm. The square shoulders on the studs are press fit into a 6mm square hole, if you drill directly to 6mm, you run the risk of having an oversized hole, so the studs will not stay in position without work. From there, file the hole square and press your OE studs into the new holes.



If you're like me and lost the studs, or want to upgrade to a beefier M8 mounting stud read on.

11. Drill out the pilot holes to a size appropriate for your chosen studs. 8mm for an M8 pan-head screw, or oversized for a countersunk bolt like I used. Ensure that you leave enough material to retain the bolt and not blow-through when tack welding.





12. Install alternator on crankcase, insert bolts into new shroud holes, and tighten down nuts to secure alternator into position on the shroud and block. You can do this without the block, but mocking everything up together ensures a better fitment. Mask off the exposed portions of the alternator to prevent damage from step 13. Also pictured is the alternator-specific fan hub you will need.

13. After cleaning to bare metal the bolt head and sheet metal around the bolt, tack weld the bolt heads to the fan shroud taking care not to blow-through the thin shroud material (and alternator). This was the first thing I've welded in 25 years, with a FCAW welder I had just purchased, so my welds leave something to be desired in the looks department. They held fast and are hidden, so it doesn't matter.



14. Don't worry about reinforcing the areas around your new studs or filling the old dynamo holes. It's not a structural piece and the holes will be covered up by the alternator tabs.



15. Before you refinish your shroud (if applicable), take some time to mock everything up to check the fitment of the fan in the housing. Install the alternator, rear shroud, fan assembly, and front shroud to check the clearance of the fan. As mentioned previously, it's a close fit, so you'd hate to find out there's fouling at 'final assembly'. Add spacers where required. If everything fits well, you're done with the shroud modifications.

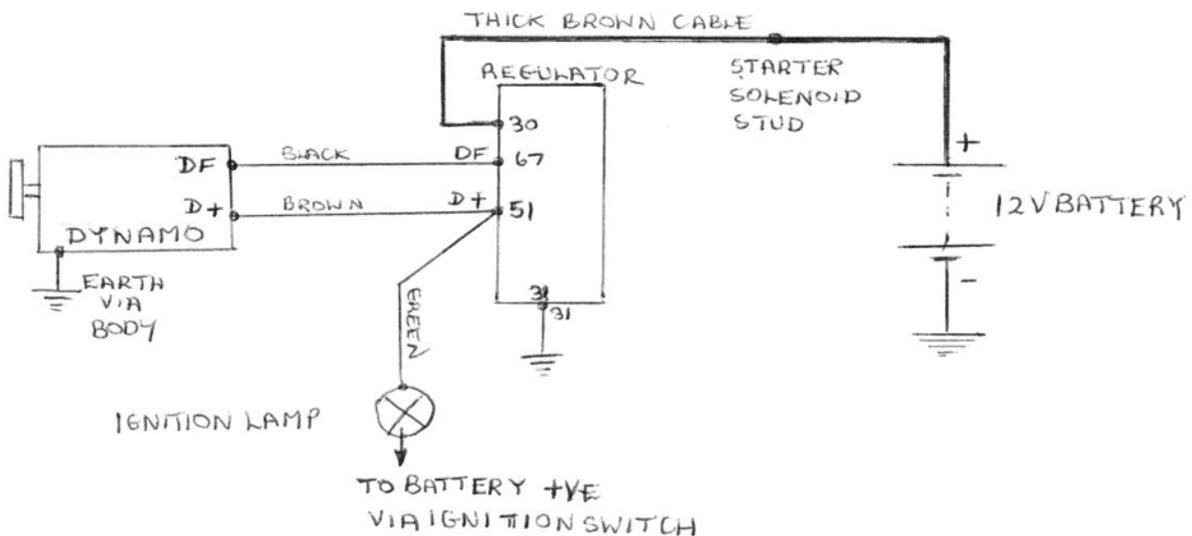
## Wiring Modifications

If you haven't already, DISCONNECT BOTH POSITIVE (+) AND NEGATIVE (-) LEADS FROM THE BATTERY. You will be wiring a 'hot' lead and don't want to shock yourself or damage any other electronics.

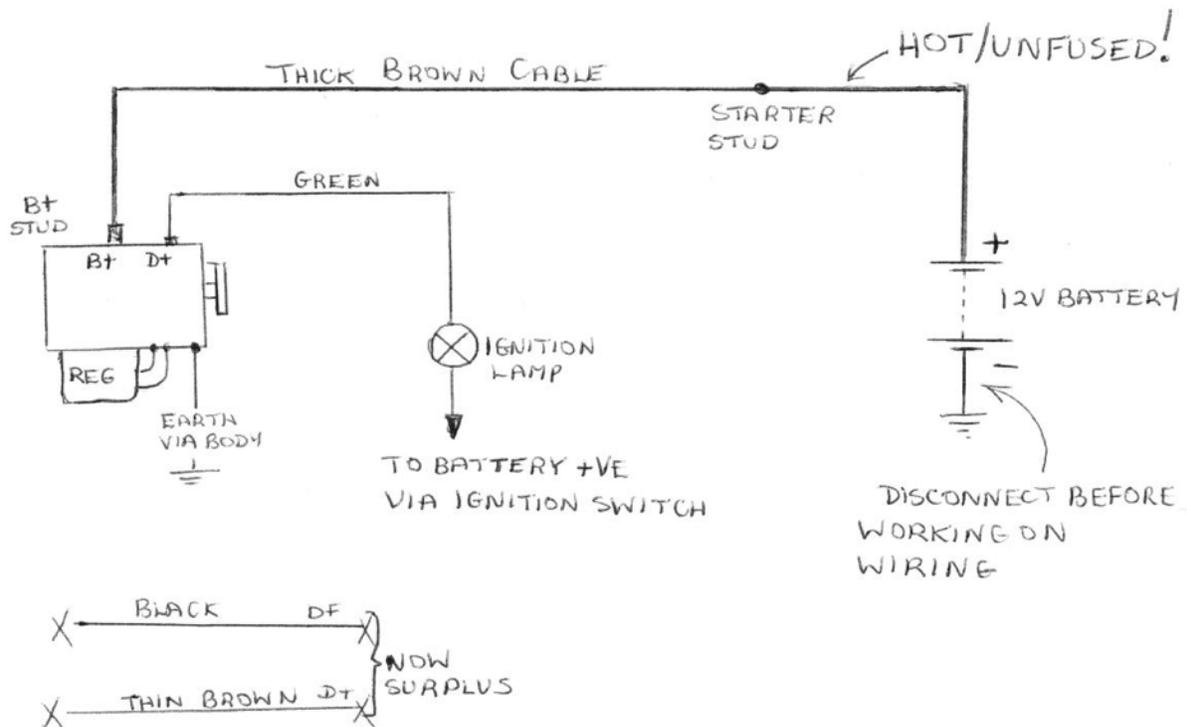
The below schematics were not made by me, but by "MATTSDAD" (not this Matt) on fiatforum.com and are perfectly clear.

### **Old Dynamo Wiring:**

#### ORIGINAL 500 DYNAMO WIRING



# NEW ALTERNATOR WIRING (USING 500LOOM AND 650 ALTERNATOR WITH REGULATOR)



## **New Alternator Wiring:**

### **Voltage Regulator**

The alternator will have a voltage regulator installed, either externally or internally, so the stock, firewall-mounted voltage regulator will not be necessary. Some people, myself included, have kept it in place for aesthetic reasons, but if you are going to do so, and run wires to it, some modifications will be necessary. Essentially, you'll need to disassemble, so that there are no linkages between the posts, and the posts will only serve as junction points for wires.



Picture. Original Voltage Regulator installed (bottom right), cover off (bottom left), disassembled (top)

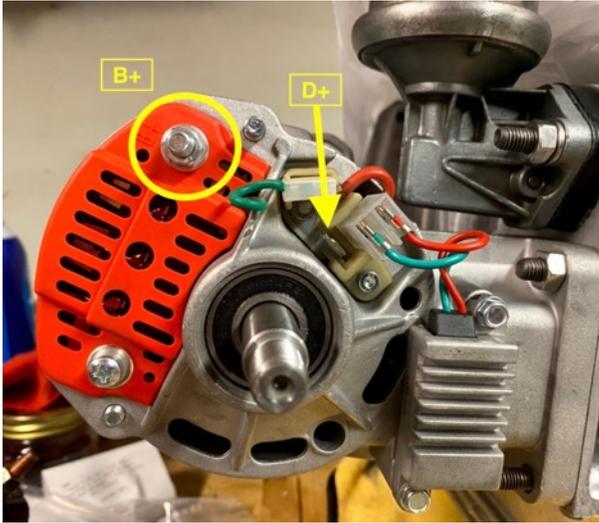


Original-style voltage regulator (top) and modified voltage regulator (bottom)

Modified voltage regulator (left) installed. Here you can see where I used the old mounting posts as 'cosmetic' junctions.



## Alternator Connections

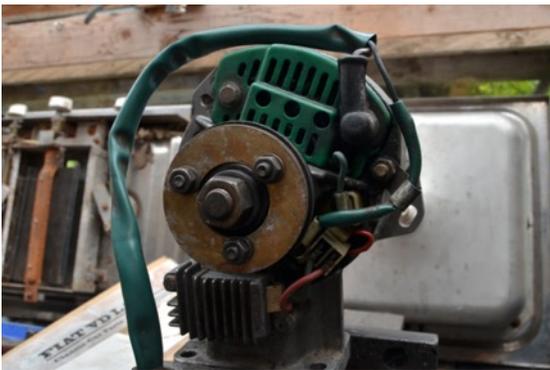


The thick (10ga) wire from the starter post goes to the B+ post (circled). The thin (18ga) wire from the green charging indicator light goes to the D+ spade terminal (arrow). Installed photo below. These are the wires you see joined on my modified voltage regulator install. Here you can also see the clearance problems with a non-alternator-specific fuel pump and mounting studs and why I recommend swapping the studs out for bolts.



## Wire Protection

For safety's sake, you should protect your alternator's B+ post with a rubber boot as seen in the picture below. Also pictured is a close up of the original style wire clamp used to keep the D+ charging light wire secure.



### **Miscellaneous**

If you have an LED installed in your GEN light on your dash, you will need to swap it out for an incandescent bulb. Due to the nature of an LED, it will remain on, even with 14V charging.

**Congratulations. You're done! Enjoy your new electrical power source.**

*Thanks to FiatForum.com members fiat500, Toshi 975, and MATTSAD for source materials*

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