

CONVERTING FROM DYNAMO TO ALTERNATOR WIRING ON A FIAT 650 ENGINE

Disclaimer – This document has been prepared solely for information purposes for the use of the recipient and without any commitment or responsibility on the part of the author.

Alternator and regulator types vary so please use this as a general guide. If you don't know what you are doing take it to a garage to have a competent auto electrician do the work.

A common conversion on Fiat 500's is the installation of a Fiat 126 650 (652cc) A1 Engine. The Fiat 126's were Alternator equipped whereas the 500's used Dynamos, therefore the wiring has to be converted to Alternator operation.

1. Alternator Types

I have covered the theory of Alternator and Regulator electrical theory in a previous document

"Ignition Light Fault Finding 500L"

What isn't explained is the three variants of Alternator/Rectifier set up

1.1 Integral Regulator

the Lucas 16ACR is typical of this configuration. The Voltage Regulator is installed in the regulator casing with the rectifier and diode pack. This type of alternator will usually have two terminals (the earth usually through the body of the alternator).

B+ the main battery charging terminal – usually a threaded stud

D+, IGN or IND Ignition Warning Light (IWL) feed (usually a 6.3 mm spade terminal)

1.2 Separate Voltage Regulator

the Lucas 11AC is typical of this type of configuration. The regulator is a physically separate, usually solid state unit, with three terminals:

D+ - this takes the D+ connection from the Dynamo and also connects to the Ignition Warning Lamp (IWL).

DF – this takes the DF connection from the Alternator Field coil terminal DF

D- this is the negative or ground connection

the third type is found on the Marelli or the Polish licensed Lucas Alternator fitted to 126's and is what I call a:-

1.3 Close Coupled Regulator

the regulator is installed on the Alternator as a separate finned box but is wired into the Alternator either :

via a green and yellow wires on a Polish Alternator or:

via Red and Green wires on a Marelli Alternator

In this configuration the Alternator will only have two external terminals

B+ main battery charging output (a threaded stud)

D+ this wire connects to the Ignition lamp (a 6.3 mm spade terminal)

Therefore the wiring described here will be for a Close Coupled Alternator.

2. Converting the wiring (please refer to attached Diagram)

Before starting any work **DISCONNECT THE BATTERY NEGATIVE CABLE FROM THE BATTERY POST**

You will have to change terminals on several cables so please ensure you have the correct terminals/cables etc before you start.

Always refer to your car's circuit diagram before starting to familiarise yourself with the circuit and cable colours and routing.

Make a drawing of the particular wiring you are dealing with showing the colours.

Take a digital photograph of the wiring before you start.

The wiring loom for the 500 will have normally four wires going to the Regulator

B+ Battery Charging (Terminal 30 – Thick Brown cable) the main battery charging cable – this cable is from the Starter Solenoid post

DF dynamo Field (Terminal 67 – Black cable) – this is the feed from the Dynamo Field windings

D+ Dynamo (Terminal 51 – thinner Brown cable) – this was connected to the Dynamo output.

There is also a separate wire (Green) which feeds the ignition warning lamp.

The regulator is normally earthed through the metal body.

Connect the thick brown wire from the Starter Motor Solenoid to the B+ terminal stud on the Alternator. This means that the regulated output from the Alternator will now charge the battery via the starter solenoid post connection.

Make sure this has a good electrical connection as it carries the main charging current (please see note below).

The Green wire from the IWL should be terminated on the D+ spade terminal on the Alternator. This will tell the IWL when the output of the Alternator reaches the Battery voltage.

The thinner Brown wire from the Dynamo output is now redundant and should be insulated and taped out of the way.

The Black wire which was used for the Field winding is now redundant as the Regulator is connected to the Field winding directly so should be insulated and taped out of the way.

I never cut away wires from a loom as they may be required in the future.

3. Testing

It is important that you test the alternator before merrily driving away into the sunset.

This is vitally important because the thick brown cable you have just terminated goes directly back to the battery (**HOT/UNFUSED!**) and any earthing faults will be disastrous when you reconnect the battery negative post.

Earthing

You must test the battery lead for earthing faults and you can do this several ways.

Make sure all electric circuits (lights etc) are switched off and ignition is off otherwise you will get a misleading reading.

If you have a Test Meter, switch it to the lowest resistance range (200Ω) and connect it between a known good earth and the alternator body – it should read less than 1Ω , this proves the alternator has a good earth and your test meter earth is OK. Now connect the positive test lead to the Alternator B+ stud. You should not get a reading. If you do get a low resistance reading then carefully work your way through the wiring to isolate the problem and **DO NOT CONNECT THE BATTERY** until you do.

If you don't have a test meter (you really should not tamper with car electrics if you don't have one) then connect an inline fuse fitted with a 5amp fuse between the battery negative post and the disconnected negative cable. If it blows you've got a problem. You can also do this test if you do have a test meter just to double check for shorts.

Alternator Voltage Output

Now reconnect the battery negative terminal.

Put the voltmeter on the 20V range and connect it across the earth and the Alternator B+ output post.

Start the car and let it warm up at normal tick over – the Ignition warning light will be on.

Now steadily increase the revs. At 3000 rpm the voltmeter should read between 13.5 and 14.5 volts.

The ignition light should be out

If the voltage climbs above 15 volts stop the test immediately and check your connections especially around the regulator.

If you do have problems refer to my document above on fault finding Alternator problems – it may help.

NOTE: Alternator to Starter Solenoid Cable

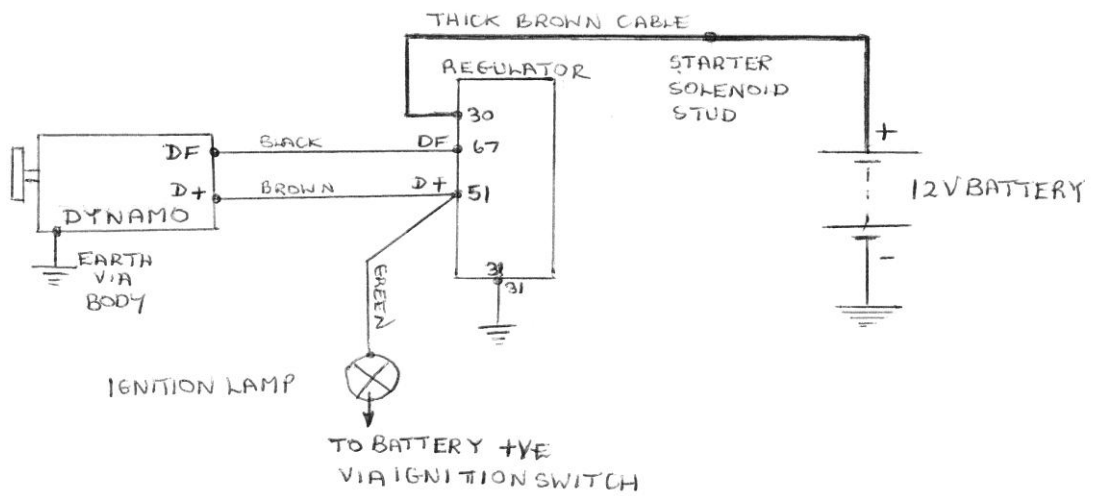
As a Chartered Electrical Engineer I have to point out that cable in the 500 wiring loom would have been designed for the maximum power output of the original Dynamo which was about 22 Amps. The Marelli Alternator is rated at 33 Amps – 50% higher than the Dynamo therefore the main (Brown) charging cable (B+ Alternator stud to Starter Motor Stud) should theoretically be upgraded. However the 33 Amp figure refers to the maximum power the alternator can deliver not what it will deliver – this is dependent on the Alternator load.

The original cable may be capable of handling the Alternator output.

Under normal circumstances the power for the car is supplied by the Battery. The Alternator's job is to keep the battery charged so it normally would not have to supply maximum power under normal load conditions but I should point it out.

You need to decide whether to upgrade the cable or not.

ORIGINAL 500 DYNAMO WIRING



NEW ALTERNATOR WIRING

(USING 500LOOM AND 650 ALTERNATOR WITH REGULATOR)

