ALTERNATORS

Why do we have them?

How do we care for them?

Alternator

Converts rotational power to Electricity

Alternators

- We used to have Dynamos, they were alright?
- Why did we change?
- Dynamos have a few limitations.
- Brushes and Commutator
- High current in moving parts
- Low charge at low speed
- Weight and manufacture cost

Because of

- Increased power demands for lighting, radios, auxiliaries.
- Better charging at low engine speeds [particularly at Idle]
- Silicon Diodes became available
- Cost and weight pressures.

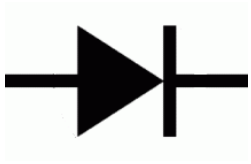
Alternators vs. Dynamos

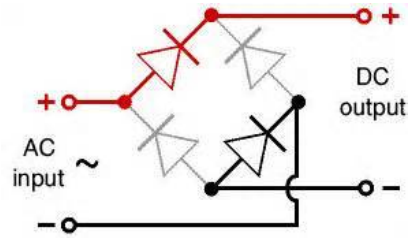
- In the dynamo
  - The power is generated in a rotating armature
  - It generates Alternating Current in the armature
  - Rectification is done by the commutator and brushes
  - The magnetic field is produced by stationary Field coils
  - Regulation by varying the current in the field coils

Alternators vs. Dynamos

- In the alternator
  - The Field coil rotates, current carried by slip rings
  - Regulation is by varying current in the field coil with transistor regulator
  - The power is generated in stationary coils
  - Rectification is by silicon diodes

Alternators > The Silicon diode





Alternators > Inside

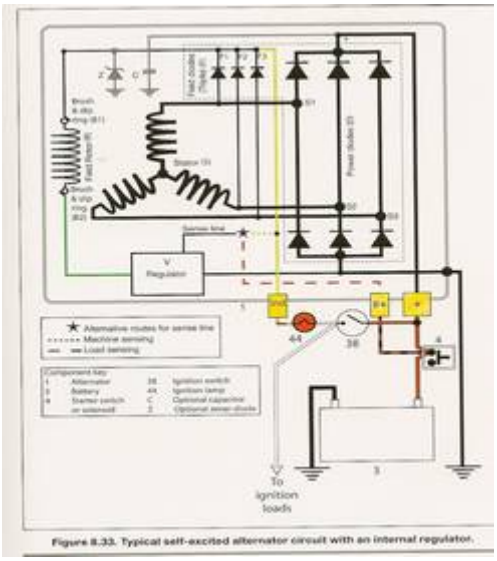


Figure 8.33. Typical self-excited alternator circuit with an internal regulator.

Alternators

- Care
  - Belt Tension: As per Workshop manual
  - Belt type, Use the “toothed” type from Clive W.
  - Cleanliness of installation
  - Electrical Connections
  - Mounting bolts

  - Battery Connections
  - Brown wire to Battery, Condition and size

Alternators The warning light.

- The Ignition warning light serves several functions; the most important, although invisible to you, is that it supplies a small amount of current to “Excite” the alternator, in effect to “wake it up” to get on with charging.
- As the output rises, the voltage difference between the alternator and the battery decreases and the lamp goes out.
- When you switch on, it must glow, if not there is a problem.
- If the lamp has simply failed, replace it, the alternator will not charge with a dud bulb.
- Fortunately failure is rare, and the cause is often elsewhere.
- If it does not go out when the engine is started, do not panic, simply blip the throttle and it will.
- If it didn’t, check the belt is still intact.

Alternators > Summary

- A very efficient, cost effective, power convertor.
  - But 50 Amps at 13.5 Volts is 675 Watts or nearly 1 HP
  - With inevitable losses in conversion, may draw > 2HP.
- Silicon chip regulator ensures accurate output voltage
  - Output voltage control avoids “boiling off” water in the battery
  - Minimises need to top up with distilled water
- No commutator and brushes carrying high current
  - minimises maintenance requirements
- Sealed for life bearings
  - Will last for life if the belt is correctly tensioned.
- Belt drive is preferable as it has inherent slip.
  - When you change gear, the engine has to change speed quickly, but the alternator rotor has considerable inertia, so the belt acts like a slipping clutch

Alternators

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