

Model A Electrical Grounds

Fixing and Improving

Why good grounds are important

All electrical components require a close path for current. The wiring provides one side of this loop, the ground circuit provides the other side. Bad grounds have the same effect as bad wiring!

Most Model A's are not for fine point judging. All the extra grounds in this presentation can be added without drilling holes or modifying parts and can be easily undone in the future.

What is wrong with original grounds?

Ford actually did a poor job of grounding electrical devices on the Model A.

- Battery is only connected to frame
- Engine has no dedicated ground; rear mounts sit on rubber pads, front mount sits on steel springs on painted cross member.
- Generator is painted and on a painted engine boss.
- Head lights mounted on ball/sockets that are rust prone and head light bar is bolted to painted fenders sitting on frame welting.
- Tail lights bolted to painted fenders that are cushioned with welting.
- Electrical wipers are mounted on a windshield frame that is held on by a hinge.

Causes of Poor Connections

- Rust and other corrosion

- Electrical paths should be clean, bare metal. All the connections deteriorate with age by rusting.

- Paint

- There should be no paint between electrical connections

- Bad wires

- Bad wires have reduced current carrying capability, broken and corroded wires should be replaced.

Overview of system ground paths

Starting circuit

Consists of battery, starter motor and starter switch

Ignition and charging

Consists of battery, ignition coil, ignition switch, distributor, generator and ammeter.

Lighting

- Head lights, tail lights, dash light, cowl lights, dome lights, sport lights

Accessories

- Horn, electric wipers, aftermarket add-ons

electric wipers, other add-ons

How to tell if there is a ground problem

- Cut a piece of wire ten to fifteen feet long and strip the ends of insulation.
- Place one end against the battery positive (ground) post and secure with vice-grips or C-clamp.
- Turn on suspect device.
- Touch other end of wire to device, if it improves (such as headlight gets brighter), there is a ground issue.

Fixing grounds

Electrical components should not have paint or rust where they bolt to the chassis and the mating surface should not have paint or rust.

If a car is not for show, the new grounds added on the following sheet provide a much better electrical path. If you choose to not add them, it is still recommended that you add a ground strap from the battery to the engine and from the generator to the engine block.

New ground connections to be added.

New engine ground using a heavy cable between battery frame ground and transmission case.

New added connections to the head lights and horn by using the front shock mounting bolts.

New added connection to the tail light by using the rear shock mounting bolts.

New ground connection to the generator using the timing cover.

New distributor internal ground.

New electrical wiper ground, if applicable.

Battery connections

- Clean battery terminal connections
- Clean Frame connection
- Extra ground strap to engine
 - Use 3/8 internal tooth lockwashers (“star washers”) under transmission case and frame bolts to get good “bite” for electrical connection. Battery cable should be bolted up against frame with new strap on top of battery strap.

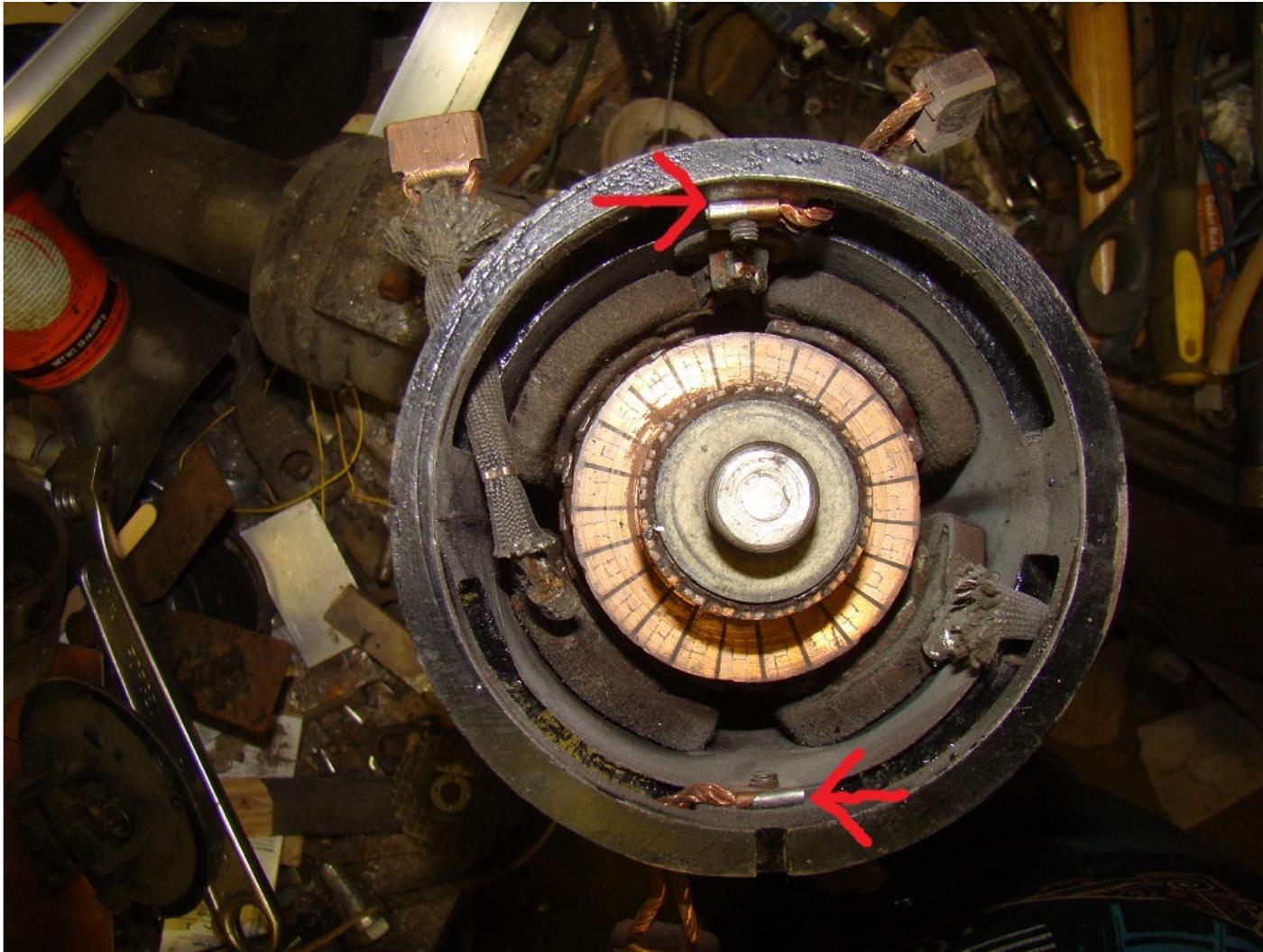
Optima battery plus extra ground strap



Starter

- Brushes need to seat properly on case
 - There should be no burrs on the brushes, they should lay flat against the case.
- Contact between parts in electrical path need to be rust and paint free
 - The back edge of the case, and the mating surfaces to the endplate should be bare metal.
 - The mating surfaces between the end plate and bell housing should be bare metal.

Places to check on starter



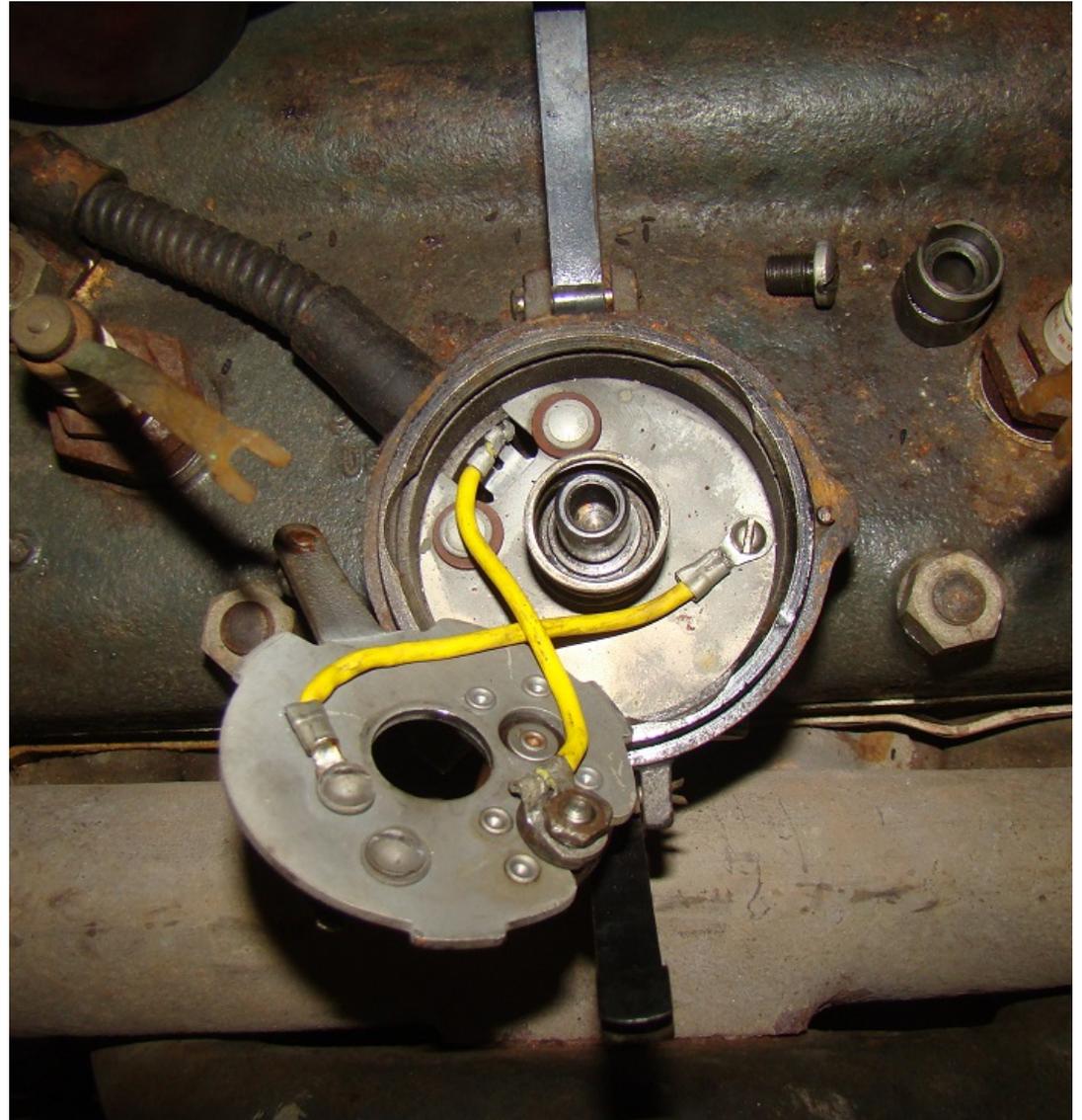
Distributor

- Adding internal ground wire

- Ensures proper grounding of point block to distributor body

Extra ground wire added inside distributor

This extra wire can be easily added to a stock distributor. It provides the points with a good ground no matter how dirty or rusty the plate edge or spring may be.



Generator

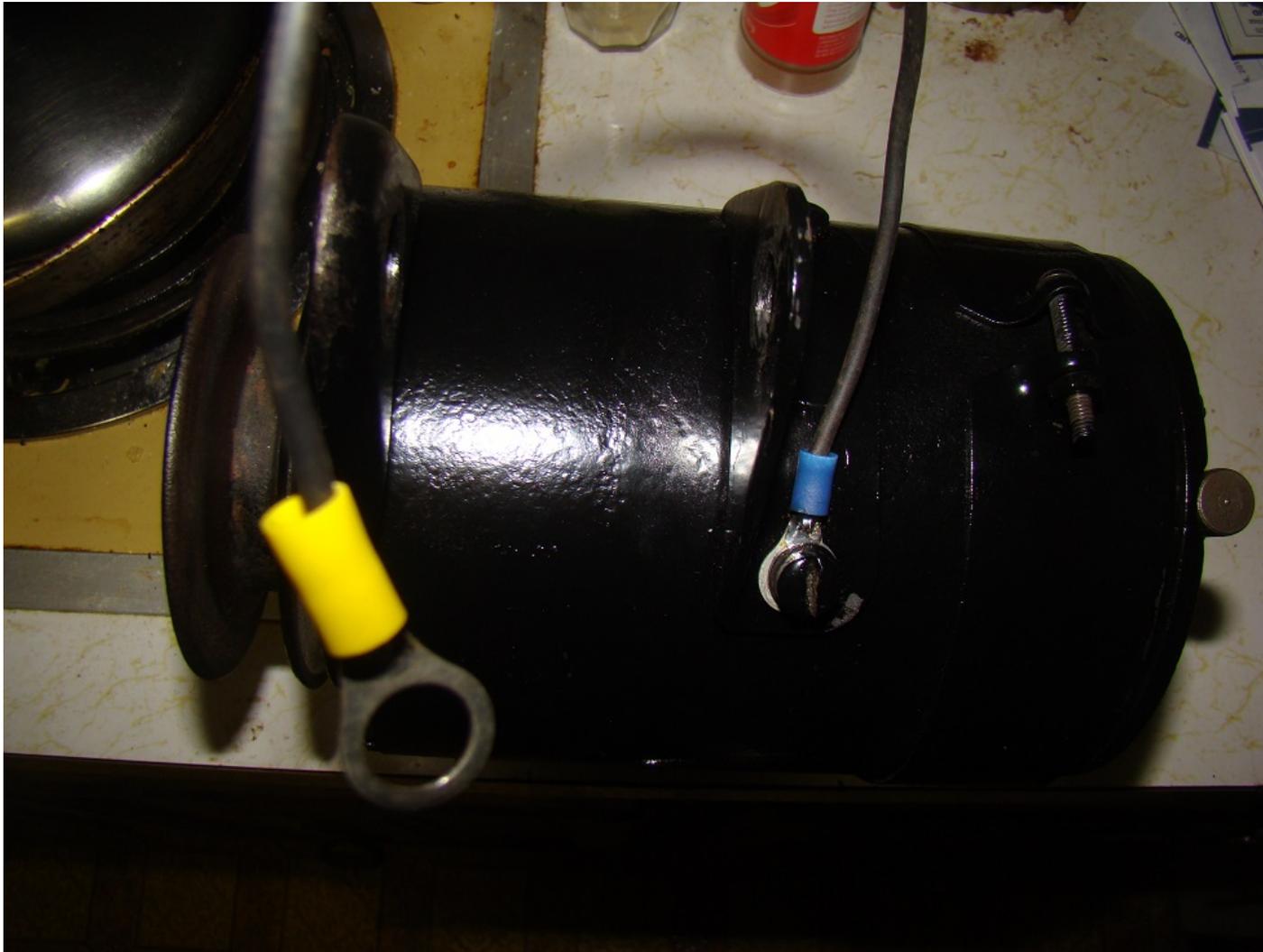
- Contact between parts in electrical path need to be rust and paint free
 - Brush holder straps to end plate and end plate to shell should be bare metal
- Add bonding strap between generator and engine to prevent loss of generator ground.
 - Use star washers on bond strap to rear bracket screw (1/4 inch) and timing cover bolt (3/8 inch).

New ground (bonding) wire for generator

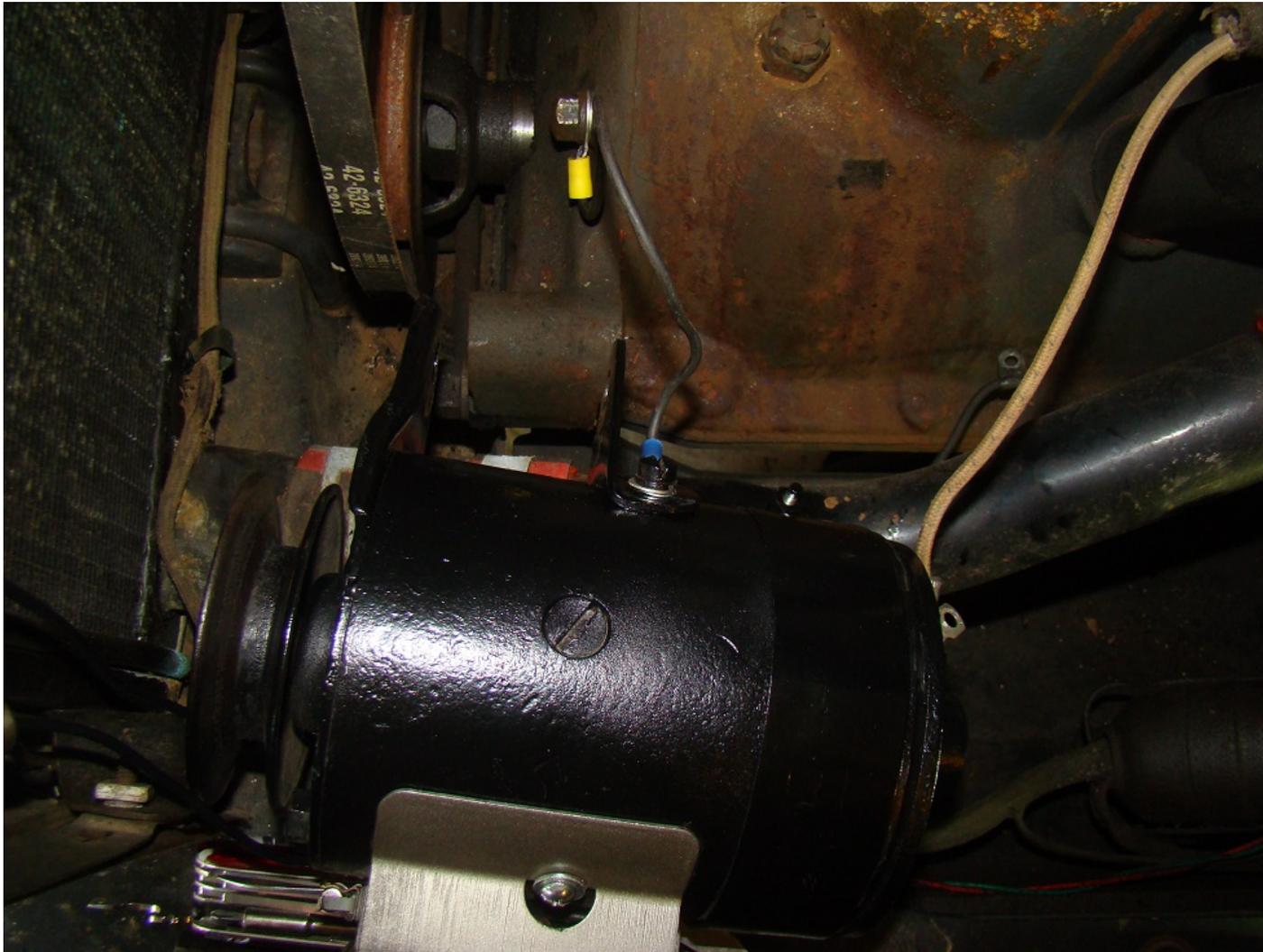
This wire is 8 inches long with a 3/8 inch ring terminal on one end and a 1/4 inch ring terminal on the other end. Wire is 16 guage.'



Bonding wire added to generator



Bonding wire connected to timing cover



Headlights

- **Eliminating shell connectors**

- These are a source of most headlight electrical problems

- **Adding ground wire to socket**

- This removes all the bad connection possibilities from the headlight circuit.

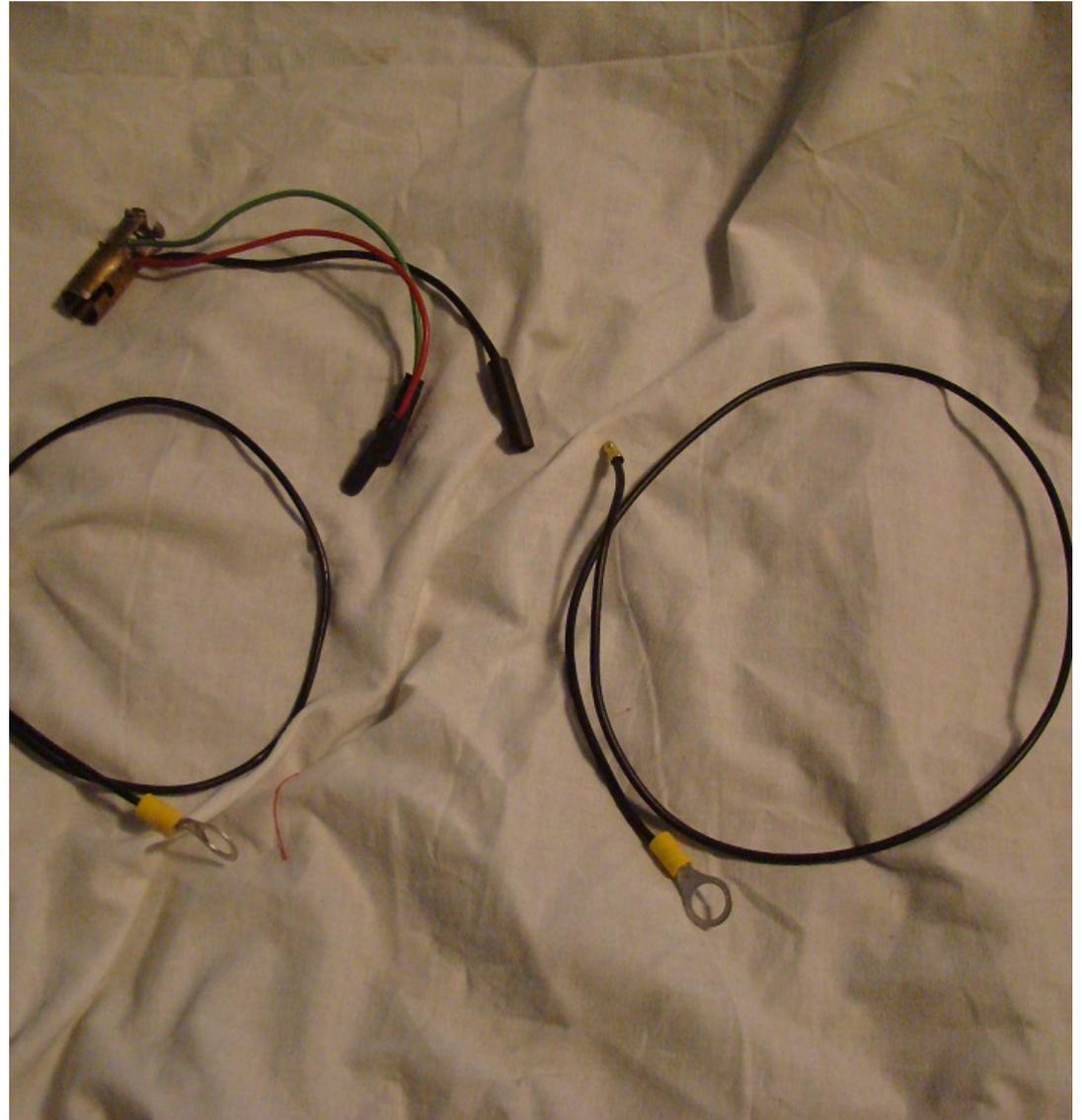
- **Adding ground wire to shock bolt**

- This completes a solid ground connection to headlights, use 7/16 star washers between ring terminal and frame.

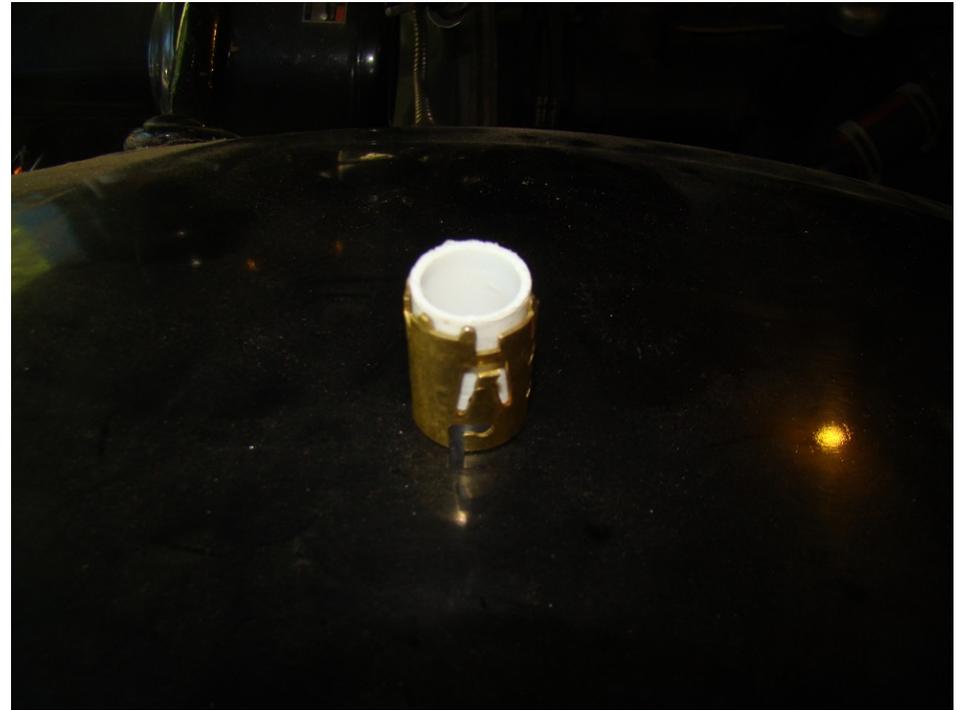
New wiring for headlight

An original socket has had a ground wire soldered to the socket base and bullet connectors added to the wires.

The wires here are to connect the sockets to the frame ground. They are 26 inches long and have a $7/16$ inch ring terminal on one end and a bullet connector on the other end. Wire is 16 gauge. The ring terminals need to be enlarged slightly to fit over the shock bolts.



New ferrule connector. Insulator is to prevent wire from rubbing ferrule.



New connections to eliminate old style connector

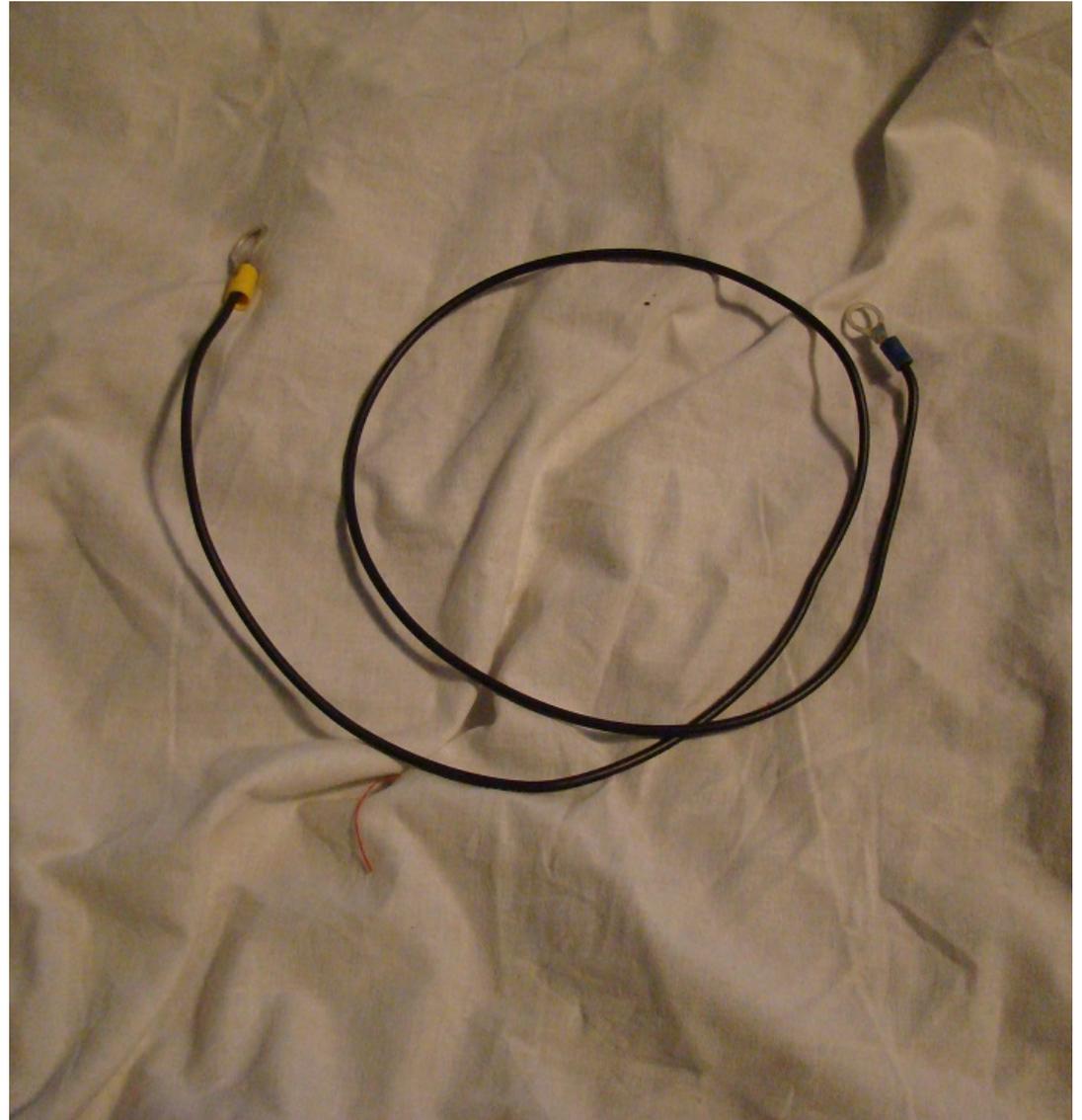


Tail lights

- Adding extra ground wire from tail light mounting screw to shock bolt
 - This guarantees a solid ground connection between the light and frame

New tail light ground wire

This is the new wire to provide a ground between tail light and frame. It is 25 inches long and has a $\frac{7}{16}$ inch ring terminal on one end and a $\frac{1}{4}$ inch ring terminal on the other. The wire is 16 guage. The ring terminals needed to be enlarged slightly to fit over the shock bolts.



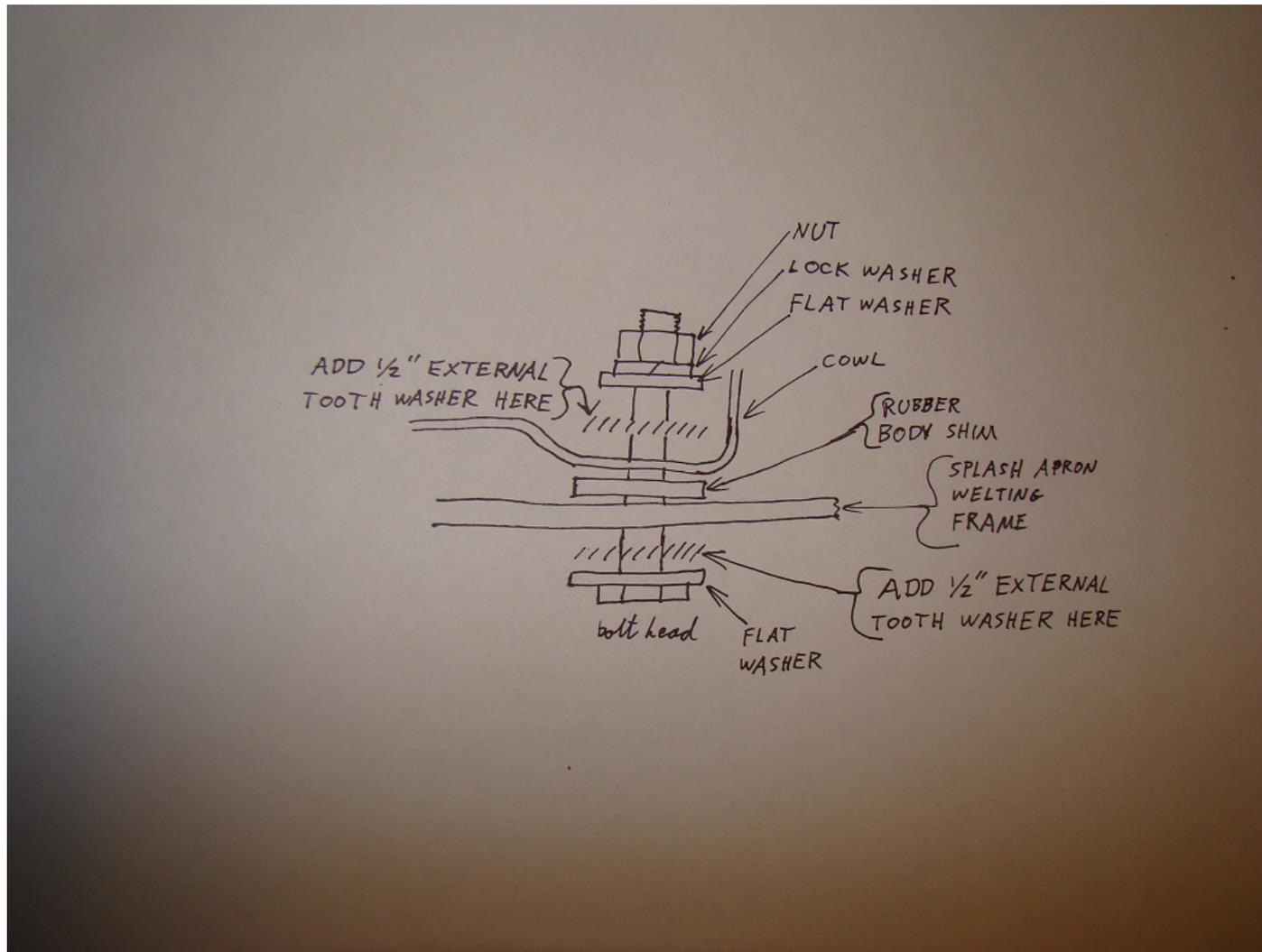
Extra ground wire under tail light mounting screw



Cowl and dash lights

- Adding star washers to body bolts to improve ground.
 - This grounds the body to the frame and provides a good ground for the cowl and dome lights as well as electric wipers and any other accessories
- Current draw is very low and is rarely a problem
 - There is virtually no gain in adding extra ground connections for these components, except for electric wipers

Star washers added to front body bolts to improve ground



Horn

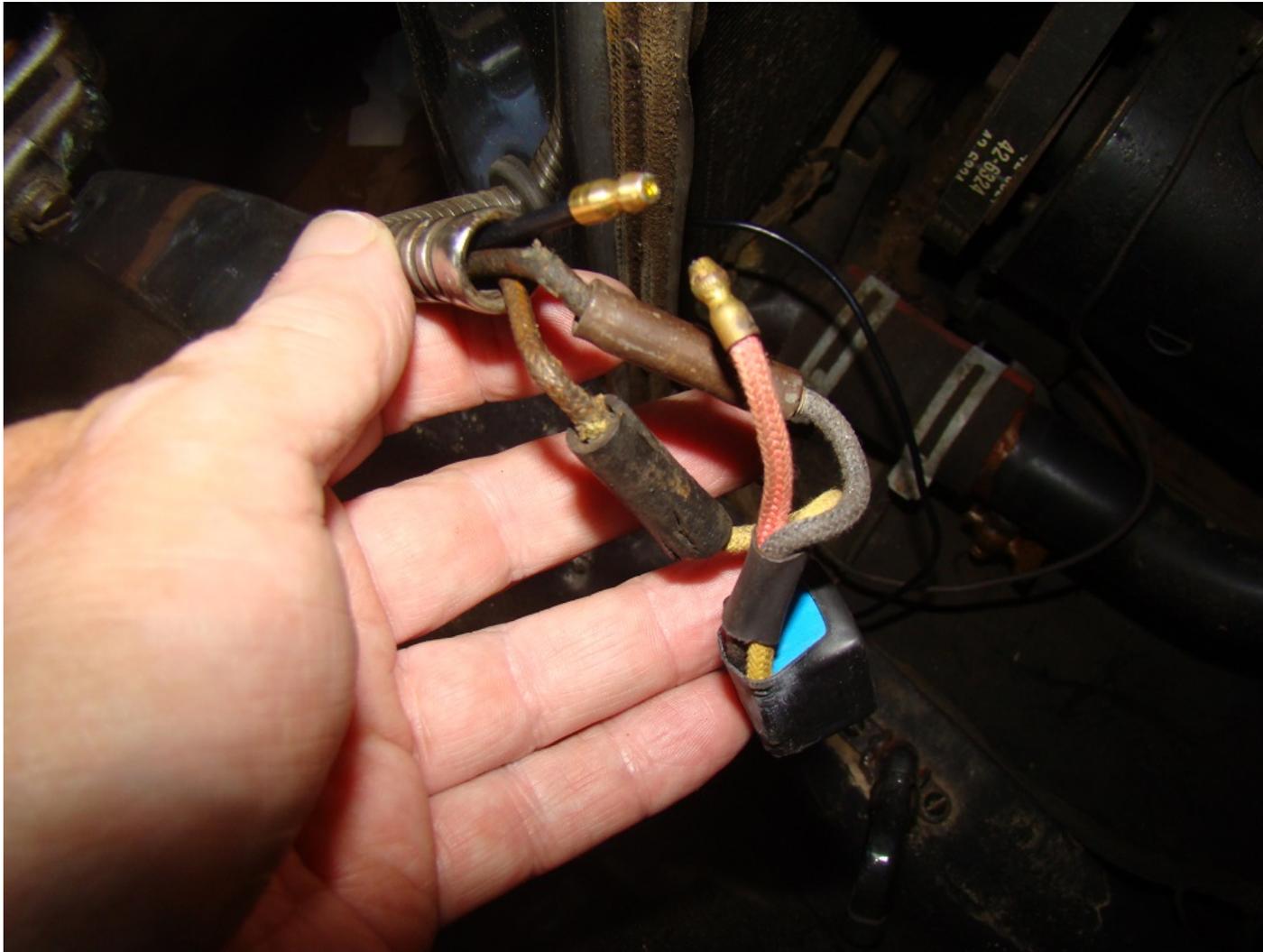
- Adding horn relay

- This removes the switch wire and long ground path from the heavy current path

- Connecting new ground to shock bolt

- This provides a solid ground connection for the horn

Relay added to horn connections,
bare terminals connect to horn

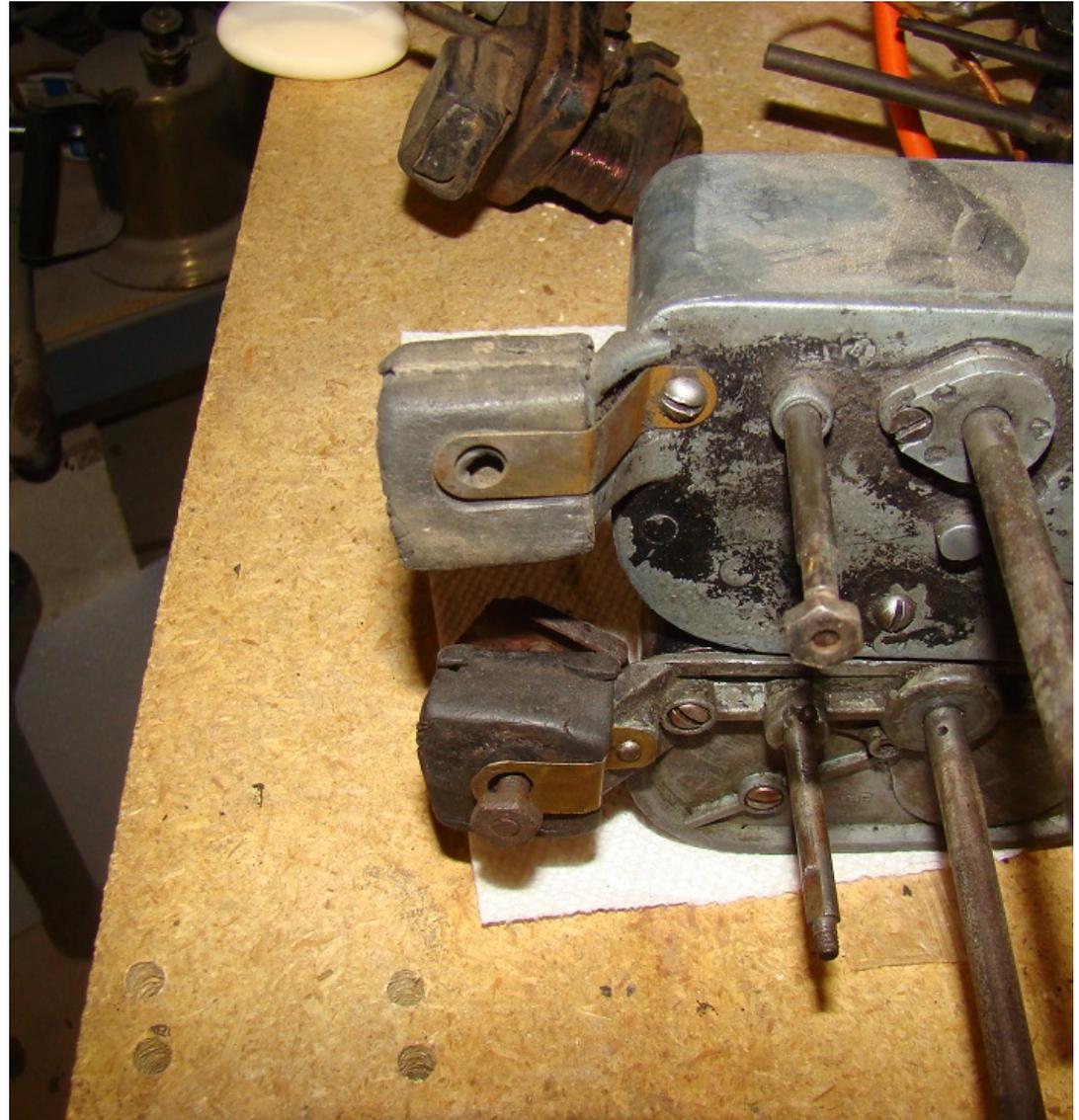


Electrical Wipers

- Internal connections need to be tight
 - Makes sure that all connections are tight and that the ground strap around the rubber boots are present and tight.
- Add extra ground wire to body
 - This can run alongside the hot wire and grounded to a door post

Electrical wiper motor ground straps around rubber boots

The top wiper motor is an Owens-Dyneto open car #3, the lower wiper motor is an E.A.Laboratory unit. All electric wipers used a brass ground strap to provide an electrical connection between the wiper motor and windshield frame. An extra wire can be added using a ring terminal to connect to this point, and then run to the windshield post and grounded there.



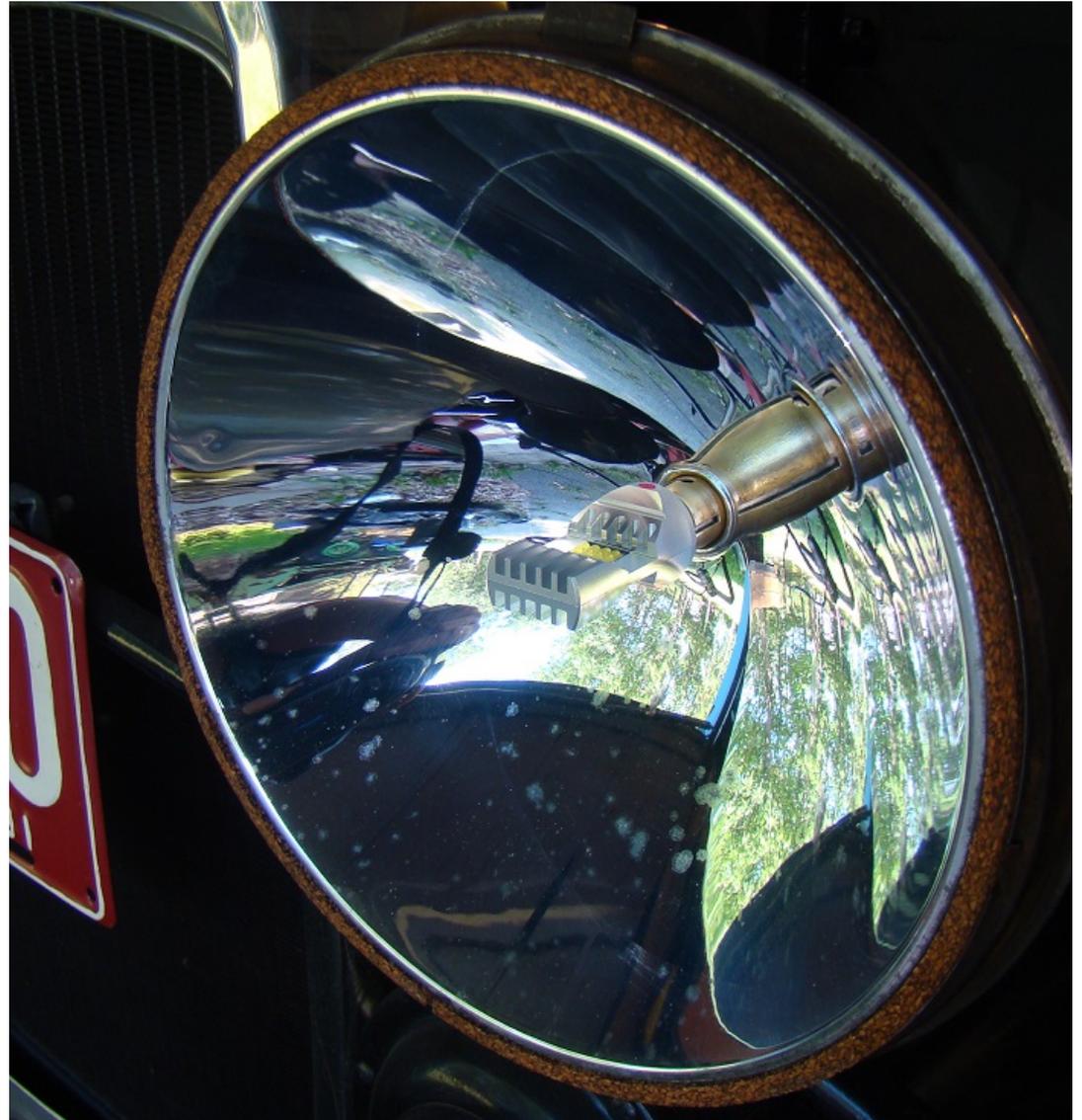
Improvements to electrical system

- LED headlights
- Other LED lights
- Alternators
- Regulated generators
- Add fuses or circuit breakers
- A regulated generator or alternator is recommended if you use LED head lights, you don't want to blow up expensive bulbs!

Headlight with LED “bulb”

This provides much more light with less current than original incandescent bulbs.

Recommend regulated generator or alternator to prevent accidental overvoltage condition blowing them!



Regulated generator

This is a stock Model A generator with a mid 1930's Chrysler regulator added to it. It fits in the existing cut-out holes and only requires removing the output terminal and running two wires through it; one to the hot brush and one to the field coil ground. The field hot wire is moved from the third brush to the hot brush. Many other regulators can be used in this same way. Many rebuilt generators were wired this way for regulators and turn up frequently in flea markets, with the field wire grounded. Many people use modern alternators, which work very well also.



Fuse added to main wire

This fuse is 30 A. A circuit breaker can also be used, which eliminates the need to carry extra fuses. If a stock generator is used, when this fuse blows, the generator can go over-voltage and cause damage! It is even better to add a second fuse of lower value (20 amps) just for the light and horn circuit, as this is where most faults occur, and the car can still be driven if it blows.



Sources

7/16" internal tooth lock washers used for shock bolts. Grainger supply

1/4" and 3/8" internal tooth lock washers available from most hardware stores

16 gauge black wire available from most hardware or auto supply stores

7/16", and 1/4" ring terminals available at most hardware or auto supply stores.

Head light ferrules (18270), bullet terminals (20550), LED headlight bulbs (17994), and horn relay (20040) from Bratton's antique auto parts and other suppliers.