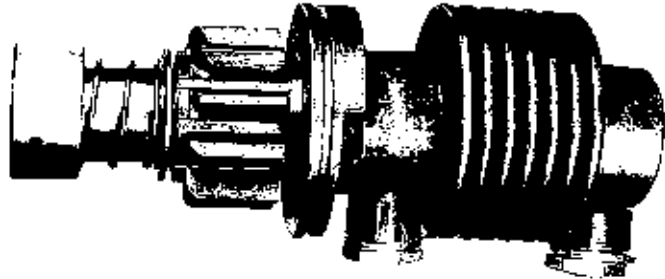


Rebuilding the Model A Starter

By Herb Neumann
Diablo A's



First remove the starter, and confirm that the 3 mounting bolts are 1" long and no longer.

Remove the Bendix drive; make sure the gear moves smoothly; clean and lightly oil. Use new locking tabs when you reinstall the drive. Remove the woodruff key and set aside.

Usually the only things that may need replacing, after thoroughly cleaning and inspecting the starter, are the bushings and possibly the brushes. The oilite bushings should be soaked in motor oil overnight before being installed.

Remove the band, giving access to the 4 brushes. Use needle nose pliers to lift the spring out of the way to remove the brushes from their holders.

Remove the 2 long bolts and set aside.

The front (brush end) mounting plate can be removed. Look for the fiber thrust washer when the plate is removed. Set the washer aside.

Remove the mount end plate, and set aside.

The armature should be removed from the brush end of the starter. Clean both shaft ends, check for wear on the armature windings and the commutator. The commutator can be cleaned up with fine sandpaper. It can be turned in a lathe if you have access to one.

Inspect the housing, use caution when cleaning as solvent will attack the field coil insulation. Check condition of the paper insulator (fish paper) at the top end, and replace if needed. Standing the housing on end, the 4 field coils are wired in a series parallel combination. With the copper contact button at 12 o'clock, 2 coils on the left are wired in series (connector bar at the far end) and the 2 coils on the right are wired in series. You should have continuity on both the right and the left pairs by measuring between the contact button and each insulated brush (make sure the brushes are not touching the case). Check between the button and the housing for an open circuit. The brushes need to be at least 1/4" long. If they are shorter, they should be replaced.

Clean the brush end plate using solvent. Make sure the 4 brush holders are clean and that a brush will move freely in the holders. Two holders are grounded and 2 are insulated. Check to verify the insulated pair are indeed insulated from the end plate. To remove the bushing, saw through the bushing using a hacksaw blade and then using a punch break the bushing to

remove. Clean the bushing area with solvent. You can use a bench vise and an appropriate size socket to press in the new bushing.

Clean the mounting end plate with solvent. Use a bench vise and appropriate size sockets to press the old bushing out and the new bushing in. The position of this bushing in the plate is used to set the armature end play when assembling the starter.

If brushes are too short, replace them. The 2 insulated brushes should be unsoldered using a 200 Watt iron or a small micro torch. If using a torch, be careful not to burn the field coil insulation; they're usually oily. If the brushes are not being replaced, make sure the insulation is in good condition.

Reassembly: After cleaning and inspection, place the thrust washer on the commutator end of the armature and place the armature in the housing. Install both end plates making sure the locating pins in both plates engage with their notches in the housing. Install both long screws. Check the armature end play; it should be about .010 to .020". Adjust the position of the mounting plate bushing to obtain this clearance. Turn the armature by hand, checking for any drag or high spots. It should turn smoothly with no drag. Remove the screws, and install the grounded brushes if they were removed, solder insulated brushes to field coil buss arms, and insert the fish paper insulator in the area of the field coil buss arms. The paper should be pressed under the coil insulation but not under the metal pole pieces. Route the brushes out the slots in the housing and reinstall the end plate and mounting screws. Insulated brushes should fit in insulated holders and the grounded brushes in the grounded holders. Installing the brushes is the reverse of removal. Using needle nose pliers, lift the brush spring away from the holder and place the brush in the holder and then position the spring in the center of the brush between the 2 wires. Make sure the wires don't bind on the spring. Again, turn the armature, checking for drag. You should hear the brushes rubbing on the commutator.

Now you can check your handy work! Connect jumper cables to a battery, connect positive end jumper to the mounting end plate, place your foot on the starter motor to keep it from turning and touch the other jumper to the copper button. Sparking is normal, the armature should run at a high speed (4000 rpm no load). Let it run for about 15 seconds, brake the connection, allow it to stop and repeat a second time. Look at the armature - it should not appear wavy or blurred; this verifies that the armature shaft is straight. If you're satisfied with the operation, install the inspection band and paint the starter black, masking the copper button and the mounting holes. Don't paint the flywheel housing side of the mounting plate.

Notes:

Use brush assemblies with 4" lead length.

Repair the insulation of the field coils as required. Use cotton tape or cotton bias tape. Use solid wax to impregnate insulation repairs and also wax the inside of the coils to aid in seating the pole pieces.

The stud height above the case should measure $3/8'' \pm 1/16''$.

For solder connections, thoroughly clean all connections to a bright finish, then tin these surfaces. The joint should be mechanically sound prior to soldering.