

# Overdrive Troubleshooting

Sometimes, Adjustments Are All That's Needed

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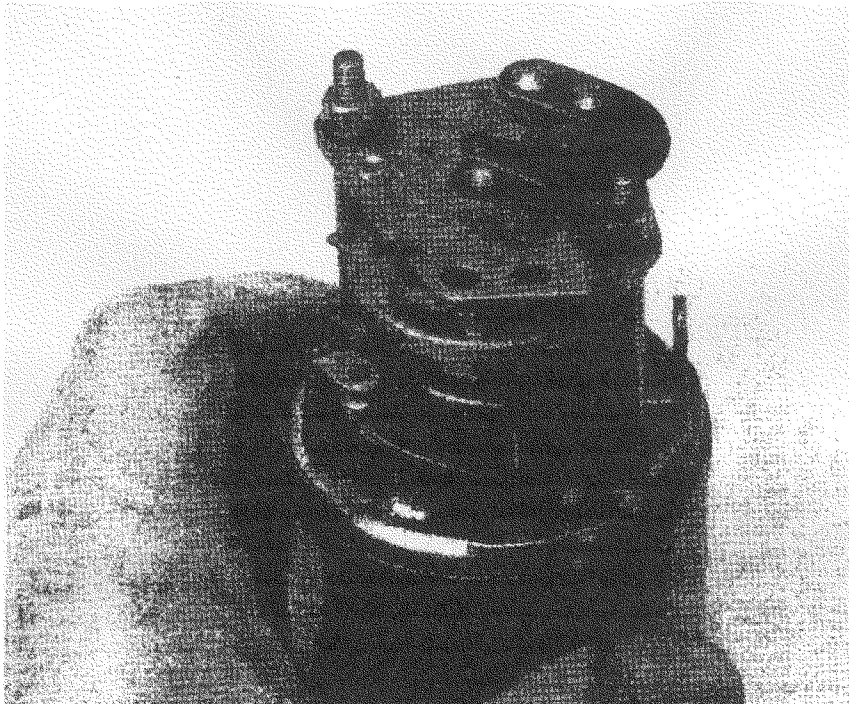


Photo 1. The engine interrupter contacts that briefly kill the engine when the transmission goes to direct drive are at the top of the unit. The 20-amp contacts are just above the housing.

I HAD JUST finished reassembling my transmission and, after the usual trials and tribulations, I got it stuffed back into the chassis. I then took the finished car out for a spin and marveled at how well it shifted with synchronizers that actually synchronized.

When I got up to speed, I put it into overdrive—and nothing happened.

So, I stopped and the first thing I noticed was that the fuse on the overdrive relay had blown.

What the heck, it looked like the original fuse, and 50 years of service is good enough for anyone. I put another in, tried to engage the overdrive and the fuse promptly blew again. Obviously, this spelled trouble.

After I returned home, I pulled out a copy of an overdrive diagnosis tree and followed its advice: I replaced the wire from the relay to the solenoid and even upgraded it to #10-gauge wire.

After all, this is a 20-amp circuit and it has a lot of work to do. Still, when I tried it, I blew another fuse.

Next, I replaced all the wires in the overdrive circuit, and blew another fuse.

I sent e-mails for help. Even with the information I received in reply, I blew another fuse.

Desperate, I removed the solenoid and removed the cover expecting a bunch of small parts to fall out. Nothing did!

Everything looked just fine...except that I noticed that when I moved the solenoid armature to its fully deployed position, the set of points that looked like they should break, didn't. Aha!

Regardless of what you may have heard, an overdrive is simple and sturdy, and if it worked the last time you used the car, and you haven't heard any rude noises coming from the overdrive since then, it should continue to work. If it doesn't, it's probably an electrical problem and the solenoid is not activating.

## Solenoid Solution

A solenoid is about one of the simplest electrical parts in the car, it has only one moving part and there are really no wear points of any significance.

The solenoid has two circuits (coils) that operate the armature; one heavy and one light. The heavy circuit, a pull-in coil,

causes the armature to move outward and engages the overdrive pawl into the pawl plate, thereby causing the transmission to shift into overdrive. The other circuit is the holding coil, which operates with far less amperage and merely has to hold the armature in position.

When the armature moves into its engaged mode, and is just about in place, a collar on the top of the armature strikes a tab on the moveable part of the point set and cuts out the heavy amperage to the pull-in circuit, at the same time maintaining the current to the holding coil. If the points don't break, the circuit becomes overloaded and the fuse blows.

## Concentrate on the Tab

The fix is to bend the tab so that the points are about an eighth of an inch or so open when the armature is in its fully extended position.

In some cases, like mine, bending the tab will not give you a consistent break when you manually push the armature into position.

In that case, you can follow my lead and epoxy a piece of material onto the armature collar where it contacts the tab. Anything will do the job. I found a piece of scrap in my shop about a sixteenth of an inch thick and cut and shaped it so it would fit under the collar and wouldn't interfere with anything else.

By the way, when you take the cover off, you will notice another set of contacts at the top of the assembly. These contacts are part of the interrupter circuit that kills the engine for a couple of revolutions so that the overdrive can shift back to direct drive when the accelerator pedal is fully depressed. (Photo 1).

An important note: To remove the solenoid, you have to rotate it about a quarter turn to the right; the flats on the plunger are correctly placed about 37 degrees from the vertical (Photo 2).

When you install the solenoid, the flats fit into a slot in the pawl and when you turn it to the vertical position, it locks into the pawl. To ensure that you installed the solenoid correctly, rotate the solenoid to the ready-to-bolt-up position and give it a tug. If you cannot remove it, it is correctly installed. If you can pull it all the way out, it wasn't engaged cor-

rectly. Check the position of the flats and try again.

### Don't be Afraid to Try

It seems simple now that I did it, but taking the solenoid apart originally seemed rather daunting. Believe me, I need not have worried, there is nothing in there that will easily break and everything appears to be overbuilt.

A nice feature about the systems in older cars is that you can manipulate parts to puzzle out what is wrong and how to fix or adjust them. It just takes the courage to take something apart and see what is happening or not happening; especially when you don't have a manual or spec sheet to walk you through the troubleshooting and repair process.

I have a feeling that a lot of solenoids have been replaced over the years when a simple adjustment would have done the job.

### About the Overdrive Itself

A couple of notes regarding the Borg-Warner Overdrive.

The same unit (model 10B) was used in a number of cars from Fords to Packards, cars with well over 100 horsepower. So, in a car with modest power like my Willys Jeepster, it should be way overbuilt and, given proper lubrication, it should last forever.

When I rebuilt my car's transmission I also rebuilt the overdrive because it was a bit noisy. What I found was that a previous owner must have driven the car without any oil in the overdrive. The gears were worn, fit loosely on their shafts (the needle bearings were actually square) and the gears were severely galled where they rubbed against the planet gear carrier. Even so, it still worked; it was just noisy. As I said before, many of these older components truly were overbuilt.

### Other Overdrive Tips

If your overdrive will not engage at its correct speed or it is erratic, make certain the companion flange at the end of the transmission is tight.

The gear that drives the governor is squeezed between the companion flange and the rear bearing. If the nut that holds the companion flange becomes loose, the gear (which is like the speedometer drive gear) will slip and cause the governor to lose speed.

### Relay Fuses

If the relay fuse fails, the first thing to check is the wire that goes from the relay to the solenoid. The tabs on the relay are

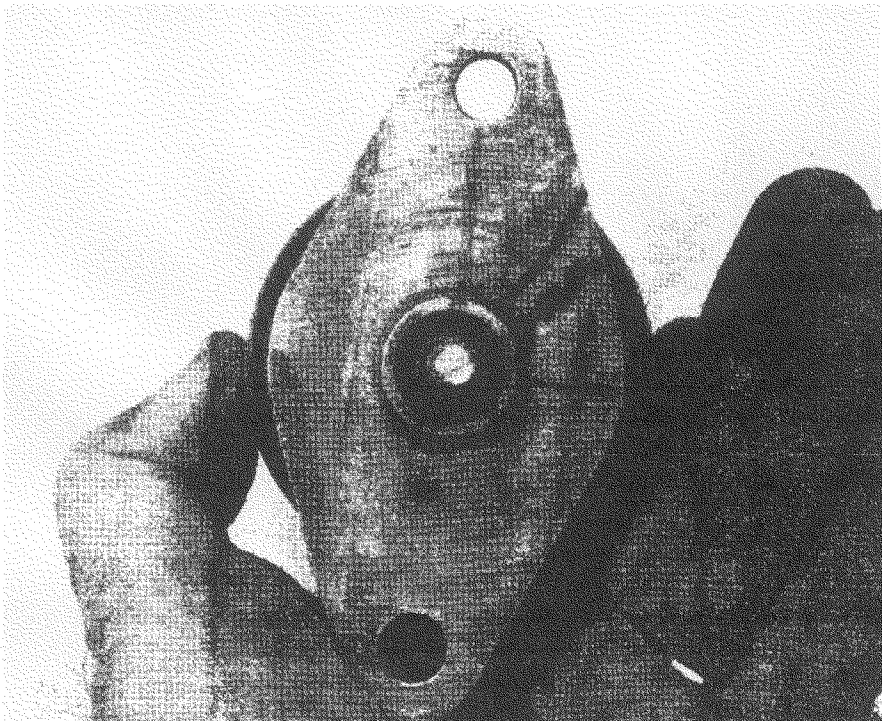


Photo 2. To remove the solenoid, rotate it about a quarter turn to the right. The flats on the plunger, shown in the center of the unit, are correctly placed about 37 degrees from the vertical, indicated by the wavy line on the right.

usually marked so that makes things a bit easier.

While you are at it, check the voltage at the #4 terminal at the solenoid, it should read at least 5.5 volts.

If it is reading less than 5.5 volts and the battery is fully charged, replace the wire from the relay to the #4 terminal on the solenoid. I suggest that you use a 10-gauge wire.

### It Won't Disengage

If your overdrive doesn't disengage, first check the overdrive shift linkage. Next, try to push the car backward. If it won't move backward, try switching the ignition off and on. If you do not hear the relay and solenoid click, you have an electrical problem.

If they click, pull the overdrive control out. If they no longer click and the problem persists, the problem is probably in the governor to lock-out/rail switch circuit or the governor itself.

If the relay and solenoid continue to click, the rail switch is most likely defective. Test it with a continuity tester.

### No Kick-Down

If your overdrive does not kick down, the problem is most likely with the kick-down switch.

You can test this by attaching a jumper from ground to the ignition terminal on the kick-down switch.

If the engine does not die, you probably have a bad or incorrectly adjusted kick-down switch.

If the engine dies when you try to go into passing gear (depress the kick-down switch), disconnect the wire at terminal #6 at the solenoid.

If the engine does not die when you press down the switch, you probably have a problem with the insulator at terminal #6. Remove the solenoid cover to make the fix.

If the engine stops when you depress the switch, disconnect the solenoid wire at the switch and try it again. If the engine dies, it is most likely the switch. If the engine continues to run, then the problem is most likely a short in the wire between the switch and the solenoid.

To check the governor without removing it, use a jumper wire from the rail switch (the switch at the end of the overdrive) and ground. If the solenoid clicks, then you may have a faulty governor.

All of this is not meant to be a comprehensive text on overdrive repair, but it should give you a good start on solving some of the more common problems found with the systems.

I also hope that if you've found yourself staring at a troublesome component lately (on an overdrive or otherwise) and weren't sure whether you should attempt a repair, my story will convince you to jump in there and give it a try. ■