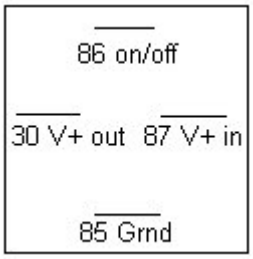
Overdrive Relay Rebuild for 1950 Champion

Overview
My overdrive relay was only putting out 3.8 volts to the solenoid. This caused the overdrive to fail intermittently. I decided I would replace the part (Studebaker part #523296) and went in search of one. Well, they're NLA (No Longer Available) and no one had a replacement for them. I spoke to Bob at Studebaker International and he says he could sell 10 of them if he had them. The members of alt.autos.studebaker suggested I clean all contacts and maybe rebuild my unit.

Decided to clean my unit up and put it back into the circuit. I cleaned all the external contacts and in the process found my 'original' unit had been rebuilt sometime in the past. It was a very poor job and explains why I was only getting 3.8 volts when it should be close to 6.0 volts. I cleaned the contacts inside and put it back together, still only 3.8 volts.

I eventually did find an old original stock unit and cleaned it up and sure enough it worked and I was getting 5.8 volts to the solenoid now. Problem solved, OD works like a dream, I'm one happy redneck!

The Relay
First let me say I do software, hardware scares me to death, I did learn how to solder at some point in my life and my electrical background is very basic. I took my old unit completely apart and started hitting the electronics manuals for a solid state relay swaps. The main criteria was the ability to handle 20 amps and be activated by 6 volts. I found a few components in Digi-Key in the $8-$20 range that might work, but I was in my local Radio Shack picking up some parts and found this relay in stock and decided to try it out. While this unit is a 12 volt part, the 7.2 volts from the generator, when running, is enough to activate the relay. It is a small black plastic cube with 4 connectors coming out the bottom.

Radio Shack #	257-226
Coil Voltage	12 V
Pull-in Voltage	6V
Drop-out Voltage	3.6 V
Coil Resistance	66 Ohms
Nominal Current	160 mA
SPST Contacts	30 A at 12 VDC
Pin Out	

Tools Required
You will need a heavy duty soldering iron for this project. I purchased one used for stain glass and it works marvelously. A Dremel tool with a wire brush attachment is great for cleaning up parts. If you don't have a Dremel, get one, best tool I own. An ohm meter is good also but a continuity checker probe will work just as well.

The Rebuild
I purchased a foot of #10 gauge solid wire from Home Depot to carry the major current from the battery to the solenoid. I used #18 braided wire for the connections from the kickdown switch terminal & the ignition switch terminal. Since these #18 wires won't be carrying much juice, I used .5" female crimp-on connectors and soldered the connector to the wire for better contact. I could then slide these connectors on/off the relay pins getting them out of the way for soldering the #10

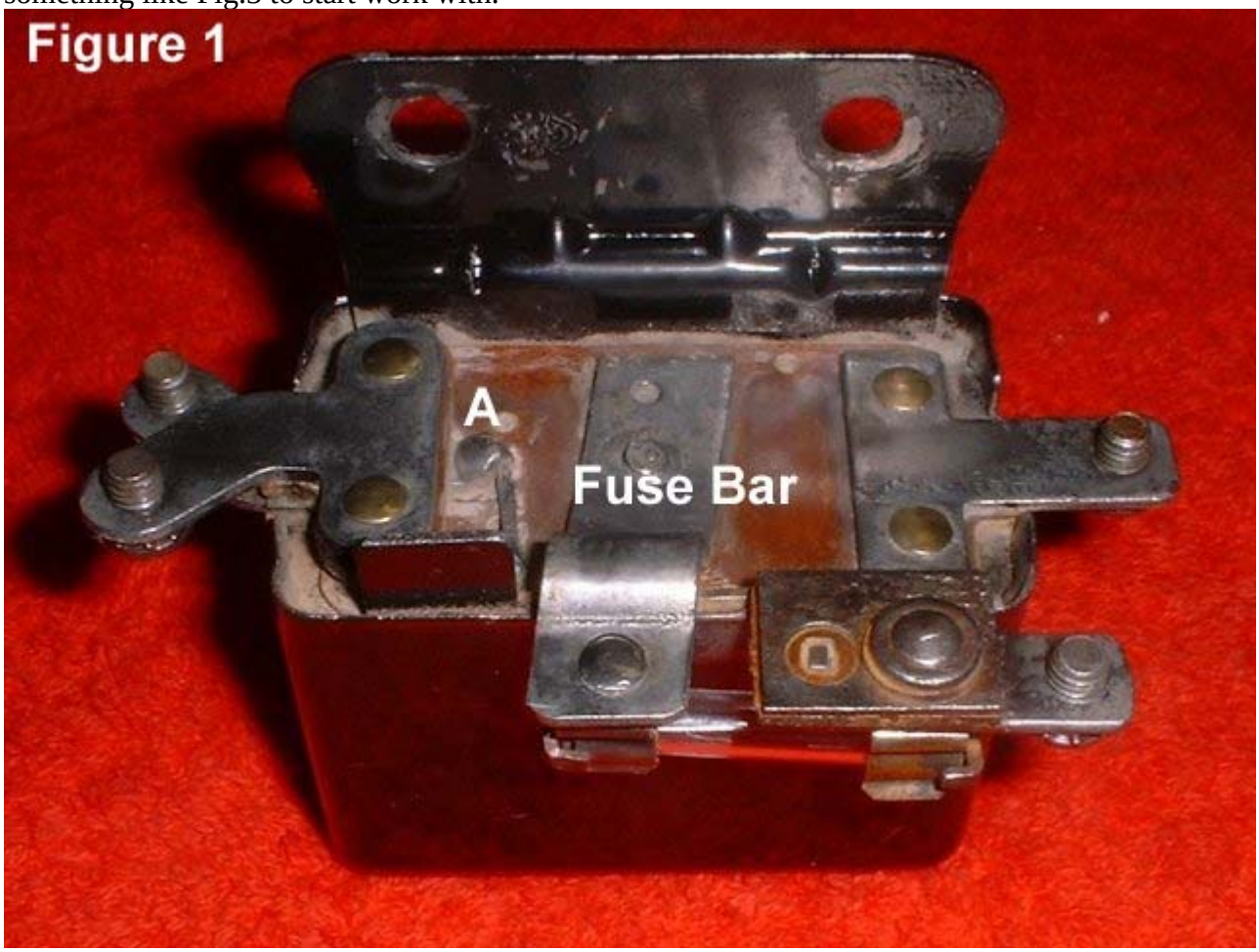
gauge wires. It is important to note the #10 solid copper wire should be as short as possible to minimize the resistance and voltage drop in the relay.

From the Studebaker Shop Manual it shows the following 4 connections to the OD Relay. In testing this circuit I did the last test in the OD relay trouble shooting guide where you ground out the OD governor wire, turn the car key on, and check for current on the unconnected SOL terminal. In this configuration, you should be reading 6 volts (the cars is not running right?) going into the 20 amp fuse, 6 volts coming out of the 20 amp fuse, and about 5.8 volts coming out on the SOL terminal. The table below summarizes the connections

BAT	#10 gauge Black Wire	Connects to Pin#87 on relay
SOL	#10 gauge Red Wire	Connects to Pin#30 on relay
IGN	#16 gauge Red/Yellow Wire	Connects to Pin#86 on relay
THSW	#16 gauge Green Wire	Connects to Pin#85 on relay

You will have to remove the top cover of the relay from the base. It is held in by four crimps in the cover at the corners. After the top cover has been removed, clean out the old relay coil and remove any pieces you can. Next spray the unit with carb cleaner or brake cleaner to get some of the gunk off. I used my Dremel and the mini wire brush to make the metal all nice and shiny.

In Fig.1 below is a bottom view of the Old Original Stock piece. Fig.2 shows what I had to work with from the prior rebuild. I would suggest you strip the base of your core down as far as possible. When completed you should have something like Fig.3 to start work with.



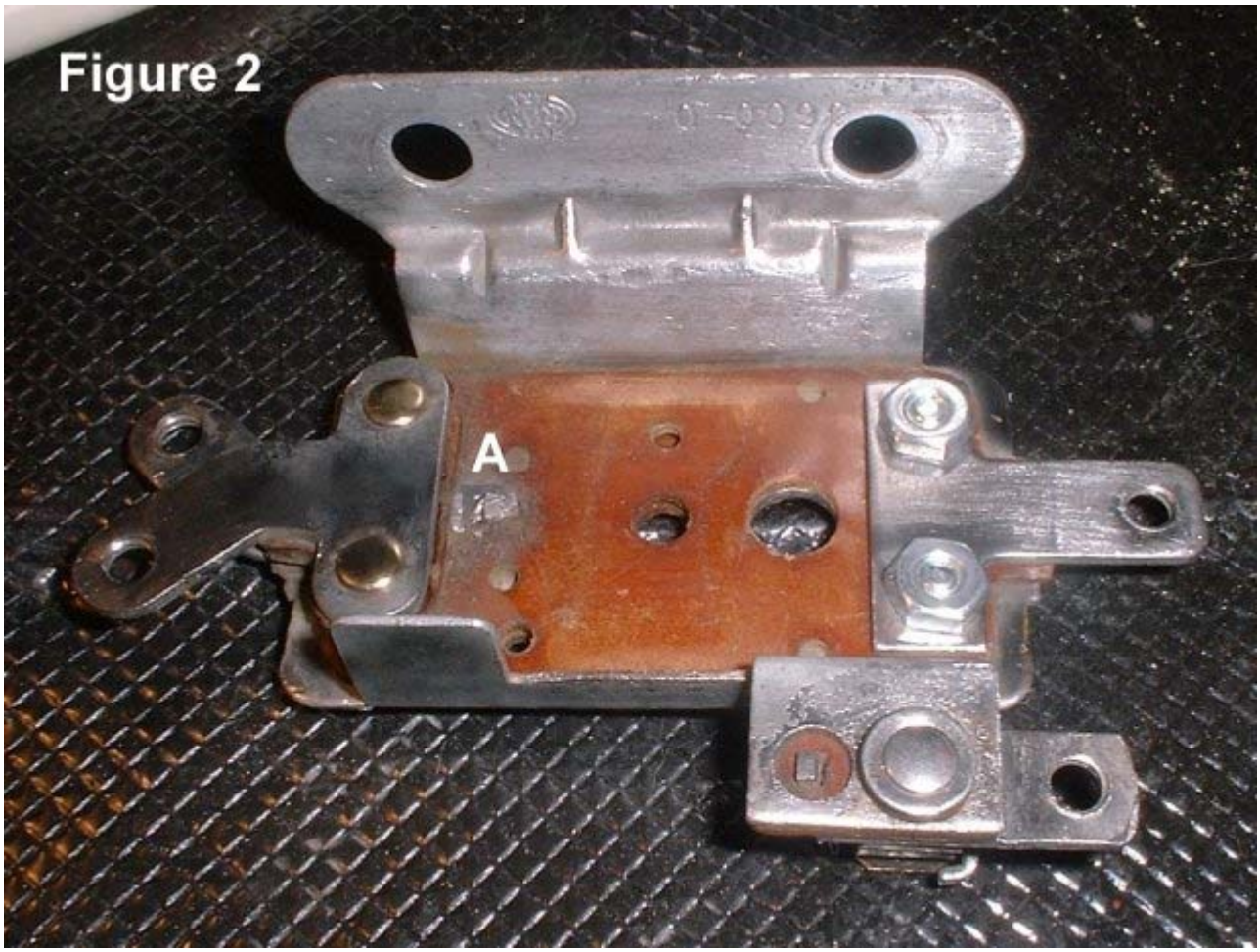
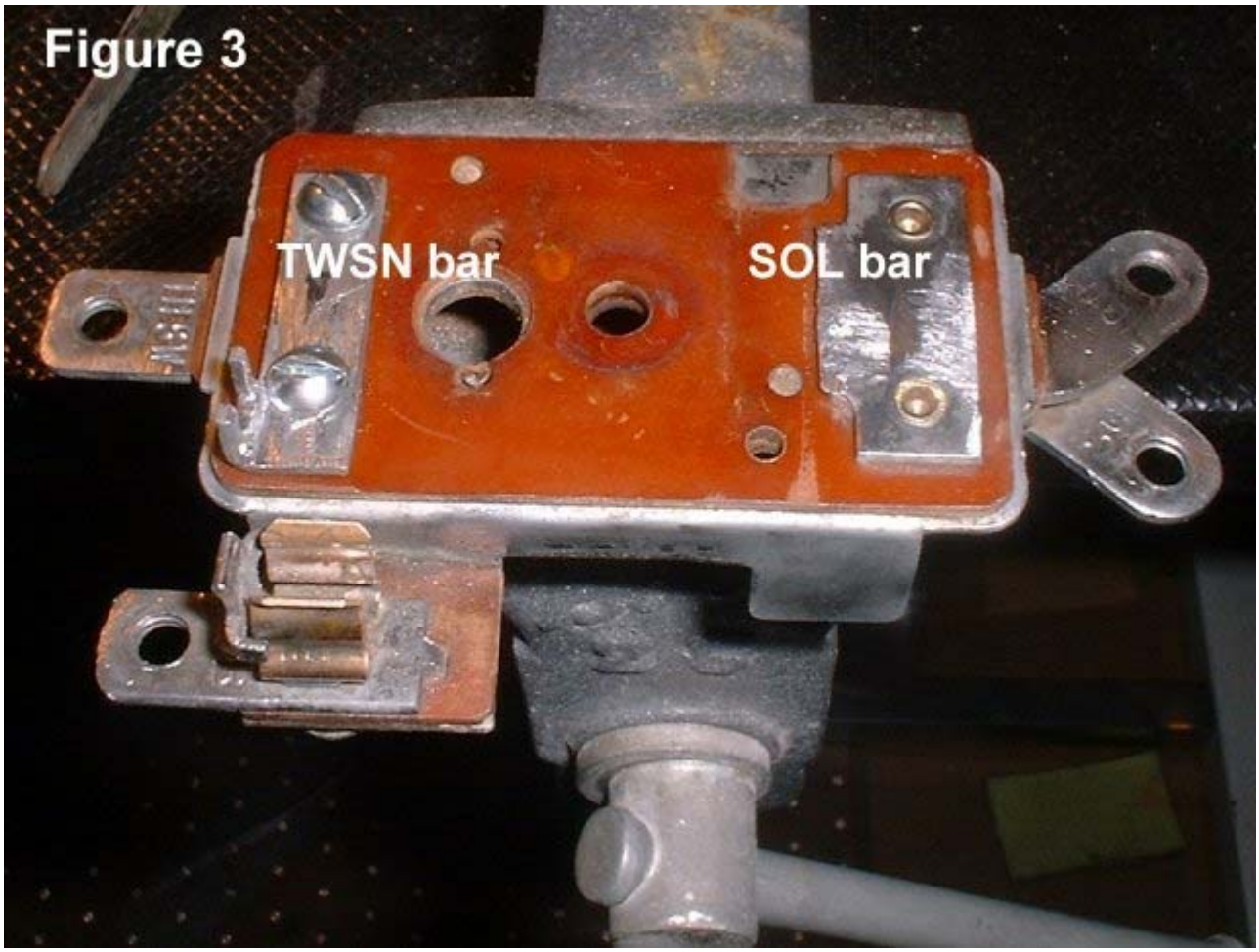


Figure 2
A



Wire #1 and #2
Cut two 5 inch pieces of #16 gauge wire and solder the female crimp connectors to one end of each. Slide the connectors onto the relay pins #85 and #86 for trial fitting, leave them long for now. The new relay case will need the mounting tab trimmed to fit flush onto the base of the relay core.

Wire #1 from pin #86 will pass through a hole in the core base and attach at the bottom of the base to the IGN terminal (point A in Fig 1 & Fig 2)

Wire #2 from pin #85 will pass under the new relay and attach to the core base at the TWSN terminal (point A in fig 3)

Wire #3
Cut a 2 inch piece of the #10 solid wire and bend a 90 degree .5 inch foot at one end. Flatten this end out on your vise so we get more of a footprint. Enlarge the existing hole in the new relay pin #30 to accept the straight end of this piece. Trial fit this piece between the SOL pad (point B in Fig 3). Get an old 120vac power cord and strip off a piece of insulation to cover this wire from point B to pin #30,

Wire #4
Cut a 4 inch piece of the #10 solid wire solder one end to pin #87 on the relay. This piece must connect down stream of the 20 amp fuse. Since my core was already rebuilt, my instructions would be different. Find the point on the top of the core base that is connected to the fuse bar (point B in Fig 1). This is where you will need to solder this piece. Trial fit the piece, then cover with old power core insulation, and solder to core base.

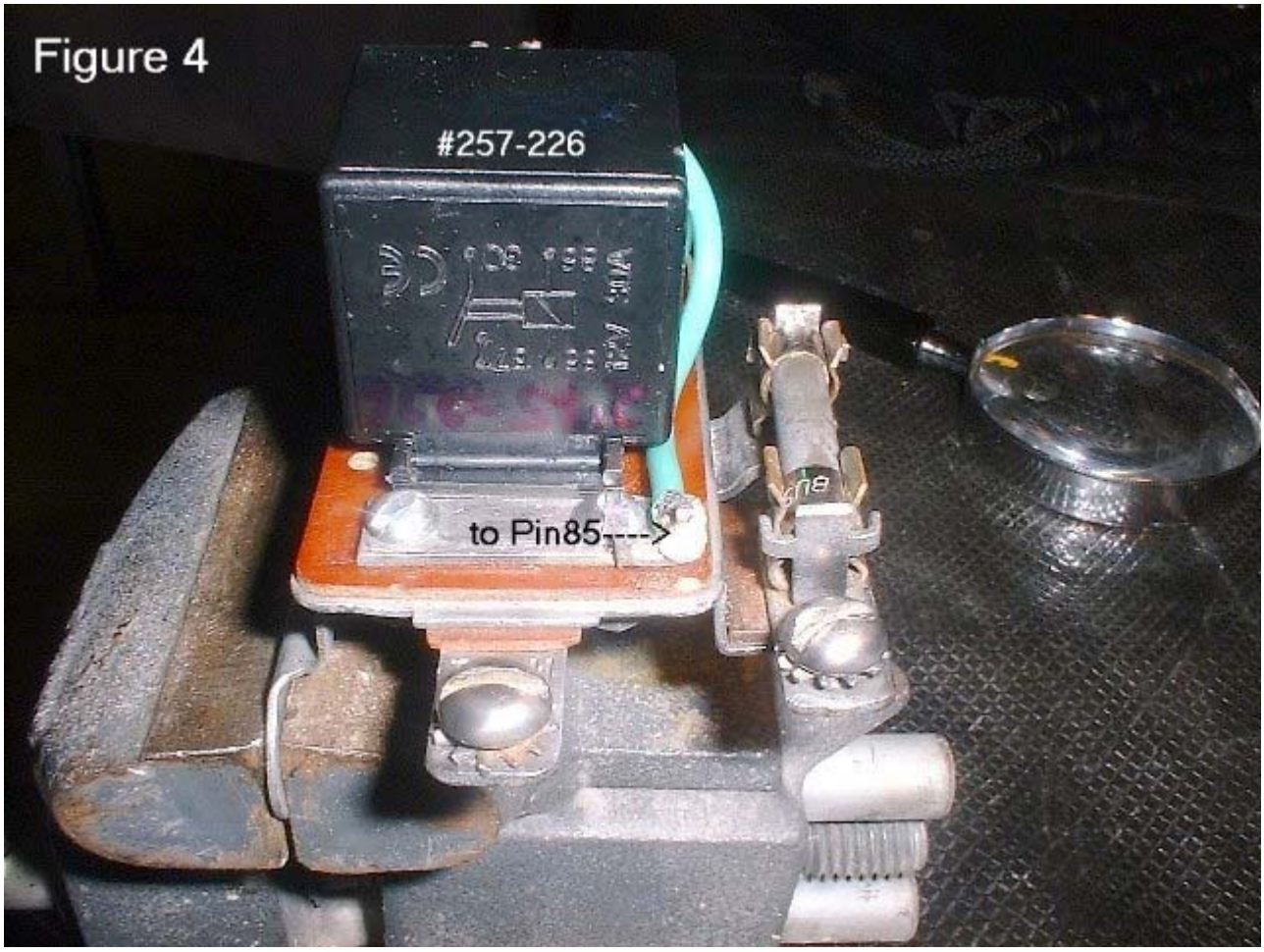
Connection #1
Now solder wire #4 to the point found above. Solder the other end to relay pin #87, making our first connection.

Connection #2
Next solder wire #3 to the SOL pad (point B Fig 3). Slip the insulation on wire #3, seat the new relay to the core base, route wire #2 to the TWSN terminal (point A in fig 3). Solder wire #3 to terminal #30 on the new relay.

Connection #3
Now attach wire #2 to pin #85 and solder the other end to the TWSN terminal (point A in fig 3). Trim off excess before soldering.

Connection #4
Finally, attach wire #1 to pin #86, pass through the core base, and solder the other end to the IGN terminal (point A in Fig 1 & Fig 2). Trim to fit and solder.

Now test all four wires for continuity from the relay, out to the core base. If you did it correctly, you should be able to replace the top cover of the relay to the base, hiding all your nice work. The finished product should look something like below.



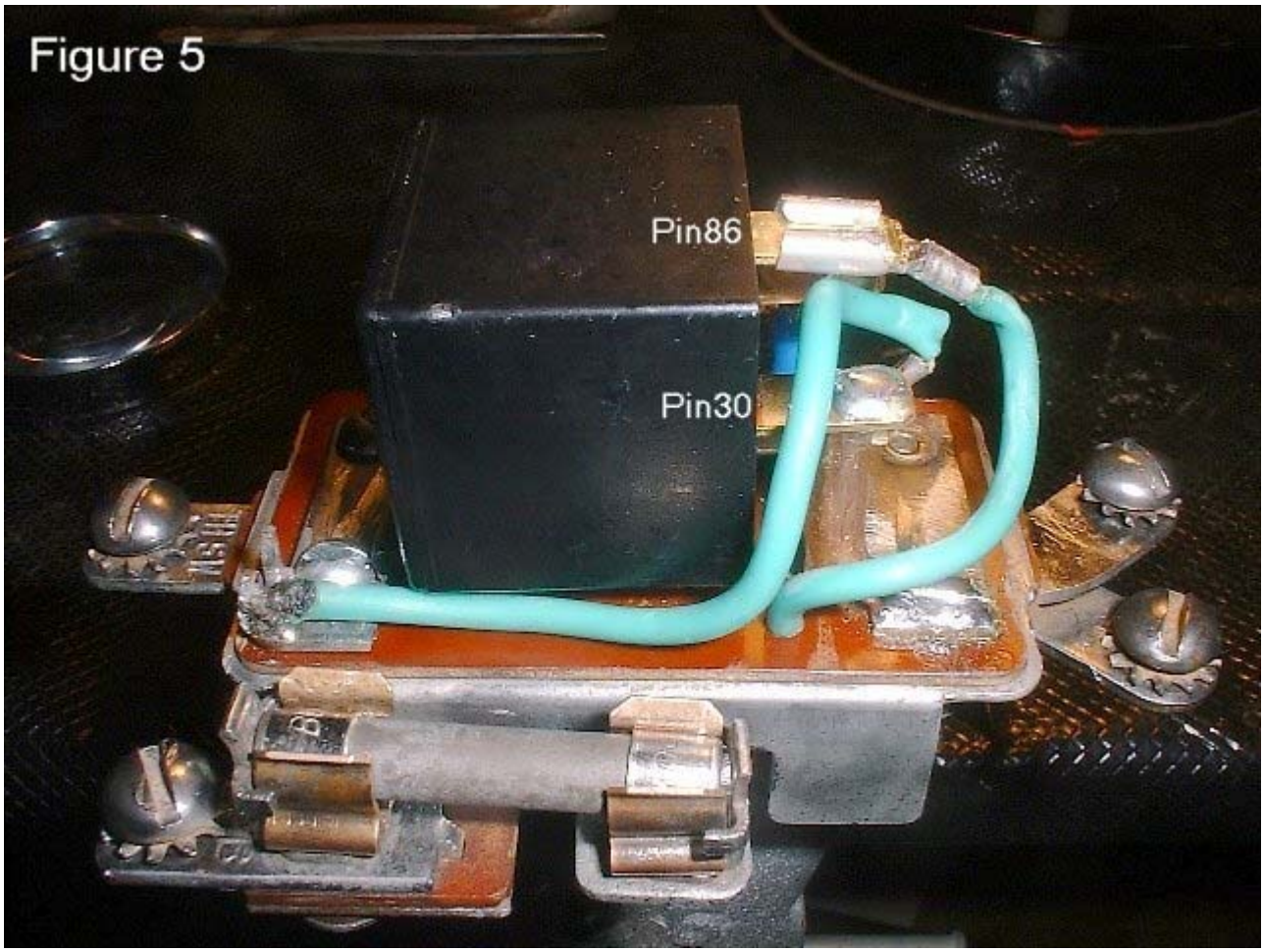


Figure 5
Pin86
Pin30

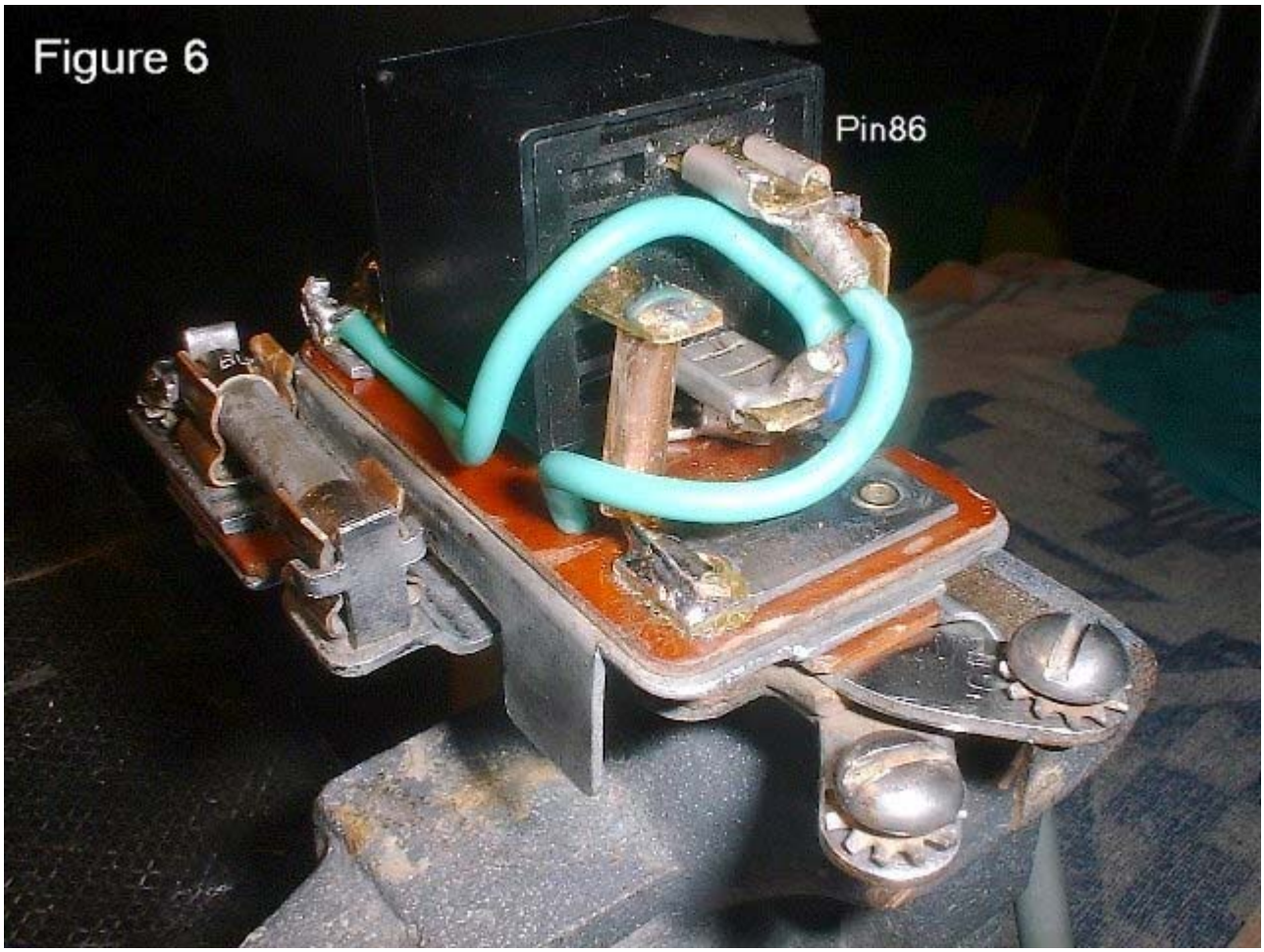
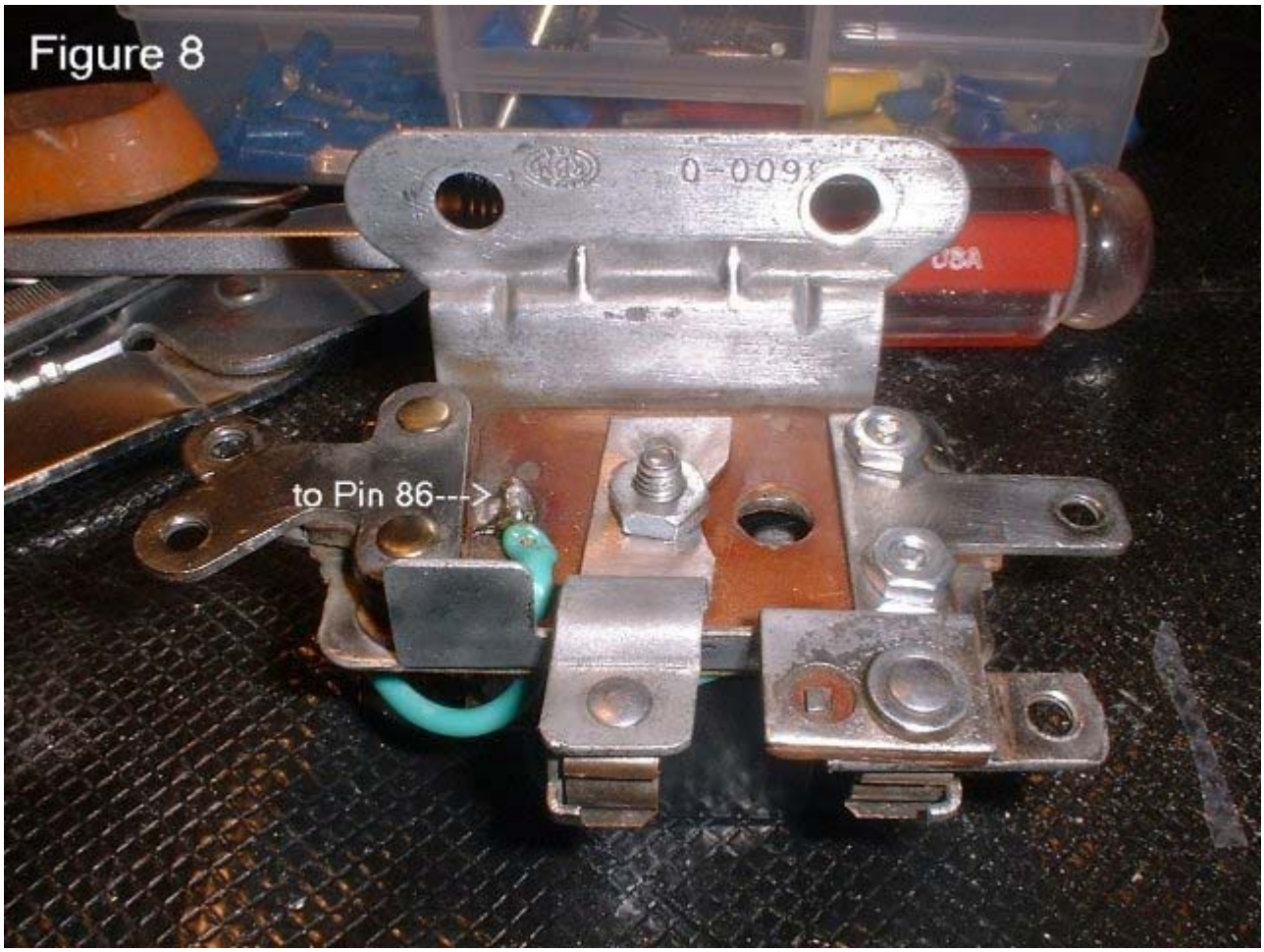


Figure 6
Pin86


Figure 7
Pin86
Pin87



Testing
Put the relay back into the circuit, connecting the wires to all but the SOL terminal. Ground out the OD governor wire at the lock out relay, turn the car key on, and check for current on the unconnected SOL terminal. In this configuration, you should be reading 6 volts (the cars is not running right?) going into the 20 amp fuse, 6 volts coming out of the 20 amp fuse, and about 5.8 volts coming out on the SOL terminal.

Date	Miles	Notes
03-15-2000	2815	Start testing of Relay Rebuild Unit#1
03-19-2000	2897	Blew 10amp fuse, replace with 20amp
04-04-2000	3336	Running fine, works like a dream!
11-11-2000	5650	Still running with no failures.