AUTOMATIC OVERDRIVE
(MAINTENANCE)

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TECH SEZ: IT PAYS TO KNOW THE "INSIDE-OUT"

Once you're acquainted with all the parts of an overdrive unit, you'll find it a lot easier to service. You know yourself that once you've had a chance to take a unit down, inspect the parts, and put it back together, you learn a lot more about that unit.

Just knowing how the parts go together helps a lot in tracking down any special conditions that might come up. What's more, you find it easier to order the right parts, if any one of them should happen to require replacement.

Well, that's why this reference book explains disassembly, inspection and reassembly. It's one good way to make sure everyone has the complete service story on the overdrive. While this book gives complete disassembly instructions, there are quite a few operations which can be performed without having to go through all of the steps given here.
Here's how the information is arranged in this book:

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REMOVAL OF
THE OVERDRIVE UNIT

To begin with . . . you have to remove both the transmission and overdrive as a unit. So, you're probably familiar with the removal operations if you've done work on a conventional transmission.

For example . . . you'd start out by removing the overdrive housing and transmission case drain plugs and drain the oil. After all, who wants to slop oil around or lug all that extra weight?
Next, you'd disconnect the two wires from the rail lockout switch. In addition, disconnect the two wires from the solenoid. You'd disconnect, also, the control wire from the control lever. Then, as in previous transmission work, you would disconnect the propeller shaft, the hand brake control cable, disassemble the gearshift linkage, and disconnect the speedometer cable.

Of course, you know it is easier to loosen the main shaft nut, which holds the parking brake drum to the shaft, before you remove the transmission from the clutch housing. Just shift the transmission into reverse, and the clutch will hold the main drive pinion while you loosen the main shaft nut.

Then you are ready to remove the transmission and overdrive as a unit. Place this unit in a transmission stand near the bench. Or . . . if all the stands happen to be in use, you can put the unit in a large vise. Either of those holding devices is perfectly okay.
DISASSEMBLY OF THE OVERDRIVE

You are now ready to take the overdrive unit apart. So, first unscrew the rail lockout switch from the housing and catch the switch interlock plunger that will drop out when the switch is removed.

AUTOMATIC OVERDRIVE SPECIAL TOOLS

C-3194  Transmission main shaft bearing installing sleeve.
C-3204  Overdrive housing bearing removing and installing tool.
C-3207  Pawl rod oil seal driver.
C-3195  Control shaft oil seal protecting sleeve.
C-3198  Control shaft oil seal driver.
C-3193  Governor wrench.
Then, remove the bolts that hold the parking brake band to the housing and remove the band.

Next, remove the parking brake drum from the overdrive main shaft. If the drum is tight on the shaft, don’t try to drive it off. Instead, use the Flange Holding Wrench (Tool C-784) and Flange Puller (Tool C-452).

Following that . . . unscrew the governor from the housing. Be sure to use the Governor Wrench (Tool C-3193), or a pair of adjustable pliers. If you try to use a pipe wrench or any other tool, you might damage the governor body.

Use a drift to drive out the taper pin that holds the control shaft in the overdrive housing. Drive the pin up from the bottom. Then, pull the shaft outward as far as possible to disengage it from the shift rail. Turn the control shaft about 90° counterclockwise to hold it in that position.
Now you can unscrew the speedometer drive pinion sleeve from the overdrive housing, and remove the sleeve and pinion. Then, remove the gearshift housing, shift forks, and rails from the transmission. These are all things you’ve done before, so you won’t have any difficulty on that score.

** REMOVING OVERDRIVE UNIT FROM TRANSMISSION **—Once you’ve got those transmission parts out of the way, you can get down to removing the overdrive unit from the transmission. To begin with, you remove the four screws that hold the overdrive housing and adapter to the transmission case.

Then, use a soft hammer to tap the edges of the adapter a few times. That will help separate the adapter from the transmission. Pull the overdrive unit, including the transmission main shaft, from the transmission. The front synchronizer stop ring and spreader spring will drop off into the transmission.
DISASSEMBLING THE OVERDRIVE—Remove the two recessed adapter screws and lockwashers from the front face of the adapter. Make sure again that the control shaft is pulled out so that it is disengaged from the shift rail. That could tie you up in knots if it’s still hooked up with the rail.

Pick up that soft hammer again and tap on the end of the overdrive main shaft a few times to free it up from its bearing
in the overdrive housing as you pull the housing away from the adapter. You might have to tap on the adapter or housing to separate those parts. When you start to remove the housing, press your thumb against the overdrive main shaft. That way, the main shaft will remain on the pinion cage and the overrunning clutch rollers won’t drop down into the housing.

Now, you should remove the retractor spring and the guide sleeve from the overdrive housing. The retractor spring and guide sleeve are between the partition on the left side of the housing and rear wall. After that, pull the overdrive main shaft and ring gear assembly from the pinion cage. While you do that, however, be careful to catch the clutch rollers that will drop out of their retainer. It might be smart to count those rollers. There should be twelve of them.

**REMOVING THE SOLENOID**—Take out the two screws that hold the solenoid to the adapter next. Then, turn the solenoid *one-sixth of a turn clockwise* and remove it.

Incidentally . . . that one-sixth turn is important. You see—the end of the pawl rod in the solenoid has two flat surfaces.
When removing or installing the solenoid, you have to make the slight turn so the flats on the pawl rod will slide through the slot in the end of the pawl. That’s what engages the rod to the pawl.

As you probably know, the pawl rod has to be connected to the control pawl so it can move the pawl in and out of the control plate. If the solenoid is ever mounted on the adapter without making that one-sixth turn, the pawl rod will push the pawl into the control plate and keep the unit in overdrive. Making this slight turn is an operation easy to overlook. That’s why it might help you if we explain its importance a little more in detail right now.

For instance . . . if you ever get a case where the owner reports that his car is sluggish on the pickup, and shows no appreciable change in performance when he lifts his foot off the accelerator, check out the electrical controls first. If they’re okay, then remove the solenoid to see if it has been properly installed.

If it comes straight out when you remove the two mounting screws, then it wasn’t installed correctly. So, you’d have
to check the position of the pawl by inserting a narrow screw driver through the pawl rod seal in the adapter and into the pawl. If the pawl is still engaged in the control plate, you'll have to pull it out. So, push in the control handle which allows the pawl interlock plunger to move up. Then, twist the screw driver, wedging it in the pawl, and pull the pawl down. Then, pull out the control handle to lock the plunger in its lock-out position.

Another way you can withdraw the pawl from the control plate is to energize the solenoid. Here's the way to go about it. First, turn the ignition key "ON." Next, push the control handle "IN." Then, raise the car on a hoist.

Now, leave the two wires connected on the solenoid, but connect a ground wire between the governor wire on the governor cover and any convenient ground on the car. This will energize the solenoid, causing the pawl rod to extend farther from the solenoid.

You can then turn the solenoid so that the two flats on the pawl rod are in a horizontal position, push it into the adapter and into the slot in the control pawl. When you feel the pawl rod engage the pawl, turn the solenoid so that the mounting bolt holes line up. This locks the pawl rod in the pawl. Now, if you pull the solenoid out as far as possible, the pawl will be drawn out of the control plate and into its locked-out position.
If the pawl rod was jammed into the slot, chances are there will be some burrs or nicks on the pawl rod end. So, you’d better dress them down before reinstalling the solenoid.

Assemble the solenoid by turning it so the pawl rod will engage the pawl properly. Then install the solenoid mounting screws.

**REMOVING PINION CAGE AND SUN GEAR**—Pry out the clutch cam retaining clip from the rear end of the transmission main shaft. Prying out the retaining clip will let you remove the pinion cage assembly and the overrunning clutch from the splines of the transmission main shaft.

![CLUTCH CAM RETAINING CLIP](image)

Remove the retaining clip from the clutch cam to separate the clutch from the pinion cage.

By the way . . . don’t separate the retainer from the cam unless there’s a real need for doing that. You see, those parts are held together by two hooked retainer springs. That means that you’d be in for an awfully difficult job to reassemble them. So, if there’s no call for it, play safe. You’ll save yourself a lot of time and effort by leaving the retainer on the cam.
Now, the next thing to do is to slide the sun gear, with the shift rail and fork, off the transmission main shaft. You can remove the shifting collar from the sun gear—if you have to—by just taking out the forward snap ring. However, you'll seldom find this necessary.

DISASSEMBLING THE ADAPTER—To further disassemble the adapter, remove the snap ring from its groove. That allows you to remove the cover plate and the sun gear control plate, with its balk ring, from the adapter. Lift out the control pawl and the interlock plunger. Use a screw driver to remove the snap ring which holds the bearing in the adapter. Then remove the bearing, the oil baffle, and the transmission main shaft.

If the pawl rod oil seal has been leaking, just pry it out and throw it away. As always, when you remove a seal during disassembly, install a new one when you reassemble the unit.

If the adapter bearing is to be replaced, remove the snap ring and press the shaft from the bearing.

REMOVING RING GEAR FROM OVERDRIVE MAIN SHAFT—If you ever have to replace the ring gear itself, you can remove it from the overdrive main shaft by prying out the large snap ring from the back side of the ring gear. This ring gear is listed separately on the parts list, but doesn't usually have to be replaced unless the overdrive unit has been used for a considerable number of miles and the ring gear is worn or damaged.
Removing this ring gear isn’t too easy. But you can use a sharp-pointed tool to pry out one end of the large snap ring so you can slide a narrow screw driver under it. Then work the snap ring out of its groove.

**DISASSEMBLING THE HOUSING**—Now, remove the main shaft oil seal from the overdrive housing by driving it out with a drift.

**NOTE:** If you wanted to replace just that seal, you could do it while the unit was installed in the car. Use the Seal Puller (Tool C-748).
When you’ve done that, you should remove the control lever from the control shaft. Next, push the control shaft inward and let it drop into the housing. Finally . . . pry out the control shaft oil seal and discard it. You’ll use a new one during reassembly.

Remove the rear bearing from the housing by first taking off the front and rear snap rings. Then use the Driver (Tool C-3204) and drive the bearing from the housing.

**CLEANING AND INSPECTION OF THE OVERDRIVE PARTS**

When you’ve disassembled the overdrive unit, clean all parts thoroughly in commercial solvent or cleaning fluid and dry them off with an air hose. Examine the two ball bearings carefully for nicked or cracked balls. If you detect any, replace the bearings.

Inspect all gears for evidence of chipped teeth or nicks. If you notice any, try dressing them down with an oil stone. And, if you’ve damaged any of the snap rings during disassembly, you’d better replace them with new ones. However, remember that these snap rings are all selectively fitted. So, replace them with rings of the same thickness. Otherwise, you may not end up with a snug-fitting assembly.
**INSPECT THE PINION CAGE ASSEMBLY**—After cleaning the pinion cage assembly, spin each pinion with your fingers to check the condition of the roller bearings. If you’ve cleaned it thoroughly, but still detect some bearing roughness, you’ll have to replace the entire cage assembly. That’s because the pinions or bearings of the assembly cannot be replaced separately. If you find that all pinions spin freely, you can be sure that the pinion cage assembly is still serviceable.

![Image of pinion cage assembly]

**NOTE:** If the bearings of the pinion cage should break and jam, the pinions would bind and could strip the pinion and ring gear teeth.

**INSPECT THE OVERRUNNING CLUTCH**—It’ll pay you, also, to carefully inspect the overrunning clutch parts. Look them over for signs of brinnelling—especially on the rollers and cams. If the rollers show any surface marks at all, play safe and replace them.

If you detect any marks or slight indentations on the flat surfaces of the cam, you’ll have to use a new cam and a set of rollers. But, if you notice any slight, lengthwise indenta-
tions on the inside surfaces of the outer race of the main shaft, you can consider that a normal condition. Those marks can’t affect the operation of the clutch.

*TEST TENSION OF THE BALK RING*—Clamp the control plate (with the balk ring mounted on it) in a vise, and use a pull scale to check the tension of the balk ring. Just hook
the pull scale to one end of the ring, pull the scale away from the opening. It should require at least one-and-one-half pounds pull on the scale to slide the balk ring on the control plate. The scale may read higher, but never lower. If the balk ring is too loose, replace it.

That tension is very important. For instance . . . if an owner reports a noisy shift into overdrive, a balk ring too loose on its control plate could very likely be the cause. When there's not enough tension, the balk ring doesn't let the notch in the control plate line up with the control pawl as quickly as it should. As a result, there's a noticeable "thump" when the pawl finally does enter the notch.

Incidentally . . . the balk ring should be installed with its embossed surface against the control plate. If it isn't, the notch won't line up properly with the control pawl.

While you're at it, make sure there are no burrs on the end of the pawl rod. If you see any, dress them down with an oil stone.

Another thing . . . don't forget to use new gaskets and oil seals for a good oil-tight fit. And—remember to use new snap rings—where needed—for a snug-fitting assembly. Just "mike" up the old snap ring so you'll be sure to replace the ring with one of the same thickness.
REASSEMBLY OF THE OVERDRIVE UNIT

Putting the overdrive unit back together starts with installing a new pawl rod oil seal. So, use the Oil Seal Driver (Tool C-3207) and drive the new seal into place. Next . . . you drive the adapter bearing on the transmission main shaft, using Driver (Tool C-3194), and secure it with its snap ring.

Then, put the oil baffle in the front face of the adapter, keeping the pressed-out section toward the rear. After that, you install the main shaft and bearing in the adapter, against the oil baffle. Secure that with the snap ring.

Now, the next thing to do is to install the pawl interlock plunger in the adapter. Then, install the pawl with its grooved side up.

Following that, you should install the sun gear control plate and balk ring. In this instance, however, remember to keep the notch in the ring lined up with the control pawl. That's because the pawl has to be able to slide through the notch and into the control plate.
Install the cover plate against the control plate in the adapter next. Then, engage the shift fork in the shifting collar of the sun gear, and install the sun gear on the main shaft.

Guide the shift rail into its hole in the adapter. Then, mesh the sun gear with the control plate. Button that up with the snap ring to hold the cover plate in the adapter.

Install the pinion cage and cam on the transmission main shaft, and secure them with the retaining clip. That gets you ready to install the overdrive main shaft over the pinion cage.

Use some heavy grease in the roller retainer to hold the twelve rollers in place as you install them. Then, oil the adapter bearing and the gears, and also put a little oil on
the inside of the overdrive main shaft and ring gear. That's for initial lubrication.

Next . . . hold the transmission main shaft with one hand, and install the overdrive main shaft with the other hand. Turn the overdrive main shaft counterclockwise as you push the ring gear into mesh with the pinions. Turning the shaft moves the rollers down on the low part of the cams and makes the shaft installation easier.

**CAUTION:** Don't force the overdrive main shaft into position. That can push the rollers out of their retainer pockets and damage the gears.

Install the speedometer gear on the overdrive main shaft next. After this, put the retractor spring guide sleeve in the retractor spring. Compress this spring by hand and install it in the overdrive housing, keeping the flange of the sleeve toward the rear of the unit.

Then, use the Oil Seal Driver (Tool C-3198) to install the control shaft oil seal into the housing. Be sure to put the

![Control Shaft Oil Seal Protecting Sleeve (Tool C-3195)](image)

Control Shaft Oil Seal Protecting Sleeve (Tool C-3195) in the seal first. Then, install the control shaft from the inside of the housing, pushing the sleeve out as the shaft enters the seal.
Keep in mind that you should position the control lever on the shaft so that the lever will be installed in the overdrive setting when the lug on the inner end of the control shaft is pointing *upward*. Button up this shaft with the plain washer, lockwasher, and nut.

To provide clearance for the shift rail, pull the control shaft outward slightly. Then, make sure the overdrive housing bearing inner snap ring is in place. Next, using the Bearing Driver (Tool C-3204), install the bearing in the housing, open side in first. Then, put in the rear snap ring.

Now, you're ready to install the solenoid. So, remember to turn the solenoid about *one-sixth of a turn counterclockwise*, to be sure the pawl rod engages the control pawl properly. Then secure it with two screws.

![Image of solenoid installation](image)

Then guide the housing carefully over the end of the overdrive main shaft. Hold the front end of the shift rail and guide it carefully into the hole in the housing and retractor
spring. Position the notch in the shift rail so the end of the control shaft will enter the notch when the shaft is pushed in.

**CAUTION:** Install the housing carefully. Just *ease* the rail into the hole.

Now, with the two adapter screws and lockwashers, you can complete your assembly of the adapter to the housing.

At this point you’ll find it pays to push the shift rail in and out of the adapter a few times to see if it works freely. If the shift rail binds, the unit won’t come back out of overdrive. In a case like this, loosen the adapter screws and shift the adapter a little to free it up.

From here on you assemble the main shaft and gears into the transmission just as you would on any other conventional transmission job. But, whatever you do, don’t forget to put the synchronizer stop ring and spreader spring back in the transmission. The fingers on the spreader spring face toward the front. Remember? Those are the parts that dropped into the transmission case during disassembly. If you ever forget to reinstall them, the owner of the car would bounce right back and curl your hair!

Another thing . . . be sure the little oil trough is in place in the rear face of the transmission. If it’s not there, oil may not flow into the overdrive housing.
NOTE: One of the three short screws used to secure the overdrive unit to the transmission is slightly longer than the other two. This screw should be installed in the upper hole on the right side of the unit because the housing flange is slightly thicker at that point.

Don’t forget to push the control shaft into position in the shift rail, and secure it with its taper pin. Just drive the taper pin in from the top.

Now, install the governor and rail lockout switch. But here’s something else. Be sure to put the little plunger in before you install the lockout switch, or the electrical control system won’t work. A little vaseline or light grease on this plunger will help it to slide easily into its passage, and hold it there while you install the switch.

After these electrical units are in, you can install the main shaft oil seal. Then, install the parking brake drum and secure it with its lockwasher and nut. Tighten the nut to a torque of 95-105 foot-pounds. Finally, fill the unit with oil.

LUBRICATION OF THE OVERDRIVE UNIT—To fill the overdrive unit with oil, use the same grade of oil specified for the transmission. First, add oil to the overdrive unit until it runs out of the filler hole. Then fill the transmission and reinstall both plugs.
INSTALLATION OF THE
OVERDRIVE UNIT

Getting the overdrive and transmission unit back into the
car should present no problem. You are probably very
familiar with the usual installation procedures that are in-
volved with the conventional transmission.

After reconnecting the propeller shaft, the hand brake con-
trol cable, speedometer cable, and the gearshift linkage, be
sure to reconnect the control wire to the control lever. Re-
connect the two wires from the rail lockout switch that you
disconnected earlier, during disassembly. Besides that, recon-
nect the two solenoid wires.

INSTALLING AN OVERDRIVE UNIT ON EARLIER
MODELS—You might hear the question, “Can I put an
overdrive unit on my Plymouth?” If the model involved is
a P-22 or P-23, the answer, of course, is “Yes, indeed!” All
you have to do is get the MOPAR Overdrive Package, Part
Number 1450343, and such additional parts as are required
for model P-22. Complete installation instructions are in the
package.
AUTOMATIC OVERDRIVE
QUESTIONNAIRE
TEST YOURSELF
WITH THESE QUESTIONS!

1. It is not necessary to remove the transmission when removing the overdrive unit from the car. RIGHT □ WRONG □

2. After removing the four bolts which hold the overdrive unit and adapter to the transmission case, the overdrive unit and adapter can be removed from the transmission simply by pulling it off the transmission main shaft. RIGHT □ WRONG □

3. When removing or installing the solenoid, you have to turn it slightly so the flats on the pawl rod will slide through the slot in the end of the pawl. RIGHT □ WRONG □

4. If there's a need to replace the ring gear, you can remove it from the overdrive main shaft by prying out the large snap ring from the back side of the ring gear. RIGHT □ WRONG □

5. Replace any snap rings you might have damaged during disassembly, but be sure to use snap rings of the same thickness as those you are replacing. RIGHT □ WRONG □

6. If you find that the pinion roller bearings are damaged, replace the entire pinion cage assembly. RIGHT □ WRONG □

7. Use a pull scale to see if there's at least 1 1/2 pounds tension of the balk ring on the control plate. RIGHT □ WRONG □

8. Install the balk ring with its embossed surface against the control plate. RIGHT □ WRONG □

9. When you install the pawl, be sure to keep the grooved side up. RIGHT □ WRONG □

10. Fill the overdrive unit with the same weight oil as that specified for the transmission. RIGHT □ WRONG □