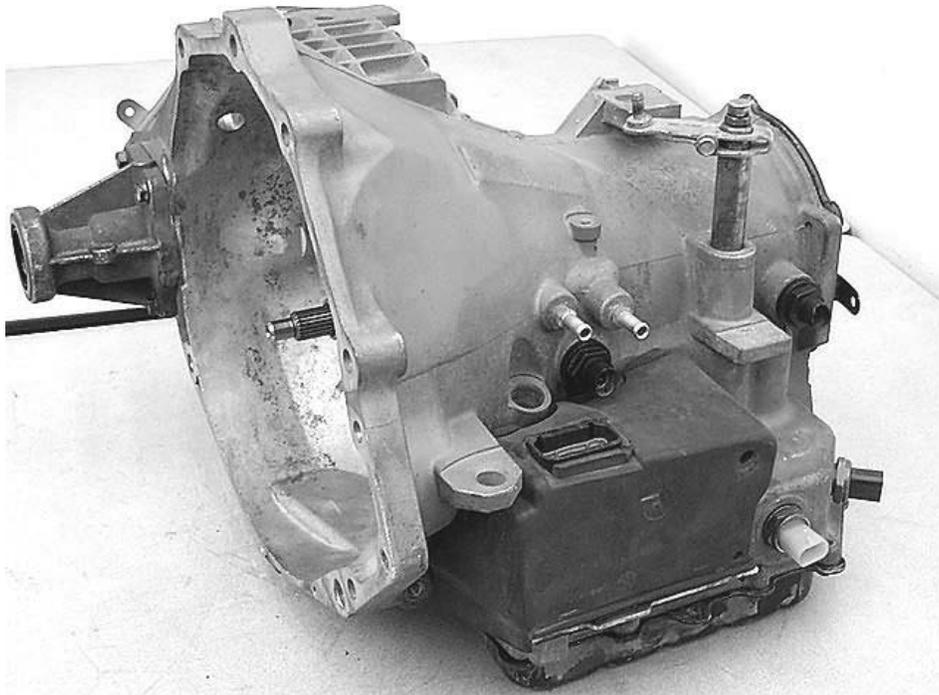


Chrysler 41TE (604)

Rebuild Procedures



Program Introduction...

The Chrysler 41TE, also known as the 604, has been with us now for well over a decade, and this unit has quickly become one of the most widely used late-model Chrysler transaxles. This unit's innovative computer control system was one of the first to use solenoids to directly control clutch apply oil without using the typical regulating or directing valves. This system also led the way in adaptive control of clutch apply rate and feel, which allows consistent operation even if internal changes or differences exist from one unit to the next. Although this transaxle is not a relatively new design, there may be parts of the rebuild process that you are not very familiar with, or you may be new to this particular type of transaxle. In either case, you need some point of reference- something that will show you how to proceed when you are not sure (or have no idea whatsoever), and that is exactly what this book is designed to do.

You will not find a photocopied section out of a factory manual between these covers. In fact, you will notice a substantial difference between the book you are holding and any other books written on the subject. This is because, as this book was being written, the author was rebuilding a 41TE step by step as he was writing this book. This helped assure that there would be no missing steps (and it was also real handy for taking pictures along the way...). This book was written for transmission rebuilders, by a transmission rebuilders, in plain English rather than complex 'factoreze' terminology.

So, whether you've already done a few of the 41TE units, or are about to tackle your first one, this book will show you how to get through the sticky parts of a rebuild, as well as the most thorough way to get through the job, start to finish.

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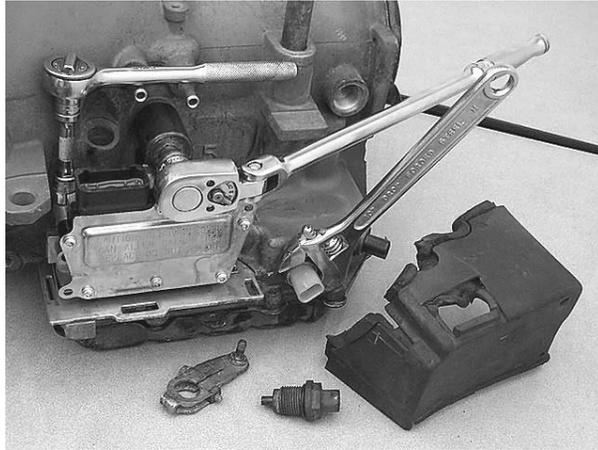
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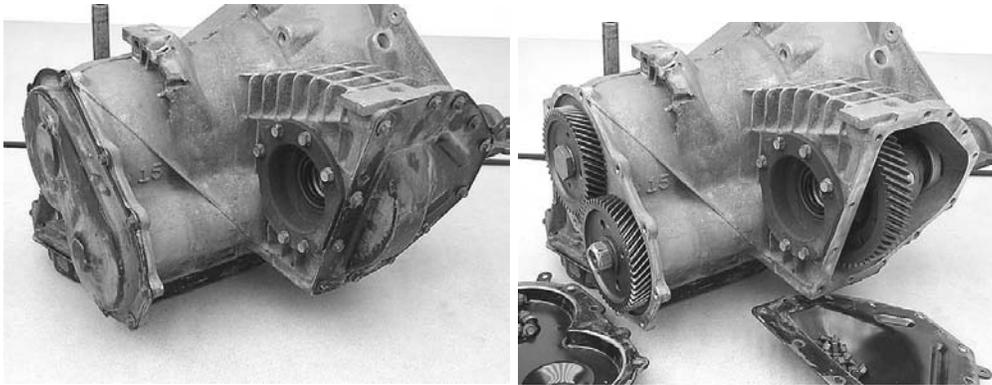
41TE Rebuild Procedures

Transaxle Disassembly

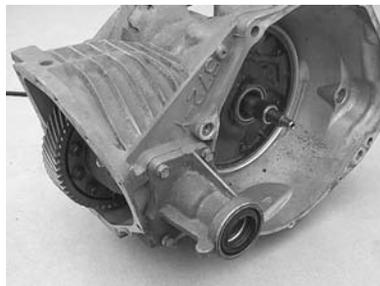
Step 1: Remove the following parts in the order shown for ease and efficiency: Dipstick, shift lever on manual shaft and solenoid block cover (if any of these are still attached), PRNODL and neutral safety switches, output and turbine speed sensors, then solenoid block with plate and gaskets.



Step 2: Unbolt the transfer gear cover and differential cover and remove them from the case. Allow any oil to drain out of the unit.

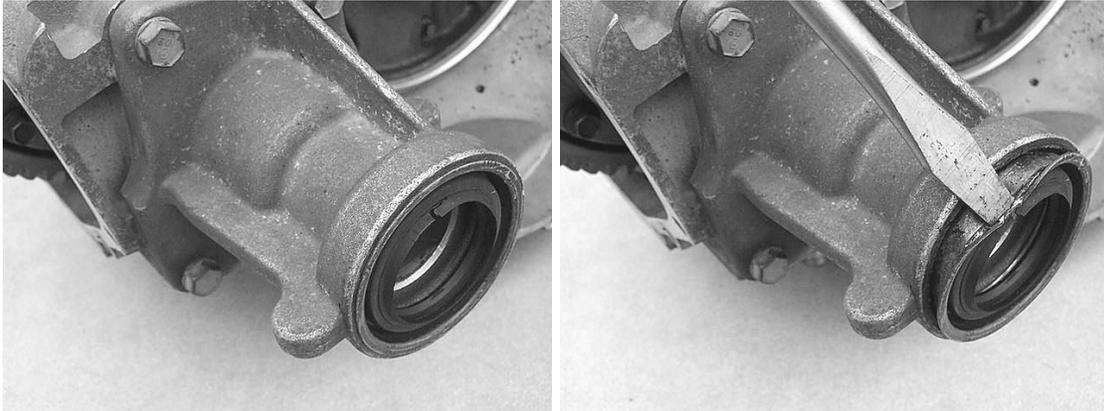


NOTE: This unit is prone to tip to the side while the differential assembly is in the case. Therefore, disassembly will be easier with the differential removed before disassembling any other area.

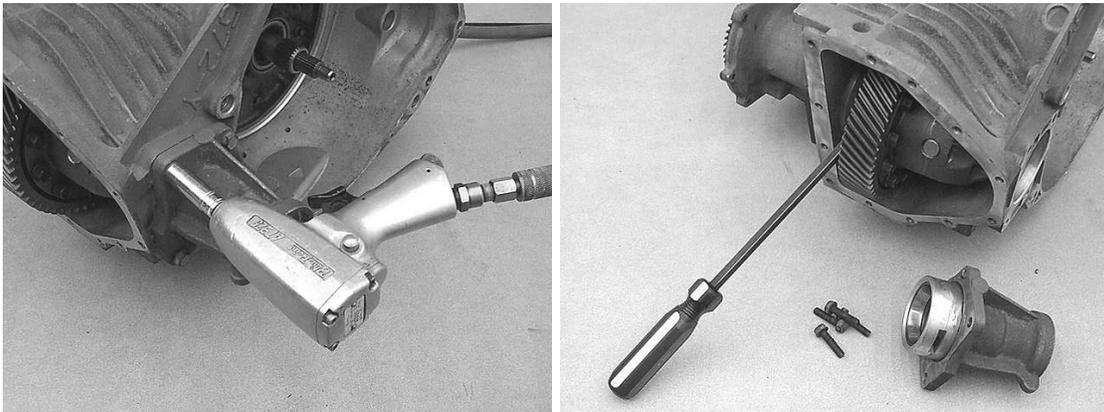


41TE Rebuild Procedures

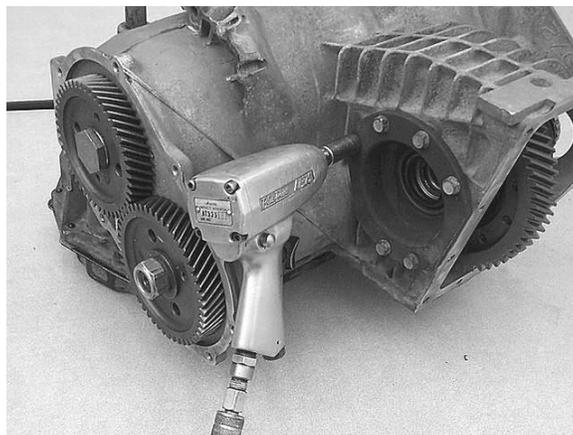
Step 3: Remove the extension housing axle seal, since the extension housing is best supported for seal removal while bolted to the transaxle.



Step 4: Remove the extension housing bolts, then work the extension housing loose (try a prybar on the carrier inside the case), and remove it from the case.

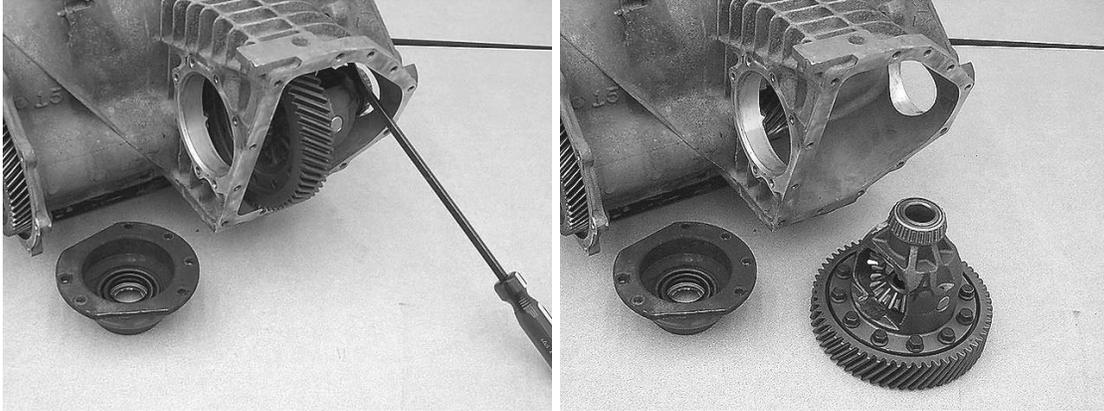


Step 5: Remove the differential retainer bolts.

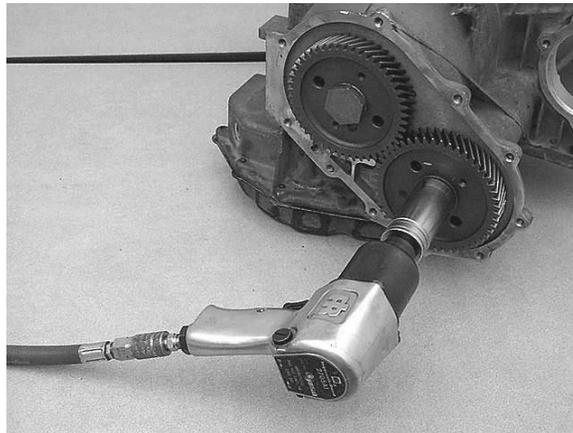


41TE Rebuild Procedures

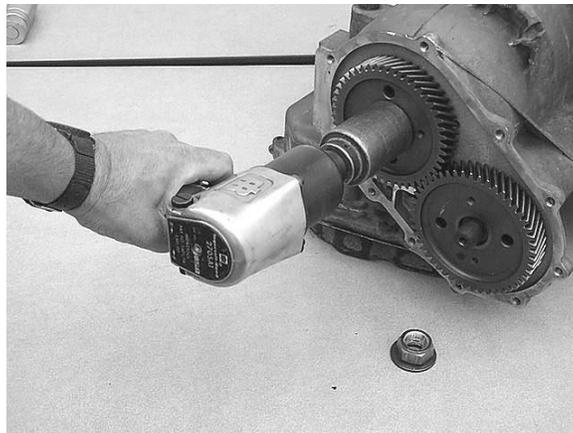
Step 6: Support the differential carrier while working the differential retainer loose, and remove the differential retainer from the case. Once you remove the differential retainer, the differential should roll right out of the housing.



Step 7: Remove the transfer shaft gear nut from the transfer shaft.

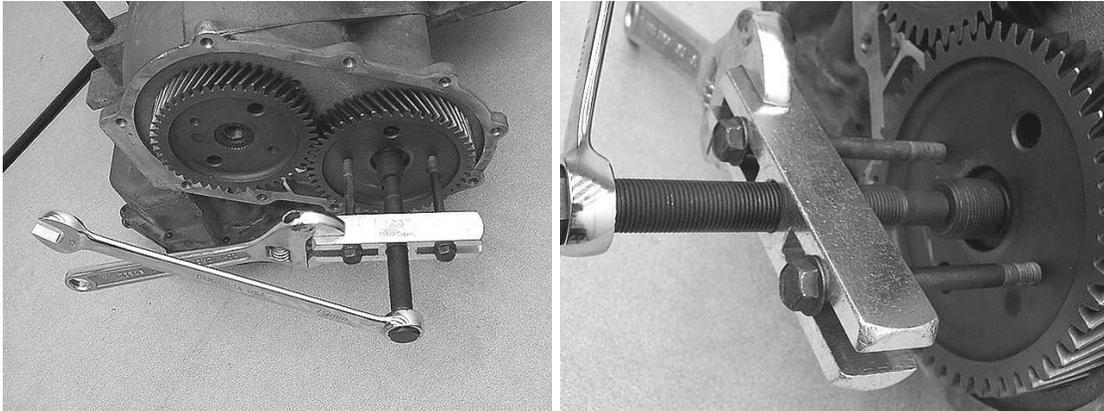


Step 8: Remove the output gear bolt from the output shaft.

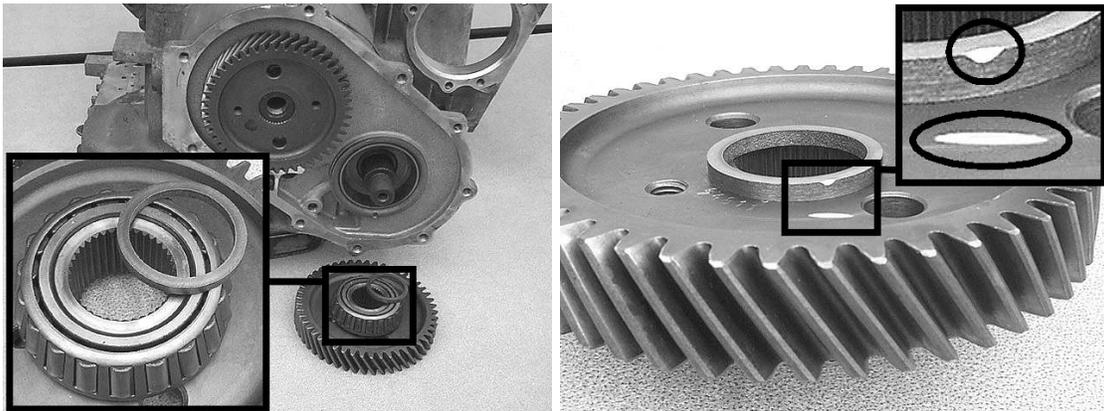


41TE Rebuild Procedures

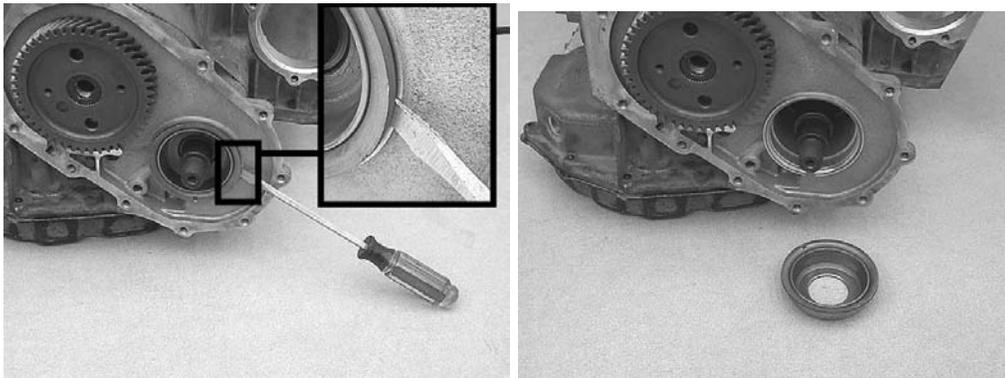
Step 9: Use an appropriate gear puller to remove the transfer shaft gear from the transfer shaft. You can use a heavy-duty steering wheel puller or harmonic balancer puller to pull this gear. Be careful not to lose the selective shim from behind the gear.



NOTE: It is advisable to mark the transfer gear and shim to avoid swapping them with the output gear and shim. Small marks from a grinding or cutting wheel will do nicely. Mark all 41TE units the same way and you'll always remember which is which, i.e., "Transfer gears and shims always have my grinder marks, output gears and shims don't".

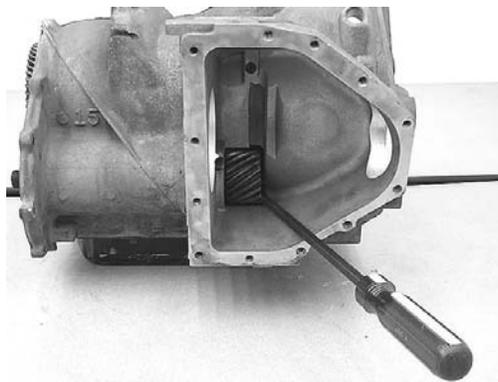
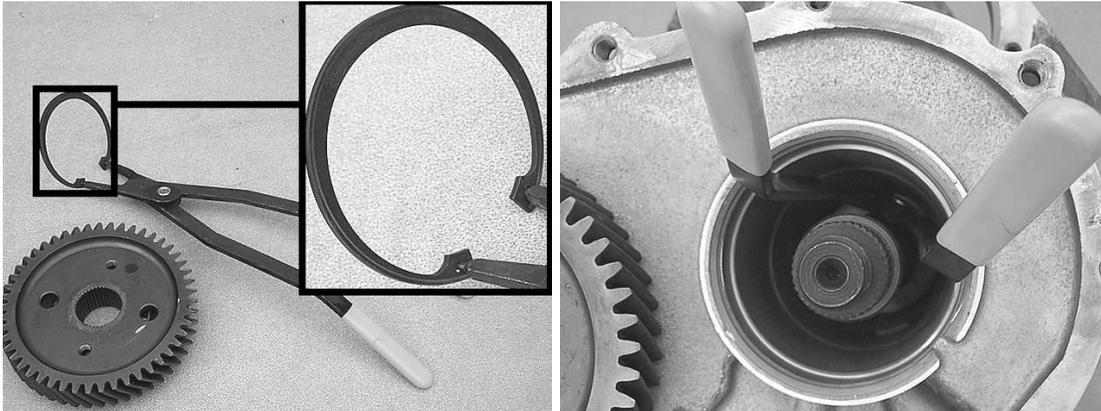
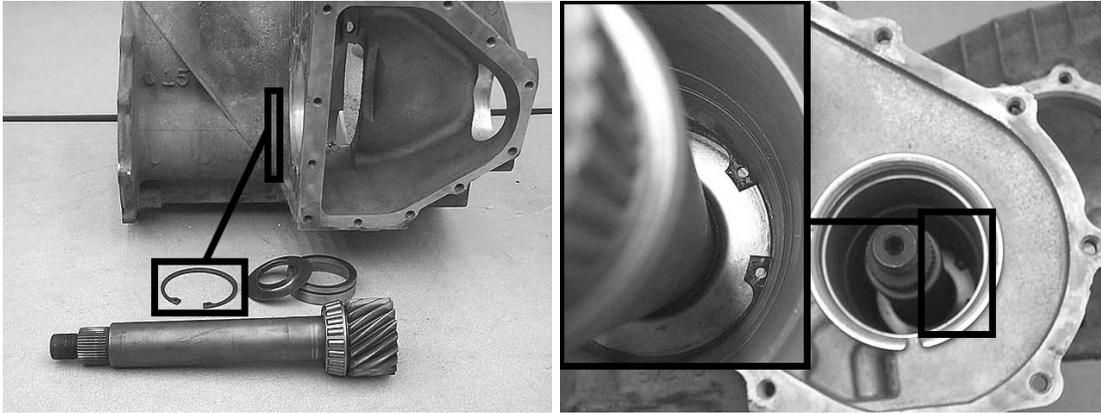


Step 10: Using a suitable prying tool, remove the transfer gear upper bearing race retainer.



41TE Rebuild Procedures

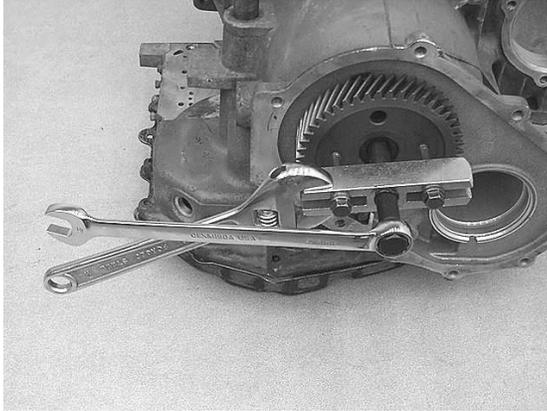
Step 11: Remove the transfer shaft lower bearing retainer snap ring using the special snap ring pliers* made for this purpose. Carefully pry the transfer shaft out of the case using a prybar or large screwdriver inserted into the differential housing and prying between the bottom of the pinion gear and the case.



* Go ahead. We dare you. Just try to get this little jewel out without the special pliers. No fair drilling holes or bashing things with a hammer until they give up. Even 'Special Magic Words' have no effect here. Had enough? Order Miller Special Tool #6051 from Miller Special Tools at 1-800-801-5420 (this is where you can get all Chrysler special tools).

41TE Rebuild Procedures

Step 12: Using the same puller used on the transfer gear, remove the output gear from the back of the output planet. Use a shorter pair of bolts to avoid excessive adjustment of the puller's center bolt. Be careful not to lose the selective shim from behind the gear.



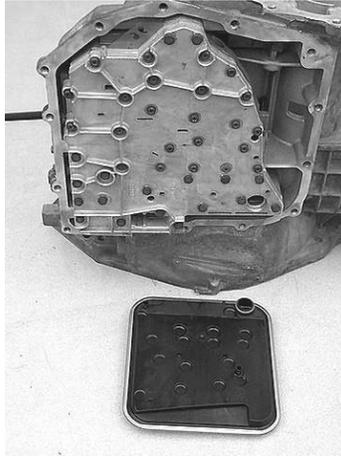
Step 13: Rotate the unit to allow removal of the bottom pan, preferably bell housing down.



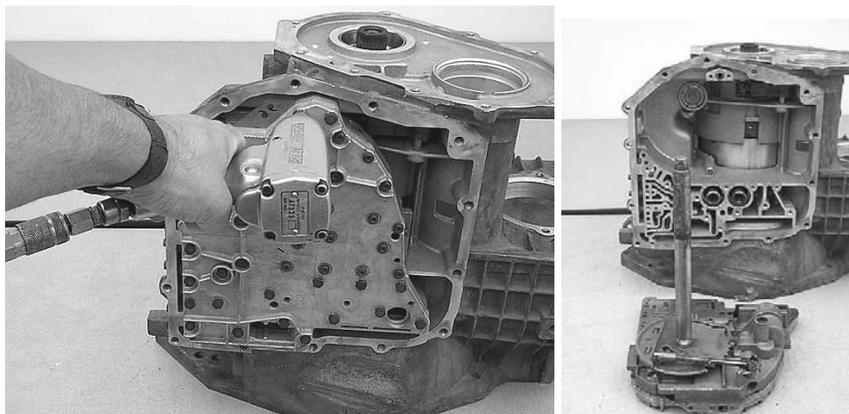
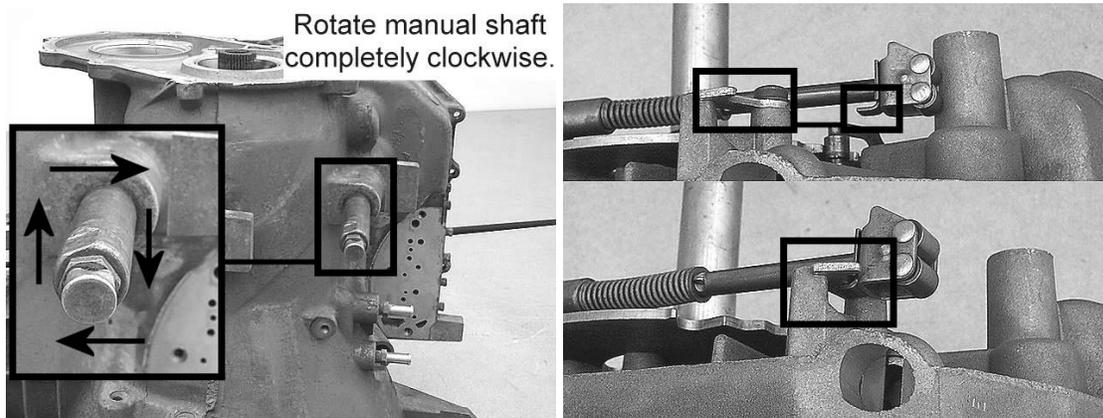
WARNING: Do not place the unit upside down, as this places the weight of the unit on the manual shaft. This can cause the valve body to almost explode off of the bottom of the case when the valve body bolts are almost all removed, ripping case threads and allowing the case to violently crash to the bench, possibly causing injury to the unit, the rebuilders, or both.

41TE Rebuild Procedures

Step 14: Remove the oil filter from the valve body. Make sure the O-ring comes off with the filter.

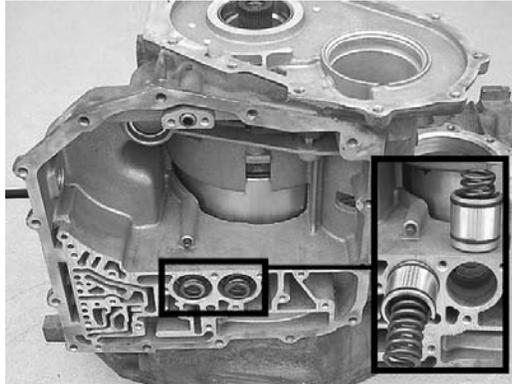


Step 15: Rotate the shift lever all the way **clockwise** when viewed from the outside end of the shaft. This will be one click *past* manual low, which is inaccessible when the vehicle shifter is connected to the lever. This locks the Park rod onto a bracket on the valve body, making it much easier to remove and install the valve body. Remove the valve body bolts, and carefully lift the valve body out of the case.

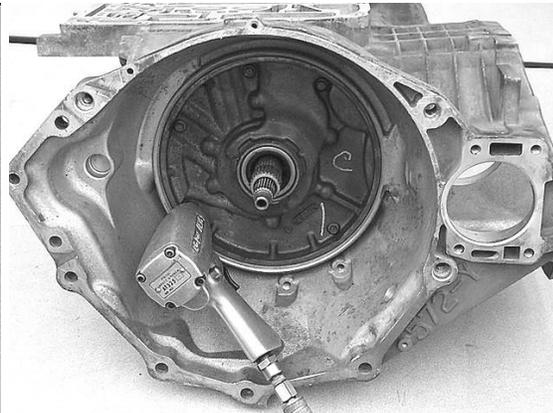
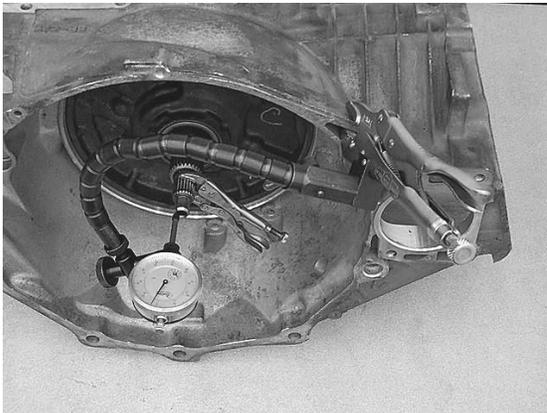


41TE Rebuild Procedures

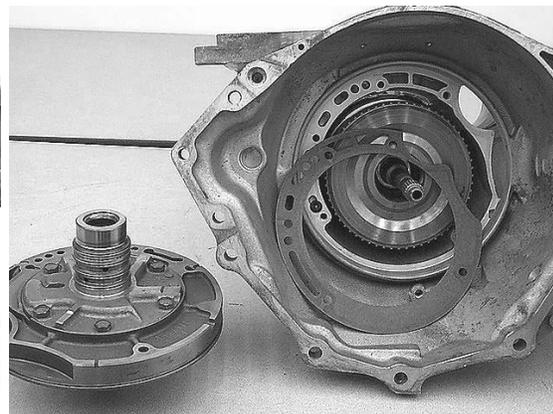
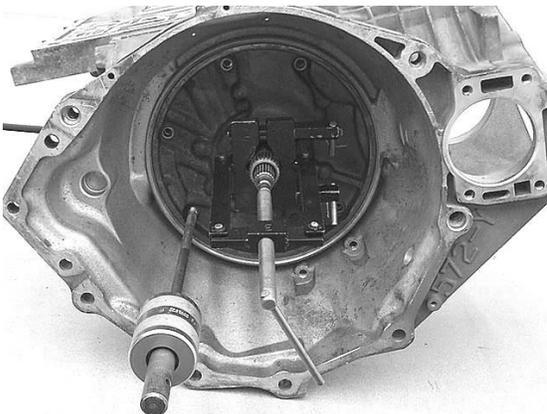
Step 16: Remove the overdrive and underdrive accumulator pistons and springs.



Step 17: Before removing the pump, check input shaft end play with a dial indicator. This end play should fall between .005" and .015" (0.12mm to 0.38mm). Excessive end play will give you a clue regarding internal wear, and if it checks to be within specification will allow you to save some time during reassembly. Once this check is complete, remove the pump retaining bolts.

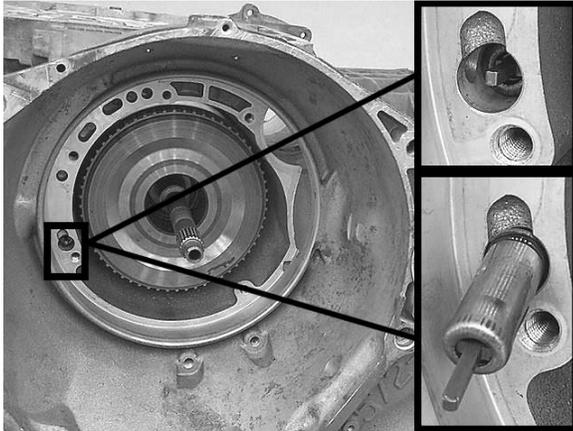


Step 18: Use slide hammers or an appropriate puller to remove the pump from the case. Remove and discard the pump gasket.

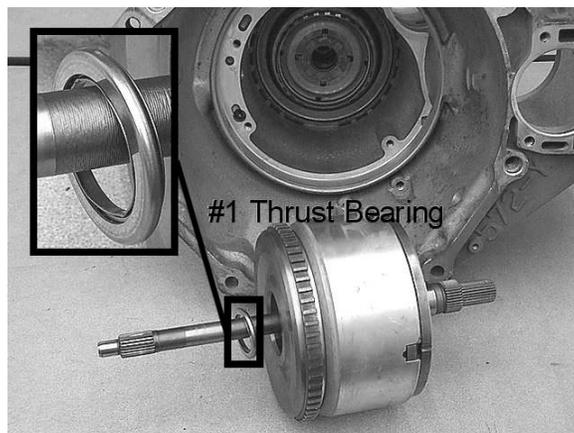


41TE Rebuild Procedures

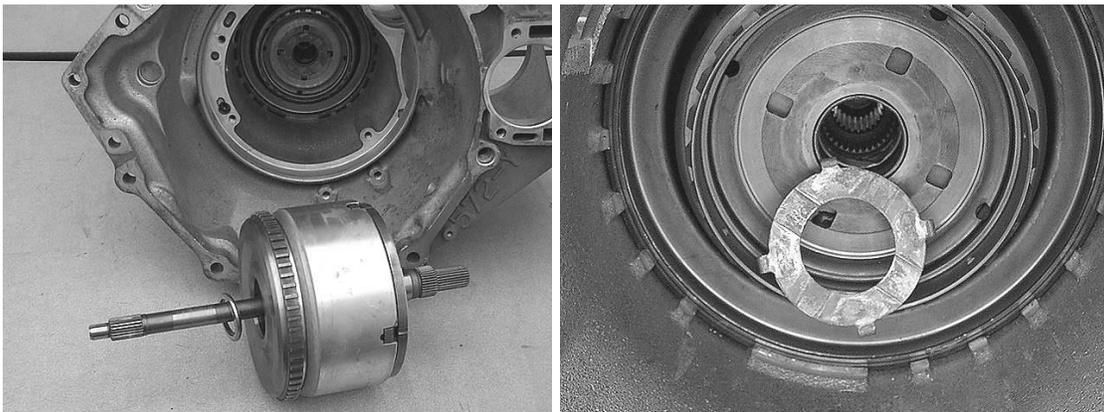
Step 19: Remove the cooler bypass valve, if so equipped.



Step 20: Locate and remove the #1 thrust bearing, which is either inside the input drum seal ring bore, or stuck to the rear end of the stator support.

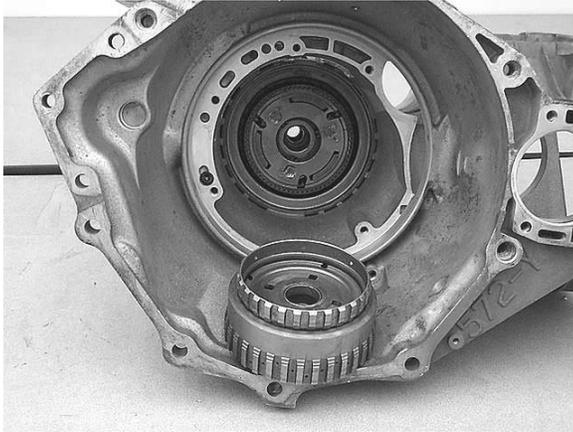


Step 21: Remove the input clutch assembly from the case. The #4 thrust washer, which is normally installed on the front sun gear hub, may come off with the clutch assembly. Be sure that this washer is located and set with the other small parts before continuing further.

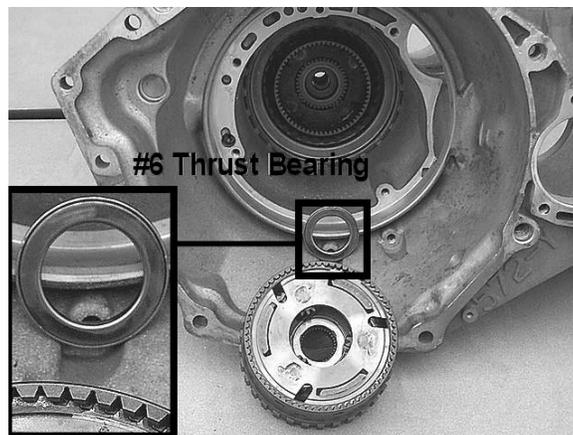


41TE Rebuild Procedures

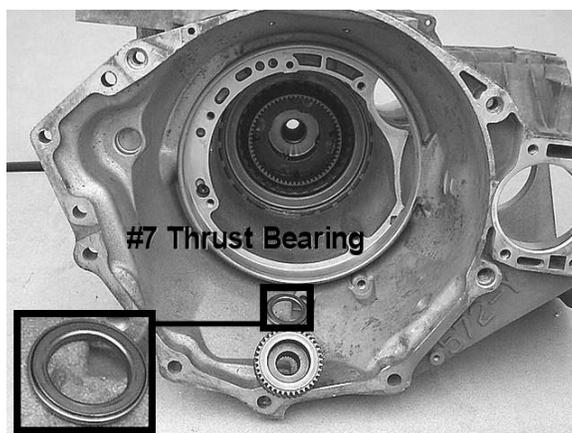
Step 22: Remove the front sun gear assembly from the case. Rotate the sun gear assembly to pull it through the 2/4 piston housing and clutch teeth.



Step 23: Using the same rotating motion, remove the front planetary carrier assembly and #6 thrust bearing (the bearing between the carrier and the rear sun gear) from the case.



Step 24: Remove the rear sun gear and #7 thrust bearing (the bearing between the sun gear and the rear carrier) from the rear carrier.

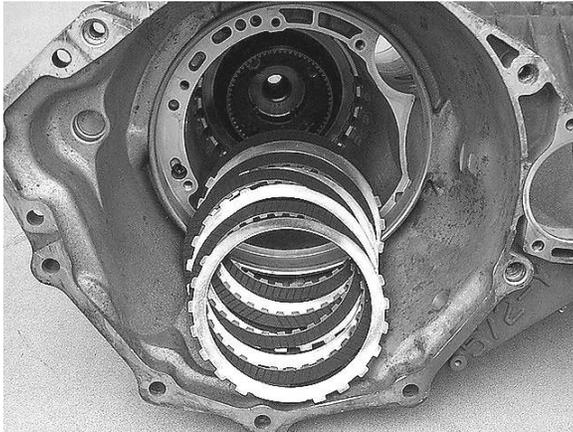


41TE Rebuild Procedures

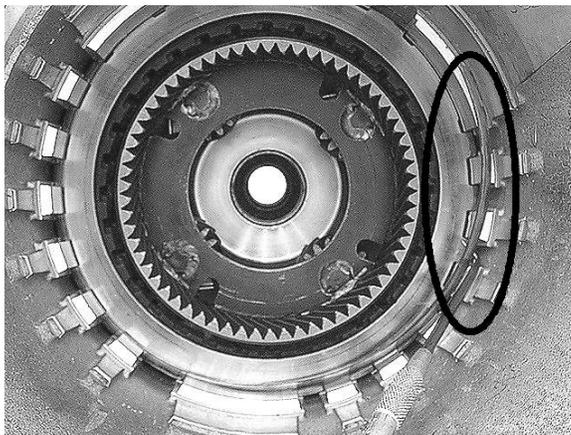
Step 25: Use a screwdriver to remove the 2-4 clutch piston retainer snap ring, then remove the 2-4 clutch piston retainer, piston and return spring from the case.



Step 26: Remove the 2-4 friction and steel plates from the case.



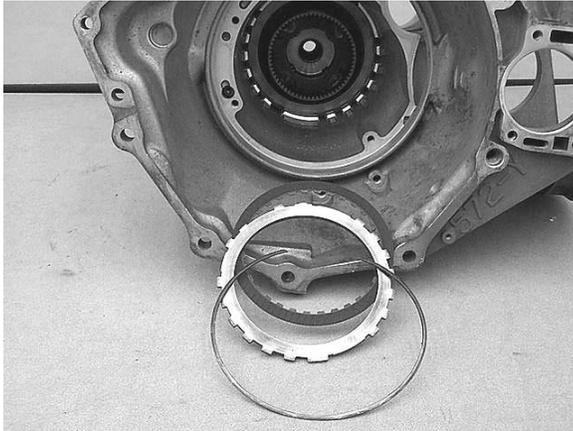
Step 27: Remove the low/reverse clutch reaction plate tapered snap ring.



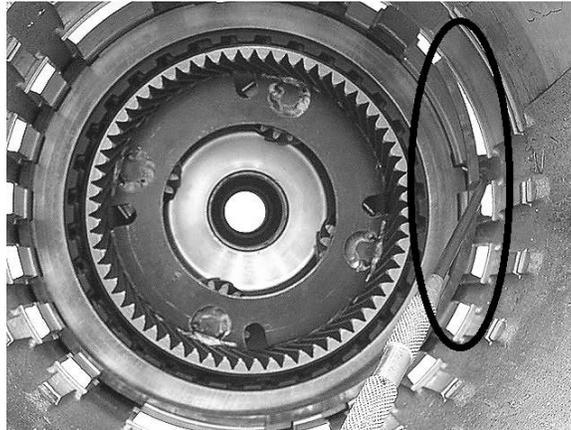
CAUTION: Be very careful not to scratch the top clutch surface of the reaction plate.

41TE Rebuild Procedures

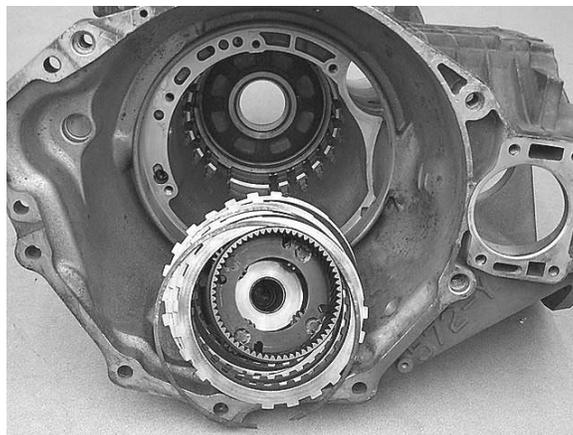
Step 28: Remove the low/reverse reaction plate and one friction plate.



Step 29: Remove the low/reverse clutch reaction plate flat snap ring.



Step 30: The rear planetary carrier should be loose in the back of the case behind the low/reverse clutch pack. Gently pulling on the carrier, remove the carrier and the rest of the low/reverse friction and steel plates, which will come out of the case at the same time.



41TE Rebuild Procedures

Step 31: Use an appropriate spring compressor to compress the low/reverse clutch return spring.

GREAT IDEA: If you choose to get the special tool designed for this purpose (an excellent choice, since this snap ring can be a real pain without it), you can avoid a lot of bolt spin-time by sliding a deep 1/2" drive socket over the long bolt to act as a spacer.

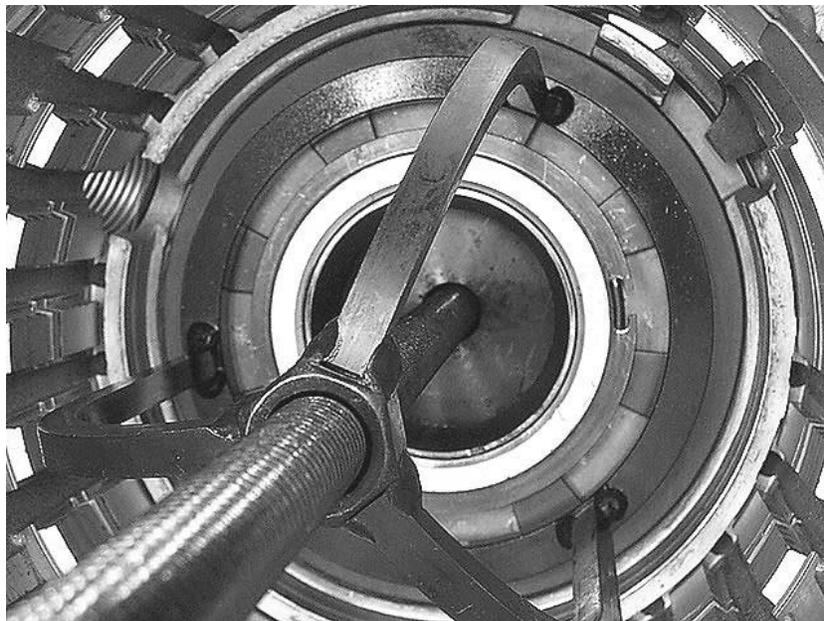
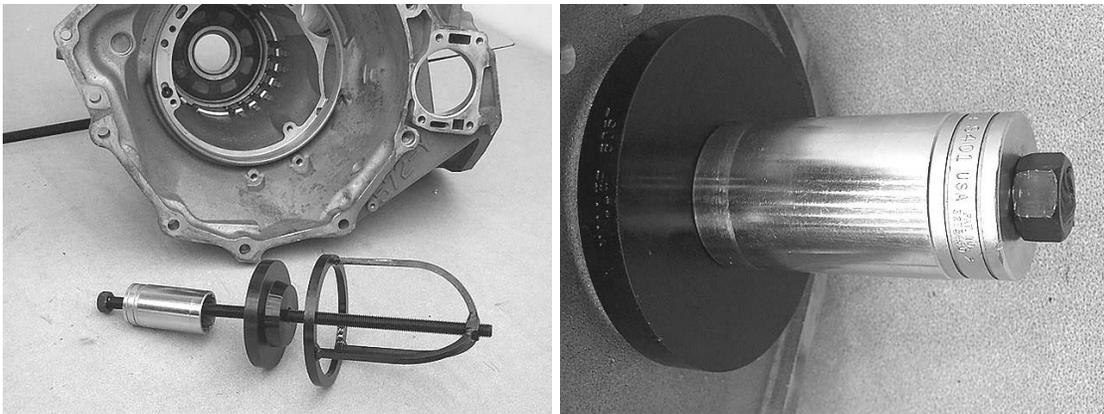
The special tool part numbers, available from Miller (1-800-801-5420), are:

5058-3

5059

6057

You need all three numbers to get the complete tool.



41TE Rebuild Procedures

Step 32: Remove the return spring retaining snap ring, then release the compressor from the low/reverse clutch return spring.

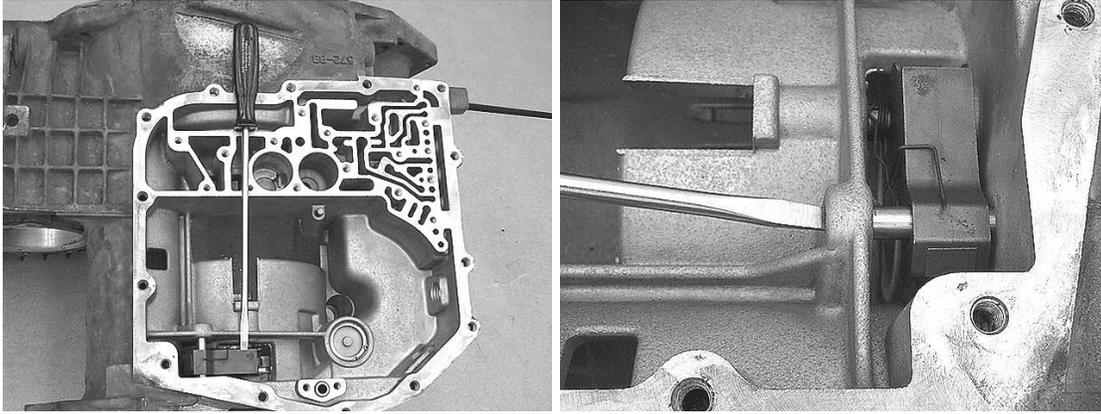


Step 33: Remove the low/reverse clutch return spring from the case.

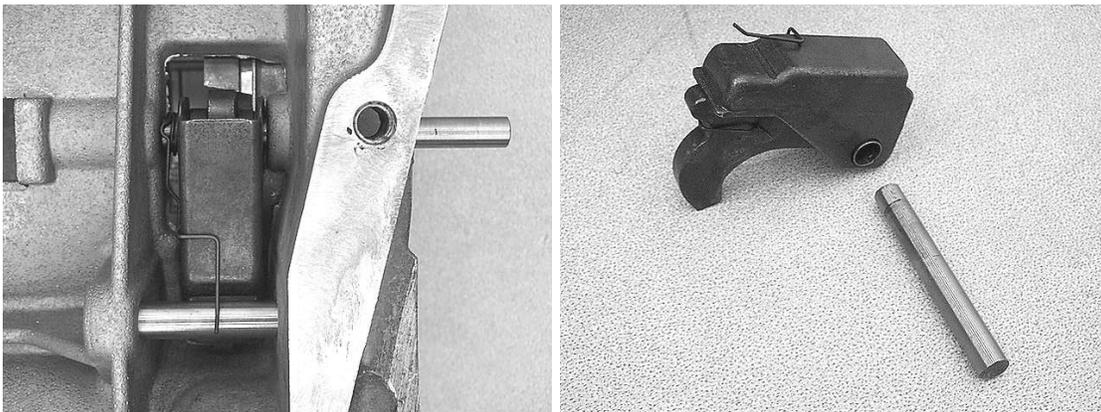


41TE Rebuild Procedures

Step 34: Removing the park pawl and **powdered metal** guide (guide has two pin holes): Using a long thin screwdriver or punch, first tap out the park guide locating pin and cup plug. Then tap the park pawl guide pivot pin out, and remove the park pawl and guide bracket from the case. If it seems stuck, slowly rotate the rear planetary carrier while pulling on the bracket.

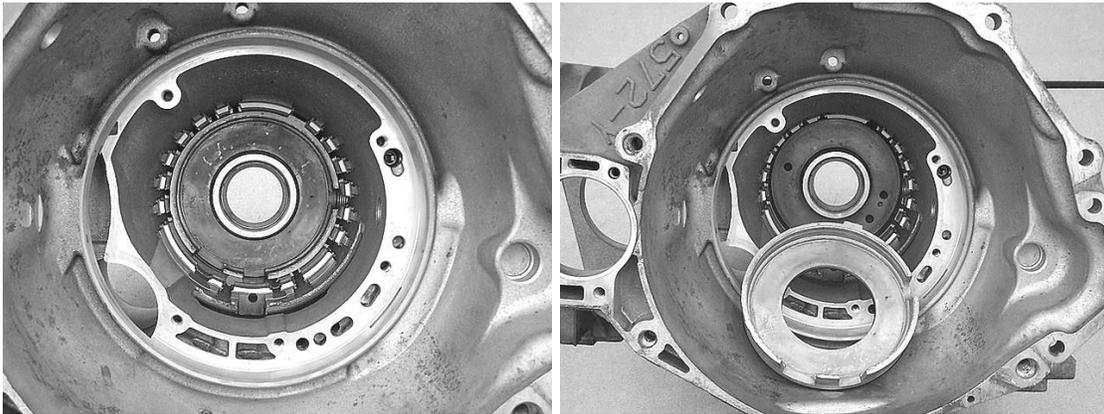


Removing the park pawl and **stamped steel** guide (guide has only one pin hole): Using a long thin screwdriver or punch, tap the park pawl guide pivot pin out, and remove the park pawl and guide bracket from the case. If it seems stuck, slowly rotate the rear planetary carrier while pulling on the bracket.

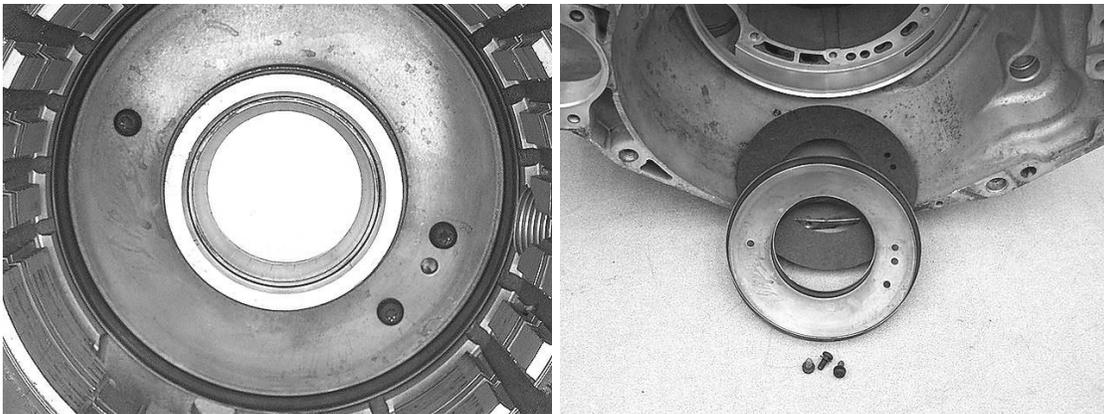


41TE Rebuild Procedures

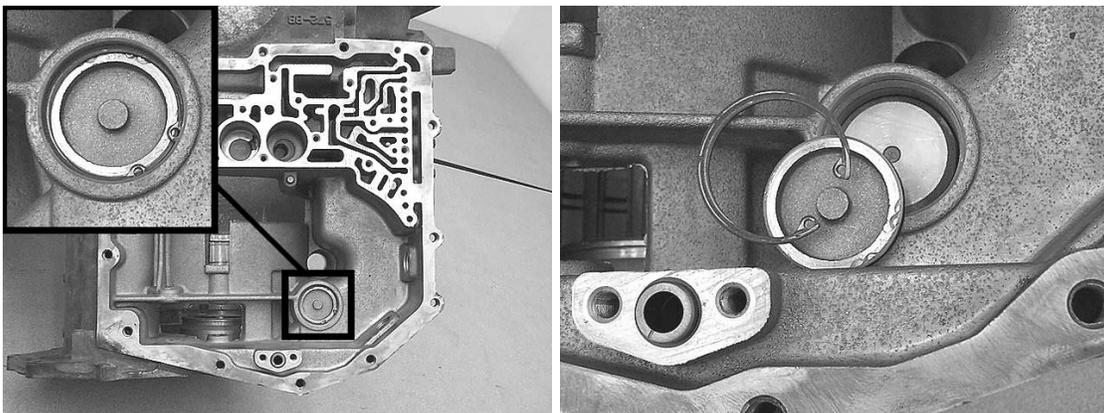
Step 35: Remove the low/reverse clutch piston from the case.



Step 36: Remove the three torx bolts from the low/reverse clutch piston retainer, and remove the retainer and gasket from the case. There may be a small aftermarket retainer support plate held on by two of the bolts. These support plates are an excellent update to the retainer, and should always be reused.

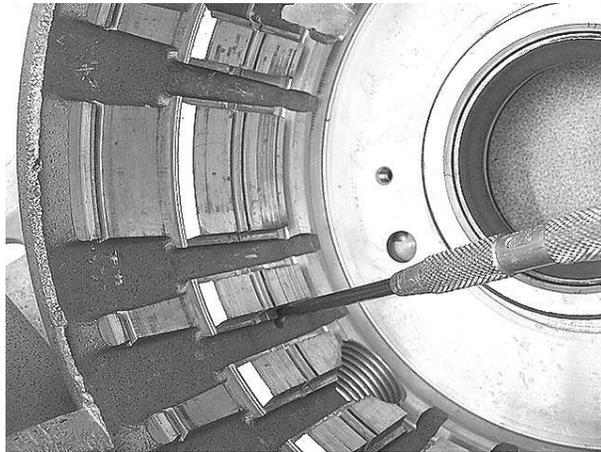


Step 37: Remove the low/reverse accumulator snap ring, and remove the accumulator cap from the case.



41TE Rebuild Procedures

Step 38: Remove the low/reverse accumulator piston and spring from the case. If the piston appears stuck in the case bore, locate the bore vent hole inside the case in the low/reverse clutch case lugs. Cover the accumulator bore with a rag and send a blast of air pressure into the vent hole to blow the piston into the rag.



41TE Rebuild Procedures

Pump



The 41TE uses a very straightforward, conventional crescent pump. There are no valve assemblies or intricate parts, other than screened checkball-controlled orifices in the stator support which are completely inaccessible.

IMPORTANT: Some of the early 41TE pumps used a stator support with only three oil control rings. If you run into one of these units, always replace the stator support with a later, 4-ring support which will also mean changing the input drum assembly as well, since the drum was changed to accommodate the pump change.



Step 1. Remove the o-ring from the outside of the pump body and use a razor blade or other suitable scraping device to scrape any stuck gasket material from the gasket surface of the pump body.



41TE Rebuild Procedures

Step 2. Remove the seal rings from the stator support.



Step 3. Remove the body-to-support bolts being careful to support the pump body as you remove the last bolt.



Step 4. Remove the pump gears from the pump body pocket.



41TE Rebuild Procedures

Step 5. Inspect pump gear and pocket surfaces for wear or damage, using the following measurements as guidelines:

Clearance between the outer pump gear OD and the pump pocket ID should be less than 0.005".



Clearance between the top of the outer pump gear and the top of the pump pocket should be less than 0.002".



Clearance between the top of the inner pump gear and the top of the pump pocket should be less than 0.002".



Thoroughly clean all pump parts.

41TE Rebuild Procedures

Step 6. Using a suitable driver, install a new bushing into the pump body.



Step 7. Use a 1/8" punch to stake the bushing into the pump bore stake pockets.



Step 8. Check the bushing to converter hub clearance with a feeler gauge. The clearance between the pump bushing and the converter hub should be less than 0.005". If there's too much clearance, look for wear on the converter hub.

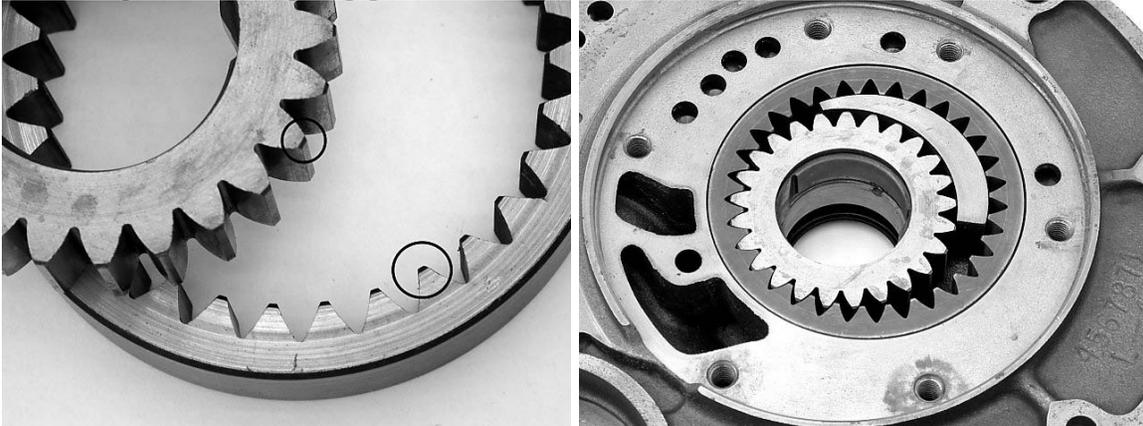


41TE Rebuild Procedures

Step 9. Coat a new front seal with sealer then install it into the pump seal bore.



Step 10. Coat the pump pocket with assembly lube and place the pump gears into the pump body. Make sure that the side of the gears with the greater chamfer on the end of the teeth goes into the pump pocket first.



Step 11. Lower the stator support onto the pump body, properly aligning the passages and bolt holes. Hand tighten the six pump bolts.



41TE Rebuild Procedures

Step 12. Torque the pump bolts to 23 ft/lbs.



Step 13. Place a new pump o-ring in the groove around the pump body.



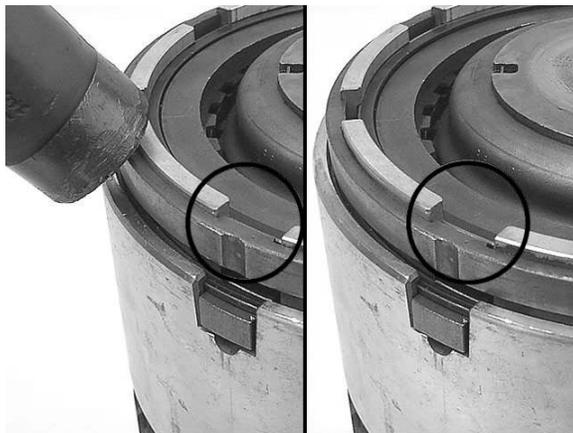
41TE Rebuild Procedures

Input Drum Disassembly



NOTE- The stand being used to support the drum is not a 41TE part. This is a 4T60 (440T4) 4th clutch shaft and hub.

Step 1: Tap down gently on the reverse clutch reaction plate; this provides additional clearance for removing the snap ring.

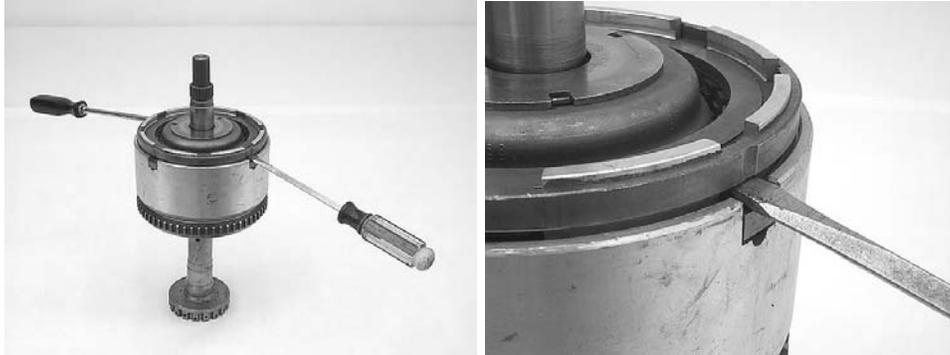


Step 2: Remove the reverse clutch snap ring.



41TE Rebuild Procedures

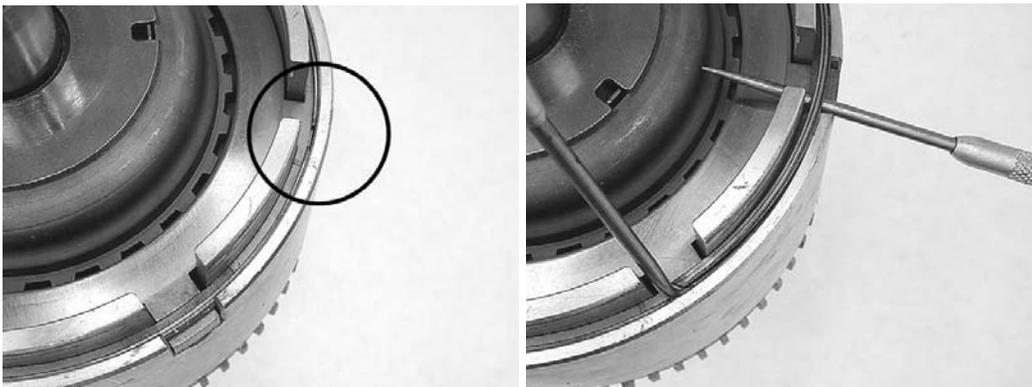
Step 3: Use two screwdrivers to GENTLY pry the reverse clutch reaction plate out of the clutch assembly. This plate has a tendency to turn a little bit sideways and jam itself in the input drum. If the end of the input drum was damaged by contact with the 2-4 piston housing, this may also make it difficult to pry the plate past the damaged area. Excessive prying force will damage the OD/Reverse piston edge. If it gets stuck, tap it back down and gently rock it back out of the drum, moving the screwdrivers around to different positions around the plate. If the top of the drum is really hammered, and the plate is locked in place, use a bench grinder to carefully grind the ridge off the top of the drum.



Step 4: Remove the reverse clutch disks from the input clutch assembly.



Step 5: Remove the flat upper OD/reverse pressure plate snap ring from the input clutch assembly. It's a very narrow ring inside a very narrow access area, so be patient. Use two tools, one to pull the ring out of the groove as you go around, and one to keep the already pulled-out part of the ring from snapping back into the groove.



41TE Rebuild Procedures

Step 6: Remove the OD/reverse pressure plate from the input clutch assembly, *gently* prying if needed.

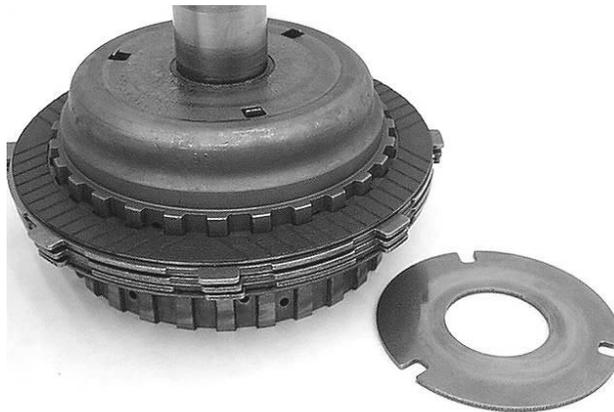
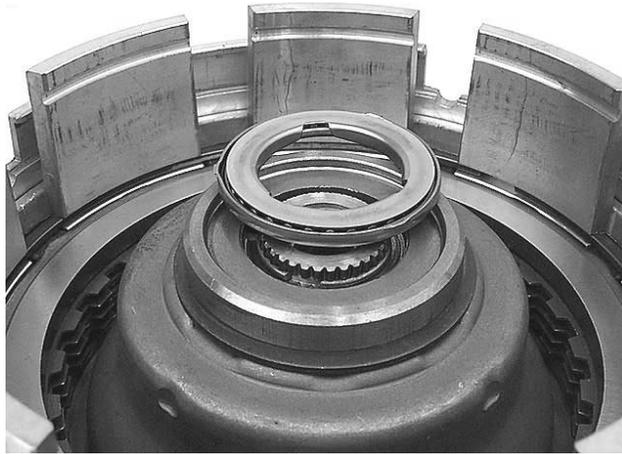


Step 7: Remove the waved lower OD/reverse clutch snap ring from the input clutch assembly.



41TE Rebuild Procedures

Step 8: Holding the solid underdrive clutch hub shaft, lift out both clutch hubs and the overdrive clutch pack. Be careful not to lose the #2 thrust bearing, which may either be on the input drum or the underside of the underdrive clutch hub. Remove the selective #4 thrust plate from the top of the OD clutch hub.



41TE Rebuild Procedures

Step 9: Lift the OD clutch off of the OD clutch hub. Separate the two clutch hubs, and remove the #3 thrust washer and #3 thrust plate from between the two hubs. Check the shaft journal on the underside of the UD clutch hub for wear. There are two bushings inside the OD clutch hub that ride on the UD clutch hub bushing journals. These bushings do not fit the UD clutch hub shaft snugly, and it is normal to feel some wobble between the two parts.

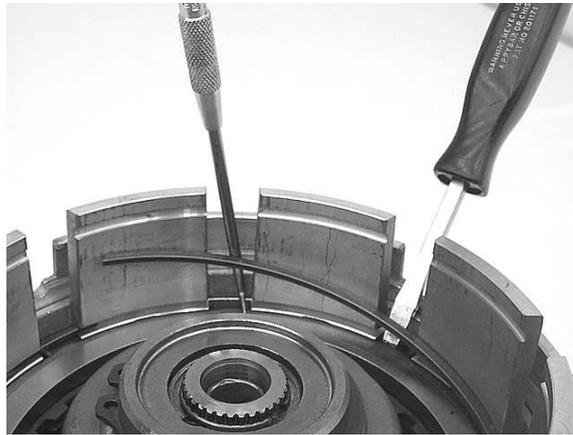


41TE Rebuild Procedures

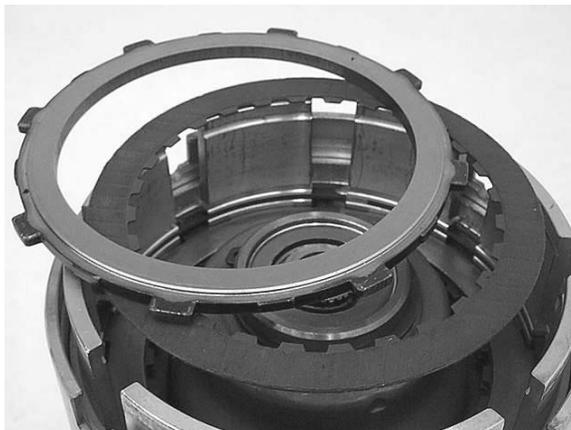
NOTE- The overdrive clutch hub has been known to break in the groove just below the splines. ATRA Technical Bulletin #321 covers an available kit which replaces the hub with an improved version and the other parts needed to make it fit.



Step 10: Remove the tapered snap ring from the overdrive/underdrive reaction plate, being careful not to scratch the top of the reaction plate, which is a clutch apply surface.

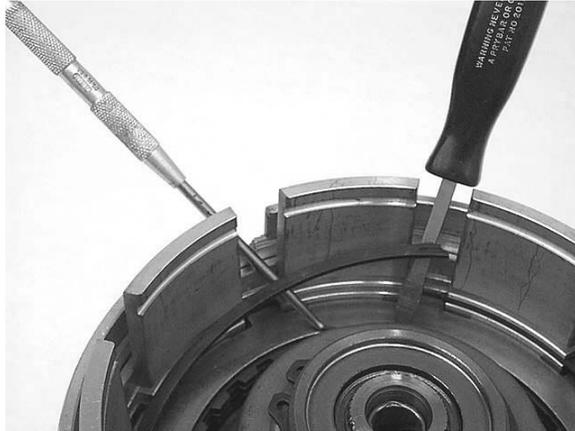


Step 11: Remove the overdrive/underdrive reaction plate, and the first underdrive clutch plate.



41TE Rebuild Procedures

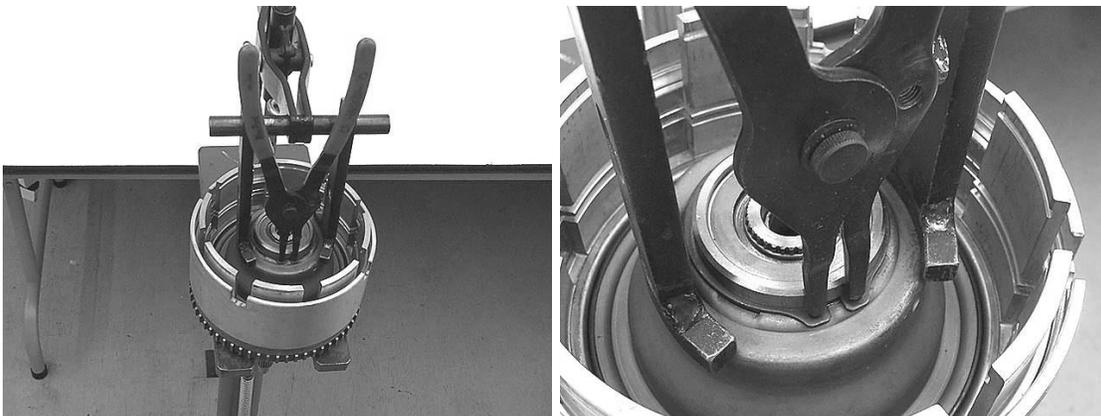
Step 12: Remove the flat snap ring from the underdrive clutch.



Step 13: Flip the drum over to remove the underdrive clutches from the input clutch assembly.



Step 14: Use an appropriate spring compressor to compress the underdrive clutch return spring, and remove the retaining snap ring.

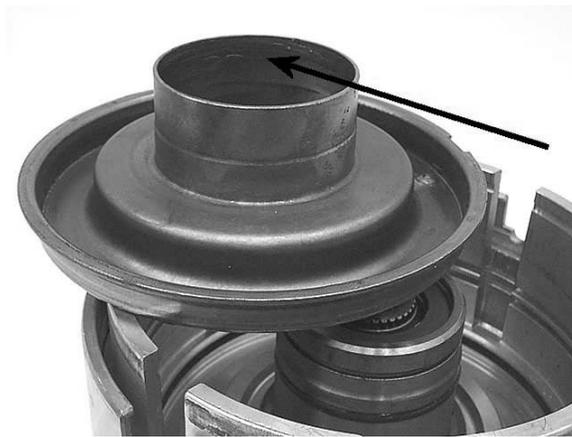


41TE Rebuild Procedures

Step 15: Release the underdrive clutch return spring, and remove the return spring retainer and return spring from the input clutch assembly.



Step 16: Remove the underdrive piston from the drum. Check the inside diameter for wear from the input hub where the lip seal rides.



Step 17: Remove the input hub tapered snap ring from the input hub.

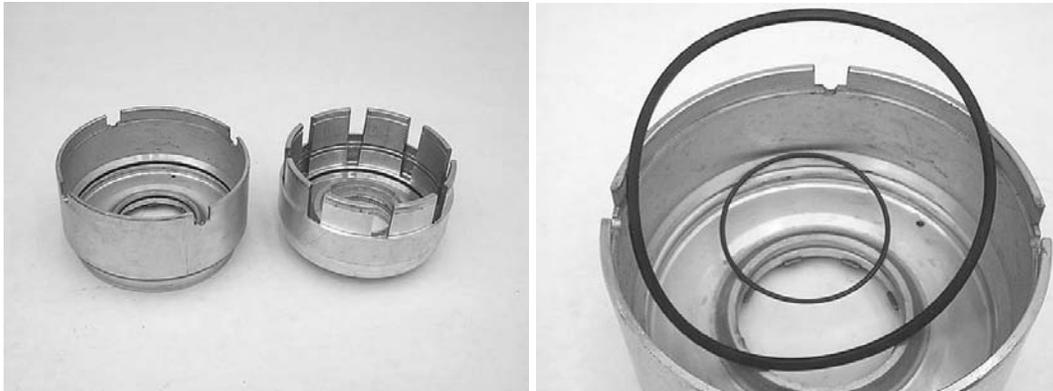


41TE Rebuild Procedures

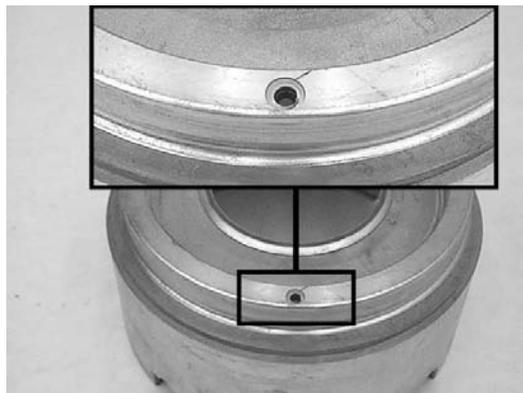
Step 18: Use a soft plastic or rubber mallet to tap the input shaft and hub assembly out of the input clutch retainer.



Step 19: Pull the input clutch retainer out of the OD/reverse piston. Remove the lip seal from the groove inside the OD piston. Remove the o-ring from the groove in the inside diameter of the piston.

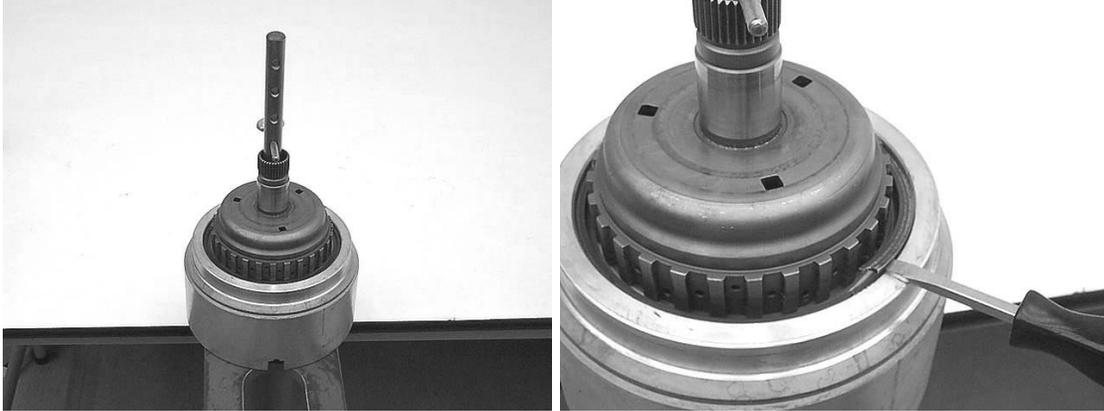


IMPORTANT- there is a small screened orifice pressed into the bottom ridge of the piston which has been known to blow out either in use or during service such as this. The unit will not work if this orifice is missing. Be certain that the orifice is in place. If not, replace the piston.



41TE Rebuild Procedures

Step 20: Use an arbor or foot press to compress the OD/reverse return spring. The OD clutch hub makes an excellent press adapter for this purpose. Be careful: Just compress the spring enough to remove the retaining snap ring.



Step 21: Remove the snap ring and return spring from the piston.

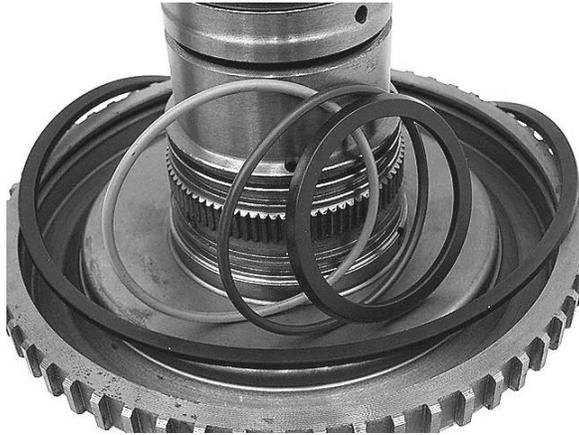


Step 22: Remove the lip seal from the groove inside the input drum.



41TE Rebuild Procedures

Step 23: Remove two lip seals and two o-rings from the input hub.



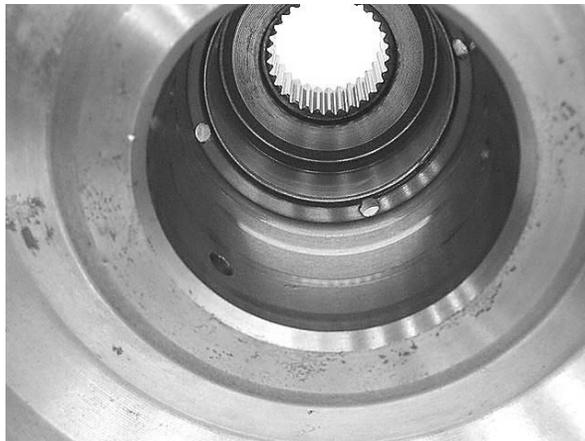
Step 24: Use a seal pick to remove the snap ring from the input shaft. Be careful not to scratch the bearing surfaces.



Step 25: Use a suitable press to press the input shaft out of the hub assembly, taking care not to let the shaft fall out and hit the ground.

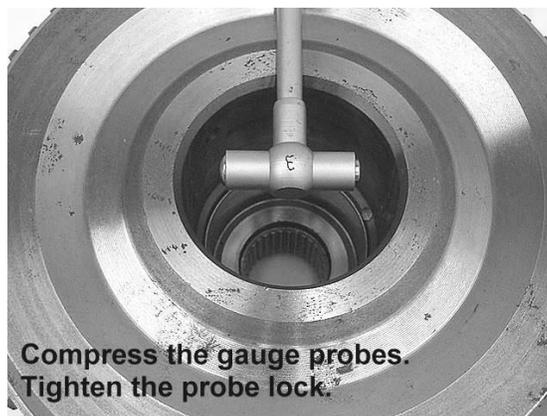
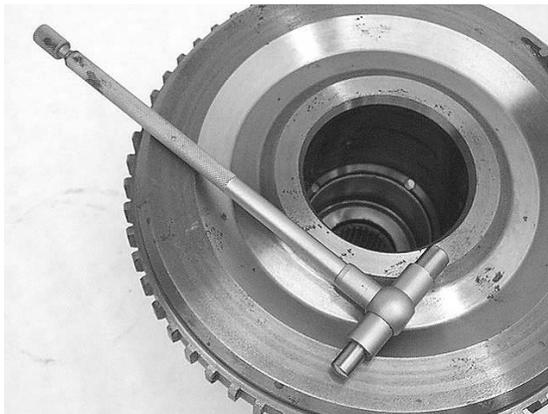
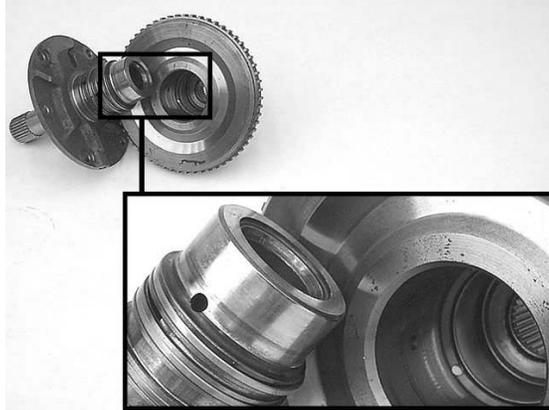
41TE Rebuild Procedures

Step 26: Remove the input shaft seal rings and inspect the input shaft and input hub bore for seal ring area damage.

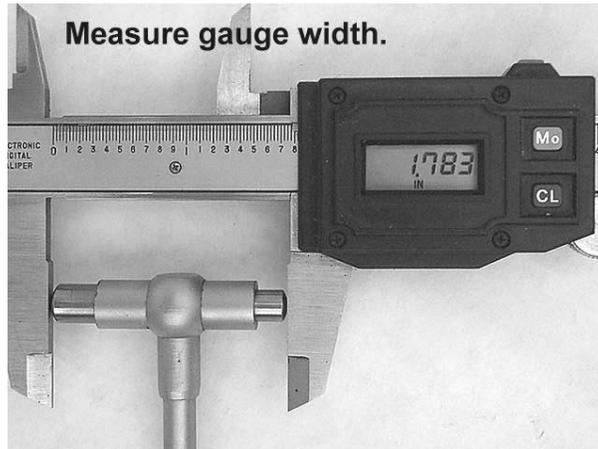
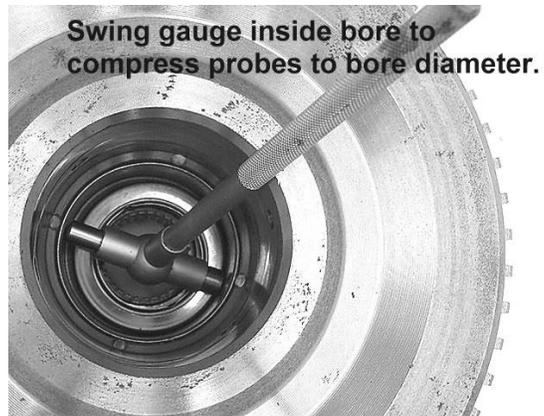
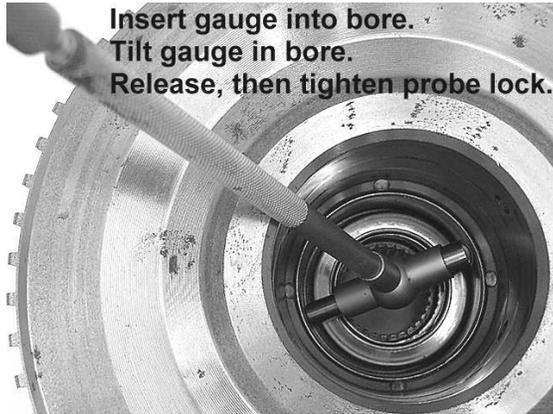


41TE Rebuild Procedures

Step 27: The bushing inside the input hub bore is used for supporting the input drum AND as a clutch circuit seal for the underdrive clutch. Excessive clearance between this bushing and the rear bushing journal of the pump stator support can cause clutch malfunction or failure, so it must be measured. These illustrations show how to measure this clearance, including the use of a telescoping gauge to measure the inside diameter of the input hub bushing. This clearance must be *less than 0.003"* to ensure a good seal for the underdrive clutch. Even though replacement bushings may be available, always perform this check even if you change this bushing. The replacement may not provide the proper clearance.



41TE Rebuild Procedures



41TE Rebuild Procedures

Input Clutch Assembly



NOTE- The stand used to support the input drum in this section is not a 41TE component. It is a 4th clutch hub and shaft from a 4T60 (440T4).

Important- Soak all new clutch material in clean ATF for at least 20 minutes before assembly.

NOTE- One of the most common 41TE failures is a broken UD/OD clutch reaction plate snap ring. Many modifications have been made in an attempt to prevent this problem, which has created a somewhat complex problem with parts interchanges between input drums, pressure plates and snap rings. The latest modification appears capable of preventing the problem, and comes in a kit that includes all the parts needed to avoid a mis-match. The kit includes an input drum, two selective UD/OD reaction plates and the snap rings for the plate. ATRA *highly* recommends the use of this kit to update an earlier unit. You can identify an earlier unit by measuring the thickness of the UD/OD reaction plate upper tapered snap ring. If it is less than 0.090" thick, order the drum kit under Chrysler part number 4886300AA.



41TE Rebuild Procedures

Step 1: Clean all of the input clutch assembly components, and inspect them for wear or damage. Pay particular attention to:

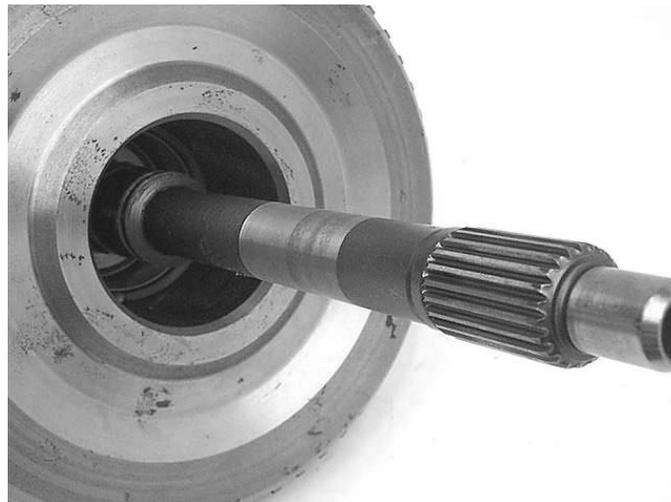
- Welds
- Thrust surfaces
- Bushings and bushing surfaces
- Splines
- Seal grooves and surfaces
- Snap ring grooves

Replace any components that show signs of wear or damage.

Step 2: Coat the input shaft seal ring grooves with assembly lube, then install the seal rings into the grooves.



Step 3: Use a suitable press to press the input shaft into the input shaft hub.



41TE Rebuild Procedures

Step 4: Use a seal pick to reinstall the snap ring onto the input shaft. Be careful not to scratch the bearing surfaces.



Step 5: Install the two lip seals and two o-rings onto the input hub.

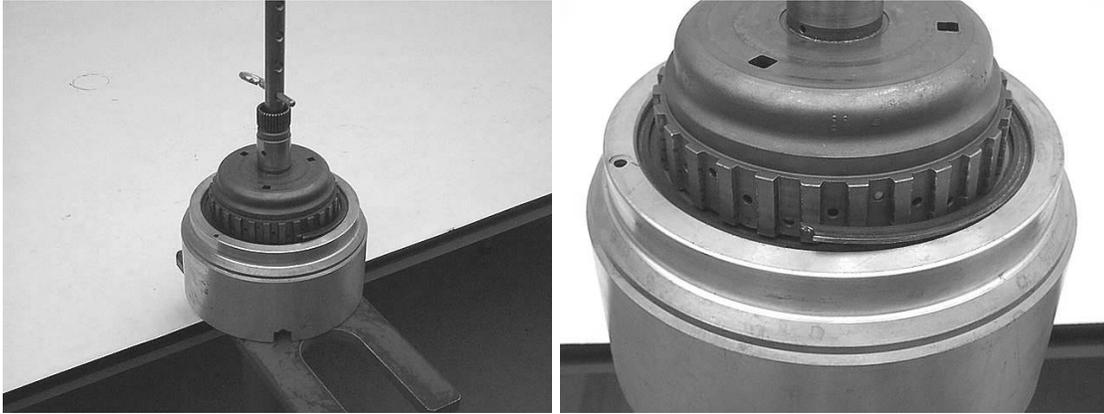


Step 6: Lay the overdrive return spring onto the OD/reverse piston, with the concave side facing up.

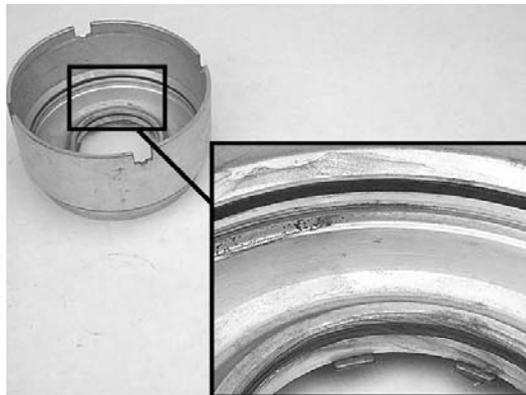


41TE Rebuild Procedures

Step 7: Use a suitable press to compress the overdrive return spring. The OD clutch hub makes a great press adapter. Install the snap ring, and release the spring.



Step 8: Install the OD/reverse piston inner lip seal into the piston inner groove, then install the o-ring into the groove in the piston inside diameter. Coat them with assembly lube.



Step 9: Set the input clutch drum into the OD/reverse piston, and press the drum into place inside the piston. You'll know it's all the way in when the bottoms of both drums are flush with each other.

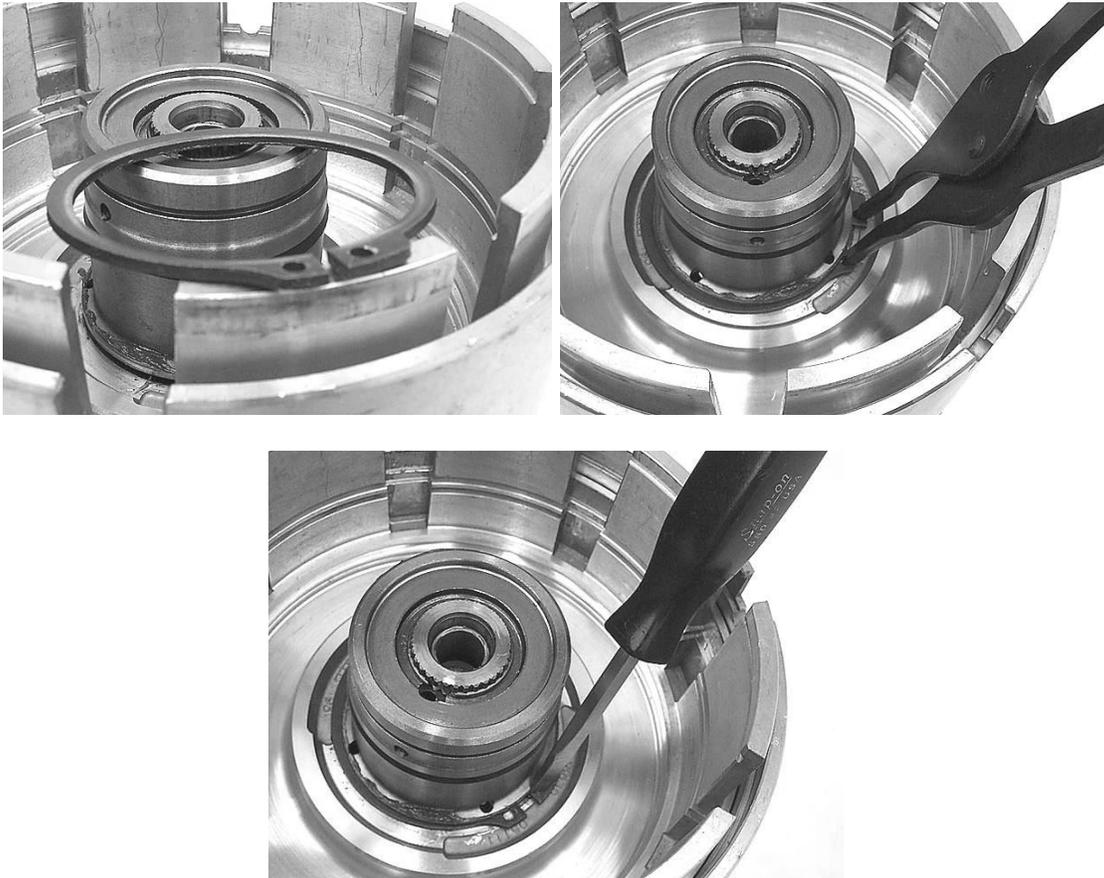


41TE Rebuild Procedures

Step 10: Coat the inside diameter of the input drum assembly with assembly lube. Coat the lip seal surface on the outside of the OD/reverse piston. Set the input shaft and hub assembly into the input drum assembly, and press it into place. You may have to rotate the hub slightly to align the splines.

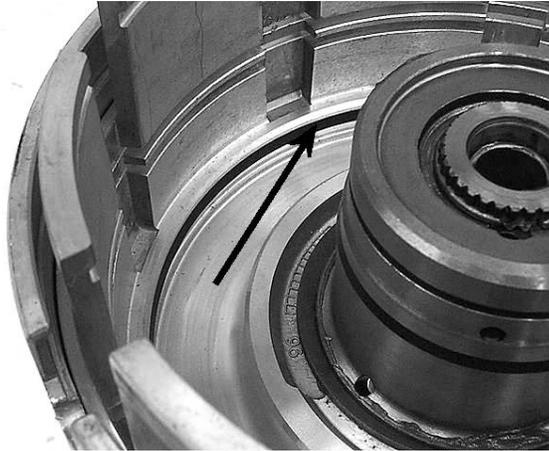


Step 11: Flip the assembly, and install the retaining snap ring onto the hub, with the tapered side of the snap ring facing up. Use a screwdriver and hammer to gently set the snap ring all the way into the groove. When seated, the gap between the ring ends is approx. 1/4".

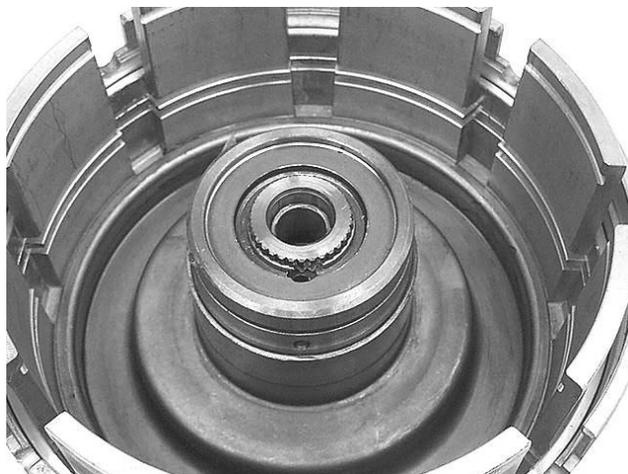


41TE Rebuild Procedures

Step 12: Install the underdrive outer piston seal into the input drum inner groove. Be certain you use the lip seal of the correct width. ATRA Technical Bulletin #318 shows how to determine the proper seal.

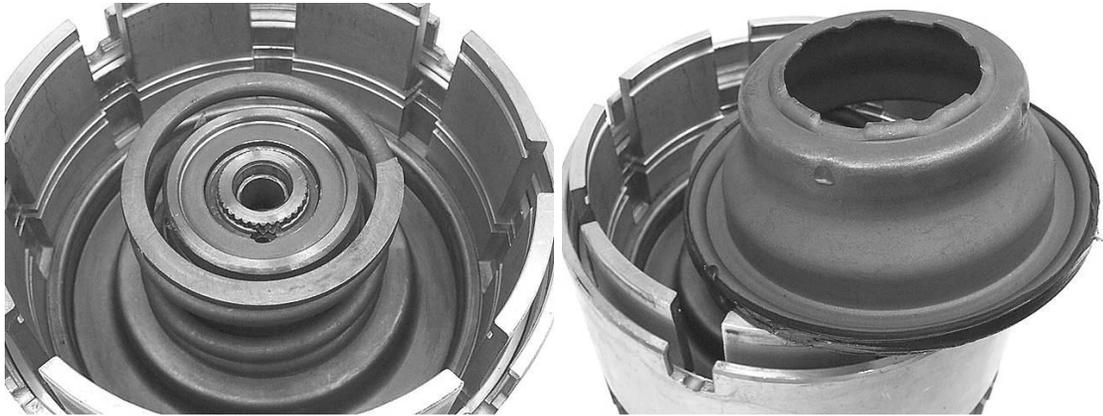


Step 13: Coat the inside and outside diameters of the underdrive piston with assembly lube. Lay the underdrive clutch piston into the drum, and rotate it into place.

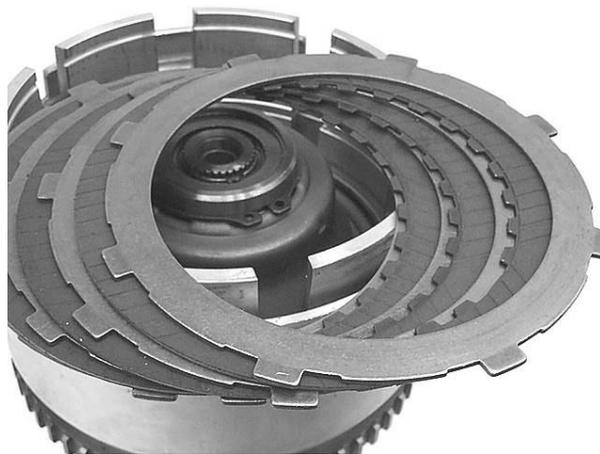


41TE Rebuild Procedures

Step 14: Place the underdrive piston return spring into position. Coat the outer edge of the underdrive return spring retainer with assembly lube. Use an appropriate compressor to compress the return spring retainer *squarely* into the piston. Install the snap ring to hold the return spring and retainer in place, and remove the compressor.

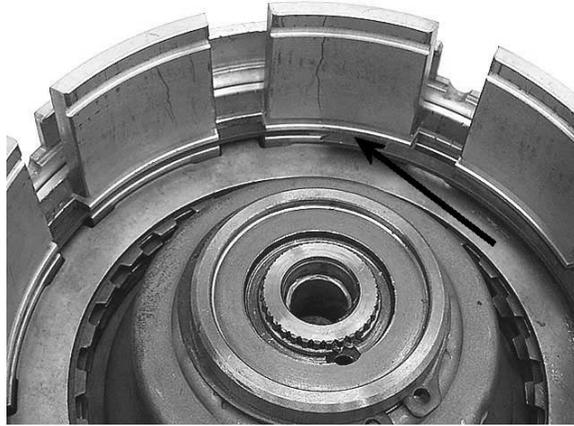


Step 15: Install the underdrive clutch stack in the clutch drum; leave out the top friction plate for now. This will include four thin steel plates and three thin friction plates.

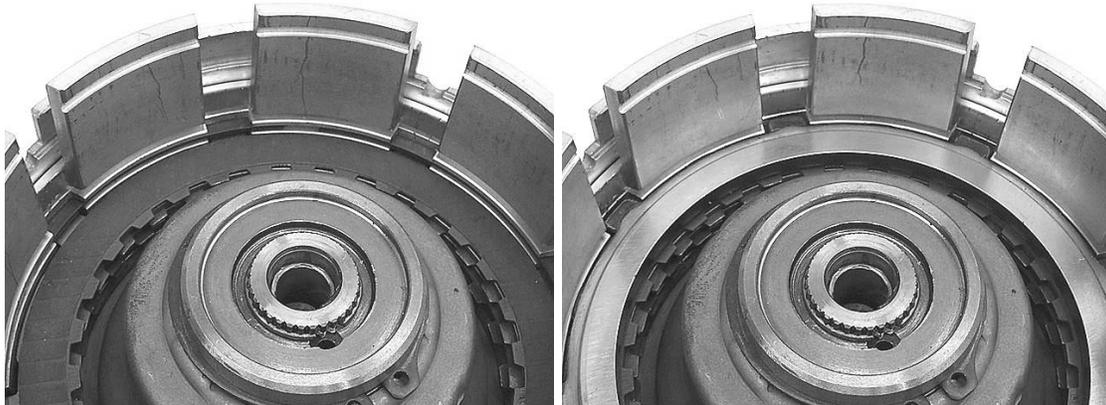


41TE Rebuild Procedures

Step 16: Install the flat overdrive/underdrive reaction plate snap ring into place, making sure that both ends of the snap ring are inside one drum lug. Be careful not to scratch the clutch plate.



Step 17: Install the last thin friction plate in the underdrive stack, and then lay the reaction plate in place. Be sure the reaction plate is oriented correctly, because it can get confusing- If the plate has only one **Step**, this **Step** goes down. If it has two **Steps**, the **Step** at the lug goes down and the **Step** partway across the apply surface goes up.



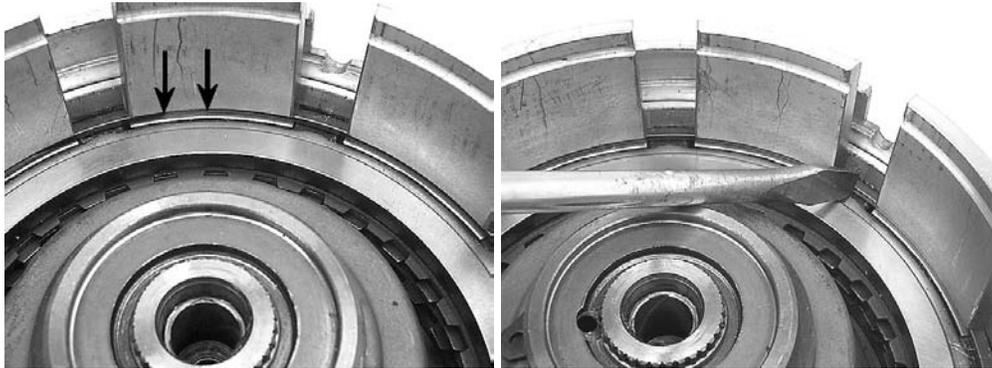
Top



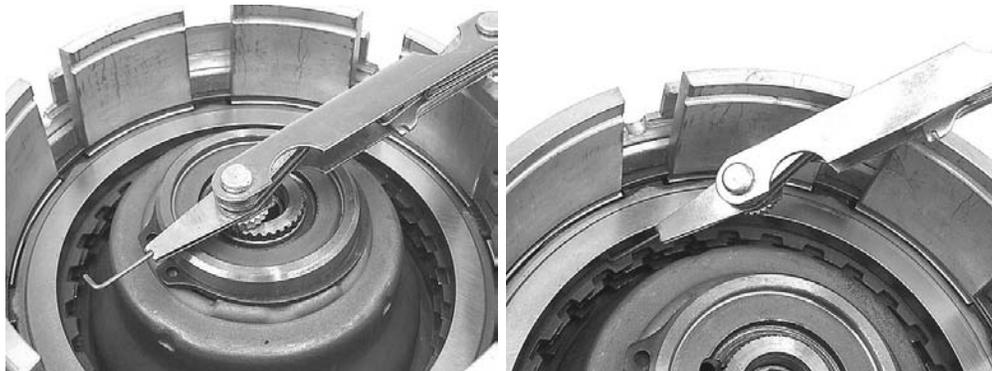
Bottom

41TE Rebuild Procedures

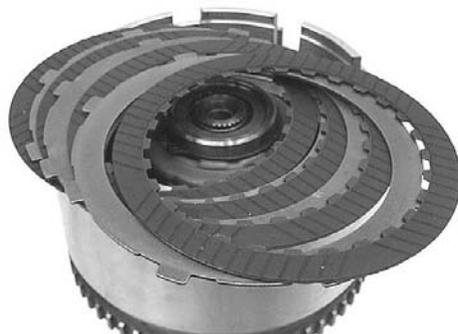
Step 18: Install the tapered snap ring to hold the pressure plate in place, carefully and gently seating it all the way into the groove with a screwdriver and hammer.



Step 19: Use a wire or spark plug gauge between the top friction plate and pressure plate to check the clutch clearance. Clearance should be between 0.035" and 0.060" (0.90 mm and 1.50 mm); for best results, keep the clutch clearance on the loose side. To adjust the clearance, replace the selective pressure plate. The drum kit described at the beginning of this section includes the two plates you may need.

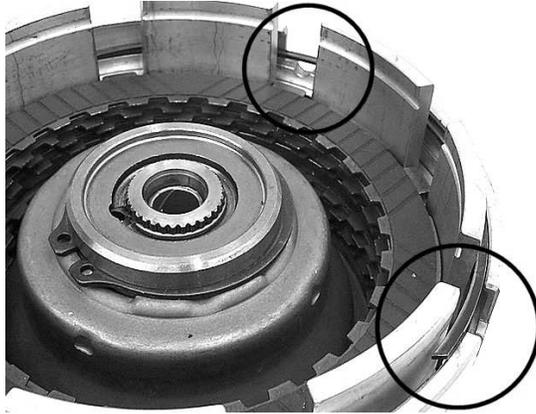


Step 20: Install the overdrive clutch stack in the clutch drum, which includes four thin frictions and three thin steels. If your unit only takes three thick frictions and two thick steels, it must be updated to the new style drum that accepts four frictions. See the note at the beginning of this section.

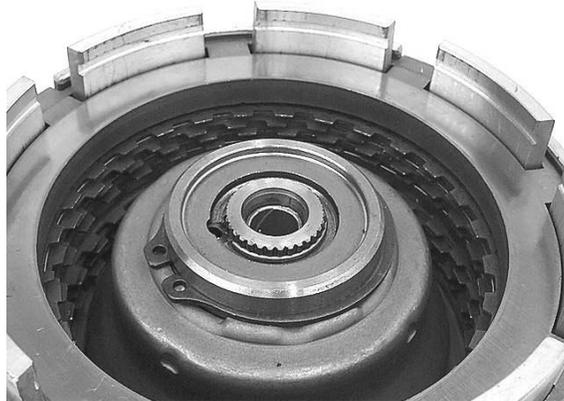


41TE Rebuild Procedures

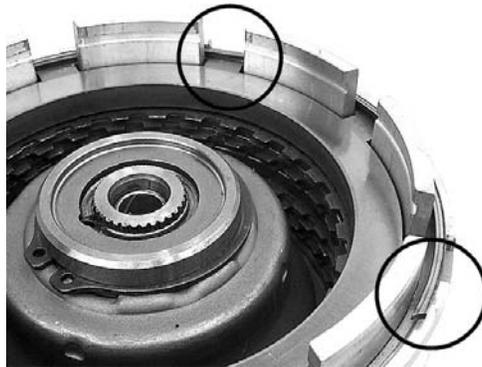
Step 21: Install the waved snap ring into the OD/reverse piston. There may be either two narrow grooves or one wide groove in the piston, but they are completely interchangeable. If this is a two-groove piston, be sure the waved snap ring goes into the lower groove.



Step 22: Lay the overdrive pressure plate into the drum, **Stepped** side down.

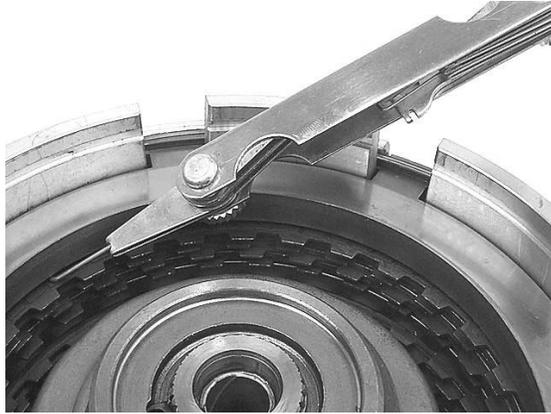


Step 23: Press down on the pressure plate to compress the waved lower snap ring and install the upper flat OD/reverse pressure plate snap ring. Work your way around the piston, pressing the snap ring into the groove as you go.

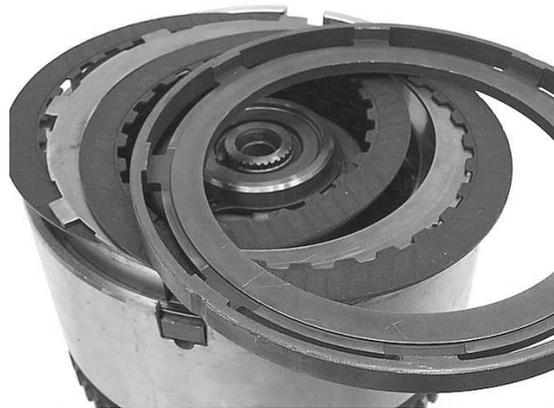


41TE Rebuild Procedures

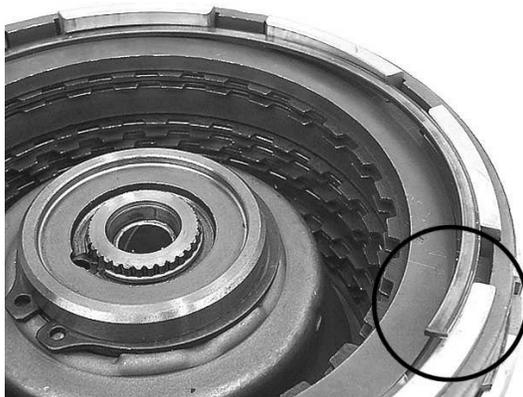
Step 24: Check the overdrive clutch clearance; it should be between 0.040" and 0.095" (1.10 mm and 2.45 mm). Try to keep it over 0.060". There is no adjustment for this clutch pack, but minor changes can be made by comparing thickness of different clutch plates. If the clearance is way out of specs, the clutch is stacked wrong.



Step 25: Set the reverse clutch pack in the drum, and install the reverse pressure plate with the flat side facing down. Gently tap it down as far as it will go.



Step 26: Install the reverse selective snap ring in the clutch drum, and use two screwdrivers to raise the reverse pressure plate up against the snap ring.



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Step 27: Use a feeler gauge to check the reverse clutch clearance; it should be between 0.030" to 0.050" (0.75 mm and 1.25 mm). If the clearance is out of specs, replace the snap ring with the proper selective snap ring. If the clearance won't come within specs, dismantle the drum and recheck your OD/reverse piston-to-input drum assembly, making sure that all snap rings are in place. Snap ring positions can be reviewed in ATRA Technical Bulletin #249.



Step 28: Remove the overdrive and reverse clutches from the clutch drum, and lay them aside for installation later. Make sure you keep these clutch stacks separate, so you don't mix them up later.



Step 29: Install the #2 thrust bearing on the input hub. Use assembly lube to hold the bearing in place.

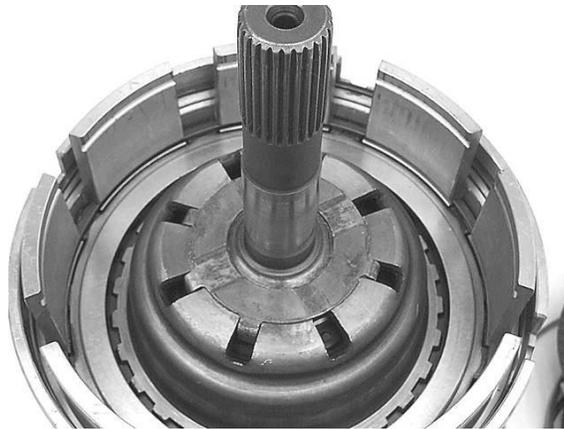


41TE Rebuild Procedures

Step 30: Install the underdrive shaft assembly into the drum. All clutches are engaged with the hub when you can press down on it and it still turns easily.



Step 31: Install the #3 thrust washer (5 locating tabs) on the underdrive shaft hub. Use assembly lube to hold the washer in place.



Step 32: Install the #3 thrust plate (3 locating tabs) onto the overdrive shaft assembly. Use assembly lube to hold the plate in place.

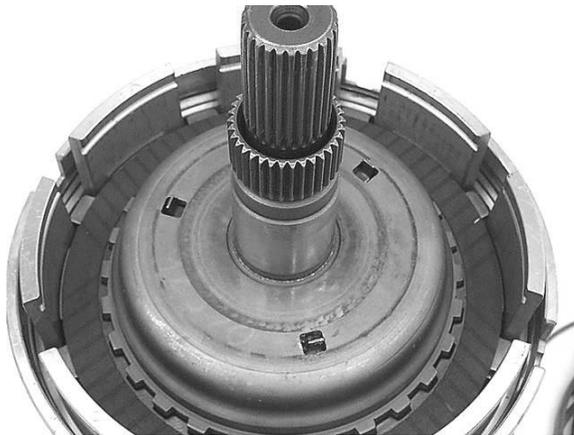


41TE Rebuild Procedures

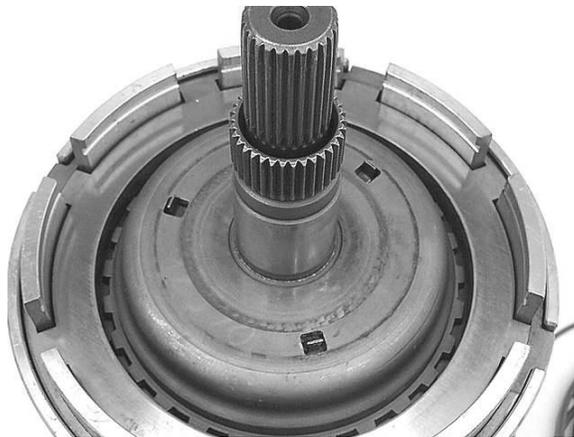
Step 33: Slide the overdrive shaft assembly over the underdrive shaft, and into the input drum assembly.



Step 34: Install the overdrive clutches into the input clutch drum.

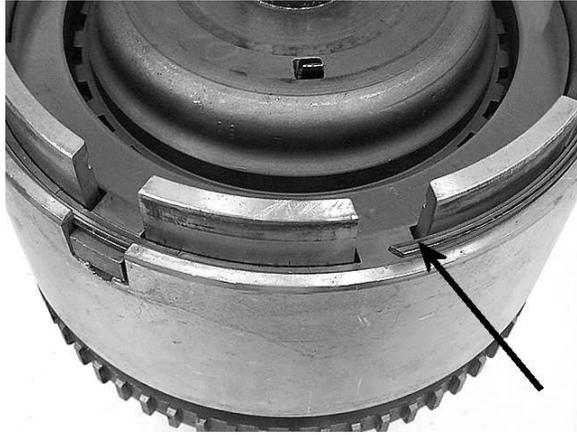


Step 35: Set the OD/reverse reaction plate into the input clutch drum, with the **Stepped** side facing down.

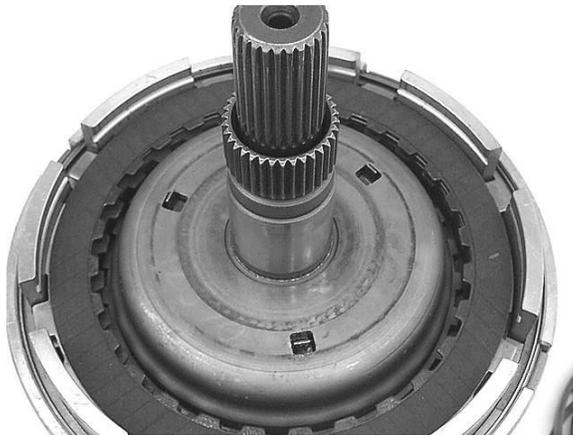


41TE Rebuild Procedures

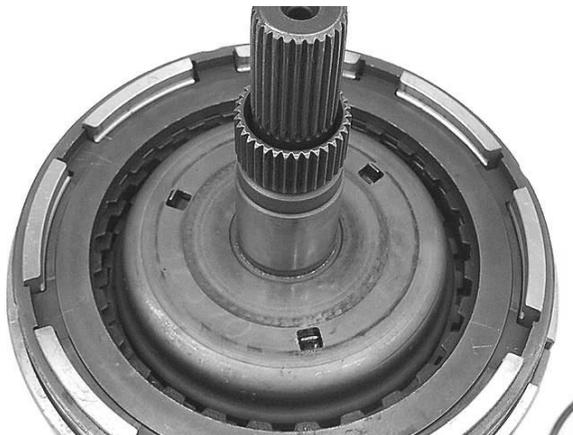
Step 36: Press down on the OD/reverse pressure plate and install the flat snap ring into the OD/reverse piston to secure it.



Step 37: Install the reverse clutches in the input clutch drum.

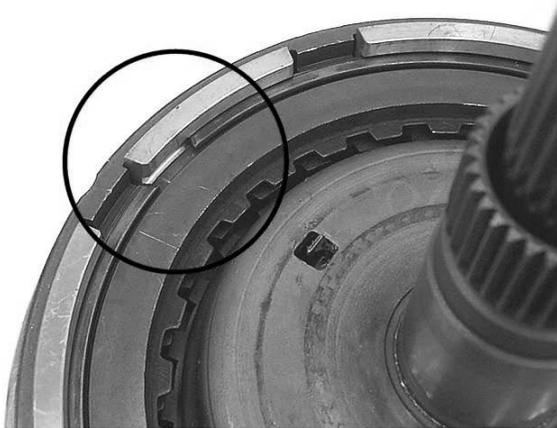


Step 38: Install the reverse clutch pressure plate, with the flat side facing down.

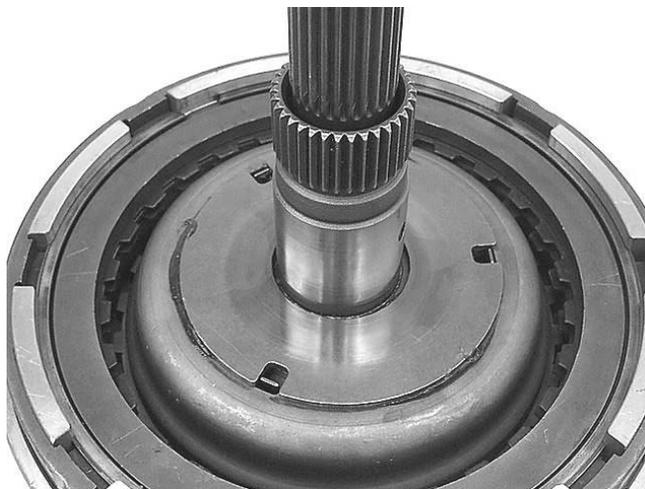


41TE Rebuild Procedures

Step 39: Install the reverse clutch snap ring in the input drum, then pry up on the pressure plate to seat it against the snap ring.



Step 40: Apply assembly lube to the #4 thrust plate and press it onto the OD clutch hub. This plate comes in several thicknesses and is the selective adjustment for input shaft end play.



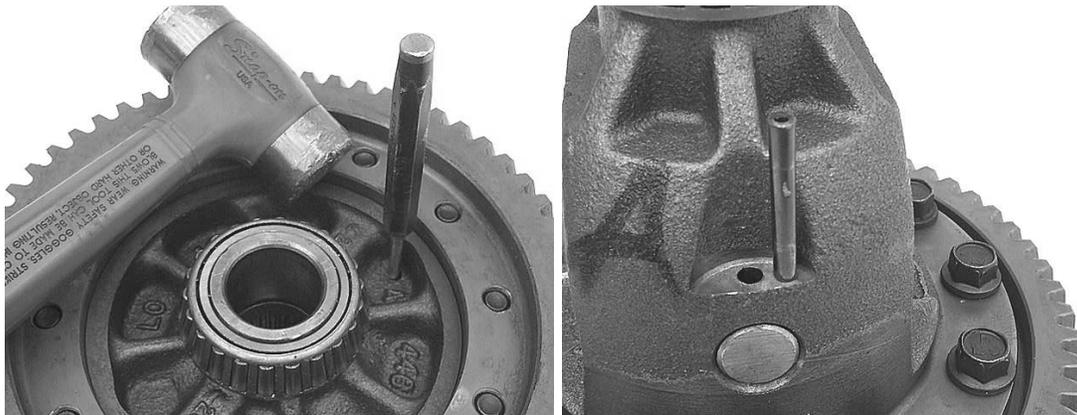
41TE Rebuild Procedures

Final Drive



Step 1: Check the bearings and races for wear or damage, and replace as necessary. Always replace the bearing and race as an assembly.

Step 2: Use a punch to drive the roll pin out of the differential housing.

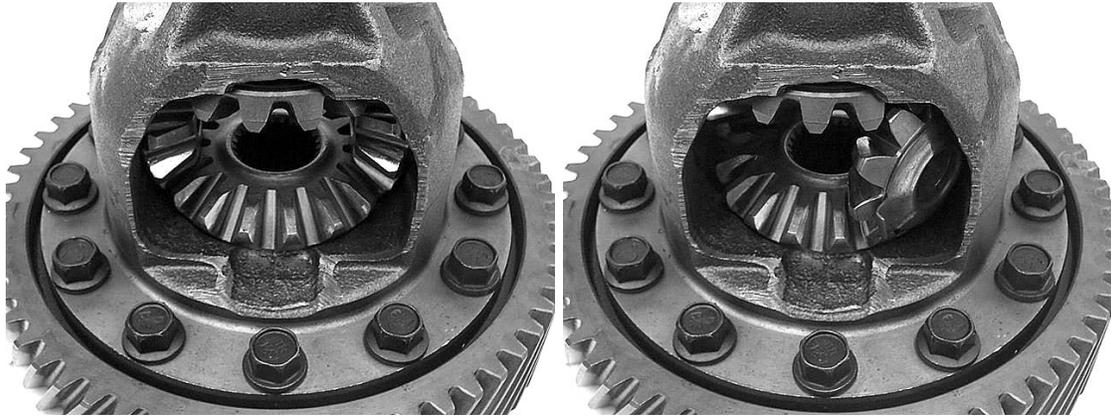


Step 3: Slide the pinion shaft out of the differential housing.



41TE Rebuild Procedures

Step 4: Rotate the side gears to align the pinion gears with the openings in the housing, and remove the pinion gears.

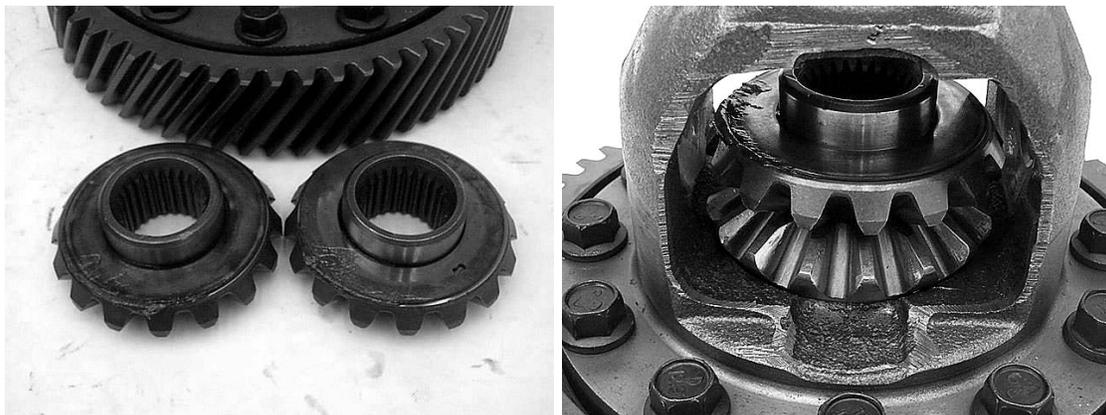


Step 5: Remove the side gears from the housing.



Step 6: Check the gears, pinion shaft and thrust washers for wear or damage.

Step 7: Install the thrust washers on the side gears, and slide the side gears into the differential housing.

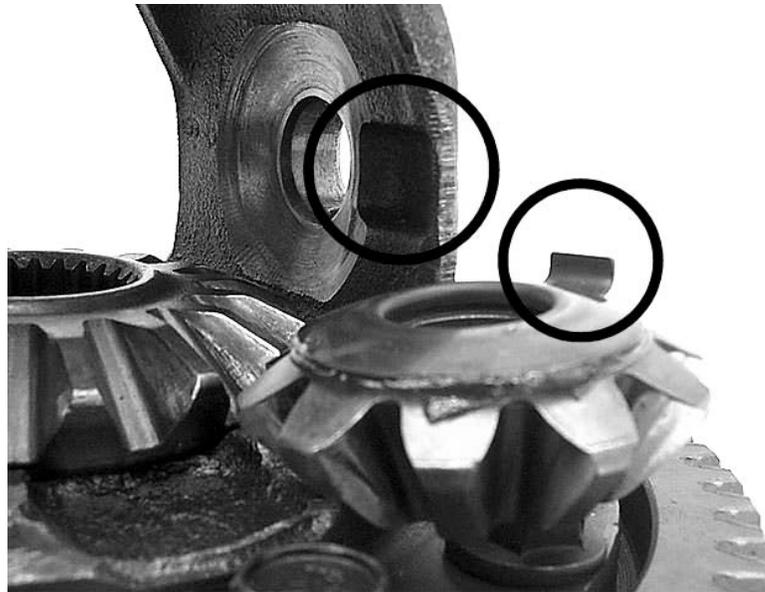


41TE Rebuild Procedures

Step 8: Install the thrust washers onto the pinion gears, and slide the pinion gears into the openings in the differential housing.

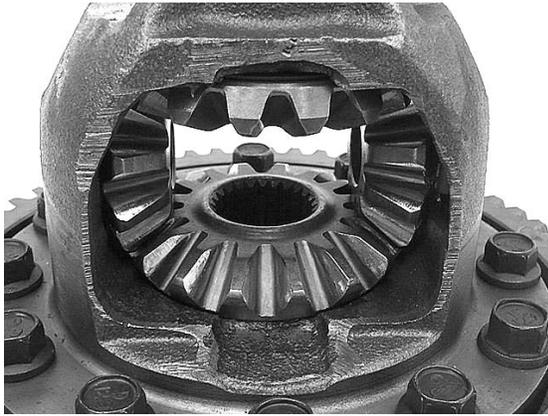
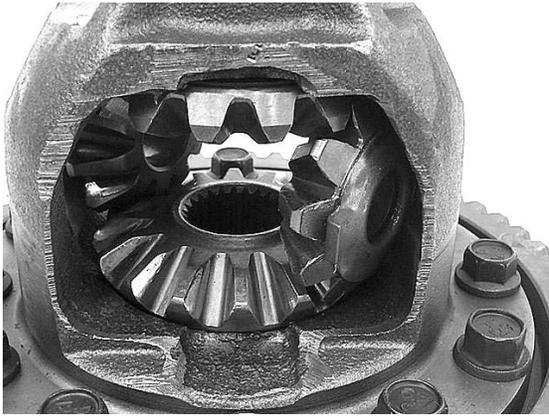
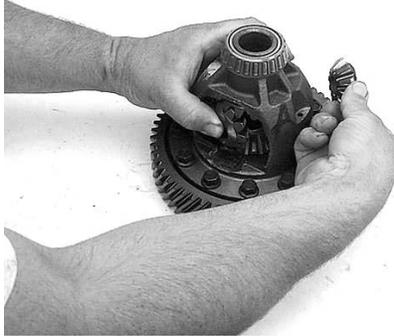


NOTE- the pinion gear washer tangs can only enter the differential carrier from one side, through the slots that lead to the pinion shaft holes. Make sure you slide the pinion gear tangs through these slots.



41TE Rebuild Procedures

Rotate the side gears to spin the pinions into place. Make sure the pinion gears align with the shaft openings in the differential. If not, rotate the pinion gears back out, and adjust their position relative to the side gears.



Step 9: Slide the pinion shaft into place.



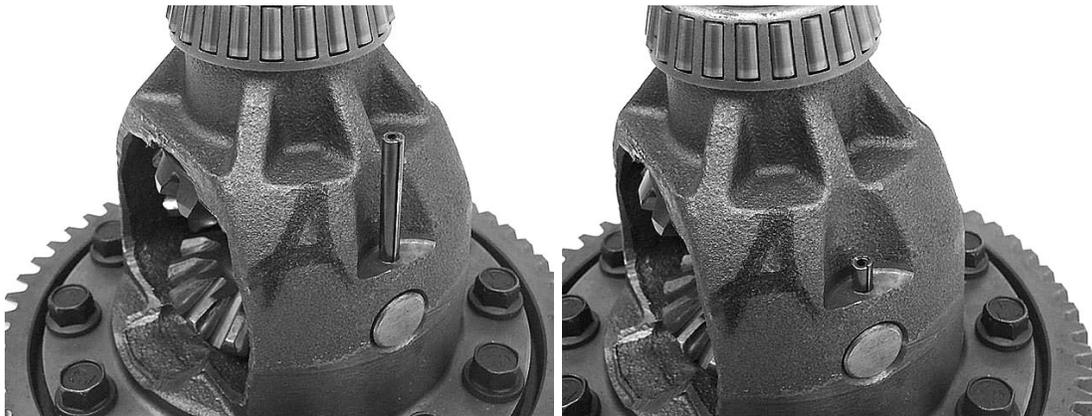
41TE Rebuild Procedures

Step 10: Slide a deep socket that will pass into the differential housing but not through the side gears into the differential housing, to rest against the side gear. Use a dial indicator to measure the up-and-down motion of the side gear and socket.



Side gear endplay should be between 0.001" and 0.013" (0.02 mm to 0.35 mm). Replace the selective side gear thrust washers to adjust the endplay.

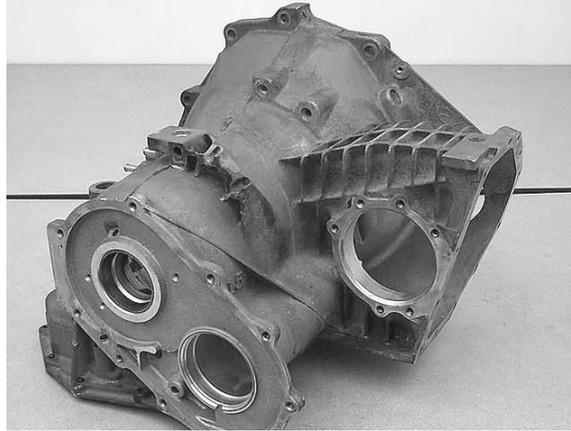
Step 11: Reinstall the roll pin to lock the pinion shaft to the differential housing.



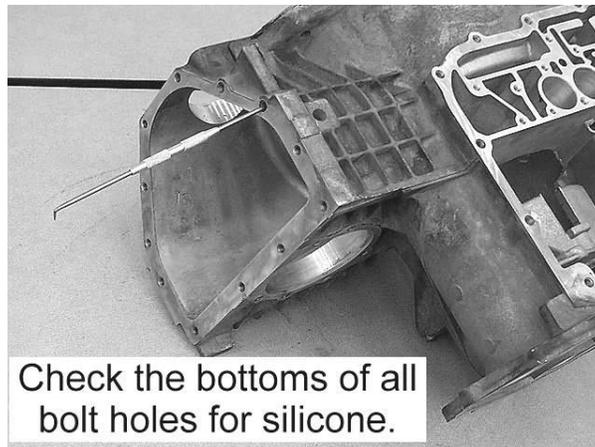
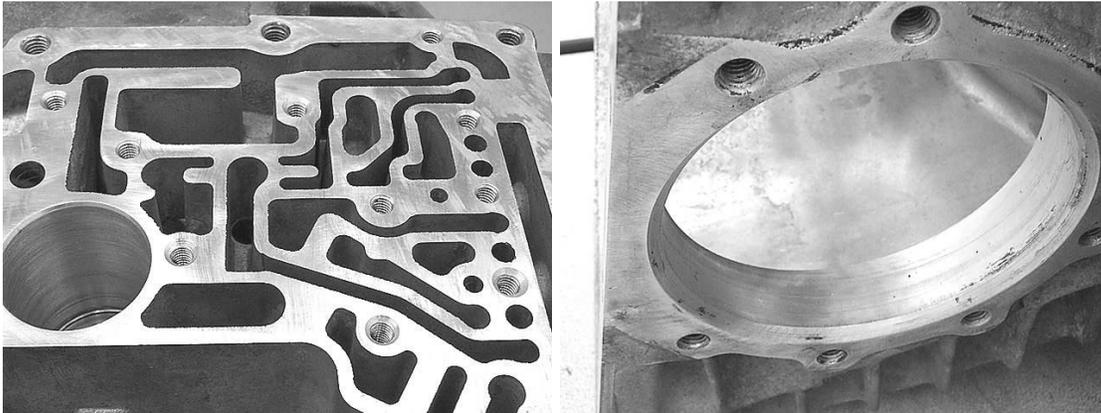
41TE Rebuild Procedures

Case and Extension Housings

Step 1: Check for cracks, wear or damage anywhere on the case and extension housing. Repair or replace as necessary.

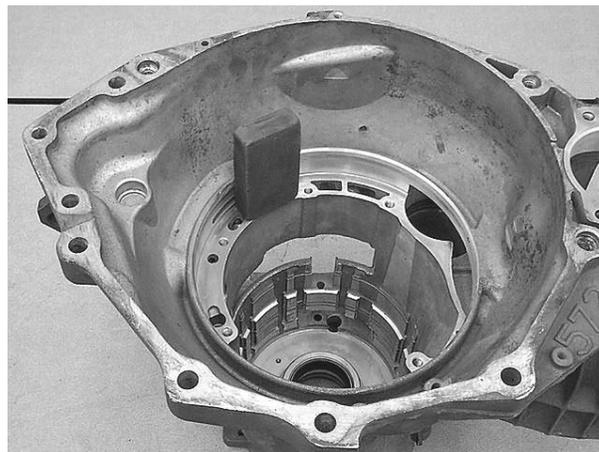
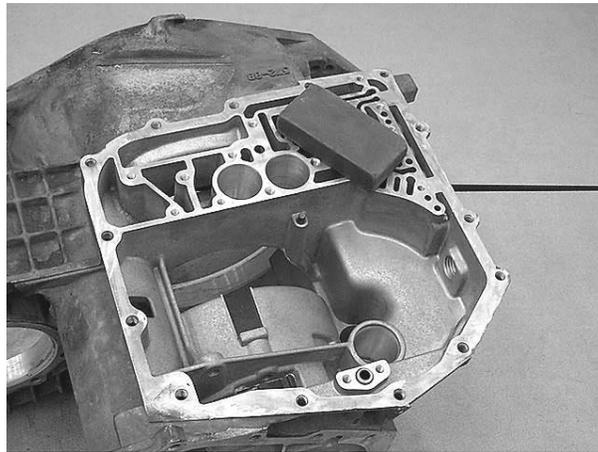
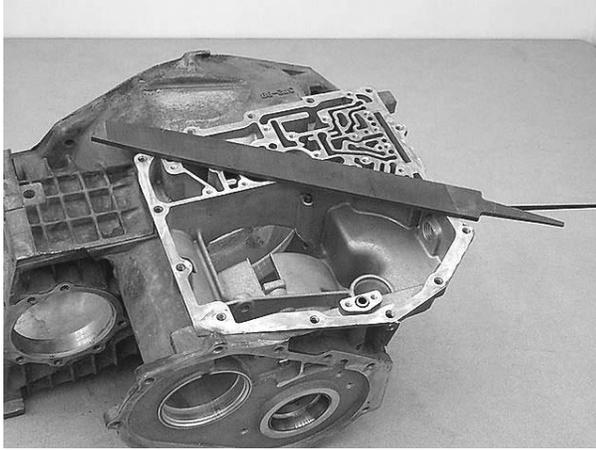


Step 2: Check for pulled or stripped threads in the case. Check for and remove any sizeable amounts of cured silicone from the bottom of bolt holes. Repair or replace as necessary.



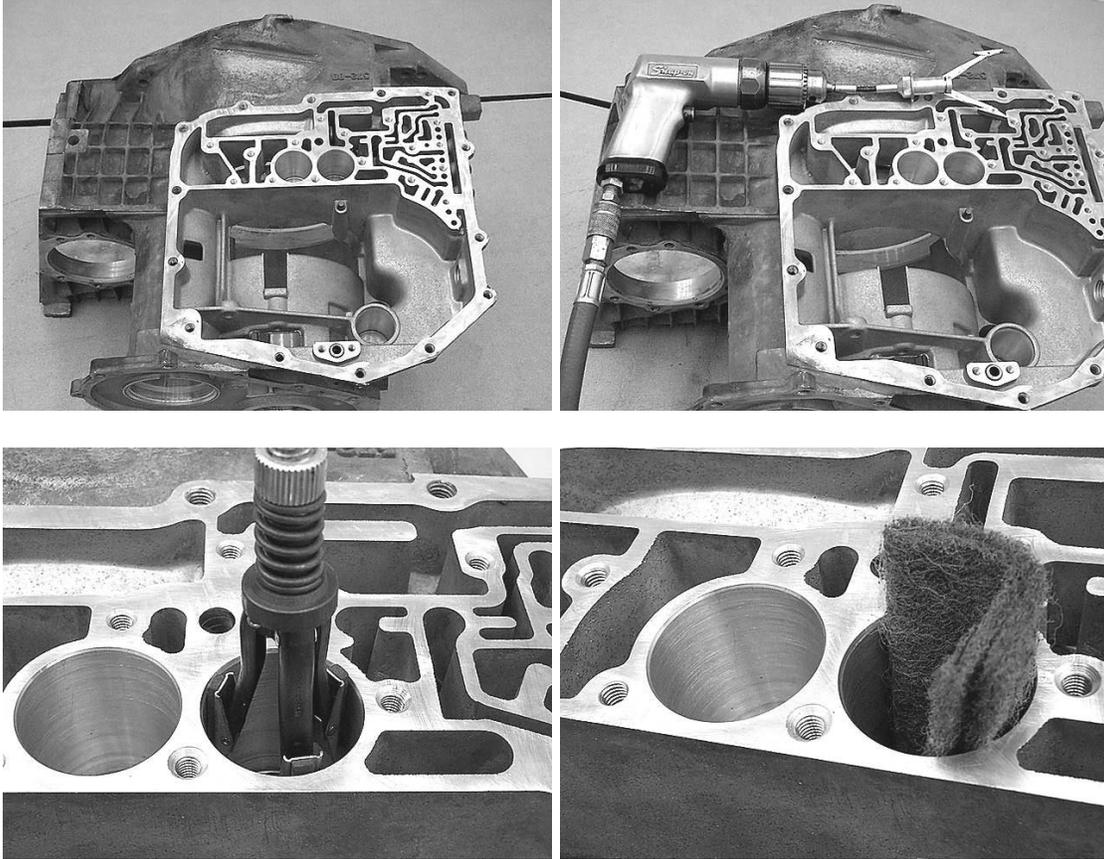
41TE Rebuild Procedures

Step 3: Check for flatness on mating surfaces, such as the valve body, pump, and flange surfaces. Flat file, flat sand or replace as necessary. The side or end of a sharpening stone can be used to flatten surfaces in tight spots. The objective here is to level out the bolt hole edges and remove any stuck gasket stuff.

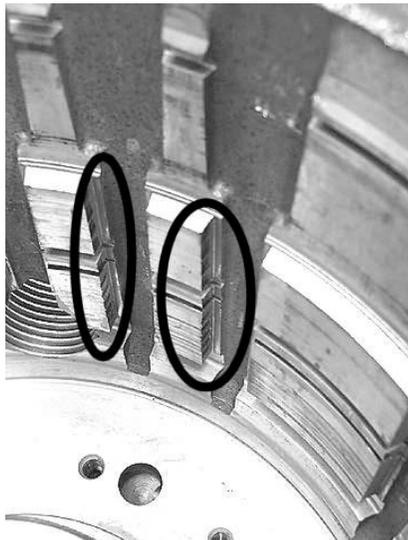


41TE Rebuild Procedures

Step 4: Check for wear or damage in the accumulator bores. Replace as necessary. If bores are not damaged or excessively worn, condition bore sealing surfaces with a brake hone if necessary, then with ScotchBrite™ or equivalent material.

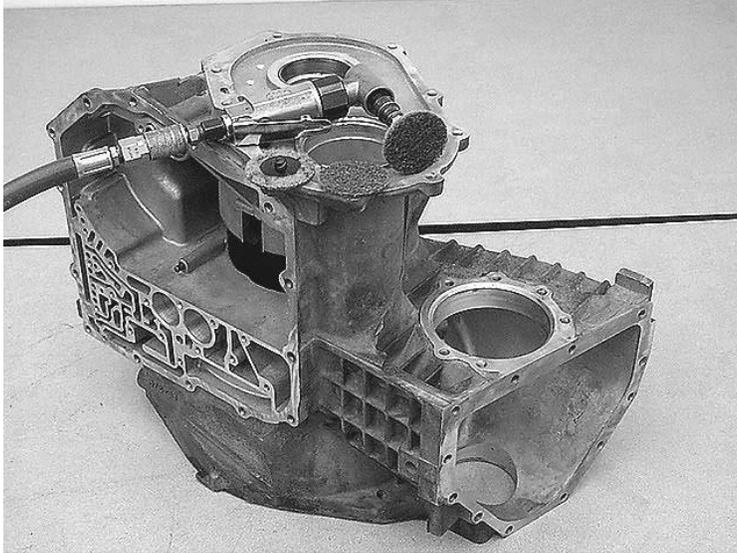


Step 5: Check for worn or damaged splines in the case. Slight notching (less than 1/16" deep) of the case lugs from steel plate motion is acceptable. Replace case if necessary.



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Step 6: Clean the case and housings thoroughly. If you are going to use a stripping disc, or 'cookie tool' on a die grinder to remove old silicone sealer (a real time-saver), be certain you don't remain in one spot with the tool long enough or press down hard enough to grind down the aluminum. These are *extremely effective abrasives*. Be careful to keep all surfaces true, flat and square.



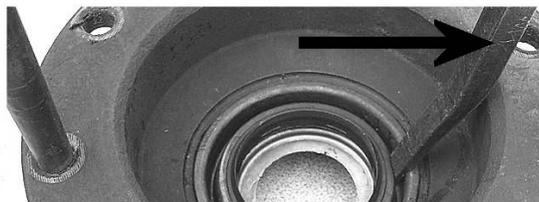
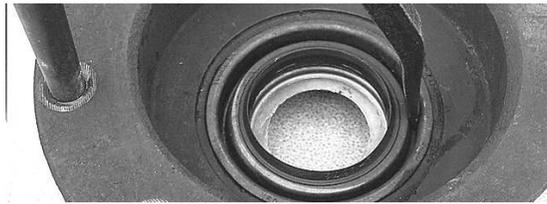
WARNING- Using this type of tool on valve body and pump mating surfaces almost guarantees a major failure of your work due to leaks caused by uneven surfaces. Keep powered abrasive tools away from this type of critical surface.

Step 7: Check for a worn or damaged axle bushing surface in the extension housing. Replace as necessary.



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Step 8: Remove the axle seal from the differential bearing retainer. It is extremely important that the bearing oil baffle (the thin steel plate between the seal and the bearing race) not be damaged. To avoid this, use a large screwdriver or prybar to deform the seal as shown to release the seal-to-bore press fit. To hold the retainer during this procedure, you can either use a long punch in a bolt hole, or temporarily bolt the retainer back into the case. After prying all the way around the seal, a small tap or two behind the seal should pop it right out of the bore.

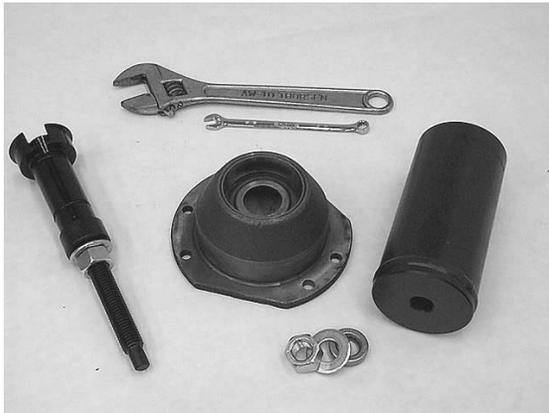


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Step 9: Check the bearing races for wear or damage. Replace as necessary. Although you can use a punch to remove the race from the bearing retainer, this method requires that you remove the bearing oil baffle which may damage the baffle. To remove the extension housing race, you need Miller Special Tool # L-4518. It's best to use the special tool to remove the races from either housing. Remember that the differential adjusting shim is right behind the bearing race in the differential bearing retainer.

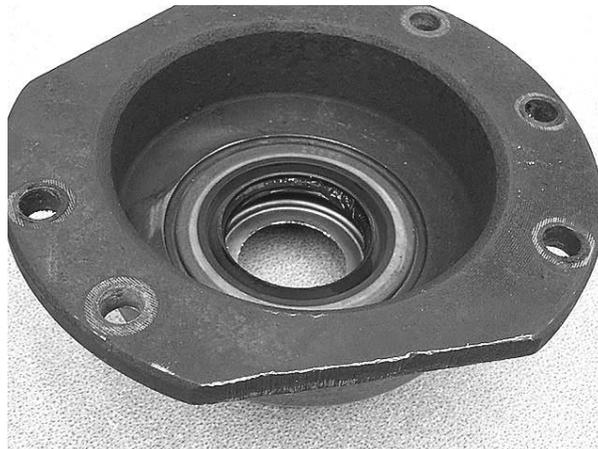
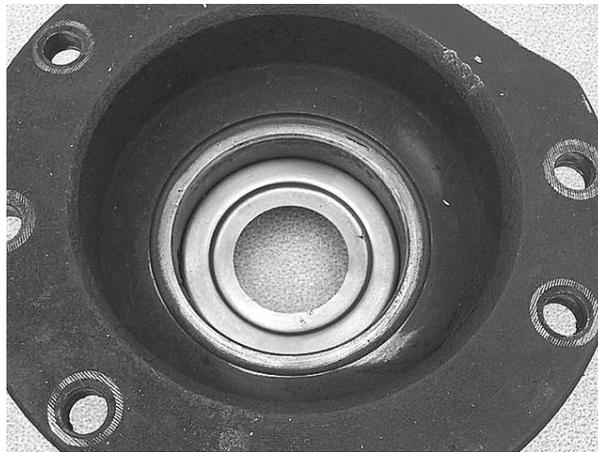


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Step 10: Install a new axle seal in the extension housing. Be certain that the bearing oil baffle is in position in the differential bearing retainer then install a new axle seal in the retainer. It is a good idea to use some form of sealer on the seal OD to avoid seepage. If you do *not* have to check or adjust differential preload, these housings are ready for final assembly, and you're ready to move on to the next part of your rebuild.



41TE Rebuild Procedures

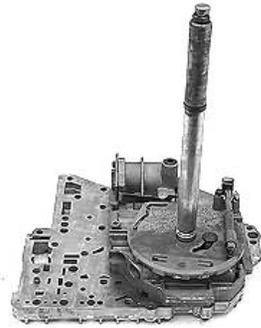
Note- If checking or adjustment of the differential preload will be necessary (due to changing the carrier, the carrier bearings, the case, or one of the extension housings, or differential noise or wear), you can prepare the differential bearing retainer for quick and easy testing and changing of the differential preload adjustment shim.

Remove the original bearing race. Grind the OD of another differential bearing outer race just enough to allow the race to easily slip in and out of the retainer bore by hand. This is now a tool to be used for checking this preload, and otherwise kept in your toolbox. When you need to check this preload, use this test race to select the proper shim. Leave this retainer disassembled until final unit reassembly.

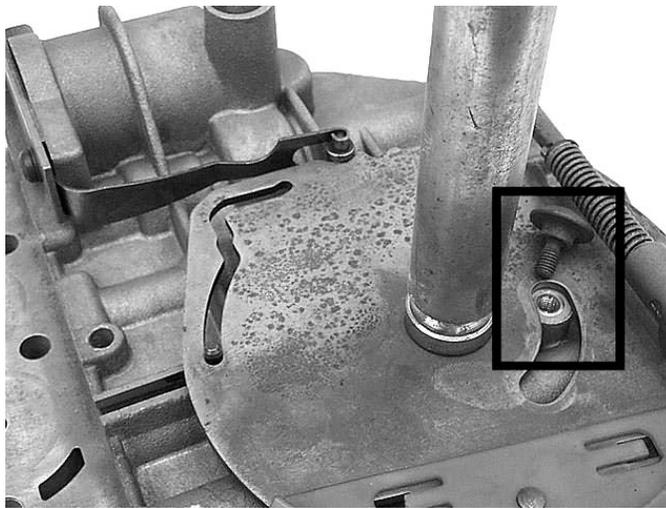


41TE Rebuild Procedures

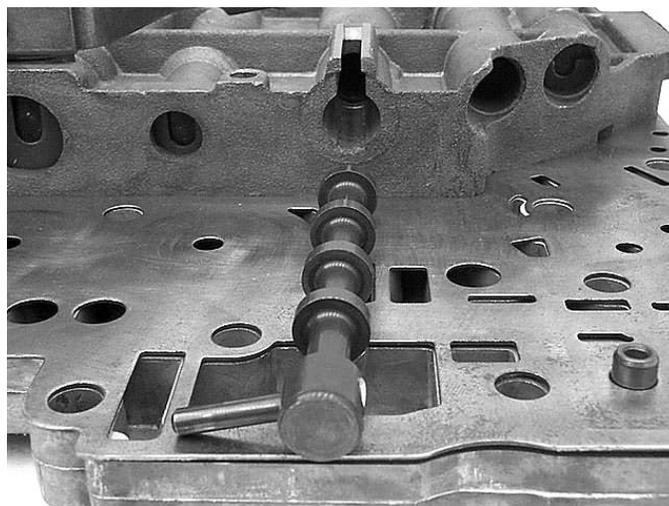
Valve Body



Step 1: Remove the retaining screw from the rooster comb, and lift the manual shaft off of the valve body.



Step 2: Slide the manual valve out of the valve body.

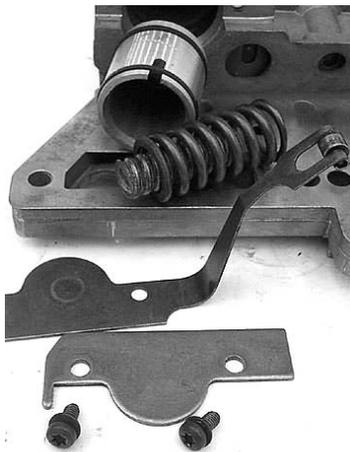


41TE Rebuild Procedures

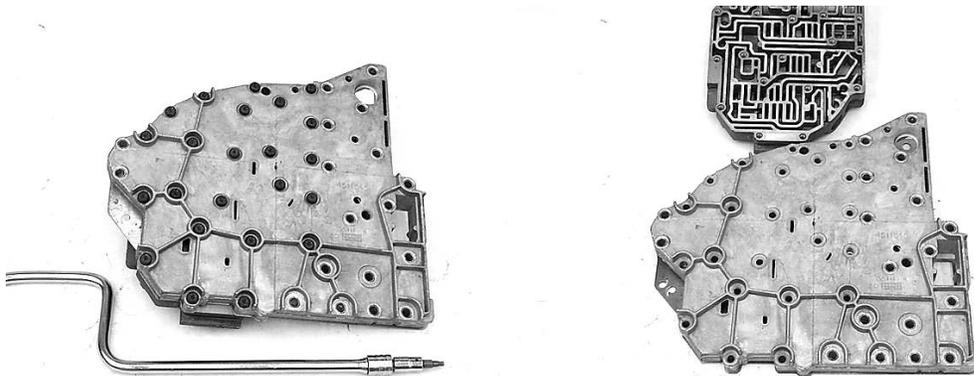
Step 3: Remove the 2-4 tower seal from the valve body.



Step 4: Remove the 2-4 accumulator retainer bolts, and remove the plate and detent spring. Slide the accumulator and springs out of the valve body, and lay them aside.

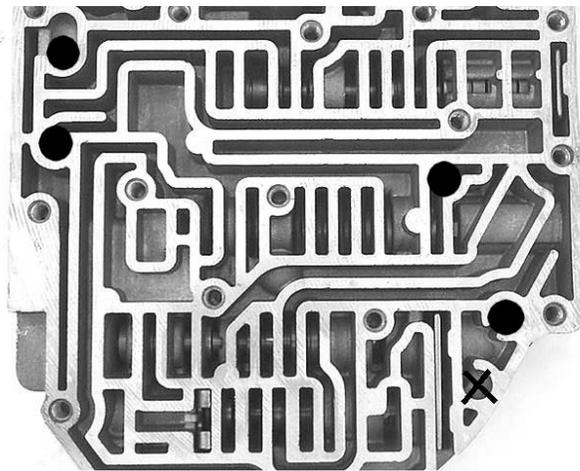
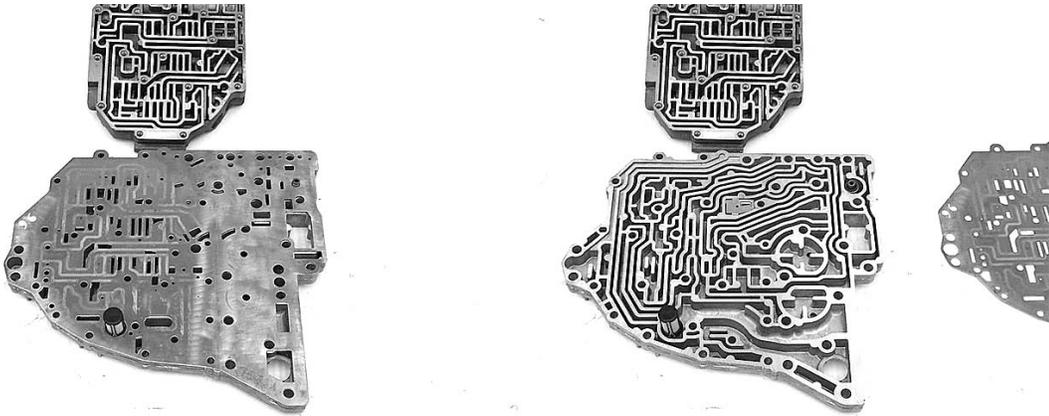


Step 5: Invert the valve body, and remove the valve body bolts. Hold the separator plate to the valve body transfer plate, and lift them off of the valve body as an assembly.



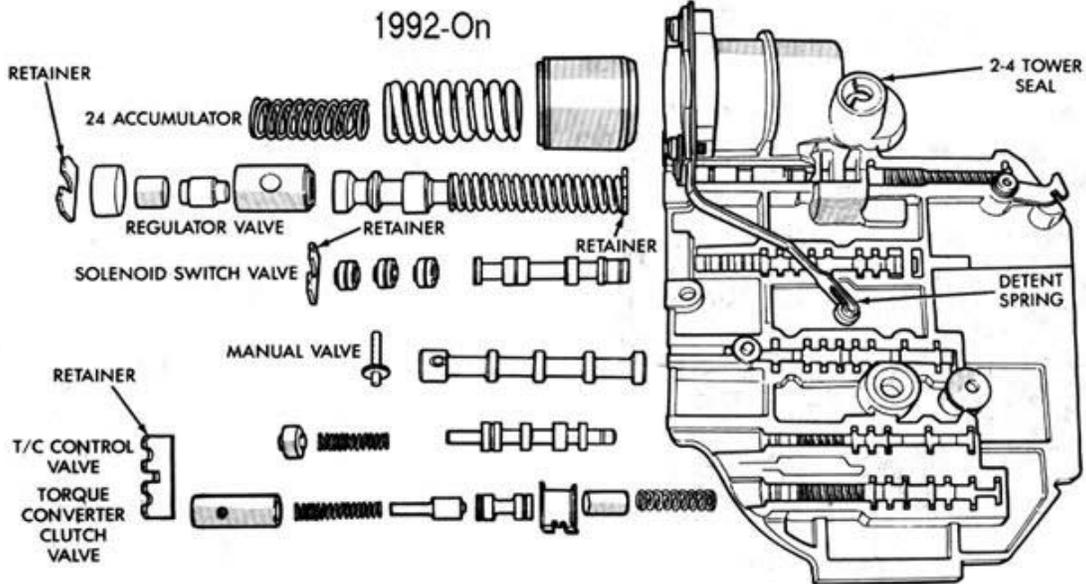
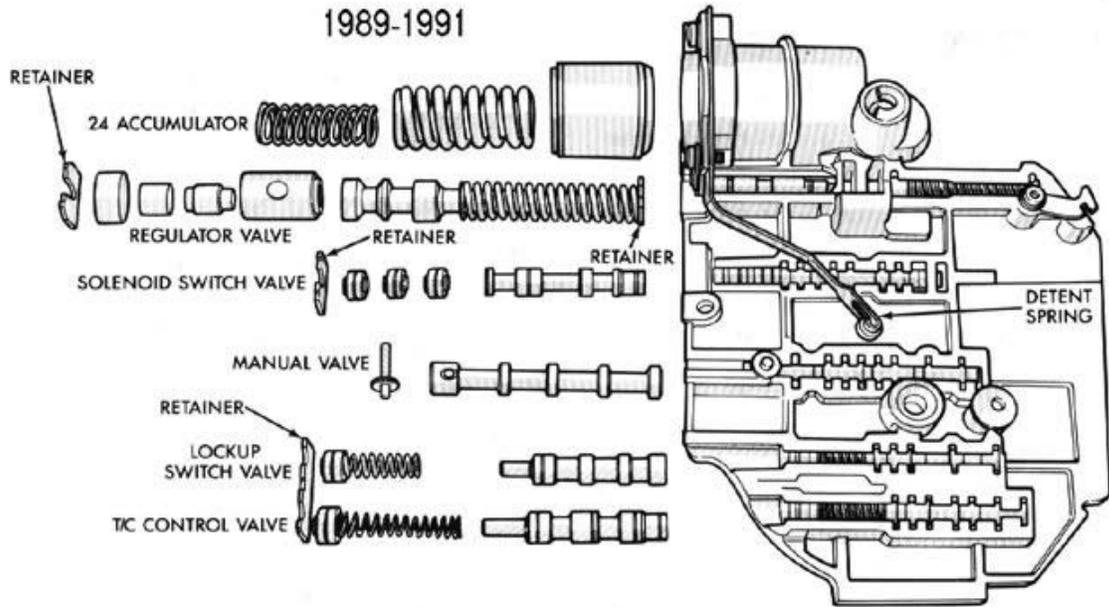
41TE Rebuild Procedures

Step 6: Flip the transfer plate and separator plate over, and remove the separator plate. Remove the checkballs and thermal valve, screen and spring-loaded orifice from the transfer plate.



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Step 7: Disassemble the valve body carefully. Set the valves, springs and retainers aside.

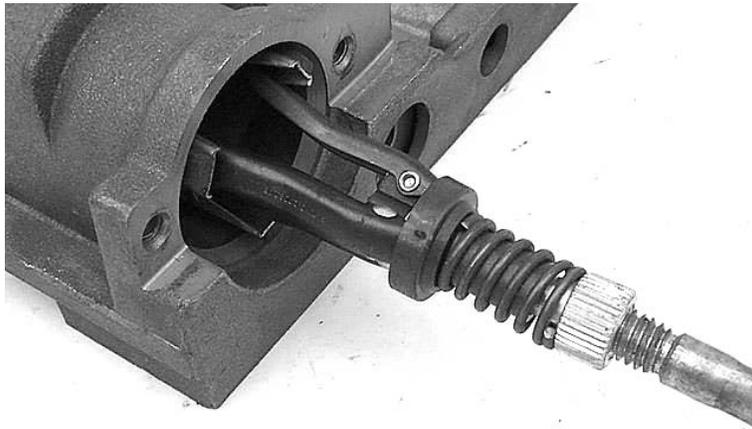


41TE Rebuild Procedures

Step 8: Clean all components thoroughly. Check for signs of wear or damage, particularly at the pressure regulator valve and bore. Since cross-leaks are a real problem on this unit, flat-sand all machined valve body surfaces.



Step 9: Resurface the 2-4 accumulator bore. A brake hone is good for this, but be sure not to remove too much material from the bore, just enough to clean up the surface. Smooth the texture a bit with some Scotch-Brite™.

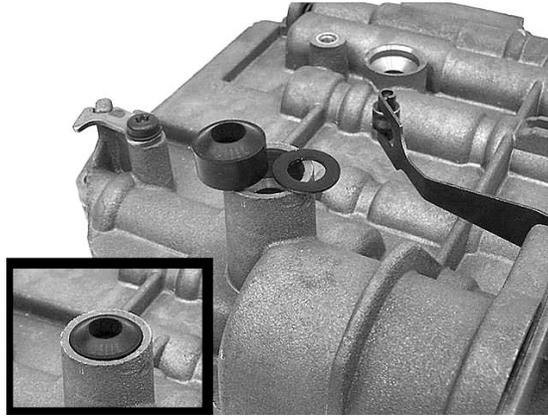


Step 10: Lubricate all components with clean ATF.

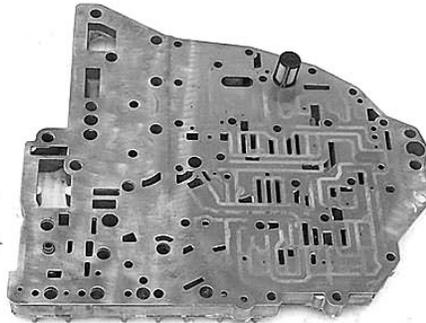
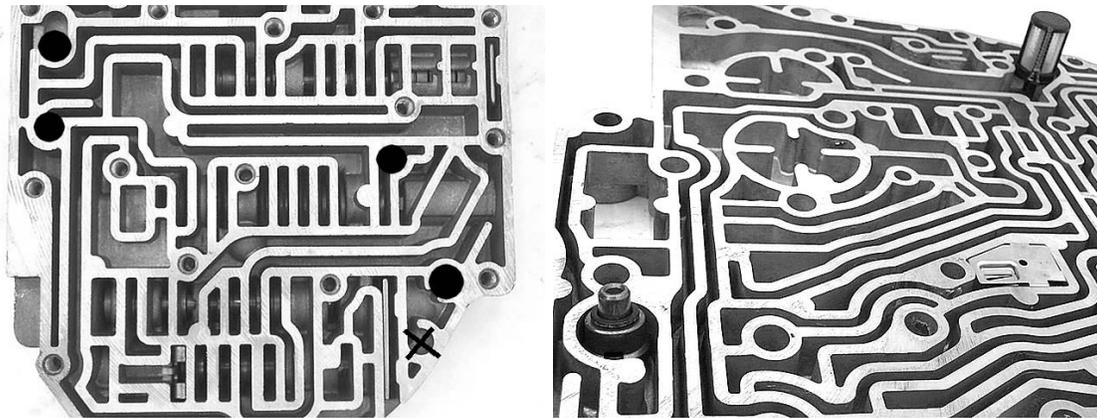
Step 11: Reassemble the valve body. Make sure the valves move freely in their bores.

41TE Rebuild Procedures

Step 12: Install a new 2-4 tower seal. To ensure a tighter seal with the 2-4 piston housing in the case, you can first install a GM pump bolt washer in the tower, then the seal.

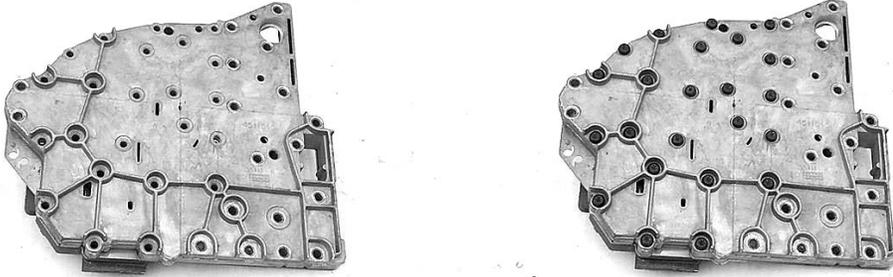


Step 13: Install new checkballs in the valve body, and reinstall the thermal valve, screen and spring-loaded orifice into the transfer plate. Lay the separator plate in place.

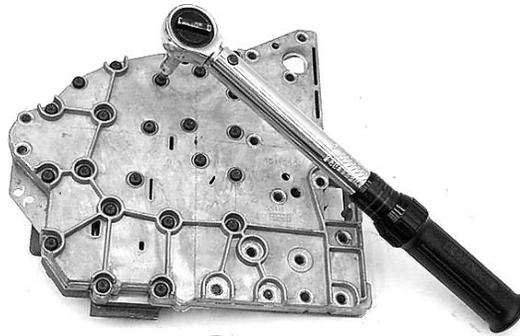


41TE Rebuild Procedures

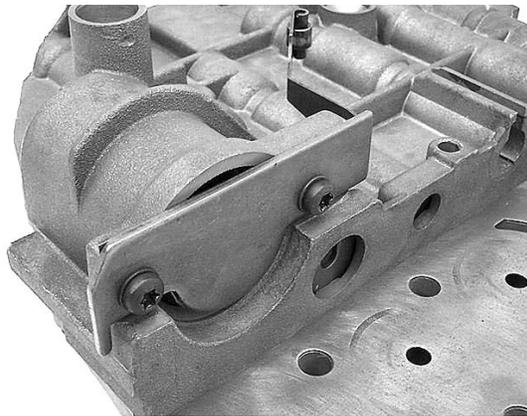
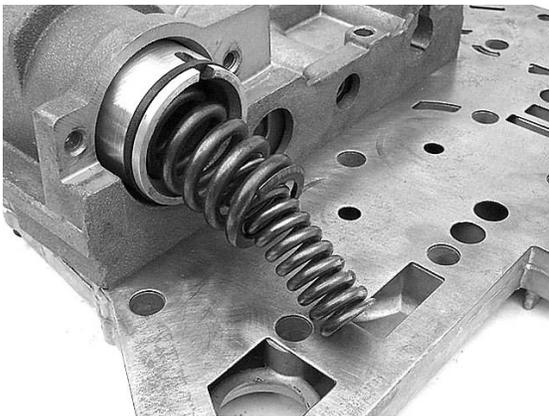
Step 14: Hold the separator plate to the transfer plate, and invert them as an assembly. Lay the assembly on the valve body, and start the attaching bolts by hand.



Step 15: Torque the valve body bolts to 40 in/lbs.

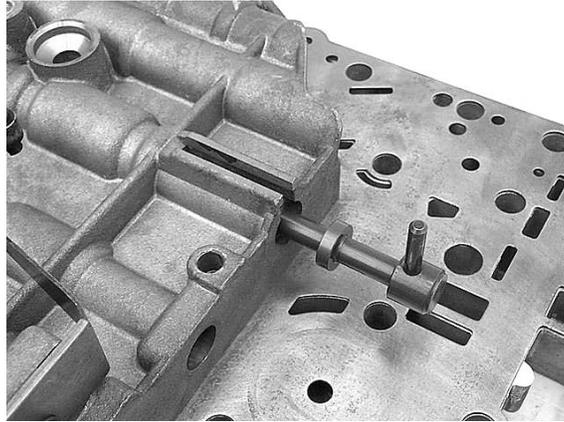


Step 16: Assemble the 2-4 accumulator and springs into the valve body, and set the detent and retainer in place. Bolt the retainer and detent onto the valve body, and torque to 40 in/lbs.

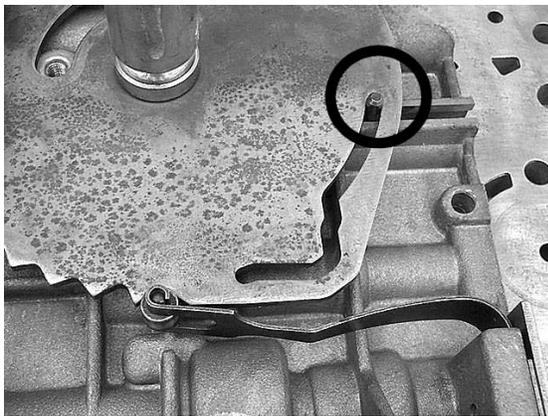


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Step 17: Slide the manual valve into the valve body bore.



Step 18: Using a seal pick, replace the manual shaft seal. Slide the manual shaft onto the valve body — you'll have to hold the detent spring back while you're aligning the shaft. Make sure the manual valve pin lines up with the rooster comb. Install the retaining screw, and torque to 40 in/lbs.



41TE Rebuild Procedures

Transaxle Assembly

Unlike most units covered by ATRA Online's Rebuild Procedures, the 41TE Transaxle Assembly section includes a large part of the entire rebuild process. Along with putting all the larger assemblies into the case and finishing the rebuild, this section also includes:

Low-Reverse Clutch and Piston Assembly.

2-4 Clutch and Piston Assembly.

Transfer Gear Assembly.

Output Gear Preload.

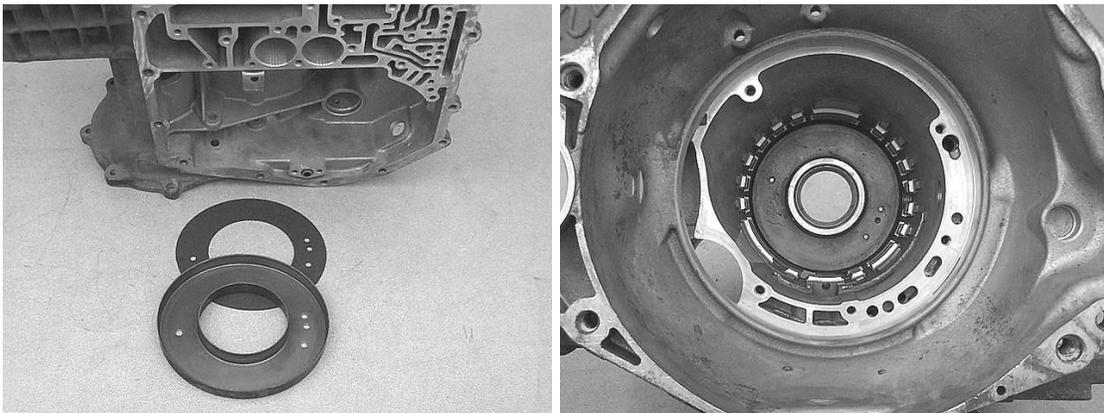
Differential Carrier Preload.

Transfer shaft End Play.

Important- Soak all new clutch material in clean ATF for at least 20 minutes before assembly.

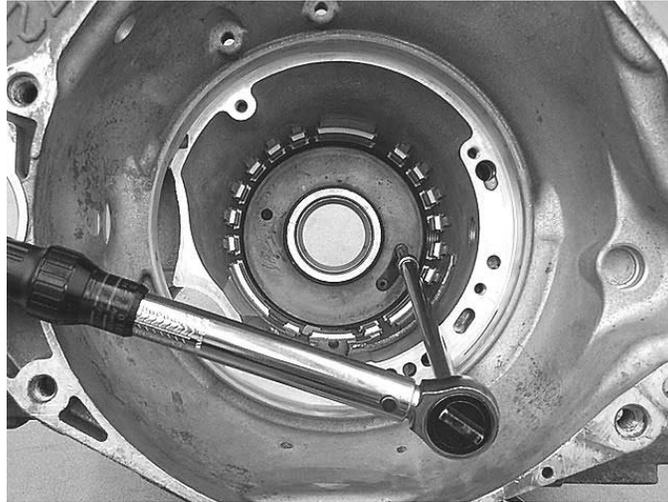
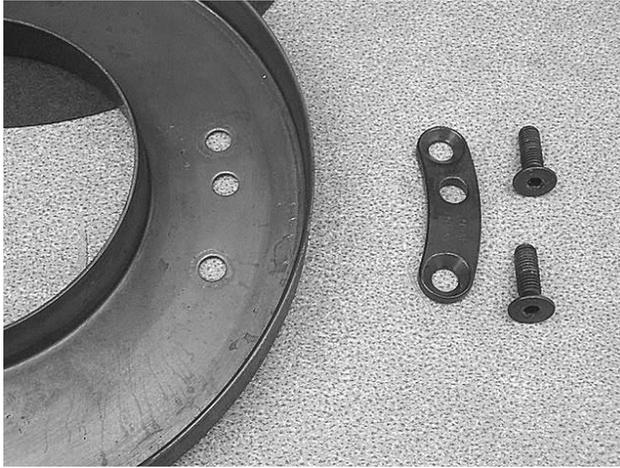
Step 1: Clean all individual components that weren't cleaned as part of another assembly. Check for wear or damage, and repair or replace as necessary.

Step 2: Lay the low/reverse clutch retainer gasket and retainer in the bottom of the case. Make sure the holes line up with the holes in the case.



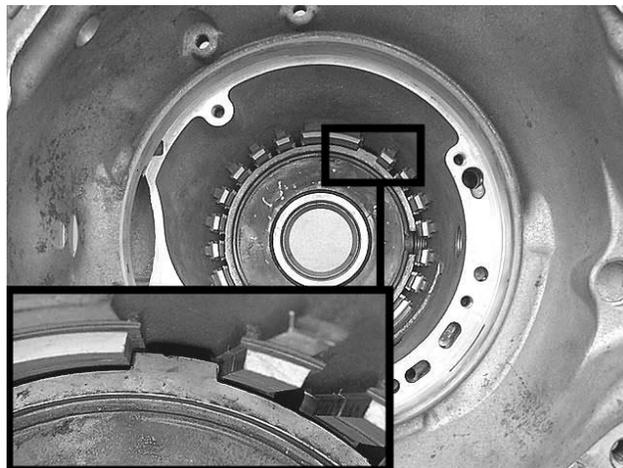
41TE Rebuild Procedures

Step 3: Set the aftermarket retainer stiffener in place, which avoids leaks in the piston housing-to-case interface, and start the screws by hand. Torque the screws to 40 in-lbs..



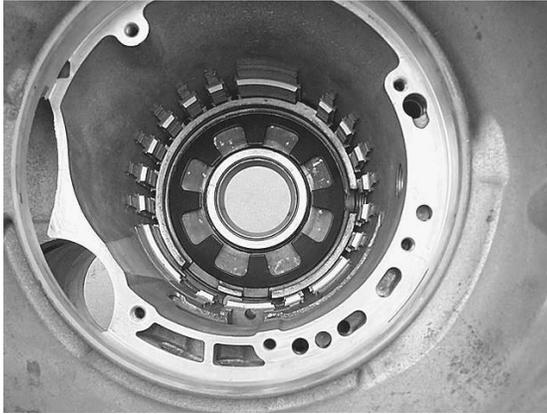
41TE Rebuild Procedures

Step 4: Replace the seals on the low/reverse piston. Lubricate the retainer with assembly lube, and slide the piston into place inside the housing. The piston has a lug on it that allows the piston to fit the housing only one way. Make sure that this lug is lined up with its slot before trying to push the piston into the housing.

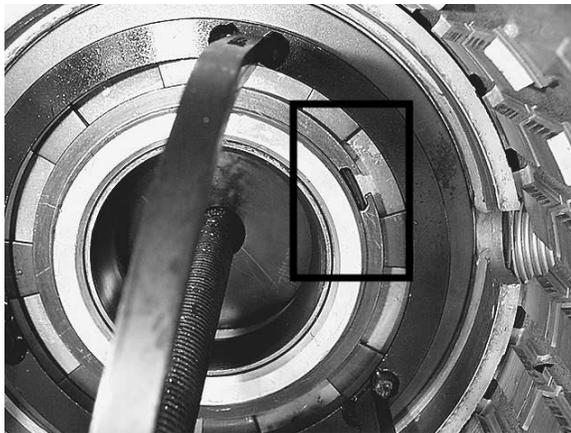
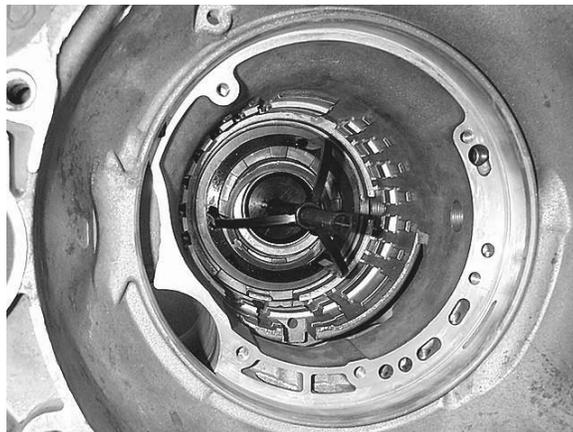


41TE Rebuild Procedures

Step 5: Lay the low/reverse return spring into the case, inner finger ends facing up, outer edge of spring facing down.

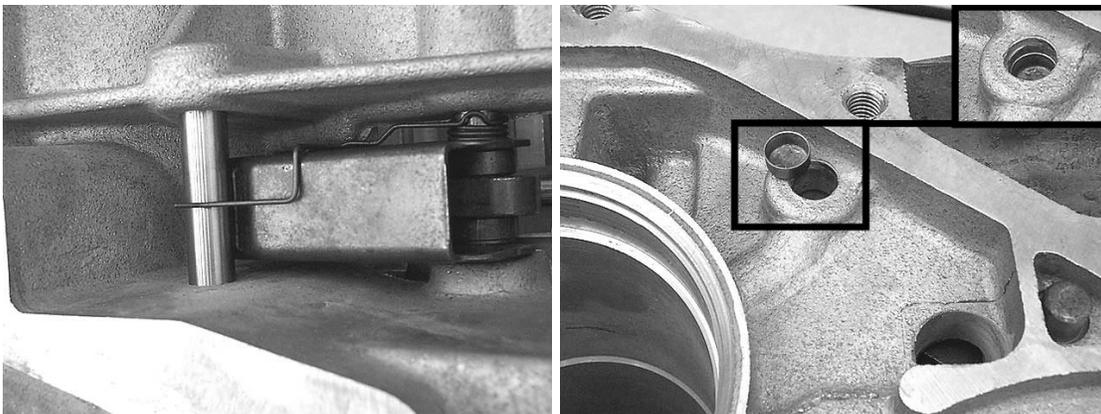
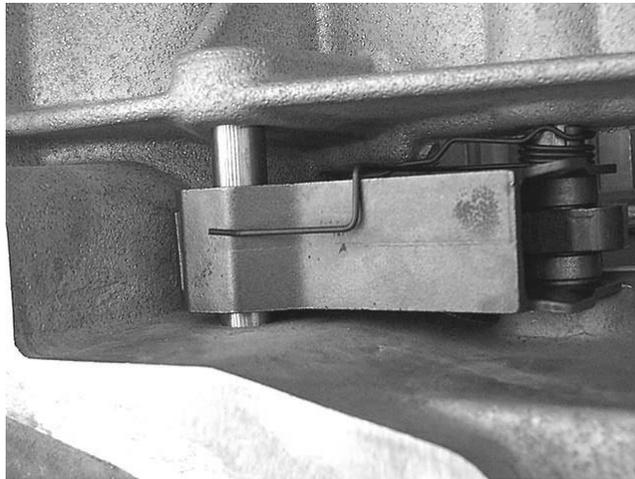
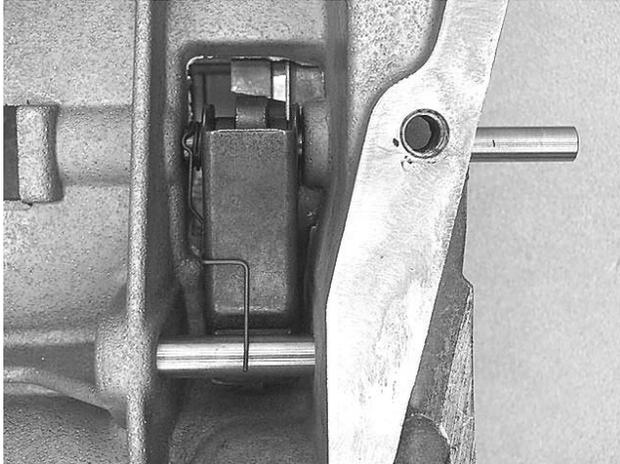


Step 6: Use an appropriate compressor to compress the spring — just far enough to clear the snap ring groove. Miller* special tool #5058-3, #5059 and #6057 comprise the recommended compressor tools for this piston. Install the snap ring, making sure that the snap ring ends are both between two spring fingers, then remove the compressor.



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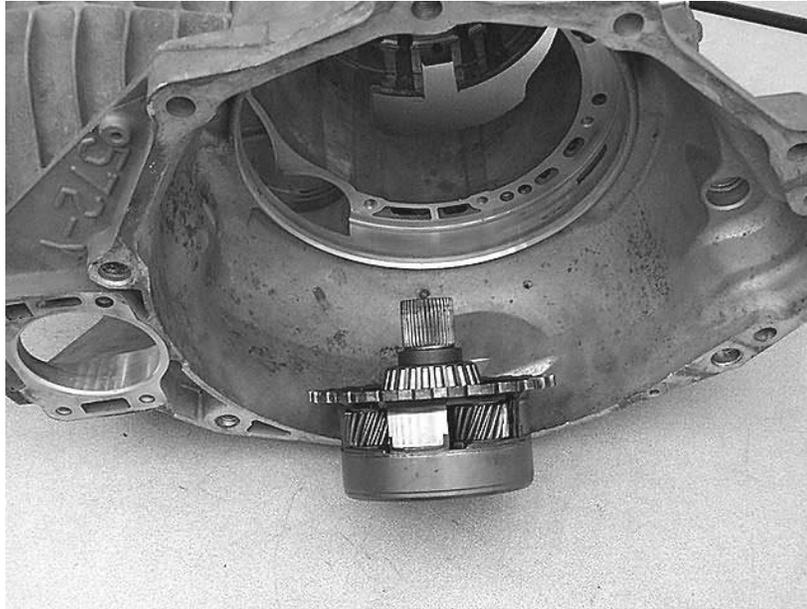
Step 7: Hold the park guide bracket in place in the case, and work the park guide bracket pivot shaft into the case to hold the bracket in place. If removed during disassembly, install the park pawl guide locating pin and cup plug at this time. Be sure that the cup plug is installed, because even though it has no hydraulic purpose, the plug is what keeps the locating pin from sliding back into the transfer gear.



41TE Rebuild Procedures

Output Gear Preload

Step 8: Coat the rear carrier roller bearing with ATF, then slide the rear carrier into the case, and hold it in place.



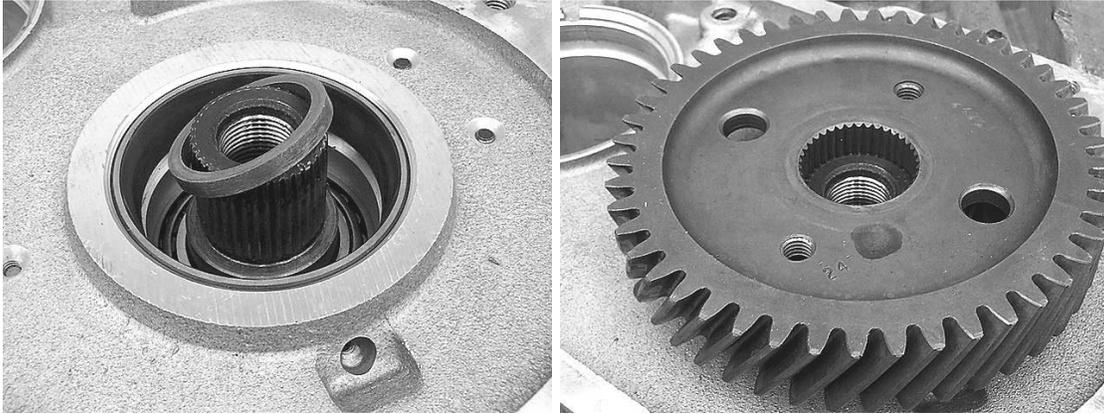
NOTE-

- If you're reusing the original case, rear carrier, output gear and their original bearings and races, and there was no gear noise or other reason to suspect an output gear preload problem, reuse the original shim. Follow Steps 9 and 10, then **skip Step 11**.
- If you're replacing any of the parts just mentioned or there was any complaint of gear noise, install a 0.177" (4.50 mm) shim on the rear carrier. This is the thickest shim listed for this location, and should provide at least some measurable endplay. This is used in Step 11 to determine the correct shim size for this location.

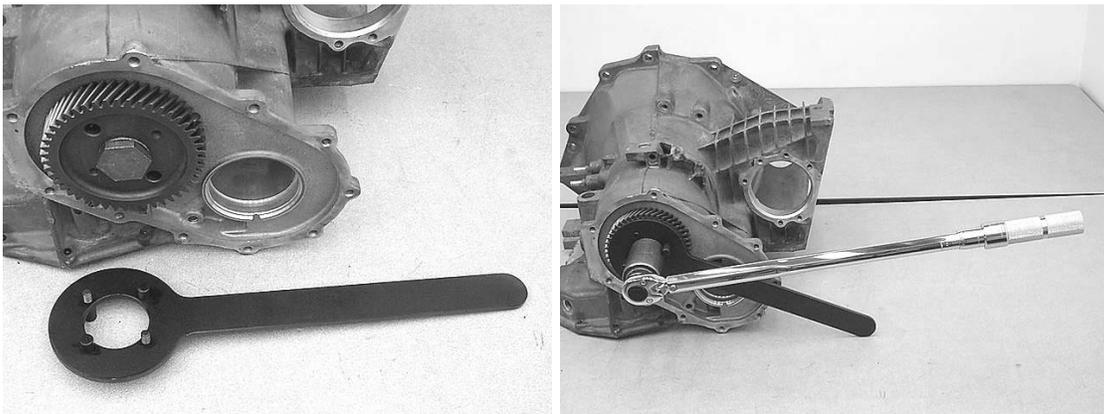
WARNING- If this NOTE has directed you to perform Step 11, but you decide not to, decide again with this in mind: Of the literally *thousands* of calls ATRA's Technical Helpline has received on the 41TE complaining of transfer gear noise, transfer gear destruction and planetary carrier explosion (sometimes on the road test!) *hundreds* of them were directly caused by this preload not being properly measured and set. Lack of preload can also be a major contributing factor in the always popular 604 Lube Fry event, held coast-to-coast every day. It takes about 10 minutes to properly check and set preload, and if it saves you one \$1000.00 rebuild failure, which our records almost guarantee that it will, it's clearly worth it. Good luck should never be a frequently relied upon rebuilding tool. Now, back to our story...

41TE Rebuild Procedures

Step 9: Slip the shim over the rear carrier shaft, coat the output gear roller bearing with ATF, then slide the output gear over the end of the shaft.



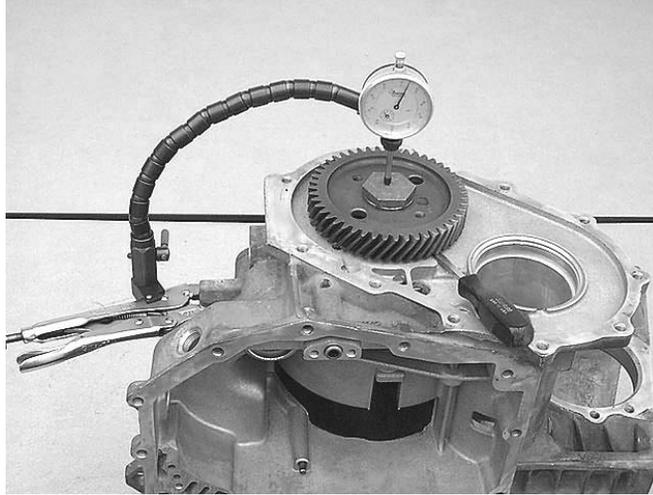
Step 10: Start the retaining bolt and cone shaped lockwasher by hand. When the bolt tightens, hold the gear with the holding tool, Miller* special tool #6259, and torque the retaining bolt to 200 ft-lbs (270 Nm).



CAUTION: Never tighten the retaining bolt with your impact gun. As tempting as it may be, the hammering could easily damage the roller bearing races and cages.

41TE Rebuild Procedures

Step 11: Mount a dial indicator to the case, then set the dial probe on the output gear. Check the bearing end play and write down the results. Make sure that you pull evenly up and down on both sides of the gear.



With a test shim installed, the gear can rock side-to-side, which will change your readings. Subtract this end play amount from the test shim size. This results in a new 'zero end play' shim. However, to get *preload*, the bearings need to have pressure pushing them together. This keeps the gear and planet from rocking side-to-side. To accomplish this, you subtract 0.005" from the 'zero end play' shim size, which allows the output gear bearings to be a little bit closer together. This is the shim size you need, *in thousandths of an inch*. Example:

Test shim installed = 0.177"

Observed end play = 0.035"

Subtract observed end play from test shim thickness;

0.177"

-0.035"

0.142"

Subtract another 0.005" from this result to create bearing preload = 0.137"

That is the required transfer shaft shim thickness.

Use the Output Gear/Transfer Shaft Shim Chart below to find the shim size closest to what you need. If there is no exact match, order the next *thinner* available shim shown in the chart. Use the metric size shown when ordering to avoid confusion.

41TE Rebuild Procedures

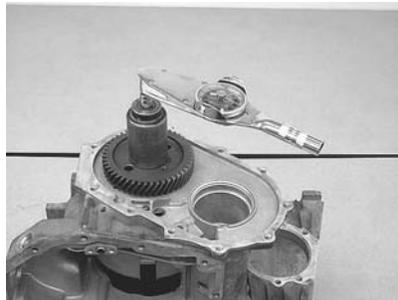
Output Gear/Transfer Shaft Shim Chart

3.22mm/0.127"	3.82mm/0.150"	4.42mm/0.174"
3.26mm/0.128"	3.86mm/0.152"	4.46mm/0.175"
3.30mm/0.130"	3.90mm/0.154"	4.50mm/0.177"
3.34mm/0.132"	3.94mm/0.155"	The 4.50mm/0.177" shim is
3.38mm/0.133"	3.98mm/0.157"	the test shim for measuring
3.42mm/0.135"	4.02mm/0.158"	output gear preload.
3.46mm/0.136"	4.06mm/0.160"	4.54mm/0.178"
3.50mm/0.138"	4.10mm/0.161"	4.58mm/0.180"
3.54mm/0.139"	4.14mm/0.163"	4.62mm/0.182"
3.58mm/0.141"	4.18mm/0.165"	4.66mm/0.183"
3.62mm/0.143"	4.22mm/0.166"	The 4.66mm/0.183" shim is
3.66mm/0.144"	4.26mm/0.168"	the test shim for measuring
3.70mm/0.146"	4.30mm/0.169"	transfer shaft end play.
3.74mm/0.147"	4.34mm/0.171"	
3.78mm/0.149"	4.38mm/0.172"	

SOLACE- Be sure that you compare apples to apples and not oranges. At first, this process can seem rather complex, but it soon becomes easy, quick and logical. If the numbers get ALL fouled up and make no sense whatsoever (you need a shim 2.7 feet thick, or some magic anti-shim) then it's almost a sure bet that metric measurement numbers got confused with inch measurement numbers, or things that should have been added got subtracted, or vice-versa. Relax, start the math part over, and it will work out. We all have to go through this sooner or later. Did it come out right this time? Well, that's good, because Fun With Shims isn't over yet...

IMPORTANT- The shim size selected *must* be double-checked to be correct. This is accomplished by measuring the *turning torque** of the output gear*. Remove the output gear and test shim, remembering to hold the carrier to keep it from crashing down to the bench when the gear comes off. Install the selected shim, then re-install the output gear, tightening the bolt to 200 ft/lbs.

Using an adapter on the socket you tightened the output gear bolt with, attach a dial or beam-type *inch-pound* torque wrench. Don't use a click-type wrench, since it will click before the gear starts to turn, even if turning torque is below specification. Rotate the gear with the wrench assembly, observing the torque reading.

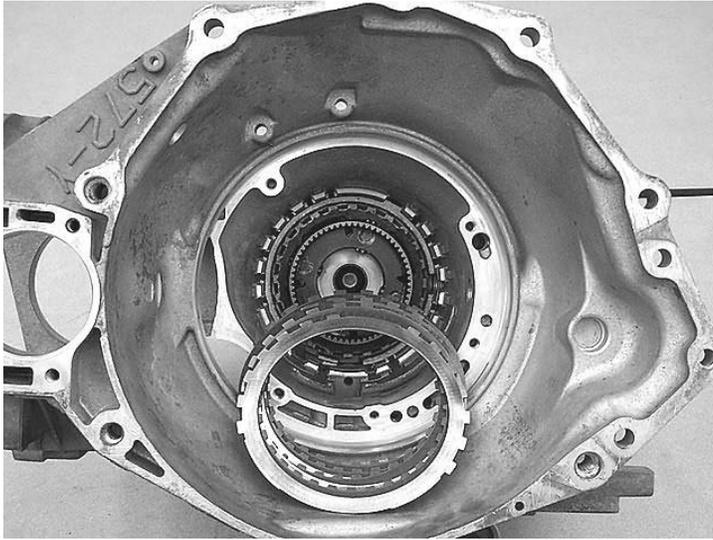


41TE Rebuild Procedures

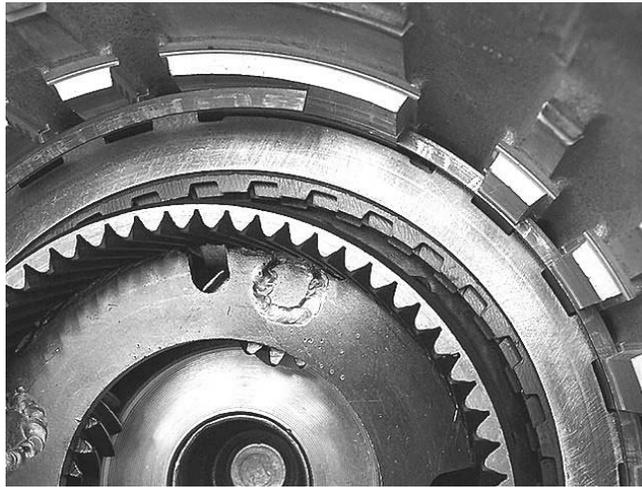
There should be between 3 and 8 **inch**/lbs of *turning torque***.

- If the reading is too high, there is too much preload. Decrease preload by installing a thicker shim.
- If the reading is too low, there is not enough preload. Increase preload by installing a thinner shim.

Step 12: Install the low/reverse clutches into the case, except for the last friction and pressure plate. These are the large diameter, *thinner* friction and steel plates. There is a total of five of each. Don't confuse these with the thicker 2-4 plates.

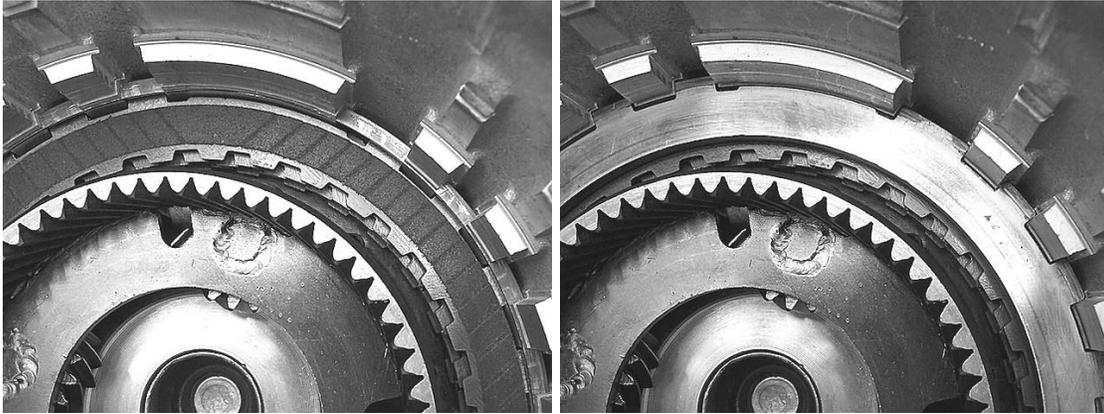


Step 13: Install the flat snap ring in the case, with the opening facing the top of the case. Be absolutely sure that the snap ring goes into the lower groove, and both ring ends inside one case lug, preferably the top (12:00) case lug. Be careful not to scratch the top surface of the clutch plate with the snap ring.

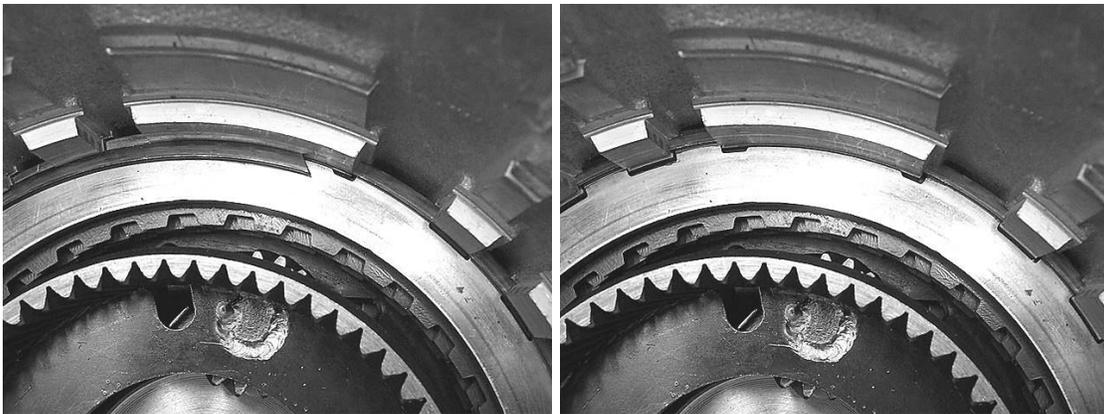


41TE Rebuild Procedures

Step 14: Install the last low/reverse friction plate and the pressure plate in the case, with the step on the pressure plate pointing down.

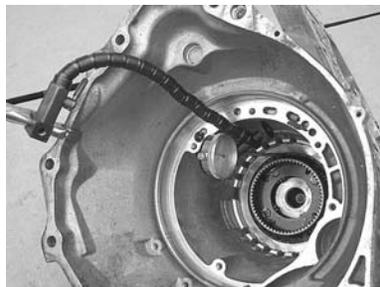


Step 15: Install the tapered snap ring in the case, with the tapered side facing up, and the opening toward the top of the case, installing both snap ring ends into the top case lug (the lug at the 12:00 case position).



CAUTION: Be very careful not to scratch the top clutch surface of the reaction plate with the snap ring or ring installation tools.

Measure low/reverse clutch clearance. It should be between 0.045" and 0.065". If you are pretty good with the 'feel' method pulling up on a clutch with a pick, use it. Otherwise, a dial indicator reading up and down movement of the top clutch plate teeth can show you this clearance.

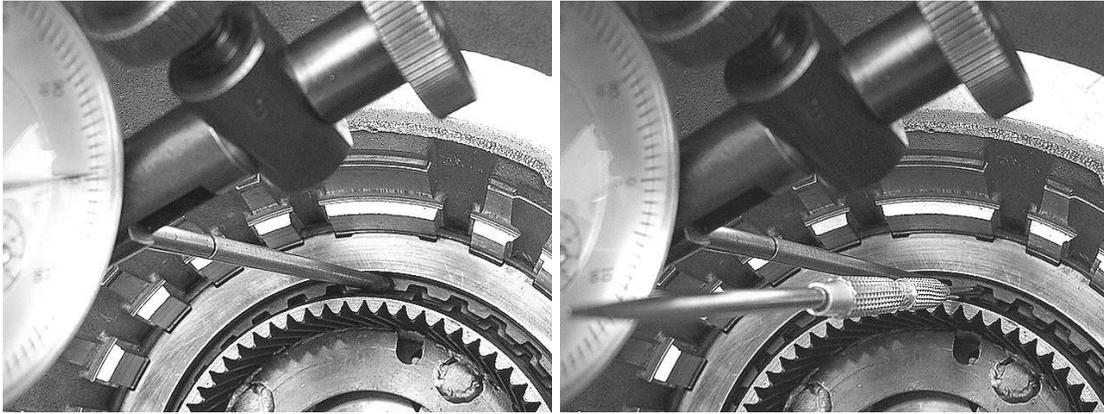


41TE Rebuild Procedures

Low/Reverse Clutch Travel Specification:

1.10 to 1.65 mm (0.045" to 0.065")

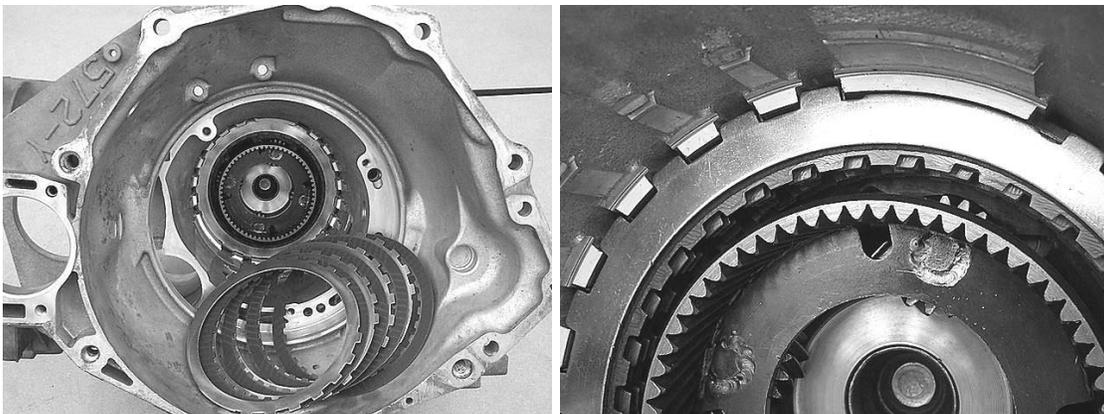
Try to maintain at least 0.050" clutch clearance.



If the travel shown is out of the above range, you can adjust this clearance by changing the selective low/reverse-2/4 clutch pressure plate. The available pressure plate sizes are:

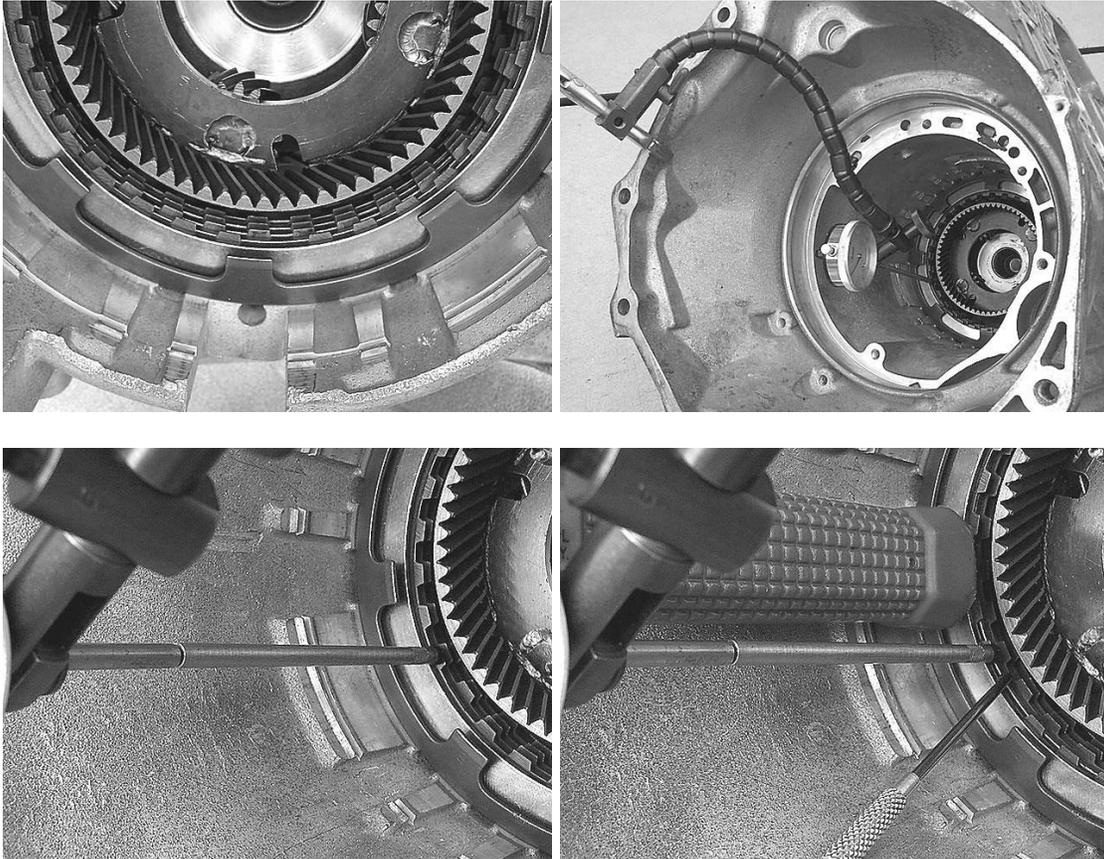
6.92 mm (.273")
6.66 mm (.262")
6.40 mm (.252")
6.14 mm (.242")
5.88 mm (.232")
5.62 mm (.221")
5.36 mm (.211")

Step 16: Install the 2-4 clutches in the case. These are the four thick frictions and four thick steel plates, not to be confused with the thin low-reverse plates.



41TE Rebuild Procedures

Step 17: Install the 2-4 return spring in the case, outside edge facing down against the last steel plate, inner edge fingers pointing up. Check the 2-4 clutch pack clearance by using either the 'feel' method, or mounting a dial indicator to the case and zeroing it on the top 2-4 steel plate or clutch tooth. While holding the return spring down against the case lugs with a hammer handle or something similar, pull up on the top 2-4 clutch and record the travel.



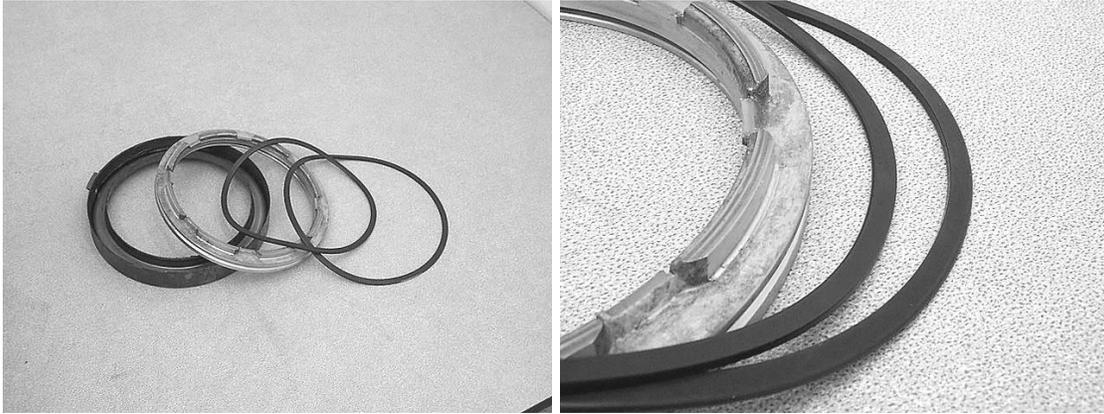
2-4 Clutch Travel Specification:

0.76 to 2.64 mm (0.030" to 0.104")

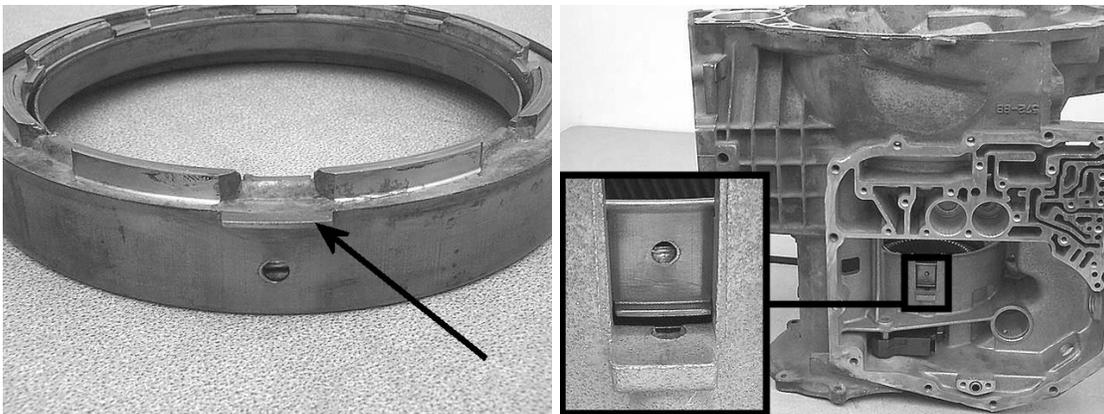
Try to maintain at least 0.045" clutch clearance. However, there is no selective adjustment for this clutch pack. If the observed measurement is outside of the allowable range, something is probably assembled improperly. You can also check for differences between different plates for small adjustments, or use a low/reverse clutch or steel plate to substantially increase travel.

41TE Rebuild Procedures

Step 18: Install the 2-4 piston D-ring seals (not the earlier o-ring style seals) onto the piston, and install the piston into the housing.



Step 19: Install the 2-4 clutch piston and housing in the case, making sure that the return spring tabs line up with the notches in the 2-4 piston. The piston housing has a tab that must be lined up with a slot in the bottom of the case to ensure that the apply oil port in the housing lines up properly with the apply passage in the valve body.



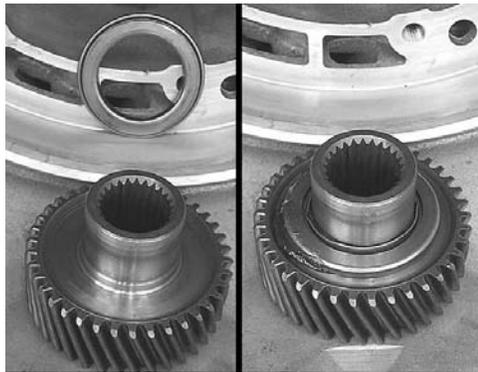
41TE Rebuild Procedures

Step 20: Use an appropriate compressor to compress the 2-4 return spring — just enough to press the piston housing low enough to expose the snap ring groove. Install the snap ring, installing both snap ring ends into the top case lug (the lug at the 12:00 case position), and remove the compressor.



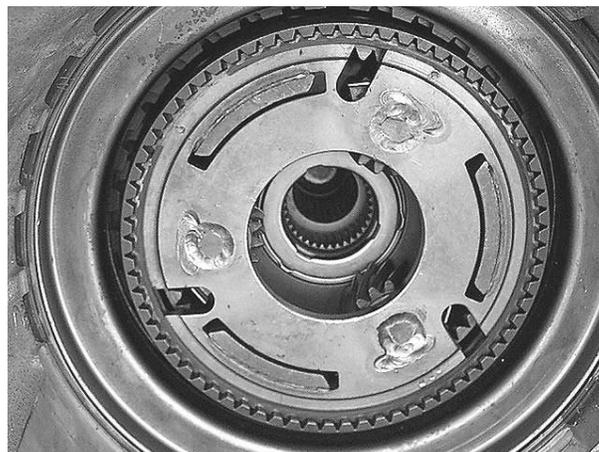
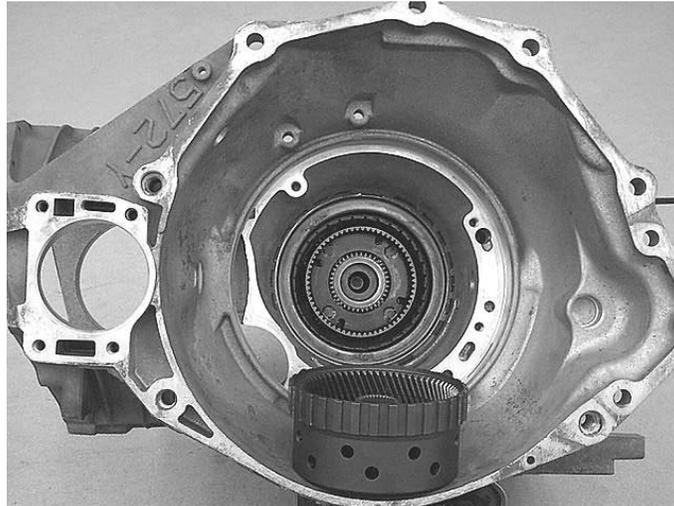
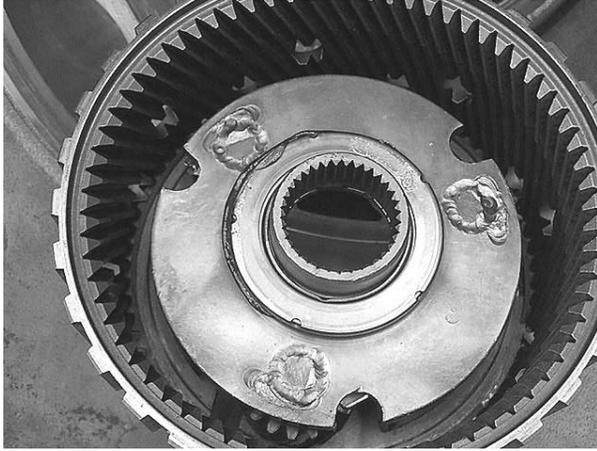
NOTE- Some technicians choose to use a hammer and large screwdriver to install the snap ring without the aid of any compressor tool. This can be successful and easy, but be sure to install both snap ring ends in the top case lug, and be sure to tap the snap ring all the way into the ring groove in the case.

Step 21: Grease the #7 thrust bearing into place on the back of the rear sun gear, then install the sun gear and bearing into the rear planetary carrier in the case.



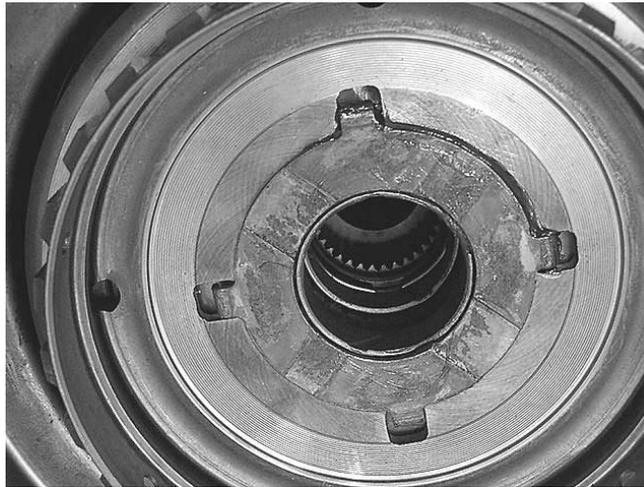
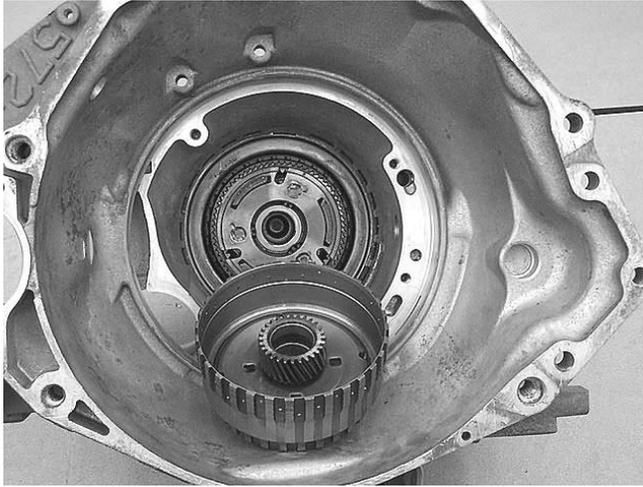
41TE Rebuild Procedures

Step 22: Grease the #6 thrust bearing into place on the back of the front planetary carrier, then install the front planetary carrier into the case. You'll have to wiggle the planet to line up the clutches and gears.



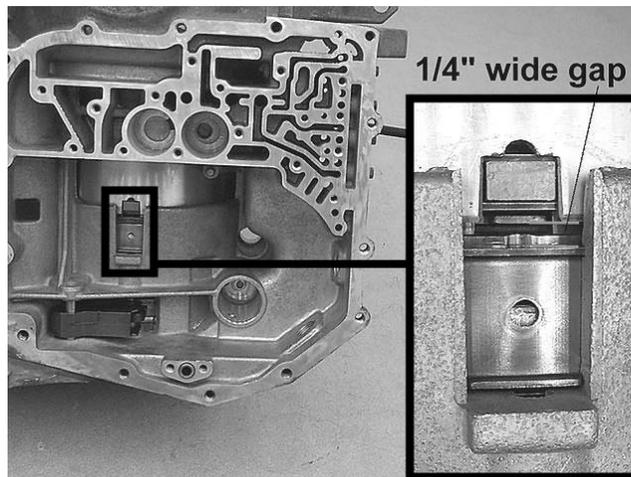
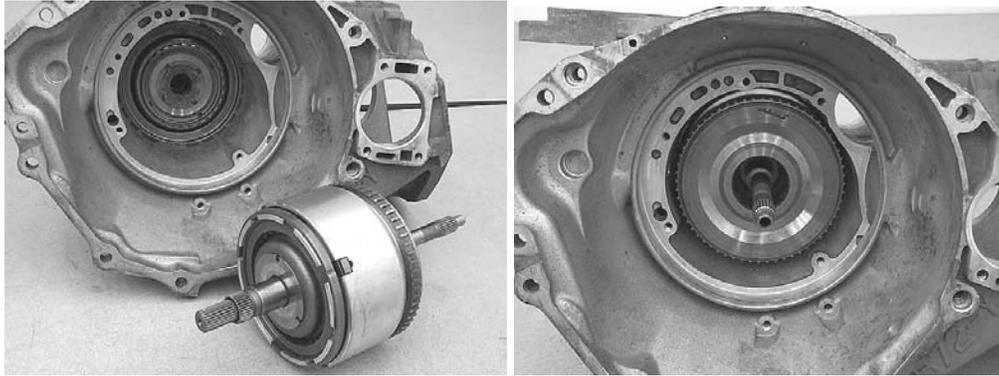
41TE Rebuild Procedures

Step 23: Install the front sun gear assembly. Install the #4 thrust washer on the sun gear assembly, with assembly lube to hold it in place.



41TE Rebuild Procedures

Step 24: Slide the input clutch assembly into place. Wiggle and turn the shaft to line up the splines on the clutch hubs with the parts below. The input drum reverse clutches must also be engaged with the 2-4 sun gear hub lugs. When the input drum is fully seated into position with all plates engaged as they should be, there will be a gap of slightly under 1/4" between the end of the O/D-reverse piston on the input drum assembly, and the snap ring that holds the 2-4 piston housing into the case.



Step 25: Slide the #1 needle bearing into place over the input shaft.



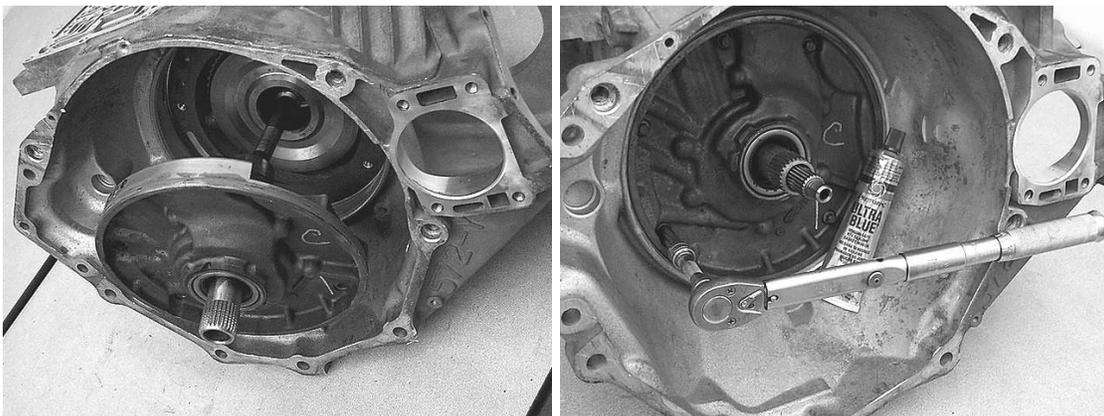
41TE Rebuild Procedures

Step 26: Make sure you've cleaned the cooler bypass valve thoroughly (if equipped), and install a new O-ring onto it. Slide the valve into the case, O-ring end first.



Pump Installation/Input Shaft End Play

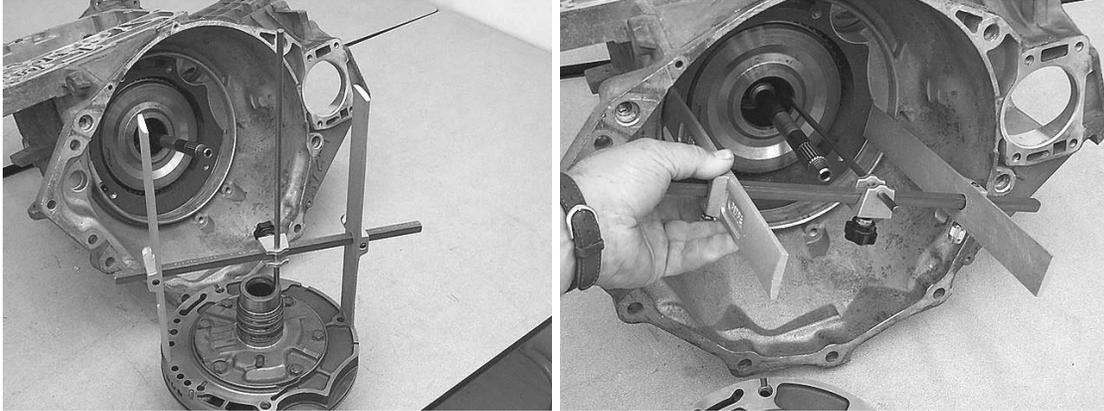
Note- If during disassembly it was determined that input shaft end play was within the proper tolerances of between 0.005" and 0.015" (0.12mm to 0.38mm), and nothing inside the unit that would change this measurement was changed, it is okay to perform final pump installation procedures at this time using the original end play shim. Install the pump o-ring into the pump body groove, and give it a small coat of silicone sealer. Torque the pump bolts to 23 ft/lbs (32NM). Skip ahead to Installing the Differential Assembly. Otherwise, continue on to Step 27.



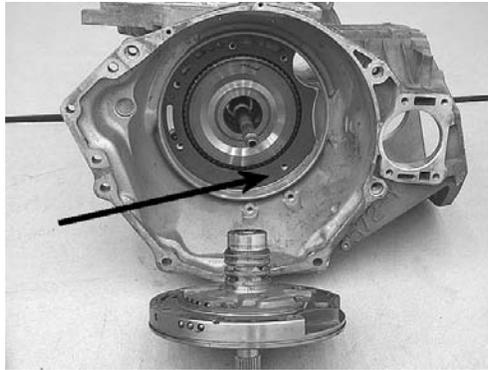
CAUTION- If at any time during pump installation the pump does not appear to go all the way to the gasket, and you can't turn the input shaft very easily, chances are that the input drum reverse clutches have not yet engaged their teeth over the 2-4 sun gear hub. When the input drum is fully seated into position with all plates engaged as they should be, there will be a gap of slightly under 1/4" between the end of the O/D-reverse piston on the input drum assembly, and the snap ring that holds the 2-4 piston housing into the case (see Step 24). If your clearance is greater, you probably still need to engage some clutches. Remove the pump and rotate/wobble the input drum around until these clutches are properly engaged.

41TE Rebuild Procedures

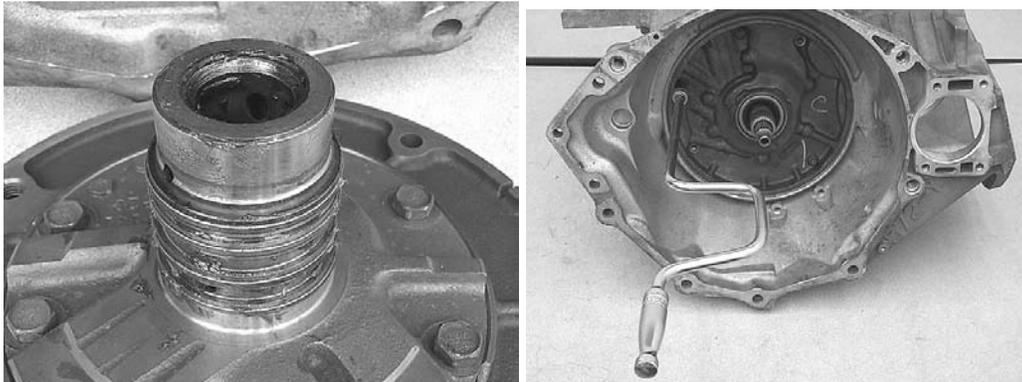
If you are familiar with using an H-Gauge to check end play, you can use it at this time to see if the drum is all the way in. Trying to force the pump into position will damage the clutch teeth.



Step 27: To check input shaft end play, lay the pump gasket in place, using a dab or two of assembly lube to hold it in position.

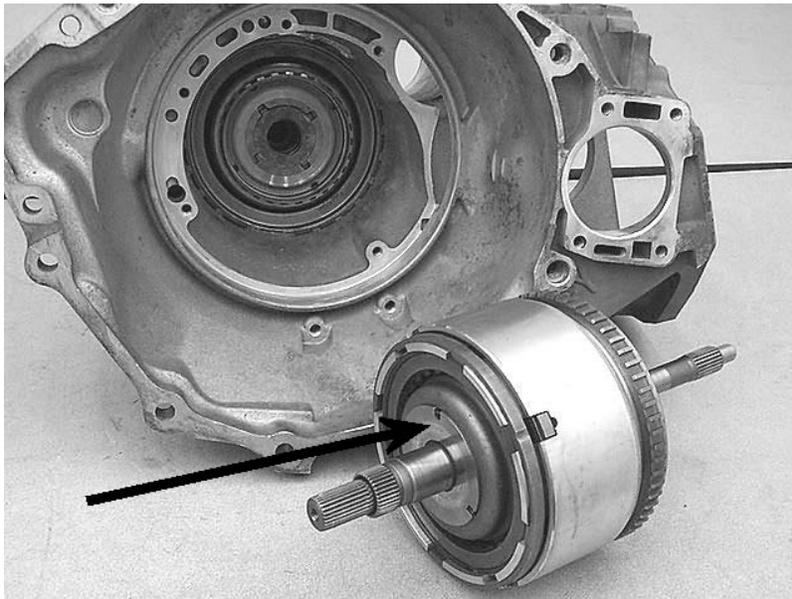
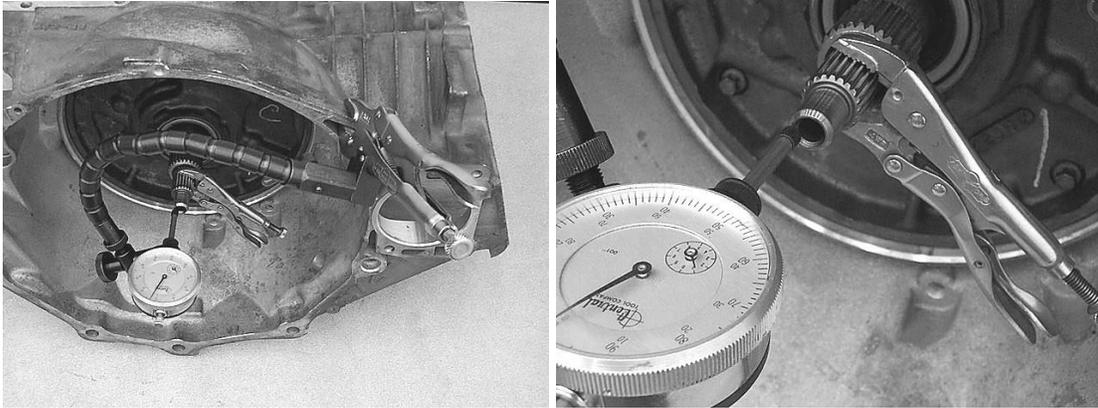


Step 28: Coat the stator support rear bore and the pump seal rings and lands with assembly lube. With no pump o-ring in the pump body groove, slide the pump into the case. Gently tap it all the way in, and start three of the pump bolts by hand, as shown in the above picture. Tighten these pump bolts with a speed handle or one hand on a ratchet wrench until good and snug.



41TE Rebuild Procedures

Step 29: Check the input shaft endplay with a dial indicator. It should be between 0.005" and 0.015" (0.12 and 0.38 mm). If it isn't within specs, remove the pump and the input clutch assembly, and replace the #4 thrust plate, which is the smooth steel washer on top of the overdrive clutch hub at the back of the input drum assembly, with a thrust plate of the proper thickness. For example, if your endplay is 0.040", you need a thrust plate approximately 0.025" to 0.030" thicker than the thrust plate in the unit. If endplay checks to be 0.003", you need a thrust plate about 0.010" thinner to increase end play. Locate the thrust plate you need in the thrust plate chart below.



Thrust Plate Chart

0.81-1.03mm (.032-.040")

1.03-1.25mm (.040-.049")

1.25-1.47mm (.049-.058")

1.47-1.69mm (.058-.066")

1.69-1.91mm (.066-.075")

1.91-2.13mm (.075-.084")

2.13-2.35mm (.084-.092")

2.35-2.57mm (.092-.101")

2.57-2.79mm (.101-.109")

2.79-3.01mm (.109-.118")

3.01-3.23mm (.118-.131")

3.23-3.45mm (.131-.136")

41TE Rebuild Procedures

Installing the Differential Assembly

Procedures for inspecting, preparing and resealing the extension housing and differential bearing retainer are explained in the **case preparation** section of this program. It is assumed that these procedures have already been performed before this stage of final assembly.

If you're reusing the original side bearings, and there were no indications of preload problems or gear noise, leave the original selective shim in place inside the differential bearing retainer (the bigger iron one) behind the bearing race. Jump ahead to Step 37.



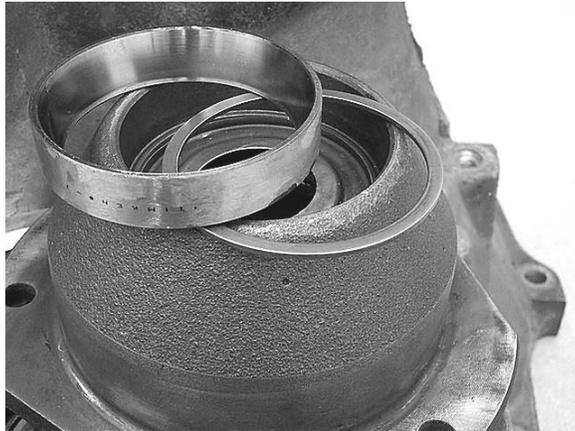
Step 30: If you're at this step, then you are either using new tapered roller differential bearings or trying to troubleshoot a possible bearing problem, and differential bearing preload needs to be checked and adjusted if necessary. This particular area of the 41TE can easily mislead you during these tests, and quite probably will either whine when moving or destroy itself if the tests are not done properly. That's why these tests must be performed in the following manner, even though they are somewhat of a hassle. At this point, the retainer should be assembled *without* the selective shim under the bearing outer race. This will create differential carrier to case *end play*.

Two measurements must be made to properly check and adjust differential carrier preload:

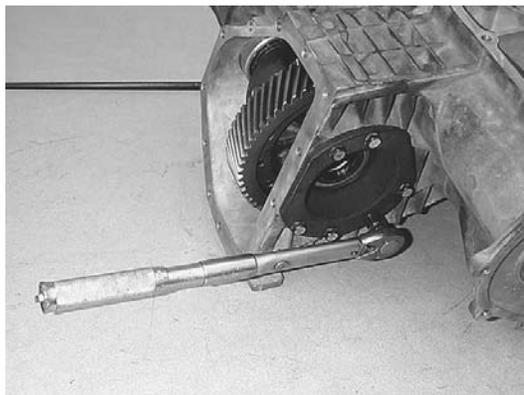
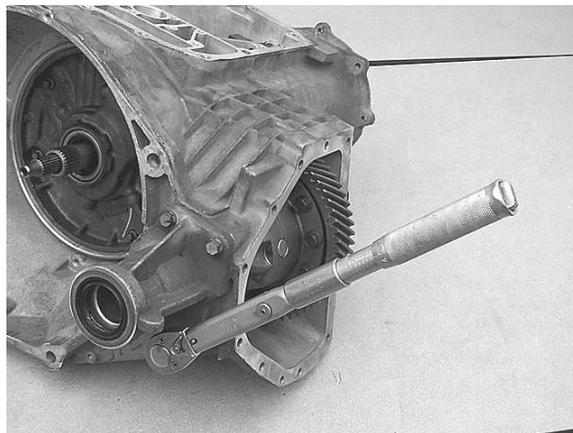
- End play measurements, made before the adjustment shim is installed, will make sure that there is not excessive preload when the shim is installed afterward. This is why this process is begun with the shim removed from the retainer.
- Turning torque** is used to determine whether the bearings are being pressed together firmly enough, or above the *minimum required* preload. This test will *not* accurately indicate if there is too much preload, which is why the end play test is necessary.

41TE Rebuild Procedures

Handy Tip- You can grind the outside diameter of a bearing race a little bit so that the race will easily slide in and out of the retainer during the shim selection process. This way it will be much easier to try different shims within the housing. This race is now a tool, and must not be actually run in a vehicle, since after grinding, it no longer provides adequate support. Always replace the tool with an unground race for final assembly.

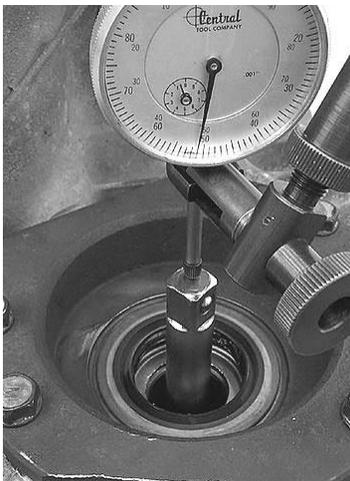
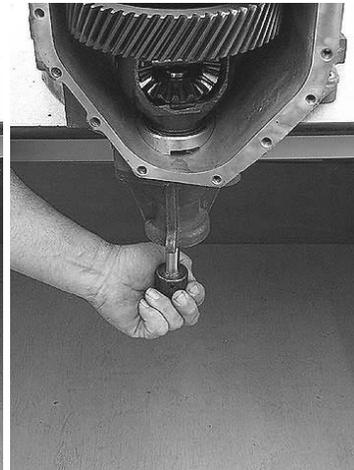
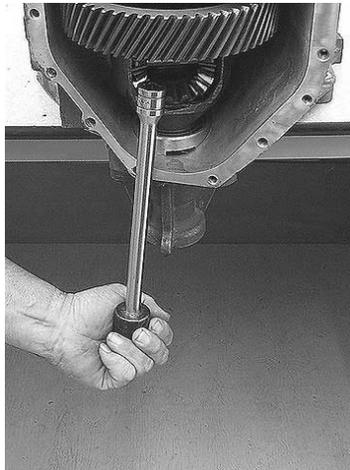
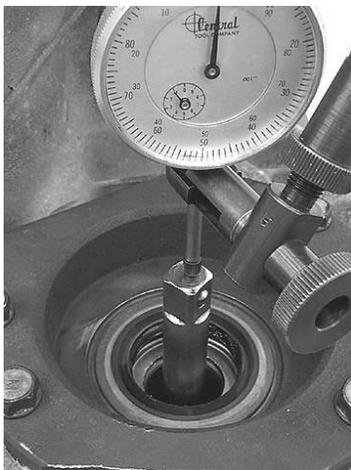
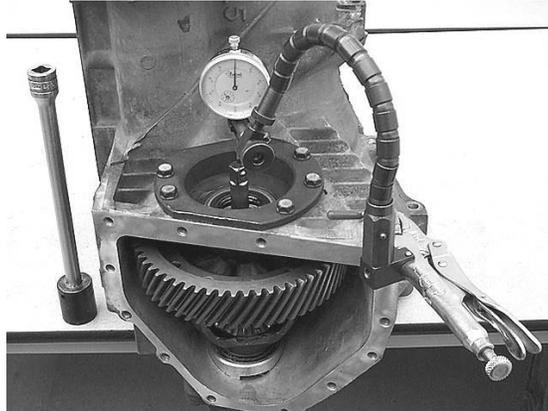


Step 31: Set the differential carrier into position in the case. Using no sealer, install the differential bearing retainer and the extension housing. Torque the retainer and housing bolts to 21 ft-lbs.



41TE Rebuild Procedures

Step 32: Rotate the differential once or twice to make sure the bearings are seated. Mount a dial indicator to the case to read up-and-down differential endplay. A short 1/2" extension makes a good spacer between the differential and the dial indicator. Use a suitable tool (another extension) to push up on the carrier pinion gear pin to move the carrier up and down inside the case while you observe and write down the carrier end play.



41TE Rebuild Procedures

With this measurement in hand, consult the Differential Bearing Shim Chart below to determine which shim you need to set the differential preload. To help with fine adjustments, it is a good idea to have the shims on hand that are a few sizes thicker and thinner than the shim you think you need. The rule of thumb is that you need a shim 0.30 mm (0.012") thicker than the observed carrier end play to establish proper preload. Consider this as the recommended *maximum* shim thickness. Make sure that your final selected shim thickness is no more than two sizes greater than this.

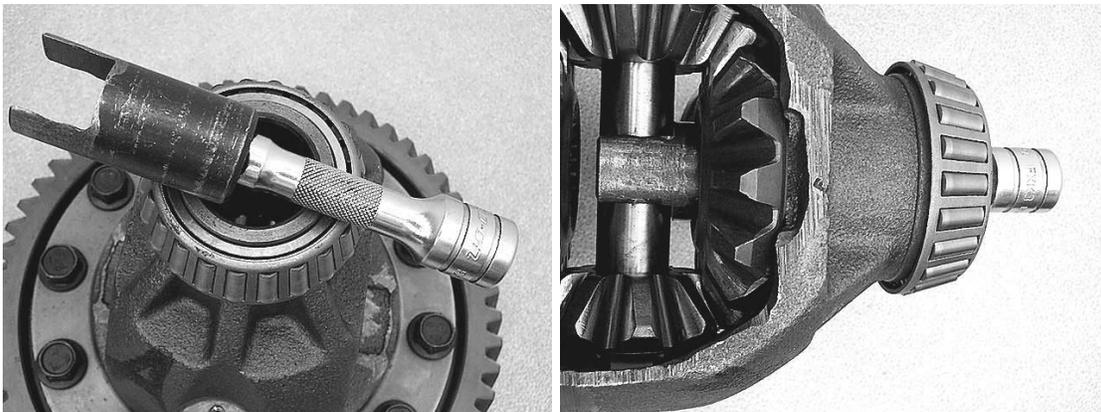
Differential Bearing Shim Chart

0.50mm/0.020"	0.80mm/0.031"
The 0.50mm/0.020" shim is the test shim used for measuring differential preload.	0.85mm/0.033"
0.55mm/0.022"	0.90mm/0.035"
0.60mm/0.024"	0.95mm/0.037"
0.65mm/0.026"	1.00mm/0.039"
0.70mm/0.027"	1.05mm/0.041"
0.75mm/0.029"	

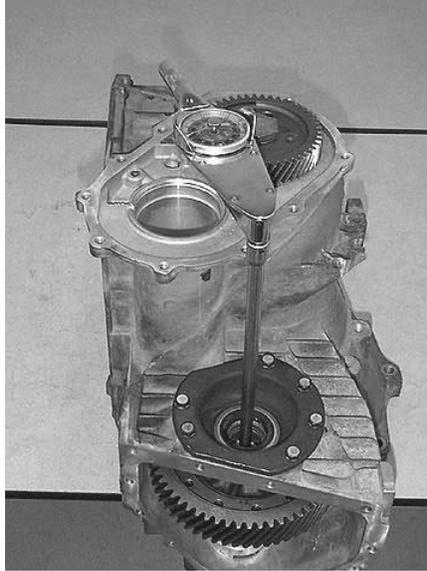
Step 33: Remove the differential bearing retainer.

Step 34: Remove the ground test bearing race from the differential bearing retainer, install the recommended shim, then reinstall the test bearing race.

Step 35: Use a special tool that allows you to turn the differential carrier with an inch-pound torque wrench to check the differential preload. It should be 5 to 12 in-lbs turning torque** with used bearings; 5 to 18 in-lbs with new bearings. If the preload is too low, replace the shim with the next thicker one.



41TE Rebuild Procedures



IMPORTANT- This measurement does not accurately indicate excessive preload. A shim that is substantially thicker than it should be will typically show turning torque within acceptable limits, possibly misleading you to believe that the current shim is acceptable when it may in fact be too thick. Always use the aforementioned end play test to establish shim thickness upper boundary.

Step 36: Once the correct shim thickness has been determined and verified by end play and turning torque tests, remove the retainer. Remove the test bearing race. Leaving the new shim in place, install the original or a new bearing race into the retainer.

Step 37: Run a 1/8" wide bead of RTV all the way around the mating surface for the differential bearing retainer and the extension housing, being careful not to get any in the bolt holes.

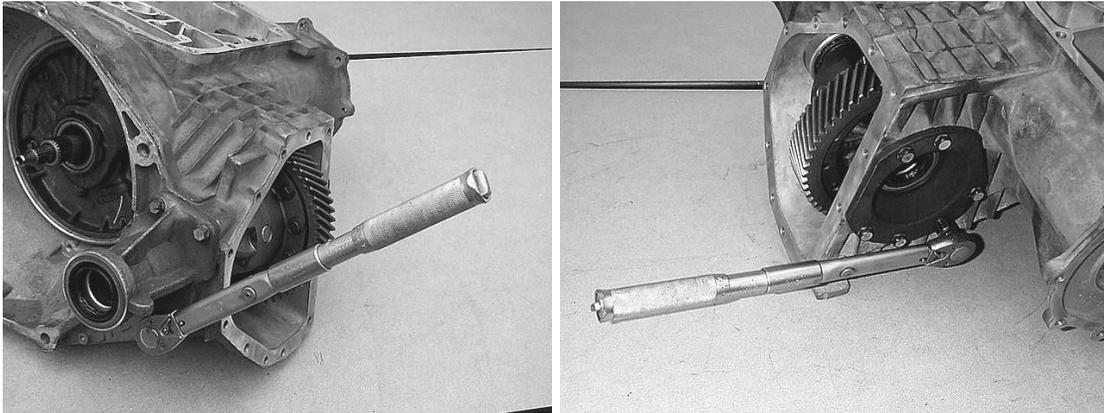


41TE Rebuild Procedures

Step 38: Install the differential assembly into the case, and hold it in place. Install the differential bearing retainer, and thread the retaining bolts in by hand.

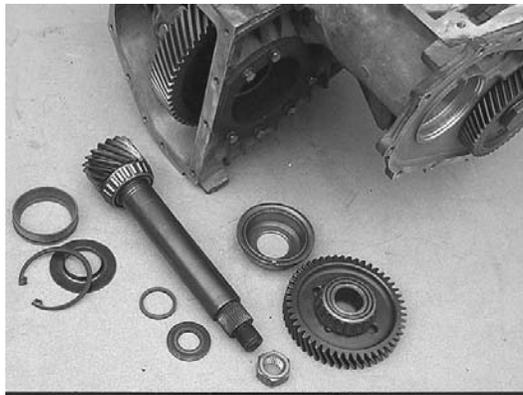
Step 39: Install the extension housing, and thread the retaining bolts in by hand.

Step 40: Torque the retaining bolts for the extension housing and the differential bearing retainer to 250 inch-pounds (28 Nm).



Installing the Transfer Shaft

Step 41: Install a new O-ring on the transfer shaft lower bearing race.

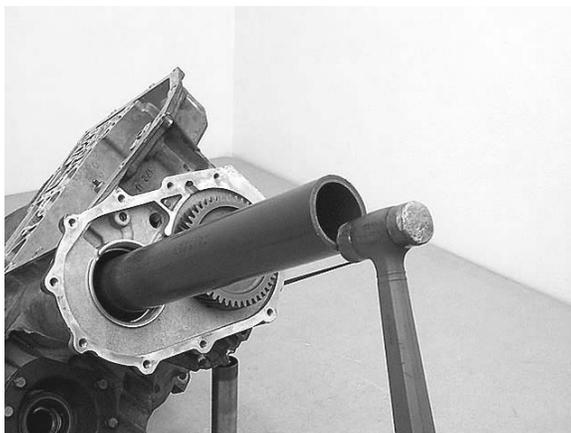
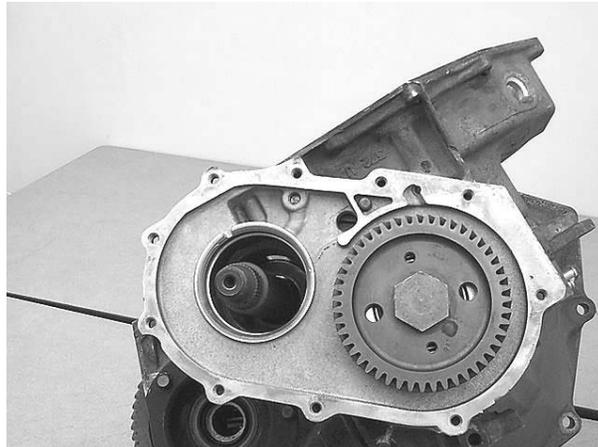


41TE Rebuild Procedures

Step 42: Slide the lower bearing race and oil baffle into place on the transfer shaft. Coat the race and o-ring with assembly lube.



Step 43: Slide the transfer shaft into the case. You'll need an installer to push the race and baffle down into place. A two foot long piece of 1-1/2" ID plastic (PVC) pipe or something similar works well for this purpose.



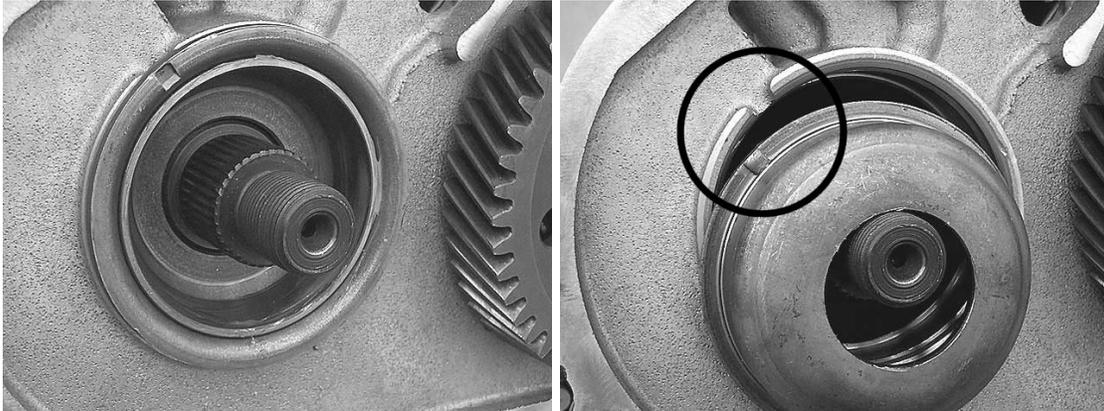
41TE Rebuild Procedures

Step 44: Install the snap ring into the case using the special pliers designed for this purpose. If the snap ring doesn't want to pop into the ring groove on its own, you may want to help it a little bit by removing the special pliers and giving the ring a gentle pop or two with the PVC pipe and a modest sledgehammer. After the snap ring is in position, gently pry up on the bottom of the transfer gear through the differential area to push the lower bearing race against the snap ring.



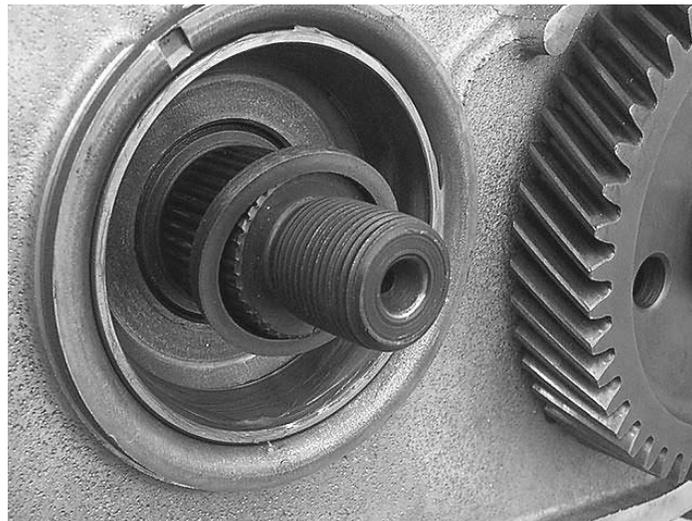
41TE Rebuild Procedures

Step 45: Install the upper transfer bearing retainer into the case, with the tab on the retainer aligned with the slot in the case.



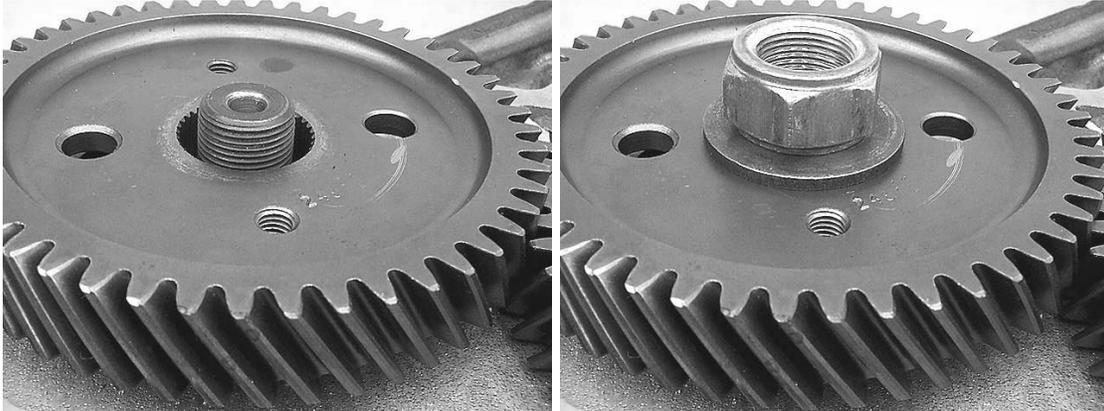
Step 46: Slide the following shim onto the transfer shaft:

- If you're reusing the original case, transfer shaft, bearings, races and race retainers, and there was no indication of a transfer shaft end play problem or gear noise, reuse the original shim. Perform steps 47 and 48, but **skip Step 49**.
- If you're replacing any of the above listed parts, or there is an indication of a transfer shaft end play problem or gear noise, install a 0.183" (4.66 mm) test shim, which is the thickest available, and almost guaranteed to give you measurable end play. This allows you to select the proper shim to get the end play down to the proper amount.

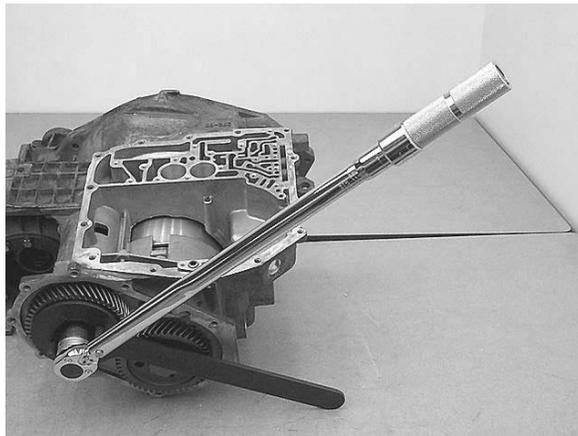
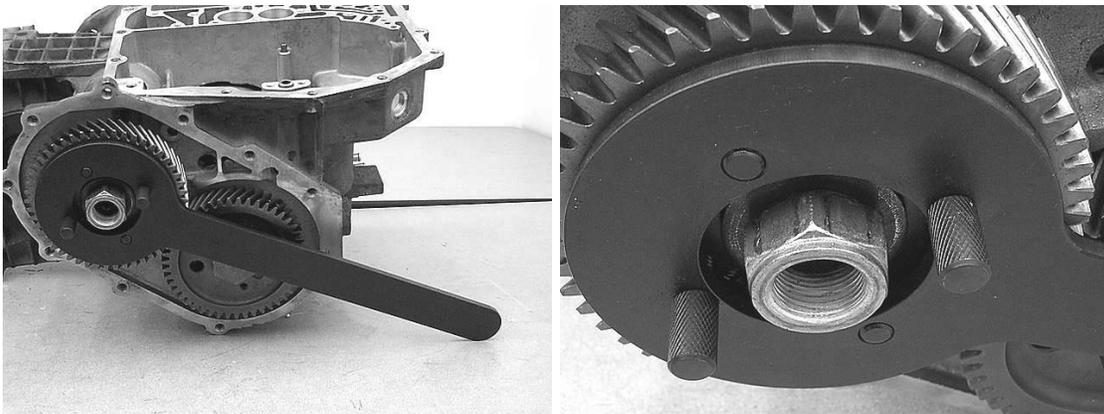


41TE Rebuild Procedures

Step 47: Install the transfer shaft gear onto the transfer shaft. Install the lock washer and thread the retaining nut onto the transfer shaft.



Step 48: Using the proper holding fixture for the transfer gear (use Miller* special tool #6259), torque the transfer shaft gear retaining nut to 200 foot-pounds (270 Nm).

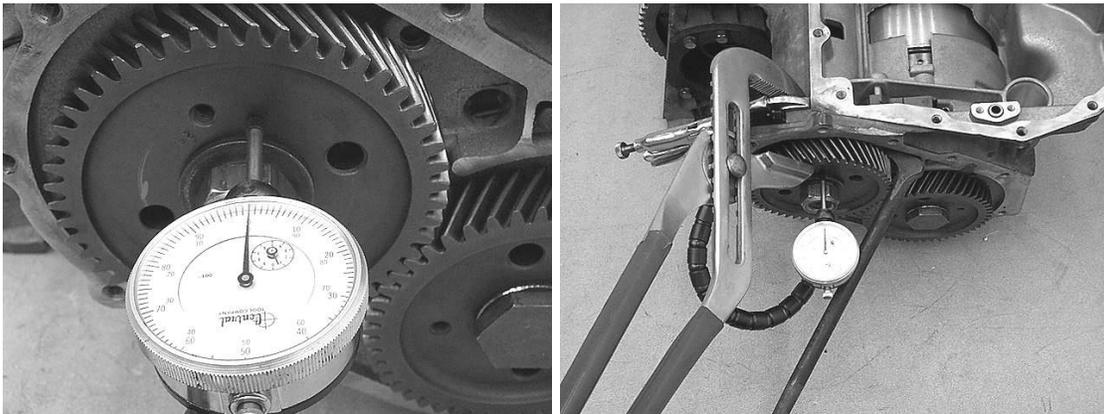


CAUTION: Never tighten the retaining nut with your impact gun. As tempting as it may be, the hammering could easily damage the roller bearing cages.

41TE Rebuild Procedures

Step 49: An end play measurement must be performed to determine the proper transfer shaft shim to use. Unlike the output gear and differential carrier, expansion of parts due to heat causes a substantial change in the transfer shaft bearing preload because the case expands more than the transfer shaft. At operating temperature the case warms up and expands more than the transfer shaft does. Enough of a difference to dangerously increase bearing preload if the transfer shaft had zero end play or preload when cold. Since this measurement is made with the unit cold, the transfer shaft is set up to have between 0.002" and 0.004" *end play* when cold, which turns to *preload* when hot because of these different expansion rates.

Use a dial indicator to check the transfer shaft endplay and record the results. Make sure you push and pull the shaft as far in and out as you can. Subtract the amount of observed end play from the test shim thickness, which results in a new 'zero end play' shim size. However, you need a bit of end play, so next you need to add a little bit back to this new shim size to create this end play. Do this by adding 3 thousandths of an inch (0.003") to the 'zero end play' shim size. This is the required transfer shaft shim thickness.



Remember to convert to and think in *inches* if that's what your dial indicator reads, and remember to add or subtract at the proper times. An example of this process is:

$$\begin{array}{r} \text{Test shim installed} = 0.183'' \\ \text{Observed end play} = 0.025'' \\ \text{Subtract observed end play from test shim thickness;} \\ \quad 0.183'' \\ \quad \underline{-0.025''} \\ \quad 0.158'' \\ \text{Add } 0.003'' \text{ to allow for the required transfer shaft end play} = 0.161'' \\ \text{That is the required transfer shaft shim thickness.} \end{array}$$

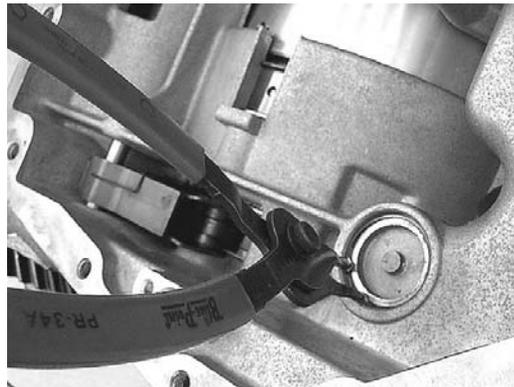
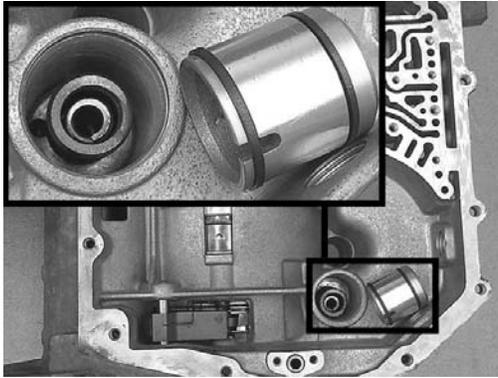
Use the Output Gear/Transfer Shaft Shim Chart from **Step 11** above to find the shim size closest to what you need. If there is no exact match, order the next *thinner* available shim shown in the chart. Use the metric size shown when ordering to avoid confusion.

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EXTRA CREDIT POINTS FOR PAYING ATTENTION- On Chrysler 3-speed 404, 413 and 470 units, be sure to check and set the transfer shaft end play exactly as described above to help avoid or correct problems with wrong gear starts and/or damage to the governor collector sleeve caused by seal ring land contact.

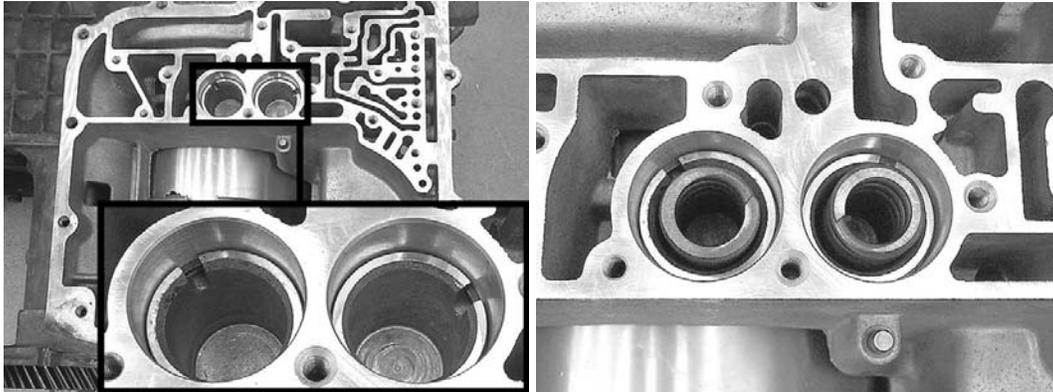
Step 50: Install new oil control rings on the three accumulator pistons that go into the case.

Step 51: Install the low reverse accumulator assembly in this order: accumulator springs, accumulator piston, then accumulator cover with a new cover o-ring in place. Be sure that the side of the cover with the single bump on it is facing outward. The side with the three small bumps faces inward toward the piston. Then install the snap ring to hold the assembly in place.

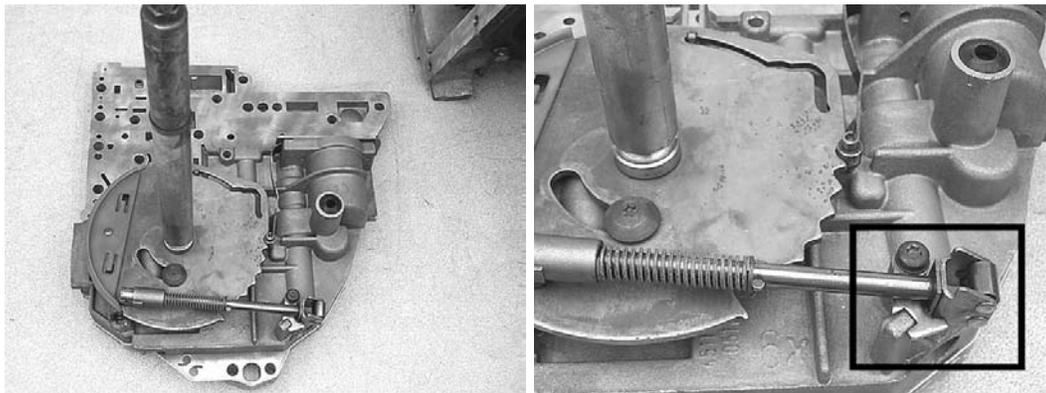


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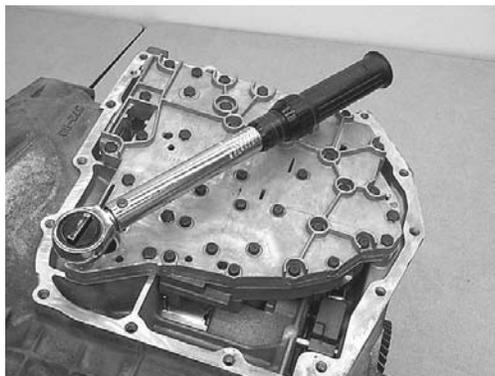
Step 52: Install the overdrive and underdrive accumulator pistons in the case, and then install the springs in the accumulators. Some later model units have different springs for these two accumulators. Make sure that the proper springs go into the proper pistons.



Step 53: Set the manual shaft on the valve body to the install position by rotating the shift lever all the way **clockwise** when viewed from the outside end of the shaft. This will be one click *past* manual low, which is inaccessible when the vehicle shifter is connected to the lever. This locks the Park rod onto a bracket on the valve body, making it much easier to remove and install the valve body.

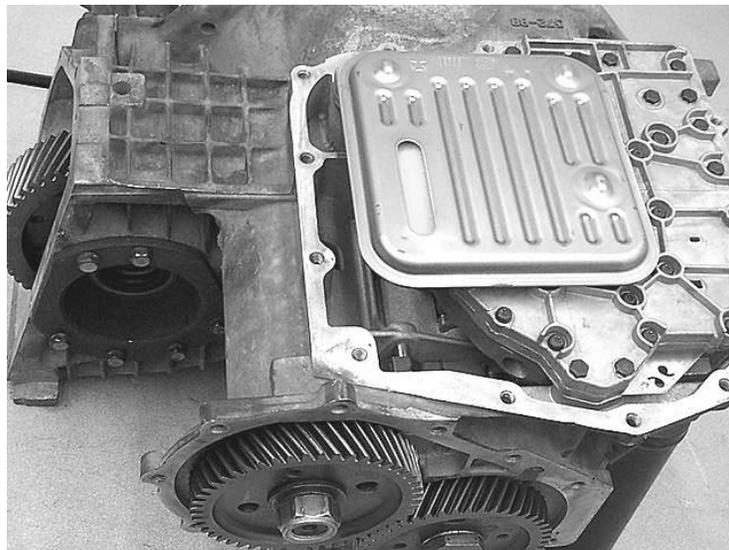
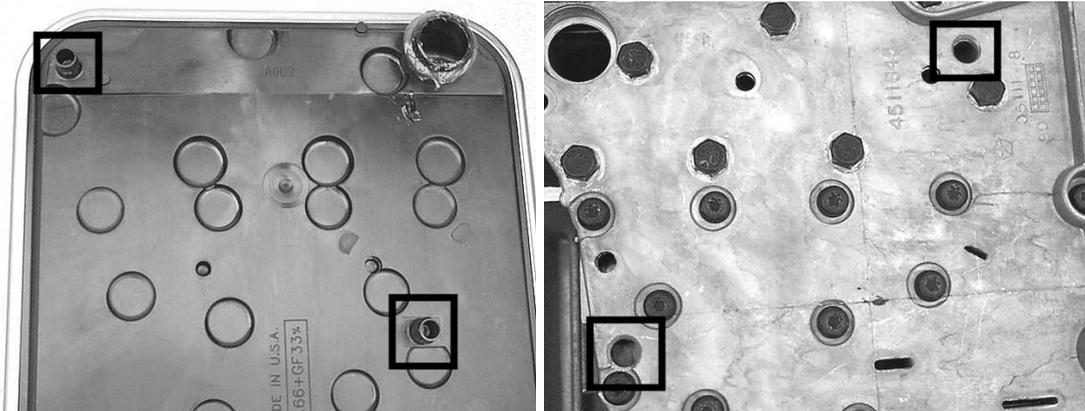
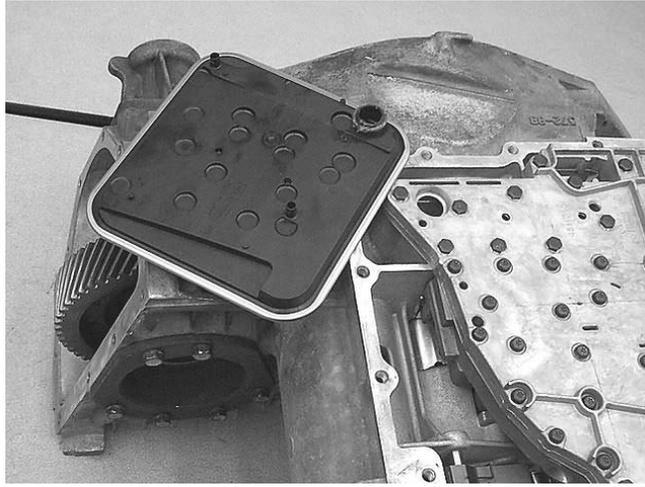


Step 54: Carefully work the valve body down into position. Install the valve body bolts by hand. Once all the bolts are in place, torque them down evenly to 40 in-lbs.



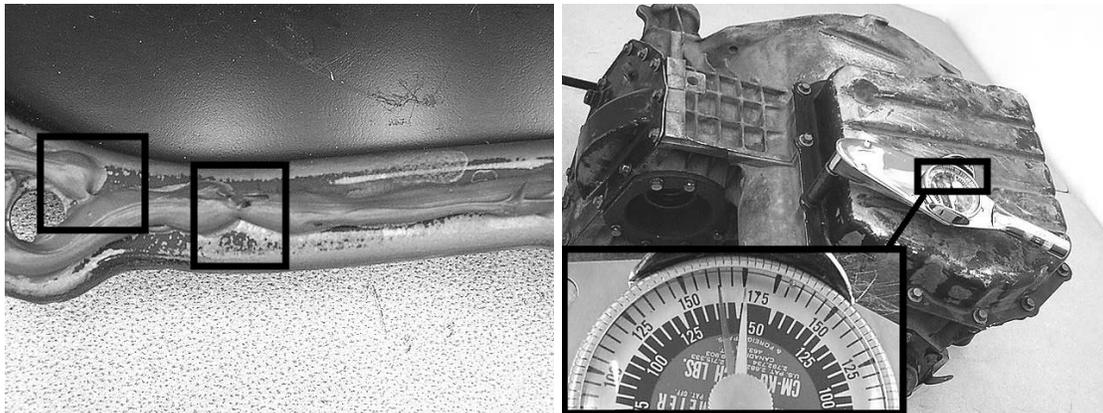
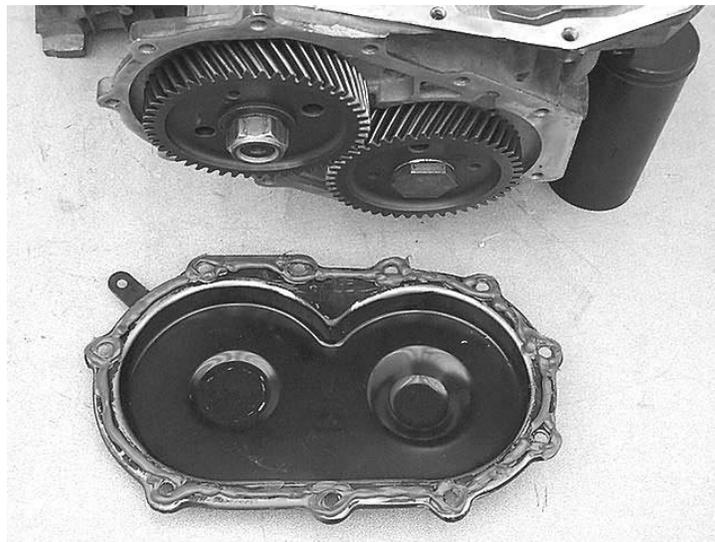
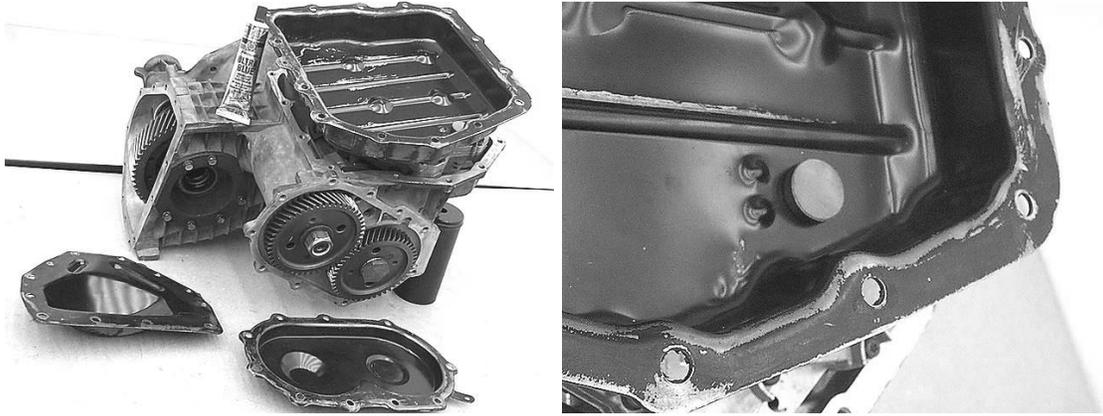
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Step 55: Install the filter and seal on the valve body. Make certain that the two alignment pegs on the filter are securely seated in their proper holes in the valve body.



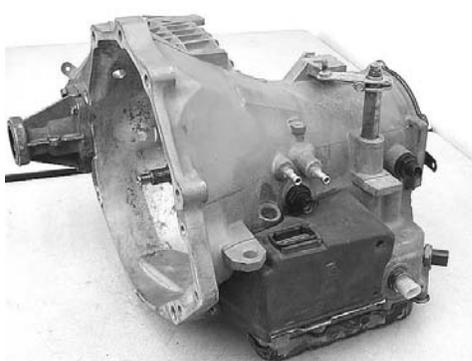
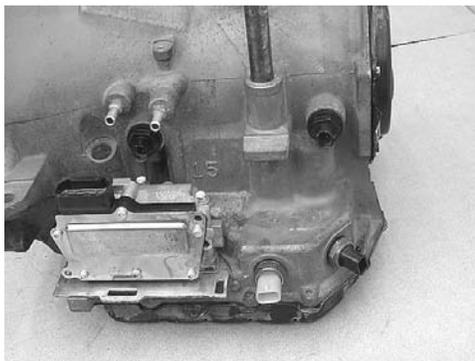
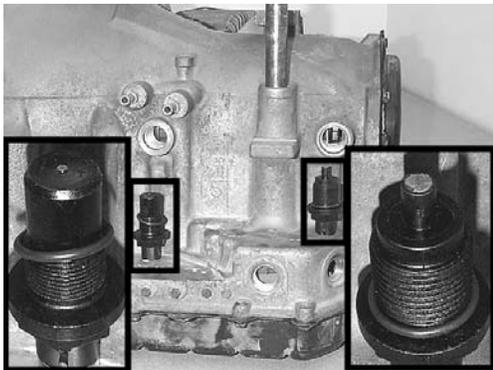
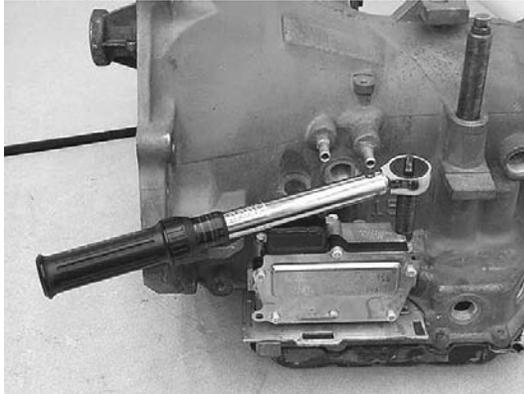
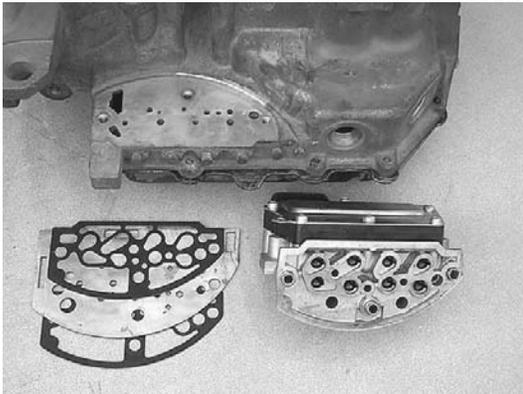
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Step 56: Do not use any pan gaskets on this unit. Run a 1/8" bead of RTV all the way around the oil pan, rear cover and differential cover. Avoid gaps or narrow spots in the silicone bead that might not allow a complete seal. Make certain that the bottom pan magnet is cleaned and in the proper position, then lay the pans in place, and start the bolts. Torque the pan bolts to 14 ft-lbs.



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Step 57: Moving to the outside of the unit, install the solenoid body before the sensors and switches, because you can't get to one of the solenoid body bolts with the turbine speed sensor installed. Be sure that the solenoid body separator plate is properly sandwiched by two gaskets. Then install the sensors and switches into the correct bores with new o-rings or sealing washers, paying close attention to different thread sizes between the components. Finally, install the solenoid body sound shield and the manual lever onto the unit if it came to your bench with them.



*Order Miller Special Tools at 1-800-801-5420 (this is where to get all Chrysler special tools).

****Turning torque** is the amount of torque required to *keep something turning*, as opposed to the amount of torque required to *start something turning*.