

5 SPEED MANUAL TRANSMISSION

Subject	Page	Subject	Page
DESCRIPTION	246	Transmission Case Inspection	257
Maintenance	246	Assembly	257
Checking and Replacing Transmission Oil	246	Synchronizers	258
Speedo Sender	246	Dismantle	258
Remove	246	Assembly	259
Install	246	Shift Cover	259
Reversing Light Switch	246	Dismantle	259
Remove	246	Assembly	259
Install	246	Input Shaft Bearing	260
Extension Housing Seal	246	Remove	260
Remove	246	Install	260
Remove Transmission	246	Input Shaft to Output Shaft Bearing Cup	260
Install	247	Remove	260
Extension Housing Rear Seal	247	Install	260
Remove	247	Bearing Retainer Seal - Front	260
Install	247	Remove	260
Shift Lever and Boot Assembly	247	Install	260
Remove	247	Counter Shaft Bearing - Front	260
Install	248	Remove	260
Transmission	248	Install	260
Remove	248	Bearing Inspection	261
Install	248	Bearing Raceways	261
Major Repairs and Rebuild	249	Inspect	261
Dismantle	249	Bearing External Surfaces	261
Assembly	251	PROBLEM SOLVING AND DIAGNOSIS	261
Gear and Shaft Assemblies	255	SPECIFICATIONS	262
Output Shaft and Gear Assemblies	255	TORQUE WRENCH SPECIFICATIONS	262
Dismantle	255		
Clean	256		
Inspect	256		

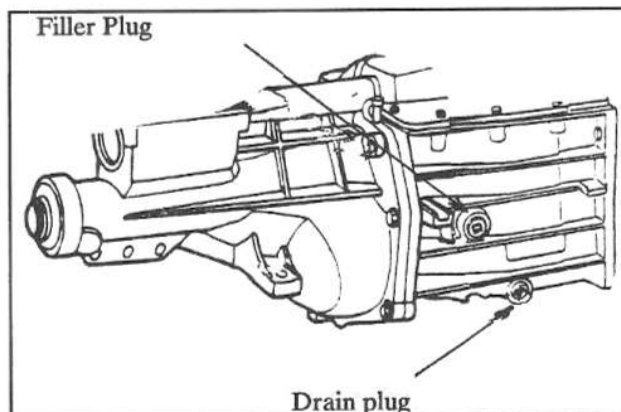
5 Speed Manual Transmission

DESCRIPTION

This transmission is a 5 speed manual utilising 5th gear as an overdrive. First through to fourth gears and reverse are meshed within the case. The 5th speed gear and synchronizer are located on the back of the case in the extension housing. The floor mounted shift lever operates a shift rail which advances from the extension housing turret to the shift cover. The 1st/2nd and 3rd/4th shift forks are mounted in the cover. The 5th speed synchronizer and reverse sliding gear are shifted through an intermediate lever mounted on a pivot pin.

Maintenance

Checking and Replacing Transmission Oil



Position an oil catching tray under the transmission, make sure it has the capacity to hold the oil from the transmission (if oil level is at the full level the transmission will hold 2.05 litres).

Remove the drain plug from the lower right side of the transmission, if the vehicle has been recently driven take care as the oil could be hot enough to burn skin on contact.

Replace the drain plug and tighten to specification.

Drain Plug torque specification: 27-40Nm

Remove the filler plug approximately half way up the right side of the transmission, fill the transmission with the correct amount of specified oil.

Oil Capacity of Transmission: 2.05 litres

Specified Transmission Oil: Dexron 11D

Check oil level by inserting your finger into the oil filler hole to check on oil level. The oil level should be at the

same level as the filler plug, but so high that oil will run out when the plug is removed.

Replace oil filler plug and tighten plug to specification.

Filler Plug specified torque: 27-40Nm

Speedo Sender

Remove

Raise vehicle, detach wiring plug, remove sender unit then pry off the retaining clip and remove the gear and remove 'O' ring seal.

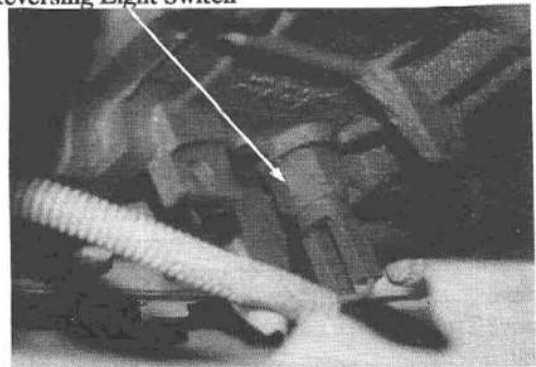
Install

Install 'O' ring, install gear and retaining clip.

Lubricate the seal and the gear with transmission oil.

Install sender unit into housing and connect wiring.

Reversing Light Switch



Reversing Light Switch

Remove

Detach wiring plug and remove the switch from the left hand side of the case with a 22mm socket.

Install

Clean threads of the switch and apply Teflon tape to threads. Install the switch and torque to specification.

Reverse Light Switch specified torque: 20-27Nm

Extension Housing Seal

Remove

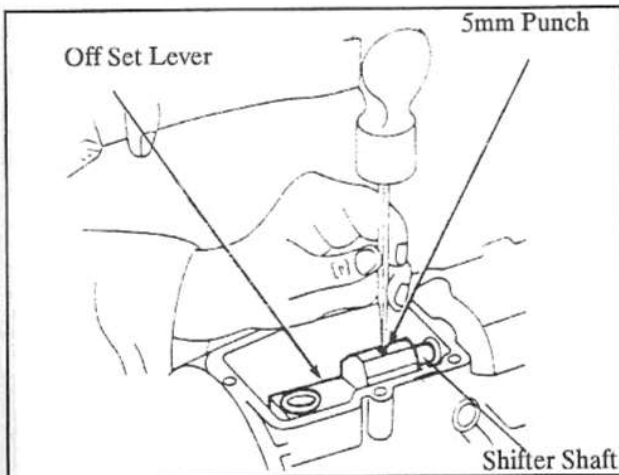
Remove transmission.

Using a 3/8-inch drive ratchet and extension, remove drain plug located on lower RH side of transmission case.

Place shift lever in Neutral detent, remove shift lever/turret cover assembly retaining bolts using a 13mm socket.

With a suitable pry bar, break turret cover-to-extension housing seal by carefully prying between the housing and cover. Remove assembly.

Remove roll pin retaining offset lever to shifter shaft, 5mm (3/16-inch) pin punch and hammer, with a 15mm



socket, remove the eight extension housing retaining bolts.

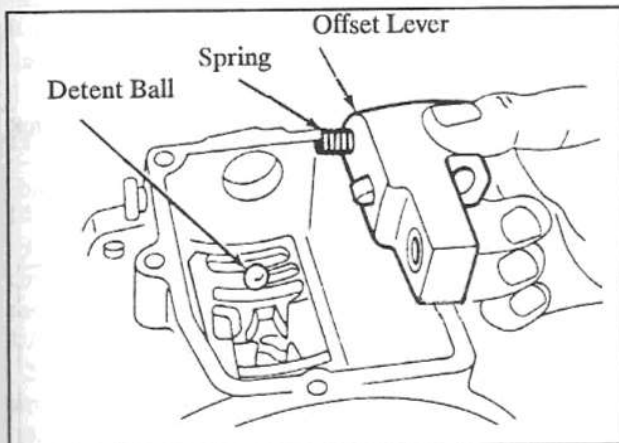
Using a suitable pry bar, break extension housing-to-case seal by carefully prying between the housing and case, remove seal from extension housing with Impact Slide Hammer and Seal Remover.

Install

Apply a 3.2mm (1/8 inch) bead of Silicone Sealer on the extension housing-to-transmission mating surface. Coat detent spring with petroleum jelly and install in the offset lever.

Lubricate detent plate and install detent ball in the Neutral position on the plate. Place offset lever in extension housing with spring over detent ball, slide lever and housing into place as an assembly.

Press down on the offset lever to compress the detent spring and push lever and housing into place.



Install extension housing retaining bolts. Tighten to specification.

Extension Housing bolts: 50-60 Nm

Using a suitable pin punch, align the hole in the shifter shaft with the hole in offset lever and install the roll pin. Install damper sleeve in offset lever.

Apply a 3.2mm (1/8 inch) bead of Silicone Sealer on the turret cover. Place cover on extension housing and install retaining bolts to specification.

Extension Cover bolts specified torque: 15-20 Nm

Replace the drain plug and fill transmission to correct specifications.

Drain Plug torque specification: 27-40Nm

Oil Capacity of Transmission: 2.05 litres

Specified Transmission Oil: Dexron 11D

Filler Plug specified torque: 27-40Nm

Install a new extension seal using Extension Housing Seal Replacer. Install transmission.

Extension Housing Rear Seal

Remove

1. Jack vehicle up and safely support vehicle to allow access to the transmission and drive / tail shaft.

2. (a) Remove drive / tail shaft as described in Tail / Drive Shaft and Universal Joints chapter in this manual.

(b) Place a drain tray beneath transmission extension.

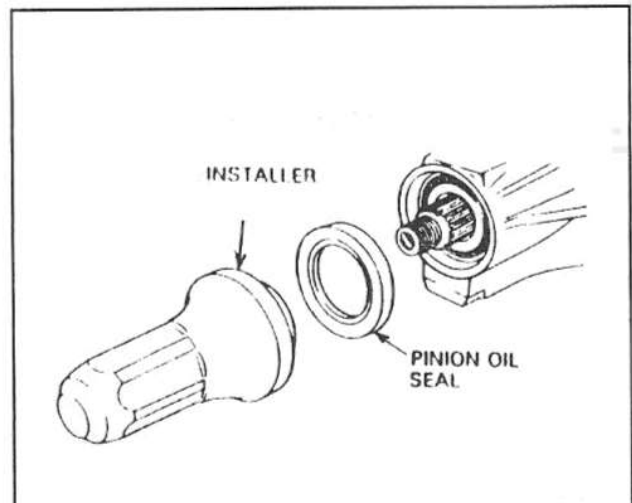
(c) Remove bolts attaching brace assembly and remove brace.

3. Remove seal using seal remover.

4. (a) Inspect seal lip surface on slip yoke of propeller shaft for damage.

(b) Clean (or replace) as necessary.

Install



1.(a) Apply a little transmission lubricant to seal lip.

(b) Install seal into the extension with a seal insertion tool.

2. Replace tail / drive shaft.

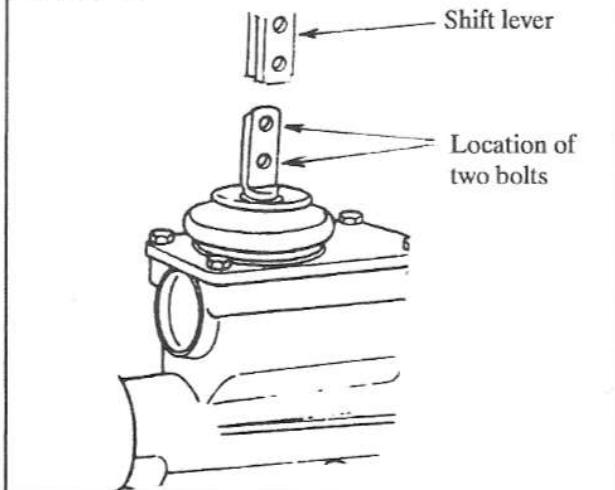
3. Check transmission lubricant level as previously described in this Chapter.

Shift Lever and Boot Assembly

Remove

Remove the gearshift knob (unscrew) from the gear lever, gently prise the boot from the console and lift the boot from the lever. Working through the console aper-

Remove the two bolts securing the shift lever to the transmission



Remove the two bolts securing the shift lever to the transmission and remove the lever.

Install

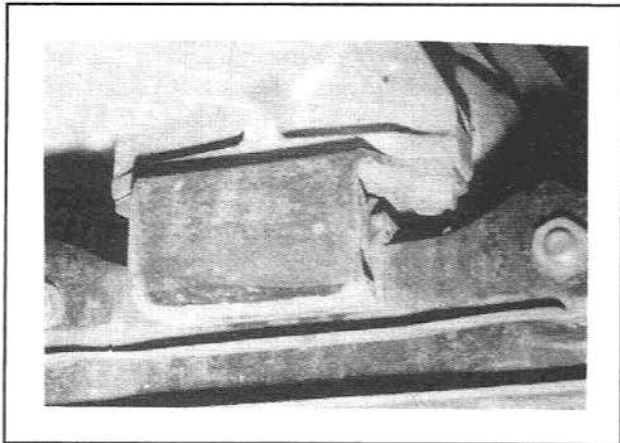
Install the gear shift lever to the transmission lever, install and torque the bolts to specification. Locate the boot and retainer over the shift lever and press the retainer lugs into the console.

Screw the knob onto the shift lever until it starts to tighten, continue tightening until the gear position markings on the knob are correctly aligned.

Transmission

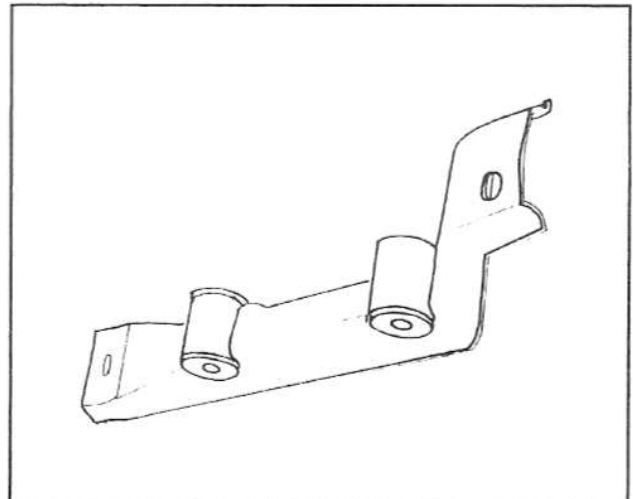
Remove

1. Remove the gearshift boot and lever. Raise vehicle.
2. Mark the drive shaft so that it may be installed in the same relative place. Detach the shaft at the universal joint and slide it off the transmission output shaft. Install a dust cover or extension housing seal replacer into the extension housing to prevent lubricant leakage.



3. Support the engine and transmission assembly with a transmission jack. Remove the insulator to crossmember nut.

4. Remove the nuts and washers securing the crossmember to the body and remove the crossmember.



5. Remove the insulator to extension housing bolts and remove the insulator.

6. Detach muffler inlet pipe bracket from the inlet pipe flange and remove bracket.

7. Lower transmission jack until the rear of the engine rests against the bulkhead.

8. Detach the wiring to the reversing light and speedometer sending unit.

9. Remove the transmission to clutch housing bolts.

10. Move transmission rearward until the input shaft clears the flywheel housing then lower the jack and remove the transmission.

Install

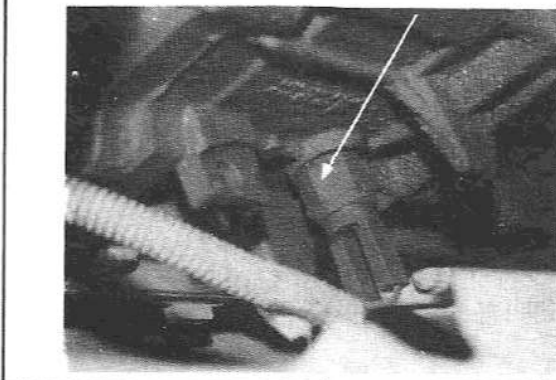
1. Install transmission on the transmission jack, raise transmission and move it forward on the guide pins until the input shaft splines enter the clutch hub splines and the case is placed against the clutch housing.

2. Install the transmission to clutch housing bolts. Torque all bolts to specification.

Transmission to Clutch Housing bolts specified torque:
70-84Nm

3. Connect the wiring to the reversing light switch and the speedometer sending unit, raise transmission.

Reversing light switch

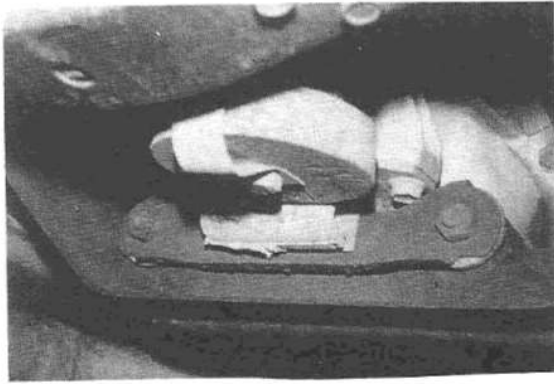


5 SPEED SYNCHRONIZED MANUAL TRANSMISSION

Page 249

4. Install crossmember to the body. Torque the bolts to specification. Remove the transmission jack and install the insulator to crossmember nut. Torque to specification.

Install crossmember to the body



Rear Crossmember to Side Frame bolt: 40-50Nm
Rear Crossmember to Transmission bolt: 30-40Nm
Install the muffler inlet pipe bracket and the insulator to the extension housing. Torque bolts to specification.
Exhaust Pipe bracket bolt specified torque: 30-50Nm

5. Remove the dust cover or seal replacer from the extension housing and slide the drive shaft over the transmission output shaft. Align the index marks at the universal joint and connect the drive shaft as described in Tail / Drive shaft chapter.

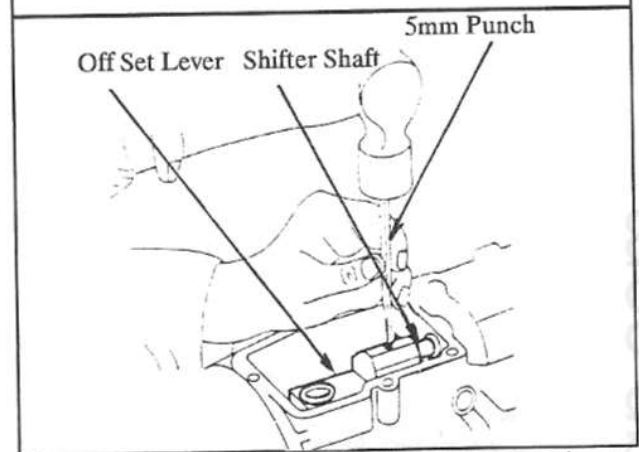
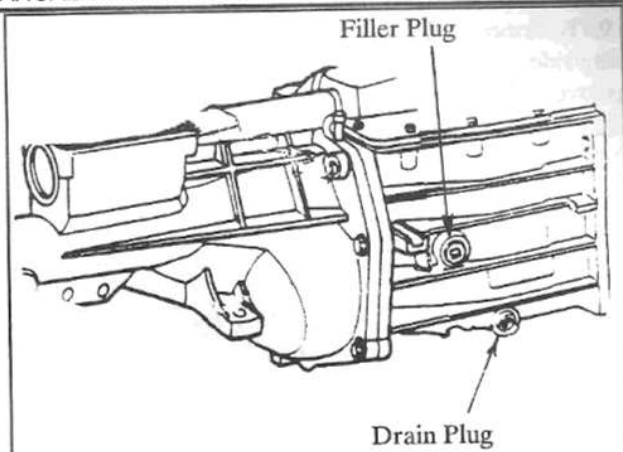
6. Fill the transmission to the proper level with specified lubricant and torque filler plug.

Oil Capacity of Transmission: 2.05 litres

Specified Transmission Oil: Dexron 11D

Drain Plug torque specification: 27-40Nm

7. Lower vehicle, install the gearshift lever and boot. Road test the vehicle for satisfactory transmission operation.



6. Using a suitable pry bar, break extension housing-to-case seal by prying between housing and case.

7. Remove extension housing and offset lever as an assembly by sliding rearward away from case. Remove offset lever, roll pin, detent spring and detent ball from extension housing detent plate.

8. With a 10mm socket, remove shift cover retaining bolts. Use a suitable pry to break cover-to-case seal by prying carefully between cover and case.

Major Repairs and Rebuild

Dismantle

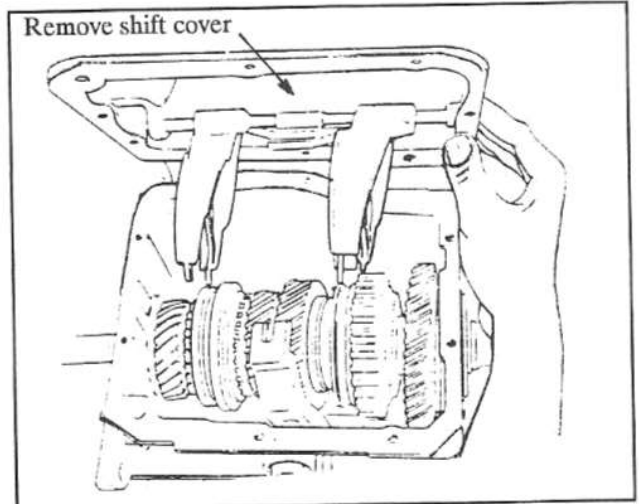
1. Place transmission on a clean bench to enable a complete pull down and rebuild. Using a 3/8-inch drive ratchet and extension, remove drain plug located on lower R/H side of transmission case.

2. Place shift lever in neutral position and remove extension cover retaining bolts with a 13mm spanner.

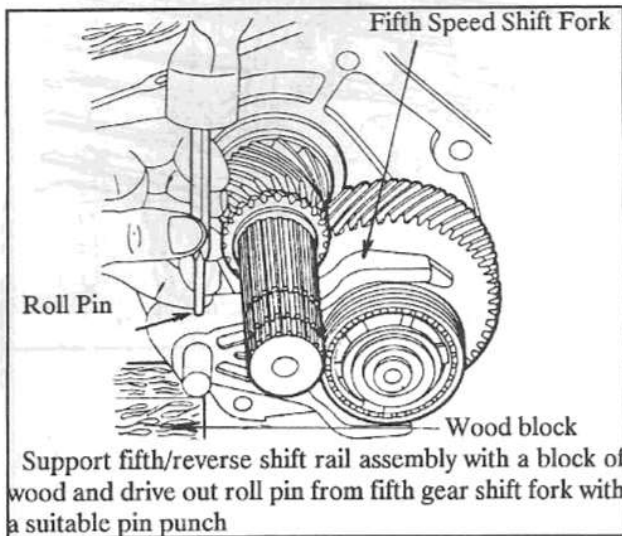
3. Using a suitable pry bar, break cover-to-extension housing seal by prying between housing and cover. Remove turret cover.

4. With a suitable pin punch and hammer, remove roll pin retaining offset lever to shifter shaft. Remove damper sleeve.

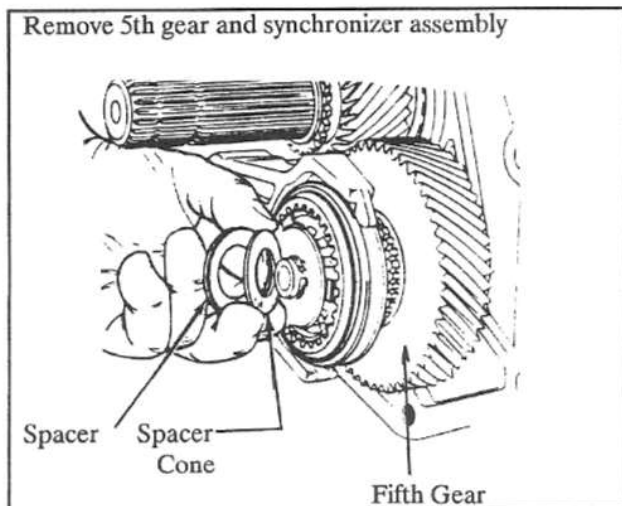
5. Remove extension housing retaining bolts, using a 15mm socket.



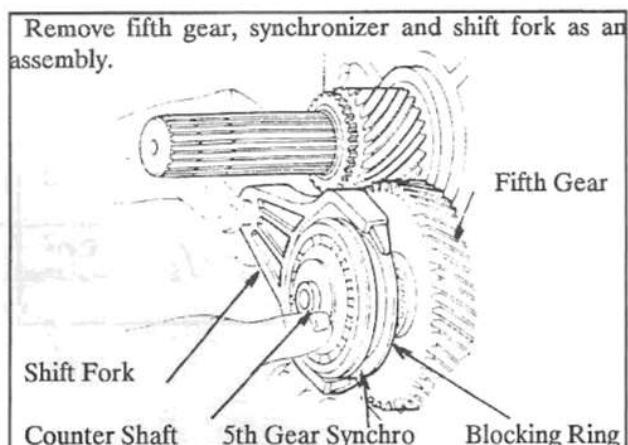
9. To remove shift cover, lift it slightly and slide to filler plug side of transmission. When shift mechanism clears groove in fifth/reverse shift lever, continue lifting cover.



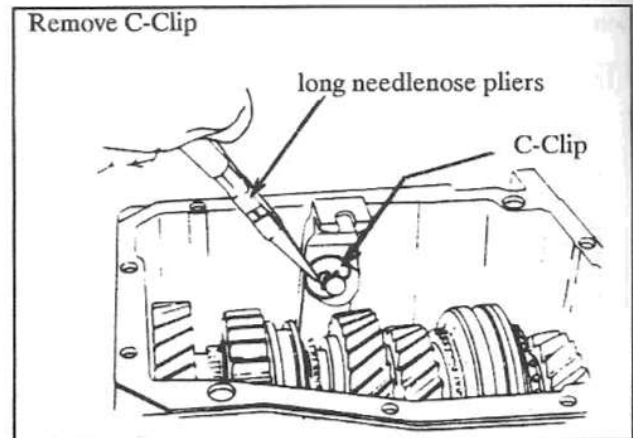
10. Support fifth/reverse shift rail assembly with a block of wood and drive out roll pin from fifth gear shift fork with a suitable pin punch.



11. Using snap ring pliers, remove fifth gear synchronizer snap ring retainer, spacer, reverse cone and synchronizer blocking ring from rear of counter shaft.



12. Remove fifth gear, synchronizer and shift fork as an assembly.

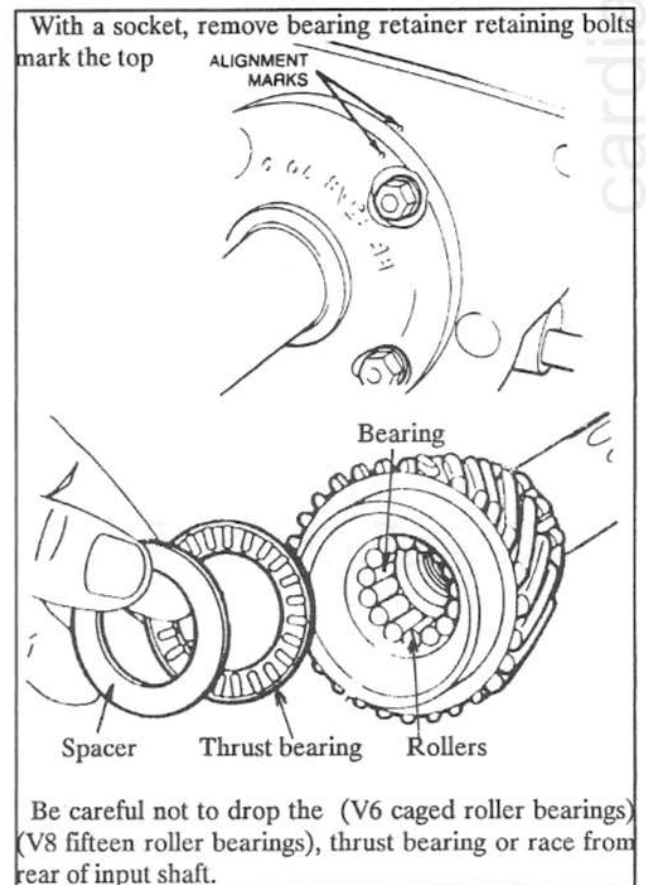


13. Using long needlenose pliers, remove C-Clip retaining fifth/reverse shift lever to lever pivot pin.

14. Remove fifth/reverse shift lever pivot pin with Torx bit driver. Do not remove the fifth/reverse shift lever at this point. With a 22mm wrench, remove the backup lamp switch.

15. Rotate fifth/reverse shift rail clockwise to disengage ball stud from fifth/reverse shift lever. Pull fifth/reverse shift rail counterclockwise to align ball stud with slot in case and remove shift rail.

16. With a socket, remove bearing retainer retaining bolts mark the top of the retainer if not marked to help during assembly.



Be careful not to drop the (V6 caged roller bearings) (V8 fifteen roller bearings), thrust bearing or race from rear of input shaft.

5 SPEED SYNCHRONIZED MANUAL TRANSMISSION

Page 251

17. Using a suitable pry bar, break the bearing retainer-to-case seal by prying between retainer and case. Remove bearing retainer.

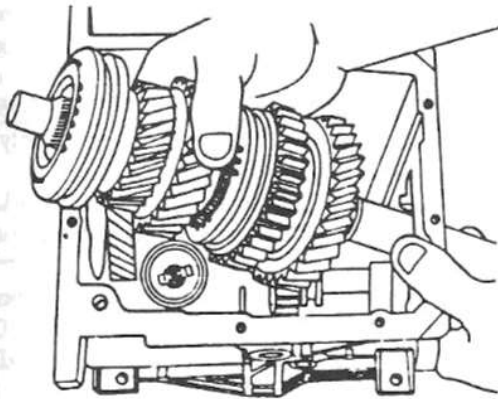
18. Rotate input shaft until flat on 4th gear clutching teeth aligns with countershaft. With input shaft properly aligned, remove it from case. Be careful not to drop the (V6 caged roller bearings) (V8 fifteen roller bearings), thrust bearing or race from rear of input shaft.

19. Remove 4th gear synchronizer blocking ring from the third/fourth synchronizer.

*** If the race sticks, it is probably misaligned in the case bore. To free the race, work the shaft back and forth in the case.**

20. Remove output shaft bearing race from rear of case. To partially remove bearing race, pull rearward on output shaft until first gear stops against case.

Tilt output shaft assembly upward and lift out of case.



21. Tilt output shaft assembly upward and lift out of case.

*** Observe location of shift lever, shift fork and inhibitor spring prior to removal. Also observe the rotation action of the reverse positioning spring during removal. This will be helpful during assembly.**

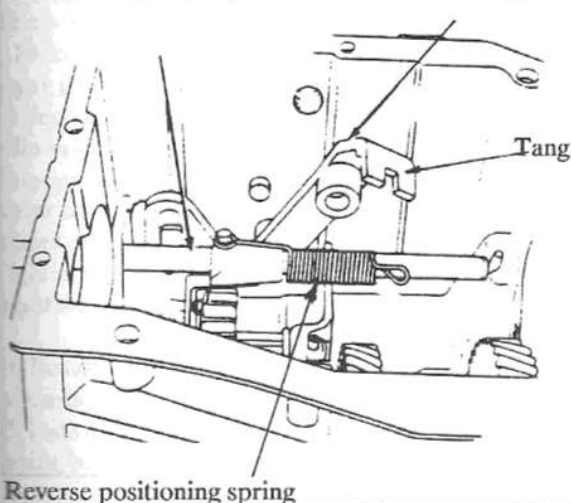
Remove fifth/reverse shift lever

5th Gear Reverse Shift Rail

Reverse Lever

Tang

Reverse positioning spring

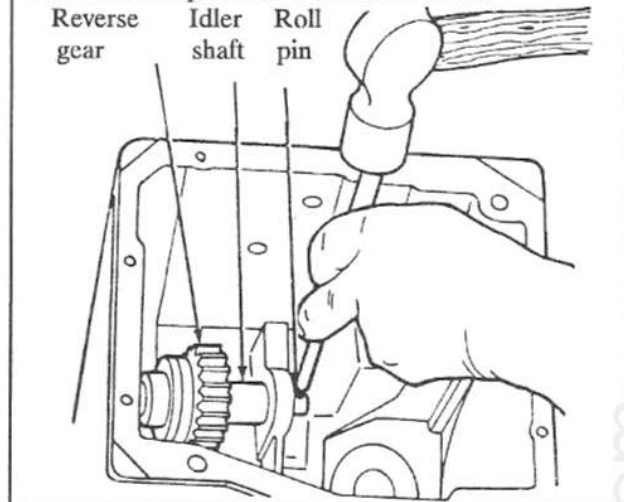


22. Remove fifth/reverse shift lever, reverse shift fork and reverse positioning spring from case by grasping lever and lifting straight up as an assembly. If case replacement is necessary, remove reverse positioning spring anchor pin by removing the Tizz bushing from the anchor bolt and then removing the anchor bolt.

23. With a suitable pin punch and hammer, remove roll

Punch out roll pin from reverse idler shaft

Reverse gear Idler shaft Roll pin



pin from reverse idler shaft. Remove reverse idler shaft by sliding it out of back case. Remove reverse idler gear and over-travel rubber stop from case.

24. Using a hammer and Locknut Staking Tool flatten tabs on countershaft retainer at all four corners, remove four 13mm bolts from countershaft retainer.

25. Remove countershaft retainer and shim/s. Remove rear counter shaft bearing race from counter shaft.

*** If the race sticks, it is probably misaligned in the case bore. To free the race, work the shaft back and forth in case.**

26. Install Front Hub Remover/Replacer and Bearing Pulling Attachment or equivalent to the counter shaft with the jaws behind the counter shaft bearing, and remove bearing.

27. Move countershaft rearward through bearing bore. Tilt assembly upward and remove from case.

Assembly

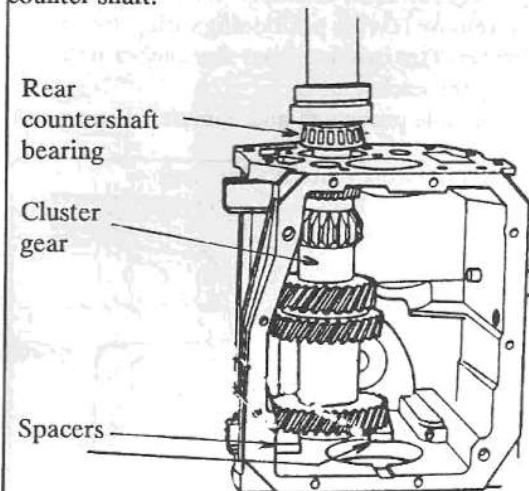
1. Using a press, install front counter shaft using Pinion Bearing Cone Replacer. Place counter shaft in case.

CAUTION: Failure to properly support the counter shaft can result in permanent distortion of the case during bearing installation.

*** Support counter shaft using two pieces of 7mm (1/4 inch) bar stock.**

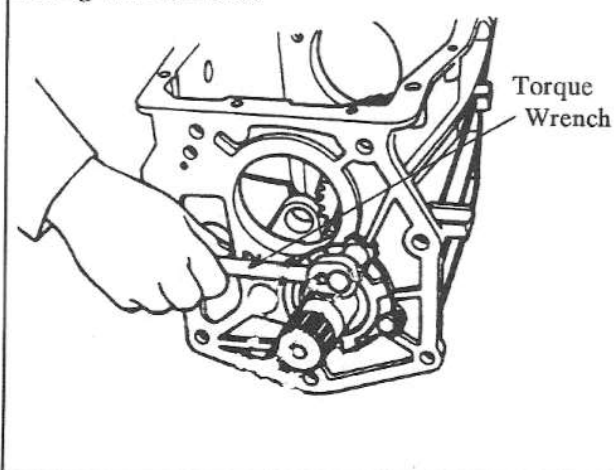
2. Using a press and Cluster Gear Bearing Installer and Remover Tube install counter shaft rear bearing to counter shaft.

Using a press and Cluster Gear Bearing Installer and Remover Tube install counter shaft rear bearing to counter shaft.



3. Install rear counter shaft bearing race onto counter shaft. Install counter shaft bearing retainer to transmission housing with four bolts. Tighten bolts to specification

Install counter shaft bearing retainer to transmission housing with four bolts



Rear Counter Gear Shaft Bearing Housing: 20Nm.

* This should be done initially without any shims installed.

4. Measure end play using Dial Indicator with Bracket.

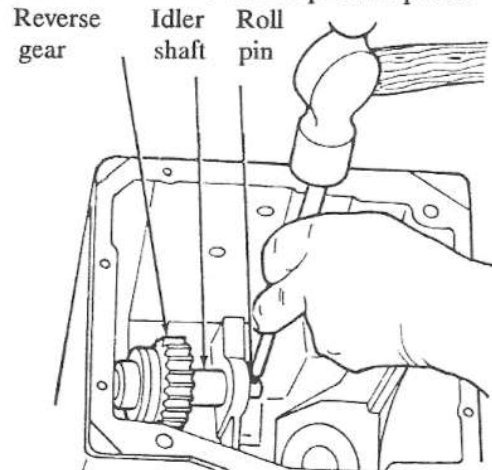
Remove retainer and install necessary shim/s between counter shaft bearing race. Verify end play is within specification.

Counter Shaft End Play: 0.013-0.102mm

After installing counter shaft retainer, bend tabs on retainer over the four attaching bolts.

5. Place reverse idler gear on case with shift lever groove facing rear of case. Install reverse idler shaft and rubber over-travel stop. Install shaft from rear of case and place over-travel stop between gear and shaft support.

Install reverse idler shaft roll pin with punch



6. With a 5mm (3/16-inch) pin punch, install reverse idler shaft roll pin.

7. If removed, apply Pipe Sealant with Teflon to reverse positioning spring anchor pin threads. Install anchor pin and tighten to specification.

Reverse Idler anchor Pin specified torque: 8-15Nm

Install Tizz bushing over anchor pin head by softly tapping into place with hammer.

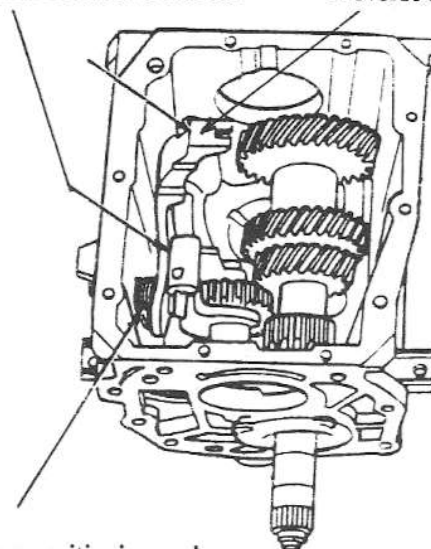
8. Align fifth/reverse shift lever, reverse shift fork and reverse positioning spring as shown, then install looped end onto anchor pin

9. Place reverse idler gear into the Neutral position and align reverse shift fork onto reverse idler gear. Once aligned, push down on shift fork until fully engaged into reverse idler gear.

* Observe reverse positioning spring rotation. Reverse positioning spring should rotate counter clockwise into its installed place.

Remove fifth/reverse shift lever
5th Gear Reverse Shift Rail

Reverse Lever



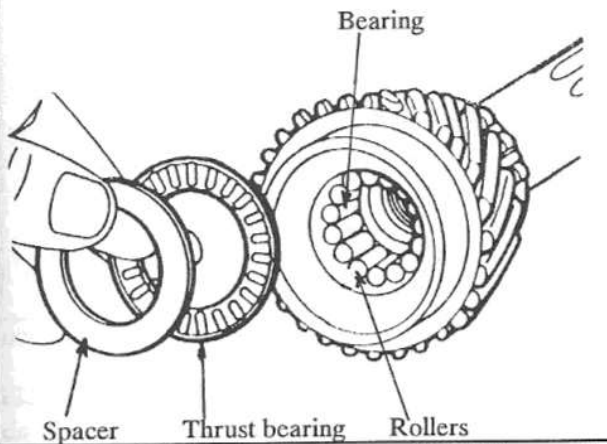
Reverse positioning spring

5 SPEED SYNCHRONIZED MANUAL TRANSMISSION

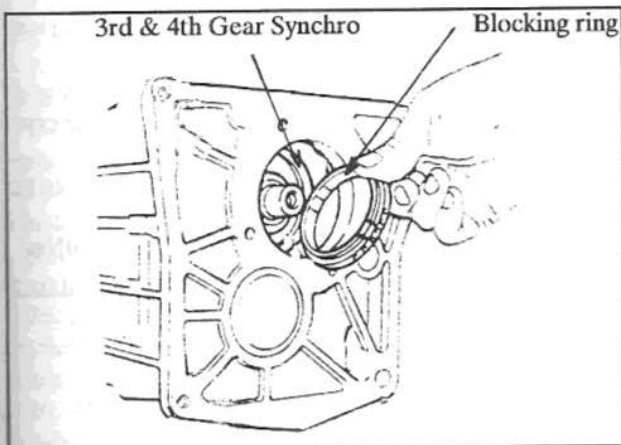
Page 253

10. Install output shaft assembly.

(V6 caged roller bearings) (V8 fifteen roller bearings)



* Coat the (V6 caged roller bearings) (V8 fifteen roller bearings), thrust bearing and race with Multi-Purpose Grease. Install components in input shaft.



11. Align notches in synchronizer blocking ring with inserts in 3-4 synchronizer and install synchronizer blocking ring.

12. Install input shaft. Align flat on synchronizer teeth with counter shaft before installing input shaft.

* Make sure 3-4 synchronizer blocking ring is still in proper place.

13. Install bearing race in bearing retainer.

* Do not install end play shims at this point.

Temporarily, install bearing retainer with narrow or smaller notch facing upward. Do not apply sealant to the retainer at this point.

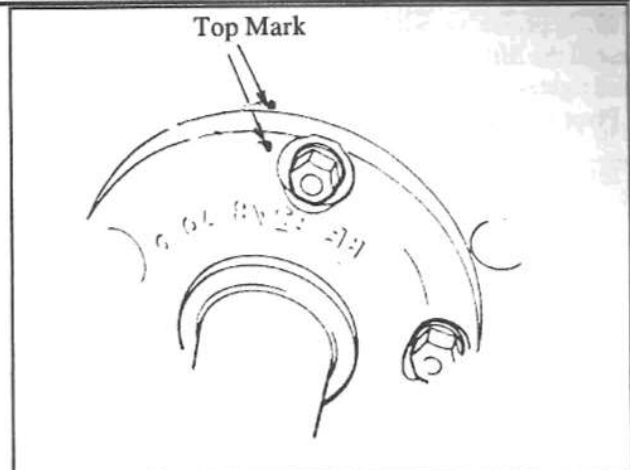
Tighten retaining bolts to specification

Input Shaft Bearing retaining bolts specified torque:

15-27 Nm

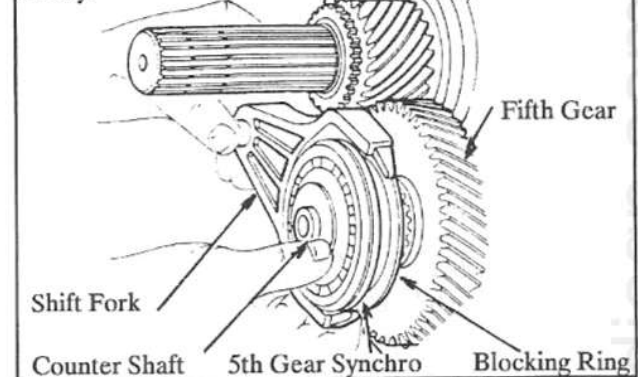
14. Install output shaft rear bearing race. If necessary, tap bearing race into place using a plastic tipped hammer.

15. Install fifth/reverse shift rail into transmission case by aligning ball stud with slot in case and aligning shift rail



with reverse shift fork. Once ball stud enters case, rotate shift rail clockwise and push in shift rail until ball aligns with fifth reverse shift lever. Rotate shift rail counter clockwise until ball stud fully engages shift lever.

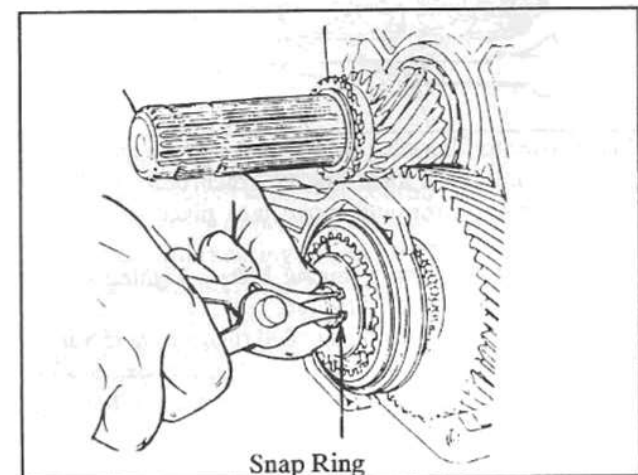
Install fifth gear, synchronizer and shift fork as an assembly.



16. Install fifth gear, synchronizer and shift fork as an assembly. Install fifth gear synchronizer blocking ring. Reverse Cone, spacer and snap ring.

* Make sure tabs on spacer engage splines of counter shaft and the tab on the reverse cone is at 12 o'clock position to assist when installing the extension housing.

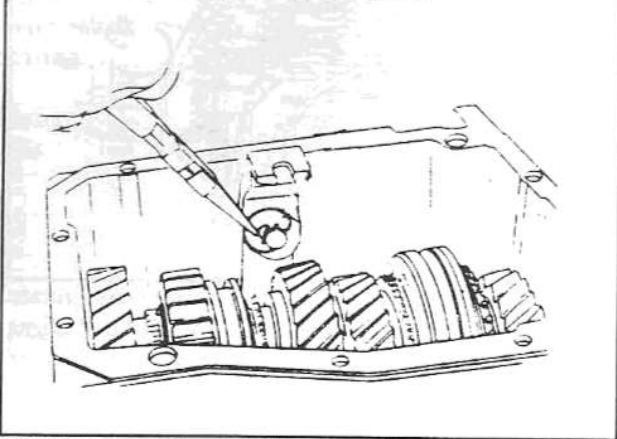
* Before installing the pivot pin, make sure the shift rail ball stud is fully engaged with the shift lever.



17. Apply sealant with teflon to the pivot pin threads and install the fifth/reverse shift lever pivot pin. Apply sealant and tighten pivot pin using a Torx driver.

Pivot Pin specified torque: 48-68Nm

Install C-clip with pointed nose pliers



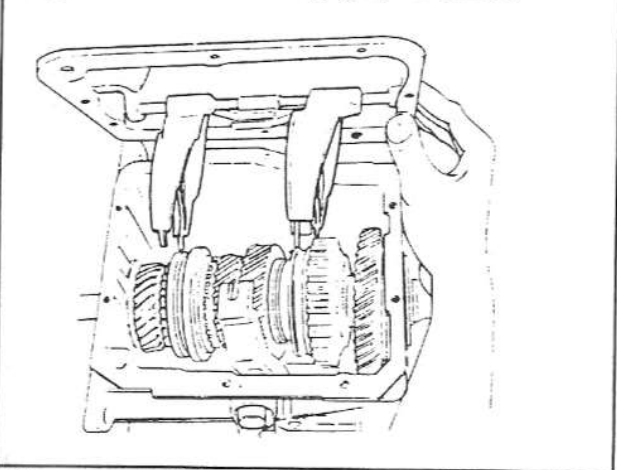
18. Using needlenose pliers, install C-Clip on shift lever pivot pin. Install speedometer gear.

* The tab on the retainer clip engages a hole in the output shaft.

19. Apply 3.2mm (1/8 inch) bead of silicone Sealer RTV Silastic 1080 or equivalent to shift cover assembly.

* Make sure all synchronizers are in the Neutral position and that the shift forks in the cover are in the Neutral position.

Place cover to filler plug side of transmission and lower into place until shift forks engage synchronizers

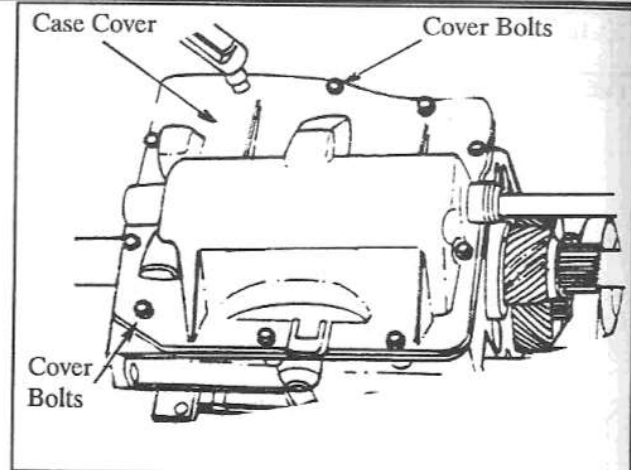


Place cover to filler plug side of transmission and lower into place until shift forks engage synchronizers. Continue lowering cover and move into place to engage fifth/reverse shift lever.

20. Install shift cover retaining bolts. Tighten cover retaining bolts to specified torque.

Transmission Cover bolt specified torque: 8-15Nm

21. Apply a 3.2mm (1/8 inch) bead of Silicone Sealer RTV Silastic 1080 or equivalent on the extension housing



mating surface. Apply silicone sealer to the lubrication funnel and install funnel to extension housing.

22. Coat detent spring with petroleum jelly and install in offset lever. Lubricate detent plate and install detent ball in neutral position on plate. Place offset lever in extension housing with spring over detent ball.

23. Slide lever and extension housing into place as an assembly.

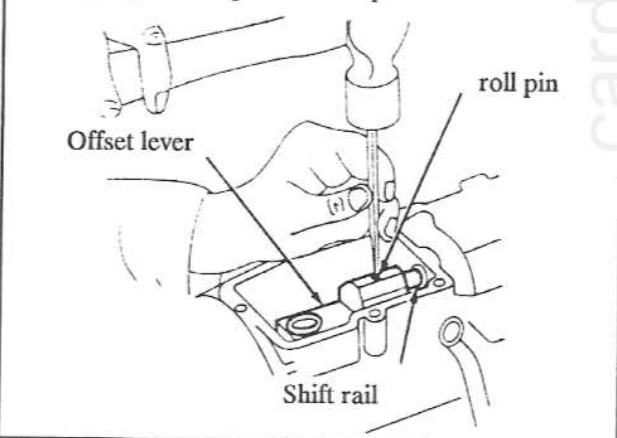
* Make sure lubrication funnel engages into fifth gear synchronizer.

Press down on offset lever to compress detent spring and push lever and housing into place. Make sure the reverse cone tag is engaged in the recess in the housing.

24. Install extension housing retaining bolts. Tighten to specification.

Extension Housing bolts specified torque: 50-60Nm

Use a pin punch to position roll pin



Using an appropriate pin punch, align the hole in shifter shaft with hole in offset lever and install roll pin. Install damper sleeve in offset lever.

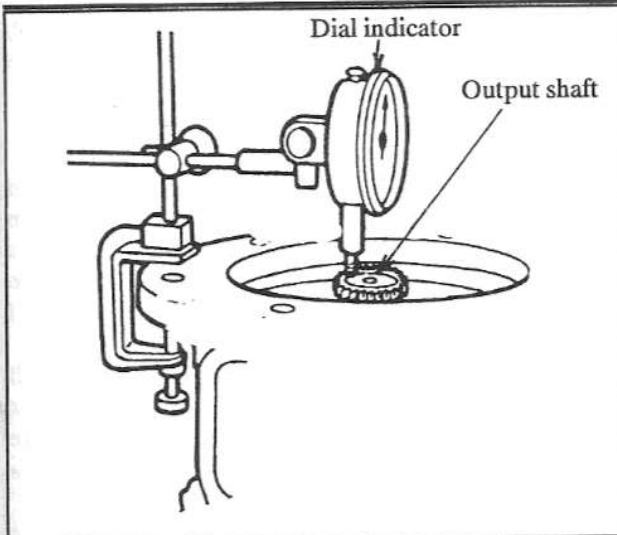
* Output shaft geartrain end play must be checked and adjusted at this point.

Examine output shaft geartrain end play as follows:

* Rotate transmission to the vertical position with extension housing facing up.

5 SPEED SYNCHRONIZED MANUAL TRANSMISSION

Page 255



* Mount Dial Indicator with Bracket on the extension housing with the indicator stylus contacting the output shaft.

* Rotate the input and output shafts. Zero the dial indicator.

* With a wood block, push up on the input shaft and note the dial indicator reading.

* A shim must be installed that is the thickness of the dial indicator reading. This will provide zero end play.

CAUTION: Although zero end play is the ideal specification, a plus or minus .050mm (0.002 inch) is a suitable tolerance. Do not overload the bearings with too thick a shim.

Thickest shim must be installed closest to the front bearing cup.

25. Rotate transmission to the horizontal position and remove the front bearing retainer. Remove bearing race from retainer and install required shim/s.

26. Apply a 3.2mm bead of silicone sealer to bearing retainer.

Install bearing retainer with narrow or smaller notch facing up, tighten retaining bolts to specified torque.

Main Drive Bearing Retainer specified torque: 15-25Nm

CAUTION: The sealer must not cover the notch in the bearing retainer.

Apply a 3.2mm bead of silicone sealer on the extension cover top.

27. Place cover on the extension housing and tighten the retaining bolts to specification.

Extension Cover Top bolts specified torque: 15-20Nm

28. Install and tighten drain plug to specification.

Drain Plug specified torque: 27-40Nm.

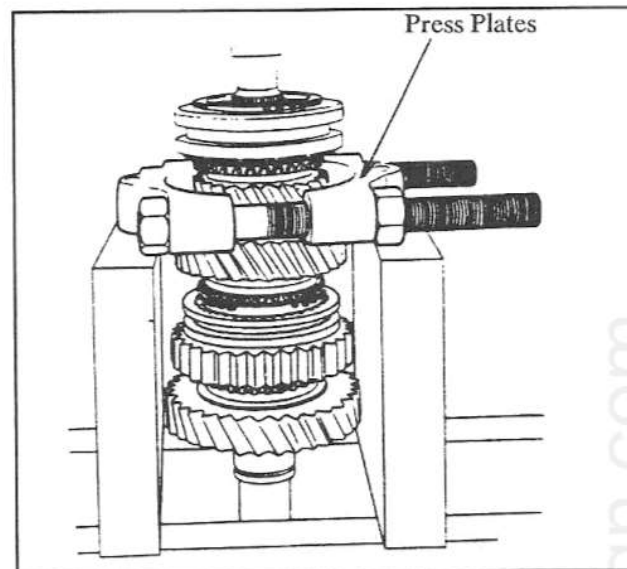
Gear and Shaft Assemblies

Output Shaft and Gear Assemblies

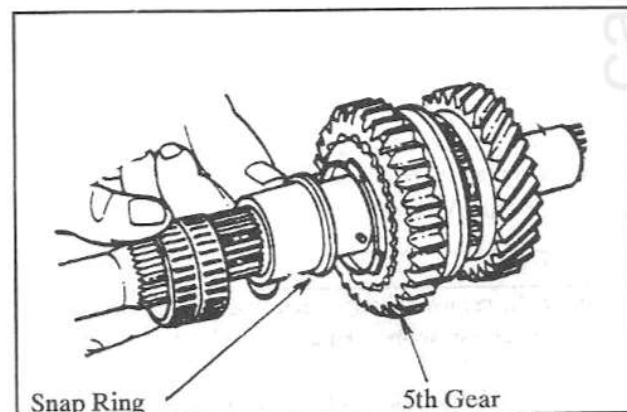
* Subassembly procedures should be performed only when required. After examining each subassembly, dismantle only those requiring component replacement or inspection.

Dismantle

2. Using a press and Pinion Bearing Cone Remover or equivalent, remove 3rd/4th synchronizer, 3rd speed blocking ring, and 3rd gear as an assembly.

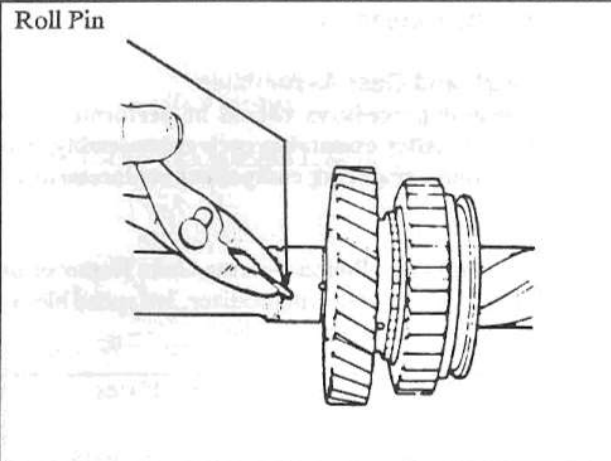


3. Remove needle bearing assembly and spacer from output shaft, remove fifth gear snap ring. Using a press and Pinion Bearing Cone Remover or equivalent, remove fifth gear.



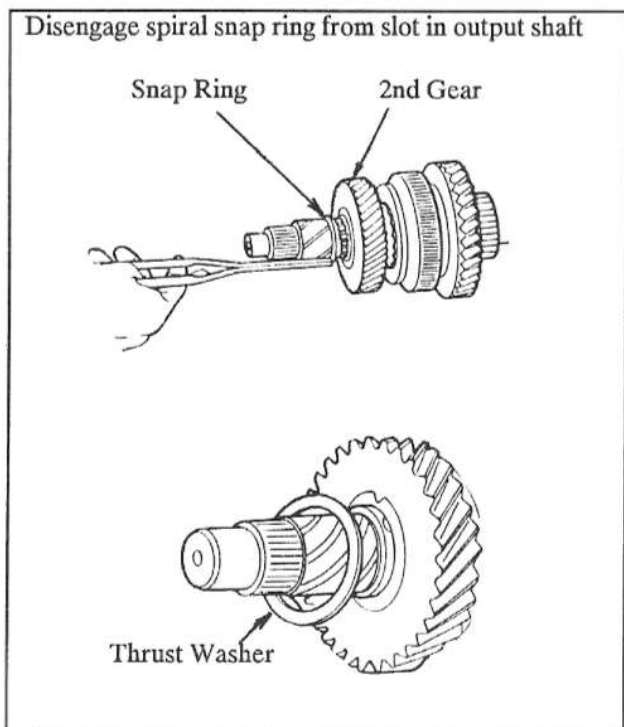
4. Remove output shaft rear bearing, remove first gear. *** There is a snug fit between the sleeve and output shaft.** Remove needle bearing assembly and sleeve, remove roll pin using a pencil magnet or pointy nose pliers.

5. Remove three-piece first gear synchronizer blocking ring assembly from output shaft, remove second gear snap ring and thrust washer.



6. Remove second gear from output shaft. Remove 2nd gear needle bearing assembly and spacer. Disengage spiral snap ring from slot in output shaft using a small screw driver.

7. Remove spiral snap ring and thrust washer from



output shaft, remove three-piece 2nd gear synchronizer blocking ring assembly. Remove 1st/2nd synchronizer from output shaft.

8. Remove detent ball and spring from hub on output shaft.

*** The 1st/2nd speed synchronizer and hub is serviced only as an assembly, with the output shaft. Therefore, no attempt should be made to separate the hub from the shaft.**

The sleeve, springs and inserts may be removed from the hub after scratching or etching alignment marks on the hub and sleeve. The only parts that can be serviced are

the springs, inserts and detent ball and spring. If the hub or sleeve is worn or damaged, the output shaft and synchronizer must be replaced as an assembly.

Clean

Wash all parts except ball bearings, O-rings and seals in a suitable cleaning solvent. Brush or scrape all foreign matter from the parts, be careful not to damage any parts with the scraper. Do not clean, wash or soak transmission seals in cleaning solvents. Dry all parts with compressed air.

Rotate ball bearings in a cleaning solvent until all lubricant is removed. Hold bearing assembly to prevent it from rotating and dry it with compressed air. Lubricate bearings with Multi-Purpose Grease and wrap them in a clean, lint-free cloth or paper until ready for use.

Clean the magnet in the bottom of the case with kerosene or mineral spirits.

Inspect

Inspect transmission case for cracks, worn or damaged bearing bores, damaged bearing bores, damaged threads, or any other damage that could affect operation of the transmission. Inspect the front face of the case for small nicks or burrs that could cause misalignment of the transmission with the flywheel housing. Remove all small nicks or burrs with a fine file.

Replace any cover that is bent or distorted. Make sure that the vent hole in the cover is open. Check the condition of the shift levers, forks, shift rails, and the lever and shafts. Inspect ball bearings. Refer to 'Ball Bearing Inspection'.

Replace roller bearings that are broken, worn or rough, and check their respective races.

Replace the counter shaft (cluster) gear if the teeth are chipped, broken or worn. Replace the counter shaft if it is bent, scored or worn. Replace the reverse idler gear or sliding gear if the teeth are chipped, worn or broken. Replace the idler gear shaft if bent, worn or scored.

Replace input shaft and gear if the splines are damaged or if the teeth are chipped, worn or broken. If the roller bearing surface in the bore is worn or rough, or if the cone surface is damaged, replace gear and gear rollers.

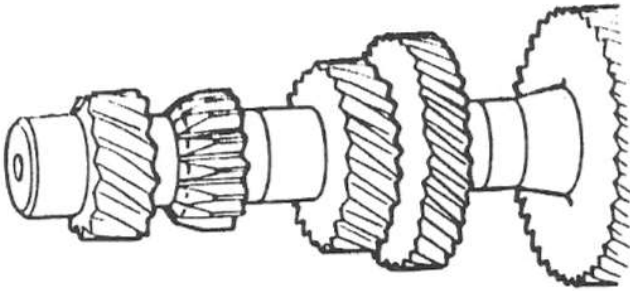
Replace all other gears that are chipped, broken or worn.

Check the synchronizer sleeves for free movement on their hubs. Make sure that the alignment marks (if present) are properly indexed.

Inspect the synchronizer blocking rings for widened index slots, rounded clutch teeth, and smooth internal surfaces (must have machined grooves). With the synchronizer blocking ring on the cone, the distance between the face of the synchronizer blocking ring and the clutch teeth on the gear must not be less than 0.5mm (0.020 inch).

5 SPEED SYNCHRONIZED MANUAL TRANSMISSION

Page 257



Replace speedometer drive gear if teeth are stripped or damaged. Be sure to install the correct size replacement gear.

Replace the output shaft if there is any evidence of wear or if any splines are damaged. Inspect bushing and seal in the extension housing, and replace if worn or damaged. The bushing and/or seal should be replaced after extension housing has been installed on the transmission.

Replace the seal in the input shaft bearing retainer, replace seals on the cam and shafts.

Transmission Case Inspection

If an aluminium transmission case thread is damaged, service kits may be purchased from local jobbers. To service a damaged thread.

Drill out the damaged threads, using same drill size as the thread OD.

Tap drilled hole. The tap is marked for the size of the thread being serviced. It cuts a thread large enough for the insert, and after the insert is installed the original thread size.

Select coil inserting tool. Place insert on the tool and adjust the sleeve to the length of the insert against the face of the tapped hole. Turn the tool clockwise and wind the insert in one-half turn below the face.

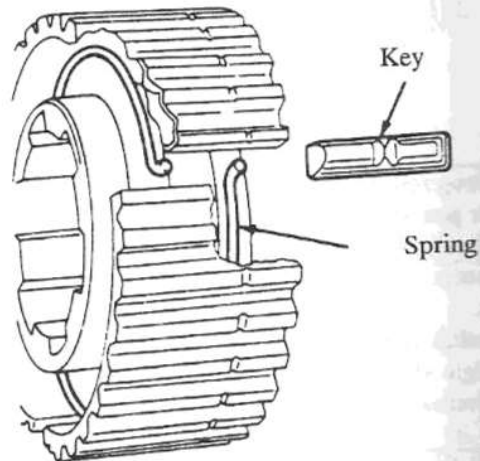
Working through the insert, bend the insert tang straight up and down until it breaks off at the notch. Position extractor tool in the insert so that the blade rests against the top coil one-fourth to one-half turn away from the end of the coil. Exert downward pressure on the tool and turn it counter clockwise until the insert is removed.

With insert on tool adjust sleeve to the length of the insert being used. Press the insert against the face of the tapped hole. Turn the tool clockwise and wind the insert

against the face of the tapped hole. Turn the tool clockwise and wind the insert into the hole until the insert is one-half turn below the face.

Assembly

1. Install detent ball and spring in 1st/2nd synchronizer hub on the output shaft.
2. Install 1st/2nd synchronizer assembly, and three-piece 2nd gear synchronizer, and three-piece 2nd gear synchronizer blocking ring assembly onto output shaft.



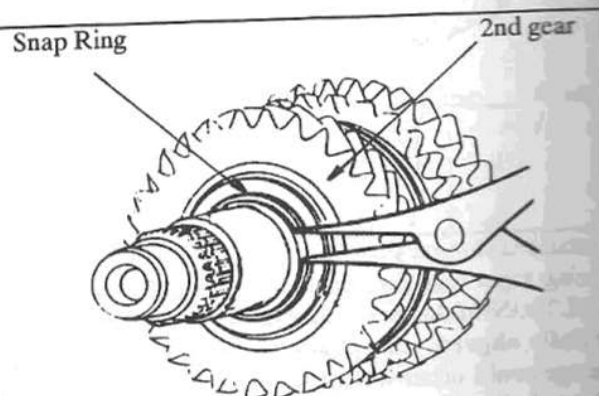
* Align slots in synchronizer blocking ring with tabs in 1st/2nd synchronizer.

For synchronizer assembly, refer to 'Synchronizer Dismantle and Assembly'.

3. Install thrust washer onto output shaft. Install spiral snap ring using Spiral Snap Ring Replacer, install 2nd gear needle bearing and spacer. Install second gear onto output shaft.

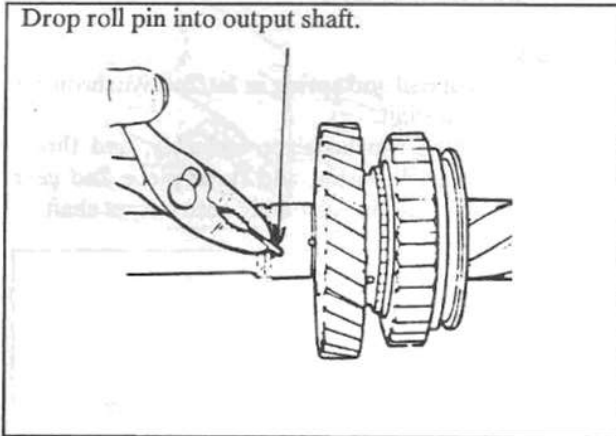
* Align slots in 2nd gear with tabs on synchronizer blocking ring assembly.

4. Install 2nd gear thrust washer and snap ring using snap ring pliers, install three-piece first gear synchronizer blocking ring assembly onto output shaft.



* Align slot in first gear synchronizer blocking ring with tab on 1st/2nd synchronizer.

Drop roll pin into output shaft.



5. Drop roll pin into output shaft.

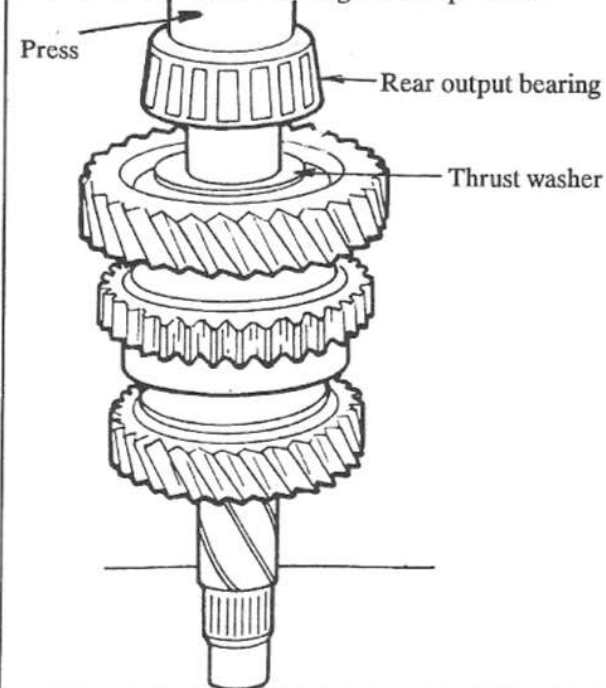
* Use pencil magnet if required.

While aligning notch in sleeve with roll pin, slide sleeve onto output shaft. Install needle bearing assembly over sleeve.

6. Install first gear onto output shaft.

* Align slots in first gear with tabs on first gear synchronizer blocking ring assembly.

Install first gear onto output shaft, thrust washer and install rear output shaft bearing onto output shaft



Install rear output shaft bearing onto output shaft. The bearing taper must face the rear of the shaft.

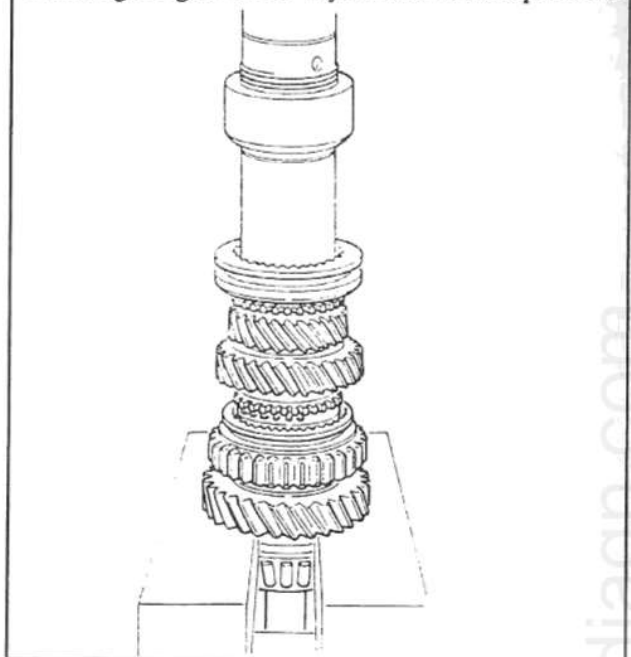
CAUTION: Make sure output shaft and gear splines are carefully aligned. If splines are improperly aligned, damage could occur when the gear is pressed onto the output shaft.

7. Lubricate fifth gear splines with petroleum jelly and place on output shaft. Using a press and a capped length of pipe, 31.75mm ID x 356mm (1-1/4 inch ID x 14 inch) press fifth gear onto output shaft.

8. With snap ring pliers, install fifth gear snap ring, install spacer and split needle bearing assembly onto output shaft.

9. Using a press and a 1-1/2 inch deep well socket, install 3rd/4th synchronizer blocking ring and third gear as an assembly.

Installing 3rd gear and 3-4 synchro on the output shaft



* Before pressing components together, make sure the synchronizer hub faces the short end of the output shaft. Hold 3rd gear against the synchronizer to maintain synchronizer blocking ring alignment.

Synchronizers

Dismantle

* The following operations apply to all synchronizer assemblies. The gear synchronizers are slightly different in design. Notation is made where procedural differences occur.

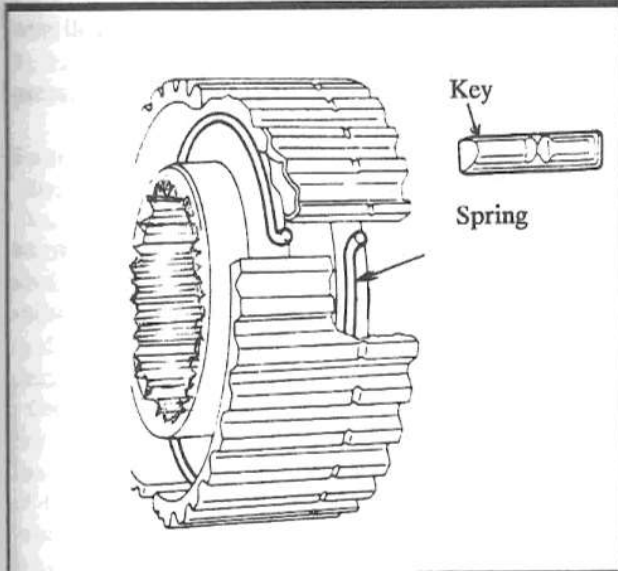
1. Scribe alignment marks on the sleeve and hub for assembly reference before dismantling the synchronizer.

2. On 5th gear synchronizer only, remove insert retainer. With a screw driver, remove the two synchronizer retaining springs. Remove the inserts.

* The 1st/2nd gear synchronizer is available only as an assembly with the output shaft. The synchronizer hub is pressed onto the output shaft with an interference fit; therefore, no attempt should be made to separate the hub from the shaft. The retaining springs, inserts, detent ball and spring are available for service. If the hub or sleeve

5 SPEED SYNCHRONIZED MANUAL TRANSMISSION

Page 259



is worn, the output sleeve is worn, the output shaft and synchronizer must be replaced as an assembly.

3. On the 1st/2nd gear synchronizer only, the synchronizer sleeve should be removed to prevent loss of the detent ball and spring.

Assembly

* When assembling a synchronizer sleeve and hub, match alignment marks made during disassembly. The sleeve and hub have an extremely close fit and must be held square during assembly to prevent jamming. Do not force the sleeve onto the hub.

1. Assemble the inserts and synchronizer retaining springs onto the sleeve and hub. The retaining springs engage the same insert but rotate in opposite directions.

2. On 5th gear synchronizer only, install the Reverse Blocking Ring into the synchronizer.

3. On the 1st/2nd gear synchronizer only, install the detent ball and spring into the hub on the output shaft.

Assemble retaining springs, inserts and sleeve onto hub. Refer to diagram for placing of the retaining springs and inserts.

Shift Cover

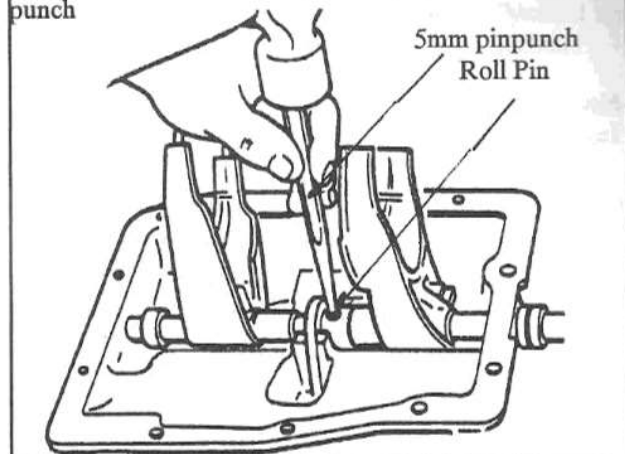
Dismantle

Mark forks for assembly, place selector arm plates and selector arm in the Neutral position. The gearshift selector arm plates should now be centred over the control selector arm.

Rotate shifter shaft anti clockwise. When the selector arm disengages from the selector arm plate, pull shifter shaft rearward. The selector arm roll pin will now be accessible. Remove selector arm roll pin using a 5mm diameter pin punch and remove the shifter shaft.

Pull shifter shaft out of cover using a twisting motion, remove shift forks, roll pin and shift interlock from shift cover.

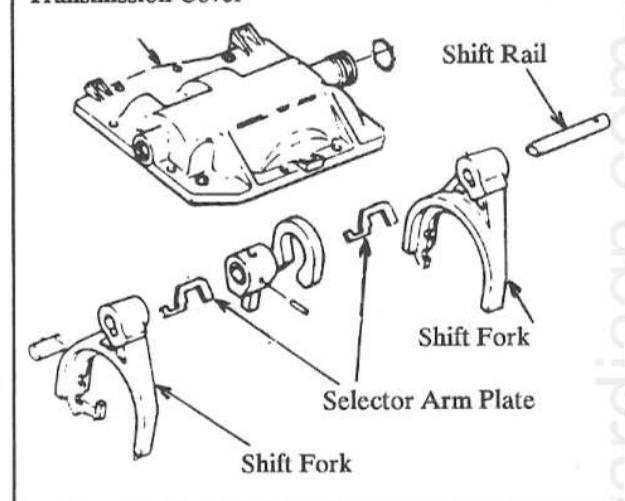
Remove selector arm roll pin using a 5mm diameter pin punch



Assembly

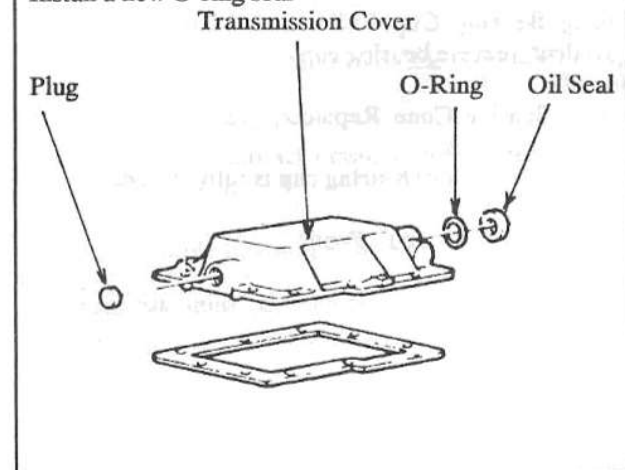
Install a new O-ring seal. If dismantled, assemble the shift forks, selector arm plates and nylon inserts.

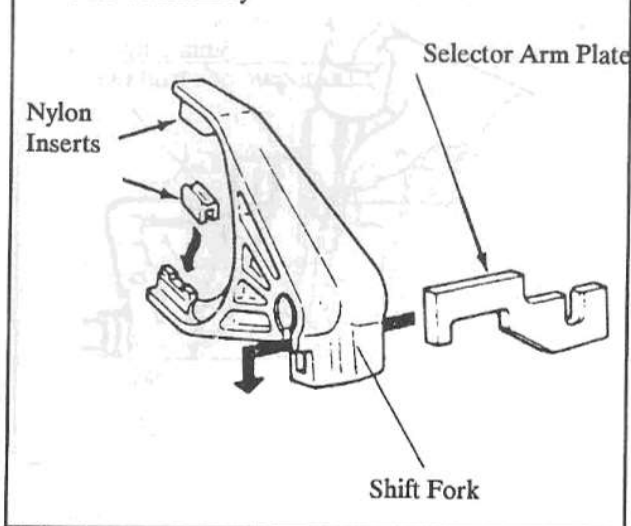
Transmission Cover



* The narrow side of the C-shaped selector interlock plate has to be positioned in the shift cover slot. The control selector arm roll pin hole has to be toward the rear of the cover.

Install a new O-ring seal



Shift Fork Assembly

Install control selector interlock plate as an assembly. Place shift forks in cover. Lubricate shifter shaft with petroleum jelly. Slide shaft through shift cover and shift components until it stops against the front of the cover.

*** The 1-2 shift fork is the larger fork, the shift fork offset is to face the rear of the cover. The 3-4 gear shift selector arm plate is to be placed under the 1-2 gearshift selector arm plate.**

CAUTION: Make sure the roll pin is installed slightly below the selector arm surface. Failure to countersink the roll pin may result in interference between the pin and the interlock plate during shifts.

Ensure flat on shifter shaft is facing upward and install the control selector arm roll pin using a 5mm pin punch.

Input Shaft Bearing**Remove**

Using a press and Pinion Bearing Cone Remover or equivalent, remove input shaft bearing.

Install

Using a press and a capped length of pipe, install input shaft bearing.

Input Shaft to Output Shaft Bearing Cup**Remove**

Using Bearing Cup Puller and Slide Hammer or equivalent, remove bearing cup.

Install

Using Bearing Cone Replacer, press bearing cup in input shaft pocket.

CAUTION: Ensure bearing cup is fully seated.

Bearing Retainer Seal, Front**Remove**

Remove bearing race and end play shim, using a screw driver, pry seal from bearing retainer.

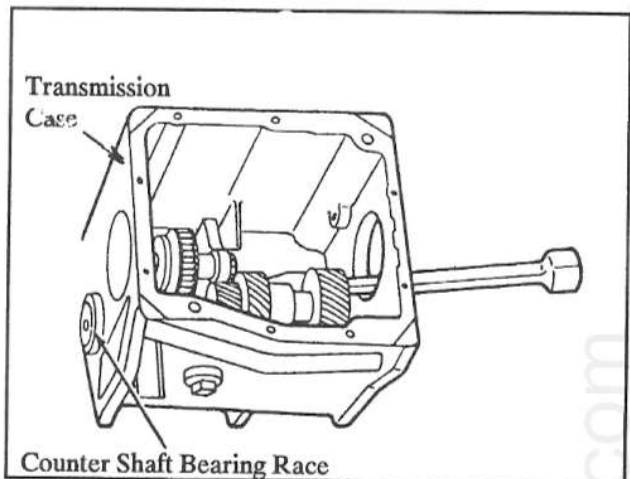
Install

Using Differential Slide Bearing Replacer install new seal. Install end play shim and bearing race.

*** If seal is being replaced as a part of a transmission overhaul, do not install the end play shim.**

Front Counter Shaft Bearing**Remove**

*** Remove front counter shaft bearing race if it is worn or damaged. If the bearing race is removed, Threadlock and Sealer or equivalent must be used during installation.**

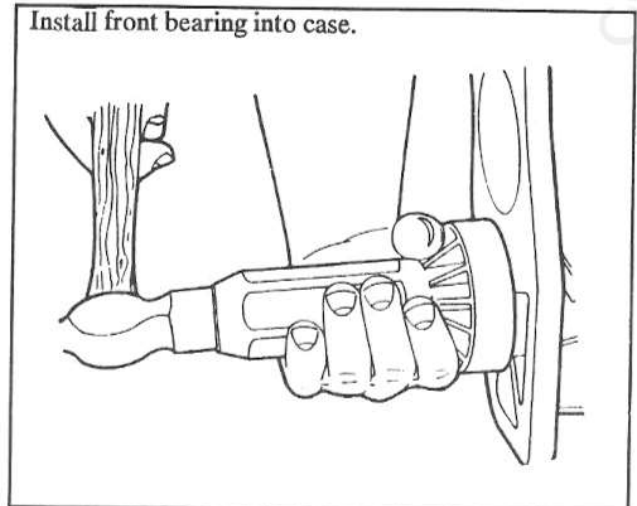


Using a press, remove: tube, main shaft front bearing replacers, counter shaft front bearing replacers and counter shaft front bearing replacer (assembled to support case) OR drift and hammer, remove bearing race with O-ring from case.

CAUTION: Failure to properly support the case will result in permanent distortion of case during bearing race removal.

Install

Install front bearing into case.



Install O-ring onto bearing race. Coat bearing race outside the diameter with Threadlock and Sealer or equivalent and place bearing race to case.

5 SPEED SYNCHRONIZED MANUAL TRANSMISSION

Page 261

With a Pinion Bearing Cone Replacer and Remover/Replacer Tube, support transmission case on press. Press bearing race until flush with case.

Bearing Inspection**Bearing Raceways****Inspect**

Inner Raceway: While holding outer ring stationary, rotate inner ring at least three revolutions. Inspect the raceway of the inner ring from both sides for pits or spalling. A bearing assembly should be replaced when damaged. Light particle indentation is allowable.

Outer Ring Raceway: While holding inner ring stationary, rotate outer ring at least three revolutions. Inspect the raceway of the outer ring from both as with the raceway of the inner ring. If the raceway is spalled or pitted, replace the bearing assembly. Light particle indentation is allowable.

Bearing External Surfaces

The bearing must be replaced if damage is found in any of the following areas:

Radial cracks on front and rear faces of outer or inner rings. Cracks on outside diameter of outer ring (particularly around snap ring groove). Deformation or cracks in ball cage (particularly around rivets).

Spin Test

Lubricate bearing raceways with a slight amount of clean automatic transmission fluid turn the bearing back and forth slowly until the raceways and balls are coated.

With bearing in vertical position. Vertical movement between inner and outer rings is allowable. Spin outer ring several times by hand. If there is roughness or vibration, the bearing should be cleaned again and relubricated. Roughness could be foreign particles in the bearing. If bearing is still rough after cleaning and relubricating several times, it must be replaced.

Repeat the above with the bearing in the horizontal position.

PROBLEM SOLVING**PROBLEM**

Transmission Noisy in Gear.

CAUSE

* Lubricate level low or wrong type.

ACTION

* Fill to bottom of filler plug hold with proper lubricant.

CAUSE

* Transmission to flywheel housing and flywheel housing to engine block bolts loose.

ACTION

* Tighten bolts to specification.

CAUSE

* Pilot bushing worn or damaged.

ACTION

Remove transmission. If noise is howling during start-up, check pilot bushing. Check for loose flywheel and housing alignment. Service or replace as required.

CAUSE

* Improper transmission pilot engagement into flywheel housing.

ACTION

* Replace housing or input shaft bearing retainer as required. Refer to 'Clutch'.

CAUSE

* Worn or damaged internal components.

ACTION

* Disassemble transmission. Inspect input, output and counter shaft bearings, gear and gear teeth for wear and damage. Service or replace as required.

PROBLEM

Transmission Shifts Hard.

CAUSE

* Improper clutch release.

ACTION

Refer to 'Clutch'.

CAUSE

* Internal shift mechanism binding.

ACTION

* Remove transmission and free up shift mechanism.

CAUSE

* Synchronizer sleeve to hub fit.

ACTION

* Remove and check for burrs or fit.

CAUSE

* Binding condition between input shaft and crank shaft pilot bearing.

ACTION

* Check alignment and service as required.

CAUSE

* Improper Fluid.

ACTION

* Drain and refill with Dexron 11D or equivalent to bottom of filler plug hole.

PROBLEM

Transmission Will Not Shift into One Gear - All Other Gears OK.

CAUSE

* Floor shift, interference between shift handle and console or floor cut out.

ACTION

* Adjust console or cut out floorpan to eliminate interference.

CAUSE

* Restricted travel of internal shifter components.

ACTION

* Remove transmission. Inspect shift rail and fork system, synchronizer system and gear clutch teeth for restricted travel. Service and replace as required.

PROBLEM

* Transmission is Locked in One Gear. It cannot be shifted Out of that Gear.

CAUSE

* Internal Shifter components worn or damaged.

ACTION

* Remove transmission. Inspect the problem gear or gearshift rails and fork and synchronizer for wear or damage. Service or replace as required.

CAUSE

* Selector arm finger broken.

ACTION

* Remove transmission. Replace selector arm assembly.

CAUSE

* Bent shifter forks at pads and selector slot.

ACTION

* Service or replace as required.

PROBLEM

Transmission Will Not Shift Into Reverse (All Others OK).

CAUSE

* Worn or damaged internal components.

ACTION

* Remove transmission. Check for damaged reverse geartrain, misaligned reverse relay lever, shift rail and fork system.

SPECIFICATIONS

TRANSMISSION

Type..... 5-Speed Manual
(Production option M78)

Borg Warner T5

Lubricant..... Dexron IID

Capacity..... 1.9 litres

Dry Capacity 2.05 litres

TRANSMISSION RATIOS : 1

1st 3.25 2.95

2nd 1.99 1.94

3rd 1.29 1.34

4th 1.00 1.00

5th 0.72 0.73

Reverse 3.15 2.76

NUMBER OF TEETH

	V6	V8
Maindrive Gear	23	24
Main Gear: 1st	33	32
2nd	31	33
3rd	27	30
5th	25	31
Reverse	32	32
Cluster Gear Drive Gear	34	31
Cluster Gear: 1st	15	14
2nd	23	22
3rd	31	29
5th	51	55
Reverse	15	15
Reverse Idler Gear	20	20

GEAR END FLOAT

1st Speed Gear	0.18 - 0.33 mm
2nd Speed Gear	0.23 - 0.66 mm
3rd Speed Gear	0.23 - 0.58 mm
5th Gear Drive Gear	0.25 - 0.99 mm
Cluster Gear	0.013 - 0.102 mm

Torque Wrench Spec's Nm

Drain Plug	27 - 40
Filler Plug	27 - 40
Cluster Gear Rear Bearing Retainer Bolt	20
5th/Reverse Shift Lever Pivot Pin	48 - 68
Back Up Lamp Switch	20 - 27
Case Cover to Transmission Case Attaching Bolt	8 - 15
Transmission Extension to Transmission Case Attaching Bolt	40 - 60
Maindrive Gear Bearing Retainer Bolt	15 - 20
Control Housing Attaching Bolt	15 - 20
Control Lever to Control Housing Lever Screw	17 - 27
Transmission Case to Clutch Housing Bolt	70 - 84
Propeller Shaft Rear Universal Joint Flange to Pinion Flange Bolt	55 - 65
Centre Bearing Carrier to Underbody Reinforcement Attaching Bolt	20 - 25
Engine Front Exhaust Pipe to Catalytic	30 - 50
Converter Bolt	30 - 50