Chapter Ⅲ Transmission system

Section Ⅰ Clutch

I. Mechanical part

Lifan 520 range of car uses traditional clutch (Figure 3-1) with separately replaceable parts，which locates between the engine and manual transmission in the transmission outer race. The clutch system is made up of following parts:

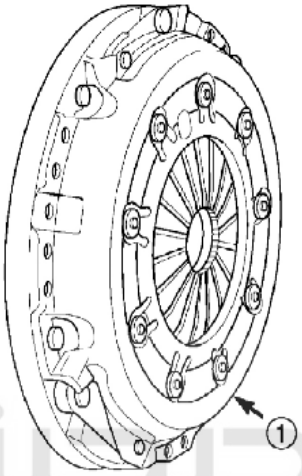


Figure 3-1 Clutch assembly

1- Clutch assembly

·Flywheel
·Clutch disk
·Pressure plate
·Diaphragm spring
·Cover

II. Hydraulic part

Clutch hydraulic system is a standalone system including master/slave cylinder assembly and oil reservoir (Figure 3-2).

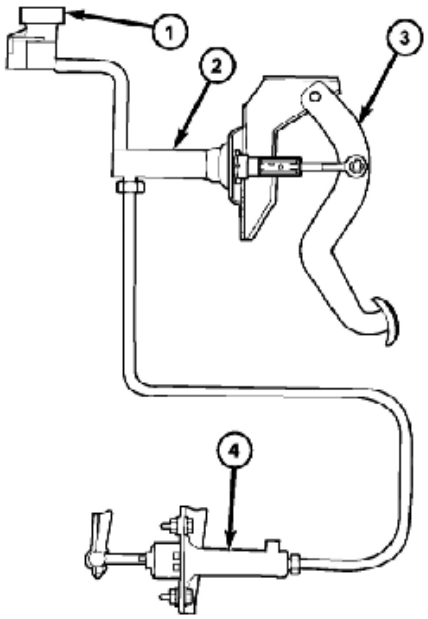


Figure 3-2 Clutch hydraulic system – typical

1-oil reservoir 2-master cylinder 3 - pedal assembly 4- slave cylinder

Clutch hydraulic fluid

Warning: no petroleum base oil (engine oil, transmission oil, power steering oil. etc.) shall be used for clutch hydraulic system as it will damage the seal of master/slave cylinder and disable the hydraulic clutch release system.

Note: as the clutch hydraulic system and replaceable parts has been filled up in advance, it is not necessary to refuel it under normal operation.

For clutch hydraulic system, designated brake oil subject to DOT 4 technical standard shall be used. It is recommended not to use other model of oils.

III. Operation

Clutch hydraulic system plays a role in engaging or disengaging the clutch. Step on the clutch pedal, the oil pressure of clutch master cylinder will be increased and transmitted to the slave cylinder via the connecting tube, then the slave cylinder controls the release lever (Figure 3-2).

The slave cylinder spring enables the release lever to disengage bearing and diaphragm spring (release bearing) (release bearing preloading). When the clutch pedal is working, the hydraulic fluid applies an extra force on the release lever. As with the applied extra force, the bearing press inwards the diaphragm spring clamp on the shaft so that the pressure plate moves backward and release the clamping force on the clutch disk (Figure 3-3).

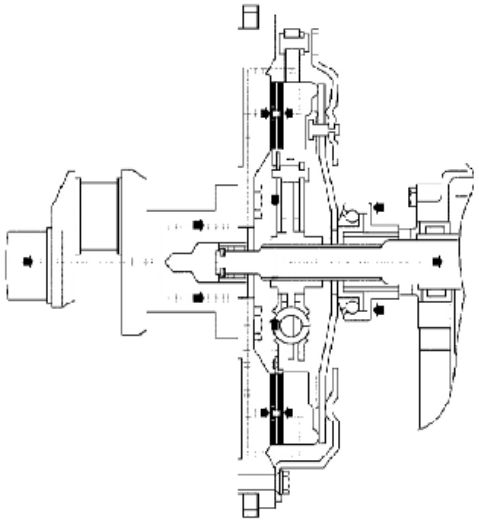


Figure 3-3 Schematic diagram of clutch

V. Diagnosis and testing

Diagnosis and testing —clutch system

Clutch troubleshooting generally refers to determining the type of failure through road testing and check parts and components to figure out the problem. During road testing, drives the car at normal speed, shift gears and observe the clutch action. In case the clutch shudders, slips or is disengaged incompletely, disassembly and check clutch components. In the event that there's noise or it is hard to shift gears, make further diagnosis. In effect, the transmission or other transmission parts may be out of action.

Diagnosis —clutch shudder

Failure	Possible cause	Troubleshooting
Oil stain is left on the cover facing side of clutch disk.	Oil leakage on the rear oil seal of engine or oil seal of transmission input shaft	Replace oil seal and clutch assembly
	There too much oil on the spline of clutch disk and input shaft	Clear away the oil on spline and apply a thin layer of oil.
No failure of clutch parts is detected.	Involving the suspension or transmission in fact	Make further diagnosis and check the mounting and suspension connectors of engine/transmission and other transmission parts
	There's something wrong with the engine	Check the fuel injection system and ignition system
The clutch disk is engaged.	Clutch cover, spring or release lever are bent and deformed (rough operation and improper assembly)	Replace the clutch assembly
	Clutch disk is broken or deformed.	Replace the clutch assembly
	Clutch is in disalignment.	Confirm the alignment of module clutch guide plate and crankshaft, in case guide plate is loose or bent, replace the clutch assembly

Diagnosis－clutch slipping

Failure	Possible cause	Troubleshooting
The clutch disk is worn on the surface	Normal wear	Replace the clutch assembly
	The driver controls (semi-engage) the clutch frequently resulting in faster wear and overheat.	Replace the clutch assembly
	The diaphragm spring for clutch cover is in sufficient tension.	Replace the clutch assembly
There's oil stain in clutch disk	The rear oil seal of engine or oil seal of transmission input shaft leaks.	Replace oil seal and clutch assembly
	Too mush oil is applied on the input shaft	Apply little oil on the input shaft and replace the clutch assembly
	Mud water penetrates the casing.	Wash the seal casing and check the clutch assembly
The clutch is disengaged locally when operating.	The release bearing is coarse or adhered and can not return to normal service position.	After confirming the adhesion of bearing, replace it; in the event that the bushing is damaged on the surface, replace the retaining ring for fore bearing of transmission.
	The release rod of clutch master cylinder is adjusted improperly and it generates high preload (LHD)	Make sure the release rod is adjusted properly.
	The slave cylinder is adhered.	Replace the slave cylinder
There's crack on the surface of clutch disk	Rear oil seal of engine or oil seal of transmission input shaft leaks.	Replace oil seal and clutch assembly
	Slipping and overheating	Replace the clutch assembly

Diagnosis － Incomplete disengagement of clutch

Failure	Possible cause	Troubleshooting
The clutch disk is adhered to the input shaft spline	The clutch bush spline is broken down in installation.	Clean, polish and lubricate the clutch disk and shaft spline, Replace the clutch assembly /in case the spline is damaged seriously, replace the input shaft
	The input shaft spline is coarse or damaged.	Wash the input shaft spline before lubrication
	The spline of input shaft and clutch disk is rusted.	Wash the input shaft spline and clutch disk spline before lubrication
The clutch disk along with flywheel and/or pressure plate is rusted.	The vehicle is stored and out of service for long time, out of use for long time after gas cleaning as well.	Replace the clutch assembly
The clutch is disengaged incompletely.	The clutch disk warped is warped and deformed during installation of transmission	Replace the clutch assembly
	The diaphragm spring of clutch cover is broken down during installation of transmission	Replace the clutch assembly
	The release lever is warped, loosened or damaged.	Replace release lever
	The master cylinder or slave cylinder of clutch leaks	Check and replace master cylinder or slave cylinder
	The adjustable release rod for master cylinder of clutch is loosened or damaged (LHD)	Check and screw down adjustment pieces or replace master cylinder
	The release rod of master cylinder shall not cover the pedal pin	Check the release rod and lining and replace them as the case may be.

Diagnosis －Noise from clutch pedal

Failure	Possible cause	Troubleshooting
When slamming the clutch pedal, squeak occurs.	The pedal bushing is worn or lubrication is improper.	Replace or lubricate bushing
	The return spring of clutch pedal return or return spring bushing is worn.	Lubricate or replace return spring and/or bushing
	The release lever pivot of clutch is not lubricated properly.	lubricate or replace clutch release lever

Diagnosis and testing －clutch shudder

For the failure of clutch shudder, take following steps:

(1) Check the engine and transmission mounting for any looseness, disalignment or crack; in case any is discovered, troubleshooting shall be performed in time. Test run and check if shudder still occurs; if it has been eliminated, then no more further check is required.

(2) In case shudder still occurs, check the function of release system of hydraulic clutch.

(3) Check the transmission system for any loose connection and troubleshoot and confirm if clutch shudder has been eliminated, if yes, then:

(a) Remove the transmission;

(b) Check if the release bearing is adhered and replace the bearing as the case may be;

(c) Check pivot and fork to see if they are worn seriously and replace worn parts;

(d) Check the clutch assembly for any oil stain and replace the clutch assembly as the case may be;

(e) Check if the bush and spline of clutch disk are broken down and replace the clutch assembly as the case may be;

(f) Check if the spline of input shaft is broken down and replace it as the case may be;

(g) Check if the clutch is worn to be uneven;

(h) Check the diaphragm spring clamp of clutch cover to see if it is broken down and replace the clutch assembly as the case may be.

Diagnosis and testing －disalignment of transmission plate

There’re following common causes for disalignment:

·Thermal warping

·The transmission plate is installed on the dirty flange of crankshaft.

·Bolts are crew down in improper manners

· The transmission plate on the crankshaft shoulder locates improperly.

·Crankshaft bolt is loosened.

Before the installation of transmission plate, clean the crankshaft flange first because the dust and oil stain on the flange may causes disalignment of flywheel and consequently excessive judder. To fix the transmission plate and crankshaft, new bolts shall be used. Bolts for transmission plate shall be screwed down in specified moment. In the event that they are screwed too tight, transmission plate hub will deform resulting in excessive bump.

Diagnosis and testing － Reverse collision

T350 manual transmission is equipped with reverse brake for the purpose of preventing collision at reverse gear but only before the movement of vehicle.

(1) Step on the clutch to the maximum extent and hold it, then shift to reverse gear in 3 seconds. In case of collision, the clutch takes too much time to rotate and reverse brake is out of action.

(2) Remove the transmission shaft.

(3) Check the input shaft spline, clutch disk spline and release bearing to ensure no rust corrosion and derusting them by applying a thin layer of bearing grease on the input shaft spline and oil applying is only limited to the slipper of clutch disk. Make sure the clutch disk slides along the input shaft spline.

(4) Check the clutch disk hub to see if there's any damage and replace the clutch assembly as the case may be.

(5) Check the input shaft, and see if there's any damage and replace it as the case may be.

(6) Check the diaphragm spring in clutch cover to see if there's any crack.

(7) Reassemble the clutch assembly and transmission.

Standard process —Deflation of clutch hydraulic pipeline

Note: in case the clutch hydraulic release system loses excess oil, air will penetrate into the pipeline and shall be discharged because if there's air in the system, the pedal will feels like soft or the clutch is disengaged incompletely. In case of failure of deflation with this process, clutch master cylinder and slave cylinder assembly shall be replaced.

Step on the clutch pedal for 60-100 times at the driver seat to verify how the clutch pedal feels like. If the pedal is still felt soft or the clutch can not be disengaged completely, there's excess air in the system and take the following steps:

(1) Verify the oil level in the oil reservoir of clutch master cylinder and refill DOT4 brake oil as the case may be.

(2) Hoist the vehicle.

(3) Remove the slave cylinder assembly (Figure 3-4) of clutch from the transmission case, don't separate it with the system and allow the slave cylinder to suspend to make it below the system.

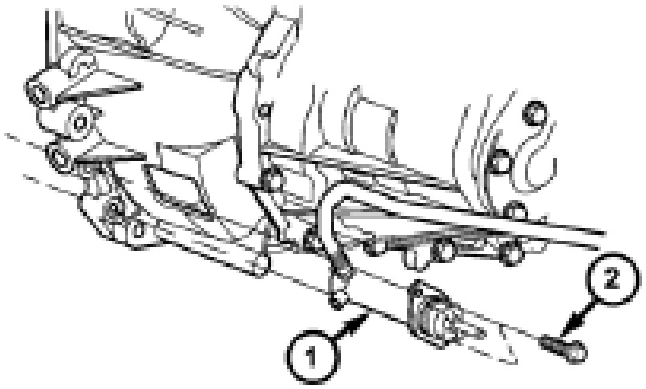


Figure 3-4 TRITEC1.6L slave cylinder for clutch r

1- Slave cylinder 2-Bolt

Warning: To remove the slave cylinder from the transmission, don't use the master cylinder of clutch, or it will damage the slave cylinder.

(4) Press the release rod of slave cylinder to the maximum extent and release it, repeat it for at least ten times to exhaust air in the system.

(5) Reassemble the 1.6L slave cylinder: screw down bolts to 12Nm (105 in. lbs.)

(6) Lay down the vehicle.

(7) Check and adjust the oil level in master cylinder of clutch. Step on clutch pedal for 30 times for verification. In the event that it feels that the pedal is still not so hard or the clutch can not be disengaged completely, it indicates there's too much air in the system and repeat step 3-7 to exhaust air. In case the air exhaustion fails for several times, replace the master cylinder and slave cylinder assembly of clutch.

(8) Raise the vehicle.

(9) Lower the vehicle.

(10) Refill the master cylinder of clutch with DOT3 brake oil as the case may be.

Technical parameters

Clutch/hydraulic device / pedal

Name	N·m	Ft. Lbs.	In. Lbs.
Brake/clutch pedal, supercharger and fender screw cap	34		300
Brake /clutch pedal assembly and dash board	34		300
Clutch cover and flywheel bolt	29		250
Clutch pedal pivot screw cap	42	31	
Damper and transmission bolt	24		215
transmission plate and crankshaft bolt	95	70	
Flywheel and crankshaft bolt	95	70	
Adjusting screw of release rod for master cylinder	6		55
Module clutch and transmission plate bolt	88	65	
Retaining screw cap for master cylinder (LHD)	15		130
Retaining screw for master cylinder oil reservoir (RHD)	3		24
Slave cylinder and transmission (1.6L)	12		105
Fixing bolt for transmission and engine	95	70	

Clutch disk and pressure plate

Disassembly

(1) remove transmission (See Transmission -Disassembly).

(2) Mark the flywheel as pressure plate with paint or stylus for the convenience of assembly.

(3) Screw off the 6 bolts to fix pressure plate and flywheel and remove pressure plateand clutch disk (Figure3- 5).

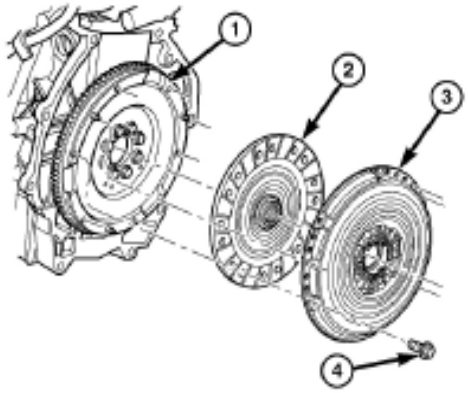


Figure 3-5 Clutch plate and pressure plate

1-Flywheel 2-clutch disk 3-pressure plate 4-bolt (6)

(4) Screw off the 8 bolts to fix crankshaft and flywheel and remove the flywheel (Figure 3-7).

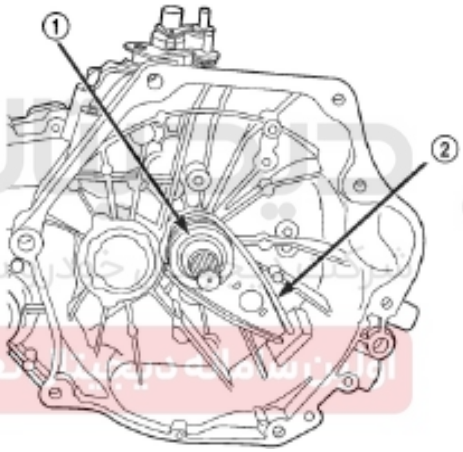


Figure 3-7 Clutch release bearing and lever

1 – clutch release bearing 2 – lever

(5) Check the release lever and bearing (Figure 3-7). Replace them as the case may be (see Clutch/Clutch Release Bearing -Disassembly).

Assembly

(1) Check the clutch release bearing and lever for any abnormal wear and replace them as the case may be (Figure 3-7).

(2) Wash the surface of flywheel and pressure plate to ensure no oil and rust stain.

(3) Confirm there’s no dirty and oil stain on the crankshaft flange. Mount the flywheel on the engine crankshaft (Figure 3-6).

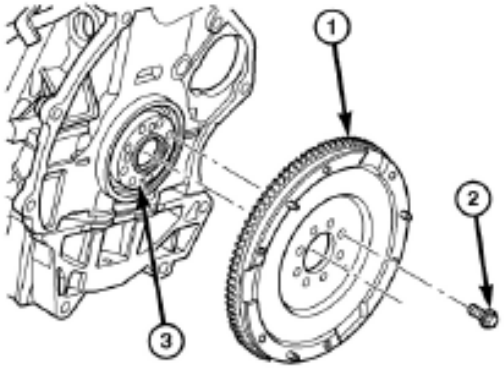


Figure 3-6 Flywheel and crankshaft

1-Flywheel 2-bolt (8) 3-crankshaft flange

(4) Mount the flywheel and screw on bolts for crankshaft to 95Nm (70 ft. lbs.).

(5) Apply a thin layer of grease to the spline of clutch disk hub.

(6) Mount the clutch disk on the flywheel and make sure the side with FLYWHEEL SIDE towards the flywheel.

(7) Assemble the clutch pressure plate on the flywheel and clutch disk (Figure 3-5) and screw down the 6 bolts for pressure plate and flywheel manually.

(8) Align the clutch disk against the flywheel center (Figure 3-8) with clutch aligning tool.

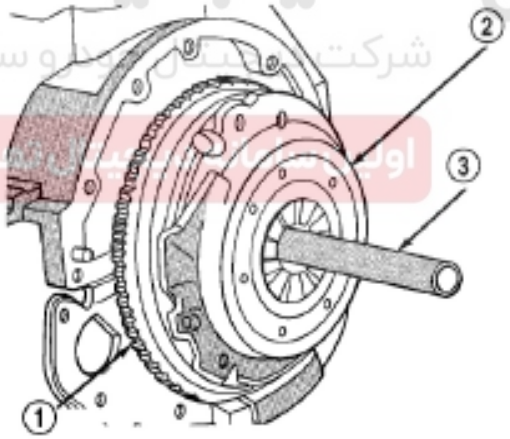


Figure 3-8 Typical method for aligning clutch disk

1-Flywheel 2-pressure plate 3-clutch disk aligning tool

(9) Screw the pressure plate bolt for several turns and screw it down evenly. The bolt must be screwed down evenly to the specified moment in case of deformation.

(10) Tighten the pressure plate and flywheel bolt in cross way to 28Nm (250 in. lbs.) and take off the clutch disk aligning tool.

(11) Apply a thin layer of MoparHigh Temperature Bearing Grease (high-temperature bearing grease) or similar grease to clutch disk hub and transmission input shaft spline.

Warning: don’t apply too much grease to the shaft spline, or it will contaminate the clutch disk.

(12) Assemble the transmission (see transmission - Assembly).

Clutch release bearing and lever

Instruction

Traditional release bearing is used to engage or disengage the clutch pressure plate. The clutch release bearing is mounted on the transmission fore-bearing retainer for bearing connection and operate with release lever (Figure 3-9) which moves the bearing to contact the clutch cover diaphragm spring.

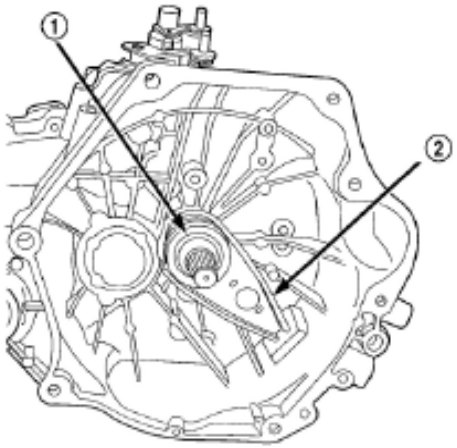


Figure 3-9 Clutch release bearing and lever

1 - release bearing 2 – lever

Operation

The release bearing is controlled through the release lever which moves the bearing to contact the clutch cover diaphragm spring with the force from slave cylinder. As the force is applied, the bearing compress the diaphragm spring clamp inwards to move back the pressure plate and release the locking force against clutch disk. When the pedal is released, the hydraulic pressure on clutch is released and then the release bearing leaves the diaphragm spring enabling the pressure plate to apply clamping force to clutch disk.

Disassembly

(1) Remove the transmission from the vehicle (see transmission -Disassembly).

(2) Remove module clutch assembly (if any).

(3) Move the lever and bearing to upright position (Figure 3-9) and hold the release lever in pivot hole with hands， then pull it with steady force to get it out of the pivot. It is not allowed to use screwdriver or crow bard to take out the lever because it may damage the spring clinch on the lever.

(4) Remove the lever from the bearing thrust plate as a unit. Take care, don’t’ breakdown the fastener on bearing.

(5) Check the condition of bearing which shall be pre-lubricated and sealed but not soaked in oil and solution.

(6) Hold the bearing and it will turns smoothly with little thrust force. In the event that the bearing rotates unsmoothly or with noise, replace it with a new one.

(7) Check the pivot spring clinch behind the clutch lever. If the spring clinch is broke down or deformed, replace the clutch lever.

Assembly

(1) Before assembly, pivot hole and lever arm should be lubricated with lubricating grease.

(2) Mount the lever on the bearing on which the stud shall bypass the lever arm.

(3) Enable bearing and lever assembly to slip into input shaft bearing cage (Figure 3-9).

(4) Clip the clutch lever on pivot knob.

(5) Assemble module clutch assembly (if any).

(6) Assemble the transmission assembly (see transmission -Assembly).

Flywheel

Instruction

Lifan 520 engine uses traditional flywheel assembly and the flywheel is an integral rotator fixed behind the crankshaft (Figure 3-10). The flywheel is also equipped with an integral starter ring gear.

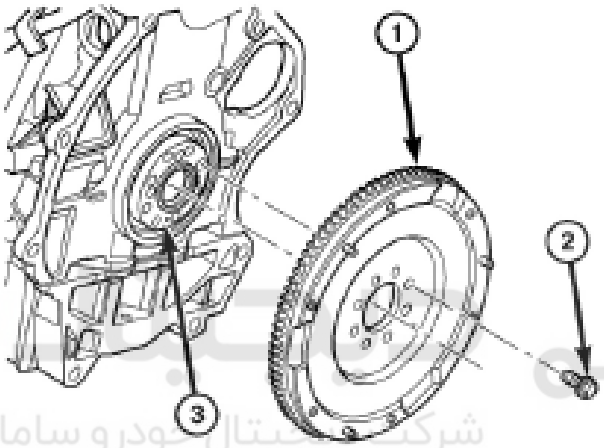


Figure 3-10 Flywheel and crankshaft

1-Flywheel 2-bolt (8) 3-crankshaftflange

Operation

Flywheel is used to cushion the ignition pulse of engine. The weight of flywheel relative to the rotating mass of engine parts is applied to hold the remaining energy of transmission system. The crankshaft tends to vary in speed with the ignition pulse of cylinder. When the crankshaft accelerates, the flywheel will absorb energy to cushion impact; when the crankshaft decelerates, the flywheel will release energy to make it return to the system.

Disassembly

(1) Remove the transmission (see transmission -Disassembly).

(2) Remove clutch pressure plate and clutch disk (see clutch-clutch disk -Disassembly).

(3) Screw off 8 bolts for flywheel and crankshaft and remove the flywheel assembly (Figure 3-10).

Assembly

(1) Clean the surface of flywheel and the pressure plate to ensure no oil crust and rust stain.

(2) Assemble and screw down the flywheel and crankshaft bolts to 95Nm (70 ft. lbs.) (Figure 10).

(3) Assemble clutch pressure plate and panel (see clutch-clutch disk -Assembly).

(4) Assemble the transmission assembly (see transmission -Disassembly).

Master cylinder

Instruction

Clutch master cylinder is assembled on the front bulkhead (Figure 3-11). The master cylinder is made up of adjustable release rod, piston, cylinder body, connecting hose and a slave cylinder (Figure 3-12).

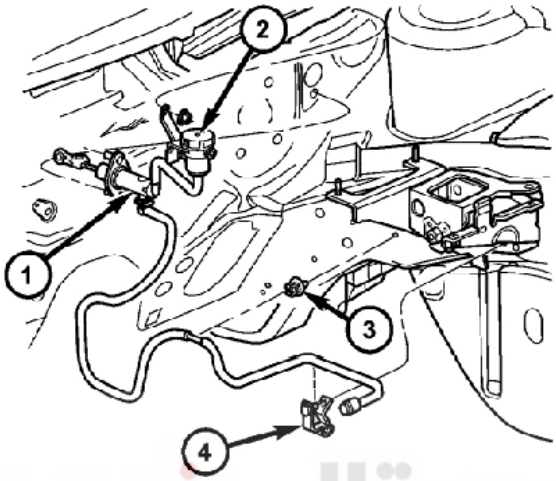


Figure 3-11 Clutch master cylinder

1-master cylinder 2-oil reservoir 3-clamp 4-clamp

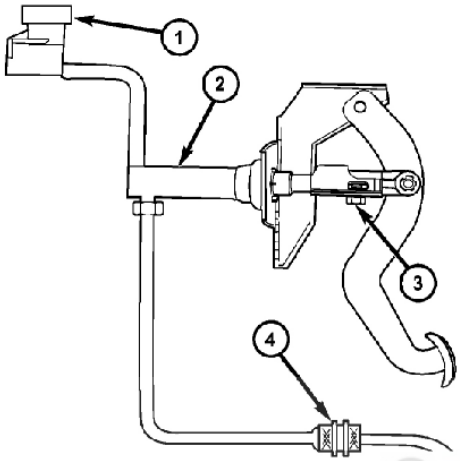


Figure 3-12 Clutch master cylinder

1-oil reservoir 2-master cylinder

3- adjusting bolt 4- quick coupler

Disassembly

Note: Pre-fueling is required before replacing the master cylinder. In this case, no refueling or system deflation is required in the process, unless under the condition of excess loss of oil in the hydraulic system or air penetration into the master cylinder.

(1) Remove the air cleaner assembly (Figure 3-13).

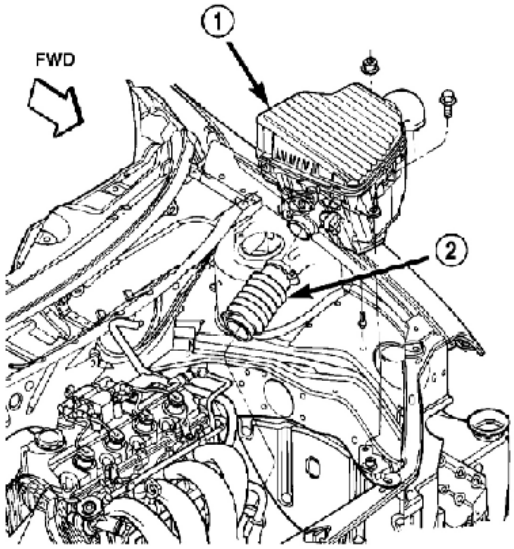


Figure 3-13 Disassembly and assembly of air cleaner assembly

1- air cleaner assembly 2-throttle body pipe

(2) Remove the battery negative terminal.

(3) Remove the slave cylinder from the transmission (Figure 3-14 and Figure 3-15).

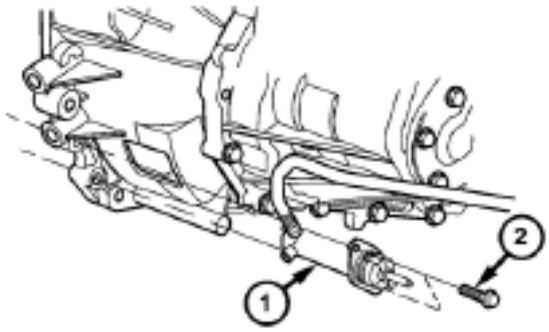


Figure 3-14 Clutch slave cylinder on the transmission

1- slave cylinder 2-bolt

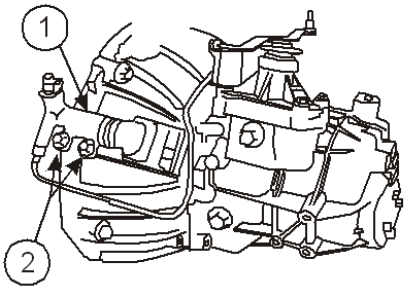


Figure 3-15 Clutch slave cylinder on the transmission

1- slave cylinder 2-bolt

(4) Remove hydraulic hose from the transmission shell (Figure 3-18).

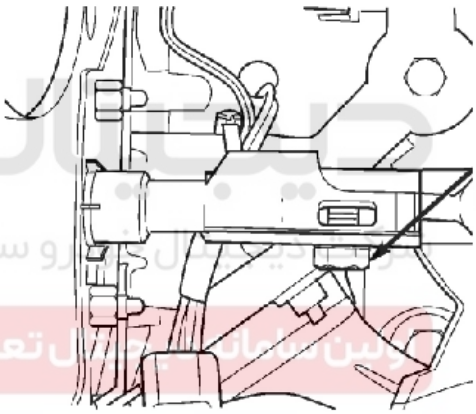


Figure 3-18 Release rod adjusting screw for the clutch master cylinder

1 – adjusting screw

(5) Remove the lower dash board (Figure 3-16).

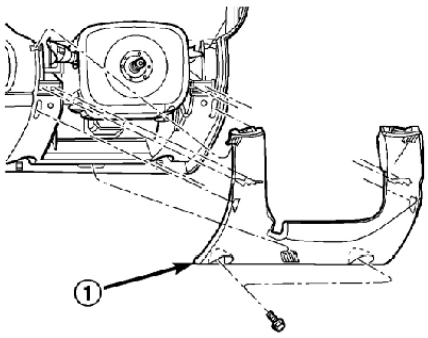


Figure 3-16 Lower cap of steering column

1 – lower cap

(6) Pick off the clip and pull out supercharger input lever from brake pedal (Figure 3-17).

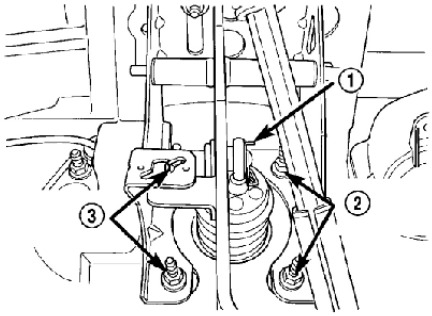


Figure 3-17 Brake supercharger fixing screw cap

1-clip 2-supercharger fixing screw cap 3-supercharger fixing screw cap

(7) Screw off fixing nuts for brake supercharger (Figure 3-17).

(8) Slip forward the supercharger and remove clutch master cylinder.

(9) Remove clutch master cylinder from the clutch pedal and check the plastic release rod snap ring. In case of any damage (crack), it is requisite to replace the snap ring.

(10) Screw off 2 fixing screw caps for clutch master cylinder.

(11) Remove autostyly joint support.

Warning: take care to remove clutch master cylinder from the engine because careless operation will causes damage to the hydraulic hose and improper disengagement of clutch after the assembly.

(12) Remove the master cylinder from the installation location and take off the hydraulic hose carefully from the engine (Figure 3-18). In case it is hard to remove such system from the vehicle, cut off the hydraulic hose for master cylinder and separate the system into two parts.

Assembly

(1) Assemble the master cylinder on front bulkhead and lay hydraulic hose under the cover in disassembly sequence.

(2) Assemble the autostyly joint support.

(3) Screw the fixing screw cap for master cylinder on the master cylinder bolt and screw it down to 11Nm (100 in. lbs.).

Warning: Check the clutch master cylinder release rod to ensure no damage.

(4) Lift up the vehicle.

(5) When the master cylinder is replaced, install the spare replaceable slave cylinder. When using the used master cylinder, then install the slave cylinder as shown in Figure 14 and 15.

(6) When the master cylinder is replaced, connect the hydraulic hose for master cylinder to the spare replaceable slave cylinder pipe. A tinkle will be heard. Pull the master cylinder pipe to confirm good connection.

(7) Lay down the vehicle.

(8) Release the release rod adjusting screw (Figure 3-18).

(8) Mount the release rod on the pedal pin.

(9) Release the clutch pedal slowly to hold the upper stop switch completely and screw down the adjusting screw to 6Nm (55 in. lbs.).

(10) Install an air cleaner.

(11) Step on and release the clutch pedal for at least 10 times to exhaust air in the system into the oil reservoir. In the event that residual air stays in the system, discharge air in the clutch system (see Clutch-Standard Process).

(12) Connect to the battery negative terminal.

(13) Refill the clutch master cylinder with DOT4 brake oil in the oil reservoir.

(14) Verify if the clutch functions well.

Slave cylinder

Instruction

The clutch slave cylinder is consisted of hydraulic piston, cylinder, oil seal and return spring.

Disassembly

(1) Lift up the vehicle.

(2) Screw off fixing bolt for slave cylinder (Figure 3-19 and Figure 3-20).

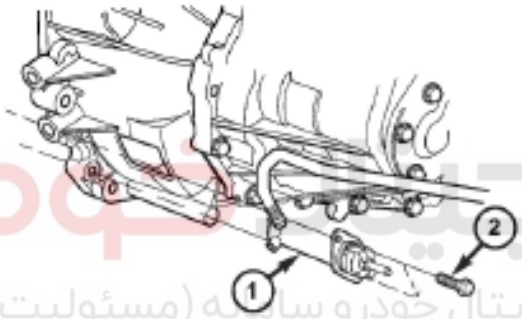


Figure 3-19 Clutch slave cylinder on the transmission

1- slave cylinder 2-bolt

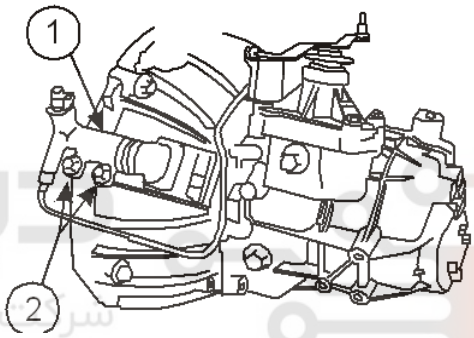


Figure 3-20 Clutch slave cylinder on the transmission

1- slave cylinder 2-bolt

(3) Remove slave cylinder from the transmission and separate the hydraulic hose to make brake oil flow into proper container.

Assembly

(1) Mount the slave cylinder on the transmission (Figure 3-19 and Figure 3-20).

(2) Screw down slave cylinder and transmission bolt to19Nm (168 in. lbs.).

(3) Mount the clutch hydraulic hose on the slave cylinder.

(4) Lay down the vehicle.

(5) Confirm the oil reservoir is fully filled with oil and refill it with DOT4 brake oil as the case may be.

(6) Exhaust air in the clutch hydraulic system.

(7) Verify the clutch release system for normal function.

Section Ⅱ Transmission

The vehicle introduces a 5-gear constant mesh manual transaxle. All gears are synchronized, except the reverse gear for which brake and snap ring are used so that it is easier to shift gears. The reverse idler gear is assembled on the spool idler gear shaft. The transaxle is a die-casting aluminum casing with steel end plate bearing cap in two pieces divided in the middle. (Figure 3-21).

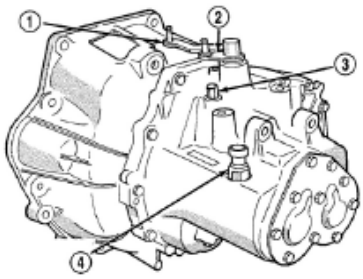


Figure 3-21 T350 Manual transaxle

1-Shift lever 2-Switching lever 3-Breather 4-Backup light switch

For transaxle, internal parts can only be maintained after disengaging the gear box via outer race.

Warning: the transaxle output shaft shall be maintained as an integral component. Don't assemble and disassemble it, or it will damage the transmission.

Identification of transaxle

The model, assembly number and date of production of transaxle are printed on the metal ID tag which is mounted on the transaxle end plate (Figure 3-22). All the information is also shown in the bar code tag in the front of transaxle (Figure 3-23).

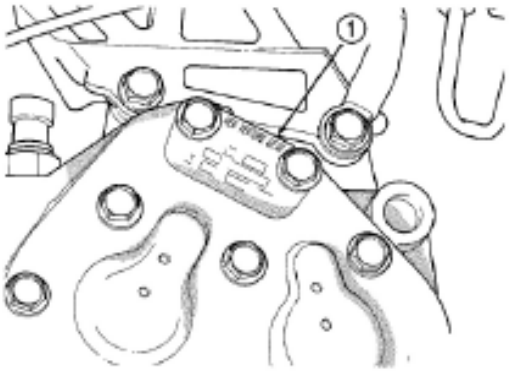


Figure 3-22 Metal ID tag

1- Metal ID tag

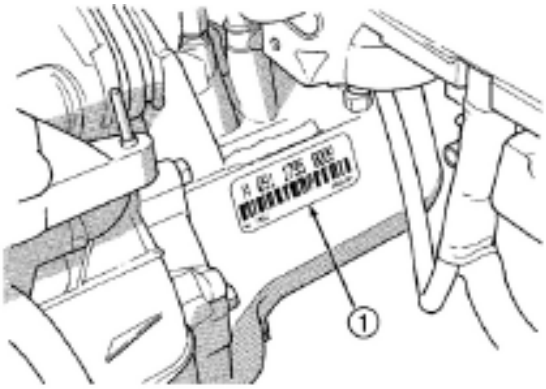


Figure 3-23 Bar code tag

1- Bar code tag

Note: in different vehicles, different final gear ratio is applied to the transaxle. Therefore, to order spare parts, correct assembly number of transaxle is required.

Gear ratio

Warning: all gears and shafts shall not be exchanged with other transaxle, or they will fail to run properly.

The differential gearing supported by taper roller bearing and in traditional array. The final output gears rotate the ring gear and differential assembly as well as drive shaft finally.

As for the gear ratio for every transaxle, see the following table.

Gear	T350	5T16	H311.5A
Gear 1	3.50	3.182	3.181
Gear 2	1.95	1.895	1.842
Gear 3	1.36	1.250	1.333
Gear 4	0.97	0.909	0.917
Gear 5	0.81	0.703	0.750
Final gear ratio	3.94	3.083	3.142
Clutch release system	Hydraulic	Hydraulic	Mechanical
Lubricating oil	Automatic transmission oil Mopar ATF	Gear oil SAE 75W-90(winter) 80W-90(summer)	

Gear shift figure

The gear shift of transaxle is in a deformative H figure (Figure 3-24). The overdrive gear 5 and reverse gear lies on the ultra right beyond gear 1 to 4 in line arrangement.

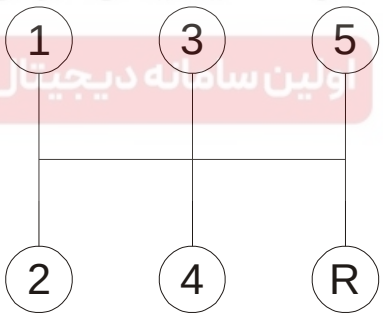


Figure 3-24 Gear shift of transmission

Lubricating oil and additive

For T350 transaxle, Mopar ATF (auto transmission oil) is used and no hypoid gear lubricating oil or engine oil shall be used as it may be hard to shift and bearing, gear and /or synchronizer will be out of action due to improper use of lubricating oil.

It is advised not to add any additive to the transaxle except the foresaid lubricating oil. One exceptional case is that special colorant can be used to check leakage. Sealant for transmission should be avoided because it has further effect on the sealing performance.

Sealant

Sealant applied to the two pieces of transmission casing and input bearing includes Mopar Gasket Marker, Loctite 518 or similar materials. Sealant for bearing end plate is Mopar RTV.

Diagnosis and testing —Cause of minor failure

Most failure in transaxle is caused by:

·Lack of lubricating oil

·Improper lubricating oil

·Improper assembly or broken internal parts

·Improper operation

Difficult gear shift

Difficult gear shift may be caused by improper adjustment of switching cable. In the event that the difficult gear shift is accompanied by gear jam phenomenon, then the synchro clutch and stopper ring or teeth of gear may have been worn or broken.

Synchronizer parts in improper assembly, such as synchronizer gear sleeve, slide block and spring, may also cause gear shift defect.

Worn, broken, mis-assembled parts or leaking hydraulic system also may develop difficult gear shift or gear jam.

Operation noise

For excess noise from the transaxle, in most cases, it is resulted from parts depreciation or breakdown. Gear and synchronizer exfoliation and break and fall of bearing also will cause noise.

Generally speaking, it is because of lack of lubricating oil that the inner body is worn or broken abnormally is typically.

Shift failure

Shift failure of transaxle probably is caused by improper assembly or breakdown of shifting parts and wear of transmission gear or teeth of synchronizer.

Low lubricating oil level

The transaxle lacks of lubricating oil typically because of leakage, improper check of oil level or refueling method. It is able to prove leakage with oil around the leaking point. In case there's no enough evidence for oil leak, the cause may be inadequate refueling.

Under the condition of transaxle refueling with pneumatic lubricant equipment, make sure proper calibration and alignment will be performed. If the equipment is not calibrated, it may lead to inadequate refueling.

Clutch defect

It may be hard to shift gears, gears may be jammed and noise may occur due to wear, break or improper assembly of clutch parts.

In the event that the clutch disk, pressure plate or release bearing is worn or broken, it will cause difficulty in gear shift and gear jam.

Disassembly

(1) Raise the hook.

(2) Remove battery cable, battery clip and bolt and then move the batter.

(3) Remove air cleaner /throttle body assembly in following steps (Figure 3-25)

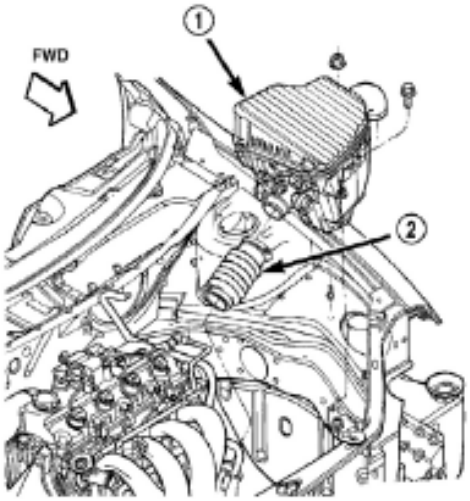


Figure 3-25 air cleaner and throttle body assembly

1-air cleaner 2-throttle body pipe

(a) Remove the vent pipe for solenoid valve of activated carbon tank and crankshaft case from throttle body.

(b) Remove the throttle position sensor (TPS) and idle air control (IAC) joint.

(c) Remove the throttle body pipe in intake manifold.

(d) Screw off fixing bolt and screw cap (Figure 3-25) and remove the air cleaner assembly.

(e) Remove the throttle cable and remove the air cleaner out of the vehicle.

(4) Remove the batter carrier out of the support.

(5) Remove the ground cable on the batter support.

(6) Remove the backup light switch joint.

(7) Plug out ting cable and support clip (Figure 3-26).

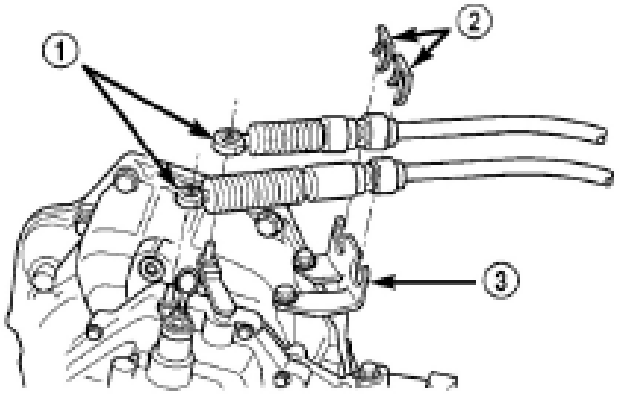


Figure 3-26 Shifting cable on transaxle

(8) Disassemble shifting cable from the lever (Figure 3-26) and put it aside.

(9) Remove vehicle speed sensor joint (Figure 3-27).

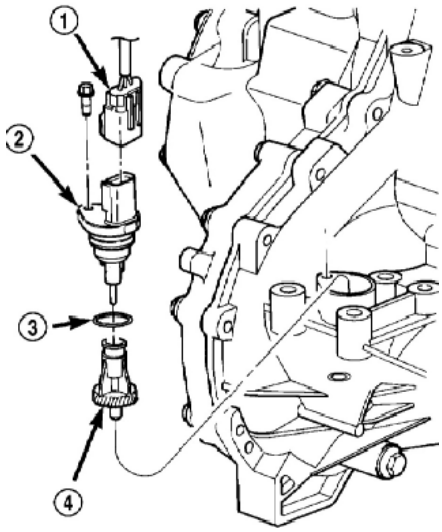


Figure 3-27 Vehicle speed sensor joint

(10) Lift up the vehicle.

(11) Remove clutch slave cylinder out of transaxle and suspend it (Figure 3-28), Figure 3-29).

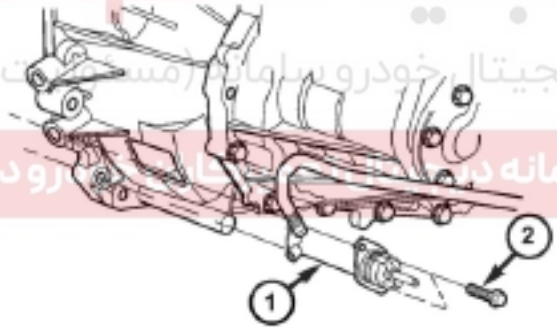


Figure 3-28 Slave cylinder on transaxle －TRITEC 1.6L

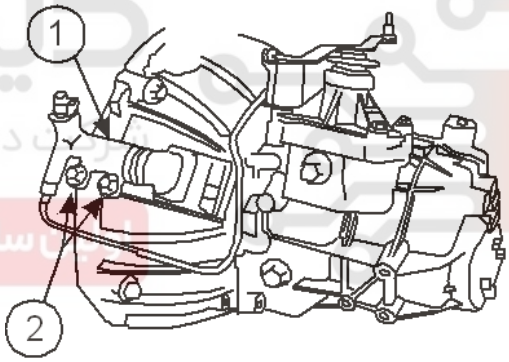


Figure 3-29 Slave cylinder on transaxle—LF481Q3

1- slave cylinder 2-bolt

(12) Screw off transaxle fuel drain plug and discharge the fuel into proper container.

(13) Remove the two axle shafts. As for correct process, see differential and transmission system in three groups.

(14) Remove structure ring (Figure 3-30).

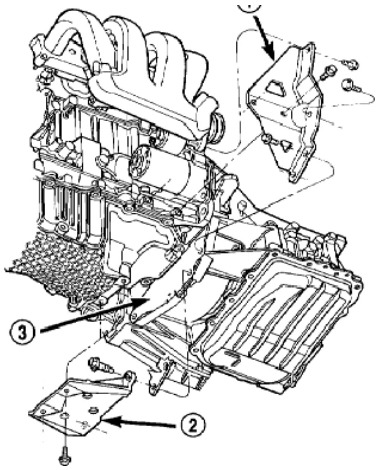


Figure 3-30 Left horizontal curved bar and structure ring — typical

1-support 2-structure ring 3-duct cap

(15) Take down the horizontal curved bar for left engine and transmission (Figure 3-30).

(16) Remove the duct cap of outer race (Figure 3-30).

(17) Take down the horizontal curved bar for right engine and transaxle (Figure 3-31).

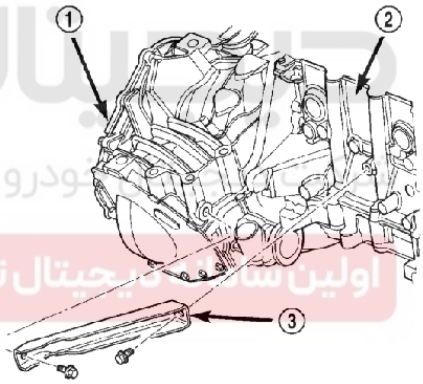


Figure 3-31 Disassembly/assembly or right horizontal curved bar —typical

1-transaxle 2-engine 3-horizontal curved bar

(18) Remove the starter (Figure 3-32).

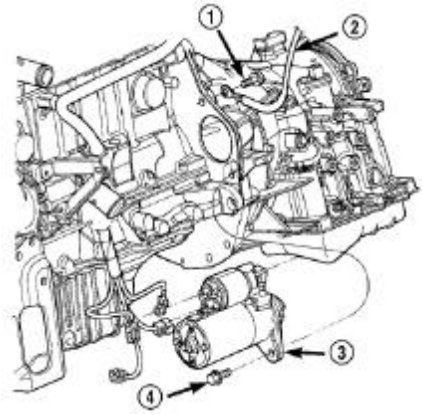


Figure 3-32 Starter Disassembly/Assembly —typical

(19) Screw off the 4 bolts for clutch and drive plate的bolt. When screwing, a drivefit (grooved) drive plate hole will arise. To remove the bolt, mark the drive plate and clutch assembly for the convenience of alignment during assembly.

(20) Support the engine with a screw jack and wooden block.

(21) Screw off the fixing stud on the transaxle and access it via the driver side wheel room (Figure 3-33).

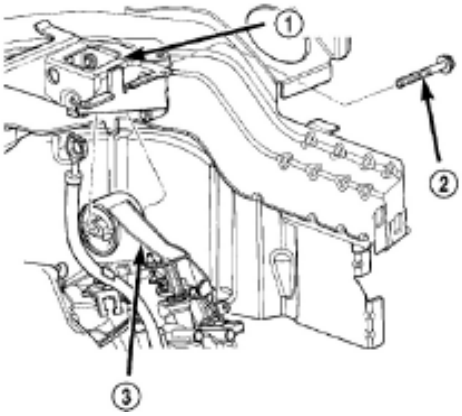


Figure 3-33 Support bolt on transaxle —typical

1-support 2-bolt 3-mounting

(22) Put the engine and transaxle on the screw jack carefully for proper space for disassembly.

(23) Unscrew the fixing bolt for transaxle and engine and fasten the transaxle (Figure 3-34).

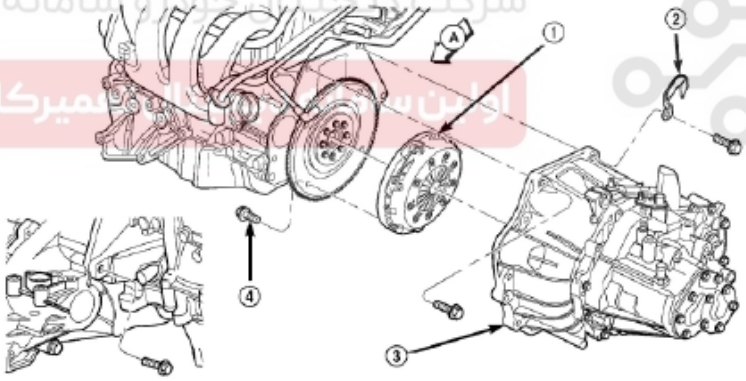


Figure 3-34 Disassembly/assembly of transaxle —1.6L

1-module clutch assembly 2-clip 3-transaxle 4-clutchbolt (4)

(24) Remove the transaxle out of the vehicle (Figure 3-34).

(25) To assemble a new transaxle or replace the transaxle, remove the upper mounting (Figure 3-35). Mount the replaceable unit and screw down all bolts to 68Nm (50 ft. lbs.).

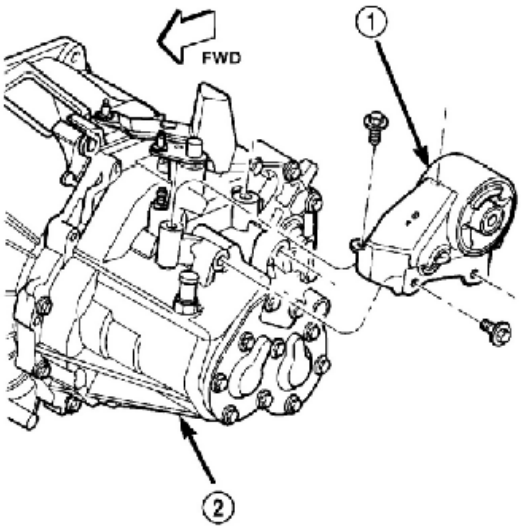


Figure 3-35 Mounting and support on transaxle

1-mounting 2-transaxle

Breakdown

For T350 transaxle, internal parts can only be maintained by separating the gear box via the outer race.

Warning: transaxle output shaft shall be maintained as an integral component. Don't disassemble and assemble it, or it will damage the transmission.

(1) Put the transaxle on the operating bench.

(2) Remove clutch release bearing and release lever. Move the withdrawal fork and bearing to be in the same straight line. Hold the release lever on the pivot base with hands and release the lever from the pivot with steady pressure.

Warning: Don't loosen the release lever with screwdriver or crow bar because it will damage the lever and /or clip.

(3) Punch the roller pin and remove the stick.

(4) Screw off transaxle housing bolt (Figure 3-36).

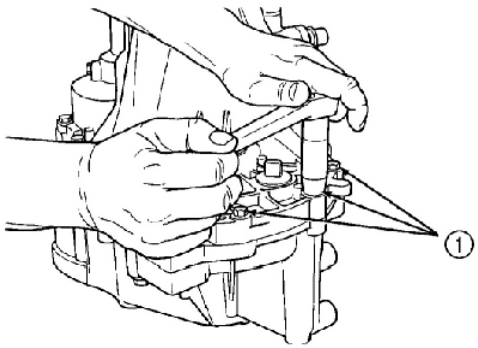


Figure 3-36 Casing bolt

1-casing bolt

(5) Insert the screwdriver into the groove nearby semi-casing locating stud (Figure 3-37) and divide the casing into two pieces (Figure 3-38).

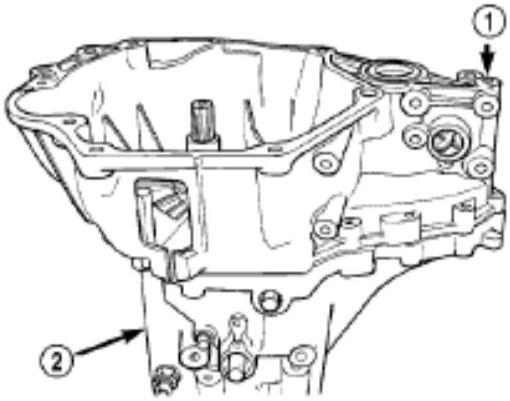


Figure 3-37 Transaxle housing

1-outer race 2-gear box

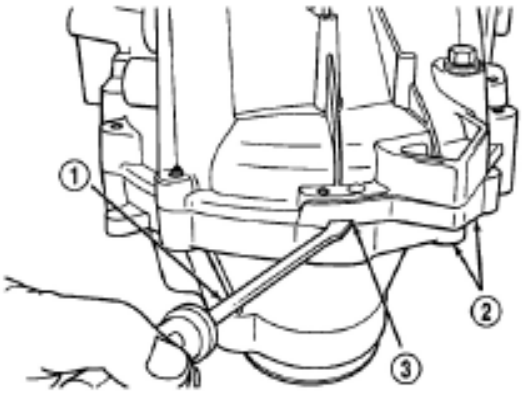


Figure 3-38 Separation of casing

1-screwdriver 2- semi-casing 3-prying groove

(6) Remove the outer race out of gear box (Figure 3-39).

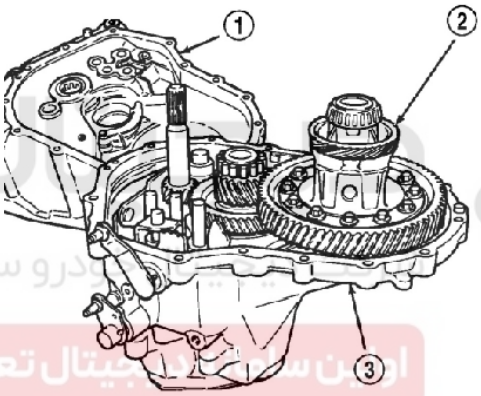


Figure 3-39 Disassembly of outer race

1-outer race 2-differential 3-gear box

(7) Remove the roller bearing out of output shaft.

(8) Remove differential assembly (Figure 3-40).

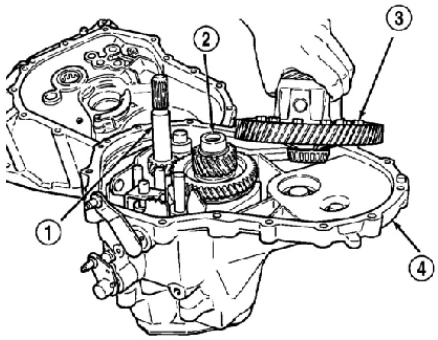


Figure 3-40 Disassembly of differential assembly

1-input shaft 2-output shaft 3-differential 4-case

(9) Screw off bolts for reverse gear shaft (Figure 3-41).

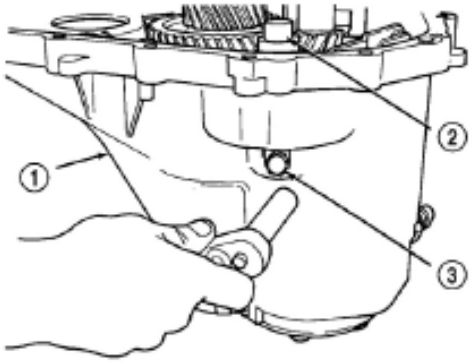


Figure 3-41 Reverse gear shaft

1- case 2-reverse gear shaft 3-reverse gear shaft bolt

(10) Draw out reverse gear shaft (Figure 3-42).

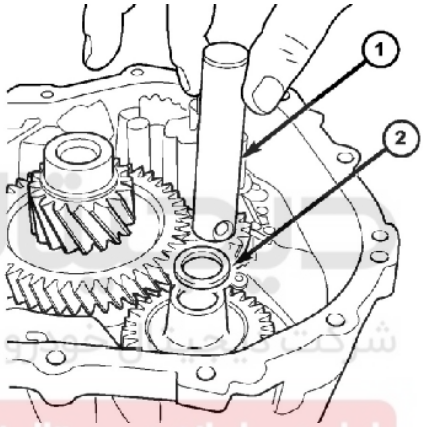


Figure 3-42 Disassembly of reverse gear shaft

1- reverse gear shaft 2-gasket

(11) Take out the reverse idler gear and gasket (Figure 3-43).

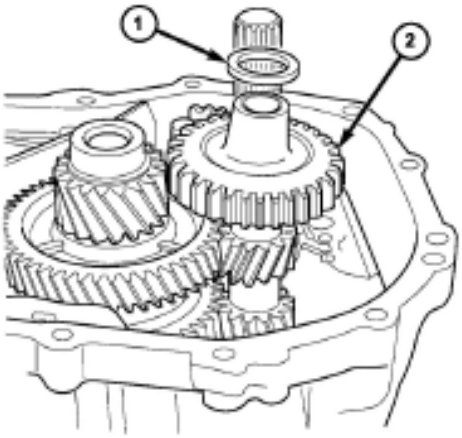


Figure 3-43 Reverse idler gear and gasket

1-gasket 2-reverse idler gear

(12) Screw off the 2 bolts to fix the reverse shift fork bracket (Figure 3-44) and remove reverse shift fork and reverse cam assembly (Figure 3-45).

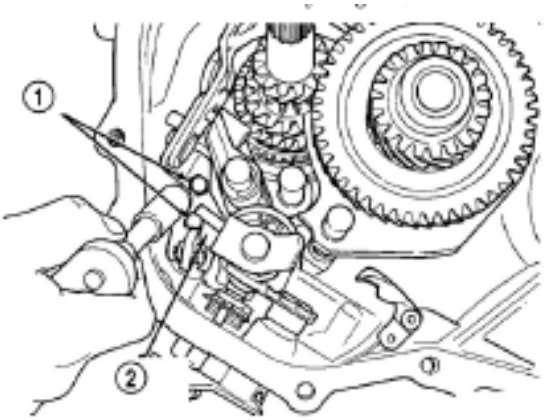


Figure 3-44 Fixing bolts for reverse shift fork bracket

1-bolt (2) 2-reverse shift fork support

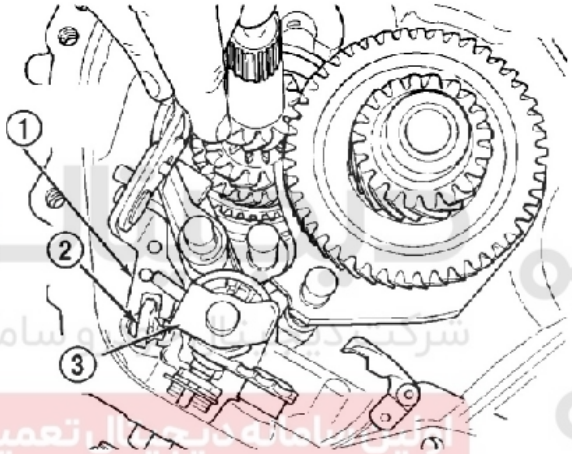


Figure 3-45 Disassembly of reverse shift fork bracket

1-reverse shift fork support 2-reverse cam 3-shift block assembly

(13) Pick out the shift shaft sleeve gasket with circlip pliers (Figure 3-46).

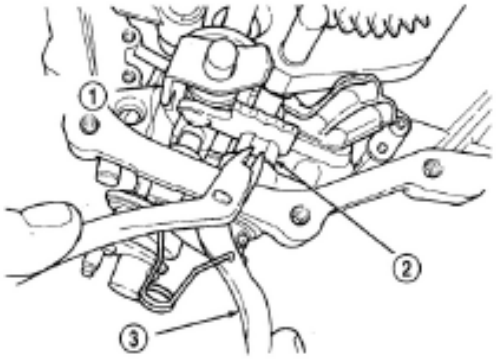


Figure 3-46 Disassembly of shift shaft sleeve gasket

1-shift block assembly 2-shift shaft sleeve gasket (plastic) 3-circlip pliers

(14) Pull shift shaft pin out of the stopper assembly groove and rotate the shift shaft upwards, then put it aside (Figure 3-47).

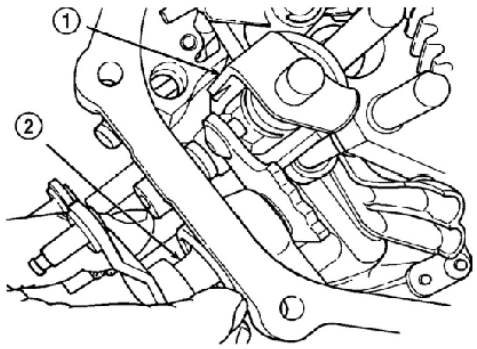


Figure 3-47 Shift shaft

1-selector 2-shift shaft

(15) Remove transaxle end plate (Figure 3-48 and Figure 3-49).

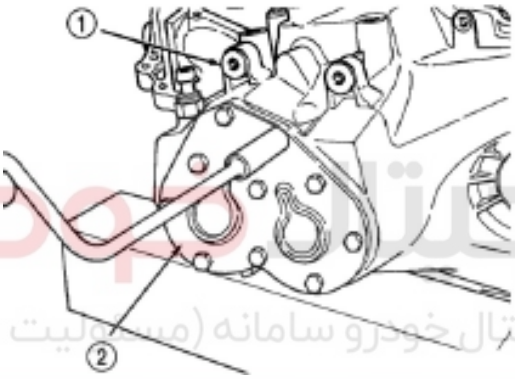


Figure 3-48 Removal of transaxle case

1-transaxle housing 2-end plate

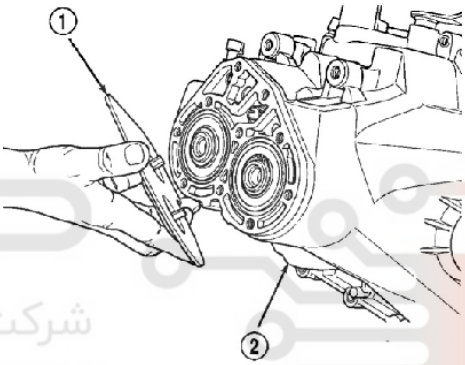


Figure 3-49 End plate

1-end plate 2-case

(16) Take down the two 2 fixing snap rings for output shaft, input shaft and bearing (Figure 3-50).

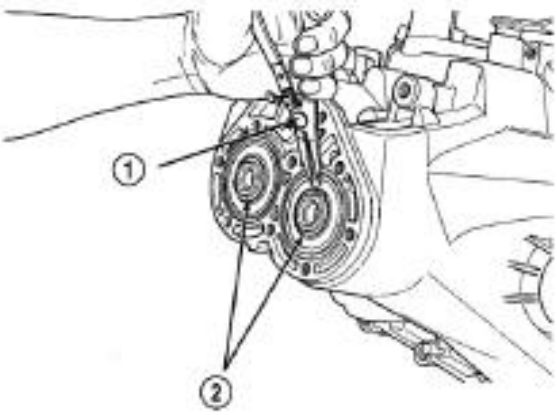


Figure 3-50 Fixing snap ring for bearing

1-circlip pliers 2-snap ring

(17) Apply plate jig and gasket (Millertool #6785, 6785-1and 6785-2) and turn the transaxle over. Mount the transaxle on the Plate jig (Figure 3-51) and confirm the gasket is put in place on the plate jig, and then place the transaxle in the compression machine.

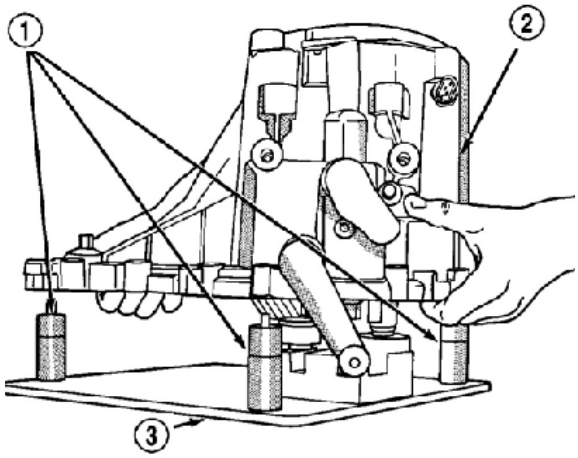


Figure 3-51 Plate jig

1-gasket 2-transaxle 3-6785 Plate jig

(18) Fix the bearing fixture Millertool 6768 on the transaxle end bearing (Figure 3-52). Verify the tool is well aligned against the input shaft and output shaft.

Figure 3-52 Bearing fixture

1-bearing fixture 2-transaxle housing

Warning: in case of use of improper bearing fixture, to press input shaft and output shaft will cause the two axles oil baffle.

(19) Fix the transaxle gear box on the compression machine and extrude the input shaft assembly and output shaft assembly from the case (Figure 3-53).

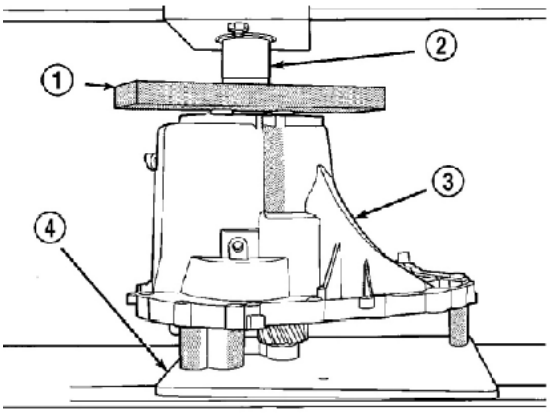


Figure 3-53 Gear in compression box

1-bearing fixture 2- press head of compression machine 3-transaxle housing 4 -Plate jig

(20) Take down the transaxle from the compression machine.

(21) Pick off the transaxle housing carefully from the input shaft assembly, output shaft assembly and plate jig (Figure 3-54). Take care not to break the feeding tank for end bearing (Figure 3-55).

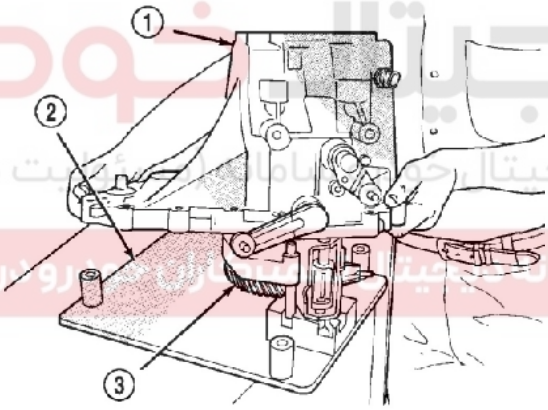


Figure 3-54 Disassembly of transaxle housing

1-transaxle housing 2-Plate jig 3-gearun

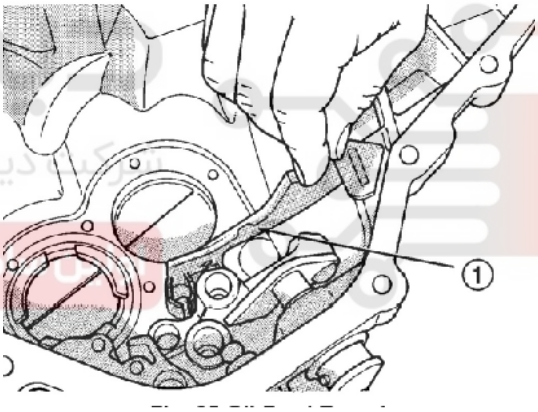


Figure 3-55 Feeding tank

1-feeding tank

(22) Remove reverse brake friction cone and locking ring out of input shaft assembly (Figure 3-56) (Figure 3-57).

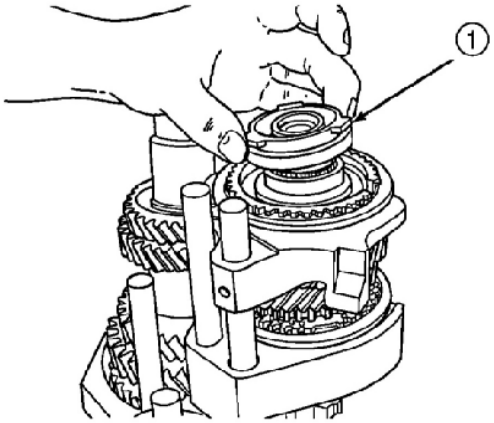


Figure 3-56 Reverse brake friction cone

1-Reverse brake friction cone

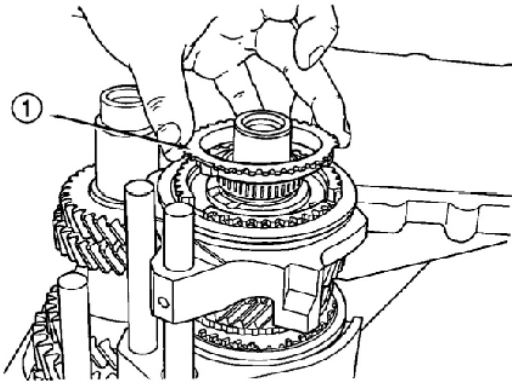


Figure 3-57 Reverse brake lock ring

1-Reverse brake lock ring

(23) Remove the shift block assembly from the plate jig (Figure 3-58).

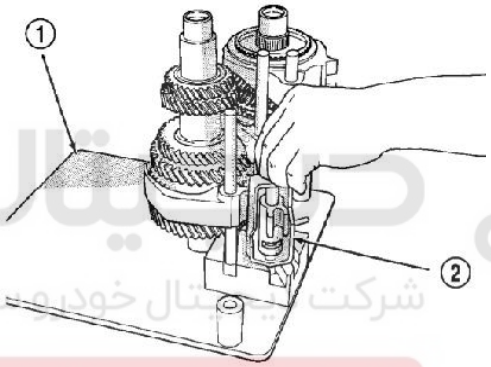


Figure 3-58 Disassembly of shift block

1-6785 Plate jig 2-shift block assembly

(24) Remove input shaft assembly and output shaft assembly from the plate jig (Figure 3-59).

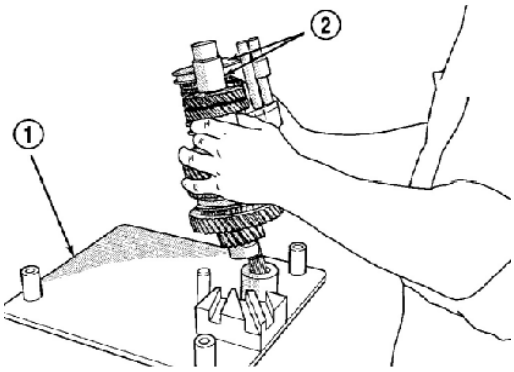


Figure 3-59 Disassembly of gearing

1-785 Plate jig 2- Input and output shaft

Warning: the output shaft assembly shall be maintained as an integral assembly. Don't ever try to repair any part on the output shaft. In case of failure of 1-2 synchronizer or gears, the entire output shaft assembly shall be replaced.

Cleaning

Clean gears, bearing, shaft, synchronizer, thrust washer, refueler, gearshift, gear box and outer race with solvent. Except the bearing, all parts shall be dried with compressed air. The bearing shall be aired or wiped dry with cloth.

Check

Check gears, bearing, shaft and thrust washer. In case wear, exfoliation, crack and spot happen to the roller or the bearing cage is damaged or deformed, replace the bearing and cap. In case of exfoliation, crack or wear-down of gear teeth, replace the gear. Check the synchronizer. In the event that the gear sleeve is worn or damaged, replace it. In the event that the friction material is ablated, exfoliated or worn, replace the retainer. Check synchro spline and spring and replace them in case of any wear, crack or deformation.

Assembly

For T350 transaxle, inner parts can only be maintained after separating the gear box via the outer race.

Warning: transaxle output shaft shall be maintained as an integral component. Don't disassemble and assemble it, or it will damage the transaxle.

Sealant applied to the two pieces of transaxle housing includes MoparGasket Marker, Loctite 518 or similar materials. Mopar RTV is used as the sealant for bearing end plate.

(1) Confirm the plate jig cushion has been removed from the plate jig and install the output shaft and input shaft on the plate jig (Millertool 6785) (Figure 3-60).

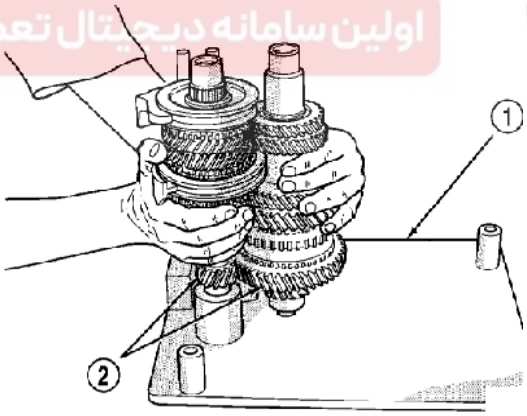


Figure 3-60 Plate jig

1-Plate jig 2-gearing

(2) Insert transmission fork shaft and fork in the plate jig (Figure 3-61).

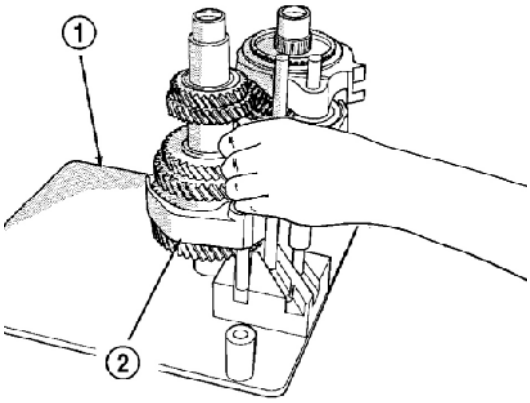


Figure 3-61 Assembly of transmission fork shaft

1-6785 Plate jig 2- Shift fork

(3) Insert the shift block assembly in plate jig (Figure 3-62).

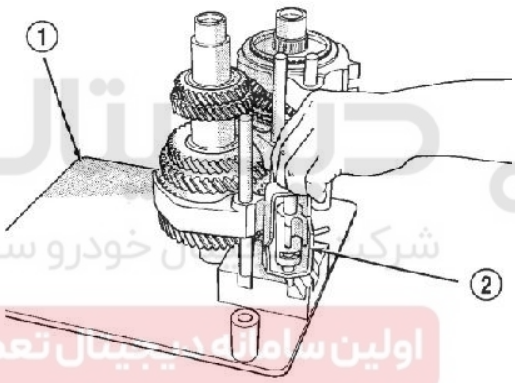


Figure 3-62 Assembly of shift block

1-6785Plate jig 2-shift block assembly

(4) Assemble the reverse brake lock ring (Figure 3-63).

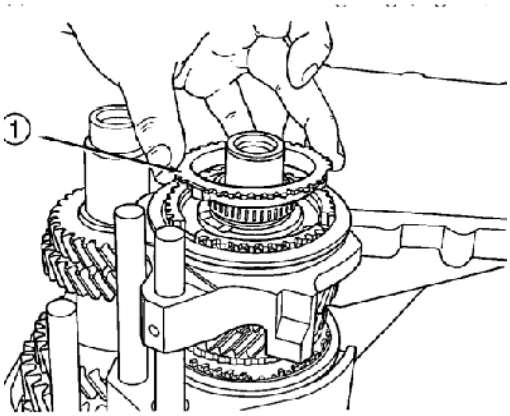


Figure 3-63 Assembly of reverse brake lock ring

1-Reverse brake lock ring

(5) Assemble the reverse brake friction cone (Figure 3-64).

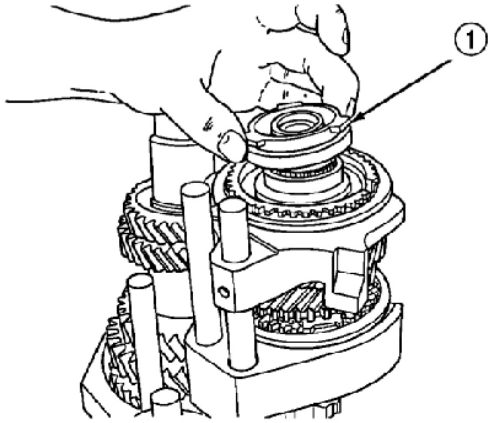


Figure 3-64 Assembly of reverse brake friction cone

1-Reverse brake friction cone

(6) Cover the gear box on the plate jig (Figure 3-65) and enable the shift pin to stay on 3-4flange.

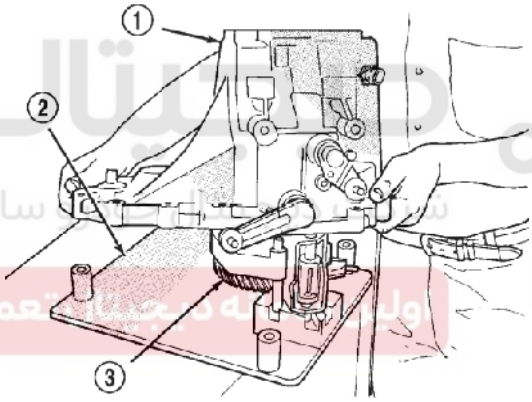


Figure 3-65 Gear box

1-transmission case 2-Plate jig 3-gearing

(7) Align the reverse brake friction cone flange against the gear box groove (Figure 3-66) and confirm the reverse brake cushion is put in place.

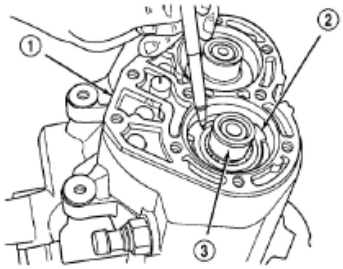


Figure 3-66 Friction cone flange

1- case 2- friction cone flange 3-input shaft

(8) Mount the input shaft bearing and output shaft bearing on the axle separately and press the Input and output shaft bearing with Millertool C-4992-1 to present the bearing bottom in the case, hold against the axle (Figure 3-67).

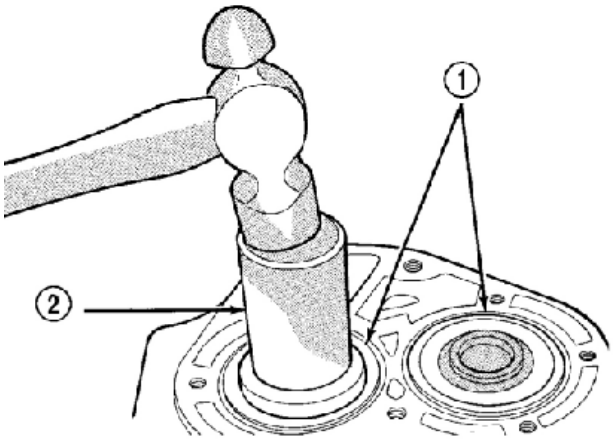


Figure 3-67 Assembly of input and output bearing

1-Input and output bearing 2 Dedicated tool C-4992-1

(9) Assemble the snap ring on Input and output bearing (Figure 3-68).

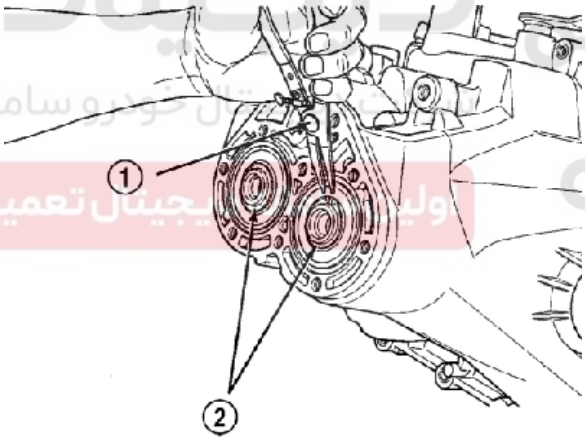


Figure 3-68 Bearing snap ring

1-circlip pliers 2-snap ring

(10) Apply sealant Mopar RTV round the end plate and bolt hole. The end plate is mounted on the gear box，screw down the end plate bolt at tightening torque 29Nm (21 ft. lbs.) (Figure 3-69).

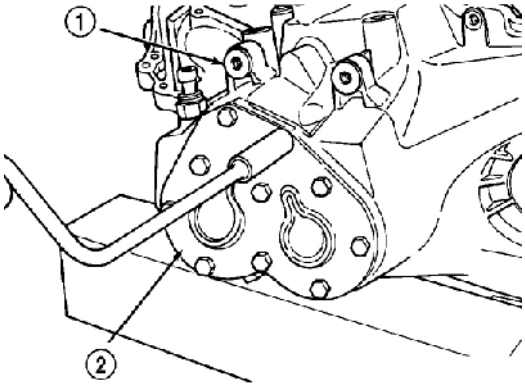


Figure 3-69 Transaxle end plate

1-transaxle housing 2-end plate

(11) Disassemble the gear box from the plate jig.

(12) Put the end plate downward and mount the gear box on the clamp.

(13) Fix the shift shaft in stop block assembly groove (Figure 3-70).

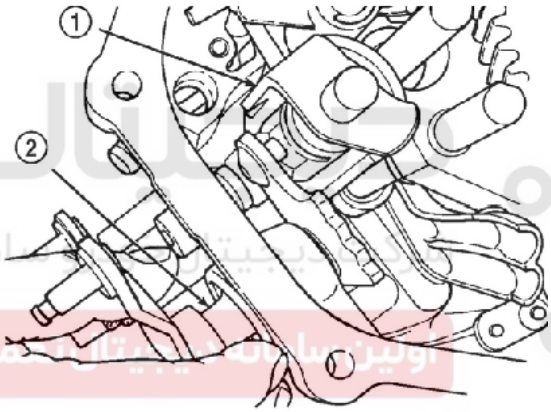


Figure 3-70 Shift shaft

1-selector 2-shift shaft

(14) Push the shift shaft sleeve gasket clip onto the selector and assemble the shift lever.

(15) Assemble the reverse idler gear and sleeve gasket (Figure 3-71).

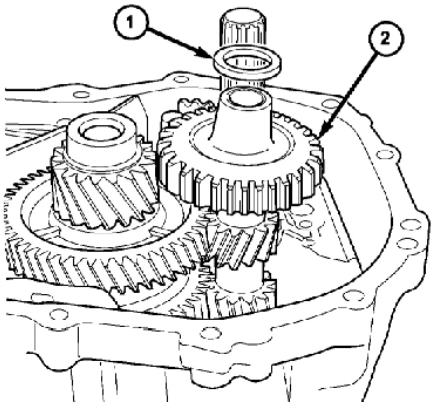


Figure 3-71 Reverse idler gear and sleeve gasket

1-sleeve gasket 2-reverse idler gear

(16) Assemble the reverse gear shaft (Figure 3-72).

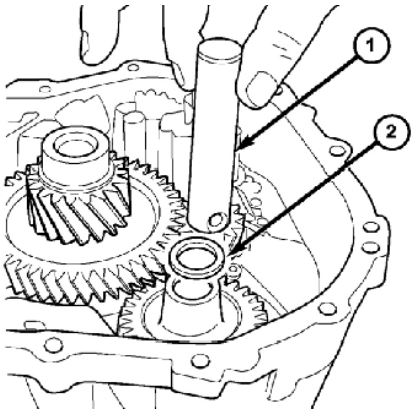


Figure 3-72 reverse gear shaft 的 Assembly

1-reverse gear shaft 2-sleeve gasket

(17) Screw bolts on the shaft at the tightening torque 26Nm(19 ft. lbs.) (Figure 3-73)

Figure 3-73 Reverse gear shaft bolt

1-case 2-reverse gear shaft 3-reverse gear shaft bolt

(18) Assemble the reverse shift fork support and reverse locking device and screw down bolts at tightening torque 11 Nm (96 in. lbs.) (Figure 3-74) and Figure 3-75).

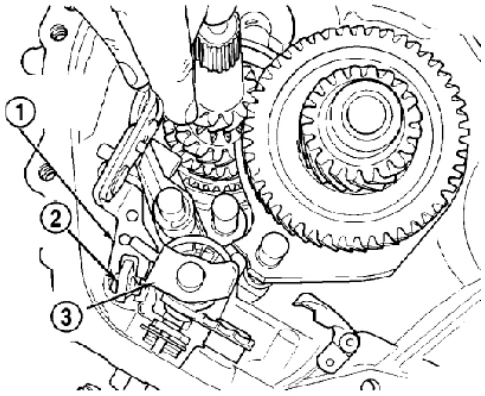


Figure 3-74 Reverse shift fork support

1-reverse shift fork support 2-reverse cam locking device 3-shift block assembly

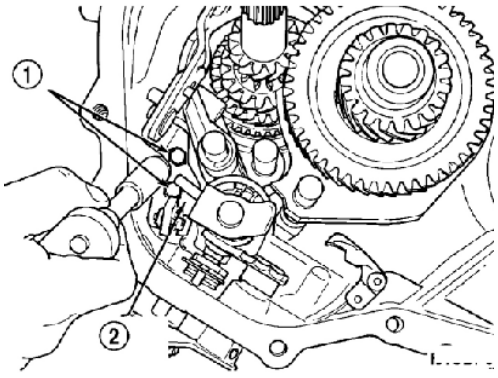


Figure 3-75 Reverse shift fork bolt

1-bolt (2) 2-reverse shift fork support

(19) Fix the differential in the gear box (Figure 3-76).

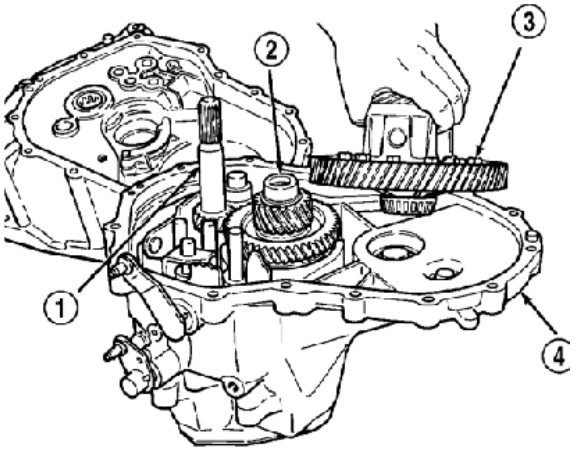


Figure 3-76 Assembly of differential

1-input shaft 2-output shaft 3-differential 4 –case

Bearing adjustment process

(1) Take more care in disassembling and assembling bearing cap and taper sleeve. Only hand press is allowed for assembly because a hammer may leads to improper assembly of bearing cap and taper sleeve. To measure if the gasket is used properly, spur or insection on the bearing saddle will leads to wrong end gap value. In case the bearing cap and taper sleeve is installed improperly, it will cause failure of low mileage.

(2) In case of pit or ablation on bearing cap and taper sleeve, they must be replaced. No matter the phenomenon appears on bearing cap or roller, bearing cap and taper sleeve should be replaced.

(3) Bearing preload and driving torque must be maintained in case of permanent damage to bearing. After being meshed, the used (original) bearing will lose 50% of original driving torque. All bearing must be adjusted under no interference of other parts or inter-meshing of gears.

(4) The bearing should be replaced in pairs: once there's something wrong with a differential bearing, both differential bearings shall be replaced; in case of defect on input shaft bearing, replace the two input shaft bearings.

(5) To replace them, the bearing taper sleeve shall not be used any longer.

(6) To run the bearing smoothly at any direction, the moment of rotation will be acquired.

Adjustment of Differential bearing preloading

Note: accurate rotating torque value can only be acquired by removing the gearing in the case.

(1) Remove bearing cap and gasket out of clutch outer race.

(2) Press the new bearing cap in the outer race (or use a polished bearing cap as it is easy to be measured).

(3) Press the new bearing cap in gear box edge.

(4) Refuel differential bearing with transmission oil, place the differential assembly inside the transaxle gear box and mount clutch outer race on the gear box, then assemble and screw down bolt to the torque 29 Nm (21 ft. lbs.).

(5) Put the transaxle on the operating bench with C-shaped fixture and place the outer race down. Install the dial gauge.

Note: The position of dial gauge in the figure is only for schematic purpose. Dial gauge shall parallel with tap holder to get the most accurate value.

(6) Apply medium down force to the differential with tool C-4995and tap holder and rotate the differential back and fro for many times so that the bearing is stabilized, then clear the dial gauge. To obtain the end gap value, rotate the differential back and fro and apply a medium don force, then write down he clearance (Figure 3-77).

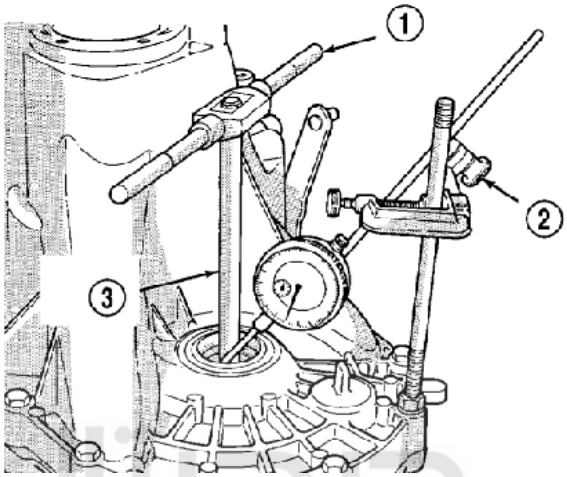


Figure 3-77 Checking the end gap of differential bearing and determining the thickness of gasket

1-tap holder 2-Dial gauge base 3-Dedicated tool C-4995

(7) The proper bearing preload for gasket is the preload of sum of total end gap plus (constant) 0.18mm (0.007 in.). Don't add the obtained preload for gasket.

(8) Screw off casing bolt, take down the differential bearing cap for clutch outer race, install the gasket selected in step 7 and press the bearing cap in outer race.

(9) Mount clutch outer race, assemble and screw down bolt to torque 26 Nm (19 ft. lbs.).

(10) Use dedicated toolC-4995 and inch –pond torque spanner and check the rotating torque of differential assembly (Figure 3-78).

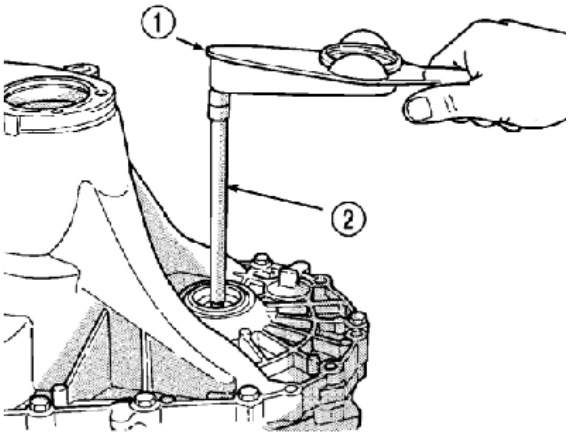


Figure 3-78 Checking the rotating torque of differential bearing

1-inch –pond torque spanner 2-Dedicated toolC-4995

The rotating torque should be 6～12 in. lbs. in case of over-large rotating torque, change into another gasket 0.05mm (0.002 in.) thinner; in case of over-small rotating torque, change into another gasket 0.05mm (0.002 in .) thicker.

(11) Re-check the rotating torque and repeat step 10 till proper rotating torque is acquired. Once a proper rotating torque is obtained, put the gear box on the end plate and apply Mopar Maker, Loctite 518 or similar materials on the counterface of case. Mount the clutch outer race on gear box, assemble and screw down bolt to the torque 29 N.m (21 ft. lbs.).

Assembly

(1) Assemble clutch components on the input shaft and fix transaxle in place.

(2) Assemble fixing bolts for transaxle and engine (Figure 3-34) to the tightening torque 95 N.m (70 ft. lbs.).

(3) Jack up the engine and transaxle with a screw jack till the through hole of upper mounting frame is aligned against the mounting hole. Assemble and screw down the bolt to the torque108 N.m (80 ft. lbs.) (Figure 3-33).

(4) Withdraw the screw jack.

(5) Assemble the 4 bolts for assembled clutch and drive plate and align with the marks on the assembled clutch and drive plate clutch made during disassembly. Start from the drivefit (groove) hole to assemble and screw down bolt to the torque 88 N.m (65 ft. lbs.).

(6) Assemble the starter and screw down bolt to the torque 54 N.m (40 ft. lbs.). Make sure bolts for ground cable and upper starter are fastened (Figure 3-55).

(7) Connect starter wires and fasten the positive cable to the torque 10 N.m (90 in. lbs.).

(8) Assemble the outer race duct cap (Figure 3-40).

(9) Assemble the structure ring in following process (Figure 3-39):

(a) Assemble the ring and screw down all bolts with hands.

(b) Tighten the ring and oil pan bolt to the torque 3 N.m (30 in. lbs.).

(c) Fasten the transaxle bolt to the torque108 N.m (80 ft. lbs.) 的.

(d) Finally fasten the ring and oil pan bolt to the torque 54 N.m (40 ft. lbs.).

(10) Assemble the right horizontal curved bar and fasten bolts to the torque 81 N.m (60 ft. lbs.).

(11) Mount the slave cylinder on transaxle (Figure 3-37and Figure 3-38).

(12) Assembly the two front axle shafts. As for correct process, see the 3 groups of differential and transmission system.

(13) Refuel the transaxle with defined quantity of Mopar TF+4.

(14) Set down the vehicle.

(15) Connect the vehicle speed sensor joint (Figure 3-27).

(16) Connect the converting cable to the stick and mount the cable on the fixed collar on the support (Figure 3-26).

(17) Connect backup light joint.

(18) Connect the earth tape to the fixed support on transaxle.

(19) Install the battery carrier and battery and screw down battery clamp.

(20) Follow the process below to assemble air cleaner/throttle body assembly:

(a) Connect the accelerator and speed control (if any) cable to the air cleaner/throttle body assembly.

(b) Install the assembly in place and make sure the air cleaner retaining nest clamps the battery fin and bolts are fastened to the torque 14 N.m (120 in. lbs.).

(c) Confirm all throttle body ducts are fixed on the intake manifold, fasten the clip to the torque 5 N.m (40 in. lbs.).

(d) Connect throttle position sensor (TPS) and idle air control (IAC) joint.

(e) Connect the linear solenoid exhaust valve (PPS) and crankshaft casing pipework via throttle body.

(21) Connect battery cable.

(22) Perform road test and check is there any oil leak.

Technical parameters

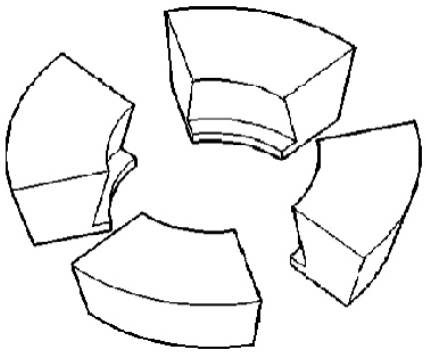
Don’t use bolts with thread sealer or torque lock patches any more. For these applications, use new bolts for ever.

Torque parameter

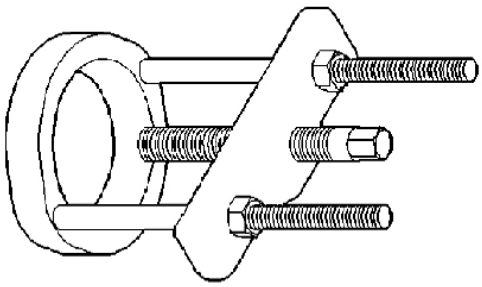
Unit: N.m

Model / Description	TRITEC 1.6L	Ft.Lbs	In.Lbs
Backup light	24	18	-
Converting cable adjusting bolt	8	-	70
Drain plug	30	-	267
Differential gear bolt	81	60	-
Dust cover and transaxle	12	-	105
End plate cover bolt	29	21	-
Front engine mounting and transmission	108	80	-
Front mounting thru bolt	61	45	-
Front mounting and engine bolt	54	40	-
Horizontal curved strut and engine	54	40	-
Horizontal curved strut and transmission	54	40	-
Left mounting thru bolt	108	80	-
Left mounting and transmission	54	40	-
Output bearing baffle	11	-	96
Reverse shift fork support	11	-	96
Reverse gear shaft bolt	29	19	-
Shift cable and transaxle	28	-	250
Transaxle casing bolt	29	21	-
Transaxle and engine bolt	95	70	-
Vehicle speed sensor	7	-	60
Vertical curved strut and engine	108	80	-
Vertical curved strut and transaxle	108	80	-

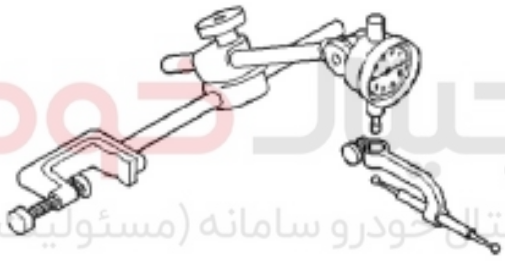
Dedicated tool



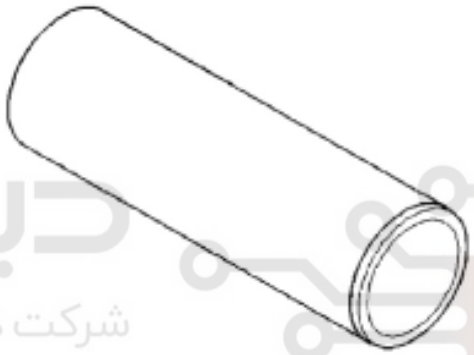
Joint block C-293-45



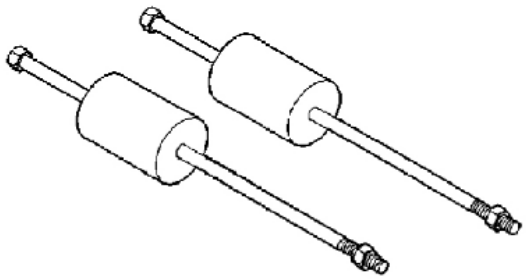
Puller C-293-PA



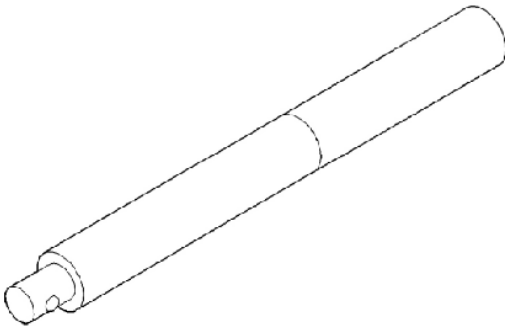
Dial gauge C-3393



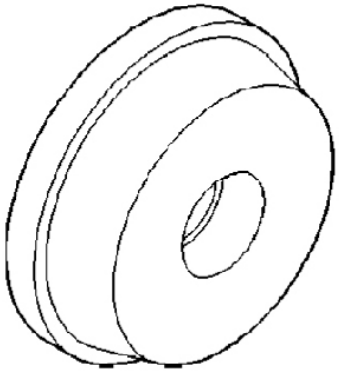
BushingC-3717



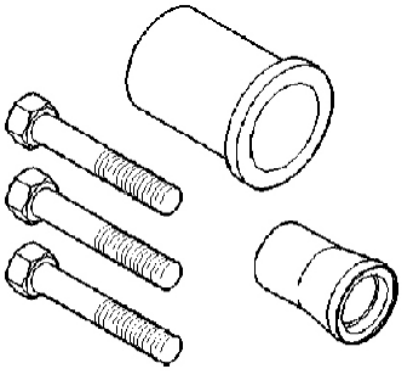
Rolling weight C-3752



Universal knob C-4171

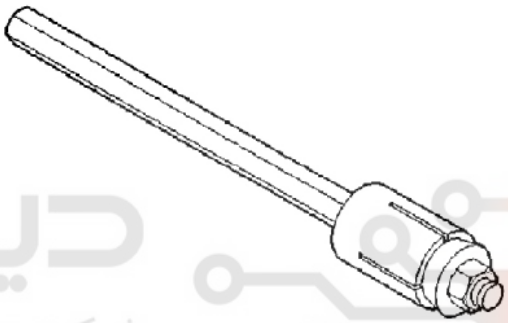


Bearing installing tool C-4628

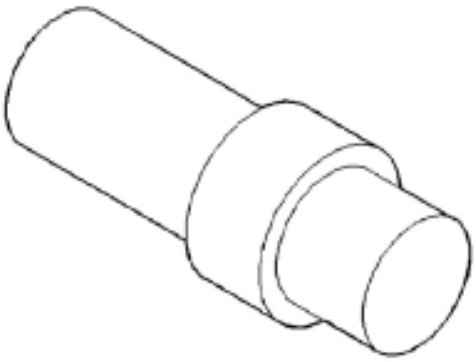


Oil seal remover C-4680

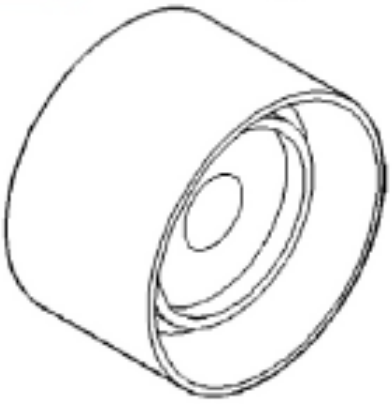
Oil seal setting tool C-4992



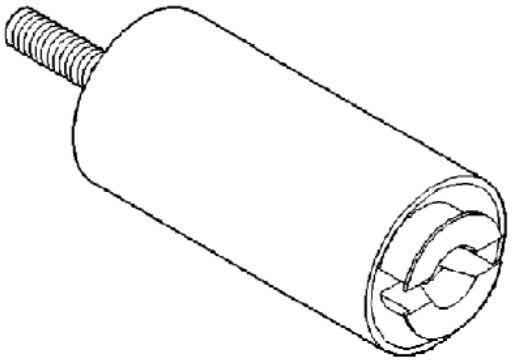
Torque tool C-4995



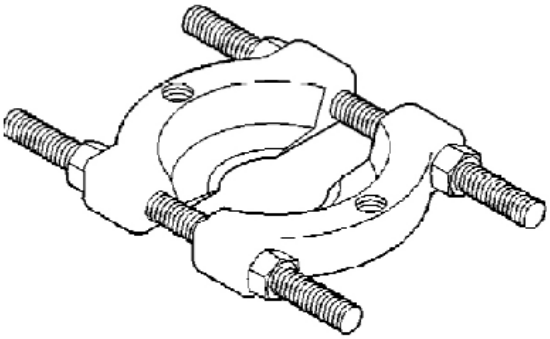
Joint C-4996



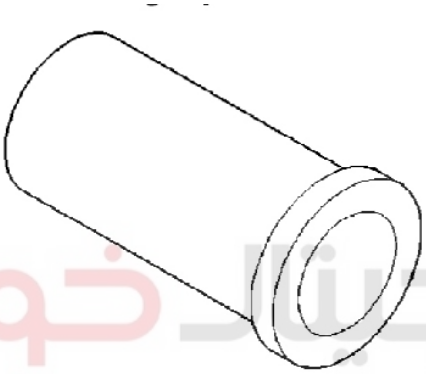
Assembly tool L-4410



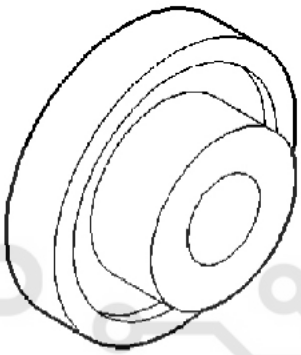
Dedicated fixtureL-4518



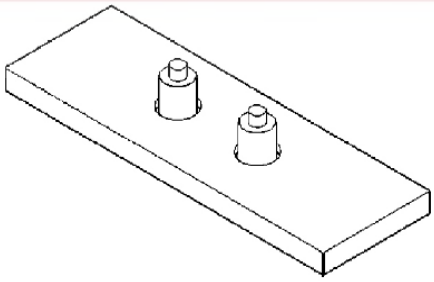
Bearing dissociator 1130



Punch 6342



Oil seal assembly tool 6709



Bearing puller 6768

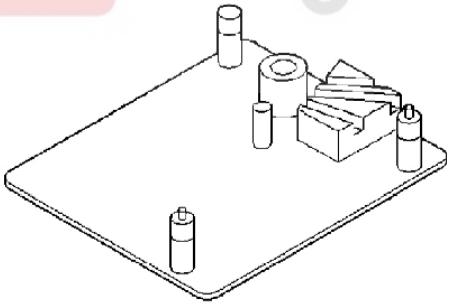
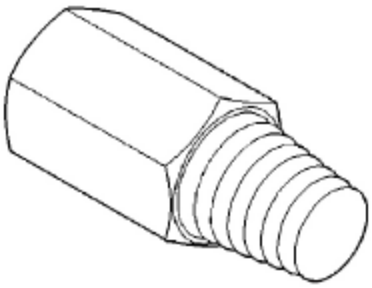
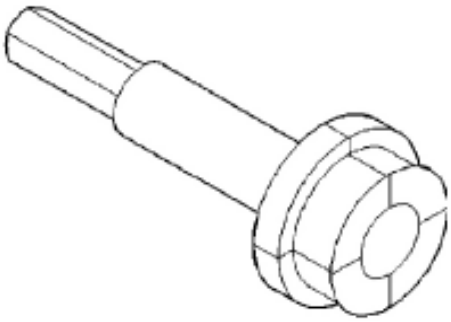


Plate jig 6785



Puller 6786



Ejector 6786

Axle shaft seal

Disassembly

(1) Remove the axle shaft. As for correct process, see the 3 groups of differential and transaxle.

(2) Insert the flat lever in axle shaft seal by the edge (Figure 3-79).

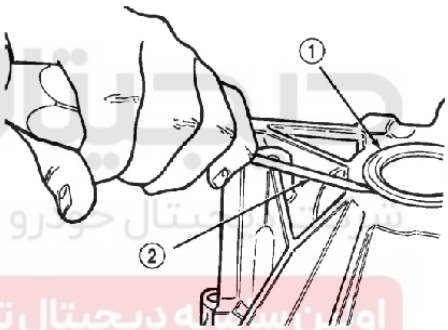


Figure 3-79 Disassembly of axle shaft seal

1-axle shaft seal 2-lever

(3) Knock the flat lever with a hammer and remove the axle shaft seal.

Assembly

(1) Remove excess lubricating oil in the axle shaft seal hole.

(2) Align the axle shaft seal against the axle shaft seal hole.

(3) Mount axle shaft seal on tool 6709 and C-4171 and insert the axle shaft seal.

(4) Punch the oil seal in place to hold against the transaxle housing.

(5) Assemble the axle shaft. As for correct process, see the 3 groups of differential and transaxle.

Backup light switch

Disassembly

(1) Lift up the vehicle.

(2) Remove backup light switch joint from the bottom (Figure 3-80).

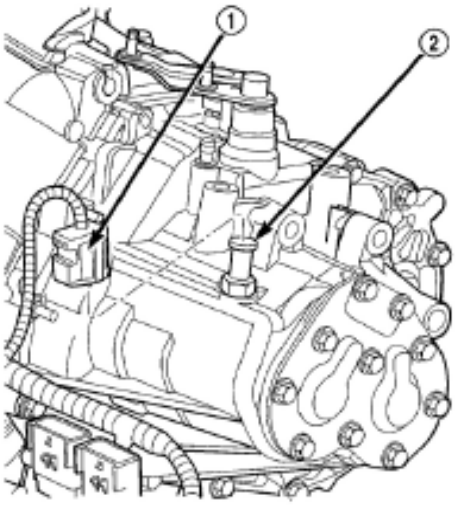


Figure 3-80 backup light switch

1-joint 2-backup light switch

(3) Screw off transaxle bolt.

Assembly

(1) Install the backup light switch and wrap the switch thread with Teflon tape or similar materials and screw the switch to the tightening torque 24Nm(18 ft. lbs.).

Warning: don't screw down the switch too heavily.

(2) Connect the backup light switch joint (Figure 3-80).

(3) Set down the vehicle.

(4) Verify the function of backup light.

Differential

Disassembly

(1) Disassemble differential bearing taper sleeve with C-293-PA, joint C-293-45 and tool 4996 (ring gear and differential casing edge) (Figure 3-81and Figure 3-82).

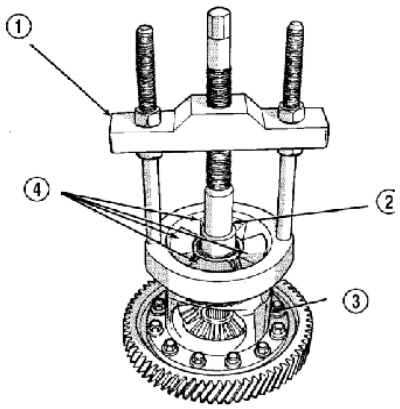


Figure 3-81 Disassembly differential bearing taper sleeve along the edge of differential casing

1-Dedicated tool C-293-PA 2-Dedicated tool C-293-PA 3-differential zassembly 4-Dedicated tool C-293-45

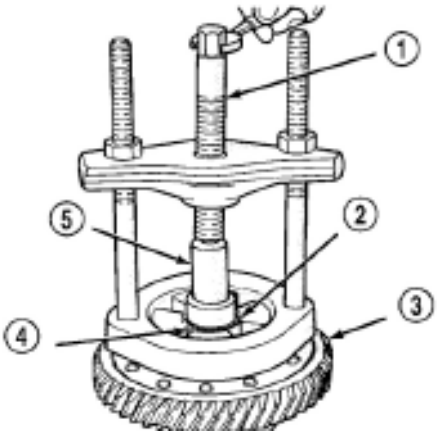


Figure 3-82 Disassembly of differential bearing taper sleeve via ring gear

1- Dedicated tool C-293 2 -Dedicated tool joint C-293-45 (4 pieces for use)

3-differential assembly 4-differential bearing taper sleeve

5 Dedicated toolC-4996 (pay attention to the location)

(2) Screw off ring gear and casing bolt (Figure 3-83).

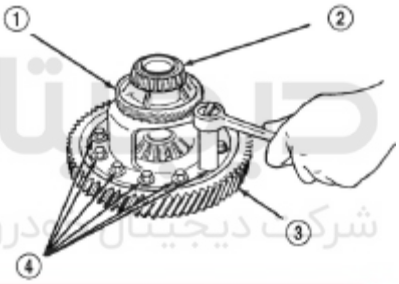


Figure 3-83 Disassembly of ring gear bolt and ring gear

1-speed meter drive gear 2-bearing 3- ring gear 4- ring gear bolt

Abandon used bolt and take new bolt for assembly.

(3) Pry out speed meter drive gear with a screwdriver (Figure 3-84 and Figure 3-85).

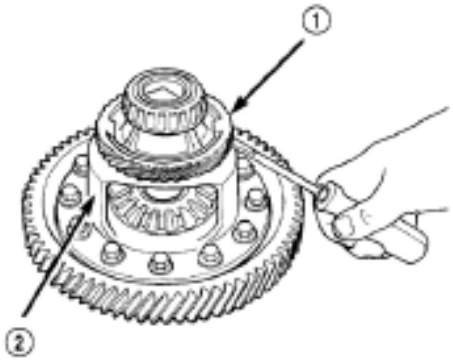


Figure 3-84 Prying out the speed meter drive gear

1-speed meter drive gear 2-differential assembly

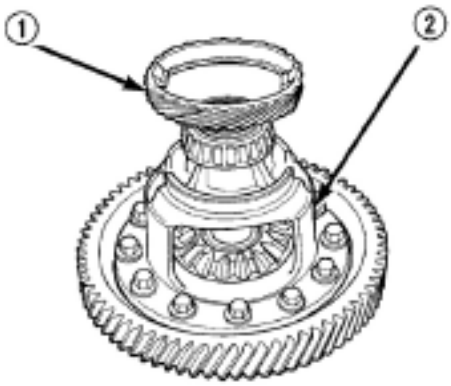


Figure 3-85 Disassembly of speed meter drive gear

1-speed meter drive gear 2-differential assembly

(4) Punch out pinion axle bumper pin with hammer and punch (Figure 3-86and Figure 3-87).

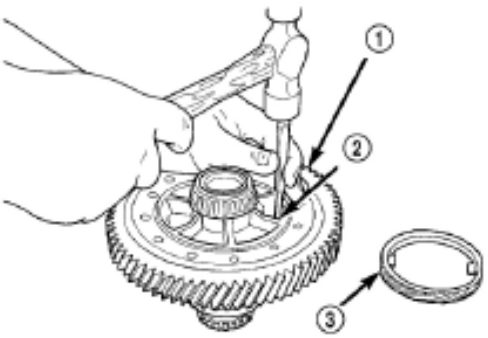


Figure 3-86 Removal of pinion axle bumper pin
1- ring gear 2-pinion axle bumper pin
3-speed meter drive gear

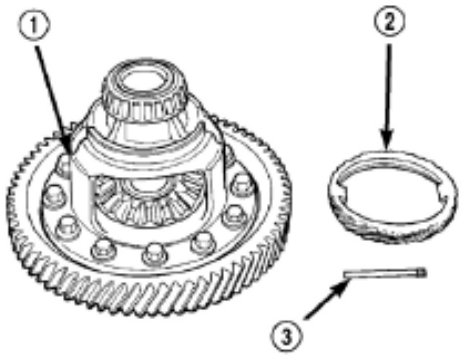


Figure 3-87 Disassembly of bumper pin
1-differential assembly 2-speed meter drive gear
3-pinion axle bumper pin

(5) Remove the pinion, side gear and thrust washer (Figure 3-88, Figure 3-89 and Figure 3-90).

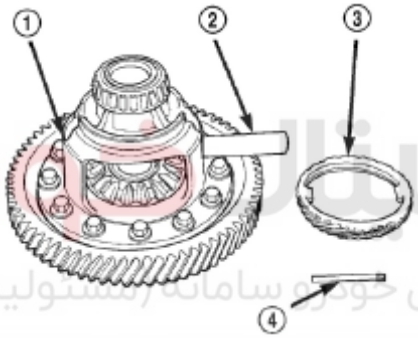


Figure 3-88 Disassembly of pinion axle
1-differential assembly 2-pinion axle
3-speed meter drive gear 4 -pinion axle bumper pin

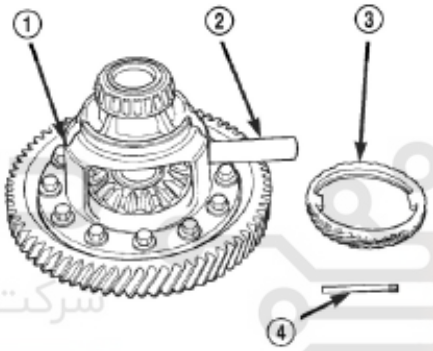


Figure 3-89 Disassembly of pinion, side gear and thrust washer
1-differential assembly 2-pinion shaft 3-speed meter drive gear
4 pinion axle bumper pin 5 pinion (2)

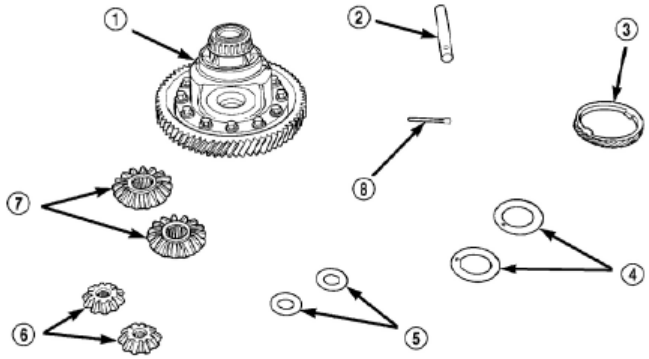


Figure 3-90 Differential parts
1-differential assembly 2-pinion shaft 3-speed meter drive gear 4-side gear thrust washer
5-pinion thrust washer 6-pinion 7-side gear 8-pinion shaft retainer

Assembly

(1) Install side gear, pinion and thrust washer in the casing through the opening and rotate them into the place (Figure 3-89and Figure 3-90).

(2) Assemble pinion shaft (Figure 3-88).

(3) Install the pinion axle bumper pin in place with hammer and punch (Figure 3-91).

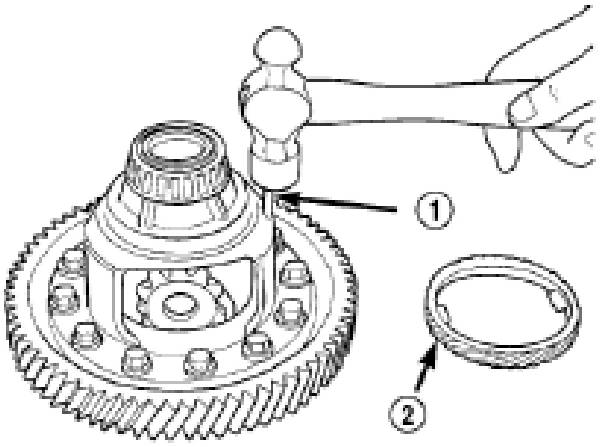


Figure 3-91 Assembly of bumper pin

1-pinion axle bumper pin 2-speed meter drive gear

(4) Profile and punch the casing to fix bumper pin (Figure 3-92).

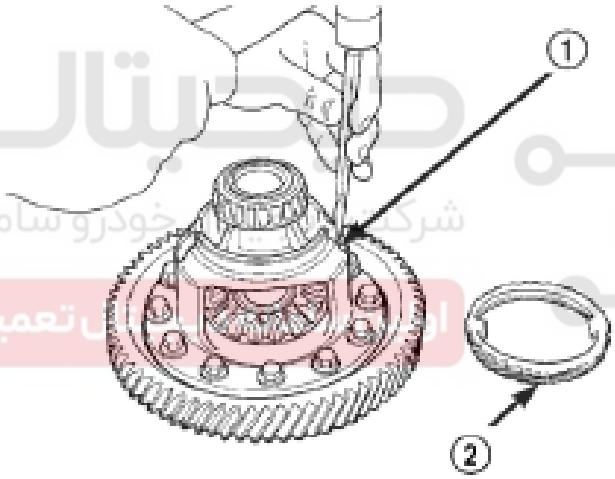


Figure 3-92 Fix stopper

1-pinion axle bumper pin 2-speed meter drive gear

(5) Use hand press, lever C-4171 and tool L-4410 to press differential side bearing into the ring gear and casing (Figure 3-93and Figure 3-94).

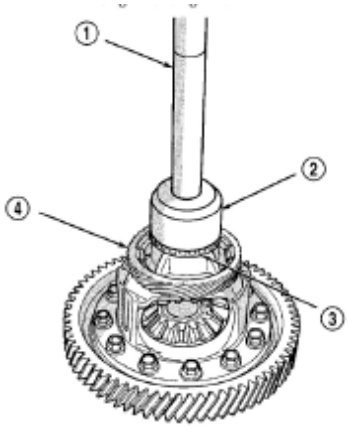


Figure 3-93 Installing differential bearing taper sleeve around differential casing

1-Dedicated tool C-4171 2-Dedicated toolL-4410

3-bearing taper sleeve 4-speed meter drive gear

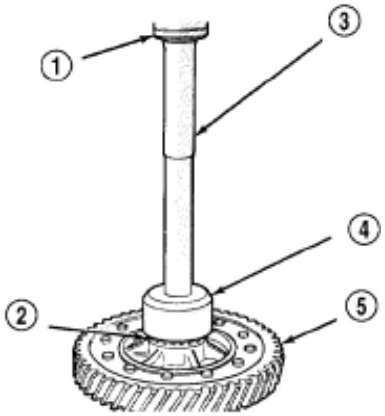


Figure 3-94 Installing differential bearing taper sleeve around ring gear

1-hand press head 2-bearing taper sleeve

3-Dedicated tool handle C-4171

4-Dedicated toolL-4410 5-differential assembly

(6) Mount the speed drive gear on the casing (Figure 3-95).

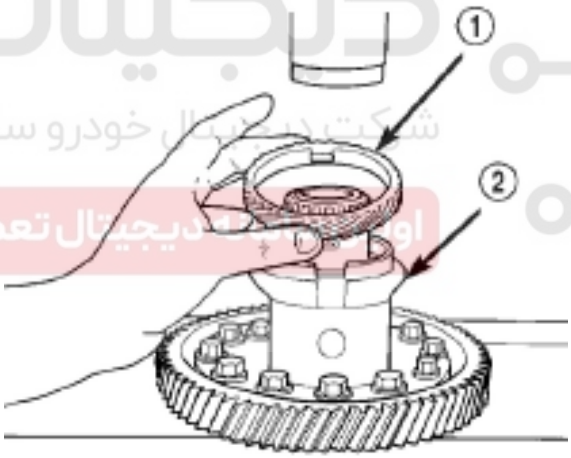


Figure 3-95 Speed meter drive gear

(7) Press the speed drive gear into differential casing with hand press, bloom and tool L-4440 (Figure 3-96 and Figure 3-97)

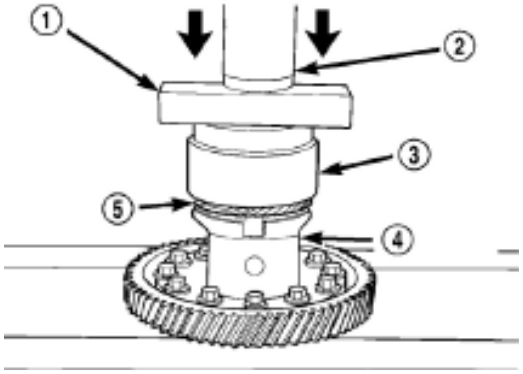


Figure 3-96 Pressing gear into differential

1-ball 2-press head 3-Dedicated tool L-4440

4-differential assembly 5-speed meter drive gear

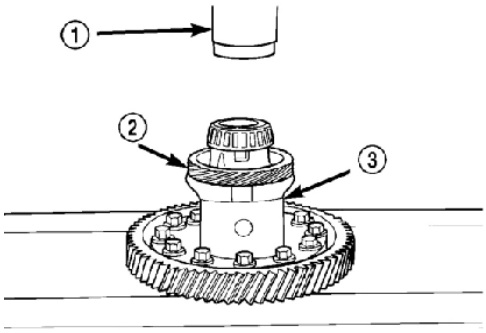


Figure 3-97 Pressing differential drive gear

1-press head 2-speed meter drive gear

3-differential assembly

(8) Place the ring gear in the differential casing and screw on new bolts at the tightening torque 81Nm (60ft.lbs.) (Figure 3-98)

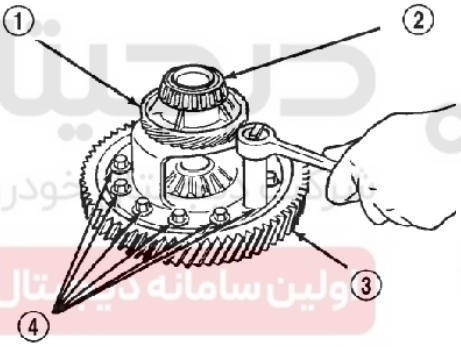


Figure 3-98 Assembly of ring gear and bolt

1-speed meter drive gear 2-bearing 3- ring gear 4- ring gear bolt

Measure and adjust the end gap of side gear.

1. Rotate the assembly clockwise and counterclockwise for two turns and assemble the dial gauge as shown in the Figure and record the end gap (Figure 3-99and Figure 3-100). Rotate the side gear for 90° and record another measurement, then rotate the side gear for 90° more and record the final measurement.

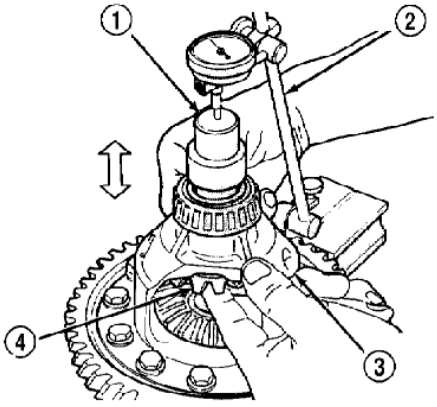


Figure 3-99 Checking the end gap of side gear (typical)
1-Dedicated toolC-4996 (pay attention to the location) 2-dial gauge seat 3-differential assembly 4-side gear

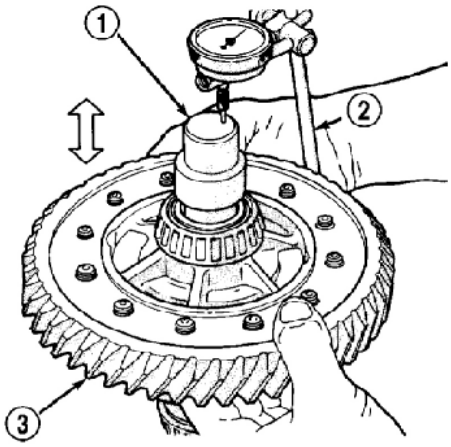


Figure 3-100 Checking the end gap of side gear—typical
1-Dedicated tool C-4996 (pay attention to the location) 2-dial gauge seat 3-differential assembly

Keep the end gap of side gear within 0.001 ~ 0.013 inch with recorded minimum end gap plus gasket and check other side gears in the same process.

Warning: the end gap of side gear must be kept within 0.001 ~ 0.013 inches. There're 5 choices of thrust washer: 0.027, 0.032, 0.037, 0.042 and 0.047 inch.

Adjustment

Adjustment of differential bearing preload /selection of gasket

To maintain transaxle, especially to replace following parts, differential side bearing preload shall be measured and adjusted:

·Transaxle gear box

·Clutch outer race

·Differential casing

·Differential bearing

Note: it is the only way to get accurate bearing rotating torque value by disassembling gearing in the casing.

(1) Remove bearing cap and existing gasket out of clutch outer race.

(2) Push the new bearing cap into the outer race (or use a polished bearing cap as it is easy to measure).

(3) Press the new bearing cap into the gear box edge.

(4) Refill differential bearing with transmission oil. Install differential assembly in the transaxle gear box and clutch outer race on the gear box, then assemble and screw down bolt to the torque 29 Nm (21 ft. lbs.).

(5) Put the transaxle on the operating bench with C-shaped fixture, with the outer race downward and mount the dial gauge.

Note: the position of dial gauge shown in Figure 3-101 is only for schematic purpose. The dial gauge shall be parallel with tap holder to get the most accurate value.

(6) Apply moderate down force to the differential with tool C-4995 and tap holder to rotate it for several times so that the bearing will be stabilized, then clear dial gauge. To obtain the value of end gap, rotate the differential back and fro and apply a moderate down force and write down end gap value (Figure 3-101).

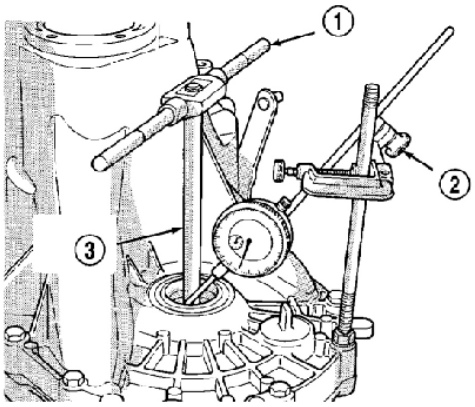


Figure 3-101 Checking end gap of differential bearing and determining the thickness of gasket

1-tap holder 2-Dial gauge seat 3-Dedicated tool C-4995

(7) The proper bearing preload for gasket equals to the total end gap plus (constant) 0.18mm (0.007 in.). Never combine the gasket to get required preload.

(8) Screw off the casing bolt and remove differential bearing cap on clutch outer race, and then assemble the gasket selected in step 7 and press the bearing cap into the outer race.

(9) Assemble the clutch outer race, then assemble and screw down bolt to the torque 26 Nm (19 ft. lbs.).

(10) Check the rotating torque of differential assembly with dedicated tool C-4995 and inch –pound torque spanner (Figure 3-102). The rotating torque should be 6～12 in. lbs.. In case of excess rotating torque, change another gasket 0.05mm (0.002 in.) thinner; in case of inadequate rotating torque, change another gasket 0.05mm (0.002 in.) thicker.

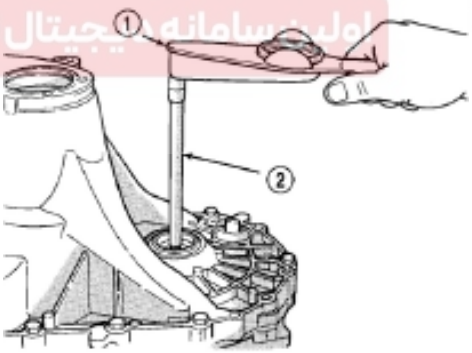


Figure 3-102 Checking the rotating torque of differential bearing

1-inch –pound torque spanner 2-Dedicated tool C-4995

(11) Check the rotating torque again and repeat step 10 till proper rotating torque is obtained.

Differential bearing cap

Disassembly

(1) Following the process to remove differential assembly out of gear box.

(2) Install Millertool L-4518 in the bearing cap (Figure 3-103).

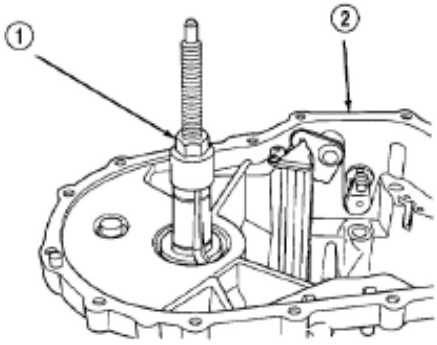


Figure 3-103 Tool mounted on the bearing

1-Dedicated tool L-451 2-gear box

(3) Cover the tool cap on the tool (Figure 3-104).

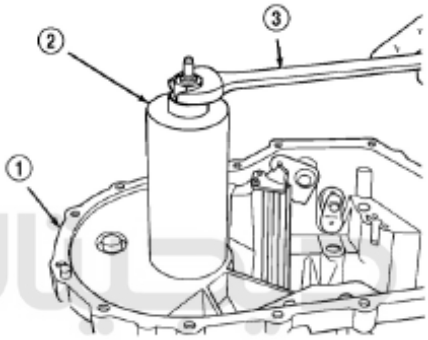


Figure 3-104 Assembly of tool cap

1-gear box 2-Dedicated tool L-4518 3-spanner

(4) Fasten the tool to pull out bearing collar from the casing.

Assembly

(1) Place the bearing cap in the casing.

(2) Mount the bearing cap on Millertool L-4520 and puller C-4171 and assemble differential bearing cap in the transaxle.

Transaxle lubricant

Standard process—oil drain and refueling

Equip an oil filler plug for every transaxle, which is located on the left of transaxle differential (Figure 3-105). The oil level shall be set within 3/16 inches below transaxle filler (the vehicle must be placed level for check).

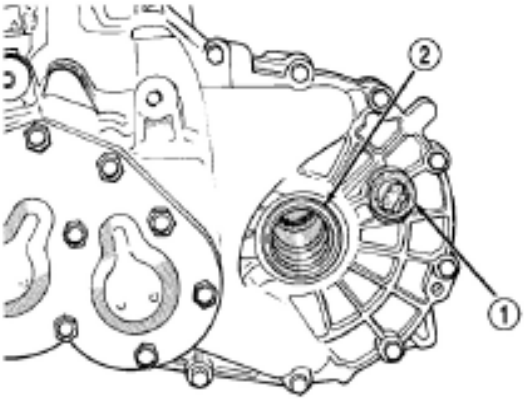


Figure 3-105 Location of oil filler plug

1-rubber oil filler plug 2- left drive shaft oil seal

Equip a fuel drain plug for every transaxle, which is located on the lower right of transaxle differential casing (Figure 3-106).The tightening torque for fuel drain plug is 28Nm (250 in. lbs.).

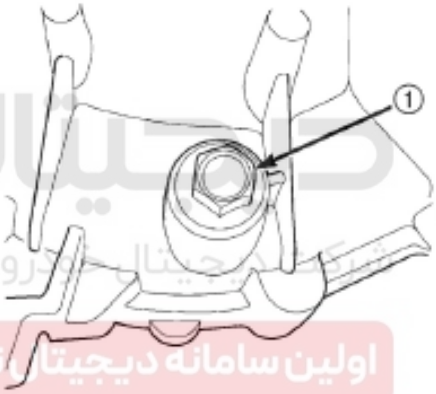


Figure 3-106 Location of fuel drain plug

1-fuel drain plug

As for refueling capacity of transaxle, see the following table. In case of any splash of lubricating oil, wipe the transaxle clean.

Fuel charge of manual transaxle

Transaxle	Model	Metric	U.S.
NV T350	Mopar ATF	2.4—2.7 升	2.5—2.8 quart
5T16			
H311.5A			

Transmission cable

Disassembly

Note: the selector and shift cable is manufactured in an integral cable “assembly” and thus shall not be used individually.

(1) Lift the hook and remove battery negative cable.

(2) Remove selector lever knob.

(3) Remove shifting sleave and sleave gasket (Figure 3-107).

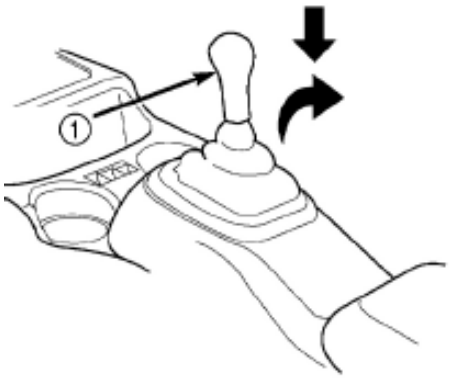


Figure 3-107 Disassembly of shift lever knob/dust cove

1-shift lever knob

(4) Remove auxiliary fascia console assembly (Figure 3-108).

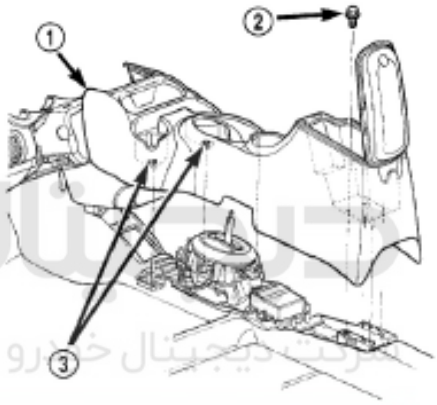


Figure 3-108 Auxiliary fascia console assembly

1-auxiliary fascia console 2-bolt (4) 3-bolt (2)

(5) Remove selector cable clamp out of the support (Figure 3-109).

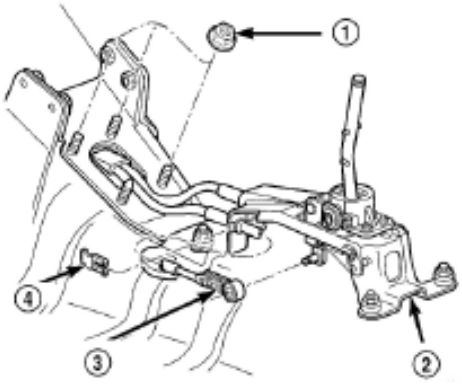


Figure 3-109 Switching cable on the transmission assembly

1-plain screw cap 2-transmission 3-switching cable 4-clamp

(6) Remove selector cable clamp out of the support (Figure 3-110).

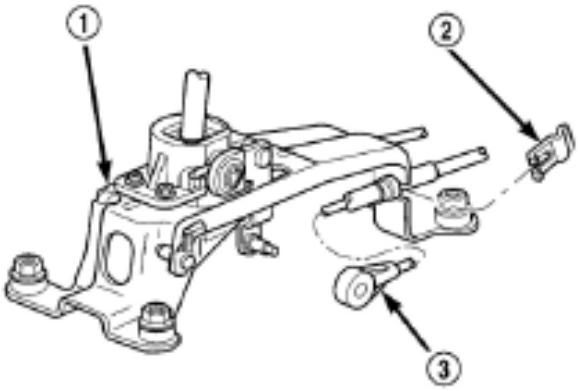


Figure 3-110 Selector cable on transmission assembly

1-transmission 2-clamp 3-selector cable

(7) Screw off 4 fixing nuts for support and floor (Figure 3-116).

(8) Disassemble air cleaner/battery (Figure 3-111):

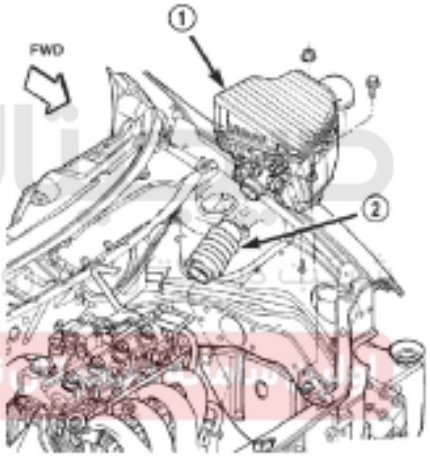


Figure 3-111 Disassembly/assembly of air cleaner assembly

1- air cleaner assembly 2-throttle body pipe

(9) Remove the cable out of shift lever on the transaxle (Figure 3-112).

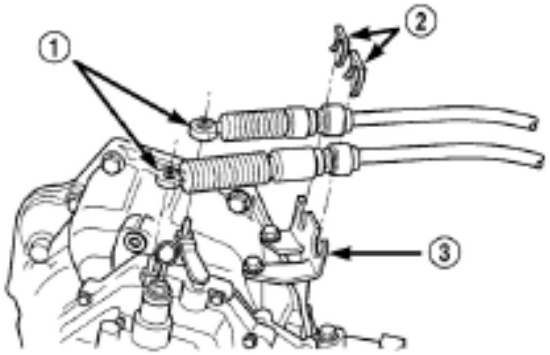


Figure 3-112 Gear shift cable on transaxle

1-gear shift cable 2-clamp 3-support

(10) Lift up the vehicle.

(11) Remove converter heat shield (Figure 3-113).

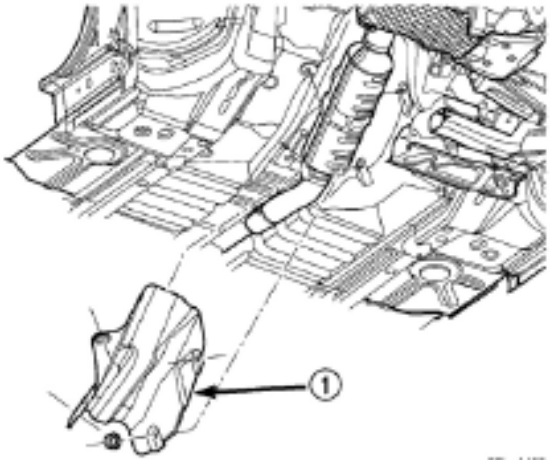


Figure 3-113 Disassembly/assembly of converter heat shield

1-converter heat shield

(12) Screw off fixing plain bolt for orifice plate and floor (Figure 3-114).

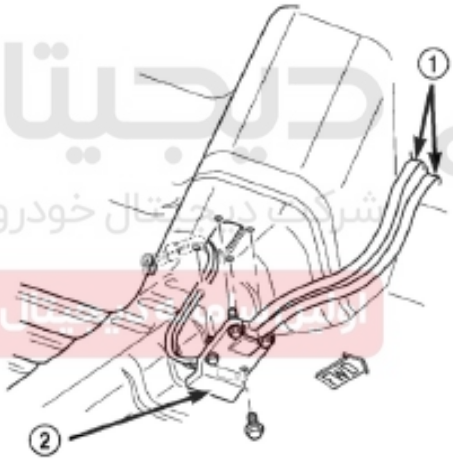


Figure 3-114 Gear shift cable assembly on the floor

1-cable assembly 2-orifice plate

(13) Remove the cable assembly out of the vehicle.

Assembly

(1) Lift up the vehicle.

(2) Install the cable assembly through the floor opening and fix it on the floor with orifice plate and a bolt (Figure 3-114). Make sure the 3 bolts for orifice plate cable stretches out through the assembly and floor and the bolt tightening torque is 7Nm (60 in. lbs.).

(3) Enable the cable assembly to bypass transaxle assembly on the transaxle end and be introduced into the engine cabin.

(4) Assemble the converter heat shield (Figure 3-113).

(5) Set down the vehicle.

(6) Mount the gear shift cable assembly on the support and fasten it with new clamp (Figure 3-114), make sure the new clamp is parallel and level with support assembly.

(7) Connect the transmission and switching cable to the transaxle shift lever (Figure 3-112).
(8) Assemble and screw down the 3 screw caps for orifice plate and floor at the tightening torque 6Nm (50 in. lbs.).
(9) Assemble the gear shift cable on the shift lever and fix it on the transmission support, then mount the fixing clip (Figure 3-110).
(10) Assemble the switching cable on the shift lever and fix it on the transmission support, and then mount the fixing clip (Figure 3-110).
Note: Only the switching cable is adjustable and the gear shift cable is by no means adjustable.
(11) Adjust the switching cable in the following process:
(a) Unscrew the regulating bolt on the transmission switching cable.
(b) The gearshift and transaxle switching lever is of spring and self-aligning type. It is not necessary to align the pin which was used before and let the gearshift and transaxle switching lever on neutral position. Make sure the shift lever is placed in proper position. When necessary, push the transmission to gear 3 and 4. The tightening torque of regulating bolt is 8Nm (70 in. lbs.). To screw down bolt, take care to prevent misalignment of the transmission mechanism.
(c) Switch the transaxle to all gears to check its function.
(12) Install the center console assembly (Figure 3-108) and confirm that the dust cover is not pressed on the opening of center console before fixing it.
(13) Mount the gear change hand lever /dust cover assembly on the support saddle. The knob shall be placed in the position shown in the Figure by push it downward to combine the spring and screwing it in clockwise (Figure 3-107).
(14) Fix the sleave gasket on the auxiliary fascia console.
(15) Put the transmission cover back to the original position (around the knob orifice).
(16) Assemble air cleaner /battery;
(17) Connect battery negative cable.
Adjustment
Note: Only switching cable is adjustable while by no means the gear shift cable.
(1) Take apart fixed tab of transmission cover from the center console,
(2) Push down the gear change hand lever and rotate it clockwise, then remove gearshift dust cover/knob assembly (Figure 3-115).

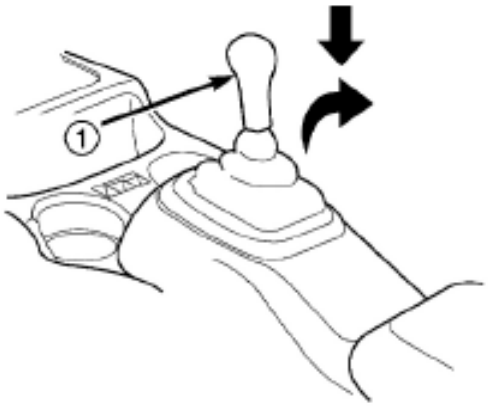


Figure 3-115 Disassembly of gear change hand lever/dust cover
1-gear change hand lever

(3) Remove the center console assembly (Figure 3-116).

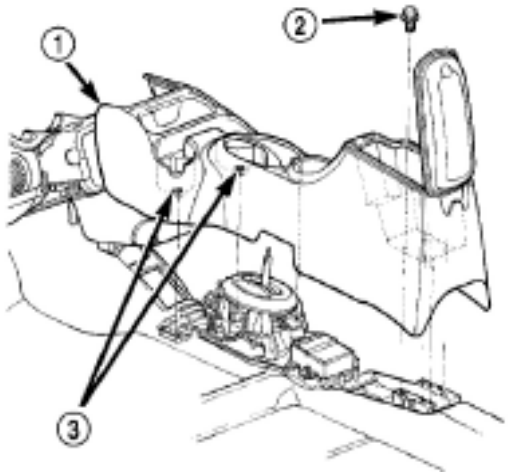


Figure 3-116 Disassembly/assembly of center console —typical

1-console 2-bolt (4) 3-bolt (2)

(4) Unscrew the switching regulating bolt for transmission assembly (Figure 3-117).

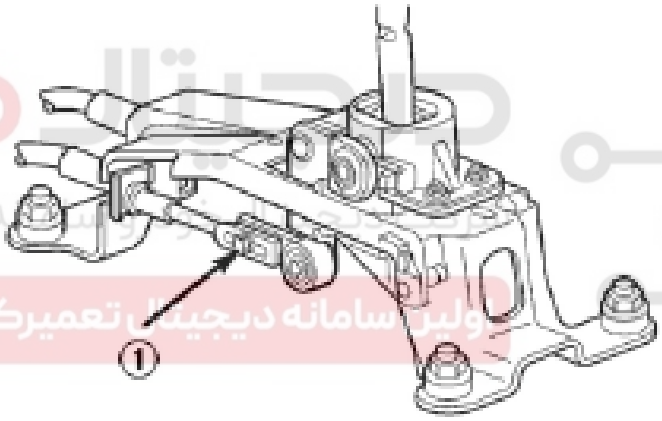


Figure 3-117 Switching adjusting bolt

1-switching adjusting bolt

(5) The gearshift and transaxle switching lever is of spring and self-aligning type. It is not necessary to align the pin which was used before and leave the gearshift and transaxle switching lever on neutral position. Make sure the shift lever is placed in proper position. When necessary, push the transmission to gear 3 and 4. The tightening torque of regulating bolt is 8Nm (70 in. lbs.). To screw down bolt, take care to prevent misalignment of the transmission mechanism.

(6) Assembly center console assembly (Figure 3-116).

(7) Mount the transmission dust cover/knob assembly on the shift lever and push down the knob to combine the spring, and then screw it in counterclockwise.

(8) Clamp the transmission dust cover clinch on the center console.

Gear change hand lever /dust cover assembly

Disassembly

(1) Raise and release the clamp and take apart the dust cover from center console.

(2) Push down the knob and screw it clockwise to remove it (Figure 3-115).

Assembly

(1) Mount the dust cover/knob assembly on the shift lever. The knob shall be placed on 3 o'clock position, push it down to combine and spring and screw it in clockwise.

(2) Mount the dust cover on the fore vane and clamp it with fastener.

Input bearing and bushing

Disassembly

The input bearing is an integral bearing and bushing (Figure 3-118). The bushing is applied to the clutch release bearing and lever slider.

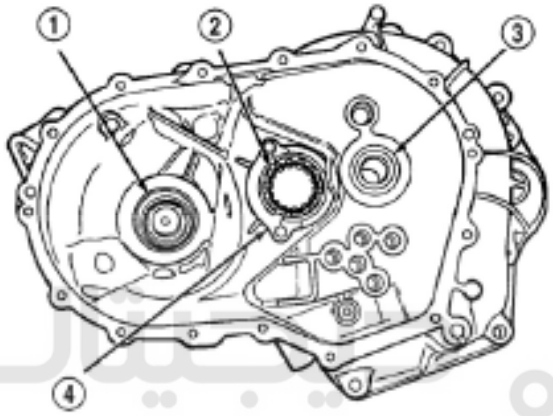


Figure 3-118 Input bearing and bushing

1-differentialbearing 2-output bearing 3-input bearing 4-bearing retainer

(1) Cover tool 6342 on the input bearing beside the transaxle clutch casing gear box.

(2) Press the input bearing out of the casing (Figure 3-119).

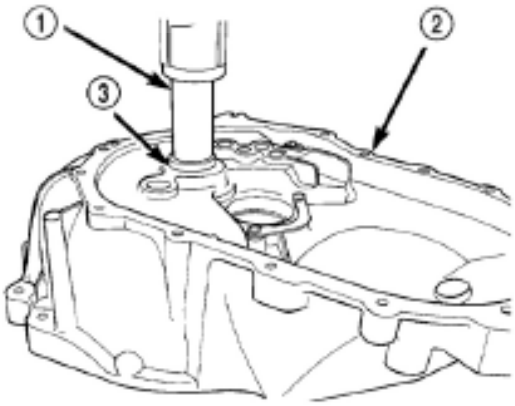


Figure 3-119 Disassembly of input bearing

1- dedicated tool 6342 2-outer race 3-input bearing and bushing

Assembly

(1) Apply a layer of Loctite® sealant on the outer diameter of bearing place bushing and shaft assembly into the input bearing hole.

(2) Cover the input bearing with tool C-4680-1 (Figure 3-120).

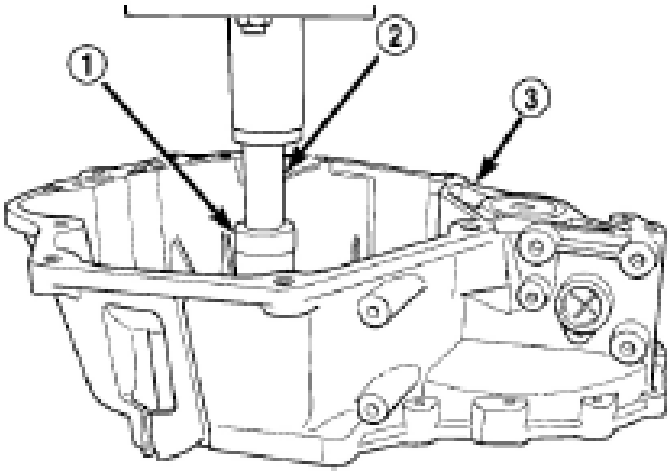


Figure 3-120 Input bearing instrument

1-Dedicated tool C-4680-1 2 -Dedicated tool 4894 3-outer race

(3) Screw the input bearing into the whole completely with sleeve gasket tool 4898 and press (Figure 3-121).

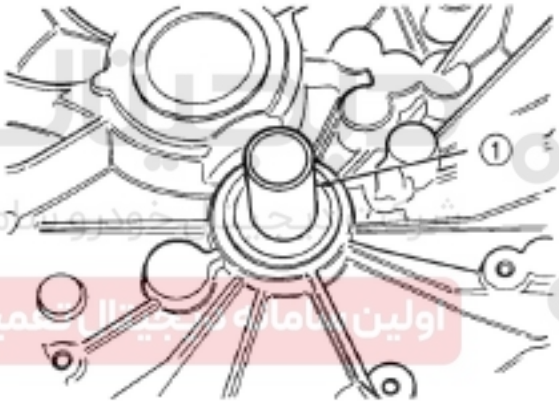


Figure 3-121 Assembly of input bearing

1-bushing and bearing assembly

Input shaft

Disassembly

Before the disassembly of input shaft, check the clearance of synchronizer stop ring and measure gap between stop ring and transmission gears with feeler gauge. The correct clearance is shown below:

·Gear 1 — 0 .522-2.208 mm (0.021-0.087 in.)

·Gear 2 — 0 .522-2.208 mm (0.021-0.087 in.)

·Gear 3 — 0 .73-1.53 mm (0.029-0.060 in.)

·Gear 4 — 0 .77-1.57 mm (0.030-0.062 in.)

·Gear 5 — 0 .73-1.53 mm (0.029-0.060 in.)

In case the clearance for any stop ring is not covered, it is essential to check if there's any wear ad replace it. In the event that the first or second gear synchronizer stop ring is worn out beyond the standard, the whole output shaft assembly must be replaced.

The input shaft is equipped with the third, fourth and fifth transmission gear and synchronizer (Figure 3-122).

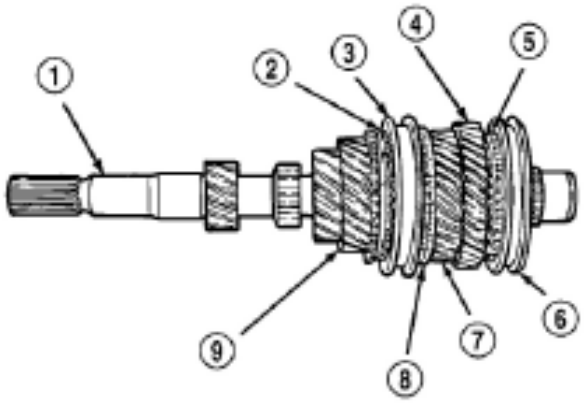


Figure 3-122 Input shaft

1-input shaft 2-stop ring 3-bushing 4- fifth transmission gear 5-stop ring 6-bushing 7- fourth transmission gear 8-stop ring 9- third transmission gear

(1) Mount the bearing dissociator behind the fifth transmission gear and remove the snap ring on the fifth gear synchronizer cover around the input shaft (Figure 3-123).

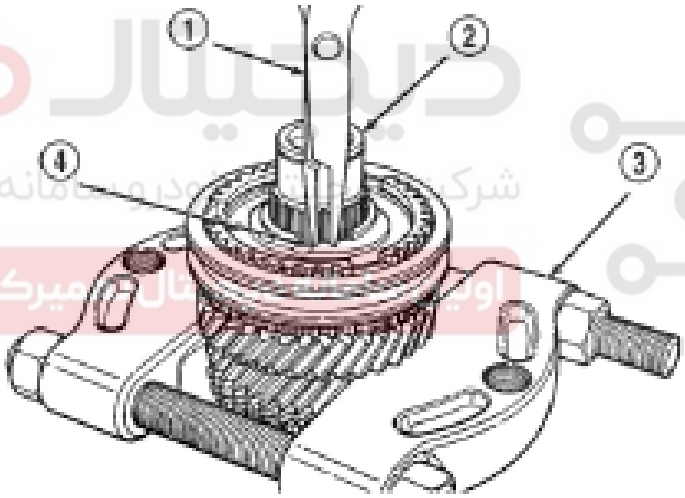


Figure 13-123 Disassembly of snap ring for the fifth synchronizer and cover

1- spring pliers 2-input shaft 3-bearing dissociator 4- snap ring

(2) Remove synchronizer and gear with a press (Figure 3-124).

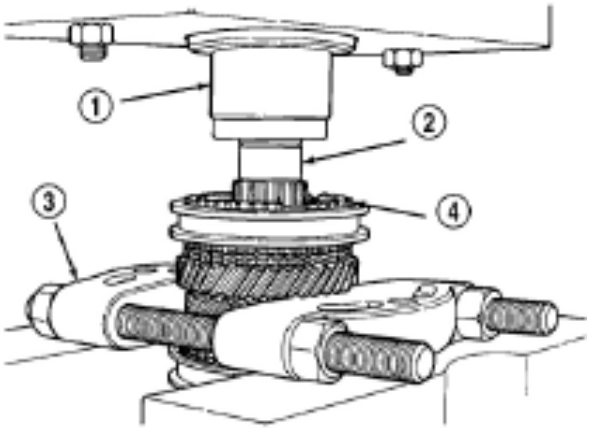


Figure 3-124 Removal of synchronizer with press

1-press head 2-input shaft 3-bearing dissociator 4-synchronizer assembly

(3) Remove the caged needle bearing (Figure 3-125).

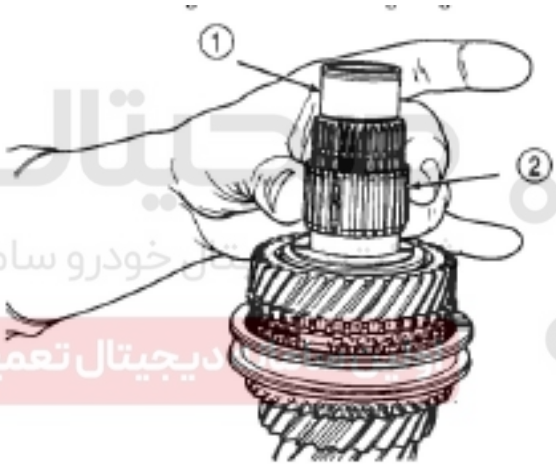


Figure 3-125 Disassembly of needle bearing

1-input shaft 2-needle bearing

(4) Remove the fourth and fifth split thrust washer stopper (Figure 3-126).

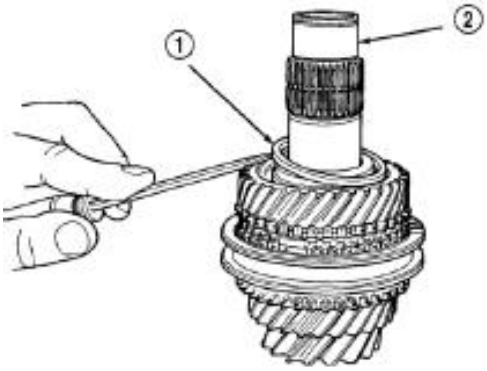


Figure 3-126 Split thrust washer stopper

1-split thrust washer stopper 2-input shaft

(5) Remove the split thrust washer (Figure 3-127).

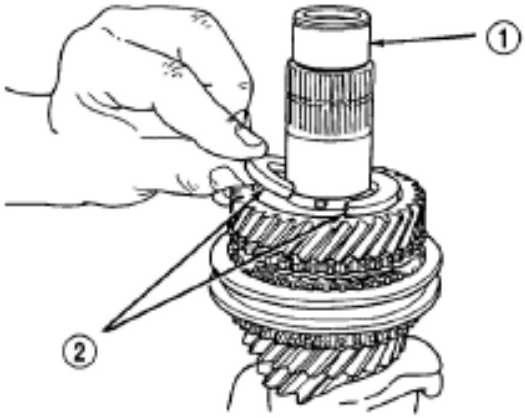


Figure 3-127 Disassembly of split thrust washer

1-input shaft 2-split thrust washer

(6) Pull out the spacer pin for split thrust washer (Figure 3-128).

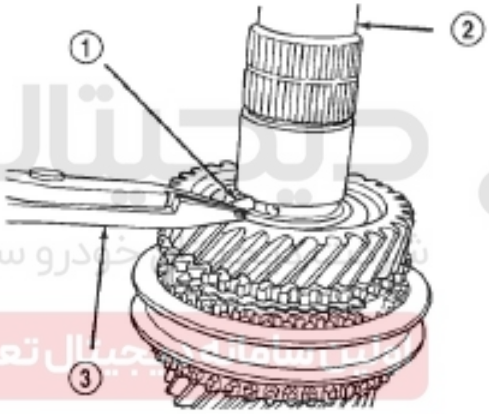


Figure 3-128 split thrust washer spacer pin

1- spacer pin 2-input sleeve 3-pliers

(7) Remove the fourth gear (Figure 3-129).

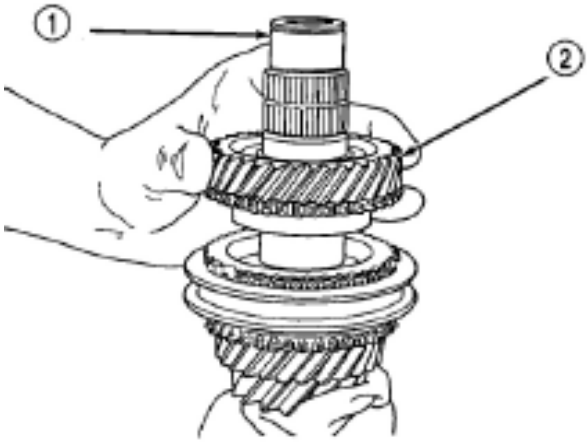


Figure 3-129 Disassembly of the fourth gear

1-input shaft 2- fourth gear

(8) Remove the fourth gear needle bearing (Figure 3-130).Check the needle bearing to see if the cage is broken or cracked.

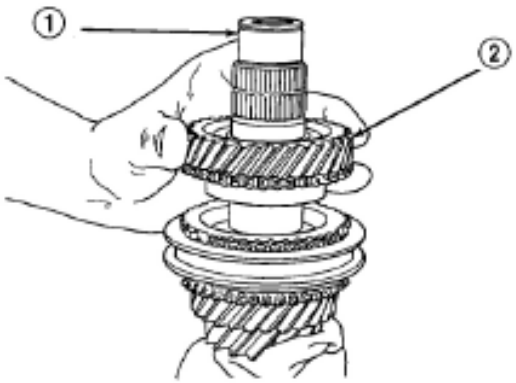


Figure 3-130 Disassembly of needle bearing

1-input shaft 2- caged needle bearing

(9) Remove the stopper ring and snap ring for 3-4synchronizer sleeve (Figure 3-131).

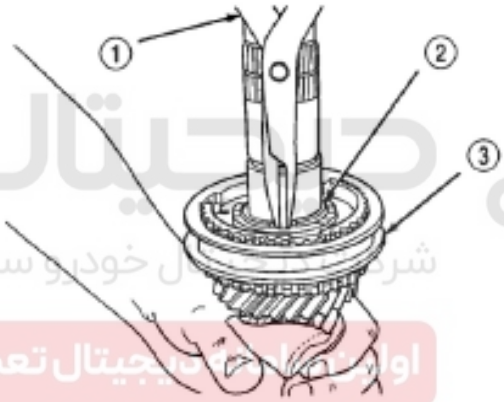


Figure 3-131 snap ring for synchronizer casing

1- spring pliers 2-snap ring for synchronizer casing 3-synchronizer assembly

(10) Mount the input shaft on the press and remove the 3-4 synchronizer and third gear with bearing dissociator (Figure 3-132).

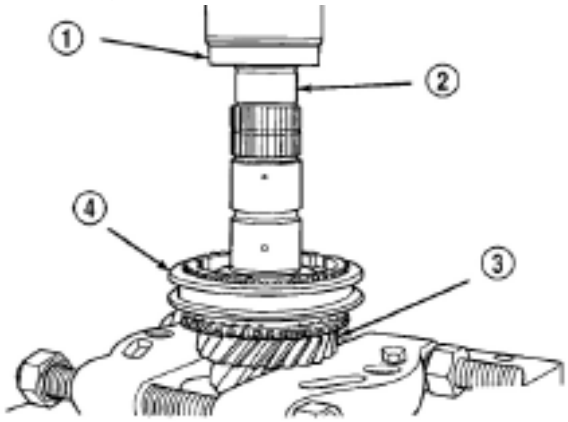


Figure 3-132 Disassembly of the third gear

1-press head 2-input shaft 3-third gear 4-synchronizer assembly

(11) Remove the third gear needle bearing (Figure 3-133) and check the needle bearing to see if the cage is cracked or broken.

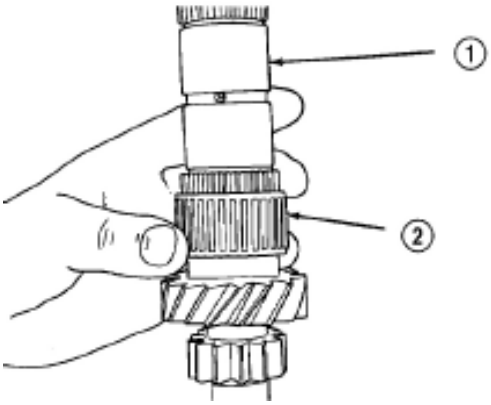


Figure 3-133 needle bearing of the third gear

1-input shaft 2- third gear caged needle bearing

(12) Check if the input shaft is worn, if the bearing race is broken and if the gear teeth are exfoliated and replace them as the case may be.

Assembly

The snap ring for input shaft shall be chosen carefully for proper specification and the thickest snap ring which can be equipped in every snap ring groove shall be used.

(1) Mount the input shaft on the press.

(2) Assembly third gear的needle bearing (Figure 3-134).

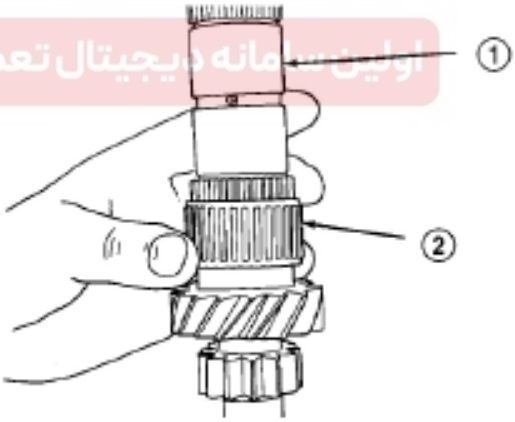


Figure 3-134 Needle bearing of the third gear

1-input shaft 2- third gear caged needle bearing

(3) Install the third gear and 3-4 synchronizer on the input shaft and cover the input shaft with tool C-3717, then press the synchronizer teeth hub and third gear (Figure 3-135). Synchronizer teeth hub is printed with letter “U” indicating the U side must be placed up during assembly.

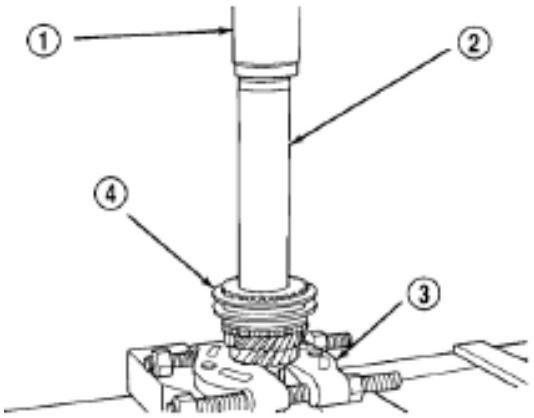


Figure 3-135 Press mounting the third gear and synchronizer gear hub

1-press head 2-Dedicated toolC-3717 3-bearing dissociator 4- third gear synchronizer assembly

(4) Assemble the snap ring for 3-4 synchronizer in the input shaft groove.

(5) Install the stopper ring in 3-4 synchronizer and the fourth gear needle bearing.

(6) Assemble the fourth gear on the input shaft.

(7) Assemble the spacer pin for 4-5 split thrust washer (Figure 3-136).

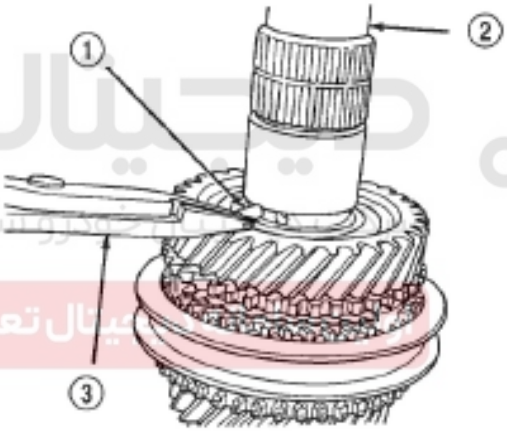


Figure 3-136 Spacer pin for split thrust washer

1- spacer pin 2-input shaft 3- pliers

(8) Mount the split thrust washer on input shaft (Figure 3-137).

Figure 3-137 Assembly of split thrust washer

1-input shaft 2- split thrust washer

(9) Assemble the split thrust washer stopper (Figure 3-138).

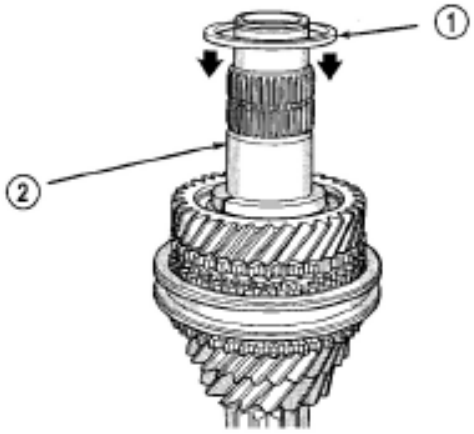


Figure 3-138 Assembly of stopper

1-split thrust washer 2-input shaft

(10) Assemble needle bearing for the fifth gear (Figure 3-139).

Figure 3-139 Assembly of caged needle bearing

1-input shaft 2- caged needle bearing

(11) Assemble the fifth transmission gear and synchronizer with dedicated tool C-3717 (Figure 3-140). The fifth gear synchronizer cover is printed with a letter “S” indicating that it shall be placed with S side upward.

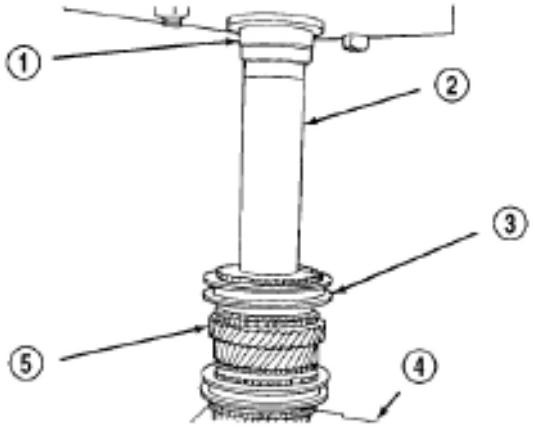


Figure 3-140 Assembly of the fifth transmission gear

1-press head 2-Dedicated tool C-3717 3-synchronizer assembly 4 bearing dissociator 5 fifth transmission gear

(12) Assemble snap ring for the fifth gear synchronizer (Figure 3-141).

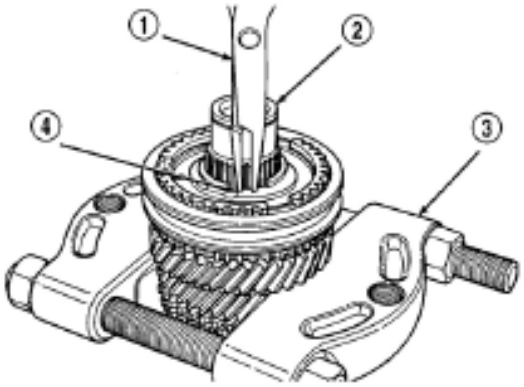


Figure 3-141 Installation of the 5th gear synchronizer clasp

1-spring forceps 2-input shaft 3-bearing resolver 4-clasp

Output bearing and race

Disassembly

Warning: harsh and rigid requirements are placed on the location of output shaft bearing as the bearing is not completely of end-to-end type. In the process of assembly, keep the cage of larger diameter outward.

(1) Remove caged roller bearing out of output bearing race (Figure 3-142).

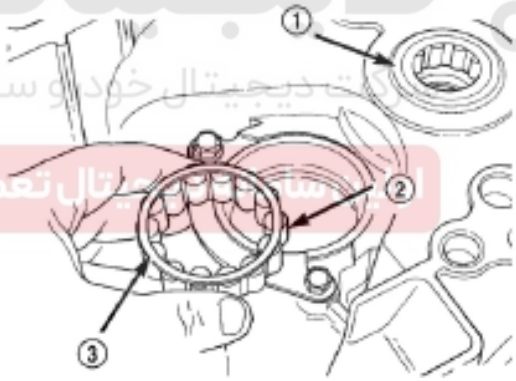


Figure 3-142 Output roller bearing

1-input bearing 2-output bearing 3-retainer with large diameter

(2) screw off output bearing baffle的bolt (Figure 3-143).

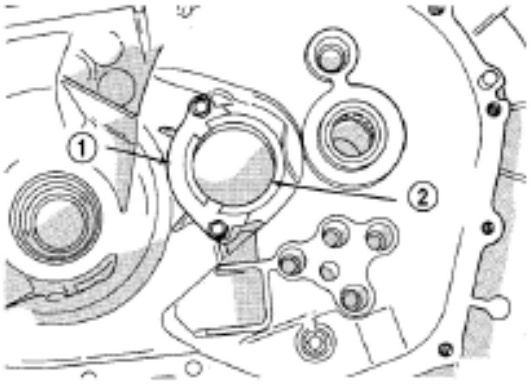


Figure 3-143 output bearing baffle

1-bearing baffle 2-output bearing race

(3) Assemble tool 6787 and rolling weight (Figure 3-144) and tighten the tool to output bearing race.

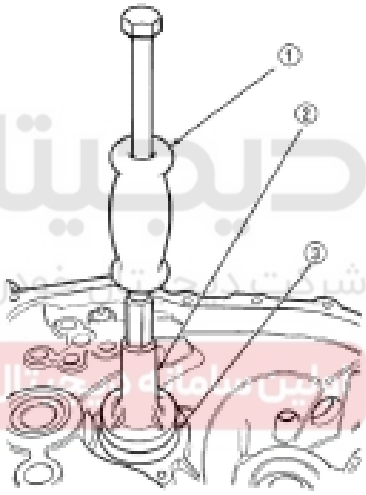


Figure 3-144 output bearing race 的 Disassembly

1-C-3752 2-Dedicated tool6787 3-output shaft bearing race

(4) Remove output bearing race with rolling weight.

Assembly

(1) Align the output bearing race against the race hole.

(2) Mount tool 4628 and C-4171 on the output bearing race (Figure 3-145) and punch the race into the hole, then fix the output bearing on the race and confirm the cage of larger diameter is placed outward, finally put the bearing baffle in place and screw down bolts to the torque 11Nm (96 in. lbs.).

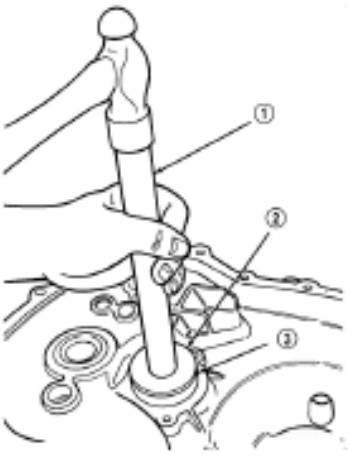


Figure 3-145 output bearing race的Assembly

1-tool C-4171 2-tool C-4628 3-output bearing race

Output shaft

Disassembly

Warning: output shaft assembly shall be maintained as an integral assembly. Don't ever try to repair any part on the output shaft. In case the 1-2 synchronizer or gear fails, the entire output shaft assembly shall be replaced.

Check the clearnace of synchronizer stop ring and measure the space between stop rings and transmission gears with feeler gauge. Correct clearance is shown below:

·Gear 1 — 0 .522-2.208 mm (0.021-0.087 in.)

·Gear 2 — 0 .522-2.208 mm (0.021-0.087 in.)

·Gear 3 — 0 .73-1.53 mm (0.029-0.060 in.)

·Gear 4 — 0 .77-1.57 mm (0.030-0.062 in.)

·Gear 5 — 0 .73-1.53 mm (0.029-0.060 in.)

In case the clearance for any stop ring is not included, it is essential to check if it is worn and replace it. In the event that the first or second gear synchronizer stop ring is worn beyond requirement, it is required to replace the whole output shaft assembly.

The output shaft is equipped with the first and second transmission gear and synchronizer (Figure 3-146).

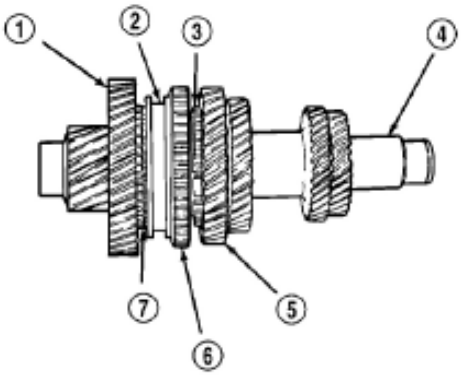


Figure 3-146 output shaft

1- first gear 2-bushing 3-stopring 4-output shaft 5- second gear 6- reverse gear 7-stop ring

Rear bearing oil supply tank

Disassembly

The bearing feeding tank on the casing is concealed by a pin and a few clips. The pin is molded on the casing while clip is a part of the tank (Figure 3-147).

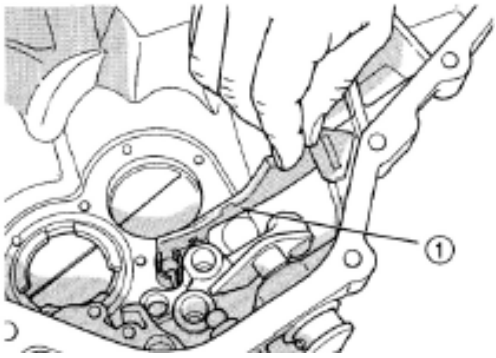


Figure 3-147 feeding tan

1-feeding tank

(1) Press the clips in the back of tank together with pies by little pressure.

(2) Make the tank slip over the stop pin which is a groove on the fixing casing.

Assembly

(1) Assemble feeding tank in counter sequence of disassembly.

Transmission switching lever

Disassembly

(1) Remove the switching cable from switching lever and cable support. See the disassembly and assembly of gear shift cable in this group.

(2) Punch the cylindrical pin out of switching lever with a punch.

(3) Pull the switching lever out of transaxle switching shaft (Figure 3-148).

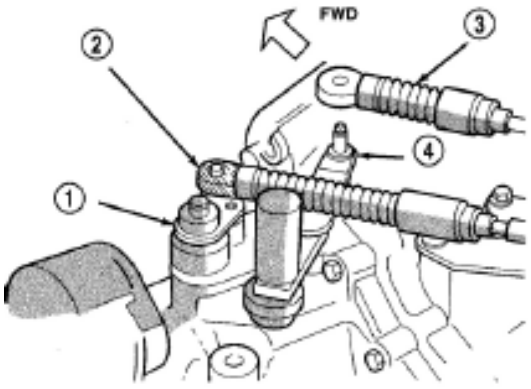


Figure 3-148 switching lever

1-switching lever 2-switching cable 3- shift cable 4-stick

Assembly

(1) Mount the switching lever on switching shaft and replace the cylindrical pin with a new one.

(2) Fix one end of switching cable on the support and clip it.

(3) Fix the other end of switching cable on the switching lever.

Transmission switching shaft

Disassembly

(1) Remove the transaxle.

(2) Remove switching shaft oil seal.

(3) Remove the snap ring in switching shaft hole with spring pliers (Figure 3-149).

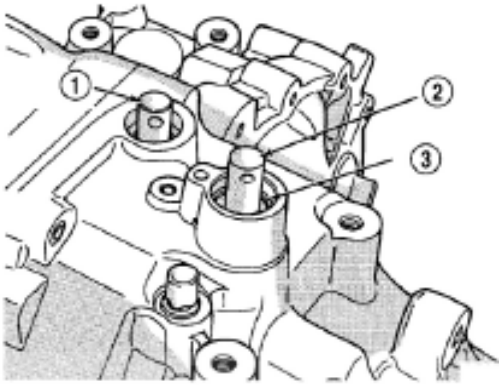


Figure 3-149 switching shaft circlip

1-shift shaft 2-switching shaft 3-circlip

(4) Push the switching shaft in the housing and remove switching shaft assembly.

Assembly

(1) Mount switching shaft in the housing and assemble the circlip (Figure 3-149).

(2) Assembly switching shaft oil seal.

(3) Assembly transaxle.

(4) Push the switching shaft in the housing and remove switching shaft assembly.

Transmission switching shaft bush

Disassembly

(1) Assemble rolling weight 3752 through switching shaft bushing.

(2) Screw in the screw cap and liner on the rolling weight.

(3) Remove the switching shaft bushing with rolling weight (Figure 3-150).

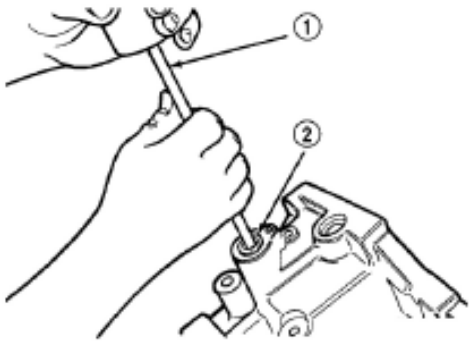


Figure 3-150 witching shaft bushing of Disassembly

1-rolling weight 2-switching shaft bushing

Assembly

(1) Fix the replaced switching shaft bushing in switching shaft bushing hole.

(2) Fix switching shaft bushing in switching shaft bushing hole with a cover of proper size.

Gearshift

Disassembly

(1) Lift up the sleave gasket for shift lever.

(2) Disassemble the knob and sleave gasket components for shifting (Figure 3-151).

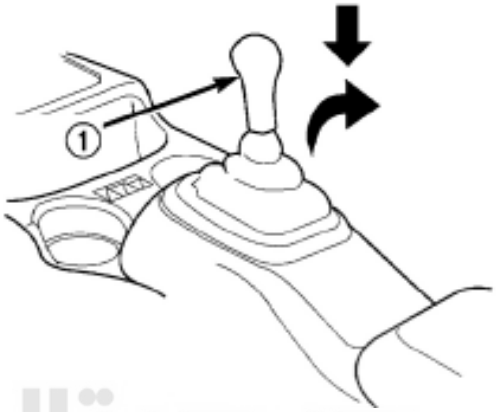


Figure 3-151 Removal of gearshifting handle/ dust boot

1-gearshifting handle

(3) Remove the auxiliary fascia console (Figure 3-152).

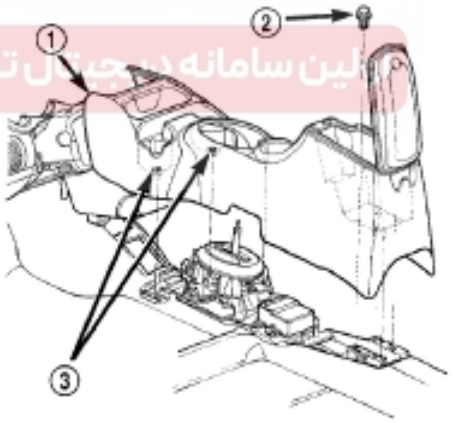


Figure 3-152 Auxiliary fascia console

1- Auxiliary fascia console 2-bolt (4) 3-bolt (2)

(4) Pick off the switching cable clamp and remove switching cable from the shift lever (Figure 3-153).

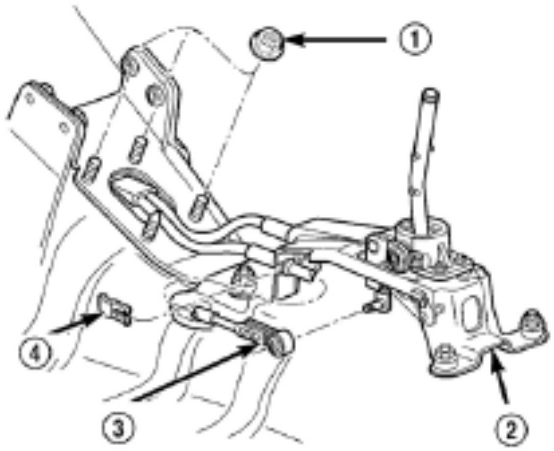


Figure 3-153 Switching cable on the shift base

1- plain screw cap 2-transmission 3-switching cable 4-clamp

(5) Pick off the selector cable clamp and remove selector cable from the shift lever (Figure 3-154).

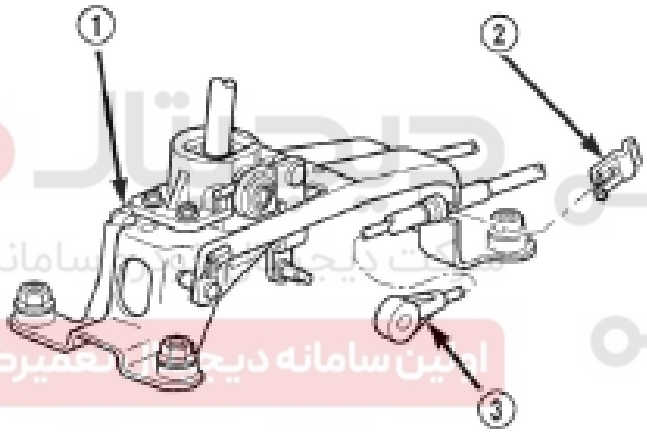


Figure 3-154 Selector cable on shift bracket

1-transmission 2-clamp 3-selector cable

(6) Screw off the 4 plain screw caps for transmission assembly and the floor and remove the shifting support assembly from the vehicle (Figure 3-155).

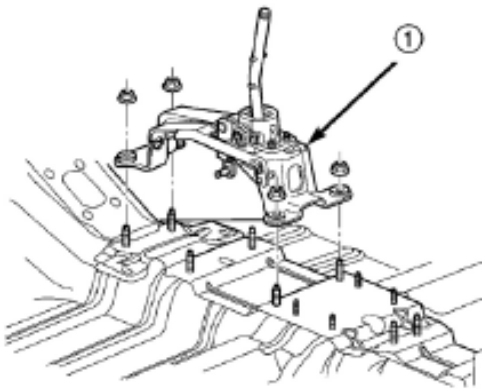


Figure 3-155 Disassembly/Assembly of shift bracket assembly

1 -transmission assembly

Assembly

(1) Mount the shifting support assembly on the floor (Figure 3-155). Place the 4 screw caps at tightening torque 12Nm (105 in. lbs.).

(2) Assemble the shift shaft assembly on the shifting support and mount the fixing clip (Figure 3-154).

(3) Assemble the shift shaft assembly on the shifting support and mount the fixing clip (Figure 3-153).

(4) Mount the auxiliary fascia console (Figure 3-152).

(5) Fix components of sleave with gasket on the shifting support and mount the sleave gasket on the auxiliary fascia console.

(6) Fix the shift lever knob on the shifting support.

(7) Verify if the gear is proper and normal.

Shift rail bushing

Disassembly

(1) Screw instrument 6786 in transmission bushing.

(2) Mount rolling weight 3752 on the instrument.

(3) Disassemble bushing with rolling weight and instrument assembly (Figure 3-156).

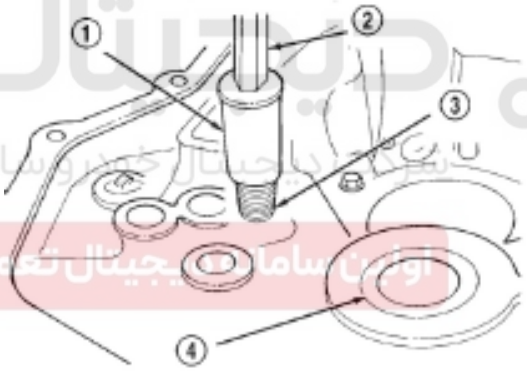


Figure 3-156 Disassembly of shift rail bushing

1-Dedicated tool6786 2-rolling weight C-3752 3-shift rail bushing 4-input bearing

Assembly

(1) Align the replaced bushing against the hole.

(2) Punch the bushing into the hole with instrument MD998343 till it is parallel and level with the cavity of housing.

Gearshift shaft

Disassembly

(1) Remove the transaxle.

(2)Take out the gearshift shaft.

Assembly

(1) Push the gearshift shaft in place from without inward.

(2) Assemble the transaxle.

Gearshift shaft bushing

Disassembly

(1) Remove the gearshift shaft in proper process.

(2) Screw instrument 6786 in bushing.

(3) Mount the rolling weight 3752 on the instrument and remove bushing with rolling weight (Figure 3-157).

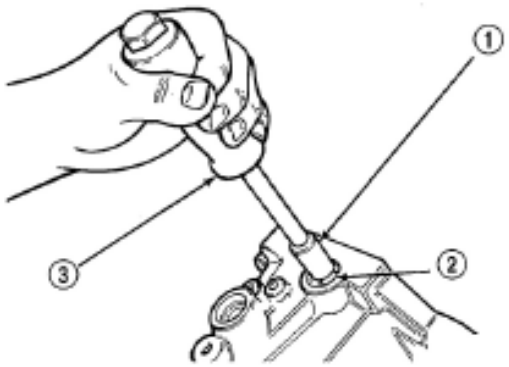


Figure 3-157 Disassembly of gearshift shaft bushing

1-Dedicated instrument 6786 2-gearshift shaft bushing rolling weight C-3752

Assembly

(1) Insert the replaced bushing in gearshift shaft hole.

(2) Press the bushing in gearshift shaft hole with a deep wall cover of proper size (Figure 3-158)

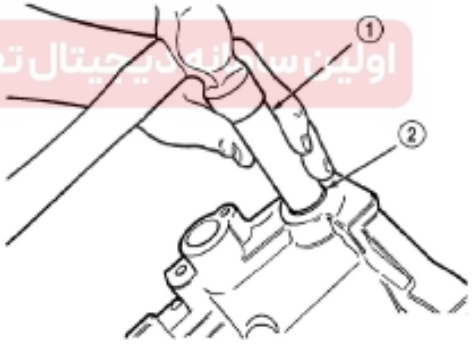


Figure 3-158 Assembly of gearshift shaft bushing

1- deep wall cover 2-gearshift shaft bushing

Gearshift shaft oil seal

Disassembly

It is not necessary to remove the gearshift shaft from transaxle to maintain the oil seal.

(1) Pry out the gearshift shaft oil seal with proper instrument and remove it from the hole.

Assembly

(1) Insert a new oil seal in gearshift shaft hole.

(2) Press oil seal into gearshift shaft hole with a deep wall cover of proper size.

Synchronizer

Disassembly

Put the synchronizer on a clean cloth and wrap it. Press the inner gear hub and unfold the cloth carefully, then remove the spring, ball, gear hub and combination set.

Cleaning

Don't clean the snap ring in solution because it will make the friction material contaminated. Put parts of synchronizer on proper bracket before clean it with solution and then dry it.

Check

Check all parts properly:

· If there's wear, scratch, crack and spur on the gear;

· If the spline is worn or deformed;

· If ball and spring are deformed, cracked or worn.

If there's defect of those parts, replace them as the case may be.

Assembly

(1) Assemble synchronizer gear hub on the proper fixture (input shaft) with U side upward (Figure 3-159).

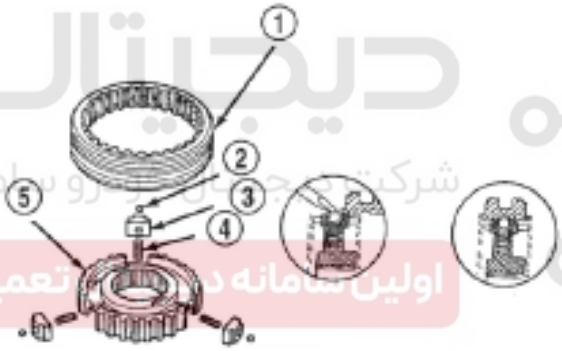


Figure 3-159 Assembly of synchronizer

1-combination set 2-ball 3-spline 4- spring 5-gear hub

(2) Fix the spline on gear hub and spring.

(3) Apply Vaseline to the spline hold and press the ball on all splines (Figure 3-160).

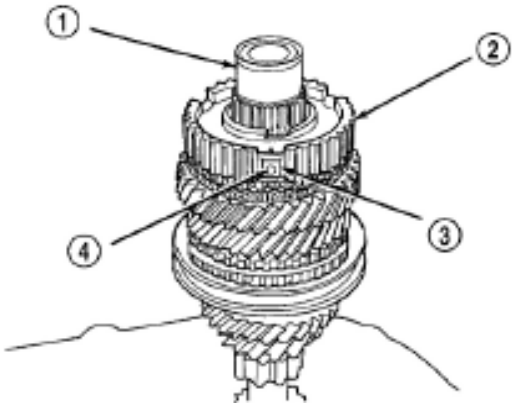


Figure 3-160 synchronizer ball

1-input shaft 2-gear hub 3-spline 4-ball

(4) Cover the combination set on gear hub and press the ball, then put the combination set in place carefully (Figure 3-161).

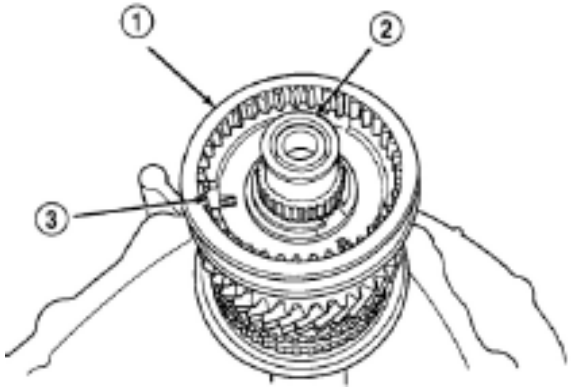


Figure 3-161 Combination set of synchronizer

1-combination set 2-input shaft 3-spline

(5) Place spline and spring in a proper manner to cover the three splines of gear hub (Figure 3-162), assemble and push the snap ring, then align the spline and ball.

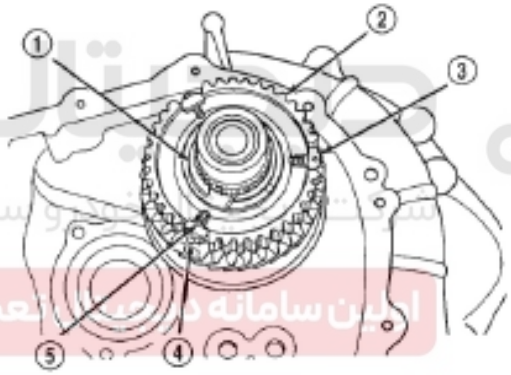


Figure 3-162 Spline on gear hub

1-snap ring 2-combination set 3-spline 4-ball 5- spring

Vehicle speed sensor

Instruction

Vehicle speed sensor

Vehicle speed sensor (VSS) is a pulse generator fixed on the joint beside transmission output shaft and driven by the speed meter pinion via joint. VSS pulse signal to the speed meter/odometer is monitered by PCM speed control line to determine vehicle speed and maintain the preset speed.

Disassembly

(1) Lift up the vehicle.

(2) Remove the speed sensor joint (Figure 3-163).

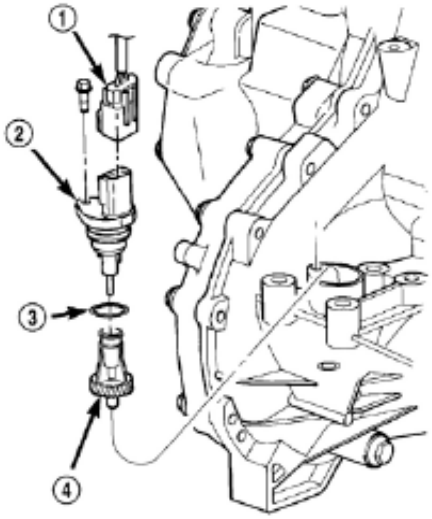


Figure 3-163 Speed Sensor -Disassembly/Assembly

1-joint 2-sensor 3-O-RING 4-pinion

Warning: before removal, clean the surrounding of speed sensor in case of dust penetration into the transaxle in the process of disassembly of speed sensor.

(3) screw off the fixing bolt for speed sensor (Figure 3-163).

(4) Remove the speed sensor from transaxle.

Warning: to disassemble the speed sensor, take care not to drop the sensor drive gear in transaxle. In case the sensor drive gear falls into the transaxle during disassembly, the drive gear must be reconnected to the sensor.

(5) Remove drive gear of speed sensor from speed sensor.

Assembly

(1) Fix the pinion on speed sensor (Figure 3-163).

(2) Replace the O-RING with a new one and mount the speed sensor on the speed drive axle (Figure 3-163).

(3) Screw on bolt at tightening torque 7Nm (60 in. lbs.).

(4) Plug in the speed sensor connector (Figure 3-163).

(5) Lay down the vehicle and perform road test to verify function of speed meter.