

In the Name of God

SAIPA 151
Repair Manual

TRANSMISSION

(CLUTCH, GEAR BOX AND DRIVEN SHAFT)

دیجیتال خودرو
شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



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PREFACE

This manual is prepared by the engineers of SAIPA automotive manufacturing group to help the engineers and technicians of the SAIPA 151 vehicle. It is recommended that the repairmen and technicians carefully study this book and follow its repair instructions. By doing so, the time will be saved and the quality of repairing will be increased.

Finally, it is requested from all the readers to kindly submit their invaluable comments about this book to the management of SAIPAYADAK company engineering department.

It is necessary to mention that any revision and copying of this manual are copyrighted by the SAIPAYADAK Company.

SAIPA Automotive Manufacturing Company

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CHAPTER ONE

CLUTCH

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Preload Adaptor

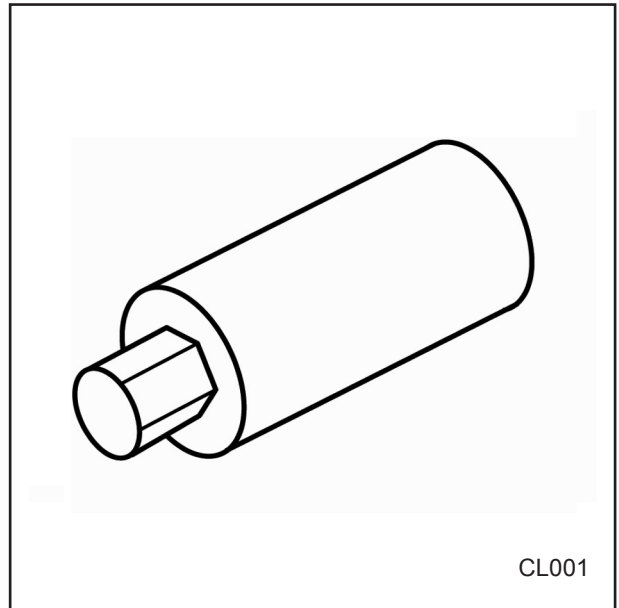
Tools number: Ok 130-171-014

Serial number: 502180

Use: When repairing the gearbox

Detail: Gasket control

Station: Mechanical shop (gear box)



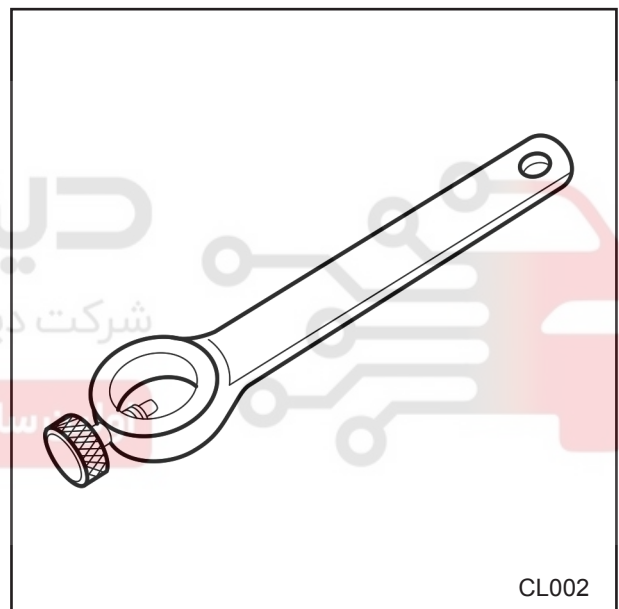
Preload Attachment

Tools number: Ok 130-322-020

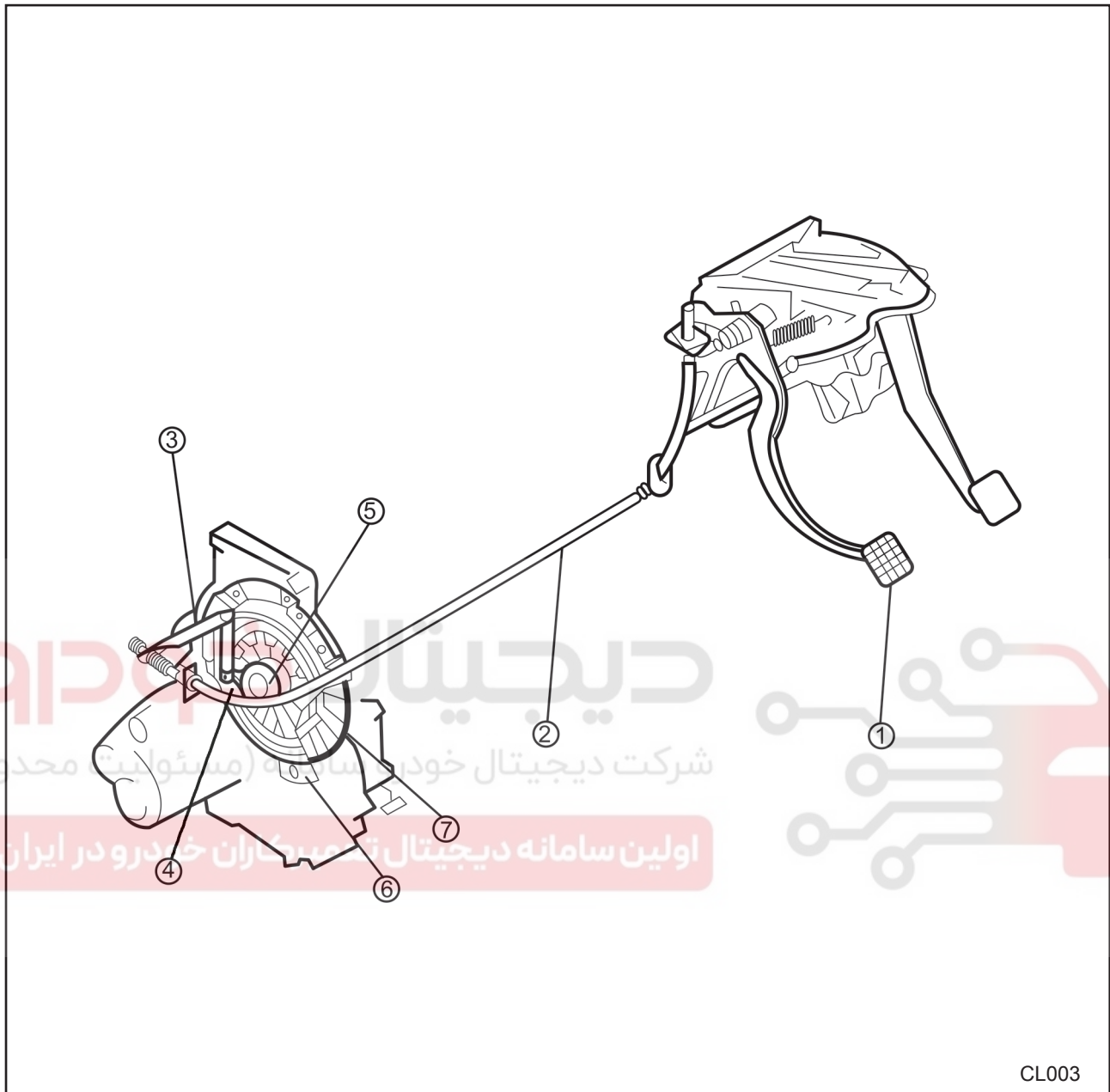
Serial number: 502189

Use: For input shaft Torque measuring

Station: Mechanical shop (gear box)



Outline and Structural View



CL003

Clutch Outline

- 1- Clutch pedal
- 2- Clutch cable
- 3- Clutch release lever
- 4- Release fork
- 5- Release bearing
- 6- Clutch cover
- 7- Clutch disk

Functional Description

The Gear box primary shaft gears connected to the engine through the clutch system. The clutch disc of this system is diaphragm spring type and the primary shaft gear passes the spline by a small release bearing into the flywheel.

The frictional force of disc to clutch face and flywheel is removed by releasing the clutch pedal.

The clutch cable, release fork, release bearing and release lever move simultaneously by pressing clutch, down the clutch pedal.

The clutch pedal and brake pedal are installed on a support. This support is welded on the vehicle body. Pedals are tightened by a nut and bolt and a washer on the support bracket. The upper part of the clutch pedal is connected to the release fork (on the gear box) by the clutch cable.

The clutch system function is as follows: When pressing down the clutch pedal, the clutch cable and release lever turn the clutch fork shaft (in the clutch case).

At these moments, the clutch fork forward moves the release bearing (on the shaft) forward until the connection occurs and the pressure release.

By releasing the clutch, the back spring of the pedal and the release fork returns the parts to their initial positions.

The clutch pedal clearance is adjusted by an adjusting nut in the cable end of the clutch. For adjusting the nut can be displaced, the length of clutch can be set as shorter or loner.



Clutch Specifications

Item		Specifications	
Clutch control type		Dry single plate	
Clutch cover	Type	Diaphragm spring	
	Set load N	2900	
Clutch disc	Outer diameter mm(in)	180 (7.087)	
	Inner diameter mm(in)	127.5 (5.02)	
	Thickness	Pressure plate side mm(in)	3.2(0.126)
		Flywheel side mm(in)	3.0(0.118)
Clutch pedal	Type		Lever
	Pedal ratio		5.18:1
	Full stroke mm(in)	135(5.315)	
	Height mm(in)	208.2-213.2(8.209-8.394)	

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Troubleshooting Guide

Trouble	Possible cause	Remedy
Slippage clutch	Excessive facing worn Facing surface contaminated with oil Clutch cover deformed Diaphragm spring damaged or fatigued Excessive clutch pedal play Clutch pedal not functioning smoothly Flywheel warped Clutch cable not functioning smoothly	Replace Replace Replace Replace Adjust Repair or replace Repair or replace Replace
Poor disengagement clutch	Excessive deflection and deformity of clutch disc Clutch disc spline worn or rusted Oil on the facing surface Diaphragm spring fatigued Excessive clutch pedal play	Replace Replace or remove the rust Clean or replace Replace Adjust
Judders when engaging clutch	Oil on facing surface Torsion spring fatigued Facing surface hardened or deformed Facing rivets loose Diaphragm spring fatigued Clutch cover excessively warped Flywheel surface hardened or warped Engine mount loosening or fatigued	Clean or replace Replace Repair or replace Replace Replace Replace Repair or replace Refer to engine repair manual
Clutch pedal does not function smoothly	Pedal shaft not properly lubricated Cable not properly lubricated Cable kinked	Lubricate or replace Lubricate or replace Repair or replace
Clutch noises	Release bearing damaged Poor lubrication on release bearing sleeve Worn sliding part of release fork Torsion spring fatigued Insufficient pedal free play Excessive crankshaft end play	Replace Lubricate or replace Replace Replace Adjust Refer to engine repair manual

Pedal Height Inspection

Measure the distance from the upper center of the pedal pad to the firewall and ensure the distance is within specification:

Pedal height: 208~213 mm

Pedal Height Adjustment

To adjust the pedal height, loosen the lock nut and turn the stopper bolt or clutch switch.

Pedal Freeplay Inspection

Depress the pedal lightly by hand and measure the free play, ensure that it is within specification.

Pedal freeplay: 9~15mm

Clutch pedal adjustment

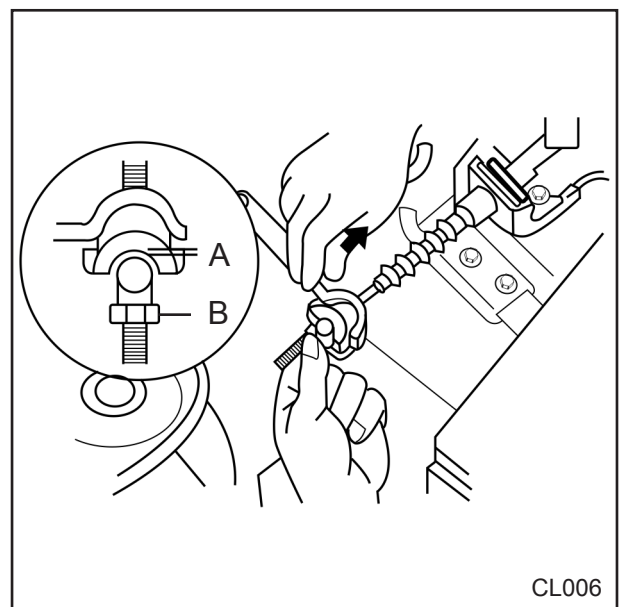
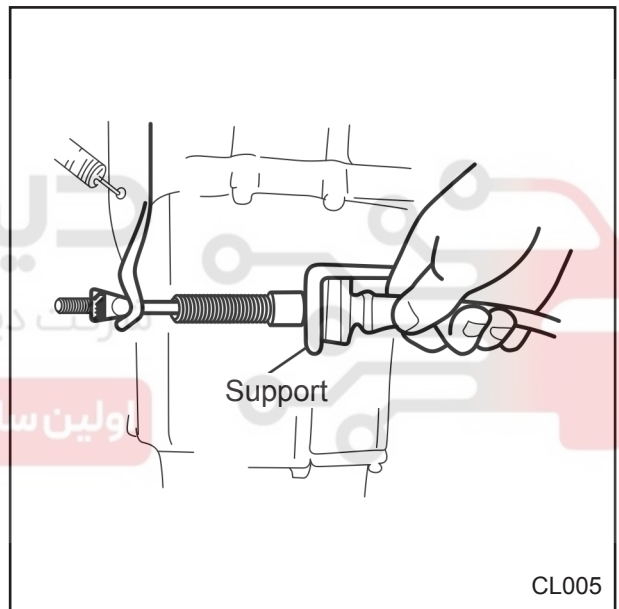
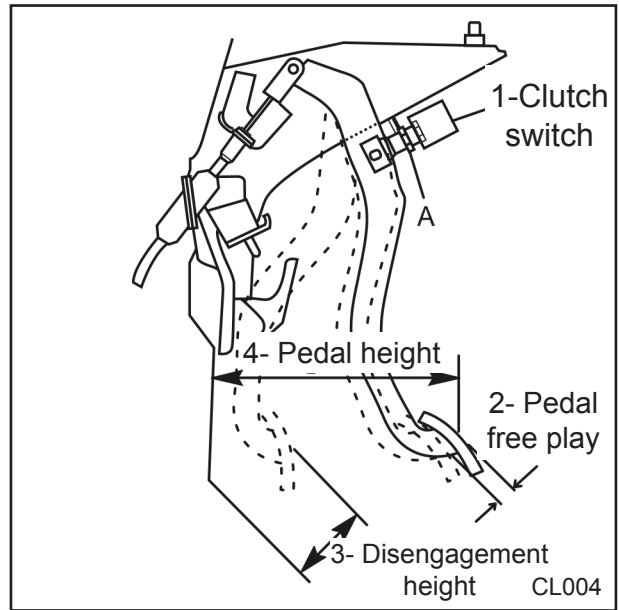
1. Depress the clutch pedal five times.
2. Straighten the clutch cable in the clutch cable bracket.

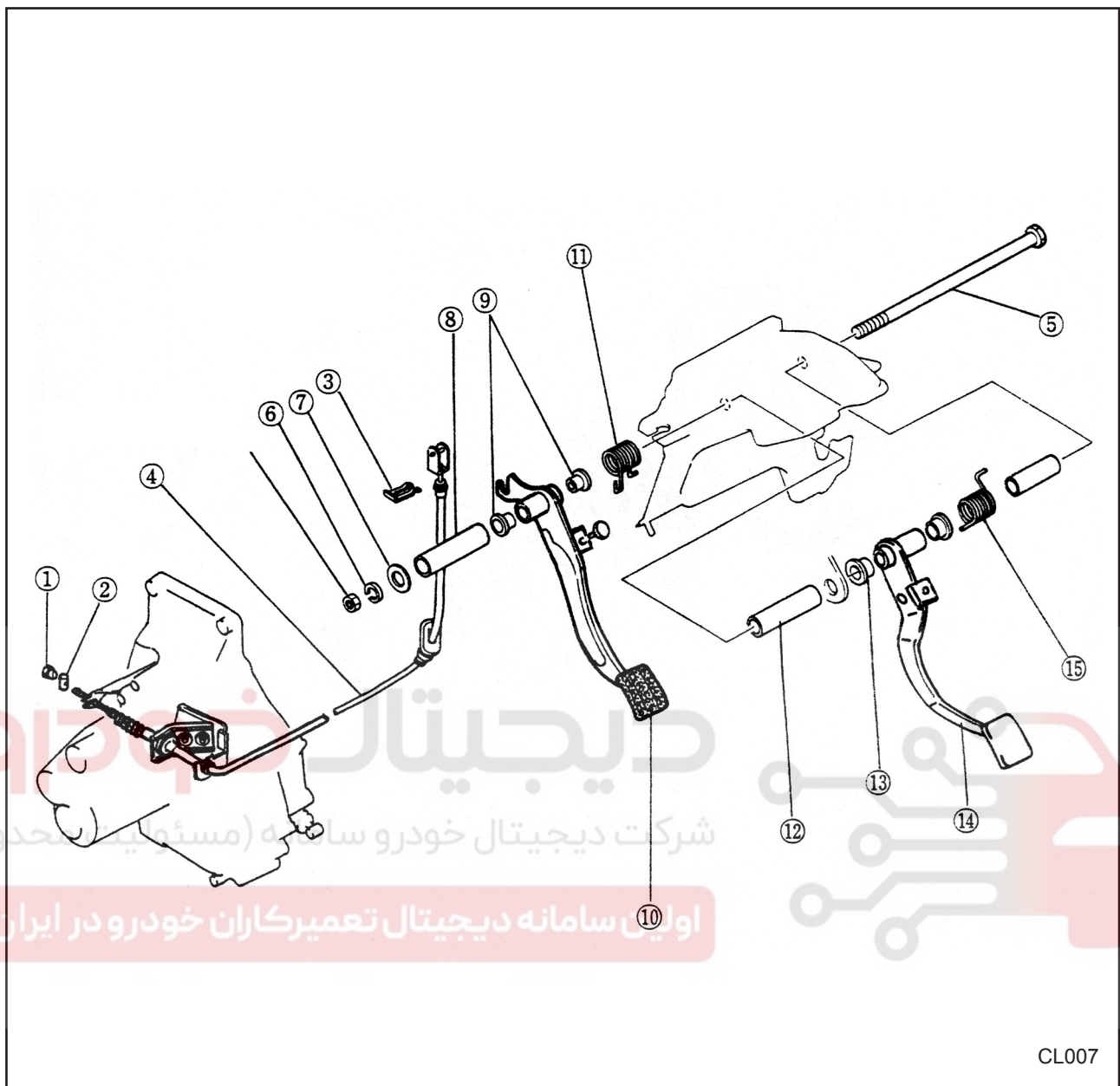
3. Depress the release lever and pull the pin away from the lever, then adjust the clearance (A) by turning adjust nut(B).

Standard clearance: 1.5~2.5mm

4. After adjustment ensure that when the clutch is disengaged, the distance between the floor and the upper center of the pedal is within specification.

Disengagement height: 85mm Min.





CL007

- | | |
|------------------|--------------------------------|
| 1. Adjust nut | 9. Bushing |
| 2. Pin | 10. Clutch pedal |
| 3. Clip | 11. Return spring clutch pedal |
| 4. Clutch cable | 12. Spacer bush |
| 5. Bolt | 13. Bushing |
| 6. Spring washer | 14. Brake pedal |
| 7. Plain washer | 15. Return spring brake pedal |
| 8. Spacer bush | |

Clutch and Attachments Disassembling and Assembling

- 1- Remove in the sequence shown in the figure.
- 2- Install in the reverse order of removal.
- 3- Adjust the clutch pedal free play.

Note:

Apply grease (lithium base, NGLT(No.2)) to the bushings and pivot points.

Inspection

Check the following parts and replace if necessary.

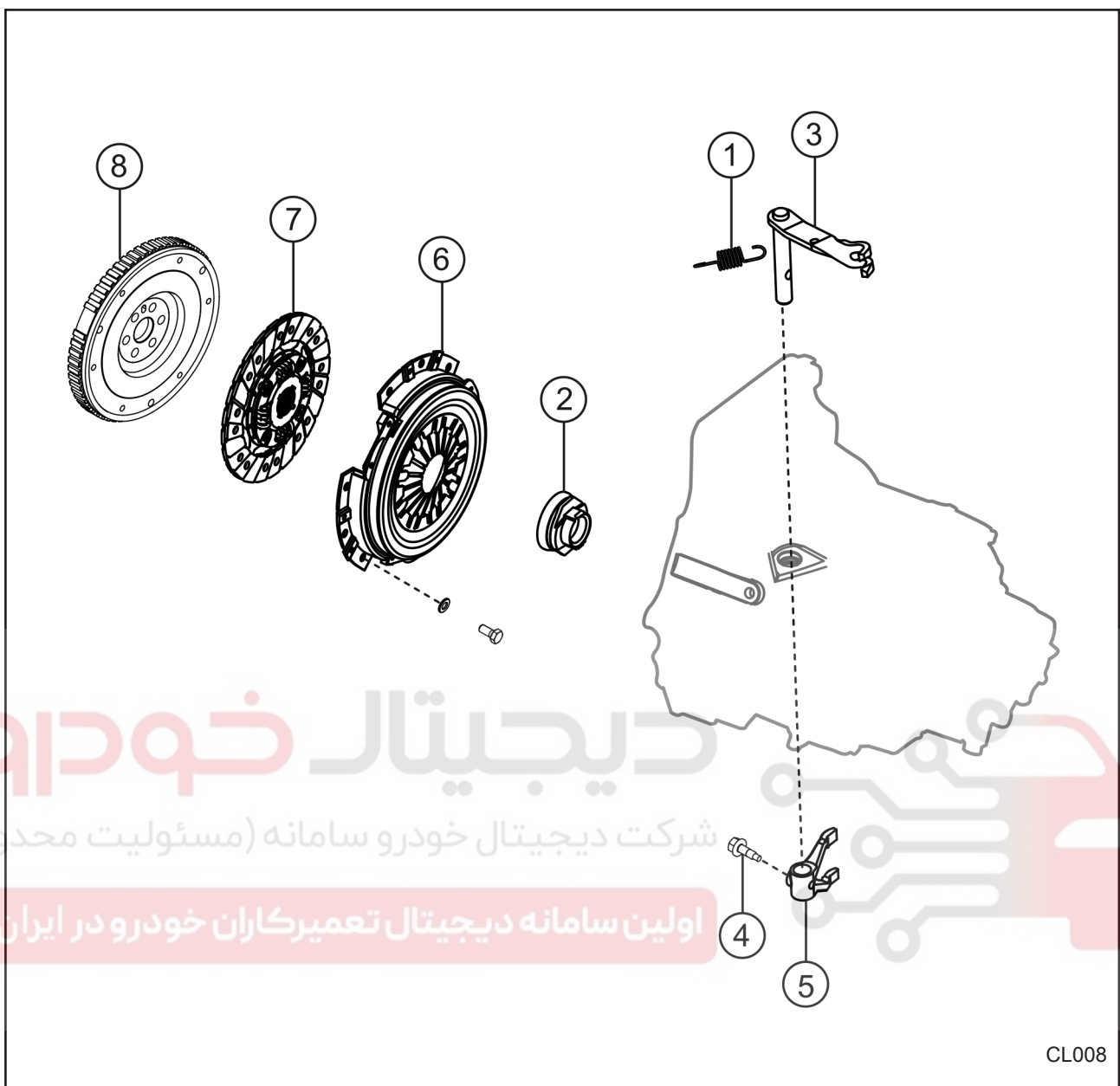
1. Worn or damaged bushings.
2. Twisted or bent clutch pedal.
3. Worn or damaged pedal pad.
4. Damage to the inner or outer cable.
5. Function of the cable.

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CL008

- | | |
|-----------------------------|------------------------|
| 1. Return spring | 5. Clutch release fork |
| 2. Clutch release bearing | 6. Clutch cover |
| 3. Clutch lever | 7. Clutch disc |
| 4. Clutch release fork bolt | 8. Flywheel |

Assembling and Disassembling Clutch and Flywheel

- 1) Disassemble in the sequence shown in the figure.
- 2) Assembling is the reverse order of disassembling.

Disassembling Clutch Disc and Clutch Cover

Never apply any oil and grease to clutch cover and clutch disc.

Even a little bit of them can lead to spinning the clutch handles. Move the clutch cover by the edges and don't touch it as much as possible.

1-Remove the gear box (Refer to gearbox chapter).

2-Remove the clutch cover and clutch disc with special tools

49 D011 1A0

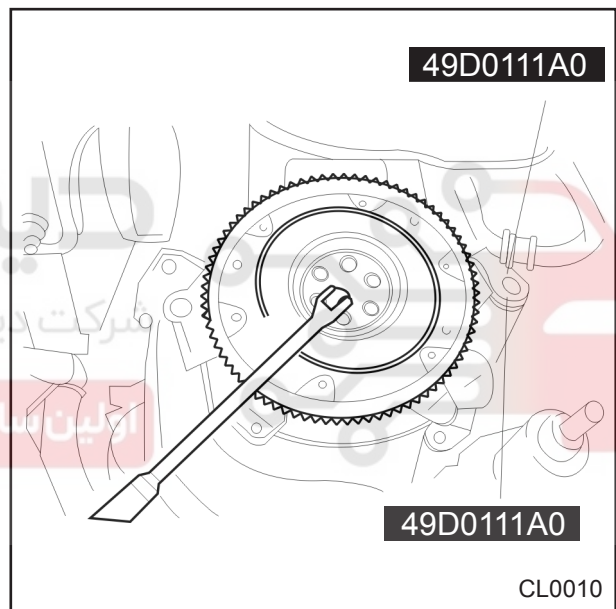
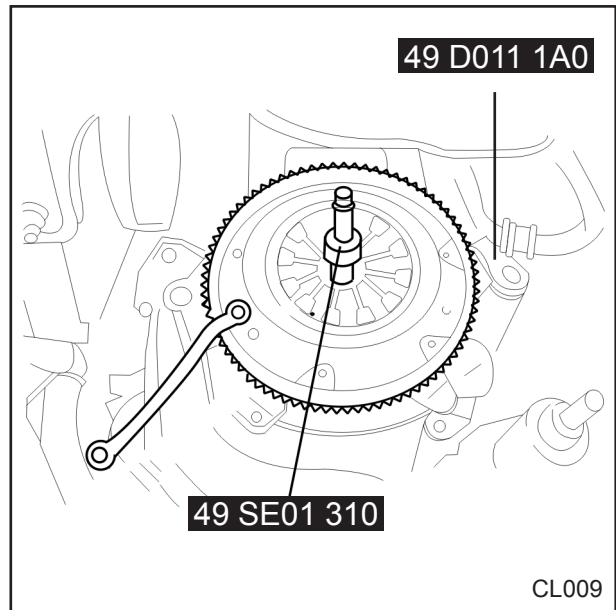
49 E301 062

49 SE01 310

If clutch disc and clutch cover is reusable, before disassembling them from the flywheel, mark its position by paint in order to install it in the same position.

3- Remove the flywheel mounting bolts. Then remove the flywheel.

Note: For loosening the mounting bolts, use flywheel stopping tool.



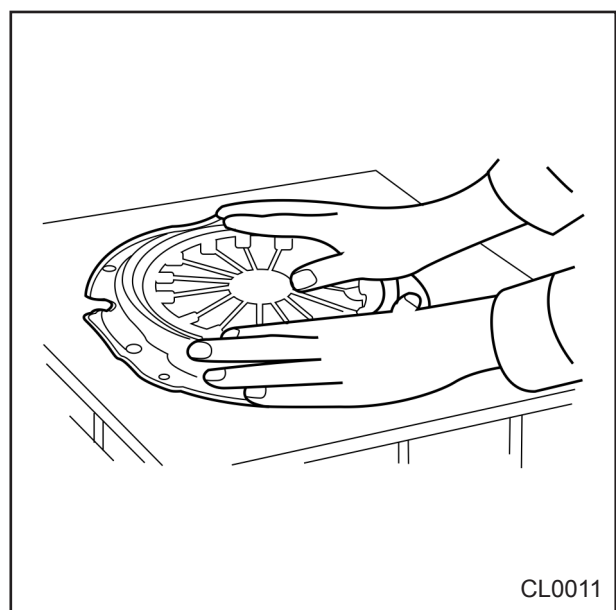
Inspection

Check the following parts, repair or replace them if necessary.

a- Clutch Disc

1- Check contact surface of the clutch disc for scoring, cracks, or partial discoloration.

2- Check diaphragm spring for any damages.



Note:

Remove any scoring or discoloration with sandpaper.

b- Clutch Disc

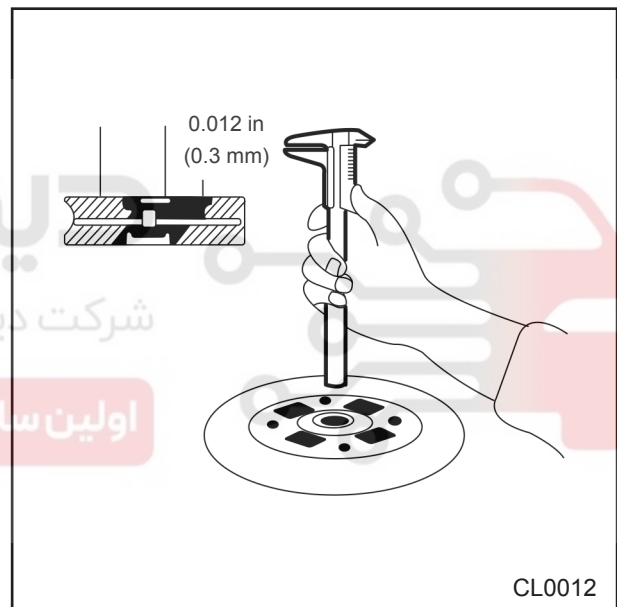
1- Check the facing surface for hardening, crack or oil contamination.

Note: Use sand paper if the trouble is minor.

2- Check clutch disk rivets.

3- Check clutch disc wearing. Measure the rivet heads depth using a slide caliper.

Depth: Min. 0.3mm



4- Clutch disc run- out

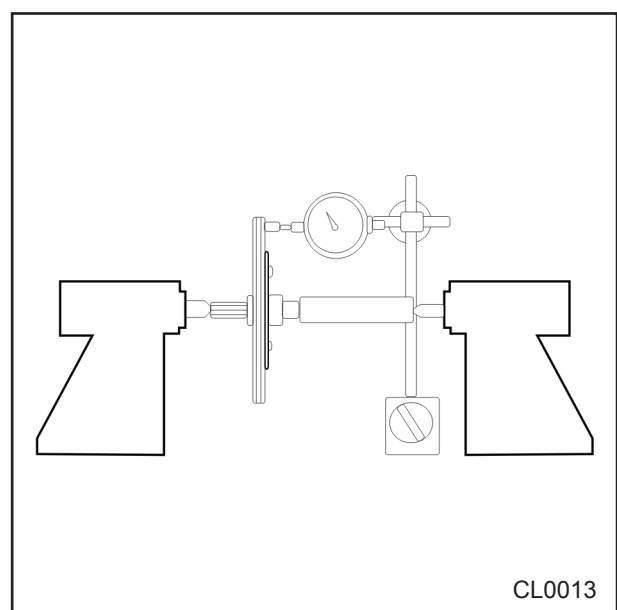
Check Run- out of clutch disc. With special tool (TS 99999005)

Lateral run-out: Max. 0.7 mm

Vertical run-out: Max. 1 mm

5- Check the splines wear or rust.

Remove any rust as far as possible.



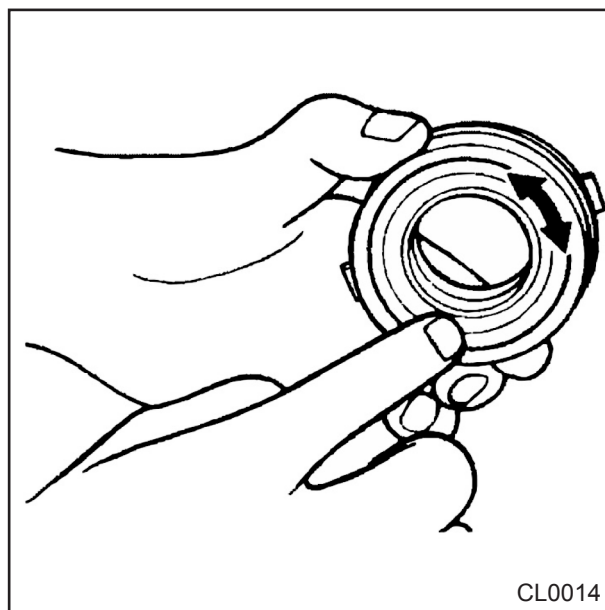
c- Clutch Release Bearing

1- Turn the bearing in both directions and check for any binding or abnormal noise.

2- Check worn or damaged diaphragm spring or release fork contact surface.

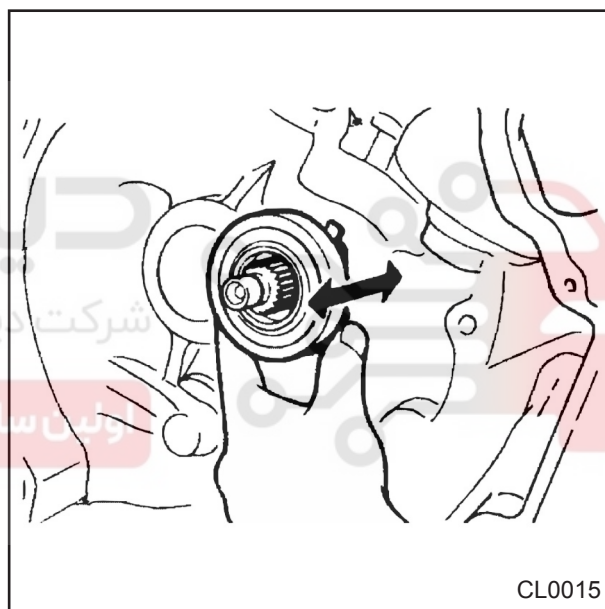
Note:

The clutch release bearing have special grease and must not be washed in gasoil or petrol.



CL0014

3- Install the bearing on the clutch housing extension and check for smooth movement.



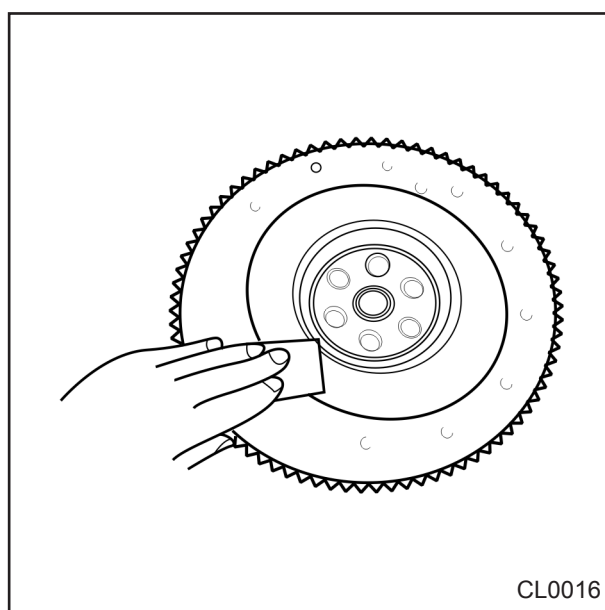
CL0015

d- Flywheel

1- Check surface cracks, scoring or discoloration of clutch contact surface.

Note:

If the problem is minor, repairs can be made by cleaning with sand paper.



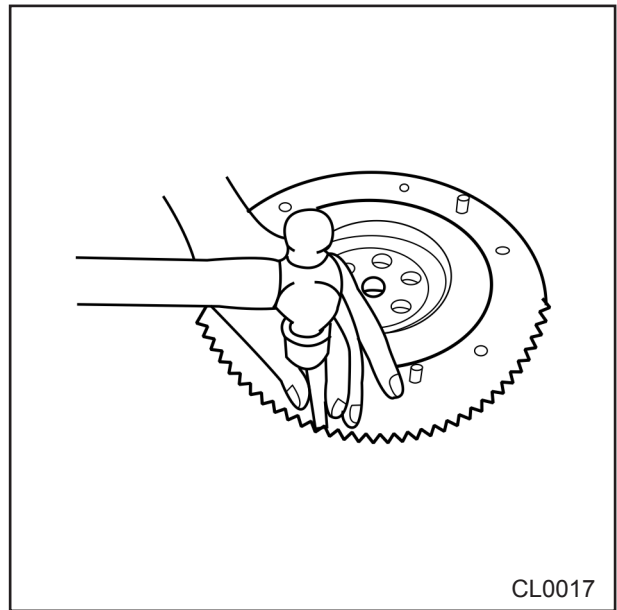
CL0016

2- Check damaged or worn ring gear teeth. If necessary, replace the ring gear as follows:

- a) Heat the ring gear with a blowtorch then tap around the gear to remove it from the flywheel.
- b) Heat a new ring gear to 250~ 300°C then fit it onto the flywheel.

Note:

The beveled side of the ring gear must face toward the engine side.



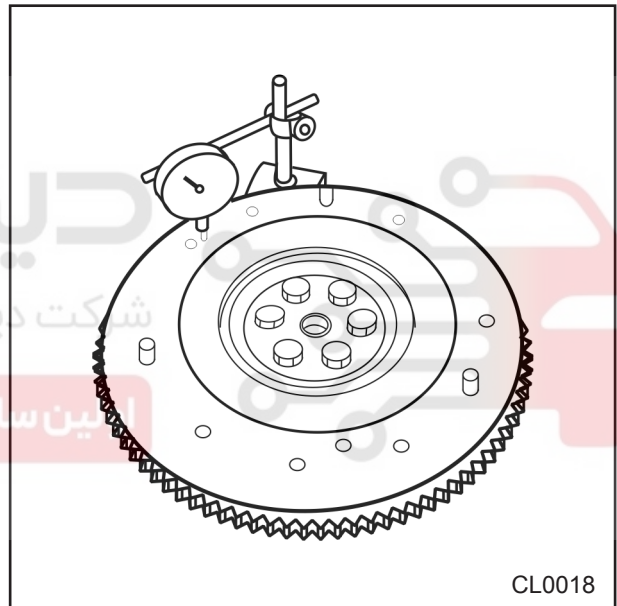
3- Run – Out of Flywheel

3-1- To measure, position the dial gauge feeler on the clutch disc contact surface, then turn the flywheel.

Allowable Run – out: 0.2mm

3-2- If the run- out exceeds specification, repair it by grinding.

Grinding limit: 0.5mm

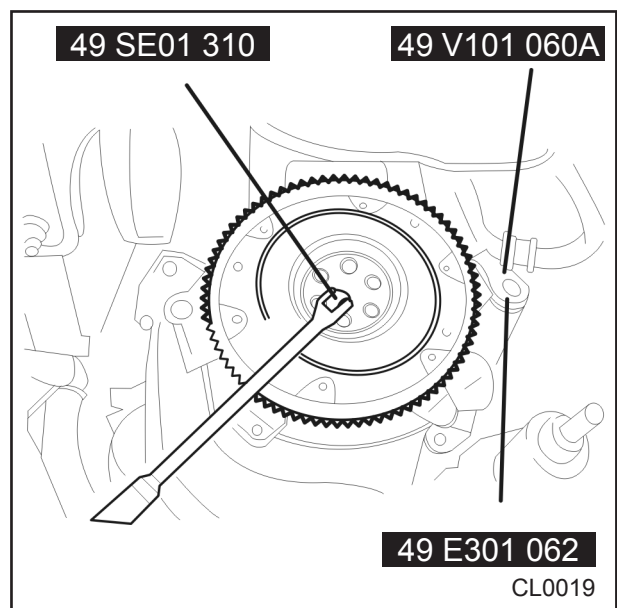


Flywheel and Clutch Installation

1- With special tools (49V101 060A) and (49 E301 062) tighten the flywheel to the specified torque.

Tightening torque: 9.6 ~ 10.3 kg.m

Note: If reusing the flywheel bolts, clean the threads to remove old sealant. Apply new sealant and tighten bolts to specification (tighten bolts in a crisscross pattern sequence). If the old sealant cannot be removed. Replace the bolts. Be careful to fit the disk on the same position. When replace the flywheel, a new bearing with oil seal must be installed.



Assembling and Disassembling Flywheel Bearing (with Oil Seal)

1- Remove the flywheel.

2- Pull out the release bearing from inside of flywheel using special tool.

Caution: Pull out the external cones from inside of flywheel using a cylinder with proper diameter.

Be careful not to put the cylinder on interior cones of release bearing, it may damage the bearing.

1) Install the release bearing with special tool.

2) Install the flywheel (refer to related section)

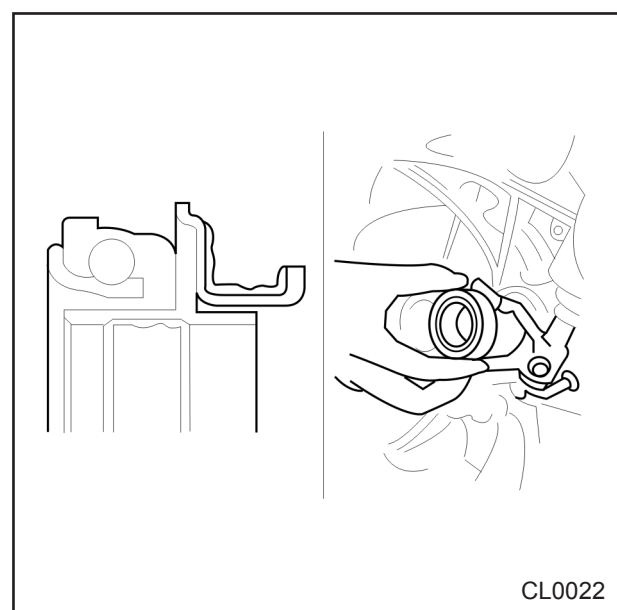
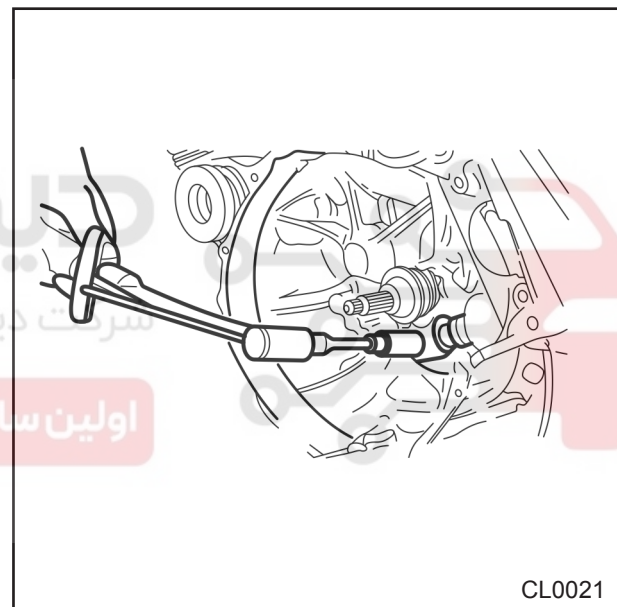
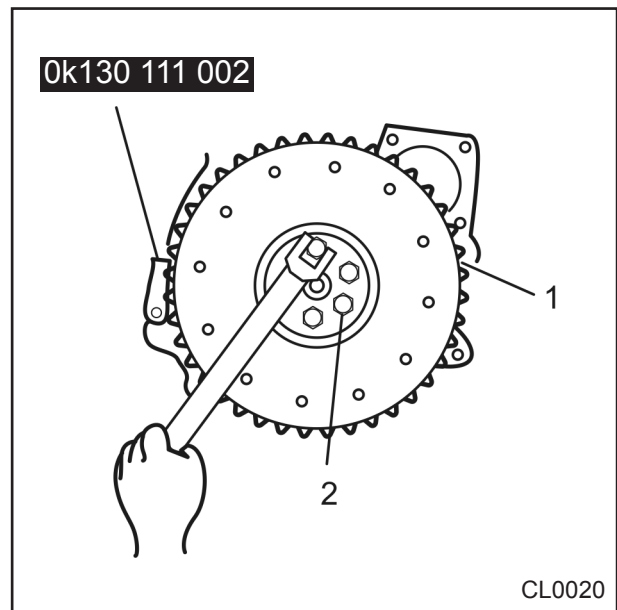
To assemble, follow the reverse order of disassembling.

1. Flywheel
2. 6 bolts of flywheel

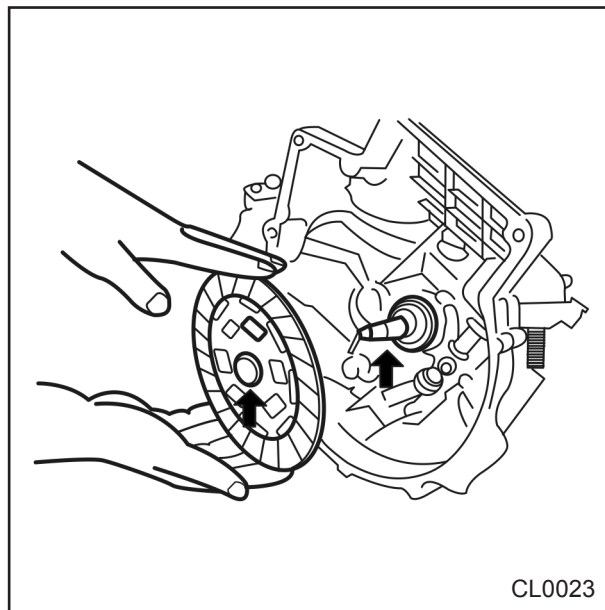
2- Install the release lever, and apply locking agent (sealer) to the bolts.

Bolts tightening torque: 3.6 ~ 4.2 kg.m.

3- Apply clutch grease (lithium grease) to the involved areas of the release bearing with clutch disk.



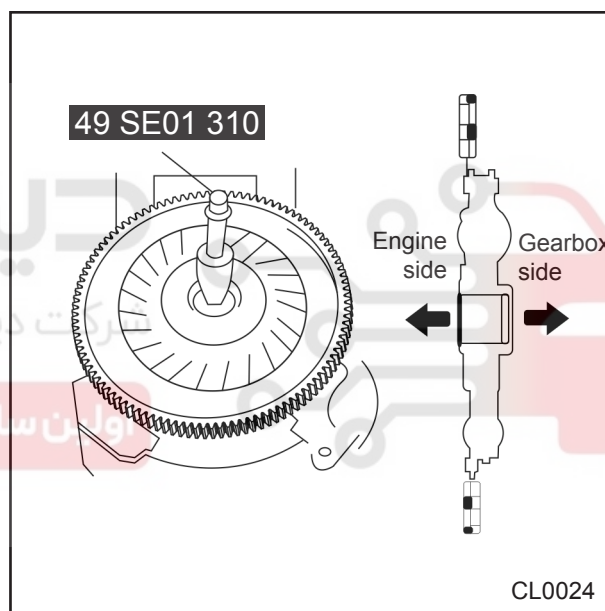
4- Clean the clutch disc splines and primary shaft, then apply clutch grease (lithium grease).



5- Install the clutch disc using the clutch disc centering tool (49 SE01 310)

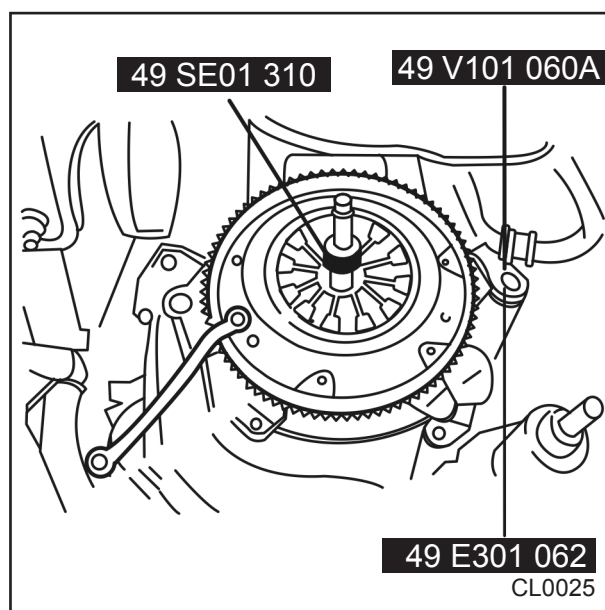
Note:

Install the clutch according to directions which are specified in figure.



6- Tighten the clutch disk bolts gradually with crisscross pattern using the 49 v101 060A and 49 E301 062 tools.

Tightening torque: 1.8 ~ 2.7 N.m



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CHAPTER TWO

GEARBOX

دیجیتال خودرو

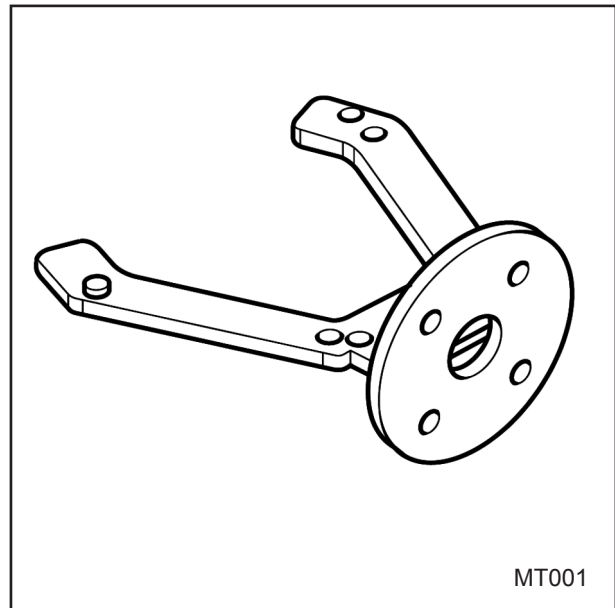
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Transmission Hanger**Technical No.:** 0k130 175 011A**Serial No:** 502171**Usage:** to install the gear box on the stand.**Place of application:** Mechanical

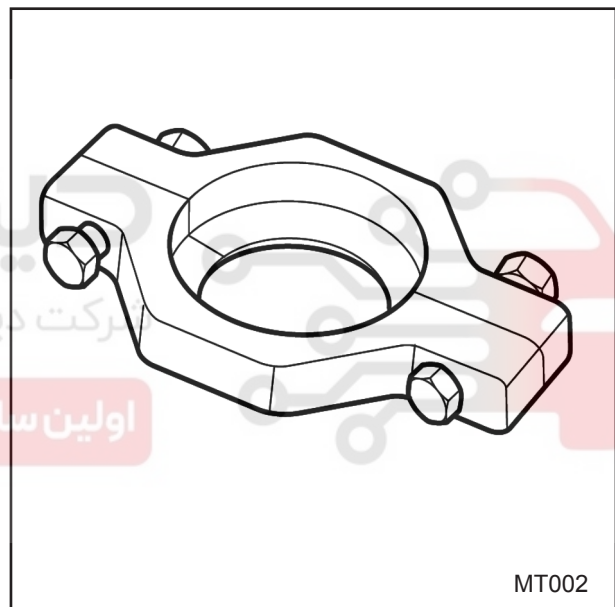
(Gear box)



MT001

Pulley Boss Puller**Technical No.:** OK130-175-008**Serial No.:** 502167**Usage:** To remove the gear wheel from the shaft**Place of application:** Mechanical

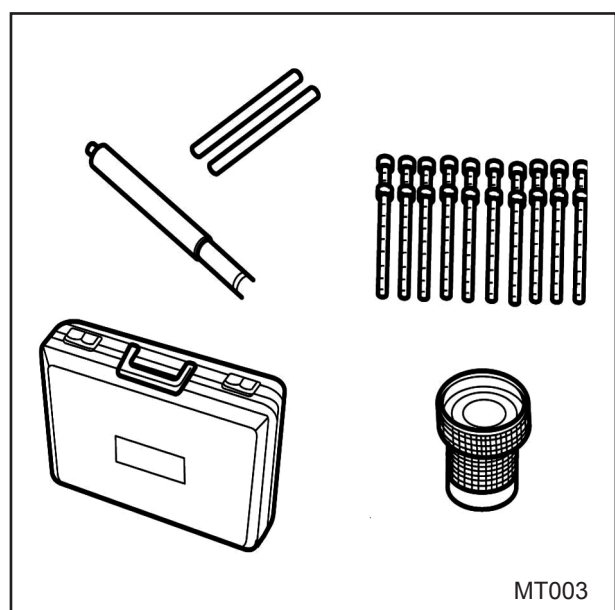
(Gearbox)



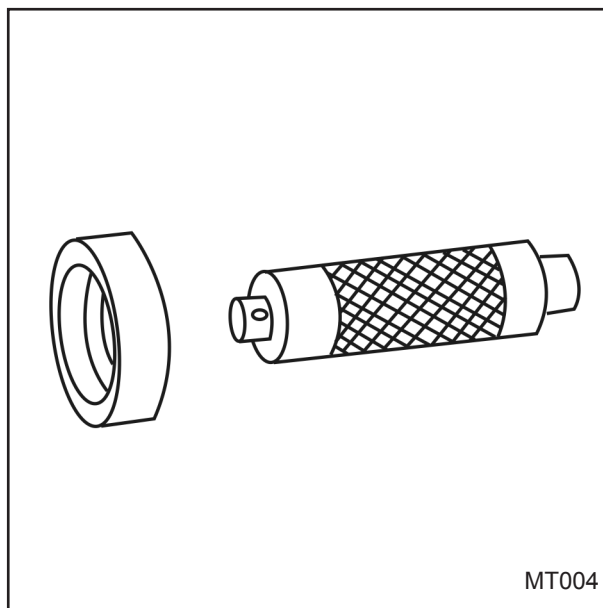
MT002

Shim Selector Set**Technical No.:** OK130-175-AA0**Serial No.:** 502168**Usage:** To adjust the roller bearing**Place of application:** Mechanical

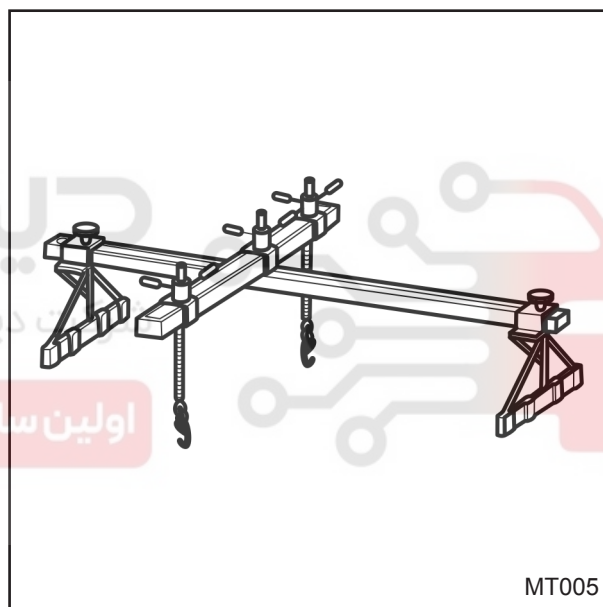
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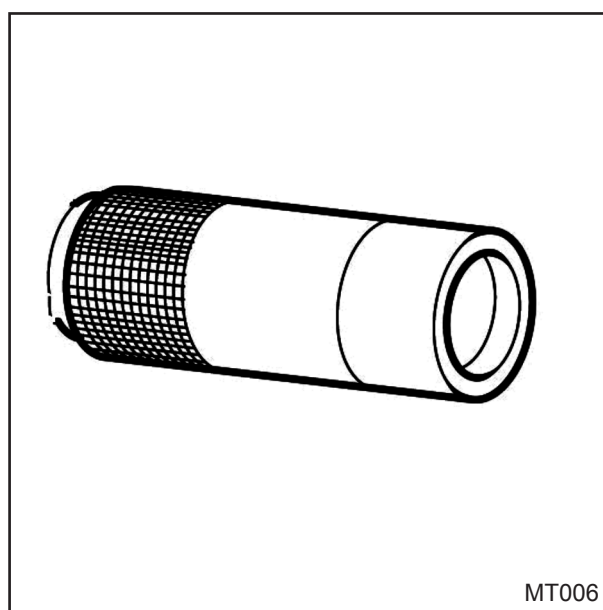
MT003

Oil Seal Installer**Technical No.:** OK130-170-015**Serial No.:** 502169**Usage:** To install the oil sealing**Place of application:** Mechanical
(Gearbox)

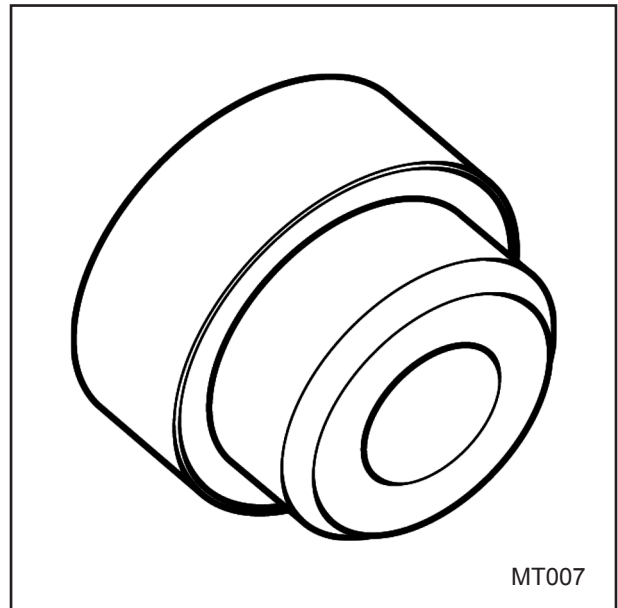
MT004

Multiple – Adjusting Engine Mounting Support with Retaining Straps**Technical No.:** 0000145300 (mot.1453)**Serial No.:** 210054**Usage:** To hold the engine when the engine mountings were removed.**Place of application:** Mechanical
(Gearbox)

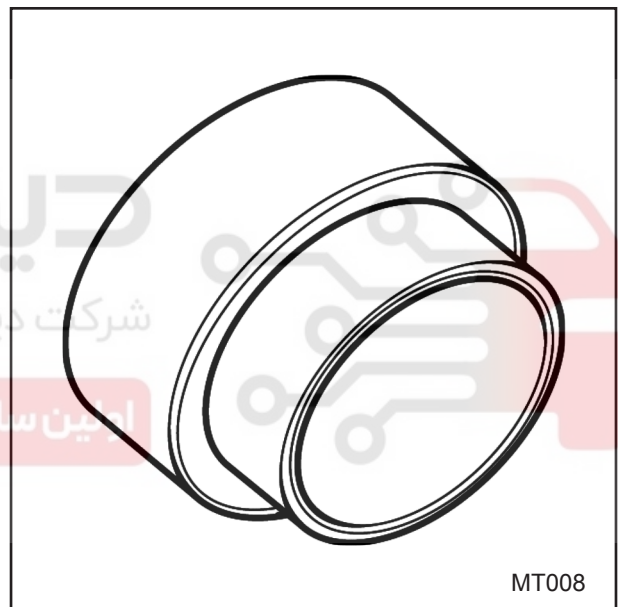
MT005

Bearing Installer**Technical No.:** OK130-175-A13**Serial No.:** 502173**Usage:** To install the ball bearing and cage.**Place of application:** Mechanical
(Gear box)

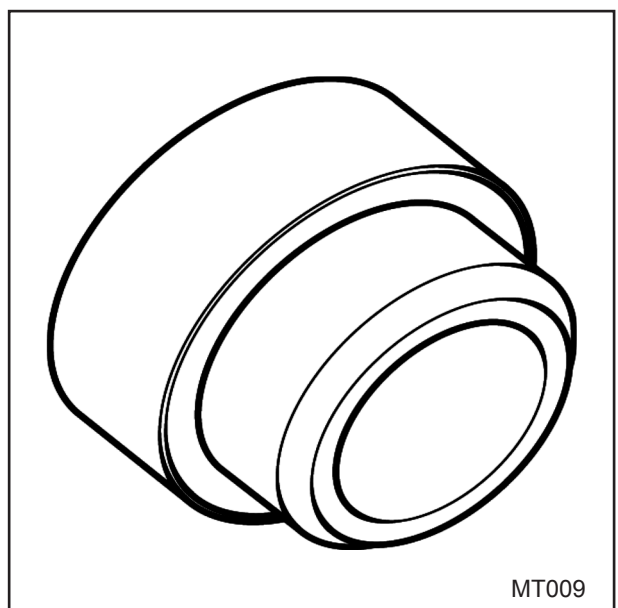
MT006

5th Synchronizer Installing Tool**Technical No.:** OK130-175-A10**Serial No.:** 502174**Usage:** to install 5th gear slide**Description:** complementary tool with the serial No. 502173**Place of application:** Mechanical (Gearbox)

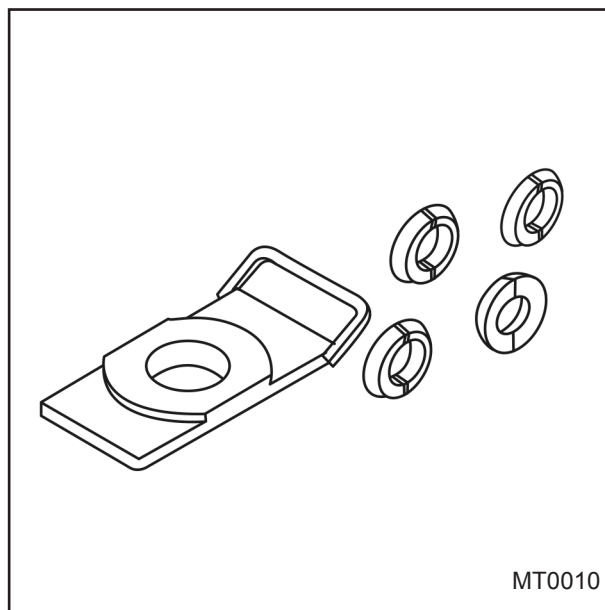
MT007

1st and 2nd Synchronizer Installing Tool**Technical No.:** OK130-175-A11**Serial No.:** 502175**Usage:** to install 1st and 2nd gears slides**Description:** complementary tool with the serial No. 502174**Place of application:** Mechanical (Gearbox)

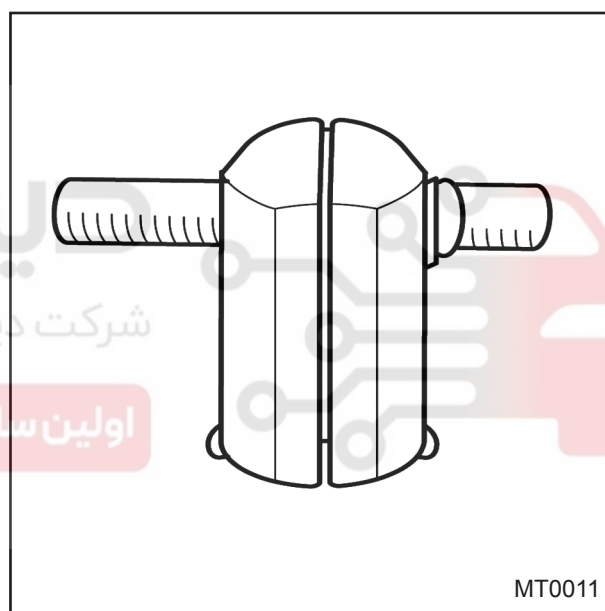
MT008

3rd and 4th Synchronizer Installing Tool**Technical No.:** 0k130 175 A12**Serial No.:** 502176**Usage:** to install 3rd and 4th gear slides**Description:** complementary tool with the serial No. 502175**Place of application:** Mechanical (Gearbox)

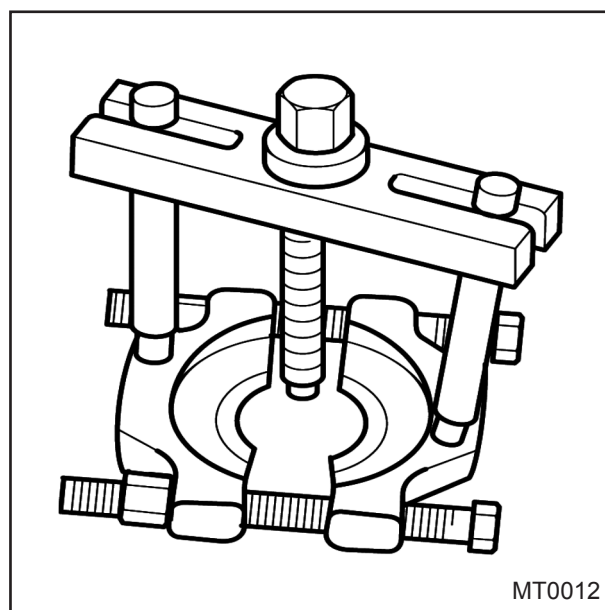
MT009

Remover Set Bearing**Technical No.:** OK130-175-AA4**Serial No.:** 502177**Usage:** to open roller bearing from front wheel – Differential housing.**Place of Application:** Mechanical (Gearbox)

MT0010

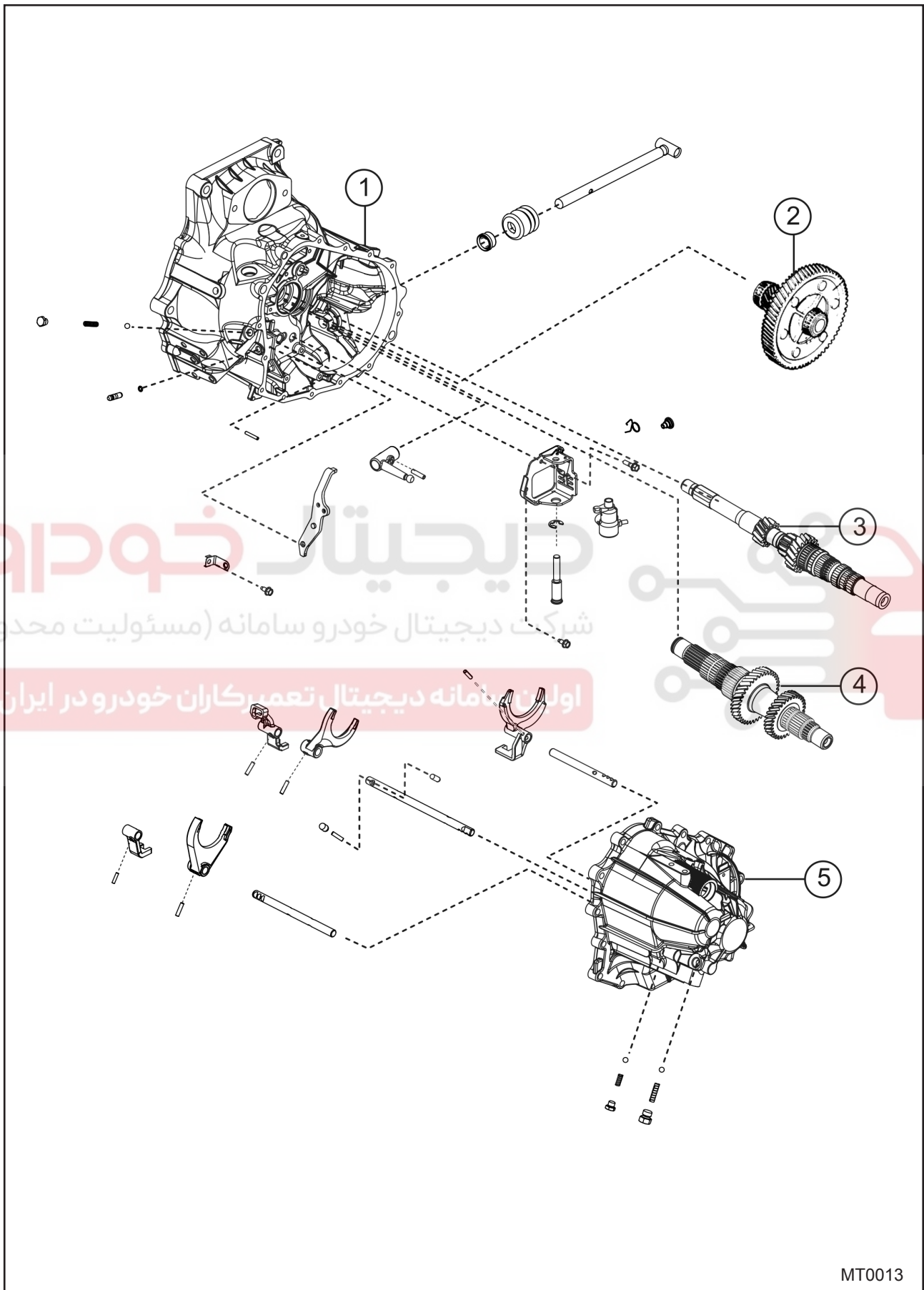
Roller Bearing Remover**Technical No.:** OK130-170-012**Serial No.:** 502178**Usage No.:** to open cone**Place of Application:** Mechanical (Gearbox)

MT0011

Bearing Puller**Technical No.:** OK130-171-013**Serial No.:** 502179**Usage:** To open ball bearing from the shaft**Description:** without using press**Place of application:** Mechanical (Gearbox)

MT0012

Gearbox Outline



MT0013

- 1- Transaxle case
- 2- Differential assembly
- 3- Input shaft
- 4- Output shaft
- 5- Differential case

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



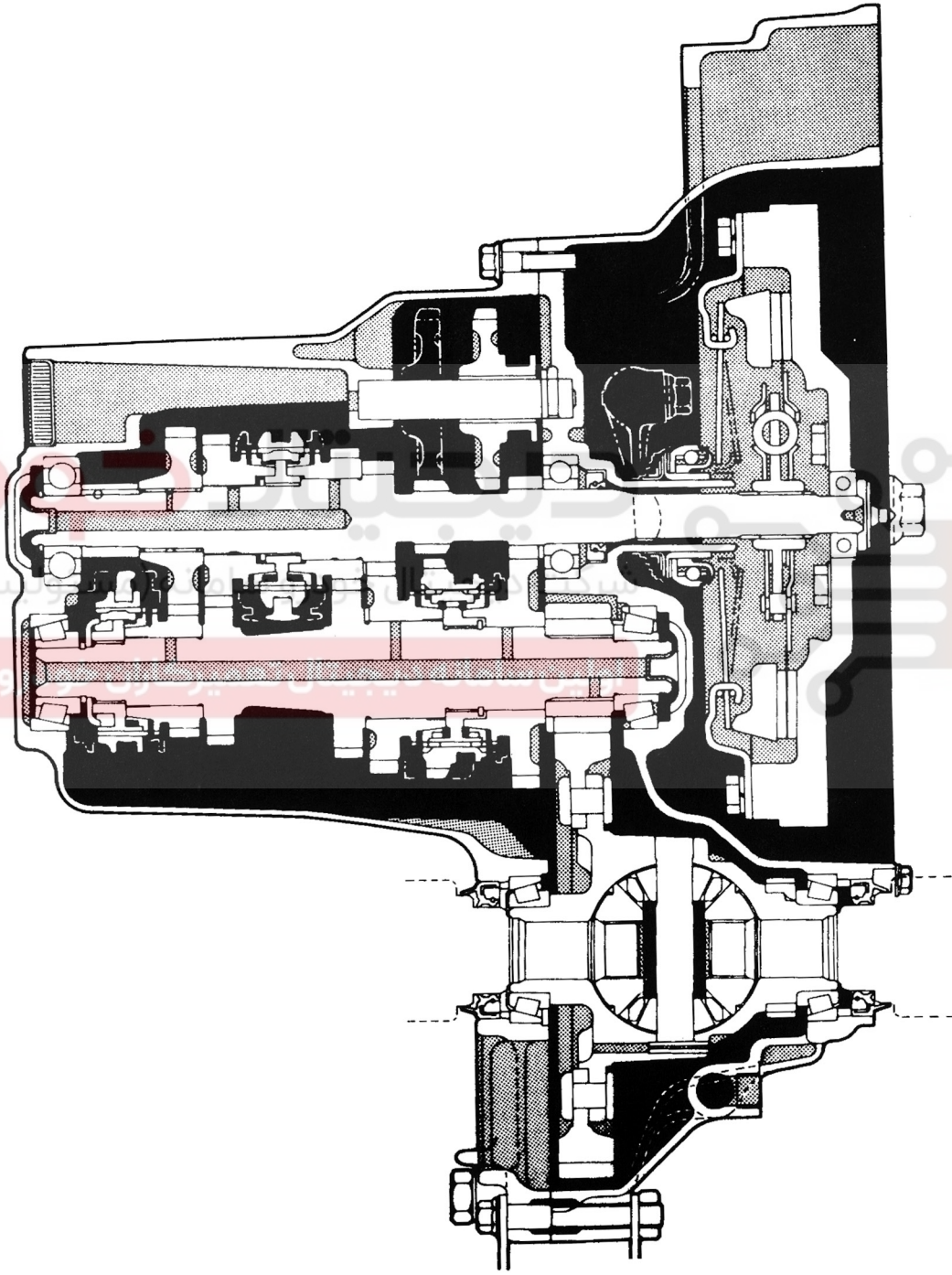
Gear Box Specifications

Speed	Item	5- Speed gear box
Transaxle control		Floor shift
Synchromesh system		Forward ... synchromesh, Reverse... selective sliding
Gear ratio	First	3.454
	Second	1.944
	Third	1.3
	Fourth	0.972
	Fifth	0.784
	Reverse	3.55
Final gear ratio		4.375
Gear oil	Type	SAE 75W-90 (API GL-4 mineral)
	Capacity	2.5 Lit

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

Gearbox Troubleshooting Tables

Problem	Probable Cause	Remedy
Shift lever won't shift smoothly, or is hard to shift	Seized gear shift lever ball Seized change control rod joint Bent control rod	Replace Replace Replace
Excessive play in shift lever	Worn control rod bushing Weak gear shift lever ball spring Worn gear shift lever ball bushing	Replace Replace Replace
Difficult to shift	Bent control rod No grease in transaxle control Insufficient oil Deterioration oil quality Wear or play of shift fork or shift rod Worn synchronizer ring Worn synchronizer cone of gear Bad control of synchronizer ring and cone of gear Excessive longitudinal play of gears Worn bearing Worn synchronizer key spring Excessive primary shaft gear bearing preload Improperly adjusted change guide plate	Replace Apply grease Apply oil Replace Replace Replace Replace Replace Adjust or replace Replace Replace Adjust
Wont stay in gear	Bent change control rod Worn control rod bushing Weak gear shift lever ball spring Improperly instilled extension bar Worn shift fork Worn clutch hub Worn clutch hub sleeve Worn primary shaft gear Worn sliding surface of gear Weak spring pressing against steel ball Excessive gear backlash , Worn bearing, Loose engine mount	Replace Replace Replace Replace Replace Replace Replace Replace Replace Replace Replace Tighten
Excessive noise	Insufficient oil Deterioration of oil quality Worn bearing Worn secondary shaft gear Worn sliding surface of gear Excessive gear backlash Damaged gear teeth Foreign material in gears Damaged differential gear, or excessive black lash	Add oil Replace Adjust or replace Replace Replace Replace Replace Replace Repair or Replace

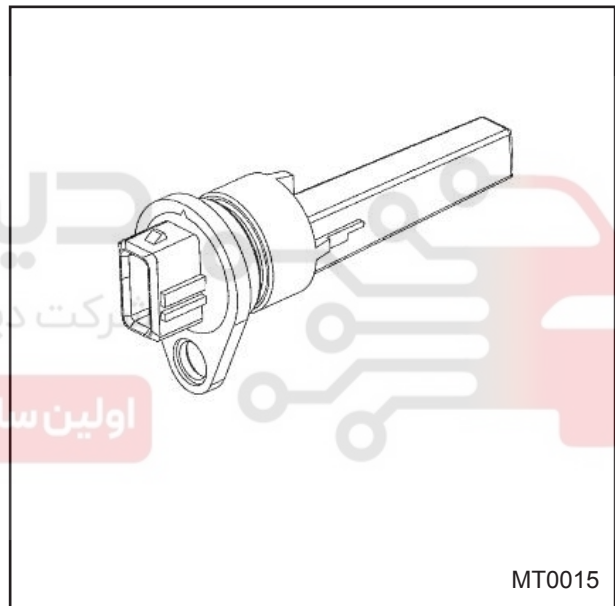


MT0014

on- Vehicle Maintenance**Transaxle Oil Inspection**

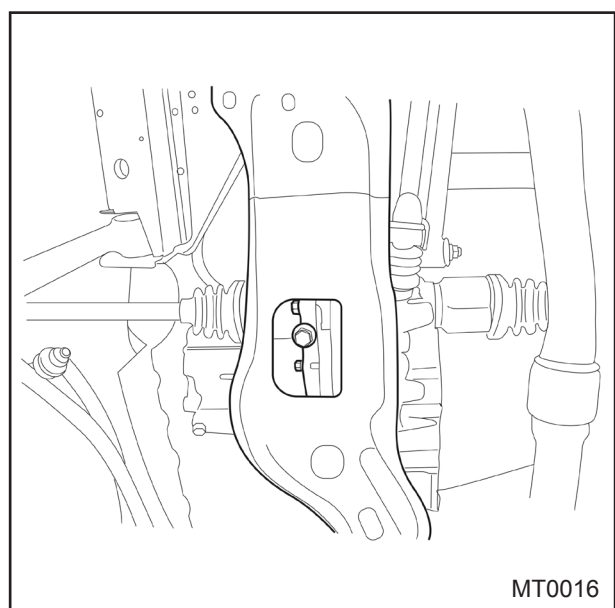
- 1- Park the vehicle on the ground level.
- 2- Remove the speedometer sensor.
- 3- After removing the bolt, pull the speedometer sensor to remove it from the gearbox. (Insert a flat – tipped screw driver between the speedometer sensor and the clutch housing)

- 4- Check the oil level.
- 5- If not, add the necessary amount of the specified oil through the gear case hole.

**Oil Replacement Add Oil**

- 1- Park the vehicle on the ground level.
- 2- Remove the speedometer driven gear (refer to “Transaxle oil inspection” section)
- 3- Remove the drain plug, and drain the oil.

Tightening torque: 24 ~ 35N.m

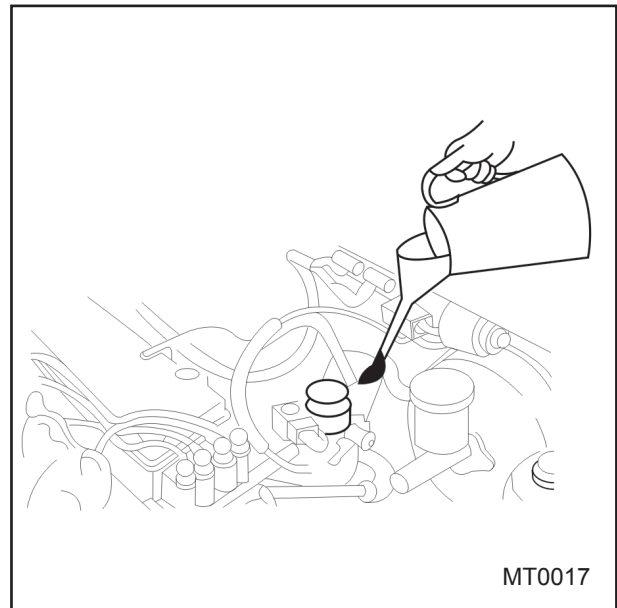


4- Replace the drain plug and add the necessary amount of specified oil through the speedometer gear case hole. Use standard transaxle oil.

Specified oil:

SAE: 75 W-90
(API service GL-4 mineral)

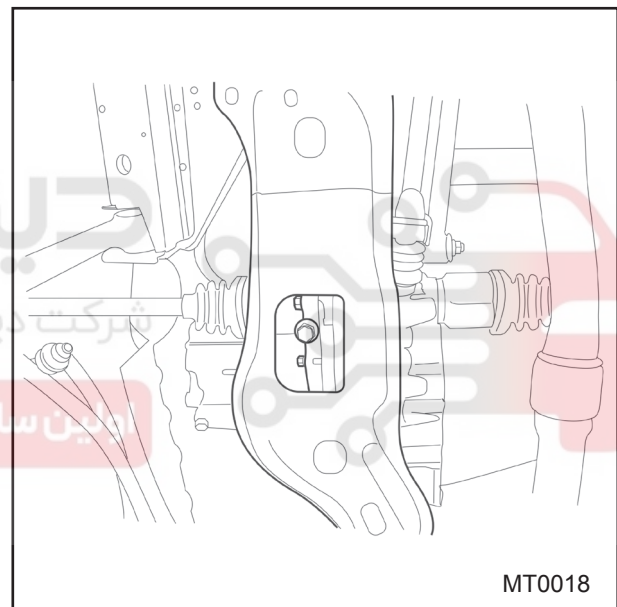
Capacity: 2.5 Lit



MT0017

Replacement of Driveshaft Oil Seal

Jack up the vehicle, and then drain the transaxle oil.



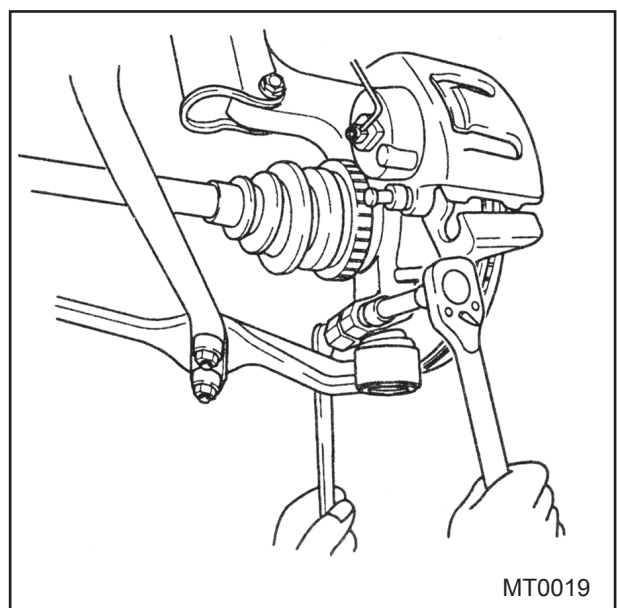
MT0018

Use the following procedure to replace the driveshaft oil seal:

1. Remove the front wheels.
2. Remove the splash shields
3. Detach the front stabilizer from the lower arm.
4. Remove the bolt and pull the lower arm downward. Separate the knuckle from the lower arm ball-joint.

Caution:

Be careful not to damage the ball-joint dust boot.

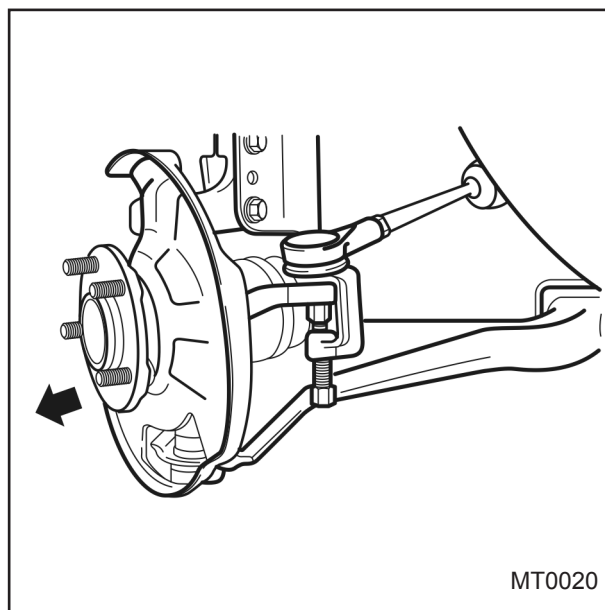


MT0019

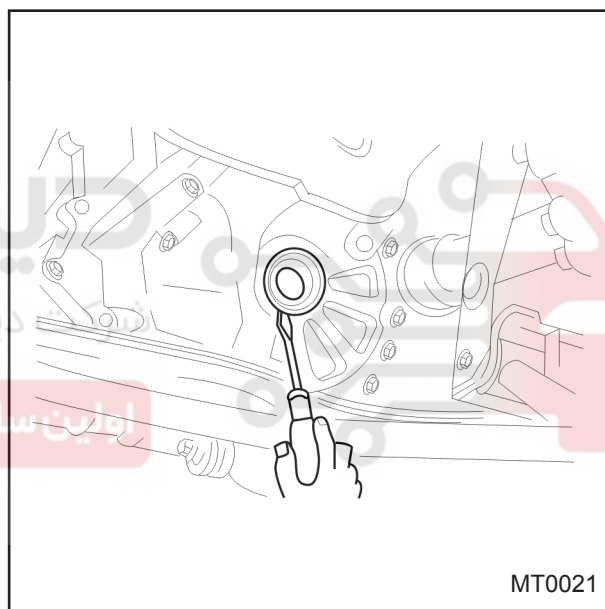
- 5- Remove the cotter pin and nut and detach the tie-rod end from the knuckle by socket joint puller
- 6- Separate the drive shaft by pulling the front hub outward.

Note:

- a- Do not use too much force at once, increase the force gradually. (Pulling direction is shown by sign).
- b- Do not allow the driveshaft ball joint to be bent to its maximum extent.

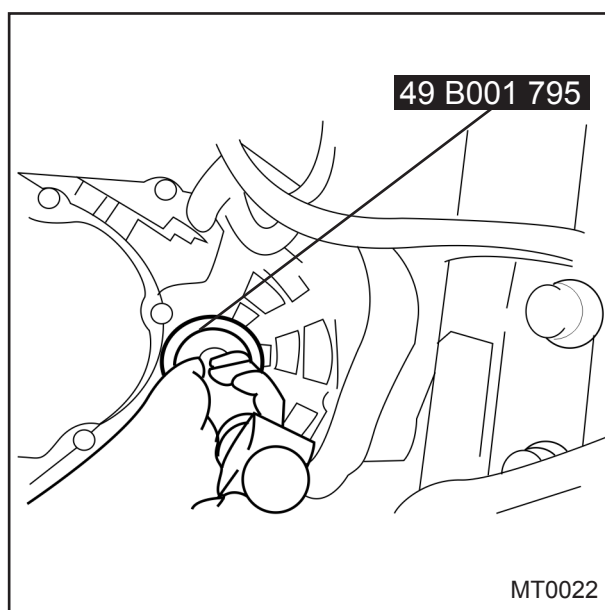


- 7- Remove the oil seal with a flat-tipped screw driver.

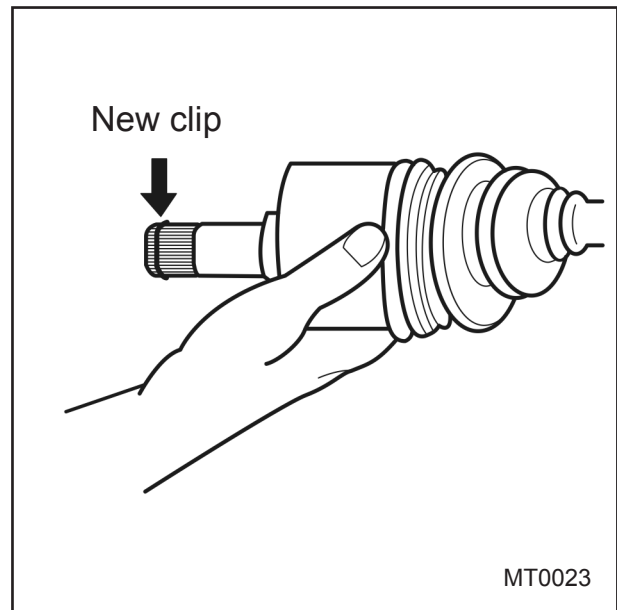


- 8- Tap the new oil seal into the transaxle case by special tool (49 B001 795)

- a- Tap in until the oil seal installer (49 B001 759) contacts the gearbox case.
- b- Coat the oil seal lip with gear oil.



c- Replace the drive shaft end clip with a new one. Insert the clip with the gap at the top of the groove.



9- Install the driveshaft as follows:

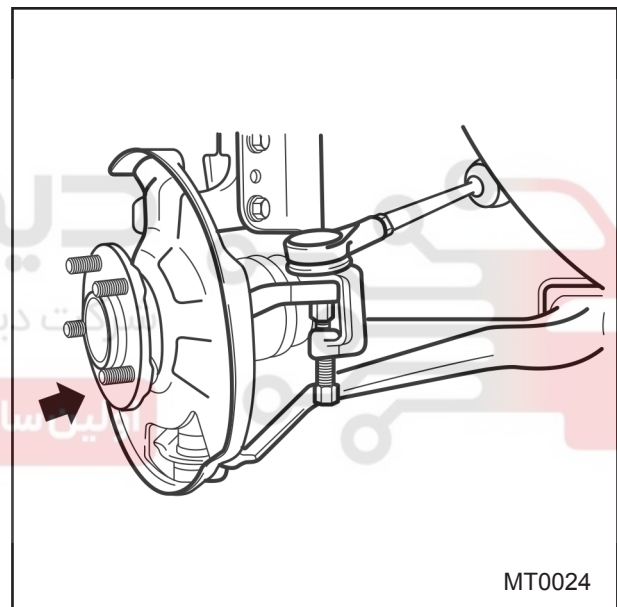
a- Pull the front hub outward, then fit the drive shaft into the transaxle.

b- Insert the driveshaft into the transaxle by pushing on the wheel hub assembly.

Note:

a- Be careful not to damage the oil seal.

b- After installation is finished; pull the front hub slowly outward to check that the drive shaft is held securely by the clip.

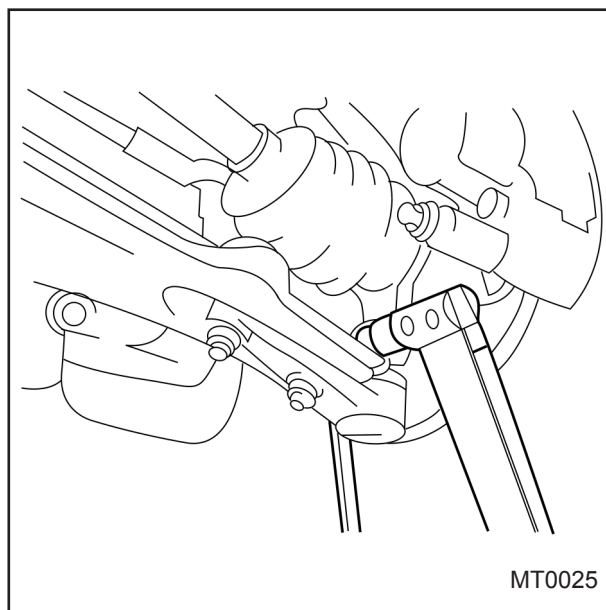


10- Install the lower arm ball joint to the knuckle arm, and tighten the clinch bolt.

Tightening torque: 55-69 N.m
5.6-7.0 kg.m

11- Install the tie-rod end and tighten its nut and install a new cotter pin.

Tightening torque: 29-44 N.m
3-4.5 kg.m



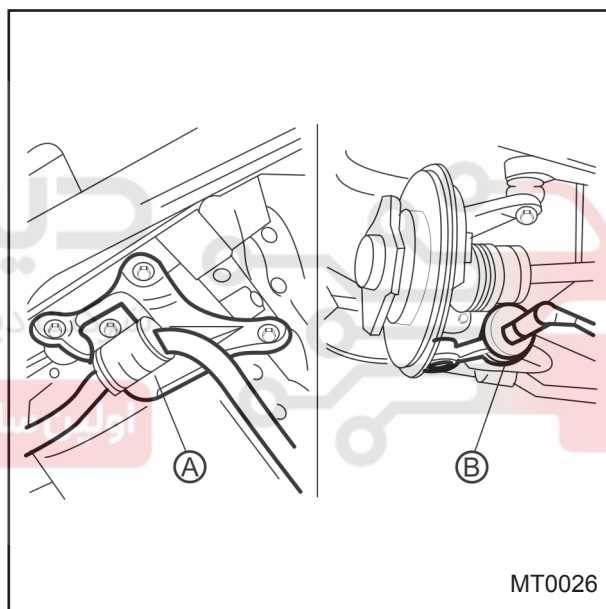
12- Install the front stabilizer.

A Tightening torque: 55-69 N.m
5.6-7.0 kg.m

B Tightening torque: 65-79 N.m
7.9-8 kh.m

13- Install the splash shield.

Tightening torque: 0.8 ~ 1.1 kg.m



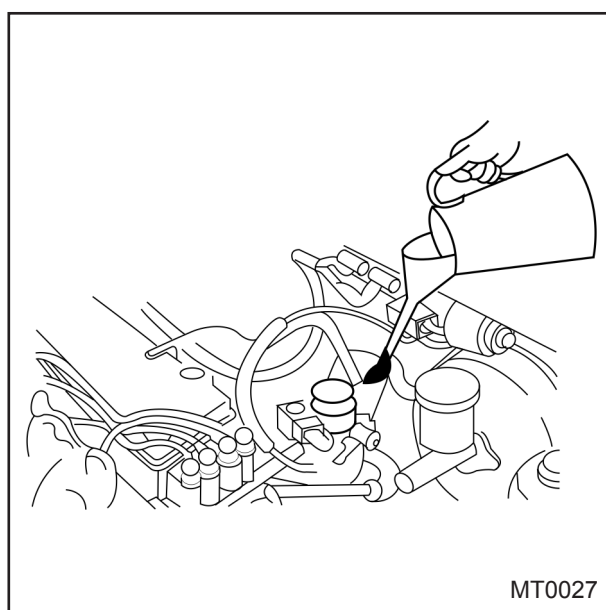
14- Install the front wheel

Tightening torque: 9 ~ 12 kg.m

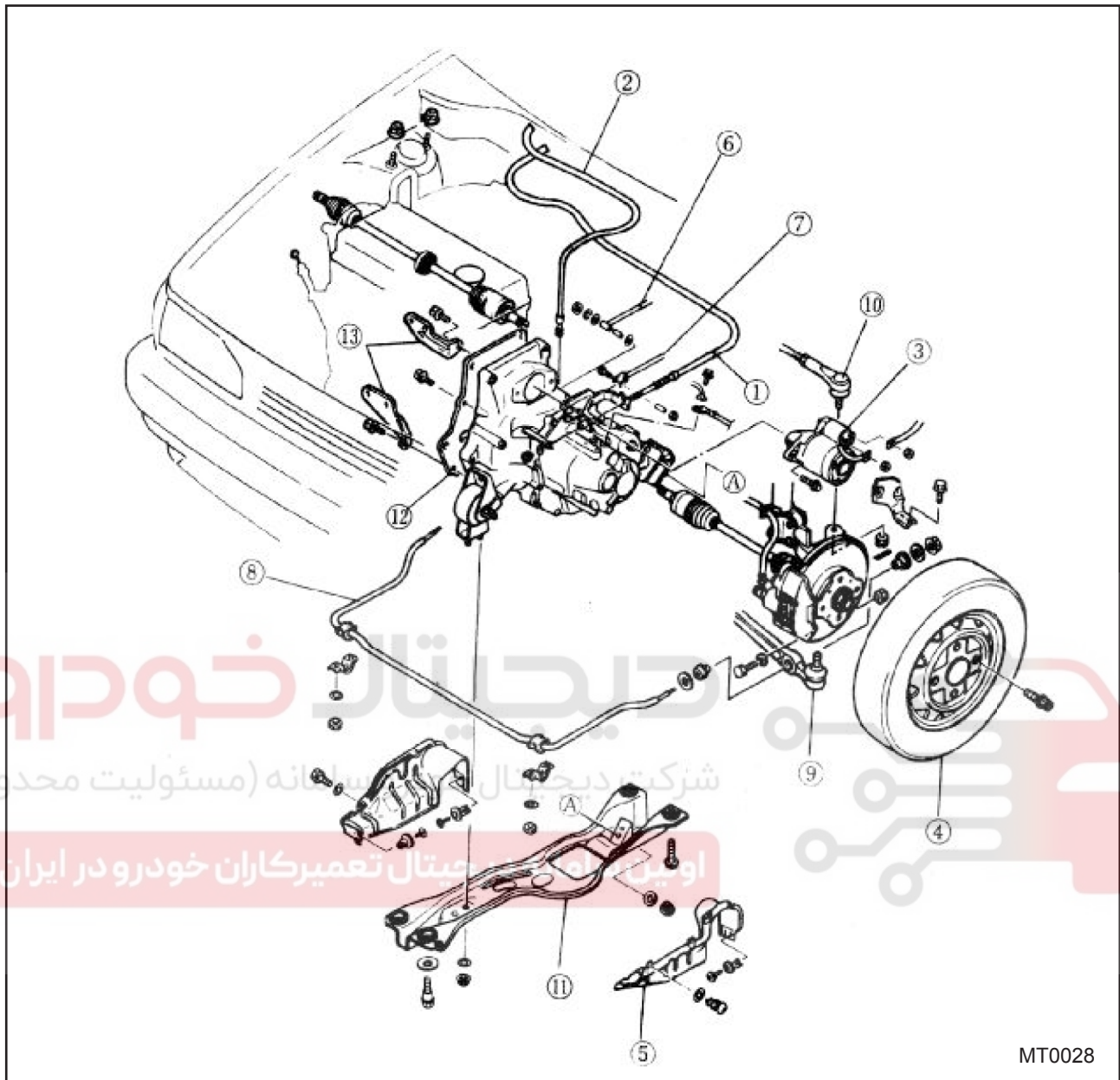
15- Remove the vehicle from jack.

16- Add the correct quantity of the specified gear oil.

For more information refer to transaxle oil inspection.



Gearbox and Its Components Disassembling Sequence

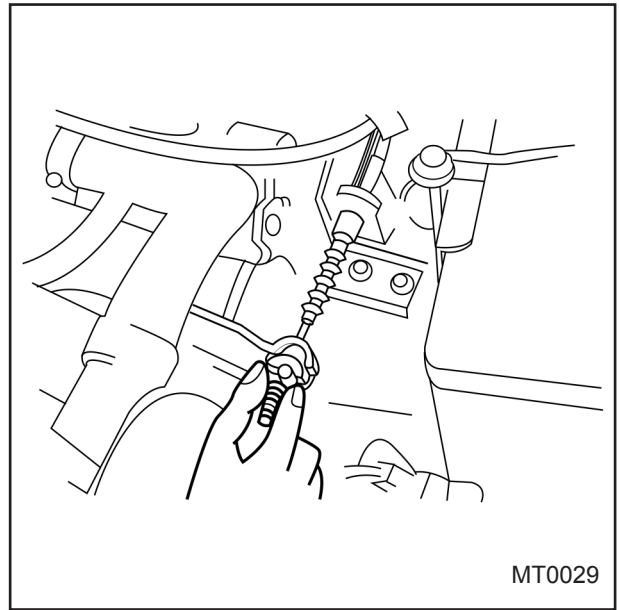


MT0028

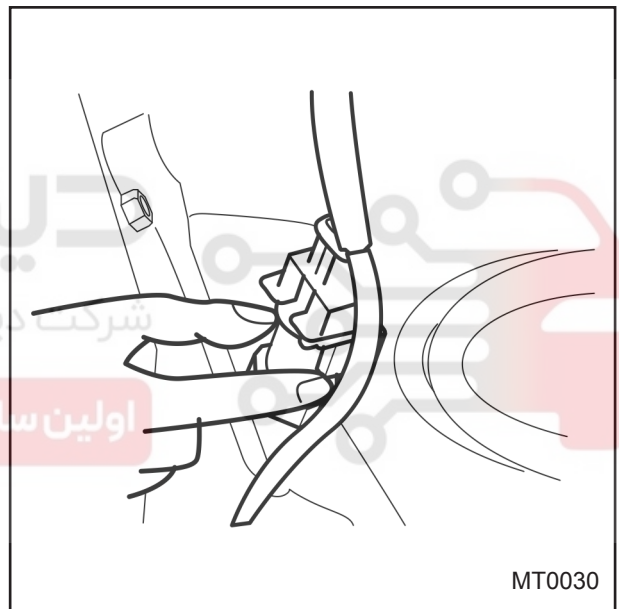
- | | |
|----------------------|--------------------|
| 1- Clutch cable | 8- Stabilizer |
| 2- Speedometer cable | 9- Lower arm |
| 3- Start | 10- Tie-rod end |
| 4- Wheel | 11- Cross member |
| 5- Splash shield | 12- End flat |
| 6- Extension bar | 13- Flat fastening |
| 7- control rod | |

Disassembling Sequence

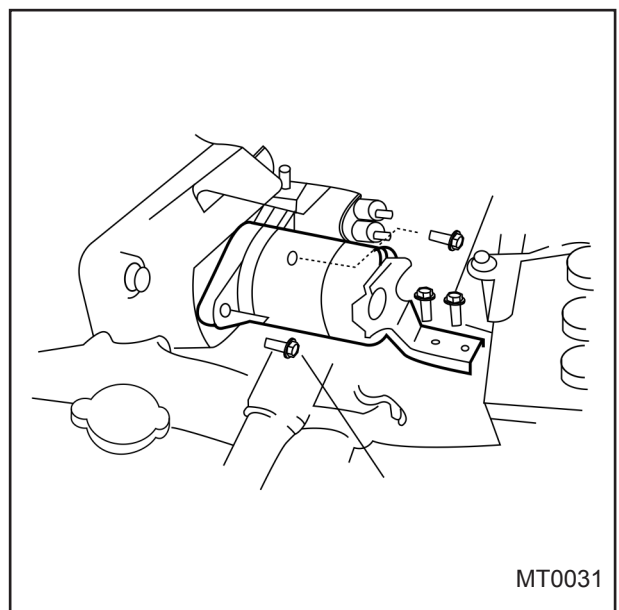
- 1- Disconnect the battery cable.
- 2- Remove the clutch cable.



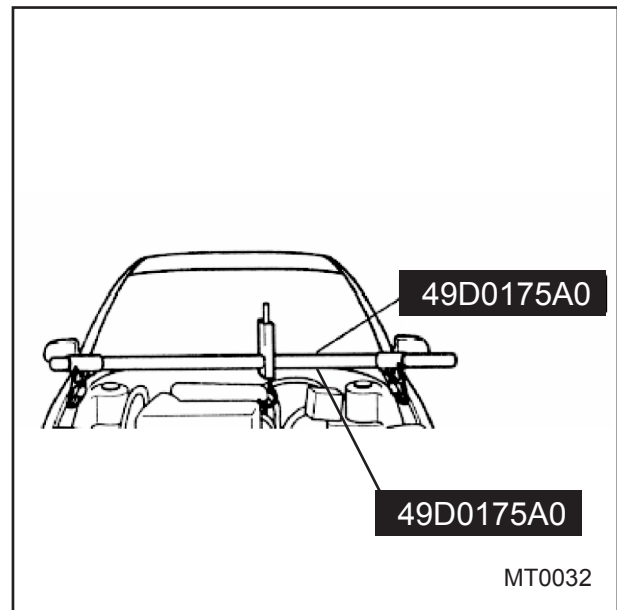
- 3- Remove the speedometer cable.



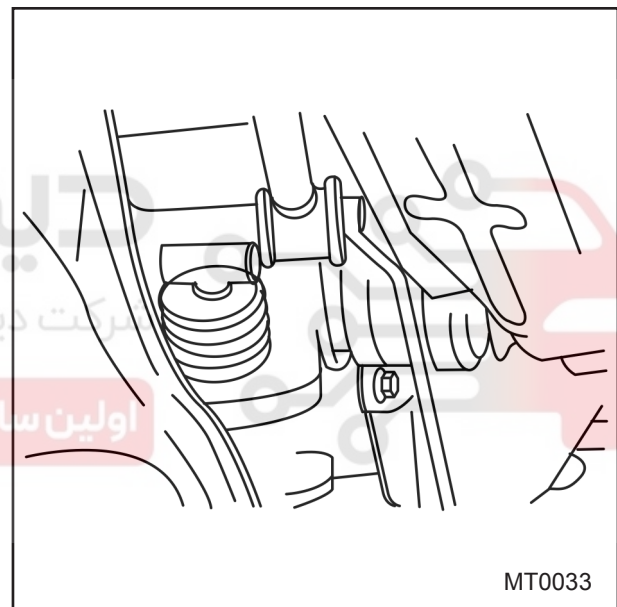
- 4- Remove the starter.



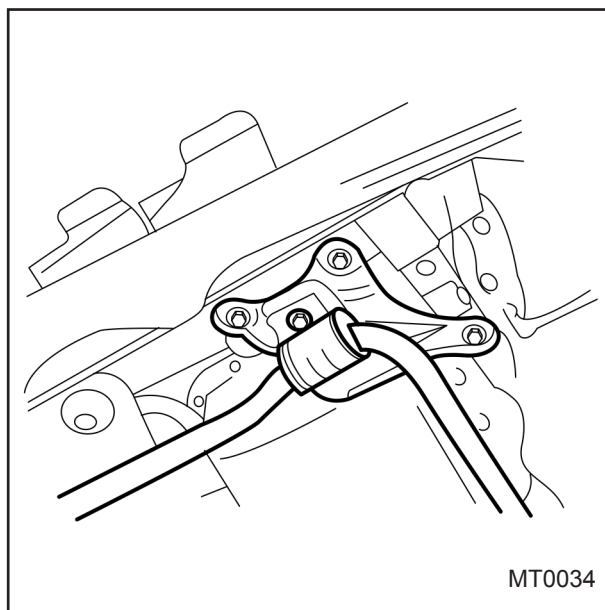
- 5- Remove the Back – up switch.
- 6- Support the Engine with 49 D017 5A0 tool.
- 7- Fix the vehicle using a jack
- 8- Drain all of the gear oil.
- 9- Remove the front wheel.
- 10- Remove the splash shield.



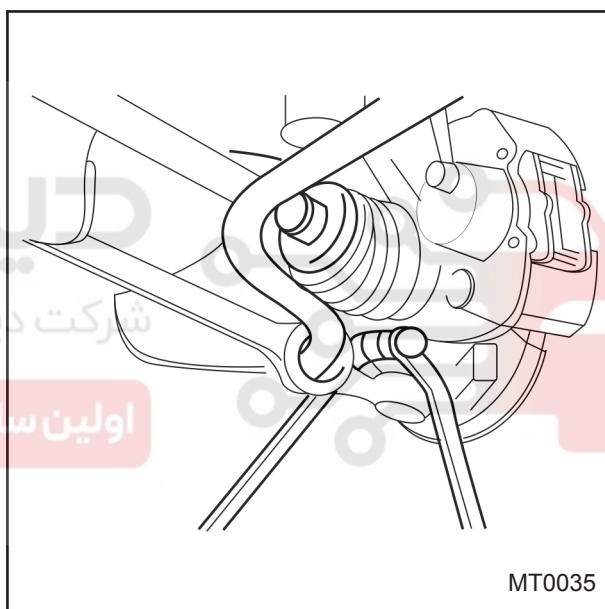
- 11- Remove control rod (Fixed or mobile)



12- Remove the front stabilizer.



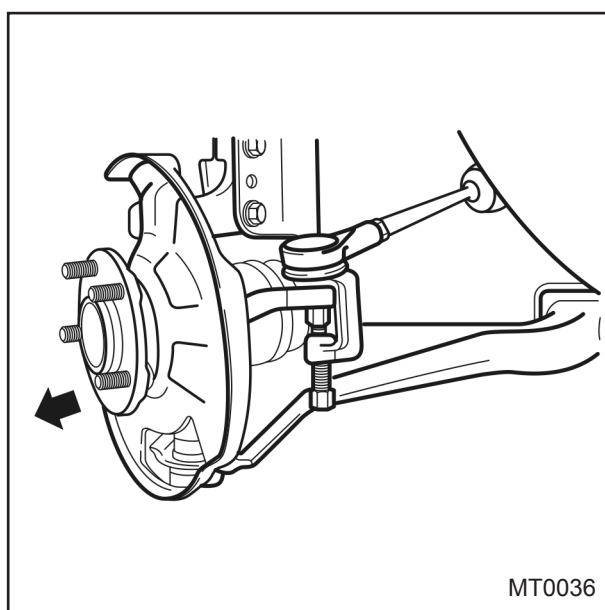
13- Remove the lower arm ball joints and the knuckle clinch bolts. Pull the lower arms downward, and detach the lower arm from the knuckles.



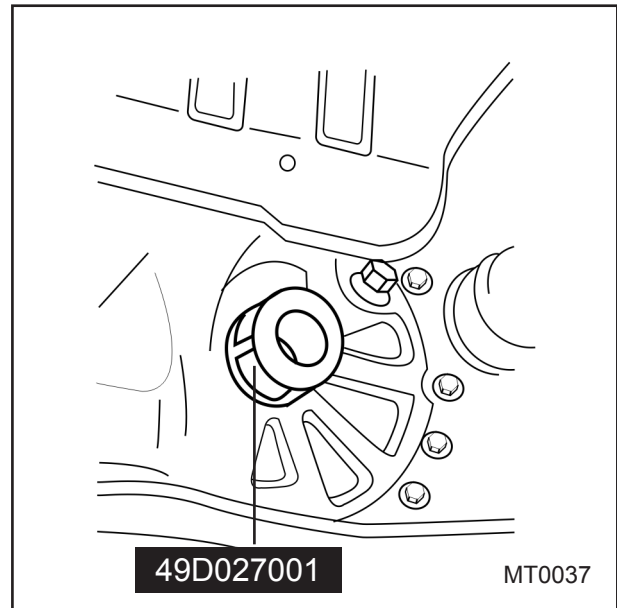
14- Remove the drive shaft with pulling the front hub out. Do not use too much force at once, increase the force gradually (in order to increase the repair man safety).

Cautions:

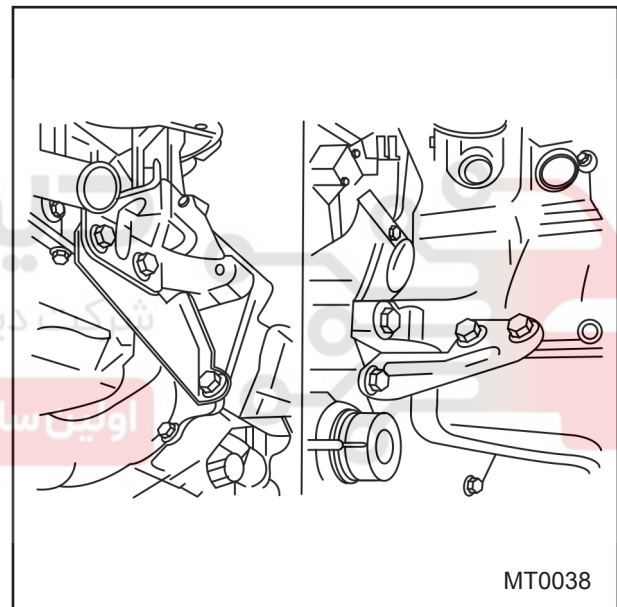
Support the driver shaft horizontally using wire string, or similar tools and do not allow the driver shaft ball Joint to be bent to its maximum extent.



15- For holding the differential side gear use (49D027001) Tool.



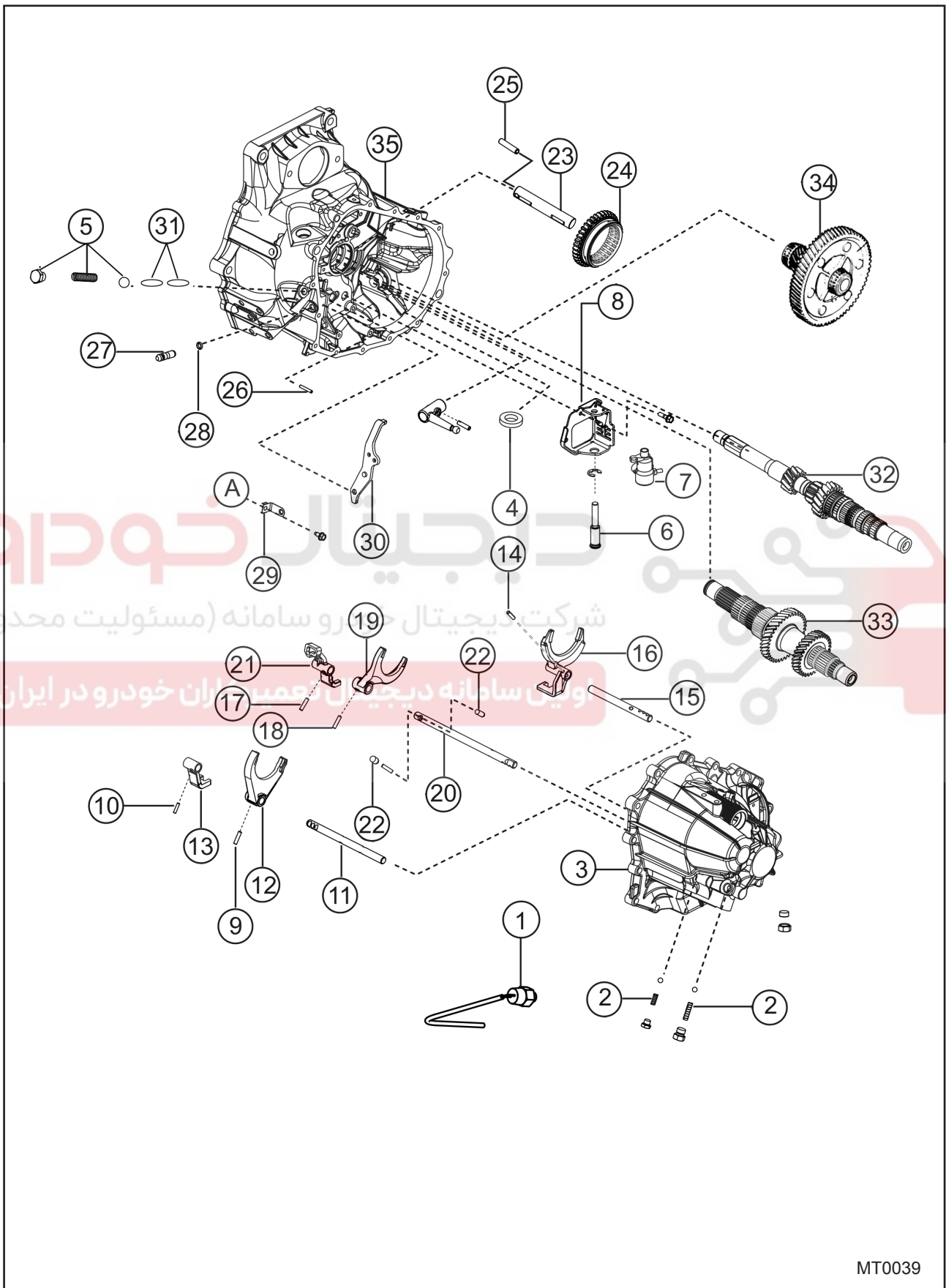
- 16- Remove the cross member.
- 17- Remove the end flat.
- 18- Remove the gusset plate bolts.



- 19- Support the gearbox with a jack.
- 20- Remove the gearbox.

Disassembling – Step 1

Disassembling sequence is as the numerical order shown in the following figure.



- | | |
|------------------------------|-----------------------------|
| 1- Back – up lamp switch | 19- 5th shift fork |
| 2- Plug and spring ball | 20- 5th / reverse shift rod |
| 3- Transaxle case | 21- 5th / reverse shift end |
| 4- Magnet | 22- Inter lock pin |
| 5- spring Plug and ball | 23- Reverse idle shaft |
| 6- Crank lever shaft | 24- Reverse idle shaft end |
| 7- Crank lever assembly | 25- Spring pin |
| 8- Base plate unit | 26- Pin |
| 9- Spring pin | 27- Reverse lever shaft |
| 10- Spring pin | 28- O- ring |
| 11- 3rd / 4th shift rod | 29- Lever set spring |
| 12- 3rd / 4th shift rod fork | 30- Reverse shift lever |
| 13- 3rd / 4th shift rod end | 31- Interlock pin |
| 14- Spring pin | 32- Input shaft |
| 15- 1st / 2nd shift rod | 33- Output shaft |
| 16- 1st / 2nd shift fork | 34- Differential assembly |
| 17- Spring pin | 35- Clutch housing |
| 18- Spring pin | |

دیجیتال خودرو

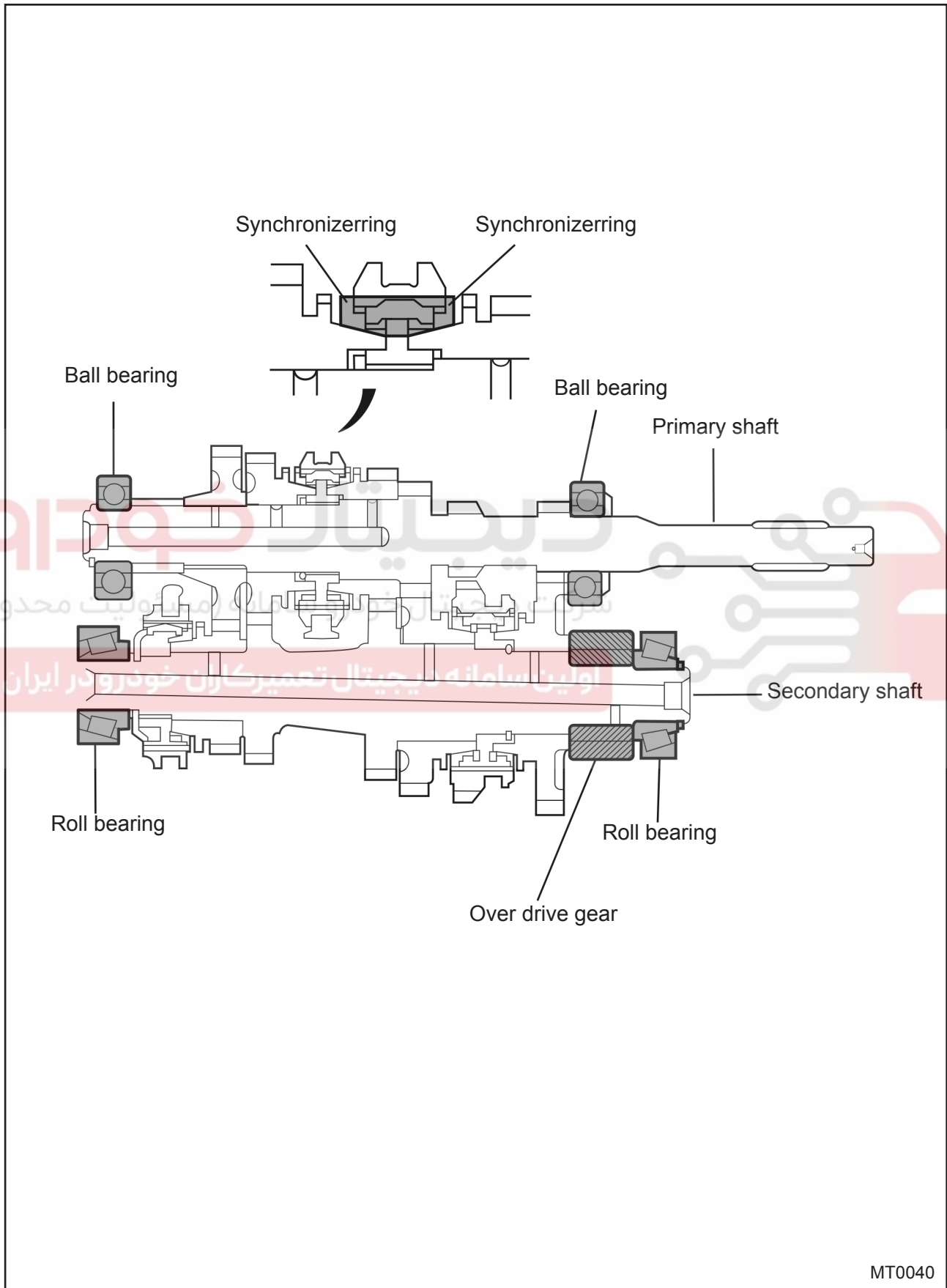
شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



Gearbox Disassembling Order – Step 1

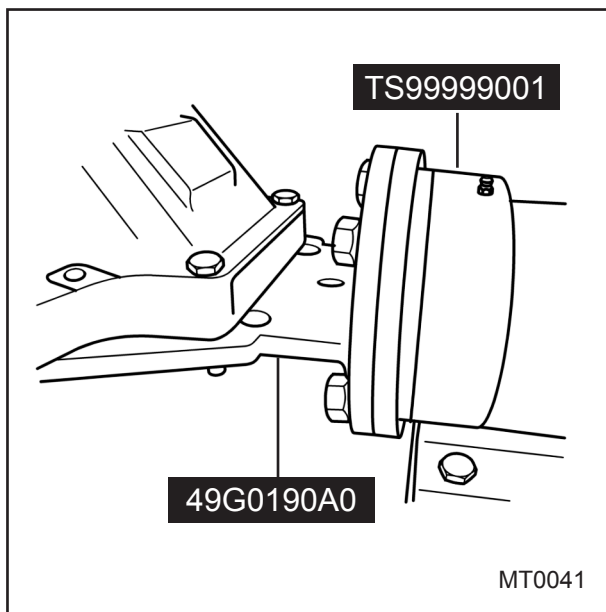
Cross section view of input and output shaft



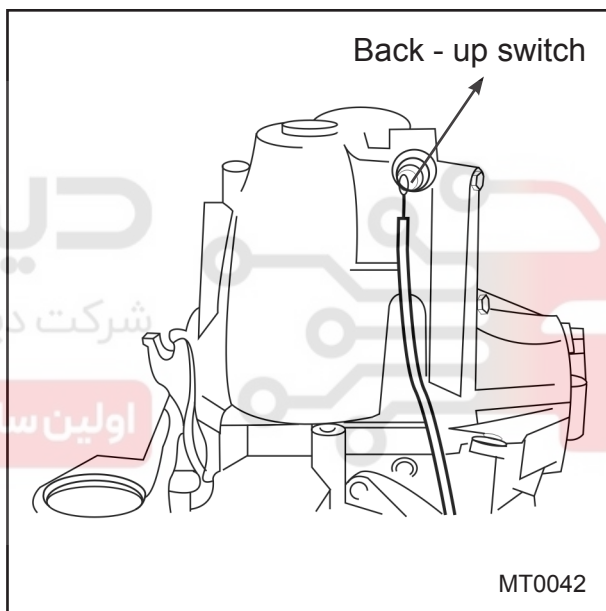
Input and Output Shaft

Transaxle Case and Clutch Housing

1- Position the transaxle hanger (49 G0190A0) on the engine stand (TS99999001), and mount the transaxle on the hanger.

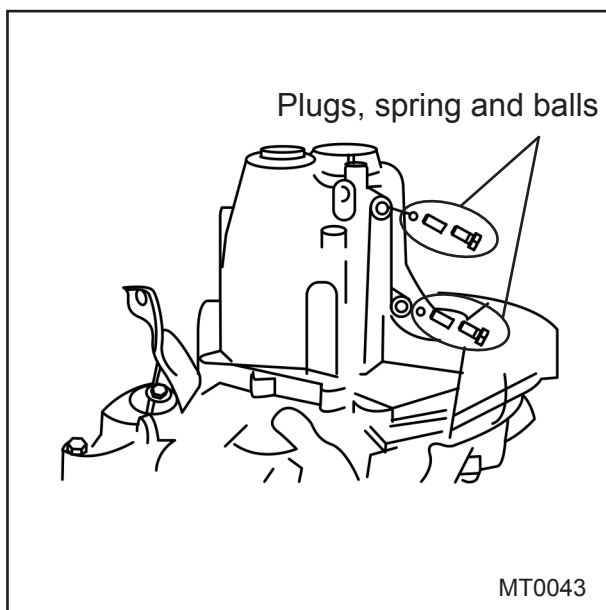


2- Remove the back - up switch.



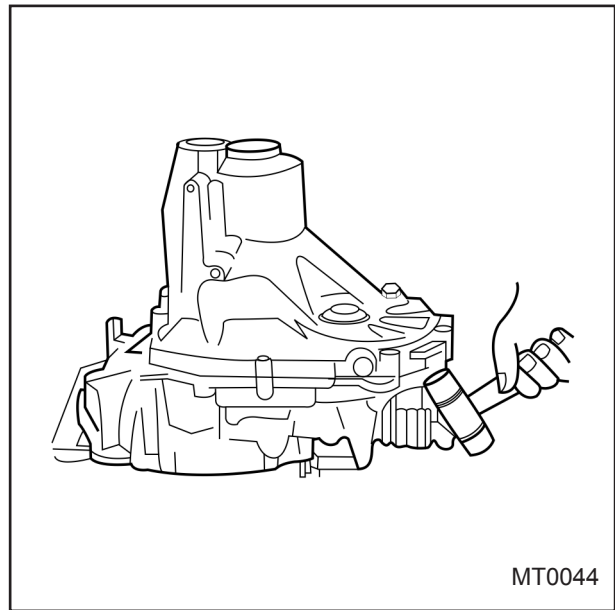
3- Remove the plugs, spring and balls.

4- Remove the bolts.



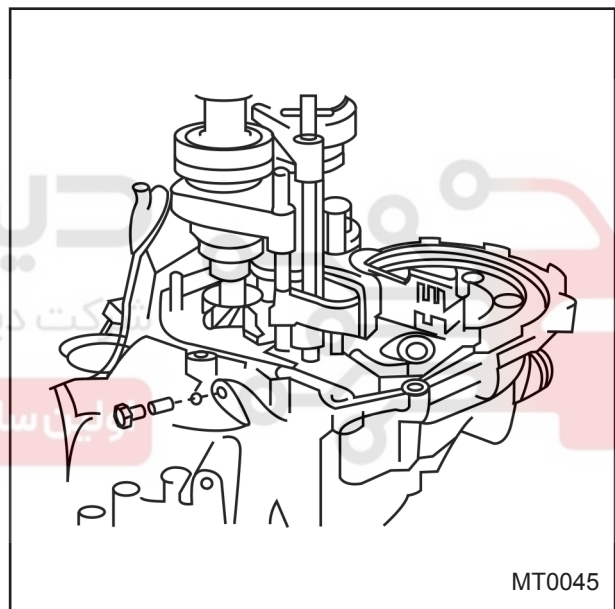
دیجیتال خودرو
 شرکت دیجیتال خودرو سامانه (مسئولیت محدود)
 اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

- 5- Remove the transaxle case
- 6- Remove the magnet



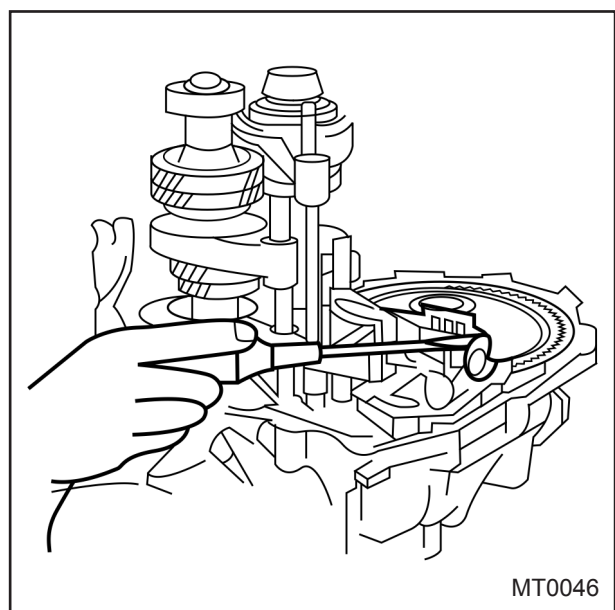
Plugs, Springs and Balls

Remove the plug , spring and ball.

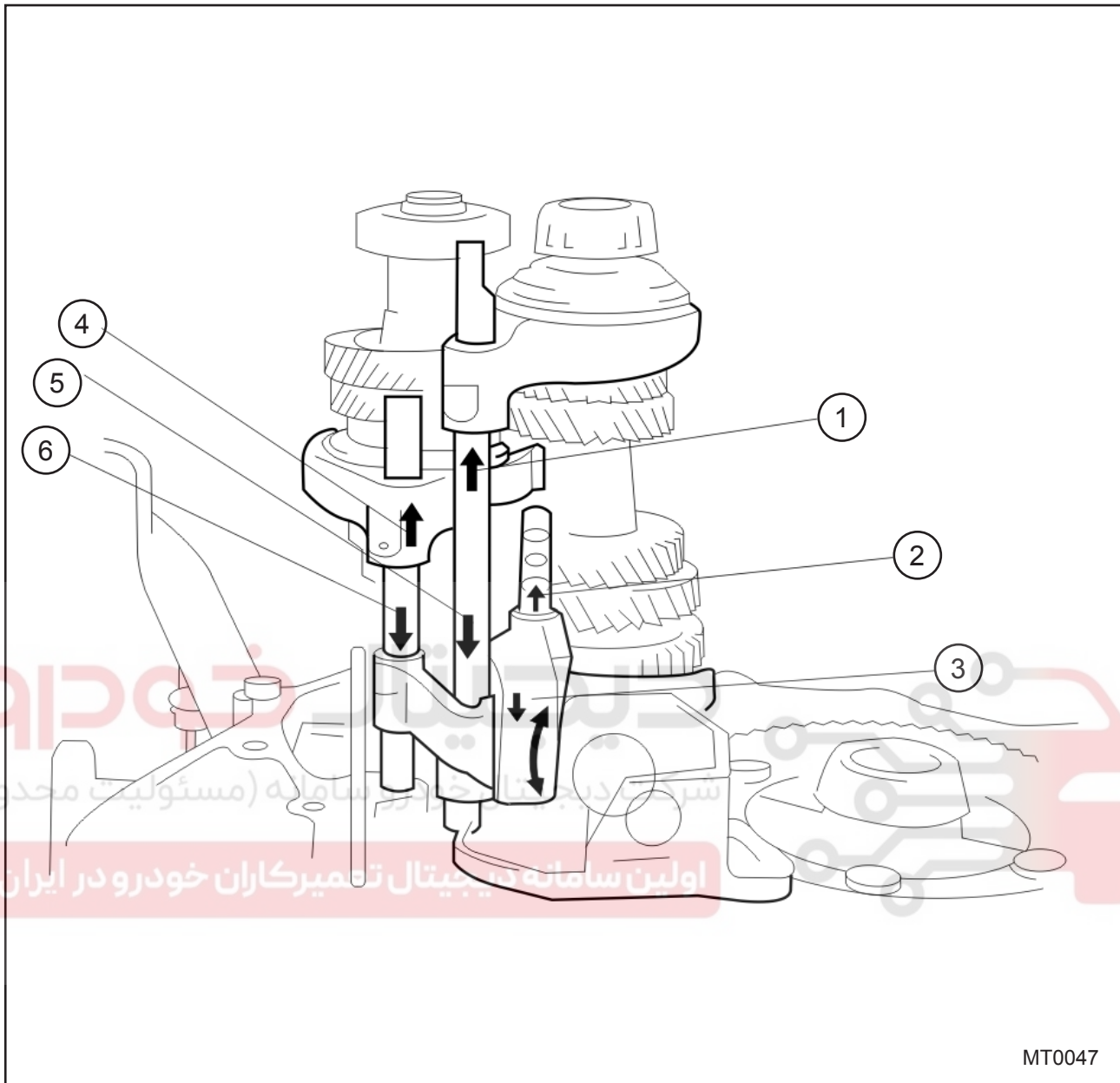


Base Plate Unit

- 1- Remove the retaining ring.
- 2- Remove the crank lever shaft and crank lever assembly.



Shift Rod

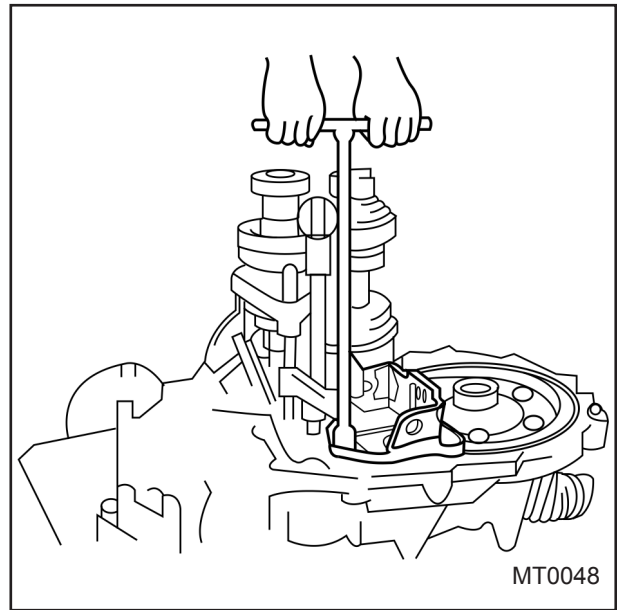
**Note:**

For smooth changing of gears, use three shift rod. In addition 1st gear shift rod- 2nd gear shift rod are similar to 3-4-5 and reverse shift rods.

The function of gear changing are independent from each other.

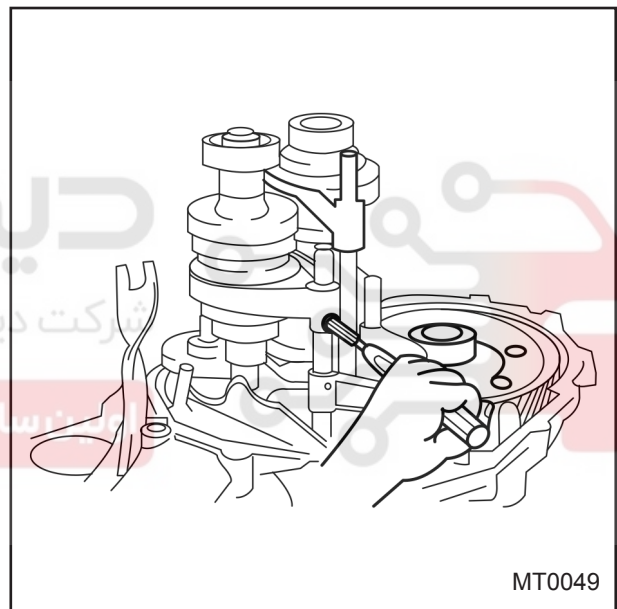
- 1- Rear gear
- 2- 2nd gear
- 3- 1st gear
- 4- 4th gear
- 5- 5th gear
- 6- 3rd gear

3- Remove the base plate unit.

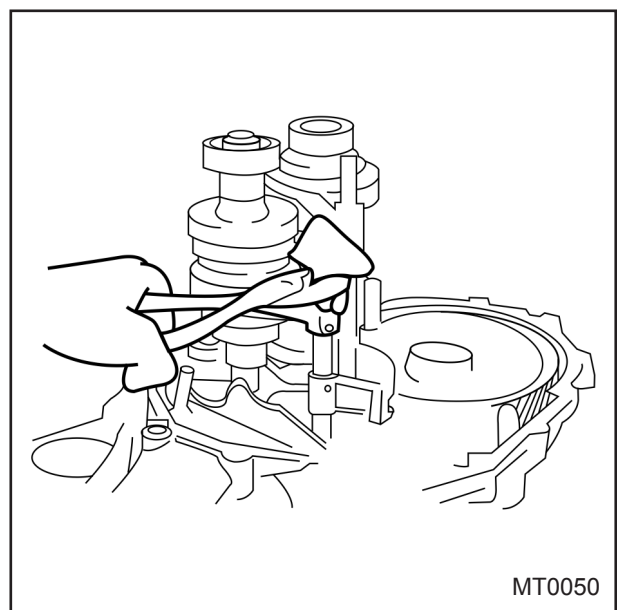


Shift Rod

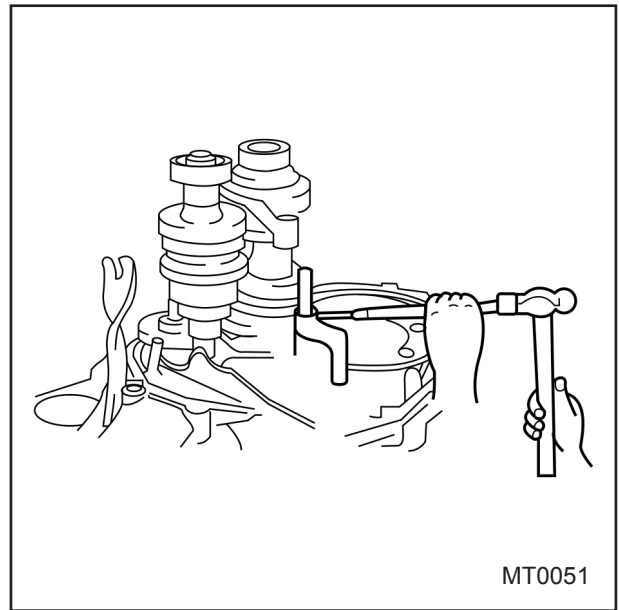
1- Pull out the spring pin from 3rd / 4th shift fork and shift rod end.



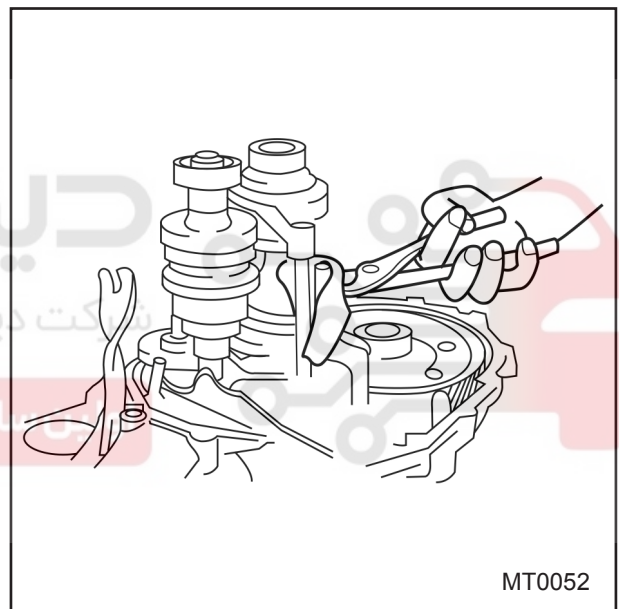
2- Remove the shift rod, shift fork (3rd / 4th). Be careful not to damage the rod.



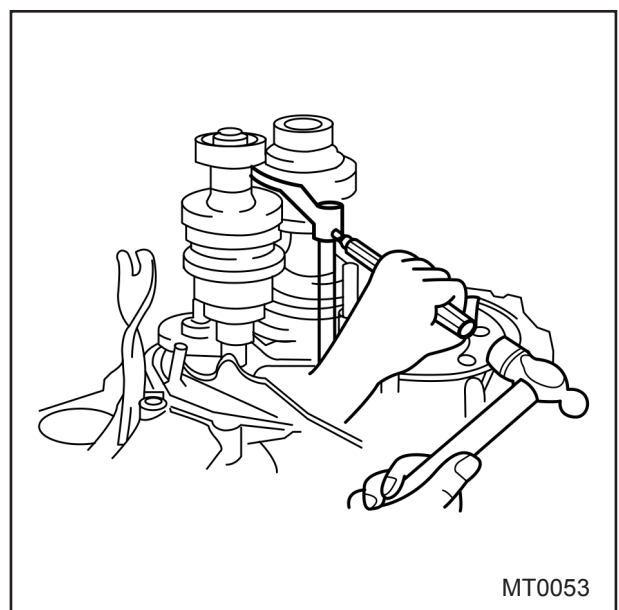
3- Pull out the spring pin from 1st / 2nd shift fork.



4- Remove the shift rod and shift fork (1st / 2nd). Be careful not to damage the rod.



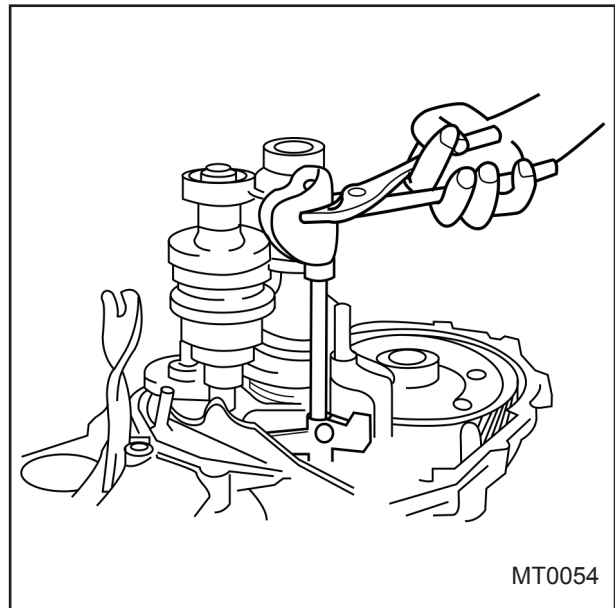
5- Pull out the spring from 5th / reverse shift fork and shift rod end. Use pin punch with 5.0 mm diameter.



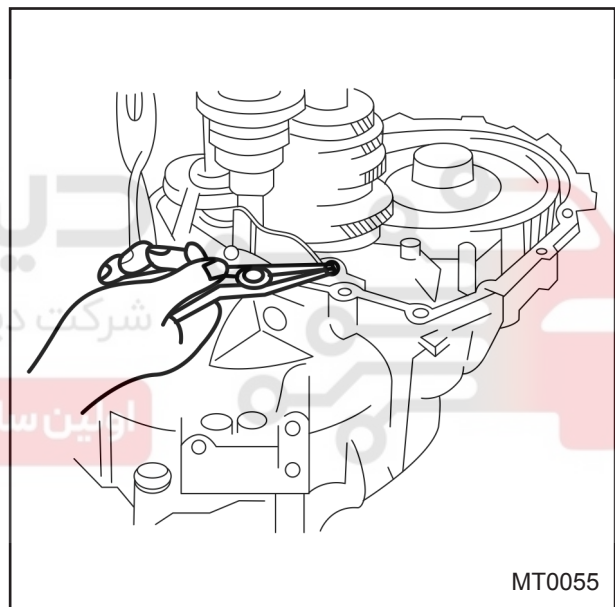
6- Remove the shift rod and shift rod end (5th / reverse)

Note:

Be careful not to damage the rod.

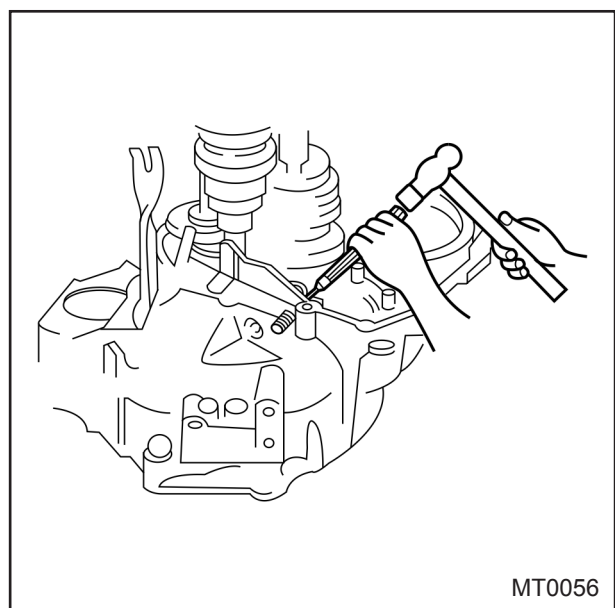


7- Remove the interlock pin.



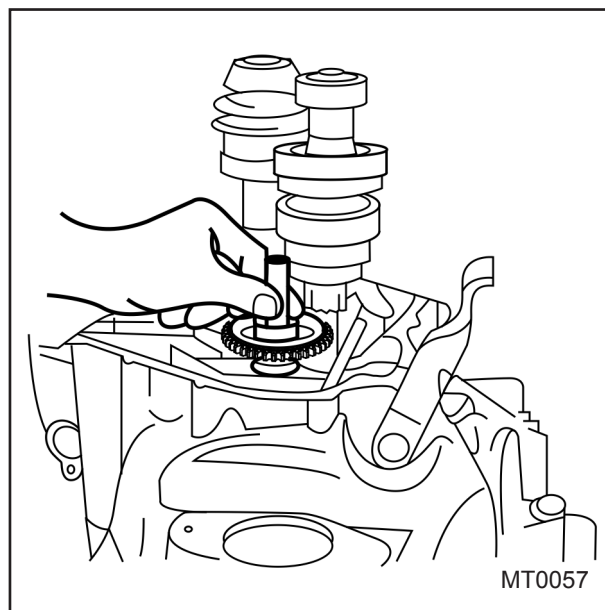
8- Remove the reverse lever shift.

9- Remove the lever set spring and reverse shift lever.

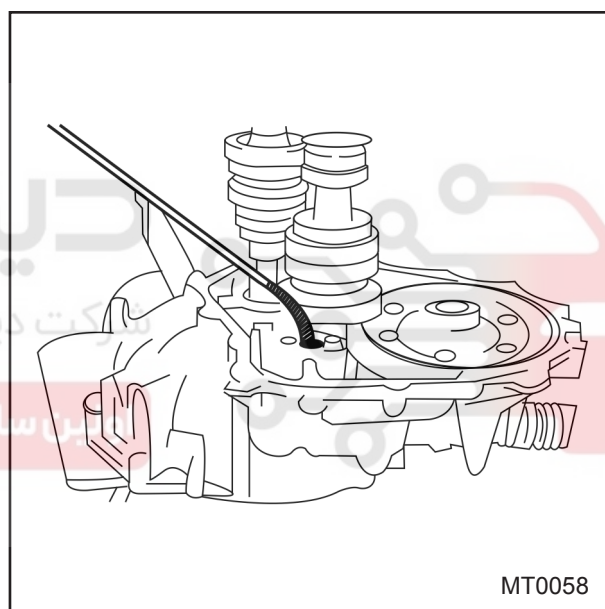


Reverse Idle Gear

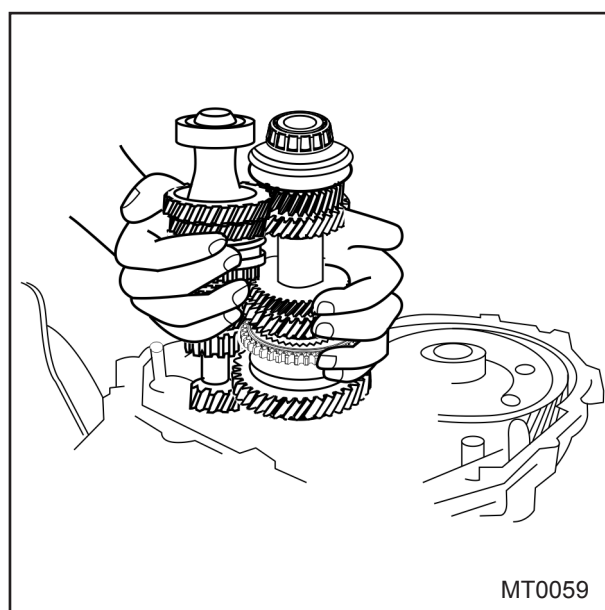
- 1- Remove the reverse idle shaft and reverse idle gear.
- 2- Remove the spring pin from reverse idle shaft.



- 3- Remove the interlock pins with magnet finger.

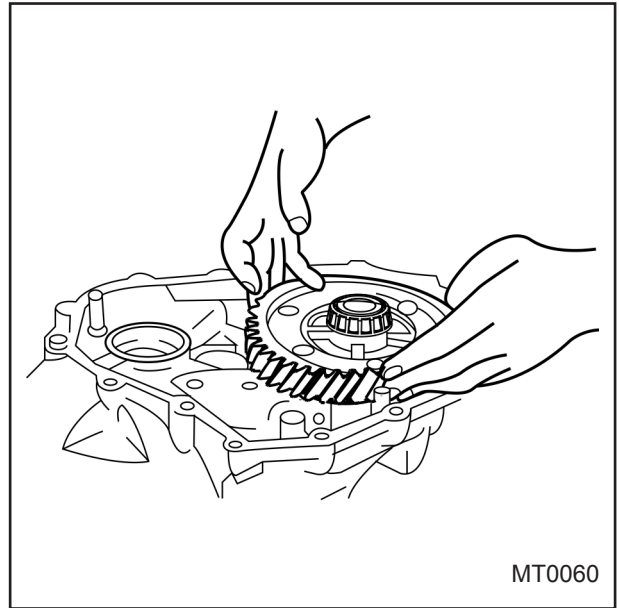
**Shaft Gears Assembly**

- Remove the primary and the secondary shaft gear assembly.



Differential

Remove the differential assembly.



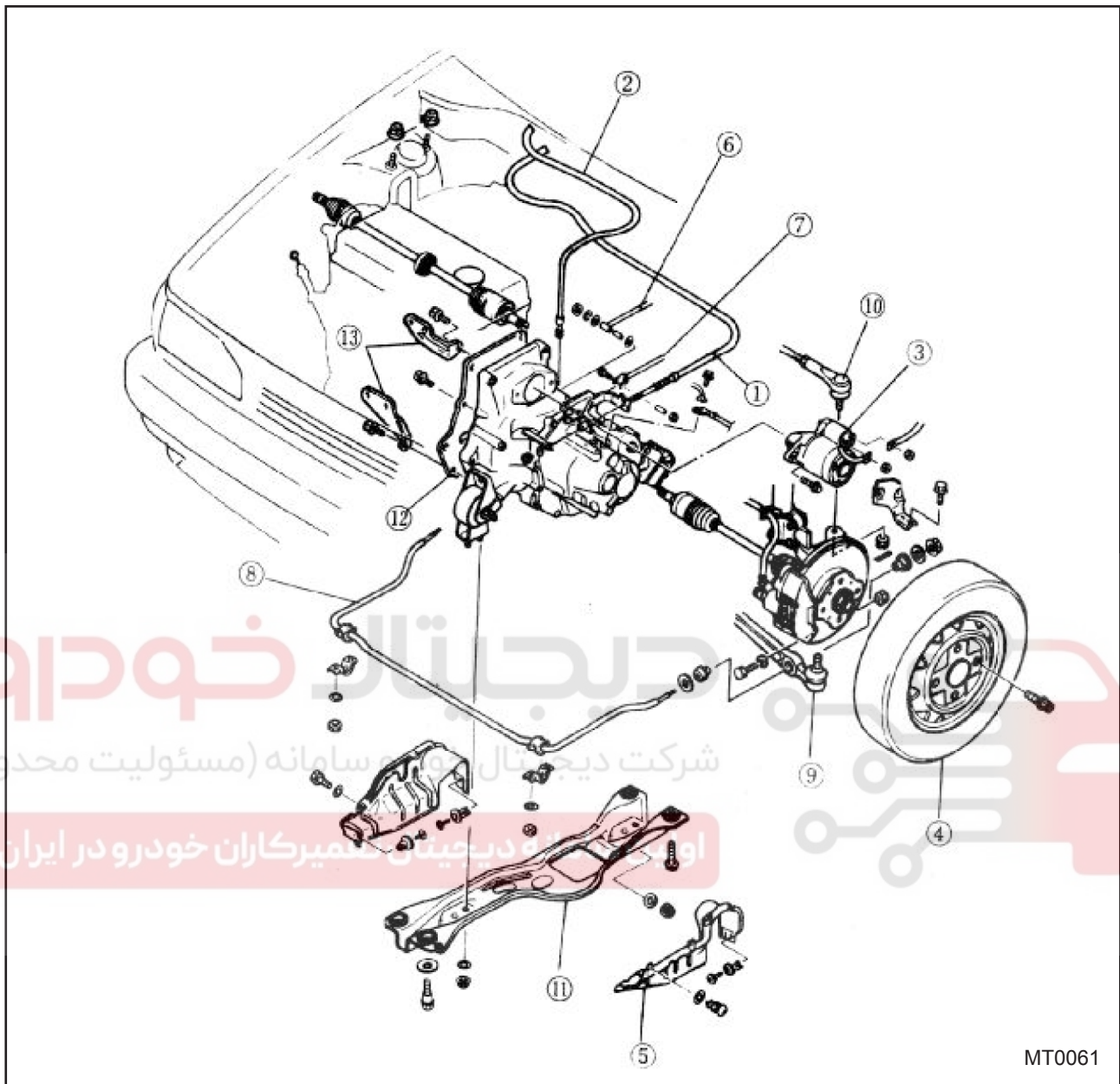
دیجیتال خودرو

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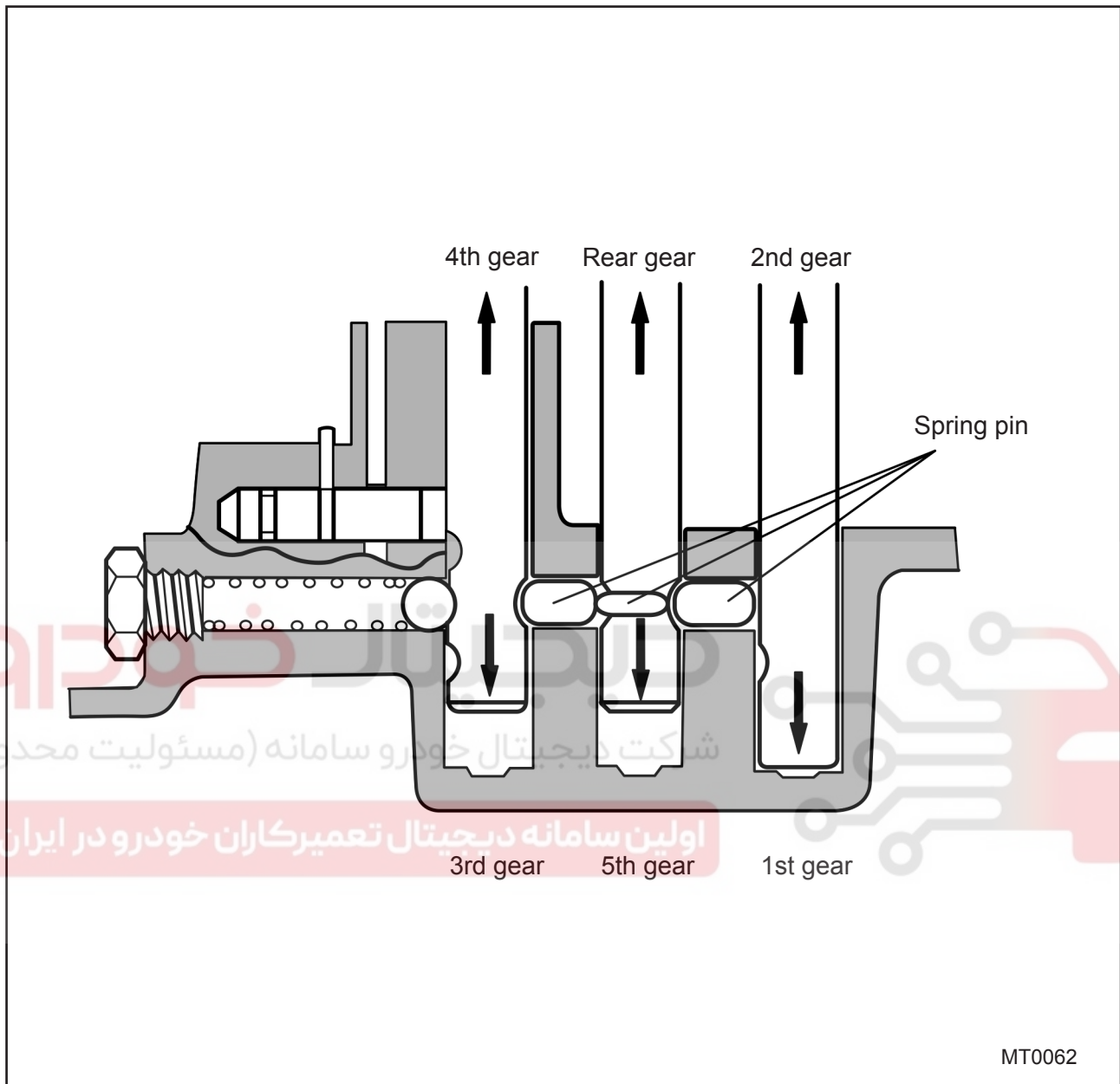
Outline – View of Components



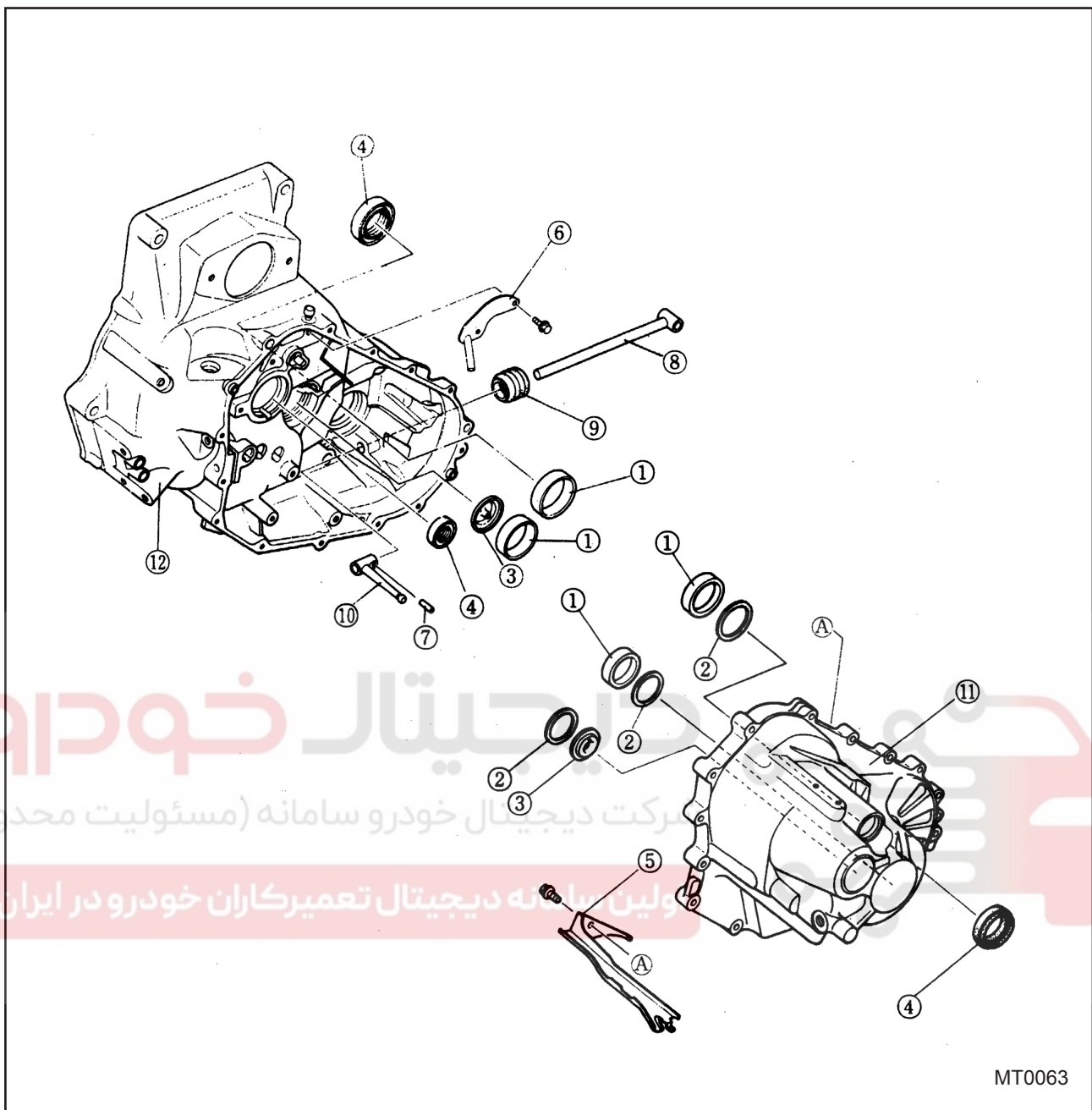
MT0061

- | | |
|----------------------|--------------------|
| 1- Clutch cable | 8- Stabilizer |
| 2- Speedometer cable | 9- Lower arm |
| 3- Start | 10- Tie-rod end |
| 4- Wheel | 11- Cross member |
| 5- Splash shield | 12- End flat |
| 6- Extension bar | 13- Flat fastening |
| 7- control rod | |

Interlock Pins Locking Mechanism



The locking mechanism is carried out by pins. They are installed so that with moving one of the rods , the pins pull outward and locking action occur on the shift rod.



- 1- Bearing outer race
- 2- Adjustment gasket
- 3- Funnel
- 4- Oil seal
- 5- Oil passage
- 6- Baffle plate
- 7- Spring pin

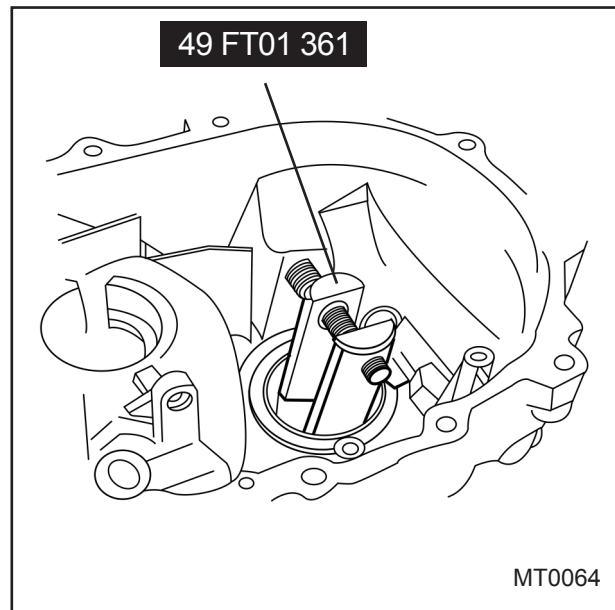
- 8- Control rod
- 9- Boot
- 10- Control lever
- 11- Transaxle case
- 12- Clutch housing

Bearing Outer Race (Differential, Clutch Housing and Transaxle Case)

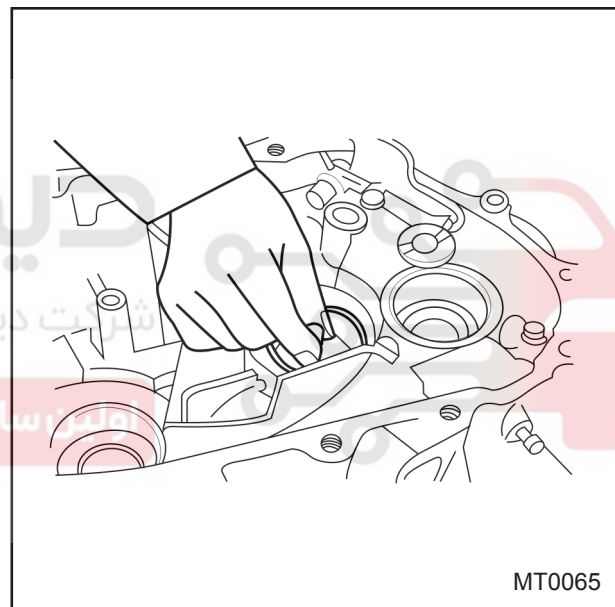
Remove the bearing outer races using the bearing remover (49 FT01 361) and hammer.

Note:

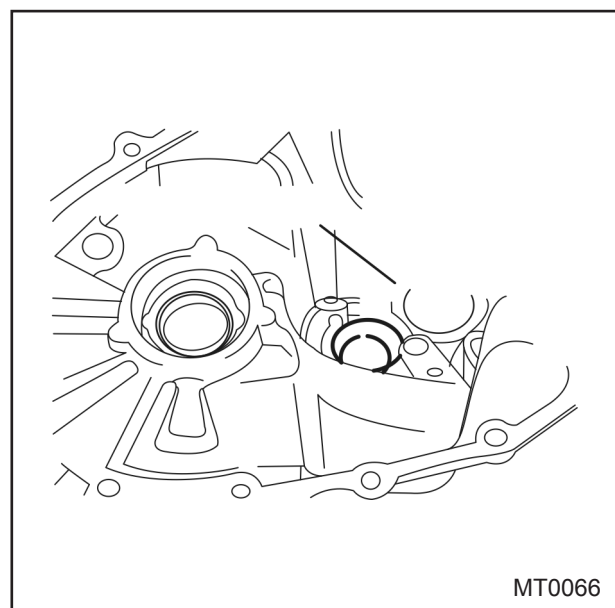
Remove the oil seals.

**Bearing Outer Race (Input Shaft, Transaxle Case, Output Shaft and Clutch Housing)**

Remove the bearing outer race by raising funnel and bearing race together.

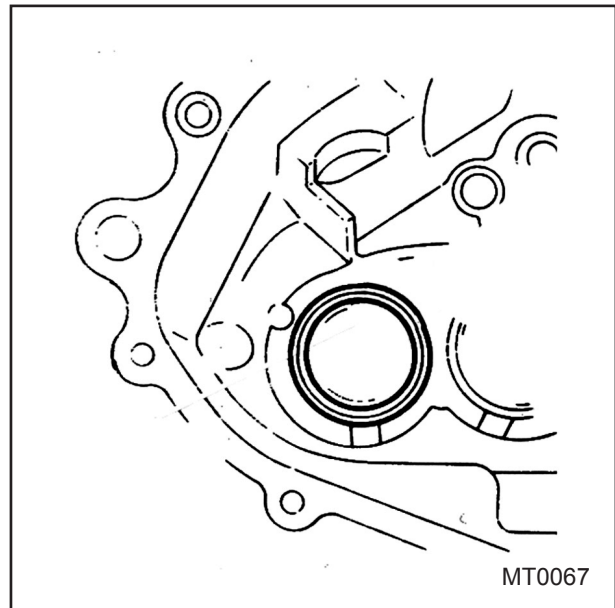
**Bearing Outer Race (Output Shaft, Transaxle Case).**

Remove the bearing outer race.



Adjustment shim

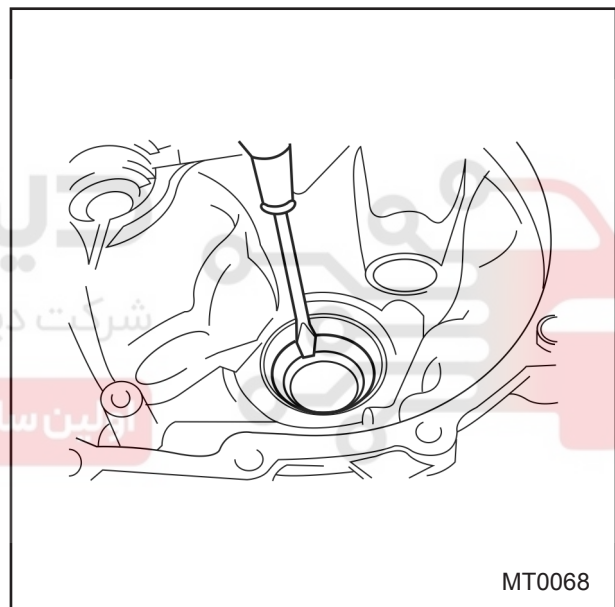
Remove the adjustment shims.

**Oil Seal**

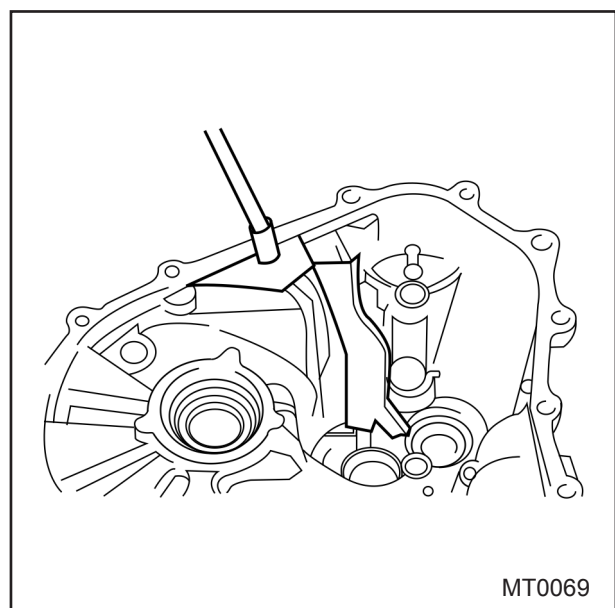
1- Replace the oil seals if necessary.

Note:

Remove the oil seal gradually and smoothly.

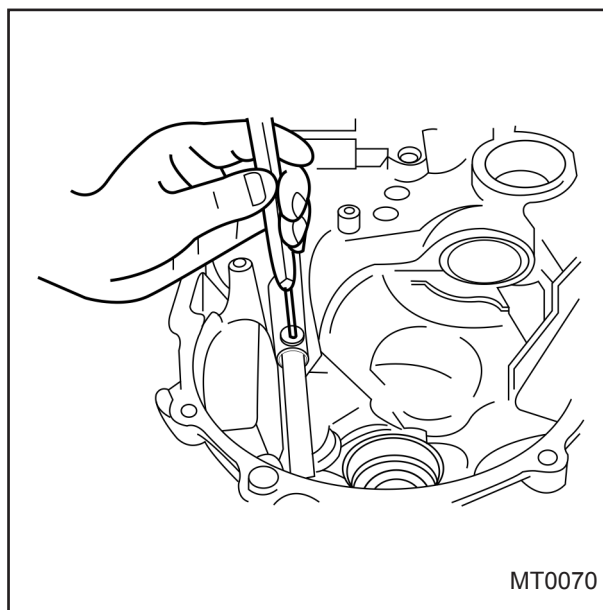


2- Remove the oil passage.

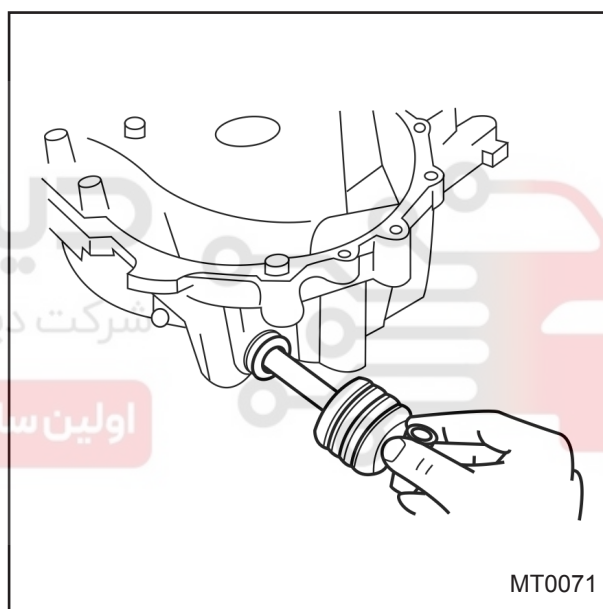


Control Rod

- 1- Remove the baffle plate and the air breather.
- 2- Remove the spring pin from the control rod.



- 3- Remove the control rod, change arm and boot.

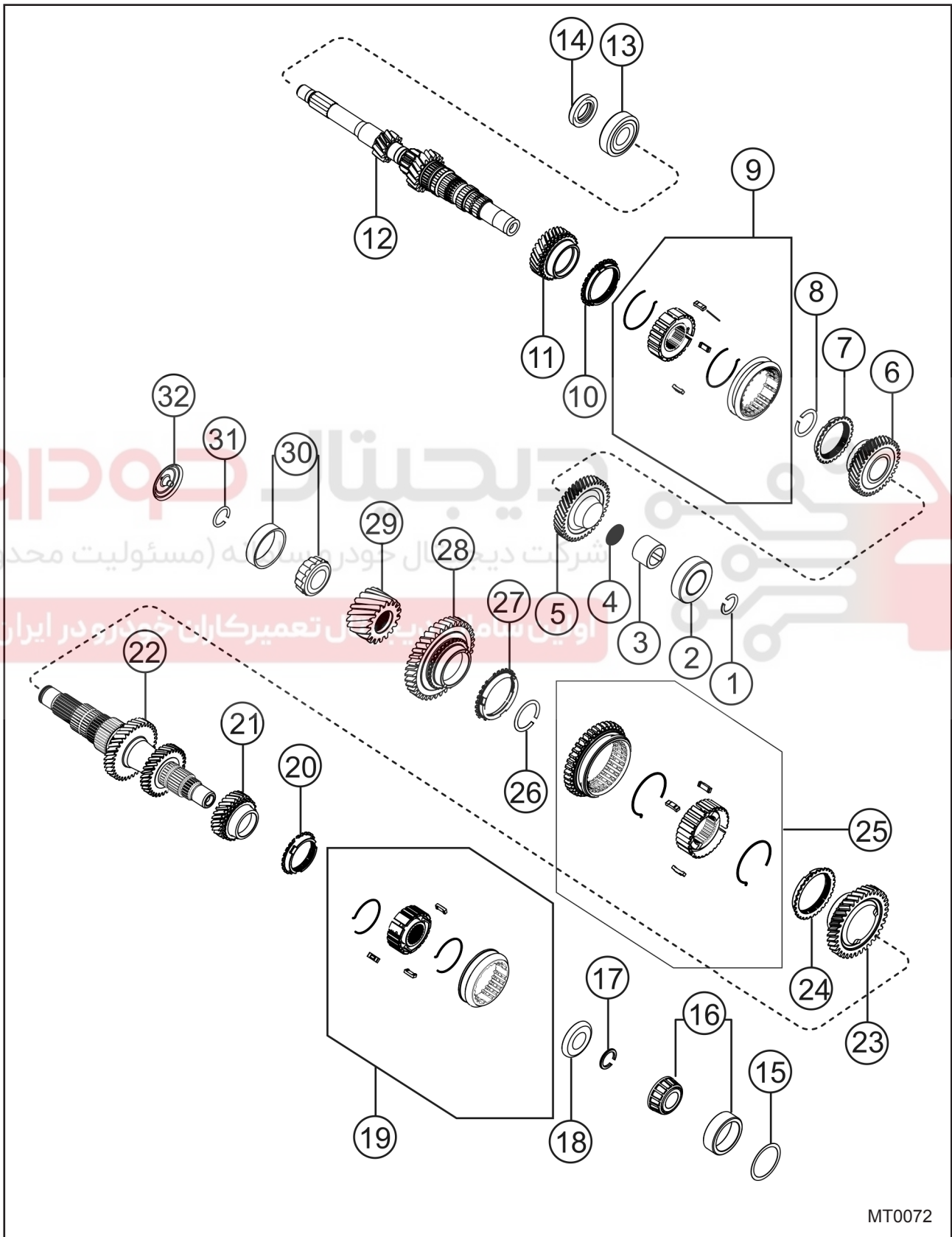
**Gearbox Gears Disassembling Order – Step 3****Notes:**

- a) Replace the bearings with new ones whenever they are disassembled.
- b) Before disassembling, check the thrust clearance of all gears. (For more information refer to next pages).

Gearbox outline

Disassembling Order – Step 3

- Replace the bearings with new ones whenever they are disassembled.
- Before the bearings disassembling, check the axial clearance for all gears.



MT0072

- | | |
|----------------------------------|----------------------------|
| 1- Retaining ring | 17- Retaining ring |
| 2- Ball bearing | 18- Gasket |
| 3- Spacer | 19- 5th gear hub assembly |
| 4- Ball | 20- Synchronizer ring |
| 5- Primary 5th gear | 21- 5th gear |
| 6- Primary 4th gear | 22- Secondary shaft gear |
| 7- 4th synchronizer ring | 23- 2nd gear |
| 8- Retaining ring | 24- Synchronizer ring |
| 9- 3rd & 4th Clutch hub assembly | 25- 1st & 2nd hub assembly |
| 10- 4th Synchronizer ring | 26- Retaining ring |
| 11- 3rd gear | 27- Synchronizer ring |
| 12- Primary shaft gear | 28- 1st gear |
| 13- Ball bearing | 29- Pinion gear |
| 14- Oil seal | 30- Roller bearing |
| 15- Adjustment shim | 31- Retaining ring |
| 16- Roller bearing | 32- Funnelled |

دیجیتال خودرو

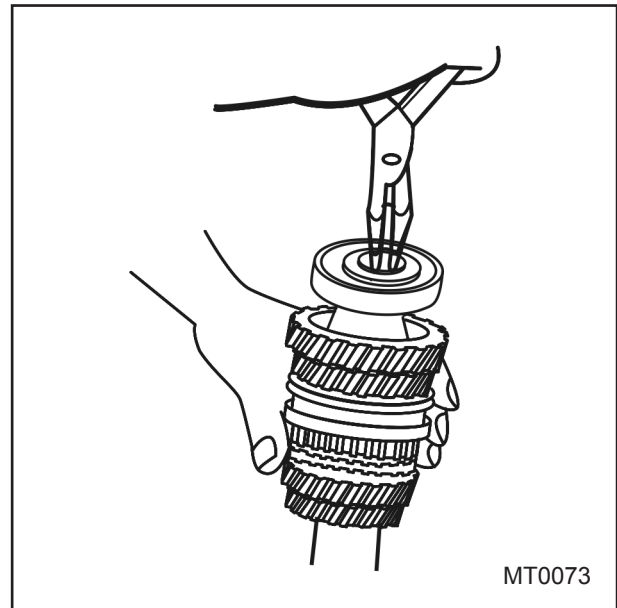
شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

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**Primary Shaft Gear Assembly
4th Gear**

1- Remove the retaining ring.

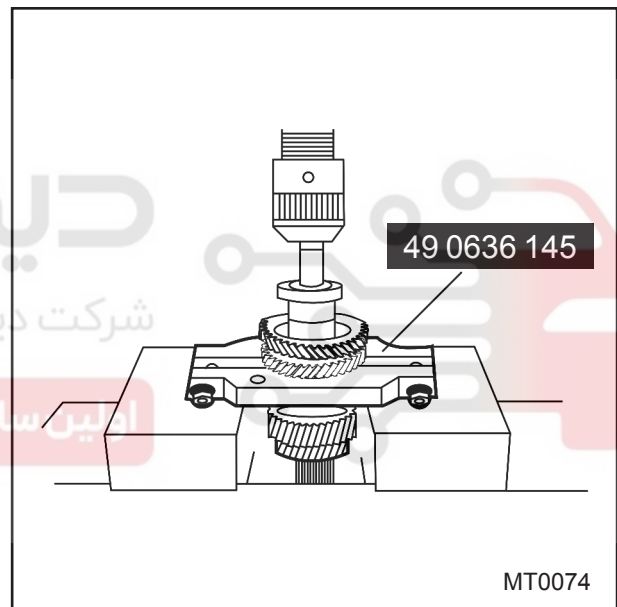


2- Set the bearing puller (49 0636 145) to 4th gear

3- Remove the ball bearing, spacer, primary 5th gear, 4th gear, and synchronizer ring.

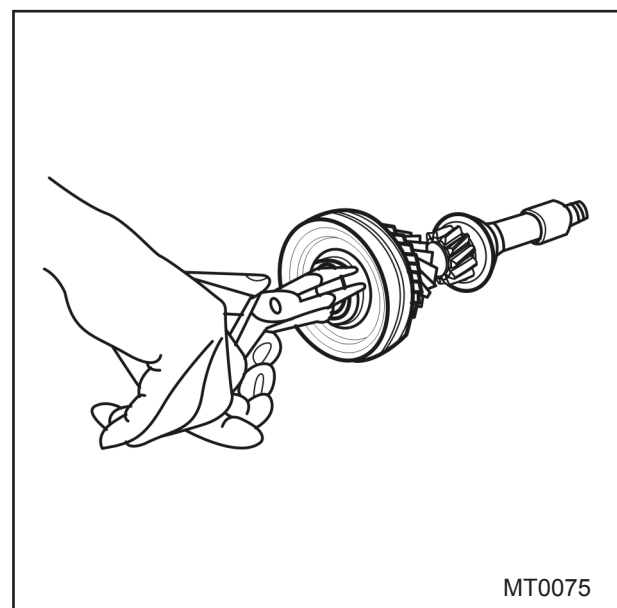
Note:

Hold the shaft with one hand so that it does not fall.



3rd Gear

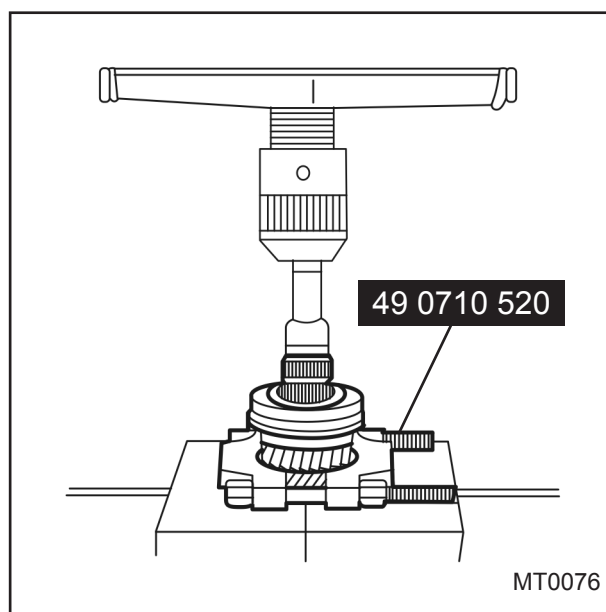
1- Remove the retaining ring.



- 2- Set the bearing puller (49 0710 520) to 3rd gear.
- 3- Remove the clutch hub assembly (3rd / 4th), 3rd gear and synchronizer ring.

Note:

Hold the shaft with one hand in order to prevent falling the shaft.

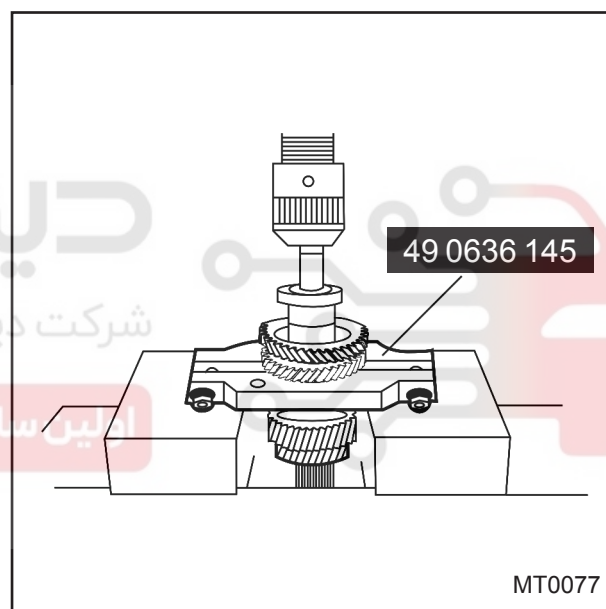


Bearing

Remove the bearing by bearing press.

Note:

If necessary replace the bearing.

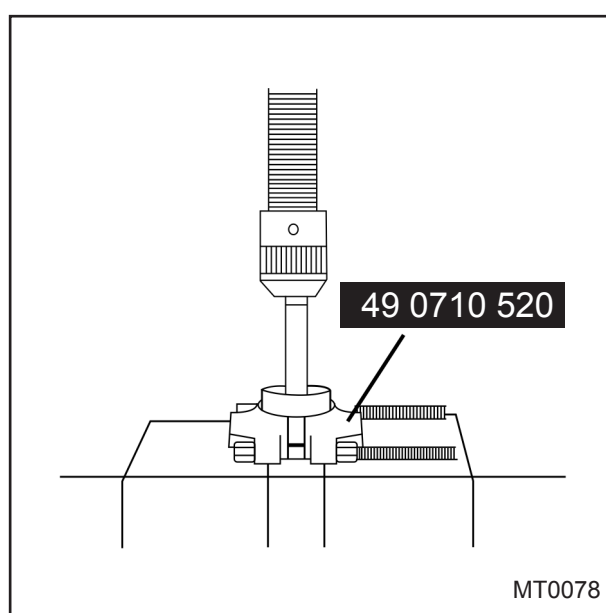


Primary Shaft Gear

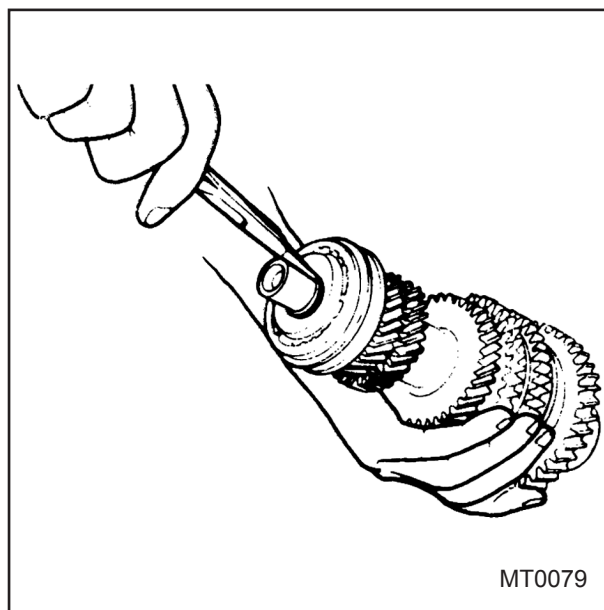
- 1- Remove the bearing inner race by bearing puller (49 0710 520).

Note:

Hold the shaft with one hand in order to prevent falling the shaft.

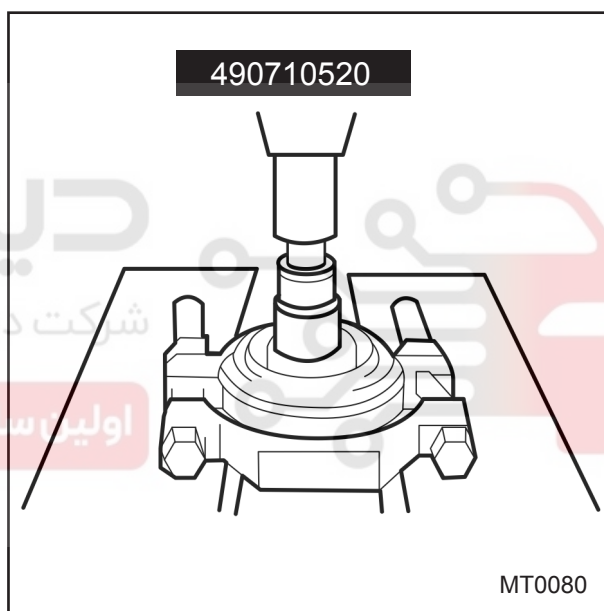


2- Remove stopper and retaining ring.



3- Set bearing puller (49 0710 520) on the 5th gear.

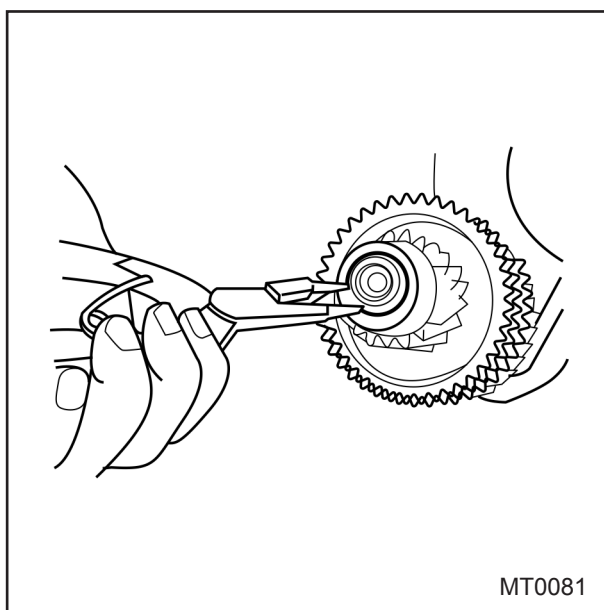
4- Remove 5th gear, synchronizer ring and clutch hub assembly.



دیجیتال خودرو
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1st Gear

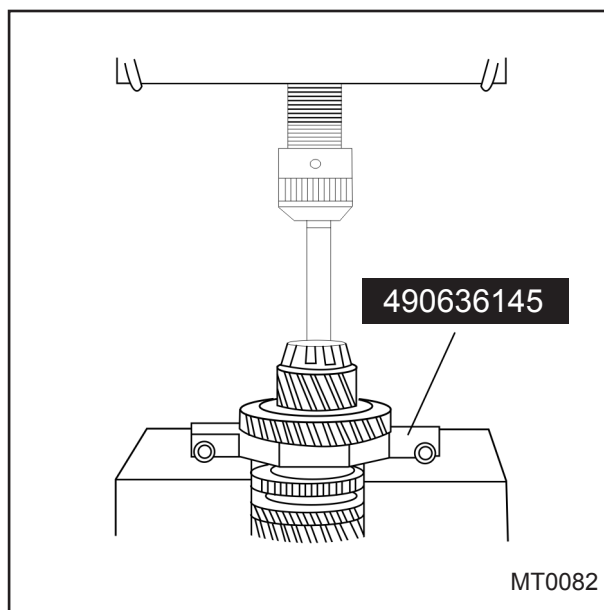
1- Remove the retaining ring.



- 2- Set the pulley boss puller (49 0636 145) around 1st gear.
- 3- Remove the bearing inner race, final gear (pinion), 1st gear and synchronizer ring.

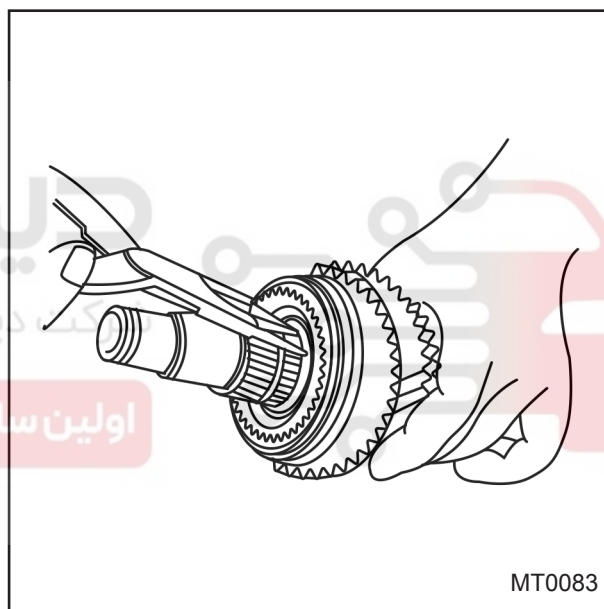
Note:

Hold the shaft with one hand in order to prevent falling the shaft.



2nd Gear

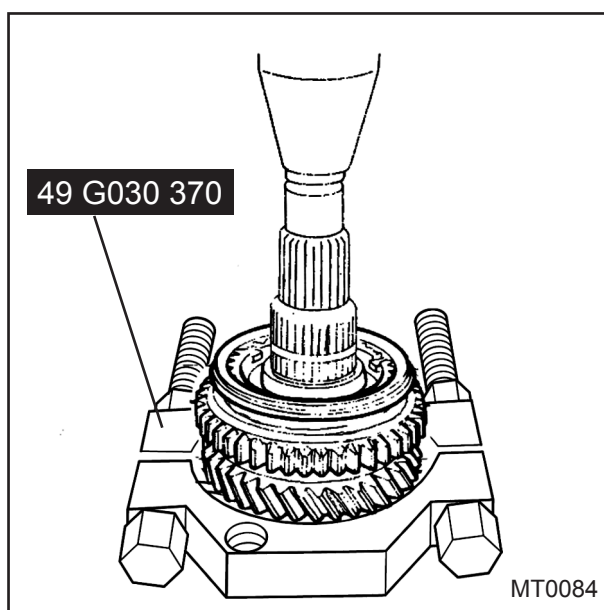
- 1- Remove the retaining ring



- 2- Set the bearing puller (49 G030 370) as shown in the figure.
- 3- Remove the clutch hub assembly (revers gear) and 2nd gear.

Note:

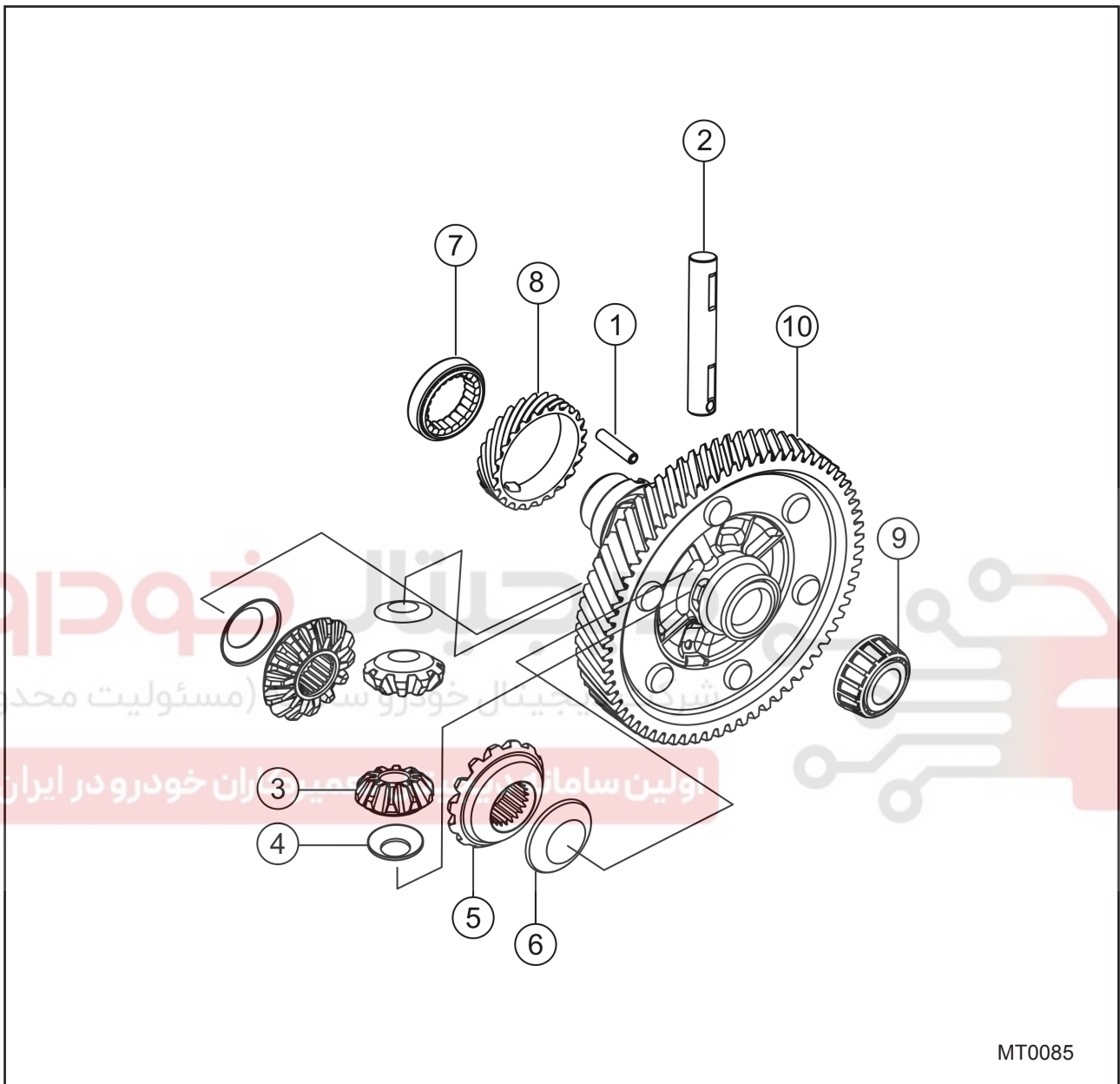
Hold the shaft with one hand in order to prevent falling the shaft.



Disassembly Order – Step 4

Note:

If any of the bearing inner races are removed replace with new ones.



MT0085

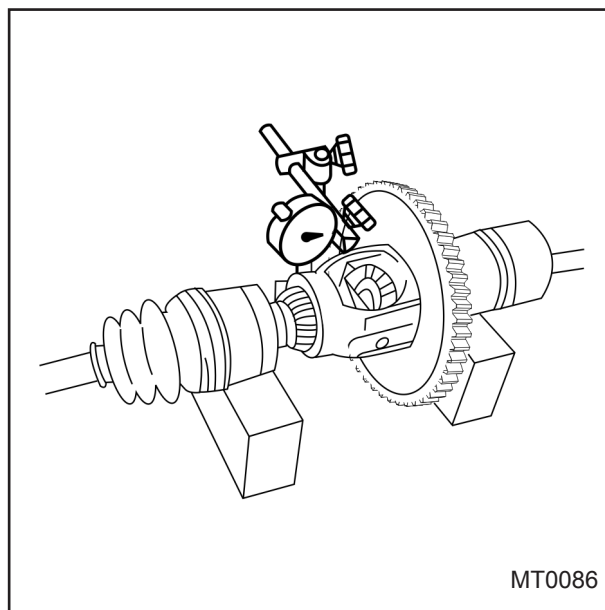
- 1- Spring pin
- 2- Pinion shaft
- 3- Pinion
- 4- Thrust washer
- 5- Side gear

- 6- Thrust washer
- 7- Side bearing inner race
- 8- Speedometer drive gear
- 9- Side bearing inner race
- 10- Gear case

Back Lash

Before disassembly, check the back lash of the side gears and pinion gears (for more information refer to next pages)

Standard backlash: 0.025 ~ 0.1mm

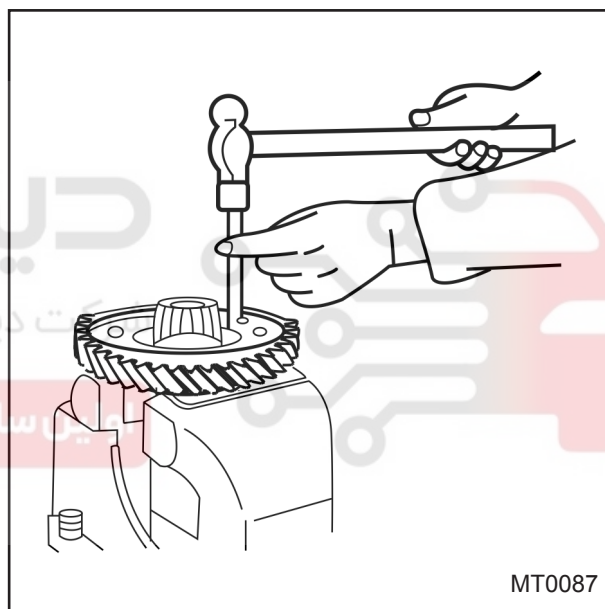


Spring Pin

To remove the spring pin from the pinion shaft, place the gear case in a vice and knock the pin out.

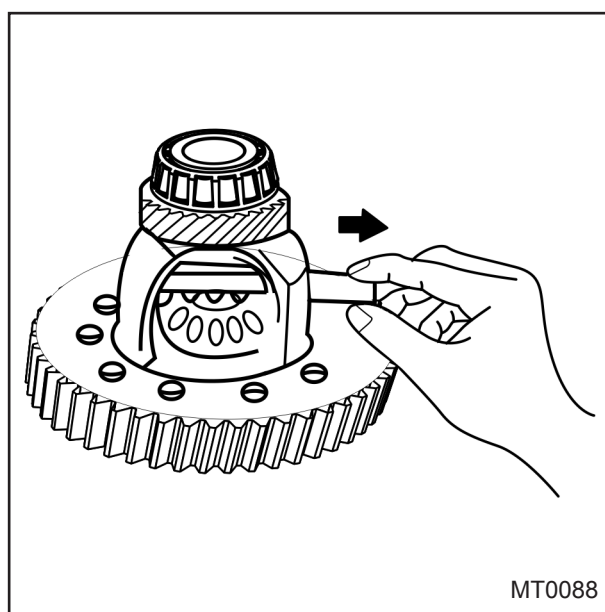
Note:

Insert the rod into the spring-pin hole from the ring gear mounting surface side.



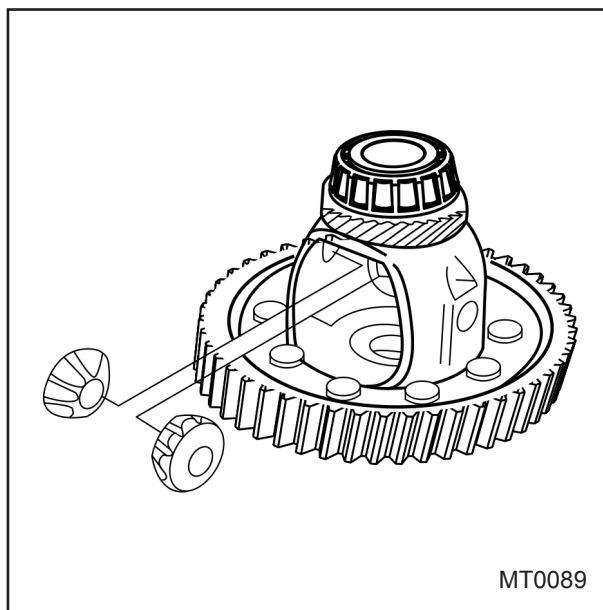
Side Gear

1- Removed the pinion shaft.



2- Remove the pinion gears and washers.

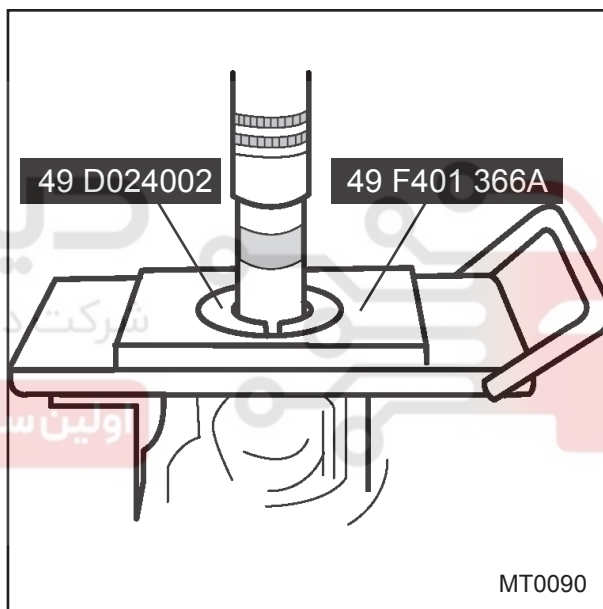
3- Remove the side gears and washers.



Side Bearing Inner Race (Opposite Ring Gear)

1- Remove the bearing inner race from the gear case using the plate (49 F401 366A) and attachment (49 D024 002).

2- Remove the speedometer drive gear.

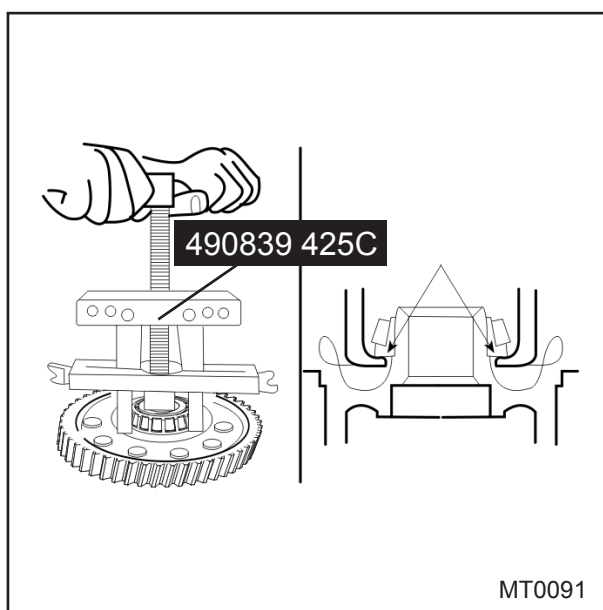


Side Bearing Inner Race (Ring Gear Side)

1- Remove the side bearing inner race using a combination of parts from the bearing puller set (49 0839 425C)

Note:

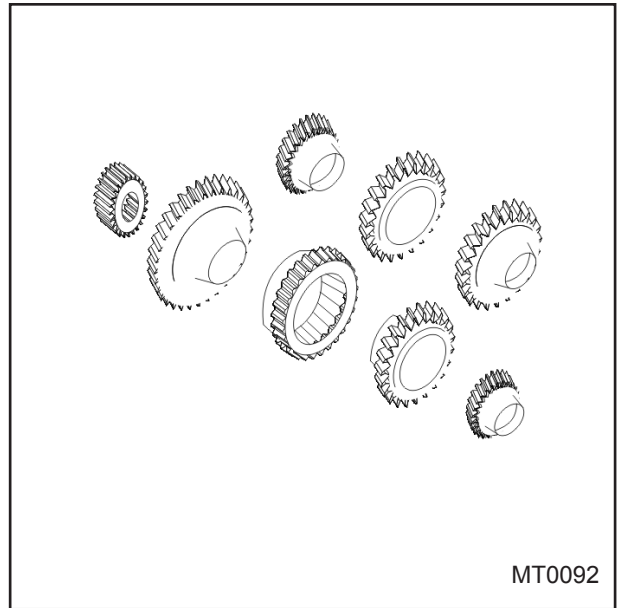
Use pads in the vice.



Inspection: Check the following parts, replace if necessary.

1st, 2nd, 3rd, 4th and 5th Gears

- 1- Worn or damaged synchronizer cone.
- 2- Worn or damaged hub sleeve coupling.
- 3- Worn or damaged teeth.
- 4- Worn or damaged inner surface or end surface of gears.



MT0092

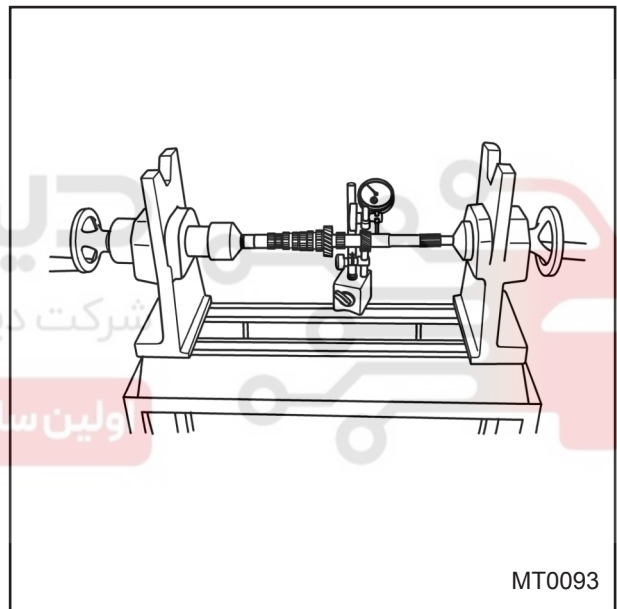
Primary Gear Shaft Assembly

- 1- Worn or damage gear contact surface.
- 2- Worn or damage splines.
- 3- Worn or teeth.
- 4- Clogged oil passage.
- 5- Primary shaft gear run-out.

Standard run-out: Max 0.015 mm

Note:

If the shaft gear is replaced, adjust the bearing preload.



MT0093

Secondary Shaft Gear Inspection

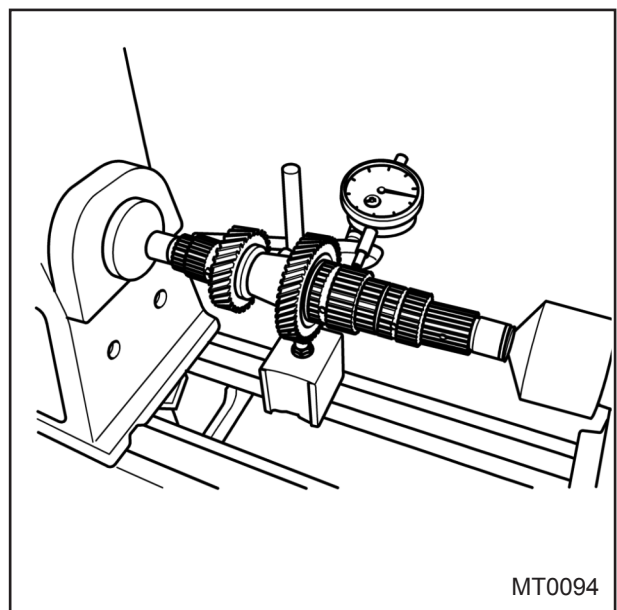
Inspect following items:

- 1- Worn or damaged gear contact surface.
- 2- Worn or damaged splines.
- 3- Worn teeth.
- 4- Clogged oil passage.
- 5- Secondary shaft gear run-out.

Standard run-out: Max 0.05mm

Note:

If the shaft gear is replaced, adjust the bearing preload (refer to next pages for adjusting)



MT0094

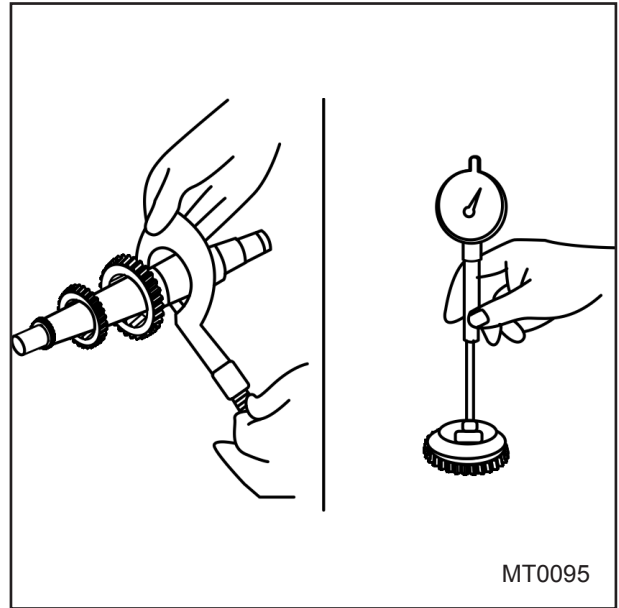
Oil Clearance

Oil clearance between secondary gear shaft and gears

Standard oil clearance: 0.03 - 0.08mm

Note:

If the shaft gear is replaced, adjust the bearing preload (for adjusting refer to next pages)



MT0095

Synchronizer Ring

Inspect followings items:

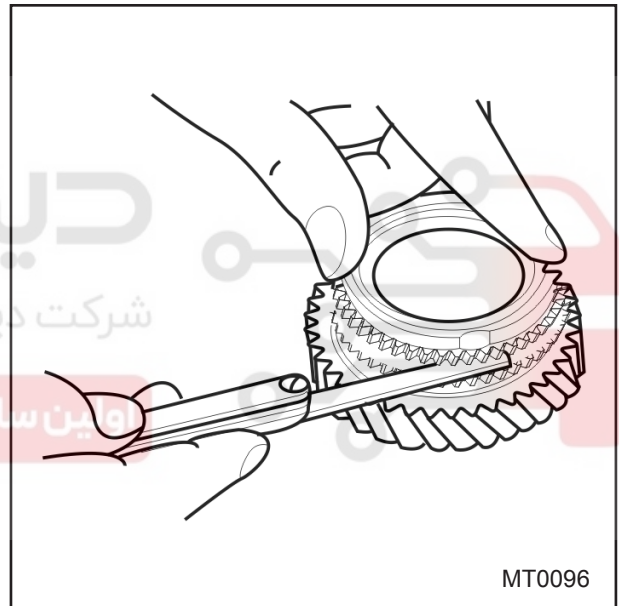
- 1- Engagement with gear
- 2- Worn or damaged teeth
- 3- Worn or damaged tapered surface.
- 4- Clearance from the side of gear.

Standard clearance: 1.5mm

Minimum clearance: 0.8mm

Notes:

- a) Place the synchronizer ring on the gear cone and rotate until it stops (approx 10- 20 degrees), then measure around the circumference.
- b) If the clearance is less than specified replace the synchronizer ring or gear.

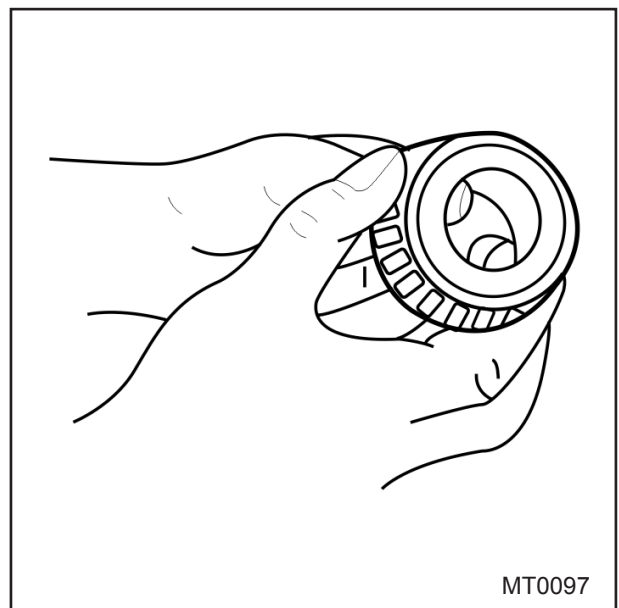


MT0096

Bearing

Inspect following items:

- 1- Roughness or noise while turning
- 2- Damaged bearing
- 3- Worn bearing

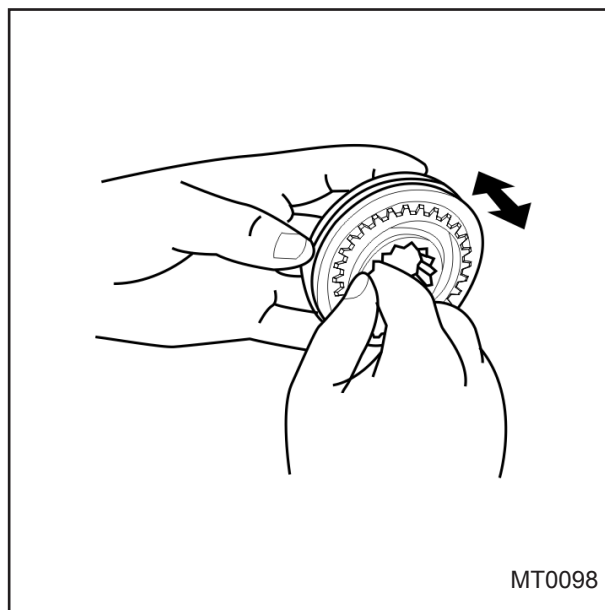


MT0097

Clutch Hub

Inspect following items:

- 1- Worn or damaged splines.
- 2- Worn or damaged synchronizer key groove.
- 3- Worn end surface.
- 4- Operation of the hub sleeve when installed.



MT0098

Clutch Hub Sleeve

Inspect following items:

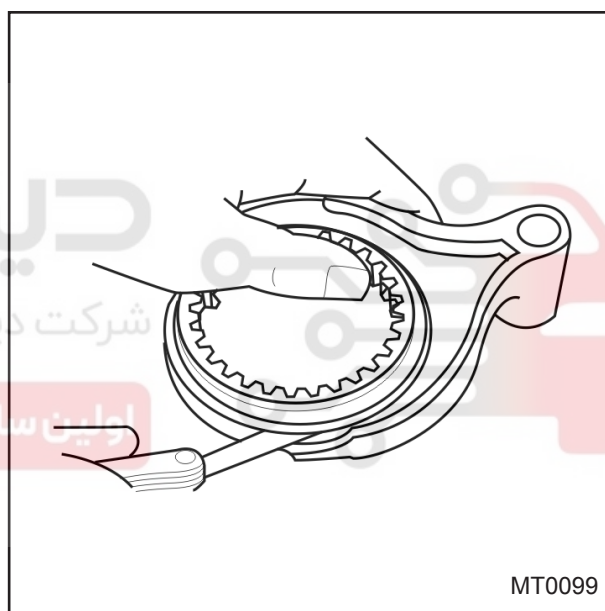
- 1- Worn or damaged splines.
- 2- Worn or damaged sleeve fork groove.
- 3- Clearance between sleeve and shaft fork.

Clearance standard:

1st /2nd:	0.10mm -0.36mm
3rd / 4th and 5th:	0.15mm - 0.46mm

Maximum clearance:

1st /2nd:	0.41mm
3rd/4th and 5th:	0.51mm



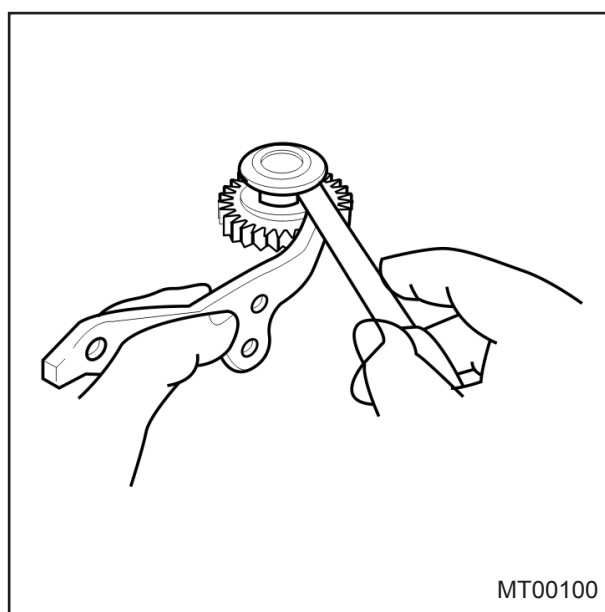
MT0099

Reveres Idle Gear

Inspect following items:

- 1- Worn or damaged bushing.
- 2- Worn or damaged teeth.
- 3- Worn or damaged reverse shift lever coupling groove.
- 4- Clearance between gear and reveres shift lever.

Clearance:	0.08 - 0.266mm
Maximum clearance:	0.32mm

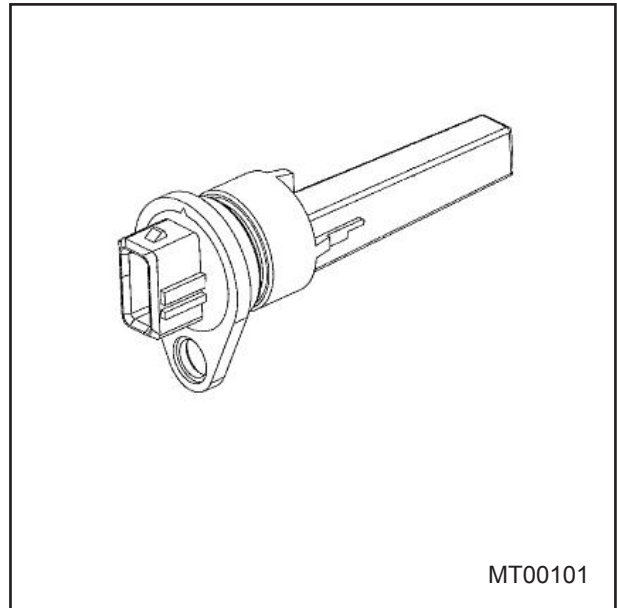


MT00100

Speedometer Drive Gear Assembly

Inspect following items:

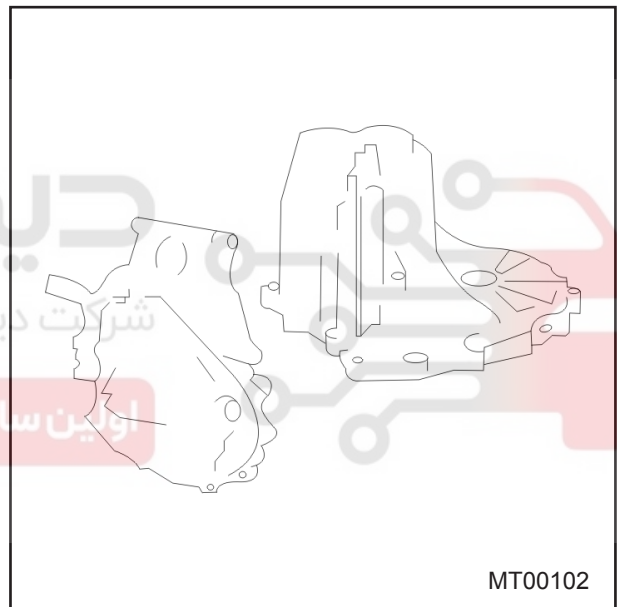
- 1- Worn or damage
- 2- Worn or damaged O ring

**Clutch and Transaxle Case**

Inspect above items for worn or damage.

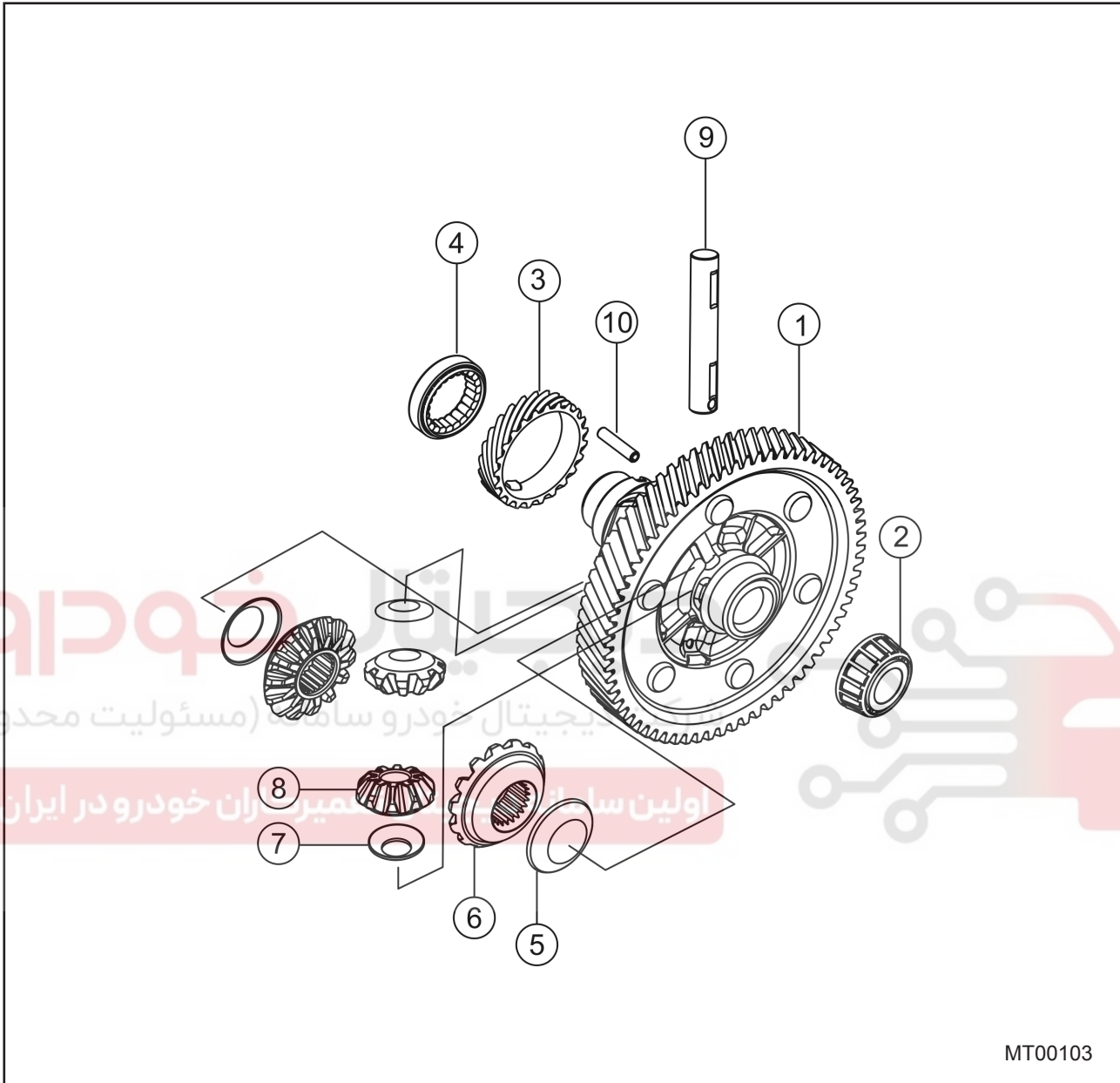
Note:

If clutch and transaxle are damaged and replaced, adjust clearance between shaft bearing and side bearings.



Differential Assembling Order – Step 1

- 1- During assembling inspect the parts carefully.
- 2- Disassembling is the reverse order of assembling.



MT00103

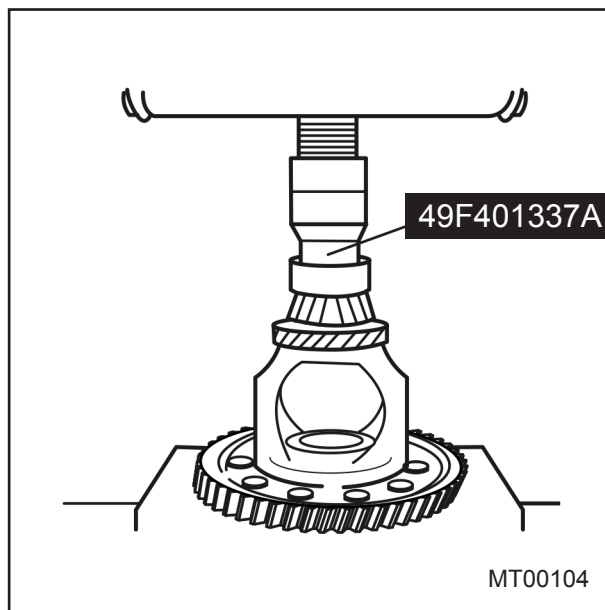
- | | |
|----------------------------|------------------|
| 1- Gear case | 6- Side gear |
| 2- Side bearing inner race | 7- Thrust washer |
| 3- Speedometer drive gear | 8- Pinion gear |
| 4- Side bearing inner race | 9- Pinion shaft |
| 5- Thrust washer | 10- Spring pin |

Side Bearing Inner Race (opposite the ring gear)

- 1- Install the speedometer drive gear.
- 2- Install the side bearing inner race using the special Tool (49 F401 337A) and press, as shown in the figure.

Note:

Pressing force: 2 tons

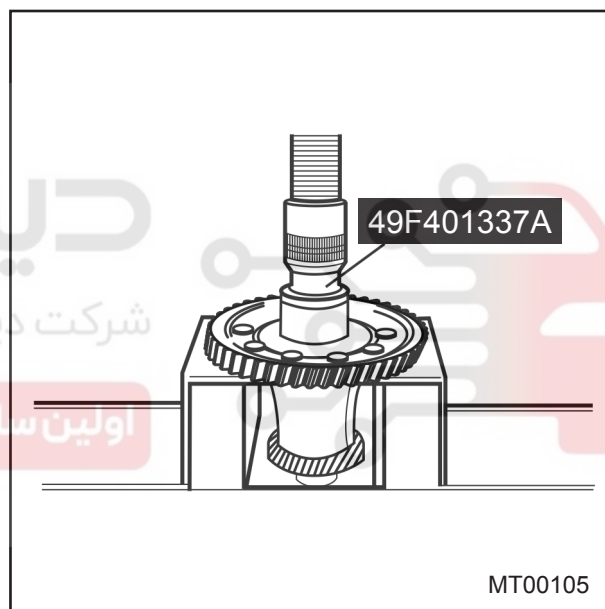


Side Bearing Inner Race (ring gear side)

- Install the side bearing inner race using the special Tool (49 F401 337A) and press, as shown in the figure.

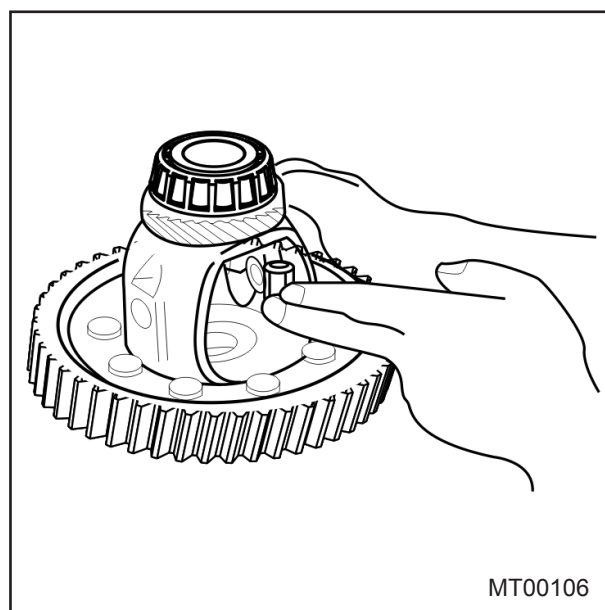
Note:

Pressing force: 2tons

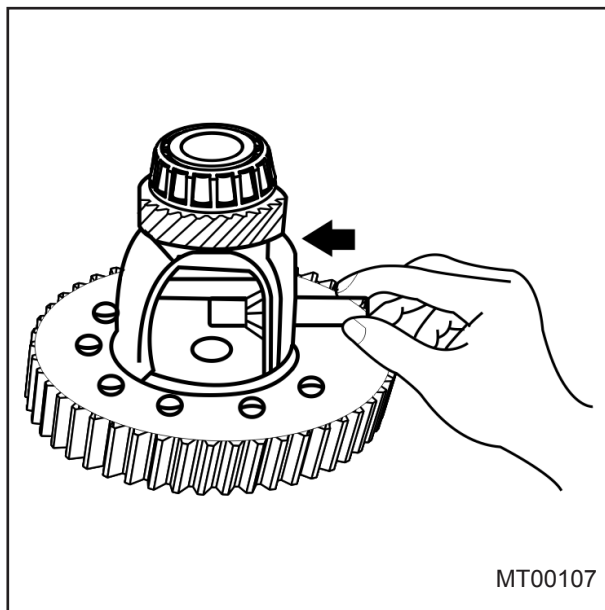


Pinion Gear and Side Gear

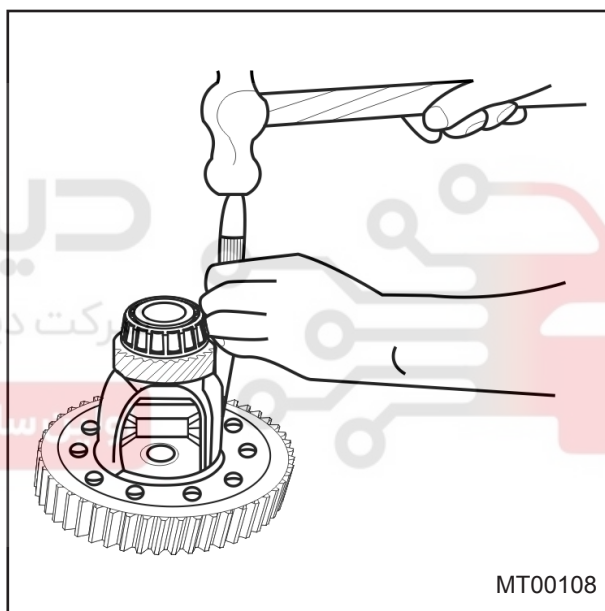
- 1- Apply ATF to the washers, and then install them and the pinion gears. (ATF: M2C33F)



2- Insert the pinion shaft.

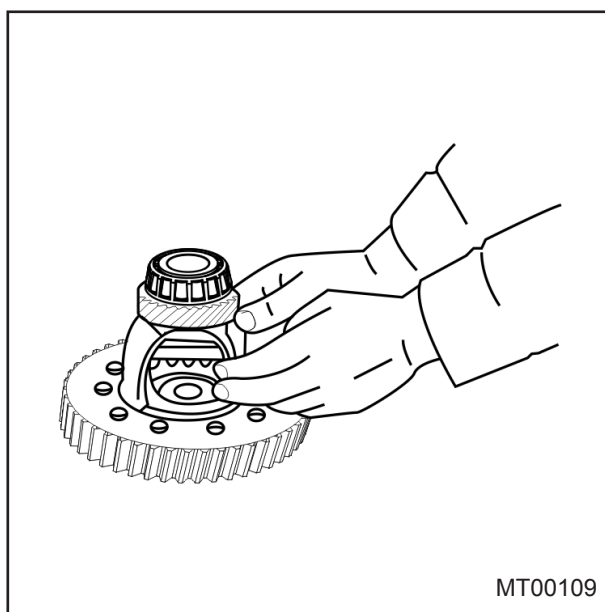


3- Install the spring pin and crimp it so that it cannot come out of the gear case.



4- Apply ATF to the washers, and then install them and side gears.

ATF: M2C33F



Backlash of Side Gear and Pinion Gear

Check and adjust by the following procedure:

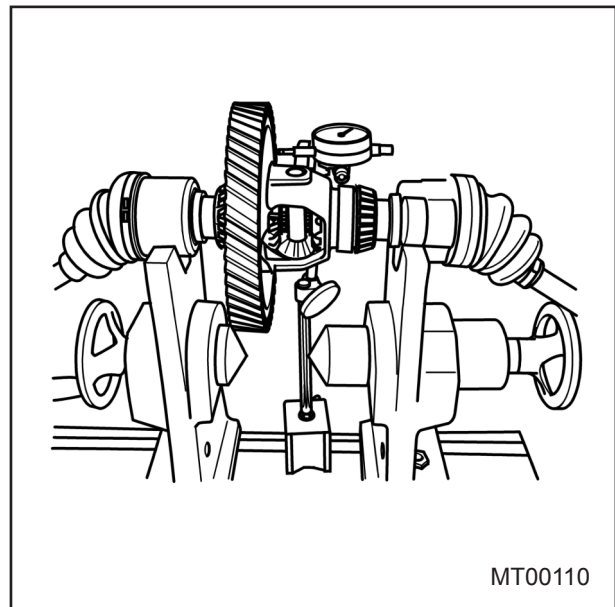
- 1- Install the left and right driver shafts on the differential assembly.
- 2- Support the driver shafts on V-blocks as shown in the figure.
- 3- Measure the backlash of both pinion gears.

Backlash: 0.025mm -0.1mm

- 4- If the backlash is more than the standard, adjust by selecting a thrust washer from 2, 2.1 and 2.2mm to go between the case and side gears.

Note:

Use thrust washers with the same thickness.

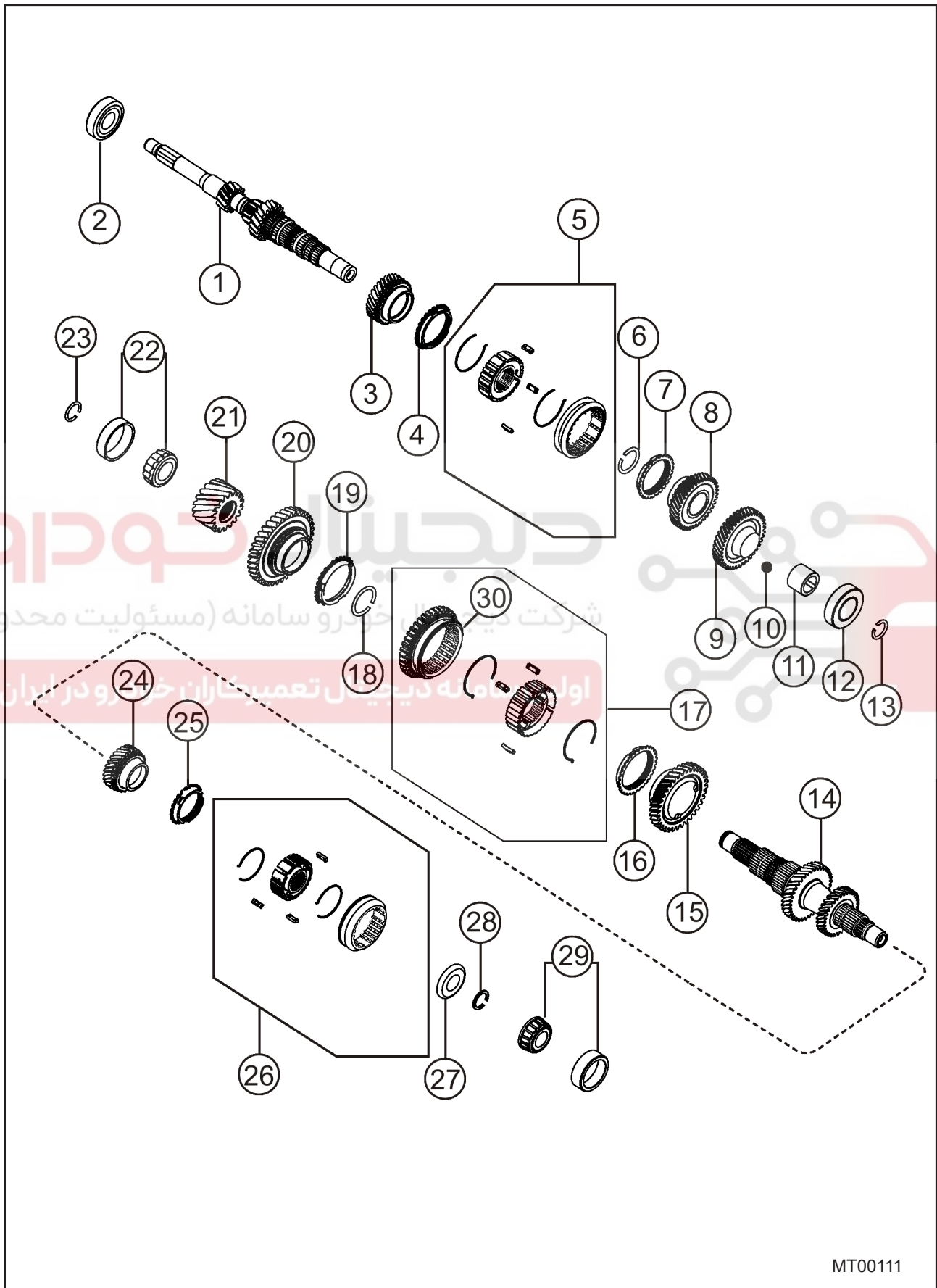


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اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

Gearbox Assembling – Step 2

During assembly, check the thrust clearance of all gears.



- | | |
|--------------------------|-------------------------|
| 1- Primary shaft gear | 16- Synchronizer ring |
| 2- Ball bearing | 17- Clutch hub assembly |
| 3- 3rd gear | 18- Retaining ring |
| 4- Synchronizer ring | 19- Synchronizer ring |
| 5- Clutch hub assembly | 20- 1st gear |
| 6- Retaining ring | 21- Final gear |
| 7- Synchronizer ring | 22- Bearing inner race |
| 8- 4th gear | 23- Retaining ring |
| 9- Primary 5th gear | 24- 5th gear |
| 10- Ball | 25- Synchronizer ring |
| 11- Spacer | 26- Clutch hub assembly |
| 12- Ball bearing | 27- Stopper plate |
| 13- Retaining ring | 28- Retaining ring |
| 14- Secondary shaft gear | 29- Bearing inner race |
| 15- 2nd gear | 30- Reverse gear |

دیجیتال خودرو

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Synchronizer Key

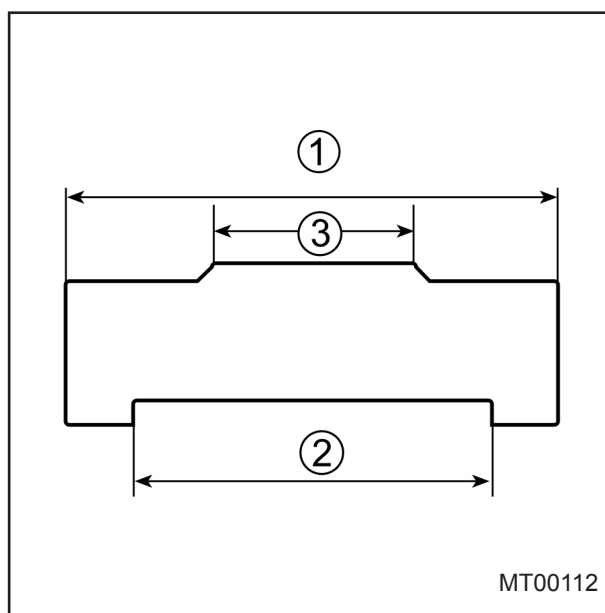
Note:

There are three (3) types of synchronizer key.

Standard dimensions:

Unit: mm

Types gear	Types		
	1	2	3
1st and 2nd	17.0	12.2	7.4
3rd and 4th ,5th and Rev	14.0	9.2	5.4

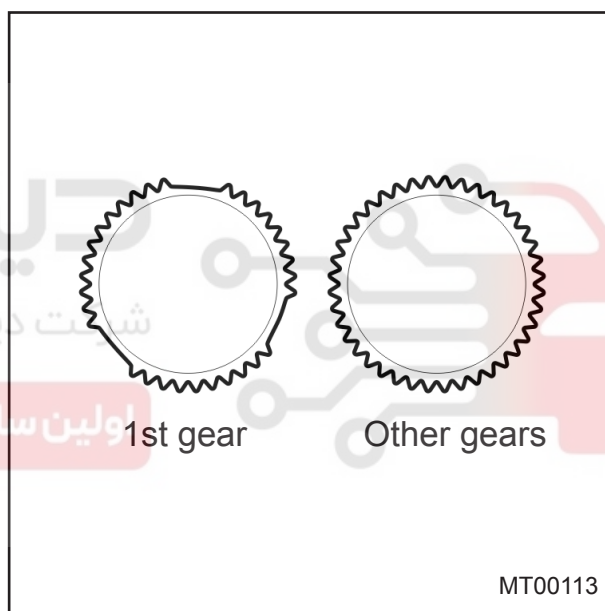


Synchronizer Ring

Note:

1st synchronizer ring

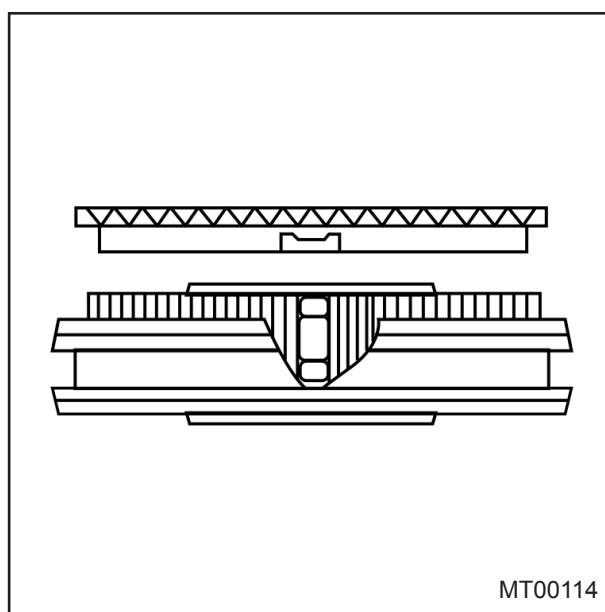
Have three cut-outs in the gear teeth



Synchronizer Ring and Clutch Hub Assembly

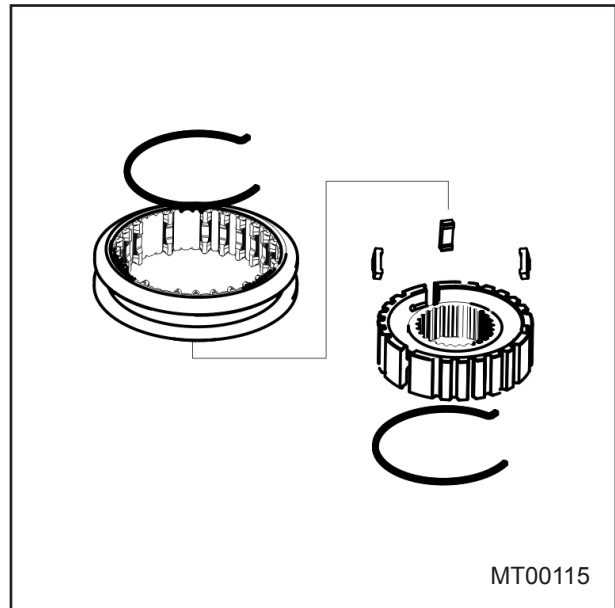
Note:

Align the synchronizer ring groove and clutch hub key when installing.



Clutch Hub Assembly

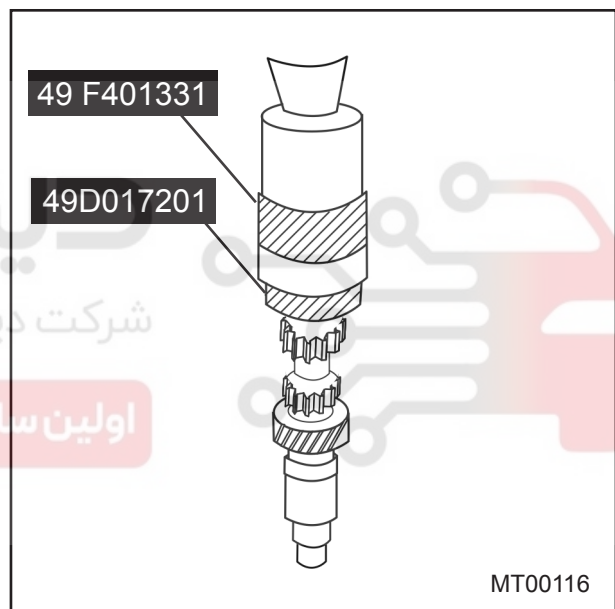
- 1- Assembly the three (3) synchronizer keys, clutch hub and clutch hub sleeve.
- 2- Install the synchronizer key spring. Fix the ends of the springs into the grooves in the hub.



Primary Shaft Gear Assembly

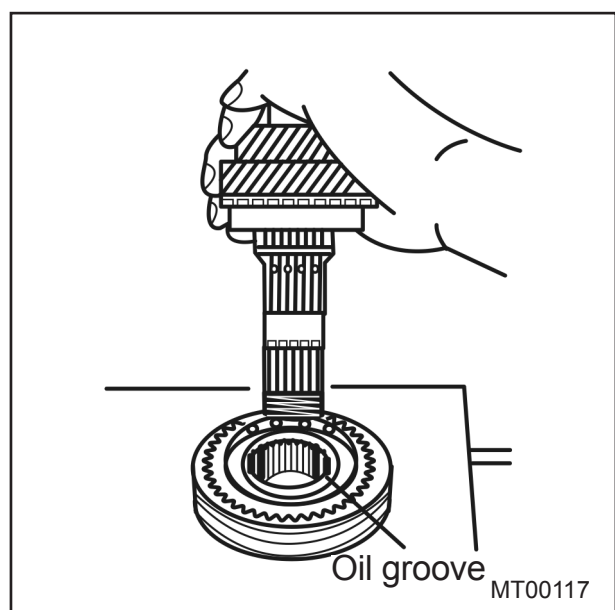
Ball bearing: Install the ball bearing using the special tools 49 F401 331 and 49 D017201

pressing force: 300kg.



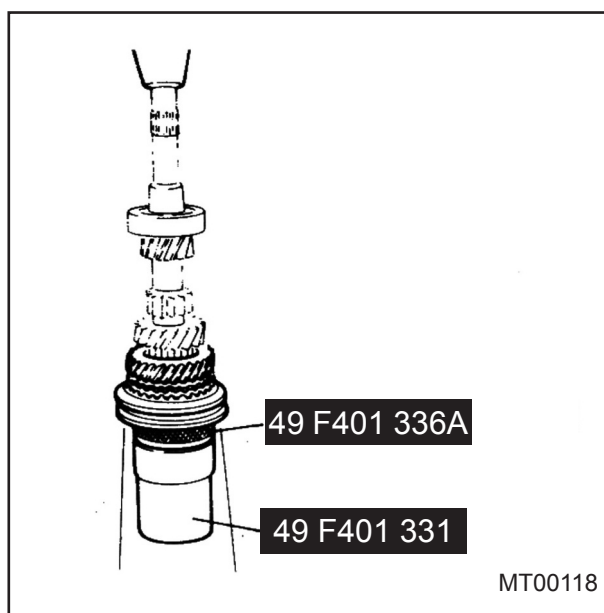
3rd Gear

- 1- Install the 3rd gear and the synchronizer ring.
- 2- Place the clutch hub assembly with the oil groove side facing 3rd gear.

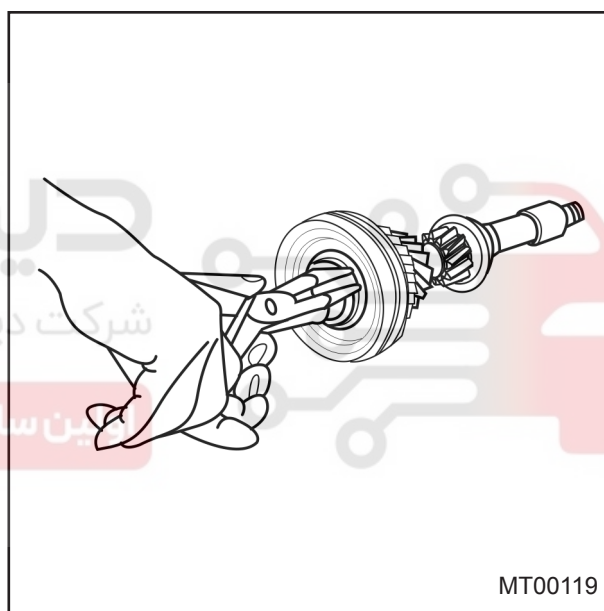


3- Install the clutch hub assembly using special Tools 49 F401 336A and 49 F401 331.

pressing force: 400kg.



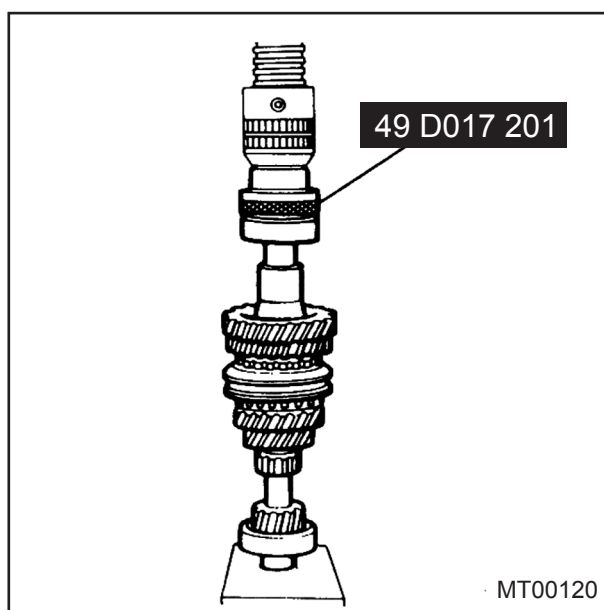
4- Install a new retaining ring.



4th Gear and primary 5th gear

- 1- Install the synchronizer ring and 4th gear
- 2- Install the primary 5th gear.
- 3- Install the ball and spacer.
- 4- Install the ball bearing using the attachment tool special (49 D017 201)
- 5- Install a new retaining ring.

Pressing force: 400kg

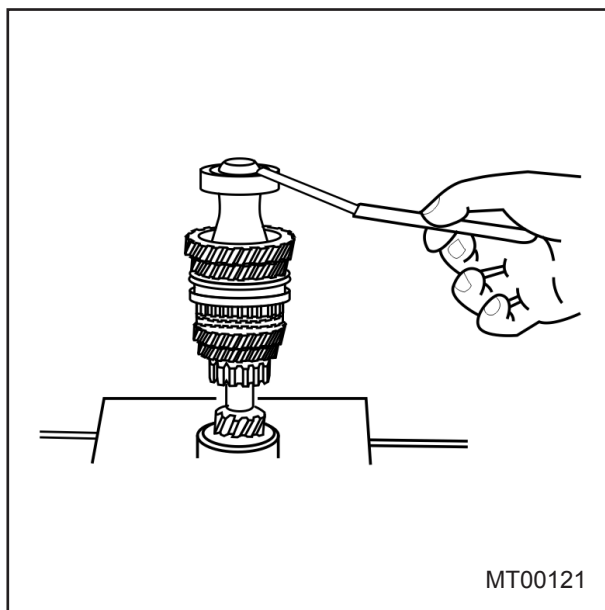


Thrust Clearance

1- Measure the clearance between the ball bearing and the retaining ring.
If the clearance is not within specification, select the proper retaining ring.

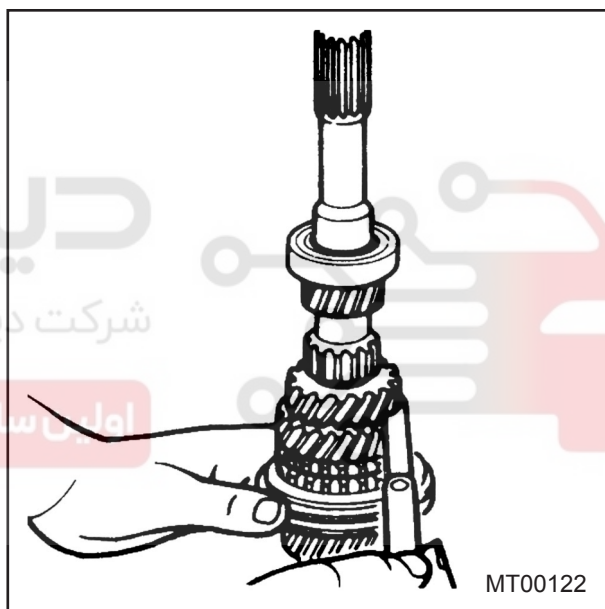
Standard clearance: 0 ~ 0.1mm

Available retaining ring thickness:
2.0mm, 2.2mm, 2.4mm



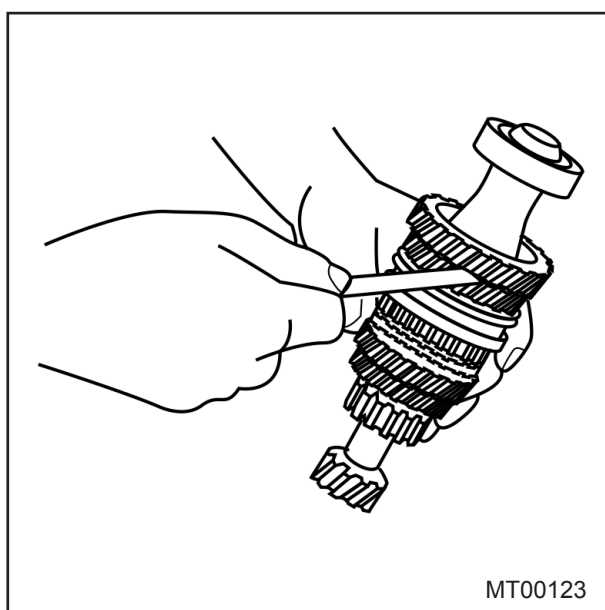
2- Measure the clearance between the 3rd gear and primary shaft gear.
If clearance is not within specification, replace any part which is worn or damaged

Standard clearance: 0.06 ~ 0.41mm



3- Measure the clearance between the 4th gear and primary 5th gear.
If clearance is not within specification, replace any part which is worn or damaged.

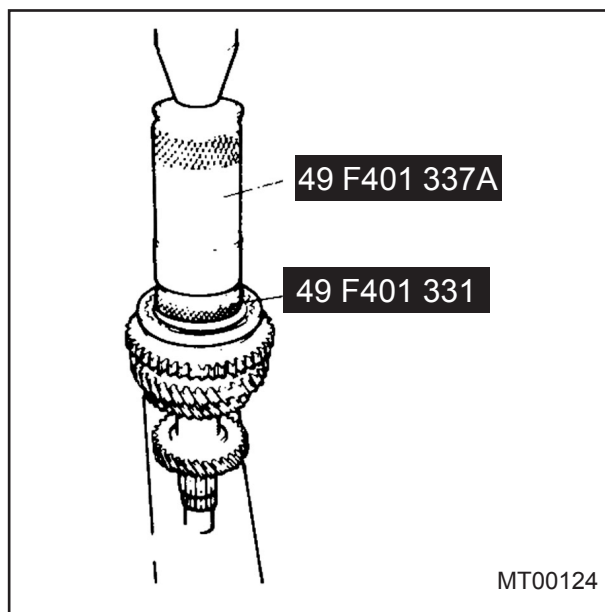
Standard clearance: 0.22 ~ 0.52mm



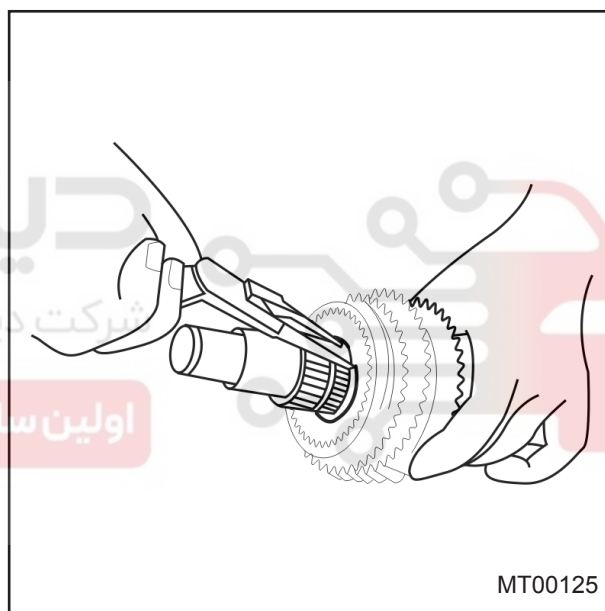
Secondary Shaft Gear Assembly – 2nd Gears

- 1- Install the 2nd gear and the synchronizer ring.
- 2- Install the clutch hub assembly (reverse gear) with the oil groove side facing the 2nd gear and the synchronizer ring using the special tool 49 F401 331 and 49 F401 337A.

pressing force: 500kg

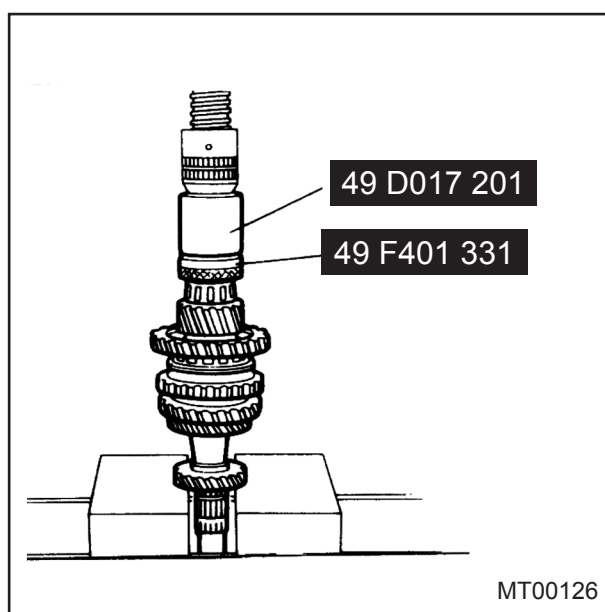


- 3- Install a new retaining ring.

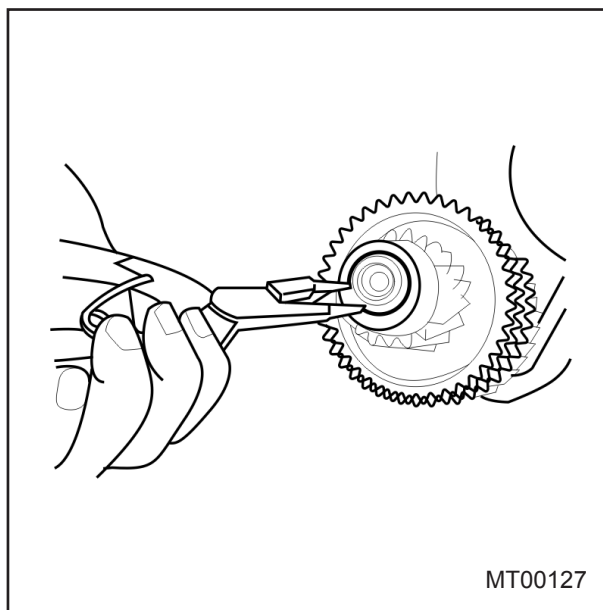


1st Gear and Final Gear

- 1- Install the 1st and final gear.
- 2- Install the bearing inner race using the special tools 49 D017 201 and 49 F401 331 press to 700kg.



3- Install a new retaining ring.

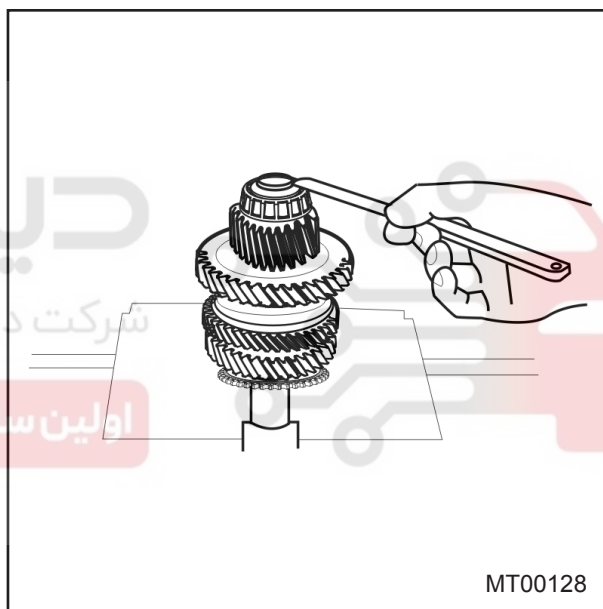


4- Measure the clearance between the bearing inner race and retaining ring. If the clearance is not within specification, select the proper retaining ring.

Standard clearance: 0 - 0.1mm

Available retaining ring thickness:

2mm, 2.2mm and 2.4mm.

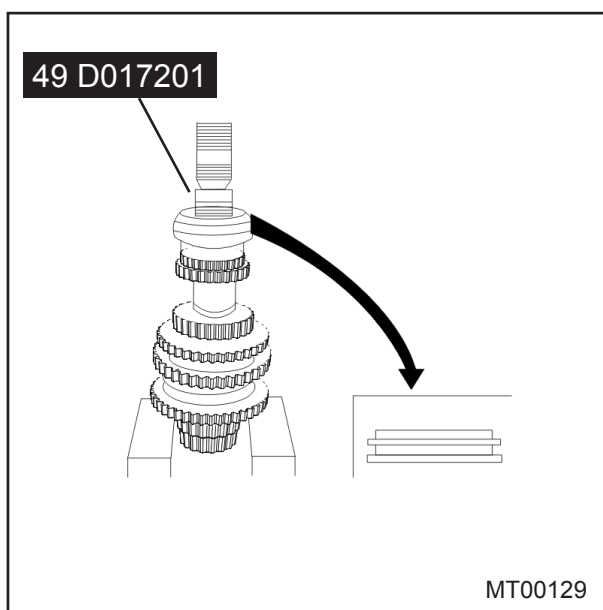


5- Install 5th gear and the synchronizer ring.

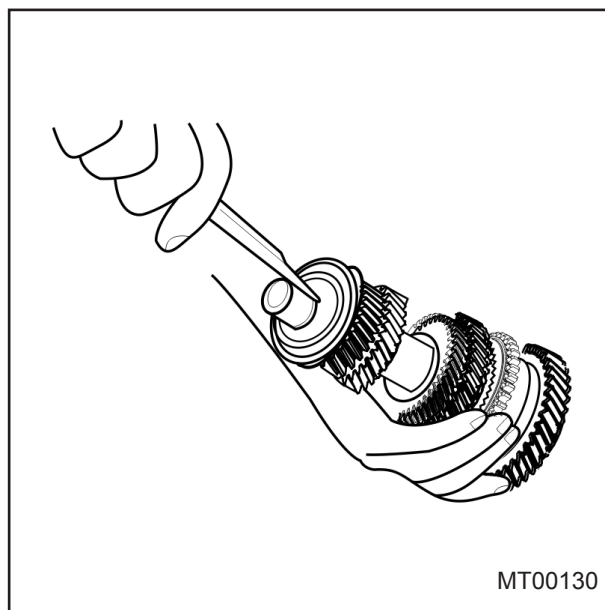
6- Press the clutch hub assembly on with the special tools 49 D017 201.

Pressing force:

Max 500kg

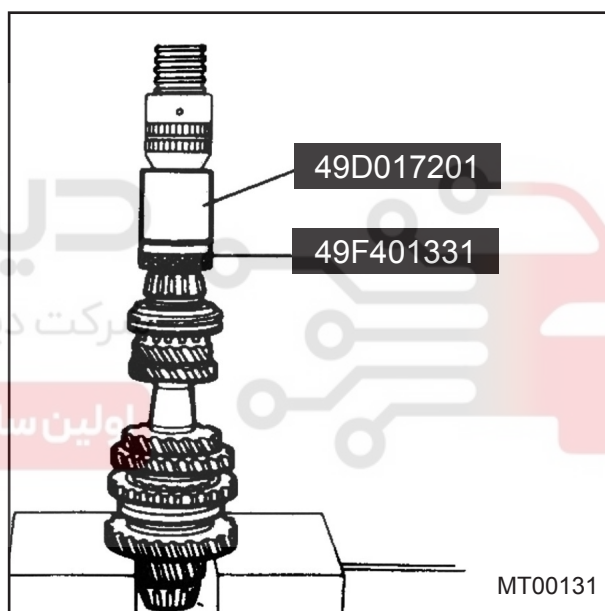


- 7- Install the stopper plate.
- 8- Install a new retaining ring.



- 9- Press the bearing inner race on with the special tools 49 D017 201 and 49 F401 331.

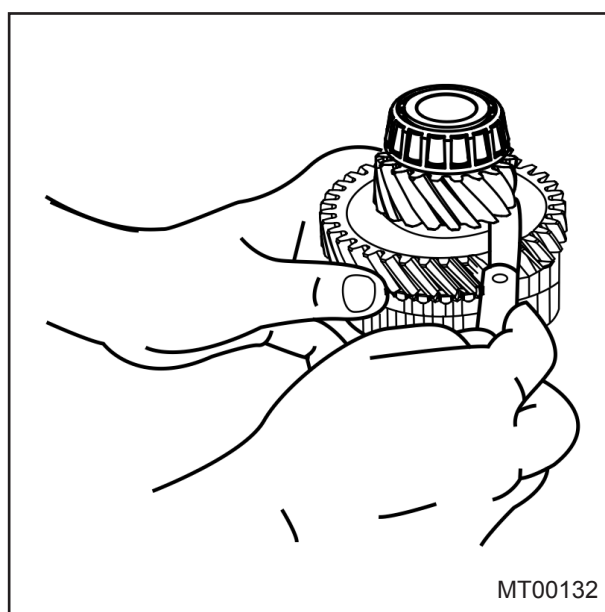
Pressing force: Max. 700kg



Thrust Clearance

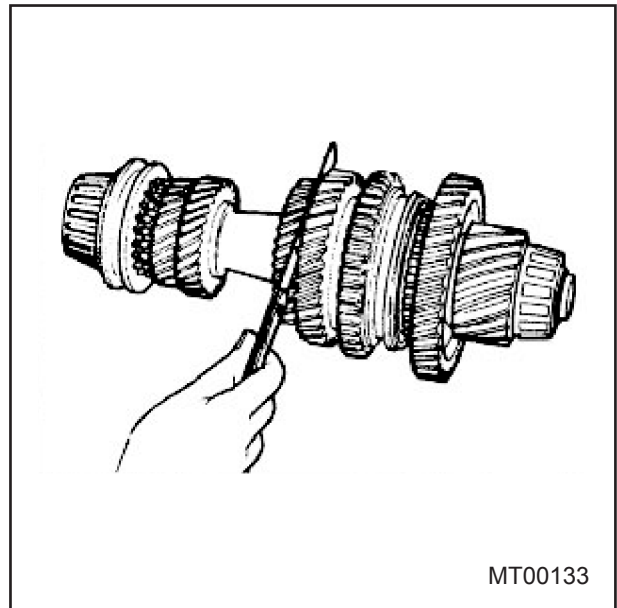
- 1- Measure the clearance between the final gear and the 1st gear.
If clearance is not within specification, replace any part which is worn or damaged.

Standard clearance: 0.22 ~0.62mm



1- Measure the clearance between the 2nd gear and the 3rd gear secondary shaft gear. If clearance is not within specification, replace any part which is worn or damaged.

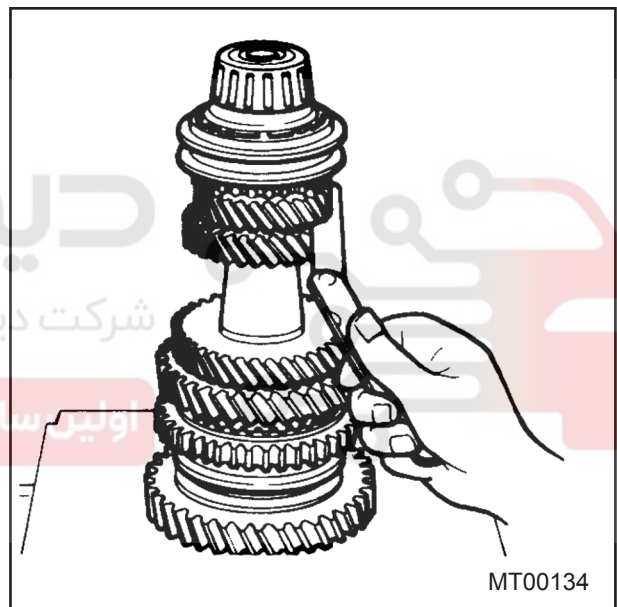
Clearance: 0.06 ~ 0.21mm

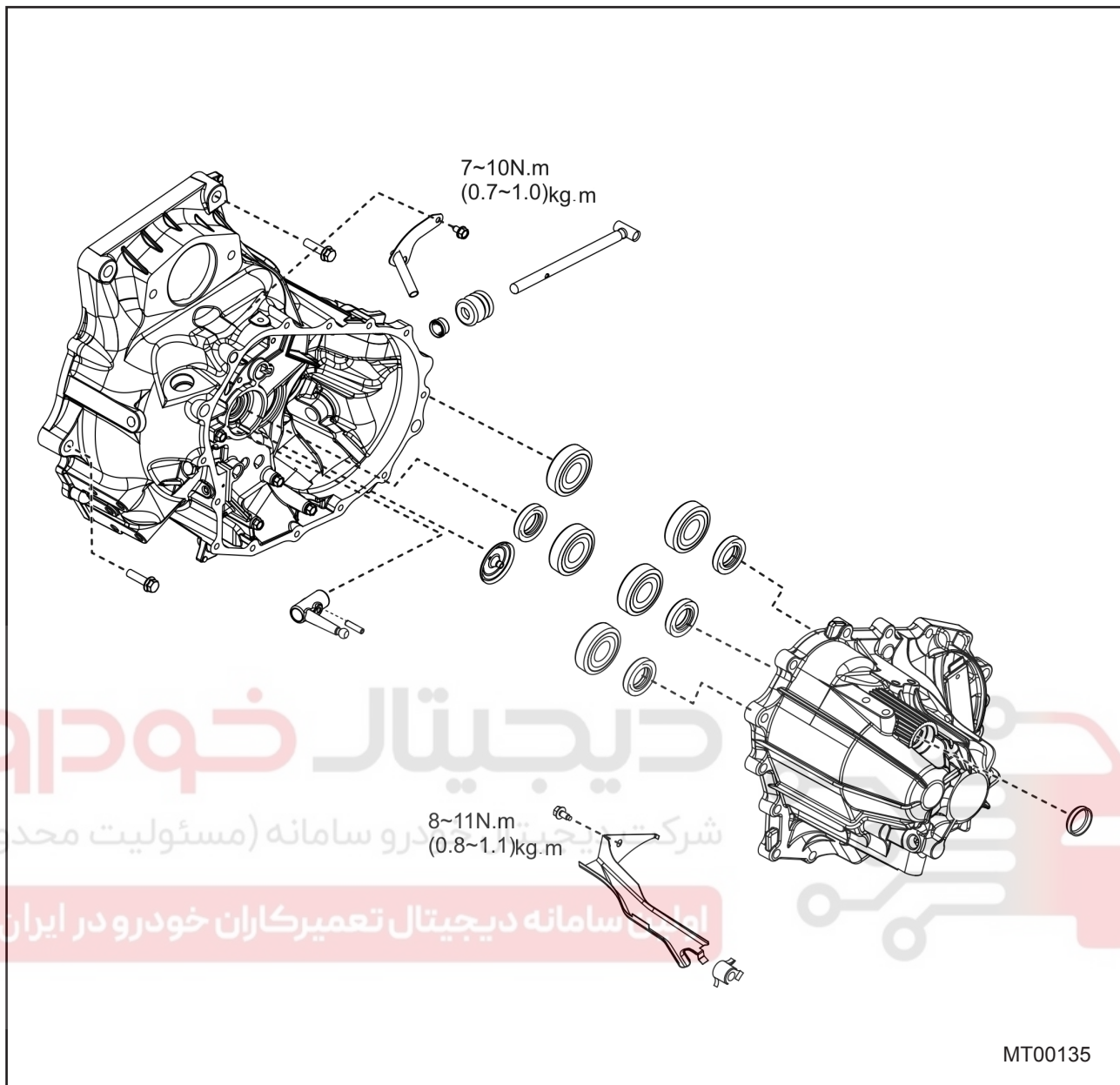


2- Measure the clearance between the 5th gear and the 4th gear secondary shaft gear.

If clearance is not within specification, replace any part which is worn or damaged.

Standard clearance: 0.06 ~ 0.21mm



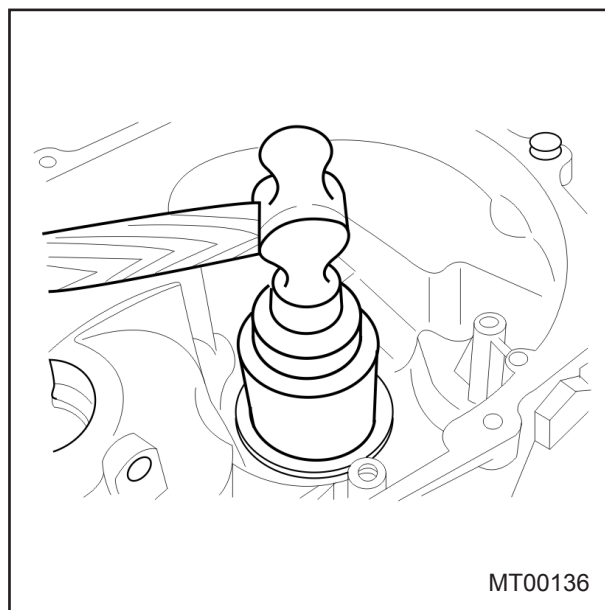


Bearing Initial Clearance

Adjust the bearing initial clearance by selecting the thickness of the adjustment shim(s). To check initial clearance remove all the adjustment shims and perform the following steps in next pages.

1- When shims are removed, install the bearing outer race into the transaxle case.

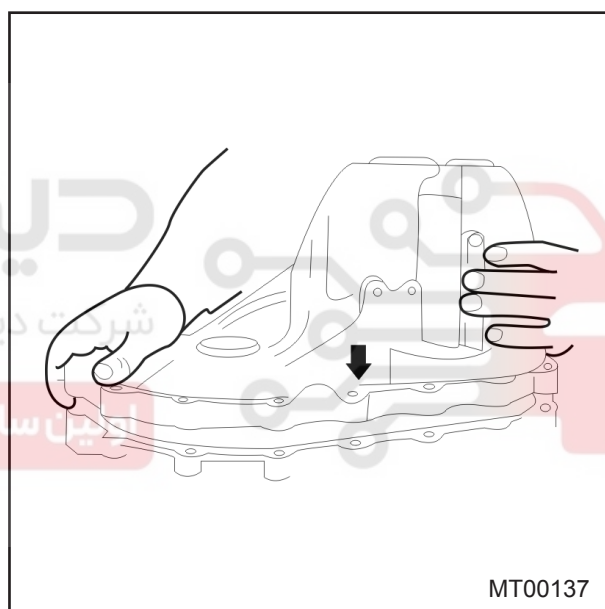
2- After mounting the clutch housing into the transaxle hanger, tap in the differential bearing outer races with a hammer handle until it is flush with the end of the clutch housing. Next, position a piece or pipe against the outer race and tap in with a hammer until it contacts the clutch housing.



MT00136

Primary Shaft

1- Install the primary shaft gear assembly.

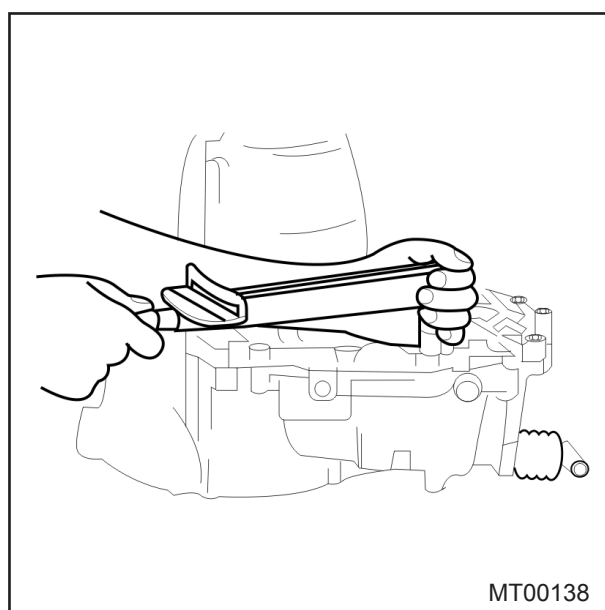


MT00137

2- Install the transaxle case and tighten the bolts to specified torque.

Standard tightening torque:

1.9 ~ 2.6 kg.m



MT00138

3- Mount the indicator to the transaxle hanger.

4- Measure the primary shaft thrust clearance.

If the clearance is not within specification, select the proper shim (s).

Standard clearance: 0 ~ 0.1mm

Available shim thickness: 0.3, 0.4 and 0.5mm

Note:

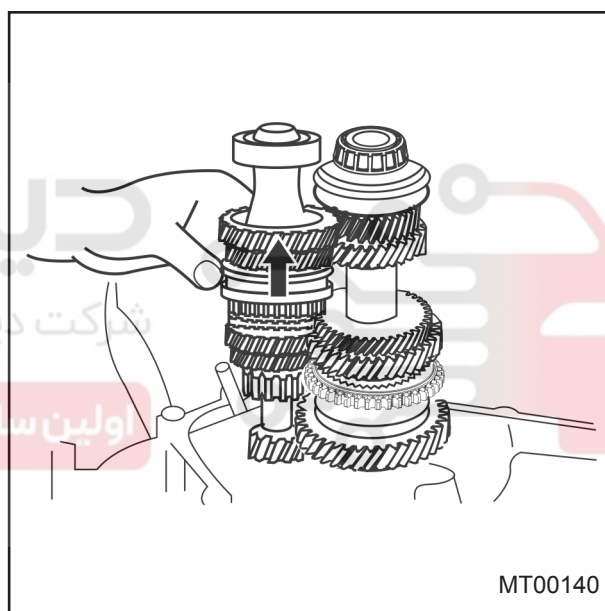
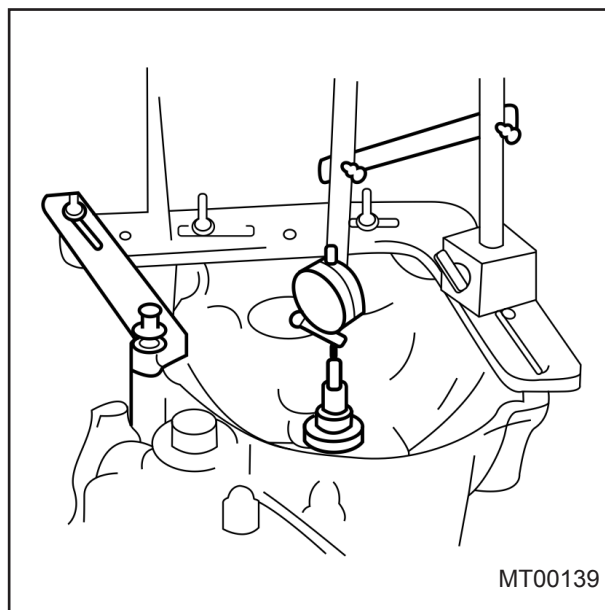
The maximum number of shims that may be used is two.

Secondary Shaft

1- Remove the transaxle case and install the proper adjustment shim for the primary shaft.

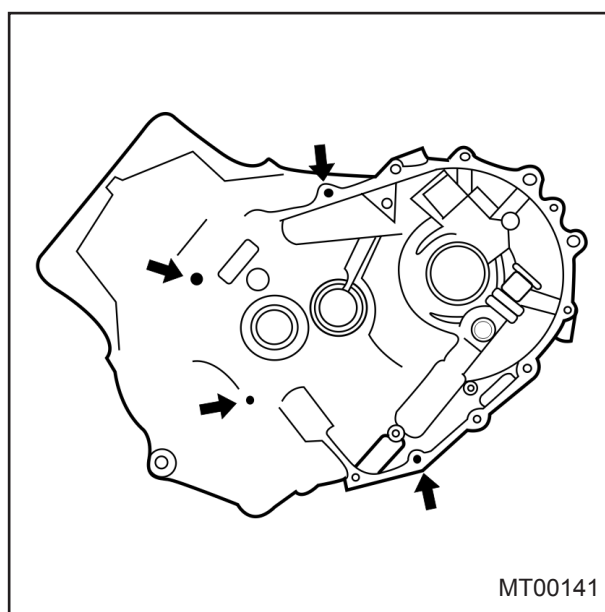
2- Install the primary shaft gear assembly and the secondary shaft gear assembly. Do not install the secondary shim at this time.

3- Shift the gears to 4th gear.

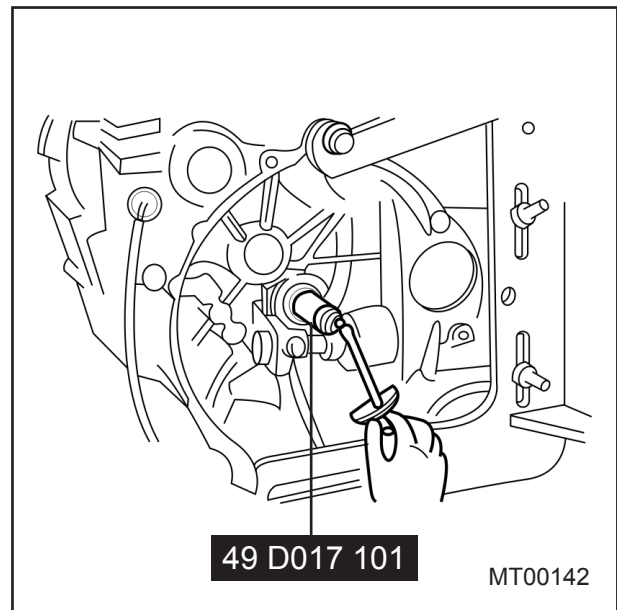


4- Install the transaxle case and tighten to the specified torque.

Tightening torque: 1.9 ~ 2.6 kg.m

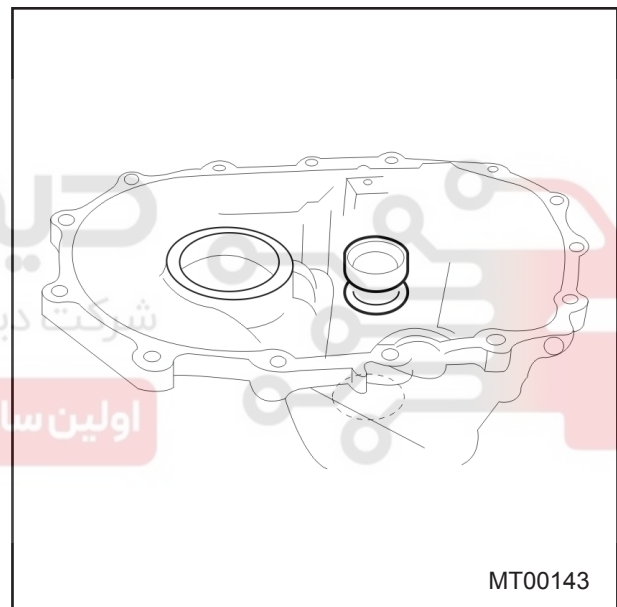


- 5- Install the 49 D017 101 (preload adaptor) and measure the preload (A).
6- Remove the transaxle case and the bearing outer race.



- 7- Install the removed shim during disassembly and the bearing outer race.
8- Install the primary shaft gear assembly and the secondary shaft gear assembly.
9- Shift the gears to 4th gear.
10- Reinstall the transaxle case and tighten to the specified torque.

Tightening torque: 1.9 ~ 2.6 kg.m



11- Install the special tool (49 D017 101) and measure the preload (B).
 Select the proper adjustment shim(S) as following table.

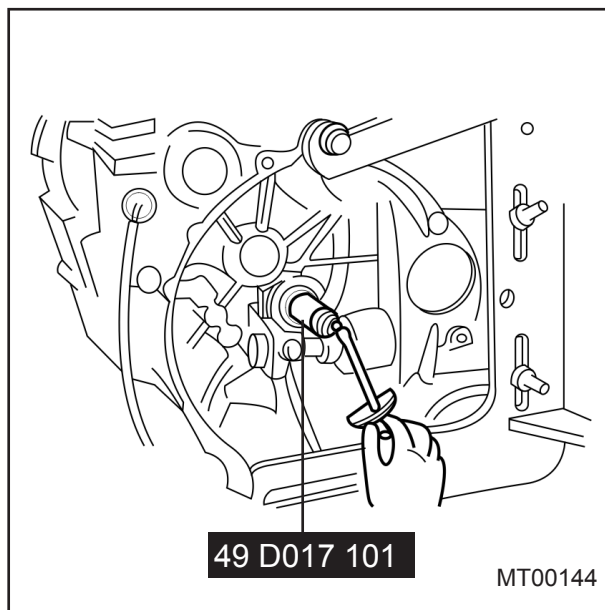
Notes:

a) The value of the primary shaft preload (A) should be less than the primary shaft preload (B).

The value of (B) should be less than 0.05 kg.m that is $(A) > (B) > 0.05 \text{kg.m}$

b) The maximum number of shims that may be used is two.

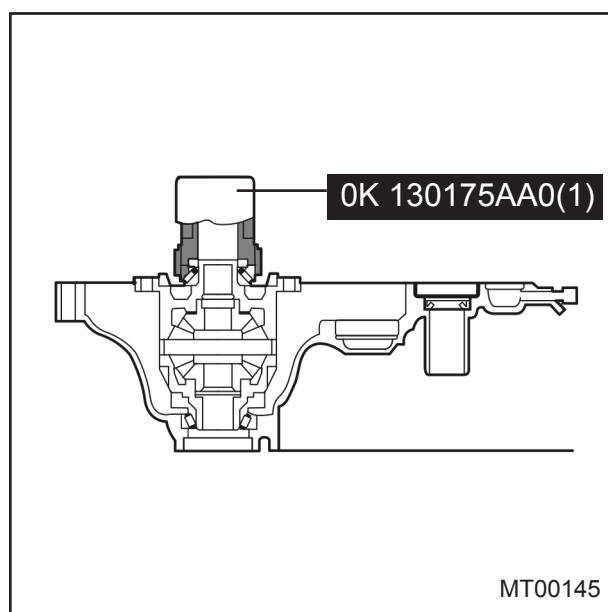
12- Remove the transaxle case, the primary shaft gear assembly and the secondary shaft gear assembly.



Thickness mm (in)
0.30 mm (0.012in)
0.35 mm (0.014in)
0.40 mm (0.016in)
0.45 mm (0.018in)
0.50 mm (0.020in)
0.55 mm (0.022in)
0.60 mm (0.024in)

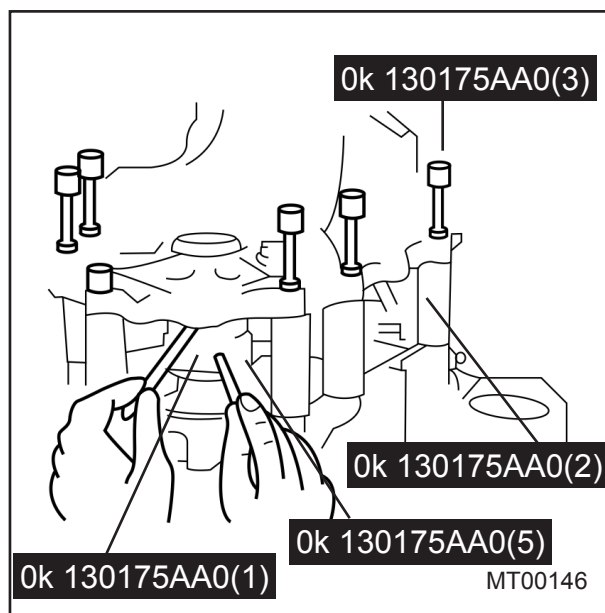
Differential

1- Set differential assembly into the clutch housing, and mount the special tool (0K 130175AA0) on the bearing outer race.

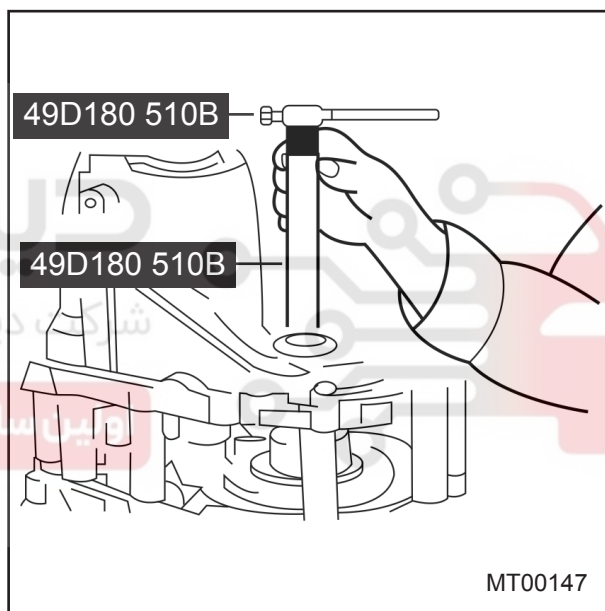


- 2- Install the transaxle case.
- 3- Set the special tool 0K130 175 AA0 between the transaxle case and the clutch housing, install the bolts, and tighten to the specified.

Tightening torque: 1.9 ~ 2.6 kg.m

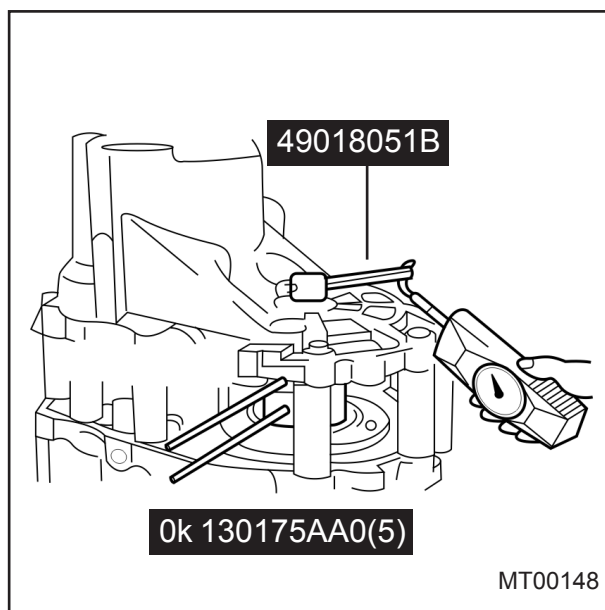


- 4- Move the special tool (0K130 175 AA0) and expand the selector until it can no longer be turned then turn it in the reverse direction until the gap is eliminated.
- 5- Mount the special tool (0K130 175 AA0) to the differential pinion shaft and install special tool (49 D180 510B).



6- Hook the pull scale on the preload attachment (49 0180 510B) and pull the scale to turn the attachment. Adjust the selector with the bar (49 F401 381A) until the preload specification is obtained.

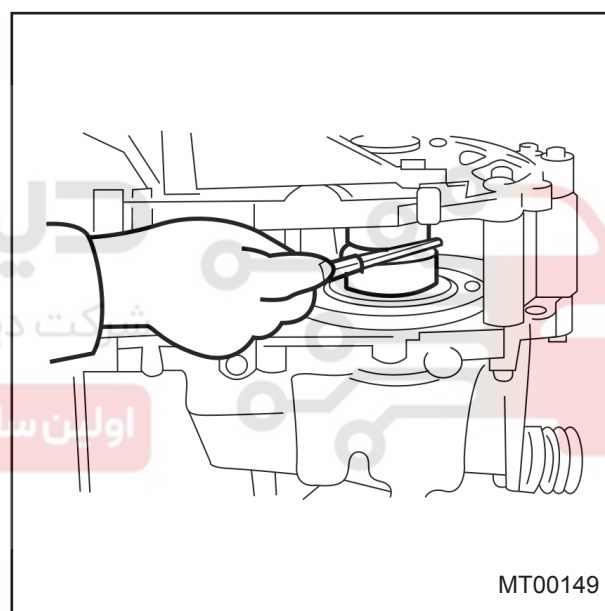
Preload: 0.05 ~ 0.076 kg.m
 Pull scale reading: 0.5 ~ 0.76 kg.m



7- Use a thickness gauge tool (49 F401 381A) to measure the gap in the selector for the differential.

Note:

Measure the gap around the entire circumference of the selector.



8- Select the proper adjustment shim(S) to be used for the differential by referring to the table and selecting the shim which is nearest (on the thick side) to the largest measured clearance in the selector.

Example: 0.32mm

So the nearest shim (on the thick side) to 0.32mm is 0.35mm

Note:

the minimum number of shim that may be used is two.

Thickness mm	
0.10	0.55
0.15	0.60
0.20	0.65
0.25	0.70
0.30	0.75
0.35	0.80
0.40	0.85
0.45	0.90

Remove the bolts (49 G019 019) and the special tool (49 F401 384), then remove the transaxle case.
Remove the selectors (49 F401 381A) and the differential.
Remove the bearing outer races.
Leave the differential side bearing outer race in the clutch housing.

Rechecking of Bearing Preload

- 1- Install the selected shim(s) above and bearing outer races.
- 2- Tighten to the specified torque.

Tightening torque: 1.9 ~ 2.6 kg.m

- 3- Connect the preload attachment (49 0180 510B) to the preload adaptor (49 B027 002) and install it through the driveshaft hole.

- 4- Hook the pull scale to the attachment and measure the preload. By special tool (490 180 510B)

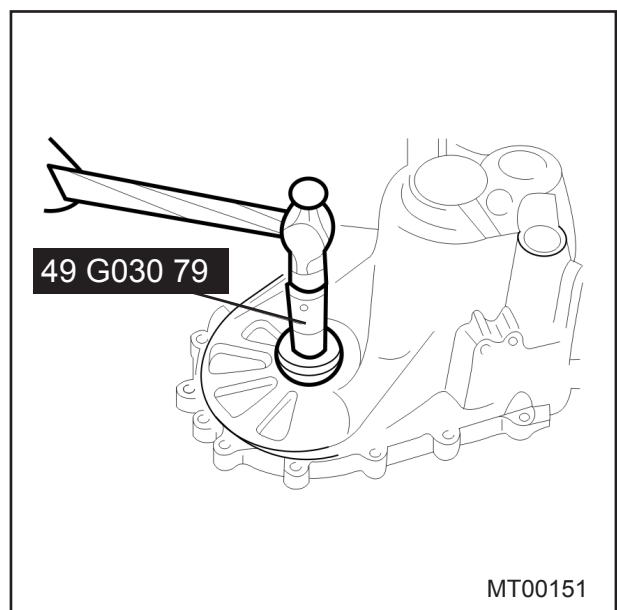
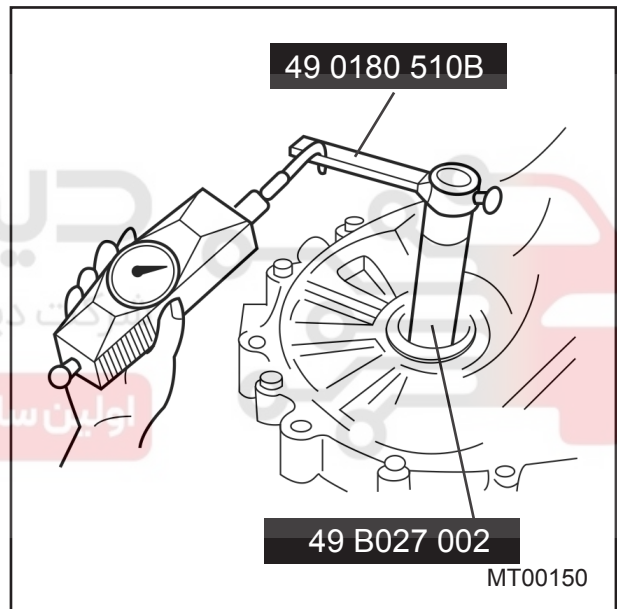
Preload: 3 ~ 7.6 kg.m

Note:

If the bearing preload is not within specification readjust.

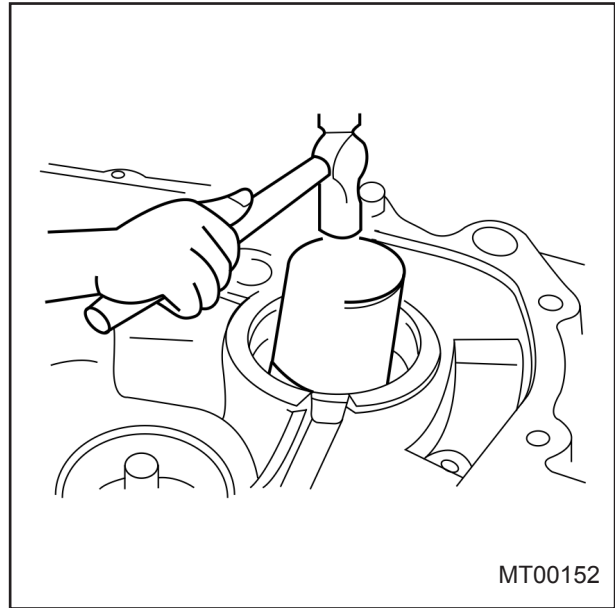
Oil Seal (Differential)

Tap the differential oil seals in, using the oil seal installer (49 G030 79)

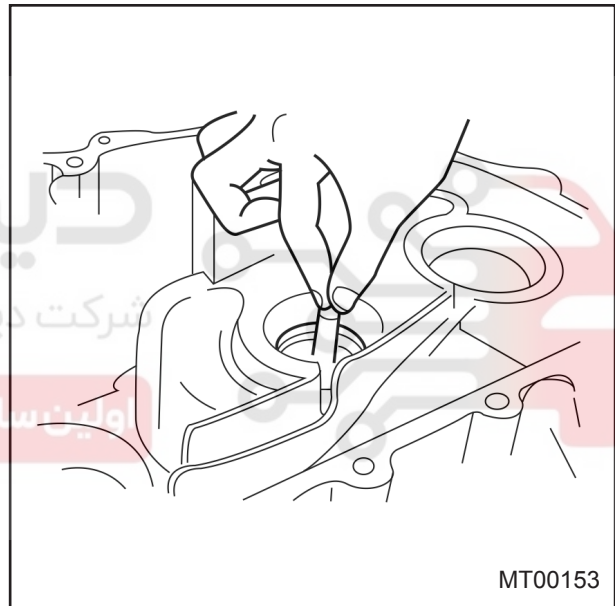


Oil Seal (Primary Shaft)

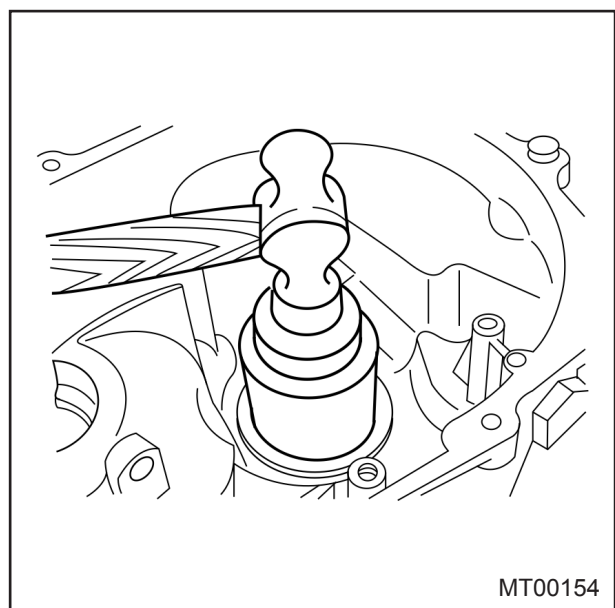
Tap the oil seal into the clutch housing using a suitable pipe.



Install the funnel.

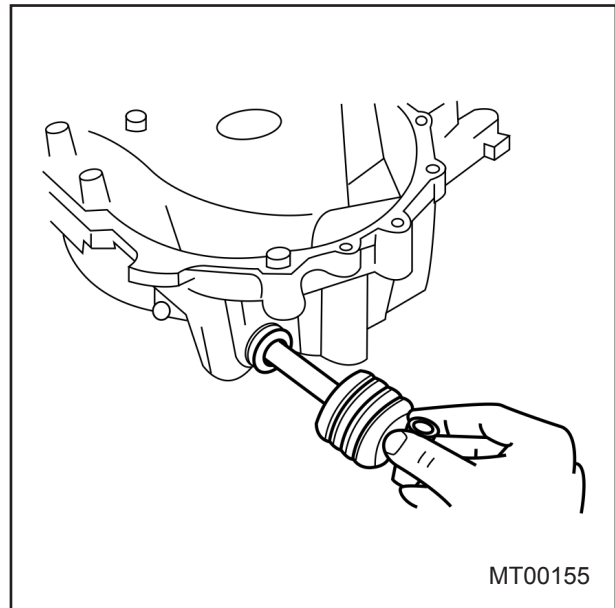
**Bearing Outer Race**

- 1- Install the selected adjustment shims.
- 2- Install the bearing outer races into the transaxle case and clutch housing.
- 3- Use a suitable pipe and tap the outer races in until they are fully seated.

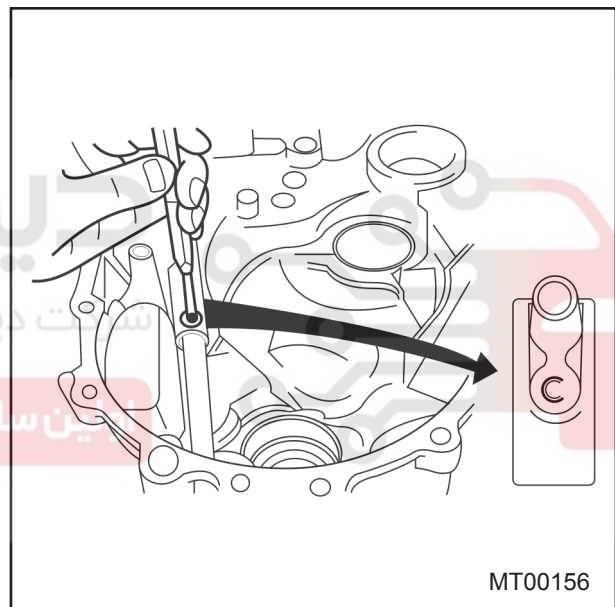


Change Rod

- 1- Install the oil seal.
- 2- Install the change rod assembly.
- 3- Install the change arm.

**Note:**

The spring pin should be installed as shown in the figure.

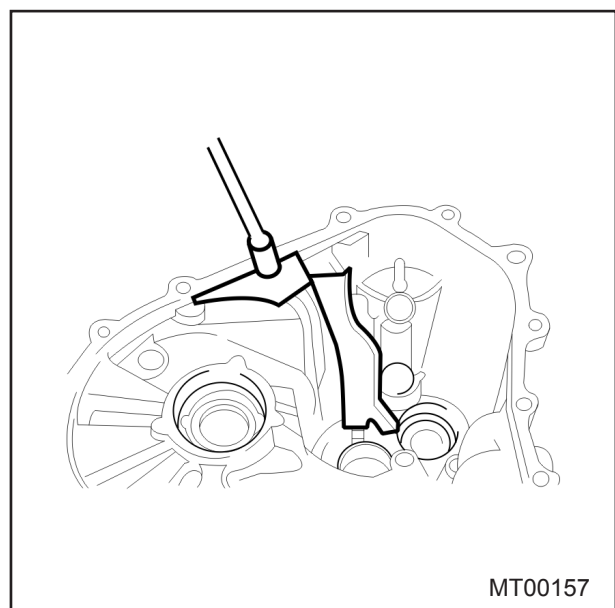
**Oil Passage and Baffle Plate**

Install the oil passage and baffle plate.

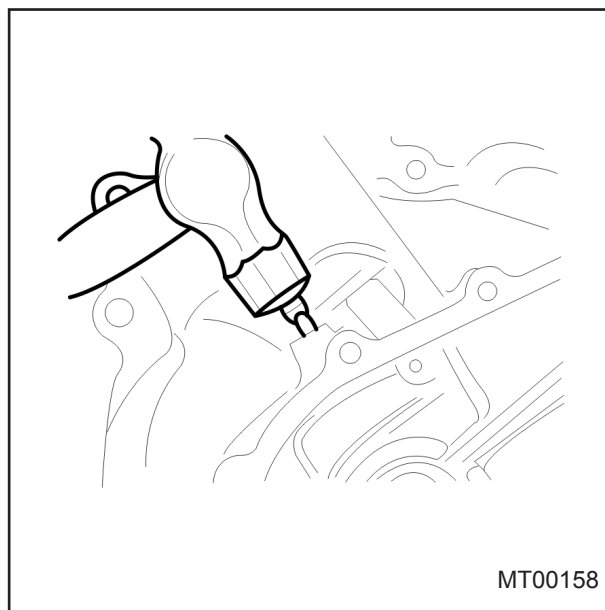
Tightening torque:

Oil passage: 0.8 ~ 1.1 kg.m

Baffle plate: 0.7 ~ 1.0 kg.m



Install the air breather



دیجیتال خودرو

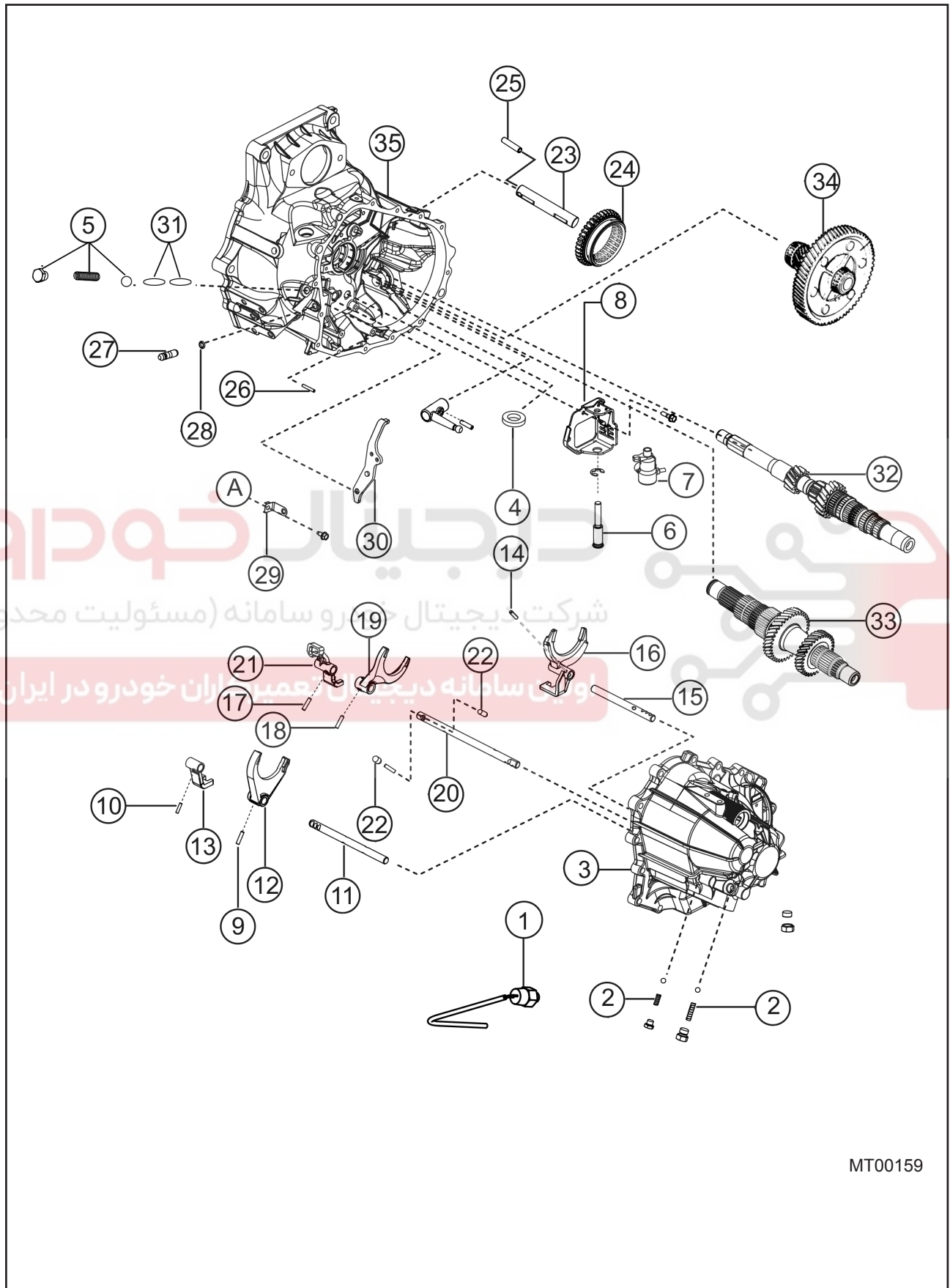
شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



Gearbox Parts Assembling Order – Step 4

Assemble the parts as the numerical order shown in the figure.

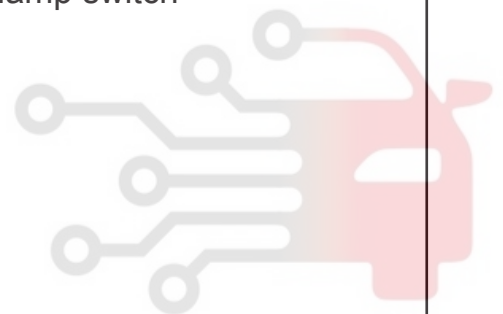


- | | |
|----------------------------------|---------------------------|
| 1- Clutch housing | 19- Spring pin |
| 2- Differential assembly | 20- 1st/2nd shift fork |
| 3- Secondary shaft gear assembly | 21- 1st/2nd shift rod |
| 4- Primary shaft gear assembly | 22- Spring pin |
| 5- Interlock pin | 23- 3rd/4th shift rod end |
| 6- Reverse shift lever | 24- 3rd/4th shift fork |
| 7- Lever set spring | 25- 3rd/4th shift rod |
| 8- O-ring | 26- Interlock pin |
| 9- Reverse shift lever | 27- Interlock pin |
| 10- Pin | 28- Base plate unit |
| 11- Pin | 29- Crank lever assembly |
| 12- Reverse idle gear | 30- Crank lever shift |
| 13- Reverse idle shaft | 31- Plug, spring and ball |
| 14- 5th Interlock pin | 32- Magnet |
| 15- 5th/reverse shift rod end | 33- Transaxle case |
| 16- 5th / reverse shift rod | 34- Plug, spring and ball |
| 17- 5th shift rod | 35- back-up lamp switch |
| 18- Spring pin | |

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

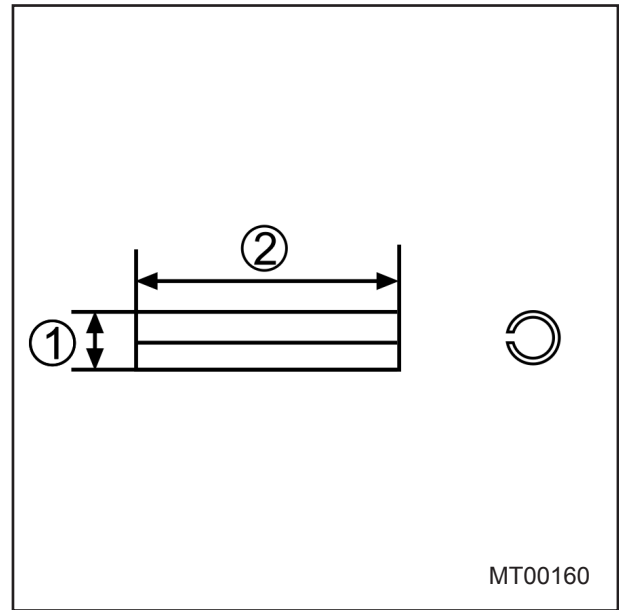


Spring pin

Note:

There are Two (2) types of spring pins.

	1	2
Shift forks and 3rd/4th shift rod end	5	22
5th/Rev.shift rod end	5	20
Change arm	6	28

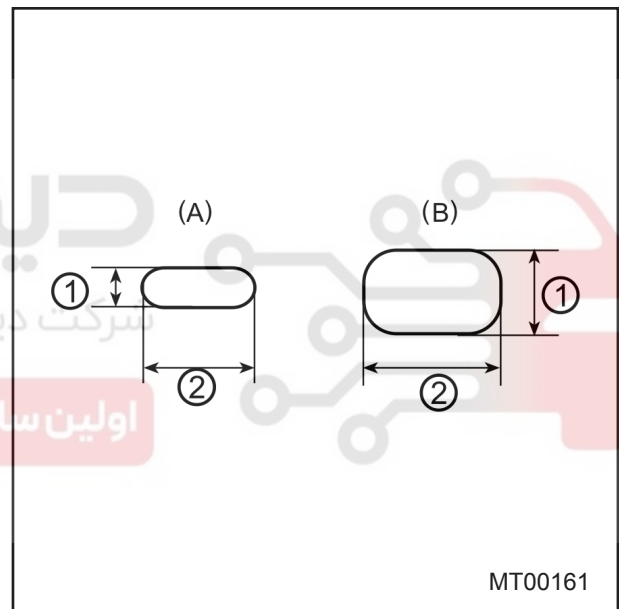


Interlock Pin

Note:

There are two (2) types of interlock pins

	1	2
(A) in 5th/Rev.shift rod	3.5	10.2
(B) Between rods	7.0	12.6

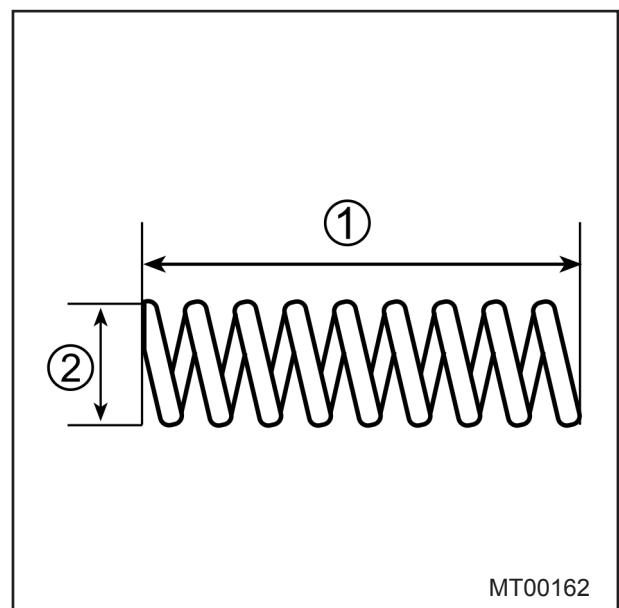


Spring

Note:

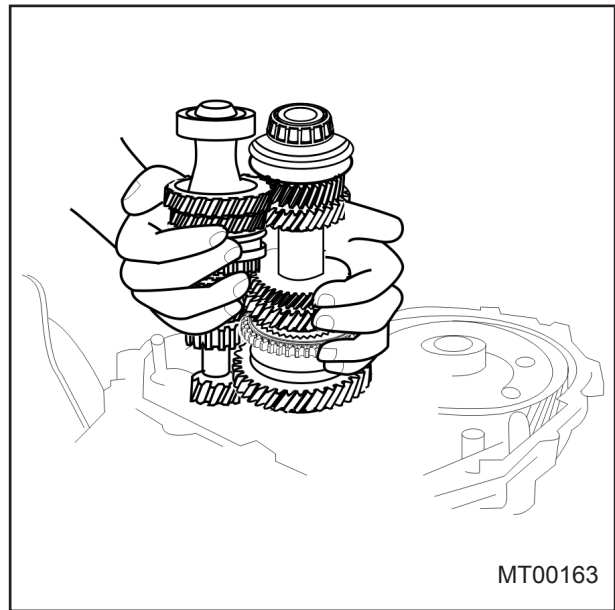
There are three (3) types of spring

	1	2
1st 2nd shift rod (Transaxle case)	22.5	7.2
3rd/4th shift rod (Clutch housing)	33.2	7.2
5th/Rev shift rod (Transaxle case)	36.2	8.0



Differential and Shaft Gear Assembly

- 1- Install the differential assembly.
- 2- Install the primary shaft assembly and the secondary shaft assembly together.



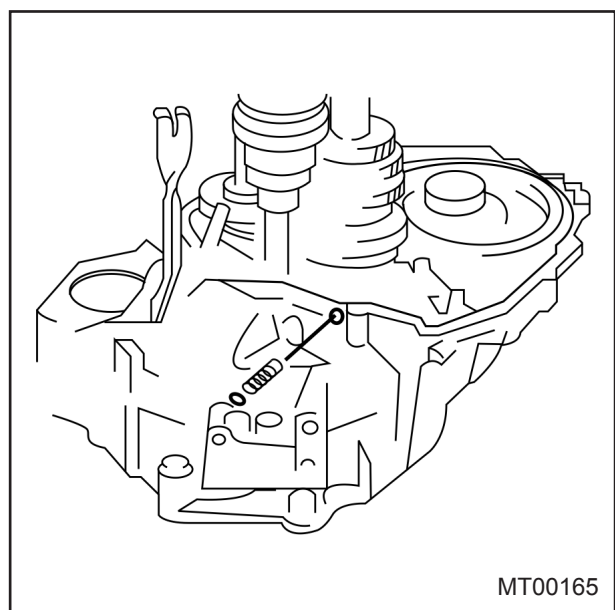
Gear Lock

For preventing of error change to reverse gear from 5th gear to 4th gear, a gear lock is installed on the base plate unit



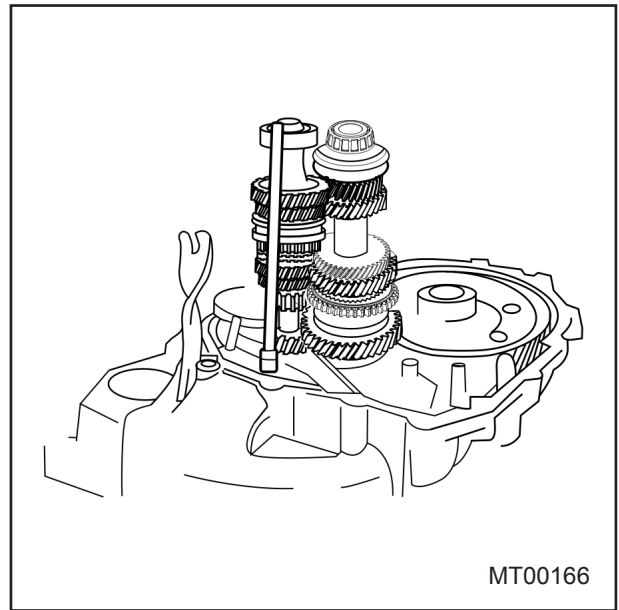
Reverse Lever and Reverse Idle Gear

- 1- Install the pin to the reverse idle shaft.



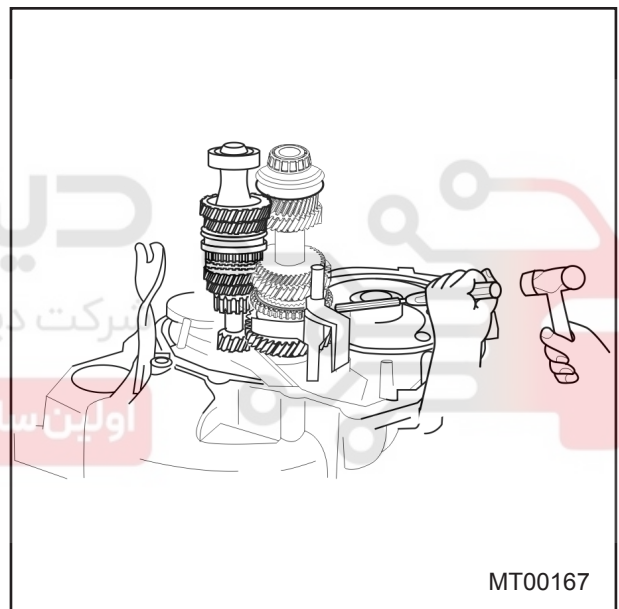
- 2- Install the reverse idle gear and reverse idle shaft.
- 3- Install the reverse lever and the reverse lever shaft
- 4- Install the pin in the clutch housing.
- 5- Install the lever set spring.

Tightening torque: 0.8 - 1 kg.m

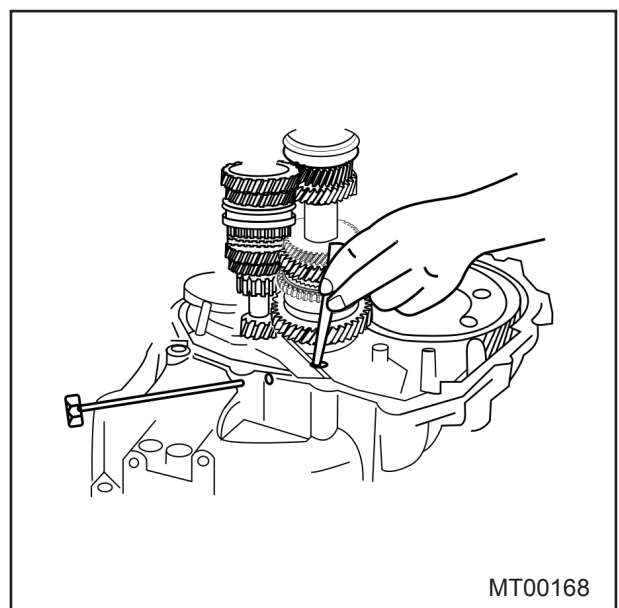


Shift Rod (1st and 2nd)

- 1- Install the shift fork and the shift rod.
- 2- Install the spring pin.



- 3- Install the interlock pin



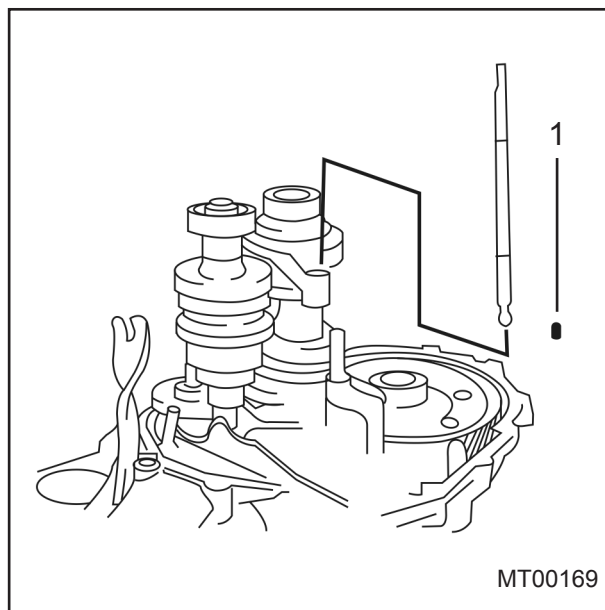
Shift Rod (5th and Reverse)

1- Install the interlock pin to the shift rod and install the shift rod.

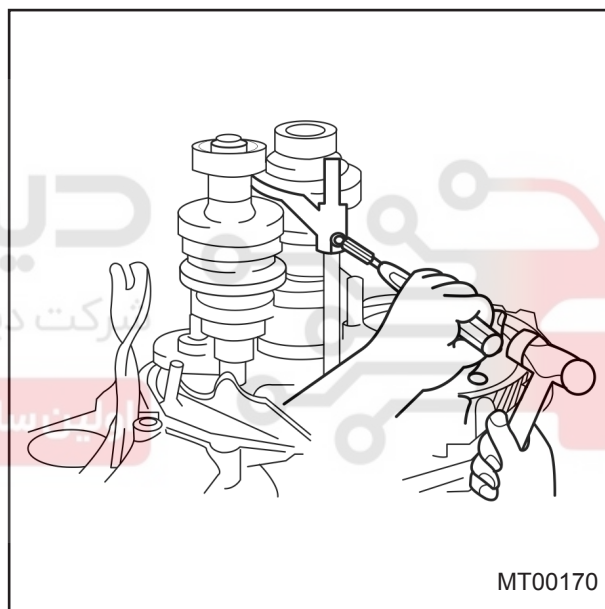
Note:

5th/Reverse shift rod length 233.5mm

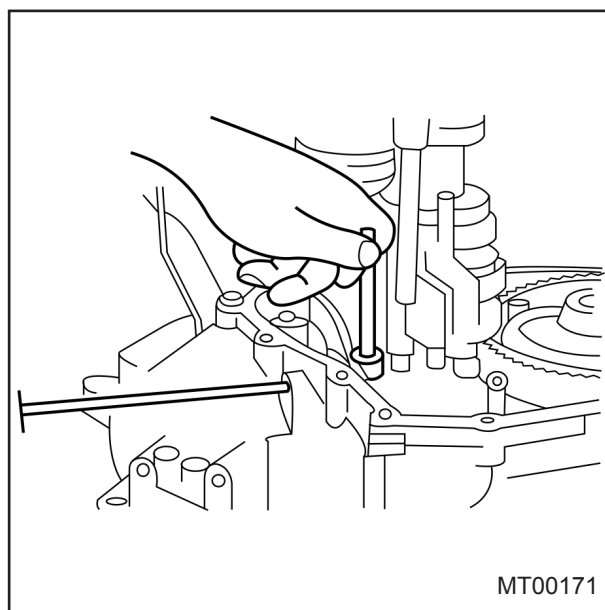
1: Interlock pin



2- Install the spring pins in the shift rod and shift rod end.

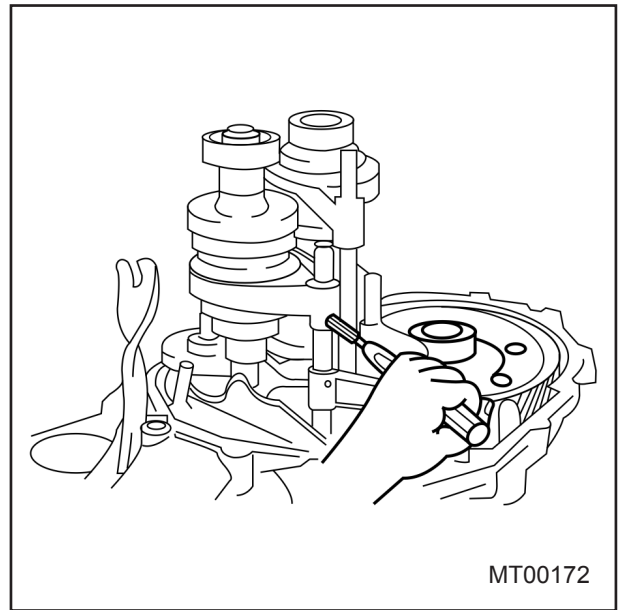


3- Install the interlock pin.



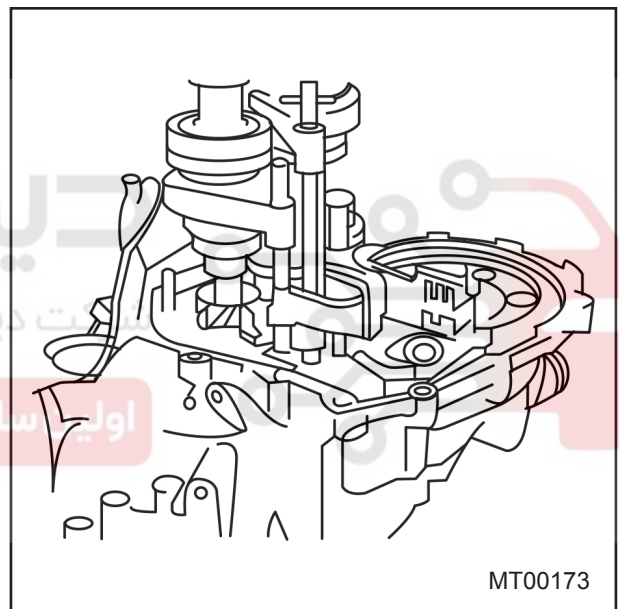
Shift Rod (3rd and 4th)

- 1- Install the shift rod.
- 2- Install the spring pins in the shift rod and shift rod end.



- 3- Install the ball, spring and plug.

Tightening torque: 1kg.m

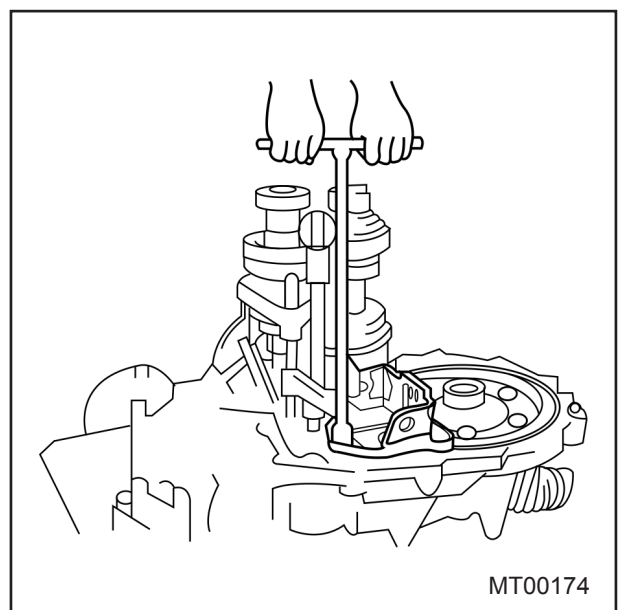


Base Plate unit

- 1- Install the base plate unit.

Tightening torque: 0.8 - 1.1 kg.m

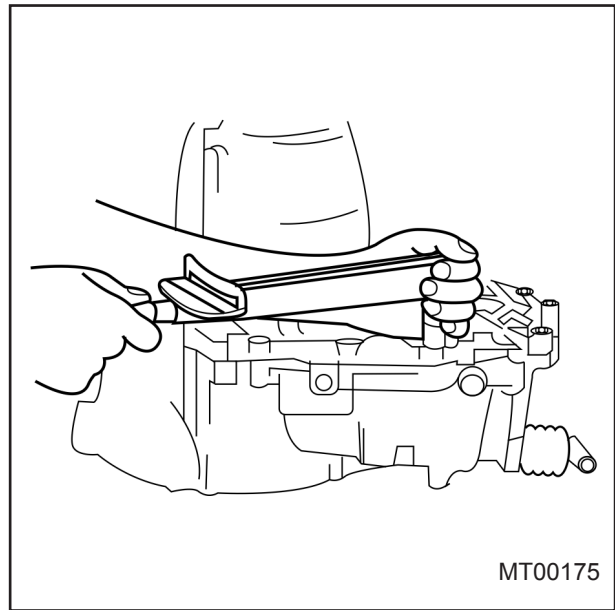
- 2- Install the retaining ring.
- 3- Install the magnet.



Transaxle Case and Clutch Housing

1- Apply sealant and install the transaxle case.

Tightening torque: 1.9 ~ 2.6 kg.m



MT00175

2- Install the balls, spring and plugs.

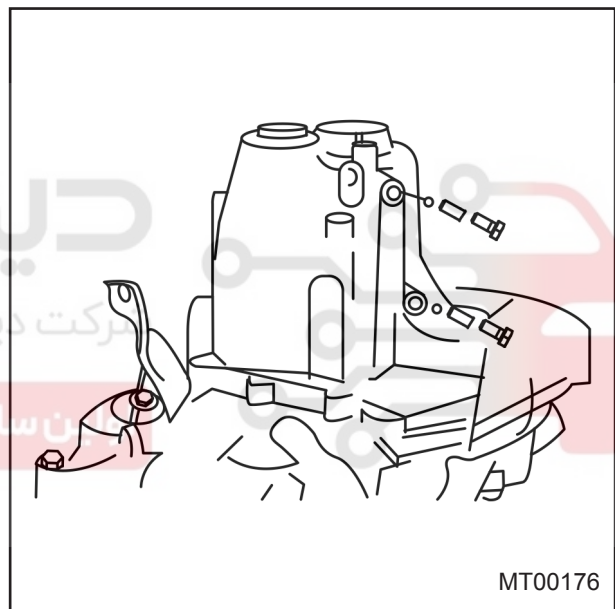
Tightening torque:

1st,2nd : 1.5 ~ 2.1 kg.m

5th/Rev: 2 ~ 3 kg.m

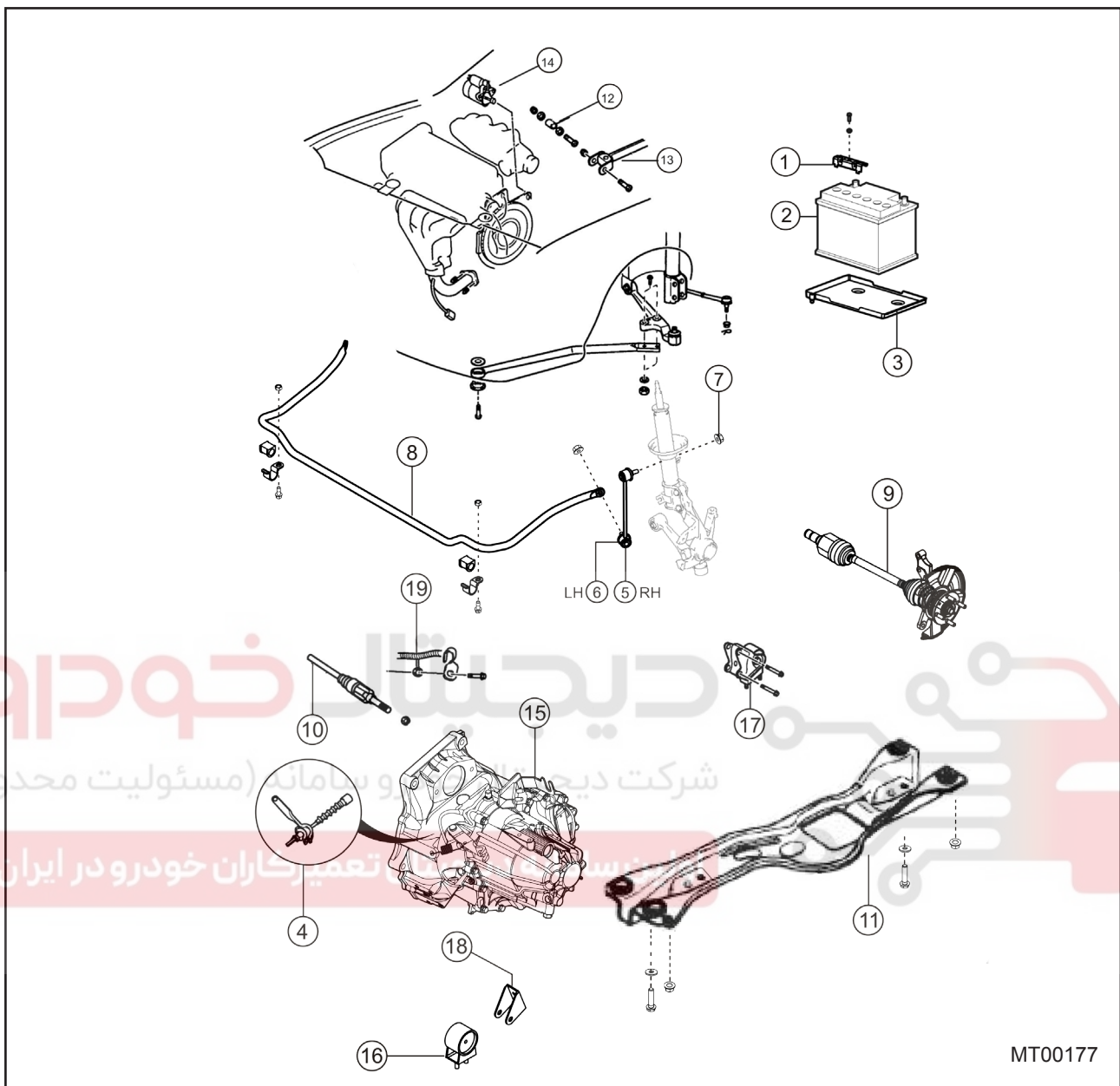
3- Install the back –up lamp switch.

Tightening torque: 2 ~ 3 kg.m



MT00176

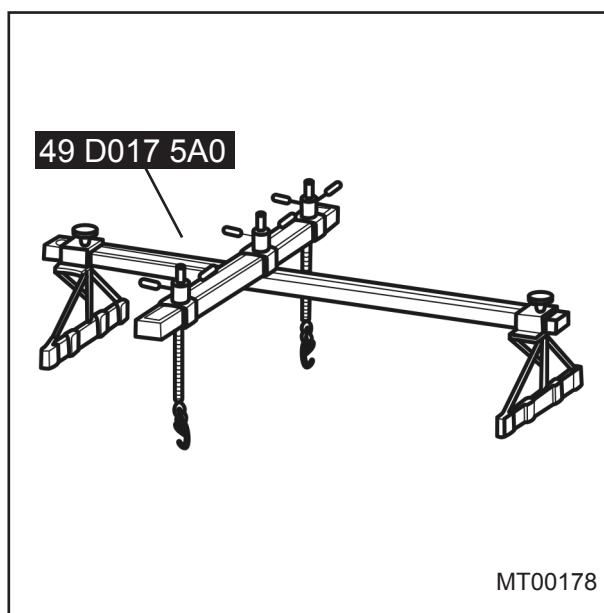
Schematic Diagram of Parts and Components



MT00177

- | | |
|----------------------------|---------------------------|
| 1- Battery clasp | 11- Cross member |
| 2- Battery | 12- Rod – control |
| 3- Tray battery | 13- Bar extension |
| 4- Cable clutch | 14- Starter |
| 5- Link assy. - control RH | 15- Transaxle |
| 6- Link assy. - control LH | 16- Mounting No.2 |
| 7- Nut flange | 17- Mounting No.1 |
| 8- Stablizer | 18- BRKT EG/No.3 |
| 9- Drive shaft LH | 19- White body connection |
| 10- Drive shaft drive RH | |

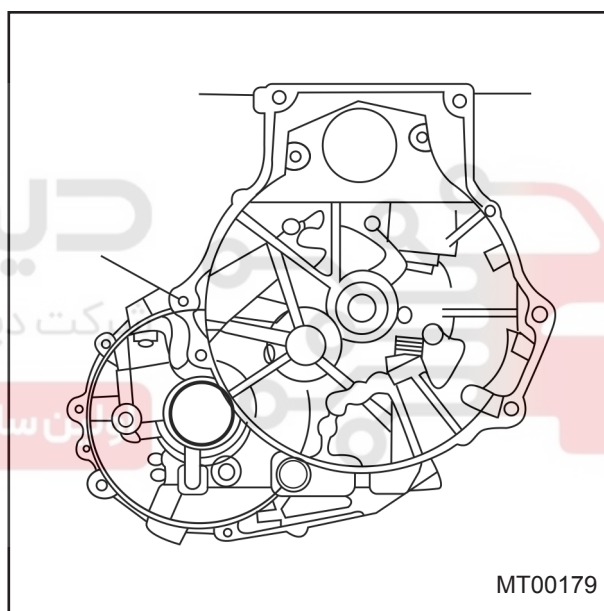
- 1- Mount the engine support (49 D017 5A0)
 - 2- Jack up the vehicle and support it with safety stands
- Disassembling order is the reverse of assembling.



Transaxle

Tighten the bolts to the specified torque.

Tightening torque:	5.7 ~ 8.3 kg.m
	56 ~ 82 N.m



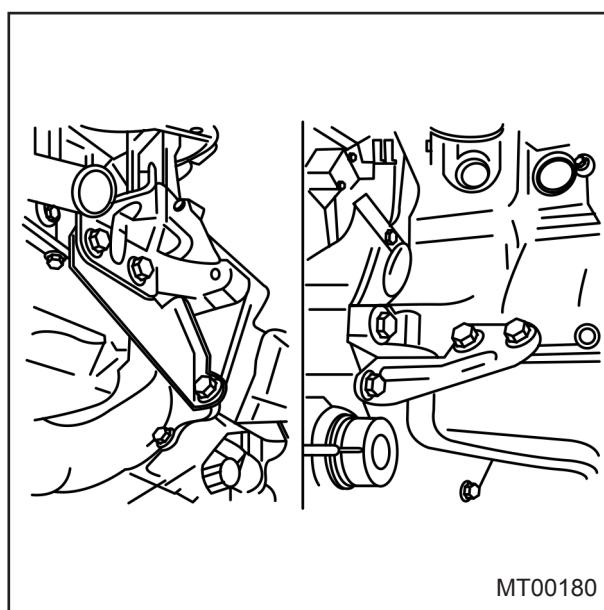
End plate and Gusset plate

1- Install the end plate.

Tightening torque:	80 ~ 110 kg.m
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2- Install the gusset plate.

Tightening torque:	3.8 ~ 5.3 kg.m
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Cross Member

Install the cross member.

Tightening torque: 6.5 ~ 9.1 kg.m
 64 ~ 90 N.m

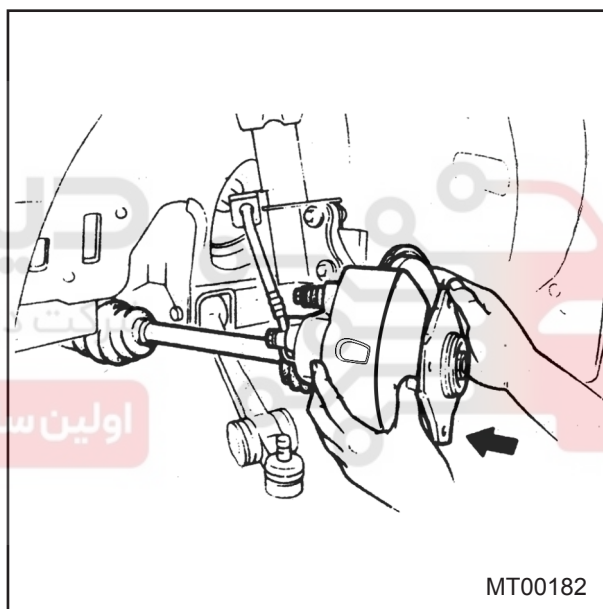
Install the mountings.

Driveshaft

- 1- Replace the clip at the end of the driveshaft with a new one. Insert the clip with the gap at the top of the groove.
- 2- Fit the driveshaft to the side gear, and push in to the transaxle by pushing in on the front hub.

Notes:

- a) When installing the driveshaft, be careful not to damage the oil seal.
- b) After installation, pull the front hub outward to confirm that the driveshaft is se-curely held by the clip.

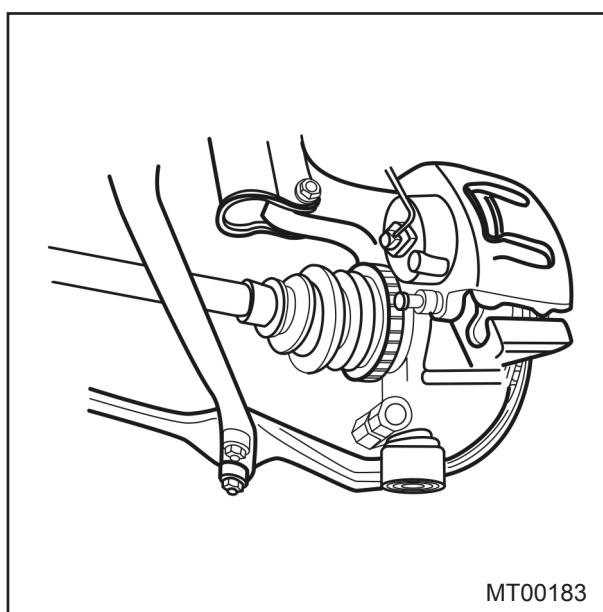
**Lower Arm and Tie-Rod End**

- 1- Install the lower arm ball- joint to the knuckle and tighten the bolt.

Tightening torque: 5.6 ~ 7 kg.m
 55 ~ 69 N.m

- 2- Install tie-rod end to the knuckle.

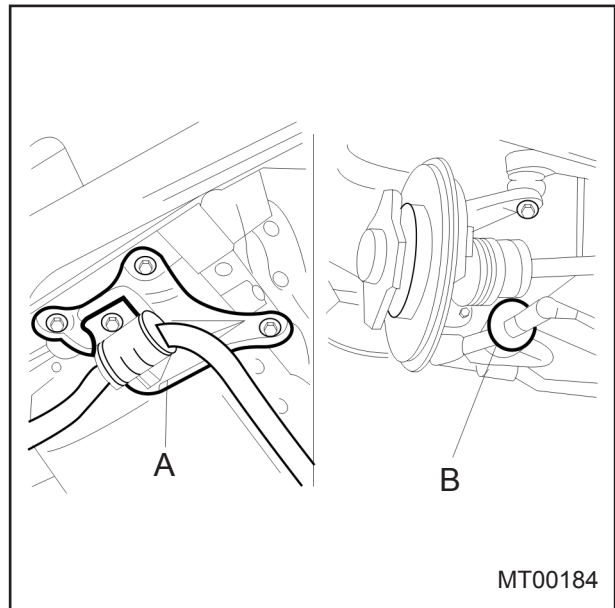
Tightening torque: 3.0 ~ 4.5 kg.m
 29 ~ 44 N.m



Stabilizer

Tightening torque:

- a) 5.6 ~ 7 kg.m
55 ~ 69 N.m
- b) 6.6 ~ 8 kg.m
64 ~ 79 N.m

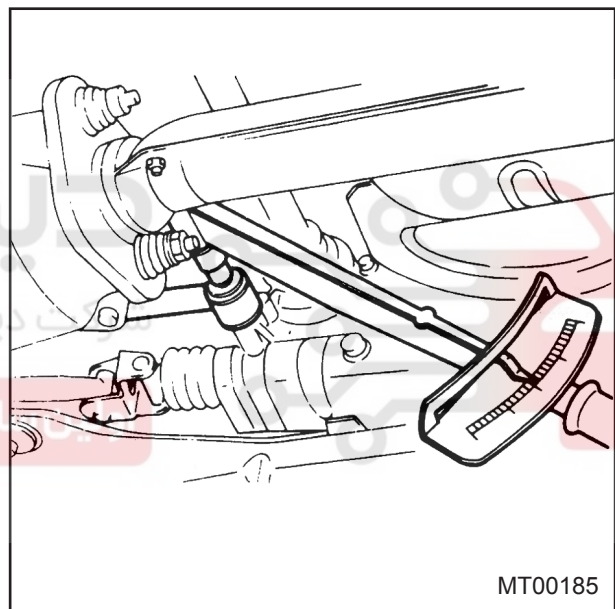


Control Rod and Extension Bar

1- Install the control rod.

Tightening torque: 3.2 ~ 4.7 kg.m

2- Install the extension bar.



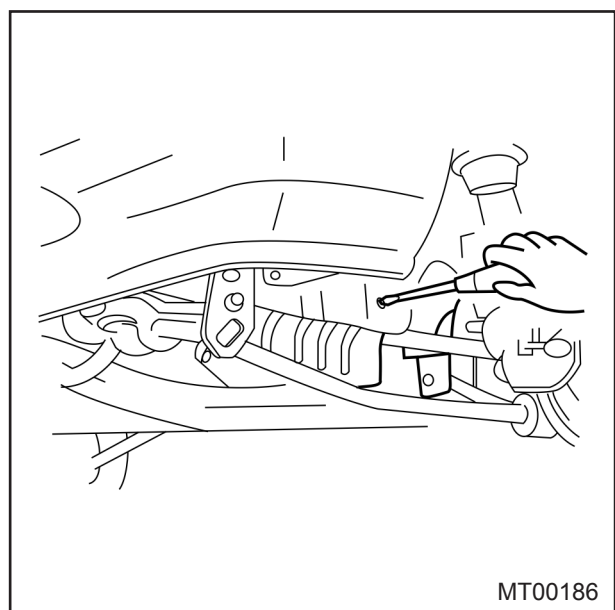
Splash Shield, Wheel and Mounting Block

1- Install the splash shields.

Tightening torque: 0.8 ~ 1.1 kg.m

2- Install the wheels.

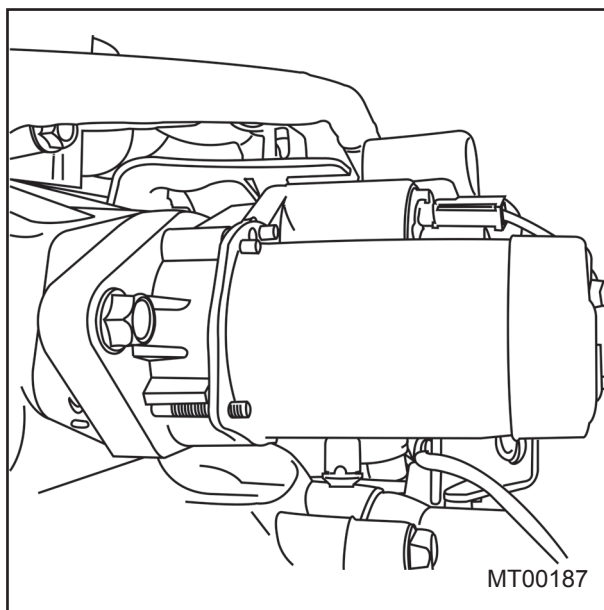
Tightening torque (wheel): 9 ~ 12 kg.m



Starter

Install the starter and bracket.

Tightening torque: 3.2 ~ 4.7 kg.m

**Clutch Cable, Back-Up Lamps Switch and Speedometer Cable**

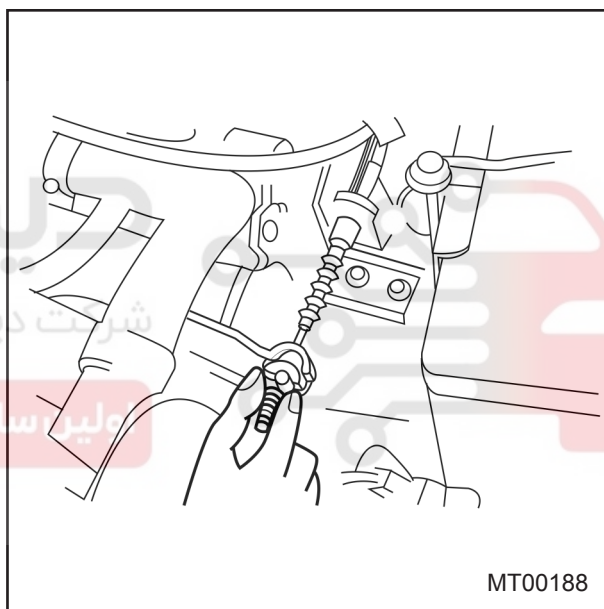
1- Install and adjust the clutch cable.
(Refer to clutch section.)

2- Connect the back-up lamp switch connector.

3- Install the body ground.

Tightening torque: 1.6 ~ 2.3 kg.m

4- Install the speedometer cable.

**Transaxle Oil**

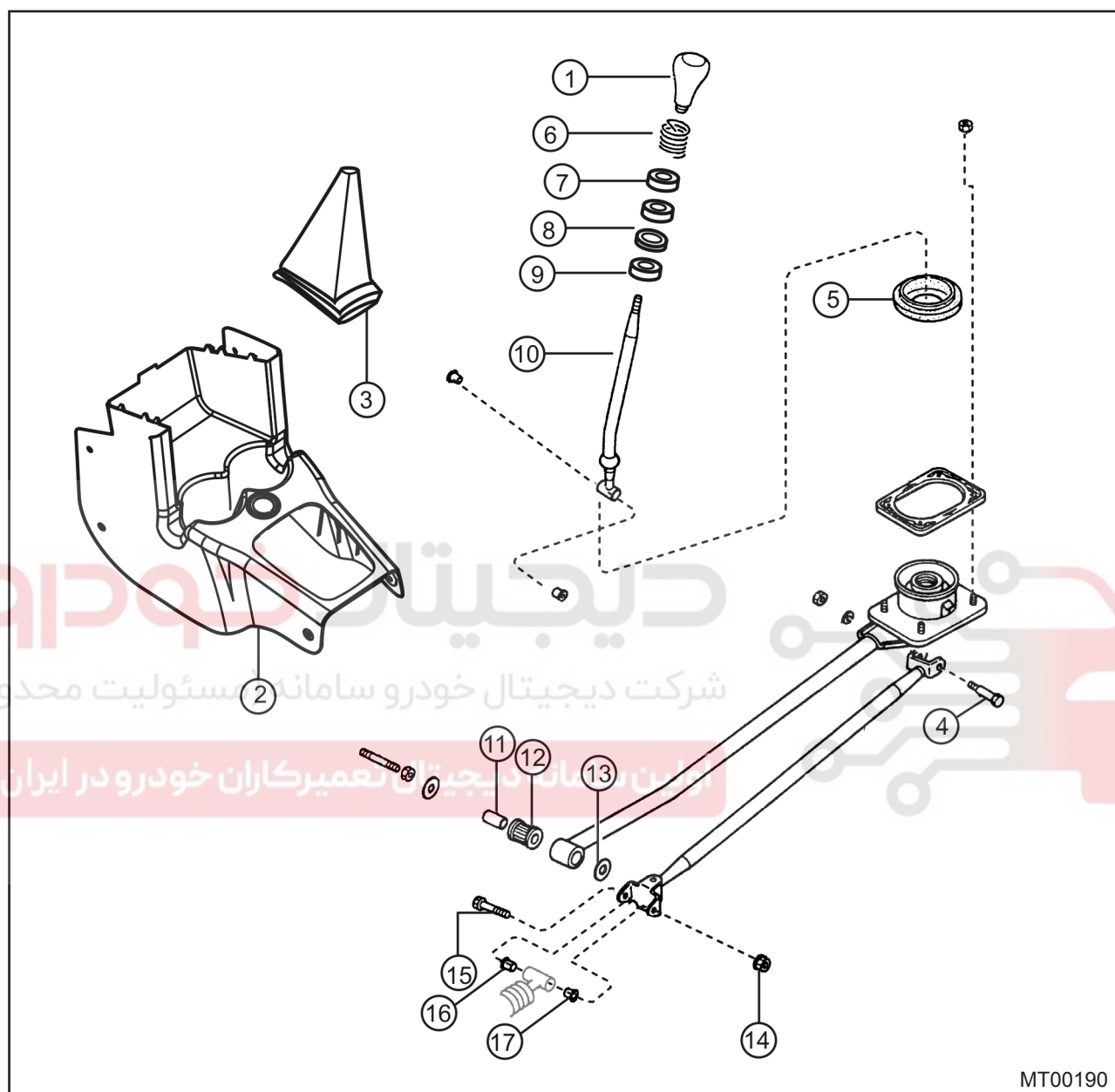
1- Add the specified amount of the specified transaxle oil through the speedometer driven gear installation hole. (Refer to prior pages)

2- Road test the vehicle and check the transaxle for proper operation and check for oil leaks.



Removal and Installation for Transaxle Control

- 1- Jack up the vehicle and support it with safety stands.
- 2- Remove in the sequence shown in the figure.
- 3- Install in the reverse order of removal.

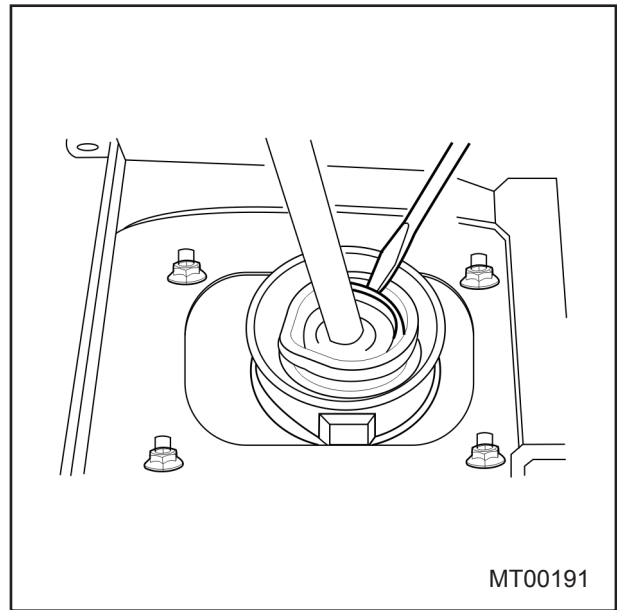


MT00190

- | | |
|--------------------------------|---|
| 1- Change lever knob | 10- Gear shift lever |
| 2- Center console | 11- Nut, spring washer and plain washer |
| 3- Change boot | 12- Bushing |
| 4- Bolt, nut and spring washer | 13- Spacer |
| 5- Mounting rubber | 14- Extension bar |
| 6- Spring | 15- Self locking nut |
| 7- Ball seat (upper) | 16- Bushing |
| 8- Ball seat (lower) | |
| 9- Holder | |

Spring

Remove the spring by prying on the hooked part of the spring with a screwdriver.



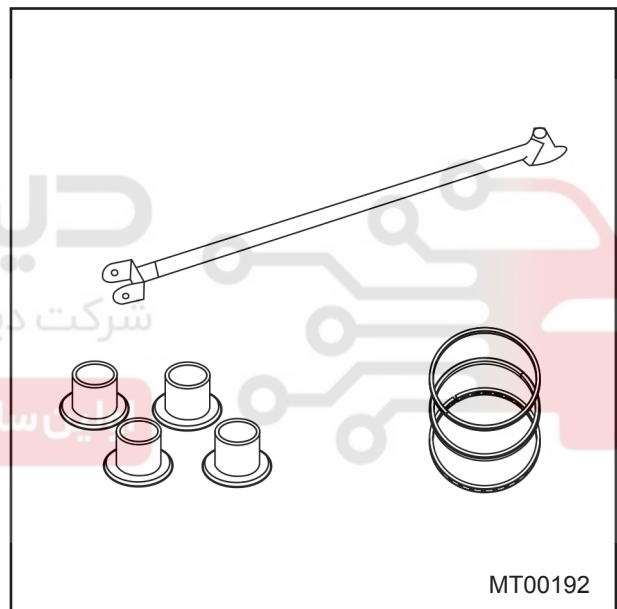
Inspection

Check the following, and replace if necessary:

- 1- Bent control rod.
- 2- Wear, damage, or malfunction of any joint.
- 3- Damaged gear shift lever ball.
- 4- Weak spring.
- 5- Wear or damage of bushing.

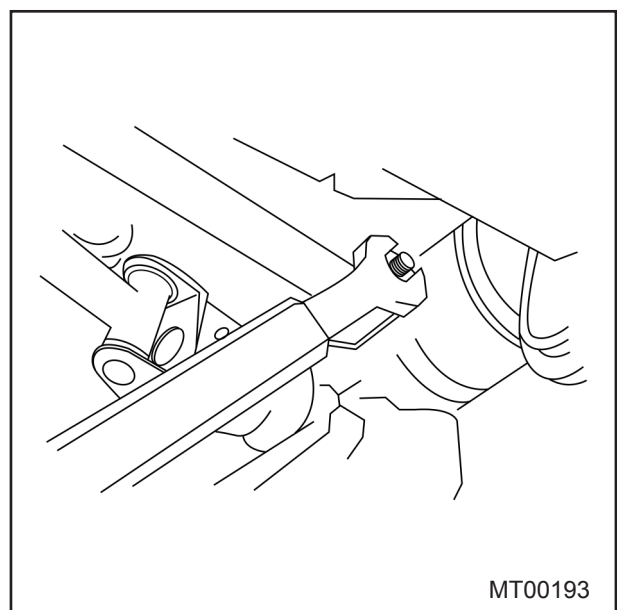
Installation

Install in the reverse order of removal and note the following



Extension bar

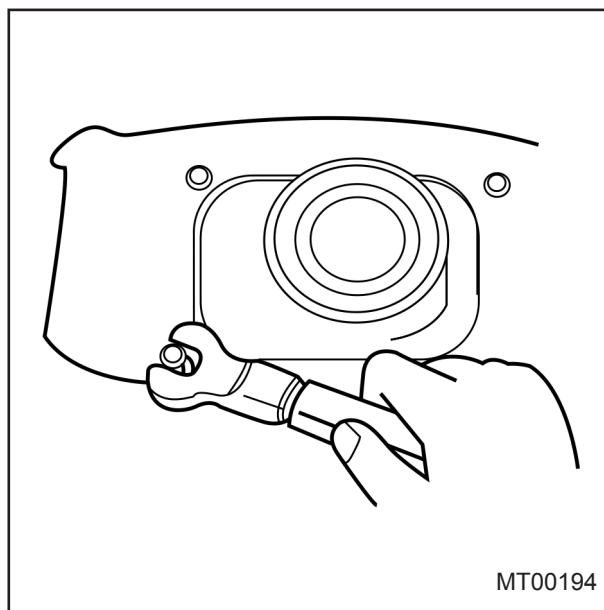
First, install the extension bar to the floor, and then install it onto the transaxle.



Self Locking Nut

Tighten the self locking nuts to the specified torque.

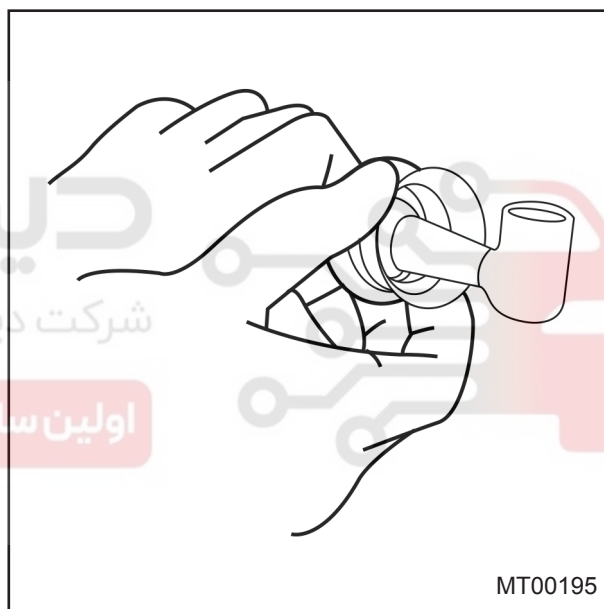
Tightening torque: 70 ~ 100 kg.cm

**Gear Shift Lever Ball**

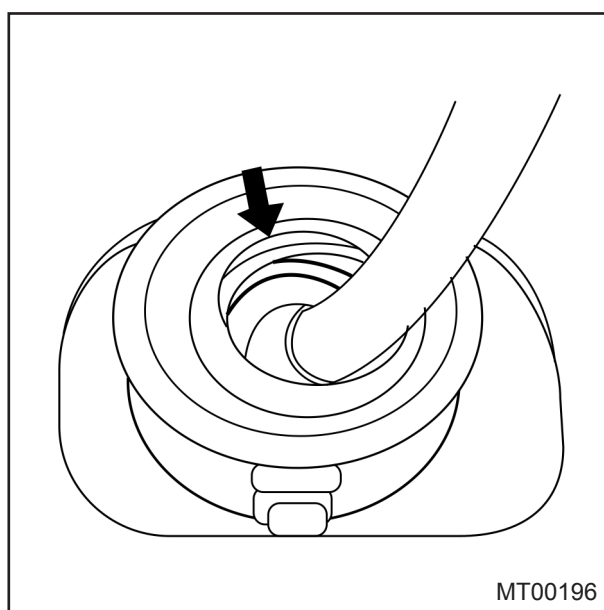
Apply grease (Lithium NLGI No.2) to the ball seat surface, and install the upper and lower ball seat, holder, and boot.

Note:

Apply grease to all joints.

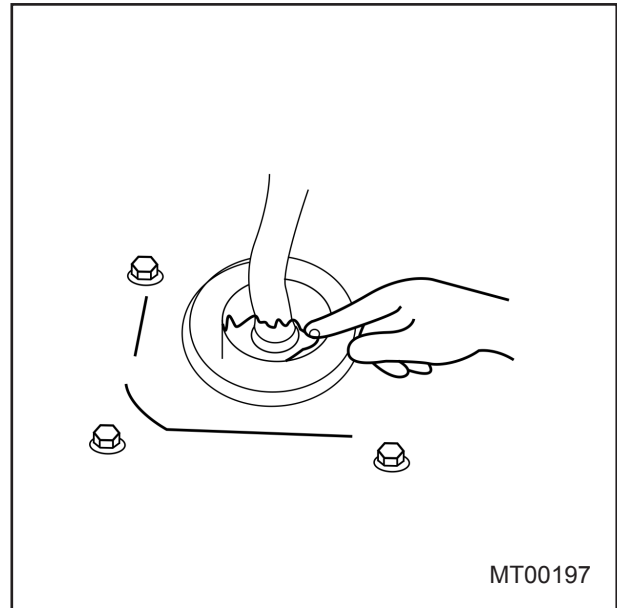
**Spring**

Make sure that the hooked part of spring is properly seated in the bracket groove as shown in the figure.



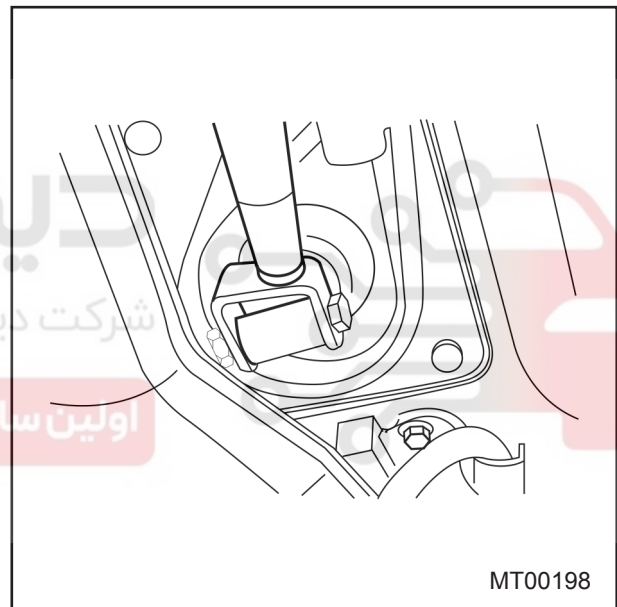
Bracket Cavity

Put grease (Lithium NLGI No.2) in the bracket cavity.

**Change Control Rod**

Install the change control rod so that its relationship with the shift lever is as shown in the figure.

Tightening torque: 1.6 ~ 2.3 kg.m



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CHAPTER THREE

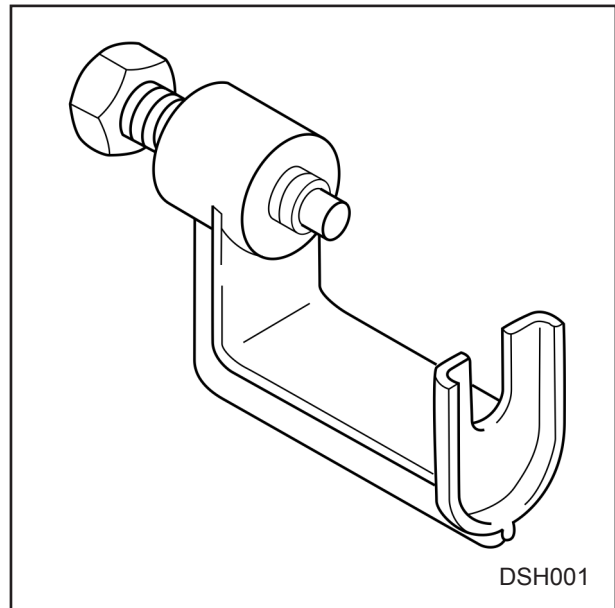
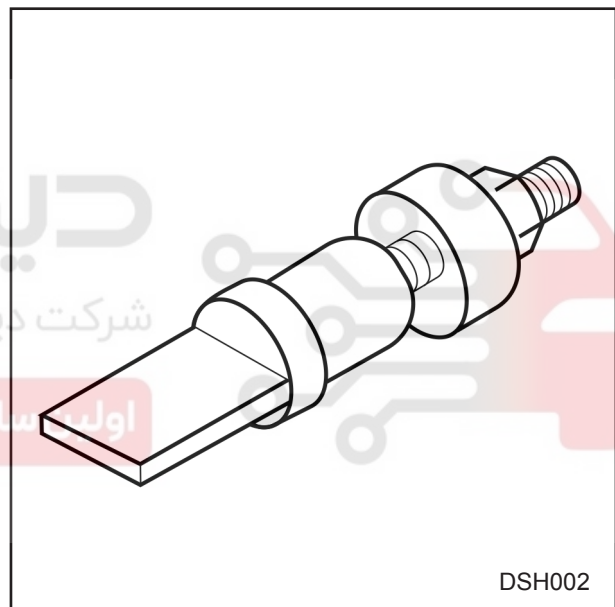
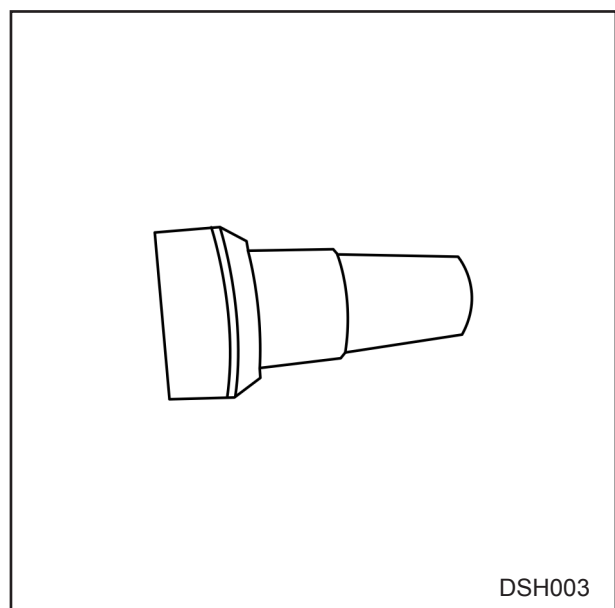
DRIVEN SHAFT

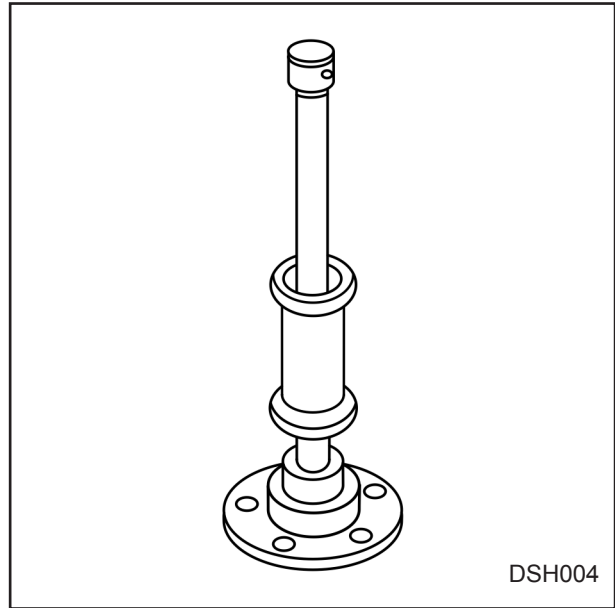
دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

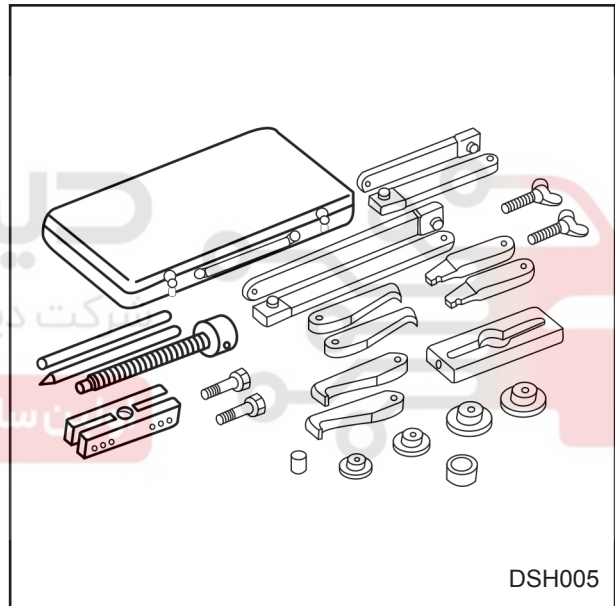
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Socket Joint Puller**Technical No.:** 0k670 3210 19**Serial No.:** 800028**Usage:** Separation of a lower arm and a tie rod end ball joint**Spacer Selector****Technical No.:** 0k130 3310 16**Serial No.:** 502183**Usage:** For adjusting the initial clearance of a front wheel bearing.**Pinion Gear Holding****Technical No.:** 0k201 270 014**Serial No.:** 800014**Usage:** For preventing of running gear oil

Puller**Technical No.:** 0K130 331 AA0A**Serial No.:** 800006**Usage:** Removal of wheel bearing inner race from hub

DSH004

Bearing Puller Set**Technical No.:** 0k670 990 AA0**Serial No.:** 800005**Usage:** For removing of wheel sensor

DSH005

Drive Shaft Specification

		B3
Joint type	Internal	Tripod joint (TJ)
	External	Birfield joint (BJ)
Balance capacity	Internal	#75
	External	#75
Drive shaft length mm (in)	Right	895(35.2)
	Left	619(24.4)
Drive shaft diameter mm (in)	Right	23(0.9)
	Left	23(0.9)

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Troubleshooting

Problem	Possible Cause	Remedy
Faulty operation of driveshaft	Broken ball- joint	Replace Drive shaft
	Broken tri-pod joint	Replace Drive shaft
	Worn or seized joint	Replace Drive shaft
Abnormal noise from driveshaft	Insufficient grease in ball-joint or spline	Replenish or add grease. inspect boot
	Excessive backlash on spline	Replace Drive shaft
	Worn joint	Replace Drive shaft
Steering wheel pulls, while driving on a straight and level road, the steering wheel pulls to one side	Incorrect front wheel bearing initial clearance adjustment	Adjust or Replace front wheel (bearing)
	Bent steering linkage	Refer to steering and suspension manual
	Fatigued coil spring	Refer to steering and suspension manual
	Lower arm bushing worn or damaged	Refer to steering and suspension manual
	Bent knuckle arm	Refer to steering and suspension manual
	Bent lower arm or loose mounting	Refer to steering and suspension manual
	Incorrect toe-in adjustment	Refer to steering and suspension manual
	Improper tire air pressure	Refer to steering and suspension manual
	Unevenly worn tires (difference in wear between left and right tires)	Refer to steering and suspension manual
	Brake dragging	Refer to steering and suspension manual

Unstable handling	Incorrect wheel bearing initial clearance adjustment	Adjust clearance or Replace front wheel bearing
	Bent steering linkage	Refer to steering and suspension manual
	Joint in steering system worn or damaged	Refer to steering and suspension manual
	Incorrect steering pinion clearance adjustment	Refer to steering and suspension manual
	Fatigued coil spring	Refer to steering and suspension manual
	Shock absorber malfunction or looseness	Refer to steering and suspension manual
	Lower arm bushing worn or damaged	Refer to steering and suspension manual
	Incorrect toe- in adjustment (front or rear)	Refer to steering and suspension manual
	Improper tire air pressure	Refer to steering and suspension manual
	Wheels bent or unbalanced	Refer to steering and suspension manual

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Excessive steering wheel play	Incorrect front wheel bearing clearance adjustment	Adjust
	Incorrect steering pinion clearance adjustment	Refer to steering and suspension manual
	Rack and pinion worn	Refer to steering and suspension manual
	Joint in steering system worn or damaged	Refer to steering and suspension manual
	Lower arm bushing worn or damaged	Refer to steering and suspension manual
Tires are excessively worn or worn unevenly	Incorrect front wheel bearing clearance adjustment(excessively loose)	Adjust
	Incorrect toe-in adjustment	Refer to steering and suspension manual
	Improper tire air pressure	Refer to steering and suspension manual
	Unbalanced wheel (S)	Refer to steering and suspension manual
Abnormal noise from axle	Malfunction wheel bearing	Replace

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Drive Shaft Function

Drive shaft is a mechanical joint that transmit power from gearbox and differential to front axle. The tripod housing (drive shaft head) joint to side gear as a spline .A clip is used for preventing shaft removing from gears. The clip is pressed and go into differential gears and placed into the gears machining groove other drive shaft head is placed in wheel hub by spline. Contact between two parts is made by needle roller bearing. In order to prevent drive shaft from removing a washer and lock nut is used.

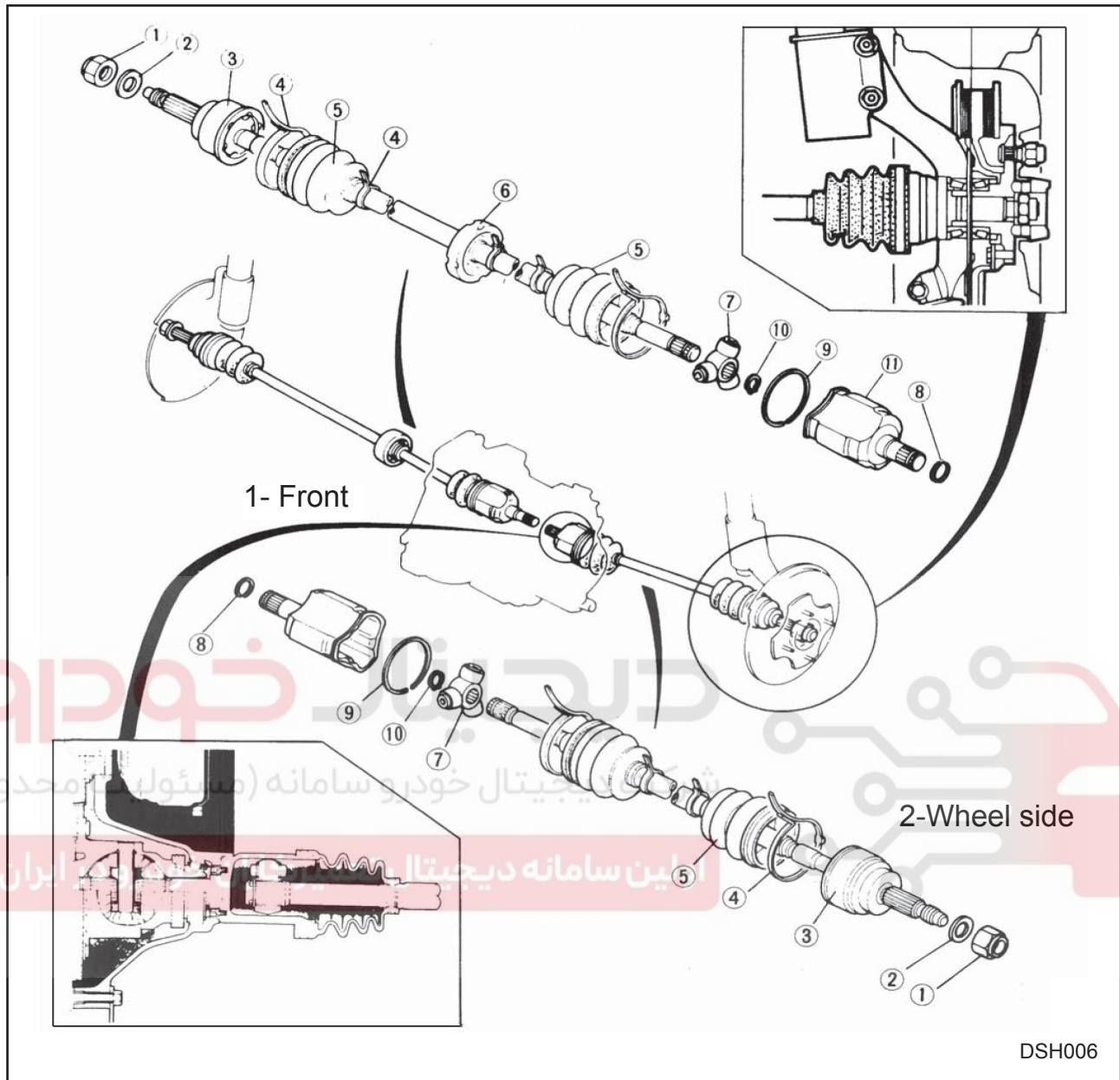
The clearance between wheel and drive shaft is eliminated by spline.

In two ends of the drive shaft two kinds of CV (Constant velocity) universal joints are attached. Repair or replace of interior parts is not recommended. Spider assembly does not allow transmitting engine vibration to vehicle body.

Spider assembly is necessary for power transmission from drive shaft and adjusting the suspension. Drive from the inner to outer race is by means of longitudinal, elliptical grooves which hold a series of steel balls. Spider assembly is made from three needle roller bearings and a tripod joint. Outer surface of each spider assembly are machined in order to place into the tripod housing.



Drive Shaft Structural View

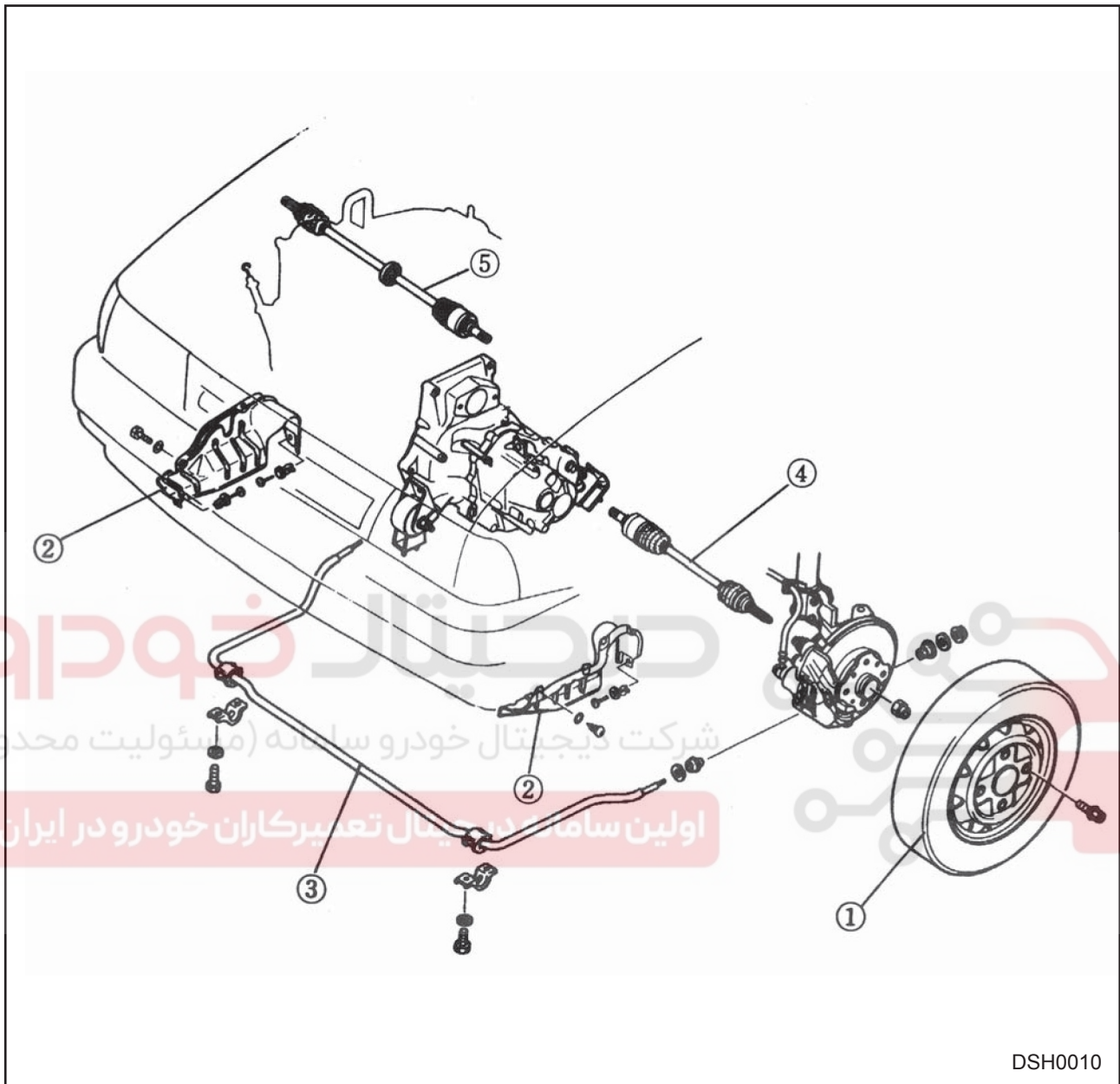


- 1- Locking nut
- 2- washer
- 3- Shaft and ball joint assembly
- 4- Boot band
- 5- Boot
- 6- damper

- 7- Tripod
- 8- Clip
- 9- Clip
- 10- Spring washer
- 11- Tripod housing

Driveshaft Disassembling Order

Disassemble the driveshaft as the numerical order shown in figure.



DSH0010

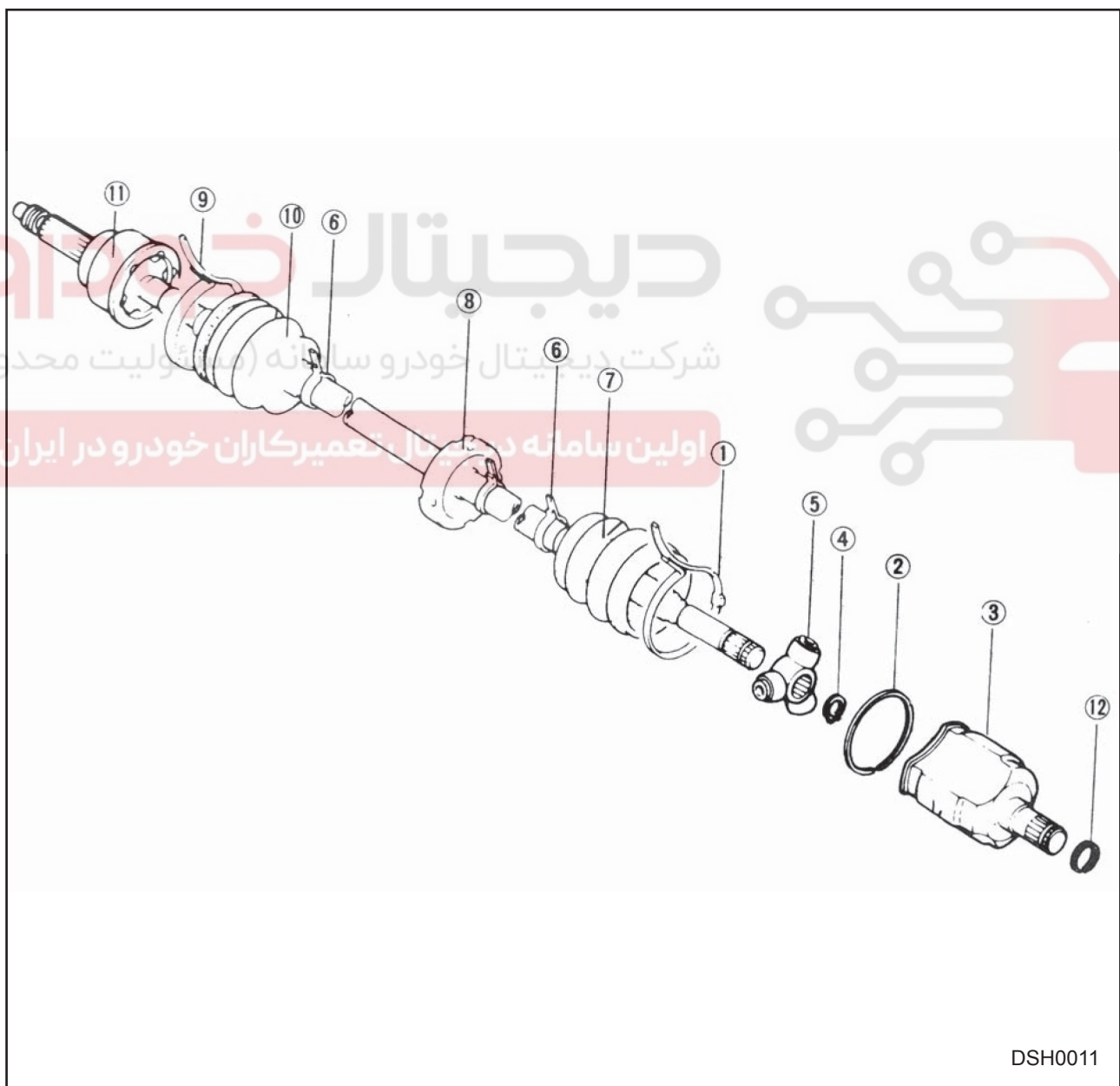
- 1- Wheel
- 2- Splash shield
- 3- stabilizer
- 4- Drive shaft Left
- 5- Drive shaft Right

Driveshaft Disassembling Order

Disassemble the driveshaft as the numerical order shown in figure.

Note:

- a) Clamp the shaft in a vice, strongly. Use protectors in the vice to avoid damage.
- b) Do not allow dust or foreign matter to enter the joint during disassembling or assembling.
- c) Disassemble the ball-joint at the wheel side. Do not wipe off the grease if there is no problem.
- d) Do not remove the clip used to secure the tripod joint to the differential side gear if is no problem. If the clip is removed, replace it with a new one.



DSH0011

- 1- Boot band
- 2- Clip
- 3- Tripod housing
- 4- Snap ring
- 5- Tripod joint (spider)
- 6- Boot band
- 7- Boot
- 8- Dynamic Damper
- 9- Boot band
- 10- Boot
- 11- Shaft and ball joint assembly
- 12- Clip (for locking the Tripod joint in the differential side gear)

دیجیتال خودرو

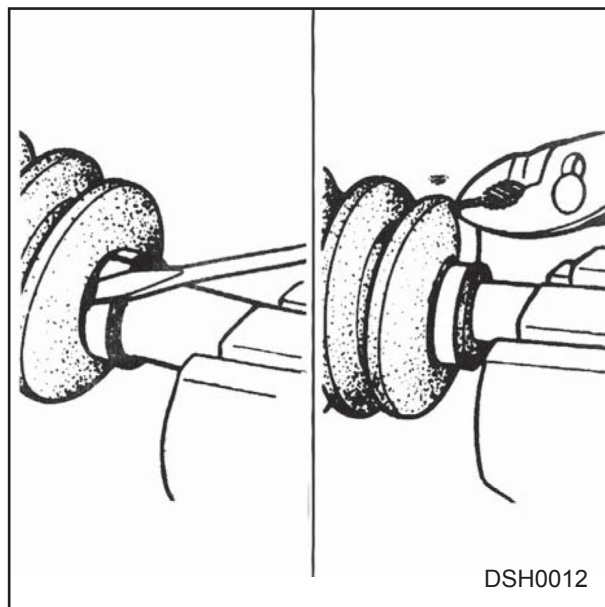
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Drive Shaft Disassembling Boot Band

Open the locking clip and Pull out the boot with a dull screw.

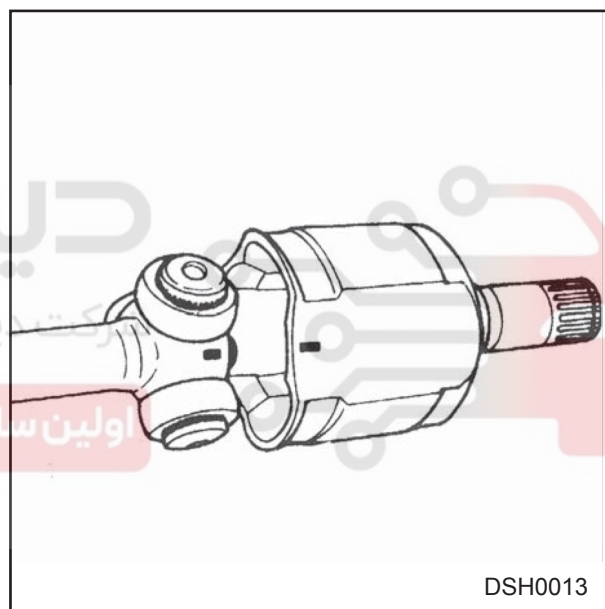


Tripod Housing

Make matching marks on Tripod joint (spider) and Tripod housing.

Note:

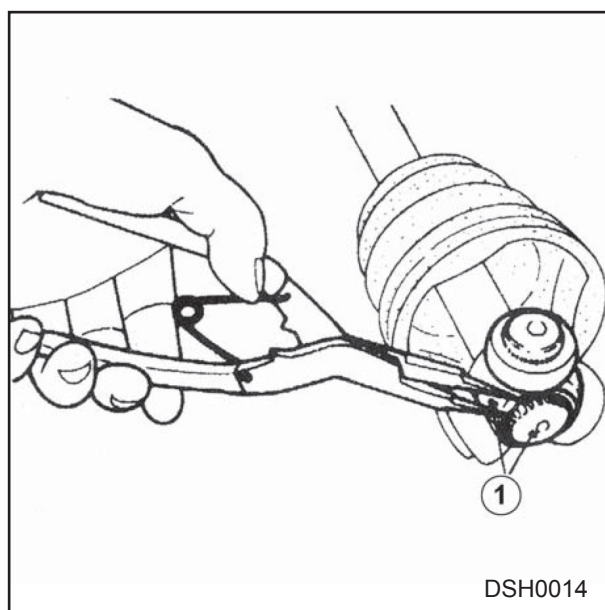
Mark with paint, do not use a punch.



Tripod joint (spider)

- 1- Remove the snap ring.
- 2- Make matching marks on Tripod joint (spider) and driveshaft end.

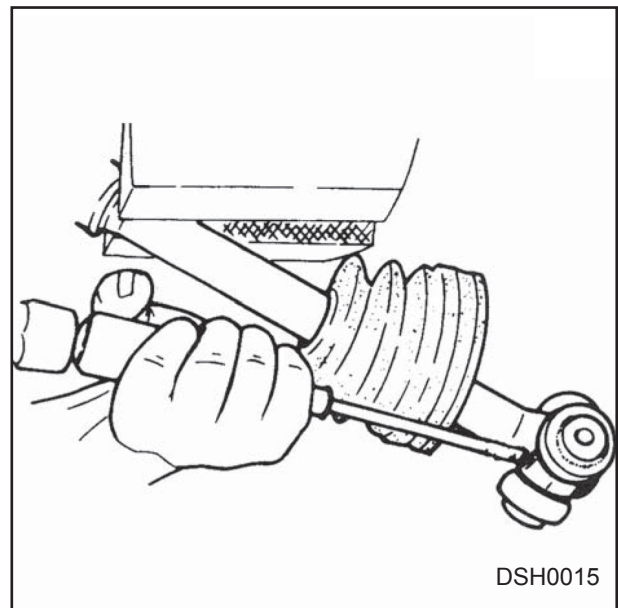
- 1- Matching mark



3- Tap the boss with a hammer and rod to remove the Tripod joint (spider) assembly.

Caution

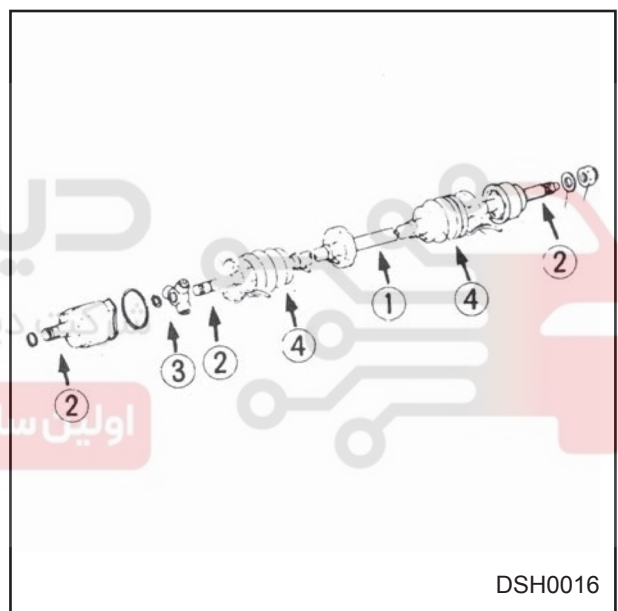
Do not tap on the roller



Inspection

Check the following parts:

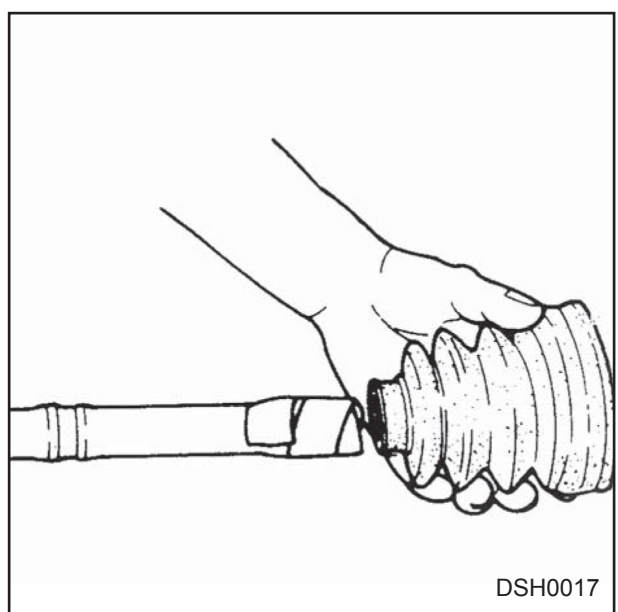
1. Twisted or cracked driveshaft.
2. Worn splines.
3. Excessively loose joint.
4. Cracked or damaged boots.



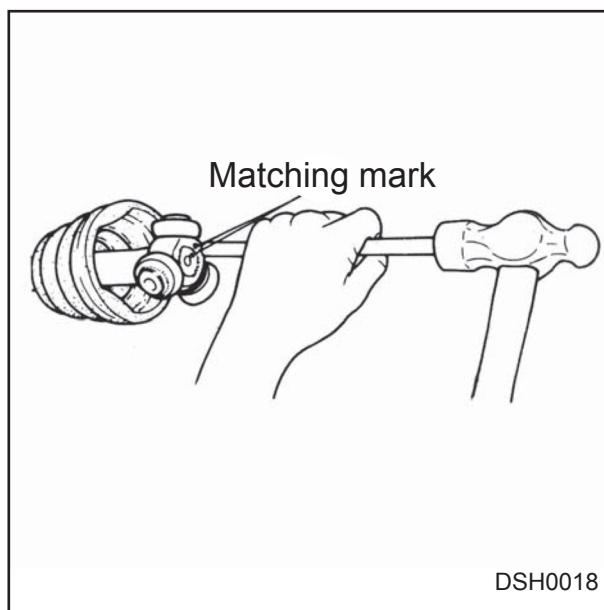
Assembling

Assemble in the reverse order of disassembling and note the following.

1. Before inserting the boot onto the shaft put tap on the shaft splines.



2. Align the matching marks and install the spider assembly with a rod and hammer.

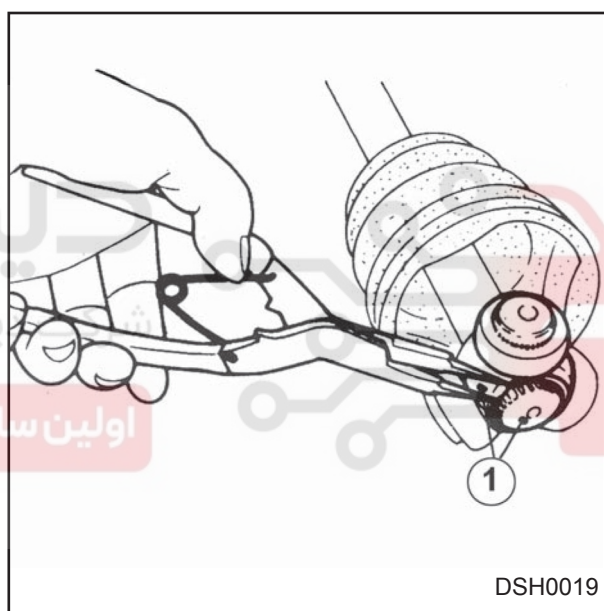


3. Install the snap ring with snap ring pliers.
4. Apply the specified grease (lithium) to the joint.
Do not use any other type of grease.

Note:

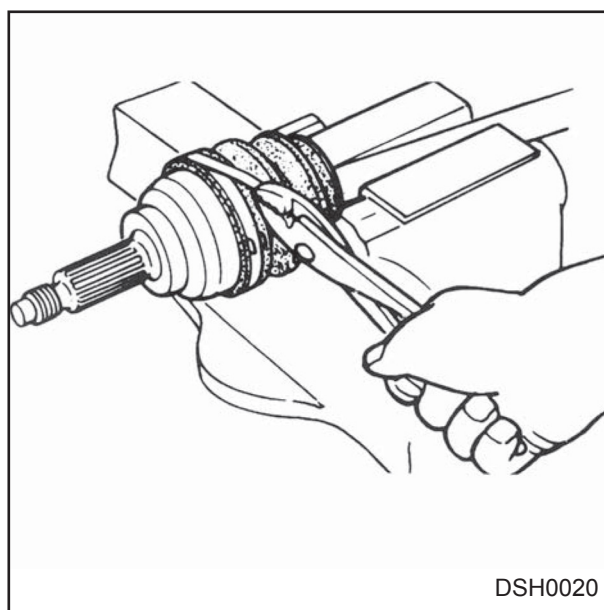
The color of this grease is lithium yellow.

1- Matching mark



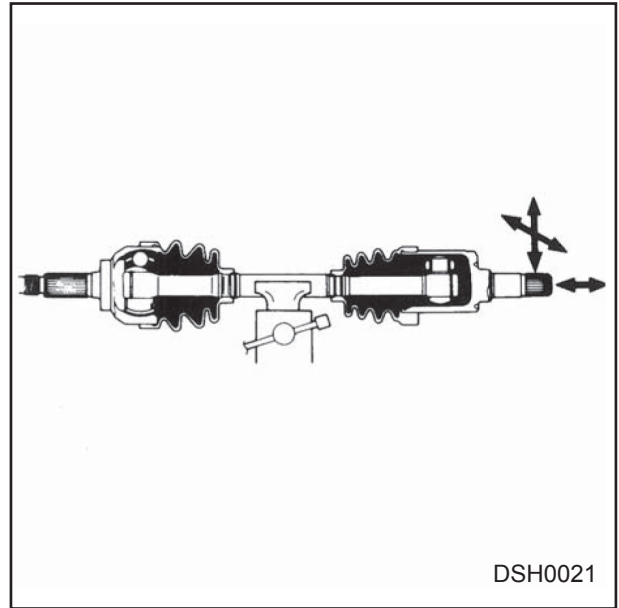
Driveshaft (Manual Transaxle)

1. Install and position the boot band over the large boot end.
2. Engage hook A with hook B.
3. Install crimping pliers at the arrow position and engage hook A with hook B using crimping pliers.
4. Lock the end of band by the locking clip.



After assembling the driveshaft, check the following:

- 1- Make sure the joint parts move smoothly in the directions indicated by the arrows.
- 2- Check the boots for grease leaks or damage.



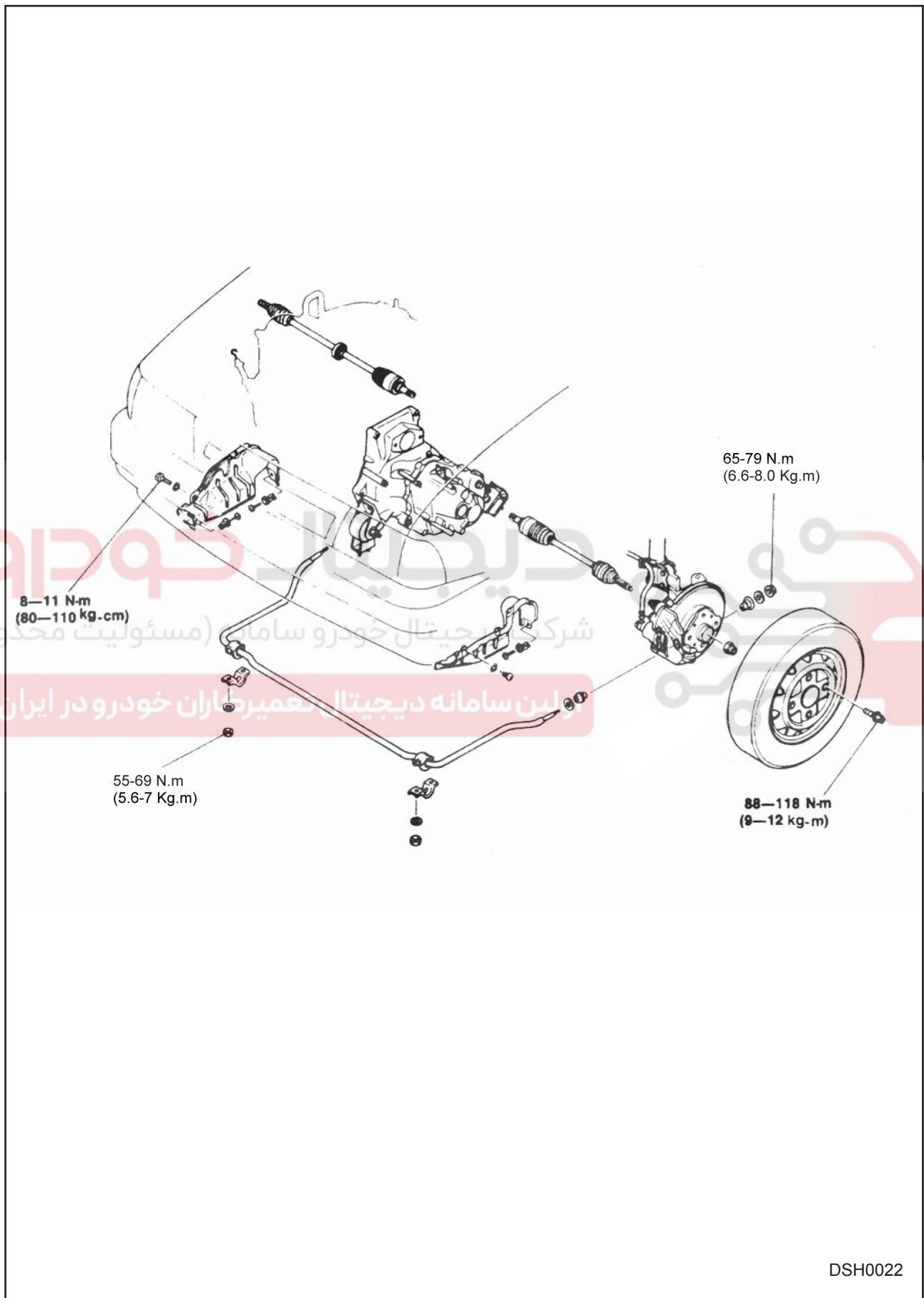
دیجیتال خودرو

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Installation Torque Specifications



Assembling order is the reverse of disassembling.

Driveshaft Installation Note

1- Check the driveshaft length.

	B3
Right shaft	895 mm
Left shaft	619 mm
Dynamic damper	486±3 mm

Note:

When measuring the length the ball-joint must be fully pushed toward the driveshaft.

1. Dynamic damper

2. Before inserting the driveshaft into the transaxle, check that the oil seals are free of scars. If there are any problems, replace the oil seal.

Note: اولین سامانه دیجیتال تعمیرکاران خودرو
 Replace the clip with a new one.

1. Clip

2. Apply grease

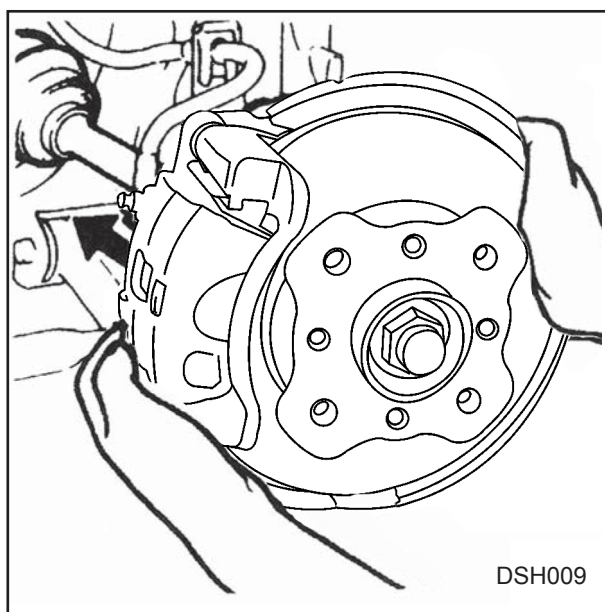
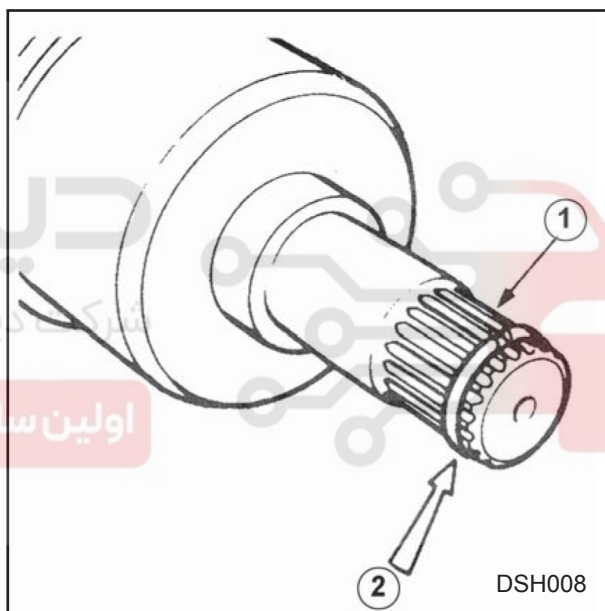
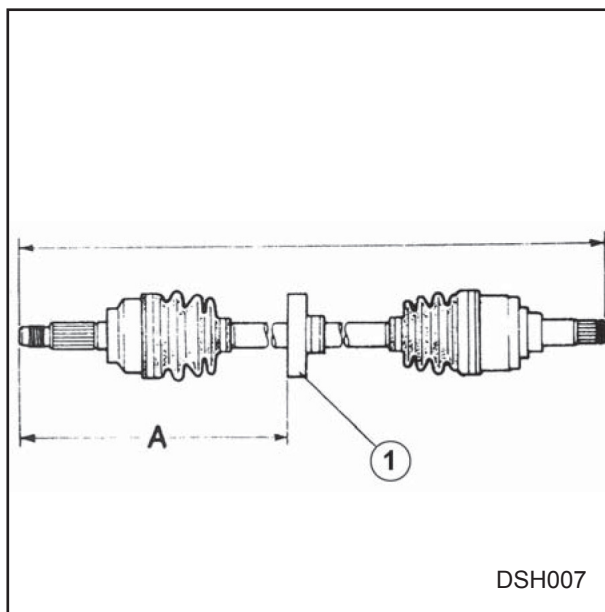
3. Install the driveshaft into the transaxle.

Caution

Do not damage the oil seal.

Note:

After installation, pull the front hub outward to check that the driveshaft is held.

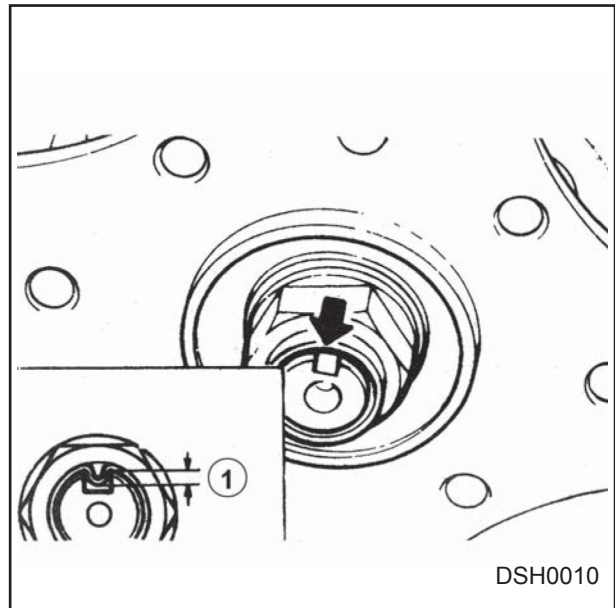


4. Install a new driveshaft locknut and tighten it to the specified torque. Then stake it securely into the groove.
5. Check that the wheel hub turns freely by hand.

Tightening torque: 16 ~ 24 kg.m

Caution

Do not use a pointed tool for staking.

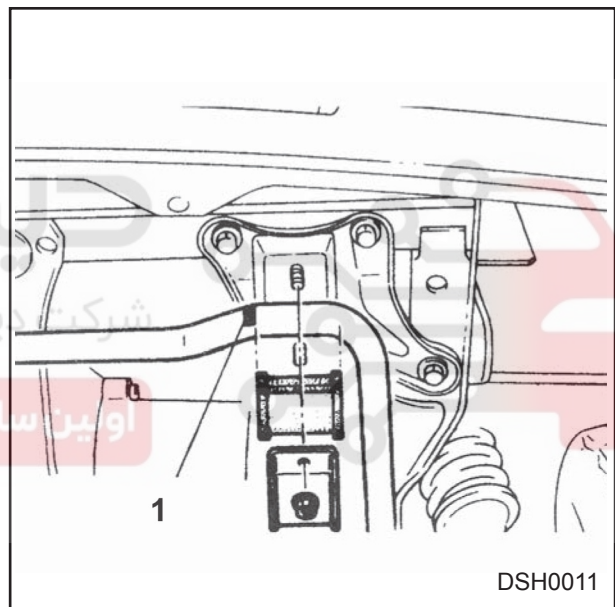


DSH0010

Stabilizer

Mount the bushing so that the seam faces forward.

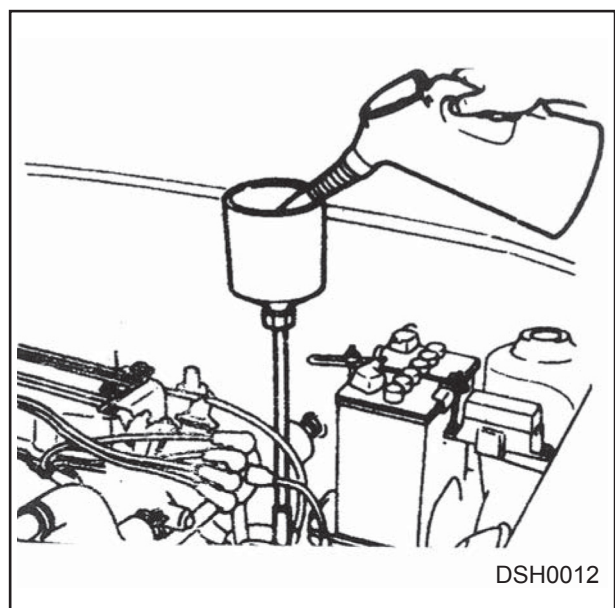
Tightening torque: 55~ 69 N.m
(5.6 ~ 7) kg.m



DSH0011

Gear Oil

Refill the gearbox with the specified grade and quality of gear oil.



DSH0012