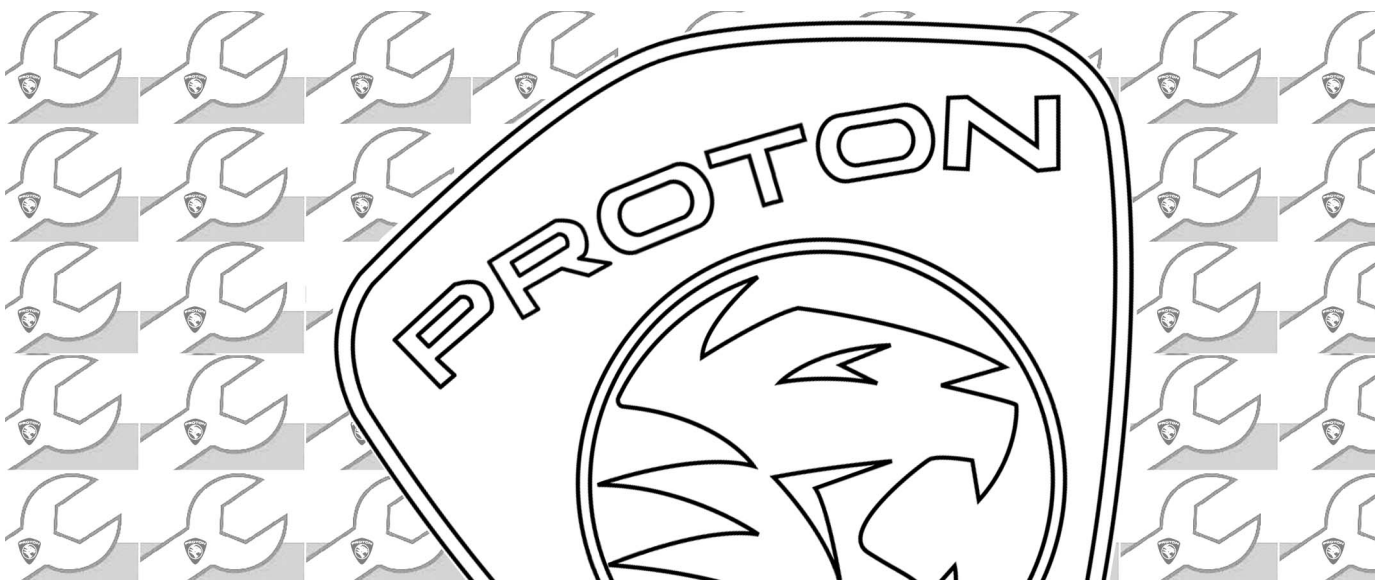


WORKSHOP MANUAL

TRANSMISSION & CLUTCH OVER- HAUL

5MTT200A



Model YR 2011

English Edition RDCE-11GTRG080-00

Destination: ALL

July 2011 Printed in Malaysia

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**Perusahaan Otomobil
Nasional Sdn. Bhd.**
(Company No.: 100995-U)



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All information, illustrations and product descriptions contained in this manual are correct at time of publication. We however reserve the right to make changes at any time without prior notice or obligation.

NOTE

00 GENERAL

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HOW TO USE THIS MANUAL

WTC000READS11001

SCOPE OF MAINTENANCE, REPAIR AND SERVICING EXPLANATIONS

This manual provides explanations concerning the inspection, checking, adjustment, disassembly and reassembly of the engine, transmission and major components after they have been removed from the vehicle.

ON-VEHICLE SERVICE

"On - Vehicle Service" is procedures for performing inspections and adjustments of particularly important locations with regard to the construction and for maintenance and servicing, but other inspection (for looseness, play, cracking, damage and etc.) must also be performed.

INSPECTION

Under this title are presented inspection and checking procedures to be performed by using special tools and measuring instruments and by feeling but for actual maintenance and servicing procedures, visual inspections should always be performed as well.

DEFINITION OF TERMS

STANDARD VALUE

Indicates the value as the standard for judging the quality of a part of assembly on inspection or the value to which the part or assembly is corrected and adjusted. It is given by tolerance

LIMIT

Shown the standard for judging the quality of a part or assembly on inspection and means the maximum or minimum value within which the part or assembly must be kept functionally or in strength. It is a value established outside the range of standard value

REFERENCE VALUE

Indicates the adjustment value prior to starting the work (presented in order to facilitate assembly and adjustment procedures, and so they can be completed in a shorter time).

CAUTION

Indicates the presentation of information particularly vital to the worker during the performance of maintenance and servicing procedures in order to avoid the possibility of injury to the worker, or damage to component parts, or a reduction of component or vehicle function or performance, etc.

INDICATION OF TIGHTENING TORQUE

The tightening torque shown in this manual is a basic value with a tolerance of $\pm 10\%$ except the followings cases when the upper and lower limits of tightening torque are given.

1. The tolerance of the basic value is within $\pm 10\%$
2. Special bolts or the like are in use.
3. Special tightening methods are used.

EXPLANATION OF MANUAL CONTENTS

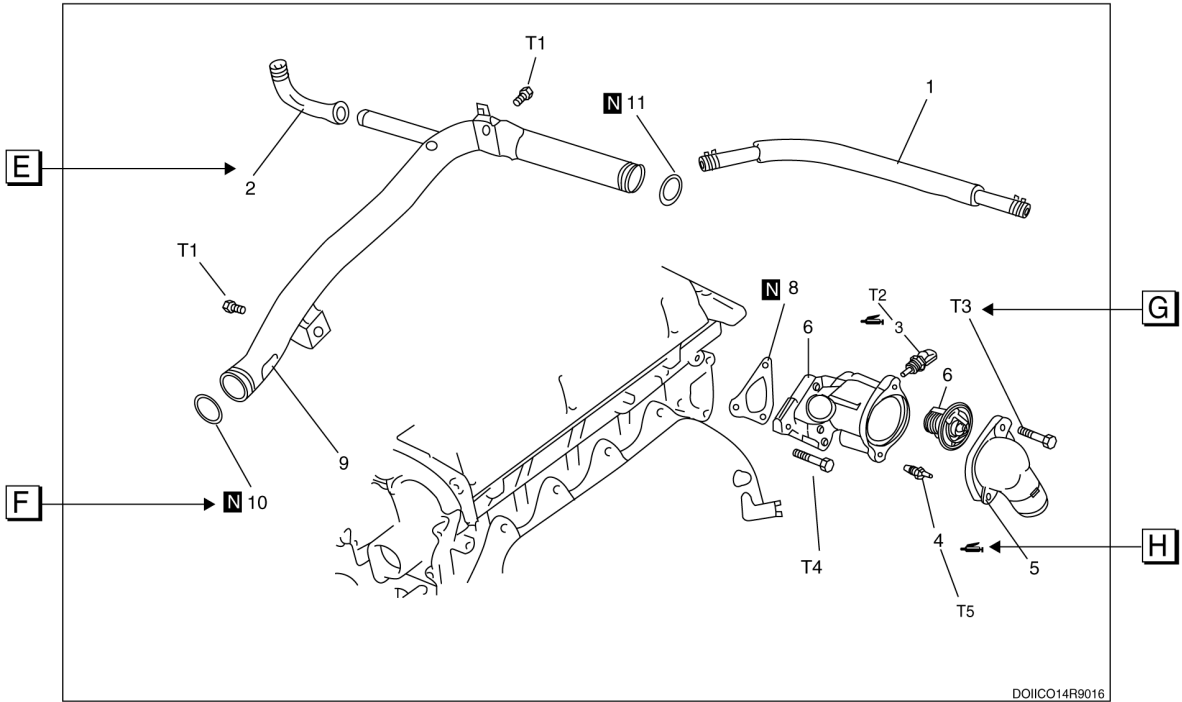
WTC000READS11002



WATER HOSE AND WATER PIPE

WCH014SASSY004

REMOVAL AND INSTALLATION



DOIIC014R9016

J

K

L

R

R

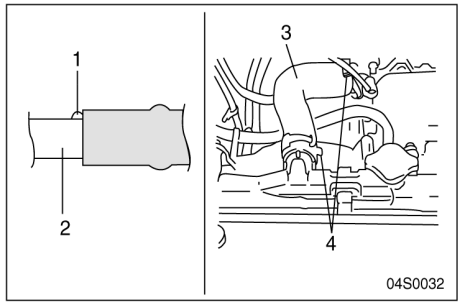
Pre-removal and Post-installation Operation

- Engine coolant draining and supplying (Please refer to "Service Procedure" on page 54)
- Air cleaner and air intake hose assembly removal and installation

Removal steps

- Water hose
- Water hose

T1 : 1.2 kgm (12 Nm : 0.805 ft.lbs)
T2 : 1.2 kgm (12 Nm : 0.805 ft.lbs)



04S0032

REMOVAL SERVICE POINTS






WCH014SPROC004




RADIATOR UPPER HOSE/RADIATOR LOWER HOSE DISCONNECTION

- After making mating marks on the radiator hose and the hose clamp, disconnect the radiator hose.

No	Description
1	Projection
2	Radiator or water outlet
3	Hose

DOIIC000R9001

SYMBOL	DESCRIPTION
A	Indicates the group title
B	Indicates the section title
C	Indicates the group number
D	Indicates the page number
E	Component Diagram A diagram of the component parts is provided near the front of each section in order to give a reader a better understanding of the installed condition of the component parts.
F	Denotes non reusable part
G	Denotes tightening torque. For bolts and nuts which do not have a tightening torque listed, refer to the "Tightening torque"
H	Symbol for lubrication sealants and adhesives. Information concerning the locations for lubrication and for application of sealants and adhesives is provided, by using symbols, in the diagrams of component parts or on the page following the component parts page, and explained. <div style="display: flex; align-items: center; margin-top: 10px;">  <div style="margin-left: 10px;"> Grease (multipurpose grease unless there is a brand or type specified) DOIIC000R9058 </div> </div> <div style="display: flex; align-items: center; margin-top: 10px;">  <div style="margin-left: 10px;"> Sealant or adhesive DOIIC000R9059 </div> </div> <div style="display: flex; align-items: center; margin-top: 10px;">  <div style="margin-left: 10px;"> Brake fluid or automatic transmission fluid DOIIC000R9060 </div> </div> <div style="display: flex; align-items: center; margin-top: 10px;">  <div style="margin-left: 10px;"> Engine oil, gear oil or air condition compressor oil DOIIC000R9061 </div> </div> <div style="display: flex; align-items: center; margin-top: 10px;">  <div style="margin-left: 10px;"> Adhesive tape or butyl rubber tape. DOIIC000R9062 </div> </div>
J	Indicates procedures to be performed before the work in that section is started, and procedures to be performed after the work in that section is finished.
K	Maintenance and servicing Procedures The number provided within the diagram individual the sequence for maintenance and servicing procedures. <ol style="list-style-type: none"> 1. A diagram of the components part is provided near the front of each section in order to give the reader a better understanding of the installed condition of component parts. 2. The number provided within the diagram indicate the sequence for maintenance and servicing procedures; the symbol N indicates a non reusable part; the tightening torque is provided where applicable. Removal steps: The part designation number correspond to the number in the illustration to indicate removal steps.

SYMBOL	DESCRIPTION
	<p>Disassembly steps: The part designation number correspond to the number in the illustration to indicate disassembly steps.</p> <p>Installation steps: Specified in case installation is impossible in reverse order of removal steps</p> <p>Reassembly steps: Specified in case reassembly is impossible in reverse order of disassembly steps. Omitted if reassembly is possible in reverse order of disassembly steps.</p>
L	<p>Classifications of major maintenance/service points When there are major points relative to maintenance and serving procedures (such as essential maintenance and service points, maintenance and service standard values, information regarding the use of special tools, etc.) these are arranged together as major maintenance and service points and explained in detail.</p> <div style="display: flex; align-items: center; margin-bottom: 10px;"> <div style="text-align: center;">  <p>DOIIC000R9052</p> </div> <div style="margin-left: 20px;">Indicates that there are essential point for removal or disassembly.</div> </div> <div style="display: flex; align-items: center; margin-bottom: 10px;"> <div style="text-align: center;">  <p>DOIIC000R9051</p> </div> <div style="margin-left: 20px;">Indicates that there are essential point for installation or reassembly</div> </div> <div style="display: flex; align-items: center;"> <div style="text-align: center;">  <p>DOIIC000R9053</p> </div> <div style="margin-left: 20px;">Indicates that there are essential points for both</div> </div>
M	Operating procedures, caution etc. on removal, installation disassembly and reassembly are described.
N	Table for graphic explanation

NOTE

21C CLUTCH

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SPECIFICATIONS

WTC21CSPECS11001

GENERAL SPECIFICATIONS

Items	Specification
Clutch operating method	Hydraulic type
Clutch disc splines	Clutch disc type
Clutch disc size OD x ID mm	200
Clutch cover type	Diaphragm spring type
Clutch cover size OD x ID mm	254

SERVICE SPECIFICATIONS

Items	Standard value / Limit
Clutch disc facing rivet sink	Minumum 0.3 mm (0.012 in)
Diaphragm spring end height difference	0.5 mm (0.02 in)

TORQUE SPECIFICATIONS

Items	Specified torque
Clutch Cover bolt	1.5 - 2.2 kgm (15 - 22 Nm, 1.01 - 1.48 ft.lbs)
Concentric slave cylinder mounting bolt	1.2 kgm (12 Nm, 0.81 ft.lbs) ± 0.18 kgm (1.8 Nm, 0.12 ft.lbs)

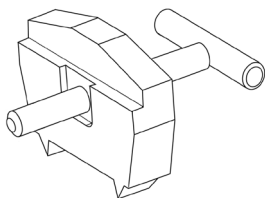

LUBRICANTS

Items	Specified lubricants
Clutch fluid	Brake Fluid DOT 3 or DOT 4
Clutch disc splines	Mitsubishi Part No. 0101011 or equivalent

SPECIAL TOOLS (5MTT200A)

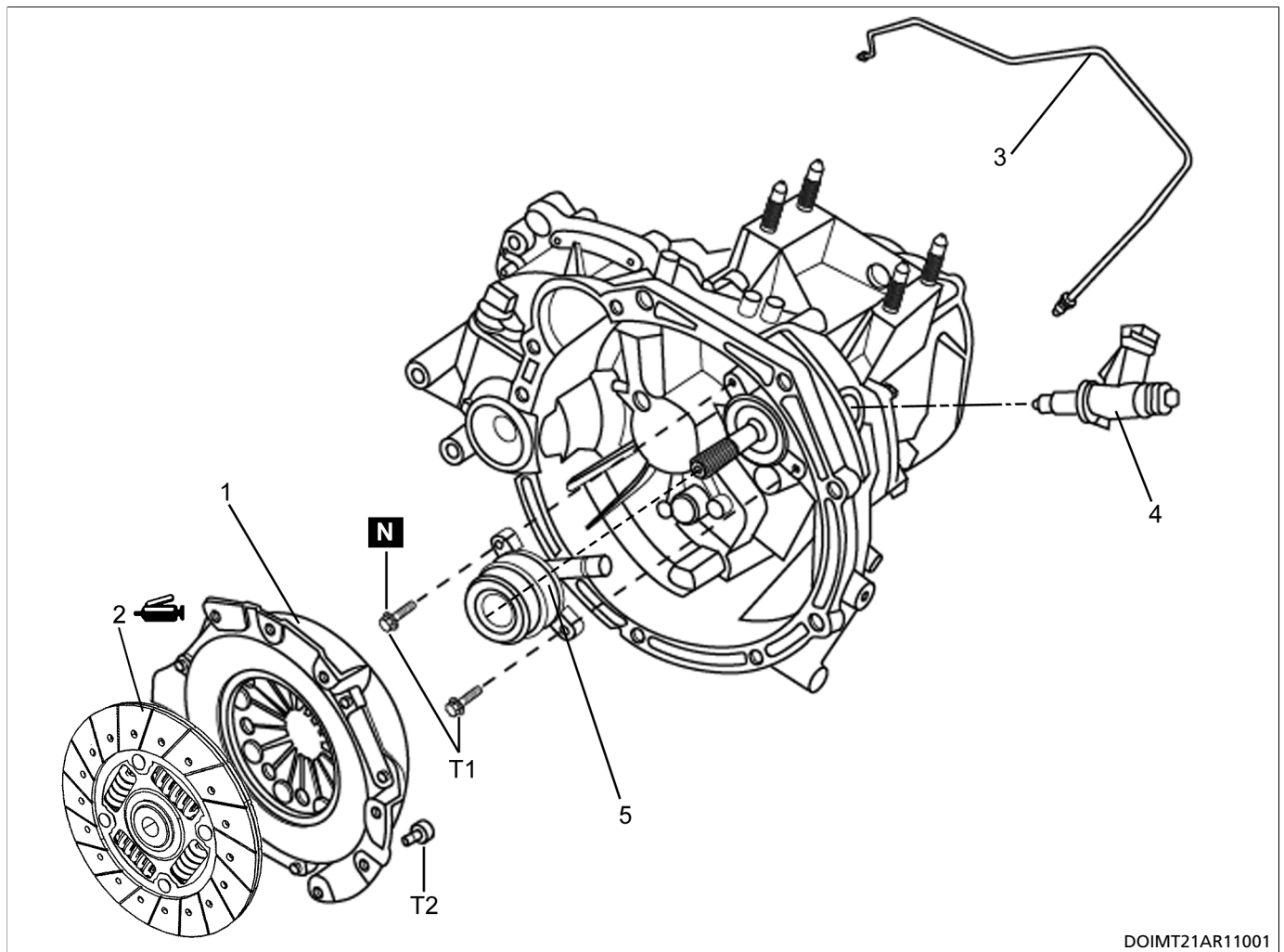
WTC21CSTOOL11001

TOOLS

Tool	Number	Name	Use
 DOIMT21AR11009	EZT 0044	Flywheel stopper.	<ul style="list-style-type: none"> To lock flywheel.
 DOIMT21AR11007	EZT 0045	Clutch plate Installer	<ul style="list-style-type: none"> To hold clutch plate during installation.

CLUTCH REMOVAL AND INSTALLATION

WTC21CSHAUL11001



DOIMT21AR11001

Symbol:

N — Non-reusable parts — Grease: (multipurpose grease unless there is a board or type specified)

Removal steps

- R&I** 1. Clutch Cover
- R&I** 2. Clutch disc
- 3. Concentric slave cylinder, hose assy
- I** 4. Concentric slave cylinder adapter
- I** 5. Concentric slave cylinder

T1 :1.2 kgm (12 Nm, 0.81 ft.lbs) ± 0.18 kgm (1.8 Nm, 0.12 ft.lbs)**T2 :1.5 - 2.2 kgm (15 - 22 Nm, 1.01 - 1.48 ft.lbs)**

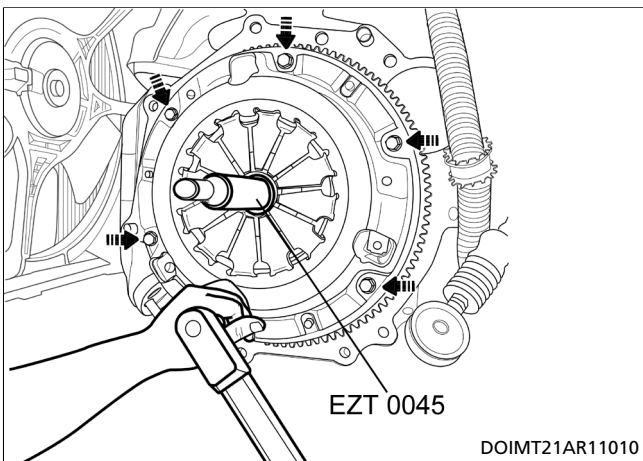
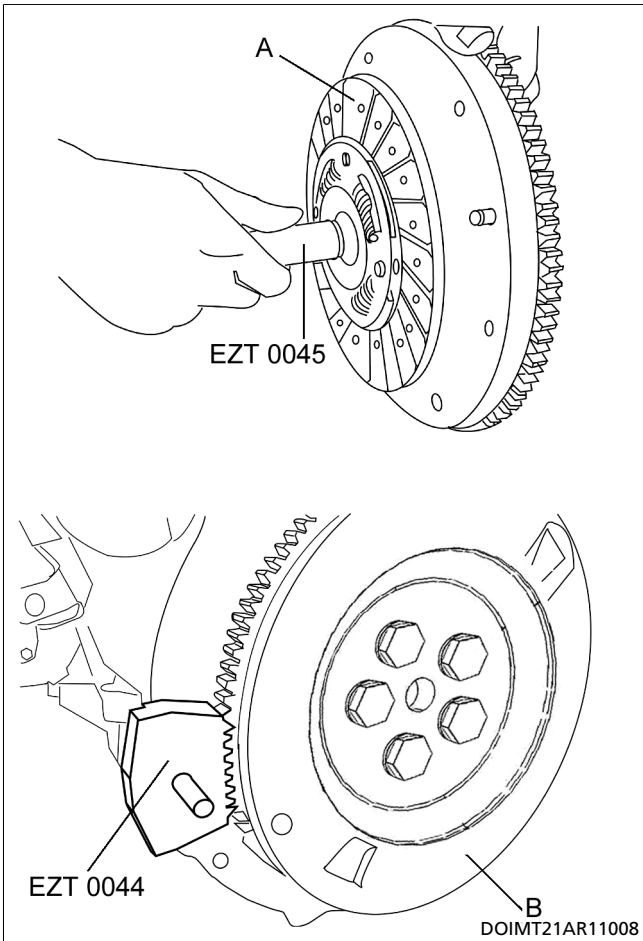
CLUTCH COVER AND DISC (5MTT200A)

WTC21CSHAUL11002

R CLUTCH COVER ASSEMBLY AND CLUTCH DISC REMOVAL

1. Use the special tool to lock and secure the clutch cover or clutch disc before remove the bolts

Symbol	Description
A	Clutch disc (EZT 0045)
B	Flywheel (EZT 0044)



2. Loosen clutch cover bolts diagonally as shown in the illustration. Back off bolts in succession, (one or two turns) in order to avoid cover flange from bending.

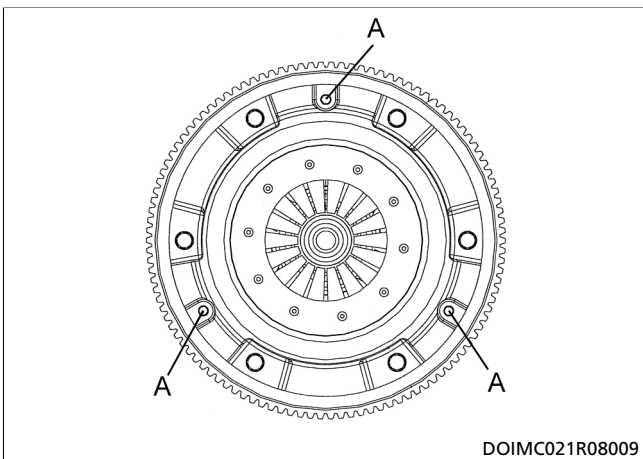
CAUTION

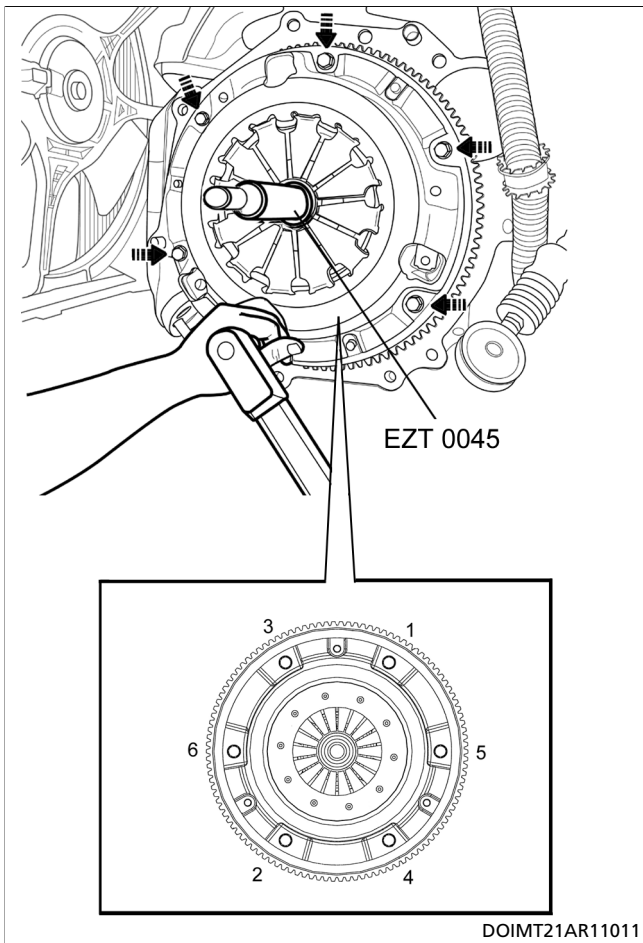
Do not clean clutch disc or release bearing with cleaning solvent.

SERVICE POINTS OF INSTALLATION

I CLUTCH COVER ASSEMBLY AND CLUTCH DISC INSTALLATION

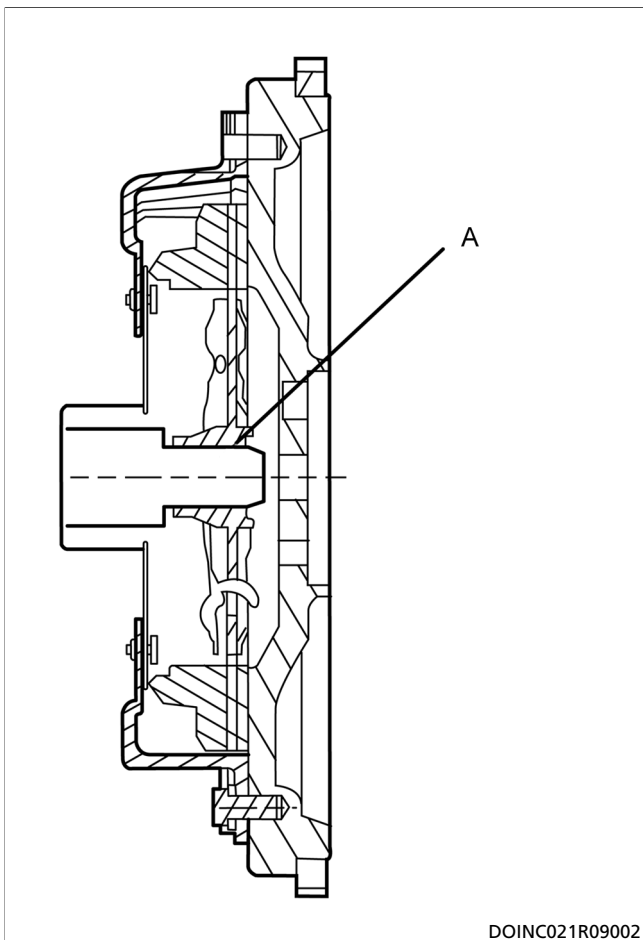
1. Fit 3 holes (A) of clutch cover to 3 dowel pins located at flywheel.
2. Pre-tighten all 6 bolts of clutch cover assy.





3. Tighten all 6 bolts in sequence as shown in the illustration.

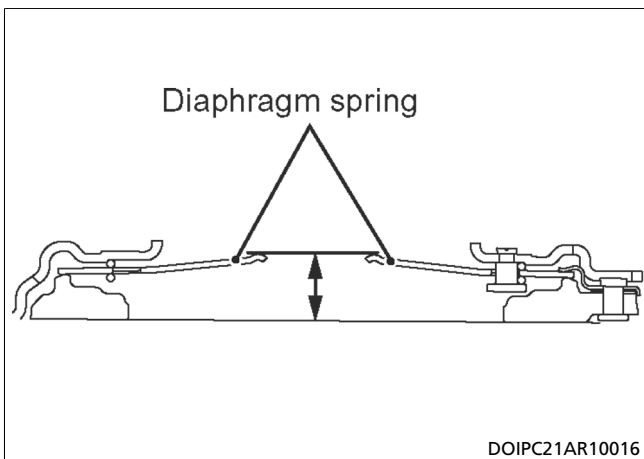
Specified torque : 1.5 - 2.2 kgm (15 - 22 Nm, 1.01 - 1.48 ft.lbs)



4. Apply grease Molycoat BR2 plus or equivalent on the clutch disc spline approximately **0.3 g (0.011 oz, 0.003 N)** before fitting transmission by the input shaft.

5. By using the special tool (EZT 0045), position the clutch disc to the flywheel

Symbol	Description
A	Grease molycoat BR2 plus



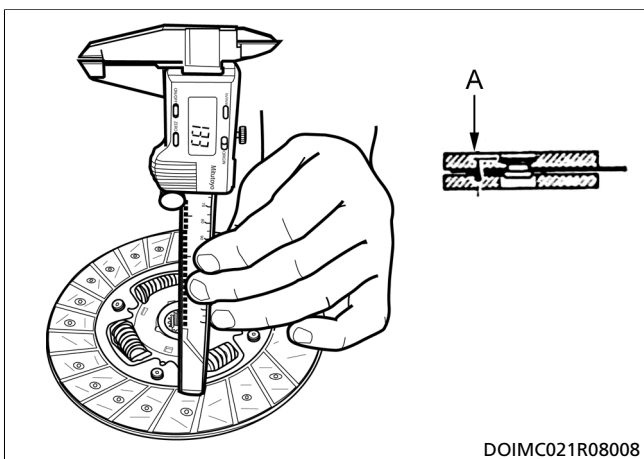
INSPECTION

CLUTCH COVER ASSEMBLY

- Check the diaphragm spring end for wear and uneven height. Replace if wear is evident or height difference exceeds the limit.
Limit: 0.5 mm (0.02 in)
- Check the pressure plate surface for wear, crack and colour change.
- Check the strap plate rivets for looseness and replace the clutch cover assembly if loosed.

CLUTCH DISC

- Check the facing for loose rivets, uneven contact, deterioration due to seizure, adhesion of oil or grease and replace the clutch disc if defective.
- Measure the rivet sink and replace the clutch disc if it is out of specification.
Limit: 0.3 mm (0.012 in)
- Check for torsion spring play and damage and if defective, replace the clutch disc.
- Combine the clutch disc with the input shaft and check sliding condition and check for play in the rotating direction. If it does not slide smoothly, check after cleaning and reassembling. If the play is excessive, replace the clutch disc and the input shaft.

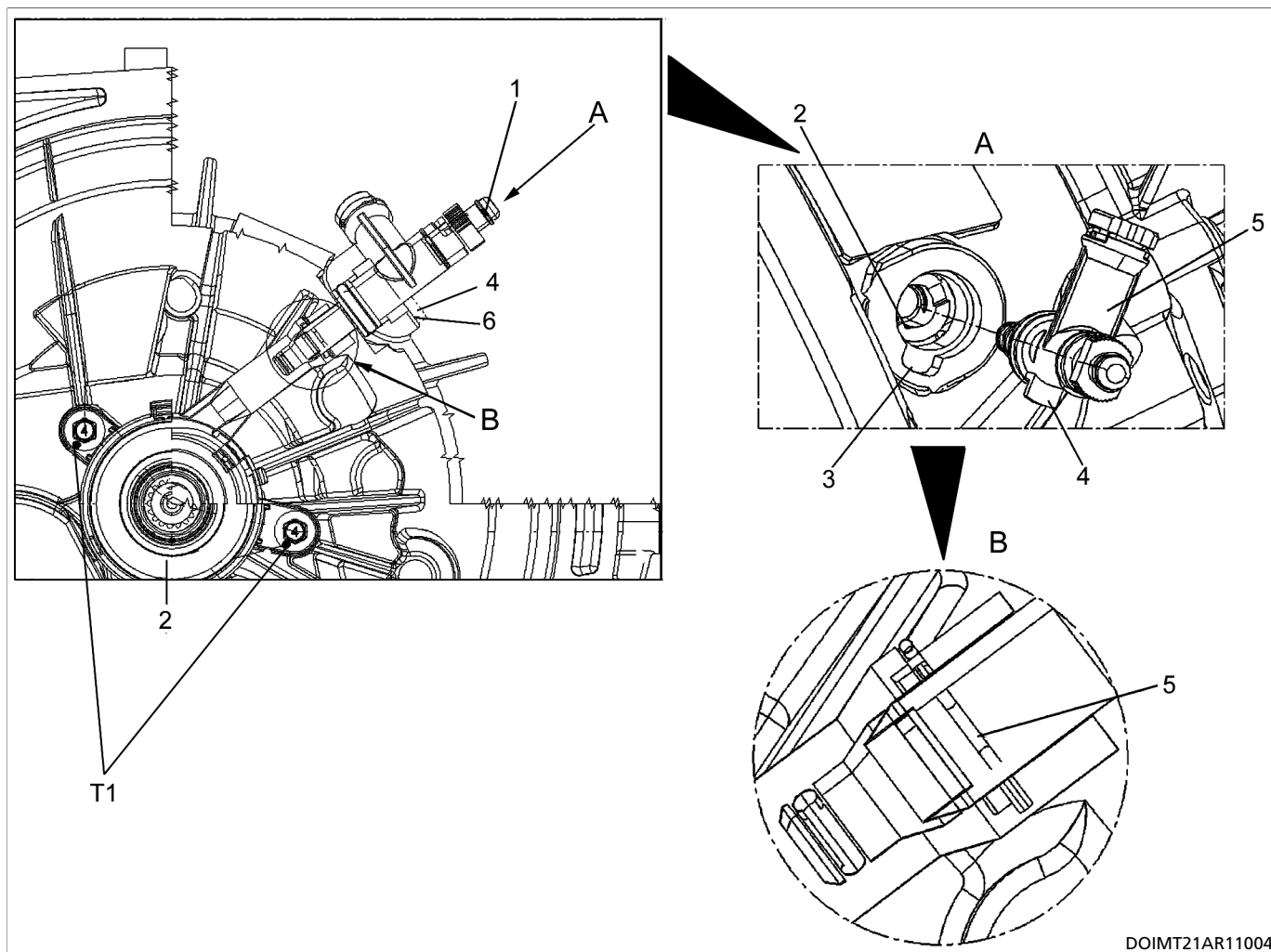


Symbol	Description
A	Rivet sink

CLUTCH

WTC21CSHAUL11003

REMOVAL SERVICE POINTS

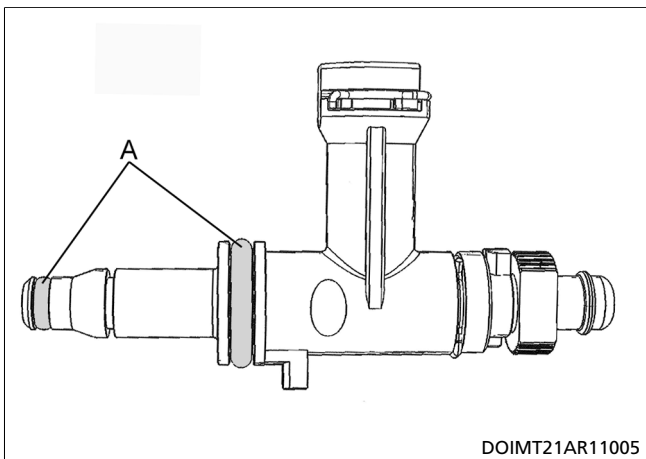
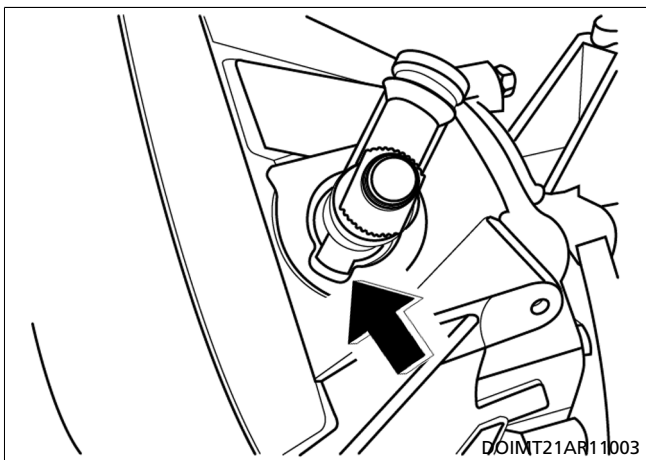
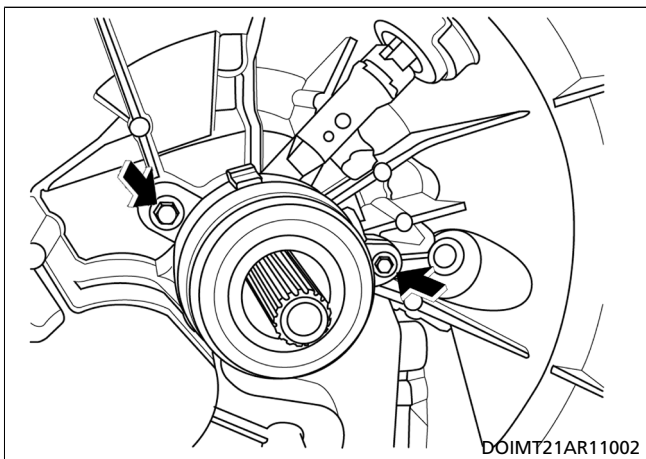
R CONCENTRIC SLAVE CYLINDER (CSC) /CONCENTRIC SLAVE CYLINDER ADAPTER REMOVAL

DOIMT21AR11004

1. Carefully align concentric slave cylinder (csc) into transmission input shaft before sliding into position
2. Ensure concentric slave cylinder (csc) seated firmly on csc seat and sleeve and align two mounting holes to the holes on the transmission clutch housing
3. Tighten the flange bolt to the specified torque of **1.2 kgm (12 Nm, 0.81 ft.lbs) ± 0.18 kgm (1.8 Nm, 0.12 ft.lbs)**
4. Align concentric slave cylinder adapter from clutch housing external hole as shown in illustration. Ensure the key on concentric slave cylinder adapter is aligned with key hole cast on transmission clutch housing.
5. Insert concentric slave cylinder adapter into clutch housing hole until it fully enters concentric slave cylinder (csc). Ensure the key on concentric slave cylinder adapter mates key seating surface on clutch housing as shown in illustration.
6. Secure the fitment of concentric slave cylinder adapter in concentric slave cylinder (csc) by engaging the snap-lock as shown in illustration

Symbol	Description
1	Concentric slave cylinder adapter
2	Concentric slave cylinder (csc)

Symbol	Description
3	Key-hole
4	Key
5	Snap-lock
6	Key resting surface
A	View – A
B	View – B
T1	1.2 kgm (12 Nm, 0.81 ft.lbs) ± 0.18 kgm (1.8 Nm, 0.12 ft.lbs)



INSTALLATION SERVICE POINTS

WTC21CSHAUL11004

I CONCENTRIC SLAVE CYLINDER/CONCENTRIC SLAVE CYLINDER ADAPTER INSTALLATION

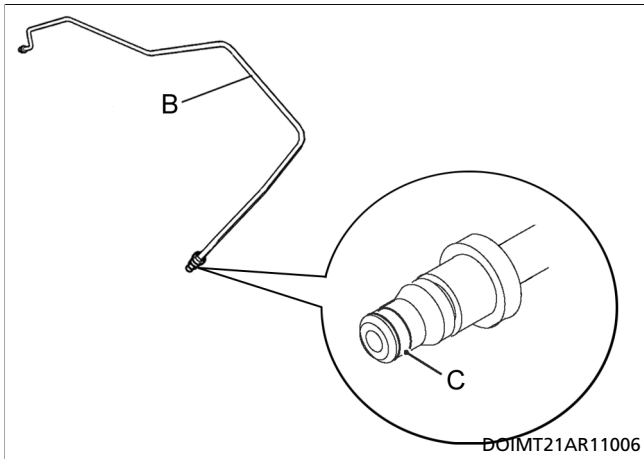
1. After setting the concentric slave cylinder to the transmission case, tighten the flange bolt temporarily.
2. Assemble the concentric slave cylinder adapter with the concentric slave cylinder.
3. Tighten the flange bolt to the specified torque of **1.2 kgfm ± 0.18 kgfm**

INSPECTION

CONCENTRIC SLAVE CYLINDER ADAPTER

1. Check the O-ring for damage and deformation. If the O-ring is damaged or deformed, replace the concentric slave cylinder adapter.
 2. Check the surface that touches the concentric slave cylinder for contamination. If contaminated, clean the surface with the specified fluid.
- Specified fluid: Brake Fluid DOT 3 or DOT 4**
3. Make sure there are no deformed and/or missing clips.

Symbol	Description
A	O-ring

**CONCENTRIC SLAVE CYLINDER,HOSE ASSY**

1. Check the O-ring for damage and deformation. If the O-ring is damaged or deformed, replace the concentric slave cylinder,hose assy.
2. Check the surface that touches the slave cylinder adapter for contamination. If contaminated, clean the surface with the specified fluid.

Specified fluid: Brake Fluid DOT 3 or DOT 4

Symbol	Description
B	Concentric slave cylinder,hose assy
C	O-ring

NOTE

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NOTE

INTRODUCTION

WTC22DGINFO001

Main Use and Application Scope

5MTT200A series transmissions are transverse and usher gearbox, which is design for matching PROTON 1.3 and 1.6L naturally aspirated engine.

Apply Work Condition and Environment

This transmission can adapt 1.3L and 1.6L naturally aspirated engine and its vehicle's work environment and condition.

Structure Type

5MTT200A is a manual and entire synchronizers (except reverse gear) shifting transmission, it have agility and nice shifting handle, low noise, tighten structure, good airproof capability and strong carrying capability.

Transport and Storage

1. It should have measures for prevent rusting.
2. Transmission should be packed before transporting, and the packing box must be fast to ensure the transmission will be fine during transporting process.

Driving

Through gear selector locate in driving room operator can control select lever and shift lever. Operator also can manipulate each gear according to different direction showing on gear selector handle ball. When operator chooses no gear, the gear selector would come back to neutral position naturally.

1. Operator should tread clutch pedal completely, then manipulate gear selector before shifting. It should use low gear when vehicle start.
2. It should use low gear when vehicle uphill, downhill and turning and it forbid clutch detached in upward driving condition.
3. When driver shift into reverse gear, operator should tread clutch pedal completely three second at least, then operate the shifting handle. Due to no-synchronizer for reverse gear, this process can prevent reverse gears crash.
4. It can't use excessive power to shift when operator find it's hard to select gear, the right way is stop the car and find out what happen.

Maintaining

1. Transmission maintain according to commercial vehicle request, generally it divided into three kinds.
2. Transmission oil does not have to replace during the transmission useful life, but if the transmission had been oil drained for repair, new oil replace be advised.

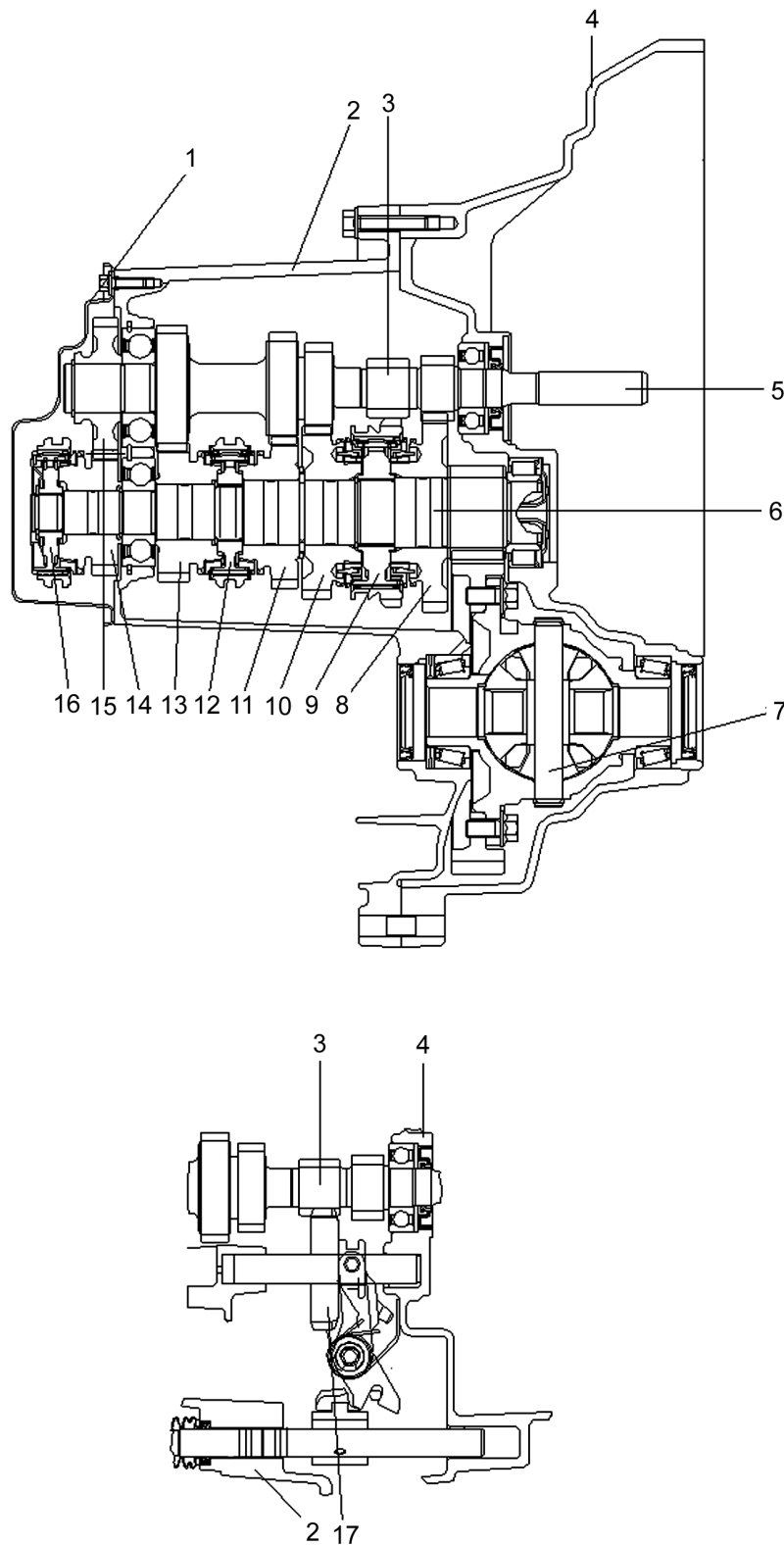
Environmental Protection

During maintaining and repairing the transmissions the dealers need disposal of wastes like oil, replaced parts, etc, according the law and regulations to protect the environment.

GENERAL INFORMATION

WTC22DGINFO002

TRANSMISSION CROSS-SECTION VIEW

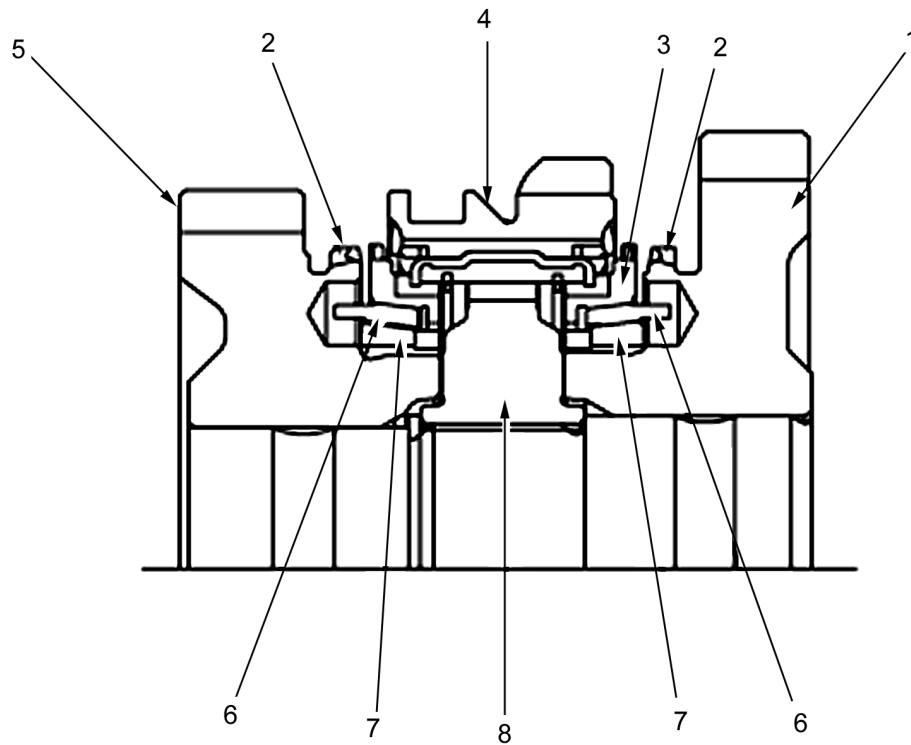


DOIMT22DR10001

Items

- | | |
|--|---|
| 1. Rear cover | 10. 2nd speed ring gear |
| 2. Transmission case | 11. 3rd speed ring gear |
| 3. Reverse gear | 12. 3rd/4th speed synchronizer assembly |
| 4. Clutch housing | 13. 4th speed ring gear |
| 5. Input shaft | 14. 5th speed ring gear |
| 6. Output shaft | 15. 5th speed driving gear |
| 7. Differential assembly | 16. 5th speed synchronizer assembly |
| 8. 1st speed ring gear | 17. Reverse idler gear |
| 9. 1st/2nd speed synchronizer assembly | |

SYNCHRONIZER SYSTEM DESCRIPTION



DOIMT22DR11027

Items

1. 1st speed driven gear
2. Clutch gear
3. Synchronizer outer ring
4. Synchronizer hub
5. 2nd speed driven gear
6. Synchronizer cone ring
7. Synchronizer inner ring
8. Synchronizer sleeve

TRANSMISSION CODE

Symbol	Description
5	5 speed
M	Manual
T	Transmission
T	Torque
200	Torque capability is 200N.m (Max. Torque)
A	The first product code

MAIN TECHNOLOGY PARAMETER

Item	Information
Torque capacity	185 N.m
Type	Manual
Driven model	FF
Gear number	5
Gear ratio	Refer table below
Speedometer ratio	Refer table below
Clutch type	Hydraulic pressure
Weight (kg)	35 kg (without gear oil)
Gear oil specification	Castrol BOT130M WSD-M2C200-C
Way of filling gear oil	From the speedometer cavity
Way of check gear oil	From the reverse lamp switch hole
Gear oil volume	1.8 L

GEAR RATIO

AF6C-7002-AA (1.3)

Items	Specifications			
Model	5MTT200A (AF6C-7002-AA)			
Applicable engine	1.3L NAFF			
Gear ratio	Output shaft teeth	Input shaft teeth	Differential drive gear teeth	
1st	39	11		3.545
2nd	45	22		2.045
3rd	41	29		1.414
4th	41	37		1.108
5th	36	41		0.878
Reverse	47	13		3.615
Final gear ratio	15		57	3.8
Speedometer gear ratio (speedometer gear teeth/Differential case)				31/36

AF6C-7002-CA (1.6)

Items	Specifications			
Model	5MTT200A (AF6C-7002-CA)			
Applicable engine	1.6L NAFF			
Gear ratio	Output shaft teeth	Input shaft teeth	Differential drive gear teeth	
1st	43	12		3.583
2nd	52	27		1.926
3rd	41	32		1.281
4th	39	41		0.951
5th	34	45		0.756
Reverse	47	13		3.615

Final gear ratio	15	57	3.8
Speedometer gear ratio (speedometer gear teeth/Differential case)			31/36

SPECIFICATIONS

WTC22DSPECS001

SERVICE SPECIFICATIONS

Gear axle clearance

Items	Allowed range (mm)	Remark
1st speed gear clearance along axial direction	D1=0.06~0.24	If actual clearance out the allowed range need replace the part
2nd speed gear clearance along axial direction	D2=0.165~0.43	
3rd speed gear clearance along axial direction	D3=0.09~0.21	
4th speed gear clearance along axial direction	D4=0.175~0.335	
5th speed gear clearance along axial direction	D5=0.125~0.475	

Synchronizer reserve quantity

Items	Allowed range (mm)	Remark
1st speed synchronizer ring reserve quantity	L1=0.62~1.54	If actual reserve quantity out the allowed range need replace the part
2nd speed synchronizer ring reserve quantity	L1=0.62~1.54	
3rd speed synchronizer ring reserve quantity	L2=0.612~1.262	
4th speed synchronizer ring reserve quantity	L3=0.643~1.273	
5th speed synchronizer ring reserve quantity	L3=0.643~1.273	

Differential side gear normal backlash

Items	Allowed range (mm)	Remark
Normal backlash	0.05~0.20	If actual differential bevel gears backlash overstep the allowed, it need to replace the side gear

SEALANT AND ADHESIVES

Items	Specified sealants and adhesive
Contacting surface of clutch housing and transmission case	LT5182 sealant
Contacting surface of transmission case and back cover	LT5900 sealant
Interlock retainer assembly	LT222 sealant
The bolt above the vent plug	

Form in Place Gasket (FIPG)

The transmission has several areas where the form in place gasket (FIPG) is in use. To ensure that the gasket fully serves its purpose, it is necessary to observe some precautions when applying the gasket. Based size, continuity and location are of paramount importance. Too thin a bead could cause leaks. Too thick a bead, on the other hand, could be squeezed out of location, causing blocking or narrowing of the fluid feed line. To eliminate the possibility of leaks from a joint, therefore, it is absolutely necessary to apply the gasket evenly without a break, while observing the correct bead size. Since the RTV hardens as it reacts with the moisture in the atmospheric air, it is normally used in the metallic flange areas.

Disassembly

The parts assembled with the FIPG can be easily disassembly without use of a special method. In some cases, however, the sealant between the joined surface may have to broken by lightly striking with a mallet or similar tool. A flat and thin gasket scraper may be lightly hammered in between the joined surfaces. In this case, however, care must be taken to prevent damage to the joined surfaces.

Surface Preparation

Thoroughly remove all substances deposited on the gasket application surface, using a gasket scraper or wire brush. Check to ensure that the surface to which the FIPG is to be applied is flat. Make sure that there are no oils, grease and foreign substance deposits on the application surfaces. Do not forget to remove the old sealant remaining in the bolts holes.

LUBRICANTS

Items	Specified lubricants	Quantity
Transmission oil	Castrol BOT130M WSD-M2C200-C	1.8 litre
Items	Specified lubricants	
Input shaft spline	High temperature lithium-based grease (WSS- M1C273-A OKS422)	
Shift lever pin	Lubricant grease (WSD-M1C244-A GLY801)	
Input shaft oil seal	Lubricant grease (WSD-M1C220-A LY261)	
Shift shaft oil seal assembly		

TORQUE SPECIFICATIONS

Part name	Application	Specification
Stud M6x16+M6x18	Transmission case to rear cover	2.9~4.9 kgm (29~49 Nm, 1.95~3.29 ft.lbs)
Stud M8x40+M8x15	Clutch housing to transmission case	2.2~3.0 kgm (22~30 Nm, 1.48~2.01 ft.lbs)
Bolt M8x40		1.9~2.5 kgm (19~25 Nm, 1.28~1.68 ft.lbs)
Bolt M6x16	Transmission case to rear cover	1.0~1.3 kgm (10~13 Nm, 0.67~0.87 ft.lbs)
Bolt M10x1x19.8	Differential case to final drive ring gear	10.0~11.0 kgm (100~110 Nm, 6.71~7.38 ft.lbs)
Shift shaft screw M7x19	Select lever to shift lever	2.2~2.6 kgm (22~26 Nm, 1.48~1.74 ft.lbs)
Drain plug M16x1.5x12	Clutch housing drain hole	2.9~ 4.1 kgm (29~ 41 Nm, 1.95~ 2.75 ft.lbs)
Bolt with pad M6x25	Speedo sensor	0.9~1.1 kgm (9~11 Nm, 0.6~0.74 ft.lbs)
Interlock retainer assembly M18x1.5	Interlock retainer assembly to transmis- sion case	2.0~2.6 kgm (20~26 Nm, 1.34~1.74 ft.lbs)
Reverse gear switch assembly M16x1.5	Reverse gear switch assembly to clutch housing	2.0~2.5 kgm (20~25 Nm, 1.34~1.68 ft.lbs)
Bolt M8x15	Gate assembly to clutching housing	1.9~2.5 kgm (19~25 Nm, 1.28~1.68 ft.lbs)

NON-REUSABLE PART

Part name	Quantity	Application
Retainer ring	2	Fastening transaxle differential shaft
Retainer ring	1	Fastening 1st/2nd gear synchronizer hub
Retainer ring	1	Fastening 3rd/4th gear synchronizer hub
Retainer ring	1	Fastening output shaft rear bearing
Snap ring	1	Fastening the 5th drive gear
Screw	8	Fastening differential case to final drive ring gear
E type retainer ring	1	Fastening the shift lever
Retainer ring	1	Fastening 5th synchronizer spacer
Spring pin	1	Fastening the 5th gear fork assembly
Input shaft oil seal	1	
Shift shaft oil seal assembly	1	
Differential oil seal	2	
Magnet	1	
Speedometer drive gear	1	Driving speedometer

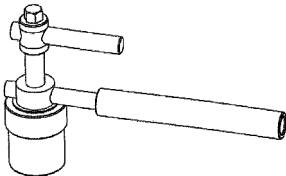
GEAR SELECTION (VEHICLE SPEED)

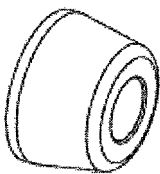
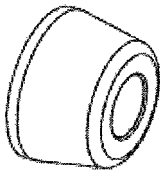
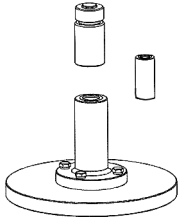
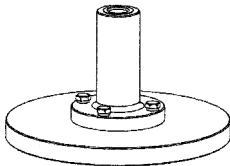


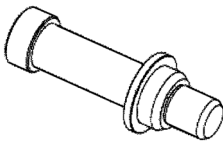
Gear selection	Speed (km/hour)
0-Rev	0 km/h
0-1st	0 km/h
1st-2nd	30 km/h (18.64 mph)
2nd-3rd	50 km/h (31.07 mph)
3rd-4th	70 km/h (43.5 mph)
4th-5th	90 km/h (55.92 mph)
5th-4th	90 km/h (55.92 mph)
4th-3rd	70 km/h (43.5 mph)
3rd-2nd	50 km/h (31.07 mph)
2nd-1st	30 km/h (18.64 mph)

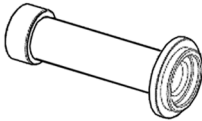

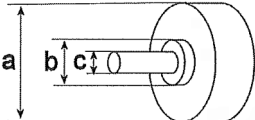
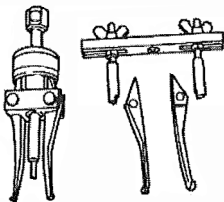
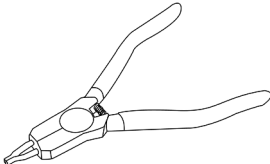
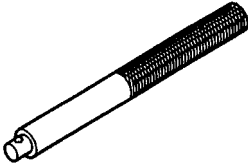
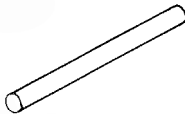
SPECIAL TOOLS

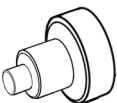
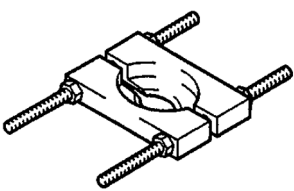
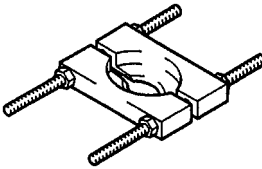

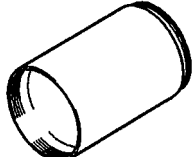
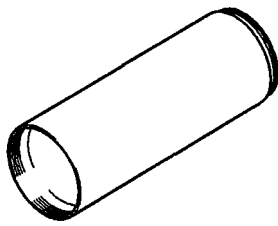
WTC22DSTOOL001






SPECIAL TOOLS LIST

Tool	Number	Name	Use
 DOIMT22DR10002	G921-01	Uninstaller	<ul style="list-style-type: none"> To disassemble 5th speed driving gear

Tool	Number	Name	Use
 DOIMT22DR10011	G922-13	Oriented mass	<ul style="list-style-type: none"> • Oriented input shaft fasten ring
 DOIMT22DR10012	G922-14	Oriented mass	<ul style="list-style-type: none"> • Oriented output shaft fasten ring
 DOIMT22DR10013	G922-15	Mounter (Assy)	<ul style="list-style-type: none"> • To install 5th speed drive gear
 DOIMT22DR11014	G922-15-01	Mounter (Base)	
 DOIMT22DR11015	G922-15-02	Mounter (Guide)	
 DOIMT22DR11016	G922-15-03	Mounter (Installer)	
 DOIMT22DR11012	G922-17	Mounter	<ul style="list-style-type: none"> • To install differential oil seal

Tool	Number	Name	Use
 DOIMT22DR11017	G922-18	Mounter	<ul style="list-style-type: none"> To install input shaft oil seal
 DOIMT22DR11018	G922-19	Oriented mass	<ul style="list-style-type: none"> Oriented input shaft oil seal
 DOIMT22CR07009	AZBST008-00A a : 100 mm dia b : 19 mm dia c : 9.5 mm dia	Output shaft mounting rack	<ul style="list-style-type: none"> To support output shaft when removing and installation output shaft part
 DOIMT22CR07007	AZBST003-00A	Puller assembly A	<ul style="list-style-type: none"> To remove output shaft front bearing outer ring
 DOIMT22CR07005	MB990628	Snap ring plier	<ul style="list-style-type: none"> To remove the snap ring
 DOIT22AR9007	MB990938	Handle	To use with installer adapter <ul style="list-style-type: none"> Install differential taper rolling bearing Install differential oil seal Install input shaft oil seal
 DOIMT22CR07110	MB990939	Cooper bar	<ul style="list-style-type: none"> To install clutch housing plug

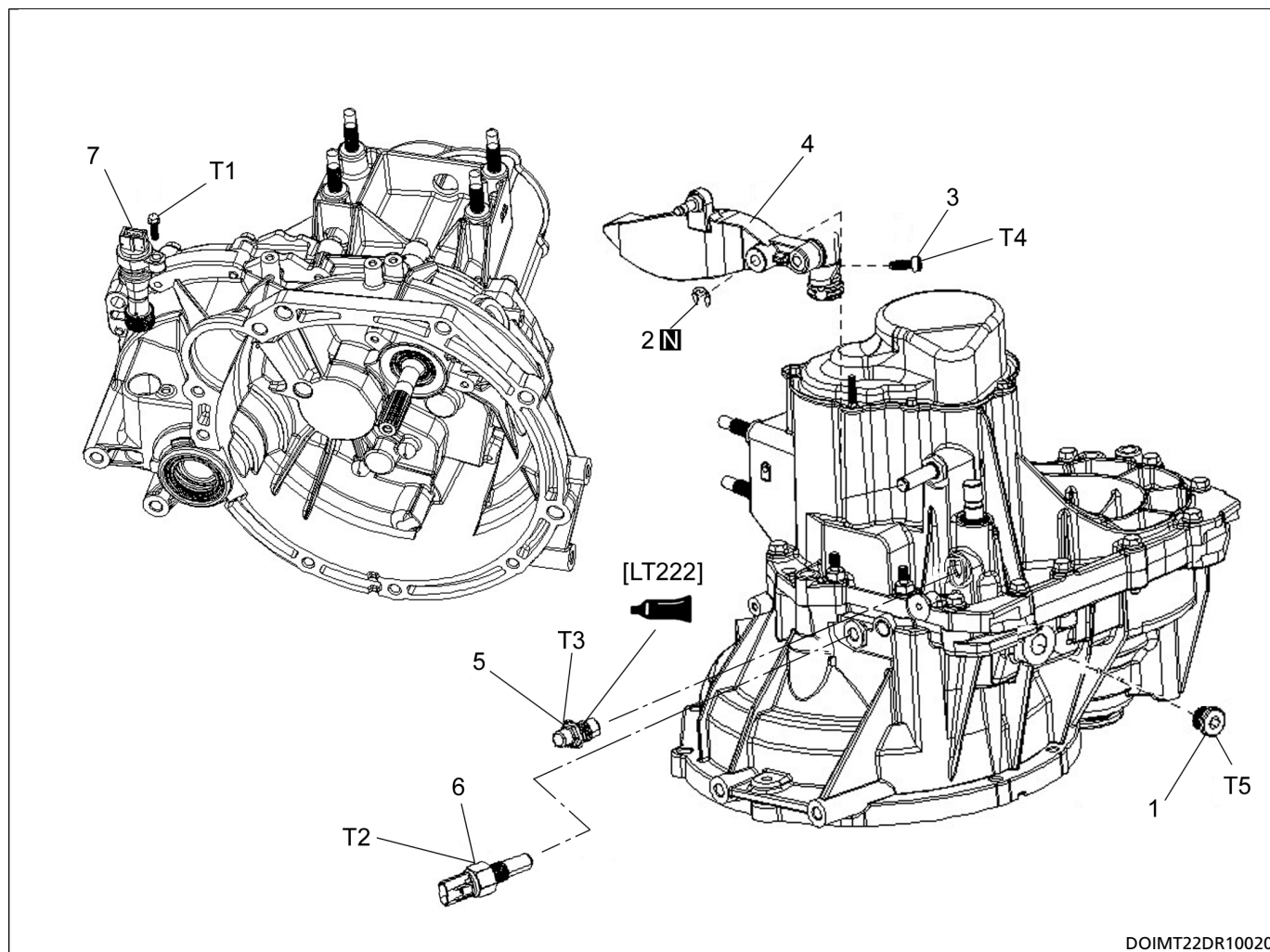
Tool	Number	Name	Use
 DOIMT22DR10152	MB991202		<ul style="list-style-type: none"> • To remove differential taper roller bearing
 DOIMT22DR11001	MB998917	Bearing removal	<ul style="list-style-type: none"> • To remove differential taper roller bearing
 DOIIT22AR9011	MD998801	Bearing removal	<ul style="list-style-type: none"> • To remove and install input shaft rear and front bearing • To remove output shaft rear bearing
 DOIIT22AR9012	MD998812	Installer cap	<ul style="list-style-type: none"> • To install input shaft front and rear bearing • To install output shaft front bearing inner ring • To install output shaft rear bearing • To install differential taper roller bearing inner ring • To install differential outer race • To install output shaft front bearing outer ring
 DOIIT22AR9013	MD998813	Installer – 100	<ul style="list-style-type: none"> • To install input shaft rear bearing • To install output shaft front bearing inner ring • To install output shaft rear bearing • To install differential taper roller bearing inner ring
 DOIIT22AR9014	MD998814	Installer – 200	<ul style="list-style-type: none"> • To install input shaft front bearing • To install differential outer race • To install output shaft front bearing outer ring

Tool	Number	Name	Use
 DOIIT22AR9015	MD998816	Installer adapter (30)	<ul style="list-style-type: none"> • To install input shaft front bearing • To install output shaft rear bearing
 DOIMT22DR11003	MD998817	Installer adapter (34)	<ul style="list-style-type: none"> • To install input shaft rear bearing
 DOIIT22AR9019	MD998820	Installer adapter (42)	<ul style="list-style-type: none"> • To install output shaft front bearing inner ring
 DOIIT22AR9020	MD998821	Installer adapter (44)	<ul style="list-style-type: none"> • To install differential taper rolling bearing
 DOIMT22DR10156	MD998827	Installer adapter (56)	<ul style="list-style-type: none"> • To install differential outer race

TRANSMISSION

WTC22DSHAUL001

TRANS CASE AND CLUTCH HOUSING DISASSEMBLY AND REASSEMBLY



DOIMT22DR10020

— Apply Sealant (LT222)

N — Non-reusable part

Items :

1. Drain oil plug
2. E type retainer ring
3. Shift shaft screw
4. Select and shift lever
5. Interlock retainer
6. Reverse lamp switch
7. Speedometer

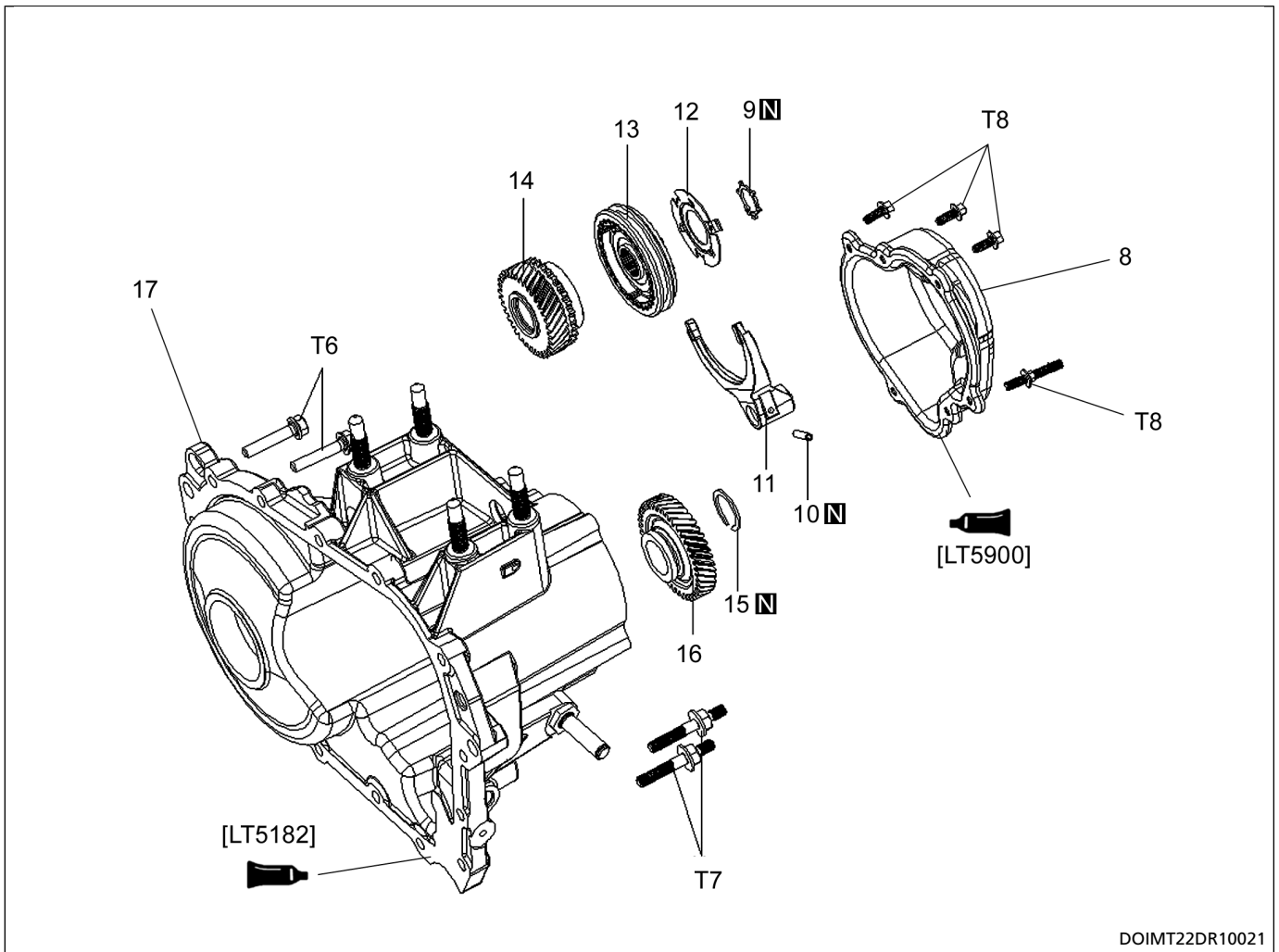
T1 : 0.9~1.1 kgm (9~11 Nm, 0.6~0.74 ft.lbs)

T2 : 2.0~2.5 kgm (20~25 Nm, 1.34~1.68 ft.lbs)

T3 : 2.0~2.6 kgm (20~26 Nm, 1.34~1.74 ft.lbs)

T4 : 2.2~2.6 kgm (22~26 Nm, 1.48~1.74 ft.lbs)

T5 : 2.9~4.1 kgm (29~41 Nm, 1.95~2.75 ft.lbs)



DOIMT22DR10021

— Apply Sealant (LT5182 and LT5900)

N — Non-reusable part

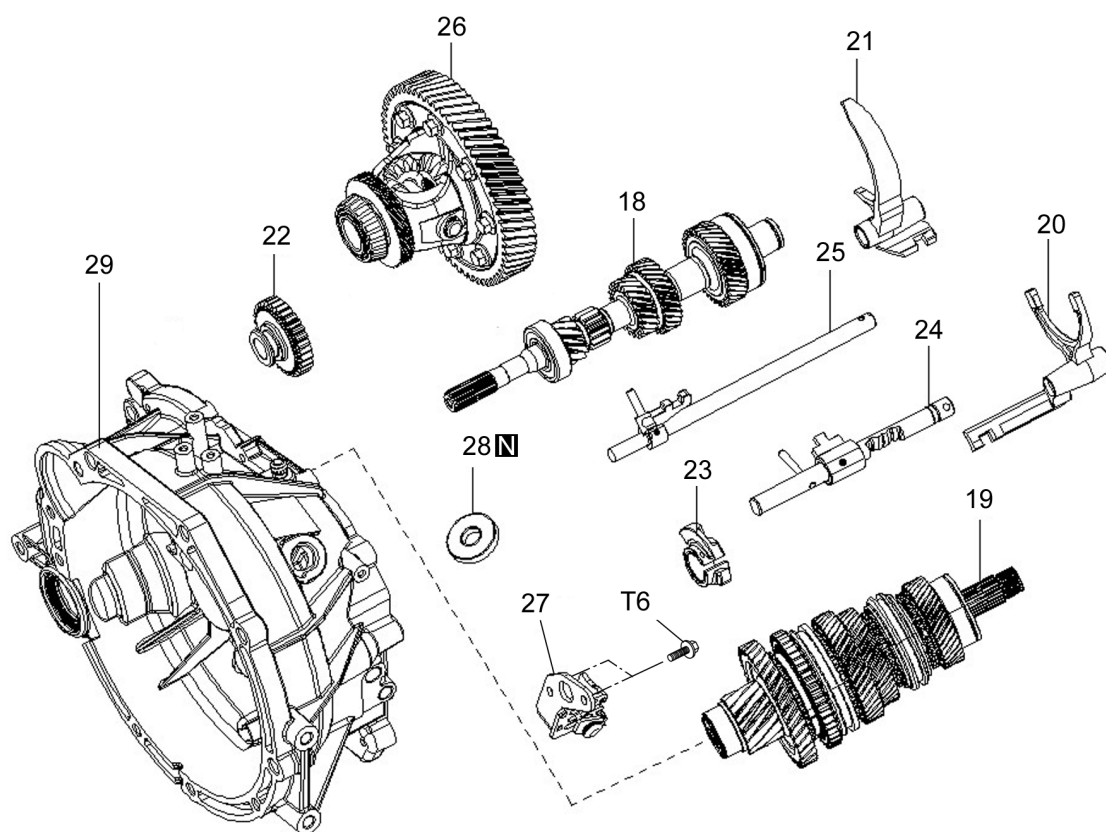
Items :

- 8. Rear cover
- 9. Retainer ring
- 10. Spring pin
- 11. 5th fork assembly
- 12. 5th gear spacer
- 13. 5th gear synchronizer assembly
- 14. 5th speed ring gear
- 15. Snap ring
- 16. 5th speed drive gear
- 17. Transmission case

T6 : 1.9~2.5 kgm (19~25 Nm, 1.28~1.68 ft.lbs)

T7 : 2.2~3.0 kgm (22~30 Nm, 1.48~2.01 ft.lbs)

T8 : 2.9~4.9 kgm (29~49 Nm, 1.95~3.29 ft.lbs)



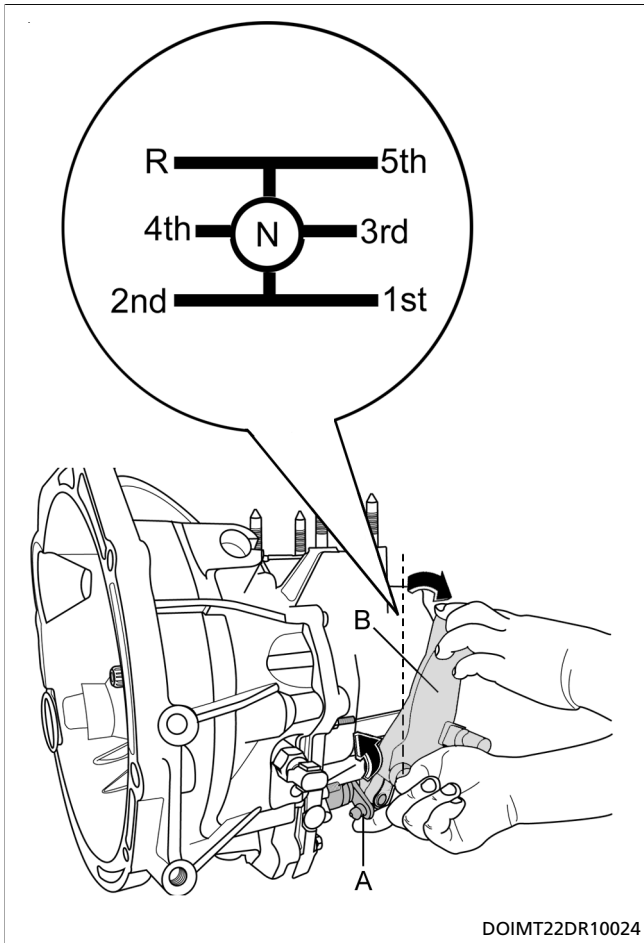
DOIMT22DR10022

N — Non-reusable part

Items :

- 18. Input shaft
- 19. Output shaft
- 20. 3rd/4th gear fork assembly
- 21. 1st/2nd gear fork assembly
- 22. Reverse idler gear
- 23. Interlock plate
- 24. Shift shaft assembly
- 25. 5th/Rev fork shaft assembly
- 26. Differential assembly
- 27. Gate assembly
- 28. Magnet
- 29. Clutch housing

T6 : 1.9~2.5 kgm (19~25 Nm, 1.28~1.68 ft.lbs)



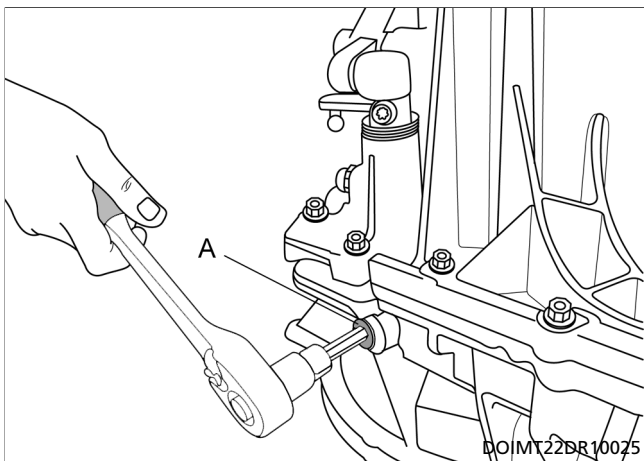
DISASSEMBLY SERVICE POINTS

WTC22DSHAUL002

R TRANSMISSION REMOVAL

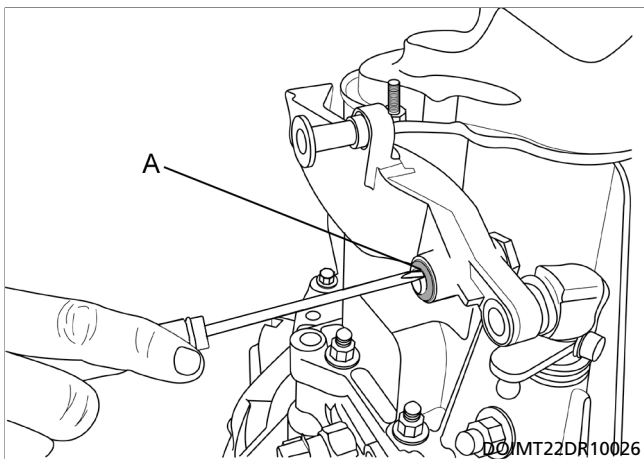
1. Pull up the select lever and push the shift lever at 5th gear position before overhauling the transmission.

Symbol	Description
A	Select lever
B	Shift lever



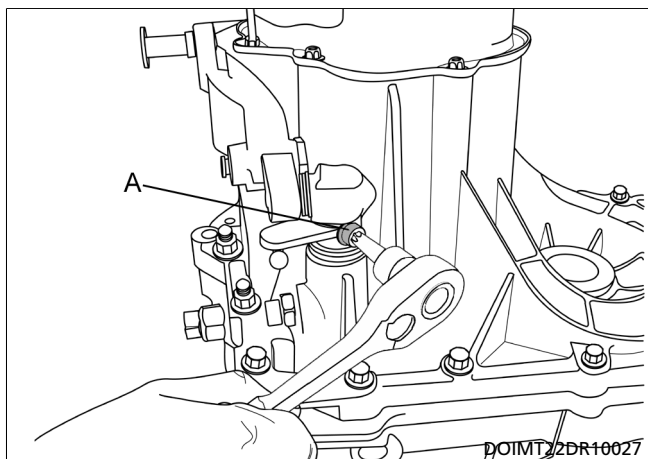
2. Remove the drain oil plug using a torque wrench.

Symbol	Description
A	Drain oil plug



3. Use a screw driver to remove the E type retainer ring.

Symbol	Description
A	E type retainer ring

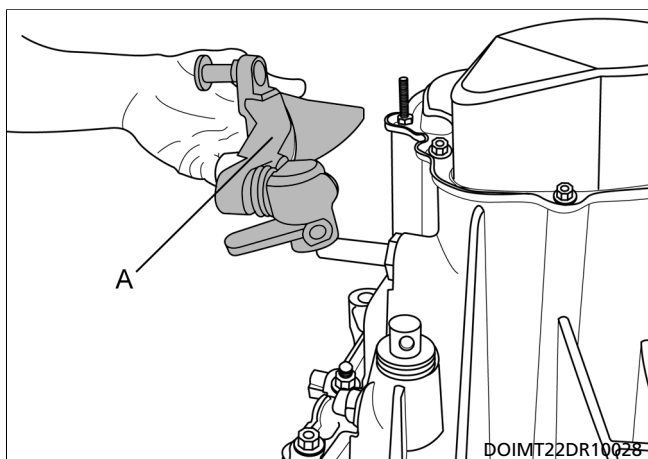


4. Remove the shift shaft screw.

Symbol	Description
A	Shift shaft screw

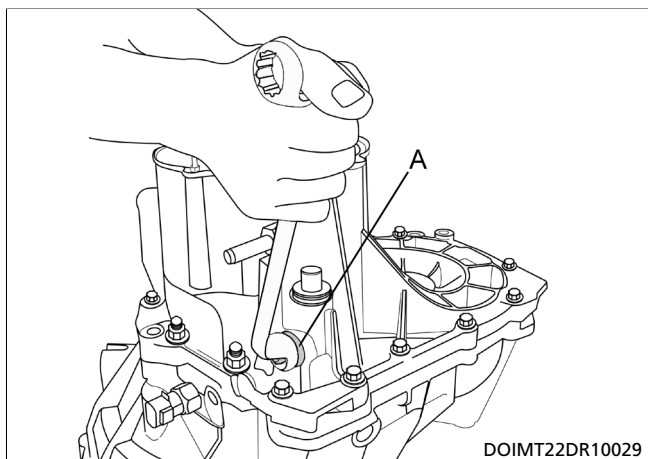
CAUTION:

Please be careful not to damage the shift shaft oil seal.



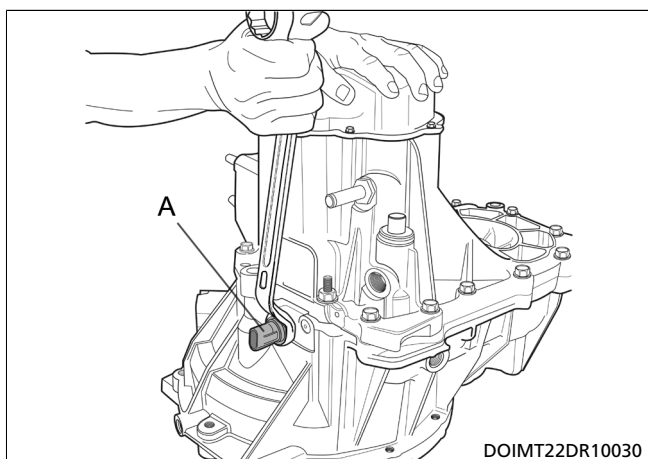
5. Remove the select and shift lever properly.

Symbol	Description
A	Select and shift lever



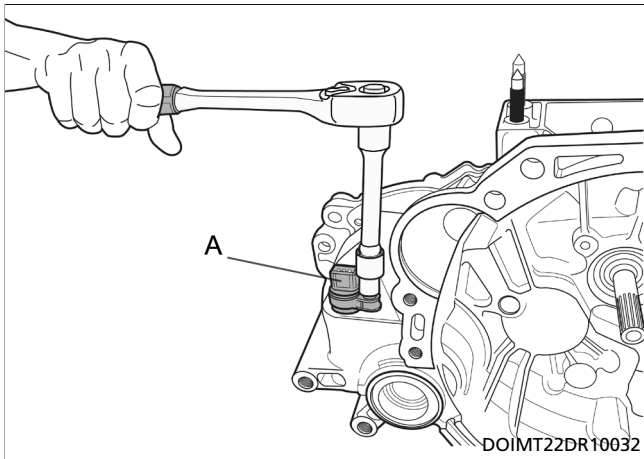
6. Remove the interlock retainer assembly by using ring spanner.

Symbol	Description
A	Interlock retainer assembly



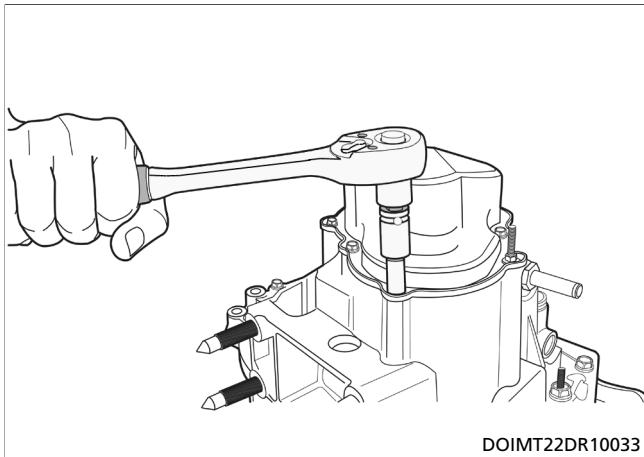
7. Remove the reverse lamp switch assembly.

Symbol	Description
A	Reverse lamp switch

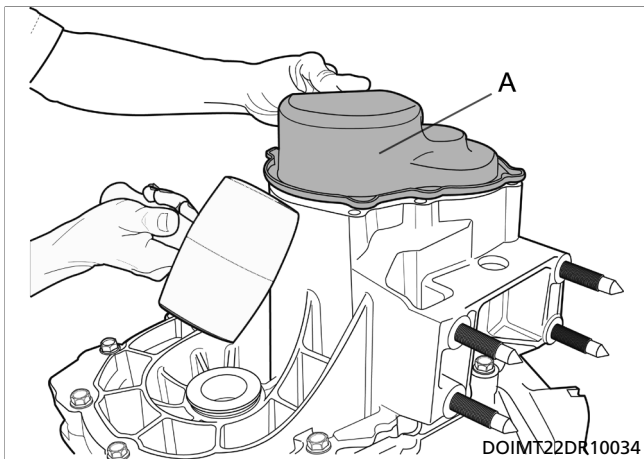


8. Remove the speedometer bolt and pull out carefully with several gentle rotations. Do not use strong power during removing the part vertically.

Symbol	Description
A	Speedometer

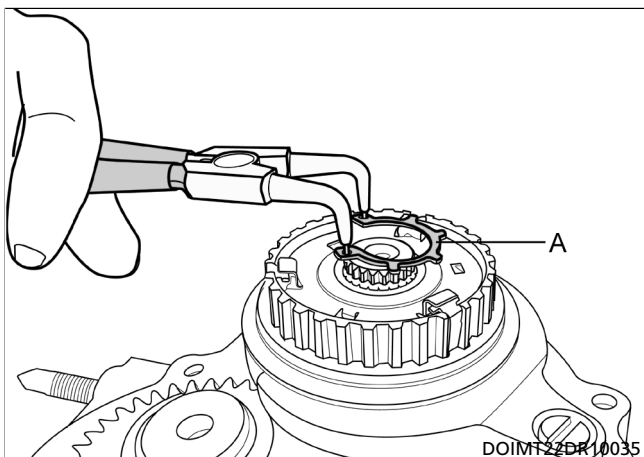


9. Remove the rear cover bolts (5 pieces) and stud (1 piece).



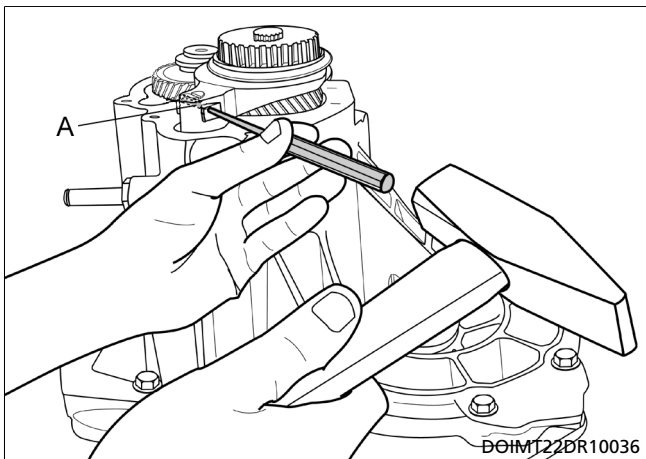
10. Remove the rear cover manually and some times probably use a rubber hammer to knock the cover in order to separate the cover and the sealant.

Symbol	Description
A	Rear cover



11. Remove the retainer ring using a circlip plier.

Symbol	Description
A	Retainer ring

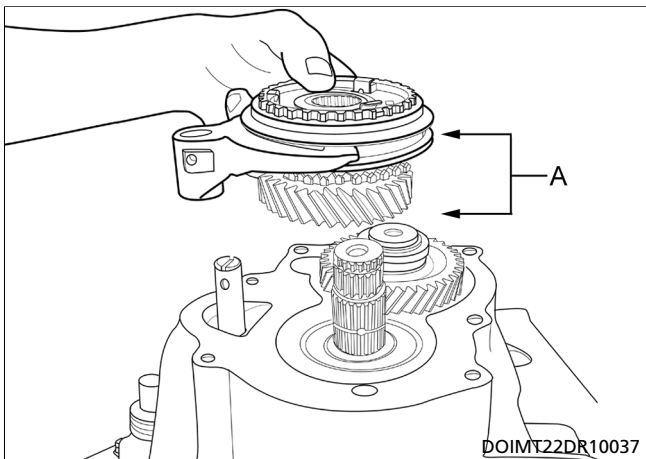


12. Remove the spring pin using common chisel (size 4).

Symbol	Description
A	Spring pin

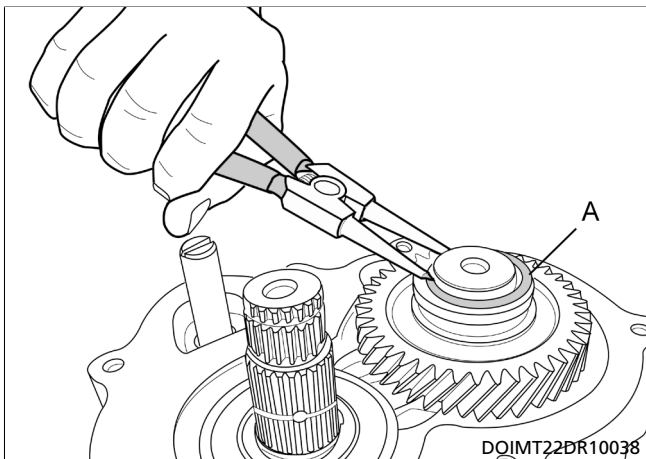
CAUTION:

- (1) Never reuse the spring pin.
 (2) If spring pin dropped into clutch housing assembly, pick up it using magnet.



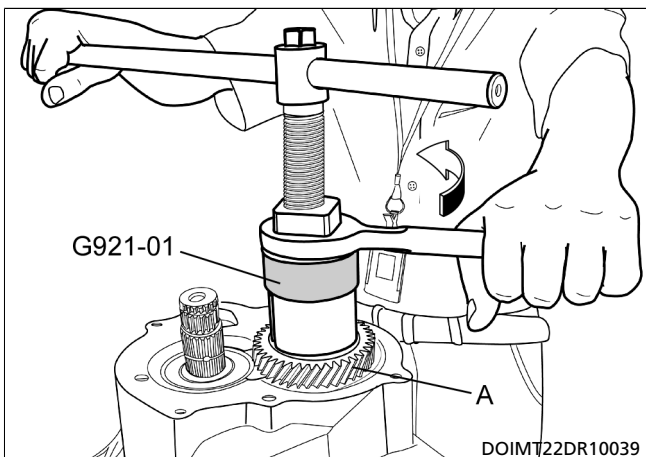
13. Remove the 5th fork with 5th synchronizer, spacer and 5th speed ring gear manually together.

Symbol	Description
A	5th fork with 5th synchronizer, spacer and 5th speed ring gear



14. Remove the snap ring using a circlip plier.

Symbol	Description
A	Snap ring

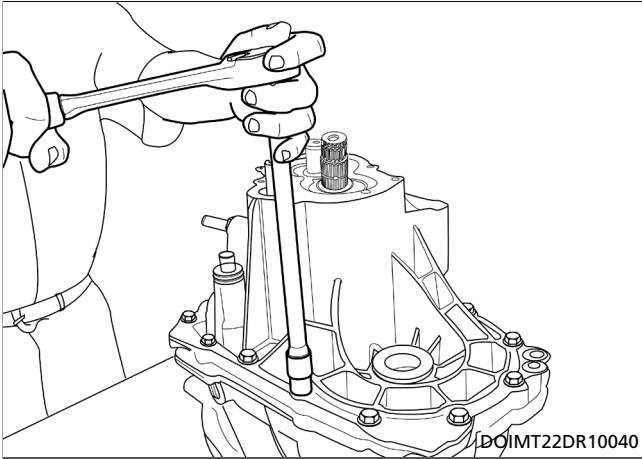


15. Remove the 5th speed drive gear using the special tool G921-01.

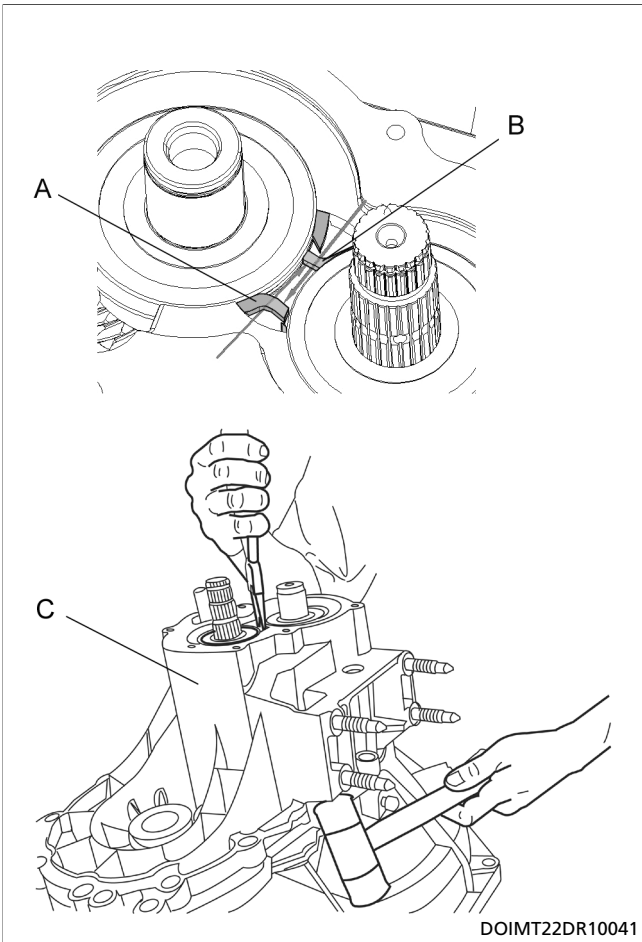
Symbol	Description
A	5th speed drive gear

NOTE

During using the special tool, hold the upper handle and at the same time turn the lower handle anti-clock wise direction as shown in the illustration.



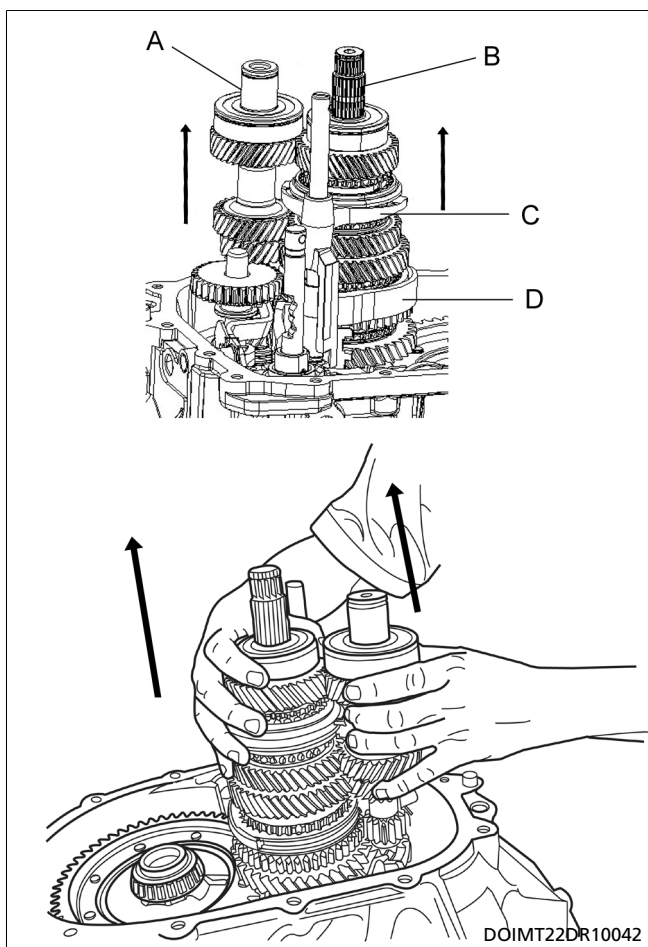
16. Remove the transmission case mounting bolts (12 pieces) and studs (2 pieces).



17. By using a circlip plier, expend the input and output fastening rings from bearings' groove.

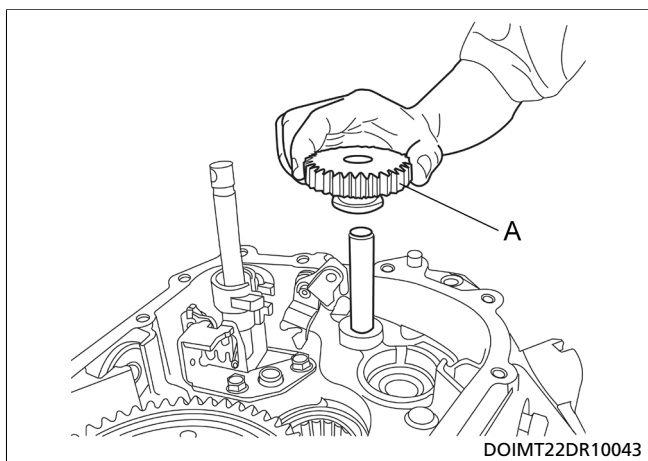
At the same time, knock along the transmission case edge and then remove the transmission case manually.

Symbol	Description
A	Input fastening ring
B	Output fastening ring
C	Transmission case



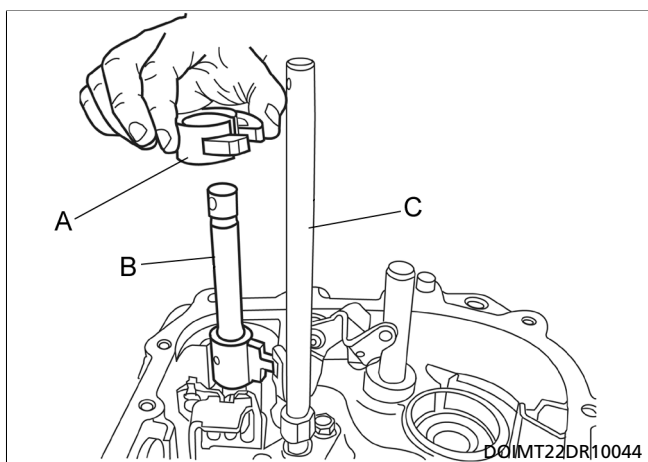
18. Remove the Input shaft assembly, output shaft assembly and forks together along the shown direction.

Symbol	Description
A	Input shaft assembly
B	Output shaft assembly
C	1st/2nd
D	3rd/4th fork



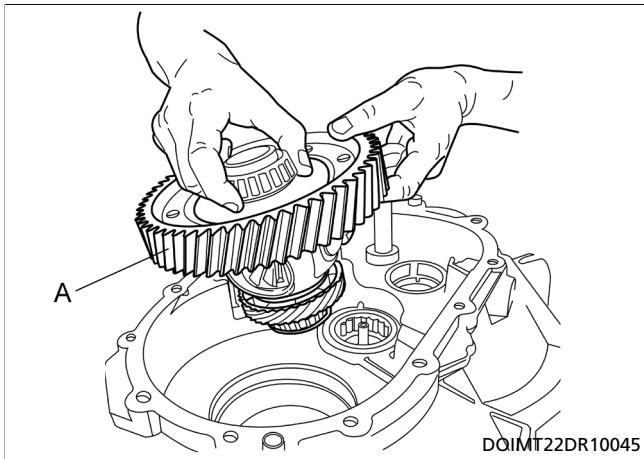
19. Remove the reverse idler gear manually.

Symbol	Description
A	Reverse idler gear



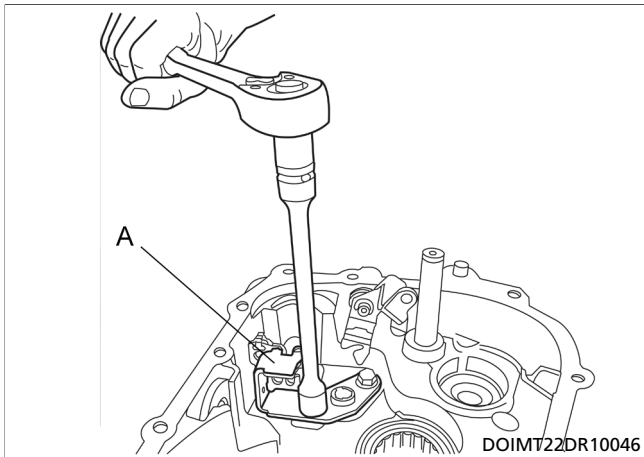
20. Remove the interlock plate, shift shaft and fork shaft manually.

Symbol	Description
A	Interlock plate
B	Shift shaft
C	5th / rev gear fork shaft



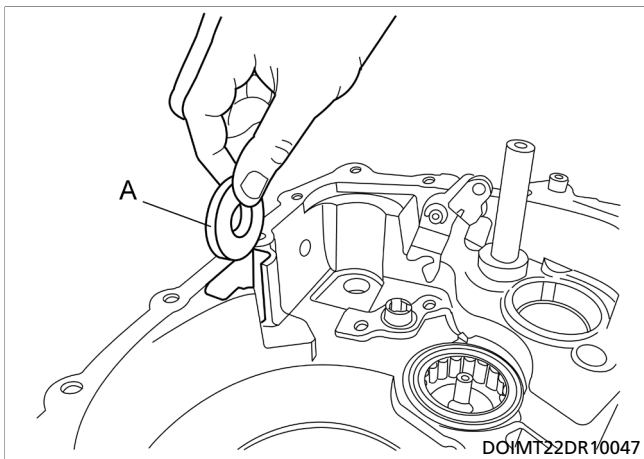
21. Remove the differential assembly manually.

Symbol	Description
A	Differential assembly



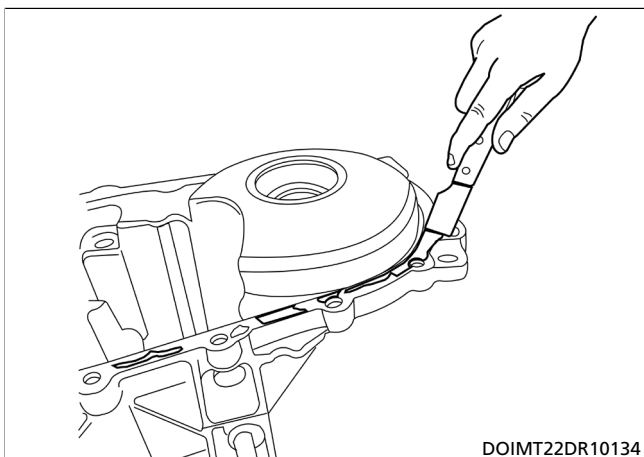
22. Remove the gate assembly.

Symbol	Description
A	Gate assembly



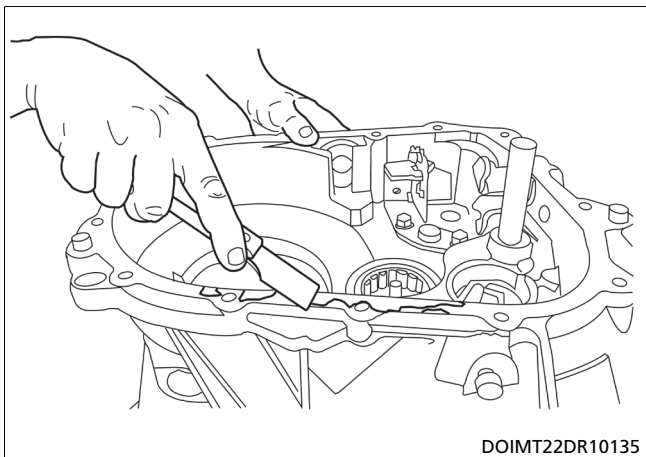
23. Remove the magnet manually.

Symbol	Description
A	Magnet

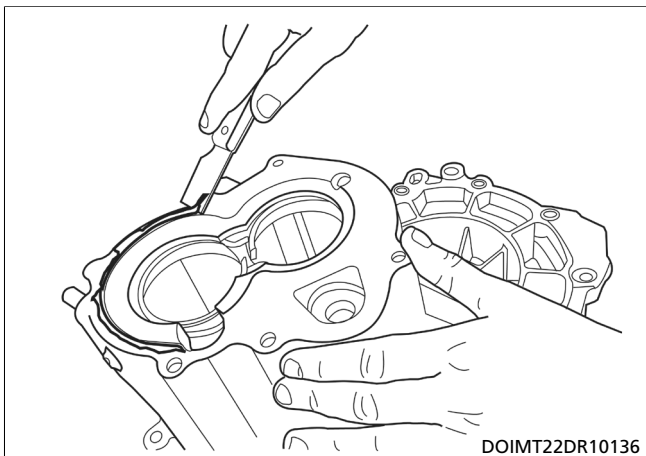


R SEALANT REMOVAL

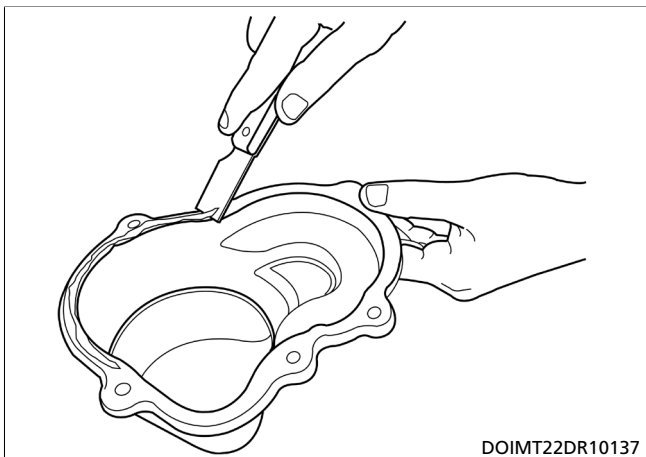
1. Clean the entire old sealant using scrapper without damaging transmission case surface.



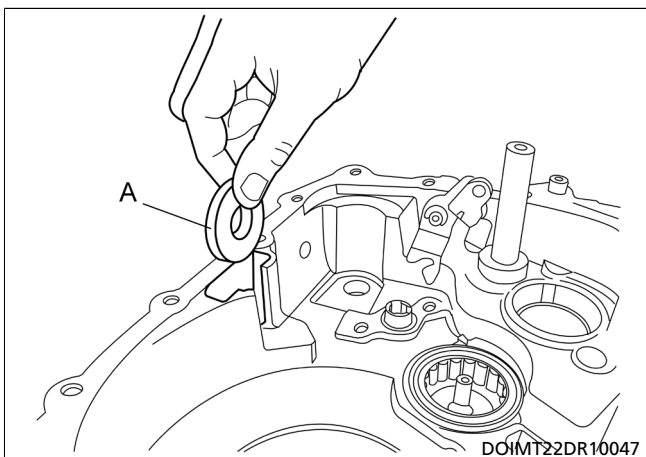
2. Clean the entire old sealant using scrapper without damaging clutch housing surface.



3. Clean the entire old sealant using scrapper without damaging transmission case surface.



4. Clean the entire old sealant using scrapper without damaging rear cover surface.



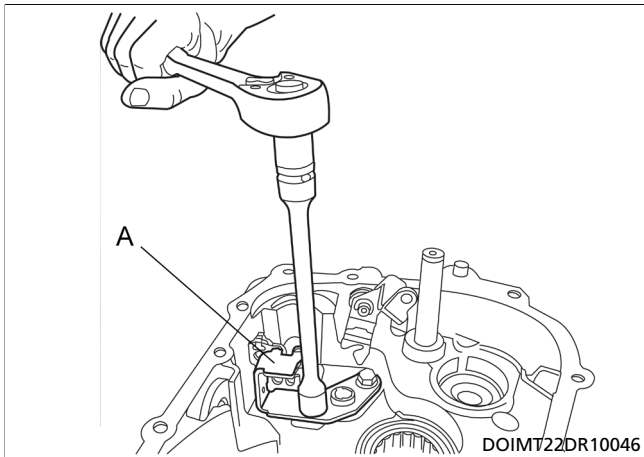
REASSEMBLY SERVICE POINTS

WTC22DSHAUL003

I TRANSMISSION INSTALLATION

1. Install the magnet.

Symbol	Description
A	Magnet

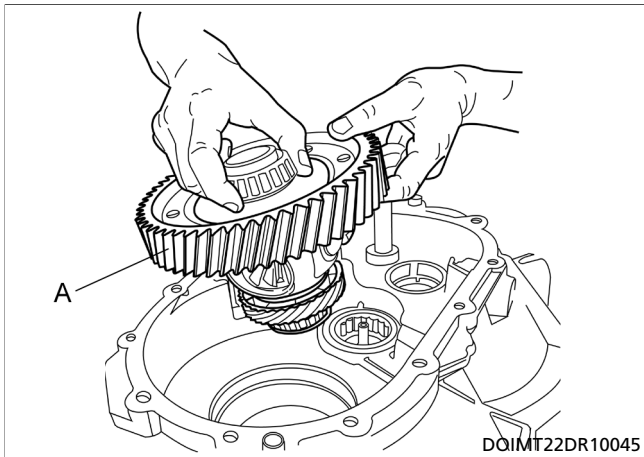


2. Install the gate assembly and tighten the bolt to the specified torque.

Specified torque:

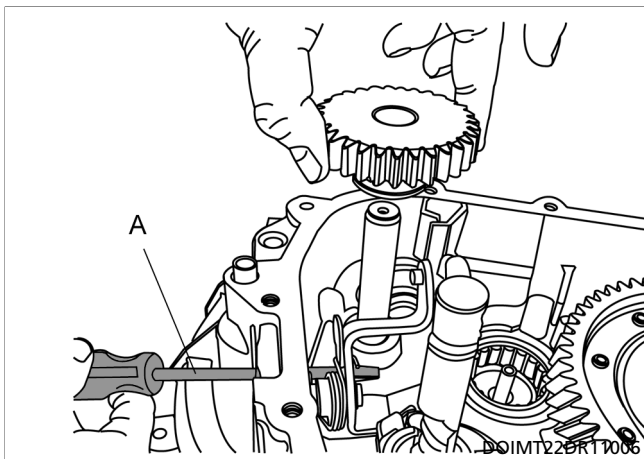
1.9~2.5 kgf.m

Symbol	Description
A	Gate assembly



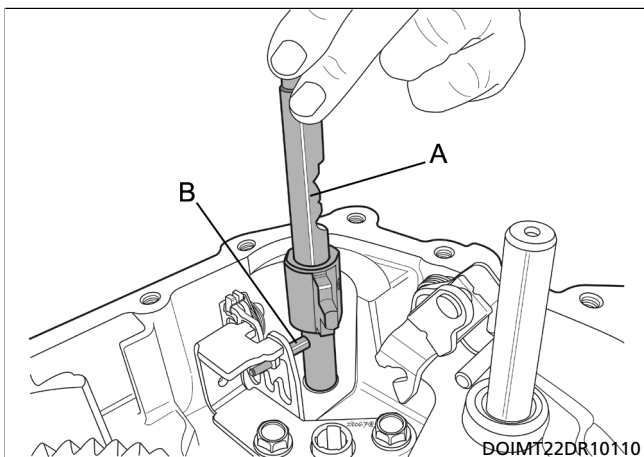
3. Install the differential assembly.

Symbol	Description
A	Differential assembly



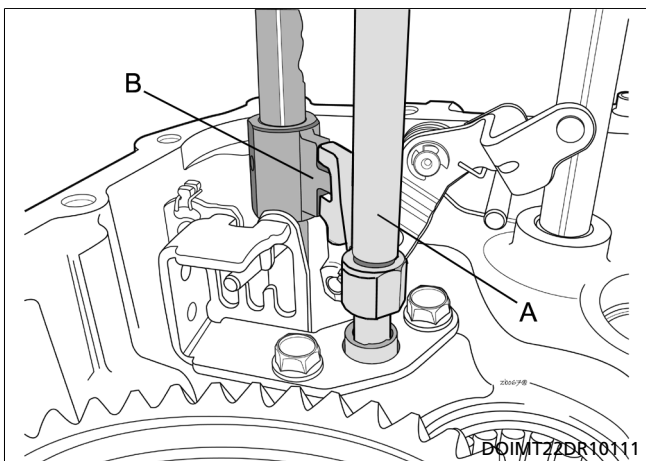
4. Insert screw driver into reverse lamp switch hole.

Symbol	Description
A	Screw driver



5. Install shift shaft assembly.
Locate the shaft pin rest on the gate as shown in the illustration.

Symbol	Description
A	Shift shaft assembly
B	Shaft pin



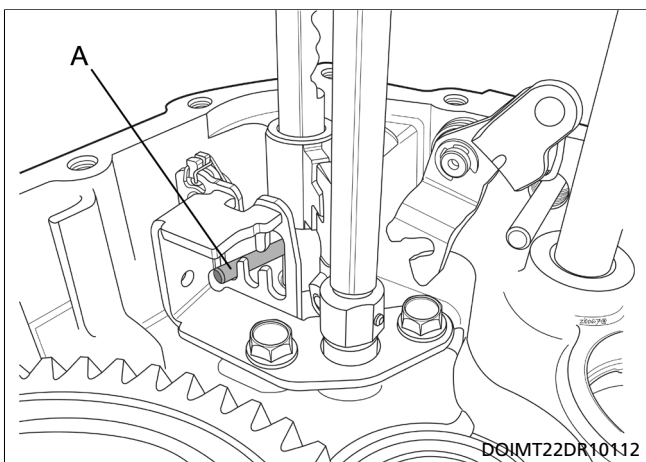
6. Install the 5th/Rev shaft assembly as shown in the illustration. Match the shift shaft finger with 5th/Rev shaft and ensure both parts are matching to each other.

Symbol	Description
A	5th/Rev shaft assembly
B	Shift finger

CAUTION

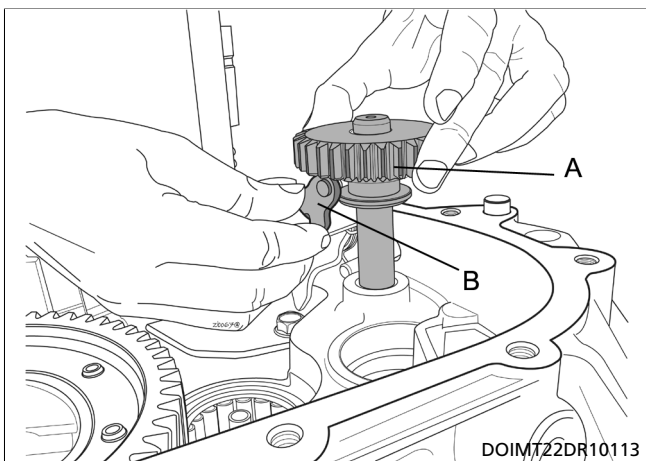
The pin of the shift shaft should be in position as shown in the illustration (5th speed position).

Symbol	Description
A	Shift shaft pin



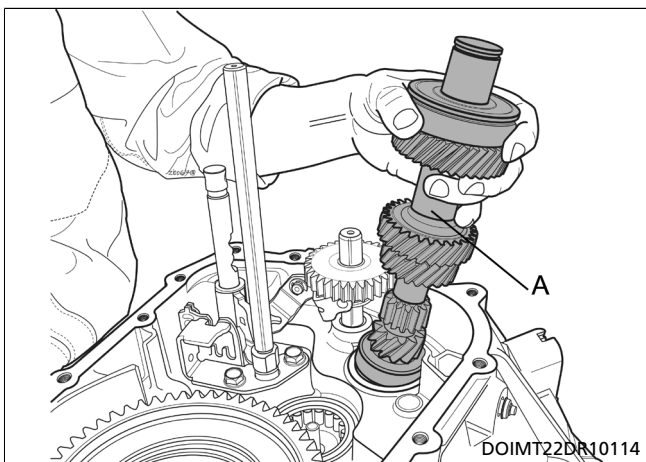
7. Install the reverse idler gear manually. Put reverse idler gear and reverse lever into right position

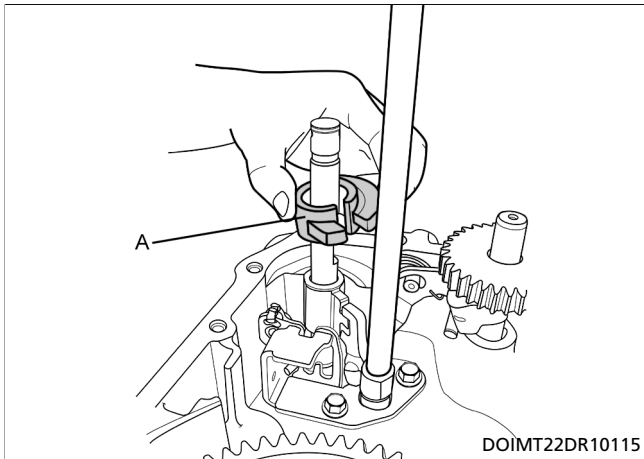
Symbol	Description
A	Reverse idler gear
B	Reverse lever



8. Install the input shaft assembly but do not put into the final position. Just locate on the clutch housing as shown in the illustration.

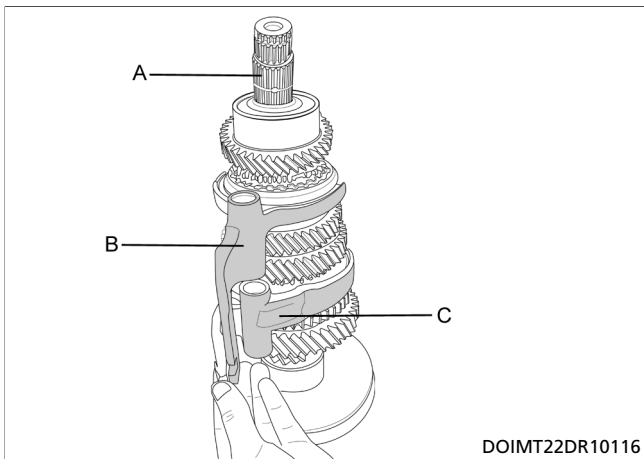
Symbol	Description
A	Input shaft assembly





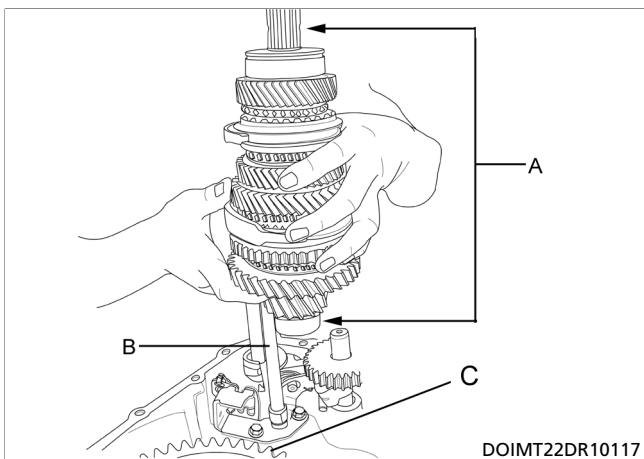
9. Install the interlock plate but do not put into the final position.

Symbol	Description
A	Interlock plate



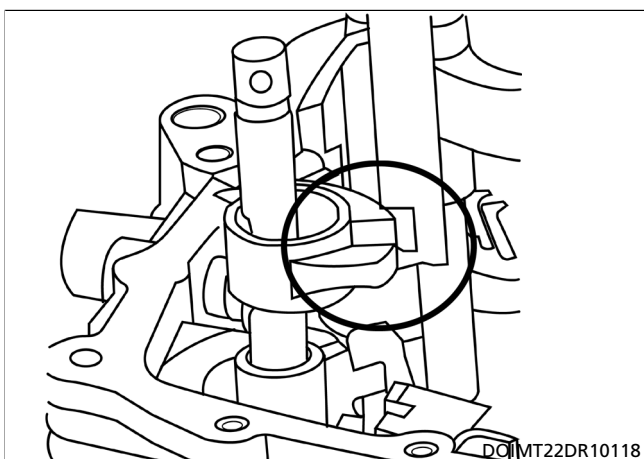
10. Mount the two forks on the output shaft assembly as shown in the illustration.

Symbol	Description
A	Output shaft assembly
B	3rd/4th gear fork assembly
C	1st/2nd gear fork assembly



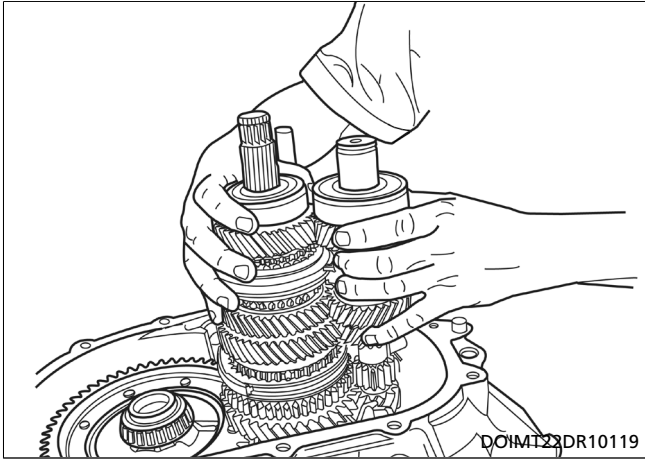
11. Locate forks assembly and output shaft onto the 5th/rev shaft. Ensure the output shaft matching with the differential ring gear.

Symbol	Description
A	Output shaft and fork assembly
B	5th/Rev shaft assembly
C	Differential ring gear

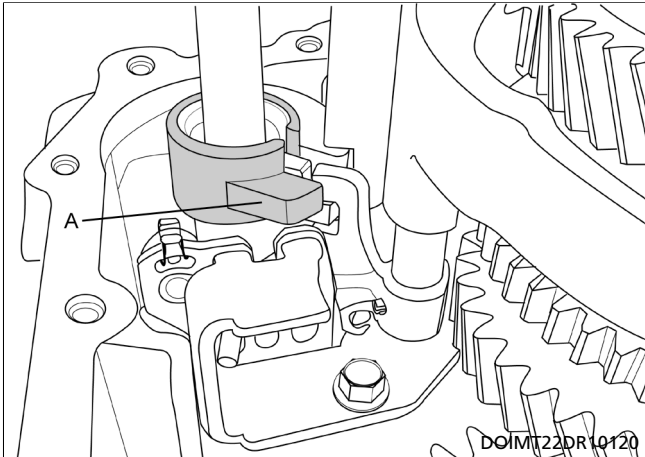


CAUTION:

Notice the position of the parts as shown in the illustration.



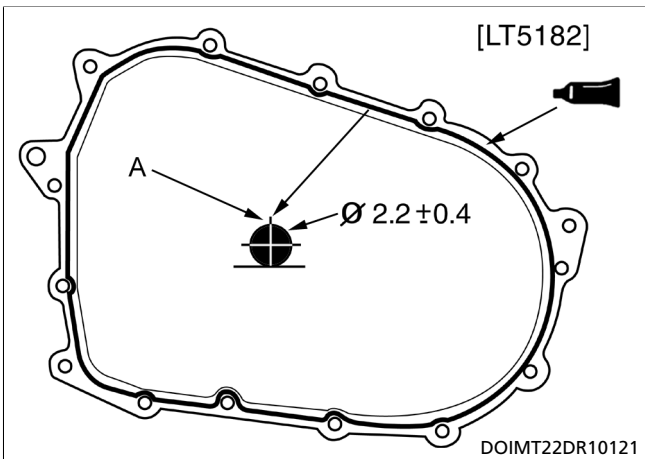
12. Match the output shaft and input shaft gears. Then locate two shafts down into the final position.



CAUTION:

To get the interlock plate in the right position, some adjustment is necessary. The input shaft and output shaft must be rotated freely.

Symbol	Description
A	Interlock plate

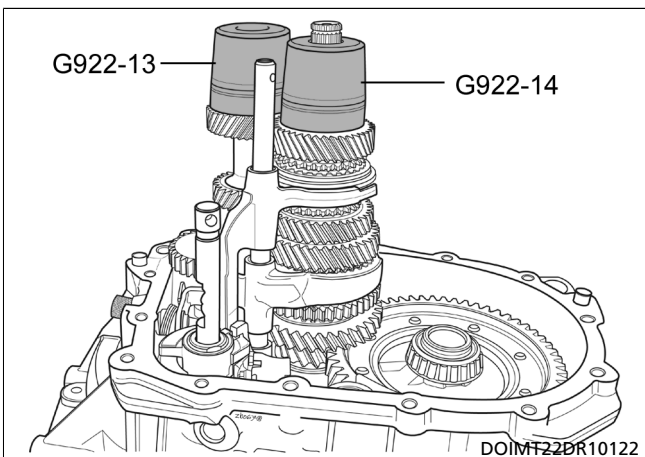


13. Apply recommended sealant to mating face of clutch housing assembly as shown in the illustration.

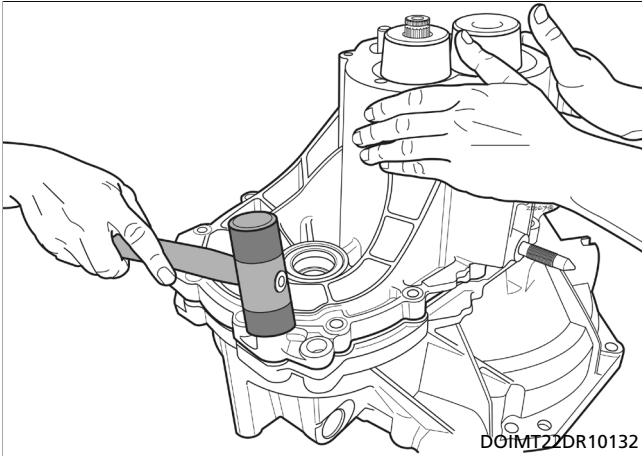
Specified sealant:

LT5182

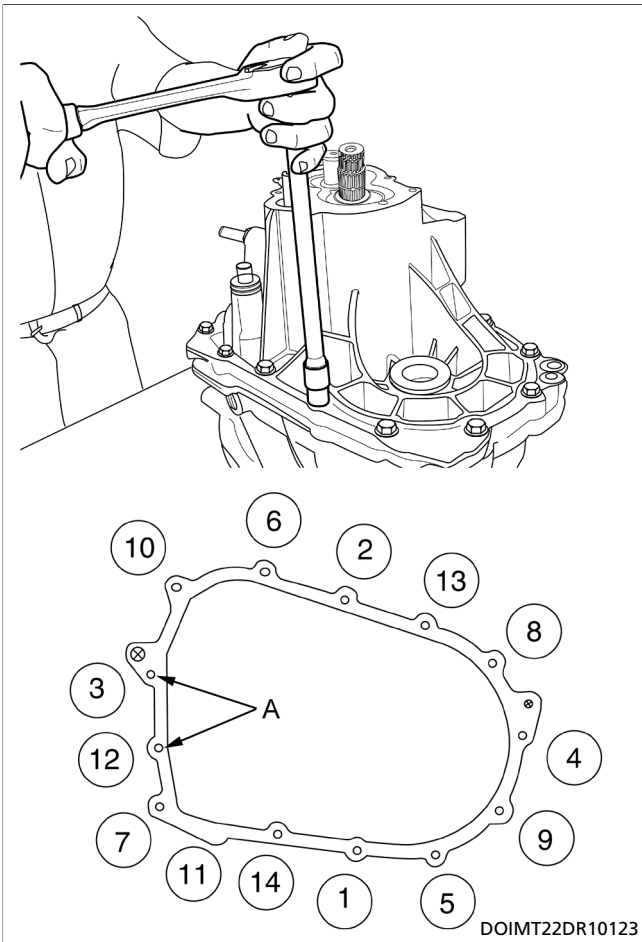
Symbol	Description
A	Sealant center line



14. Mounting two special tool G922-13 and G922-14 into place as shown in the illustration.



15. Mount the transmission case on the clutch housing.

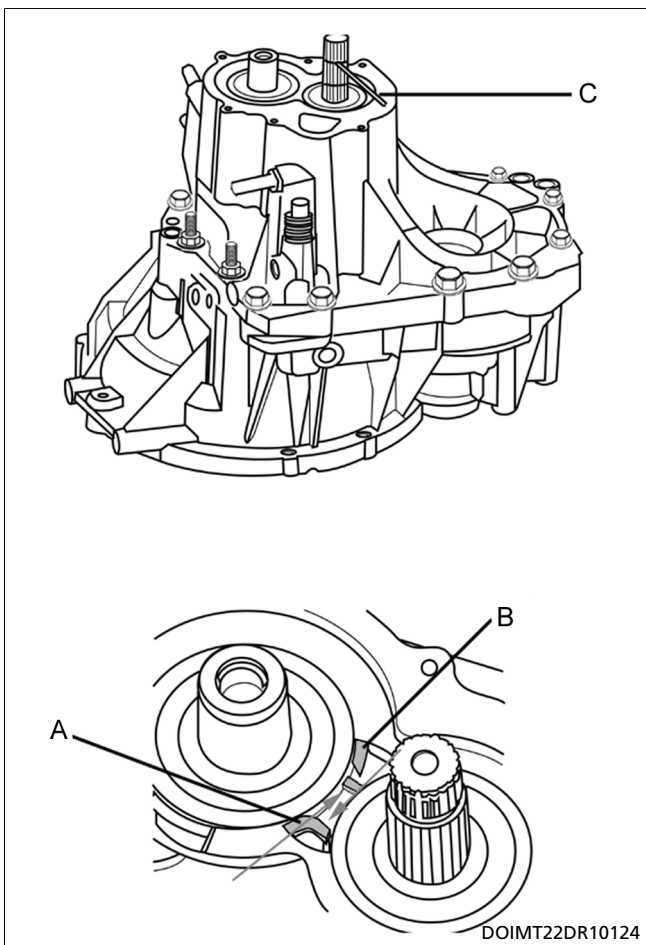


16. Tighten the 12 pieces bolt and 2 pieces stud to the specified torque in sequence order as shown in illustration.

Symbol	Description
A	Stud

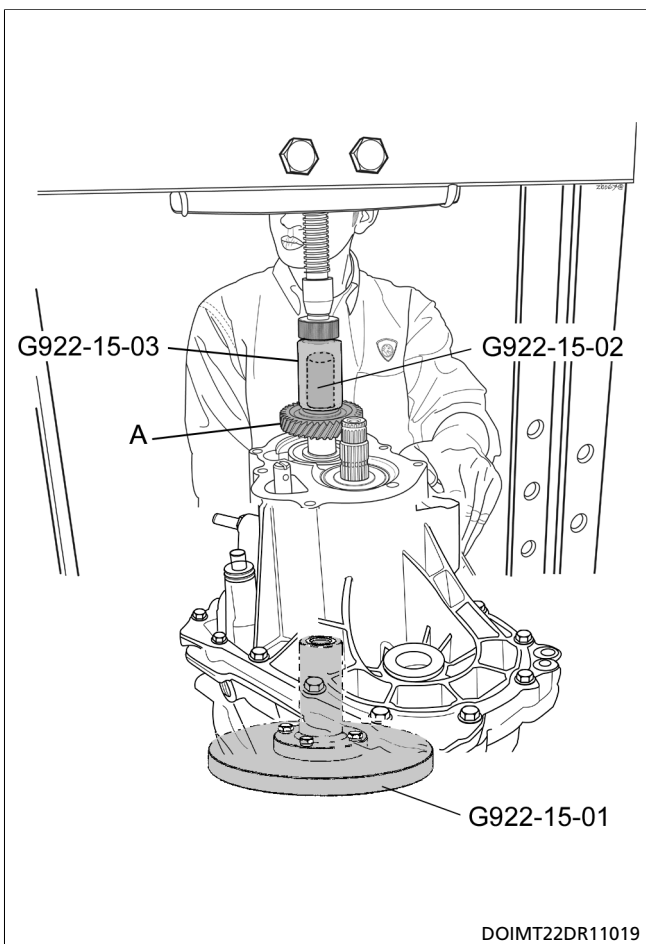
Specified torque:

Bolt	1.9~2.5 kgm (19~25 Nm, 1.28~1.68 ft.lbs)
Stud	2.2~3.0 kgm (22~30 Nm, 1.48~2.01 ft.lbs)



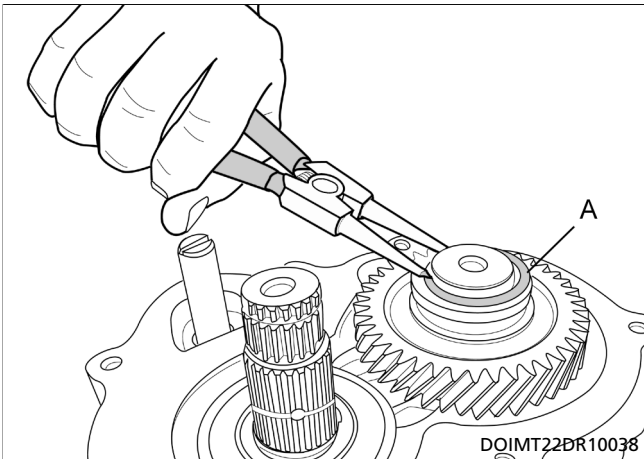
17. Use a small handle to lift the output shaft in order to make sure output shaft and input shaft fastening ring can be stayed in the right position. Then adjust the rings position as shown in the illustration.

Symbol	Description
A	Input shaft fastening ring
B	Output shaft fastening ring
C	Handle



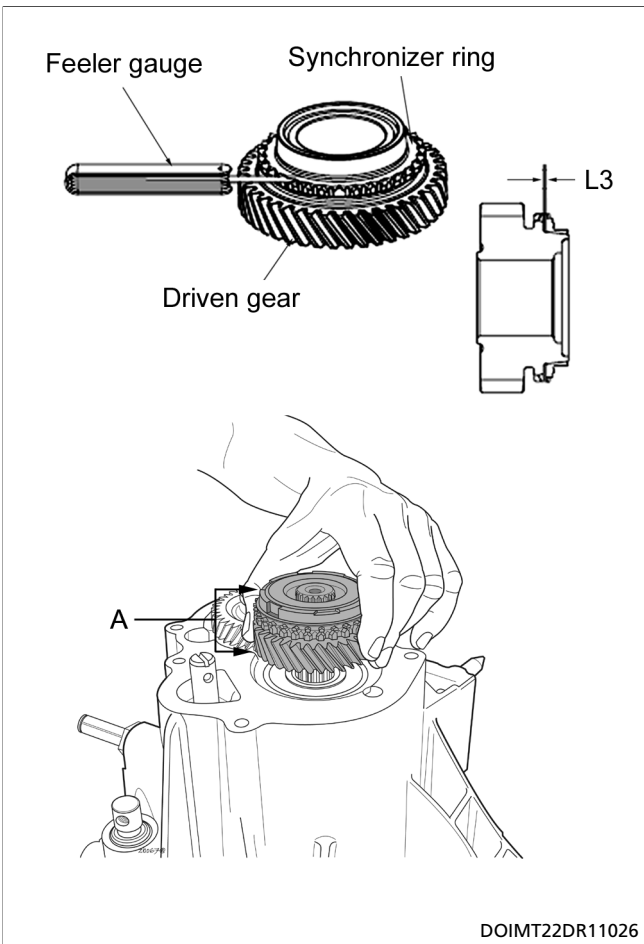
18. Use the special tool G922-15-01, G922-15-02, G922-15-03 and press machine to install the 5th speed drive gear.

Symbol	Description
A	5th speed drive gear



19. Use a circlip plier to install a new snap ring.

Symbol	Description
A	Snap ring



20. 20.1 Check the 5th gear synchronizer ring clearance before its installation.

20.2 By using a feeler gauge check the dimension L3.

CAUTION

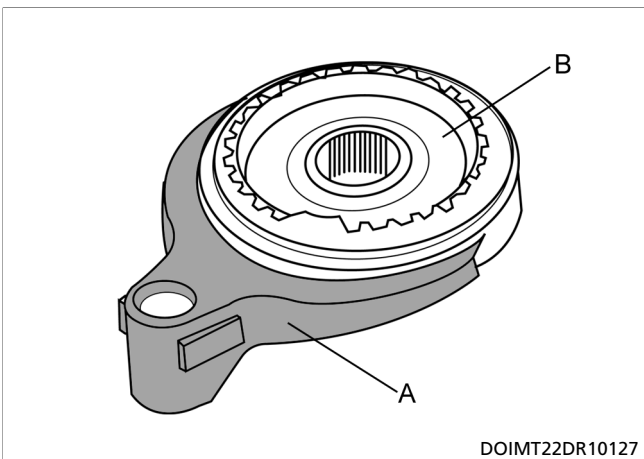
If actual clearance not within the allowed range, replace the part.

Specified clearance:

Symbol	Allowed range
L3	0.643~1.273 mm (0.025~0.05 in)

20.3 Install the 5th speed ring gear and synchronizer ring.

Symbol	Description
A	5th speed ring gear & synchronizer

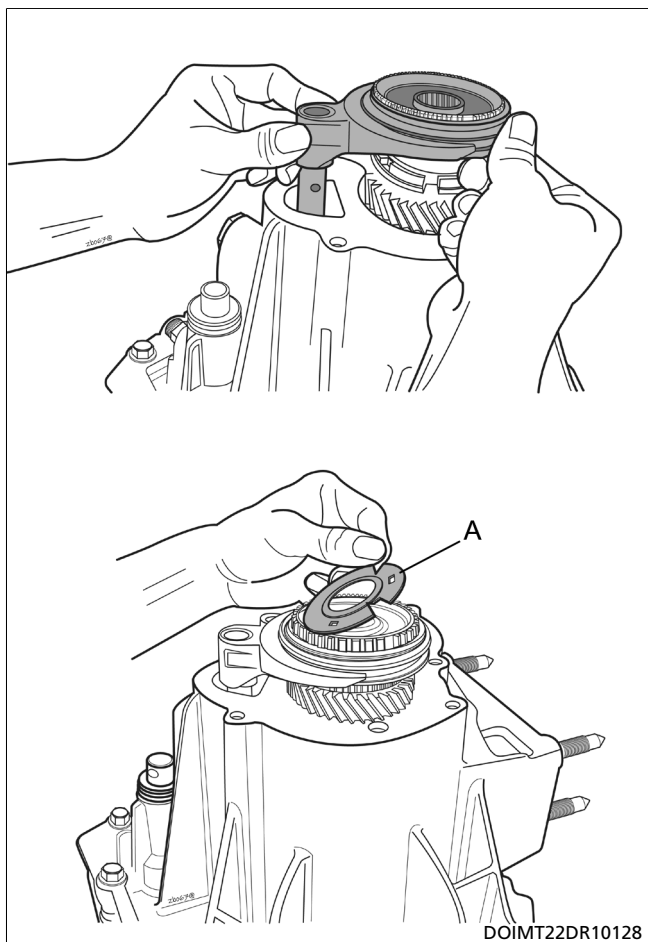


21. Put the 5th gear fork assembly and 5 th gear synchronizer assembly in the right position.

Symbol	Description
A	5th gear fork assembly
B	5th gear synchronizer assembly

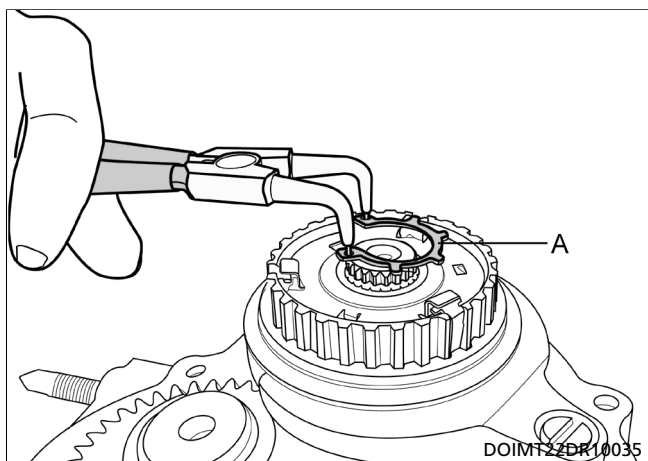
NOTE:

Notice the orientation of 5th gear synchronizer assembly, and make sure the hub's side which has letters is below.



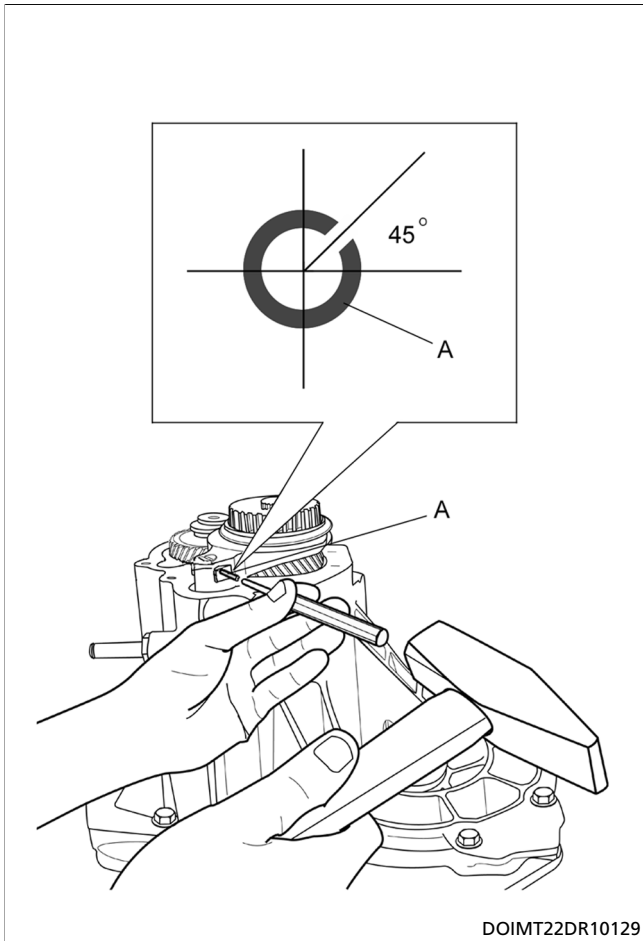
Add the 5th gear fork and synchronizer assembly then, put the 5th gear synchronizer spacer in place. Make sure the claws of spacer matching to the hub's slider grooves.

Symbol	Description
A	5th gear synchronizer spacer



22. Use a circlip plier to install a new retainer ring.

Symbol	Description
A	Retainer ring



23. Install a new spring pin by using common chisel (size 4) into the 5th fork and 5th /R shaft as shown in the illustration.

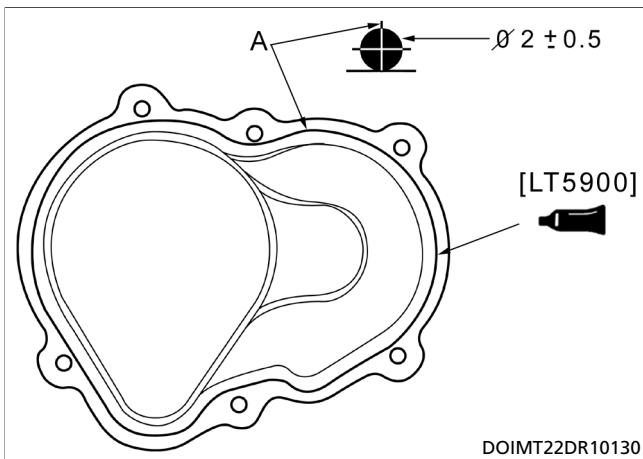
Symbol	Description
A	Spring pin

NOTE:

- (1) Ensure the spring pin is seating in 45° angle.
- (2) After this step the helper which had been showed in step 4 can be pulled off.

CAUTION:

Never reuse spring pin.

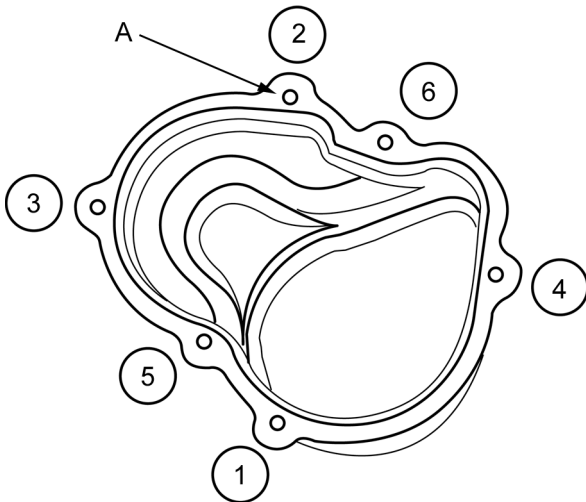
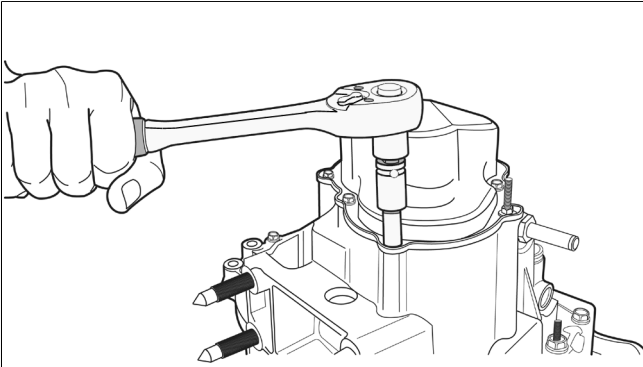


24. Apply recommended sealant to the rear cover as shown in the illustration.

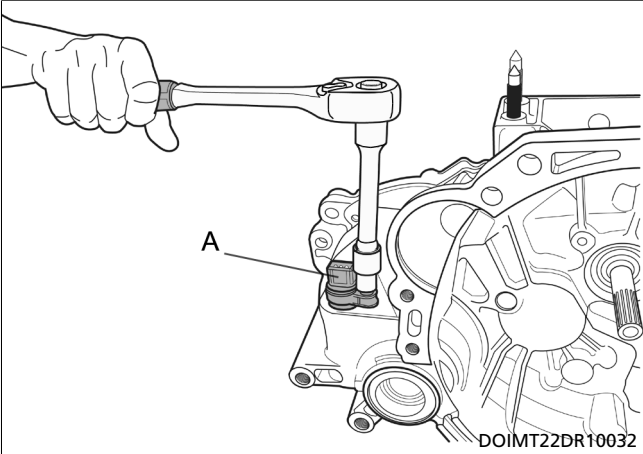
Specified sealant:

LT5900

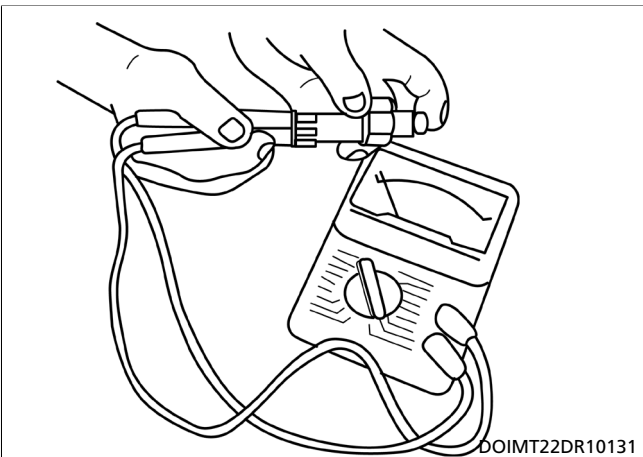
Symbol	Description
A	Sealant center line



DOIMT22DR10133



DOIMT22DR10032



DOIMT22DR10131

25. Mount the rear cover on transmission case and then tighten the bolts (5 pieces) and stud (1 piece) to the specified torque in sequence order as shown in illustration.

Symbol	Description
A	Stud

Specified torque:

Bolt	1.0~1.3 kgm (10~13 Nm, 0.67~0.87 ft.lbs)
Stud	2.9~4.9 kgm (29~49 Nm, 1.95~3.29 ft.lbs)

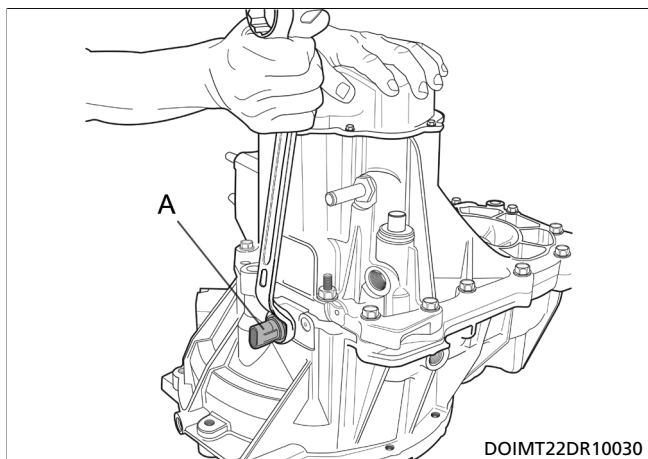
26. Put the speedometer assembly in place, and then install the bolt. Tighten the bolt to the specified torque.

Specified torque:

0.9~1.1 kgm (9~11 Nm, 0.6~0.74 ft.lbs)

Symbol	Description
A	Speedometer assembly

27. Before installing the reverse lamp switch, check the reverse lamp switch using multi-meter.

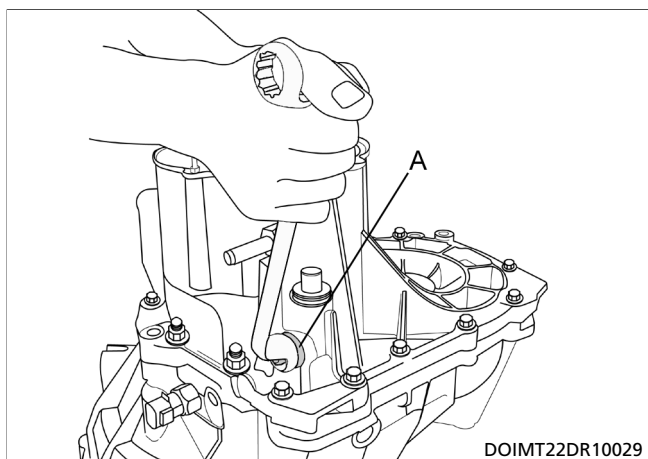


28. Mount the reverse lamp switch on clutch housing and tighten to the specified torque.

Symbol	Description
A	Reverse lamp switch

Specified torque:

2.0~2.5 kgm (20~25 Nm, 1.34~1.68 ft.lbs)

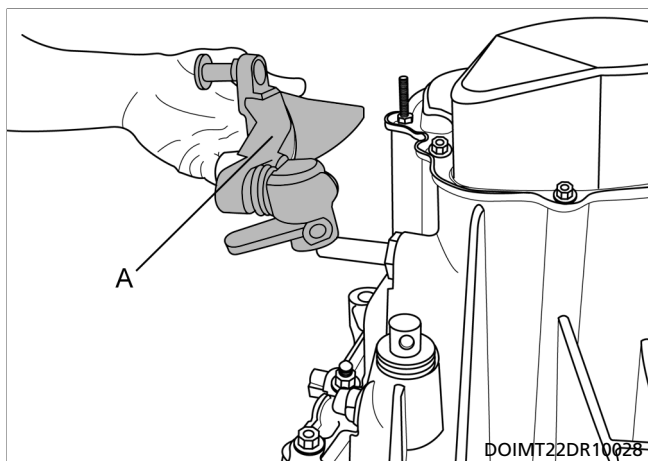


29. Mount the interlock retainer seat on the transmission case and tighten to the specified torque.

Specified torque:

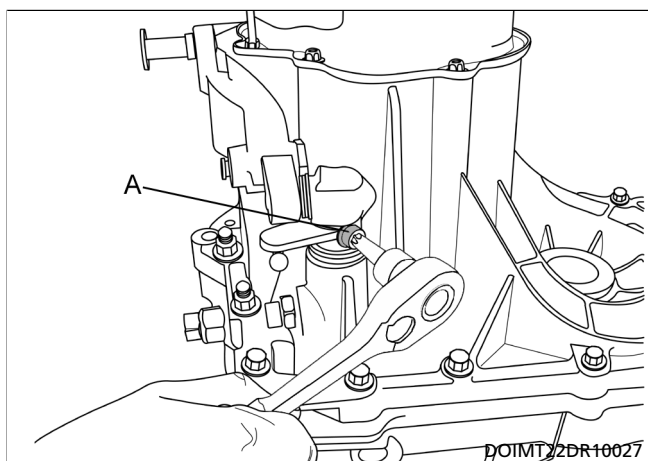
2.0~2.6 kgm (20~26 Nm, 1.34~1.74 ft.lbs)

Symbol	Description
A	Interlock retainer assembly



30. Install the select and shift lever.

Symbol	Description
A	Select and shift lever



31. Install the shift shaft screw and tighten the screw to the specified torque.

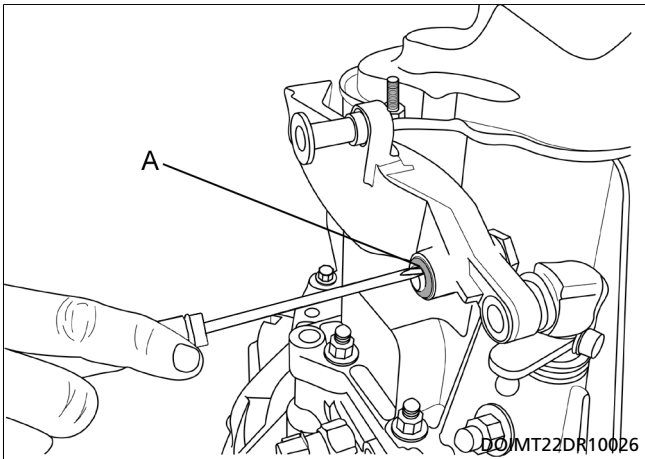
Specified torque:

2.0~2.6 kgm (20~26 Nm, 1.34~1.74 ft.lbs)

Symbol	Description
A	Shift shaft screw

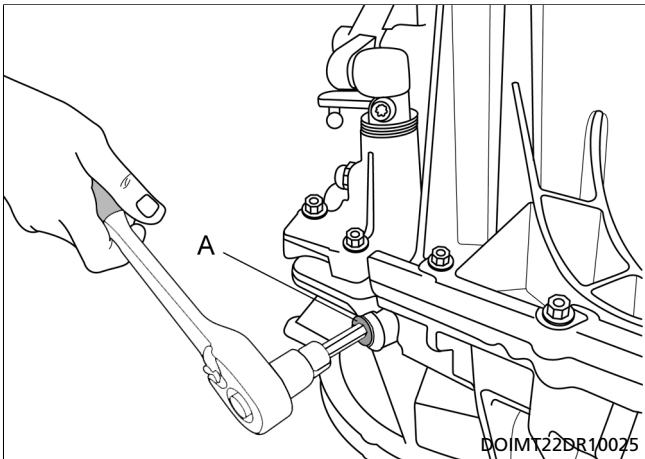
CAUTION:

Please be careful not to break the shift shaft oil seal.



32. Use a snap ring plier to connect E type retainer ring.

Symbol	Description
A	E type retainer ring



33. Use a torque wrench to install the drain oil plug on clutch housing and tighten the plug to the specified torque.

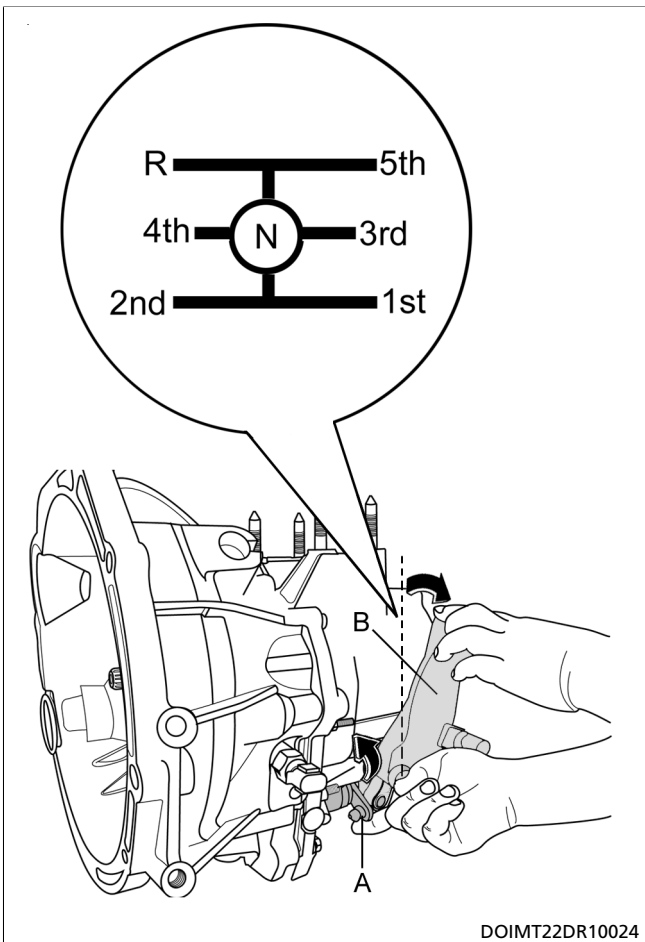
Specified torque:

2.9~4.1 kgm (29~41 Nm, 1.95~2.75 ft.lbs)

Symbol	Description
A	Drain plug

34. Check the select lever and shift lever operation condition.

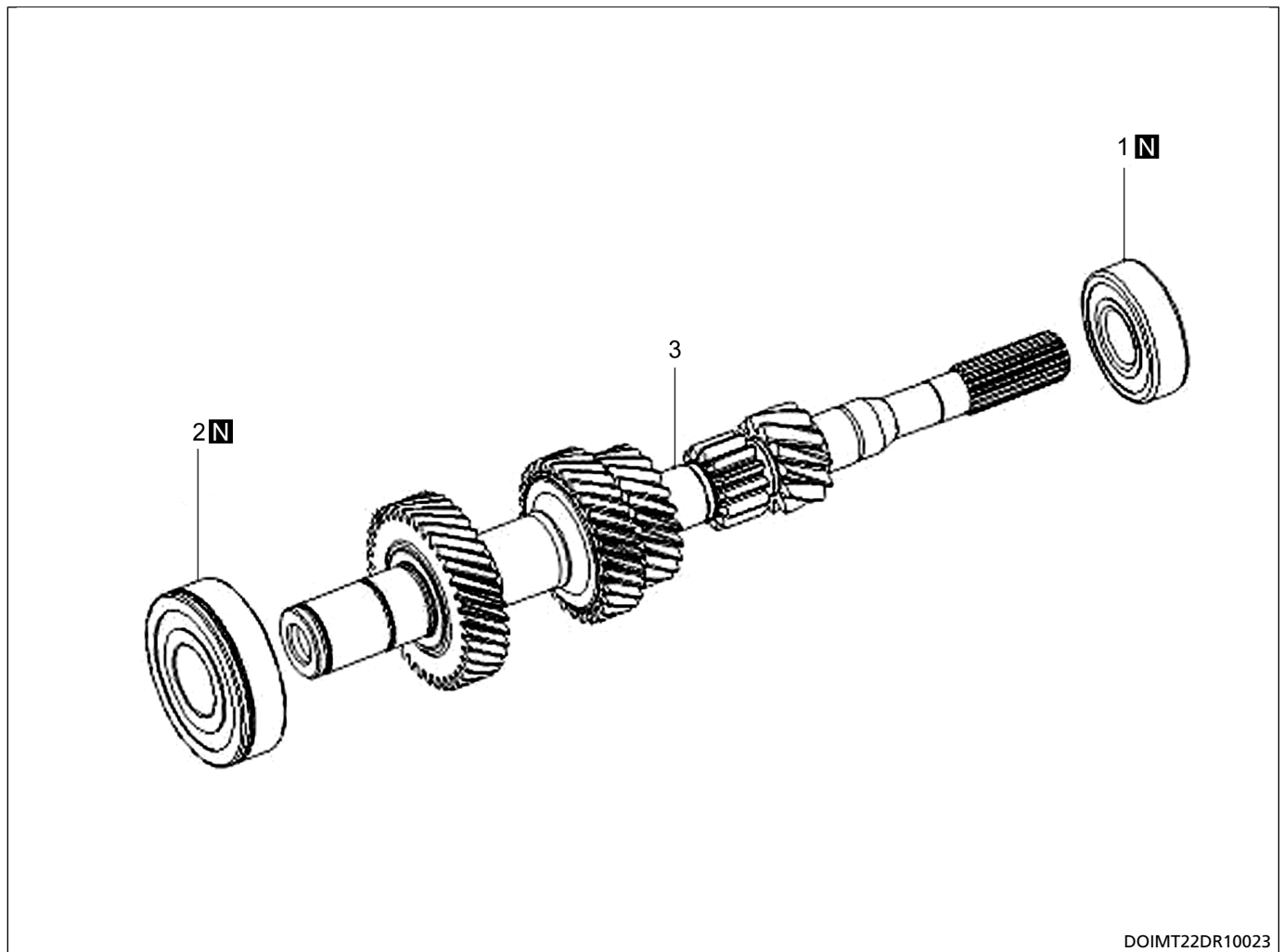
Symbol	Description
A	Select lever
B	Shift lever



INPUT SHAFT

WTC22DSHAUL004

DISASSEMBLY AND REASSEMBLY



DOIMT22DR10023



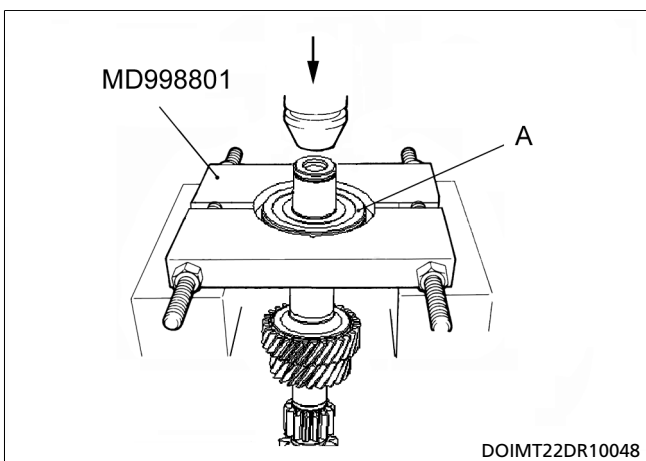
Lubricate all internal part with gear oil during reassembly



— Non-reusable part

Disassembly steps

- R&I** 1. Input shaft front bearing
- R&I** 2. Input shaft rear bearing
- 3. Input shaft



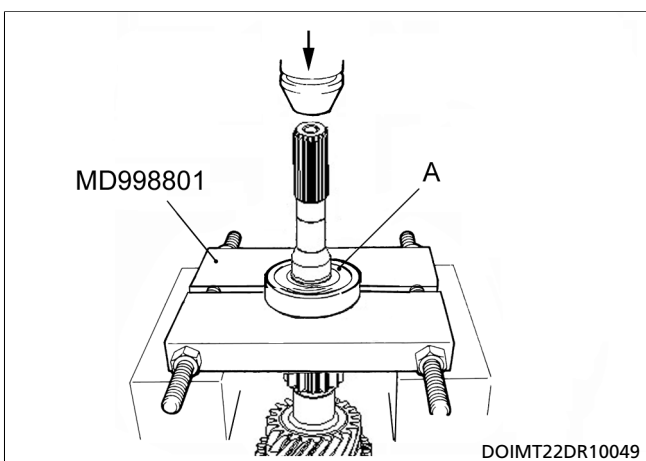
DISASSEMBLY SERVICE POINTS

WTC22DSHAUL005

R INPUT SHAFT REAR BEARING REMOVAL

By using special tool MD998801, press the input shaft in order to remove the rear bearing.

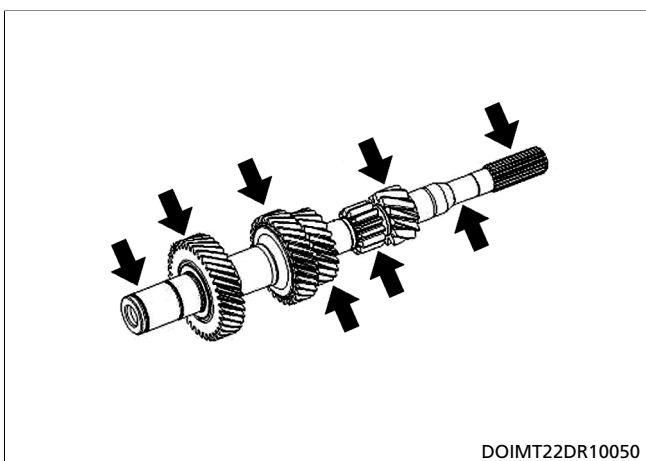
Symbol	Description
A	Input shaft rear bearing



R INPUT SHAFT FRONT BEARING REMOVAL

By using special tool MD998801, press the input shaft in order to remove the front bearing.

Symbol	Description
A	Input shaft front bearing



CHECK AND INSPECTION

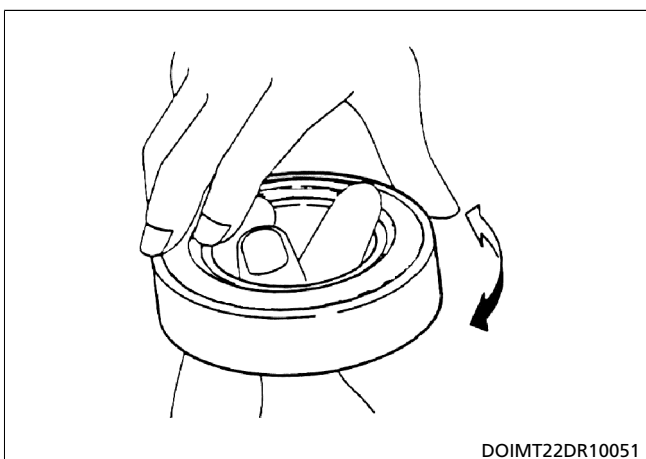
WTC22DSHAUL006

INPUT SHAFT

1. Check shaft for cracks, wear or bending.
2. Check gears for excessive wear, chips or cracks.

NOTE:

Replace new shaft if damage or wear.

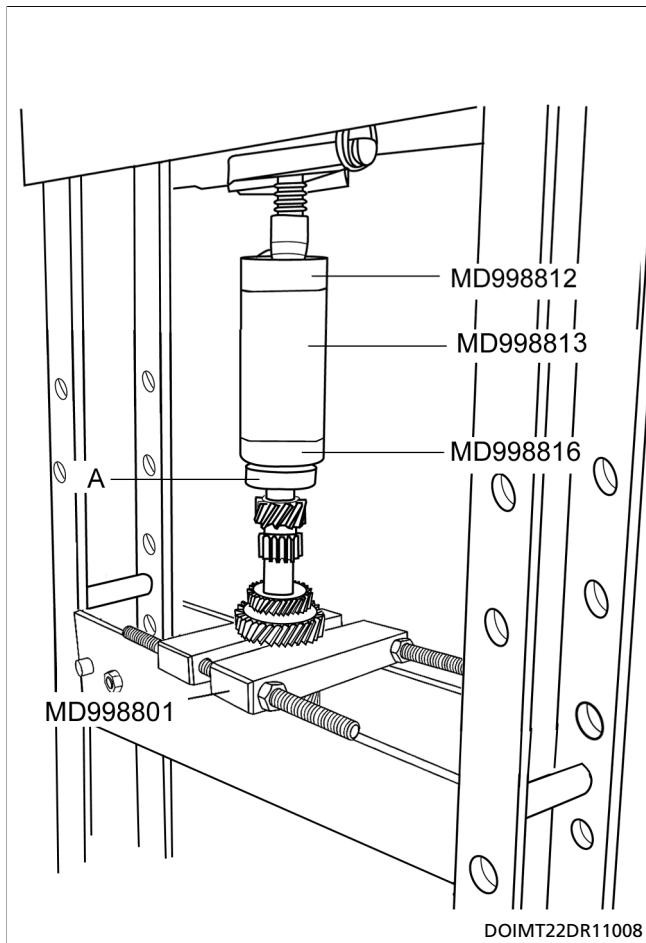


BEARING

Make sure bearing roll freely and free from noise, cracks, pitting or wear.

NOTE:

Replace new bearing if damage or wear.

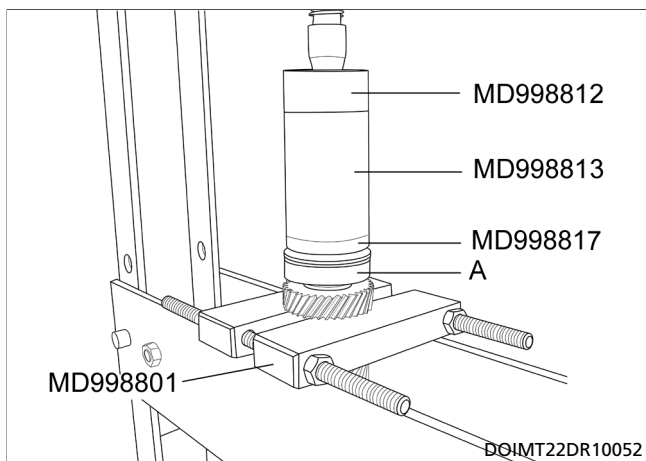
**REASSEMBLY SERVICE POINTS**

WTC22DSHAUL007

I INPUT SHAFT FRONT BEARING INSTALLATION

By using special tool MD998812, MD998813, MD998816, and MD998801, press the input shaft in order to install the front bearing.

Symbol	Description
A	Input shaft front bearing

**I INPUT SHAFT REAR BEARING INSTALLATION**

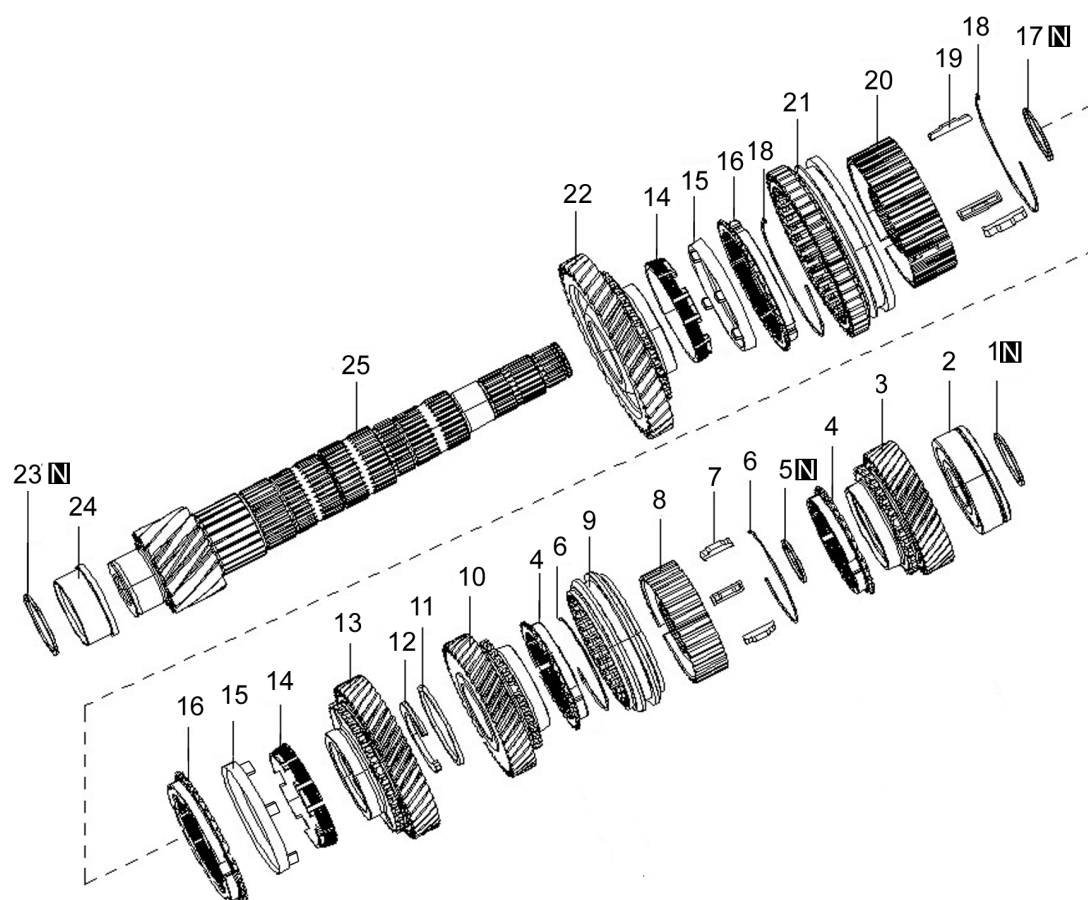
By using special tool MD998812, MD998813, MD998817 and MD998801, press the input shaft in order to install the rear bearing.

Symbol	Description
A	Input shaft rear bearing

OUTPUT SHAFT

WTC22D5HAUL008

DISASSEMBLY AND REASSEMBLY



DOIMT22DR10053



Lubricate all internal part with gear oil during reassembly

N — Non-reusable part

Disassembly steps

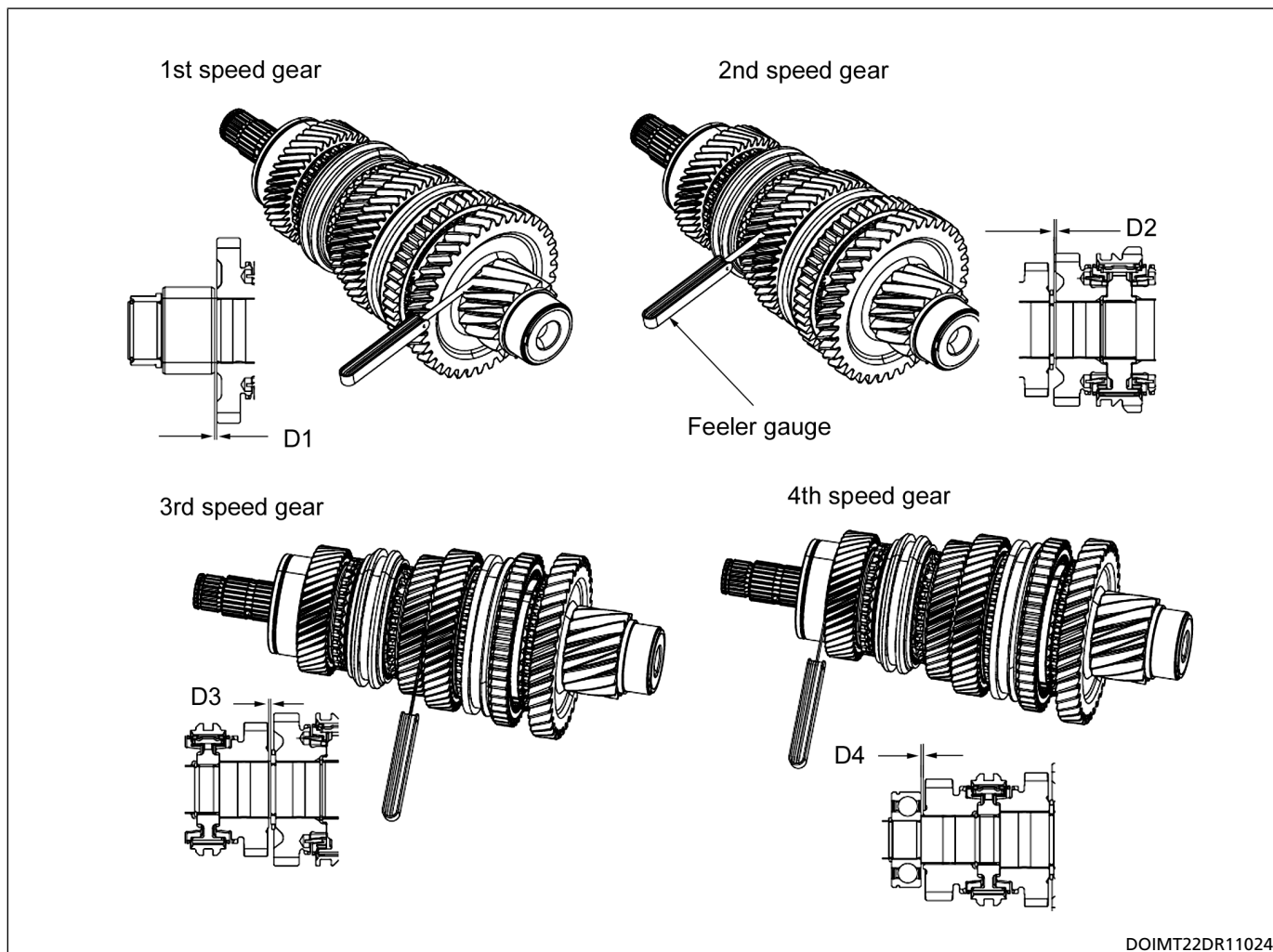
1. Retainer ring
2. Output shaft rear bearing
3. 4th speed ring gear
4. 3rd/4th/5th synchronizer ring
5. Retainer ring
6. 3rd/4th synchronizer spring
7. 3rd/4th synchronizer slider
8. 3rd/4th synchronizer hub
9. 3rd/4th synchronizer sleeve
10. 3rd speed ring gear
11. Stop ring
12. Stop washer
13. 2nd speed ring gear

14. 1st/2nd synchronizer inner ring
15. Synchronizer cone ring
16. 1st/2nd synchronizer outer ring
17. Retainer ring
18. 1st/2nd gear synchronizer spring
19. 1st/2nd gear synchronizer slider
20. 1st/2nd gear synchronizer hub
21. 1st/2nd gear synchronizer sleeve
22. 1st speed ring gear
23. Retainer ring
24. Output shaft front bearing inner ring
25. Output shaft

DISASSEMBLY SERVICE POINTS

WTC22DSHAUL009

SPEED GEAR CLEARANCE CHECK



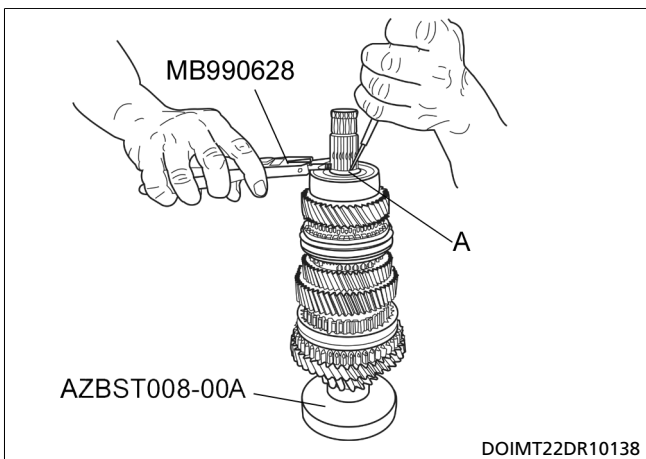
1. Check each speed gear clearance before disassembly the output shaft assy.
2. By using a feeler gauge check the dimension D1, D2, D3 and D4.

CAUTION

If actual clearance out the allowed range need replace the part.

Specified clearance:

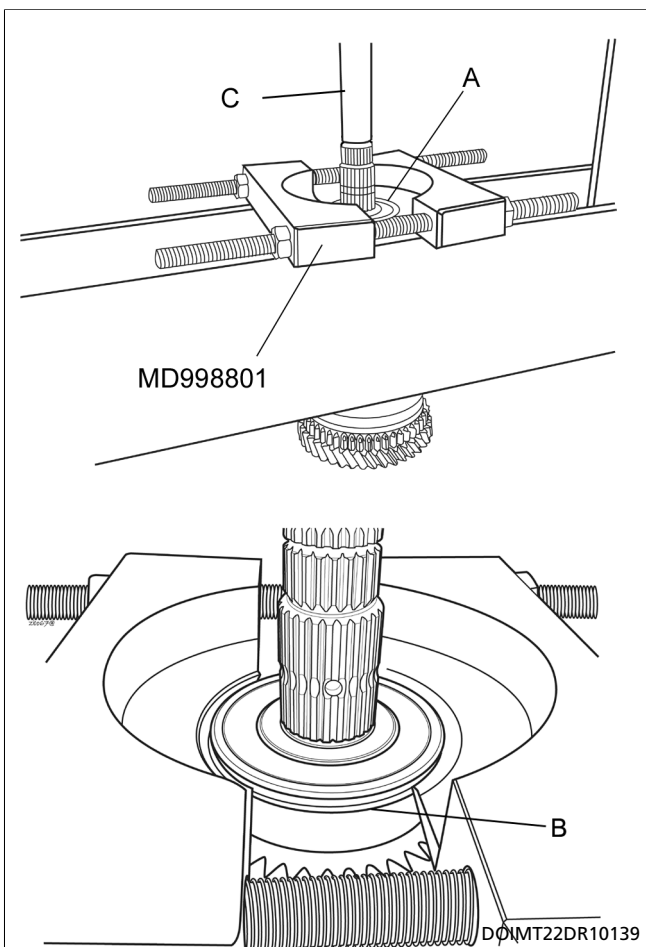
Symbol	Allowed range
D1	0.06~0.24 mm (0.002~0.009 in)
D2	0.165~0.43 mm (0.006~0.017 in)
D3	0.09~0.21 mm (0.004~0.008 in)
D4	0.175~0.335 mm (0.007~0.013 in)



R OUTPUT SHAFT RETAINER RING REMOVAL

By using a snap ring plier MB990628 and AZBST008-00A remove the retainer ring.

Symbol	Description
A	Retainer ring



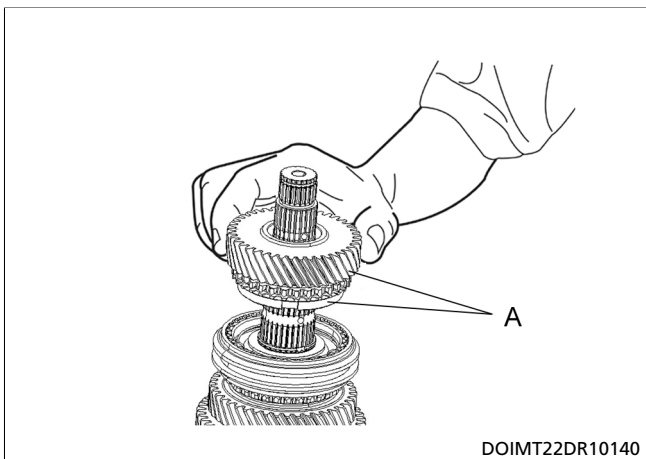
R OUTPUT SHAFT REAR BEARING REMOVAL

By using special tool MD998801 and bar, press the output shaft in order to remove the output shaft rear bearing.

Symbol	Description
A	Output shaft rear bearing
B	Output shaft rear bearing groove
C	Bar

NOTE:

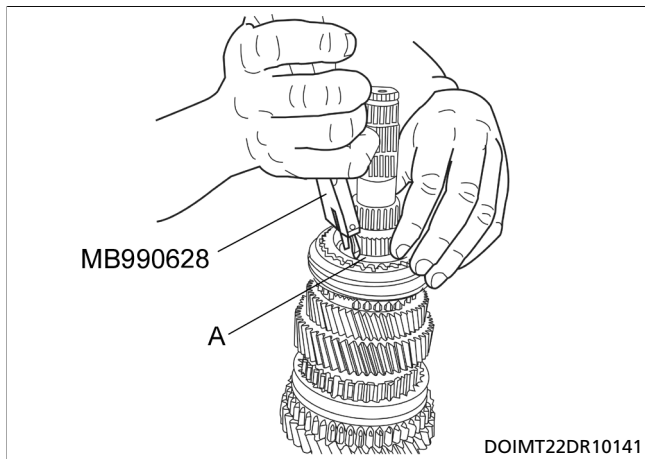
Ensure lip of the special tool seat in the rear bearing groove.



R 4TH SPEED RING GEAR AND SYNCHRONIZER RING REMOVAL

Remove the 4th speed ring gear and synchronizer ring pack manually.

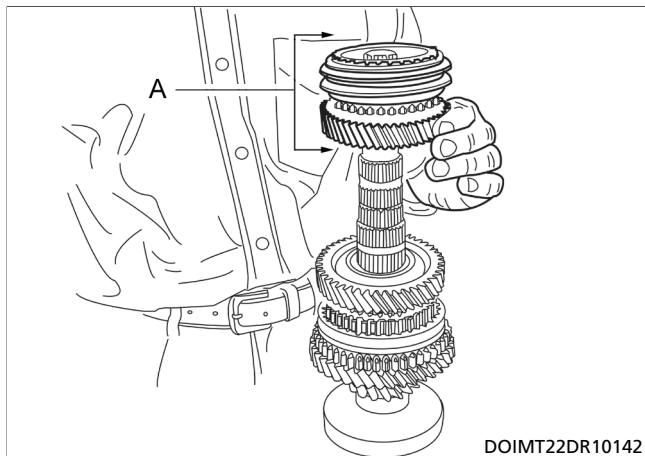
Symbol	Description
A	4th speed ring gear and synchronizer ring



R RETAINER RING REMOVAL

By using a snap ring plier MB990628, remove the retainer ring.

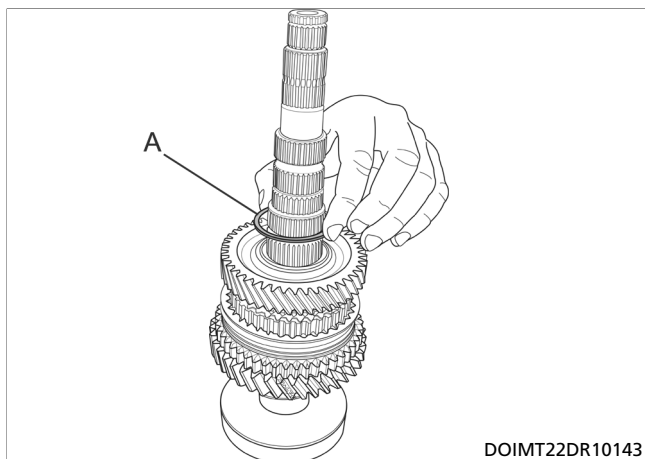
Symbol	Description
A	Retainer ring



R 3RD SPEED RING GEAR AND SYNCHRONIZER REMOVAL

Remove the 3rd speed ring gear and synchronizer pack manually.

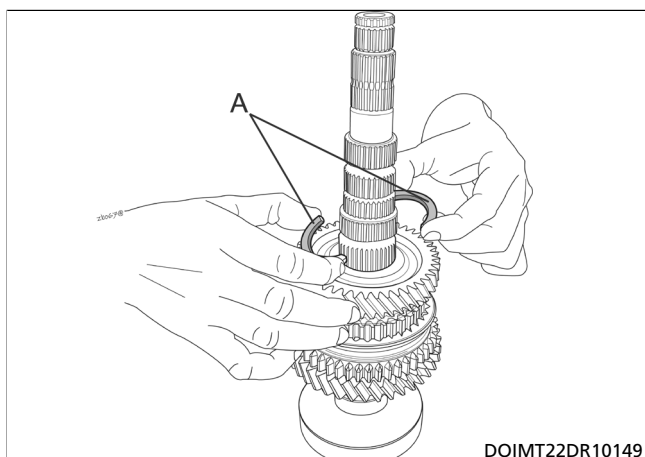
Symbol	Description
A	3rd speed ring gear and synchronizer



R STOP RING REMOVAL

Remove the stop ring manually.

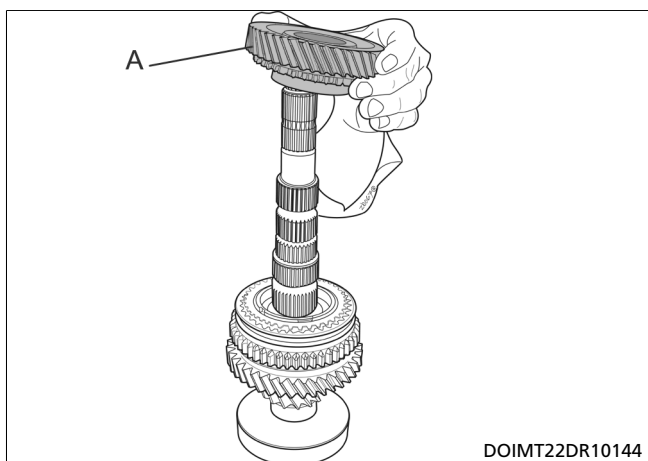
Symbol	Description
A	Stop ring



R STOP WASHER REMOVAL

Remove the stop washer manually.

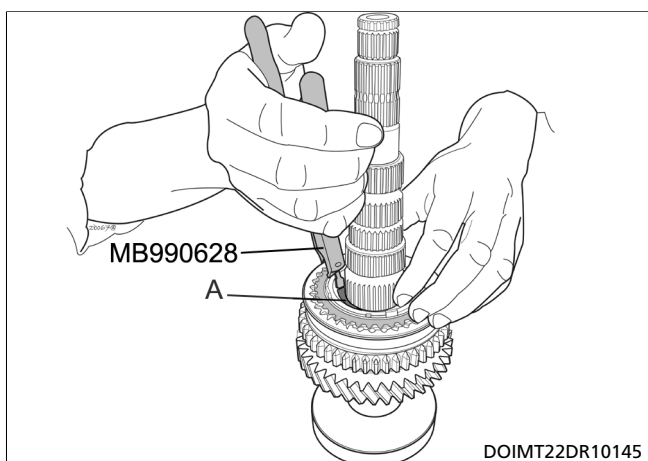
Symbol	Description
A	Stop washer



R 2ND SPEED RING GEAR AND SYNCHRONIZER RING REMOVAL

Remove the 2nd speed ring gear and synchronizer rings manually.

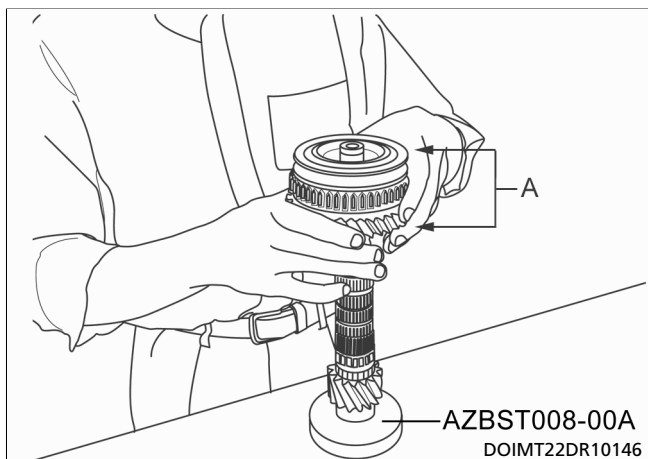
Symbol	Description
A	2nd speed ring gear & synchronizer ring



R RETAINER RING REMOVAL

By using a snap ring plier MB990628, remove the retainer ring.

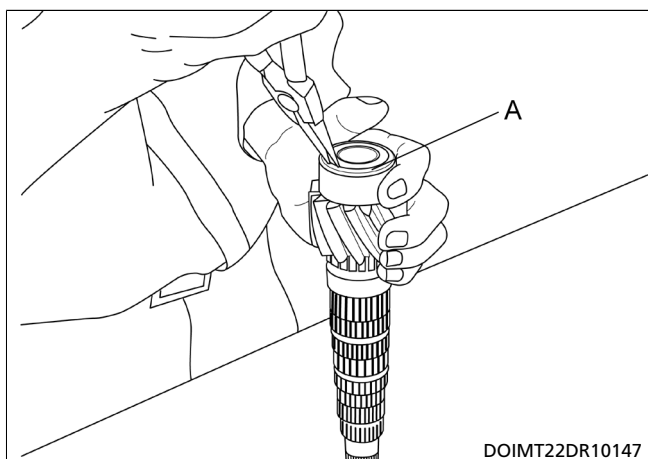
Symbol	Description
A	Retainer ring



R 1ST SPEED RING GEAR AND SYNCHRONIZER REMOVAL

Remove the 1st speed ring gear and synchronizer pack manually.

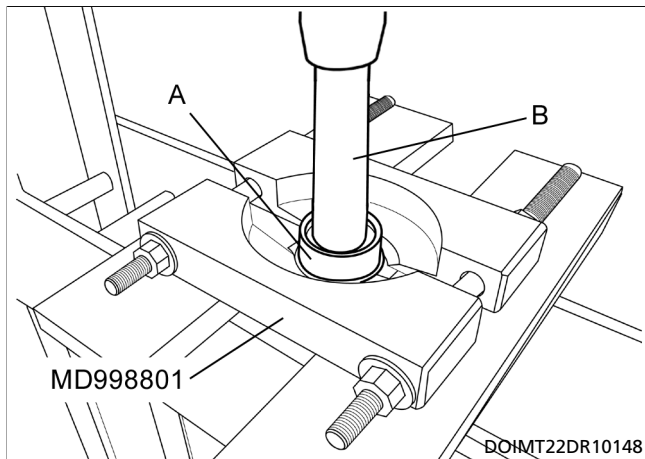
Symbol	Description
A	1st speed ring gear and synchronizer pack



R RETAINER RING REMOVAL

By using a circlip plier, remove the retainer ring.

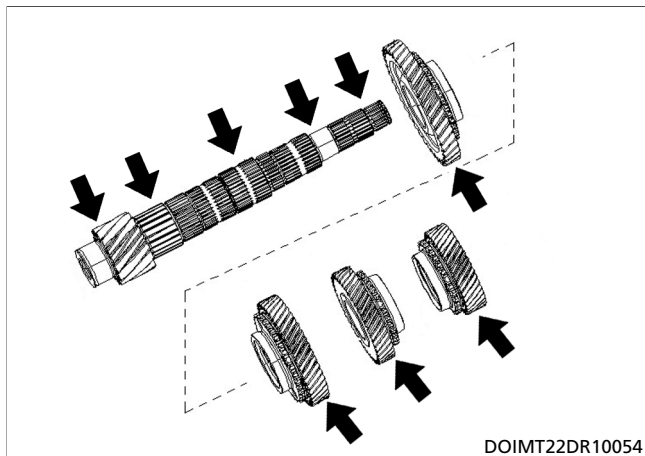
Symbol	Description
A	Retainer ring



R OUTPUT SHAFT FRONT BEARING INNER RING REMOVAL

By using special tool MD998801 and bar, press the output shaft in order to remove the output shaft front bearing inner ring.

Symbol	Description
A	Output shaft front bearing inner ring
B	Bar size 32 mm (1.26 in)

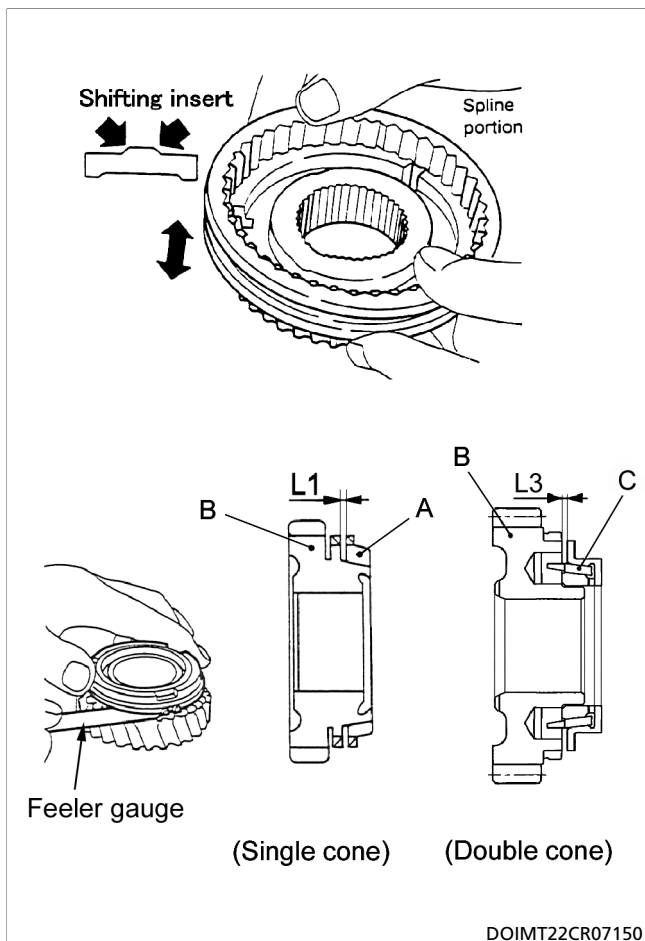


CHECK AND INSPECTION

WTC22DSHAUL010

GEAR AND SHAFT

1. Check shaft for cracks, wear or bending.
2. Check gears for excessive wear, chips or cracks.



SYNCHRONIZER

1. Check spline area of new coupling sleeves, hubs and gears for wear or cracks.
2. Check the new synchronizer rings for cracks or deformation.
3. Check shifting insert for wear or deformation.

CAUTION:

Never reuse synchronizer assembly (coupling sleeve, hub and synchronizer ring).

4. By using a feeler gauge measure clearance between new synchronizer ring and gear (for single cone side).

Dimension "L1" :

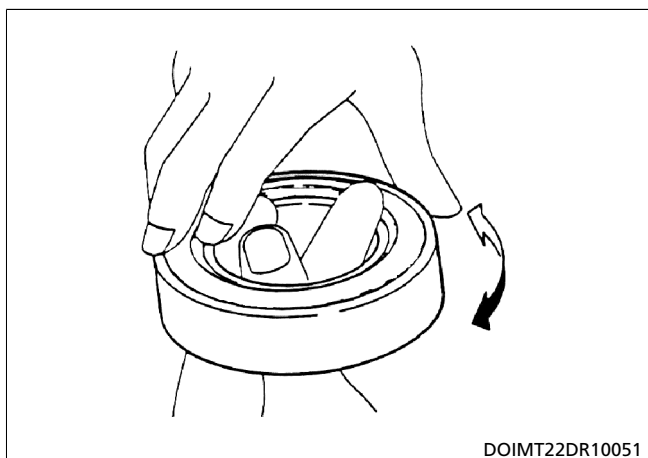
0.62-1.54 mm (0.024-0.061 in) (Refer to page 22D/9 — Synchronizer ring clearance).

5. By using a feeler gauge measure clearance between new synchronizer ring assembly and gear (for double cone side).

Dimension "L3" :

0.643-1.273 mm (0.025-0.05 in) (Refer to page 22D/9 — Synchronizer ring clearance).

Symbol	Description
A	Synchronizer ring
B	Gear
C	Synchronizer ring assembly

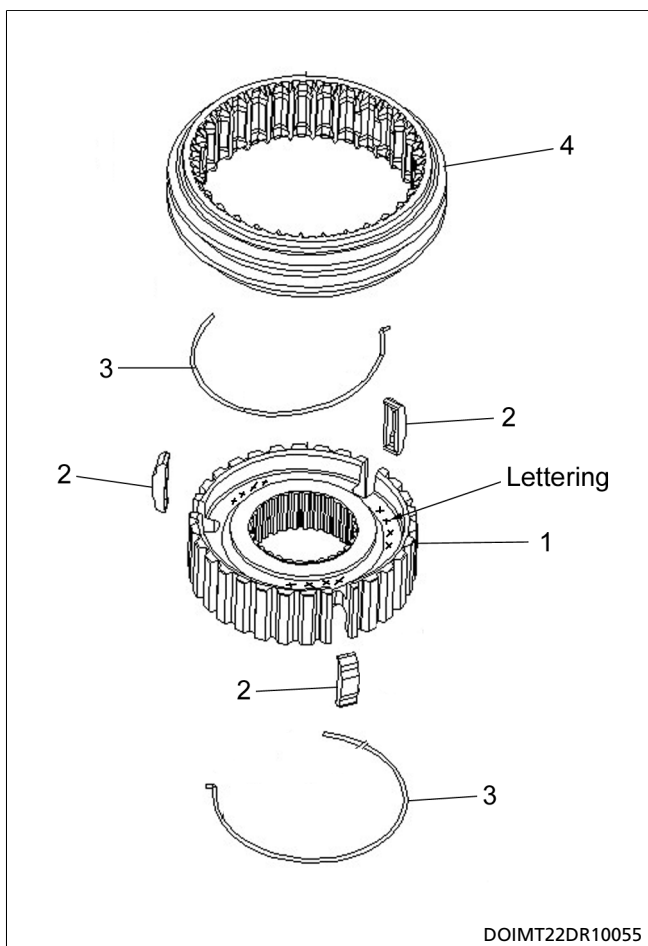


BEARING

Make sure new bearings roll freely and free from noise, cracks, pitting or wear.

NOTE:

- (1) Is damage or wear, replace new bearing (for rear bearing only).
- (2) Is damage or wear, replace new bearing and shaft (for front bearing only).



ASSEMBLY OF SYNCHRONIZER

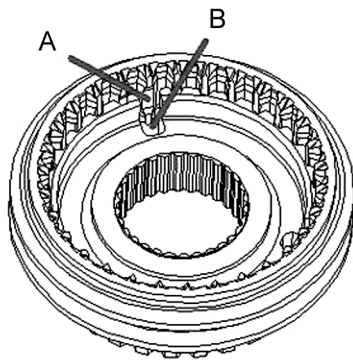
WTC22DSHAUL011

SYNCHRONIZER SECTIONAL VIEW

Symbol	Description
1	Synchronizer hub
2	Synchronizer slider
3	Synchronizer spring
4	Synchronizer sleeve

NOTE

Ensure synchronizer hub lettering is upper before install at the shaft.

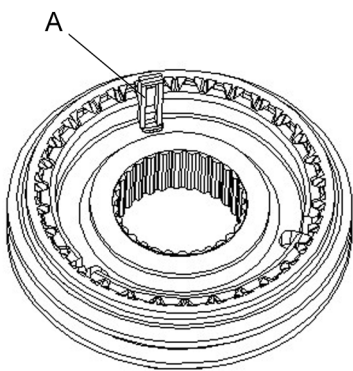


DOIMT22DR10056

I SYNCHRONIZER HUB INSTALLATION

Locate the sleeve and hub, by ensuring the groove of the sleeve mating with the groove of the hub.

Symbol	Description
A	Groove of the sleeve
B	Groove of the hub

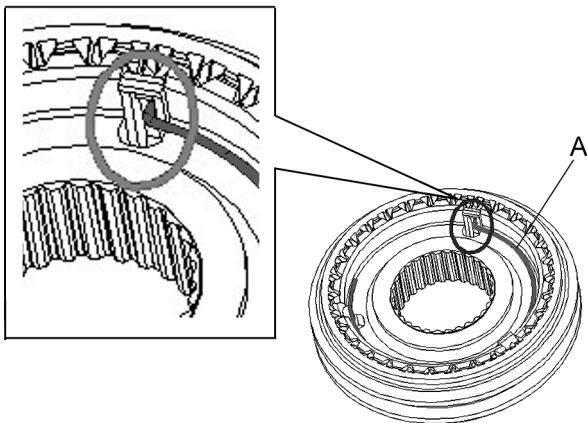


DOIMT22DR10057

I SYNCHRONIZER SLIDER INSTALLATION

Insert the slider into the groove as shown in the illustration.

Symbol	Description
A	Slider



DOIMT22DR10058

I SYNCHRONIZER SPRING INSTALLATION

1. Fit the hook of the spring into the slider.

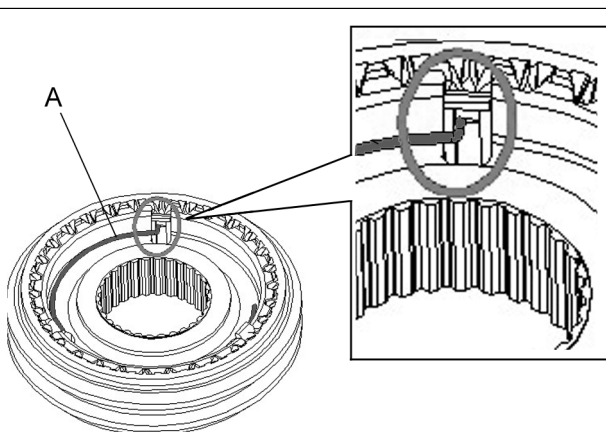
Symbol	Description
A	Spring

2. Mount the spring on the other side, and then wait for transmission installation.

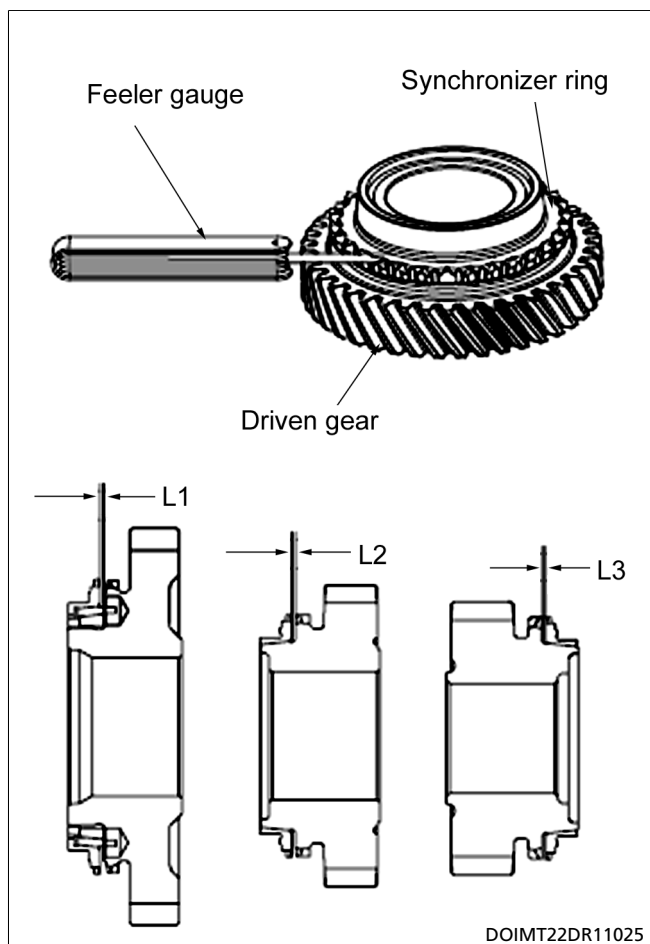
NOTE:

Be careful, the spring orientation during installation. The orientation at one side is opposite to the other side.

Symbol	Description
A	Spring



DOIMT22DR10059



REASSEMBLY SERVICE POINTS

WTC22D5HAUL012

I SYNCHRONIZER RING CLEARANCE CHECK

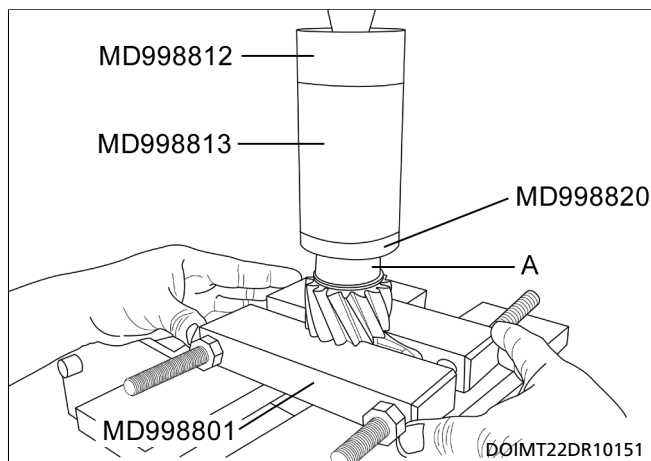
1. Check each gear except 5th gear synchronizer ring clearance before reassembly the output shaft assy.
2. By using a feeler gauge check the dimension L1, L2 and L3.

CAUTION

If actual clearance out the allowed range need replace the part.

Specified clearance:

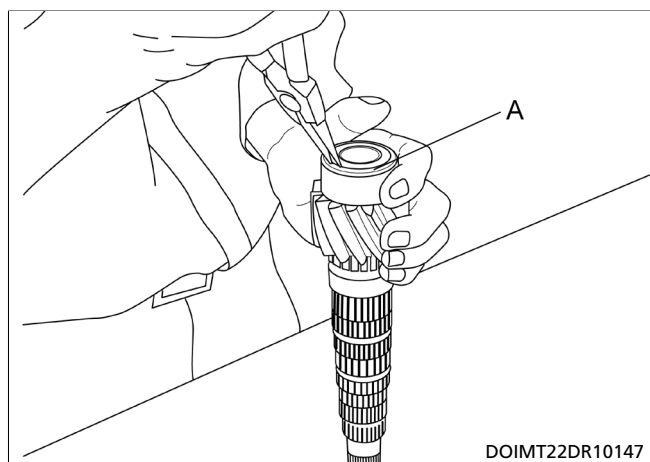
Symbol	Allowed range (mm)
L1	0.62~1.54 mm (0.024~0.061 in)
L2	0.612~1.262 mm (0.024~0.05 in)
L3	0.643~1.273 mm (0.025~0.05 in)



I OUTPUT SHAFT FRONT BEARING INNER RING INSTALLATION

By using special tools MD998801, MD998812, MD998813 and MD998820, press the front bearing inner ring.

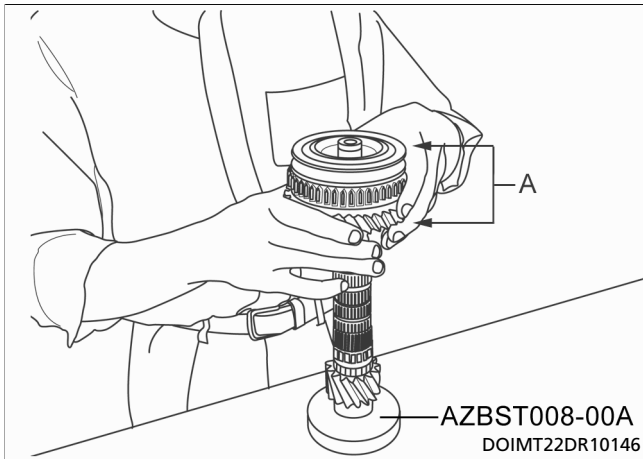
Symbol	Description
A	Output shaft front bearing inner ring



I RETAINER RING INSTALLATION

By using circlip plier, install the retainer ring.

Symbol	Description
A	Retainer ring



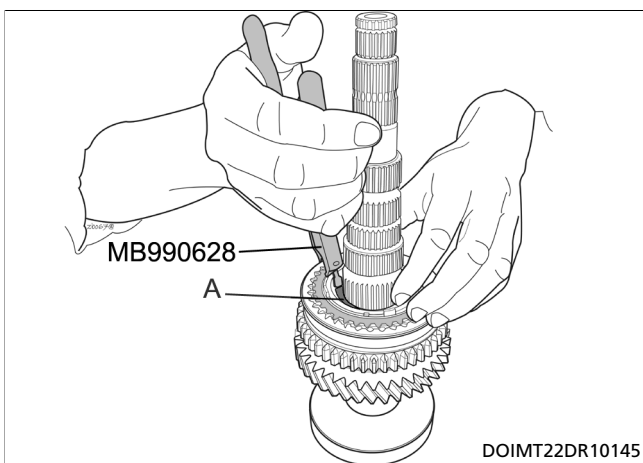
I 1ST SPEED RING GEAR AND 1ST/2ND SYNCHRONIZER PACK INSTALLATION

Locate the output shaft at special tool AZBST008-00A and install 1st speed ring gear and 1st/2nd synchronizer pack in place.

Symbol	Description
A	1st speed ring gear & 1st/2nd synchronizer pack

NOTE:

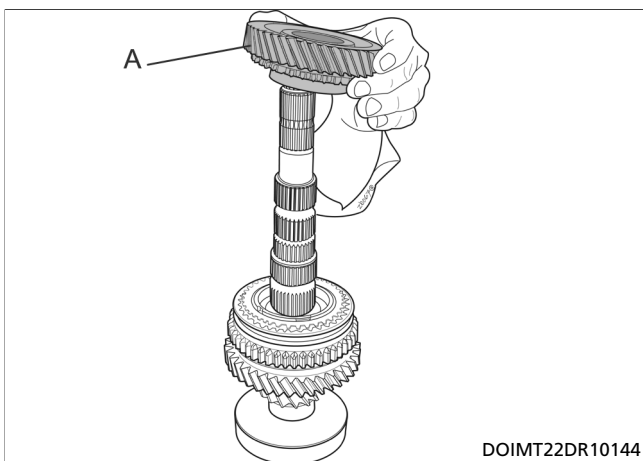
Notice the orientation of synchronizer assembly. Make sure the hub's side which has letters is above.



I RETAINER RING INSTALLATION

By using a snap ring plier MB990628, install the retainer ring.

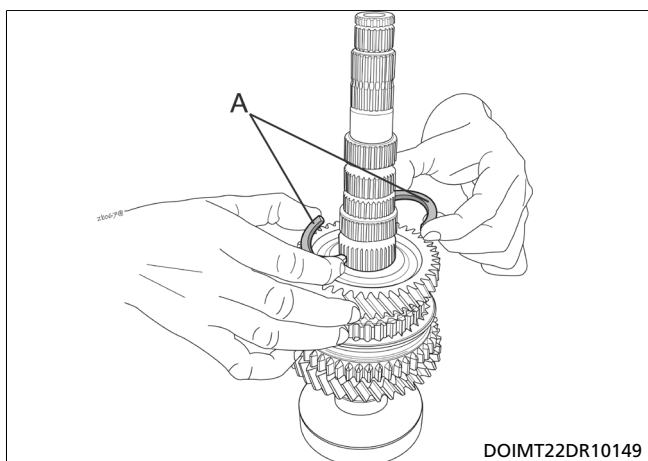
Symbol	Description
A	Retainer ring



I 2ND SPEED RING GEAR AND SYNCHRONIZER RING INSTALLATION

Put the 2nd speed ring gear and synchronizer rings in place.

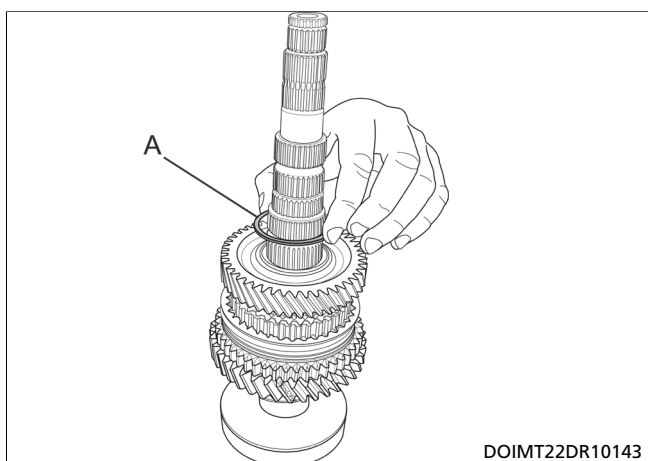
Symbol	Description
A	2nd speed ring gear & synchronizer ring



I STOP WASHER AND INSTALLATION

Put the stop washer in place.

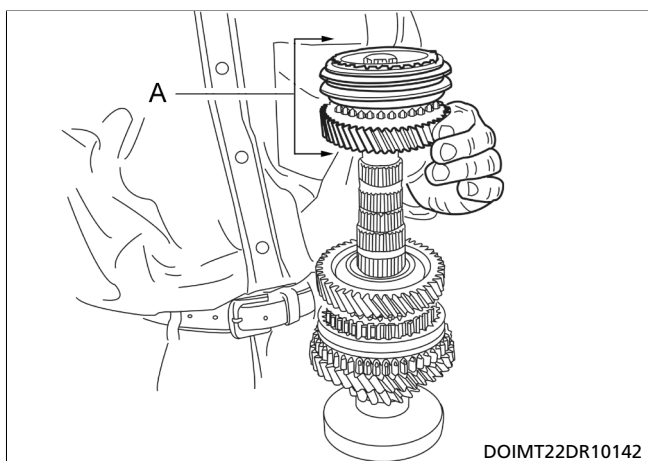
Symbol	Description
A	Stop washer



I STOP RING INSTALLATION

Put the stop ring on the thrust washer.

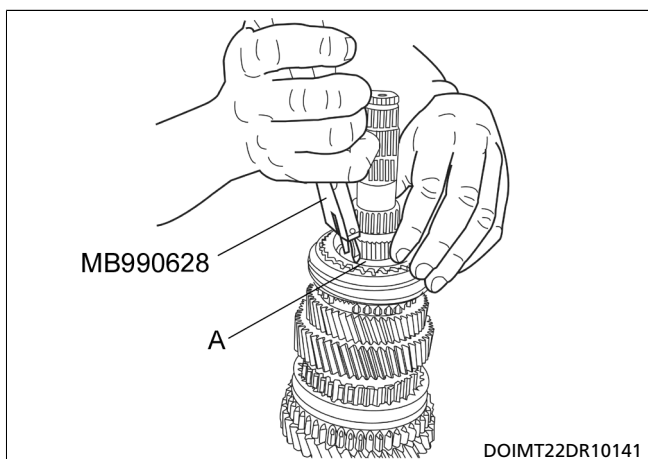
Symbol	Description
A	Stop ring



I 3RD SPEED RING GEAR AND SYNCHRONIZER RING INSTALLATION

Put the 3rd speed ring gear and synchronizer ring in place.

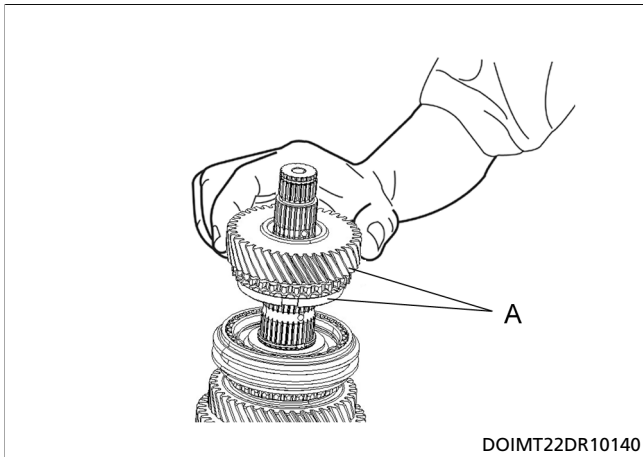
Symbol	Description
A	3rd speed ring gear & synchronizer ring



I RETAINER RING INSTALLATION

By using snap ring plier MB990628, install the retainer ring.

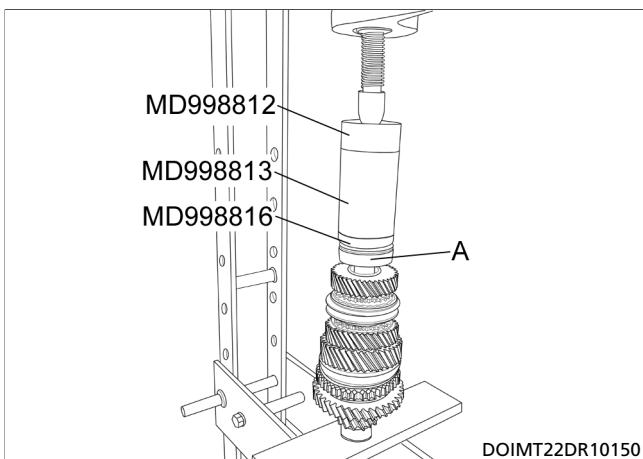
Symbol	Description
A	Retainer ring



I 4TH SPEED RING GEAR AND SYNCHRONIZER RING INSTALLATION

Put the 4th speed ring gear and synchronizer ring in place.

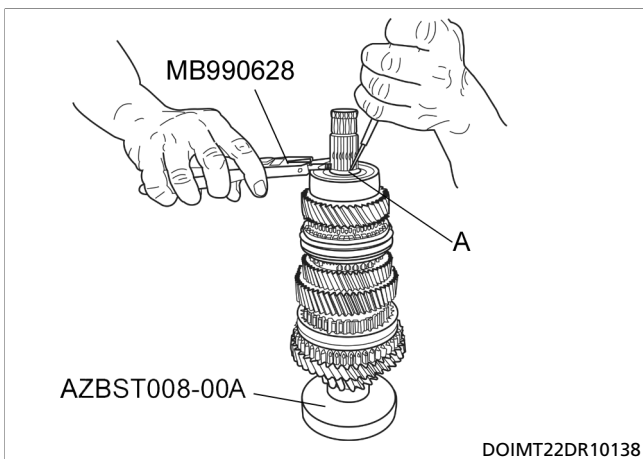
Symbol	Description
A	4th speed ring gear & synchronizer ring



I OUTPUT SHAFT REAR BEARING INSTALLATION

By using special tools MD998812, MD998813 and MD998816, press the output shaft rear bearing.

Symbol	Description
A	Output shaft rear bearing



I RETAINER RING INSTALLATION

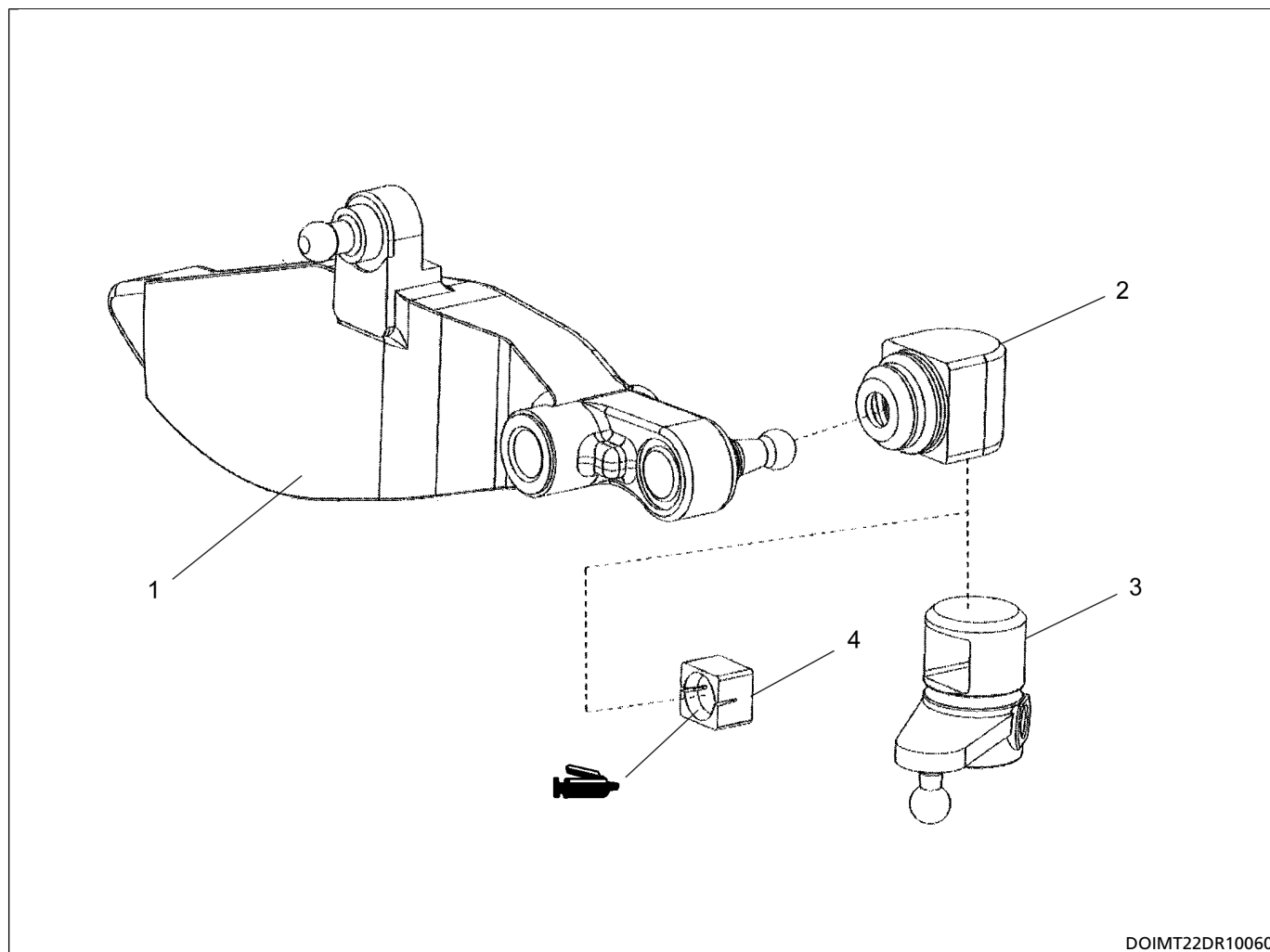
By using a snap ring plier MB990628, install the retainer ring.

Symbol	Description
A	Retainer ring

SELECT AND SHIFT LEVER

WTC22D5HAUL013

DISASSEMBLY AND REASSEMBLY



DOIMT22DR10060



Apply lubricant grease (Type: WSD-M1C244-A GLY801)

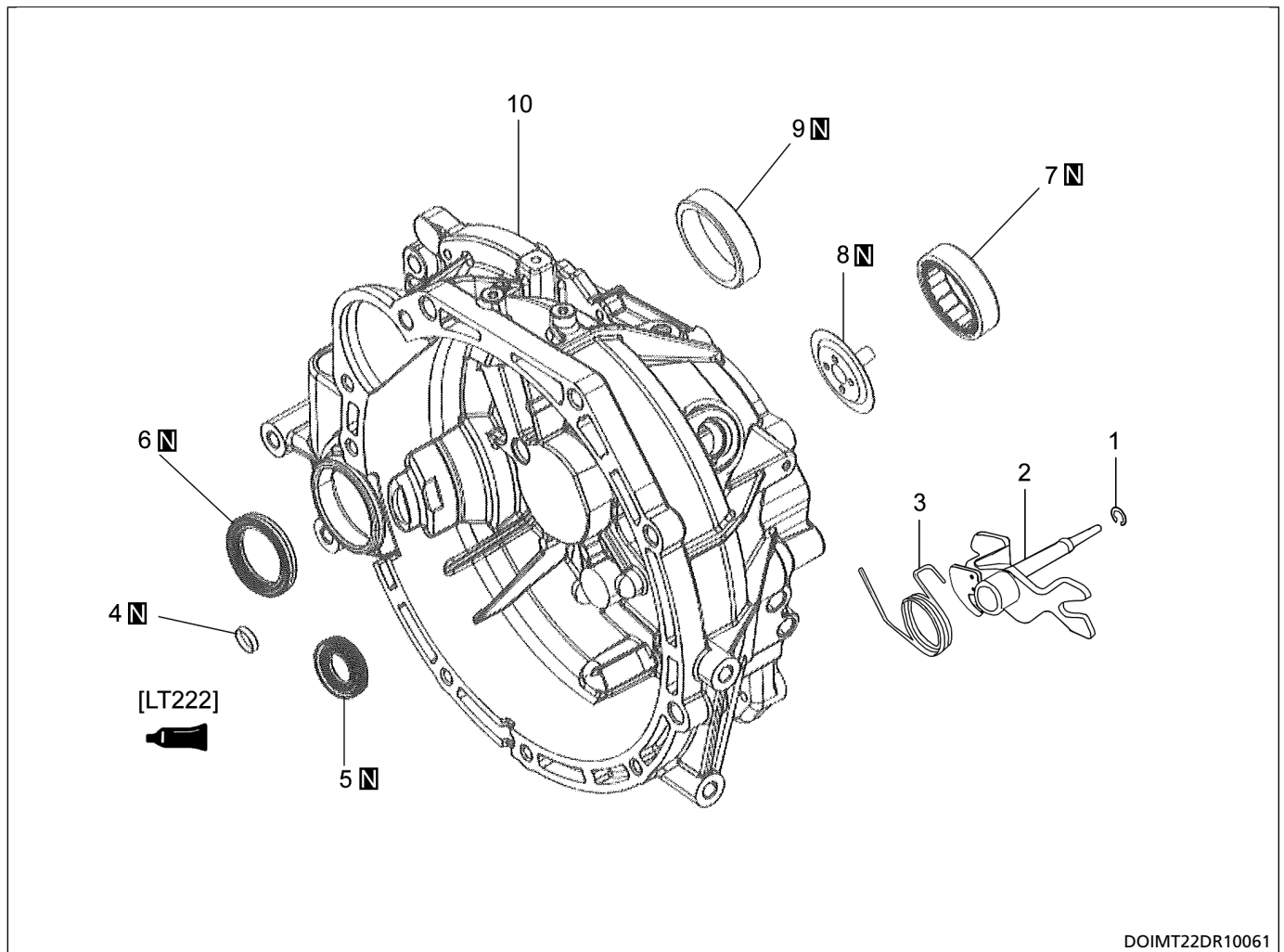
Disassembly steps

1. Shift lever
2. Select lever sleeve
3. Select lever
4. Select lever slider

CLUTCH HOUSING

WTC22DSHAUL014

DISASSEMBLY AND REASSEMBLY



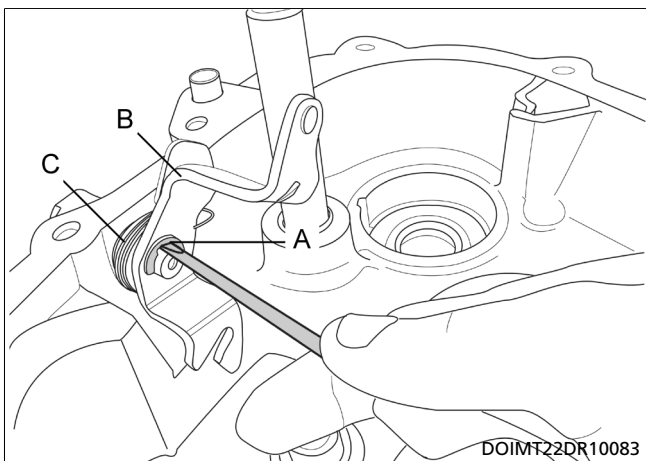
DOIMT22DR10061

— Apply Sealant (Type: LT222)

N — Non-reusable part

Disassembly steps

- R&I** 1. E type retainer ring
- 2. Reverse shift lever
- 3. Reverse gear rebound spring
- R&I** 4. Clutch housing plug
- R&I** 5. Input shaft oil seal
- R&I** 6. Differential oil seal
- R&I** 7. Output shaft front bearing outer ring
- 8. Output shaft funnel
- R&I** 9. Differential outer race
- 10. Clutch housing



DISASSEMBLY SERVICE POINTS

WTC22D5HAUL015

R SHIFT SHAFT CLIP REMOVAL

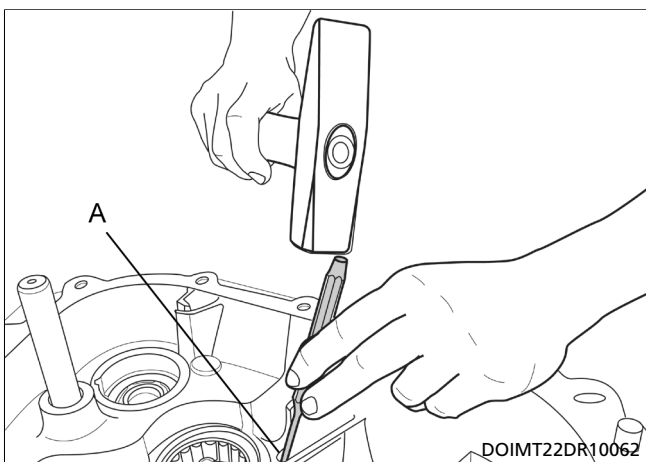
Use a screw driver to push out the E type retainer ring and then, remove the reverse shift lever and reverse gear rebound spring.

Symbol	Description
A	E type retainer ring
B	Reverse shift lever
C	Reverse gear rebound spring

R CLUTCH HOUSING PLUG REMOVAL

Use a chisel and hammer to knock the plug out from the clutch housing.

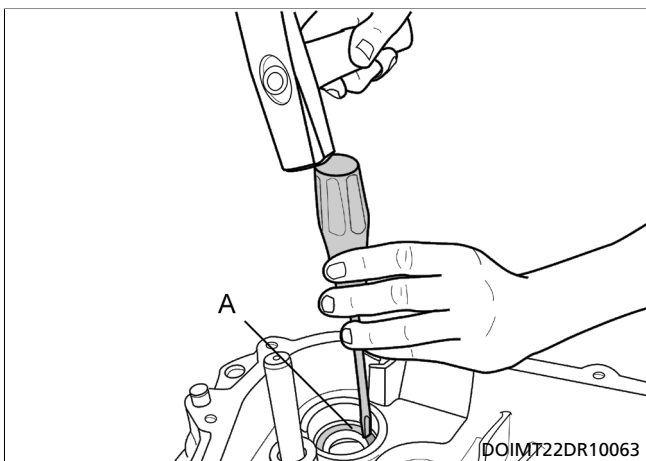
Symbol	Description
A	Plug



R INPUT SHAFT OIL SEAL REMOVAL

By using screw driver, remove the input shaft oil seal.

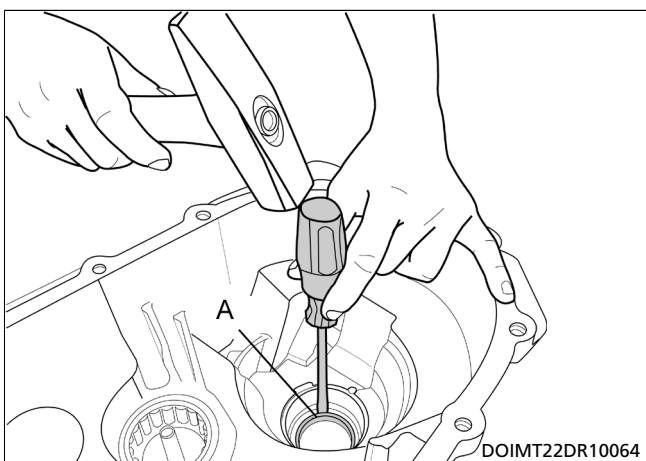
Symbol	Description
A	Input shaft oil seal

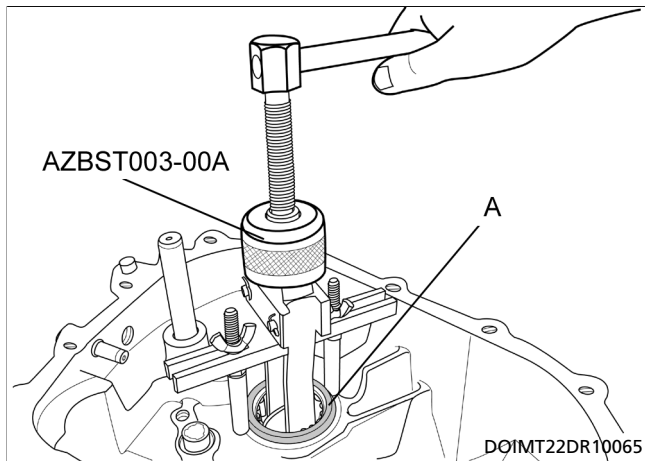


R DIFFERENTIAL OIL SEAL REMOVAL

By using screw driver, remove the differential oil seal.

Symbol	Description
A	Differential oil seal

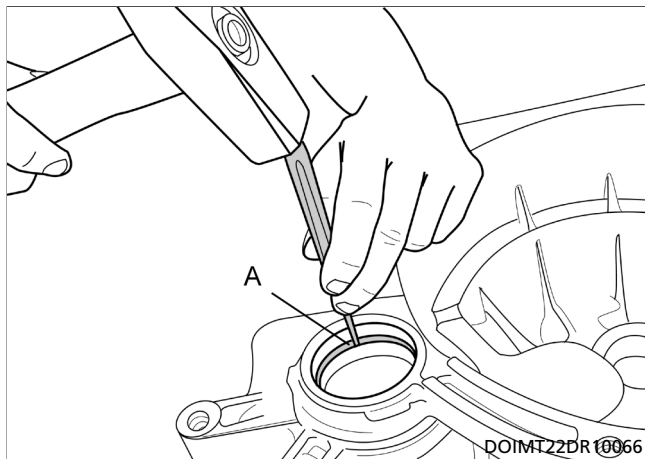




R OUTPUT SHAFT FRONT BEARING OUTER RING REMOVAL

By using special tool AZBST003-00A, remove the output shaft front bearing outer ring from clutch housing.

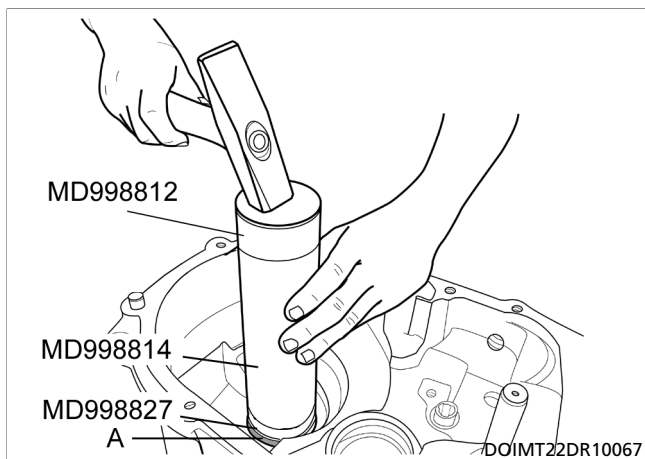
Symbol	Description
A	Output shaft front bearing outer ring



R DIFFERENTIAL OUTER RACE REMOVAL

Use a chisel and hammer to knock the differential outer race out from the clutch housing.

Symbol	Description
A	Differential outer race



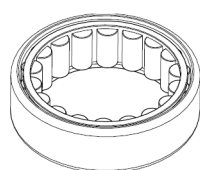
REASSEMBLY SERVICE POINTS

WTC22D5HAUL016

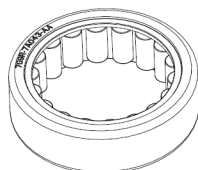
I DIFFERENTIAL OUTER RACE INSTALLATION

Install the differential outer race to the clutch housing by using special tools MD998812, MD998814 and MD998827.

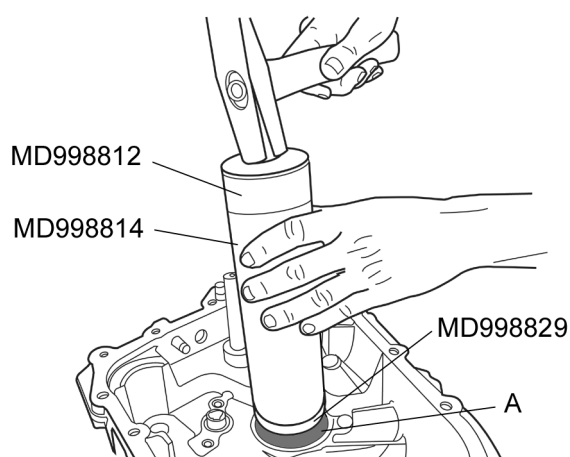
Symbol	Description
A	Differential outer race



Right



Wrong



DOIMT22DR11023

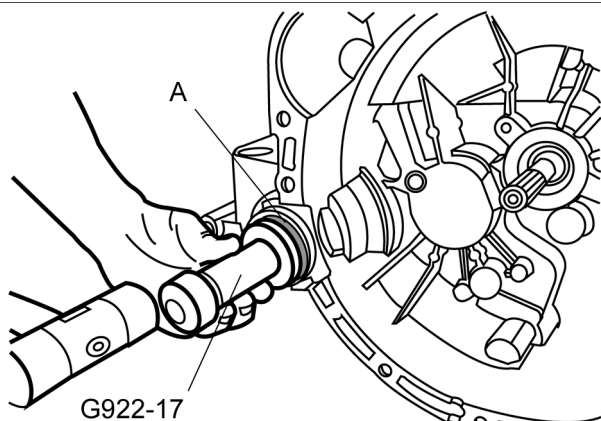
I OUTPUT SHAFT FRONT BEARING OUTER RING INSTALLATION

CAUTION

Ensure the front bearing outer ring is correct position before installation to the clutch housing.

Install the output shaft front bearing outer ring to the clutch housing by using special tools MD998812, MD998814 and MD998829 .

Symbol	Description
A	Output shaft front bearing outer ring



DOIMT22DR11020

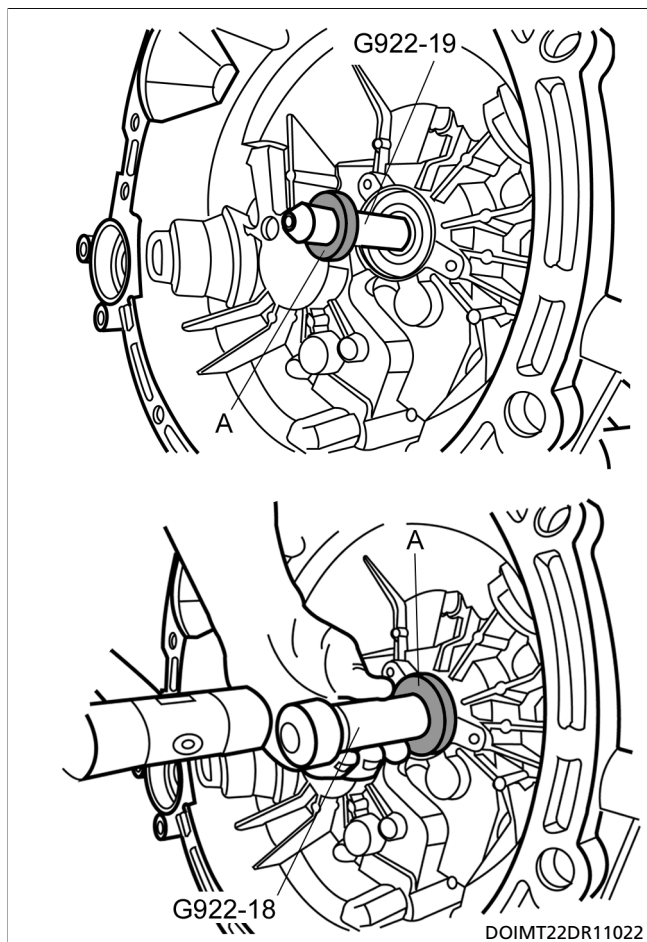
I DIFFERENTIAL OIL SEAL INSTALLATION

NOTE

Install the oil seal after all transmission component reassemble.

Install the differential oil seal by using special tools G922-17.

Symbol	Description
A	Differential oil seal



I INPUT SHAFT OIL SEAL INSTALLATION

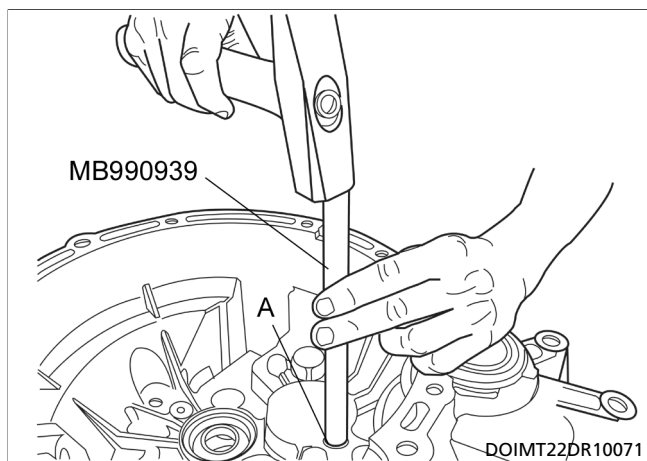
NOTE

Install the oil seal after input shaft reassemble.

1. Put the special tool G922-19 on the input shaft.
2. Slide the oil seal over the special tool G922-19.

Fit the input shaft oil seal by using special tools G922-18.

Symbol	Description
A	Input shaft oil seal

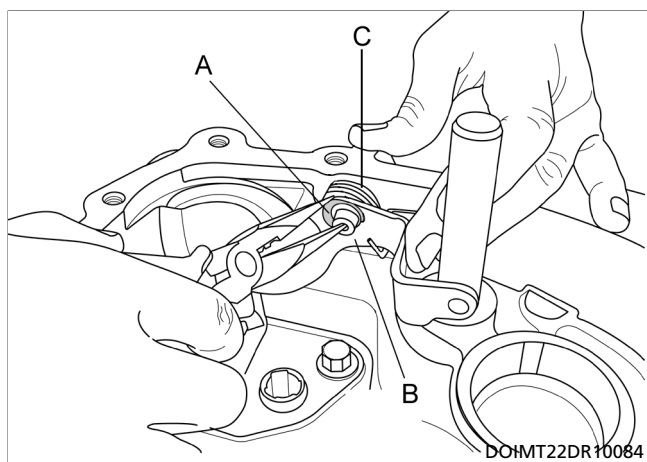


I CLUTCH HOUSING PLUG INSTALLATION

Apply sealant at the plug and then install the plug to the clutch housing by using special tool MB990939 .

Specified sealant:
LT222

Symbol	Description
A	Plug



I E-TYPE RETAINER RING INSTALLATION

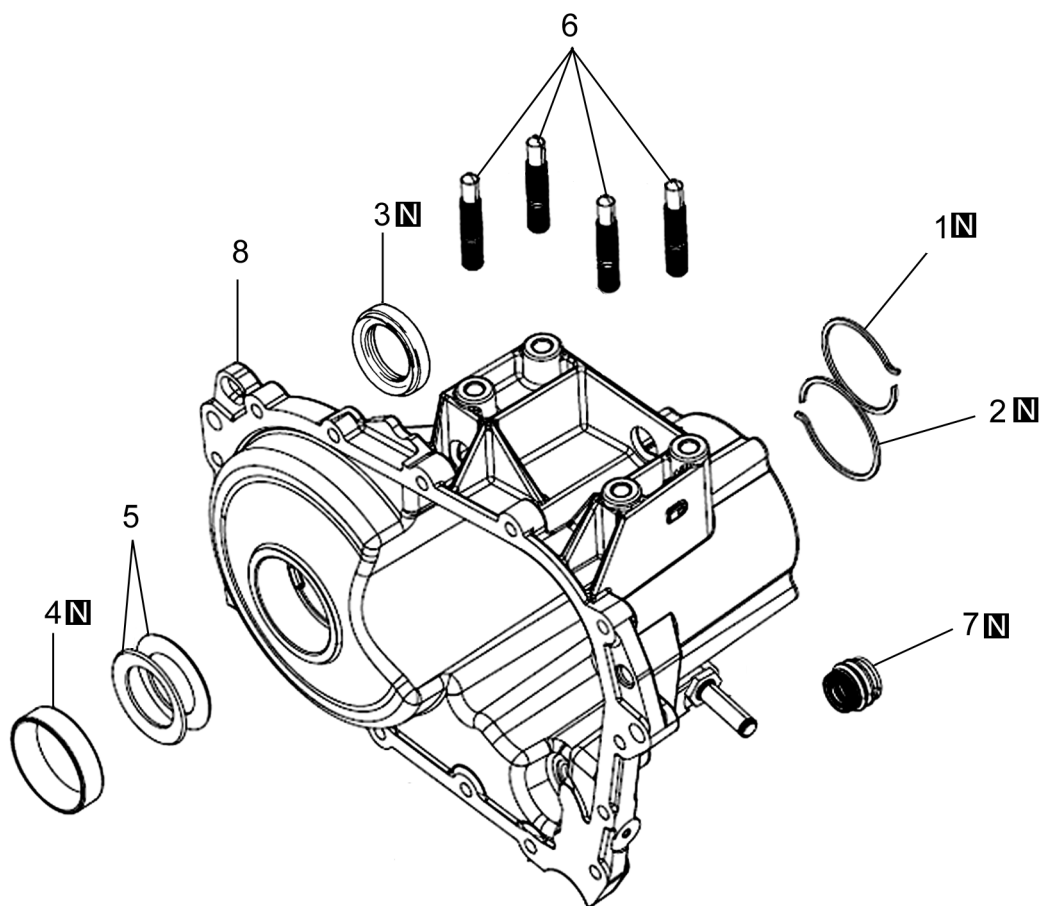
Install reverse shift lever, reverse gear rebound spring and fit the E-type retainer ring by using plier.

Symbol	Description
A	E-type retainer ring
B	Reverse shift lever
C	Reverse gear rebound spring

TRANSMISSION CASE

WTC22D5HAUL017

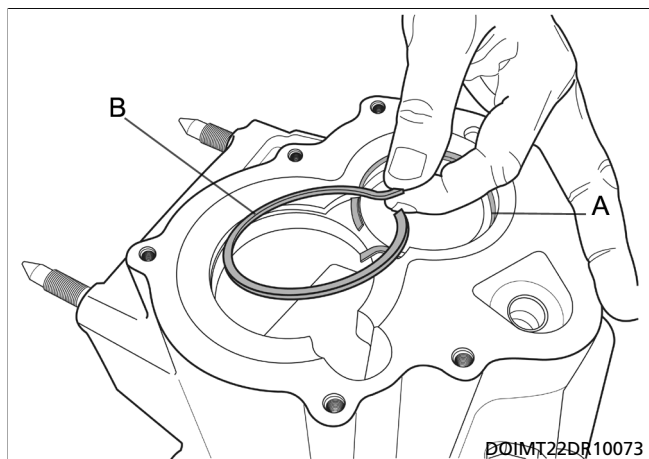
DISASSEMBLY AND REASSEMBLY



DOIMT22DR10072

N — Non-reusable part**Disassembly steps**

- R&I** 1. Input shaft fastening ring
- R&I** 2. Output shaft fastening ring
- R&I** 3. Differential oil seal
- R&I** 4. Differential outer race
- I** 5. Double spring washer
- R&I** 6. Transmission stud
- R&I** 7. Shift shaft oil seal assy
- 8. Transmission case



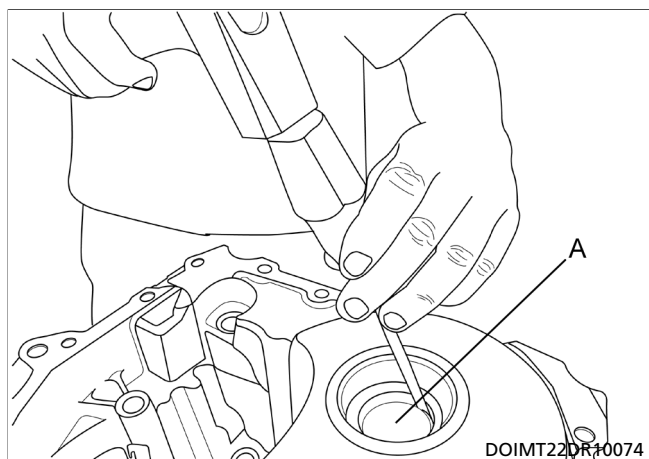
DISASSEMBLY SERVICE POINTS

WTC22DSHAUL018

R INPUTSHAFT AND OUTPUT SHAFT FASTENING RINGS REMOVAL

Remove the input shaft and output shaft fastening rings from the transmission case.

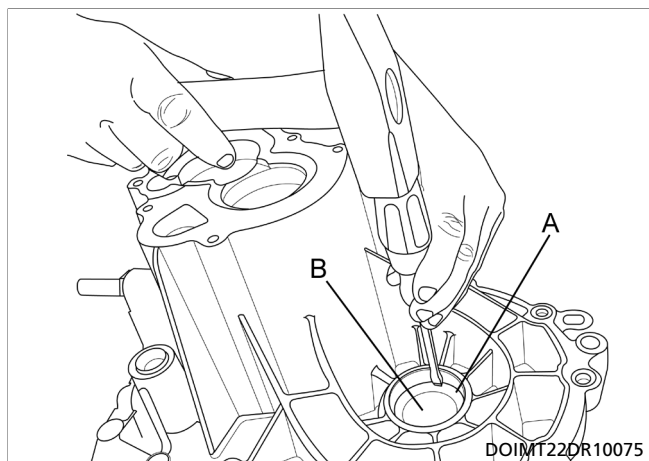
Symbol	Description
A	Input shaft fastening ring
B	Output shaft fastening ring



R DIFFERENTIAL OIL SEAL REMOVAL

By using screw driver, remove the differential oil seal.

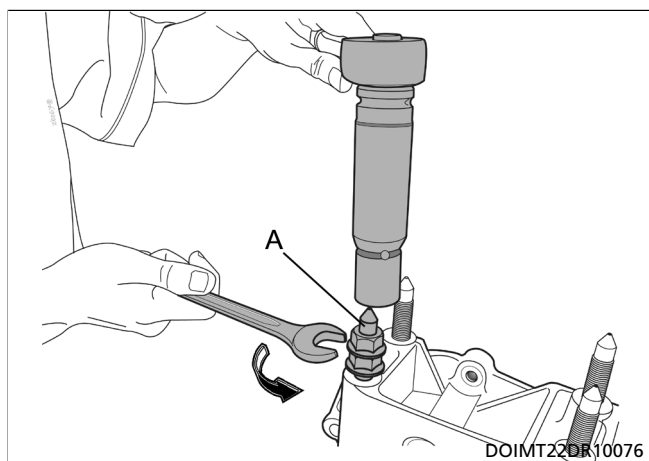
Symbol	Description
A	Differential oil seal



R DOUBLE SPRING WASHER AND DIFFERENTIAL OUTER RACE REMOVAL

By using screw driver, push the double spring washer first in order to remove the differential outer race.

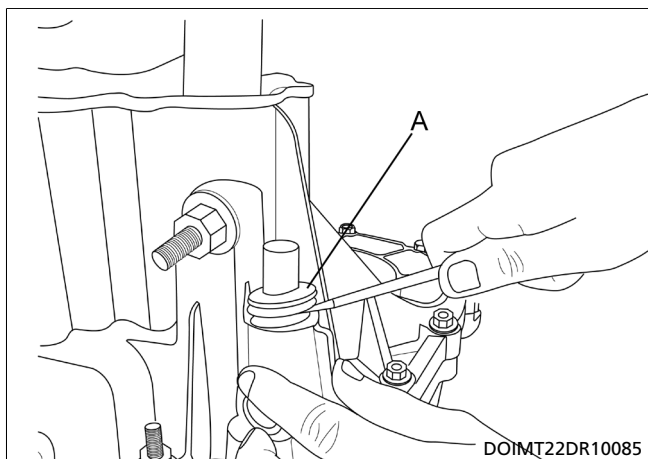
Symbol	Description
A	Double spring washer
B	Differential outer race



R TRANSMISSION STUD REMOVAL

Remove the transmission stud as shown in the illustration.

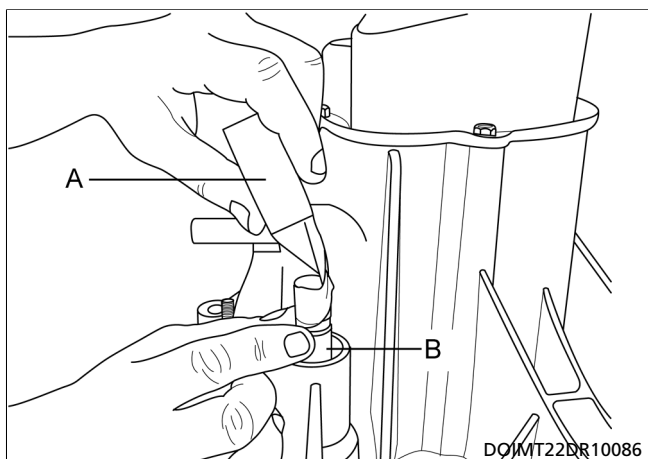
Symbol	Description
A	Transmission stud



R SHIFT SHAFT OIL SEAL REMOVAL

By using screw driver, push up the shift shaft oil seal from the transmission case.

Symbol	Description
A	Shift shaft oil seal



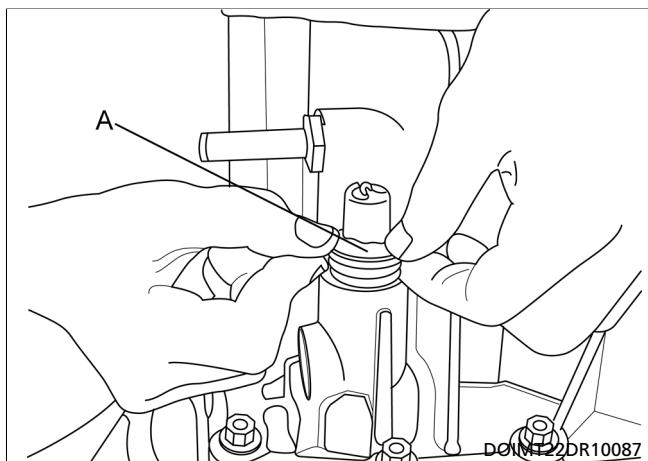
REASSEMBLY SERVICE POINTS

WTC22D5HAUL019

I SHIFT SHAFT OIL SEAL INSTALLATION

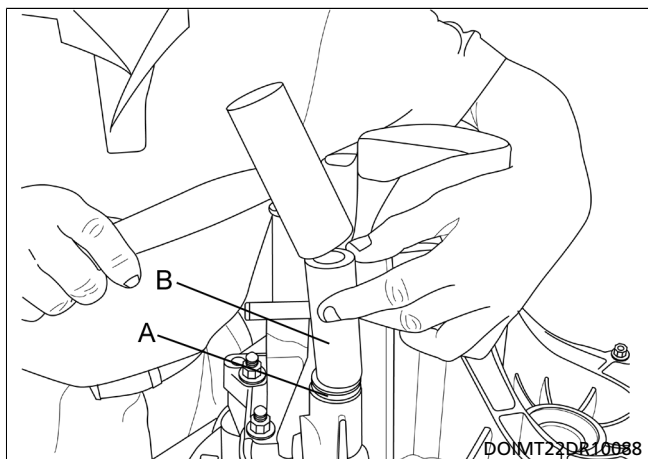
1. Apply masking tape to the shift shaft.

Symbol	Description
A	Masking tape
B	Shift shaft



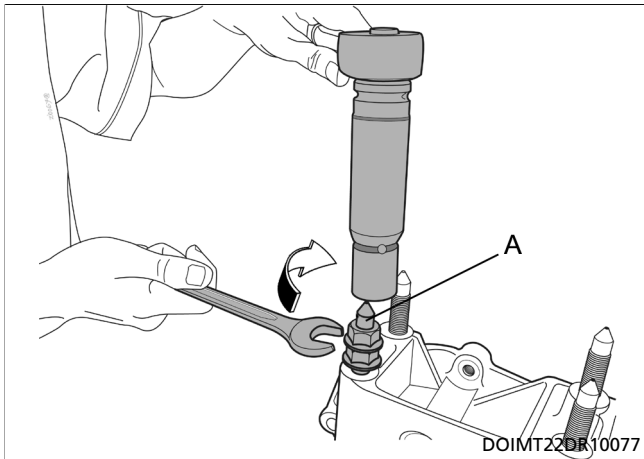
2. Install the shift shaft oil seal slowly and carefully.

Symbol	Description
A	Shift shaft oil seal



3. By using mallet and socket (size 21), knock slowly and carefully the shift shaft oil seal. Then remove the masking tape.

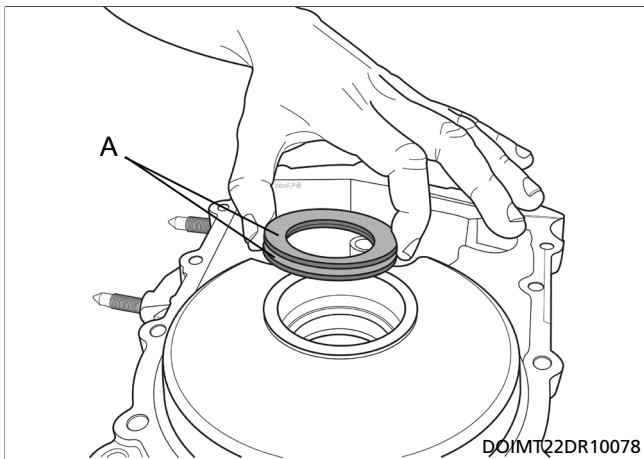
Symbol	Description
A	Shift shaft oil seal
B	Socket size 21



I TRANSMISSION STUD INSTALLATION

Install the transmission studs as shown in the illustration.

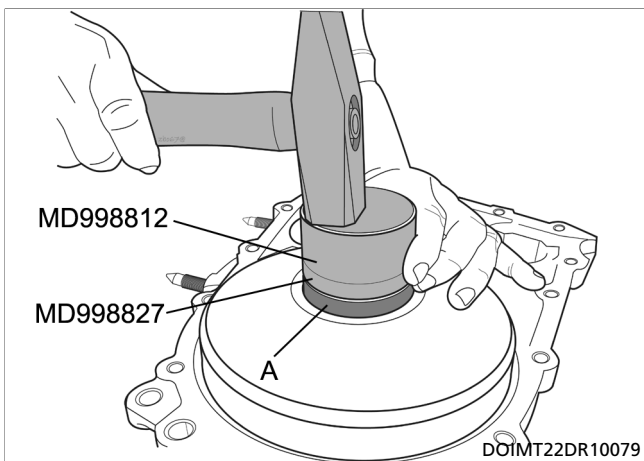
Symbol	Description
A	Transmission stud



I DOUBLE SPRING WASHER INSTALLATION

Install the double spring washer as shown in the illustration.

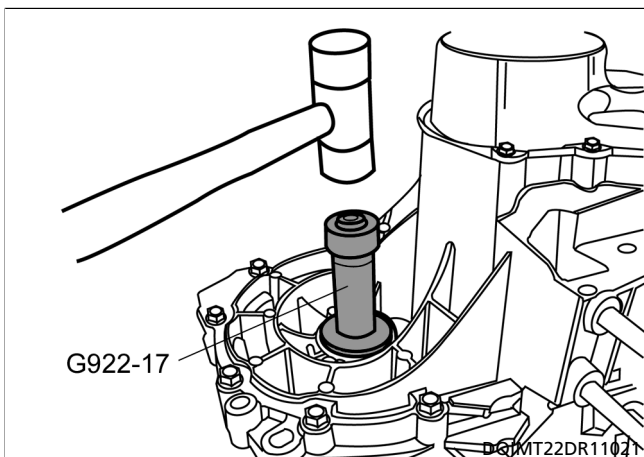
Symbol	Description
A	Double spring washer



I DIFFERENTIAL OUTER RACE INSTALLATION

Install the differential outer race by using special tool MD998812 and MD998827.

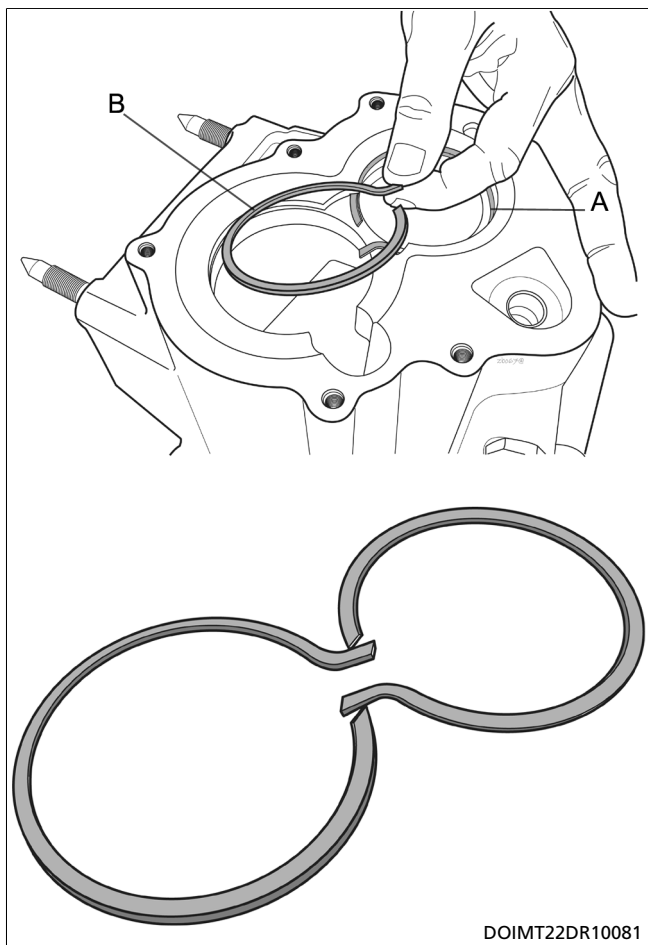
Symbol	Description
A	Differential outer race



I DIFFERENTIAL OIL SEAL INSTALLATION

Install the differential oil seal by using special tool G922-17.

Symbol	Description
A	Differential oil seal



I INPUT SHAFT AND OUTPUT SHAFT FASTENING RINGS INSTALLATION

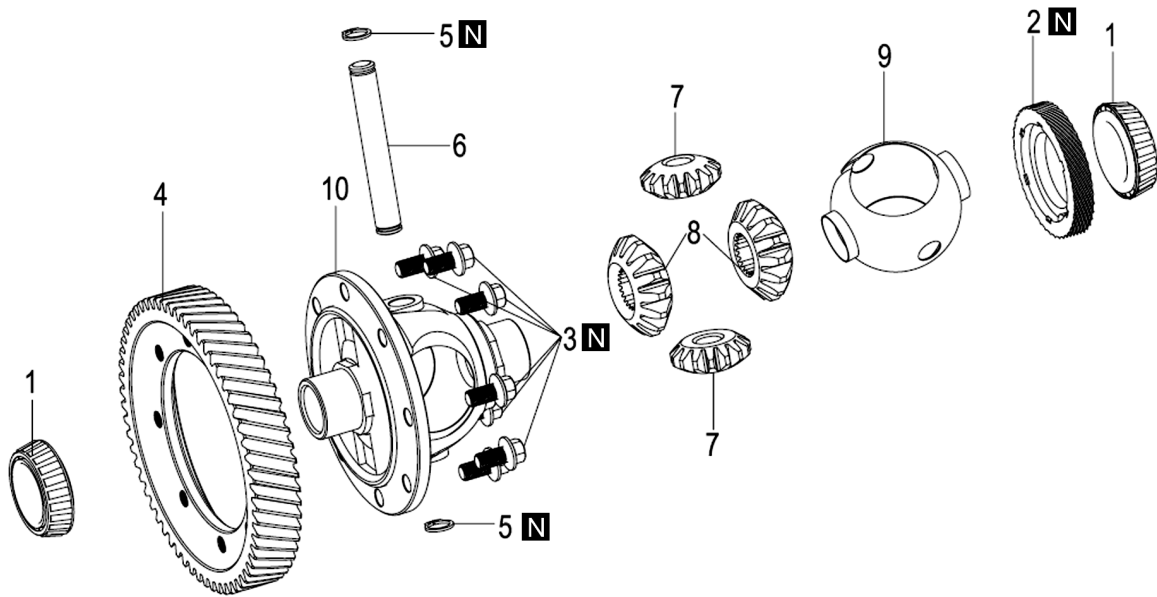
Install the fastening rings to the transmission case slot as shown in the illustration.

Symbol	Description
A	Input shaft fastening ring
B	Output shaft fastening ring

DIFFERENTIAL

WTC22DSHAUL020

DISASSEMBLY AND REASSEMBLY

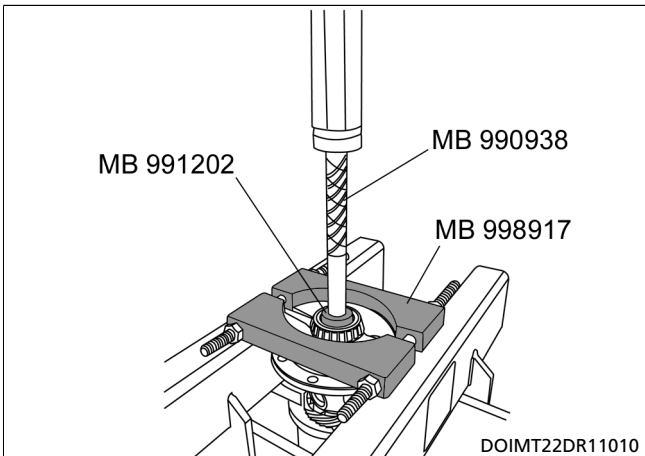
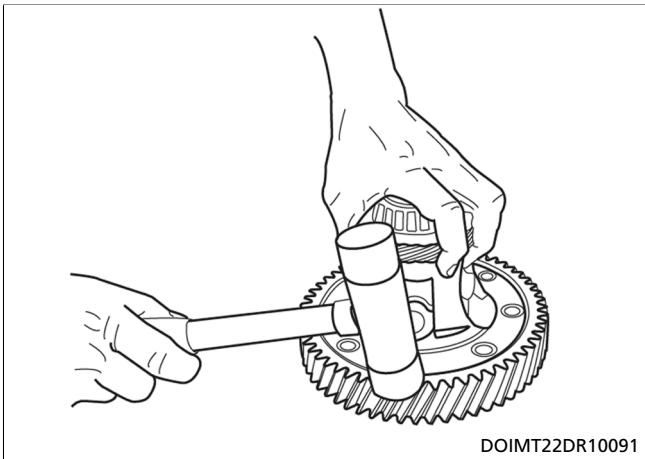
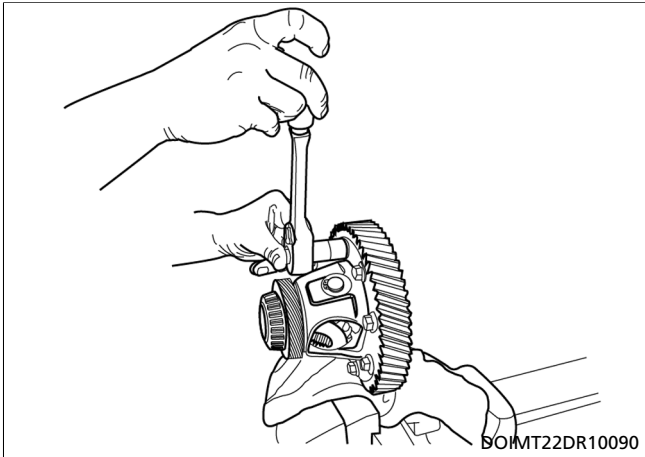
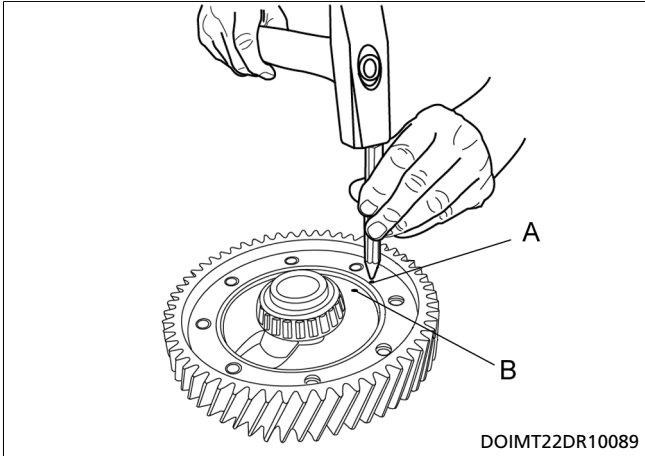


DOIMT22DR10082

N — Non-reusable part**Disassembly steps**

- R&I** 1. Differential taper rolling bearing
- R&I** 2. Speedometer drive gear
- 3. Bolt
- R&I** 4. Final drive ring gear
- R&I** 5. Retainer ring
- R&I** 6. Planet pinion shaft
- R&I** 7. Planet pinion
- R&I** 8. Differential gear
- R&I** 9. Differential lining
- 10. Differential case

T1: 10.0~11.0 kgm (100~110 Nm, 6.71~7.38 ft.lbs)



DISASSEMBLY SERVICE POINTS

WTC22DSHAUL021

R FINAL DRIVE RING GEAR REMOVAL

1. Create a marking (punch mark) at final drive ring gear and differential case.

Symbol	Description
A	Punch mark at final drive ring gear
B	Punch mark at differential case

2. By using a torque wrench, remove the bolts (8 pieces).

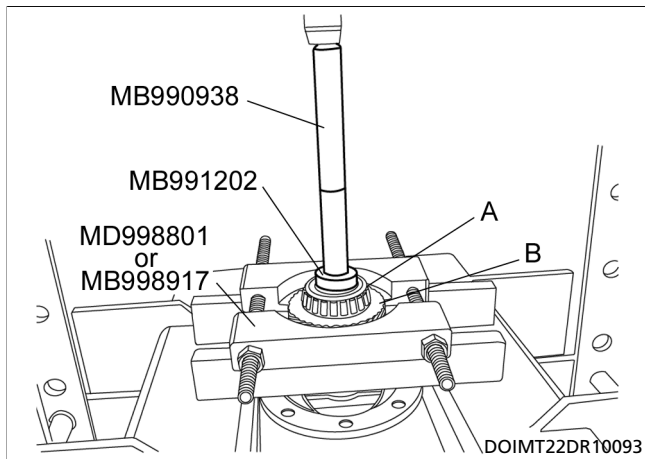
NOTE:

Do not reuse the bolts.

3. By using mallet, knock slowly and carefully the final drive ring gear from the differential case.

R DIFFERENTIAL TAPER ROLLING BEARING REMOVAL

By using the special tools MB990938, MB991202 and MB998917 remove the taper rolling bearing inner ring.



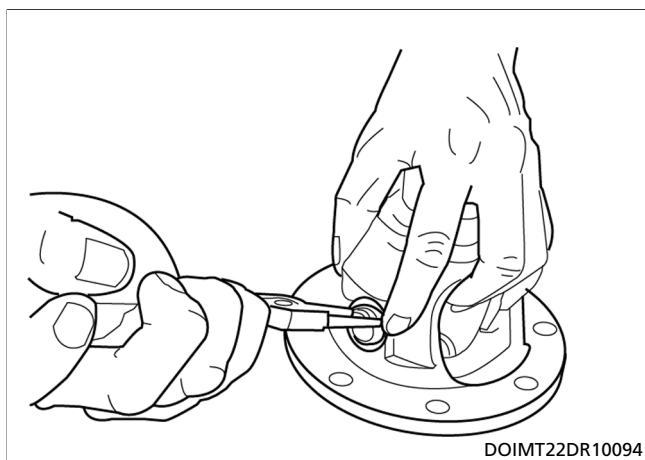
R DIFFERENTIAL TAPER ROLLING BEARING AND SPEEDOMETER DRIVE GEAR REMOVAL

By using the special tool MB990938, MB991202 and MD998801 or MB998917, remove the taper rolling bearing inner ring and speedometer driving gear.

Symbol	Description
A	Differential taper rolling bearing
B	Speedometer drive gear

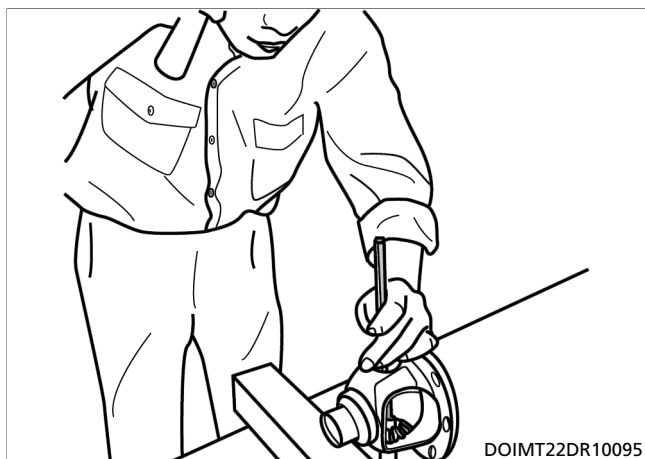
NOTE:

Do not reuse the speedometer drive gear.



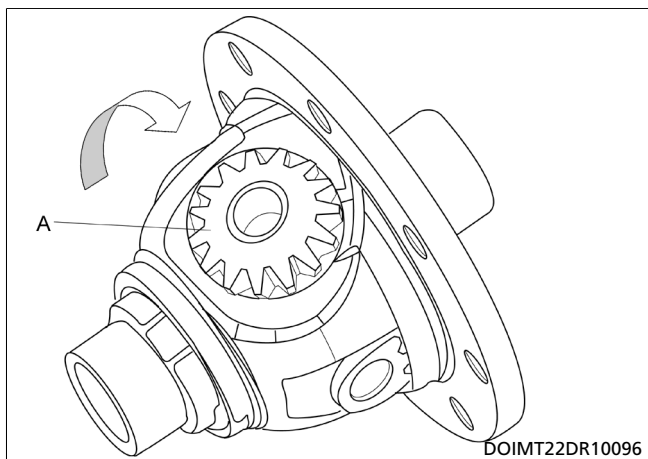
R RETAINER RING REMOVAL

By using a circlip plier, remove the two retainer rings from the planet pinion shaft.



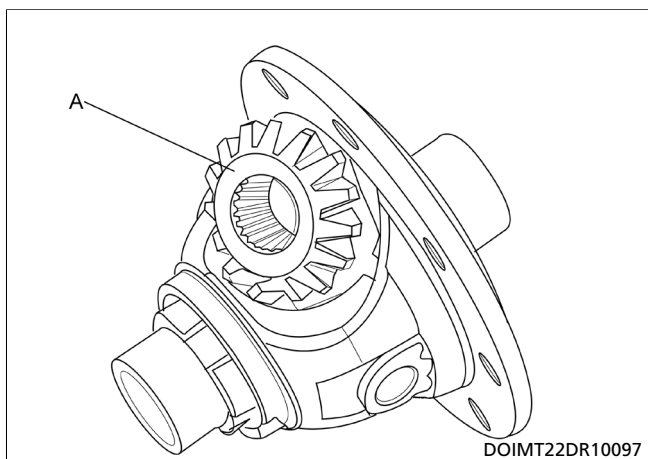
R PLANET PINION SHAFT REMOVAL

By using suitable bar and hammer to knock the planet pinion shaft.

**R PLANET PINION REMOVAL**

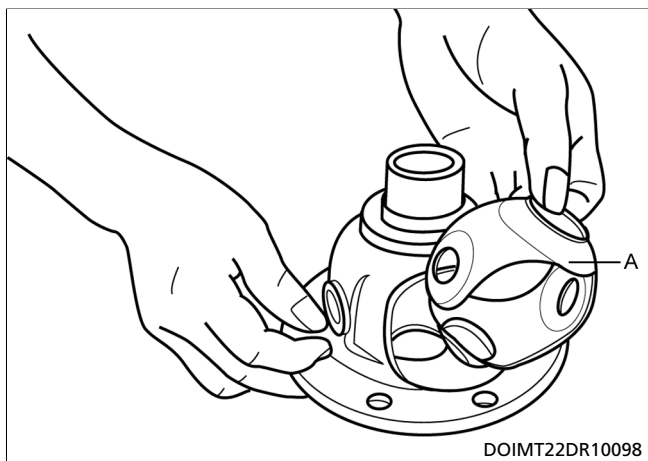
Rotate the planet pinion to 90° and then remove it from differential case.

Symbol	Description
A	Planet pinion

**R DIFFERENTIAL GEAR REMOVAL**

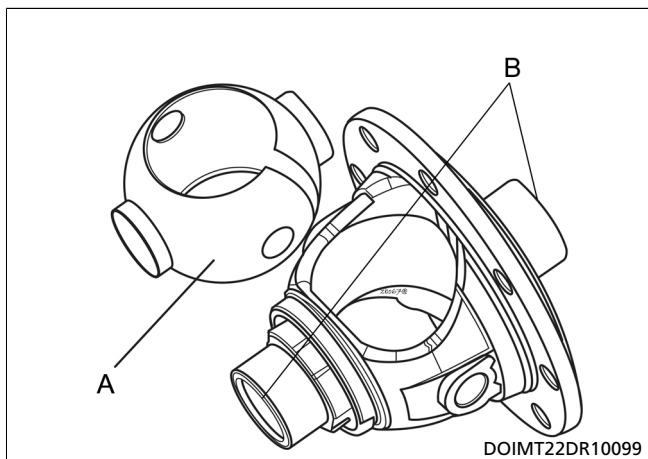
Remove the differential gear from differential case.

Symbol	Description
A	Differential gear

**R DIFFERENTIAL LINING REMOVAL**

Remove the differential lining from differential case.

Symbol	Description
A	Differential lining

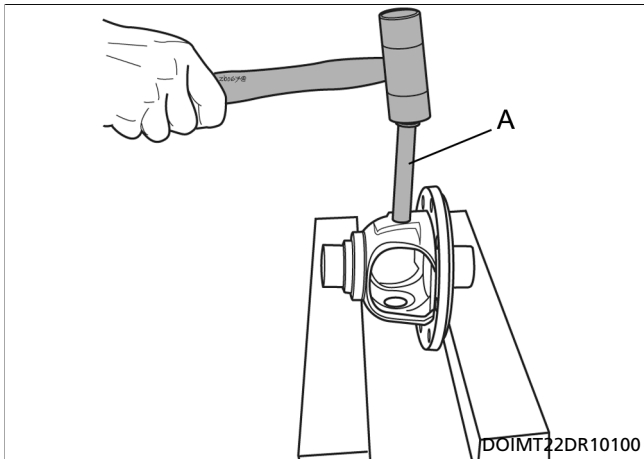
**REASSEMBLY SERVICE POINTS**

WTC22DSHAUL022

I DIFFERENTIAL LINING INSTALLATION

Insert the differential lining manually and then after assembly, it should be oriented to the differential shaft hole as shown in the illustration.

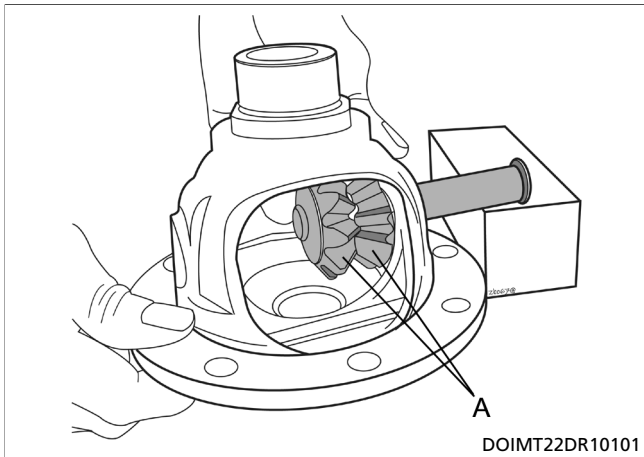
Symbol	Description
A	Differential lining
B	Differential shaft hole



I PLANET PINION SHAFT INSTALLATION

By using mallet, knock slowly the planet pinion shaft into half position.

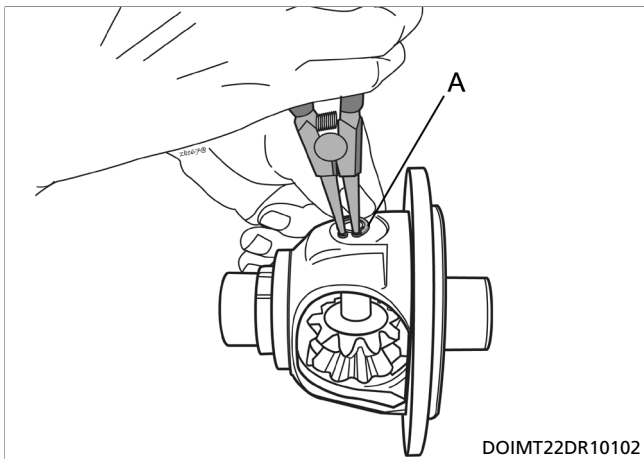
Symbol	Description
A	Planet pinion shaft



I PLANET PINION INSTALLATION

Insert two pieces planet pinion into the planet pinion shaft then continue knocking the planet pinion shaft.

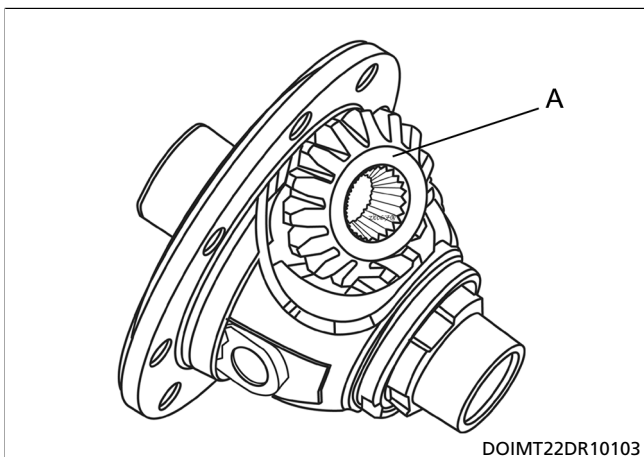
Symbol	Description
A	Planet pinion



I RETAINER RING INSTALLATION

By using a snap ring plier, install two retainer rings.

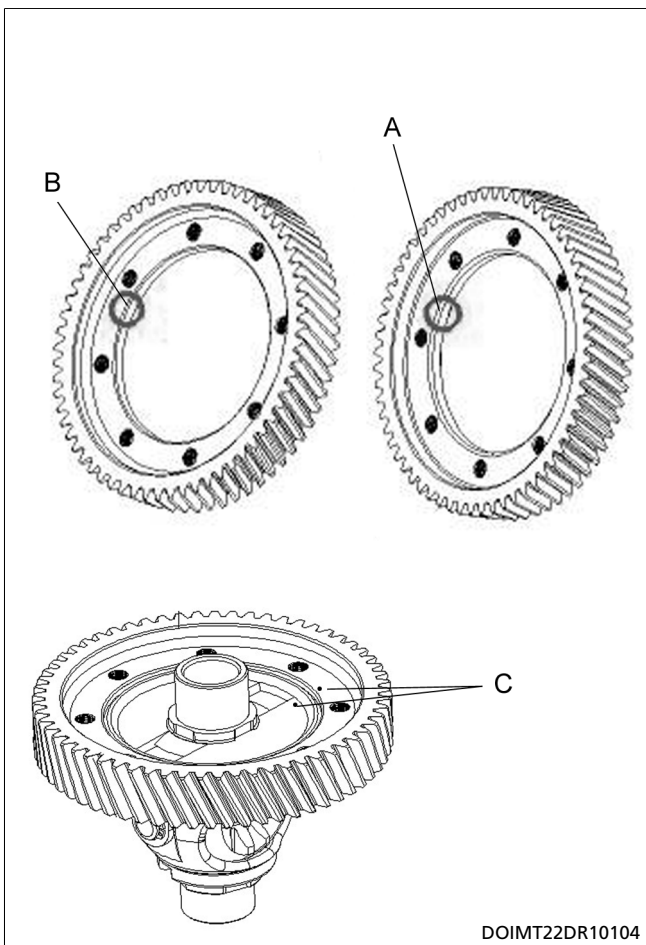
Symbol	Description
A	Retainer ring



I DIFFERENTIAL GEAR INSTALLATION

Install the two differential gears manually.

Symbol	Description
A	Differential gear



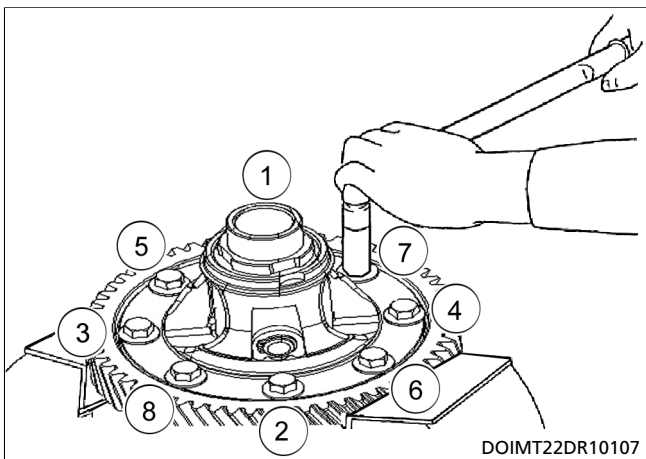
I FINAL DRIVE RING GEAR INSTALLATION

1. Install the final drive ring gear to the differential case by aligning the punch mark or ensure the big chamfer at final drive ring gear is below.

NOTE:

Notice the orientation of the final drive ring gear. Please make sure the side of big chamfer is below as shown in the illustration.

Symbol	Description
A	Big chamfer (Below)
B	Small chamfer (Upper)
C	Punch mark



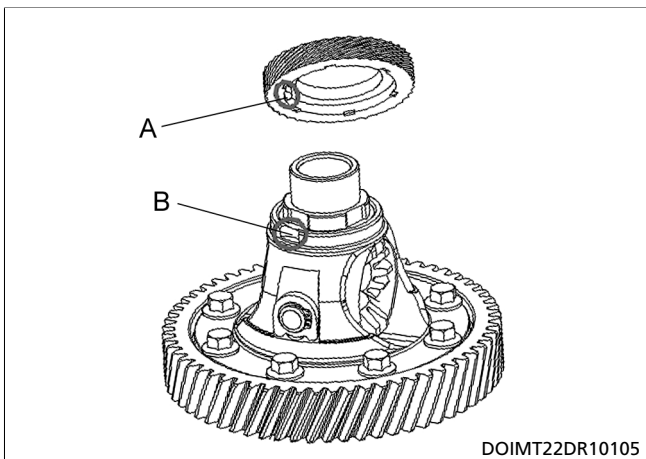
2. Install all final drive ring gear bolts and tighten the bolt in sequence order to the specified torque.

Specified torque:

10.0~11.0 kgm (100~110 Nm, 6.71~7.38 ft.lbs)

NOTE:

Never reuse final drive ring gear bolts.

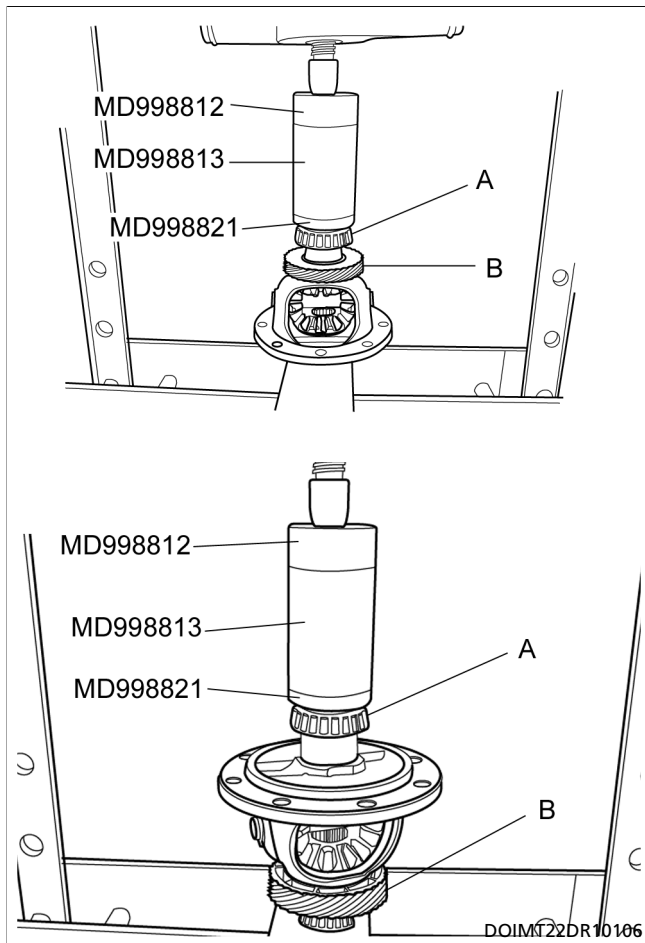


I SPEEDOMETER DRIVE GEAR INSTALLATION

Install the speedometer drive gear on the differential case.

Please ensure the speedometer drive gear bulge is aligning with differential case groove.

Symbol	Description
A	Speedometer drive gear bulge
B	Differential case groove



I DIFFERENTIAL TAPER ROLLING BEARING INSTALLATION

Install the differential taper rolling bearing on differential case by using special tools MD998812, MD998813 and MD998821.

Symbol	Description
A	Taper rolling bearing inner ring
B	Speedometer drive gear

NOTE

