

WORKSHOP MANUAL

TF SERIES

MANUAL TRANSMISSION MUA MODELS

SECTION 7B1

ISUZU

ISUZU



International Service & Parts
Tokyo, Japan

NOTICE

Before using this Workshop Manual to assist you in performing vehicle service and maintenance operations, it is recommended that you carefully read and thoroughly understand the information contained in Section - 0 "GENERAL INFORMATION".

All material contained in this Manual is based on the latest product information available at the time of publication.

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SECTION 7B1

MANUAL TRANSMISSION

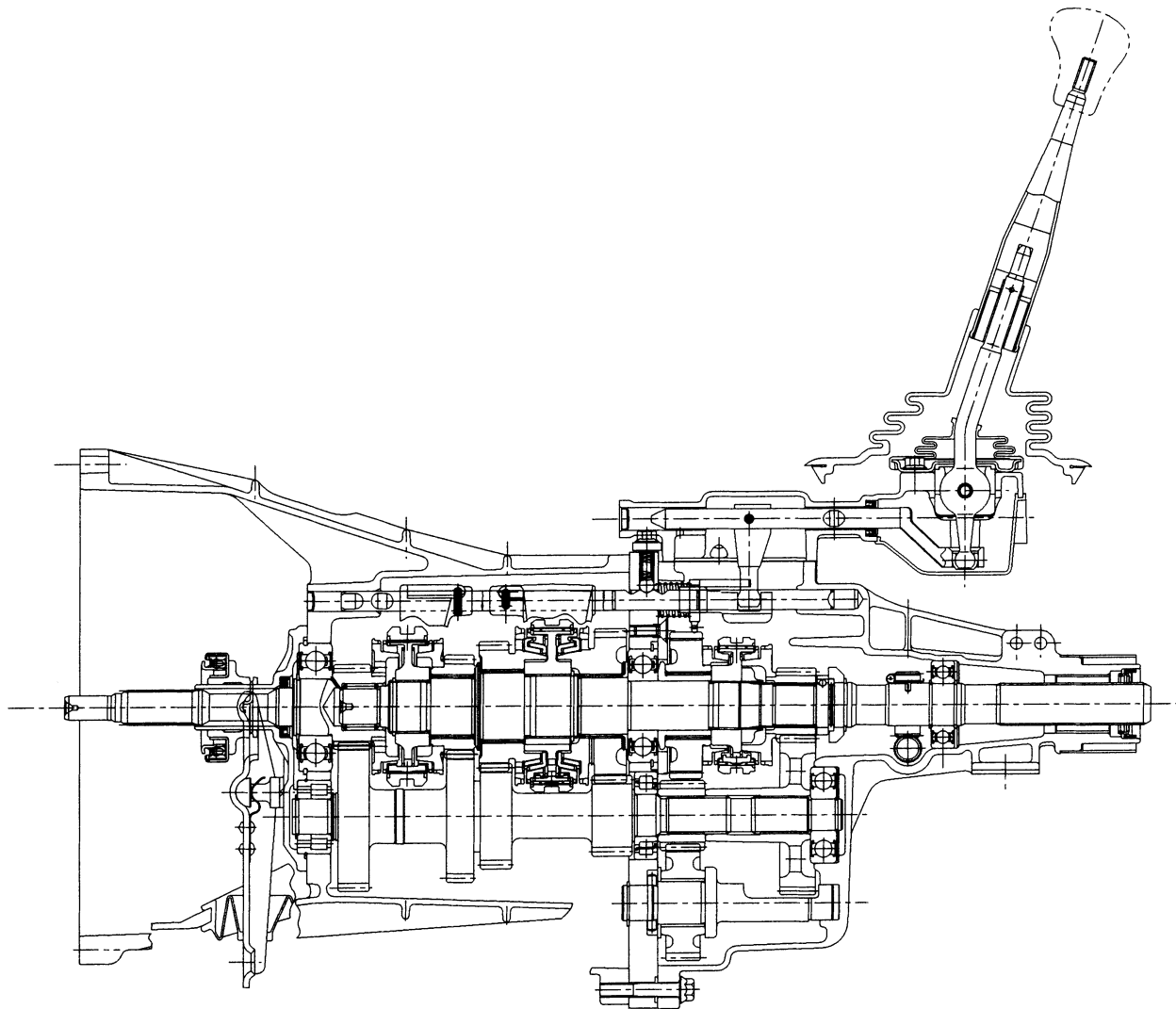
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4 x 2 MODEL TRANSMISSION**MAIN DATA AND SPECIFICATIONS**

Models		MUA 5C	MUA 5S
Transmission type		Fully synchronized 5-forward and revers gears.	
Gear ratio	1st	3.767	4.357
	2nd	2.248	2.502
	3rd	1.404	1.501
	4th	1.000	1.000
	5th	0.809	0.809
	Rev.	3.873	3.970
Oil capacity	lit (US gal.)	2.95 (0.78)	

GENERAL DESCRIPTION



A07LV003

The transmission is designed for the quietest possible operation.

A longer center distance (77.5 mm (3.05 in)) provides increased durability.

Principle parts of the transmission are the integral clutch housing, the intermediate plate, the rear cover, and the gears.

The gear control box is built-in to the rear cover.

TORQUE SPECIFICATIONS



STANDARD BOLTS

The torque values given in the following table should be applied where a particular torque is not specified.

N·m (kg·m / lb·ft)

Strength Class Bolt Identification Bolt Diameter × Pitch (mm)		4.8/4T	7T	8.8		9.8/9T
				Refined	Non-Refined	
		No mark	—			
Standard Hex. Head Bolt	M6 × 1.0	6 (0.6 / 52 lb-in)	7 (0.7 / 61 lb-in)	8 (0.8 / 69 lb-in)		—
	M8 × 1.25	13 (1.3 / 113 lb-in)	17 (1.7 / 12)	20 (2.0 / 14)		24 (2.4 / 17)
	M10 × 1.25	27 (2.8 / 20)	37 (3.8 / 27)	42 (4.3 / 31)		50 (5.1 / 37)
	M12 × 1.25	61 (6.3 / 45)	76 (7.8 / 56)	87 (8.9 / 64)		95 (9.7 / 70)
	M14 × 1.5	96 (9.8 / 71)	116 (11.8 / 85)	133 (13.6 / 98)		142 (14.5 / 105)
	M16 × 1.5	130 (13.3 / 96)	170 (17.3 / 125)	193 (19.7 / 143)		200 (20.4 / 148)
	M18 × 1.5	188 (19.2 / 139)	244 (24.9 / 180)	278 (28.3 / 205)		287 (29.3 / 212)
	M20 × 1.5	258 (26.3 / 190)	337 (34.4 / 249)	385 (39.3 / 284)		396 (40.4 / 292)
	M22 × 1.5	332 (33.9 / 245)	453 (46.3 / 335)	517 (52.7 / 381)		530 (54.1 / 391)
	M24 × 2.0	449 (45.8 / 331)	570 (58.2 / 421)	651 (66.3 / 480)		692 (70.6 / 511)
	* M10 × 1.5	26 (2.7 / 20)	36 (3.7 / 27)	41 (4.2 / 30)		48 (4.9 / 35)
	* M12 × 1.75	57 (5.8 / 42)	71 (7.2 / 52)	80 (8.2 / 59)		89 (9.1 / 66)
	* M14 × 2.0	89 (9.1 / 66)	110 (11.2 / 81)	125 (12.7 / 92)		133 (13.6 / 98)
	* M16 × 2.0	124 (12.7 / 92)	162 (16.5 / 119)	185 (18.9 / 137)		191 (19.5 / 141)
Flange Bolt	M6 × 1.0	7 (0.7 / 61 lb-in)	8 (0.8 / 69 lb-in)	9 (0.9 / 78 lb-in)		—
	M8 × 1.25	15 (1.5 / 11)	19 (1.9 / 14)	22 (2.2 / 16)		26 (2.7 / 20)
	M10 × 1.25	31 (3.2 / 23)	41 (4.2 / 30)	47 (4.8 / 35)		56 (5.7 / 41)
	M12 × 1.25	69 (7.0 / 51)	85 (8.7 / 63)	97 (9.9 / 72)		106 (10.8 / 78)
	M14 × 1.5	104 (10.6 / 77)	126 (12.8 / 93)	144 (14.6 / 106)		154 (15.7 / 114)
	M16 × 1.5	145 (14.8 / 127)	188 (19.2 / 139)	214 (21.8 / 158)		221 (22.5 / 163)
	M18 × 1.5	—	—	—		—
	M20 × 1.5	—	—	—		—
	M22 × 1.5	—	—	—		—
	M24 × 2.0	—	—	—		—
	* M10 × 1.5	30 (3.1 / 22)	40 (4.1 / 30)	46 (4.7 / 34)		54 (5.5 / 40)
	* M12 × 1.75	64 (6.5 / 47)	78 (8.0 / 58)	89 (9.1 / 66)		99 (10.1 / 73)
	* M14 × 2.0	97 (9.9 / 72)	119 (12.1 / 88)	135 (13.8 / 99.7)		144 (14.7 / 107)
	* M16 × 2.0	137 (14.0 / 101)	178 (18.2 / 132)	203 (20.7 / 150)		210 (21.5 / 155)

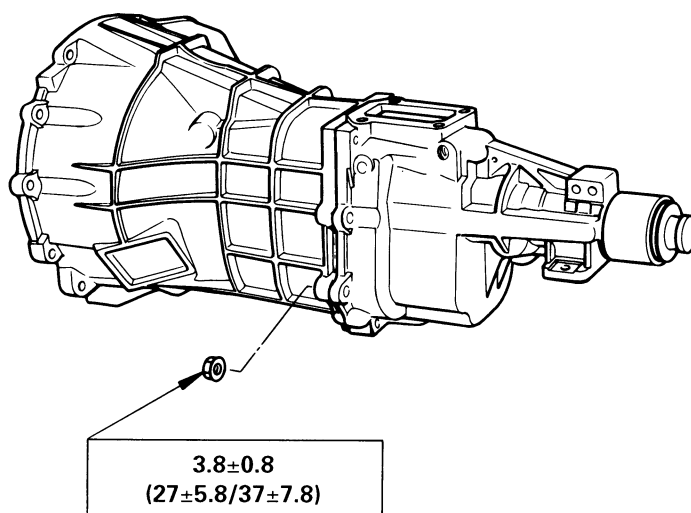
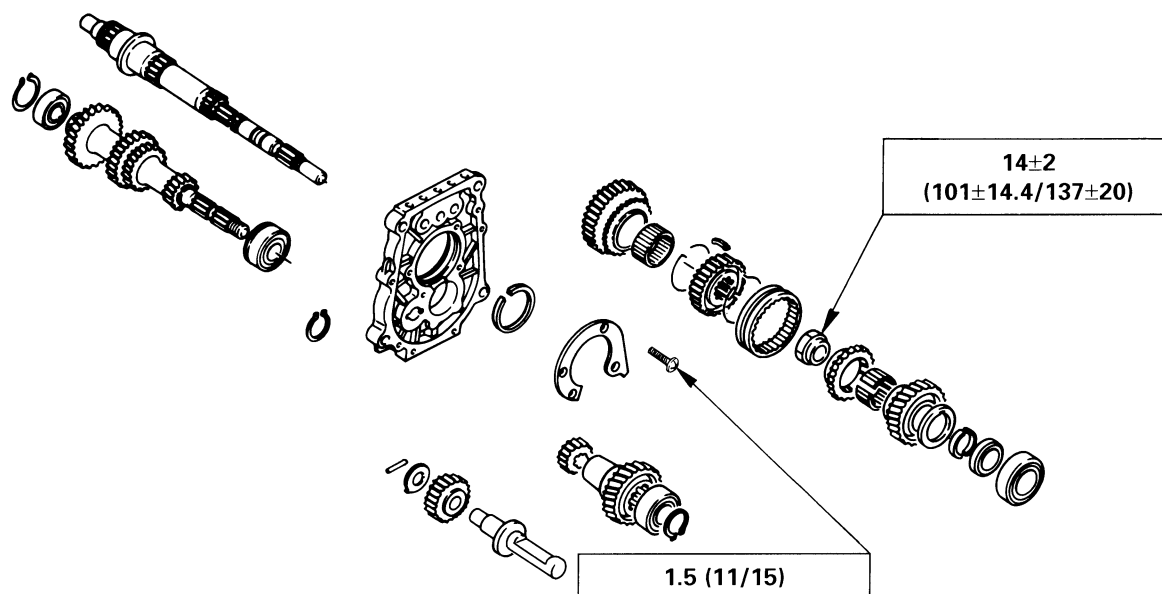
The asterisk * indicates that the bolts are used for female-threaded parts that are made of soft materials such as casting, etc.



FLARE NUTS

N·m (kg·m / lb·ft)

Pipe diameter mm (in)	Torque	Pipe diameter mm (in)	Torque
4.76 (0.187)	16 (1.6 / 12)	10.00 (0.394)	54 (5.5 / 40)
6.35 (0.250)	26 (2.7 / 20)	12.00 (0.472)	88 (9.0 / 65)
8.00 (0.315)	44 (4.5 / 33)	15.00 (0.591)	106 (10.8 / 78)

**SPECIAL PARTS FIXING NUTS AND BOLTS****kg·m(lb.ft/N·m)**



RECOMMENDED LIQUID GASKET

Type	Brand Name	Manufacturer	Remarks
RTV* Silicon Base	ThreeBond 1207B ThreeBond 1207C	Three Bond Three Bond	For Engine Repairs
	ThreeBond 1215 ThreeBond 1281	Three Bond Three Bond	For Axle Case and Transmission Repairs
Water Base	ThreeBond 1141E	Three Bond	For Engine Repairs
Solvent	ThreeBond 1104 BelcoBond 4 BelcoBond 401 BelcoBond 402	Three Bond Isuzu Isuzu Isuzu	For Engine Repairs
Anerobic	LOCTITE 515 LOCTITE 518	Loctite Loctite	All

* RTV : Room Temperature Vulcanizer

Note:

1. It is very important that the liquid gaskets listed above or their exact equivalent be used on the vehicle.
2. Be careful to use the specified amount of liquid gasket.
Follow the manufacturer's instructions at all times.
3. Be absolutely sure to remove all lubricants and moisture from the connecting surfaces before applying the liquid gasket.
The connecting surfaces must be perfectly dry.
4. LOCTITE 515 and LOCTITE 518 harden upon contact with a metal surface.
Do not apply LOCTITE 515 or LOCTITE 518 between two metal surfaces having a clearance of greater than 0.25 mm (0.01 in). Poor adhesion will result.



REMOVAL AND INSTALLATION

Read this Section carefully before performing any removal and installation procedure. This Section gives you important points as well as the order of operation. Be sure that you understand everything in this Section before you begin.



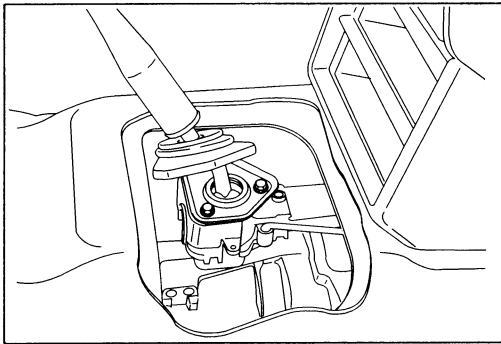
Important Operations — Removal

Battery Cable

Disconnect the negative (–) cable from the battery terminal.

Engine Hood

Apply setting marks to the engine hood and the engine hood hinges before removing the engine hood.



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Gear Shift Lever

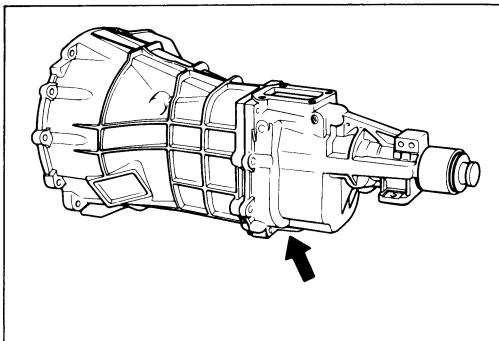
1. Place the gear shift lever in the neutral position.
2. Remove the gear shift lever knob.
3. Remove the front console assembly.
4. Remove the gear shift lever grommet and dust cover.
5. Remove the gear shift lever cover bolts.
6. Remove the gear shift lever.

Note:

Cover the shift lever hole to prevent the entry of foreign material into the transmission.

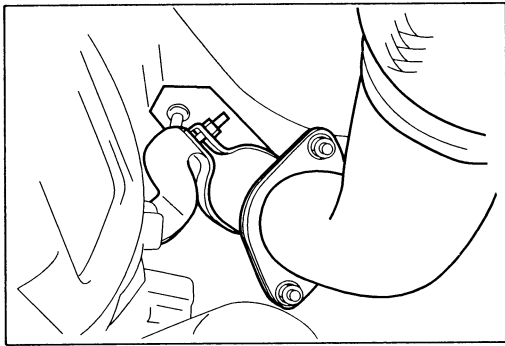
Lifting the Vehicle

1. Jack up the vehicle.
2. Place chassis stands at the front and the rear of the vehicle.



Transmission Oil Draining

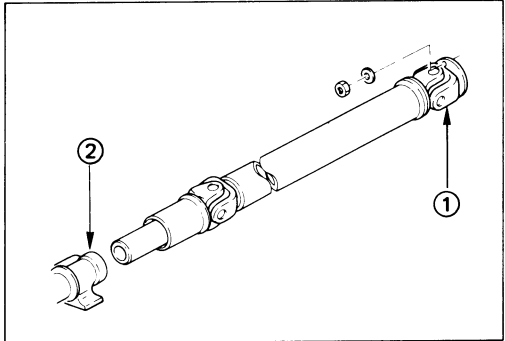
1. Remove the transmission oil drain plug.
2. Replace the drain plug after draining the oil.



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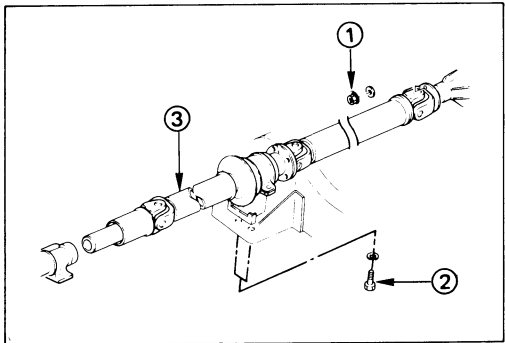
Exhaust Pipe

1. Remove the exhaust pipe bracket from the transmission case.
2. Remove the front exhaust pipe and 2nd-3rd exhaust pipe.



Rear Propeller Shaft (Single Shaft Type)

1. Remove the propeller shaft flange yoke at the drive pinion side ①.
2. Remove the propeller shaft from the transmission main shaft spline ②.

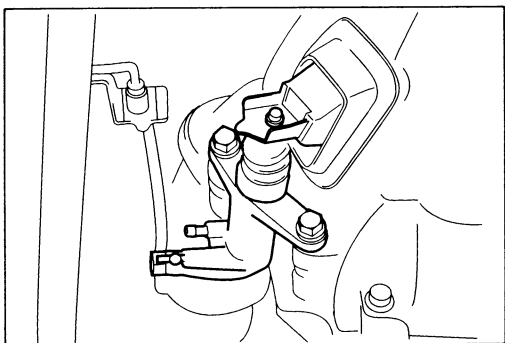


Rear Propeller Shaft (Dual Shaft Type)

1. Apply setting marks to the 2nd propeller shaft flange yoke.
This will prevent mispositioning during the installation procedure.
2. Remove the 2nd propeller shaft flange yoke bolts at the drive pinion side ①.
3. Remove the center bearing retainer bolts ②.
4. Remove the 1st propeller shaft ③ with the center bearing and the 2nd propeller shaft.
Pull the 1st propeller shaft toward the rear of the vehicle unit the spline yoke is free of the transmission main shaft.

Harness Connector

Disconnect the back up light switch connector and the speedometer sensor connector.



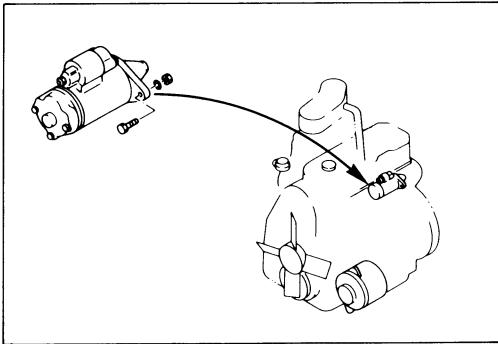
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Slave Cylinder

Remove the slave cylinder from the transmission case.

Engine Lifting Hanger

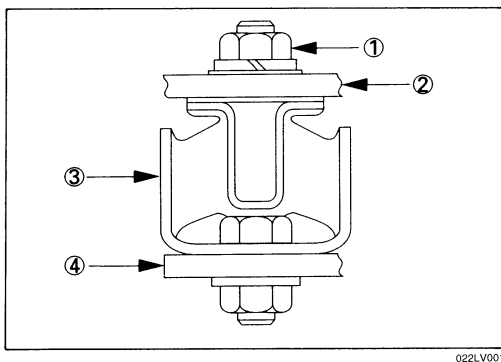
1. Attach the engine lifting hanger to the front portion of the engine.
2. Attach the lifting wire to both ends of the engine lifting hanger.

**Starter Motor**

Remove the starter motor from the engine rear plate.

Flywheel Under Cover (6VD1)

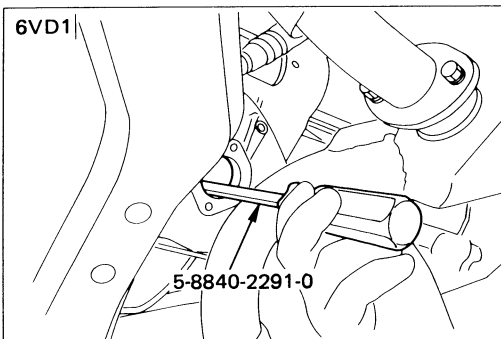
Remove flywheel under cover bolts.



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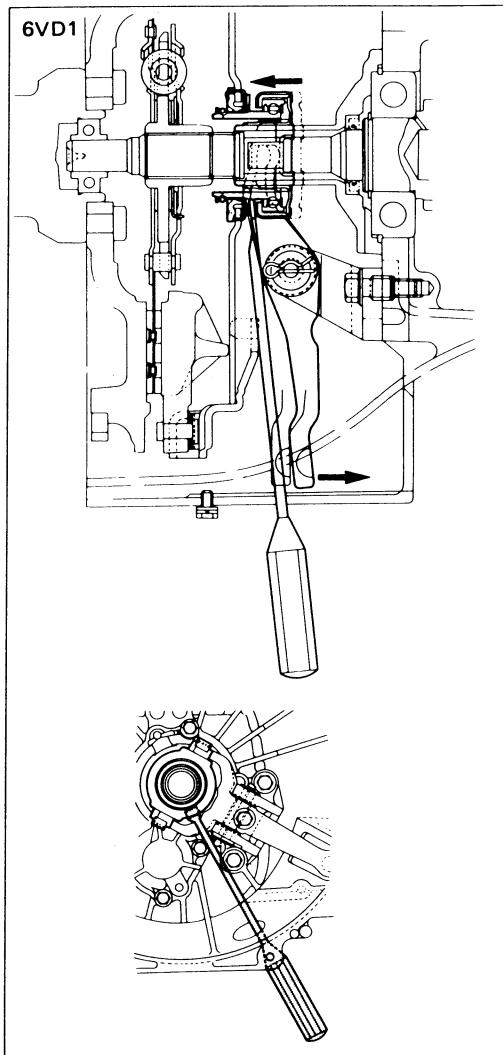
Transmission

1. Support the transmission with a transmission jack.
2. Remove the engine rear mounting rubber nuts ① from the transmission ②.
3. Remove the rear mounting rubber ③ from the No.3 crossmember ④.
4. Remove the gear control box from the transmission.



5. Use the remover for disconnect the clutch release bearing from the clutch pressure plate (6VD1).

Clutch release bearing remover : 5-8840-2291-0
(J-39207)

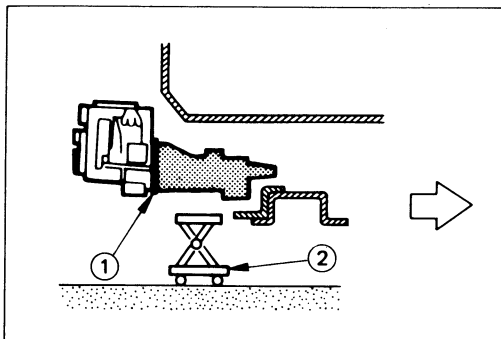
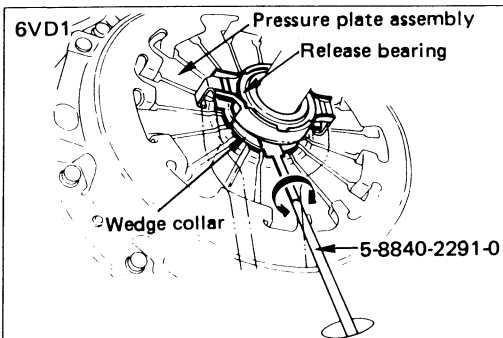


Release Bearing Disconnection (6VD1)

- ① Pull the shift fork toward the transmission to press the clutch release bearing against the clutch.
- ② Insert the clutch release bearing remover between the wedge collar and the release bearing.
- ③ Turn the remover to separate the release bearing.

NOTE:

Be sure not to insert the remover between the wedge collar and the clutch.

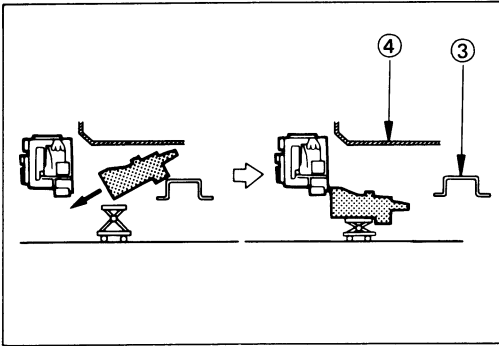


6. Remove the transmission from the engine.

The removal of the transmission will require the cooperative efforts of two mechanics.

- 1) Remove the transmission nuts and bolts ① from the engine rear plate.
- 2) Place a transmission jack ② beneath the transmission.

Do not raise the transmission jack.



3) Manually move the transmission as far as possible toward the rear of the vehicle (into the space between the No.3 crossmember ③ and the floor panel ④).

4) Lower the clutch housing end of the transmission toward the transmission jack.

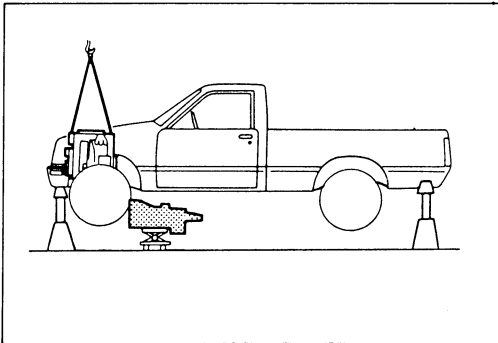
The rear of the transmission is supported by the No. 3 crossmember at this time.

5) Firmly grasp the transmission rear cover (1st mechanic).

Raise the transmission jack toward the transmission (2nd mechanic).

Carefully lower the transmission onto the transmission jack.

The transmission must be centered on the transmission jack.

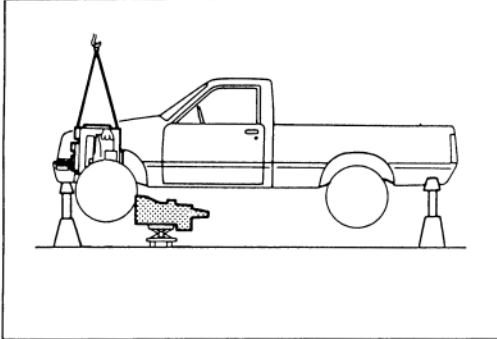


7. Carefully pull the transmission jack with the transmission from beneath the vehicle.



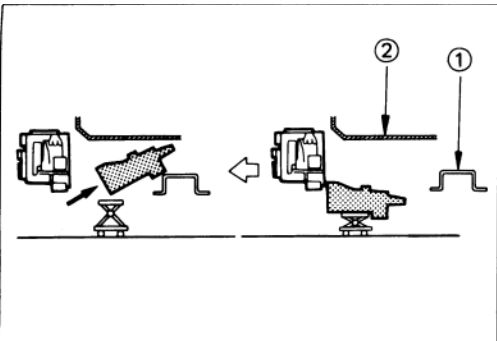
Important Operations – Installation

Follow the removal procedure in the reverse order to perform the installation procedure. Pay careful attention to the important points during the installation procedure.

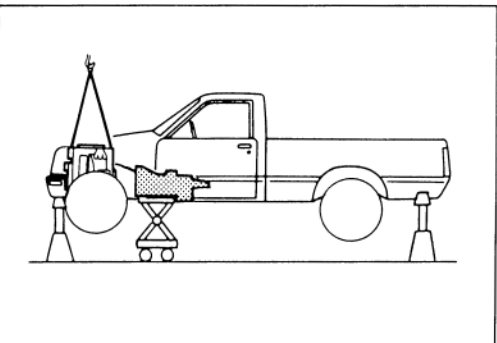


Transmission

1. Apply a thin coat of molybdenum disulfide grease to the top gear shaft spline.
2. Place the transmission on a transmission jack.
3. Carefully move the transmission jack and transmission into position behind the engine.



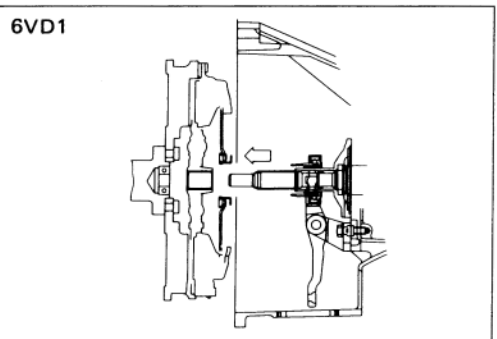
4. Slowly operate the transmission jack to raise the transmission until the rear of the transmission is at the same level as the No.3 crossmember ①.
5. Manually support the transmission rear cover.
Move the transmission into position between the No.3 crossmember and the floor panel ②.



6. Slowly raise the transmission jack until the front of the transmission is aligned with the rear of the engine.

The slope of the engine and the transmission must be the same.

7. Install the gear control box to the transmission.



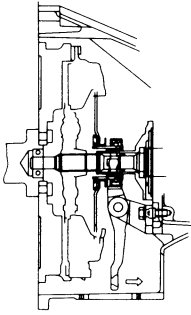
8. Align the top gear shaft spline with the clutch drive plate spline.

9. Install the transmission to the engine.

Tighten the transmission nuts and bolts to the specified torque.

Transmission Nut and Bolt Torque	kg·m(lb·ft/N·m)
M10: 4.1 ± 1.0 ($30 \pm 7.2/40 \pm 10$)	
M12: 8.0 ± 1.6 ($58 \pm 12/78 \pm 16$)	

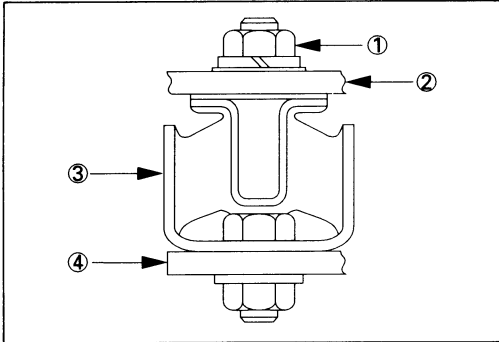
6VD1



10. Apply a force of 59–78N (6–8 kg / 13.2–17.6 lb) to the tip of the shift fork in the direction of the transmission to engage the clutch pressure plate and release bearing (6VD1).

NOTE (6VD1):

A click sound is heard when the release bearing and the tip of the diaphragm spring engage each other. Check to see if they are securely engaged by pushing the tip of the shift fork toward the engine while applying a force of about 25N (2.5 kg / 5.5 lb). If the shift fork will not move, then they are securely engaged.



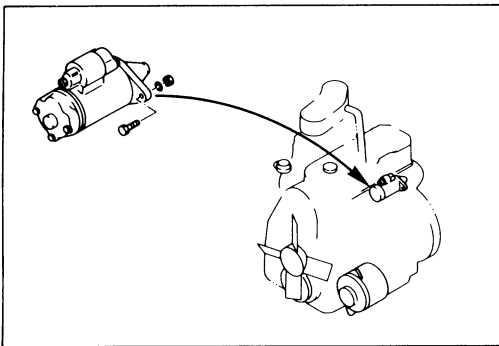
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11. Install the rear mounting rubber ③ to the transmission ②.
Install the rear mounting rubber ③ to the No.3 cross-member ④.
12. Tighten the rear mounting rubber nuts ① to the specified torque.

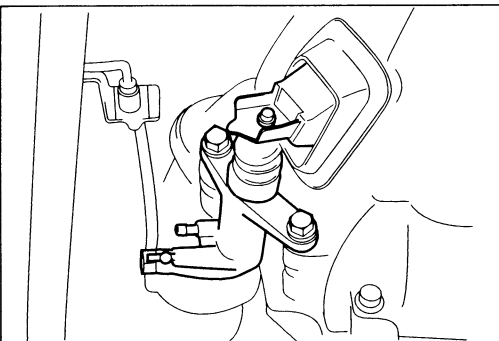
Rear Mounting Rubber Nut Torque	kg·m(lb·ft/N·m)
4.2 ± 0.5 ($30 \pm 3.6/41 \pm 4.9$)	

Mounting Bolt Torque	kg·m(lb·ft/N·m)
5.1 ± 0.6 ($37 \pm 4.3/50 \pm 6$)	

**Starter Motor**

1. Install the starter motor to the engine rear plate.
2. Tighten the starter motor bolts to the specified torque.

Starter Motor Bolt Torque	kg·m(lb·ft/N·m)
8.0 ± 1.6 ($58 \pm 12/78 \pm 16$)	



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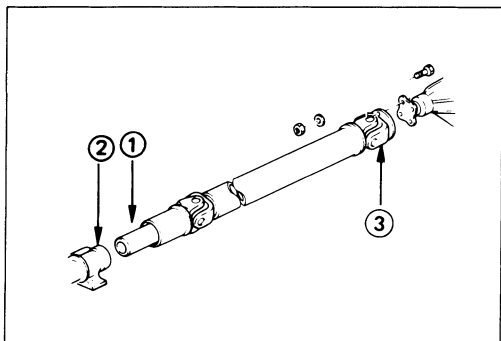
**Slave Cylinder**

Install the slave cylinder to the transmission case.

Slave Cylinder Bolt Torque	kg·m(lb·ft/N·m)
4.1 ± 1.0 ($30 \pm 7.2/40 \pm 10$)	

Harness Connector

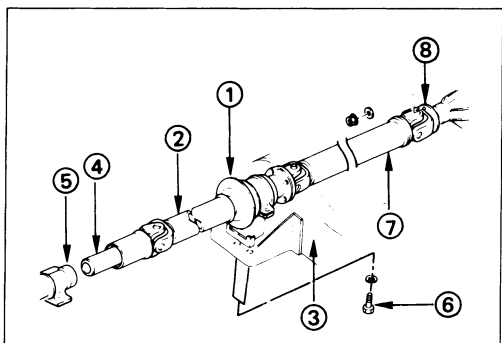
Connect the back up light switch connector and speedometer sensor connector.

**Rear Propeller Shaft (Single Shaft Type)**

1. Insert the splined yoke ① with the propeller shaft into the transmission main shaft spline ②.
2. Install the propeller shaft flange yoke ③ to the drive pinion side.
3. Tighten the propeller shaft flange yoke bolt to the specified torque.

Propeller Shaft Flange Yoke Bolt Torque kg·m(lb·ft/N·m)

6.4 ± 0.4 ($46.3 \pm 2.9/62.7 \pm 3.9$)

**Rear Propeller Shaft (Dual Shaft Type)**

1. Place the center bearing and retainer ① together with the 1st propeller shaft ② and 2nd propeller shaft ⑦ on the No.4 crossmember ③.
2. Insert the splined yoke ④ into the transmission main shaft spline ⑤.
3. Tighten the center bearing retainer bolts ⑥ to the specified torque.

Center Bearing Retainer Bolt Torque kg·m(lb·ft/N·m)

6.2 ± 1.2 ($44.8 \pm 8.7/60.8 \pm 11.8$)



4. Connect the 2nd propeller shaft ⑦ and drive pinion side ⑧.

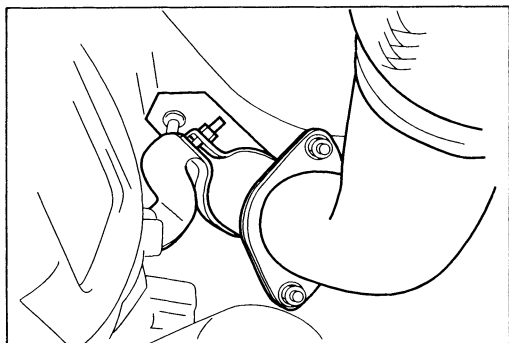


Be sure to align the setting marks applied at dis-assembly.

5. Tighten the coupling bolts to the specified torque.

Propeller Shaft Flange Yoke Bolt Torque kg·m(lb·ft/N·m)

6.4 ± 0.4 ($46.3 \pm 2.9/62.7 \pm 3.9$)

**Exhaust Pipe**

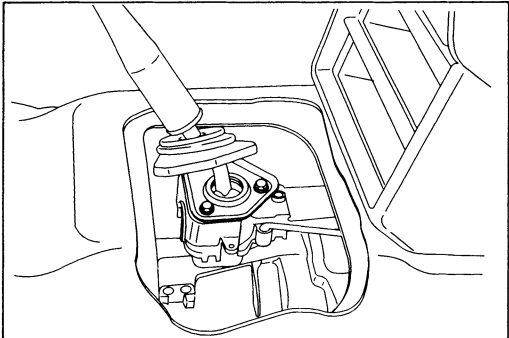
1. Install the front exhaust pipe and 2nd-3rd exhaust pipe.
2. Install the exhaust pipe bracket to the transmission case.



Gear Shift Lever

1. Replenish the transmission case with the specified engine oil.

Transmission Case Oil	lit(US/UK gt.)
2.95 (3.12/2.6)	



235RT005



2. Install the gear shift lever to the gear control box.
3. Tighten the gear shift lever cover bolts to the specified torque.

Shift Lever Cover Bolt Torque	kg·m(lb·ft/N·m)
2.0 ± 0.2 (14.5 ± 1.5/19.6 ± 1.96)	

4. Install the dust cover and the grommet.
5. Install the front console assembly.
6. Install the gear shift lever knob.

Lowering the Vehicle

1. Place a jack beneath the vehicle.
2. Raise the jack to remove the chassis stands.
3. Lower the vehicle to the ground.

Engine Hood

Align the setting marks (applied at removal) on the engine hood and the engine hood hinges to install the engine hood.

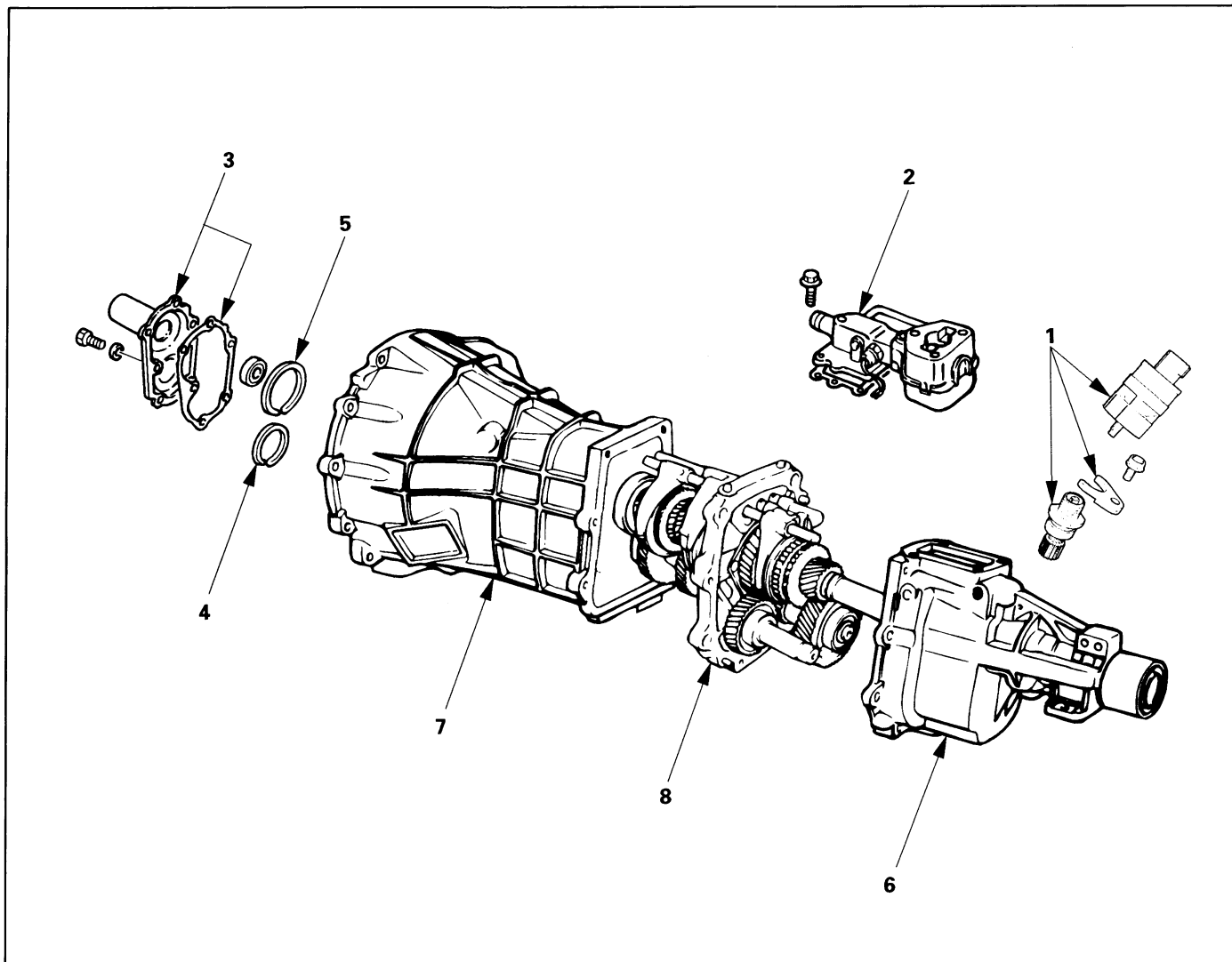
Battery Cable

Connect the negative (–) cable to the battery terminal.



DISASSEMBLY

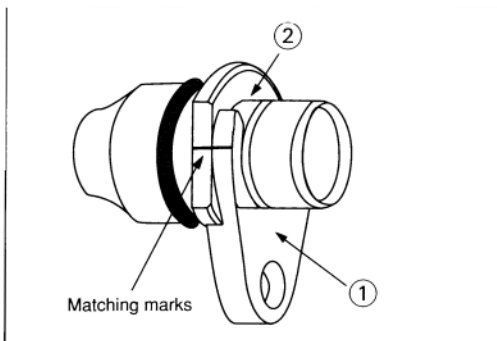
MAJOR COMPONENTS



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Disassembly Steps

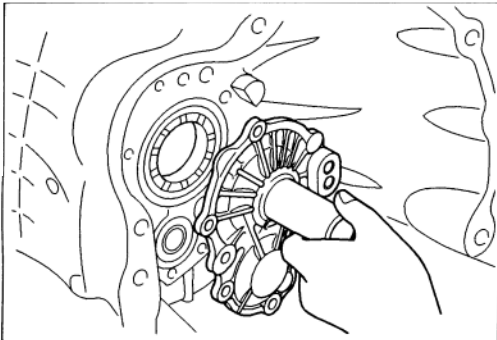
- ▲ 1. Speedometer sensor and speedometer driven gear
- 2. Gear control box assembly
- ▲ 3. Front cover with oil seal
- ▲ 4. Counter front bearing snap ring
- ▲ 5. Front bearing snap ring
- 6. Rear cover with oil seal
- 7. Transmission case
- 8. Intermediate plate with gear assembly



Important Operations

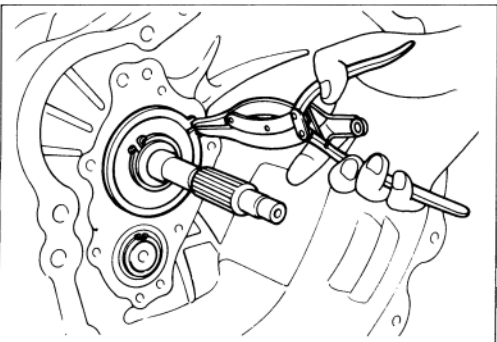
1. Speedometer Sensor and Speedometer Driven Gear

Mark the plate (1) and bush (2) alignment for reassembly.



3. Front Cover with Oil Seal

Remove the front cover with oil seal from the transmission case



4. Counter Front Bearing Snap Ring

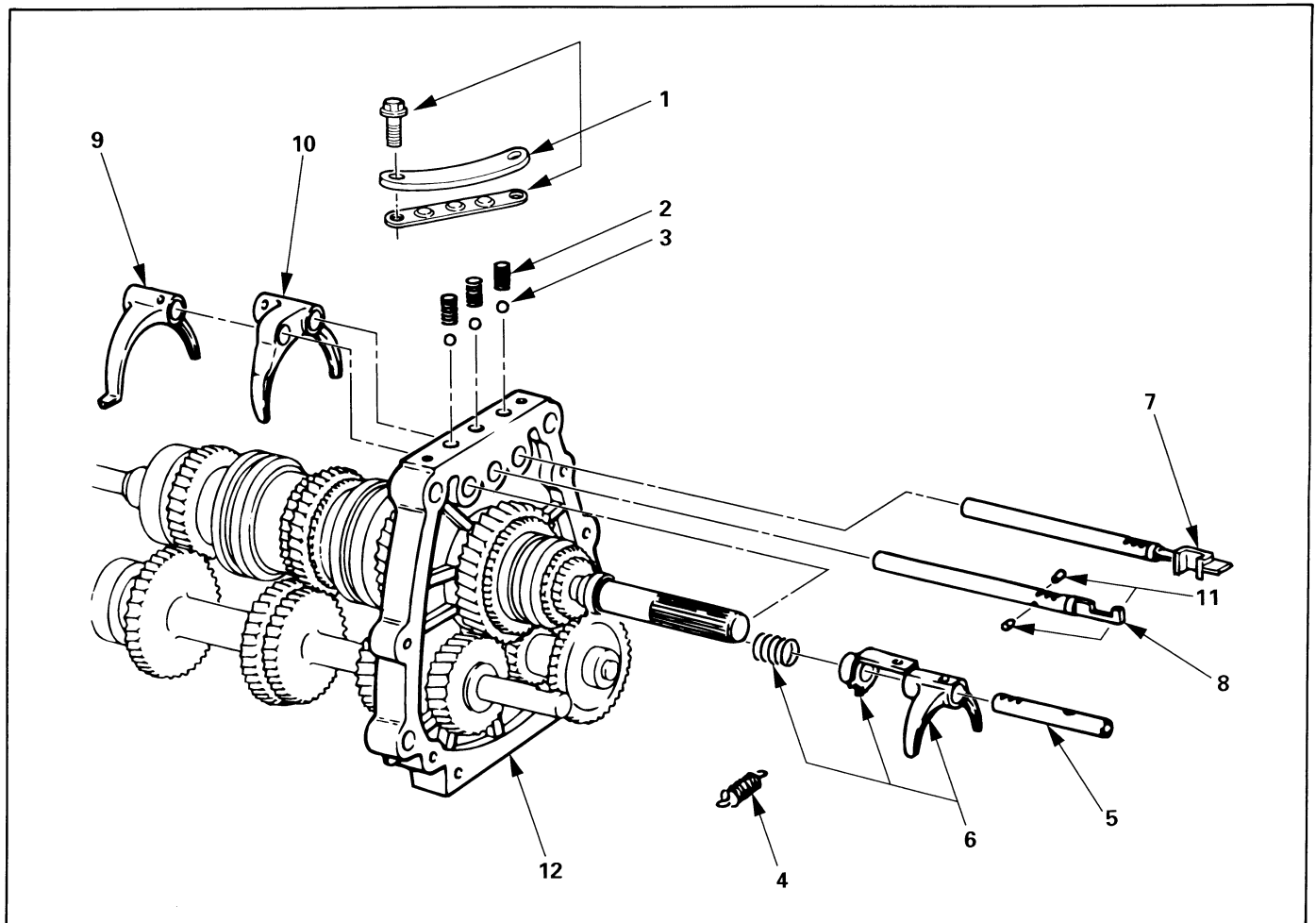
5. Front Bearing Snap Ring

Use a pair of snap ring pliers to remove the snap ring.



MINOR COMPONENTS

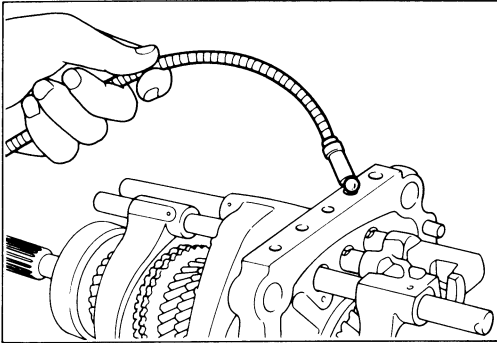
INTERMEDIATE PLATE AND GEAR ASSEMBLY, DETENT, SHIFT ARM ASSEMBLY, AND INTERLOCK PIN



220RW071

Disassembly Steps

- | | |
|--|--|
| 1. Detent spring plate and gasket | 7. 1st-2nd shift rod |
| 2. Detent spring | ▲ 8. 3rd-4th shift rod |
| ▲ 3. Detent ball | ▲ 9. 3rd-4th shift arm |
| 4. Spring | ▲ 10. 1st-2nd shift arm |
| 5. Rev-5th shift rod | 11. Interlock pin |
| 6. Rev-5th shift arm and reverse inhibitor | 12. Intermediate plate and gear assembly |

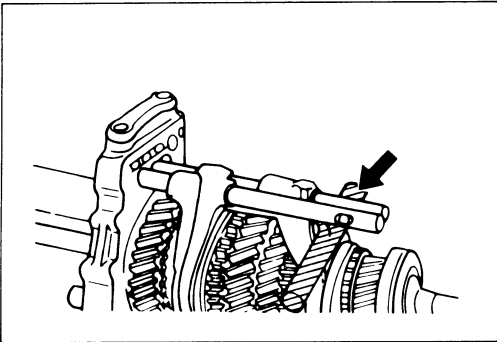


Important Operations

3. Detent Ball

Use a magnetic hand to remove the detent balls from the intermediate plate.

Take care not to lose the detent balls.



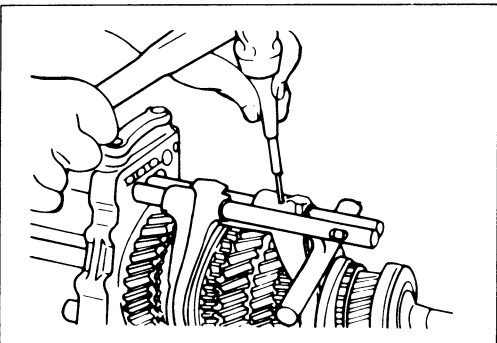
8. 3rd-4th Shift Rod

9. 3rd-4th Shift Arm

10. 1st-2nd Shift Arm

- 1) Hold a round bar against the shift arm end.

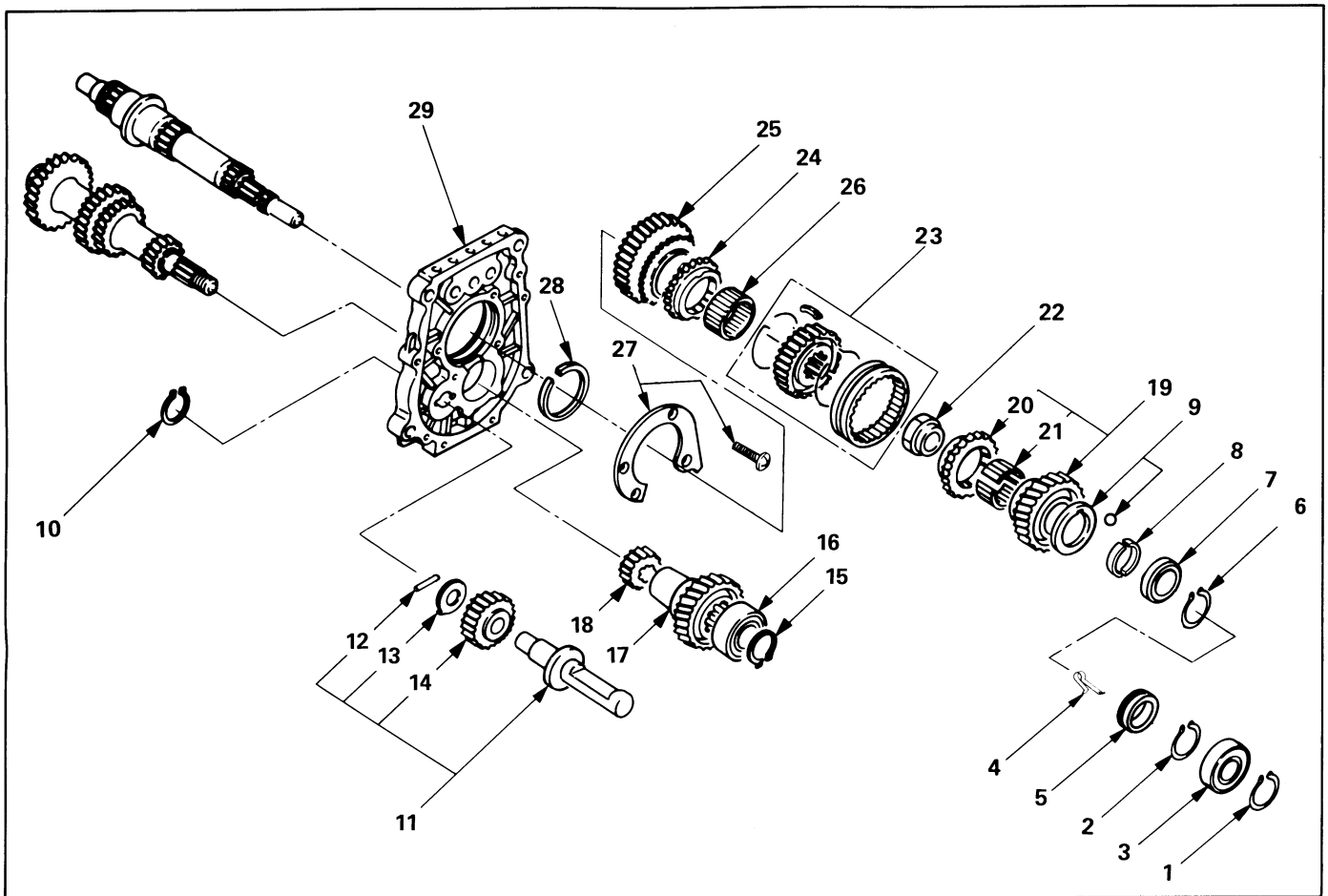
This will prevent damage to other components.



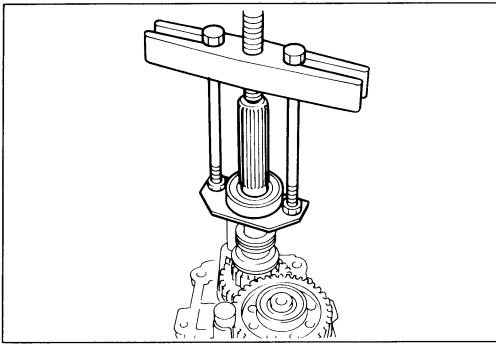
- 2) Use a spring pin remover to remove the shift arm spring pin from the shift arm and the shift rod.

- 3) Move the 3rd-4th shift rod forward.

Take care not to lose the interlock pins.

**REVERSE GEAR AND 5TH GEAR****Disassembly Steps**

- | | |
|--------------------------------|-------------------------------------|
| 1. Bearing snap ring | ▲ 16. Ball bearing |
| 2. Bearing snap ring | ▲ 17. Counter 5th gear |
| ▲ 3. Ball bearing | 18. Counter reverse gear |
| 4. Clip | 19. 5th gear |
| 5. Speedometer drive gear | 20. 5th block ring |
| 6. Retainer snap ring | ▲ 21. Needle bearing |
| 7. Retaining ring | ▲ 22. Mainshaft nut |
| 8. Thrust plate | ▲ 23. Rev-5th synchronizer assembly |
| 9. Thrust washer and lock ball | ▲ 24. Reverse block ring |
| ▲ 10. Reverse gear snap ring | ▲ 25. Reverse gear |
| 11. Reverse shaft | 26. Needle bearing |
| 12. Idler shaft pin | ▲ 27. Bearing plate and screw |
| 13. Thrust washer | ▲ 28. Bearing snap ring |
| 14. Reverse idler gear | ▲ 29. Intermediate plate |
| 15. Bearing snap ring | |



Important Operations

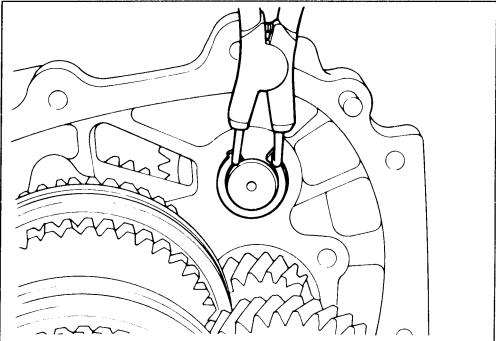


3. Ball Bearing

Set the bearing remover to the bearing and the mainshaft end to remove the bearing.

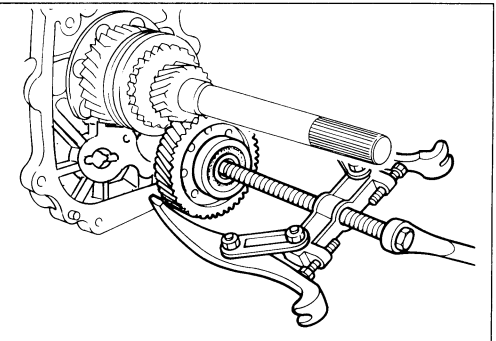
Bearing Remover : 5-8840-2155-0 (J-32717)

Puller : 5-8840-2027-0



10. Reverse Gear Snap Ring

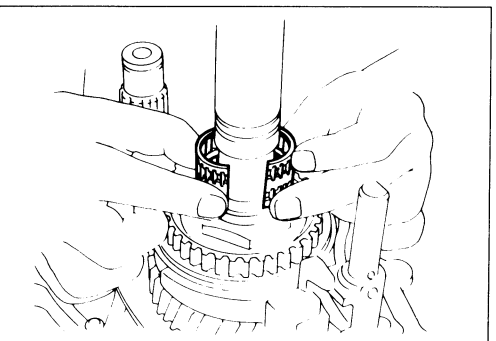
Use a pair of snap ring pliers to remove the snap ring.



16. Ball Bearing

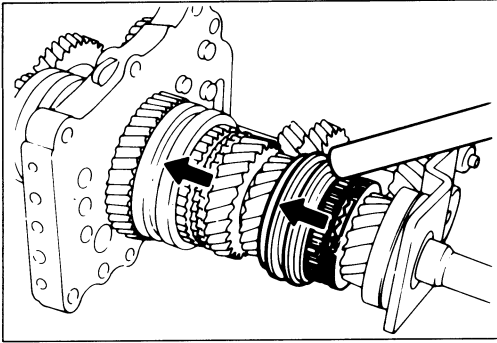
17. Counter 5th Gear

Use the bearing remover to remove the bearing.



21. Needle Bearing

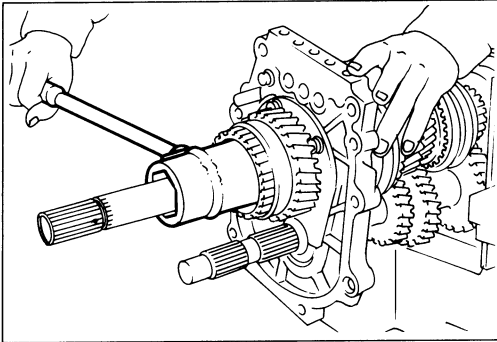
Remove the needle bearing (2 piece type).



22. Mainshaft Nut

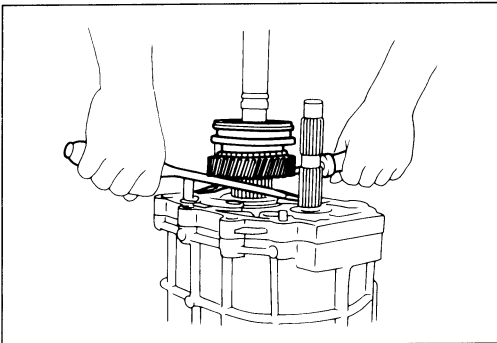
- 1) Engage the 3rd - 4th synchronizer with the 3rd gear.
- 2) Engage the 1st-2nd synchronizer with the 1st gear.
- 3) Attach the holding fixture to the mainshaft and the counter gear.

Holding Fixture: 5-8840-2160-0 (J-37224)



- 4) Use the mainshaft nut wrench to remove the mainshaft nut.

Wrench: 5-8840-2156-0 (J-37219)

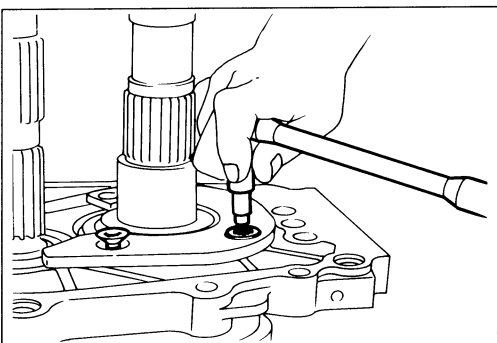


23. Rev.-5th Synchronizer Assembly

24. Reverse Ring

25. Reverse Gear

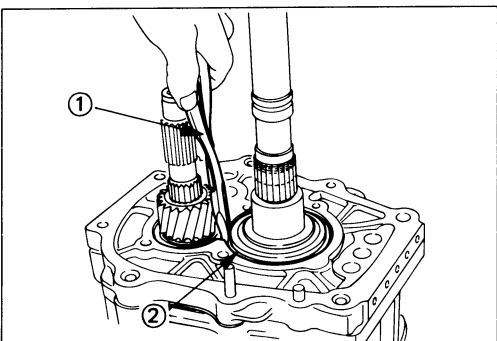
Use screw drivers between the reverse gear and bearing plate to remove the Rev.-5th synchronizer assembly together with reverse ring and gear.



27. Bearing Plate and Screw

Use the torx bit wrench to remove the bearing plate screw from the intermediate plate.

Torx Bit Wrench: 5-8840-0047-0 (J-37225 : T45)



28. Bearing Snap Ring

29. Intermediate Plate

- 1) Insert the snap ring pliers into the mainshaft bearing snap ring hole.
- 2) Use the snap ring pliers ① to force open the mainshaft bearing snap ring ②.

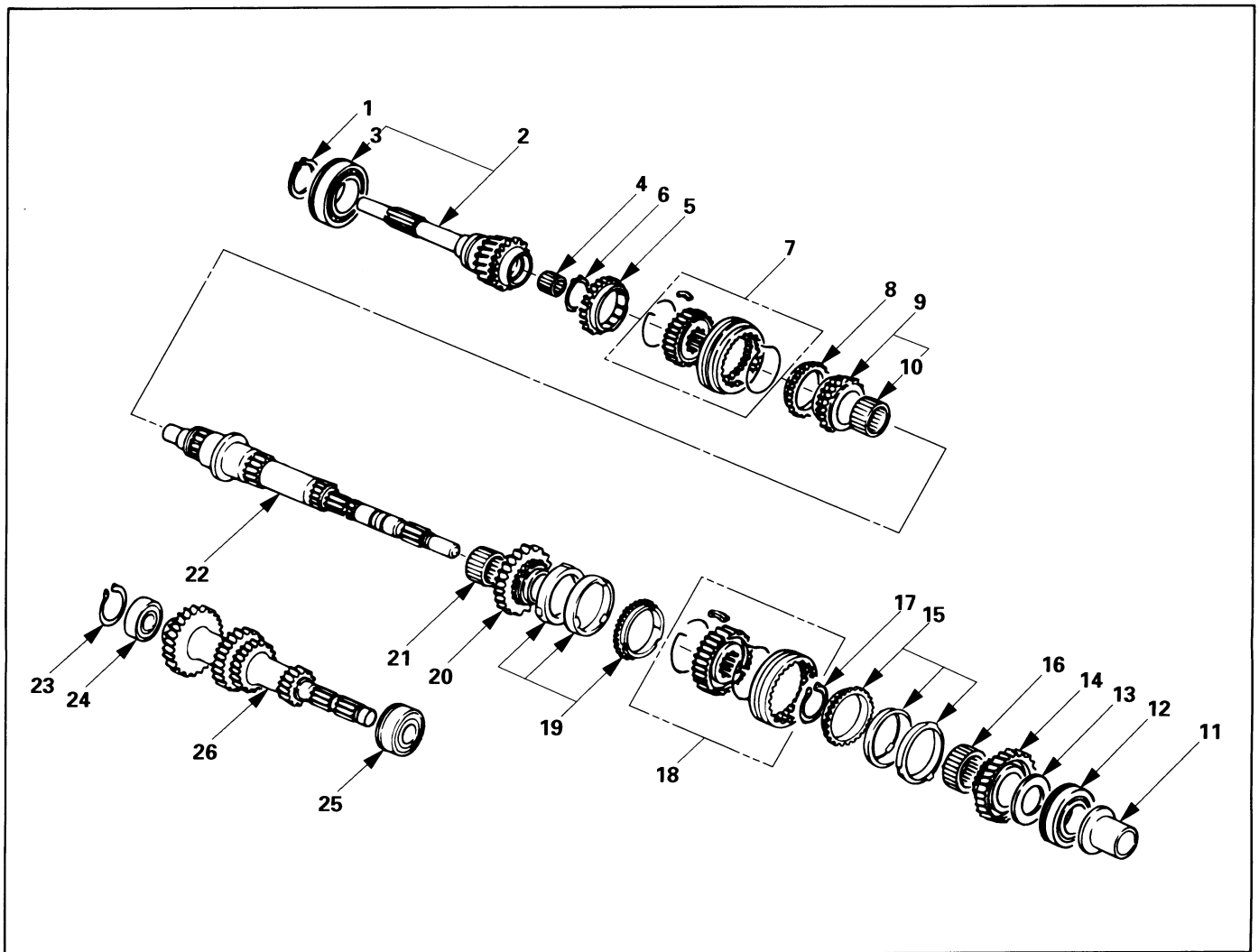
Hold the snap ring open with the pliers.

- 3) Push the intermediate plate toward the rear of the transmission to remove it.

The ball bearing snap ring will come free.



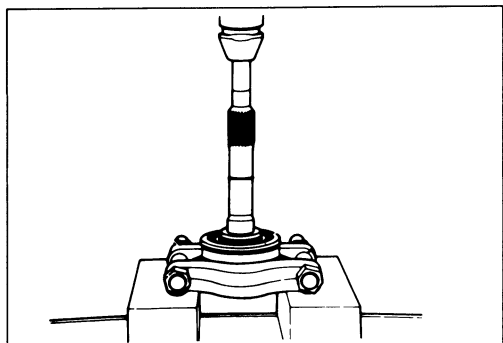
TOP GEAR SHAFT, MAIN GEAR SHAFT, AND COUNTER GEAR



22BLV002

Disassembly Steps

- | | |
|---|-------------------------------------|
| 1. Top gear shaft snap ring | ▲ 14. 1st gear |
| 2. Top gear shaft | 15. 1st block ring (set) |
| ▲ 3. Top gear ball bearing | 16. Needle bearing |
| 4. Needle bearing | ▲ 17. Clutch hub snap ring |
| 5. Top block ring | ▲ 18. 1st-2nd synchronizer assembly |
| ▲ 6. Mainshaft snap ring | ▲ 19. 2nd block ring (set) |
| ▲ 7. 3rd-4th synchronizer assembly | ▲ 20. 2nd gear |
| 8. 3rd block ring | 21. Needle bearing |
| 9. 3rd gear | 22. Mainshaft |
| 10. Needle bearing | 23. Bearing snap ring |
| ▲ 11. Needle bearing collar | ▲ 24. Counter gear front bearing |
| ▲ 12. Mainshaft ball bearing | 25. Counter gear center bearing |
| ▲ 13. 1st gear thrust bearing and plate | 26. Counter gear |



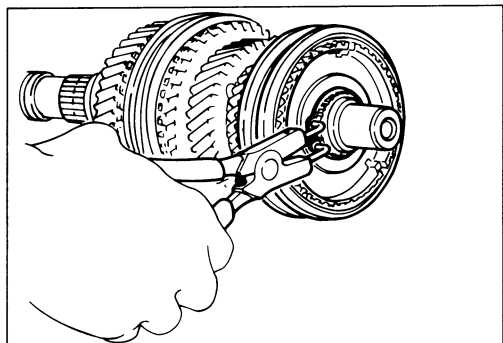
Important Operations



3. Top Gear Ball Bearing

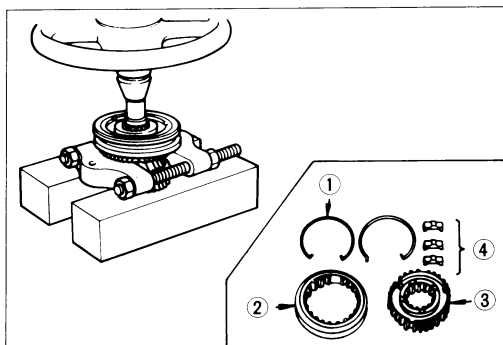
Use a bench press and the bearing replacer to remove the ball bearing.

Bearing Replacer : 5-8840-0015-0 (J-22912-01)



6. Mainshaft Snap Ring

Use a pair of snap ring pliers to remove the snap ring.

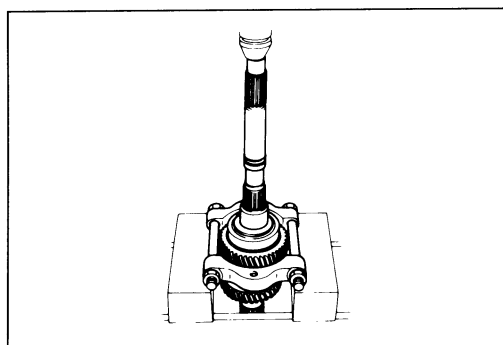


7. 3rd-4th Synchronizer Assembly

- 1) Use a bench press and the bearing replacer to remove the synchronizer assembly as a set.
- 2) Disassemble the synchronizer assembly.
 - ① Springs
 - ② Sleeve
 - ③ Clutch Hub
 - ④ Inserts

Note:

Mark the hub and sleeve alignment for reassembly.



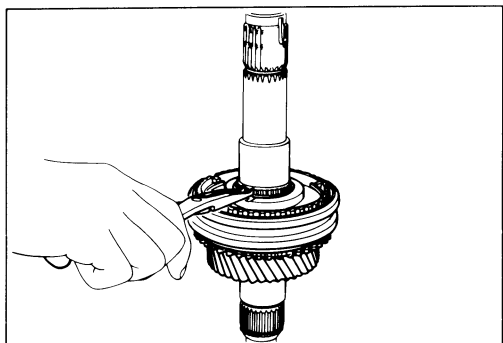
11. Needle Bearing Collar

12. Mainshaft Ball Bearing

13. 1st Gear Thrust Bearing and Plate

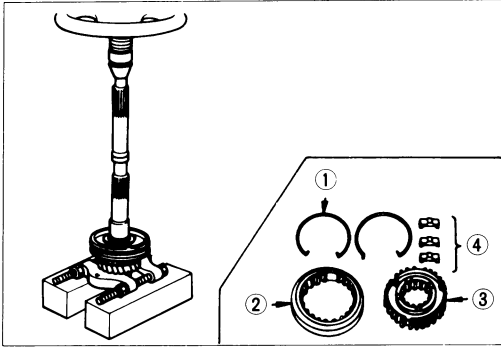
14. 1st Gear

Use a bench press and the bearing replacer to remove the ball bearing.



17. Clutch Hub Snap Ring

Use a pair of snap ring pliers to remove the snap ring.

**18. 1st-2nd Synchronizer Assembly****19. 2nd Block Ring (Set)****20. 2nd Gear**

- 1) Use a bench press and the bearing remover to remove the 2nd gear together with synchronizer assembly.

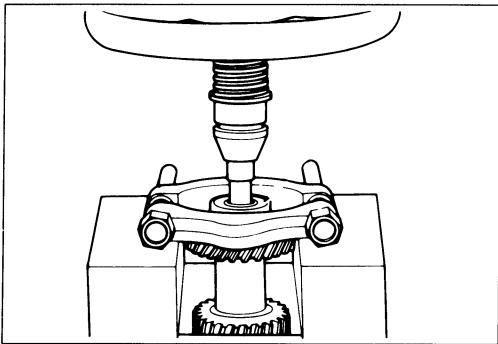
Remover: 5-8840-0015-0 (J-22912-01)

- 2) Disassemble the synchronizer assembly.

- ① Springs
- ② Sleeve
- ③ Clutch Hub
- ④ Inserts

Note:

Mark the hub and sleeve alignment for reassembly.

**24. Counter Gear Front Bearing**

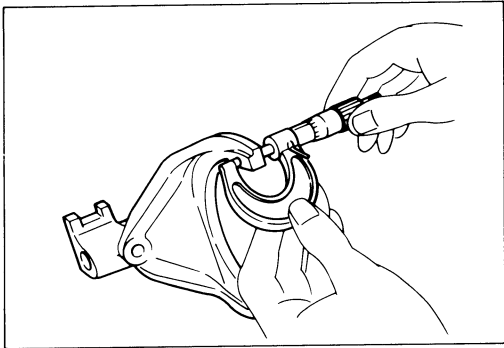
Use a bench press and the bearing remover to remove the bearing.

Bearing Remover : 5-8840-0015-0 (J-22912-01)



INSPECTION AND REPAIR

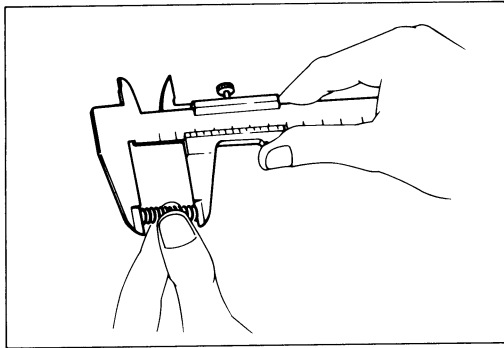
Make the necessary adjustments, repairs, and part replacements if excessive wear or damage is discovered during inspection.



SHIFT ARM THICKNESS

Use a micrometer to measure the shift arm thickness. If the measured value is less than the specified limit, the shift arm must be replaced.

Shift Arm Thickness		mm(in)
	Standard	Limit
1st–2nd	9.60–9.85 (0.378–0.388)	9.0 (0.354)
3rd–4th Rev.–5th	9.60–9.80 (0.378–0.386)	

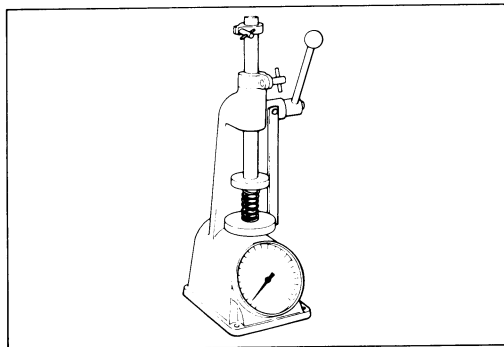


DETENT SPRING FREE LENGTH

Use a vernier caliper to measure the detent spring free length.

If the measured value is less than the specified limit, the detent spring must be replaced.

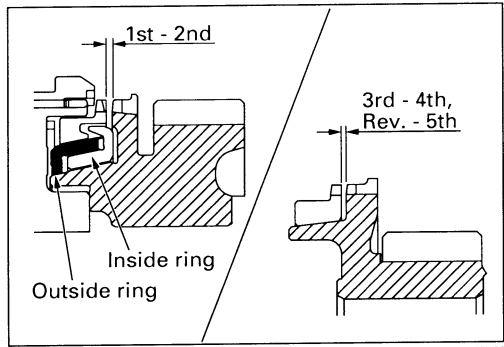
Detent Spring Free Length		mm(in)
	Standard	Limit
	26.8 (1.06)	26.2 (1.03)



DETENT SPRING TENSION

Use a spring tester to measure the detent spring tension. If the measured value is less than the specified standard, the detent spring must be replaced.

Detent Spring Tension		kg(lb/N)
Compressed Height	Standard	
20 mm (0.787 in)	8.9–9.9 (19.6–21.8/87.2–97)	

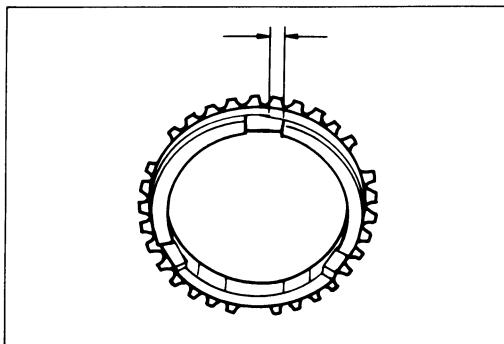


BLOCK RING AND DOG TEETH CLEARANCE

Use a thickness gauge to measure the clearance between the block ring and the dog teeth.

If the measured value exceeds the specified limit, the block ring must be replaced.

Block Ring and Dog Teeth Clearance		mm(in)
	Standard	Limit
	1.5 (0.059)	0.8 (0.032)



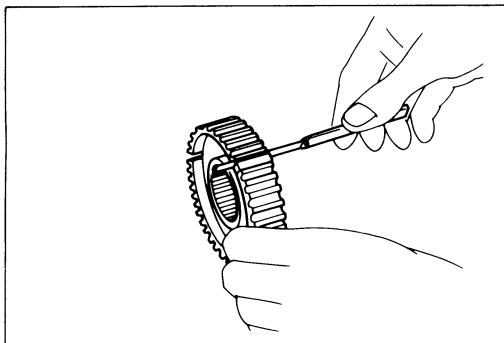
BLOCK RING AND INSERT CLEARANCE

Use a vernier caliper or thickness gauge to measure the clearance between the block ring and the insert.

If the measured value exceeds the specified limit, the block ring and the insert must be replaced.

Block Ring and Insert Clearance mm(in)

	Standard	Limit
3rd-4th	3.46–3.74 (0.136–0.147)	4.0 (0.158)
1st-2nd	4.34–4.66 (0.171–0.183)	4.9 (0.193)
Rev.-5th	3.59–3.91 (0.141–0.154)	4.1 (0.161)



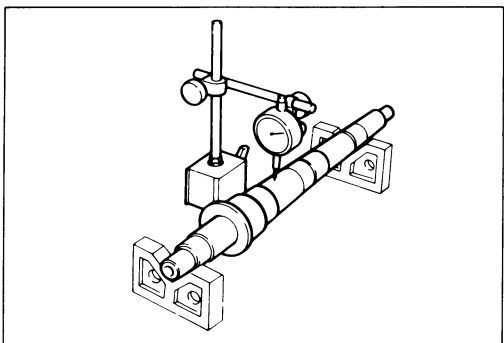
CLUTCH HUB AND INSERT CLEARANCE

Use a thickness gauge to measure the clearance between the clutch hub and the insert.

If the measured value exceeds the specified limit, the clutch hub and the insert must be replaced.

Clutch Hub and Insert Clearance mm(in)

	Standard	Limit
3rd-4th	0.01-0.19 (0.0004-0.0075)	0.4 (0.016)
1st-2nd Rev.-5th	0.09-0.31 (0.0035-0.0122)	



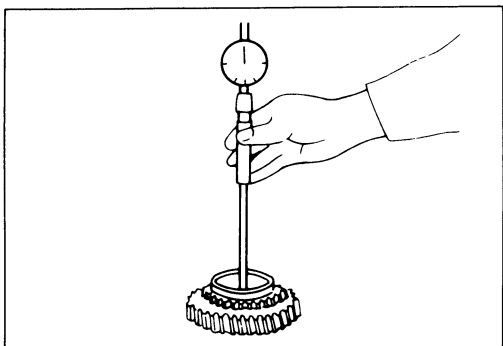
MAINSHAFT RUN-OUT

1. Install the mainshaft to a grinding machine.
2. Use a dial indicator to measure the mainshaft central portion run-out.

If the measured mainshaft run-out exceeds the specified limit, the mainshaft must be replaced.

Mainshaft Run Out mm(in)

Limit
0.05 (0.0020)



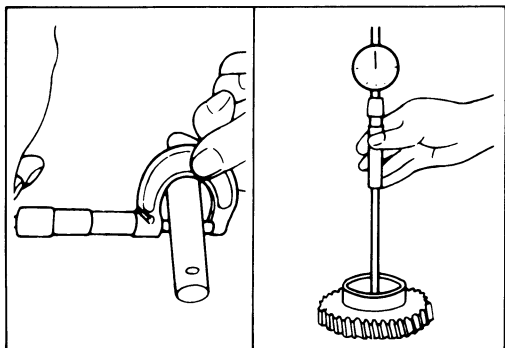
GEAR INSIDE DIAMETER

Use an inside dial indicator to measure the gear inside diameter.

If the measured value is less than the specified limit, the gear must be replaced.

Gear Inside Diameter mm(in)

	Standard	Limit
1st 3rd	45.000-45.013 (1.771-1.772)	45.100 (1.776)
2nd	52.000-52.013 (2.047-2.048)	52.100 (2.051)
Rev.	48.000-48.013 (1.889-1.890)	48.100 (1.894)
5th	32.000-32.013 (1.259-1.260)	32.100 (1.264)



REVERSE IDLER GEAR AND IDLER GEAR SHAFT CLEARANCE

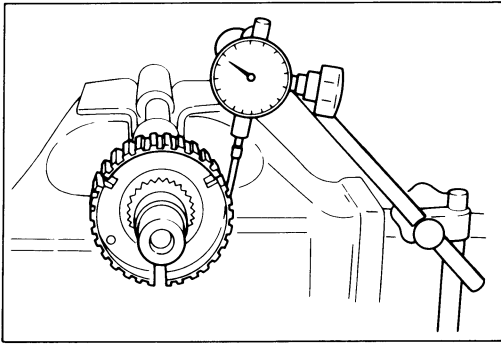
1. Use a micrometer to measure the idler gear shaft diameter.
2. Use an inside dial indicator to measure the idler gear inside diameter.
3. Calculate the idler gear and idler gear shaft clearance.

$$\text{Idler gear inside diameter} - \text{idler gear shaft diameter} = \text{idler gear and idler gear shaft clearance.}$$

If the measured value exceeds the specified limit, the idler gear and/or the idler gear shaft must be replaced.

Idler Gear and Idler Gear Shaft Clearance mm(in)

Standard	Limit
0.041 – 0.074 (0.0016 – 0.0029)	0.150 (0.0059)



CLUTCH HUB SPLINE PLAY

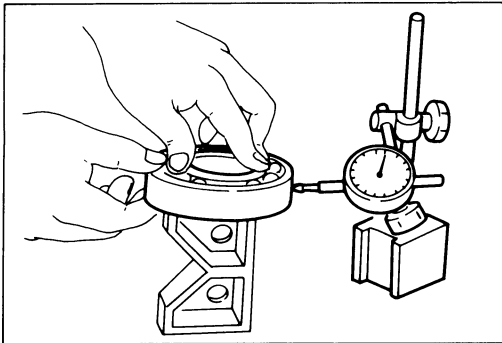
1. Set a dial indicator to the clutch hub to be measured.
2. Move the clutch hub as far as possible to both the right and the left.

Note the dial indicator reading.

If the measured value exceeds the specified limit, the clutch hub must be replaced.

Clutch Hub Spline Play mm(in)

	Standard	Limit
1st-2nd 3rd-4th	0-0.1 (0-0.0039)	0.2 (0.0079)
Rev.-5th	0-0.2 (0-0.0079)	0.3 (0.0118)



BALL BEARING PLAY

Use a dial indicator to measure the ball bearing play.

Ball Bearing Play mm(in)

Limit
0.2 (0.0079)

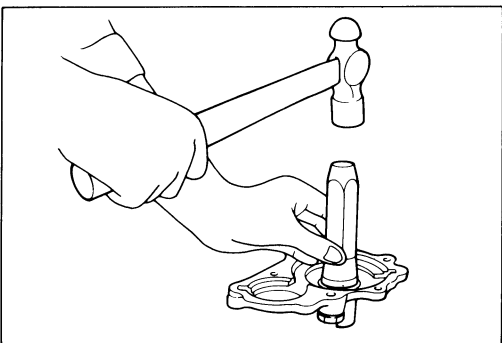


FRONT COVER OIL SEAL

Oil Seal Replacement

Oil Seal Removal

Use a screwdriver to pry the oil seal from the front cover.



Oil Seal Installation

1. Use the oil seal installer to install the oil seal to the front cover.

Oil Seal Installer : 5-8840-0026-0 (J-26540)

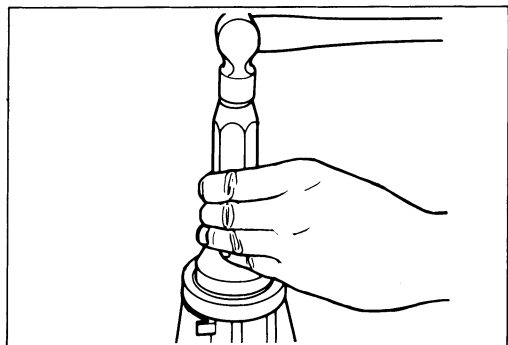
2. Apply gear oil to the oil seal lip.

REAR COVER OIL SEAL

Oil Seal Replacement

Oil Seal Removal

Use a screwdriver to pry the oil seal from the rear cover.



Oil Seal Installation

1. Use the oil seal installer to install the oil seal to the rear cover.

Oil Seal Installer : 5-8522-0050 (J-29769)

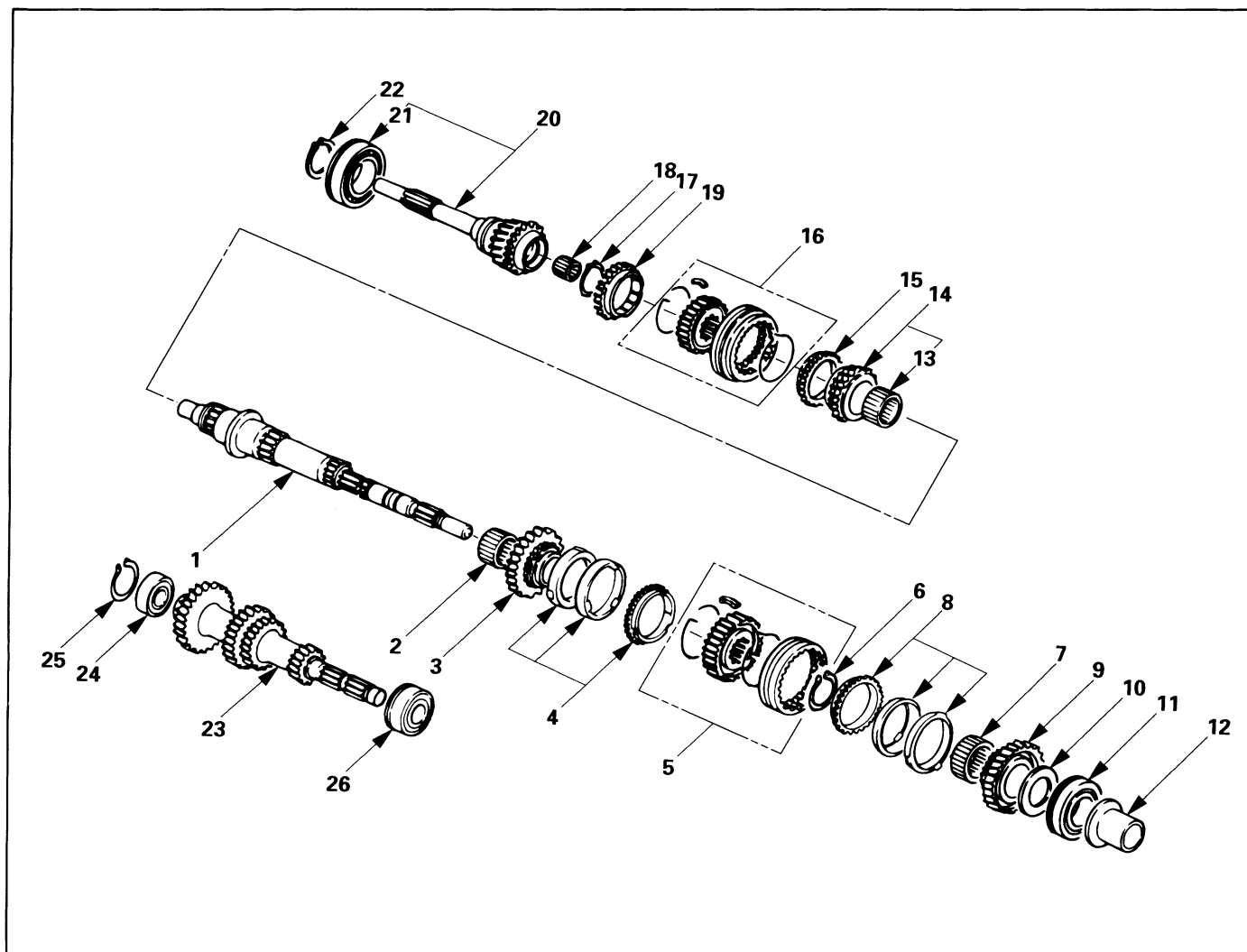
2. Apply engine oil to the oil seal lip.



REASSEMBLY

MINOR COMPONENTS

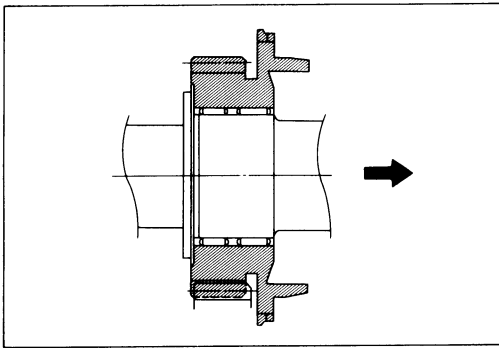
TOP GEAR SHAFT, MAIN GEAR SHAFT, AND COUNTER GEAR



226LV003

Reassembly Steps

- | | |
|---|-------------------------------------|
| 1. Mainshaft | ▲ 14. 3rd gear |
| ▲ 2. Needle bearing | 15. 3rd block ring |
| ▲ 3. 2nd gear | ▲ 16. 3rd-4th synchronizer assembly |
| 4. 2nd block ring (set) | ▲ 17. Mainshaft snap ring |
| ▲ 5. 1st-2nd synchronizer assembly | 18. Needle bearing |
| ▲ 6. Clutch hub snap ring | 19. Top block ring |
| ▲ 7. Needle bearing | 20. Top gear shaft |
| 8. 1st block ring (set) | ▲ 21. Top gear ball bearing |
| ▲ 9. 1st gear | ▲ 22. Top gear shaft snap ring |
| ▲ 10. 1st gear thrust bearing and plate | 23. Counter gear |
| ▲ 11. Mainshaft ball bearing | ▲ 24. Counter gear front bearing |
| ▲ 12. Needle bearing collar | 25. Snap ring |
| ▲ 13. Needle bearing | 26. Counter gear center bearing |



Important Operations



2. Needle Bearing

3. 2nd Gear

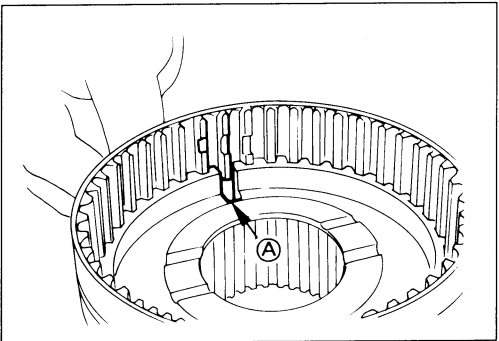
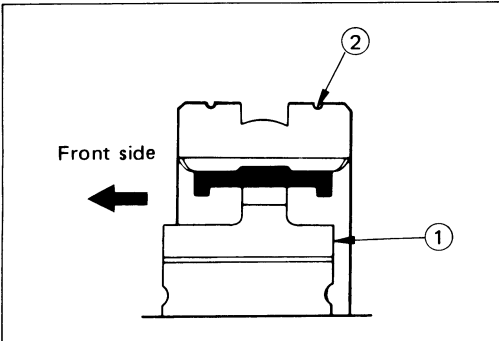
- 1) Apply engine oil to the needle bearing and the 2nd gear thrust surfaces.
- 2) Install the needle bearing and the 2nd gear to the mainshaft.

The 2nd gear dog teeth must be facing the transmission rear side.



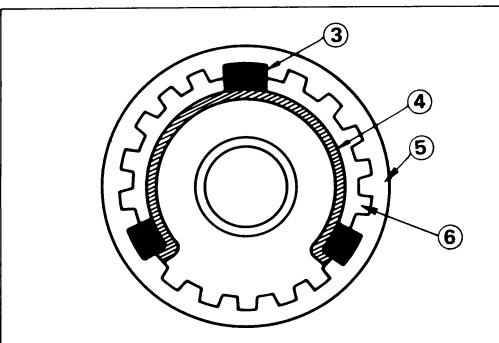
5. 1st-2nd Synchronizer Assembly

- 1) Turn the clutch hub face ① shallow toward the sleeve small groove ② on the outer circumference.



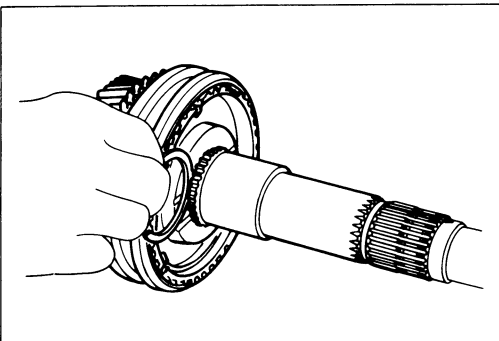
Note:

The clutch hub groove (A) must be aligned with the key groove of sleeve.



- 2) Check that the inserts ③ fit snugly into the block ring insert grooves.
- 3) Check that the insert springs ④ are fitted to the inserts as shown in the illustration.
- 4) Check that the clutch hub ⑤ and the sleeve ⑥ slide smoothly.
- 5) Install the synchronizer assembly to the mainshaft.

The clutch hub face (with the heavy boss) must be facing the 2nd gear side.



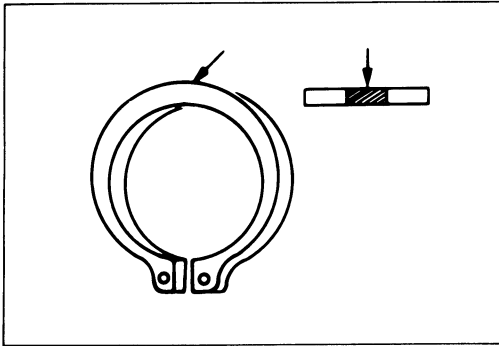
6. Clutch Hub Snap Ring

- 1) Select the snap ring which will provide the minimum clearance between the 1st-2nd clutch hub and the snap ring.

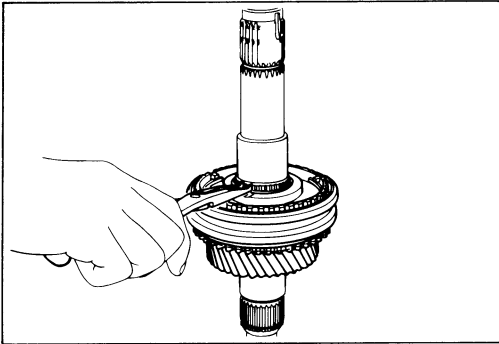
There are three snap ring sizes available.

The snap rings are color-coded to indicate their thickness.

Clutch Hub and Snap Ring Clearance	mm(in)
Standard	
0 – 0.1 (0 – 0.0039)	



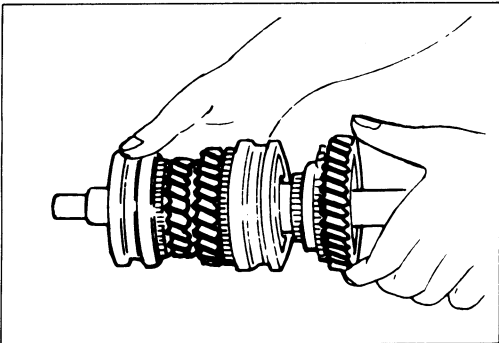
Snap Ring Availability		mm(in)
Thickness	Color-Coding	
1.80 (0.071)	White	
1.85 (0.073)	Yellow	
1.90 (0.075)	Blue	



- 2) Use a pair of snap ring pliers to install the snap ring to the mainshaft.

Snap Ring Pliers

The snap ring must be fully inserted into the mainshaft snap ring groove.

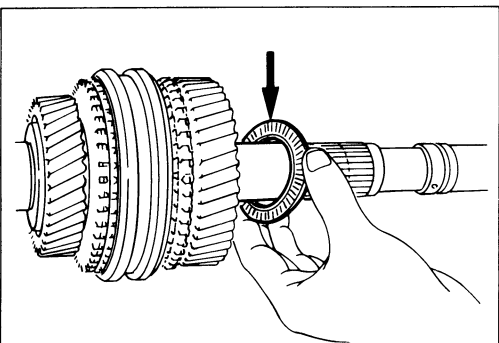


7. Needle Bearing

9. 1st Gear

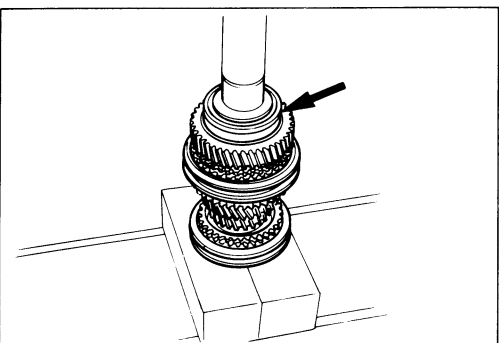
- 1) Apply engine oil to the needle bearing and the 1st gear thrust surfaces.
- 2) Install the needle bearing and the 1st gear to the mainshaft.

The 1st gear dog teeth must be facing the transmission front side.



10. 1st Gear Thrust Bearing and Plate

Install the thrust bearing and the race to the main shaft.
The thrust bearing side must be facing the transmission front side.



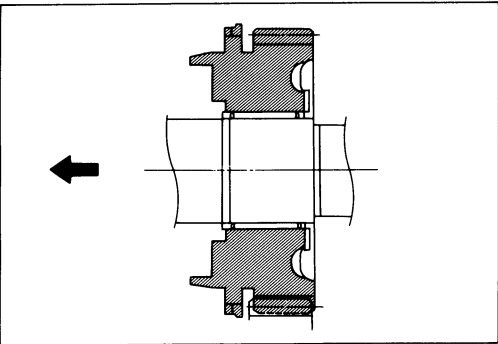
11. Mainshaft Ball Bearing

12. Needle Bearing Collar

- 1) Apply engine oil to the ball bearing and the mainshaft.
- 2) Install the ball bearing and collar to the mainshaft. The ball bearing snap ring groove must be facing the transmission rear side.
- 3) Use a bench press to slowly force the collar into place.



Installer : 5-8840-2195-0 (J-6133-01)

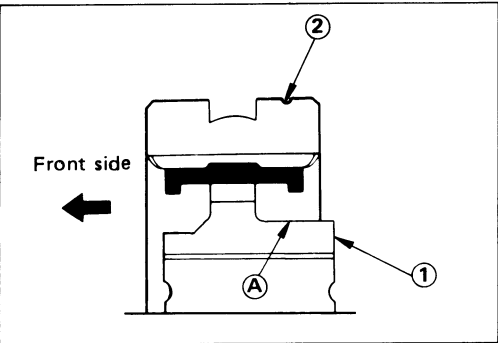


13. Needle Bearing

14. 3rd Gear

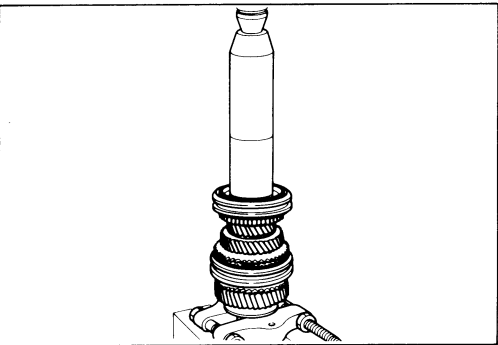
- 1) Apply engine oil to the needle bearing and the 3rd gear thrust surfaces.
- 2) Install the needle bearing and the 3rd gear to the mainshaft.

The 3rd gear dog teeth must be facing the transmission front side.

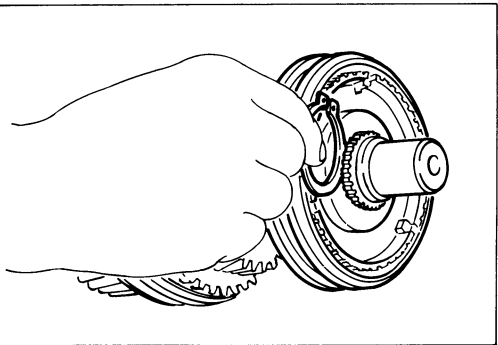


16. 3rd-4th Synchronizer Assembly

- 1) Turn the clutch hub face ① with the heavy boss ① toward the sleeve small groove ② on the outer circumference.



- 2) Check that the inserts fit snugly into the block ring insert grooves.
 - 3) Check that the insert springs are fitted to the inserts as shown in the illustration.
 - 4) Check that the clutch hub and the sleeve slide smoothly.
 - 5) Install the synchronizer assembly to the main shaft.
- The clutch hub face (with the heavy boss) must be facing the 3rd gear side.



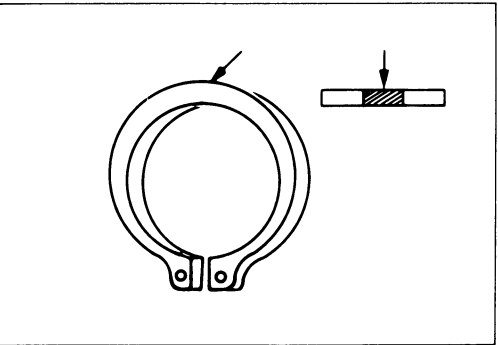
17. Mainshaft Snap Ring

- 1) Select the snap ring which will provide the minimum clearance between the 3rd-4th clutch hub and the snap ring.

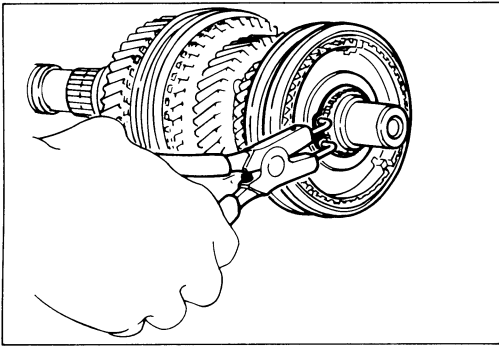
There are three snap ring sizes available.

The snap rings are color-coded to indicate their thickness.

Clutch Hub and Snap Ring Clearance	mm(in)
Standard	
0 — 0.1 (0 — 0.0039)	

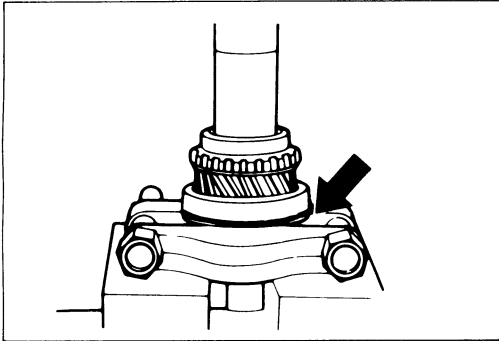


Snap Ring Availability		mm(in)
Thickness mm(in)	Color-Coding	
1.80 (0.071)	White	
1.85 (0.073)	Yellow	
1.90 (0.075)	Blue	



- 2) Use a pair of snap ring pliers to install the snap ring to the mainshaft.

The snap ring must be fully inserted into the mainshaft snap ring groove.



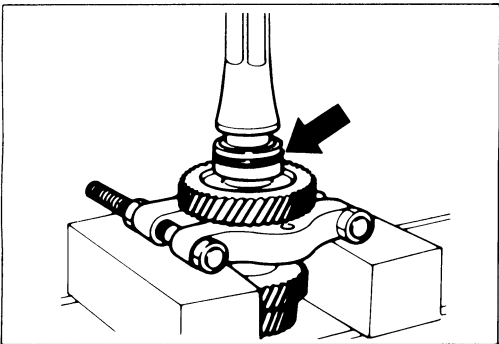
21. Top Gear Ball Bearing

22. 4th Gear Shaft Snap Ring

- 1) Use a bench press to install the top gear shaft ball bearing to the mainshaft.

The snap ring groove must be facing the transmission front side.

- 2) Use a pair of snap ring pliers to install the snap ring to the bearing.



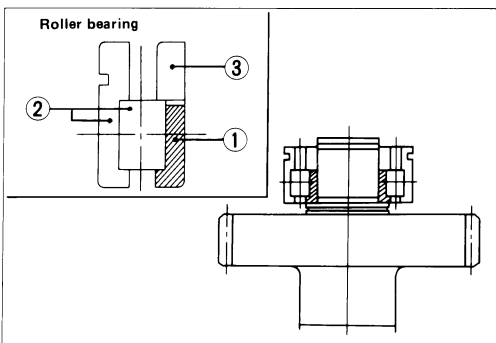
24. Counter Gear Front Bearing

Use a bench press to install the counter gear front bearing to the mainshaft.



The snap ring groove must be facing the transmission front side.

Bearing Installer: 5-8840-2194-0 (J-35283)



- 1) Apply engine oil to the bearing and install the inner race ① and outer race with roller ② in the proper direction to the mainshaft.



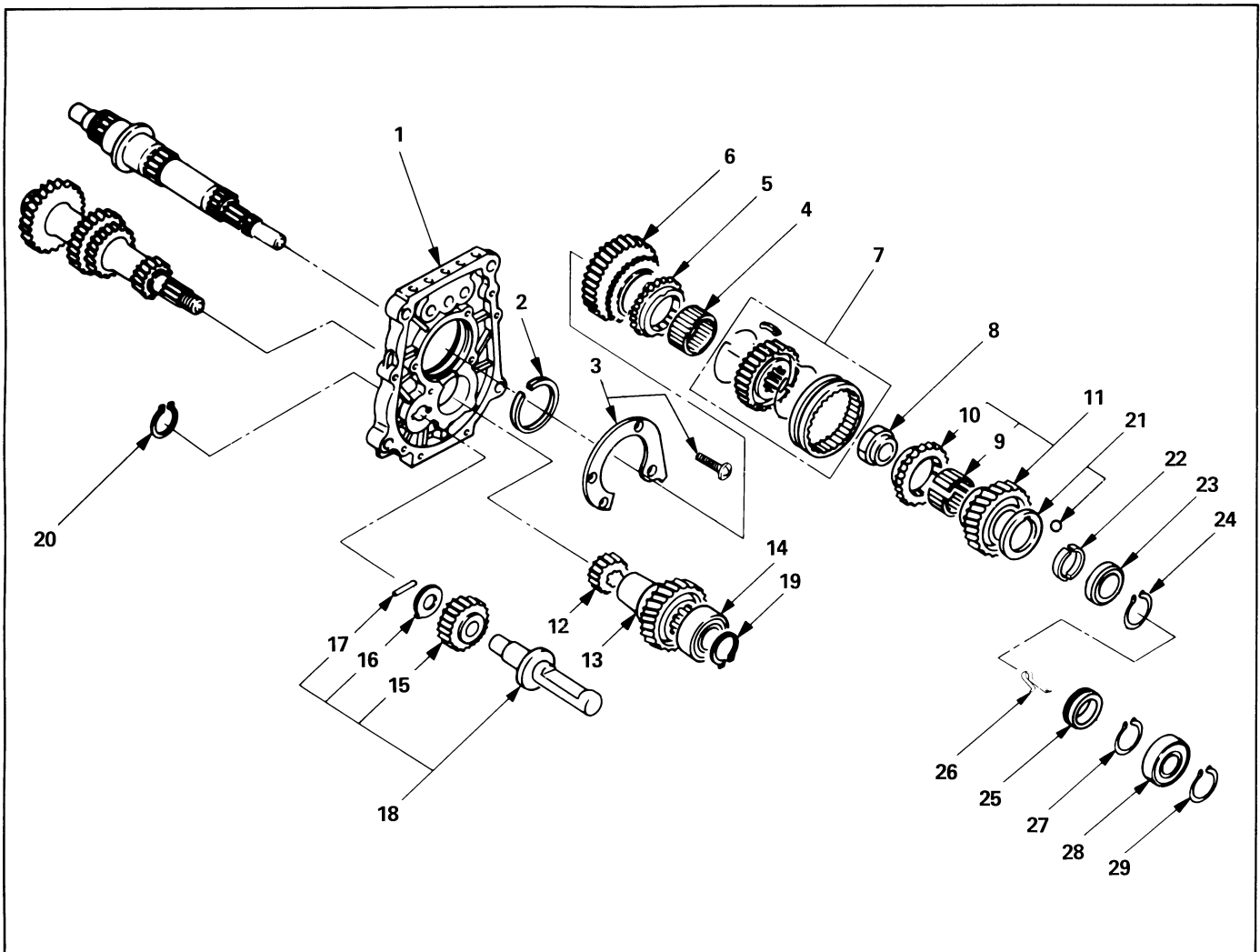
- 2) Then install the inner race ③ with taper side turned to outer race ②.

Note:

The inner race ③ should be installed with stamp on die face side turned to the front side of transmission.

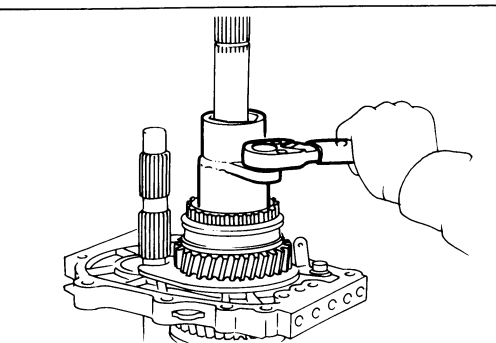
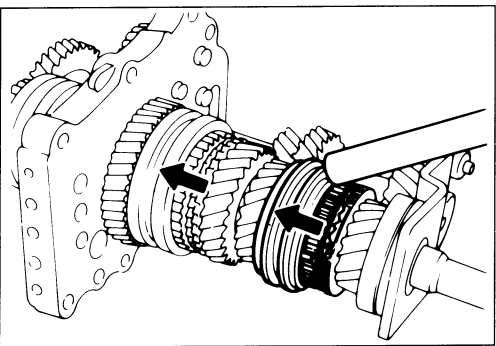
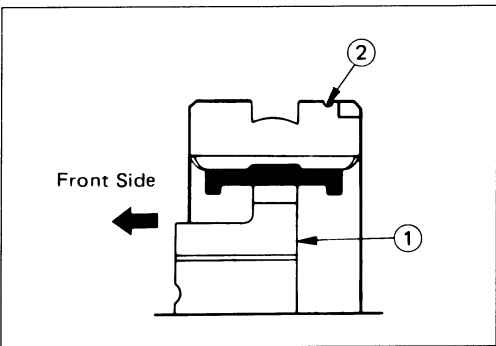
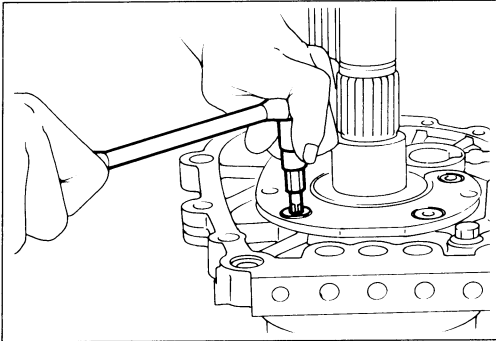
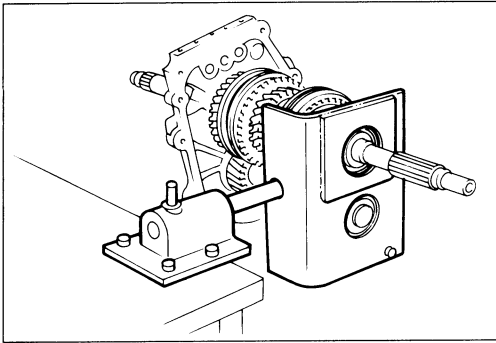


REVERSE GEAR AND 5TH GEAR



Reassembly Steps

- | | |
|-------------------------------------|-----------------------------------|
| ▲ 1. Intermediate plate | 16. Thrust washer |
| 2. Bearing snap ring | 17. Idler shaft pin |
| ▲ 3. Bearing plate and screw | 18. Reverse idler shaft |
| 4. Needle bearing | ▲ 19. Bearing snap ring |
| 5. Reverse block ring | ▲ 20. Reverse gear snap ring |
| 6. Reverse gear | ▲ 21. Thrust washer and lock ball |
| ▲ 7. Rev.-5th synchronizer assembly | 22. Thrust plate |
| ▲ 8. Mainshaft nut | 23. Retaining ring |
| 9. Needle bearing | 24. Retainer snap ring |
| 10. 5th block ring | 25. Speedometer drive gear |
| 11. 5th gear | 26. Clip |
| ▲ 12. Counter reverse gear | 27. Bearing snap ring |
| 13. Counter 5th gear | ▲ 28. Ball bearing |
| 14. Ball bearing | 29. Bearing snap ring |
| 15. Reverse idler gear | |



Important Operations



1. Intermediate Plate

- 1) Mesh the counter gear with the mainshaft assembly.
- 2) Install the holding fixture to the mainshaft and the counter gear.

Holding Fixture: 5-8840-2160-0 (J-37224)

Holding Base: 5-8840-0003-0 (J-3289-20)

- 3) Place the holding fixture (with the mainshaft and the countershaft) in a vise.
- 4) Install the intermediate plate.



3. Bearing Plate and Screw

- 1) Apply recommended thread locking agents or its equivalent to each of the bearing plate screw threads.
- 2) Tighten the screws to the specified torque.

Torx Bit Wrench: 5-8840-0047-0 (J-37225 : T45)

Bearing Plate Screw Torque	kg·m (lb·ft/N·m)
1.5 (11/15)	



7. Rev-5th Synchronizer Assembly

- 1) Turn the clutch hub face ① toward the sleeve small groove ② on the outer circumference.
- 2) Install the synchronizer assembly to the mainshaft.
The clutch hub face (with the heavy boss) must be facing the reverse gear side.

8. Mainshaft Nut

- 1) Mesh the 1st-2nd synchronizer with both the 1st and 3rd gears (double engagement).

This will prevent the mainshaft from turning.



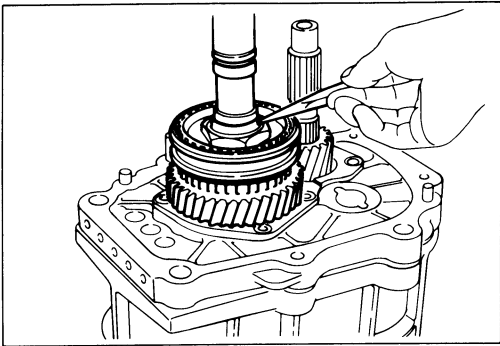
- 2) Install the mainshaft hub nut.

- 3) Use the mainshaft nut wrench to tighten the mainshaft nut to the specified torque.

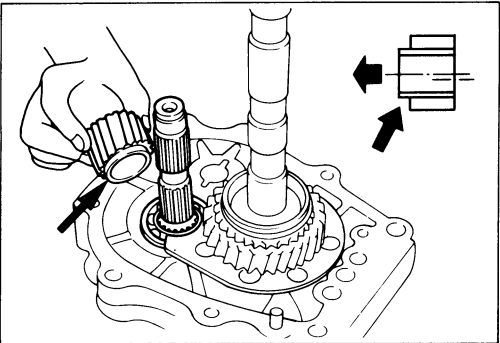
Wrench: 5-8840-2156-0 (J-37219)



Mainshaft Nut Torque	kg·m (lb·ft/N·m)
14 ± 2 ($101 \pm 14.2/137 \pm 20$)	



4) Use a punch to caulk the mainshaft nut.



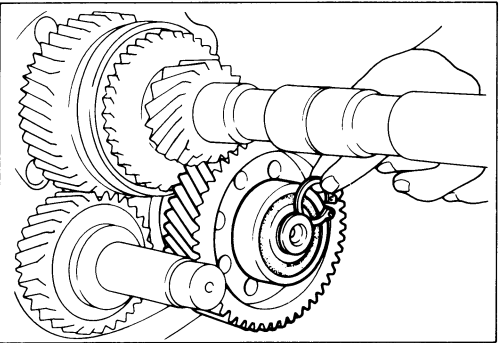
12. Counter Reverse Gear

1) Apply engine oil to the counter reverse gear and the reverse gear.

2) Install the counter reverse gear to the counter gear.

Note the projection at either side of the counter reverse gear.

The larger projection must be facing the intermediate plate.



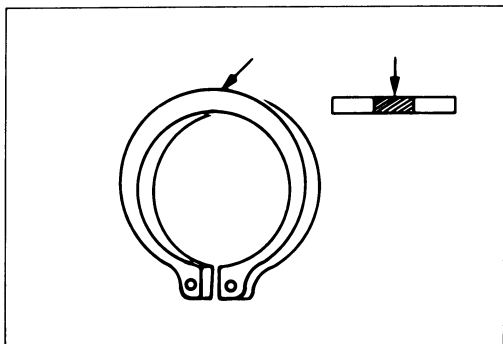
19. Bearing Snap Ring

1) Select the snap ring which will provide the minimum clearance between the ball bearing and the snap ring.

There are six snap ring sizes available.

The snap rings are color-coded to indicate their thickness.

Ball Bearing and Snap Ring Clearance	mm(in)
Standard	
0 – 0.15 (0 – 0.0059)	



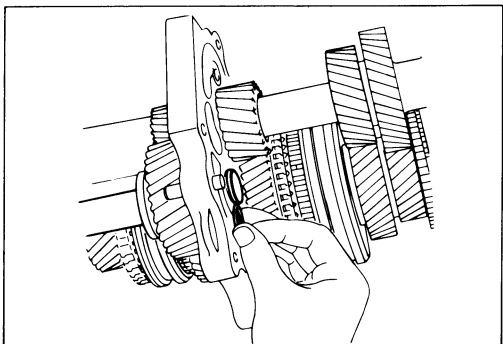
Snap Ring Availability mm(in)

Thickness mm(in)	Color-Coding
1.1 (0.043)	White
1.2 (0.047)	Yellow
1.3 (0.051)	Blue
1.4 (0.055)	Pink
1.5 (0.059)	Green
1.6 (0.063)	Brown

- 2) Use a pair of snap ring pliers to install the snap ring to the counter 5th gear.

Snap Ring Pliers

The snap ring must be fully inserted into the reverse idler shaft snap ring groove.



20. Reverse Gear Snap Ring

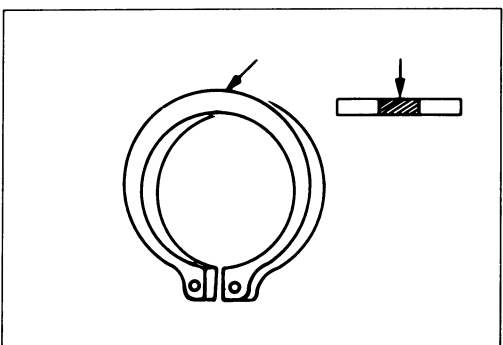
- 1) Select the snap ring which will provide the minimum clearance between the intermediate plate and the snap ring.

There are three snap ring sizes available.

The snap rings are color-coded to indicate their thickness.

Intermediate Plate and Snap Ring Clearance mm(in)

Standard
0 — 0.15 (0 — 0.0059)



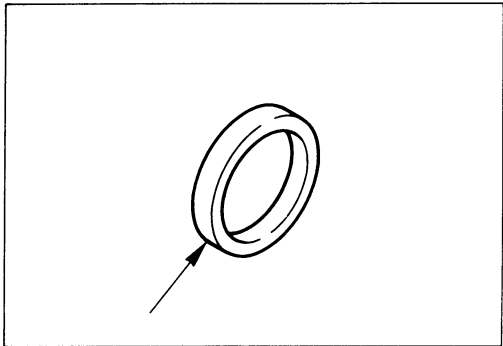
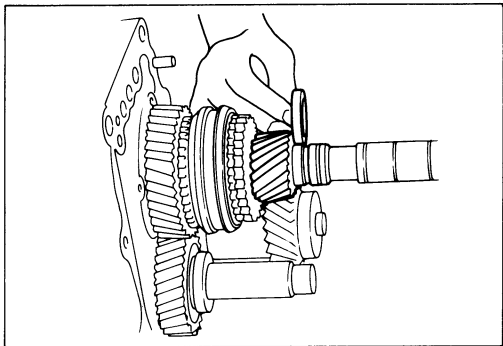
Snap Ring Availability mm(in)

Thickness mm(in)	Color-Coding
1.2 (0.047)	White
1.3 (0.051)	Yellow
1.4 (0.055)	Blue

- 2) Use a pair of snap ring pliers to install the snap ring to the reverse idler shaft.

Snap Ring Pliers

The snap ring must be fully inserted into the reverse idler shaft snap ring groove.



21. Thrust Washer and Lock Ball

- 1) Use a thickness gauge to measure the clearance between the 5th gear and the thrust washer.

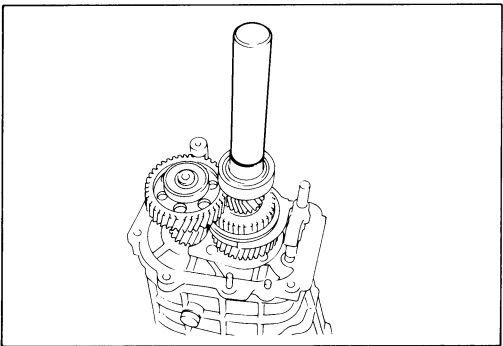
5th Gear and Thrust Washer Clearance	mm(in)
Standard	
0.10 – 0.25 (0.0039 – 0.0098)	

If required, replace the existing thrust washer with a new thrust washer to bring the clearance to specification.

There are four thrust washer sizes available. The snap rings are color-coded to indicate their thickness.

Thrust Washer Availability		mm(in)
Thickness	Color-Coding	
7.9 (0.311)	White	
8.0 (0.315)	Yellow	
8.1 (0.319)	Green	
8.2 (0.323)	Blue	

- 2) Apply grease to the thrust washer and the lock ball.
- 3) Install the thrust washer and the lock ball.

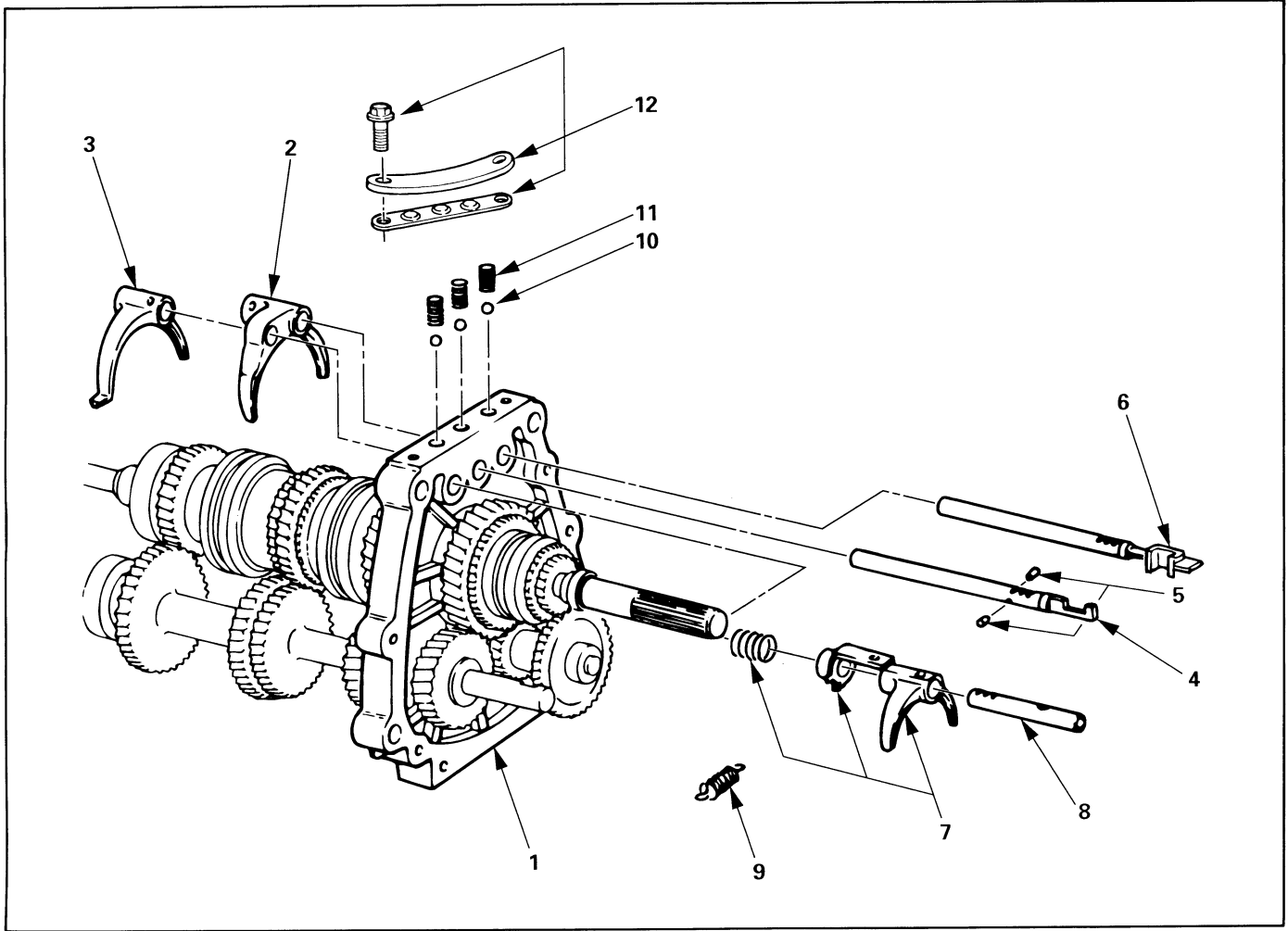


28. Ball Bearing

Use the installer to install the ball bearing to the mainshaft.
Installer: 5-8840-2159-0 (J-37223)



INTERMEDIATE PLATE AND GEAR ASSEMBLY, DETENT, SHIFT ARM ASSEMBLY, AND INTERLOCK PIN



220RW072

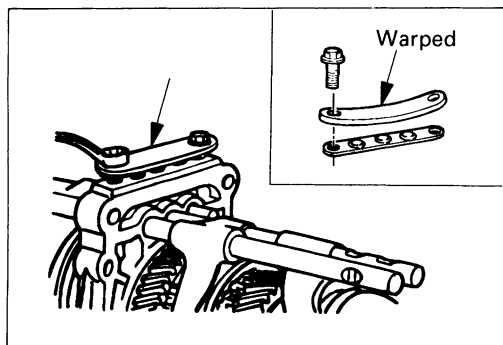
Reassembly Steps

- | | |
|---|--|
| 1. Intermediate plate and gear assembly | 7. Rev-5th shift arm and reverse inhibitor |
| 2. 1st-2nd shift arm | 8. Rev-5th shift rod |
| 3. 3rd-4th shift arm | 9. Spring |
| ▲ 4. 3rd-4th shift rod | 10. Detent ball |
| ▲ 5. Interlock pin | 11. Detent spring |
| 6. 1st-2nd shift rod | ▲ 12. Detent spring plate and gasket |

**Important Operations****4. 3rd-4th Shift Rod****5. Interlock Pin**

- 1) Install the interlock pin to the shift rod.
- 2) Install the shift rod together with the interlock pin to the intermediate plate.

Do not allow the interlock pin to fall from the shift rod.



220LV017

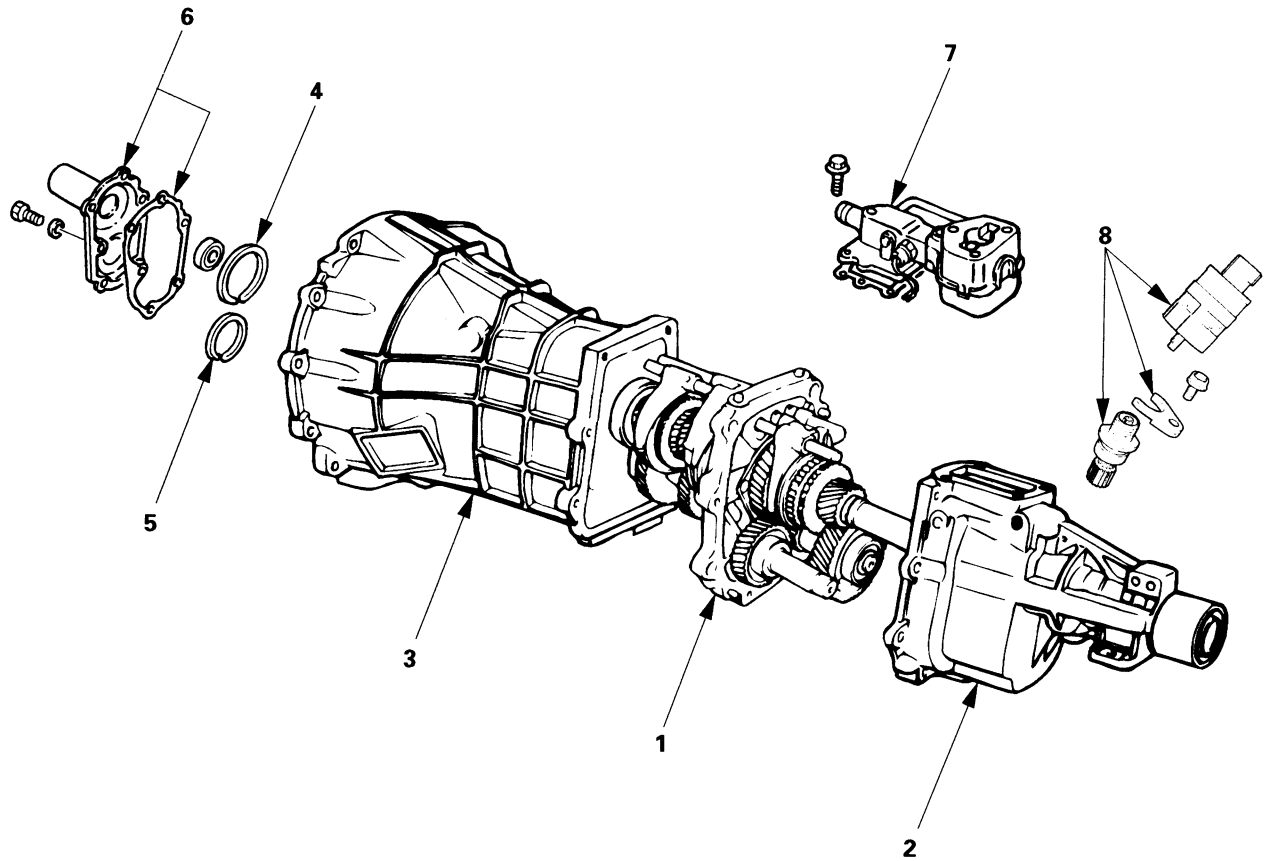
**12. Detent Spring Plate and Gasket**

- 1) Install the new-detent plate and new gasket onto the transmission case into the correct direction.
- 2) Tighten the detent spring plate bolts to the specified torque.

Detent Spring Plate Bolt Torque	kg·m(lb·ft/N·m)
2.0 ± 0.4 ($14 \pm 3/20 \pm 4$)	



MAJOR COMPONENTS



220LV005

Reassembly Steps

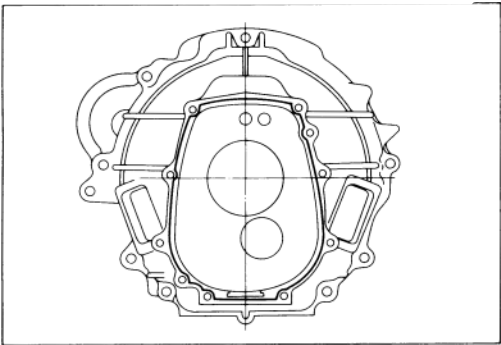
- | | |
|--|---|
| ▲ 1. Intermediate plate with gear assembly | ▲ 5. Counter front bearing snap ring |
| ▲ 2. Rear cover with oil seal | ▲ 6. Front cover with oil seal |
| ▲ 3. Transmission case | ▲ 7. Gear control box assembly |
| ▲ 4. Front bearing snap ring | ▲ 8. Speedometer driven gear and speedometer sensor |



Important Operations

1. Intermediate Plate with Gear Assembly

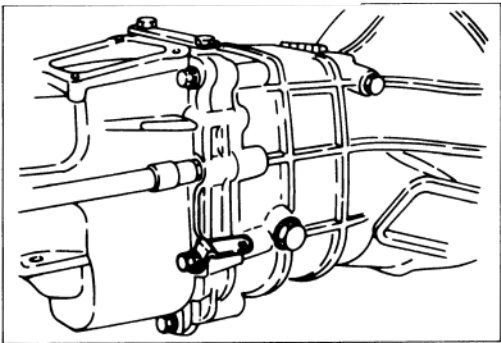
- 1) Apply a light coat of oil to the transmission case top gear shaft ball bearing fitting faces and the shift rods.
This will facilitate smooth installation.
 - 2) Install the intermediate plate assembly.
 - 3) Pull out the top gear shaft until the ball bearing snap ring groove protrudes from the transmission case front cover fitting face.
- Avoid subjecting the mainshaft to sudden shock or stress.



2. Rear Cover with Oil Seal

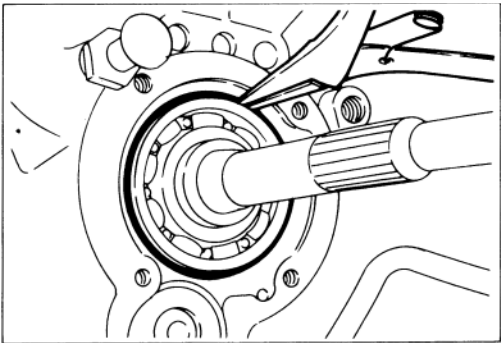
3. Transmission Case

- 1) Apply recommended liquid gasket or its equivalent to the transmission case and rear cover fitting surfaces.



- 2) Install the rear cover and the transmission case to the intermediate plate.
- 3) Tighten the rear cover bolts to the specified torque.

Rear Cover Bolt Torque	kg·m (lb·ft/N·m)
3.8 ± 0.8 (27 ± 5.8 / 37 ± 7.8)	

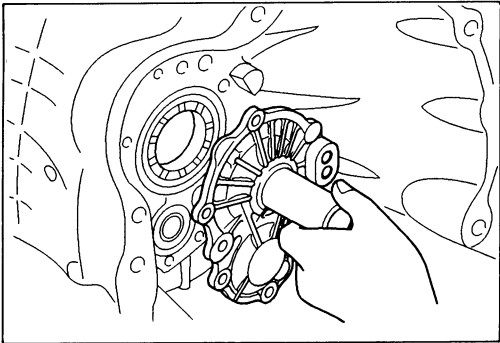


4. Front Bearing Snap Ring

5. Counter Front Bearing Snap Ring

Use a pair of snap ring pliers to install the snap rings to the mainshaft.

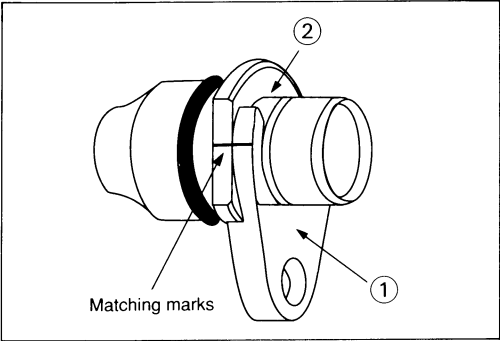
The snap rings must be fully inserted into the ball bearing snap ring groove.



6. Front Cover with Oil Seal

- 1) Apply recommended liquid gasket or its equivalent to the through bolt threads.
- 2) Install the new gasket and the front cover to the transmission case
Take care not to damage the oil seal.
- 3) Tighten the front cover bolts to the specified torque.

Front Cover Bolt Torque	kg·m (lb·ft/N·m)
1.9 ± 0.4 (13.7 ± 2.9/18.6 ± 3.9)	



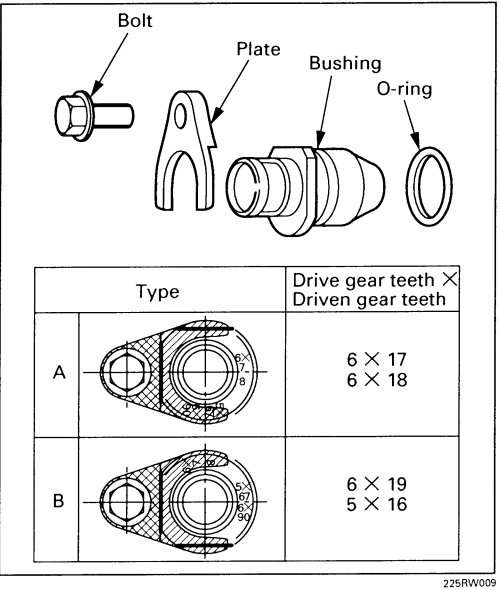
7. Speedometer Driven Gear and Speedometer Sensor

- 1) Install the O-ring to the speedometer driven gear bushing.
- 2) Install the driven gear to the speedometer driven gear bushing.
- 3) Align the matching marks on plate ① and bush ②, then tighten the bolt.

Bolt Torque	kg·m (lb·ft/N·m)
1.5 (10.8/14.7)	

- 4) Install the speedometer sensor.

Speedometer Sensor Torque	kg·m (lb·ft/N·m)
2.8 (20/27)	

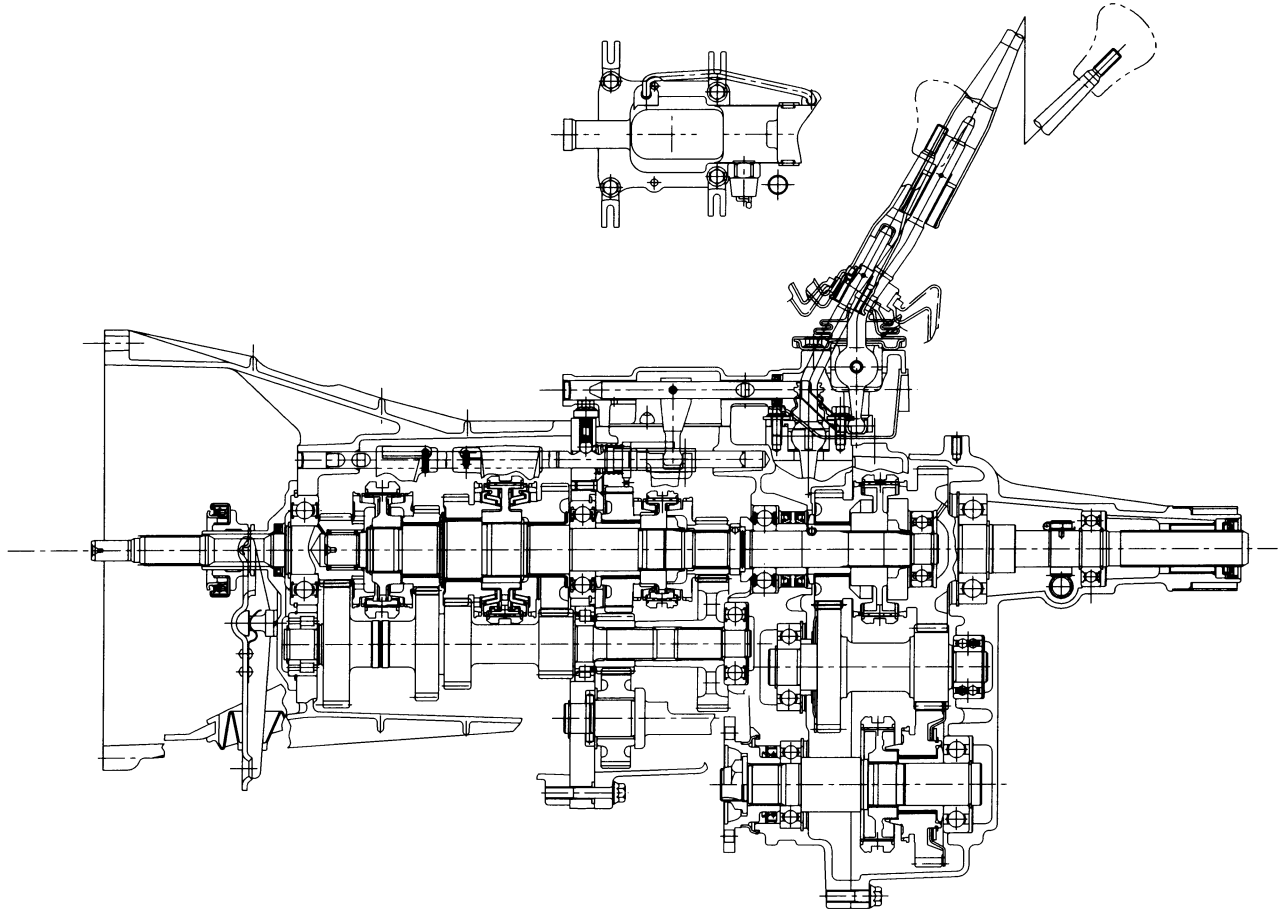


4 x 4 MODEL TRANSMISSION

MAIN DATA AND SPECIFICATIONS

	MUA 5C	MUA 5S
Transmission type	Fully synchronized 5-forward and reverse gears.	
Transfer case type	Constant mesh type Low-High and 2H-4H gears.	
Gear ratio : Transmissior		
1st	3.767	4.357
2nd	2.248	2.502
3rd	1.404	1.501
4th	1.000	1.000
5th	0.809	0.809
Rev.	3.873	3.970
Transfer		
High	1.000	
Low	2.050	
Oil capacity : Transmission	lit (US gal.)	2.95 (0.78)
: Transfer	lit (US gal.)	1.45 (0.38)

GENERAL DESCRIPTION



A07LV004

The transmission is designed for the quietest possible operation.

A longer center distance (77.5 mm (3.05 in)) provides increased durability.

Principle parts of the transmission are the integral clutch housing, the intermediate plate, the rear cover, and the gears.

The gear control box is built-in to the transfer case.

Transfer gear ratio is 1 : 2.050.

TORQUE SPECIFICATIONS

STANDARD BOLTS

The torque values given in the following table should be applied where a particular torque is not specified.

N·m (kg·m / lb·ft)

Strength Class Bolt Identification Bolt Diameter × Pitch (mm)		4.8/4T	7T	8.8		9.8/9T
				Refined	Non-Refined	
						
		 No mark	—			
Standard Hex. Head Bolt	M6 × 1.0	6 (0.6 / 52 lb·in)	7 (0.7 / 61 lb·in)	8 (0.8 / 69 lb·in)		—
	M8 × 1.25	13 (1.3 / 113 lb·in)	17 (1.7 / 12)	20 (2.0 / 14)		24 (2.4 / 17)
	M10 × 1.25	27 (2.8 / 20)	37 (3.8 / 27)	42 (4.3 / 31)		50 (5.1 / 37)
	M12 × 1.25	61 (6.3 / 45)	76 (7.8 / 56)	87 (8.9 / 64)		95 (9.7 / 70)
	M14 × 1.5	96 (9.8 / 71)	116 (11.8 / 85)	133 (13.6 / 98)		142 (14.5 / 105)
	M16 × 1.5	130 (13.3 / 96)	170 (17.3 / 125)	193 (19.7 / 143)		200 (20.4 / 148)
	M18 × 1.5	188 (19.2 / 139)	244 (24.9 / 180)	278 (28.3 / 205)		287 (29.3 / 212)
	M20 × 1.5	258 (26.3 / 190)	337 (34.4 / 249)	385 (39.3 / 284)		396 (40.4 / 292)
	M22 × 1.5	332 (33.9 / 245)	453 (46.3 / 335)	517 (52.7 / 381)		530 (54.1 / 391)
	M24 × 2.0	449 (45.8 / 331)	570 (58.2 / 421)	651 (66.3 / 480)		692 (70.6 / 511)
	* M10 × 1.5	26 (2.7 / 20)	36 (3.7 / 27)	41 (4.2 / 30)		48 (4.9 / 35)
	* M12 × 1.75	57 (5.8 / 42)	71 (7.2 / 52)	80 (8.2 / 59)		89 (9.1 / 66)
	* M14 × 2.0	89 (9.1 / 66)	110 (11.2 / 81)	125 (12.7 / 92)		133 (13.6 / 98)
	* M16 × 2.0	124 (12.7 / 92)	162 (16.5 / 119)	185 (18.9 / 137)		191 (19.5 / 141)
Flange Bolt	M6 × 1.0	7 (0.7 / 61 lb·in)	8 (0.8 / 69 lb·in)	9 (0.9 / 78 lb·in)		—
	M8 × 1.25	15 (1.5 / 11)	19 (1.9 / 14)	22 (2.2 / 16)		26 (2.7 / 20)
	M10 × 1.25	31 (3.2 / 23)	41 (4.2 / 30)	47 (4.8 / 35)		56 (5.7 / 41)
	M12 × 1.25	69 (7.0 / 51)	85 (8.7 / 63)	97 (9.9 / 72)		106 (10.8 / 78)
	M14 × 1.5	104 (10.6 / 77)	126 (12.8 / 93)	144 (14.6 / 106)		154 (15.7 / 114)
	M16 × 1.5	145 (14.8 / 127)	188 (19.2 / 139)	214 (21.8 / 158)		221 (22.5 / 163)
	M18 × 1.5	—	—	—		—
	M20 × 1.5	—	—	—		—
	M22 × 1.5	—	—	—		—
	M24 × 2.0	—	—	—		—
	* M10 × 1.5	30 (3.1 / 22)	40 (4.1 / 30)	46 (4.7 / 34)		54 (5.5 / 40)
	* M12 × 1.75	64 (6.5 / 47)	78 (8.0 / 58)	89 (9.1 / 66)		99 (10.1 / 73)
	* M14 × 2.0	97 (9.9 / 72)	119 (12.1 / 88)	135 (13.8 / 99.7)		144 (14.7 / 107)
	* M16 × 2.0	137 (14.0 / 101)	178 (18.2 / 132)	203 (20.7 / 150)		210 (21.5 / 155)

The asterisk * indicates that the bolts are used for female-threaded parts that are made of soft materials such as casting, etc.

FLARE NUTS

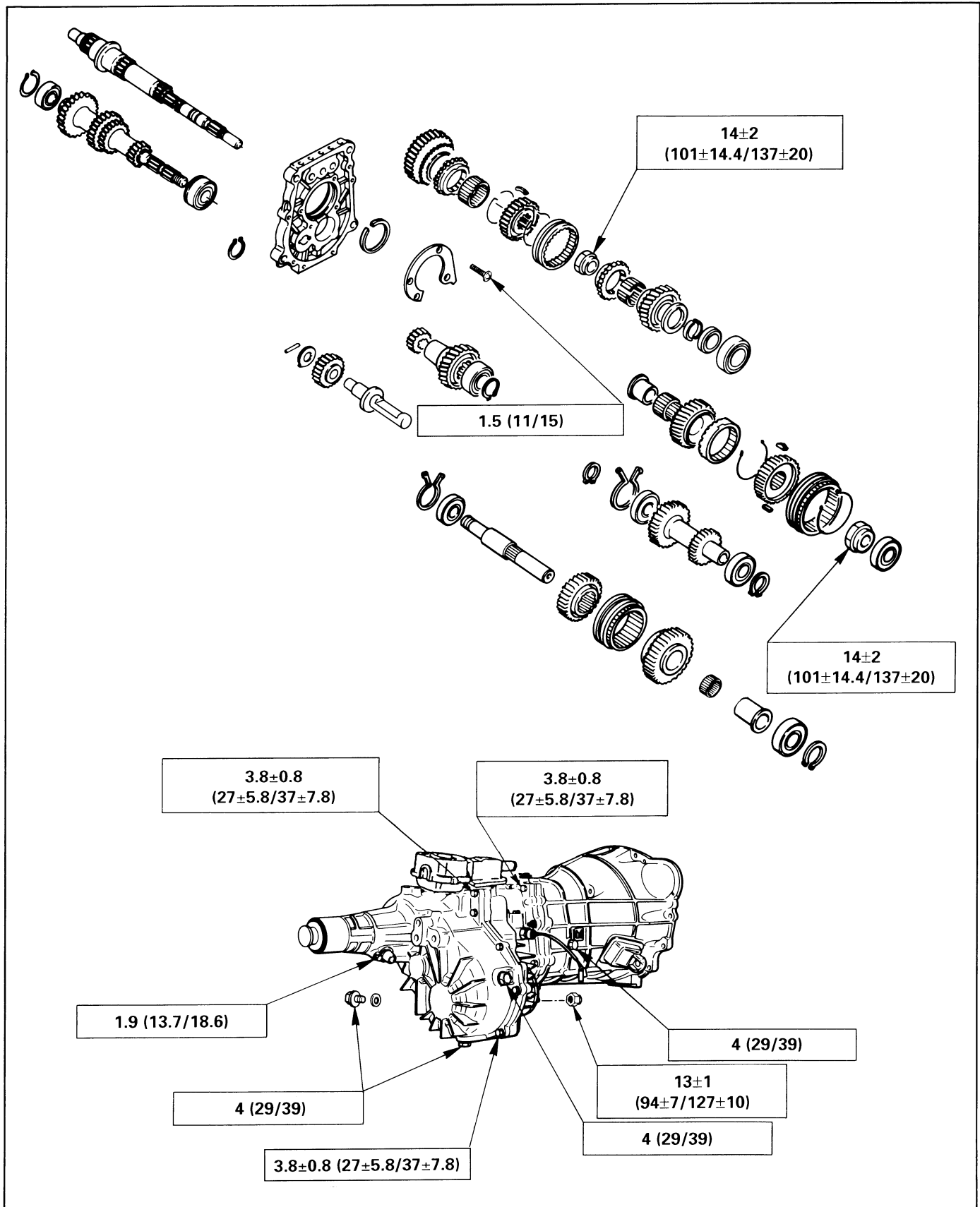
N·m (kg·m / lb·ft)

Pipe diameter mm (in)	Torque	Pipe diameter mm (in)	Torque
4.76 (0.187)	16 (1.6 / 12)	10.00 (0.394)	54 (5.5 / 40)
6.35 (0.250)	26 (2.7 / 20)	12.00 (0.472)	88 (9.0 / 65)
8.00 (0.315)	44 (4.5 / 33)	15.00 (0.591)	106 (10.8 / 78)



SPECIAL PARTS FIXING NUTS AND BOLTS

kg·m(lb.ft/N·m)





RECOMMENDED LIQUID GASKET

Type	Brand Name	Manufacturer	Remarks
RTV* Silicon Base	ThreeBond 1207B ThreeBond 1207C	Three Bond Three Bond	For Engine Repairs
	ThreeBond 1215 ThreeBond 1281	Three Bond Three Bond	For Axle Case and Transmission Repairs
Water Base	ThreeBond 1141E	Three Bond	For Engine Repairs
Solvent	ThreeBond 1104 BelcoBond 4 BelcoBond 401 BelcoBond 402	Three Bond Isuzu Isuzu Isuzu	For Engine Repairs
Anerobic	LOCTITE 515 LOCTITE 518	Loctite Loctite	All

* RTV : Room Temperature Vulcanizer

Note:

1. It is very important that the liquid gaskets listed above or their exact equivalent be used on the vehicle.
2. Be careful to use the specified amount of liquid gasket.
Follow the manufacturer's instructions at all times.
3. Be absolutely sure to remove all lubricants and moisture from the connecting surfaces before applying the liquid gasket.
The connecting surfaces must be perfectly dry.
4. LOCTITE 515 and LOCTITE 518 harden upon contact with a metal surface.
Do not apply LOCTITE 515 or LOCTITE 518 between two metal surfaces having a clearance of greater than 0.25 mm (0.01 in). Poor adhesion will result.

REMOVAL AND INSTALLATION

Read this Section carefully before performing any removal and installation procedure. This Section gives you important points as well as the order of operation. Be sure that you understand everything in this Section before you begin.



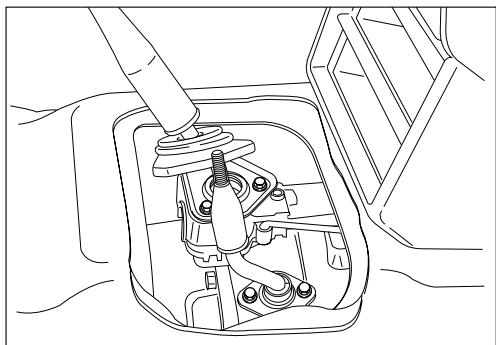
Important Operations – Removal

Battery Cable

Disconnect the negative (–) cable from the battery terminal.

Engine Hood

Apply setting marks to the engine hood and the engine hood hinges before removing the engine hood.



235RT004

Gear Shift Lever and Transfer Change Lever

1. Place the gear shift lever in the neutral position.
2. Place the transfer change lever in the “H” position.
3. Remove the gear shift lever knob and transfer change lever knob.
4. Remove the center console assembly and front console assembly.
5. Remove the grommet and dust cover.
6. Remove the gear shift lever cover bolt.
7. Remove the gear shift lever.
8. Remove the transfer change lever retainer bolts.
9. Remove the transfer change lever and O-ring.

Note:

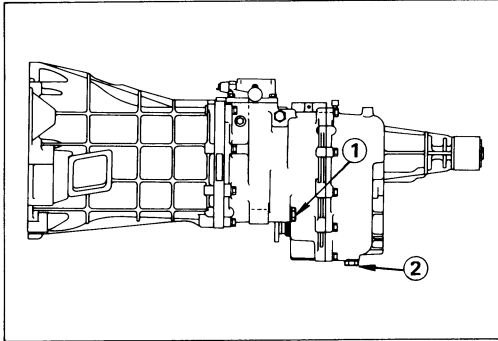
Cover the shift lever and change lever holes to prevent the entry of foreign material into the transmission.

Lifting the Vehicle

1. Jack up the vehicle.
2. Place chassis stands at the front and the rear of the vehicle.

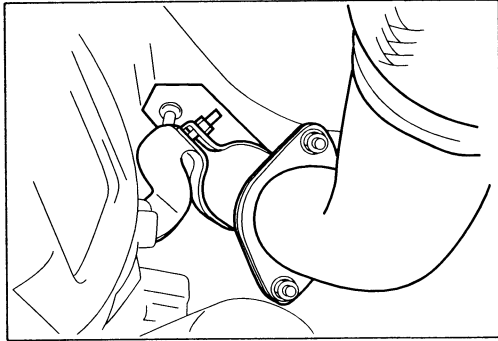
Transfer Case Protector (Except 00 Year or Subsequent ones)

Remove the transfer case protector from the transmission mounting member and the side member.



Transmission and Transfer Case Oil Draining

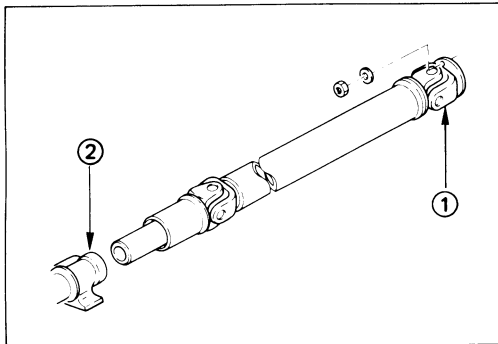
1. Remove the transmission oil drain plug ①.
2. Remove the transfer case oil drain plug ②.
3. Replace the drain plug(s) after draining the oil.



220LV018

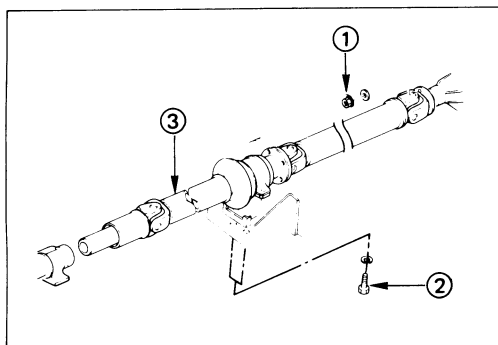
Exhaust Pipe

1. Remove the exhaust pipe bracket from the transmission case.
2. Remove the front exhaust pipe and 2nd-3rd exhaust pipe.



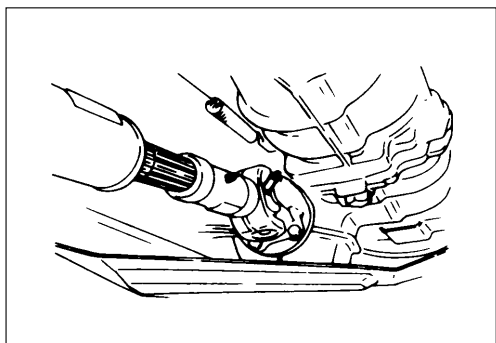
Rear Propeller Shaft (Single Shaft Type)

1. Remove the propeller shaft flange yoke at the drive pinion side ①.
2. Remove the propeller shaft from the transmission main shaft spline ②.



Rear Propeller Shaft (Dual Shaft Type)

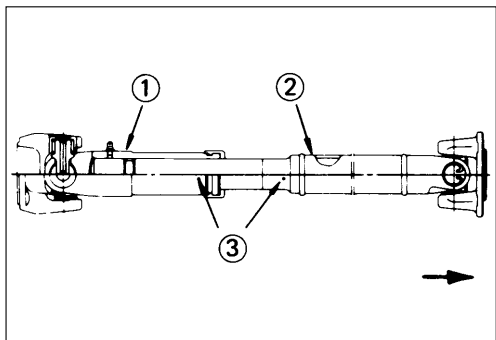
1. Apply setting marks to the 2nd propeller shaft flange yoke.
This will prevent mispositioning during the installation procedure.
2. Remove the 2nd propeller shaft flange yoke bolts at the drive pinion side ①.
3. Remove the center bearing retainer bolts ②.
4. Remove the 1st propeller shaft ③ with the center bearing and the 2nd propeller shaft.
Pull the 1st propeller shaft toward the rear of the vehicle until the spline yoke is free of the transmission main shaft.



Front Propeller Shaft

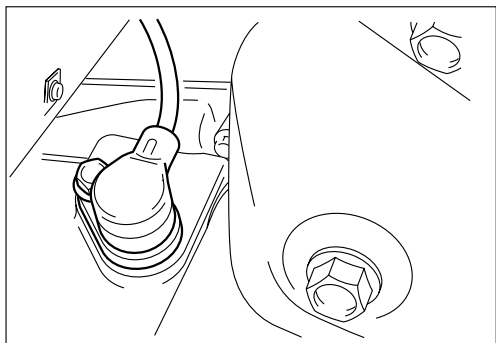
Remove the splined yoke flange bolt at the transfer case side.

Do not allow the splined yoke to fall away from the front propeller shaft.



If the splined yoke should fall away from the front propeller shaft, align the setting marks ③ on the splined yoke ① and the propeller shaft ② to reassemble the two parts.

The setting marks ③ are punched circles approximately 3 mm (0.12 in) in diameter.

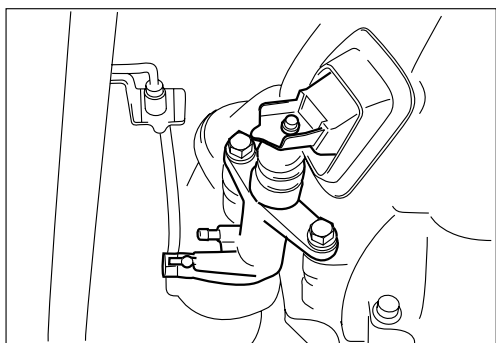


TDC Sensor (4JA1TC Model)

Disconnect the TDC sensor from the transmission housing.

Harness Connector

Disconnect the 4WD switch connectors, back up light switch connector and the speedometer sensor connector.

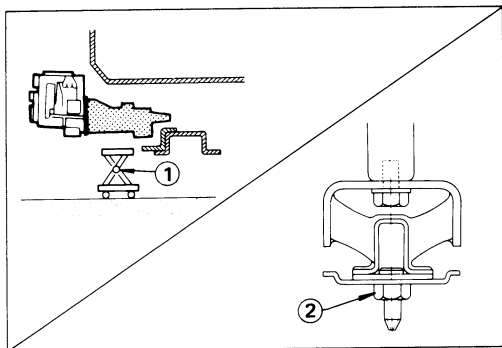


Slave Cylinder

Remove the slave cylinder from the transmission case.

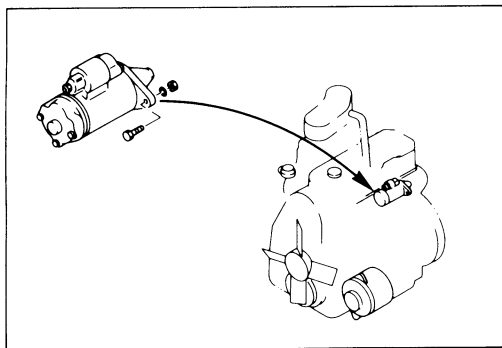
Engine Lifting Hanger

1. Attach the engine lifting hanger to the front portion of the engine.
2. Attach the lifting wire to both ends of the engine lifting hanger.



Engine Rear Mounting and Mounting Member

1. Support the transmission with a transmission jack ①.
2. Remove the engine rear mounting nuts ②.
3. Remove the engine rear mounting bolts.
4. Loosen the mounting member bolts.
5. Remove the mounting member from the sidemembers.
6. Remove the engine rear mounting.

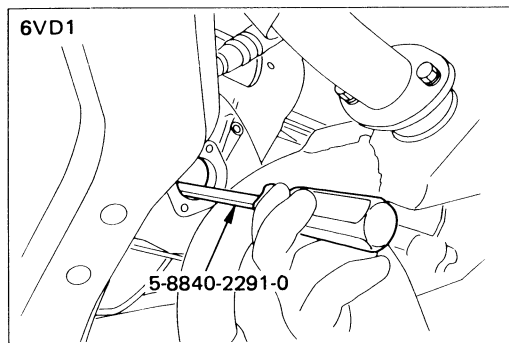


Starter Motor

Remove the starter motor from the engine rear plate.

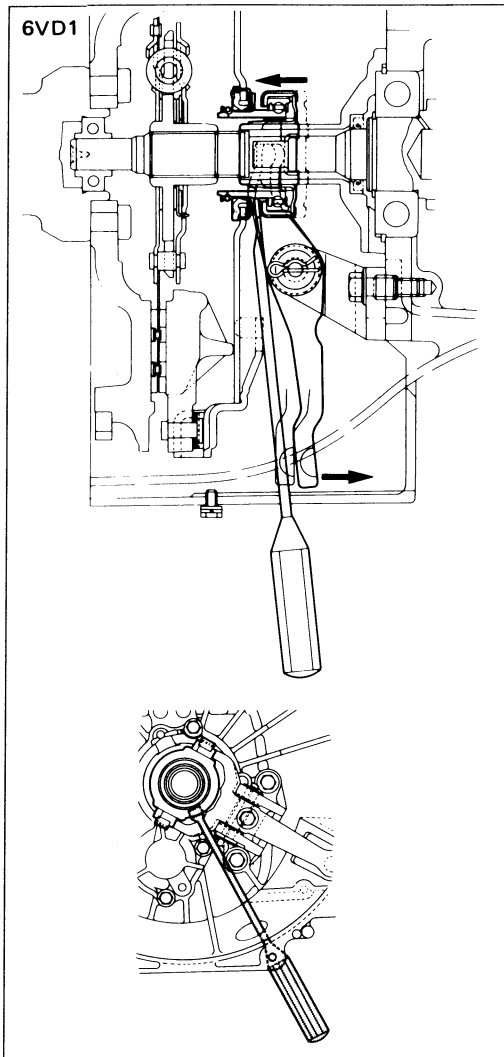
Flywheel Under Cover (6VD1)

Remove flywheel under cover bolts.



Transmission with Transfer

1. Use the remover for disconnect the clutch release bearing from the clutch pressure plate (6VD1).
Clutch release bearing remover: 5-8840-2291-0 (J-39207)

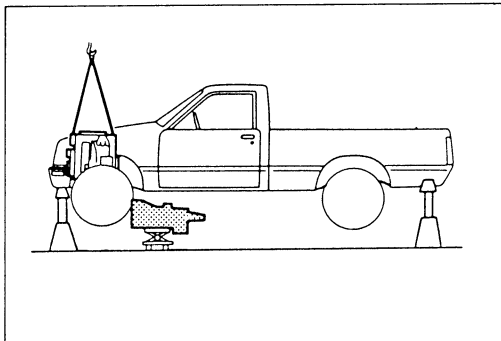
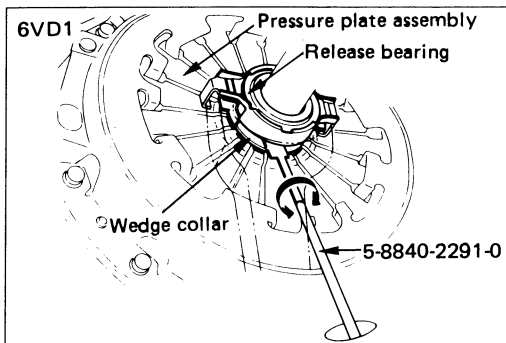


Release Bearing Disconnection (6VD1)

- ① Pull the shift fork toward the transmission to press the clutch release bearing against the clutch.
- ② Insert the clutch release bearing remover between the wedge collar and the release bearing.
- ③ Turn the remover to separate the release bearing.

NOTE:

Be sure not to insert the remover between the wedge collar and the clutch.

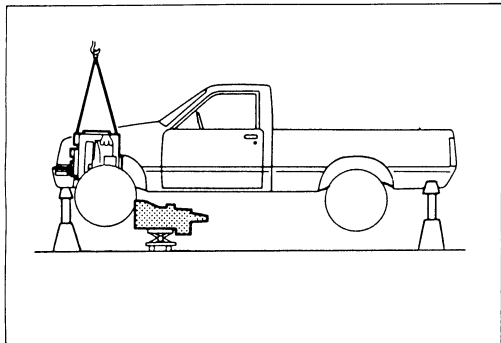


2. Remove the transmission nuts and bolts from the engine rear plate.
3. Carefully pull the transmission with the transmission jack toward the rear of the vehicle.
4. Operate the transmission jack to slowly lower the transmission.



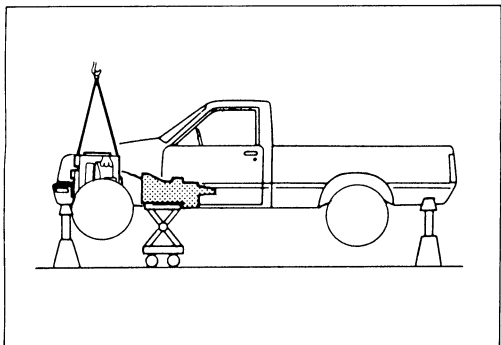
Important Operations — Installation

Follow the removal procedure in the reverse order to perform the installation procedure. Pay careful attention to the important points during the installation procedure.



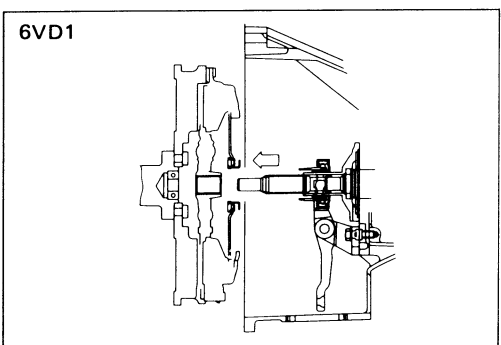
Transmission with Transfer

1. Apply a thin coat of molybdenum disulfide grease to the top gear shaft spline.
2. Place the transmission on a transmission jack.
3. Carefully move the transmission jack and transmission into position behind the engine.



4. Slowly raise the transmission jack until the front of the transmission is aligned with the rear of the engine.

The slope of the engine and the transmission must be the same.



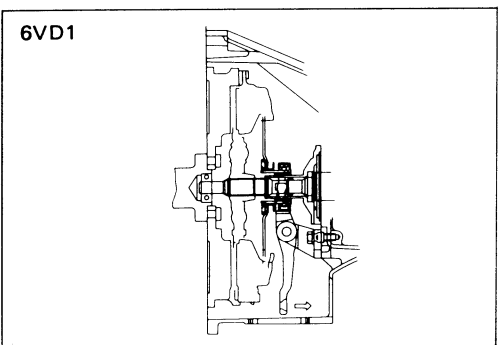
6VD1

5. Align the top gear shaft spline with the clutch driven plate spline.

6. Install the transmission to the engine.

Tighten the transmission nuts and bolts to the specified torque.

Transmission Nut and Bolt Torque	kg·m(lb·ft/N·m)
M10: 4.1 ± 1.0 ($30 \pm 7.2/40 \pm 10$)	
M12: 8.0 ± 1.6 ($58 \pm 12/78 \pm 16$)	

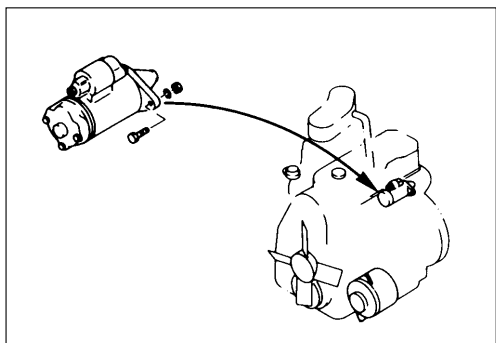


6VD1

7. Apply a force of 59–78N (6–8 kg / 13.2–17.6 lb) to the tip of the shift fork in the direction of the transmission to engage the clutch pressure plate and release bearing (6VD1).

NOTE (6VD1):

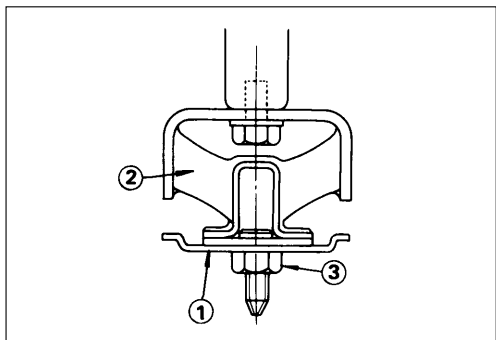
A click sound is heard when the release bearing and the tip of the diaphragm spring engage each other. Check to see if they are securely engaged by pushing the tip of the shift fork toward the engine while applying a force of about 25N (2.5 kg / 5.5 lb). If the shift fork will not move, then they are securely engaged.



Starter Motor

1. Install the starter motor to the engine rear plate.

Starter Motor Bolt Torque	kg·m (lb·ft/N·m)
8.0 ± 1.6 ($58 \pm 12/78 \pm 16$)	



Engine Rear Mounting and Mounting Member

1. Install the engine rear mounting to the transmission.

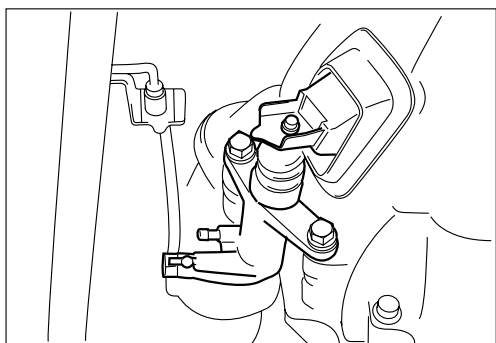
Rear Mounting Bolt Torque	kg·m (lb·ft/N·m)
4.2 ± 0.5 ($30 \pm 3.6/41 \pm 4.9$)	

2. Install the mounting member ① to the mounting rubber ②.

Mounting Rubber Nut Torque	kg·m (lb·ft/N·m)
5.1 ± 0.6 ($37 \pm 4.3/50 \pm 6$)	

3. Install the mounting member to the sidemembers.

Mounting Member Bolt Torque	kg·m (lb·ft/N·m)
5.1 ± 0.6 ($37 \pm 4.3/50 \pm 6$)	



220LV019



Slave Cylinder

Install the slave cylinder to the transmission case.

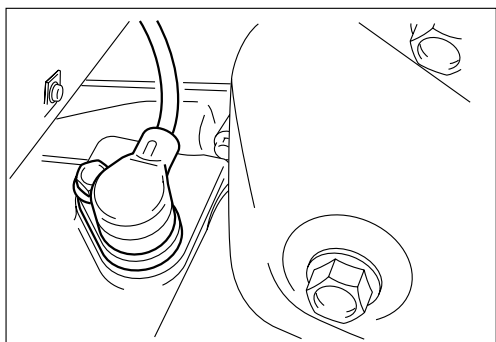
Slave Cylinder Bolt Torque	kg·m (lb·ft/N·m)
4.1 ± 1.0 ($30 \pm 7.2/40 \pm 10$)	

Harness Connector

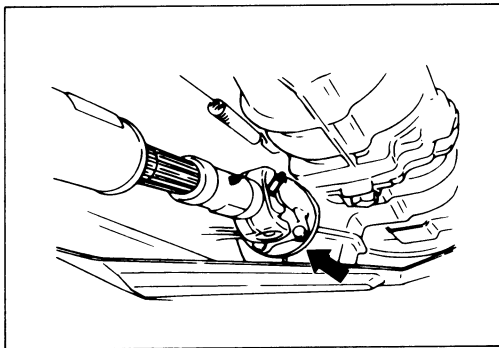
Disconnect the 4WD switch connectors back up light switch connector and speedometer sensor connector.

TDC Sensor (4JA1TC Model)

Connect the TDC sensor from the transmission housing.



220R200001



Front Propeller Shaft

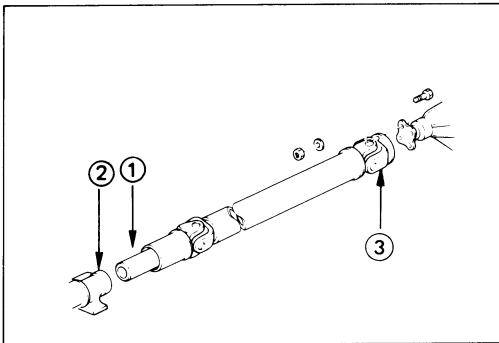
1. Connect the propeller shaft flange yoke to the matching flange.
2. Tighten the propeller shaft flange yoke bolt to the specified torque.

Propeller Shaft Flange Yoke Bolt Torque	kg·m (lb·ft/N·m)
6.4 ± 0.4 ($46.3 \pm 2.9/62.7 \pm 3.9$)	

Note:

If the splined yoke and the front propeller shaft have accidentally separated, align their setting marks and recouple them.

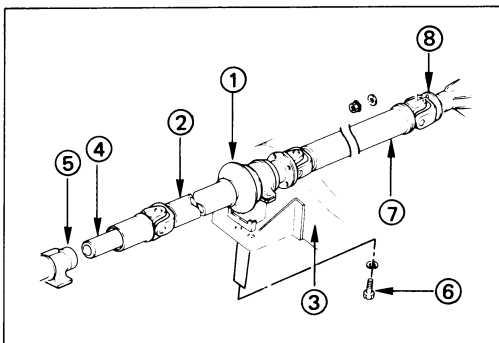
Refer to "FRONT PROPELLER SHAFT REMOVAL".



Rear Propeller Shaft (Single Shaft Type)

1. Insert the splined yoke ① with the propeller shaft into the transmission main shaft spline ②.
2. Install the propeller shaft flange yoke ③ to the drive pinion side.
3. Tighten the propeller shaft flange yoke bolt to the specified torque.

Propeller Shaft Flange Yoke Bolt Torque	kg·m (lb·ft/N·m)
6.4 ± 0.4 ($46.3 \pm 2.9/62.7 \pm 3.9$)	



Rear Propeller Shaft (Dual Shaft Type)

1. Place the center bearing ① together with the 1st propeller shaft ② and 2nd propeller shaft ⑦ on the No.4 crossmember ③.
2. Insert the splined yoke ④ into the transmission main shaft spline ⑤.
3. Tighten the center bearing retainer bolts ⑥ to the specified torque.

Center Bearing Retainer Bolt Torque	kg·m (lb·ft/N·m)
6.2 ± 1.2 ($44.8 \pm 8.7/60.8 \pm 11.8$)	

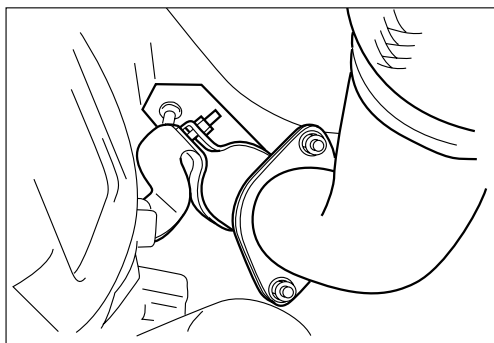
4. Connect the 2nd propeller shaft ⑦ and drive pinion side ⑧.

Be sure to align the setting marks applied at disassembly.

5. Tighten the coupling bolts to the specified torque.

Propeller Shaft Flange Yoke Bolt Torque	kg·m (lb·ft/N·m)
6.4 ± 0.4 ($46.3 \pm 2.9/62.7 \pm 3.9$)	

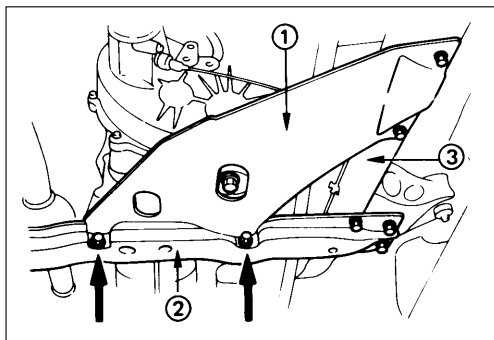




220LV018

Exhaust Pipe

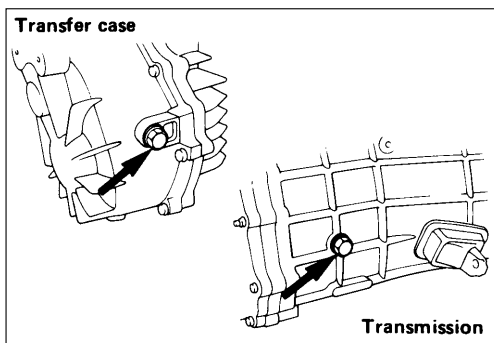
1. Connect the front exhaust pipe and 2nd-3rd exhaust pipe.
2. Install the exhaust pipe bracket to the transmission case.



Transfer Case Protector (Except 00 Year or Subsequent ones)

1. Install the transfer case protector ① to the mounting member ② and the sidemembers ③.
2. Tighten the transfer case protector bolts to the specified torque.

Transfer Case Protector Bolt Torque	kg·m (lb·ft/N·m)
	3.7 ± 1.0 ($26.8 \pm 7.2/36.3 \pm 9.8$)

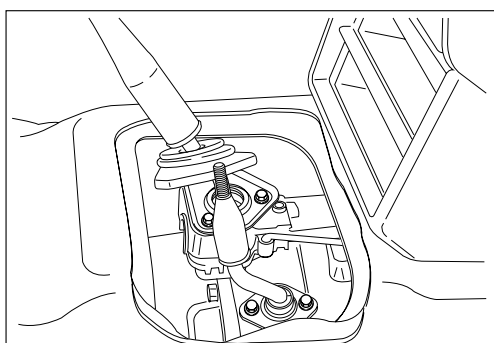


Gear Shift Lever and Transfer Change Lever

1. Replenish the transmission case and the transfer case with the specified engine oil.



Transmission and Transfer Case Oil	lit (US/UK qt.)
Transmission Case	2.95 (3.12/2.6)
Transfer Case	1.45 (1.53/1.28)



235RT004



2. Install the gear shift lever to the gear control box.

Shift Lever Cover Bolt Torque	kg·m (lb·ft/N·m)
	2.0 ± 0.2 ($14.5 \pm 1.5/19.6 \pm 1.96$)



3. Install the dust cover.

4. Insert the transfer change lever to the transfer case.

Change Lever Retainer Bolt Torque	kg·m (lb·ft/N·m)
	2.0 ± 0.2 ($14.5 \pm 1.5/19.6 \pm 1.96$)

5. Install the grommet.

6. Install the front console assembly and center console assembly.

7. Install the gear shift lever and the transfer change lever knobs.

Lowering the Vehicle

1. Place a jack beneath the vehicle.
2. Raise the jack to remove the chassis stands.
3. Lower the vehicle to the ground.

Engine Hood

Align the setting marks (applied at removal) on the engine hood and the engine hood hinges to install the engine hood.

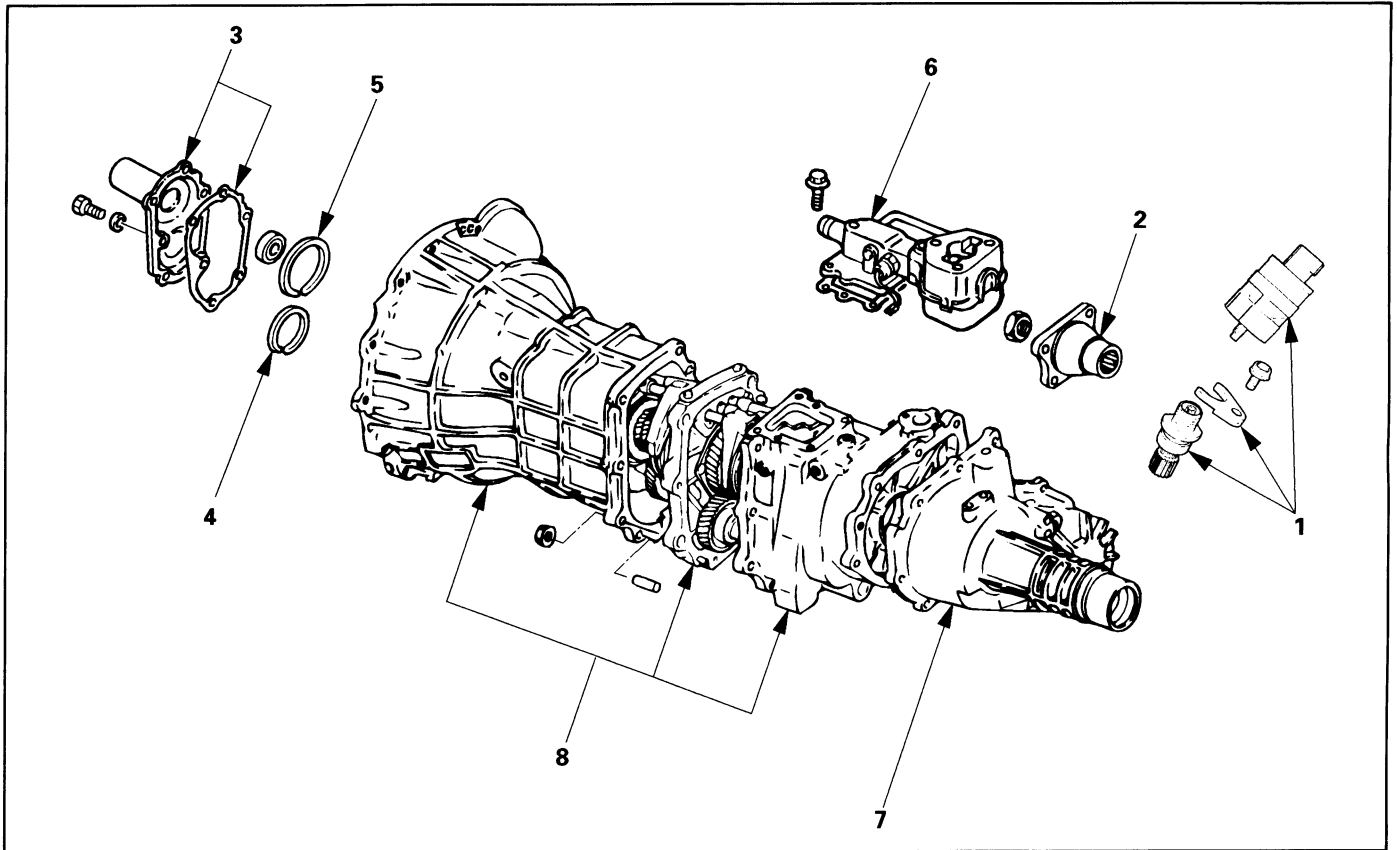
Battery Cable

Connect the negative (–) cable to the battery terminal.



DISASSEMBLY

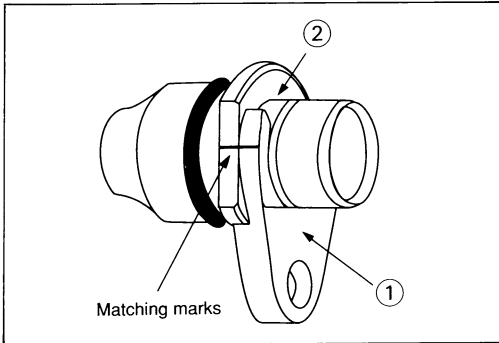
EXTERAL COMPONENTS



220LV002

Disassembly Steps

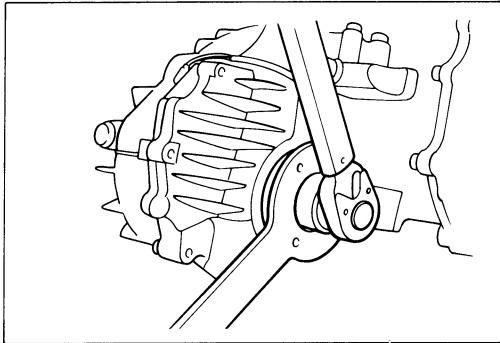
- ▲ 1. Speedometer sensor and speedometer driven gear
- ▲ 2. Transfer flange
- ▲ 3. Front cover with oil seal
- ▲ 4. Counter gear snap ring
- ▲ 5. Bearing snap ring
- ▲ 6. Gear control box assembly
- ▲ 7. Transfer rear case assembly
- ▲ 8. Transmission and transfer case assembly



Important Operations

1. Speedometer Sensor and Speedometer Driven Gear

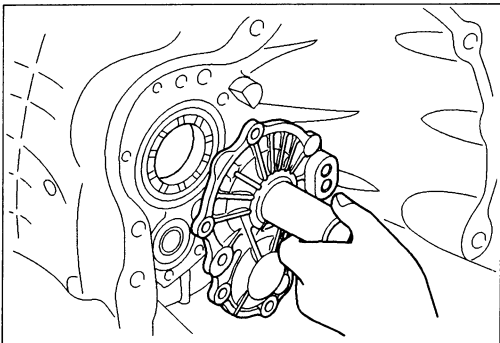
Mark the plate ① and bush ② alignment for reassembly.



2. Transfer Flange

Use the transfer flange holder to remove the transfer flange.

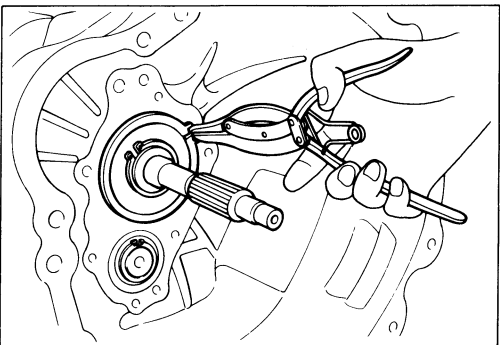
Transfer Flange Holder: 5-8840-2157-0 (J-37221)



220RT017

3. Front Cover with Oil Seal

Remove the front cover with oil seal from the transmission case.

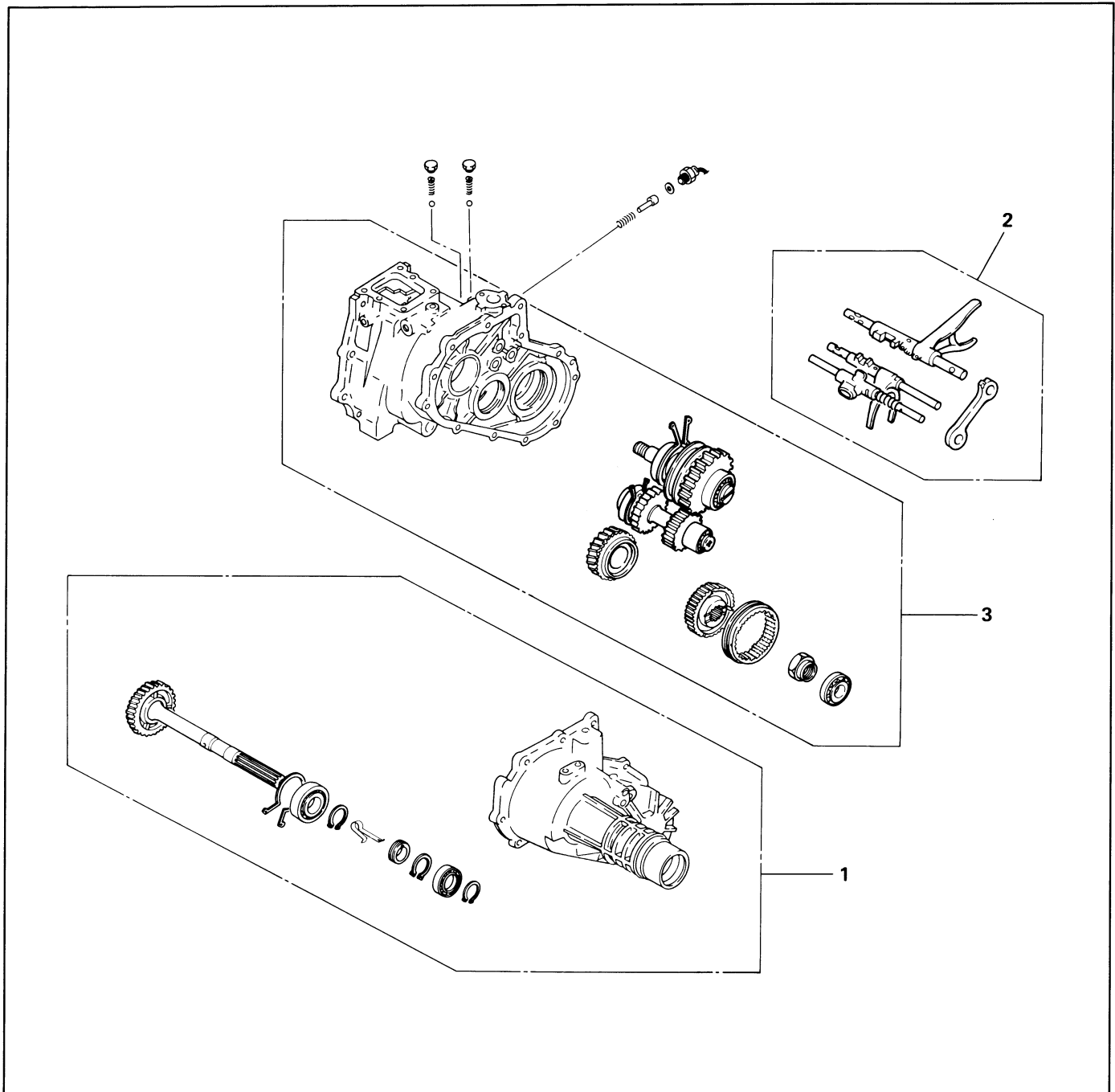


4. Counter Gear Snap Ring

5. Bearing Snap Ring

Use a pair of snap ring pliers to remove the snap ring.

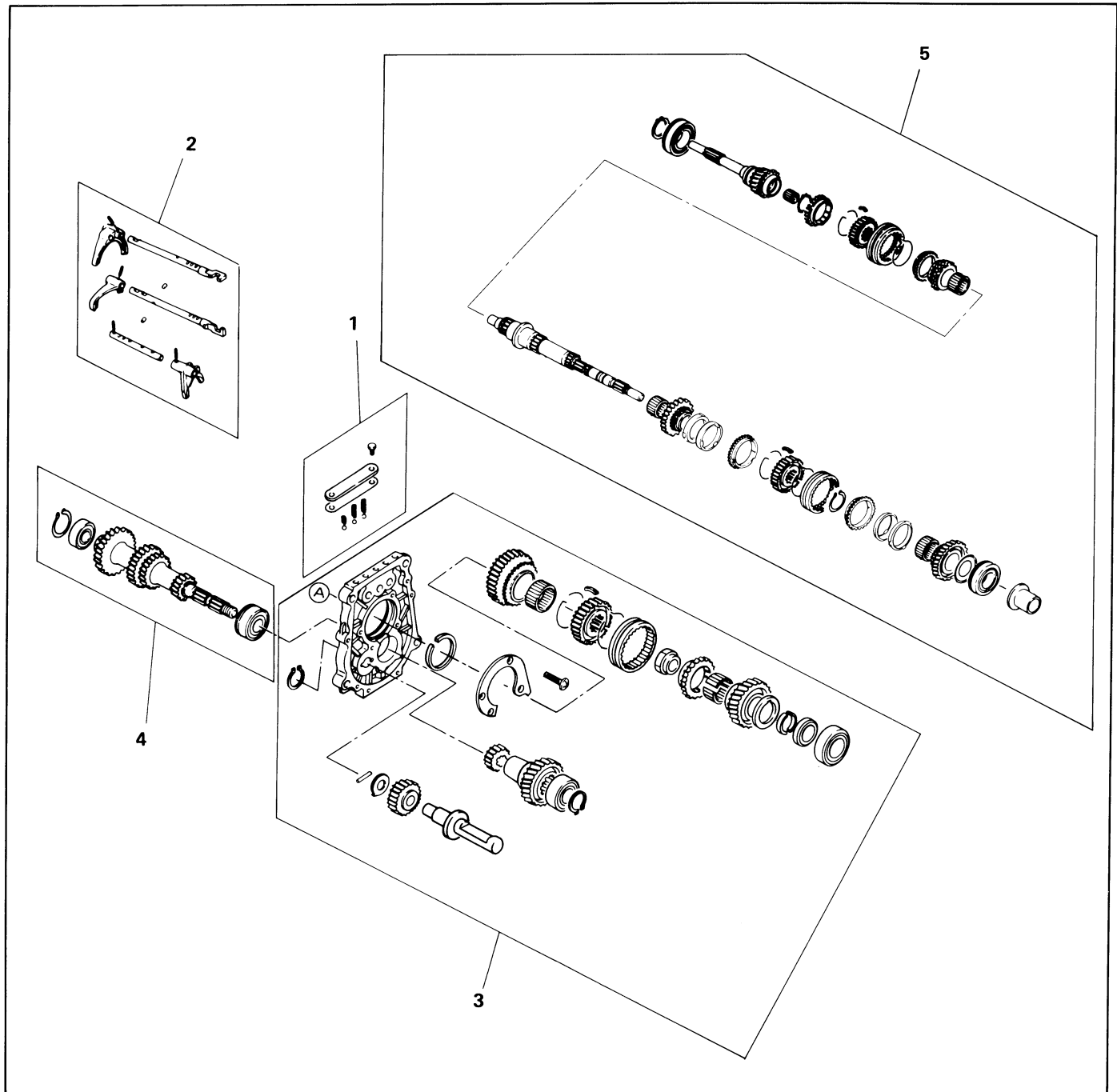
MAJOR COMPONENT (TRANSFER CASE)



Disassembly Steps

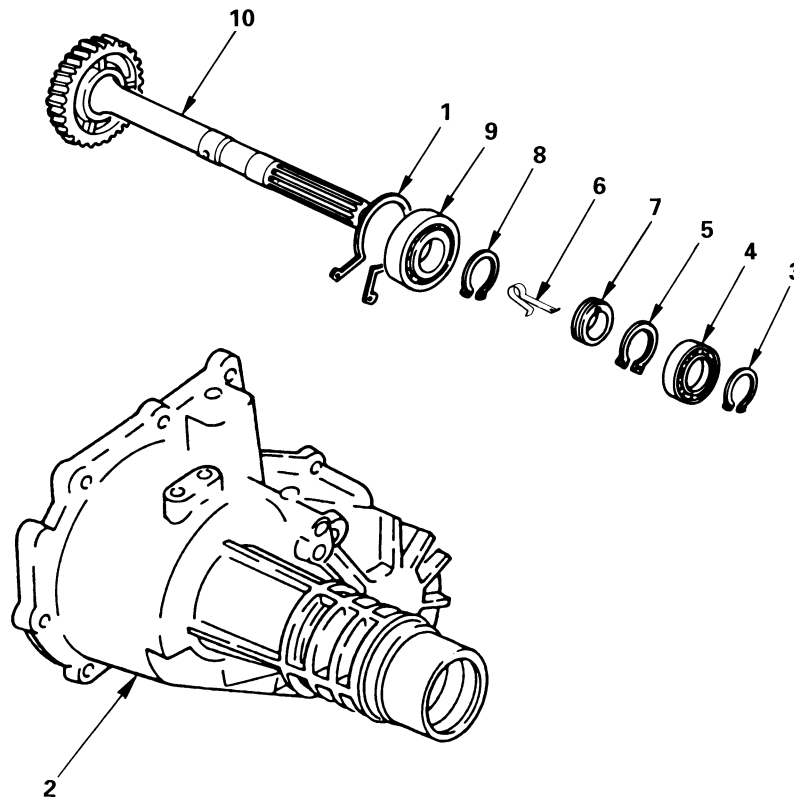
1. Transfer rear case assembly
2. Shift fork assembly & interlock pin & detent assembly
3. Transfer case assembly

MAJOR COMPONENT (TRANSMISSION)

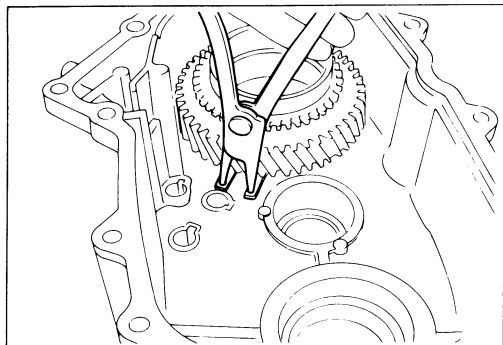


Disassembly Steps

1. Detent assembly
2. Shift fork assembly & interlock pin
3. Rev. and 5th gear assembly
4. Counter gear shaft assembly
5. Top & main gear shaft assembly

MINOR COMPONENT**TRANSFER REAR CASE ASSEMBLY****Disassembly Steps**

- ▲ 1. Bearing snap ring
- 2. Transfer rear case
- 3. Bearing snap ring
- ▲ 4. Ball bearing
- 5. Bearing snap ring
- 6. Clip
- 7. Speedometer drive gear
- 8. Bearing snap ring
- ▲ 9. Ball bearing
- 10. Rear output shaft

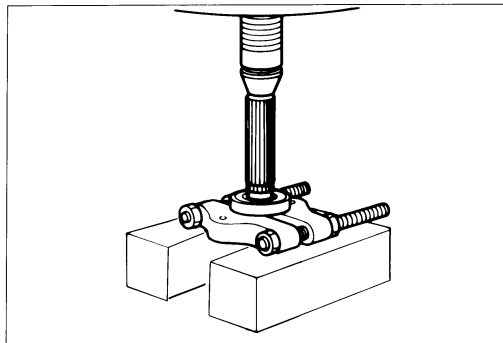


Important Operations



1. Bearing Snap Ring

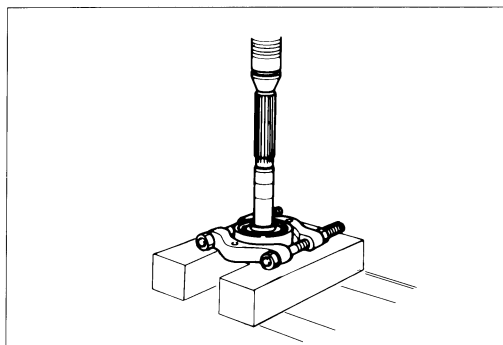
Use a pair of snap ring pliers to remove the snap ring.



4. Ball Bearing

Use a bench press and the bearing remover to remove the ball bearing.

Bearing Remover: 5-8840-0015-0 (J-22912-01)

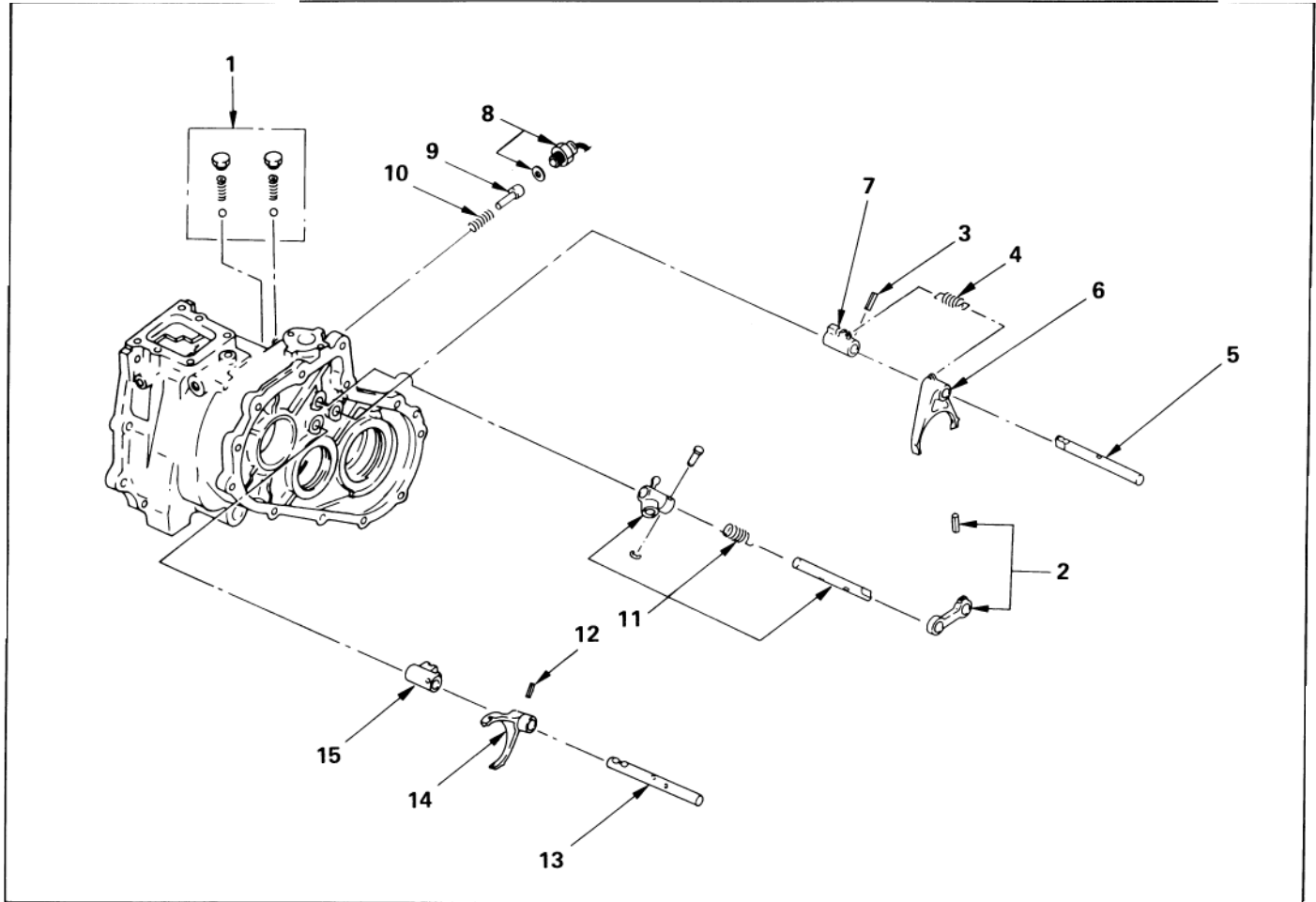


9. Ball Bearing

Use a bench press and the bearing remover to remove the ball bearing.

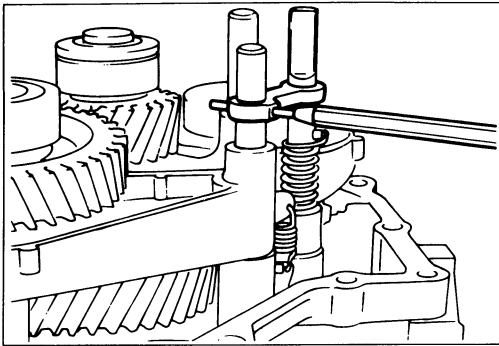


DETENT, SHIFT ARM ASSEMBLY AND INTERLOCK PIN



Disassembly Steps

- | | |
|---------------------------------|--------------------------|
| 1. Detent ball, spring and plug | ▲ 9. Interlock pin |
| ▲ 2. Pin and bridge | 10. Spring |
| 3. Pin | 11. Select rod assembly |
| 4. Spring | 12. Pin |
| ▲ 5. 2WD-4WD shift rod | ▲ 13. High-low shift rod |
| 6. Shift arm | 14. Shift arm |
| 7. Shift block | 15. Shift block |
| 8. 4WD indicator switch | |

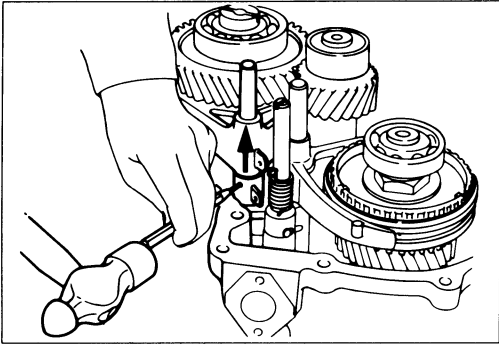


Important Operations



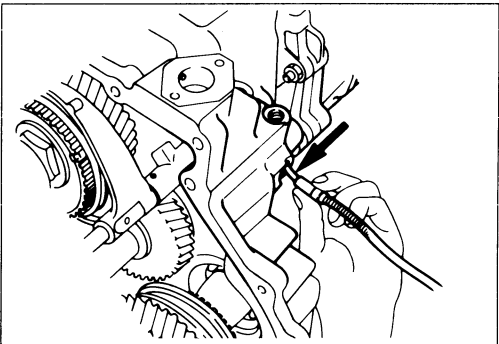
2. Bridge

Use a spring pin remover to remove the spring from the bridge.



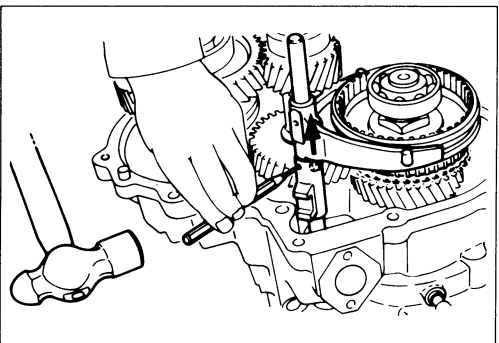
5. 2WD-4WD Shift Rod

- 1) Engage the 2nd-4th sleeve with the front output gear.
- 2) Remove the spring pin from the block.
- 3) Remove the shift rod.



9. Interlock Pin

Use a magnetic tool to remove the interlock pin from the transfer case.

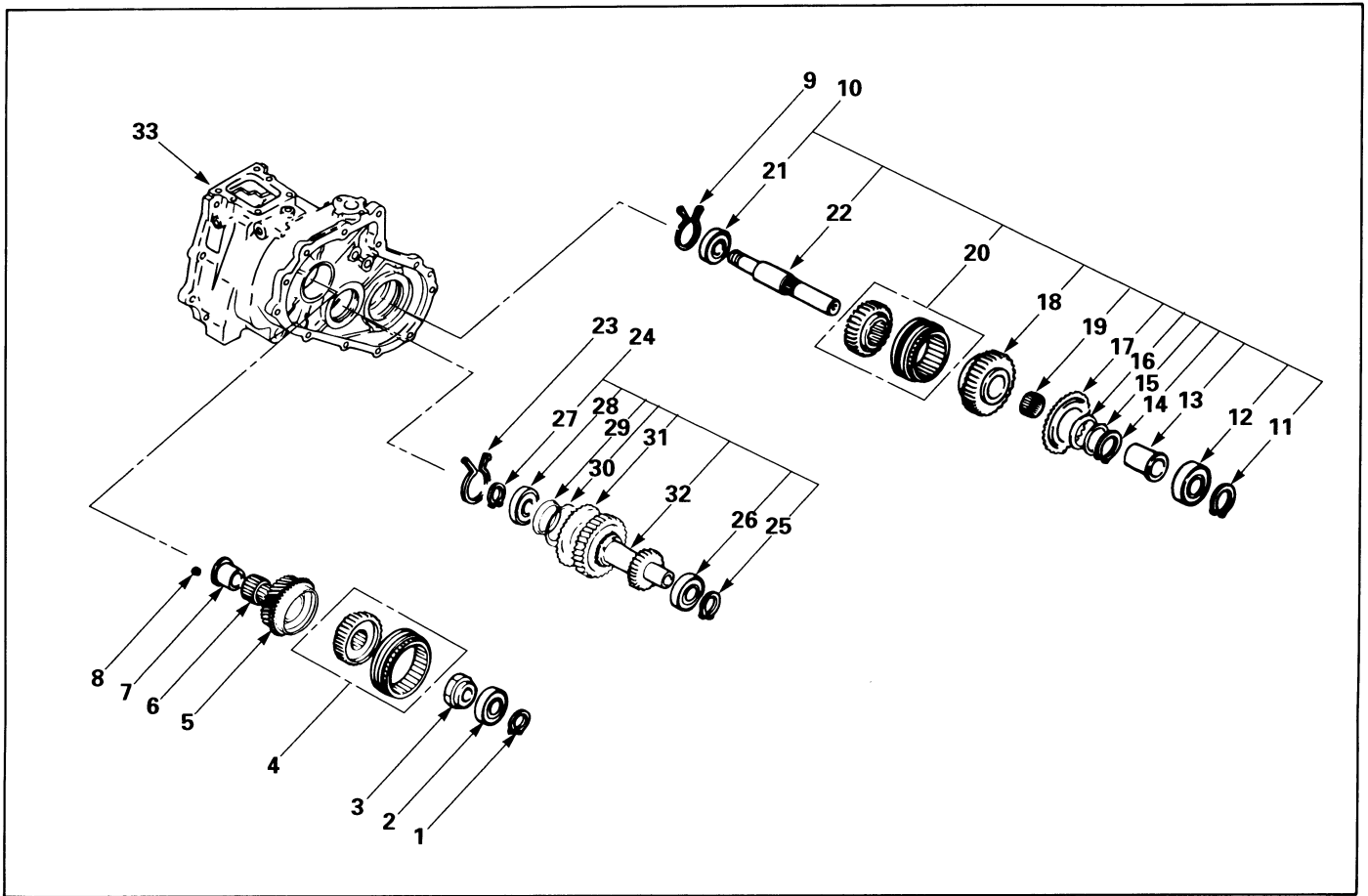


13. High-Low Shift Rod

Use a spring pin remover to remove the shift arm spring from the shift arm and the shift rod.



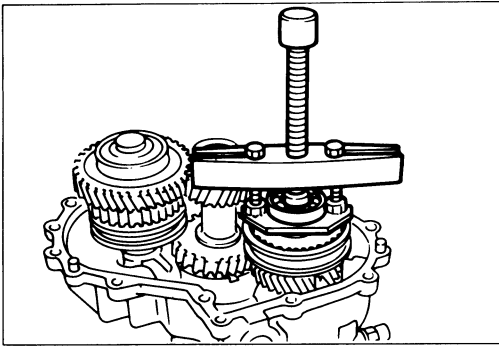
TRANSFER CASE ASSEMBLY AND MAINSHAFT GEAR



220RT007

Disassembly Steps

- | | |
|-------------------------------------|--------------------------------|
| 1. Bearing snap ring | 18. Front output gear |
| ▲ 2. Mainshaft end ball bearing | 19. Needle bearing |
| ▲ 3. Mainshaft end lock nut | 20. Clutch hub and sleeve |
| ▲ 4. High-low clutch hub and sleeve | ▲ 21. Ball bearing |
| ▲ 5. Transfer input gear | 22. Front output shaft |
| 6. Needle bearing | 23. Bearing snap ring |
| ▲ 7. Bearing collar | 24. Counter gear assembly |
| 8. Ball | 25. Bearing snap ring |
| ▲ 9. Bearing snap ring | ▲ 26. Ball bearing |
| 10. Front output gear assembly | 27. Bearing snap ring |
| 11. Bearing snap ring | ▲ 28. Ball bearing |
| ▲ 12. Ball bearing | 29. Spacer |
| 13. Bearing collar | 30. Belleville spring |
| ▲ 14. Anti-lash plate snap ring | 31. Sub gear (Anti-lash plate) |
| 15. Spacer | 32. Counter gear |
| 16. Belleville spring | 33. Transfer case |
| 17. Sub gear (Anti-lash plate) | |



Important Operations

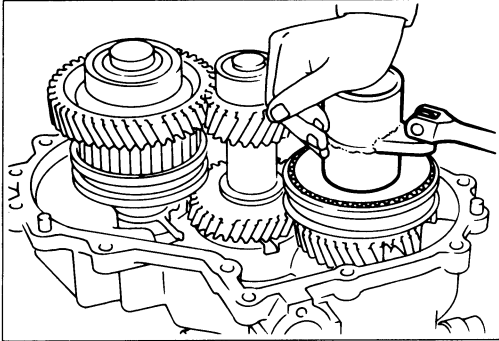


2. Mainshaft End Ball Bearing

Use a bearing remover to remove the ball bearing.

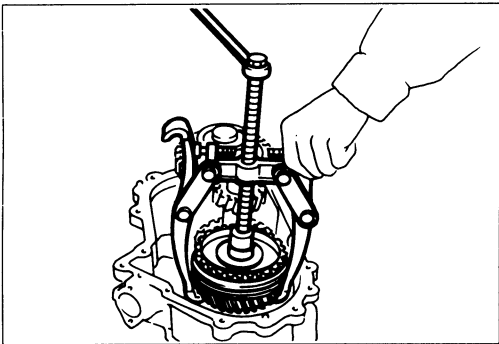
Remover : 5-8840-2155-0 (J-37217)

Puller : 5-8840-2027-0



3. Mainshaft End Lock Nut

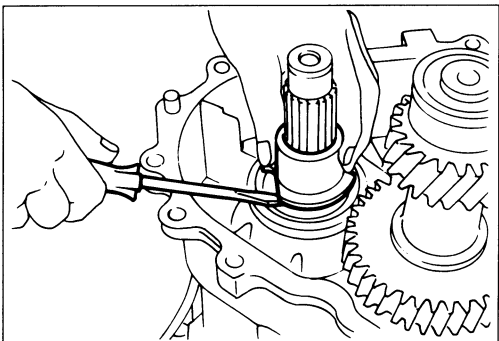
- 1) Engage the 3rd-top synchronizer with the 3rd gear.
 - 2) Engage the low-2nd synchronizer with the low gear.
 - 3) Use the lock nut wrench to remove the lock nut.
- Lock Nut Wrench: 5-8840-2156-0 (J-37219)



4. High-Low Clutch Hub and Sleeve

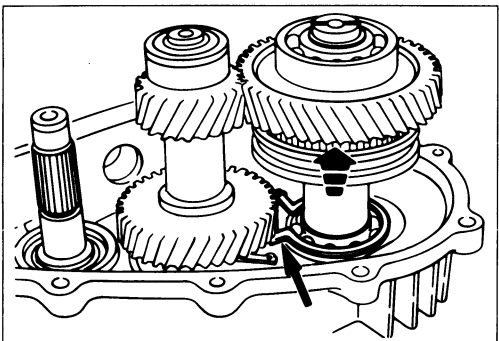
5. Transfer Input Gear

Use the universal puller to remove the high-low synchronizer assembly, the high-low block ring, and the transfer input gear.



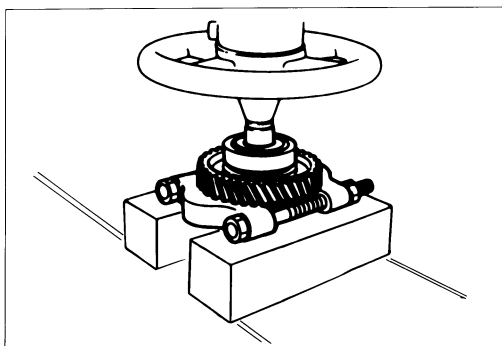
7. 8. Bearing Collar and Ball

Using screw driver to remove the bearing collar.



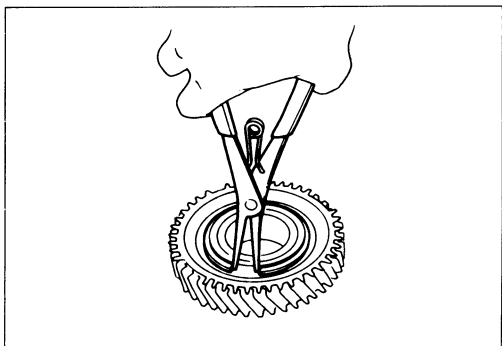
9. Bearing Snap Ring

Use a pair of snap ring pliers to expand the bearing snap ring.
Use a plastic hammer to tap the front output gear assembly free.

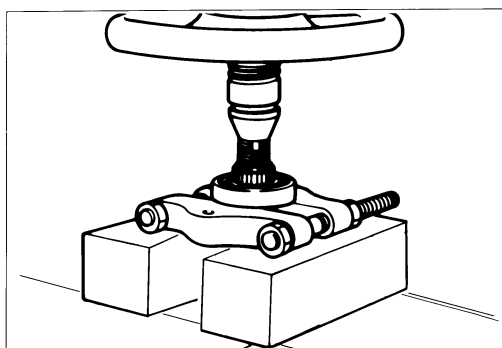
**12. Ball Bearing**

Use a bench press and the ball bearing remover to remove the ball bearing.

Bearing Remover: 5-8840-0015-0 (J-22912-01)

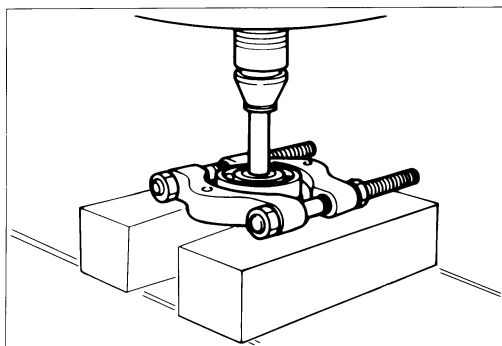
**14. Anti-lash Plate Snap Ring**

Use a pair of pliers to remove the snap ring.

**21. Ball Bearing**

Use a bench press and the bearing remover to remove the ball bearing.

Bearing Remover: 5-8840-0015-0 (J-22912-01)

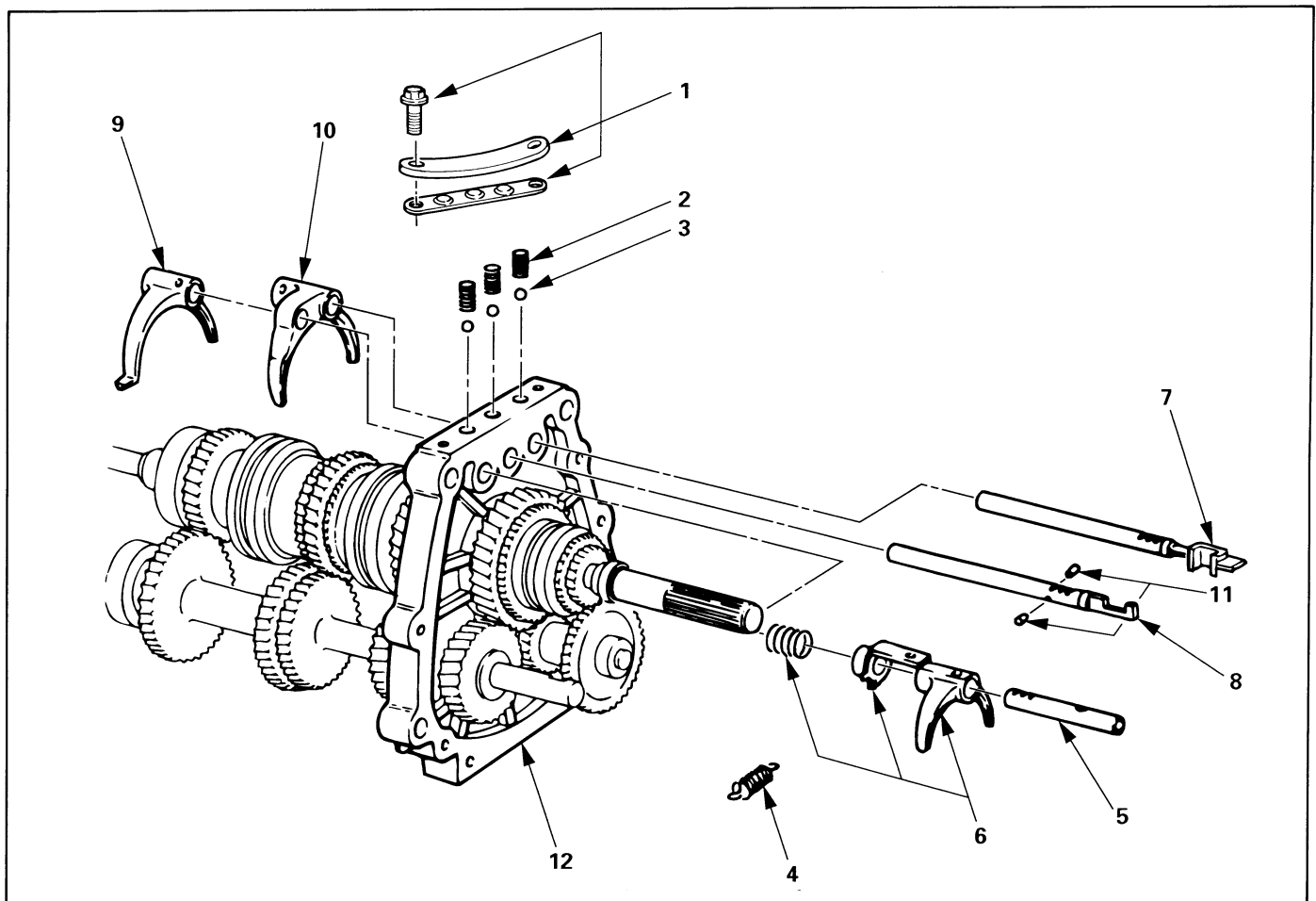
**26. Ball Bearing****28. Ball Bearing**

Use a bench press and the bearing remover to remove the ball bearings.

MINOR COMPONENT



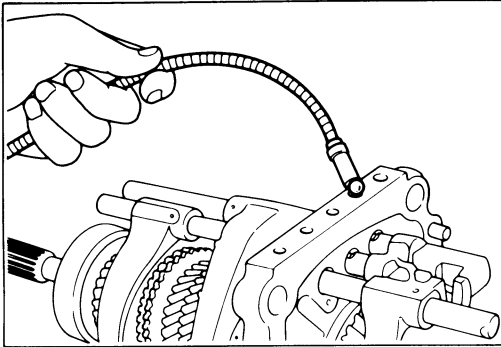
INTERMEDIATE PLATE AND GEAR ASSEMBLY, DETENT, SHIFT ARM ASSEMBLY, AND INTERLOCK PIN



220RW071

Disassembly Steps

- | | |
|--|--|
| 1. Detent spring plate and gasket | 7. 1st-2nd shift rod |
| 2. Detent spring | ▲ 8. 3rd-4th shift rod |
| ▲ 3. Detent ball | ▲ 9. 3rd-4th shift arm |
| 4. Spring | ▲ 10. 1st-2nd shift arm |
| 5. Rev-5th shift rod | ▲ 11. Interlock pin |
| 6. Rev-5th shift arm and reverse inhibitor | 12. Intermediate plate and gear assembly |



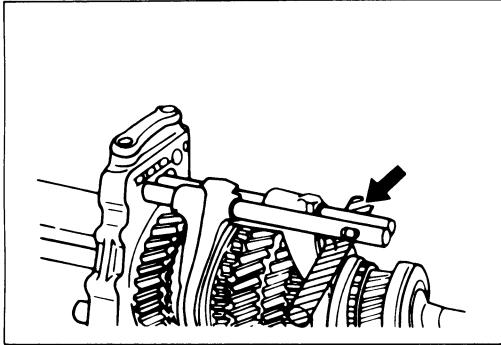
Important Operations



3. Detent Ball

Use a magnetic tool to remove the detent balls from the intermediate plate.

Take care not to lose the detent balls.



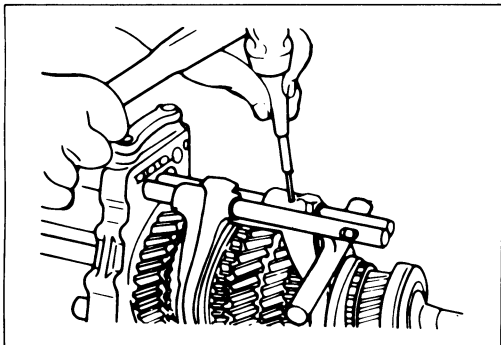
8. 3rd-4th Shift Rod

9. 3rd-4th Shift Arm

10. 1st-2nd Shift Arm

- 1) Hold a round bar against the shift arm end.

This will prevent damage to other components.

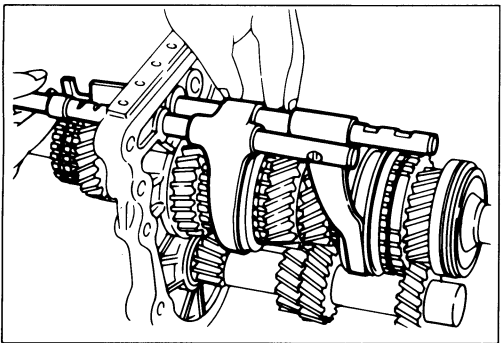


- 2) Use a spring pin remover to remove the shift arm spring pin from the shift arm and the shift rod.

Discard the used spring pin.

- 3) Move the 3rd-4th shift rod forward.

Take care not to lose the interlock pins.



11. Interlock Pin

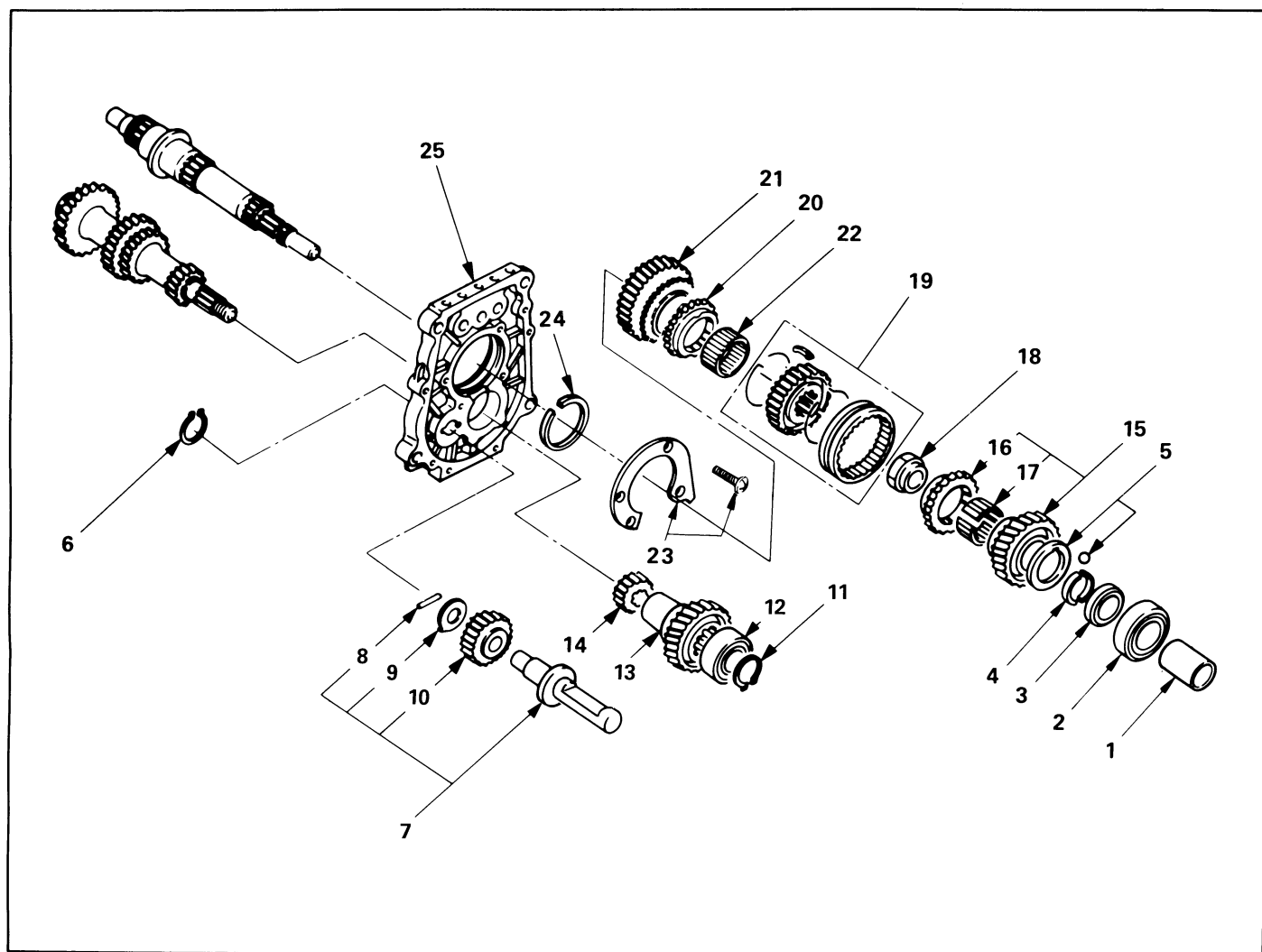
Carefully remove the reverse shifter rod forward to avoid losing the interlock pins.

Note:

Remove the shifter rods carefully. Interlock pins are located between the shifter rod in the intermediate plate.

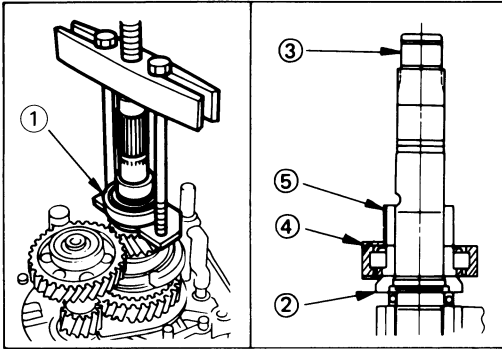


REVERSE GEAR AND 5TH GEAR



Disassembly Steps

- | | |
|-----------------------------------|-------------------------------------|
| ▲ 1. Oil seal collar | 14. Counter reverse gear |
| ▲ 2. Bearing | 15. 5th gear |
| ▲ 3. Retainer | 16. 5th block ring |
| 4. Thrust plate | ▲ 17. Needle bearing |
| 5. Thrust washer and lock ball | ▲ 18. Clutch hub nut |
| ▲ 6. Reverse idler gear snap ring | ▲ 19. Rev-5th synchronizer assembly |
| 7. Reverse idler shaft | ▲ 20. Reverse block ring |
| 8. Idle shaft pin | ▲ 21. Reverse gear |
| 9. Thrust washer | 22. Needle bearing |
| 10. Reverse idler gear | ▲ 23. Bearing plate and screw |
| 11. Bearing snap ring | ▲ 24. Bearing snap ring |
| ▲ 12. Ball bearing | ▲ 25. Intermediate plate |
| ▲ 13. Counter 5th gear | |



Important Operations

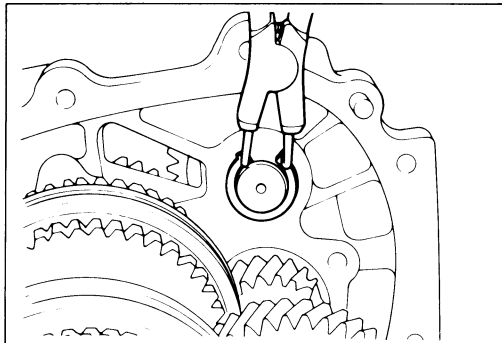
1. Oil Seal Collar
2. Bearing
3. Retainer

- 1) Set the retaining ring remover ① to the retainer ② and the mainshaft end ③.
- 2) Remove the retainer together with the bearing ④ and the oil seal collar ⑤.

The universal puller may be used in place of the retaining ring remover.

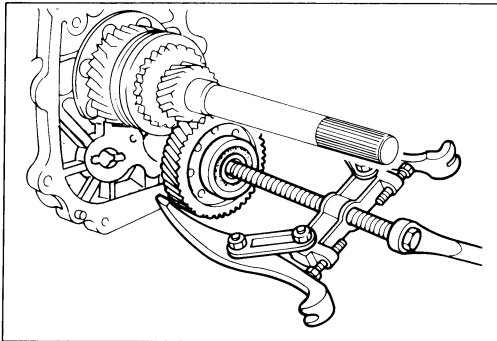
Retainer Remover: 5-8840-2158-0 (J-37222)

Universal Puller: 5-8840-2027-0



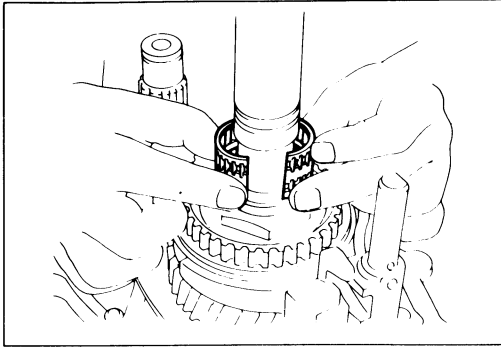
6. Reverse Idler Gear Snap Ring

Use a pair of snap ring pliers to remove the snap ring.



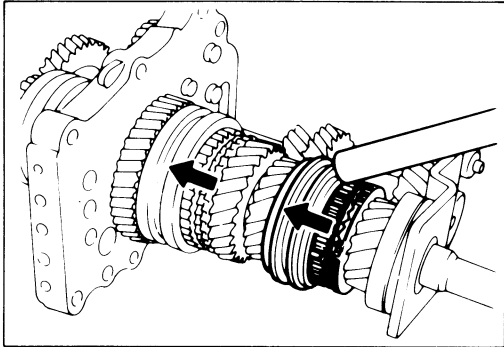
12. Ball Bearing
13. Counter 5th Gear

Use the bearing remover to remove the ball bearing.



17. Needle Bearing

Remove the needle bearing (2 piece type).

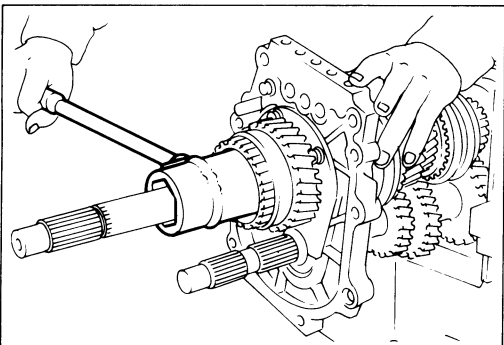


18. Clutch Hub Nut

- 1) Engage the 3rd-4th synchronizer with the 3rd gear.
- 2) Engage the 1st-2nd synchronizer with the 1st gear.
- 3) Attach the holding fixture together with the holding base to the mainshaft front bearing and the counter gear front bearing.

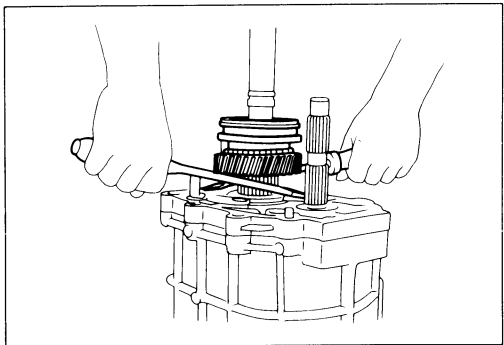
Holding Fixture: 5-8840-2160-0 (J-37224)

Holding Base: 5-8840-0003-0 (J-3289-20)



- 4) Use the hub nut wrench to remove the hub nut.

Hub Nut Wrench: 5-8840-2156-0 (J-37219)

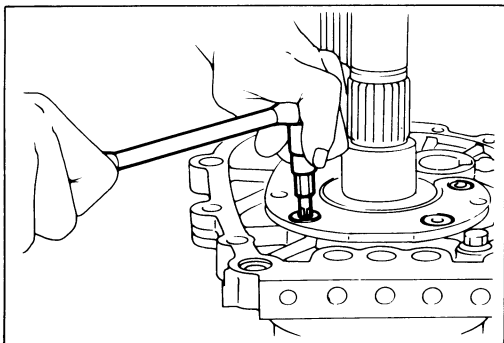


19. Rev.-5th Synchronizer Assembly

20. Reverse Ring

21. Reverse Gear

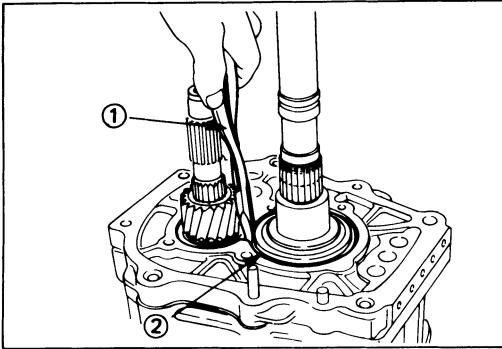
Use screw drivers between the reverse gear and bearing plate to remove the Rev.-5th synchronizer assembly together with reverse ring and gear.



23. Bearing Plate and Screw

Use the Torx bit to remove the bearing plate screw from the intermediate plate.

Torx Bit Wrench: 5-8840-0047-0 (J-37225) (T45)

**24. Ball Bearing Snap Ring****25. Intermediate Plate**

- 1) Insert the snap ring pliers into the mainshaft bearing snap ring hole.
- 2) Use the snap ring pliers ① to force open the mainshaft bearing snap ring ②.

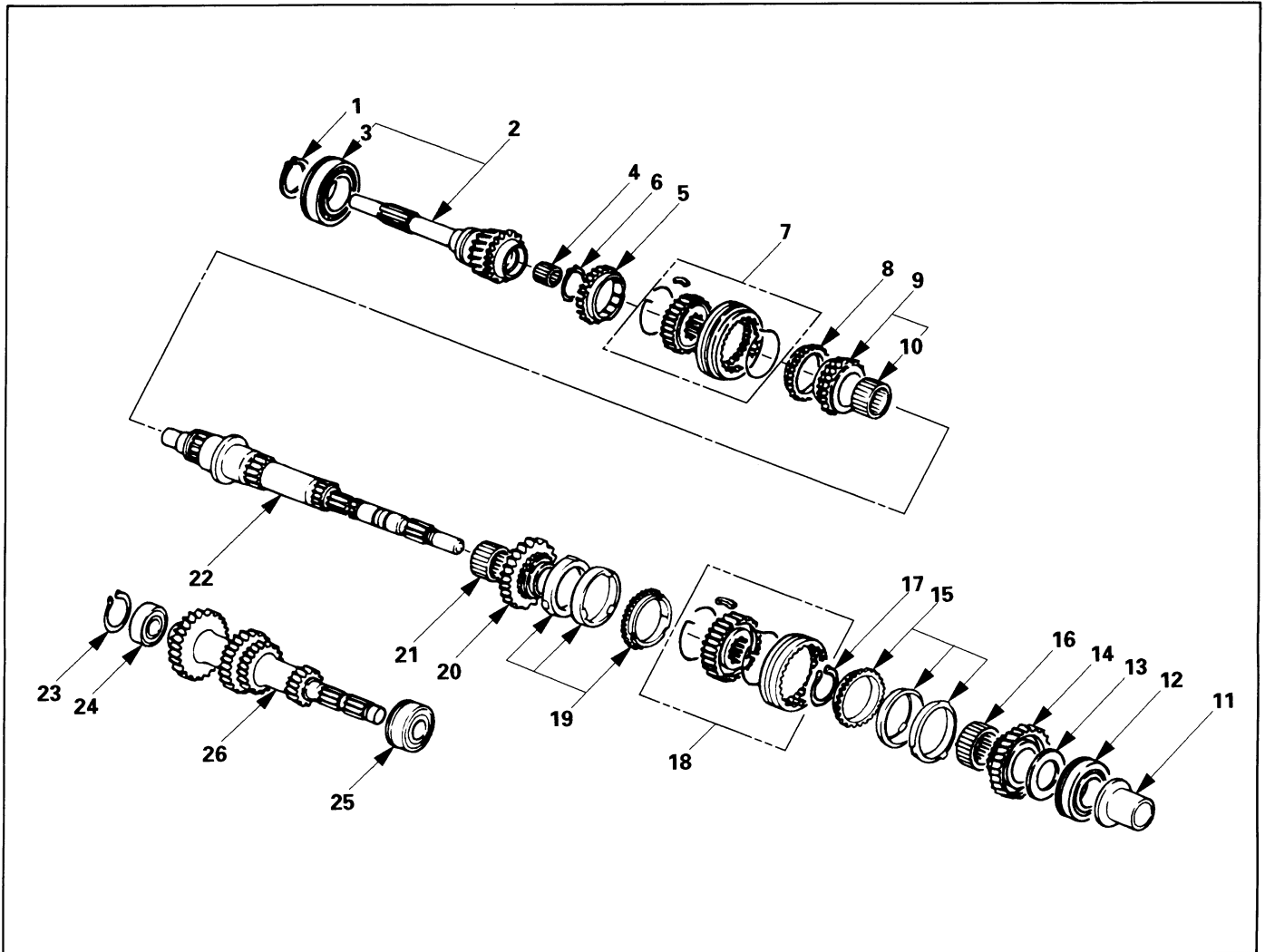
Hold the snap ring open with the pliers.

- 3) Push the intermediate plate toward the rear of the transmission to remove it.

The ball bearing snap ring will come free.



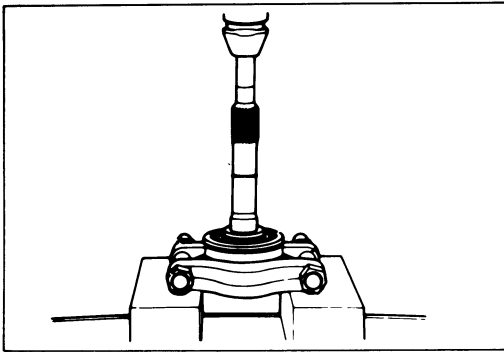
TOP GEAR SHAFT, MAIN GEAR SHAFT, AND COUNTER GEAR



226L V002

Disassembly Steps

- | | |
|------------------------------------|-------------------------------------|
| 1. Top gear shaft snap ring | ▲ 14. 1st gear |
| 2. Top gear shaft | 15. 1st block ring (set) |
| ▲ 3. Top gear ball bearing | 16. Needle bearing |
| 4. Needle bearing | ▲ 17. Clutch hub snap ring |
| 5. Top block ring | ▲ 18. 1st-2nd synchronizer assembly |
| ▲ 6. Mainshaft snap ring | ▲ 19. 2nd block ring (set) |
| ▲ 7. 3rd-4th synchronizer assembly | ▲ 20. 2nd gear |
| 8. 3rd block ring | 21. Needle bearing |
| 9. 3rd gear | 22. Mainshaft |
| 10. Needle bearing | 23. Bearing snap ring |
| ▲ 11. Needle bearing collar | ▲ 24. Counter gear front bearing |
| ▲ 12. Mainshaft ball bearing | 25. Counter gear center bearing |
| ▲ 13. 1st gear thrust bearing | 26. Counter gear |



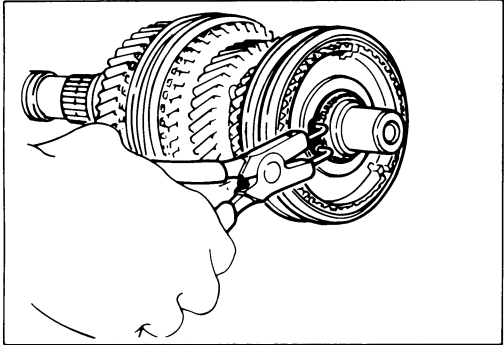
Important Operations



3. Top Gear Ball Bearing

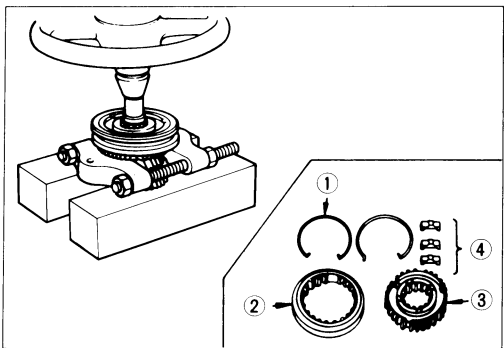
Use a bench press and the bearing remover to remove the ball bearing.

Bearing Remover : 5-8840-0015-0 (J-22912-01)



6. Mainshaft Snap Ring

Use a pair of snap ring pliers to remove the snap ring.

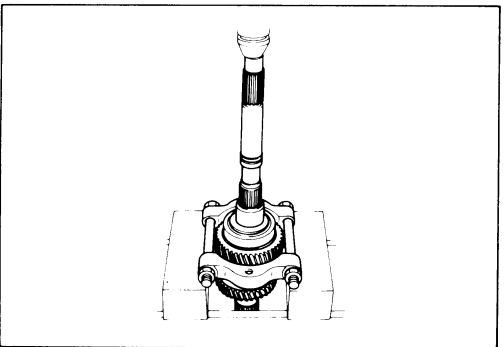


7. 3rd-4th Synchronizer Assembly

- 1) Use a bench press and the bearing replacer to remove the synchronizer assembly as a set.
- 2) Disassemble the synchronizer assembly.
 - ① Springs
 - ② Sleeve
 - ③ Clutch Hub
 - ④ Inserts

Note:

Mark the hub and sleeve alignment for reassembly.



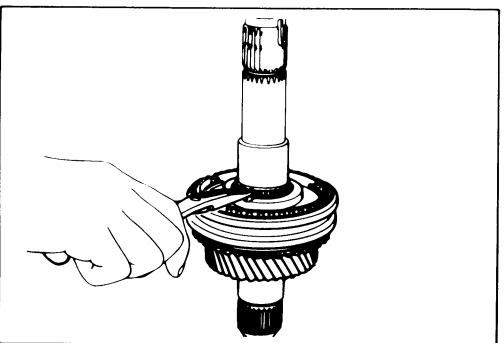
11. Needle Bearing Collar

12. Mainshaft Ball Bearing

13. 1st Gear Thrust Bearing

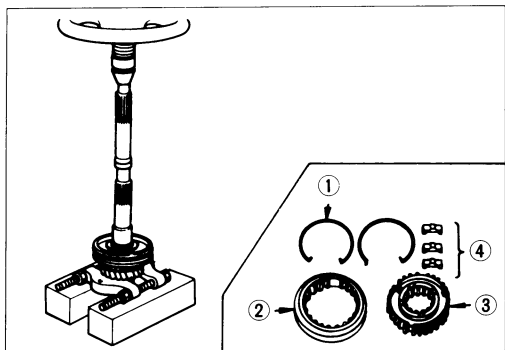
14. 1st Gear

Use a bench press and the bearing remover to remove the ball bearing.



17. Clutch Hub Snap Ring

Use a pair of snap ring pliers to remove the snap ring.



18. 1st-2nd Synchronizer Assembly

19. 2nd Block Ring (Set)

20. 2nd Gear

- 1) Use a bench press and the bearing remover to remove the ball bearing 2nd gear together with synchronizer assembly.

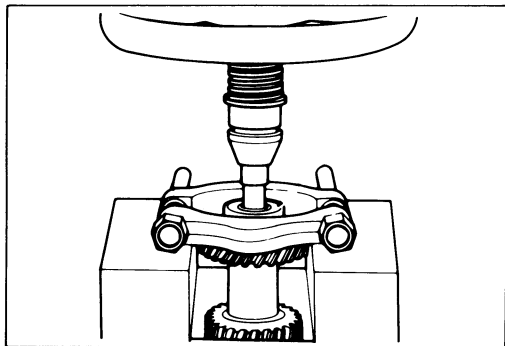
Remover: 5-8840-0015-0 (J-22912-01)

- 2) Disassemble the synchronizer assembly.

- ① Springs
- ② Sleeve
- ③ Clutch Hub
- ④ Inserts

Note:

Mark the hub and sleeve alignment for reassembly.



24. Counter Gear Front Bearing

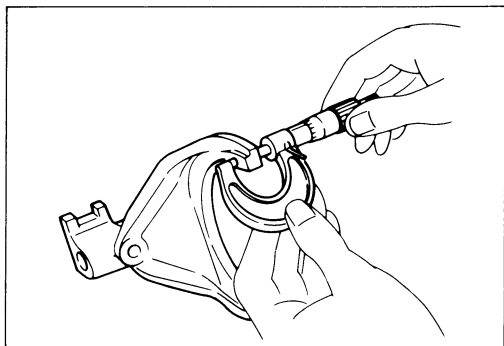
Use a bench press and the bearing remover to remove the bearing.

Bearing Remover: 5-8840-0015-0 (J-22912-01)



INSPECTION AND REPAIR

Make the necessary adjustments, repairs, and part replacements if excessive wear or damage is discovered during inspection.

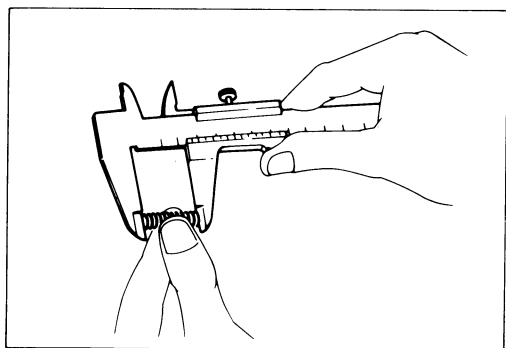


SHIFT ARM THICKNESS

Use a micrometer to measure the shift arm thickness.

If the measured value is less than the specified limit, the shift arm must be replaced.

Shift Arm Thickness		mm(in)	
		Standard	Limit
1st–2nd Transfer	4x4/4x2 High/Low	9.60–9.85 (0.378–0.388)	9.0 (0.354)
3rd–4th Rev.–5th		9.60–9.80 (0.378–0.386)	

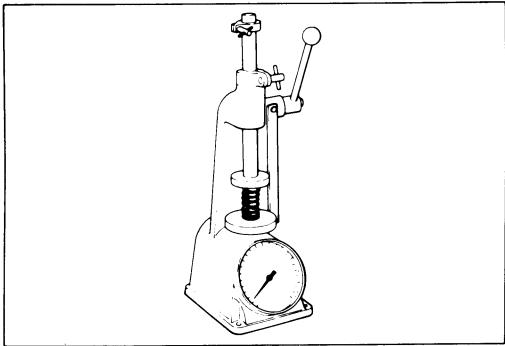


DETENT AND INTERLOCK SPRINGS FREE LENGTH

Use a vernier caliper to measure the springs free length.

If the measured value is less than the specified limit, the springs must be replaced.

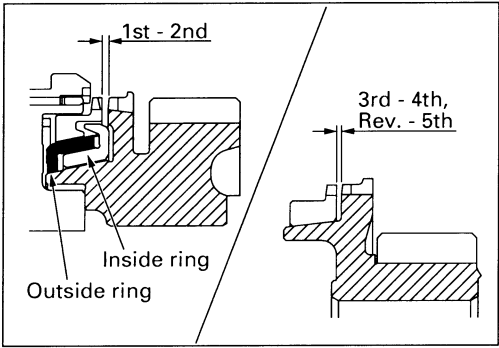
Springs Free Length		mm(in)	
		Standard	Limit
(Detent Ball)	Transmission	26.8 (1.06)	26.2 (1.03)
	Transfer case	23.4 (0.92)	22.8 (0.90)
(Interlock Pin)	Transfer case	15.9 (0.626)	15.3 (0.602)



DETENT SPRING TENSION

Use a spring tester to measure the springs tension. If the measured value is less than the specified standard, the springs must be replaced.

Springs Tension		kg(lb/N)	
		Compressed Height	Standard
(Detent Ball)	Transmission	20 mm (0.787 in)	8.9—9.9 (19.6—21.8/ 87.2—97)
	Transfer case	18.7 mm (0.736 in)	7.0—9.0 (15.4—19.8/ 68.6—88.2)
(Interlock Pin)	Transfer case	11.5 mm (0.453 in)	1.0 (2.2/9.8)

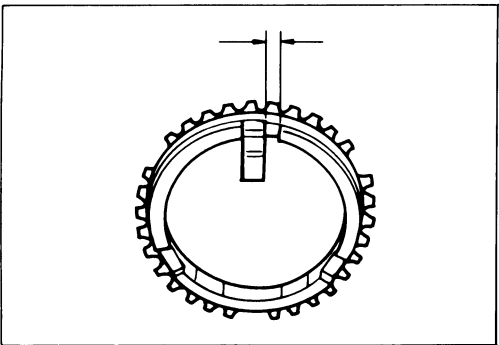


BLOCK RING AND DOG TEETH CLEARANCE

Use a thickness gauge to measure the clearance between the block ring and the dog teeth.

If the measured value exceeds the specified limit, the block ring must be replaced.

Block Ring and Dog Teeth Clearance		mm(in)
Standard		Limit
1.5 (0.059)		0.8 (0.032)

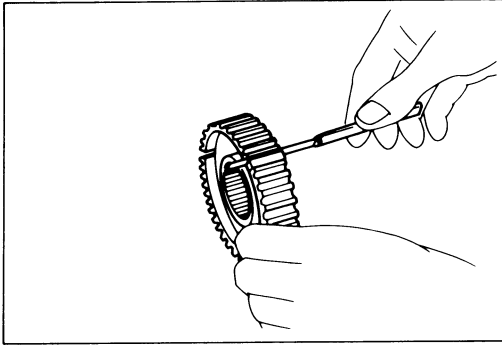


BLOCK RING AND INSERT CLEARANCE

Use a vernier caliper to measure the clearance between the block ring and the insert.

If the measured value exceeds the specified limit, the block ring and the insert must be replaced.

Block Ring and Insert Clearance			mm(in)
	Standard	Limit	
3rd-4th	3.46—3.74 (0.136—0.147)	4.0 (0.158)	
1st-2nd	4.34—4.66 (0.171—0.183)	4.9 (0.193)	
Transfer	2.46—2.74 (0.097—0.108)	3.0 (0.118)	
Rev.-5th	3.59—3.91 (0.141—0.154)	4.1 (0.161)	

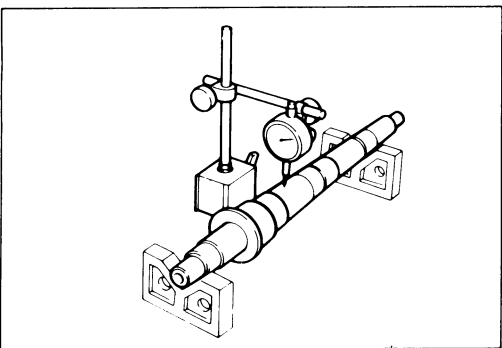


CLUTCH HUB AND INSERT CLEARANCE

Use a thickness gauge to measure the clearance between the clutch hub and the insert.

If the measured value exceeds the specified limit, the clutch hub and the insert must be replaced.

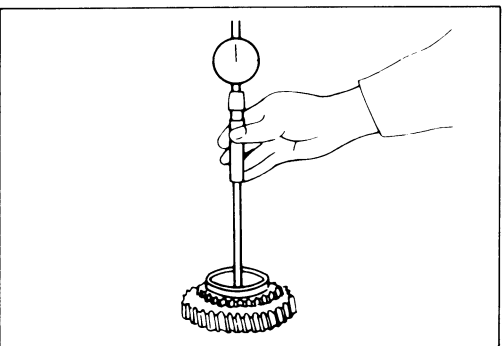
Clutch Hub and Insert Clearance		mm(in)
	Standard	Limit
3rd-4th	0.01-0.19 (0.0004-0.0075)	0.3 (0.012)
1st-2nd Rev.-5th	0.09-0.31 (0.0035-0.0122)	0.4 (0.016)



MAINSHAFT RUN-OUT

1. Install the mainshaft to a grinding machine.
 2. Use a dial indicator to measure the mainshaft central portion run-out.
- If the measured mainshaft run-out exceeds the specified limit, the mainshaft must be replaced.

Mainshaft Run Out	mm(in)
Limit	
	0.05 (0.0020)

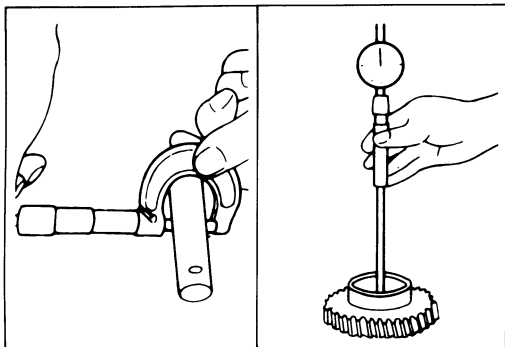


GEAR INSIDE DIAMETER

Use an inside dial indicator to measure the gear inside diameter.

If the measured value is less than the specified limit, the gear must be replaced.

Gear Inside Diameter		mm(in)
	Standard	Limit
1st 3rd	45.000-45.013 (1.771-1.772)	45.100 (1.776)
2nd	52.000-52.013 (2.047-2.048)	52.100 (2.051)
Rev. Transfer	48.000-48.013 (1.889-1.890)	48.100 (1.894)
5th	32.000-32.013 (1.259-1.260)	32.100 (1.264)



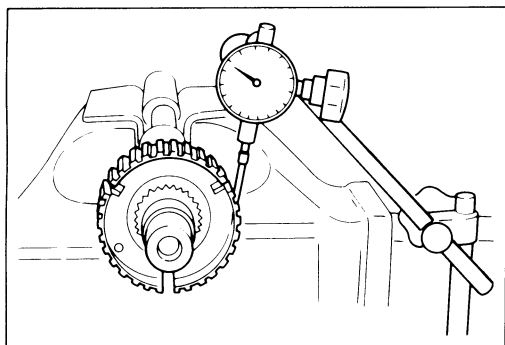
REVERSE IDLER GEAR AND IDLER GEAR SHAFT CLEARANCE

1. Use a micrometer to measure the idler gear shaft diameter.
2. Use an inside dial indicator to measure the idler gear inside diameter.
3. Calculate the idler gear and idler gear shaft clearance.

$$\text{Idler gear inside diameter} - \text{idler gear shaft diameter} = \text{idler gear and idler gear shaft clearance.}$$

If the measured value exceeds the specified limit, the idler gear and/or the idler gear shaft must be replaced.

Idler Gear and Idler Gear Shaft Clearance		mm(in)
Standard		Limit
0.041 – 0.074 (0.0016 – 0.0029)		0.150 (0.0059)



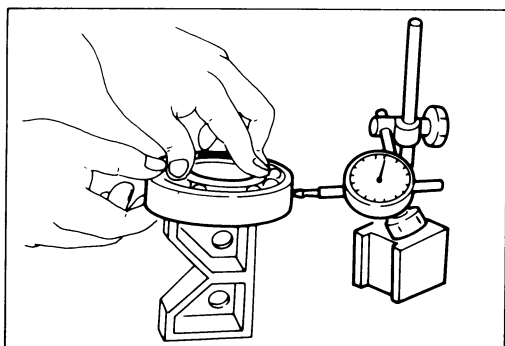
CLUTCH HUB SPLINE PLAY

1. Set a dial indicator to the clutch hub to be measured.
2. Move the clutch hub as far as possible to both the right and the left.

Note the dial indicator reading.

If the measured value exceeds the specified limit, the clutch hub must be replaced.

Clutch Hub Spline Play		mm(in)
	Standard	Limit
1st—2nd	0 — 0.1 (0 — 0.0039)	0.2 (0.0079)
3rd—4th		
Transfer		
4×2/4×4		
High/Low	0 — 0.2 (0 — 0.0079)	0.3 (0.0118)
Rev.—5th		



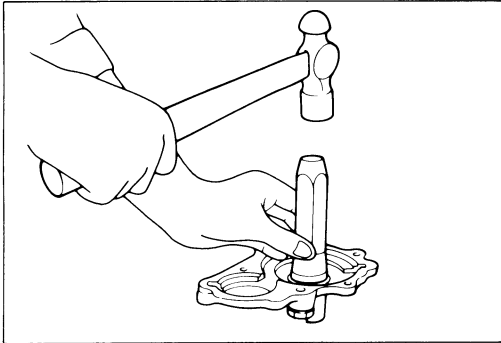
BALL BEARING PLAY

Use a dial indicator to measure the ball bearing play.

Ball Bearing Play	mm(in)
Limit	
	0.2 (0.0079)

**FRONT COVER OIL SEAL****Oil Seal Replacement****Oil Seal Removal**

Use a screwdriver to pry the oil seal from the front cover.

**Oil Seal Installation**

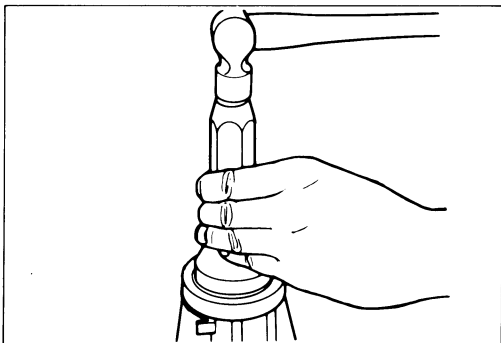
1. Use the oil seal installer to install the oil seal to the front cover.

Oil Seal Installer : 5-8840-0026-0 (J-26540)

2. Apply gear oil to the oil seal lip.

**REAR COVER OIL SEAL****Oil Seal Replacement****Oil Seal Removal**

Use a screwdriver to pry the oil seal from the rear cover.

**Oil Seal Installation**

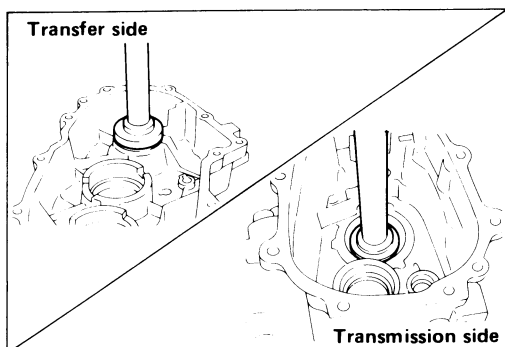
1. Use the oil seal installer to install the oil seal to the rear cover.

Oil Seal Installer : 5-8522-0050 (J-29769)

2. Apply engine oil to the oil seal lip.

**TRANSFER CASE MAINSHAFT OIL SEAL****Oil Seal Replacement****Oil Seal Removal**

Use a screwdriver to pry the oil seal from the transfer case.



Oil Seal Installation

1. Use the oil seal installer to install the oil seal to the transfer case.

Oil Seal Installer : 5-8840-2193-0 (J-37488)

Drive Handle : 5-8840-0007-0 (J-8092)



2. Apply engine oil to the oil seal lip.

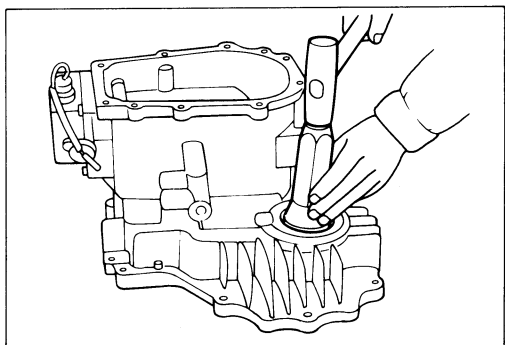


TRANSFER CASE FRONT OUTPUT SHAFT OIL SEAL

Oil Seal Replacement

Oil Seal Removal

Use a screwdriver to pry the oil seal from the transfer case.



Oil Seal Installation

1. Use the oil seal installer to install the oil seal to the transfer case.

Oil Seal Installer : 5-8840-2161-0 (J-37226)

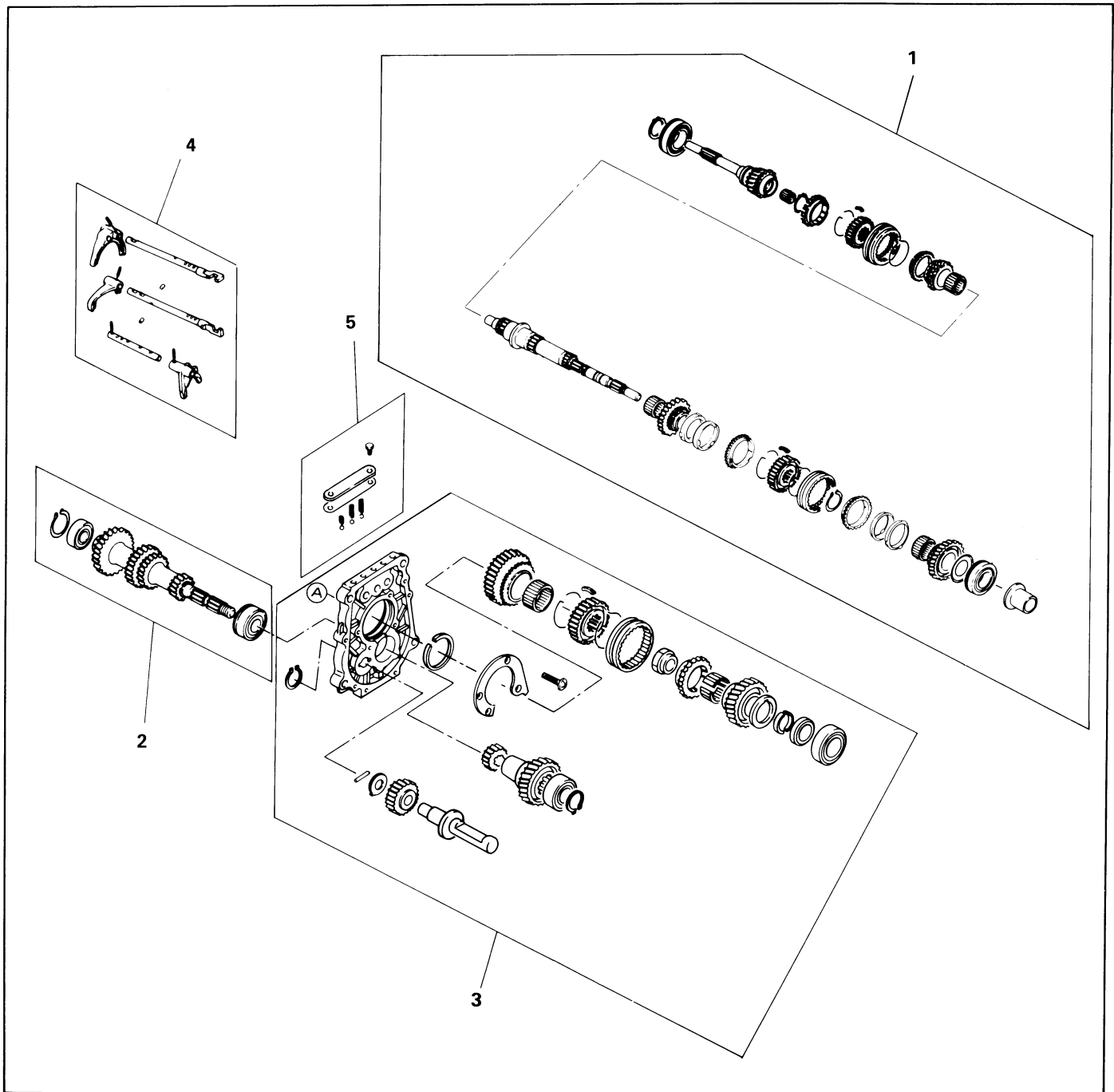
2. Apply engine oil to the oil seal lip.





REASSEMBLY

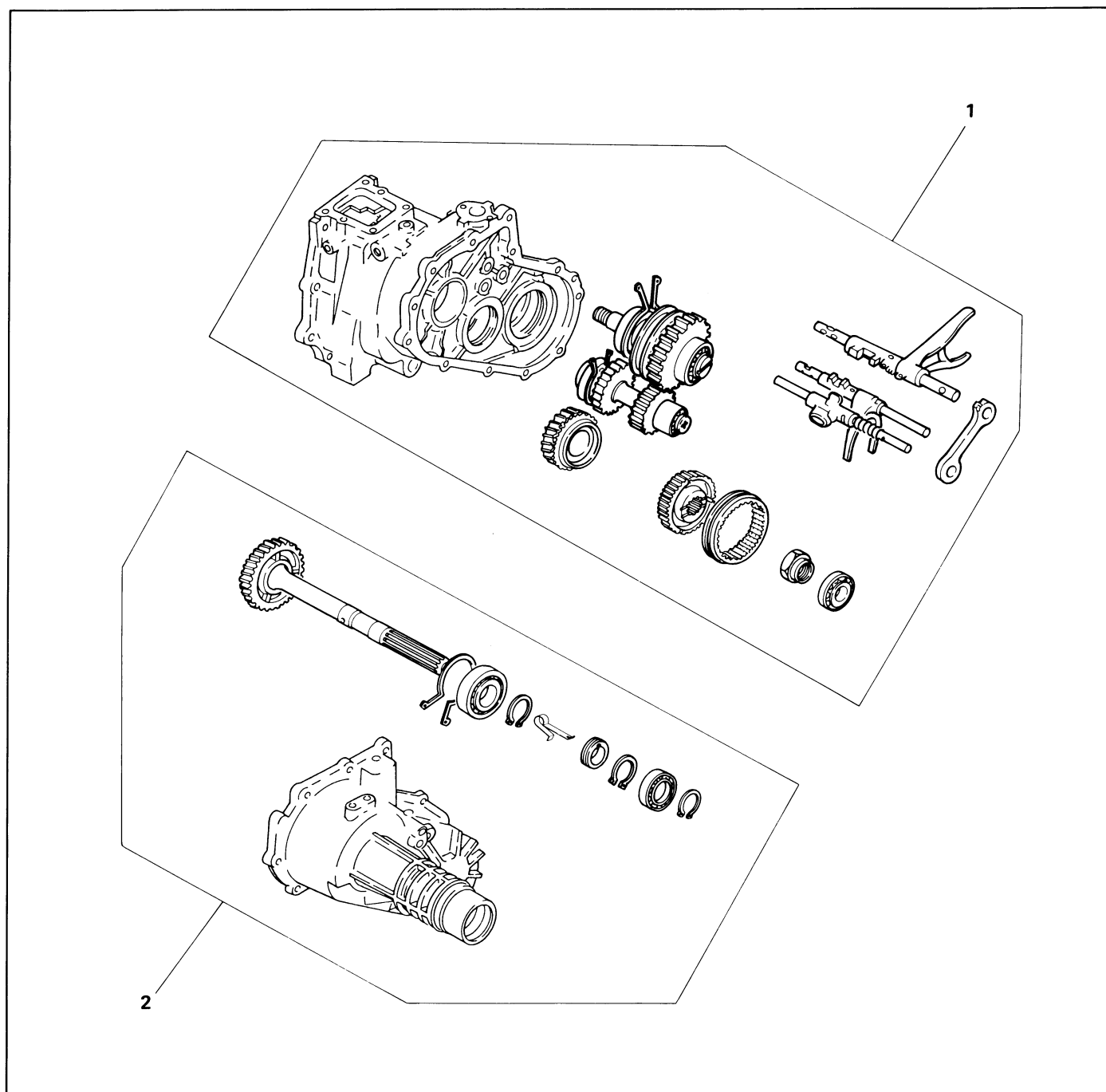
MAJOR COMPONENT (TRANSMISSION)



Reassembly Steps

1. Top & main gear shaft assembly
2. Counter gear shaft assembly
3. Rev. and 5th gear assembly
4. Shift arm assembly & interlock pin
5. Detent assembly

MAJOR COMPONENT (TRANSFER CASE)

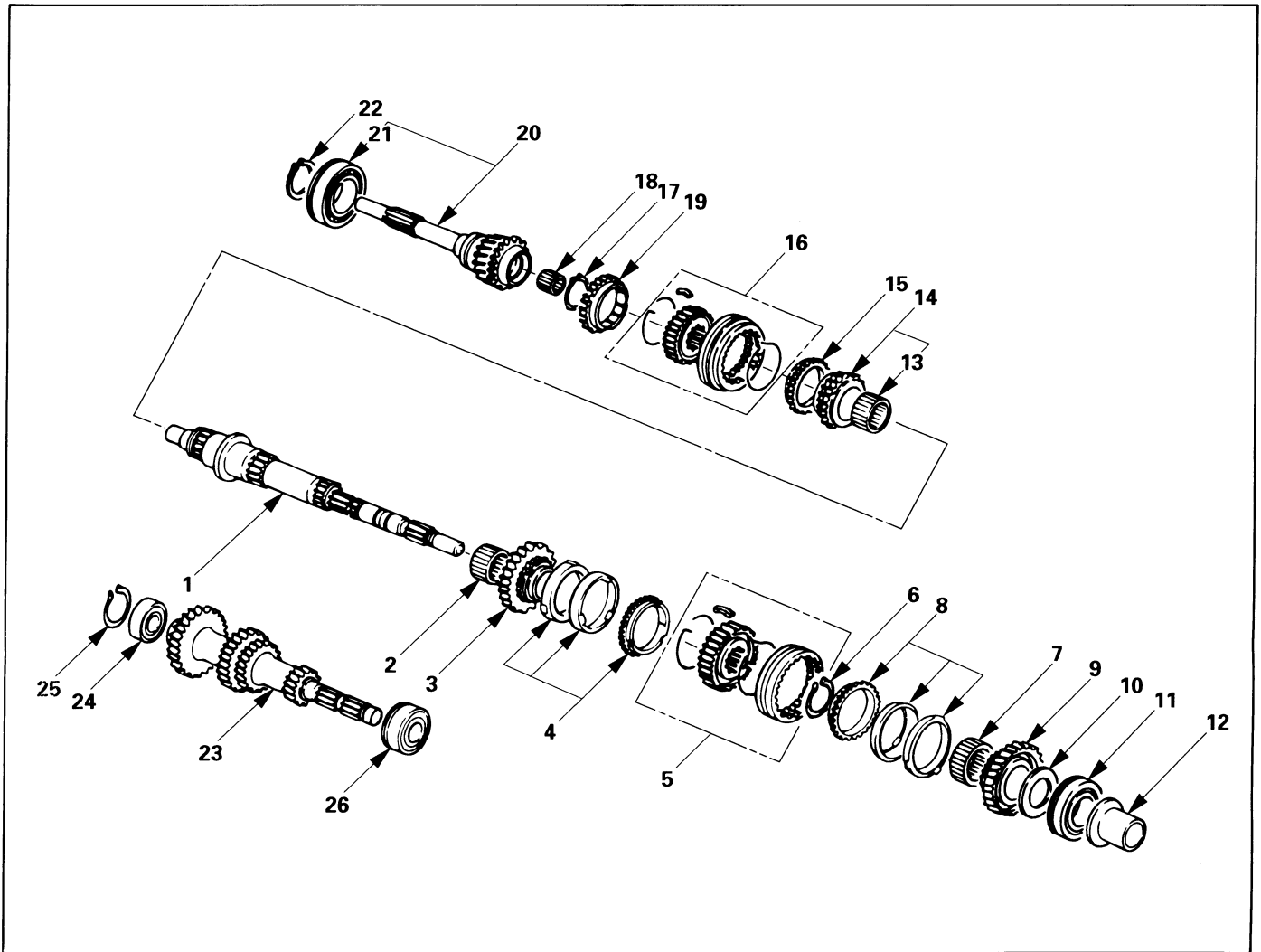


Reassembly Steps

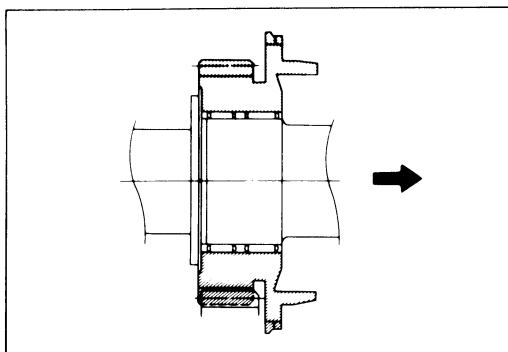
1. Transfer case assembly
2. Transfer rear case assembly

INTERMEDIATE PLATE AND GEAR ASSEMBLY

TOP GEAR SHAFT, MAIN SHAFT GEAR AND COUNTER GEAR



- 1. Mainshaft
- ▲ 2. Needle bearing
- ▲ 3. 2nd gear
- 4. 2nd block ring (set)
- ▲ 5. 1st—2nd synchronizer assembly
- ▲ 6. Clutch hub snap ring
- ▲ 7. Needle bearing
- 8. 1st block ring (set)
- ▲ 9. 1st gear
- ▲ 10. 1st gear thrust bearing
- ▲ 11. Mainshaft ball bearing
- ▲ 12. Needle bearing collar
- ▲ 13. Needle bearing
- ▲ 14. 3rd gear
- 15. 3rd block ring
- ▲ 16. 3rd—4th synchronizer assembly
- ▲ 17. Mainshaft snap ring
- 18. Needle bearing
- 19. Top block ring
- 20. Top gear shaft
- ▲ 21. Ball bearing
- ▲ 22. Top gear shaft snap ring
- 23. Counter gear
- ▲ 24. Counter gear front bearing
- 25. Snap ring
- 26. Counter gear center bearing



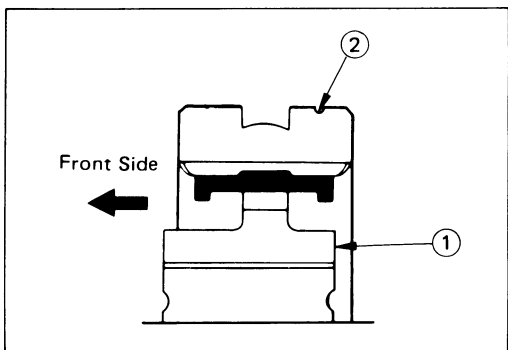
Important Operations



2. Needle Bearing

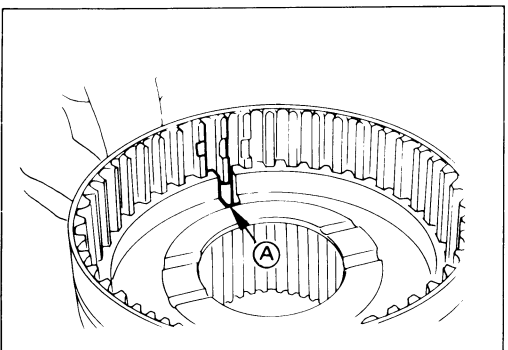
3. 2nd Gear

- 1) Apply engine oil to the needle bearing and the 2nd gear thrust surfaces.
- 2) Install the needle bearing and the 2nd gear to the mainshaft.
The dog teeth of the 2nd gear must be facing the rear side of the transmission.



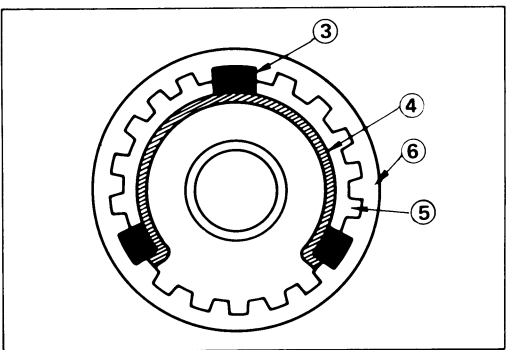
5. 1st—2nd Synchronizer Assembly

- 1) Turn the shallow clutch hub face ① toward the side of the sleeve with small groove ② on the outer circumference.

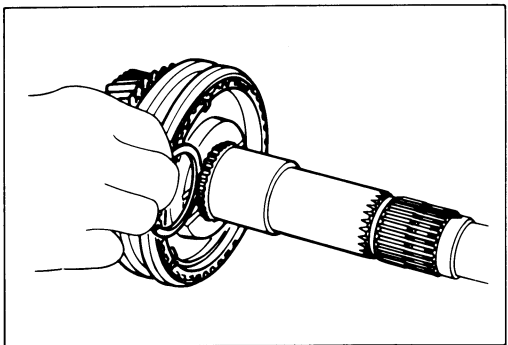


Note:

The clutch hub groove (A) must be aligned with the key groove of sleeve.



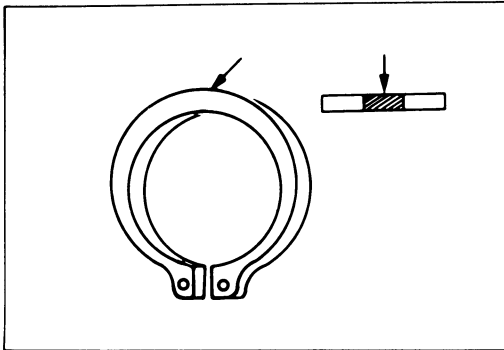
- 2) Check that the inserts ③ fit snugly into the block ring insert grooves.
- 3) Check that the insert springs ④ are fitted to the inserts as shown in the illustration.
- 4) Check that the clutch hub ⑤ and the sleeve ⑥ slide smoothly.
- 5) Install the synchronizer assembly to the mainshaft.
The clutch hub face (with the heavy boss) must be facing the 2nd gear side.



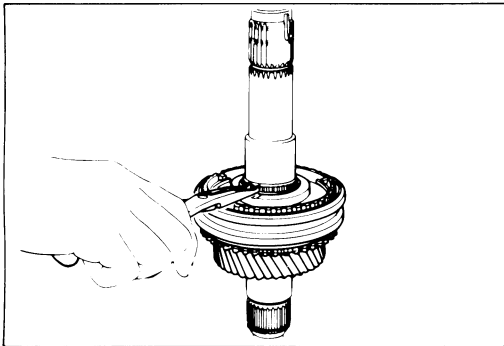
6. Clutch Hub Snap Ring

- 1) Select the snap ring which will provide the minimum clearance between the 1st/2nd clutch hub and the snap ring.
There are three snap ring sizes available.
The snap rings are color-coded to indicate their thickness.

Clutch Hub and Snap Ring Clearance	mm(in)
Standard	
	0 – 0.1 (0.0039)

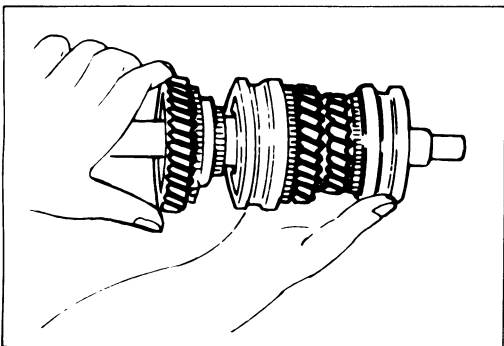
**Snap Ring Availability**

Thickness mm(in)	Color-Coding
1.80 (0.071)	White
1.85 (0.073)	Yellow
1.90 (0.075)	Blue



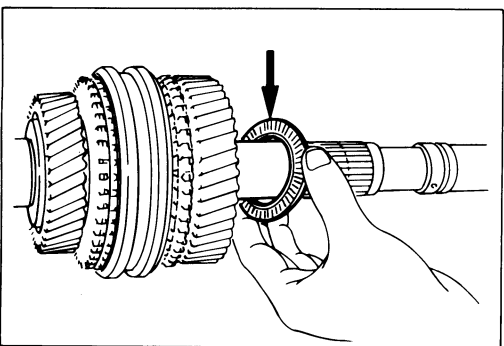
- 2) Use a pair of snap ring pliers to install the snap ring to the mainshaft.

The snap ring must be fully inserted into the mainshaft snap ring groove.

**7. Needle Bearing****9. 1st Gear**

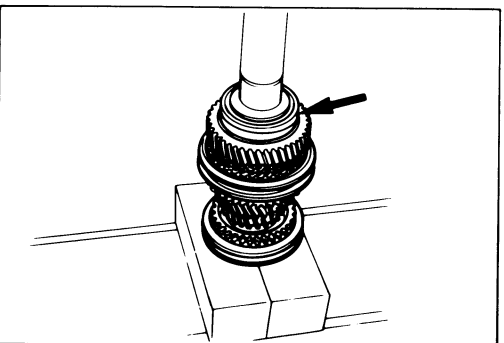
- 1) Apply engine oil to the needle bearing and the 1st gear thrust surfaces.
- 2) Install the needle bearing and the 1st gear to the mainshaft.

The 1st gear dog teeth must be facing the transmission front side.

**10. 1st Gear Thrust Bearing**

Install the thrust bearing to the mainshaft.

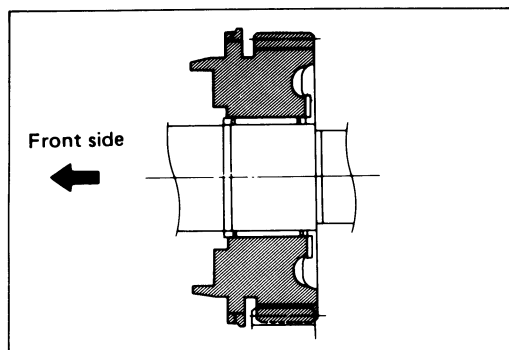
The thrust bearing side must be facing the transmission front side.

**11. Mainshaft Ball Bearing****12. Needle Bearing Collar**

- 1) Apply engine oil to the ball bearing and the mainshaft.
- 2) Install the ball bearing and collar to the mainshaft. The ball bearing snap ring groove must be facing the transmission rear side.
- 3) Use a bench press to slowly force the collar into place.

Installer: 5-8840-2195-0 (J-6133-01)



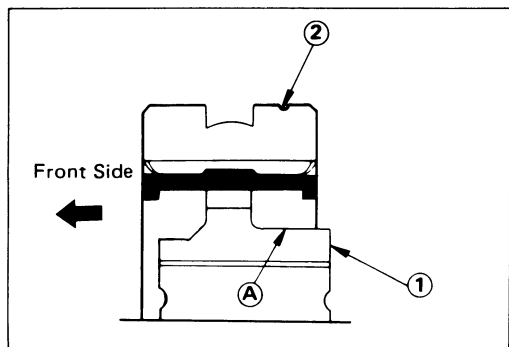


13. Needle Bearing

14. 3rd Gear

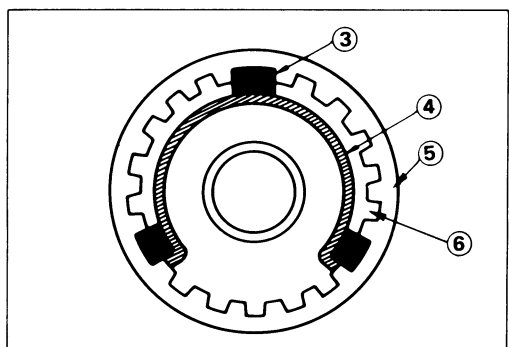
- 1) Apply engine oil to the needle bearing and the 3rd gear thrust surfaces.
- 2) Install the needle bearing and the 3rd gear to the mainshaft.

The dog teeth of the 3rd gear must be facing the front side of the transmission.



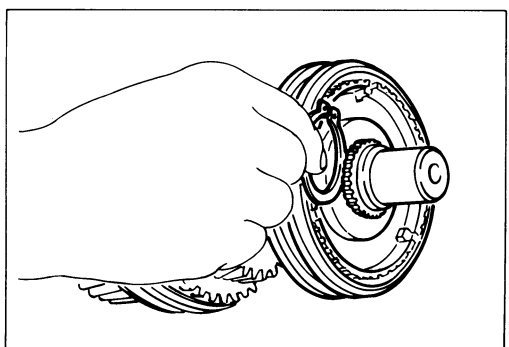
16. 3rd—4th Synchronizer Assembly

- 1) Turn the clutch hub face (1) with the heavy boss (A) toward the side of the sleeve with small groove (2) on the outer circumference.



- 2) Check that the inserts (3) fit snugly into the block ring insert grooves.
- 3) Check that the insert springs (4) are fitted to the inserts as shown in the illustration.
- 4) Check that the clutch hub (5) and the sleeve (6) slide smoothly.
- 5) Install the synchronizer assembly to the mainshaft.

The clutch hub face (with the heavy boss) must be facing the 3rd gear side.



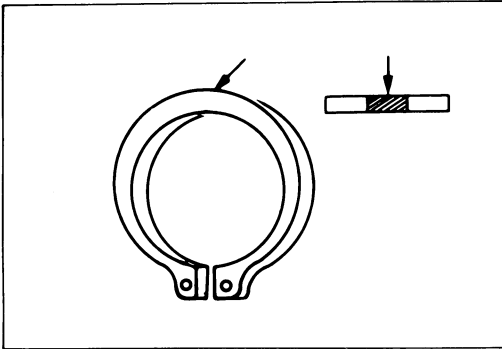
17. Mainshaft Snap Ring

- 1) Select the snap ring which will provide the minimum clearance between the 3rd—4th clutch hub and the snap ring.

There are three snap ring sizes available.

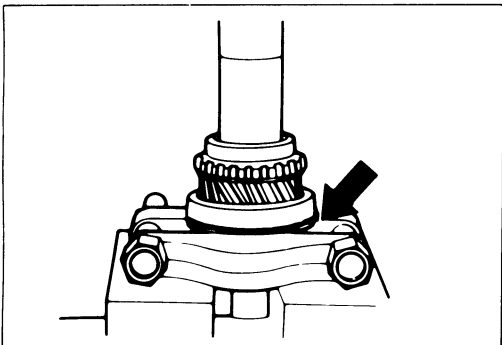
The snap rings are color-coded to indicate their thickness.

Clutch Hub and Snap Ring Clearance	mm(in)
Standard	
	0 – 0.1 (0.0039)



Snap Ring Availability		mm(in)
Thickness	Color-Coding	
1.80 (0.071)	White	
1.85 (0.073)	Yellow	
1.90 (0.075)	Blue	

- 2) Use a pair of snap ring pliers to install the snap ring to the mainshaft.
- 3) The snap ring must be fully inserted into the mainshaft snap ring groove.

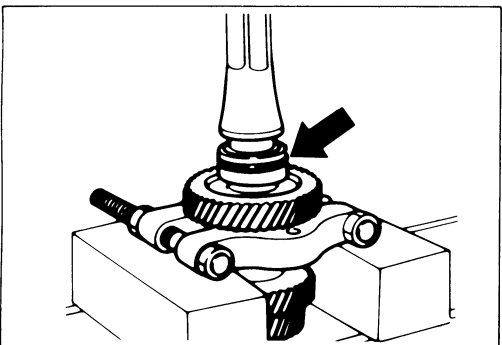


21. Ball Bearing



22. Top Gear Shaft Snap Ring

- 1) Use a bench press to install the top gear shaft ball bearing to the mainshaft.
The snap ring groove must be facing the transmission front side.
- 2) Use a pair of snap ring pliers to install the snap ring to the bearing.

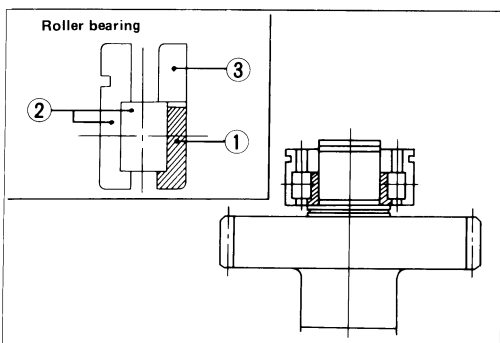


24. Counter Gear Front Bearing

Use a bench press to install the counter gear front ball bearing to the mainshaft.

The snap ring groove must be facing the transmission front side.

Bearing installer : 5-8840-2194-0 (J-35283)



- 1) Apply engine oil to the bearing and install the inner race ① and outer race with roller ② in the proper direction to the mainshaft.
- 2) Then install the inner race ③ with taper side turned to outer race ②.

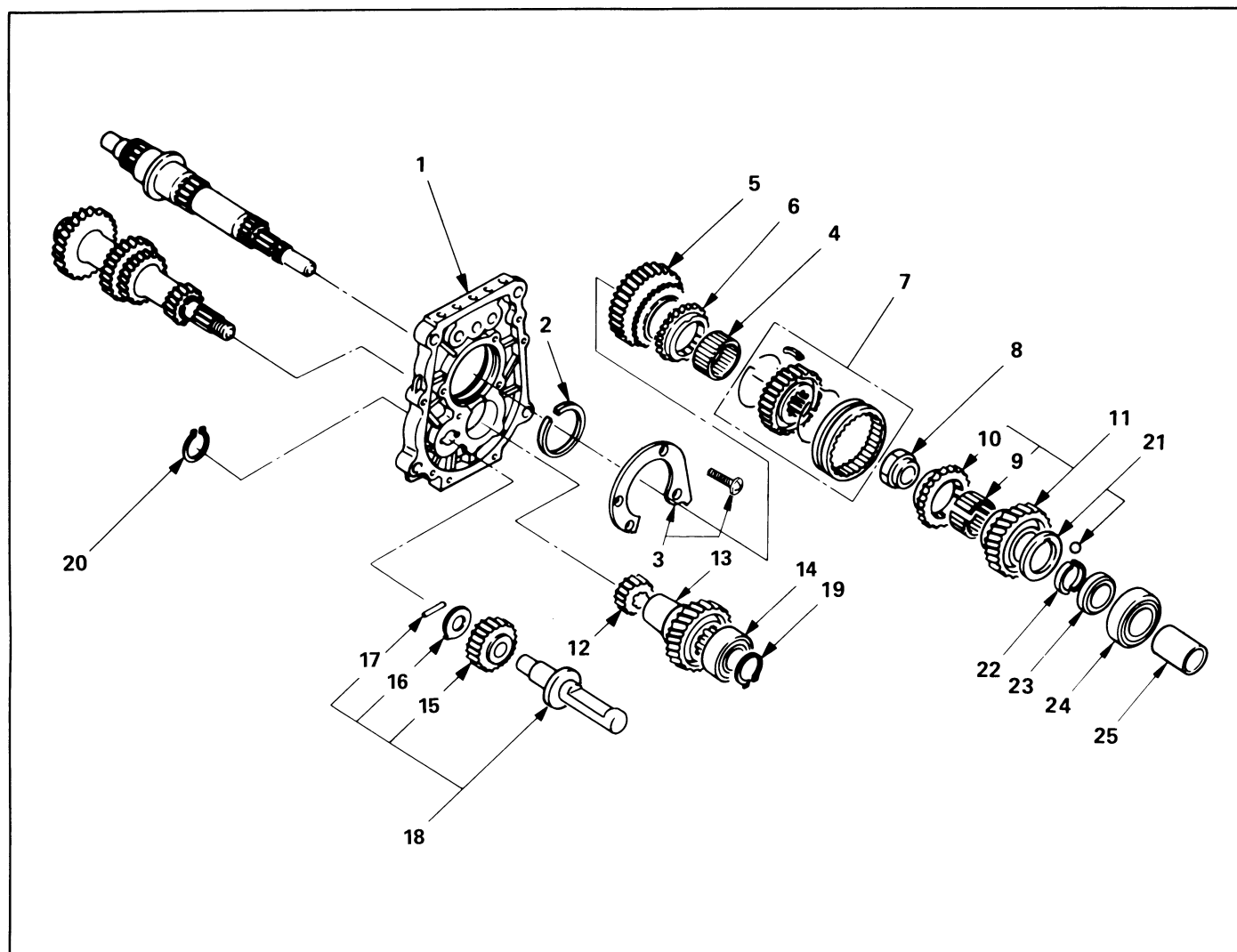


Note:

The inner race ③ should be installed with stamp on die face side turned to the front side of transmission.

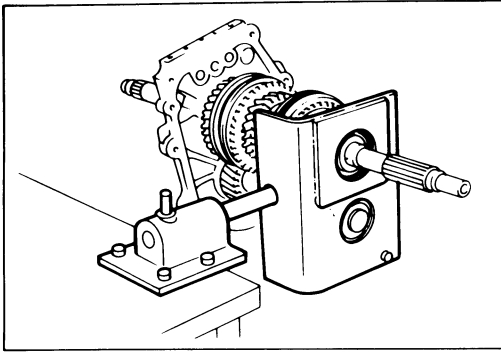


REVERSE GEAR AND 5TH GEAR



Reassembly Steps

- | | |
|-------------------------------------|-----------------------------------|
| ▲ 1. Intermediate plate | 14. Ball bearing |
| 2. Bearing snap ring | 15. Reverse idler gear |
| ▲ 3. Bearing plate and screw | 16. Thrust washer |
| 4. Needle bearing | 17. Idler shaft pin |
| 5. Mainshaft reverse gear | 18. Reverse idler shaft |
| 6. Reverse block ring | ▲ 19. Bearing snap ring |
| ▲ 7. Rev.-5th synchronizer assembly | ▲ 20. Reverse gear snap ring |
| ▲ 8. Clutch hub nut | ▲ 21. Thrust washer and lock ball |
| 9. Needle bearing | 22. Thrust plate |
| 10. 5th block ring | 23. Retainer |
| 11. 5th gear | ▲ 24. Roller bearing |
| ▲ 12. Counter reverse gear | 25. Oil seal collar |
| 13. Counter 5th gear | |



Important Operations

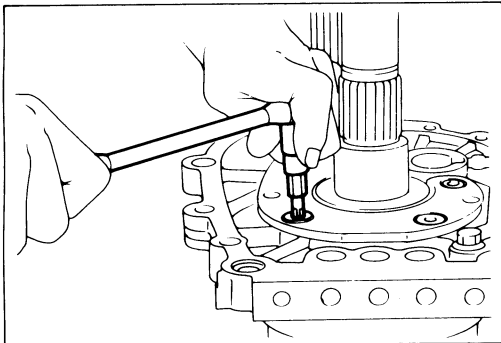
1. Intermediate Plate

- 1) Mesh the counter gear with the mainshaft assembly.
- 2) Install the holding fixture to the mainshaft and the counter gear.

Holding Fixture : 5-8840-2160-0 (J-37224)

Holding base : 5-8840-0003-0 (J-3289-20)

- 3) Place the holding fixture (with the mainshaft and the counter shaft) in a vise.
- 4) Install the intermediate plate.

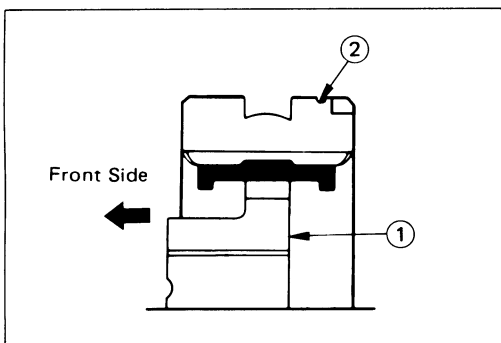


3. Bearing Plate and Screw

- 1) Apply recommended thread locking agents or its equivalent to each of the plate screw threads.
- 2) Use the wrench to tighten the screws to the specified torque.

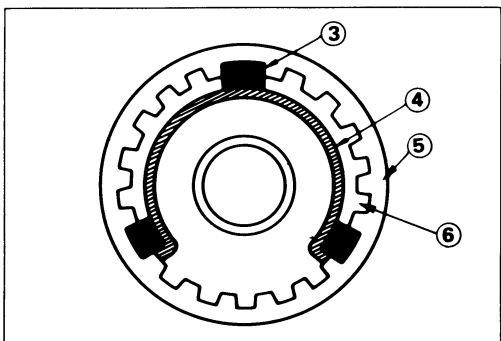
Torx Bit Wrench : 5-8840-0047-0 (J-37225) (T45)

Plate Screw Torque	kg·m (lb·ft/N·m)
	1.5 (11/15)

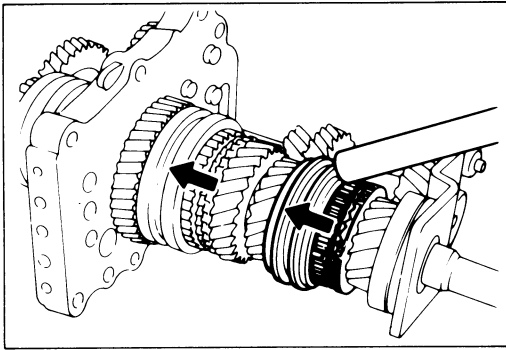


7. Rev.—5th Synchronizer Assembly

- 1) Turn the clutch hub face ① toward the side of the sleeve with small groove ② on the outer circumference.



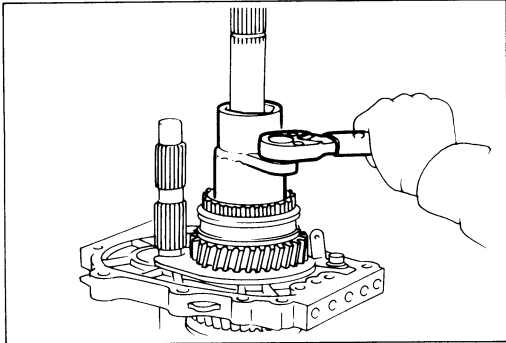
- 2) Check that the inserts ③ fit snugly into the block ring insert grooves.
- 3) Check that the insert springs ④ are fitted to the inserts as shown in the illustration.
- 4) Check that the clutch hub ⑤ and the sleeve ⑥ slide smoothly.
- 5) Install the synchronizer assembly to the mainshaft.
The clutch hub face (with the heavy boss) must be facing the reverse gear side.



8. Clutch Hub Nut

- 1) Mesh the 1st—2nd synchronizer with both the 1st and 3rd gears (double engagement).

This will prevent the mainshaft from turning.

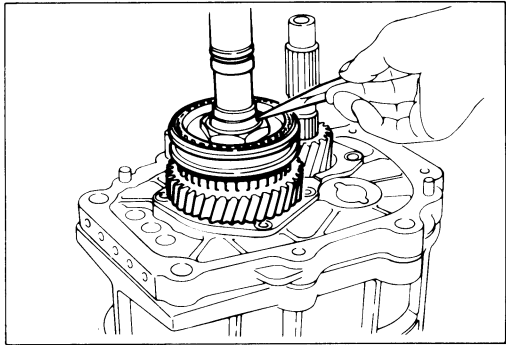


- 2) Install the mainshaft lock nut.

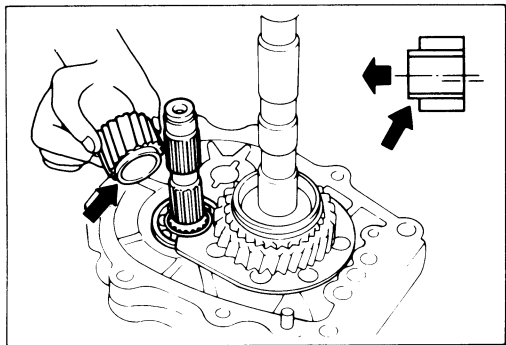
- 3) Use the lock nut wrench to tighten the lock nut to the specified torque.

Wrench: 5-8840-2156-0 (J-37219)

Hub Nut Torque	kg·m(lb.ft/N·m)
14 ± 2 ($101 \pm 14.4/137 \pm 20$)	



- 4) Use a punch to stake the lock nut.

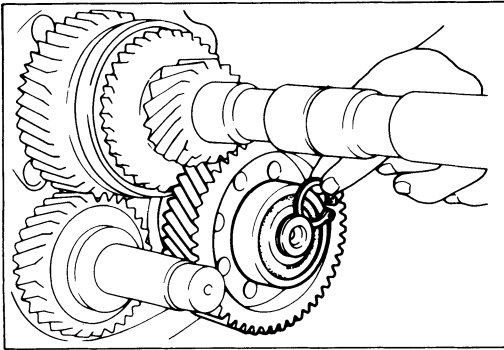


12. Counter Reverse Gear

- 1) Apply engine oil to the counter reverse gear and the reverse gear.



- 2) Install the counter reverse gear to the counter gear.
The reverse gear projection must be facing the side of the intermediate plate.



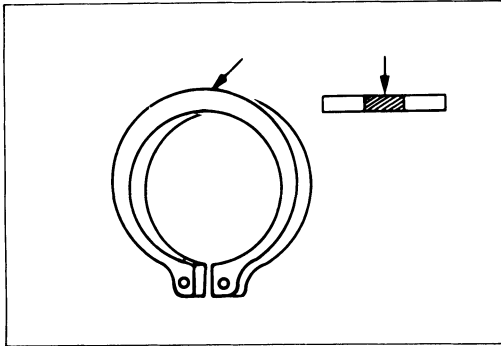
19. Bearing Snap Ring

- 1) Select the snap ring which will provide the minimum clearance between the ball bearing and the snap ring.

There are six snap ring sizes available.

The snap rings are color-coded to indicate their thickness.

Ball Bearing and Snap Ring Clearance		mm(in)
Standard		0 – 0.15 (0 – 0.0059)

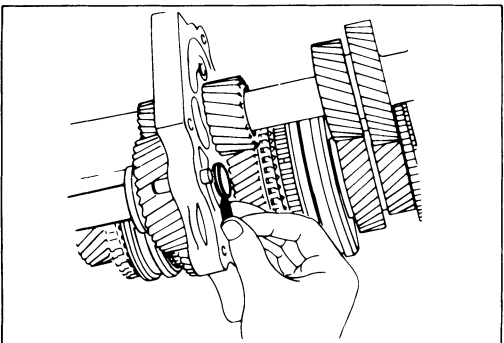


Snap Ring Availability

Thickness mm(in)	Color-Coding
1.1 (0.043)	White
1.2 (0.047)	Yellow
1.3 (0.051)	Blue
1.4 (0.055)	Pink
1.5 (0.059)	Green
1.6 (0.063)	Brown

- 2) Use a pair of snap ring pliers to install the snap ring to the counter 5th gear.

The snap ring must be fully inserted into the counter 5th gear snap ring groove.



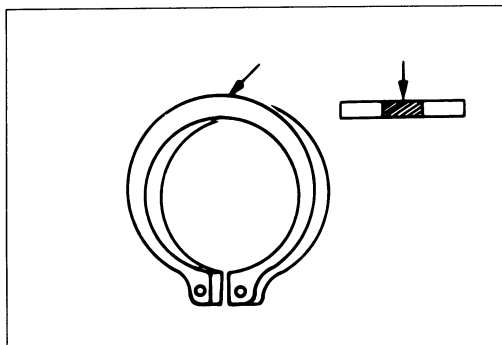
20. Reverse Gear Snap Ring

- 1) Select the snap ring which will provide the minimum clearance between the intermediate plate and the snap ring.

There are three snap ring sizes available.

The snap rings are color-coded to indicate their thickness.

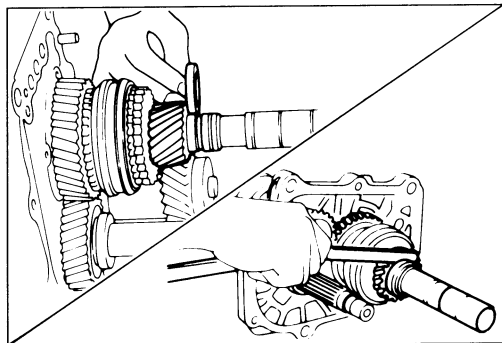
Intermediate Plate and Snap Ring Clearance		mm(in)
Standard		0 – 0.15 (0 – 0.0059)



Snap Ring Availability mm(in)

Thickness mm(in)	Color-Coding
1.2 (0.047)	White
1.3 (0.051)	Yellow
1.4 (0.055)	Blue

- 2) Use a pair of snap ring pliers to install the snap ring to the reverse idler shaft.
The snap ring must be fully inserted into the reverse idler shaft snap ring groove.

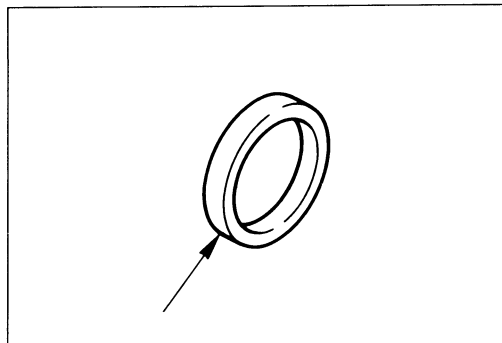


21. Thrust Washer and Lock Ball

- 1) Use a thickness gauge to measure the clearance between the 5th gear and the thrust washer.

5th Gear and Thrust Washer Clearance mm(in)
Standard
0.10 – 0.25 (0.0039 – 0.0098)

If required, replace the existing thrust washer with a new thrust washer to bring the clearance to specification.



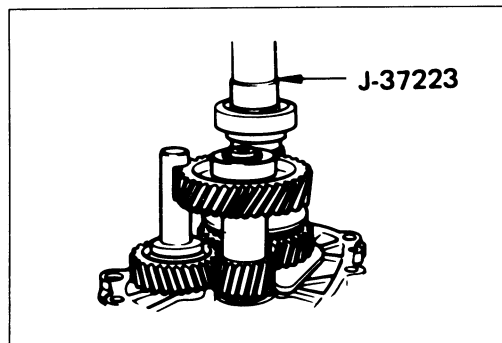
There are four thrust washer sizes available.

The snap rings are color-coded to indicate their thickness.

Thrust Washer Availability mm(in)

Thickness	Color-Coding
7.9 (0.311)	White
8.0 (0.315)	Yellow
8.1 (0.319)	Green
8.2 (0.323)	Blue

- 2) Apply grease to the thrust washer and the lock ball.
- 3) Install the thrust washer and the lock ball to the mainshaft.



24. Roller Bearing

Apply engine oil to the bearing inner and outer circumference.

Use the installer to install the roller bearing to the mainshaft.

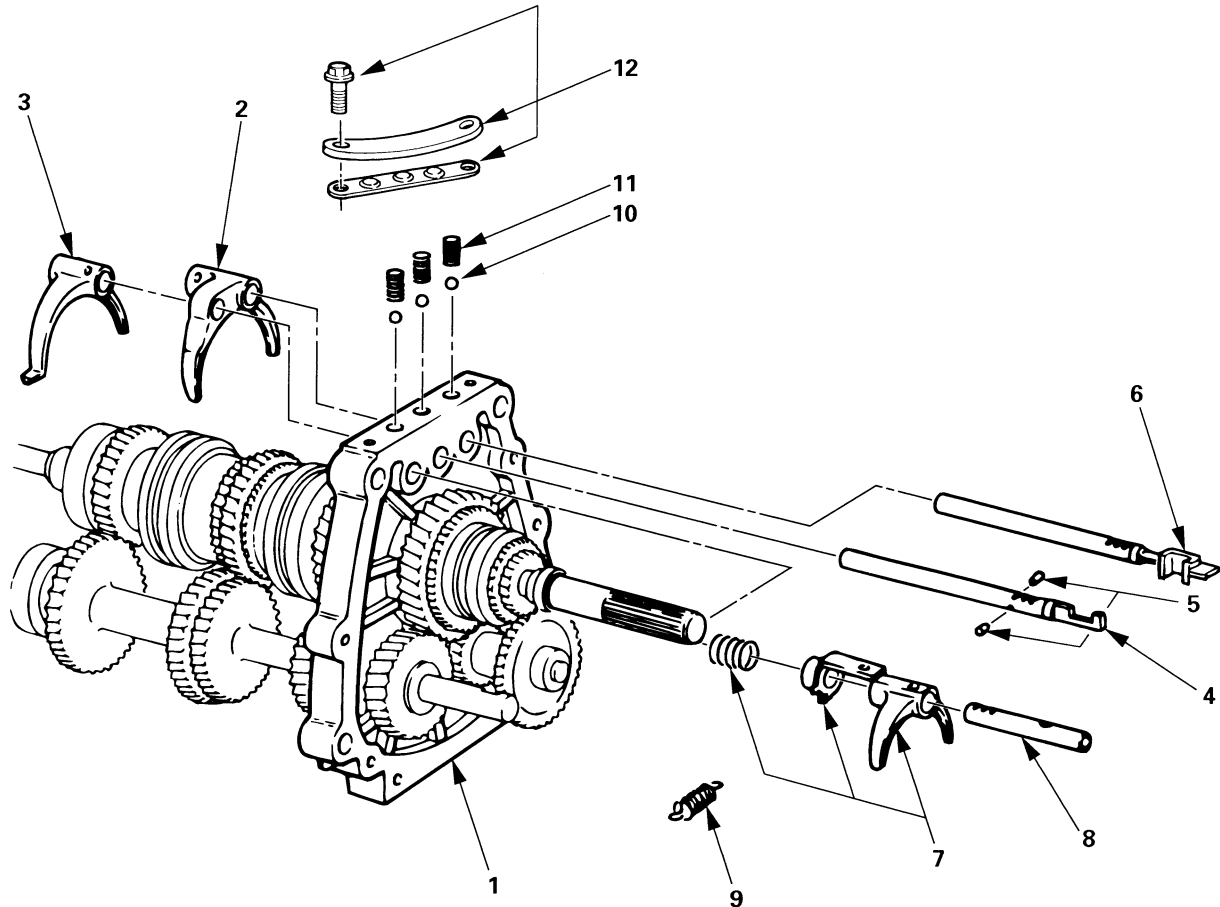
Installer : 5-8840-2159-0 (J-37223)

Note:

Be sure the bearing is installed in the direction it was removed from.



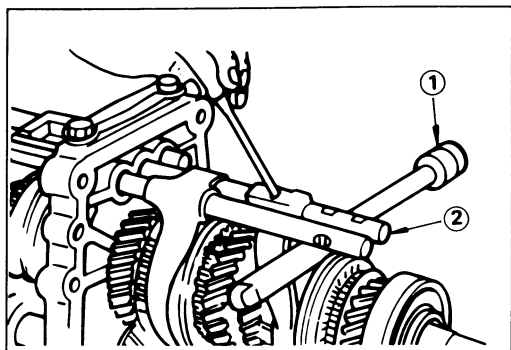
DETENT, SHIFT ARM ASSEMBLY AND INTERLOCK PIN



220RW072

Reassembly Steps

- | | |
|---|--------------------------------------|
| 1. Intermediate plate and gear assembly | 7. Rev.—5th shift arm and inhibitor |
| ▲ 2. 1st—2nd shift arm | 8. Rev.—5th shift rod |
| ▲ 3. 3rd—4th shift arm | 9. Spring |
| ▲ 4. 3rd—4th shift rod | 10. Detent ball |
| ▲ 5. Interlock pin | 11. Detent spring |
| 6. 1st—2nd shift rod | ▲ 12. Detent spring plate and gasket |



Important Operations

2. 1st—2nd Shift Arm

3. 3rd—4th Shift Arm

Hold a round bar ① against the shift rod end lower face ② to protect it against damage.

Install the new spring pin.

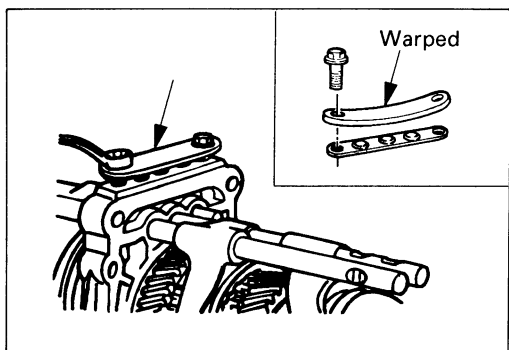
Never reinstall the used spring pin.

4. 3rd—4th Shift Rod

5. Interlock pin

- 1) Install the interlock pin to the shift rod.
- 2) Install the shift rod together with the interlock pin to the intermediate plate.

Do not allow the interlock pin to fall from the shift rod.



220LV017



12. Detent Spring Plate and Gasket

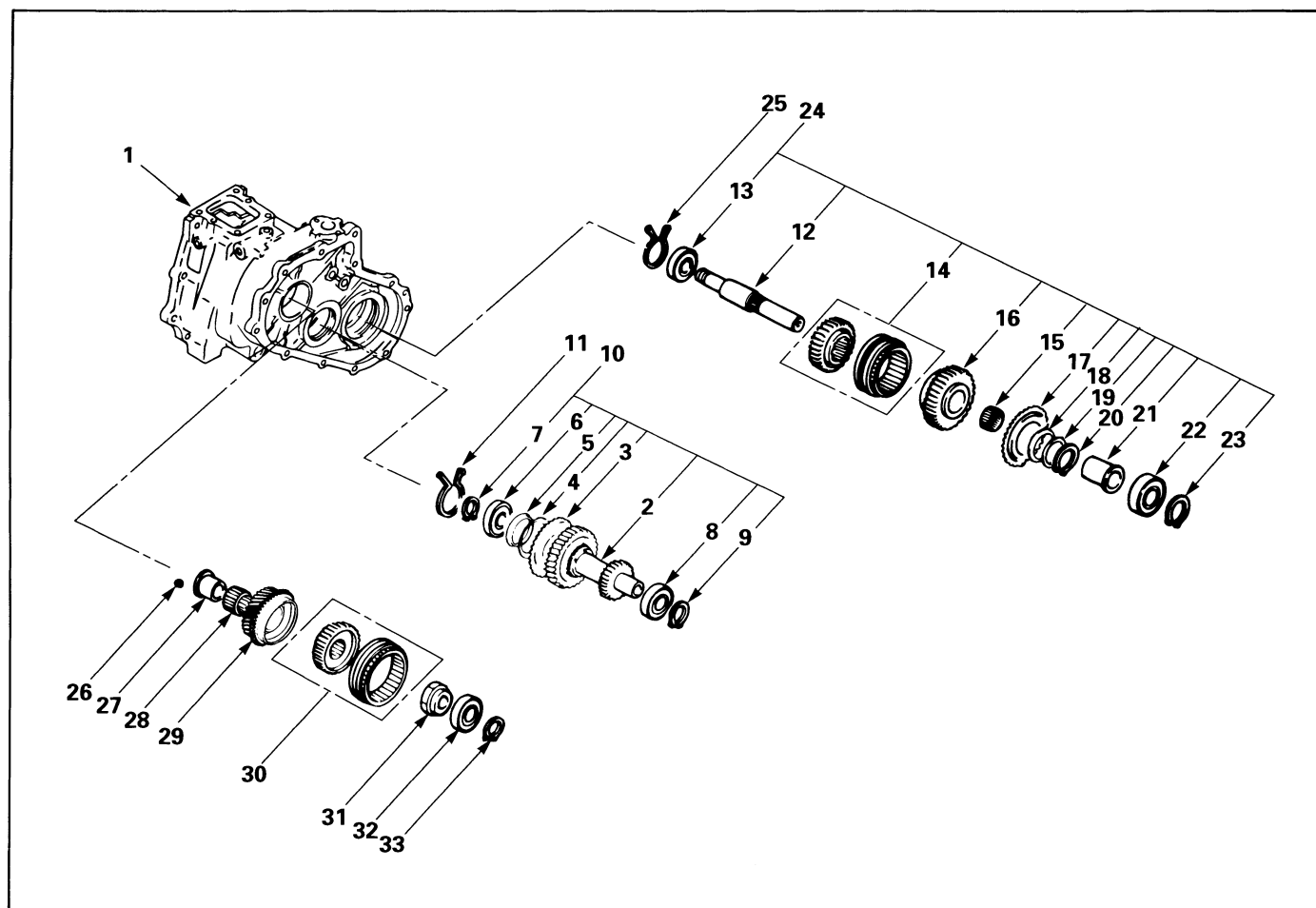
- 1) Install the new-detent plate and new gasket onto the transmission case into the correct direction.
- 2) Tighten the detent spring plate bolts to specified torque.

Detent Spring Plate Bolt Torque	kg·m(lb.ft/N·m)
2.0 ± 0.4 ($14 \pm 3/20 \pm 4$)	

MINOR COMPONENT



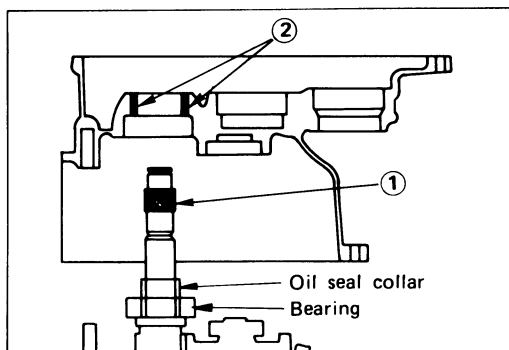
TRANSFER CASE ASSEMBLY



226LV001

Reassembly Steps

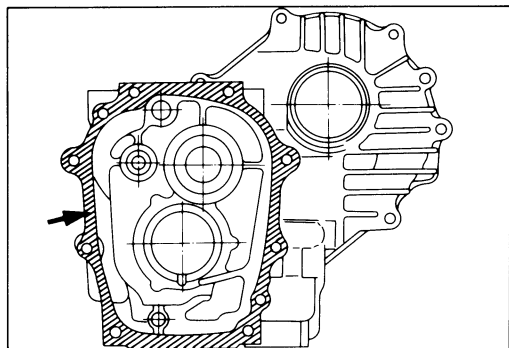
- ▲ 1. Transfer case
- ▲ 2. Counter gear
- ▲ 3. Sub gear (Anti-lash plate)
- 4. Belleville spring
- 5. Spacer
- 6. Ball bearing
- ▲ 7. Snap ring
- 8. Ball bearing
- 9. Snap ring
- 10. Counter gear assembly
- 11. Bearing snap ring
- 12. Front output shaft
- 13. Ball bearing
- 14. Clutch hub and sleeve
- 15. Needle bearing
- ▲ 16. Front output gear
- ▲ 17. Sub gear (Anti-lash plate)
- ▲ 18. Belleville spring
- ▲ 19. Spacer
- ▲ 20. Anti-lash plate snap ring
- ▲ 21. Bearing collar
- 22. Ball bearing
- ▲ 23. Snap ring
- 24. Front output gear assembly
- 25. Bearing snap ring
- 26. Ball
- 27. Bearing collar
- 28. Needle bearing
- 29. Transfer input gear
- ▲ 30. High-low clutch hub and sleeve
- ▲ 31. Mainshaft end lock nut
- ▲ 32. Ball bearing
- 33. Snap ring



Important Operations

1. Transfer Case

- 1) Cover the shaft spline with adhesive tape ①.
This will prevent damage to the oil seal lip ②.

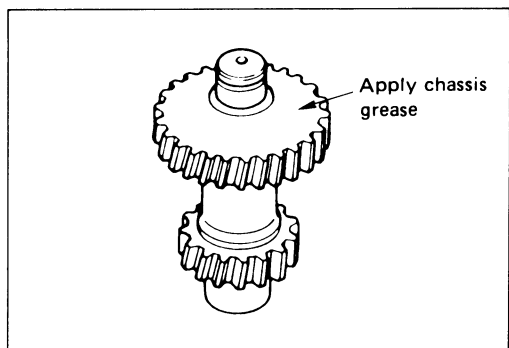


- 2) Apply recommend liquid gasket or its equivalent to the transfer case fitting surfaces.



- 3) Tighten the transfer case bolts to the specified torque a little at a time.

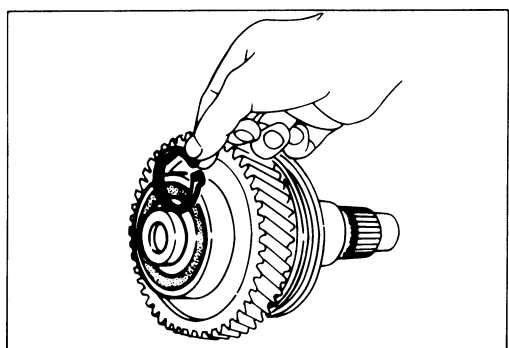
Transfer Case Bolt Torque	kg·m (lb·ft/N·m)
3.8 ± 0.8 (27 ± 5.8 / 37 ± 7.8)	



2. Counter Gear

3. Sub Gear (Anti-lash Plate)

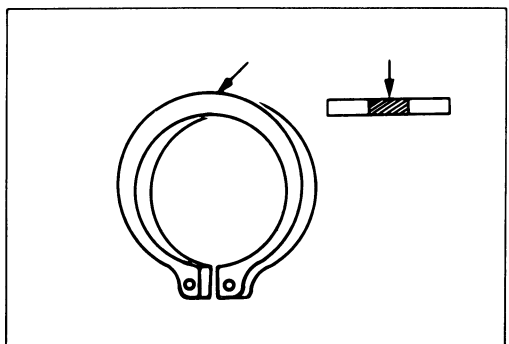
Apply chassis grease to the sub-gear and the counter gear thrust surfaces.



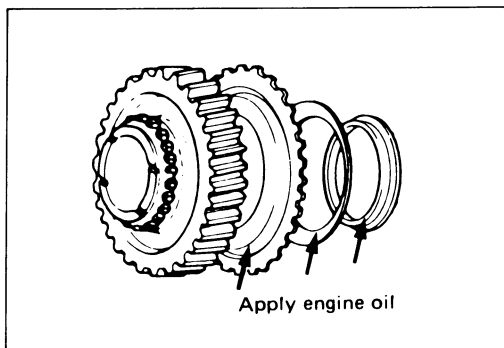
7. Snap Ring

- 1) Select a snap ring that will allow the minimum axial play.
- 2) Use a pair of snap ring pliers to install the snap ring to the counter gear.

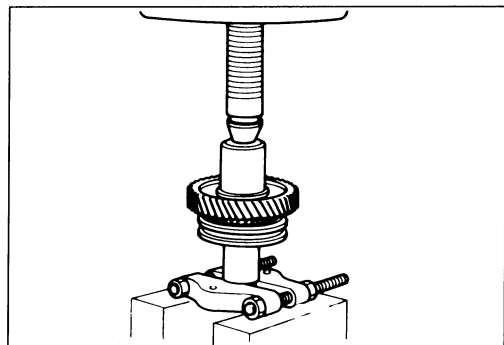
Bearing and Snap Ring Clearance	mm(in)
Standard	
$0 - 0.1$ ($0 - 0.0039$)	



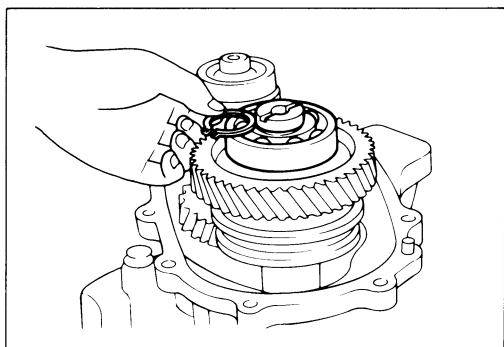
Snap Ring Availability		mm(in)
Thickness	Color-Coding	
1.50 (0.059)	White	
1.55 (0.061)	Yellow	
1.60 (0.063)	Blue	

**16. Front Output Gear****17. Sub Gear (Anti-lash Plate)****18. Belleville Spring****19. Spacer**

Apply engine oil to the thrust surfaces of the sub-gear, the Belleville spring, and the spacer.

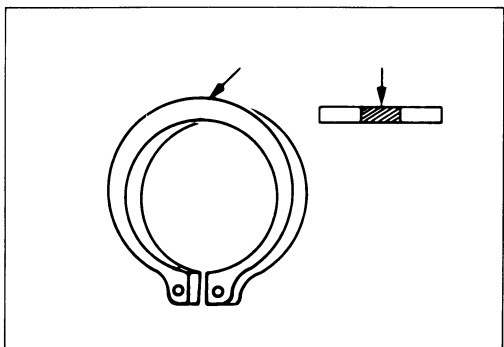
**20. Anti-lash Plate Snap Ring****21. Bearing Collar**

Use a bench press to install the needle bearing and collar together with the front output gear.

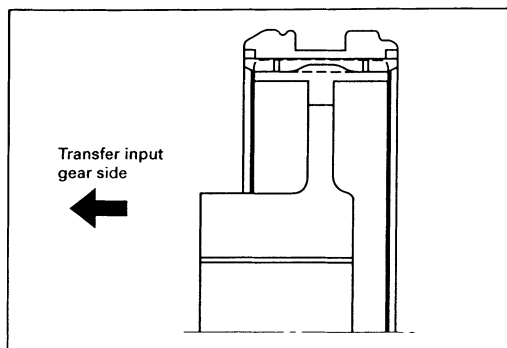
**23. Snap Ring**

- 1) Select a snap ring that will allow the minimum axial play.
- 2) Use a pair of snap ring pliers to install the snap ring to the output shaft.

Bearing and Snap Ring Clearance	mm(in)
Standard	
0 – 0.1 (0 – 0.0039)	



Snap Ring Availability		mm(in)
Snap Ring Thickness	Color Coding	
1.55 (0.061)	White	
1.60 (0.063)	Yellow	
1.65 (0.065)	Blue	
1.70 (0.067)	Pink	
1.75 (0.069)	Green	
1.80 (0.071)	Brown	
1.85 (0.073)	Red	
1.90 (0.075)	Orange	

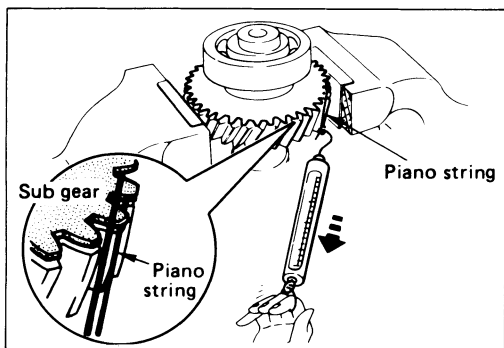


226RV003



30. High-Low Clutch Hub and Sleeve

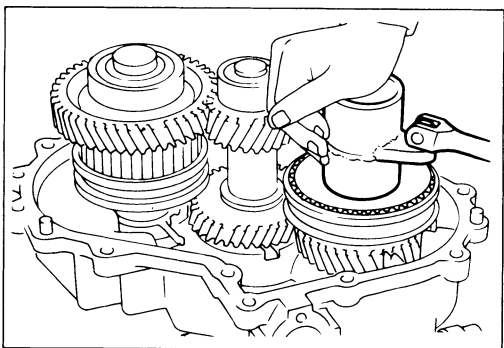
The clutch hub face with the heavy bass must be facing the transfer input gear side.



Sub Gear (Anti-lash Plate) Preload

- 1) Hook a length of piano wire over one of the sub-gear teeth.
- 2) Attach the other end of the piano wire to a spring balancer.
- 3) Measure the sub-gear preload.

Sub-Gear Preload	kg(lb/N)
Standard	
6 – 10 (13 – 22/59 – 98)	



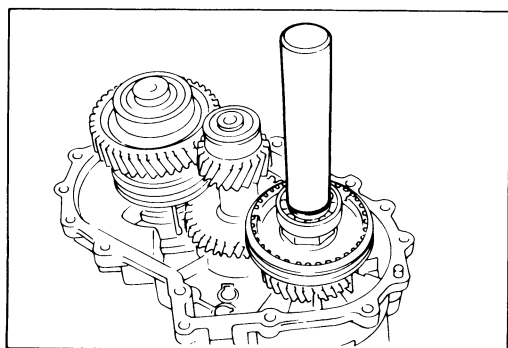
32. Mainshaft End Lock Nut

- 1) Use the lock nut wrench to tighten the mainshaft end lock nut to the specified torque.

Lock Nut Wrench : J-37219

Mainshaft End Lock Nut Torque	kg·m (lb·ft/N·m)
14 ± 2 ($101 \pm 14.4/137 \pm 20$)	

- 2) Stake the lock nut.



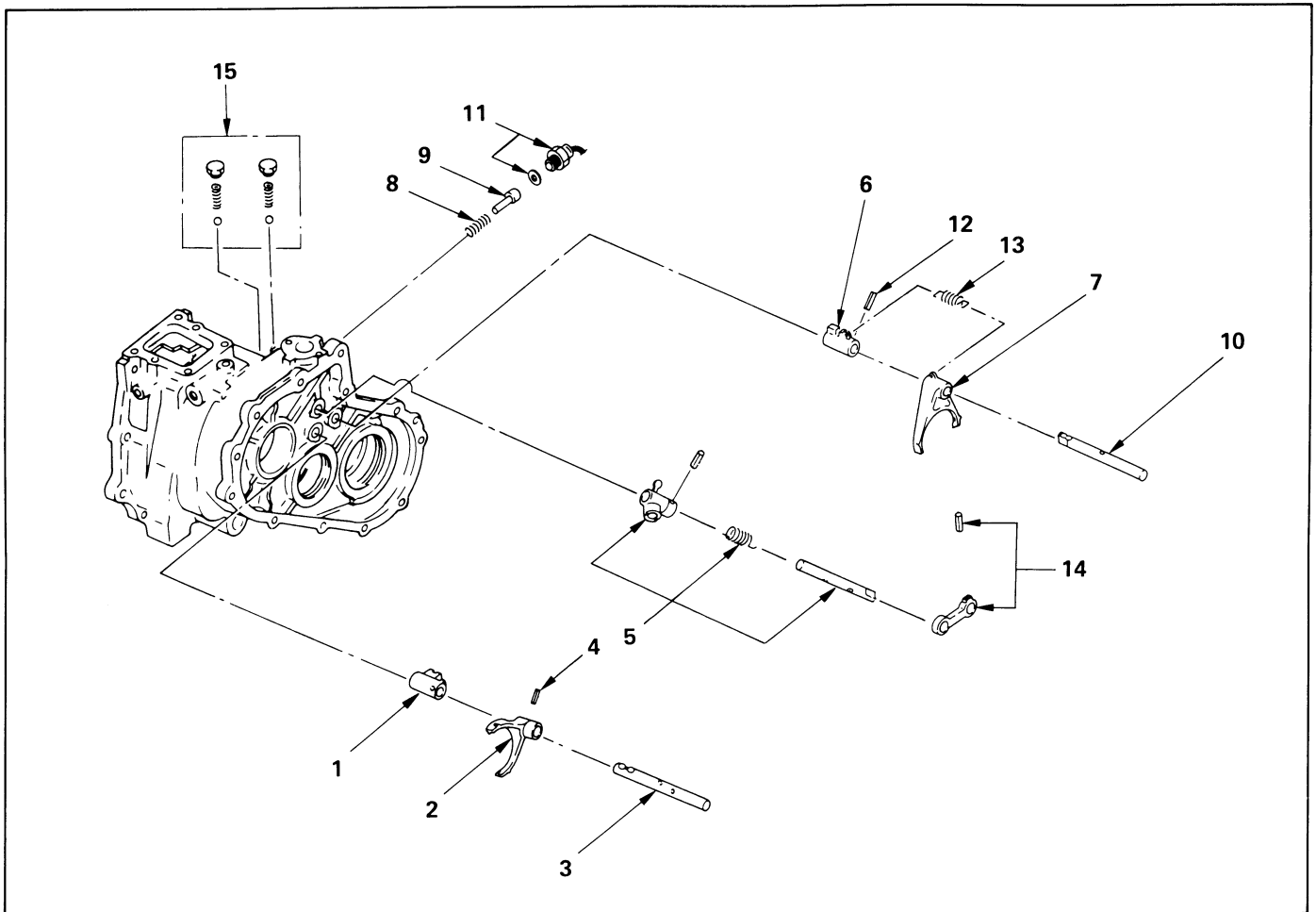
33. Ball Bearing

Use the ball bearing installer to install the ball bearing.

Installer: 5-8840-2159-0 (J-37223)

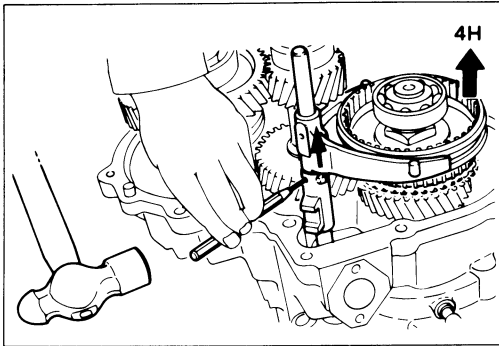


DETENT, SHIFT ARM ASSEMBLY AND INTERLOCK PIN



Reassembly Steps

- | | |
|-------------------------|------------------------------------|
| 1. Shift block | ▲ 9. Interlock pin |
| 2. Shift arm | ▲ 10. 2WD-4WD shift rod |
| ▲ 3. High-low shift rod | ▲ 11. 4WD indicator switch |
| ▲ 4. Spring pin | ▲ 12. Spring pin |
| 5. Select rod assembly | ▲ 13. Spring |
| 6. Shift block | ▲ 14. Pin and bridge |
| 7. Shift arm | ▲ 15. Detent ball, spring and plug |
| 8. Spring | |

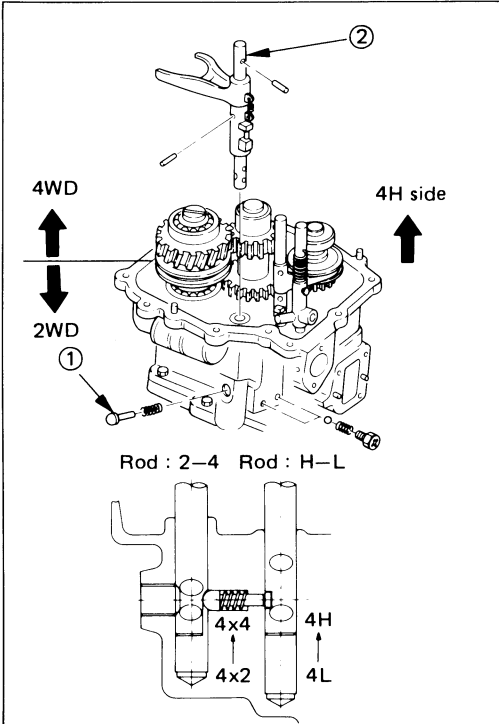


Important Operations

3. High-Low Shift Rod

4. Spring Pin

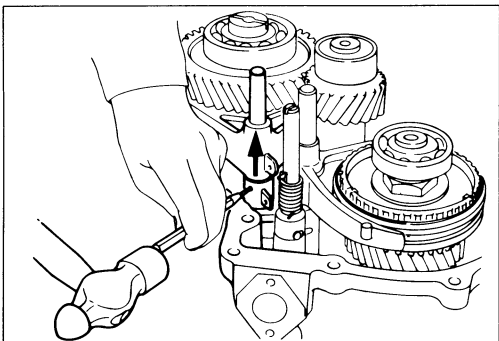
- 1) Engage the High-Low sleeve with 4H side.
- 2) Install the spring pin to the shift block.



9. Interlock Pin

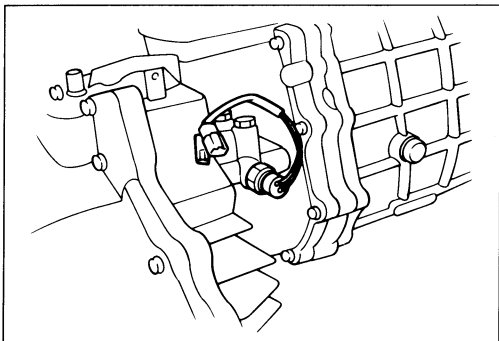
10. 2WD-4WD Shift Rod

- 1) Engage the High-Low synchronizers with 4H side and install the interlock pin 1 in proper direction.
- 2) Install the shift rod: 2WD-4WD 2 with the interlock pin pushed it in.



12. Spring Pin

- 1) Engage the 2WD-4WD sleeve with the 4WD side and install the spring pin.



11. 4WD Indicator Switch

Tighten the switch to the specified torque.

Switch Torque kg·m(lb.ft/N·m)

4 (29.0/39.2)



15. Detent Ball, Spring and Plug

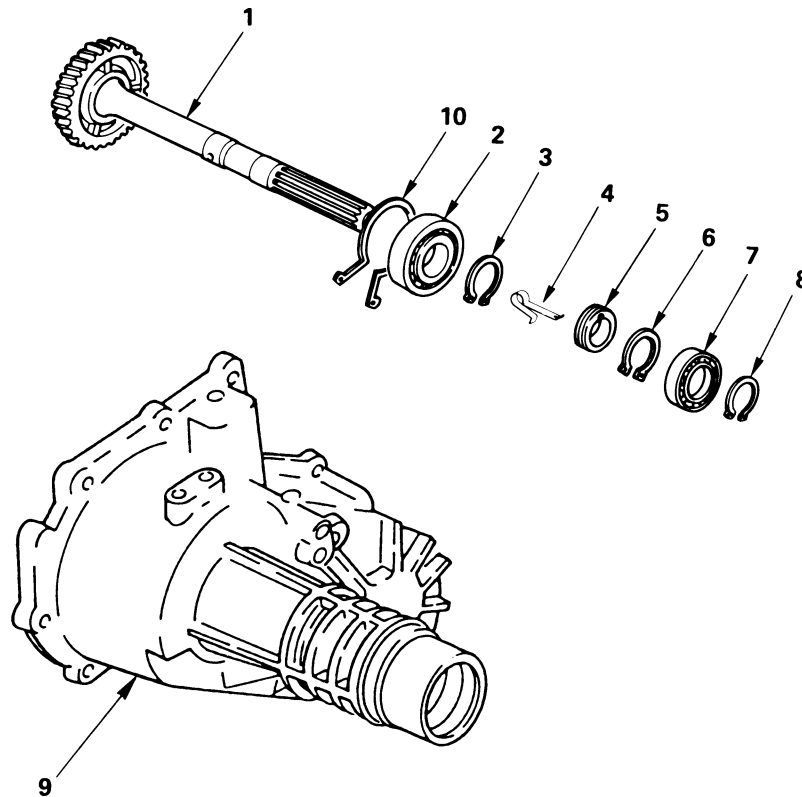
Tighten the plugs to the specified torque.

Plug Torque kg·m(lb.ft/N·m)

1.9 ± 0.4 ($13.7 \pm 2.9/18.6 \pm 3.9$)



TRANSFER REAR CASE ASSEMBLY



Reassembly Steps

- | | |
|---------------------------|-----------------------|
| 1. Rear output shaft | ▲ 7. Ball bearing |
| ▲ 2. Ball bearing | 8. Bearing snap ring |
| 3. Bearing snap ring | 9. Rear case |
| ▲ 4. Clip | 10. Bearing snap ring |
| 5. Speedometer drive gear | |
| 6. Bearing snap ring | |



Important Operations

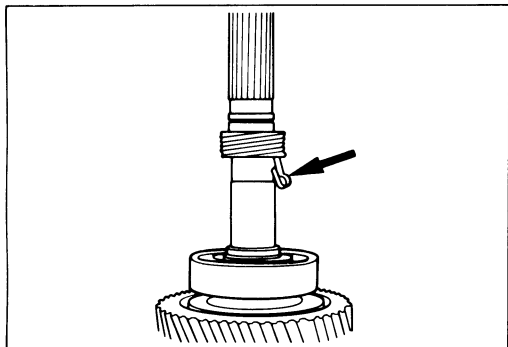


2. Ball Bearing

Use the ball bearing installer and the adapter to install the ball bearing.

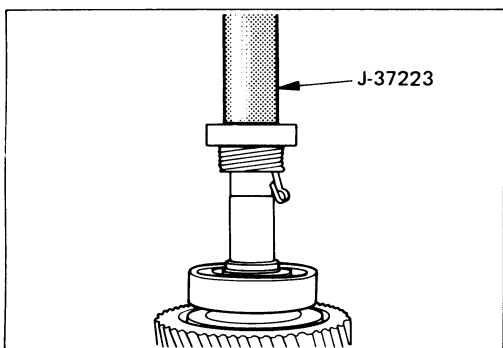
Ball Bearing Installer : 5-8840-2159-0 (J-37223)

Adapter : 5-8840-2192-1 (J-37486-A)



4. Clip

Install the clip to the drive gear groove.



7. Ball Bearing

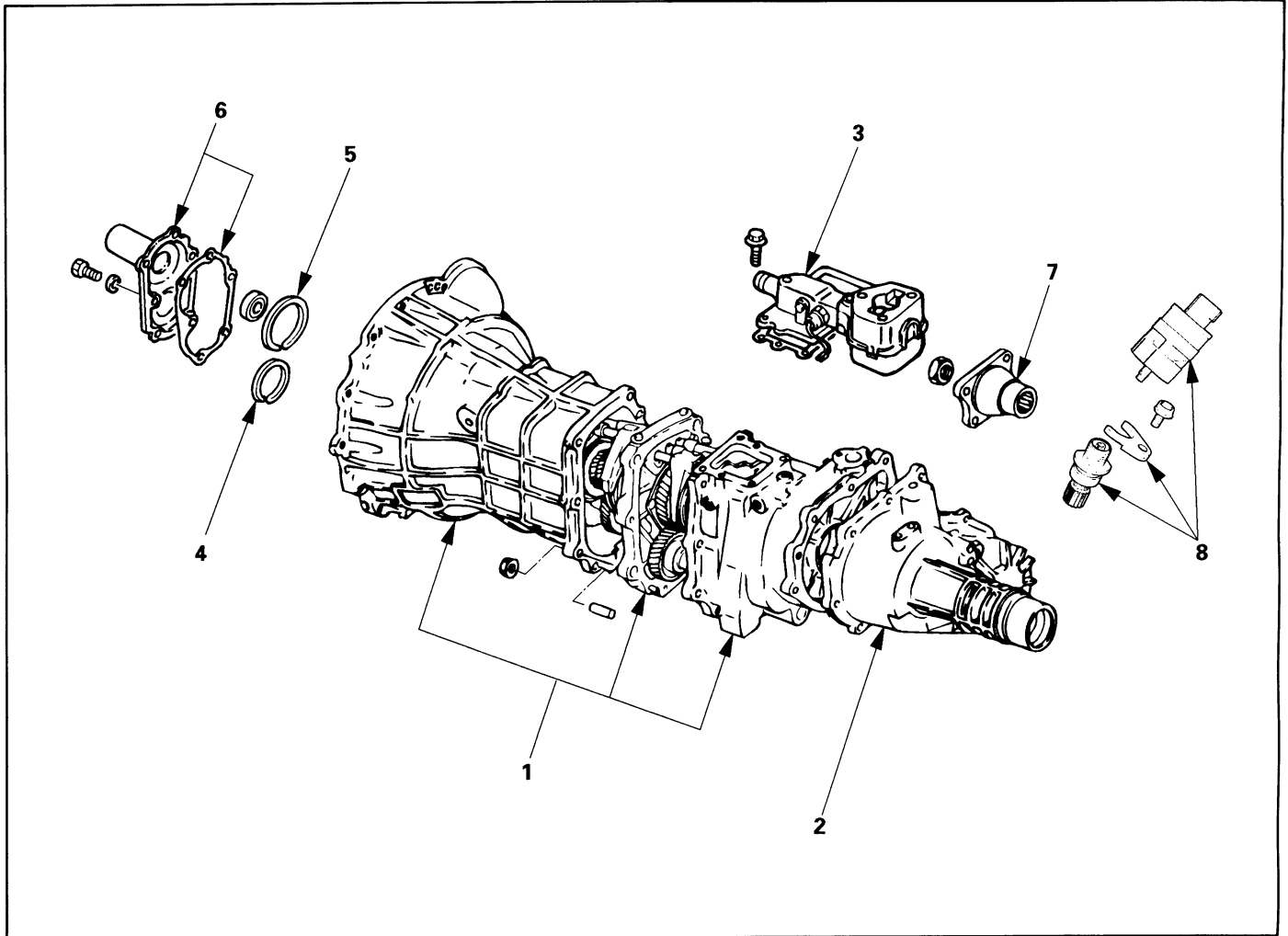
Use the ball bearing installer to install the ball bearing.

Ball Bearing Installer : 5-8840-2159-0 (J-37223)



REASSEMBLY

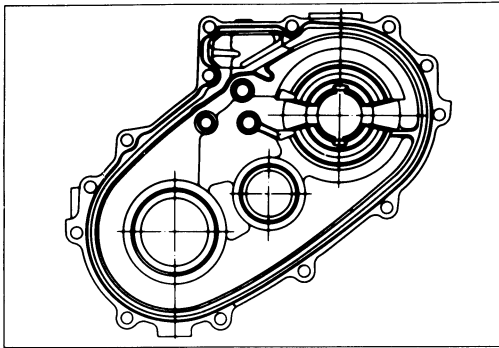
EXTERNAL COMPONENTS



220LV003

Reassembly Steps

- | | |
|---------------------------------------|---|
| 1. Transmission and transfer assembly | ▲ 5. Bearing snap ring |
| ▲ 2. Transfer rear case assembly | ▲ 6. Front cover with oil seal |
| 3. Gear control box assembly | ▲ 7. Transfer flange |
| ▲ 4. Counter gear snap ring | ▲ 8. Speedometer driven gear and speedometer sensor |

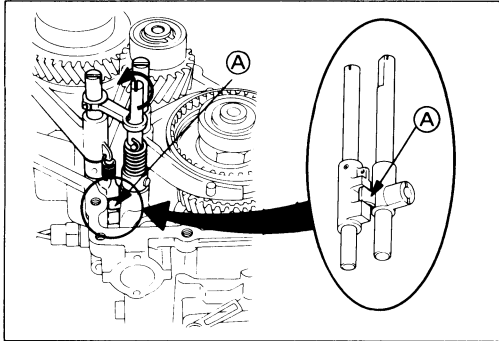


Important Operations



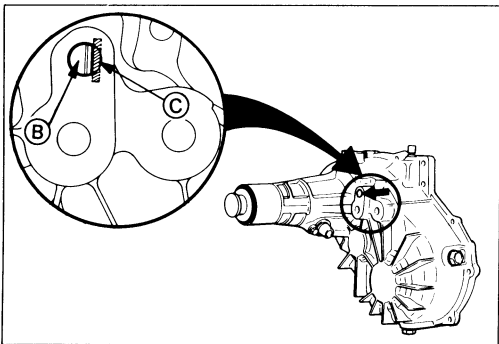
2. Transfer Rear Case Assembly

- 1) Apply recommended liquid gasket or its equivalent to the transfer rear case fitting faces.



- 2) Apply the following steps before fitting the transfer rear case.

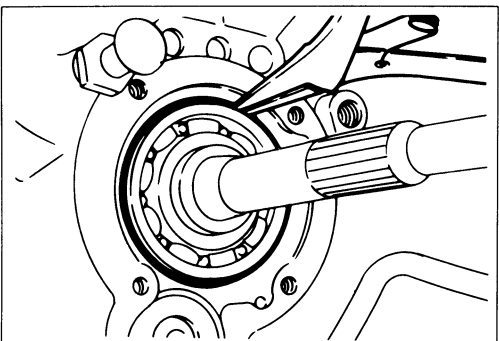
- ① Shift the High-Low synchronizer to the 4H side.
- ② Turn the select rod counterclockwise so that the select block projection **A** may enter into the 2WD-4WD shift block.



When the rear case is fitted under this condition ②, the direction of the cut-away portion of select rod head **B** aligns with that of the rear case hole's stopper **C**.

- 3) Tighten the rear transfer rear case bolts to the specified torque.

Transfer Case Bolt Torque	kg·m (lb·ft/N·m)
	3.8 ± 0.8 (27 ± 5.8 / 37 ± 7.8)

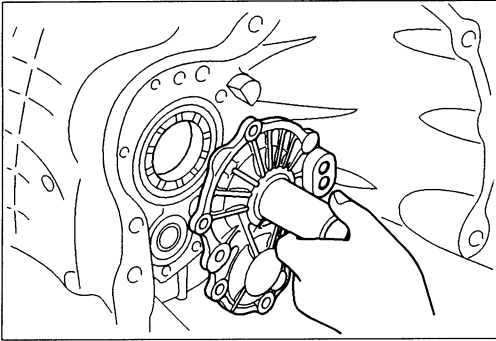


4. Counter Gear Snap Ring

5. Bearing Snap Ring

Use a pair of snap ring pliers to install the snap ring to the mainshaft.

The snap ring must be fully inserted into the ball bearing snap ring groove.



220RT017



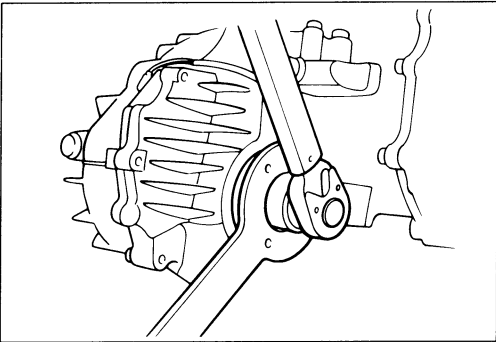
6. Front Cover with Oil Seal

- 1) Apply recommended liquid gasket or its equivalent to the through bolt threads.
- 2) Install the new gasket and the front cover with oil seal to the transmission case.

Take care not to damage the oil seal.

- 3) Tighten the front cover bolts to the specified torque.

Front Cover Bolt Torque	kg·m (lb·ft/N·m)
1.9 ± 0.4 ($13.7 \pm 2.9/18.6 \pm 3.9$)	



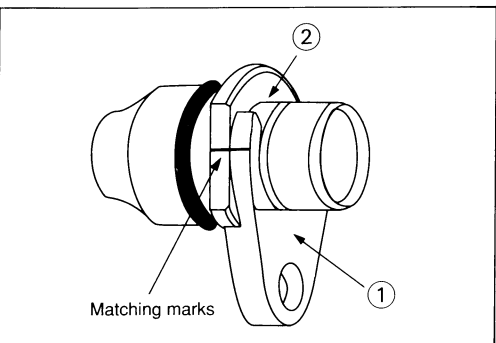
7. Transfer Flange

- 1) Use the flange holder to install the flange to the rear transfer case.

Flange Holder : 5-8840-2157-0 (J-27221)

- 2) Tighten the transfer flange bolts to the specified torque.

Transfer Flange Bolt Torque	kg·m(lb.ft/N·m)
14 ± 2 ($101 \pm 14.4/ 137 \pm 20$)	



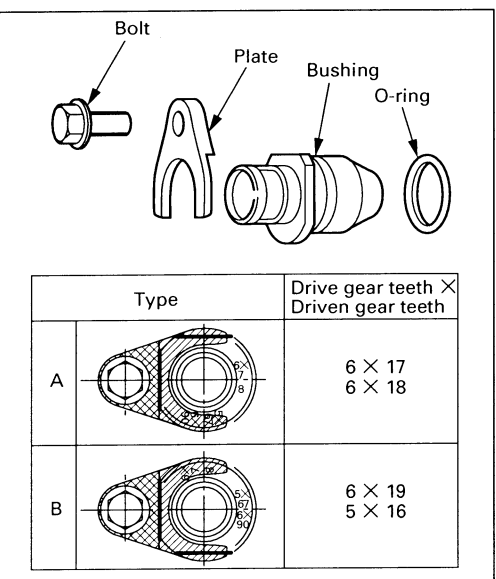
8. Speedometer Driven Gear and Speedometer Sensor

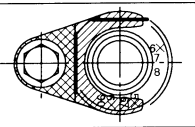
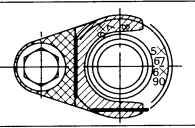
- 1) Install the O-ring to the speedometer driven gear bushing.
- 2) Install the driven gear to the speedometer driven gear bushing.
- 3) Align the matching marks on plate ① and bush ② then tighten the bolt.

Bolt Torque	kg·m (lb·ft/N·m)
1.5 ($10.8/14.7$)	

- 4) Install the speedometer sensor.

	kg·m (lb·ft/N·m)
2.8 ($20/27$)	



Type	Drive gear teeth × Driven gear teeth
A	 6×17 6×18
B	 6×19 5×16

225RW009

TROUBLESHOOTING

Refer to this Section to quickly diagnose and repair engine problems. Each troubleshooting chart has three headings arranged from left to right.

(1) Checkpoint (2) Trouble Cause (3) Countermeasure

This Section is divided into four sub-sections:

1. Abnormal Noise
 - 1) Noise in Neutral
 - 2) Noisy Operation
2. Head Shifting
3. Walking or Jumping Out of Gear
4. Oil Leakage

1. ABNORMAL NOISE

1) NOISY IN NEUTRAL

Checkpoint		Trouble Cause	Countermeasure
Gear oil	NG	Insufficient or improper gear oil	Replenish or replace the gear oil
OK			
Flywheel pilot bearing	NG	Worn flywheel pilot bearing	Replace the flywheel pilot
OK			
Bearings (Mainshaft, counter-shaft, and transfer shaft)	NG	Worn or broken bearing(s)	Replace the bearing(s)
OK			
Gears (Mainshaft, counter-shaft, reverse idler gear and transfer gears)	NG	Worn or scuffed gear tooth contact surfaces	Replace the gear(s)
OK			
Mainshaft splines Synchronizer clutch hub splines	NG	Worn splines	Replace the main shaft and the synchronizer clutch hub
OK			
Transmission	NG	Transmission misalignment	Realign the transmission

2) NOISY OPERATION

Checkpoint		Trouble Cause	Countermeasure
Gear oil (Metallic rattling)	NG	Insufficient or improper gear oil	Replenish or replace the gear oil
OK			
Bearings (Hissing, thumping or bumping)	NG	Worn or broken bearing(s)	Replace the bearing(s)
OK			
Gears (Growling, humming, or grinding)	NG	Worn, chipped, or cracked gear(s)	Replace the gear(s)
OK			
Gears (Squealing at high speeds)	NG	Free running gears seizing on the thrust face or the inner face	Replace the gear(s)
OK			
Gears (Gear whining)	NG	Lack of backlash between meshing gears	Replace the gear(s)

2. HARD SHIFTING

Checkpoint		Trouble Cause	Countermeasure
Gear oil	NG	Insufficient or improper gear oil	Replenish or replace the gear oil
	OK		
Clutch pedal free play	NG	Improper clutch pedal free play	Readjust the clutch pedal free play
	OK		
Change lever operation	NG	Hard operating change lever caused insufficient grease	Repair or regrease the change lever assembly
	OK		
Change lever play	NG	Worn change lever sliding portions	Repair or replace the applicable parts and regrease
	OK		
Shift block sleeve movement	NG	Sleeve movement failure	Repair or replace the sleeve
	OK		
Shift rod and quadrant box sliding faces, and other parts	NG	Worn shift rod and/or sliding faces	Replace the shift rod and/or the quadrant box

Continued on the next page

Checkpoint		Trouble Cause	Countermeasure
Continued from the previous page			
OK			
Shift arm and synchro- nizer sleeve	NG	Worn shift arm and/or syn- chronizer sleeve groove	Replace the worn parts
OK			
Mainshaft and counter- shaft thrust play	NG	Worn thrust washer, collar, and/or gear thrust faces	Replace the worn parts
OK			
Synchronizer assembly	NG	Worn synchronizer parts	Replace the worn parts

3. WALKING OR JUMPING OUT OF GEAR

Checkpoint		Trouble Cause	Countermeasure
Change lever play	NG	Insufficient stroke caused by sliding position wear and excessive play	Replace the worn parts
OK			
Detent ball	NG	Worn detent ball	Replace the detent ball
OK			
Detent spring	NG	Detent spring weak or broken	Repair or replace the detent spring
OK			
Shift rod and quadrant box sliding faces	NG	Worn shift rod and/or sliding faces	Replace the shift rod and/or the quadrant box
OK			
Shift arm and synchronizer sleeve	NG	Worn shift arm and/or synchronizer sleeve groove	Replace the worn parts
OK			
Mainshaft and countershaft thrust play	NG	Worn thrust washer, collar, and/or gear thrust faces	Replace the worn parts

Continued on the next page

Checkpoint		Trouble Cause	Countermeasure
Continued from the previous page			
OK			
Bearings (Mainshaft, countershaft, and individual gears)	NG	Worn or broken bearing(s)	Replace the bearing(s)
OK			
Mainshaft splines Synchronizer clutch hub splines	NG	Worn splines	Replace the main shaft and the synchronizer clutch hub
OK			
Synchronizer assembly	NG	Weak or broken spring	Replace the spring

4. OIL LEAKAGE

Checkpoint		Trouble Cause	Countermeasure
Oil level	NG	Oil level too high	Drain the oil to the correct level
	OK		
Gear oil	NG	Improper gear oil	Replace the gear oil
	OK		
Drain plug and/or filler plug	NG	Loose plug(s)	Tighten the plug(s) and replenish the oil
	OK		
Gaskets	NG	Defective or improperly installed gasket(s)	Replace the gasket(s)
	OK		
Air breather	NG	Air breather not installed Air breather clogged	Install the air breather Replace the air breather
	OK		
Front cover oil seal	NG	Worn or scratched oil seal	Replace the oil seal
	OK		
Rear cover oil seal	NG	Worn or scratched oil seal	Replace the oil seal

TFMUA-WE-9711

You are requested to order this manual using the manual number that is shown above.

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