MANUAL TRANSMISSION

SECTION MT

CONTENTS

REMOVAL AND INSTALLATION

Removal

- Remove exhaust front tube, catalytic converter and exhaust manifold connecting tube.
  Refer to EM section.
- Remove propeller shaft.
  Refer to PD section.

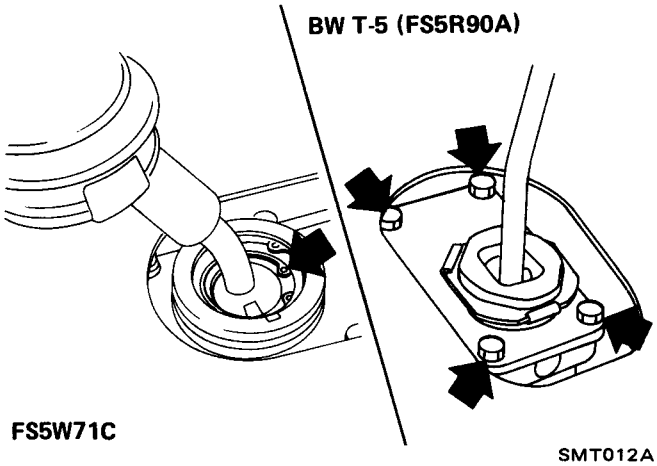
Insert plug into rear oil seal after removing propeller shaft.

- Support engine by placing a jack under oil pan.

CAUTION:

- **Be careful not to damage spline, sleeve yoke and rear oil seal, when removing propeller shaft.**
- **Do not place jack under the oil pan drain plug.**

- Remove shift lever.



FS5W71C

SMT012A

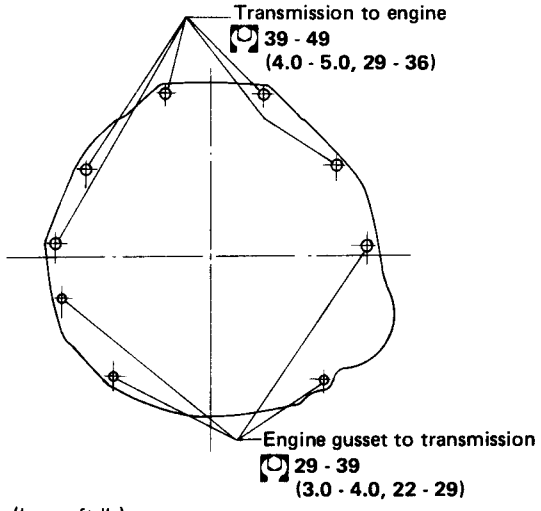
WARNING:

Support Manual Transmission, while removing it.

Installation

- Tighten bolts securing transmission to engine.

These bolts have different lengths.



: N-m (kg-m, ft-lb)

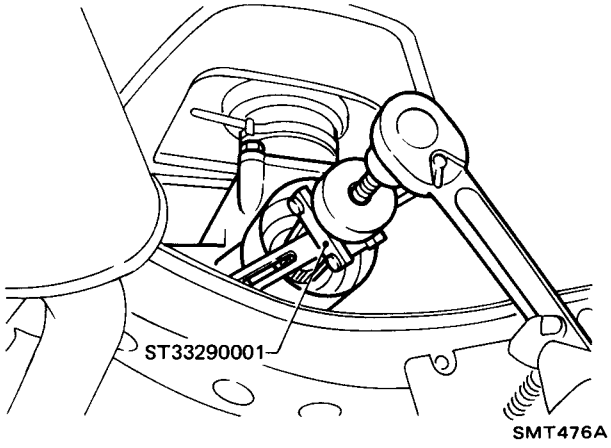
SMT978

- Fill transmission with recommended gear oil.

Oil Seal Replacement

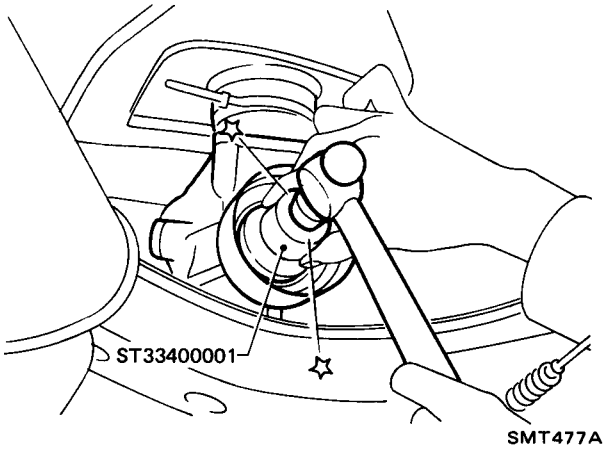
- Rear extension oil seal.

Removal



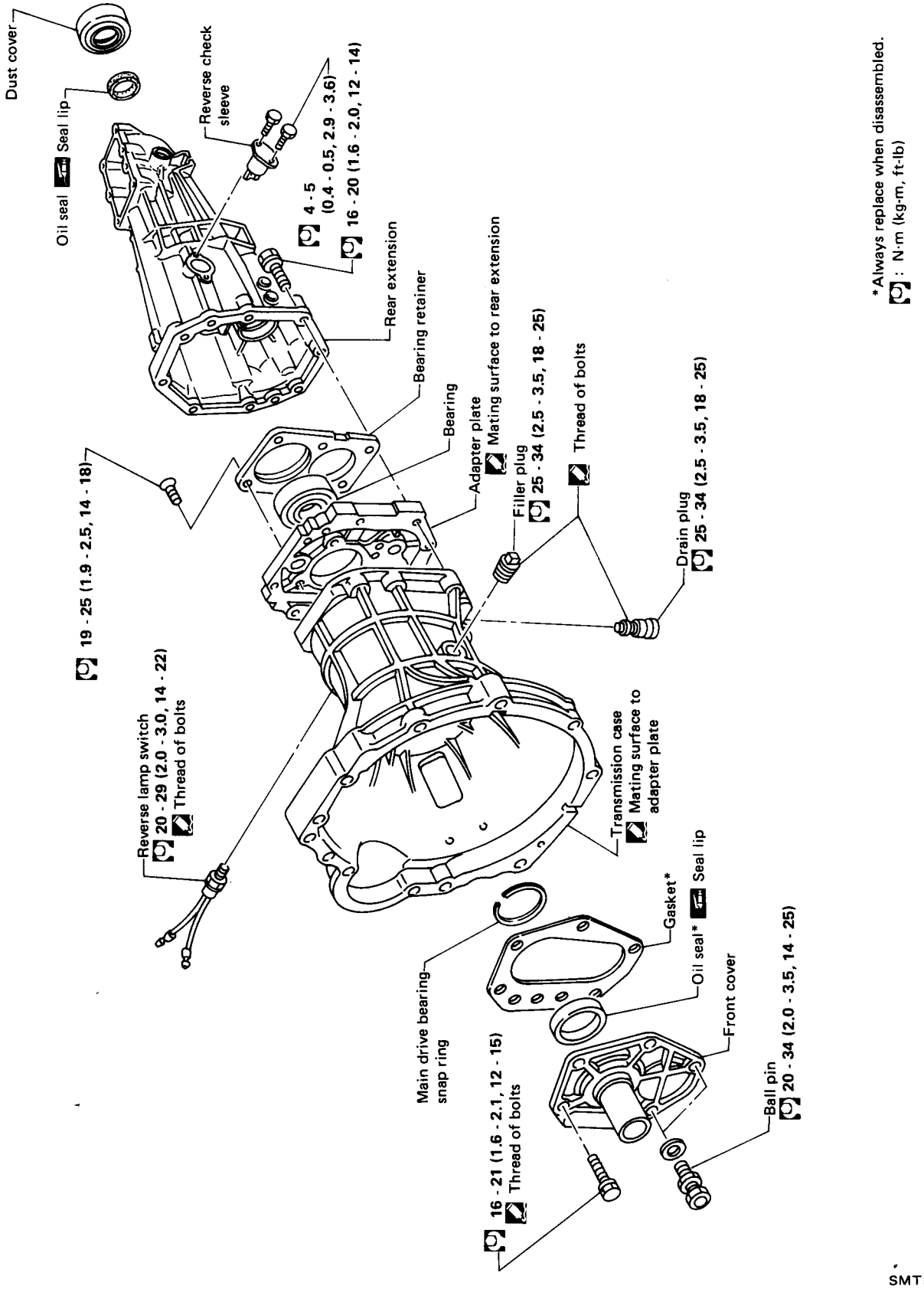
SMT476A

Installation



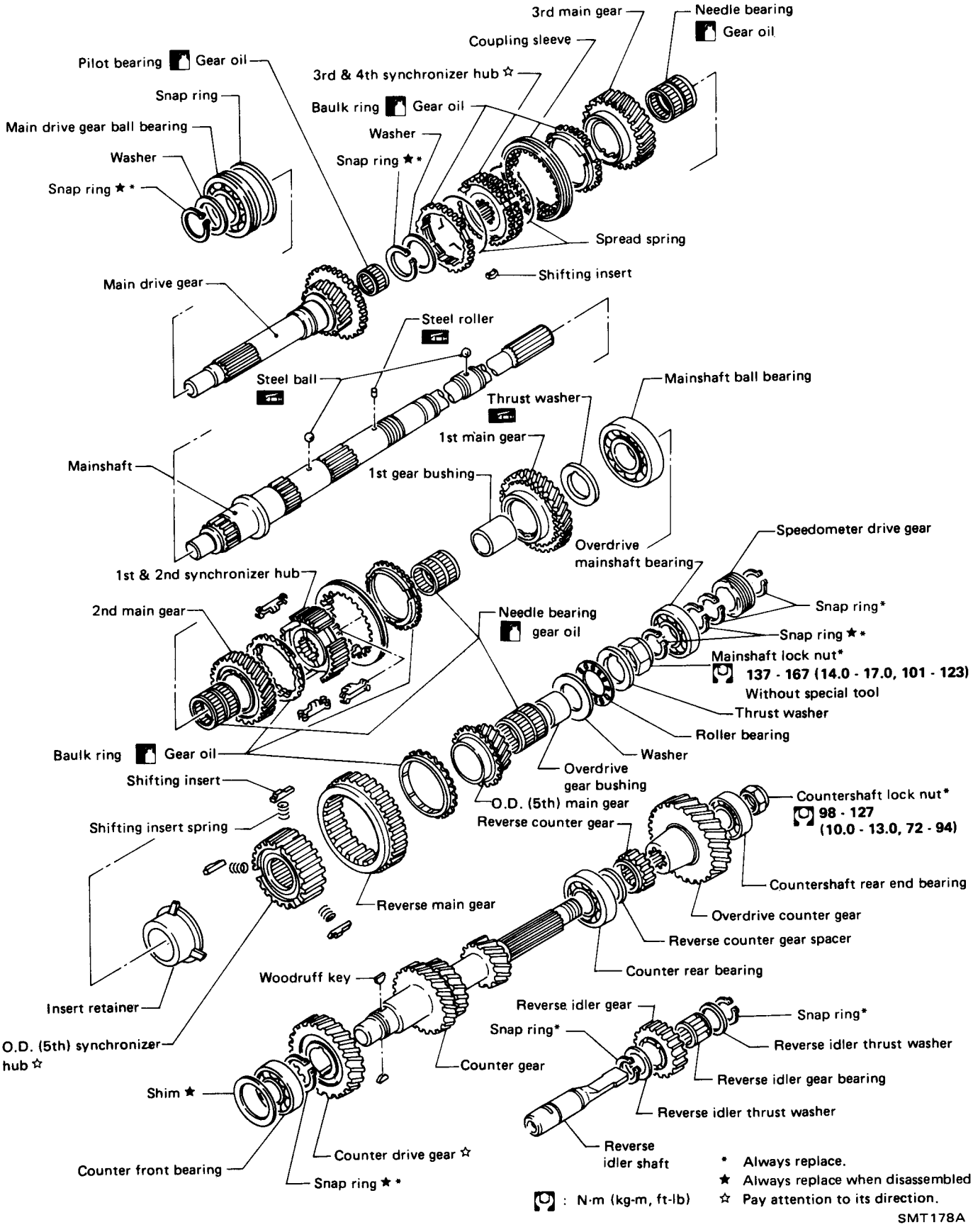
SMT477A

Case Components

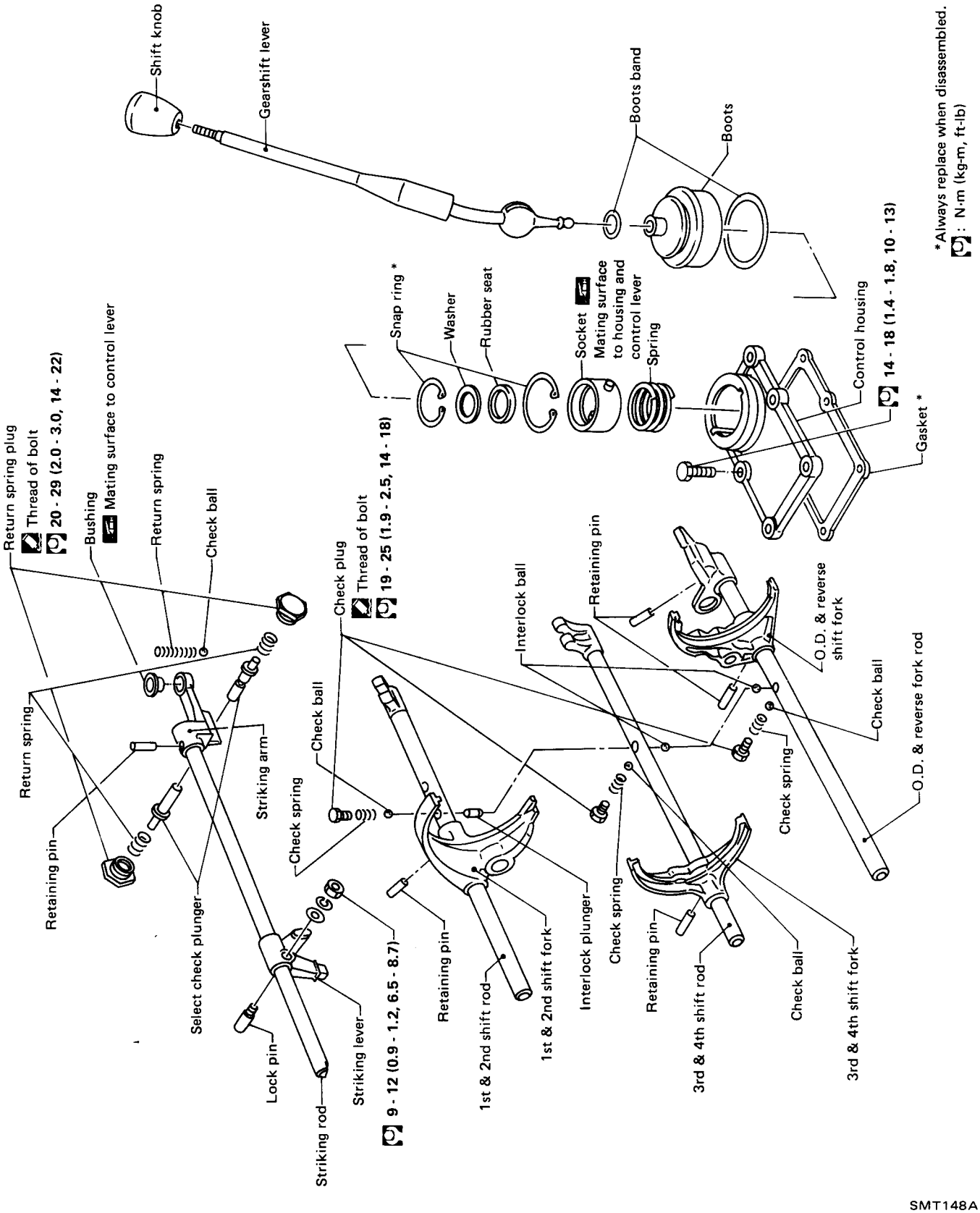


SMT541A

Gear Components

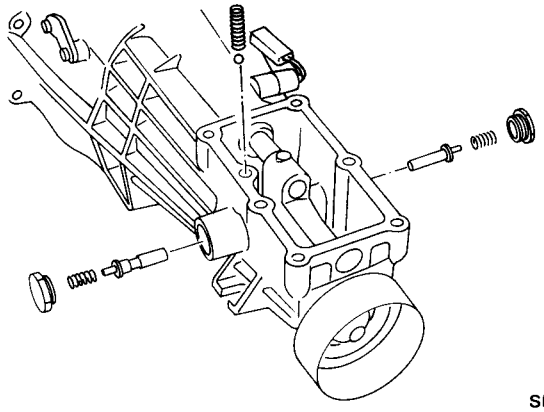


Shift Control Components



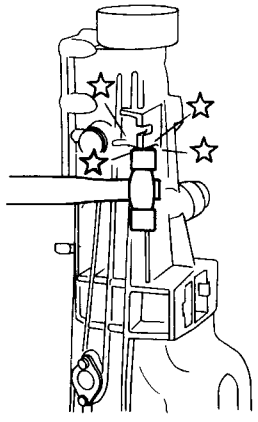
SMT148A

1. Remove control housing, check ball, return spring plug, select check plunger and return springs.



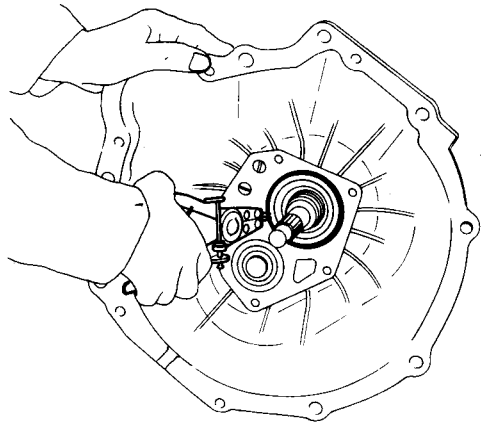
SMT982

2. Remove rear extension by lightly tapping it.



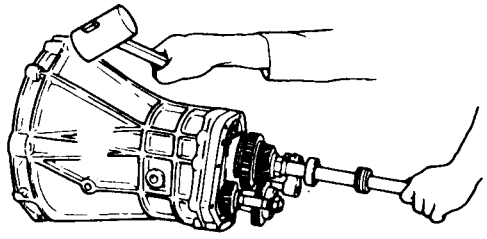
SMT983

3. Remove front cover, gasket, countershaft front bearing shim, and main drive bearing snap ring.



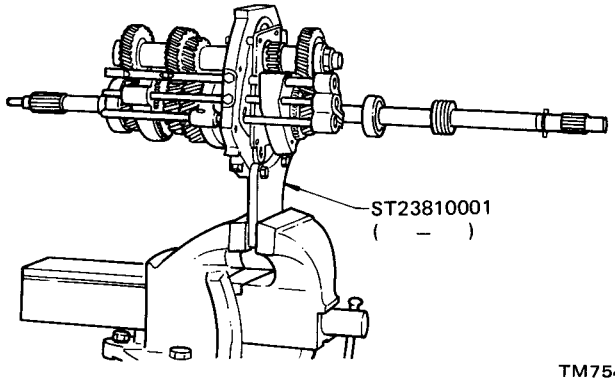
SMT011

4. Separate transmission case from adapter plate.



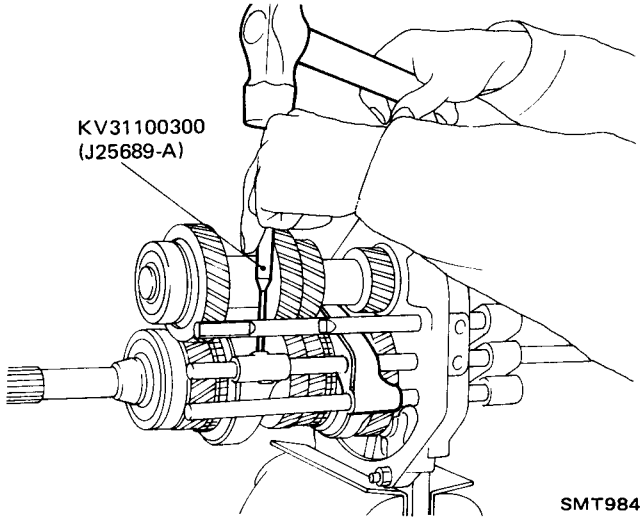
TM753

5. Set up Tool on adapter plate.



TM754

6. Remove check ball plugs, check springs, and check balls.
7. Drive out retaining pins. Then drive out fork rods and remove interlock balls.

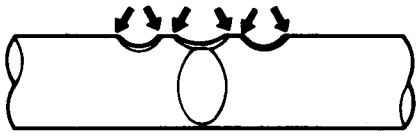


SMT984

Forks and Fork Rods

INSPECTION

- Check for wear, scratches, projection or damage.

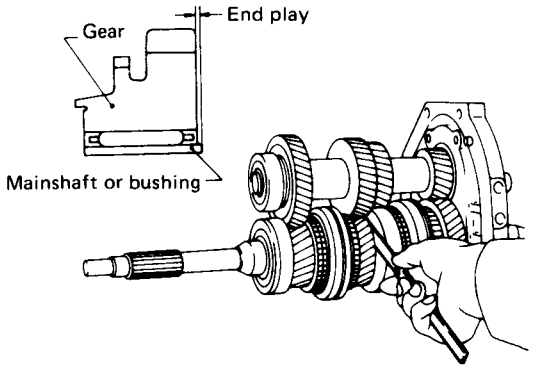


SMT137

Gears and Shafts

DISASSEMBLY

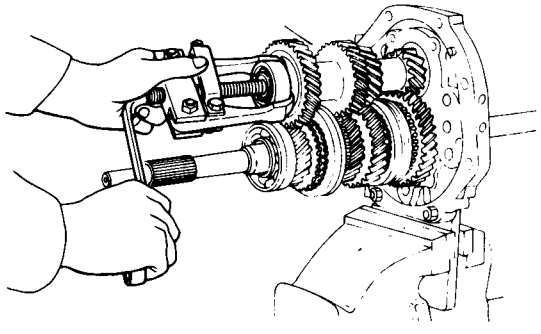
1. Before disassembly, measure each gear end play.
- If end play is not within the specified limit, disassemble and check the parts.
- Replace any part which is worn or damaged.



SMT025

Gear	End play mm (in)
1st	0.31 - 0.41 (0.0122 - 0.0161)
2nd	0.11 - 0.21 (0.0043 - 0.0083)
3rd	0.11 - 0.21 (0.0043 - 0.0083)
O.D.	0.32 - 0.39 (0.0126 - 0.0154)
Reverse idler	0.05 - 0.50 (0.0020 - 0.0197)

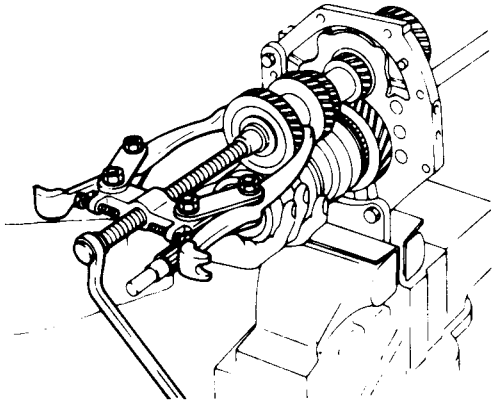
2. Mesh 2nd and reverse gear, then draw out counter front bearing.



TM398

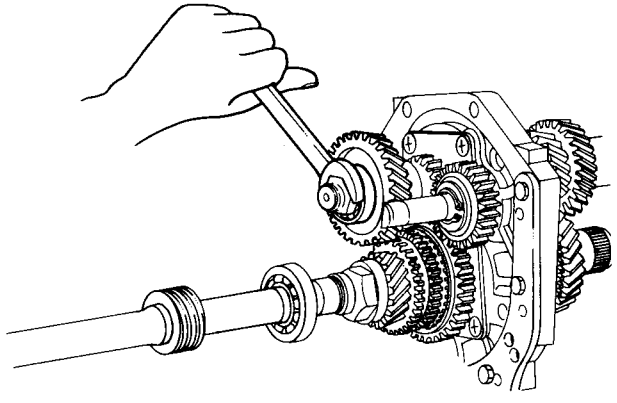
Gears and Shafts (Cont'd)

3. Remove snap ring and draw out counter drive gear with main drive gear assembly.



SMT023

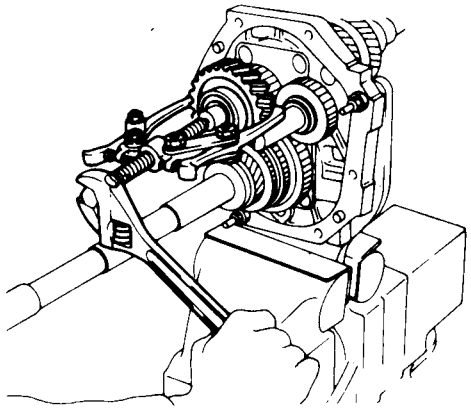
4. Remove snap ring and draw out 3rd & 4th synchronizer and 3rd main gear.
5. Release staking on counter gear nut and mainshaft nut and loosen these nuts.



TM757

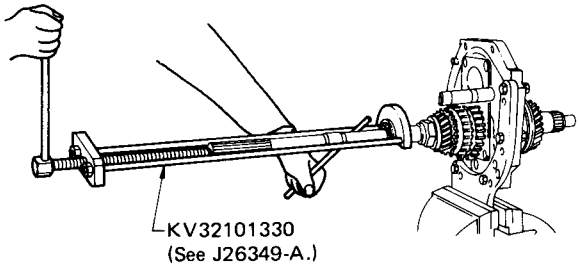
Mainshaft nut: Left-hand thread

6. Pull out O.D. counter gear with bearing.



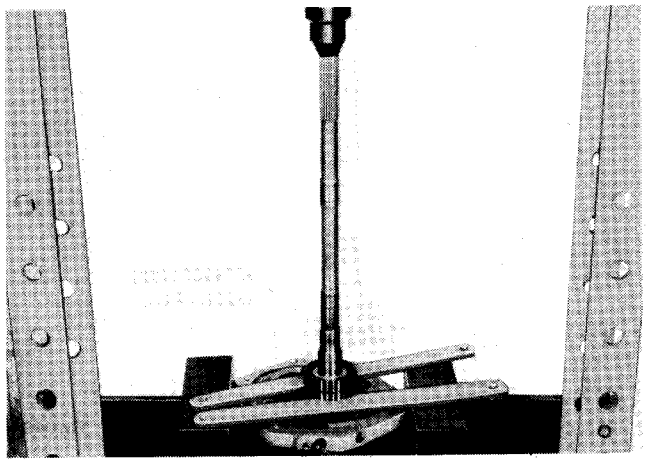
SMT042

7. Draw out reverse counter gear and spacer.
8. Remove snap rings from reverse idler shaft, and draw out reverse idler gear, thrust washers and needle bearing.
9. Remove snap rings, steel ball, speedometer gear and bearing.

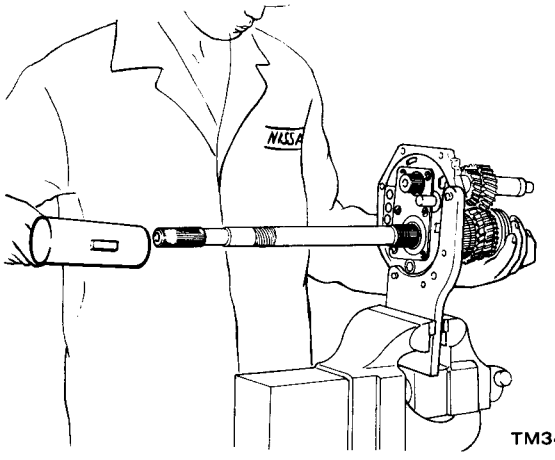


TM760

10. Remove mainshaft nut, thrust washer, steel roller, needle bearing, O.D. main gear and baulk ring.
11. Remove O.D. gear bushing, insert retainer and O.D. synchronizer.



12. Draw out mainshaft assembly together with counter gear, by tapping rear end of mainshaft and counter gear.

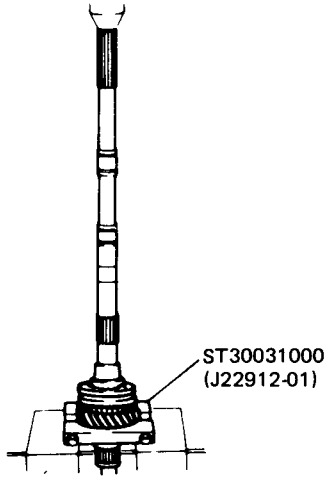


TM347

13. Remove thrust washer, steel ball, 1st main gear and needle bearing.

Be careful not to lose steel ball.

14. Press out 1st gear mainshaft bushing together with 2nd main gear.



TM049A

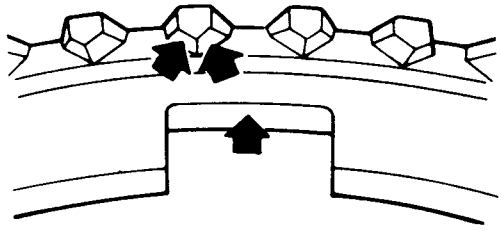
15. Remove 2nd gear needle bearing.

INSPECTION

- Check all gears for excessive wear, chips and cracks; replace as required.
- Check shaft for bending, cracks and wear; if necessary, replace.

Baulk rings

- If found to be deformed, cracked or otherwise damaged excessively, replace baulk ring.



SMT026

- Place baulk ring in position on gear cone. While holding baulk ring against gear as far as it will go, measure gap between baulk ring and gear.
  If the clearance is smaller than the wear limit, replace baulk ring.

Baulk ring to gear clearance:

Standard

1st & 2nd gear

1.00 - 1.60 mm (0.0394 - 0.0630 in)

3rd & main drive gear

1.20 - 1.60 mm (0.0472 - 0.0630 in)

O.D. gear

1.00 - 1.40 mm (0.0394 - 0.0551 in)

Wear limit

1st & 2nd gear

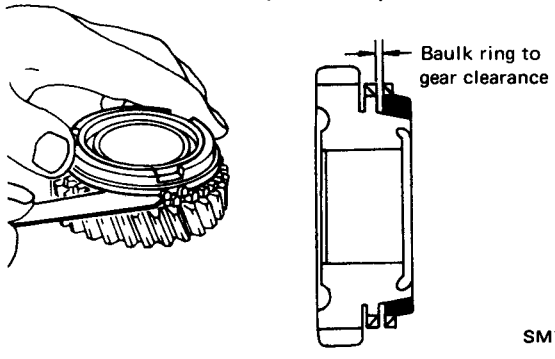
0.8 mm (0.031 in)

3rd & main drive gear

0.8 mm (0.031 in)

O.D. gear

0.5 mm (0.020 in)

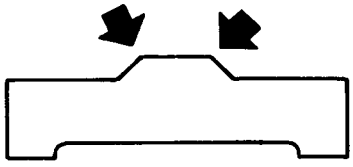


SMT140

Gears and Shafts (Cont'd)

Shifting inserts and springs

If worn excessively, worn unevenly, deformed, or damaged, replace.



SMT064

ASSEMBLY

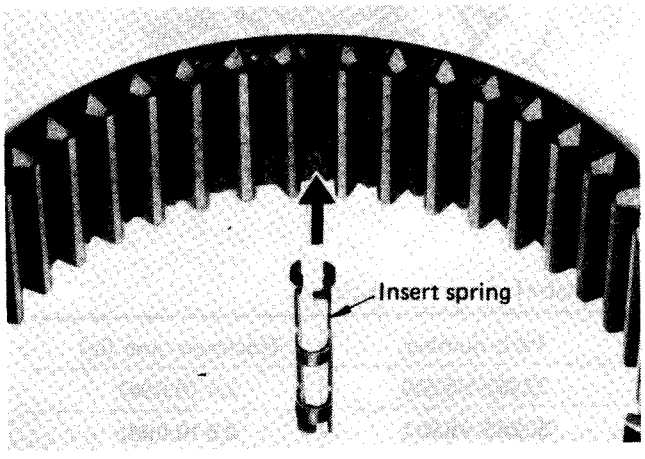
Note:

Apply gear oil to each part.

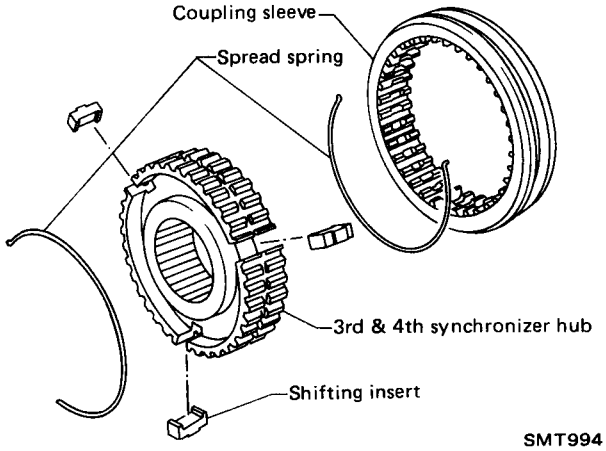
- **Needle bearings**
- **Baulk rings**
- **Shafts**
- **Gears**
- **Oil seals**

1. Place inserts.

- 1st & 2nd

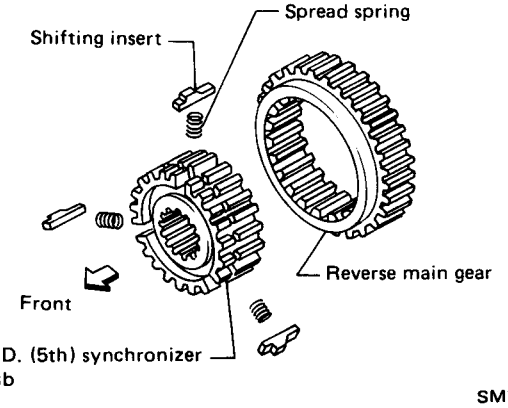


- 3rd & 4th



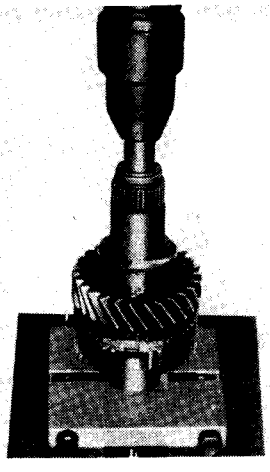
SMT994

- O.D.



SMT095A

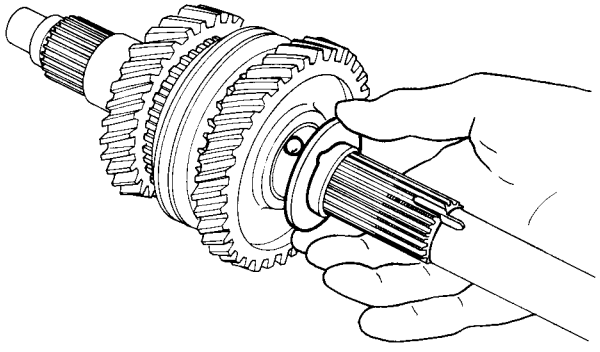
2. Assemble 2nd main gear, needle bearing and 1st & 2nd synchronizer assembly, then press 1st gear bushing on mainshaft.



Gears and Shafts (Cont'd)

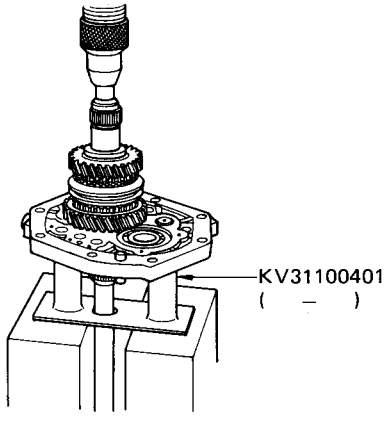
3. Assemble 1st main gear, steel ball, and thrust washer on mainshaft.

Before installing steel ball and thrust washer apply grease to them.



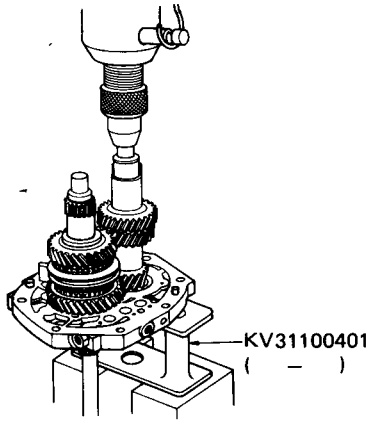
TM358

4. Install counter rear bearing to adapter plate.
5. Press mainshaft assembly to adapter plate using Tool.



TM439

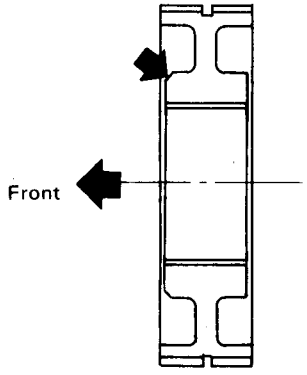
6. Press counter gear into adapter plate.



TM440

7. Install 3rd main gear, needle bearing, and 3rd & 4th synchronizer assembly.

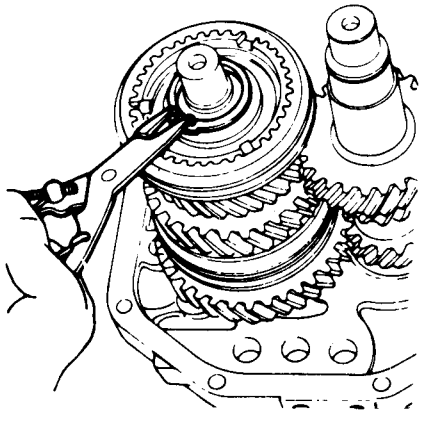
Pay attention to direction of synchronizer.



SMT008A

8. Install thrust washer on mainshaft and secure it with mainshaft front snap ring.

Select proper snap ring that will minimize clearance of groove in mainshaft.



TM441

Mainshaft front snap ring:

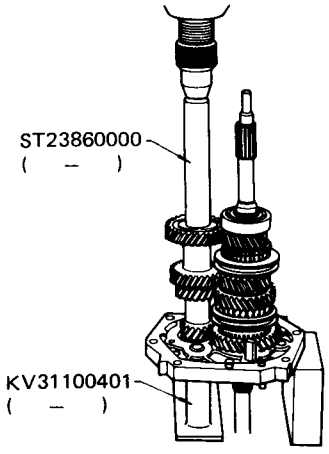
Parts number	Thickness mm (in)
32263-V5200	2.4 (0.094)
32263-V5201	2.5 (0.098)
32263-V5202	2.6 (0.102)

9. Apply gear oil to mainshaft pilot bearing and install it on mainshaft.

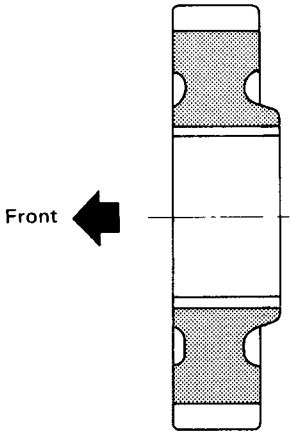
Gears and Shafts (Cont'd)

10. Press counter drive gear with main drive gear using Tool.

Pay attention to direction of counter front gear.



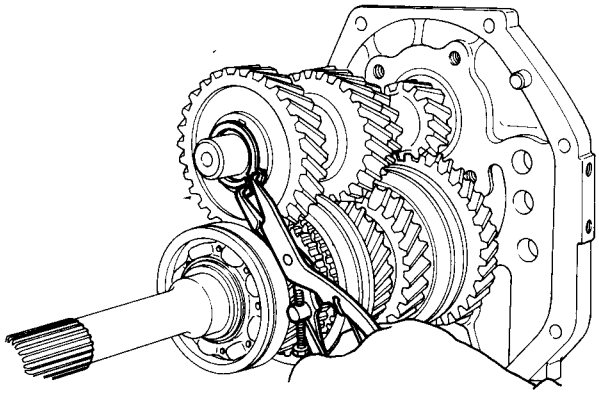
TM442



SMT065

11. Secure counter drive gear with snap ring.

Select proper snap ring that will minimize clearance of groove in countershaft.

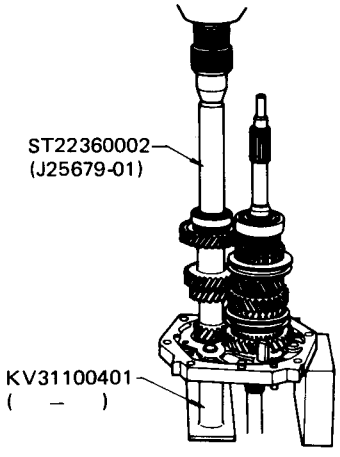


TM366

Counter drive gear snap ring:

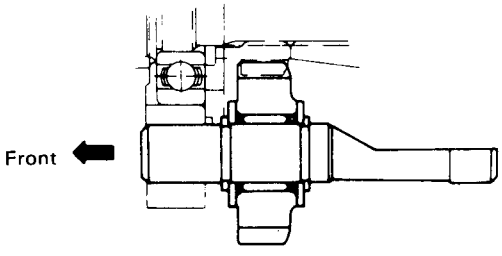
Parts number	Thickness mm (in)
32215-E9000	1.4 (0.055)
32215-E9001	1.5 (0.059)
32215-E9002	1.6 (0.063)

12. Press counter gear front bearing onto counter gear.



TM443

13. Install reverse idler gear to reverse idler shaft with spacers, snap rings and needle bearing.

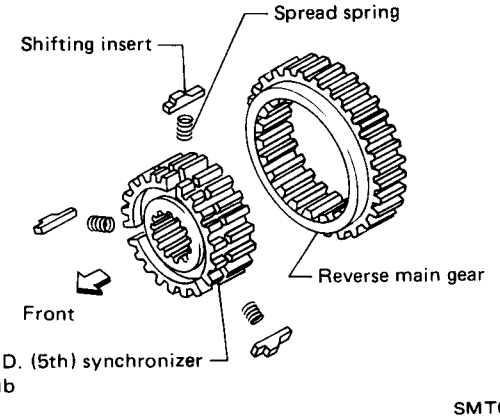


TM451

Gears and Shafts (Cont'd)

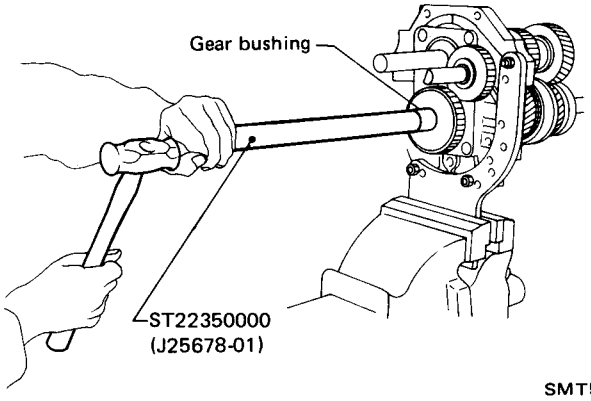
14. Install insert retainer and O.D. synchronizer to mainshaft.

Pay attention to direction of hub.



SMT095A

15. Install O.D. gear bushing.

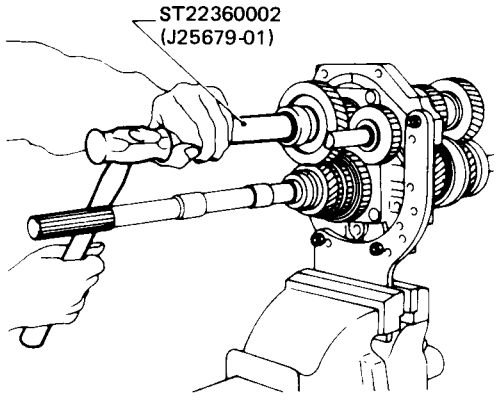


SMT531

16. Install O.D. main gear, needle bearing, steel roller and thrust washer.
17. Install spacer, reverse counter gear and O.D. counter gear.

O.D. main gear and O.D. counter gear should be handled as a matched set.

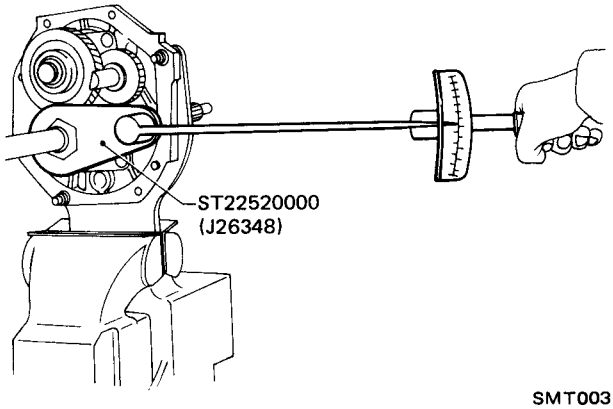
18. Install countershaft rear end bearing.



SMT043

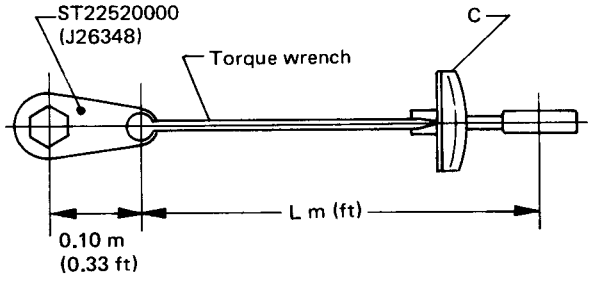
19. Mesh 2nd and reverse gears and tighten mainshaft lock nut.

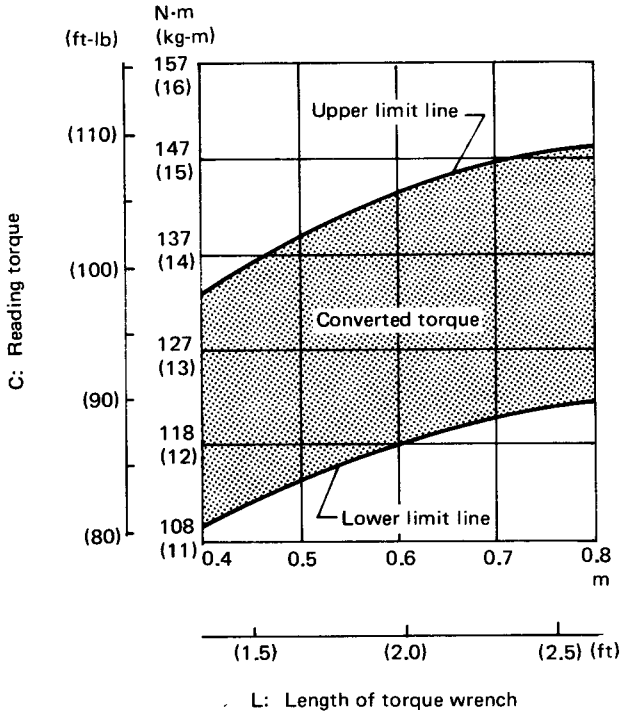
- With special tool



SMT003A

Using the following chart
(Length of torque wrench vs. setting or reading torque)





SMT004A

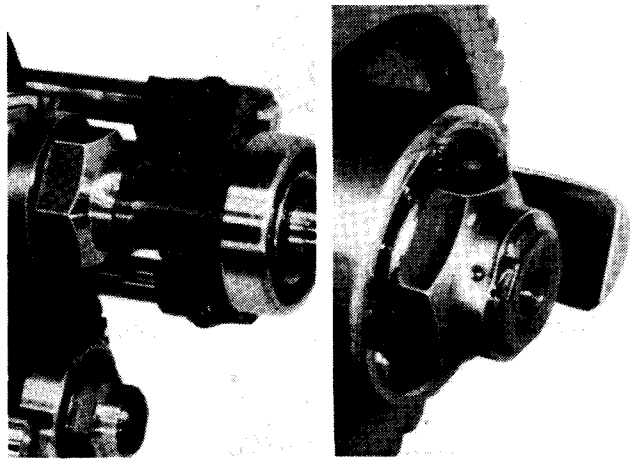
- Without special tool

  137 - 167 N·m
  (14.0 - 17.0 kg-m, 101 - 123 ft-lb)

20. Tighten counter gear lock nut.

    : 98 - 127 N·m
    (10.0 - 13.0 kg-m, 72 - 94 ft-lb)

21. Stake mainshaft lock nut and counter gear lock nut with a punch.

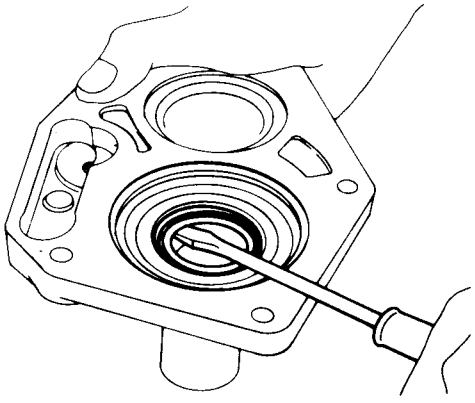


- Always use new lock nuts.

22. Measure gear end play. For the description, refer to Disassembly of Gears and Shafts.

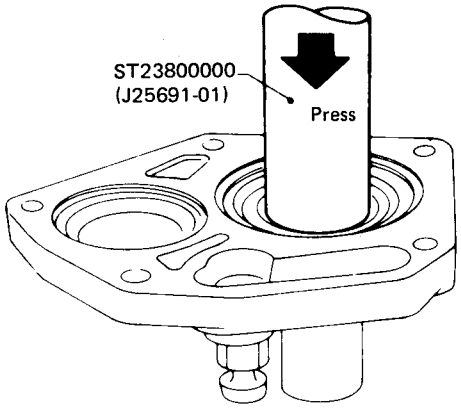
Oil Seals

FRONT COVER OIL SEAL



SMT035

- Be careful not to damage lip of oil seal.

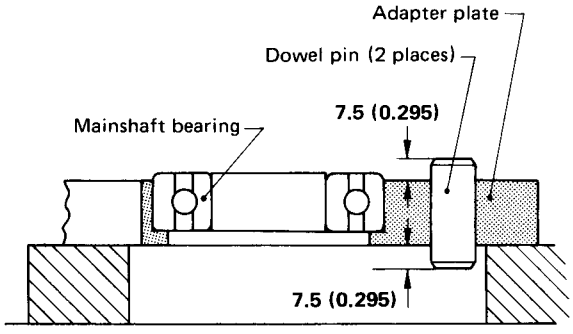


SMT036

Adapter Plate

- When replacing adapter plate parts, use the following procedures.

DOWEL PIN

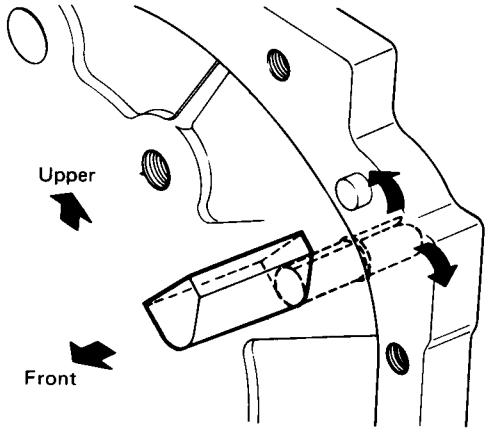


Unit: mm (in)

SMT027

OIL GUTTER

Install oil gutter on adapter plate and expand on rear side.

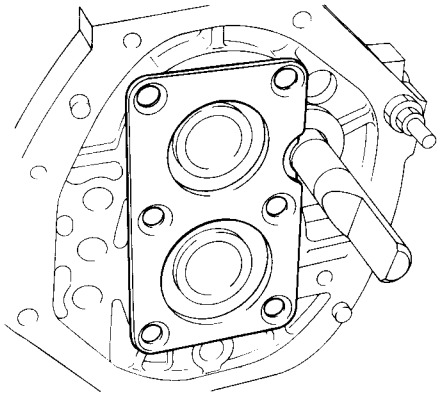


SMT153A

Adapter Plate (Cont'd)

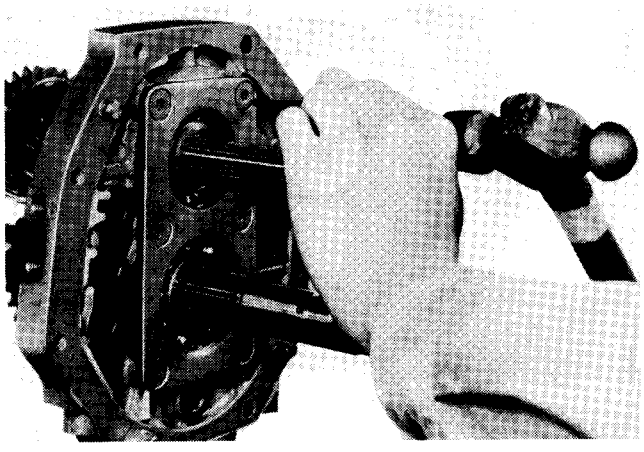
BEARING RETAINER

1. Insert reverse shaft, then install bearing retainer.

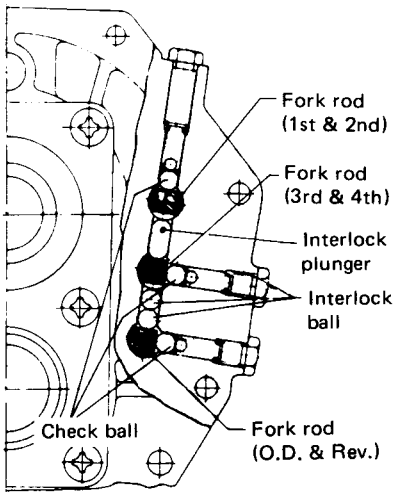


SMT028

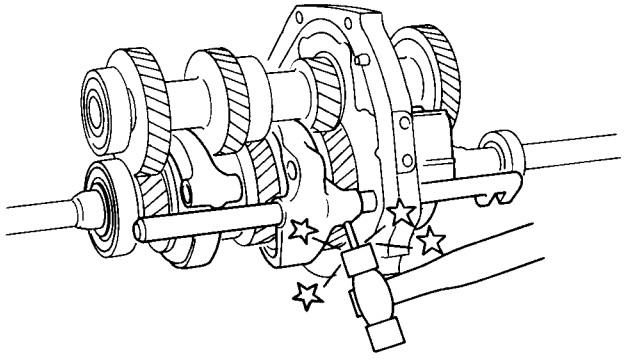
2. Tighten each screw, then stake it at two points.



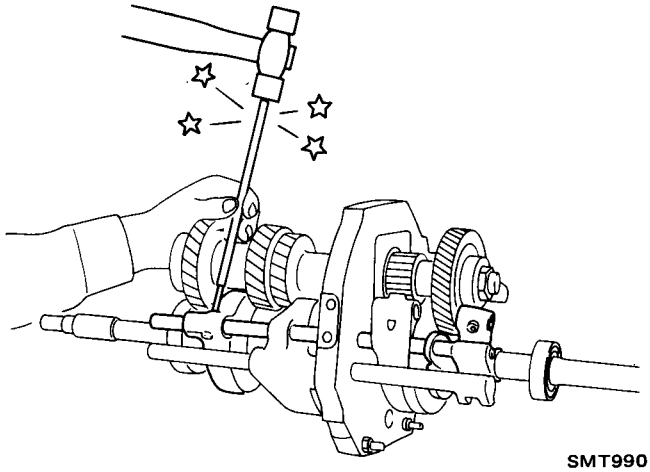
1. Install shift rods, interlock balls and check balls.



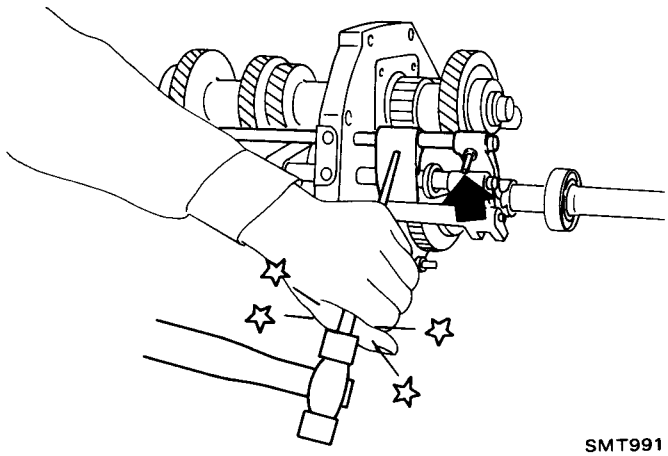
SMT992



SMT989

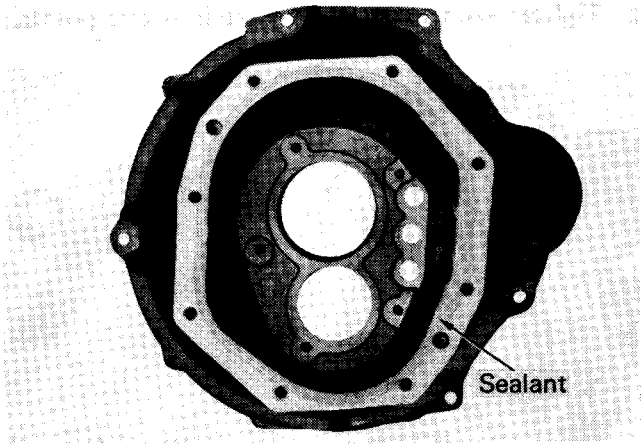


SMT990

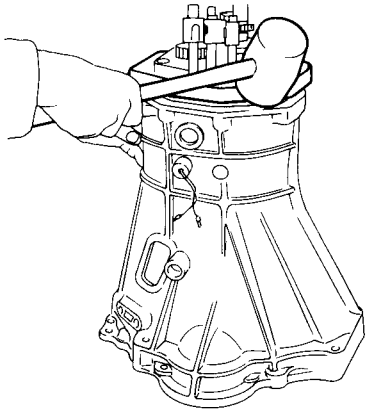


SMT991

2. Apply sealant to mating surface of transmission case.

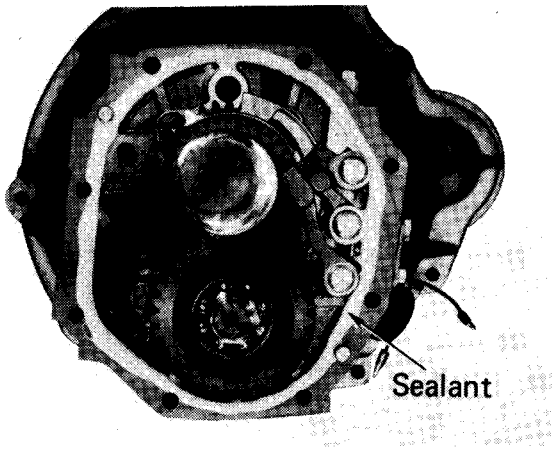


3. Slide gear assembly onto adapter plate by lightly tapping with a soft hammer.

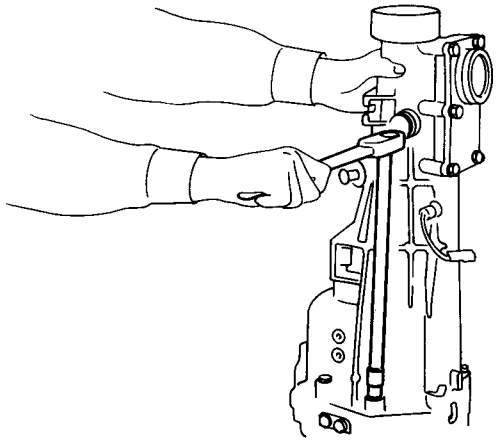


SMT013

4. Apply sealant to mating surface of adapter plate.

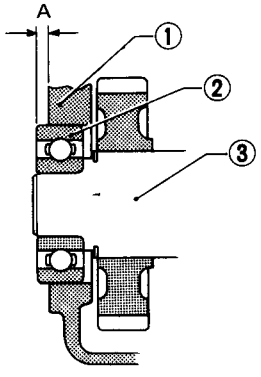


5. Install rear extension.



SMT993

6. Fit main drive bearing snap ring.
7. Select countershaft front bearing shim.



A: Distance from bearing surface to transmission case

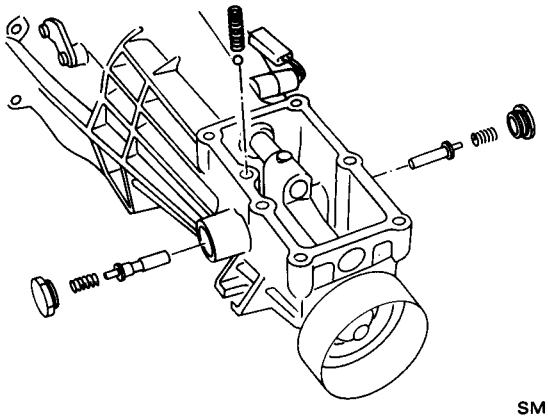
1 Transmission case
2 Counter gear front bearing
3 Counter gear

TM371

Unit: mm (in)

"A"	Thickness of shim	Part number
4.52 - 4.71 (0.1780 - 0.1854)	Not necessary	
4.42 - 4.51 (0.1740 - 0.1776)	0.1 (0.004)	32218-V5000
4.32 - 4.41 (0.1701 - 0.1736)	0.2 (0.008)	32218-V5001
4.22 - 4.31 (0.1661 - 0.1697)	0.3 (0.012)	32218-V5002
4.12 - 4.21 (0.1622 - 0.1657)	0.4 (0.016)	32218-V5003
4.02 - 4.11 (0.1583 - 0.1618)	0.5 (0.020)	32218-V5004
3.92 - 4.01 (0.1543 - 0.1579)	0.6 (0.024)	32218-V5005

8. Install gasket and front cover.
9. Install bolts and plunger shown below.

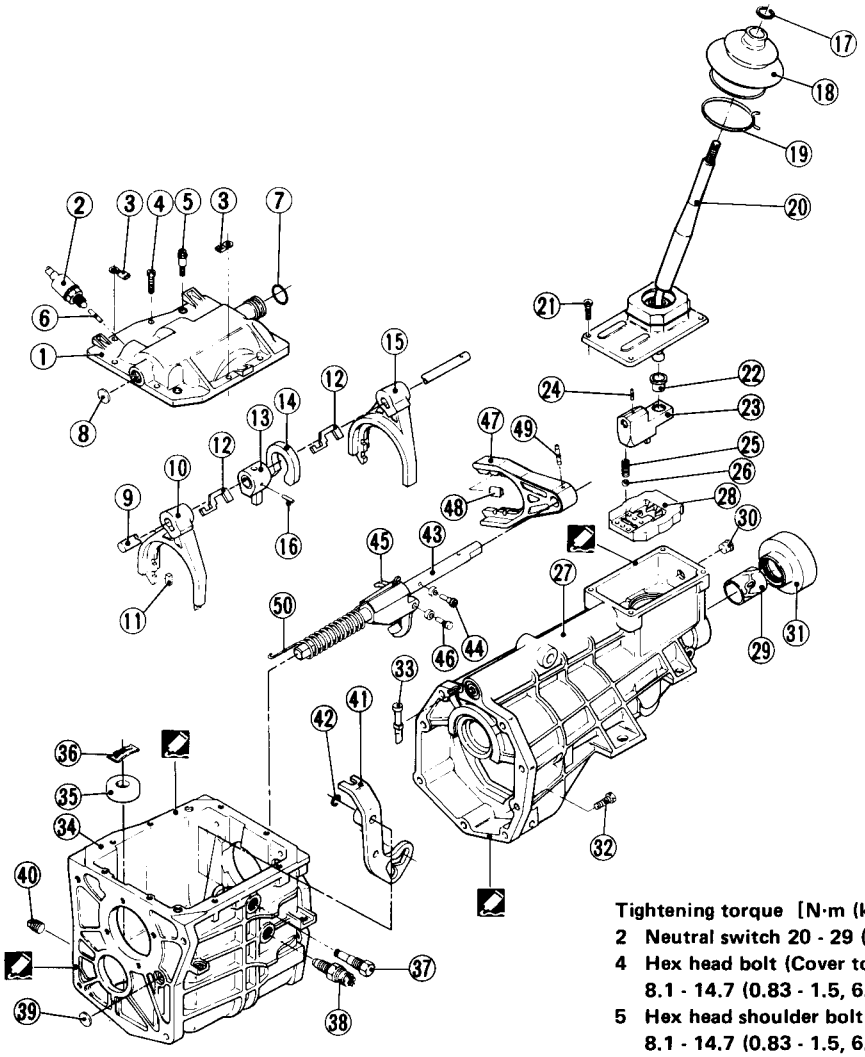


SMT982

10. Install control housing.

5-SPEED TRANSMISSION [Model : BW T-5 (FS5R90A)]

Case, shift cover, extension housing



Tightening torque [N·m (kg-m, ft-lb)]

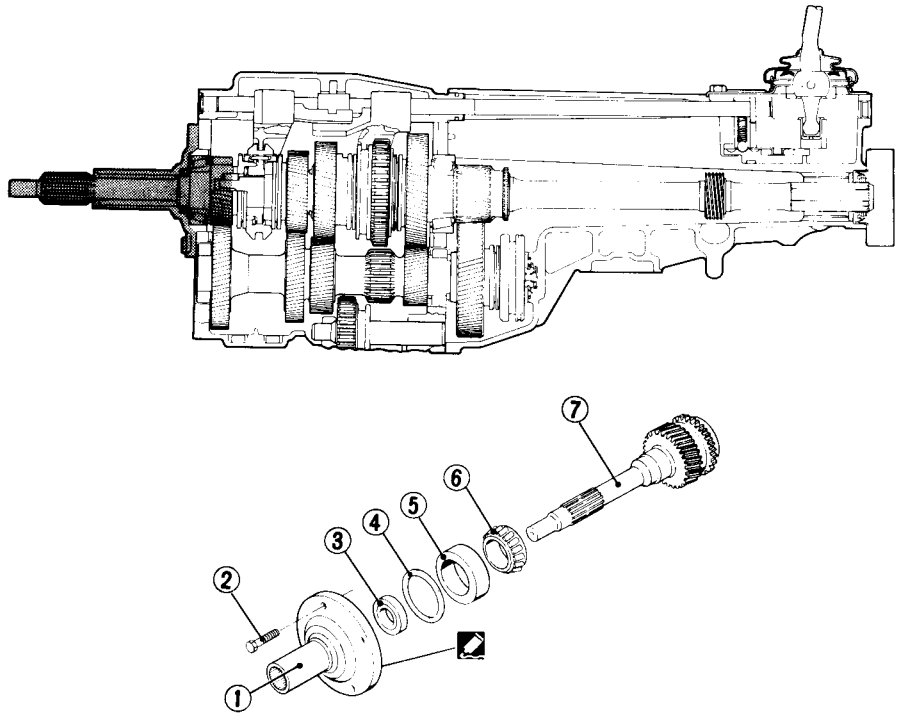
- **2 Neutral switch 20 - 29 (2.0 - 3.0, 14 - 22)**
- **4 Hex head bolt (Cover to case) 8.1 - 14.7 (0.83 - 1.5, 6.0 - 10.8)**
- **5 Hex head shoulder bolt (Cover to case) 8.1 - 14.7 (0.83 - 1.5, 6.0 - 10.8)**
- **21 Control housing screw 15 - 27 (1.5 - 2.8, 11 - 20)**
- **32 Hex head flanged bolt (Extension to case) 27 - 62 (2.8 - 6.3, 20 - 46)**
- **37 Reverse pivot pin 21 - 33 (2.1 - 3.4, 15 - 25)**
- **38 Reverse lamp switch 17 - 24 (1.7 - 2.4, 12 - 17)**

1 Case cover
2 Neutral switch
3 Wiring clip
4 Hex head bolt
5 Hex head shoulder bolt
6 Pin
7 O-ring
8 Welsh plug
9 Shifter shaft
10 3–4 shift fork
11 Shift fork insert
12 Selector plate
13 Control selector arm
14 Interlock plate
15 1–2 shift fork
16 Spring-pin*
17 Boot retainer
18 Boot
19 Boot retainer
20 Control lever/housing assembly
21 Control housing screw
22 Damper sleeve
23 Offset lever
24 Spring-pin*
25 Detent spring
26 Ball
27 Extension housing } Not serviced
28 Detent & guide plate } separately
29 Bushing
30 Cup plug
31 Oil seal*
32 Hex head flanged bolt
33 Breather
34 Case
35 Magnet
36 Clip
37 Reverse pivot pin
38 Reverse lamp switch
39 Welsh plug
40 Pipe plug
41 5th and reverse relay lever
42 Retaining ring
43 5th and reverse shift rail } Not serviced
44 Roller cam and pin } separately
45 Reverse shift fork } Not serviced
46 Roller cam and pin } separately
47 5th gear shift fork
48 Insert
49 Spring-pin*
50 Spring

*Always replace when disassembled.

SMT152A

Input shaft assembly



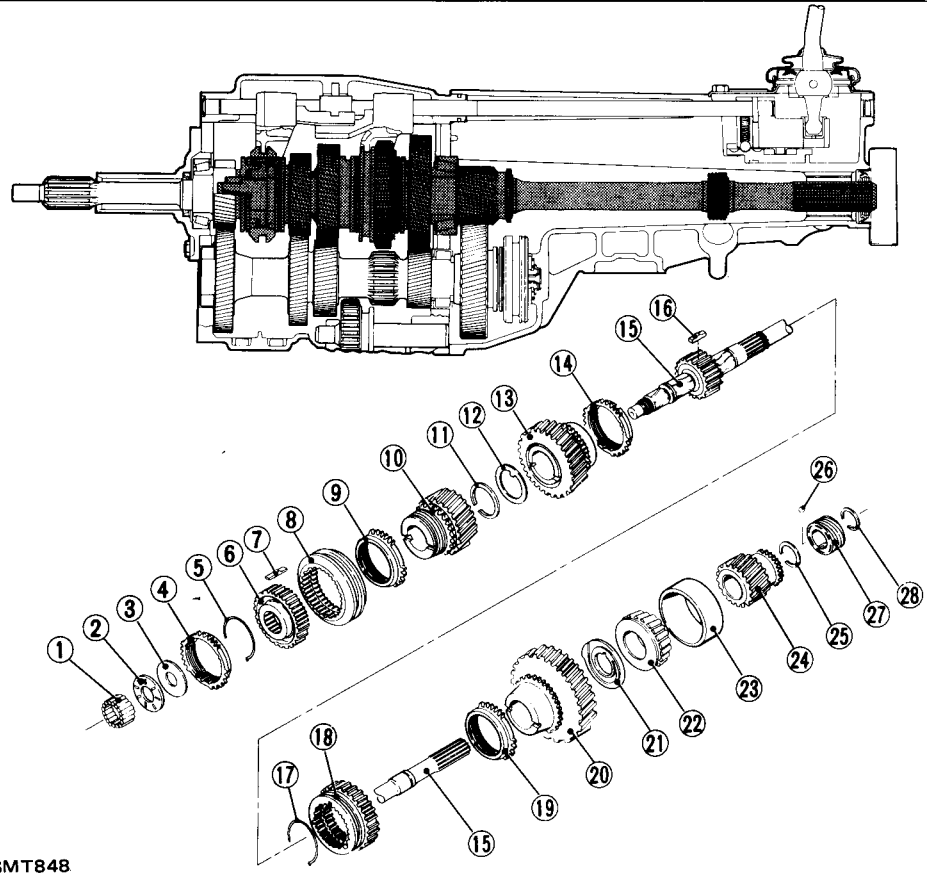
SMT847

*Always replace when disassembled.

1 Input shaft bearing retainer
2 Hex head bolt
3 Seal*
4 Shim
5 Bearing cup
6 Bearing cone
7 Input shaft (main drive gear)

Ⓣ : 2 (Hex head bolt) 15 - 27 N·m (1.5 - 2.8 kg-m, 11 - 20 ft-lb)

Output shaft assembly

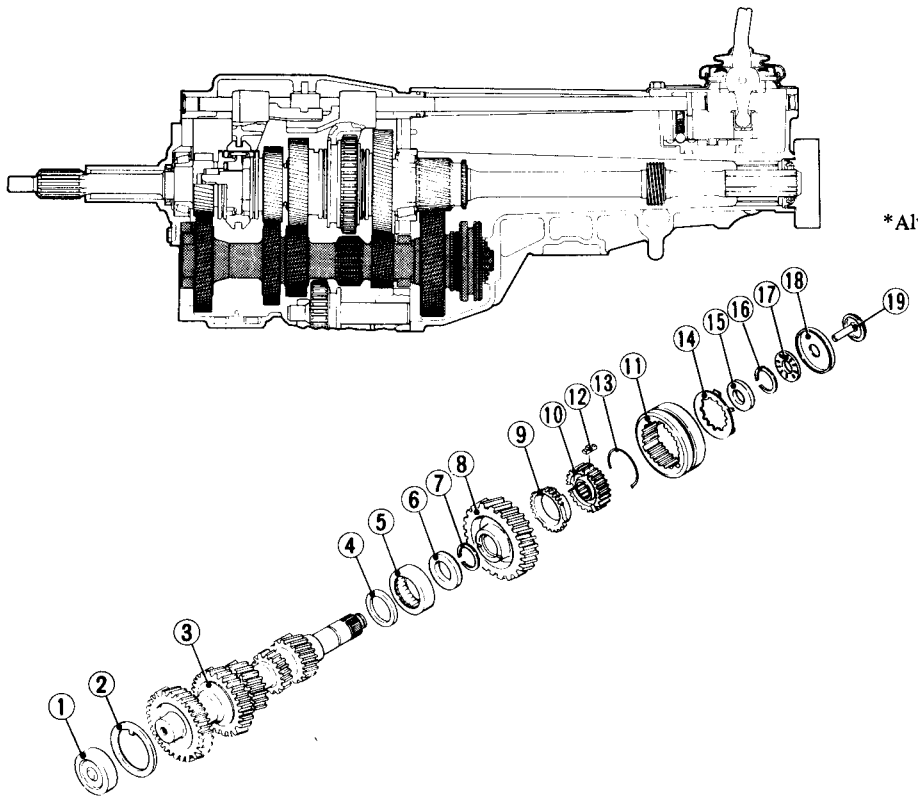


SMT848

1 Needle rollers
2 Needle thrust bearing
3 Thrust bearing race
4 Blocking ring
5 Spring
6 Hub
7 Insert
8 Sleeve
(6, 7, 8: Not serviced separately)
9 Blocking ring
10 3rd speed gear
11 Snap ring*
12 2nd speed thrust washer
13 2nd speed gear
14 Blocking ring
15 Output shaft and hub assembly
16 Insert
17 Spring
18 Reverse sliding gear
19 Blocking ring
20 1st speed gear
21 Thrust washer
22 Bearing cone
23 Bearing cup
24 5th speed driven gear
25 Snap ring*
26 Ball
27 Speedometer gear
28 Snap ring*

*Always replace when disassembled.

Countershaft assembly

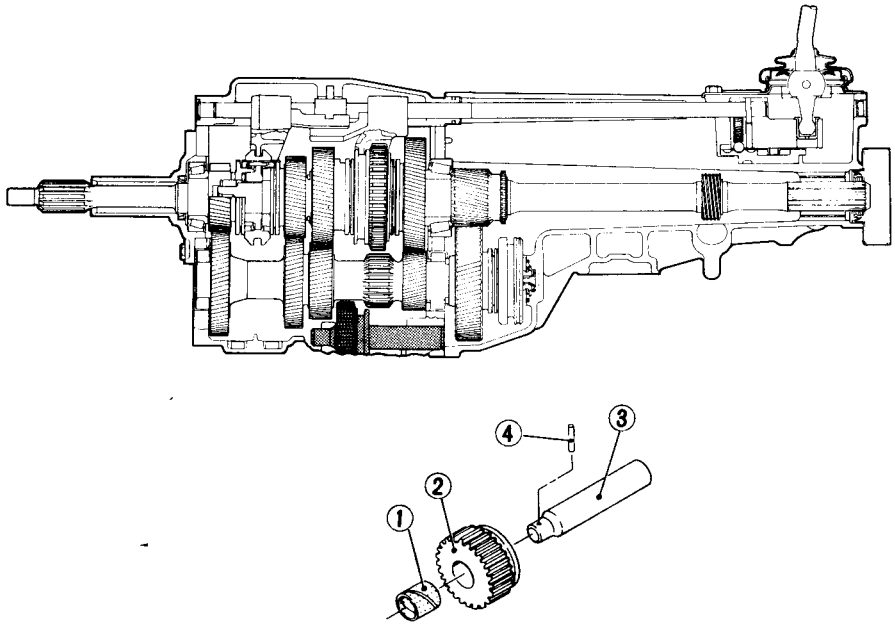


SMT150A

*Always replace when disassembled.

1 Roller bearing
2 Thrust washer
3 Countershaft gear
4 Spacer
5 Roller bearing
6 Spacer
7 Snap ring*
8 5th speed drive gear
9 Blocking ring
10 Hub } Not serviced
11 Sleeve } separately
12 Insert
13 Spring
14 Insert retainer
15 Thrust race
16 Snap ring*
17 Needle thrust bearing
18 Thrust race
19 Funnel

Reverse idler assembly



SMT850

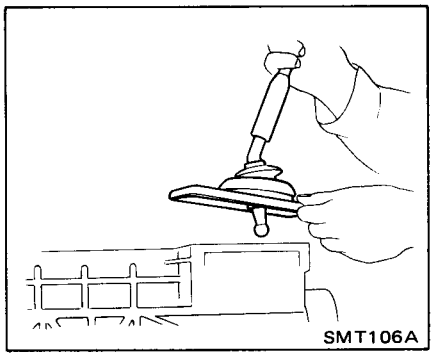
1 Reverse idler bushing } Not serviced
2 Reverse idler gear } separately
3 Reverse idler shaft
4 Spring pin*

*Always replace when disassembled.

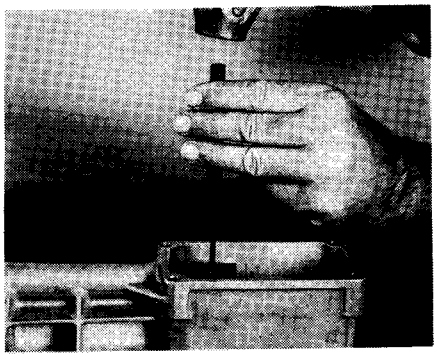
REAR EXTENSION

DISASSEMBLY

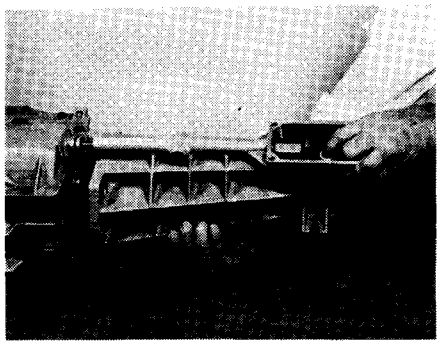
1. Wipe off dirt and grease.
2. Drain oil.
3. Remove shift lever assembly and damper sleeve.



4. Remove pin from offset lever.



5. Remove rear extension, offset lever, detent spring and ball by tapping it.



When disassembling rear extension, be careful not to lose thrust race and funnel.

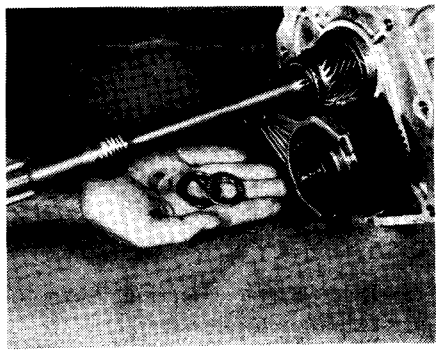
INSPECTION

1. Clean with solvent and check for cracks.
2. Check mating surface of rear extension for small nicks, projections or sealant.

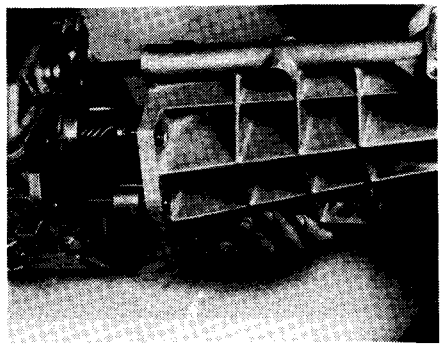
If the rear extension bushing or guide plate are worn, cracked or broken, replace them as an assembly of bushing, guide plate and rear extension housing.

ASSEMBLY

1. Clean mating surfaces of case and rear extension.
2. Apply a continuous bead of sealant to the mating surface of the case.
3. Retain the needle thrust bearing, race and funnel to the rear of the countershaft with Petroleum jelly.



4. Place detent ball, spring and offset lever into position on guide plate and install extension housing to the transmission case.



5. Align the hole in the shifter shaft with the hole in the offset lever and install the retaining pin.

6. Install rear extension bolts to transmission case.

Ⓣ : 27 - 62 N·m (2.8 - 6.3 kg-m, 20 - 46 ft-lb)

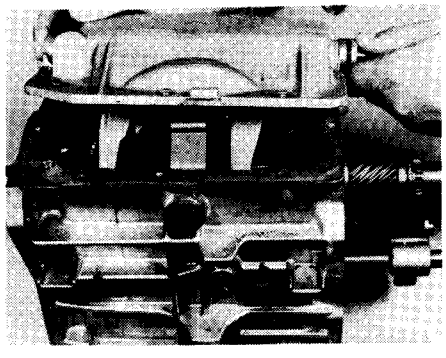
7. Apply a continuous bead of sealant to shift cover opening of rear extension.
8. Assemble damper sleeve into offset lever and install shift lever.
9. Make sure that gears operate smoothly.
10. Apply sealant to thread and install drain plug.

Ⓣ : 20 - 34 N·m (2.0 - 3.5 kg-m, 14 - 25 ft-lb)

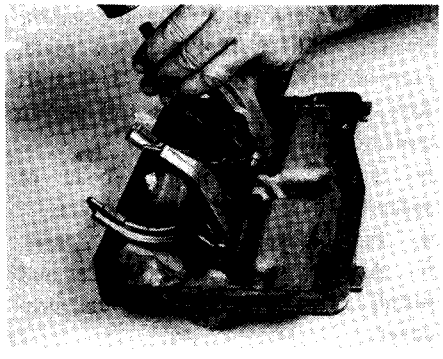
CASE COVER

DISASSEMBLY

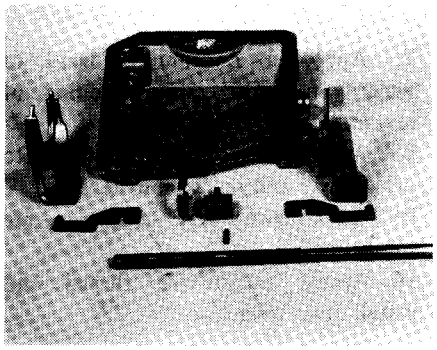
1. Remove rear extension. Refer to rear extension for disassembly.
2. Remove cover bolts and cover. Slide cover to right side of case and lift.



3. Pull shifter shaft to rear and remove shifter shaft roll pin.

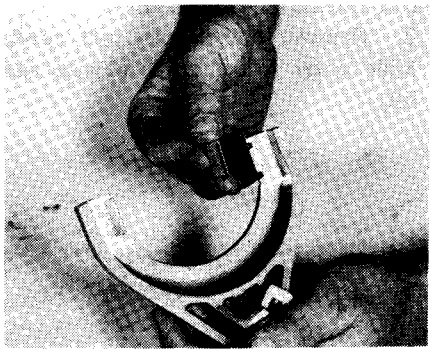


4. Remove shifter shaft through rear of case cover.
5. Slide selector plates from shift fork assemblies.



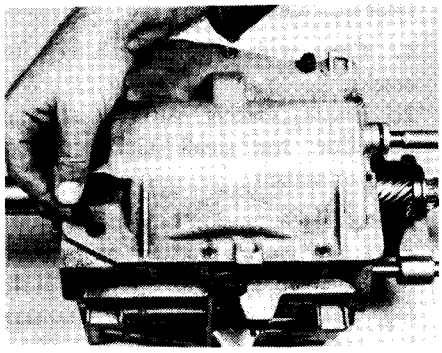
INSPECTION

1. Clean with solvent and check for wear, scratches, projections, damage, breakage or other faulty conditions. Replace any part which is worn or damaged.
2. Inspect shift fork inserts for wear or damage. Replace if necessary.



ASSEMBLY

1. Assemble selector plates to shift fork assemblies.
2. Install shifter shaft through opening in rear of case cover and assemble to 1–2 shift fork, interlock plate, control selector arm and 3–4 shift fork. Install shifter shaft roll pin to control selector arm.
3. Apply a continuous bead of sealant to case cover mating surface.
4. Install cover to case.
5. Apply sealant to threads and install two alignment dowels into cover.



6. Apply sealant to threads and install case cover bolts.

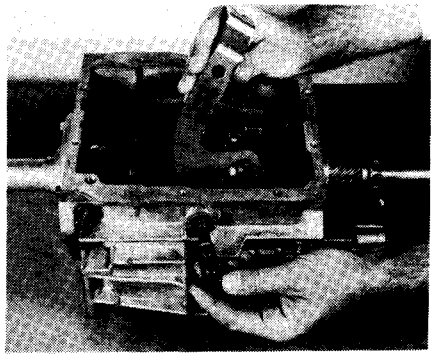
Ⓣ : 8.1 - 14.7 N·m (0.83 - 1.5 kg-m, 6.0 - 10.8 ft-lb)

7. Install rear extension. Refer to rear extension for assembly.

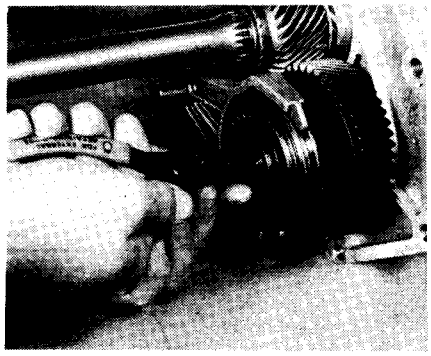
TRANSMISSION CASE

DISASSEMBLY

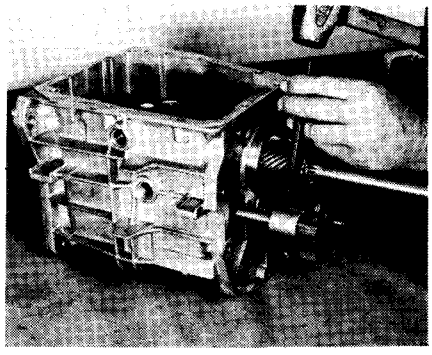
1. Remove rear extension. Refer to rear extension for disassembly.
2. Remove case cover. Refer to case cover for disassembly.
3. Remove reverse lamp switch.
4. Remove retainer ring and pivot pin.



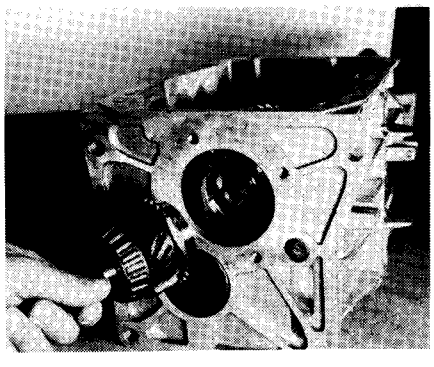
5. Remove funnel, thrust race, and needle thrust bearing.
6. Remove snap ring and thrust race from rear of 5th speed synchronizer hub.



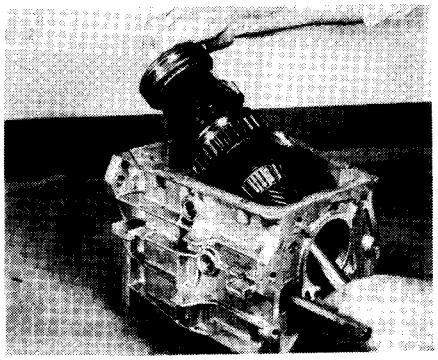
7. Remove pin from 5th speed shift fork.



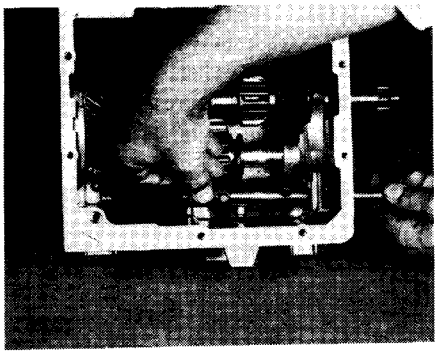
8. Remove 5th speed shift fork, synchronizer and counter gear.
9. Remove input shaft bearing retainer.
10. Remove input shaft and main drive gear assembly. Position flat area of main drive gear toward the counter gear and remove through the front of the case.



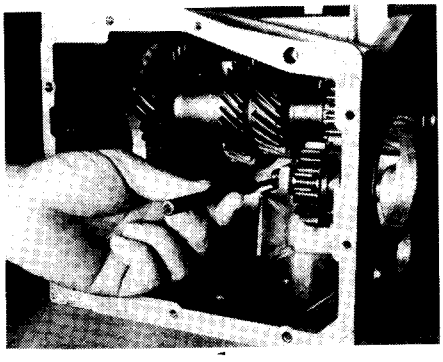
11. Remove mainshaft rear bearing race and remove mainshaft assembly through top of case.



12. Remove 5th and reverse shift rail, reverse shift fork with 5th and reverse relay lever, and spring.

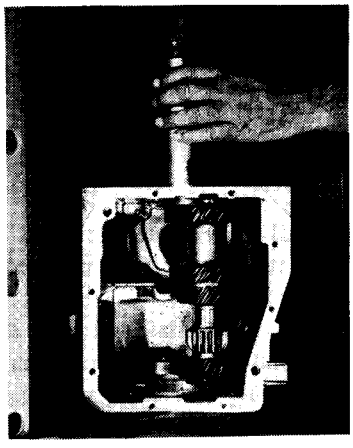


13. Remove pin from reverse idler shaft. Remove reverse idler shaft and gear.



14. Remove snap ring and spacer from rear of counter gear bearing.
15. Remove counter gear rear bearing by pressing counter gear toward rear of case until bearing is free. Remove bearing and spacer from rear of counter gear.

CAUTION:
When pressing out bearing, hold hand under counter gear so bearing does not drop.



16. Remove counter gear and front thrust washer through top of case.
17. Press front counter gear bearing from case.

This bearing should not be removed unless replacement is necessary.

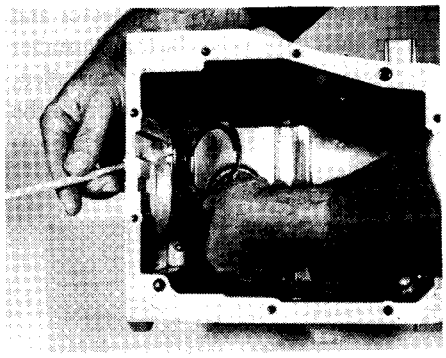
INSPECTION

1. Clean with solvent and check for cracks or pits.
2. Check mating surfaces of transmission case for small nicks, projections or sealant.

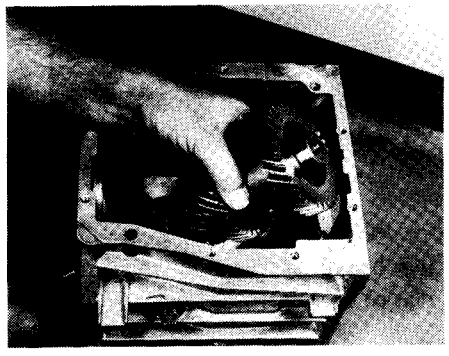
The magnet at the bottom of the case is held in place by a clip and a special glue. It should not be removed from the case.

ASSEMBLY

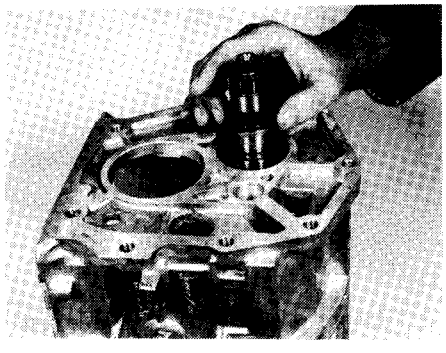
1. Install front counter gear bearing as follows:
(1) Apply a small bead of adhesive agent to outside diameter of bearing.
(2) Press bearing into case until the front edge is flush with the front edge of the case.
2. Install the counter gear thrust washer into the case being sure to align the tang with the notch in the case. Retain the washer in the case with a light coat of petroleum jelly.



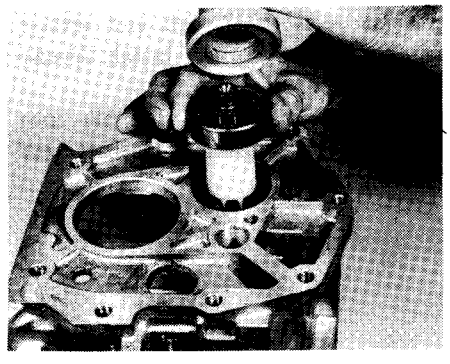
3. Install the counter gear into the case and engage its front journal into the front bearing.



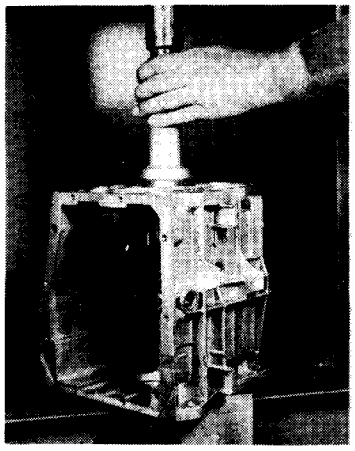
4. Install the rear counter gear bearing as follows:
(1) Install spacer to the rear of counter gear.



(2) Install bearing protector J-33032 on the counter gear.

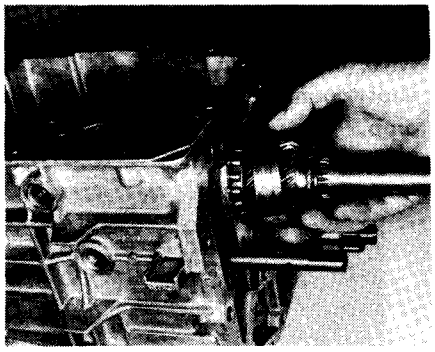


(3) Install bearing over protector and press into case using bearing installer J-29895. When properly installed, the bearing race will protrude from the case 3.12 to 3.22 mm (0.1228 to 0.1268 in).



(4) Install spacer and snap ring at rear of bearing.

5. Install reverse idler gear into case with shift fork groove toward the rear. Install reverse idler shaft, bushing and retaining pin.
6. Install reverse fork with 5th and reverse relay lever, 5th and reverse shift rail and spring. Install reverse lamp switch.
7. Install mainshaft assembly into the case and install mainshaft rear bearing race.

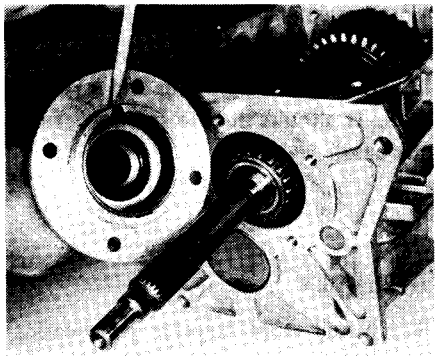


8. Install roller bearings into the main drive gear. Retain with petroleum jelly.
9. Install input shaft and main drive gear assembly, needle thrust bearing, thrust bearing race and blocking ring into case.

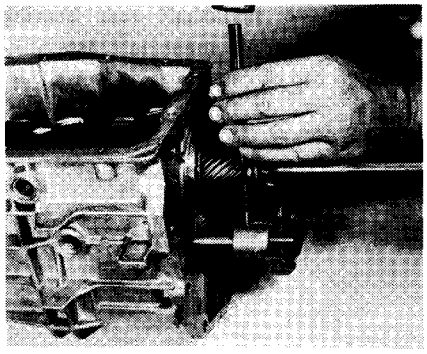
Be sure to align the flat area of the main drive gear with the countergear and install carefully so as not to dislodge the roller bearings.

10. Remove at least 0.15 mm shims (0.0059 in) from under front bearing race in bearing retainer. Install remaining shims and race into retainer.
11. Install front bearing retainer to case. Be sure to position it so that the oil collector groove is up.

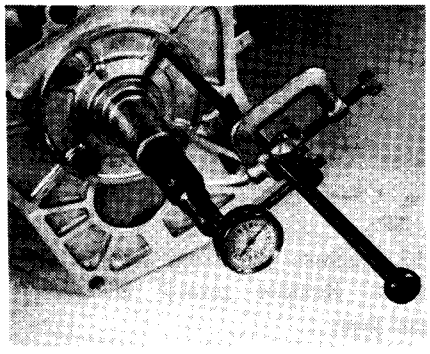
Ⓣ : 15 - 27 N·m (1.5 - 2.8 kg-m, 11 - 20 ft-lb)



12. Install 5th speed shift fork, 5th speed counter gear and synchronizer as a unit. Align pin holes in shift fork and shift rail and install retaining pin.



13. Install thrust race and snap ring to rear of 5th speed synchronizer hub.
14. Install case cover. Refer to case cover for assembly.
15. Install rear extension. Refer to rear extension for assembly.
16. Push input shaft to rear and mount dial indicator so that its stem rests against the front end of the input shaft. Zero indicator.
17. Push output shaft forward and read indicator. Record reading for calculation. Remove indicator.



18. Remove bearing retainer and bearing race. Select proper thickness shim to provide 0.13 to 0.25 mm (0.0051 to 0.0098 in) preload.

Calculation Example:

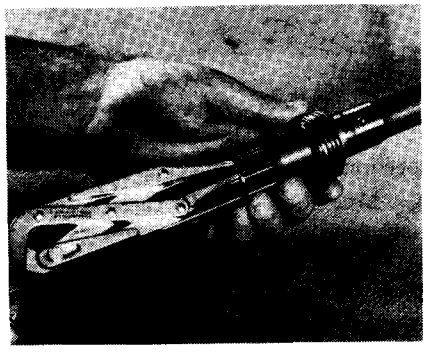
A + B = Shim size		
(A)	**Indicator reading (clearance)**	**0.10 mm**
(B)	**Desired preload**	**0.20 mm**
Additional shim required		**0.30 mm**

19. Apply a continuous bead of sealant to bearing retainer mating surface and threads of bolts.
20. Install shims and bearing race into bearing retainer and install the bearing retainer as in Step 11.

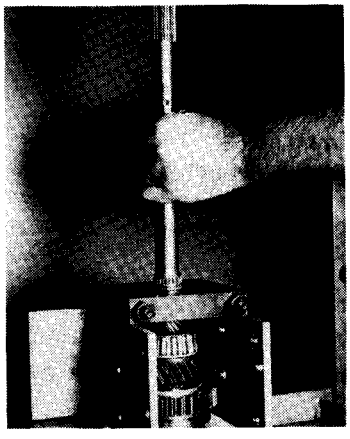
GEARS & SHAFTS

DISASSEMBLY

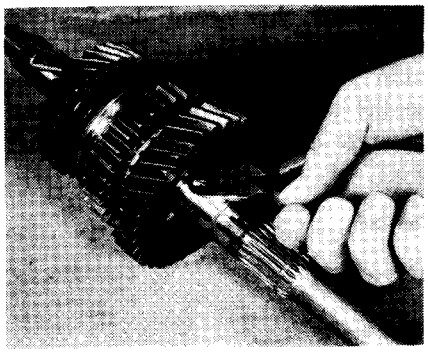
1. Remove rear extension. Refer to rear extension for disassembly.
2. Remove case cover. Refer to case cover for disassembly.
3. Remove transmission case. Refer to transmission case for disassembly.
4. Remove speedometer gear and drive ball from mainshaft.



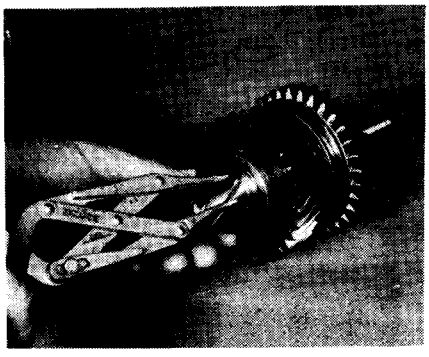
5. Press 3rd and 4th synchronizer from front of mainshaft. Remove 3rd speed gear.
6. Press 5th speed gear from mainshaft.



7. Slip rear bearing off shaft. Remove thrust washer.
8. Remove 1st speed gear.



9. Remove snap ring, thrust washer, and second speed gear.



10. Remove 1st and 2nd synchronizer sleeve, inserts and springs.

INSPECTION

Bearings

1. Thoroughly clean and dry with compressed air.

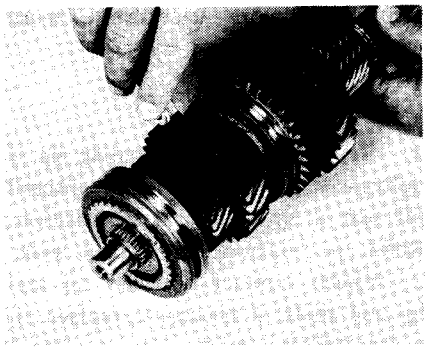
CAUTION:
Do not allow bearing to spin as it will damage the race and rollers.

2. When race or rollers are worn or rough, replace bearing.
3. Replace needle rollers if worn or damaged.

Gears and shafts

1. Check all gears for excessive wear, chips or cracks; replace as required.
2. Check shafts for bending, cracks, wear and worn splines; replace if necessary.

3. Measure gear end play.
- It is necessary to measure end play before disassembling mainshaft and also after reassembling it.

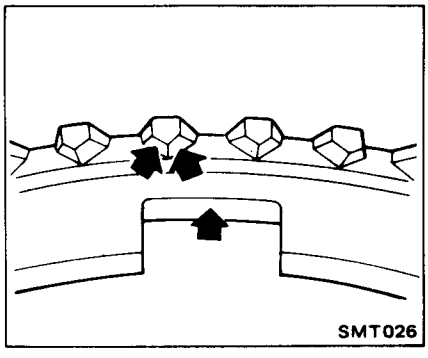


- If end play is not within specified limits, disassemble and check parts for condition.
- Replace any part which is worn or damaged.

Standard end play:
1st main gear
0.10 - 0.25 mm
(0.0039 - 0.0098 in)
2nd main gear
0.10 - 0.25 mm
(0.0039 - 0.0098 in)
3rd main gear
0.15 - 0.40 mm
(0.0059 - 0.0157 in)
5th counter gear
0.10 - 0.48 mm
(0.0039 - 0.0189 in)
Counter gear
0.25 - 0.50 mm
(0.0098 - 0.0197 in)

Baulk rings

1. Replace baulk ring if found to be deformed, cracked or otherwise damaged.
2. Check teeth and insert notches for wear.



3. Inspect cone surface for excessive wear.

Shifting insert

Replace if worn excessively, worn unevenly, or damaged.

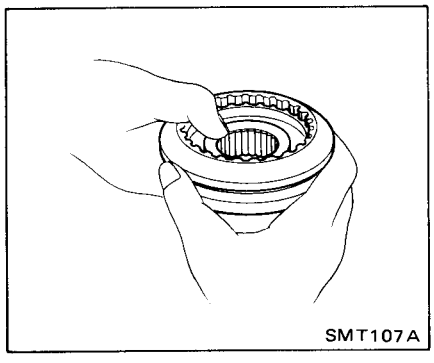
Oil seals

1. Replace oil seal if sealing lip is deformed or cracked. Also discard oil seal if spring is out of position. Refer to replacement of oil seals.
2. Check contact between oil seal lip and shaft; if necessary, replace oil seal and shaft as a set.

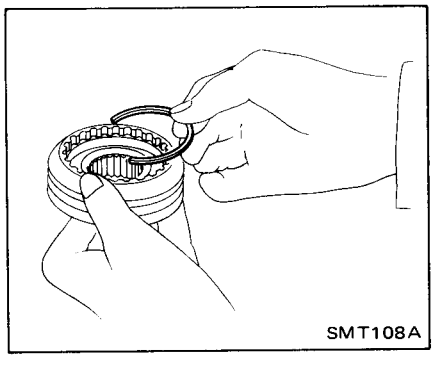
ASSEMBLY

Synchronizers

1. Assemble coupling sleeve to synchronizer hub. Make sure that the sleeve slides freely on the hub.


SMT107A

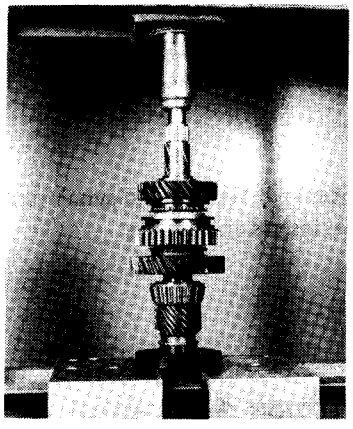
2. Position shifting inserts into 3 slots in synchronizer hub with raised portion facing outward.
3. Install first insert spring with hooked end engaged to one of the shift inserts.


SMT108A

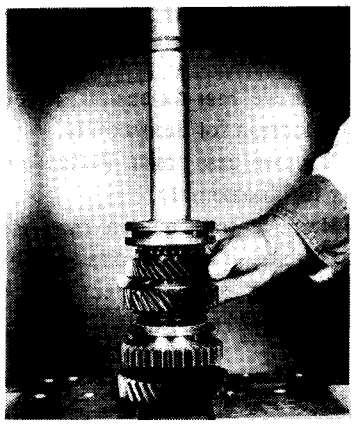
4. Install the second insert spring on the opposite side of the synchronizer with the hooked end engaged to the same insert but turned in the opposite direction of the first spring.

Mainshaft

1. Assemble the 1st and 2nd synchronizer sleeve, inserts and springs to the synchronizer hub.
2. Install 2nd speed gear, thrust washer and snap ring.
3. Install 1st speed gear.
4. Install thrust washer against 1st speed gear.
5. Install rear bearing and press 5th speed gear onto mainshaft using special tool J-26010-01.



6. Install 3rd speed gear. Press 3rd and 4th synchronizer onto front of mainshaft using special tool J-25863-01. Be sure that the portion of the hub with the extended hose is toward the front.



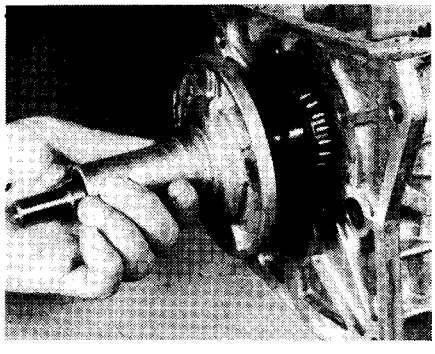
7. Install speedometer drive ball, speedometer gear, and snap ring.
8. Install transmission case. Refer to transmission case for assembly.
9. Install case cover. Refer to case cover for assembly.
10. Install rear extension. Refer to rear extension for assembly.

REPLACEMENT OF OIL SEALS

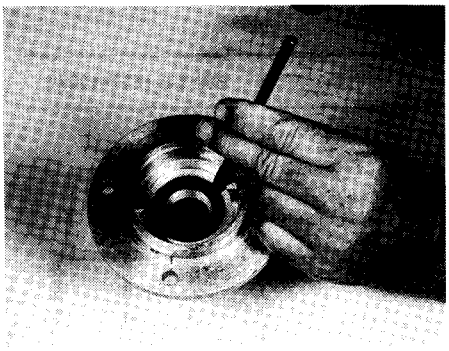
FRONT BEARING RETAINER SEAL

It is necessary to remove transmission unit from car. Replace oil seal as follows:

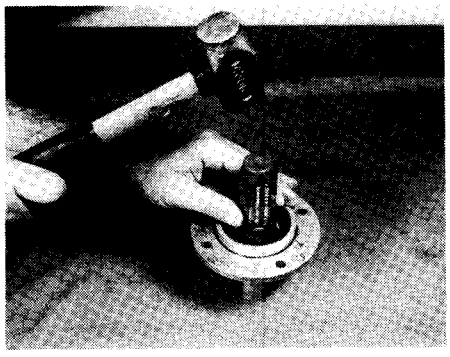
1. Remove transmission. Refer to removal.
2. Wipe off dirt and grease.
3. Drain oil.
4. Remove front bearing retainer.



5. Remove oil seal.



6. Clean bearing retainer and case mating surface.
7. Check bearing retainer and mating surface for cracks, nicks, projections or sealant.
8. Apply a coat of transmission fluid to oil seal surface and install seal using seal installer J-23096.



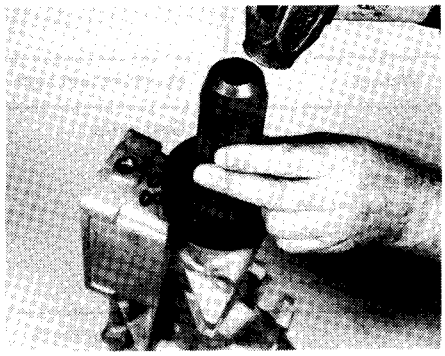
9. Install front bearing retainer to case. Be sure to position it so that the oil collector groove is up.

Ⓣ : **15 - 27 N·m (1.5 - 2.8 kg-m, 11 - 20 ft-lb)**

10. Install transmission. Refer to installation.

REAR EXTENSION OIL SEAL

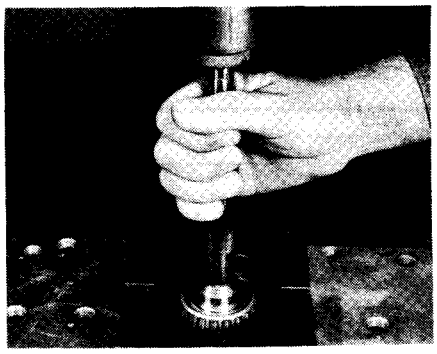
The rear extension oil seal can be replaced without removing transmission from car.
1. Remove propeller shaft. Refer to propeller shaft (section PD) for removal.
2. Remove oil seal.
3. Apply a coat of transmission fluid to oil seal surface and drive new seal into place using seal installer J-28894.



4. Install propeller shaft. Refer to propeller shaft (section PD) for installation.

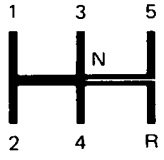
REPLACEMENT OF BEARINGS

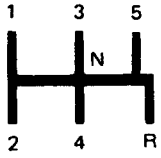
1. Remove rear extension. Refer to rear extension for disassembly.
2. Remove case cover. Refer to case cover for disassembly.
3. Remove input shaft, mainshaft, counter gear and counter gear front bearing. Refer to transmission case for disassembly.
4. Press main drive bearing from input shaft.



5. Press new main drive bearing to input shaft using special tool J-26010-01.
6. Replace rear bearing. Refer to gears and shafts for disassembly and assembly.
7. Install front and rear countergear bearings. Refer to transmission case for assembly.
8. Install transmission case. Refer to transmission case for assembly.
9. Install case cover. Refer to case cover for assembly.
10. Install rear extension. Refer to rear extension for assembly.

General Specifications

Transmission model		FS5W71C
Shift pattern		
Synchromesh type		Warner
Gear ratio		
	1st	3.321
	2nd	1.902
	3rd	1.308
	4th	1.000
	O.D.	0.759
	Reverse	3.382
Number of teeth		
Main drive gear		22
Main bear	1st	33
	2nd	27
	3rd	26
	O.D.	21
	Reverse	36
Counter drive gear		31
Counter gear	1st	14
	2nd	20
	3rd	28
	O.D.	39
	Reverse	15
Reverse idler gear		21
Oil capacity	liter (US pt, Imp pt)	1.9 (4, 3-3/8)

Transmission model		BW T-5 (FS5R90A)
Shift pattern		
Synchromesh type		Warner
Gear ratio		
	1st	3.350
	2nd	2.056
	3rd	1.376
	4th	1.000
	O.D.	0.752
	Reverse	3.153
Number of teeth		
Main drive gear		23
Main gear	1st	34
	2nd	32
	3rd	27
	O.D.	29
	Reverse	32
Counter drive gear		34
Counter gear	1st	15
	2nd	23
	3rd	29
	O.D.	57
	Reverse	15
Reverse idler gear		20
Oil capacity	liter (US pt, Imp pt)	1.9 (4, 3-3/8)

FOR MODEL FS5W71C

Gears

Unit: mm (in)

Gear backlash	
Main drive gear	0.05 - 0.10 (0.0020 - 0.0039)
1st gear	0.05 - 0.20 (0.0020 - 0.0079)
2nd gear	0.05 - 0.20 (0.0020 - 0.0079)
3rd gear	0.05 - 0.20 (0.0020 - 0.0079)
O.D. gear	0.05 - 0.20 (0.0020 - 0.0079)
Reverse idler gear	0.05 - 0.20 (0.0020 - 0.0079)
Gear end play	
1st gear	0.31 - 0.41 (0.0122 - 0.0161)
2nd gear	0.11 - 0.21 (0.0043 - 0.0083)
3rd gear	0.11 - 0.21 (0.0043 - 0.0083)
O.D. gear	0.32 - 0.39 (0.0126 - 0.0154)
Reverse idler gear	0.05 - 0.50 (0.0020 - 0.0197)
Baulk ring to gear clearance	
Standard	
1st & 2nd gear	1.00 - 1.60 (0.0394 - 0.0630)
3rd & main drive gear	1.20 - 1.60 (0.0472 - 0.0630)
O.D. gear	1.00 - 1.40 (0.0394 - 0.0551)
Wear limit	
1st & 2nd gear	0.8 (0.031)
3rd & main drive gear	0.8 (0.031)
O.D. gear	0.5 (0.020)

Available snap ring

Main drive gear bearing

Thickness mm (in)	Part number
1.73 (0.0681)	32204 - 78005
1.80 (0.0709)	32204 - 78000
1.87 (0.0736)	32204 - 78001
1.94 (0.0764)	32204 - 78002
2.01 (0.0791)	32204 - 78003
2.08 (0.0819)	32204 - 78004

Mainshaft front

Thickness mm (in)	Part number
2.4 (0.094)	32263 - V5200
2.5 (0.098)	32263 - V5201
2.6 (0.102)	32263 - V5202

Mainshaft rear end bearing

Thickness mm(in)	Part number
1.1 (0.043)	32228 - 20100
1.2 (0.047)	32228 - 20101
1.3 (0.051)	32228 - 20102
1.4 (0.055)	32228 - 20103

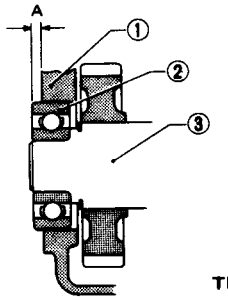
Counter drive gear

Thickness mm (in)	Part number
1.4 (0.055)	32215 - E9000
1.5 (0.059)	32215 - E9001
1.6 (0.063)	32215 - E9002

Available shim

Counter front bearing

Unit: mm (in)



TM371

A: Distance from bearing surface to transmission case

1 Transmission case
2 Counter gear front bearing
3 Counter gear

"A"	Thickness of shim	Part number
4.52 - 4.71 (0.1780 - 0.1854)	Not necessary	
4.42 - 4.51 (0.1740 - 0.1776)	0.1 (0.004)	32218 - V5000
4.32 - 4.41 (0.1701 - 0.1736)	0.2 (0.008)	32218 - V5001
4.22 - 4.31 (0.1661 - 0.1697)	0.3 (0.012)	32218 - V5002
4.12 - 4.21 (0.1622 - 0.1657)	0.4 (0.016)	32218 - V5003
4.02 - 4.11 (0.1583 - 0.1618)	0.5 (0.020)	32218 - V5004
3.92 - 4.01 (0.1543 - 0.1579)	0.6 (0.024)	32218 - V5005

FOR MODEL BW T-5 (FS5R90A)

Unit: mm (in)

Transmission model	FS5R90A
Gear backlash	
Main drive gear	0.05 - 0.15 (0.0020 - 0.0059)
1st gear	0.05 - 0.15 (0.0020 - 0.0059)
2nd gear	0.05 - 0.15 (0.0020 - 0.0059)
3rd gear	0.05 - 0.15 (0.0020 - 0.0059)
5th gear	0.05 - 0.15 (0.0020 - 0.0059)
Reverse idler gear	0.10 - 0.20 (0.0039 - 0.0079)
Gear end play	
1st main gear	0.10 - 0.25 (0.0039 - 0.0098)
2nd main gear	0.10 - 0.25 (0.0039 - 0.0098)
3rd main gear	0.15 - 0.40 (0.0059 - 0.0157)
5th counter gear	0.10 - 0.48 (0.0039 - 0.0189)
Counter gear	0.25 - 0.50 (0.0098 - 0.0197)
Main drive gear bearing	
Preload	0.13 - 0.25 (0.0051 - 0.0098)

Inspection and Adjustment (Cont'd)

Main drive gear bearing adjusting shim

Thickness mm (in)	Part number
0.31 (0.0122)	C2204-P9513
0.36 (0.0142)	C2204-P9510
0.41 (0.0161)	C2204-P9511
0.46 (0.0181)	C2204-P9512
0.51 (0.0201)	C2204-P9514
0.56 (0.0220)	C2204-P9516
0.81 (0.0319)	C2204-P9517
0.92 (0.0362)	C2204-P9515
1.12 (0.0441)	C2204-P9518

Tightening Torque

TRANSMISSION INSTALLATION

Unit	N·m	kg-m	ft-lb
Clutch operating cylinder	30 - 40	3.1 - 4.1	22 - 30
Transmission to engine	39 - 49	4.0 - 5.0	29 - 36
Engine gusset to transmission	29 - 39	3.0 - 4.0	22 - 29
Crossmember to body	31 - 42	3.2 - 4.3	23 - 31
Rear mounting insulator to crossmember	31 - 42	3.2 - 4.3	23 - 31
Rear mounting insulator to rear extension	31 - 42	3.2 - 4.3	23 - 31
Starter motor to transmission	29 - 39	3.0 - 4.0	22 - 29

GEAR ASSEMBLY

Model: FS5W71C

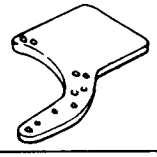
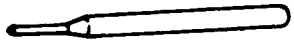
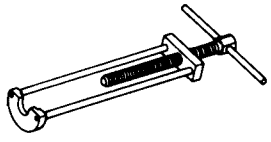
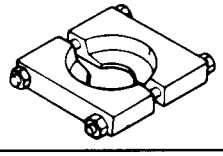
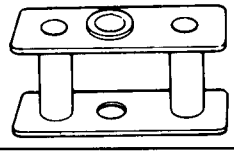
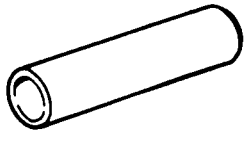
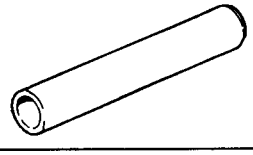
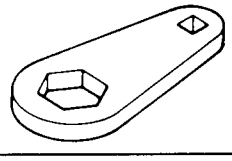
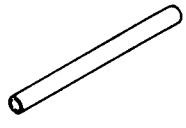
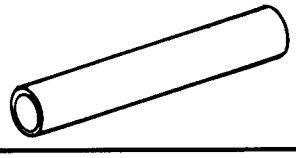
Unit	N·m	kg-m	ft-lb
Rear extension to transmission case	16 - 20	1.6 - 2.0	12 - 14
Front cover to transmission case	16 - 21	1.6 - 2.1	12 - 15
Control housing to rear extension	14 - 18	1.4 - 1.8	10 - 13
Ball pin	20 - 34	2.0 - 3.5	14 - 25
Filler plug	25 - 34	2.5 - 3.5	18 - 25
Drain plug	25 - 34	2.5 - 3.5	18 - 25
Speedometer sleeve installation	4 - 5	0.4 - 0.5	2.9 - 3.6
Return spring plug	20 - 29	2.0 - 3.0	14 - 22
Reverse check sleeve to transmission case	4 - 5	0.4 - 0.5	2.9 - 3.6
Reverse lamp switch	20 - 29	2.0 - 3.0	14 - 22
Check ball plug	19 - 25	1.9 - 2.5	14 - 18
Mainshaft lock nut	137 - 167	14.0 - 17.0	101 - 123
Countershaft lock nut	98 - 127	10.0 - 13.0	72 - 94
Striking lever lock nut	9 - 12	0.9 - 1.2	6.5 - 8.7
Bearing retainer to adapter plate	19 - 25	1.9 - 2.5	14 - 18

Model: BW T-5 (FS5R90A)

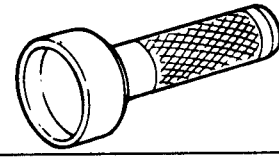
Unit	N·m	kg-m	ft-lb
Clutch housing to case	41 - 69	4.2 - 7.0	30 - 51
Cover to case	8.1 - 14.7	0.83 - 1.5	6.0 - 10.8
Front retainer to case	15 - 27	1.5 - 2.8	11 - 20
Filler plug	20 - 34	2.0 - 3.5	14 - 25
Drain plug	20 - 34	2.0 - 3.5	14 - 25
Speedometer sleeve	4 - 5	0.4 - 0.5	2.9 - 3.6
Reverse lamp switch	17 - 24	1.7 - 2.4	12 - 17
Reverse pivot pin	21 - 33	2.1 - 3.4	15 - 25
Neutral switch	20 - 29	2.0 - 3.0	14 - 22
Extension to case	27 - 62	2.8 - 6.3	20 - 46
Control lever housing to extension	15 - 27	1.5 - 2.8	11 - 20

SPECIAL SERVICE TOOLS

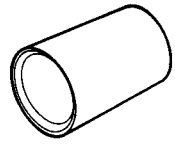
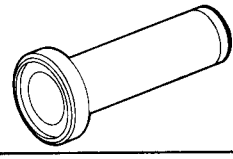
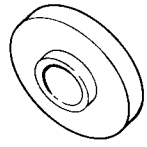
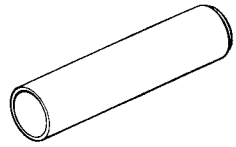
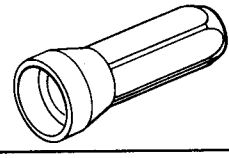
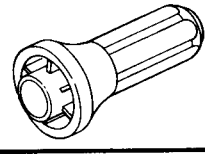
Model: FS5W71C

Tool number (Kent-Moore No.)	Tool name	
ST23810001 (—)	Adapter setting plate	
KV31100300 (J25689-A)	Fork rod pin punch	
KV32101330 (See J26349-A.)	Bearing puller	
ST30031000 (J22912-01)	Bearing puller	
KV31100401 (—)	Transmission press stand	
ST23860000 (—)	Counter gear drift	
ST22360002 (J25679-01)	Bearing drift	
ST22520000 (J26348)	Wrench	
ST22350000 (J25678-01)	Mainshaft bearing drift	
ST23800000 (J25691-01)	Transmission adapter	

SPECIAL SERVICE TOOLS

Tool number (Kent-Moore No.)	Tool name
ST33400001 (J26082)	Oil seal drift 
ST33290001 (J25810-A)	Bearing puller 

Model: BW T-5 (FS5R90A)

J-33032*		Tapered sleeve — for installing countershaft rear bearing.
J-29895*		Countershaft rear bearing installer — for pressing bearing to correct depth.
J26010-01*		Press tool — for installing 5th speed gear on output shaft and for installing roller bearing on main drive gear.
J-25863-01*		Press tool — for installing 3rd and 4th synchromesh on output shaft.
J-23096*		Front bearing retainer seal installer.
J-28894*		Extension housing seal installer.

*: Kent-Moore No.