

# MANUAL TRANSMISSION

## SECTION **MT**

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# REMOVAL AND INSTALLATION

## Removal

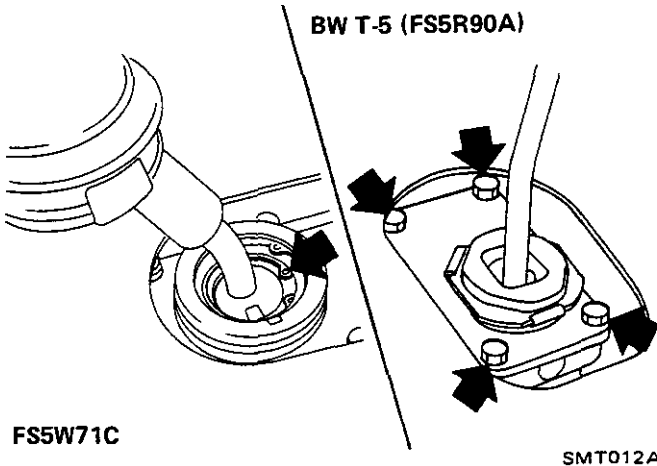
- Remove exhaust front tube, catalytic converter and exhaust manifold connecting tube  
Refer to EM section.
- Remove propeller shaft.  
Refer to PD section

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

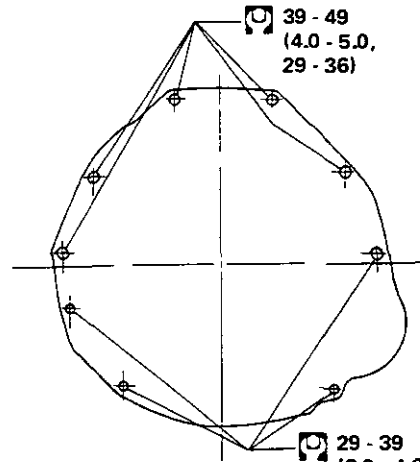



### WARNING:

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

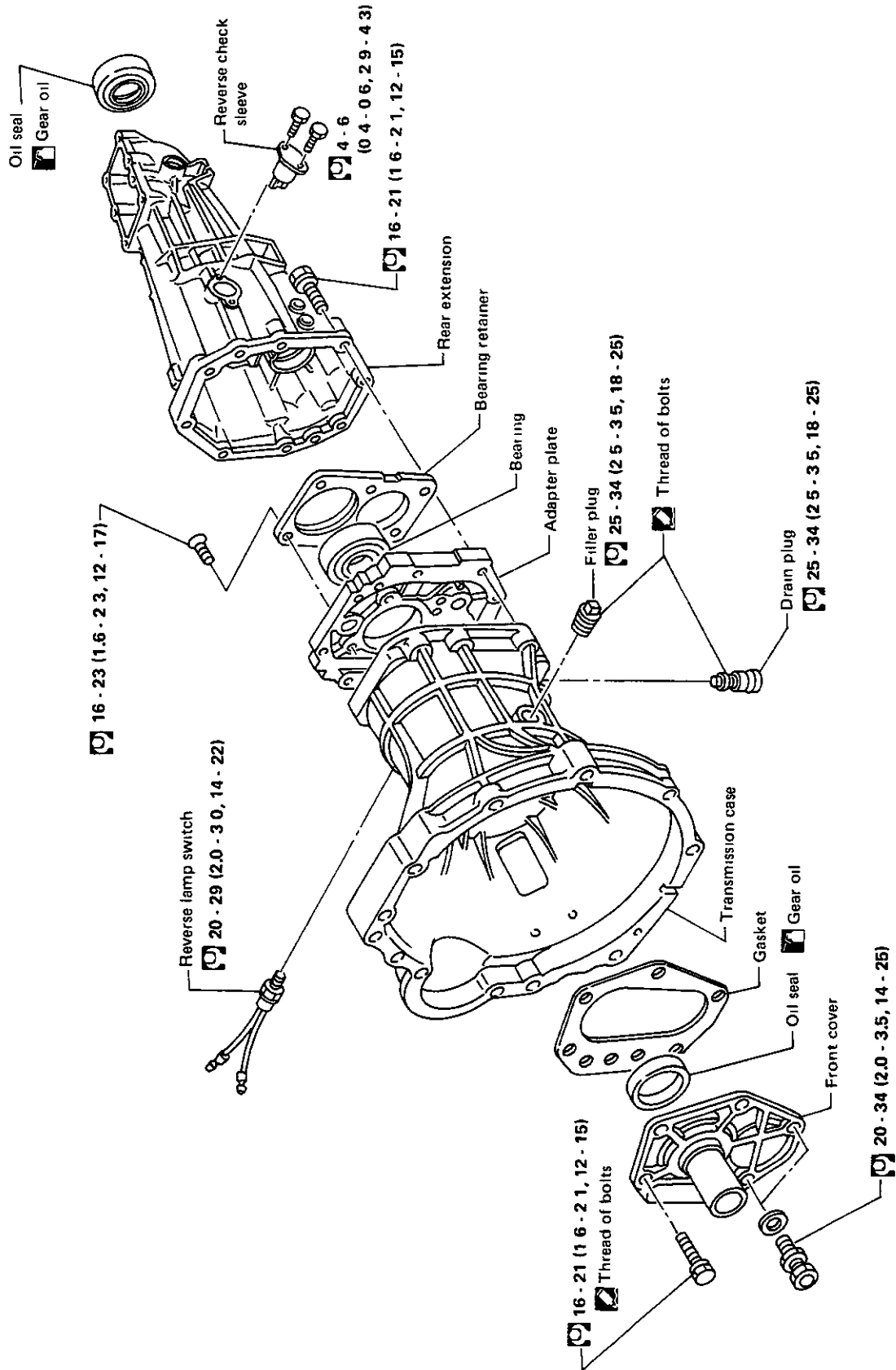
# ON-VEHICLE SERVICE

- Rear extension oil seal.



# MAJOR OVERHAUL—FS5W71C

## Case Components

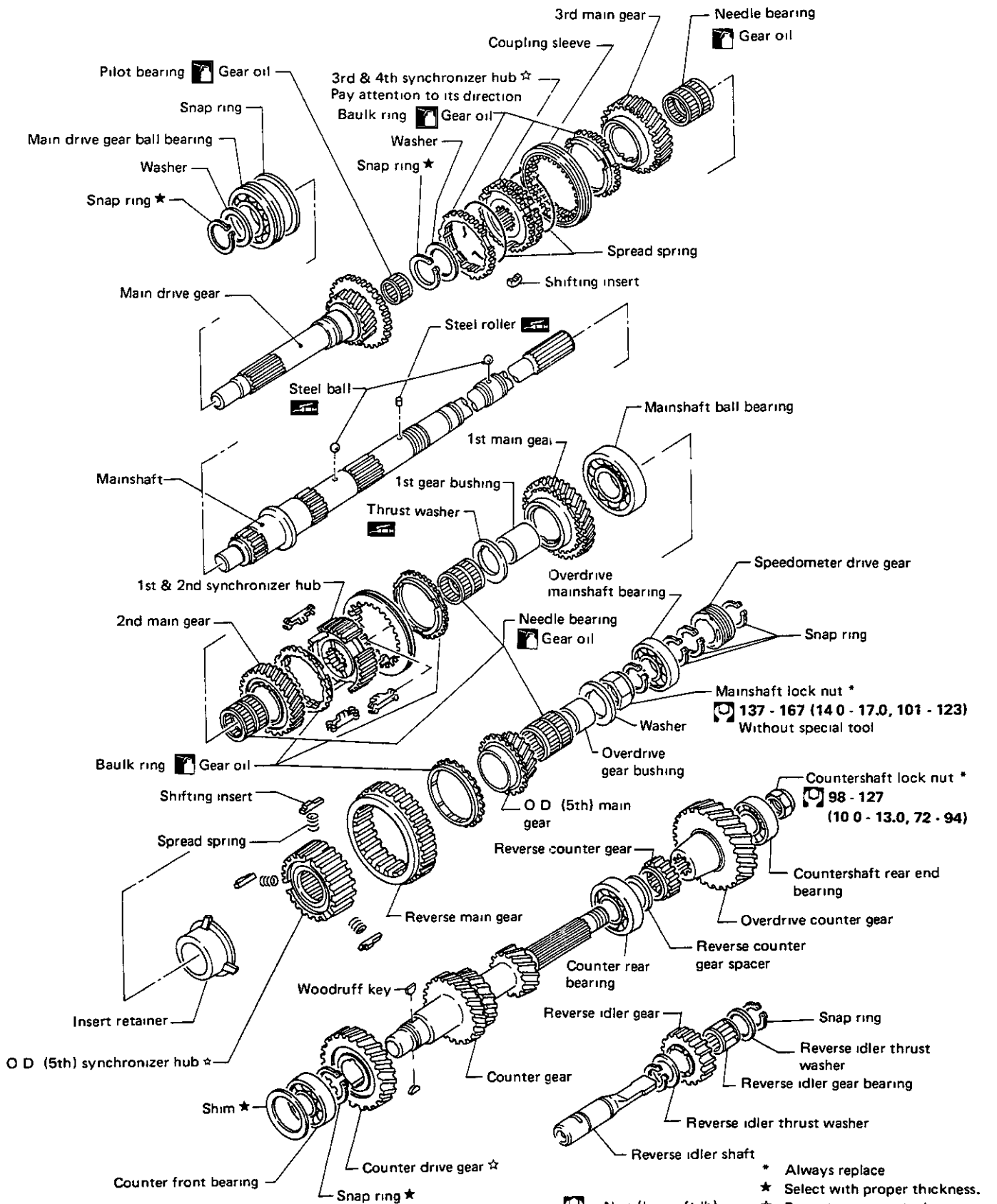


N m (kg-m, ft-lb)

SMT979

# MAJOR OVERHAUL—FS5W71C

## Gear Components



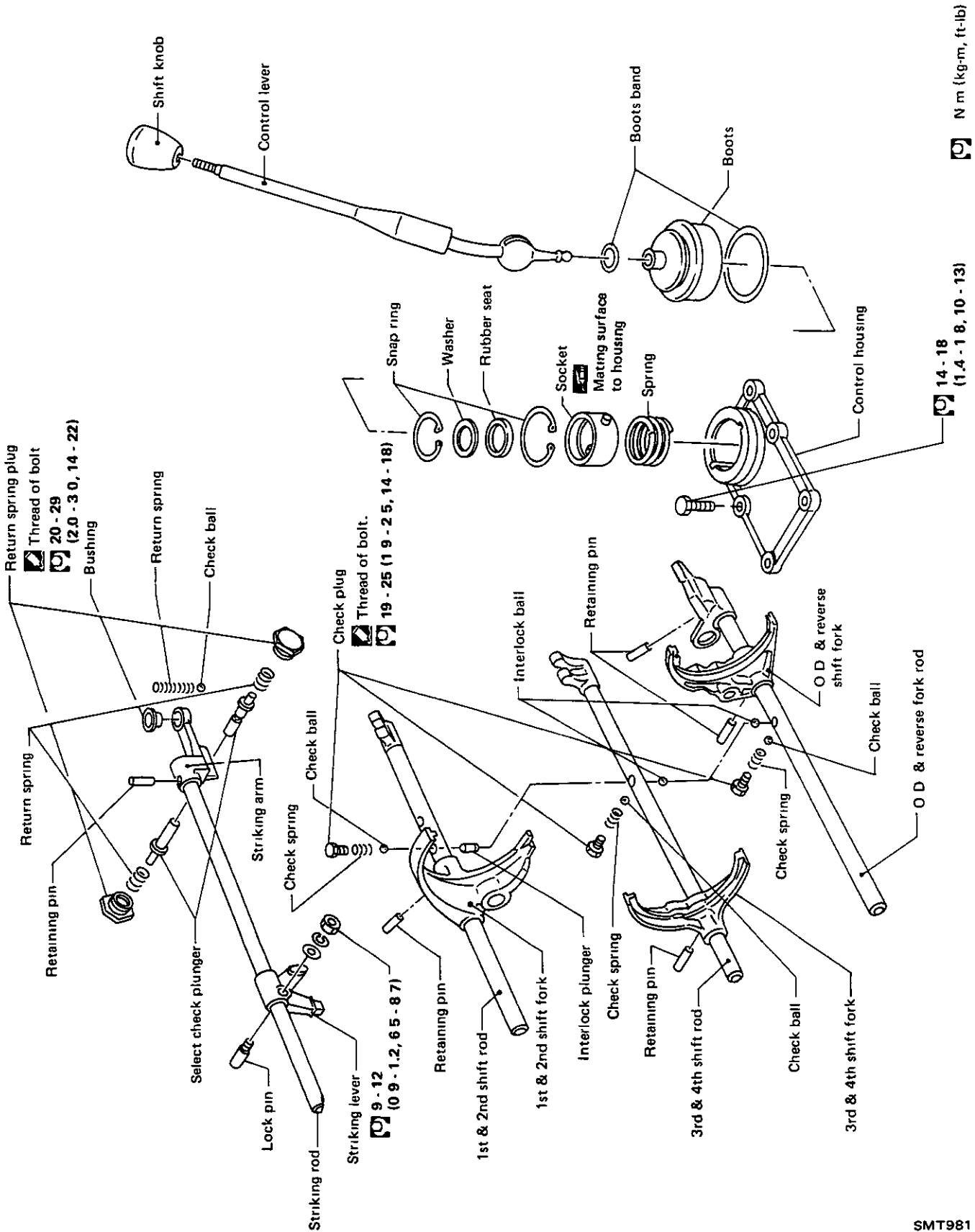
SMT980

N m (kg-m, ft-lb)

\* Always replace  
 ★ Select with proper thickness.  
 ☆ Pay attention to its direction.

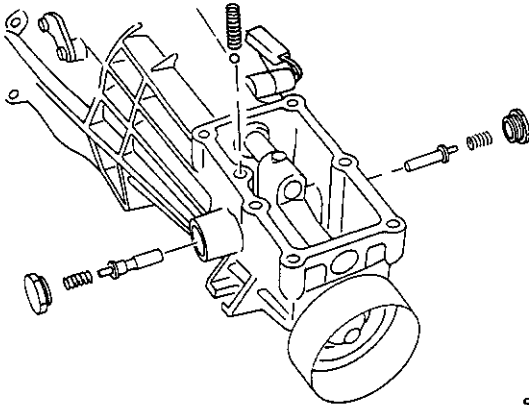
# MAJOR OVERHAUL—FS5W71C

## Shift Control Components



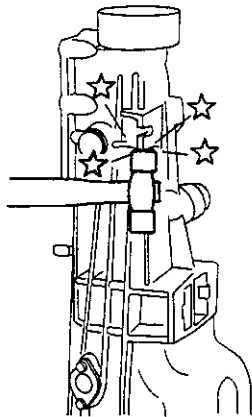
# DISASSEMBLY—FS5W71C

- 1 Remove control housing, check ball and plunger.



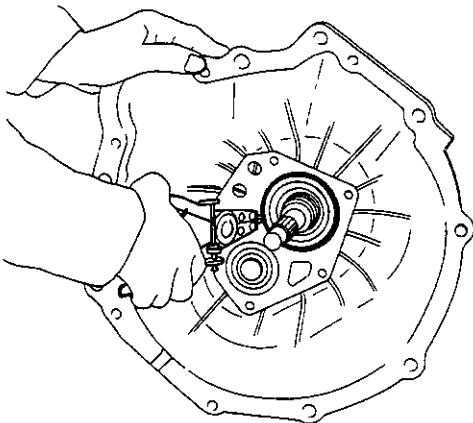
SMT982

- 2 Remove rear extension by lightly tapping it.



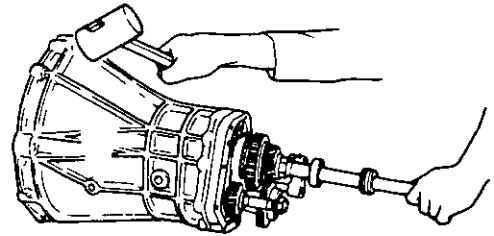
SMT983

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



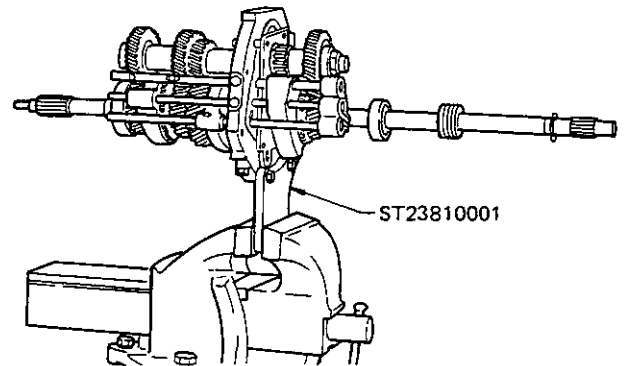
SMT011

- 4 Separate transmission case from adapter plate



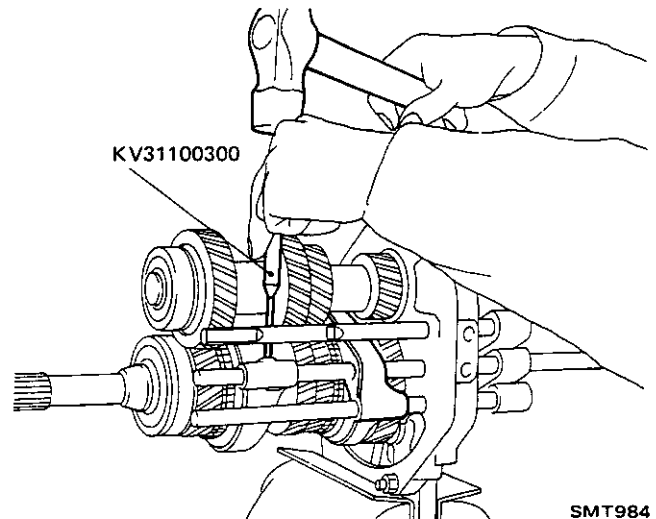
TM753

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



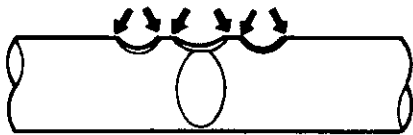
SMT984

# REPAIR FOR COMPONENT PARTS—FS5W71C

## Forks and Fork Rods

### INSPECTION

- Check for wear, scratches, projection or damage.

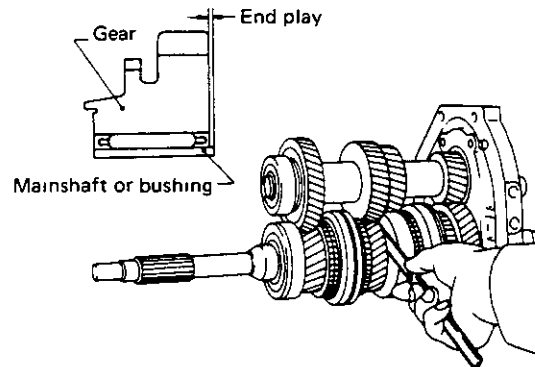


SMT137

## Gears and Shafts

### DISASSEMBLY

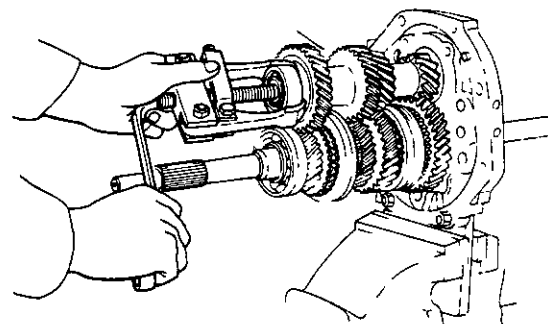
1. Before disassembly, measure each gear end play.
  - If end play is not within the specified limit, disassemble and check the parts
  - Replace any part which is worn or damaged



SMT025

Gear	End play mm (in)
1st	0.31 - 0.37 (0.0122 - 0.0146)
2nd	0.11 - 0.17 (0.0043 - 0.0067)
3rd	0.11 - 0.17 (0.0043 - 0.0067)
O D	0.32 - 0.35 (0.0126 - 0.0138)
Reverse idler	0.05 - 0.50 (0.0020 - 0.0197)

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



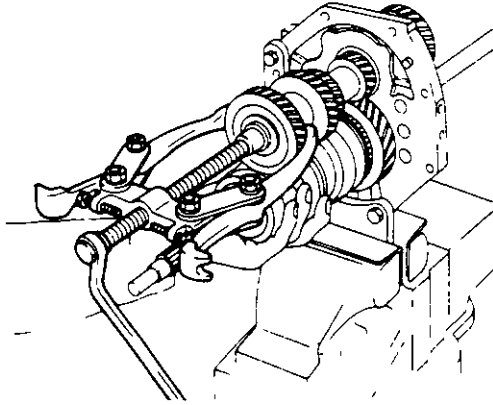
TM398



# REPAIR FOR COMPONENT PARTS—FS5W71C

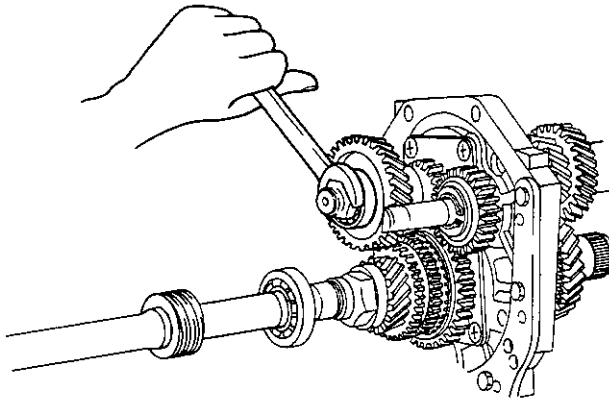
## Gears and Shafts (Cont'd)

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



SMT023

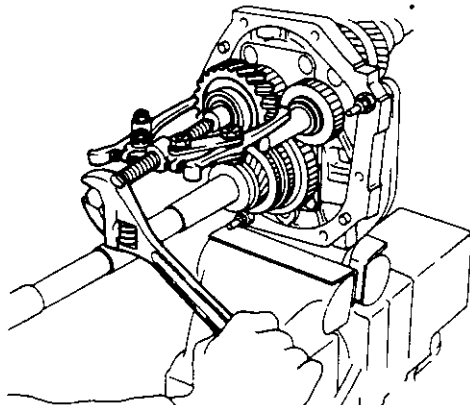
- 4 Remove snap ring and draw out 3rd & 4th synchronizer and 3rd gear
- 5 Release staking on counter gear nut and mainshaft nut and loosen these nuts



TM757

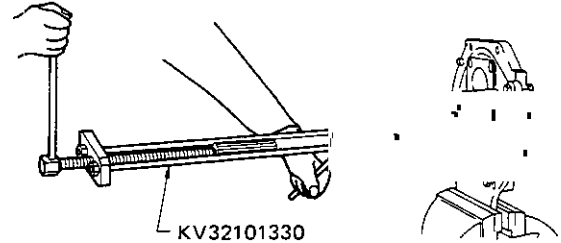
Mainshaft nut: Left-hand thread

- 6 Pull out counter O.D gear with bearing



SMT042

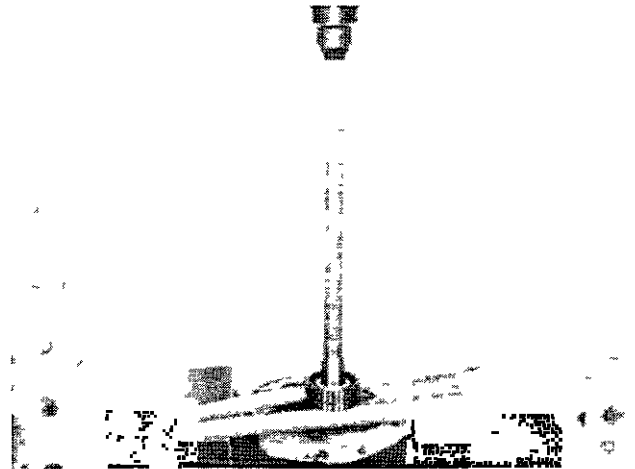
- 7 Draw out reverse counter gear and spacer.
- 8 Remove snap ring from reverse idler shaft, and draw out reverse idler gear
- 9 Remove snap rings, steel ball, speedometer gear and bearing



KV32101330

TM760

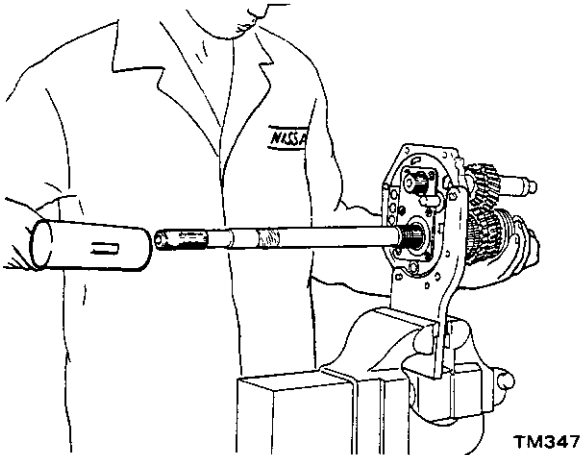
10. Remove mainshaft nut, thrust washer, steel ball, steel roller, needle bearing, O D gear and baulk ring
- 11 Remove O D gear bushing, insert retainer and O D synchronizer.



# REPAIR FOR COMPONENT PARTS—FS5W71C

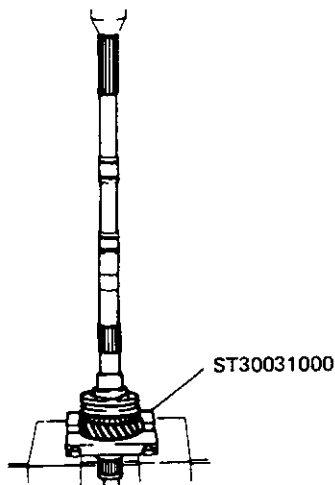
## Gears and Shafts (Cont'd)

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



- 13 Remove thrust washer, steel ball, and 1st gear. Be careful not to lose steel ball.

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

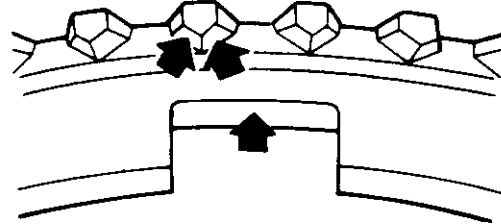


### INSPECTION

- 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



- 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 - 1.40 mm  
(0.0394 - 0.0551 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

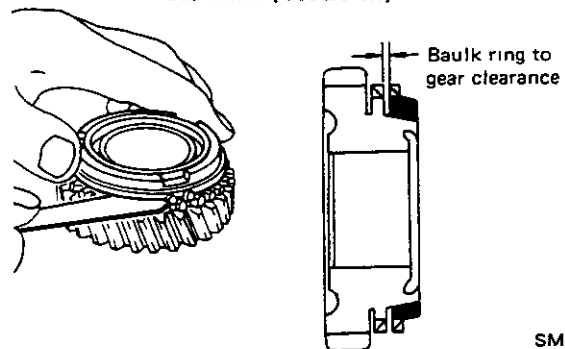
0.5 mm (0.020 in)

##### 3rd & main drive gear

0.8 mm (0.031 in)

##### O.D. gear

0.5 mm (0.020 in)

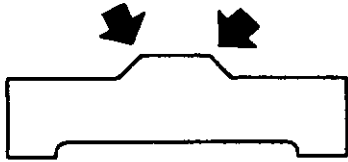


# REPAIR FOR COMPONENT PARTS—FS5W71C

## Gears and Shafts (Cont'd)

### Shifting inserts and springs

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



SMT064

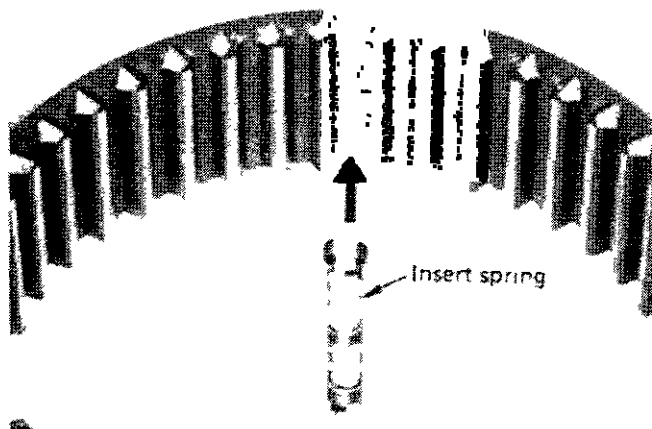
### ASSEMBLY

#### Note:

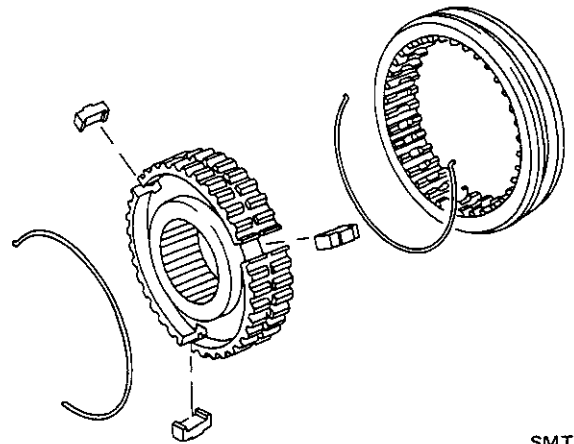
Apply gear oil to each part.

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

- 1 Place inserts
- 1st & 2nd

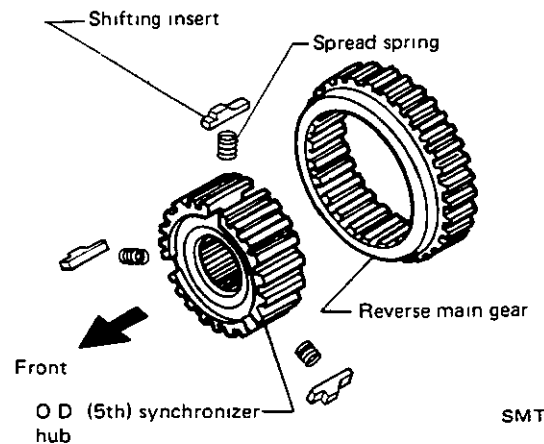


- 3rd & 4th



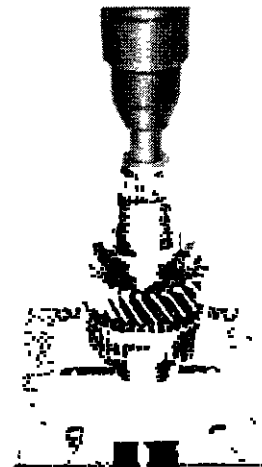
SMT994

- O D



SMT986

- 2 Assemble 2nd gear and 1st & 2nd synchronizer assembly, then press 1st gear bushing on main shaft

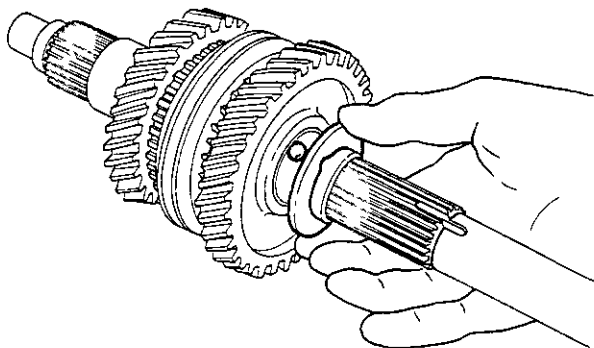


# REPAIR FOR COMPONENT PARTS—FS5W71C

## Gears and Shafts (Cont'd)

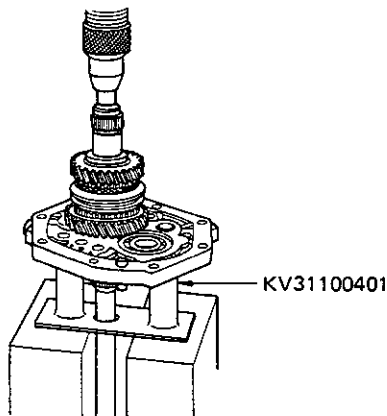
- 3 Assemble 1st gear, steel ball, and thrust washer on mainshaft on mainshaft

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



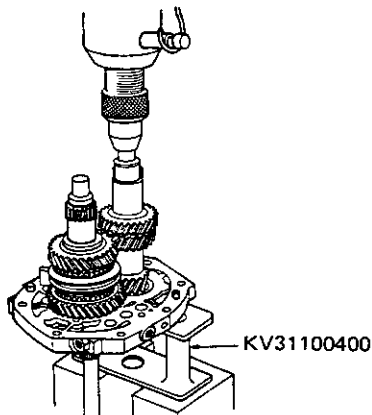
TM358

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



TM439

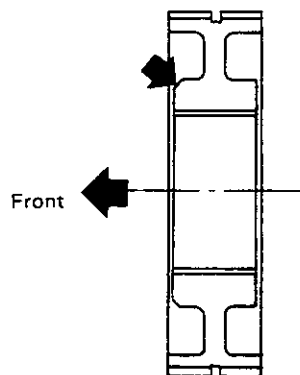
- 6 Press counter gear into adapter plate.



TM440

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

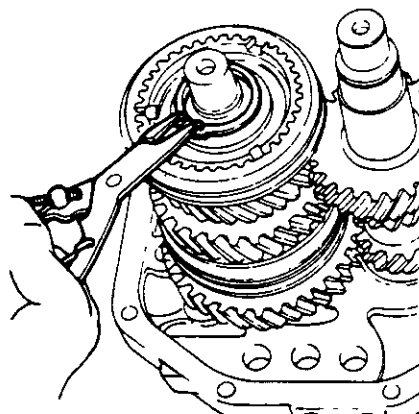
Pay attention to direction of synchronizer.



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)

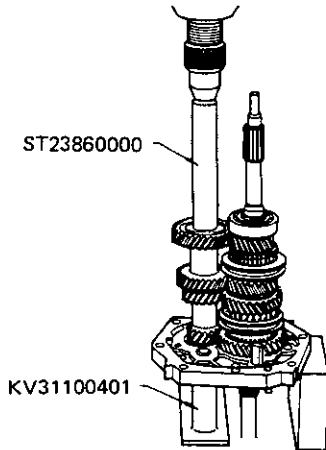
9. Apply gear oil to mainshaft pilot bearing and install it on mainshaft

# REPAIR FOR COMPONENT PARTS—FS5W71C

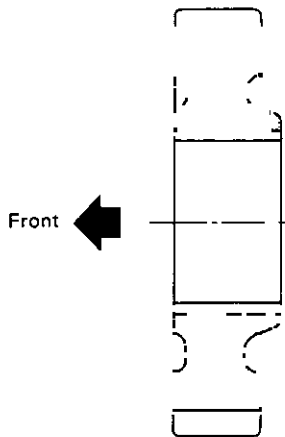
## Gears and Shafts (Cont'd)

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

Pay attention to direction of counter front gear.



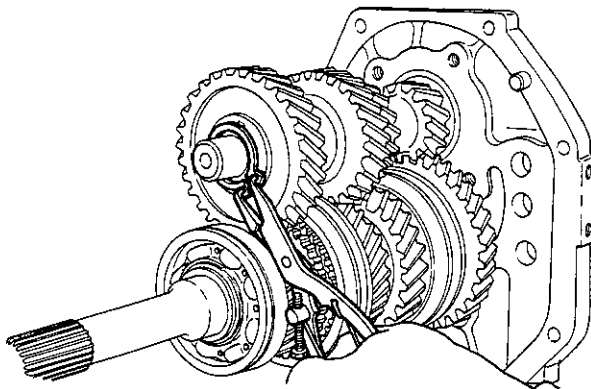
TM442



SMT065

11 Secure counter drive gear with snap ring

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

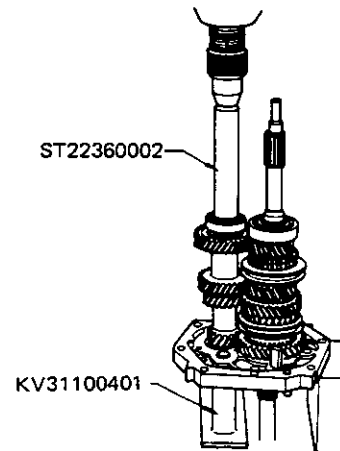


TM366

Counter drive gear snap ring:

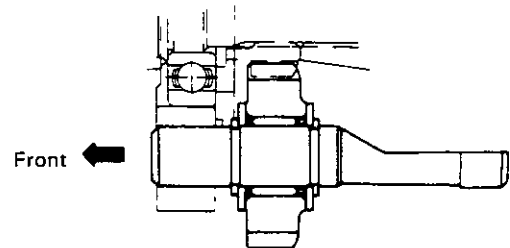
Parts number	Thickness mm (in)
32215-E9000	1.4 (0.055)
32215-E9001	1.5 (0.059)
32215-E9002	1.6 (0.063)

12 Press counter gear front bearing onto counter gear



TM443

13. Install idler gear to reverse idler shaft

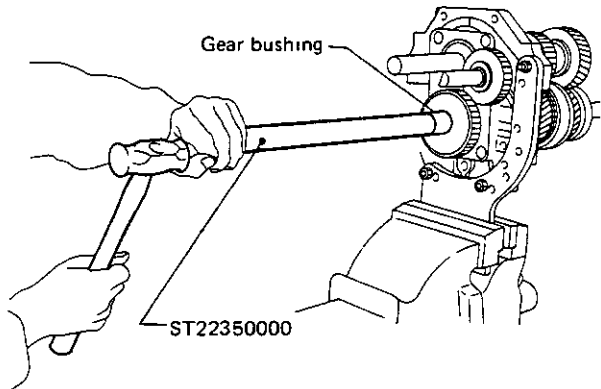


TM451

# REPAIR FOR COMPONENT PARTS—FS5W71C

## Gears and Shafts (Cont'd)

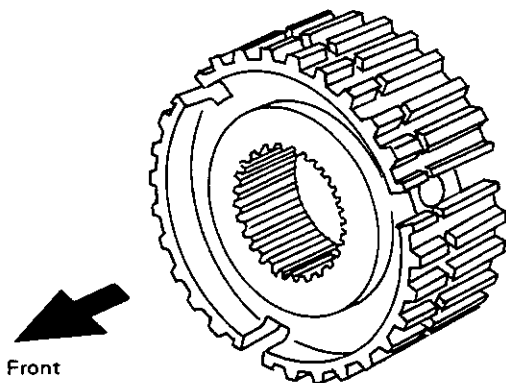
- 14 Install insert retainer and O D synchronizer to mainshaft
- 15 Install O.D. gear bushing



SMT531

- 16 Install O.D. gear assembly, steel roller and thrust washer

Pay attention to direction of hub.

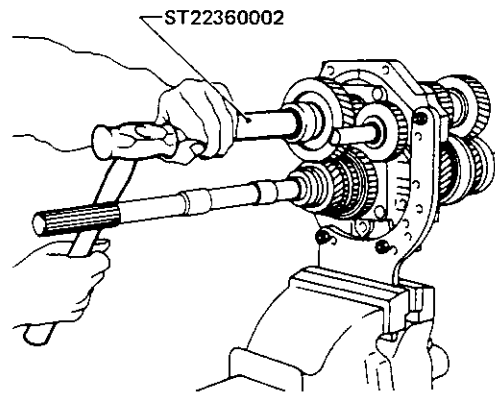


SMT007A

- 17 Install spacer, reverse counter gear and O.D. counter gear

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

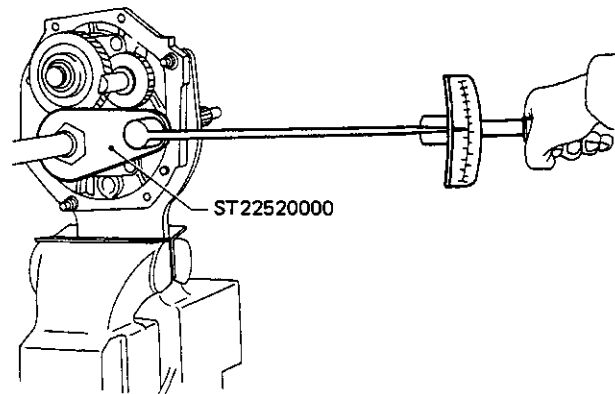
- 18 Install countershaft rear end bearing



SMT043

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

- With special tool

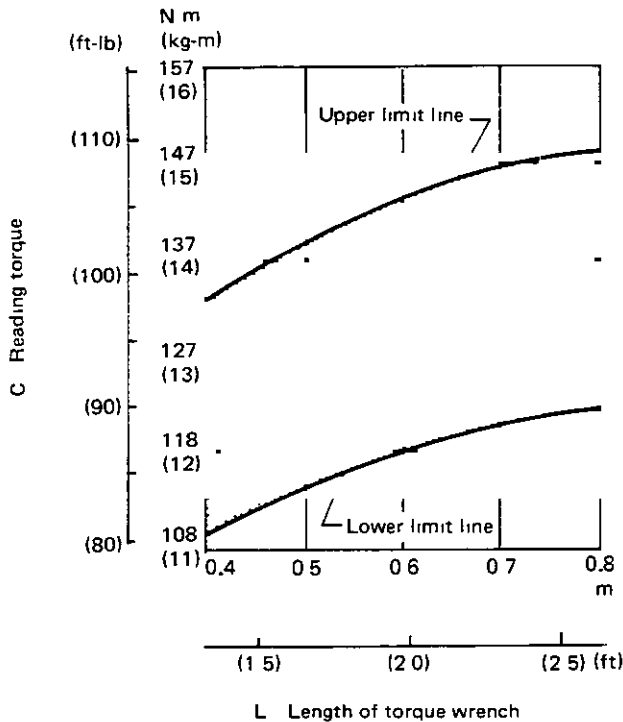
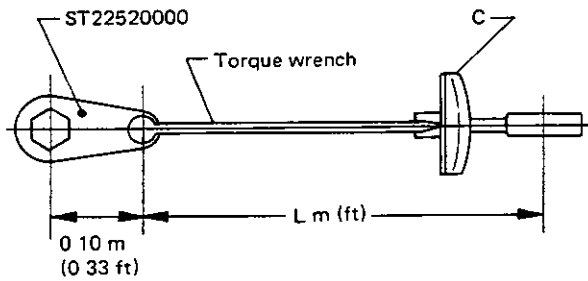


SMT003A

# REPAIR FOR COMPONENT PARTS—FS5W71C

## Gears and Shafts (Cont'd)

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)

- Tighten counter gear lock nut

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

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



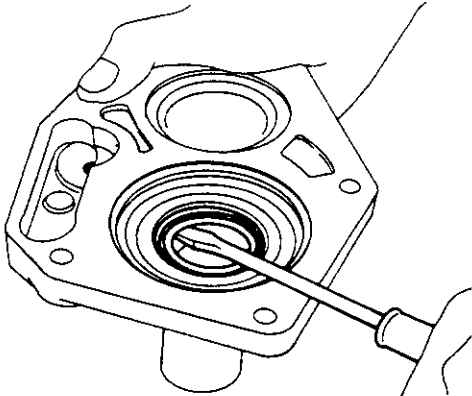
- Always use new lock nuts

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

# REPAIR FOR COMPONENT PARTS—FS5W71C

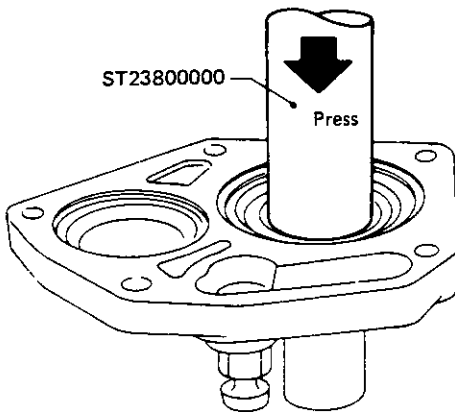
## Oil Seals

### FRONT COVER OIL SEAL



SMT035

- Be careful not to damage lip of oil seal.

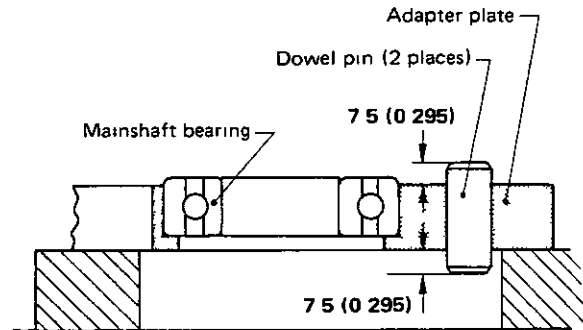


SMT036

## Adapter Plate

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

### DOWEL PIN

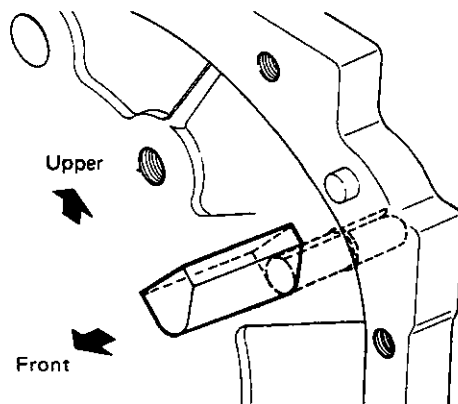


Unit mm (in)

SMT027

### OIL GUTTER

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



TM356

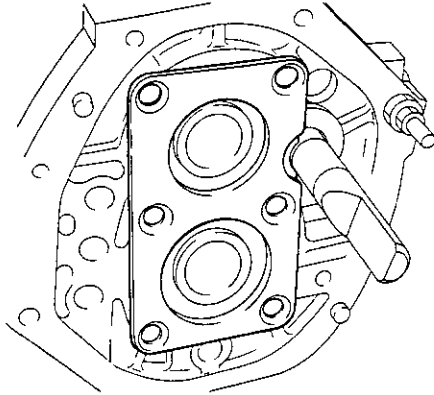


# REPAIR FOR COMPONENT PARTS—FS5W71C

## Adapter Plate (Cont'd)

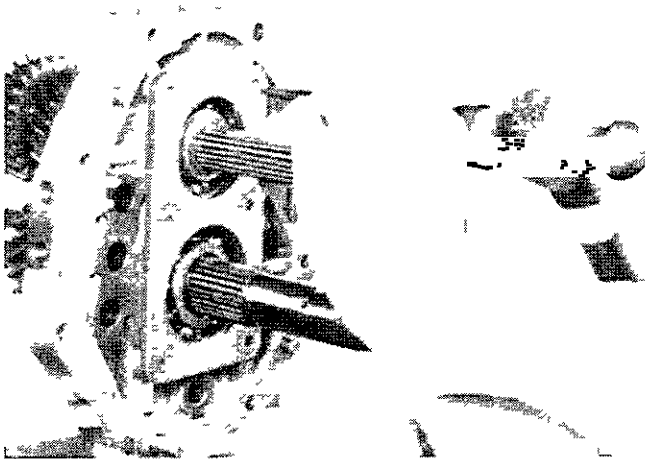
### BEARING RETAINER

- 1 Insert reverse shaft, then install bearing retainer



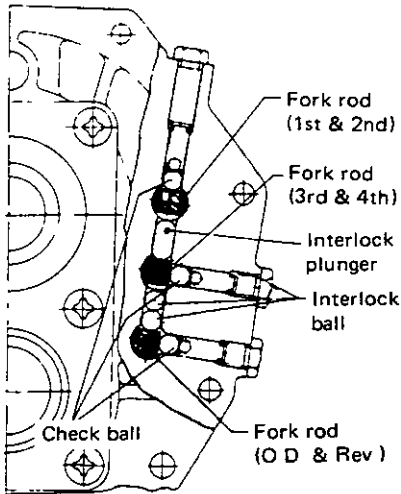
SMT028

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

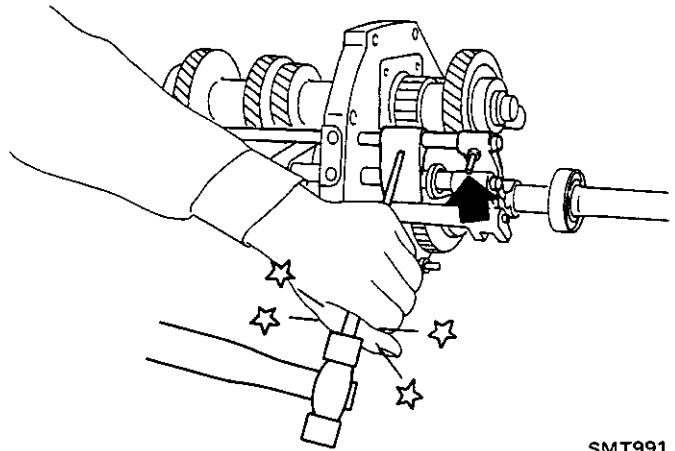


# ASSEMBLY—FS5W71C

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

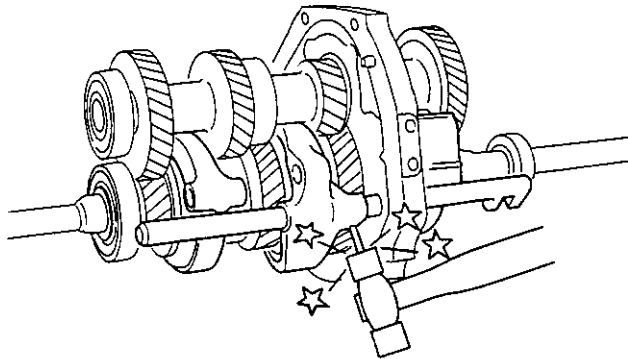
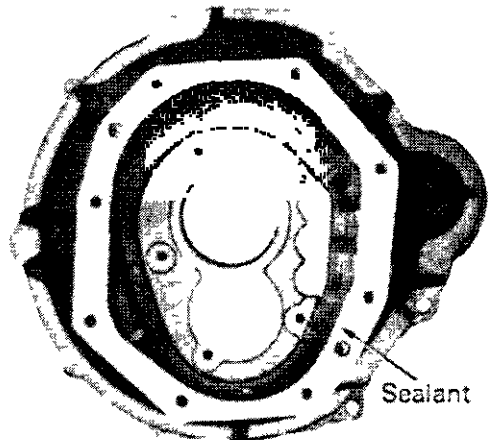


SMT992



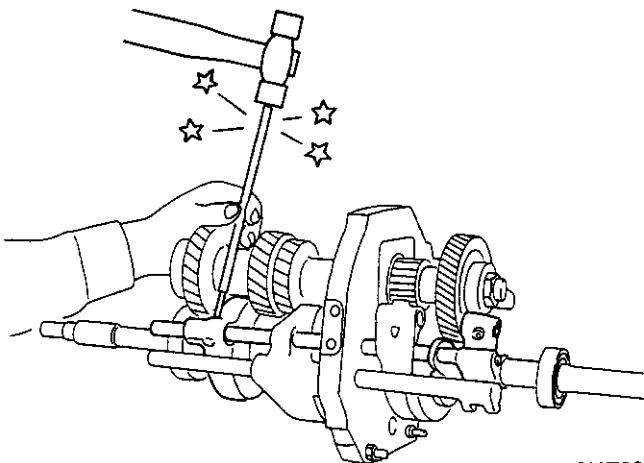
SMT991

- 2 Apply sealant to mating surface of transmission case

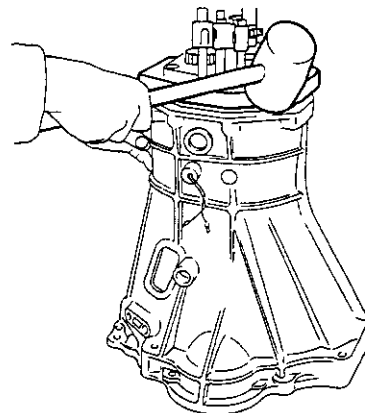


SMT989

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



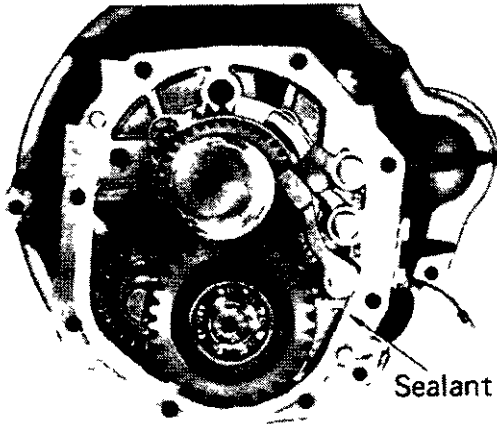
SMT990



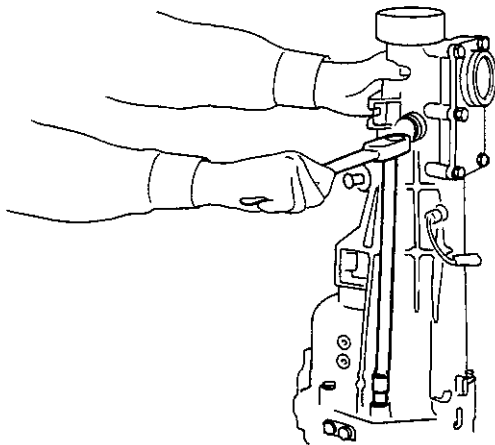
SMT013

# ASSEMBLY—FS5W71C

- 4 Apply sealant to mating surface of adapter plate.

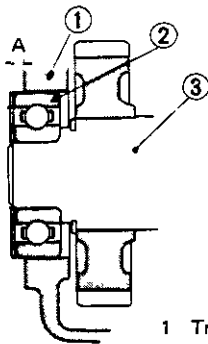


- 5 Install rear extension



SMT993

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



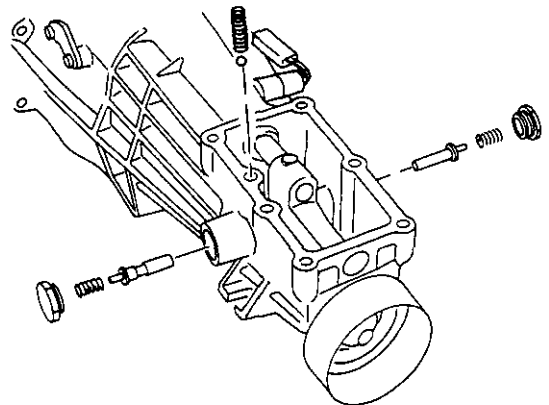
- 1 Transmission case  
2 Counter gear front bearing  
3 Counter gear

TM371

Unit mm (in)

'A'	Thickness of shim	Part number
3 52 - 3 71 (0 1386 - 0 1461)	Not necessary	
3 42 - 3 51 (0 1346 - 0 1382)	0 1 (0 004)	32218-V5000
3 32 - 3 41 (0 1307 - 0 1343)	0 2 (0 008)	32218-V5001
3 22 - 3 31 (0 1268 - 0 1303)	0 3 (0 012)	32218-V5002
3 12 - 3 21 (0 1228 - 0 1264)	0 4 (0 016)	32218-V5003
3 02 - 3 11 (0 1189 - 0 1224)	0 5 (0 020)	32218-V5004
2 92 - 3 01 (0 1150 - 0 1185)	0 6 (0 024)	32218-V5005

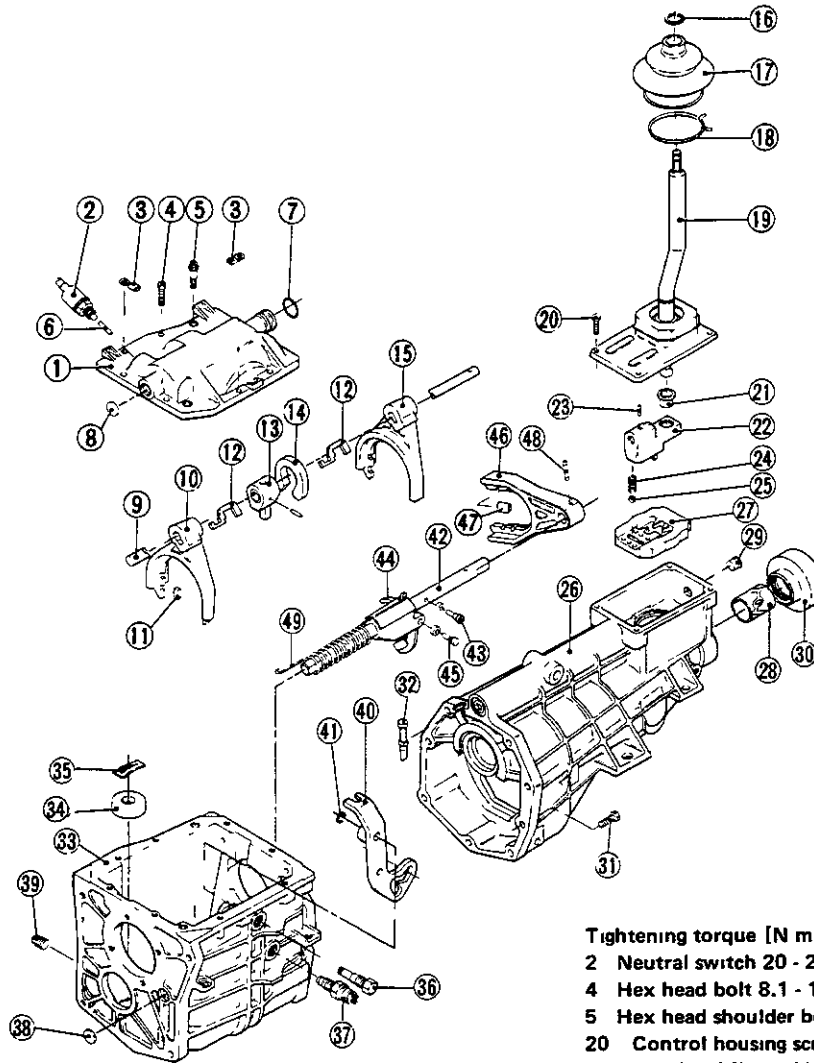
- 8 Install gasket and front cover.  
9 Install bolts and plunger shown below



SMT982

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

Case, shift cover, extension housing



**Tightening torque [N m (kg-m, ft-lb)]**

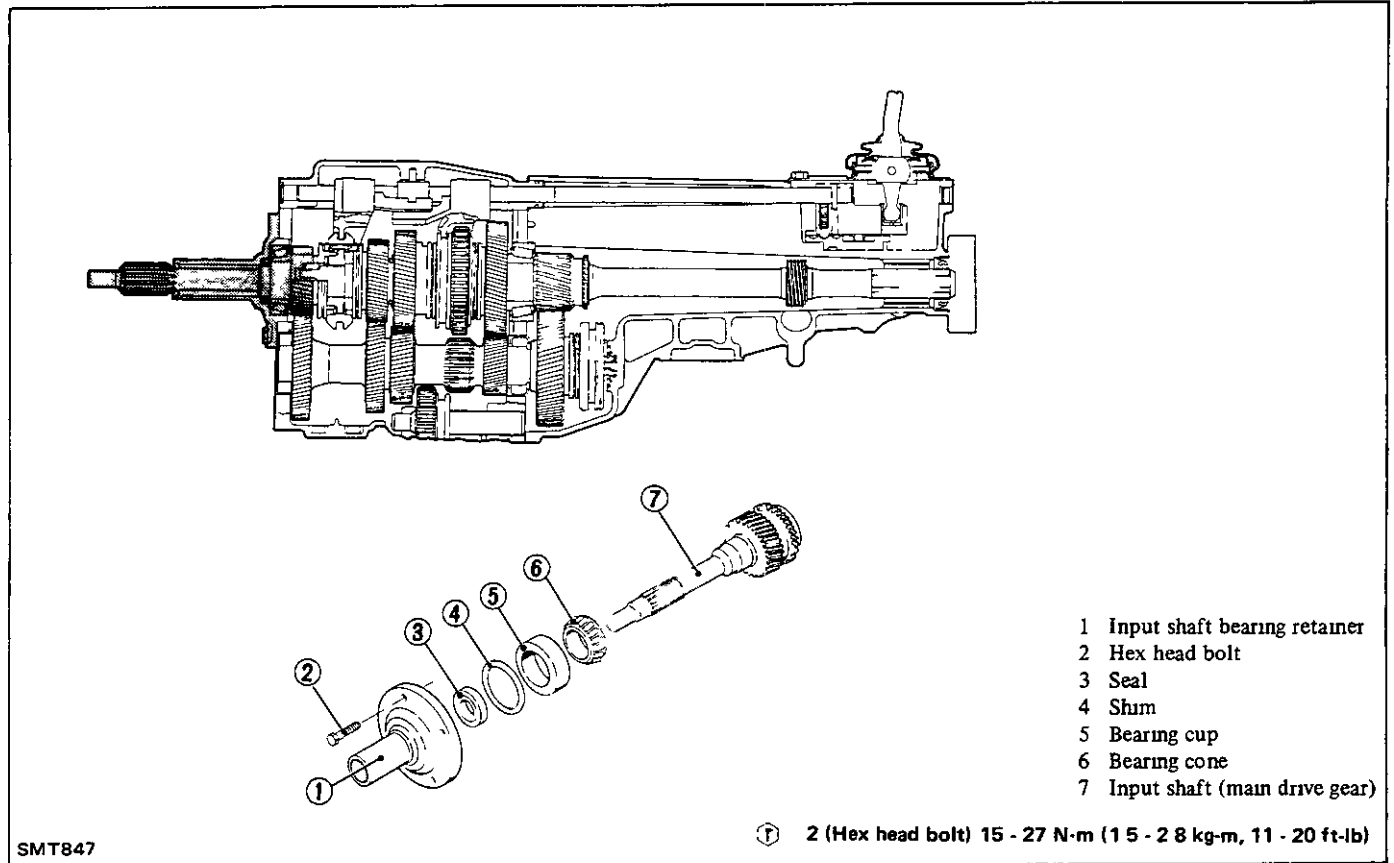
- 2 Neutral switch 20 - 29 (2.0 - 3.0, 14 - 22)
- 4 Hex head bolt 8.1 - 14.7 (0.83 - 1.5, 6.0 - 10.8)
- 5 Hex head shoulder bolt 8.1 - 14.7 (0.83 - 1.5, 6.0 - 10.8)
- 20 Control housing screw 15 - 27 (1.5 - 2.8, 11 - 20)
- 31 Hex head flanged bolt 27 - 62 (2.8 - 6.3, 20 - 46)
- 36 Pivot pin 21 - 33 (2.1 - 3.4, 15 - 25)
- 37 Back-up lamp switch 17 - 24 (1.7 - 2.4, 12 - 17)
- Drain plug 20 - 34 (2.0 - 3.5, 14 - 25)

SMT846

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

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

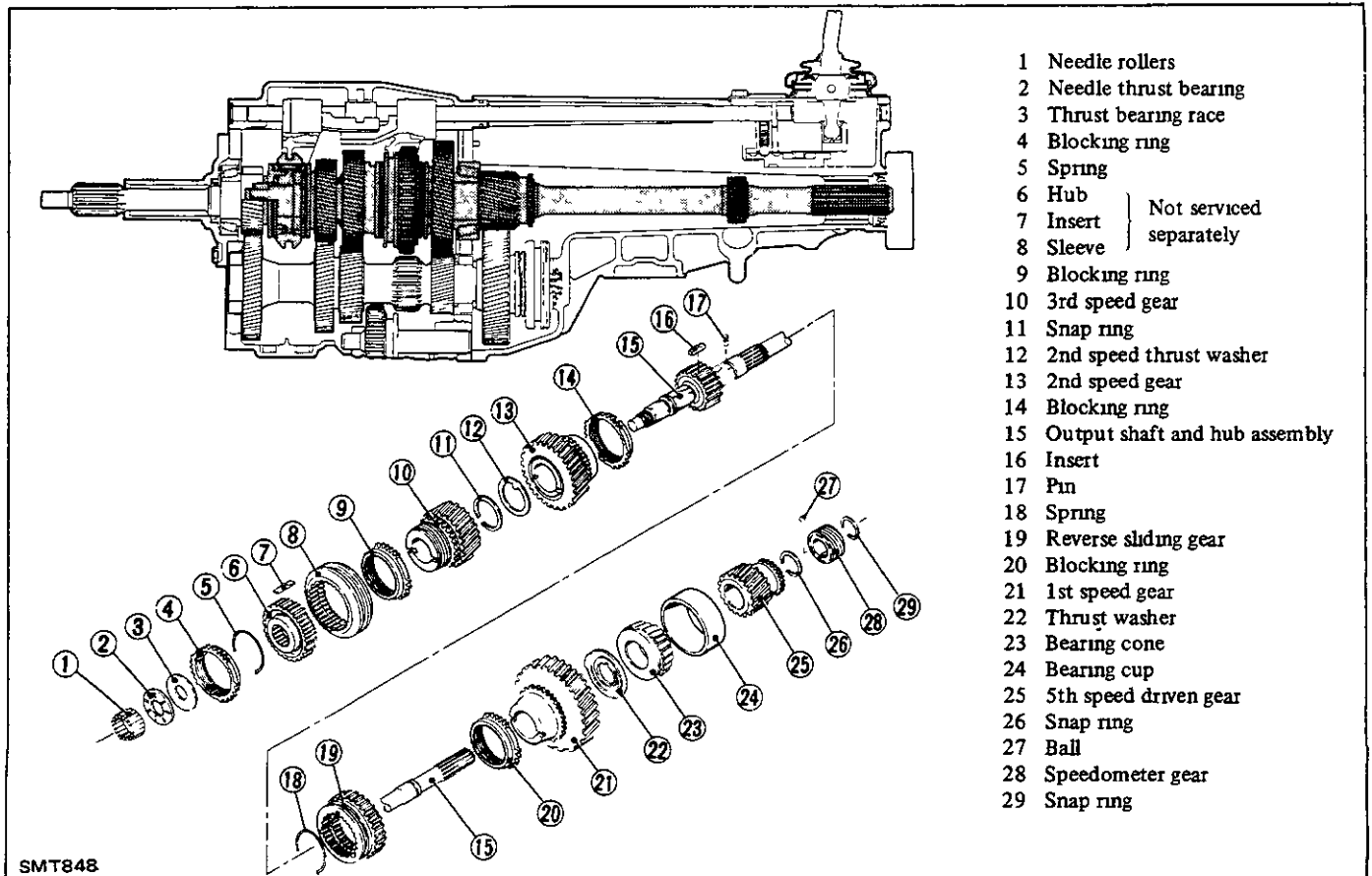
## Input shaft assembly



SMT847

2 (Hex head bolt) 15 - 27 N·m (15 - 28 kg-m, 11 - 20 ft-lb)

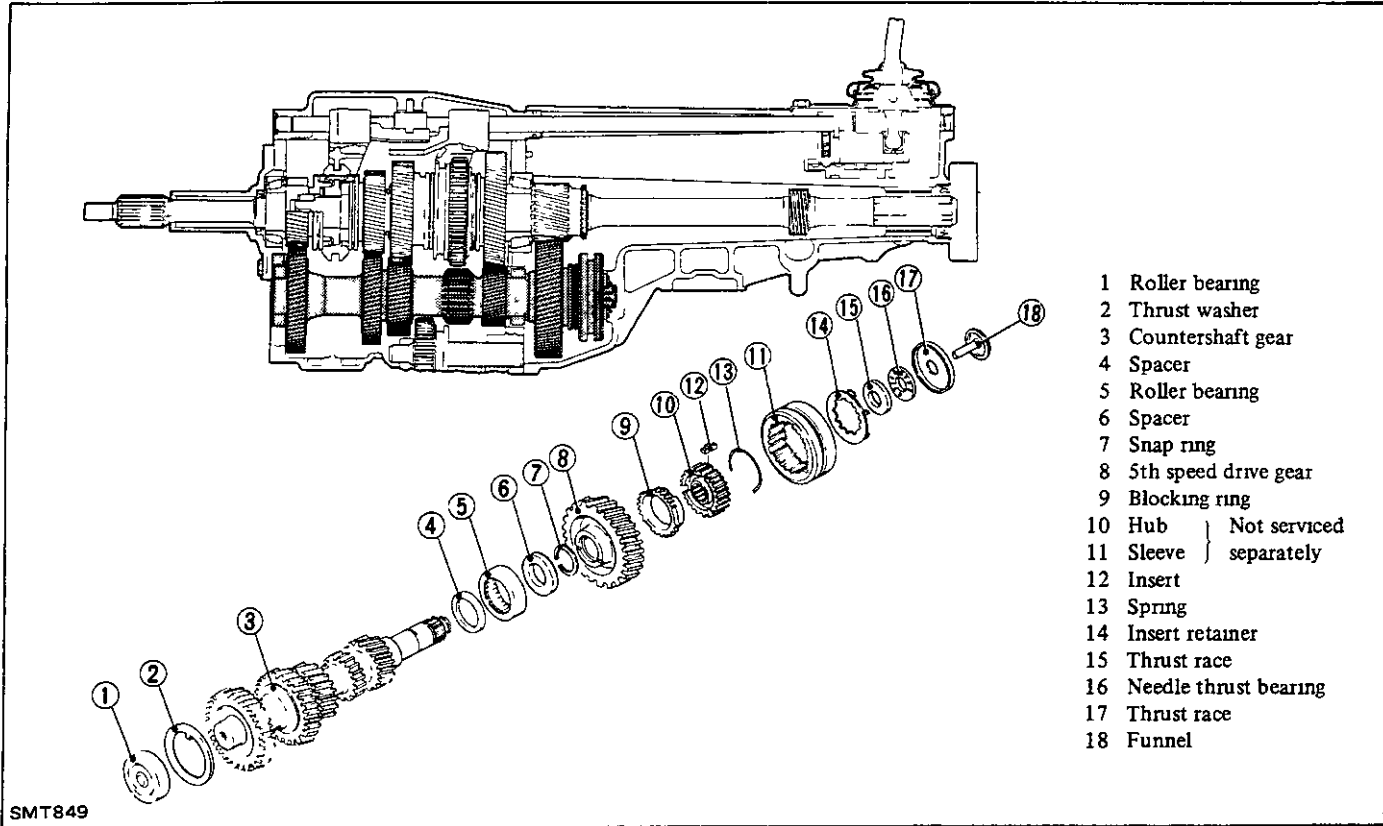
## Output shaft assembly



SMT848

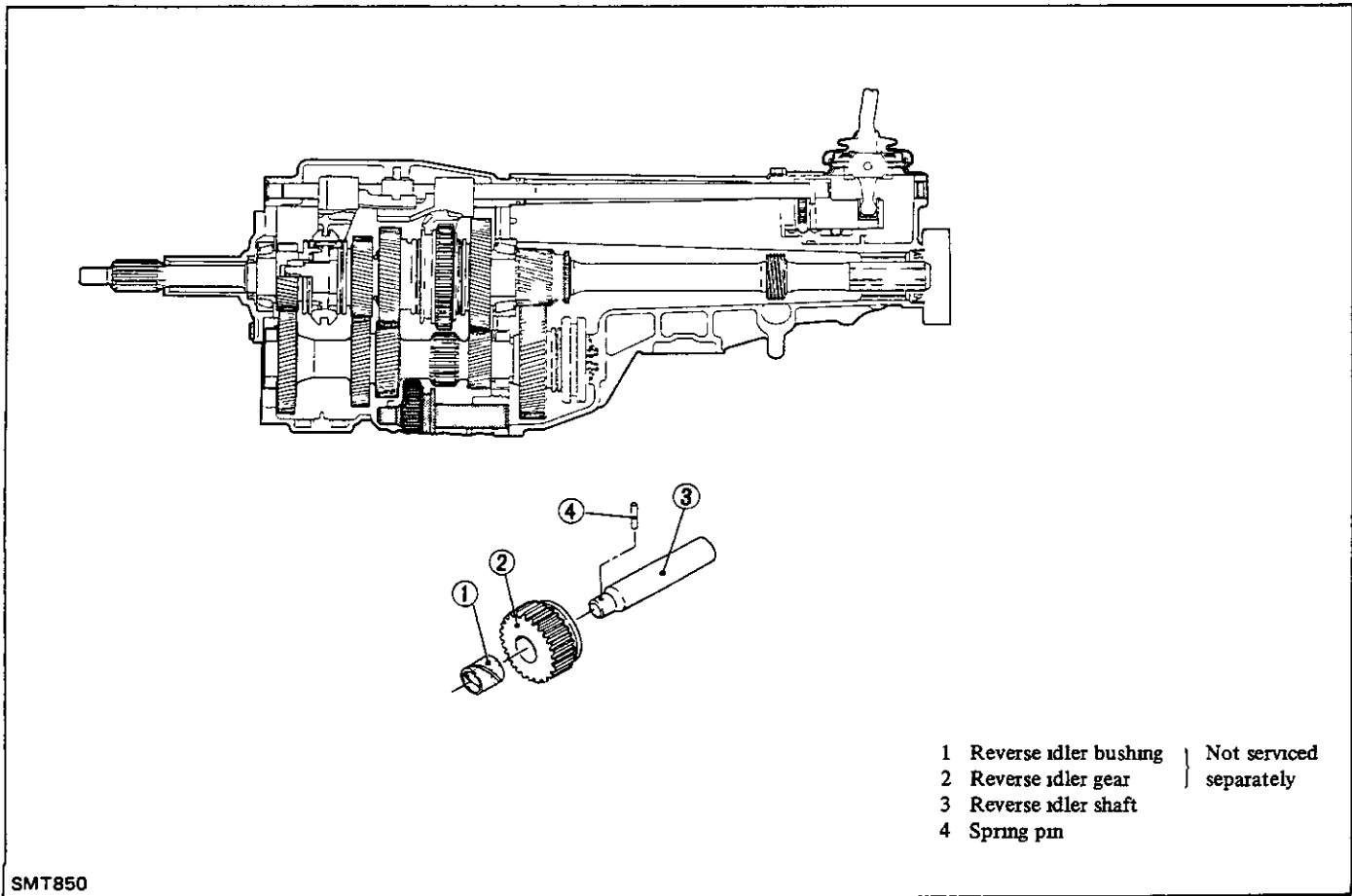
# 5-SPEED TRANSMISSION [Model: BW T-5 (FS5R90A)]

## Countershaft assembly



- 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 Needle thrust bearing
- 17 Thrust race
- 18 Funnel

## Reverse idler assembly

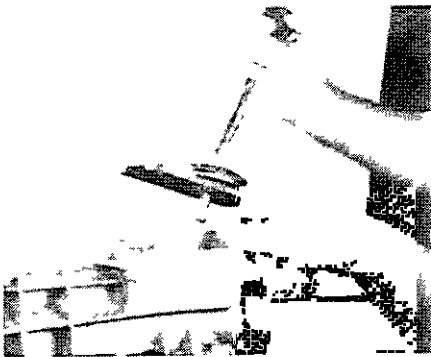


- 1 Reverse idler bushing } Not serviced
- 2 Reverse idler gear } separately
- 3 Reverse idler shaft
- 4 Spring pin

## REAR EXTENSION

### DISASSEMBLY

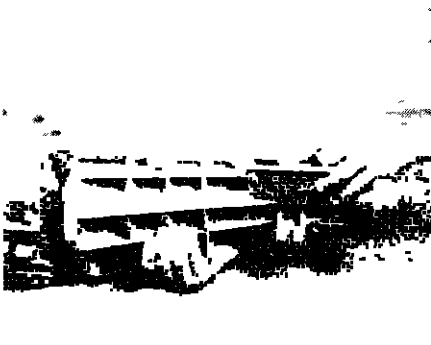
- 1 Wipe off dirt and grease
- 2 Drain oil
- 3 Remove shift lever assembly and damper sleeve



- 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  
(28 - 63 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

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

- 9 Make sure that gears operate smoothly

- 10 Apply sealant to thread and install drain plug

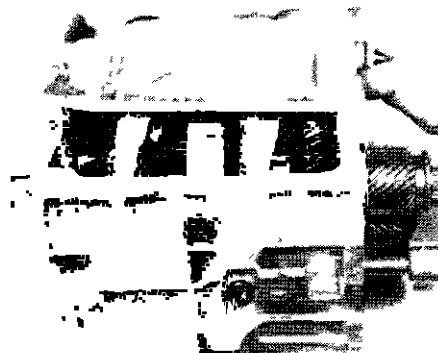
Ⓣ : 20 - 34 N·m  
(2.0 - 3.5 kg·m,  
14 - 25 ft·lb)

## CASE COVER

### DISASSEMBLY

- 1 Remove rear extension Refer to rear extension for disassembly

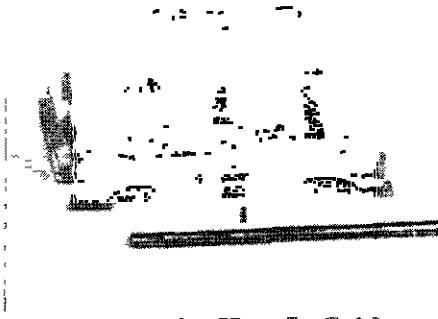
- 2 Remove cover bolts and cover by tapping it with driver Slide cover to right side of case and lift



- 3 Pull shifter shaft to rear and remove striking lever to 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, striking lever and 3-4 shift fork. Install shifter shaft roll pin to striking lever.
- 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 back-up light switch.
- 4 Remove retainer ring and pivot pin.



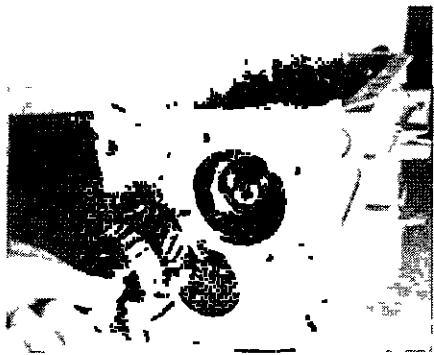
- 5 Remove funnel, thrust race, and needle thrust bearing.
- 6 Remove snap ring and thrust race from rear of 5th speed synchronizer hub.



- 7 Remove pin from 5th speed shift fork.
- 8 Remove 5th speed shift fork, synchronizer and counter gear.



- 9 Remove front 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.





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

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



12 Remove 5th speed shift rail, reverse 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, O-ring and retaining pin.

6 Install reverse fork with 5th and reverse relay lever, 5th speed shift rail and spring. Install backup light 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 countergear 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 0.10 mm  
(clearance)

(B) Desired preload 0.20 mm  
Additional shim 0.30 mm  
required

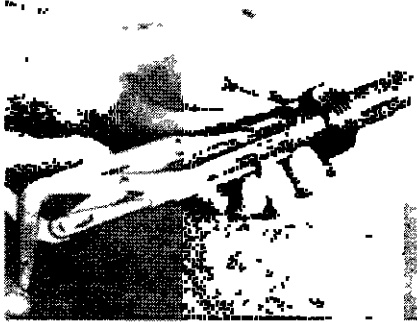
19 Apply a continuous bead of sealant to bearing retainer mating surface and threads of bolts.

20 Install shims and bearing race into bearing retainer and install the bearing retainer as in Step 11.

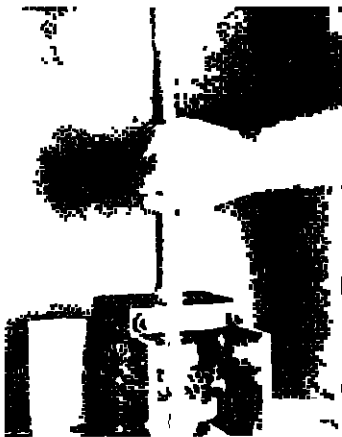
**GEARS & SHAFTS**

**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 pin from mainshaft and 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)

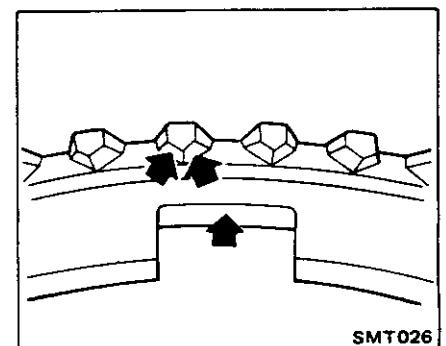
3rd main gear  
0.15 - 0.40 mm  
(0.0059 - 0.0157 in)

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



SMT026

3 Inspect cone surface for excessive wear

**Shifting insert**

Replace if worn excessively, worn unevenly, or damaged

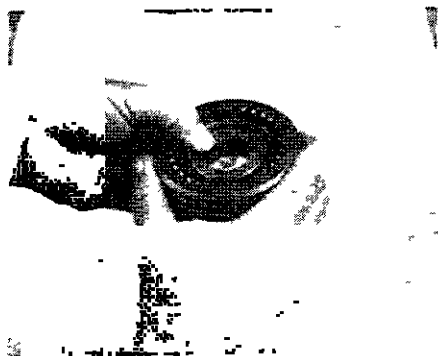
**Oil seals**

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



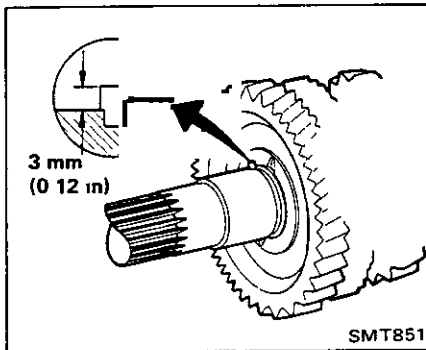
2 Position shifting inserts into 3 slots in synchronizer hub with raised portion facing outward  
3 Install first insert spring with hooked end engaged to one of the shift inserts



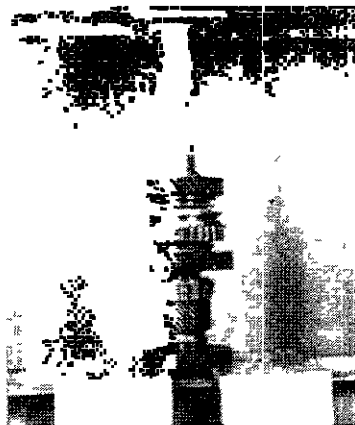
4 Install the second insert spring on the opposite side of the synchronizer with the hooked end engaged to the same insert but turned in the opposite direction of the first spring

**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 positioning pin into mainshaft so that it projects 3 mm (0.12 in) from the bearing surface



5 Install thrust washer against 1st speed gear, being certain that the slot in the washer aligns with the pin  
6 Install rear bearing and press 5th speed gear onto mainshaft using special tool J-26010-01.



7 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



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

**REPLACEMENT OF OIL SEALS**

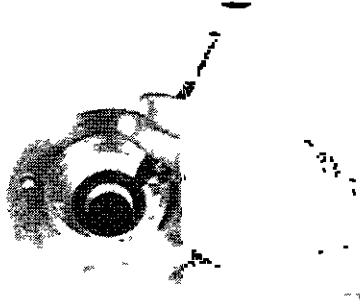
**FRONT BEARING RETAINER SEAL**

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

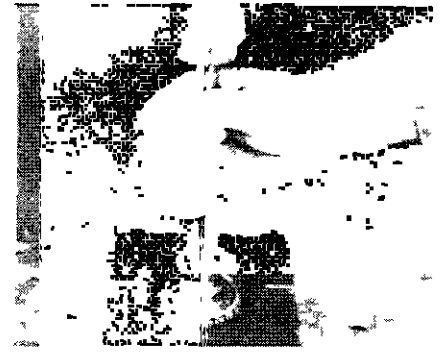
#### REAR EXTENSION OIL SEAL

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



- 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 counter-gear 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

#### 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

# SERVICE DATA AND SPECIFICATIONS (S.D.S.)

## 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 gear		
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		0.779
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		55
Reverse		15
Reverse idler gear		20
Oil capacity	liter (US pt, Imp pt)	1.9 (4, 3-3/8)

# SERVICE DATA AND SPECIFICATIONS (S.D.S.)

## Inspection and Adjustment

### FOR MODEL FS5W71C

#### Gears

	Unit	mm (in)
<b>Gear backlash</b>		
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)
<b>Gear end play</b>		
1st gear	0 31 - 0 37	(0 0122 - 0 0146)
2nd gear	0 11 - 0 17	(0 0043 - 0 0067)
3rd gear	0 11 - 0 17	(0 0043 - 0 0067)
O D gear	0 32 - 0 35	(0 0126 - 0 0138)
Reverse idler gear	0 05 - 0 50	(0 0020 - 0 0197)
<b>Baulk ring to gear clearance</b>		
Standard		
1st & 2nd gear	1 00 - 1 40	(0 0394 - 0 0551)
3rd & main drive gear	1 20 - 1 50	(0 0472 - 0 0591)
O D gear	1 00 - 1 40	(0 0394 - 0 0551)
<b>Wear limit</b>		
1st & 2nd gear	0 5	(0 020)
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
1 4 (0 055)	32263 - V5200
1 5 (0 059)	32263 - V5201
1 6 (0 063)	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

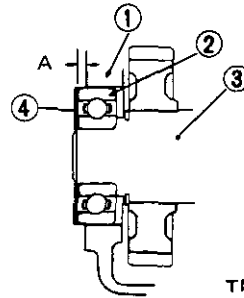
#### Counter drive gear

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

- 1 Transmission case
- 2 Counter gear front bearing
- 3 Counter gear
- 4 Shim

"A"	Thickness of shim	Part number
3 52 - 3 71 (0 1386 - 0 1461)	Not necessary	
3 42 - 3 51 (0 1346 - 0 1382)	0 1 (0 004)	32218 - V5000
3 32 - 3 41 (0 1307 - 0 1343)	0 2 (0 008)	32218 - V5001
3 22 - 3 31 (0 1268 - 0 1303)	0 3 (0 012)	32218 - V5002
3 12 - 3 21 (0 1228 - 0 1264)	0 4 (0 016)	32218 - V5003
3 02 - 3 11 (0 1189 - 0 1224)	0 5 (0 020)	32218 - V5004
2 92 - 3 01 (0 1150 - 0 1185)	0 6 (0 024)	32218 - V5005

### FOR MODEL BW T-5 (FS5R90A)

Unit mm (in)

Transmission model	FS5R90A
<b>Gear backlash</b>	
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)
<b>Gear end play</b>	
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)
<b>Main drive gear bearing adjusting shim</b>	
Preload	0 13 - 0 25 (0 0051 - 0 0098)

# SERVICE DATA AND SPECIFICATIONS (S.D.S.)

## 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	43 - 58	4.4 - 5.9	32 - 43
Engine rear plate to transmission	9 - 12	0.9 - 1.2	6.5 - 8.7
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
Transmission case to rear extension	16 - 21	1.6 - 2.1	12 - 15
Starter motor to transmission	29 - 39	3.0 - 4.0	22 - 29

### GEAR ASSEMBLY

#### Model: FS5W71C

Unit	N m	kg-m	ft-lb
Bearing retainer to adapter plate	16 - 23	1.6 - 2.3	12 - 17
Mainshaft lock nut	137 - 167	14.0 - 17.0	101 - 123
Counter gear lock nut	98 - 127	10.0 - 13.0	72 - 94
Rear extension to transmission case	16 - 21	1.6 - 2.1	12 - 15
Front cover to transmission case	16 - 21	1.6 - 2.1	12 - 15
Filler plug	25 - 34	2.5 - 3.5	18 - 25
Drain plug	25 - 34	2.5 - 3.5	18 - 25
Ball pin	20 - 34	2.0 - 3.5	14 - 25
Striking lever lock nut	9 - 12	0.9 - 1.2	6.5 - 8.7
Check ball plug	19 - 25	1.9 - 2.5	14 - 18
Speedometer sleeve installation	4 - 5	0.4 - 0.5	2.9 - 3.6
Back-up lamp switch	20 - 29	2.0 - 3.0	14 - 22
Return spring plug	8 - 10	0.8 - 1.0	5.8 - 7.2

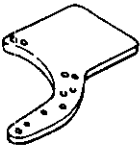
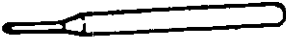
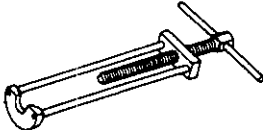
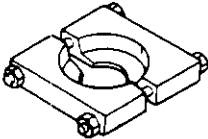
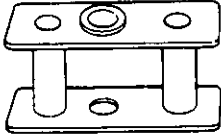


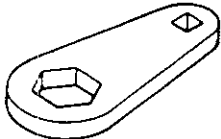


#### Model: BW T-5 (FS5R90A)

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
Back-up 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

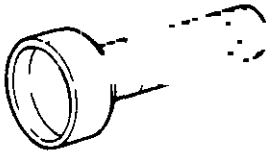



# SPECIAL SERVICE TOOLS

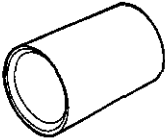
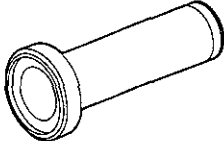
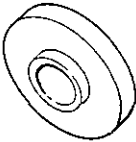
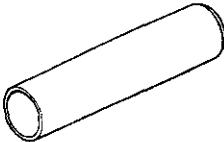
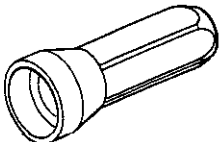
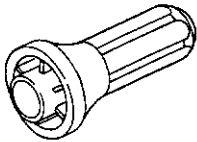
## Model. FS5W71C

Tool number (Kent-Moore No )	Tool name	
ST23810001 (J25693)	Adapter setting plate	
KV31100300 (J25689-A)	Fork rod pin punch	
KV32101330 (See J26349)	Bearing puller	
ST30031000 (J25733-1)	Bearing puller	
KV31100401 ( - )	Transmission press stand	
ST23860000 ( - )	Counter gear drift	
ST22360002 (J25679-91)	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)	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
J-26060-01*		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