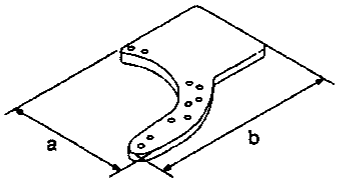
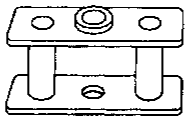
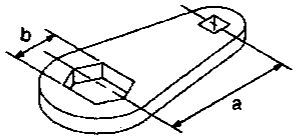
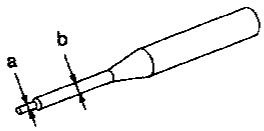
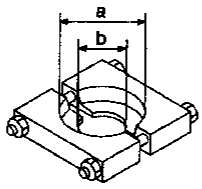
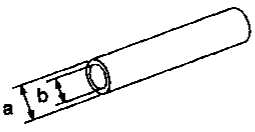
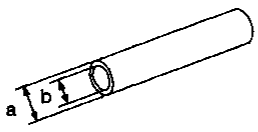
MANUAL TRANSMISSION

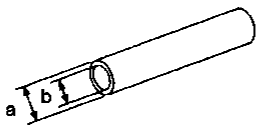
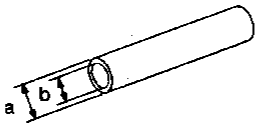
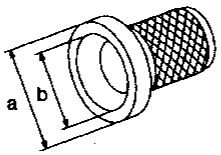
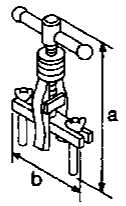
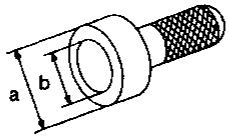
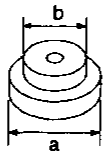
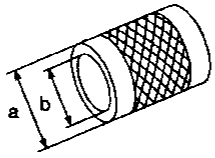
SECTION MT

CONTENTS

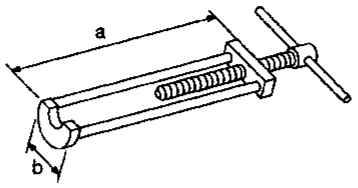
Special Service Tools

Tool number (Kent-Moore No.) Tool name	Description	
ST23810001 (—) Adapter setting plate	 NT407	Fixing adapter plate with gear assembly **a: 166 mm (6.54 in)** **b: 270 mm (10.63 in)**
KV31100401 (—) Transmission press stand	 NT068	Pressing counter gear and mainshaft
ST22520000 (J26348) Wrench	 NT409	Tightening mainshaft lock nut **a: 100 mm (3.94 in)** **b: 41 mm (1.61 in)**
ST23540000 (J25689-A) Pin punch	 NT442	Removing and installing fork rod retaining pin **a: 2.3 mm (0.091 in) dia.** **b: 4 mm (0.16 in) dia.**
ST30031000 (J22912-01) Puller	 NT411	Removing and installing 1st gear bushing Removing main drive gear bearing Measuring wear of baulk rings **a: 90 mm (3.54 in) dia.** **b: 50 mm (1.97 in) dia.**
ST23860000 (—) Drift	 NT065	Installing counter drive gear **a: 38 mm (1.50 in) dia.** **b: 33 mm (1.30 in) dia.**
ST22360002 (J25679-01) Drift	 NT065	Installing counter gear front and rear end bearings **a: 29 mm (1.14 in) dia.** **b: 23 mm (0.91 in) dia.**

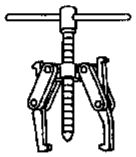
Special Service Tools (Cont'd)

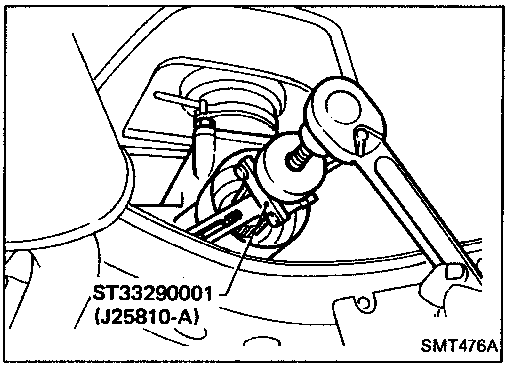
Tool number (Kent-Moore No.) Tool name	Description	
ST22350000 (J25678-01) Drift	 NT065	Installing OD gear bushing **a: 34 mm (1.34 in) dia.** **b: 28 mm (1.10 in) dia.**
ST23800000 (J25691-01) Drift	 NT065	Installing front cover oil seal **a: 44 mm (1.73 in) dia.** **b: 31 mm (1.22 in) dia.**
ST33400001 (J26082) Drift	 NT086	Installing rear oil seal **a: 60 mm (2.36 in) dia.** **b: 47 mm (1.85 in) dia.**
ST33290001 (J25810-A) Puller	 NT414	Removing rear oil seal **a: 250 mm (9.84 in)** **b: 160 mm (6.30 in)**
ST30720000 (—) Drift	 NT115	Installing mainshaft ball bearing **a: 77 mm (3.03 in) dia.** **b: 55.5 mm (2.185 in) dia.**
ST30613000 (J25742-3) Drift	 NT073	Installing main drive gear bearing **a: 71.5 mm (2.815 in) dia.** **b: 47.5 mm (1.870 in) dia.**
ST33200000 (J26082) Drift	 NT091	Installing counter rear bearing Installing 3rd & 4th synchronizer assembly **a: 60 mm (2.36 in) dia.** **b: 44.5 mm (1.752 in) dia.**

Special Service Tools (Cont'd)

Tool number (Kent-Moore No.) Tool name	Description
KV32101330 (See J26349-A) Puller	 NT408 Removing overdrive mainshaft bearing **a: 447 mm (17.60 in)** **b: 100 mm (3.94 in)**

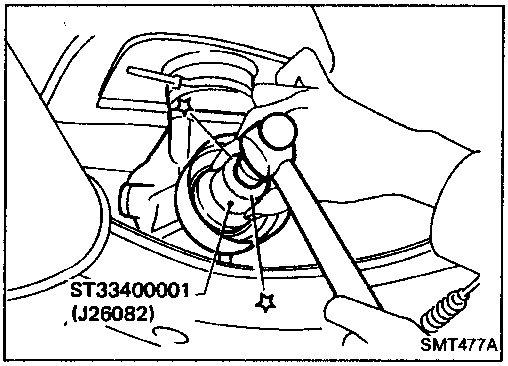
Commercial Service Tool

Tool name	Description
Puller	 NT077 Removing counter bearings, counter drive and OD gears

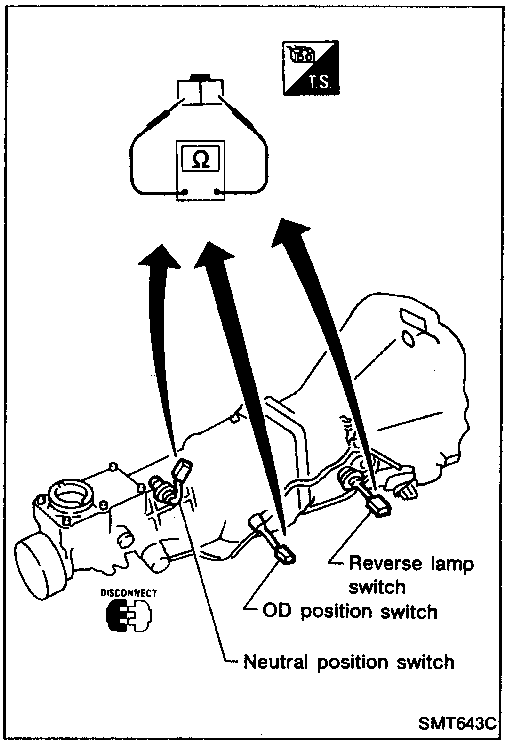


Replacing Rear Oil Seal

REMOVAL



INSTALLATION



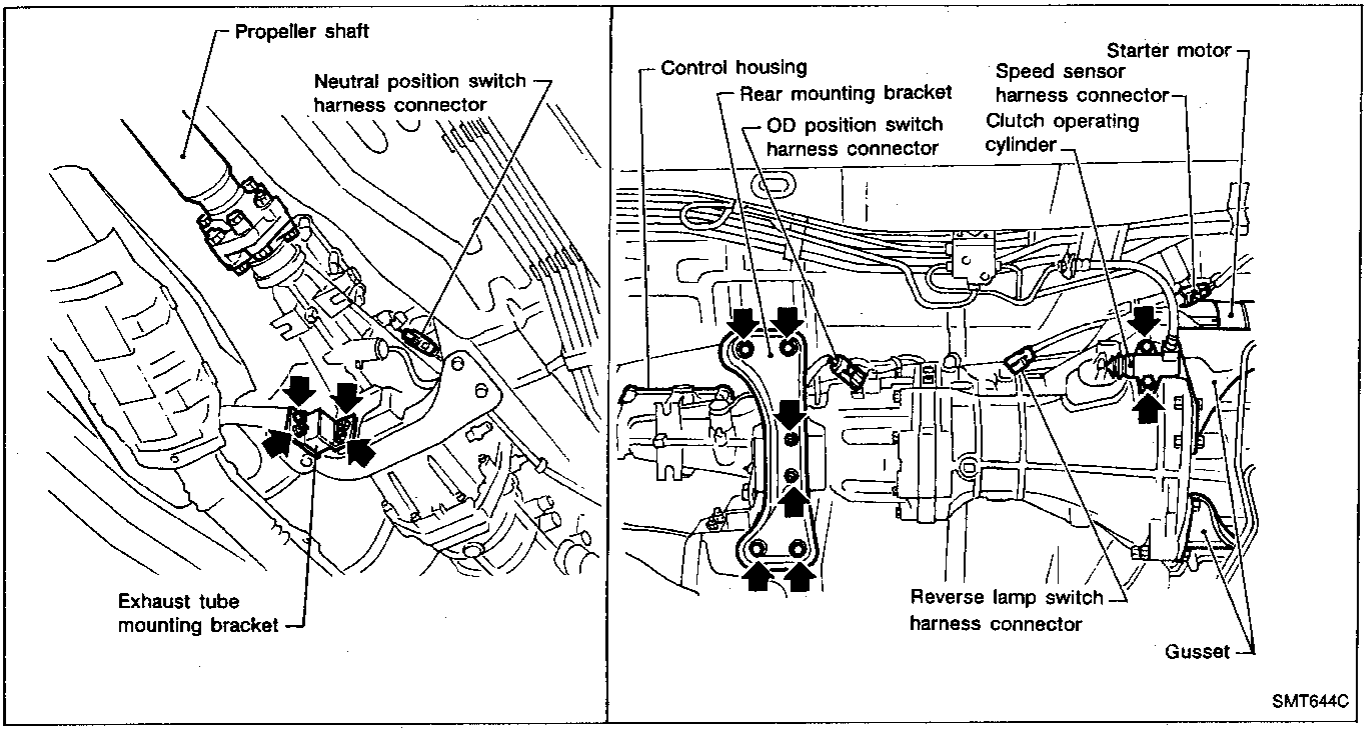
Check of Position Switches

Switch	Gear position	Continuity
Reverse lamp switch	Reverse	Yes
	Other than reverse	No
Neutral position switch	Neutral	Yes
	Other than neutral	No
OD (5th) position switch	5th	Yes
	Other than 5th	No

Removal

CAUTION:

When removing the transmission assembly from engine, first remove the crankshaft position sensor (OBD) from the assembly. Be careful not to damage sensor edge and ring gear teeth.

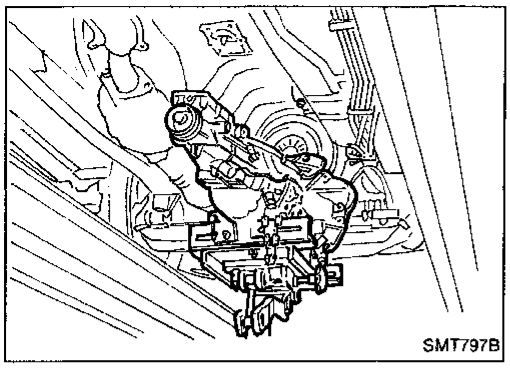


1. Remove battery negative terminal.
2. Remove shift lever with control housing from transmission.
3. Remove crankshaft position sensor (OBD) from upper side of transmission case.
4. Remove clutch operating cylinder from transmission.
5. Disconnect speed sensor, OD position switch, reverse lamp switch, rear heated oxygen sensor and neutral position switch harness connectors.
6. Remove starter motor from transmission.
7. Remove propeller shaft. — Refer to section PD.

- **Insert plug into rear oil seal after removing propeller shaft.**
- **Be careful not to damage spline, sleeve yoke and rear oil seal when removing propeller shaft.**

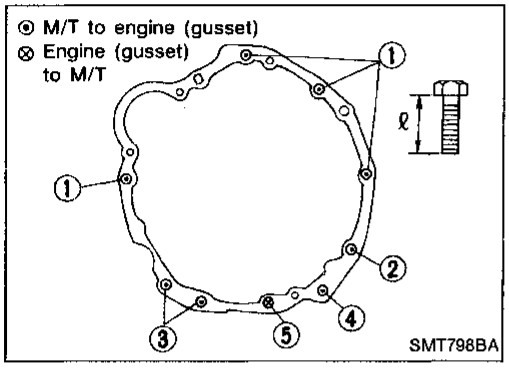
8. Remove gussets from transmission or engine.
9. Remove exhaust tube mounting bracket from transmission.
10. Support manual transmission with a jack.
11. Remove rear mounting bracket.
12. Lower manual transmission as much as possible.

Removal (Cont'd)



13. Remove transmission fixing bolts.
14. Remove transmission from engine.

- **Support manual transmission while removing it.**



Installation

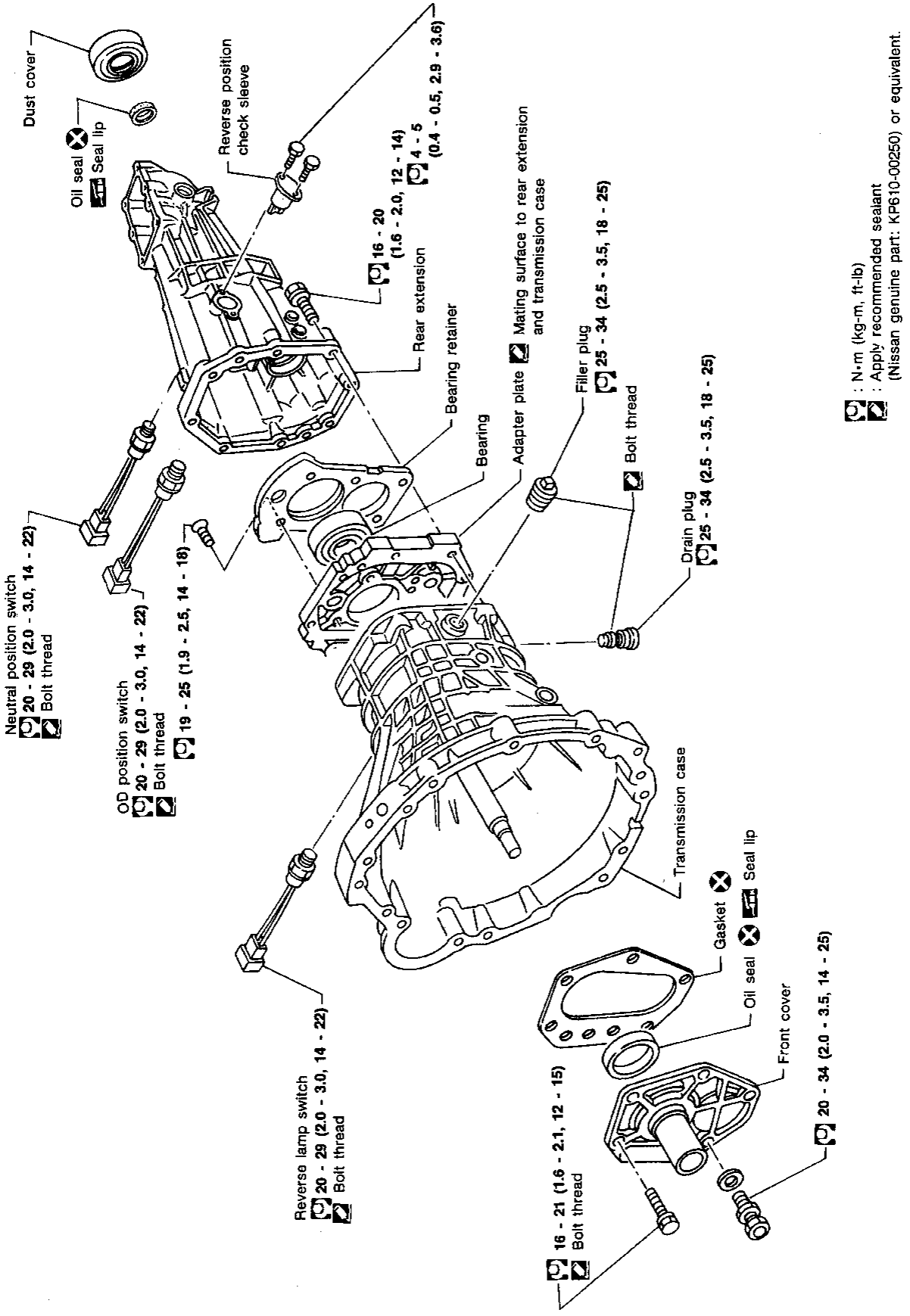
- Tighten transmission fixing bolts.

Bolt No.	Tightening torque N·m (kg-m, ft-lb)	"ℓ" mm (in)
①	39 - 49 (4.0 - 5.0, 29 - 36)	60 (2.36)
②	39 - 49 (4.0 - 5.0, 29 - 36)	70 (2.76)
③*	29 - 39 (3.0 - 4.0, 22 - 29)	35 (1.38)
④*	29 - 39 (3.0 - 4.0, 22 - 29)	65 (2.56)
⑤	29 - 39 (3.0 - 4.0, 22 - 29)	25 (0.98)
Gusset to engine	29 - 39 (3.0 - 4.0, 22 - 29)	20 (0.79)

*: With nut.

- Install any part removed.

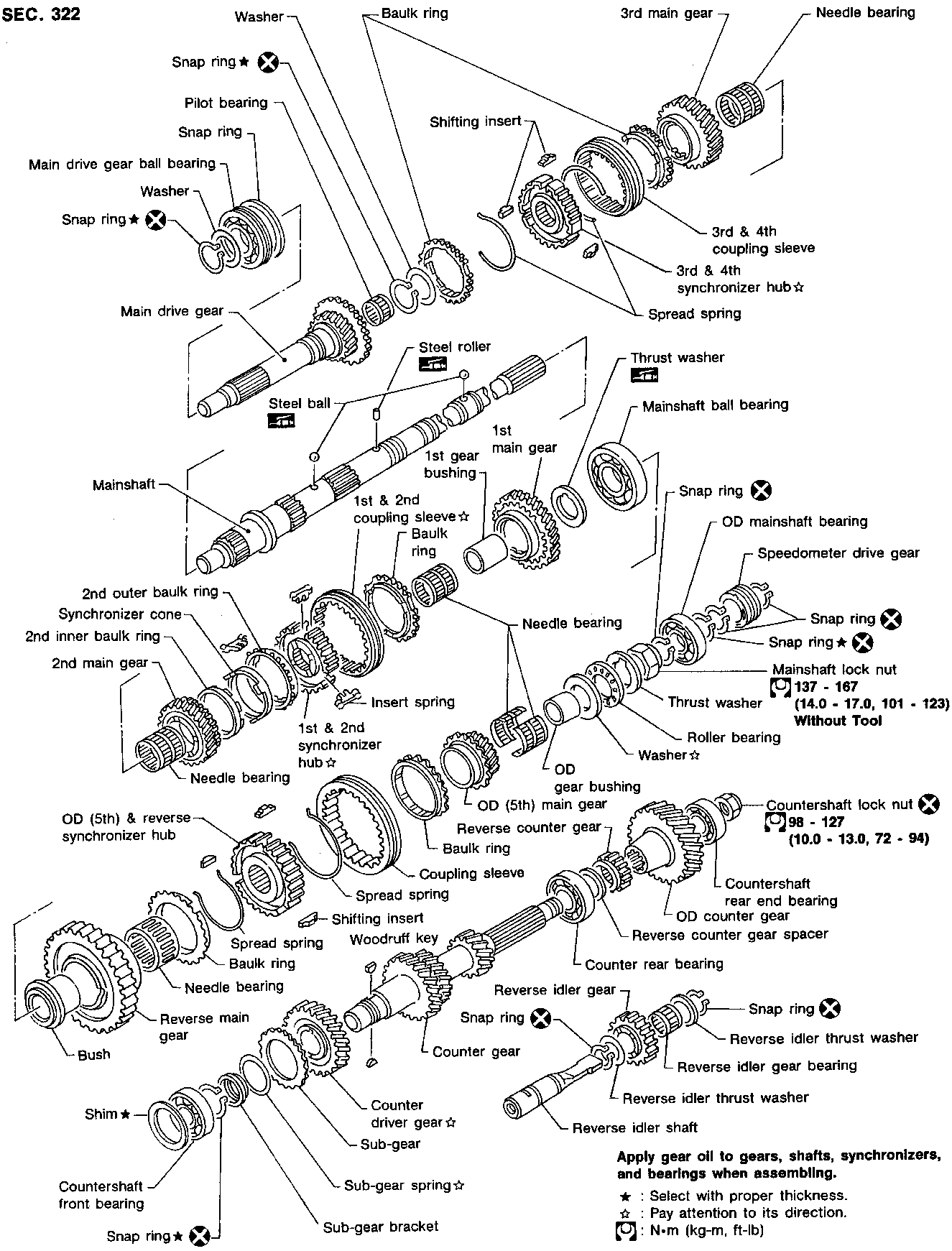
Case Components



SMT645C

Gear Components

SEC. 322

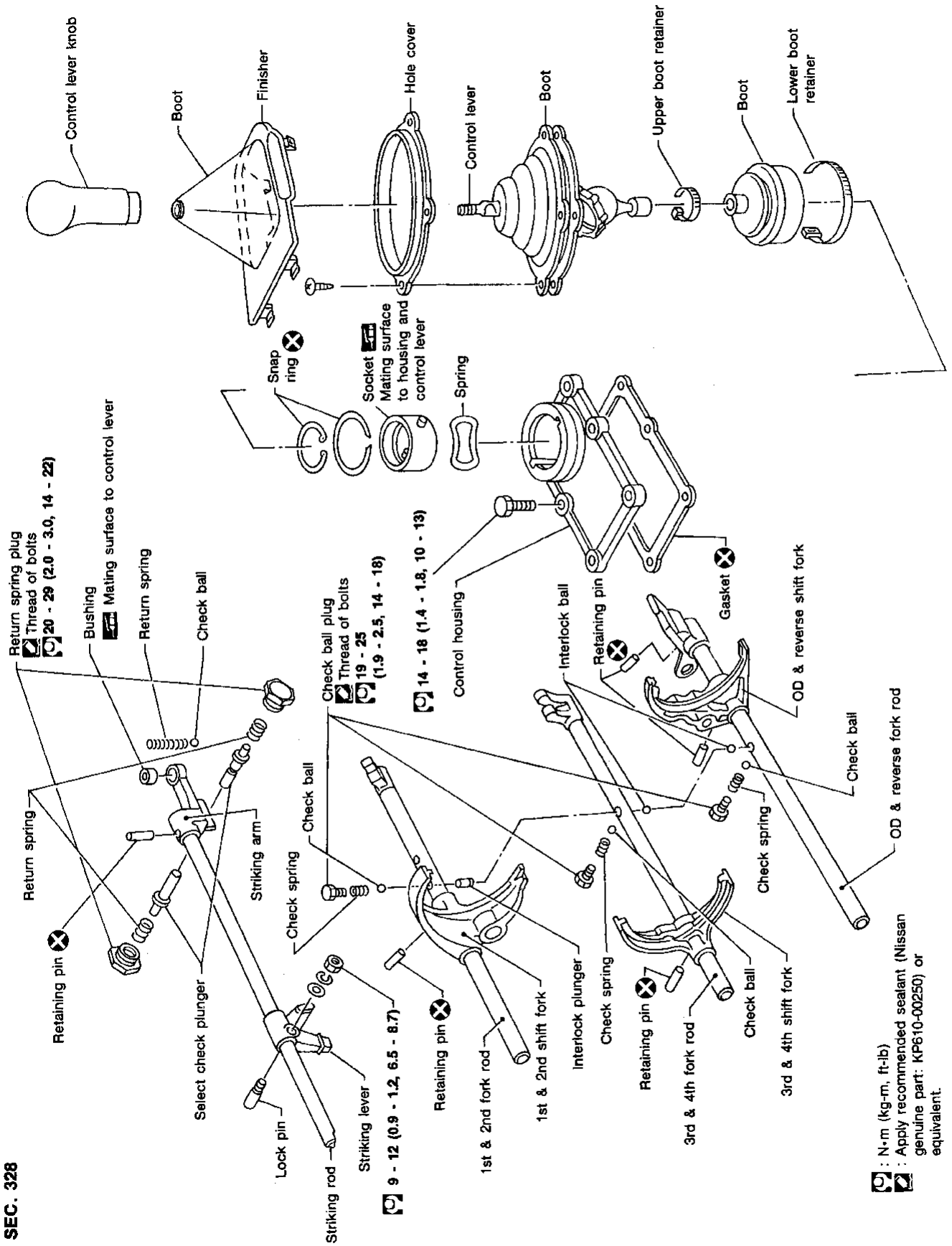


Apply gear oil to gears, shafts, synchronizers, and bearings when assembling.

★ : Select with proper thickness.
☆ : Pay attention to its direction.
: N·m (kg-m, ft-lb)

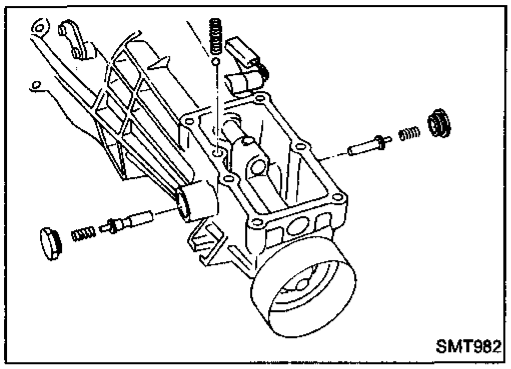
SMT646C

Shift Control Components



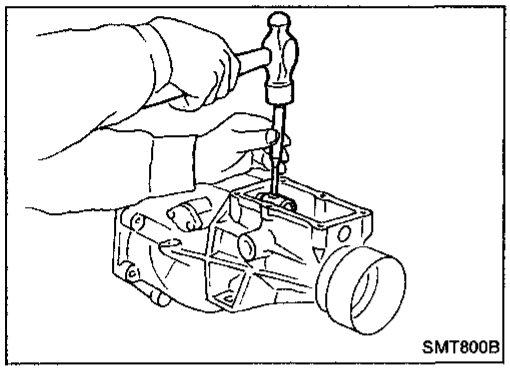
SEC. 328

SMT647C

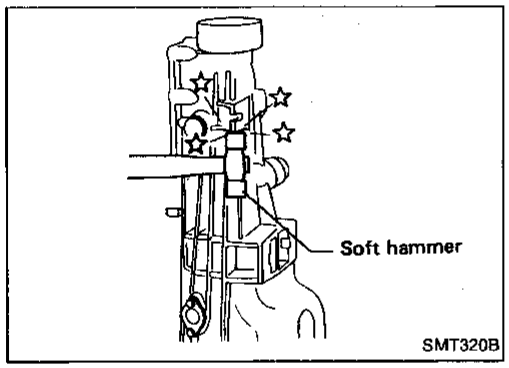

SMT982

Case Components

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

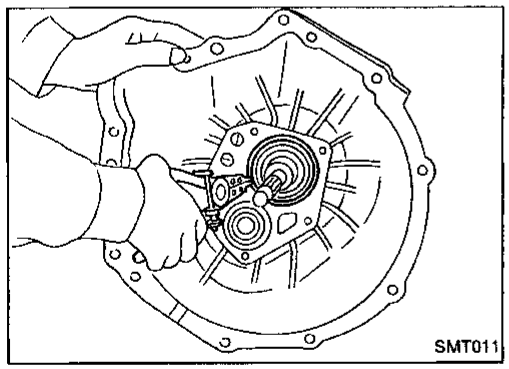

SMT800B

b. Drive out striking arm retaining pin.
c. Remove striking arm from striking rod.

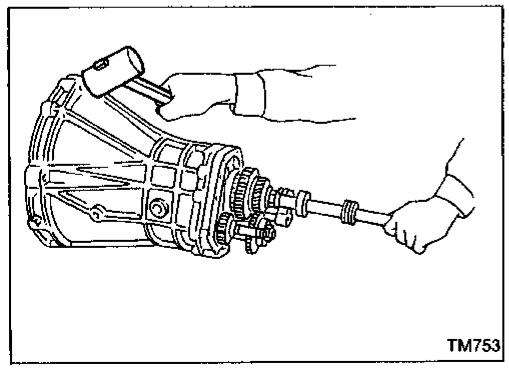


SMT320B

d. Remove rear extension by lightly tapping it.

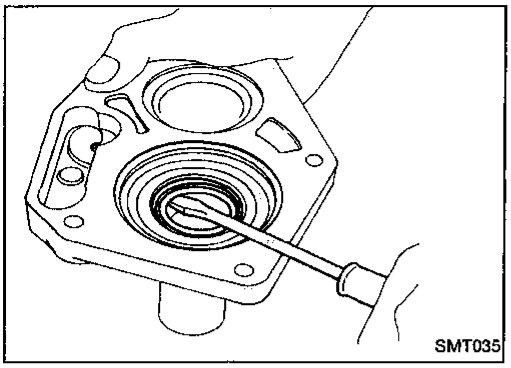

SMT011

2. Remove front cover, gasket, shim of countershaft front bearing, and snap ring of main drive gear ball bearing.


TM753

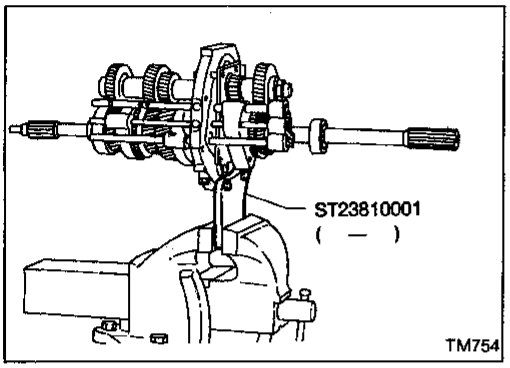
3. Remove transmission case by tapping lightly.

Case Components (Cont'd)

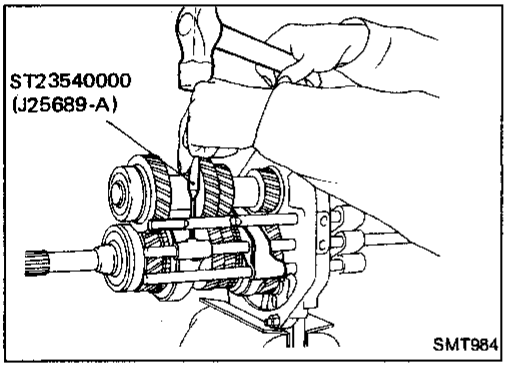


4. Remove front cover oil seal.

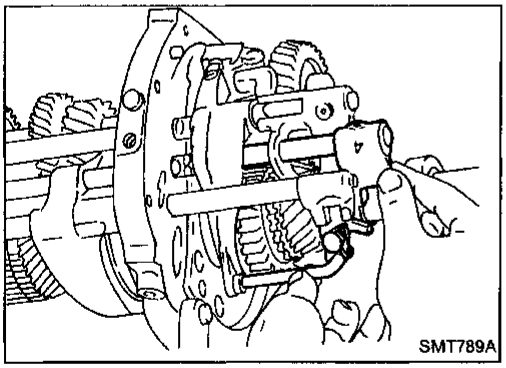
Shift Control Components



1. Set up Tool on adapter plate.
2. Remove striking rod from adapter plate.
3. Remove check ball plugs, check springs, and check balls.

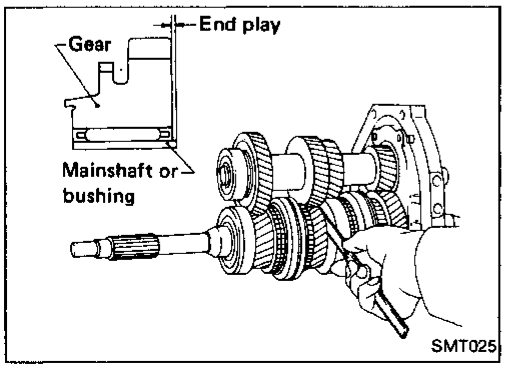


4. Drive out retaining pins. Then drive out fork rods and remove interlock balls.



5. Draw out 3rd-4th and OD-reverse fork rods.

Gear Components

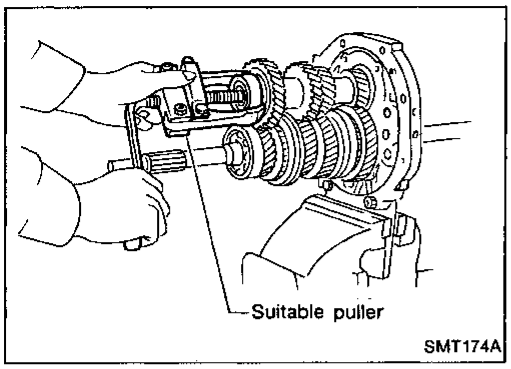


1. Before removing gears and shafts, measure each gear end play.

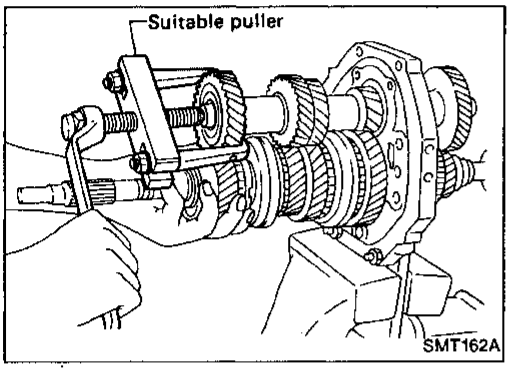
   Gear end play: Refer to SDS, MT-28.

   If not within specification, disassemble and check contact surface of gear to hub, washer, bushing, needle bearing and shaft.

Gear Components (Cont'd)

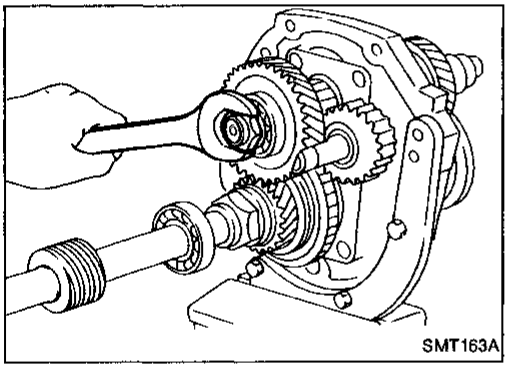


2. Mesh 2nd and reverse gear, then draw out counter front bearing with suitable puller.
3. Remove snap ring and then remove sub-gear bracket, sub-gear spring and sub-gear.



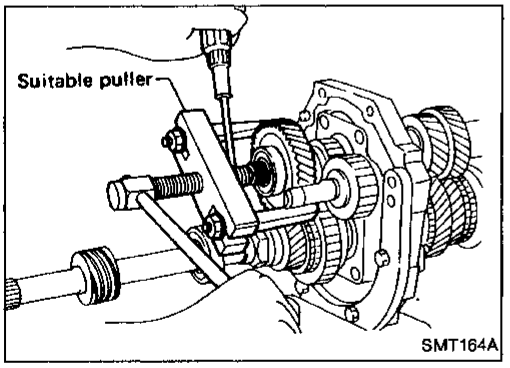
4. Draw out counter drive gear with main drive gear assembly with suitable puller.

- **When drawing out main drive gear assembly, be careful not to drop pilot bearing and baulk ring.**

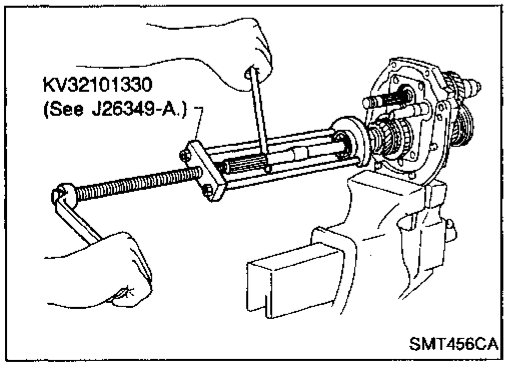


5. Remove rear side components on mainshaft and counter gear.

a. Release staking on countershaft nut and mainshaft nut and loosen these nuts.
   Mainshaft nut: Left-hand thread

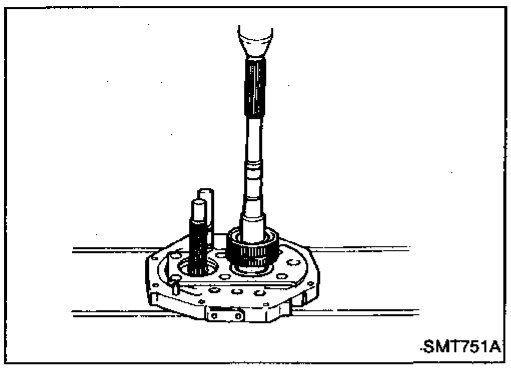


b. Pull out OD counter gear with bearing with suitable puller.
c. Draw out reverse counter gear and spacer.
d. Remove snap rings from reverse idler shaft and draw out reverse idler gear, thrust washers and reverse idler gear bearing.
e. Remove speedometer drive gear and steel ball.



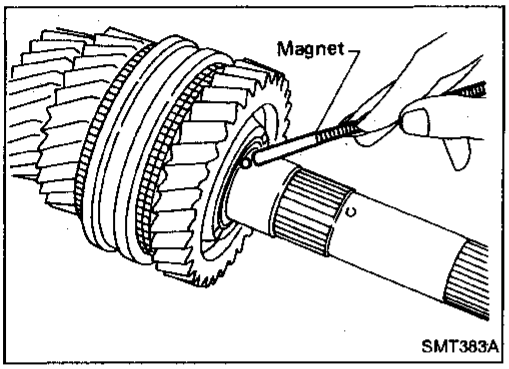
f. Remove snap ring and pull out OD mainshaft bearing, then remove snap ring.
g. Remove mainshaft nut.
h. Remove steel roller and washer.
i. Remove roller bearing and washer.
j. Remove OD main gear, needle bearing and baulk ring (OD).
k. Remove OD coupling sleeve and shifting inserts.

Gear Components (Cont'd)

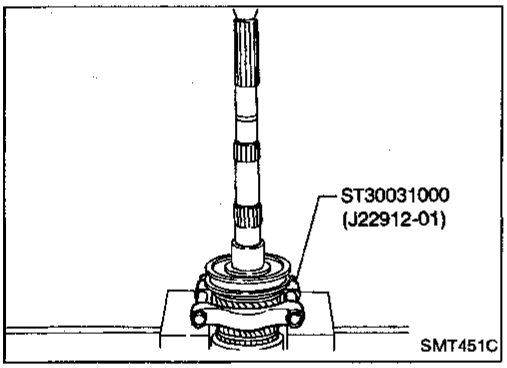


I. Press out mainshaft and counter gear alternately.

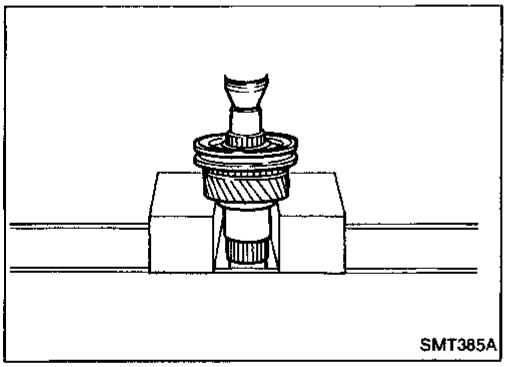
- **Press down mainshaft and counter gear alternately and carefully. Do not allow gears attached to mainshaft and counter gear underneath adapter plate to hit each other.**



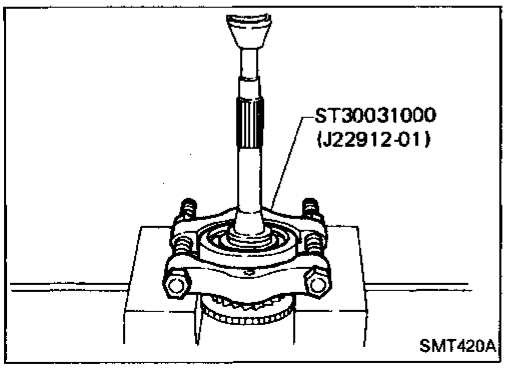
6. Remove front side components on mainshaft.
a. Remove 1st gear washer and steel ball.
b. Remove 1st main gear and 1st gear needle bearing.



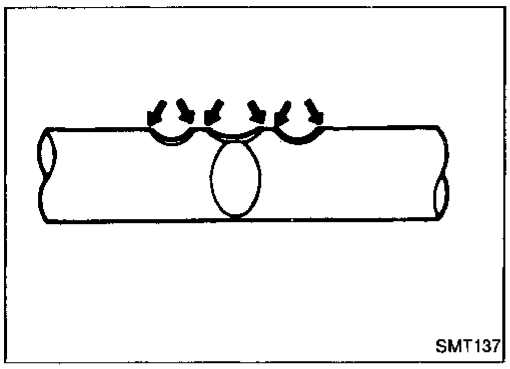
c. Press out 2nd main gear together with 1st gear bushing and 1st & 2nd synchronizer assembly.
d. Remove mainshaft front snap ring.



e. Press out 3rd main gear together with 3rd & 4th synchronizer assembly and 3rd gear needle bearing.

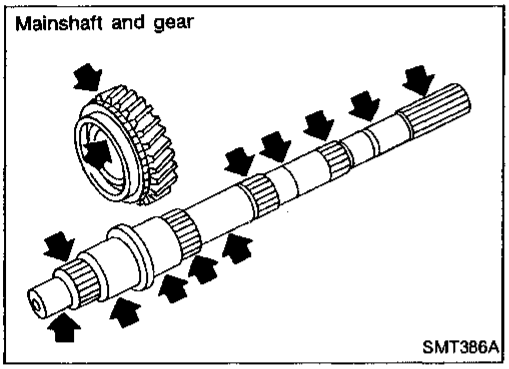


7. Remove main drive gear bearing.
a. Remove main drive gear snap ring and spacer.
b. Press out main drive gear bearing.


SMT137

Shift Control Components

- Check contact surface and sliding surface for wear, scratches, projections or other damage.

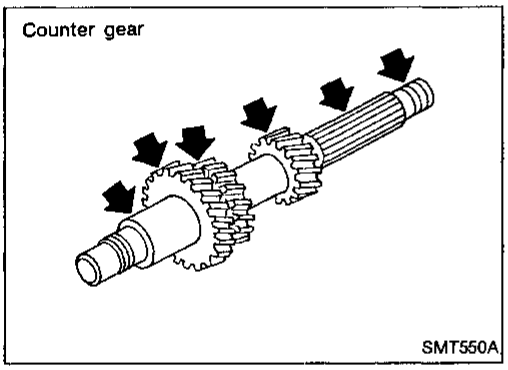


SMT386A

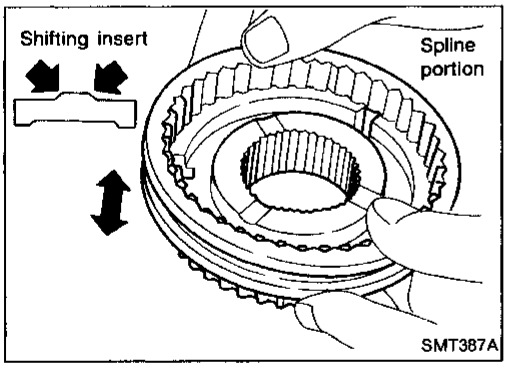
Gear Components

GEAR AND SHAFT

- Check shafts for cracks, wear or bending.
- Check gears for excessive wear, chips or cracks.



SMT550A

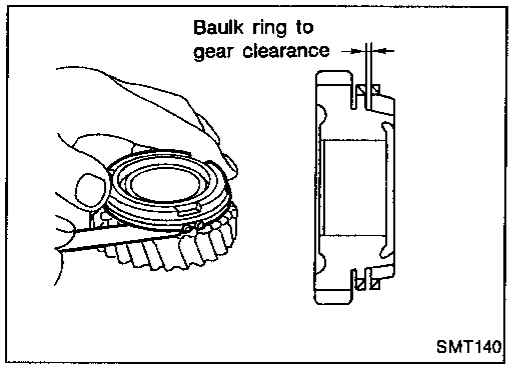


SMT387A

SYNCHRONIZERS

- Check spline portion of coupling sleeves, hubs and gears for wear or cracks.
- Check baulk rings for cracks or deformation.
- Check shifting inserts for wear or deformation.
- Check spread spring for deformation.

Gear Components (Cont'd)



- Measure clearance between baulk ring and gear.

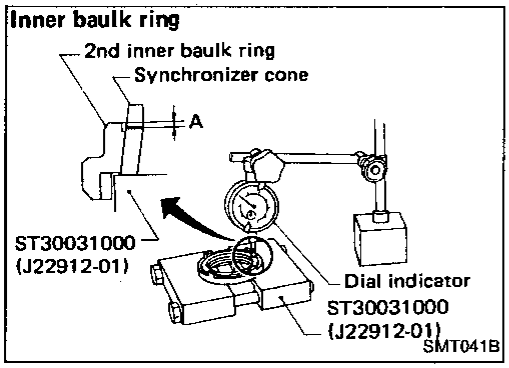
Clearance between baulk ring and gear

(1st, 3rd, main drive, OD and reverse baulk ring):

Unit: mm (in)

Dimension	Standard	Wear limit
1st	1.2 - 1.6 (0.047 - 0.063)	0.8 (0.031)
3rd and main drive	1.2 - 1.6 (0.047 - 0.063)	
OD	1.2 - 1.6 (0.047 - 0.063)	
Reverse	1.10 - 1.55 (0.0433 - 0.0610)	0.7 (0.028)

If the clearance is smaller than the wear limit, replace baulk ring.



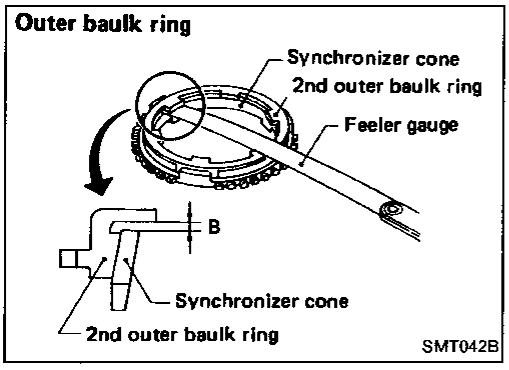
- Measure wear of 2nd baulk ring.

a. Place baulk rings in position on synchronizer cone.

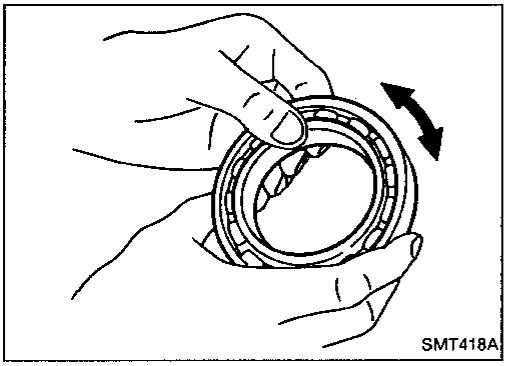
b. While holding baulk rings against synchronizer cone as far as it will go, measure dimensions "A" and "B".

Unit: mm (in)

Dimension	Standard	Wear limit
A	0.6 - 1.1 (0.024 - 0.043)	0.2 (0.008)
B	0.7 - 0.9 (0.028 - 0.035)	

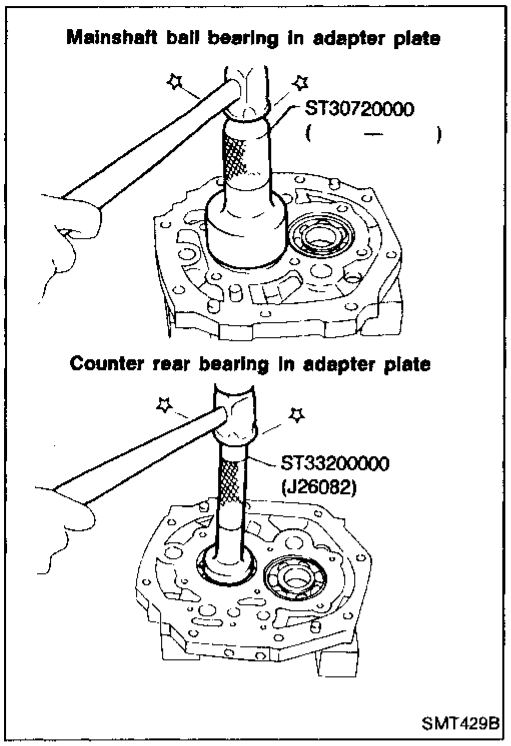


c. If dimension "A" or "B" is smaller than the wear limit, replace baulk ring.



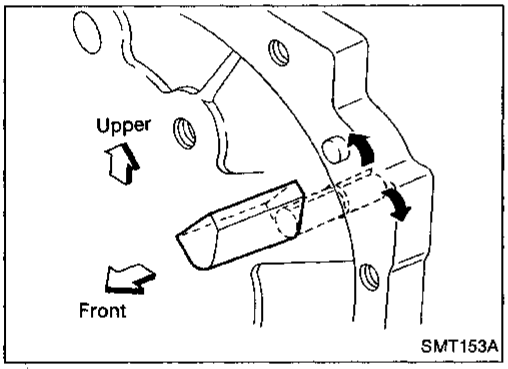
BEARINGS

- Make sure bearings roll freely and are free from noise, crack, pitting or wear.

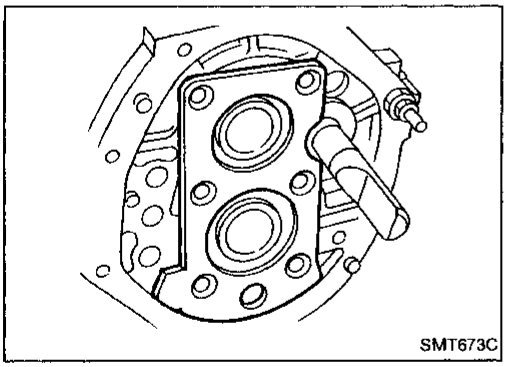


Gear Components

1. Install bearings into case components.

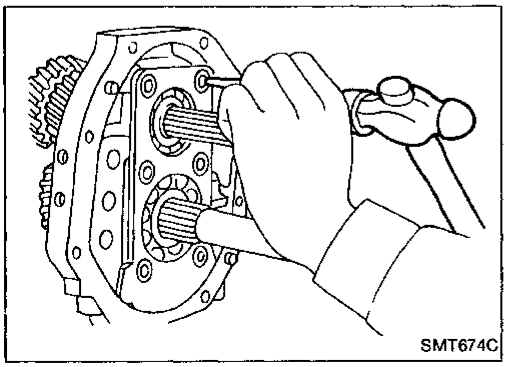


2. Assemble adapter plate parts.
- Install oil gutter on adapter plate and expand on rear side.



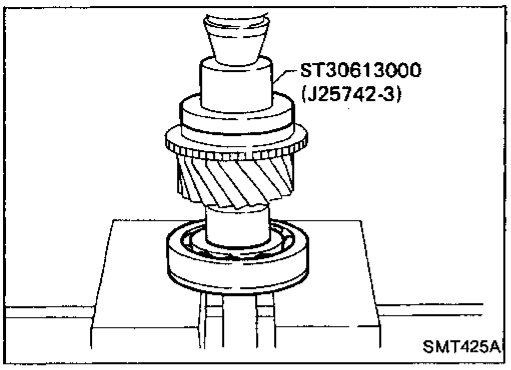
- Install bearing retainer.

a. Insert reverse shaft, then install bearing retainer.

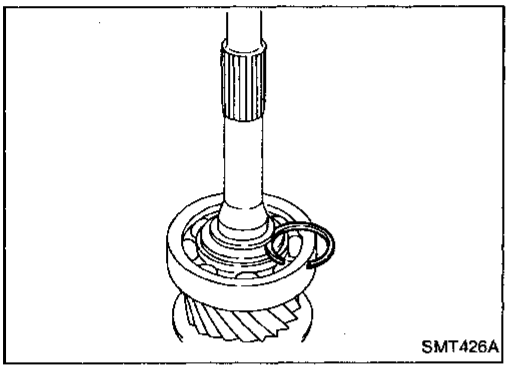


b. Tighten each screw, then stake each at two points.

Gear Components (Cont'd)

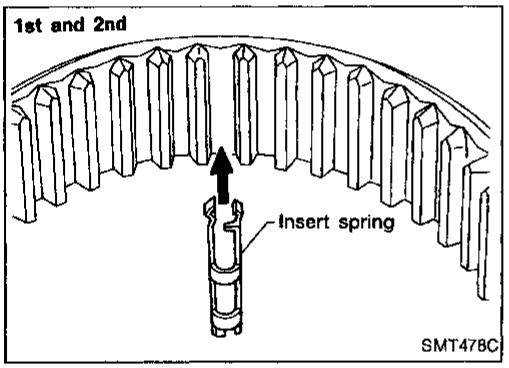


3. Install main drive gear bearing.
a. Press main drive gear bearing.
b. Install main drive gear spacer.

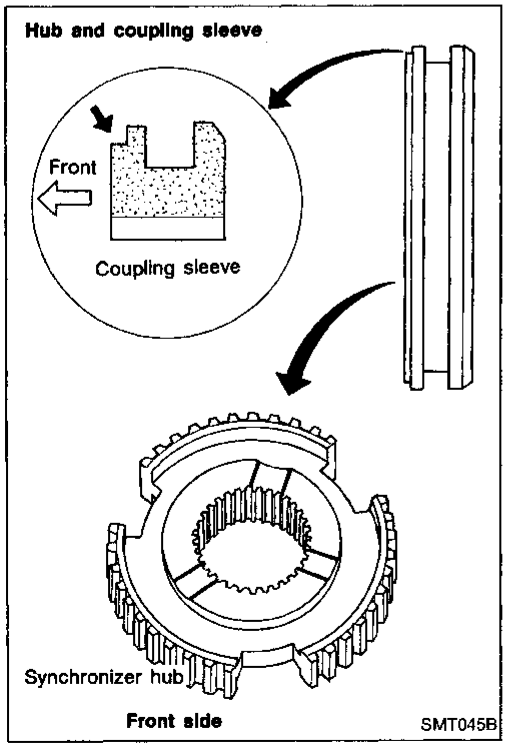


c. Select proper main drive gear snap ring to minimize clearance of groove and install it.

Allowable clearance of groove:
0 - 0.13 mm (0 - 0.0051 in)
Main drive gear snap ring:
Refer to SDS, MT-28.

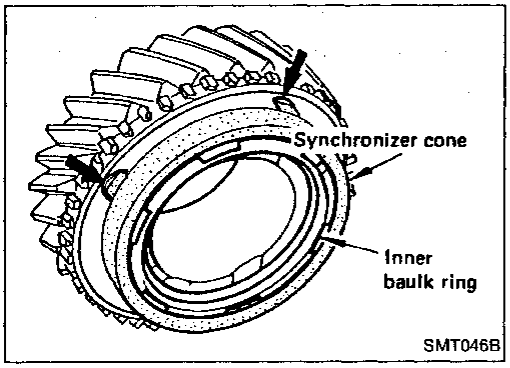


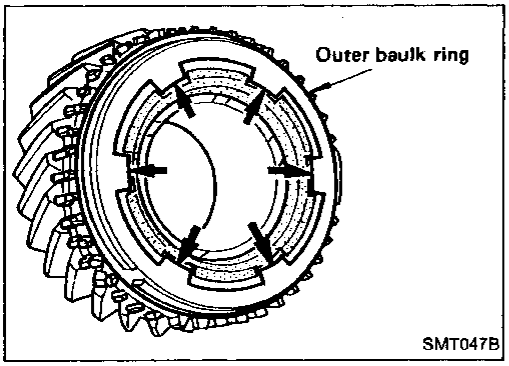
4. Assemble synchronizers.
- 1st & 2nd synchronizer

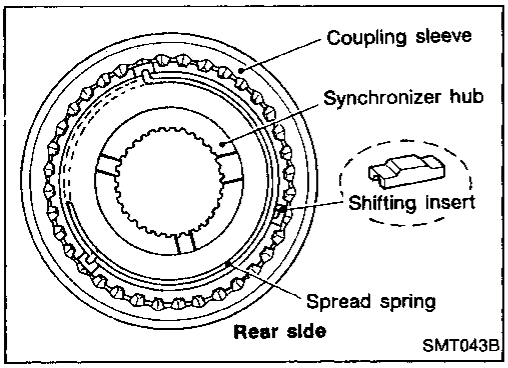


- Check coupling sleeve and synchronizer hub orientation.

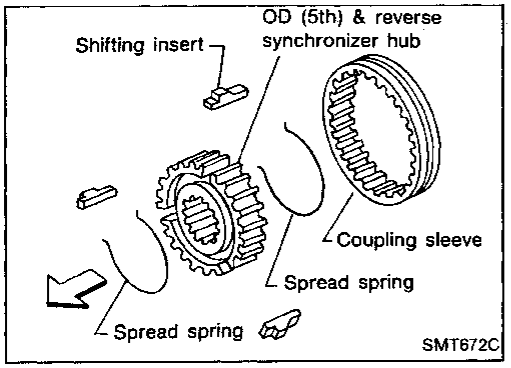
Gear Components (Cont'd)



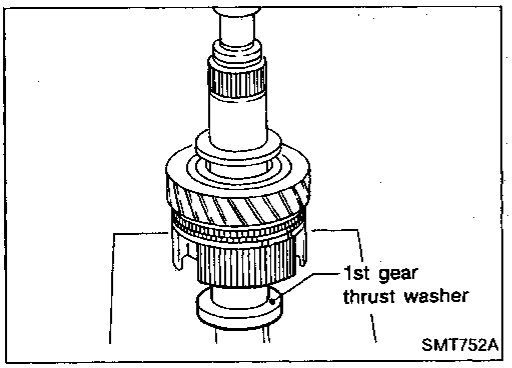




- 3rd & 4th synchronizer

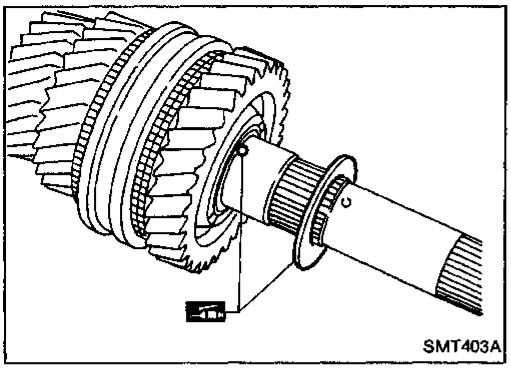


- OD & reverse synchronizer



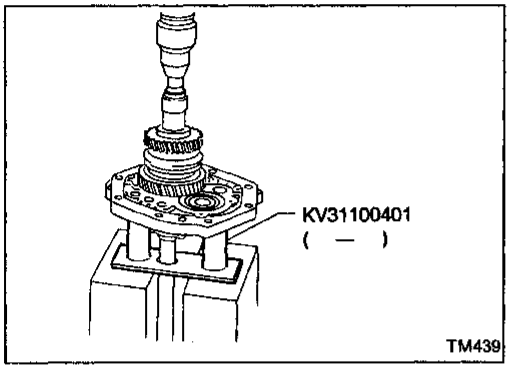
5. Install front side components on main shaft.
a. Assemble 2nd main gear, needle bearing and 1st & 2nd synchronizer assembly. Then press 1st gear bushing on mainshaft.
b. Install 1st main gear.

Gear Components (Cont'd)



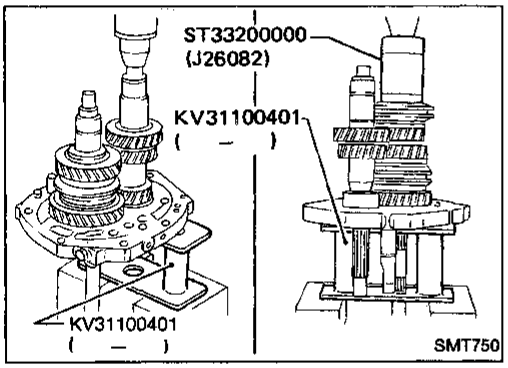
c. Install steel ball and 1st gear washer.

- **Apply multi-purpose grease to steel ball and 1st gear washer before installing.**



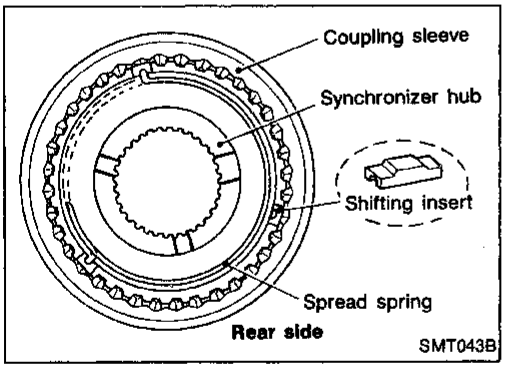
6. Install mainshaft and counter gear on adapter plate and main drive gear on mainshaft.

a. Press mainshaft assembly to adapter plate with Tool.

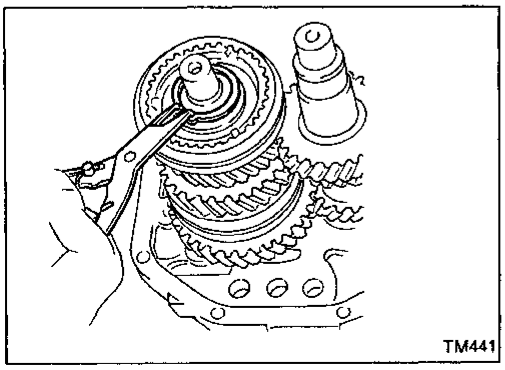


b. Press counter gear into adapter plate with Tool.

c. Install 3rd main gear and then press 3rd & 4th synchronizer assembly.



- **Pay attention to direction of 3rd & 4th synchronizer.**

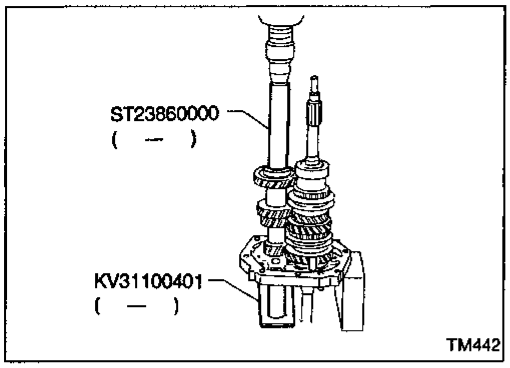


d. Install thrust washer on mainshaft and secure it with mainshaft front snap ring.
Select proper snap ring to minimize clearance of groove in mainshaft.

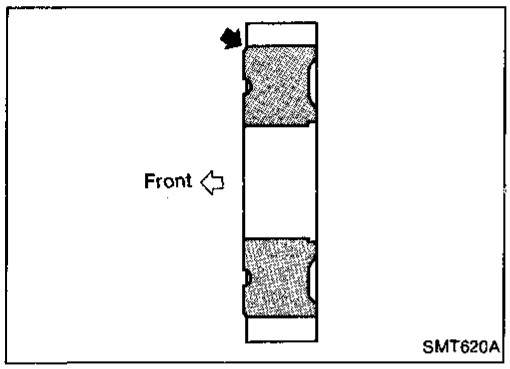
Allowable clearance of groove:
0 - 0.18 mm (0 - 0.0071 in)
Mainshaft front snap ring:
Refer to SDS, MT-28.

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

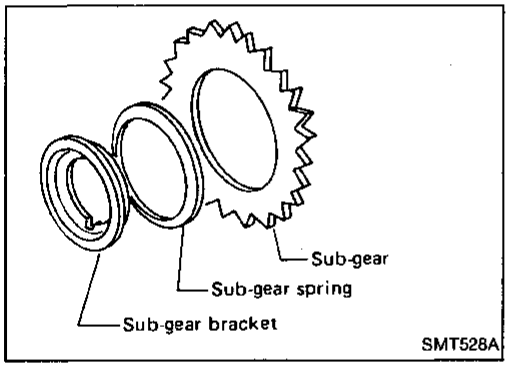
Gear Components (Cont'd)



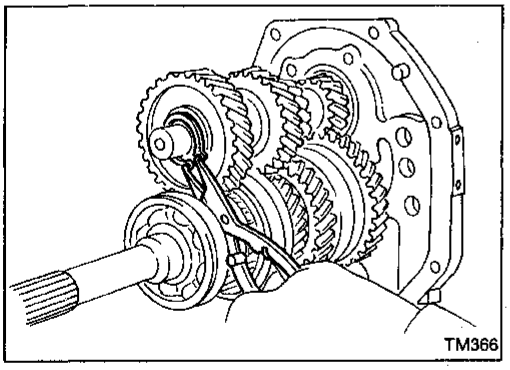
f. Press counter drive gear with main drive gear with Tool.



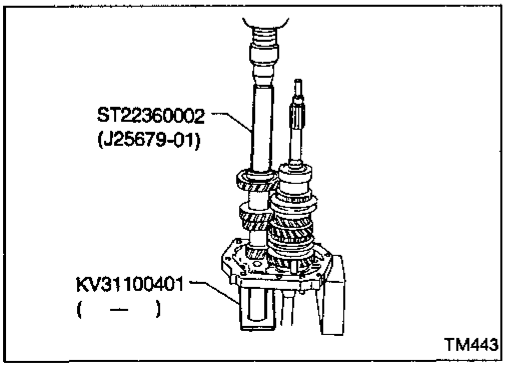
- **Pay attention to direction of counter drive gear.**



g. Install sub-gear components.
(1) Install sub-gear and sub-gear bracket on counter drive gear. Then select proper snap ring to minimize clearance of groove in counter gear.
Allowable clearance of groove:
0 - 0.13 mm (0 - 0.0051 in)
Counter drive gear snap ring: Refer to SDS, MT-28.
(2) Remove snap ring, sub-gear bracket and sub-gear from counter gear.
(3) Reinstall sub-gear, sub-gear spring and sub-gear bracket.

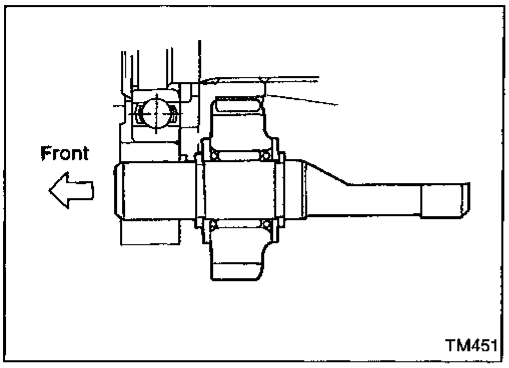


h. Install selected counter drive gear snap ring.

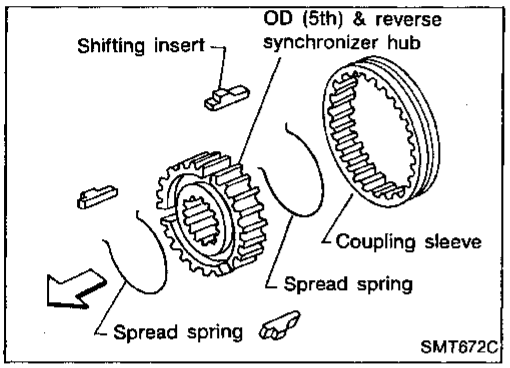


i. Press counter gear front bearing onto counter gear.

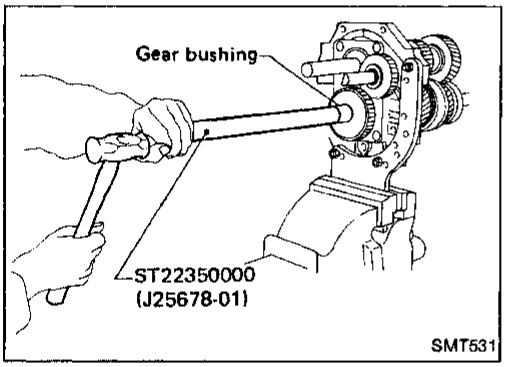
Gear Components (Cont'd)



7. Install rear side components on mainshaft and counter gear.
a. Install reverse idler gear to reverse idler shaft with spacers, snap rings and needle bearing.

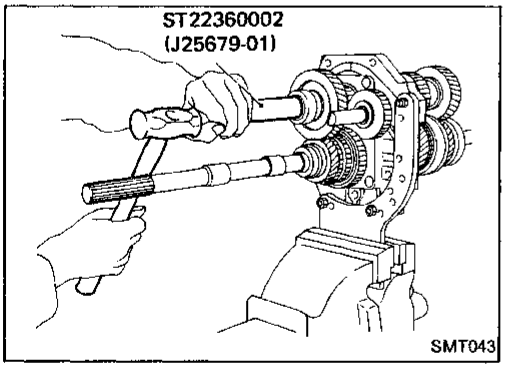


b. Install insert retainer and OD & reverse synchronizer to mainshaft.
- **Pay attention to direction of hub.**

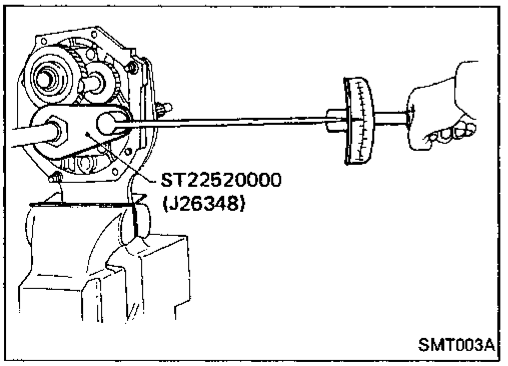


c. Install OD gear bushing with Tool.
d. Install OD main gear and needle bearing.
e. Install spacer, reverse counter gear and OD counter gear.
- **OD main gear and OD counter gear should be handled as a matched set.**

f. Install washer, roller bearing, steel roller and thrust washer.
g. Tighten mainshaft lock nut temporarily.
- **Always use new lock nut.**

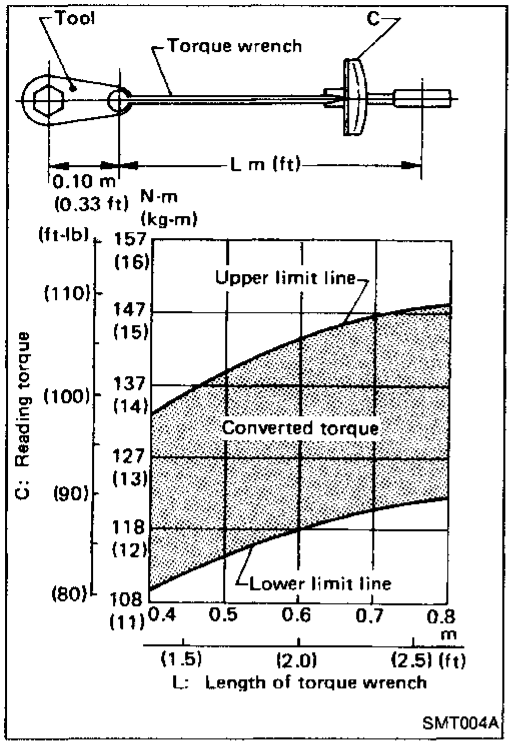


h. Install countershaft rear end bearing with Tool.



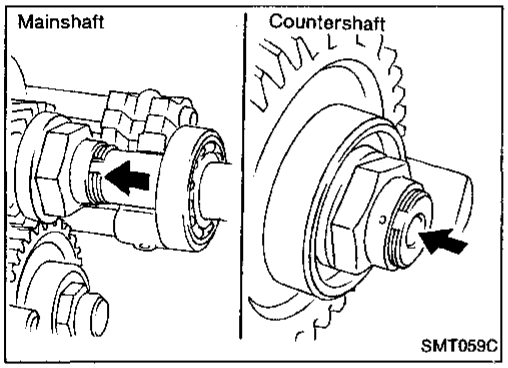
8. Mesh 2nd and reverse gears, then tighten mainshaft lock nut with Tool.

Gear Components (Cont'd)



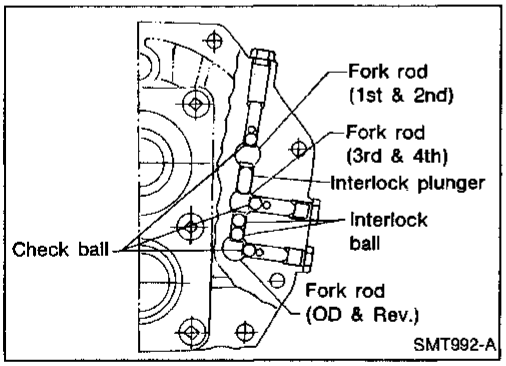
- Use the left chart when deciding the reading torque. (Length of torque wrench vs. setting or reading torque)

9. Tighten countershaft lock nut.
   - **Always use new lock nut.**

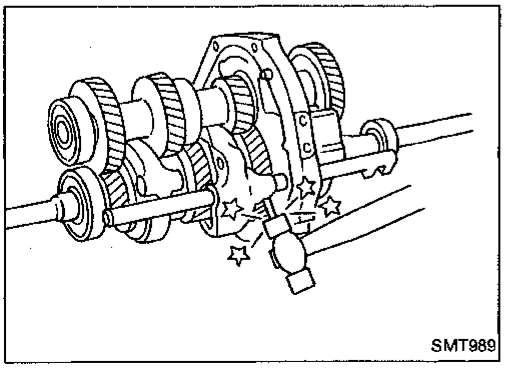


10. Stake mainshaft lock nut and countershaft lock nut with a punch.
11. Measure gear end play. For the description, refer to DISASSEMBLY for Gear Components, MT-12.

Shift Control Components

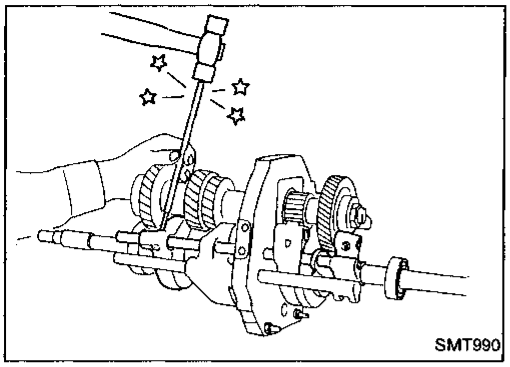


1. Install shift rods, interlock plunger, interlock balls and check balls.

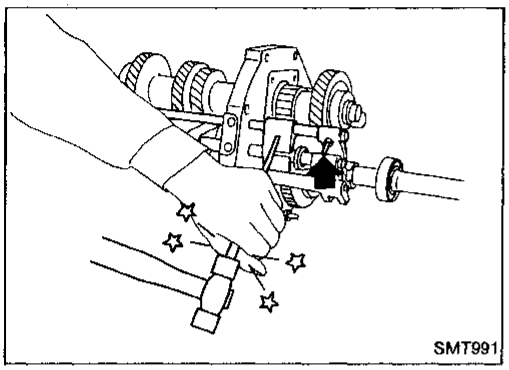


a. 1st-2nd shift fork

Shift Control Components (Cont'd)

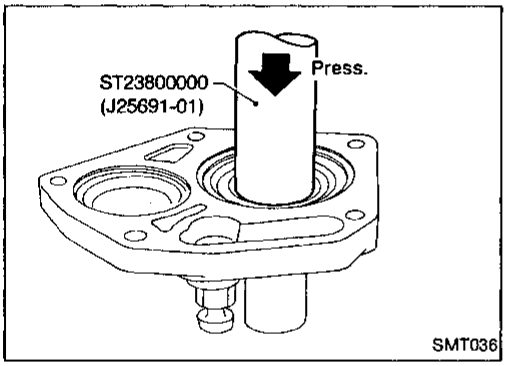


b. 3rd-4th shift fork



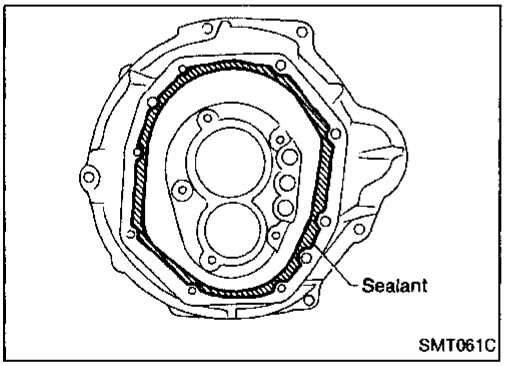
c. OD-reverse shift fork or reverse shift fork.

Case Components

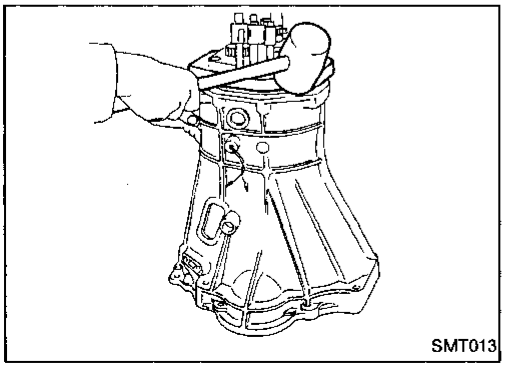


1. Install front cover oil seal.

- **Apply multi-purpose grease to seal lip of oil seal before installing.**

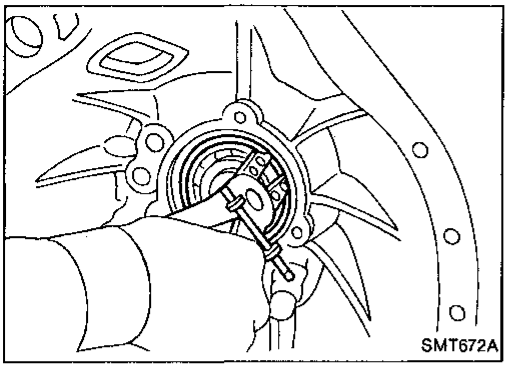


2. Apply sealant to mating surface of transmission case.

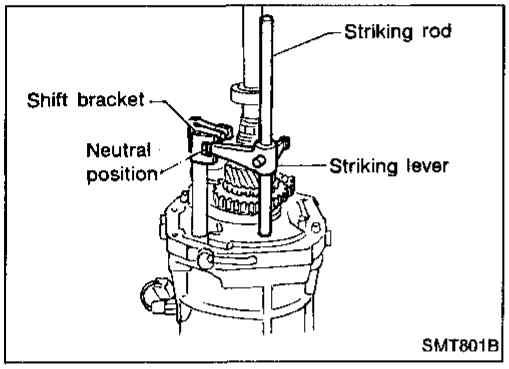


3. Install gear assembly onto transmission case.

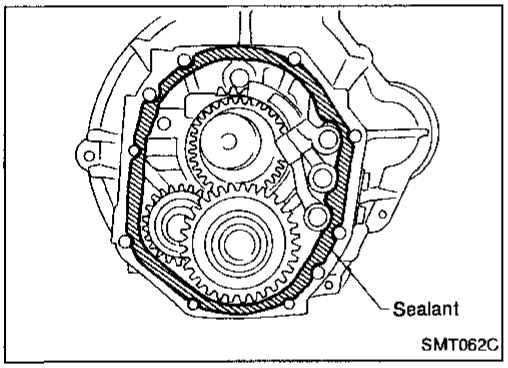
Case Components (Cont'd)



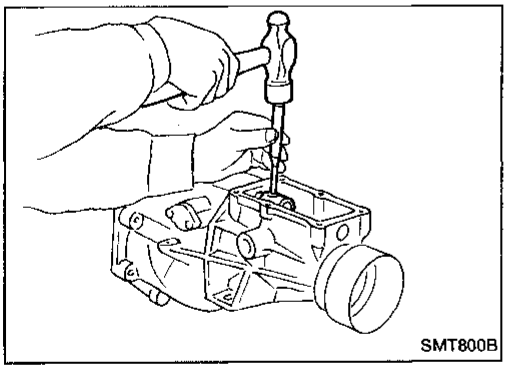
4. Install snap ring of main drive bearing.



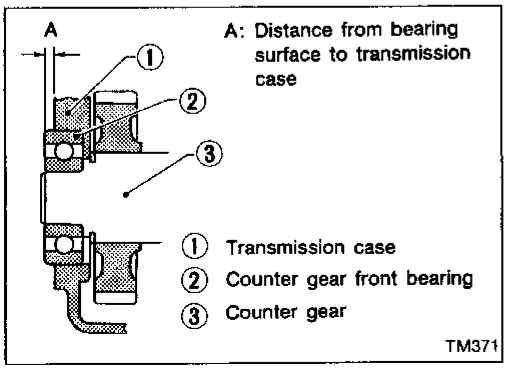
5. Set 1st & 2nd, 3rd & 4th and 5th & reverse shift forks in neutral position.
6. Install striking rod onto adapter plate while aligning striking lever with shift brackets.



7. Apply sealant to mating surface of adapter plate.
8. Install rear extension while inserting striking arm into striking rod.

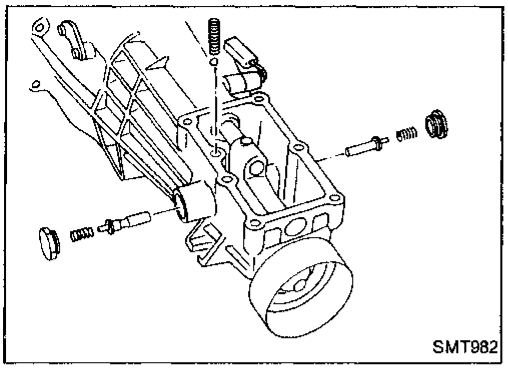


9. Install striking arm retaining pin.



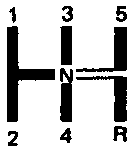
10. Select counter front bearing shim.
    Counter front bearing shim: Refer to SDS, MT-29.
11. Install gasket and front cover.

Case Components (Cont'd)



12. Install return spring plugs, check ball, return springs and select check plunger.
13. Install control housing and gasket.

General Specifications

Transmission model		FS5W71C
Number of speeds		5
Shift pattern		
Synchromesh type		Warner
Gear ratio	1st	3.321
	2nd	1.902
	3rd	1.308
	4th	1.000
	OD	0.759
	Reverse	3.382
Number of teeth		
Mainshaft	Drive	22
	1st	33
	2nd	27
	3rd	26
	OD	21
	Reverse	36
Countershaft	Drive	31
	1st	14
	2nd	20
	3rd	28
	OD	39
	Reverse	15
Reverse idler gear		21
Oil capacity	ℓ (US pt, Imp pt)	2.5 (5-1/4, 4-3/8)
Remarks	Sub-gear	○
	Reverse synchronizer	○
	Double baulk ring type synchronizer	2nd synchronizer

Inspection and Adjustment

GEAR END PLAY

Gear	End play mm (in)
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)
OD gear	0.24 - 0.41 (0.0094 - 0.0161)

CLEARANCE BETWEEN BAULK RING AND GEAR

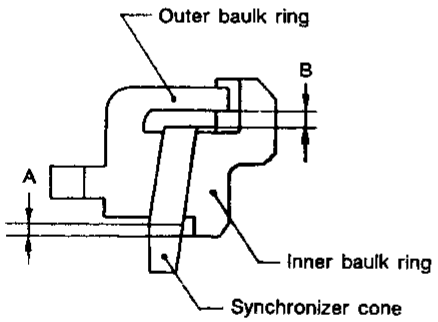
1st, 3rd, main drive, OD and reverse baulk ring

Unit: mm (in)

	Standard	Wear limit
1st	1.2 - 1.6 (0.047 - 0.063)	0.8 (0.031)
3rd and main drive	1.2 - 1.6 (0.047 - 0.063)	
OD	1.2 - 1.6 (0.047 - 0.063)	
Reverse	1.10 - 1.55 (0.0433 - 0.0610)	0.7 (0.028)

2nd baulk ring

Unit: mm (in)



SMT044B

Dimension	Standard	Wear limit
A	0.6 - 1.1 (0.024 - 0.043)	0.2 (0.008)
B	0.7 - 0.9 (0.028 - 0.035)	

AVAILABLE SNAP RINGS

Main drive gear bearing

Allowable clearance	0 - 0.13 mm (0 - 0.0051 in)
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

Allowable clearance	0 - 0.18 mm (0 - 0.0071 in)
Thickness mm (in)	Part number
2.4 (0.094)	32263-V5200
2.5 (0.098)	32263-V5201
2.6 (0.102)	32263-V5202

OD mainshaft bearing

Allowable clearance	0 - 0.14 mm (0 - 0.0055 in)
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

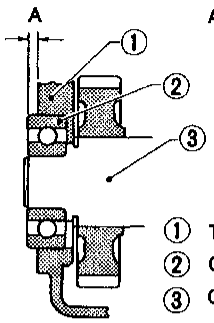
Counter drive gear

Allowable clearance	0 - 0.13 mm (0 - 0.0051 in)
Thickness mm (in)	Part number
1.4 (0.055)	32215-E9000
1.5 (0.059)	32215-E9001
1.6 (0.063)	32215-E9002

AVAILABLE SHIMS

Counter front bearing

Unit: mm (in)



A: Distance from bearing surface to transmission case

① Transmission case
② Counter gear front bearing
③ Counter gear

TM371

Allowable clearance	0 - 0.16 mm (0 - 0.0063 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