

CLUTCH AND MANUAL TRANSMISSION

	Page
TROUBLESHOOTING	9-2
SPECIAL TOOLS AND TEST EQUIPMENT	9-3
CHECK AND ADJUSTMENT OF CLUTCH	
PEDAL	9-5
BLEEDING OF CLUTCH SYSTEM	9-5
CLUTCH PEDAL	9-6
CLUTCH MASTER CYLINDER	9-7
CLUTCH RELEASE CYLINDER	9-8
CLUTCH UNIT	9-10
G52 TRANSMISSION	9-13
W42 AND W52 TRANSMISSION	9-37
L45 AND L52 TRANSMISSION	9-56

TROUBLESHOOTING

Problem	Possible cause	Remedy	Page
Hard to shift or will not shift	Clutch pedal freeplay excessive	Adjust pedal freeplay	9-4
	Clutch release cylinder faulty	Repair release cylinder	9-7
	Clutch master cylinder faulty	Repair master cylinder	9-6
	Clutch disc out of true, lining greasy or broken	Inspect clutch disc	9-9
	Splines on input shaft or clutch disc dirty or burred	Repair as necessary	9-9
	Clutch pressure plate faulty	Replace pressure plate	9-9
	Transmission faulty	Disassemble and inspect transmission	9-12, 56
Transmission jumps out of gear	Clutch pilot bearing worn	Replace pilot bearing	4-36
	Transmission faulty	Disassemble and inspect transmission	9-12, 56
Clutch slips	Clutch pedal freeplay insufficient	Adjust pedal freeplay	9-4
	Clutch disc lining oily or worn out	Inspect clutch disc	9-9
	Pressure plate faulty	Replace pressure plate	9-9
	Release fork binds	Inspect release fork	9-9
Clutch grabs/chatters	Clutch disc lining oily or worn out	Inspect clutch disc	9-9
	Pressure plate faulty	Replace pressure plate	9-9
	Clutch diaphragm bending	Align clutch diaphragm	9-9
	Engine mounts loose	Repair as necessary	
Clutch pedal spongy	Air in clutch lines	Bleed clutch system	9-4
	Clutch release cylinder faulty	Repair release cylinder	9-7
	Clutch master cylinder faulty	Repair master cylinder	9-6
Clutch noisy	Loose part inside housing	Repair as necessary	
	Release bearing worn or dirty	Replace release bearing	9-9
	Pilot bearing worn	Replace pilot bearing	4-36
	Release fork or linkage sticks	Repair as necessary	

SPECIAL TOOLS AND TEST EQUIPMENT

Tool	SST No.	Use
[CLUTCH]		
Flare nut wrench	09751-36011 or Commercial	To disconnect clutch line union
Clutch release bearing replacer	09315-00010 or Commercial	To replace clutch release bearing
Clutch guide tool	09301-20020	To install clutch
Diaphragm aligner tool set	09301-00012	To align clutch diaphragm
[G52 TRANSMISSION]		
Timing gear remover	09213-36020	To remove counter 5th gear
Drive pinion rear bearing replacer	09506-35010	To install input shaft bearing, output shaft rear bearing and 5th gear
Bearing remover	09950-00020	To remove counter gear front bearing
Oil seal replacer	09223-50010	To install front bearing retainer oil seal
Spring tension tool	09921-00010	To remove speedometer drive gear oil seal
Valve stem guide replacer	09201-60011	To install speedometer driven gear oil seal
Oil seal puller	09308-00010	To remove extension housing oil seal
Oil seal puller	09308-10010	To remove extension housing oil seal
Extension housing bushing	09307-30010	To replace extension housing bushing
Transmission oil plug	09325-20010	To install extension housing oil seal
Transmission bearing replacer	09316-60010	To install gear spline piece No. 5
[W42 AND W52 TRANSMISSION]		
Allen wrench	09313-30021	To remove straight screw plug
Universal puller	09950-20014	To remove output shaft rear bearing
Timing gear remover	09213-36020	To remove counter gear rear bearing and counter 5th gear
Drive pinion rear bearing replacer	09506-35010	To install input shaft bearing
Bearing remover	09950-00020	To remove counter gear rear bearing
Oil seal replacer	09223-50010	To install front bearing retainer oil seal
Spring tension tool	09921-00010	To remove speedometer driven gear oil seal
Valve stem guide replacer	09201-60011	To install speedometer driven gear oil seal
Oil seal puller	09308-00010	To remove extension housing oil seal
Oil seal puller	09308-10010	To remove extension housing oil seal
Extension housing bushing replacer	09307-30010	To replace extension housing bushing
Transmission oil plug	09325-20010	To install extension housing oil seal
Drive pinion bearing cone replacer	09506-30011	To install output shaft center bearing
Tilt steering bearing replacer	09612-22010	To install counter 5th gear
Counter shaft bearing replacer	09310-35010	To install counter rear bearing
Transmission rear bearing replacer	09309-35010	To install output shaft rear bearing
Rear axle shaft bearing replacer	09515-20010	To install output shaft rear bearing

SPECIAL TOOLS AND TEST EQUIPMENT (Cont'd)

Tool	SST No.	Use
[L45 AND L52 TRANSMISSION]		
Shift lever remover	09305-20012	To remove shift lever
Snap ring pliers	09905-00012 or Commercial	To remove snap ring
Back-up light switch tool	09817-16010	To remove back-up light switch
Universal puller	09950-20014	To remove sleeve, counter center bearing and output shaft rear bearing
Socket wrench	09326-22011 or Commercial	To loosen and tighten countershaft lock nut
Bearing replacer	09506-30011 or Commercial	To install input shaft bearing, clutch hub No. 1 and No. 2
Bearing puller	09310-36021	To remove countershaft rear bearing
Bushing replacer	09307-30010 or Commercial	To install countershaft rear bearing and replace extension housing bushing
Oil seal replacer	09304-12012 or Commercial	To install case cover oil seal
Hook	09921-00010 or Commercial	To remove speedometer driven gear oil seal
Oil seal replacer	09201-60011 or Commercial	To install speedometer driven gear oil seal
Oil seal replacer	09608-30021 or Commercial	To install input shaft oil seal
Oil seal puller	09308-00010 or Commercial or 09308-10010	To remove extension housing oil seal
Transmission oil plug	09325-20010 or Commercial	To install extension housing oil seal
Transmission oil plug	09325-12010 or Commercial	To install adapter oil seal
Bearing replacer	09309-35010 or Commercial	To install output shaft rear bearing, input shaft, countershaft center bearing and fifth gear
Bearing replacer	09310-35010 or Commercial	To install countershaft front bearing and sleeve

CHECK AND ADJUSTMENT OF CLUTCH PEDAL

1. CHECK THAT PEDAL HEIGHT AND PUSH ROD PLAY IS CORRECT

Pedal height:

22R 152 – 162 mm (5.98 – 6.38 in.)

L 162 – 172 mm (6.38 – 6.79 in.)

Push rod play at pedal top:

1.0 – 5.0 mm (0.039 – 0.197 in.)

If incorrect, adjust the pedal height and push rod play.

2. IF NECESSARY, ADJUST PEDAL HEIGHT AND PUSH ROD PLAY

- Loosen the lock nut and turn the stopper bolt until the height is correct. Tighten the lock nut.
- Loosen the lock nut and turn the push rod until the push rod play is correct. Tighten the lock nut.

3. CHECK THAT PEDAL FREEPLAY IS CORRECT

Push in on the pedal until the beginning of clutch resistance is felt.

Pedal freeplay: 5 – 15 mm (0.20 – 0.59 in.)

BLEEDING OF CLUTCH SYSTEM

NOTE: If any work is done on the clutch system or if air is suspected in the clutch lines, bleed the system of air.

CAUTION: DO NOT let brake fluid remain on a painted surface. Wash it off immediately.

1. FILL CLUTCH RESERVOIR WITH BRAKE FLUID

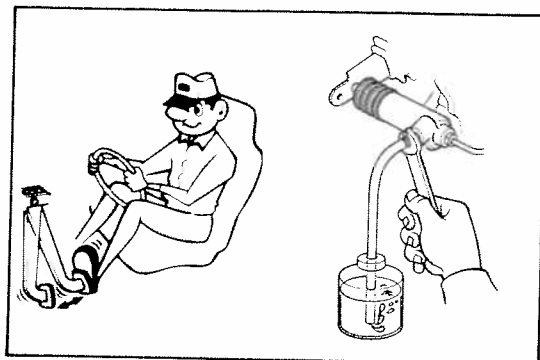
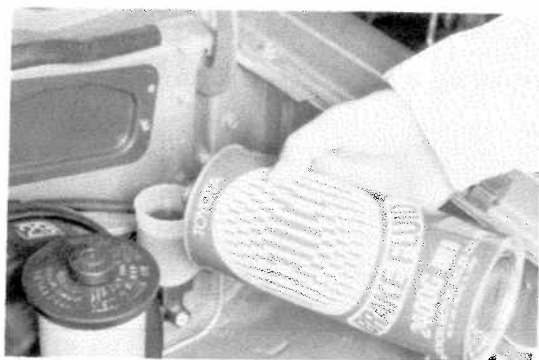
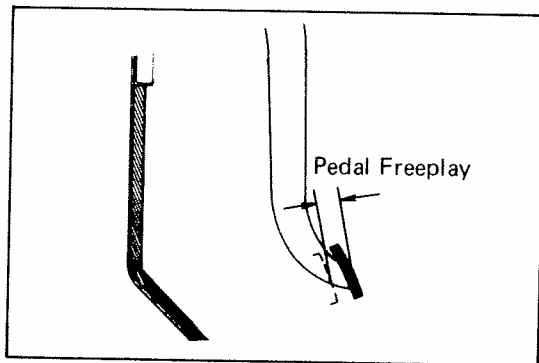
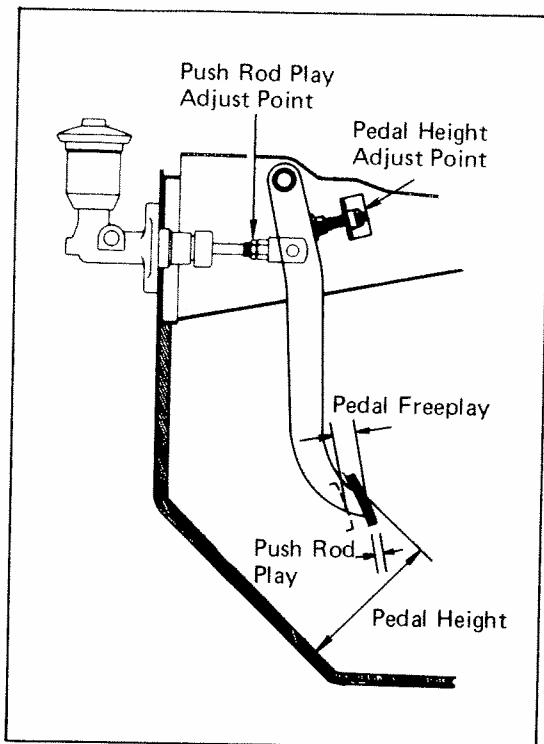
Check the reservoir frequently. Add fluid if necessary.

2. CONNECT VINYL TUBE TO BLEEDER PLUG

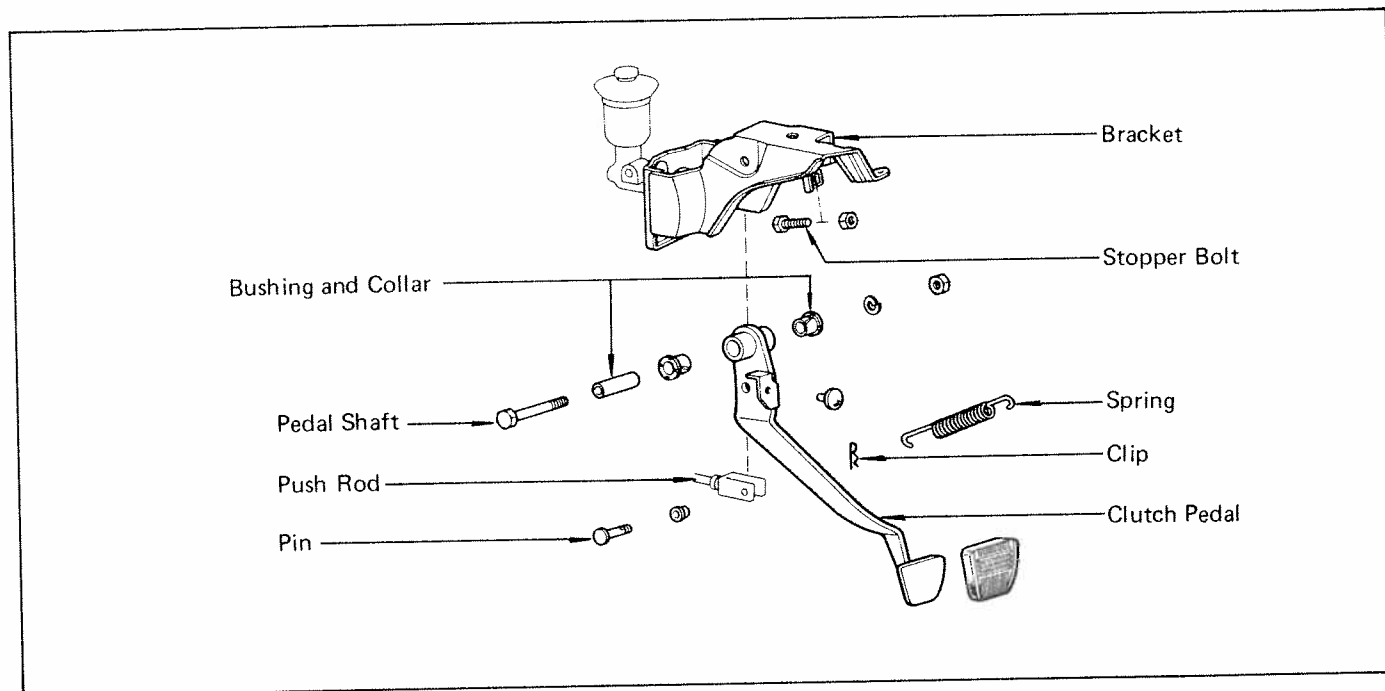
Insert the other end of the tube in a half-filled container of brake fluid.

3. BLEED CLUTCH LINE

- Slowly pump the clutch pedal several times.
- While pressing on the pedal, loosen the bleeder plug until the fluid starts to run out. Then close the bleeder plug.
- Repeat this procedure until there are no more air bubbles in the fluid.



CLUTCH PEDAL

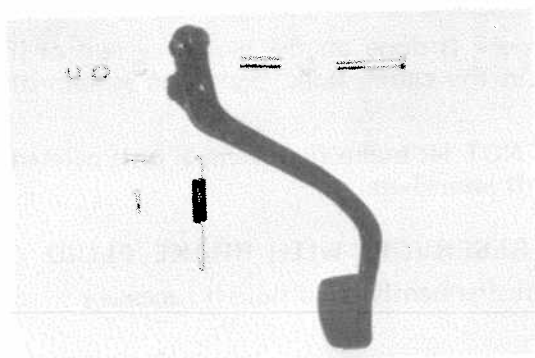


REMOVAL OF CLUTCH PEDAL

1. REMOVE SPRING
2. REMOVE PUSH ROD PIN
Remove clip and pull out the push rod pin.
3. REMOVE PEDAL SHAFT
4. REMOVE CLUTCH PEDAL WITH BUSHINGS AND COLLAR

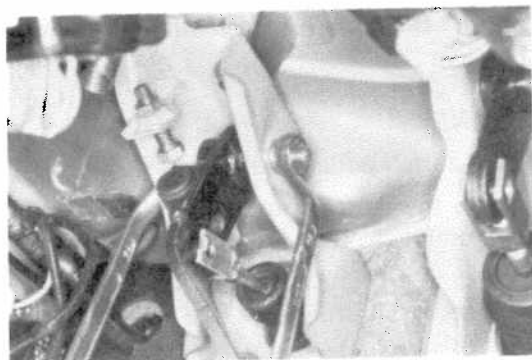
INSPECTION OF CLUTCH PEDAL PARTS

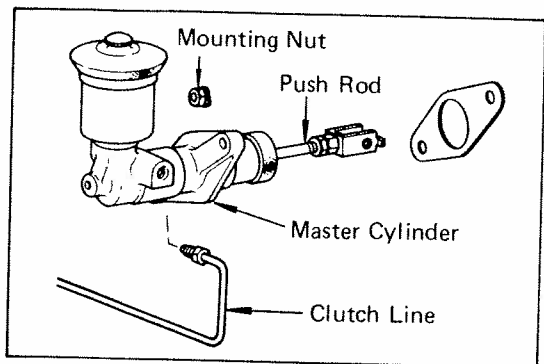
INSPECT ALL PARTS FOR WEAR OR DAMAGE



INSTALLATION OF CLUTCH PEDAL

1. COAT BUSHINGS WITH MULTIPURPOSE GREASE
2. PLACE CLUTCH PEDAL WITH BUSHINGS AND COLLAR IN POSITION
3. INSTALL PEDAL SHAFT
4. INSTALL PUSH ROD PIN AND CLIP
5. INSTALL SPRING

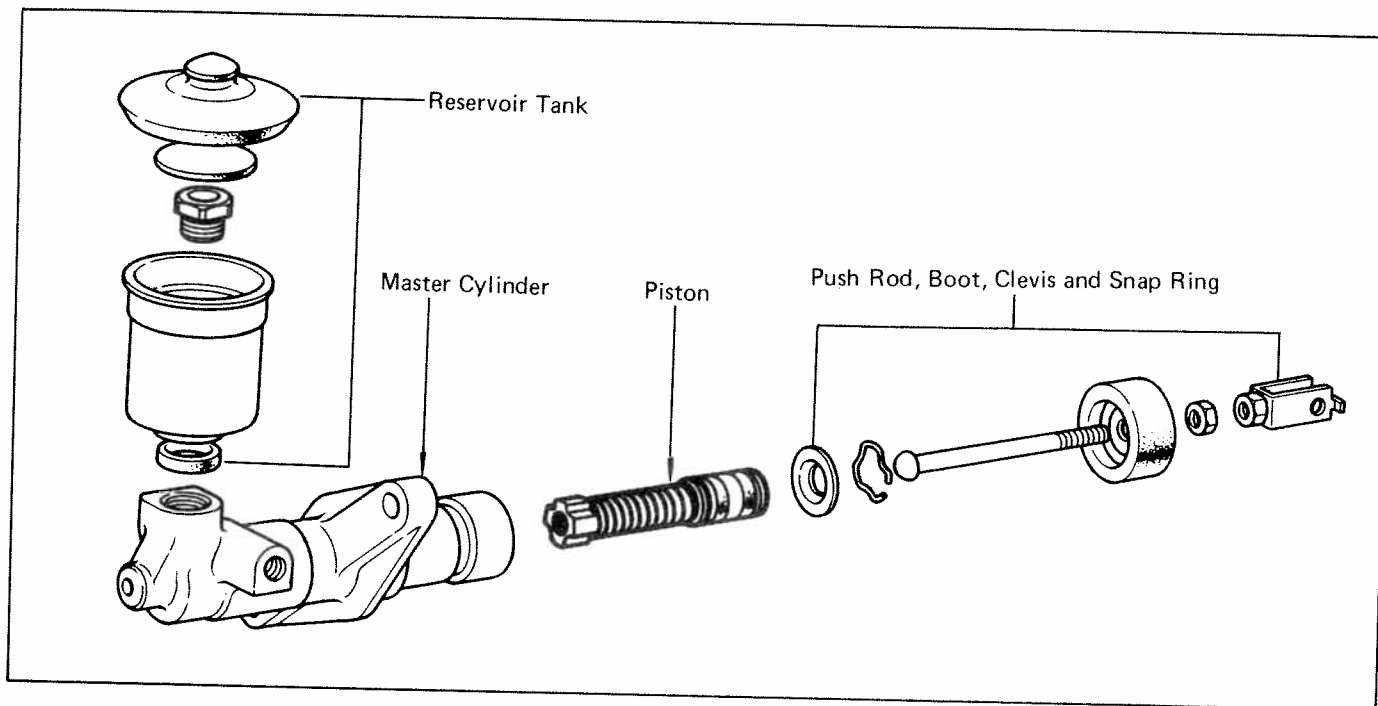




CLUTCH MASTER CYLINDER

REMOVAL OF MASTER CYLINDER

1. REMOVE PUSH ROD PIN
2. DISCONNECT CLUTCH LINE UNION
Using a flare nut wrench*, disconnect the union.
*SST 09751-36011 or Commercial wrench
3. REMOVE MOUNTING NUTS AND PULL OUT MASTER CYLINDER



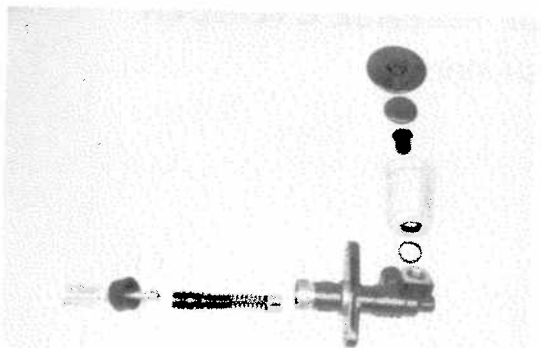
DISASSEMBLY OF MASTER CYLINDER

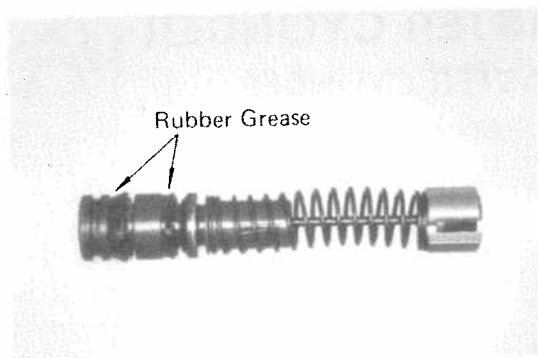
1. REMOVE RESERVOIR TANK
Remove the hold-down bolt and pull off the tank.
2. REMOVE PUSH ROD AND PISTON
 - (a) Pull back the boot and, using a screwdriver, remove the snap ring.
 - (b) Pull out the push rod, washer and piston.



INSPECTION OF CYLINDER PARTS

1. WASH ALL PARTS IN CLEAN BRAKE FLUID
2. INSPECT PARTS FOR WEAR OR DAMAGE
Replace parts as necessary.

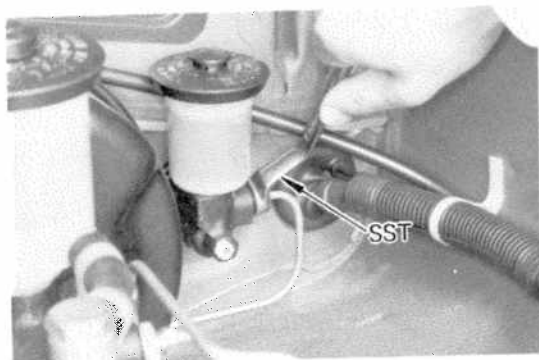




ASSEMBLY OF MASTER CYLINDER

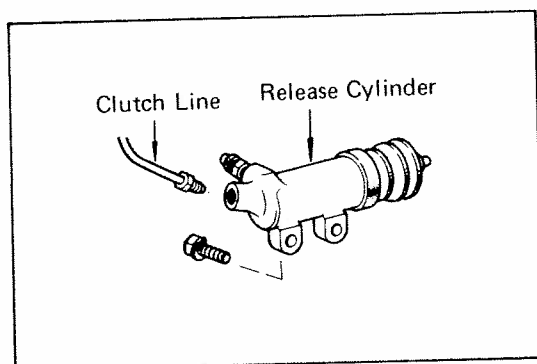
(See illustration on page 9-7)

1. COAT PARTS WITH RUBBER GREASE AS SHOWN
2. INSERT PISTON INTO CYLINDER
3. INSTALL PUSH ROD ASSEMBLY WITH SNAP RING



INSTALLATION OF MASTER CYLINDER

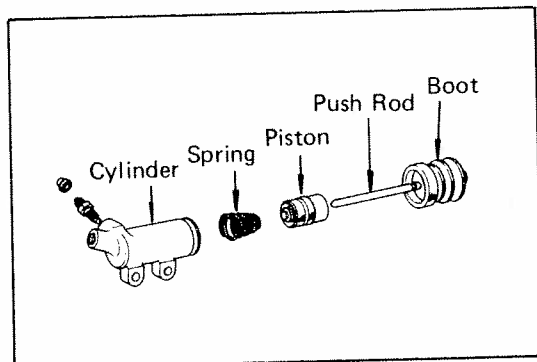
1. INSTALL MASTER CYLINDER WITH MOUNTING NUTS
2. CONNECT CLUTCH LINE UNION
Using a flare nut wrench*, connect the union.
*SST 09751-36011 or Commercial wrench
3. CONNECT PUSH ROD AND INSTALL PIN
Secure the pin with clip.
4. ADJUST CLUTCH PEDAL AND BLEED SYSTEM
(See page 9-5)



CLUTCH RELEASE CYLINDER

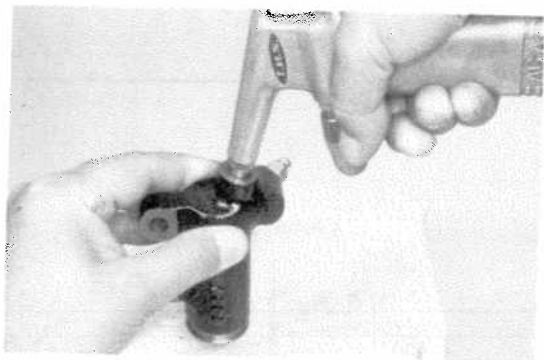
REMOVAL OF RELEASE CYLINDER

1. DISCONNECT CLUTCH LINE UNION
Using a flare nut wrench*, disconnect the union.
*SST 09751-36011 or Commercial wrench
2. REMOVE TWO BOLTS AND PULL OFF RELEASE CYLINDER

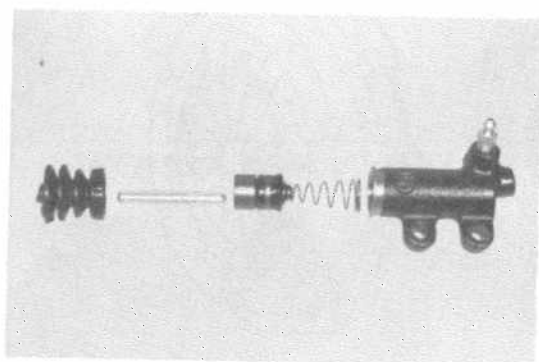


DISASSEMBLY OF RELEASE CYLINDER

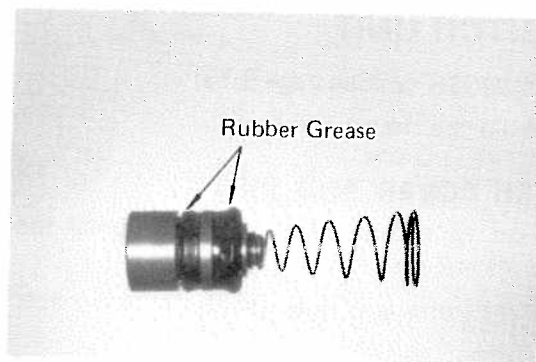
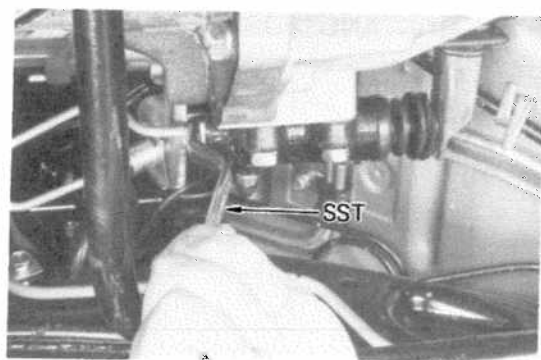
1. PULL OUT PUSH ROD
2. REMOVE BOOT

**3. REMOVE PISTON**

Using compressed air, remove the piston from the cylinder.

4. REMOVE SPRING**INSPECTION OF RELEASE CYLINDER PARTS****1. WASH ALL PARTS IN CLEAN BRAKE FLUID****2. INSPECT PARTS FOR WEAR OR DAMAGE**

Replace parts as necessary.

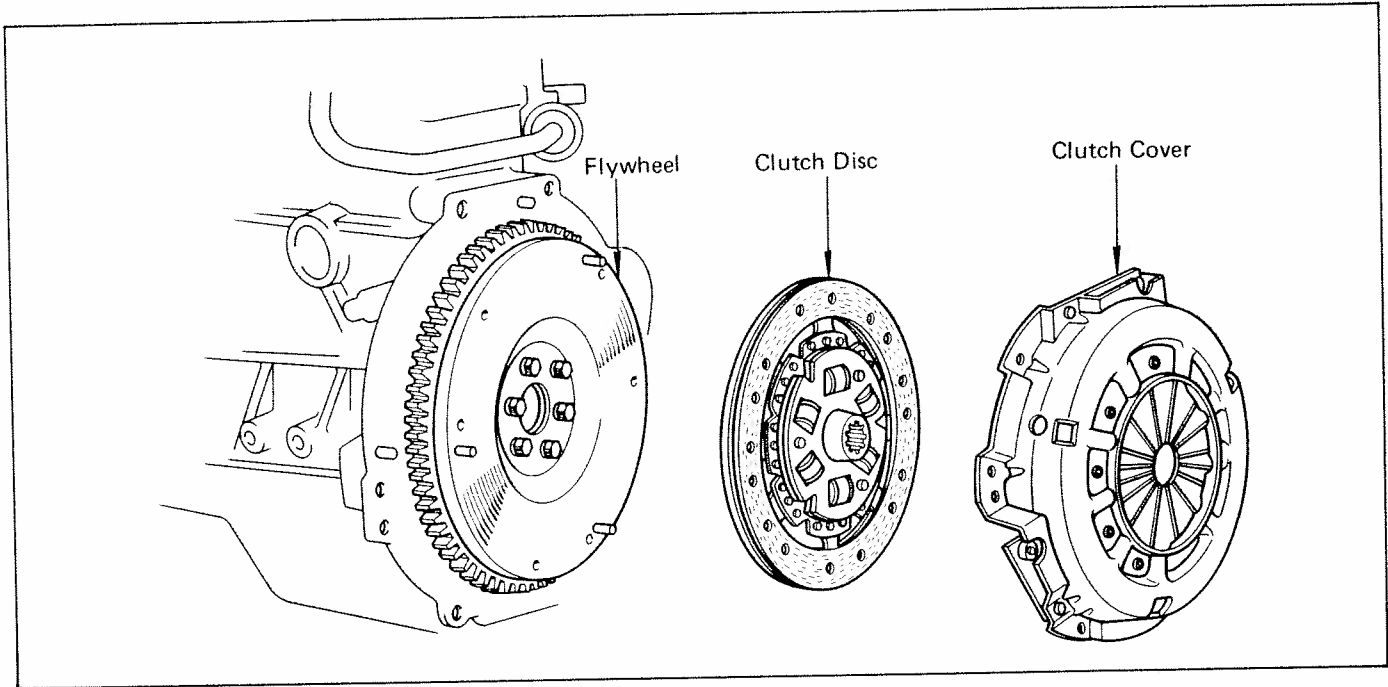
**ASSEMBLY OF RELEASE CYLINDER
(See illustration on page 9-7)****1. INSTALL SPRING ON PISTON****2. COAT PISTON WITH RUBBER GREASE****3. INSTALL PISTON****4. INSTALL BOOT AND INSERT PUSH ROD****INSTALLATION OF RELEASE CYLINDER
(See illustration on page 9-8)****1. INSTALL RELEASE CYLINDER WITH TWO BOLTS****2. CONNECT CLUTCH LINE UNION**

Using a flare nut wrench*, connect the union.

*SST 09751-36011 or Commercial wrench

3. BLEED CLUTCH SYSTEM (See page 9-5)

CLUTCH UNIT



REMOVAL OF CLUTCH UNIT

1. REMOVE TRANSMISSION (See page 9-13)

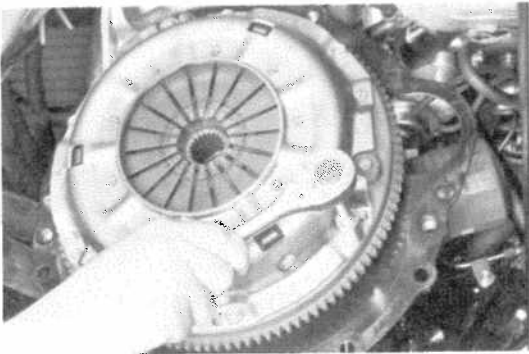
NOTE: Do not drain the transmission oil.

2. REMOVE CLUTCH COVER AND DISC

- Loosen the set bolts one turn at a time until the spring tension is released.
- Remove the set bolts and pull off the clutch cover and disc.

3. REMOVE BEARING, HUB AND FORK FROM TRANSMISSION

- Remove the retaining clip and pull off the bearing and hub.
- Remove the fork and boot.



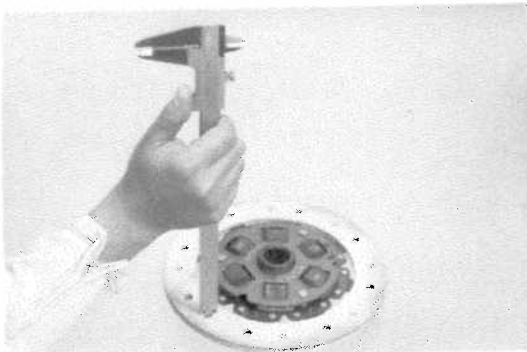
INSPECTION OF CLUTCH PARTS

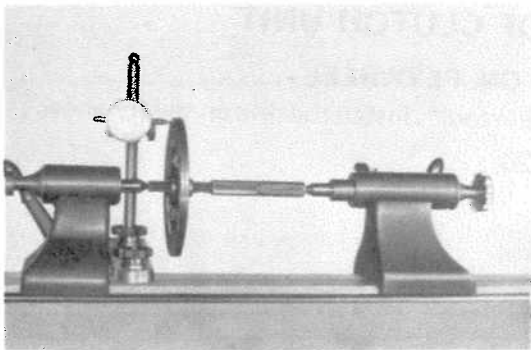
1. INSPECT CLUTCH DISC FOR WEAR OR DAMAGE

Using calipers, measure the rivet head depth.

Minimum rivet depth: 0.3 mm (0.012 in.)

If a problem is found, repair or replace the clutch disc.



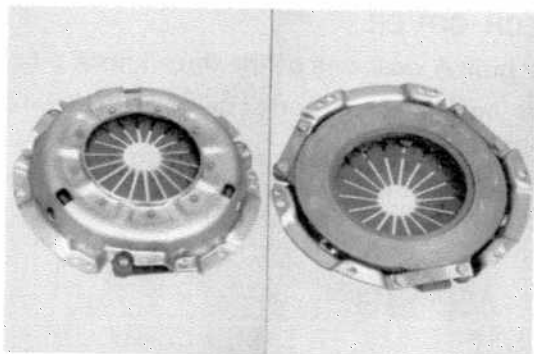


2. INSPECT CLUTCH DISC RUNOUT

Using a dial indicator, check the disc runout.

Maximum runout: 0.8 mm (0.031 in.)

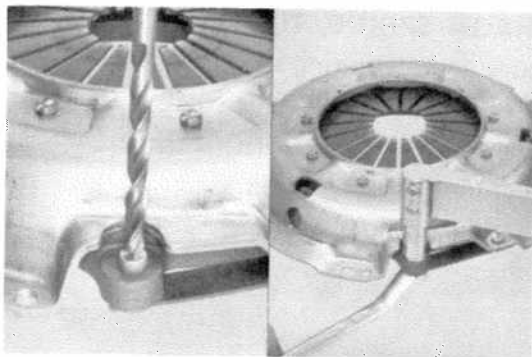
If runout is excessive, replace the disc.



3. INSPECT CLUTCH COVER ASSEMBLY

Check for wear or burning.

If only the pressure plate is worn, replace it.



4. IF NECESSARY, REPLACE PRESSURE PLATE

(a) Drill out the rivet heads.

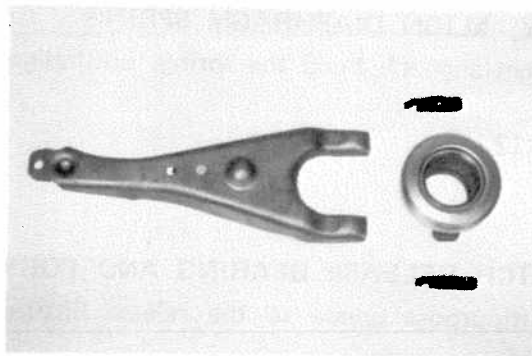
(b) Using a punch, drive out the rivets.

(c) Install a new pressure plate with special pressure plate bolts and nuts.

Torque the nuts.

Torque: 200 – 300 kg-cm (15 – 21 ft-lb)

(d) Stake the nuts.



5. INSPECT BEARING, HUB AND FORK

Check for wear or damage.

NOTE: The bearing is permanently lubricated and requires no cleaning or lubrication.

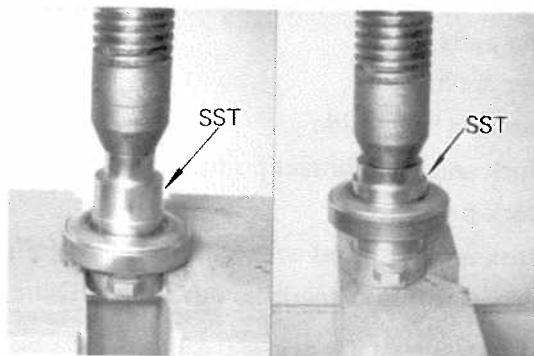
If the bearing is rough or worn, replace it.

6. IF NECESSARY, REPLACE RELEASE BEARING

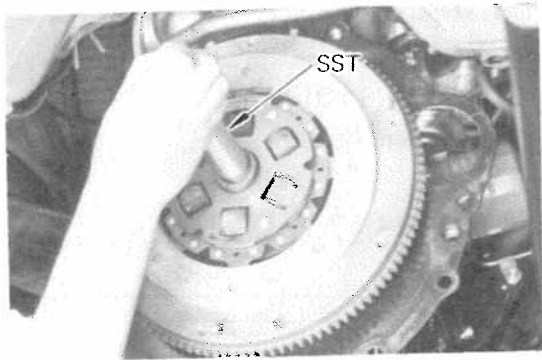
(a) Using a press and collar*, press the release bearing from the hub.

(b) Using a press and collar*, press a new release bearing into the hub.

*SST 09315-00010 or Commercial collar



7. INSPECT PILOT BEARING AND FLYWHEEL (See page 4-36)

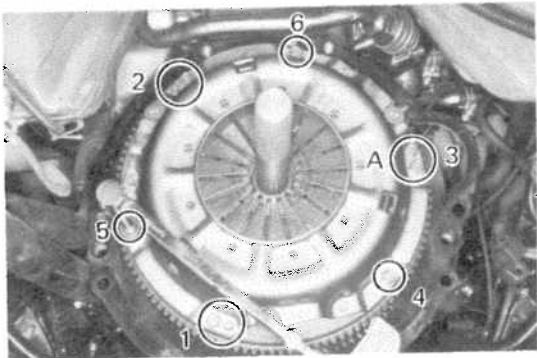


INSTALLATION OF CLUTCH UNIT

1. INSTALL DISC ON FLYWHEEL

Using a clutch guide tool*, install the disc on the flywheel.

*SST 09301-20020

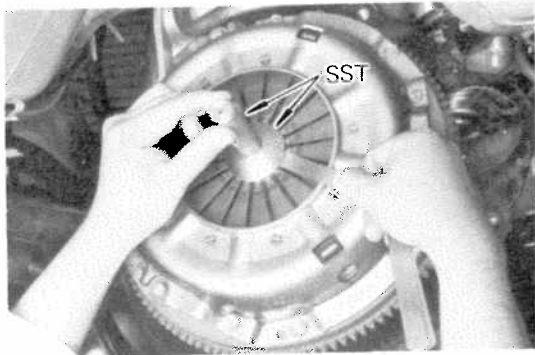


2. INSTALL CLUTCH COVER

(a) Half tighten bolt A near one of the three knock pins.

(b) Tighten the bolts in the numerical order shown.
Torque the bolts.

Torque: 150 – 220 kg-cm (11 – 15 ft-lb)



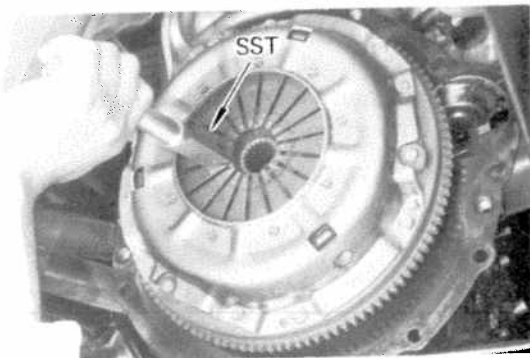
3. CHECK DIAPHRAGM SPRING TIP ALIGNMENT

Using a feeler gauge and measuring tool*, measure the gap between the spring tips and the tool.

*SST 09301-00012

Maximum gap: 0.5 mm (0.020 in.)

If gap is excessive, adjust as follows.



4. IF NECESSARY, ALIGN DIAPHRAGM SPRING

Using a diaphragm aligner*, bend the springs until alignment is correct.

*SST 09301-00012



5. INSTALL CLUTCH RELEASE BEARING AND FORK

(a) Apply multipurpose grease to the release bearing front.

(b) Apply molybdenum disulphide lithium base grease to the following parts.

- Clutch disc spline
- Release bearing hub inside
- Release fork and hub contact points
- Release fork pivot point
- Release fork and push rod contact point

(c) Install the release fork and bearing on the transmission.

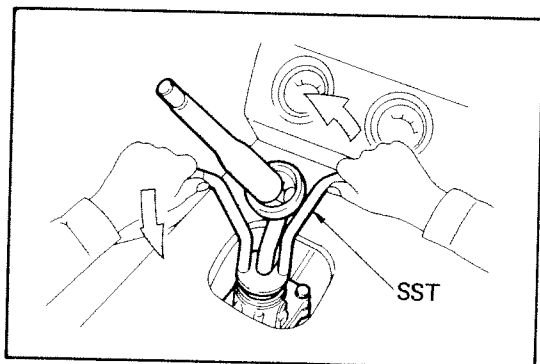
6. INSTALL TRANSMISSION (See page 9-35)

G52 TRANSMISSION

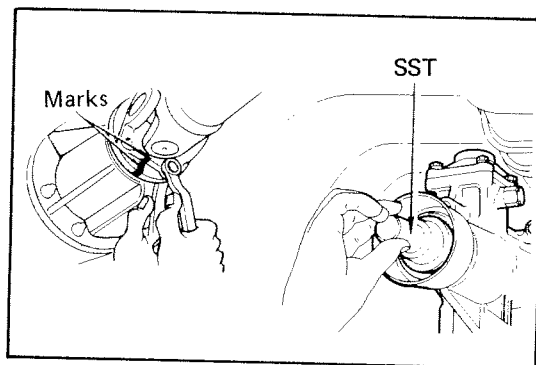
REMOVAL OF TRANSMISSION (RN 4×2)

NOTE: For transmission (RN4x4), refer to REMOVAL OF TRANSFER on page 11-3.

1. DISCONNECT NEGATIVE CABLE FROM BATTERY TERMINAL



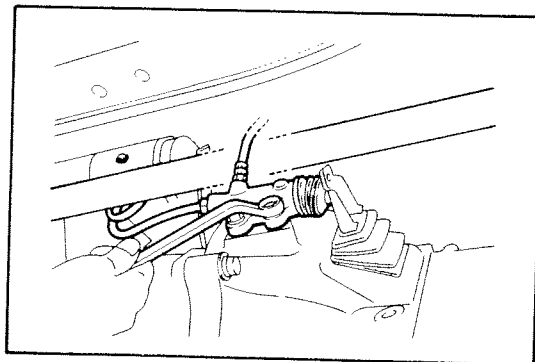
2. REMOVE SHIFT LEVER FROM INSIDE OF VEHICLE
Using SST, remove the shift lever from the transmission.
SST 09305-20012
3. RAISE VEHICLE AND DRAIN TRANSMISSION
CAUTION: Be sure the vehicle is securely supported.



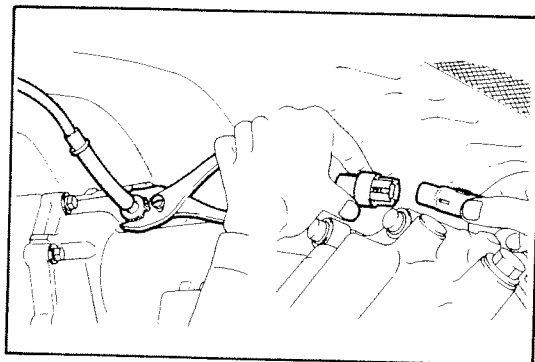
4. REMOVE PROPELLER SHAFT
 - (a) Put alignment marks on the flanges.
 - (b) Disconnect the propeller shaft flange from the flange on the differential.
 - (c) Remove the center support bearing from the body. (3-Joint Type)
 - (d) Pull the yoke from the transmission and insert SST into the extension housing.

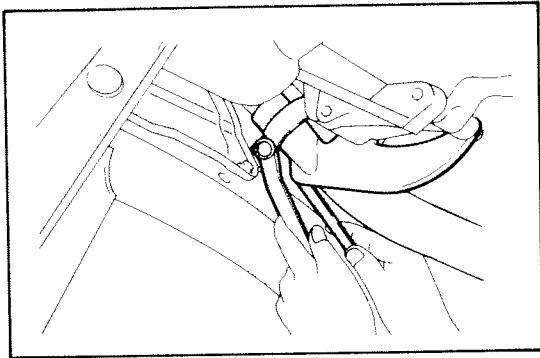
SST 09325-20010

5. REMOVE CLUTCH RELEASE CYLINDER AND RELEASE CYLINDER TUBE BRACKET

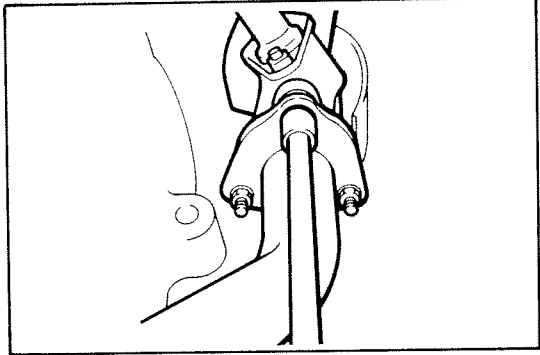


6. DISCONNECT SPEEDOMETER CABLE
7. DISCONNECT BACK-UP LIGHT SWITCH CONNECTOR





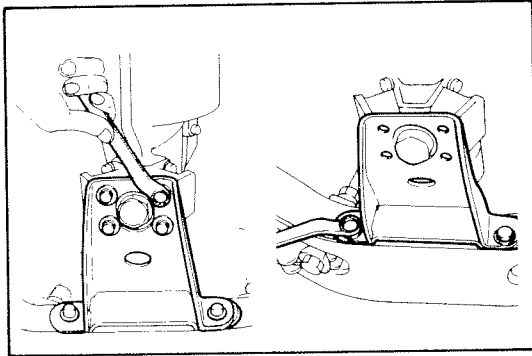
8. REMOVE EXHAUST PIPE BRACKET AND STIFFENER PLATE



9. REMOVE EXHAUST PIPE CLAMP AND EXHAUST PIPE

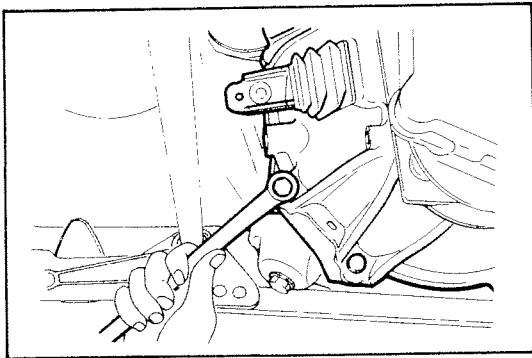
10. REMOVE INSULATOR PLATE

Remove two bolts, nut and plate.



11. REMOVE ENGINE REAR MOUNTING WITH BRACKET

- (a) Remove the four mounting bolts from the extension housing.
- (b) Raise the transmission slightly by raising the engine with a jack and wooden block under the engine.
- (c) Remove the four bracket bolts from the support member and remove the rear mounting with bracket.



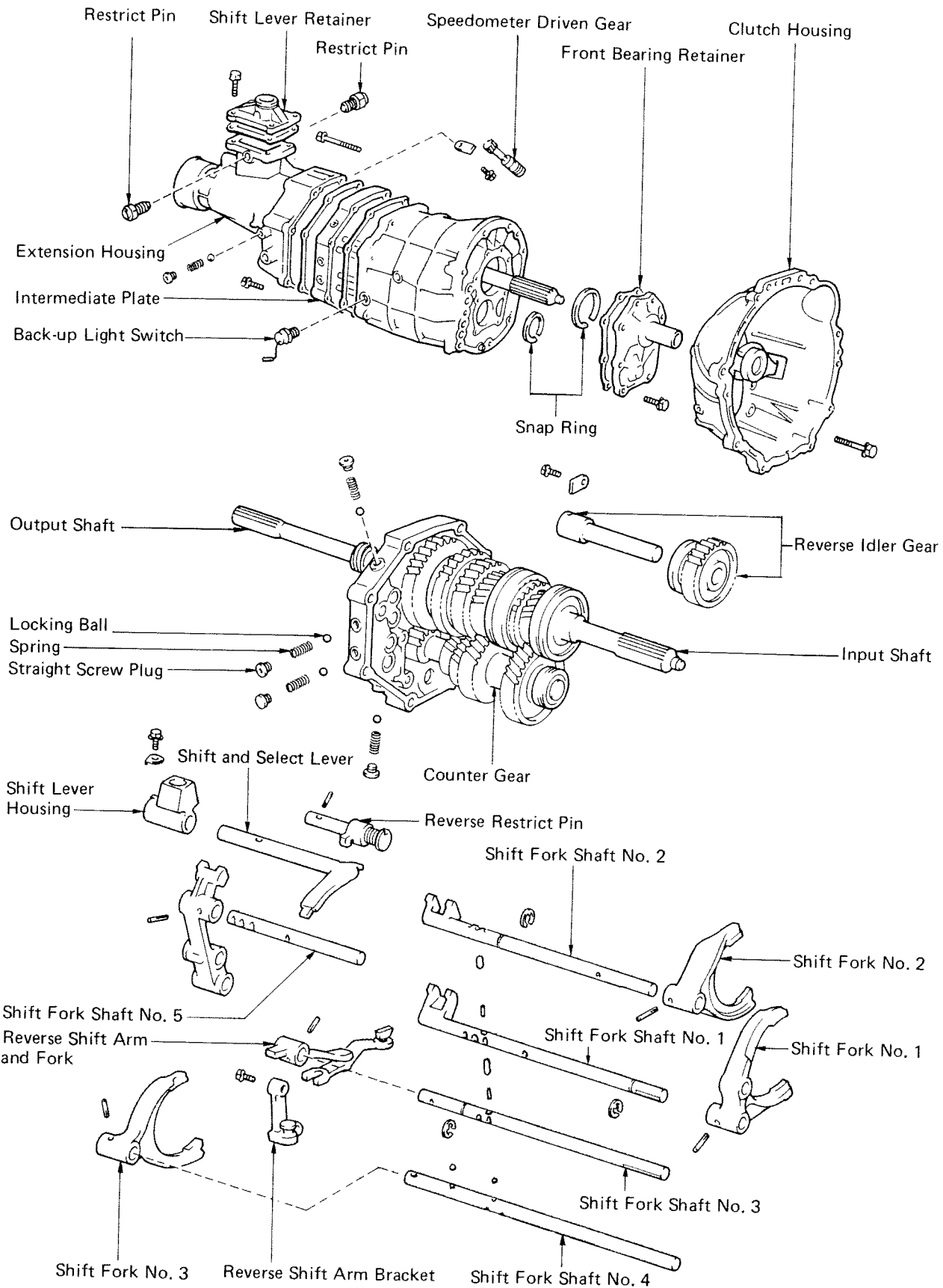
12. REMOVE REMAINING TRANSMISSION HOUSING BOLTS

13. REMOVE TRANSMISSION ASSEMBLY

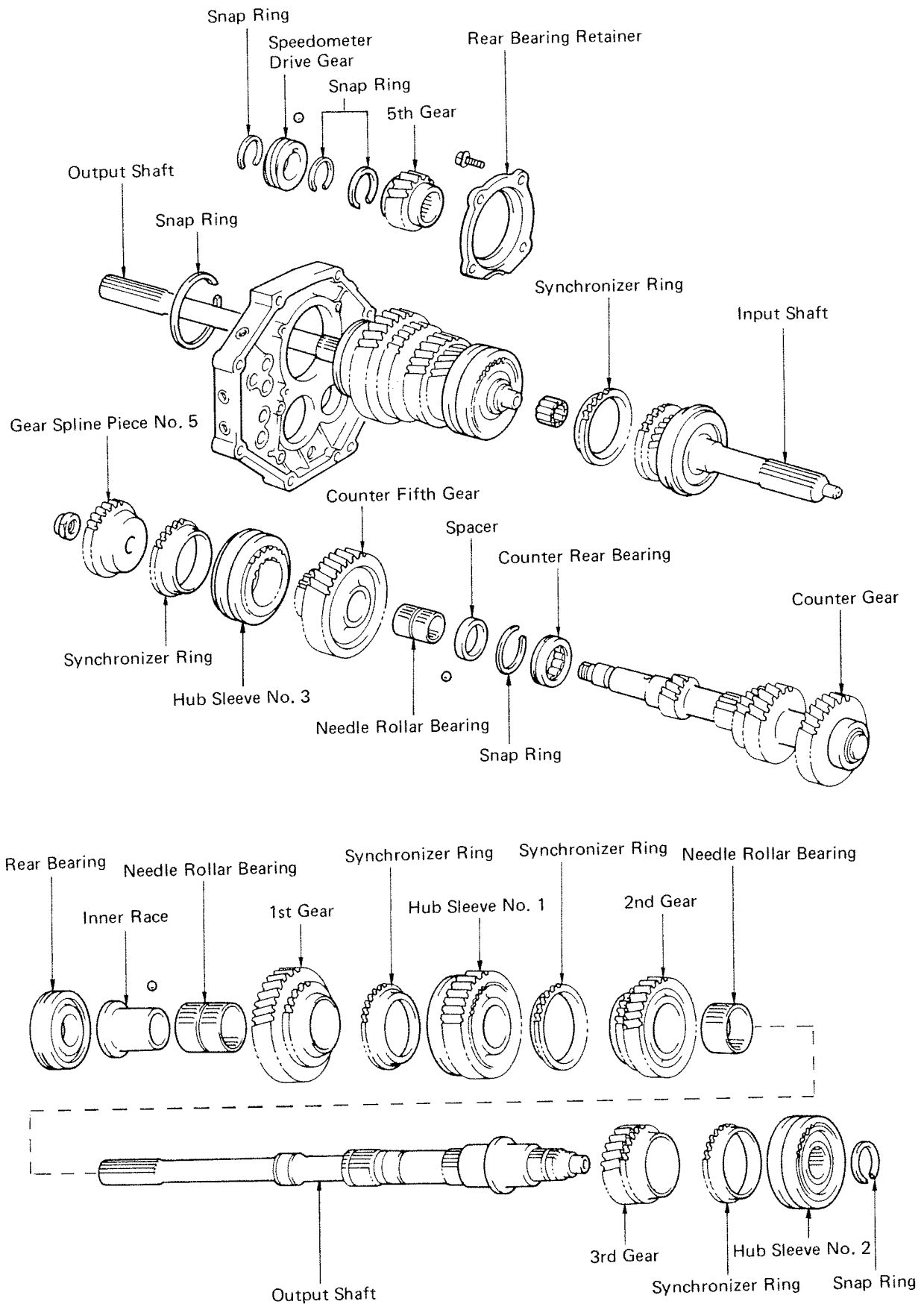
- (a) Draw out the transmission toward the rear.
- (b) Lower the transmission front and remove the transmission from the vehicle.

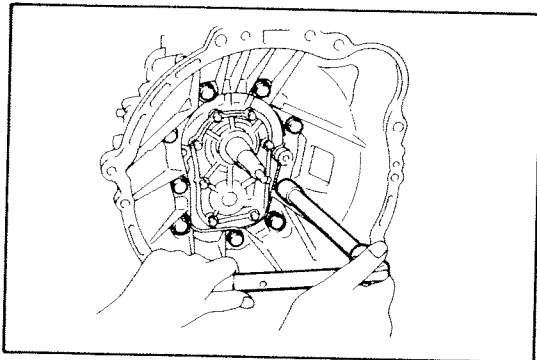
NOTE: Be careful not to damage the extension housing dust deflector.

COMPONENTS



COMPONENTS (Cont'd)

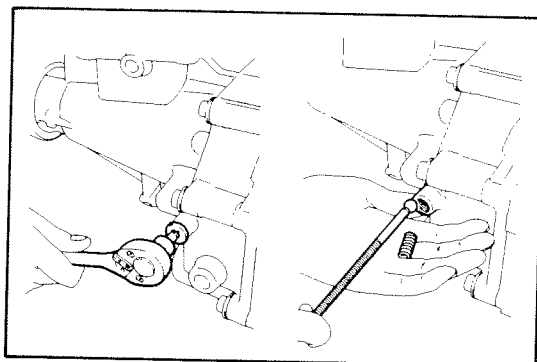




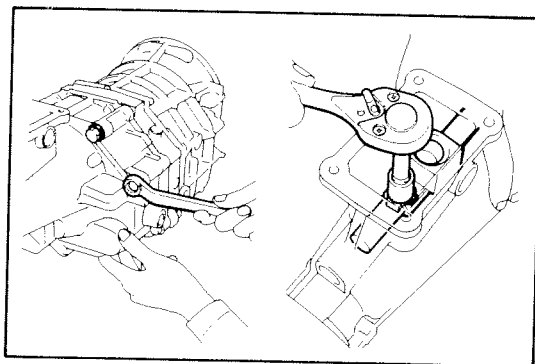
DISASSEMBLY OF TRANSMISSION

(See page 9-15, 16)

1. REMOVE RELEASE FORK AND BEARING
2. REMOVE BACK-UP LIGHT SWITCH, SPEEDOMETER DRIVEN GEAR, SHIFT LEVER RETAINER AND RESTRICT PINS
3. REMOVE CLUTCH HOUSING FROM TRANSMISSION CASE

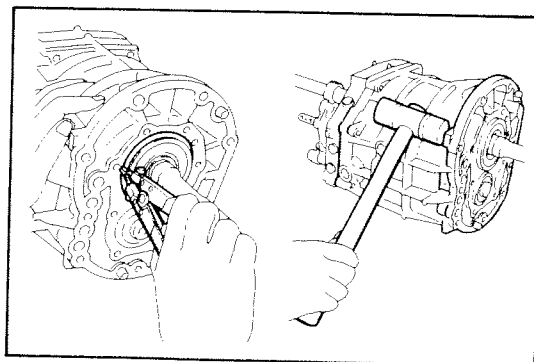


4. REMOVE STRAIGHT SCREW PLUG, SPRING AND BALL
 - (a) Using a torx socket wrench, remove the screw plug from the extension housing.
 - (b) Using a magnetic finger, remove the spring and ball.



5. REMOVE EXTENSION HOUSING
 - (a) Remove eight bolts.
 - (b) Remove the shift lever housing set bolt and lock washer.
 - (c) Using a plastic hammer, tap the extension housing and remove the shift lever housing and shift and select lever.

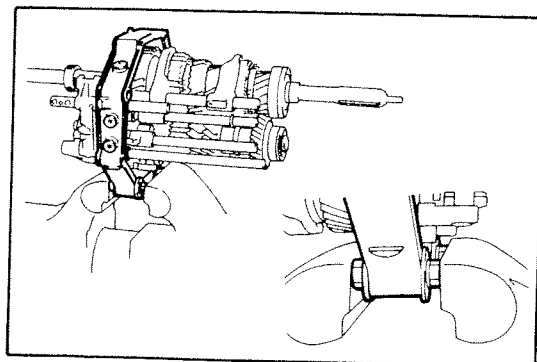
NOTE: Leave the gasket attached to the intermediate plate.



6. REMOVE FRONT BEARING RETAINER AND TWO BEARING SNAP RINGS

7. SEPARATE INTERMEDIATE PLATE FROM TRANSMISSION CASE

- (a) Using a plastic hammer, carefully tap off the transmission case.
- (b) Remove the transmission case from the intermediate plate.

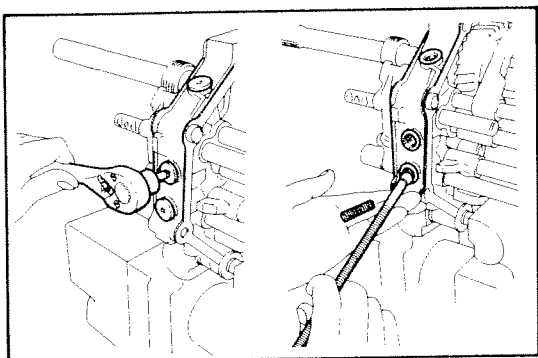


8. MOUNT INTERMEDIATE PLATE IN VISE

- (a) Use two clutch housing bolts, plate washers and suitable nuts as shown.

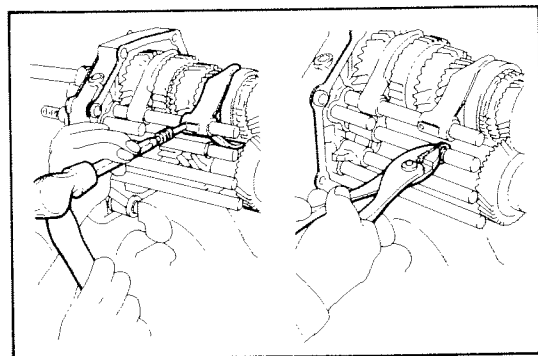
CAUTION: Install the plate washers in reverse of normal. Increase or decrease plate washers so that the bolt tip and front tip surface of nut are aligned.

- (b) Mount the intermediate plate in a vise.



9. REMOVE STRAIGHT SCREW PLUGS, LOCKING BALLS AND SPRINGS

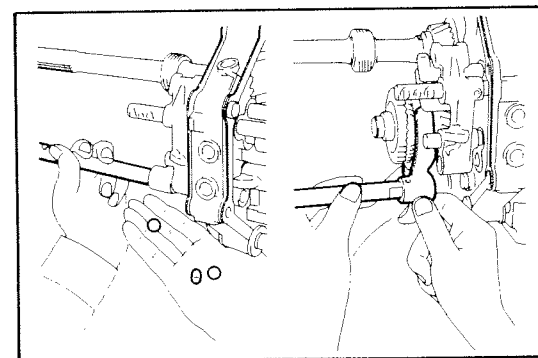
- (a) Using a torx socket wrench, remove the four plugs.
- (b) Using a magnetic finger, remove the four springs and balls.



10. REMOVE SLOTTED SPRING PINS

Using a pin punch and hammer, drive out the five pins.

11. REMOVE TWO E-RINGS

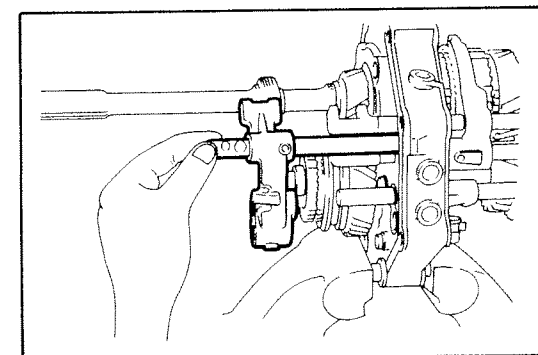


12. REMOVE SHIFT FORK SHAFT NO. 4 AND SHIFT FORK NO. 3

- (a) Pull out shift fork shaft No. 4 from the intermediate plate.

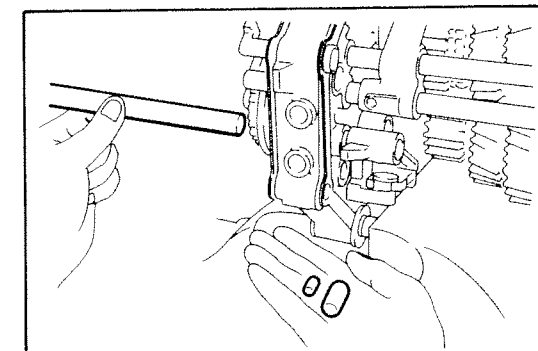
CAUTION: The locking balls and interlock pin will fall from the holes so be sure to catch them by hand. If they do not come out, remove them with a magnetic finger.

- (b) Remove shift fork shaft No. 4 and shift fork No. 3.



13. REMOVE REVERSE SHIFT HEAD AND SHIFT FORK SHAFT NO. 5

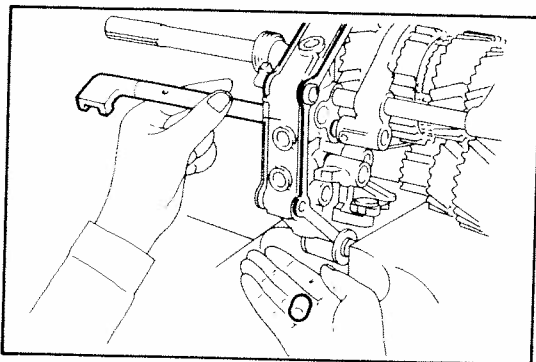
Pull out shift fork shaft No. 5 from the intermediate plate, and remove it with the reverse shift head.



14. REMOVE SHIFT FORK SHAFT NO. 3

Pull out shift fork shaft No. 3 from the intermediate plate.

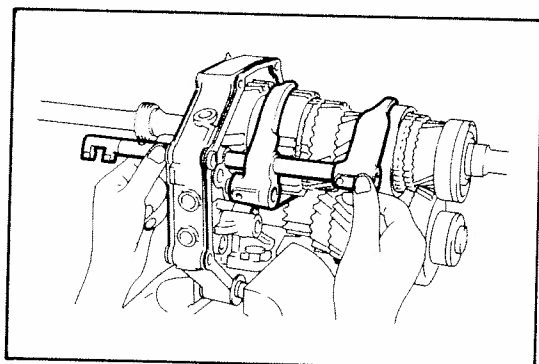
CAUTION: The interlock pins will fall from the hole so be sure to catch them by hand. If they do not come out, remove them with a magnetic finger.



15. REMOVE SHIFT FORK SHAFT NO. 1

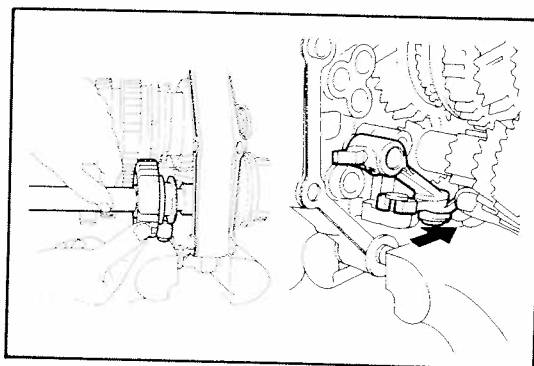
Pull out shift fork shaft No. 1 from the intermediate plate.

CAUTION: The interlock pin will fall from the hole so be sure to catch it by hand. If this do not come out remove it with a magnetic finger.



16. REMOVE SHIFT FORK SHAFT NO. 2, SHIFT FORK NO. 2 AND SHIFT FORK NO. 1

Pull out shift fork shaft No. 2 and remove shift fork No. 2 and No. 1.



17. REMOVE REVERSE IDLER GEAR AND SHAFT

- (a) Remove the reverse idler gear shaft stopper.
- (b) Remove the reverse idler gear and shaft.

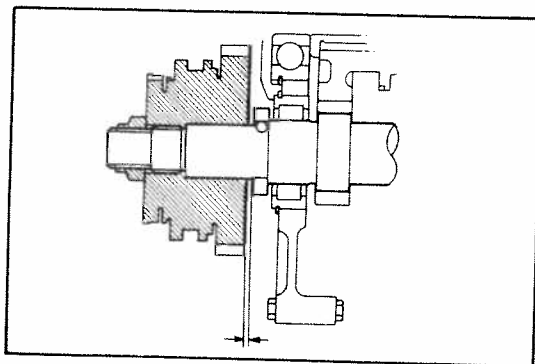
18. REMOVE REVERSE SHIFT ARM FROM REVERSE SHIFT ARM BRACKET

19. MEASURE COUNTER FIFTH GEAR THRUST CLEARANCE

Using a feeler gauge, measure the counter 5th gear thrust clearance.

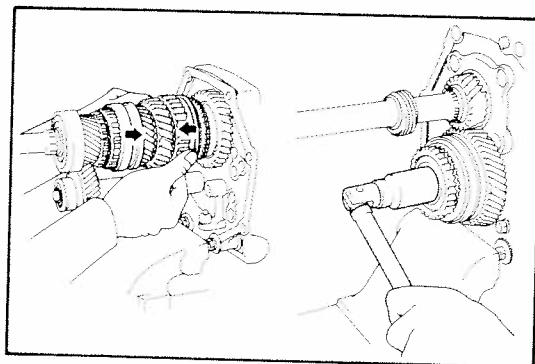
Standard clearance: 0.10 – 0.30 mm
(0.0039 – 0.0118 in.)

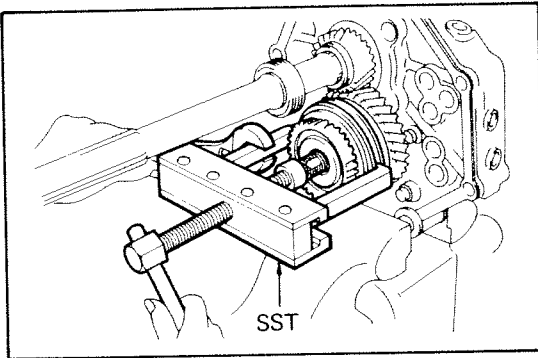
Maximum clearance: 0.30 mm (0.0118 in.)



20. REMOVE GEAR SPLINE PIECE NO. 5, SYNCHRONIZER RING, NEEDLE ROLLER BEARINGS AND COUNTER FIFTH GEAR WITH HUB SLEEVE NO. 3

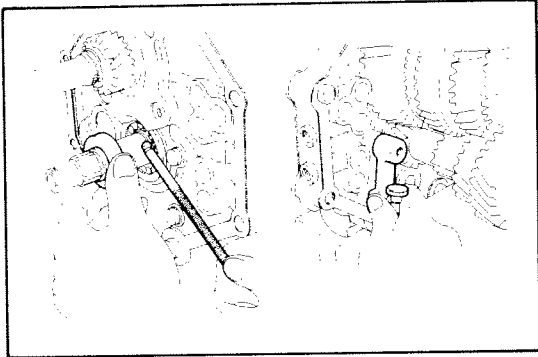
- (a) Engage the gear double meshing.
- (b) Using a hammer and chisel, loosen the staked part of the nut.
- (c) Remove the lock nut.
- (d) Disengage the gear double meshing.





- (e) Using SST, remove gear spline piece No. 5, synchronizer ring, needle roller bearing and counter fifth gear.

SST 09213-36020

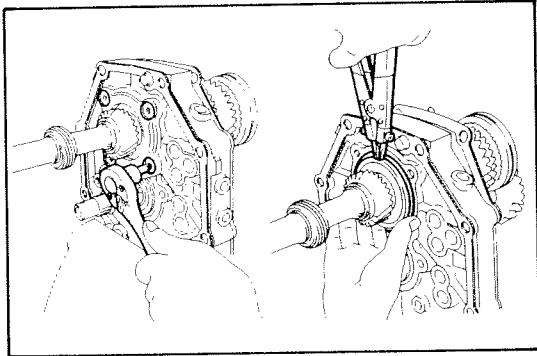


21. REMOVE SPACER AND BALL

Using a magnetic finger, remove the ball.

22. REMOVE REVERSE SHIFT ARM BRACKET

Remove the two bolts and the reverse shift arm bracket.

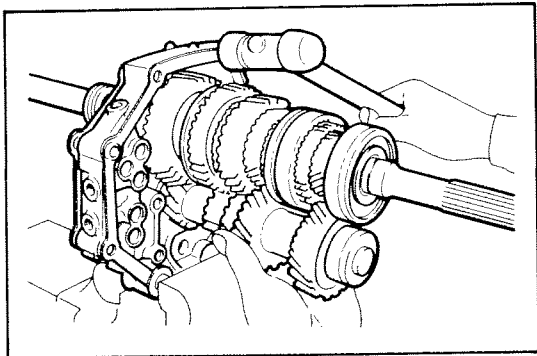


23. REMOVE REAR BEARING RETAINER

Using a forx socket wrench, remove the four bolts.

24. REMOVE BEARING SNAP RING

Using snap ring pliers, remove the snap ring.



25. REMOVE OUTPUT SHAFT, COUNTER GEAR AND INPUT SHAFT AS A UNIT FROM INTERMEDIATE PLATE

Remove the output shaft, counter gear and input shaft as a unit from the intermediate plate by pulling on the counter gear and tapping on the intermediate plate with a plastic hammer.

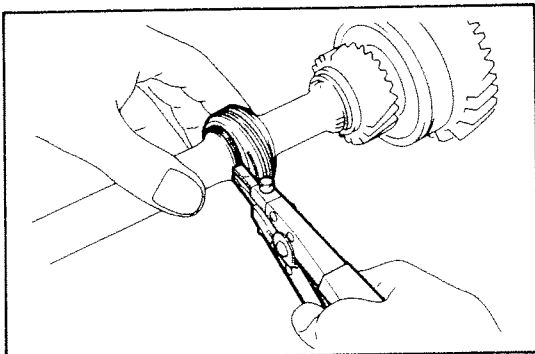
26. REMOVE INPUT SHAFT FROM OUTPUT SHAFT

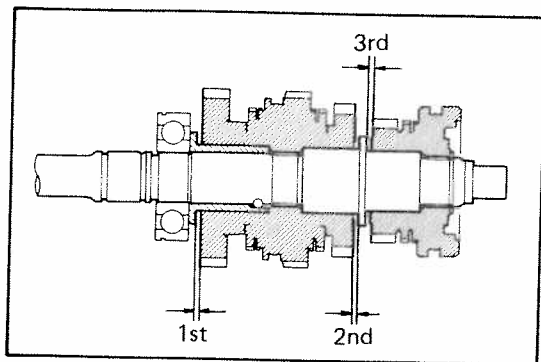
Remove the input shaft with fourteen needle roller bearings from the output shaft.

27. REMOVE COUNTER REAR BEARING FROM INTERMEDIATE PLATE

28. REMOVE SPEEDOMETER DRIVE GEAR

- Using snap ring pliers, remove the snap ring.
- Remove the speedometer drive gear and ball.
- Using a magnetic finger, remove the steel ball.
- Using snap ring pliers, remove the snap ring.



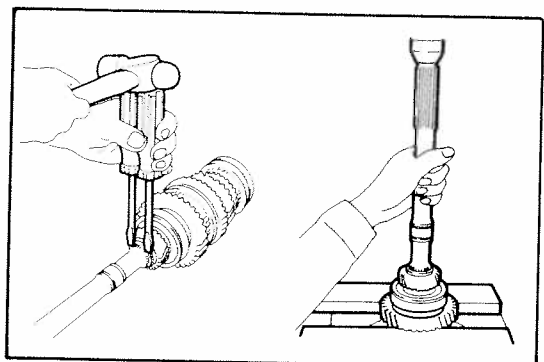


29. MEASURE EACH GEAR THRUST CLEARANCE

Measure the thrust clearance of each gear.

Standard clearance: 0.10 – 0.25 mm
(0.0039 – 0.0098 in.)

Maximum clearance: 0.25 mm (0.0098 in.)



30. REMOVE FIFTH GEAR, REAR BEARING, FIRST GEAR, INNER RACE AND NEEDLE ROLLER BEARING

- Using two screwdrivers and a hammer, tap out the snap ring.
- Using a press, remove the fifth gear, rear bearing, first gear and inner race.
- Remove the needle roller bearing.

31. REMOVE SYNCHRONIZER RING

32. REMOVE LOCKING BALL

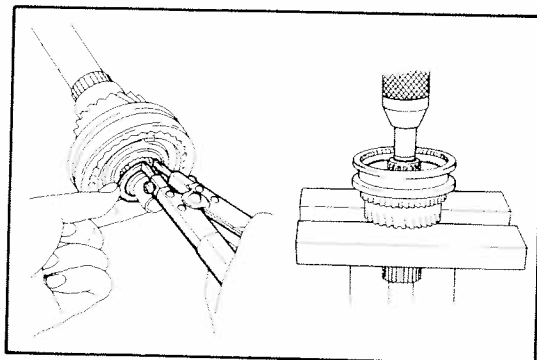
Using a magnetic finger, remove the locking ball.

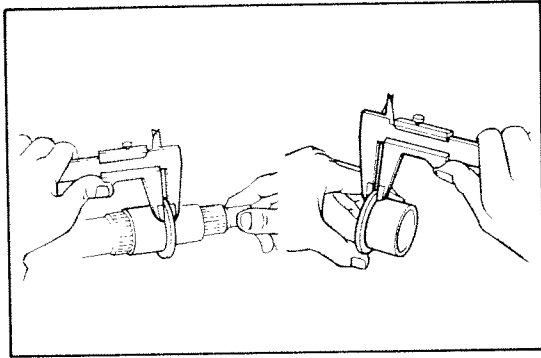
33. REMOVE HUB SLEEVE NO. 1 ASSEMBLY, SYNCHRONIZER RING, SECOND GEAR AND NEEDLE ROLLER BEARING

- Using a press, remove the hub sleeve No. 1, synchronizer ring and second gear.
- Remove the needle roller bearing.

34. REMOVE HUB SLEEVE NO. 2 ASSEMBLY, SYNCHRONIZER RING, THIRD GEAR AND NEEDLE ROLLER BEARING

- Using snap ring pliers, remove the snap ring.
- Using a press, remove the hub sleeve No. 2, synchronizer ring and third gear.
- Remove the needle roller bearing.





INSPECTION OF TRANSMISSION COMPONENTS

1. INSPECT OUTPUT SHAFT AND INNER RACE

- (a) Check the output shaft and inner race for wear or damage.
- (b) Using calipers, measure the output shaft flange thickness.

Minimum thickness: 4.80 mm (0.1890 in.)

- (c) Using calipers, measure the inner race flange thickness.

Minimum thickness: 3.99 mm (0.1571 in.)

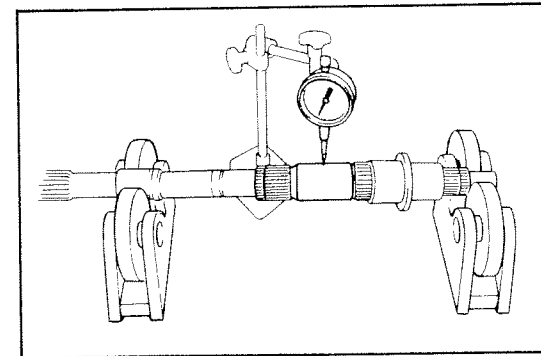
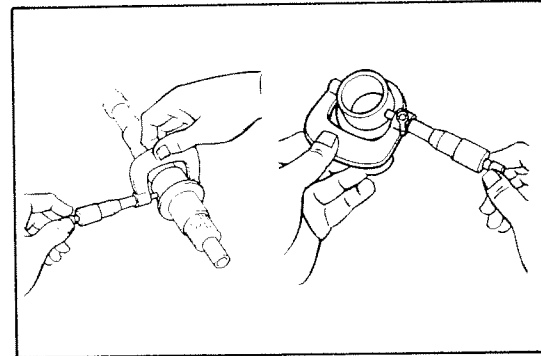
- (d) Using a micrometer, measure the outer diameter of the output shaft journal surface.

2nd gear: Minimum 37.984 mm (1.4954 in.)

3rd gear: Minimum 34.984 mm (1.3773 in.)

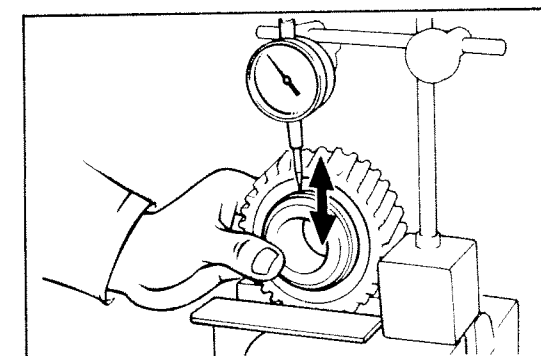
- (e) Using a micrometer, measure the outer diameter of the inner race.

Minimum diameter: 38.985 mm (1.5348 in.)



- (f) Using a dial indicator, measure the shaft runout.

Maximum runout: 0.05 mm (0.0020 in.)

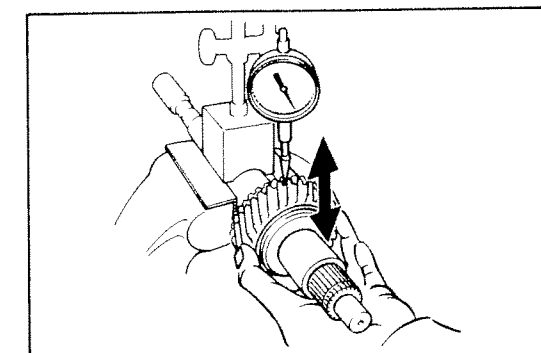


2. CHECK OIL CLEARANCE OF FIRST GEAR

Using a dial indicator, measure the oil clearance between the gear and inner race with the needle roller bearing installed.

**Standard clearance: 0.009 – 0.032 mm
(0.00035 – 0.00126 in.)**

Maximum clearance: 0.032 mm (0.00126 in.)



3. CHECK OIL CLEARANCE OF SECOND, THIRD AND COUNTER FIFTH GEAR

Using a dial indicator, measure the oil clearance between the gear and shaft with the needle roller bearing installed.

Standard clearance:

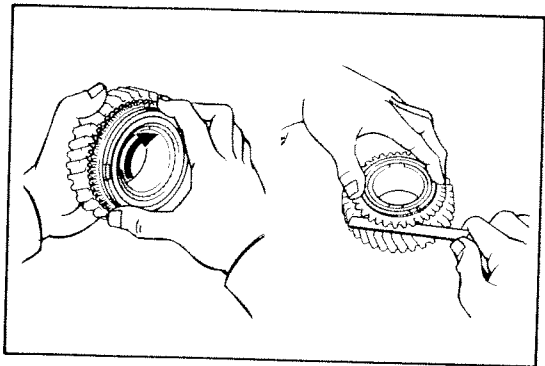
**2nd and 3rd gears 0.009 – 0.033 mm
(0.00035 – 0.00130 in.)**

**Counter 5th gear 0.009 – 0.032 mm
(0.00035 – 0.00126 in.)**

Maximum clearance:

2nd and 3rd gears 0.033 mm (0.00130 in.)

Counter 5th gear 0.032 mm (0.00126 in.)

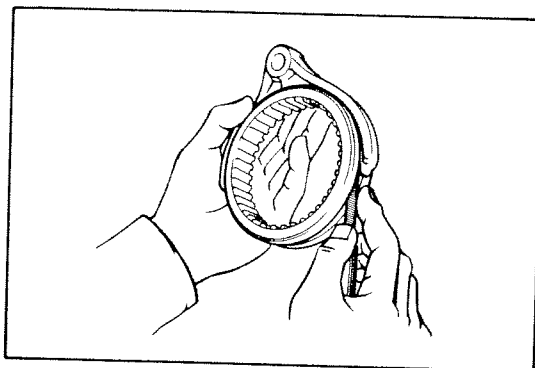


4. INSPECT SYNCHRONIZER RINGS

- Check for wear or damage.
- Turn the ring and push it into check the braking action.
- Measure the clearance between the synchronizer ring back and the gear spline end.

Standard clearance: 1.0 – 2.0 mm (0.040 – 0.078 in.)

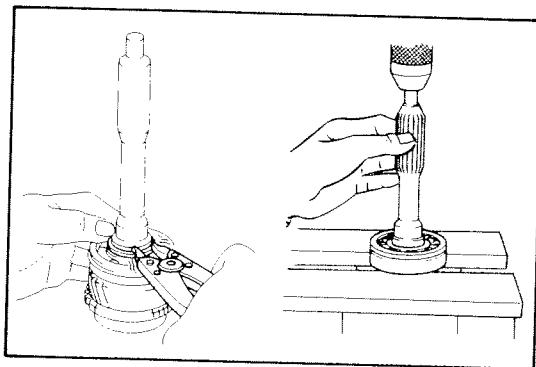
Minimum clearance: 0.8 mm (0.031 in.)



5. MEASURE CLEARANCE OF SHIFT FORKS AND HUB SLEEVES

Using a feeler gauge, measure the clearance between the hub sleeve and shift fork.

Maximum clearance: 1.0 mm (0.039 in.)



6. INSPECT INPUT SHAFT AND BEARING

Check for wear or damage.

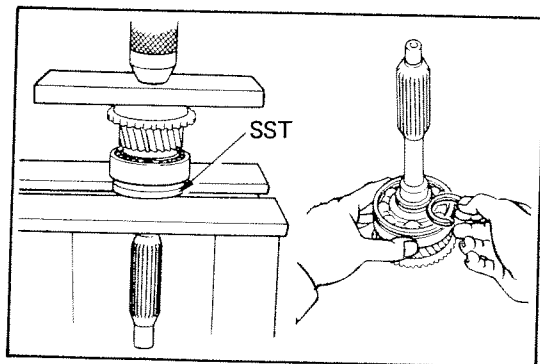
7. IF NECESSARY, REPLACE INPUT SHAFT BEARING

- Using snap ring pliers, remove the snap ring.
- Using a press, remove the bearing.

- Using a press and SST, install a new bearing.

SST 09506-35010

- Select a snap ring that will allow minimum axial play and install it on the shaft.



Mark	Thickness	mm (in.)
0	2.05 – 2.10	(0.0807 – 0.0827)
1	2.10 – 2.15	(0.0827 – 0.0846)
2	2.15 – 2.20	(0.0846 – 0.0866)
3	2.20 – 2.25	(0.0866 – 0.0886)
4	2.25 – 2.30	(0.0886 – 0.0906)
5	2.30 – 2.35	(0.0906 – 0.0925)

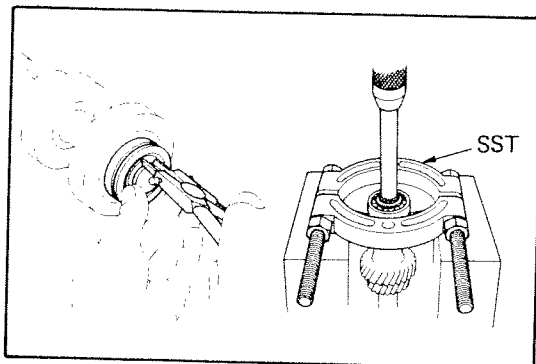
8. INSPECT COUNTER GEAR AND BEARING

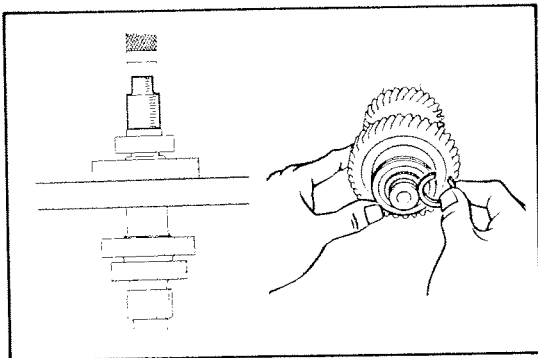
- Check the gear teeth for wear or damage.
- Check the bearing for wear or damage.

9. IF NECESSARY, REPLACE COUNTER GEAR FRONT BEARING

- Using snap ring pliers, remove the snap ring.
- Using SST, press out the bearing.

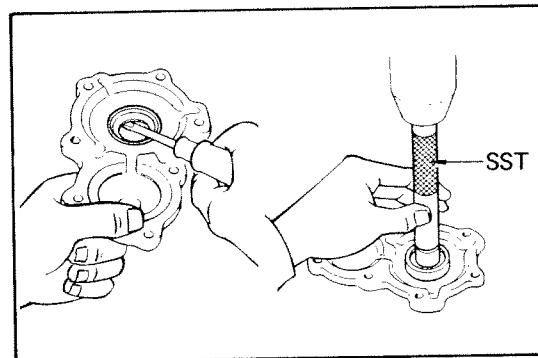
SST 09950-00020





- (c) Replace the side race.
- (d) Using a socket wrench, press in the bearing and inner race.
- (e) Select a snap ring that will allow minimum axial play and install it on the shaft.

Mark	Thickness	mm (in.)
1	2.05 – 2.10	(0.0807 – 0.0827)
2	2.10 – 2.15	(0.0827 – 0.0846)
3	2.15 – 2.20	(0.0846 – 0.0866)
4	2.20 – 2.25	(0.0866 – 0.0886)
5	2.25 – 2.30	(0.0886 – 0.0906)
6	2.30 – 2.35	(0.0906 – 0.0925)



10. INSPECT FRONT BEARING RETAINER

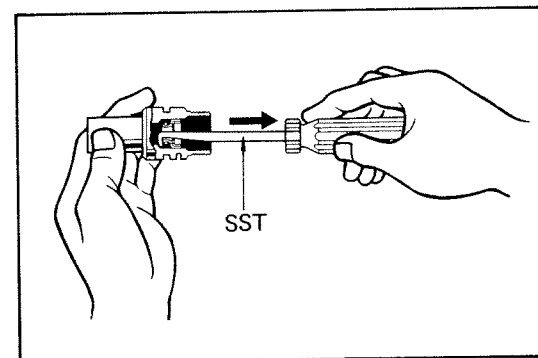
- (a) Check for damage.
- (b) Check the oil seal lip for wear or damage.

11. IF NECESSARY, REPLACE OIL SEAL

- (a) Using a screwdriver, pry out the oil seal.
- (b) Using SST, press in the oil seal.

SST 09223-50010

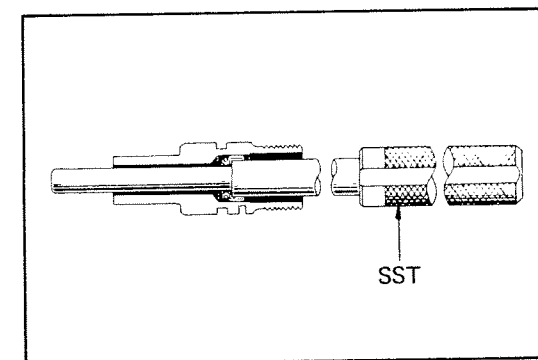
Oil seal depth: 11.2 – 12.2 mm (0.441 – 0.480 in.)
Transmission case installation surface



12. IF NECESSARY, REPLACE SPEEDOMETER DRIVEN GEAR OIL SEAL

- (a) Using SST, pull out the oil seal.

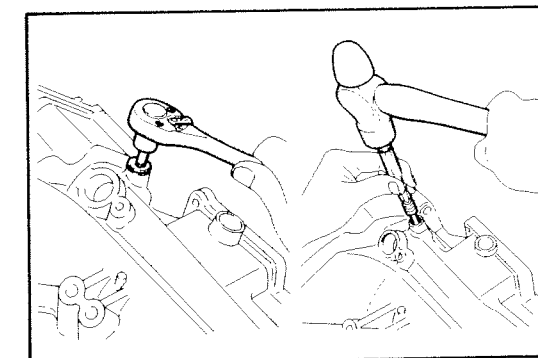
SST 09921-00010



- (b) Using SST, drive in the oil seal into the sleeve.

SST 09201-60011

Oil seal depth: 20 mm (0.79 in.)

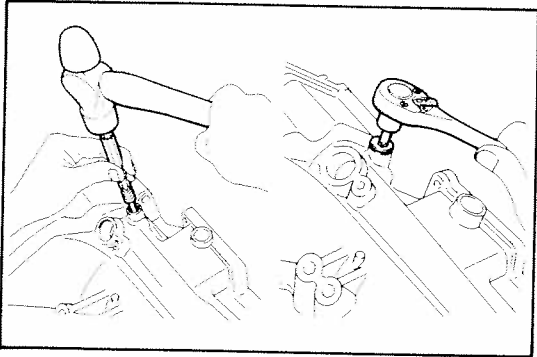


13. INSPECT REVERSE RESTRICT PIN

Check for wear or damage.

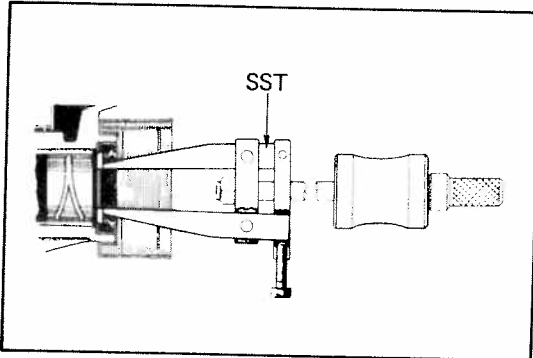
14. IF NECESSARY, REPLACE REVERSE RESTRICT PIN

- (a) Using a torx socket wrench, remove the screw plug.
- (b) Using a pin punch and hammer, drive out the slotted spring pin.
- (c) Pull off the lever housing and slide out the shaft.
- (d) Install the lever housing.



- (e) Using a pin punch and hammer, drive in the slotted spring pin.
- (f) Using a torx socket wrench, install and torque the screw plug.

Torque: 190 kg-cm (14 ft-lb)



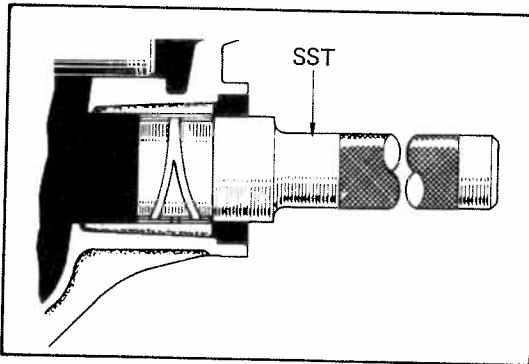
15. INSPECT EXTENSION HOUSING

- (a) Check for damage.
- (b) Check the oil seal and bushing for wear or damage.

16. IF NECESSARY, REPLACE OIL SEAL AND BUSHING

- (a) Using SST, remove the oil seal.

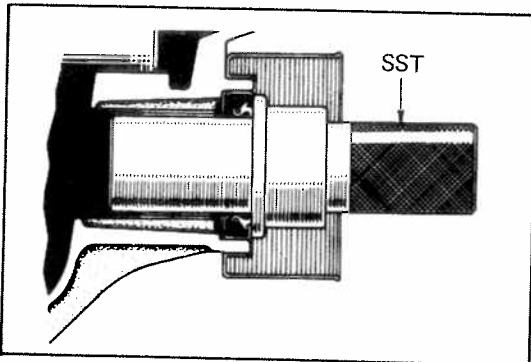
SST 09308-00010 or
09308-10010 with output shaft installed



- (b) Heat the extension housing end to 80 – 100°C (176 – 212°F) in an oil bath.

- (c) Using SST, remove the bushing and install a new bushing.

SST 09307-30010

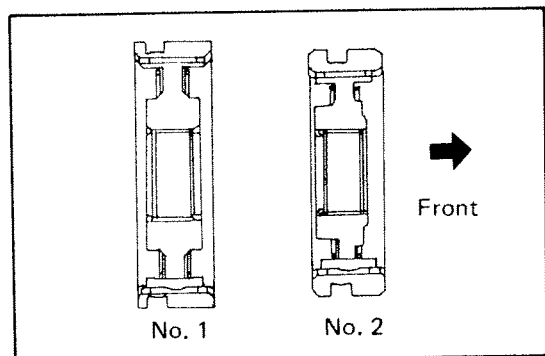


- (d) Using SST, drive in the new oil seal.

SST 09325-20010

ASSEMBLY OF TRANSMISSION

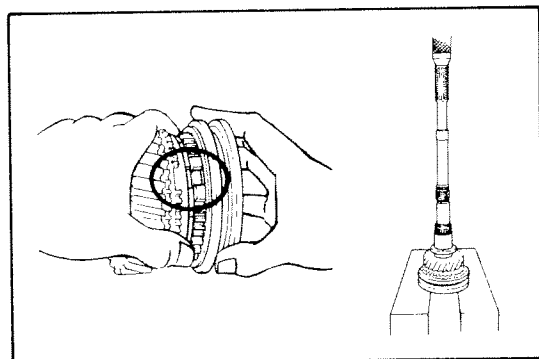
(See page 9-15, 16)



1. INSERT CLUTCH HUB NO. 1 AND NO. 2 INTO HUB SLEEVE

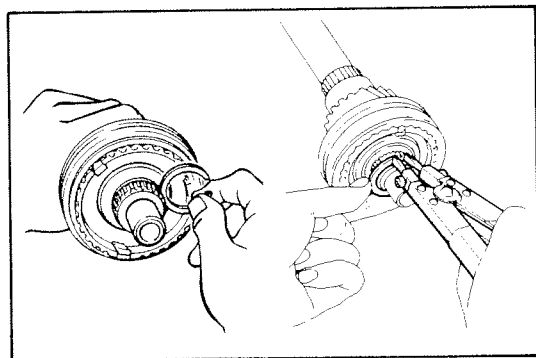
- Install the clutch hub and shifting keys to the hub sleeve.
- Install the shifting key springs under the shifting keys.

CAUTION: Install the key springs positioned so that their end gaps are not in line.



2. INSTALL THIRD GEAR AND HUB SLEEVE NO. 2 ON OUTPUT SHAFT

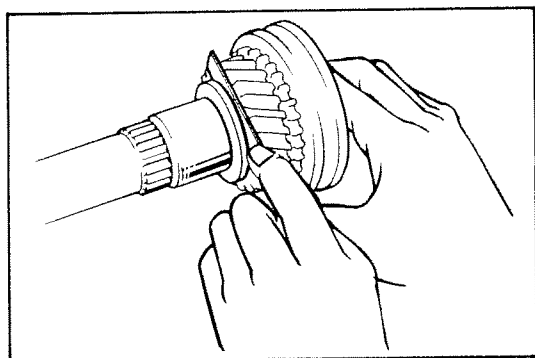
- Apply gear oil to the shaft and needle roller bearing.
- Place the synchronizer ring on the gear and align the ring slots with the shifting keys.
- Install the needle roller bearing in the 3rd gear.
- Using a press, install the 3rd gear and hub sleeve No. 2.



3. INSTALL SNAP RING

Select a snap ring that will allow minimum axial, play and install it on the shaft.

Mark	Thickness	mm (in.)
C-1	1.75 – 1.80	(0.0689 – 0.0709)
D	1.80 – 1.85	(0.0709 – 0.0728)
D-1	1.85 – 1.90	(0.0728 – 0.0748)
E	1.90 – 1.95	(0.0748 – 0.0768)
E-1	1.95 – 2.00	(0.0768 – 0.0787)
F	2.00 – 2.05	(0.0788 – 0.0807)
F-1	2.05 – 2.10	(0.0807 – 0.0827)

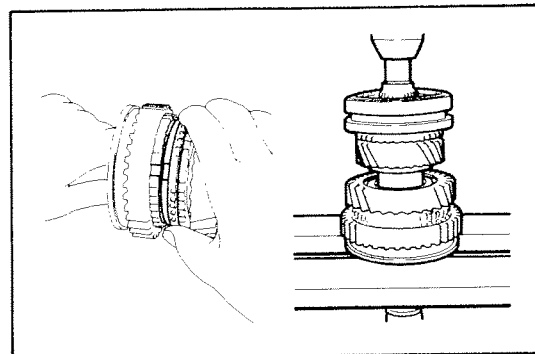


4. MEASURE THIRD GEAR THRUST CLEARANCE

Using a feeler gauge, measure the 3rd gear thrust clearance.

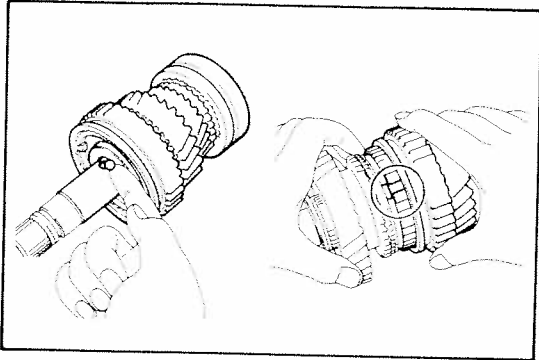
Standard clearance: 0.10 – 0.25 mm
(0.0039 – 0.0098 in.)

Maximum clearance: 0.25 mm (0.0098 in.)



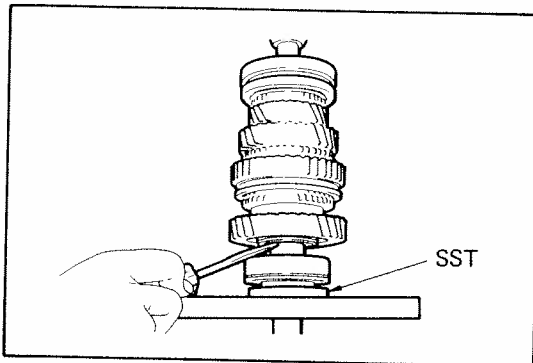
5. INSTALL SECOND GEAR AND HUB SLEEVE NO. 1

- Apply gear oil to the shaft and needle roller bearing.
- Place the synchronizer ring on the gear and align the ring slots with the shifting keys.
- Install the needle roller bearing in the 2nd gear.
- Using a press, install the 2nd gear and hub sleeve No. 1.



6. INSTALL LOCKING BALL AND FIRST GEAR ASSEMBLY

- Install the locking ball in the shaft.
- Apply gear oil to the needle roller bearing.
- Assemble the 1st gear, synchronizer ring, needle roller bearing and bearing inner race.
- Install the assembly on the output shaft with the synchronizer ring slots aligned with the shifting keys.
- Turn the inner race to align it with the locking ball.

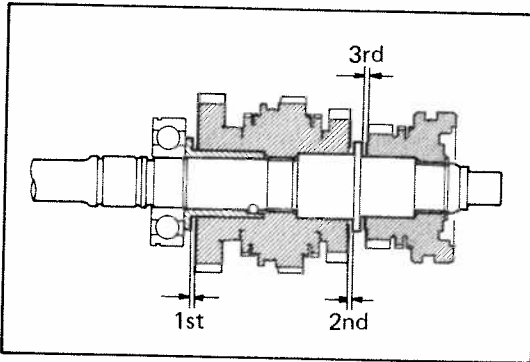


7. INSTALL OUTPUT SHAFT REAR BEARING

Using SST and a press, install the bearing on the output shaft with the outer race snap ring groove toward the rear.

NOTE: Hold the 1st gear inner race to prevent it from falling.

SST 09506-35010

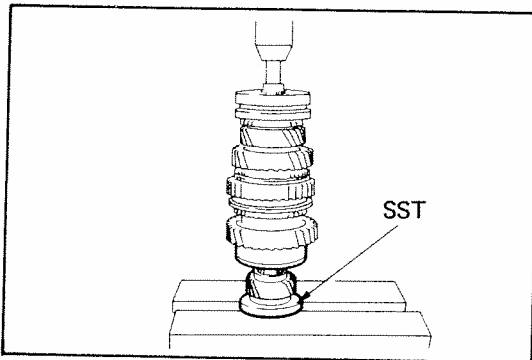


8. MEASURE FIRST AND SECOND GEAR THRUST CLEARANCE

Using a feeler gauge, measure the 1st and 2nd gear thrust clearance.

Standard clearance: 0.10 – 0.25 mm
(0.0039 – 0.0098 in.)

Maximum clearance: 0.25 mm (0.0098 in.)



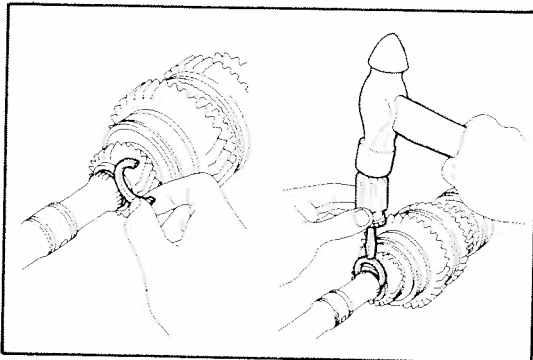
9. INSTALL FIFTH GEAR

Using SST and a press, install the 5th gear.

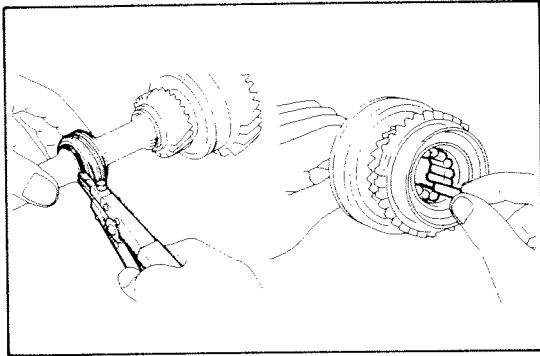
SST 09506-35010

10. INSTALL SNAP RING

- Select a snap ring that will allow minimum axial play.
- Using a screwdriver and hammer, tap in the snap ring.



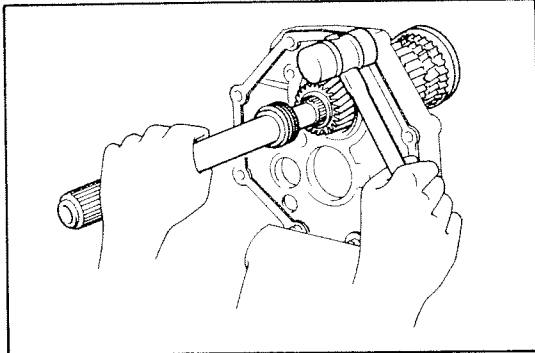
Mark	Thickness	mm (in.)
A	2.67 – 2.72	(0.1051 – 0.1071)
B	2.73 – 2.78	(0.1075 – 0.1094)
C	2.79 – 2.84	(0.1098 – 0.1118)
D	2.85 – 2.90	(0.1122 – 0.1142)
E	2.91 – 2.96	(0.1146 – 0.1165)
F	2.97 – 3.02	(0.1169 – 0.1189)
G	3.03 – 3.08	(0.1193 – 0.1213)
H	3.09 – 3.14	(0.1217 – 0.1236)
J	3.15 – 3.20	(0.1240 – 0.1260)
K	3.21 – 3.26	(0.1264 – 0.1283)
L	3.27 – 3.32	(0.1287 – 0.1307)

**11. INSTALL SPEEDOMETER DRIVE GEAR**

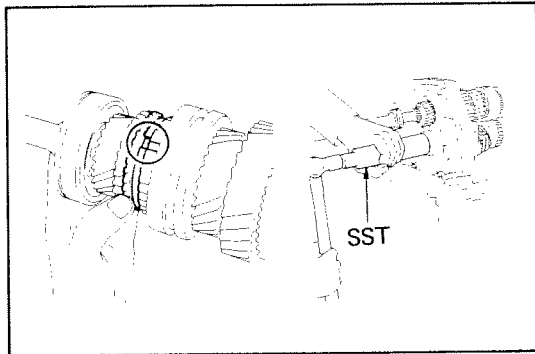
- (a) Using snap ring pliers, install the snap ring.
- (b) Install the ball and drive gear.
- (c) Using snap ring pliers, install the snap ring.

12. INSTALL NEEDLE ROLLER BEARING TO INPUT SHAFT

Apply MP grease to the 14-needle roller bearing and install it into the input shaft.

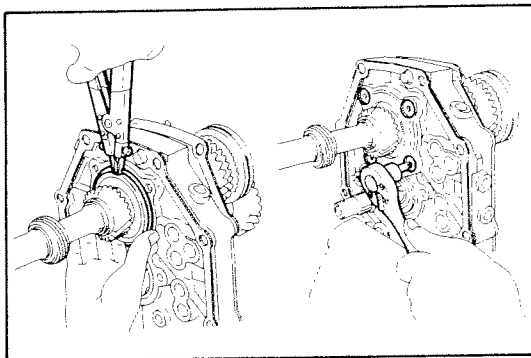
**13. INSTALL OUTPUT SHAFT TO INTERMEDIATE PLATE**

Install the output shaft into the intermediate plate by pulling on the output shaft and tapping on the intermediate plate.

**14. INSTALL INPUT SHAFT AND COUNTER GEAR**

- (a) Install the input shaft to the output shaft with the synchronizer ring slots aligned with the shifting keys.
- (b) Install the counter gear into the intermediate plate while holding the counter gear, and install the counter rear bearing with SST.

SST 09316-60010

**15. INSTALL BEARING SNAP RING**

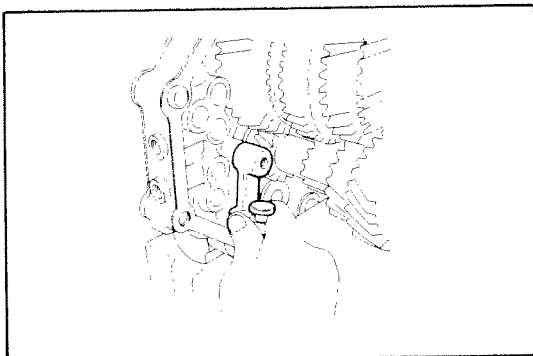
Using snap ring pliers, install the snap ring.

NOTE: Be sure the snap ring is flush with the intermediate plate surface.

16. INSTALL REAR BEARING RETAINER

Using a torx socket wrench, install and torque the screws.

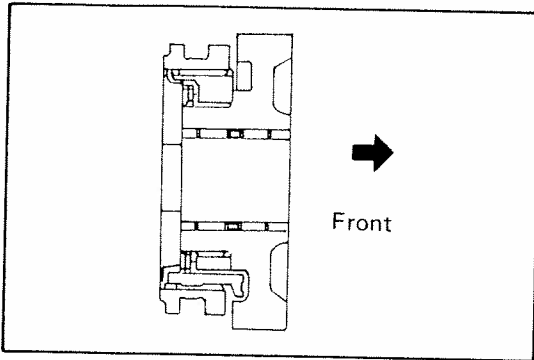
Torque: 185 kg-cm (13 ft-lb)

**17. INSTALL REVERSE SHIFT ARM BRACKET**

Install the reverse shift arm bracket and torque the bolts.

Torque: 185 kg-cm (13 ft-lb)

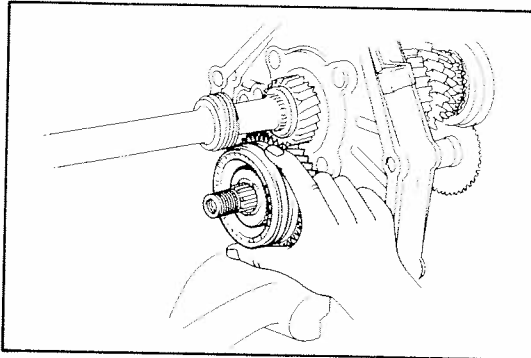
18. INSTALL BALL AND SPACER



19. INSERT COUNTER FIFTH GEAR INTO HUB SLEEVE NO. 3

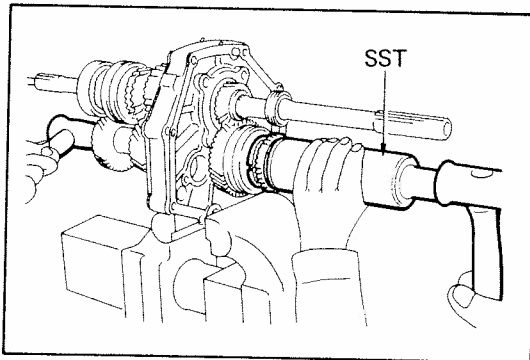
- Install the shifting keys and hub sleeve No. 3 onto the counter 5th gear.
- Install the shifting key springs under the shifting keys.

CAUTION: Install the key springs positioned so that their end gaps are not in line.



20. INSTALL COUNTER FIFTH GEAR WITH HUB SLEEVE NO. 3 ASSEMBLY AND NEEDLE ROLLER BEARINGS

- Apply gear oil to the needle roller bearings.
- Install the counter 5th gear with hub sleeve No. 3 and needle roller bearings.



21. INSTALL SYNCHRONIZER RING AND GEAR SPLINE PIECE NO. 5

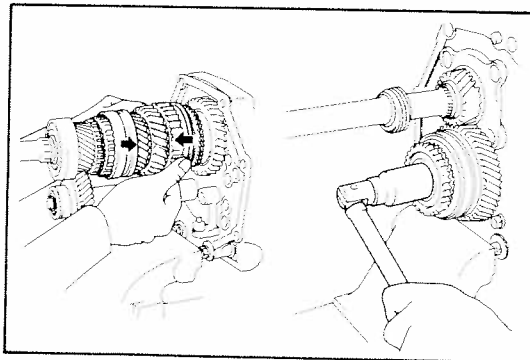
- Install the synchronizer ring on gear spline piece No. 5.
- Using SST, drive in gear spline piece No. 5 with the synchronizer ring slots aligned with the shifting keys.

SST 09316-60010

NOTE: When installing gear spline piece No. 5, support the counter gear in front with a 3–5 lb hammer or equivalent.

22. INSTALL LOCK NUT

- Engage the gear double meshing.
- Install and torque the lock nut.
Torque: 1,200 kg-cm (87 ft-lb)
- Stake the lock nut.
- Disengage the gear double meshing.

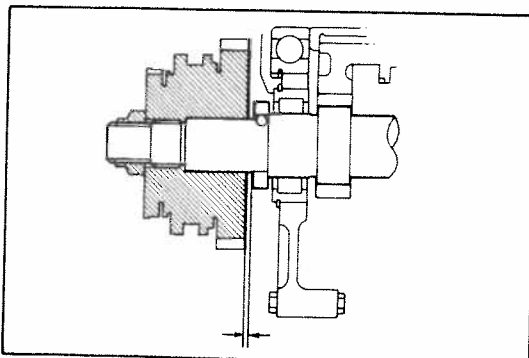


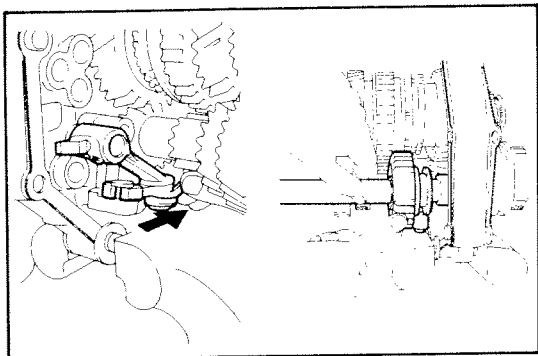
23. MEASURE COUNTER FIFTH GEAR THRUST CLEARANCE

Using a feeler gauge, measure the counter 5th gear thrust clearance.

Standard clearance: 0.10 – 0.30 mm
(0.0039 – 0.0118 in.)

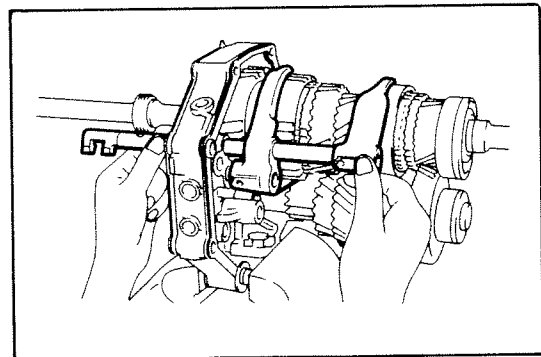
Maximum clearance: 0.30 mm (0.0118 in.)





24. INSTALL REVERSE SHIFT ARM TO REVERSE SHIFT ARM BRACKET

Install the reverse shift arm to the pivot of the reverse shift arm bracket.



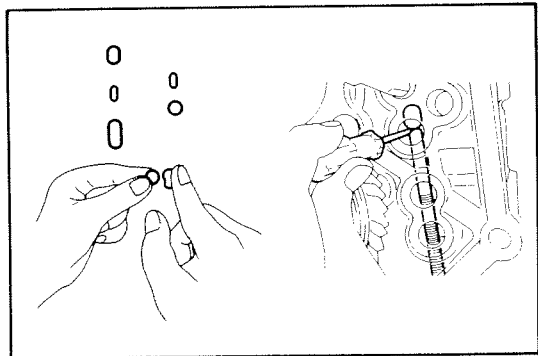
25. INSTALL REVERSE IDLER GEAR AND SHAFT

- Install the reverse idler gear on the shaft.
- Align the reverse shift arm shoe to the reverse idler gear groove and insert the reverse idler gear shaft to the intermediate plate.
- Install the reverse idler gear shaft stopper and torque the bolt.

Torque: 175 kg-cm (13 ft-lb)

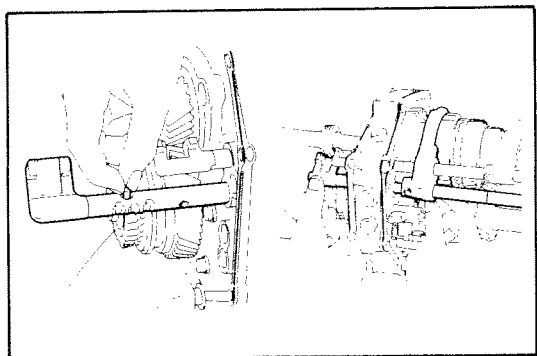
26. INSTALL SHIFT FORK SHAFT NO. 2, SHIFT FORK NO. 1 AND NO. 2

Place shift forks No. 1 and No. 2 into the groove of hub sleeves No. 1 and No. 2 and install fork shaft No. 2 to the shift forks No. 1 and No. 2 through the intermediate plate.



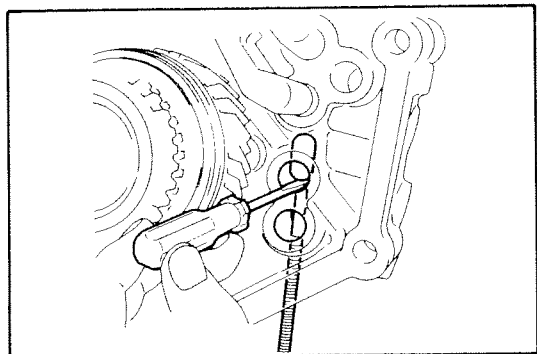
27. INSTALL INTERLOCK PIN

- Apply MP grease to the interlock pins.
- Using a magnetic finger and screwdriver, install the interlock pin into the intermediate plate.



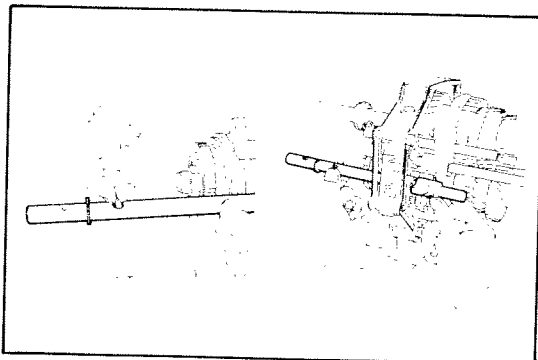
28. INSTALL SHIFT FORK SHAFT NO. 1

- Install the interlock pin into the shaft hole.
- Install fork shaft No. 1 to shift fork No. 1 through the intermediate plate.

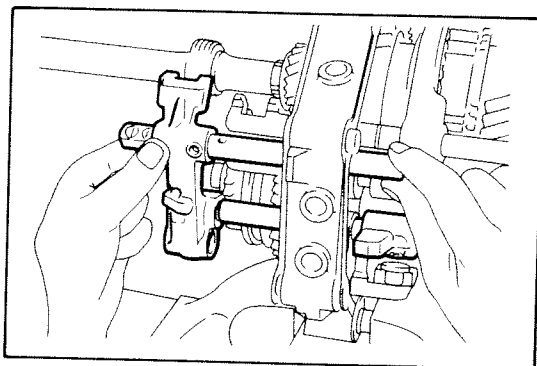


29. INSTALL INTERLOCK PIN

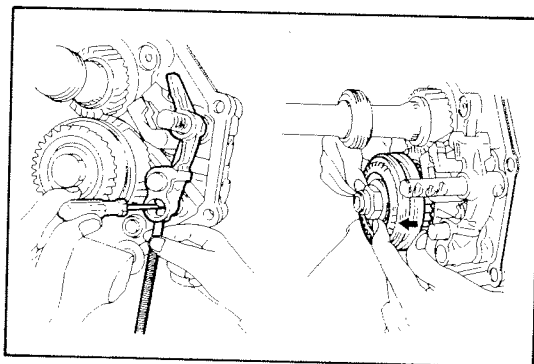
Using a magnetic finger and screwdriver, install the interlock pin into the intermediate plate.

**30. INSTALL SHIFT FORK SHAFT NO. 3**

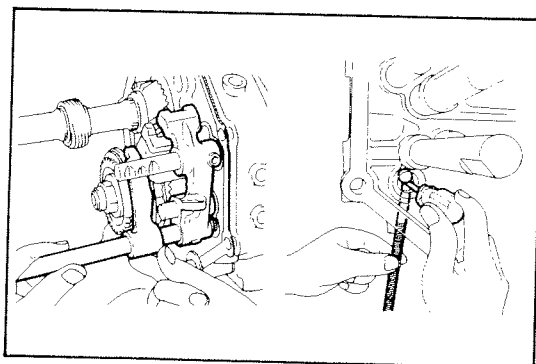
- (a) Install the interlock pin into the shaft hole.
- (b) Install fork shaft No. 3 to the reverse shift arm through the intermediate plate.

**31. INSTALL SHIFT FORK SHAFT NO. 5 AND REVERSE SHIFT HEAD**

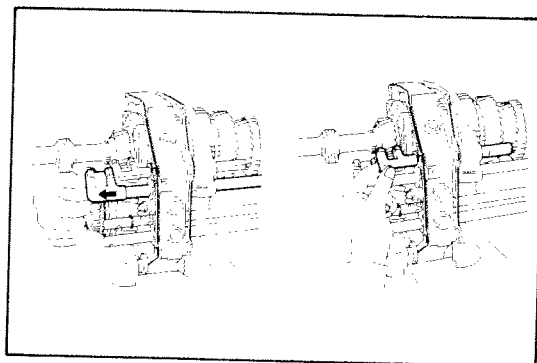
- (a) Install the reverse shift head into fork shaft No. 5.
- (b) Insert fork shaft No. 5 to the intermediate plate and put in the reverse shift head to the shift fork shaft No. 3.

**32. INSTALL SHIFT FORK SHAFT NO. 4, SHIFT FORK NO. 3 AND TWO LOCKING BALLS**

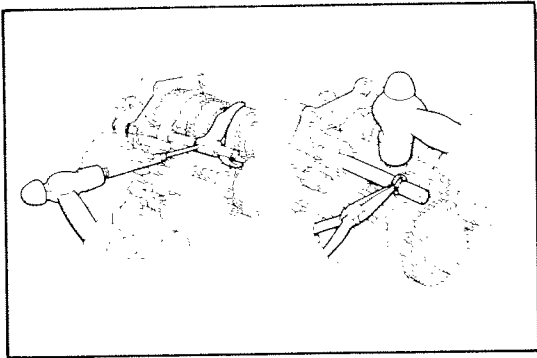
- (a) Using a magnetic finger and screwdriver, install the locking ball into the reverse shift head hole.
- (b) Shift hub sleeve No. 3 to the 5th speed position.



- (c) Place shift fork No. 3 into the groove of hub sleeve No. 3 and install fork shaft No. 4 to shift fork No. 4 and reverse shift arm.
- (d) Using a magnetic finger and screwdriver, install the locking ball into the intermediate plate and insert fork shaft No. 4 to the intermediate plate.

**33. CHECK INTERLOCK**

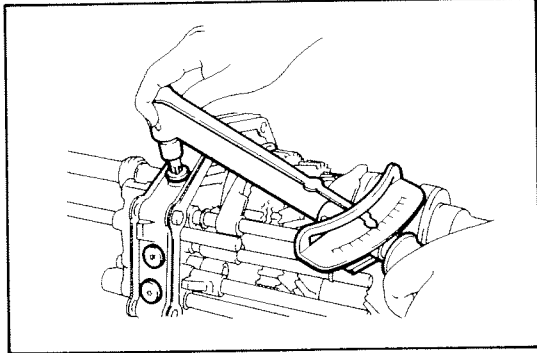
- (a) Shift fork shaft No. 1 to the 1st speed position.
- (b) Fork shafts No. 2, No. 3, No. 4 and No. 5 should not move.



34. INSTALL FIVE SLOTTED SPRING PINS

Using a pin punch and hammer, drive in the slotted spring pins to each shift fork, reverse shift arm and reverse shift head.

35. INSTALL TWO FORK SHAFT E-RINGS

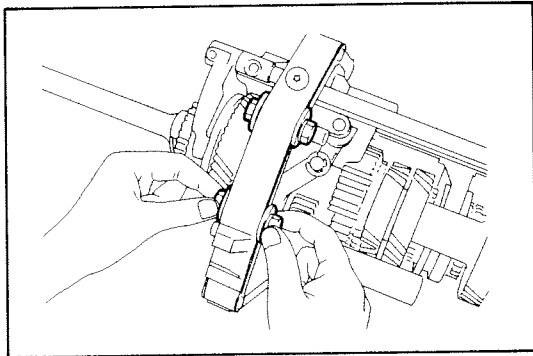


36. INSTALL LOCKING BALLS, SPRINGS AND SCREW PLUGS

- Apply liquid sealer to the plugs.
- Install the locking balls, springs and screw plugs and torque the screw plugs with a torx socket wrench.

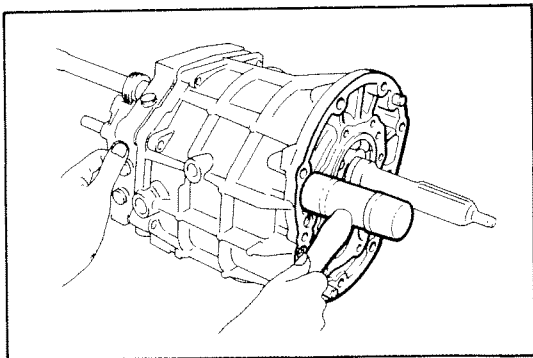
Torque: 190 kg-cm (14 ft-lb)

NOTE: Install the short spring into the lower of the intermediate plate.



37. DISMOUNT INTERMEDIATE PLATE FROM VISE

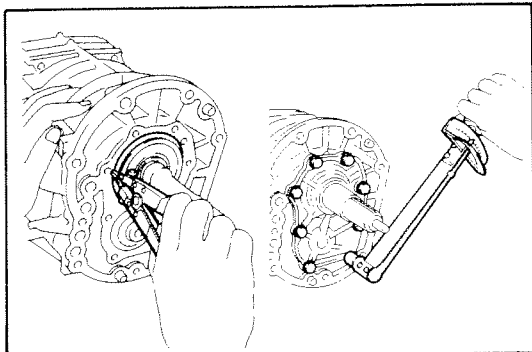
- Dismount the intermediate plate from the vise.
- Remove the bolts, nuts, plate washers and gasket.



38. INSTALL TRANSMISSION CASE WITH A NEW GASKET TO INTERMEDIATE PLATE

Align each bearing outer race, each fork shaft end and reverse idler gear shaft end with the case installed holes, and install the case.

If necessary, tap on the case with a plastic hammer.

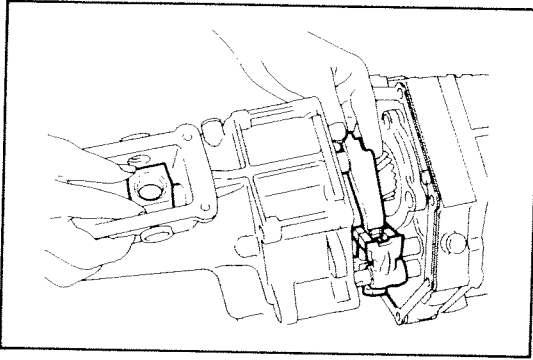


39. INSTALL TWO BEARING SNAP RINGS

40. INSTALL FRONT BEARING RETAINER WITH A NEW GASKET

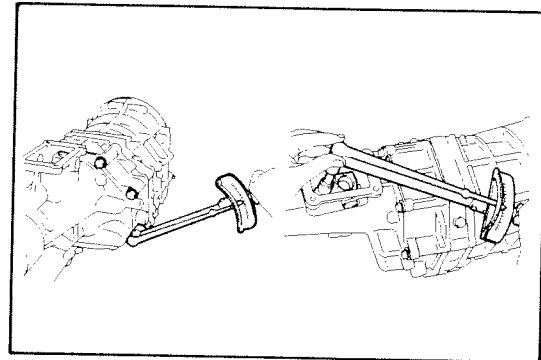
- Install the bearing retainer with a new gasket.
- Apply liquid sealer to the bolts.
- Install and torque the bolts.

Torque: 170 kg-cm (12 ft-lb)



41. INSTALL EXTENSION HOUSING, NEW GASKET, SHIFT AND SELECT LEVER AND SHIFT LEVER HOUSING

- (a) Install the new gasket to the intermediate plate.
- (b) Insert the shift and select lever to the extension housing.
- (c) Connect the shift and select lever to the fork shaft and put in the shift lever housing.



- (d) Align fork shaft No. 5 to the extension housing installed hole and push in the extension housing.

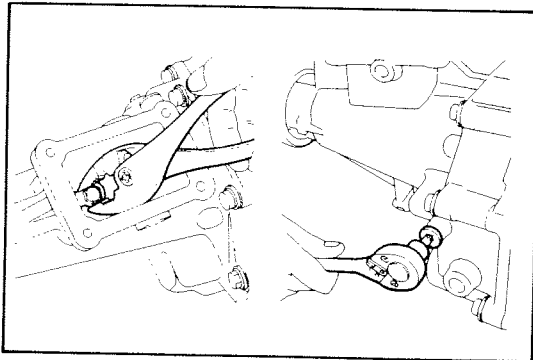
- (e) Install and torque the extension housing bolts.

Torque: 380 kg-cm (27 ft-lb)

- (f) Install and torque the shift lever housing bolt with a lock washer.

Torque: 390 kg-cm (28 ft-lb)

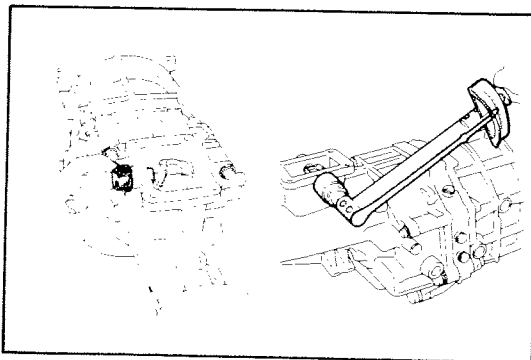
- (g) Stake the lock washer.



42. INSTALL LOCKING BALL, SPRING AND SCREW PLUG

- (a) Apply liquid sealer to the plug.
- (b) Install the locking ball, spring and plug, and torque the plug.

Torque: 190 kg-cm (14 ft-lb)



43. AFTER INSTALLING EXTENSION HOUSING, CHECK FOLLOWING ITEMS:

- (a) Check to see that the input shaft and output shafts rotate smoothly.
- (b) Check to see that shifting can be made smoothly to all positions.

44. INSTALL RESTRICT PINS

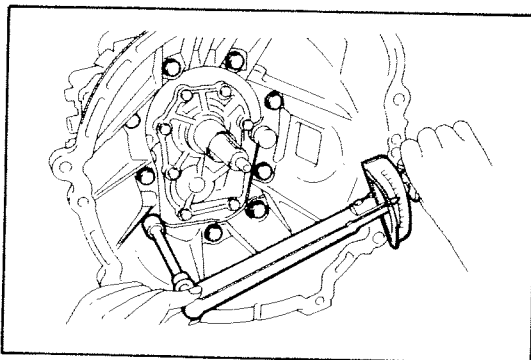
- (a) Install the black pin on the reverse gear/5th gear side.
- (b) Install another pin and torque the pins.

Torque: 280 kg-cm (20 ft-lb)

45. INSTALL CLUTCH HOUSING

- (a) Install the clutch housing.
- (b) Install and torque the bolts.

Torque: 380 kg-cm (27 ft-lb)



46. INSTALL SHIFT LEVER RETAINER WITH A NEW GASKET

Torque: 185 kg-cm (13 ft-lb)

47. INSTALL BACK-UP LIGHT SWITCH

Torque: 380 kg-cm (27 ft-lb)

48. INSTALL SPEEDOMETER DRIVE GEAR**49. INSTALL RELEASE FORK AND BEARING**

Apply molybdenum disulphide lithium base grease to the following parts:

- Release bearing hub inside groove
- Input shaft spline
- Release fork contact surface

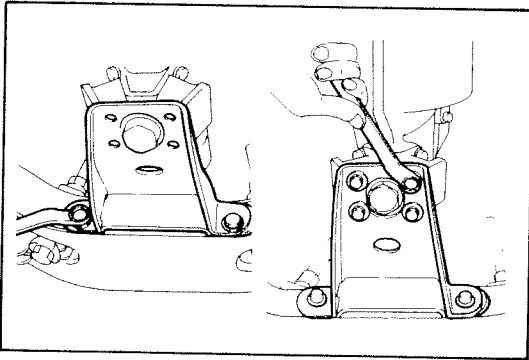
INSTALLATION OF TRANSMISSION (RN 4×2)

NOTE: For transmission (RN4x4), refer to INSTALLATION OF TRANSFER on page 11-28.

1. PLACE TRANSMISSION AT INSTALLATION POSITION, AND INSTALL TWO UPPER BOLTS

Insert the extension housing between the member and floor and then slide the transmission forward.

Align the input shaft spline with the clutch disc, and push the transmission fully into position.

**2. INSTALL ENGINE REAR MOUNTING WITH BRACKET**

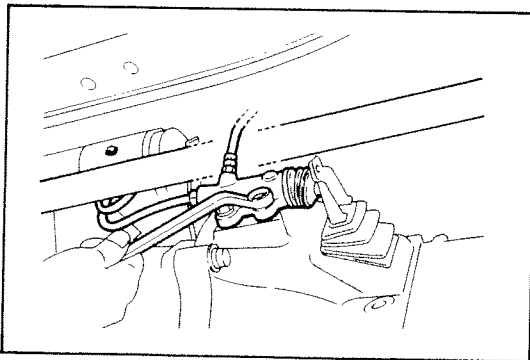
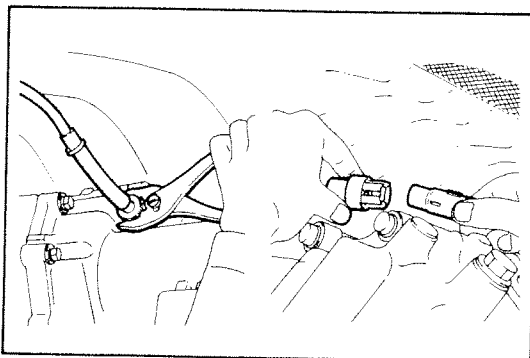
(a) Install the engine rear mounting with bracket to the support member. Tighten the four bolts.

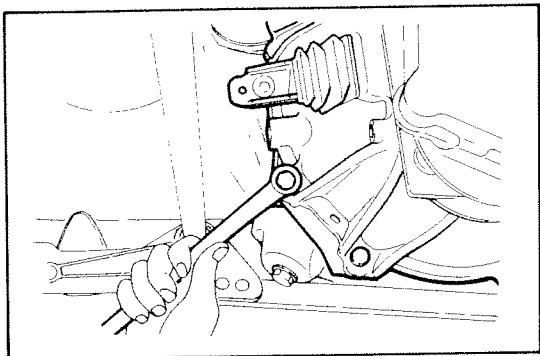
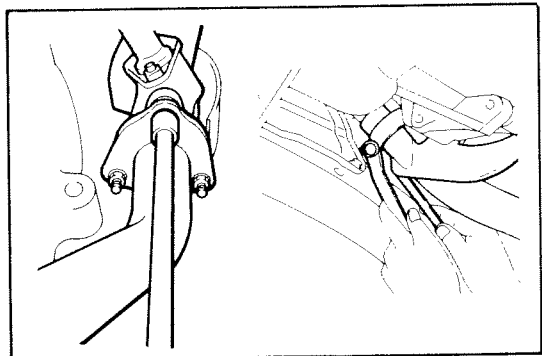
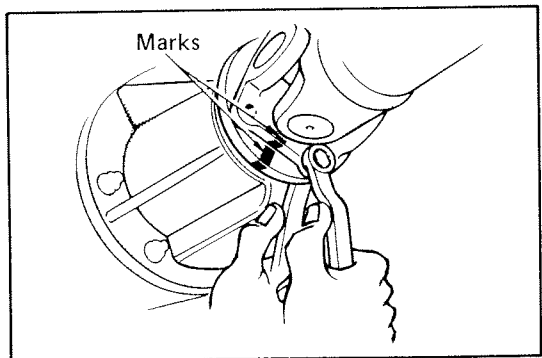
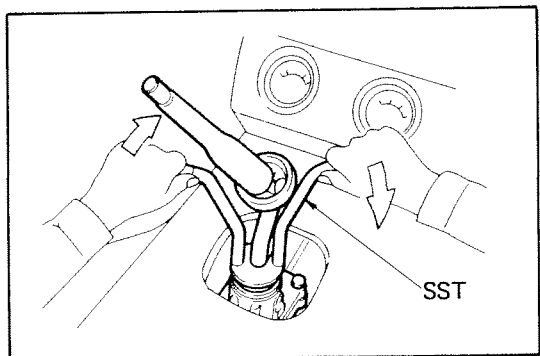
Torque: 350 — 500 kg-cm (26 — 36 ft-lb)

(b) Lower the transmission and rest it on the rear mounting.

(c) Install the four mounting bolts to the extension housing.

Torque: 190 — 310 kg-cm (14 — 22 ft-lb)

**3. INSTALL EXHAUST PIPE BRACKET****4. INSTALL CLUTCH RELEASE CYLINDER AND RELEASE CYLINDER TUBE BRACKET****5. INSTALL INSULATOR PLATE****6. CONNECT SPEEDOMETER CABLE****7. CONNECT BACK-UP LIGHT SWITCH CONNECTOR**

**8. INSTALL STIFFENER PLATE****9. INSTALL REMAINING TRANSMISSION HOUSING BOLTS****10. INSTALL EXHAUST PIPE AND CLAMP****11. INSTALL PROPELLER SHAFT (See page 12-8)****12. INSTALL CENTER SUPPORT BEARING****13. INSTALL SHIFT LEVER**

- (a) Apply multipurpose grease to the shift lever.
 - (b) Using SST, install the shift lever to the transmission.
- SST 09305-20012

14. FILL TRANSMISSION WITH OIL

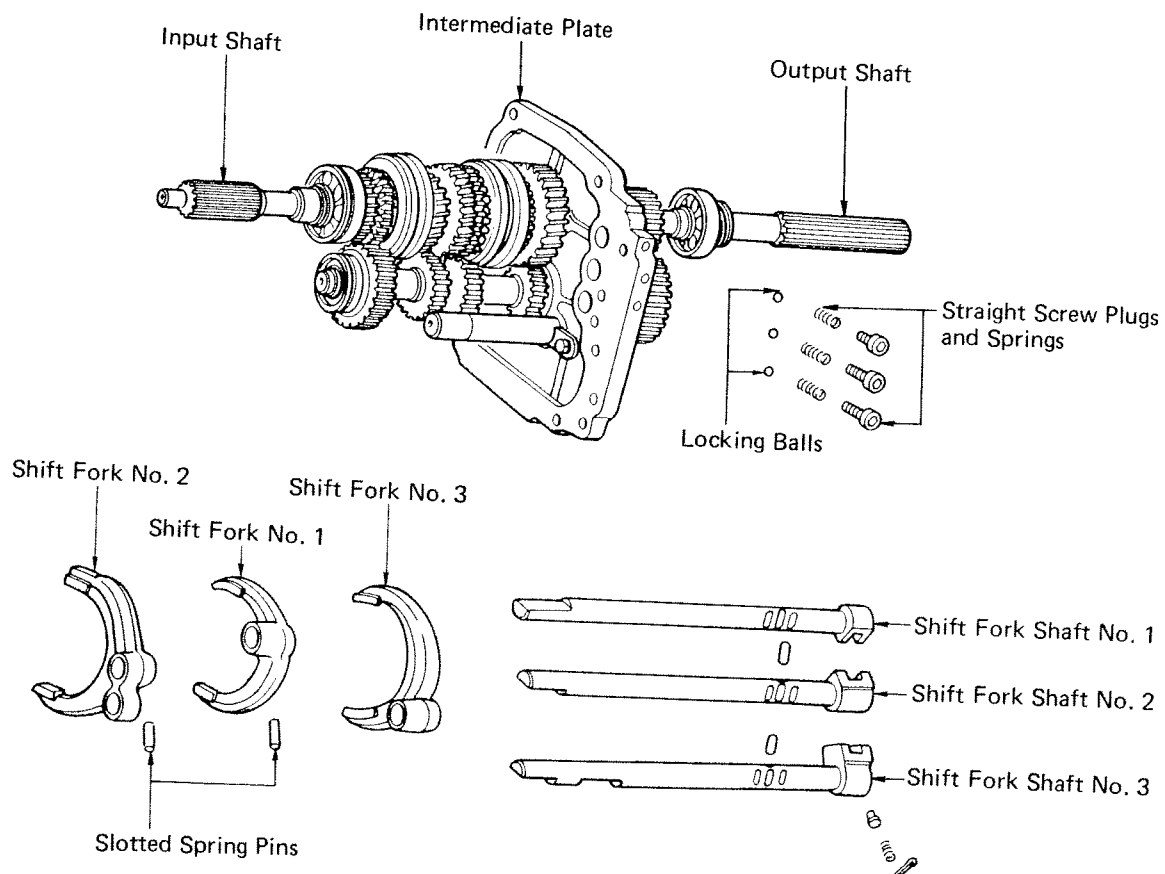
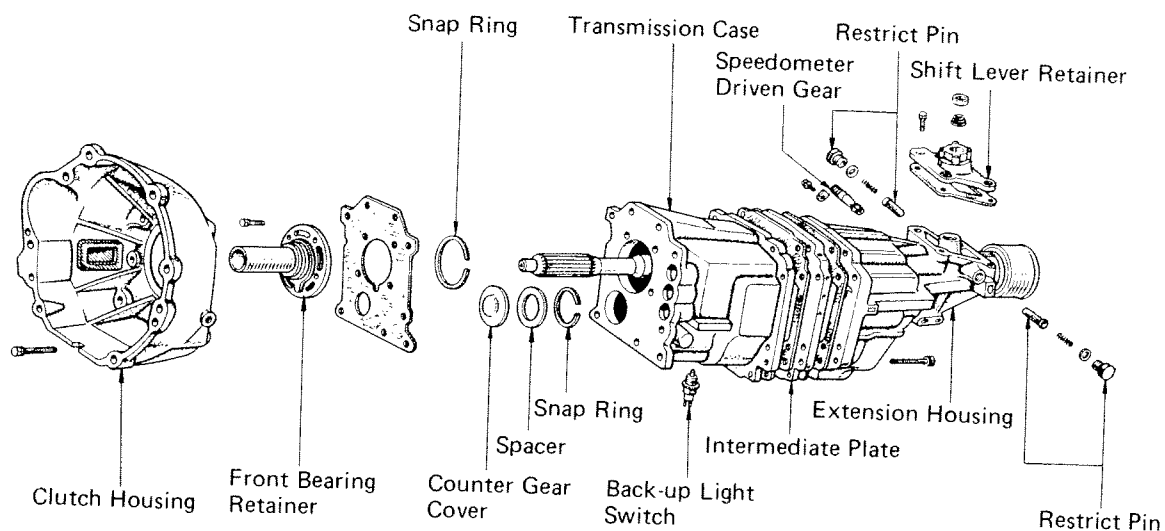
Oil type: API GL-4 or GL-5
SAE 75W-90

Quantity: G52 2.2 liters (2.3 US qts, 1.9 Imp. qts)

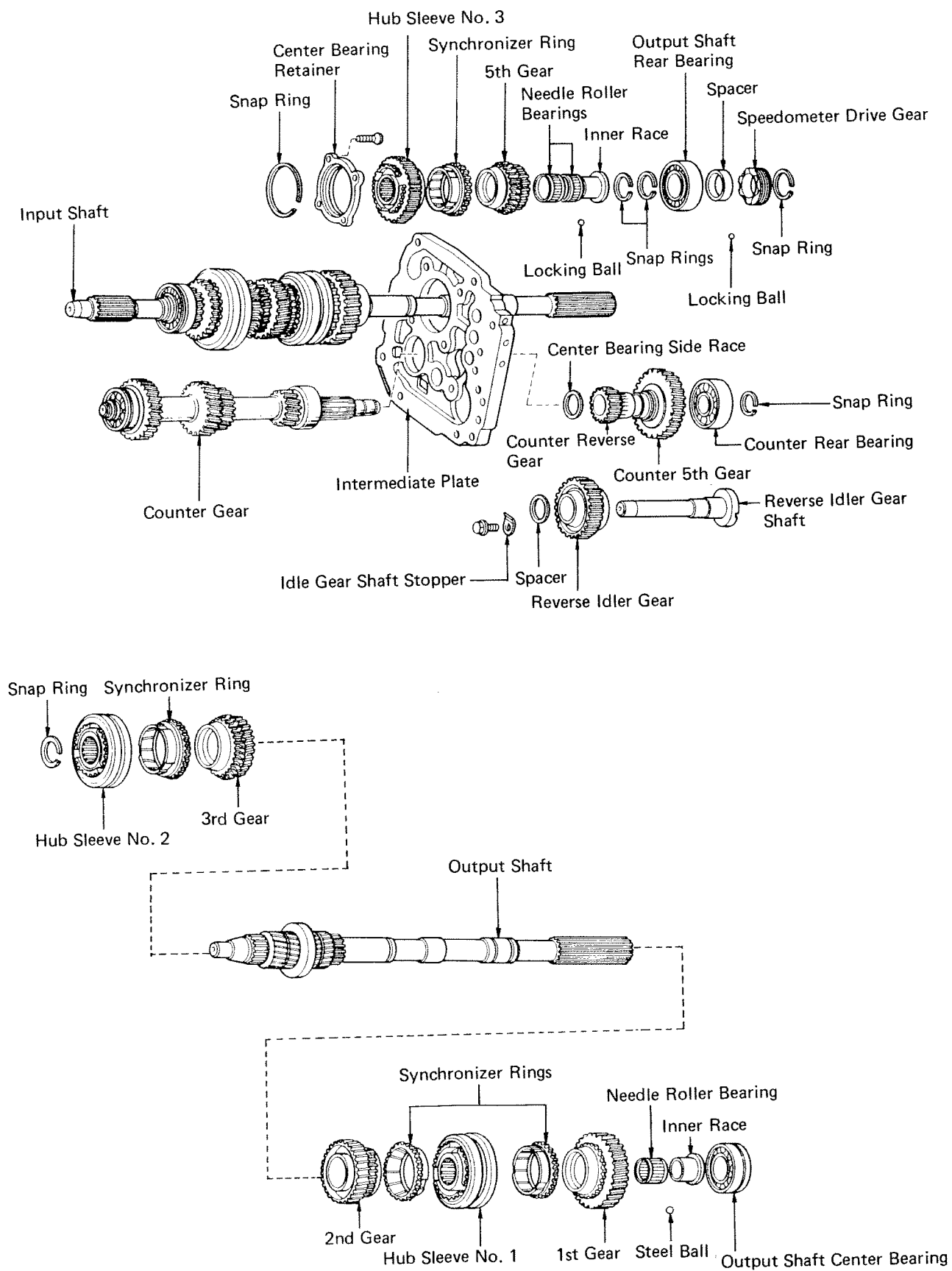
15. PERFORM ROAD TEST

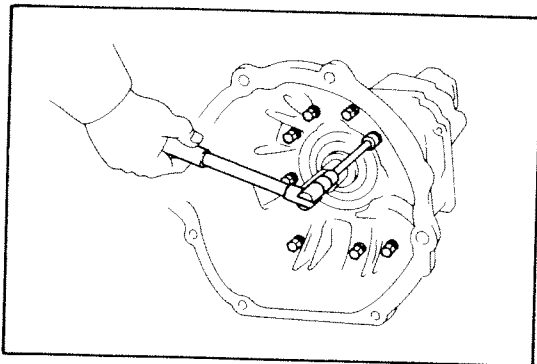
Check for abnormal noise and smooth operation.

W42 AND W52 TRANSMISSIONS COMPONENTS



COMPONENTS (Cont'd)

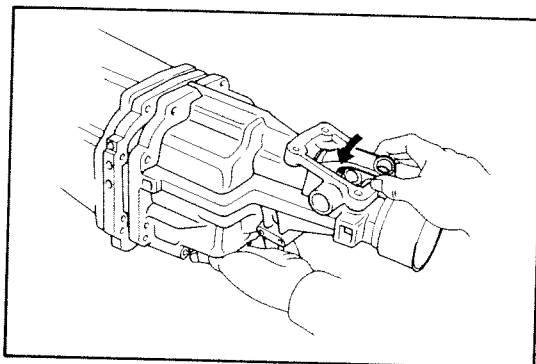




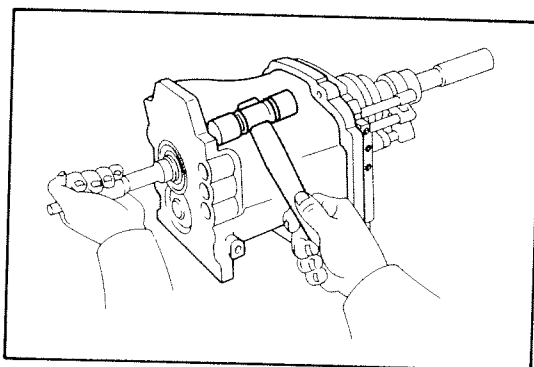
DISASSEMBLY OF TRANSMISSION

(See page 9-37, 38)

1. REMOVE BACK-UP LIGHT SWITCH, SPEEDOMETER DRIVEN GEAR, SHIFT LEVER RETAINER AND RESTRICT PINS
2. REMOVE CLUTCH RELEASE BEARING, FORK AND CLUTCH HOUSING FROM TRANSMISSION CASE



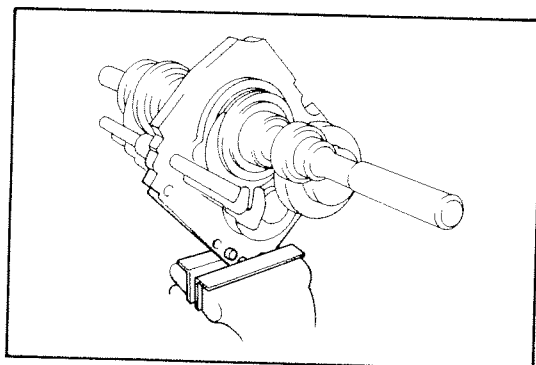
3. REMOVE EXTENSION HOUSING
 - (a) Remove the eight bolts.
 - (b) Using a plastic hammer, tap off the extension housing.
 - (c) Turn the shift lever housing counterclockwise.



4. REMOVE FRONT BEARING RETAINER, COUNTER GEAR COVER AND TWO BEARING SNAP RINGS

5. SEPARATE TRANSMISSION CASE FROM INTERMEDIATE PLATE

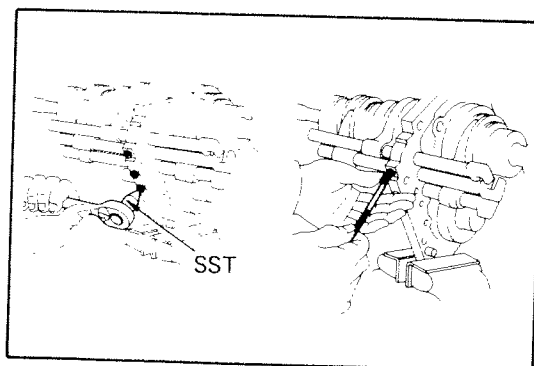
- (a) Using a plastic hammer, carefully tap the transmission case.
- (b) Pull the transmission case from the intermediate plate.



6. MOUNT INTERMEDIATE PLATE IN VISE

Place the intermediate plate in a vise, taking care not to mar the fitting surfaces of the transmission case and extension housing.

CAUTION: To prevent damaging the intermediate plate, use a set of soft jaws in the vise.

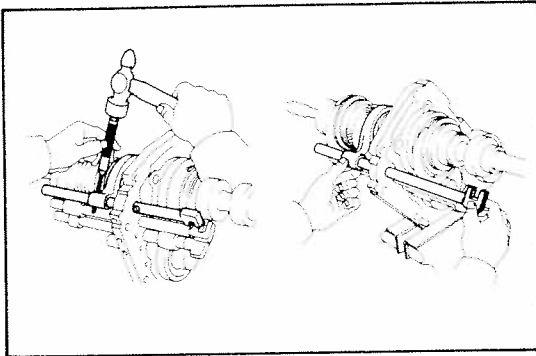


7. REMOVE THREE STRAIGHT SCREW PLUGS, SPRINGS AND BALLS

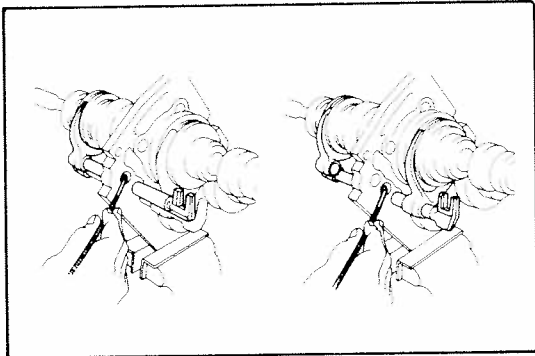
- (a) Using SST, remove the three plugs.

SST 09313-30021

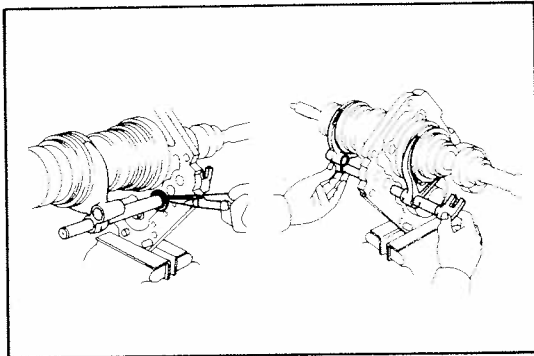
- (b) Using a magnetic finger, remove the three springs and balls.

**8. REMOVE SHIFT FORKS AND SHIFT FORK SHAFTS**

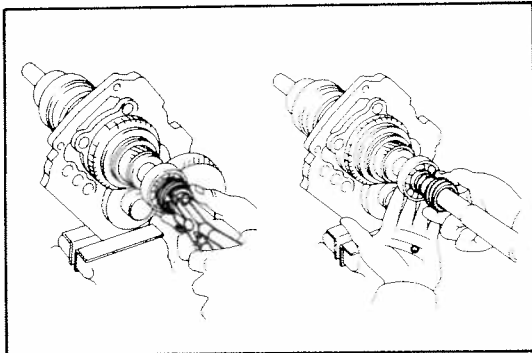
- (a) Using a pin punch and hammer, drive out the slotted spring pins from each fork.
- (b) Remove the shift fork and shaft No. 1.



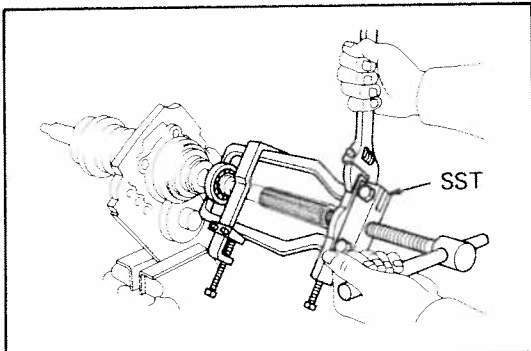
- (c) Using a magnetic finger, remove interlock pin No. 1.
- (d) Remove shaft No. 2.
- (e) Using a magnetic finger, remove interlock pin No. 2.



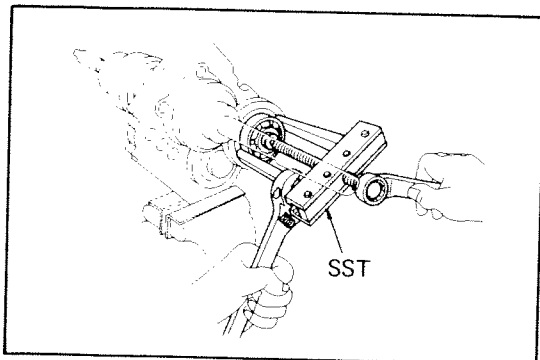
- (f)-1. (W42)
Remove the E-ring from shaft No. 3.
Remove shift fork No. 2, No. 3 and shaft No. 3.
- (f)-2. (W52)
Remove shift fork No. 2, No. 3 and shaft No. 3.

**9. REMOVE SPEEDOMETER DRIVE GEAR**

- (a) Using snap ring pliers, remove the snap ring.
- (b) Remove the drive gear, locking ball and spacer.

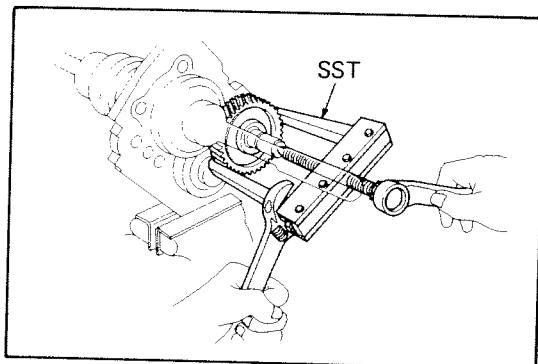
**10. REMOVE OUTPUT SHAFT REAR BEARING**

- (a) Using SST, remove the bearing.
SST 09950-20014
- (b) Using snap ring pliers, remove the snap ring.

**11. REMOVE COUNTER GEAR REAR BEARING**

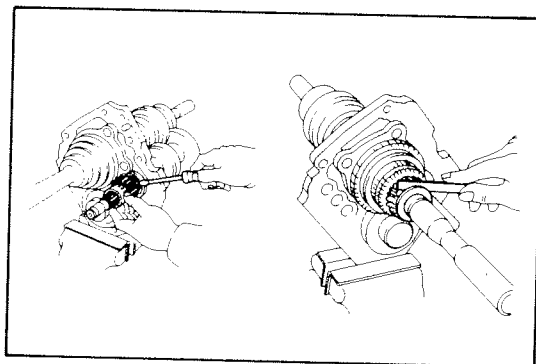
- (a) Using snap ring pliers, remove the snap ring.
- (b) Using SST, remove the bearing.

SST 09213-36020

**12.-1(W42)****REMOVE SPACER****12.-2(W52)****REMOVE COUNTER FIFTH GEAR**

Using SST, remove the counter 5th gear.

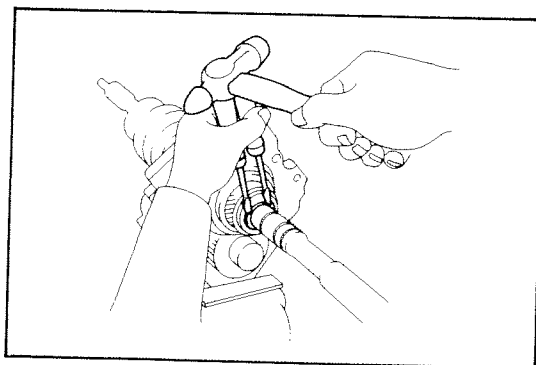
SST 09213-36020

**13. REMOVE COUNTER REVERSE GEAR AND CENTER BEARING SIDE RACE****14. (W52)****MEASURE FIFTH GEAR THRUST CLEARANCE**

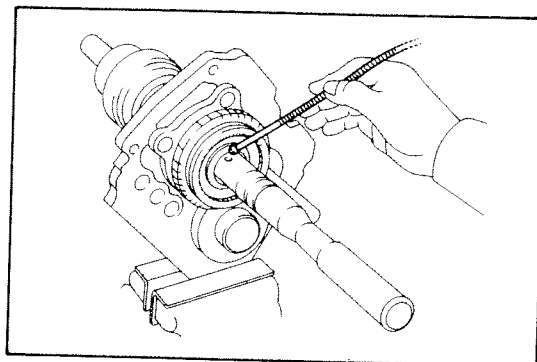
Using a feeler gauge, measure the 5th gear thrust clearance.

Standard clearance: 0.10 – 0.25 mm
(0.0039 – 0.0098 in.)

Maximum clearance: 0.30 mm (0.0118 in.)

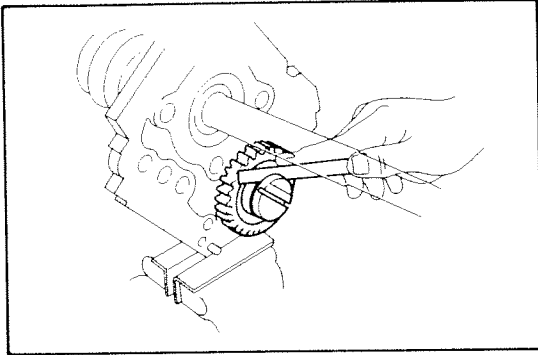
**15. REMOVE SNAP RING**

Using two screwdrivers and a hammer, tap out the snap ring.

**16.-1(W42)****REMOVE SPACER****16.-2(W52)****REMOVE FIFTH GEAR ASSEMBLY****17. REMOVE LOCKING BALL**

Using a magnetic finger, remove the locking ball.

18. REMOVE HUB SLEEVE NO.3 ASSEMBLY

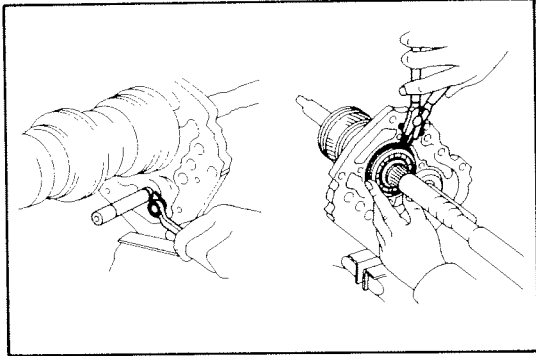


19. MEASURE REVERSE IDLER GEAR THRUST CLEARANCE

Using a feeler gauge, measure the thrust clearance.

Standard clearance: 0.15 – 0.25 mm
(0.0059 – 0.0098 in.)

Maximum clearance: 0.30 mm (0.0118 in.)

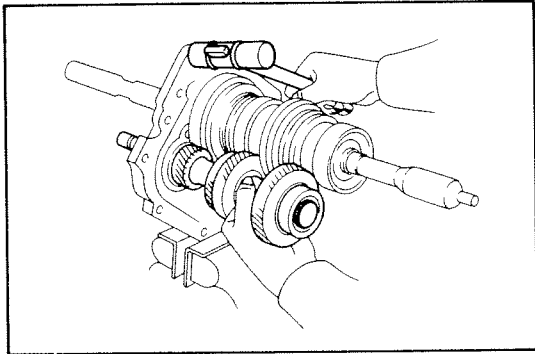


20. REMOVE REVERSE IDLER GEAR AND SHAFT

- (a) Remove the reverse idler gear shaft stopper.
- (b) Remove the reverse idler gear, shaft and spacer.

21. REMOVE CENTER BEARING RETAINER

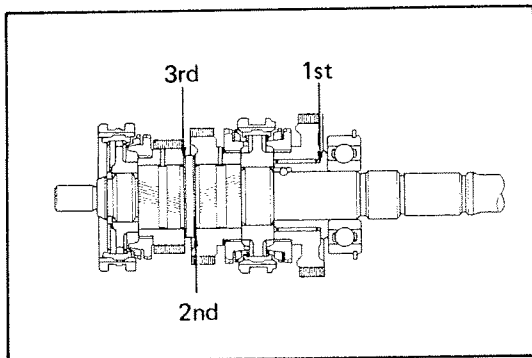
22. REMOVE SNAP RING



23. REMOVE OUTPUT SHAFT AND COUNTER GEAR AS A UNIT FROM INTERMEDIATE PLATE

Remove the output shaft, input shaft and counter gear as a unit from the intermediate plate by pulling on the counter gear and tapping on the intermediate plate with a plastic hammer.

24. REMOVE INPUT SHAFT FROM OUTPUT SHAFT

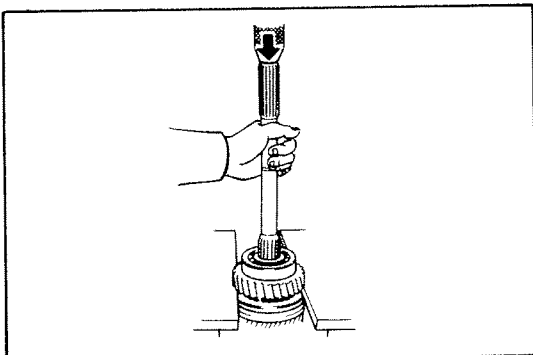


25. MEASURE EACH GEAR THRUST CLEARANCE

Measure the thrust clearance of each gear.

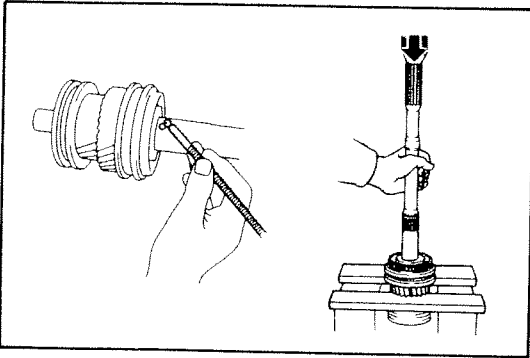
Standard clearance: 0.15 – 0.25 mm
(0.0059 – 0.0098 in.)

Maximum clearance: 0.30 mm (0.0118 in.)

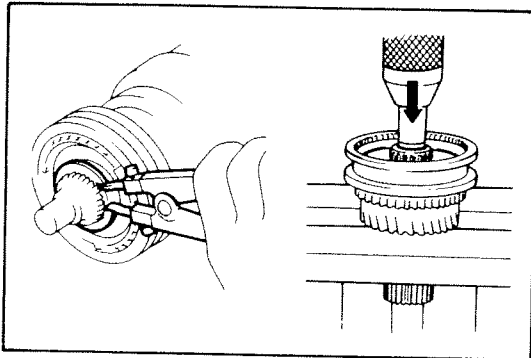


26. REMOVE OUTPUT SHAFT CENTER BEARING AND FIRST GEAR ASSEMBLY

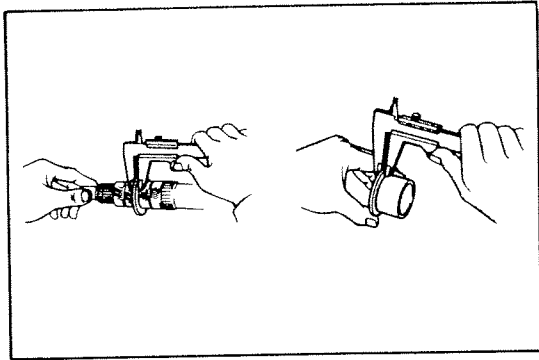
- (a) Shift hub sleeve No. 1 onto the 2nd gear.
- (b) Using a press, remove the center bearing, 1st gear, needle roller bearing, inner race and synchronizer ring.

**27. REMOVE LOCKING BALL****28. REMOVE HUB SLEEVE NO. 1 ASSEMBLY AND SECOND GEAR**

Using a press, remove hub sleeve No. 1, 2nd gear and synchronizer ring.

**29. REMOVE HUB SLEEVE NO. 2 ASSEMBLY AND THIRD GEAR**

- (a) Using snap ring pliers, remove the snap ring.
- (b) Using a press, remove hub sleeve No. 2, synchronizer ring and 3rd gear.



INSPECTION OF TRANSMISSION COMPONENTS

1. INSPECT OUTPUT SHAFT AND INNER RACE

- (a) Check the output shaft and inner race for wear or damage.
- (b) Using calipers, measure the output shaft flange thickness.

Minimum thickness: 4.80 mm (0.1890 in.)

- (c) Using calipers, measure the inner race flange thickness.

Minimum thickness:

1st gear 4.55 mm (0.1791 in.)

5th gear 3.85 mm (0.1516 in.)

- (d) Using a micrometer, measure the outer diameter of the output shaft journal.

Minimum diameter: 40.80 mm (1.6063 in.)

- (e) Using a micrometer, measure the outer diameter of the inner race.

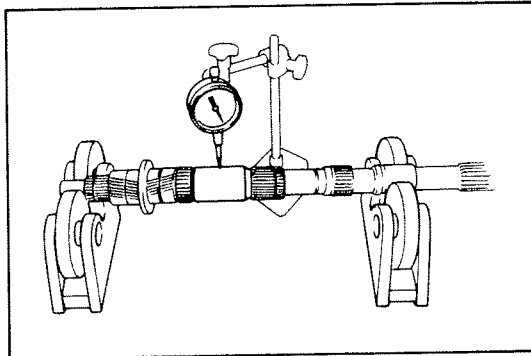
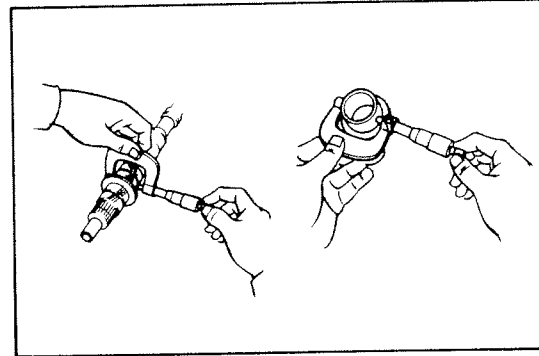
Minimum diameter:

1st gear 42.85 mm (1.6870 in.)

5th gear 34.85 mm (1.3720 in.)

- (f) Using a dial indicator, measure the shaft runout.

Maximum runout: 0.06 mm (0.0024 in.)



2. CHECK OIL CLEARANCE OF FIRST AND FIFTH GEAR

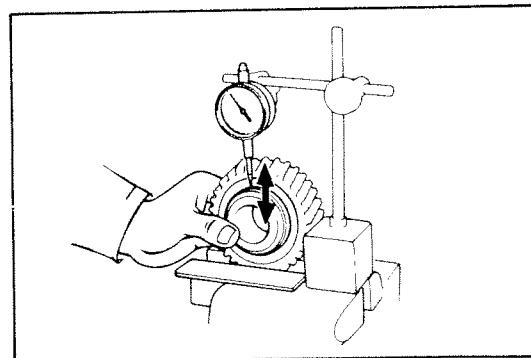
Using a dial indicator, measure the oil clearance between the gear and inner race with the needle roller bearing installed.

Standard clearance:

1st gear 0.009 – 0.053 mm (0.0004 – 0.0021 in.)

5th gear 0.009 – 0.051 mm (0.0004 – 0.0020 in.)

Maximum clearance: 0.15 mm (0.0059 in.)

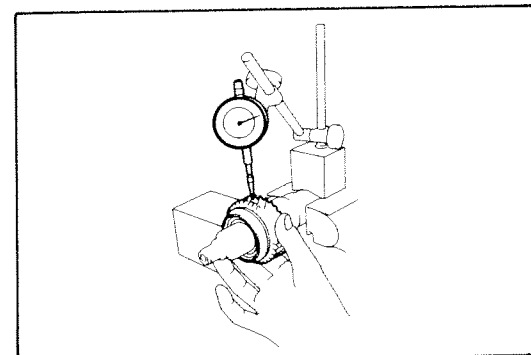


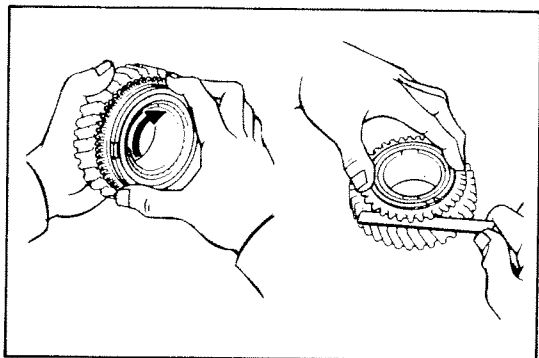
3. CHECK OIL CLEARANCE OF SECOND AND THIRD GEAR

Using a dial indicator, measure the oil clearance between the gear and output shaft.

**Standard clearance: 0.06 – 0.103 mm
(0.0024 – 0.0040 in.)**

Maximum clearance: 0.20 mm (0.0079 in.)





4. INSPECT SYNCHRONIZER RINGS

- Check for wear or damage.
- Turn the ring and push it into check the braking action.
- Measure the clearance between the synchronizer ring back and the gear spline end.

Standard clearance:

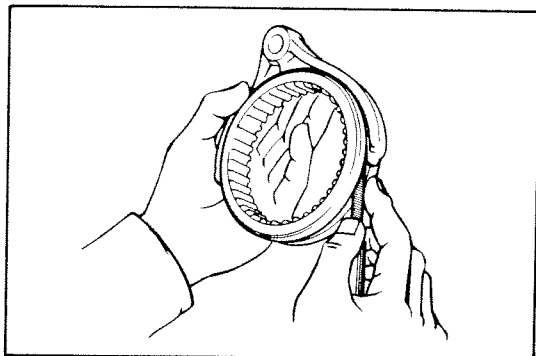
1st and 2nd 0.7 – 1.7 mm (0.028 – 0.067 in.)

3rd, 4th and 5th 1.0 – 2.0 mm (0.039 – 0.079 in.)

Minimum clearance:

1st and 2nd 0.5 mm (0.020 in.)

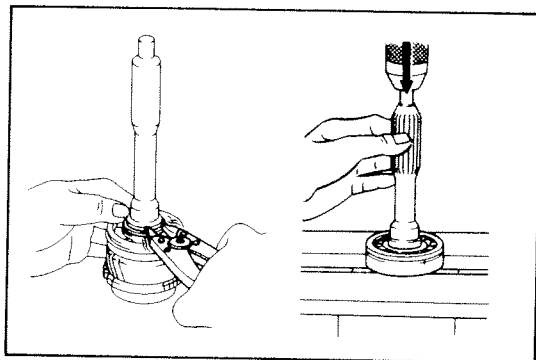
3rd, 4th and 5th 0.8 mm (0.031 in.)



5. MEASURE CLEARANCE OF SHIFT FORKS AND HUB SLEEVES

Using a feeler gauge, measure the clearance between the hub sleeve and shift fork.

Maximum clearance: 1.0 mm (0.039 in.)



6. INSPECT INPUT SHAFT AND BEARING

Check for wear or damage.

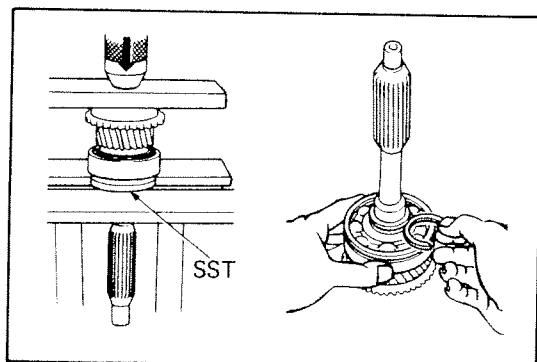
7. IF NECESSARY, REPLACE INPUT SHAFT BEARING

- Using snap ring pliers, remove the snap ring.
- Using a press, remove the bearing.

- Using a press and SST, install a new bearing.

SST 09506-35010

- Select a snap ring that will allow minimum axial play and install it on the shaft.



Mark	Thickness	mm (in.)
0	2.05 – 2.10	(0.0807 – 0.0827)
1	2.10 – 2.15	(0.0827 – 0.0846)
2	2.15 – 2.20	(0.0846 – 0.0866)
3	2.20 – 2.25	(0.0866 – 0.0886)
4	2.25 – 2.30	(0.0886 – 0.0906)
5	2.30 – 2.35	(0.0906 – 0.0925)

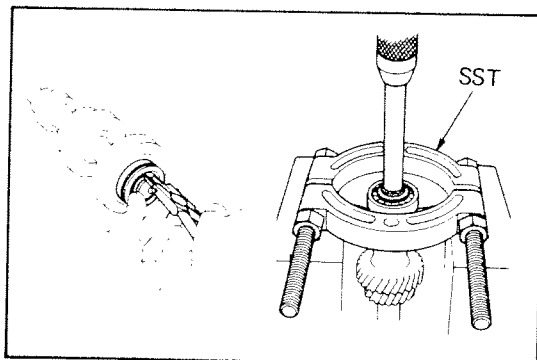
8. INSPECT COUNTER GEAR AND BEARING

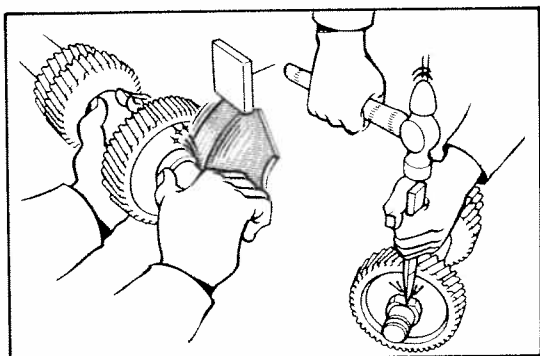
- Check the gear teeth for wear or damage.
- Check the bearing for wear or damage.

9. IF NECESSARY, REPLACE COUNTER GEAR FRONT BEARING

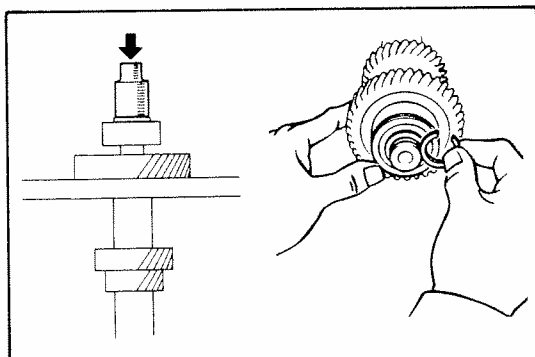
- Using snap ring pliers, remove the snap ring.
- Using SST, press out the bearing.

SST 09950-00020





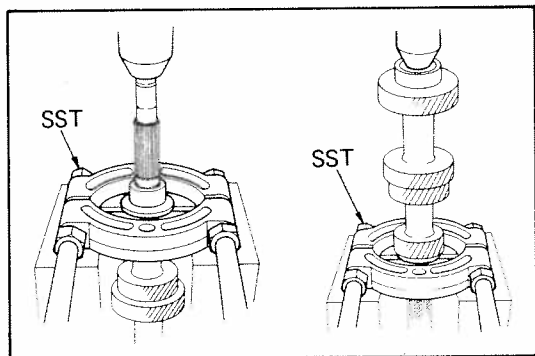
- (c) If necessary, remove the side race.
Grind part of the side race and cut it off with a chisel.



- (d) Using a socket wrench, press in the side race, bearing and inner race.

CAUTION: Be sure the side race is installed in the correct direction.

- (e) Using snap ring pliers, install the snap ring.

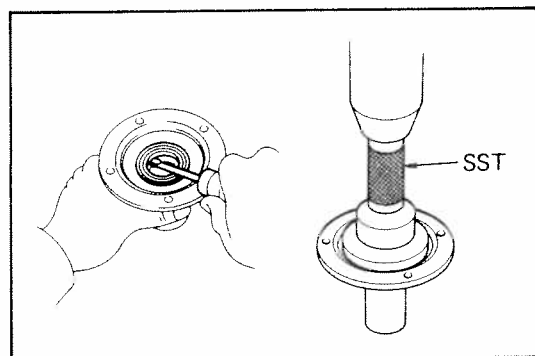


10. IF NECESSARY, REPLACE COUNTER GEAR CENTER BEARING INNER RACE

- (a) Using SST, press out the inner race.

SST 09950-00020

- (b) Press in the inner race.



11. INSPECT FRONT BEARING RETAINER

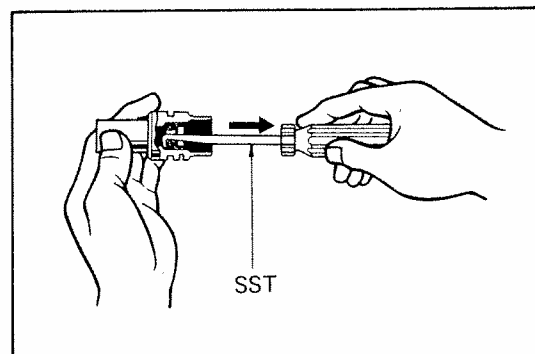
- (a) Check for damage.
(b) Check the oil seal lip for wear or damage.

12. IF NECESSARY, REPLACE OIL SEAL

- (a) Using a screwdriver, pry out the oil seal.
(b) Using SST, press in the oil seal.

SST 09223-50010

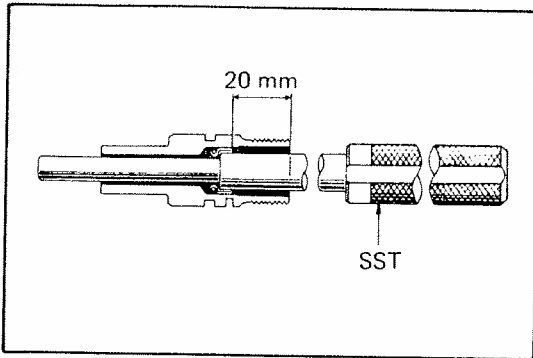
Oil seal depth: 11.5 — 12.0 mm (0.453 — 0.472 in.)



13. IF NECESSARY, REPLACE SPEEDOMETER DRIVEN GEAR OIL SEAL

- (a) Using SST, pull out the oil seal.

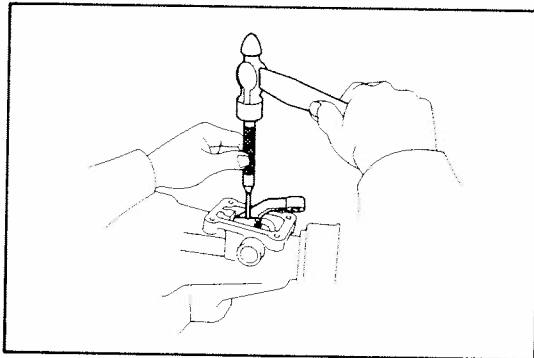
SST 09921-00010



(b) Using SST, drive in the oil seal into the sleeve.

SST 09201-60011

Oil seal depth: 20 mm (0.79 in.)

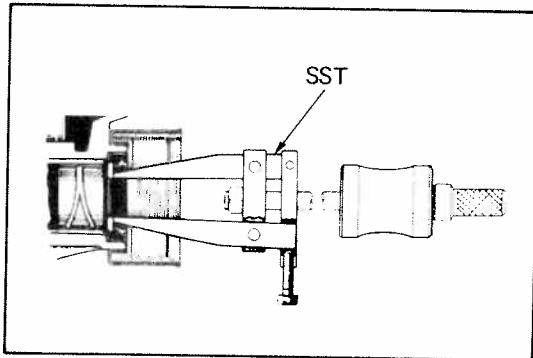


14. INSPECT SHIFT AND SELECT LEVER

Check the sliding action of the lever.

15. IF NECESSARY, REPLACE SHIFT AND SELECT LEVER

- Using a pin punch and hammer, drive out the slotted spring pin.
- Pull off the housing and slide out the shaft.
- Install the lever and shaft.
- Using a pin punch and hammer, drive in the pin.



16. INSPECT EXTENSION HOUSING

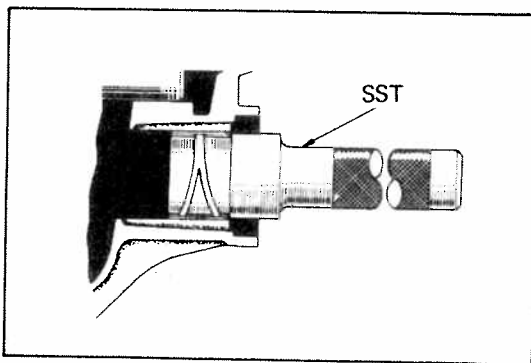
- Check for damage.
- Check the oil seal and bushing for wear or damage.

17. IF NECESSARY, REPLACE OIL SEAL AND BUSHING

- Using SST, remove the oil seal.

SST 09308-00010 or

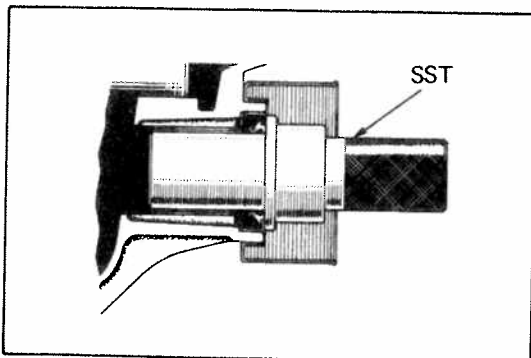
09308-10010 with output shaft installed



- Heat the extension housing end to 80 – 100°C (176 – 212°F) in an oil bath.

- Using SST, remove the bushing and install a new bushing.

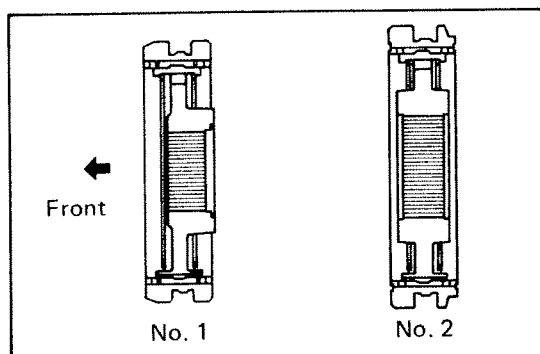
SST 09307-30010



- Using SST, drive in the new oil seal.

SST 09325-20010

Oil seal depth: 4.5 mm (0.177 in.)



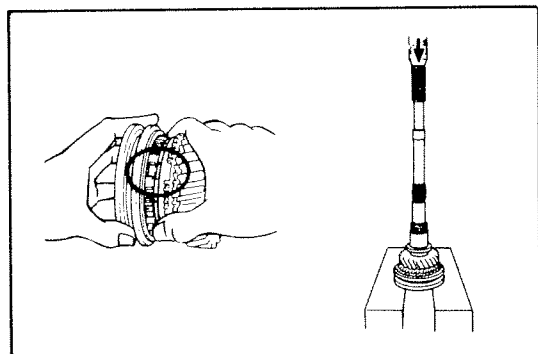
ASSEMBLY OF TRANSMISSION

(See page 9-37, 38)

1. INSERT CLUTCH HUB NO. 1 AND NO. 2 INTO HUB SLEEVE

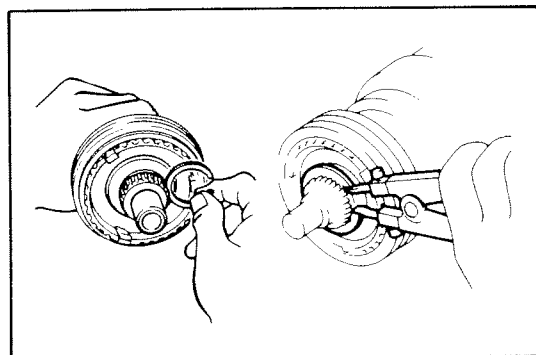
- Install the clutch hub and shifting keys to the hub sleeve.
- Install the shifting key springs under the shifting keys.

CAUTION: Install the key springs positioned so that their ends overlap.



2. INSTALL THIRD GEAR AND HUB SLEEVE NO. 2 ASSEMBLY ON OUTPUT SHAFT

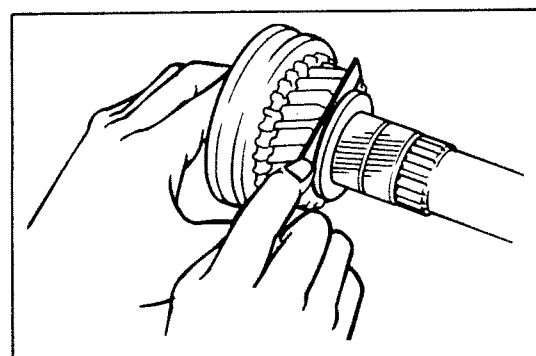
- Apply gear oil to the shaft.
- Place the synchronizer ring on the gear and align the ring slots with the shifting keys.
- Using a press, install the 3rd gear and hub sleeve No. 2.



3. INSTALL SNAP RING

Select a snap ring that will allow minimum axial play and install it on the shaft.

Mark	Thickness	mm (in.)
(none)	2.00 – 2.05	(0.0787 – 0.0807)
0	2.05 – 2.10	(0.0807 – 0.0827)
1	2.10 – 2.15	(0.0827 – 0.0846)
2	2.15 – 2.20	(0.0846 – 0.0866)
3	2.20 – 2.25	(0.0866 – 0.0886)
4	2.25 – 2.30	(0.0886 – 0.0906)

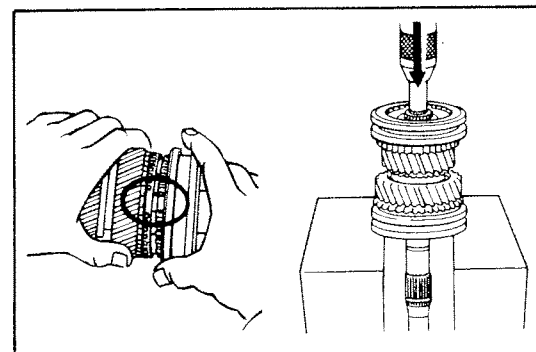


4. MEASURE THIRD GEAR THRUST CLEARANCE

Using a feeler gauge, measure the 3rd gear thrust clearance.

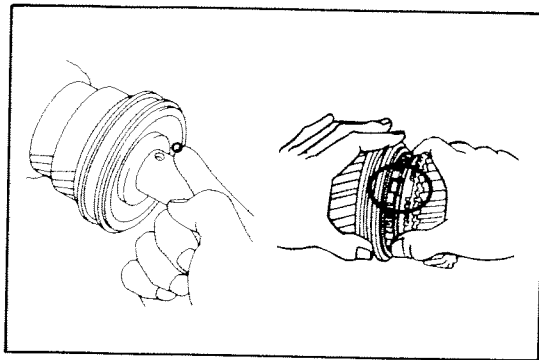
Standard clearance: 0.15 – 0.25 mm
(0.0059 – 0.0098 in.)

Maximum clearance: 0.30 mm (0.0118 in.)



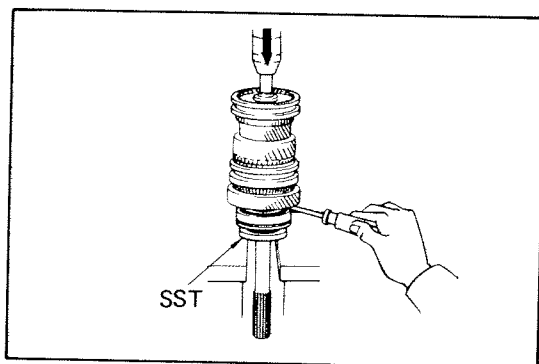
5. INSTALL SECOND GEAR AND HUB SLEEVE NO. 1 ASSEMBLY

- Apply gear oil to the output shaft.
- Place the synchronizer ring on the gear and align the ring slots with the shifting keys.
- Using a press, install the 2nd gear and hub sleeve No. 1.



6. INSTALL LOCKING BALL AND FIRST GEAR ASSEMBLY

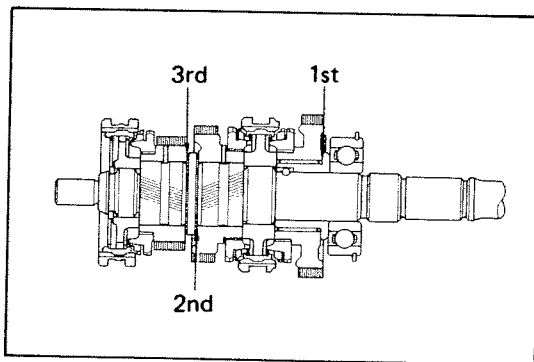
- (a) Install the locking ball in the shaft.
- (b) Apply gear oil to the bearing.
- (c) Assemble the 1st gear, synchronizer ring, needle roller bearing and bearing inner race.
- (d) Install the assembly on the output shaft with the synchronizer ring slots aligned with the shifting keys, and turn the inner race to align it with the locking ball.



7. INSTALL OUTPUT SHAFT CENTER BEARING

Using SST and a press, install the bearing on the output shaft with the outer race snap ring groove toward the rear.
NOTE: Hold the 1st gear inner race to prevent it from falling.

SST 09506-30011

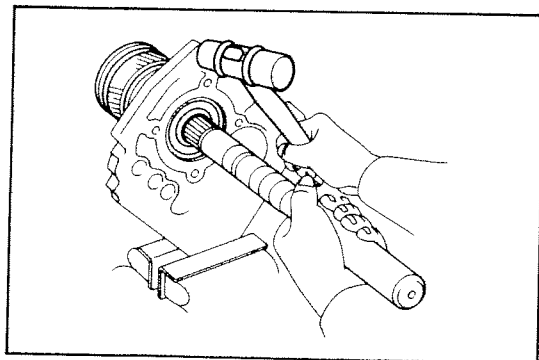


8. MEASURE FIRST AND SECOND GEAR THRUST CLEARANCE

Measure the 1st and 2nd gear thrust clearance.

Standard clearance: 0.15 – 0.25 mm
(0.0059 – 0.0098 in.)

Maximum clearance: 0.30 mm (0.0118 in.)



9. INSTALL OUTPUT SHAFT TO INTERMEDIATE PLATE

Install the output shaft into the intermediate plate by pulling on the output shaft and tapping on the intermediate plate.

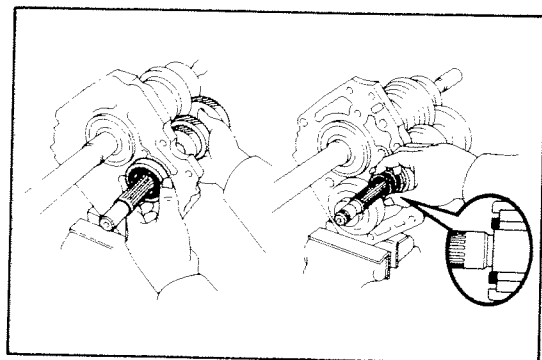
10. INSTALL INPUT SHAFT

- (a) Apply gear oil to the bearing.
- (b) Install the bearing in the input shaft.
- (c) Install the input shaft on the output shaft with the synchronizer ring slots aligned with the shifting keys.

11. INSTALL COUNTER GEAR AND CENTER BEARING

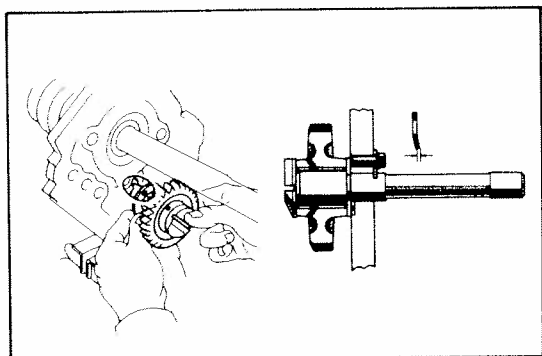
- (a) Install the counter gear.
- (b) Install the counter center bearing and side race.

NOTE: Be careful not to slant the bearing when pushing it in.



12. INSTALL BEARING SNAP RING

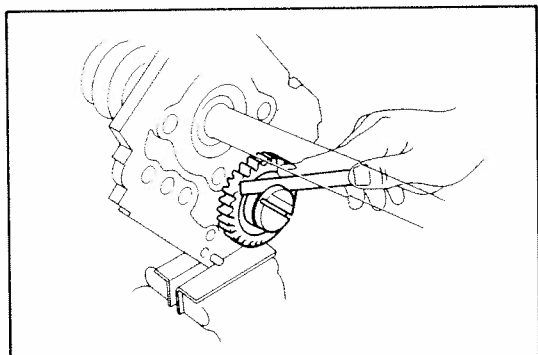
Using snap ring pliers, install the snap ring.

**13. INSTALL CENTER BEARING RETAINER**

Torque: 150 – 210 kg-cm (11 – 15 ft-lb)

14. INSTALL REVERSE IDLER GEAR AND SHAFT

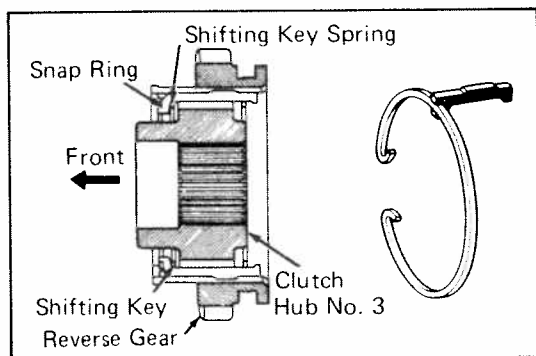
- Assemble the idler gear with the oil hole toward the rear, and the spacer on the idler shaft.
- Insert the assembly with the tab on the spacer fitted into the notch on the intermediate plate.
- Install the reverse idler shaft stopper.

**15. MEASURE REVERSE IDLER GEAR THRUST CLEARANCE**

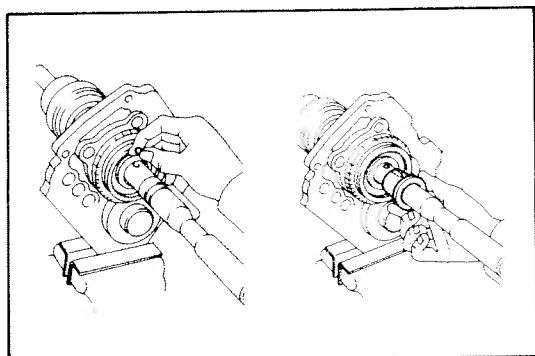
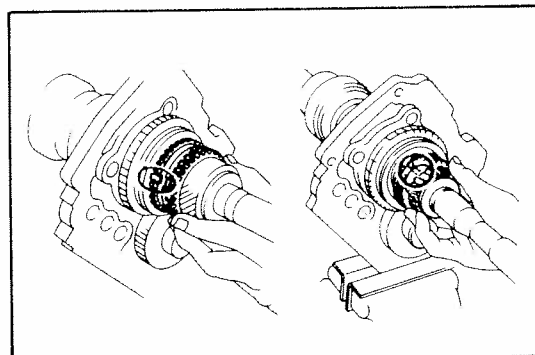
Using a feeler gauge, measure the reverse idler gear thrust clearance.

Standard clearance: 0.15 – 0.25 mm
(0.0059 – 0.0098 in.)

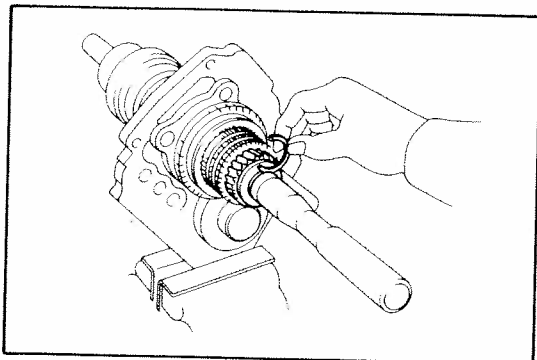
Maximum clearance: 0.30 mm (0.0118 in.)

**16. INSERT CLUTCH HUB NO. 3 INTO REVERSE GEAR**

- Fit the snap ring in the grooves of the hub and the shifting keys.
- Install the shifting key springs under the shifting keys.

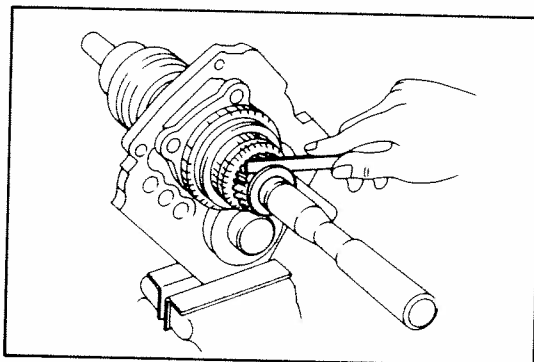
**17. INSTALL HUB SLEEVE NO. 3 ASSEMBLY****18. INSTALL LOCKING BALL****19-1 (W42)****INSTALL INNER RACE****19-2 (W52)****INSTALL FIFTH GEAR ASSEMBLY**

- Apply gear oil to the needle roller bearings.
- Assemble the 5th gear, synchronizer ring, needle roller bearings and inner race.
- Install the 5th gear assembly with the synchronizer ring slots aligned with the shifting keys, and turn the inner race to align it with the locking ball.

**20. INSTALL SNAP RING**

Select a snap ring that will allow minimum axial play and install it on the shaft.

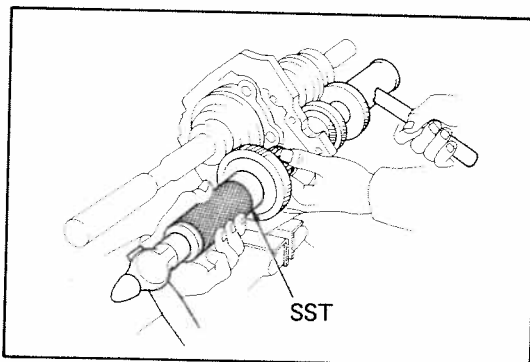
Mark	Thickness	mm (in.)	Mark	Thickness	mm (in.)
1	1.89 – 1.94	(0.0744 – 0.0764)	8	2.31 – 2.36	(0.0909 – 0.0929)
2	1.95 – 2.00	(0.0768 – 0.0787)	9	2.37 – 2.42	(0.0933 – 0.0953)
3	2.01 – 2.06	(0.0791 – 0.0811)	10	2.43 – 2.48	(0.0957 – 0.0976)
4	2.07 – 2.12	(0.0815 – 0.0835)	11	2.49 – 2.54	(0.0980 – 0.1000)
5	2.13 – 2.18	(0.0839 – 0.0858)	12	2.55 – 2.60	(0.1003 – 0.1024)
6	2.19 – 2.24	(0.0862 – 0.0881)	13	2.61 – 2.66	(0.1028 – 0.1047)
7	2.25 – 2.30	(0.0886 – 0.0906)			

**21. (W52)****MEASURE FIFTH GEAR THRUST CLEARANCE**

Using a feeler gauge, measure the 5th gear thrust clearance.

Standard clearance: 0.10 – 0.25 mm
(0.0039 – 0.0098 in.)

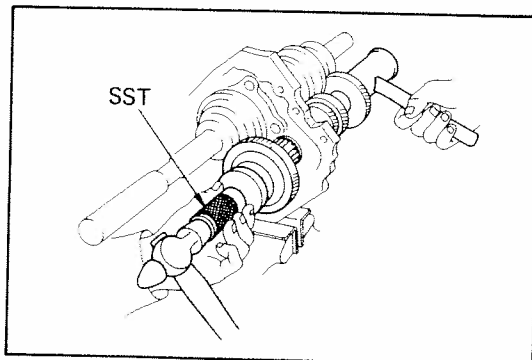
Maximum clearance: 0.30 mm (0.0118 in.)

**22. INSTALL COUNTER REVERSE GEAR****23.-1(W42)****INSTALL SPACER****23.-2(W52)****INSTALL COUNTER FIFTH GEAR**

Using SST, drive in the counter 5th gear.

SST 09612-22010

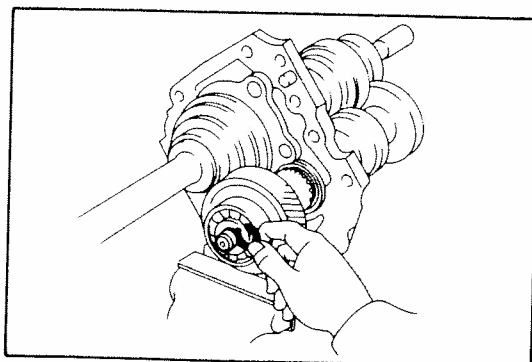
NOTE: When installing the counter 5th gear, support the counter shaft in front with a 3–5 lb hammer or equivalent.

**24. INSTALL COUNTER REAR BEARING**

Using SST, drive in the counter rear bearing.

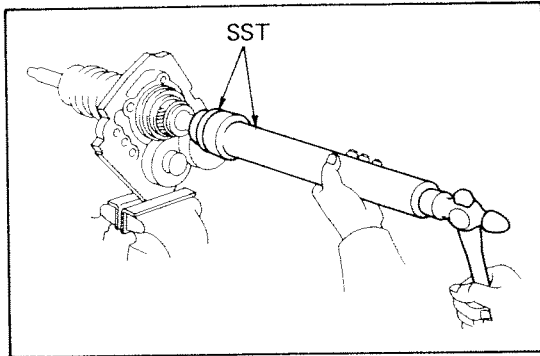
SST 09310-35010

NOTE: When driving in the bearing, support the counter gear in front with a 3–5 lb hammer or equivalent.

**25. INSTALL SNAP RING**

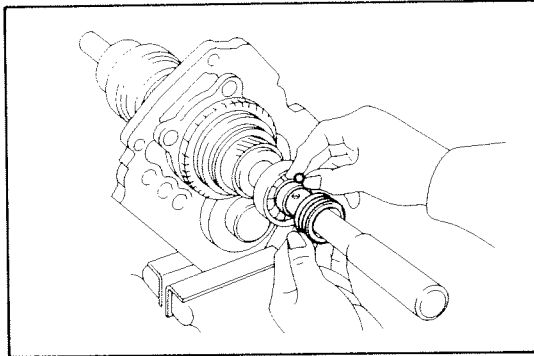
Select a snap ring that will allow minimum axial play and install it on the shaft.

Mark	Thickness	mm (in.)
4	1.40 – 1.45	(0.0551 – 0.0571)
3	1.60 – 1.65	(0.0630 – 0.0650)
2	1.80 – 1.85	(0.0709 – 0.0728)
1	2.00 – 2.05	(0.0787 – 0.0807)

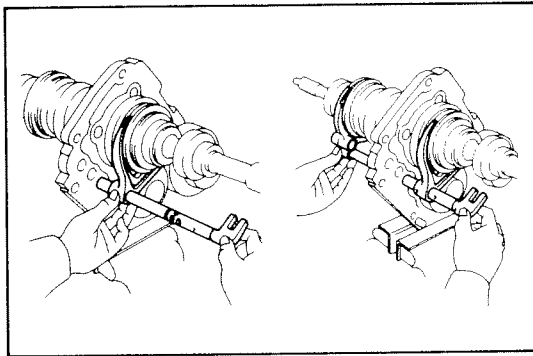
**26. INSTALL OUTPUT SHAFT REAR BEARING**

- (a) Using snap ring pliers, install the snap ring.
- (b) Using SST, drive in the rear bearing.

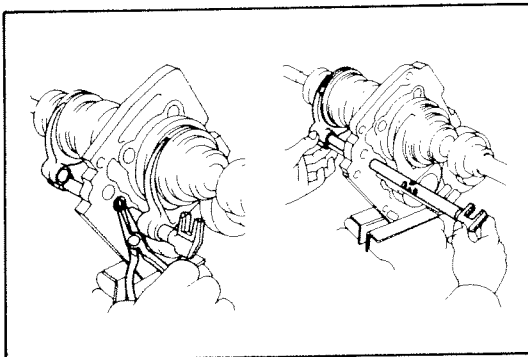
SST 09309-35010 and 09515-20010

**27. INSTALL SPEEDOMETER DRIVE GEAR**

- (a) Install the spacer, locking ball and drive gear.
- (b) Using snap ring pliers, install the snap ring.

**28. INSTALL SHIFT FORK NO. 2, NO. 3 AND FORK SHAFT NO. 3**

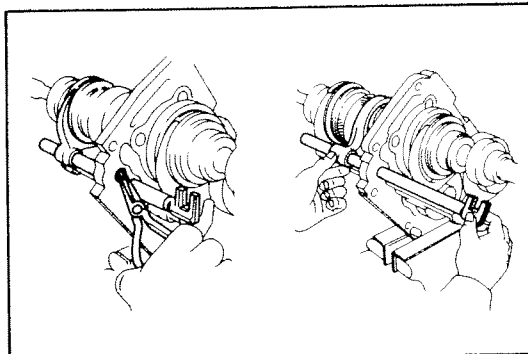
- (a) Place shift fork No. 3 into the groove of hub sleeve No. 3.
- (b) Install fork shaft No. 3 to shift fork No. 3 through the intermediate plate.
- (c) Place shift fork No. 2 into the groove of hub sleeve No. 2.
- (d) Insert fork shaft No. 3 to shift fork No. 2.
- (e) (W42)
Install the E-ring.

**29. INSTALL INTERLOCK PIN**

- (a) Apply MP grease to the interlock pin.
- (b) Install the interlock pin into the intermediate plate hole.

30. INSTALL FORK SHAFT NO. 2

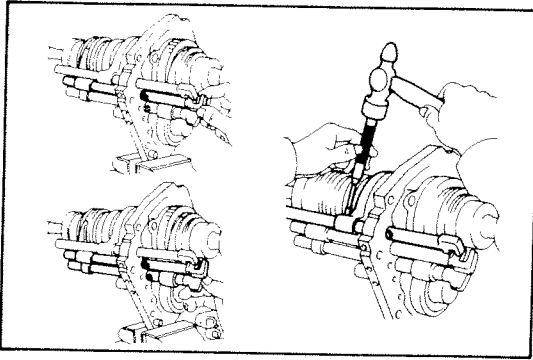
Install fork shaft No. 2 through the intermediate plate and shift fork No. 2.

**31. INSTALL INTERLOCK PIN**

- (a) Apply MP grease to the interlock pin.
- (b) Install the interlock pin into the intermediate plate hole.

32. INSTALL SHIFT FORK NO. 1 AND FORK SHAFT NO. 1

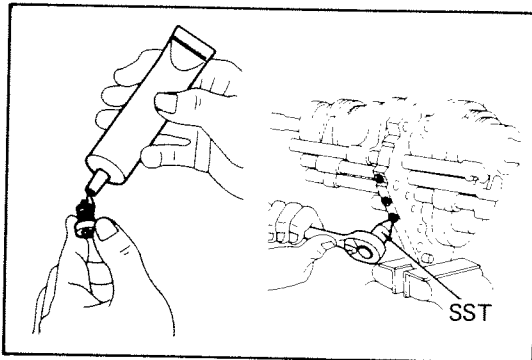
- (a) Place shift fork No. 1 into the groove of hub sleeve No. 1.
- (b) Install fork shaft No. 1 through the intermediate plate and shift fork No. 1.

**33. CHECK INTERLOCK**

- (a) Shift No. 2 fork shaft to the 3rd speed position.
- (b) No. 1 and No. 3 fork shafts should not move.

34. INSTALL SLOTTED SPRING PIN

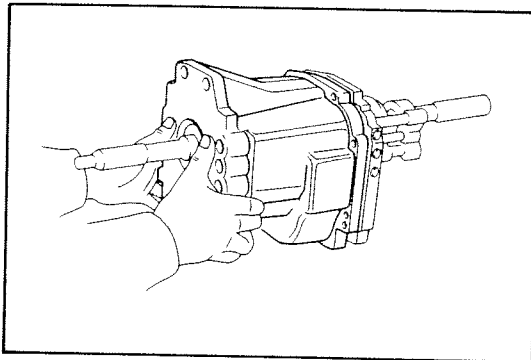
- (a) Align the pin hole in the fork with the hole in the shaft.
- (b) Using a pin punch, drive in the slotted spring pin until it is flush with the fork.

**35. INSTALL LOCKING BALLS, SPRINGS AND PLUGS**

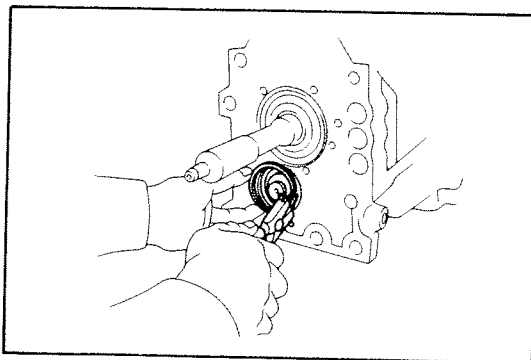
- (a) Install the balls and springs into each hole.
- (b) Apply liquid sealer to the plugs.
- (c) Using SST, tighten three plugs.

SST 09313-30021

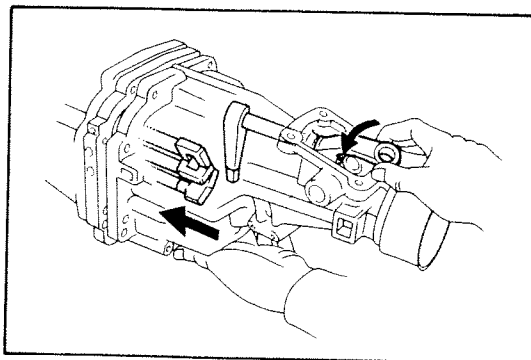
Torque: 190 – 310 kg-cm (14 – 22 ft-lb)

**36. DISMOUNT INTERMEDIATE PLATE FROM VISE****37. INSTALL TRANSMISSION CASE TO INTERMEDIATE PLATE**

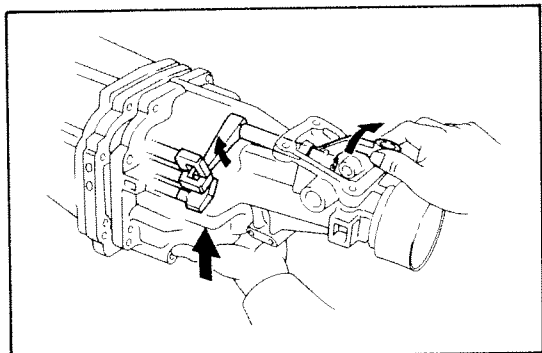
- (a) Align each bearing outer race and each shift fork shaft end with the case installation holes.
- (b) Using a plastic hammer, tap on the case to install it.

**38. INSTALL TWO BEARING SNAP RINGS**

Using snap ring pliers, install the snap rings.

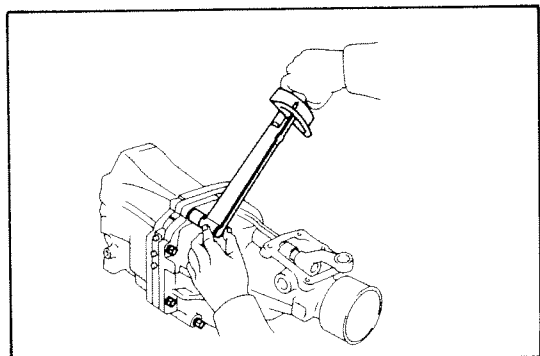
**39. INSTALL EXTENSION HOUSING**

- (a) Place the gasket in position on the intermediate plate.
- (b) Push the shift lever housing forward and, with it turned counterclockwise, push in the extension housing so it is positioned 20 – 30 mm (0.79 – 1.18 in.) from the intermediate plate.



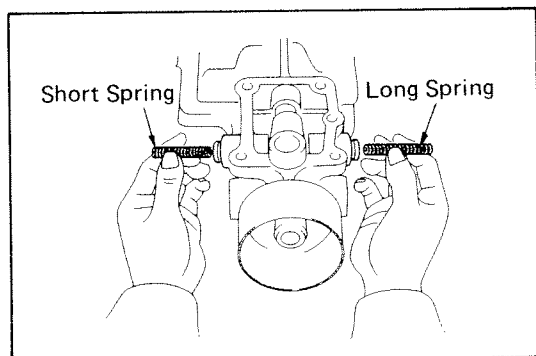
- (c) Slightly revolve the extension housing clockwise and connect the select lever to the shift fork shaft.

NOTE: If necessary, tap on the extension housing with a plastic hammer to bring it flush against the intermediate plate.



- (d) Install and torque the housing bolts.

Torque: 400 – 550 kg-cm (29 – 40 ft-lb)



40. INSTALL RESTRICT PINS

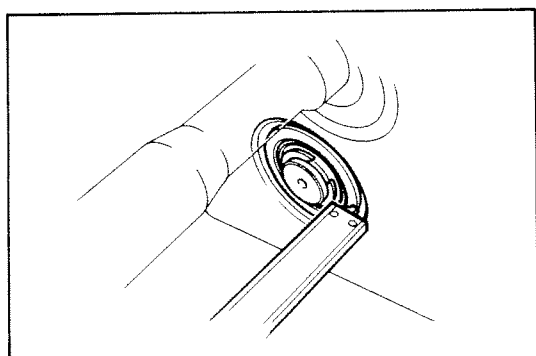
- (a) Install the restrict pins and springs with the short spring on the left side.

- (b) Install the plugs with washers and torque them.

Torque: 370 – 450 kg-cm (27 – 33 ft-lb)

41. INSTALL OIL BAFFLE AND SHIFT LEVER RETAINER

Torque: 150 – 220 kg-cm (11 – 15 ft-lb)



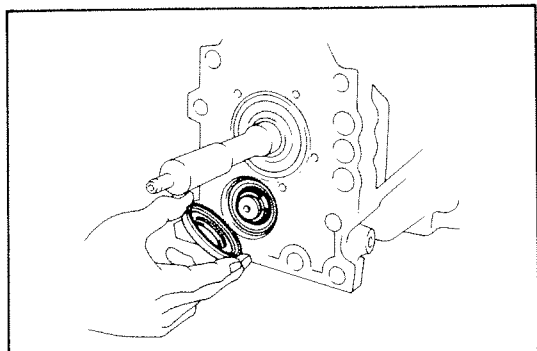
42. MEASURE COUNTERSHAFT CLEARANCE

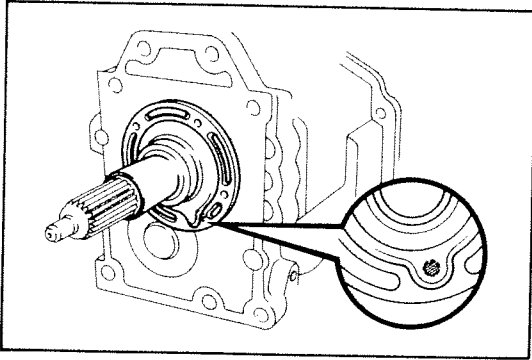
- (a) Push the countershaft firmly toward the rear.

- (b) Using calipers, measure the space between the bearing and the transmission case surface.

- (c) Select the correct spacer and install it and cover.

Clearance mm (in.)	Spacer sizes	
	Mark	Thickness mm (in.)
2.87 – 2.99 (0.1130 – 0.1177)	•	1.95 – 2.05 (0.0768 – 0.0807)
3.00 – 3.09 (0.1181 – 0.1217)	••	2.10 – 2.20 (0.0827 – 0.0866)
3.10 – 3.19 (0.1220 – 0.1260)	•••	2.25 – 2.35 (0.0886 – 0.0925)
3.20 – 3.32 (0.1260 – 0.1307)	••••	2.40 – 2.50 (0.0945 – 0.0984)



**43. INSTALL FRONT BEARING RETAINER**

(a) Align the oil return hole with the groove and install the retainer with a gasket.

(b) Install and torque the bolts.

Torque: 100 – 140 kg-cm (7 – 10 ft-lb)

44. INSTALL CLUTCH HOUSING

Torque:

45. INSTALL SPEEDOMETER DRIVEN GEAR**46. INSTALL BACK-UP LIGHT SWITCH****47. INSTALL CLUTCH RELEASE FORK AND BEARING**

(a) Apply molybdenum disulphide lithium base grease to the following parts:

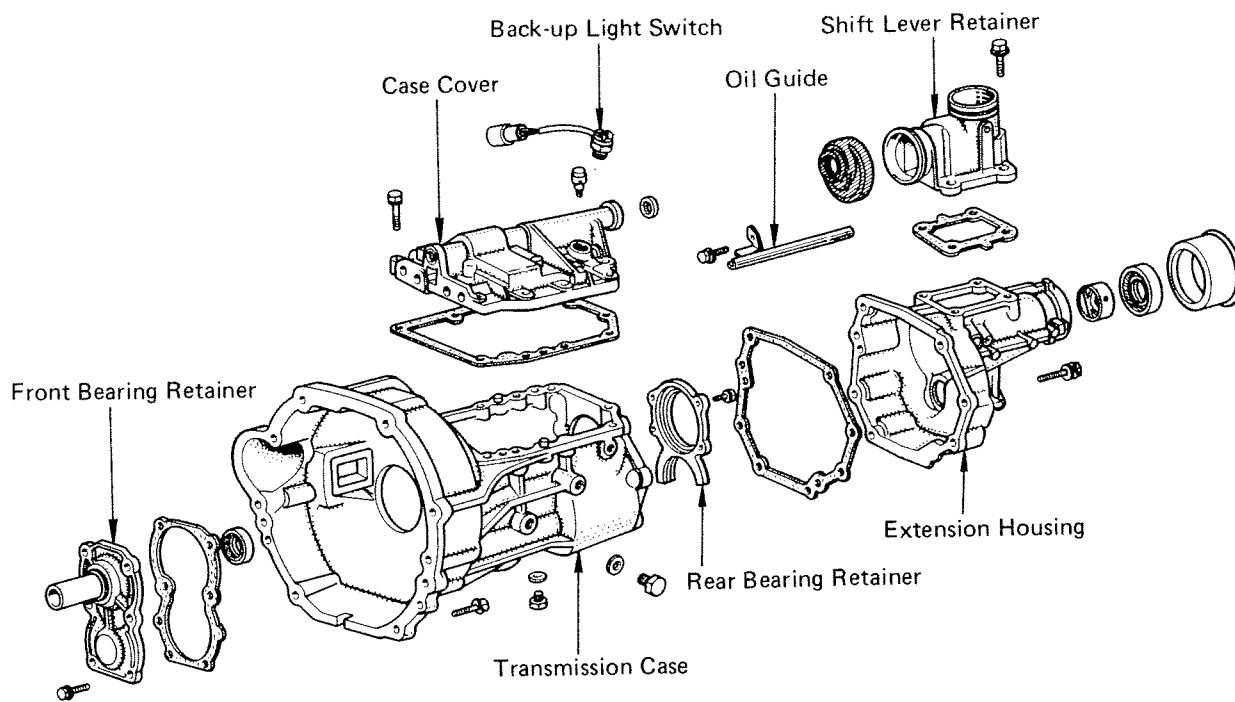
- Release bearing hub inside groove
- Input shaft spline
- Release fork contact surface

(b) Insert the fork into the boot and install it to the clutch housing.

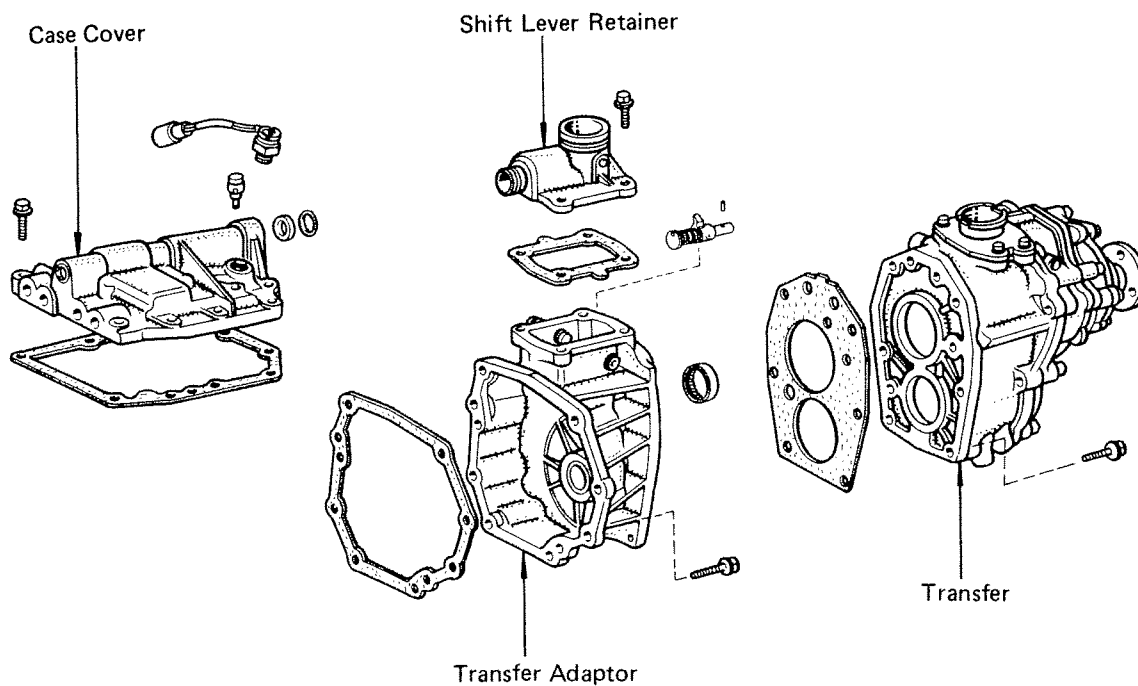
(c) Install the bearing hub with two clips.

L45 AND L52 TRANSMISSIONS COMPONENTS

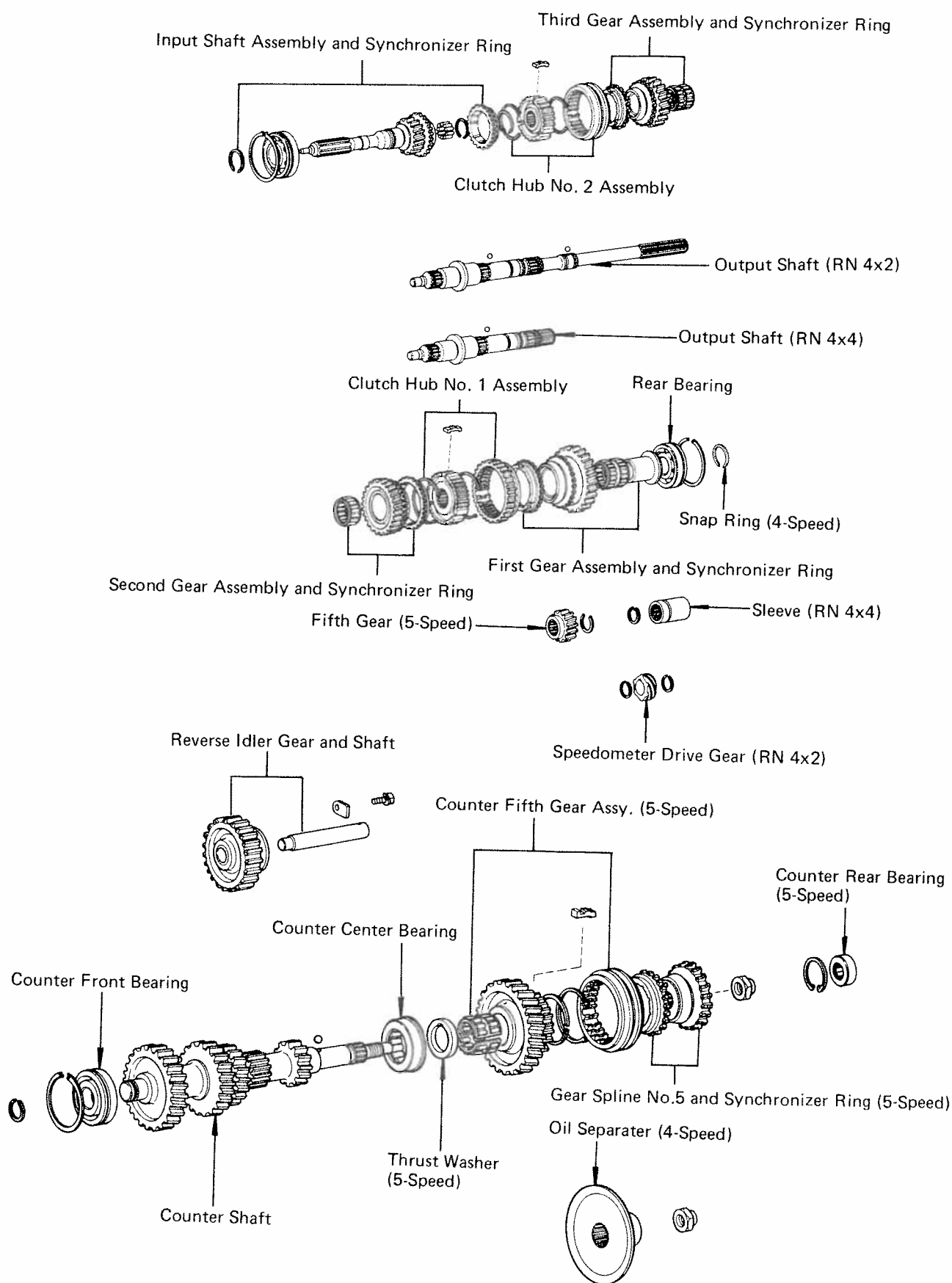
[RN 4x2]



[RN 4x4]

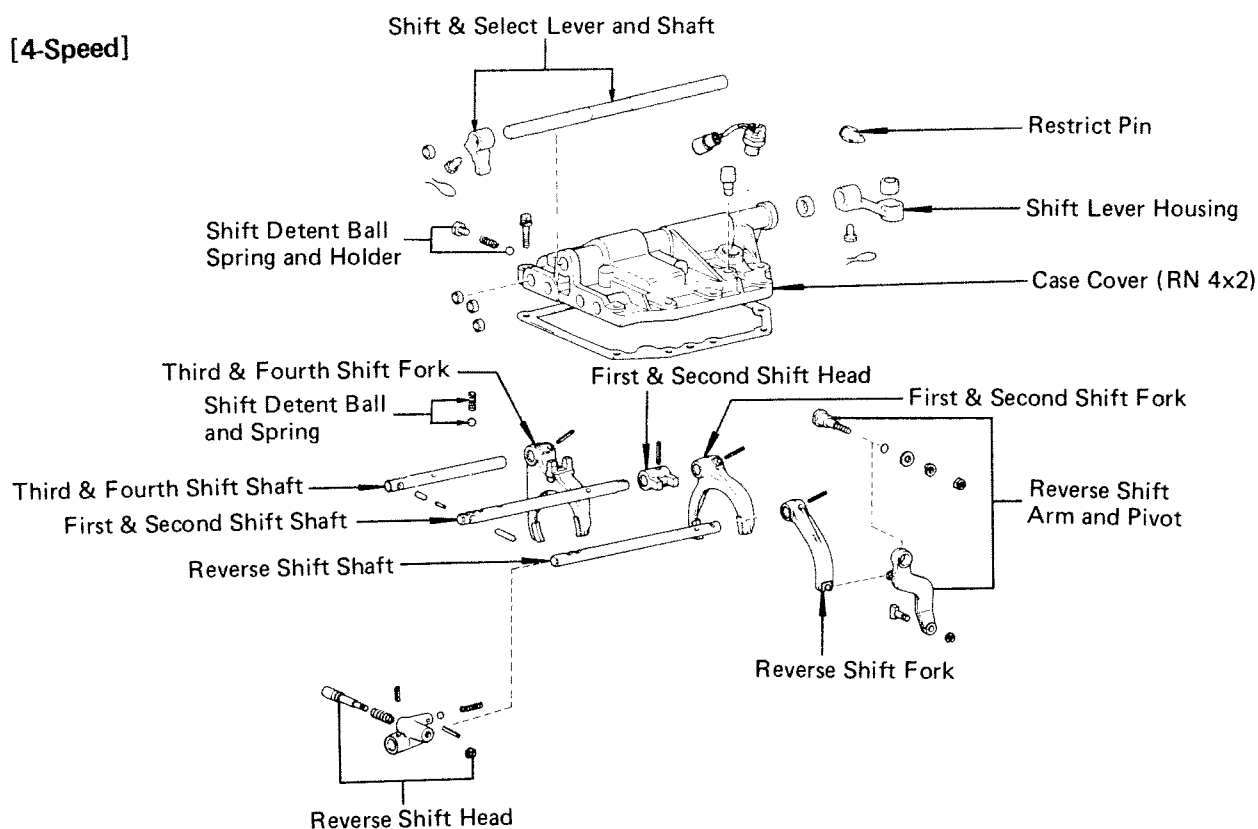


COMPONENTS (Cont'd)

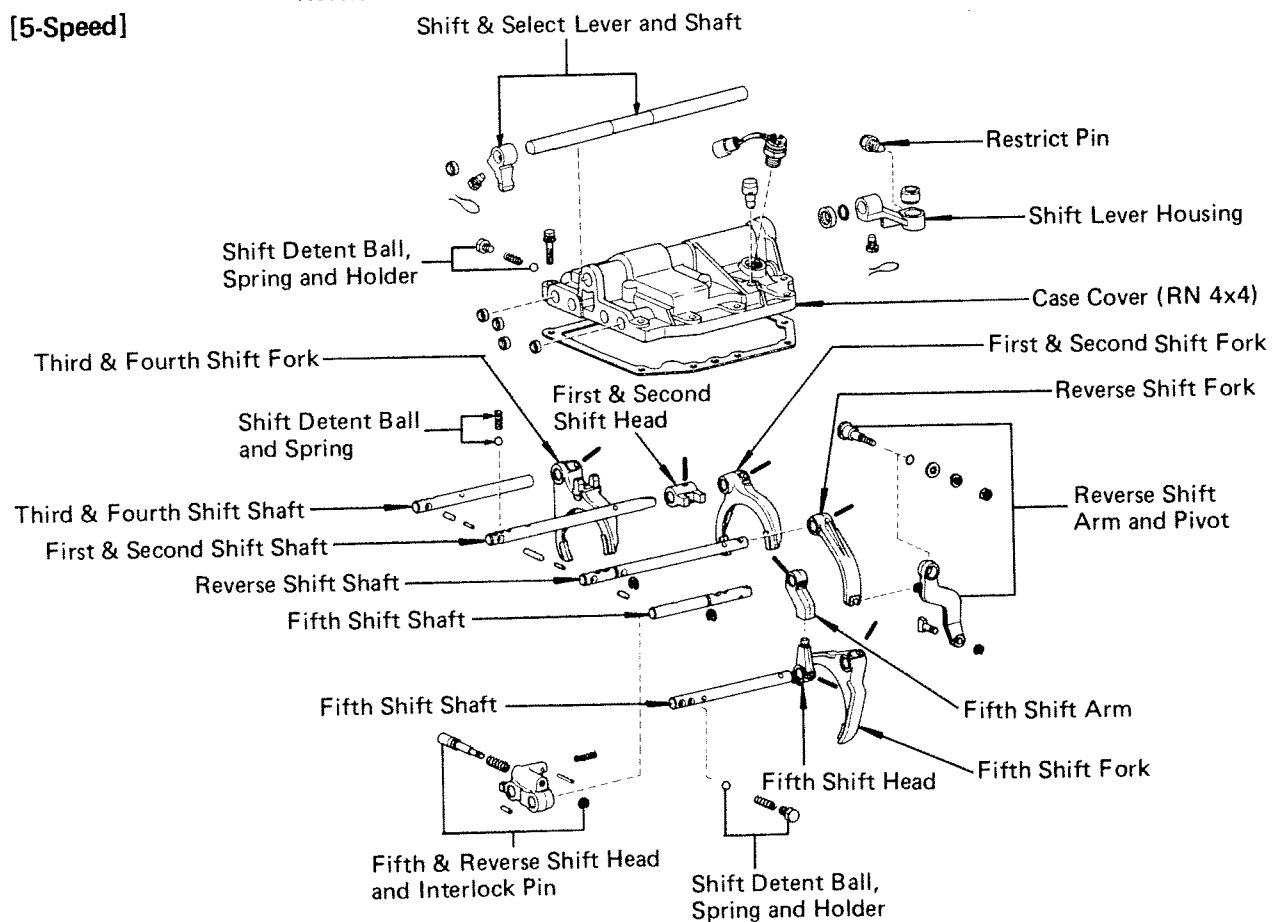


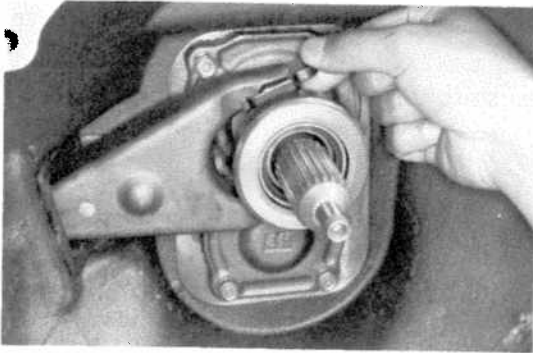
COMPONENTS (Cont'd)

[4-Speed]



[5-Speed]





DISASSEMBLY OF TRANSMISSION

(See page 9-56, 57, 58)

1. REMOVE CLUTCH RELEASE BEARING AND FORK

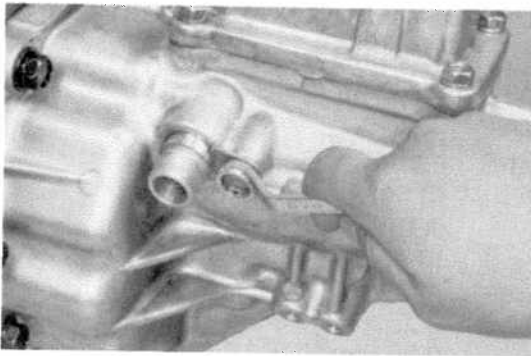
- (a) Remove the two clips and release bearing from the fork.
- (b) Pull the fork and remove it from the pivot.



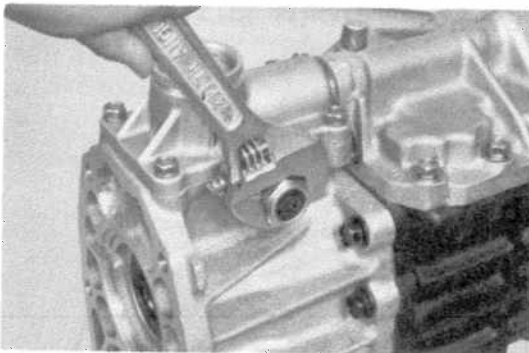
2. REMOVE BACK-UP LIGHT SWITCH

Using a back-up light switch tool*, remove the back-up light switch from the case cover.

*SST 09817-16010

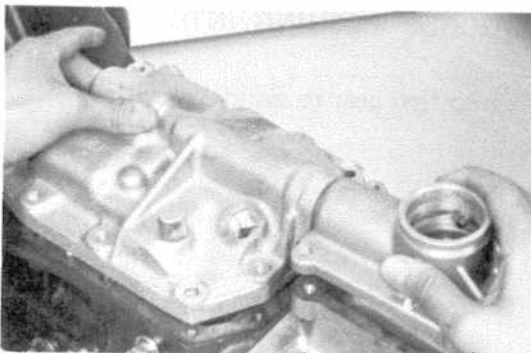


3. REMOVE SPEEDOMETER DRIVEN GEAR



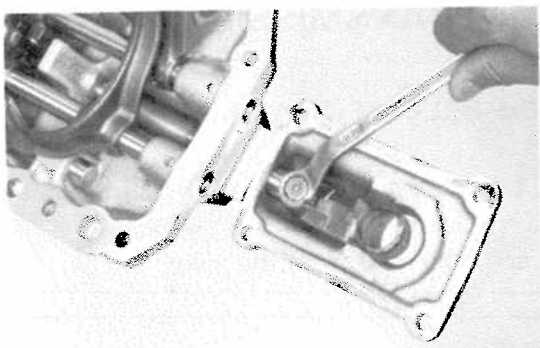
4. REMOVE RESTRICT PIN

Remove the restrict pin from the adaptor.

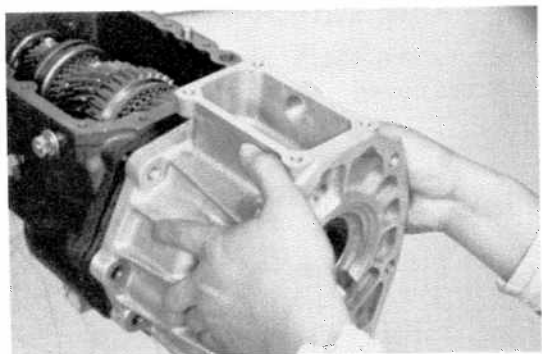


5. REMOVE SHIFT LEVER RETAINER AND CASE COVER

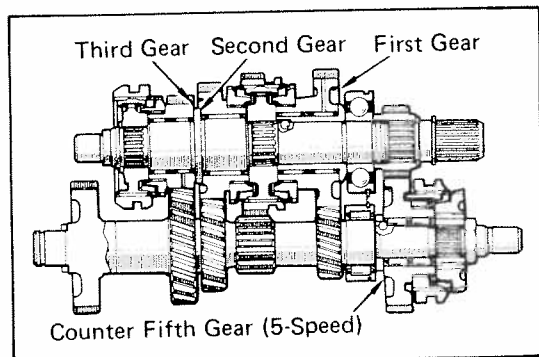
- (a) Remove the transmission case cover and shift lever retainer mounting bolts.
- (b) Remove the case cover together with the shift lever retainer.



- (c) Remove the lock wire and bolt from the shift lever housing.
- (d) Remove the shift lever housing and shift lever retainer.



6. REMOVE TRANSFER ADAPTOR



7. MEASURE THRUST CLEARANCE FOR EACH GEAR

Using a feeler gauge, measure the thrust clearance for each gear, and record the result for later reference.

Standard clearance:

1st, 2nd and 3rd	0.10 – 0.25 mm (0.0039 – 0.0098 in.)
Counter 5th	0.10 – 0.30 mm (0.0039 – 0.0118 in.)

Maximum clearance:

1st, 2nd and 3rd	0.25 mm (0.0098 in.)
Counter 5th	0.30 mm (0.0118 in.)

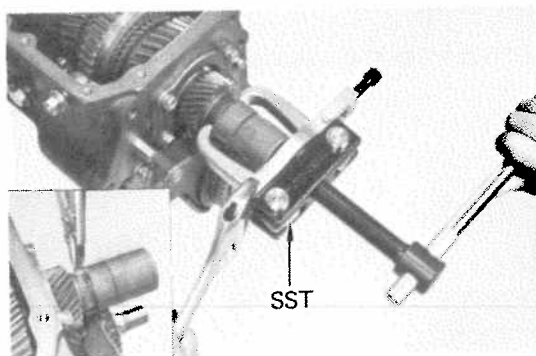
8. REMOVE SLEEVE FROM OUTPUT SHAFT

- (a) Using snap ring pliers, remove the snap ring from the groove.

- (b) Using a universal puller*, remove the sleeve.

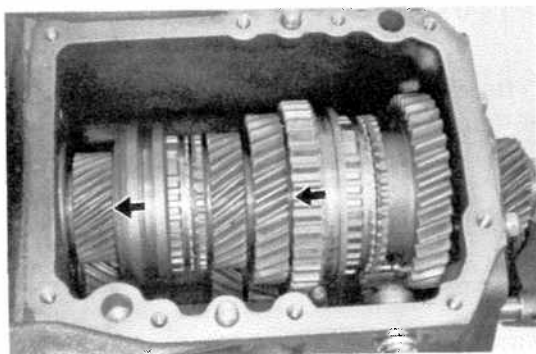
*SST 09950-20014

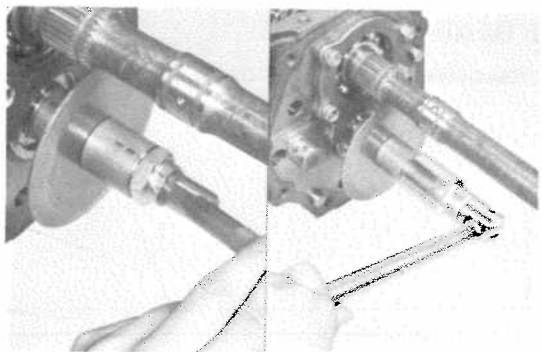
- (c) Remove the snap ring stated in (a).



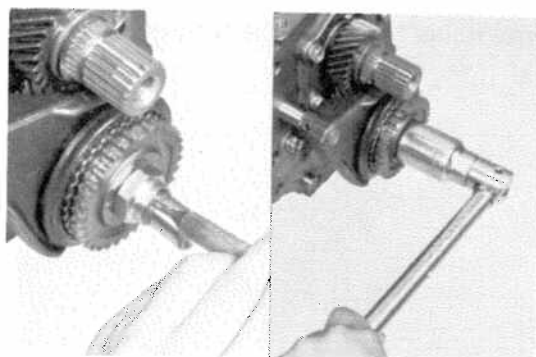
9. ENGAGE GEAR DOUBLE MESHING INTO SECOND AND THIRD

NOTE: Do not shift into first gear to avoid overshifting.

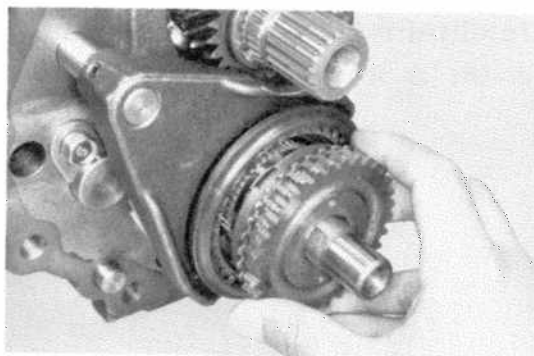
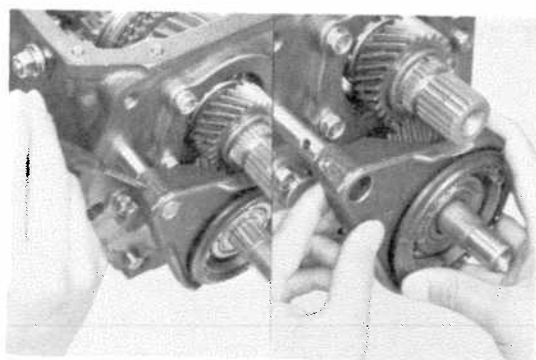


**10. REMOVE COUNTERSHAFT LOCK NUT AND OIL SEPARATOR (4-Speed)**

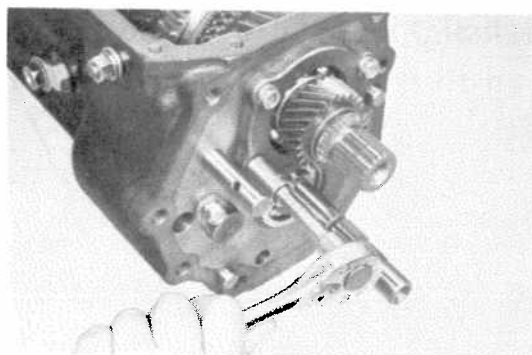
- (a) Using a hammer and chisel, loosen the staked part of the nut.
 - (b) Using a socket wrench*, remove the lock nut.
- *SST 09326-22011 or Commercial socket
- (c) Remove the oil separator from the countershaft.

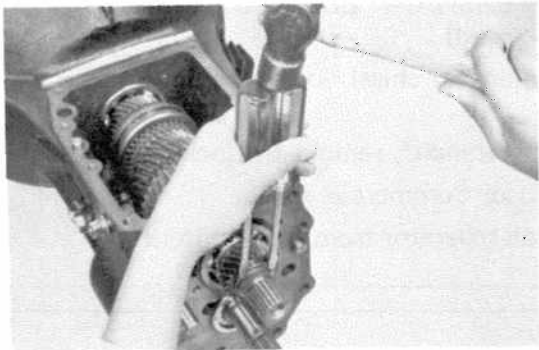
**11. REMOVE COUNTERSHAFT LOCK NUT (5-Speed)**

- (a) Using a hammer and chisel, loosen the staked part of the nut.
 - (b) Using a socket wrench*, remove the lock nut.
- *SST 09326-22011 or Commercial socket

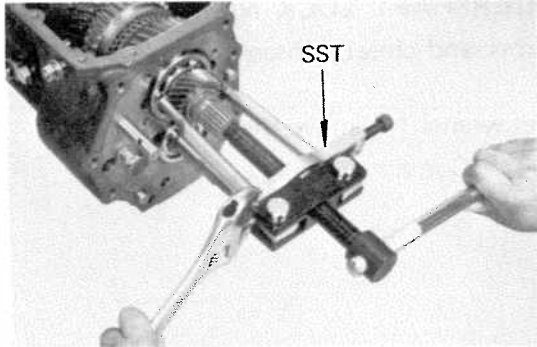
**12. REMOVE GEAR SPLINE NO.5 AND SYNCHRONIZER RING FROM COUNTERSHAFT (5-Speed)****13. REMOVE COUNTERSHAFT FIFTH GEAR ASSEMBLY AND SHIFT FORK (5-Speed)**

- (a) Using a pin punch, drive out the slotted spring pin from the fork.
- (b) Remove the shift fork, fifth gear, needle roller bearing and inner race together.
- (c) Remove the lock ball from the countershaft.

**14. REMOVE REAR BEARING RETAINER**

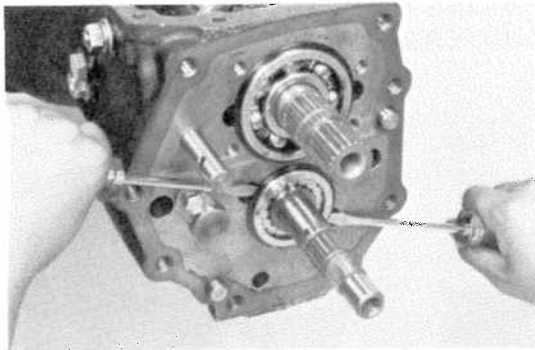
**15. REMOVE FIFTH GEAR (5-Speed)**

- (a) Using two screwdrivers as shown, drive out the snap ring.

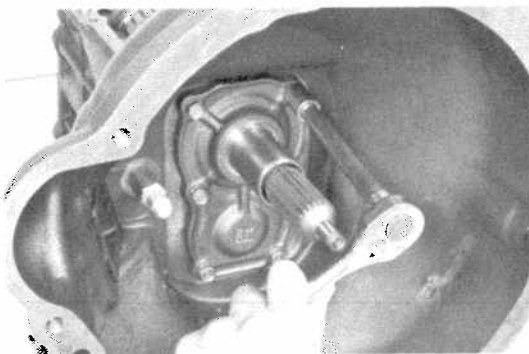
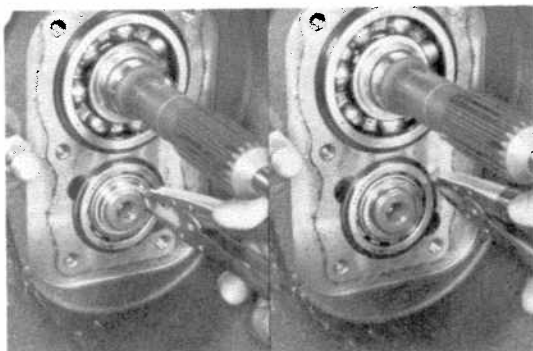


- (b) Using a universal puller*, remove the fifth gear.

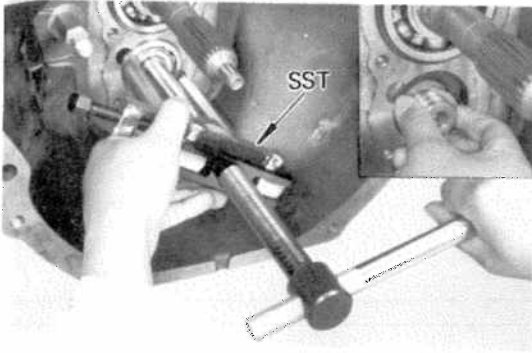
*SST 09950-20014

**16. REMOVE COUNTERSHAFT CENTER BEARING**

Using two screwdrivers as shown, pry out the center bearing.

**17. REMOVE FRONT BEARING RETAINER****18. REMOVE COUNTERSHAFT FRONT BEARING**

- (a) Using snap ring pliers, remove the two snap rings.

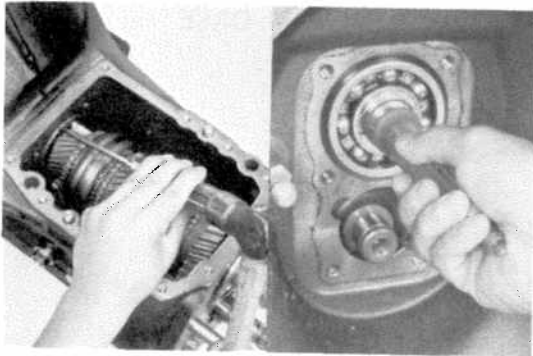


- (b) Using a universal puller*, remove the countershaft front bearing.

*SST 09950-20014

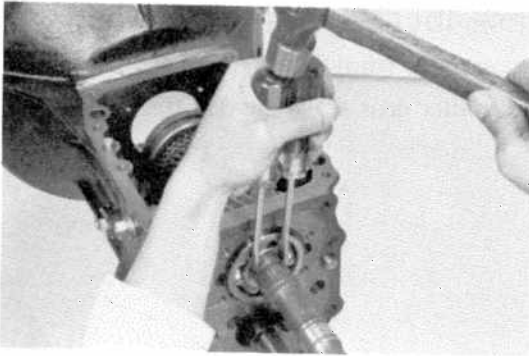
NOTE: The bearing spacer may be stuck to the countershaft, so remove it after removing the bearing.

Lay the countershaft on the bottom of the case.



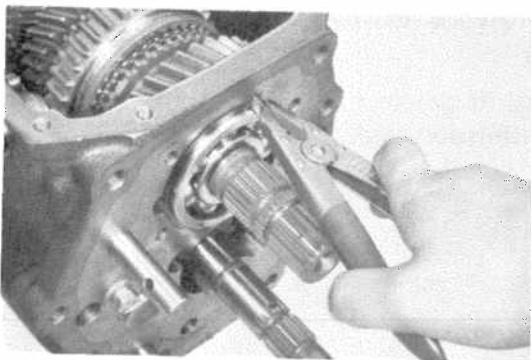
19. REMOVE INPUT SHAFT

Using a screwdriver and hammer, tap the bearing outer race and remove the input shaft with the synchronizer ring.

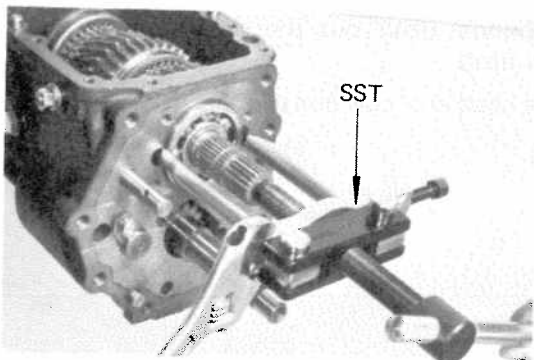


20. REMOVE OUTPUT SHAFT REAR BEARING

- (a) Using snap ring pliers, remove the small snap ring. (4-Speed)

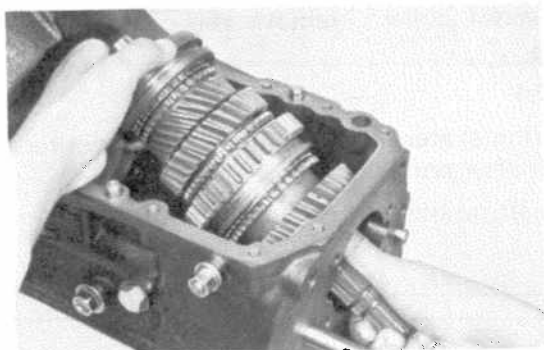


- (b) Using snap ring pliers, remove the large snap ring.

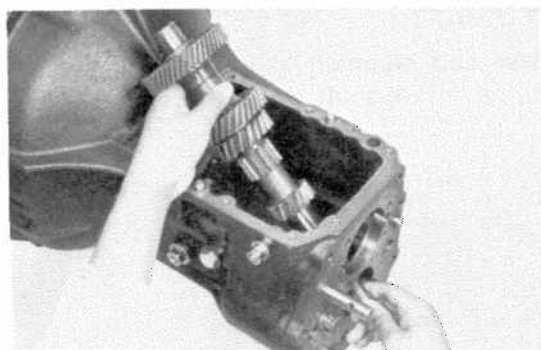
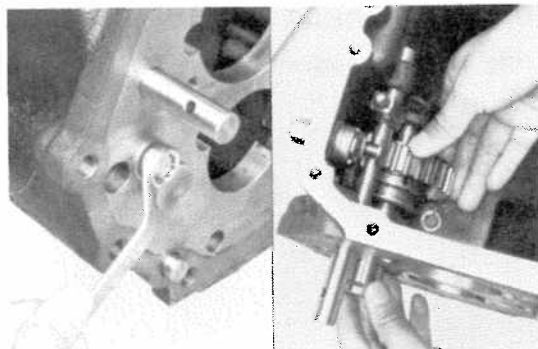


- (c) Using a universal puller*, remove the output shaft rear bearing.

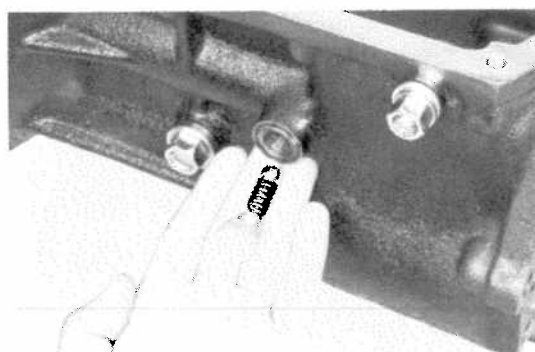
*SST 09950-20014

**21. REMOVE OUTPUT SHAFT WITH GEARS**

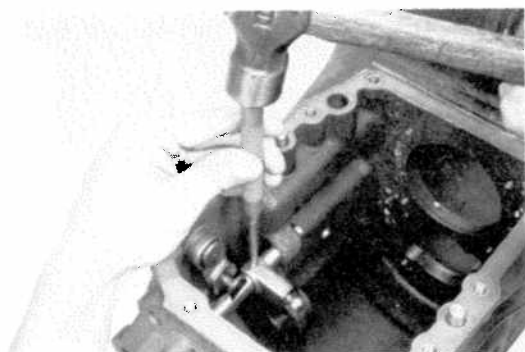
While holding the first gear and bearing inner race, remove the output shaft with the gears from the case.

**22. REMOVE COUNTERSHAFT FROM CASE****23. REMOVE REVERSE IDLER GEAR AND SHAFT**

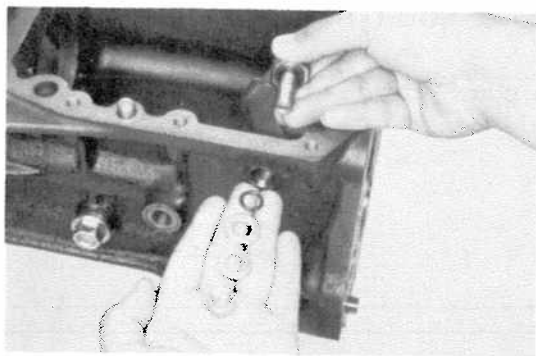
- (a) Remove the lock plate from the shaft.
- (b) Hold the reverse idler gear and slide out the shaft.

**24. REMOVE FIFTH GEAR SHIFT HEAD AND FORK SHAFT (5-Speed)**

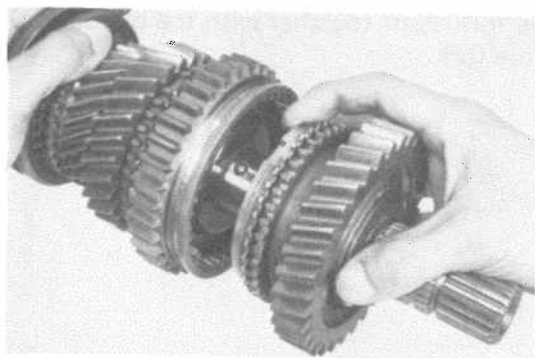
- (a) Remove the shift detent ball holder, spring and ball from the transmission case.



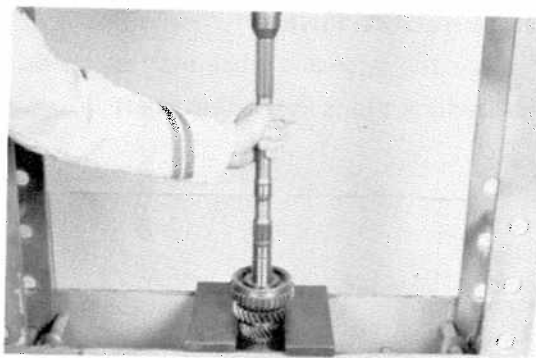
- (b) Using a pin punch, drive out the slotted spring pin from the shift head.
- (c) Hold the shift head and pull out the shaft.

**25. REMOVE REVERSE SHIFT ARM**

- (a) Remove the reverse shift arm pivot lock nut, spring washer, plate washer and O-ring.
- (b) Remove the pivot and shift arm from the case.

**26. REMOVE FIRST GEAR ASSEMBLY AND SYNCHRONIZER RING**

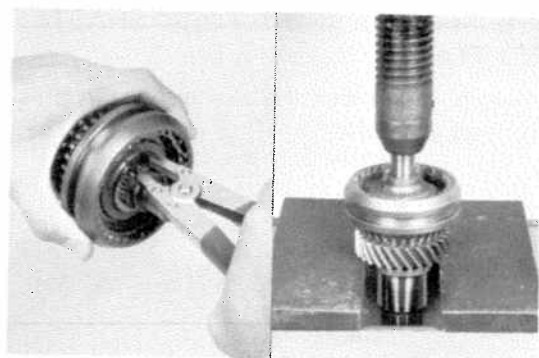
- (a) Pull out the first gear together with the needle roller bearings, inner race and synchronizer ring.
- (b) Remove the lock ball from the output shaft.

**27. REMOVE CLUTCH HUB No. 1 ASSEMBLY, SYNCHRONIZER RING AND SECOND GEAR**

- (a) Support the second gear and press out the clutch hub No. 1 assembly, synchronizer ring and second gear with a press.

NOTE: Support the shaft by hand to prevent it from dropping down when the splines clear the hub.

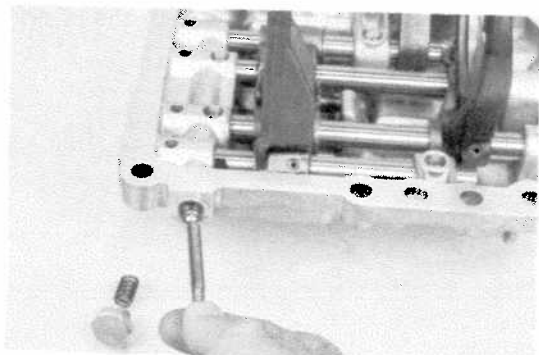
- (b) Remove the needle roller bearing from the output shaft.

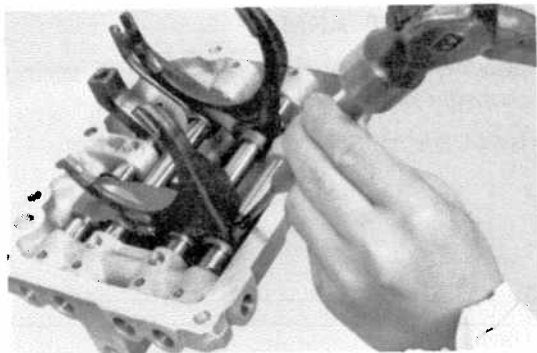
**28. REMOVE CLUTCH HUB NO. 2 ASSEMBLY, SYNCHRONIZER RING AND THIRD GEAR**

- (a) Using snap ring pliers, remove the snap ring.
- (b) Support the third gear and press out the clutch hub No. 2 assembly, synchronizer ring and third gear with a press.

NOTE: Support the shaft by hand so as to prevent it from dropping down when splines clear the hub.

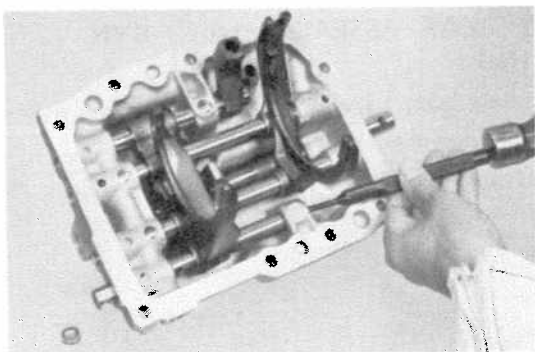
- (c) Remove the needle roller bearings from the output shaft.

**29. REMOVE SHIFT DETENT BALL HOLDER, SPRING AND BALL**

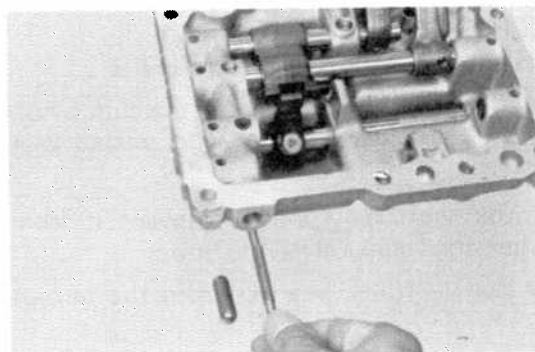


30. REMOVE THIRD & FOURTH SHIFT FORK SHAFT AND FORK

- (a) Using a pin punch, drive out the slotted spring pin from the fork.



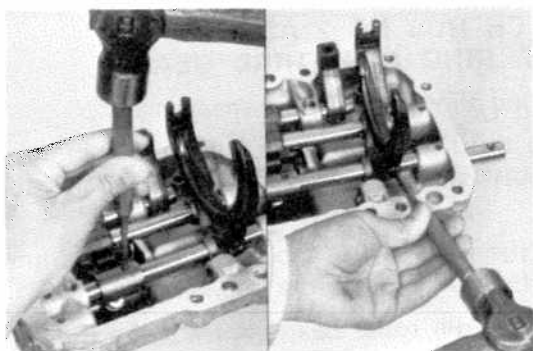
- (b) Drive out the fork shaft together with the blind plug, and remove the fork.



31. REMOVE TWO INTERLOCK PINS

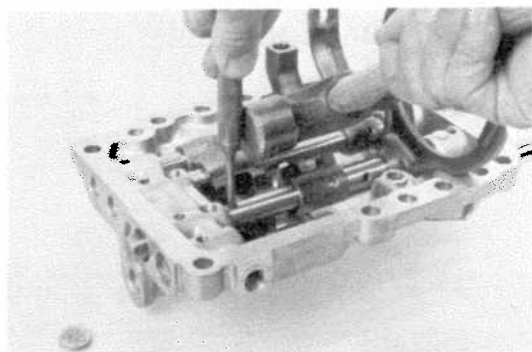
Using a magnet, remove the large and small interlock pins.

NOTE: The small interlock pin is in the fork shaft.

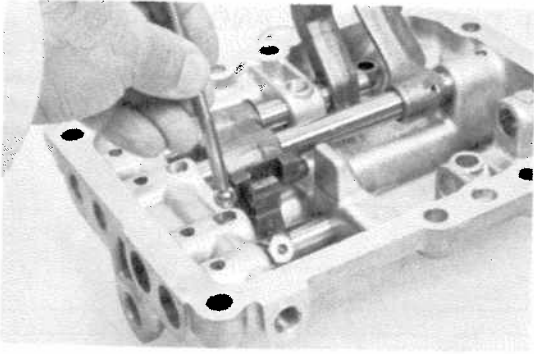


32. REMOVE FIRST & SECOND SHIFT FORK SHAFT, SHIFT HEAD AND FORK

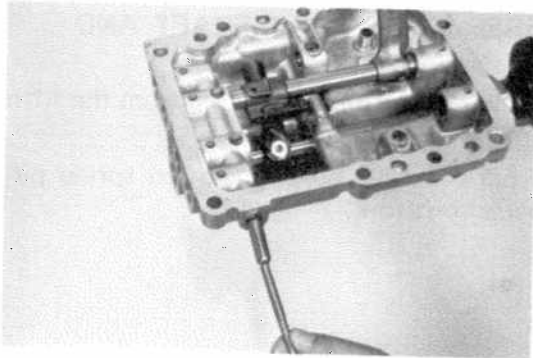
- (a) Using a pin punch, drive out the slotted spring pins from the shift head and fork.



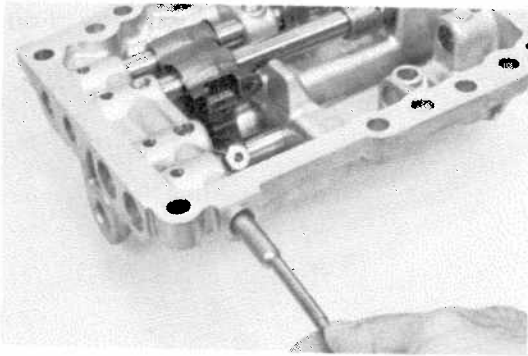
- (b) Drive out the shift fork shaft together with the blind plug and remove the shift head and fork.

**33. REMOVE SHIFT DETENT BALL AND SPRING**

Using a magnet, remove the ball and spring from the hole.

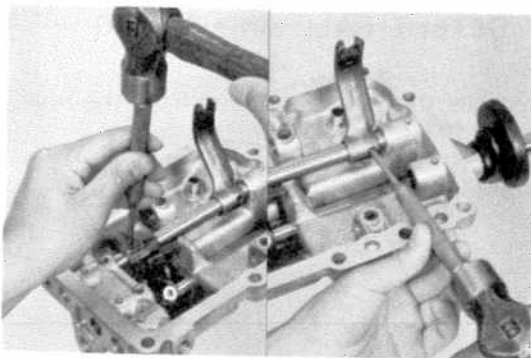
**34. REMOVE INTERLOCK PIN (4-Speed)**

Using a magnet, remove the interlock pin.

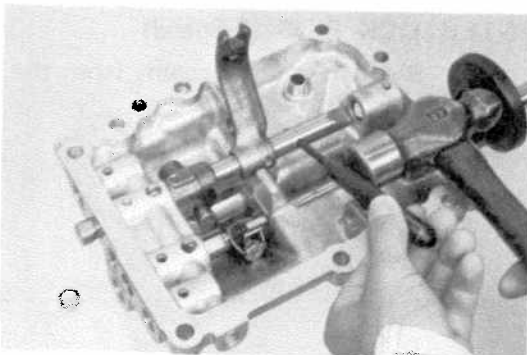
**35. REMOVE TWO INTERLOCK PINS (5-Speed)**

Using a magnet, remove the large and small interlock pins.

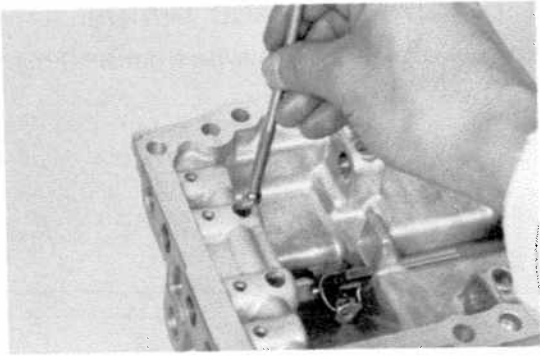
NOTE: The small interlock pin is in the fork shaft.

**36. REMOVE REVERSE SHIFT FORK SHAFT, FORK AND HEAD (4-Speed)**

(a) Using a pin punch, drive out the slotted spring pins from the reverse shift fork and head.

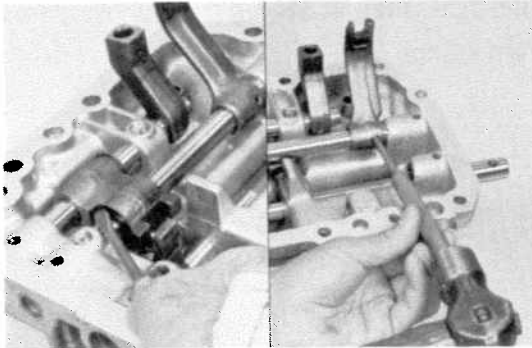


(b) Drive out the shift fork shaft together with the blind plug and remove the reverse shift fork and head.



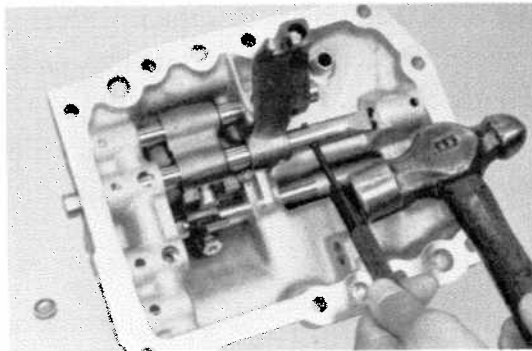
37. REMOVE SHIFT DETENT BALL AND SPRING (4-Speed)

Using a magnet, remove the ball and spring.

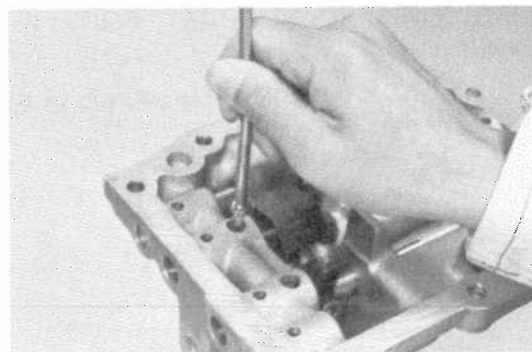


38. REMOVE REVERSE SHIFT FORK SHAFT AND FORK (5-Speed)

- (a) Using a screwdriver, pry out the E-ring from the fifth & reverse shift head.
- (b) Using a pin punch, drive out the slotted spring pin from the reverse shift fork.

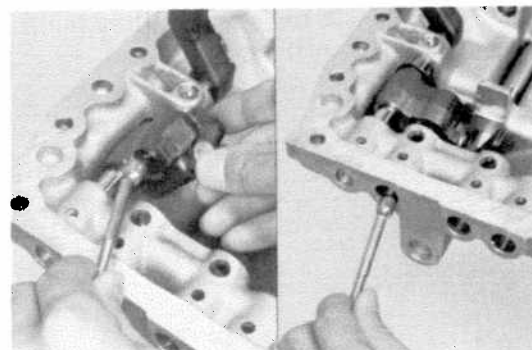


- (c) Drive out the shift fork shaft together with the blind plug and remove the reverse shift fork.



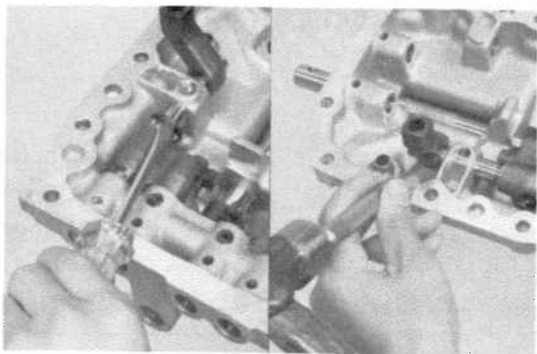
39. REMOVE SHIFT DETENT BALL AND SPRING (5-Speed)

Using a magnet, remove the ball and spring from the hole.



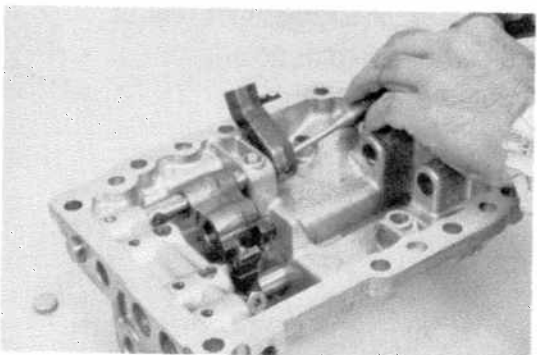
40. REMOVE TWO INTERLOCK PINS (5-Speed)

Using a magnet, remove the two interlock pins from the fifth & reverse shift head and case cover.

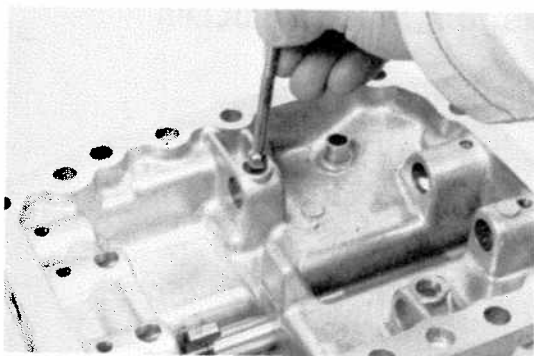


41. REMOVE FIFTH SHIFT FORK SHAFT, FIFTH & REVERSE SHIFT HEAD AND FIFTH SHIFT ARM (5-Speed)

- (a) Using a screwdriver, pry out the E-ring from the fifth and reverse shift head.
- (b) Using a pin punch, drive out the slotted spring pin from the fifth shift arm.

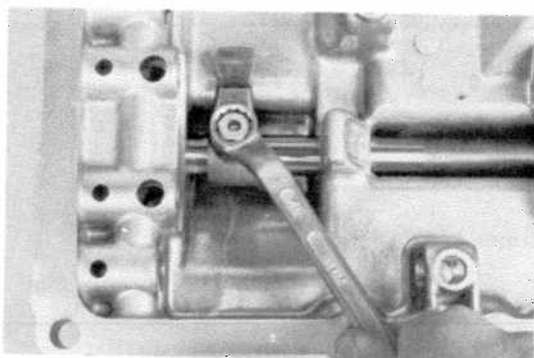


- (c) Drive out the shift fork shaft together with the blind plug and remove the shift head and shift arm.



42. REMOVE SHIFT DETENT BALL AND SPRING (5-Speed)

Using a magnet, remove the ball and spring from the hole.



43. REMOVE SHIFT & SELECT LEVER AND SHAFT

- (a) Remove the lock wire and bolt from the lever.
- (b) Pull out the shaft from the case cover.



INSPECTION OF TRANSMISSION COMPONENTS

1. INSPECT OUTPUT SHAFT

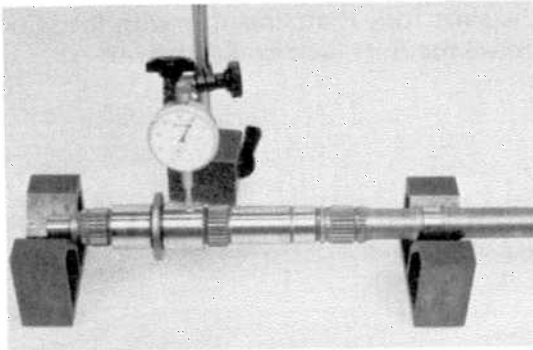
- (a) Inspect the bearing contact surface for wear or damage.
- (b) Using calipers, measure the output shaft flange thickness.

Minimum thickness: 4.90 mm (0.1929 in.)

- (c) Using a dial indicator, check the shaft runout.

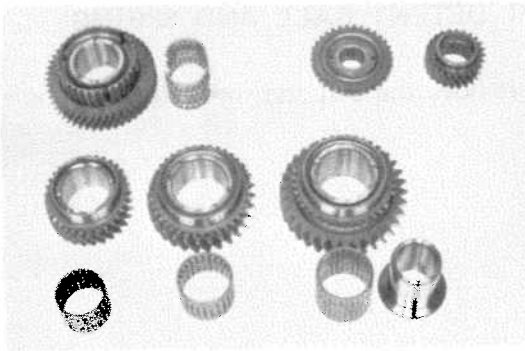
Maximum runout: 0.05 mm (0.0020 in.)

If a problem is found, replace the shaft.



2. INSPECT GEARS AND NEEDLE ROLLER BEARINGS

Check for wear or damage.

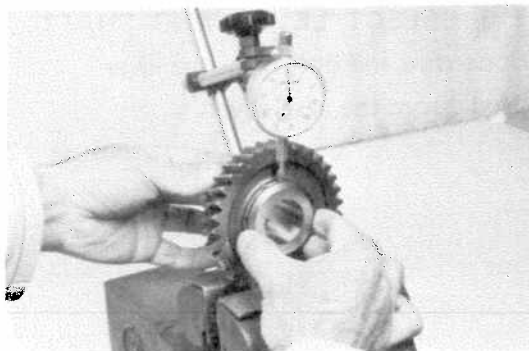


3. CHECK OIL CLEARANCE OF FIRST GEAR

Using a dial indicator, measure the oil clearance between the gear and inner race with the needle roller bearing installed.

**Standard clearance: 0.009 – 0.032 mm
(0.0004 – 0.0013 in.)**

Maximum clearance: 0.032 mm (0.0013 in.)



4. CHECK OIL CLEARANCE OF SECOND, THIRD AND COUNTERSHAFT FIFTH GEAR

Using a dial indicator, measure the oil clearance between the gear and shaft with the needle roller bearing installed.

Standard clearance:

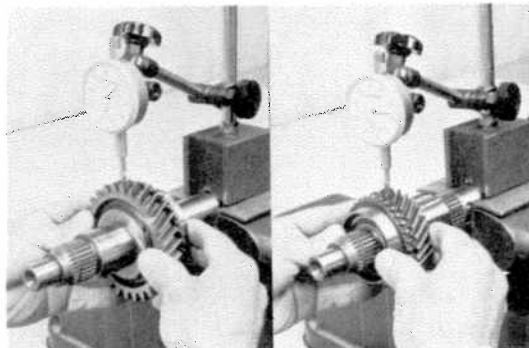
**Second and third gears 0.0090 – 0.0325 mm
(0.0004 – 0.0013 in.)**

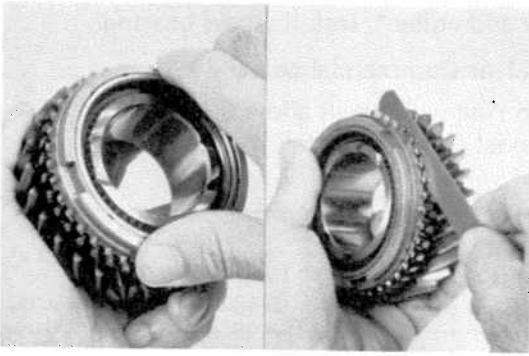
**Countershaft fifth gear 0.009 – 0.032 mm
(0.0004 – 0.0013 in.)**

Maximum clearance:

Second and third gears 0.0325 mm (0.0013 in.)

Countershaft fifth gear 0.032 mm (0.0013 in.)

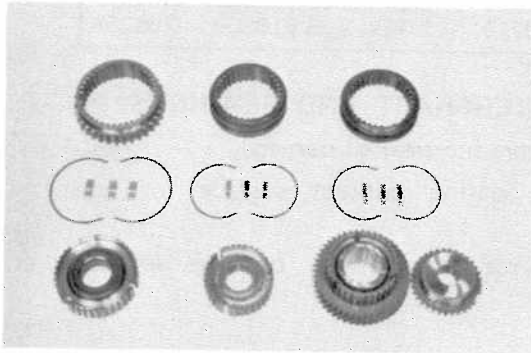




5. INSPECT SYNCHRONIZER RINGS

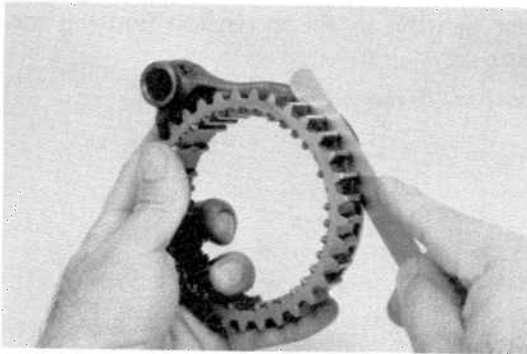
- (a) Check the synchronizer rings for wear or damage.
- (b) Turn the ring and push it in to check the braking action.
- (c) Measure the clearance between the synchronizer ring back and the gear spline end.

Minimum clearance: 0.8 mm (0.031 in.)



6. INSPECT CLUTCH HUBS, SLEEVES, KEYS AND KEY SPRINGS

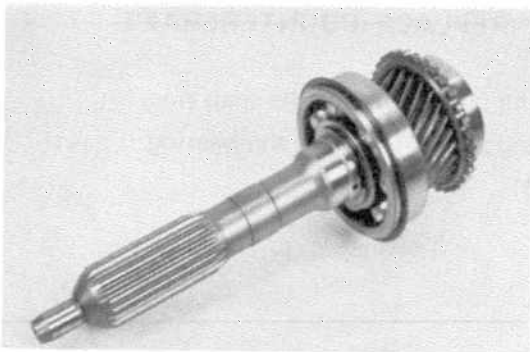
- (a) Check parts for wear or damage.
- (b) Check the rounded part of the keys for wear or damage.



7. INSPECT SHIFT FORK AND HUB SLEEVE

- (a) Check the contact surfaces for wear or damage.
- (b) Measure the clearance between the hub sleeve and the shift fork.

Maximum clearance: 1.0 mm (0.039 in.)

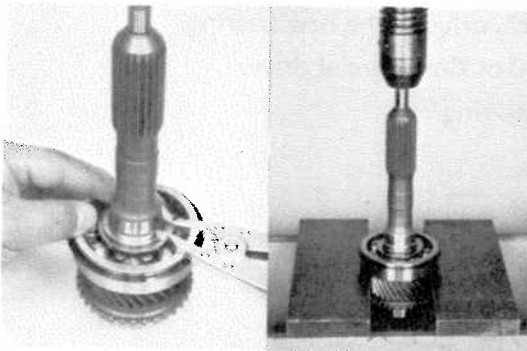


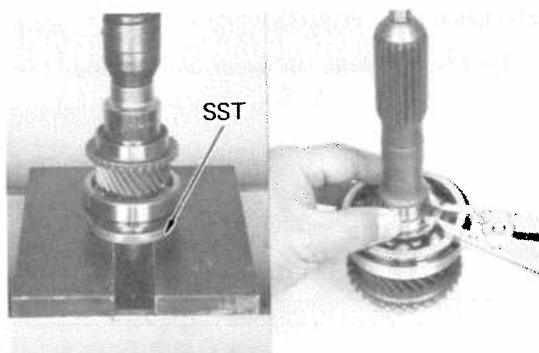
8. INSPECT INPUT SHAFT AND BEARING

Check the shaft and bearing for wear or damage.
If the bearing is worn or damaged, replace it.

9. IF NECESSARY, REPLACE INPUT SHAFT BEARING

- (a) Using snap ring pliers, remove the snap ring.
- (b) Using a press, remove the bearing.





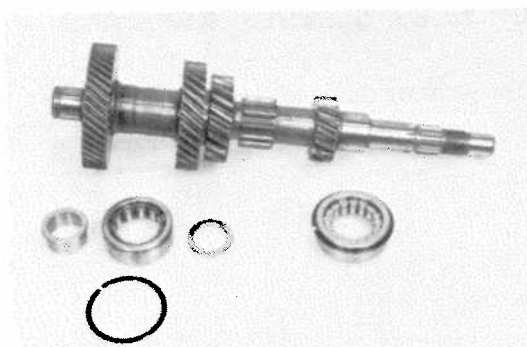
- (c) Using a press and collar*, install a new bearing.

*SST 09506-30011 or Commercial collar

- (d) Select a snap ring which will allow 0 — 0.10 mm (0 — 0.0039 in.) axial play and install it on the shaft.

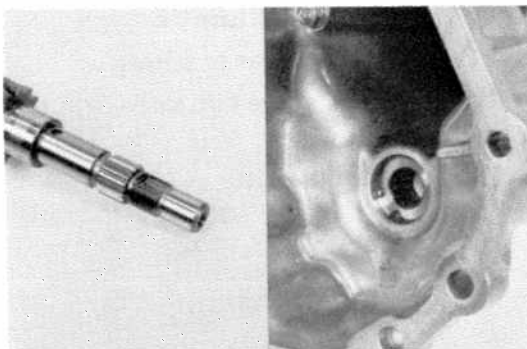
Snap ring thickness

Mark	Part No.	Thickness	mm (in.)
0	90520-30214	2.05 — 2.10	(0.0807 — 0.0827)
1	90520-30215	2.10 — 2.15	(0.0827 — 0.0846)
2	90520-30216	2.15 — 2.20	(0.0846 — 0.0866)
3	90520-30217	2.20 — 2.25	(0.0866 — 0.0886)
4	90520-30218	2.25 — 2.30	(0.0886 — 0.0906)
5	90520-30219	2.30 — 2.35	(0.0906 — 0.0925)



10. INSPECT COUNTERSHAFT AND BEARINGS

- (a) Check the gears for wear or damage.
- (b) Check the bearing contact surface for wear or damage.
- (c) Check the front and center bearings for wear or damage.



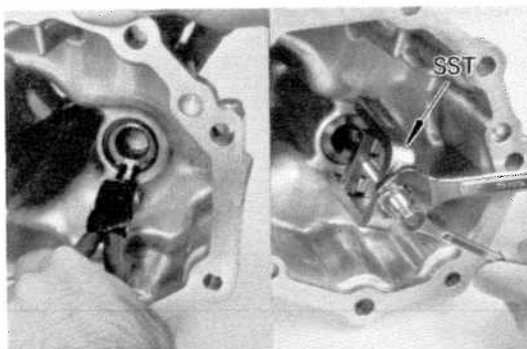
- (d) Check the rear bearing in the extension housing for wear or damage.

If the bearing is worn or damaged, replace it.

11. IF NECESSARY, REPLACE COUNTERSHAFT REAR BEARING

- (a) Using snap ring pliers, remove the snap ring.
- (b) Using a bearing puller*, remove the bearing.

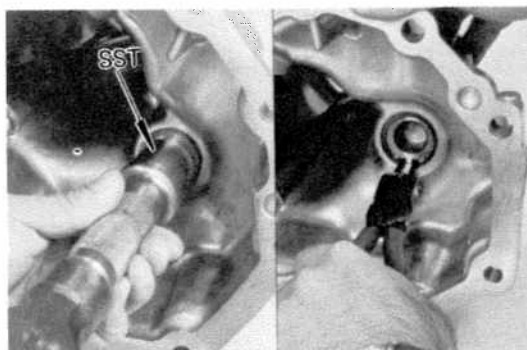
*SST 09310-36021

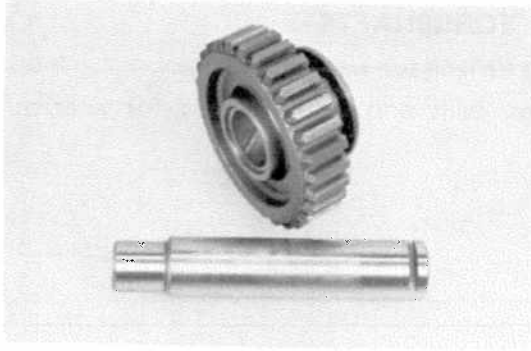


- (c) Using a driver*, drive in the new bearing.

*SST 09307-30010 or Commercial driver

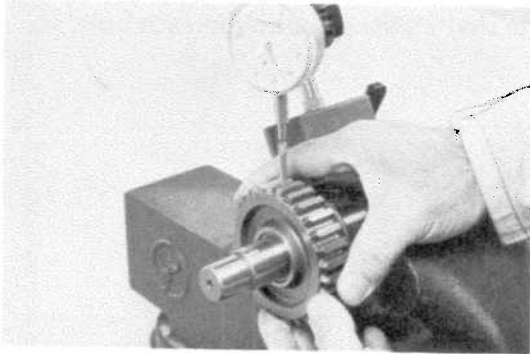
- (d) Install the snap ring.





12. INSPECT REVERSE IDLER GEAR

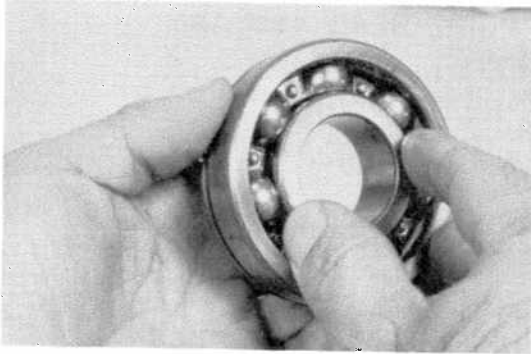
- (a) Check the idler gear and shaft for wear or damage.



- (b) Using a dial indicator, measure the oil clearance between the idler gear and shaft.

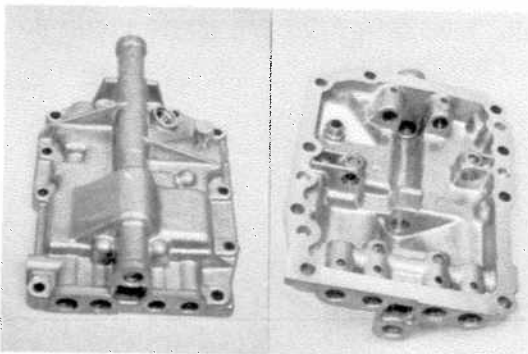
Standard clearance : 0.040 – 0.082 mm
(0.0016 – 0.0032 in.)

Maximum clearance : 0.082 mm (0.0032 in.)



13. INSPECT OUTPUT SHAFT REAR BEARING

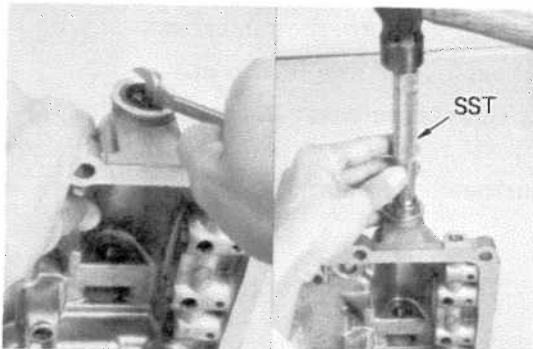
Check the bearing for wear or damage.



14. INSPECT CASE COVER

- (a) Check the case cover for damage or cracks.
(b) Check the oil seal for wear or damage.

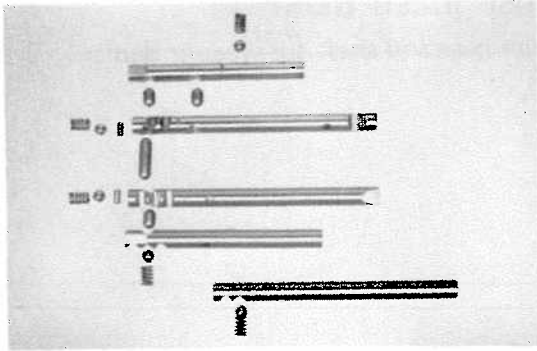
If the oil seal is worn or damaged, replace it.



15. IF NECESSARY, REPLACE OIL SEAL

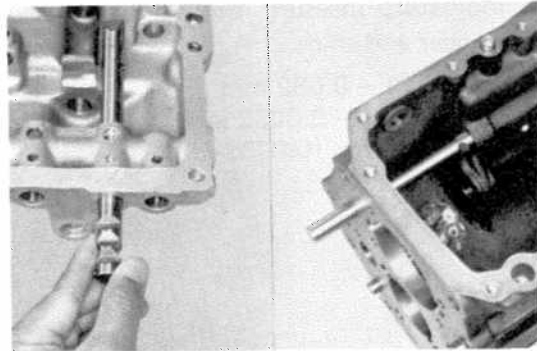
- (a) Pry out the seal.
(b) Using a driver*, drive in the new seal.

*SST 09304-12012 or Commercial driver

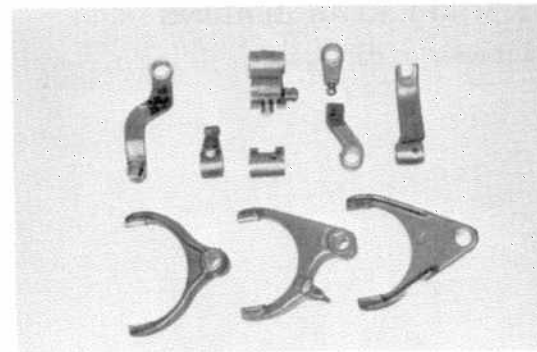


16. INSPECT SHIFT FORKSHAFTS

- (a) Check sliding surface for wear or damage.
- (b) Check springs, balls and interlock pins for wear or damage.



- (c) Check that the shafts slide smoothly in each hole.

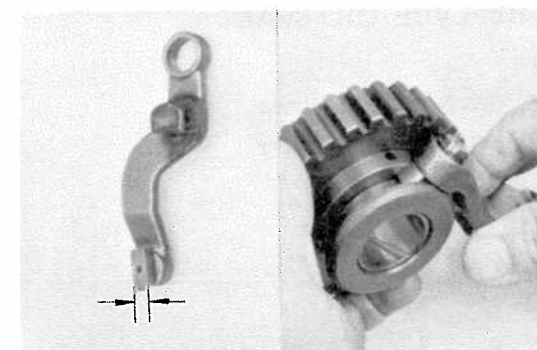


17. INSPECT SHIFT FORK, HEAD AND ARM

- (a) Check the parts for wear or cracks.



- (b) Check that the reverse restrict pin slides smoothly with spring and ball resistance.

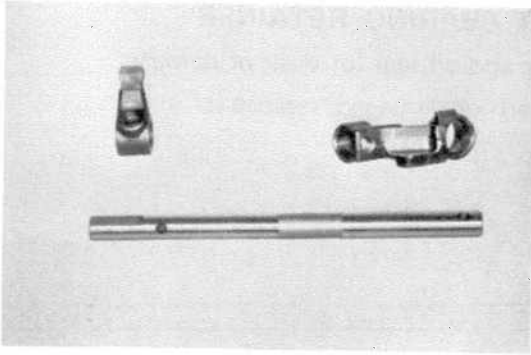


- (c) Measure the reverse shift arm shoe thickness.

Minimum shoe thickness: 7.5 mm (0.295 in.)

- (d) Measure the clearance between the reverse idle gear and shoe.

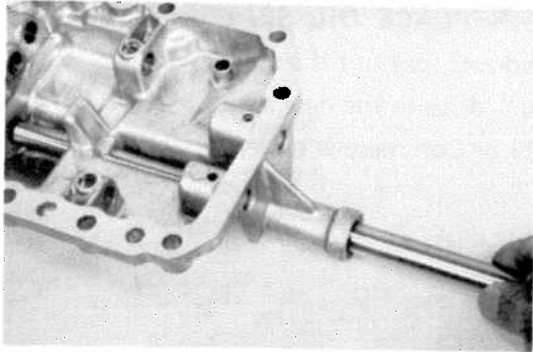
Maximum shoe clearance: 0.6 mm (0.024 in.)



18. INSPECT SHIFT & SELECT LEVER, SHAFT AND SHIFT LEVER HOUSING

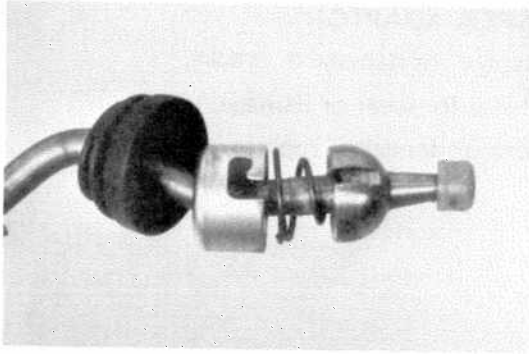
- (a) Check the lever, shaft and housing for wear or damage.

- (b) Check that the shaft slides smoothly in the hole.



19. INSPECT SHIFT LEVER

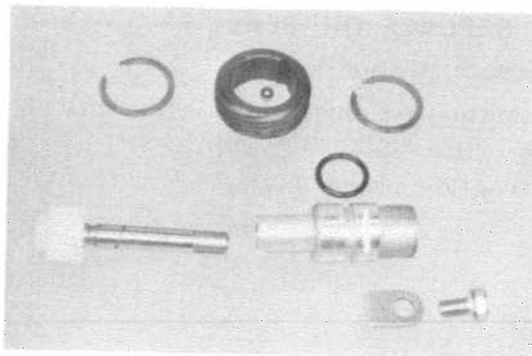
Check the shift lever for wear or damage.



20. INSPECT SPEEDOMETER DRIVE GEAR AND DRIVEN GEAR

- (a) Check gear teeth for wear or damage.
(b) Check gear shaft, oil seal and O-ring for wear or damage.

If the oil seal is worn or damaged, replace it.



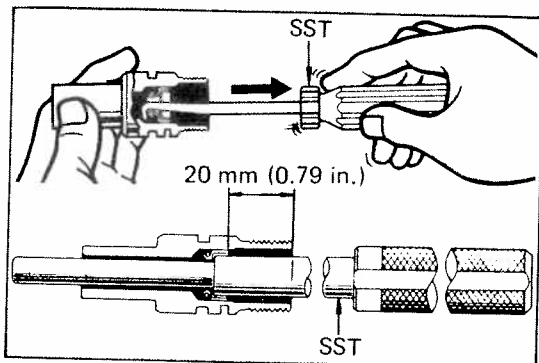
21. IF NECESSARY REPLACE OIL SEAL

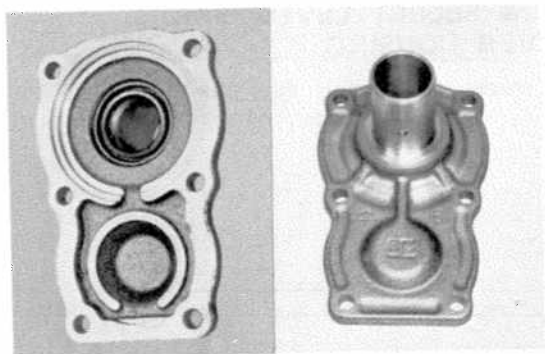
- (a) Using a hook*, remove the seal.

*SST 09921-00010 or Commercial tool

- (b) Using a driver*, install the new seal.

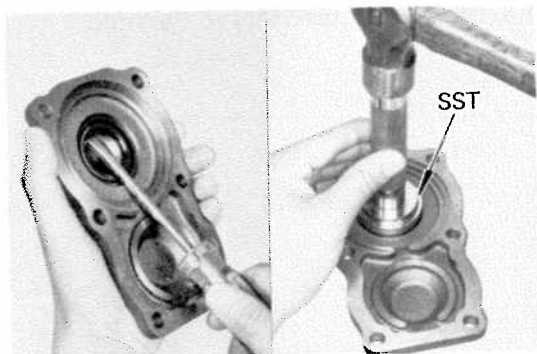
*SST 09201-60011 or Commercial driver





22. INSPECT FRONT BEARING RETAINER

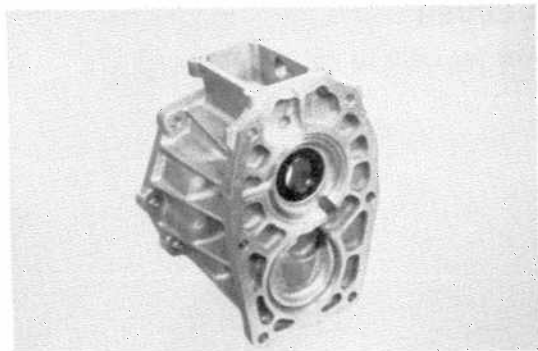
Check the retainer and oil seal for wear or damage.
If the oil seal is worn or damaged, replace it.



23. IF NECESSARY, REPLACE OIL SEAL

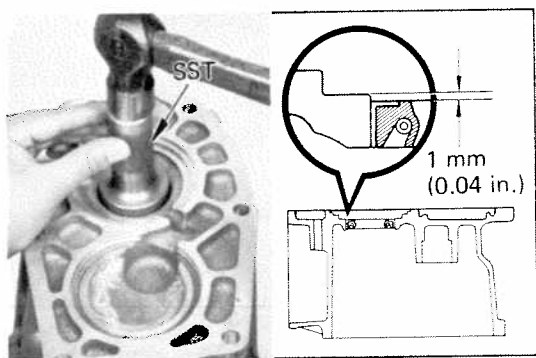
- (a) Using a screwdriver, pry out the seal.
- (b) Using a driver*, drive in the new seal.

*SST 09608-30021 or Commercial driver



24. INSPECT TRANSFER ADAPTOR

- (a) Check the adaptor for damage or cracks.
 - (b) Check the oil seal for wear or damage.
- If the oil seal is worn or damaged, replace it.



25. IF NECESSARY, REPLACE OIL SEAL

- (a) Using a screwdriver, pry out the seal.
- (b) Using a transmission oil plug*, drive in the new oil seal.

*SST 09325-12010 or Commercial driver

26. INSPECT SHIFT LEVER RETAINER

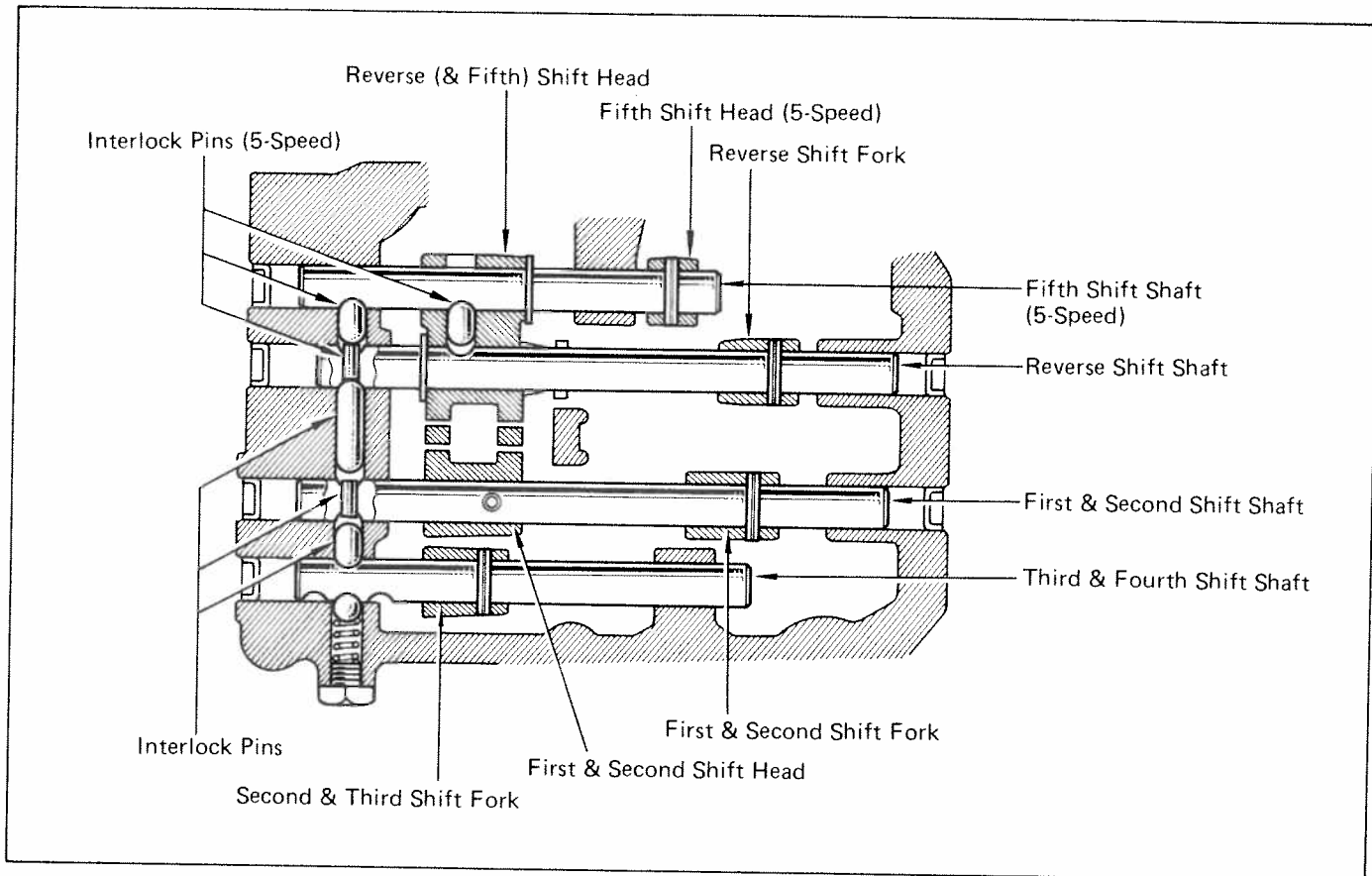
- (a) Check the shift lever retainer for damage or cracks.
- (b) Check that the restrict pin moves smoothly with spring resistance.



ASSEMBLY OF TRANSMISSION

(See illustration on page 9-56, 57, 58)

NOTE: Assemble the case cover as shown in the figure.



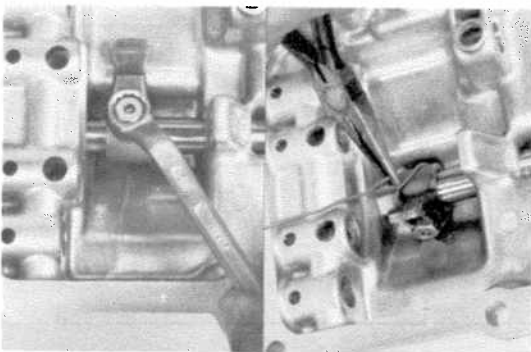
1. APPLY GEAR OIL TO BEARINGS, GEARS AND SHAFTS

2. INSTALL SHIFT & SELECT LEVER AND SHAFT

- Apply multipurpose grease to the oil seal lip.
- Align the holes of the shaft and lever.
- Tighten the bolt.

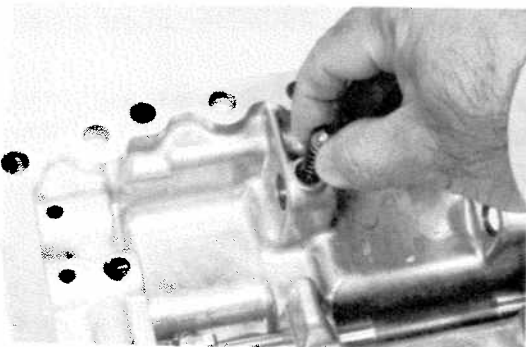
Torque: 190 – 310 kg-cm (14 – 22 ft-lb)

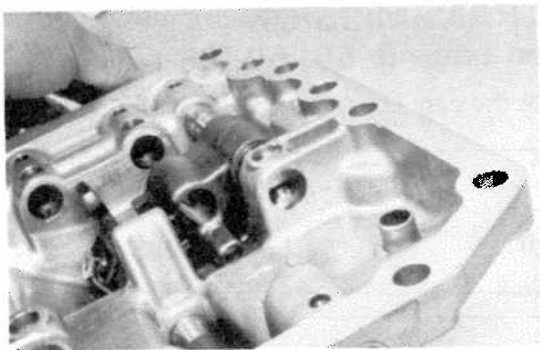
- Secure the bolt with the lock wire.



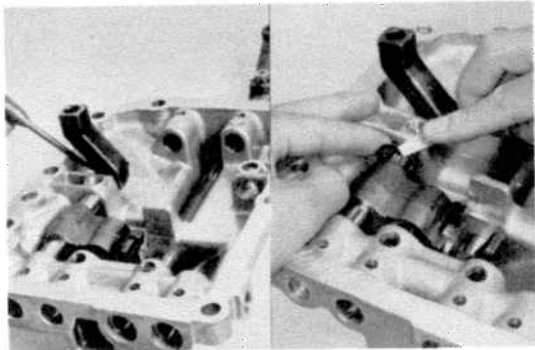
3. INSTALL FIFTH & REVERSE SHIFT HEAD, FIFTH SHIFT ARM AND SHAFT (5-Speed)

- Install the spring and shift detent ball in the hole.

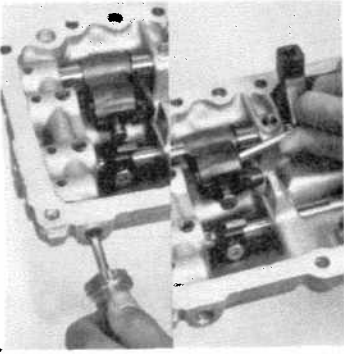
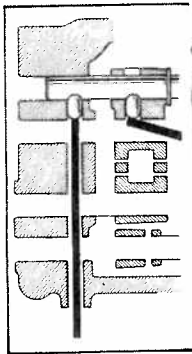




- (b) Insert the shaft through the fifth & reverse shift head.

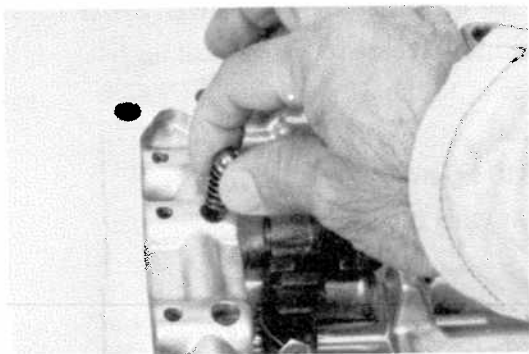


- (c) Align the shaft and fifth shift arm pin holes, and drive in the slotted spring pin with a pin punch.
 (d) Using a screwdriver, push in the E-ring to the fifth & reverse shift head.



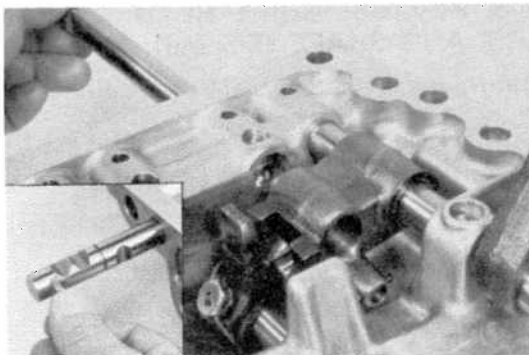
4. INSTALL TWO INTERLOCK PINS (5-Speed)

- (a) Set the fifth shift fork shaft to the neutral position.
 (b) Coat the two interlock pins with multipurpose grease.
 (c) Push in the two interlock pins to the shaft grooves with a screwdriver.

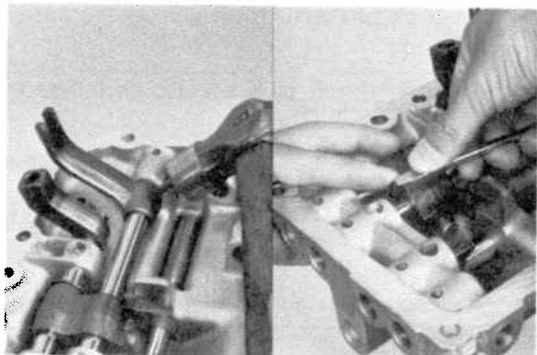


5. INSTALL REVERSE SHIFT FORK AND SHAFT (5-Speed)

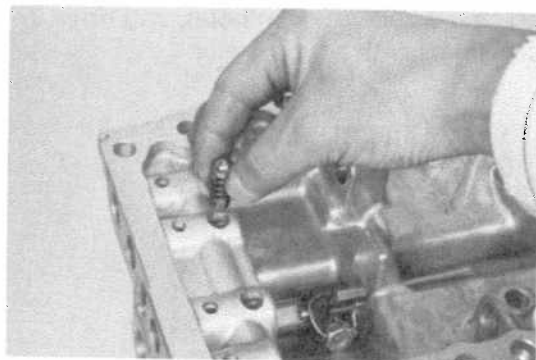
- (a) Install the spring and shift detent ball in the hole.



- (b) Coat the small interlock pin with multipurpose grease and install it in the shaft.
 (c) Insert the shaft through the fifth & reverse shift head and reverse shift fork.

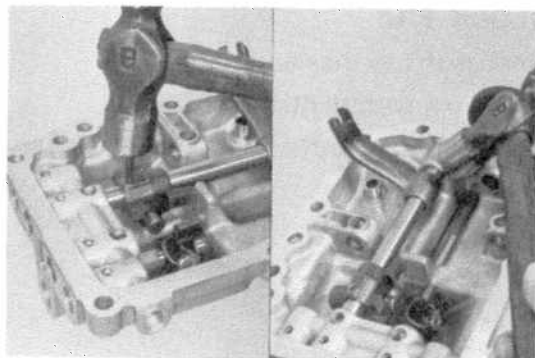


- (d) Align the shaft and shift fork pin holes, and drive in the slotted spring pin.
- (e) Using a screwdriver, push in the E-ring to the reverse shift fork shaft.

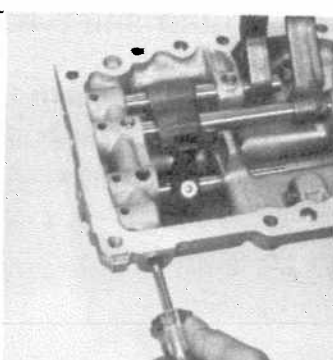
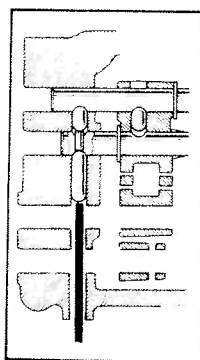


6. INSTALL REVERSE SHIFT HEAD, FORK AND SHAFT (4-Speed)

- (a) Install the spring and shift detent ball in the hole.



- (b) Insert the shaft through the reverse shift head and arm.
- (c) Align the shaft, head and fork pin holes, and drive in the slotted spring pins with a pin punch.



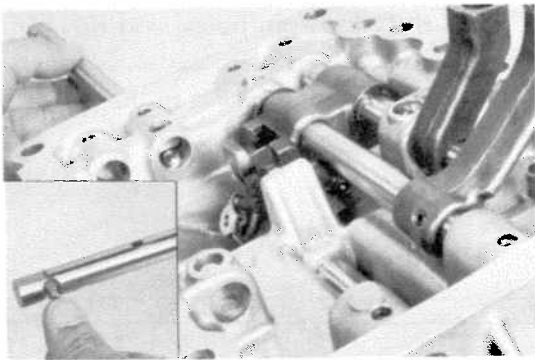
7. INSTALL INTERLOCK PIN

- (a) Set the shift fork shafts to the neutral position.
- (b) Coat the interlock pin with multipurpose grease.
- (c) Push in the interlock pin to the shaft groove with a screwdriver.

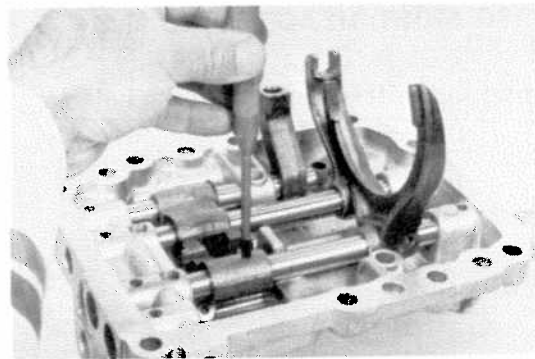
8. INSTALL FIRST & SECOND SHIFT HEAD, FORK AND SHAFT

- (a) Install the spring and shift detent ball in the hole.

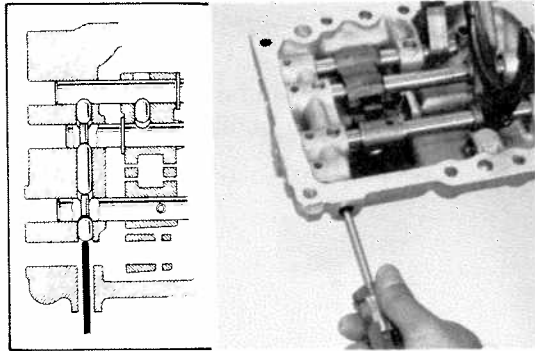




- (b) Coat the small interlock pin with multipurpose grease and install it in the shaft.
- (c) Insert the shaft through the first & second shift head and fork.

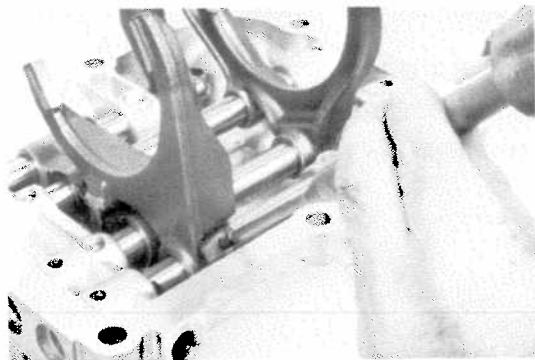


- (d) Align the shaft, head and fork pin holes, and drive in the slotted spring pins with a pin punch.



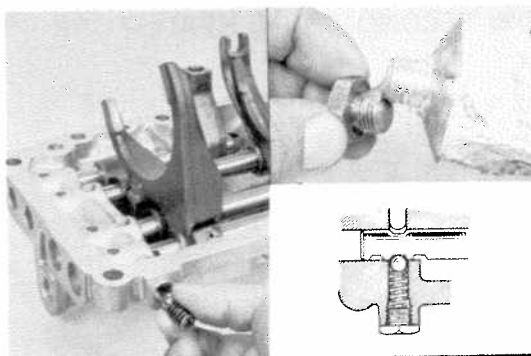
9. INSTALL INTERLOCK PIN

- (a) Set the shift fork shafts to the neutral position.
- (b) Coat the interlock pin with multipurpose grease.
- (c) Push in the interlock pin to the shaft groove with a screwdriver.



10. INSTALL SECOND & THIRD SHIFT FORK AND SHAFT

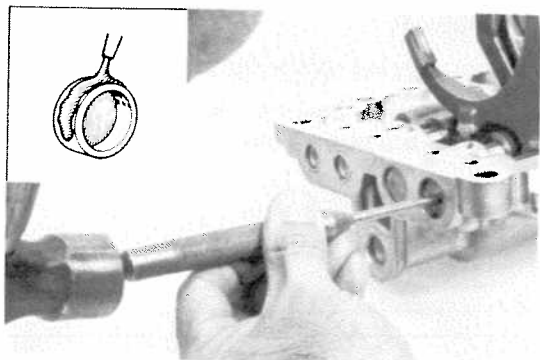
- (a) Insert the fork shaft through the shift fork.
- (b) Align the shaft and fork pin holes, and drive in the slotted spring pin with a pin punch.



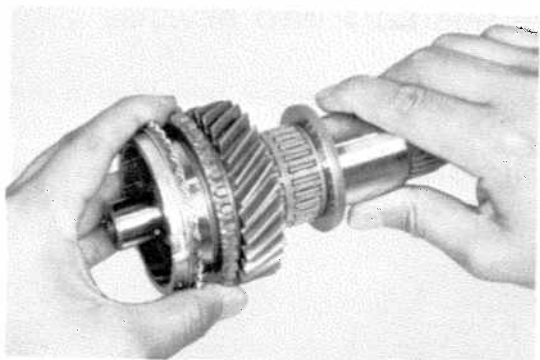
11. INSTALL SHIFT DETENT BALL, SPRING AND HOLDER

- (a) Install the shift detent ball and spring to the hole.
- (b) Apply liquid sealer to the holder and tighten it.

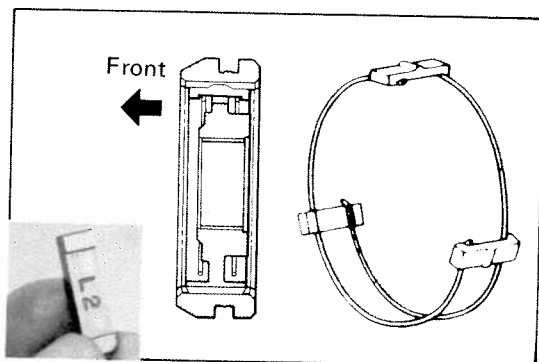
Torque: 150 – 220 kg-cm (11 – 15 ft-lb)

**12. INSTALL BLIND PLUGS**

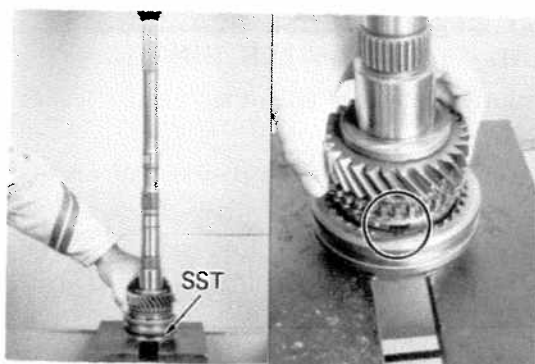
Apply liquid sealer to the blind plugs and drive them into the case cover.

**13. INSTALL THIRD GEAR**

- Apply multipurpose grease to the output shaft.
- Install the needle roller bearings, third gear and synchronizer ring on the output shaft.

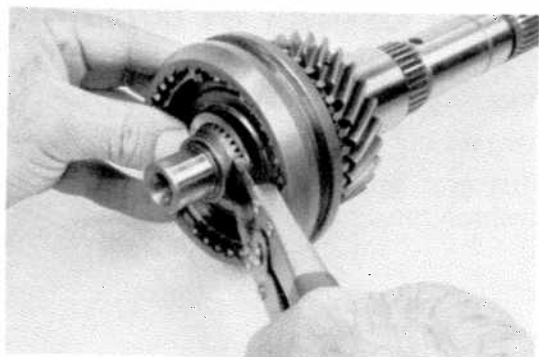
**14. INSERT CLUTCH HUB NO. 2 INTO HUB SLEEVE**

- Install the clutch hub No. 2 and shifting keys to the hub sleeve.
- Install the shifting key springs under the shifting keys so that the spring ends are not in line, as shown in the figure.

**15. INSTALL CLUTCH HUB NO. 2**

- Apply multipurpose grease to the output shaft.
- Align the synchronizer ring slots with the shifting keys.
- Using a press and collar*, install the clutch hub No. 2.

*SST 09506-30011 or Commercial collar

**16. INSTALL SNAP RING**

Select a snap ring which will allow 0 — 0.10 mm (0 — 0.0039 in.) axial play and install it on the shaft.

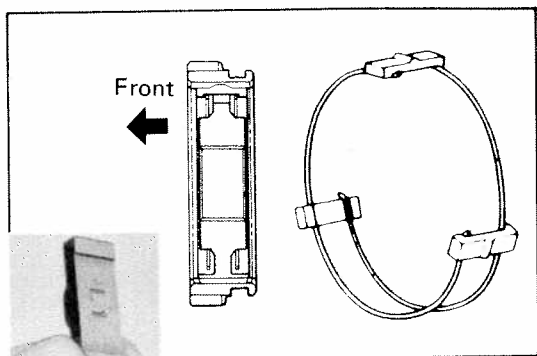
Snap ring thickness

Mark	Part No.	Thickness	mm (in.)
D	90520-28245	1.80 — 1.85	(0.0709 — 0.0728)
D-1	90520-28010	1.85 — 1.90	(0.0728 — 0.0748)
E	90520-28246	1.90 — 1.95	(0.0748 — 0.0768)
E-1	90520-28011	1.95 — 2.00	(0.0768 — 0.0787)
F	90520-28248	2.00 — 2.05	(0.0787 — 0.0807)



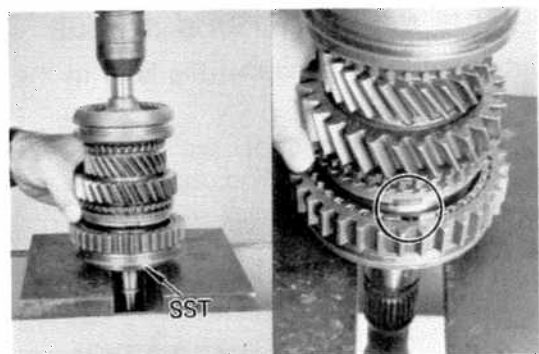
17. INSTALL SECOND GEAR

- (a) Apply multipurpose grease to the output shaft.
- (b) Install the needle roller bearing, second gear and synchronizer ring on the output shaft.



18. INSERT CLUTCH HUB NO. 1 INTO REVERSE GEAR

- (a) Install the clutch hub No. 1 and shifting keys to the reverse gear.
- (b) Install the shifting key springs under the shifting keys so that the spring ends are not in line, as shown in the figure.



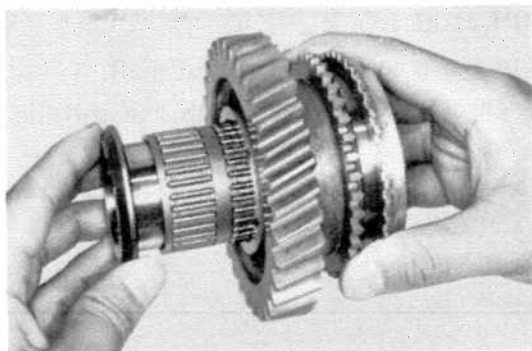
19. INSTALL CLUTCH HUB NO. 1 (REVERSE GEAR) ON OUTPUT SHAFT

- (a) Apply multipurpose grease to the output shaft.
- (b) Align the synchronizer ring slots with the shifting keys.
- (c) Using a press and collar*, install the clutch hub No. 1.

*SST 09506-30011 or Commercial collar

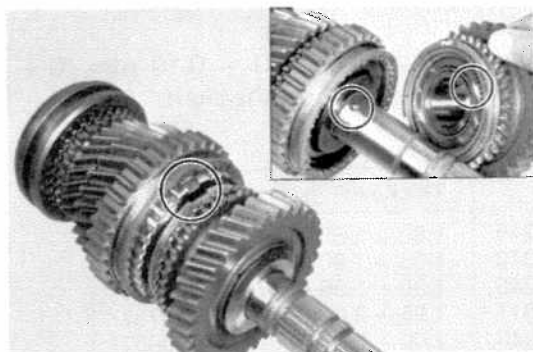
20. ASSEMBLE FIRST GEAR, NEEDLE BEARINGS, INNER RACE AND SYNCHRONIZER RING

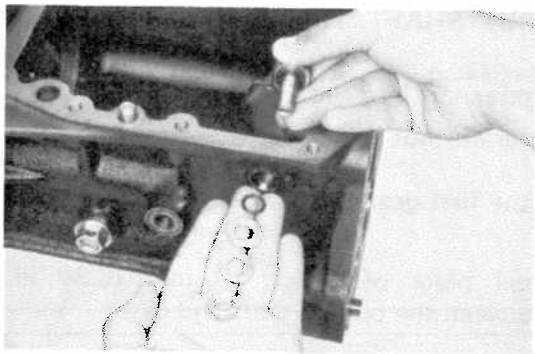
- (a) Apply multipurpose grease to the needle roller bearings.
- (b) Insert the needle roller bearings and first gear on the inner race.
- (c) Place the synchronizer ring on the first gear.



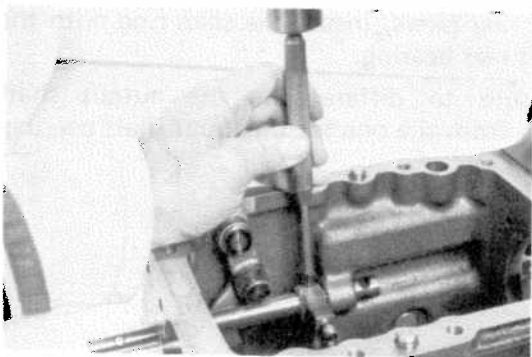
21. INSTALL FIRST GEAR ASSEMBLY ON OUTPUT SHAFT

- (a) Install the inner race locking ball to the output shaft.
- (b) Align the inner race slot with the locking ball.
- (c) Install the first gear assembly on the output shaft with the synchronizer ring slots aligned with the shifting keys.

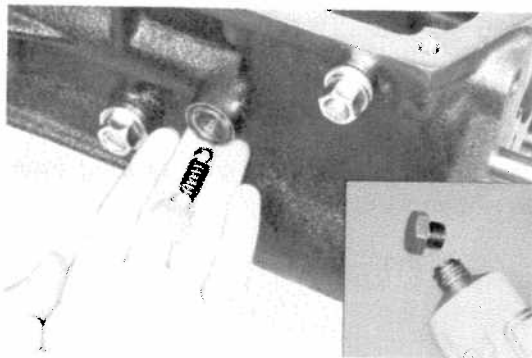


**22. INSTALL REVERSE SHIFT ARM**

- (a) Install the reverse shift arm and pivot to the transmission case.
- (b) Install the O-ring, plate washer, spring washer and nut to the pivot.

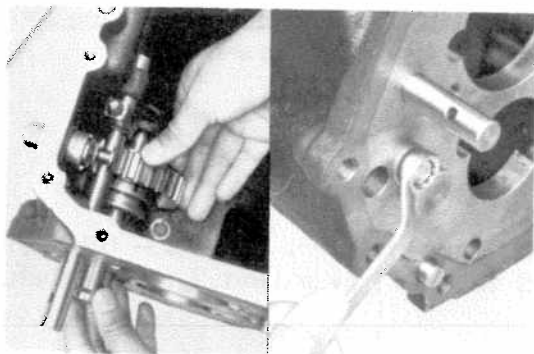
**23. INSTALL FIFTH SHIFT HEAD AND SHAFT (5-Speed)**

- (a) Insert the shift fork shaft through the shift head.
- (b) Align the shaft and head pin holes, and drive in the slotted spring pin with a pin punch.

**24. INSTALL SHIFT DETENT BALL, SPRING AND HOLDER (5-Speed)**

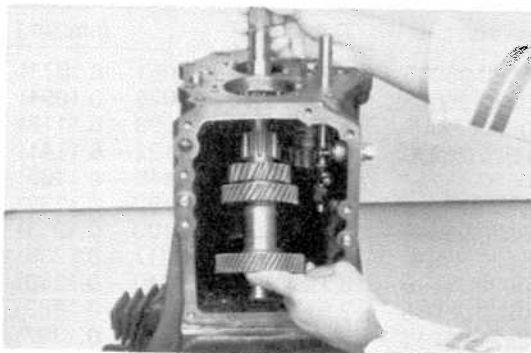
- (a) Install the shift detent ball and spring to the hole.
- (b) Apply liquid sealer to the holder and tighten it.

Torque: 150 – 220 kg-cm (11 – 15 ft-lb)

**25. INSTALL REVERSE IDLER GEAR AND SHAFT**

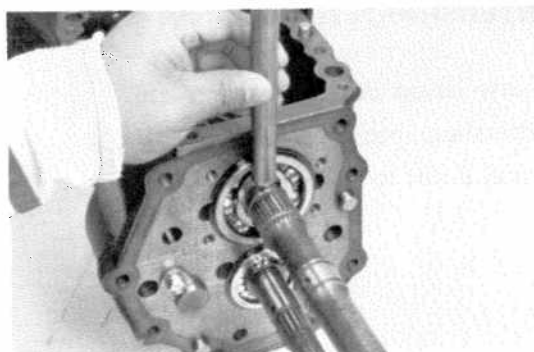
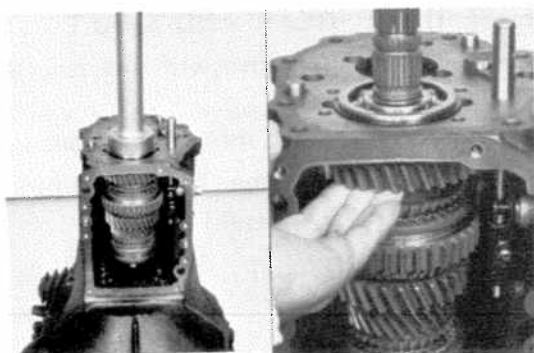
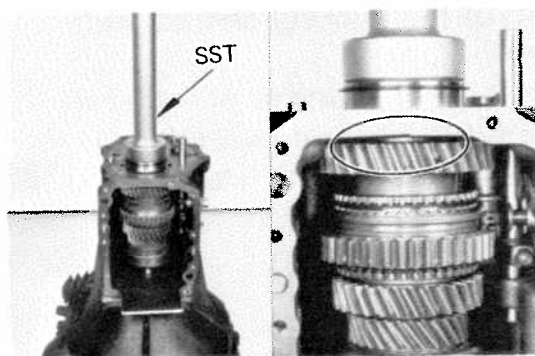
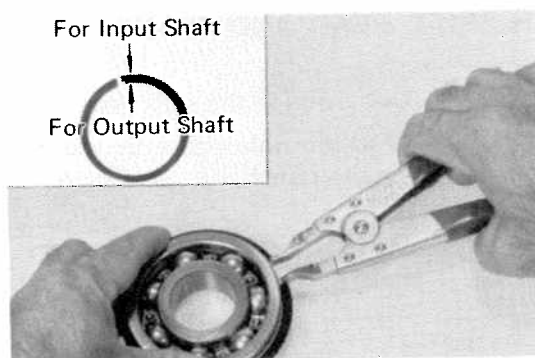
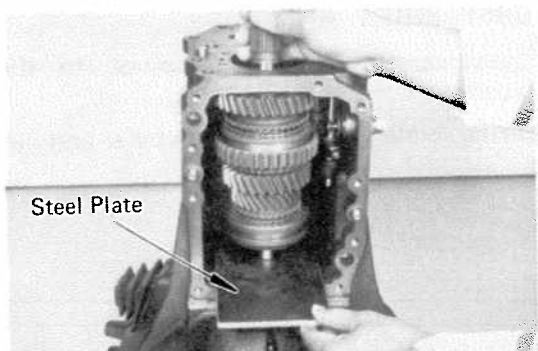
- (a) Align the reverse idler gear groove with the reverse shift arm shoe.
- (b) Install the reverse idler gear shaft through the gear.
- (c) Secure the shaft with the lock plate. Tighten the bolt.

Torque: 150 – 220 kg-cm (11 – 15 ft-lb)

**26. INSTALL COUNTERSHAFT TO TRANSMISSION CASE**

- (a) Stand the transmission case on its front end.
- (b) Put the countershaft into the case.

CAUTION: Be careful not to damage either end.



27. INSTALL OUTPUT SHAFT TO TRANSMISSION CASE

- (a) Put the output shaft into the case.

CAUTION: Be careful not to damage the front end of the shaft.

Be careful that the first gear and needle roller bearing do not drop off.

- (b) Place a steel plate of about 10 mm (0.39 in.) thickness between the output shaft and case.

- (c) Using snap ring pliers, install the snap ring onto the output shaft rear bearing.

NOTE: Make sure to differentiate the output shaft bearing snap ring from the one for the input shaft bearing.

- (d) Using a bearing driver*, drive in the bearing until it comes into contact with the first gear needle roller bearing inner race.

*SST 09309-35010 or Commercial driver

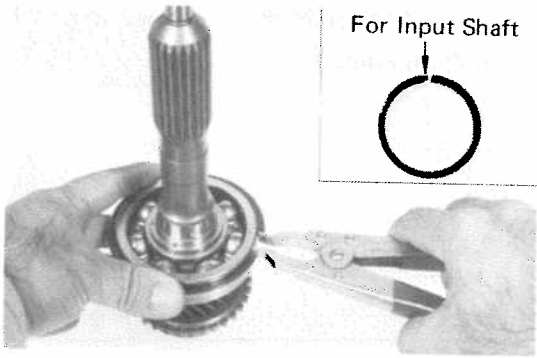
CAUTION: Be careful that the first gear bearing inner race lock ball does not come out.

- (e) Remove the steel plate and drive in the bearing until its snap ring is flush with the case end.

- (f) Select a snap ring which will allow 0 – 0.10 mm (0 – 0.0039 in.) axial play and install it on the shaft. (4-Speed)

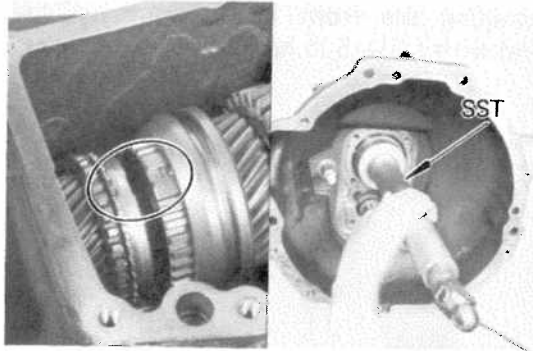
Snap ring thickness

Mark	Part No.	Thickness	mm (in.)
A	90520-25005	2.67 – 2.72	(0.1051 – 0.1071)
B	90520-25006	2.73 – 2.78	(0.1075 – 0.1094)
C	90520-25009	2.79 – 2.84	(0.1098 – 0.1118)
D	90520-25010	2.85 – 2.90	(0.1122 – 0.1141)
E	90520-25011	2.91 – 2.96	(0.1146 – 0.1165)
F	90520-25012	2.97 – 3.02	(0.1169 – 0.1189)
G	90520-25013	3.03 – 3.08	(0.1193 – 0.1213)
H	90520-25014	3.09 – 3.14	(0.1217 – 0.1236)
J	90520-25015	3.15 – 3.20	(0.1240 – 0.1260)
K	90520-25016	3.21 – 3.26	(0.1264 – 0.1283)
L	90520-25017	3.27 – 3.32	(0.1287 – 0.1307)



28. INSTALL INPUT SHAFT

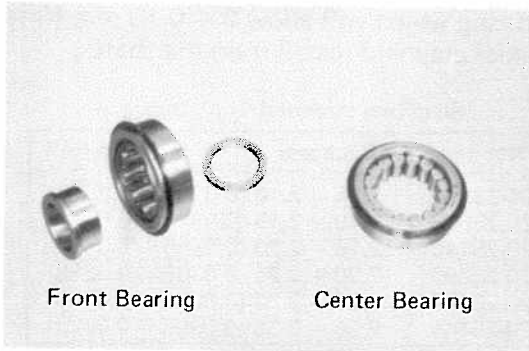
- (a) Using snap ring pliers, install the snap ring onto the input shaft bearing.
- (b) Coat the needle roller bearing with multipurpose grease.



- (c) Align the synchronizer ring slots with the shifting keys.

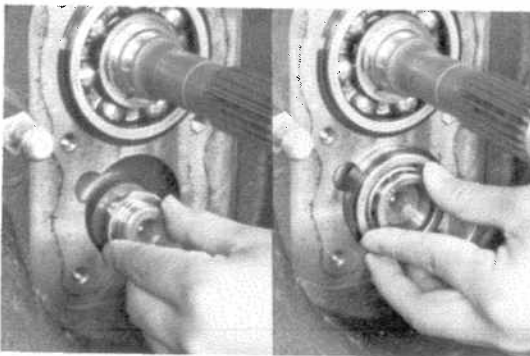
- (d) Using a bearing driver*, drive in the input shaft.

*SST 09309-35010 or Commercial driver



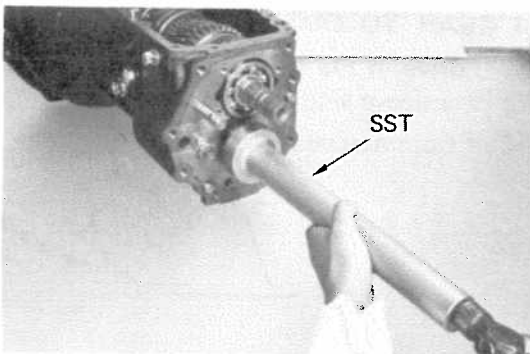
29. INSTALL COUNTERSHAFT FRONT AND CENTER BEARINGS

- (a) Using snap ring pliers, install the snap rings onto the front and center bearings.



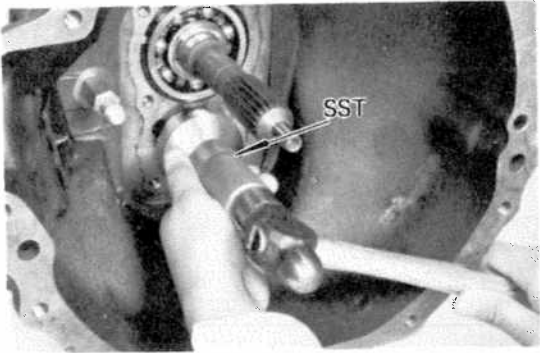
- (b) Assemble the front bearing inner race piece with its tapered side toward the gear.

- (c) Temporarily install the front bearing to the case.



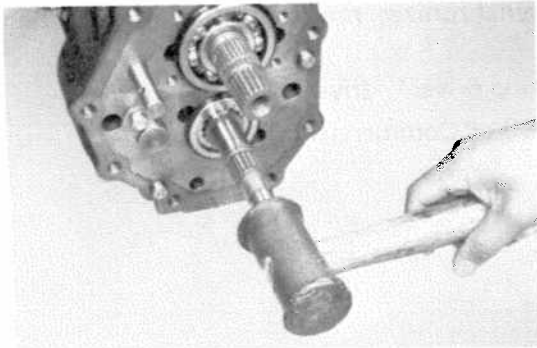
- (d) Using a bearing driver*, drive in the center bearing.

*SST 09309-35010 or Commercial driver

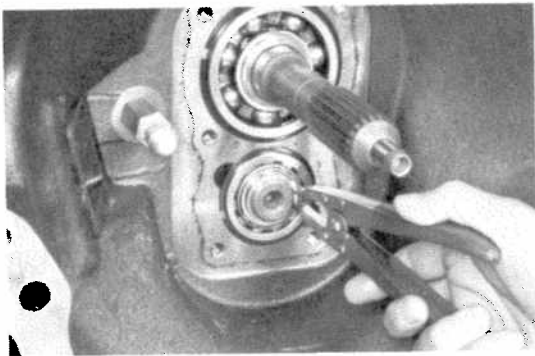


(e) Using a bearing driver*, drive in the front bearing.

*SST 09310-35010 or Commercial driver



NOTE: When installing the front bearing, support the countershaft rear end with a 3 – 5 lb hammer or equivalent.



(f) Select a snap ring which will allow 0 – 0.10 mm (0 – 0.0039 in.) axial play and install it on the shaft.

Snap ring thickness

Mark	Part No.	Thickness	mm (in.)
1	90520-23115	2.05 – 2.10	(0.0807 – 0.0827)
2	90520-23089	2.10 – 2.15	(0.0827 – 0.0846)
3	90520-23143	2.15 – 2.20	(0.0846 – 0.0866)
4	90520-23090	2.20 – 2.25	(0.0866 – 0.0886)
5	90520-23144	2.25 – 2.30	(0.0886 – 0.0906)
6	90520-23145	2.30 – 2.35	(0.0906 – 0.0925)

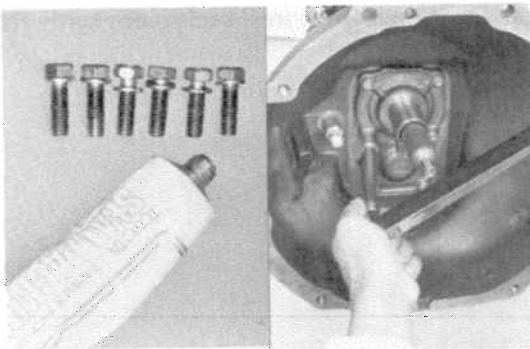
30. INSTALL BEARING RETAINER WITH NEW GASKET

(a) Place the new gasket in position.

(b) Apply multipurpose grease to the oil seal.

(c) Apply liquid sealer to the mounting bolts and tighten the retainer.

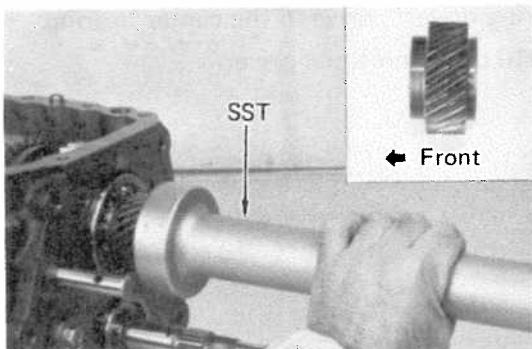
Torque: 200 – 280 kg-cm (15 – 20 ft-lb)

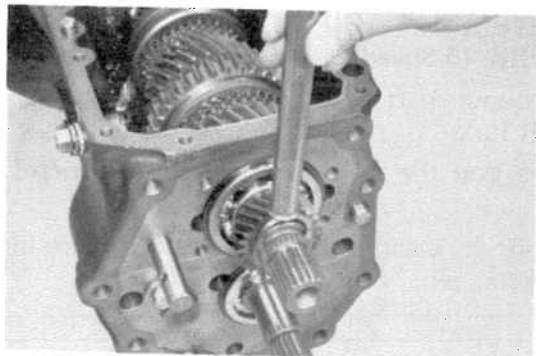


31. INSTALL FIFTH GEAR TO OUTPUT SHAFT (5-Speed)

(a) Using a driver*, drive in the fifth gear to the output shaft with the long sleeve side faced toward the front.

*SST 09309-35010 or Commercial driver.

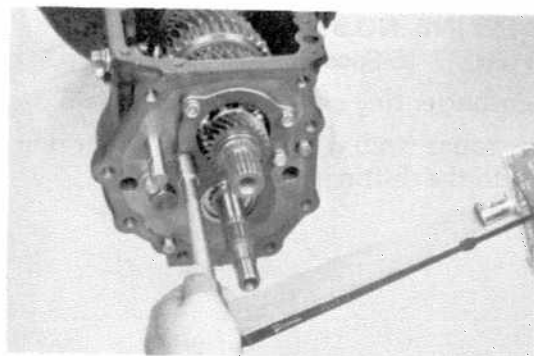




- (b) Select a snap ring which will allow 0 – 0.10 mm (0 – 0.0039 in.) axial play and install it on the shaft.

Snap ring thickness

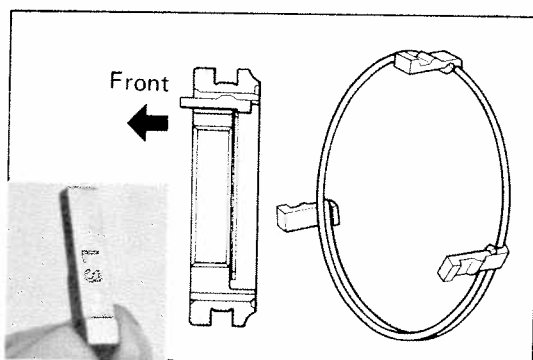
Mark	Part No.	Thickness	mm (in.)
A	90520-25005	2.67 – 2.72	(0.1051 – 0.1071)
B	90520-25006	2.73 – 2.78	(0.1075 – 0.1094)
C	90520-25009	2.79 – 2.84	(0.1098 – 0.1118)
D	90520-25010	2.85 – 2.90	(0.1122 – 0.1141)
E	90520-25011	2.91 – 2.96	(0.1146 – 0.1165)
F	90520-25012	2.97 – 3.02	(0.1169 – 0.1189)
G	90520-25013	3.03 – 3.08	(0.1193 – 0.1213)
H	90520-25014	3.09 – 3.14	(0.1217 – 0.1236)
J	90520-25015	3.15 – 3.20	(0.1240 – 0.1260)
K	90520-25016	3.21 – 3.26	(0.1264 – 0.1283)
L	90520-25017	3.27 – 3.32	(0.1287 – 0.1307)



32. INSTALL REAR BEARING RETAINER

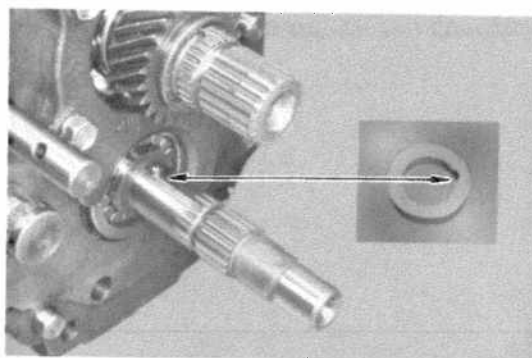
Install the rear bearing retainer and tighten the mounting bolts.

Torque: 150 – 220 kg-cm (11 – 15 ft-lb)

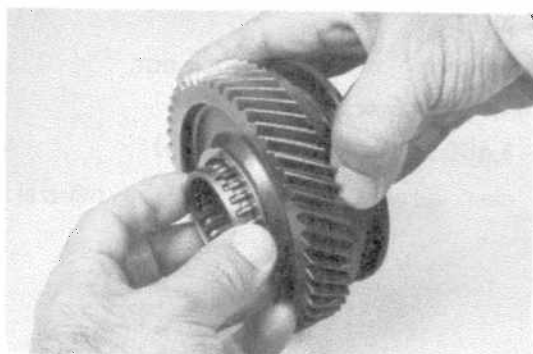


33. INSERT CLUTCH HUB NO.3 INTO HUB SLEEVE (COUNTERSHAFT FIFTH GEAR) (5-Speed)

- Install the clutch hub No.3 and shifting keys to the hub sleeve.
- Install the shifting key springs under the shifting keys so that the spring ends are not in line.

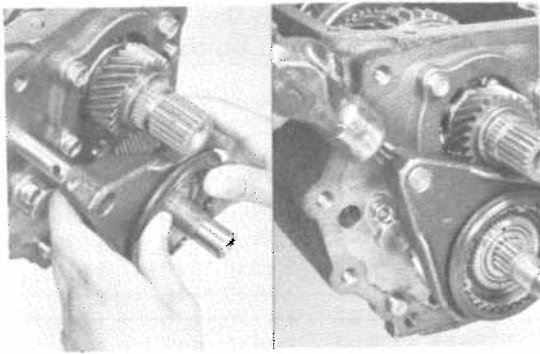


34. INSTALL LOCK BALL AND THRUST WASHER (5-Speed)



35. INSTALL NEEDLE ROLLER BEARING INTO COUNTERSHAFT FIFTH GEAR (5-Speed)

- Apply multipurpose grease to the needle roller bearing.
- Insert the needle roller bearing into the countershaft fifth gear.

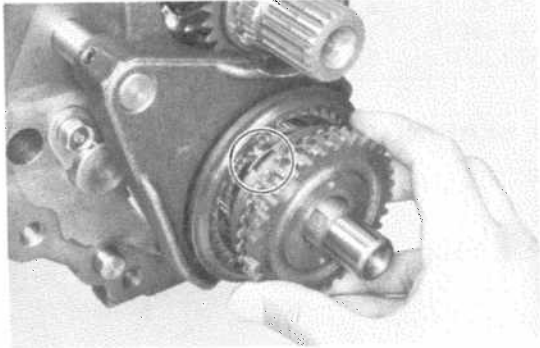


36. INSTALL COUNTERSHAFT FIFTH GEAR ASSEMBLY AND SHIFT FORK (5-Speed)

- (a) Install the countershaft fifth gear assembly together with the shift fork.

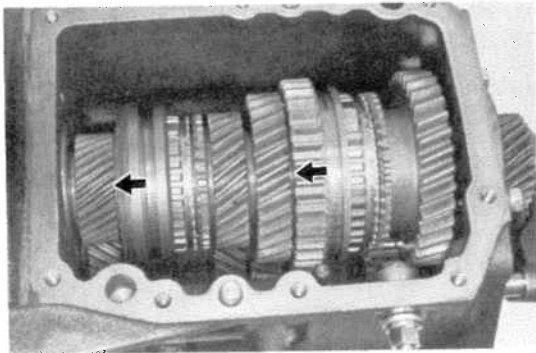
CAUTION: Insure that the shift fork pin hole is toward the front.

- (b) Align the shift fork and shaft pin holes and drive in the slotted spring pin.



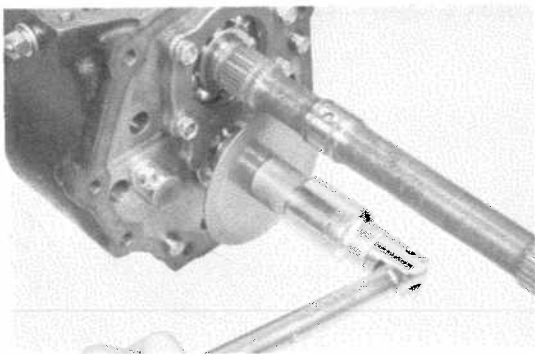
37. INSTALL GEAR SPLINE NO.5 AND SYNCHRONIZER RING (5-Speed)

- (a) Place the synchronizer ring on the gear spline No.5.
- (b) Install the gear spline No.5 with the synchronizer ring slots aligned with the shifting keys.

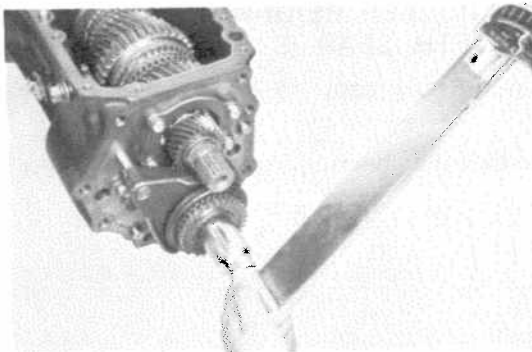


38. ENGAGE GEAR DOUBLE MESHING INTO SECOND AND THIRD

NOTE: Do not shift into first gear to avoid overshifting.



39. INSTALL OIL SEPARATOR (4-Speed)



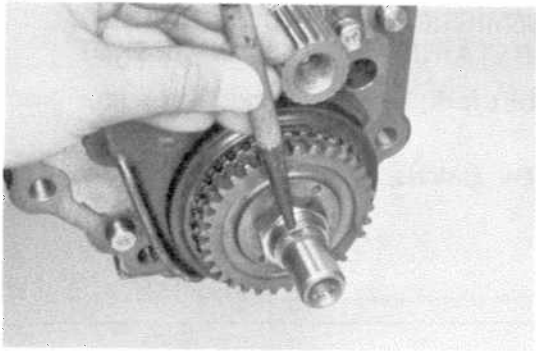
40. TIGHTEN LOCK NUT

- (a) Using a socket wrench*, tighten the lock nut.

*SST 09326-22011 or Commercial socket

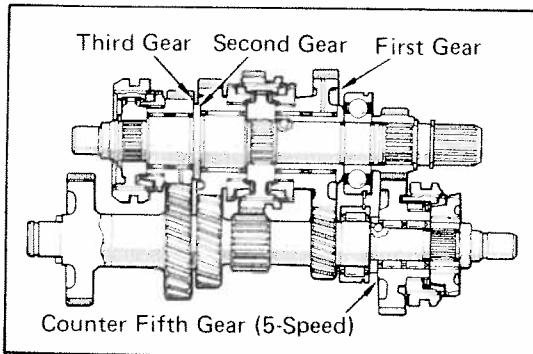
Torque: 1,100 – 1,400 kg-cm (80 – 101 ft-lb)

- (b) Release the gear double meshing to the neutral position.

**41. STAKE LOCK NUT**

Using a punch, stake the lock nut.

NOTE: Be careful not to damage the end of the counter-shaft.

**42. MEASURE THRUST CLEARANCE FOR EACH GEAR**

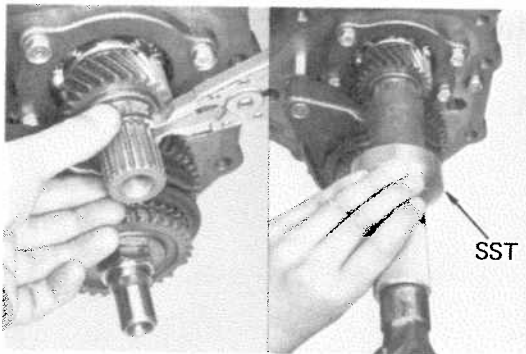
Using a feeler gauge, measure the thrust clearance for each gear.

Standard clearance:

1st, 2nd and 3rd	0.10 – 0.25 mm (0.0039 – 0.0098 in.)
Counter 5th	0.10 – 0.30 mm (0.0039 – 0.0118 in.)

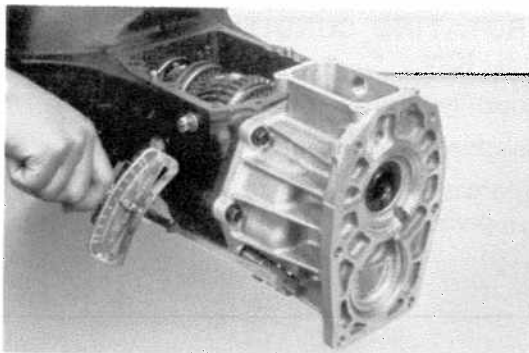
Maximum clearance:

1st, 2nd and 3rd	0.25 mm (0.0098 in.)
Counter 5th	0.30 mm (0.0118 in.)

**43. INSTALL SLEEVE ONTO OUTPUT SHAFT**

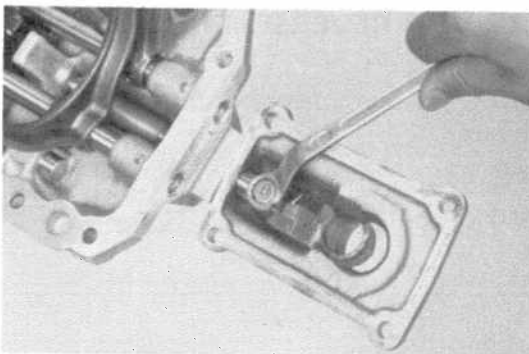
- Using snap ring pliers, install the snap ring.
- Using a driver*, drive in the sleeve onto the output shaft.

*SST 09310-35010 or Commercial driver

**44. INSTALL TRANSFER ADAPTOR WITH NEW GASKET**

- Place the new gasket in position.
- Apply multipurpose grease to the oil seal and needle roller bearing.
- Tighten the transfer adaptor mounting bolts.

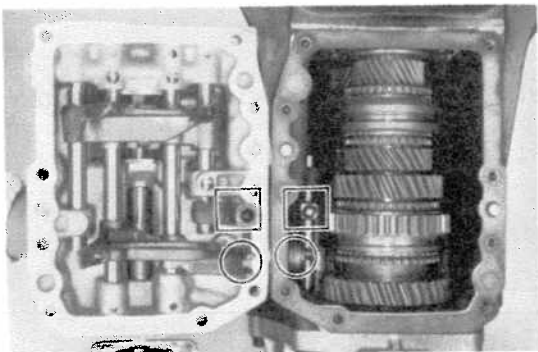
Torque: 400 – 550 kg-cm (29 – 39 ft-lb)

**45. INSTALL SHIFT LEVER RETAINER AND SHIFT LEVER HOUSING TO CASE COVER**

- Insert the shift lever retainer in the case cover.
- Install the shift lever housing to the shift & select lever shaft.
- Align the holes of the shaft and housing, and tighten the bolt.

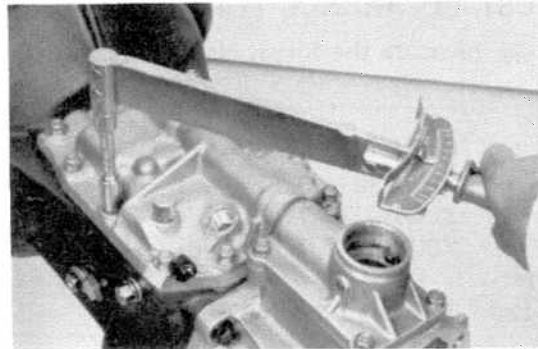
Torque: 190 – 310 kg-cm (14 – 22 ft-lb)

- Secure the bolt with the lock wire.



46. INSTALL TRANSMISSION CASE COVER AND SHIFT LEVER RETAINER WITH NEW GASKET

- (a) Place each shift fork, hub sleeve and reverse idler gear in neutral.
- (b) Place the new gaskets in position on the case and adaptor.



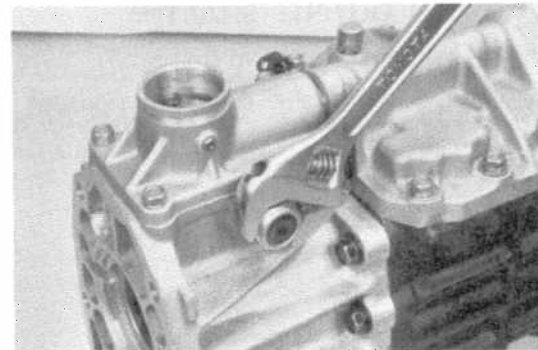
- (c) Install the transmission case cover and shift lever retainer.

- (d) Tighten the case cover mounting bolts.

Torque: 150 – 220 kg-cm (11 – 15 ft-lb)

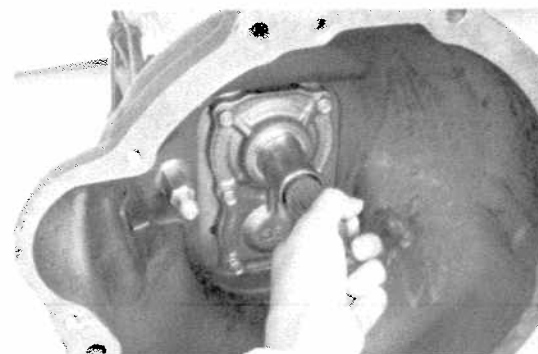
- (e) Apply liquid sealer to the mounting bolts and tighten the retainer.

Torque: 150 – 220 kg-cm (11 – 15 ft-lb)



47. INSTALL RESTRICT PIN TO SHIFT LEVER RETAINER

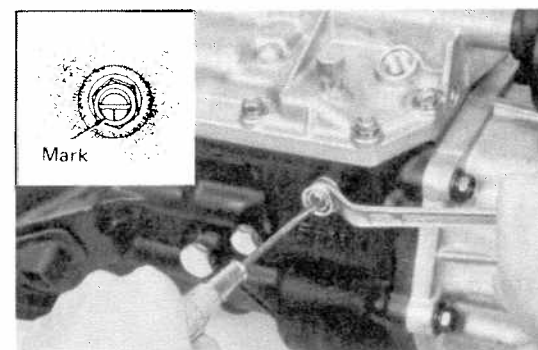
Install the restrict pin to the adaptor.



48. CHECK GEARS ROTATING CONDITION IN EACH SHIFT POSITION

- (a) Check for smooth gear rotation.
- (b) Check for smooth shift operation.

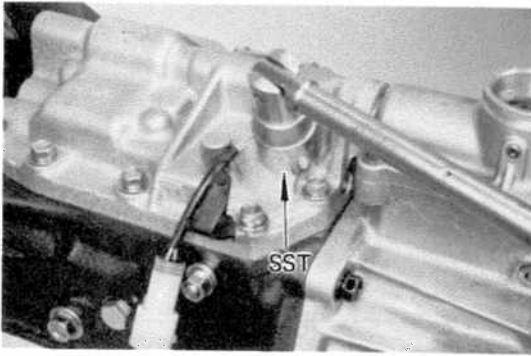
If abnormal noise comes from the reverse idler gear, adjust the reverse shift arm pivot position.



49. IF NECESSARY, ADJUST REVERSE SHIFT ARM PIVOT POSITION

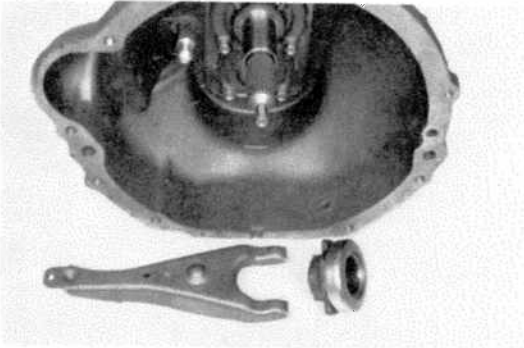
- (a) Correct the reverse shift arm pivot position by turning the pivot within 90°.
- (b) Tighten the lock nut.

Torque: 190 – 310 kg-cm (14 – 22 ft-lb)

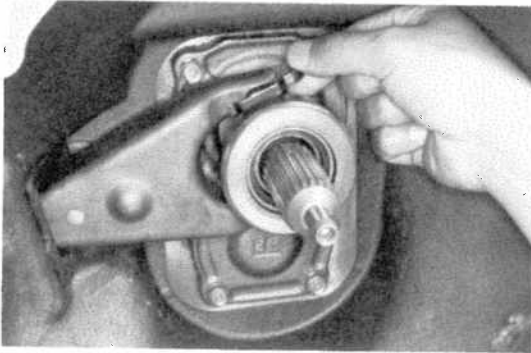
**50. INSTALL BACK-UP LIGHT SWITCH**

Using a back-up light switch tool*, install the back-up light switch to the case cover.

*SST 09817-16010

**51. INSTALL CLUTCH RELEASE BEARING AND FORK**

- (a) Apply multipurpose grease to the release bearing front.
- (b) Apply molybdenum disulphide lithium base grease to the following parts:
 - Clutch disc spline
 - Release bearing hub inside
 - Release fork and hub contact points
 - Release fork pivot point
 - Release fork and push rod contact point
- (c) Insert the fork into the boot and install to the clutch housing.
- (d) Install the bearing hub with two clips.



— MEMO —
