CLUTCH

REFER TO FOLLOWING REPAIR MANUALS:

Manual Name	Pub. No.
• Land Cruiser (Station Wagon) Chassis and Body Repair Manual	RM184E
• Land Cruiser (Hardtop, Canvas Top and Station Wagon) Chassis and Body Repair Manual Supplement	RM290E

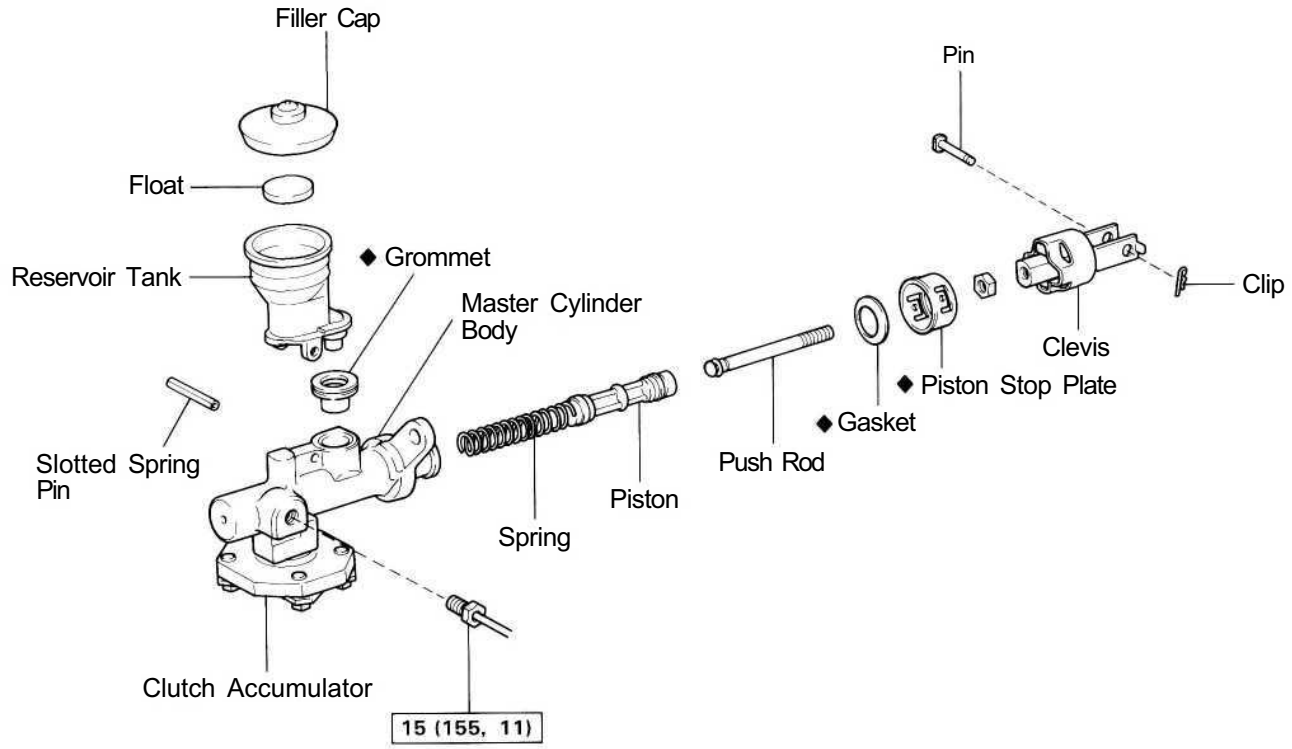
NOTE: The following pages contain only the points which differ from the above listed manuals.

(STATION WAGON)

CLUTCH MASTER CYLINDER

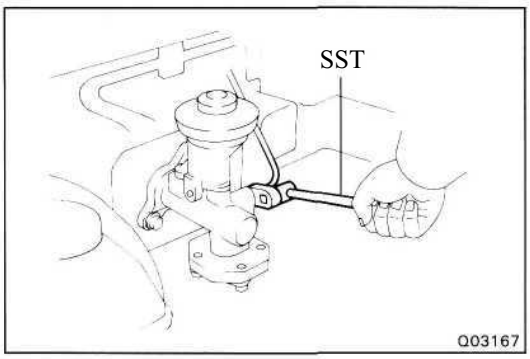
COMPONENTS

1FZ-FE Engine



N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part

Q03157

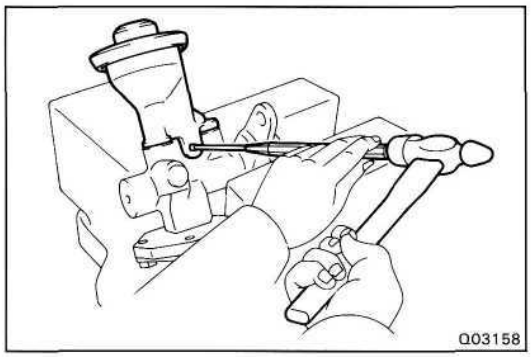


Q03167

CLUTCH MASTER CYLINDER REMOVAL

REMOVE MASTER CYLINDER

(a) Draw out fluid with syringe.
(b) Using SST, disconnect the clutch tube.
SST 09023-00100
(c) Remove the clip, clevis pin and return spring.
(d) Remove the nut from the room side.
(e) Remove the nut from the engine room side.
(f) Pull out the master cylinder.

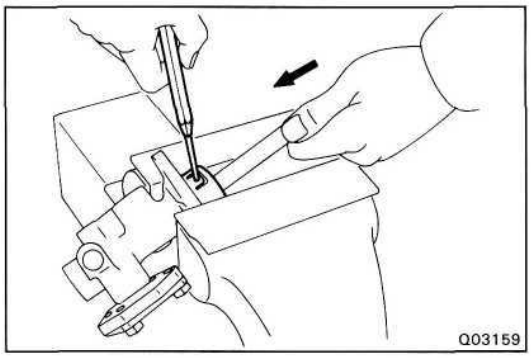


MASTER CYLINDER DISASSEMBLY

1. REMOVE RESERVOIR TANK

(a) Using a pin punch and a hammer, drive out the slotted spring pin.

(b) Remove reservoir tank and grommet.



2. REMOVE PUSH ROD

(a) Using a pin punch, loosen the staked part of the plate.

(b) Remove the piston stop plate, gasket and the push rod.

3. REMOVE PISTON

MASTER CYLINDER INSPECTION

HINT: Clean the disassembled parts with compressed air.

1. INSPECT MASTER CYLINDER BORE FOR SCORING OR CORROSION

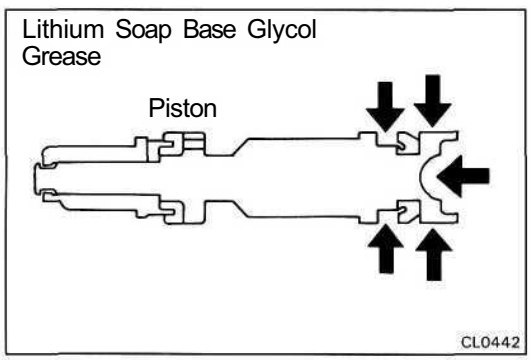
If a problem is found, clean or replace the cylinder.

2. INSPECT PISTON AND CUPS FOR WEAR, SCORING, CRACKS OR SWELLING

If either one requires replacement, use the parts from the cylinder kit.

3. INSPECT PUSH ROD FOR WEAR OR DAMAGE

If necessary, replace the push rod.

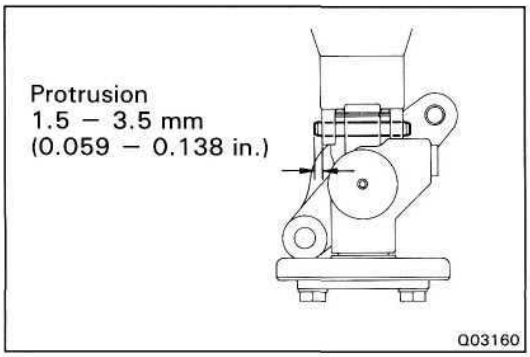


MASTER CYLINDER ASSEMBLY

1. COAT PARTS WITH LITHIUM SOAP BASE GLYCOL GREASE AS SHOWN

2. INSERT PISTON INTO CYLINDER

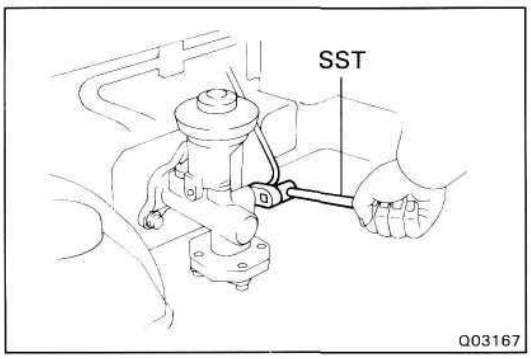
3. INSTALL PUSH ROD ASSEMBLY WITH NEW STOP PLATE AND NEW GASKET



4. INSTALL RESERVOIR TANK

(a) Install reservoir tank and new grommet.

(b) Using a pin punch and a hammer, drive in the slotted spring pin.



MASTER CYLINDER INSTALLATION

1. INSTALL MASTER CYLINDER

Install the mounting nut, and torque them.

Torque: 7.8 Nm (80 kgfcm, 69 in.·lb)

2. CONNECT CLUTCH LINE UNION

Using SST, connect the union.

SST 09023-00100

3. CONNECT PUSH ROD AND INSTALL PIN

Install the clip in the push rod pin.

4. BLEED SYSTEM AND ADJUST CLUTCH PEDAL

MANUAL TRANSMISSION

REFER TO FOLLOWING REPAIR MANUALS:

Manual Name	Pub. No.
• Land Cruiser (Hardtop and Canvas Top) Chassis and Body Repair Manual	RM183E
• Land Cruiser (Station Wagon) Chassis and Body Repair Manual	RM184E
• Land Cruiser (Hardtop, Canvas Top and Station Wagon) Chassis and Body Repair Manual Supplement	RM290E

NOTE: The following pages contain only the points which differ from the above listed manuals.

DESCRIPTION

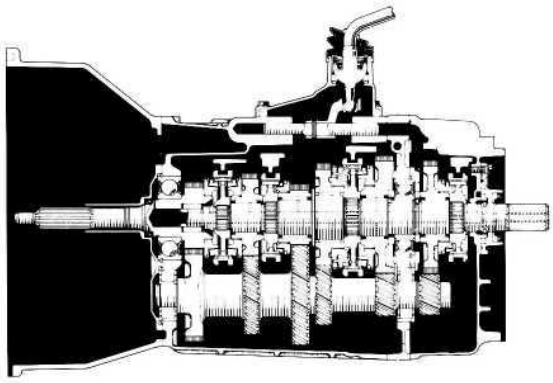
PRECAUTIONS

When working with FIPG material, you must be observe the following.

- Using a razor blade and gasket scraper, remove all the old sealant (FIPG) material from the gasket surfaces.
- Throughly clean all components to remove all the loose material.
- Clean both sealing surfaces with a non-residue solvent.
- Apply the sealant in approx. 1 mm (0.04 in.) bead along the sealing surface.
- Parts must be assembled within 10 minutes of application. Otherwise, the sealant (FIPG) material must be removed and reapplied.

DESCRIPTION

- Transmission type H150F and H151F are constant mesh synchronizers for forward gears, and a sliding mesh reverse gear.
- A triple - cone type synchromesh mechanism is used in the second gear to improve the shift feeling characteristics. This helps to reduce the shifting effort, provide smoothly shifting.
- The input shaft is composed of the 1st and 2nd speed gears and the reverse drive gear, and the output shaft is composed of the drive gear (for use with the ring gear).

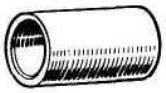
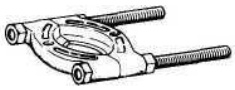


Q03143

Type of Transmission		H150F	H151F
Type of Engine		1FZ-F, 1FZ-FE	
Gear Ratio	1st	4.529	4.081
	2nd	2.464	2.294
	3rd	1.490	←
	4th	1.000	←
	5th	0.881	←
	Reverse	4.313	←
Oil Capacity		2.7 liters (2.6 US qts, 3.1 Imp. qts)	
Oil Vicosity		SAE 75W-90	
Oil Grade		API GL-4 or GL-5	

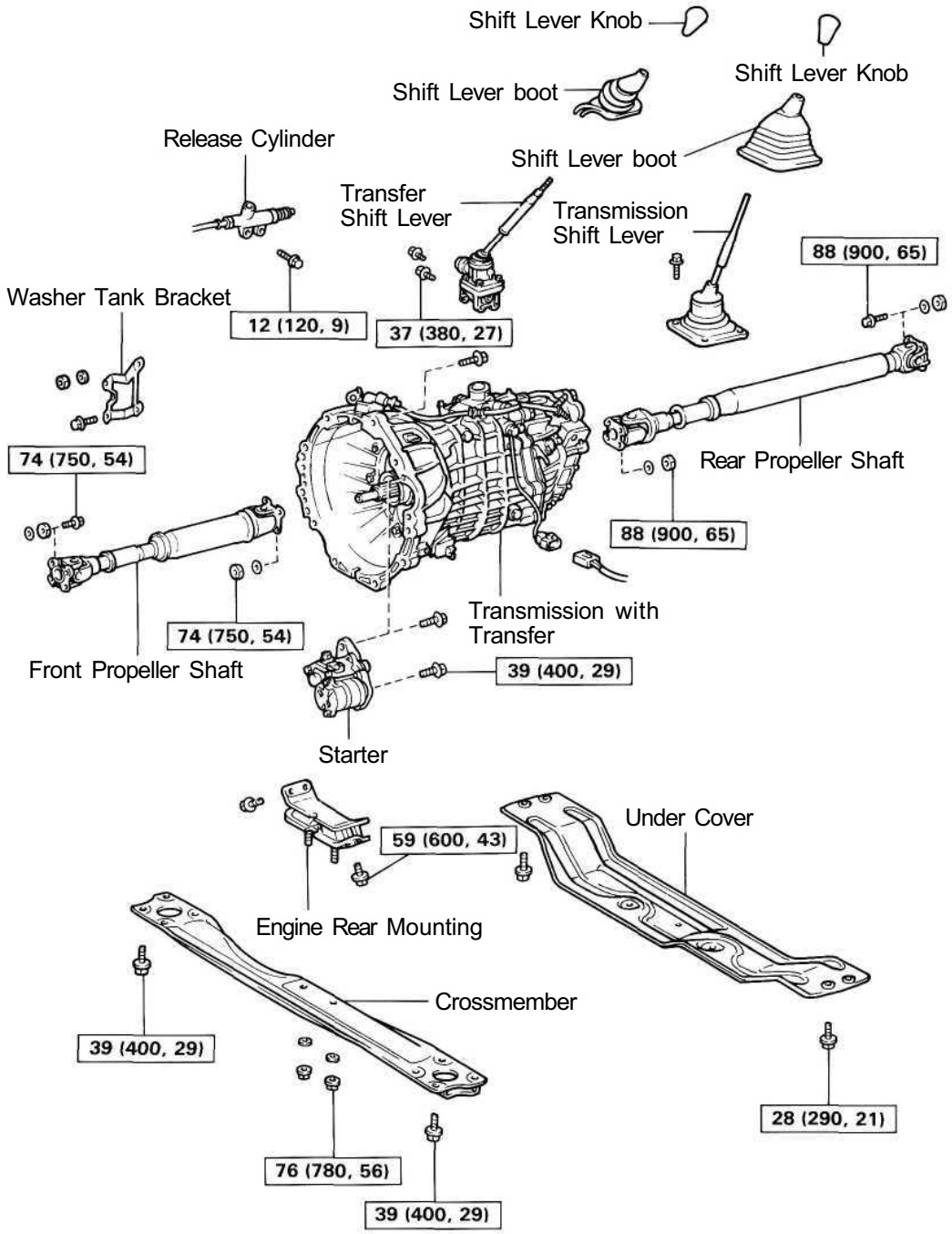
PREPARATION

SST (SPECIAL SERVICE TOOLS)

	09316-60010	Transmission & Transfer Bearing Replacer	
	(09316-00010)	Replacer Pipe	
	09523-36010	Rear Axle Hub Guide Tool	Output shaft rear ball bearing
	09555-55010	Differential Drive Pinion Bearing Replacer	
	09950-00020	Bearing Remover	

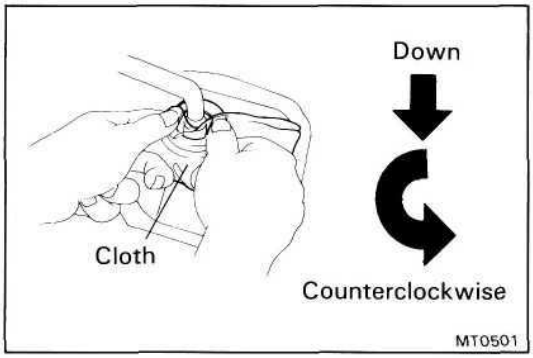
TRANSMISSION REMOVAL AND INSTALLATION

COMPONENTS



Q03129

N·m (kgf·cm, ft·lbf) : Specified torque



TRANSMISSION REMOVAL

1. DISCONNECT BATTERY CABLE FROM NEGATIVE TERMINAL

2. REMOVE TRANSMISSION SHIFT LEVER FROM INSIDE OF VEHICLE

(a) Remove the transmission shift lever knob.

(b) Remove the four screws and remove the shift lever boot retainer.

(c) Pull up the shift lever boot.

(d) Cover the shift lever cap with cloth.

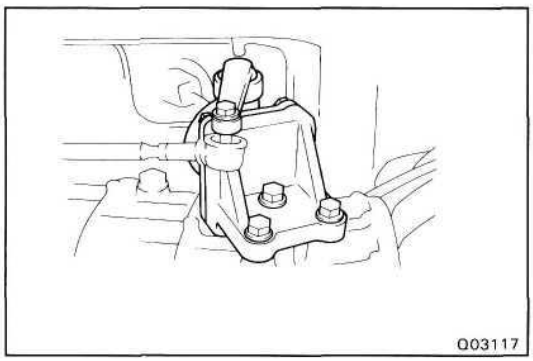
(e) Then, pressing down on the shift lever cap, rotate it countercrockwise to remove.

(f) Remove the shift lever.

3. REMOVE TRANSFER SHIFT LEVER

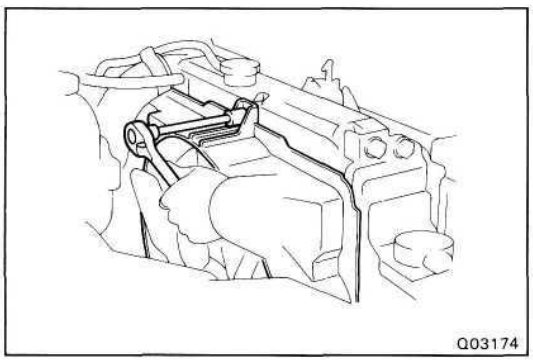
(a) Remove the transfer shift lever knob.

(b) Remove the four screws and remove the boot.



(c) Remove the nut and washer and the link.

(d) Remove the three bolts and the transfer shift lever.

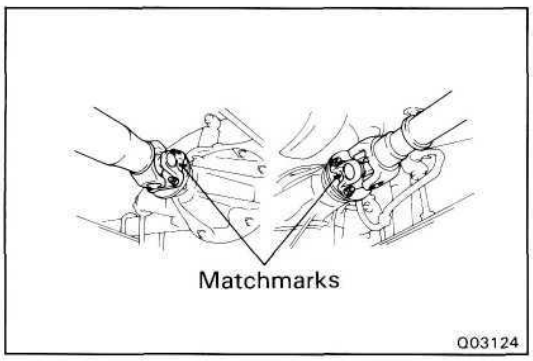


4. LOOSEN FAN SHROUD OF COOLING FAN TO AVOID DAMAGE TO FAN

5. RAISE VEHICLE AND DRAIN TRANSMISSION OIL

NOTICE: Be sure the vehicle is securely supported.

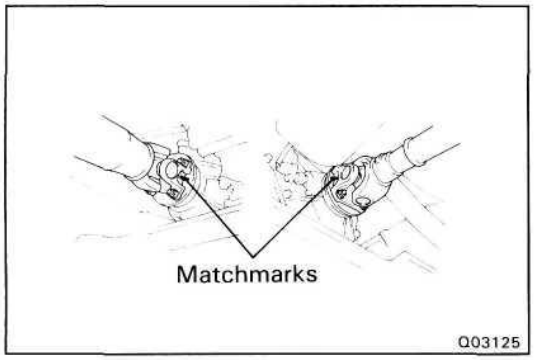
6. REMOVE TRANSFER UNDER COVER



7. DISCONNECT FRONT AND REAR PROPELLER SHAFT FLANGES FROM COMPANION FLANGE ON DIFFERENTIAL

(a) Put matchmarks on the flanges.

(b) Remove the four bolts and nuts.

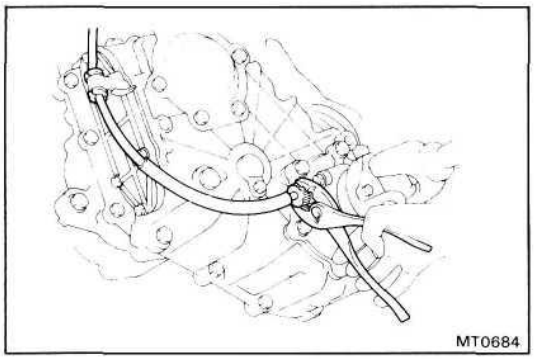


8. DISCONNECT FRONT AND REAR PROPELLER SHAFT FLANGES FROM COMPANION FLANGE ON TRANSFER

(a) Put matchmarks on the flange.

(b) Remove the four nuts.

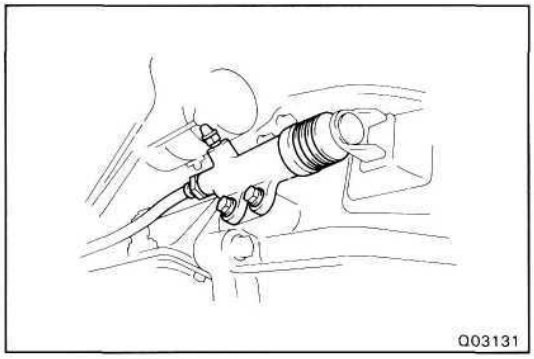
(c) Remove the propeller shaft.



9. REMOVE SPEEDOMETER CABLE

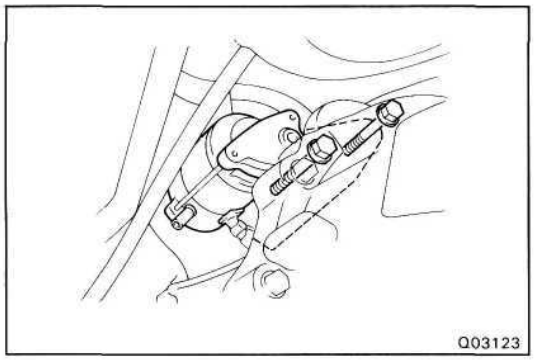
Using pliers, remove the speedometer cable.

10. DISCONNECT BACK-UP LIGHT SWITCH CONNECTOR



11. REMOVE CLUTCH RELEASE CYLINDER

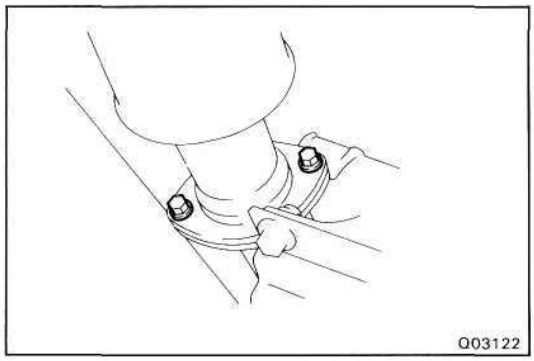
Remove the two bolts and release cylinder.



12. REMOVE STARTER

(a) Disconnect the connector and wire from the starter.

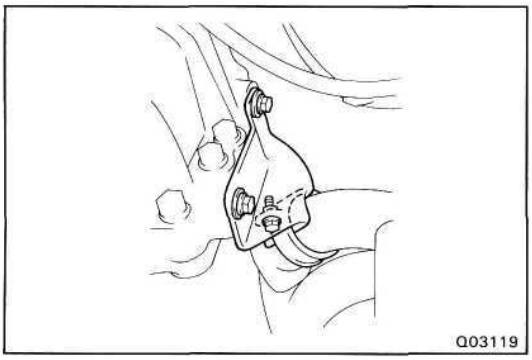
(b) Remove the two bolts and starter.



13. REMOVE FRONT EXHAUST PIPE

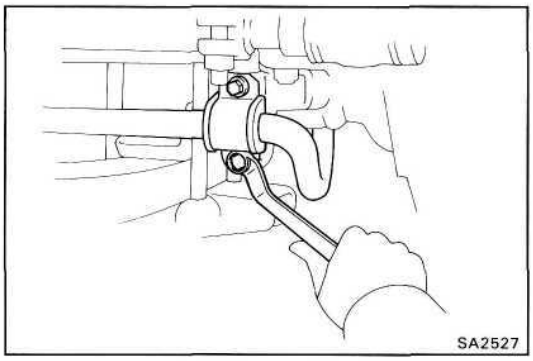
(a) Disconnect the oxygen sensor connector.

(b) Remove the two bolts, bracket and a gasket.



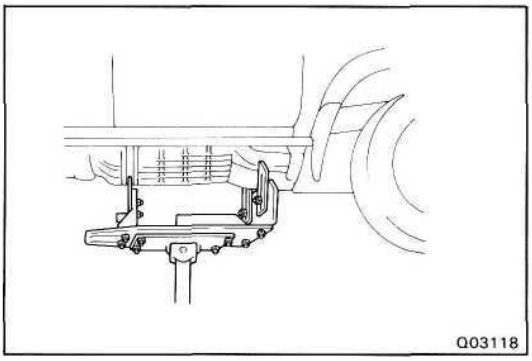
(c) Remove the exhaust pipe clamp from the bracket.

(d) Remove the two bolts and exhaust pipe bracket from the clutch housing.



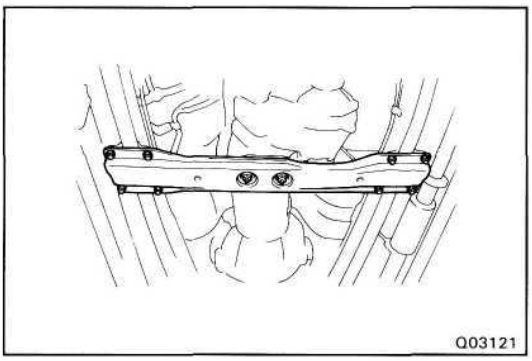
14. REMOVE STABILIZER BRAKET SET BOLTS

Remove four stabilizer bracket set bolts.



15. SUPPORT TRANSMISSION

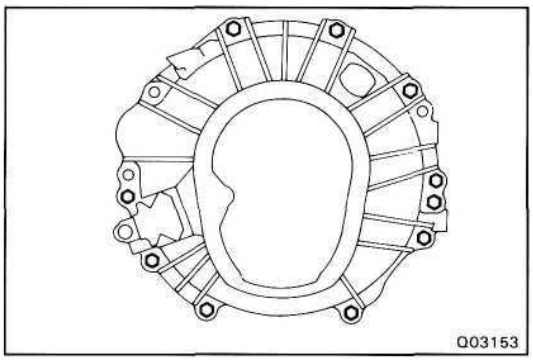
Remove the transmission enough to remove the weight from the rear support.



16. REMOVE CROSSMEMBER

(a) Raise the transmission slightly with a jack.

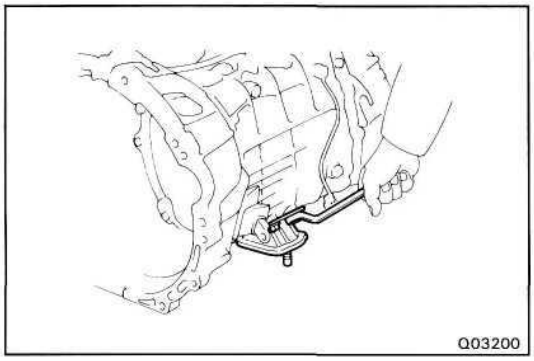
(b) Remove the eight bolts, two nuts and crossmember.



17. REMOVE TRANSMISSION

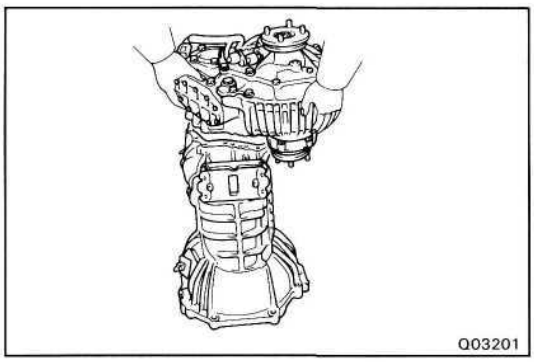
(a) Remove the transmission mounting bolts from the engine.

(b) Pull out the transmission down and toward the rear.



18. REMOVE ENGINE REAR MOUNTING

Remove the four bolts and engine rear mounting from the transmission.

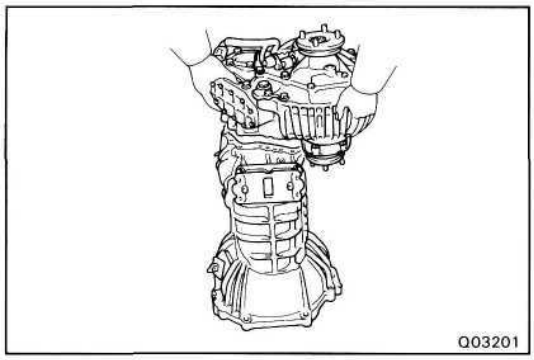


19. REMOVE TRANSFER FROM TRANSMISSION

(a) Remove the transfer adaptor rear mounting bolts.

(b) Pull the transfer straight up and remove it from the transmission.

HINT: Take care not to damage the adaptor rear oil seal with the transfer input gear spline.


Q03201

TRANSMISSION INSTALLATION (See page MT-4)

1. INSTALL TRANSFER TO TRANSMISSION

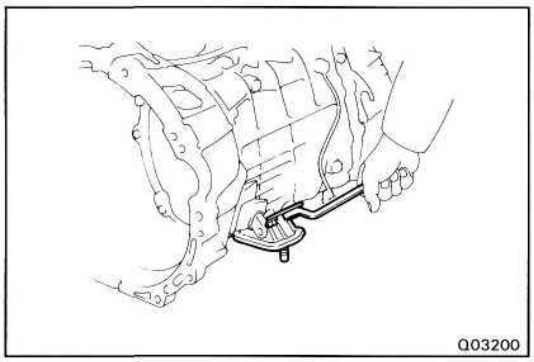
(a) Apply MP grease to the adaptor oil seal.

(b) Install the transfer to the transmission.

HINT: Take care not to damage the oil seal by the input gear spline when installing the transfer.

(c) Install and torque the bolts.

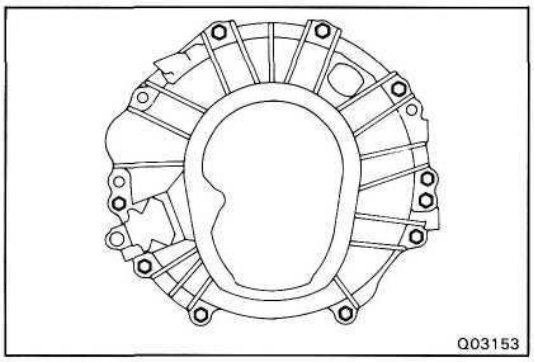
Torque: 37 N-m (380 kgf-cm, 27 ft-lbf)


Q03200

2. INSTALL ENGINE REAR MOUNTING

Install the engine rear mounting and torque the four bolts.

Torque: 59 N-m (600 kgf-cm, 43 ft-lbf)

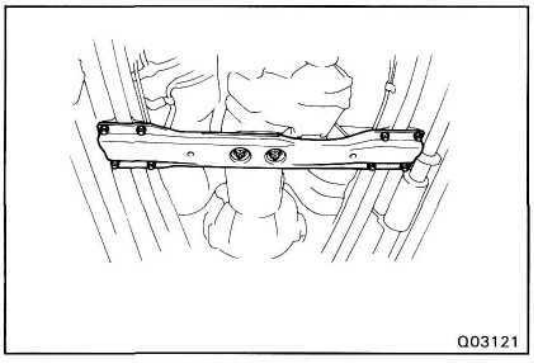

Q03153

3. INSTALL TRANSMISSION TO ENGINE

(a) Align the input shaft spline with the clutch disc and install the transmission to the engine.

(b) Install and torque the ten bolts.

Torque: 72 N-m (730 kgf-cm, 53 ft-lbf)


Q03121

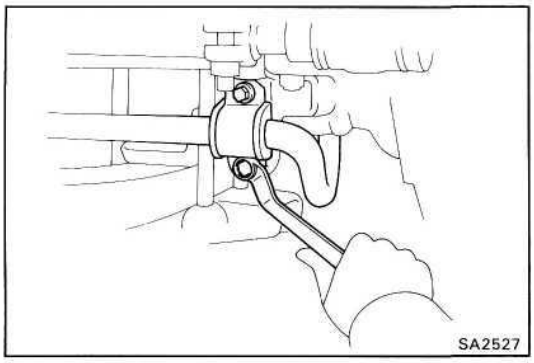
4. INSTALL CROSSMEMBER

(a) Raise the transmission slightly with a jack.

(b) Install the crossmember with eight bolts and two nuts.

Torque: BOLT 39 N-m (400 kgf-cm, 29 ft-lbf)
NUT 76 N-m (780 kgf-cm, 56 ft-lbf)

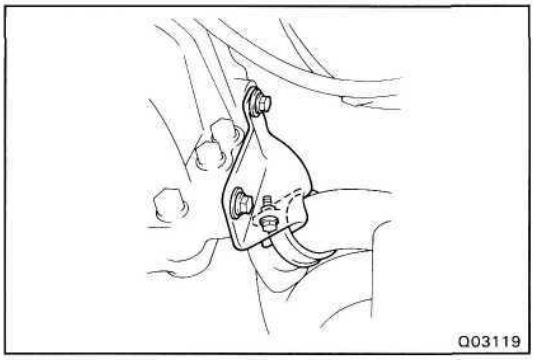
(c) Remove the jack.



5. INSTALL STABILIZER BRACKET SET BOLTS

Install the stabirizer bracket with four bolts.

Torque: 28 N·m (290 kgfcm, 21 ftlbf)



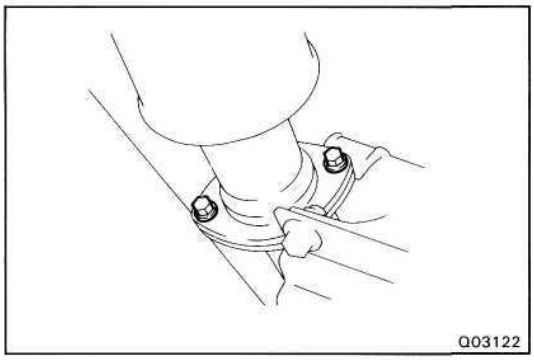
6. INSTALL FRONT EXHAUST PIPE

(a) Install the exhaust pipe bracket and two bolts to the clutch housing.

Torque: 39 N·m (400 kgfcm, 29 ftlbf)

(b) Install the exhaust pipe clamp.

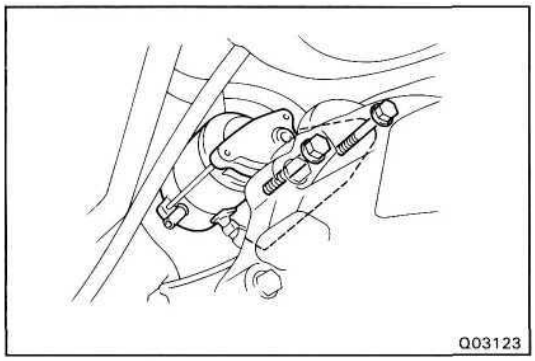
Torque: 19 N·m (195 kgfcm, 14 ftlbf)



(c) Install a new gasket, bracket and torque the two bolts.

Torque: 39 N·m (400 kgfcm, 29 ftlbf)

(d) Connect the oxygen sensor connector.

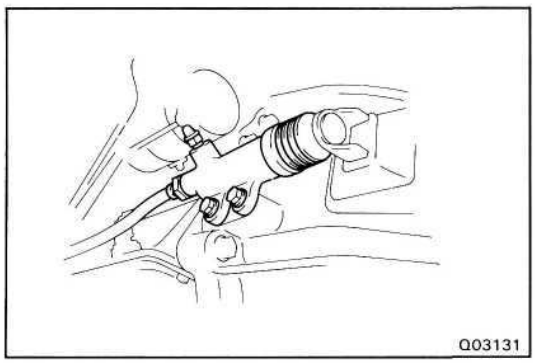


7. INSTALL STARTER

(a) Install the starter with two bolts.

Torque: 39 N·m (400 kgfcm, 29 ftlbf)

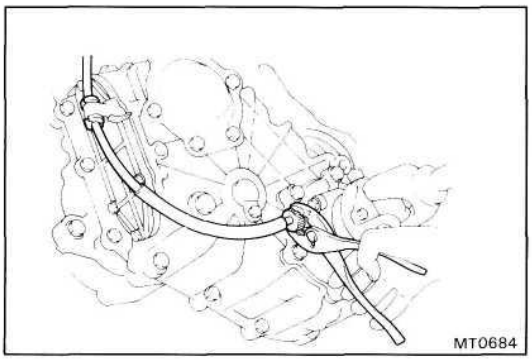
(b) Connect the connector and wire to the starter.



8. INSTALL CLUTCH RELEASE CYLINDER

Install the clutch release cylinder with two bolts.

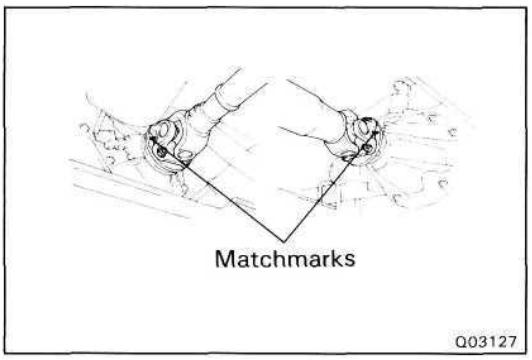
Torque: 12 N·m (120 kgfcm, 9 ftlbf)



9. INSTALL SPEEDOMETER CABLE

Using pliers, install the speedometer cable.

10. CONNECT BACK-UP LIGHT SWITCH CONNECTOR



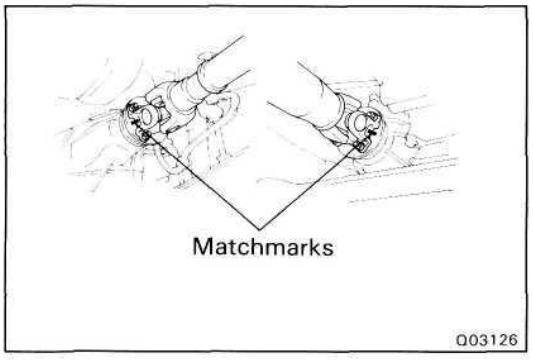
11. CONNECT PROPELLER SHAFT FLANGE TO COMPANION FLANGE ON TRANSFER

(a) Align the matchmarks on the flanges and connect the flanges with four nuts.

(b) Torque the nuts.

Torque:
Front Propeller Shaft
74 Nm (750 kgf-cm, 54 ft-lb)
Rear Propeller Shaft
88 Nm (900 kgfcm, 65 ft-lb)

HINT: When installing the washers, put them properly in place.



12. CONNECT PROPELLER SHAFT FLANGE ON DIFFERENTIAL

(a) Align the matchmarks on the flanges and connect the flanges with four bolts and nuts.

(b) Torque the bolts and nuts.

Torque:
Front Propeller Shaft
74 Nm (750 kgfcm, 54 ft-lb)
Rear Propeller Shaft
88 Nm (900 kgfcm, 65 ft-lb)

HINT: When installing the washers, put them properly in place.

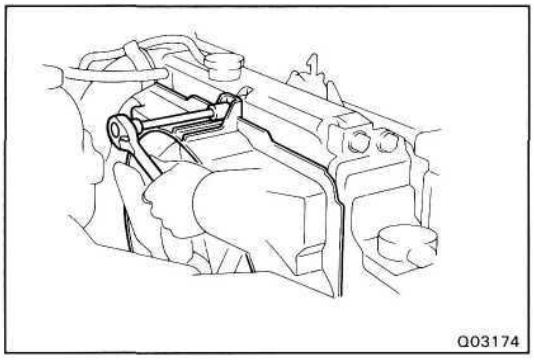
13. INSTALL TRANSFER UNDER COVER

14. FILL TRANSMISSION WITH GEAR OIL

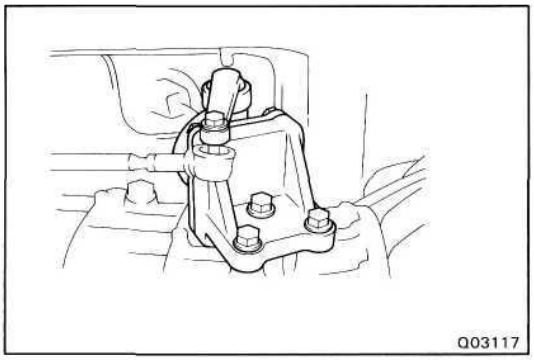
Oil grade:
API GL - 4 or GL - 5

Viscosity:
SAE 75W - 90

Capacity:
2.7 liters (2.6 US qts, 3.1 Imp.qts)

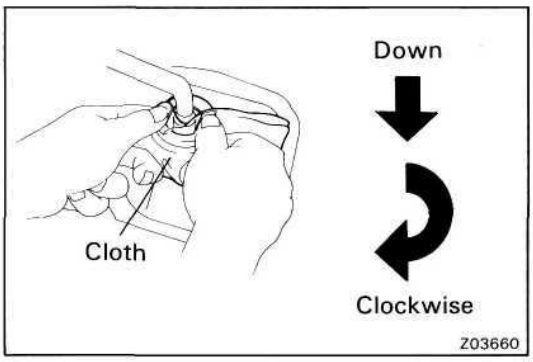

Q03174

15. TIGHTEN FAN SHROUD


Q03117

16. INSTALL TRANSFER SHIFT LEVER

(a) Install the link with the washer and nut.
(b) Install the transfer shift lever and the three bolts.
(c) Install the boot and four screws.
(d) Install the transfer shift lever knob.



Z03660

17. INSTALL TRANSMISSION SHIFT LEVER

(a) Apply MP grease to the transmission shift lever.
(b) Align the groove of the shift lever cap and the pin part of the case cover.
(c) Cover the shift lever cap with a cloth.
(d) Then, pressing down on the shift lever cap, rotate it clockwise to install.
(e) Install the shift lever boot.
(f) Install the transmission shift lever knob.

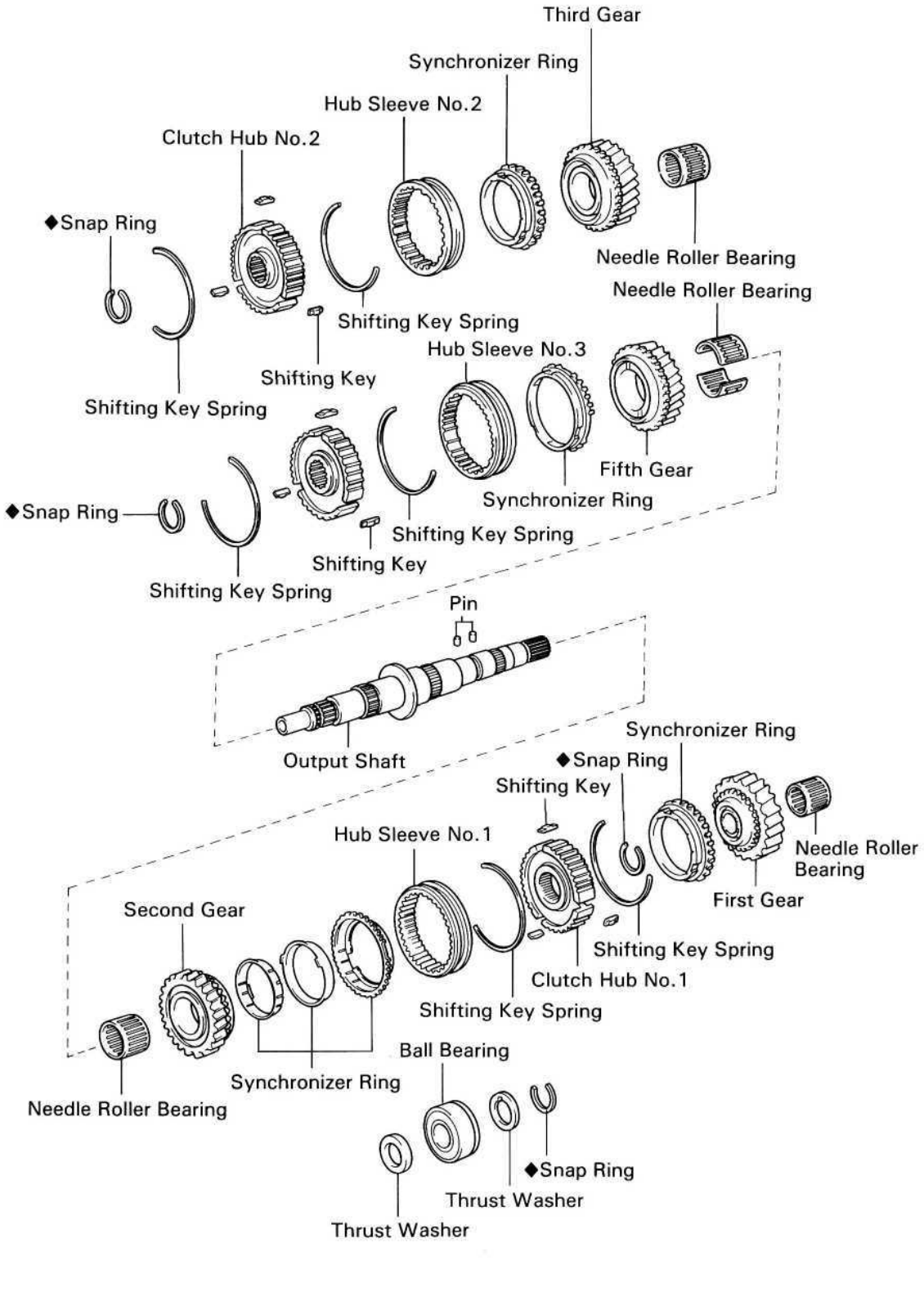
18. INSTALL NEGATIVE BATTERY CABLE

19. PERFORM ROAD TEST

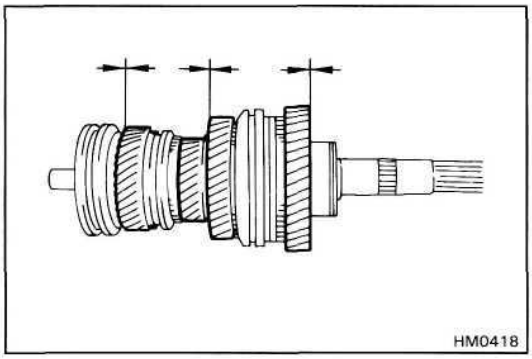
Check for abnormal noise and smooth shifting.

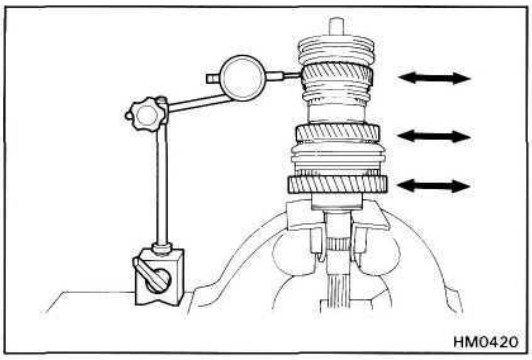
OUTPUT SHAFT

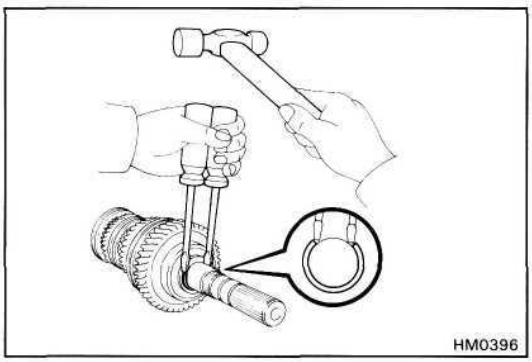
COMPONENTS

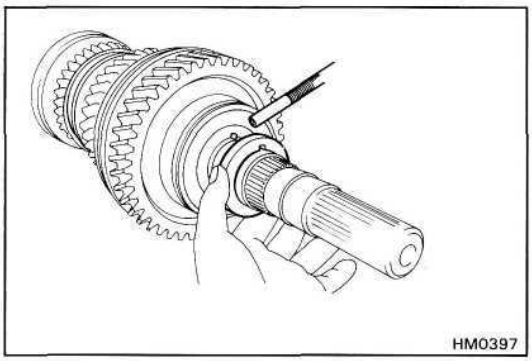


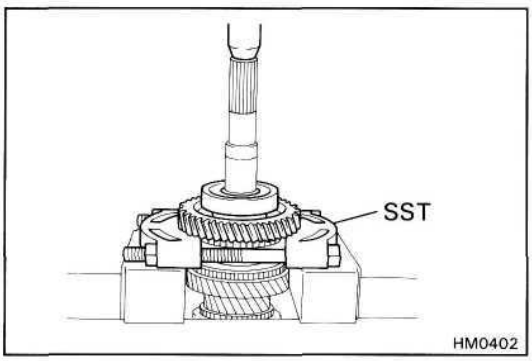
◆ Non-reusable part


HM0418


HM0420


HM0396


HM0397



HM0402

OUTPUT SHAFT DISASSEMBLY

1. INSPECT EACH GEAR THRUST CLEARANCE

Measure the thrust clearance of each gear.

Standard clearance:

1st and 3rd gear	**0.1 — 0.45 mm (0.0039 - 0.0177 in.)**
2nd and 5th gear	**0.1 — 0.35 mm (0.0039 - 0.0138 in.)**

Maximum clearnace:

1st and 3rd gear	**0.45 mm (0.0177 in.)**
2nd and 5th gear	**0.35 mm (0.0138 in.)**

2. INSPECT EACH GEAR OIL CLEARANCE

Using a dial indicator, measure the oil clearance of each gear.

Standard clearance:

1st and 3rd gear	**0.020 - 0.073 mm (0.0008 - 0.0029 in.)**
2nd and 5th gear	**0.015 - 0.068 mm (0.0006 - 0.0027 in.)**

Maximum clearance:

1st and 3rd gear	**0.073 mm (0.0029 in.)**
2nd and 5th gear	**0.068 mm (0.0027 in.)**

3. REMOVE BALL BEARING AND FIRST GEAR

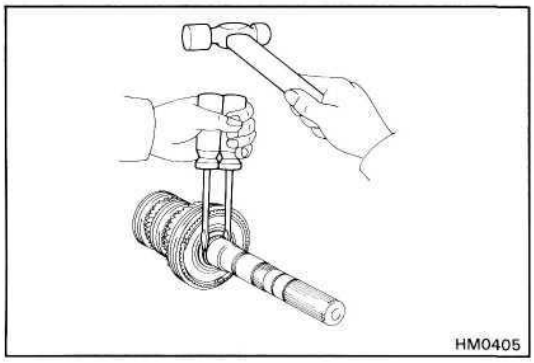
(a) Using two screwdrivers and a hammer, drive out the snap ring.

(b) Remove the thrust washer and pin.

(c) Using SST and a press, remove the ball bearing, thrust washer, first gear and synchronizer rings.

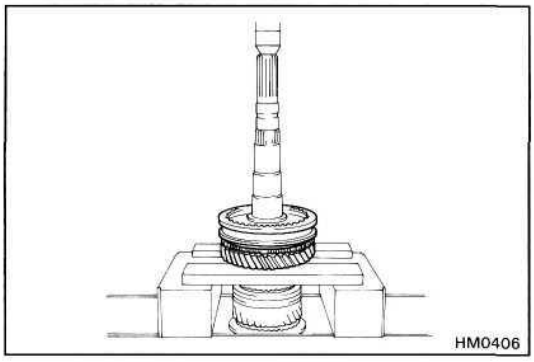
SST 09555-55010

(d) Remove the pin and needle roller bearing.



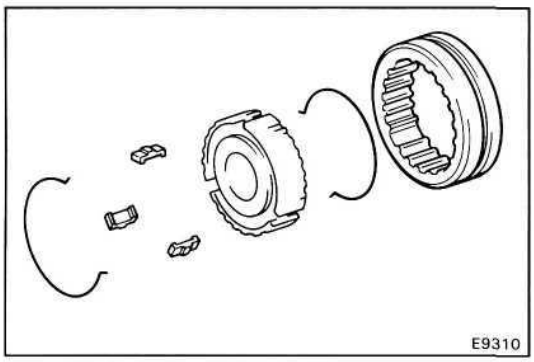
4. REMOVE HUB SLEEVE NO.1 ASSEMBLY, SYNCHRONIZER RING, SECOND GEAR AND NEEDLE ROLLER BEARING

(a) Using two screwdrivers and a hammer, drive out the snap ring.



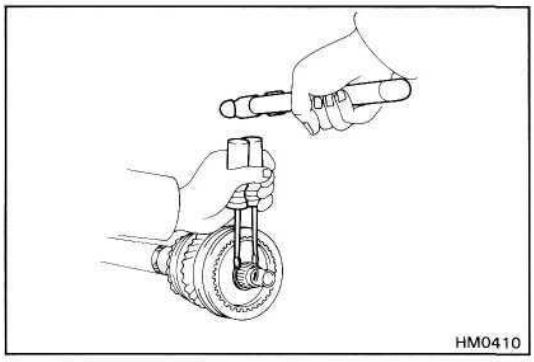
(b) Using a press, remove the hub sleeve No.1 assembly, synchronizer rings, and second gear.

(c) Remove the needle roller bearing.



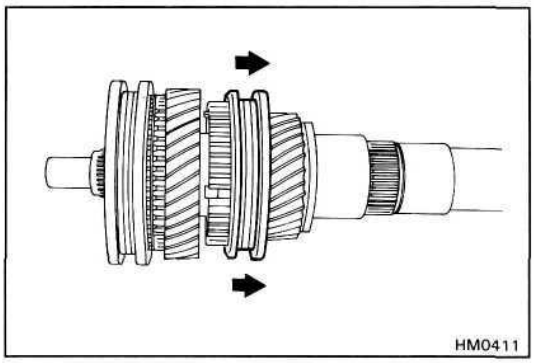
5. REMOVE HUB SLEEVE NO.1, SHIFTING KEYS AND SPRING FROM CLUTCH HUB NO.1

Using a screwdriver, remove the three shifting keys and two springs from the clutch hub No.1.

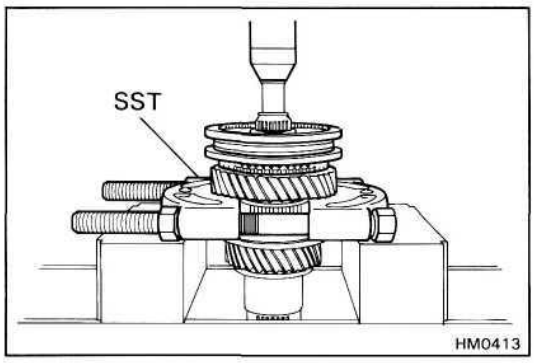


6. REMOVE HUB SLEEVE NO.2 ASSEMBLY, SYNCHRONIZER RINGS, THIRD GEAR AND NEEDLE ROLLER BEARING

(a) Remove two screwdrivers and a hammer, drive out the snap ring.



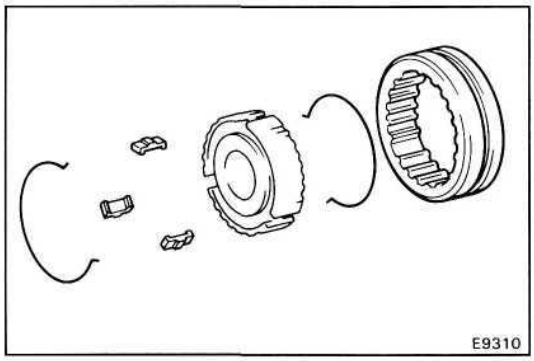
(b) Shift hub sleeve No.3 onto the fifth gear.



(c) Using SST and a press, remove the hub sleeve No.2 assembly, synchronizer ring and third gear.

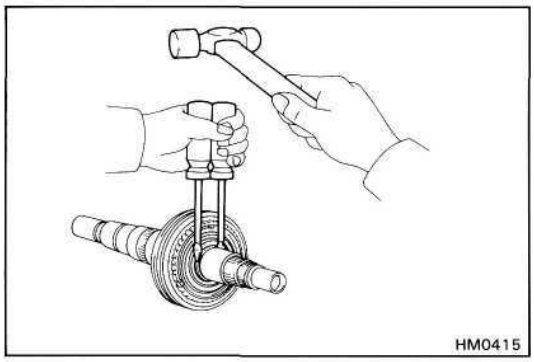
SST 09555-55010

(d) Remove the needle roller bearing.



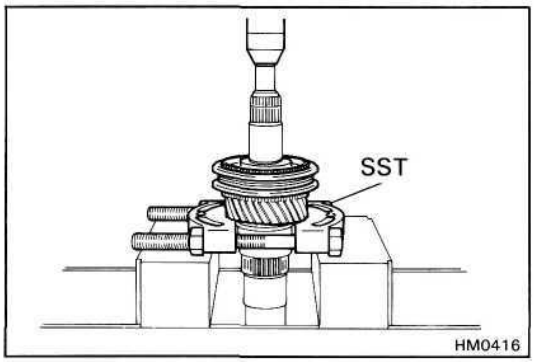
7. REMOVE HUB SLEEVE NO.2, SHIFTING KEYS AND SPRINGS FROM CLUTCH HUB NO.2

Using a screwdriver, remove the three shifting keys and two springs from the clutch hub No.2.



8. REMOVE HUB SLEEVE NO.3 ASSEMBLY, SYNCHRONIZER RING, FIFTH GEAR AND NEEDLE ROLLER BEARING

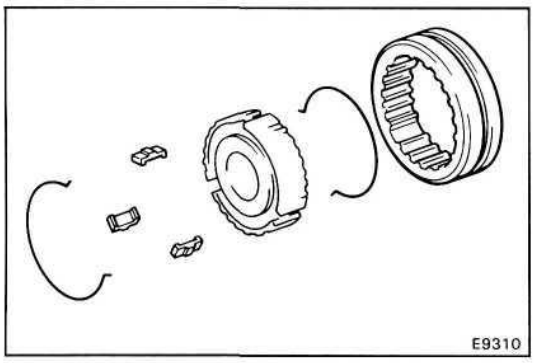
(a) Using two screwdriver, and a hammer, drive out the snap ring.



(b) Using SST and a press, remove the hub sleeve No.3 assembly and synchronizer ring.

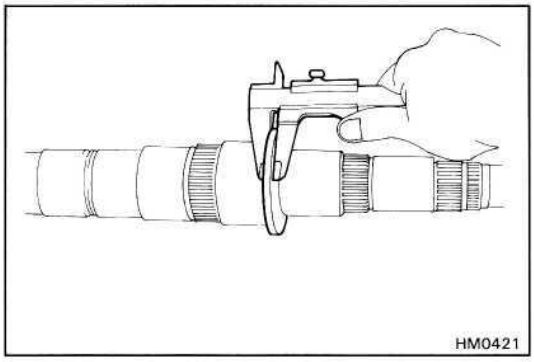
SST 09950-00020

(c) Remove the needle roller bearing.



9. REMOVE HUB SLEEVE NO.3 SHIFTING KEYS AND SPRINGS FROM CLUTCH HUB NO.3

Using a screwdriver, remove the three shifting keys and two springs from the clutch hub No.3.



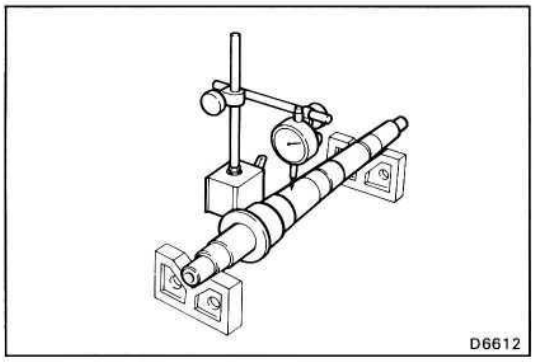
OUTPUT SHAFT ASSEMBLY INSPECTION

INSPECT OUTPUT SHAFT

(a) Using calipers, measure the output shaft flange thickness.

Minimum thickness:
4.725 mm (0.1860 in.)

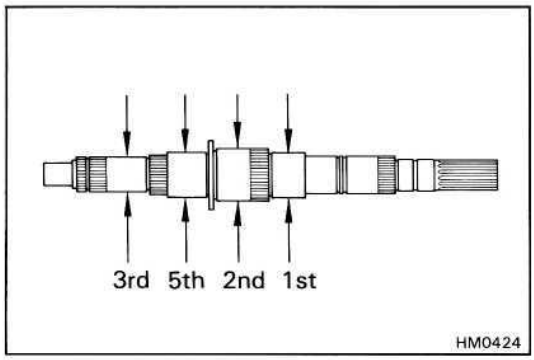
If the thickness is less than the minimum, replace the output shaft.



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

Maximum runout:
0.03 mm (0.0020 in.)

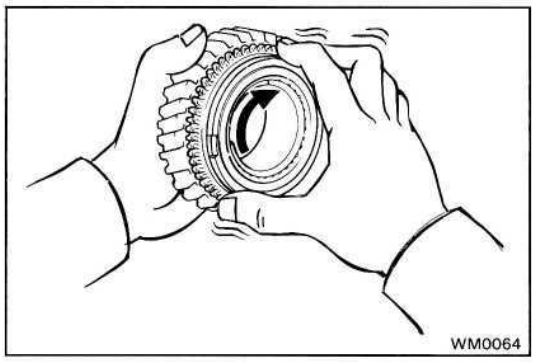
If the run out exceeds the maximum, replace the output shaft.



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

Minimum outer diameter:
1st 49.979 mm (1.9677 in.)
2nd 57.984 mm (2.2828 in.)
3rd 37.979 mm (1.4952 in.)
5rh 45.984 mm (1.8104 in.)

If the outer diameter is less than the minimum, replace the output shaft.



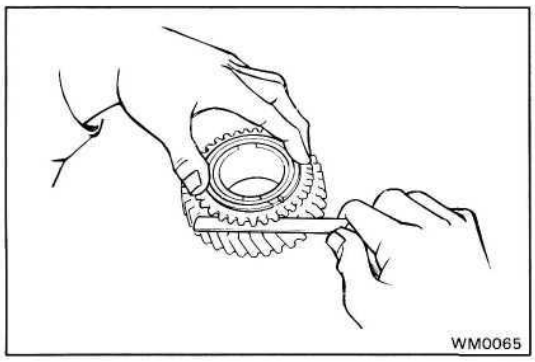
OUTPUT SHAFT COMPONENT PARTS INSPECTION

1. INSPECT SYNCHRONIZER RINGS FOR 1st AND 3rd GEAR

(a) Check for wear or damage.

(b) Check the braking effect of the synchronizer ring. Turn the synchronizer ring in one direction while pushing it to the gear cone and check that the ring is locked. If the braking effect is insufficient, lightly rub the synchronizer ring and gear cone by applying a small amount of fine lapping compound.

NOTICE:
- **Wash off completely the fine lapping compound after rubbing.**
- **Check again the braking effect of the synchronizer ring.**

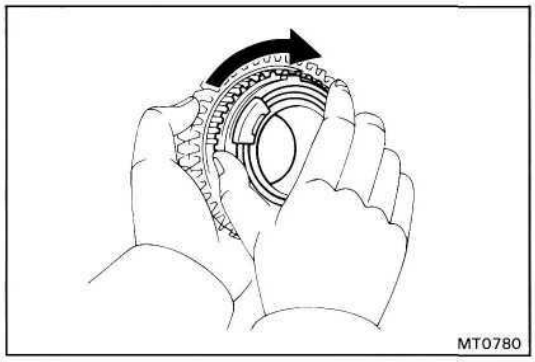

WM0065

(c) Using a feeler gauge, measure the clearance between the synchronizer ring back and the gear spline end.

Minimum clearance:
1st gear 1.1 mm (0.0433 in.)
3rd gear 0.8 mm (0.0315 in.)

HINT:
- When replacing either a synchronizer ring or gear, apply a small amount of fine lapping compound between the synchronizer ring and gear cone. Lightly rub the synchronizer ring and gear together.
- When replacing both the synchronizer ring and gear, there is no need to apply any compound or to rub them together.

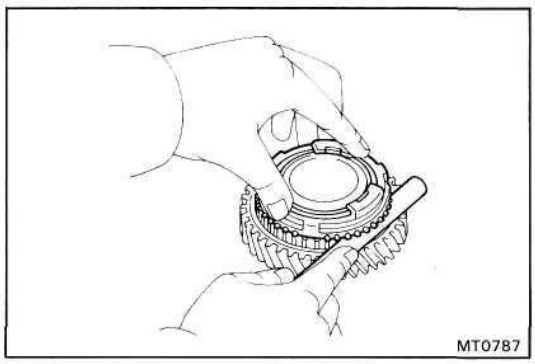
NOTICE: Wash off completely the fine lapping compound after rubbing.


MT0780

2. INSPECT SYNCHRONIZER RING FOR 2nd GEAR

(a) Check for wear or damage.

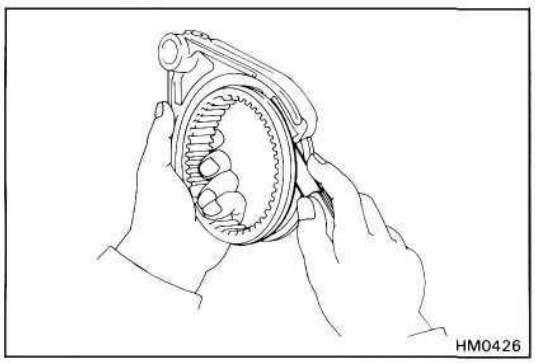
(b) Check the braking effect of the synchronizer direction while pushing it to the gear cone and check that the ring is locked. If the braking effect is insufficient, replace the synchronizer ring.


MT0787

(c) Measure the clearance between the synchronizer ring back and gear spline end.

Minimum clearance:
0.85 mm (0.0335 in.)

If the clearance is less than the limit, replace the synchronizer ring.

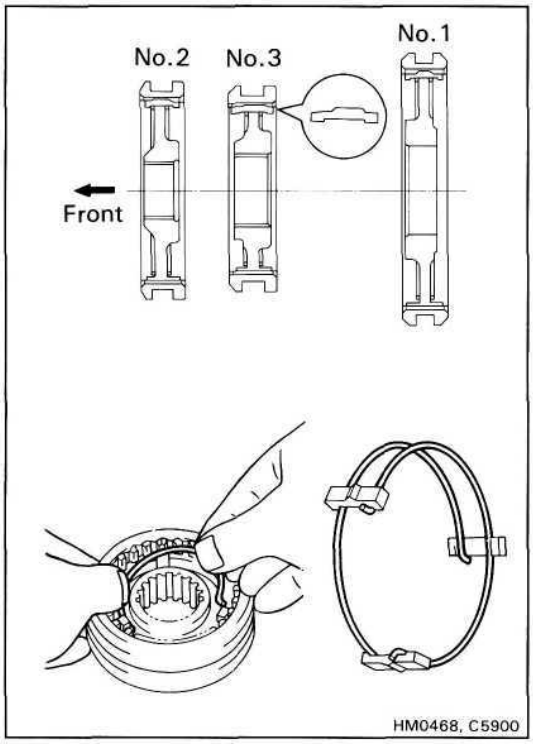

HM0426

3. **INSPECT CLEARNACE OF SHIFT FORKS AND HUB SLEEVES**

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

Maximum clearance:
0.35 mm (0.0138 in.)

If the clearance exceeds the maximum, replace the shift fork or hub sleeve.



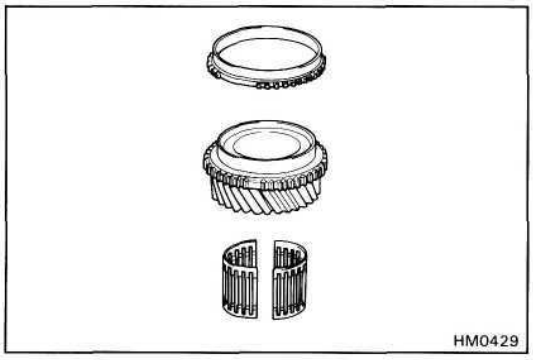
OUTPUT SHAFT ASSEMBLY

1. INSTALL CLUTCH HUB NO.1, NO.2 AND NO.3 INTO HUB SLEEVE

(a) Install the clutch hub and shifting keys to the hub sleeve.

(b) Install the springs under the shifting keys.

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

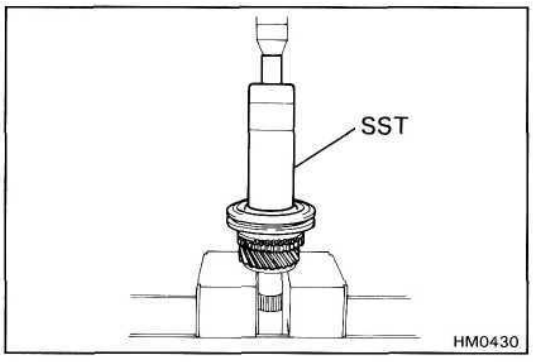


2. INSTALL FIFTH GEAR AND HUB SLEEVE NO.3 ASSEMBLY ON OUTPUT SHAFT

(a) Apply gear oil to the shaft and needle roller bearing.

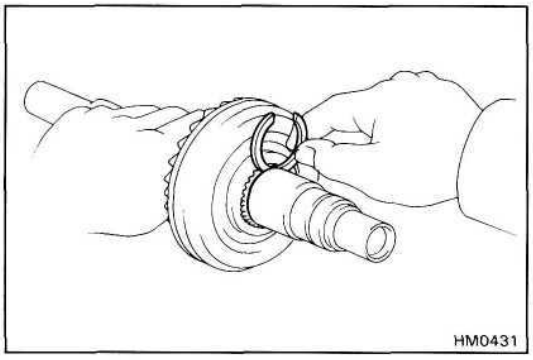
(b) Place the synchronizer ring on the gear and align the ring slots with the shifting keys.

(c) Install the needle roller bearing in the fifth gear.



(d) Using SST and a press, install the fifth gear and hub sleeve No.3.

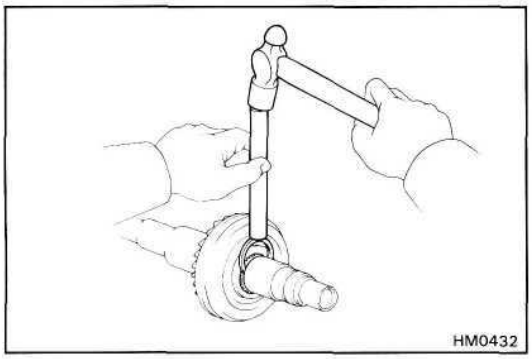
SST 09316-60010 (09316-00010)



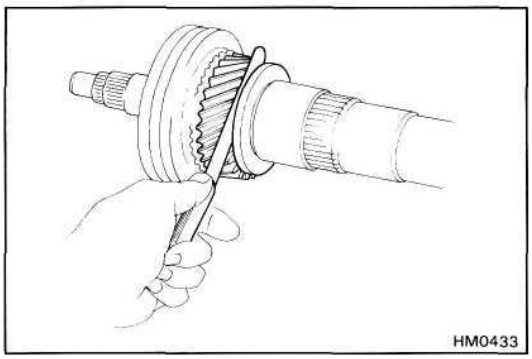
3. **INSTALL SNAP RING**

(a) Select a snap ring that will allow minimum axial play.

Mark	Thickness mm (in.)
A	2.40 – 2.45 (0.0945 – 0.0965)
B	2.45 – 2.50 (0.0965 – 0.0984)
C	2.50 – 2.55 (0.0984 – 0.1004)
D	2.55 – 2.60 (0.1004 – 0.1024)
E	2.60 – 2.65 (0.1024 – 0.1044)
F	2.65 – 2.70 (0.1044 – 0.1063)


HM0432

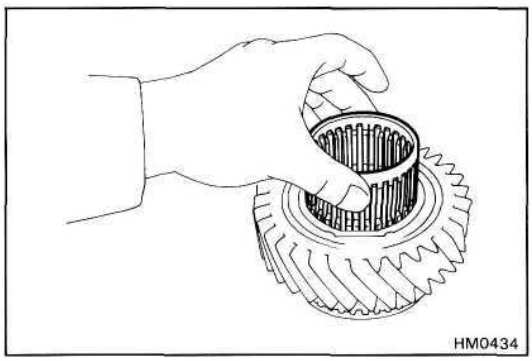
(b) Using a brass bar and hammer, drive in the snap ring.


HM0433

4. INSPECT FIFTH GEAR THRUST CLEARANCE

Using a feeler gauge, measure the fifth gear thrust clearance.

Standard clearance:
0.1 - 0.35 mm (0.0039 - 0.0138 in.)

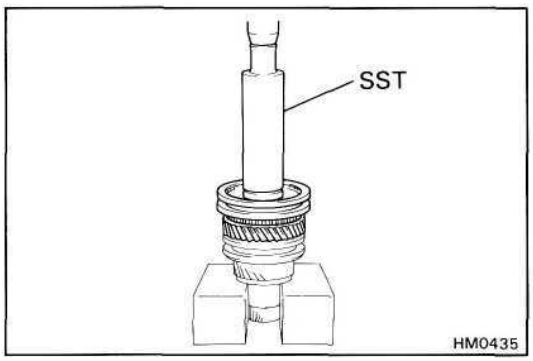

HM0434

5. INSTALL THIRD GEAR AND HUB SLEEVE NO.2 ASSEMBLY

(a) Apply gear oil to the shaft and needle roller bearing.

(b) Place the synchronizer ring on the gear and align the ring slots with the shifting keys.

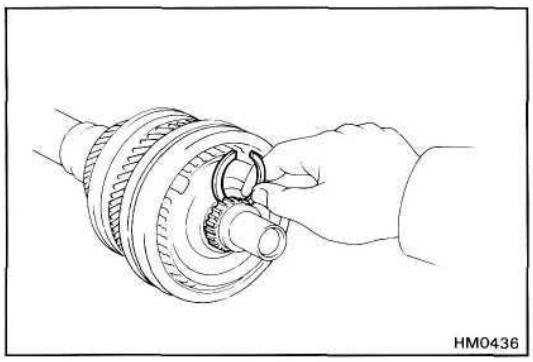
(c) Install the needle roller bearing in the third gear.



HM0435

(d) Using SST and a press, install the third gear and hub sleeve No.2.

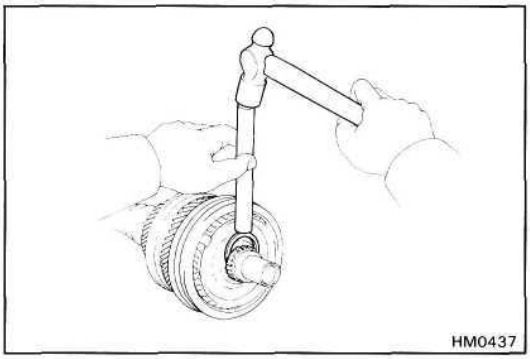
SST 09316-60010 (09316-00010)


HM0436

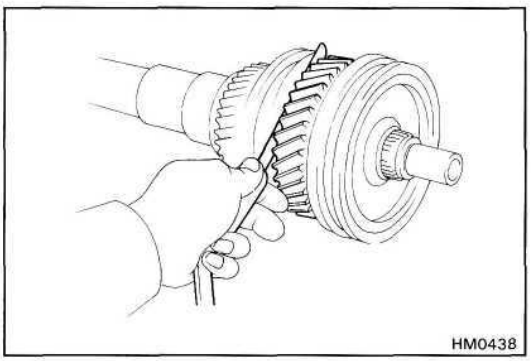
6. INSTALL SNAP RING

(a) Select a snap ring that will allow minimum axial play.

Mark	Thickness mm (in.)
4	1.90 — 1.95 (0.0748 — 0.0768)
5	1.95 — 2.00 (0.0768 — 0.0787)
6	2.00 — 2.05 (0.0787 — 0.0807)
7	2.05 — 2.10 (0.0807 — 0.0827)
8	2.10 — 2.15 (0.0827 — 0.0847)
9	2.15 — 2.20 (0.0847 — 0.0866)


HM0437

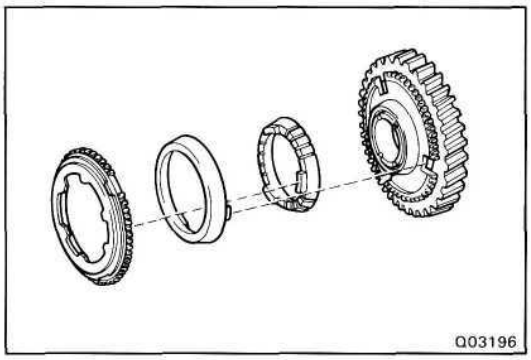
(b) Using a brass bar and hammer, drive in a new snap ring.


HM0438

7. INSPECT THIRD GEAR THRUST CLEARANCE

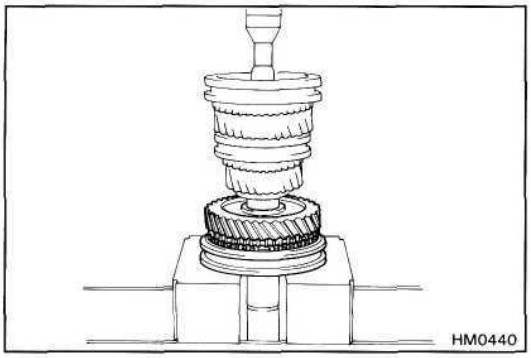
Using a feeler gauge, measure the third gear thrust clearance.

Standard clearance:
0.1 - 0.45 mm (0.0039 - 0.0138 in.)


Q03196

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

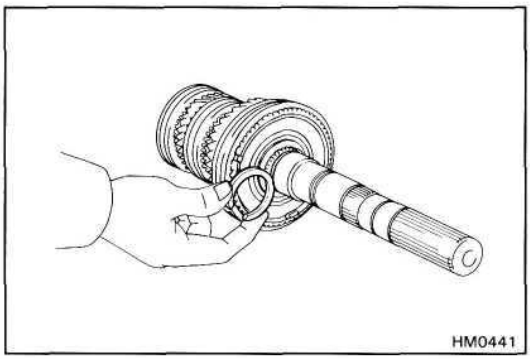
(a) Place the synchronizer rings on the 2nd gear.


HM0440

(b) Apply gear oil to the shaft and needle roller bearing.

(c) Install the needle roller bearing in the second gear.

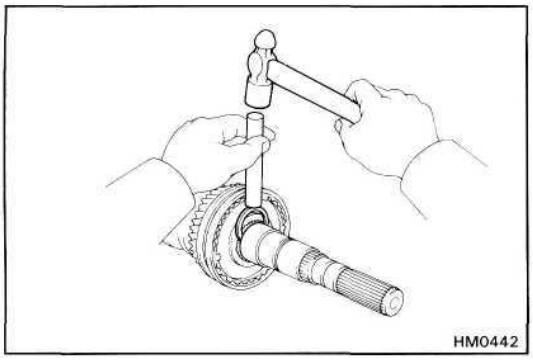
(d) Using a press, install the second gear and hub sleeve No.1 assembly.


HM0441

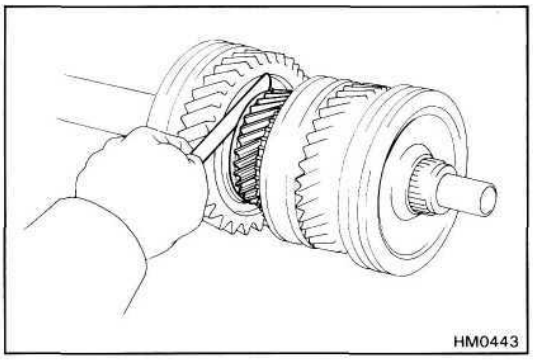
9. INSTALL SNAP RING

(a) Select a snap ring that will allow minimum axial play.

Mark	Thickness mm (in.)
A	2.90 — 2.95 (0.1142 — 0.1162)
B	2.95 — 3.00 (0.1162 — 0.1181)
C	3.00 — 3.05 (0.1181 — 0.1201)
D	3.05 — 3.10 (0.1201 — 0.1220)
E	3.10 — 3.15 (0.1220 — 0.1240)
F	3.15 — 3.20 (0.1240 — 0.1260)


HM0442

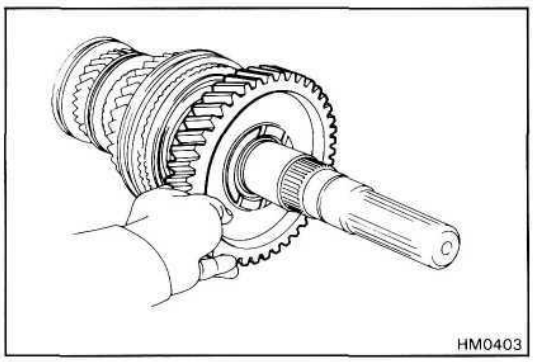
(b) Using a brass bar and hammer, drive in a new snap ring.


HM0443

10. INSPECT SECOND GEAR THRUST CLEARANCE

Using a feeler gauge, measure the second gear thrust clearance.

Standard clearance:
0.1 - 0.35 mm (0.0039 - 0.0138 in.)

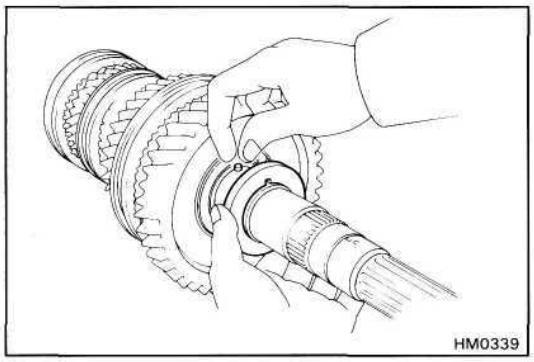

HM0403

11. INSTALL FIRST GEAR

(a) Apply gear oil to the shaft and needle roller bearing.

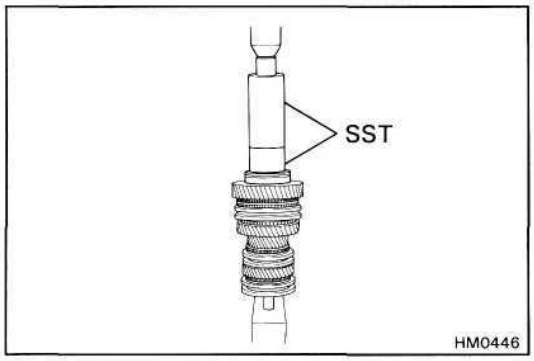
(b) Place the synchronizer ring on the gear and align the ring slots with the shifting keys.

(c) Install the needle roller bearing in the first gear.


HM0339

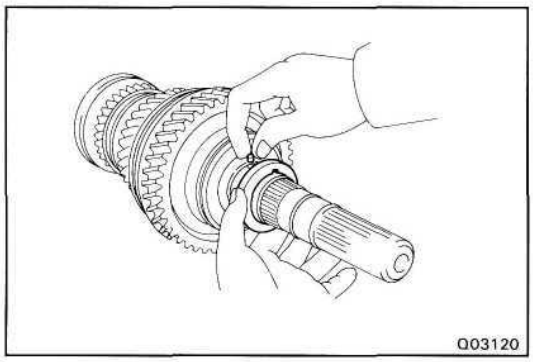
12. INSTALL BALL BEARING

(a) Install the pin and thrust washer.

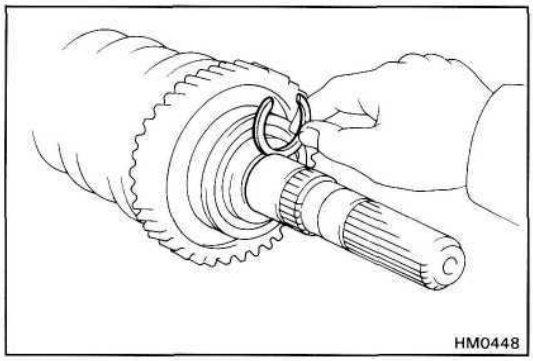


HM0446

(b) Using SST and a press, install the ball bearing.
SST 09316-60010 (09316-00010), 09523-36010



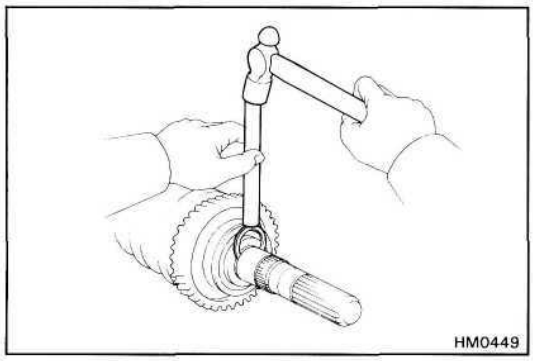
(c) Install the pin and thrust washer.



13. INSTALL SNAP RING

(a) Select a snap ring that will allow minimum axial play.

Mark	Thickness mm (in.)
A	2.40 – 2.45 (0.0945 – 0.0965)
B	2.45 – 2.50 (0.0965 – 0.0984)
C	2.50 – 2.55 (0.0984 – 0.1004)
D	2.55 – 2.60 (0.1004 – 0.1024)
E	2.60 – 2.65 (0.1024 – 0.1044)
F	2.65 – 2.70 (0.1044 – 0.1063)
G	2.70 – 2.75 (0.1063 – 0.1083)
H	2.75 – 2.80 (0.1083 – 0.1102)



(b) Using a brass bar and a hammer, drive in a new snap ring.

SERVICE SPECIFICATIONS

SERVICE DATA

Output shaft 1st gear journal diameter			
	Limit	49.979 mm	1.9177 in.
Output shaft 2nd gear journal diameter			
	Limit	57.984 mm	2.2828 in.
Output shaft 3rd gear journal diameter			
	Limit	37.979 mm	1.4952 in.
Output shaft 5th gear journal diameter			
	Limit	45.984 mm	1.8104 in.
Output shaft Frange thickness			
	Limit	4.725 mm	0.1860 in.
Output shaft Runout			
	Limit	0.03 mm	0.0012 in.
Gear thrust clearance 1st and 3rd			
	STD	0.1 – 0.45 mm	0.0039 – 0.0177 in.
Gear thrust clearance 2nd and 5th			
	STD	0.1 – 0.35 mm	0.0039 – 0.0138 in.
Gear oil clearance 1st and 3rd			
	STD	0.020 – 0.073 mm	0.0008 – 0.0029 in.
Gear oil clearance 2nd and 5th			
	STD	0.015 – 0.068 mm	0.0006 – 0.0027 in.
Synchronizer ring for 1st gear clearance			
	Limit	1.1 mm	0.04331 in.
Synchronizer ring for 2nd gear clearance			
	Limit	0.85 mm	0.0335 in.
Synchronizer ring for 3rd gear clearance			
	Limit	0.8 mm	0.0315 in.
Output shaft snap ring thickness			
No.3 Hub sleeve	Mark A	2.40 – 2.45 mm	0.0945 – 0.0965 in.
No.3 Hub sleeve	Mark B	2.45 – 2.50 mm	0.0965 – 0.0984 in.
No.3 Hub sleeve	Mark C	2.50 – 2.55 mm	0.0984 – 0.1004 in.
No.3 Hub sleeve	Mark D	2.55 – 2.60 mm	0.1004 – 0.1024 in.
No.3 Hub sleeve	Mark E	2.60 – 2.65 mm	0.1024 – 0.1044 in.
No.3 Hub sleeve	Mark F	2.65 – 2.70 mm	0.1044 – 0.1063 in.
No.2 Hub sleeve	Mark 4	1.90 – 1.95 mm	0.0748 – 0.0768 in.
No.2 Hub sleeve	Mark 5	1.95 – 2.00 mm	0.0768 – 0.0787 in.
No.2 Hub sleeve	Mark 6	2.00 – 2.05 mm	0.0787 – 0.0807 in.
No.2 Hub sleeve	Mark 7	2.05 – 2.10 mm	0.0807 – 0.0827 in.
No.2 Hub sleeve	Mark 8	2.10 – 2.15 mm	0.0827 – 0.0847 in.
No.2 Hub sleeve	Mark 9	2.15 – 2.20 mm	0.0847 – 0.0866 in.
No.1 Hub sleeve	Mark A	2.90 – 2.95 mm	0.1142 – 0.1162 in.
No.1 Hub sleeve	Mark B	2.95 – 3.00 mm	0.1162 – 0.1181 in.
No.1 Hub sleeve	Mark C	3.00 – 3.05 mm	0.1181 – 0.1201 in.
No.1 Hub sleeve	Mark D	3.05 – 3.10 mm	0.1201 – 0.1220 in.
No.1 Hub sleeve	Mark E	3.10 – 3.15 mm	0.1220 – 0.1240 in.
No.1 Hub sleeve	Mark F	3.15 – 3.20 mm	0.1240 – 0.1260 in.
Rear bearing	Mark A	2.40 – 2.45 mm	0.0945 – 0.0965 in.
Rear bearing	Mark B	2.45 – 2.50 mm	0.0965 – 0.0984 in.
Rear bearing	Mark C	2.50 – 2.55 mm	0.0984 – 0.1004 in.
Rear bearing	Mark D	2.55 – 2.60 mm	0.1004 – 0.1024 in.
Rear bearing	Mark E	2.60 – 2.65 mm	0.1024 – 0.1044 in.
Rear bearing	Mark F	2.65 – 2.70 mm	0.1044 – 0.1063 in.
Rear bearing	Mark G	2.70 – 2.75 mm	0.1063 – 0.1083 in.
Rear bearing	Mark H	2.75 – 2.80 mm	0.1083 – 0.1102 in.

TORQUE SPECIFICATIONS

Part tightened	N·m	kgf·cm	ft·lbf
Transfer x Transmission	69	700	51
Engine rear mounting x Transfer adapter	59	600	43
Transmission x Engine	72	730	53
Crossmember x Body	39	400	29
Crossmember x Engine rest mounting	76	780	56
Stabirizer bracket x Axle housing	28	290	21
Exhaust pipe bracket x Clutch housing	39	400	29
Exhaust pipe clamp	19	195	14
Exhaust center pipe	39	400	29
Transmission x Starter	39	400	29
Clutch release cylinder set bolt	12	120	9
Shift lever control retainer x Transmission case	17	170	12
Front propeller shaft x Front differential	74	750	54
Front propeller shaft x Transfer	74	750	54
Rear propeller shaft x Rear differential	88	900	65
Rear propeller shaft x Transfer	88	900	65

DESCRIPTION

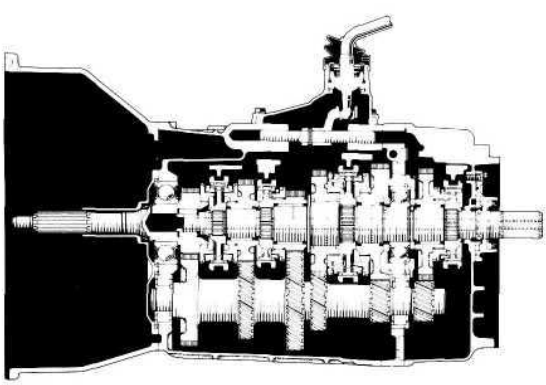
PRECAUTIONS

When working with FIPG material, you must be observe the following.

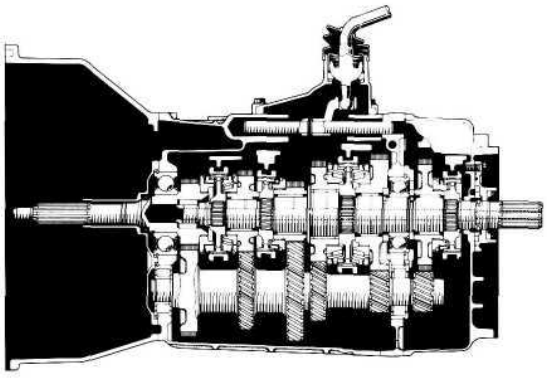
- Using a razor blade and gasket scraper, remove all the old sealant (FIPG) material from the gasket surfaces.
- Throughly clean all components to remove all the loose material.
- Clean both sealing surfaces with a non-residue solvent.
- Apply the sealant in approx. 1 mm (0.04 in.) bead along the sealing surface.
- Parts must be assembled within 10 minutes of application. Otherwise, the sealant (FIPG) material must be removed and reapplied.

DESCRIPTION

- Transmission type H150F and H151F are constant mesh synchronizers for forward gears, and a sliding mesh reverse gear.
- (H1 50F) A triple-cone type synchromesh mechanism is used in the second gear to improve the shift feeling characteristics. This helps to reduce the shifting effort, provide smoothly shifting.
- (H1 51F) A triple-cone type synchromesh mechanism is used in the first, second and third gears to improve the shift feeling characteristics. This helps to reduce the shifting effort, provide smoothly shifting.
- The input shaft is composed of the 1st and 2nd speed gears and the reverse drive gear, and the output shaft is composed of the drive gear (for use with the ring gear).



Q03143

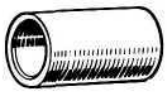
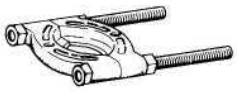


Q03145

Type of Transmission		H150F	H151F
Type of Engine		1HZ	1HD-T, 1FZ-F, 1FZ-FE
Gear Ratio	1st	4.529	4.081
	2nd	2.464	2.294
	3rd	1.490	←
	4th	1.000	←
	5th	0.881	←
	Reverse	4.313	←
Oil Capacity		2.7 liters (2.6 US qts, 3.1 Imp.qts)	
Oil Vicosity		SAE75W — 90	
Oil Grade		API GL-4 or GL-5	

PREPARATION

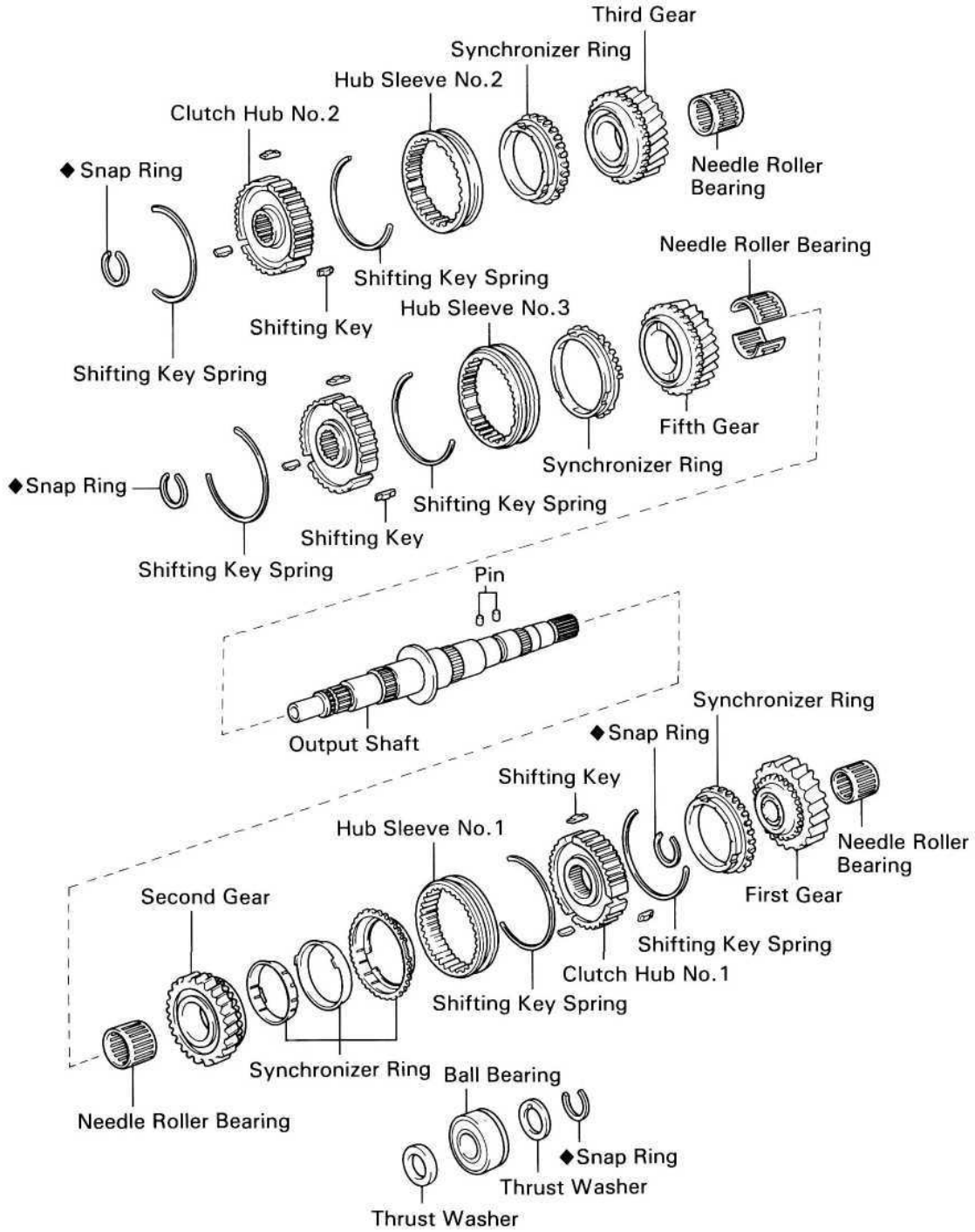
SST (SPECIAL SERVICE TOOLS)

	09316-60010	Transmission & Transfer Bearing Replacer	
	(09316-00010)	Replacer Pipe	
	09523-36010	Rear Axle Hub Guide Tool	Output shaft rear ball bearing
	09555-55010	Differential Drive Pinion Bearing Replacer	
	09950-00020	Bearing Remover	

OUTPUT SHAFT

COMPONENTS

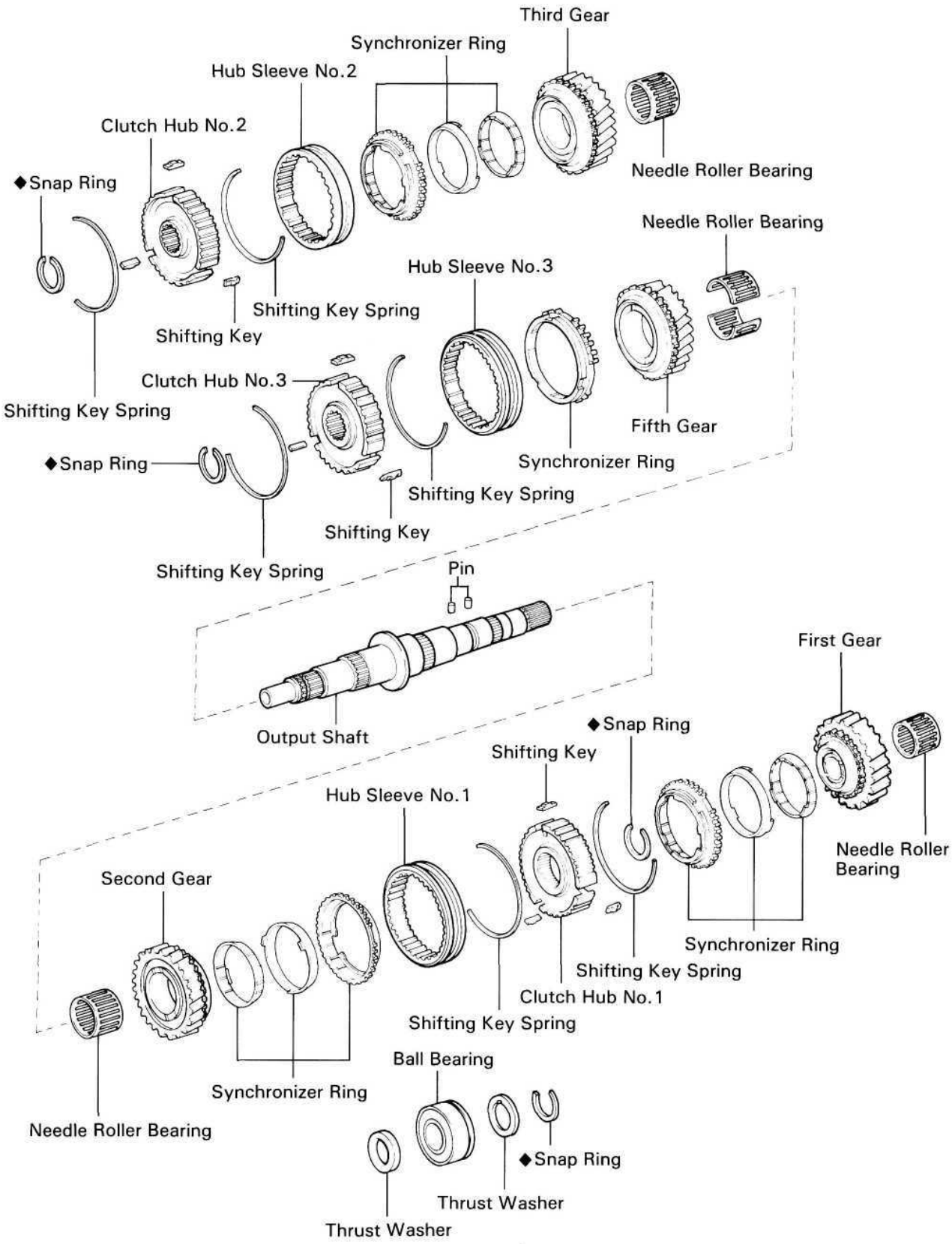
H150F



◆ Non-reusable part

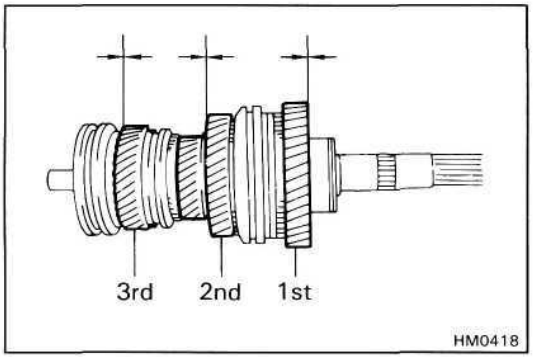
Q03128

H151F



◆ Non-reusable part

HM0527



OUTPUT SHAFT DISASSEMBLY

1. INSPECT EACH GEAR THRUST CLEARANCE

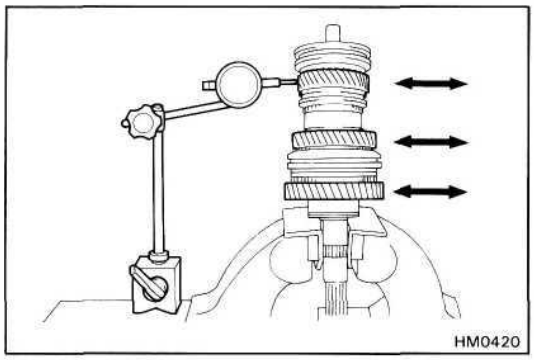
Measure the thrust clearance of each gear.

Standard clearance:

1st and 3rd gear	**0.1 — 0.45 mm (0.0039 - 0.0177 in.)**
2nd and 5th gear	**0.1 — 0.35 mm (0.0039 - 0.0138 in.)**

Maximum clearance:

1 st and 3rd gear	**0.45 mm (0.0177 in.)**
2nd and 5th gear	**0.35 mm (0.0138 in.)**



2. INSPECT EACH GEAR OIL CLEARANCE

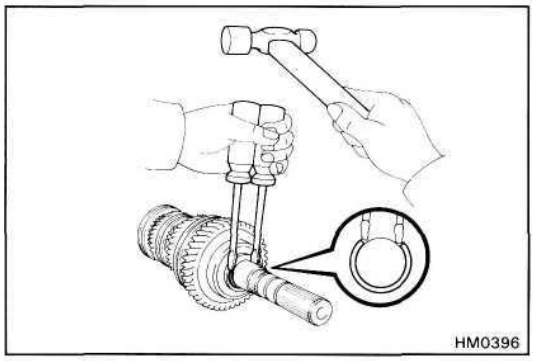
Using a dial indicator, measure the oil clearance of each gear.

Standard clearance:

1st and 3rd gear	**0.020 — 0.073 mm (0.0008 - 0.0029 in.)**
2nd and 5th gear	**0.015 — 0.068 mm (0.0006 - 0.0027 in.)**

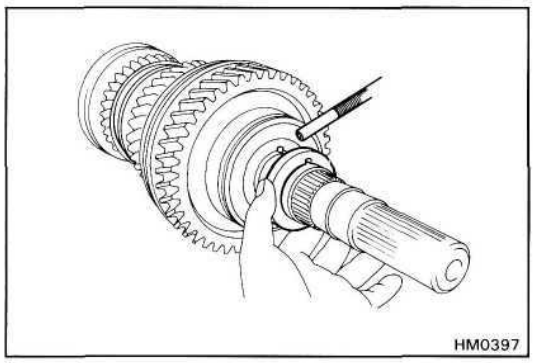
Maximum clearance:

1st and 3rd gear	**0.073 mm (0.0029 in.)**
2nd and 5th gear	**0.068 mm (0.0027 in.)**

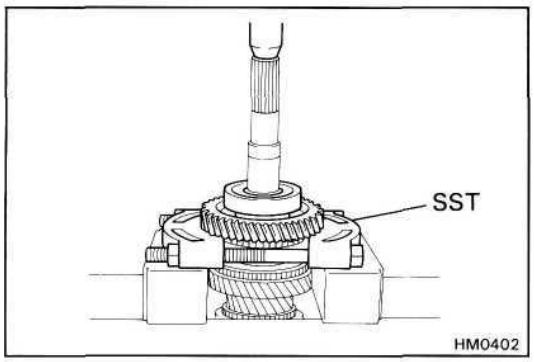


3. REMOVE BALL BEARING AND FIRST GEAR

(a) Using two screwdrivers and a hammer, drive out the snap ring.



(b) Remove the thrust washer and pin.



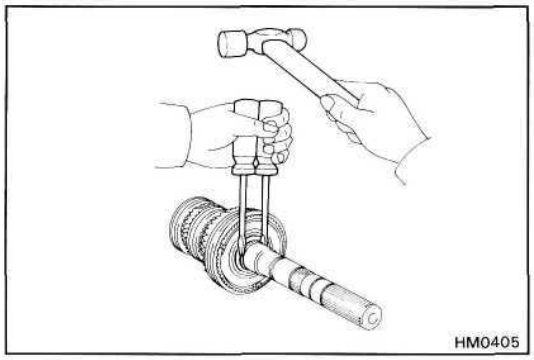
(c) Using SST and a press, remove the ball bearing, thrust washer, first gear and synchronizer ring.

H150F — Single Synchronizer ring

H1 51F — Triple Synchronizer rings

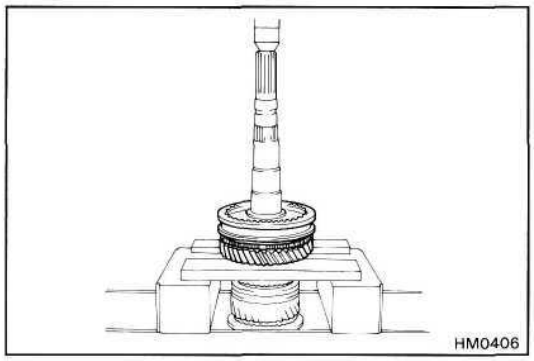
SST 09555-55010

(d) Remove the pin and needle roller bearing.



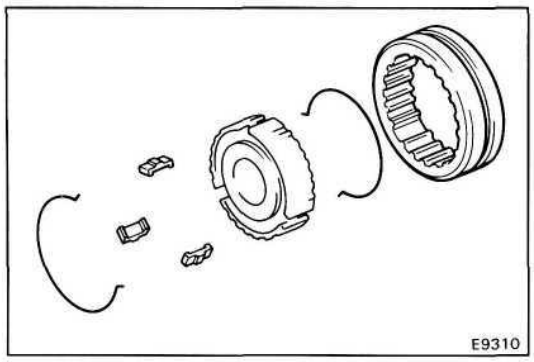
4. REMOVE HUB SLEEVE NO.1 ASSEMBLY, SYNCHRONIZER RING. SECOND GEAR AND NEEDLE ROLLER BEARING

(a) Using two screwdrivers and a hammer, drive out the snap ring.



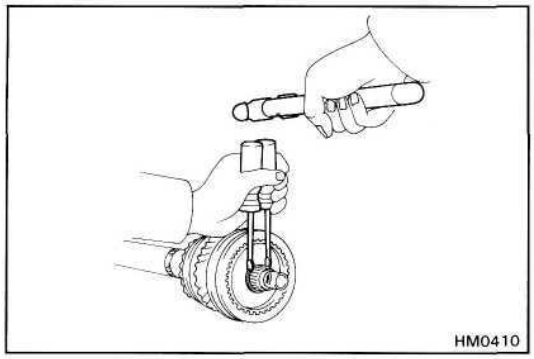
(b) Using a press, remove the hub sleeve No.1 assembly, synchronizer rings, and second gear.

(c) Remove the needle roller bearing.



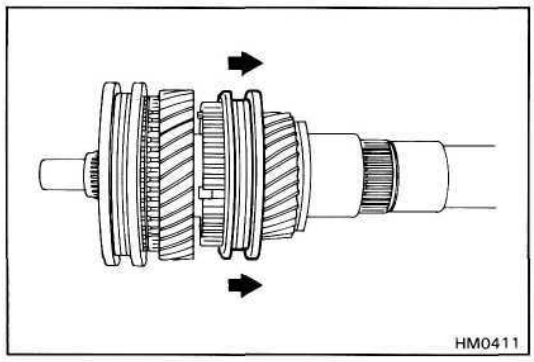
5. REMOVE HUB SLEEVE NO.1, SHIFTING KEYS AND SPRINGS FROM CLUTCH HUB NO.1

Using a screwdriver, remove the three shifting keys and two springs from the clutch hub No.1.

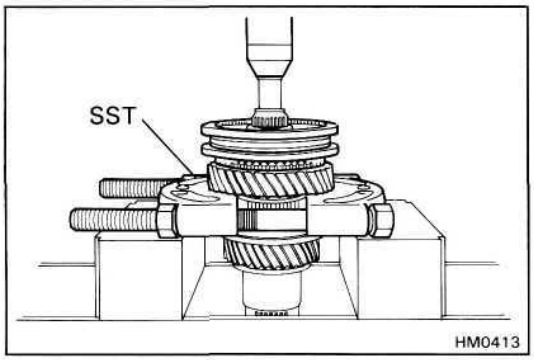


6. REMOVE HUB SLEEVE NO.2 ASSEMBLY, SYNCHRONIZER RING, THIRD GEAR AND NEEDLE ROLLER BEARING

(a) Remove two screwdrivers and a hammer, drive out the snap ring.



(b) Shift hub sleeve No.3 onto the fifth gear.



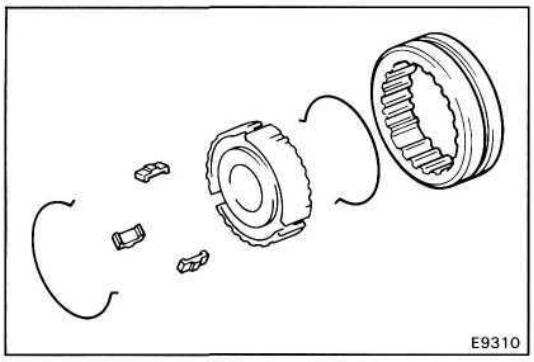
(c) Using SST and a press, remove the hub sleeve No.2 assembly, synchronizer ring and third gear.

H15OF — Single Synchronizer ring

H151F — Triple Synchronizer rings

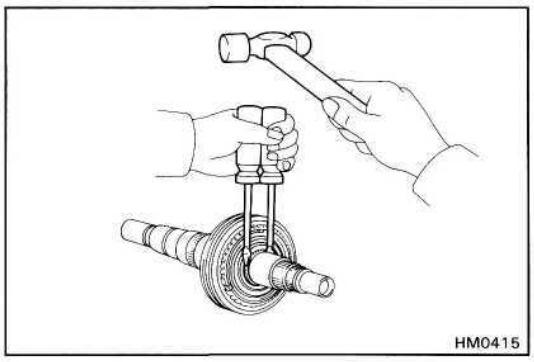
SST 09555-55010

(d) Remove the needle roller bearing.



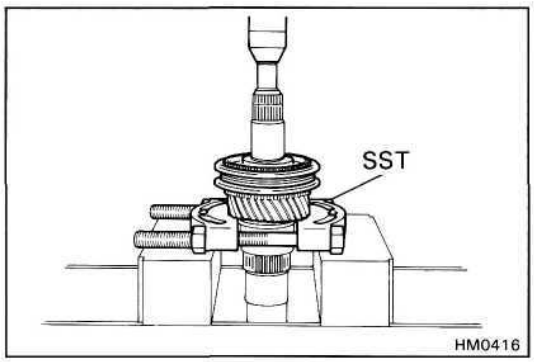
7. REMOVE HUB SLEEVE NO.2, SHIFTING KEYS AND SPRINGS FROM CLUTCH HUB NO.2

Using a screwdriver, remove the three shifting keys and two springs from the clutch hub No.2.



8. REMOVE HUB SLEEVE NO.3 ASSEMBLY, SYNCHRONIZER RING, FIFTH GEAR AND NEEDLE ROLLER BEARING

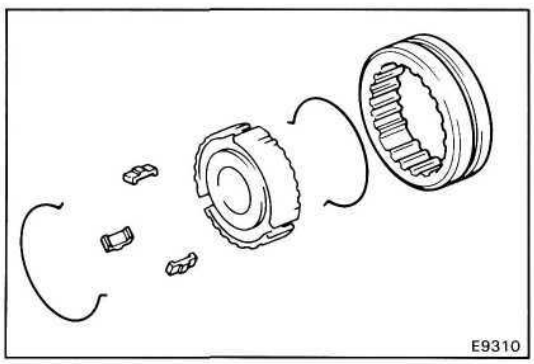
(a) Using two screwdriver, and a hammer, drive out the snap ring.



(b) Using SST and a press, remove the hub sleeve No.3 assembly and synchronizer ring.

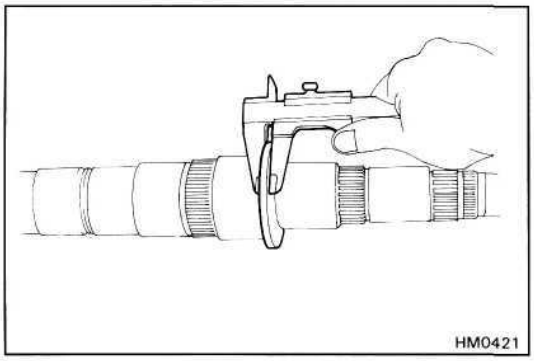
SST 09950-00020

(c) Remove the needle roller bearing.



9. REMOVE HUB SLEEVE NO.3 SHIFTING KEYS AND SPRINGS FROM CLUTCH HUB NO.3

Using a screwdriver, remove the three shifting keys and two springs from the clutch hub No.3.



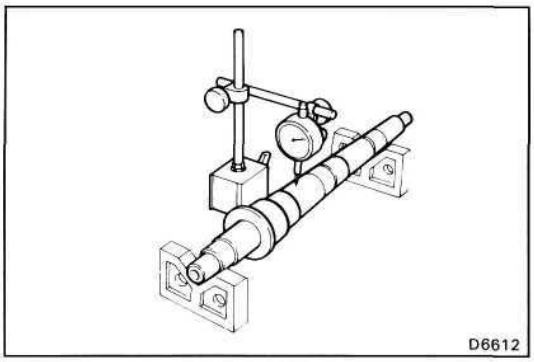
OUTPUT SHAFT ASSEMBLY INSPECTION

1. INSPECT OUTPUT SHAFT

(a) Using calipers, measure the output shaft flange thickness.

Minimum thickness:
4.725 mm (0.1860 in.)

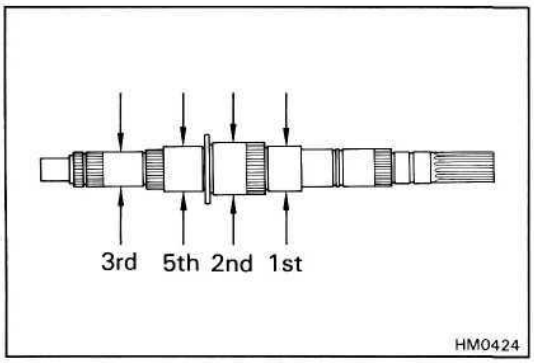
If the thickness is less than the minimum, replace the output shaft.



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

Maximum runout:
0.03 mm (0.0020 in.)

If the runout exceeds the maximum, replace the output shaft.

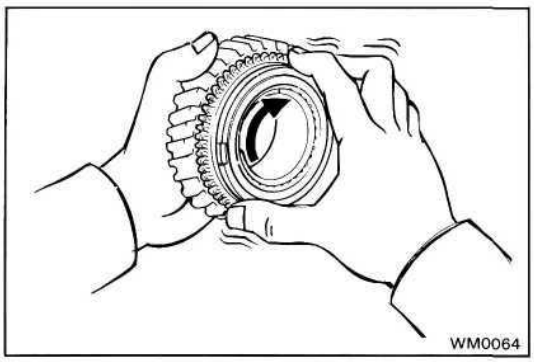


(c) Using a micrometer, measure the outer diameter of the output shaft journal.

Minimum outer diameter:

1st	**49.979 mm (1.9677 in.)**
2nd	**57.984 mm (2.2828 in.)**
3rd	**37.979 mm (1.4952 in.)**
5th	**45.984 mm (1.8104 in.)**

If the outer diameter is less than the minimum, replace the output shaft.



2. INSPECT SYNCHRONIZER RINGS

H150F - FOR FIRST, THIRD AND FIFTH GEARS

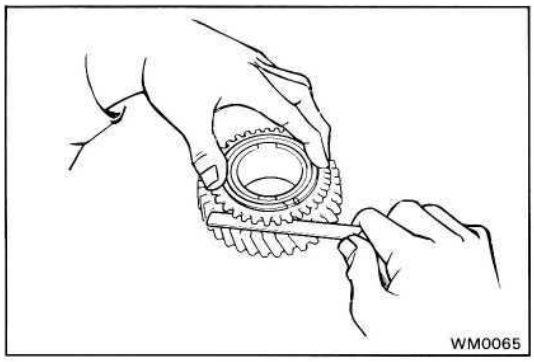
H151F - FOR FIFTH GEARS

(a) Check for wear or damage.

(b) Check the braking effect of the synchronizer ring. Turn the synchronizer ring in one direction while pushing it to the gear cone and check that the ring is locked. If the braking effect is insufficient, lightly rub the synchronizer ring and gear cone by applying a small amount of fine lapping compound.

NOTICE:

- **Wash off completely the fine lapping compound after rubbing.**
- **Check again the braking effect of the synchronizer ring.**


WM0065

(c) Using a feeler gauge, measure the clearance between the synchronizer ring back and the gear spline end.

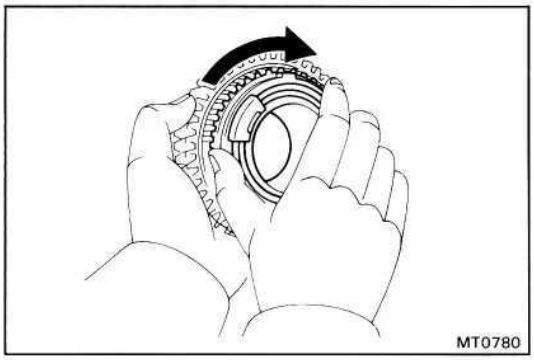
Minimum clearance:

1st gear	**1.1 mm (0.0433 in.)**
3rd and 5th gear	**0.8 mm (0.0315 in.)**

HINT:

- When replacing either a synchronizer ring or gear, apply a small amount of fine lapping compound between the synchronizer ring and gear cone.Lightly rub the synchronizer ring and gear together.
- When replacing both the synchronizer ring and gear, there is no need to apply any compound or to rub them together.

NOTICE: Wash off completely the fine lapping compound after rubbing.


MT0780

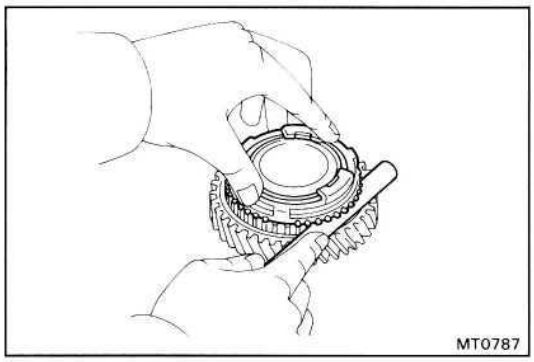
3. INSPECT SYNCHRONIZER RING

H150F - FOR SECOND GEARS

H1 51F - FOR FIRST SECOND AND THIRD GEARS

(a) Check for wear or damage.

(b) Check the braking effect of the synchronizer direction while pushing it to the gear cone and check that the ring is locked. If the braking effect is insufficient, replace the synchronizer ring.

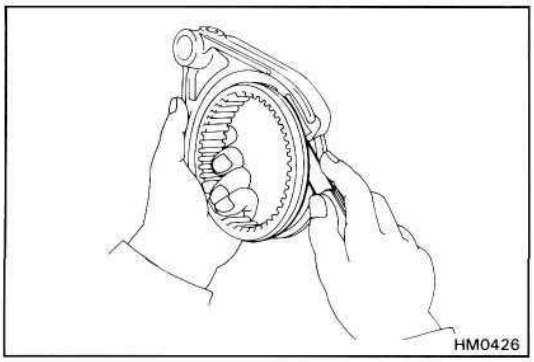

MT0787

(c) Measure the clearance between the synchronizer ring back and gear spline end.

Minimum clearance:

1st and 2nd gear	**0.85 mm (0.0335 in.)**
3rd gear	**0.75 mm (0.0295 in.)**

If the clearance is less than the limit, replace the synchronizer ring.


HM0426

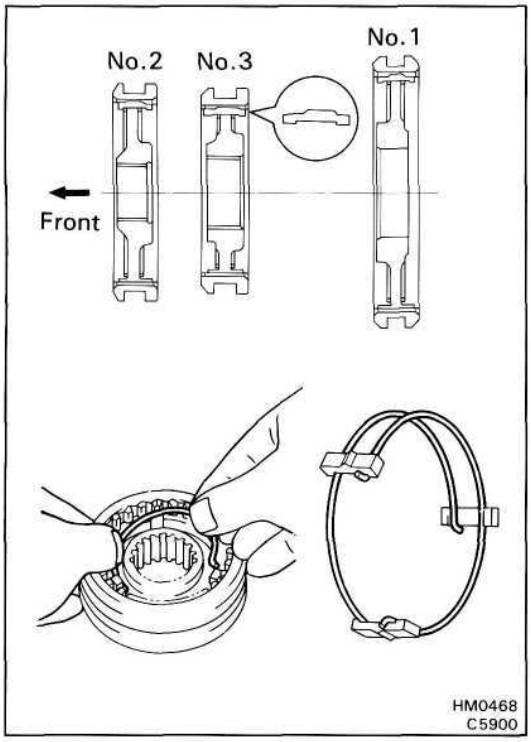
4. INSPECT CLEARANCE OF SHIFT FORKS AND HUB SLEEVES

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

Maximum clearance:

0.35 mm (0.0138 in.)

If the clearance exceeds the maximum, replace the shift fork or hub sleeve.



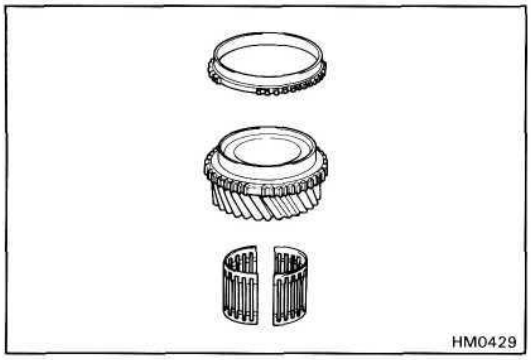
OUTPUT SHAFT ASSEMBLY

1. INSTALL CLUTCH HUB NO.1, NO.2 AND NO.3 INTO HUB SLEEVE

(a) Install the clutch hub and shifting keys to the hub sleeve.

(b) Install the springs under the shifting keys.

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

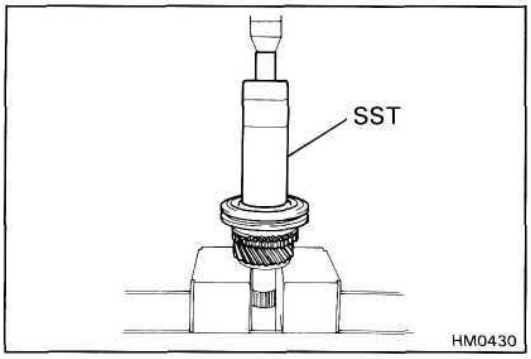


2. INSTALL FIFTH GEAR AND HUB SLEEVE NO.3 ASSEMBLY ON OUTPUT SHAFT

(a) Apply gear oil to the shaft and needle roller bearing.

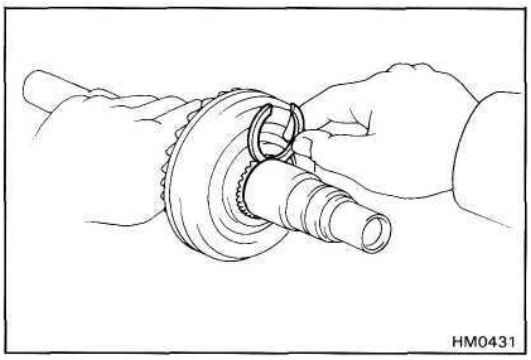
(b) Place the synchronizer ring on the gear and align the ring slots with the shifting keys.

(c) Install the needle roller bearing in the fifth gear.



(d) Using SST and a press, install the fifth gear and hub sleeve No.3.

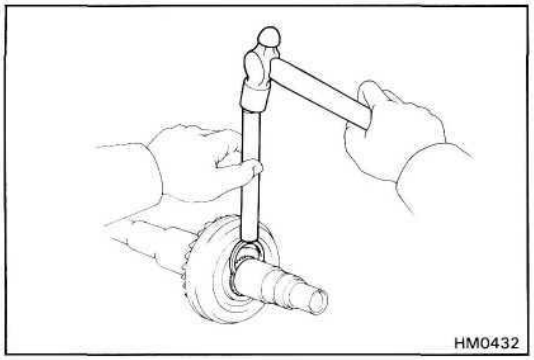
SST 09316-60010 (09316-00010)



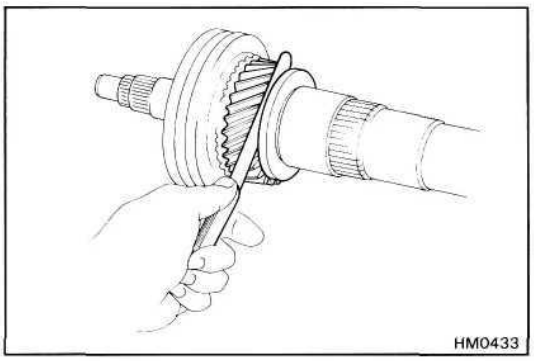
3. INSTALL SNAP RING

(a) Select a snap ring that will allow minimum axial play.

Mark	Thickness mm (in.)
A	2.40 – 2.45 (0.0945 – 0.0965)
B	2.45 – 2.50 (0.0965 – 0.0984)
C	2.50 – 2.55 (0.0984 – 0.1004)
D	2.55 – 2.60 (0.1004 – 0.1024)
E	2.60 – 2.65 (0.1024 – 0.1044)
F	2.65 – 2.70 (0.1044 – 0.1063)


HM0432

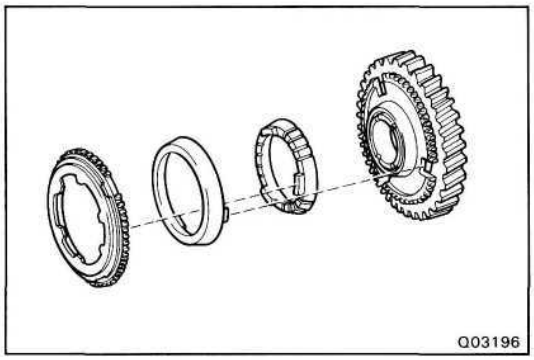
(b) Using a brass bar and hammer, drive in the snap ring.


HM0433

4. INSPECT FIFTH GEAR THRUST CLEARANCE

Using a feeler gauge, measure the fifth gear thrust clearance.

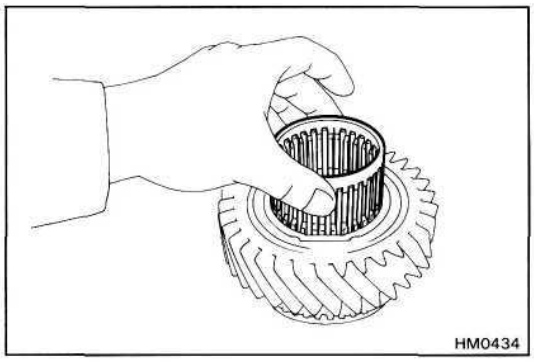
Standard clearance:
0.1 - 0.35 mm (0.0039 - 0.0138 in.)


Q03196

5. INSTALL THIRD GEAR AND HUB SLEEVE NO.2 ASSEMBLY

(H151F)

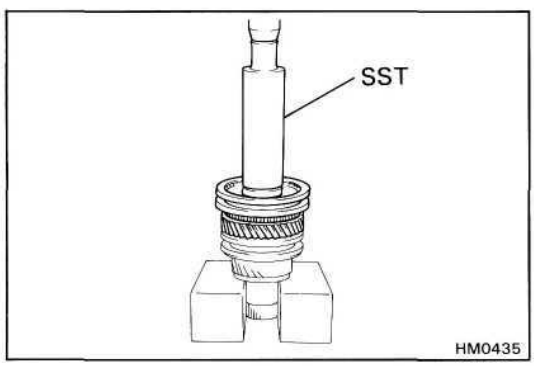
(a) Place the synchronizer rings on the 3rd gear.


HM0434

(b) Apply gear oil to the shaft and needle roller bearing.
(H150F)

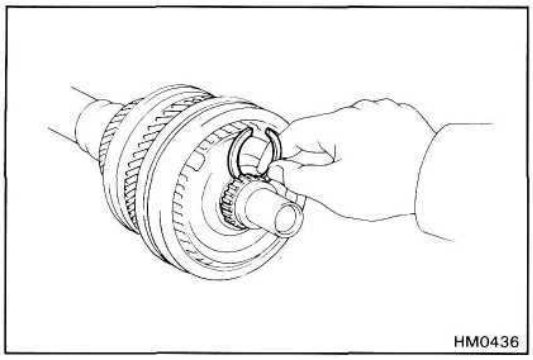
(c) Place the synchronizer ring on the gear and align the ring slots with the shifting keys.

(d) Install the needle roller bearing in the third gear.



HM0435

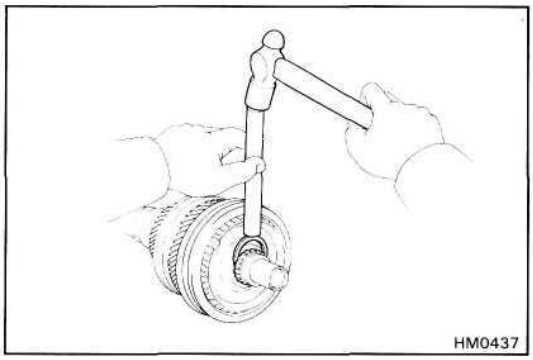
(e) Using SST and a press, install the third gear and hub sleeve No.2.
SST 09316-60010 (09316-00010)


HM0436

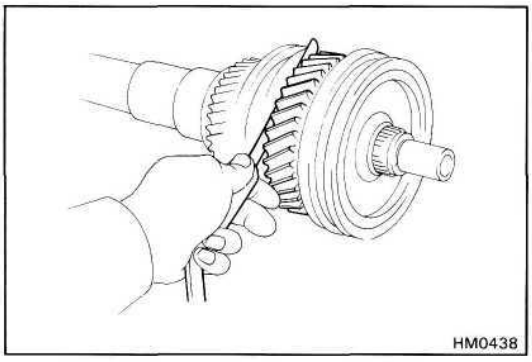
6. INSTALL SNAP RING

(a) Select a snap ring that will allow minimum axial play.

Mark	Thickness mm (in.)
4	1.90 — 1.95 (0.0748 — 0.0768)
5	1.95 — 2.00 (0.0768 — 0.0787)
6	2.00 — 2.05 (0.0787 — 0.0807)
7	2.05 — 2.10 (0.0807 — 0.0827)
8	2.10 — 2.15 (0.0827 — 0.0847)
9	2.15 — 2.20 (0.0847 — 0.0866)


HM0437

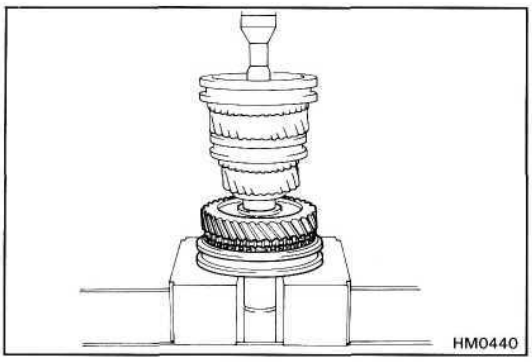
(b) Using a brass bar and a hammer, drive in a new snap ring.


HM0438

7. MEASURE THIRD GEAR THRUST CLEARANCE

Using a feeler gauge, measure the third gear thrust clearance.

Standard clearance:
0.1 - 0.45 mm (0.0039 - 0.0138 in.)


HM0440

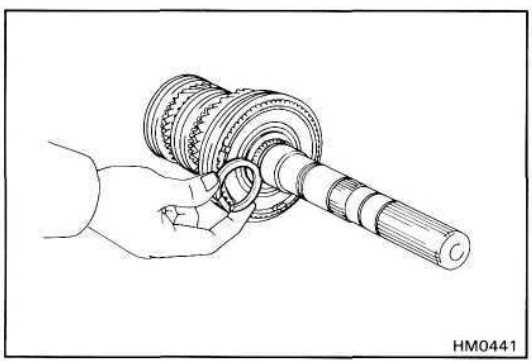
8. INSTALL SECOND GEAR AND HUB SLEEVE NO.1 ASSEMBLY

(a) Apply gear oil to the shaft and needle roller bearing.

(b) Place the synchronizer rings on the gear and align the ring slots with the shifting keys.

(c) Install the needle roller bearing in the second gear.

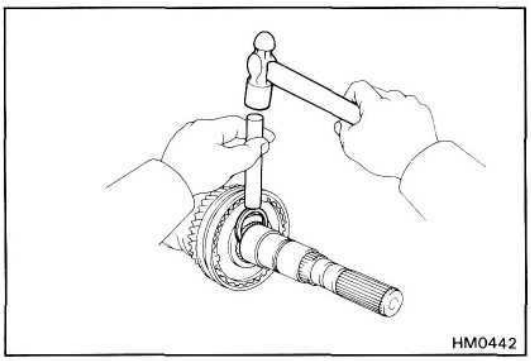
(d) Using a press, install the second gear and hub sleeve No.1 assembly.


HM0441

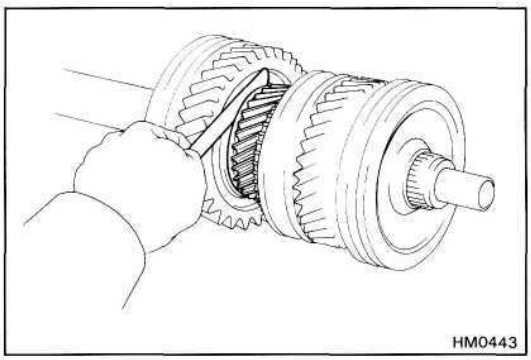
9. INSTALL SNAP RING

(a) Select a snap ring that will allow minimum axial play.

Mark	Thickness mm (in.)
A	2.90 — 2.95 (0.1142 — 0.1162)
B	2.95 — 3.00 (0.1162 — 0.1181)
C	3.00 — 3.05 (0.1181 — 0.1201)
D	3.05 — 3.10 (0.1201 — 0.1220)
E	3.10 — 3.15 (0.1220 — 0.1240)
F	3.15 — 3.20 (0.1240 — 0.1260)



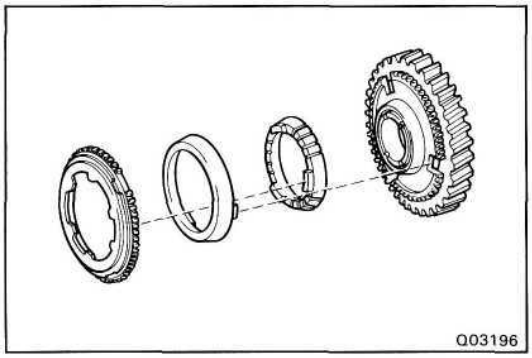
(b) Using a brass bar and a hammer, drive in a new snap ring.



10. INSPECT SECOND GEAR THRUST CLEARANCE

Using a feeler gauge, measure the second gear thrust clearance.

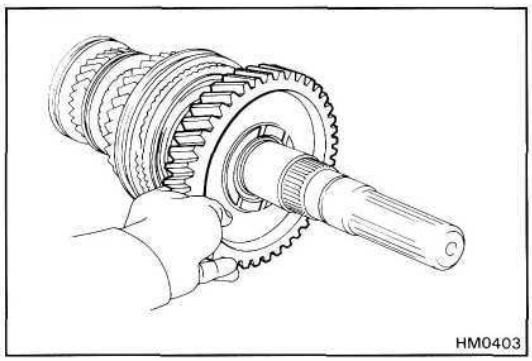
Standard clearance:
0.1 - 0.35 mm (0.0039 - 0.0138 in.)



11. INSTALL FIRST GEAR

(H151F)

(a) Place the synchronizer rings on the 1st gear.

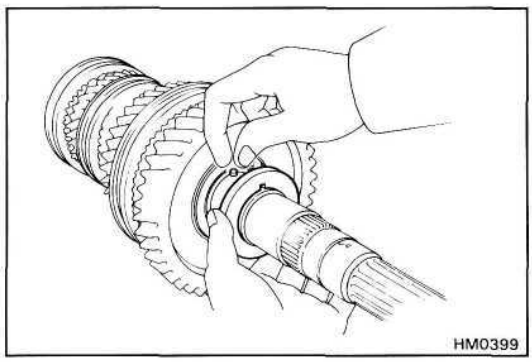


(b) Apply gear oil to the shaft and needle roller bearing.

(H150F)

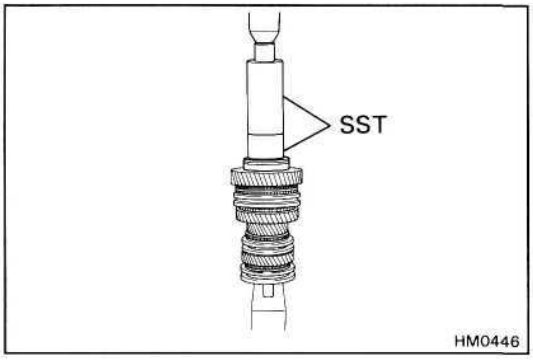
(c) Place the synchronizer ring on the gear and align the ring slots with the shifting keys.

(d) Install the needle roller bearing in the first gear.

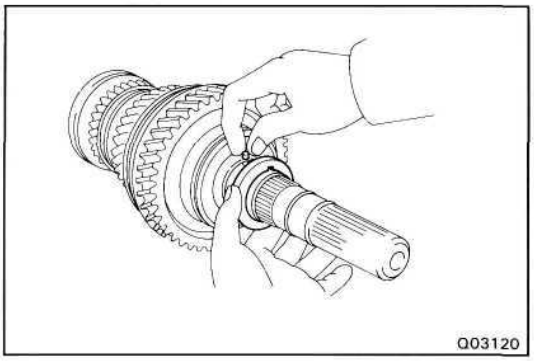


12. INSTALL BALL BEARING

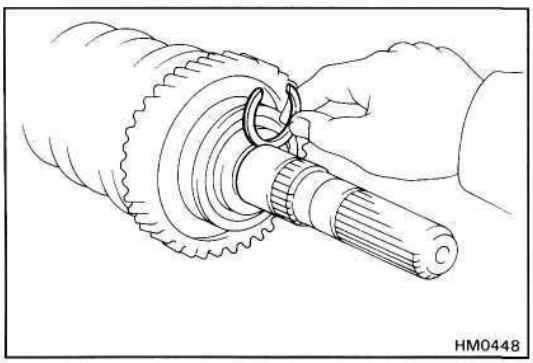
(a) Install the pin and thrust washer.



(b) Using SST and a press, install the ball bearing.
SST 09316-60010 (09316-00010), 09523-36010



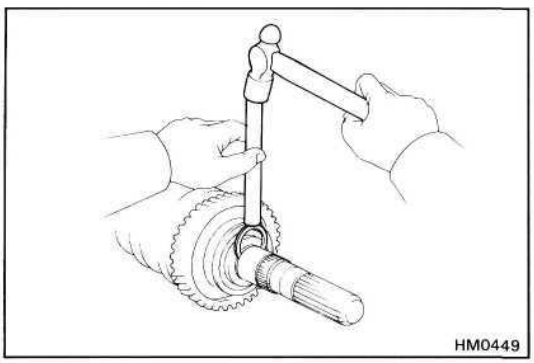
(c) Install the pin and thrust washer.



13. INSTALL SNAP RING

(a) Select a snap ring that will allow minimum axial play.

Mark	Thickness mm (in.)
A	2.40 – 2.45 (0.0945 – 0.0965)
B	2.45 – 2.50 (0.0965 – 0.0984)
C	2.50 – 2.55 (0.0984 – 0.1004)
D	2.55 – 2.60 (0.1004 – 0.1024)
E	2.60 – 2.65 (0.1024 – 0.1044)
F	2.65 – 2.70 (0.1044 – 0.1063)
G	2.70 – 2.75 (0.1063 – 0.1083)
H	2.75 – 2.80 (0.1083 – 0.1102)



(b) Using a brass bar and a hammer, drive in a new snap ring.

SERVICE SPECIFICATIONS

SERVICE DATA

Output shaft 1st gear journal diameter	Limit	49.979 mm	1.9677 in.
Output shaft 2nd gear journal diameter	Limit	57.984 mm	2.2828 in.
Output shaft 3rd gear journal diameter	Limit	37.979 mm	1.4952 in.
Output shaft 5th gear journal diameter	Limit	45.984 mm	1.8104 in.
Output shaft Frange thickness	Limit	4.725 mm	0.1860 in.
Output shaft Runout	Limit	0.05 mm	0.0020 in.
Gear thrust clearance 1st and 3rd	STD	0.1 — 0.45 mm	0.0039 — 0.0177 in.
Gear thrust clearance 2nd and 5th	STD	0.1 — 0.35 mm	0.0039 — 0.0138 in.
Gear oil clearance 1st and 3rd	STD	0.020 — 0.073 mm	0.0008 — 0.0029 in.
Gear oil clearance 2nd and 5th	STD	0.015 — 0.068 mm	0.0006 — 0.0027 in.
Synchronizer ring for 1st gear clearance			
(H150F)			
	Limit	1.1 mm	0.0433 in.
Synchronizer ring for 2nd gear clearance			
(H150F)			
	Limit	0.85 mm	0.0335 in.
Synchronizer ring for 3rd gear clearance			
(H150F)			
	Limit	0.8 mm	0.0315 in.
Synchronizer ring for 1st and 2nd gear clearance			
(H151F)			
	Limit	0.85 mm	0.0335 in.
Synchronizer ring for 3rd gear clearance			
(H151F)			
	Limit	0.75 mm	0.0295 in.
Output shaft snap ring thickness			
No.3 Hub sleeve	Mark A	2.40 — 2.45 mm	0.0945 — 0.0965 in.
No.3 Hub sleeve	Mark B	2.45 — 2.50 mm	0.0965 — 0.0984 in.
No.3 Hub sleeve	Mark C	2.50 — 2.55 mm	0.0984 — 0.1004 in.
No.3 Hub sleeve	Mark D	2.55 — 2.60 mm	0.1004 — 0.1024 in.
No.3 Hub sleeve	Mark E	2.60 — 2.65 mm	0.1024 — 0.1044 in.
No.3 Hub sleeve	Mark F	2.65 — 2.70 mm	0.1044 — 0.1063 in.
No.2 Hub sleeve	Mark 4	1.90 — 1.95 mm	0.0748 — 0.0768 in.
No.2 Hub sleeve	Mark 5	1.95 — 2.00 mm	0.0768 — 0.0787 in.
No.2 Hub sleeve	Mark 6	2.00 — 2.05 mm	0.0787 — 0.0807 in.
No.2 Hub sleeve	Mark 7	2.05 — 2.10 mm	0.0807 — 0.0827 in.
No.2 Hub sleeve	Mark 8	2.10 — 2.15 mm	0.0827 — 0.0847 in.
No.2 Hub sleeve	Mark 9	2.15 — 2.20 mm	0.0847 — 0.0866 in.
No.1 Hub sleeve	Mark A	2.90 — 2.95 mm	0.1142 — 0.1162 in.
No.1 Hub sleeve	Mark B	2.95 — 3.00 mm	0.1162 — 0.1181 in.
No.1 Hub sleeve	Mark C	3.00 — 3.05 mm	0.1181 — 0.1201 in.
No.1 Hub sleeve	Mark D	3.05 — 3.10 mm	0.1201 — 0.1220 in.
No.1 Hub sleeve	Mark E	3.10 — 3.15 mm	0.1220 — 0.1240 in.
No.1 Hub sleeve	Mark F	3.15 — 3.20 mm	0.1240 — 0.1260 in.

Output shaft snap ring thickness			
Rear bearing	Mark A	2.40 — 2.45 mm	0.0945 — 0.0965 in.
Rear bearing	Mark B	2.45 — 2.50 mm	0.0965 — 0.0984 in.
Rear bearing	Mark C	2.50 — 2.55 mm	0.0984 — 0.1004 in.
Rear bearing	Mark D	2.55 — 2.60 mm	0.1004 — 0.1024 in.
Rear bearing	Mark E	2.60 — 2.65 mm	0.1024 — 0.1044 in.
Rear bearing	Mark F	2.65 — 2.70 mm	0.1044 — 0.1063 in.
Rear bearing	Mark G	2.70 — 2.75 mm	0.1063 — 0.1083 in.
Rear bearing	Mark H	2.75 — 2.80 mm	0.1083 — 0.1102 in.