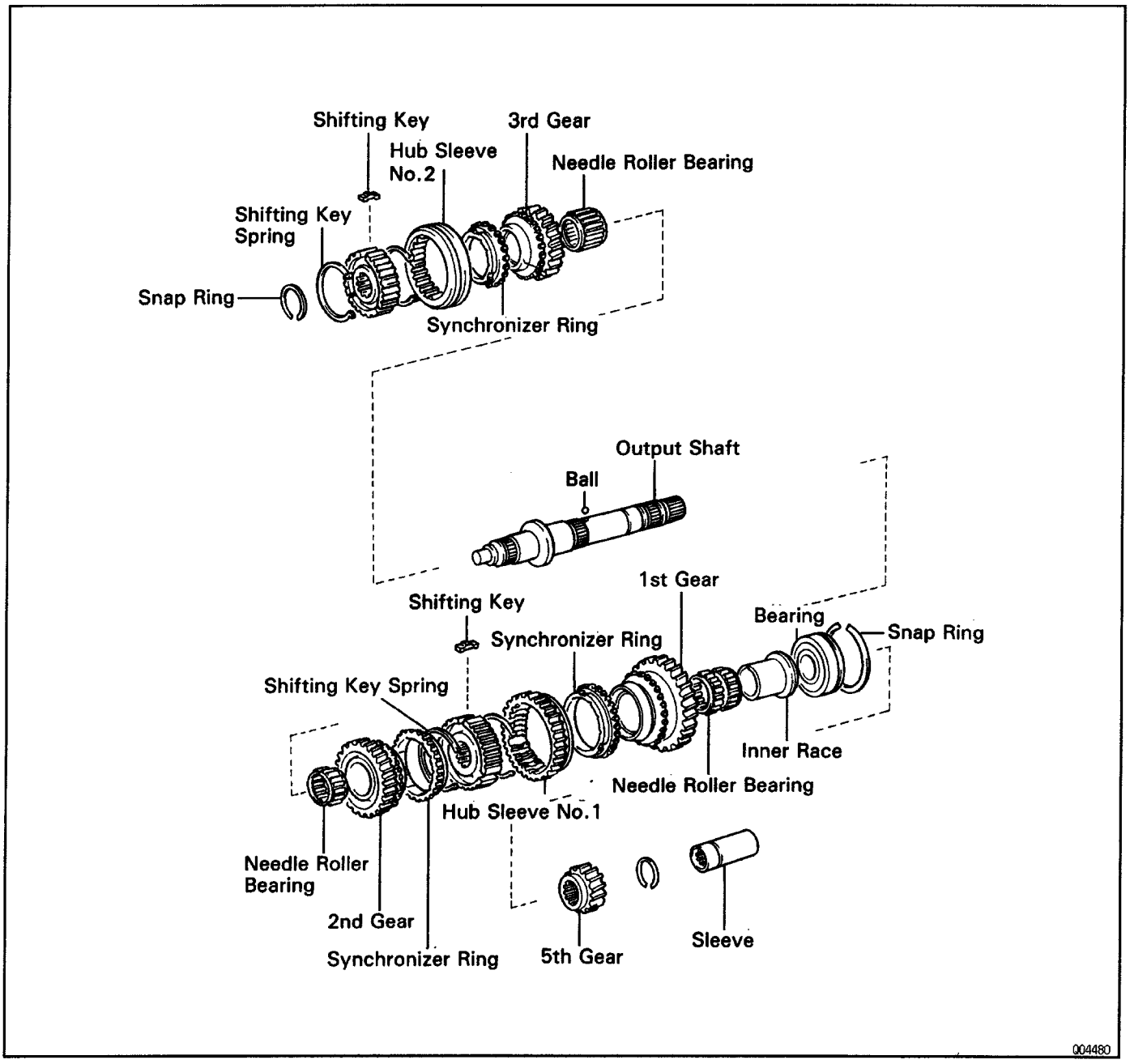
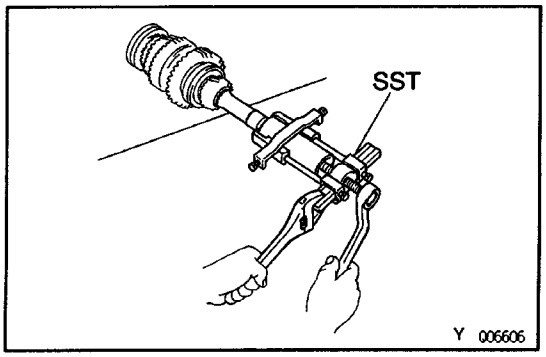
OUTPUT SHAFT
COMPONENTS

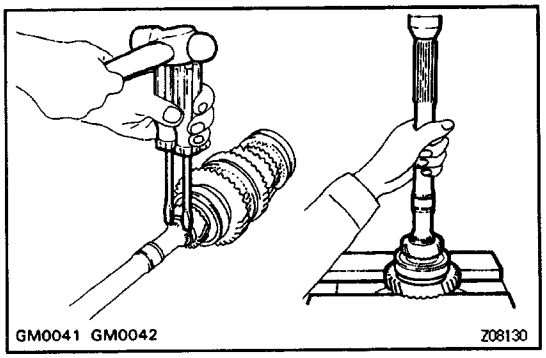




OUTPUT SHAFT DISASSEMBLY

1. REMOVE SLEEVE FROM OUTPUT SHAFT

Using SST, remove the sleeve from the output shaft.
SST 09950–40010



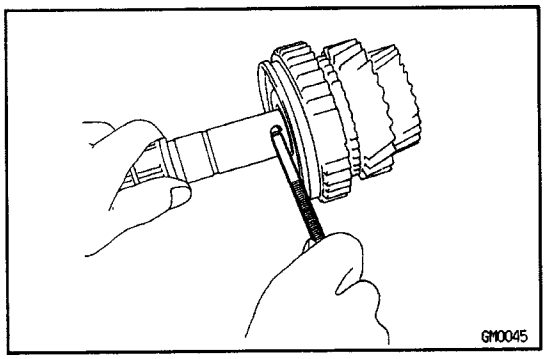
2. REMOVE 5TH GEAR, REAR BEARING, 1ST GEAR, INNER RACE AND NEEDLE ROLLER BEARING

(a) Using 2 screwdrivers and a hammer, tap out the snap ring.

(b) Using a press, remove the 5th gear, rear bearing, 1st gear and inner race.

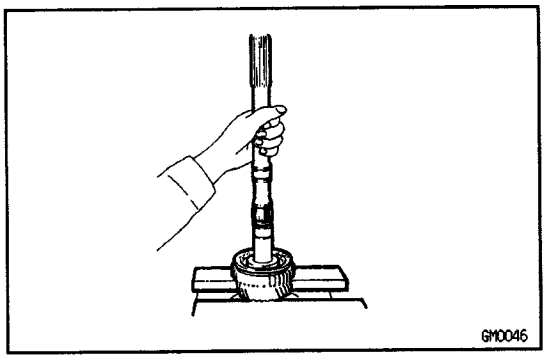
(c) Remove the needle roller bearing.

3. REMOVE SYNCHRONIZER RING



4. REMOVE LOCKING BALL

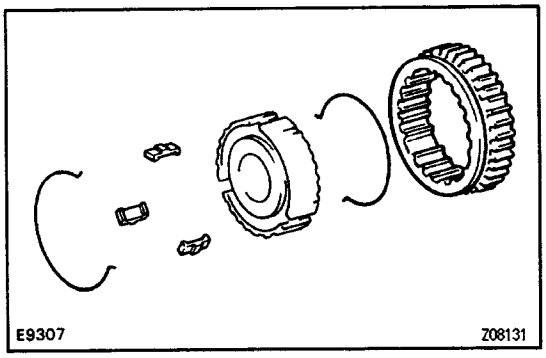
Using a magnetic finger, remove the locking ball.



5. REMOVE HUB SLEEVE NO.1 ASSEMBLY, SYNCH–RONIZER RING, 2ND GEAR AND NEEDLE ROLLER BEARING

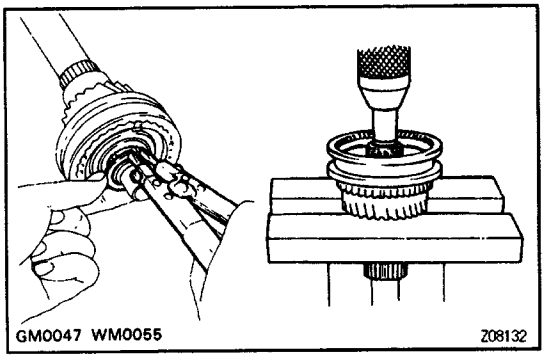
(a) Using a press, remove the hub sleeve No. 1, synchronizer ring and 2nd gear.

(b) Remove the needle roller bearing.



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

Using a screwdriver, remove the 3 shifting keys and springs from the clutch hub No.1.

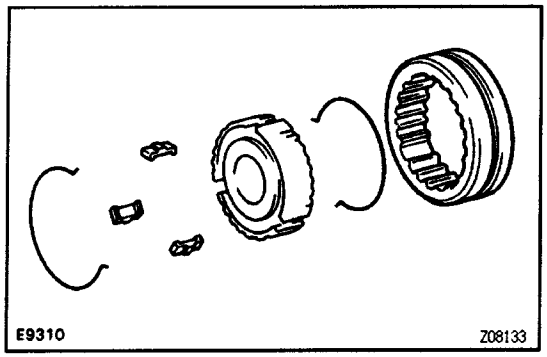


7. REMOVE HUB SLEEVE NO.2 ASSEMBLY, SYNCH, RONIZER RING, 3RD GEAR AND NEEDLE ROLLEF BEARING

(a) Using a snap ring expander, remove the snap ring.

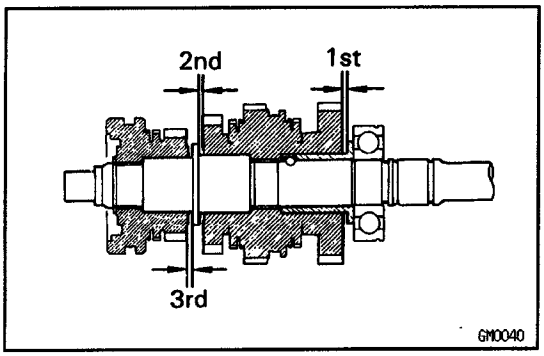
(b) Using a press, remove the hub sleeve No.2 assembly synchronizer ring and 3rd gear.

(c) Remove the needle roller bearing.



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

Using a screwdriver, remove the 3 shifting keys and 2 springs from the clutch hub No.2.



OUTPUT SHAFT COMPONENT PARTS INSPECTION

1. INSPECT EACH GEAR THRUST CLEARANCE

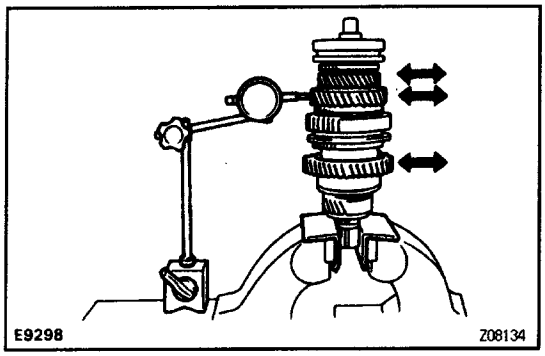
Using a feeler gauge, measure the thrust clearance of each gear.

Standard clearance:

0.10–0.25 mm (0.0039–0.0098 in.)

Maximum clearance:

0.25 mm (0.0098 in.)



2. INSPECT EACH GEAR RADIAL CLEARANCE

Using a dial indicator, measure each gear radial clearance.

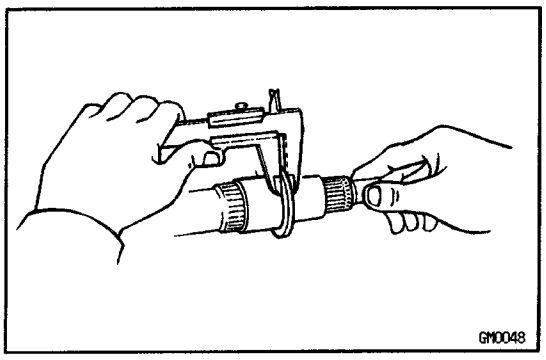
Standard clearance:

0.009–0.032 mm (0.0004–0.0013 in.)

Maximum clearance:

0.032 mm (0.0013 in.)

If the clearance exceeds the maximum, replace the gear, needle roller bearing or output shaft.



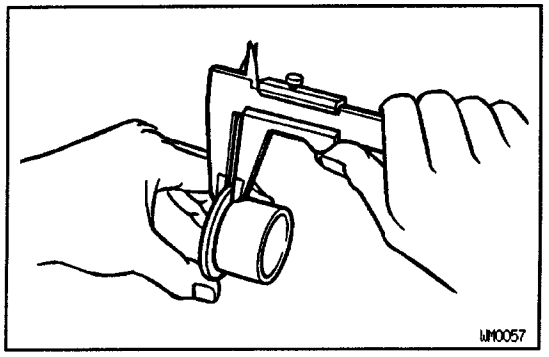
3. INSPECT OUTPUT SHAFT AND INNER RACE

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

Minimum thickness:

4.80 mm (0.1890 in.)

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

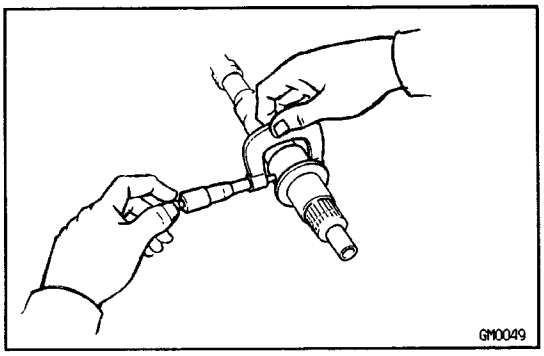


(b) Using calipers, measure the inner race flange thickness.

Minimum thickness:

3.99 mm (0.1571 in.)

If the thickness is less than the minimum, replace the inner race.



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

Minimum diameter:

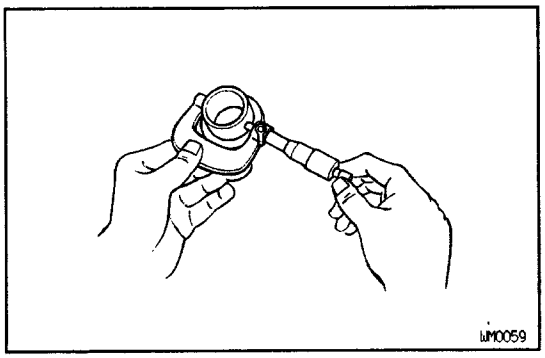
2nd gear

37.984 mm (1.4954 in.)

3rd gear

34.984 mm (1.3773 in.)

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

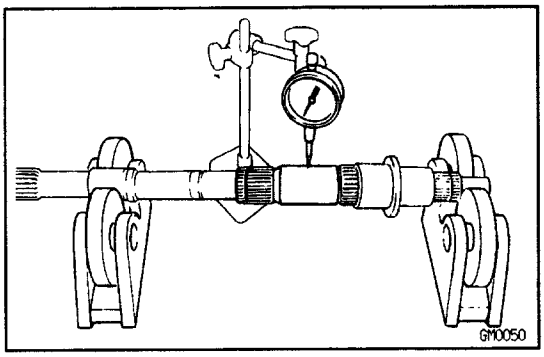


(d) Using a micrometer, measure the outer diameter of the inner race.

Minimum diameter:

38.985 mm (1.5348 in.)

If the outer diameter is less than the minimum, replace the inner race.

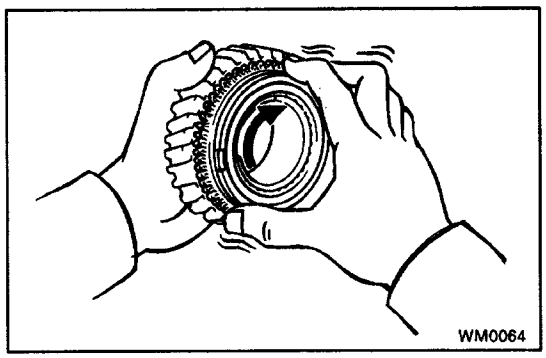


(e) Using a dial indicator, check the shaft runout.

Maximum runout:

0.05 mm (0.0020 in.)

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



4. INSPECT SYNCHRONIZER RING

(a) Check for wear or damage.

(b) Check the braking effect of the synchronizer ring.

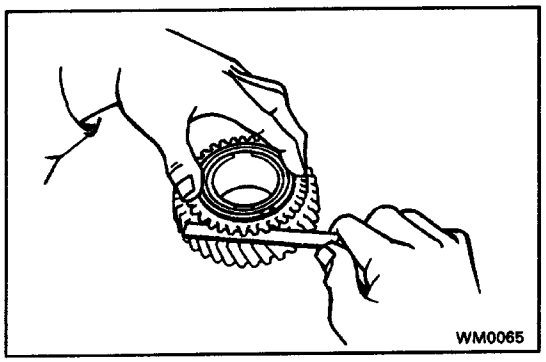
Turn the synchronizer ring in one direction while pushing it to the gear cone. Check that the ring locks.

If the braking effect is insufficient, apply a small amount of fine lapping compound between the synchronizer ring and gear cone.

Lightly rub the synchronizer ring and gear cone together.

NOTICE: Ensure the fine lapping compound is completely washed off after rubbing.

(c) Check again the braking effect of the synchronizer ring. If it does not lock, replace the synchronizer ring.



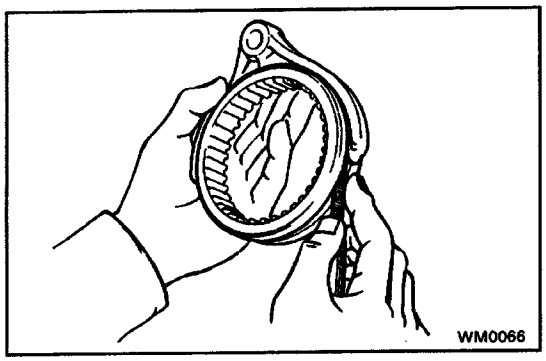
(d) Using a feeler gauge, measure the clearance between the synchronizer ring back and gear spline end.

Minimum clearance:
0.8 mm (0.031 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 cone together.
- When replacing both the synchronizer ring and gear, there is no need to apply any compound or to rub them together.

NOTICE: Ensure the fine lapping compound is completely washed off after rubbing.

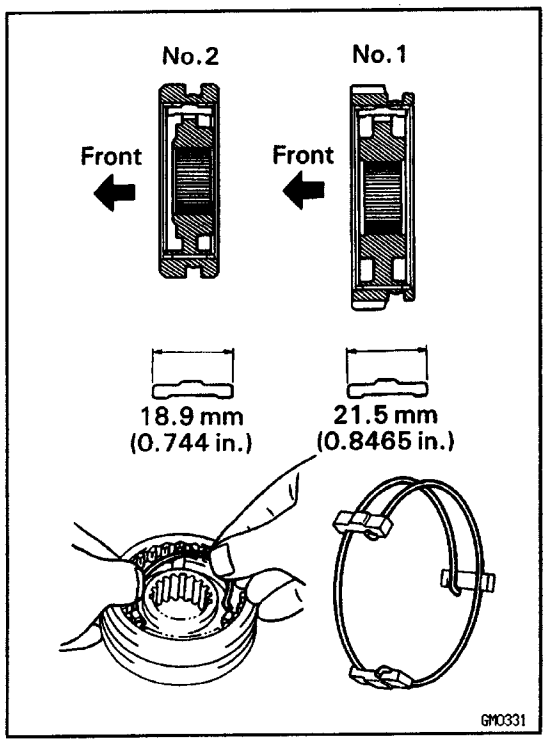


5. INSPECT SHIFT FORKS AND HUB SLEEVES CLEARANCE

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

Maximum clearance:
1.0 mm (0.039 in.)

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



OUTPUT SHAFT ASSEMBLY

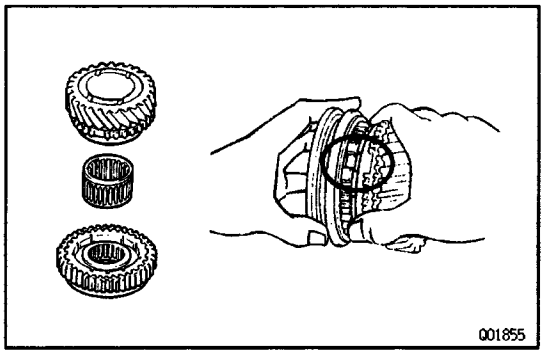
HINT: Coat all of the sliding and rotating surfaces with gear oil before assembly.

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

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

(b) Install the shifting key springs under the shifting keys.

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

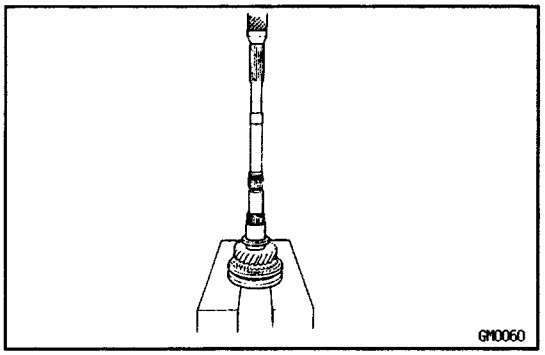


2. INSTALL 3RD GEAR AND HUB SLEEVE NO.2 ON OUTPUT SHAFT

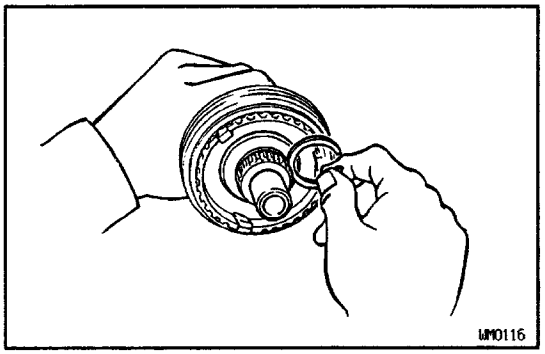
(a) Apply gear oil to the shaft and needle roller bearing.

(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 3rd gear.



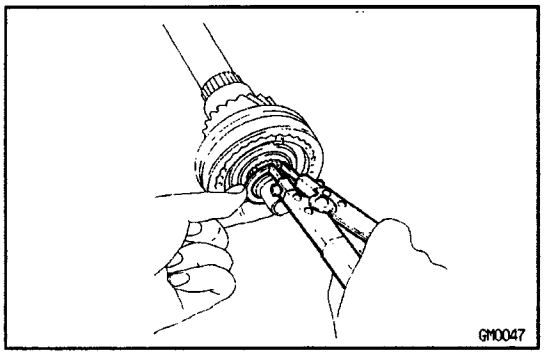
(d) Using a press, install the 3rd gear and hub sleeve No.2.



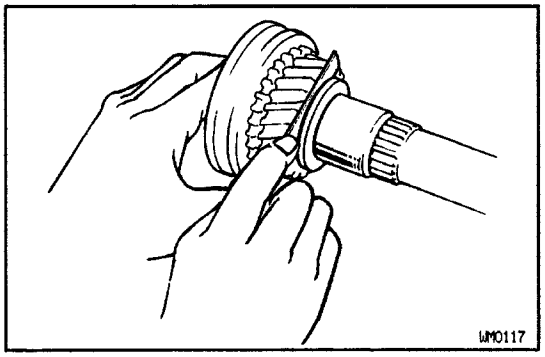
3. INSTALL SNAP RING

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

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 (0.0787−0.0807)
F−1	2.05−2.10 (0.0807−0.0827)



(b) Using a snap ring expander, install the snap ring.



4. INSPECT 3RD GEAR THRUST CLEARANCE

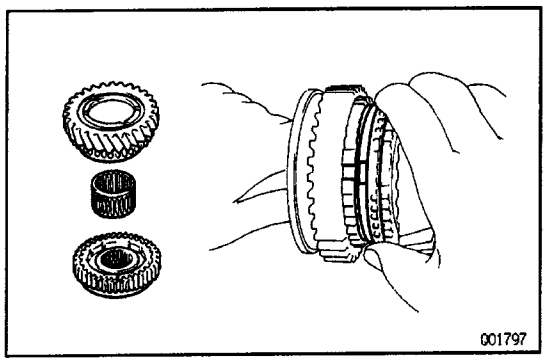
Using a feeler gauge, measure the 3rd gear thrust clearance.

Standard clearance:

0.10–0.25 mm (0.0039–0.0098 in.)

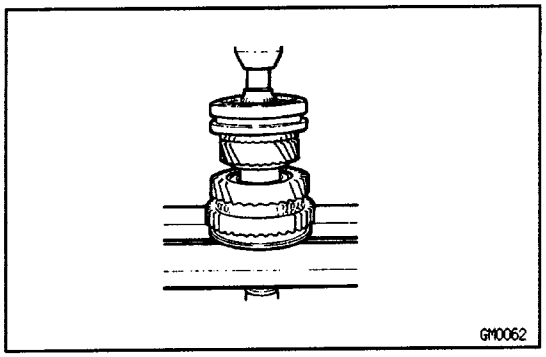
Maximum clearance:

0.25 mm (0.0098 in.)

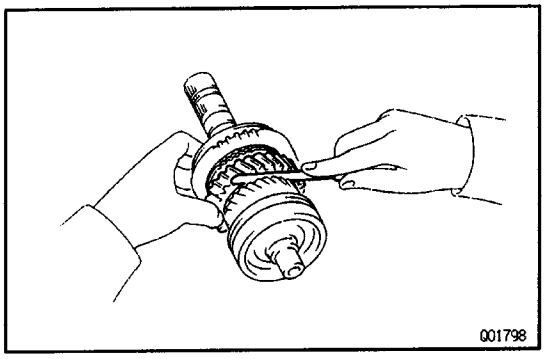


5. INSTALL 2ND GEAR AND HUB SLEEVE NO.9

(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 2nd gear.



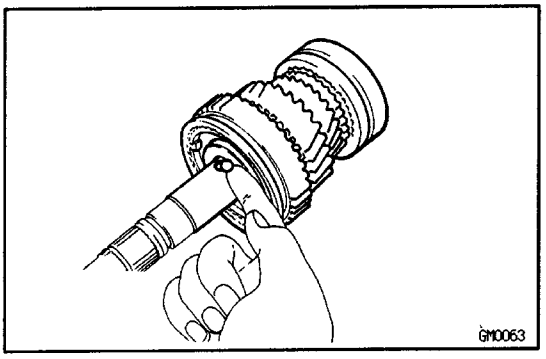
(d) Using a press, install the 2nd gear and hub sleeve No. 1.



6. INSPECT 2ND GEAR THRUST CLEARANCE

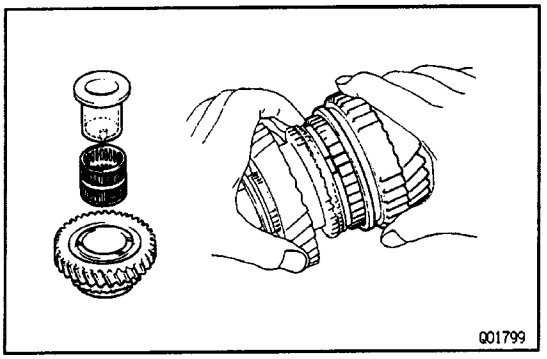
Using a feeler gauge, measure the 2nd gear thrust clearance.

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

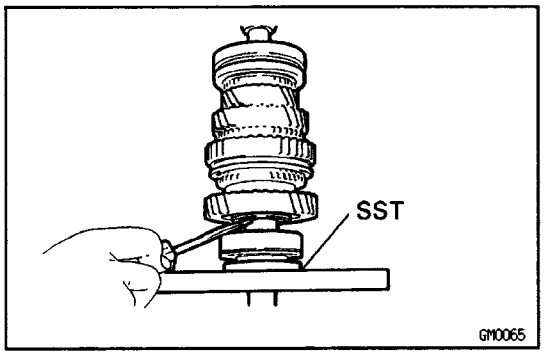


7. INSTALL LOCKING BALL AND 1ST GEAR ASSEMBLY

(a) Install the locking ball in the shaft.



(b) Apply gear oil to the needle roller 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.
(e) Turn the inner race to align it with the locking ball.

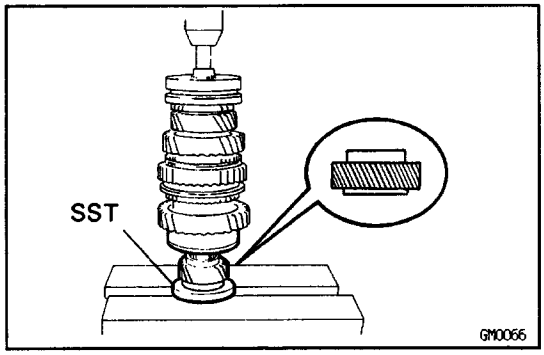


8. INSTALL OUTPUT SHAFT REAR BEARING

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

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

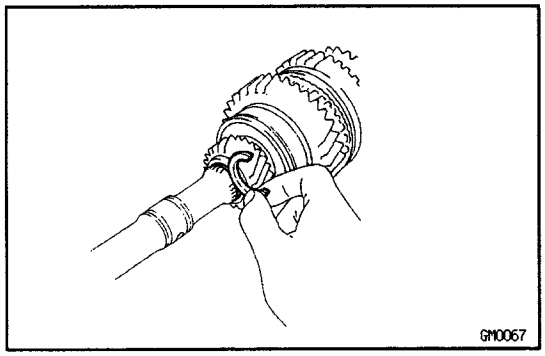
SST 09506 – 35010



9. INSTALL 5TH GEAR

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

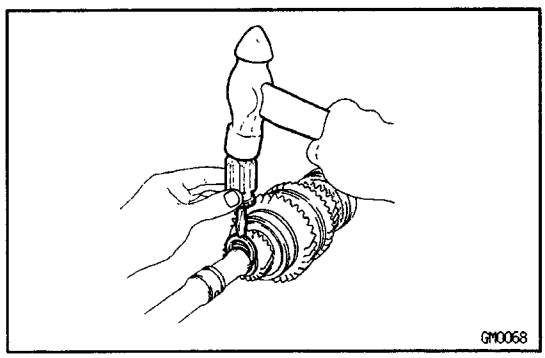
SST 09506 – 35010



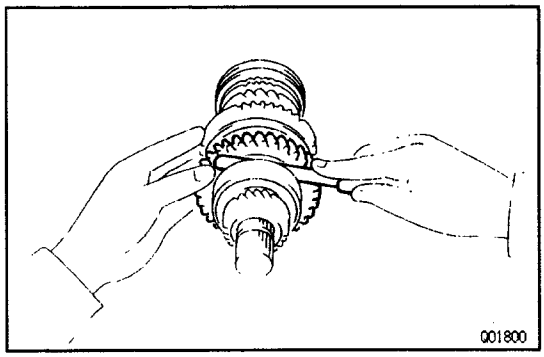
10. INSTALL SNAP RING

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

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)



(b) Using a screwdriver and hammer, tap in the snap ring.



11. INSPECT 1 ST GEAR THRUST CLEARANCE

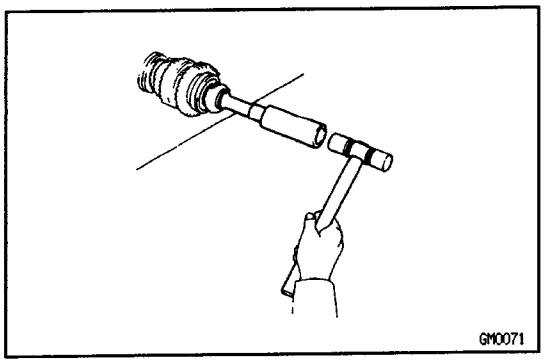
Using a feeler gauge, measure the 1 st gear thrust clearance.

Standard clearance:

0.10–0.25 mm (0.0039–0.0098 in.)

Maximum clearance:

0.25 mm (0.0098 in.)



12. INSTALL SLEEVE TO OUTPUT SHAFT

Using a plastic hammer, tap the sleeve onto the output shaft.