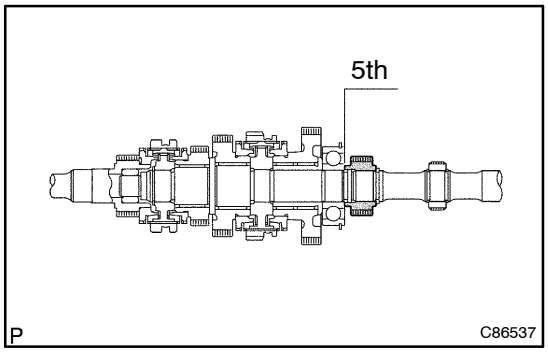
OUTPUT SHAFT ASSY (G52)

410BB-01

OVERHAUL

HINT:

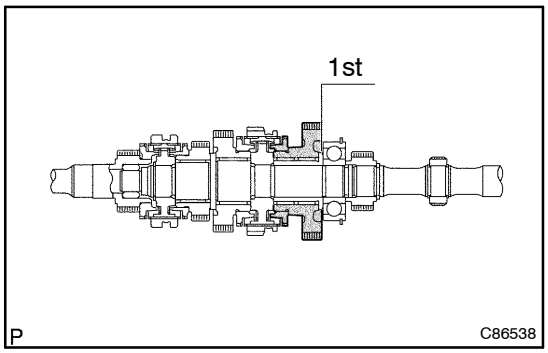
COMPONENTS: See page 41-1



1. INSPECT 5TH GEAR THRUST CLEARANCE

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

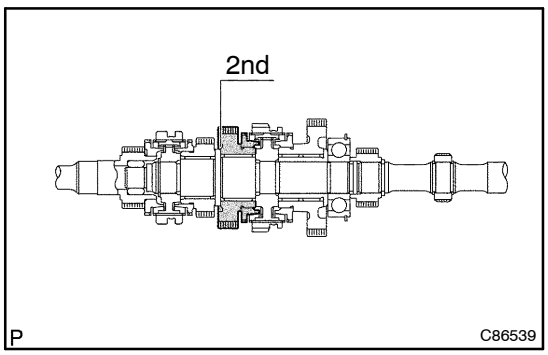
Standard clearance:
0.1 – 0.3 mm (0.0039 – 0.018 in.)



2. INSPECT 1ST GEAR THRUST CLEARANCE

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

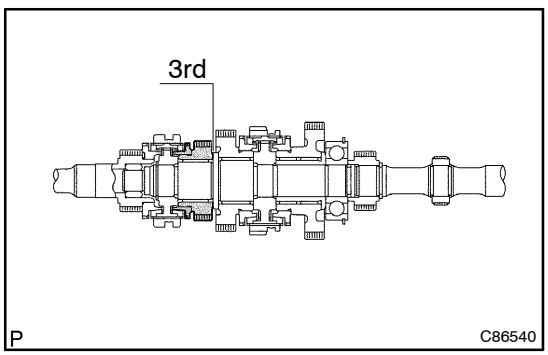
Standard clearance:
0.1 – 0.25 mm (0.0039 – 0.0098 in.)



3. INSPECT 2ND GEAR THRUST CLEARANCE

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

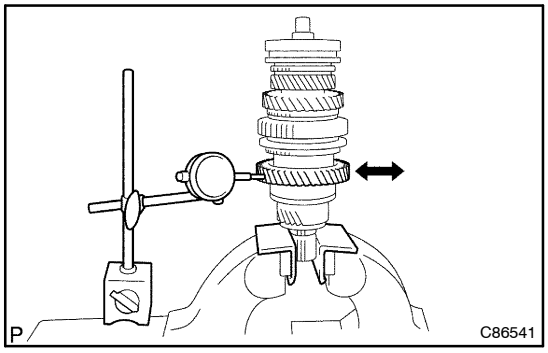
Standard clearance:
0.1 – 0.25 mm (0.0039 – 0.0098 in.)



4. INSPECT 3RD GEAR THRUST CLEARANCE

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

Standard clearance:
0.1 – 0.25 mm (0.0039 – 0.0098 in.)



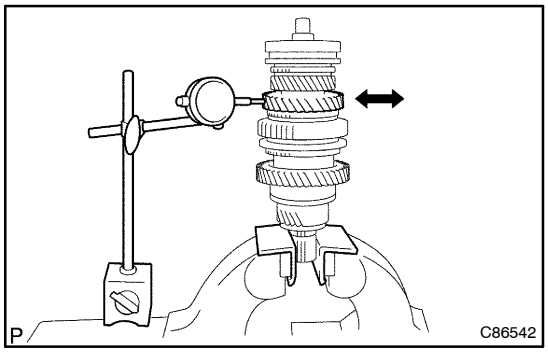
5. INSPECT 1ST GEAR RADIAL CLEARANCE

(a) Using a dial indicator, measure the 1st gear radial clearance between the gear and the shaft.

Standard clearance:

0.009 – 0.056 mm (0.0004 – 0.0022 in.)

If the clearance is outside the standard, replace the 1st gear needle roller bearing.



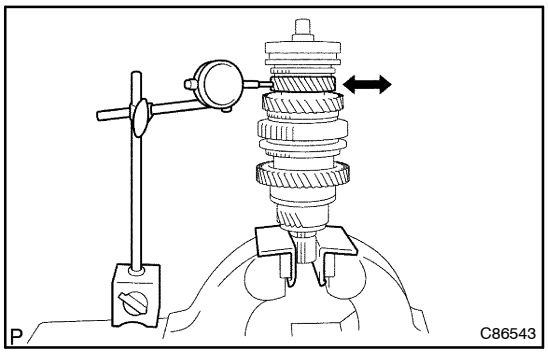
6. INSPECT 2ND GEAR RADIAL CLEARANCE

(a) Using a dial indicator, measure the 2nd gear radial clearance between the gear and the shaft.

Standard clearance:

0.008 – 0.034 mm (0.0003 – 0.00134 in.)

If the clearance is outside the standard, replace the 1st gear needle roller bearing.



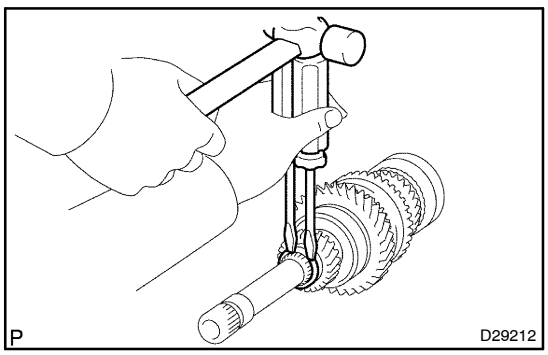
7. INSPECT 3RD GEAR RADIAL CLEARANCE

(a) Using a dial indicator, measure the 3rd gear radial clearance between the gear and the shaft.

Standard clearance:

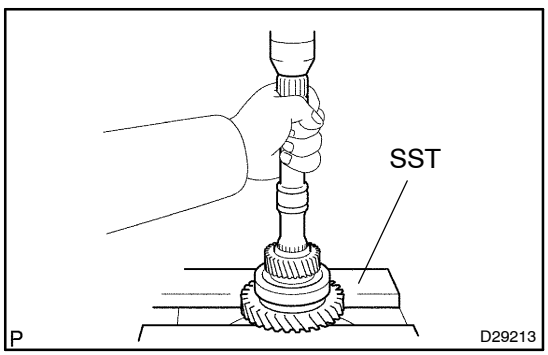
0.008 – 0.034 mm (0.0003 – 0.00134 in.)

If the clearance is outside the standard, replace the 3rd gear needle roller bearing.



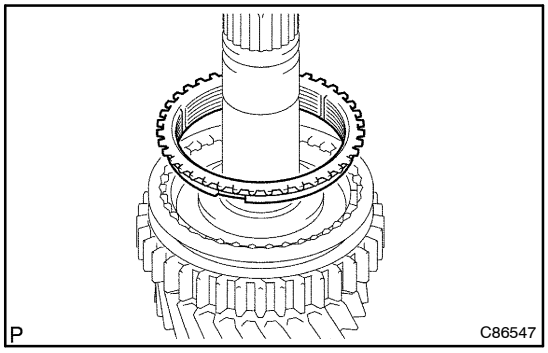
8. REMOVE 1ST GEAR

(a) Using 2 screw drivers and a hammer, remove the output shaft bearing shaft snap ring form the output shaft.



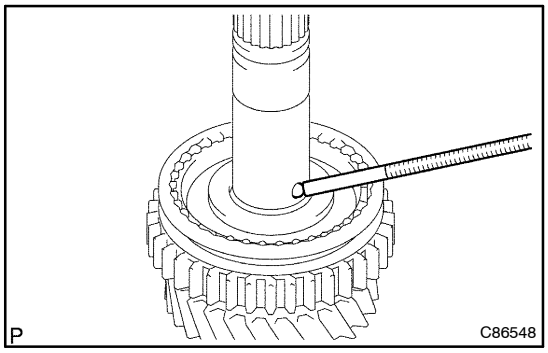
(b) Using SST and a press, remove the 5th gear, the output shaft bearing RR, the 1st gear, the 1st gear needle roller bearing and the 1st gear bearing inner lace from the output shaft.

SST 09527–10011



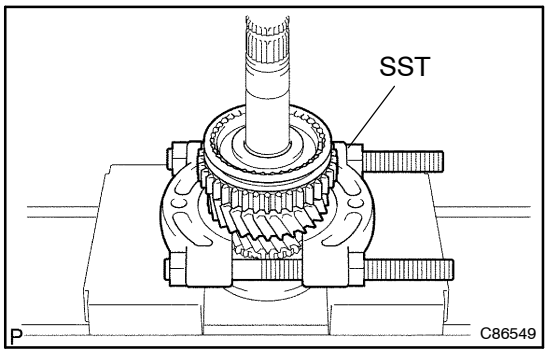
9. REMOVE SYNCHRONIZER RING NO.1 (FOR FIRST SYNCHRONIZER RING)

(a) Remove the synchronizer ring No. 2 (for the first synchronizer ring) from the transmission clutch hub No. 1.



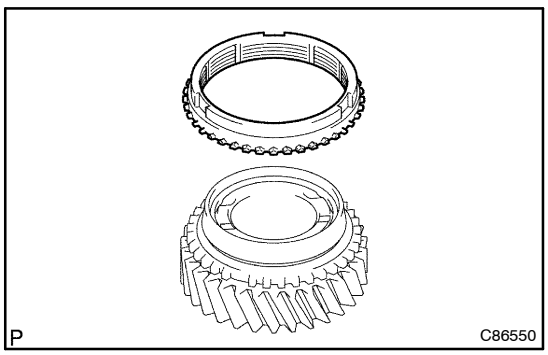
10. REMOVE 1ST GEAR BEARING INNER RACE LOCK KEY OR BALL

(a) Using a magnetic finger, remove the 1st gear bearing inner race lock key from the output shaft.



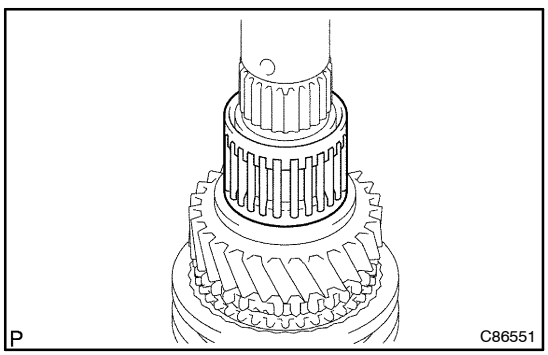
11. REMOVE 2ND GEAR

(a) Using SST and a press, remove the transmission clutch hub No. 1 assy and the 2nd gear from the output shaft.
SST 09950–00020



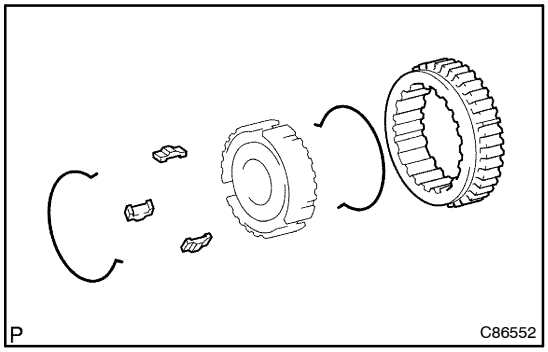
12. REMOVE SYNCHRONIZER RING NO.1 (FOR SECOND SYNCHRONIZER RING)

(a) Remove the synchronizer ring No. 2 (for the second synchronizer ring) from the 2nd gear.



13. REMOVE 2ND GEAR NEEDLE ROLLER BEARING

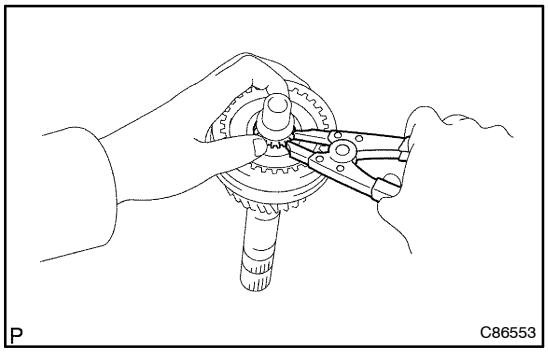
(a) Remove the 2nd gear needle roller bearing from the output shaft.



14. REMOVE TRANSMISSION CLUTCH HUB NO.1

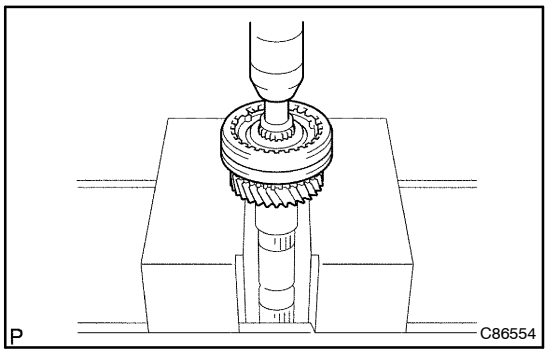
(a) Remove the 2 synchromesh shifting key springs No. 1.

(b) Remove the reverse gear and the 3 synchromesh shifting keys No. 1 from the transmission clutch hub No. 1.

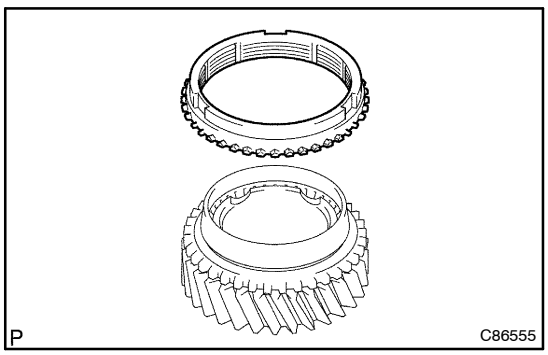


15. REMOVE 3RD GEAR

(a) Using a snap ring pliers, remove the clutch hub shaft snap ring from the output shaft.

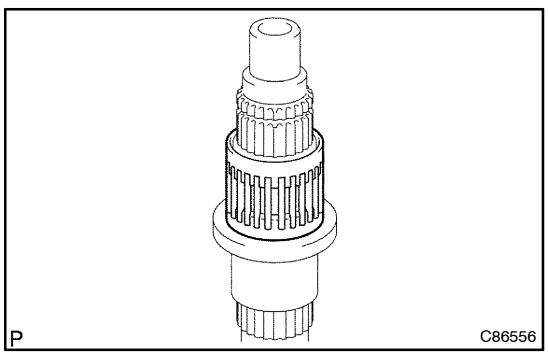


(b) Using a snap ring expander and a press, remove the clutch hub No. 2 assy and the 3rd gear.



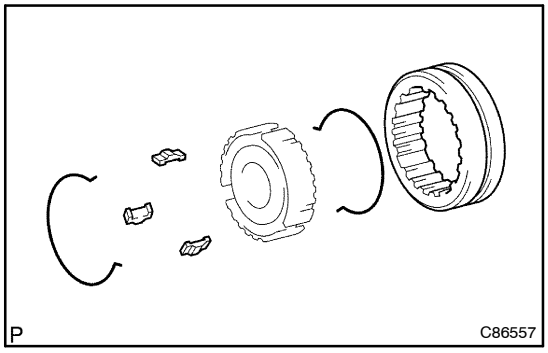
16. REMOVE SYNCHRONIZER RING NO.2

(a) Remove synchronizer ring No. 1 from the 3rd gear.



17. REMOVE 3RD GEAR NEEDLE ROLLER BEARING

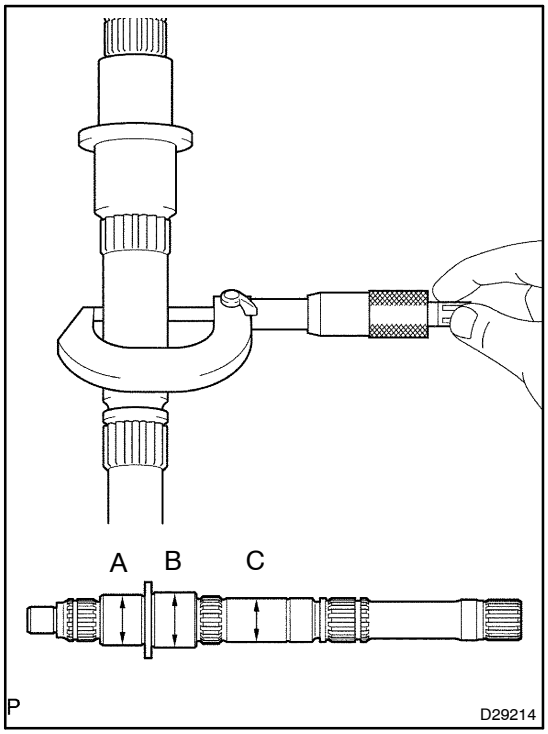
(a) Remove the 3rd gear needle roller bearing form the output shaft.



18. REMOVE TRANSMISSION CLUTCH HUB NO.2

(a) Remove the 2 synchromesh shifting key springs No.2.

(b) Remove the transmission hub sleeve No. 2 and 3 synchromesh shifting keys No. 2 from the transmission clutch hub No. 2.

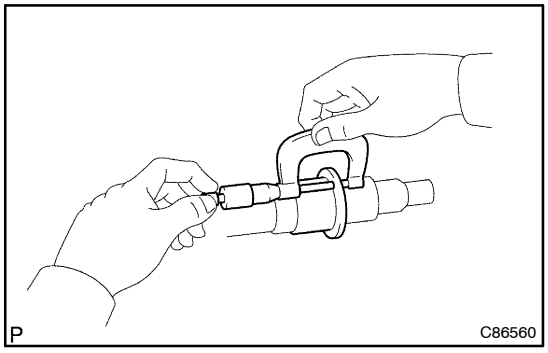


19. INSPECT OUTPUT SHAFT

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

Standard outer diameter:
Part A: 30.384 – 30.400 mm (1.1962 – 1.1968 in.)
Part B: 37.984 – 38.000 mm (1.4954 – 1.4960 in.)
Part C: 34.984 – 35.000 mm (1.3773 – 1.3780 in.)
Minimum outer diameter:
Part A: 30.384 mm (1.1962 in.)
Part B: 37.984 mm (1.4954 in.)
Part C: 34.984 mm (1.3773 in.)

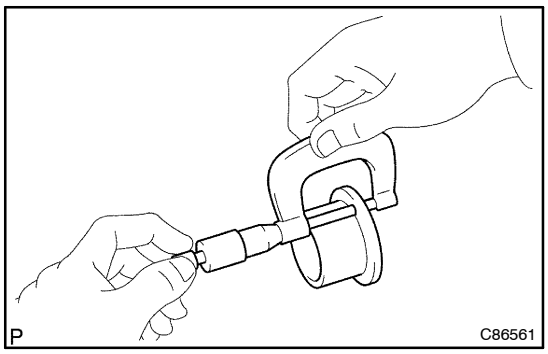
If the outer diameter is less than the minimum, replace the output shaft.



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

Standard thickness:
4.80 – 5.20 mm (0.1890 – 0.2047 in.)
Minimum thickness: 4.80 mm (0.1890 in.)

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

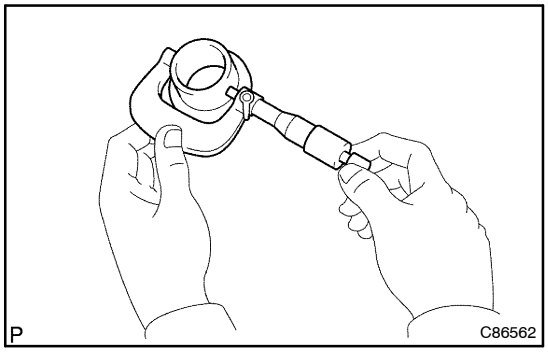


20. INSPECT 1ST GEAR BEARING INNER RACE

(a) Using a micrometer, measure the 1st gear bearing inner lace thickness.

Standard thickness:
4.00 – 4.20 mm (0.1575 – 0.1654 in.)
Minimum thickness: 4.0 mm (0.1575 in.)

If the thickness is less than the minimum, replace the 1st gear bearing inner lace.



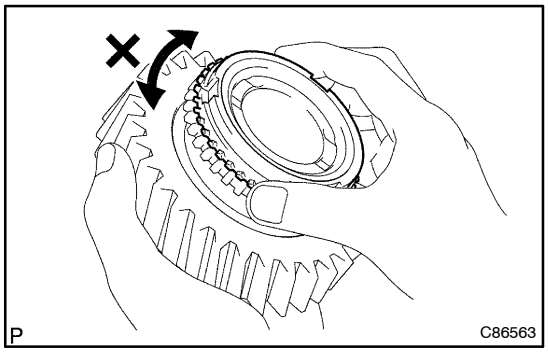
(b) Using a micrometer, measure the outer diameter of the 1st gear bearing inner lace.

Standard thickness:

38.985 – 39.000 mm (1.5348 – 1.5354 in.)

Minimum thickness: 38.985 (1.5348 in.)

If the outer diameter is less than the minimum, replace the 1st gear bearing inner lace.



21. INSPECT SYNCHRONIZER RING NO.1 (FOR FIRST SYNCHRONIZER RING)

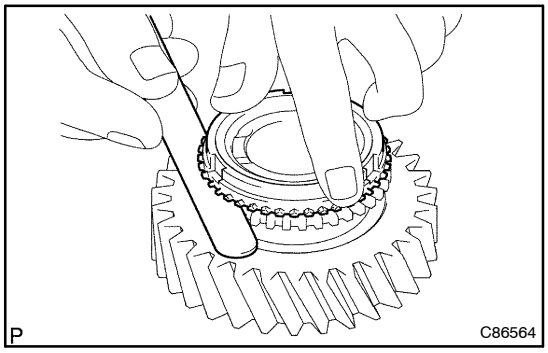
(a) Coat the 1st gear cone with gear oil. Check the braking effect of the synchronizer ring No. 2 (for the first synchronizer ring). Turn the synchronizer ring No. 2 (for the first synchronizer ring) in one direction while pushing it to the 1st gear cone. Check that the ring locks.

If the braking effect is insufficient, apply a small amount of the fine lapping compound between the synchronizer ring No. 2 (for the first synchronizer ring) and the 1st gear cone. Lightly rub the synchronizer ring No. 2 (for the first synchronizer ring) and the 1st gear cone together.

NOTICE:

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

(b) Check again the braking effect of the synchronizer ring No. 2 (for the first synchronizer ring).



(c) Using a feeler gauge, measure the clearance between the synchronizer ring No. 2 (for the first synchronizer ring) back and the 1st gear spline end.

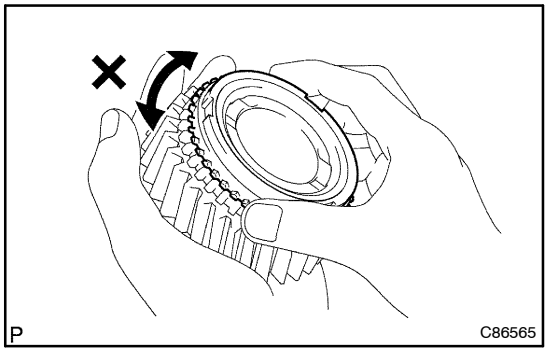
Standard clearance:

1.0 – 2.0 mm (0.0394 – 0.0787 in.)

If the clearance is less than the minimum, replace the synchronizer ring No .2 (for the first synchronizer ring), and apply a small amount of the fine lapping compound on the 1st gear cone.

NOTICE:

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



22. INSPECT SYNCHRONIZER RING NO.1 (FOR SECOND SYNCHRONIZER RING)

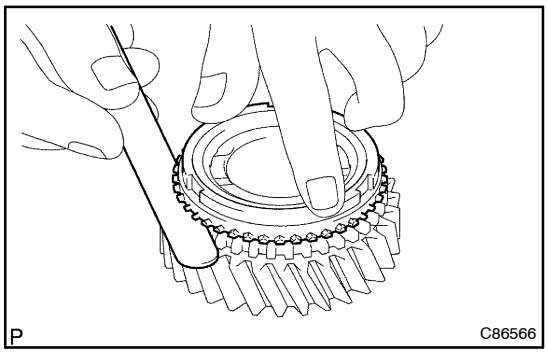
(a) Coat the 2nd gear cone with gear oil. Check the braking effect of the synchronizer ring No. 2 (for the second synchronizer ring). Turn the synchronizer ring No. 2 (for the second synchronizer ring) in one direction while pushing it to the 2nd gear cone. Check that the ring locks.

If the braking effect is insufficient, apply a small amount of the fine lapping compound between the synchronizer ring No. 2 (for the second synchronizer ring) and the 2nd gear cone. Lightly rub the synchronizer ring No. 2 (for the second synchronizer ring) and the 2nd gear cone together.

NOTICE:

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

(b) Check again the braking effect of the synchronizer ring No. 2 (for second synchronizer ring).



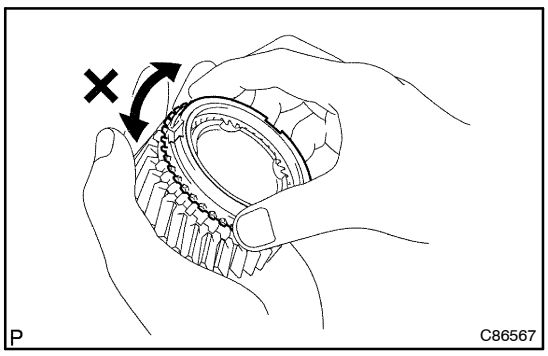
(c) Using a feeler gauge, measure the clearance between the synchronizer ring No. 2 (for the second synchronizer ring) back and the 2nd gear spline end.

Standard clearance: 1.0 – 2.0 mm (0.0394 – 0.0787 in.)

If the clearance is less than the minimum, replace the synchronizer ring No. 2 (for the second synchronizer ring), and apply a small amount of the fine lapping compound on 2nd gear cone.

NOTICE:

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



23. INSPECT RING, SYNCHRONIZER, NO.1

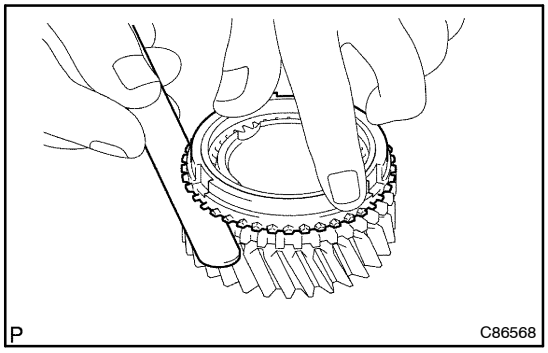
(a) Coat the 3rd gear cone with gear oil. Check the braking effect of the synchronizer ring No. 1. Turn the synchronizer ring No. 1 in one direction while pushing it to the 3rd gear cone. Check that the ring locks.

If the braking effect is insufficient, apply a small amount of the fine lapping compound between the synchronizer ring No1 and the 3rd gear cone. Lightly rub the synchronizer ring No. 1 and the 3rd gear cone together.

NOTICE:

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

(b) Check again the braking effect of the synchronizer ring No. 1.



(c) Using a feeler gauge, measure the clearance between the synchronizer ring No.1 back and the 3rd gear spline end.

Standard clearance: 1.0 – 2.0 mm (0.0394 – 0.0787 in.)

If the clearance is less than the minimum, replace the synchronizer ring No. 1, and apply a small amount of the fine lapping compound on 3rd gear cone.

NOTICE:

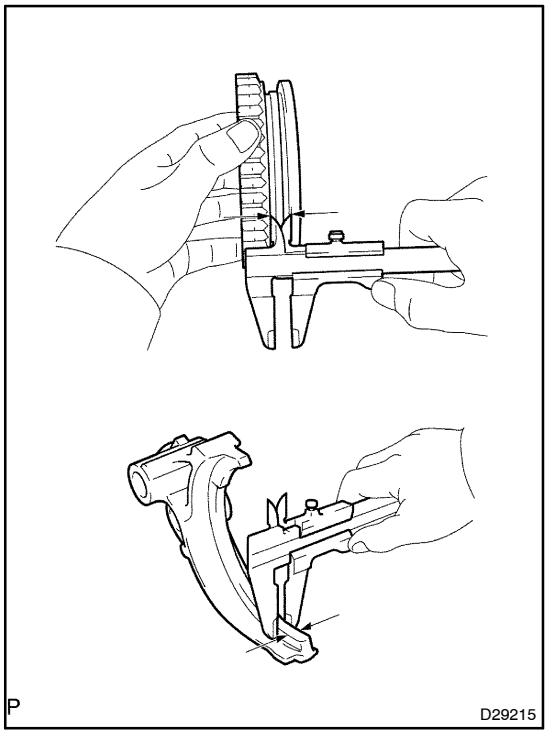
Ensure the fine lapping compound is completely washed off after rubbing.

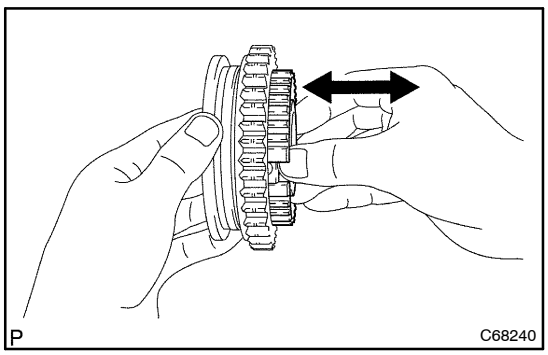
24. INSPECT REVERSE GEAR

(a) Using a vernier caliper, measure the clearance between reverse gear and the gear shift fork No.1.

Standard clearance:
0.15 – 0.35 mm (0.0059 – 0.0138 in.)
Minimum clearance: 0.35 mm (0.0138 in.)

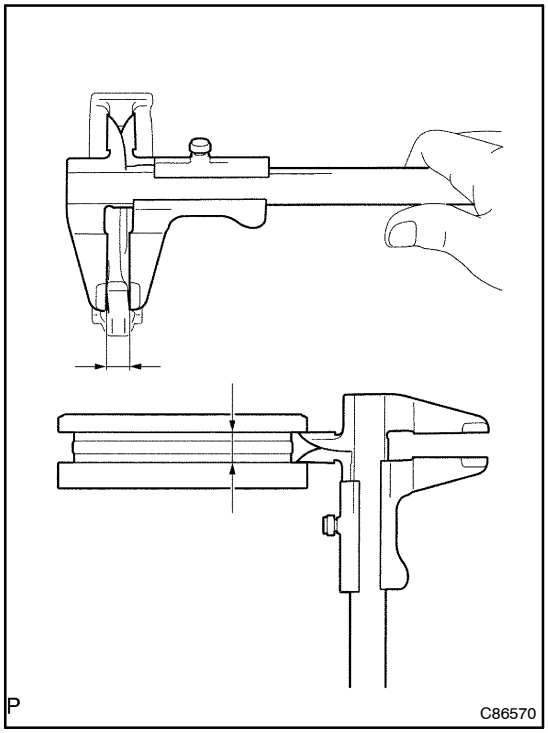
If the clearance exceeds the maximum, replace the gear shift fork No. 1 and the reverse gear.





(b) Check that the transmission clutch hub No. 1 and the reverse gear slide smoothly.

(c) Check that the spline gear's edges of the reverse gear are not worn down.

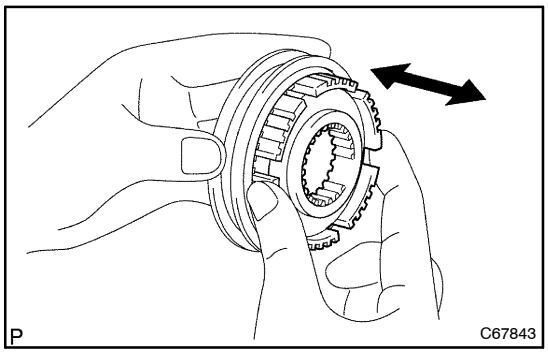


25. INSPECT TRANSMISSION HUB SLEEVE NO.2

(a) Using a vernier caliper, inspect the transmission hub sleeve No. 2 and the gear shift fork No. 2 as shown in the illustration.

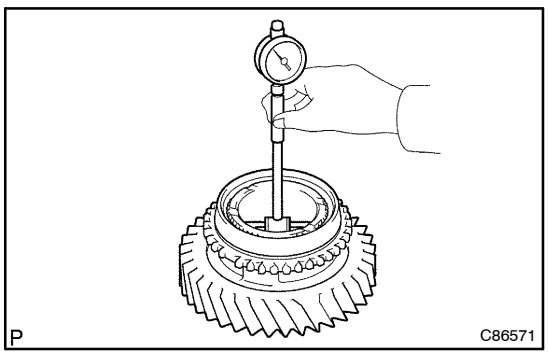
Standard clearance:
0.26 – 0.84 mm (0.0102 – 0.0331 in.)

If the clearance is outside the standard, replace the transmission hub sleeve No. 2 and the gear shift fork No. 2.



(b) Check the sliding condition between the transmission hub sleeve No. 2 and the transmission clutch hub No. 2.

(c) Check that the spline gear's edges of the transmission hub sleeve No. 2 are not worn down.

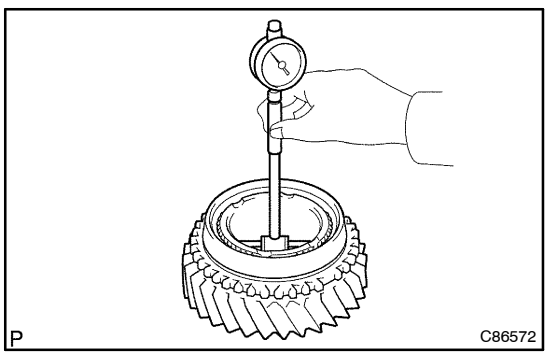


26. INSPECT 1ST GEAR

(a) Using a cylinder gauge, measure the inside diameter of the 1st gear.

Standard clearance:
44.015 – 44.040 mm (1.7329 – 1.7339 in.)
Maximum clearance: 44.040 mm (1.7339 in.)

If the clearance exceeds the maximum, replace the 1st gear.

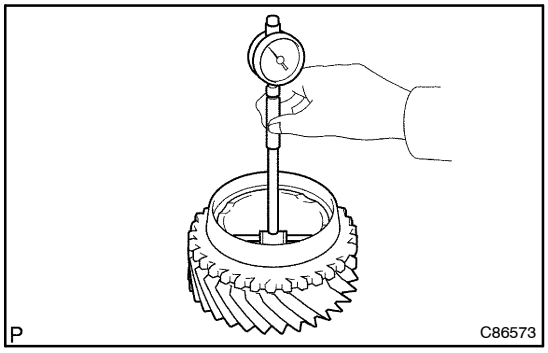


27. INSPECT 2ND GEAR

(a) Using a cylinder gauge, measure the inside diameter of the 2nd gear.

Standard clearance:
44.015 – 44.040 mm (1.7329 – 1.7339 in.)
Maximum clearance: 44.040 mm (1.7339 in.)

If the clearance exceeds the maximum, replace the 2nd gear.

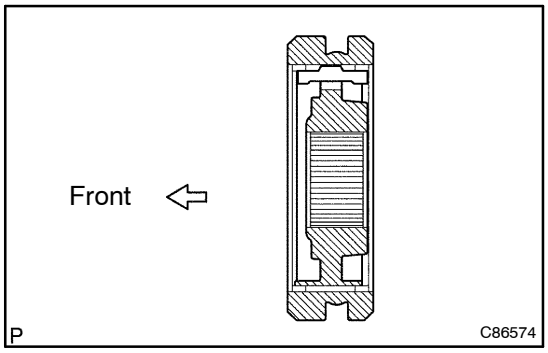


28. INSPECT 3RD GEAR

(a) Using a cylinder gauge, measure the inside diameter of the 3rd gear.

Standard clearance:
44.015 – 44.040 mm (1.7329 – 1.7339 in.)
Maximum clearance: 44.040 mm (1.7339 in.)

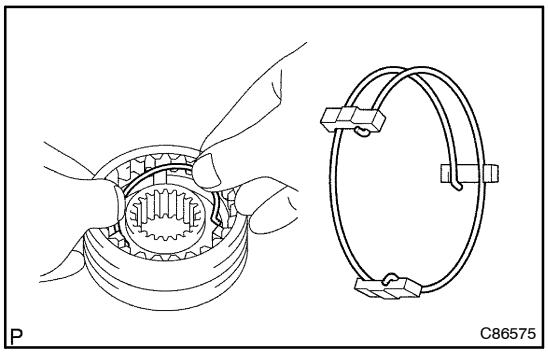
If the clearance exceeds the maximum, replace the 3rd gear.



29. INSTALL TRANSMISSION CLUTCH HUB NO.2

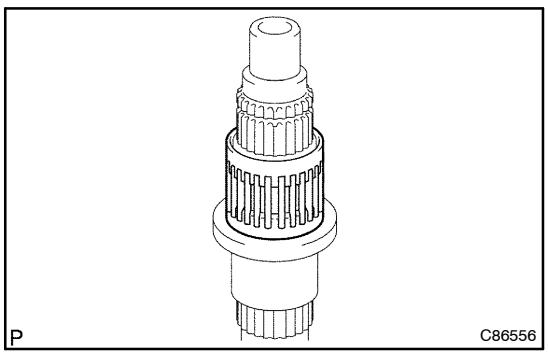
(a) Coat the transmission hub sleeve No. 2 with gear oil, and install it to the transmission clutch hub No. 2.

NOTICE:
Be sure to set the trans mission hub sleeve No.2 to the transmission clutch hub No.2 in the correct direction.



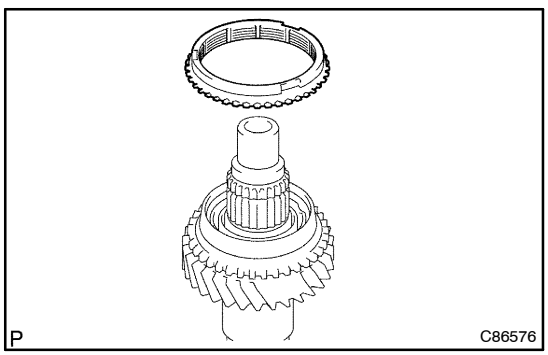
(b) Install the 2 synchromesh shifting key springs No. 2 with the 3 synchromesh shifting keys No. 2 to the transmission clutch hub No. 2.

HINT:
Do not set the both openings of the shifting key springs in the same position.



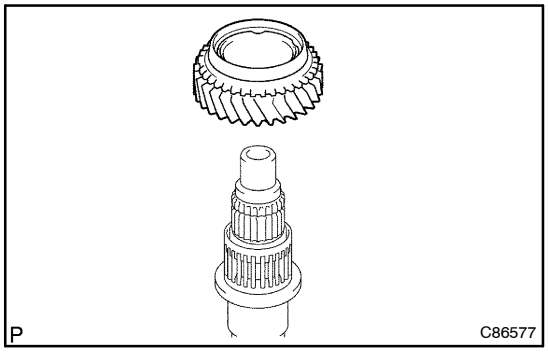
30. INSTALL BEARING, NEEDLE ROLLER

(a) Coat the 3rd gear bearing with gear oil, and install it to the output shaft.



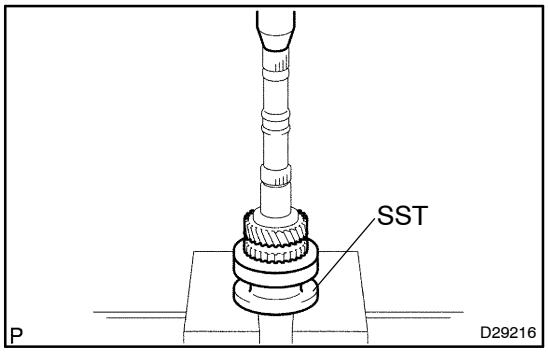
31. INSTALL 3RD GEAR

(a) Coat the 3rd gear with gear oil, and install it to the output shaft.



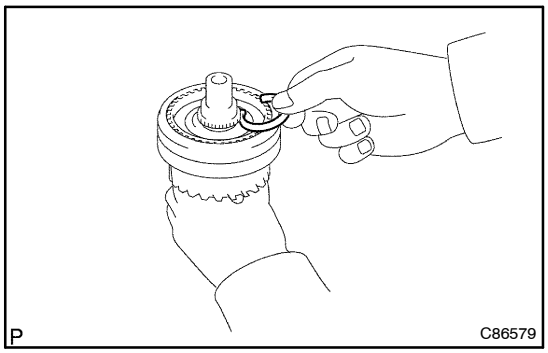
32. INSTALL RING, SYNCHRONIZER, NO.1

(a) Coat the synchronizer ring No. 1 with gear oil, and install it to the 3rd gear.



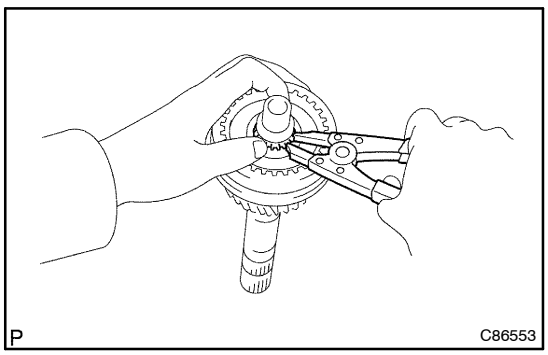
33. INSTALL TRANSMISSION CLUTCH HUB NO.2

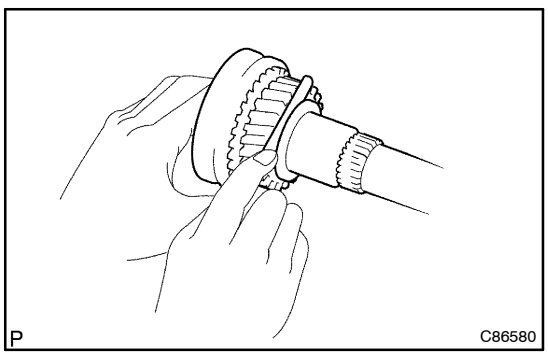
(a) Using SST and a press, install the transmission clutch hub No. 2 to the output shaft.
SST 09316–60011 (09316–00021)



(b) Select a clutch hub shaft snap ring that will allow minimum axial play.
Standard clearance:
0.1 mm (0.039 in.) or less
Clutch hub shaft snap ring thickness: mm (in)

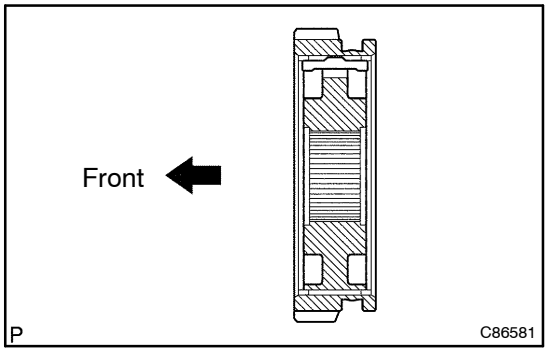
Mark	Thickness
C–1	1.75 – 1.80 (0.0689 – 0.0709)
D	1.80 – 1.85 (0.0709 – 0.0728)
D–1	1.85 – 1.90 (0.0728 – 0.0748)
E	1.90 – 1.95 (0.0748 – 0.0768)
E–1	1.95 – 2.00 (0.0768 – 0.0787)
F	2.00 – 2.05 (0.0787 – 0.0807)
F–1	2.05 – 2.10 (0.0807 – 0.0827)





34. INSPECT 3RD GEAR THRUST CLEARANCE

(a) Using a feeler gauge, measure the 3rd gear thrust clearance.
Standard clearance:
0.1 – 0.25 mm (0.0039 – 0.0098 in.)

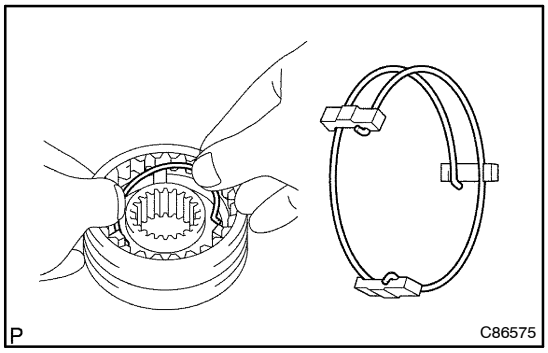


35. INSTALL TRANSMISSION CLUTCH HUB NO.1

(a) Coat the reverse gear with gear oil, and install it to the transmission clutch hub No. 1.

NOTICE:

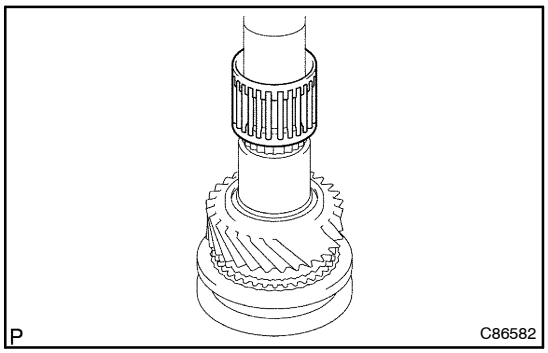
Be sure to set the reverse gear to the transmission clutch hub No.1 in the correct direction.



(b) Install the 2 synchromesh shifting key springs No. 1 and the 3 synchromesh shifting keys No. 1.

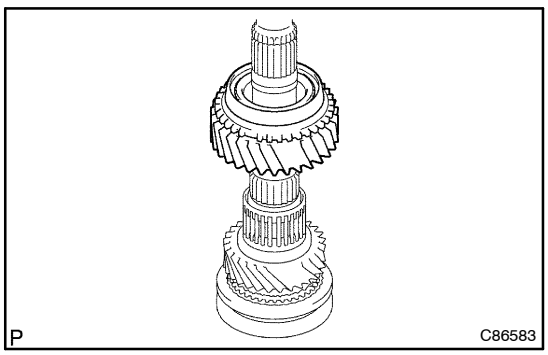
HINT:

Do not set both openings of the shifting key springs in the same position.



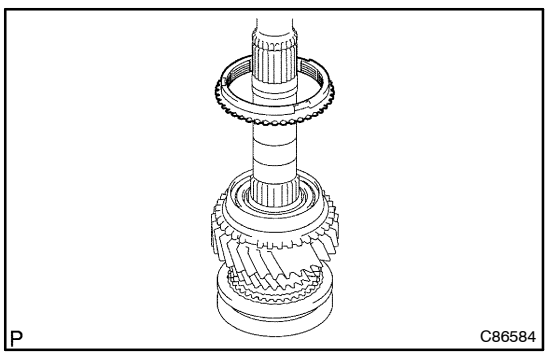
36. INSTALL BEARING, NEEDLE ROLLER

(a) Coat the 2nd gear needle roller bearing with gear oil, and install it to the output shaft.



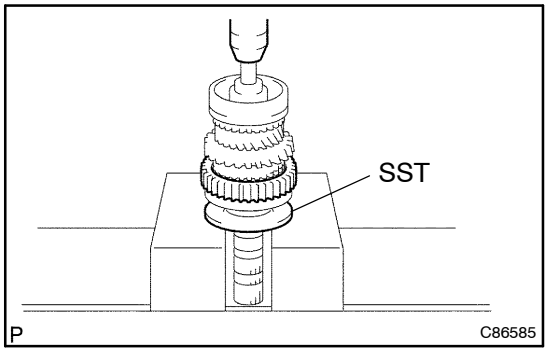
37. INSTALL 2ND GEAR

(a) Coat the 2nd gear with gear oil, and install it to the output shaft.



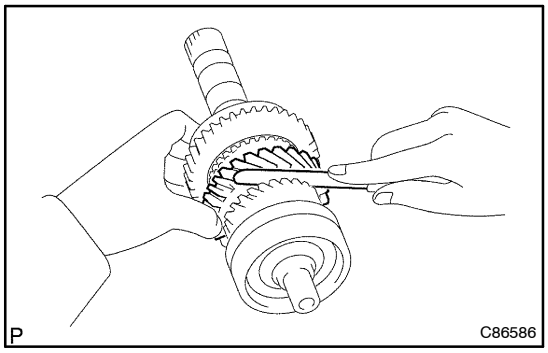
38. INSTALL SYNCHRONIZER RING NO.1 (FOR SECOND SYNCHRONIZER RING)

(a) Coat the synchronizer ring No. 2 (for second synchronizer ring) with gear oil, and install it to the 2nd gear.



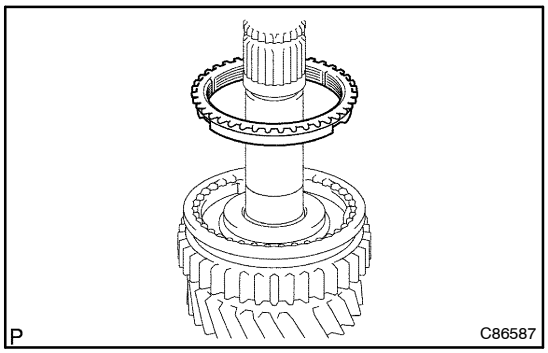
39. INSTALL TRANSMISSION CLUTCH HUB NO.1

(a) Using SST and a press, install the transmission clutch hub No. 1 to the output shaft.
SST 09316–60011 (09316–00021)



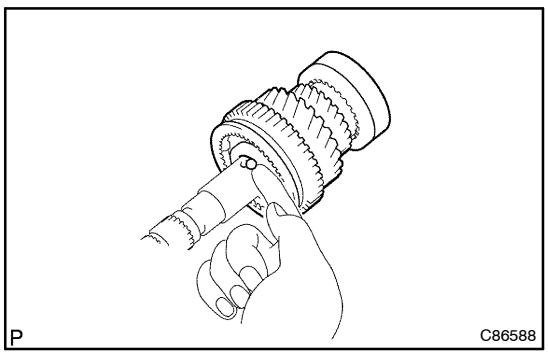
40. INSPECT 2ND GEAR THRUST CLEARANCE

(a) Using a feeler gauge, measure the 2nd gear thrust clearance.
Standard clearance:
0.1 – 0.25 mm (0.0039 – 0.0098 in.)



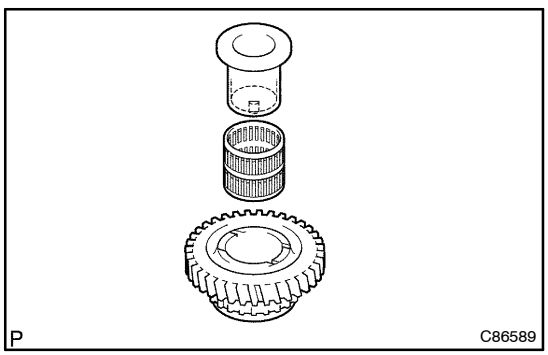
41. INSTALL SYNCHRONIZER RING NO.1 (FOR FIRST SYNCHRONIZER RING)

(a) Coat the synchronizer ring No. 2 (for first synchronizer rig) with gear oil, and install it to the transmission clutch hub No. 2.



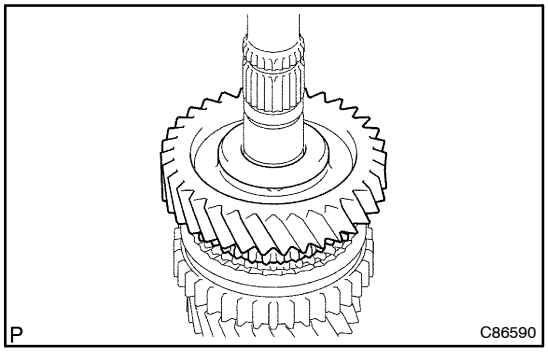
42. INSTALL BALL, REVERSE SHIFT RESTRICT

(a) Coat the 1st gear bearing inner lock key with gear oil, and install it to the output shaft.



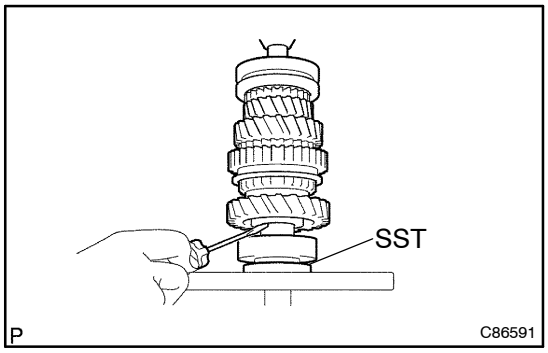
43. INSTALL 1ST GEAR BEARING INNER RACE

(a) Coat the 1st gear needle roller bearing with gear oil.
(b) Install the 1st gear bearing inner lace and the 1st gear needle roller bearing to the 1st gear.



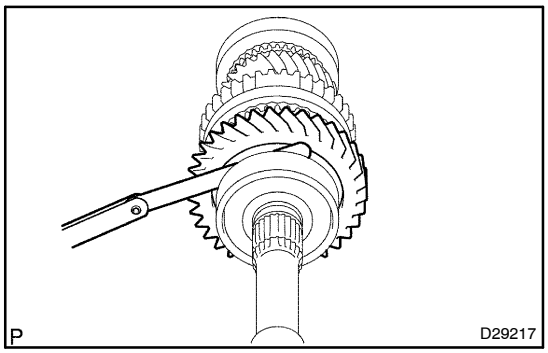
44. INSTALL 1ST GEAR

(a) Coat the 1st gear with gear oil, and install it to the output shaft.



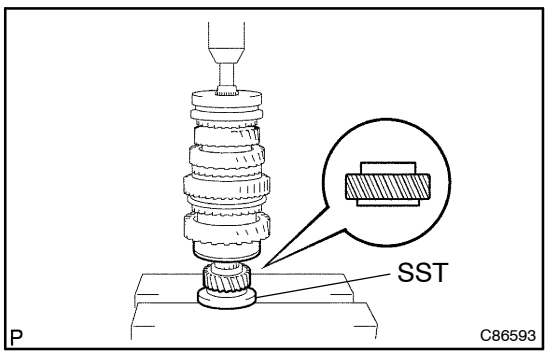
45. INSTALL BEARING, RADIAL BALL

(a) Using SST and a press, install the output shaft bearing RR to the output shaft bearing.
SST 09316–60011 (09316–00021)



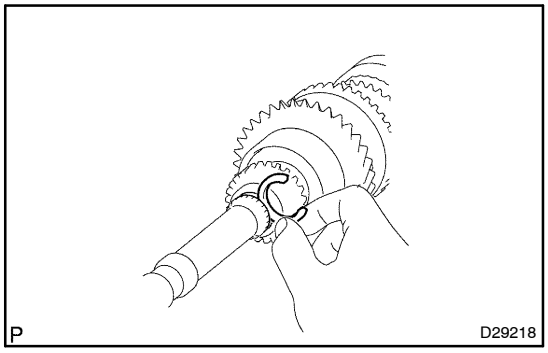
46. INSPECT 1ST GEAR THRUST CLEARANCE

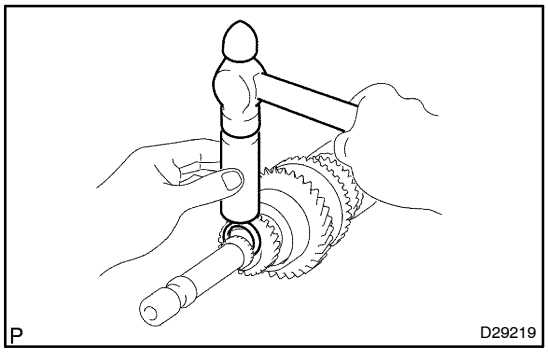
(a) Using a feeler gauge, measure the 1st gear thrust clearance.
Standard clearance:
0.1 – 0.25 mm (0.0039 – 0.008 in.)



47. INSTALL 5TH GEAR

(a) Using SST and a press, install the 5th gear to the output shaft.
SST 09316–60011 (09316–00021)





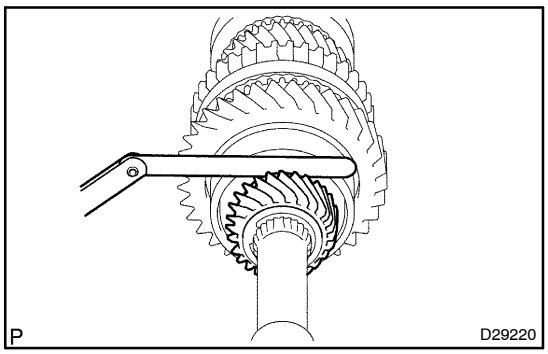
(b) Select a output shaft bearing shaft snap ring that will allow minimum axial play.

Standard clearance:

0.1 mm (0.039 in.) or less

Output shaft bearing shaft snap ring: mm (in)

Mark	Thickness
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 – 0.1141)
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)

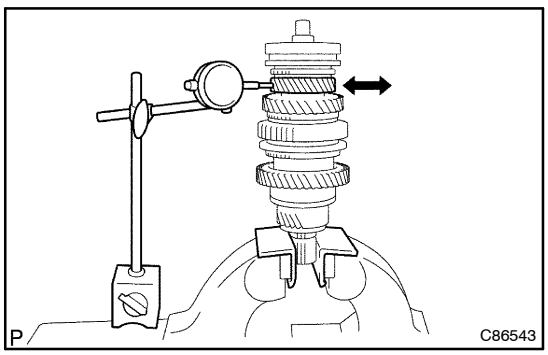


48. INSPECT 5TH GEAR THRUST CLEARANCE

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

Standard clearance:

0.1 – 0.3 mm (0.0039 – 0.0118 in.)

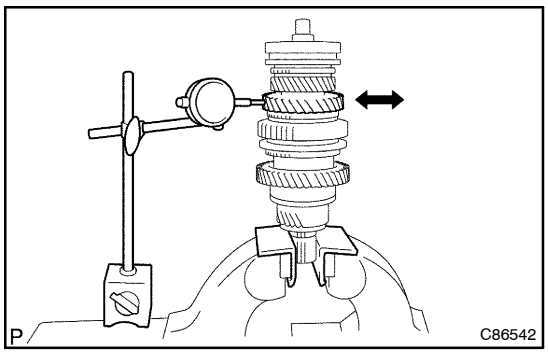


49. INSPECT 3RD GEAR RADIAL CLEARANCE

(a) Using a did indicator, measure the 3rd gear radial clearance.

Standard clearance:

0.008 – 0.034 mm (0.0003 – 0.00134 in.)

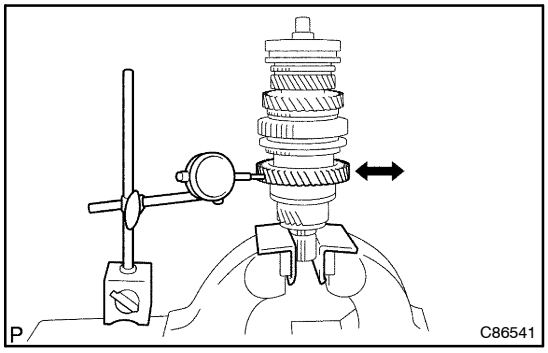


50. INSPECT 2ND GEAR RADIAL CLEARANCE

(a) Using a dial indicator, measure the 2nd gear radial clearance.

Standard clearance:

0.008 – 0.034 mm (0.0003 – 0.00134 in.)



51. INSPECT 1ST GEAR RADIAL CLEARANCE

(a) Using a dial indicator, measure the 1st gear radial clearance.

Standard clearance:
0.009 – 0.056 mm (0.00035 – 0.00220 in.)