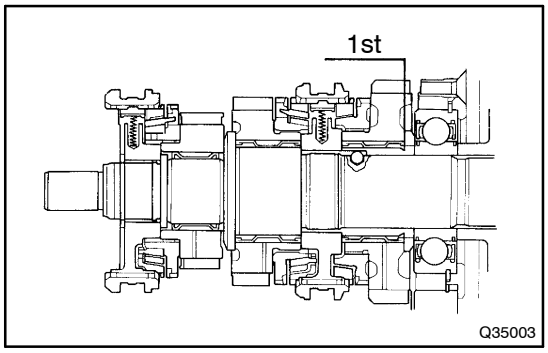
OUTPUT SHAFT ASSY (W56)

410BT-01

OVERHAUL

HINT:

COMPONENTS: See page 41-1

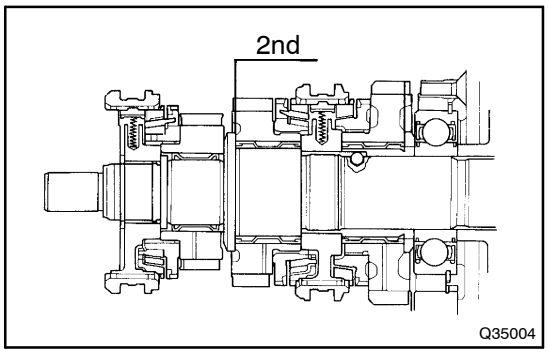


1. INSPECT 1ST GEAR THRUST CLEARANCE

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

Standard clearance:

0.1 – 0.25 mm (0.0039 – 0.0098 in.)

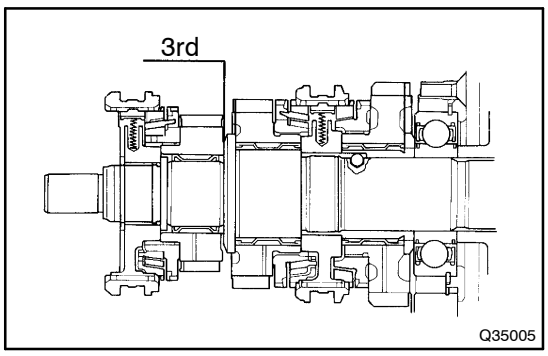


2. INSPECT 2ND GEAR THRUST CLEARANCE

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

Standard clearance:

0.1 – 0.25 mm (0.0039 – 0.0098 in.)

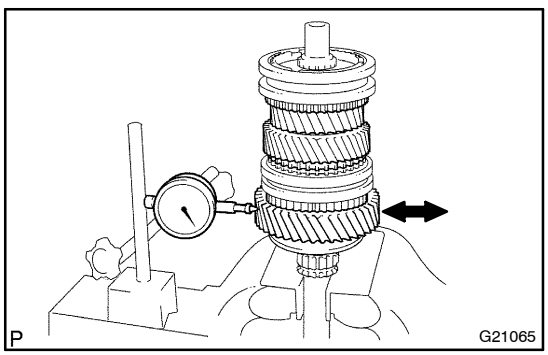


3. INSPECT 3RD GEAR THRUST CLEARANCE

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

Standard clearance:

0.1 – 0.25 mm (0.0039 – 0.0098 in.)



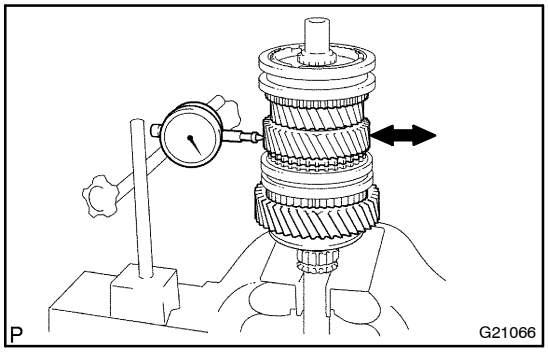
4. INSPECT 1ST GEAR RADIAL CLEARANCE

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

Standard clearance:

0.012 – 0.104 mm (0.0005 – 0.0041 in.)

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



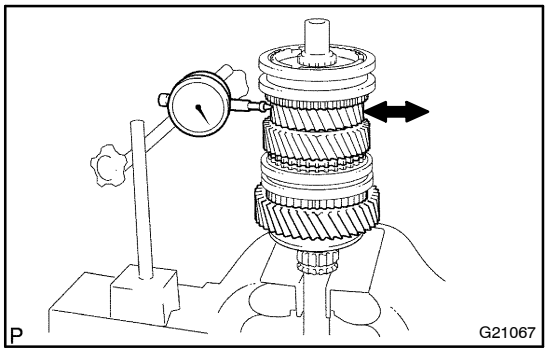
5. INSPECT 2ND GEAR RADIAL CLEARANCE

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

Standard clearance:

0.009 – 0.060 mm (0.0004 – 0.0024 in.)

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



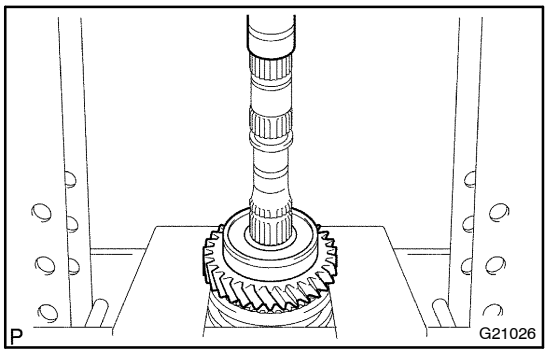
6. INSPECT 3RD GEAR RADIAL CLEARANCE

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

Standard clearance:

0.022 – 0.071 mm (0.0009 – 0.0028 in.)

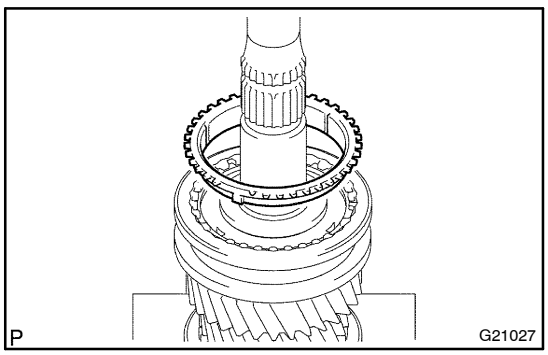
If the clearance exceeds the standard clearance, replace the 3rd gear needle roller bearing.



7. REMOVE 1ST GEAR

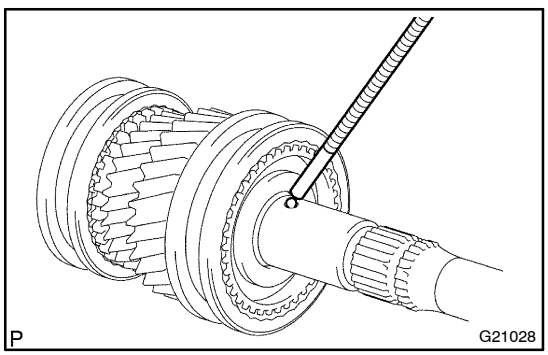
(a) Shift the transmission hub sleeve No.1 onto the 2nd gear.

(b) Using a press, remove the output shaft center bearing, 1st gear, 1st gear needle roller bearing and 1st gear bush from the output shaft.



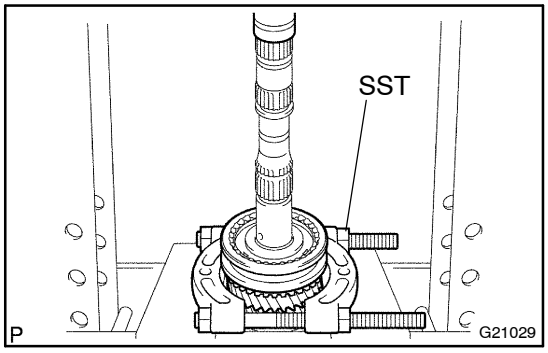
8. REMOVE SYNCHRONIZER RING NO.1

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



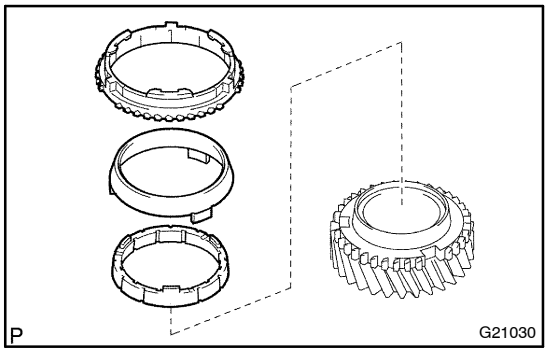
9. REMOVE 1ST GEAR BUSH BALL

(a) Using a magnetic finger, remove the 1st gear bush ball from the output shaft.



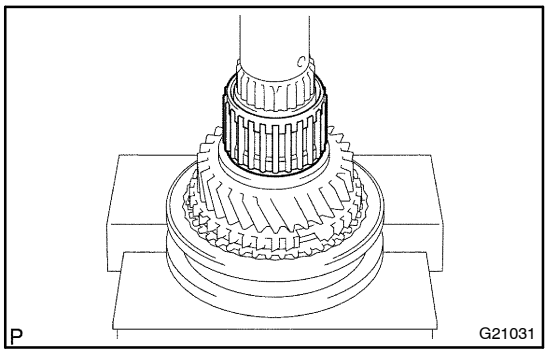
10. REMOVE 2ND GEAR

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



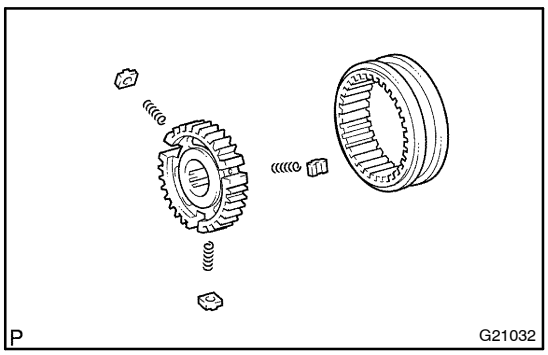
11. REMOVE SYNCHRONIZER RING SET NO.1

(a) Remove the synchronizer ring set No.1 from the 2nd gear.



12. REMOVE 2ND GEAR NEEDLE ROLLER BEARING

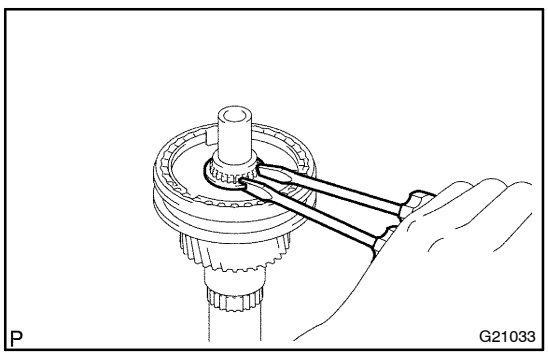
(a) Remove the 2nd gear needle roller bearing from the output shaft.



13. REMOVE TRANSMISSION CLUTCH HUB NO.1

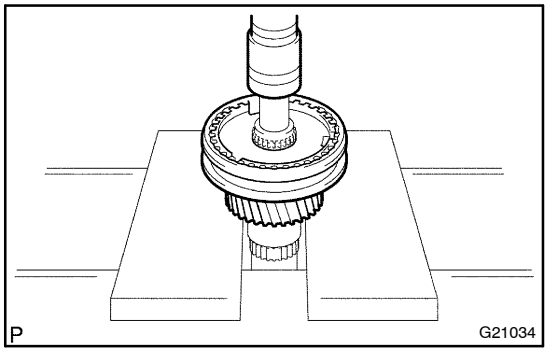
(a) Remove the transmission hub sleeve No.1 from the transmission clutch hub No.1.

(b) Push the compression spring with a screwdriver and remove the 3 synchromesh shifting key No.1 and 3 compression springs from the transmission clutch hub No.1.

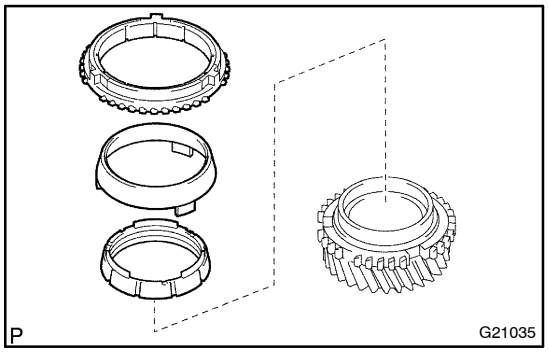


14. REMOVE 3RD GEAR

(a) Using 2 screwdrivers and a hammer, remove the clutch hub shaft snap ring from the output shaft.

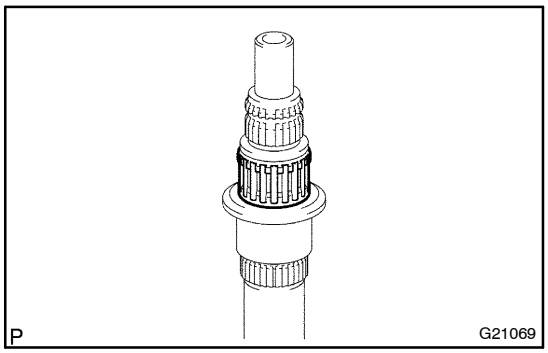


(b) Using a press, remove the clutch hub No.2 assy and 3rd gear.



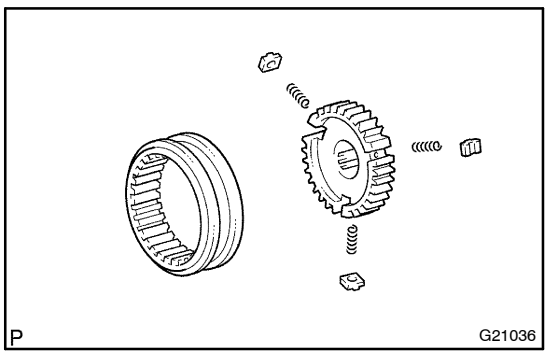
15. REMOVE SYNCHRONIZER RING SET NO.2

(a) Remove the synchronizer ring set No.2 from the 3rd gear.



16. REMOVE 3RD GEAR NEEDLE ROLLER BEARING

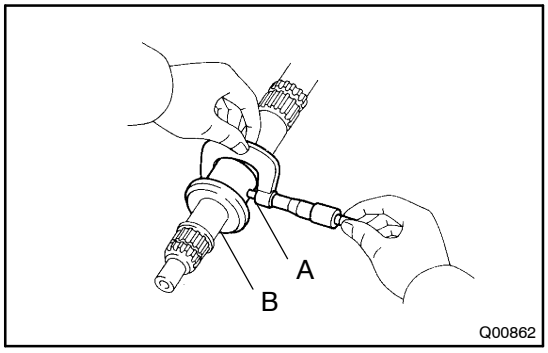
(a) Remove the 3rd gear needle roller bearing form the output shaft.



17. REMOVE TRANSMISSION CLUTCH HUB NO.2

(a) Remove the transmission hub sleeve No.2 from the transmission clutch hub No.2.

(b) Push the compression spring with a screwdriver, remove the 3 synchromesh shifting key No.2 and 3 compression springs from the transmission clutch hub No.2.

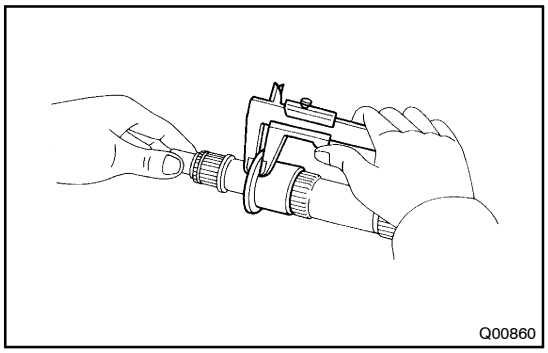


18. INSPECT OUTPUT SHAFT

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

Standard outer diameter:
Part A: 42.975 – 42.991 mm (1.6919 – 1.6926 in.)
Part B: 31.969 – 31.985 mm (1.2586 – 1.2592 in.)
Minimum outer diameter:
Part A: 42.975 mm (1.6919 in.)
Part B: 31.969 mm (1.2586 in.)

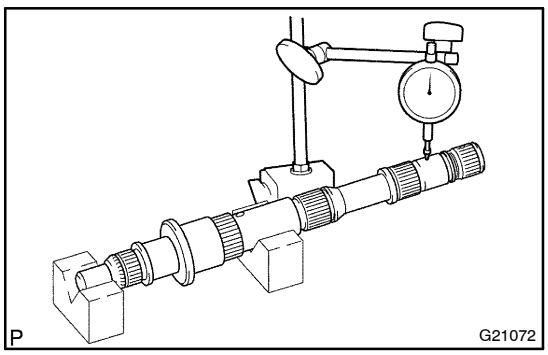
If the outer diameter is less than the minimum, replace the output shaft.



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

Standard thickness:
5.7 – 6.1 mm (0.2244 – 0.2402 in.)
Minimum thickness: 5.7 mm (0.2244 in.)

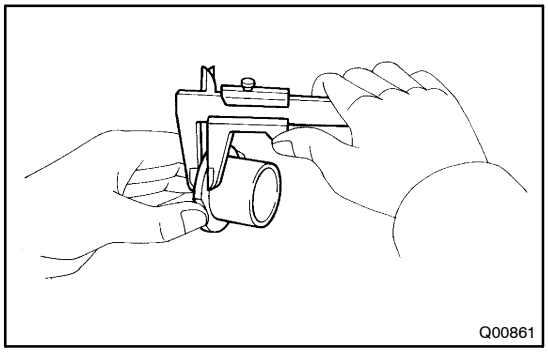
If the thickness is less than the minimum, replace the output shaft.



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

Maximum runout: 0.03 mm (0.0012 in.)

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

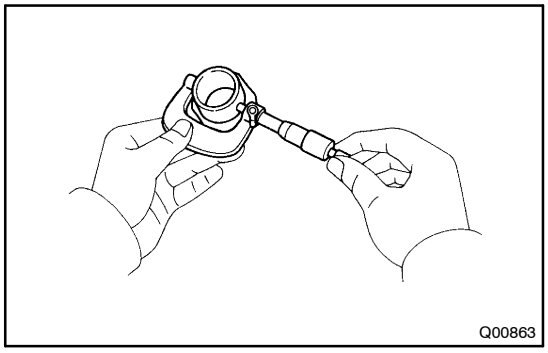


19. INSPECT 1ST GEAR BUSH

(a) Using vernier calipers, measure the 1st gear bush thickness.

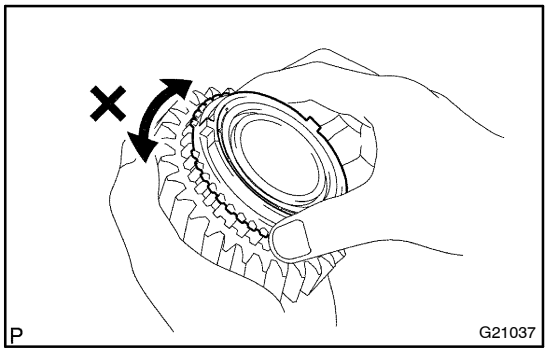
Standard thickness:
4.78 – 4.98 mm (0.1882 – 0.1961 in.)
Minimum thickness: 4.78 mm (0.1882 in.)

If the thickness is less than the minimum, replace the 1st gear bush.



(b) Using a micrometer, measure the outer diameter of the 1st gear bush.
Standard thickness:
42.975 – 42.991 mm (1.6919 – 1.6926 in.)
Minimum thickness: 42.975 (1.6919 in.)

If the outer diameter is less than the minimum, replace the 1st gear bush.



20. INSPECT SYNCHRONIZER RING NO.1

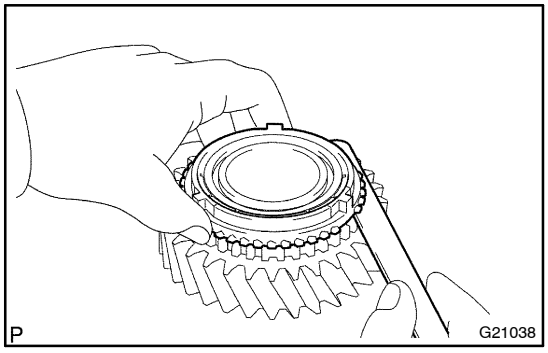
(a) Coat the 1st gear cone with gear oil. Check the braking effect of the synchronizer ring No.1. Turn the synchronizer ring No.1 in one direction while pushing it to the 1st gear cone. Check that the ring locks.

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

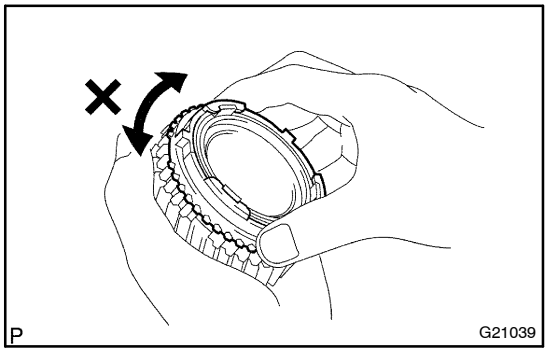


(c) Using a feeler gauge, measure the clearance between the synchronizer ring No.1 back and 1st gear spline end.
Standard clearance:
0.7 – 1.7 mm (0.0276 – 0.0669 in.)

If the clearance exceeds the standard clearance, replace the synchronizer ring No.1 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.



21. INSPECT SYNCHRONIZER RING SET NO.1

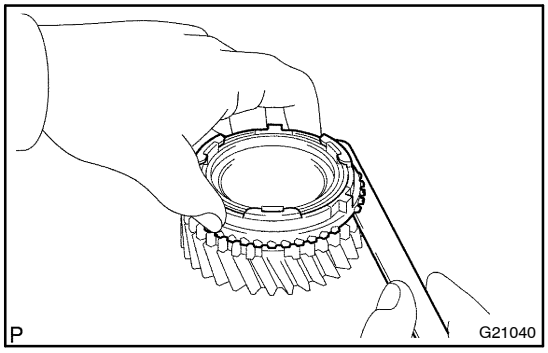
(a) Coat the 2nd gear cone with gear oil. Check the braking effect of the synchronizer ring set No.1. Turn the synchronizer ring set No.1 in one direction while pushing it to the 2nd gear cone. Check that the ring locks.

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

NOTICE:

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

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



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

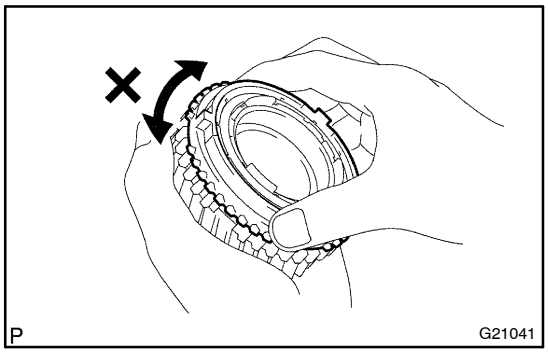
Standard clearance:

0.57 – 1.63 mm (0.0224 – 0.0642 in.)

If the clearance exceeds the standard clearance, replace the synchronizer ring set No.1 and apply a small amount of the fine lapping compound on the 2nd gear cone.

NOTICE:

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



22. INSPECT SYNCHRONIZER RING SET NO.2

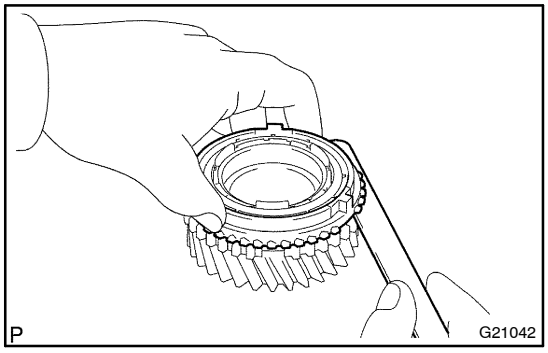
(a) Coat the 3rd gear cone with gear oil. Check the braking effect of the synchronizer ring set No.2. Turn the synchronizer ring set No.2 in one direction while pushing it to the 3rd gear cone. Check that the ring locks.

If the braking effect is insufficient, apply a small amount of the fine lapping compound between the synchronizer ring set No.2 and 3rd gear cone. Lightly rub the synchronizer ring set No.2 and 3rd gear cone together.

NOTICE:

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

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



(c) Using a feeler gauge, measure the clearance between the synchronizer ring set No.2 back and the 3rd gear spline end.

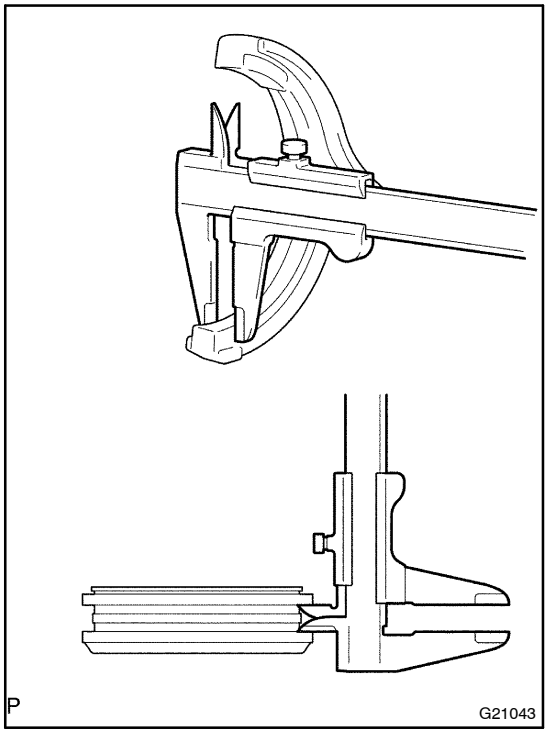
Standard clearance:

1.14 – 1.74 mm (0.0449 – 0.0685 in.)

If the clearance exceeds the standard clearance, replace the synchronizer ring set No.2 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.



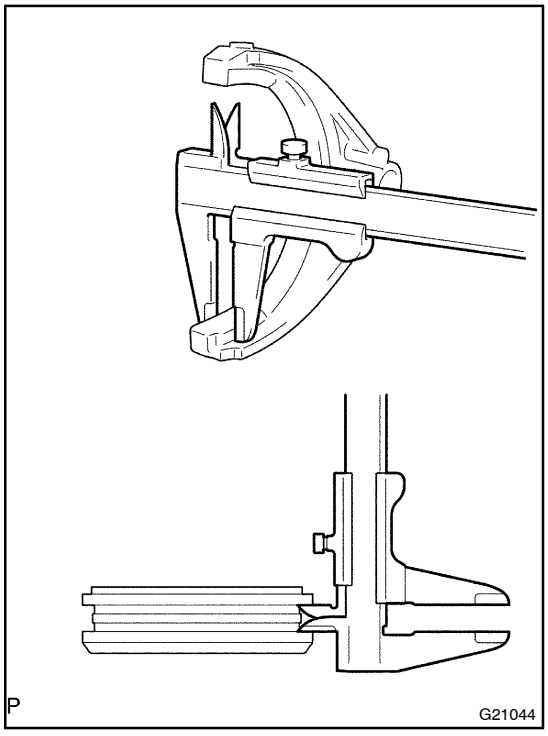
23. INSPECT TRANSMISSION HUB SLEEVE NO.1

(a) Using vernier calipers, measure the clearance between the gear shift fork No.1 and the transmission hub sleeve No.1.

Standard clearance:

0.3 – 0.5 mm (0.012 – 0.020 in.)

If the clearance exceeds the standard clearance, replace the gear shift fork No.1 and the transmission hub sleeve No.1.



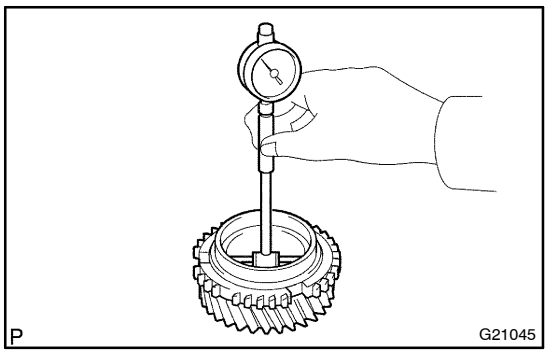
24. INSPECT TRANSMISSION HUB SLEEVE NO.2

(a) Using vernier calipers, measure the clearance between gear shift fork No.2 and transmission hub sleeve No.2.

Standard clearance:

0.3 – 0.5 mm (0.012 – 0.020 in.)

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



25. INSPECT 1ST GEAR

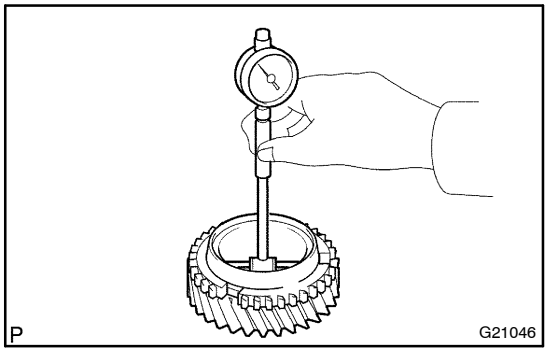
(a) Using a cylinder gauge, measure the inside diameter of the 1st gear.

Standard clearance:

49.000 – 49.025 mm (1.9291 – 1.9301 in.)

Maximum clearance: 49.025 mm (1.9301 in.)

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

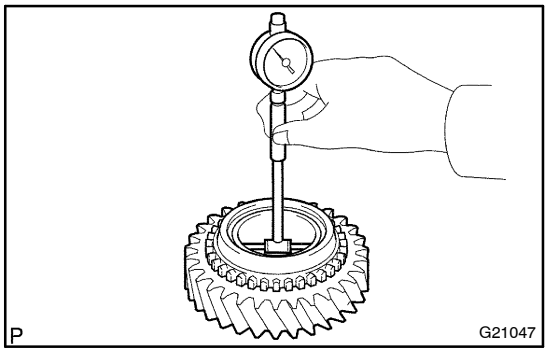


26. INSPECT 2ND GEAR

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

Standard clearance:
49.000 – 49.025 mm (1.9291 – 1.9301 in.)
Maximum clearance: 49.025 mm (1.9301 in.)

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

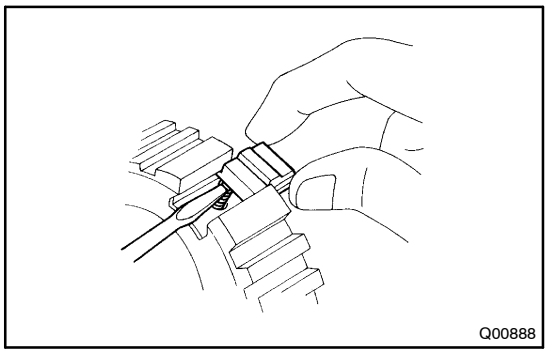


27. INSPECT 3RD GEAR

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

Standard clearance:
38.007 – 38.028 mm (1.4963 – 1.4972 in.)
Maximum clearance: 38.028 mm (1.4972 in.)

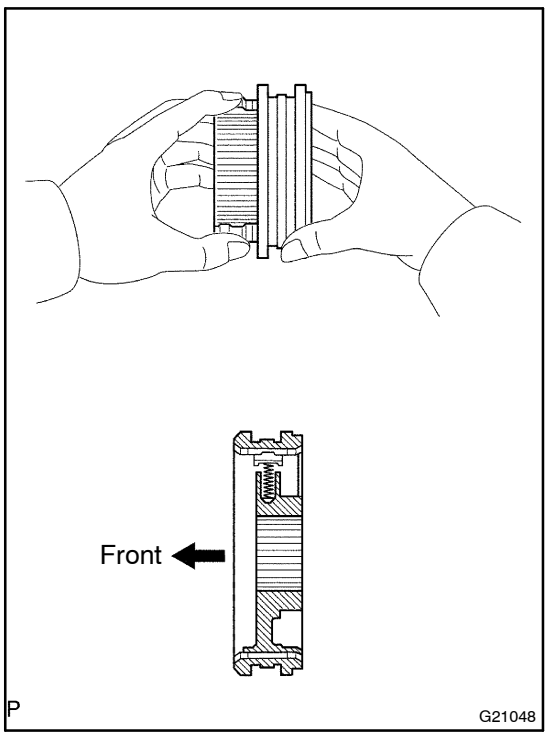
If the clearance exceeds the maximum, replace the 3rd gear.



28. INSTALL TRANSMISSION CLUTCH HUB NO.2

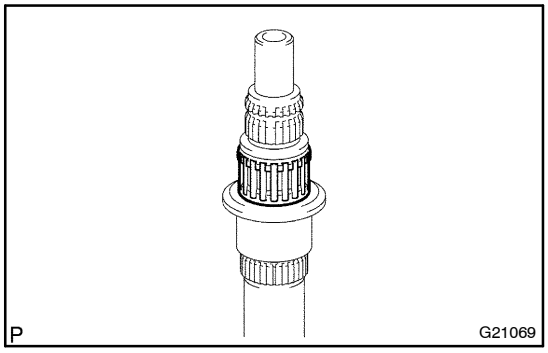
(a) Install the 3 synchromesh shifting key No.2 on the transmission clutch hub No.2.

(b) While pushing the compression spring with a screwdriver, install the 3 compression springs.



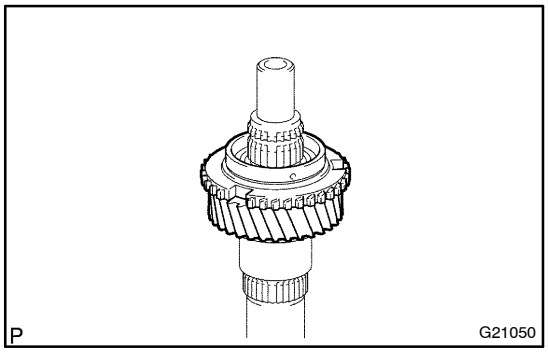
(c) While pushing the 3 synchromesh shifting keys No.2, install the 2 transmission clutch hub No.2 on the transmission hub sleeve No.2, as shown.

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



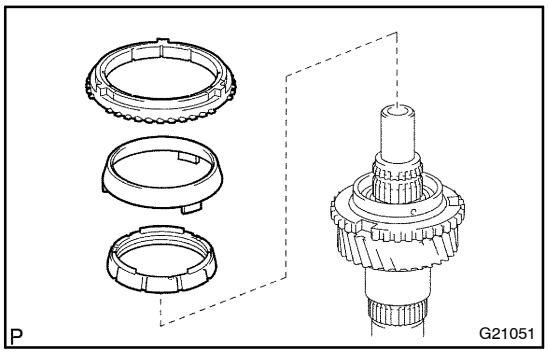
29. INSTALL 3RD GEAR NEEDLE ROLLER BEARING

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



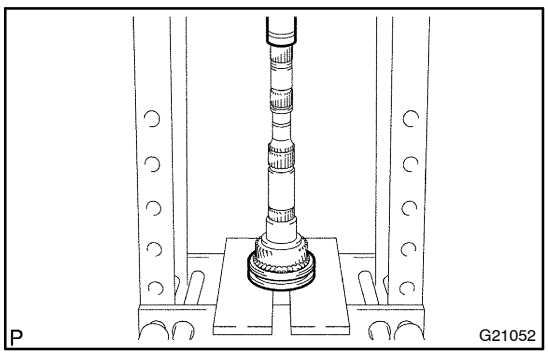
30. INSTALL 3RD GEAR

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



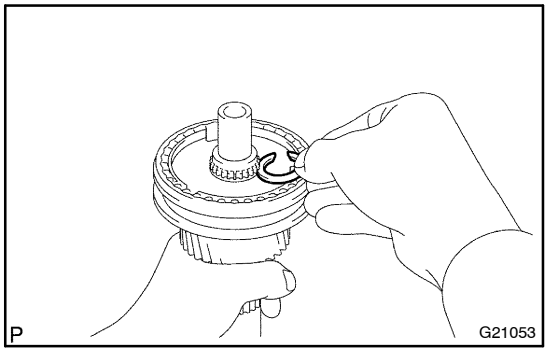
31. INSTALL SYNCHRONIZER RING SET NO.2

(a) Coat the synchronizer ring set No.2 with gear oil, install it on the 3rd gear.



32. INSTALL TRANSMISSION CLUTCH HUB NO.2

(a) Using a press, install the transmission clutch hub No.2 on the output shaft.

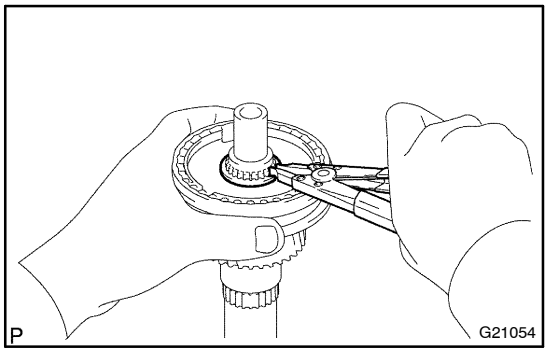


(b) Select a clutch hub set shaft snap ring that will allows minimum axial play.

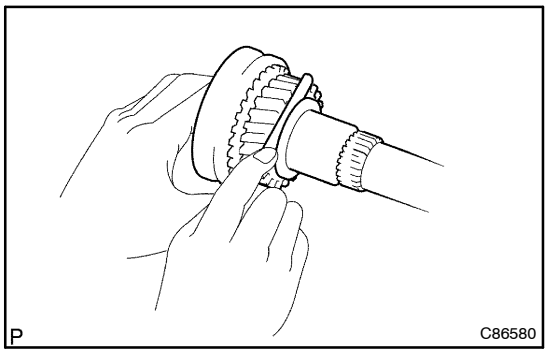
Standard clearance:
0.1 mm (0.039 in.) or less

Clutch hub set 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)
11	1.86 – 1.91 (0.0732 – 0.0752)
12	1.92 – 1.97 (0.0756 – 0.0776)
13	1.98 – 2.03 (0.0780 – 0.0799)
14	2.04 – 2.09 (0.0803 – 0.0823)
15	2.10 – 2.15 (0.0827 – 0.0846)



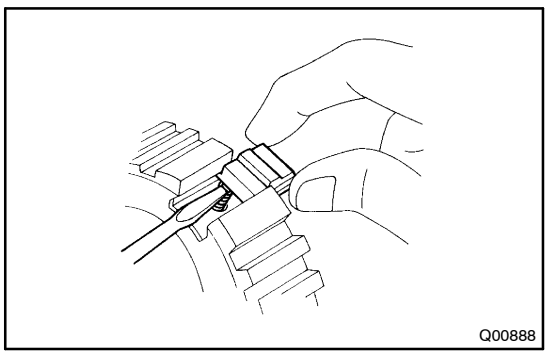
(c) Using snap ring pliers, install the cluch hub set shaft snap ring on the output shaft.



33. INSPECT 3RD GEAR THRUST CLEARANCE

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

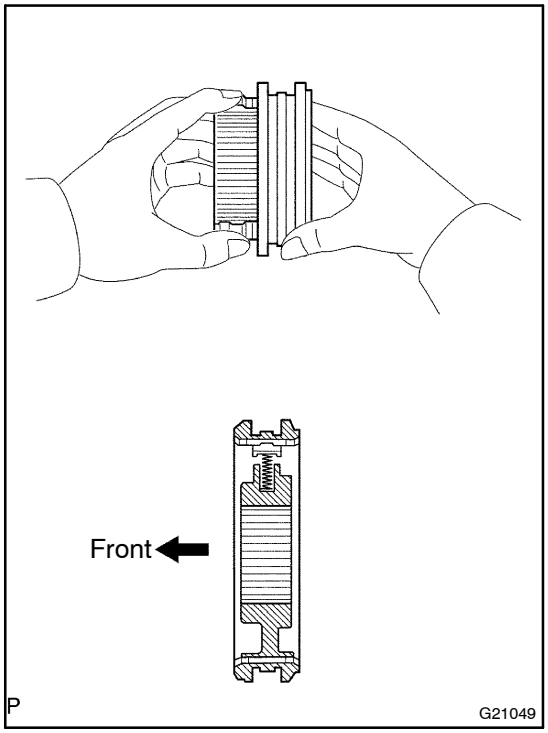
Standard clearance:
0.1 – 0.25 mm (0.0039 – 0.0098 in.)



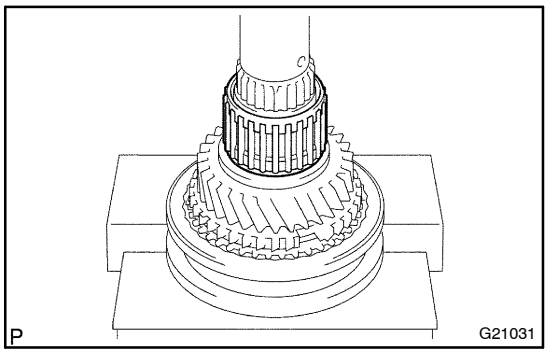
34. INSTALL TRANSMISSION CLUTCH HUB NO.1

(a) Install the 3 synchromesh shifting key No.1 to the transmission clutch hub No.1.

(b) While pushing the compression spring with a screwdriver, install the 3 compression springs.

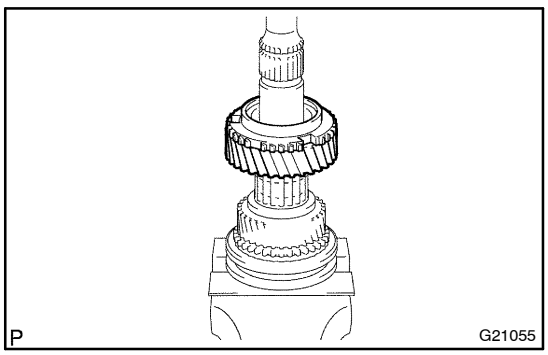


(c) While pushing the 3 synchromesh shifting key No.1, install the transmission clutch hub No.1 on the transmission hub sleeve No.1, as shown.
(d) Check the sliding condition between the transmission hub sleave No.1 and the transmission clutch hub No.1.



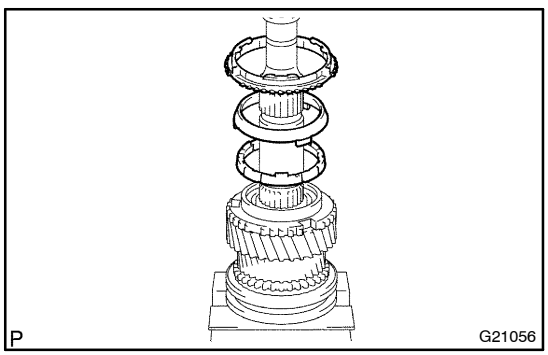
35. INSTALL 2ND GEAR NEEDLE ROLLER BEARING

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



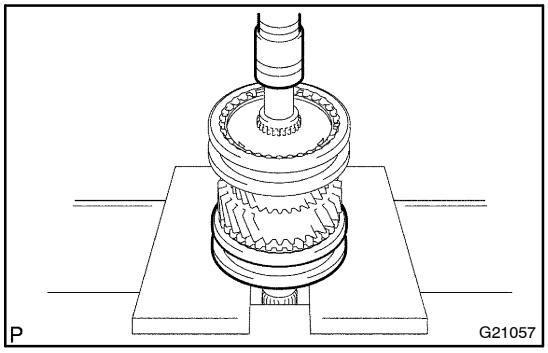
36. INSTALL 2ND GEAR

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



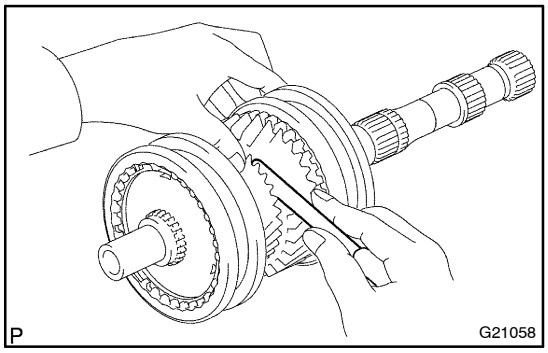
37. INSTALL SYNCHRONIZER RING SET NO.1

(a) Coat the synchronizer ring set No.2 with gear oil, install it on the 2nd gear.



38. INSTALL TRANSMISSION CLUTCH HUB NO.1

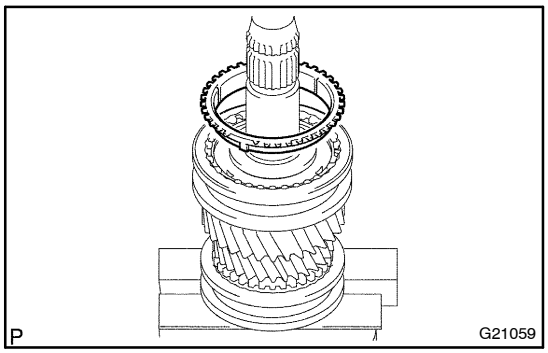
(a) Using a press, install the transmission clutch hub No.1 on the output shaft.



39. INSPECT 2ND GEAR THRUST CLEARANCE

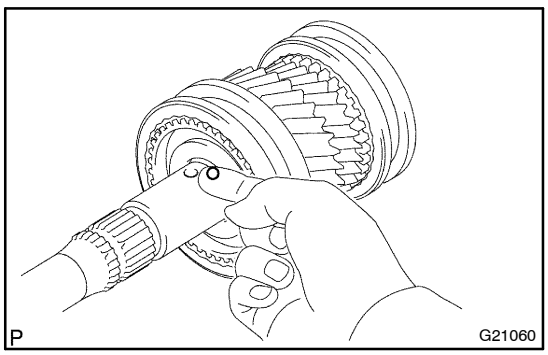
(a) Using a feeler gauge, measure the 2nd gear thrust clearance.

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



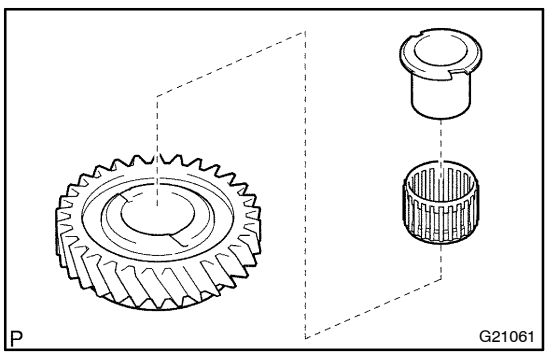
40. INSTALL SYNCHRONIZER RING NO.1

(a) Coat the synchronizer ring No.1 with gear oil, install it on the transmission clutch hub No.1.



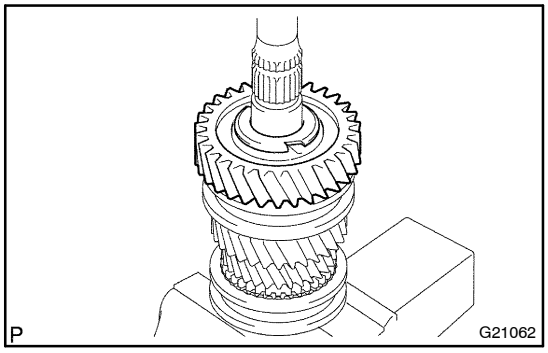
41. INSTALL 1ST GEAR BUSH BALL

(a) Coat the 1st gear bush ball with gear oil, install it on the output shaft.



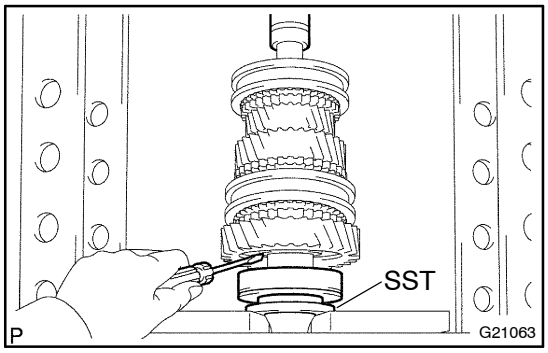
42. INSTALL 1ST GEAR BUSH

(a) Coat the 1st gear needle roller bearing with gear oil.
(b) Install the 1st gear bearing bush and 1st gear needle roller bearing on the 1st gear.



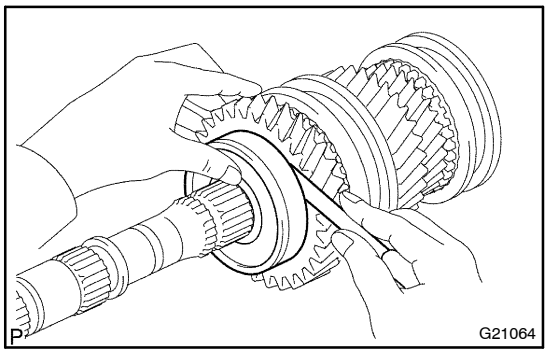
43. INSTALL 1ST GEAR

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



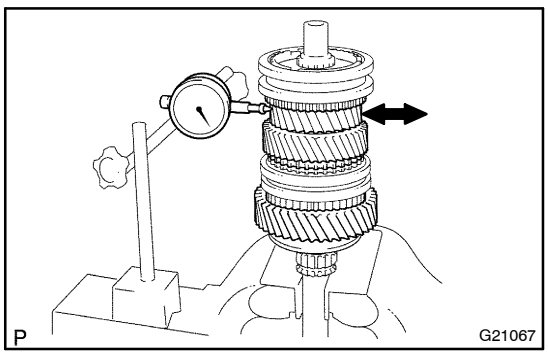
44. INSTALL OUTPUT SHAFT CENTER BEARING

(a) Using SST and a press, install the output shaft bearing RR on the output shaft bearing.
SST 09506–35010



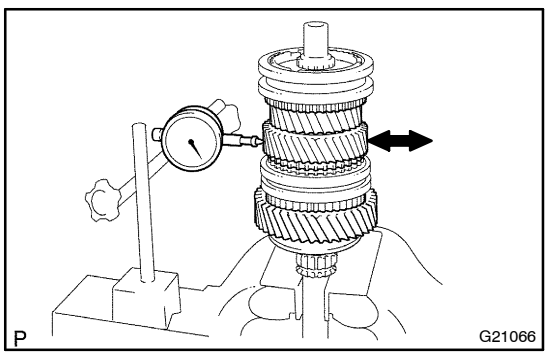
45. INSPECT 1ST GEAR THRUST CLEARANCE

(a) Using feeler gauge, measure the 1st gear thrust clearance.
Standard clearance:
0.1 – 0.25 mm (0.0039 – 0.0098 in.)



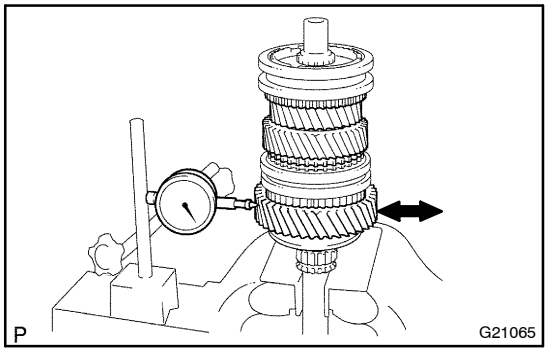
46. INSPECT 3RD GEAR RADIAL CLEARANCE

(a) Using a dial indicator, measure the 3rd gear radial clearance.
Standard clearance:
0.022 – 0.071 mm (0.0009 – 0.0028 in.)



47. INSPECT 2ND GEAR RADIAL CLEARANCE

(a) Using a dial indicator, measure the 2nd gear radial clearance.
Standard clearance:
0.009 – 0.060 mm (0.0004 – 0.0024 in.)



48. INSPECT 1ST GEAR RADIAL CLEARANCE

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

Standard clearance:
0.012 – 0.104 mm (0.0005 – 0.0041 in.)