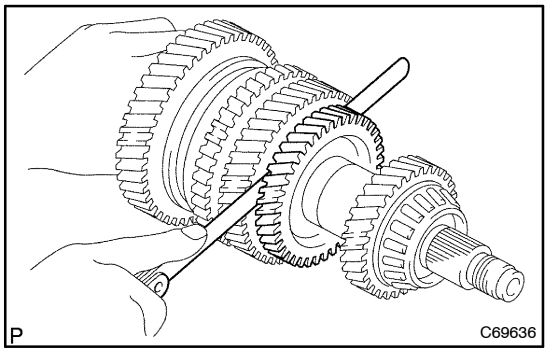
OUTPUT SHAFT ASSY (E354)

OVERHAUL

4103Y–02

HINT:

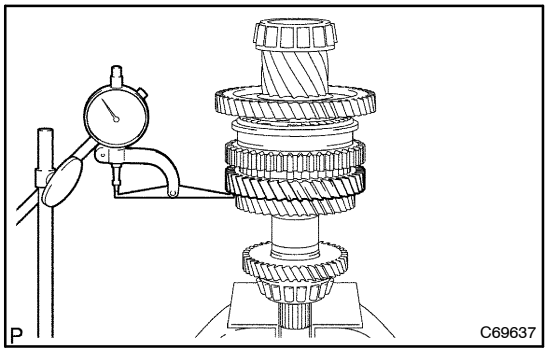
COMPONENTS: See page 41–1



1. INSPECT 1ST GEAR THRUST CLEARANCE

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

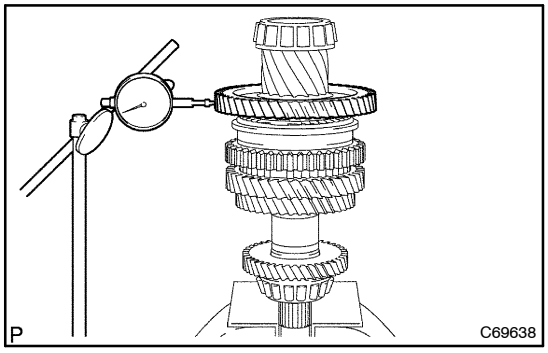
Standard clearance:
0.25 – 0.40 mm (0.0098 – 0.0157 in.)



2. INSPECT 2ND GEAR THRUST CLEARANCE

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

Standard clearance:
0.10 – 0.35 mm (0.0039 – 0.0138 in.)



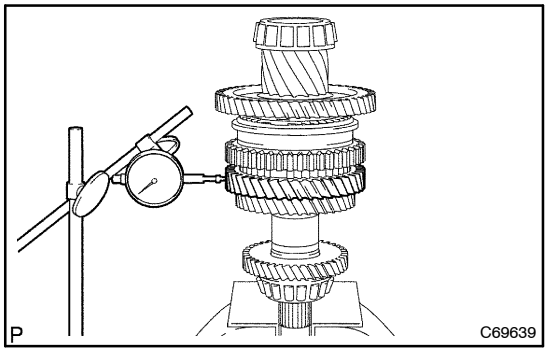
3. INSPECT 1ST GEAR RADIAL CLEARANCE

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

Standard clearance: mm (in.)

Bearing	Standard clearance
KOYO made	0.009 – 0.051 (0.0004 – 0.0020)
NSK made	0.009 – 0.051 (0.0004 – 0.0020)

If the clearance is out of the specification, replace the 1st gear needle roller bearing.



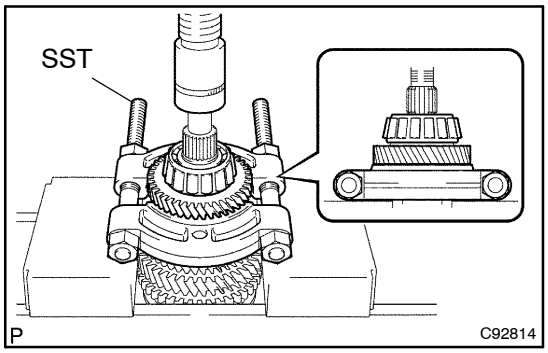
4. INSPECT 2ND GEAR RADIAL CLEARANCE

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

Standard clearance: mm (in.)

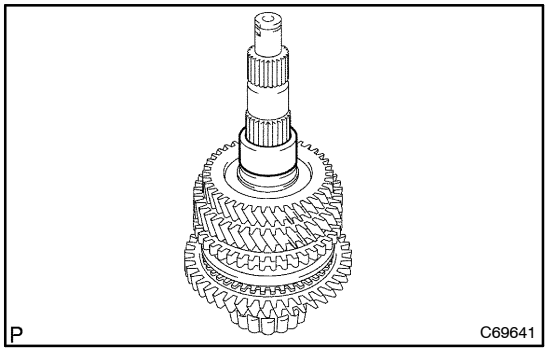
Bearing	Standard clearance
KOYO made	0.009 – 0.053 (0.0004 – 0.0021)
NSK made	0.009 – 0.051 (0.0004 – 0.0020)

If the clearance is out of the specification, replace the 2nd gear needle roller bearing.



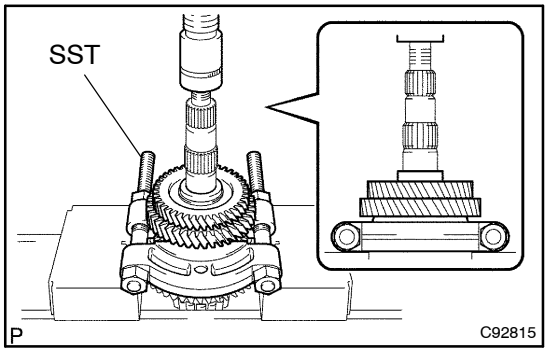
5. REMOVE 4TH DRIVEN GEAR

(a) Using SST and a press, remove the output shaft bearing rear (inner race) and 4th driven gear.
SST 09950–00020



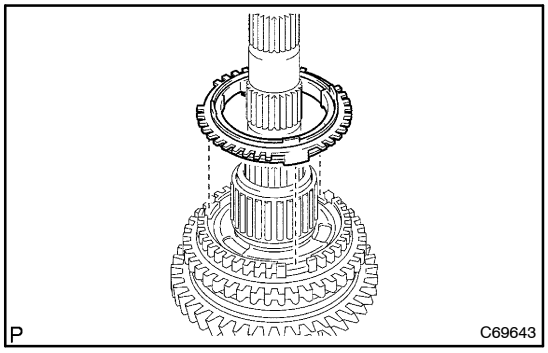
6. REMOVE OUTPUT GEAR SPACER

(a) Remove the output gear spacer from the output shaft.



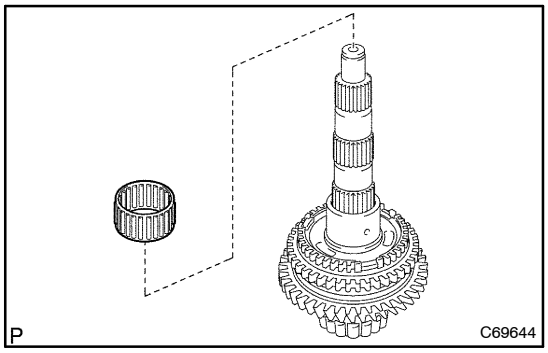
7. REMOVE 2ND GEAR

(a) Using SST and a press, remove the 3rd driven gear and 2nd gear from the output shaft.
SST 09950–00020



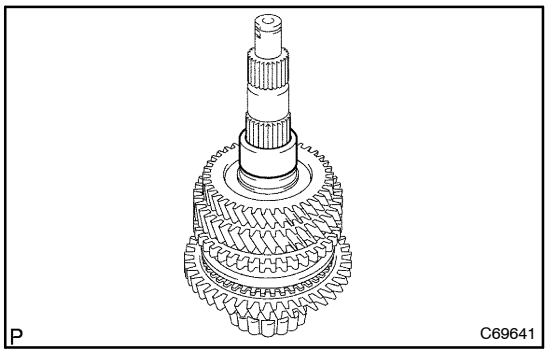
8. REMOVE SYNCHRONIZER RING SET NO.2

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



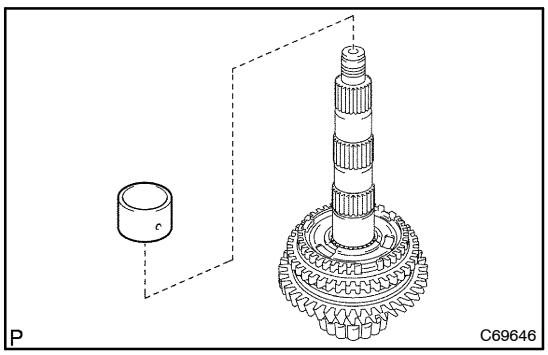
9. REMOVE 2ND GEAR NEEDLE ROLLER BEARING

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



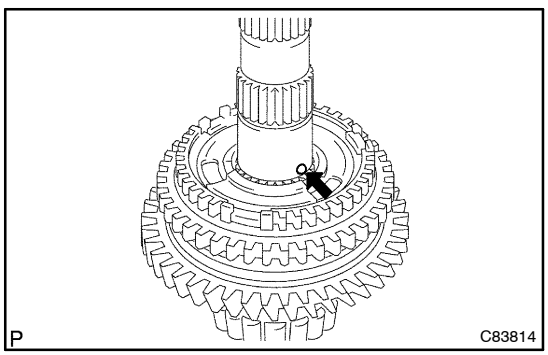
10. REMOVE 2ND GEAR BEARING SPACER

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



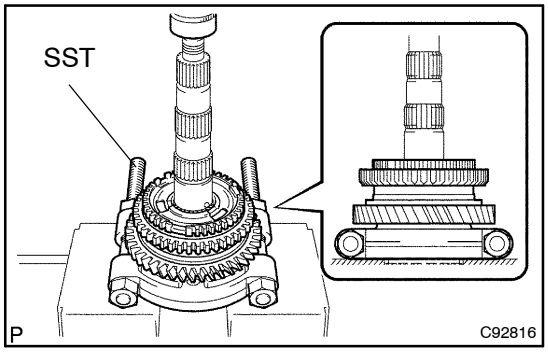
11. REMOVE 2ND GEAR BUSH

(a) Remove the 2nd gear bush from the output shaft.



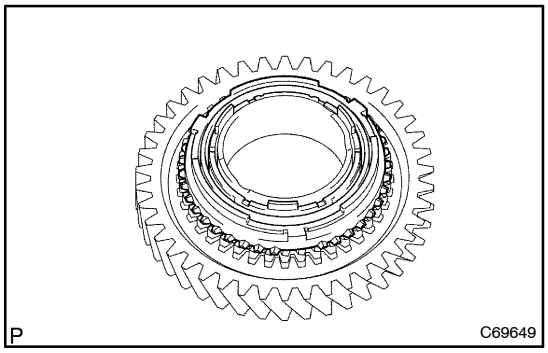
12. REMOVE 2ND GEAR BUSH BALL

(a) Using a magnetic finger, remove the 2nd gear bush ball from the output shaft.



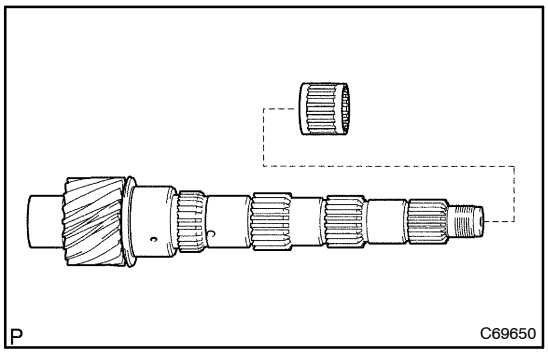
13. REMOVE 1ST GEAR

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



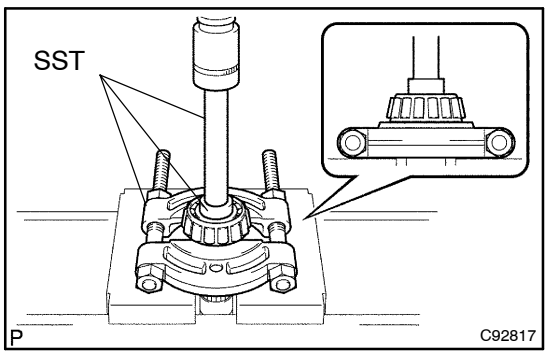
14. REMOVE SYNCHRONIZER RING SET NO.1

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



15. REMOVE 1ST GEAR NEEDLE ROLLER BEARING

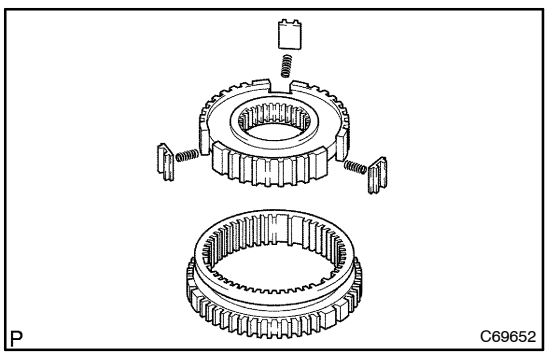
(a) Remove the 1st gear needle roller bearing from the output shaft.



16. REMOVE OUTPUT SHAFT FRONT BEARING

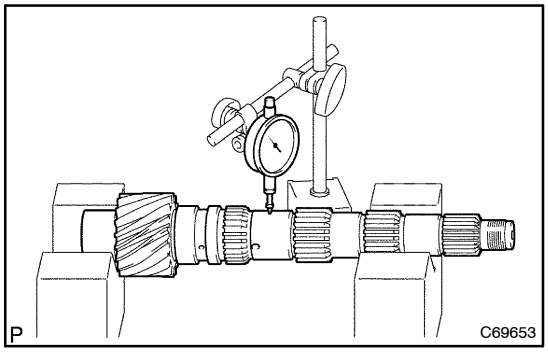
(a) Using SST and a press, remove the output shaft front bearing (inner race) from the output shaft.
SST 09950–00020, 09950–60010 (09951–00320), 09950–70010 (09951–07150)

NOTICE:
Do not tighten SST excessively.



17. REMOVE REVERSE GEAR

(a) Remove the reverse gear, 3 synchromesh shifting keys and 3 synchromesh shifting key springs from the transmission clutch hub No.1.

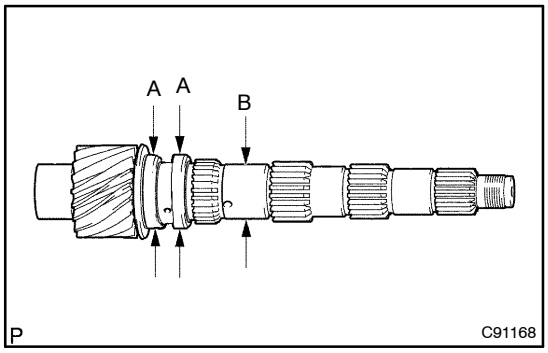


18. INSPECT OUTPUT SHAFT

(a) Using V–block and a dial indicator, measure the shaft run out.

Maximum run out: 0.03 mm (0.0012 in.)

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

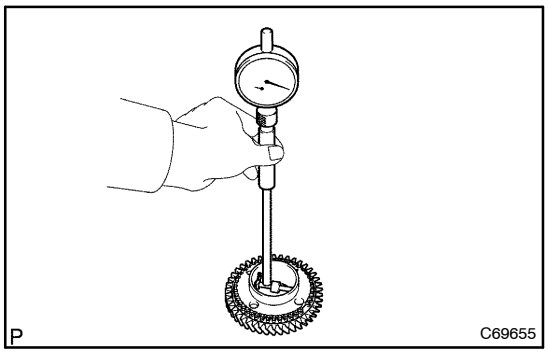


(b) Using a micrometer, measure the outer diameter of the output shaft journal surface.

Outer diameter: mm (in.)

Part	Standard outer diameter	minimum outer diameter
A	37.610 – 37.626 (1.4807 – 1.4813)	37.610 (1.4807)
B	34.802 – 34.512 (1.3702 – 1.3587)	34.802 (1.3702)

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



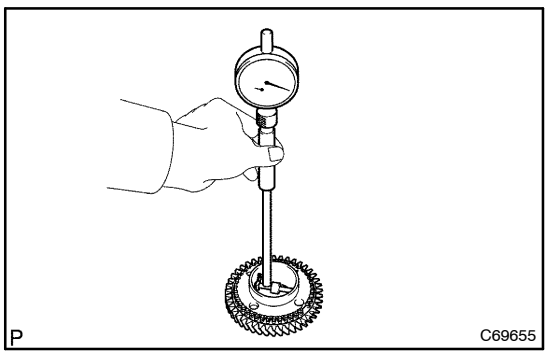
19. INSPECT 2ND GEAR

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

Inside diameter: mm (in.)

Standard inside diameter	Maximum inside diameter
50.009 – 50.025 (1.9689 – 1.9695)	50.025 (1.9695)

If the inside diameter exceeds the maximum, replace the 2nd gear.



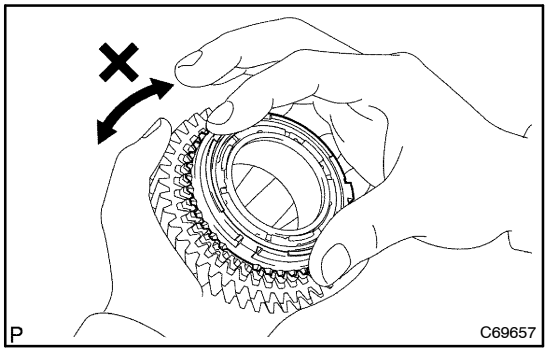
20. INSPECT 1ST GEAR

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

Inside diameter: mm (in.)

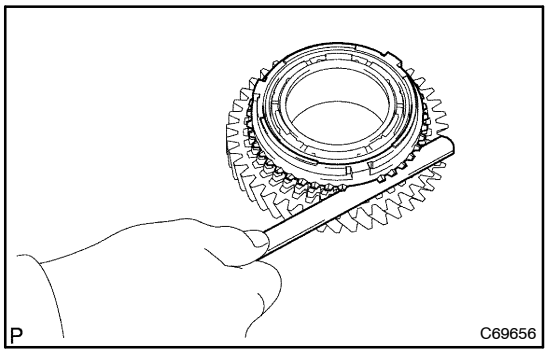
Standard inside diameter	Maximum inside diameter
51.009–51.025 (2.0082 – 2.0089)	51.025 (2.0089)

If the inside diameter exceeds the maximum, replace the 1st gear.



21. INSPECT SYNCHRONIZER RING SET NO.2

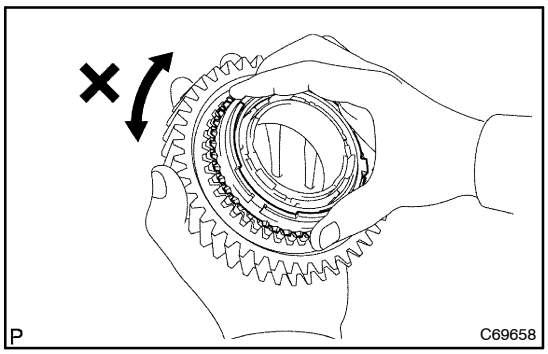
(a) Coat the cone of the 2nd gear with gear oil, check that it does not turn in the both circumference directions while pushing it to the synchronizer ring No.2.



(b) Check the clearance between the synchronizer ring No.2 and 2nd gear while pushing it to the synchronizer ring No.2.

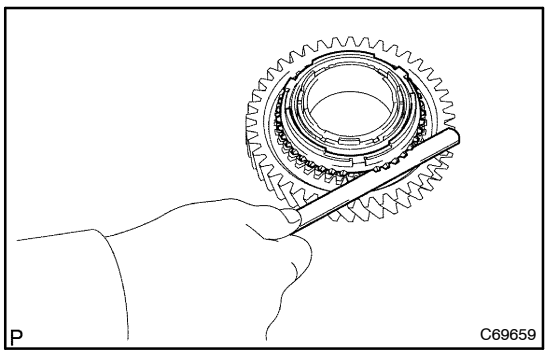
Standard clearance:
0.70 – 1.45 mm (0.0276 – 0.0571 in.)

If the standard clearance is out of the specification, replace the synchronizer ring set No.2 with a new one.



22. INSPECT SYNCHRONIZER RING SET NO.1

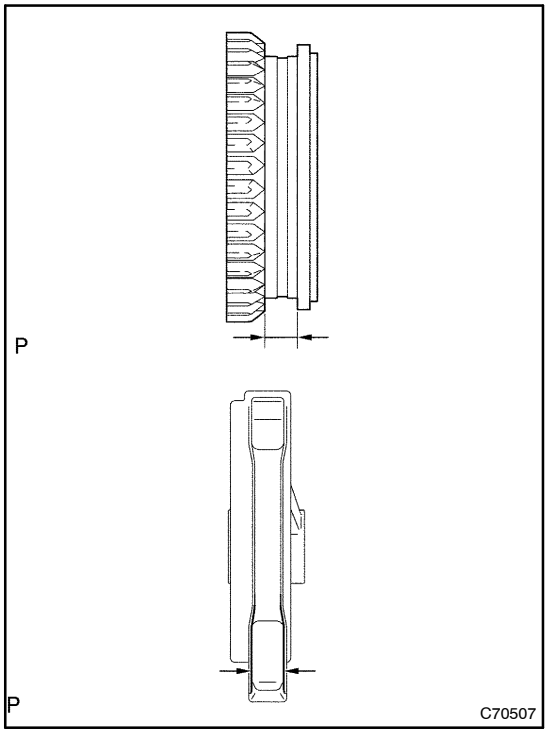
(a) Coat the 1st gear cone with gear oil. Turn the synchronizer ring set No.1. in one direction while pushing it to the 1st gear cone. Check that the ring locks.



(b) Check the clearance between the synchronizer ring set No.1 and 1st gear while pushing it to the cone of synchronizer ring set No.1.

Standard clearance:
0.70 – 1.45 mm (0.0276 – 0.0571 in.)

If the standard clearance is out of the specification, replace the synchronizer ring set No.1 with a new one.



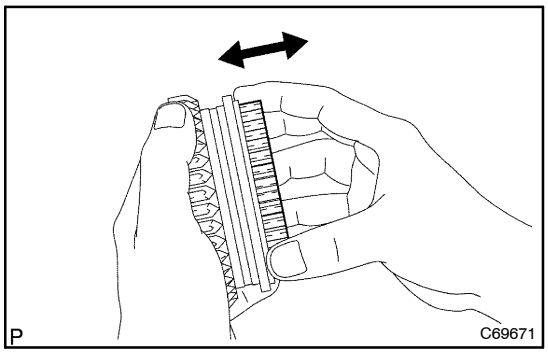
23. INSPECT REVERSE GEAR

(a) Using a vernier calipers, measure the reverse gear groove and thickness of the claw part on gear shift fork No.1, and calculate.

Standard clearance:

0.15 – 0.35 mm (0.0059 – 0.0138 in.)

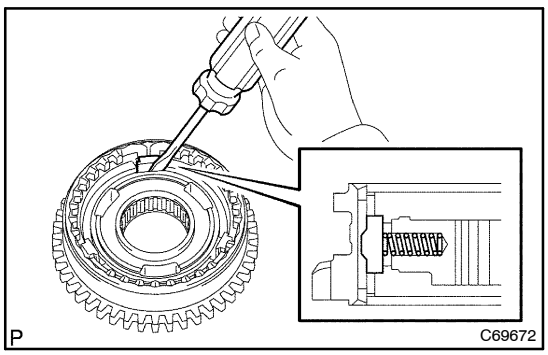
If the clearance is of the specification, replace the reverse gear and gear shift fork No.1 with the new one.



24. INSPECT TRANSMISSION CLUTCH HUB NO.1

(a) Check the sliding condition between the transmission clutch hub No.1 and reverse gear.

(b) Check the tip of spline gear on the sleeve of reverse gear for wear.



25. INSTALL REVERSE GEAR

(a) Coat the reverse gear with gear oil.

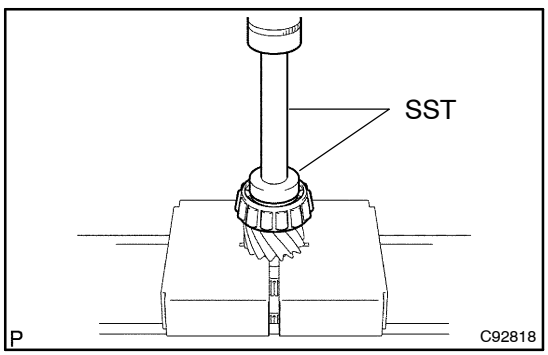
(b) Install the 3 synchromesh shifting key spring No.1 and transmission clutch hub No.1 to the reverse gear.

NOTICE:

Do not set the reverse gear and the transmission clutch hub No.1 in the incorrect direction.

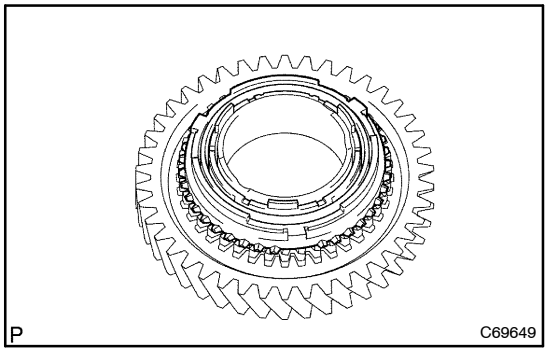
(c) Using a screwdriver, install the synchromesh sifting key No.1 to the reverse gear.

26. INSTALL OUTPUT SHAFT FRONT BEARING



(a) Using SST and a press, install the output shaft front bearing (inner race) to the output shaft.

SST 09950–60010 (09951–00430), 09950–70010 (09951–07150)

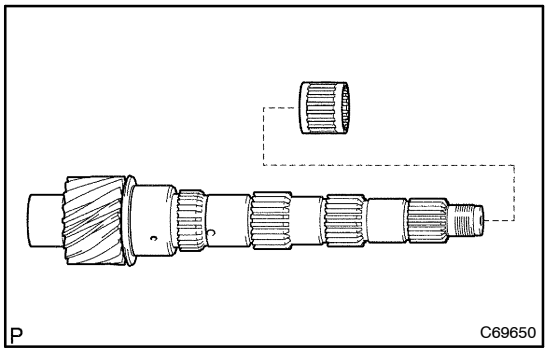


27. INSTALL SYNCHRONIZER RING SET NO.1

(a) Coat the synchronizer ring set No.1 with gear oil, install it to the 1st gear.

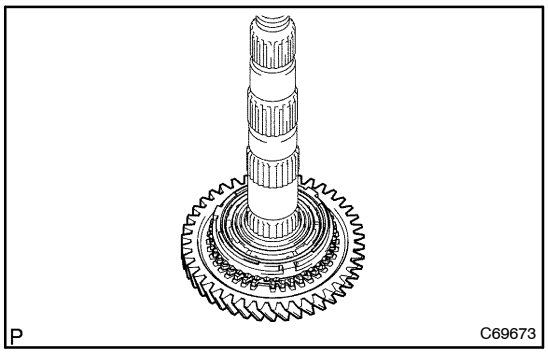
NOTICE:

Align the synchronizer ring set No.1 with the hole of 1st gear and install.



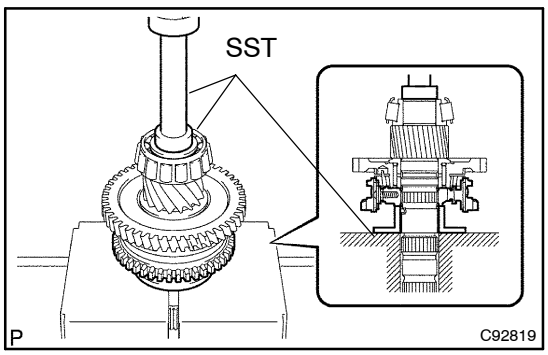
28. INSTALL 1ST GEAR NEEDLE ROLLER BEARING

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



29. INSTALL 1ST GEAR

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



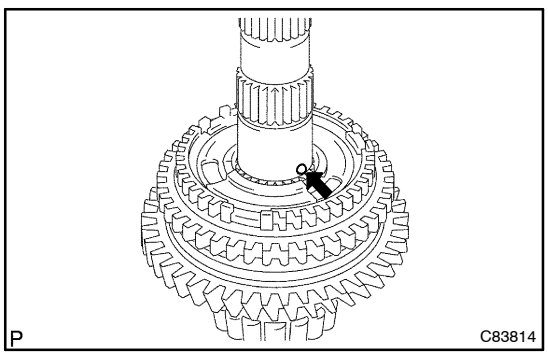
30. INSTALL TRANSMISSION CLUTCH HUB NO.1

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

SST 09316–60011 (09316–00031), 09950–60010 (09951–00320), 09950–70010 (09951–07100)

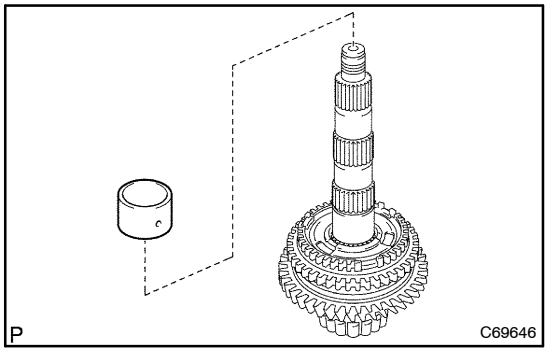
NOTICE:

- **Align the synchronizer ring No.1 with synchromesh shifting key No.1 and install.**
- **Make sure that the 1st gear rotates.**



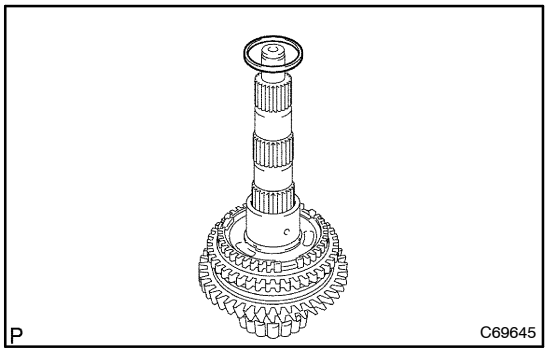
31. INSTALL 2ND GEAR BUSH BALL

(a) Coat the gear bush with MP grease, install it to the output shaft.



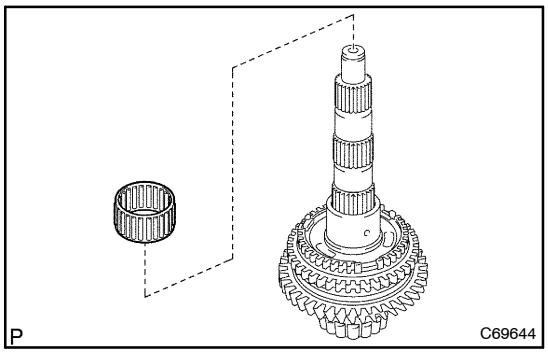
32. INSTALL 2ND GEAR BUSH

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



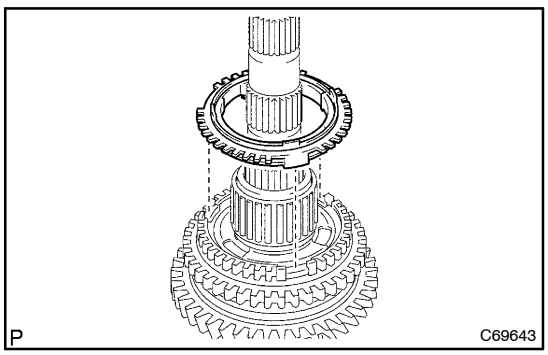
33. INSTALL 2ND GEAR BEARING SPACER

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



34. INSTALL 2ND GEAR NEEDLE ROLLER BEARING

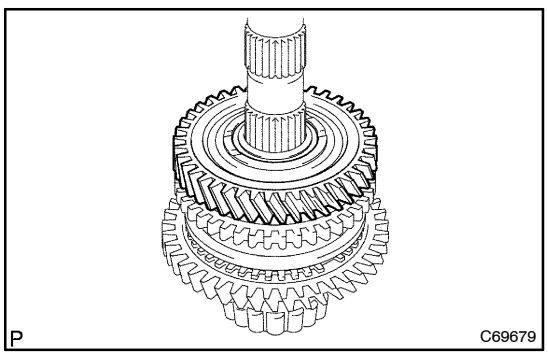
(a) Coat the 2nd gear needle roller bearing with gear oil, install it to the output shaft.



35. INSTALL SYNCHRONIZER RING SET NO.2

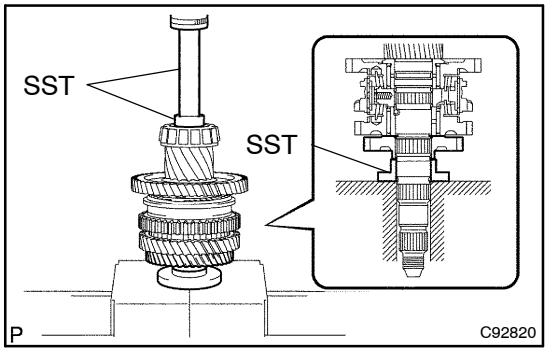
(a) Coat the synchronizer ring set No.2 with gear oil, install it to the transmission clutch hub No.1.

NOTICE:
Align the key groove on the synchronizer ring set No.2 with the synchromesh shifting key No.1.



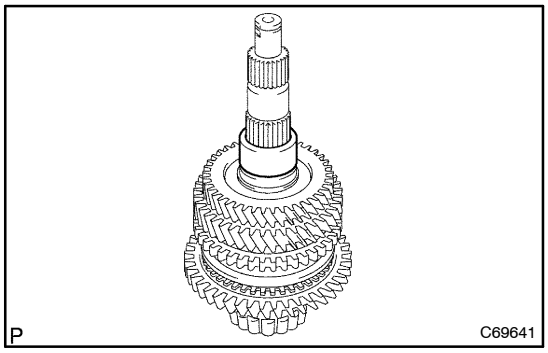
36. INSTALL 2ND GEAR

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



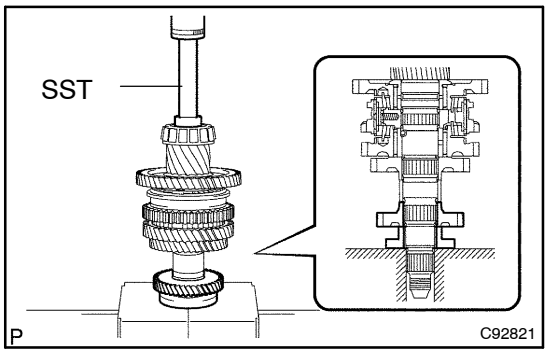
37. INSTALL 3RD DRIVEN GEAR

(a) Using SST and a press, install the 3rd driven gear to the output shaft.
SST 09608–00071, 09950–60010 (09951–00320), 09950–70010 (09951–07100)



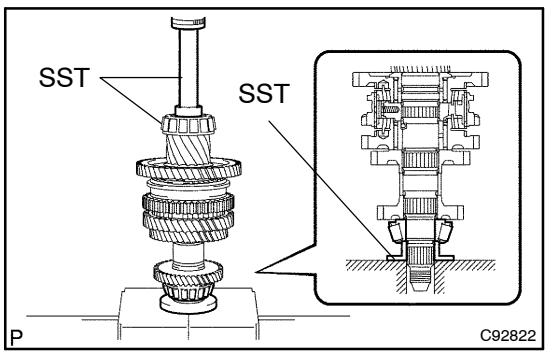
38. INSTALL OUTPUT GEAR SPACER

(a) Install the output gear spacer to the output shaft.



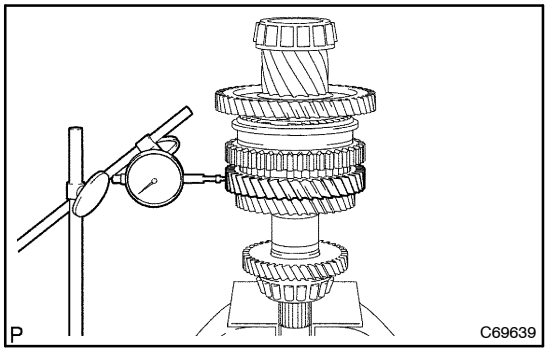
39. INSTALL 4TH DRIVEN GEAR

(a) Using SST and a press, install the 4th driven gear to the output shaft.
SST 09608–00071, 09950–60010 (09951–00320), 09950–70010 (09951–07100)



40. INSTALL OUTPUT SHAFT FRONT BEARING

(a) Using SST and a press, install the output shaft front bearing (inner race) to the output shaft.
SST 09506–30012, 09950–60010 (09951–00320), 09950–70010 (09951–07100)



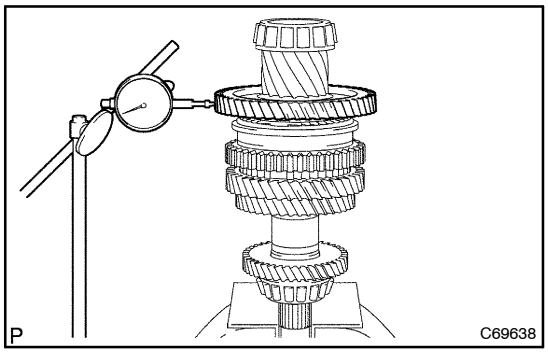
41. INSPECT 2ND GEAR RADIAL CLEARANCE

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

Standard clearance: mm (in.)

Bearing	Standard clearance
KOYO made	0.009 – 0.053 (0.0004 – 0.0021)
NSK made	0.009 – 0.051 (0.0004 – 0.0020)

If the clearance is out of the specification, replace the 2nd gear needle roller bearing.



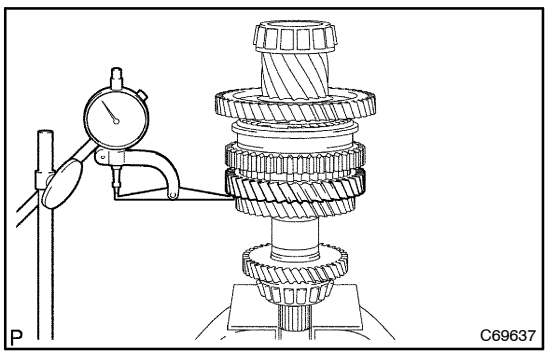
42. INSPECT 1ST GEAR RADIAL CLEARANCE

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

Standard clearance: mm (in.)

Bearing	Standard clearance
KOYO made	0.009 – 0.051 (0.0004 – 0.0020)
NSK made	0.009 – 0.051 (0.0004 – 0.0020)

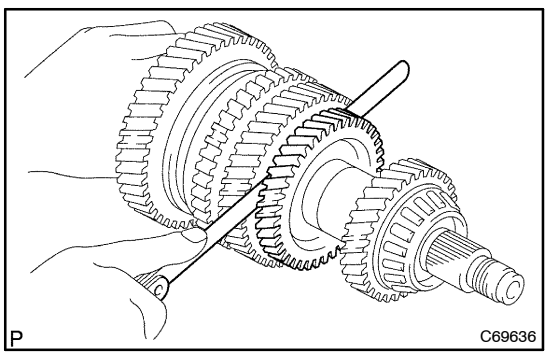
If the clearance is out of the specification, replace the 1st gear needle roller bearing.



43. INSPECT 2ND GEAR THRUST CLEARANCE

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

Standard clearance:
0.10 – 0.35 mm (0.0039 – 0.0138 in.)



44. INSPECT 1ST GEAR THRUST CLEARANCE

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

Standard clearance:
0.25 – 0.4 mm (0.0098 – 0.0157 in.)