

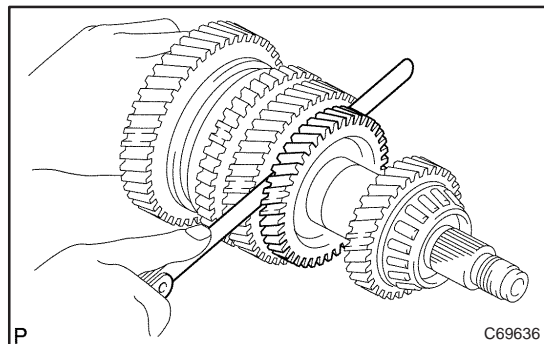
# OUTPUT SHAFT ASSY (E355/E356)

## OVERHAUL

HINT:

COMPONENTS: [See page 41-1](#)

4103Y-01

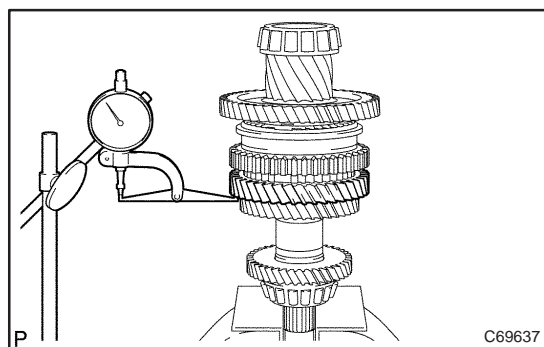


### 1. INSPECT 1ST GEAR THRUST CLEARANCE

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

**Standard clearance:**

**0.25 – 0.4 mm (0.0099 – 0.0159 in.)**

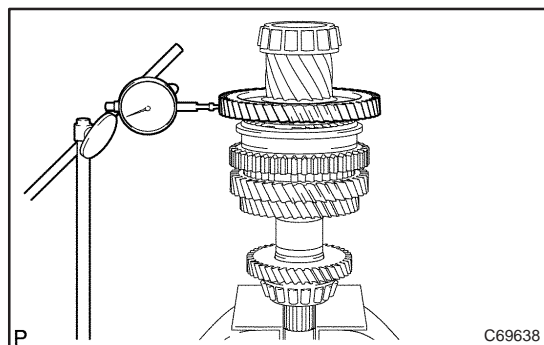


### 2. INSPECT 2ND GEAR THRUST CLEARANCE

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

**Standard clearance:**

**0.1 – 0.35 mm (0.0004 – 0.0139 in.)**



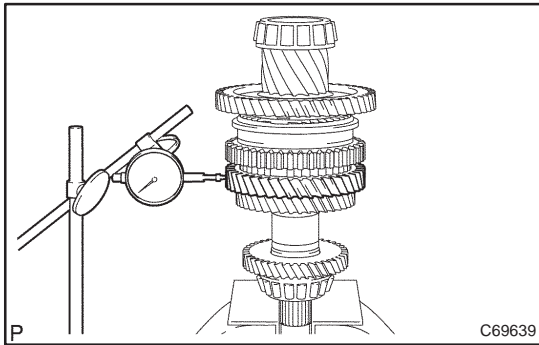
### 3. INSPECT 1ST GEAR RADIAL CLEARANCE

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

**Standard clearance:mm (in.)**

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

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



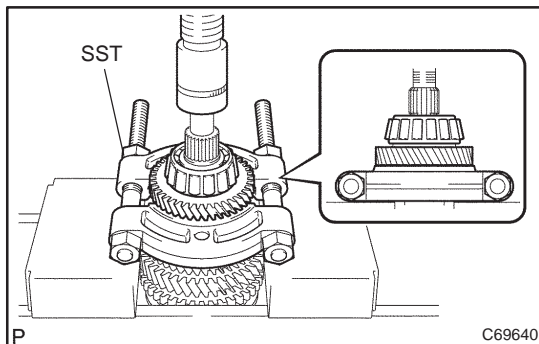
#### 4. INSPECT 2ND GEAR RADIAL CLEARANCE

- (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)

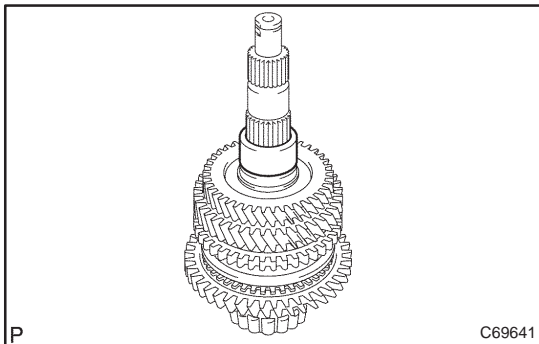
If the clearance is out of the specification, replace the 2nd gear needle roller bearing.



#### 5. REMOVE 4TH DRIVEN GEAR

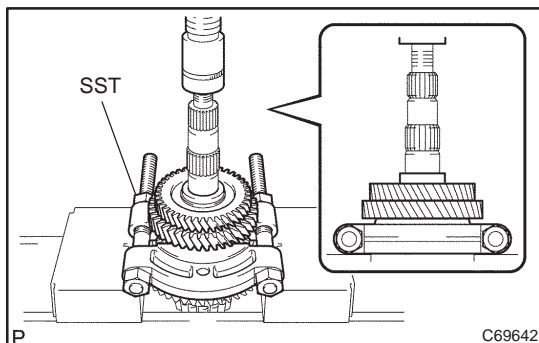
- (a) Using SST and a press, remove the output shaft bearing rear (inner race) and 4th driven gear.

SST 09950-00020



#### 6. REMOVE OUTPUT GEAR SPACER

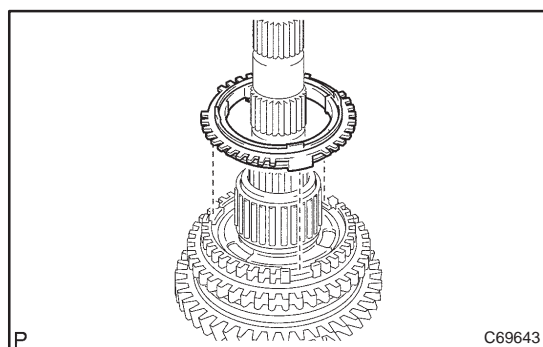
- (a) Remove the out put gear spacer from the output shaft.



#### 7. REMOVE 2ND GEAR

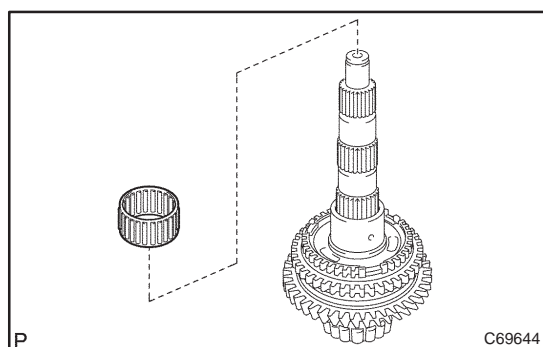
- (a) Using SST and a press, remove the 3rd driven gear and 2nd gear from the out put shaft.

SST 09950-00020



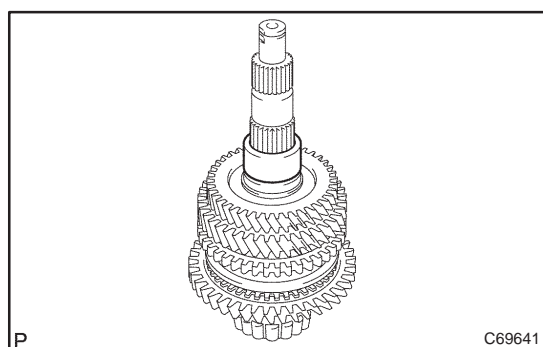
## 8. REMOVE SYNCHRONIZER RING SET NO.2

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



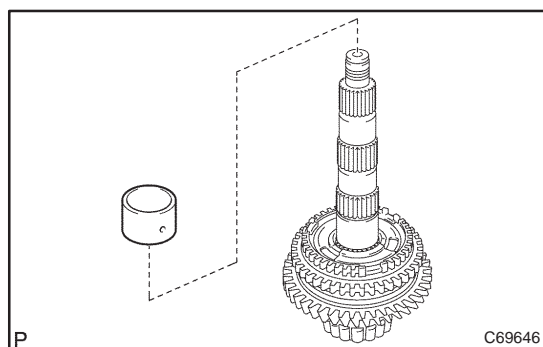
## 9. REMOVE 2ND GEAR NEEDLE ROLLER BEARING

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



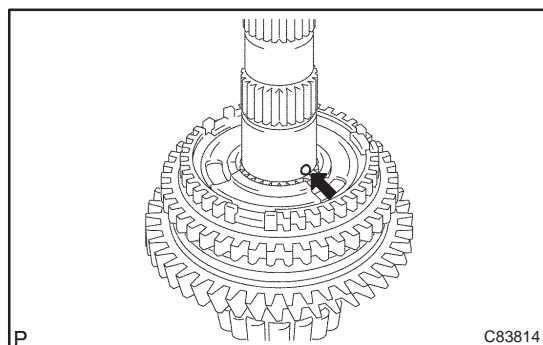
## 10. REMOVE 2ND GEAR BEARING SPACER

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



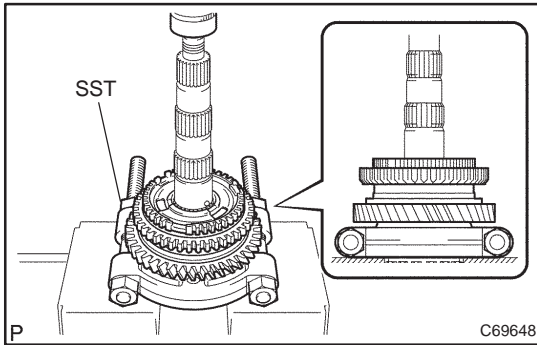
## 11. REMOVE 2ND GEAR BUSH

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

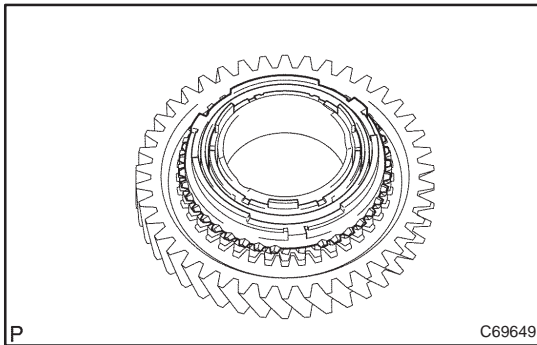


## 12. REMOVE 2ND GEAR BUSH BALL

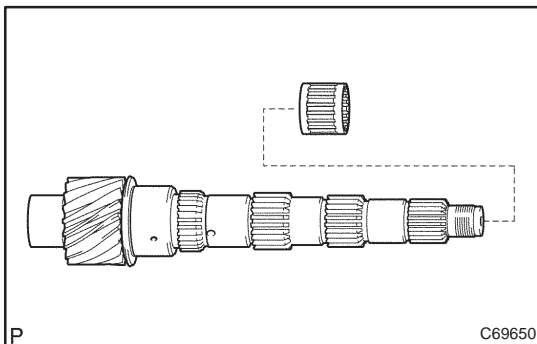
- (a) Using a magnetic finger, remove the 2nd gear bush ball from the output shaft.

**13. REMOVE 1ST GEAR**

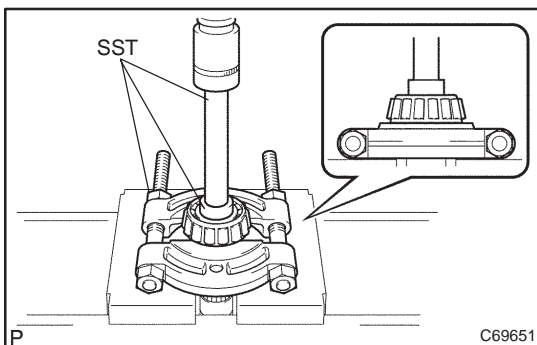
- (a) Using SST and a press, remove the transmission clutch hub No.1 and 1st gear from the output shaft.  
SST 09950-00020

**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**

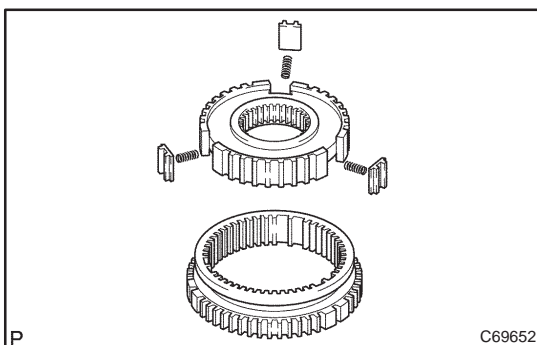
- (a) Remove the 1st gear needle roller bearing from the output shaft.

**16. REMOVE OUTPUT SHAFT FRONT BEARING**

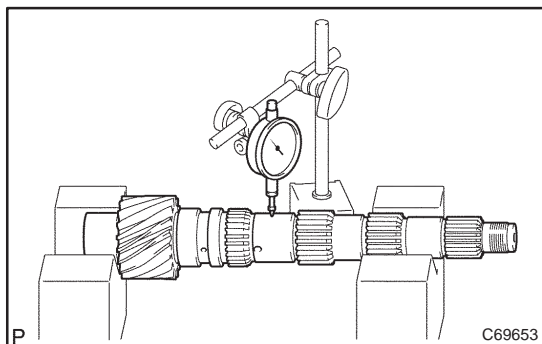
- (a) Using SST and a press, remove the output shaft front bearing (inner race) from the output shaft.  
SST 09950-00020, 09950-60010 (09951-00320), 09950-70010 (09951-07150)

**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.

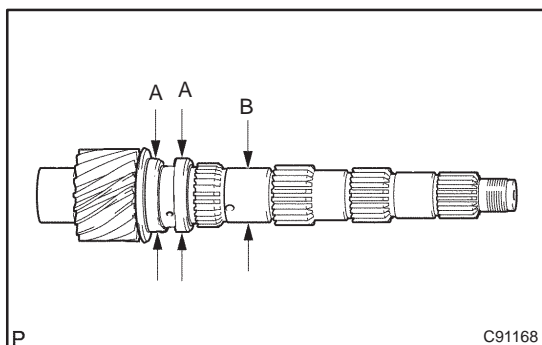


## 18. INSPECT OUTPUT SHAFT

- (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 input shaft.

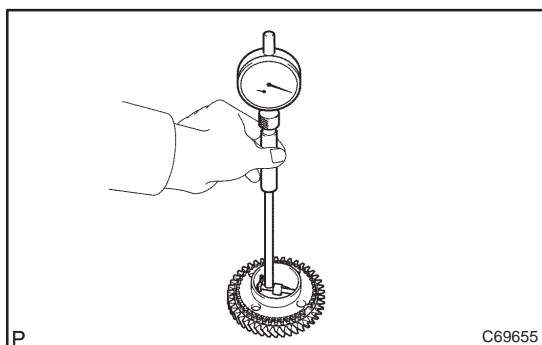


- (b) Using a micrometer, measure the outer diameter of the output shaft journal surface.

**Outer diameter: mm (in.)**

Part	Standard outer diameter	minimum outer diameter
A	37.610 – 37.626 (1.4931 – 1.4938)	37.610 (1.4931)
B	34.802 – 34.512 (1.3816 – 1.3701)	34.802 (1.3816)

If the outer diameter is less than the minimum replace the input shaft.



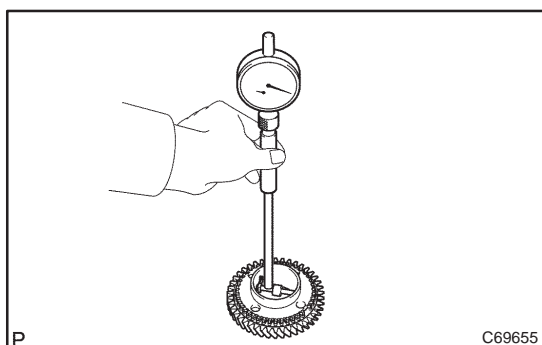
## 19. INSPECT 2ND GEAR

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

**Inside diameter: mm (in.)**

Standard inside diameter	Maximum inside diameter
50.009 – 50.025 (1.9854 – 1.9860)	50.025 (1.9860)

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



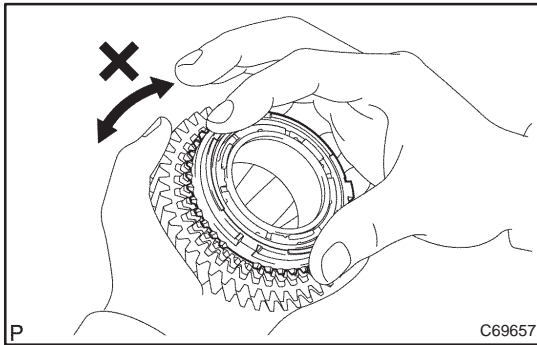
## 20. INSPECT 1ST GEAR

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

**Inside diameter: mm (in.)**

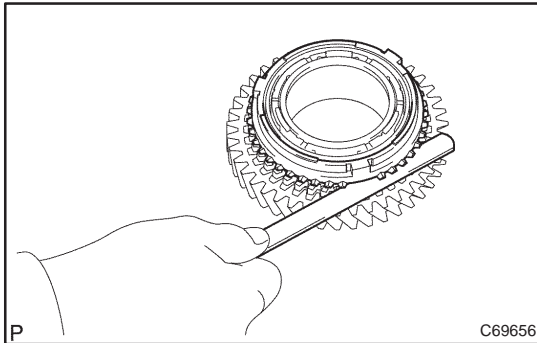
Standard inside diameter	Maximum inside diameter
51.009 – 51.025 (2.0250 – 2.0257)	51.025 (2.0257)

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.

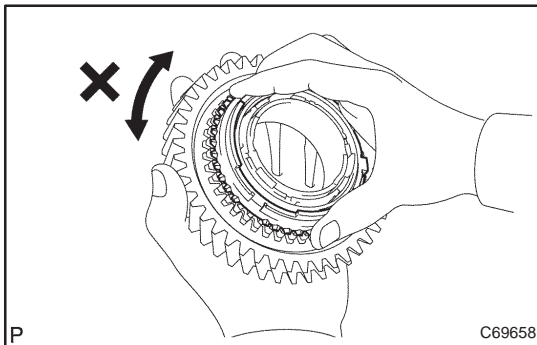


- (b) Check the clearance between the synchronizer ring No.2 and 2nd gear while pushing it to the synchronizer ring No.2.

**Standard clearance:**

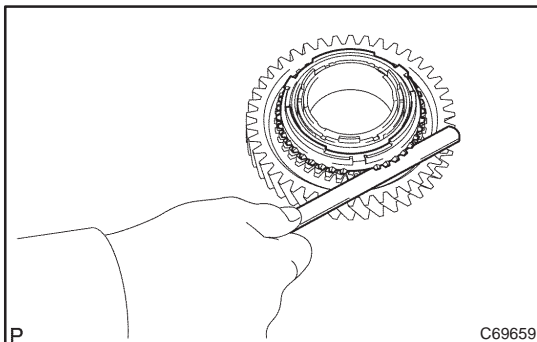
**0.70 – 1.45 mm (0.0278 – 0.0576 in.)**

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.

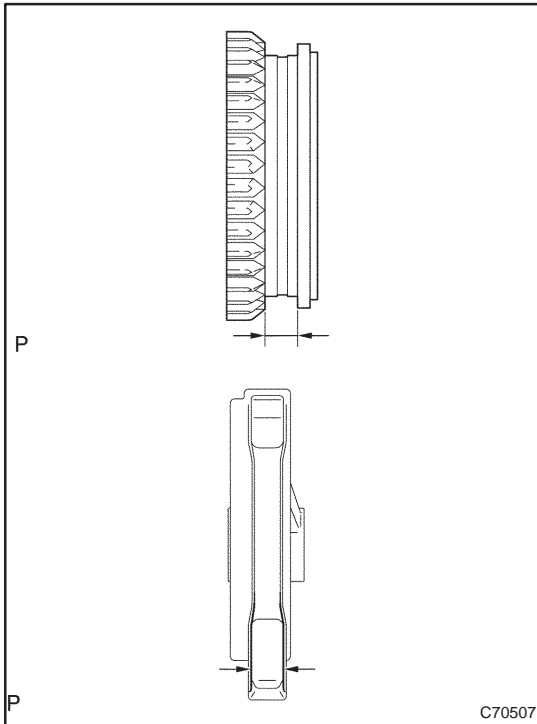


- (b) Check the clearance between the synchronizer ring set No.1 and 1st gear while pushing it to the cone of synchronizer ring set No.1.

**Standard clearance:**

**0.70 – 1.45 mm (0.0278 – 0.0576 in.)**

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



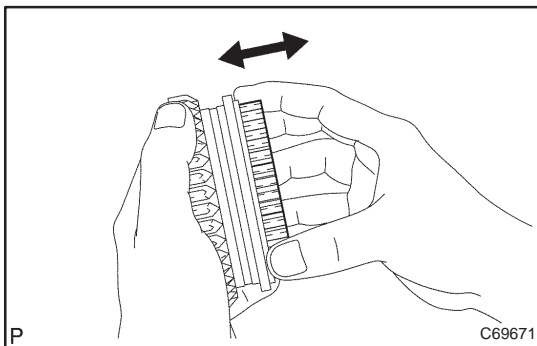
### 23. INSPECT REVERSE GEAR

- (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:**

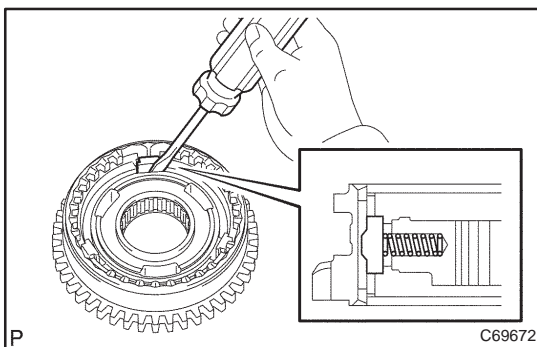
**0.15 – 0.35 mm (0.0060 – 0.0139 in.)**

If the clearance is out 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.

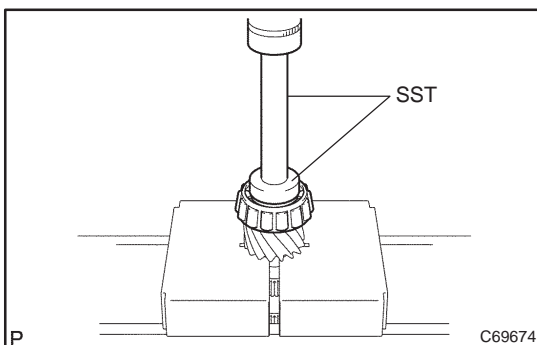
**NOTICE:**

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

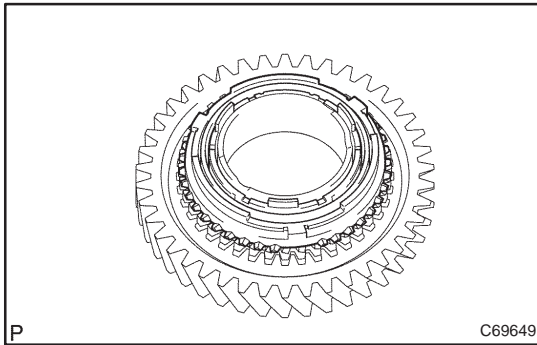
- (c) Using a screwdriver, install the synchromesh shifting key No.1 to the reverse gear.

### 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)





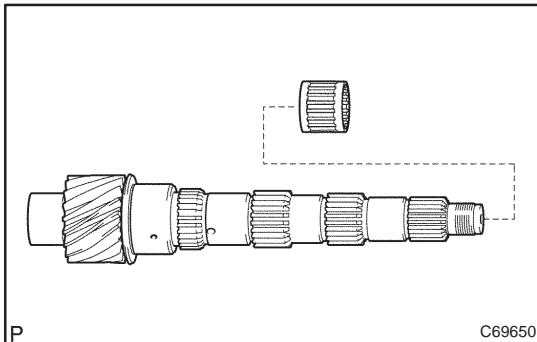


## 27. INSTALL SYNCHRONIZER RING SET NO.1

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

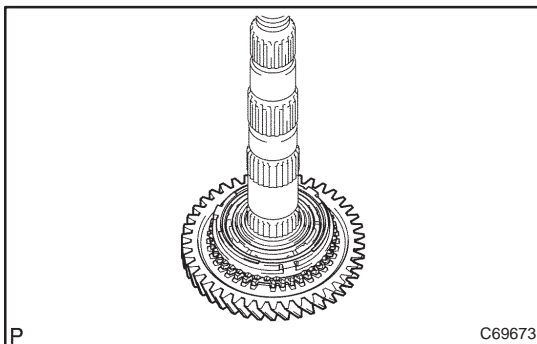
### NOTICE:

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



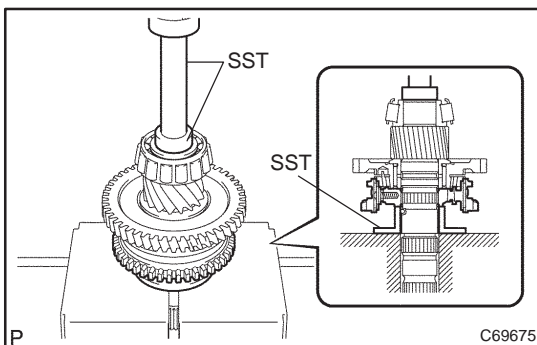
## 28. INSTALL 1ST GEAR NEEDLE ROLLER BEARING

- (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.

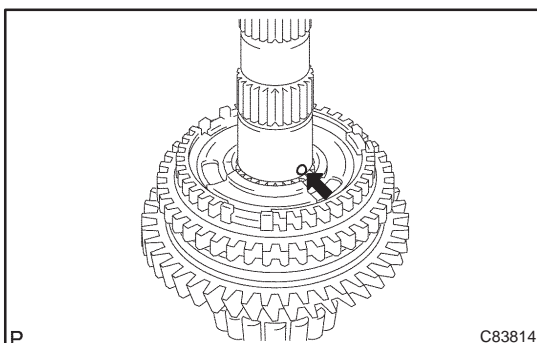
SST 09316-60011 (09316-00031), 09950-60010 (09951-00320), 09950-70010 (09951-07100)

### NOTICE:

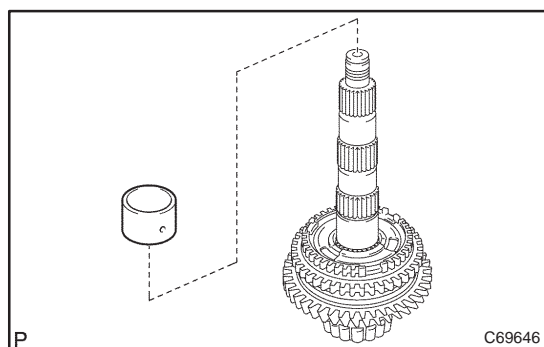
- **Align the synchronizer ring No.1 with synchromesh shifting key No.1 and install.**
- **Make sure that the 1st gear rotates.**

## 31. INSTALL 2ND GEAR BUSH BALL

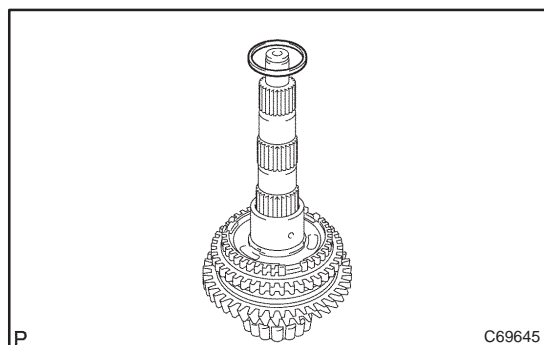
- (a) Coat the gear bush with MP grease, install it to the output shaft.



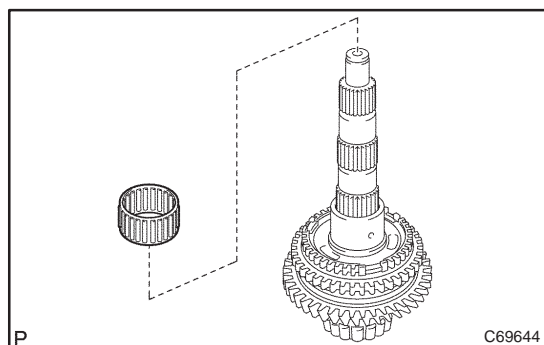


**32. INSTALL 2ND GEAR BUSH**

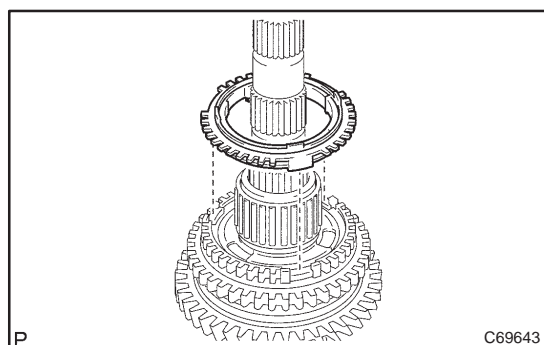
- (a) Coat the gear 2nd gear bush with gear oil, install it to the output shaft.

**33. INSTALL 2ND GEAR BEARING SPACER**

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

**34. INSTALL 2ND GEAR NEEDLE ROLLER BEARING**

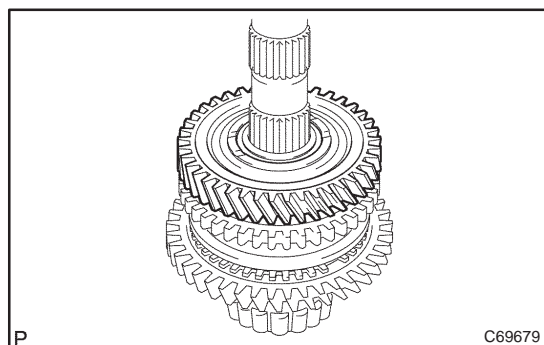
- (a) Coat the 2nd gear needle roller bearing with gear oil, install it to the output shaft.

**35. INSTALL SYNCHRONIZER RING SET NO.2**

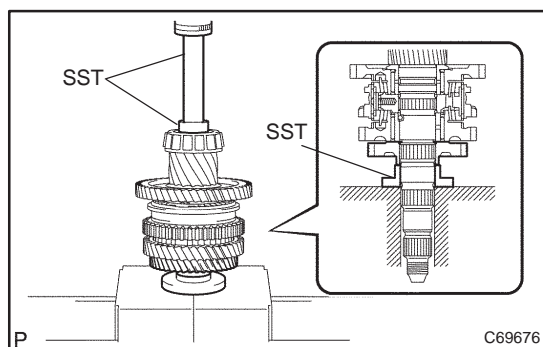
- (a) Coat the synchronizer ring set No.2 with gear oil, install it to the transmission clutch hub No.1

**NOTICE:**

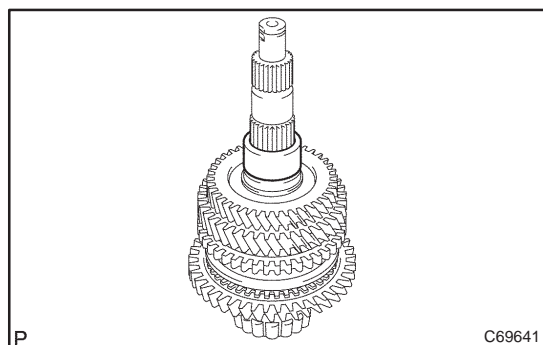
**Align the key groove on the synchronizer ring set No.2 with the synchromesh shifting key No.1.**

**36. INSTALL 2ND GEAR**

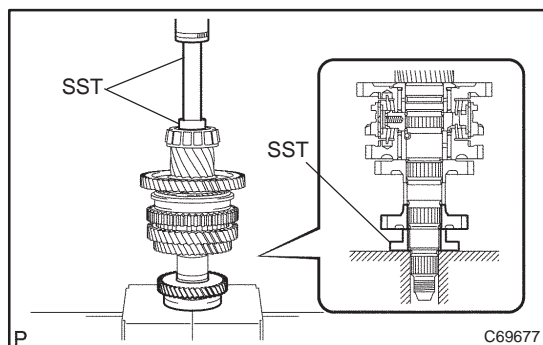
- (a) Coat the 2nd gear with gear oil, install it to the output shaft.

**37. INSTALL 3RD DRIVEN GEAR**

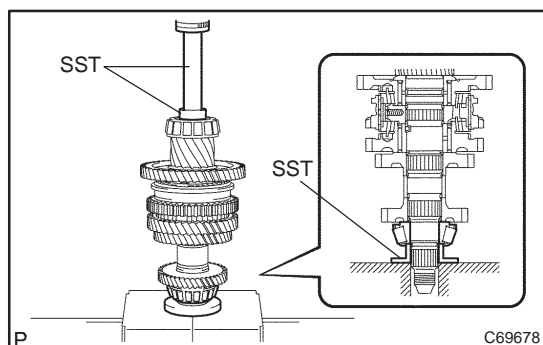
- (a) Using SST and a press, install the 3rd driven gear to the output shaft.  
 SST 09608-00071, 09950-60010 (09951-00320),  
 09950-70010 (09951-07100)

**38. INSTALL OUTPUT GEAR SPACER**

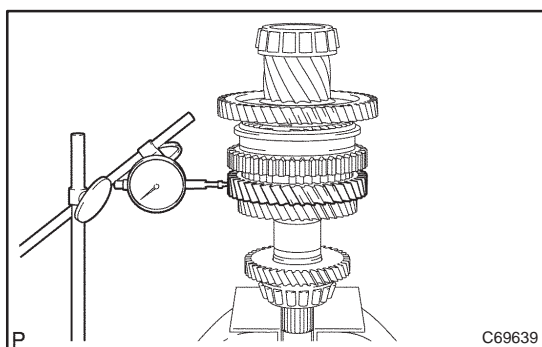
- (a) install the output gear spacer to the output shaft.

**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)

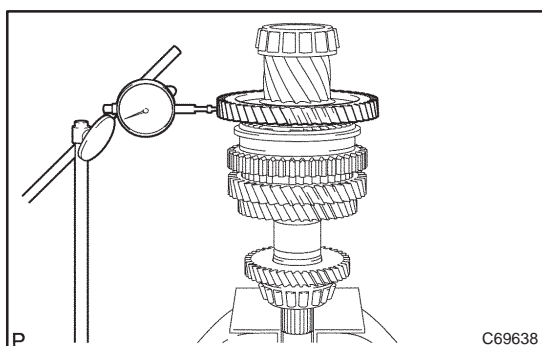
**41. INSPECT 2ND GEAR RADIAL CLEARANCE**

- (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.

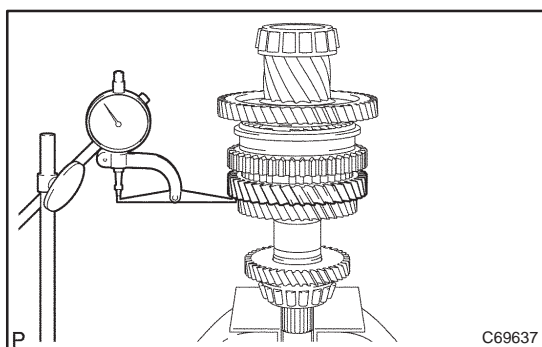
**42. INSPECT 1ST GEAR RADIAL CLEARANCE**

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

**Standard clearance:mm (in.)**

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

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

**43. INSPECT 2ND GEAR THRUST CLEARANCE**

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

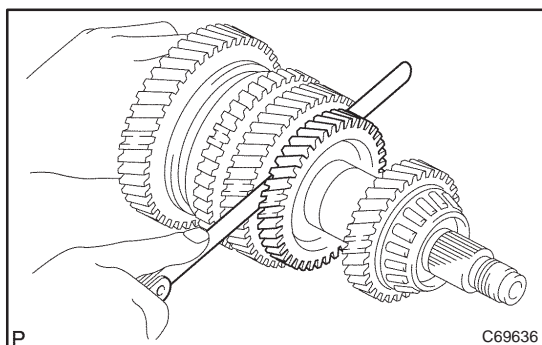
**Standard clearance:**

**0.1 – 0.35 mm (0.0039 – 0.0139 in.)**

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

**Standard clearance:**

**0.25 – 0.4 mm (0.099 – 0.0159 in.)**

**44. INSPECT 1ST GEAR THRUST CLEARANCE**

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

**Standard clearance:**

**0.25 – 0.4 mm (0.099 in. – 0.0159 in.)**