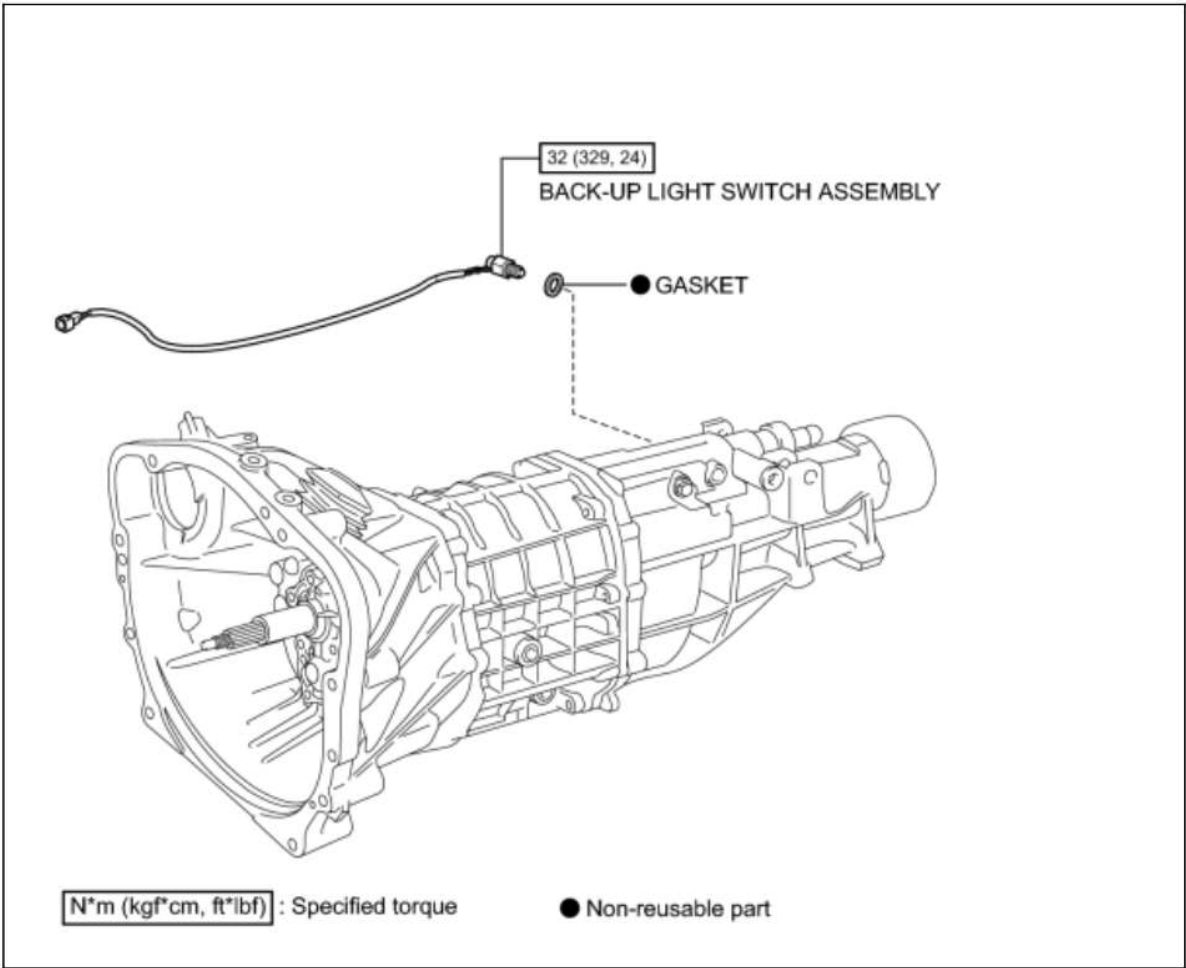


Last Modified: 3-27-2012	6.4 K	From: 201203
Model Year: 2013	Model: FR-S	Doc ID: RM0000032KE02UX
Title: TL70 MANUAL TRANSMISSION / TRANSAXLE: BACK-UP LIGHT SWITCH: COMPONENTS (2013 FR-S)		

COMPONENTS

ILLUSTRATION



cardiagn.com

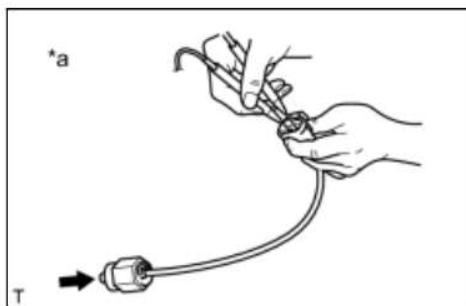
Last Modified: 3-27-2012	6.4 G	From: 201203
Model Year: 2013	Model: FR-S	Doc ID: RM0000017MP03IX
Title: TL70 MANUAL TRANSMISSION / TRANSAXLE: BACK-UP LIGHT SWITCH: INSPECTION (2013 FR-S)		

INSPECTION

1. INSPECT BACK-UP LIGHT SWITCH ASSEMBLY

(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:



TESTER CONNECTION	SWITCH CONDITION	SPECIFIED CONDITION
1 - 2	Pushed	Below 1 Ω
1 - 2	Released	10 k Ω or higher

Text in Illustration

*a	Component without harness connected (Back-Up Light Switch Assembly)
----	--

If the result is not as specified, replace the back-up light switch assembly.



Last Modified: 3-27-2012	6.4 A	From: 201203
Model Year: 2013	Model: FR-S	Doc ID: RM000001YVJ04BX
Title: TL70 MANUAL TRANSMISSION / TRANSAXLE: BACK-UP LIGHT SWITCH: INSTALLATION (2013 FR-S)		

INSTALLATION

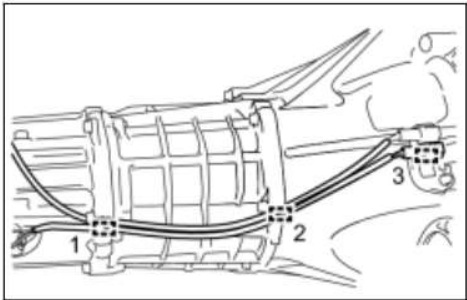
1. INSTALL BACK-UP LIGHT SWITCH ASSEMBLY

- (a) Using a 19 mm union nut wrench, install the back-up light switch assembly with a new gasket to the manual transmission assembly.

Torque: 32 N·m (329 kgf·cm, 24ft·lbf)

NOTICE:

Use the formula to calculate special torque values for situations where a union nut wrench is combined with a torque wrench INFO .



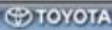
- (b) In the order indicated in the illustration, engage the 3 clamps in place, and connect the back-up light switch assembly wire and neutral position switch assembly wire.

HINT:

Install the wire harness so that there is slack on the connector side.

2. INSTALL MANUAL TRANSMISSION ASSEMBLY

INFO



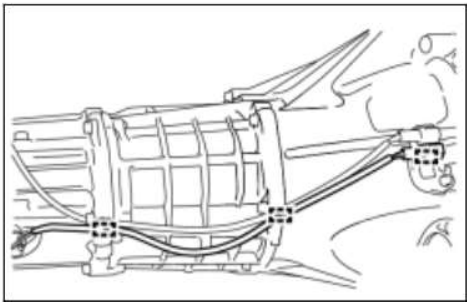
Last Modified: 3-27-2012	6.4 A	From: 201203
Model Year: 2013	Model: FR-S	Doc ID: RM000001YVL04BX
Title: TL70 MANUAL TRANSMISSION / TRANSAXLE: BACK-UP LIGHT SWITCH: REMOVAL (2013 FR-S)		

REMOVAL

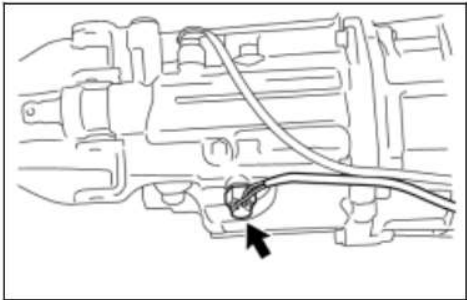
1. REMOVE MANUAL TRANSMISSION ASSEMBLY

INFO

2. REMOVE BACK-UP LIGHT SWITCH ASSEMBLY



(a) Disconnect the 3 clamps.

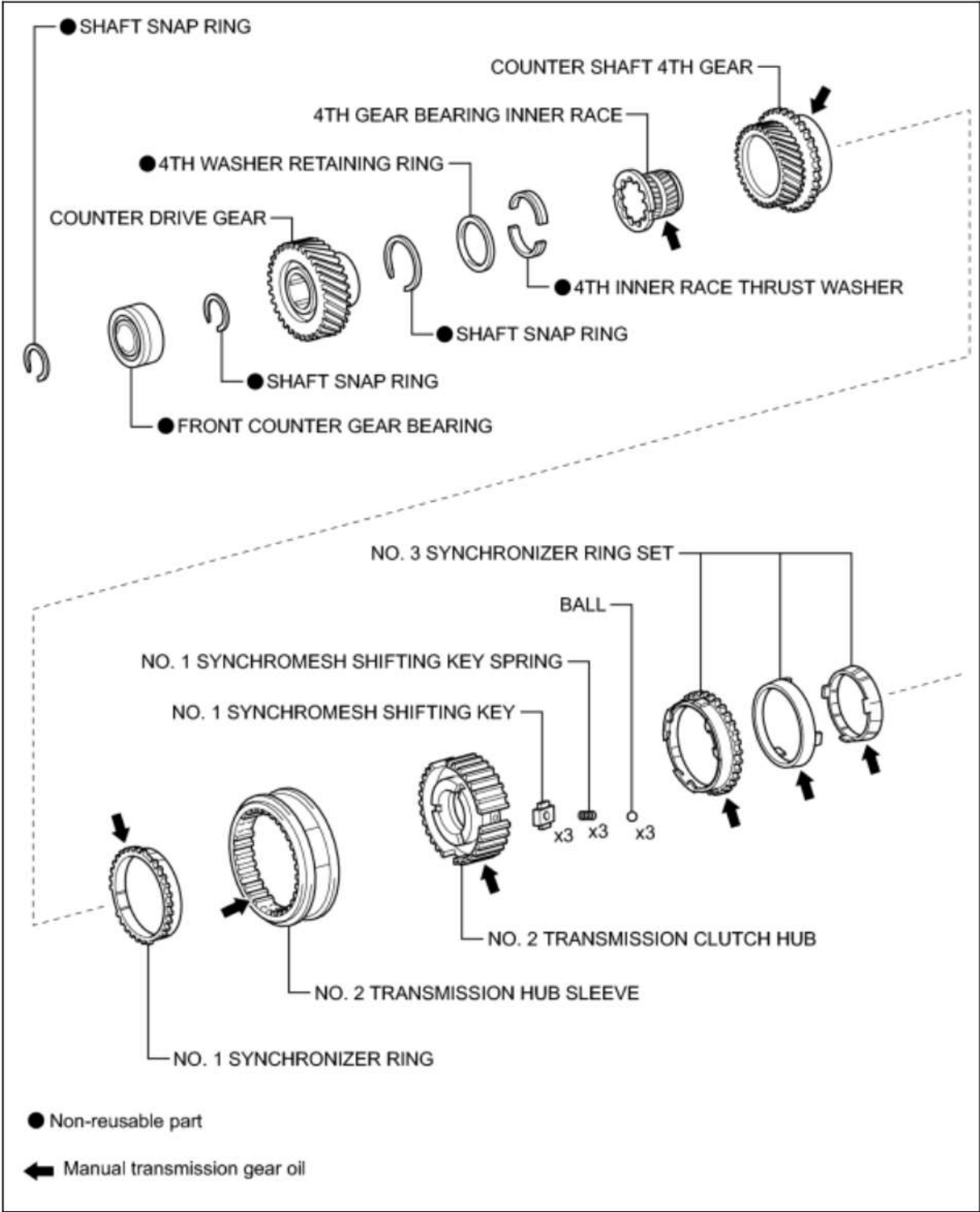


(b) Using a 19 mm union nut wrench, remove the back-up light switch assembly and gasket from the manual transmission assembly.

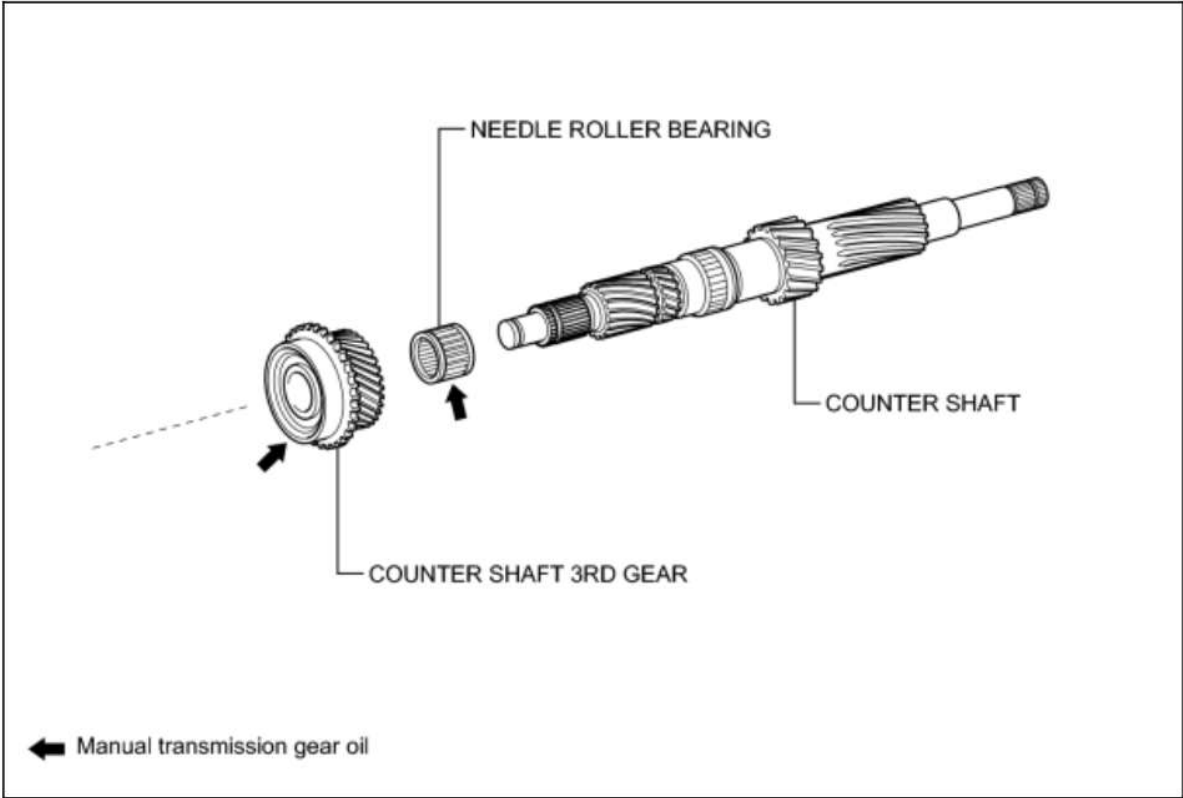
Last Modified: 3-27-2012	6.4 K	From: 201203
Model Year: 2013	Model: FR-S	Doc ID: RM000002H8K00EX
Title: TL70 MANUAL TRANSMISSION / TRANSAXLE: COUNTER GEAR: COMPONENTS (2013 FR-S)		

COMPONENTS

ILLUSTRATION



ILLUSTRATION



Last Modified: 3-27-2012	6.4 A	From: 201203
Model Year: 2013	Model: FR-S	Doc ID: RM000002RI2006X
Title: TL70 MANUAL TRANSMISSION / TRANSAXLE: COUNTER GEAR: DISASSEMBLY (2013 FR-S)		

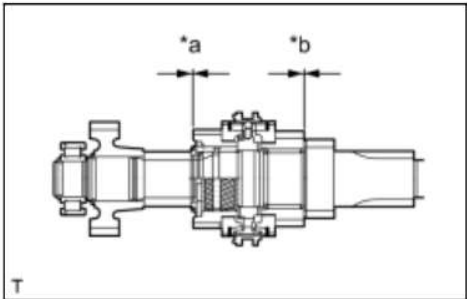
DISASSEMBLY

1. INSPECT THRUST CLEARANCE

(a) Using a feeler gauge, measure the thrust clearance of the counter shaft 3rd gear and counter shaft 4th gear.

Text in Illustration

*a	Counter shaft 4th gear thrust clearance
*b	Counter shaft 3rd gear thrust clearance



Standard Clearance

GEAR	STANDARD CLEARANCE MM (IN.)	MAXIMUM CLEARANCE MM (IN.)
Counter shaft 3rd gear	0.10 to 0.35 (0.00393 to 0.0138)	0.35 (0.0138)
Counter shaft 4th gear	0.10 to 0.35 (0.00393 to 0.0138)	0.35 (0.0138)

HINT:

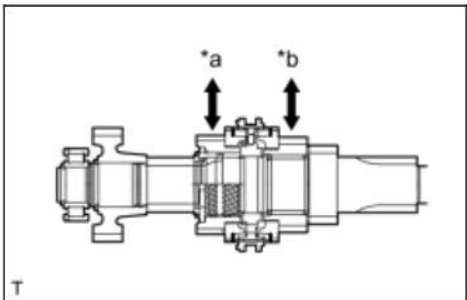
If the clearance exceeds the maximum, adjust it with the 4th inner race thrust washer.

2. INSPECT RADIAL CLEARANCE

(a) Using a feeler gauge, measure the radial clearance of the counter shaft 3rd gear and counter shaft 4th gear.

Text in Illustration

*a	Counter shaft 4th gear radial clearance
*b	Counter shaft 3rd gear radial clearance



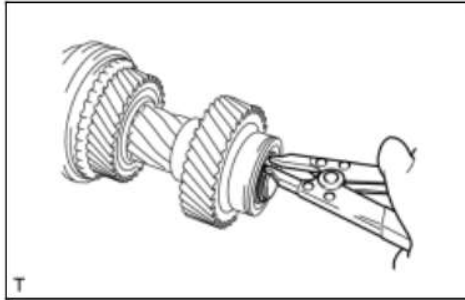
Standard Clearance

GEAR	STANDARD CLEARANCE MM (IN.)	MAXIMUM CLEARANCE MM (IN.)
Counter shaft 3rd gear	0.015 to 0.068 (0.000590 to 0.00268)	0.068 (0.00268)
Counter shaft 4th gear	0.065 to 0.115	

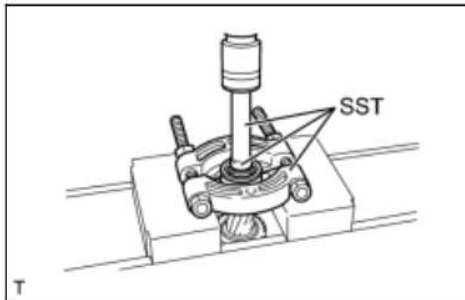
4th gear	(0.002559 to 0.00453)	0.115 (0.00453)
----------	-----------------------	-----------------

HINT:

If the clearance exceeds the maximum, replace the corresponding gear and needle roller bearing or 4th gear bearing inner race all together with a new ones.

3. REMOVE FRONT COUNTER GEAR BEARING

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



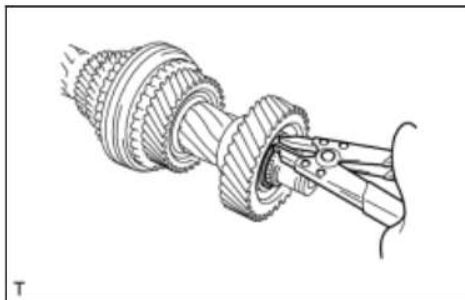
(b) Using SST and a press, remove the front counter gear bearing.

SST: 09950-00020

SST: 09950-60010

09951-00230

SST: 09950-70010

4. REMOVE COUNTER DRIVE GEAR

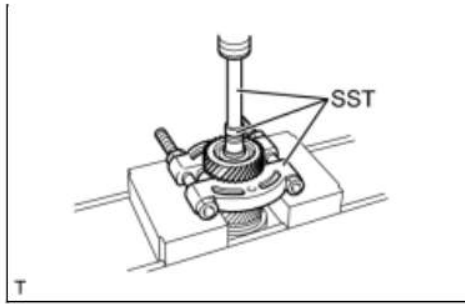
(a) Using a snap ring expander, remove the shaft snap ring.

(b) Using SST and a press, remove the counter drive gear.

SST: 09950-00020

SST: 09950-60010

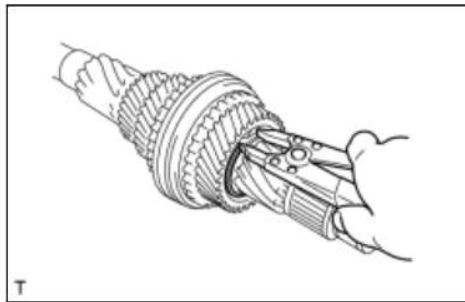
09951-00230



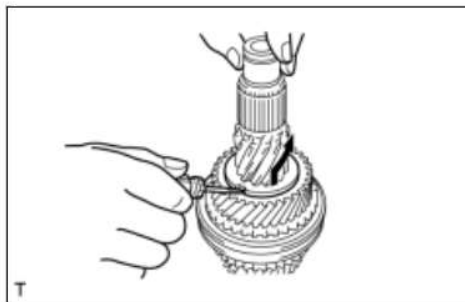
SST: 09950-70010

09951-07100

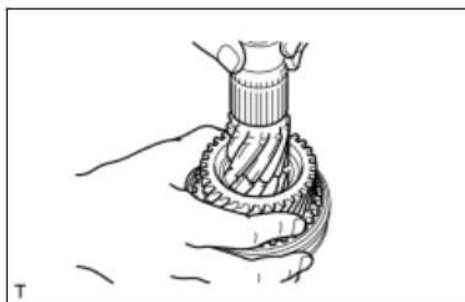
5. REMOVE COUNTER SHAFT 4TH GEAR



- (a) Using a snap ring expander, remove the shaft snap ring, and then remove the 4th washer retaining ring and 4th inner race thrust washer.

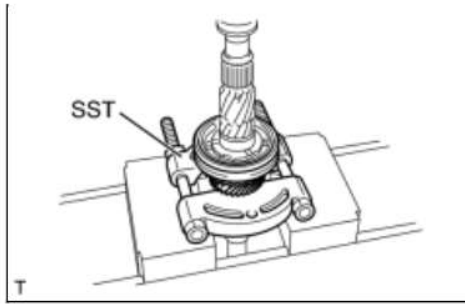


- (b) Using a screwdriver, pry the 4th gear bearing inner race and turn it counterclockwise along the gear, and remove the 4th gear bearing inner race.



- (c) Remove the counter shaft 4th gear and No. 1 synchronizer ring.

6. REMOVE COUNTER SHAFT 3RD GEAR



- (a) Using SST and a press, remove the No. 2 transmission clutch hub, counter shaft 3rd gear, No. 3 synchronizer ring set and needle roller bearing.

SST: 09950-00020

7. REMOVE NO. 2 TRANSMISSION HUB SLEEVE



- (a) Remove the No. 2 transmission hub sleeve, and then remove the 3 No. 1 synchromesh shifting keys, 3 No. 1 synchromesh shifting key springs and 3 balls from the transmission clutch hub.

NOTICE:

- Use a cloth to prevent the No. 1 synchromesh shifting keys, No. 1 synchromesh shifting key springs and balls from popping out.
- Do not deform the No. 1 synchromesh shifting key spring.

HINT:

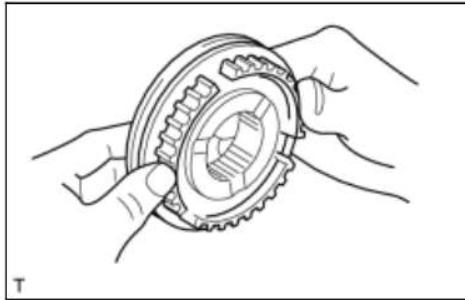
During this operation, keep the No. 2 transmission clutch hub and No. 1 synchromesh shifting key intact.



Last Modified: 3-27-2012	6.4 G	From: 201203
Model Year: 2013	Model: FR-S	Doc ID: RM00000590U000X
Title: TL70 MANUAL TRANSMISSION / TRANSAXLE: COUNTER GEAR: INSPECTION (2013 FR-S)		

INSPECTION

1. INSPECT NO. 2 TRANSMISSION HUB SLEEVE



- (a) Check that the spline gear edges of the No. 2 transmission hub sleeve are not worn down.

HINT:

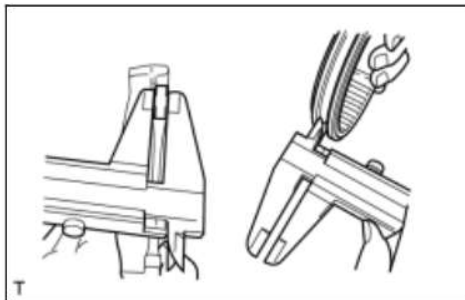
If it shows any sign of wear, replace the No. 2 transmission hub sleeve with a new one.

- (b) Install the No. 2 transmission hub sleeve to the No. 2 transmission clutch hub, and then check that it slides smoothly.

HINT:

If it does not slide smoothly, replace the No. 2 transmission hub sleeve and No. 2 transmission clutch hub with a new one.

2. INSPECT NO. 2 TRANSMISSION HUB SLEEVE CLEARANCE



- (a) Using a vernier caliper, measure the claw width of the No. 2 gear shift fork.

Standard width:
7.9 to 8.0 mm (0.311 to 0.315 in.)

Minimum width:
7.9 mm (0.311 in.)

HINT:

If the width is less than the minimum, replace the No. 2 gear shift fork with a new one.

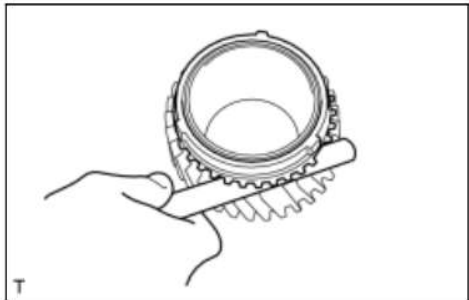
- (b) Using a vernier caliper, measure the groove of the No. 2 transmission hub sleeve, and then calculate the clearance with the No. 2 gear shift fork.

Standard clearance:
0.15 to 0.35 mm (0.00590 to 0.0138 in.)
Maximum clearance:
0.35 mm (0.0138 in.)

HINT:

If the clearance exceeds the maximum, replace both the No. 2 gear shift fork and No. 2 transmission hub sleeve with a new ones.

3. INSPECT NO. 1 SYNCHRONIZER RING

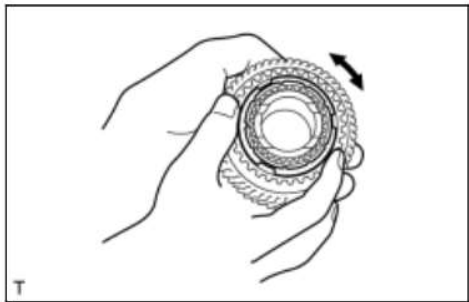


(a) Apply manual transmission gear oil to the taper cone of the counter shaft 4th gear, and then hold the No. 1 synchronizer ring in position with your hand to measure the clearance between the No. 1 synchronizer ring and counter shaft 4th gear by using a feeler gauge.

Standard clearance:
0.8 to 1.6 mm (0.0314 to 0.0629 in.)
Maximum clearance:
1.6 mm (0.0629 in.)

NOTICE:
Check the entire circumference of the gear.

HINT:
If the clearance exceeds the maximum, replace the No. 1 synchronizer ring with a new one.

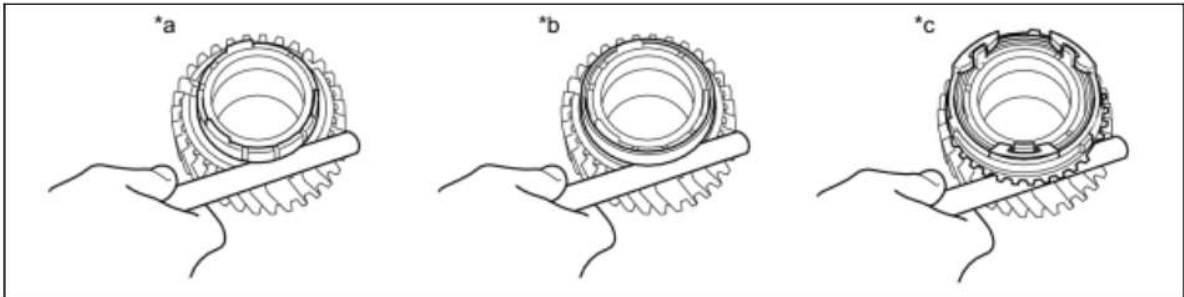


(b) Apply manual transmission gear oil to the taper cone of the counter shaft 4th gear, and then hold the No. 1 synchronizer ring in position with your hand to check that it does not slide in the circumferential direction.

HINT:
If the ring slides, replace the No. 1 synchronizer ring with a new one.

4. INSPECT NO. 3 SYNCHRONIZER RING SET

(a) Apply manual transmission gear oil to the taper cone of the counter shaft 3rd gear and No. 3 synchronizer ring set, and then hold the No. 3 synchronizer ring set in position with your hand to measure the clearance between the No. 3 synchronizer ring set and the counter shaft 3rd gear by using a feeler gauge.



Text in Illustration

*a	Inner	*b	Middle
----	-------	----	--------

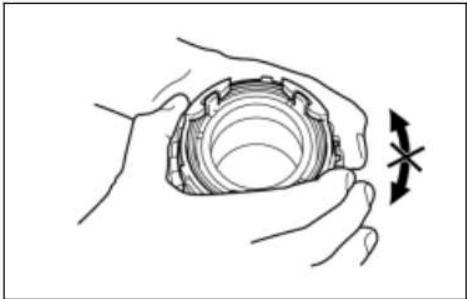
*C	Outer	-	-
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Standard Clearance:

LOCATION	STANDARD CLEARANCE MM (IN.)
Inner	0.4 to 1.2 (0.0157 to 0.0472)
Middle	0.3 to 1.3 (0.0118 to 0.0512)
Outer	0.8 to 1.8 (0.0315 to 0.0709)

NOTICE:
Check the entire circumference of the gear.

HINT:
If the result is not as specified, replace the No. 3 synchronizer ring set with a new one.



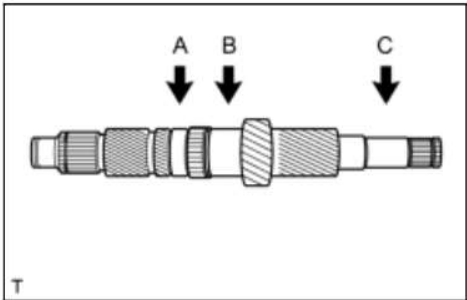
(b) Apply manual transmission gear oil to the taper cone of the counter shaft 3rd gear, and then hold the No. 3 synchronizer ring set in position with your hand to check that it does not slide in the circumferential direction.

HINT:
If the No. 3 synchronizer ring set slides, replace the No. 3 synchronizer ring set with a new one.

5. INSPECT COUNTER SHAFT

(a) Using a micrometer, measure the outer diameter of each location.

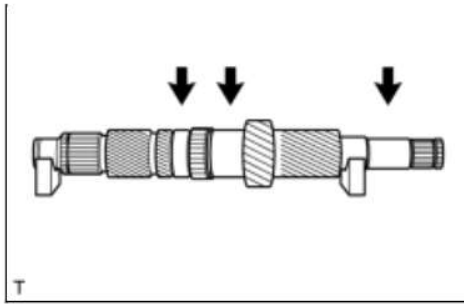
Standard Outer Diameter:



PART	STANDARD OUTER DIAMETER MM (IN.)	MINIMUM OUTER DIAMETER MM (IN.)
A	39.284 to 39.300 (1.54661 to 1.54721)	39.284 (1.54661)
B	37.984 to 38.000 (1.49543 to 1.49606)	37.984 (1.49543)
C	24.987 to 25.000 (0.98374 to 0.98425)	24.987 (0.98374)

HINT:
If the diameter is less than the minimum, replace the counter shaft with a new one.

(b) Using V-block and a dial gauge, measure the runout of



each location as shown in the illustration.

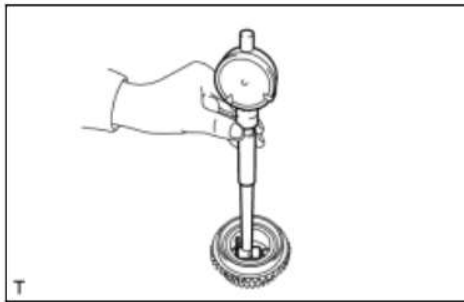
Standard runout:

0.03 mm (0.00118 in.) or less

HINT:

If the runout exceeds the standard, replace the counter shaft with a new one.

6. INSPECT COUNTER SHAFT 3RD GEAR



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

Standard inside diameter:

43.015 to 43.040 mm (1.69350 to 1.69448 in.)

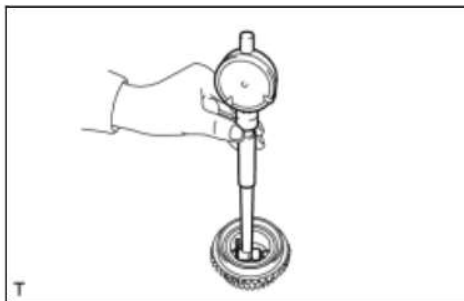
Maximum inside diameter:

43.040 mm (1.69448 in.)

HINT:

If the inside diameter exceeds the maximum, replace the counter shaft 3rd gear with a new one.

7. INSPECT COUNTER SHAFT 4TH GEAR



(a) Using a cylinder gauge, measure the inside diameter of the counter shaft 4th gear.

Standard inside diameter:

46.315 to 46.340 mm (1.82425 to 1.82441 in.)

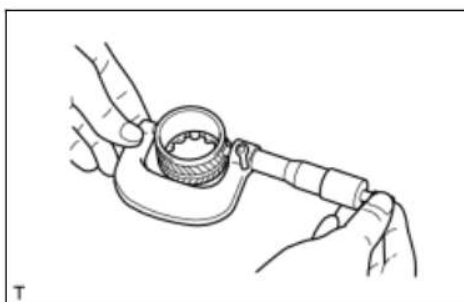
Maximum inside diameter:

46.340 mm (1.82441 in.)

HINT:

If the inside diameter exceeds the maximum, replace the counter shaft 4th gear with a new one.

8. REMOVE 4TH GEAR BEARING INNER RACE



(a) Using a micrometer, measure the outside diameter of the 4th gear bearing inner race.

Standard outside diameter:

46.225 to 46.250 mm (1.81988 to 1.82087 in.)

Minimum outside diameter:

46.225 mm (1.81988 in.)

NOTICE:

Do not measure the oil groove.

HINT:

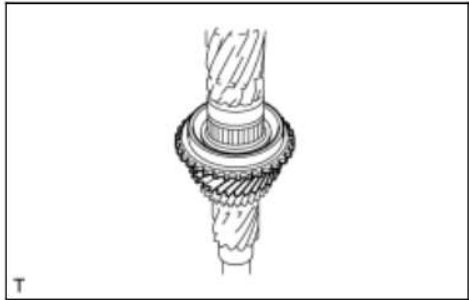
If the outside diameter is less than the minimum, replace the 4th gear bearing inner race with a new one.



Last Modified: 3-27-2012	6.4 A	From: 201203
Model Year: 2013	Model: FR-S	Doc ID: RM000002RI3006X
Title: TL70 MANUAL TRANSMISSION / TRANSAXLE: COUNTER GEAR: REASSEMBLY (2013 FR-S)		

REASSEMBLY

1. INSTALL COUNTER SHAFT 3RD GEAR

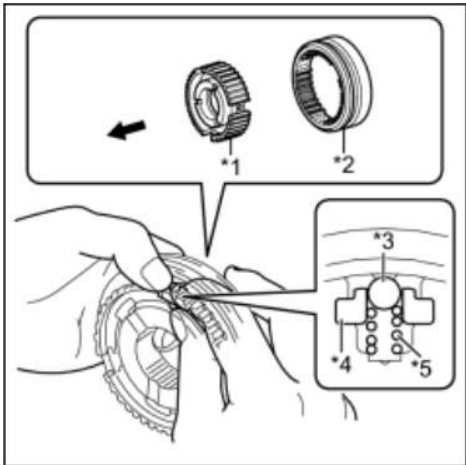


(a) Apply manual transmission gear oil to the mounting point of the counter shaft, needle roller bearing and inside surface and taper cone of the counter shaft 3rd gear.

(b) Install the needle roller bearing and counter shaft 3rd gear.

2. INSTALL NO. 2 TRANSMISSION HUB SLEEVE

(a) Apply manual transmission gear oil to the moving parts of the No. 2 transmission clutch hub.



Text in Illustration

*1	No. 2 Transmission Clutch Hub
*2	No. 2 Transmission Hub Sleeve
*3	Ball
*4	No. 1 Synchromesh Shifting Key
*5	No. 1 Synchromesh Shifting Key Spring
	Front Side

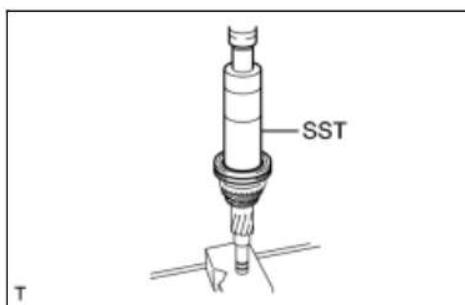


- (b) As shown in the illustration, install the No. 2 transmission hub sleeve to the No. 2 transmission clutch hub. Install the 3 No. 1 synchromesh shifting keys and 3 No. 1 synchromesh shifting key springs all together, and then install the balls.

HINT:

- Install the shifting key ball while holding down the synchromesh shifting key spring. Install the ball while holding down the No. 1 synchromesh shifting key spring.
- After the installation, let the No. 1 synchromesh shifting key spring settle down.

3. INSTALL NO. 2 TRANSMISSION CLUTCH HUB



- (a) Install the No. 3 synchronizer ring set to the counter shaft 3rd gear.

HINT:

- Align the middle ring claw with the groove in the counter shaft 3rd gear.
- Align the inner ring claw with the groove in the outer ring.

- (b) Using SST and a press, install the No. 2 transmission clutch hub.

SST: 09316-60011

09316-00011

NOTICE:

Make sure that the No. 3 synchronizer ring set is positioned properly.

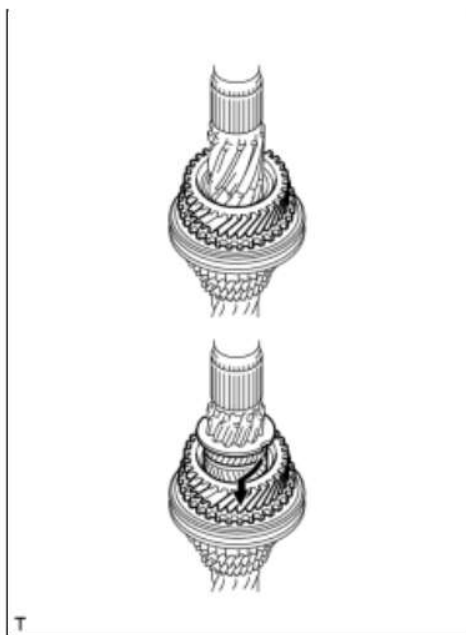
HINT:

- Align the No. 2 transmission clutch hub and the No. 3 synchronizer ring set so that they can fit together.
- Make sure to press fit the No. 2 transmission clutch hub until it touches the counter shaft.
- After the press fit, make sure that the No. 3 synchronizer ring set moves toward the thrust direction.

4. INSTALL COUNTER SHAFT 4TH GEAR

- (a) Install the No. 1 synchronizer ring to the No. 2 transmission clutch hub.

HINT:



Align the No. 2 transmission clutch hub and the No. 1 synchronizer ring so that they can fit together.

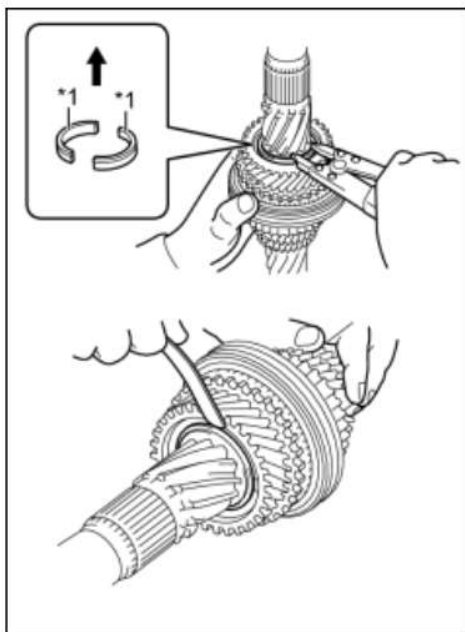
- (b) Apply manual transmission gear oil to the 4th gear bearing inner race and inside surface and taper cone of the counter shaft 4th gear.
- (c) Install the counter shaft 4th gear and 4th gear bearing inner race.

HINT:

To install it, rotate the 4th gear bearing inner race along the gear in a clockwise direction.

5. INSTALL 4TH INNER RACE THRUST WASHER

- (a) Select a 4th inner race thrust washer that is suitable to retain the specific thrust clearance between the 4th gear bearing inner race and 4th inner race thrust washer.



Text in Illustration

*1	4th Inner Race Thrust Washer
	Front Side

Standard clearance:

0 to 0.1 mm (0 to 0.00394 in.)

HINT:

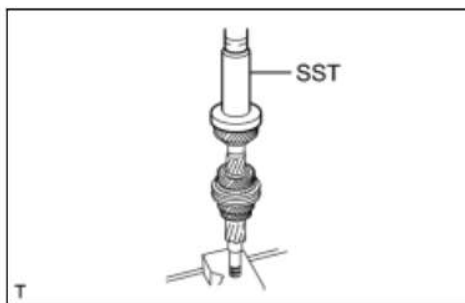
Select the thickest 4th inner race thrust washer possible for installation.

4th Inner Race Thrust Washer Thickness

PART NO.	THICKNESS MM (IN.)	MARK
SU003-03500	3.75 (0.14763)	A
SU003-03501	3.80 (0.14960)	B
SU003-03502	3.85 (0.15157)	C
SU003-03503	3.90 (0.15354)	D
SU003-03504	3.95 (0.15551)	E
SU003-03505	4.00 (0.15748)	F
SU003-03506	4.05 (0.15944)	G
SU003-03507	4.10 (0.16141)	H

- (b) Using a snap ring expander, as shown in the illustration, install a new 4th inner race thrust washer, new 4th washer retaining ring and new shaft snap ring to the counter shaft.

6. INSTALL COUNTER DRIVE GEAR



- (a) Using SST and a press, install the counter drive gear.

SST: 09309-36010

7. INSTALL SHAFT SNAP RING (for Counter Drive Gear)

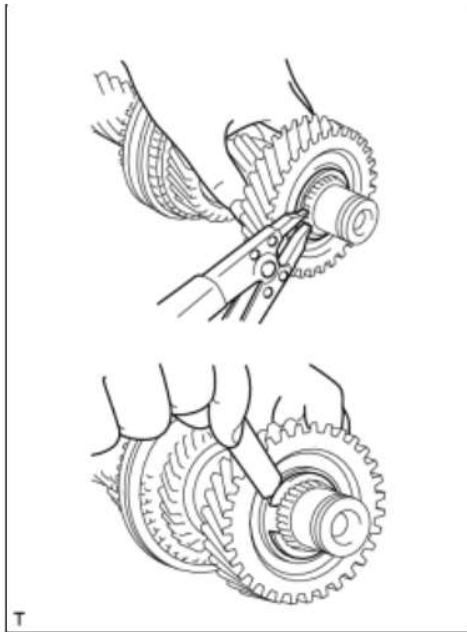
- (a) Select a shaft snap ring that is suitable to retain the specific thrust clearance between the counter drive gear and shaft snap ring.

Standard clearance:

0 to 0.1 mm (0 to 0.00394 in.)

HINT:

Select the thickest shaft snap ring possible for installation.



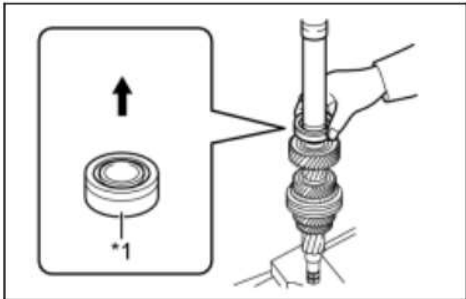
Shaft Snap Ring Thickness

PART NO.	THICKNESS: MM (IN.)	MARK
SU003-03581	1.80 (0.07086)	A
SU003-03582	1.85 (0.07283)	B
SU003-03583	1.90 (0.07480)	C
SU003-03584	1.95 (0.07677)	D
SU003-03585	2.00 (0.07874)	E
SU003-03586	2.05 (0.08070)	F

(b) Using a snap ring expander, install a new shaft snap ring to the counter shaft.

8. INSTALL FRONT COUNTER GEAR BEARING

(a) Using SST and a press, as shown in the illustration, install a new front counter gear bearing while holding it with your hand.



Text in Illustration

*1	Front Counter Gear Bearing
	Front Side

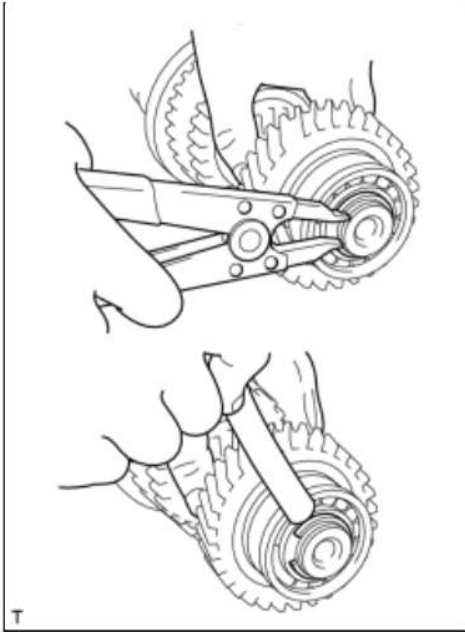
SST: 09330-50010

NOTICE:

Attach SST to the inner race of the front counter gear bearing, and then install the front counter gear bearing.

9. INSTALL SHAFT SNAP RING (for Front Counter Gear Bearing)

(a) Select a shaft snap ring that is suitable to retain the specific thrust clearance between the counter gear front



bearing and shaft snap ring.

Standard clearance:
0 to 0.1 mm (0 to 0.00394 in.)

HINT:
Select the thickest shaft snap ring possible for installation.

Shaft Snap Ring Thickness

PART NO.	THICKNESS: MM (IN.)	MARK
SU003-03560	2.05 (0.08070)	1
SU003-03558	2.10 (0.08267)	2
SU003-03561	2.15 (0.08464)	3
SU003-03559	2.20 (0.08661)	4
SU003-03562	2.25 (0.08858)	5
SU003-03563	2.30 (0.09055)	6

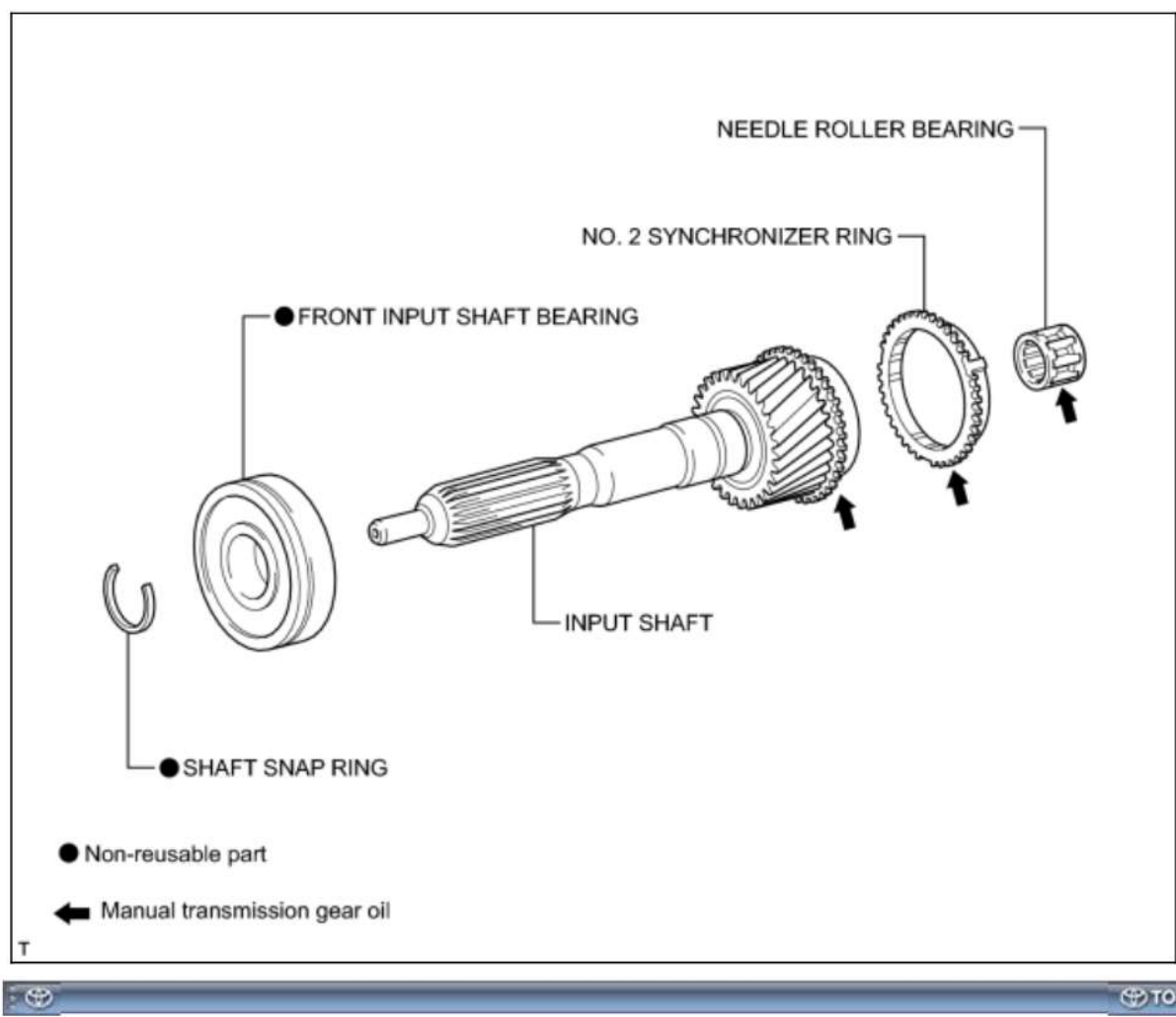
(b) Using a snap ring expander, install a new shaft snap ring to the counter shaft.



Last Modified: 3-27-2012	6.4 K	From: 201203
Model Year: 2013	Model: FR-S	Doc ID: RM000002H8K00CX
Title: TL70 MANUAL TRANSMISSION / TRANSAXLE: INPUT SHAFT: COMPONENTS (2013 FR-S)		

COMPONENTS

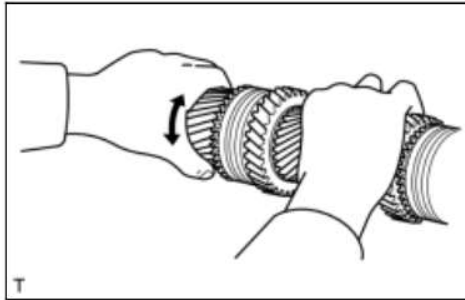
ILLUSTRATION



Last Modified: 3-27-2012	6.4 A	From: 201203
Model Year: 2013	Model: FR-S	Doc ID: RM000002H8L00BX
Title: TL70 MANUAL TRANSMISSION / TRANSAXLE: INPUT SHAFT: DISASSEMBLY (2013 FR-S)		

DISASSEMBLY

1. INSPECT NEEDLE ROLLER BEARING



- (a) Install the input shaft to the output shaft, and then check the needle roller bearing.

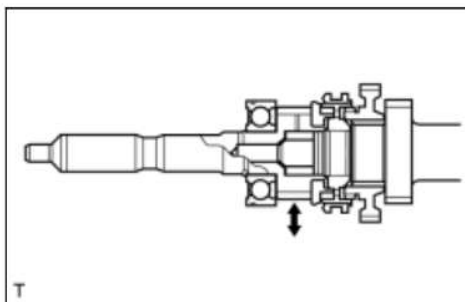
Standard:

Abnormal fitting, interfering, abnormal noise, or looseness should not be found.

HINT:

If any abnormality is found, replace the needle roller bearing with a new one.

2. INSPECT RADIAL CLEARANCE



- (a) Install the input shaft to the output shaft, and then using a dial indicator, measure the radial clearance.

Standard clearance:

0.029 to 0.072 mm (0.00114 to 0.00283 in.)

Maximum clearance:

0.072 mm (0.00283 in.)

HINT:

If the clearance exceeds the maximum, replace the needle roller bearing and output shaft with a new ones.

3. INSPECT FRONT INPUT SHAFT BEARING



- (a) Check the front input shaft bearing.

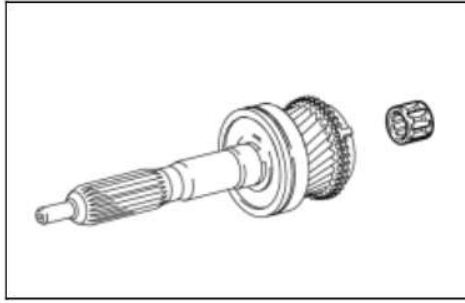
Standard:

Abnormal fitting, interfering, abnormal noise, or looseness should not be found.

HINT:

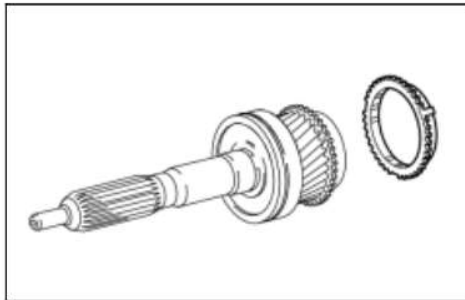
If any abnormality is found, replace the front input shaft bearing with a new one.

4. REMOVE NEEDLE ROLLER BEARING



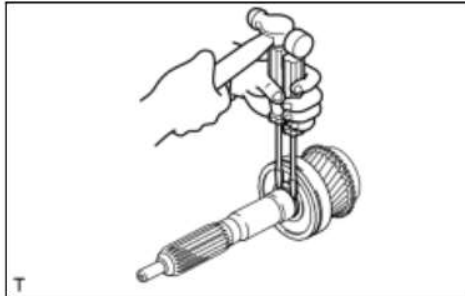
(a) Remove the needle roller bearing from the input shaft.

5. REMOVE NO. 2 SYNCHRONIZER RING



(a) Remove the No. 2 synchronizer ring from the input shaft.

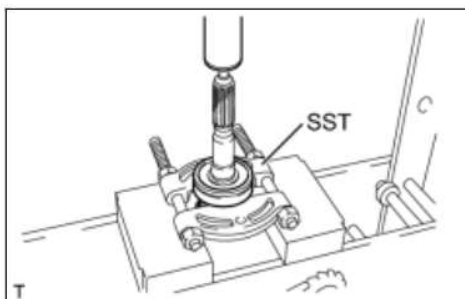
6. REMOVE FRONT INPUT SHAFT BEARING



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

NOTICE:

Use a cloth to prevent the shaft snap ring from popping out.



(b) Using SST and a press, remove the front input shaft bearing from the input shaft.

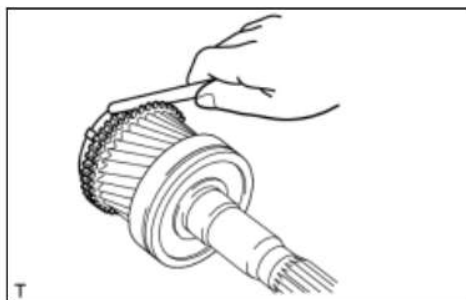
SST: 09950-00020



Last Modified: 3-27-2012	6.4 G	From: 201203
Model Year: 2013	Model: FR-S	Doc ID: RM00000590S000X
Title: TL70 MANUAL TRANSMISSION / TRANSAXLE: INPUT SHAFT: INSPECTION (2013 FR-S)		

INSPECTION

1. INSPECT NO. 2 SYNCHRONIZER RING



- (a) Apply manual transmission gear oil to the taper corn of the 3rd gear, and hold the No. 2 synchronizer ring in position with your hand to measure the clearance between the No. 2 synchronizer ring and 3rd gear by using a feeler gauge.

Standard clearance:

0.8 to 1.6 mm (0.0315 to 0.0630 in.)

Minimum clearance:

0.8 mm (0.0315 in.)

NOTICE:

Check the entire circumference of the gear.

HINT:

If the clearance is less than the minimum, replace the No. 2 synchronizer ring with a new one.



- (b) Apply manual transmission gear oil to the taper cone of the 3rd gear, and then hold the No. 2 synchronizer ring in position with your hand to check that it does not slide in the circumferential direction.

HINT:

If the No. 2 synchronizer ring slides, replace the No. 2 synchronizer ring with a new one.

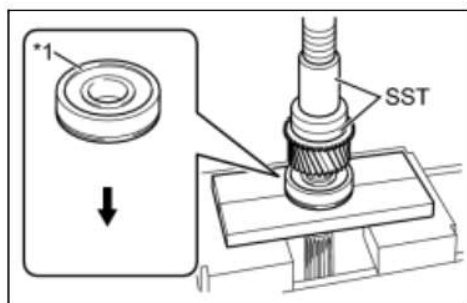


Last Modified: 3-27-2012	6.4 A	From: 201203
Model Year: 2013	Model: FR-S	Doc ID: RM000002H8M00BX
Title: TL70 MANUAL TRANSMISSION / TRANSAXLE: INPUT SHAFT: REASSEMBLY (2013 FR-S)		

REASSEMBLY

1. INSTALL FRONT INPUT SHAFT BEARING

- (a) Using SST and a press, as shown in the illustration, install a new front input shaft bearing to the input shaft.



Text in Illustration

*1	Front Input Shaft Bearing
	Front Side

SST: 09527-20011

SST: 09950-60010

09951-00560

NOTICE:

Retain the front input shaft bearing inner race, and press fit.

- (b) Select a shaft snap ring that is suitable to retain the specific thrust clearance between the front input shaft bearing and shaft snap ring.

Standard clearance:

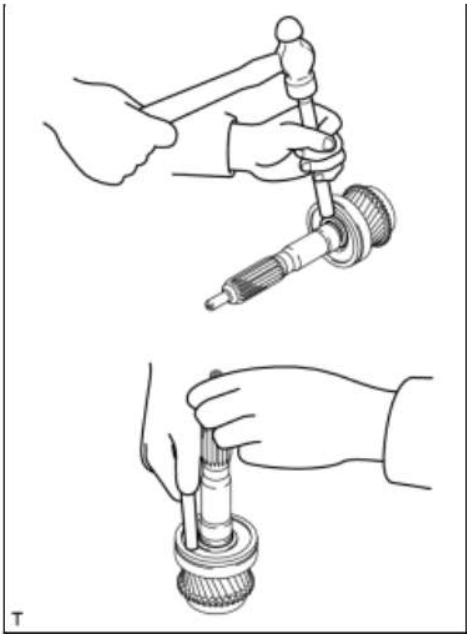
0 mm (0 in.)

Maximum clearance:

0.1 mm (0.00394 in.)

Shaft Snap Ring Thickness

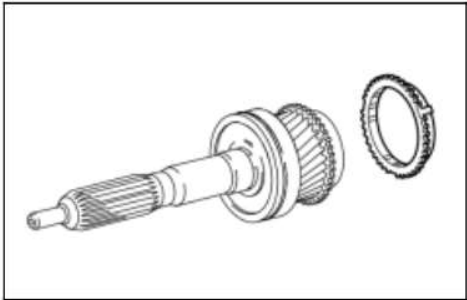
PART NO.	THICKNESS MM (IN.)	MARK
SU003-03575	1.95 (0.07677)	0
SU003-03576	2.00 (0.07874)	1
SU003-03577	2.05 (0.08070)	2
SU003-03578	2.10 (0.08267)	3



SU003-03579	2.15 (0.08464)	4
SU003-03580	2.20 (0.08661)	5

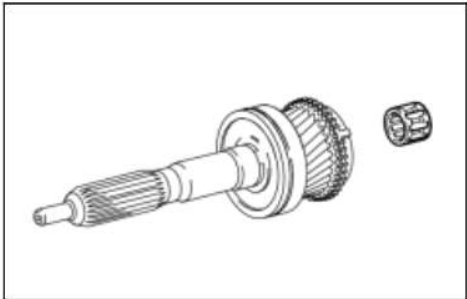
(c) Using a brass bar and a hammer, install a new shaft snap ring to the input shaft.

2. INSTALL NO. 2 SYNCHRONIZER RING



(a) Apply manual transmission gear oil to the No. 2 synchronizer ring, and then install the No. 2 synchronizer ring to the input shaft.

3. INSTALL NEEDLE ROLLER BEARING

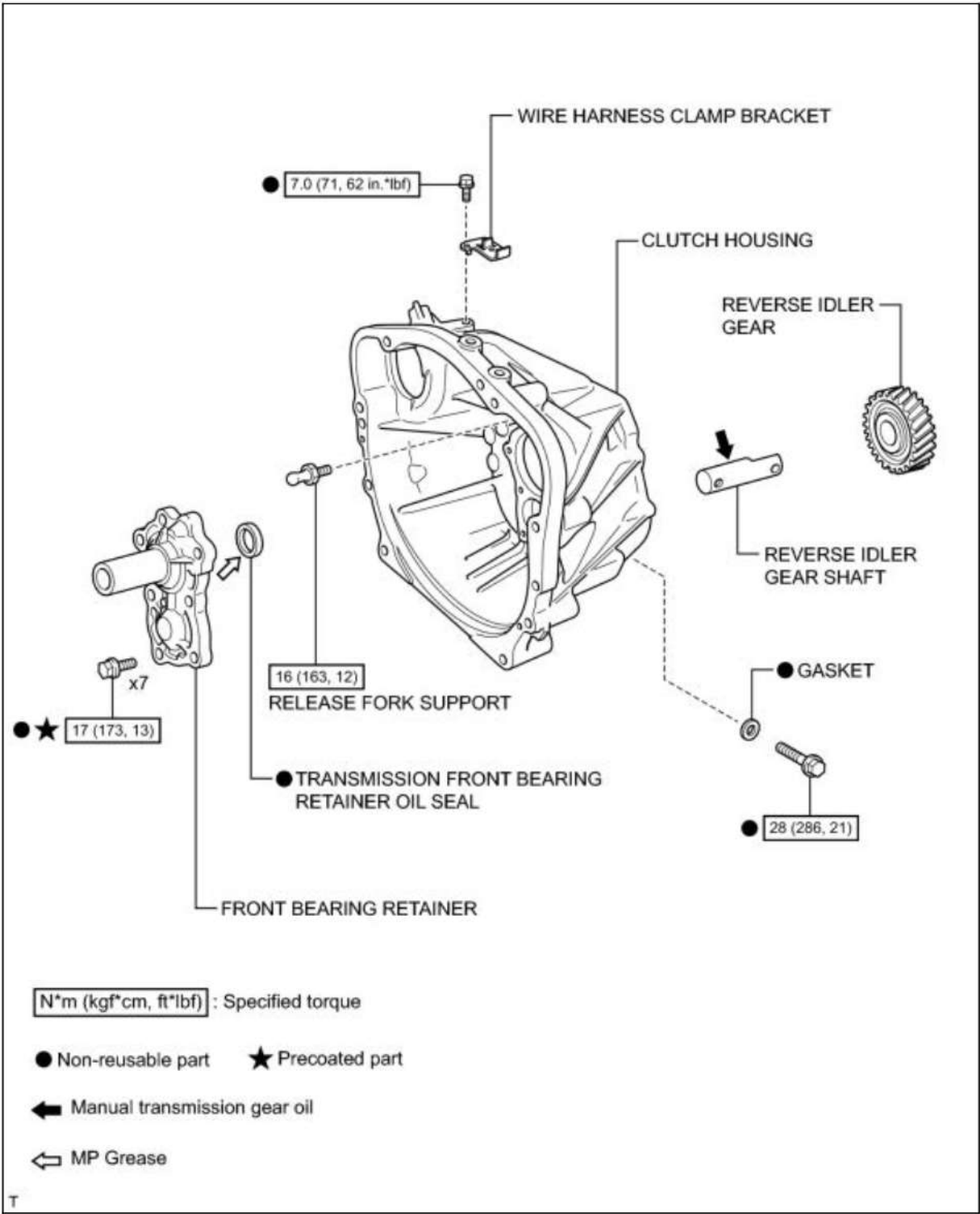


(a) Apply manual transmission gear oil to the needle roller bearing, and then install the needle roller bearing to the input shaft.

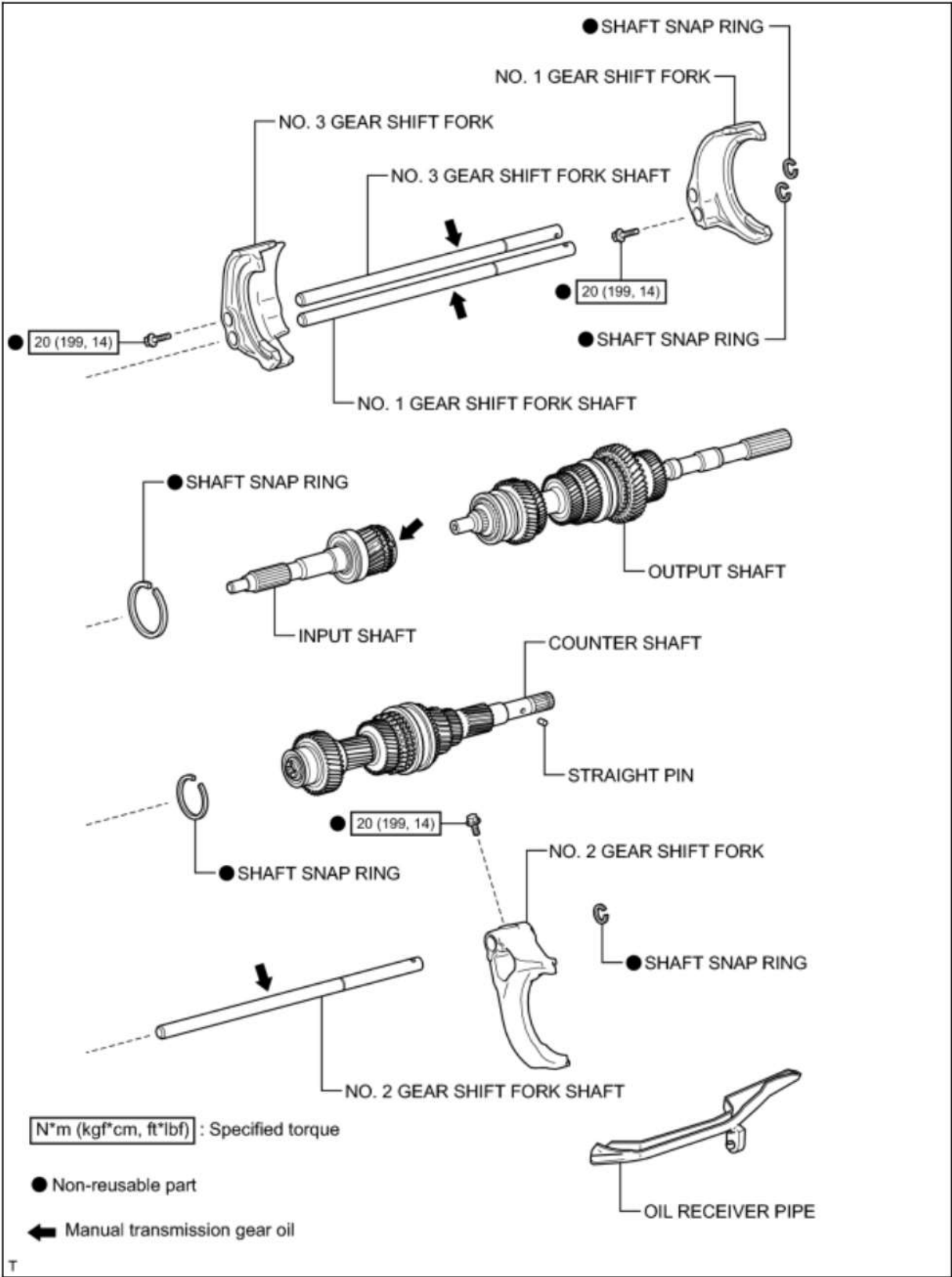
Last Modified: 3-27-2012	6.4 K	From: 201203
Model Year: 2013	Model: FR-S	Doc ID: RM000002H8K00BX
Title: TL70 MANUAL TRANSMISSION / TRANSAXLE: MANUAL TRANSAXLE UNIT: COMPONENTS (2013 FR-S)		

COMPONENTS

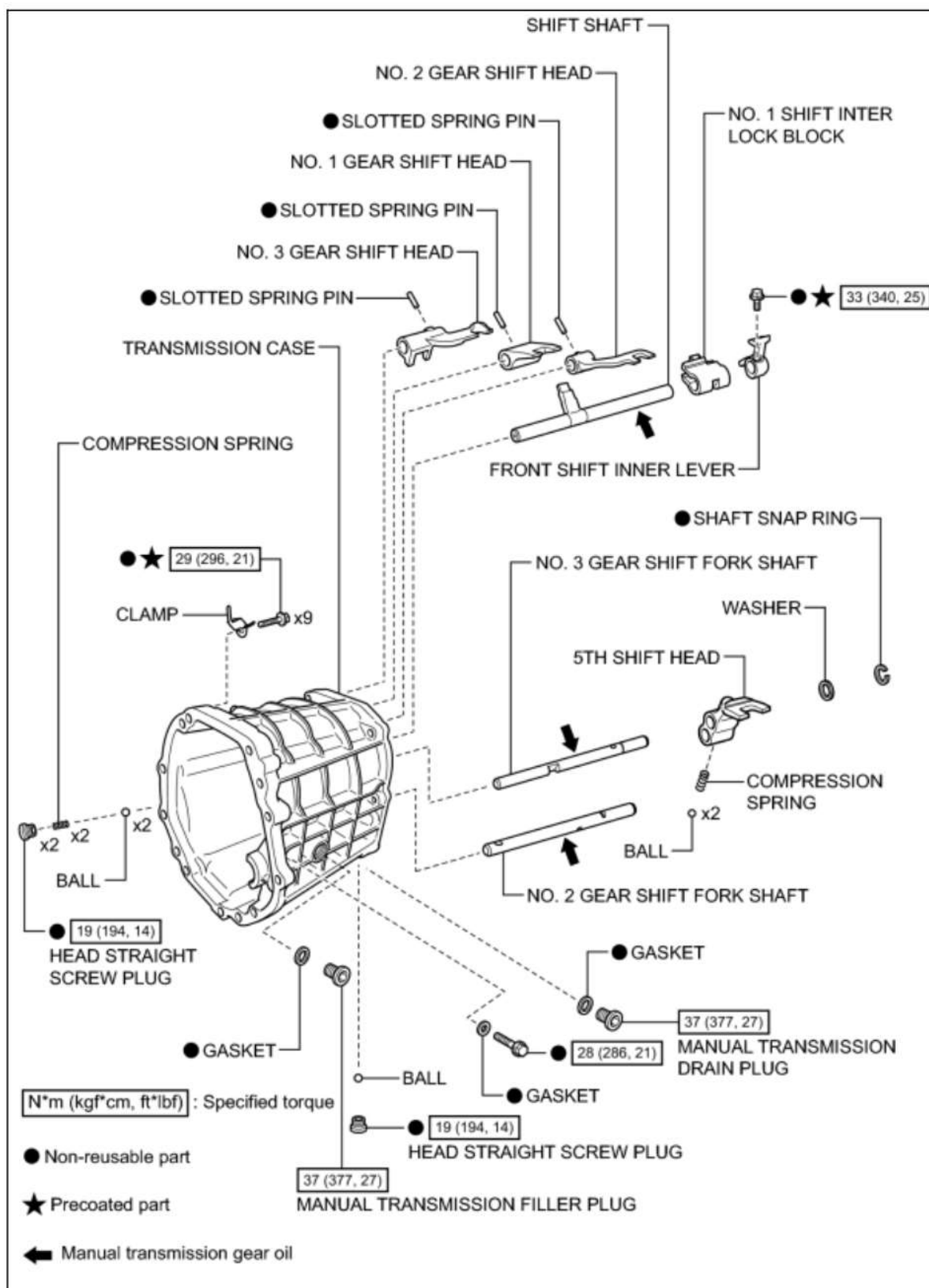
ILLUSTRATION



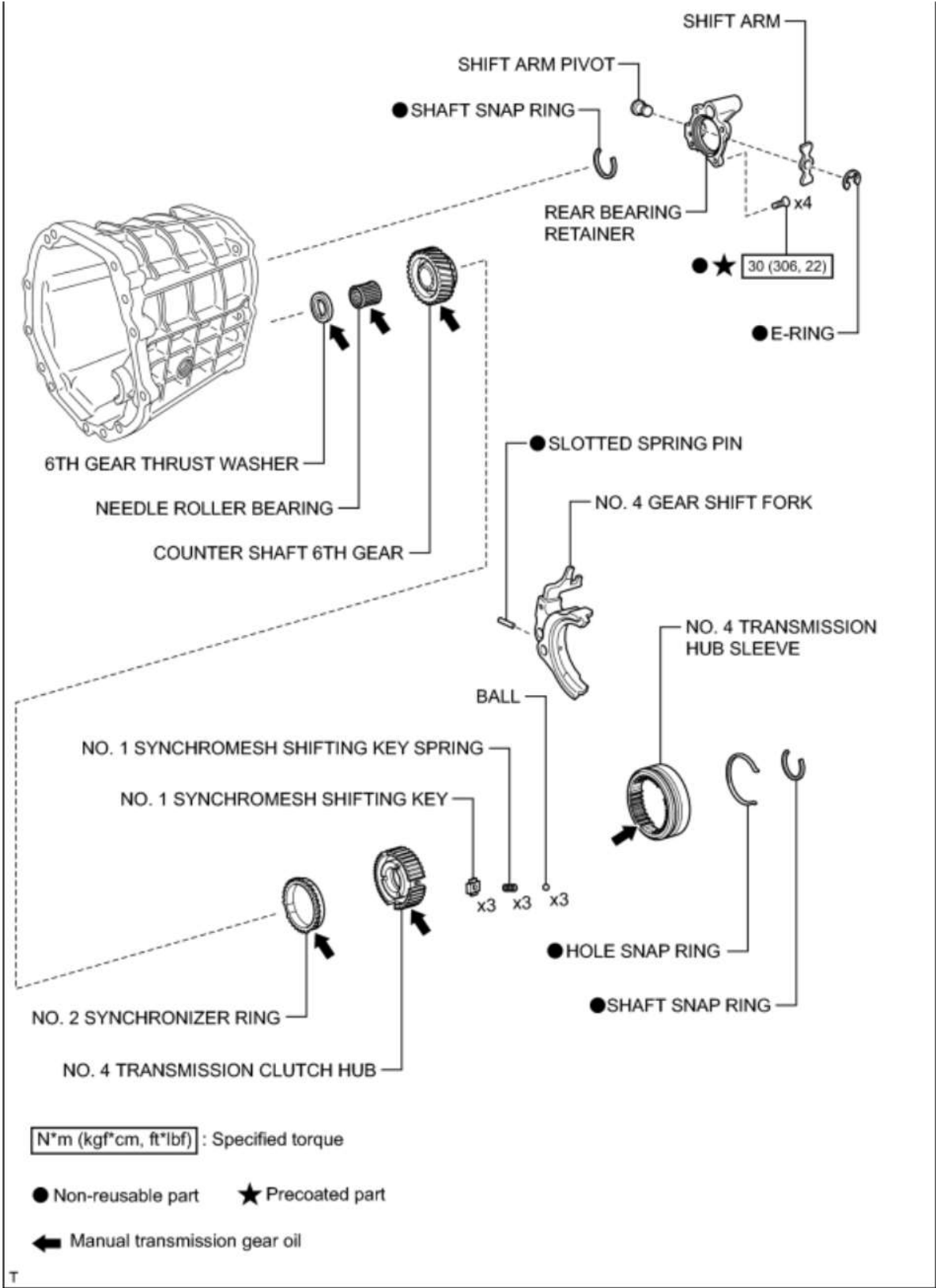
ILLUSTRATION



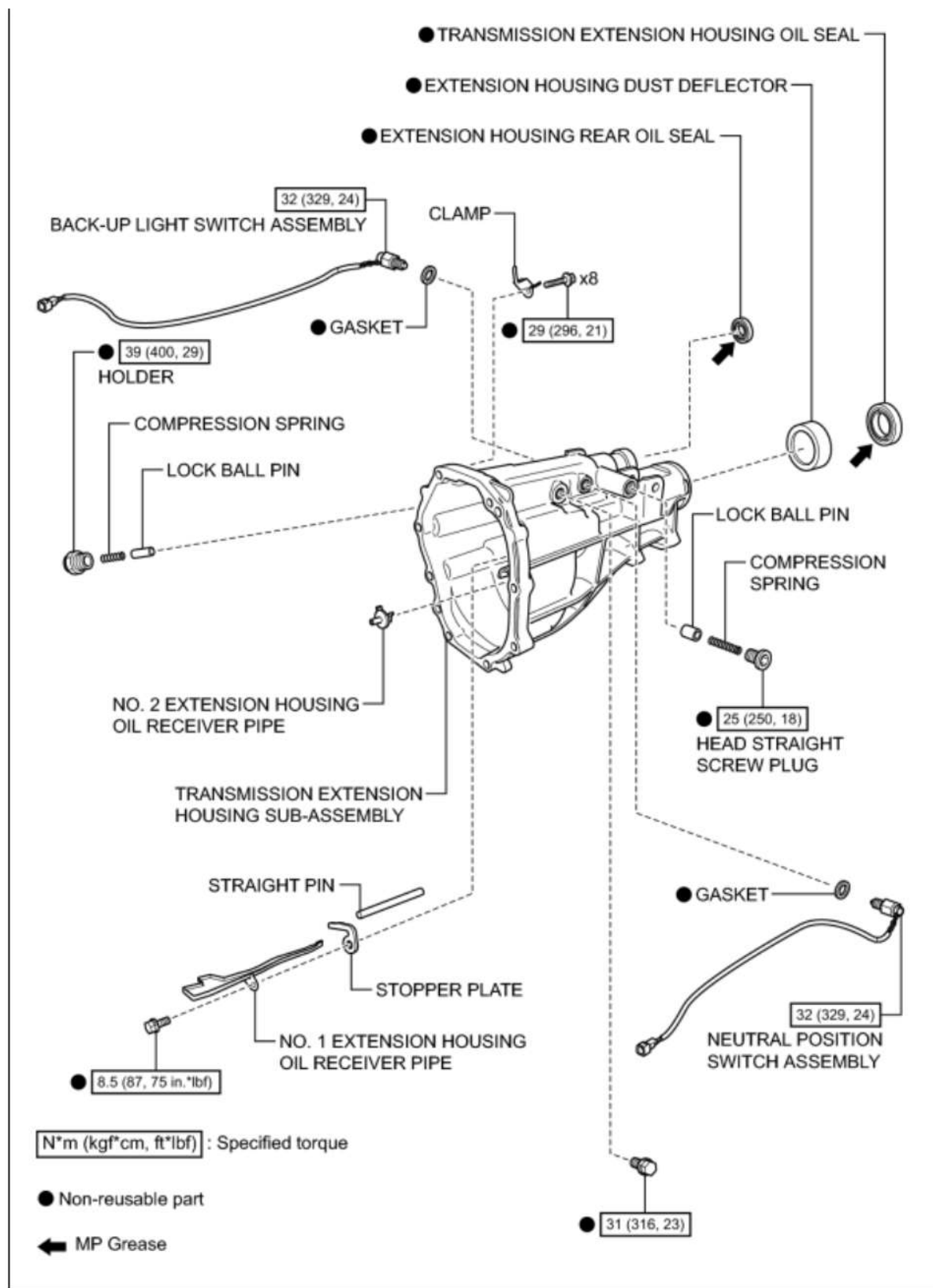
ILLUSTRATION



ILLUSTRATION



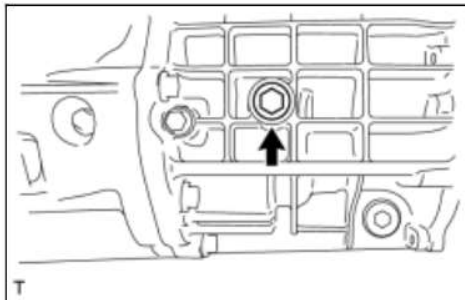
ILLUSTRATION



Last Modified: 3-27-2012	6.4 A	From: 201203
Model Year: 2013	Model: FR-S	Doc ID: RM000002RHU007X
Title: TL70 MANUAL TRANSMISSION / TRANSAXLE: MANUAL TRANSAXLE UNIT: DISASSEMBLY (2013 FR-S)		

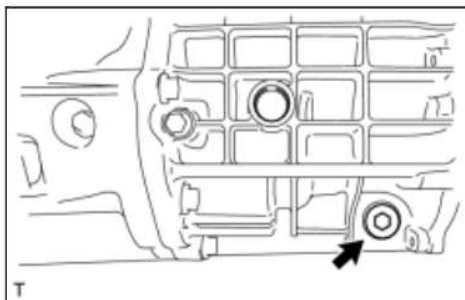
DISASSEMBLY

1. REMOVE MANUAL TRANSMISSION FILLER PLUG



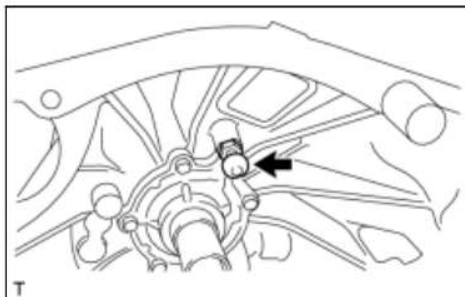
(a) Remove the manual transmission filler plug and gasket.

2. REMOVE MANUAL TRANSMISSION DRAIN PLUG



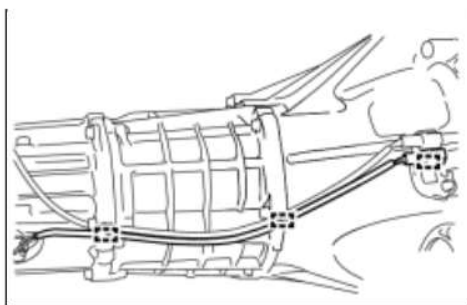
(a) Remove the manual transmission drain plug and gasket.

3. REMOVE RELEASE FORK SUPPORT

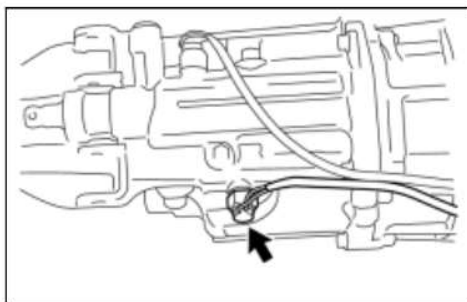


(a) Using a 19 mm deep socket wrench, remove the release fork support from the clutch housing.

4. REMOVE BACK-UP LIGHT SWITCH ASSEMBLY

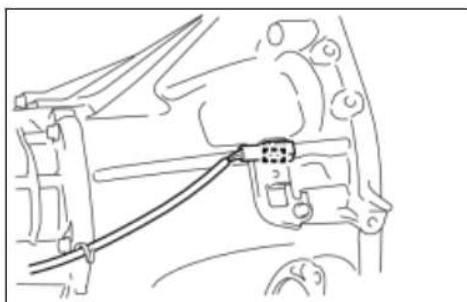


(a) Disengage the 3 clamps.

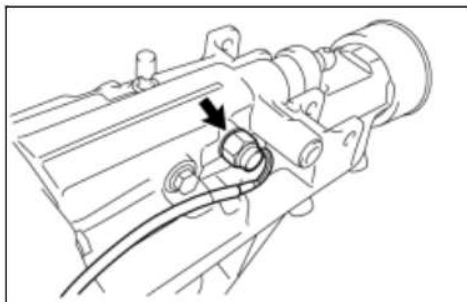


(b) Using a 19 mm union nut wrench, remove the back-up light switch assembly and gasket.

5. REMOVE NEUTRAL POSITION SWITCH ASSEMBLY



(a) Disengage the clamp.



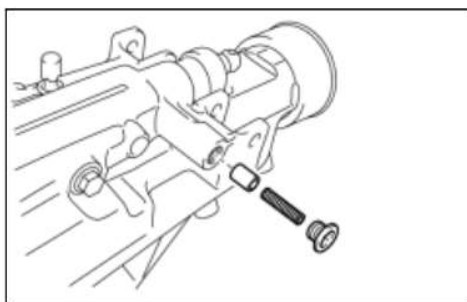
(b) Using a 19 mm union nut wrench, remove the neutral position switch assembly and gasket.

6. REMOVE WIRE HARNESS CLAMP BRACKET



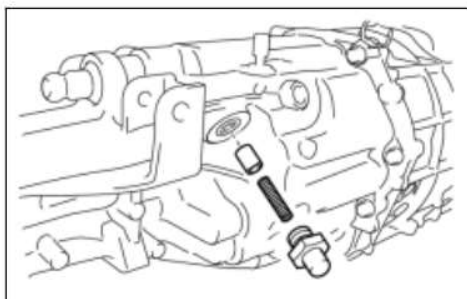
(a) Remove the bolt and wire harness clamp bracket.

7. REMOVE LOCK BALL PIN



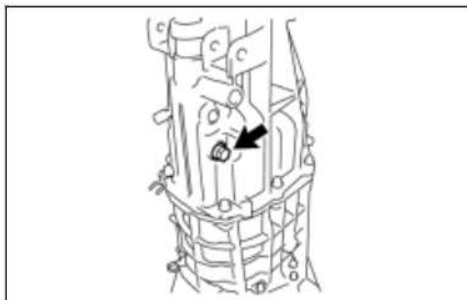
(a) Using a 10 mm hexagon socket wrench, remove the head straight screw plug, compression spring and lock ball pin.

8. REMOVE HOLDER

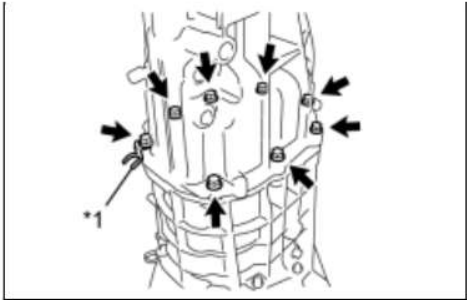


(a) Using a 27 mm deep socket wrench, remove the holder, compression spring and lock ball pin.

9. REMOVE TRANSMISSION EXTENSION HOUSING SUB-ASSEMBLY



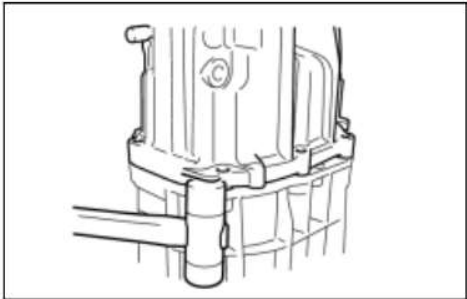
(a) Remove the bolt.



(b) Remove the 8 bolts and clamp.

Text in Illustration

*1	Clamp
----	-------



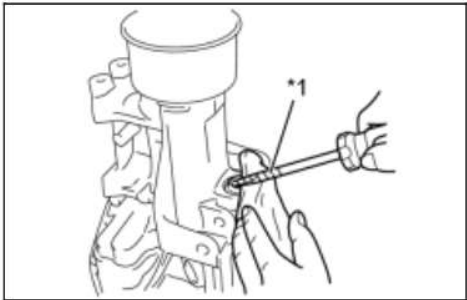
(c) Using a plastic hammer, remove the transmission extension housing sub-assembly.

NOTICE:

- Be sure to remove the transmission extension housing sub-assembly while the transmission is in neutral.
- Do not damage the transmission extension housing sub-assembly.

10. REMOVE EXTENSION HOUSING REAR OIL SEAL

(a) Using a screwdriver with its tip wrapped with protective tape, remove the extension housing rear oil seal.



Text in Illustration

*1	Protective Tape
----	-----------------

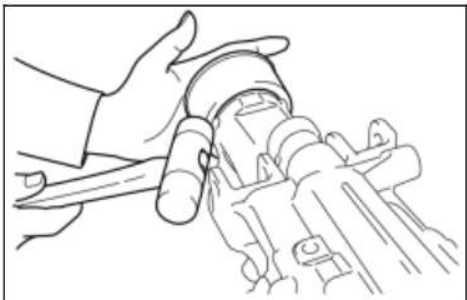
NOTICE:

Do not damage the transmission extension housing sub-assembly.

HINT:

Remove the transmission extension housing sub-assembly while protecting it with a piece of cloth.

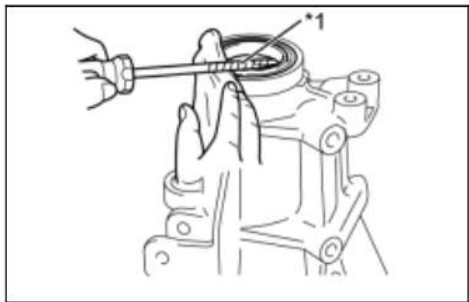
11. REMOVE EXTENSION HOUSING DUST DEFLECTOR



(a) Using a plastic hammer, remove the extension housing dust deflector.

12. REMOVE TRANSMISSION EXTENSION HOUSING OIL SEAL

- (a) Using a screwdriver with its tip wrapped with protective tape, remove the transmission extension housing oil seal.



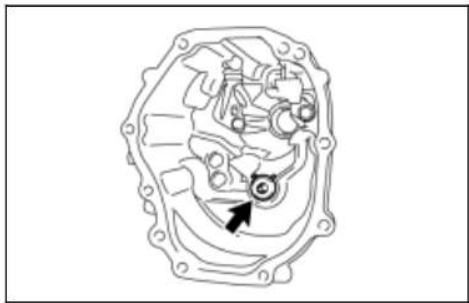
Text in Illustration

*1	Protective Tape
----	-----------------

NOTICE:
Do not damage the transmission extension housing sub-assembly.

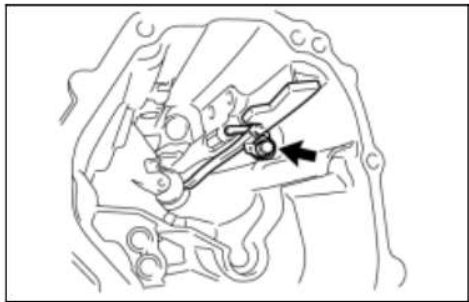
HINT:
Remove the transmission extension housing sub-assembly while protecting it with a piece of cloth.

13. REMOVE NO. 2 EXTENSION HOUSING OIL RECEIVER PIPE



- (a) Remove the No. 2 extension housing oil receiver pipe.

14. REMOVE NO. 1 EXTENSION HOUSING OIL RECEIVER PIPE

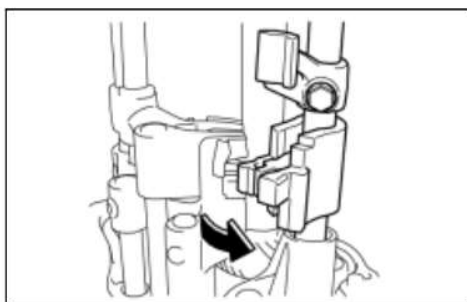


- (a) Remove the bolt, No. 1 extension housing oil receiver pipe and stopper plate.

- (b) Remove the straight pin.

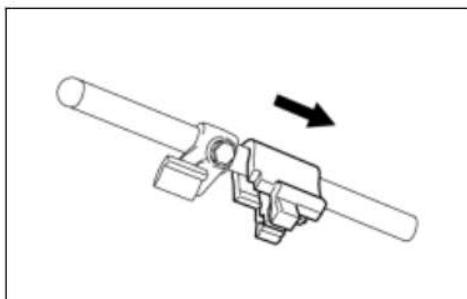


15. REMOVE SHIFT SHAFT



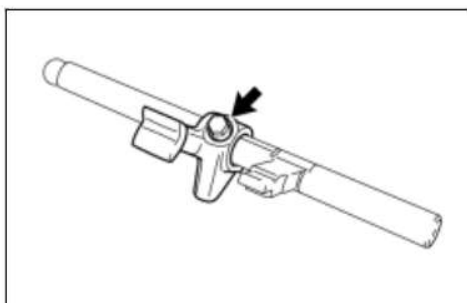
(a) Slide and remove the shift shaft and No. 1 shift inter lock block.

16. REMOVE NO. 1 SHIFT INTER LOCK BLOCK



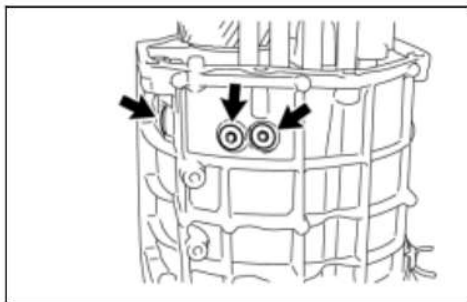
(a) Remove the No. 1 shift inter lock block from the shift shaft.

17. REMOVE FRONT SHIFT INNER LEVER

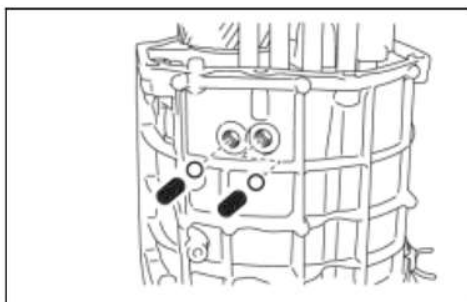


(a) Remove the bolt and front shift inner lever from the shift shaft.

18. REMOVE HEAD STRAIGHT SCREW PLUG

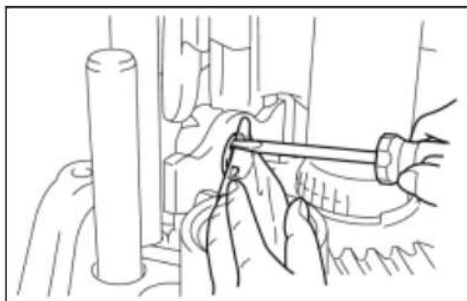


(a) Using a T40 "TORX" socket wrench, remove 3 head straight screw plugs.



(b) Using a magnet hand, remove the 2 compression springs and 2 balls.

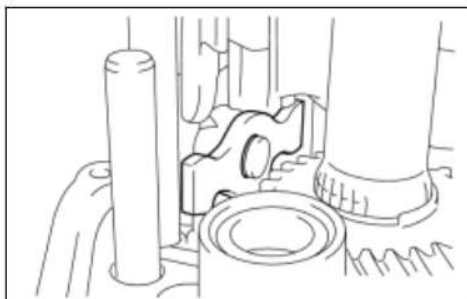
19. REMOVE SHIFT ARM



(a) Using a screwdriver, remove the E-ring.

NOTICE:

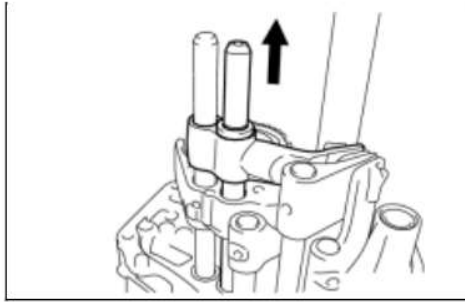
Use a cloth to prevent the E-ring from flying off.



(b) Remove the shift arm.

20. REMOVE NO. 3 GEAR SHIFT FORK SHAFT

(a) Remove the No. 3 gear shift fork shaft and 5th shift head



together.

NOTICE:

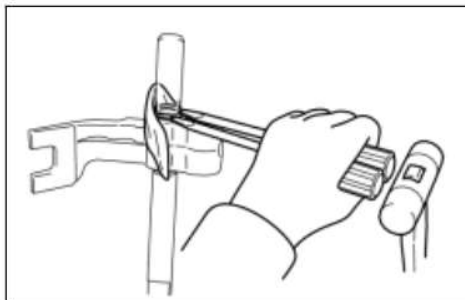
- Be careful not to drop the ball from the 5th shift head.
- The ball on the transmission case may fall inside the transmission case. If that happens, take it out when the transmission case is removed.

(b) Remove the ball from the 5th shift head.



(c) Using a magnetic hand, remove the ball.

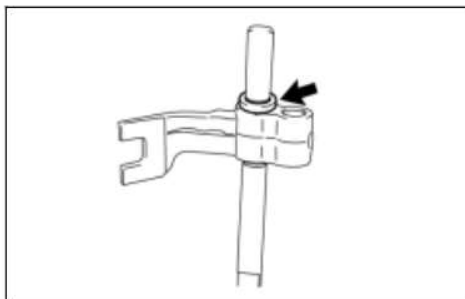
21. REMOVE 5TH SHIFT HEAD



(a) Using 2 screwdrivers and a plastic hammer, remove the shaft snap ring.

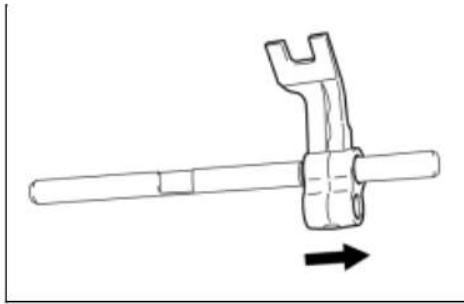
NOTICE:

Use a cloth to prevent the shaft snap ring from flying off.



(b) Remove the washer.

(c) Remove the 5th shift head, compression spring and ball.

**NOTICE:**

Be careful of the ball and compression spring that fall out when sliding the 5th shift head.

22. INSPECT COUNTER SHAFT 6TH GEAR THRUST CLEARANCE

- (a) Using SST and a dial indicator, measure the thrust clearance.

SST: 09350-20015

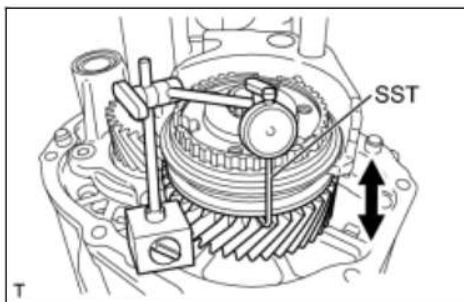
09350-06120

Standard clearance:

0.10 to 0.40 mm (0.00394 to 0.0157 in.)

Maximum clearance:

0.40 mm (0.0157 in.)

**HINT:**

If the clearance exceeds the maximum, replace the counter shaft 6th gear, No. 4 transmission clutch hub, 6th gear thrust washer, needle roller bearing and counter shaft with a new ones.

23. INSPECT COUNTER SHAFT 6TH GEAR RADIAL CLEARANCE

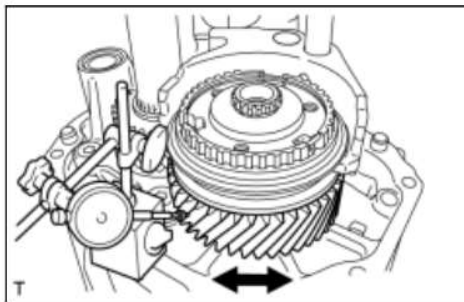
- (a) Using a dial indicator, measure the radial clearance.

Standard clearance:

0.015 to 0.068 mm (0.000590 to 0.00268 in.)

Maximum clearance:

0.068 mm (0.00268 in.)

**HINT:**

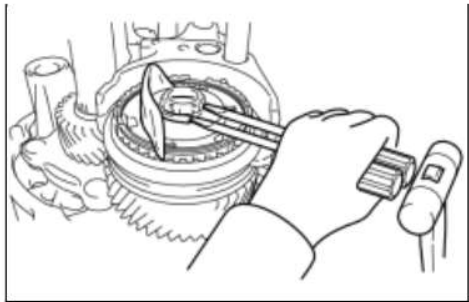
If the clearance exceeds the maximum, replace the counter shaft 6th gear, needle roller bearing and counter shaft with a new ones.

24. REMOVE NO. 4 TRANSMISSION CLUTCH HUB

- (a) Using 2 screwdrivers and a plastic hammer, remove the shaft snap ring.

NOTICE:

Use a cloth to prevent the shaft snap ring from flying

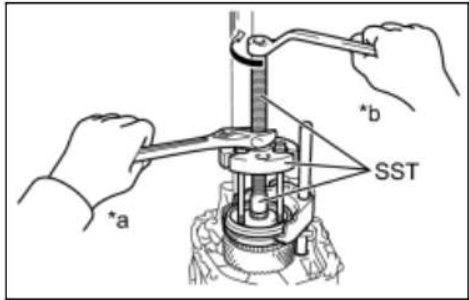


off.

- (b) Using SST and 3 bolts, remove the No. 4 transmission clutch hub, No.4 transmission hub sleeve, No. 4 gear shift fork and No. 2 gear shift fork shaft all together.

Text in Illustration

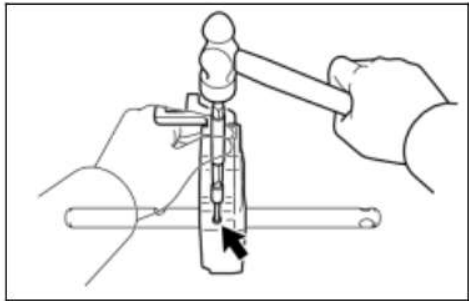
*a	Hold
*b	Turn



SST: 09950-30012

- 09951-03010
- 09953-03010
- 09956-03010

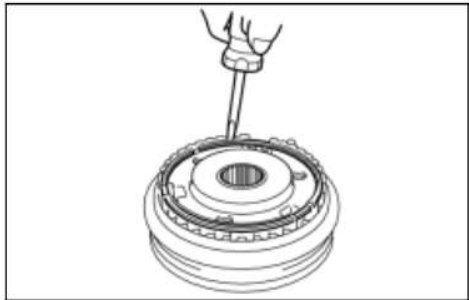
25. REMOVE NO. 4 GEAR SHIFT FORK



- (a) Using a 5 mm pin punch and hammer, remove the slotted spring pin.

- (b) Remove the No. 4 gear shift fork from the No. 2 gear shift fork shaft.

26. REMOVE NO. 4 TRANSMISSION HUB SLEEVE



- (a) Using a screwdriver, remove the hole snap ring.



- (b) Remove the No. 4 transmission hub sleeve, and then remove the 3 No. 1 synchronesh shifting keys, 3 No. 1 synchronesh shifting key springs and 3 balls from the No. 4 transmission clutch hub.

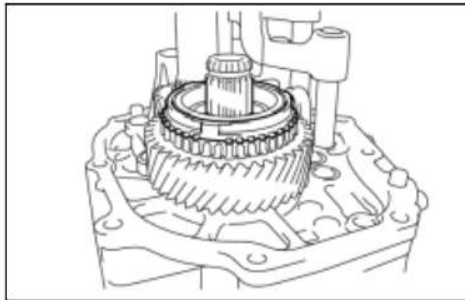
NOTICE:

- Use a cloth to prevent the No. 1 synchronesh shifting keys, No. 1 synchronesh shifting key springs and balls from popping out.
- Do not deform the No. 1 synchronesh shifting key spring.

HINT:

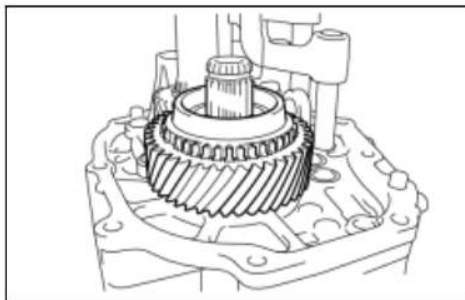
During this operation, keep intact the No. 4 transmission clutch hub and No. 1 synchronesh shifting key.

27. REMOVE NO. 2 SYNCHRONIZER RING



- (a) Remove the No. 2 synchronizer ring.

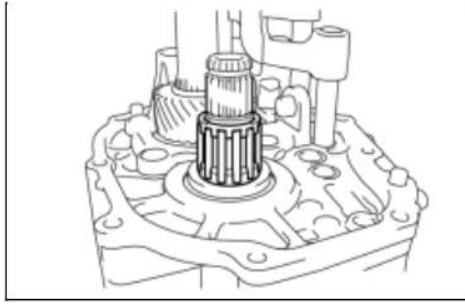
28. REMOVE COUNTER SHAFT 6TH GEAR



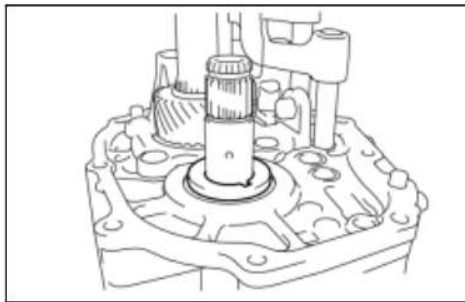
- (a) Remove the counter shaft 6th gear.

29. REMOVE NEEDLE ROLLER BEARING

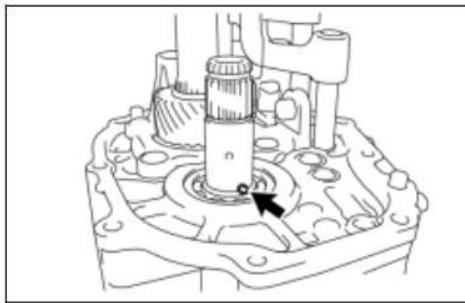
- (a) Remove the needle roller bearing.



30. REMOVE 6TH GEAR THRUST WASHER

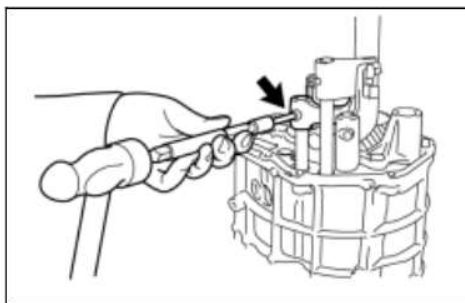


(a) Remove the 6th gear thrust washer.



(b) Remove the straight pin.

31. REMOVE NO. 2 GEAR SHIFT HEAD



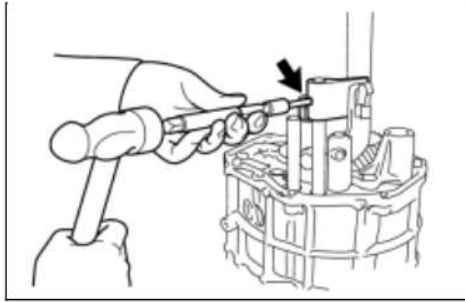
(a) Using a 5 mm pin punch and hammer, remove the slotted spring pin.

NOTICE:

- Use a cloth to prevent the slotted spring pin from flying off.
- Take care in order that the slotted spring pin does not fall inside through the gear shift fork shaft hole.

(b) Remove the No. 2 gear shift head from the No. 2 gear shift fork shaft.

32. REMOVE NO. 1 GEAR SHIFT HEAD



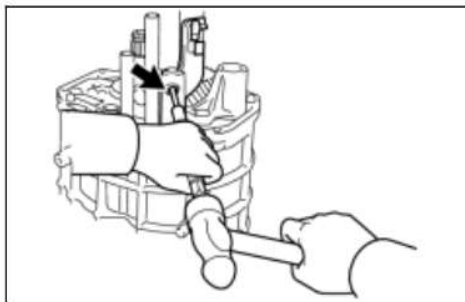
(a) Using a 5 mm pin punch and a hammer, remove the slotted spring pin.

NOTICE:

- Use a cloth to prevent the slotted spring pin from flying off.
- Take care in order that the slotted spring pin does not fall inside through the gear shift fork shaft hole.

(b) Remove the No. 1 gear shift head from the No. 1 gear shift fork shaft.

33. REMOVE NO. 3 GEAR SHIFT HEAD



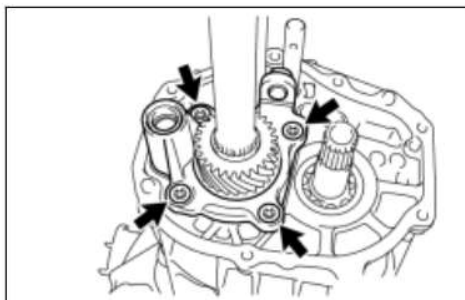
(a) Using a 5 mm pin punch and a hammer, remove the slotted spring pin.

NOTICE:

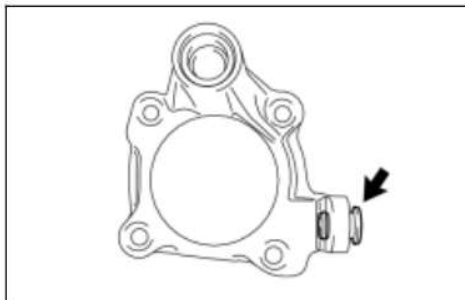
- Use a cloth to prevent the slotted spring pin from flying off.
- Take care in order that the slotted spring pin does not fall inside through the gear shift fork shaft hole.

(b) Remove the No. 3 gear shift head from the No. 3 gear shift fork shaft.

34. REMOVE REAR BEARING RETAINER

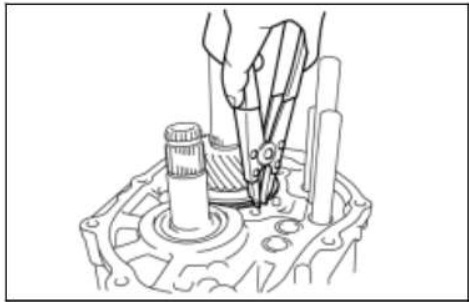


(a) Using a T45 "TORX" socket wrench, remove the 4 bolts and rear bearing retainer.

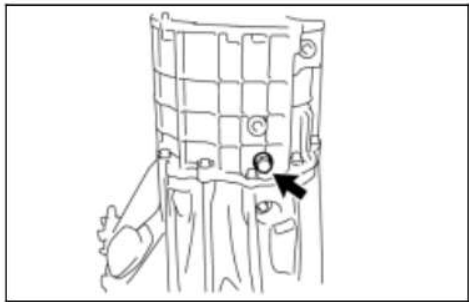


(b) Remove the shift arm pivot.

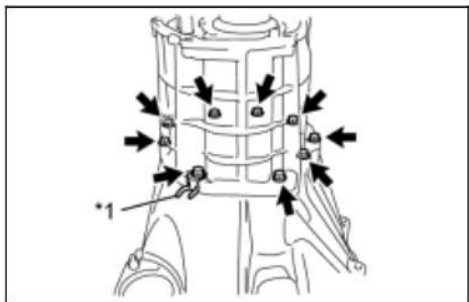
35. REMOVE TRANSMISSION CASE



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



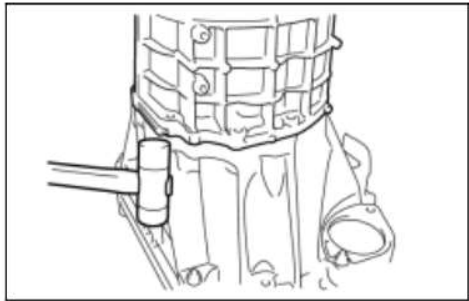
(b) Remove the bolt that retains the reverse idler gear shaft, and the gasket (transmission case side)



(c) Remove the 9 bolts and clamp.

Text in Illustration

*1	Clamp
----	-------



(d) Using a plastic hammer, remove the transmission case.

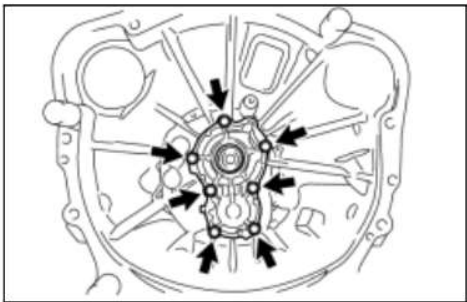
NOTICE:
Do not damage the transmission case.

36. REMOVE OIL RECEIVER PIPE



(a) Remove the oil receiver pipe.

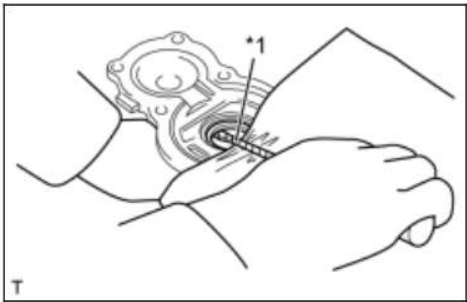
37. REMOVE FRONT BEARING RETAINER



(a) Remove 7 bolts and front bearing retainer.

38. REMOVE TRANSMISSION FRONT BEARING RETAINER OIL SEAL

(a) Using a screwdriver with its tip wrapped with protective tape, remove the transmission front bearing retainer oil seal.



Text in Illustration

*1	Protective Tape
----	-----------------

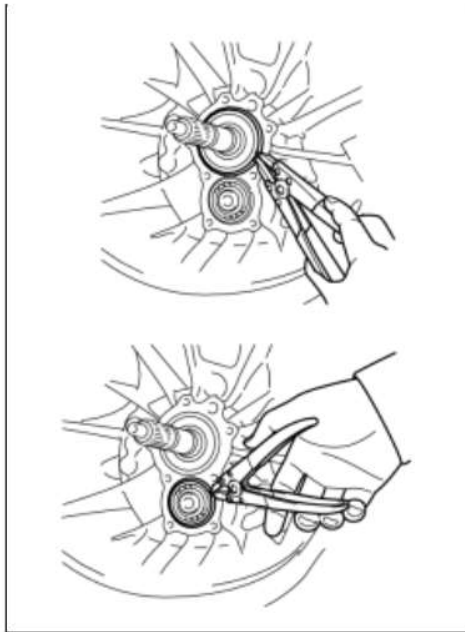
NOTICE:
Do not damage the front bearing retainer.

HINT:
Remove the front bearing retainer while protecting it with a piece of cloth.

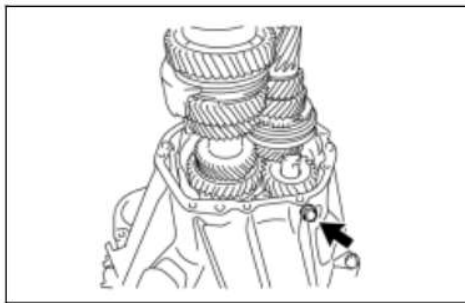
39. REMOVE COUNTER SHAFT

(a) Using a snap ring expander, remove the 2 shaft snap rings.

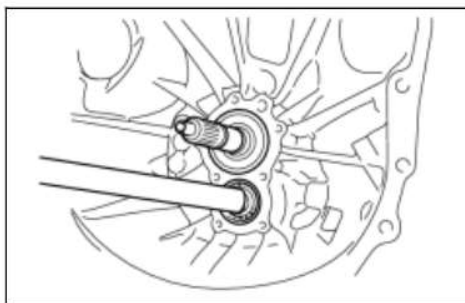
HINT:



Remove the 2 shaft snap rings from the input shaft and counter shaft.



(b) Remove the bolt and gasket to free the reverse idler gear and reverse idler gear shaft. (Clutch housing side)

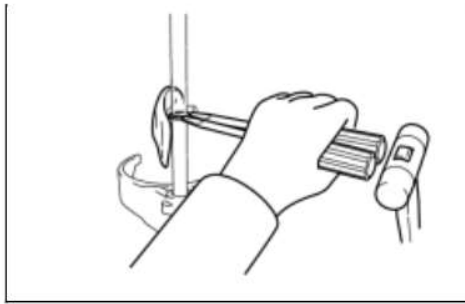


(c) Using a hammer handle edge, tap to remove the input shaft, output shaft, counter shaft, reverse idler gear, reverse idler gear shaft, No. 1 gear shift fork shaft, No. 2 gear shift fork shaft and No. 3 gear shift fork shaft all together from the clutch housing side.

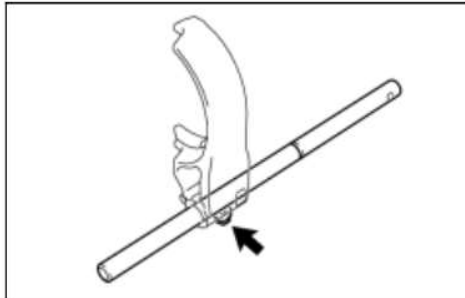
40. REMOVE NO. 2 GEAR SHIFT FORK SHAFT

(a) Using 2 screwdrivers and a plastic hammer, remove the shaft snap ring.

NOTICE:

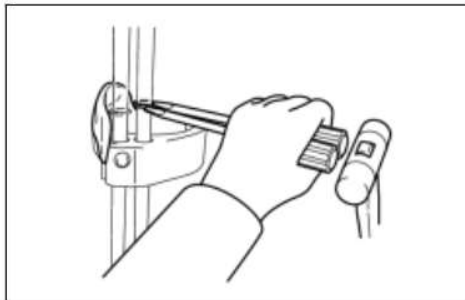


Use a cloth to prevent the shaft snap ring from flying off.



(b) Remove the bolt and No. 2 gear shift fork shaft.

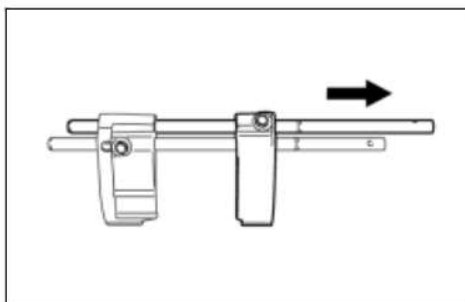
41. REMOVE NO. 1 GEAR SHIFT FORK SHAFT



(a) Using 2 screwdrivers and a plastic hammer, remove the shaft snap ring.

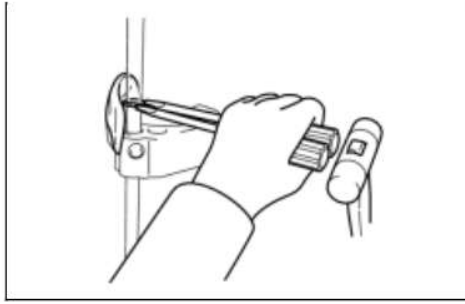
NOTICE:

Use a cloth to prevent the shaft snap ring from flying off.

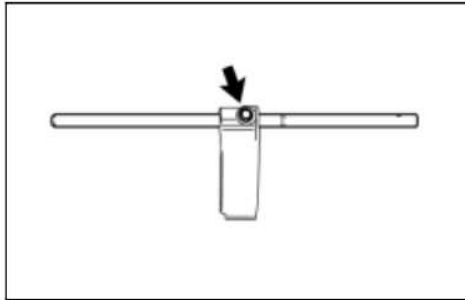


(b) Remove the No. 1 gear shift fork shaft and No.1 gear shift fork together.

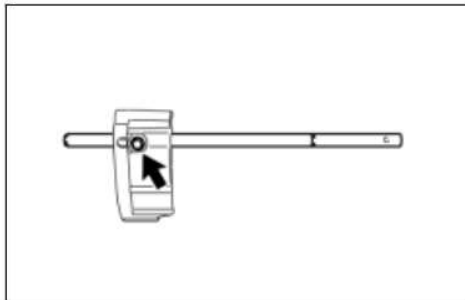
(c) Using 2 screwdrivers and a plastic hammer, remove the shaft snap ring.

**NOTICE:**

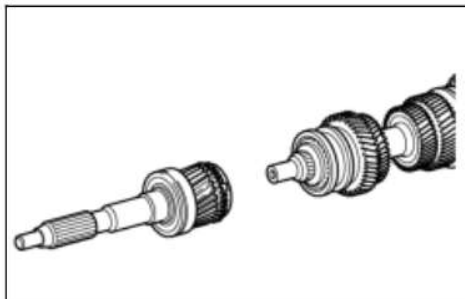
Use a cloth to prevent the shaft snap ring from flying off.



(d) Remove the bolt and No. 1 gear shift fork shaft.

42. REMOVE NO. 3 GEAR SHIFT FORK SHAFT

(a) Remove the bolt and No. 3 gear shift fork shaft.

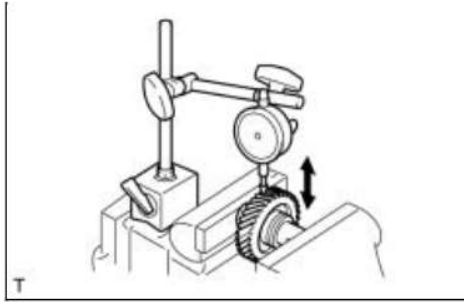
43. REMOVE INPUT SHAFT

(a) Remove the input shaft from the output shaft.

44. INSPECT REVERSE IDLER GEAR RADIAL CLEARANCE

(a) Use a vice to secure the reverse idler gear, and then use a dial indicator to measure the radial clearance.

Standard clearance:



0.040 to 0.082 mm (0.00157 to 0.00323 in.)

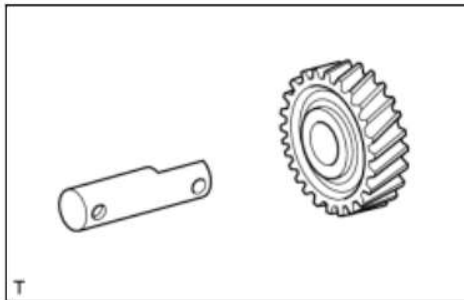
Maximum clearance:

0.082 mm (0.00323 in.)

HINT:

If the clearance exceeds the maximum, replace the reverse idler gear and reverse idler gear shaft with a new ones.

45. REMOVE REVERSE IDLER GEAR SHAFT



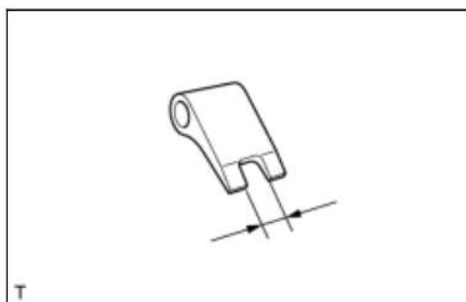
- (a) Remove the reverse idler gear shaft from the reverse idler gear.



Last Modified: 3-27-2012	6.4 G	From: 201203
Model Year: 2013	Model: FR-S	Doc ID: RM00000590P000X
Title: TL70 MANUAL TRANSMISSION / TRANSAXLE: MANUAL TRANSAXLE UNIT: INSPECTION (2013 FR-S)		

INSPECTION

1. INSPECT NO. 1 GEAR SHIFT HEAD



- (a) Using a vernier caliper, measure the clearance of the No. 1 gear shift head groove.

Standard clearance:

15.2 to 15.4 mm (0.59843 to 0.60630 in.)

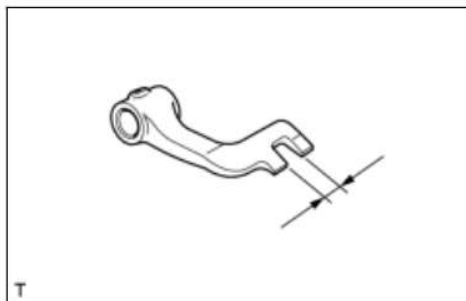
Maximum clearance:

15.4 mm (0.60630 in.)

HINT:

If the clearance exceeds the maximum, replace the No. 1 gear shift head with a new one.

2. INSPECT NO. 2 GEAR SHIFT HEAD



- (a) Using a vernier caliper, measure the clearance of the No. 2 gear shift head groove.

Standard clearance:

15.2 to 15.4 mm (0.59843 to 0.60630 in.)

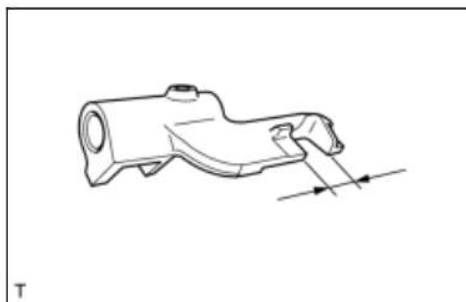
Maximum clearance:

15.4 mm (0.60630 in.)

HINT:

If the clearance exceeds the maximum, replace the No. 2 gear shift head with a new one.

3. INSPECT NO. 3 GEAR SHIFT HEAD



- (a) Using a vernier caliper, measure the clearance of the No. 3 gear shift head groove.

Standard clearance:

15.2 to 15.4 mm (0.598 to 0.606 in.)

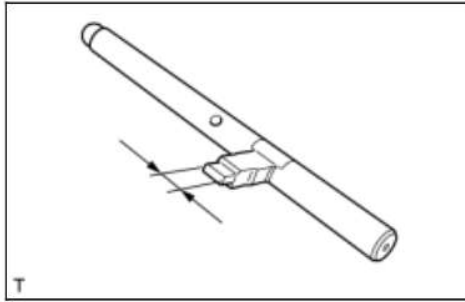
Maximum clearance:

15.4 mm (0.606 in.)

HINT:

If the clearance exceeds the maximum, replace the No. 3 gear shift head with a new one.

4. INSPECT SHIFT SHAFT



- (a) Using a vernier caliper, measure the claw width of the shift shaft.

Standard width:

14.8 to 15.0 mm (0.583 to 0.591 in.)

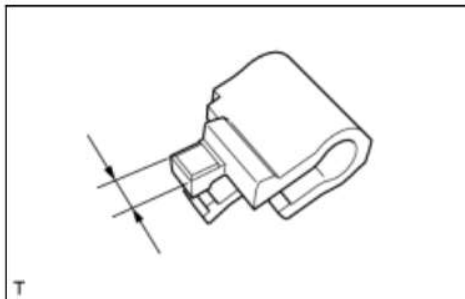
Minimum width:

14.8 mm (0.583 in.)

HINT:

If the width is less than the minimum, replace the gear shift with a new one.

5. INSPECT NO. 1 SHIFT INTER LOCK BLOCK



- (a) Using a vernier caliper, measure the claw width of the No. 1 shift inter lock block.

Standard width:

14.8 to 15.0 mm (0.583 to 0.591 in.)

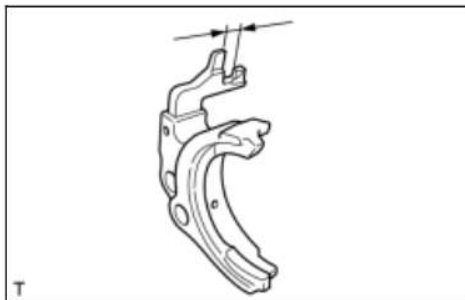
Minimum width:

14.8 mm (0.583 in.)

HINT:

If the width is less than the minimum, replace the No. 1 shift inter lock block.

6. INSPECT NO. 4 GEAR SHIFT FORK



- (a) Using a vernier caliper, measure the clearance of the No. 4 gear shift fork groove.

Standard clearance:

15.2 to 15.4 mm (0.598 to 0.606 in.)

Maximum clearance:

15.4 mm (0.606 in.)

HINT:

If the clearance exceeds the maximum, replace the No. 4 gear shift fork with a new one.

7. INSPECT 5TH SHIFT HEAD

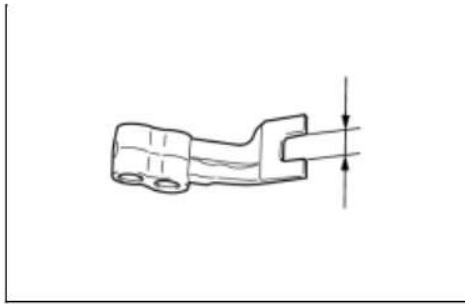
- (a) Using a vernier caliper, measure the clearance of the 5th shift head groove.

Standard clearance:

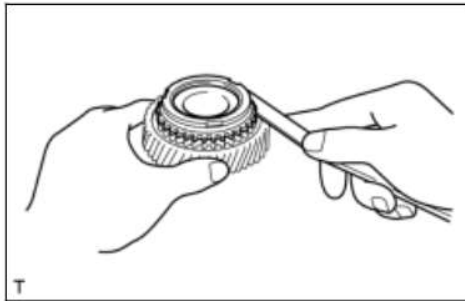
15.2 to 15.4 mm (0.598 to 0.606 in.)

Maximum clearance:

15.4 mm (0.606 in.)

**HINT:**

If the clearance exceeds the maximum, replace the 5th shift head with a new one.

8. INSPECT NO. 2 SYNCHRONIZER RING

- (a) Apply manual transmission gear oil to the taper cone of the counter shaft 6th gear, and then hold the No. 2 synchronizer ring in position with your hand to measure the clearance between the No. 2 synchronizer ring and counter shaft 6th gear by using a feeler gauge.

Standard clearance:

0.88 to 1.52 mm (0.0346 to 0.0598 in.)

Minimum clearance:

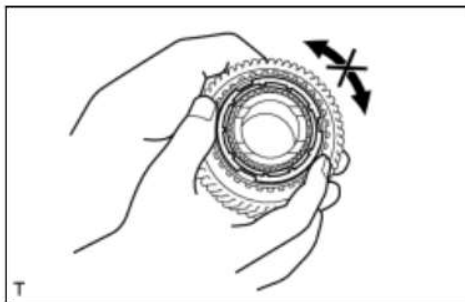
0.88 mm (0.0346 in.)

NOTICE:

Check the entire circumference of the gear.

HINT:

If the clearance is less than the minimum, replace the No. 2 synchronizer ring and counter shaft 6th gear with a new one.



- (b) Apply manual transmission gear oil to the taper cone of the counter shaft 6th gear, and then hold the No. 2 synchronizer ring in position with your hand to check that it does not slide in the circumferential direction.

HINT:

If the No. 2 synchronizer ring slides, replace the No. 2 synchronizer ring and counter shaft 6th gear with a new one.

9. INSPECT COUNTER SHAFT 6TH GEAR

- (a) Using a cylinder gauge, measure the inside diameter of the counter shaft 6th gear.

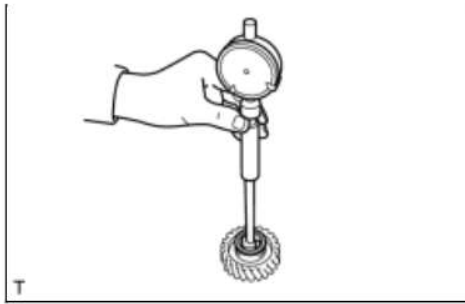
Standard inside diameter:

34.015 to 34.040 mm (1.33917 to 1.34016 in.)

Maximum inside diameter:

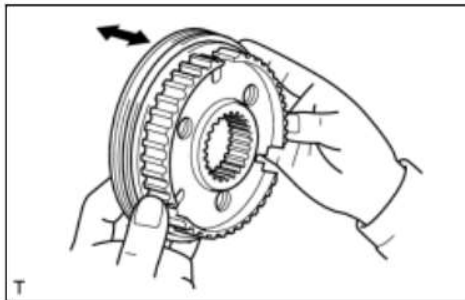
34.040 mm (1.34016 in.)

HINT:



If the inside diameter exceeds the maximum, replace the counter shaft 6th gear with a new one.

10. INSPECT NO. 4 TRANSMISSION HUB SLEEVE



- (a) Check that the spline gear edges of the No. 4 transmission hub sleeve are not worn down.

HINT:

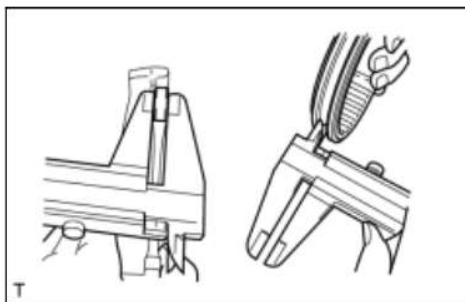
If it shows any sign of wear, replace the No. 4 transmission hub sleeve with a new one.

- (b) Install the No. 4 transmission hub sleeve to the No. 4 transmission clutch hub, and then check that it slides smoothly.

HINT:

If it does not slide smoothly, replace the No. 4 transmission hub sleeve and No. 4 transmission clutch hub with a new one.

11. INSPECT NO. 4 TRANSMISSION HUB SLEEVE CLEARANCE



- (a) Using a vernier caliper, measure the claw width of the No. 4 gear shift fork.

Standard width:

7.9 to 8.0 mm (0.311 to 0.315 in.)

Minimum width:

7.9 mm (0.311 in.)

HINT:

If the width is less than the minimum, replace the gear No. 4 shift fork with a new one.

- (b) Using a vernier caliper, measure the groove of the No. 4 transmission hub sleeve and then calculate the clearance with the No. 4 gear shift fork.

Standard clearance:

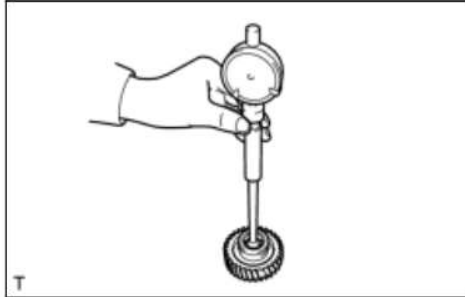
0.15 to 0.35 mm (0.00590 to 0.0138 in.)

Maximum clearance:

0.35 mm (0.0138 in.)

HINT:

If the clearance exceeds the maximum, replace both the No. 4 gear shift fork and No. 4 transmission hub sleeve with a new ones.

12. INSPECT REVERSE IDLER GEAR

- (a) Using a cylinder gauge, measure the inner diameter of the reverse idler gear.

Standard inside diameter:

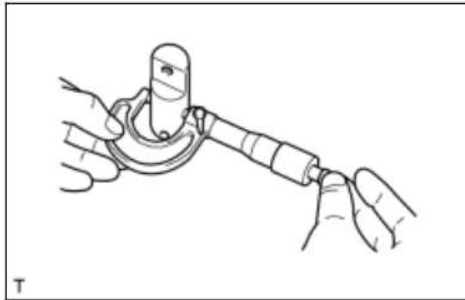
22.040 to 22.061mm (0.86771 to 0.86854 in.)

Maximum inside diameter:

22.061mm (0.86854 in.)

HINT:

If the inside diameter exceeds the maximum, replace the reverse idler gear with a new one.

13. INSPECT REVERSE IDLER GEAR SHAFT

- (a) Using a micrometer, measure the outer diameter of the reverse idler gear shaft.

Standard outer diameter:

21.979 to 22.000 mm (0.86531 to 0.86614 in.)

Minimum outer diameter:

21.979 mm (0.86531 in.)

HINT:

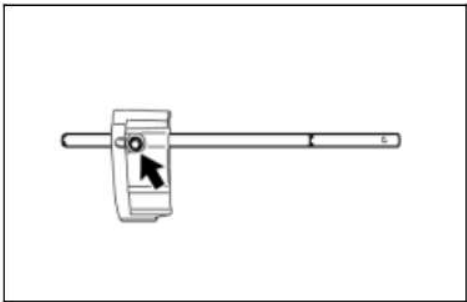
If the outer diameter is less than the minimum, replace the reverse idler gear shaft with a new one.



Last Modified: 3-27-2012	6.4 A	From: 201203
Model Year: 2013	Model: FR-S	Doc ID: RM000002RHV007X
Title: TL70 MANUAL TRANSMISSION / TRANSAXLE: MANUAL TRANSAXLE UNIT: REASSEMBLY (2013 FR-S)		

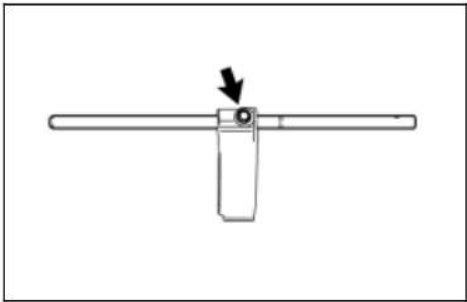
REASSEMBLY

1. INSTALL NO. 3 GEAR SHIFT FORK SHAFT

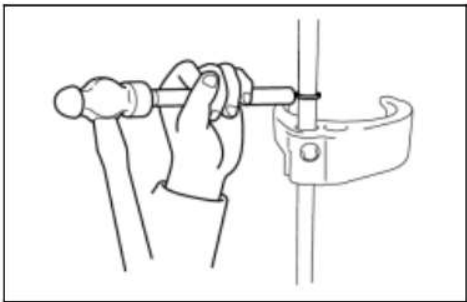


- (a) Install the No. 3 gear shift fork shaft to the No. 3 gear shift fork with a new bolt.
- Torque: 20 N·m (199 kgf·cm, 14ft·lbf)**

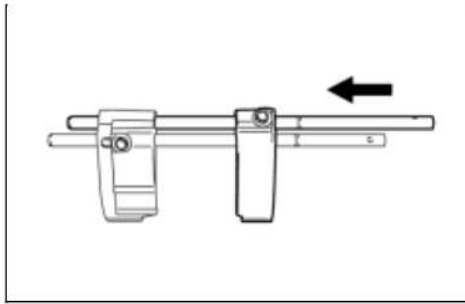
2. INSTALL NO. 1 GEAR SHIFT FORK SHAFT



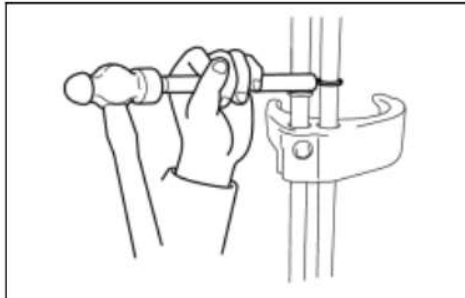
- (a) Install the No. 1 gear shift fork shaft to the No. 1 gear shift fork with a new bolt.
- Torque: 20 N·m (199 kgf·cm, 14ft·lbf)**



- (b) Using a brass bar and a hammer, install a new shaft snap ring.

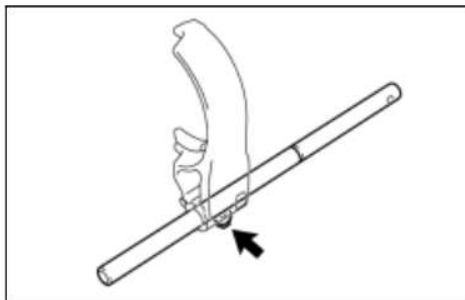


- (c) Install the No. 1 gear shift fork shaft together with the No. 1 gear shift fork to the No. 3 gear shift fork shaft and No. 3 gear shift fork.



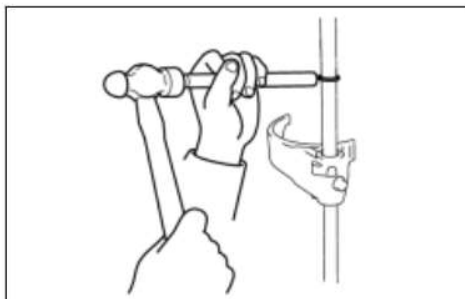
- (d) Using a brass bar and a hammer, install a new shaft snap ring.

3. INSTALL NO. 2 GEAR SHIFT FORK SHAFT



- (a) Install the No. 2 gear shift fork shaft to the No. 2 gear shift fork with a new bolt.

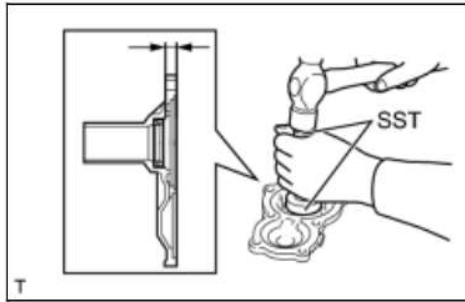
Torque: 20 N·m (199 kgf·cm, 14ft·lbf)



- (b) Using a brass bar and a hammer, install a new shaft snap ring.

4. INSTALL TRANSMISSION FRONT BEARING RETAINER OIL SEAL

- (a) Using SST and a hammer, install a new transmission front bearing retainer oil seal.



SST: 09950-60010

09951-00420

SST: 09950-70010

09951-07100

Installation depth:

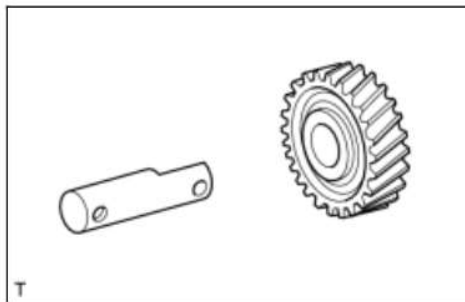
11.1 to 11.9 mm (0.437 to 0.469 in.) (from the end surface of the front bearing retainer)

NOTICE:

- Do not damage the lip of the transmission front bearing retainer oil seal.
- Do not damage the front bearing retainer.

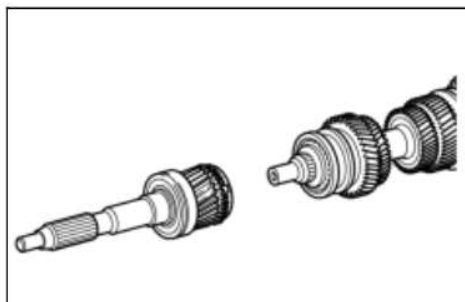
(b) Apply MP grease to the lip of the transmission front bearing retainer oil seal.

5. INSTALL REVERSE IDLER GEAR SHAFT



(a) Apply manual transmission gear oil to the reverse idle gear shaft, and then install it to the reverse idler gear.

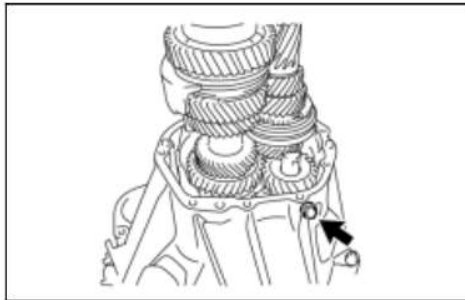
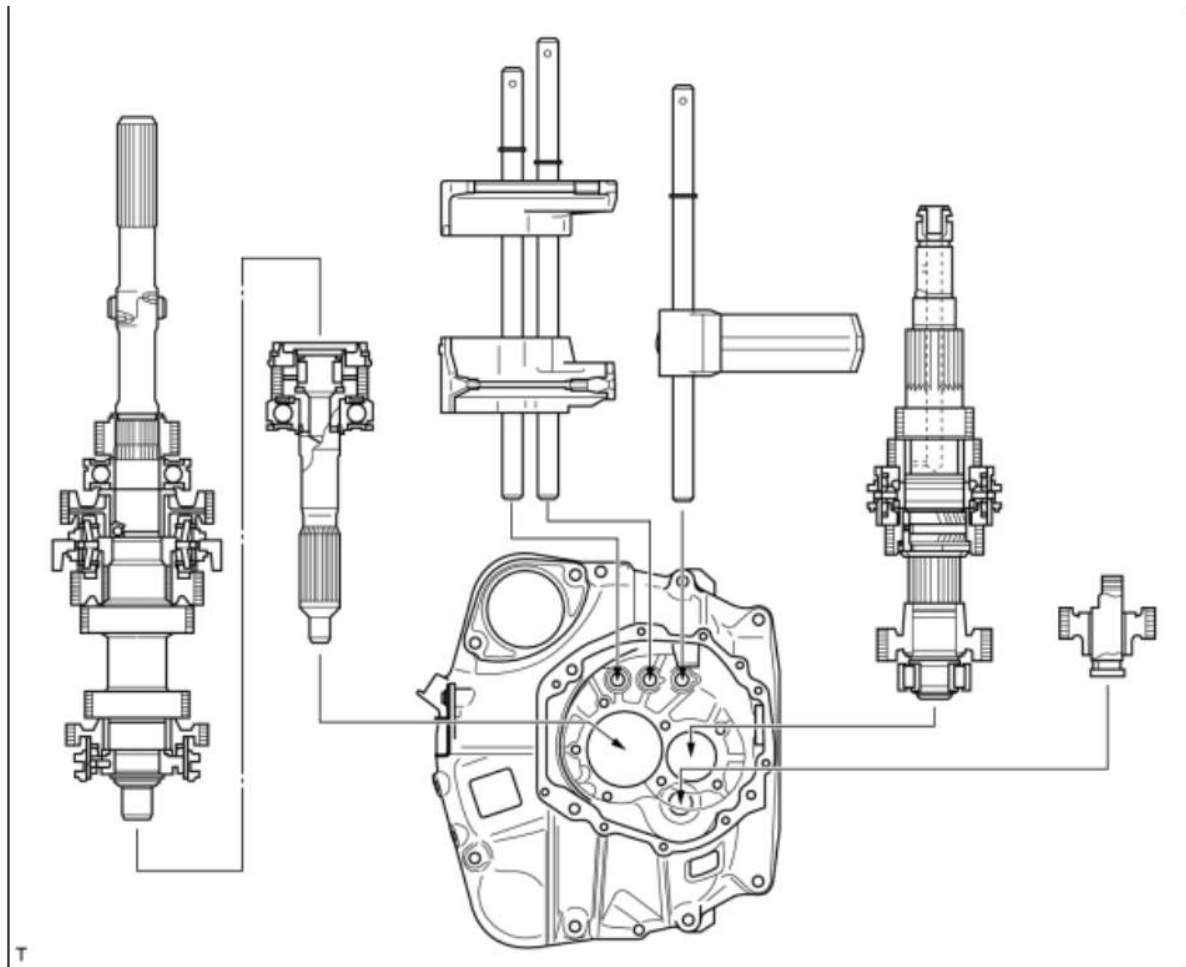
6. INSTALL INPUT SHAFT



(a) Apply manual transmission gear oil to the needle roller bearing of the input shaft, and then install the input shaft to the output shaft.

7. INSTALL COUNTER SHAFT

(a) Install the input shaft, output shaft, counter shaft, reverse idler gear, reverse idler gear shaft, No. 1 gear shift fork shaft, No. 2 gear shift fork shaft and No. 3 gear shift fork shaft all together to the clutch housing.

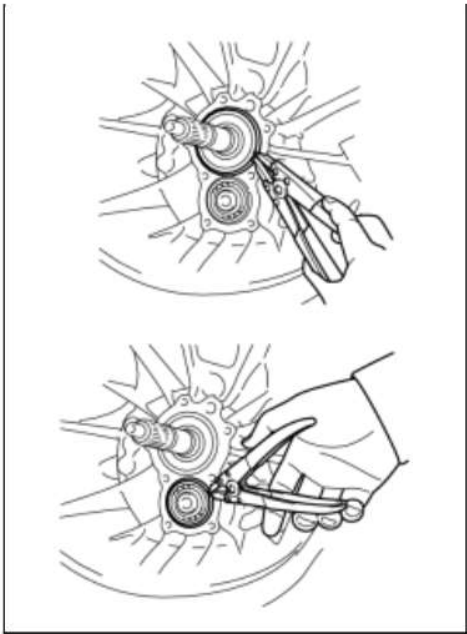


(b) Using a new gasket and a new bolt, temporarily install the reverse idler gear shaft (clutch housing side).

(c) Using a snap ring expander, install 2 new shaft snap rings.

HINT:

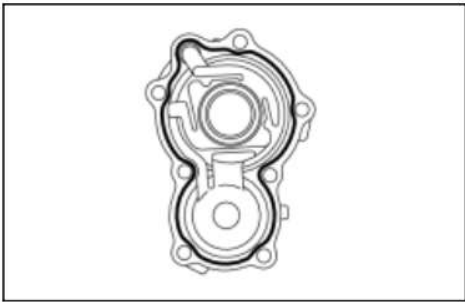
Install the shaft snap rings to the input shaft and counter



shaft.

8. INSTALL FRONT BEARING RETAINER

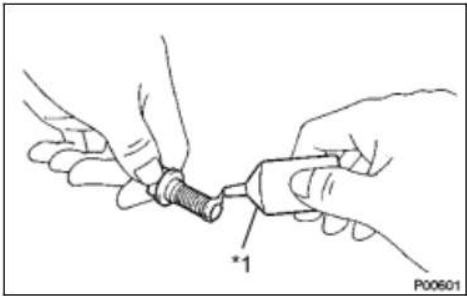
(a) Apply seal packing 1281 continuously to the front bearing retainer as shown in the illustration.



Text in Illustration

	Seal Packing 1281
---	-------------------

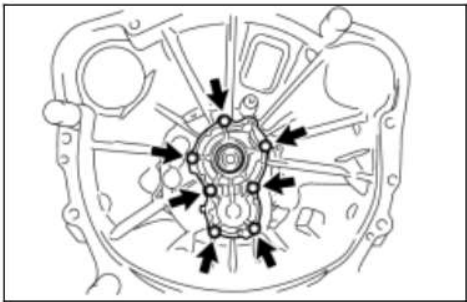
NOTICE:
Install it within 10 minutes of the seal packing application.



(b) Apply adhesive 1344 to the 2nd and 3rd pitches from the tip of new bolt.

Text in Illustration

*1	Adhesive 1344
----	---------------

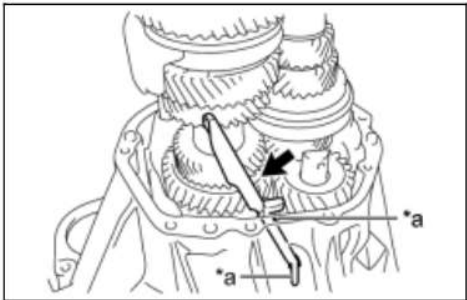


(c) Install the front bearing retainer with the 7 bolts.

Torque: 17 N·m (173 kgf·cm, 13ft·lbf)

NOTICE:
Install the front bearing retainer ensuring that the transmission front bearing retainer oil seal lip is not damaged.

9. INSTALL OIL RECEIVER PIPE



(a) Install the oil receiver pipe.

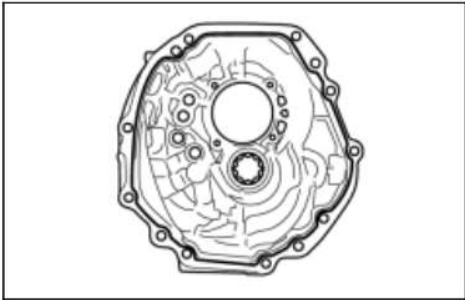
NOTICE:
Confirm that the protrusions of the oil receiver pipe are properly fitted in the grooves.

Text in Illustration

*a	Protrusion
----	------------

10. INSTALL TRANSMISSION CASE

(a) Apply seal packing 1281 continuously to the transmission case as shown in the illustration.

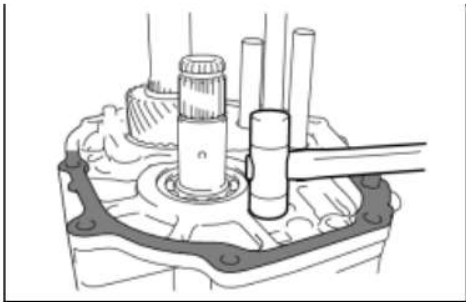


Text in Illustration

	Seal Packing 1281
---	-------------------

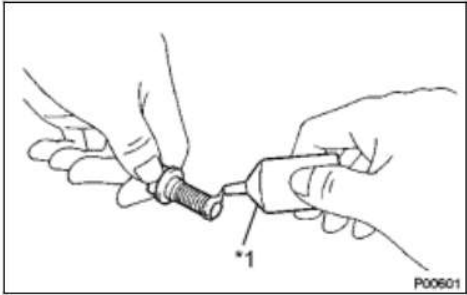
NOTICE:
Install within 10 minutes of the seal packing application.

(b) Check the location of the knock pin, and then using a plastic hammer, install the transmission case.



Text in Illustration

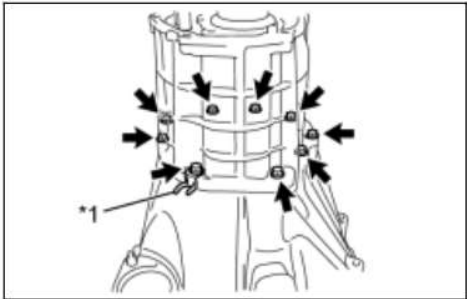
	Do not hit hard.
---	------------------



(c) Apply adhesive 1324 to the 2nd and 3rd pitches.

Text in Illustration

*1	Adhesive 1324
----	---------------



(d) Install the transmission case and clamp with the 9 bolts.

Text in Illustration

*1	clamp
----	-------

Torque: 29 N·m (296 kgf·cm, 21ft·lbf)

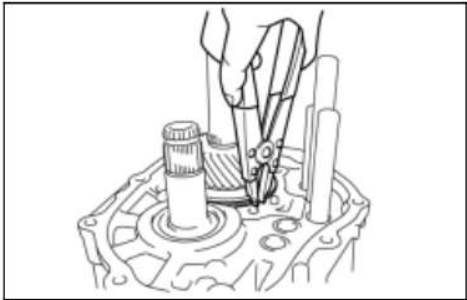


(e) Install a new reverse idler gear shaft fixing bolt and new gasket (transmission case side).

Torque: 28 N·m (286 kgf·cm, 21ft·lbf)

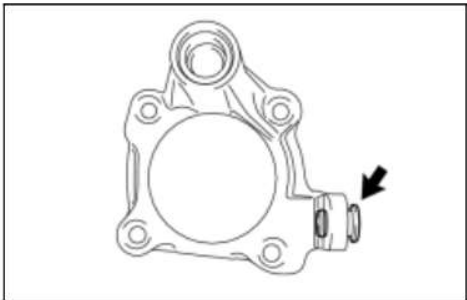


- (f) Securely tighten the reverse idler gear shaft fixing bolt (clutch housing side).
- Torque: 28 N·m (286 kgf·cm, 21ft·lbf)**

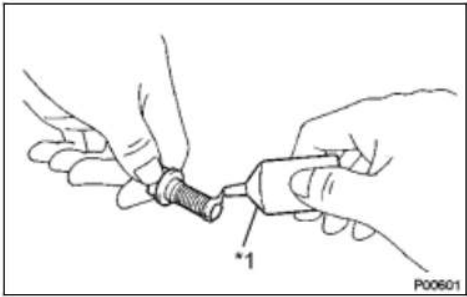


- (g) Using a snap ring expander, install a new shaft snap ring.

11. INSTALL REAR BEARING RETAINER



- (a) Install the shift arm pivot to the rear bearing retainer.

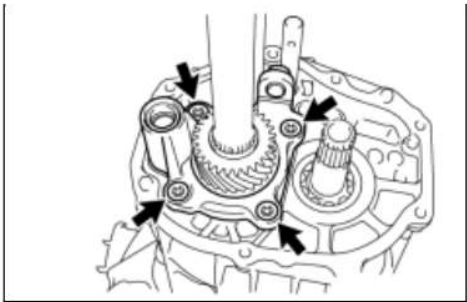


- (b) Apply adhesive 1324 to the 2nd and 3rd pitches from the tip of new bolt.

Text in Illustration

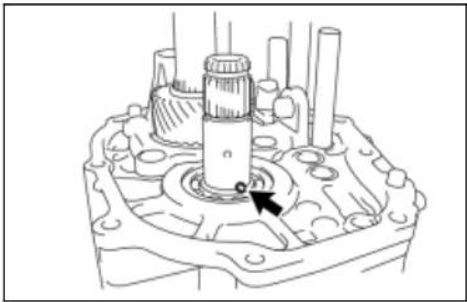
*1	Adhesive 1324
----	---------------

- (c) Using a T45 "TORX" socket wrench, install the rear



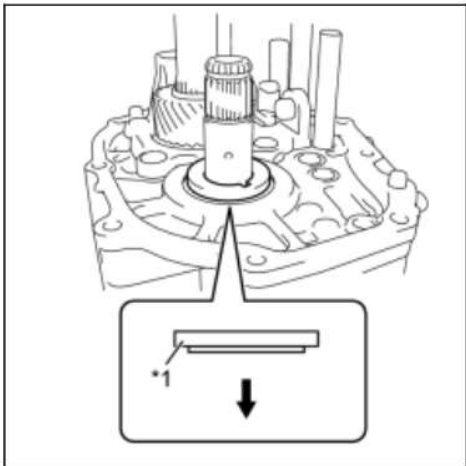
bearing retainer with the 4 bolts.
Torque: 30 N·m (306 kgf·cm, 22ft·lbf)

12. INSTALL 6TH GEAR THRUST WASHER



(a) Install the straight pin to the counter shaft.

(b) Apply manual transmission gear oil to the 6th gear thrust washer.



Text in Illustration

*1	6th Gear Thrust Washer
	Front Side

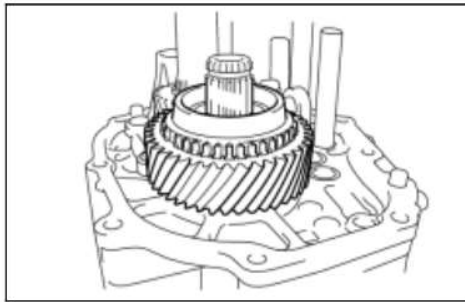
(c) As shown in the illustration, install the 6th gear thrust washer to the counter shaft.

13. INSTALL NEEDLE ROLLER BEARING



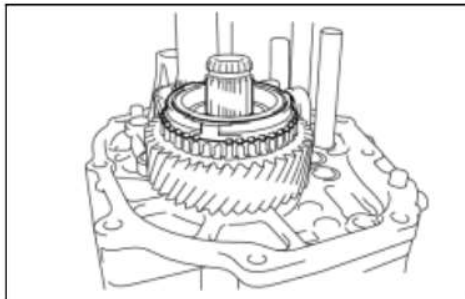
- (a) Apply manual transmission gear oil to the needle roller bearing, and then install the needle roller bearing to the counter shaft.

14. INSTALL COUNTER SHAFT 6TH GEAR



- (a) Apply manual transmission gear oil to the counter shaft 6th gear, and then install the counter shaft 6th gear to the counter shaft.

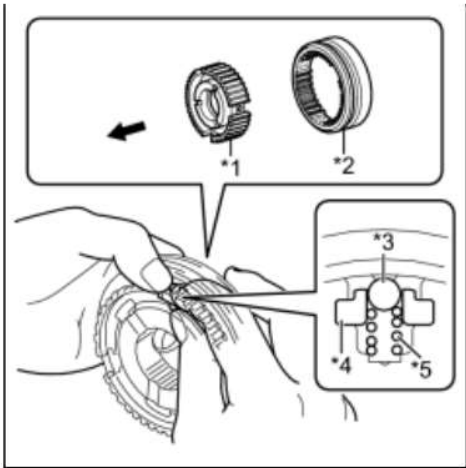
15. INSTALL NO. 2 SYNCHRONIZER RING



- (a) Apply manual transmission gear oil to the No. 2 synchronizer ring, and then install the No. 2 synchronizer ring to the counter shaft.

16. INSTALL NO. 4 TRANSMISSION HUB SLEEVE

- (a) Apply manual transmission gear oil to the moving parts of the No. 4 transmission clutch hub.



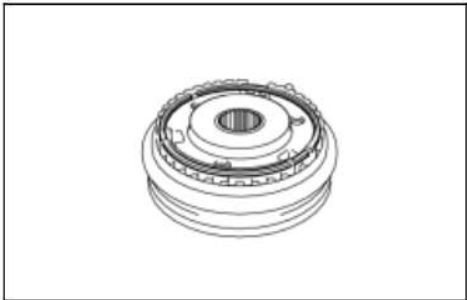
Text in Illustration

*1	No. 4 Transmission Clutch Hub
*2	No. 4 Transmission Hub Sleeve
*3	Ball
*4	No. 1 Synchromesh Shifting Key
*5	No. 1 Synchromesh Shifting Key Spring
	Front Side

(b) As shown in the illustration, install the No. 4 transmission hub sleeve to the No. 4 transmission clutch hub, and install the 3 No. 1 synchromesh shifting keys and 3 No. 1 synchromesh shifting key springs all together, and then install the 3 balls.

HINT:

- Install the ball while holding down the No. 1 synchromesh shifting key spring.
- After the installation, settle the No. 1 synchromesh shifting key spring.

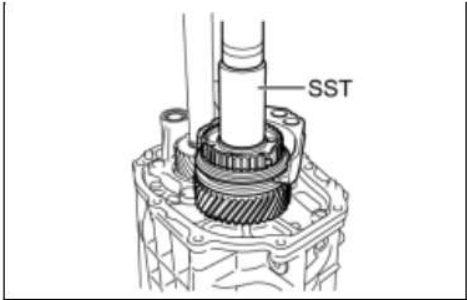


(c) Install a new hole snap ring.

17. INSTALL NO. 4 TRANSMISSION CLUTCH HUB

(a) Using SST and a press, install the No. 4 transmission clutch hub, No. 4 transmission hub sleeve, and No. 4 gear shift fork all together.

SST: 09632-36010



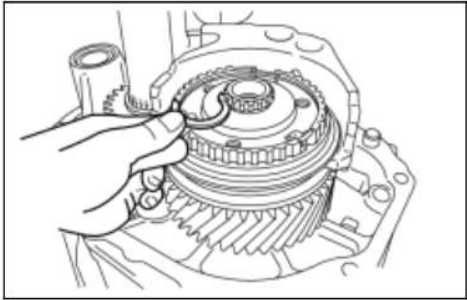
HINT:

- Align the No. 4 transmission clutch hub and the No. 2 synchronizer ring so that they can fit together.
- Engage the No. 4 gear shift fork with the groove of the No. 4 transmission hub sleeve.

18. INSTALL SHAFT SNAP RING

- (a) Select a shaft snap ring that is suitable to retain the specific thrust clearance between the No. 4 transmission clutch hub and shaft snap ring.

Standard clearance:
0 to 0.1 mm (0 to 0.00394 in.)

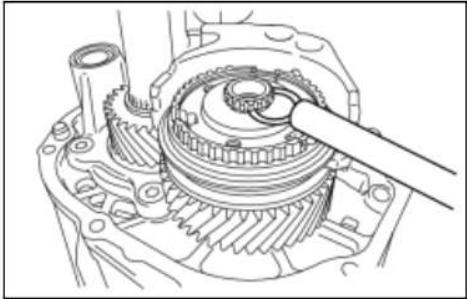


HINT:

Select the thickest shaft snap ring possible for installation.

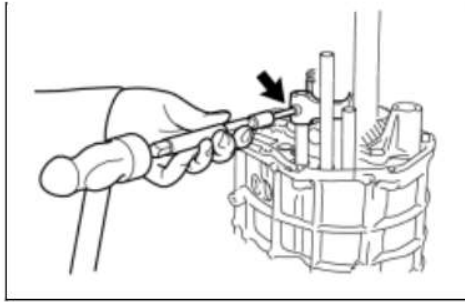
Shaft Snap Ring Thickness

PART NO.	THICKNESS MM (IN.)	MARK
SU003-03552	2.80 (0.11023)	A
SU003-03553	2.85 (0.11220)	B
SU003-03554	2.90 (0.11417)	C
SU003-03555	2.95 (0.11614)	D
SU003-03556	3.00 (0.11811)	E
SU003-03557	3.05 (0.12007)	F



- (b) Using a brass bar and a hammer, install a new shaft snap ring to the counter shaft.

19. INSTALL NO. 2 GEAR SHIFT HEAD



- (a) Install the No. 2 gear shift head to the No. 2 gear shift fork shaft.

- (b) Using a 5 mm pin punch and a hammer, install a new slotted spring pin to the No. 2 gear shift fork shaft.

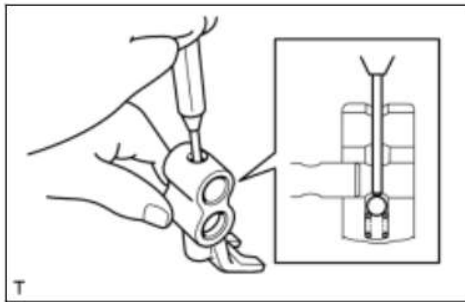
NOTICE:

Do not tap the pin too deep.

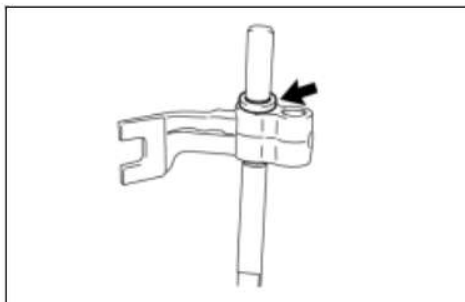
Standard depth:

0 mm (0 in.) (from the end surface of the No. 2 gear shift head)

20. INSTALL 5TH SHIFT HEAD



- (a) Install the compression spring to the 5th shift head, and then, while holding down the ball with the 5 mm pin punch, install the 5th shift head to the No. 3 gear shift fork shaft.

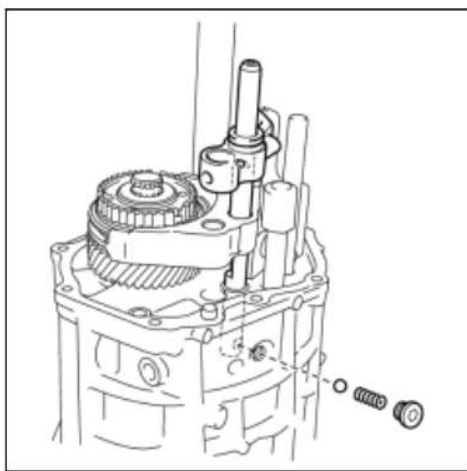


- (b) Install the washer.

- (c) Using a brass bar and a hammer, install a new shaft snap ring to the No. 3 gear shift fork shaft.



21. INSTALL NO. 3 GEAR SHIFT FORK SHAFT



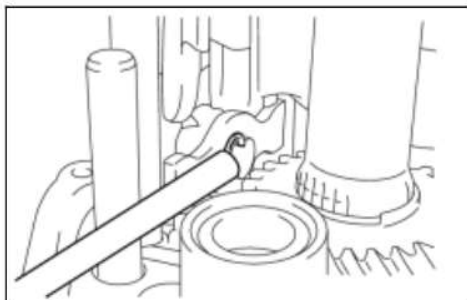
- (a) As shown in the illustration, insert the No. 3 gear shift fork shaft. Using a T40 "TORX" socket wrench, install the ball and compression spring, and then tighten with a new head straight screw plug.

Torque: 19 N·m (194 kgf·cm, 14ft·lbf)

22. INSTALL SHIFT ARM

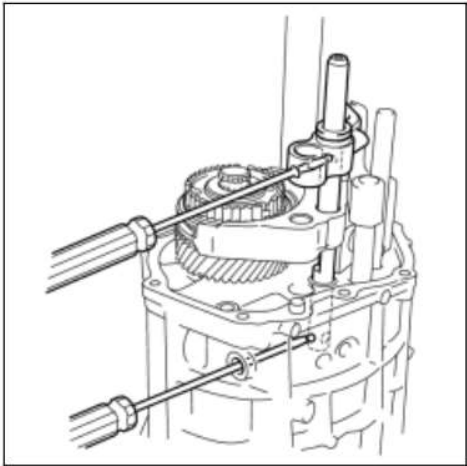


- (a) Install the shift arm to the shift arm pivot.



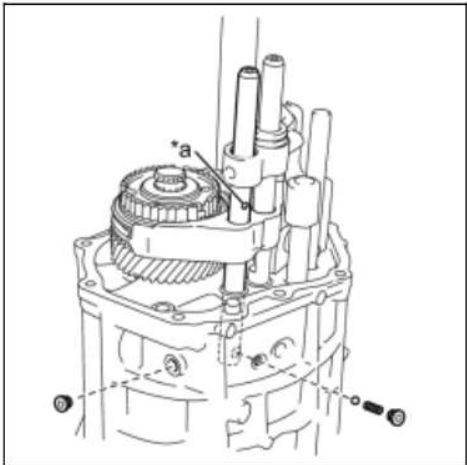
- (b) Using a brass bar and a hammer, install a new E- ring to the shift arm pivot.

23. INSTALL NO. 2 GEAR SHIFT FORK SHAFT



(a) Using a screwdriver, install the 2 balls to the No. 3 gear shift fork shaft.

HINT:
Support the ball with the screwdriver so that the ball does not fall off.

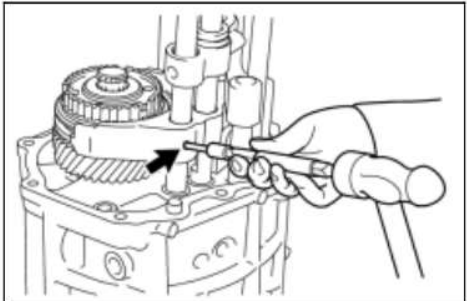


(b) While the identification hole is facing towards the outside, insert the No. 2 gear shift fork shaft. And then, using a T40 "TORX" socket wrench, install the ball and compression spring, and then tighten 2 new head straight screw plugs.

Text in Illustration

*a	Identification Hole
----	---------------------

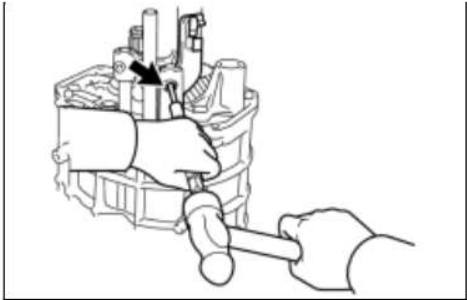
Torque: 19 N·m (194 kgf·cm, 14ft·lbf)



(c) Using a 5 mm pin punch and a hammer, install a new slotted spring pin to the No. 2 gear shift fork shaft.

NOTICE:
Do not tap the pin too deep.
Standard depth:
0 mm (0 in.) (from the end surface of the No. 4 gear shift fork)

24. INSTALL NO. 3 GEAR SHIFT HEAD



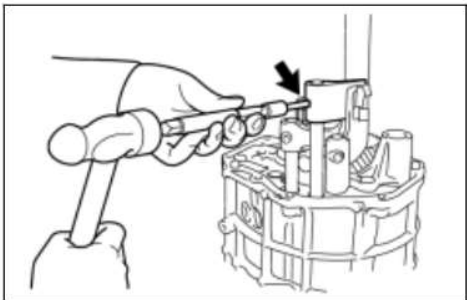
(a) Install the No. 3 gear shift head to the No. 3 gear shift fork shaft.

HINT:
While rotating, install the No. 3 gear shift head so that the shift arm is engaged with the groove of the No. 3 gear shift head.

(b) Using a 5 mm pin punch and a hammer, install a new slotted spring pin to the No. 3 gear shift fork shaft.

NOTICE:
Do not tap the pin too deep.
Standard depth:
0 mm (0 in.) (from the end surface of the No. 3 gear shift head)

25. INSTALL NO. 1 GEAR SHIFT HEAD

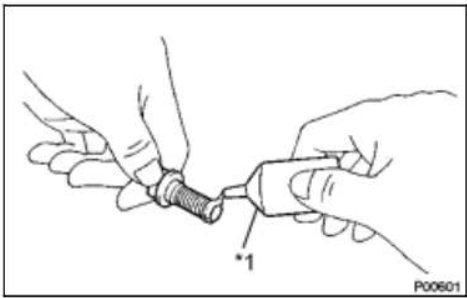


(a) Install the No. 1 gear shift head to the No. 1 gear shift fork shaft.

(b) Using a 5 mm pin punch and a hammer, install a new slotted spring pin to the No. 1 gear shift fork shaft.

NOTICE:
Do not tap the pin too deep.
Standard depth:
0 mm (0 in.) (from the end surface of the No. 1 gear shift head)

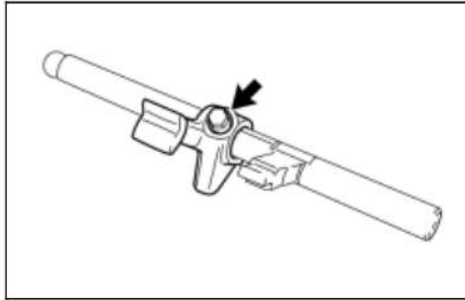
26. INSTALL FRONT SHIFT INNER LEVER



(a) Apply adhesive 1324 to the 2nd and 3rd pitches from the tip of new bolt.

Text in Illustration

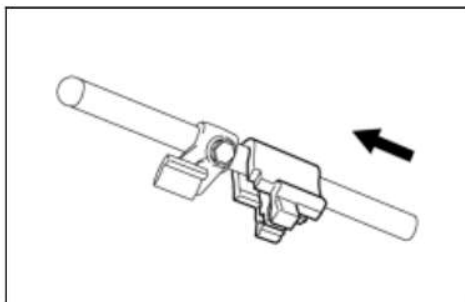
*1	Adhesive 1324
----	---------------



(b) Install the front shift inner lever to the shift shaft with a new bolt.

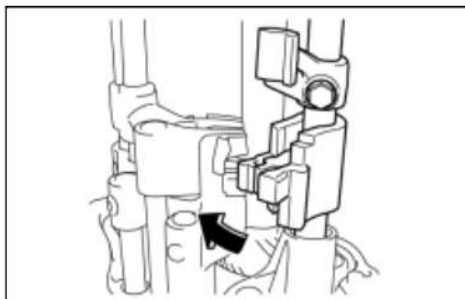
Torque: 33 N·m (340 kgf·cm, 25ft·lbf)

27. INSTALL NO. 1 SHIFT INTER LOCK BLOCK



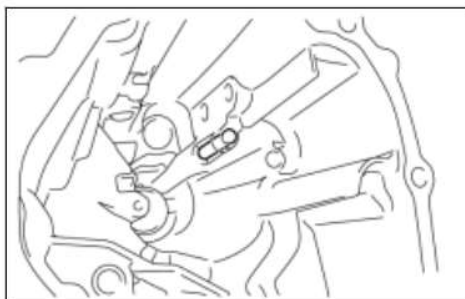
(a) Install the No. 1 shift inter lock block to the shift shaft.

28. INSTALL SHIFT SHAFT

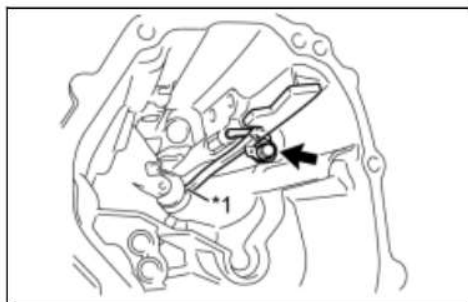


(a) Install the shift shaft and No. 1 shift inter lock block by sliding them.

29. INSTALL NO. 1 EXTENSION HOUSING OIL RECEIVER PIPE



(a) Install the straight pin.



- (b) Install the No. 1 extension housing oil receiver pipe and stopper plate with a new bolt.

Text in Illustration

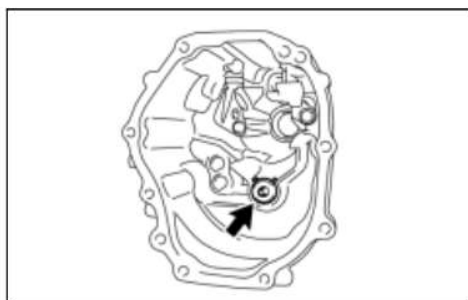
*1	No. 1 Extension Housing Oil Receiver Pipe End
----	---

Torque: 8.5 N·m (87 kgf·cm, 75in·lbf)

NOTICE:

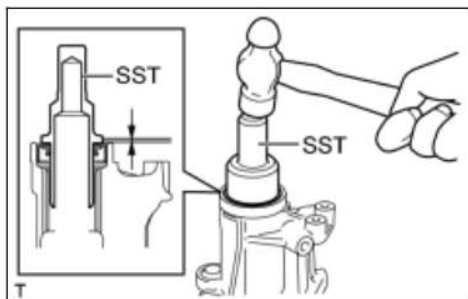
Confirm that the end of No. 1 extension housing oil receiver pipe is properly fitted in the groove.

30. INSTALL NO. 2 EXTENSION HOUSING OIL RECEIVER PIPE



- (a) Install the No. 2 extension housing oil receiver pipe.

31. INSTALL TRANSMISSION EXTENSION HOUSING OIL SEAL



- (a) Apply MP grease to the lip of the new transmission extension housing oil seal.

- (b) Using SST and a hammer, install a new transmission extension housing oil seal.

SST: 09325-20010

Installation depth:

0.1 to 1.1 mm (0.00394 to 0.0433 in.) (from the end surface of the transmission extension housing sub-assembly)

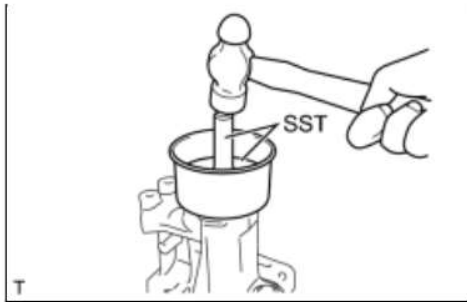
NOTICE:

Do not damage the lip of the transmission extension housing oil seal.

32. INSTALL EXTENSION HOUSING DUST DEFLECTOR

- (a) Using SST and a hammer, install a new extension housing dust deflector.

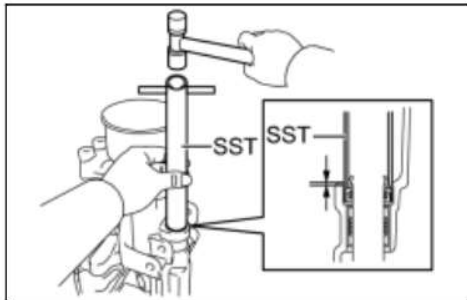
SST: 09950-60020



09951-00750
SST: 09950-70010
09951-07100

HINT:
Make sure to tap it until it touches the transmission extension housing sub-assembly.

33. INSTALL EXTENSION HOUSING REAR OIL SEAL

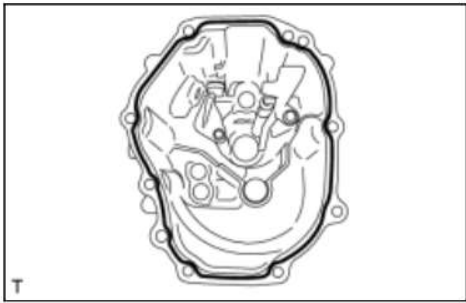


(a) Using SST and a hammer, install a new extension housing rear oil seal.
SST: 09612-70100
09612-07210
Installation depth:
1.0 to 2.0 mm (0.0394 to 0.0787 in.) (from the end surface of the transmission extension housing sub-assembly)
NOTICE:
Do not damage the lip of the extension housing rear oil seal.

(b) Apply MP grease to the lip of the extension housing rear oil seal.

34. INSTALL TRANSMISSION EXTENSION HOUSING SUB-ASSEMBLY

(a) Apply seal packing 1281 continuously to the transmission extension housing sub-assembly as shown in the illustration.

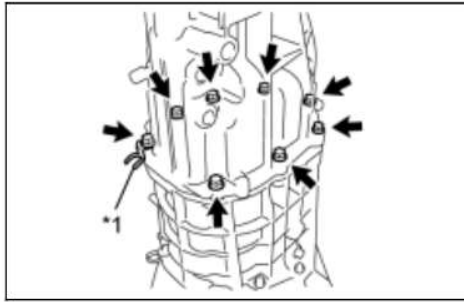


Text in Illustration

	Seal Packing 1281
---	-------------------

NOTICE:
Install it within 10 minutes of the seal packing application.

(b) Install the transmission extension housing sub-assembly and clamp with 8 new bolts.

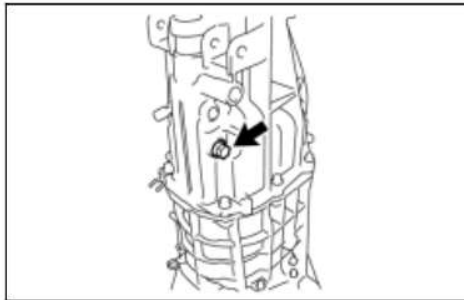
**Text in Illustration**

*1	clamp
----	-------

Torque: 29 N·m (296 kgf·cm, 21ft·lbf)

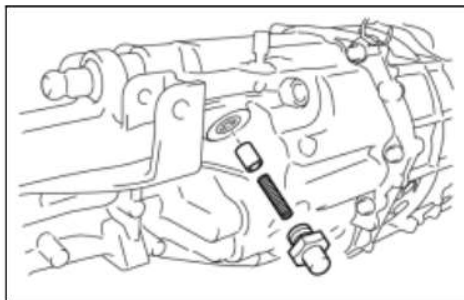
NOTICE:

- Be sure to install the transmission extension housing sub-assembly while the transmission is in neutral.
- Make sure to align the knock pin with the hole securely.



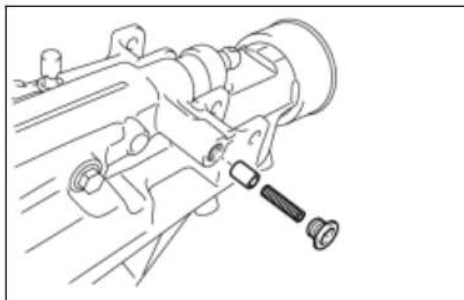
(c) Install a new bolt.

Torque: 31 N·m (316 kgf·cm, 23ft·lbf)

35. INSTALL HOLDER

(a) Using a 27 mm deep socket wrench, install a new holder, compression spring and lock ball pin.

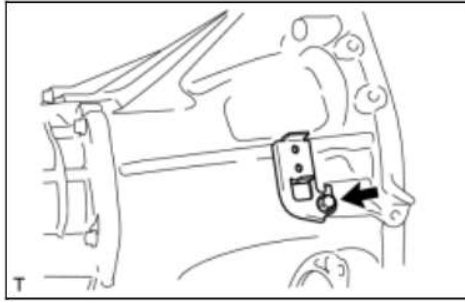
Torque: 39 N·m (400 kgf·cm, 29ft·lbf)

36. INSTALL LOCK BALL PIN

(a) Using a 10 mm hexagon socket wrench, install a new head straight screw plug, compression spring and lock ball pin.

Torque: 25 N·m (250 kgf·cm, 18ft·lbf)

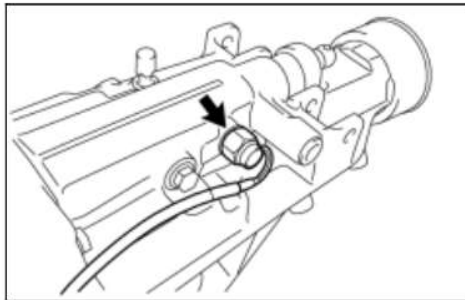
37. INSTALL WIRE HARNESS CLAMP BRACKET



- (a) Install the wire harness clamp bracket with a new bolt.

Torque: 7.0 N·m (71 kgf·cm, 62in·lbf)

38. INSTALL NEUTRAL POSITION SWITCH ASSEMBLY

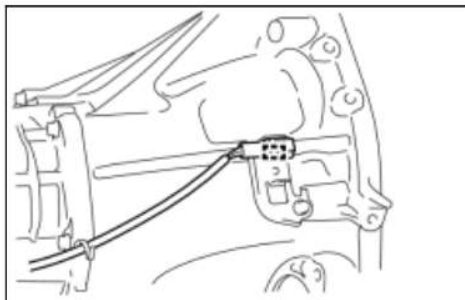


- (a) Using a 19 mm union nut wrench, install the neutral position switch assembly and a new gasket.

Torque: 32 N·m (329 kgf·cm, 24ft·lbf)

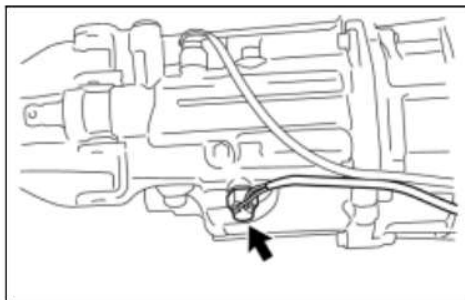
NOTICE:

Use the formula to calculate special torque values for situations where the union nut wrench is combined with a torque wrench [INFO](#) .



- (b) Engage the clamp and connect the neutral position switch assembly wire.

39. INSTALL BACK-UP LIGHT SWITCH ASSEMBLY

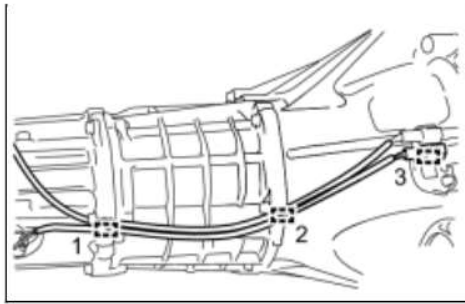


- (a) Using a 19 mm union nut wrench, install the back-up light switch assembly and a new gasket.

Torque: 32 N·m (329 kgf·cm, 24ft·lbf)

NOTICE:

Use the formula to calculate special torque values for situations where the union nut wrench is combined with a torque wrench [INFO](#) .

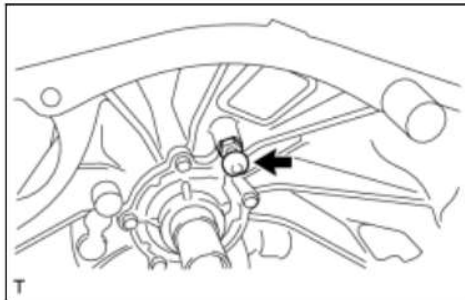


- (b) In the order indicated in the illustration, engage the 3 clamps in place, and connect the back-up light switch assembly wire and neutral position switch assembly wire.

HINT:

Install the wire harness so that there is slack on the connector side.

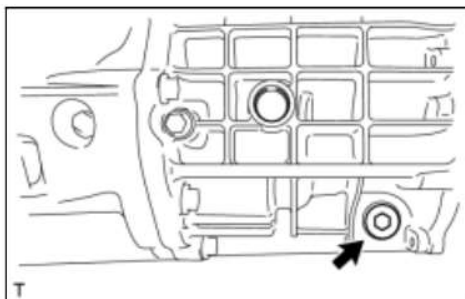
40. INSTALL RELEASE FORK SUPPORT



- (a) Using a 19 mm deep socket wrench, install the release fork support to the clutch housing.

Torque: 16 N·m (163 kgf·cm, 12ft·lbf)

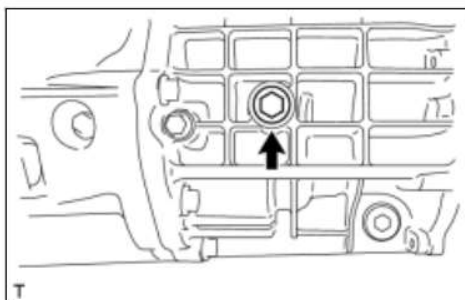
41. INSTALL MANUAL TRANSMISSION DRAIN PLUG



- (a) Install the manual transmission drain plug with a new gasket to the transmission case.

Torque: 37 N·m (377 kgf·cm, 27ft·lbf)

42. INSTALL MANUAL TRANSMISSION FILLER PLUG



- (a) Install the manual transmission filler plug with a new gasket to the transmission case.

Torque: 37 N·m (377 kgf·cm, 27ft·lbf)

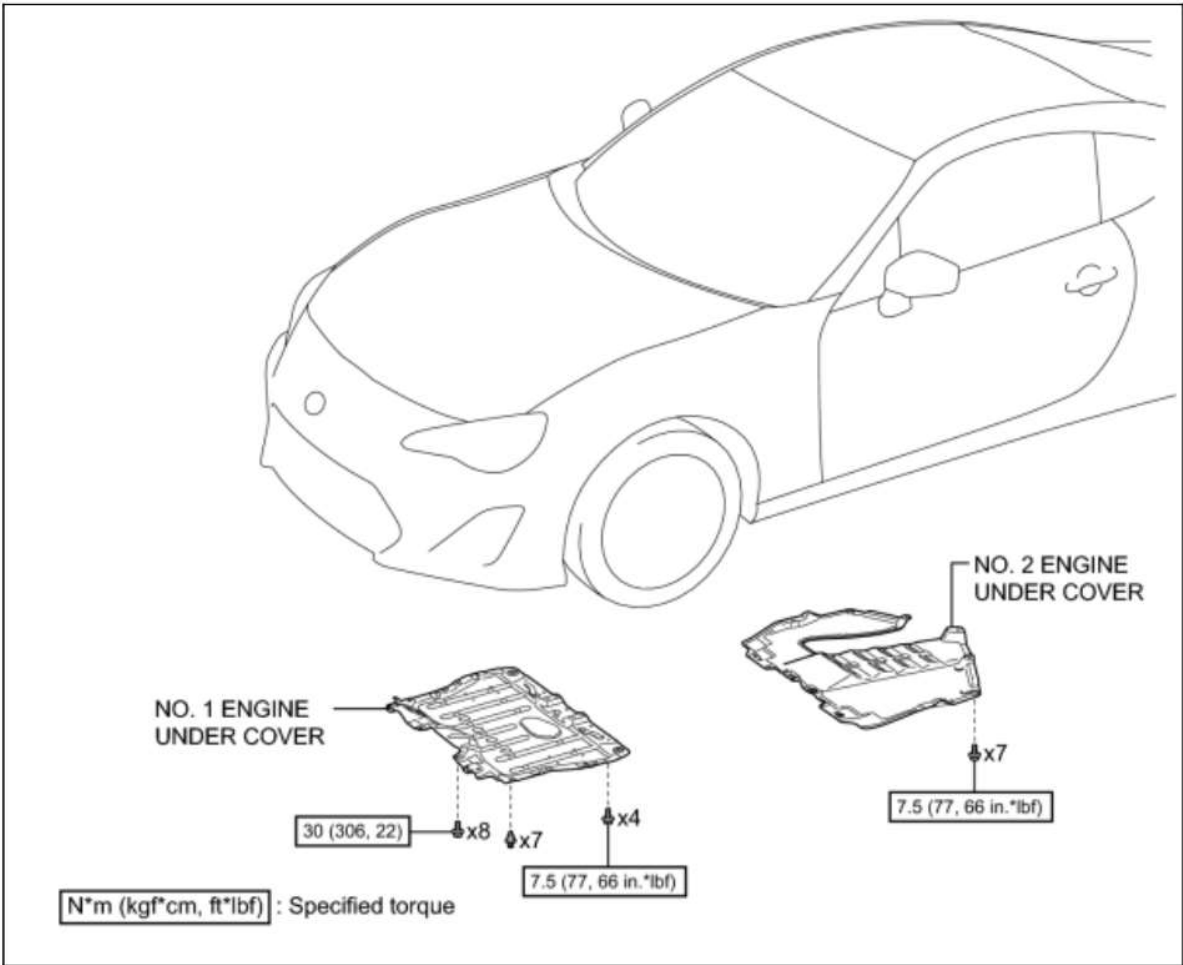


cardiagn.com

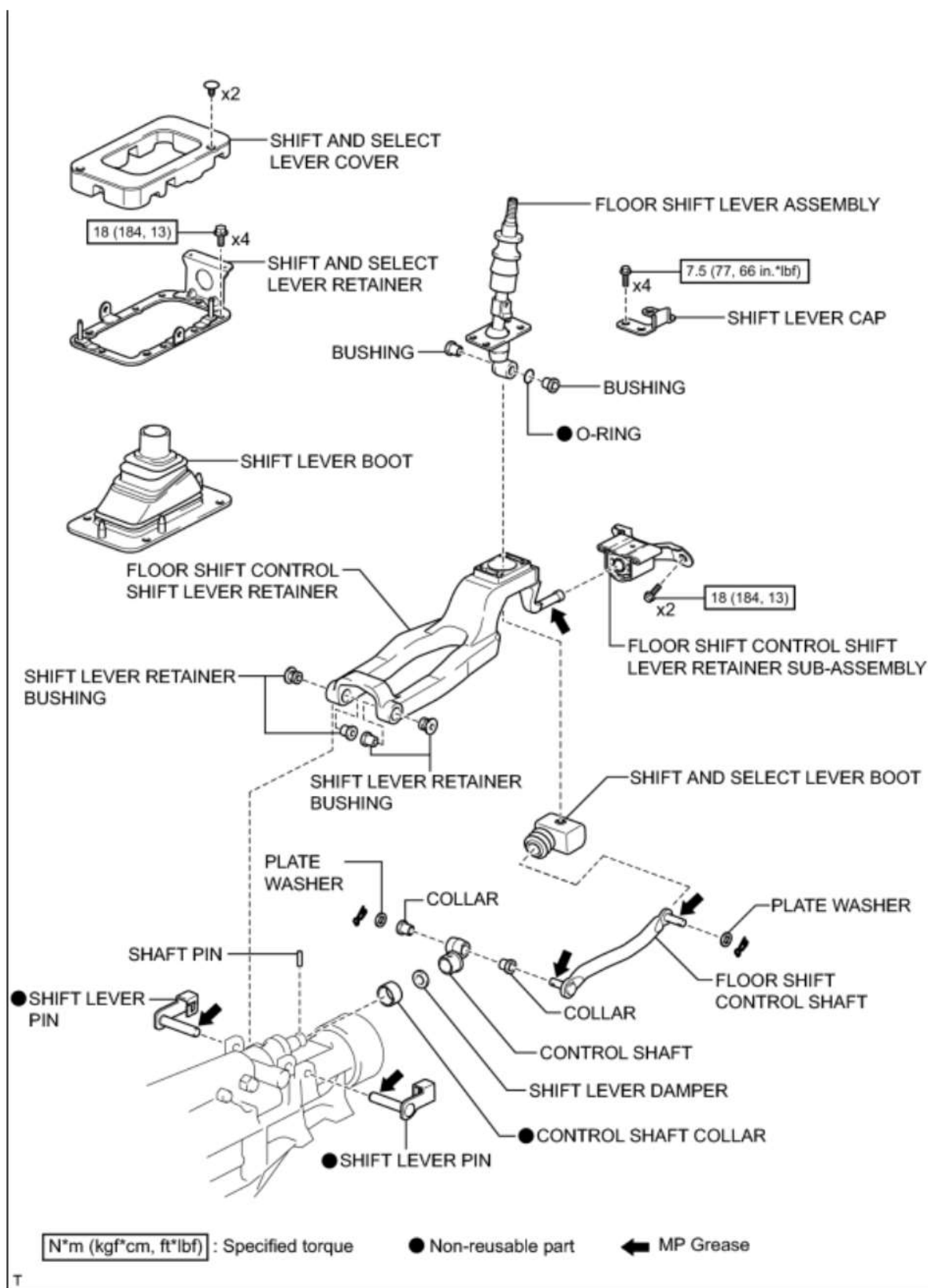
Last Modified: 3-27-2012	6.4 K	From: 201203
Model Year: 2013	Model: FR-S	Doc ID: RM000001P1600KX
Title: TL70 MANUAL TRANSMISSION / TRANSAXLE: MANUAL TRANSMISSION ASSEMBLY: COMPONENTS (2013 FR-S)		

COMPONENTS

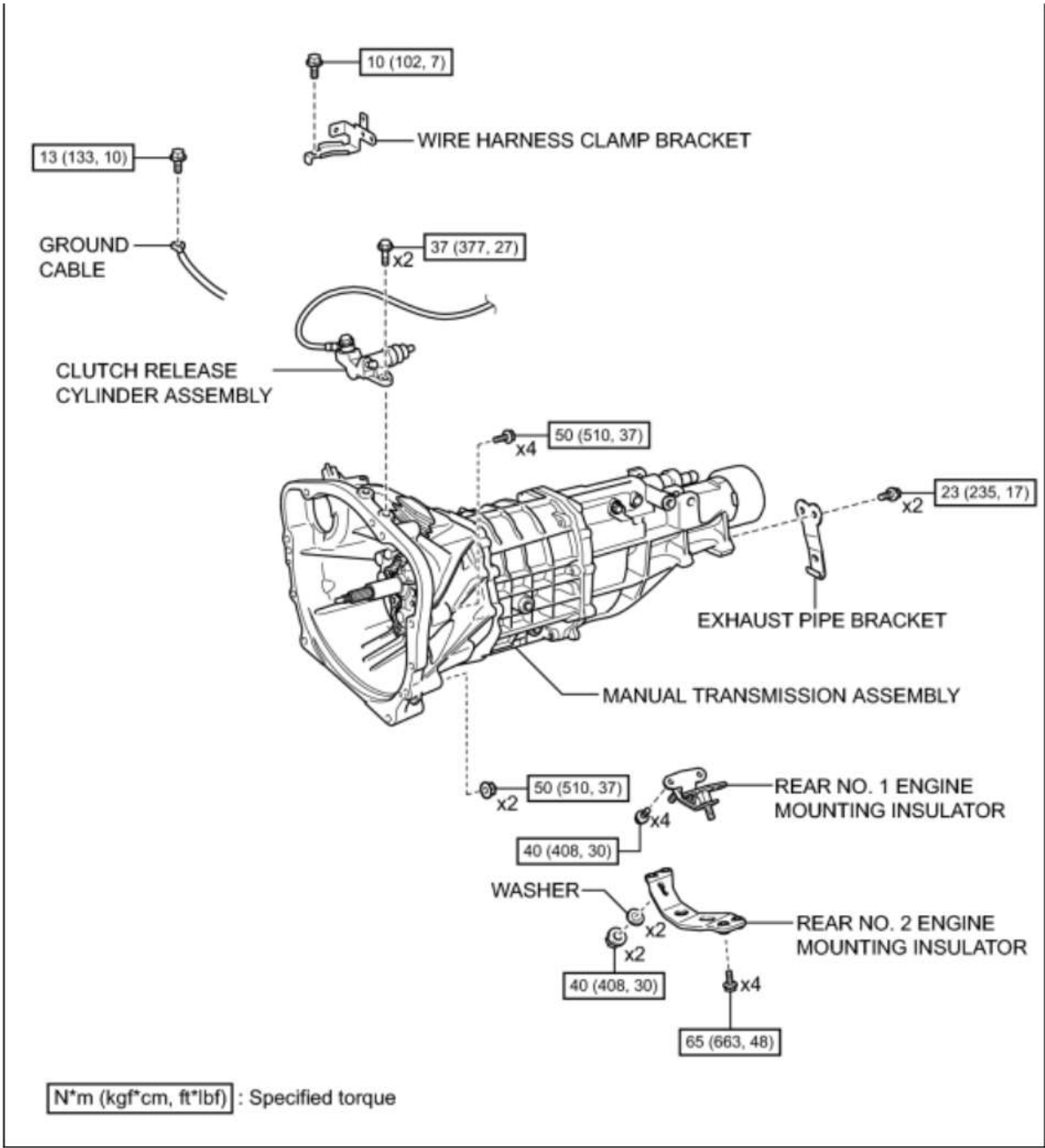
ILLUSTRATION



ILLUSTRATION



ILLUSTRATION



Last Modified: 3-27-2012	6.4 A	From: 201203
Model Year: 2013	Model: FR-S	Doc ID: RM000001P1500UX
Title: TL70 MANUAL TRANSMISSION / TRANSAXLE: MANUAL TRANSMISSION ASSEMBLY: INSTALLATION (2013 FR-S)		

INSTALLATION

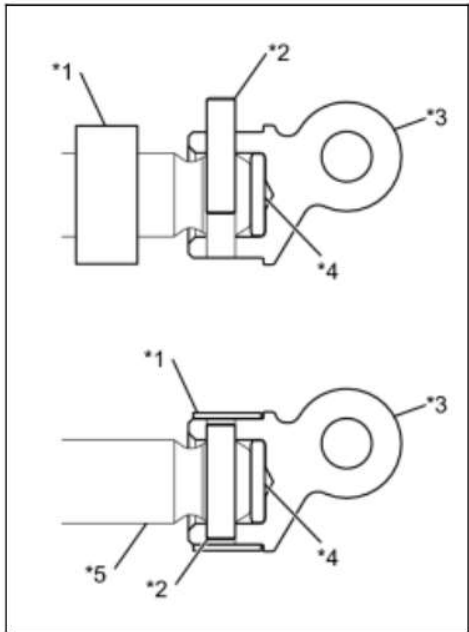
1. INSTALL CONTROL SHAFT

- (a) Install a new control shaft collar onto the shift shaft.
- (b) Install the shift lever damper and control shaft to the shift shaft.
- (c) Using a pin punch (5 mm (0.197 in.)) and a hammer, align the control shaft hole and the shift shaft hole with the cutout of the control shaft collar, and insert the shaft pin from above.
- (d) Slide the control shaft collar until it comes into contact with the stopper of the control shaft, then stake it to the cutout.

NOTICE:
Be careful to install the floor shift control shaft in the proper direction.

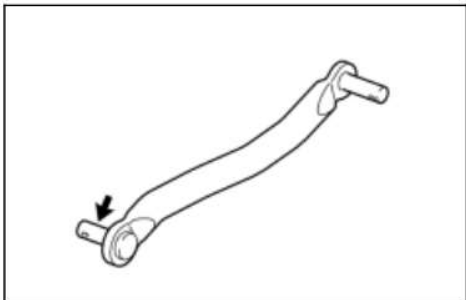
Text in Illustration

*1	Control Shaft Collar
*2	Shaft Pin
*3	Control Shaft
*4	Shift Lever Damper
*5	Shift Shaft



2. INSTALL FLOOR SHIFT CONTROL SHAFT

- (a) Apply a light coat of with MP grease to the floor shift control shaft.



Text in Illustration

	MP grease
---	-----------

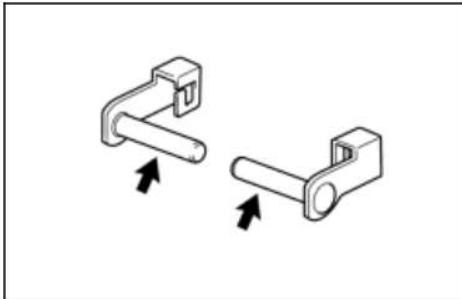
- (b) Install the 2 collars to the floor shift control shaft.
- (c) Install the plate washer and clip.

3. INSTALL SHIFT LEVER RETAINER BUSHING

- (a) Install the 4 shift lever retainer bushings.

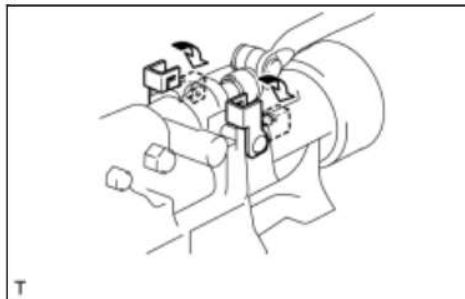
4. INSTALL FLOOR SHIFT CONTROL SHIFT LEVER RETAINER

- (a) Apply a light coat of with MP grease to the new 2 shift lever pins.



Text in Illustration

	MP grease
---	-----------

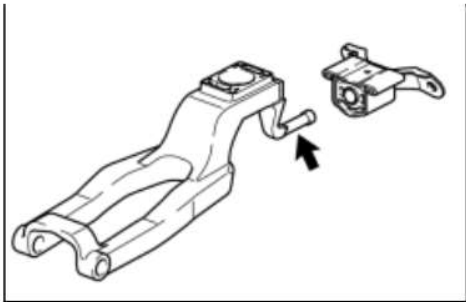


- (b) Install the floor shift control shift lever retainer with the 2 shift lever pins.

- (c) Secure the shift lever pins to the extension housing sub-assembly.

5. INSTALL FLOOR SHIFT CONTROL SHIFT LEVER RETAINER SUB-ASSEMBLY

- (a) Apply a light coat of with MP grease to the floor shift control shift lever retainer sub-assembly.



Text in Illustration

	MP grease
---	-----------

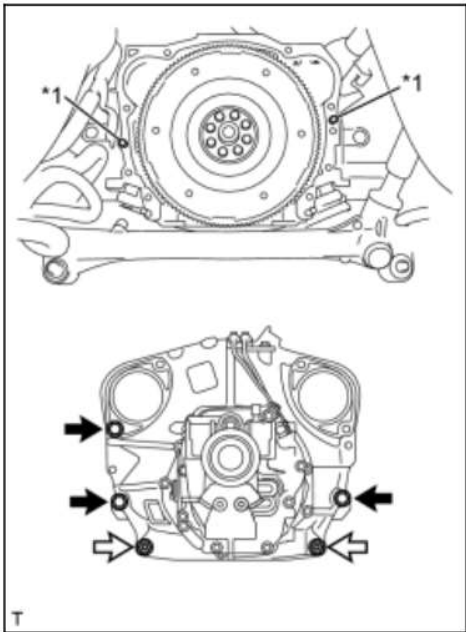
- (b) Install the floor shift control shift lever retainer sub-assembly to the floor shift control shift lever retainer.

6. INSTALL REAR NO. 1 ENGINE MOUNTING INSULATOR

- (a) Install the rear No. 1 engine mounting insulator to the manual transmission assembly with the 4 bolts.

Torque: 40 N·m (408 kgf·cm, 30ft·lbf)

7. INSTALL MANUAL TRANSMISSION ASSEMBLY



- (a) Confirm that 2 knock pins are on the manual transmission assembly contact surface of the engine cylinder block before manual transmission assembly installation.
- (b) Install the manual transmission assembly to the engine with the 3 bolts and 2 nuts.

Text in Illustration

*1	Knock Pin
	Bolt

	
	Nut

Torque: 50 N·m (510 kgf·cm, 37ft·lbf)

NOTICE:

- Do not apply excessive force to the transmission assembly as this will break the input shaft.
- Insert dowel pins into the dowel holes securely so that the end face of the transmission assembly fits close against the engine assembly before tightening the bolts.

8. INSTALL REAR NO. 2 ENGINE MOUNTING INSULATOR

- (a) Tilt up the manual transmission assembly.
- (b) Install the rear No. 2 engine mounting insulator to the rear No. 1 engine mounting insulator with the 2 washers and 2 nuts.

Torque: 40 N·m (408 kgf·cm, 30ft·lbf)

- (c) Install the rear No. 2 engine mounting insulator to the body with the 4 bolts.

Torque: 65 N·m (663 kgf·cm, 48ft·lbf)

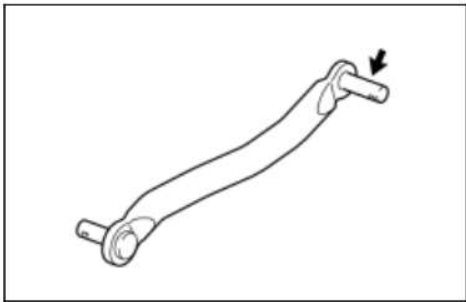
9. REMOVE EXHAUST PIPE BRACKET

- (a) Install the exhaust pipe bracket with the 2 bolts.

Torque: 23 N·m (235 kgf·cm, 17ft·lbf)

10. INSTALL FLOOR SHIFT LEVER ASSEMBLY

- (a) Apply a light coat of with MP grease to the floor shift control shaft.



Text in Illustration

	MP grease
---	-----------

- (b) Install the new O-ring and 2 bushings to the shift lever assembly.
- (c) Install the plate washer to the floor shift lever assembly.
- (d) Install the shift lever assembly with the clip.
- (e) Install the shift and select lever boot.

11. INSTALL SHIFT AND SELECT LEVER BOOT

- (a) Install the shift and select lever boot to the floor shift control shaft.

12. INSTALL FLOOR SHIFT CONTROL SHIFT LEVER RETAINER SUB-ASSEMBLY

- (a) Install the floor shift control shift lever retainer sub-assembly with the 2 bolts.

Torque: 18 N·m (184 kgf·cm, 13ft·lbf)

13. INSTALL EXHAUST MANIFOLD

INFO

14. INSTALL MANUAL TRANSMISSION ASSEMBLY

- (a) Install the bolt to the manual transmission assembly.

Torque: 50 N·m (510 kgf·cm, 37ft·lbf)

15. INSTALL CLUTCH RELEASE CYLINDER ASSEMBLY

- (a) Install the clutch release cylinder assembly with the 2 bolts.

Torque: 37 N·m (377 kgf·cm, 27ft·lbf)

16. CONNECT WIRE HARNESS

- (a) Install the wire harness clamp bracket with the bolt.

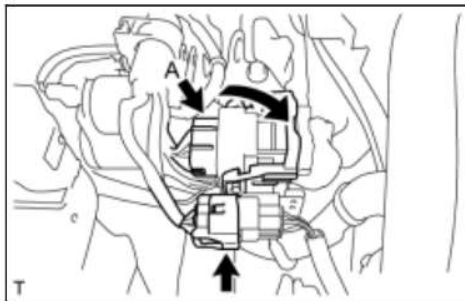
Torque: 10 N·m (102 kgf·cm, 7ft·lbf)

- (b) Engage the wire harness clamp.

- (c) Connect the ground cable with the bolt.

Torque: 13 N·m (133 kgf·cm, 10ft·lbf)

- (d) Connect the 2 connectors.



- (e) Connect the 2 connectors.

HINT:

Press down the lever until the claw of the connector A makes a connection sound.

17. INSTALL STARTER ASSEMBLY

INFO

18. INSTALL FRONT STABILIZER BAR

INFO

19. INSTALL PROPELLER SHAFT WITH CENTER BEARING ASSEMBLY

INFO

20. INSTALL SHIFT LEVER CAP

- (a) Install the shift lever cap with the 4 bolts.

Torque: 7.5 N·m (77 kgf·cm, 66in·lbf)

21. INSTALL SHIFT LEVER BOOT

- (a) Install the No. 1 shift and select lever boot and shift and select lever retainer with the 4 bolts.

Torque: 18 N·m (184 kgf·cm, 13ft·lbf)

- (b) Connect the wire harness clamp.
(c) Install the shift and select lever cover with the 2 clips.

22. INSTALL CONSOLE BOX ASSEMBLY

INFO

23. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

24. ADD MANUAL TRANSMISSION OIL

INFO

25. INSPECT MANUAL TRANSMISSION OIL

INFO

26. INSPECT FOR MANUAL TRANSMISSION OIL LEAK

27. INSTALL NO. 2 ENGINE UNDER COVER

INFO

28. INSTALL NO. 1 ENGINE UNDER COVER

INFO



Last Modified: 3-27-2012	6.4 A	From: 201203
Model Year: 2013	Model: FR-S	Doc ID: RM000001P1700TX
Title: TL70 MANUAL TRANSMISSION / TRANSAXLE: MANUAL TRANSMISSION ASSEMBLY: REMOVAL (2013 FR-S)		

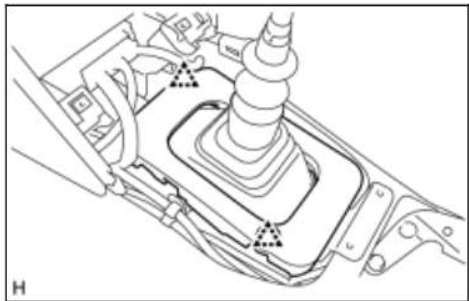
REMOVAL

1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL INFO

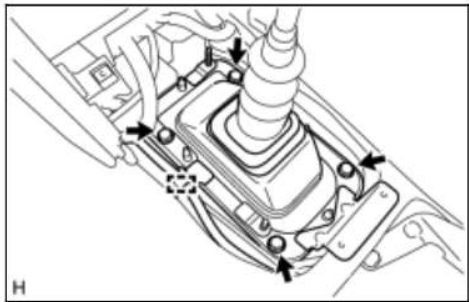
2. REMOVE CONSOLE BOX ASSEMBLY

INFO

3. REMOVE SHIFT LEVER BOOT



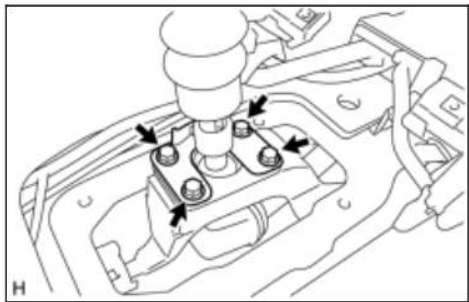
(a) Remove the 2 clips and the shift and select lever cover.



(b) Disconnect the wire harness clamp.

(c) Remove the 4 bolts, the shift and select lever retainer and the select lever boot.

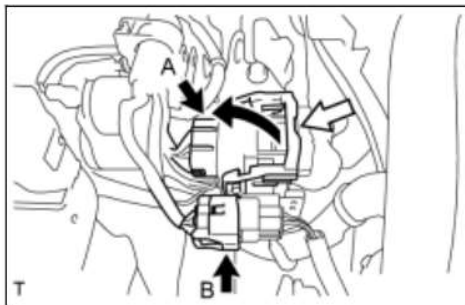
4. REMOVE SHIFT LEVER CAP



(a) Remove the 4 bolts and the shift lever cap.

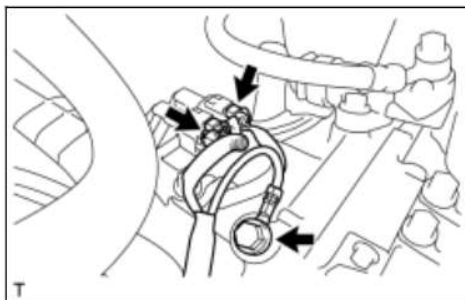
5. REMOVE NO. 1 ENGINE UNDER COVER INFO**6. REMOVE NO. 2 ENGINE UNDER COVER** INFO**7. DRAIN MANUAL TRANSMISSION OIL** INFO**8. REMOVE PROPELLER SHAFT WITH CENTER BEARING ASSEMBLY**INFO**9. REMOVE FRONT STABILIZER BAR**INFO**10. REMOVE STARTER ASSEMBLY**INFO**11. SEPARATE WIRE HARNESS****HINT:**

Fix the disconnected harness components with tape to keep them out of the way.



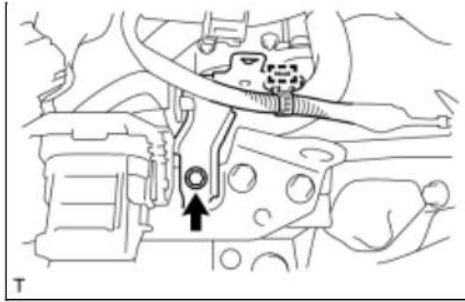
(a) Release the lock of connector (A) and disconnect the connector.

(b) Disconnect the connector (B).



(c) Disconnect the 2 connectors.

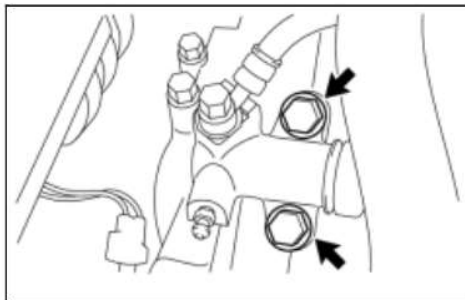
(d) Remove the bolt and disconnect the ground cable.



(e) Disengage the wire harness clamp.

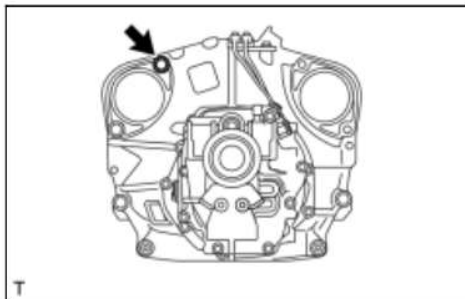
(f) Remove the bolt and the wire harness clamp bracket.

12. SEPARATE CLUTCH RELEASE CYLINDER ASSEMBLY



(a) Remove the 2 bolts and separate the clutch release cylinder assembly.

13. SEPARATE MANUAL TRANSMISSION ASSEMBLY



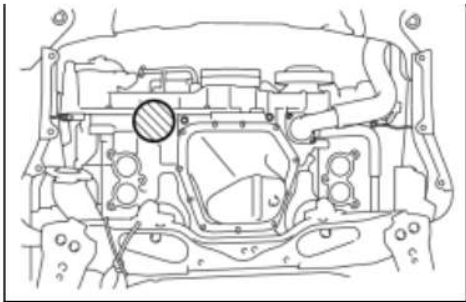
(a) Remove the bolt from the manual transmission assembly.

14. REMOVE EXHAUST MANIFOLD

INFO

15. SUSPEND ENGINE ASSEMBLY

(a) Support the engine assembly with an engine lifter so that it is stable, as shown in the illustration.



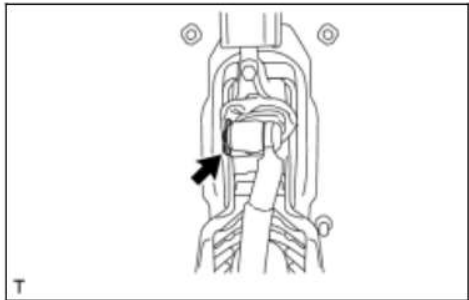
Text in Illustration

	Attachment Placement Positions
---	--------------------------------

NOTICE:

- Set the engine assembly with transmission so that it is horizontal.
- Never attach the attachment and plate lift attachment to the oil pan section of the engine assembly.

16. REMOVE FLOOR SHIFT LEVER ASSEMBLY



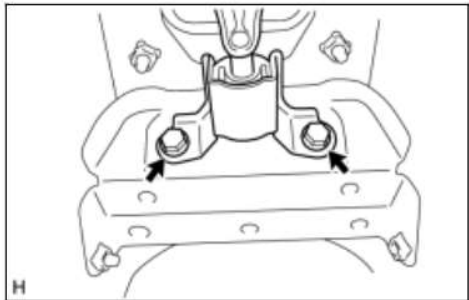
(a) Turn over the shift and select lever boot.

- (b) Using a screwdriver, remove the clip and the floor shift lever assembly.
- (c) Remove the plate washer from the floor shift lever assembly.
- (d) Remove the 2 bushings and O-ring from the floor shift lever assembly.

17. REMOVE SHIFT LEVER BOOT

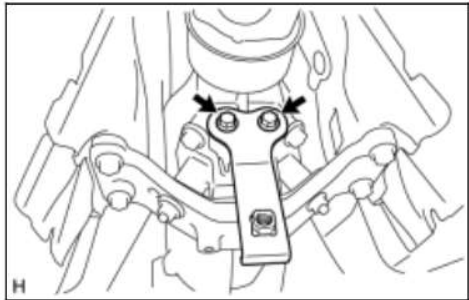
- (a) Remove the shift lever boot from the floor shift lever assembly.

18. SEPARATE FLOOR SHIFT CONTROL SHIFT LEVER RETAINER SUB-ASSEMBLY



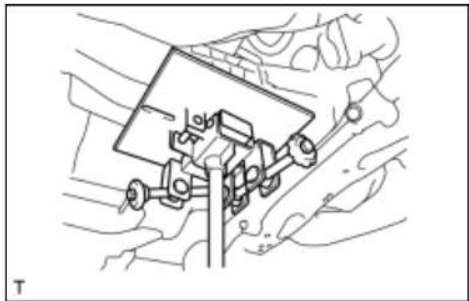
(a) Remove the 2 bolts and separate the floor shift control shift lever retainer sub-assembly.

19. REMOVE EXHAUST PIPE BRACKET



(a) Remove the 2 bolts and the exhaust pipe bracket.

20. SUPPORT MANUAL TRANSMISSION ASSEMBLY



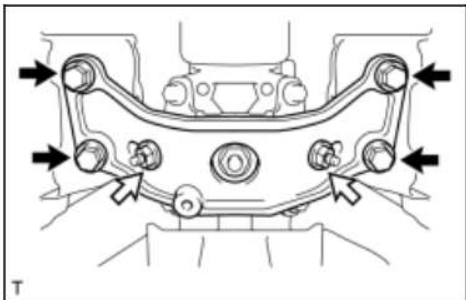
(a) Support the manual transmission assembly with a transmission jack.

NOTICE:

- Check that the manual transmission assembly is centered on the transmission jack plate.
- When removing the manual transmission assembly, support the engine assembly so that it does not tilt.

21. REMOVE REAR NO. 2 ENGINE MOUNTING INSULATOR

(a) Remove the 4 bolts, 2 washers, 2 nuts and rear No. 2 engine mounting insulator.

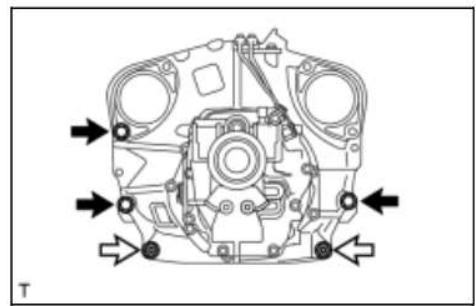


Text in Illustration

	Bolt
	Nut

22. REMOVE MANUAL TRANSMISSION ASSEMBLY

(a) Remove the 3 bolts, 2 nuts and manual transmission assembly.



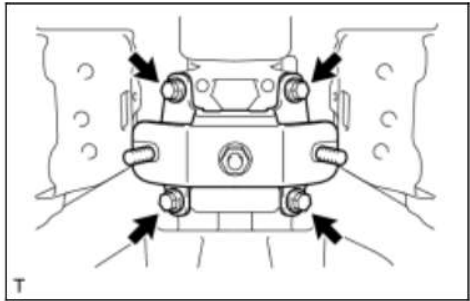
Text in Illustration

	Bolt
	Nut

NOTICE:

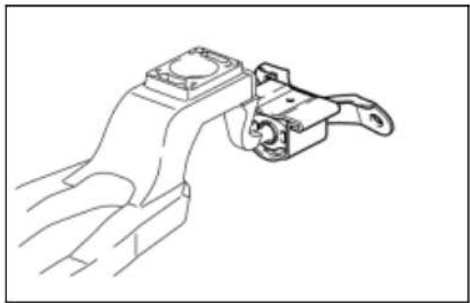
- Do not apply excessive force to the transmission assembly as this will break the input shaft.
- To prevent damage to the knock pins, do not pry between the manual transmission assembly and the engine assembly.

23. REMOVE REAR NO. 1 ENGINE MOUNTING INSULATOR



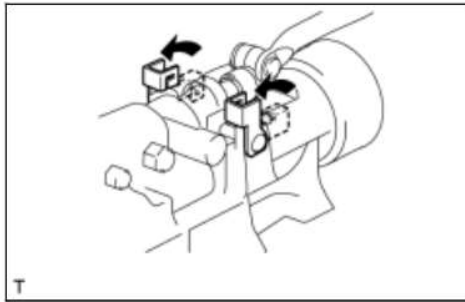
(a) Remove the 4 bolts and rear No. 1 engine mounting insulator.

24. REMOVE FLOOR SHIFT CONTROL SHIFT LEVER RETAINER SUB-ASSEMBLY



(a) Remove the floor shift control shift lever retainer sub-assembly.

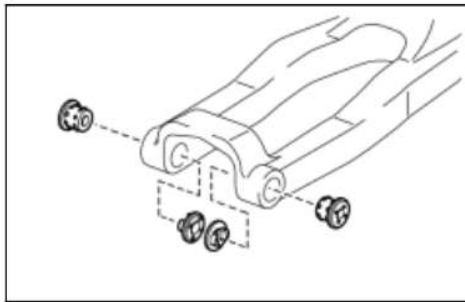
25. REMOVE FLOOR SHIFT CONTROL SHIFT LEVER RETAINER



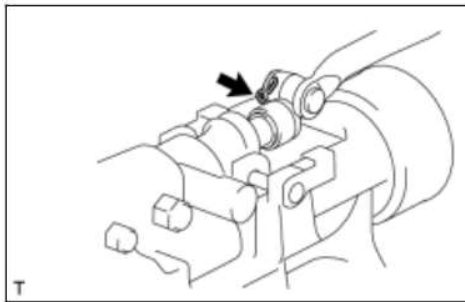
- (a) Pull up the locks of the shift lever pins, and remove the 2 shift lever pins.

- (b) Remove the floor shift control shift lever retainer.

26. REMOVE SHIFT LEVER RETAINER BUSHING



- (a) Remove the 4 shift lever retainer bushings.



27. REMOVE FLOOR SHIFT CONTROL SHAFT

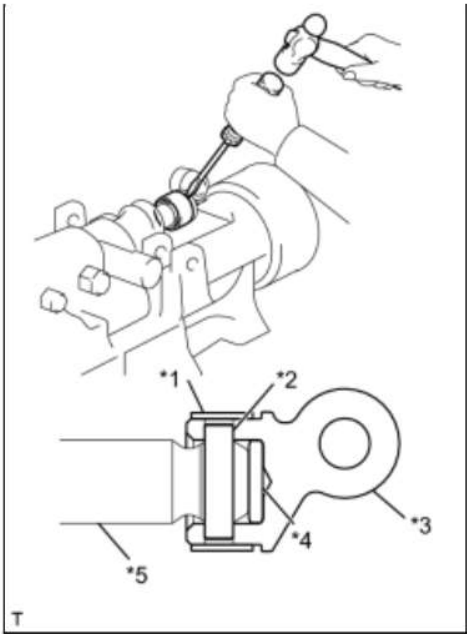
- (a) Using a screwdriver, remove the clip, plate washer and floor shift control shaft.
- (b) Remove the 2 collars from the control shaft.

28. REMOVE CONTROL SHAFT

- (a) Using a hammer and a screwdriver, cut off the control shaft collar and remove it from the shift shaft.
- (b) Using a pin punch (5 mm (0.197 in.)) and a hammer, remove the shaft pin and control shaft from the shift shaft.
- (c) Remove the shift lever damper from the floor shift control shaft.

Text in Illustration



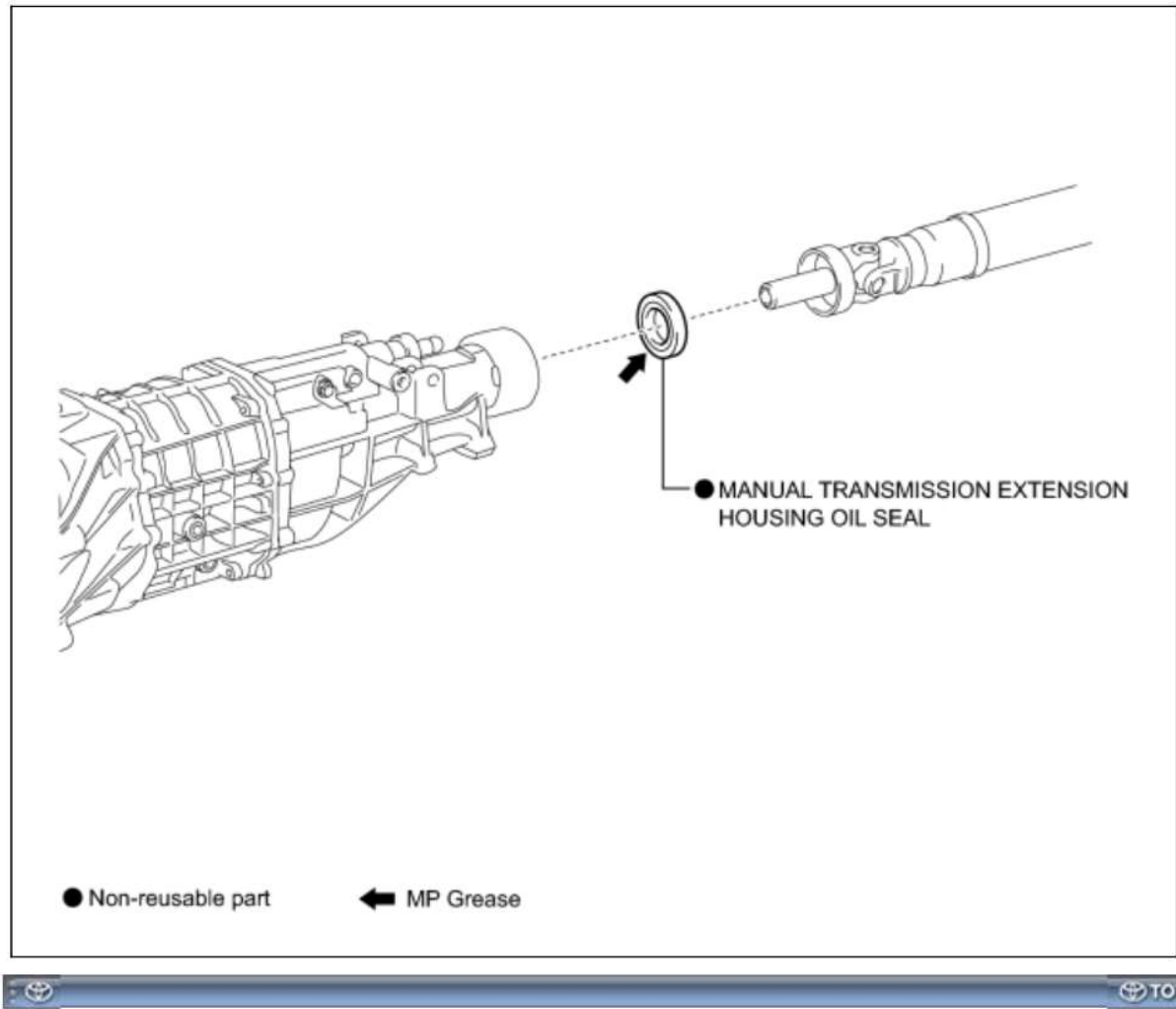


*1	Control Shaft Collar
*2	Shaft Pin
*3	Control Shaft
*4	Shift Lever Damper
*5	Shift Shaft

Last Modified: 3-27-2012	6.4 K	From: 201203
Model Year: 2013	Model: FR-S	Doc ID: RM000001P1400HX
Title: TL70 MANUAL TRANSMISSION / TRANSAXLE: MANUAL TRANSMISSION EXTENSION HOUSING OIL SEAL: COMPONENTS (2013 FR-S)		

COMPONENTS

ILLUSTRATION



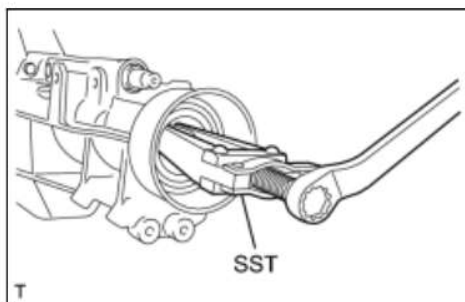
Last Modified: 3-27-2012	6.4 A	From: 201203
Model Year: 2013	Model: FR-S	Doc ID: RM000001P1300JX
Title: TL70 MANUAL TRANSMISSION / TRANSAXLE: MANUAL TRANSMISSION EXTENSION HOUSING OIL SEAL: REPLACEMENT (2013 FR-S)		

REPLACEMENT

1. REMOVE PROPELLER SHAFT WITH CENTER BEARING ASSEMBLY

INFO

2. REMOVE MANUAL TRANSMISSION EXTENSION HOUSING OIL SEAL

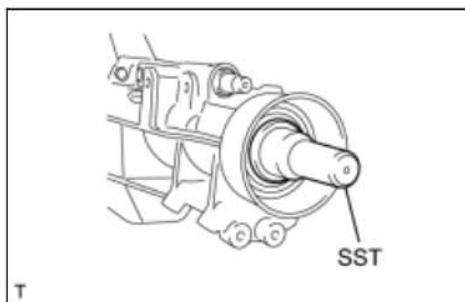


- (a) Using SST, remove the manual transmission extension housing oil seal.

SST: 09308-00010

3. INSTALL MANUAL TRANSMISSION EXTENSION HOUSING OIL SEAL

- (a) Coat the lip of a new manual transmission extension housing oil seal with MP grease.



- (b) Using SST and a hammer, tap in the manual transmission extension housing oil seal.

SST: 09325-20010

Installation depth:

0.1 to 1.1 mm (0.00394 to 0.0433 in.)

NOTICE:

- Keep the lip free of foreign matter.
- Do not tap the oil seal at an angle.

4. INSTALL PROPELLER SHAFT WITH CENTER BEARING ASSEMBLY

INFO

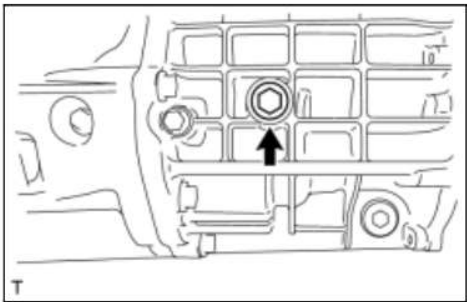


Last Modified: 3-27-2012	6.4 G	From: 201203
Model Year: 2013	Model: FR-S	Doc ID: RM000001B3K03FX
Title: TL70 MANUAL TRANSMISSION / TRANSAXLE: MANUAL TRANSMISSION OIL: ON-VEHICLE INSPECTION (2013 FR-S)		

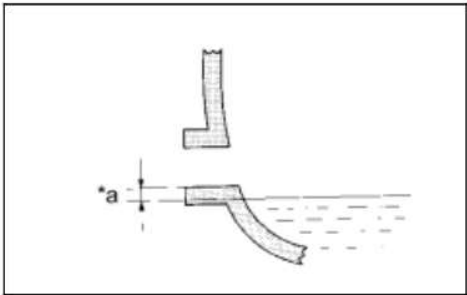
ON-VEHICLE INSPECTION

1. INSPECT MANUAL TRANSMISSION OIL

(a) Stop the vehicle in a level place.



(b) Remove the manual transmission filler plug and the gasket.



(c) Check that the oil surface is within 5 mm (0.197 in.) of the bottom of the manual transmission filler plug opening.

Text in Illustration

*a	0 to 5 mm (0 to 0.197 in.)
----	----------------------------

NOTICE:

- Excessively large or small amounts of oil may cause problems.
- After replacing the oil, drive the vehicle and check the oil level again.

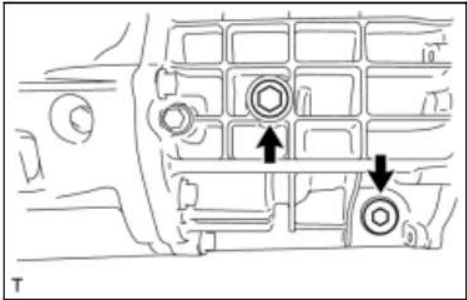
- (d) Check for oil leakage when the oil level is low.
- (e) Install the manual transmission filler plug and a new gasket.

Torque: 37 N·m (377 kgf·cm, 27ft·lbf)



Last Modified: 3-27-2012	6.4 A	From: 201203
Model Year: 2013	Model: FR-S	Doc ID: RM000002Z2L03AX
Title: TL70 MANUAL TRANSMISSION / TRANSAXLE: MANUAL TRANSMISSION OIL: REPLACEMENT (2013 FR-S)		

REPLACEMENT

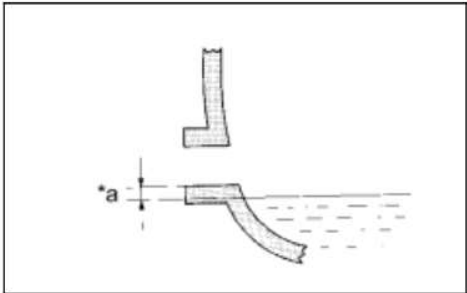


1. DRAIN MANUAL TRANSMISSION OIL

- (a) Remove the manual transmission filler plug and the gasket.
- (b) Remove the manual transmission drain plug and gasket, and then drain the manual transaxle oil.
- (c) Install a new gasket and the manual transmission drain plug.

Torque: 37 N·m (377 kgf·cm, 27ft·lbf)

2. ADD MANUAL TRANSMISSION OIL



- (a) Add manual transmission oil until the oil level is within 5 mm (0.197 in.) from the bottom of the manual transmission filler plug opening.

Text in Illustration

*a	0 to 5 mm (0 to 0.197 in.)
----	----------------------------

Standard capacity (Reference):
2.2 liters (2.3 US qts, 1.9 Imp. qts)
Gear oil type:
Toyota Genuine Manual Transmission Gear Oil "LV GL-3 and SAE 75W-90"

- (b) Check for oil leakage when the oil level is low.
- (c) Install the transmission filler plug and a new gasket.

Torque: 37 N·m (377 kgf·cm, 27ft·lbf)

3. INSPECT FOR MANUAL TRANSMISSION OIL INFO

4. INSPECT FOR MANUAL TRANSMISSION OIL LEAK

Last Modified: 3-27-2012	6.4 T	From: 201203
Model Year: 2013	Model: FR-S	Doc ID: RM000001P1800PX
Title: TL70 MANUAL TRANSMISSION / TRANSAXLE: MANUAL TRANSMISSION SYSTEM: PROBLEM SYMPTOMS TABLE (2013 FR-S)		

PROBLEM SYMPTOMS TABLE

HINT:

Use the table below to help determine the cause of problem symptoms. If multiple suspected areas are listed, the potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.

Manual Transmission System

SYMPTOM	SUSPECTED AREA	SEE PAGE
Abnormal noise	Oil level (Low)	INFO
	Oil (Wrong)	INFO
	Synchronizer ring (Input shaft) (Worn or damaged)	INFO
	Synchronizer ring (Output shaft) (Worn or damaged)	INFO
	Gear (Output shaft) (Worn or damaged)	INFO
	Gear (Counter shaft) (Worn or damaged)	INFO
	Bearing (Input shaft) (Worn or damaged)	INFO
	Bearing (Output shaft) (Worn or damaged)	INFO
	Bearing (Counter shaft) (Worn or damaged)	INFO
Oil leak	Oil level (High)	INFO
	Gasket (Damaged)	INFO
	Oil seal (Worn or damaged)	INFO
Hard shifting or impossible to shift	Oil (Wrong)	INFO
	Clutch (Dragging)	INFO
	Shift fork (Input shaft) (Worn)	INFO
	Shift fork (Output shaft) (Worn)	INFO
	Shift fork (Counter shaft) (Worn)	INFO
	Synchronizer ring (Input shaft) (Worn or damaged)	INFO
	Synchronizer ring (Output shaft) (Worn or damaged)	INFO
	Synchronizer ring (Counter shaft) (Worn or	INFO

	damaged)	
	Shift key spring (Output shaft) (Worn or damaged)	INFO
	Shift key spring (Counter shaft) (Worn or damaged)	INFO
	Gear (Output shaft) (Worn or damaged)	INFO
	Gear (Counter shaft) (Worn or damaged)	INFO
	Hub sleeve (Output shaft) (Worn or damaged)	INFO
	Hub sleeve (Counter shaft) (Worn or damaged)	INFO
Jumps out of gear or shift lever moves excessively	Shift detent ball spring (Damaged)	INFO
	Shift fork (Output shaft) (Worn)	INFO
	Shift fork (Counter shaft) (Worn)	INFO
	Hub sleeve (Output shaft) (Worn or damaged)	INFO
	Hub sleeve (Counter shaft) (Worn or damaged)	INFO
	Gear (Output shaft) (Worn or damaged)	INFO
	Gear (Counter shaft) (Worn or damaged)	INFO
	Bearing (Output shaft) (Worn or damaged)	INFO
	Bearing (Counter shaft) (Worn or damaged)	INFO



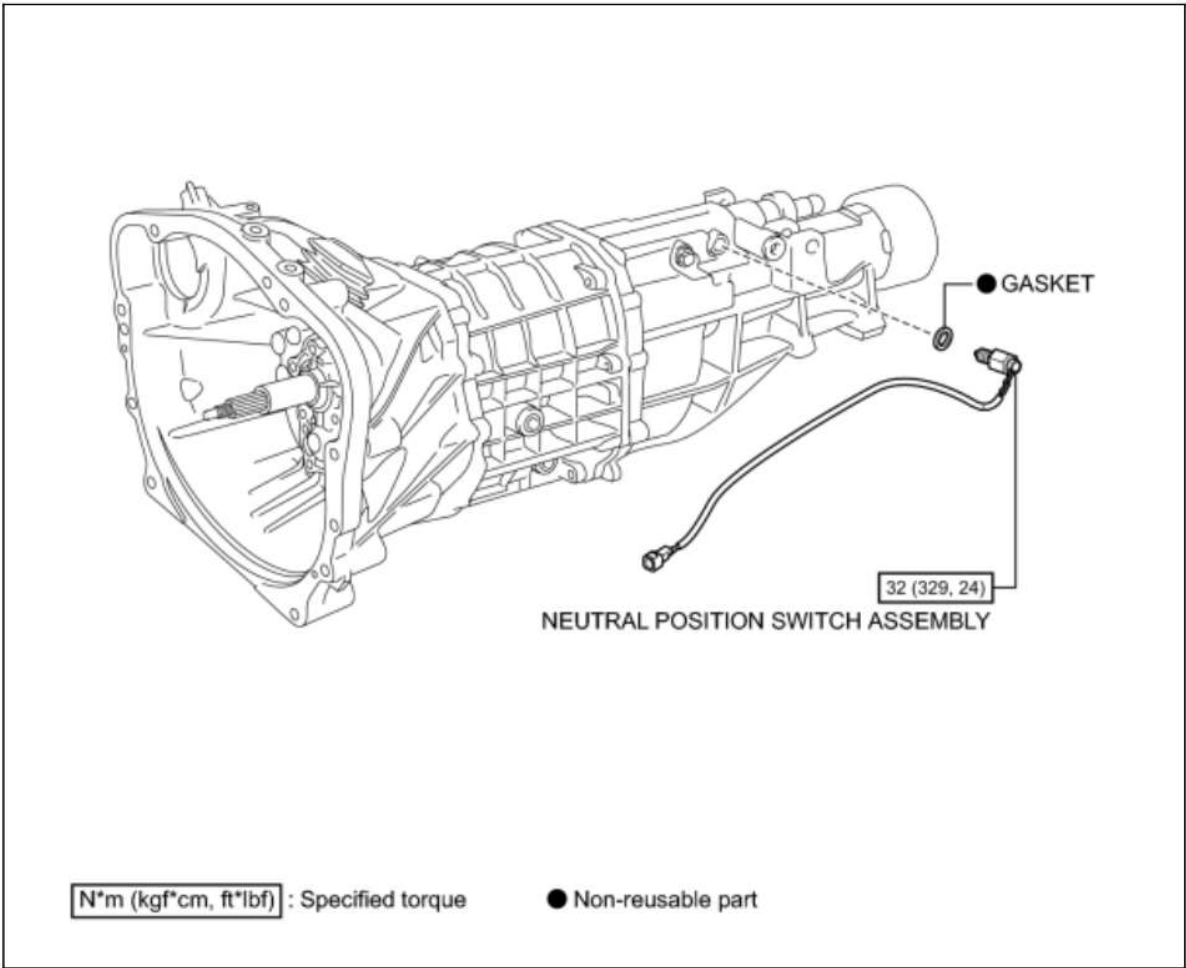
TOYOTA

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Last Modified: 3-27-2012	6.4 K	From: 201203
Model Year: 2013	Model: FR-S	Doc ID: RM0000032KE02VX
Title: TL70 MANUAL TRANSMISSION / TRANSAXLE: NEUTRAL POSITION SWITCH: COMPONENTS (2013 FR-S)		

COMPONENTS

ILLUSTRATION



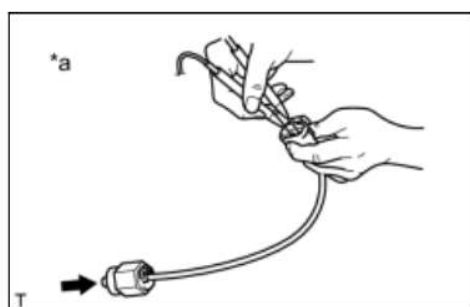
Last Modified: 3-27-2012	6.4 G	From: 201203
Model Year: 2013	Model: FR-S	Doc ID: RM0000017MP03JX
Title: TL70 MANUAL TRANSMISSION / TRANSAXLE: NEUTRAL POSITION SWITCH: INSPECTION (2013 FR-S)		

INSPECTION

1. INSPECT NEUTRAL POSITION SWITCH ASSEMBLY

(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:



TESTER CONNECTION	SWITCH CONDITION	SPECIFIED CONDITION
1 - 2	Pushed	Below 1 Ω
1 - 2	Released	10 k Ω or higher

Text in Illustration

*a	Component without harness connected (Neutral Position Switch Assembly)
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If the result is not as specified, replace the neutral position switch assembly.



Last Modified: 3-27-2012	6.4 A	From: 201203
Model Year: 2013	Model: FR-S	Doc ID: RM000001YVJ04CX
Title: TL70 MANUAL TRANSMISSION / TRANSAXLE: NEUTRAL POSITION SWITCH: INSTALLATION (2013 FR-S)		

INSTALLATION

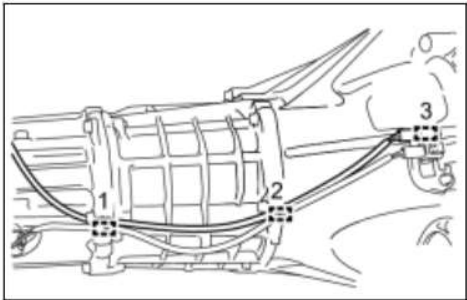
1. INSTALL NEUTRAL POSITION SWITCH ASSEMBLY

- (a) Using a 19 mm union nut wrench, install the neutral position switch assembly with a new gasket to the manual transmission assembly.

Torque: 32 N·m (329 kgf·cm, 24ft·lbf)

NOTICE:

Use the formula to calculate special torque values for situations where a union nut wrench is combined with a torque wrench INFO .



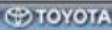
- (b) In the order indicated in the illustration, engage the 3 clamps in place, and connect the back-up light switch assembly wire and neutral position switch assembly wire.

HINT:

Install the wire harness so that there is slack on the connector side.

2. INSTALL MANUAL TRANSMISSION ASSEMBLY

INFO



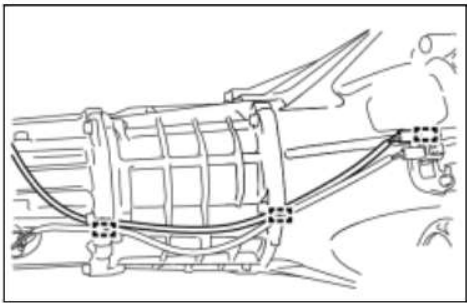
Last Modified: 3-27-2012	6.4 A	From: 201203
Model Year: 2013	Model: FR-S	Doc ID: RM000001YVL04CX
Title: TL70 MANUAL TRANSMISSION / TRANSAXLE: NEUTRAL POSITION SWITCH: REMOVAL (2013 FR-S)		

REMOVAL

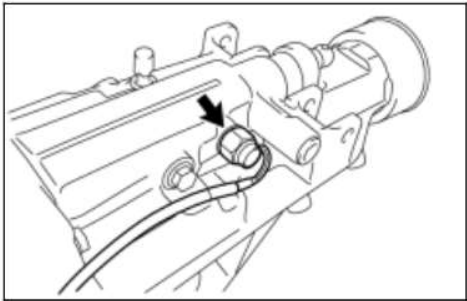
1. REMOVE MANUAL TRANSMISSION ASSEMBLY

INFO

2. REMOVE NEUTRAL POSITION SWITCH ASSEMBLY



(a) Disconnect the 3 clamps.

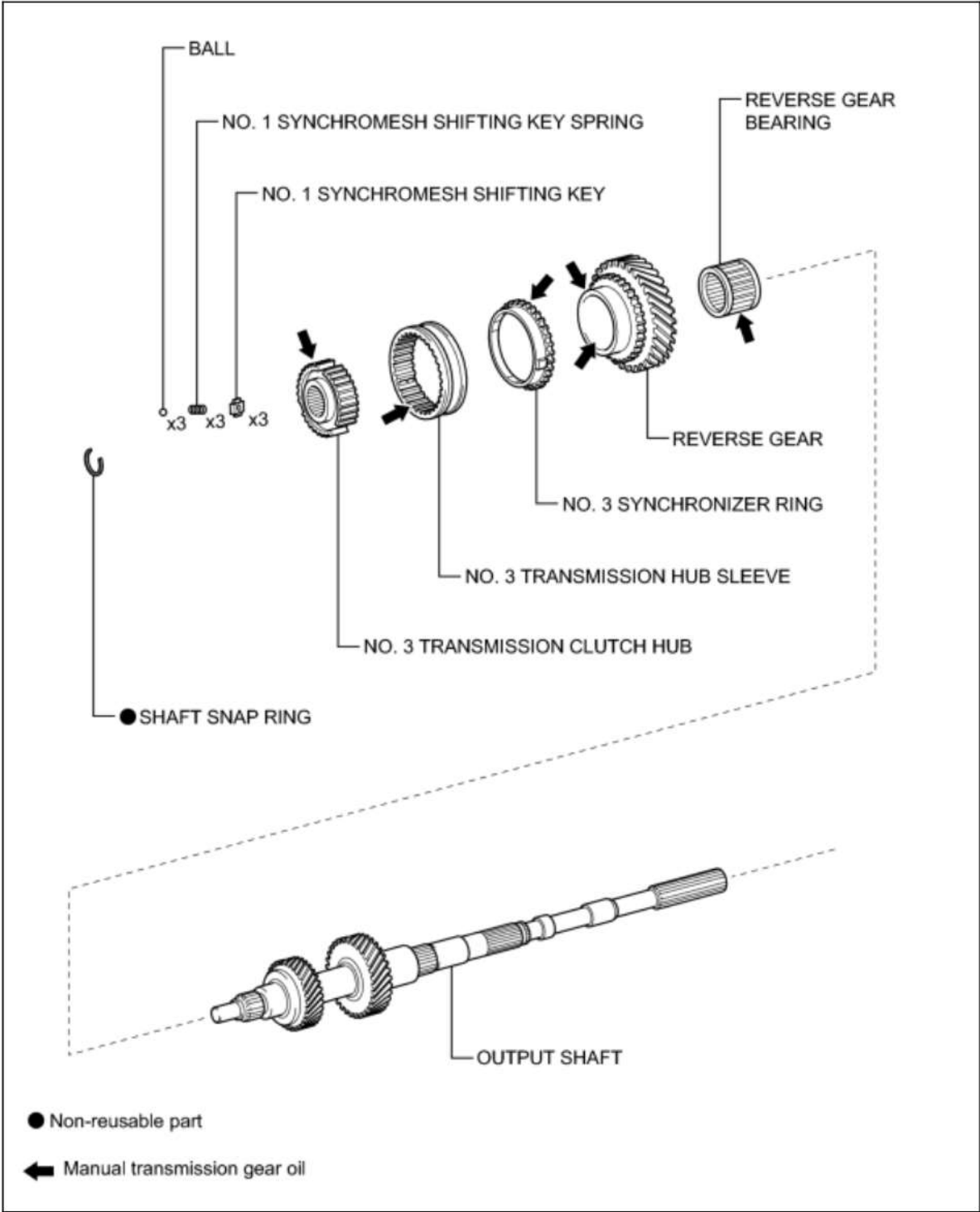


(b) Using a 19 mm union nut wrench, remove the neutral position switch assembly and gasket from the manual transmission assembly.

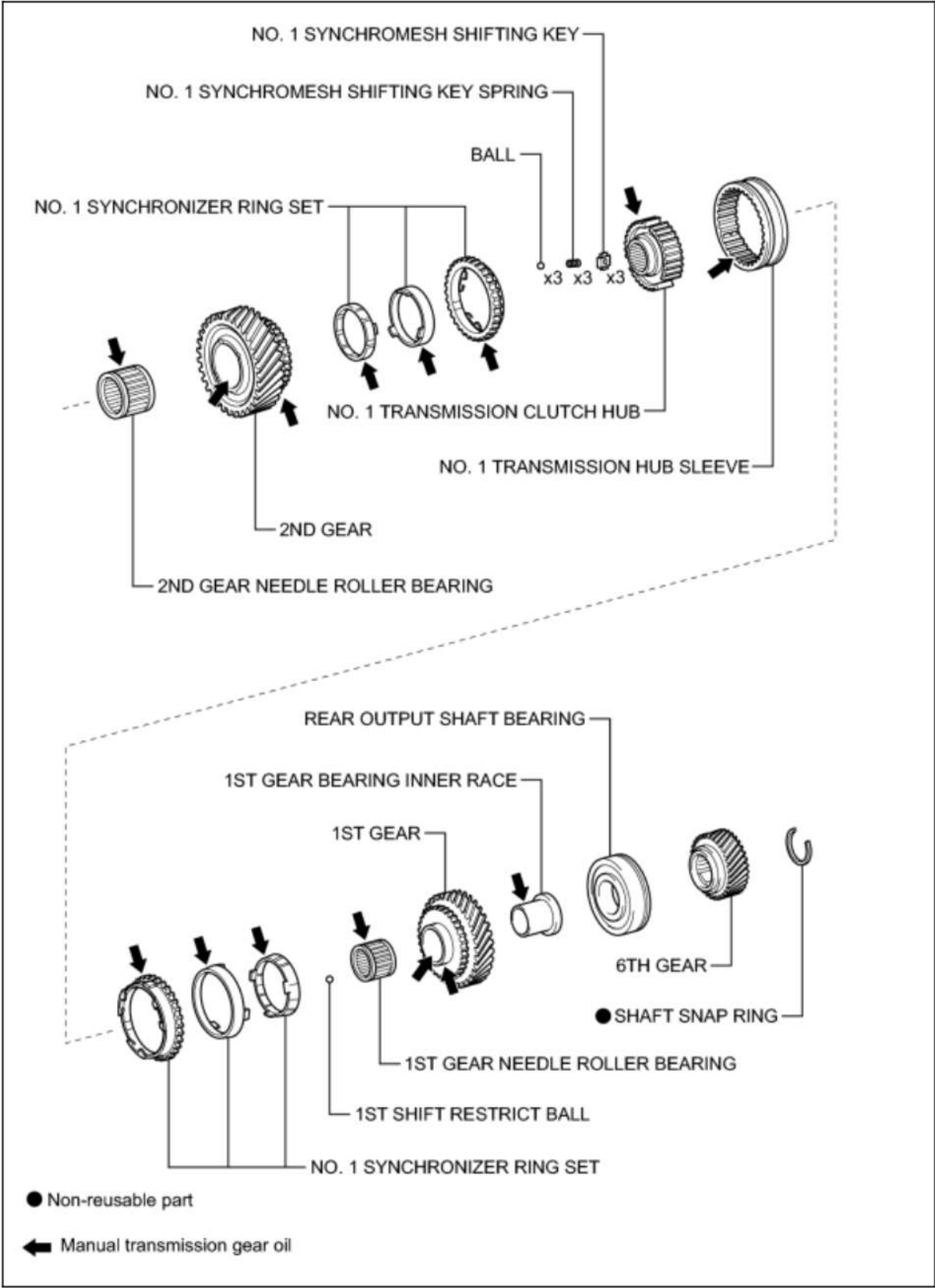
Last Modified: 3-27-2012	6.4 K	From: 201203
Model Year: 2013	Model: FR-S	Doc ID: RM000002H8K00DX
Title: TL70 MANUAL TRANSMISSION / TRANSAXLE: OUTPUT SHAFT: COMPONENTS (2013 FR-S)		

COMPONENTS

ILLUSTRATION



ILLUSTRATION



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Last Modified: 3-27-2012	6.4 A	From: 201203
Model Year: 2013	Model: FR-S	Doc ID: RM000002RHY006X
Title: TL70 MANUAL TRANSMISSION / TRANSAXLE: OUTPUT SHAFT: DISASSEMBLY (2013 FR-S)		

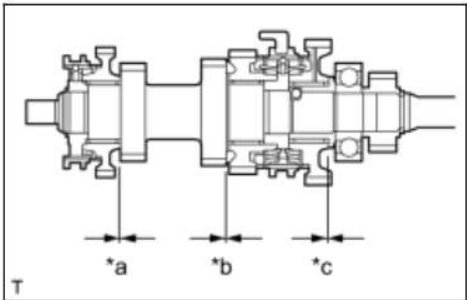
DISASSEMBLY

1. INSPECT THRUST CLEARANCE

(a) Using a feeler gauge, measure the thrust clearance of the 1st gear, 2nd gear and reverse gear.

Text in Illustration

*a	Reverse gear thrust clearance
*b	2nd gear thrust clearance
*c	1st gear thrust clearance



Standard Clearance:

GEAR	STANDARD CLEARANCE MM (IN.)	MAXIMUM CLEARANCE MM (IN.)
1st gear	0.15 to 0.40 (0.00590 to 0.0157)	0.40 (0.0157)
2nd gear	0.10 to 0.45 (0.000394 to 0.0177)	0.45 (0.0177)
Reverse gear	0.10 to 0.45 (0.000394 to 0.0177)	0.45 (0.0177)

HINT:

If the clearance exceeds the maximum, replace the corresponding gear, transmission clutch hub, needle roller bearing and output shaft with a new ones.

2. INSPECT RADIAL CLEARANCE

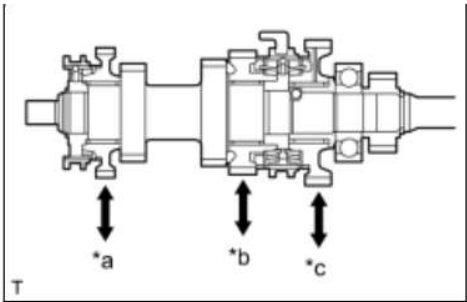
(a) Using a dial indicator, measure the radial clearance of the 1st gear, 2nd gear and reverse gear.

Text in Illustration

*a	Reverse gear radial clearance
*b	2nd gear radial clearance
*c	1st gear radial clearance

Standard Clearance:

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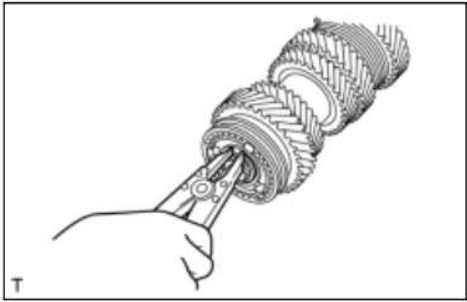


GEAR	STANDARD CLEARANCE MM (IN.)	MAXIMUM CLEARANCE MM (IN.)
1st gear	0.015 to 0.066 (0.000590 to 0.00260)	0.066 (0.00260)
2nd gear	0.015 to 0.066 (0.000590 to 0.00260)	0.066 (0.00260)
Reverse gear	0.015 to 0.066 (0.000590 to 0.00260)	0.066 (0.00260)

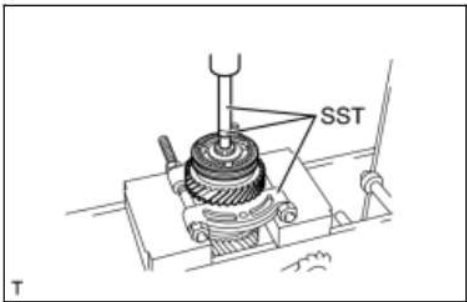
HINT:

If the clearance exceeds the maximum, replace the corresponding gear, needle roller bearing and output shaft with a new ones.

3. REMOVE REVERSE GEAR



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



(b) Using SST and a press, remove the No. 3 transmission clutch hub, No. 3 transmission hub sleeve, reverse gear, No. 3 synchronizer ring and reverse gear bearing from the output shaft.

SST: 09950-00020

SST: 09950-60010

09951-00230

SST: 09950-70010

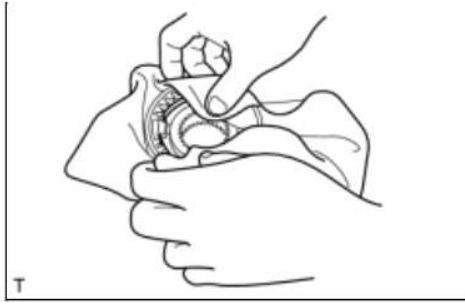
09951-07100

4. REMOVE NO. 3 TRANSMISSION HUB SLEEVE

(a) Remove the No. 3 transmission hub sleeve, and then remove the 3 No. 1 synchromesh shifting keys, 3 No. 1 synchromesh shifting key springs and 3 balls from the No. 3 transmission clutch hub.

NOTICE:

- Use a cloth to prevent the No. 1 synchromesh shifting



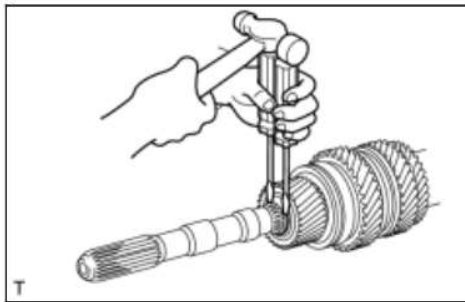
keys, No. 1 synchromesh shifting key springs and balls from popping out.

- Do not deform the No. 1 synchromesh shifting key spring.

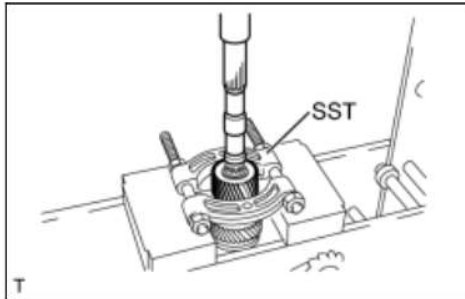
HINT:

During this operation, keep intact the No. 3 transmission clutch hub and No. 1 synchromesh shifting key.

5. REMOVE 6TH GEAR



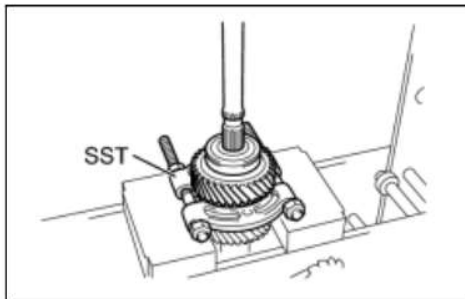
- (a) Using 2 screwdrivers and a hammer, remove the shaft snap ring.



- (b) Using SST and a press, remove the 6th gear.

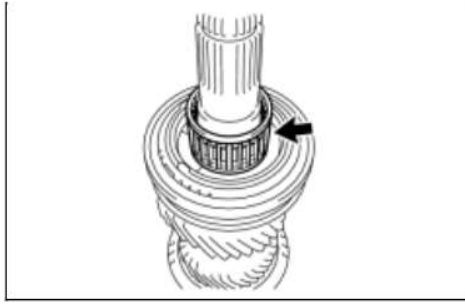
SST: 09950-00020

6. REMOVE 1ST GEAR



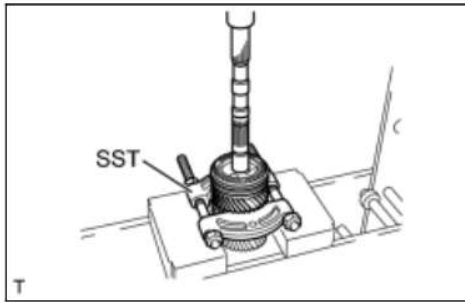
- (a) Using SST and a press, remove the rear output shaft bearing, 1st gear and 1st gear bearing inner race.

SST: 09950-00020



- (b) Remove the 1st gear needle roller bearing, 1st shift restrict ball and No. 1 synchronizer ring set.

7. REMOVE 2ND GEAR



- (a) Using SST and a press, remove the 2nd gear, No. 1 transmission clutch hub and 2nd gear needle roller bearing from the output shaft.

SST: 09950-00020

8. REMOVE NO. 1 SYNCHRONIZER RING SET

- (a) Remove the No. 1 synchronizer ring set.

9. REMOVE NO. 1 TRANSMISSION HUB SLEEVE

- (a) Remove the No. 1 transmission hub sleeve, and then remove the 3 No. 1 synchromesh shifting keys, 3 No. 1 synchromesh shifting key springs and 3 balls from the No. 1 transmission clutch hub.



NOTICE:

- Use a cloth to prevent the No. 1 synchromesh shifting keys, No. 1 synchromesh shifting key springs and balls from popping out.
- Do not deform the No. 1 synchromesh shifting key spring.

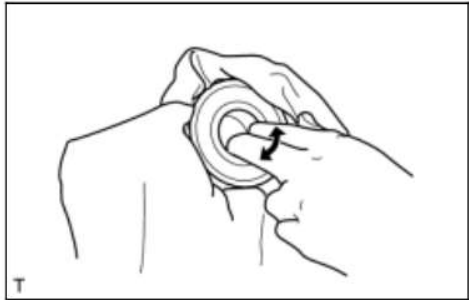
HINT:

During this operation, keep the No. 1 transmission clutch hub and No. 1 synchromesh shifting key intact.

Last Modified: 3-27-2012	6.4 G	From: 201203
Model Year: 2013	Model: FR-S	Doc ID: RM00000590T000X
Title: TL70 MANUAL TRANSMISSION / TRANSAXLE: OUTPUT SHAFT: INSPECTION (2013 FR-S)		

INSPECTION

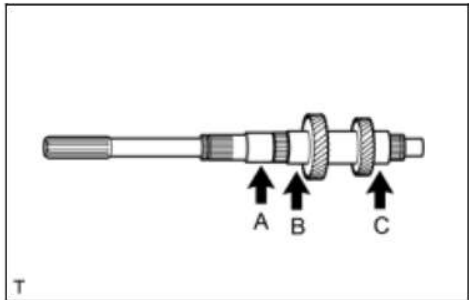
1. INSPECT REAR OUTPUT SHAFT BEARING



- (a) Check the rear output shaft bearing.
- Standard:
Abnormal fitting, interfering, abnormal noise, or looseness should not be found.

HINT:
If any abnormality is found, replace the rear output shaft bearing with a new one.

2. INSPECT OUTPUT SHAFT



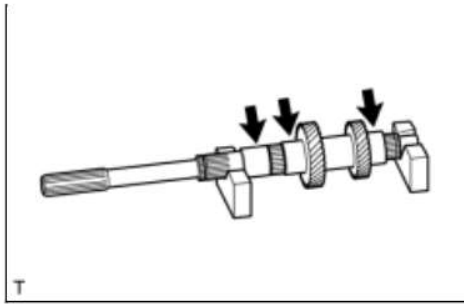
- (a) Using a micrometer, measure the outer diameter of each point.
- Standard Outer Diameter:

PART	STANDARD OUTER DIAMETER MM (IN.)	MINIMUM OUTER DIAMETER MM (IN.)
A	31.984 to 32.000 (1.25921 to 1.25984)	31.984 (1.25921)
B	42.984 to 43.000 (1.69228 to 1.69291)	42.984 (1.69228)
C	40.984 to 41.000 (1.61354 to 1.61417)	40.984 (1.61354)

HINT:
If the outer diameter is less than minimum, replace the output shaft with a new one.

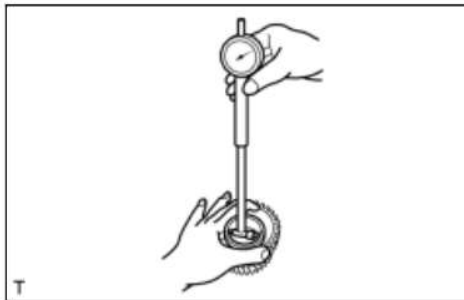
- (b) Using V-blocks and a dial indicator, measure the runout of each location as shown in the illustration.
- Standard runout:
0.03 mm (0.00118 in.) or less

HINT:



If the runout is outside the specification, replace the output shaft with a new one.

3. INSPECT REVERSE GEAR



- (a) Using a cylinder gauge, measure the inner diameter of the reverse gear.

Standard inside diameter:

47.015 to 47.040 mm (1.85098 to 1.85197 in.)

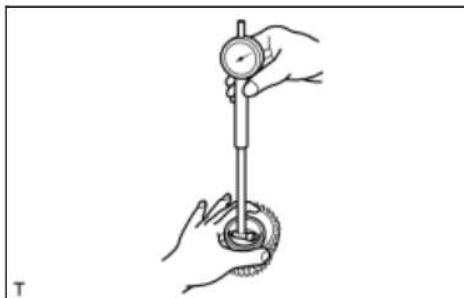
Maximum inside diameter:

47.040 mm (1.85197 in.)

HINT:

If the inner diameter exceeds the maximum, replace the reverse gear with a new one.

4. INSPECT 1ST GEAR



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

Standard inside diameter:

46.315 to 46.340 mm (1.82343 to 1.82441 in.)

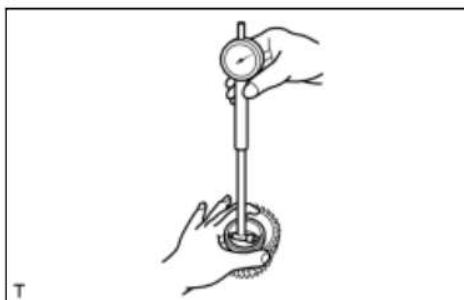
Maximum inside diameter:

46.340 mm (1.82441 in.)

HINT:

If the inside diameter exceeds the maximum, replace the 1st gear with a new one.

5. INSPECT 2ND GEAR



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

Standard inside diameter:

49.015 to 49.040 mm (1.92972 to 1.93071 in.)

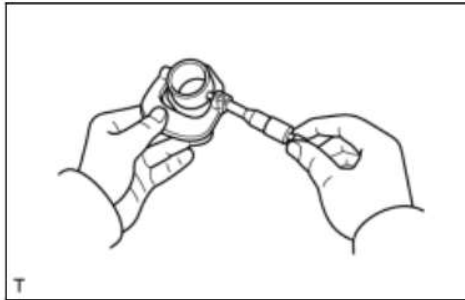
Maximum inside diameter:

49.040 mm (1.93071 in.)

HINT:

If the inside diameter exceeds the maximum, replace the 2nd gear with a new one.

6. INSPECT 1ST GEAR BEARING INNER RACE



- (a) Using a micrometer, measure the outside diameter of the 1st gear bearing inner race.

Standard outer diameter:

40.284 to 40.300 mm (1.58598 to 1.58661 in.)

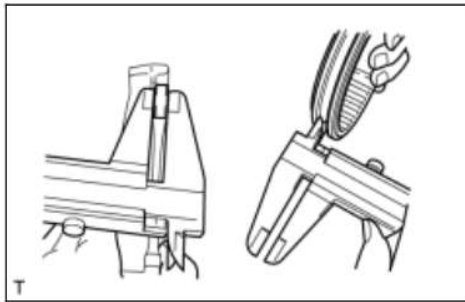
Minimum outer diameter:

40.284 mm (1.58598 in.)

HINT:

If the outside diameter is less than minimum, replace the 1st gear bearing inner race with a new one.

7. INSPECT NO. 1 TRANSMISSION HUB SLEEVE CLEARANCE



- (a) Using a vernier caliper, measure the claw width of the No. 1 gear shift fork.

Standard width:

7.9 to 8.0 mm (0.311 to 0.315 in.)

Minimum width:

7.9 mm (0.311 in.)

HINT:

If the width is less than the minimum, replace the No. 1 gear shift fork with a new one.

- (b) Using a vernier caliper, measure the groove of the No. 1 transmission hub sleeve, and then calculate the clearance with the No. 1 gear shift fork.

Standard clearance:

0.15 to 0.35 mm (0.00590 to 0.0138 in.)

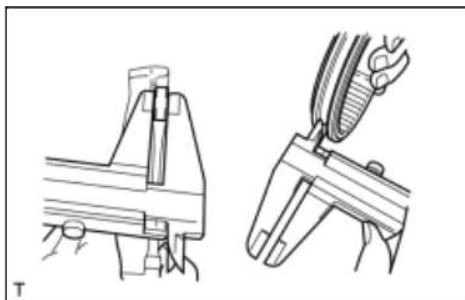
Maximum clearance:

0.35 mm (0.0138 in.)

HINT:

If the clearance exceeds the maximum, replace both the No. 1 gear shift fork and No. 1 transmission hub sleeve with a new ones.

8. INSPECT NO. 3 TRANSMISSION HUB SLEEVE CLEARANCE



- (a) Using a vernier caliper, measure the claw width of the No. 3 gear shift fork.

Standard width:

7.9 to 8.0 mm (0.311 to 0.315 in.)

Minimum width:

7.9 mm (0.311 in.)

HINT:

If the width is less than the minimum, replace the No. 3 gear

shift fork with a new one.

- (b) Using a vernier caliper, measure the groove of the No. 3 transmission hub sleeve, and then calculate the clearance with the No. 3 gear shift fork.

Standard clearance:

0.15 to 0.35 mm (0.00590 to 0.0138 in.)

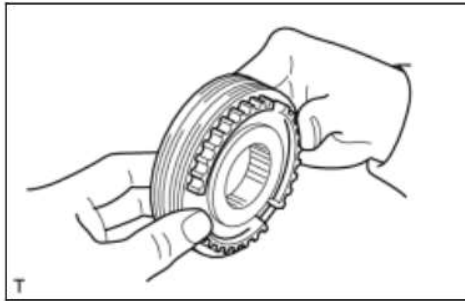
Maximum clearance:

0.35 mm (0.0138 in.)

HINT:

If the clearance exceeds the maximum, replace both the No. 3 gear shift fork and No. 3 transmission hub sleeve with a new ones.

9. INSPECT NO. 1 TRANSMISSION HUB SLEEVE



- (a) Check that the spline gear edges of the No. 1 transmission hub sleeve are not worn down.

HINT:

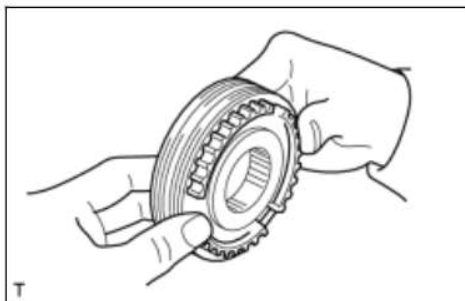
If it shows any sign of wear, replace the No. 1 transmission hub sleeve with a new one.

- (b) Install the No. 1 transmission hub sleeve to the No. 1 transmission clutch hub, and then check that it slides smoothly.

HINT:

If it does not slide smoothly, replace the No. 1 transmission hub sleeve and No. 1 transmission clutch hub with a new one.

10. INSPECT NO. 3 TRANSMISSION HUB SLEEVE



- (a) Check that the spline gear edges of the No. 3 transmission hub sleeve are not worn down.

HINT:

If it shows any sign of wear, replace the No. 3 transmission hub sleeve with a new one.

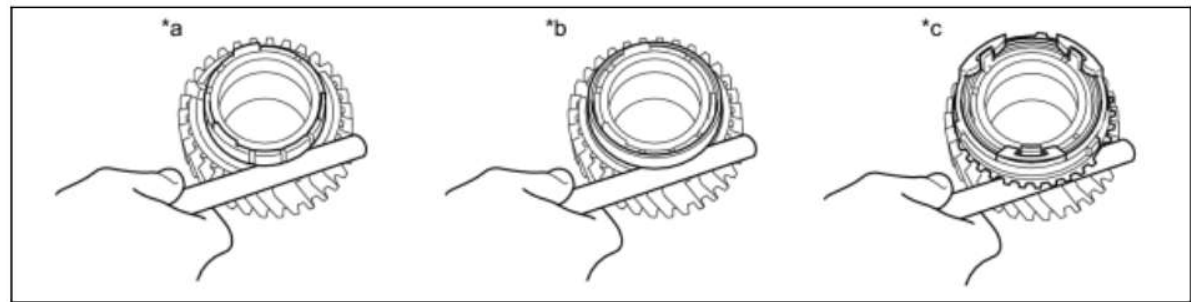
- (b) Install the No. 3 transmission hub sleeve to the No. 3 transmission clutch hub, and then check that it slides smoothly.

HINT:

If it does not slide smoothly, replace the No. 3 transmission hub sleeve and No. 3 transmission clutch hub with a new one.

11. INSPECT NO. 1 SYNCHRONIZER RING SET (for 1st Gear)

- (a) Apply manual transmission gear oil to the taper cone of the 1st gear and No. 1 synchronizer ring set, and then hold the No. 1 synchronizer ring set in position with your hand to measure the clearance between the No. 1 synchronizer ring set and the 1st gear by using a feeler gauge.



Text in Illustration

*a	Inner	*b	Middle
*c	Outer	-	-

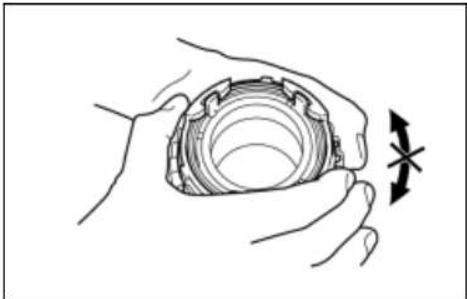
Standard Clearance:

LOCATION	STANDARD CLEARANCE MM (IN.)
Inner	0.48 to 1.12 (0.0189 to 0.0441)
Middle	0.38 to 1.22 (0.0150 to 0.0480)
Outer	0.8 to 1.8 (0.0315 to 0.0709)

NOTICE:
Check the entire circumference of the gear.

HINT:

If the result is not as specified, replace the No. 1 synchronizer ring set with a new one.



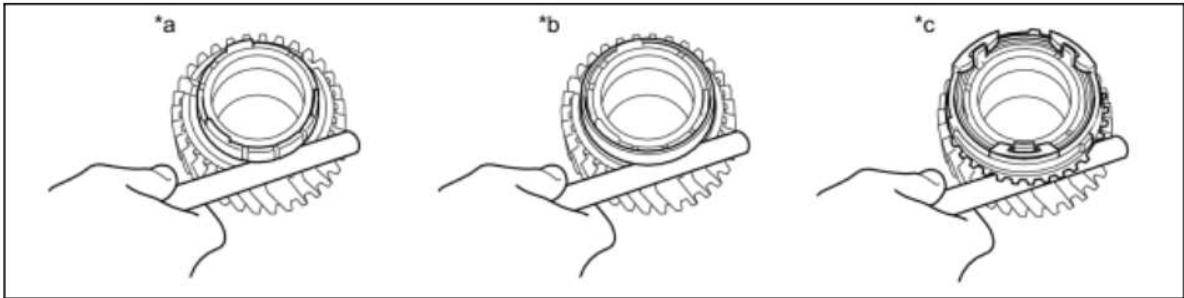
- (b) Apply manual transmission gear oil to the taper cone of the 1st gear, and then hold the No. 1 synchronizer ring set in position with your hand to check that it does not slide in the circumferential direction.

HINT:
If the No. 1 synchronizer ring set slides, replace the No. 1 synchronizer ring set with a new one.

12. INSPECT NO. 1 SYNCHRONIZER RING SET (for 2nd Gear)

- (a) Apply manual transmission gear oil to the taper cone of the 2nd gear and No. 1 synchronizer ring set, and then hold the No. 1 synchronizer ring set in position with your hand to measure the

clearance between the No. 1 synchronizer ring set and the 2nd gear by using a feeler gauge.



Text in Illustration

*a	Inner	*b	Middle
*c	Outer	-	-

Standard Clearance:

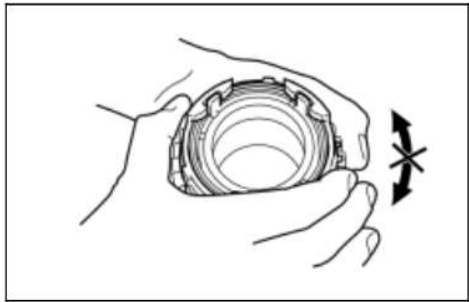
LOCATION	STANDARD CLEARANCE MM (IN.)
Inner	0.48 to 1.12 (0.0189 to 0.0441)
Middle	0.38 to 1.22 (0.0150 to 0.0480)
Outer	0.8 to 1.8 (0.0315 to 0.0709)

NOTICE:

Check the entire circumference of the gear.

HINT:

If the result is not as specified, replace the No. 1 synchronizer ring set with a new one.



(b) Apply manual transmission gear oil to the taper cone of the 2nd gear, and then hold the No. 1 synchronizer ring in position with your hand to check that it does not slide in the circumferential direction.

HINT:

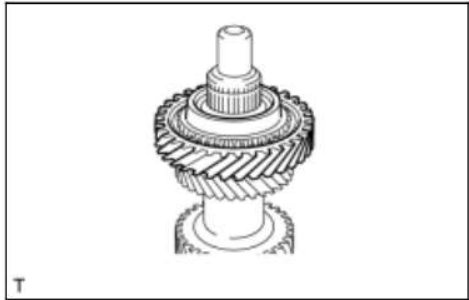
If the No. 1 synchronizer ring set slides, replace the No. 1 synchronizer ring set with a new one.



Last Modified: 3-27-2012	6.4 A	From: 201203
Model Year: 2013	Model: FR-S	Doc ID: RM000002RHZ006X
Title: TL70 MANUAL TRANSMISSION / TRANSAXLE: OUTPUT SHAFT: REASSEMBLY (2013 FR-S)		

REASSEMBLY

1. INSTALL REVERSE GEAR

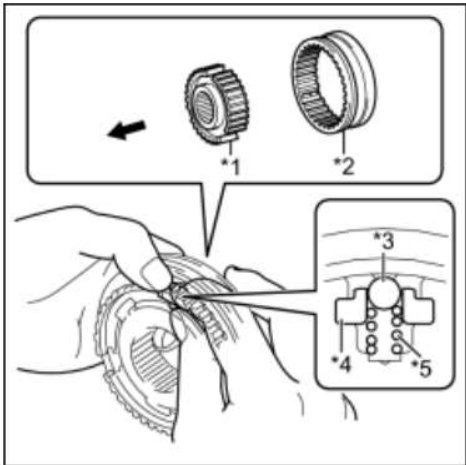


- (a) Apply manual transmission gear oil to the mounting point of the output shaft, reverse gear bearing and inside surface and taper cone of the reverse gear.

- (b) Install the reverse gear bearing and reverse gear to the output shaft.

2. INSTALL NO. 3 TRANSMISSION HUB SLEEVE

- (a) Apply manual transmission gear oil to the moving parts of the No. 3 transmission clutch hub.



Text in Illustration

*1	No. 3 Transmission Clutch Hub
*2	No. 3 Transmission Hub Sleeve
*3	Ball
*4	No. 1 Synchromesh Shifting Key
*5	No. 1 Synchromesh Shifting Key Spring
	Front Side

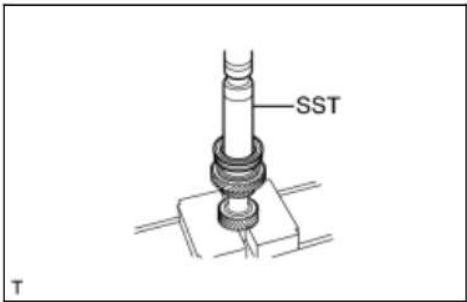


(b) As shown in the illustration, install the No. 3 transmission hub sleeve to the No. 3 transmission clutch hub. And install the 3 No. 1 synchromesh shifting keys and 3 synchromesh shifting key springs all together, and then install the 3 balls.

HINT:

- Install the ball while holding down the No. 1 synchromesh shifting key spring.
- After the installation, let the No. 1 synchromesh shifting key spring settle down.

3. INSTALL NO. 3 TRANSMISSION CLUTCH HUB



(a) Install the No. 3 synchronizer ring to the reverse gear.

(b) Using SST and a press, install the No. 3 transmission clutch hub.

SST: 09309-37010

HINT:

- Align the No. 3 transmission clutch hub and the No. 3 synchronizer ring so that they can fit together.
- After the No. 3 transmission clutch hub is installed, check that the No. 3 synchronizer ring moves in the thrust direction.
- Make sure to press fit the No. 3 transmission clutch hub until it touches the output shaft.

4. INSTALL SHAFT SNAP RING (for No. 3 transmission clutch hub)

(a) Select a shaft snap ring that is suitable to retain the specific thrust clearance between the No. 3 transmission clutch hub and shaft snap ring.

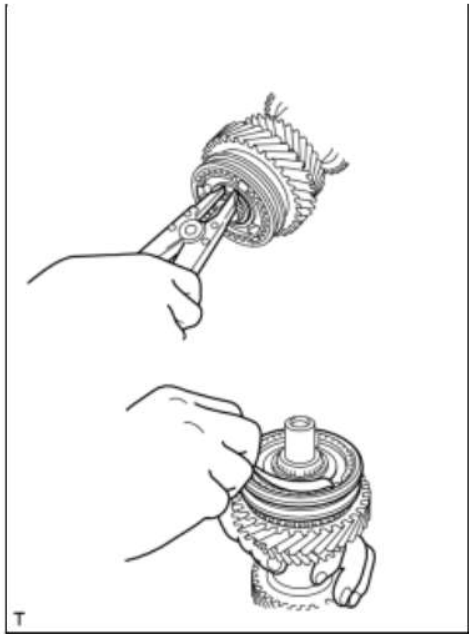
Standard clearance:
0 to 0.1 mm (0 to 0.00394 in.)

HINT:

Select the thickest shaft snap ring possible for installation.

Shaft Snap Ring Thickness

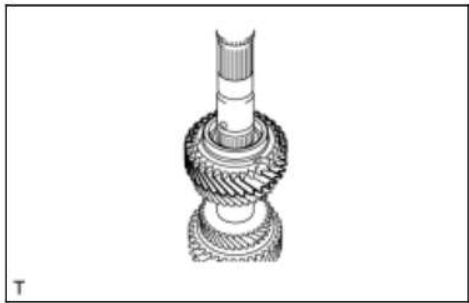
PART NO.	THICKNESS MM (IN.)	MARK
SU003-03581	1.80 (0.07086)	A
SU003-03582	1.85 (0.07283)	B



SU003-03583	1.90 (0.07480)	C
SU003-03584	1.95 (0.07677)	D
SU003-03585	2.00 (0.07874)	E
SU003-03586	2.05 (0.08070)	F

(b) Using a snap ring expander, install a new shaft snap ring to the output shaft.

5. INSTALL 2ND GEAR

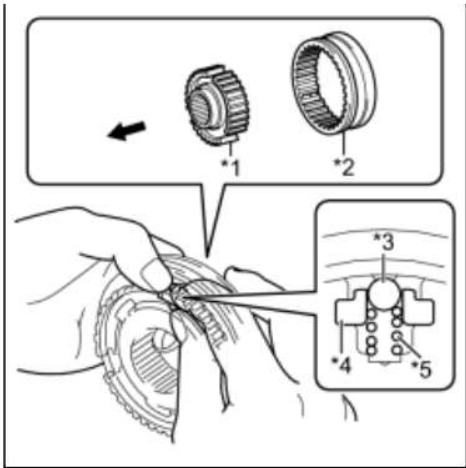


(a) Apply manual transmission gear oil to the mounting point of the output shaft, 2nd gear needle roller bearing and inside surface and taper cone of the reverse gear.

(b) Install the 2nd gear needle roller bearing and 2nd gear to the output shaft.

6. INSTALL NO. 1 TRANSMISSION HUB SLEEVE

(a) Apply manual transmission gear oil to the moving parts of the No. 1 transmission clutch hub.



Text in Illustration

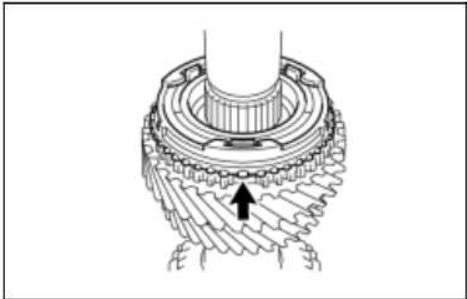
*1	No. 1 Transmission Clutch Hub
*2	No. 1 Transmission Hub Sleeve
*3	Ball
*4	No. 1 Synchromesh Shifting Key
*5	No. 1 Synchromesh Shifting Key Spring
	Front Side

(b) As shown in the illustration, install the No. 1 transmission hub sleeve to the No. 1 transmission clutch hub. And install the 3 No. 1 synchromesh shifting keys and 3 synchromesh shifting key springs all together, and then install the 3 balls.

HINT:

- Install the ball while holding down the No. 1 synchromesh shifting key spring.
- After the installation, let the No. 1 synchromesh shifting key spring settle down.

7. INSTALL NO. 1 TRANSMISSION CLUTCH HUB



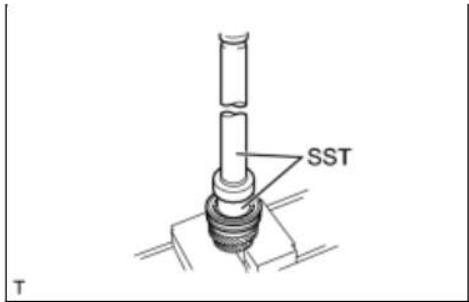
(a) Align and install the No. 1 synchronizer ring set (for 2nd gear) in the position, as shown in the illustration.

HINT:

- Align the middle ring claw with the groove in the 2nd gear.
- Align the inner ring claw with the groove in the outer ring.

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

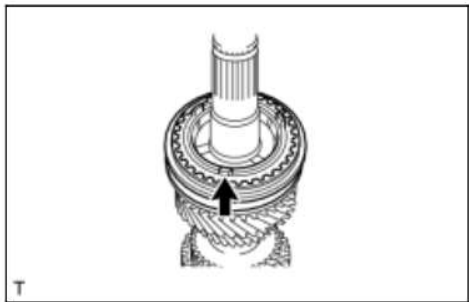
SST: 09309-35010



SST: 09631-12090

HINT:

- Align the No. 1 transmission clutch hub and the No. 1 synchronizer ring set (for 2nd gear) so that they can fit together.
- After the No. 1 transmission clutch hub is installed, check that the No. 1 synchronizer ring set (for 2nd gear) moves in the thrust direction.
- Make sure to press fit the No. 1 transmission clutch hub until it touches the output shaft.

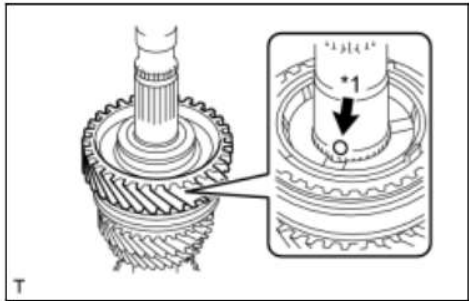


(c) Align and install the No. 1 synchronizer ring set (for 1st gear) in the position, as shown in the illustration.

HINT:

- Align the outer ring claw with the groove in No. 1 transmission clutch hub.
- Align the inner ring claw with the groove in the outer ring.

8. INSTALL 1ST GEAR



(a) After the output shaft is installed, apply manual transmission gear oil to the mounting point of the output shaft, needle roller bearing inner race, and inside surface and taper cone of the 1st gear.

(b) Install the 1st shift restrict ball, 1st gear, 1st gear needle roller bearing and 1st gear bearing inner race to the output shaft.

Text in Illustration

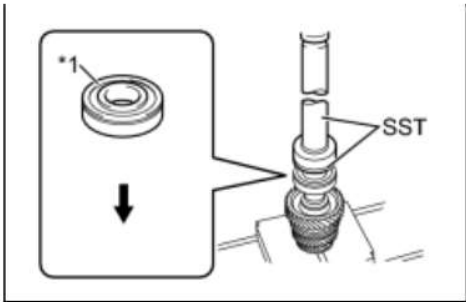
*1	1st Shift Restrict Ball
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HINT:

Align the middle ring claw with the groove in the 1st gear.

9. INSTALL REAR OUTPUT SHAFT BEARING

(a) Using SST and a press, as shown in the illustration, install the rear output shaft bearing.



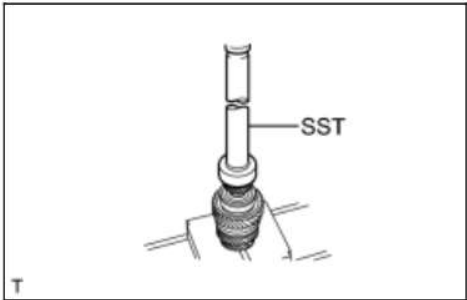
Text in Illustration

*1	Rear Output Shaft Bearing
	Front Side

SST: 09309-35010
SST: 09316-60011
09316-00021

HINT:
Make sure to press fit the rear output shaft bearing until it touches the 1st gear bearing inner race.

10. INSTALL 6TH GEAR



(a) Using SST and a press, install the 6th gear.
SST: 09309-35010

HINT:
Make sure to press fit the 6th gear until it touches the rear output shaft bearing.

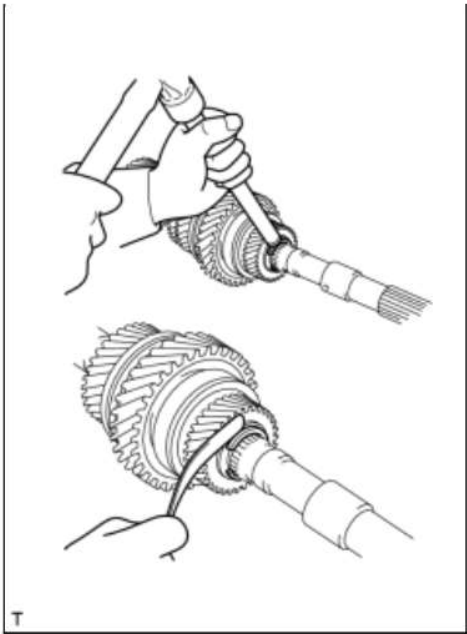
11. INSTALL SHAFT SNAP RING (for 6th gear)

(a) Select a shaft snap ring that is suitable to retain the specific thrust clearance between the 6th gear and shaft snap ring.
Standard clearance:
0 to 0.11 mm (0 to 0.00433 in.)

HINT:
Select the thickest shaft snap ring possible for installation.

Shaft Snap Ring Thickness

PART NO.	THICKNESS MM (IN.)	MARK
SU003-03564	2.67 (0.10511)	A



SU003-03565	2.73 (0.10748)	B
SU003-03566	2.79 (0.10984)	C
SU003-03567	2.85 (0.11220)	D
SU003-03568	2.91 (0.11456)	E
SU003-03569	2.97 (0.11692)	F
SU003-03570	3.03 (0.11929)	G
SU003-03571	3.09 (0.12165)	H
SU003-03572	3.15 (0.12401)	J
SU003-03573	3.21 (0.01053)	K
SU003-03574	3.27 (0.12874)	L

(b) Using a brass bar and hammer, install a new shaft snap ring to the output shaft.