

## 2006-08 TRANSMISSION

### Manual Transmission P66M-D Overhaul - MX-5 Miata

## MANUAL TRANSMISSION

### PRECAUTION

1. Clean the transmission exterior thoroughly using a steam cleaner or cleaning solvents before disassembly.

**WARNING:**

- Using compressed air can cause dirt and other particles to fly out, causing injury to the eyes. Wear protective eye wear whenever using compressed air.

**CAUTION:**

- Cleaning sealed bearings using cleaning fluids or a steam cleaner can wash the grease out of the bearing.

2. Clean the removed parts using cleaning solvent, and dry them using compressed air.
3. Clean out all holes and passages using compressed air, and check that there are no obstructions.
4. Make sure each part is cleaned before assembling.
5. Coat all movable parts with the specified oil.
6. Replace parts whenever required.
7. Remove old sealant from contact surfaces before applying new sealant.
8. Assemble the parts within **10 min** after applying sealant. Allow all sealant to cure at least **30 min** after assembling before filling the transmission with transmission oil.

**WARNING:**

- Although the stand has a self-locking brake system, there is a possibility that the brake may not hold when the transmission is held in a lopsided position on the stand. This would cause the transmission to turn suddenly, causing serious injury. Never keep the transmission tilted to one side. Always hold the rotating handle firmly when turning the transmission.

### TOP COVER COMPONENT AND EXTENSION HOUSING DISASSEMBLY

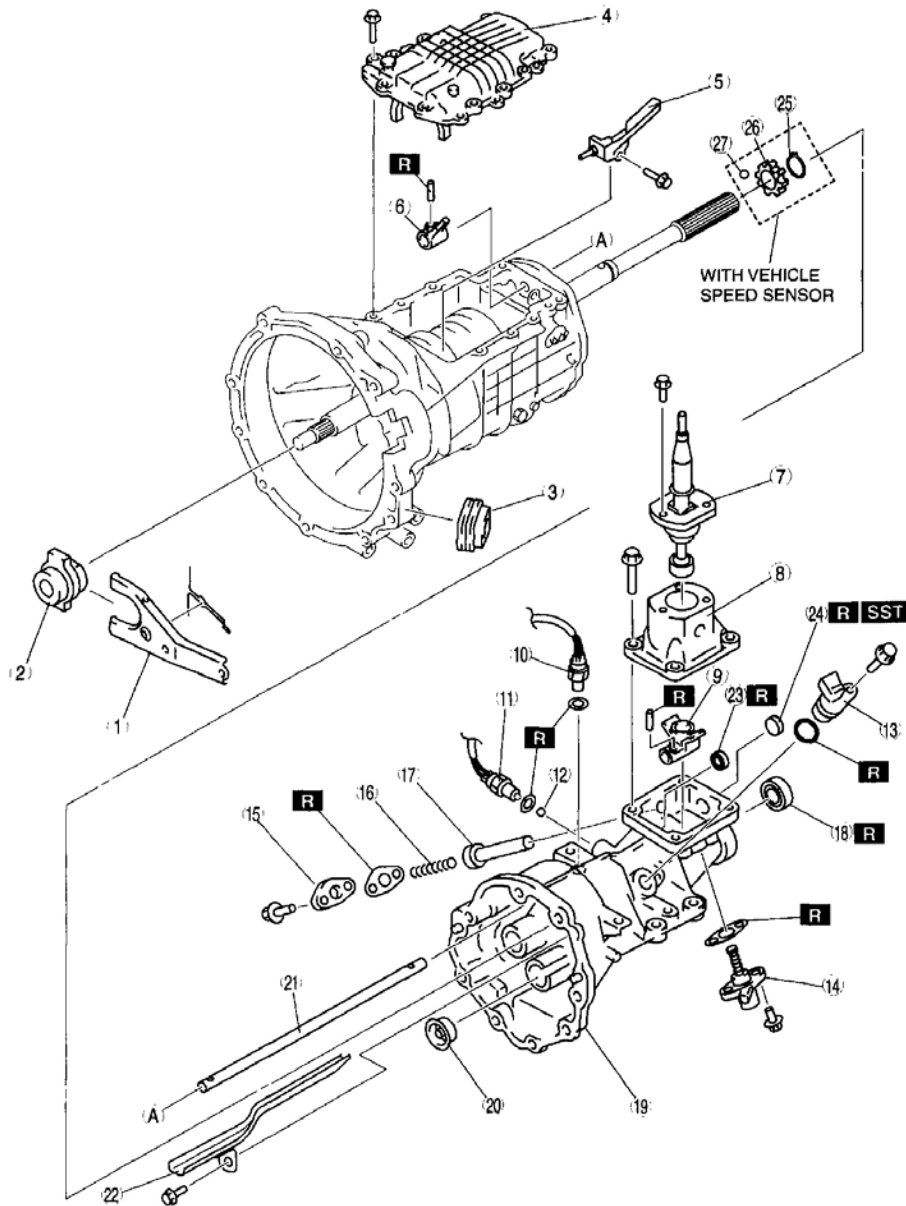
**CAUTION:**

- Remove the oil seal (extension housing and control rod) only if there is a malfunction.

1. Disassemble in the order indicated in **Fig. 1**.

# 2007 Mazda MX-5 Miata Sport

2006-08 TRANSMISSION Manual Transmission P66M-D Overhaul - MX-5 Miata



E5U511BM5001

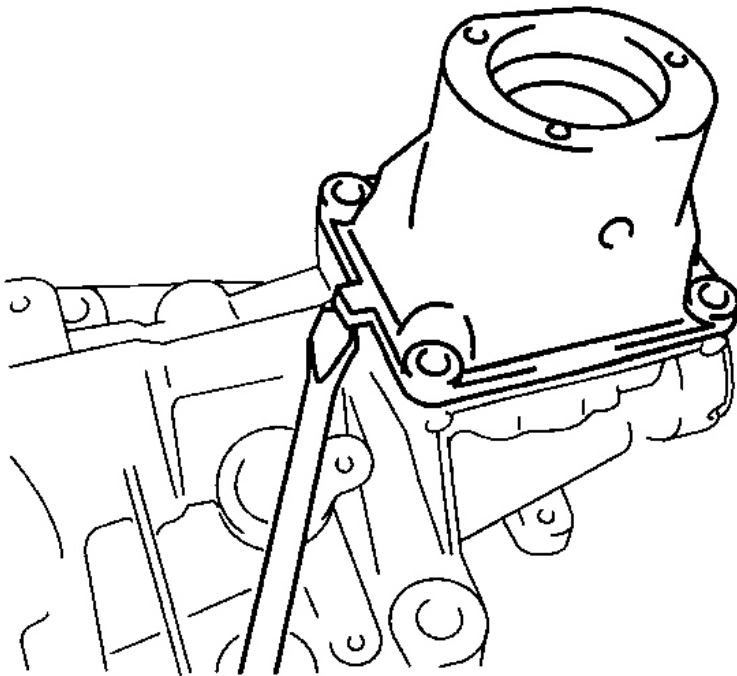
1	Release fork
2	Release collar
3	Dust boot
4	Top cover, shift component
5	Oil passage
6	Control lever
7	Change lever component
8	Control case
9	Control rod end
10	Back-up light switch
11	Neutral switch
12	Steel ball
13	Vehicle speed sensor, hole cover
14	Select spindle component

15	Spring cap
16	Select lock spindle spring
17	Select lock spindle
18	Oil seal (extension housing)
19	Extension housing
20	Funnel
21	Control rod
22	Oil passage
23	Oil seal (control rod)
24	Sealing cap
25	Retaining ring
26	Sensor rotor
27	Steel ball

**Fig. 1: Exploded View Of Top Cover Component & Extension Housing**  
Courtesy of MAZDA MOTORS CORP.

**Control Case Disassembly Note**

1. Pry the seal open at the projection on the case using a flathead screwdriver or similar tool as shown in **Fig. 2** , and then remove the control case.

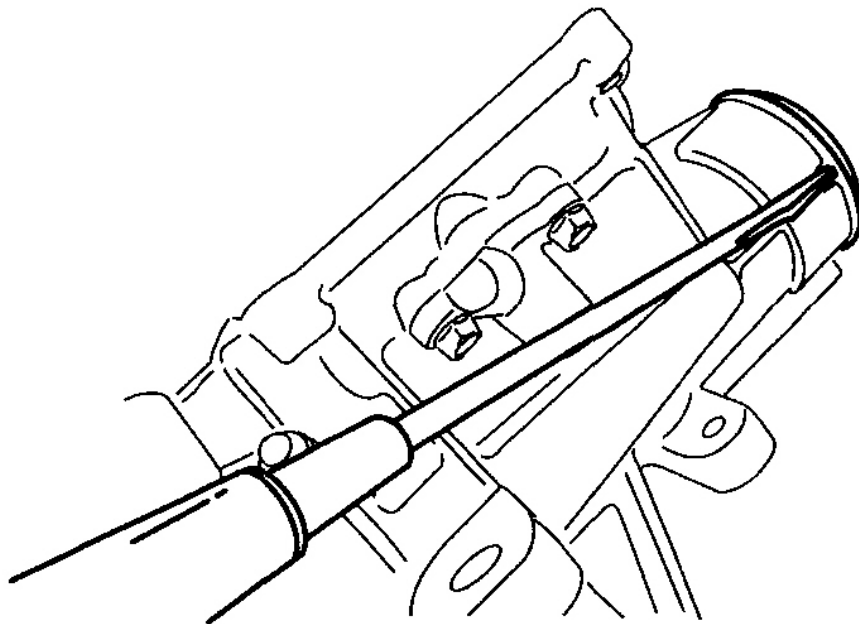


E5U511BM5067

**Fig. 2: Using Flathead Screwdriver To Pry Seal Open At Projection On Control Case**  
Courtesy of MAZDA MOTORS CORP.

**Oil Seal (Extension Housing) Removal Note**

1. Remove the oil seal using a flathead screwdriver as shown in **Fig. 3** .

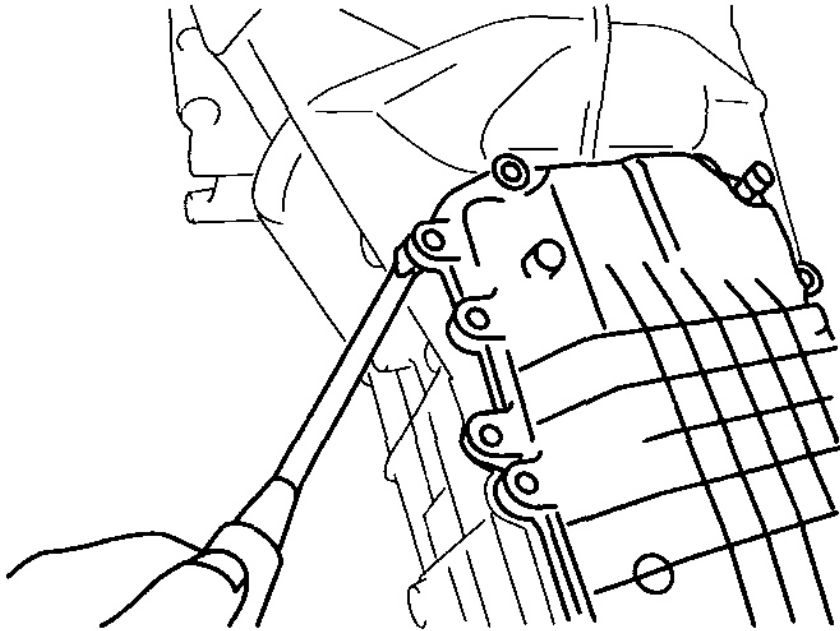


E5U511BM5080

**Fig. 3: Removing Oil Seal Using Flathead Screwdriver**  
Courtesy of MAZDA MOTORS CORP.

**Top Cover Disassembly Note**

1. Pry the seal open at the projection on the case using a flathead screwdriver or similar tool as shown in **Fig. 4** , and then remove the top cover.

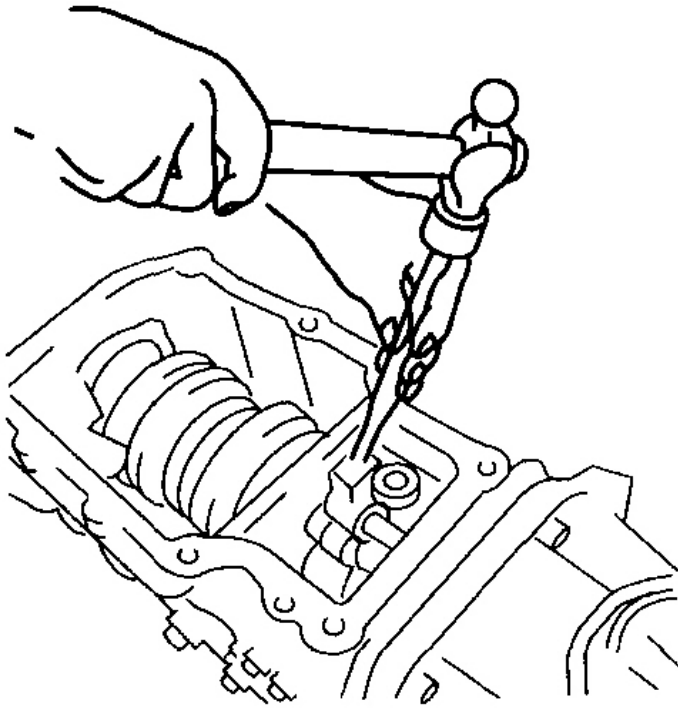


E5U511BM5068

**Fig. 4: Prying Open Seat At Projection On Case Using Flathead Screwdriver & Removing Top Cover**  
Courtesy of MAZDA MOTORS CORP.

**Extension Housing Disassembly Note**

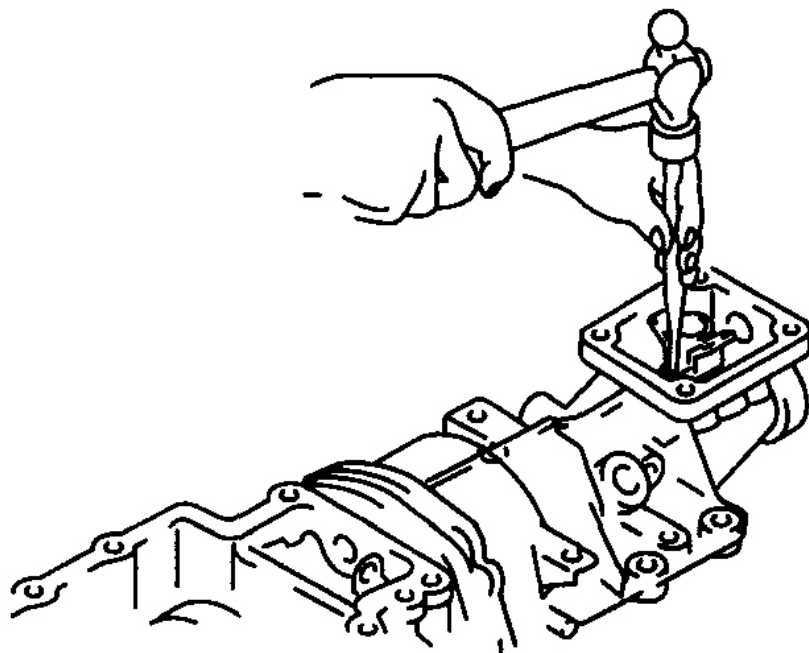
1. Remove the spring pin of the control lever using a pin punch in **Fig. 5** .



E5U511BM5009

**Fig. 5: Removing Spring Pin Of Control Lever Using Pin Punch**  
Courtesy of MAZDA MOTORS CORP.

2. Remove the spring pin of the control rod end using a pin punch in **Fig. 6** .



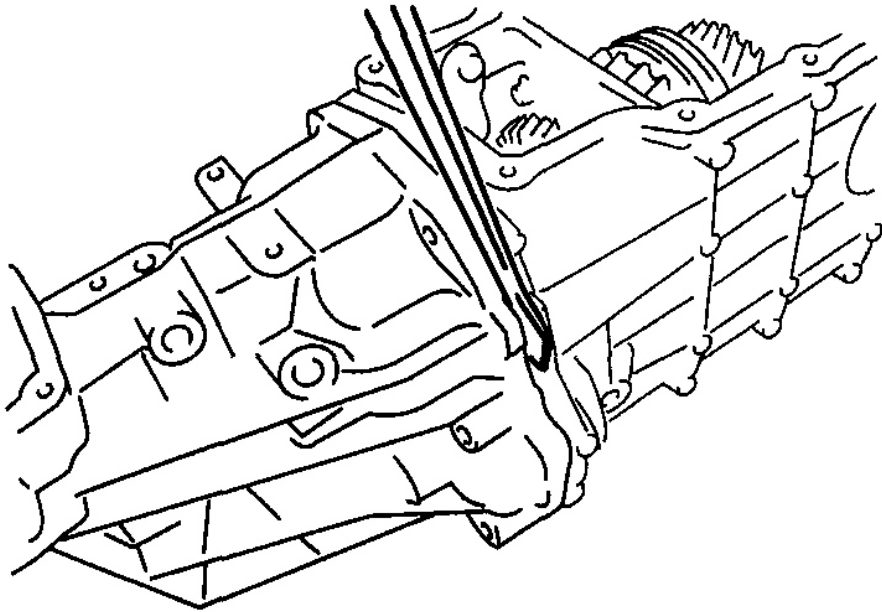
E5U511BM5071

**Fig. 6: Removing Spring Pin Of Control Rod End Using Pin Punch**  
Courtesy of MAZDA MOTORS CORP.

3. Remove the extension housing component.

**NOTE:**

- Pry open the seal at the projection on the case using a flathead screwdriver or similar tool as shown in [Fig. 7](#) , and then remove the extension housing.



E5U511BM5069

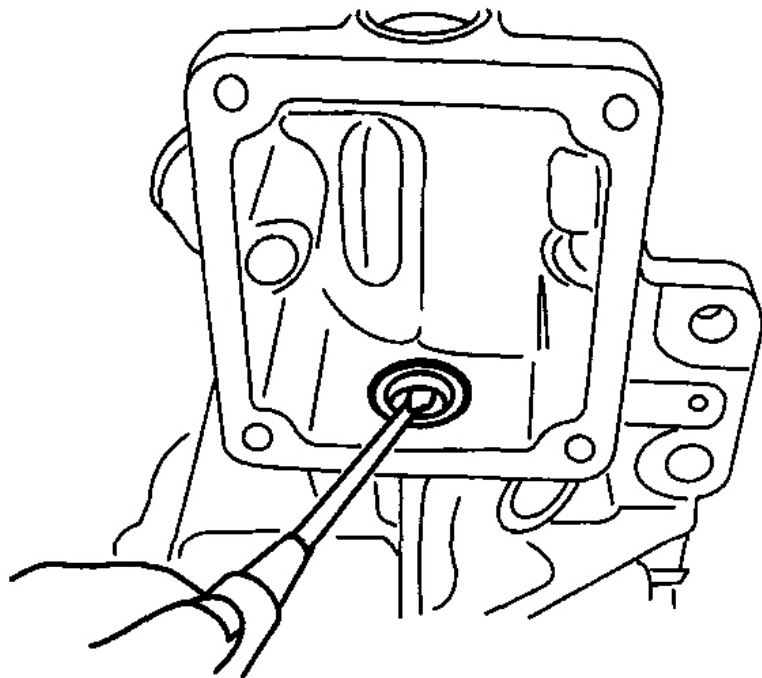
**Fig. 7: Prying Open Seal At Projection On Case Using Flathead Screwdriver & Removing Extension Housing**

Courtesy of MAZDA MOTORS CORP.

**Oil Seal (Control Rod) Disassembly Note**

1. Using a flathead screwdriver, remove the oil seal as shown in **Fig. 8**.





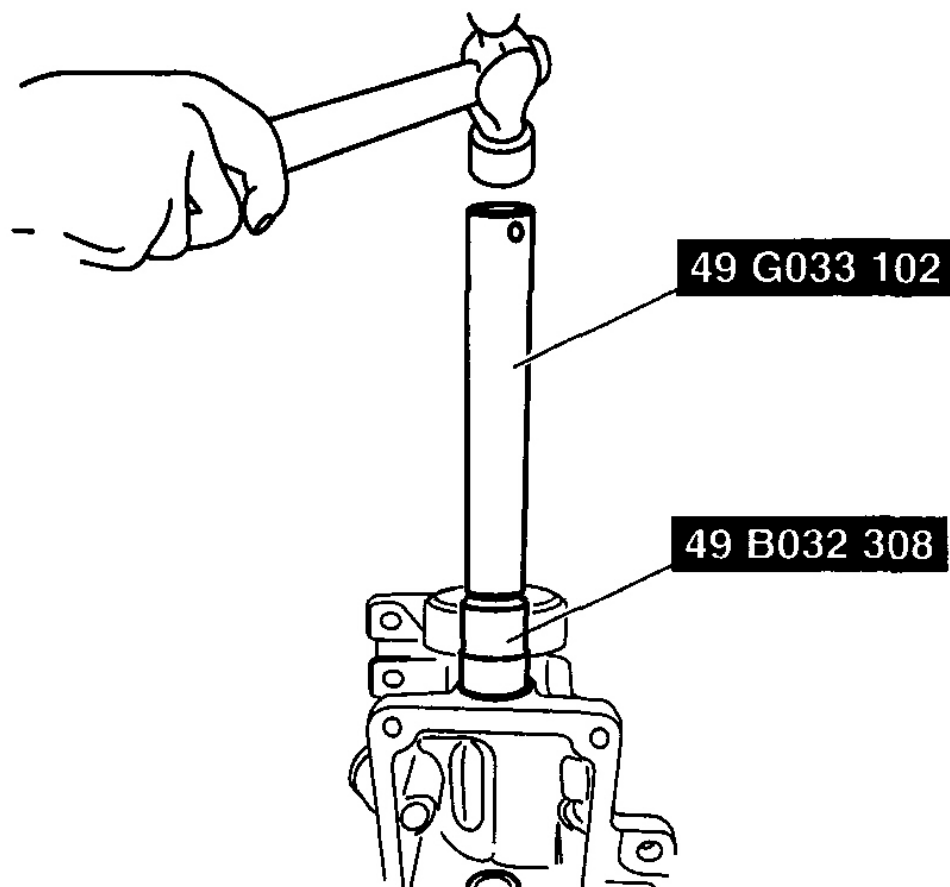
E5U511BM5081

**Fig. 8: Removing Oil Seal Using Flathead Screwdriver**  
Courtesy of MAZDA MOTORS CORP.

**Sealing Cap Disassembly Note**

1. Remove the sealing cap using the SST

**CAUTION:** • Remove the sealing cap only if there is malfunction.



E5U511BM5082

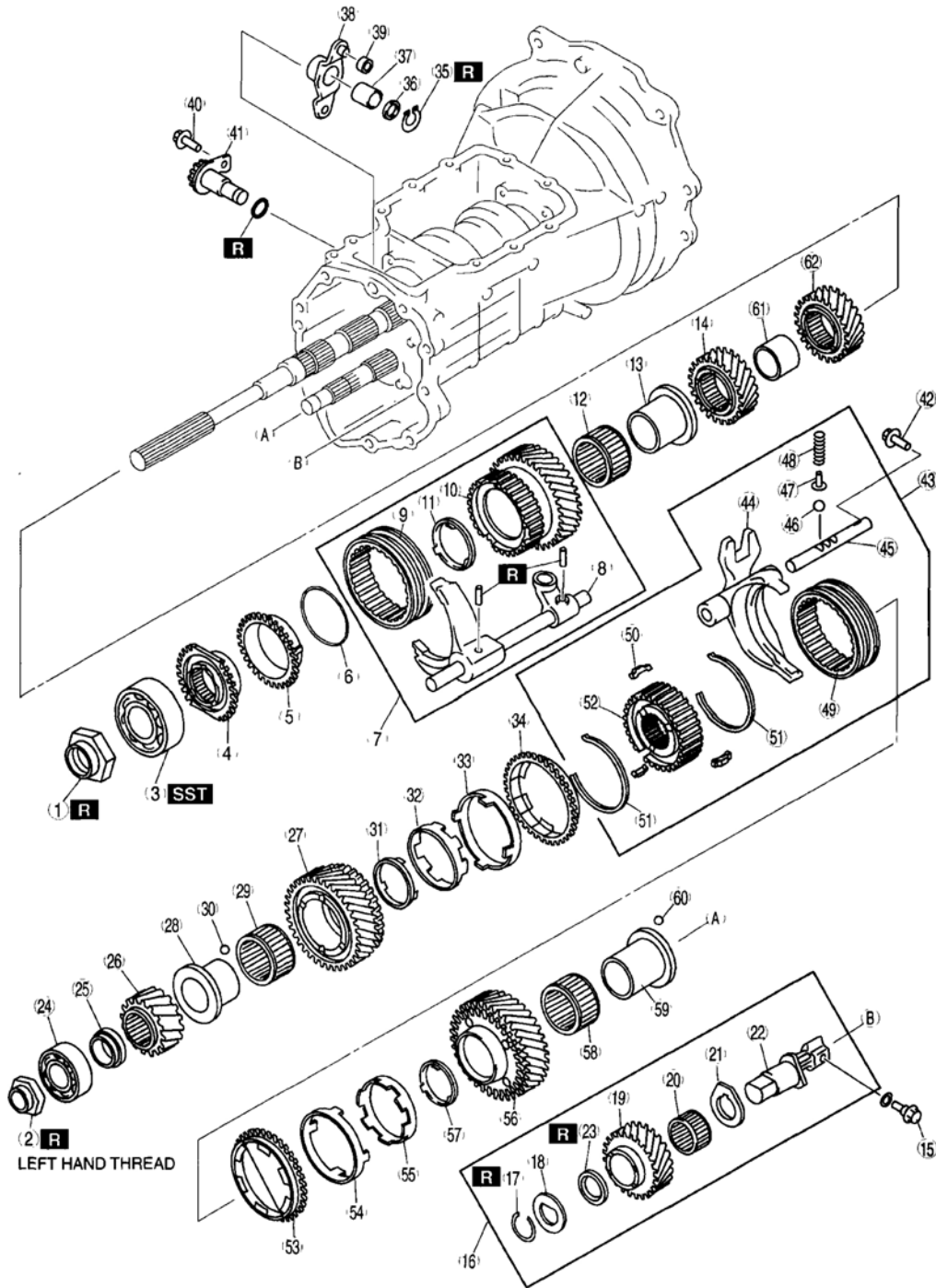
**Fig. 9: Removing Sealing Cap Using SST**  
Courtesy of MAZDA MOTORS CORP.

### REVERSE GEAR COMPONENT AND 3RD/4TH GEAR COMPONENT DISASSEMBLY

1. Disassemble in the order indicated in **Fig. 10** and **Fig. 11** .

# 2007 Mazda MX-5 Miata Sport

2006-08 TRANSMISSION Manual Transmission P66M-D Overhaul - MX-5 Miata



E5J511BM5002

**Fig. 10: Exploded View Of Reverse Gear Components (1 Of 2)**  
Courtesy of MAZDA MOTORS CORP.

## 2007 Mazda MX-5 Miata Sport

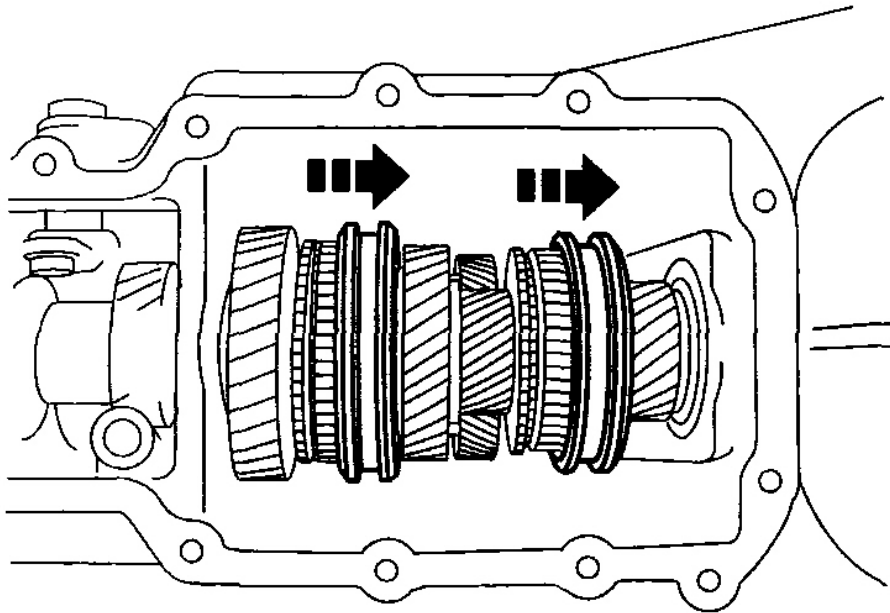
2006-08 TRANSMISSION Manual Transmission P66M-D Overhaul - MX-5 Miata

1	Locknut	29	Needle bearing
2	Locknut	30	Steel ball
3	Mainshaft rear bearing	31	Friction damper
4	Reverse synchronizer cone	32	Inner cone
5	Synchronizer ring	33	Double cone
6	Synchronizer key spring	34	Synchronizer ring
7	Reverse gear, shift fork component	35	Retaining ring
8	Reverse shift fork	36	Spacer
9	Clutch hub sleeve	37	Needle bearing
10	Reverse gear	38	Counter lever
11	Friction damper	39	Bush
12	Needle bearing	40	Retaining bolt
13	Needle bearing race	41	Counter lever shaft component
14	4th gear	42	Retaining bolt
15	Retaining bolt	43	3rd/4th clutch hub and shift fork component
16	Reverse idler gear shaft component	44	3rd/4th shift fork
17	Retaining ring	45	3rd/4th shift rod
18	Thrust washer	46	Detent ball
19	Reverse idler gear	47	Spring seat
20	Needle bearing	48	Detent spring
21	Thrust washer	49	Clutch hub sleeve
22	Reverse idler gear shaft	50	Synchronizer key
23	Friction damper	51	Synchronizer key spring
24	Countershaft rear bearing	52	3rd/4th clutch hub
25	Collar	53	Synchronizer ring
26	Reverse counter gear	54	Double cone
27	4th counter gear	55	Inner cone
28	Needle bearing race	56	3rd counter gear
		57	Friction damper
		58	Needle bearing
		59	Needle bearing race
		60	Steel ball
		61	Spacer
		62	3rd gear

**Fig. 11: Exploded View Of Reverse Gear Components (2 Of 2)**  
 Courtesy of MAZDA MOTORS CORP.

### Mainshaft Rear Bearing Locknut and Countershaft Rear Bearing Locknut Disassembly Note

1. Slide the 5th/6th and 1st/2nd clutch hub sleeves to lock the transmission into 5th and 2nd gears.



E5U511BM5011

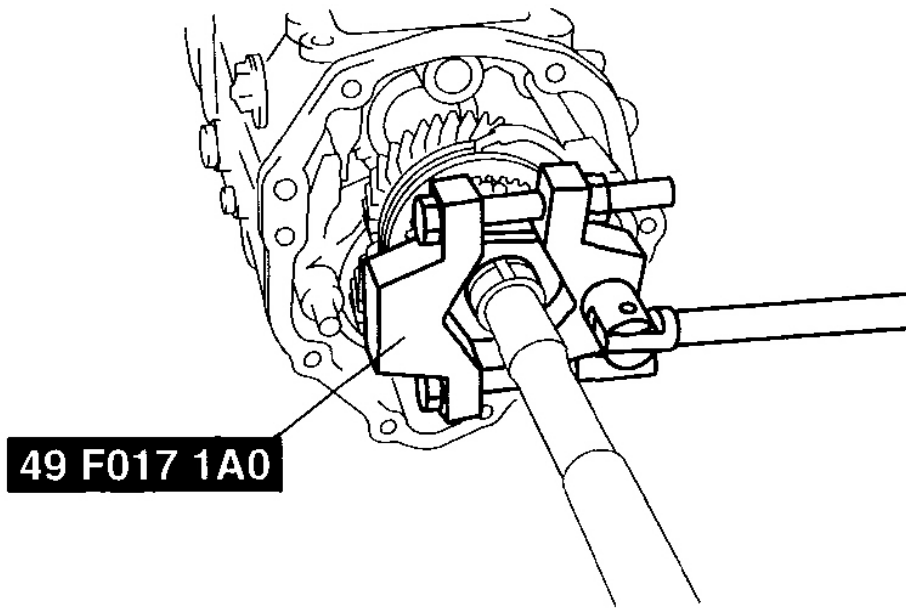
**Fig. 12: Sliding 5TH/6TH And 1ST/2ND Clutch Hub Sleeves To Lock Transmission Into 5TH And 2ND Gears**

Courtesy of MAZDA MOTORS CORP.

2. Remove the mainshaft rear bearing locknut by rotating it counterclockwise using the SST .
3. Remove the countershaft rear bearing locknut by rotating it clockwise.

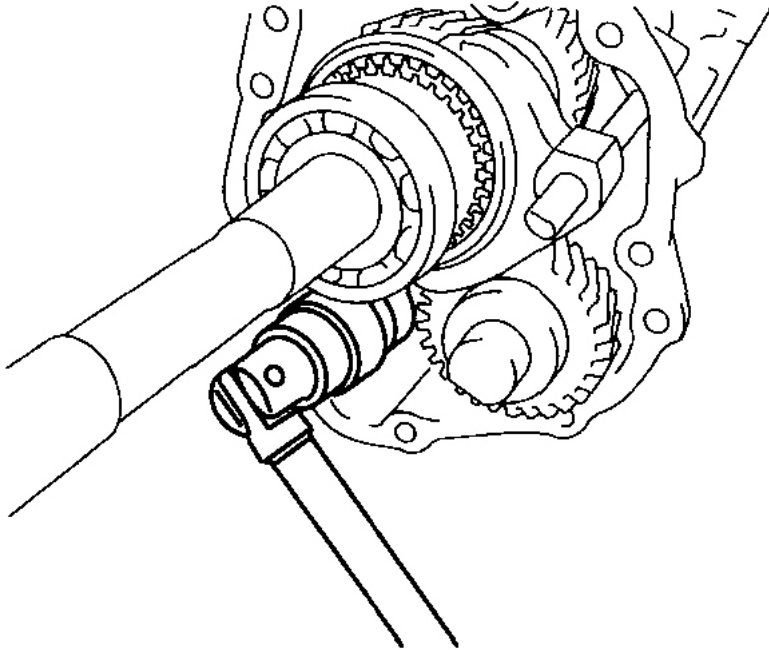
**CAUTION:**

- Note that the countershaft rear bearing locknut has a left-hand thread.



E5U511BM5012

**Fig. 13: Removing Mainshaft Rear Bearing Locknut By Rotating It Counterclockwise Using SST**  
Courtesy of MAZDA MOTORS CORP.

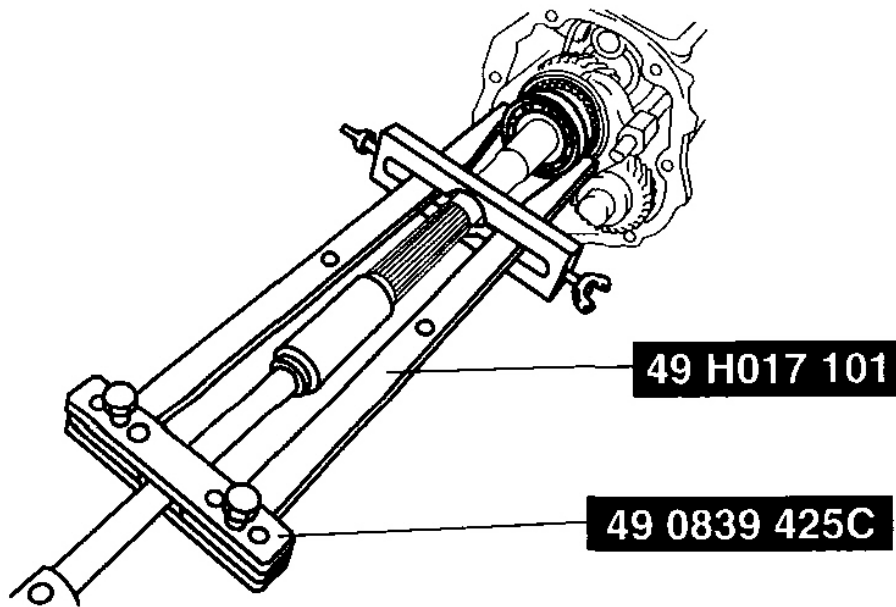


E5U511BM5013

**Fig. 14: Removing Countershaft Rear Bearing Locknut By Rotating It Clockwise**  
Courtesy of MAZDA MOTORS CORP.

**Mainshaft Rear Bearing Disassembly Note**

1. Using the SSTs to remove the mainshaft rear bearing.



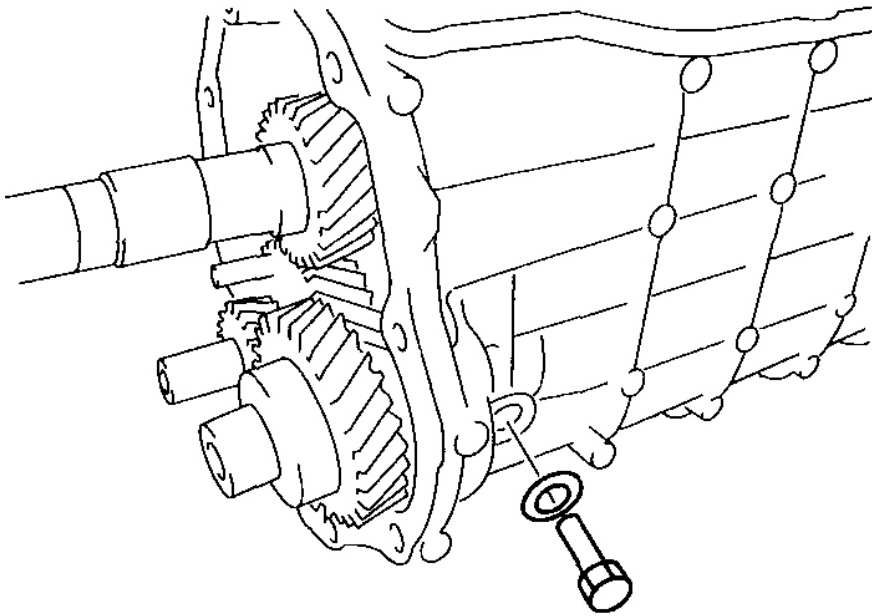
E5U511BM5014

**Fig. 15: Disassembling Mainshaft Rear Bearing Using SSTs**  
Courtesy of MAZDA MOTORS CORP.

**Reverse Idler Gear Shaft Component Disassembly Note**

1. Remove the reverse idler gear shaft retaining bolt and then remove the reverse idler gear shaft component from the transmission case.



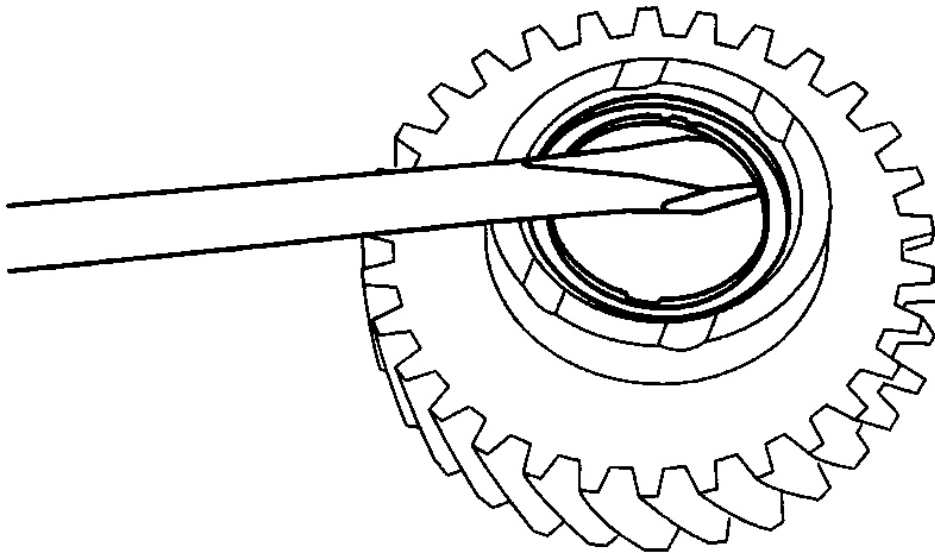


E5U511BM5015

**Fig. 16: Removing Reverse Idler Gear Shaft Retaining Bolt**  
Courtesy of MAZDA MOTORS CORP.

**Reverse Idler Gear Friction Damper Disassembly Note**

1. Remove the friction damper using a flathead screwdriver.

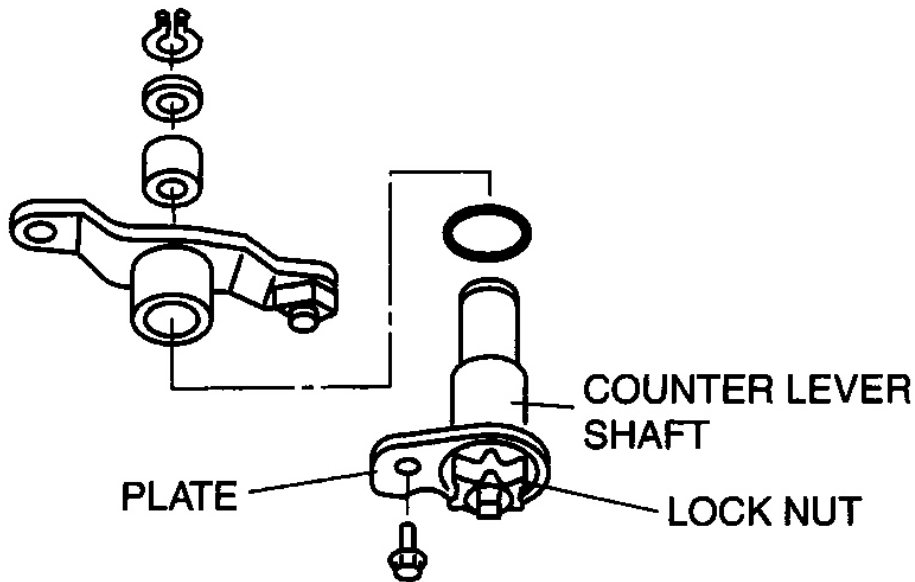


E5U511BM5019

**Fig. 17: Removing Friction Damper Using Flathead Screwdriver**  
Courtesy of MAZDA MOTORS CORP.

Counter Lever Disassembly Note

- CAUTION:**
- To prevent the shaft position from deviating when removing the counter lever, remove the countershaft lever component without loosening the locknut unless it is necessary.

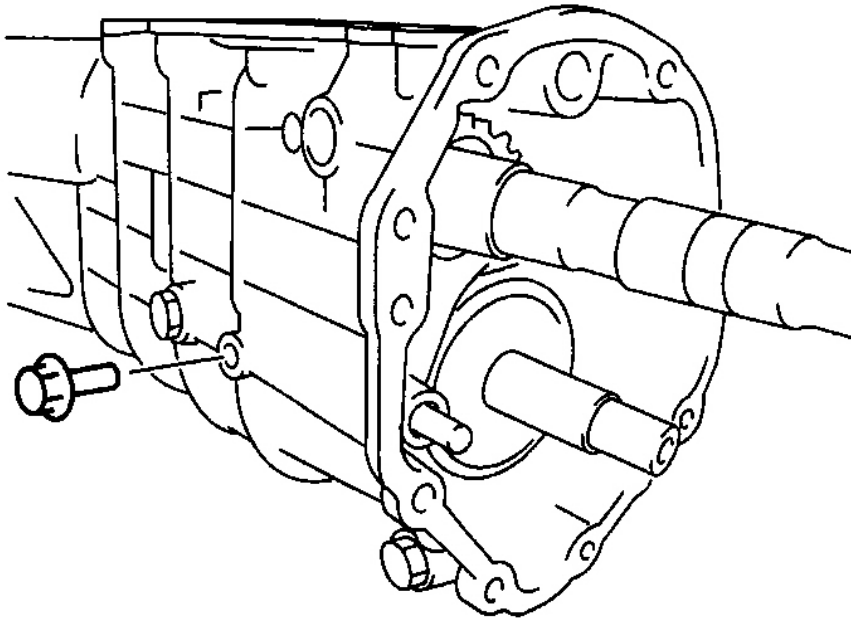


E5U511BM5016

**Fig. 18: Removing Counter Shaft Lever & Lock Nut**  
Courtesy of MAZDA MOTORS CORP.

**3rd/4th Shift Fork Disassembly Note**

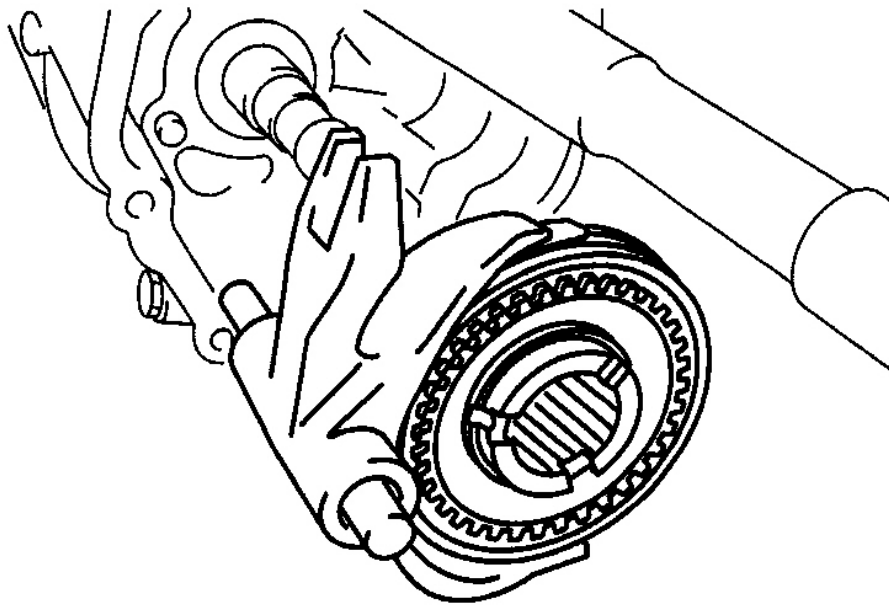
1. Remove the 3rd/4th shift rod retaining bolt.



E5U511BM5017

**Fig. 19: Removing 3rd/4h Shift Rod Retaining Bolt**  
Courtesy of MAZDA MOTORS CORP.

2. Remove the 3rd/4th shift fork component and 3rd/4th clutch hub component at the same time.



E5U511BM5018

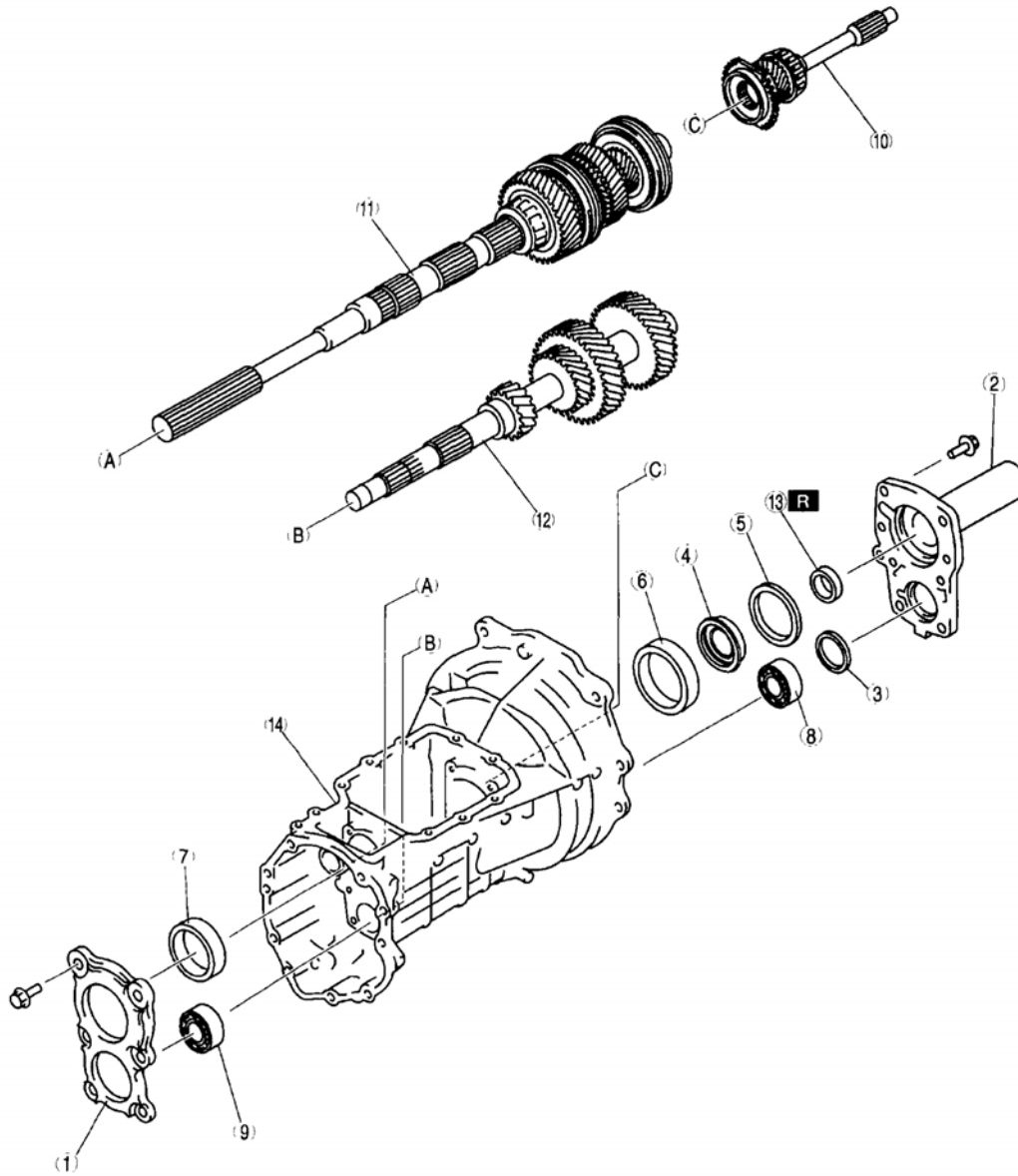
**Fig. 20: Removing 3rd/4th Shift Fork Component & 3rd/4th Clutch Hub Component**  
Courtesy of MAZDA MOTORS CORP.

**MAINSHAFT COMPONENT, COUNTERSHAFT COMPONENT AND TRANSMISSION CASE  
DISASSEMBLY**

1. Disassemble in the order indicated in **Fig. 21** .

## 2007 Mazda MX-5 Miata Sport

2006-08 TRANSMISSION Manual Transmission P66M-D Overhaul - MX-5 Miata



E5U511BM5003

1	Bearing cover
2	Front cover
3	Bearing shim
4	Oil baffle
5	Bearing shim
6	Maindrive gear bearing race
7	Mainshaft bearing race
8	Countershaft front bearing
9	Countershaft rear bearing

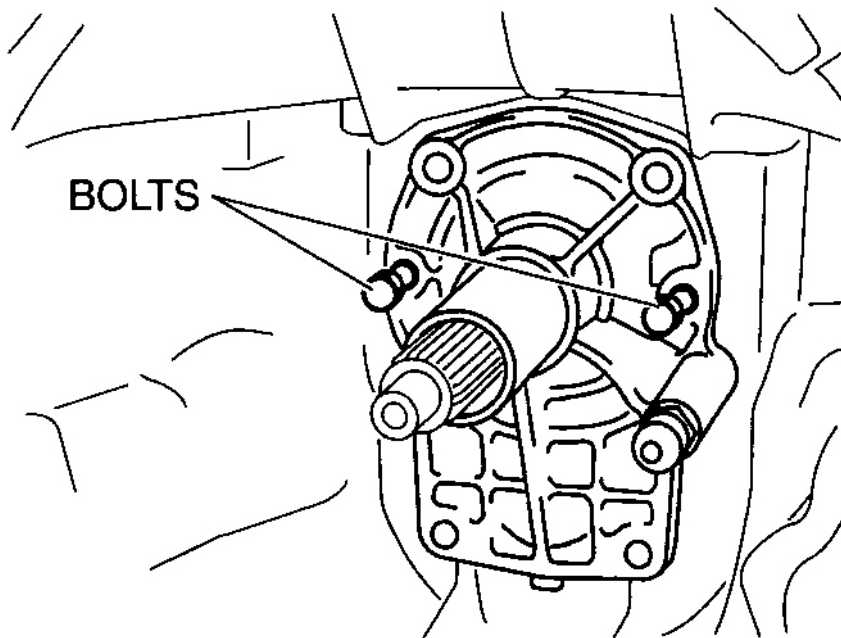
10	Maindrive gear
11	Mainshaft component
12	Countershaft component
13	Front oil seal
14	Transmission case

**Fig. 21: Exploded View Of Mainshaft Component & Transmission Case**  
 Courtesy of MAZDA MOTORS CORP.

### Front Cover Disassembly Note

1. Remove the front cover.

- CAUTION:**
- Insert the front cover tightening bolts into the bolt holes for the front cover disassembly, tighten the two bolts uniformly and, then remove the front cover.

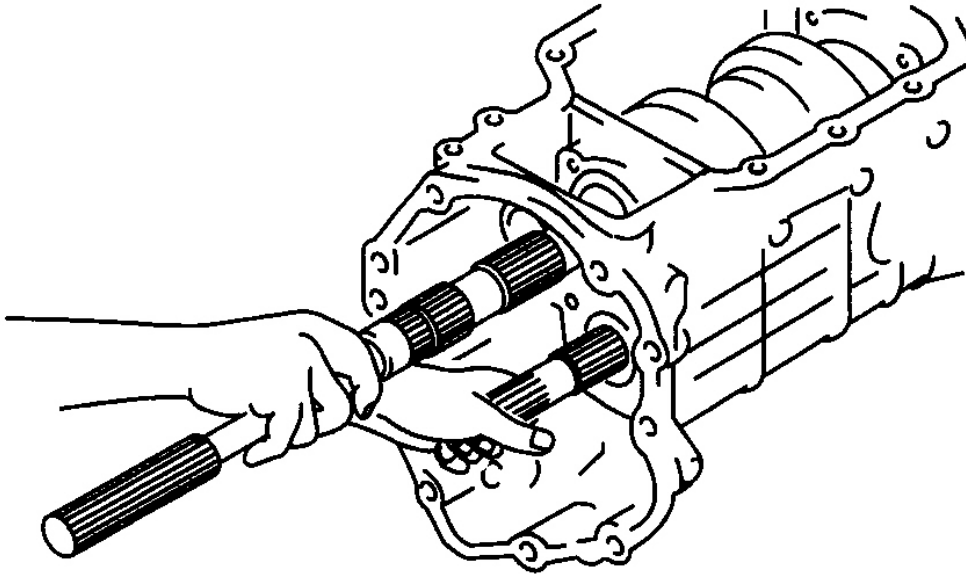


E5U511BM5051

**Fig. 22: Removing Front Cover & Bolts**  
Courtesy of MAZDA MOTORS CORP.

### Bearing Race Disassembly Note

1. Grasping the mainshaft and countershaft, move them forward and back to remove the bearing races.



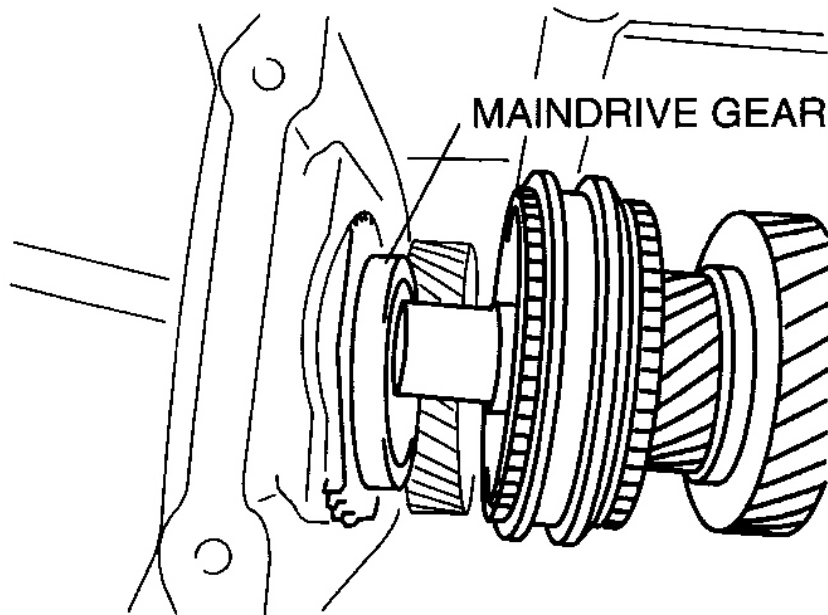
E5U511BM5074

**Fig. 23: Removing Bearing Race**  
Courtesy of MAZDA MOTORS CORP.

**Mainshaft Component and Countershaft Component Disassembly Note**

1. Separate the maindrive gear component from the mainshaft component and remove it from the front cover installation holes.

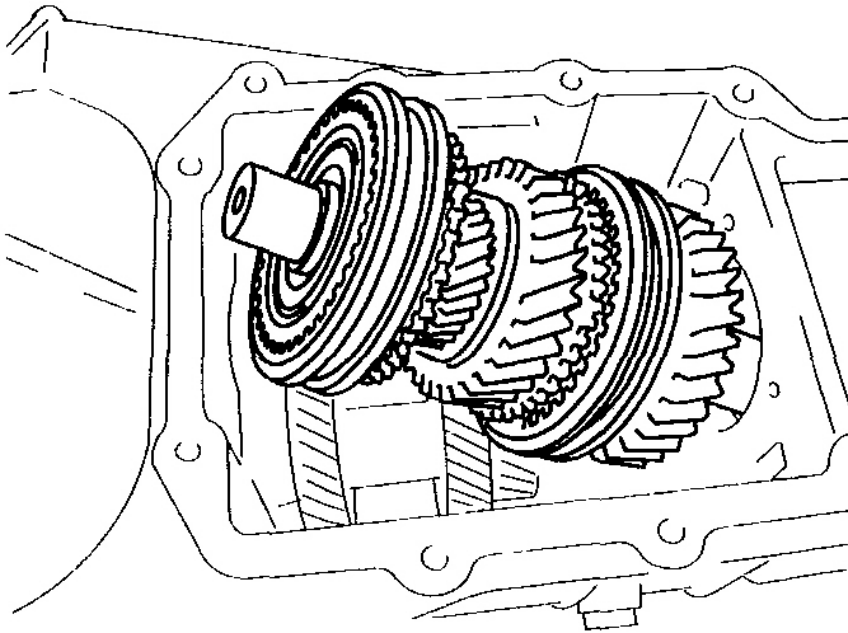




E5U511BM5020

**Fig. 24: Removing Maindrive Gear Component**  
Courtesy of MAZDA MOTORS CORP.

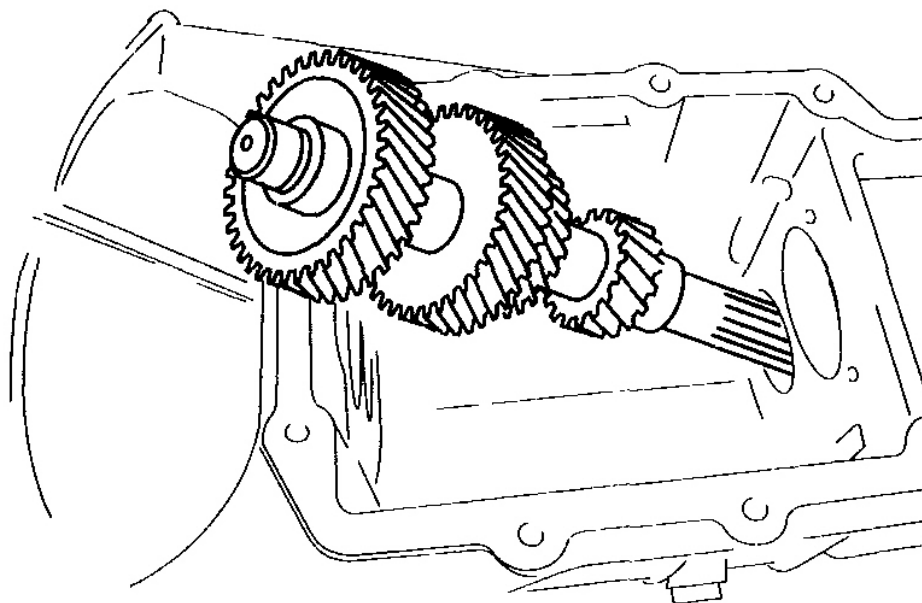
2. Tilt the mainshaft component as shown in **Fig. 25** and remove it from the transmission case.



E5U511BM5021

**Fig. 25: Removing Mainshaft Component From Transmission Case**  
Courtesy of MAZDA MOTORS CORP.

3. Tilt the countershaft component as shown in **Fig. 26** and remove it from the transmission case.



E5U511BM5073

**Fig. 26: Removing Countershaft Component**  
Courtesy of MAZDA MOTORS CORP.

**1ST/2ND GEAR COMPONENT, 5TH/6TH GEAR COMPONENT AND COUNTERSHAFT  
DISASSEMBLY**

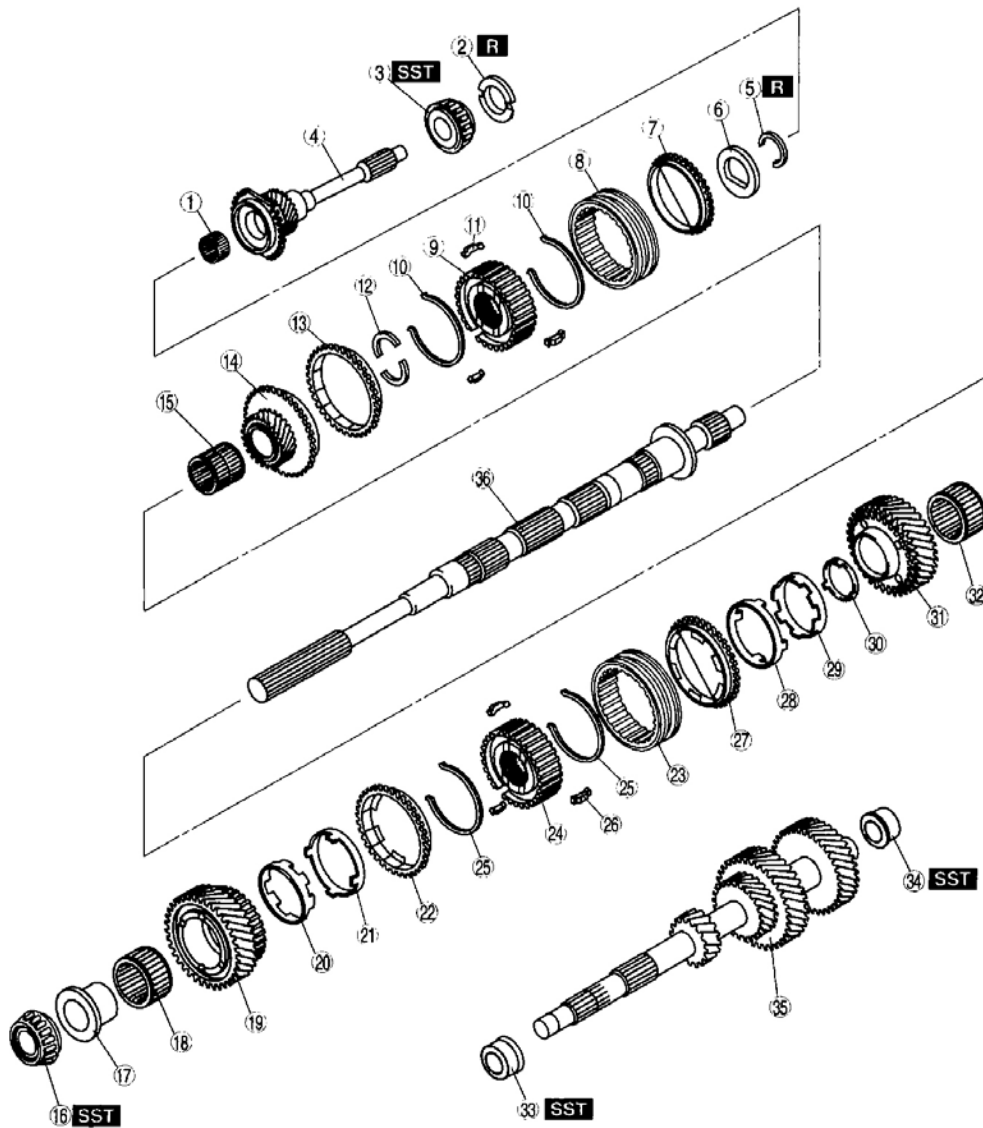
**CAUTION:**

- Remove the countershaft center bearing race only if there is a malfunction.

1. Disassemble in the order indicated in **Fig. 27** .

## 2007 Mazda MX-5 Miata Sport

2006-08 TRANSMISSION Manual Transmission P66M-D Overhaul - MX-5 Miata



E5U511BM5007

1	Needle bearing
2	Scoop ring
3	Maindrive gear shaft bearing
4	Maindrive gear shaft
5	Retaining ring
6	Needle bearing
7	Synchronizer ring
8	Clutch hub sleeve
9	5th/6th clutch hub
10	Synchronizer key spring
11	Synchronizer key
12	Thrust washer
13	Synchronizer ring
14	6th gear
15	Needle bearing
16	Mainshaft center bearing

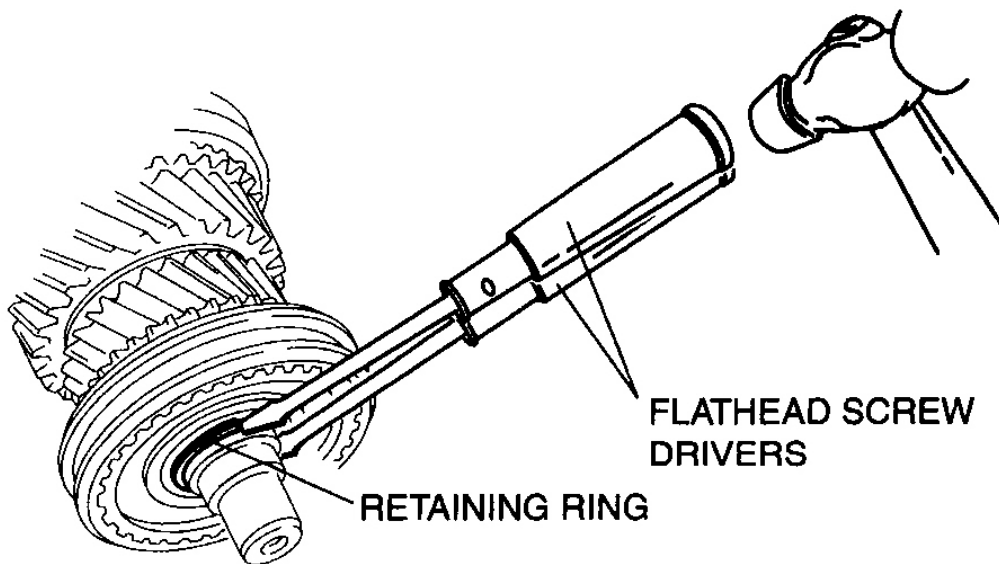
17	Needle bearing race
18	Needle bearing
19	1st gear
20	Inner cone
21	Double cone
22	Synchronizer ring
23	Clutch hub sleeve
24	1st/2nd clutch hub
25	Synchronizer key spring
26	Synchronizer key
27	Synchronizer ring
28	Double cone
29	Inner cone
30	Friction damper
31	2nd gear
32	Needle bearing
33	Countershaft center bearing race
34	Countershaft front bearing race

**Fig. 27: Exploded View Of Gear Component & Countershaft**  
Courtesy of MAZDA MOTORS CORP.

**5th/6th Clutch Hub Component Disassembly Note**

1. Remove the retaining ring using the two flathead screwdrivers.

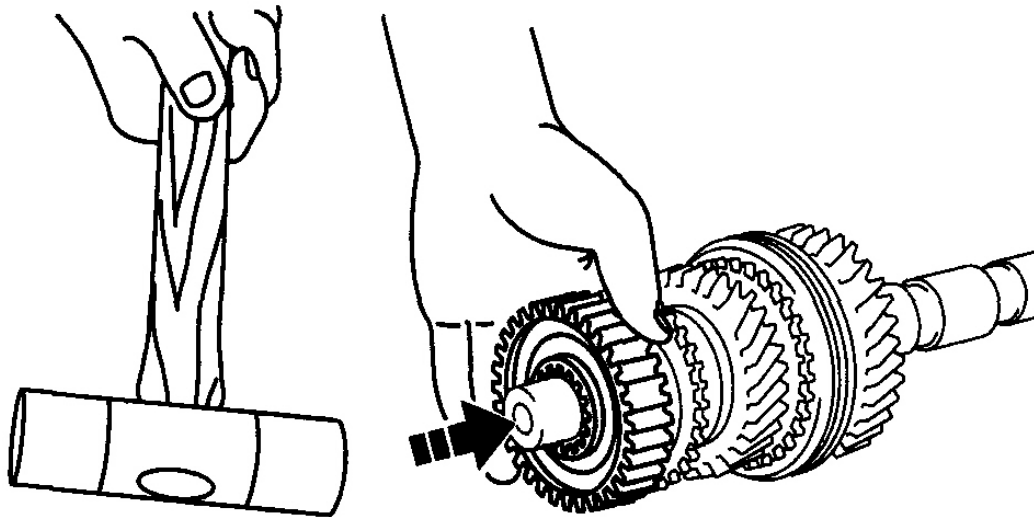
**CAUTION:** • Do not reuse the retaining ring.



E5U511BM5010

**Fig. 28: Removing Retaining Ring Using Two Flathead Screwdrivers**  
Courtesy of MAZDA MOTORS CORP.

2. Supporting the 5th/6th clutch hub with your hand as shown in **Fig. 29** , tap the mainshaft with a plastic hammer to remove the 5th/6th clutch hub.



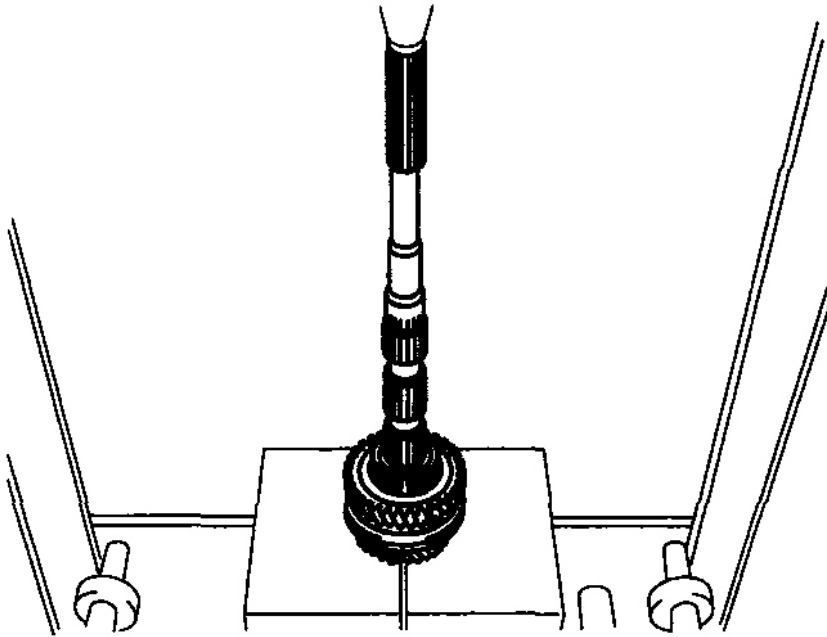
E5U511BM5022

**Fig. 29: Tapping Mainshaft With Plastic Hammer To Remove 5th/6th Clutch Hub**  
Courtesy of MAZDA MOTORS CORP.

**1st/2nd Clutch Hub Component Disassembly Note**

1. Using a press, remove the mainshaft center bearing, 1st gear, 1st synchronizer ring component, 1st/2nd clutch hub component, 2nd synchronizer ring component and 2nd gear at the same time.

**CAUTION:**     • Be sure to support the mainshaft component so that it does not fall.

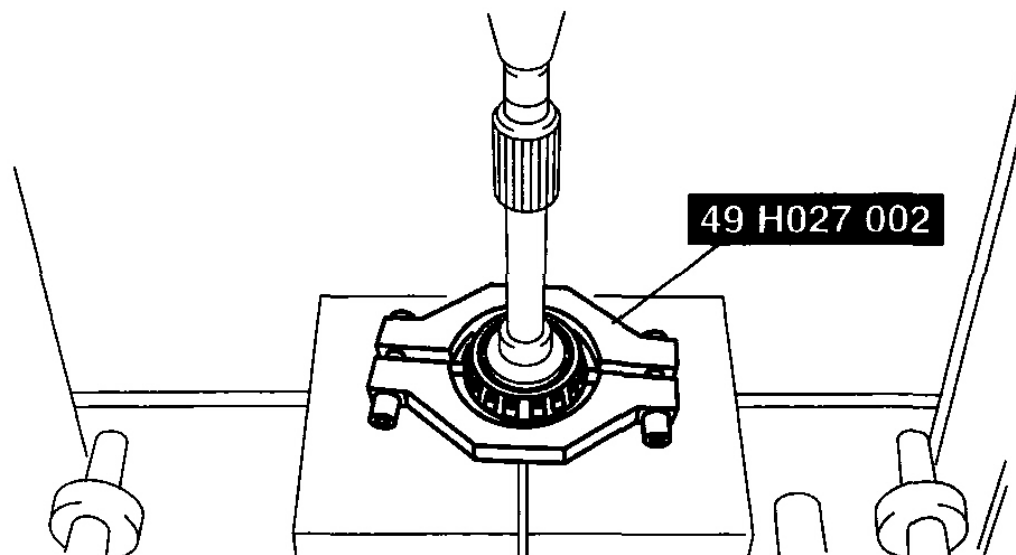


E5U511BM5023

**Fig. 30: Removing 1st/2nd Clutch Hub Component Assembly Using Press**  
Courtesy of MAZDA MOTORS CORP.

**Maindrive Gear Shaft Bearing Disassembly Note**

1. Remove the maindrive gear shaft bearing using the SST and press.



E5U511BM5024

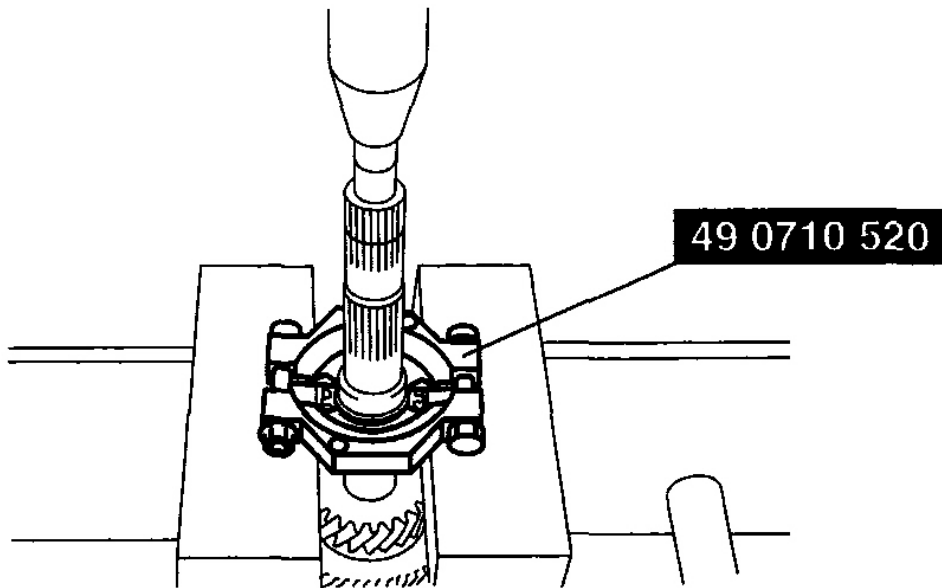
**Fig. 31: Removing Maindrive Gear Shaft Bearing Using SST & Press**  
Courtesy of MAZDA MOTORS CORP.

**Countershaft Center Bearing Race Disassembly Note**

1. Remove the countershaft center bearing race using the SST and press.

**CAUTION:** • Be sure to support the countershaft so that it does not fall.



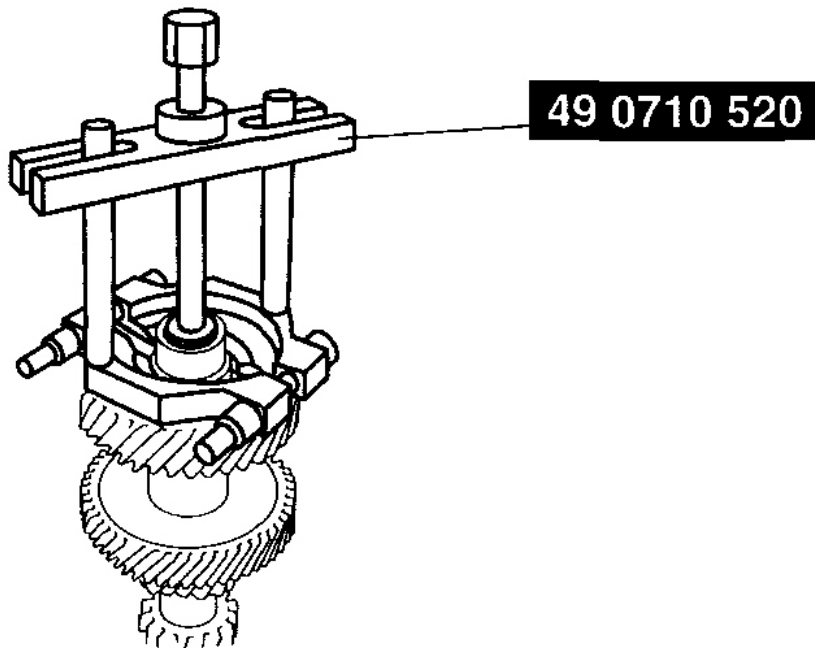


E5U511BM5025

**Fig. 32: Removing Countershaft Center Bearing Race Using SST & Press**  
Courtesy of MAZDA MOTORS CORP.

**Countershaft Front Bearing Race Disassembly Note**

1. Remove the countershaft front bearing race using the SST .



E5U511BM5026

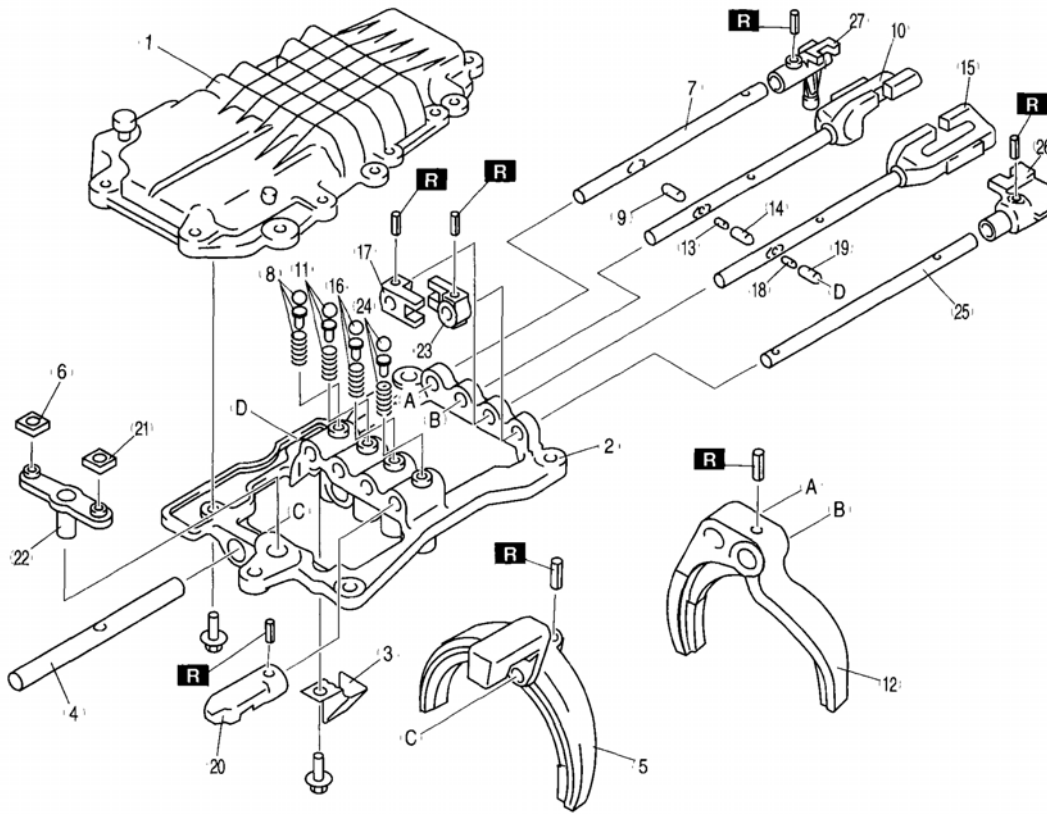
**Fig. 33: Removing Countershaft Front Bearing Race Using SST**  
Courtesy of MAZDA MOTORS CORP.

#### SHIFT COMPONENT DISASSEMBLY

1. Disassemble in the order indicated in **Fig. 34** .

# 2007 Mazda MX-5 Miata Sport

2006-08 TRANSMISSION Manual Transmission P66M-D Overhaul - MX-5 Miata



ESU511BM5055

1	Top cover
2	Change frame
3	Baffle plate
4	5th/6th shift rod
5	5th/6th shift fork
6	Change bush
7	Reverse shift rod
8	Detent ball, spring seat, spring
9	Interlock pin
10	1st/2nd shift rod
11	Detent ball, spring seat, spring
12	1st/2nd shift fork
13	Interlock pin
14	Interlock pin

15	3rd/4th shift rod
16	Detent ball, spring seat, spring
17	Stopper block
18	Interlock pin
19	Interlock pin
20	Shift gate
21	Change bush
22	Crank lever
23	Stopper block
24	Detent ball, spring seat, spring
25	5th/6th shift rod
26	5th/6th shift rod end
27	Reverse Shift rod end

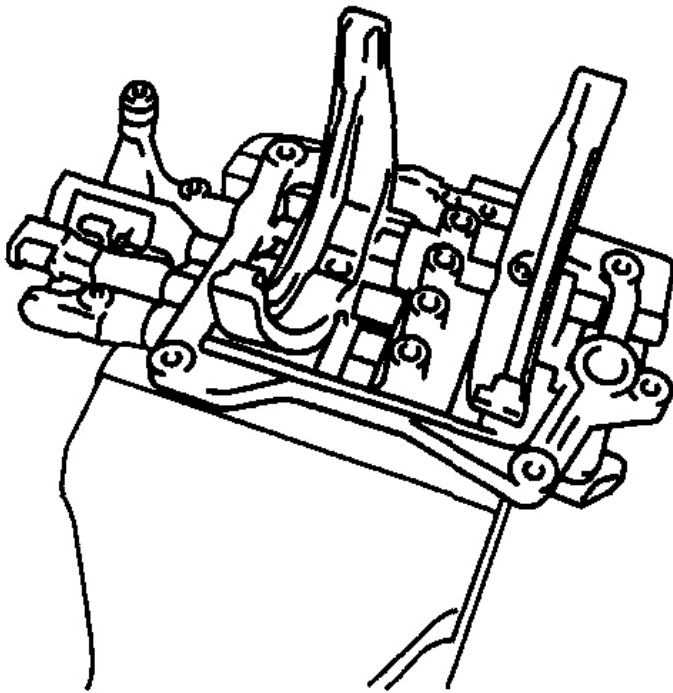
**Fig. 34: Exploded View Of Shift Components**  
Courtesy of MAZDA MOTORS CORP.

### Shift Rod Disassembly Note

1. Set the change frame in the vise as shown in **Fig. 35** .

### CAUTION:

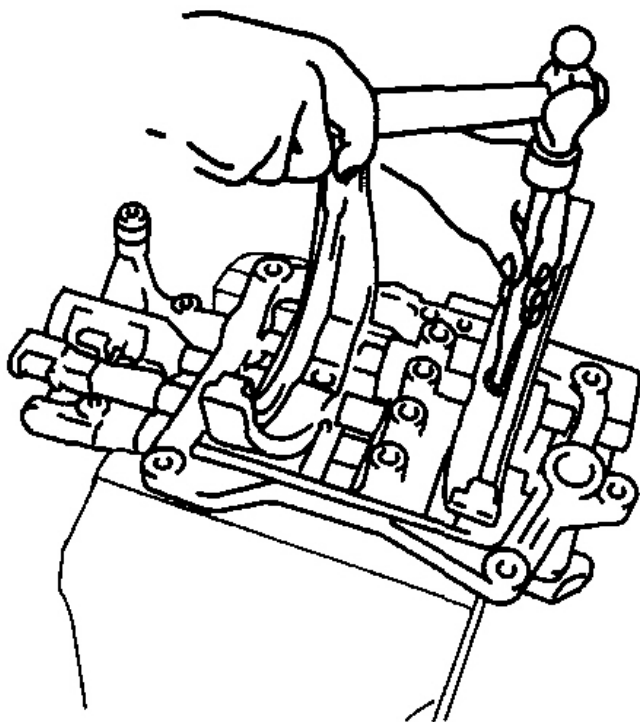
- Insert aluminum plates in the vise and tighten the vise handle lightly so as not to damage the part.



E5U511BM5063

**Fig. 35: Setting Change Frame In Vise**  
Courtesy of MAZDA MOTORS CORP.

2. Remove the spring pins from each of the shift rods using a pin punch.
3. Place the shift mechanism in the neutral position.



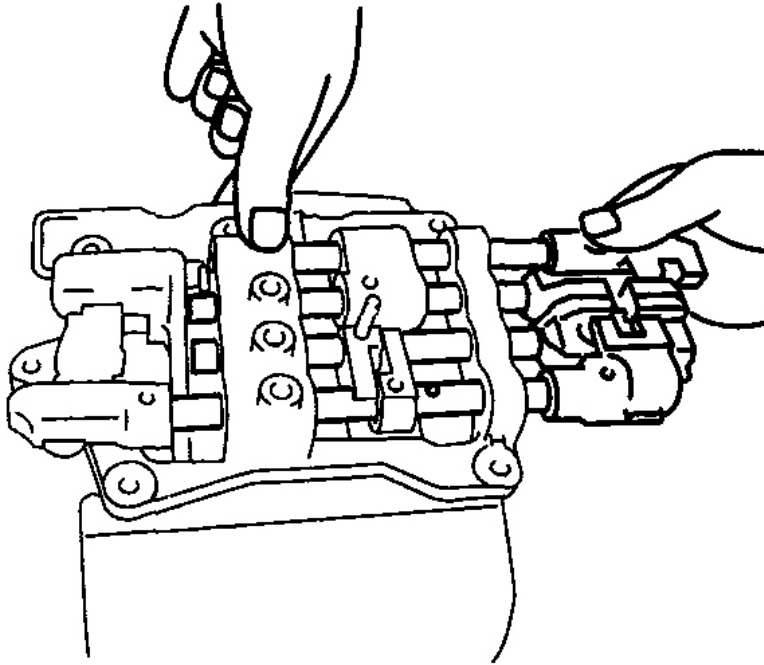
E5U511BM5054

**Fig. 36: Removing Spring Pins From Each Of Shift Rods Using Pin Punch**  
Courtesy of MAZDA MOTORS CORP.

4. Pull out the shift rods from the change frame.

**CAUTION:**

- When pulling out the shift rods, press the top of each detent ball so that it doesn't spring out.



E5U511BM5064

**Fig. 37: Pulling Out Shift Rods From Change Frame**  
Courtesy of MAZDA MOTORS CORP.

## MANUAL TRANSMISSION PARTS INSPECTION

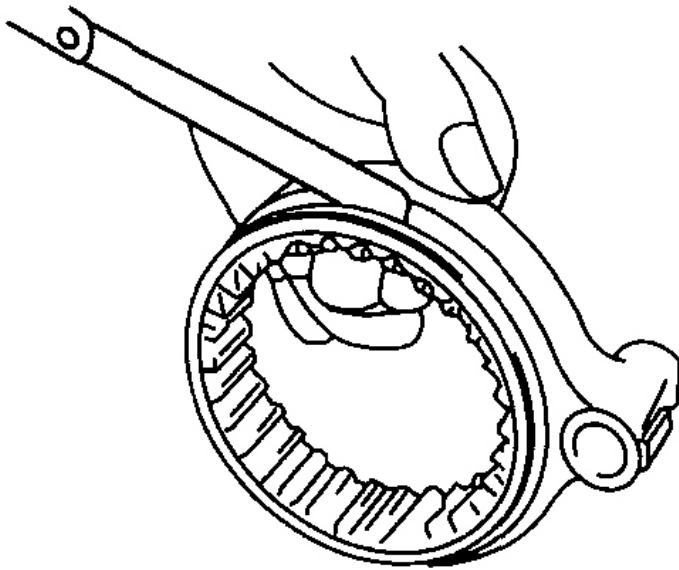
### Clutch Hub Component

1. Measure the clearance between each shift fork and clutch hub sleeve groove using a feeler gauge.
  - If not within the specification, replace the shift fork and clutch hub sleeve as a set.

**Standard clearance between shift fork and clutch hub sleeve groove**

**0.05-0.40 mm {0.002-0.015 in}**

**Maximum clearance between shift fork and clutch hub sleeve groove 0.5 mm {0.020 in}**



BHJ0511M018

**Fig. 38: Measuring Clearance Between Each Shift Fork & Clutch Hub Sleeve Groove Using Feeler Gauge**

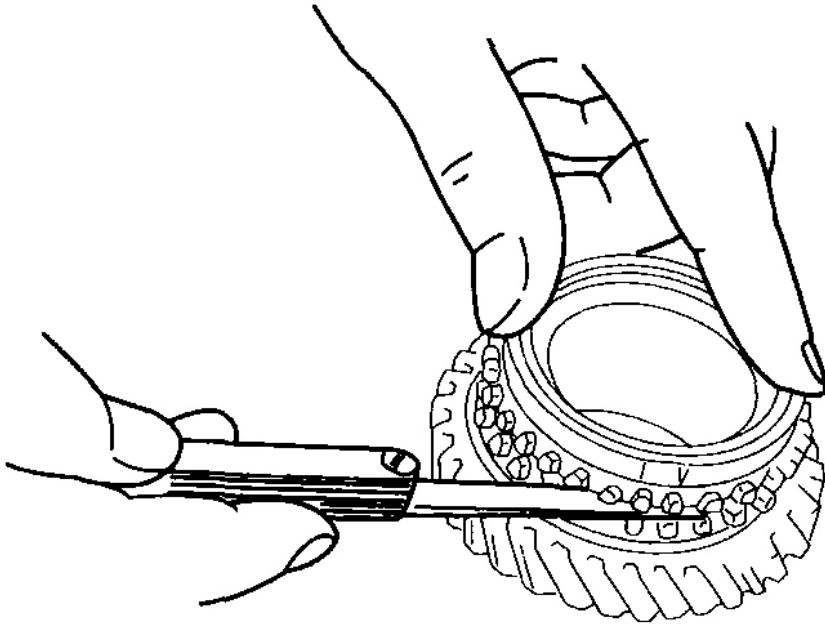
Courtesy of MAZDA MOTORS CORP.

#### **Synchronizer Ring**

1. Measure the clearance between the synchronizer ring and flank surface of the gear using a feeler gauge around the entire circumference.
  - If not within the specification, replace the synchronizer ring.

**Standard clearance between synchronizer ring and flank surface of gear 1.5 mm {0.059 in}**

**Maximum clearance between synchronizer ring and flank surface of gear 0.8 mm {0.031 in}**



BHJ0511M020

**Fig. 39: Measuring Clearance Between Synchronizer Ring & Flank Surface Of Gear Using Feeler Gauge**

Courtesy of MAZDA MOTORS CORP.

**NOTE:**

- Set the synchronizer ring squarely in the gear.

**Spring**

1. Measure the free length of each spring.
  - If not within the specification, replace the spring.

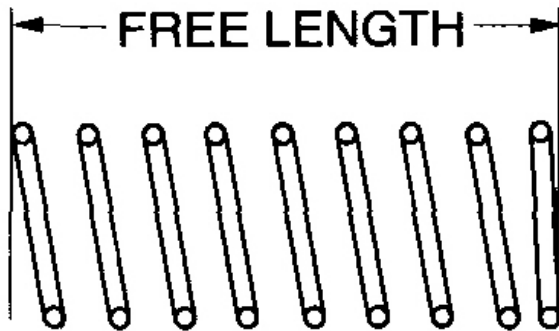
**Detent ball spring**

**Standard length: 23.5 mm {0.925 in}**

**1st/2nd select return spring**

**Standard length: 83.5 mm {3.287 in}**





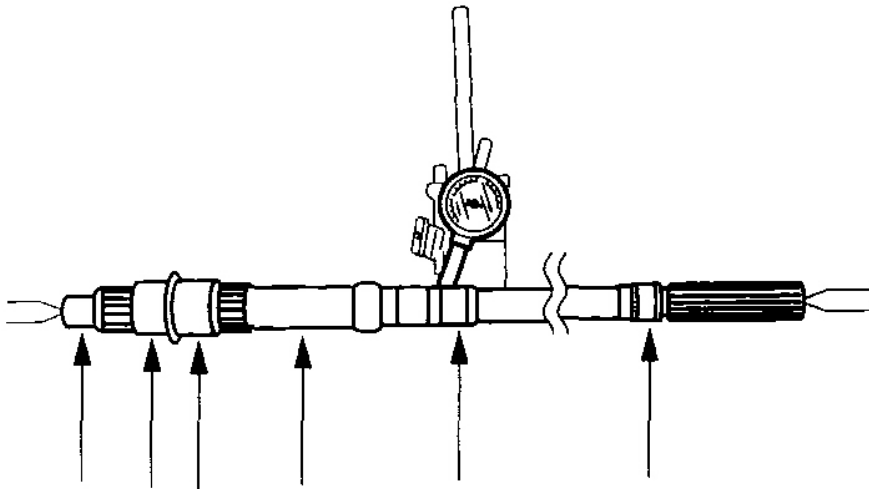
BHE0511M023

**Fig. 40: Measuring Free Length Of Each Spring**  
Courtesy of MAZDA MOTORS CORP.

**Mainshaft**

1. Measure the mainshaft runout using a dial gauge.
  - If it exceeds the maximum specification, replace the mainshaft.

**Mainshaft maximum runout 0.03 mm {0.0012 in}**



BHJ0511M084

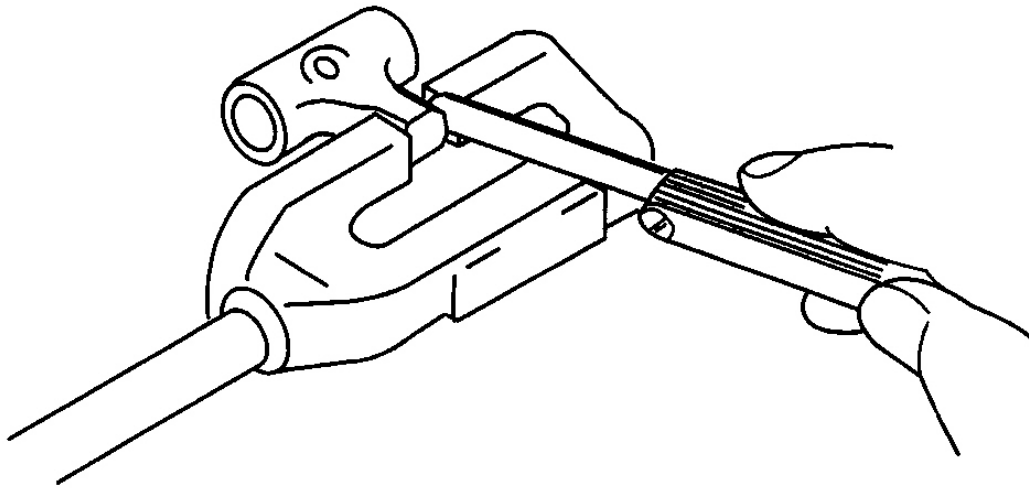
**Fig. 41: Measuring Mainshaft Runout Using Dial Gauge**  
Courtesy of MAZDA MOTORS CORP.

**Shift Rod End, Control Lever**

1. Measure the clearance between the shift rod end and control lever using a feeler gauge.
  - If not within the specification, replace the shift rod end or control lever as a set.

**Standard clearance between shift rod end and control lever**

**0.5 mm {0.020 in} or less**



E5U511BM5087

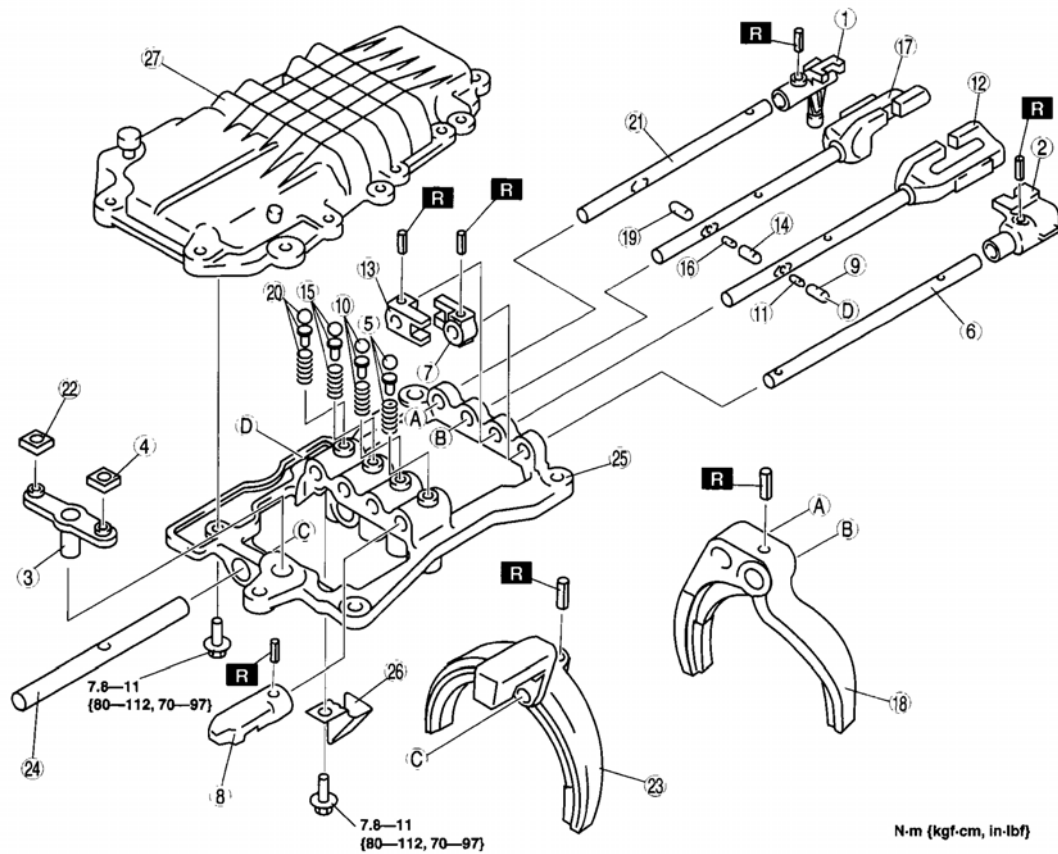
**Fig. 42: Measuring Clearance Between Shift Rod End & Control Lever Using Feeler Gauge**  
Courtesy of MAZDA MOTORS CORP.

#### **SHIFT COMPONENT ASSEMBLY**

1. Assemble in the order indicated in **Fig. 43** .

# 2007 Mazda MX-5 Miata Sport

2006-08 TRANSMISSION Manual Transmission P66M-D Overhaul - MX-5 Miata



E5U511BM5056

1	Reverse shift rod end
2	5th/6th shift rod end
3	Crank lever
4	Change bush
5	Detent ball, spring seat, spring
6	5th/6th shift rod
7	Stopper block
8	Shift gate
9	Interlock pin
10	Detent ball, spring seat, spring
11	interlock pin
12	3rd/4th shift rod
13	Stopper block
14	interlock pin

15	Detent ball, spring seat, spring
16	Interlock pin
17	1st/2nd shift rod
18	1st/2nd shift fork
19	Interlock pin
20	Detent ball, spring seat, spring
21	Reverse shift rod
22	Change bush
23	5th/6th shift fork
24	5th/6th shift rod
25	Change frame
26	Baffle plate
27	Top cover

**Fig. 43: Exploded View Of Shift Component (With Torque Specifications)**  
 Courtesy of MAZDA MOTORS CORP.

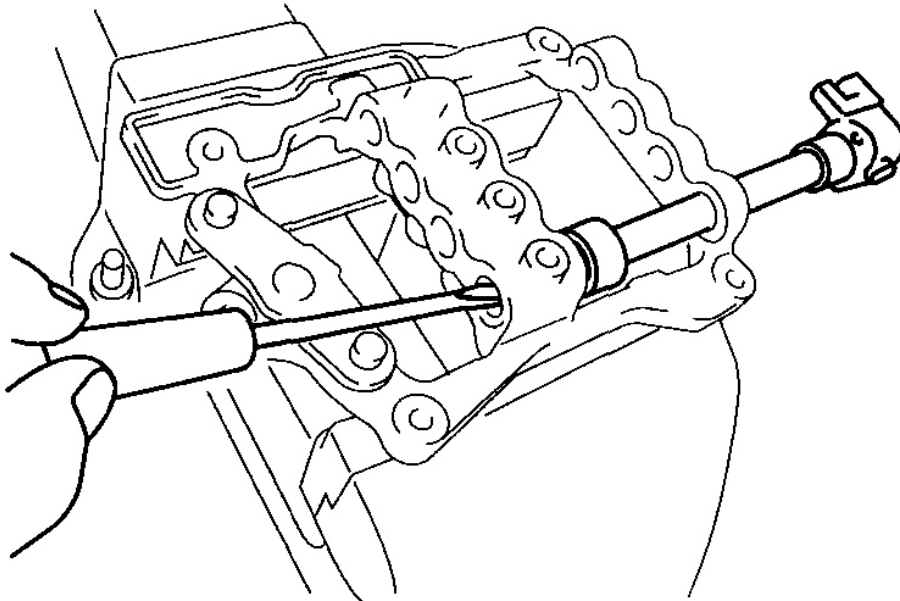
### Shift Rod Assembly Note

1. Install each shift rod.

**CAUTION:** • Do not forget to insert the interlock pins.

**NOTE:**

- Insert the shift rod while pressing the detent ball with a flathead screwdriver as shown in **Fig. 44** .



E5U511BM5065

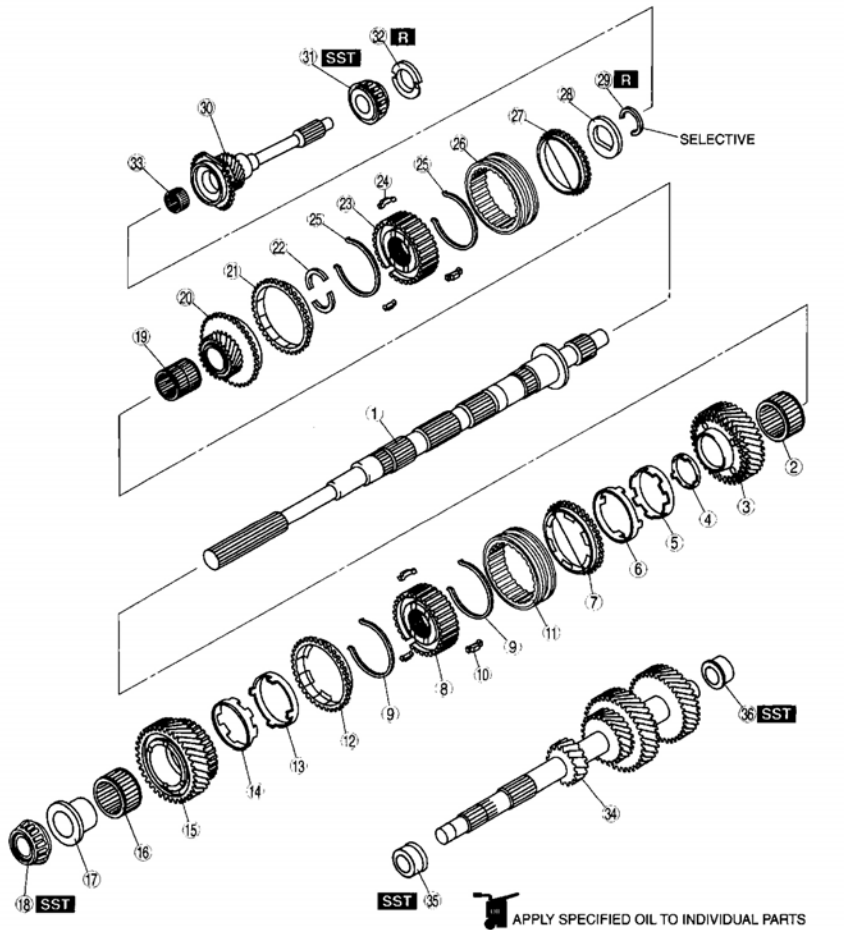
**Fig. 44: Inserting Shift Rod While Pressing Detent Ball With Flathead Screwdriver**  
Courtesy of MAZDA MOTORS CORP.

**1ST/2ND GEAR COMPONENT, 5TH/6TH GEAR COMPONENT AND COUNTERSHAFT ASSEMBLY**

1. Assemble in the order indicated in **Fig. 45** .

# 2007 Mazda MX-5 Miata Sport

2006-08 TRANSMISSION Manual Transmission P66M-D Overhaul - MX-5 Miata



E5U511BM5008

1	Mainshaft
2	Needle bearing
3	2nd gear
4	Friction damper
5	Inner cone
6	Double cone
7	Synchronizer ring
8	1st/2nd clutch hub
9	Synchronizer key spring
10	Synchronizer key
11	Clutch hub sleeve
12	Synchronizer ring
13	Double cone
14	Inner cone
15	1st gear
16	Needle bearing
17	Needle bearing race
18	Mainshaft center bearing
19	Needle bearing
20	6th gear
21	Synchronizer ring
22	Thrust washer

23	Clutch hub
24	Synchronizer key
25	Synchronizer key spring
26	Clutch hub sleeve
27	Synchronizer ring
28	Needle bearing
29	Retaining ring
30	Maindrive gear
31	Maindrive gear shaft bearing
32	Scoop ring
33	Needle bearing
34	Countershaft
35	Countershaft center bearing race
36	Countershaft front bearing race

**Fig. 45: Exploded View Of Gear Components & Countershaft Assembly**  
 Courtesy of MAZDA MOTORS CORP.

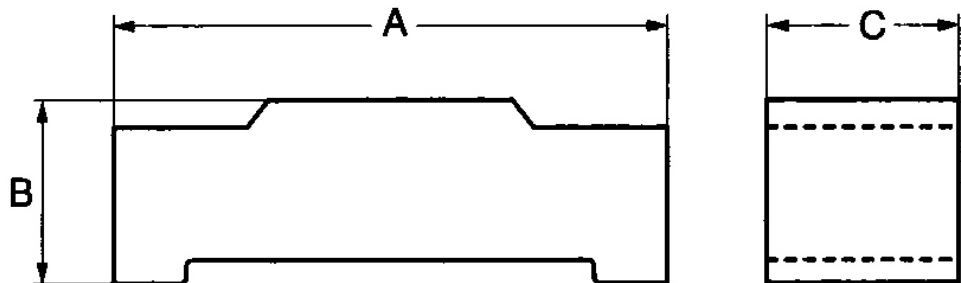
1st/2nd Clutch Hub Component Assembly Note

**CAUTION:**

- Be sure to assemble the clutch hub components and synchronizer ring components while aligning the synchronizer ring grooves with the synchronizer keys.
- The standard synchronizer key dimensions are as follows:

**1ST/2ND CLUTCH HUB COMPONENT**

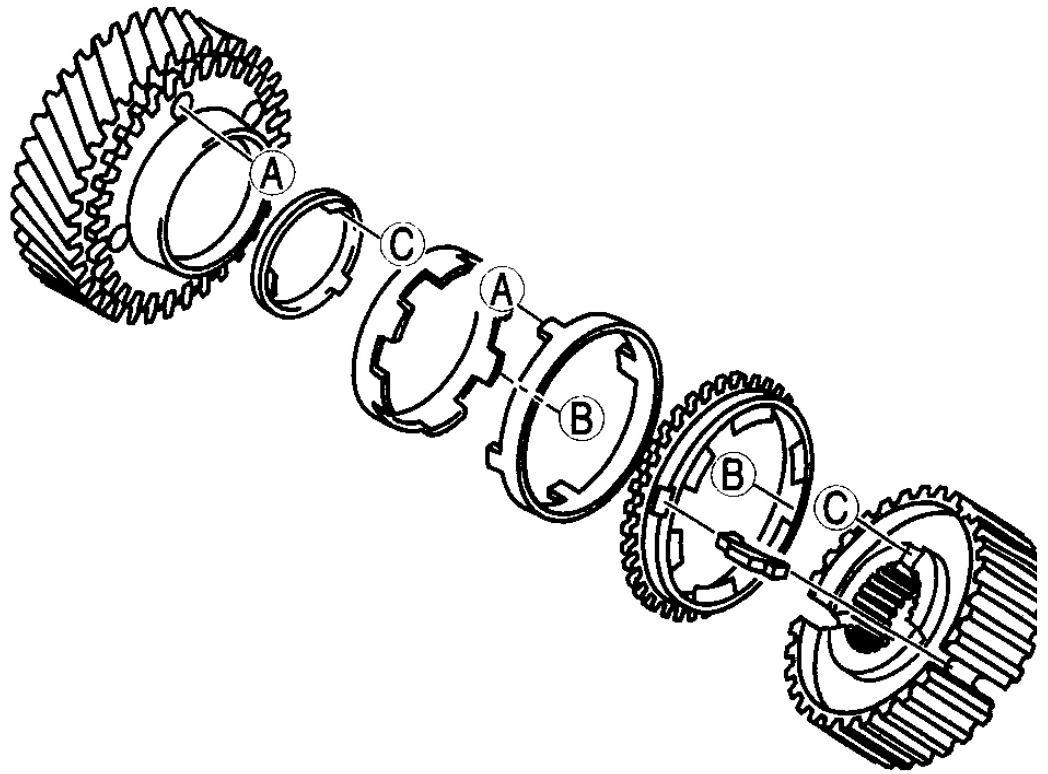
mm {in}			
-	A	B	C
1st/2nd	17.0 {0.670}	4.7 {0.185}	5.0 {0.197}



A6E5110M13

**Fig. 46: Assembling Clutch Hub Component**  
Courtesy of MAZDA MOTORS CORP.

- Be sure to align the synchronizer ring projections with the inner cone notches.
- Be sure to assemble the gears and the synchronizer ring components while aligning the double cone projections with the gear holes as show in [Fig. 47](#) .
- Align the friction damper projections with the clutch hub grooves. (2nd gear)

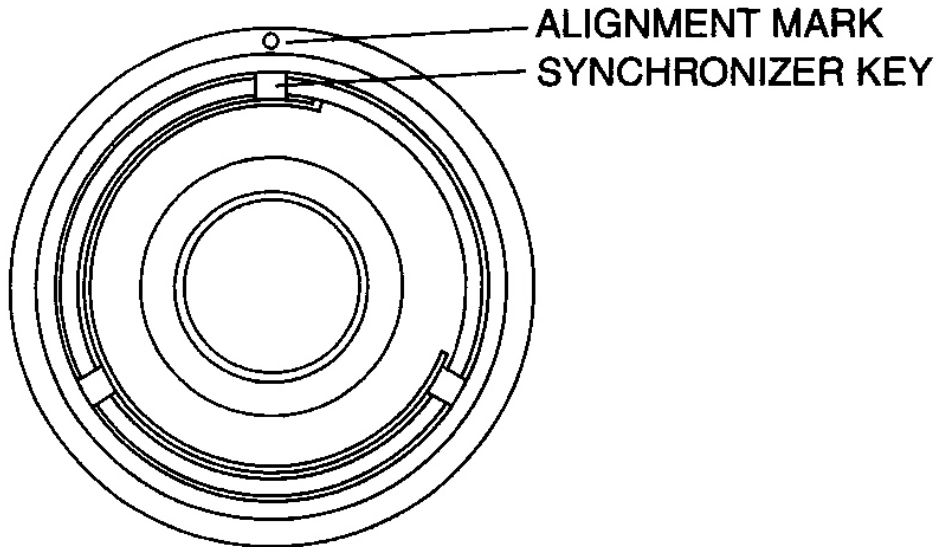


E5U511BM50t

**Fig. 47: Aligning Double Cone Projections With Gear Holes**  
Courtesy of MAZDA MOTORS CORP.

- Align the clutch hub sleeve alignment mark with the clutch hub synchronizer key installation position and assemble.





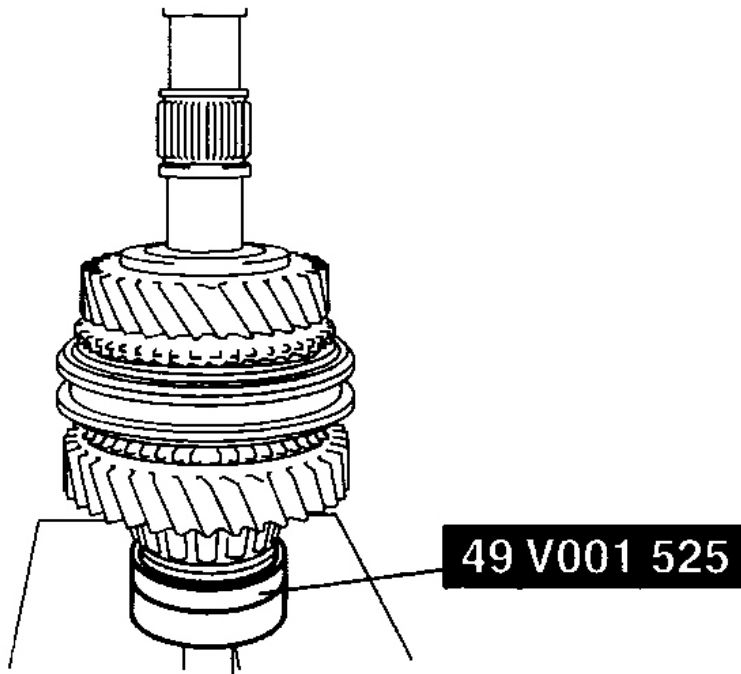
E5U511BM5058

**Fig. 48: Aligning Clutch Hub Sleeve Alignment Mark With Clutch Hub Synchronizer Key Installation Position**

Courtesy of MAZDA MOTORS CORP.

1. Using a **SST** and press, assemble the needle bearing, 2nd gear, synchronizer ring component (2nd), 1st/2nd clutch hub component, synchronizer ring component (1st), 1st gear, needle bearing, needle bearing race and mainshaft center bearing to the mainshaft at the same time.

**CAUTION:** • When using a press, be careful not to damage the parts.



E5U511BM5027

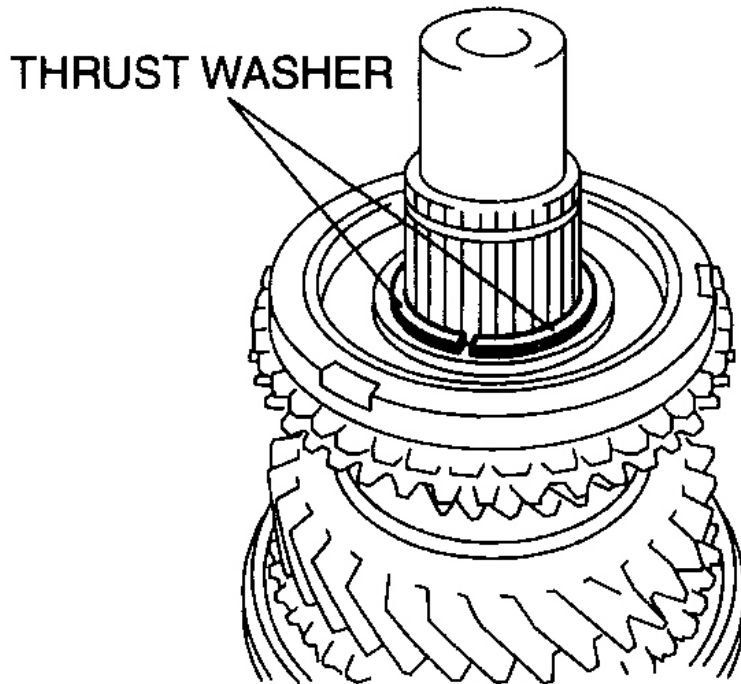
**Fig. 49: Assembling Needle Bearing Gear Using SST**  
Courtesy of MAZDA MOTORS CORP.

**5th/6th Clutch Hub Component Assembly Note**

1. Place the thrust washers onto the 6th gear.

**NOTE:**

- Apply petroleum jelly making sure the thrust washer does not deviate.



E5U511BM5028

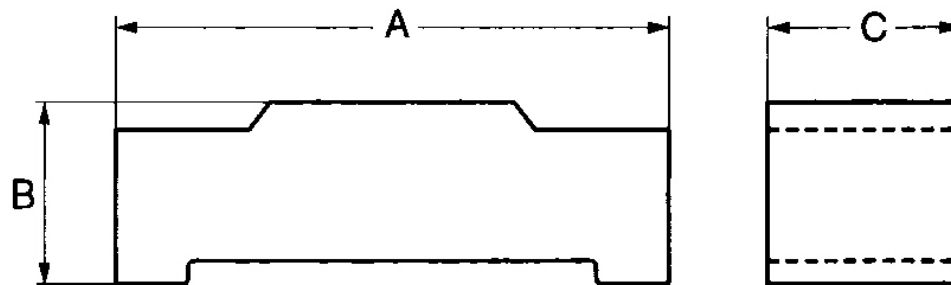
**Fig. 50: Placing Thrust Washers Onto 6th Gear**  
 Courtesy of MAZDA MOTORS CORP.

2. Assemble the 5th/6th clutch hub component.

**CAUTION:** • The standard synchronizer key dimensions are as follows:

**5TH/6TH CLUTCH HUB COMPONENT**

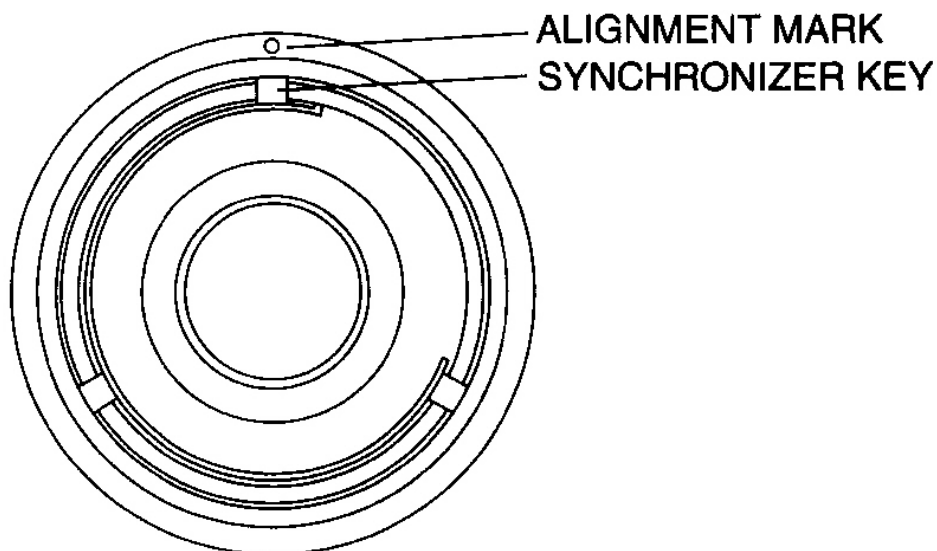
mm {in}			
-	A	B	C
5th/6th	17.0 {0.670}	4.25 {0.167}	5.0 {0.197}



A6E51

**Fig. 51: Standard Synchronizer Key Dimensions**  
Courtesy of MAZDA MOTORS CORP.

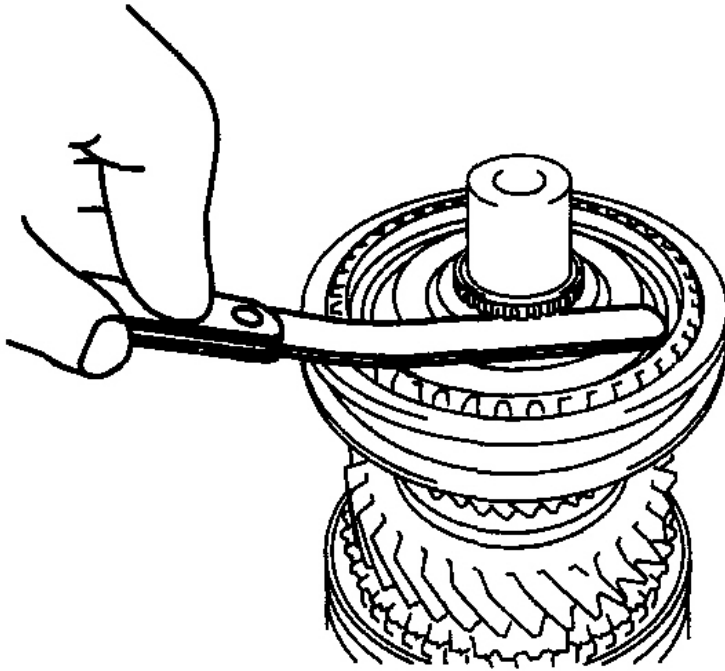
- Align the clutch hub sleeve alignment mark with the clutch hub synchronizer key installation position and assemble.
3. Install the 5th/6th clutch hub component to the mainshaft.
  4. Install the retaining ring.



E5U511BM5058

**Fig. 52: Aligning Clutch Hub Sleeve Alignment Mark With Clutch Hub Synchronizer Key Installation Position**  
Courtesy of MAZDA MOTORS CORP.

5. Measure the clearance between retaining ring and groove of the mainshaft.
  - If not within the specification, adjust by choosing the proper retaining ring.



E5U511BM5029

**Fig. 53: Measuring Clearance Between Retaining Ring & Groove Of Mainshaft**  
 Courtesy of MAZDA MOTORS CORP.

5th/6th clutch hub end play 0-0.05 mm {0-0.0019 in}

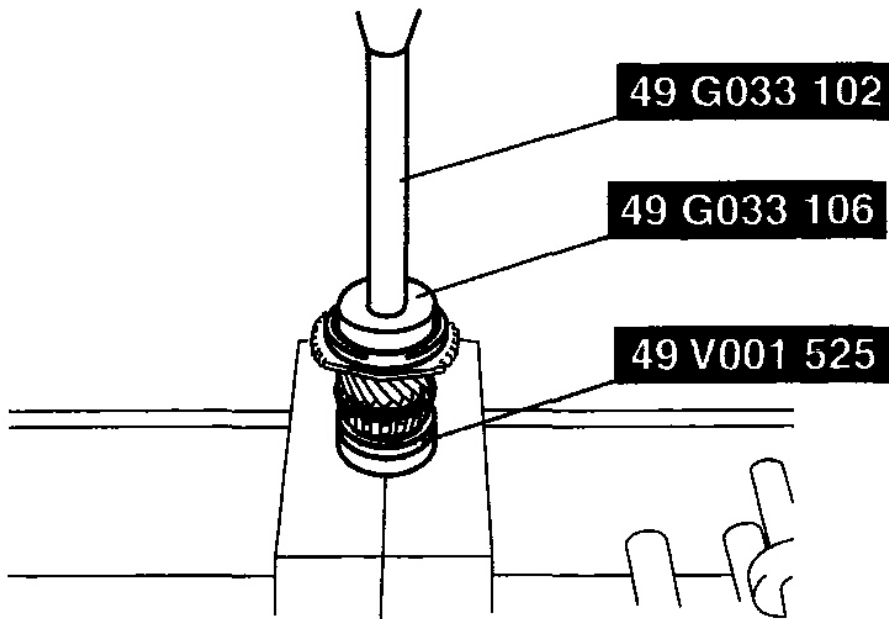
**5TH/6TH CLUTCH HUB RETAINING RING THICKNESS**

Thickness (mm {in})
1.50 {0.0591}
1.55 {0.0610}
1.60 {0.0630}
1.65 {0.0650}
1.70 {0.0669}
1.75 {0.0689}
1.80 {0.0709}
1.85 {0.0728}
1.90 {0.0748}

1.95 {0.0768}

**Maindrive Gear Shaft Bearing Assembly Note**

1. Assemble the maindrive gear shaft bearing using the SSTs .

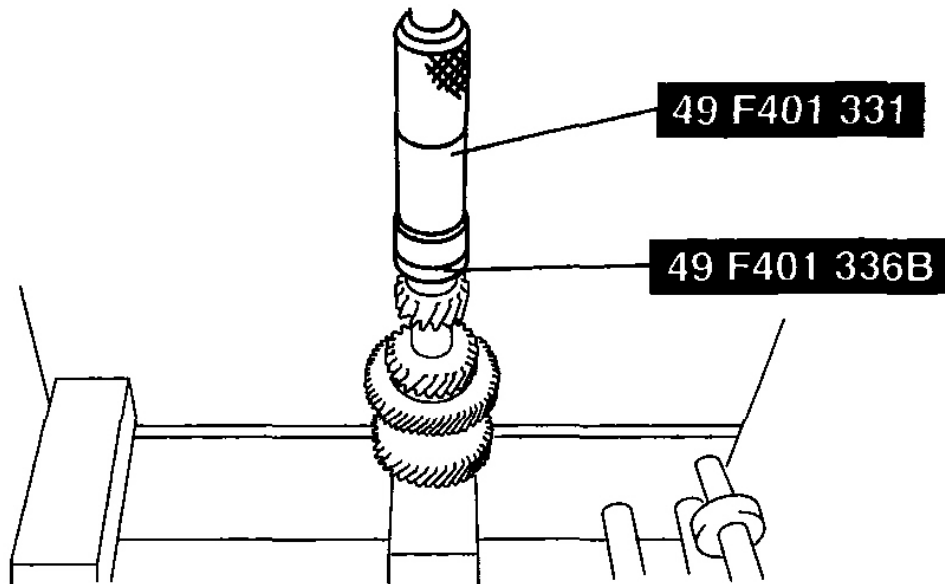


E5U511BM5066

**Fig. 54: Assembling Maindrive Gear Shaft Bearing Using SSTs**  
Courtesy of MAZDA MOTORS CORP.

**Countershaft Center Bearing Race Assembly Note**

1. Assemble the countershaft center bearing race using the SSTs .



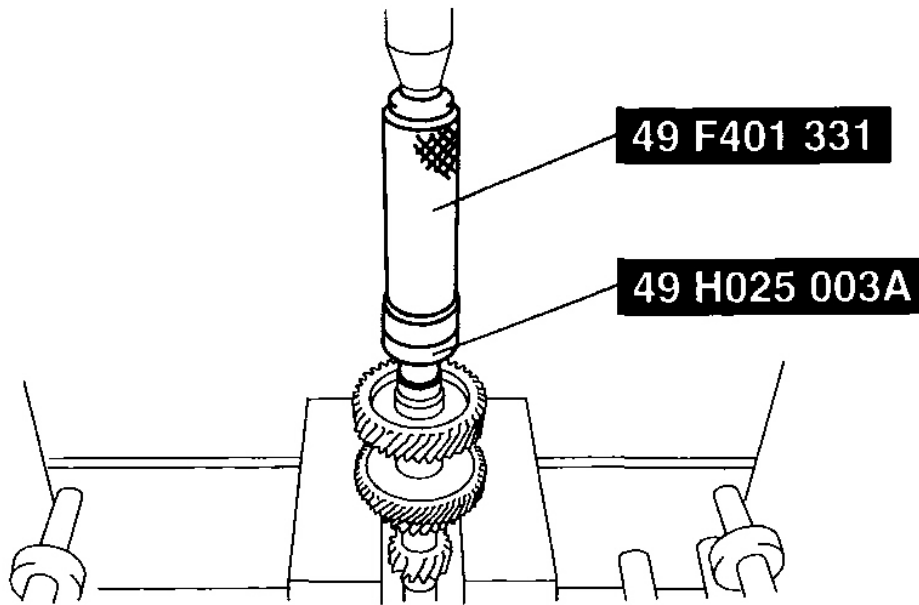
E5U511BM5030

**Fig. 55: Assembling Countershaft Center Bearing Race Using SSTs**  
Courtesy of MAZDA MOTORS CORP.

**Countershaft Front Bearing Race Assembly Note**

1. Assemble the countershaft front bearing race using the SSTs .





E5U511BM5031

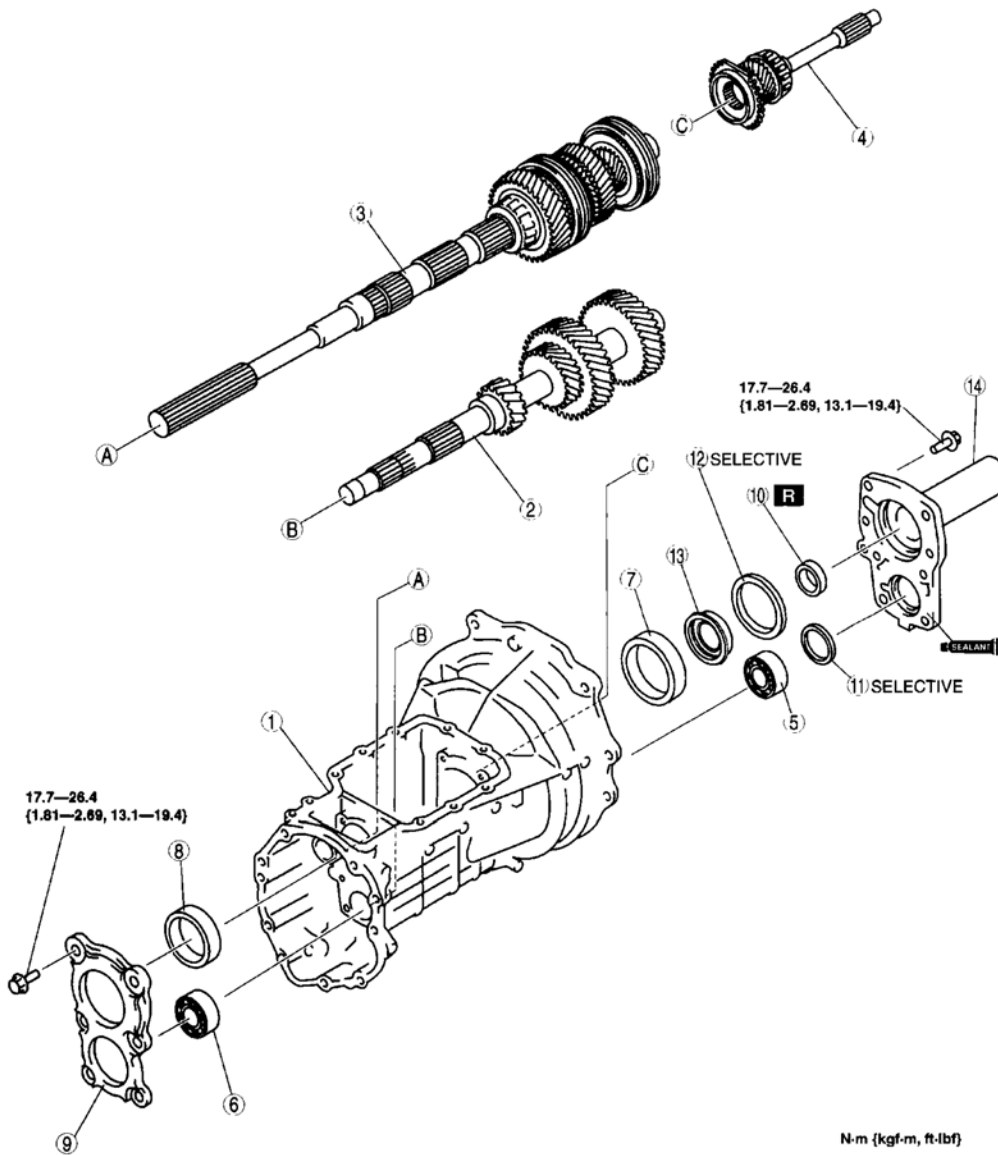
**Fig. 56: Assembling Countershaft Front Bearing Race Using SSTs**  
Courtesy of MAZDA MOTORS CORP.

**MAINSHAFT COMPONENT, COUNTERSHAFT COMPONENT AND TRANSMISSION CASE ASSEMBLY**

1. Assemble in the order indicated in **Fig. 57** .

# 2007 Mazda MX-5 Miata Sport

2006-08 TRANSMISSION Manual Transmission P66M-D Overhaul - MX-5 Miata



N·m {kgf·m, ft·lbf}

E5U5118M5006

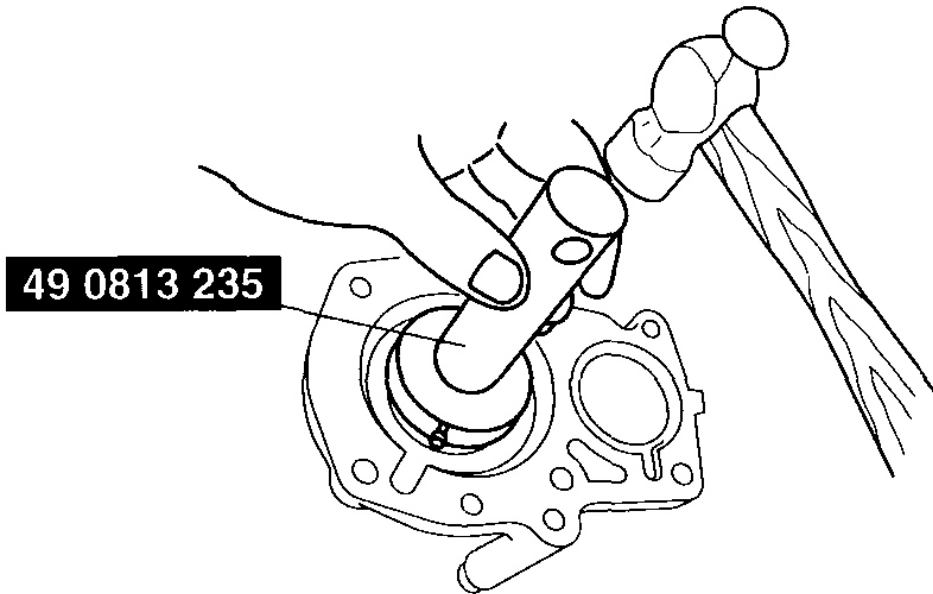
1	Transmission case
2	Countershaft component
3	Mainshaft component
4	Maindrive gear
5	Countershaft front bearing
6	Countershaft rear bearing
7	Maindrive gear bearing race
8	Mainshaft bearing race
9	Bearing cover
10	Front oil seal
11	Bearing shim
12	Bearing shim
13	Oil baffle
14	Front cover

**Fig. 57: Exploded View Of Mainshaft Component, Countershaft Component & Transmission Case (With Torque Specifications)**

Courtesy of MAZDA MOTORS CORP.

**Front Oil Seal Assembly Note**

1. Install the oil seal to the front cover using the SST.



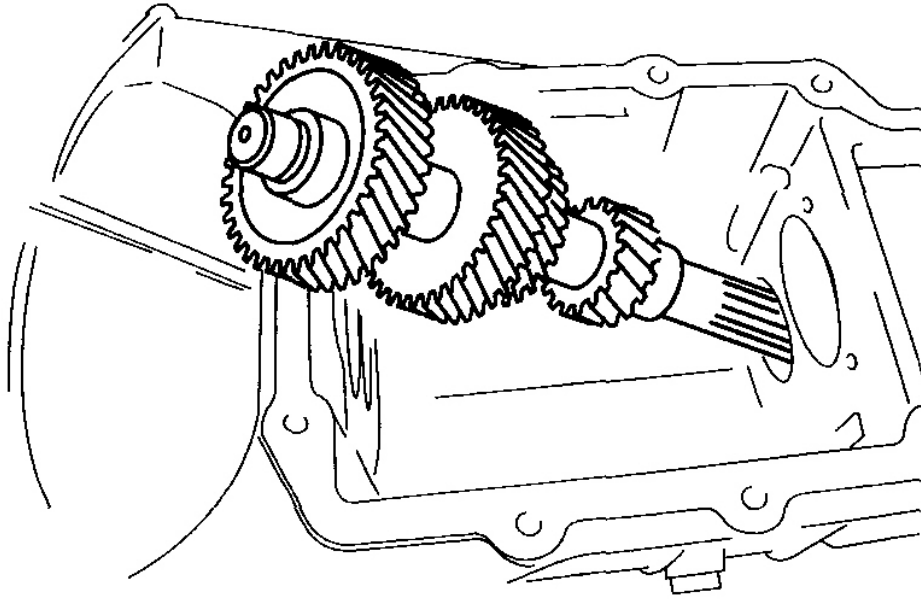
E5U511BM5043

**Fig. 58: Installing Oil Seal To Front Cover Using SST**

Courtesy of MAZDA MOTORS CORP.

**Maindrive Gear Component, Mainshaft Component and Countershaft Component Assembly Note**

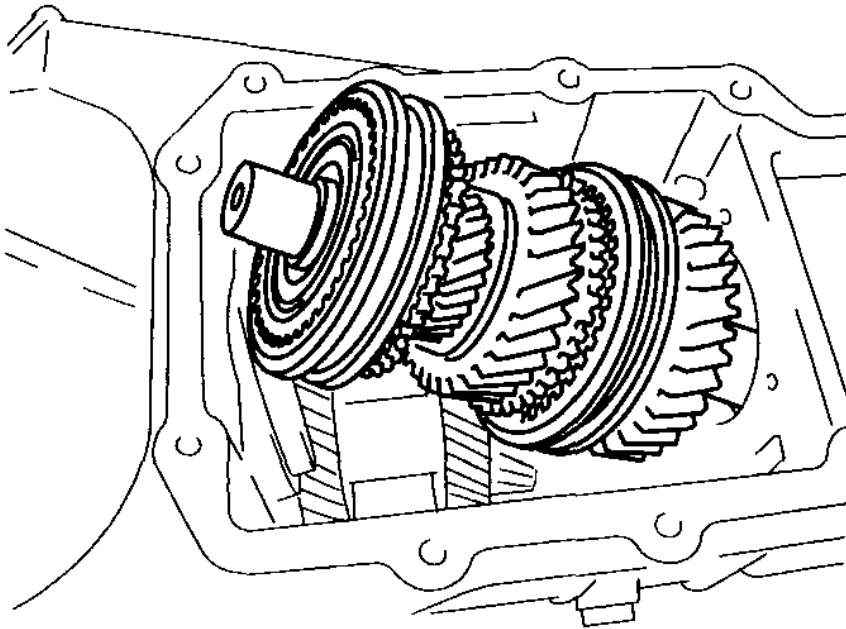
1. Install the countershaft component.



E5U511BM5073

**Fig. 59: Installing Countershaft Component**  
Courtesy of MAZDA MOTORS CORP.

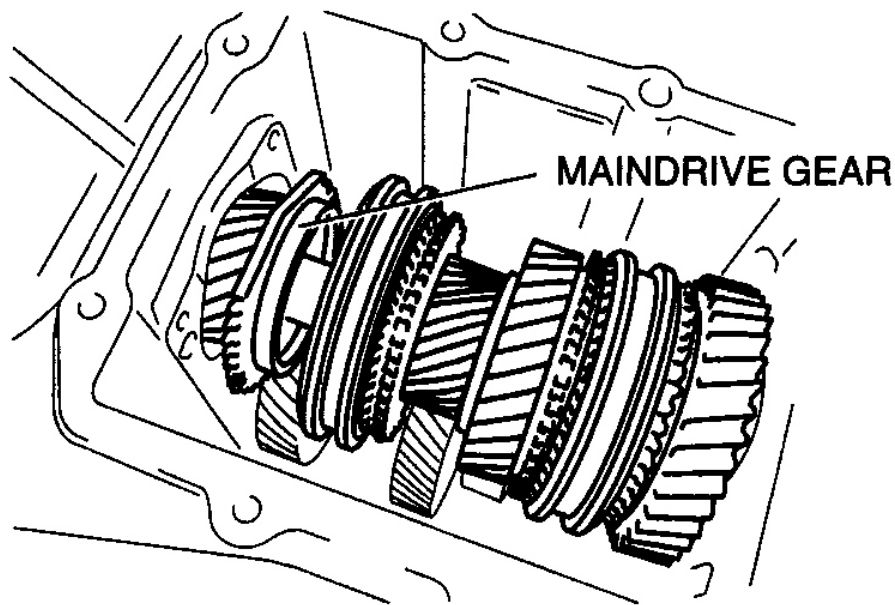
2. Install the mainshaft component.



E5U511BM5044

**Fig. 60: Installing Mainshaft Component**  
Courtesy of MAZDA MOTORS CORP.

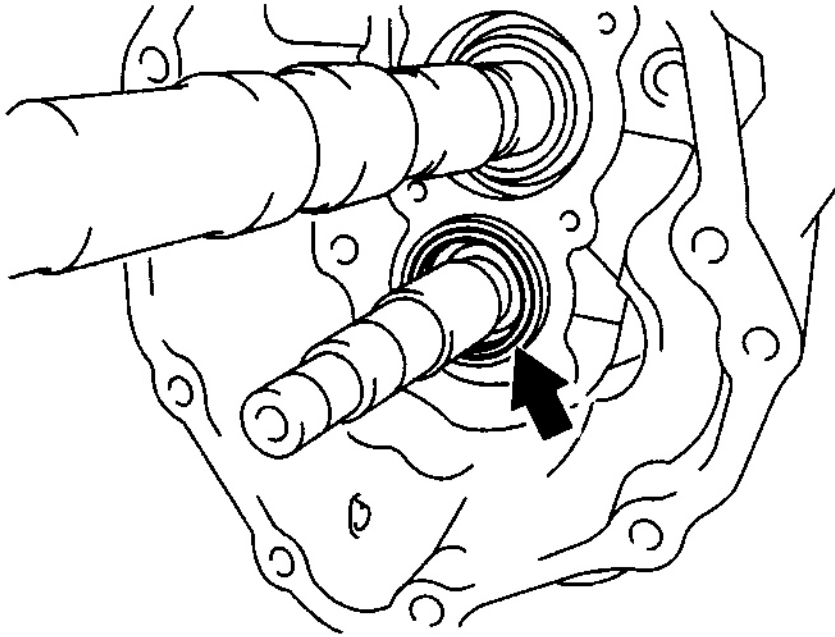
3. Insert the maindrive gear component from the front cover hole and assemble to the mainshaft component.



E5U511BM5045

**Fig. 61: Inserting Maindrive Gear Component From Front Cover Hole**  
Courtesy of MAZDA MOTORS CORP.

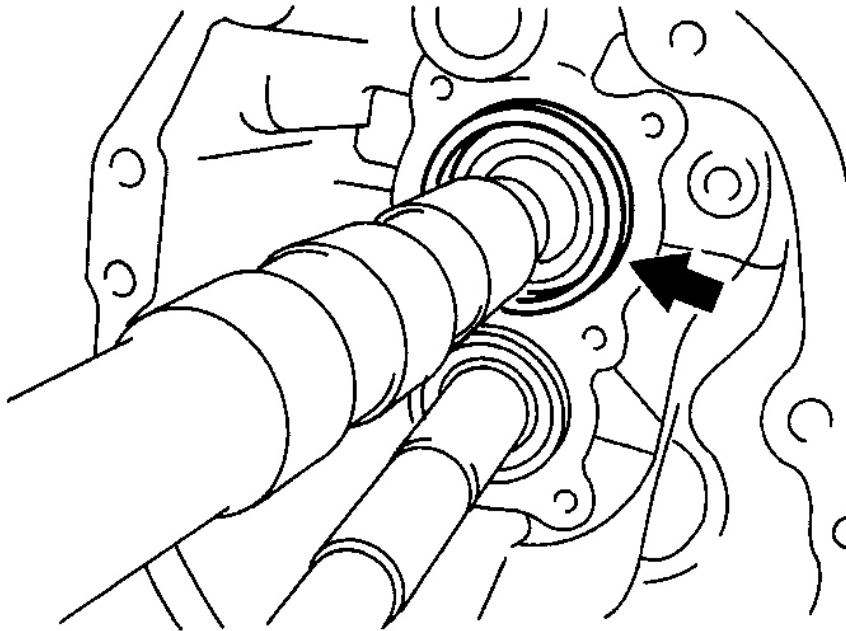
4. Install the countershaft front and center bearing.



E5U511BM5046

**Fig. 62: Installing Countershaft Front & Center Bearing**  
Courtesy of MAZDA MOTORS CORP.

5. Install the maindrive gear bearing race and mainshaft center bearing race.



E5U511BM5047

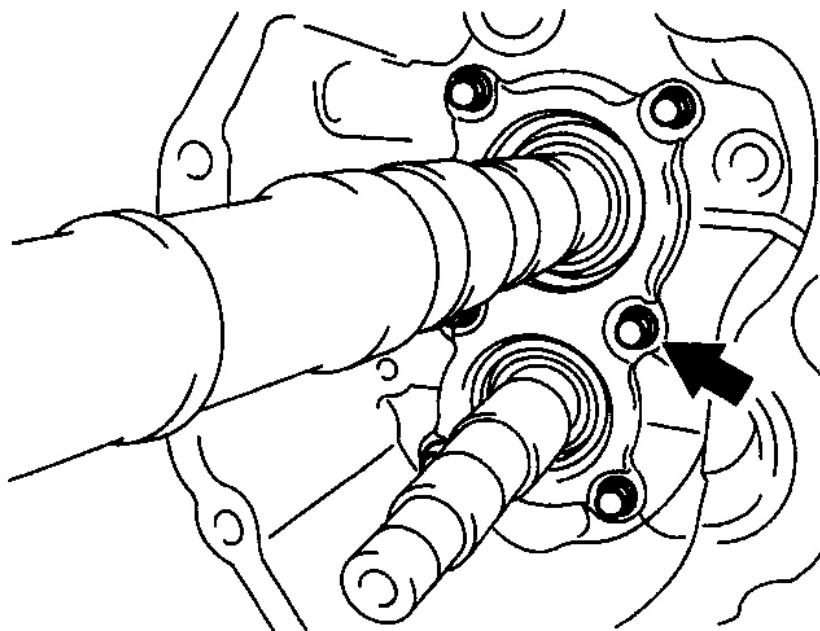
**Fig. 63: Installing Maindrive Gear Bearing Race & Mainshaft Center Bearing Race**  
Courtesy of MAZDA MOTORS CORP.

6. Install the bearing cover with the arrow pointing to the top of the case.

**Tightening torque:**

**17.7-26.4 N.m {1.81-2.69 kgf.m, 13.1-19.4 ft.lbf}**





E5U511BM5048

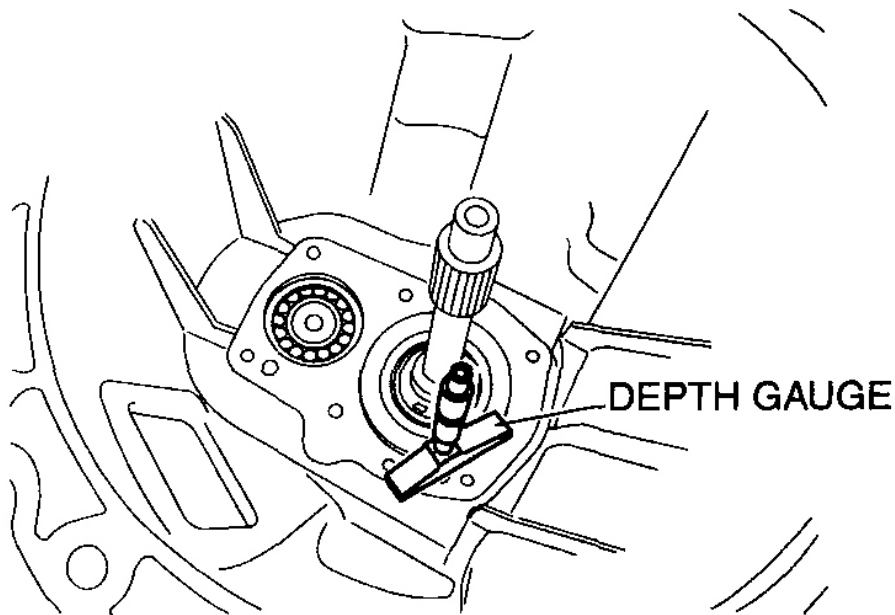
**Fig. 64: Installing Bearing Cover With Arrow Pointing To Top Of Case**  
Courtesy of MAZDA MOTORS CORP.

7. Select the mainshaft component and countershaft component bearing shims according to the following procedure.
  1. Set the clutch housing side upward and level the transmission case.

**CAUTION:**

- **Securely assemble the mainshaft, maindrive gear component, and countershaft component so that there is no looseness or play.**

2. Using a depth gauge, measure the maindrive gear bearing outer race height A.



E5U511BM5049

**Fig. 65: Measuring Maindrive Gear Bearing Outer Race Height A Using Depth Gauge**  
Courtesy of MAZDA MOTORS CORP.

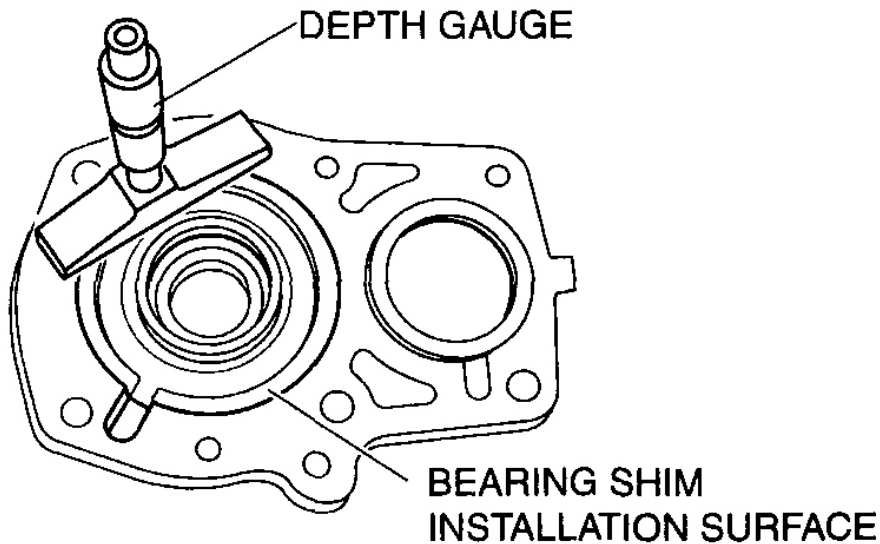
3. Using a depth gauge, measure the maindrive gear bearing retainer depth B.
4. Calculate and select the correct maindrive gear bearing shim thickness.

**Formula:  $C = B - A$**

**C : Dimension between the maindrive gear bearing and bore in the front cover**

**B: Depth of the maindrive gear bearing bore in the front cover**

**A: Maindrive gear bearing height**



E5U511BM5050

**Fig. 66: Measuring Maindrive Gear Bearing Retainer Depth B Using Depth Gauge**  
 Courtesy of MAZDA MOTORS CORP.

- Refer to the MAINDRIVE GEAR BEARING SHIM SELECTIVE TABLE .

**MAINDRIVE GEAR BEARING SHIM SELECTIVE TABLE**

Dimension C (mm {in})	Shim thickness (mm {in})
2.75-2.85 {0.1083-0.1122}	2.7 {0.106}
2.85-2.95 {0.1122-0.1161}	2.8 {0.110}
2.95-3.05 {0.1161-0.1201}	2.9 {0.114}
3.05-3.15 {0.1201-0.1240}	3.0 {0.118}
3.15-3.25 {0.1240-0.1280}	3.1 {0.122}
3.25-3.35 {0.1280-0.1319}	3.2 {0.126}
3.35-3.45 {0.1319-0.1358}	3.3 {0.130}
3.45-3.55 {0.1358-0.1398}	3.4 {0.134}
3.55-3.65 {0.1398-0.1437}	3.5 {0.138}
3.65-3.75 {0.1437-0.1476}	3.6 {0.142}
3.75-3.85 {0.1476-0.1516}	3.7 {0.147}
3.85-3.95 {0.1516-0.1555}	3.8 {0.150}

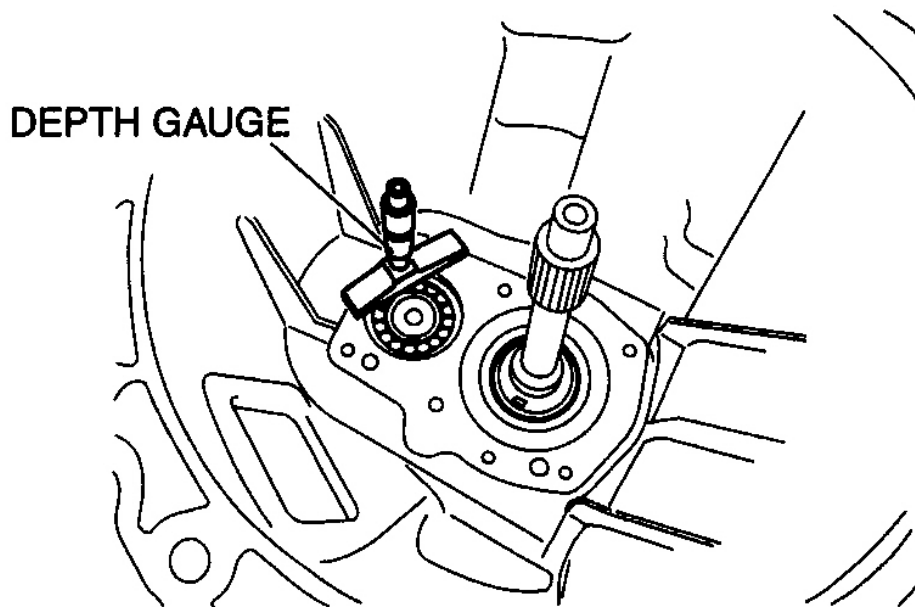
3.95-4.05 {0.1555-0.1594}	3.9 {0.154}
4.05-4.15 {0.1594-0.1634}	4.0 {0.157}
4.15-4.25 {0.1634-0.1673}	4.1 {0.161}

**Maindrive gear shaft total end play 0.05-0.15 mm {0.0020-0.0059 in}**

- Using a depth gauge, measure the countershaft front bearing depth D.

**NOTE:**

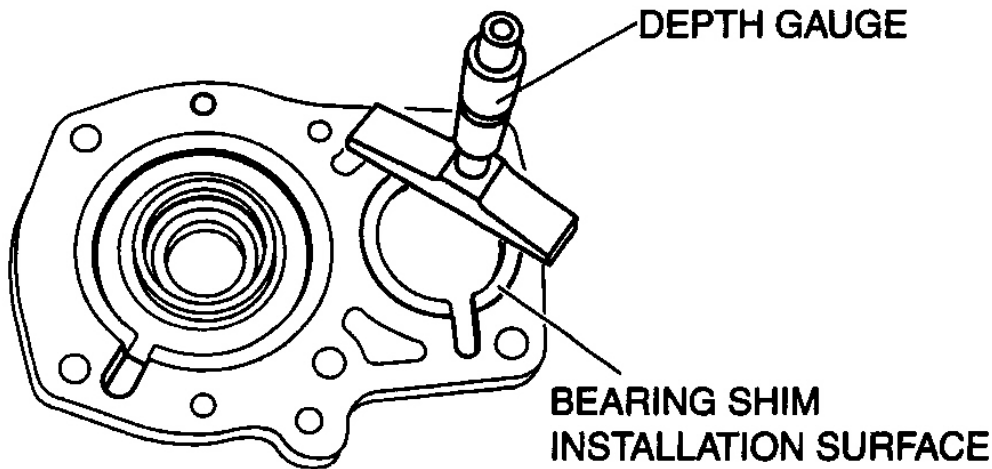
- The countershaft bearing is located below the contact surface of the case and front cover.



E5U511BM5052

**Fig. 67: Measuring Countershaft Front Bearing Depth D Using Depth Gauge**  
 Courtesy of MAZDA MOTORS CORP.

- Using a depth gauge, measure the countershaft front bearing retainer depth E.
- Calculate and select the correct countershaft front bearing shim thickness.



E5U511BM5053

**Fig. 68: Measuring Countershaft Front Bearing Retainer Depth E Using Depth Gauge**  
 Courtesy of MAZDA MOTORS CORP.

**Formula:  $F = E + D$**

**F :** Dimension between the countershaft front bearing and bore in the front cover

**E:** Depth of the countershaft front bearing bore in the front cover

**D:** Countershaft front bearing depth

- Refer to the COUNTERSHAFT FRONT BEARING SHIM SELECTIVE TABLE .

**COUNTERSHAFT FRONT BEARING SHIM SELECTIVE TABLE**

Dimension F (mm {in})	Shim thickness (mm {in})
2.45-2.55 {0.0965-0.1004}	2.3 {0.091}
2.55-2.65 {0.1004-0.1043}	2.4 {0.094}
2.65-2.75 {0.1043-0.1083}	2.5 {0.098}
2.75-2.85 {0.1083-0.1122}	2.6 {0.102}
2.85-2.95 {0.1122-0.1161}	2.7 {0.106}
2.95-3.05 {0.1161-0.1201}	2.8 {0.110}
3.05-3.15 {0.1201-0.1240}	2.9 {0.114}

## 2007 Mazda MX-5 Miata Sport

2006-08 TRANSMISSION Manual Transmission P66M-D Overhaul - MX-5 Miata

3.15-3.25 {0.1240-0.1280}	3.0 {0.118}
3.25-3.35 {0.1280-0.1319}	3.1 {0.122}

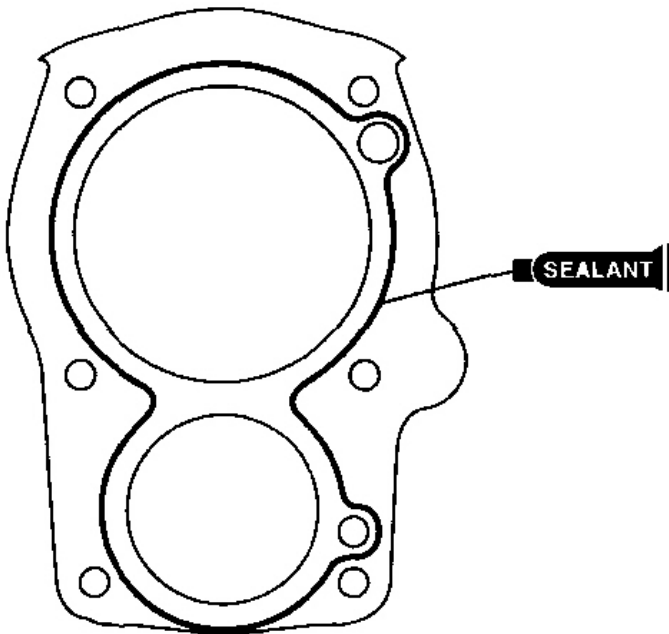
**Countershaft total end play 0.15-0.25 mm {0.0059-0.0098 in}**

8. Position the maindrive gear bearing shim, oil baffle, and the countershaft bearing shim onto the front cover.

**NOTE:**

- If necessary, apply a light coat of petroleum jelly to the shims and oil baffle.

9. Apply sealant to the contact surfaces of the transmission case and front cover as shown in **Fig. 69**.



E5U511BM5078

**Fig. 69: Applying Sealant To Contact Surfaces Of Transmission Case & Front Cover**  
Courtesy of MAZDA MOTORS CORP.

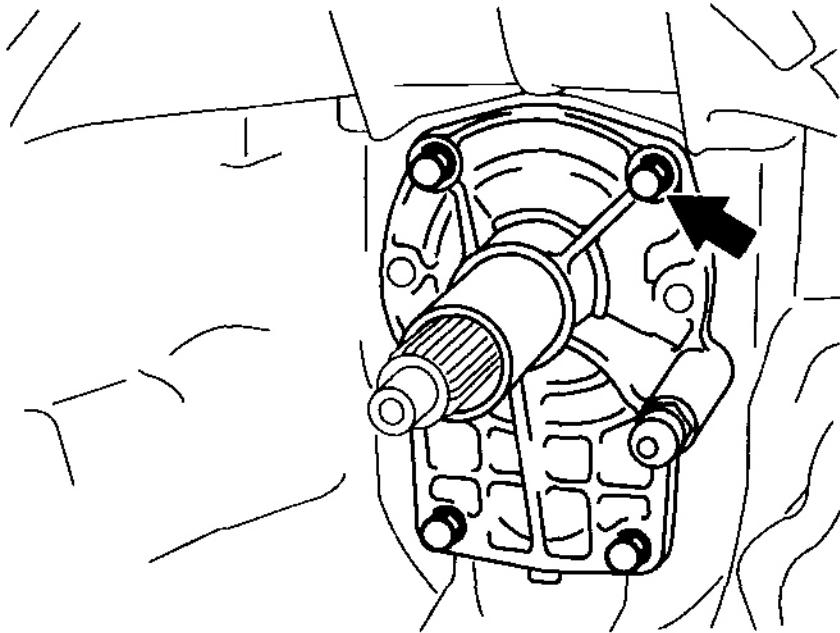
10. Install the front cover to the transmission case.

**Tightening torque:**

17.7-26.4 N.m {1.81-2.69 kgf.m, 13.1-19.4 ft.lbf}

**NOTE:**

- To prevent damage to the oil seal lip during assembly, tape maindrive gear shaft splines.



E5U511BM5059

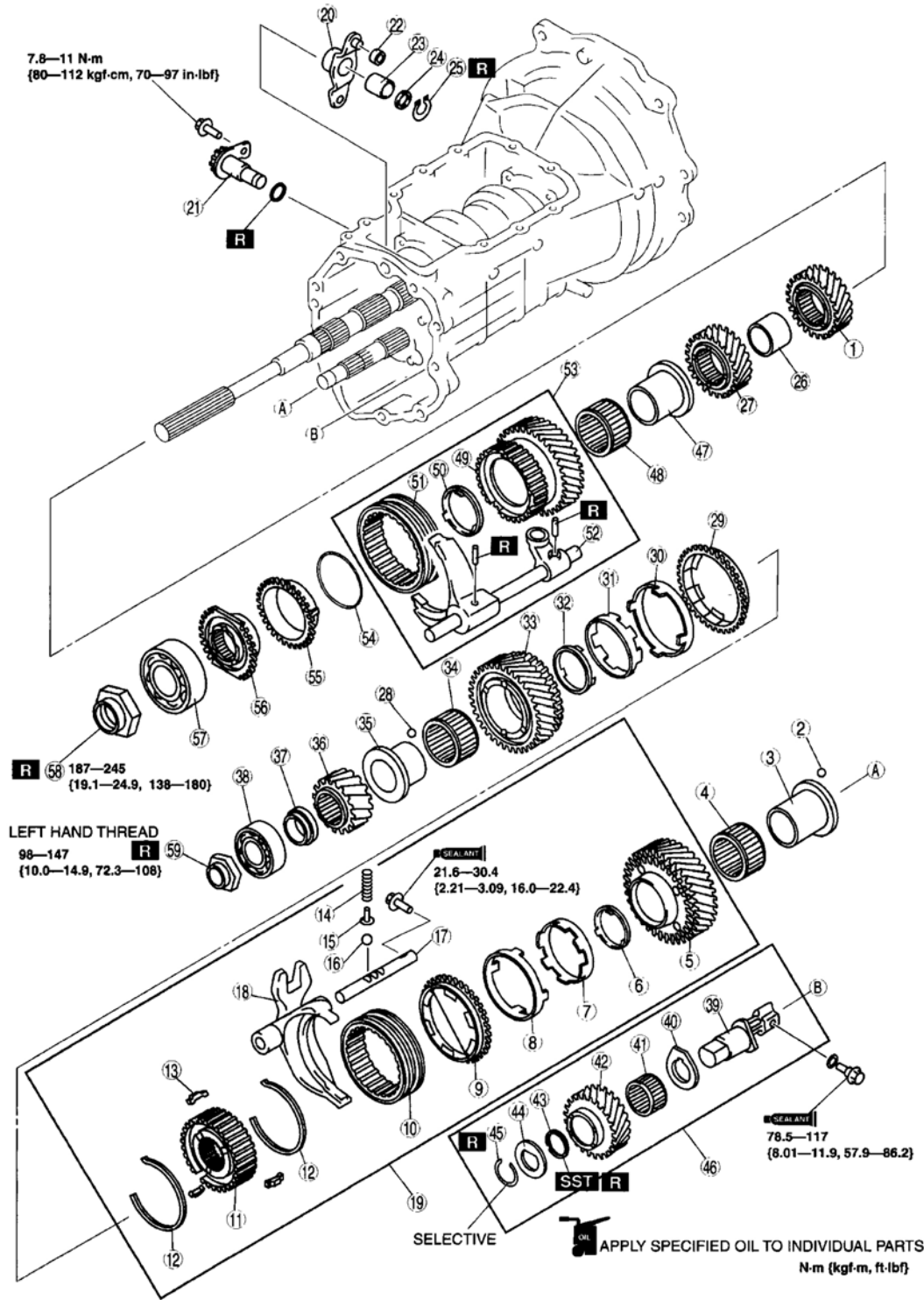
**Fig. 70: Installing Front Cover To Transmission Case**  
Courtesy of MAZDA MOTORS CORP.

**REVERSE GEAR COMPONENT AND 3RD/4TH GEAR COMPONENT ASSEMBLY**

1. Assemble in the order indicated in **Fig. 72** .

# 2007 Mazda MX-5 Miata Sport

2006-08 TRANSMISSION Manual Transmission P66M-D Overhaul - MX-5 Miata



ESU511BM5005

Fig. 71: Exploded View Of Reverse Gear Components (With Torque Specifications) (1 Of 2)



## 2007 Mazda MX-5 Miata Sport

2006-08 TRANSMISSION Manual Transmission P66M-D Overhaul - MX-5 Miata

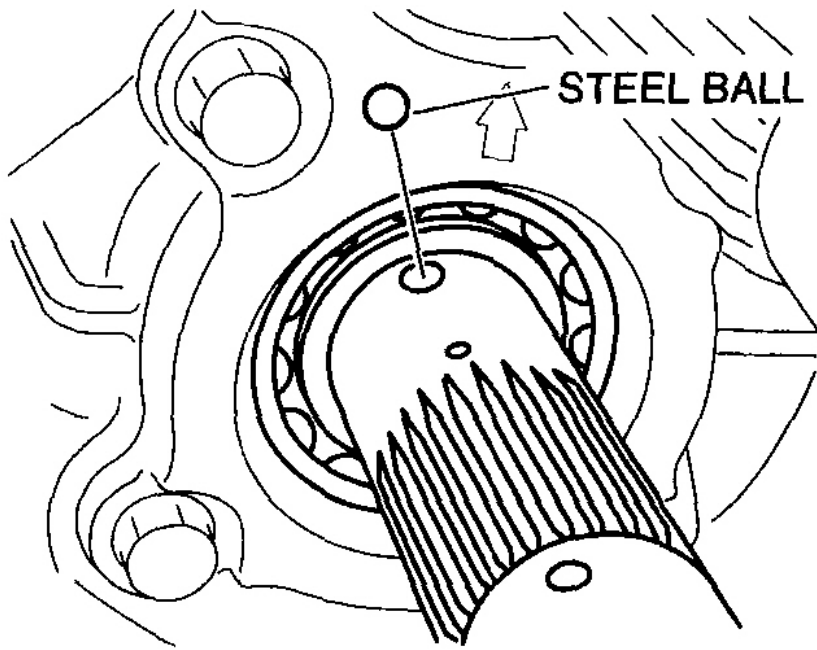
Courtesy of MAZDA MOTORS CORP.

1	3rd gear	33	4th counter gear
2	Steel ball	34	Needle bearing
3	Needle bearing inner race	35	Needle bearing race
4	Needle bearing	36	Reverse counter gear
5	3rd counter gear	37	Collar
6	Friction damper	38	Countershaft rear bearing
7	Inner cone	39	Reverse idler gear shaft
8	Double cone	40	Thrust washer
9	Synchronizer ring	41	Needle bearing
10	Clutch hub sleeve	42	Reverse idler gear
11	3rd/4th clutch hub	43	Friction damper
12	Synchronizer key spring	44	Thrust washer
13	Synchronizer key	45	Retaining ring
14	Detent spring	46	Reverse idler gear component
15	Spring seat	47	Needle bearing race
16	Detent ball	48	Needle bearing
17	3rd/4th shift rod	49	Reverse gear
18	3rd/4th shift fork	50	Friction damper
19	3rd/4th clutch hub component	51	Clutch hub sleeve
20	Counter lever	52	Reverse shift fork
21	Counter lever shaft component	53	Reverse gear, shift fork component
22	Bush	54	Synchronizer key spring
23	Needle bearing	55	Synchronizer ring
24	Spacer	56	Reverse synchronizer cone
25	Retaining ring	57	Mainshaft rear bearing
26	Spacer	58	Locknut
27	4th gear	59	Locknut
28	Steel ball		
29	Synchronizer ring		
30	Double cone		
31	Inner cone		
32	Friction damper		

**Fig. 72: Exploded View Of Reverse Gear Components (2 Of 2)**  
Courtesy of MAZDA MOTORS CORP.

### 3rd Gear Bearing Inner Race Assembly Note

1. Install the steel ball to the countershaft.
2. Align the ball groove position of the 3rd gear bearing inner race and assemble it to the countershaft.



E5U511BM5032

**Fig. 73: Installing Steel Ball To Countershaft**  
 Courtesy of MAZDA MOTORS CORP.

**3rd Counter Gear, 3rd/4th Clutch Hub Component and 3rd/4th Shift Fork Assembly Note**

1. Assemble the 3rd drive gear and 3rd/4th clutch hub component.

**CAUTION:**

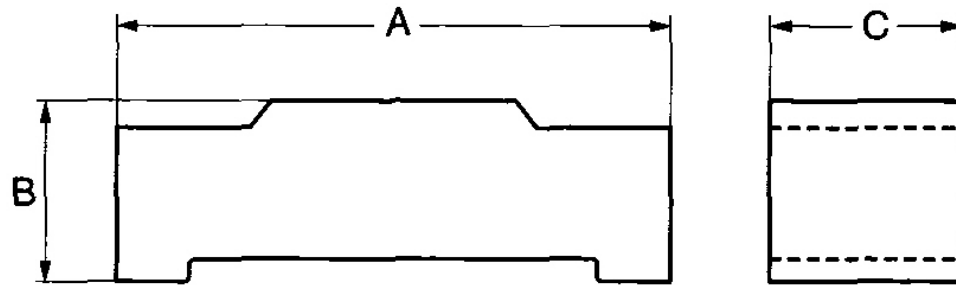
- Be sure to assemble the clutch hub components and synchronizer components while aligning the synchronizer ring grooves with the synchronizer keys.
- The standard synchronizer key dimensions are as follows:

**CLUTCH HUB COMPONENTS AND SYNCHRONIZER RING**

mm {in}			
-	A	B	C
5th/6th	17.0 {0.670}	4.25 {0.167}	5.0 {0.197}

- Be sure to align the synchronizer ring projections with the inner (

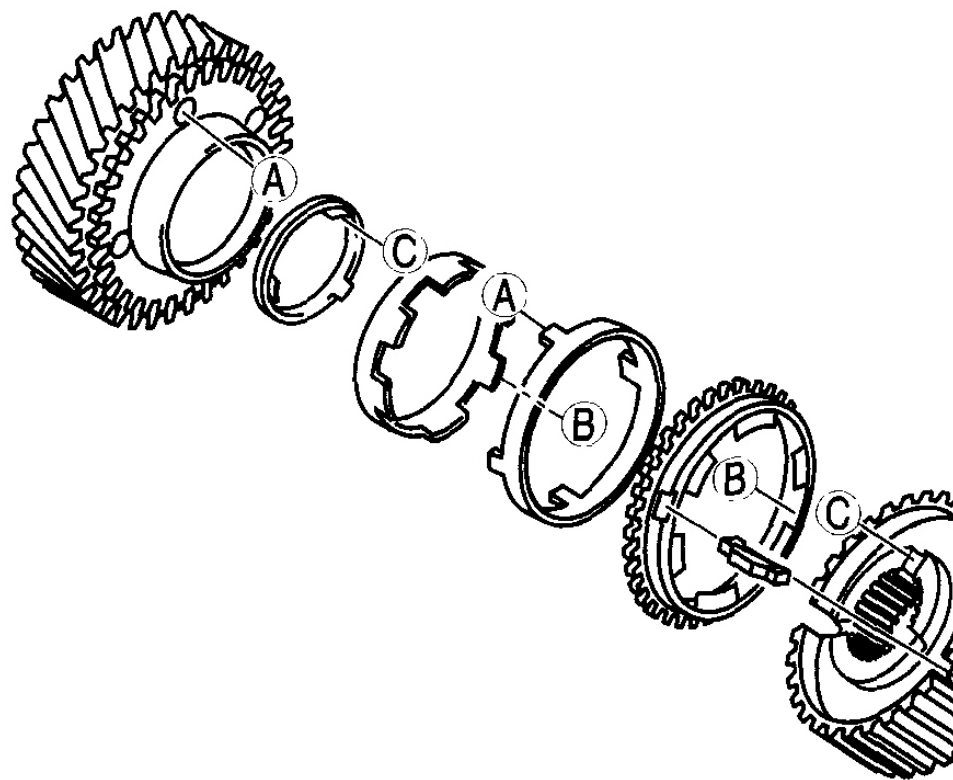
notches.



A6E51

**Fig. 74: Standard Synchronizer Key Dimensions**  
Courtesy of MAZDA MOTORS CORP.

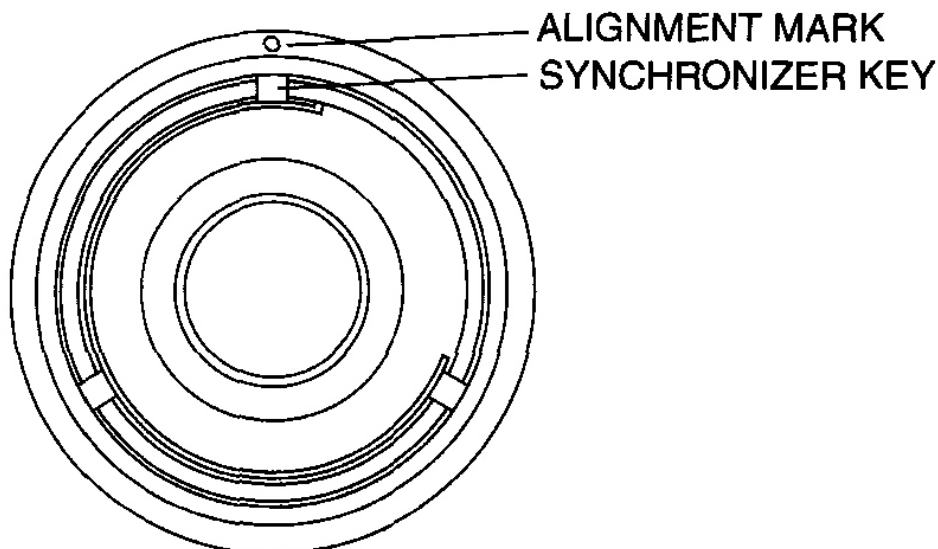
- Be sure to assemble the gears and the synchronizer ring compor while aligning the double cone projections with the gear holes as in Fig. 75 .
- Align the friction damper projections with the clutch hub grooves



E5U511

**Fig. 75: Assembling Gears & Synchronizer Ring Components**  
Courtesy of MAZDA MOTORS CORP.

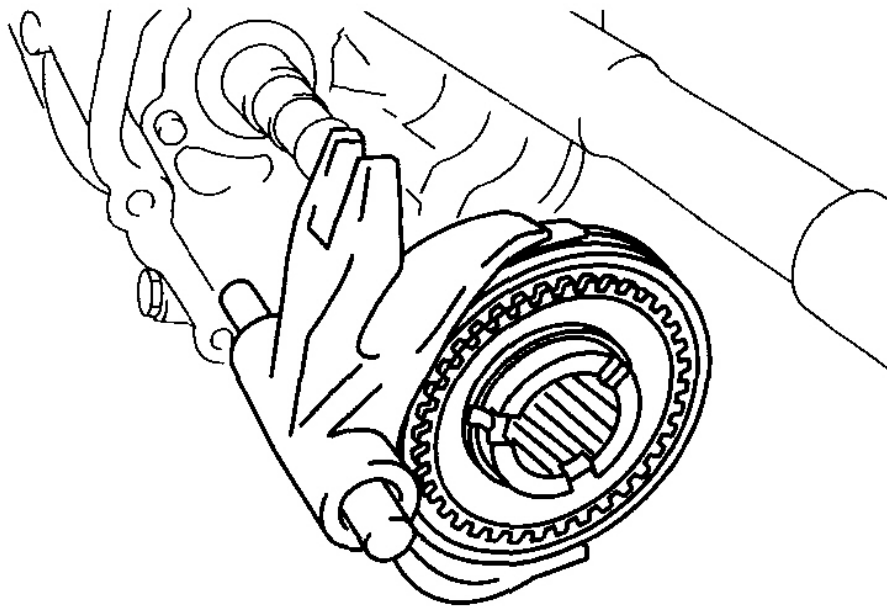
- Align the clutch hub sleeve alignment mark with the clutch hub synchronizer key installation position and assemble.



E5U511BM5058

**Fig. 76: Aligning Clutch Hub Sleeve Alignment Mark With Clutch Hub Synchronizer Key  
Installation Position**  
Courtesy of MAZDA MOTORS CORP.

2. Assemble the 3rd counter gear component, 3rd/4th clutch hub component, and 3rd/4th shift fork component as a single unit.



E5U511BM5018

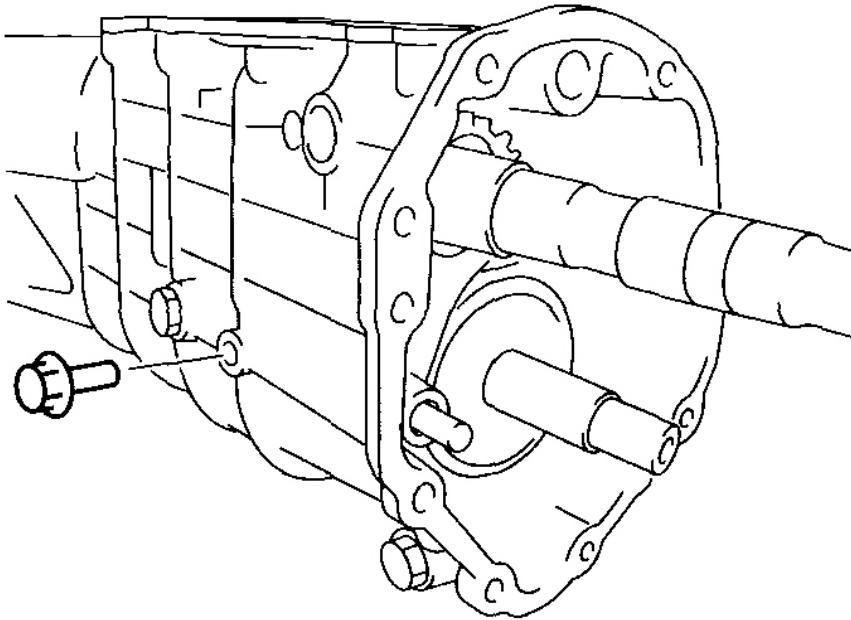
**Fig. 77: Assembling 3rd Counter Gear Component, 3rd/4th Clutch Hub Component & 3rd/4th Shift Fork Component**

**Courtesy of MAZDA MOTORS CORP.**

3. Install the 3rd/4th shift rod retaining bolt.

**Tightening torque:**

**21.6-30.4 N.m {2.21-3.09 kgf.m, 16.0-22.4 ft.lbf}**



E5U511BM5017

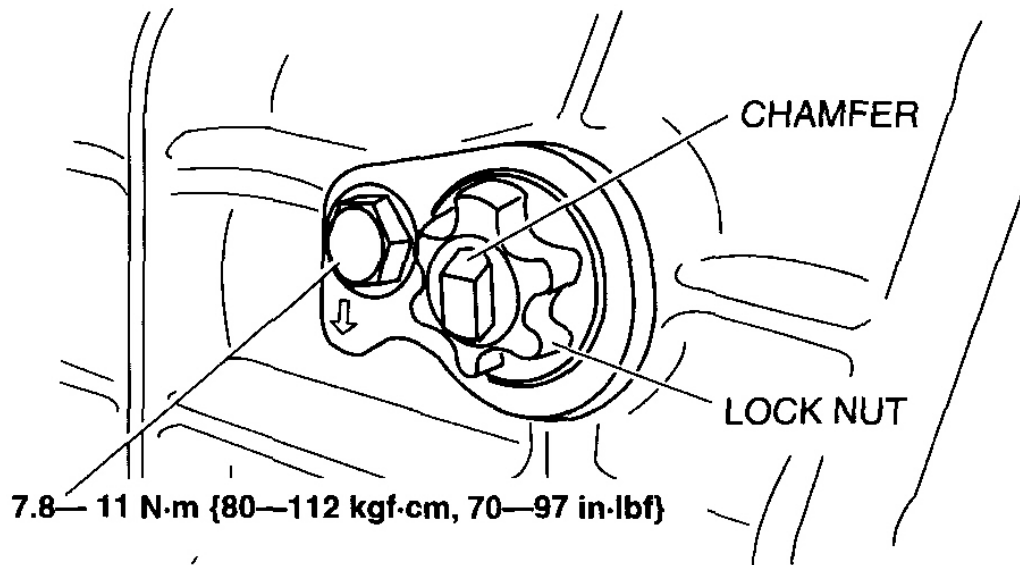
**Fig. 78: Installing Shift Rod Retaining Bolt**  
Courtesy of MAZDA MOTORS CORP.

**Counter Lever Shaft Assembly Note**

1. Install the counter lever shaft component.

**CAUTION:**

- If the counter lever shaft has been replaced or the locknut is loose, assemble the counter lever shaft with the chamfer side of the shaft pointed straight upward.
- Apply sealant to the threads of the locknut.
- If there is an abnormality in the 3rd/4th shift stroke after assembling, loosen the locknut and readjust.



E5U511BM5072

**Fig. 79: Installing Counter Lever Shaft Component (With Torque Specifications)**  
Courtesy of MAZDA MOTORS CORP.

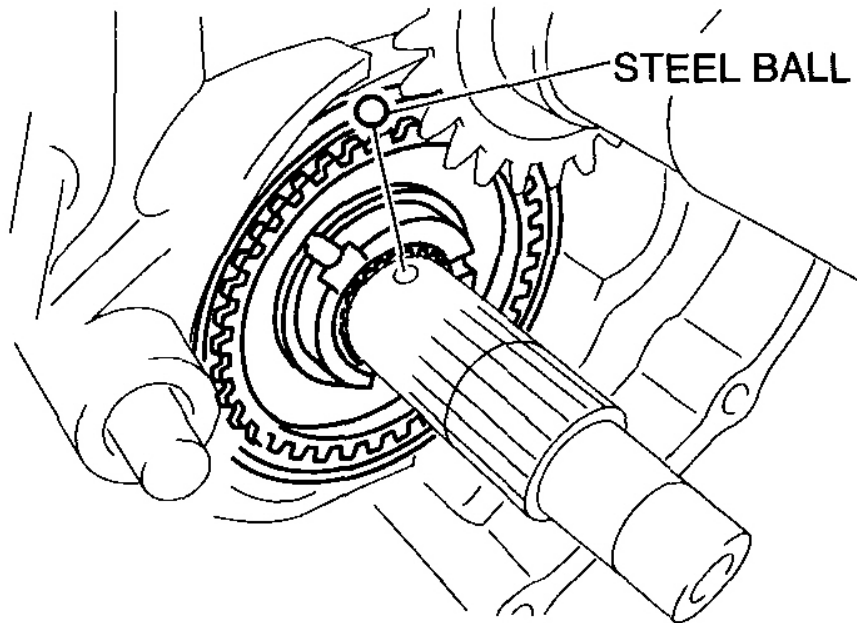
**Locknut tightening torque:**

**37.3-51.9 N.m {3.81-5.29 kgf.m, 27.6-38.2 ft.lbf}**

**4th Counter Gear, 4th Synchronizer ring, 4th Bearing Inner Race Assembly Note**

1. Install the steel ball to the countershaft.





E5U511BM5035

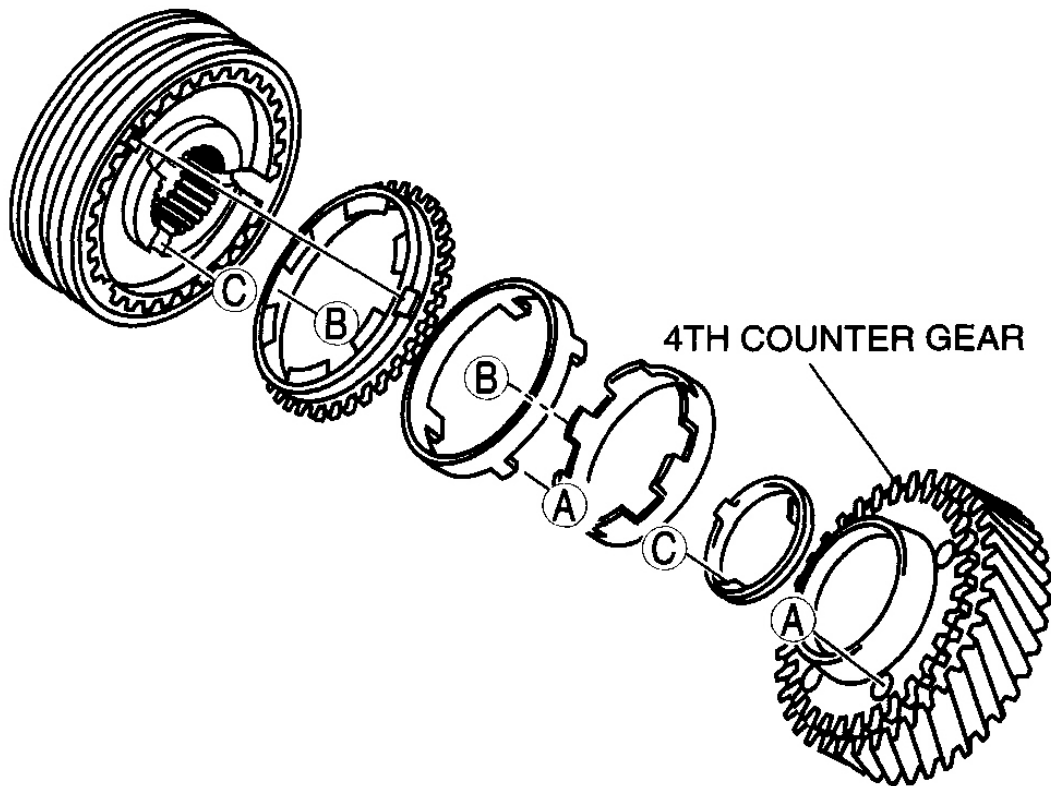
**Fig. 80: Installing Steel Ball To Countershaft**  
Courtesy of MAZDA MOTORS CORP.

2. Assemble the 4th counter gear component to the 3rd/4th clutch hub.

**CAUTION:**

- Be sure to assemble the clutch hub components and synchronizer ring components while aligning the synchronizer ring grooves with the synchronizer keys.
- Be sure to align the synchronizer ring projections with the inner cone notches.
- Be sure to assemble the gears and the synchronizer ring components while aligning the double cone projections with the gear holes as shown in [Fig. 80](#) .
- Align the friction damper projections with the clutch hub grooves.

3. Align the ball groove position of the 4th counter gear bearing inner race and assemble it to the countershaft.

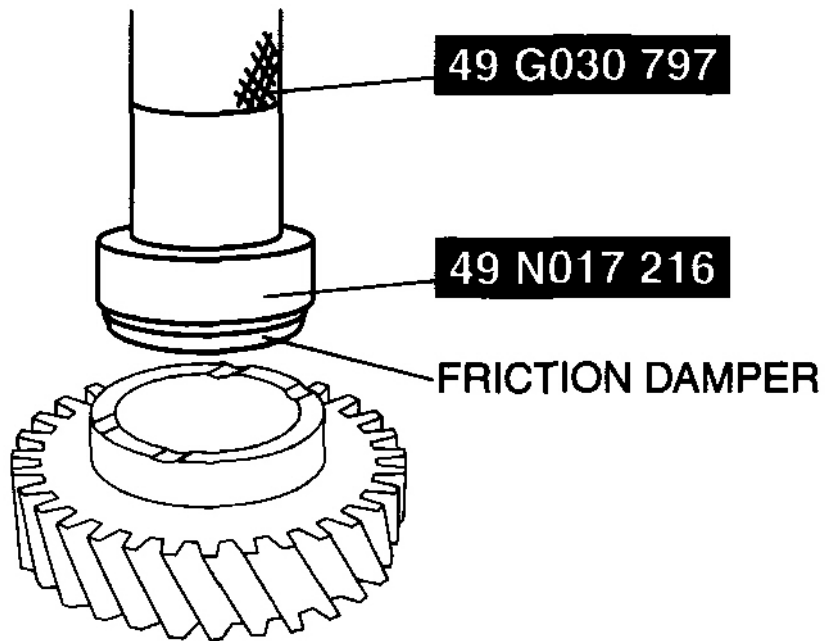


E5U511BM5062

**Fig. 81: Identifying 4th Counter Gear Bearing Inner Race**  
Courtesy of MAZDA MOTORS CORP.

**Reverse Idler Gear Component Assembly Note**

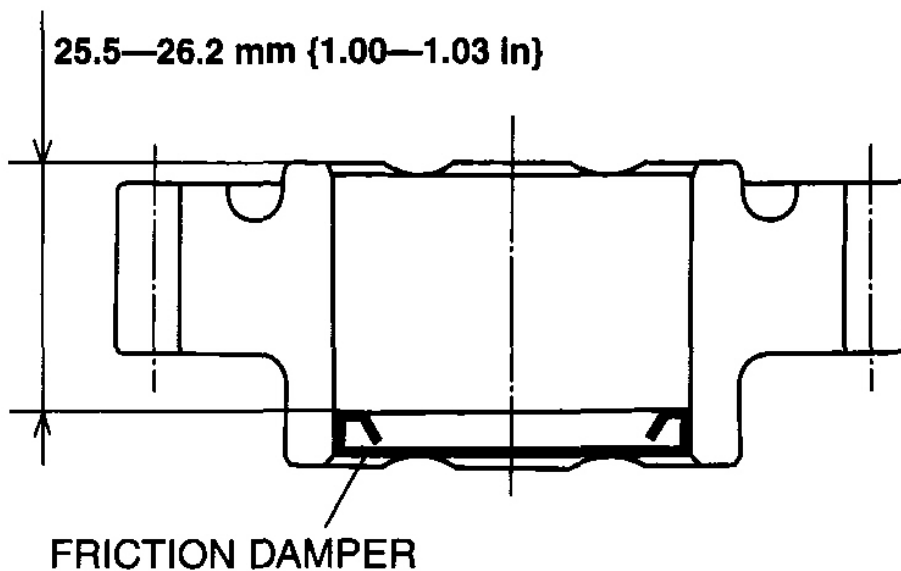
1. Using the **SST** , install the friction damper to the reverse idler gear.
  - Verify the depth of the friction damper installation position.



E5U511BM5038

**Fig. 82: Installing Friction Damper To Reverse Idler Gear Using SST**  
Courtesy of MAZDA MOTORS CORP.

2. Assemble the reverse idler gear component.



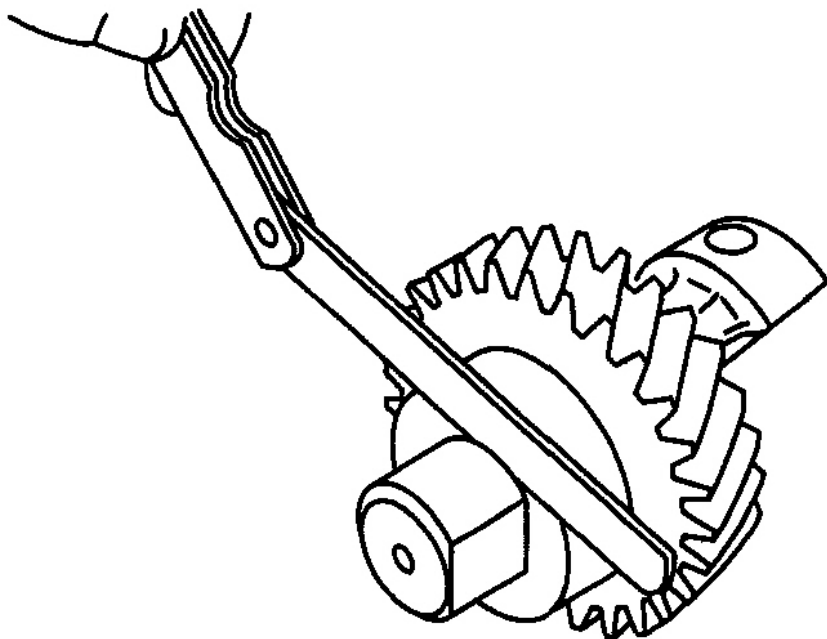
E5U511BM5088

**Fig. 83: Identifying Friction Damper**  
Courtesy of MAZDA MOTORS CORP.

3. Measure the clearance between the retaining ring and thrust washer.
  - If not within the specification, adjust by choosing the proper retaining ring.

**Reverse idler gear end play**

**0.1-0.2 mm {0.0040-0.0078 in}**



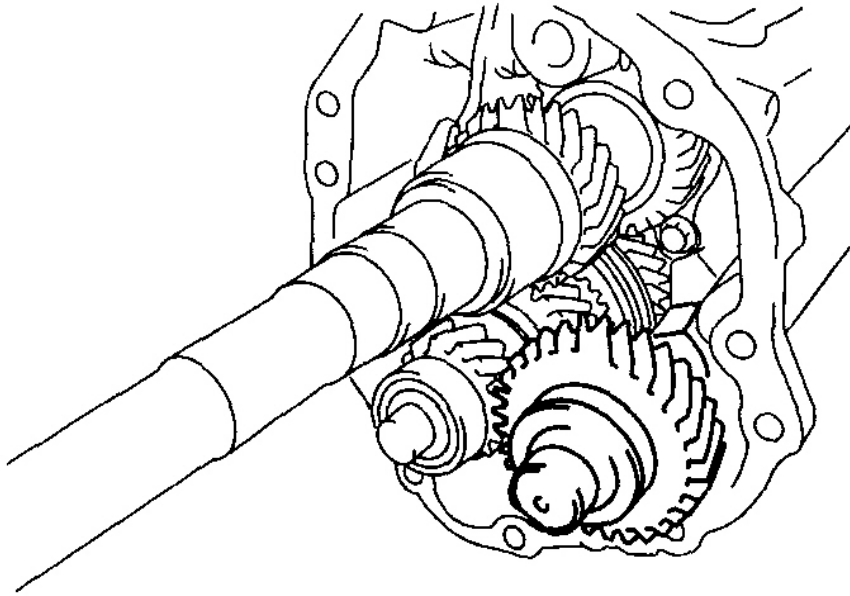
E5U511BM5039

**Fig. 84: Measuring Clearance Between Retaining Ring & Thrust Washer**  
Courtesy of MAZDA MOTORS CORP.

**REVERSE IDLER GEAR RETAINING RING**

Thickness (mm {in})
1.5 {0.059}
1.6 {0.063}
1.7 {0.067}
1.8 {0.071}
1.9 {0.075}

4. Install the reverse idler gear component to the transmission case.



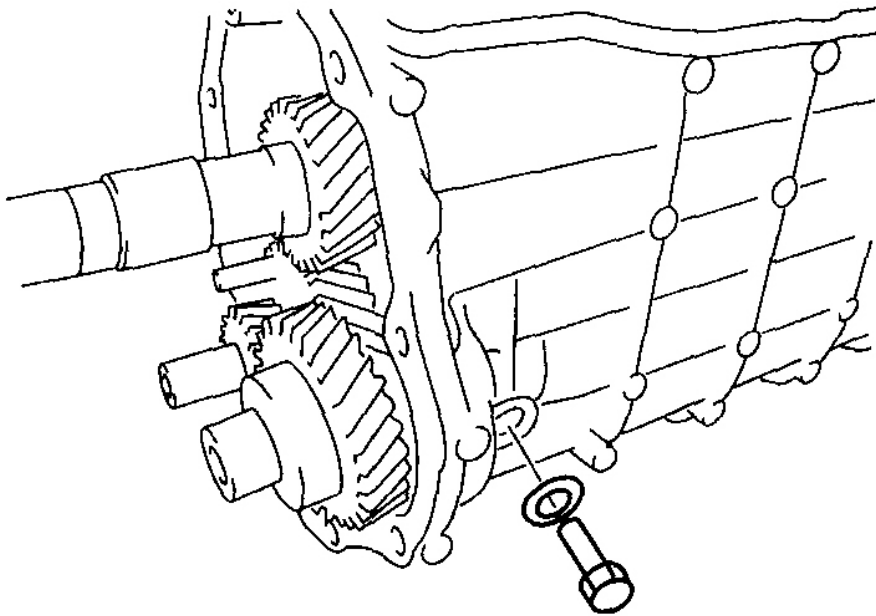
E5U511BM5070

**Fig. 85: Installing Reverse Idler Gear Component To Transmission Case**  
Courtesy of MAZDA MOTORS CORP.

5. Install the reverse idler gear shaft retaining bolt.

**Tightening torque**

**78.5-117 N.m {8.01-11.9 kgf.m, 57.9-86.2 ft.lbf}**



E5U511BM5015

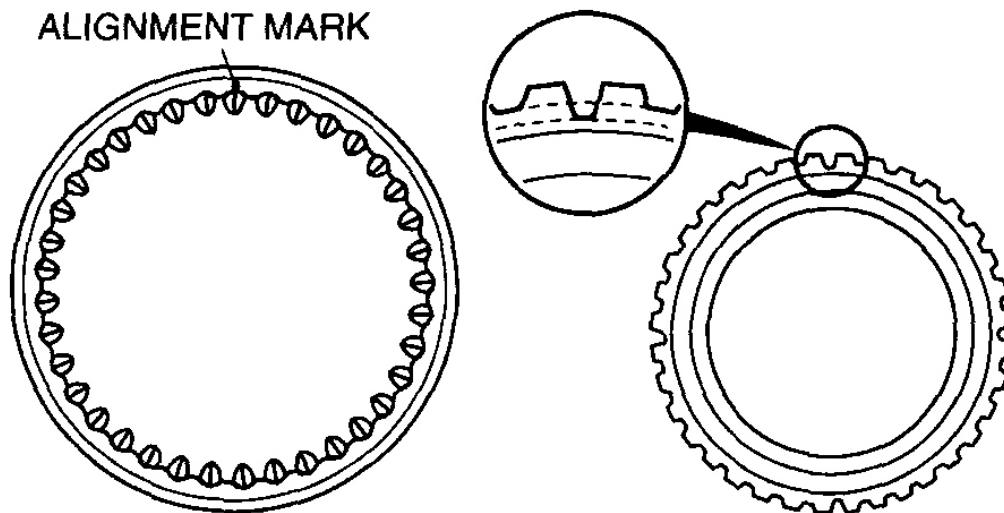
**Fig. 86: Installing Reverse Idler Gear Shaft Retaining Bolt**  
Courtesy of MAZDA MOTORS CORP.

**Reverse Gear and Reverse Clutch Hub Component Assembly Note**

1. Assemble the reverse gear and clutch hub sleeve.

**CAUTION:**

- Align the clutch hub sleeve alignment mark with the deepened valley of the reverse gear spline, and assemble them so that the synchronizer teeth are facing outward

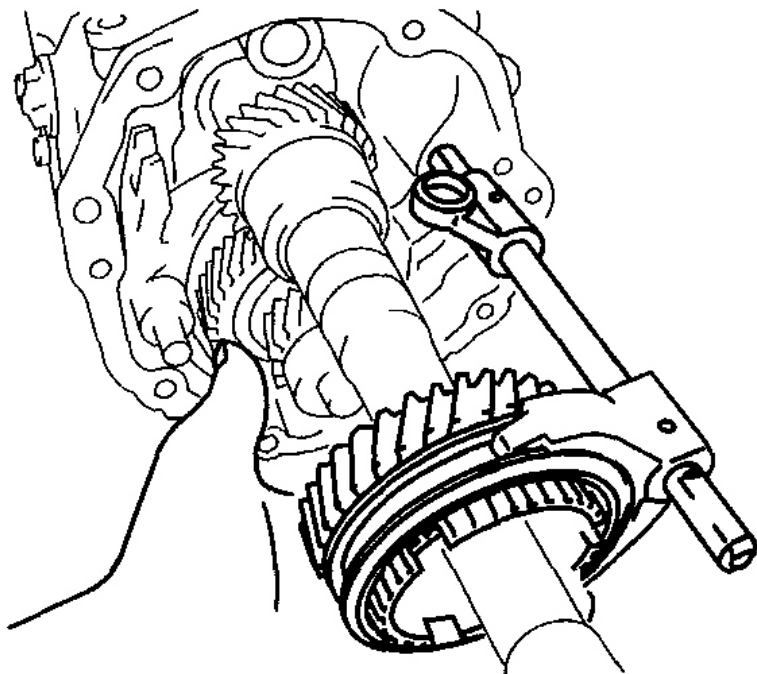


E5U511BM5061

**Fig. 87: Identifying Alignment Mark**  
Courtesy of MAZDA MOTORS CORP.

2. Assemble the reverse gear, clutch hub sleeve and shift fork as a single unit.



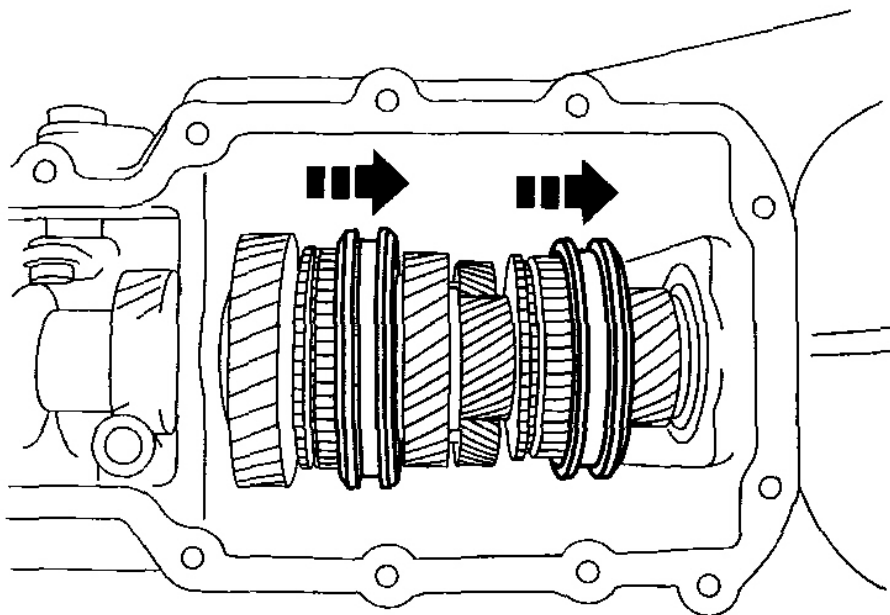


E5U511BM5040

**Fig. 88: Assembling Reverse Gear, Clutch Hub Sleeve & Shift Fork As Single Unit**  
Courtesy of MAZDA MOTORS CORP.

**Mainshaft Rear Bearing and Countershaft Rear Bearing Locknut Assembly Note**

1. Slide the 5th/6th and 1st/2nd clutch hub sleeves to lock the transmission into 5th and 2nd gears.
2. Insert the mainshaft rear bearing into the mainshaft and install the locknut.



E5U511BM5011

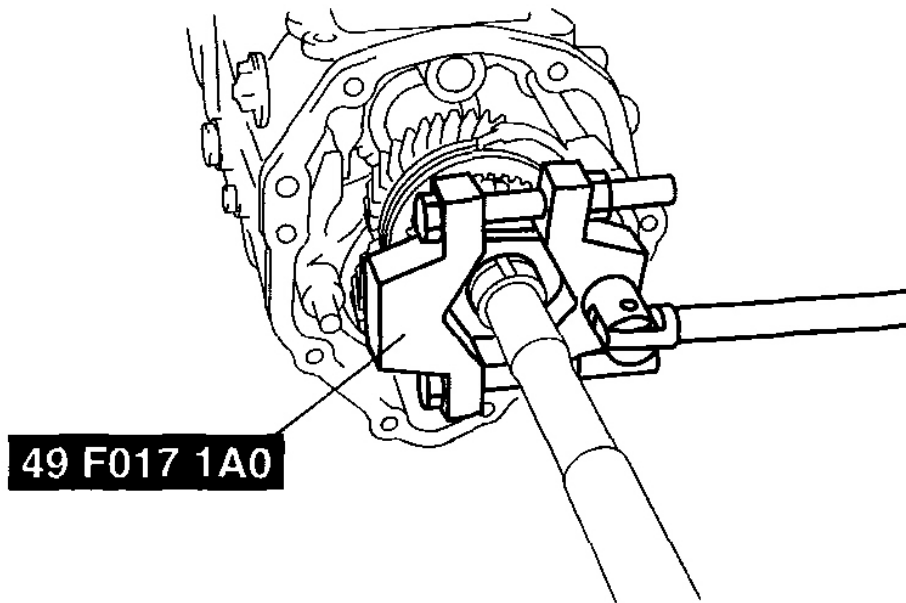
**Fig. 89: Sliding 5th/6th And 1st/2nd Clutch Hub Sleeves To Lock Transmission Into 5th And 2nd Gears**

Courtesy of MAZDA MOTORS CORP.

3. Attach the SST to the locknut and tighten the nut to the specified torque.

**CAUTION:**

- Attach the SST with the locknut seated in the bearing.



E5U511BM5012

**Fig. 90: Attaching SST With Locknut Seated In Bearing**  
Courtesy of MAZDA MOTORS CORP.

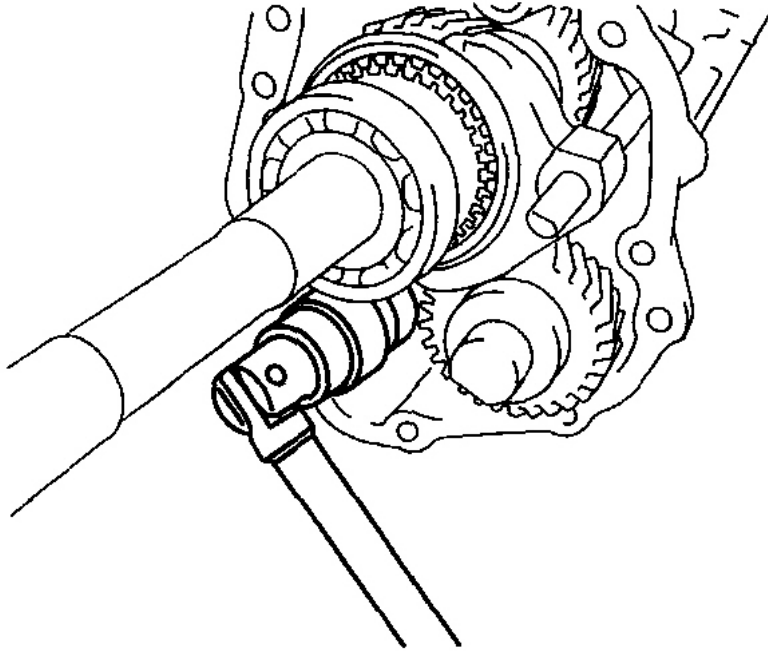
**Tightening torque:**

**187-245 N.m {19.1-24.9 kgf.m, 138-180 ft.lbf}**

4. Tighten the countershaft locknut in the counterclockwise direction.

**Tightening torque:**

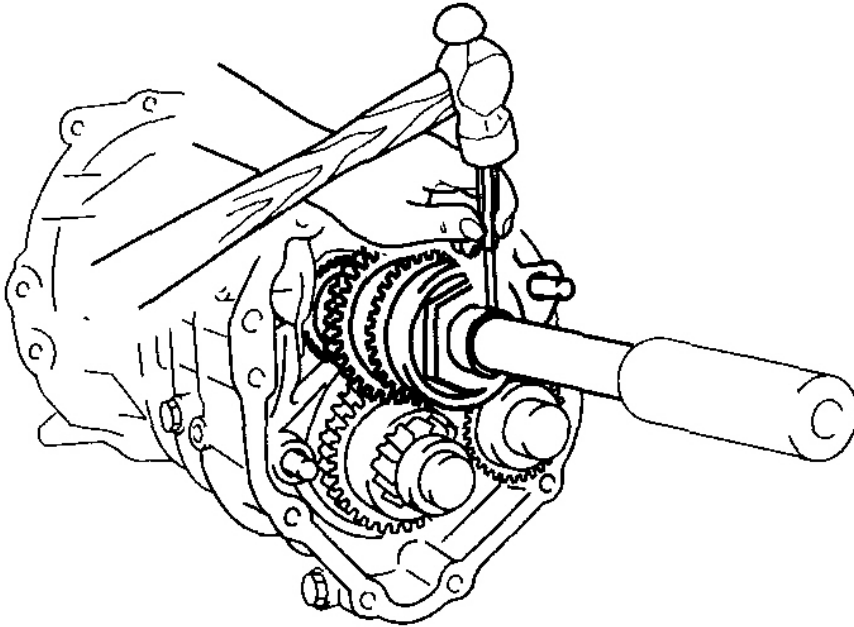
**98-147 N.m {10.0-14.9 kgf.m, 72.3-108 ft.lbf}**



E5U511BM5013

**Fig. 91: Tightening Countershaft Locknut In Counterclockwise Direction**  
Courtesy of MAZDA MOTORS CORP.

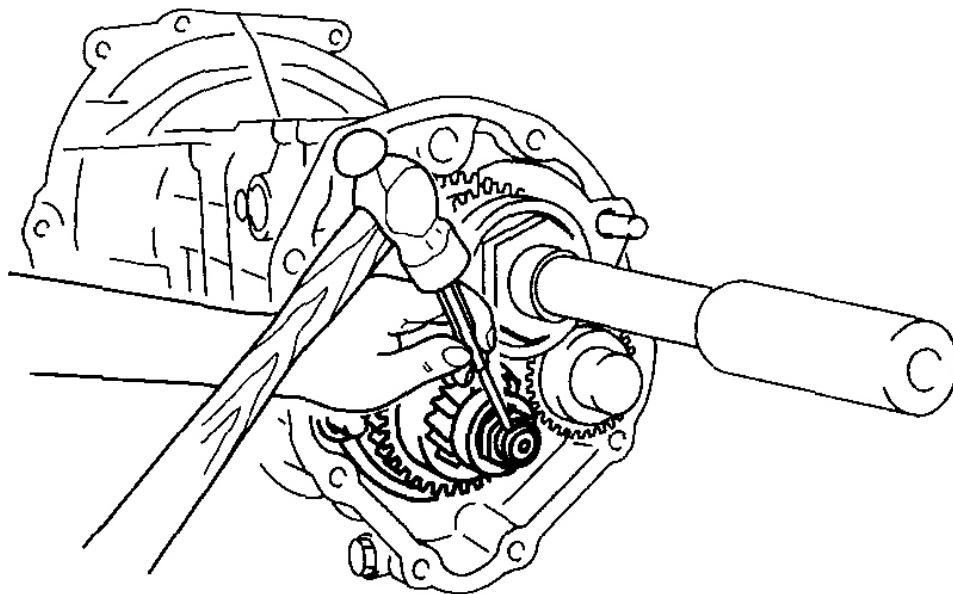
5. Using the pin punch, stake the mainshaft rear bearing locknut.



E5U511BM5042

**Fig. 92: Using Pin Punch To Stake Mainshaft Rear Bearing Locknut**  
Courtesy of MAZDA MOTORS CORP.

6. Using the pin punch, stake the countershaft rear bearing locknut.



E5U511BM5089

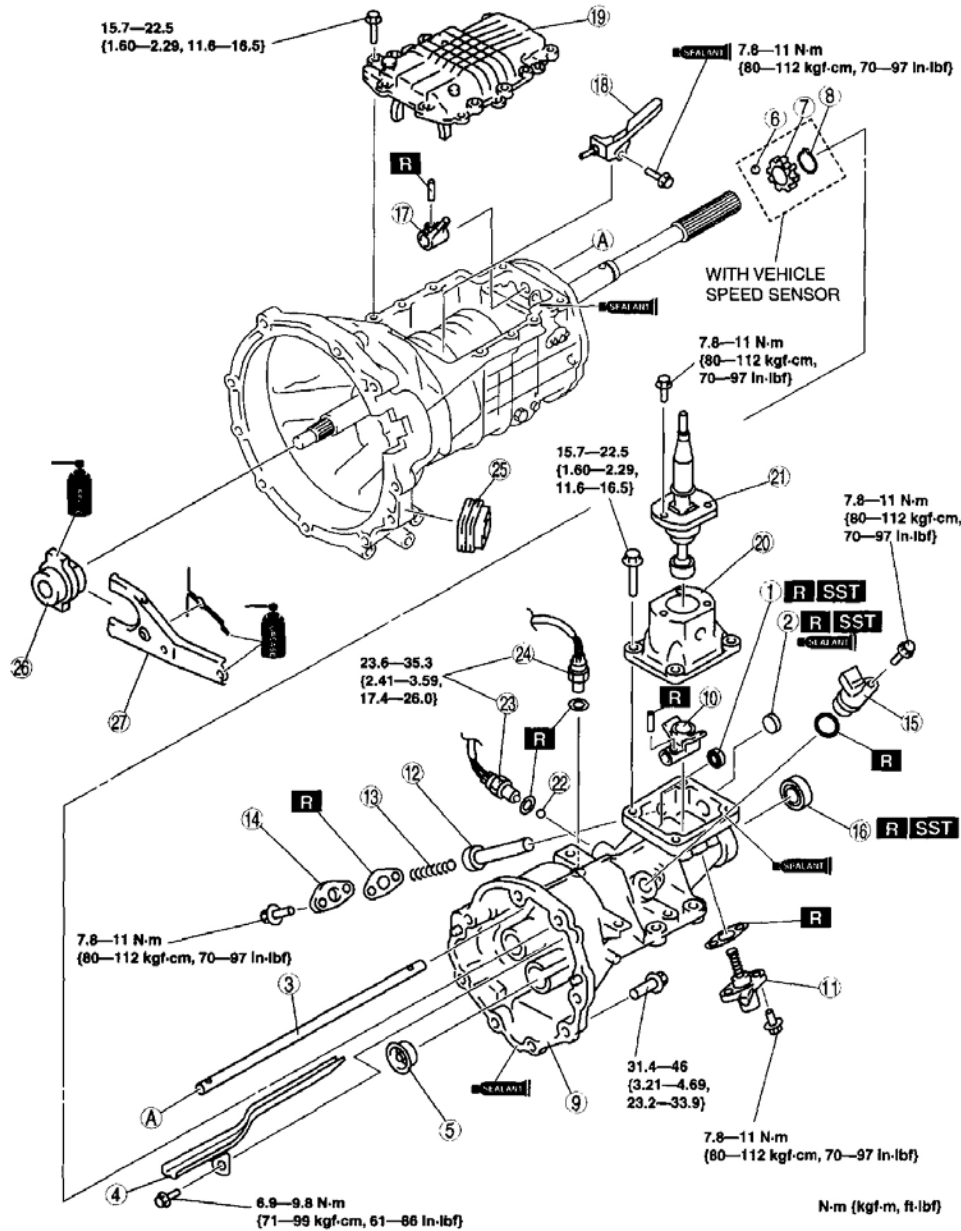
**Fig. 93: Using Pin Punch To Stake Countershaft Rear Bearing Locknut**  
Courtesy of MAZDA MOTORS CORP.

#### **TOP COVER COMPONENT AND EXTENSION HOUSING ASSEMBLY**

1. Assemble in the order indicated in **Fig. 94** .

# 2007 Mazda MX-5 Miata Sport

2006-08 TRANSMISSION Manual Transmission P66M-D Overhaul - MX-5 Miata



ESU511BM5004

1	Oil seal (control rod)
2	Sealing cap
3	Control rod
4	Oil passage
5	Funnel
6	Steel ball
7	Sensor rotor
8	Retaining ring
9	Extension housing
10	Control rod end
11	Select spindle component
12	Select lock spindle
13	Select lock spindle spring
14	Spring cap

16	Oil seal (extension housing)
17	Control lever
18	Oil passage
19	Top cover, shift component
20	Control case
21	Change lever component
22	Steel ball
23	Neutral switch
24	Back-up light switch
25	Dust boot
26	Release collar
27	Release fork

**Fig. 94: Exploded View Of Top Cover Component & Extension Housing (With Torque Specifications)**  
Courtesy of MAZDA MOTORS CORP.

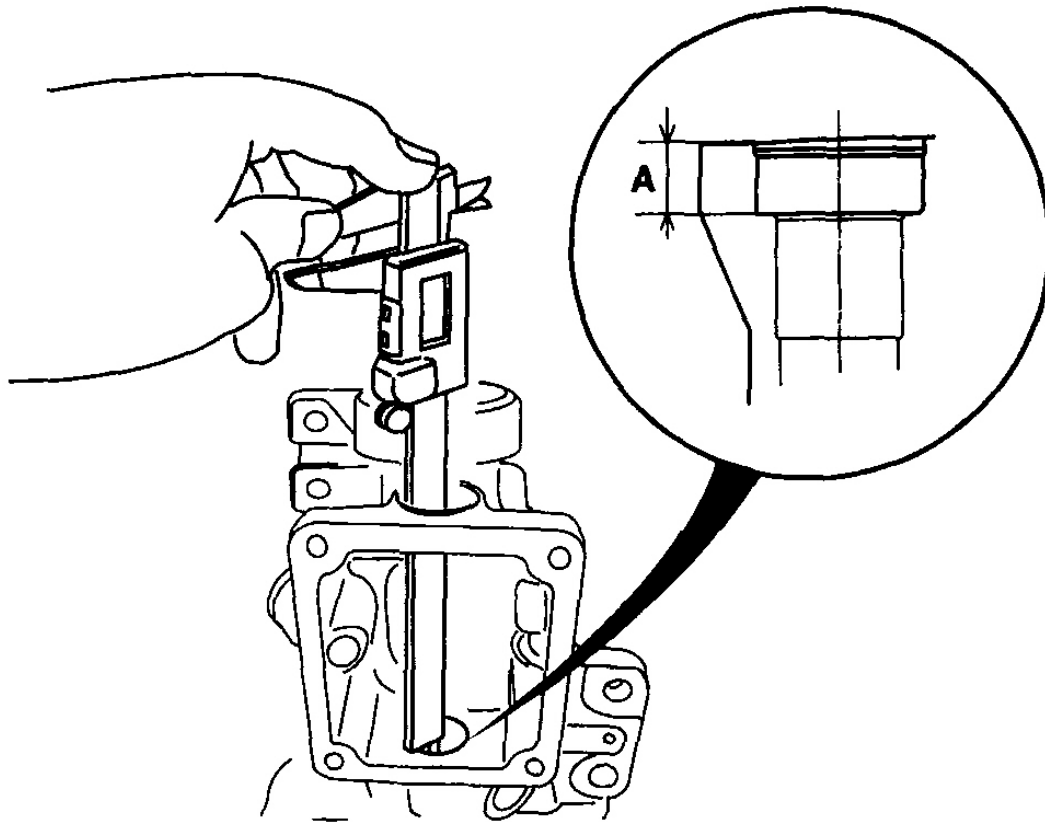
**Oil Seal (Control Rod) Assembly Note**

1. Measure the depth A of the oil seal installation hole as shown in **Fig. 95** .
2. Calculate the oil seal installation depth B.

**Formula:  $B = A - (6.5-7.5 \text{ mm } \{0.158-0.295 \text{ in}\})$**

**B: Depth of the oil seal installation position**

**A: Depth of the oil seal installation hole**



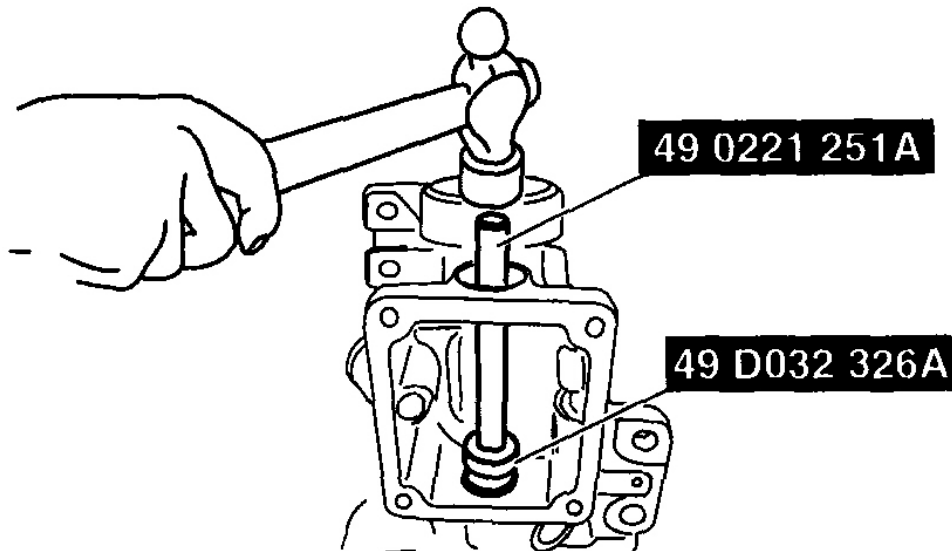
E5U511BM5084

**Fig. 95: Measuring Depth A Of Oil Seal Hole**



Courtesy of MAZDA MOTORS CORP.

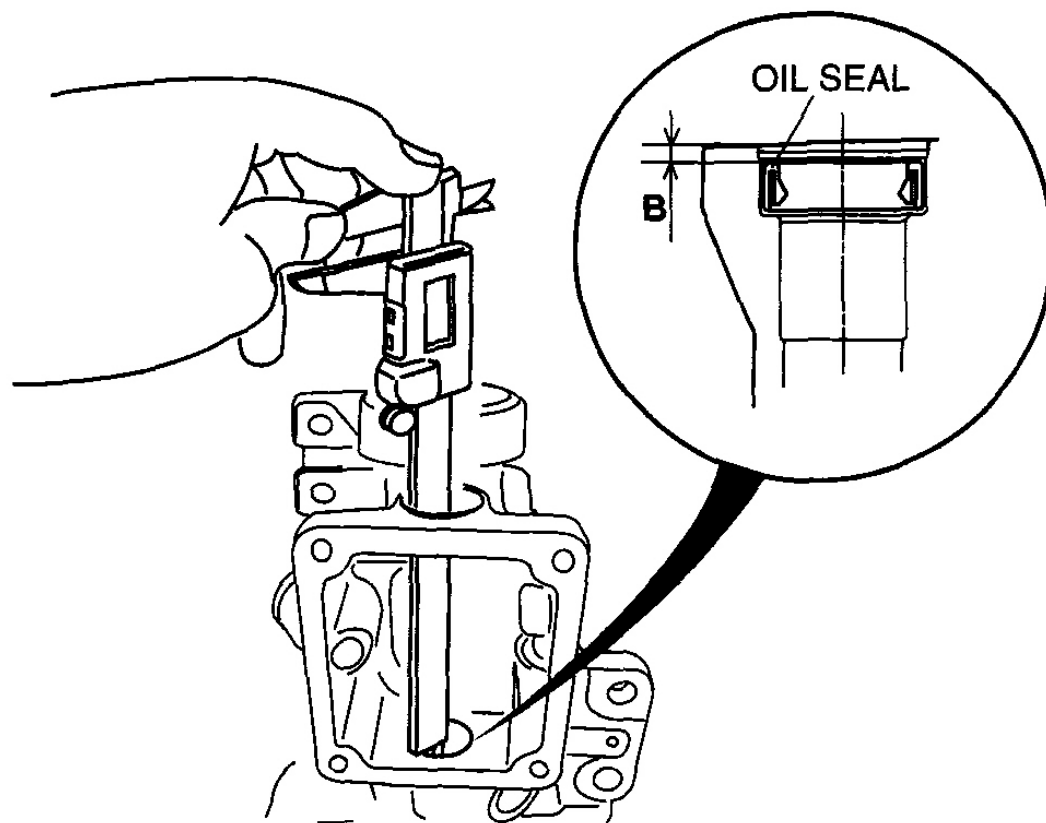
3. Install the oil seal using the SST through the sealing cap hole as shown in **Fig. 96** .



E5U511BM5083

**Fig. 96: Installing Oil Seal Using SST Through Sealing Cap Hole**  
Courtesy of MAZDA MOTORS CORP.

- Verify that the depth B is within the calculated value in step 2.



E5U511BM5085

**Fig. 97: Verifying Depth B Is Within Calculated Value**  
Courtesy of MAZDA MOTORS CORP.

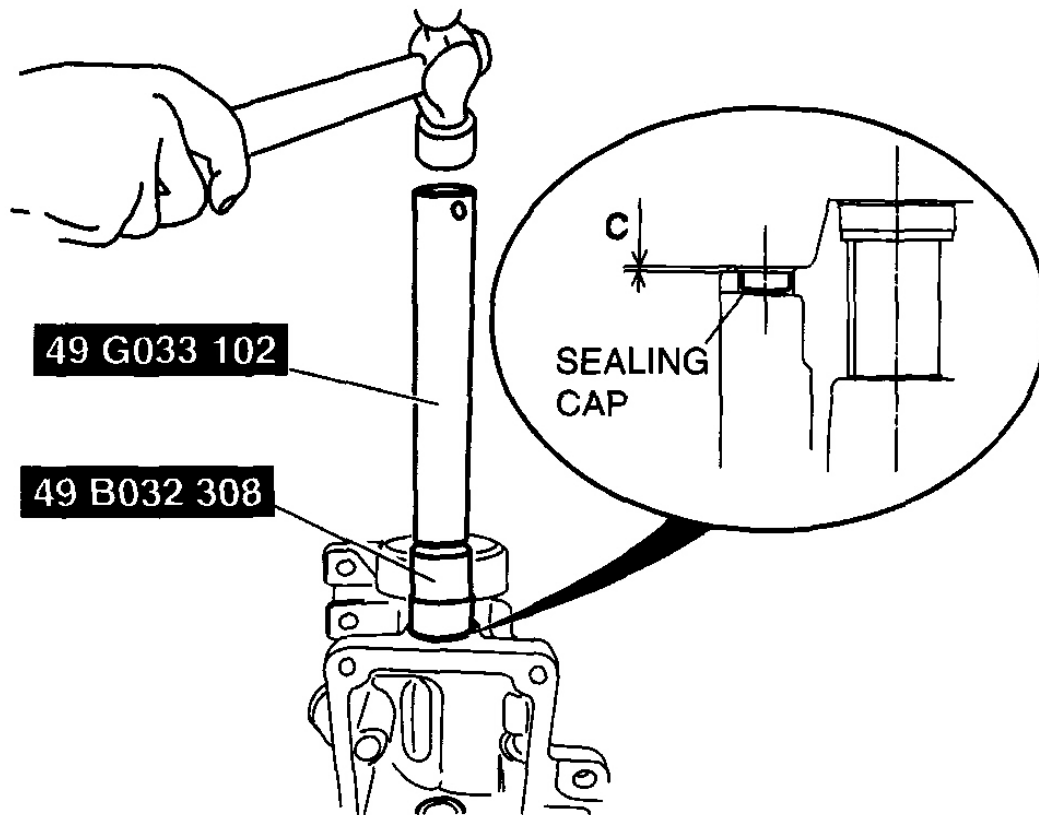
**Sealing Cap Assembly Note**

1. Install the sealing cap using the SST.

**CAUTION:** • Apply silicone sealant to the sealing cap.

**Installation depth C:**

**2.0-4.0 mm {0.079-0.157 in}**

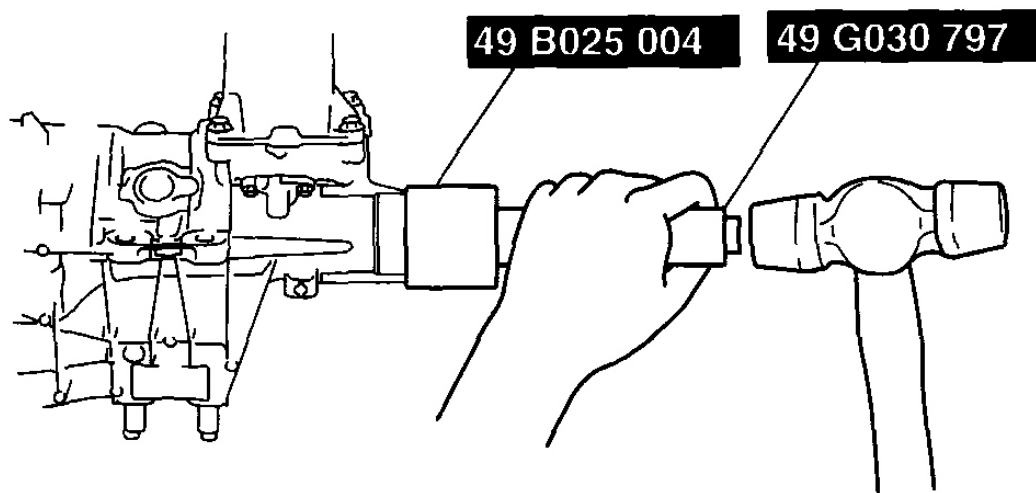


E5U511BM5086

**Fig. 98: Installing Sealing Cap Using SST**  
Courtesy of MAZDA MOTORS CORP.

**Oil Seal (Extension Housing) Assembly Note**

1. Apply specified oil to the lip of a new oil seal.
2. Install the oil seal evenly and gradually using the **SST** and a hammer.



E5U511BW5007

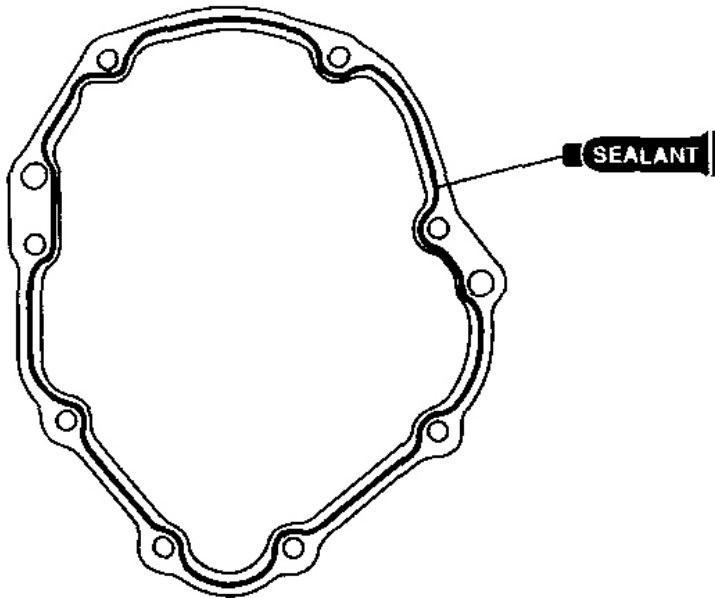
**Fig. 99: Installing Oil Seal Evenly & Gradually Using SST & Hammer**  
Courtesy of MAZDA MOTORS CORP.

**Extension Housing Assembly Note**

1. Apply sealant to the contact surfaces of the extension housing and transmission case as shown in **Fig. 100**.
2. Install the extension housing to the transmission case.

**Tightening torque:**

**31.4-46 N.m {3.21-4.69 kgf.m, 23.2-33.9 ft.lbf}**



E5U511BM5075

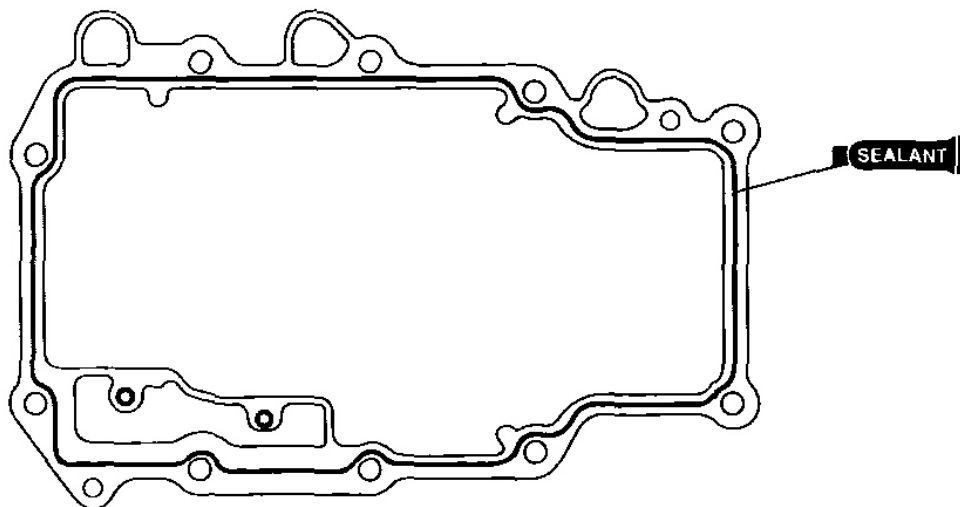
**Fig. 100: Applying Sealant To Contact Surfaces Of Extension Housing & Transmission Case**  
Courtesy of MAZDA MOTORS CORP.

**Top Cover Assembly Note**

1. Apply sealant to the contact surfaces of the transmission case and top cover as shown in **Fig. 101** .
2. Install the top cover component to the transmission case.

**Tightening torque:**

**15.7-22.5 N.m {1.60-2.29 kgf.m, 11.6-16.5 ft.lbf}**



E5U511BM5077

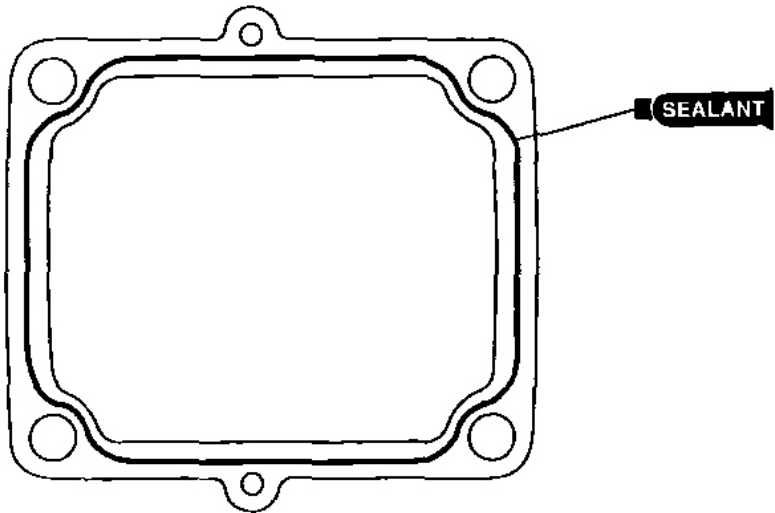
**Fig. 101: Applying Sealant To Contact Surfaces Of Transmission Case & Top Cover**  
Courtesy of MAZDA MOTORS CORP.

**Control Case Assembly Note**

1. Apply sealant to the contact surfaces of the control case and extension housing as shown in **Fig. 102** .
2. Install the control case to the extension housing.

**Tightening torque:**

**15.7-22.5 N.m {1.60-2.29 kgf.m, 11.6-16.5 ft.lbf}**



E5U511BM5076

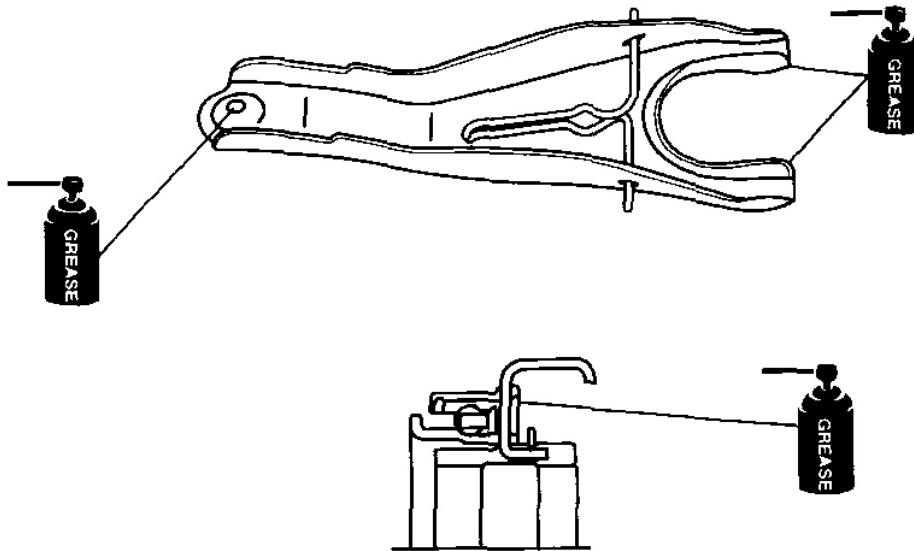
**Fig. 102: Applying Sealant To Contact Surfaces Of Control Case & Extension Housing**  
Courtesy of MAZDA MOTORS CORP.

**Release Collar, Release Fork Assembly Note**

1. Apply specified grease to the areas shown in **Fig. 103** .
2. Install the release collar and release fork.

## 2007 Mazda MX-5 Miata Sport

2006-08 TRANSMISSION Manual Transmission P66M-D Overhaul - MX-5 Miata



BHJ0511M219

**Fig. 103: Applying Specified Grease To Areas**  
Courtesy of MAZDA MOTORS CORP.

## TECHNICAL DATA

### TRANSMISSION/TRANSAXLE

#### TRANSMISSION/TRANSAXLE SPECIFICATION

Item	Specification
Standard clearance between shift fork and clutch hub sleeve groove	0.05-0.40 mm {0.002-0.015 in}
Maximum clearance between shift fork and clutch hub sleeve groove	0.5 mm {0.020 in}
Standard clearance between synchronizer ring and flank surface of gear	1.5 mm {0.059 in}
Maximum clearance between synchronizer ring and flank surface of gear	0.8 mm {0.031 in}
Detent ball spring	Standard length: 23.5 mm {0.925 in}
1st/2nd select return spring	Standard length: 83.5 mm {3.287 in}
Mainshaft maximum runout	0.03 mm {0.0012 in}



## 2007 Mazda MX-5 Miata Sport

2006-08 TRANSMISSION Manual Transmission P66M-D Overhaul - MX-5 Miata

Standard clearance between shift rod end and control lever	0.5 mm {0.020 in} or less
5th/6th clutch hub end play	0-0.05 mm {0-0.0019 in}
Maindrive gear shaft total end play	0.05-0.15 mm {0.0020-0.0059 in}
Countershaft total end play	0.15-0.25 mm {0.0059-0.0098 in}
Reverse idler gear end play	0.1-0.2 mm {0.0040-0.0078 in}

### 5TH/6TH CLUTCH HUB RETAINING RING THICKNESS

Thickness (mm {in})
1.50 {0.0591}
1.55 {0.0610}
1.60 {0.0630}
1.65 {0.0650}
1.70 {0.0669}
1.75 {0.0689}
1.80 {0.0709}
1.85 {0.0728}
1.90 {0.0748}
1.95 {0.0768}

### MAINDRIVE GEAR BEARING SHIM SELECTIVE TABLE

Dimension C (mm {in})	Shim thickness (mm {in})
2.75-2.85 {0.1083-0.1122}	2.7 {0.106}
2.85-2.95 {0.1122-0.1161}	2.8 {0.110}
2.95-3.05 {0.1161-0.1201}	2.9 {0.114}
3.05-3.15 {0.1201-0.1240}	3.0 {0.118}
3.15-3.25 {0.1240-0.1280}	3.1 {0.122}
3.25-3.35 {0.1280-0.1319}	3.2 {0.126}
3.35-3.45 {0.1319-0.1358}	3.3 {0.130}
3.45-3.55 {0.1358-0.1398}	3.4 {0.134}
3.55-3.65 {0.1398-0.1437}	3.5 {0.138}
3.65-3.75 {0.1437-0.1476}	3.6 {0.142}
3.75-3.85 {0.1476-0.1516}	3.7 {0.147}
3.85-3.95 {0.1516-0.1555}	3.8 {0.150}
3.95-4.05 {0.1555-0.1594}	3.9 {0.154}
4.05-4.15 {0.1594-0.1634}	4.0 {0.157}
4.15-4.25 {0.1634-0.1673}	4.1 {0.161}

### COUNTERSHAFT FRONT BEARING SHIM SELECTIVE TABLE

Dimension F (mm {in})	Shim thickness (mm {in})
2.45-2.55 {0.0965-0.1004}	2.3 {0.091}
2.55-2.65 {0.1004-0.1043}	2.4 {0.094}

## 2007 Mazda MX-5 Miata Sport

2006-08 TRANSMISSION Manual Transmission P66M-D Overhaul - MX-5 Miata

2.65-2.75 {0.1043-0.1083}	2.5 {0.098}
2.75-2.85 {0.1083-0.1122}	2.6 {0.102}
2.85-2.95 {0.1122-0.1161}	2.7 {0.106}
2.95-3.05 {0.1161-0.1201}	2.8 {0.110}
3.05-3.15 {0.1201-0.1240}	2.9 {0.114}
3.15-3.25 {0.1240-0.1280}	3.0 {0.118}
3.25-3.35 {0.1280-0.1319}	3.1 {0.122}

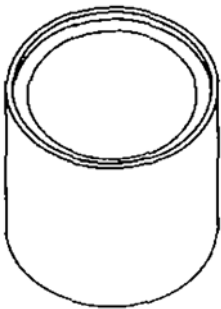
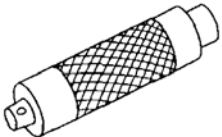
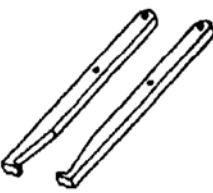
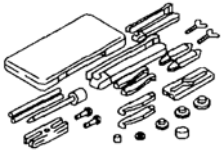
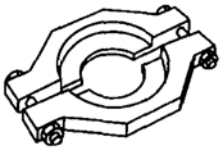


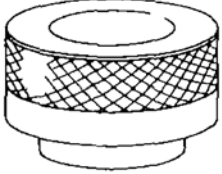

### REVERSE IDLER GEAR RETAINING RING THICKNESS

Thickness (mm {in})
1.5 {0.059}
1.6 {0.063}
1.7 {0.067}
1.8 {0.071}
1.9 {0.075}

## SERVICE TOOLS

### SERVICE TOOLS

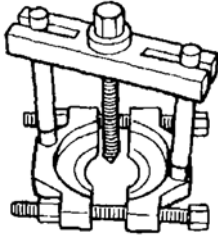
### SERVICE TOOLS

<p>49 B025 004 Installer, Dust Seal</p> 	<p>49 G030 797 Handle</p> 	<p>49 H017 101 Hook</p> 
<p>49 0839 425C Bearing Puller Set</p> 	<p>49 H027 002 Remover, Bearing</p> 	<p>49 G033 106 Attachment</p> 
<p>49 G033 102 Handle</p> 	<p>49 V001 525 Installer, Dust Boot</p> 	<p>49 0813 235 Main Bearing Puller &amp; Installer</p> 

# 2007 Mazda MX-5 Miata Sport

2006-08 TRANSMISSION Manual Transmission P66M-D Overhaul - MX-5 Miata

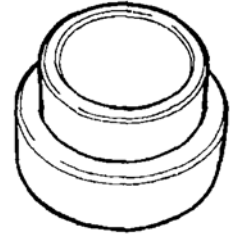
49 0710 520  
Bearing  
Puller



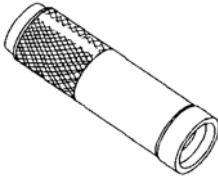
49 H025  
003A  
Bearing  
Installer



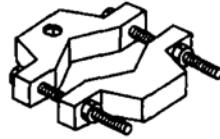
49 F401 336B  
Attachment B



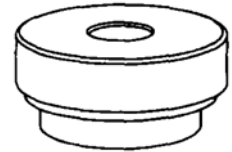
49 F401 331  
Body



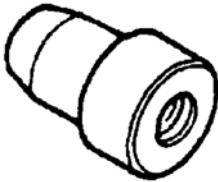
49 F017 1A0  
Universal  
Wrench



49 N017 216  
Installer



49 B032 308  
Attachment A



49 0221  
251A  
Valve Guide  
Installer



49 D032 326A  
Attachment

