RX-7 Factory Service Material

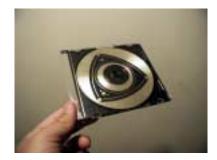
This manual can be downloaded for free from http://members.xoom.com/diepat_rx7/fsm/rx7.htm

Or you can donate \$10 to <u>diepat@earthlink.net</u> through paypal.com and a gift CD with all manuals and resources I carry will be sent to you.

This includes

1993 Factory Service Manual
1988 Factory Service Manual
1995 Printed Microfiche of all parts
1989 Printed Microfiche of all parts*
1990 Printed Microfiche of all parts*
1986 Printed Microfiche of all parts*
1987 Printed Microfiche of all parts*
1988 Printed Microfiche of all parts*

The \$10 donation is used to offset the tremendous amount of time it takes to make everything available.



* These works are currently in process and may or not be readily available upon request. They will be hosted on the same link above and for download

MANUAL TRANSMISSION

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	870074-0	

OUTLINE

SPECIFICATIONS

Model		Turbo	Non-turbo	
Synchromesh syste	m	Forward: Sy Reverse: Co	vnchromesh Instant-mesh	
Shift type	-	· · · · · · · · · · · · · · · · · · ·	R	
	First	3.483	3.475	
Gear ratio Fourth Fifth Reverse	Second	2.015	2.002	
	Third	1.391	1.366	
	Fourth	1.000		
	Fifth	0.762	0.697	
	Reverse	3.288	3.493	
Oil	Туре	API Service GL-4 or GL-5 Outside temp. –18°C (0° Outside temp. –18°C (0° All season type:	F) or lower: SAE 80W	
	Capacity liters (US qts, Imp. qts)	2.5 (2.6, 2.2)	2.0 (2.1, 1.8)	

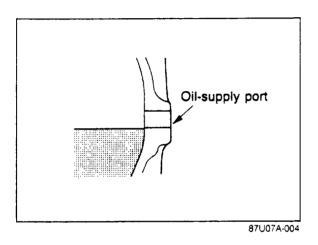
TROUBLESHOOTING GUIDE

Problem	Possible Cause	Remedy
Abnormal noise	Insufficient oil Deterioration of oil quality	Add oil Replace with specified oil
	Worn bearing Worn contact surface of counter shaft gear	Replace Replace
	Worn contact surface of gears Excessive gear backlash	Replace Replace
	Damaged gear teeth	Replace

77U07A-103

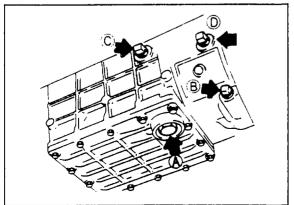
Problem	Possible Cause	Remedy
Jumps out of gear	Weak or broken lock ball spring	Replace
	Worn shift fork	Replace
	Worn clutch hub	Replace
	Worn clutch hub sleeve	Replace
Worn gears Excessive gear backlash Worn bearing	Worn gears	Replace
		Replace
	Worn bearing	Replace
	Loose engine or transmission mounts	Tighten

87U07A-003



Check plug port

87U07A-005



87U07A-006

ON-VEHICLE CHECK

(NON-TURBO MODEL) CHECKING TRANSMISSION OIL LEVEL

Remove the oil fill plug. Check that the oil is near the bottom of the hole. If it is low, add the specified oil.

(TURBO MODEL) CHECKING TRANSMISSION OIL LEVEL

Remove inspection plug D. Verify that the oil is near the bottom of the hole. If it is low, add specified oil from plug C port.

REPLACEMENT OF OIL

- 1. Remove the two drain plugs (A and B) and the two inspection plugs (C and D) and drain the oil into a suitable container.
- 2. Wipe the magnetic drain plugs clean.
- 3. After the oil has drained, apply sealant to the plug threads and install them.

Tightening torque: (A): 39—59 N⋅m (4.0—6.0 m-kg, 29—43 ft-lb) (B): 25—39 N⋅m (2.5—4.0 m-kg, 18—29 ft-lb)

- 4. Add oil from plug C port until the it reaches the bottom of plug D hole.
- 5. Apply sealant to the threads of the inspection plugs and install them.

Tightening torque: 25-39 N·m (2.5-4.0 m-kg, 18-29 ft-lb)

REMOVAL AND INSTALLATION

- 1. Disconnect the negative battery cable.
- 2. Raise the vehicle and support it with stands.
- 3. Drain the transmission oil
- 4. Remove in the sequence shown in the figure.
- 5. Install in the reverse order of removal.

(6) 12 (III)

- 1. Console box
- 2. Gearshift lever
- 3. Clutch release cylinder
- 4. Exhaust pipe
- 5. Covers
- 6. Propeller shaft
- 7. Speedometer cable
- 8. Connector (neutral)

67U07A-006

67U07A-005

- 9. Connector (5th/reverse
- gear)
- 10. Starter
- 11. Transmission crossmember
- 12. Transmission

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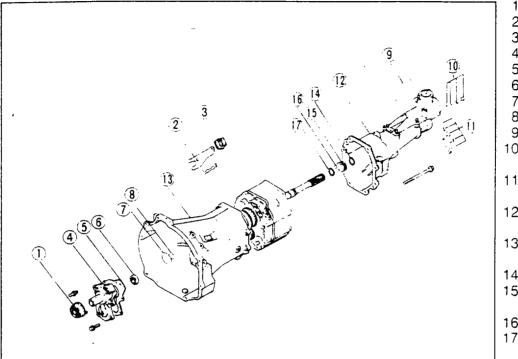
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DISASSEMBLY NON-TURBO

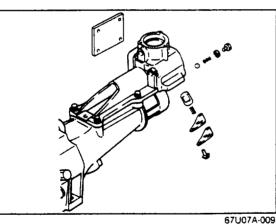
Disassemble in the sequence shown in the figure. HOUSING PARTS



- 1. Release bearing
- 2. Release fork
- 3. Boot

77U07A-105

- 4. Front cover
- 5. Gasket
- 6. Oil seal
- 7. Adjust shim(s)
- 8. Snap ring
- 9. Cover
- 10. Bolt, spring and lock ball
- 11. Cover and select lock spindle
- 12. Extension housing
- 13. Transmission case
- 14. Snap ring
- 15. Speedometer drive gear
- 16. Ball
- 17. Snap ring



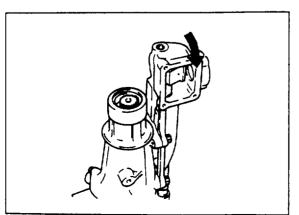
Extension Housing

1. Remove the cap bolt, spring and lock ball.

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- 2. Remove the cover, spring and select lock spindle.
- 3. Remove the control case cover.

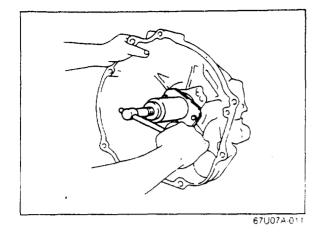




67U07A-010

- 4. Shift the transmission into 1st gear.
- 5. Remove the extension housing attaching bolts.
- 6. Remove the bolt attaching the control rod end to the control rod. **Do not** remove the control rod end.
- 7. Turn the control rod in the direction of the arrow and remove the extension housing.

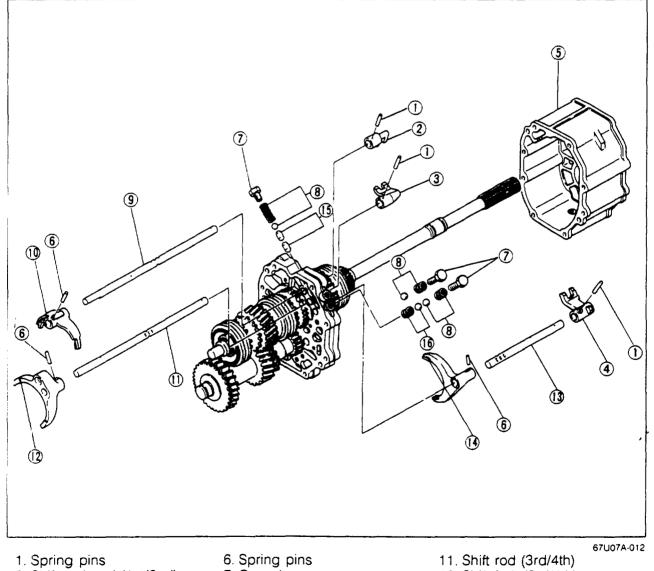
7A DISASSEMBLY



Transmission Case

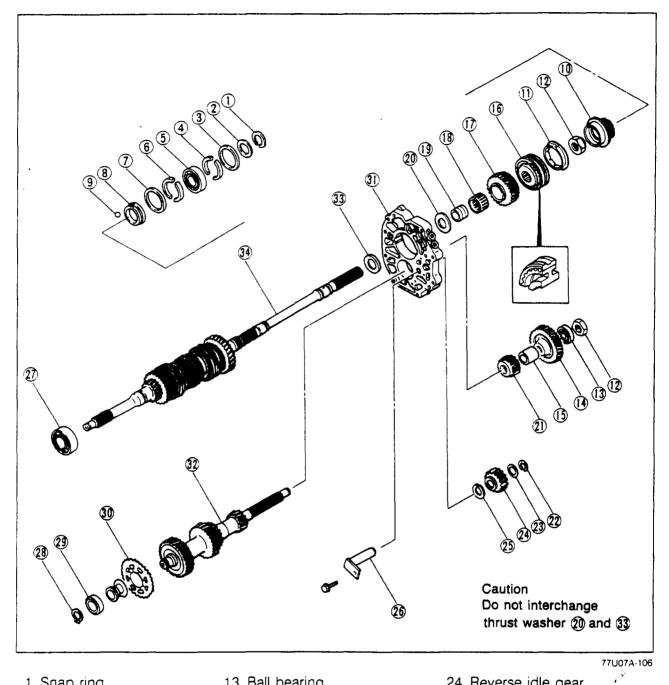
Remove the transmission case from the intermediate housing and gear assembly using the mainshaft pusher (49 0305 430).

SHIFT FORK AND SHIFT ROD



- 2. Shift rod end (1st/2nd)
- 3. Shift rod end (3rd/4th)
- 4. Shift rod end (5th/reverse)
- 5. Intermediate housing
- 7 Cap plugs
- 8. Springs and balls
- 9. Shift rod (1st/2nd)
- 10. Shift fork (1st/2nd)
- 12. Shift fork (3rd/4th)
- 13. Shift rod (5th/reverse)
- 14. Shift fork (5th/reverse)
- 15. Interlock pins
- 16 Ball and spring

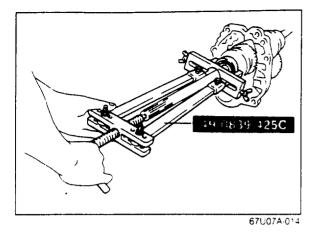
MAINSHAFT AND COUNTERSHAFT



- 1. Snap ring
- 2. Washer
- 3. Retaining ring
- 4. "C' washers
- 5. Mainshaft rear bearing
- 6. "C" washers
- 7. Retaining ring
- 8. Thrust lock washer
- 9. Ball
- 10. 5th gear
- 11. Synchronizer ring
- 12. Lock nut

- 13. Ball bearing
- 14. Countergear
- 15. Spacer
- 16. Clutch hub assembly (5th/reverse)
- 17. Reverse gear
- 18. Needle bearing
- 19. Inner race
- 20. Washer
- 21. Counter reverse gear
- 22. Snap ring
- 23. Adjust washer

- 24. Reverse idle gear
- 25. Thrust washer
- 26. Reverse idle gear shaft
- 27. Main drive gear bearing
- 28. Snap ring
- 29. Bearing
- 30. Friction gear
- 31. Bearing housing assembly
- 32. Countershaft gear
- 33. Thrust washer
- 34. Mainshaft and gear assembly



Bearing

1. Remove the snap ring, washer, retaining ring, and "C" washers, then remove the mainshaft rear bearing using **puller** (49 0839 425C).

 Remove the lock nut (see page 7A—9), then remove the countershaft rear bearing using puller (49 0839 425C).

HIGH 25C

0839

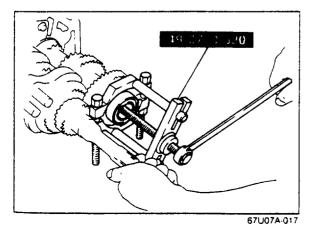
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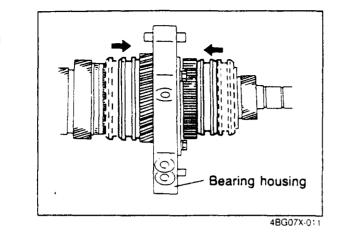
67U07A-015

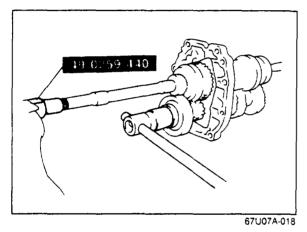
67U07A-016

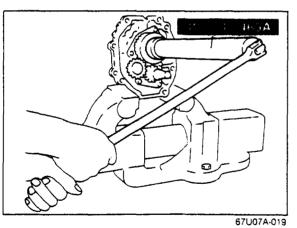
3. Remove the main drive gear bearing using **puller** (49 0839 425C).

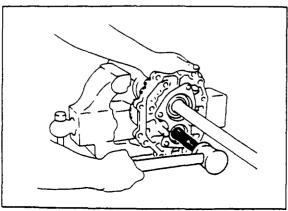
4. Remove the countershaft bearing using **bearing puller** (49 0710 520).











67U07A-020

Lock Nut

1. Shift the clutch hub sleeves to first gear and reverse gear to put the gears in the double-engaged condition.

- 2. Counter shaft lock nut
 - 1) Connect the **mainshaft holder** (49 0259 440) to the mainshaft, and mount securely in a vise.
 - 2) Remove the lock nut.

Caution Do not re-use the lock nut.

- 3. 5th/reverse clutch hub lock nut.
 - 1) Uncrimp the tabs of the lock nut.
 - 2) Secure the bearing housing in a vise.
 - 3) Remove the lock nut using **lock nut wrench** (49 1243 465A).

Caution

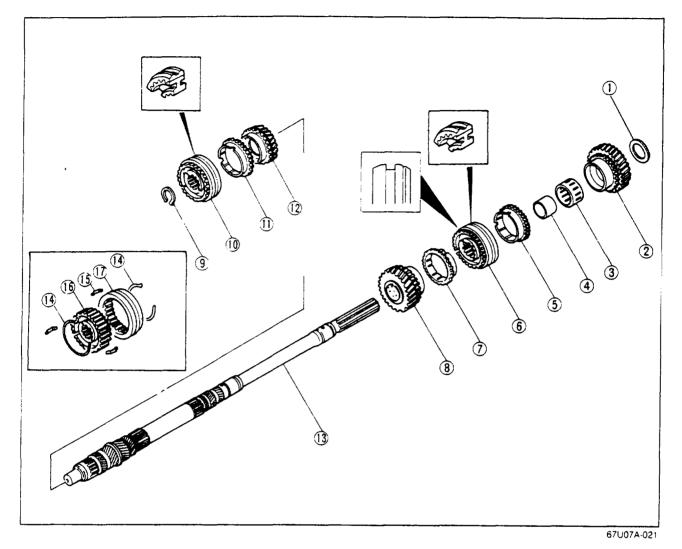
- a) Do no re-use the lock nut after it has been removed.
- b) Use pads in the vise.

Center Bearing Housing Assembly

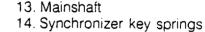
Remove the bearing housing by lightly tapping the countershaft and mainshaft with a copper hammer.

7A DISASSEMBLY

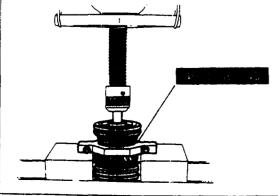
MAINSHAFT



- ;1. Washer
- 2.1st gear
- 3. Needle bearing
- 4. Inner race
- 5. Synchronizer ring (1st)
- 6. Clutch hub assembly (1st/2nd)
- 7. Synchronizer ring (2nd)
- 8. 2nd gear
- 9. Snap ring
- 10. Clutch hub assembly
- (3rd/4th)
- 11. Synchronizer ring (3rd)
- 12. 3rd gear



- 15. Synchronizer key
- 16. Clutch hub
- 17. Clutch hub sleeve



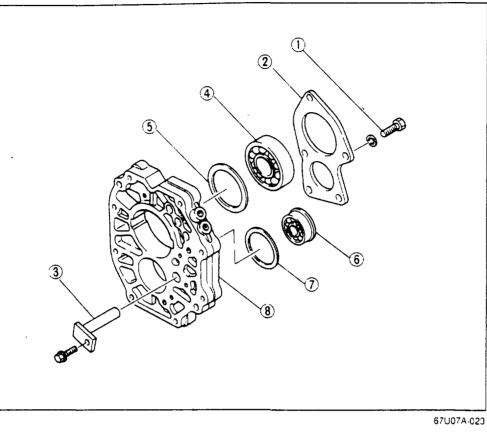
Clutch Hub Assembly

- 1. Place the pulley boss puller (49 0636 145) between 2nd gear and 3rd gear.
- 2. Support the mainshaft by hand to prevent if from falling, and press on the clutch hub assembly.

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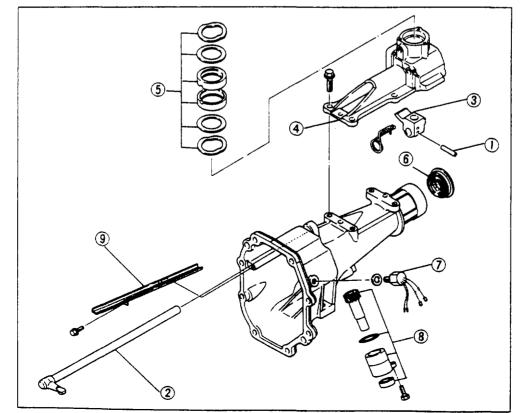
BEARING HOUSING

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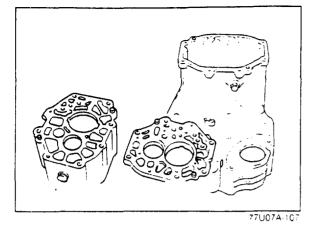
- 1. Bolt
- 2 Bearing cover 3. Reverse idle
- gear shaft
- 4. Ball bearing
- 5. Adjust shim
- 6. Ball bearing
- 7. Adjust shim
- 8. Bearing housing

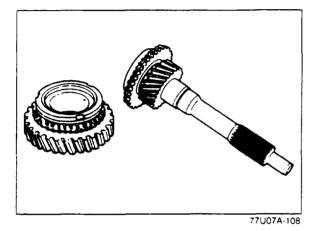
EXTENSION HOUSING



- 1. Pin.
- 2. Control lever
- 3. Control rod end
- 4. Change control case
- 5. Change lever bush set
- 6. Oil seal
- 7. Back up lamp and 5th switch
- 8. Speedometer driven gear
- 9. Oil passage

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INSPECTION

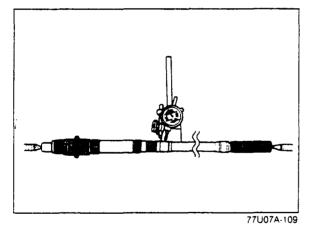
Check each of the items listed below, repair or replace if necessary.

Transmission Case and Housing

- 1. Cracked or damaged.
- 2. Rough or damaged contact surfaces.
- 3. Worn or damaged extension housing bushing or oil seal.

Each Gear and Main Drive Gear

- 1. Worn or damaged synchronizer cones.
- 2. Worn or damaged hub sleeve parts.
- 3. Worn or damaged teeth.
- 4. Worn or damaged inner gear or outer gear surfaces.
- 5 Worn or damaged main drive shaft splines.

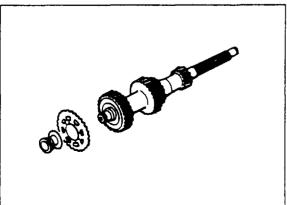


Mainshaft

1. Deflection.

Deflection: 0.03 mm (0.0001 in) max.

2. Worn or damaged splines.

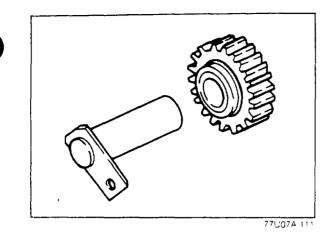


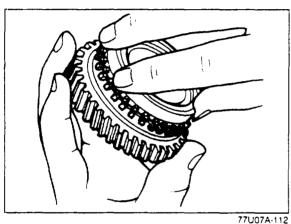
Countershaft

- 1. Worn or damaged gear teeth.
- 2. Worn or damaged splines.
- 3 Worn or damaged friction gears.

77U07A-110

7A—12





Reverse Idle Gear and Shaft

- 1. Worn or damaged gear.
- 2. Worn shaft.

Standard clearance: 0.02-0.05 mm (0.0008-0.0020 in) Max: 0.15 mm (0.0059 in)

Synchronizer Ring

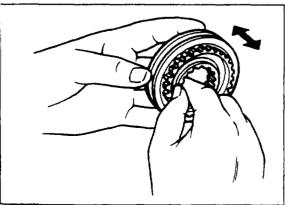
- 1. Gear cone mesh.
- 2. Worn or damaged splines.
- 3. Worn or damaged taper surface.

- TTUTA-113
- 4. Clearance between synchronizer ring and flank surface of gear.

Standard clearance: 1.5 mm (0.059 in) Max: 0.8 mm (0.031 in)

Note

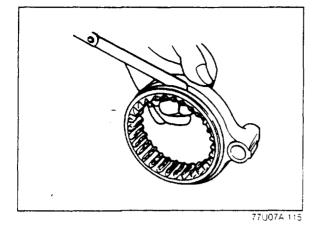
Set the synchronizer ring straight in the gear, and measure around the circumference.



77U07A-114

Clutch Hub

- 1. Operation of clutch hub sleeve and hub.
- 2. Worn or damaged hub sleeve sliding surface.
- 3. Worn or damaged hub synchronizer key groove.
- 4. Worn gear teeth.



Clutch Hub Sleeve

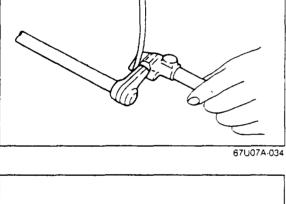
- 1. Worn or damaged clutch hub sliding surfaces.
- 2. Clearance between hub sleeve and release fork.

Standard clearance: 0.2-0.3 mm (0.008-0.012 in) Max: 0.8 mm (0.031 in)

Control Lever and Shift Rods

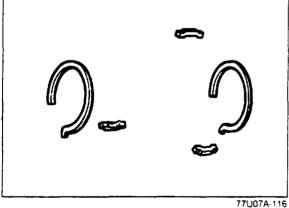
1. Clearance between the control lever and the gate of the shift rod.

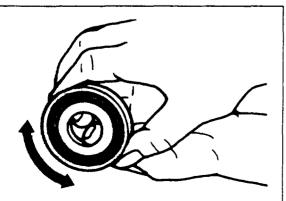
Clearance: 0.8 mm (0.0315 in) max.



Synchronizer Key and Key Spring

- 1. Worn key.
- 2. Fatigued or damaged spring.



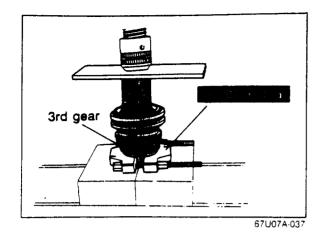


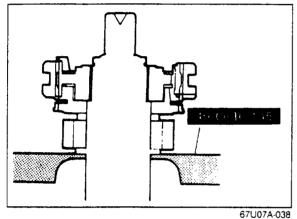
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Bearing

- 1. Roughness or noise while turning.
- 2. Damaged bearing.
- 3. Worn bearing.







ASSEMBLY

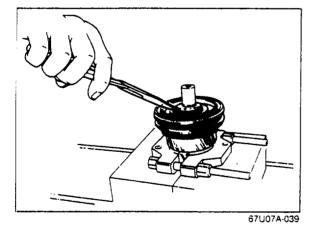
Clutch Hub

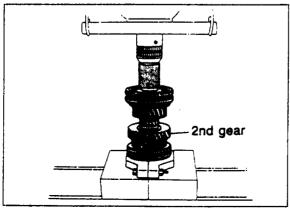
- 1. Place the 3rd gear and synchronizer ring on the mainshaft.
- 2. Press the clutch hub assembly (3rd/4th) on using a suitable pipe and **pulley boss puller** (49 0636 145).

Caution

Align the synchronizer ring and clutch hub when installing.

3. Insert the snap ring using snap ring pliers.





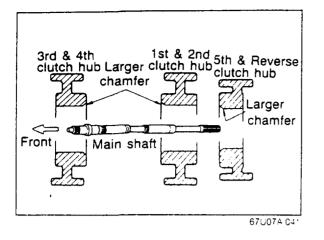
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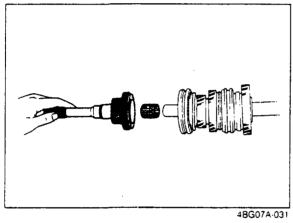
4. After mounting the 2nd gear and synchronizer ring on the mainshaft, use a suitable piece of pipe to press the clutch hub assembly (1st/2nd) on.

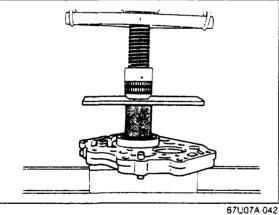
Caution

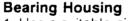
Align the synchronizer ring and clutch hub when installing.

7A ASSEMBLY









Note

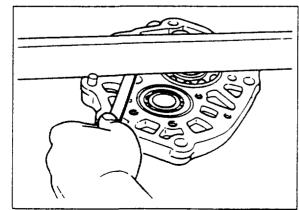
1. Use a suitable piece of pipe to press the bearing into the bearing housing.

Press each clutch hub assembly on to the

5 Assemble the gear sleeve, 1st gear and washer to the mainshaft, install the needle bearing, syn-

chronizer ring and main drive gear.

mainshaft in the proper direction.



67U07A-043

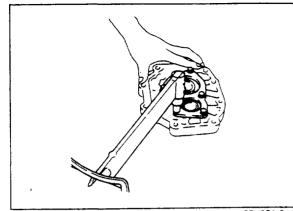
2. Measure the clearance between the bearing and the bearing housing. If the clearance is not as specified, adjust it by us-

Standard clearance:

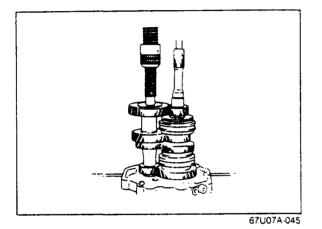
 0 ± 0.05 mm (0 ± 0.002 in) Adjust shim: 0.1 mm (0.004 in), 0.3 mm (0.012 in)

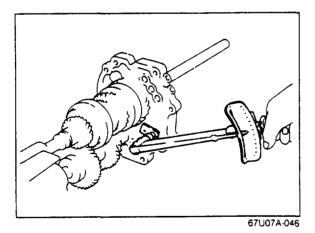
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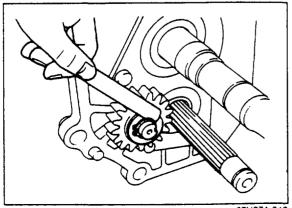
ing an adjust shim(s).



67U07A-044







67U07A-047

3. Install the bearing cover to the bearing housing.

Tightening torque: Bearing cover 18—26 N·m (1.8—2.7 m-kg, 13—20 ft-lb)

4. Install the mainshaft and main drive gear assembly and the countershaft gear.

Use a suitable round bar to press in the countershaft.

Reverse Idle Gear

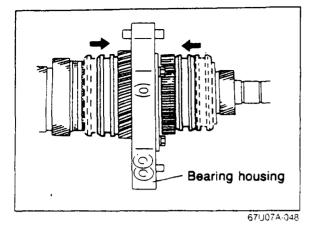
1. Mount the reverse idle gear and 2 washers to the reverse idle gear shaft.

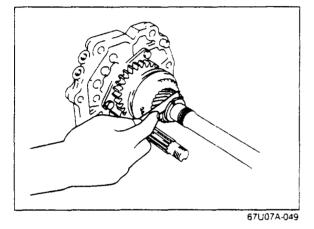
Tightening torque: 9-13 N·m (90-130 cm-kg, 78-113 in-lb)

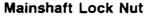
- 2. Install the washer, reverse gear and counter reverse gear.
- 3. Install the reverse idle gear shaft in the bearing housing.
- 4. Install the thrust washer, reverse idle gear, adjust washer and secure with the snap ring.
- 5. Measure the clearance between the adjust washer and snap ring.
- 6. If the clearance is not as specified, adjust with an adjust washer.

Standard clearance: 0.1 mm (0.004 in) max. Adjust washer thickness:

2.1 mm (0.083 in), 2.2 mm (0.087 in) 2.3 mm (0.091 in), 2.4 mm (0.094 in)





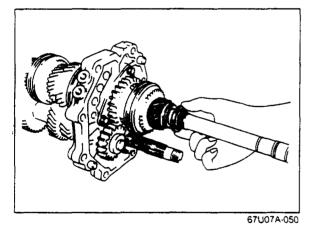


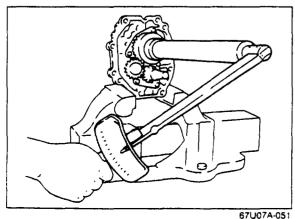
- 1. Install the clutch hub assembly and reverse idle gear.
- 2. Shift the clutch hub sleeves to first gear and reverse gear to put the gears in the double-engaged condition

- 3. Secure the bearing housing in a vise.
- 4. Tighten the new lock nut using the lock nut wrench (49 1243 465A).

Tightening torque: 130-210 N·m (13-21 m-kg, 94-152 ft-lb)

5. Stake the lock nut.





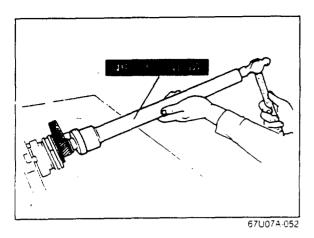
5th Gear

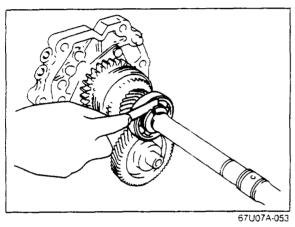
- 1. Install the 5th gear and synchronizer ring.
- 2. Insert the ball and thrust lock washer.
- 3. Install the "C" washers and hold them with the retaining ring.

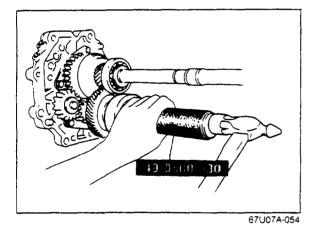
Caution

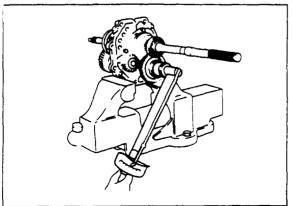
- a) Use the 3.0 mm (0.118 in) "C" washers, or else the rear "C" washer may not be able to be installed.
- b) The two "C" washers must be the same thickness; a difference in thickness will cause bearing failure.
- 4. Measure the clearance between the thrust lock washer and "C" washers (5th gear end play). If the end play is not as specified, adjust with a thrust lock washer.

Standard play: 0.1--0.3 mm (0.004--0.012 in) Thrust lock washer thickness: 6.4 mm (0.252 in) 6.5 mm (0.256 in) 6.6 mm (0.260 in) 6.7 mm (0.264 in)









67U07A-055

Bearing

1. Drive on the main drive gear bearing using the **lock nut wrench** (49 1243 465A), then install the "C" washers, retaining ring and washer and secure them with the snap ring.

2. Measure the clearance between the "C" washers and washer. If end play is not as specified, adjust the end play with other "C" washers.

Standard play: 0.3 mm (0.012 in) max. "C' washer thickness:

2.9 mm (0.114 in), 3.0 mm (0.118 in) 3.1 mm (0.122 in), 3.2 mm (0.126 in)

Caution

Check that there is no clearance between the bearing and "C" washers.

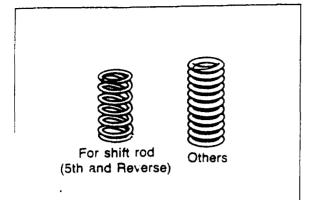
3. Drive the ball bearing on the counter shaft using the **bearing installer** (49 0500 330).

Countershaft Lock Nut

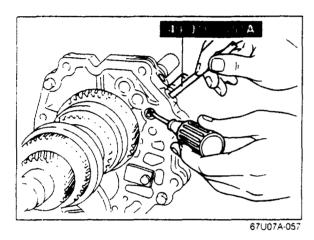
- 1. Shift the clutch hub sleeves to first gear and reverse gear to put the gears in the double-engaged condition.
 - (1) Install the **mainshaft holder** (49 0259 440) on the mainshaft, and place in a vise.
 - (2) Tighten the lock nut.

Tightening torque:

127—196 N·m (13—20 m-kg, 94—145 ft-lb)



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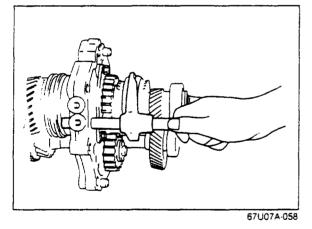
- Shift Fork and Rod
- 1. Insert the spring and ball (5th/reverse) into the bearing housing.

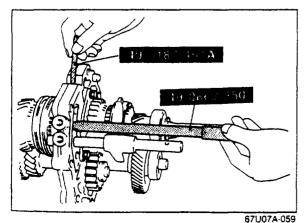
Note

There are 2 types of springs; be sure to install them correctly.

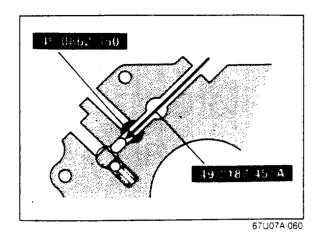
2. Press the spring and ball (5th/reverse) using the **interlock pin guide** (49 0187 451A) and a flat-tip screwdriver to install the shift rod.

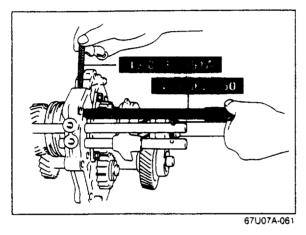
3. Install the shift rod in the bearing housing.

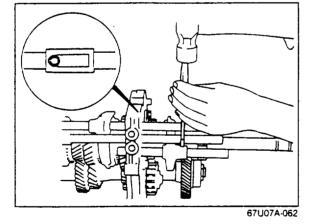


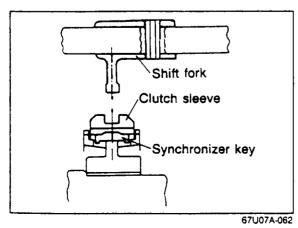


4. Position the interlock pin in the bearing housing using the **shift fork guide** (49 0862 350) and **interlock pin guide** (49 0187 451A).









5. Check that the interlock pin is correctly installed.

- 6. Install the shift fork and rod (3rd/4th), and install the interlock pin in the bearing housing as in step 4.
- 7. Install the shift fork and rod (1st/2nd), the springs balls, and the caps.

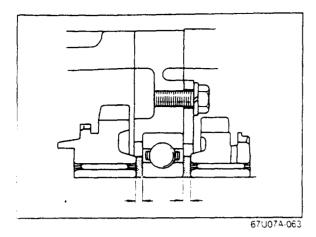
8. Install the spring pins in the shift forks.

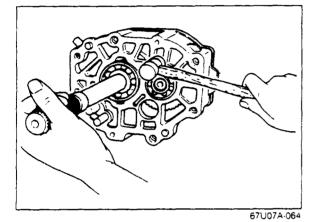
Caution

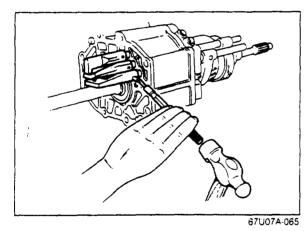
The spring pin should be installed so the groove of the pin is as shown in the figure.

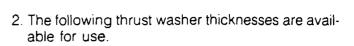
Adjustment of Shift Fork and Clutch Hub Sleeve

 To obtain the correct position of the shift fork to the clutch hub sleeve, select the proper thrust washer for between 1st gear and the mainshaft bearing, or reverse gear and the mainshaft bearing.









2.2 mm (0.0866 in)	3.2 mm (0 1260 in
2.7 mm (0.1063 in)	3.7 mm (0.1457 in
3.0 mm (0.1181 in)	

Intermediate Housing

- 1. Coat the intermediate housing mounting surfaces with sealant.
- 2. Mount the intermediate housing to the bearing housing by tapping lightly with plastic hammer.

Rod End

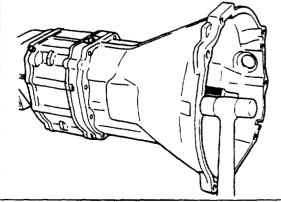
Install the shift rod ends on the shift rods.

Speedometer Drive Gear

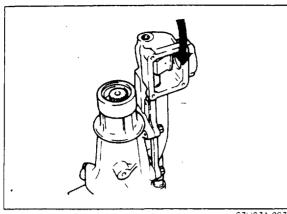
- 1. Install the snap ring.
- 2. Mount the ball and speedometer drive gear, and secure them with a snap ring.

Transmission Case

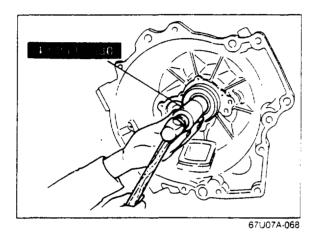
- 1. Coat the mounting surfaces of the transmission case and bearing housing with sealant.
- 2. Mount the transmission case to the bearing housing by tapping lightly with a plastic hammer.



67U07A-066







Extension Housing

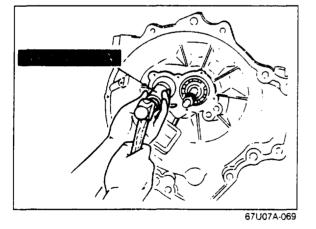
- 1. Coat the mounting surfaces of the extension housing and intermediate housing with sealant.
- 2. Shift the clutch hub sleeves to 1st gear.
- 3. Turn the control rod in the direction of the arrow and install the extension housing.
- 4. Tighten the bolts.

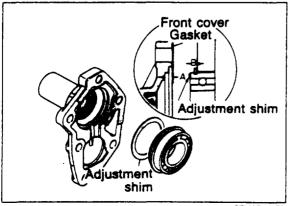
Tightening torque: 16-23 Nm (1.6-2.3 m-kg, 12-17 ft-lb)

Bearing

1. Drive the main drive shaft bearing on using bearing installer (49 0500 330) and secure with the two snap rings.

2. Drive the counter shaft bearing on using bearing installer (49 0180 321A).



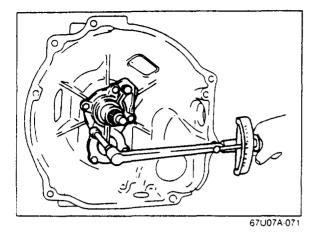


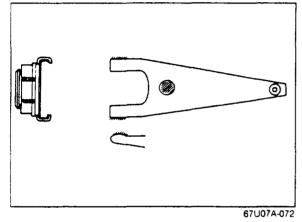
67U07A-070

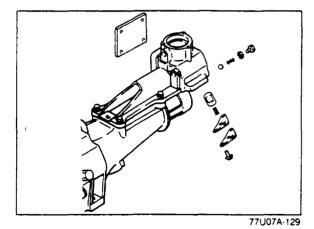
Front Cover

1. After measuring dimensions (A) and (B), use an adjust shim(s), of a thickness corresponding to the value of (A) minus (B), so that bearing end play will be within the specification.

Bearing end play: 0-0.1 mm (0-0.004 in) Adjust shim thickness: 0.15 mm (0.006 in) 0.30 mm (0.012 in)







2. Install the front cover.

Tightening torque: 19-26 N·m (1.9-2.6 m-kg, 14-19 ft-lb)

Release Fork

- 1. Apply molybdenum disulphide grease to the parts of the release bearing and release fork indicated by the shaded lines in the figure.
- 2. Install the release bearing and release fork.

Select Lock Spindle

- 1. Install the select lock spindle, spring and spring cap.
- 2. Push the select lock spindle down by pushing on the control rod.

Insert the ball and spring, and install the spring cap.

INSTALLATION

Install the transmission in the reverse order of removal.

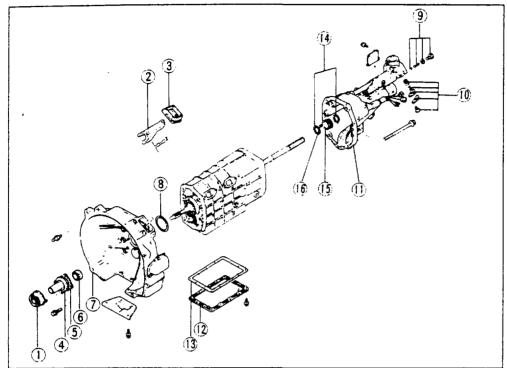
Note

Fill the transmission with the correct grade and quantity of lubricant.

67U07A-074

DISASSEMBLY TURBO MODEL

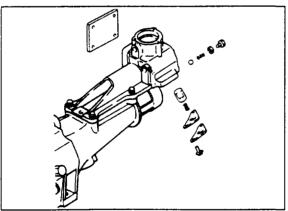
Disassemble in the sequence shown in the figure. CLUTCH HOUSING AND EXTENSION HOUSING



- 1. Release bearing
- 2. Release fork

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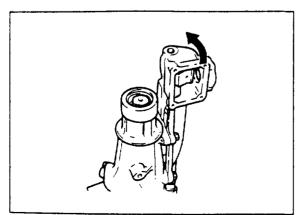
- 3. Boot
- 4. Front cover
- 5. Gasket
- 6. Oil seal
- 7. Clutch housing
- 8. Adjust shim(s)
- 9. Bolt, spring and lock ball
- 10. Cover and select lock spindle
- 11. Extension housing
- 12. Under cover
- 13. Gasket
- 14. Snap ring(s)
- 15. Speedometer drive gear
- 16. Key



77U07A 006

- Extension Housing
- 1. Remove the cap bolt, spring and lock ball.
- 2. Remove the cover, spring and select lock spindle.
- 3. Remove the control case cover.



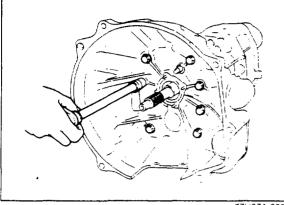


77U07A-007

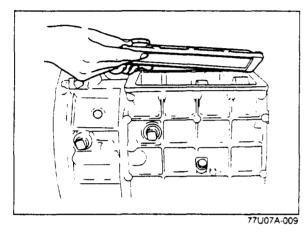
4. Remove the extension housing attaching bolts.

Note Do not remove the change control case.

5. Turn the control rod in the direction of the arrow and remove the extension housing.

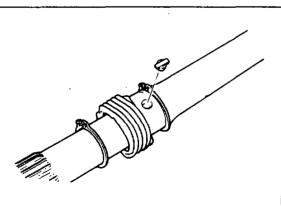


77U07A-008



Clutch Housing Remove the clutch housing.

Under Cover Remove the under cover.

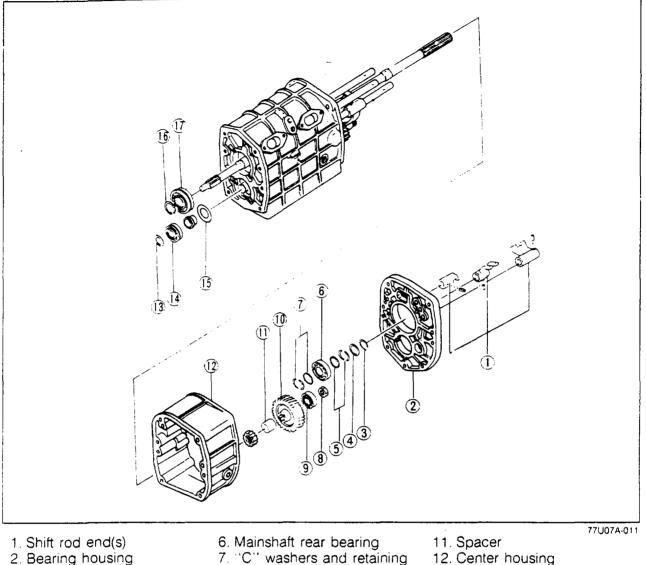


77U07A-010

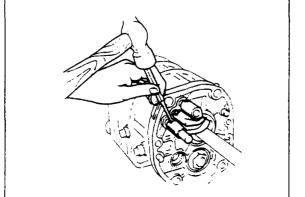
Speedometer Drive Gear

Remove the snap ring, speedometer drive gear, key and snap ring.

HOUSING PARTS



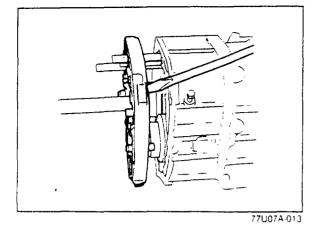
- 2. Bearing housing
- 3. Snap ring 4. Adjust washer
- ring
- 8. Lock nut
- 5. "C" washers and retaining 9. Countershaft rear bearing 10. Counter gear ring
- 12. Center housing
- 13. Snap ring
- 14. Countershaft front bearing
- 15. Adjust shim(s)
- 16. Snap ring
- 17. Main drive gear bearing

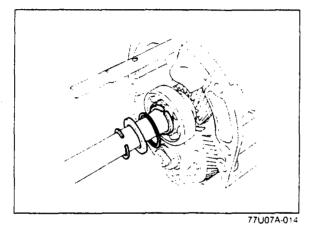


77U07A-012

Remove the spring pins and shift rod ends.

Shift Rod Ends





Bearing Housing

Gently pry the bearing housing away from the transmission case with a flattipped screwdriver, being careful not to damage the housing or case. Slide the bearing housing off the mainshaft.

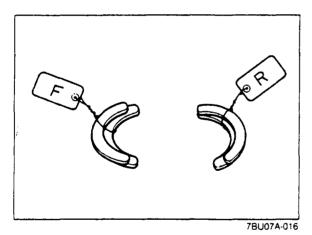
Mainshaft Rear Bearing

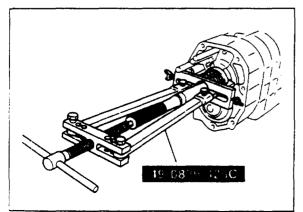
1. Remove the snap ring, washer, retaining ring, and C washers.

2. For proper reassembly, identify the front and rear C washers.

Note

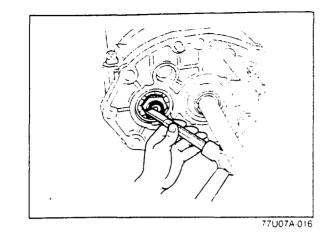
The front and rear C washers may have different thicknesses.





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78U07A-017
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3. Remove the mainshaft rear bearing with the **bear**ing puller set (49 0839 425C).



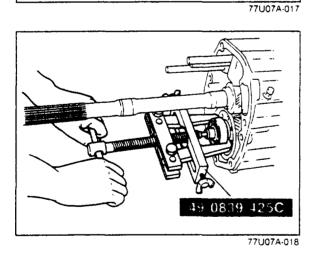
Countershaft Rear Bearing

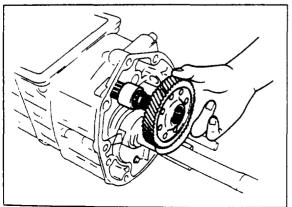
1. Uncrimp the tab of the lock nut.

- 2. Shift the clutch hub sleeves to first gear and reverse gear to put the gears in the double-engaged condition.
- 3. Remove the lock nut.

Caution Do not re-use the lock nut.

4. Remove the countershaft rear bearing using **bear**ing puller set (49 0839 425C).

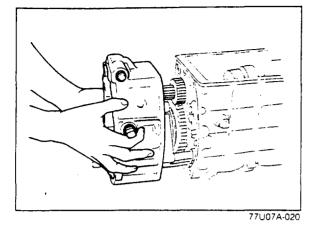




Counter 5th Gear

Remove the counter 5th gear and spacer from the rear of the countershaft.

77U07A-019



77U07A-021

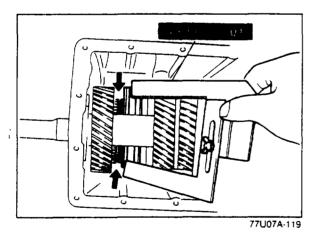
Center Housing

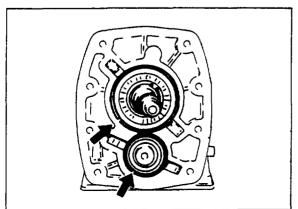
- Remove the cap screw from center housing.
 Tap the housing with a plastic hammer, if neccesarry, and remove the center housing.

Main Drive Gear Front Bearing

1. Remove the snap ring from the main drive gear.

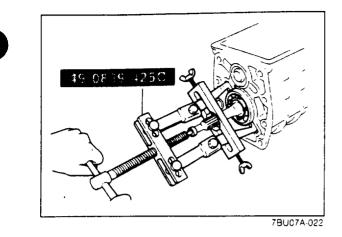
2. Install the synchronizer ring holder (49 F017 101) between the 4th speed synchronizer ring and synchromesh gear on the mainshaft.





77U07A-023

3. Remove the main drive gear bearing using bearing puller set (49 0839 425C).



49 0839 125C

77U07A-024

4. remove the mainshaft front bearing with the **bear**ing puller set (49 08399 425C).

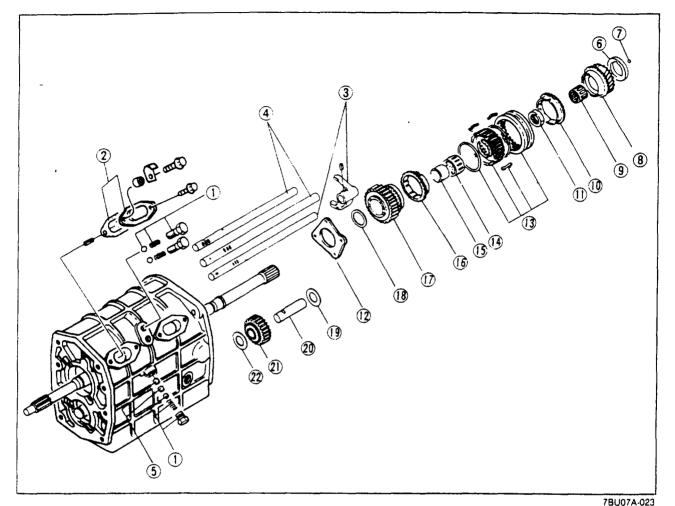


Countershaft Front Bearing

- 1. Remove the snap ring from the front of the countershaft.
- 2. Remove the countershaft front bearing using **bear**ing puller set (49 0839 425C).

7A DISASSEMBLY

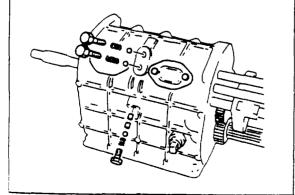
5TH/REVERSE GEAR



- 1. Bolt, spring, and ball
- 2 Blind cover
- 3 Shift fork (5th/reverse) and 10. Synchronizer ring rod
- 4. Shift rods
- 5. Interlock pin
- 6. Thrust lock washer
- 7. Lock ball

- 8.5th gear
- 9. Needle bearing
- 11. Locknut
- 12. Bearing stopper
- 13. Clutch hub assembly (5th/reverse)
- 14. Needle bearing

- 15. Inner case
- 16. Synchronizer ring
- 17. Reverse gear
- 18. Thrust washer
- 19. Thrust washer
- 20. Reverse idle gear shaft
- 21. Reverse idle gear
- 22. Thrust washer

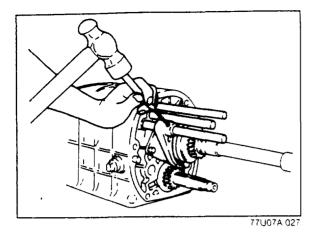


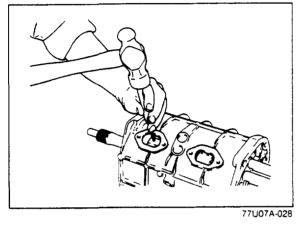
Shift Rod

1. Remove the three spring cap bolts, and then remove the balls and springs.

77U07A-026

7A-32

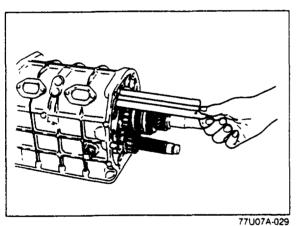




2. Drive the spring pin from the 5th/reverse shift fork. Slide the 5th/reverse shift rod out of the transmission case.

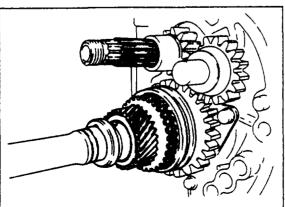
- 3. Remove the covers and gaskets.
- 4. Shift the transmission into 4th gear. This will provide adequate space to drive out the spring pin.
 - Drive the spring pin from 3rd/4th shift fork.
- 5. Slide the 3rd/4th shift rod out of the rear of the transmission case.

6. Drive the spring pin from the 1st/2nd shift fork. Slide the 1st/2nd shift rod out the rear of the transmission case.



7. Remove both interlock pins.

Remove the thrust washer, lock ball, needle bearing,

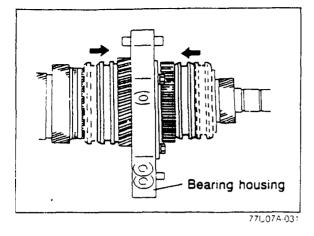


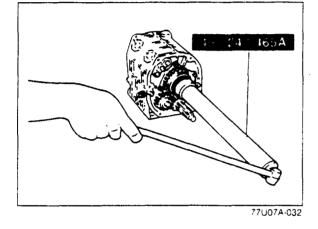
5th gear, and synchronizer ring from the rear of the mainshaft.

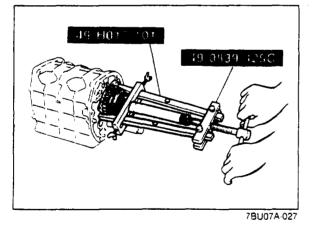
7BU07A-026

5th Gear

7A-33







5th/Reverse Clutch Hub Assembly

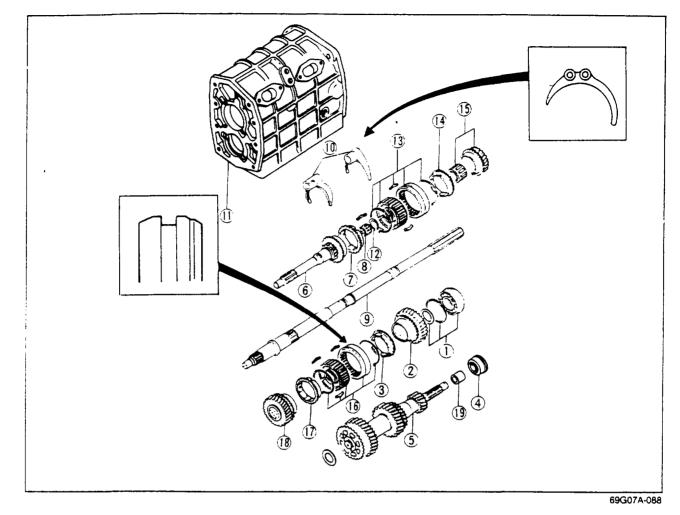
- 1. Uncrimp the tabs of the locknut.
- 2. Shift into 1st gear and reverse gear to lock the rotation of the mainshaft.

3. Remove the locknut using the **locknut wrench** (49 1243 465A).

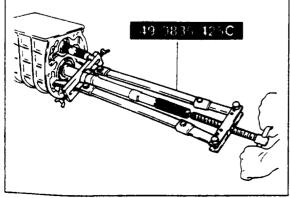
Caution Do not reuse the locknut.

- 4. Remove the bearing stopper installation bolts.
- 5. Attach the **bearing puller set** (49 0839 425C) and **hook** (49 H017 101) to the bearing stopper, and remove the assembly containing the following parts:
 - 5th/reverse clutch hub assembly
 - Synchronizer ring
 - Needle bearing
 - Inner race
 - Reverse gear
 - Thrust washer
- 6. Remove the thrust washers, reverse idle gear shaft, and reverse idle gear.

MAINSHAFT



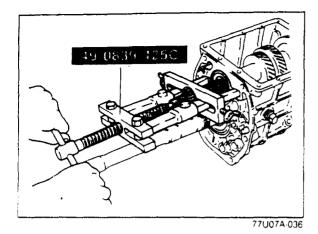
- 1. Mainshaft bearing, adjust shim, and thrust washer
- 2.1st gear
- 3. Synchronzer ring (1st)
- 4. Countershaft rear bearing
- 5. Countershaft
- 6. Main drive gear
- 7. Synchronizer ring (4th)
- 8. Needle bearing
- 9. Mainshaft
- 10. Shift forks
- 11. Transmission case
- 12. Snap ring
- 13. Clutch hub assembly (3rd/4th) 14. Synchronizer ring (3rd)
- 15. 3rd gear and needle
 - bearing
- 16. Clutch hub assembly (1st/2nd)
- 17. Synchronizer ring (2nd)
- 18. 2nd gear
- 19. Inner race

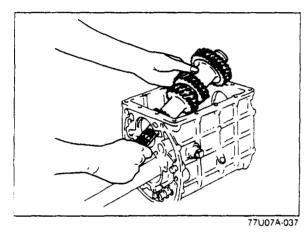


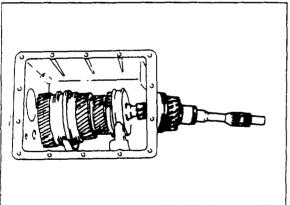
87U07A-007

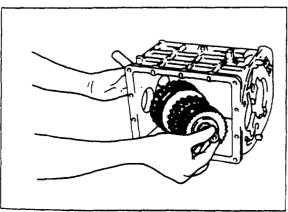
Disassembly Note Mainshaft bearing

- 1. Remove the mainshaft bearing using bearing puller set (49 0839 425C).
- 2. Remove the 1st gear.









77U07A-039

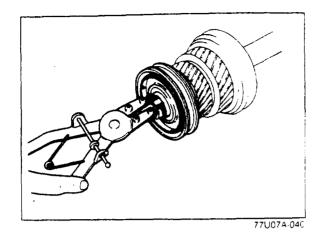
Countershaft

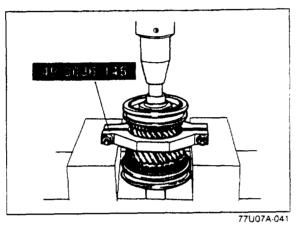
1. Remove the countershaft center bearing using **bearing puller set** (49 0839 425C).

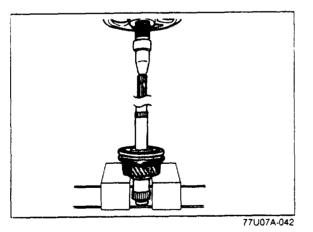
2 Remove the countershaft.

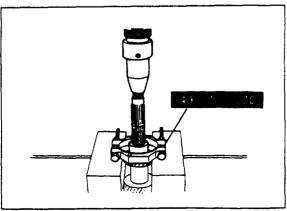
Mainshaft

- 1. Remove the main drive gear from the transmission case.
 - ...
 - .
- 2. Remove the mainshaft and gear assembly from the transmission case.









Clutch Hub

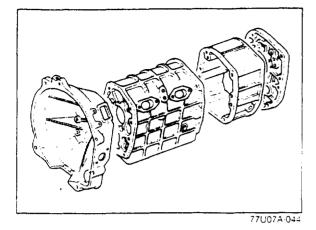
1. Remove the snap ring from the front of the mainshaft.

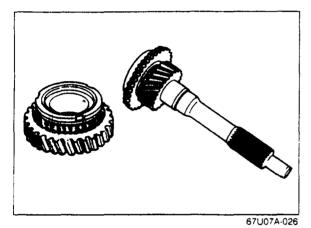
- 2. Position the **puller** (49 0636 145) between 2nd arid 3rd gear.
- 3. Press the mainshaft out of 3rd gear and 3rd/4th clutch hub assembly.

4. Press the 1st/2nd clutch hub assembly and 1st gear sleeve from the mainshaft.

Bearing Inner Race

Remove the inner race of the countershaft bearing from countershaft using **puller** (49 0710 520).





INSPECTION

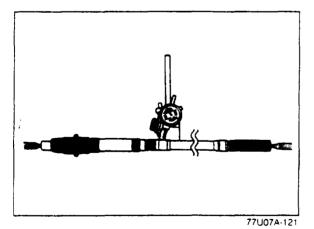
Check each of the items listed below, repair or replace if necessary.

Transmission Case and Housing

- 1. Cracks, damage or wear.
- 2 Rough contact surfaces or damage.

Each Gear and Main Drive Gear

- 1. Worn or damaged synchronizer cones.
- 2 Worn or damaged hub sleeve parts.
- 3. Worn or damaged teeth.
- 4 Worn or damaged inner gear or outer gear surfaces.
- 5 Worn or damaged main drive shaft splines.

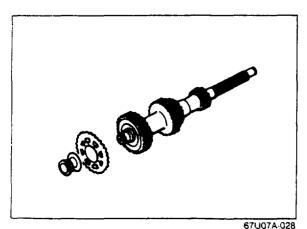


Mainshaft

1. Runout.

Max: 0.20 mm (0.0079 in)

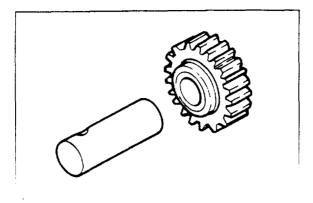
2. Worn or damaged splines.



Countershaft

- 1. Worn or damaged gear teeth.
- 2. Worn or damaged splines.
- 3. Worn or damaged friction gears.

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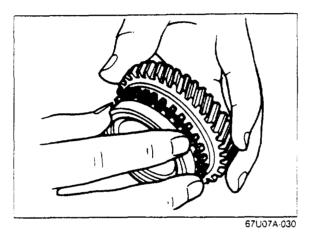


Reverse idle Gear and Shaft

- 1. Worn or damaged gear.
- 2. Worn shaft.

Standard clearance: 0.02-0.05 mm (0.0008-0.0020 in) Max: 0.15 mm (0.0059 in)

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Synchronizer Ring

- 1. Gear cone mesh.
- 2. Worn or damaged splines.
- 3. Worn or damaged taper surface.

4. Clearance between synchronizer ring and flank surface of gear.

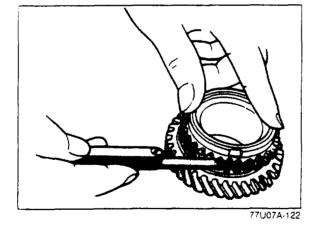
Standard clearance: 1.5 mm (0.059 in) Max: 0.8 mm (0.031 in)

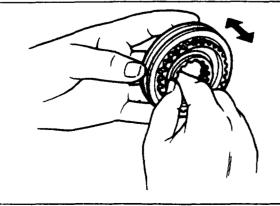
Note

Set the synchronizer ring straight in the gear, and measure around the circumference.

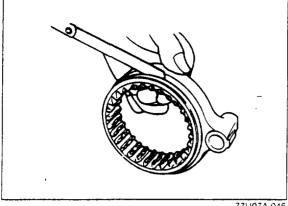
Clutch Hub

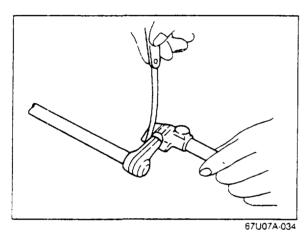
- 1. Operation of clutch hub sleeve and hub.
- 2. Worn or damaged hub sleeve sliding surface.
- 3. Worn or damaged hub synchronizer key groove.
- 4. Worn gear teeth.





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Clutch Hub Sleeve

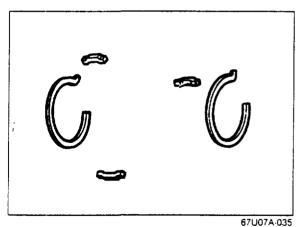
- Worn or damaged clutch hub sliding surfaces.
 Clearance between hub sleeve and release fork.

Standard clearance: 0.2—0.3 mm (0.008—0.012 in) Max: 0.5 mm (0.020 in)

Control Lever and Shift Rod

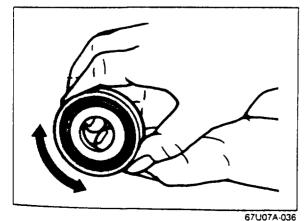
1. Clearance between the control lever and the gate of the shift rod.

Clearance: 0.8 mm (0.0315 in) max.



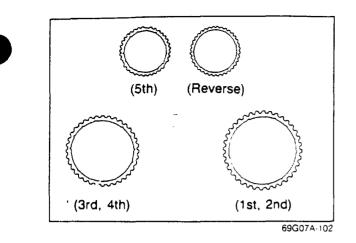
Synchronizer Key and Key Spring

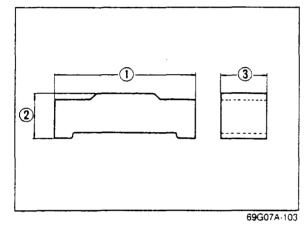
- 1. Worn key.
- 2. Fatigued or damaged spring.

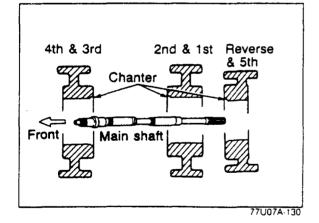


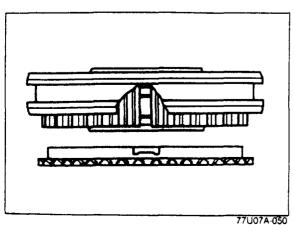
Bearing

- 1. Roughness or noise while turning.
- 2. Damaged bearing.
- 3. Worn bearing.









ASSEMBLY

ASSEMBLY NOTE Clutch Hub

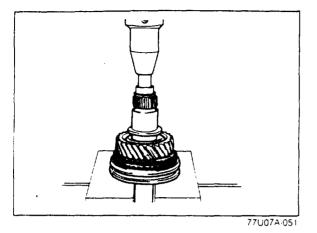
Note

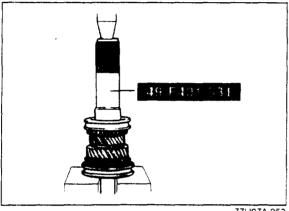
- a) The synchronizer rings all have the same basic shape; therefore, be careful to select the correct ones.
 - The 5th and reverse synchronizer rings are the smallest.
 - The 5th has notches in the teeth.
 - The 4th and 3rd are the next size up and are exactly the same.
 - The 2nd and 1st are the biggest and are exactly the same.
- b) There are two types of synchronizer key. Standard dimensions are as follows.

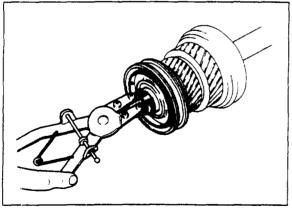
		mm (in)	
	1	2	3
1st and 2nd	18 (0.7087)	5.45 (0.2146)	6 (0.2362)
3rd, 4th, 5th, and Rev.	17 (0.6693)	4.25 (0.1791)	5 (0.1969)

- c) Press each clutch hub assembly onto the mainshaft in the proper direction.
- d) Install the clutch hubs with the chamfer of the inner gear teeth as shown.

Caution Align the synchronizer ring groove and clutch hub key during installation.

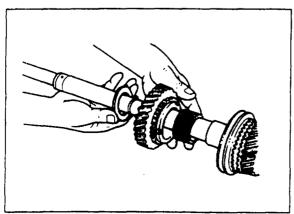






3. Insert the snap ring to the front of the mainshaft using snap ring pliers.





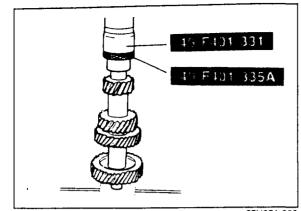
77U07A-054

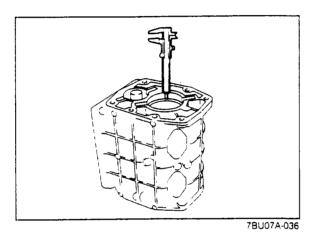
1. Place the 2nd gear and 1st/2nd clutch hub assembly, and press in the mainshaft.

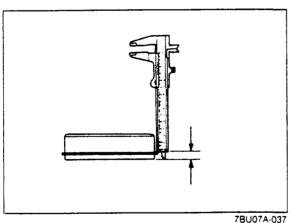
2. Place the 3rd gear, needle bearing and 3rd/4th clutch hub assembly, press the 3rd/4th clutch hub assembly using **body** (49 F401 331).

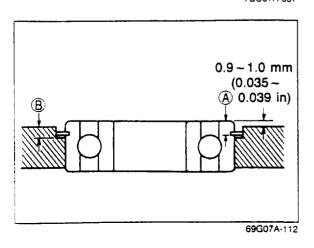
4. Install the inner race, needle bearing, 1st gear and thrust washer.

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Countershaft

Press the inner race of the countershaft rear bearing onto the countershaft, using the **body** (49 F401 331) and **attachment A** (49 F401 335A).

Measurement of Bearing Thrust Play Mainshaft center bearing

1. Measure the depth of the main shaft center bearing bore in the transmission case.

2. Measure the mainshaft center bearing snap ring height. The difference between the two measurements indicates the required thickness of the adjusting shim.

Standard thrust play: 0-0.1 mm (0-0.004 in)

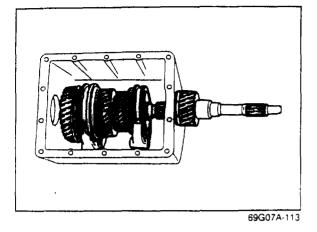
Adjusting shim thickness: 0.1 mm (0.004 in), 0.3 mm (0.012 in)

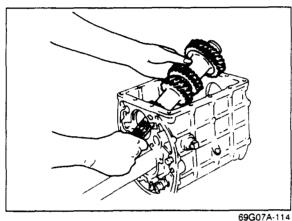
Countershaft front bearing

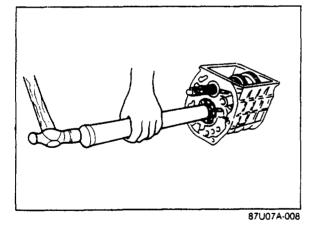
- 1. Measure the depth (B) of the countershaft front bearing bore in the transmission case and the countershaft front bearing height (A).
- 2. The difference between the two measurements indicates the required thickness of the adjust shim.

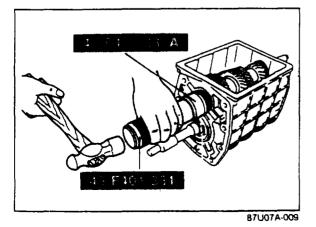
(A - B + Adjust shim(s) = 0.9-1.0 mm(0.035-0.039 in) Standard installed bearing height: 0.9-1.0 mm (0.035-0.039 in) Adjust shim thickness:

0.1 mm (0.004 in), 0.3 mm (0.012 in)









Transmission Case

- 1. Position the 1st and 2nd shift forks and the 3rd and 4th shift forks in the grooves of the clutch hub and sleeve assemblies.
- 2. Install the needle bearing and main drive gear on the front of the mainshaft.

Note

Check that the friction gear engages the main drive gear.

3. Position the countershaft gear in the case, making sure that the countershaft gears engage each gear of the mainshaft assembly.

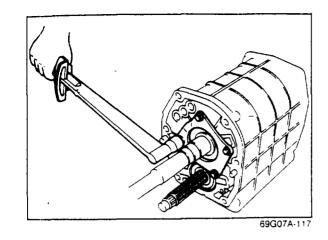
Note

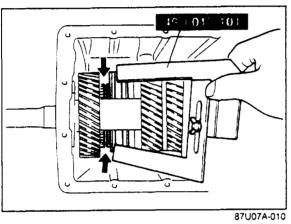
Check that the friction gear engages the main drive gear.

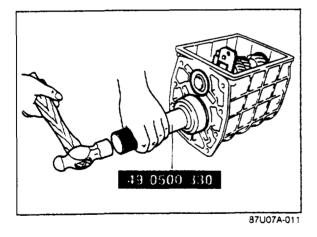
Bearing for Transmission Case

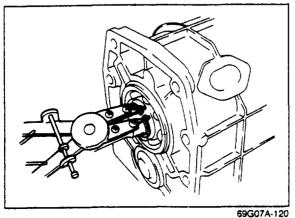
- 1. Install the correct shim on the rear of the mainshaft as determined in the measurement of bearing thrust play.
- 2. Drive on the mainshaft bearing using a suitable pipe.

3. Drive the countershaft center bearing onto the rear of the countershaft using **body** (49 F401 331) and **attachment A** (49 F401 335A).









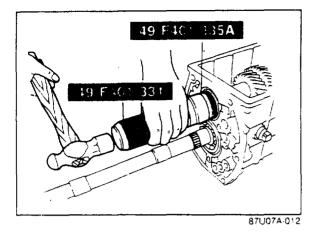
4. Install the bearing cover.

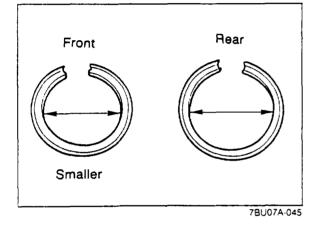
Tightening torque: 18-26 N·m (1.8-2.7 m-kg, 13-20 ft-lb)

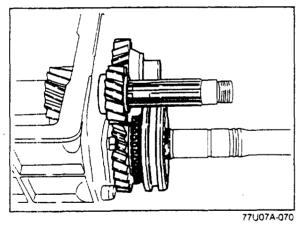
5. Install the **synchronizer ring holder** (49 F017 101) between the 4th synchronizer ring and synchromesh gear on the main drive gear.

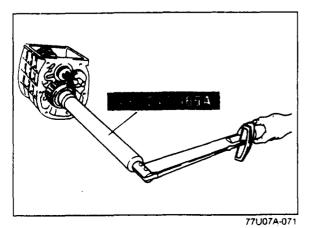
6. Drive on the main drive gear bearing using transmission bearing installer (49 0500 330).

7. Install the snap ring to secure the main drive gear bearing.









- 8. Install the correct shim in the countershaft front bearing bore as determined by the measurement of bearing thrust play.
- 9. Drive on the countershaft front bearing using **body** (49 F401 331) and **attachment A** (49 F401 335A).

10. Install the snap ring to secure the countershaft front bearing.

Note

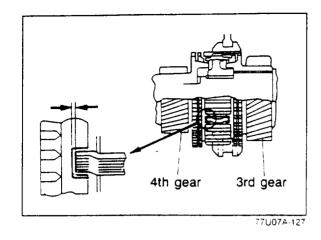
Do not confuse the front and rear bearing snap rings. The front snap ring is smaller.

Reverse Gear

- 1. Install the reverse idle gear and shaft with a spacer on each side of the gear.
- 2. Install the counter-reverse gear (chamfer side forward) and spacer.
- 3. Install the thrust washer, reverse gear, inner race, needle bearing, and clutch hub assembly.

- 4. Shift into 1st gear and reverse gear to lock the, rotation of the mainshaft.
- 5. Install a new locknut and tighten it with the **main shaft locknut wrench** (49 1243 465A).

Tightening torque: 157—235 N-m (16—24 m-kg, 116—174 ft-lb)

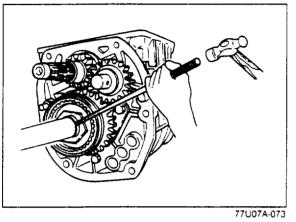


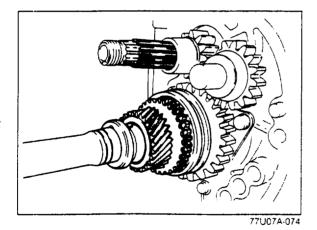
6. Check the clearance between the synchronizer key and the exposed edge of the synchronizer ring. If the clearance is not within specification, select the thrust washer between the mainshaft center bearing and the first gear.

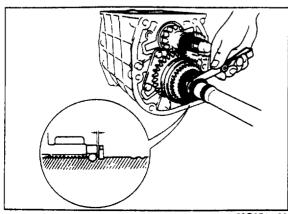
Standard: 0.66-2.0 mm (0.026-0.079 in)

Available thrust washer thickness: 2.5 mm (0.098 in), 3.0 mm (0.118 in) 3.5 mm (0.138 in)

7. Stake the lock nut into the main drive gear keyway.







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5th Gear

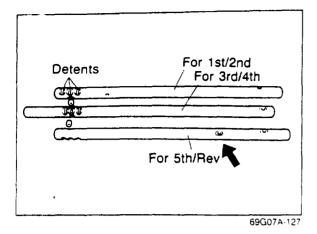
- 1. Install the synchronizer ring and 5th gear.
- 2. Install the steel ball and thrust washer.
- 3. Install 3.0 mm (0.118 in) thick "C" washers and hold them with the retaining ring.

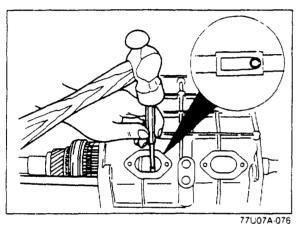
4. Measure the clearance between the C washers and thrust washer.

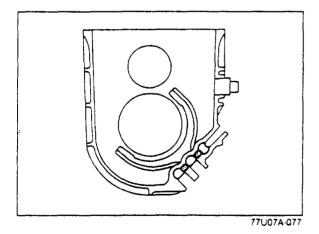
If it is not as specified, select another thrust washer.

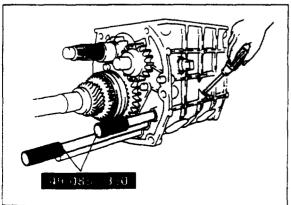
Standard: 0.1-0.2 mm (0.004-0.008 in) Available thrust washer thickness: 6.4 mm (0.252 in), 6.5 mm (0.256 in) 6.6 mm (0.260 in), 6.7 mm (0.264 in)

A ASSEMBLY









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Shift Fork and Rod

Note

A simple way to identify the shift rods is the following:

- The 3rd/4th shift rod is the longest.
- The 5th/Rev shift rod has an extra hole for the shift fork at the rear of the rod.

When installing the shift rods, set the detents toward the ball side.

Shift Fork and Rod

- 1. Slide the 1st and 2nd shift rod into the case.
- 2. Secure the 1st and 2nd shift forks to the rod with the spring pin.

Caution

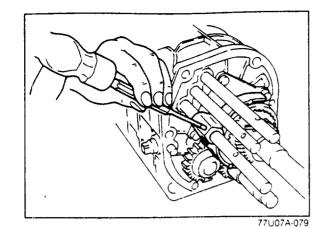
The spring pin should be installed so the groove of the pin is as shown in the figure.

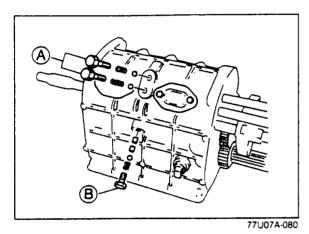
Note

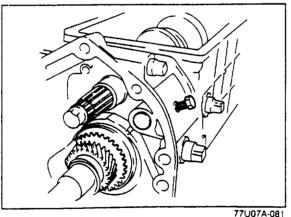
Insert the interlock pin into the transmission case correctly.

- 3. Slide the **shift fork guide** (49 0862 350) into the transmission case, insert the inter-lock pin using **interlock pin guide** (49 0187 451A).
- 4. Slide the 3rd and 4th shift rod into the transmission case.
- 5. Secure the 3rd and 4th shift rod to the fork with spring pin.

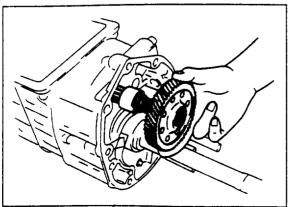
Insert the interlock pin.











- 6. Install the reverse and 5th fork on the clutch hub and slide the reverse and 5th shift rod into the transmission case.
- 7. Secure the reverse and 5th shift fork to the shift rod with the spring pin.

8. Install the two blind covers and gaskets.

Tightening torque: 7.8—11.8 N·m (0.8—1.2 m-kg, 5.8—8.7 ft-lb)

9. Install the three detent balls, springs and cap bolts.

Tightening torque:

(A.39—59 N·m (4.0—6.0 m-kg, 29—43 ft-lb) (B.19—26 N·m (1.9—2.7 m-kg, 14—20 ft-lb)

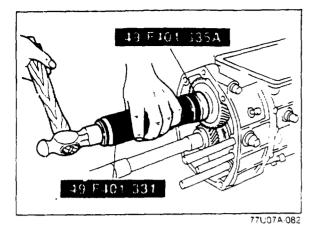
Center Housing

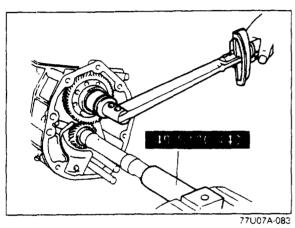
- 1. Coat the contact surfaces of the transmission case and center housing with sealant.
- 2. Install the center housing.

Align the reverse idle gear shaft boss with the center housing attaching bolt boss, and tighten the bolt.

Tightening torque: 8.8—13.7 N·m (0.9—1.4 m-kg, 6.5—10.1 ft-lb)

3. Install the spacer and counter 5th gear.





Rear Bearing

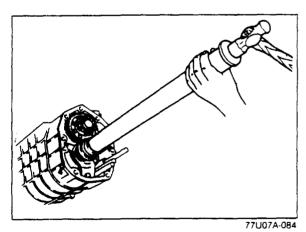
1. Drive on the countershaft rear bearing using **body** (49 F401 331) and **attachment A** (49 F401 335A).

- 2. Shift into 1st gear and reverse gear to lock the rotation of the countershaft.
- 3. Install the countershaft lock nut.

Tightening torque: 127—196 N·m (13—20 m-kg, 94—145 ft-lb)

4. Stake the lock nut into the countershaft keyway.

5. Drive on the mainshaft rear bearing using a suitable pipe.

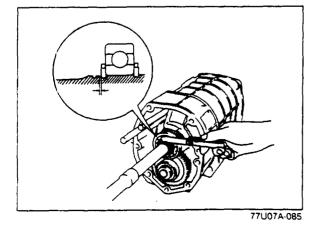


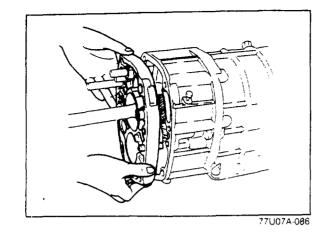
- 6. Install the "C" washers and hold them with the re-
- 7. Measure the clearance between the "C" washers and groove.

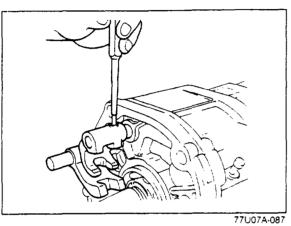
If the clearance is not within specification, select the proper "C" washers.

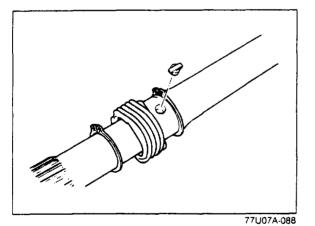
Standard: 0-0.1 mm (0-0.0039 in) Available "C" washers thickness: 2.9 mm (0.1142 in), 3.0 mm (0.1181 in)

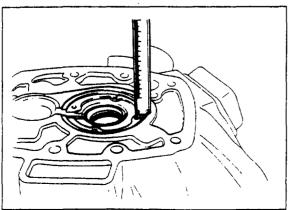
3.1 mm (0.1220 in), 3.2 mm (0.1260 in)











Bearing Housing

- 1. Coat the contacting surfaces of the center housing and bearing housing with sealant.
- 2. Install the bearing housing on the center housing.

Shift Rod End

Install the shift rod ends onto the proper shift rods, and secure with spring pins.

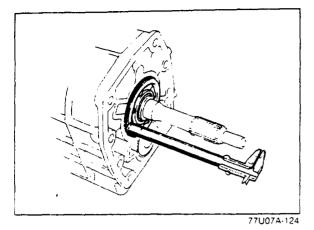
Speedometer Drive Gear

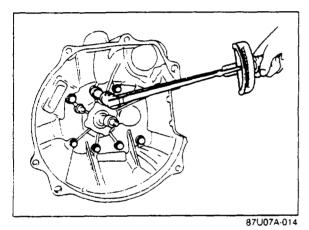
- 1. Install the snap ring and key.
- 2. Install the speedometer drive gear and snap ring.

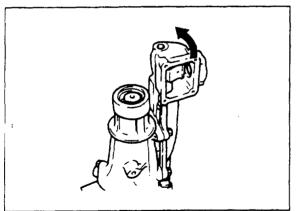
Measurement of Bearing Thrust Play Main drive gear bearing

1. Measure the depth of the main drive gear bearing bore in the clutch housing using vernier calipers.

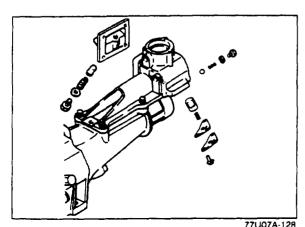
7A ASSEMBLY







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2. Measure the main drive gear bearing height. The difference between the two measurements indicates the required thickness of the adjust shim.

Standard thrust play: 0-0.1 mm (0-0.004 in) Adjust shim thickness: 0.1 mm (0.004 in), 0.3 mm (0.012 in)

Note

Make this measurement after assembling the transmission case.

Clutch Housing

- 1. Coat the contact surfaces of the clutch housing and center housing with sealant.
- 2 Install the correct shim on the main drive gear bearing and countershaft front bearing as determined in the Measurement of Thrust Play.
- 3 Tighten the bolts.

Tightening torque: 31-46 N·m (3.2-4.7 m-kg, 23-34 ft-lb)

Extension Housing

- 1. Coat the contact surfaces of the extension housing and bearing housing with sealant.
- 2. Turn the control rod in the direction of the arrow and install the extension housing.
- 3. Tighten the bolts.

Tightening torque: 31-46 N·m (3.2-4.7 m-kg, 23-34 ft-lb)

Select Lock Spindle

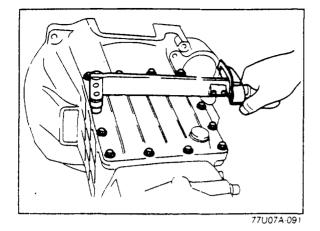
- 1. Install the select lock spindle, spring and spring cap.
- 2. Push the select lock spindle down by pushing on the control rod.

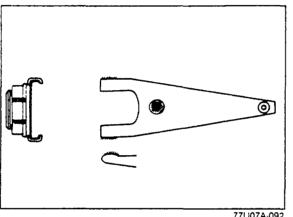
Insert the ball and spring and install the spring cap.

Note

If the select lock spindle is not pushed down, the ball will not correctly engage the select lock spindle.



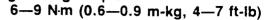




Under Cover

Install the gasket and under cover.

Tightening torque:



Release Fork

- 1. Apply a coat of molybdenum disulphide grease to the parts of the release bearing and release fork indicated by the shaded lines in the figure.
- 2. Install the release bearing and release fork.

INSTALLATION

Install the transmission in the reverse order of removal.

Note

Fill the transmission with the correct grade and quantity of lubricant.

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