

# MANUAL

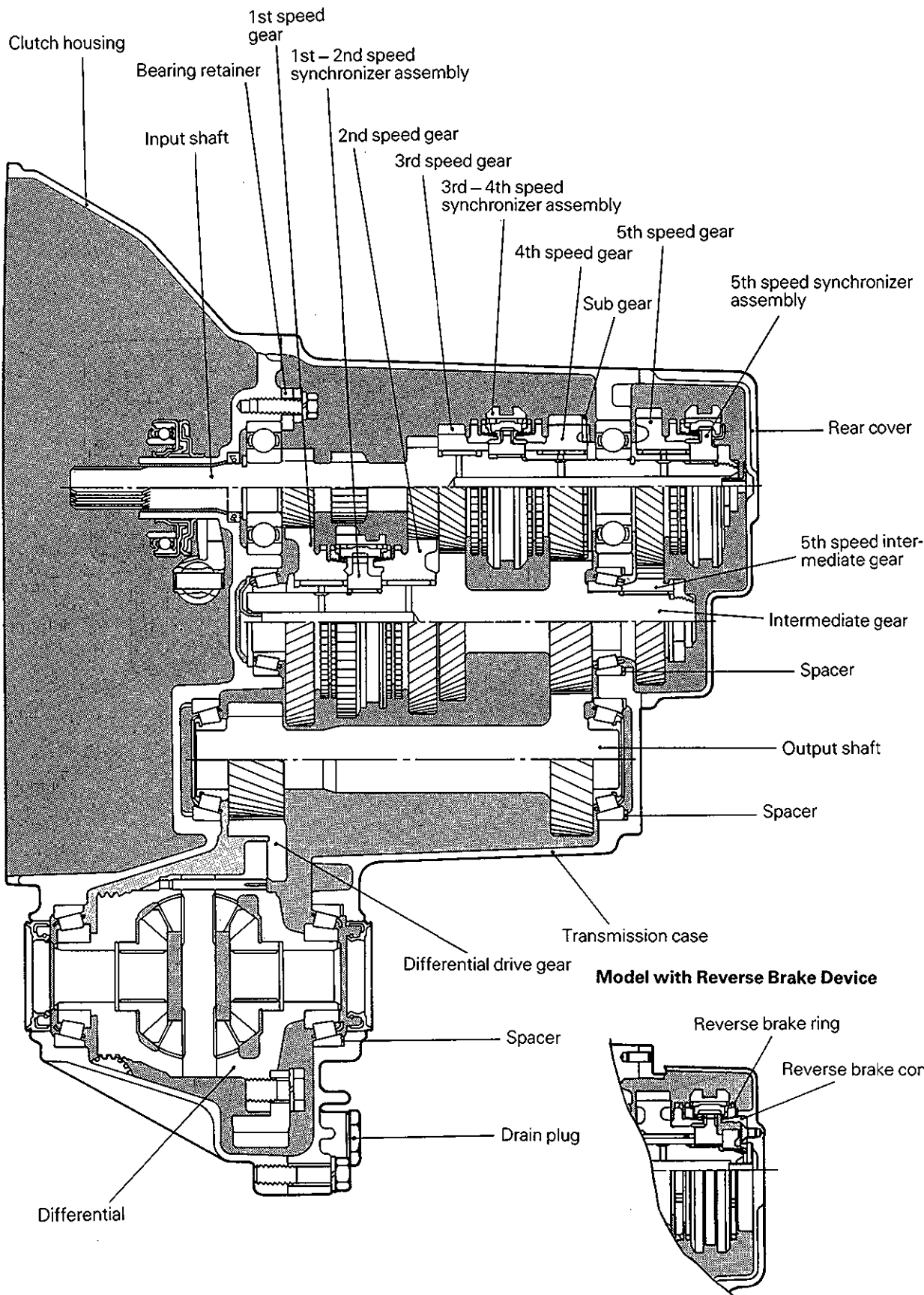
# TRANSMISSION

**MODEL F4M21, F5M21, F5M22,  
F5M31, F5M33, W5M31 AND W5M33**

## CONTENTS

<b>GENERAL INFORMATION</b> .....	<b>22A- 0-3</b>
<b>1. SPECIFICATIONS</b> .....	<b>22A- 1-1</b>
<b>TRANSMISSION MODEL TABLE</b> .....	<b>22A- 1-1</b>
<b>GEAR RATIO TABLE</b> .....	<b>22A- 1-7</b>
<b>SERVICE SPECIFICATIONS</b> .....	<b>22A- 1-8</b>
<b>SEALANTS AND ADHESIVES</b> .....	<b>22A- 1-9</b>
<b>ADJUSTMENT SNAP RINGS AND SPACERS</b> .....	<b>22A-1-10</b>
<b>TORQUE SPECIFICATIONS</b> .....	<b>22A-1-18</b>
<b>2. SPECIAL TOOLS</b> .....	<b>22A- 2-1</b>
<b>3. TRANSMISSION</b> .....	<b>22A- 3-1</b>
<b>4. 5TH SPEED SYNCHRONIZER</b> .....	<b>22A- 4-1</b>
<b>5. INPUT SHAFT</b> .....	<b>22A- 5-1</b>
<b>6. INTERMEDIATE GEAR</b> .....	<b>22A- 6-1</b>
<b>7. OUTPUT SHAFT</b> .....	<b>22A- 7-1</b>
<b>8. FRONT OUTPUT SHAFT</b> .....	<b>22A- 8-1</b>
<b>9. DIFFERENTIAL</b> .....	<b>22A- 9-1</b>
<b>10. CENTER DIFFERENTIAL</b> .....	<b>22A-10-1</b>
<b>11. TRANSMISSION CASE ADAPTER</b> .....	<b>22A-11-1</b>
<b>12. SHIFT FORK</b> .....	<b>22A-12-1</b>
<b>13. SPEEDOMETER DRIVEN GEAR</b> .....	<b>22A-13-1</b>
<b>14. CLUTCH HOUSING</b> .....	<b>22A-14-1</b>
<b>15. TRANSFER</b> .....	<b>22A-15-1</b>
<b>16. EXTENSION HOUSING</b> .....	<b>22A-16-1</b>
<b>17. TRANSFER CASE</b> .....	<b>22A-17-1</b>
<b>18. TRANSFER CASE ADAPTER</b> .....	<b>22A-18-1</b>
<b>19. DRIVE BEVEL GEAR</b> .....	<b>22A-19-1</b>
<b>20. DRIVEN BEVEL GEAR</b> .....	<b>22A-20-1</b>

MODEL F5M22 -- FIVE SPEED FRONT WHEEL DRIVE TRANSMISSION



## LIST OF MAJOR CHANGES

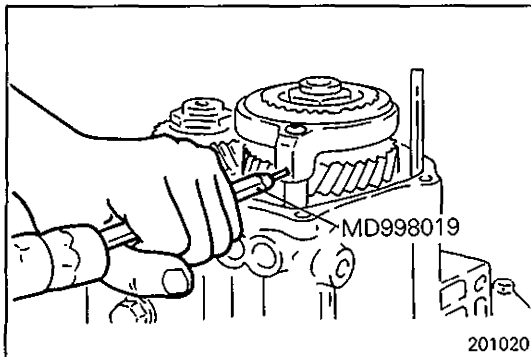
	Description of Change	Applicable Transmission Model	Effective Date
①	Output shaft bearing changed from ball bearing to taper roller bearing.	F4M21, F5M21	From July 1987
②	Synchronizer spring and synchronizer key changed it shape.	All models	From Sept. 1987
③	Synchronizer ring diameter reduced by 1 mm (0.04 in.).	All models	From Oct. 1987
④	Tooth width of 5th speed gear increased by 3 mm (0.12 in.).	F5M21, F5M22	From Nov. 1987
⑤	Input shaft snap ring added.	5-speed model only	From Dec. 1987
⑥	3rd-4th speed synchronizer sleeve & key, 5th speed synchronizer sleeve key and rear cover changed.	All models	From Nov. 1988
⑦	Reverse brake device added.	5-speed model only	From Jan. 1989
⑧	1st-2nd speed synchronizer spring changed in shape.	All models	From Nov. 1989
⑨	Filter added to intermediate rear bearing.	W5M31 for EC only	From Jan. 1990

**TRANSMISSION MODEL TABLE – MODEL 1994**

Transmission model	Gear ratio	Speedometer gear ratio	Final gear ratio	Vehicle model	Engine model		
EC	F5M21-1-VRAE	E	31/36	4.233	CA1A, CB1A	4G13	
	VRJE	E	31/36	4.233	CA1A, CB1A	4G13	
F5M22-1-FDTE	FRME	B	31/36	3.752	CB8A	4D68	
	FRMG	B	31/36	3.752	CB8A, CB8W	4D68	
	XPXL	B	29/36	4.592	N33W	4G63	
	XPZL	B	29/36	4.592	N11W	4G93	
	XPZL	B	29/36	4.592	N34W	4G64	
	2-FRZE	B	31/36	3.752	CA4A	4G92	
	RRGE	B	31/36	4.021	CB4W	4G92	
	RRZE	B	31/36	4.021	CA4A, CB4A	4G92	
	VPZF	B	29/36	4.233	E52A	4G93	
	VQKF	B	30/36	4.233	E55A	4G63	
	VRXE	B	31/36	4.233	CA5A, CB5A	4G93	
	F5M31-1-VPMF	ZPML	K	29/36	4.322	E57A	4D68
		2-ZPEF	K	29/36	4.913	N18W, N38W	4D68
		ZPGF	K	29/36	4.913	E54A, E64A	6A12 DOHC
ZPKF		K	29/36	4.913	E54A	6A12 DOHC	
ZPKF		K	29/36	4.913	E54A, E64A	6A12	
ZPXF		K	29/36	4.913	E54A	6A12 DOHC	
F5M33-2-SNEJ		SNXJ	J	28/36	4.153	F16A	6G72 DOHC
	SNXJ	J	28/36	4.153	F16A	6G72, 6G72 DOHC	
W5M31-2-VPCE	VPXL	M	29/36	5.208	CD4W	4G92	
	VPXL	M	29/36	5.208	N21W	4G93	
	VPXL	O	29/36	5.208	N43W	4G63	
	VQBF	O	30/36	5.208	E75A	4G63	
	VRCE	M	31/36	5.208	CC4A	4G92	
W5M33-2-WPXF	Q	29/36	5.443	E88A	6G73 DOHC		

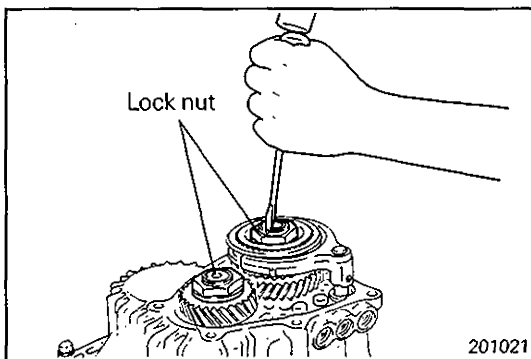
NOTE  
DOHC: Double overhead camshaft

Part name	Thickness mm (in.)	Identification symbol	Part No.
Spacer: W5M31, W5M33 ..... (For adjustment of drive bevel gear mount)	1.34 (0.0528)	34	MD723600
	1.37 (0.0539)	37	MD723601
	1.40 (0.0551)	40	MD723602
	1.43 (0.0563)	43	MD723603
	1.46 (0.0575)	46	MD723604
	1.49 (0.0587)	49	MD723605
	1.52 (0.0598)	52	MD723606
	1.55 (0.0610)	55	MD723607
	1.58 (0.0622)	58	MD723608
	1.61 (0.0634)	61	MD723609
Spacer: W5M31, W5M33 ..... (For adjustment of drive bevel gear preload)	1.64 (0.0646)	64	MD726170
	1.67 (0.0657)	67	MD726171
	1.28 (0.0504)	B28	MD726167
	1.31 (0.0516)	B31	MD726168
	1.34 (0.0528)	B34	MD726169
	1.37 (0.0539)	B37	MD724326
	1.40 (0.0551)	B40	MD724327
	1.43 (0.0563)	B43	MD724328
	1.46 (0.0575)	B46	MD724329
	1.49 (0.0587)	B49	MD724330
	1.52 (0.0598)	B52	MD724331
	1.55 (0.0610)	B55	MD724332
	1.58 (0.0622)	B58	MD724333
	1.61 (0.0634)	B61	MD724334
	1.64 (0.0646)	B64	MD724335
	1.67 (0.0657)	B67	MD724336
	1.70 (0.0669)	B70	MD724337
1.73 (0.0681)	B73	MD724338	
1.76 (0.0693)	B76	MD724339	
1.79 (0.0705)	B79	MD724340	
1.82 (0.0717)	B82	MD724341	
1.85 (0.0728)	B85	MD724342	
Spacer: W5M31, W5M33 ..... (For adjustment of driven bevel gear mount)	0.13 (0.0051)	13	MD720353
	0.16 (0.0063)	16	MD720354
	0.19 (0.0075)	19	MD720355
	0.22 (0.0087)	22	MD720356
	0.25 (0.0098)	25	MD720357
	0.28 (0.0110)	28	MD720358
	0.31 (0.0122)	31	MD720359
	0.34 (0.0134)	34	MD720360
	0.37 (0.0146)	37	MD720361
	0.40 (0.0157)	40	MD720362
	0.43 (0.0169)	43	MD720363
	0.46 (0.0181)	46	MD720364
	0.49 (0.0193)	49	MD720365
0.52 (0.0205)	52	MD720366	



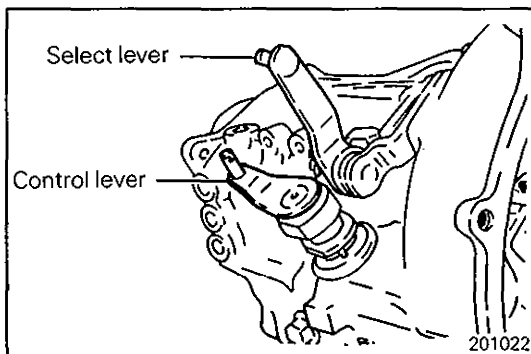
**SERVICE POINTS OF DISASSEMBLY**

**Ⓐ REMOVAL OF SPRING PIN FOR OD-R SHIFT FORK**

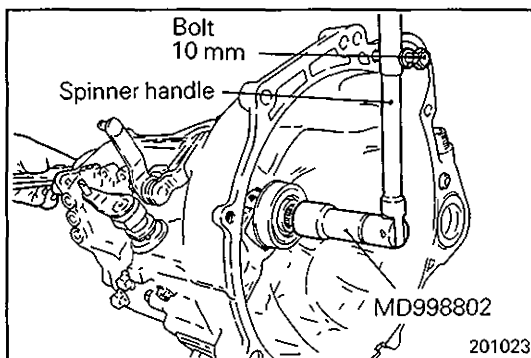


**Ⓑ REMOVAL OF LOCK NUTS FOR INPUT SHAFT / INTERMEDIATE GEAR**

(1) Unstake lock nuts of the input shaft and intermediate gear.



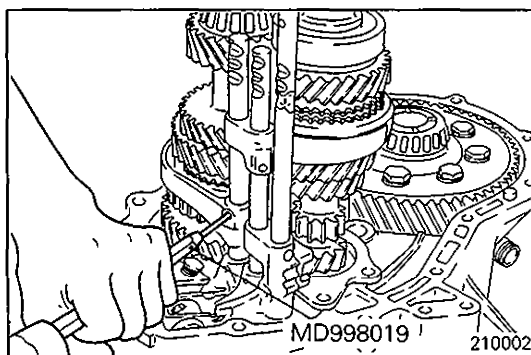
(2) Shift the transmission in reverse using the control lever and select lever.



(3) Install the special tool onto the input shaft.

(4) Screw a bolt (10 mm) into the bolt hole on the periphery of clutch housing and attach a spinner handle to the special tool.

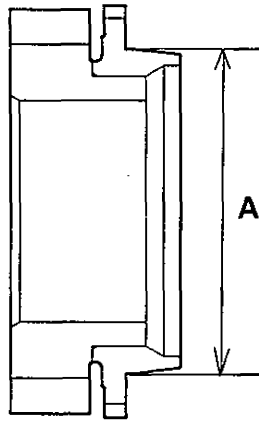
(5) Remove the lock nut, while using the bolt as a spinner handle stopper.



**Ⓒ REMOVAL OF SPRING PINS FOR 1ST-2ND SPEED SHIFT FORK / 3RD-4TH SPEED SHIFT FORK**

③

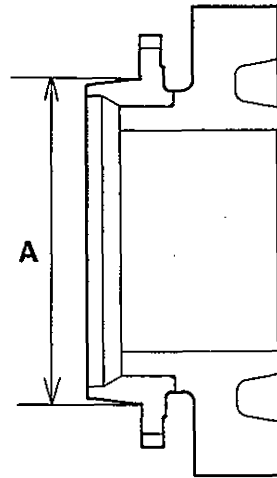
3rd speed gear



TFM0083

(F4M21, F5M21, F5M22)  
 (New) (Old)  
 A = 53 mm ← 54 mm  
 (F5M31, W5M31)  
 (New) (Old)  
 A = 62 mm ← 63 mm

4th speed gear



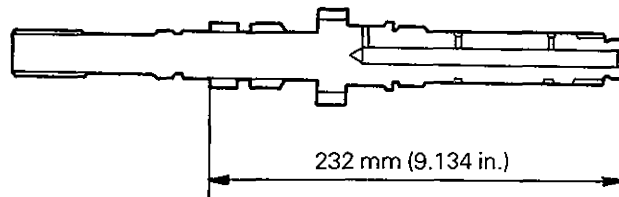
TFM0084

(F4M21, F5M21, F5M22)  
 (New) (Old)  
 A = 53 mm ← 54 mm  
 (F5M31, W5M31)  
 (New) (Old)  
 A = 53 mm ← 54 mm

④

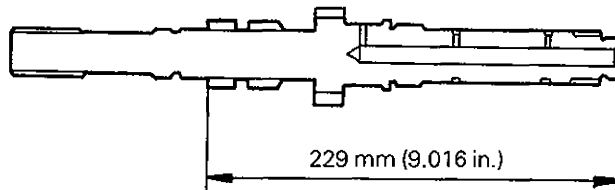
Input shaft

(New)

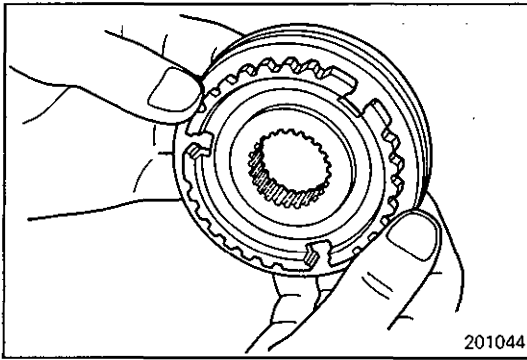


2010048

(Old)



2010048

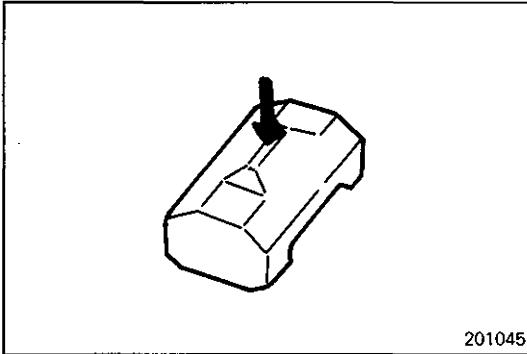


**SYNCHRONIZER SLEEVE AND HUB**

- (1) Combine the synchronizer sleeve and hub and check that they slide smoothly.
- (2) Check that the sleeve is free from damage at its inside front and rear ends.
- (3) Check for wear of the hub end surfaces (in contact with each speed gear).

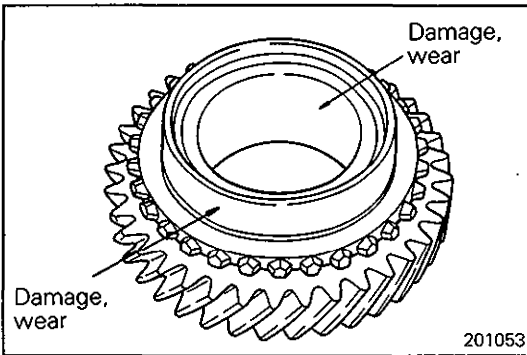
**Caution**

- When replacing, replace the synchronizer hub and sleeve as a set.



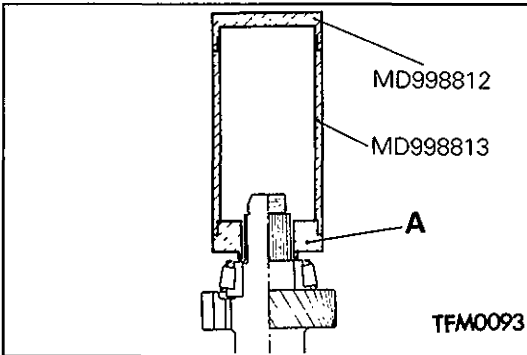
**SYNCHRONIZER KEY AND SPRING**

- (1) Check for wear of the synchronizer key center protrusion.
- (2) Check the spring for weakness, deformation and breakage.



**SPEED GEARS**

- (1) Check the bevel gear and clutch gear teeth for damage and wear.
- (2) Check the synchronizer cone for rough surface, damage and wear.
- (3) Check the gear bore and front and rear ends for damage and wear.



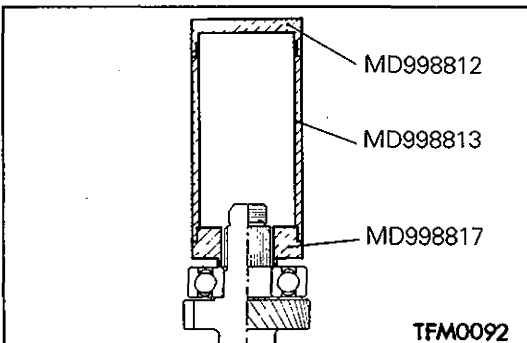
**SERVICE POINTS OF REASSEMBLY**

**A INSTALLATION OF TAPER ROLLER BEARING**

**Caution**

- When installing the bearing, push the inner race only.

	F5M22, F5M31	F5M33, W5M31, W5M33
A	MD998817	MD998818



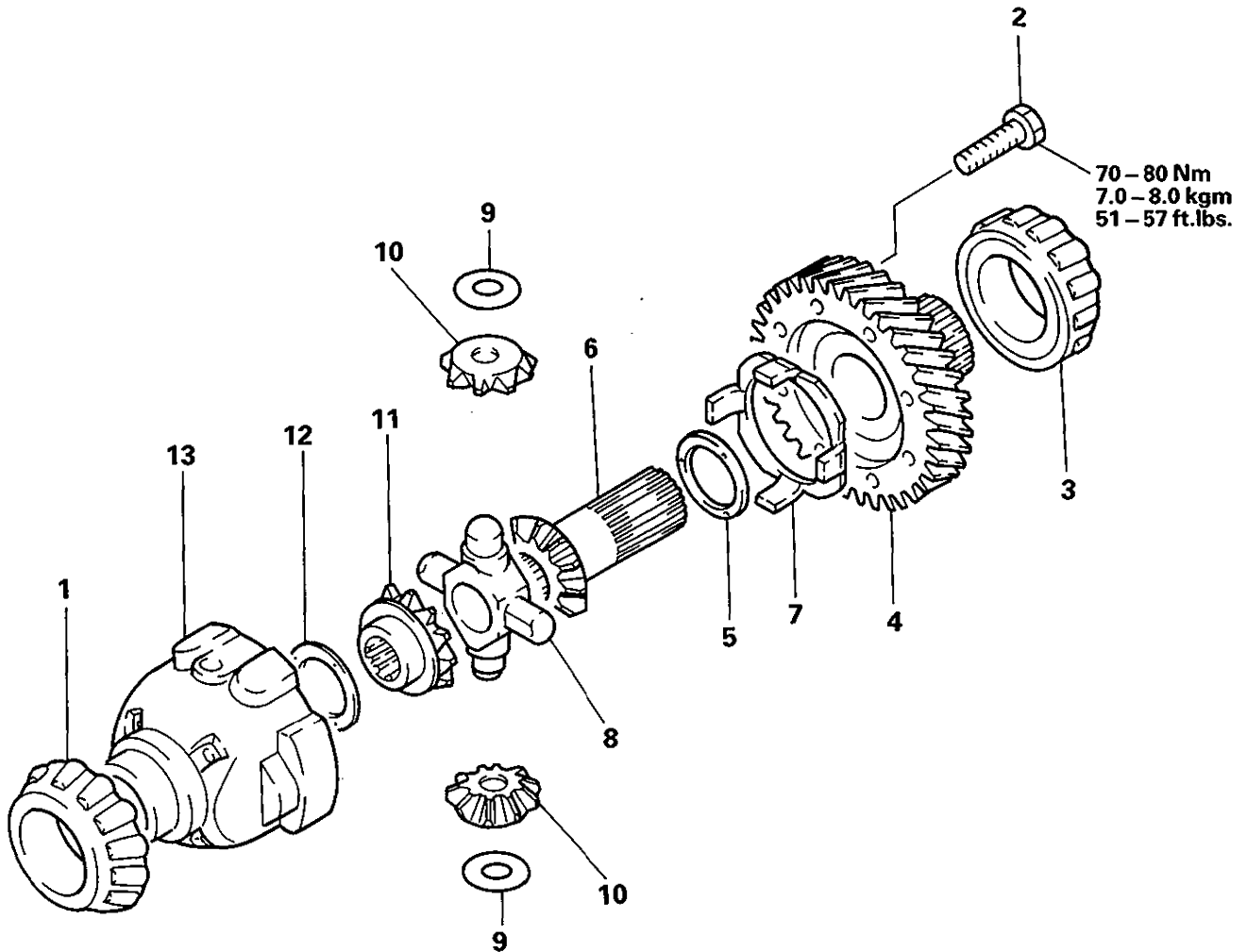
**B INSTALLATION OF BALL BEARING**



**10. CENTER DIFFERENTIAL**  
**<FOUR WHEEL DRIVE MODEL ONLY>**

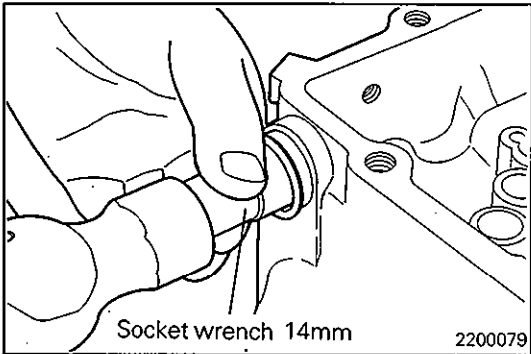
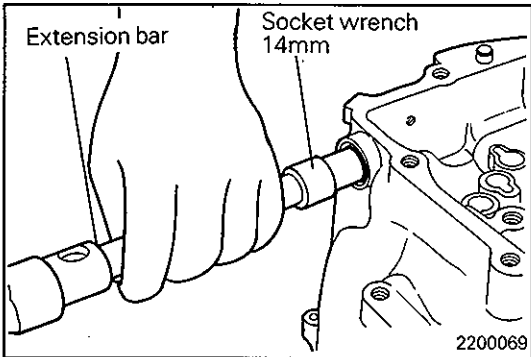
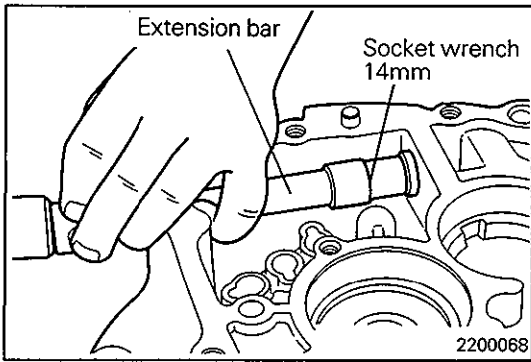
**W5M31**

**DISASSEMBLY AND REASSEMBLY**

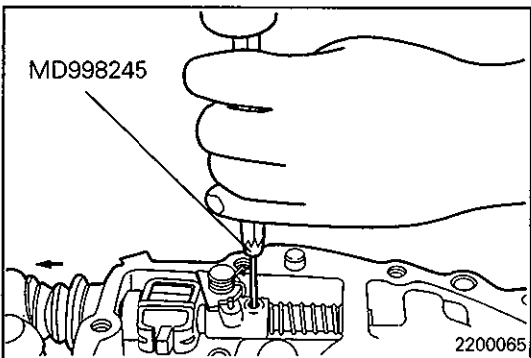


**Disassembly steps**

- Ⓐ **D** 1. Taper roller bearing
- Ⓐ **C** 2. Bolt
- Ⓐ **B** 3. Taper roller bearing
- 4. Output gear
- A** 5. Spacer
- 6. Side gear
- 7. Pinion shaft retainer (with differential lock)
- 8. Pinion shaft
- 9. Washer
- 10. Pinion
- 11. Side gear
- A** 12. Spacer
- 13. Center differential case



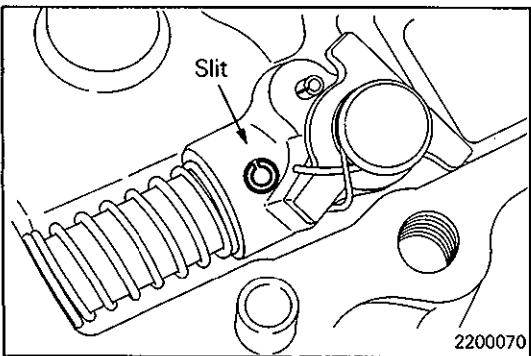
**B** INSTALLATION OF OIL SEAL

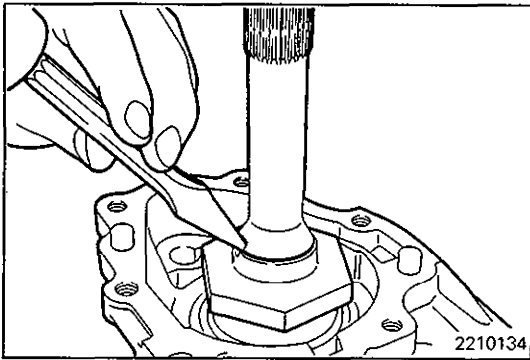


**C** INSTALLATION OF SPRING PIN / LOCK PIN

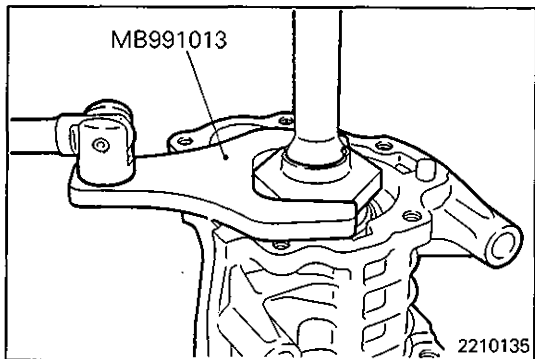
**Caution**

- Do not reuse the spring pin and lock pin.
- Install the spring pin in such a way its slit will be at right angle to the control shaft center.

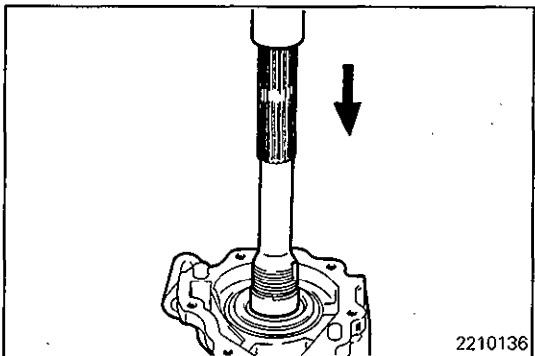


**SERVICE POINTS OF DISASSEMBLY****Ⓐ REMOVAL OF LOCKNUT**

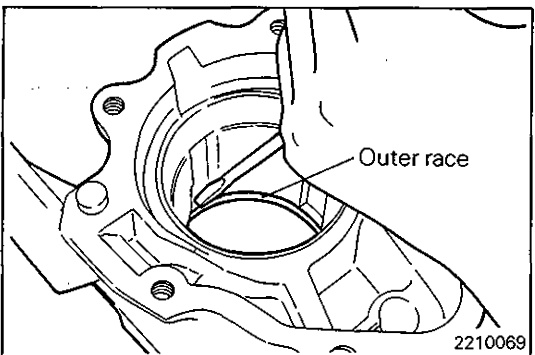
(1) Unlock the lock nut. (Straighten the bent nut.)



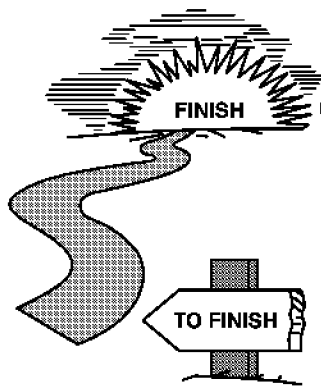
(2) Holding the driven bevel gear in a vice and using the special tool, remove the lock nut.

**Ⓑ REMOVAL OF DRIVEN BEVEL GEAR ASSEMBLY**

(1) Using a press, remove the driven bevel gear assembly.

**Ⓒ REMOVAL OF OUTER RACE**

(1) Remove the outer race, striking lightly with a screwdriver, etc.



**MODULE GOAL**

You will overhaul the W5M31/33 transaxle, and All Wheel Drive transfer case.

**OBJECTIVES**

Upon completion of this module, you will be able to do the following:

- overhaul a W5M31/33 transaxle.
- use solder crush techniques to setup bearing pre-load and end-play.
- disassemble and assemble an AWD transfer case.
- check and adjust bearing pre-load in the AWD transfer case.
- check and adjust gear tooth contact in the AWD transfer case.

**PREREQUISITE**

Completion of Theory Module 22.11, 30 series AWD Transaxle Operation.

**WHAT YOU WILL NEED**

Hand tools, Torque wrench, Dial caliper or micrometer, 2-jaw puller, Bearing splitter, Dial indicator, Solder (1/8 in. diameter)

Special tools

- MB990938-01
- MB998802-01
- MIT307098
- MD990988-A
- MD998806-01A
- MIT4336
- MD998245-01
- MD998822-01
- MD998323-01
- MIT208977

**FOR TRAINING CENTER PRACTICE ONLY**

Many parts removed or discarded during service of a customer's transmission (seals, snap rings, spring pins, gaskets, etc.) are NOT replaced in class. Remove only those parts referenced in this module.

To avoid wear and tear on training components when tightening fasteners, reduce the torque values specified by one-half.

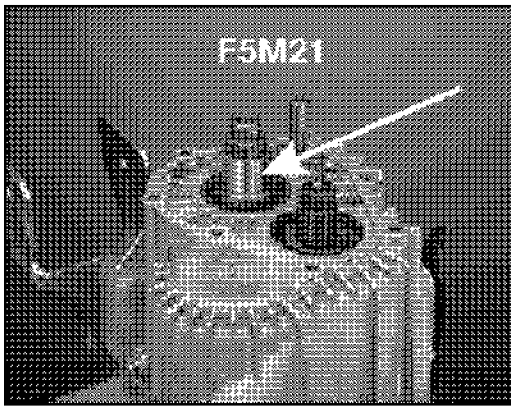
Do not use new gaskets or sealants when assembling components.

**DIRECTIONS**

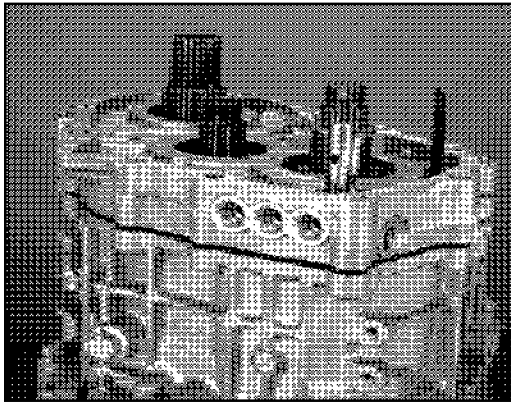
- Follow the instructions in this module, referring to related video or print material when directed.
- When you reach a **Performance Check**, ask your instructor to inspect your work and initial this Skill Module.

**TIME TO COMPLETE**

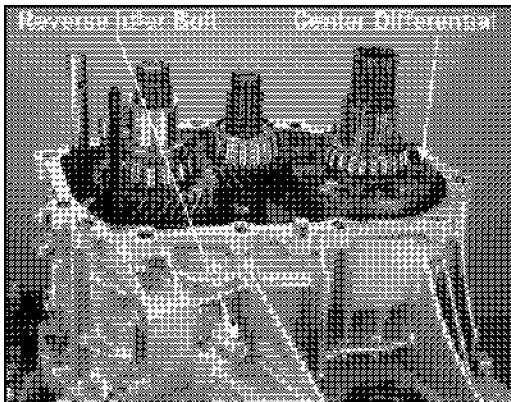
About 4 hours.



**Note** On F5M21 transaxles only, remove the bearing sleeve and snap ring on the input shaft. The bearing sleeve hides the snap ring when it is installed. These parts are not used on other transaxles.



16. Remove the transaxle case adapter assembly.

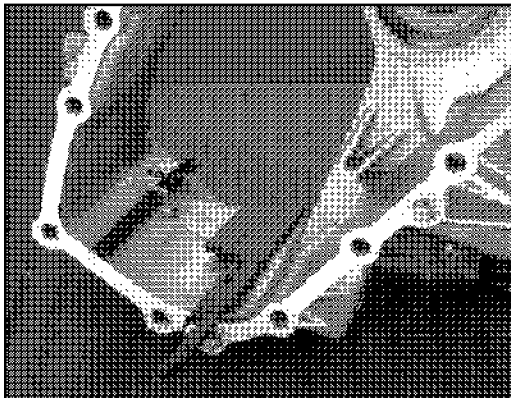


17. Lift out the center differential.

18. Remove reverse idler shaft bolt. Save the gasket.

**Note** On training center transaxles, the gasket will be reused. On customer transaxles, the gasket must be replaced with a new gasket.

**Note** The reverse idler shaft bolt is tapered on the end.

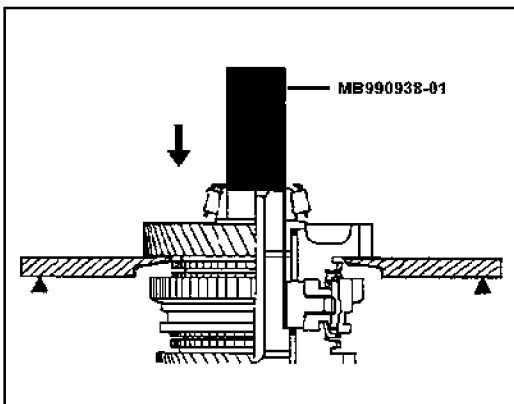
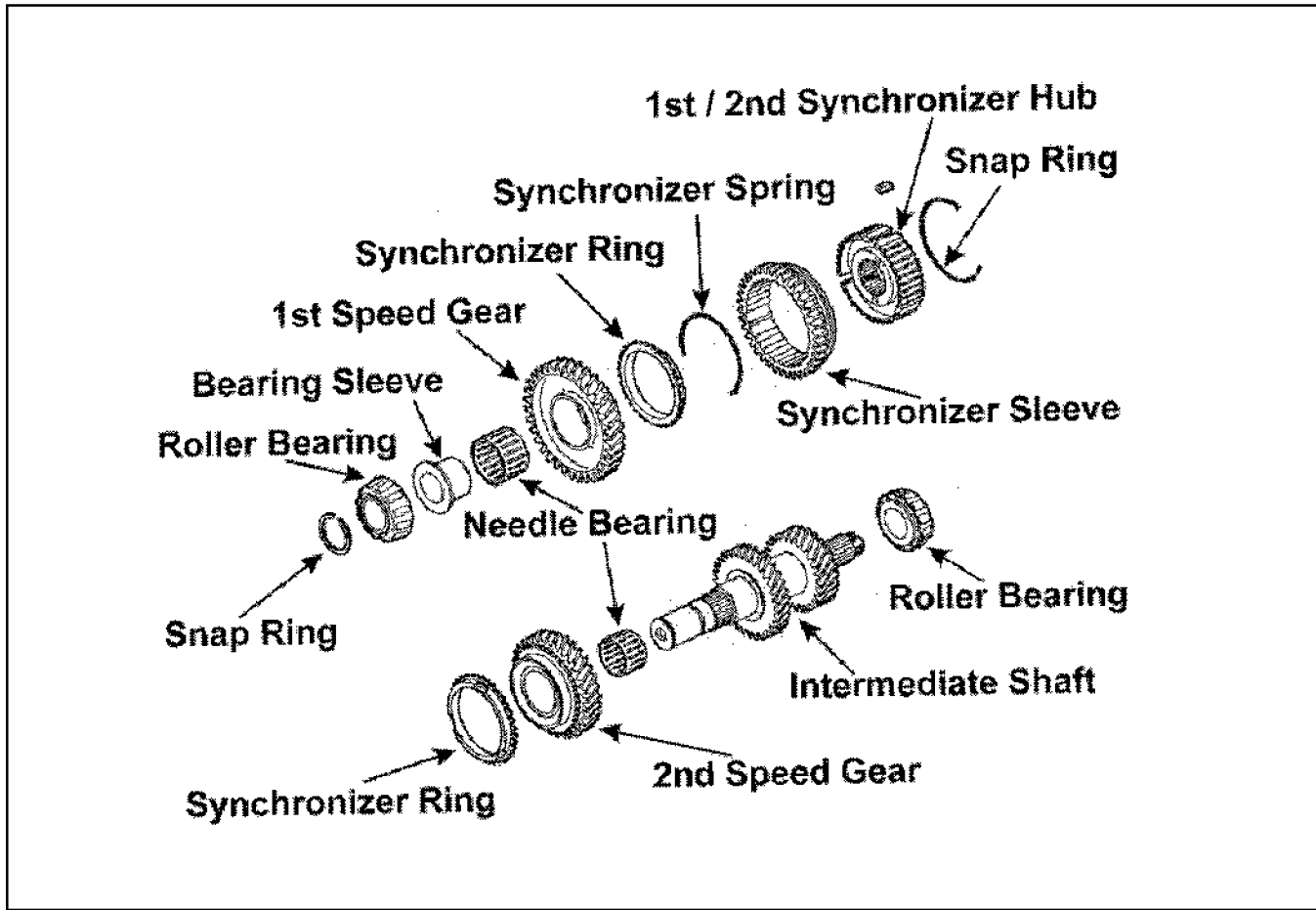


19. Remove transaxle case from the clutch housing. Tap it off with a soft mallet. Usually, the front differential bearing hangs in the case.

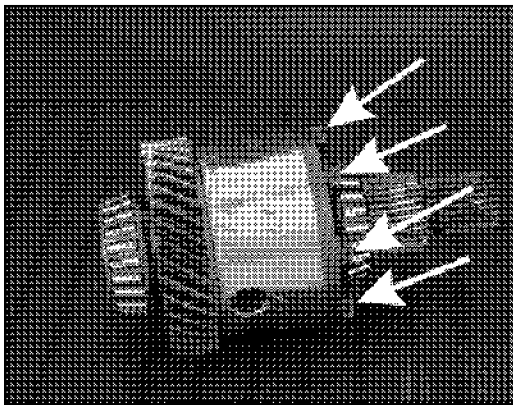
**Caution** Be careful not to damage the plastic oil guide(s) in the transaxle case. Some models only have one oil guide.

### INTERMEDIATE SHAFT DISASSEMBLY

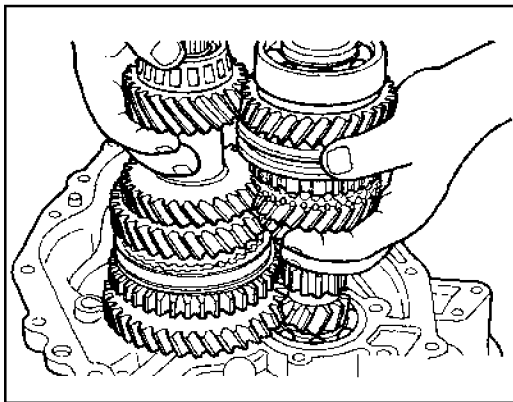
1. Remove the snap ring on the clutch end of the intermediate shaft.



2. Fit the bearing splitter under the 1<sup>st</sup> speed gear, then press off the gear, bearing sleeve and front bearing. Use special tool MB990938-01.
3. Slide the 1<sup>st</sup>/2<sup>nd</sup> synchro off.



12. Bolt the output gear to the center differential case.
13. On W5M33 models, install the washer and side gear in the differential cover. Bolt the cover to the center differential case.
14. Torque the output gear or cover bolts to 75 Nm (55 ft.-lb.)

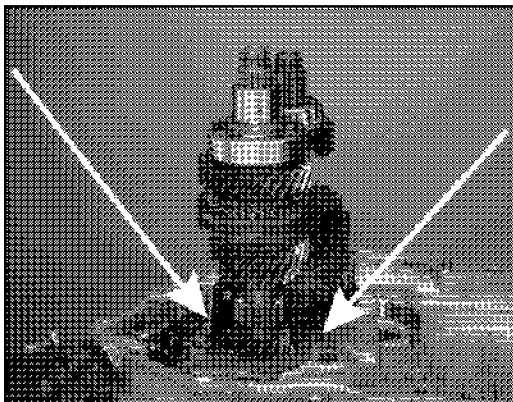


### TRANSAXLE ASSEMBLY

1. Place the transaxle on the bench with the clutch housing down.
2. Install the input shaft and intermediate shaft together.



*Be careful not to damage the oil seal with the end of the input shaft.*



3. Install the bearing retainer with the Allen screw and bolt.