DATSUN 280Z
MODEL S30 SERIES

NISSAN

NISSAN MOTOR CO., LTD.
TOKYO, JAPAN

SECTION MT

MANUAL TRANSMISSION

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4-SPEED TRANSMISSION (TYPE: F4W71B)

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DESCRIPTION

The transmission is of a 4-speed forward, fully synchronized constant-mesh type that uses helical gears.

The reverse gear is of a sliding-mesh type using spur gears.

In construction, the main drive gear is meshed with the counter drive gear which is keyed to the countershaft. The forward speed gears on the countershaft are in constant mesh with the mainshaft gears which ride on the mainshaft freely through the needle bearing. When shifting is accomplished, the inner teeth of the coupling sleeve slide over the synchronizer hub and mesh with the outer teeth which are provided on the mainshaft gear.

The synchronizer hub is fitted to the mainshaft by splines so the mainshaft gear turns together with the mainshaft.

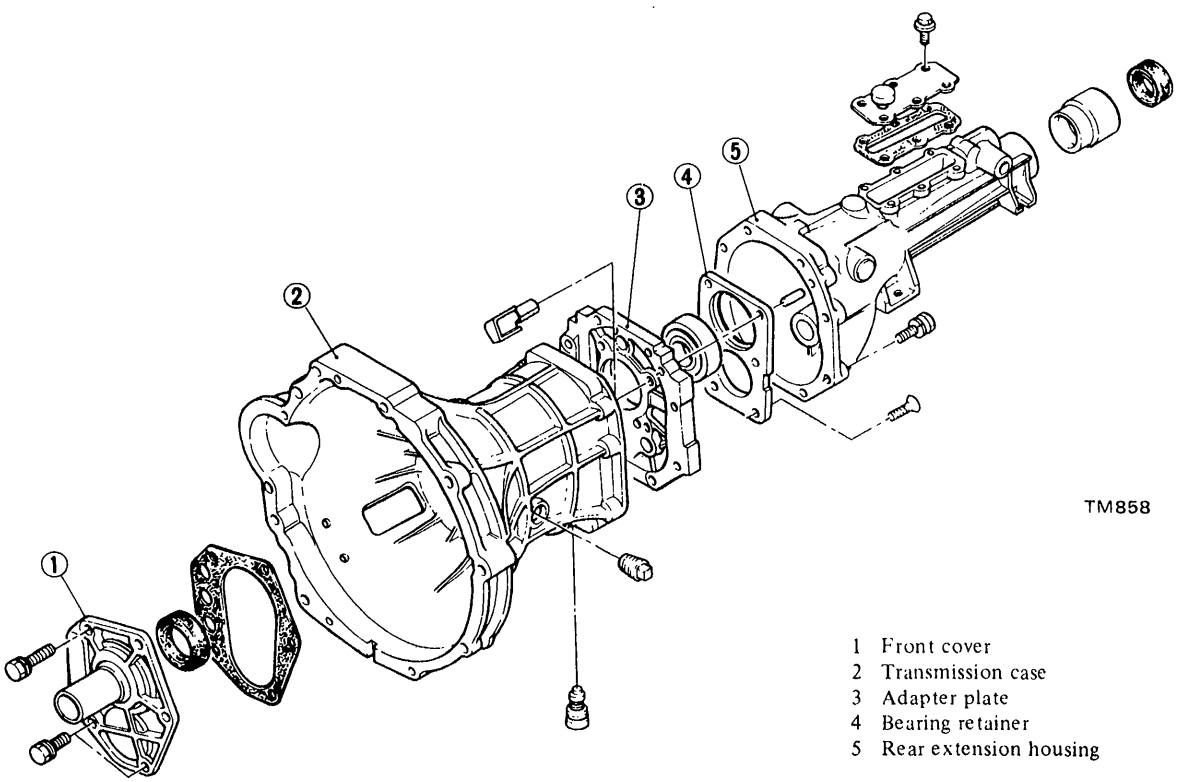
The baulk ring serves to synchronize the coupling sleeve and mainshaft gear.

Placing the control lever in reverse position brings the reverse idler gear into mesh with mainshaft reverse gear.

The transmission assembly consists of three main parts; a transmission case with clutch housing, adapter plate to which all gears anc shafts are installed, and rear extension.

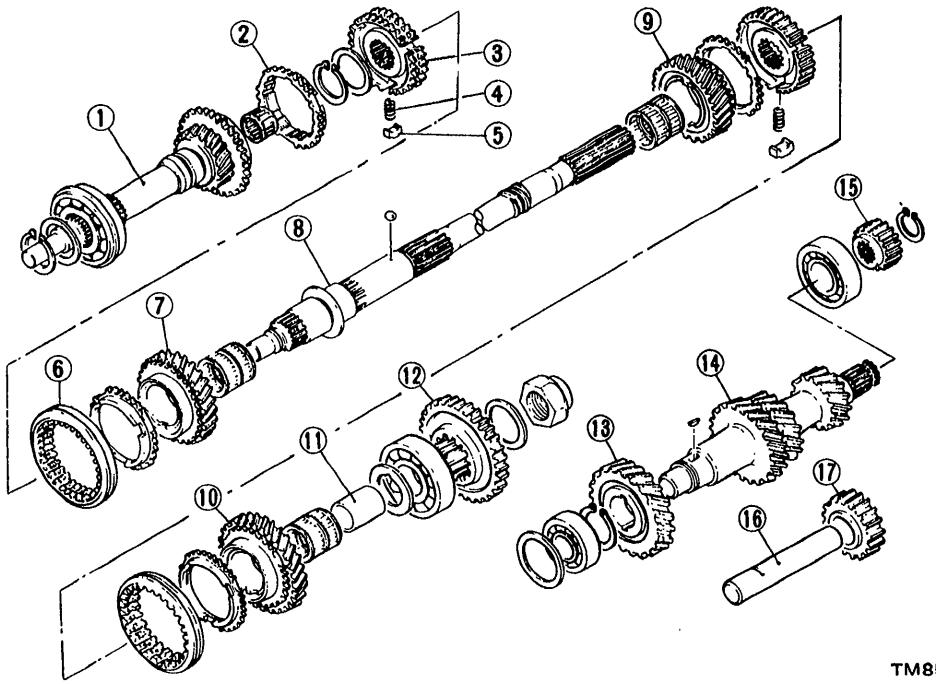
The cast-iron adapter plate supports the mainshaft, countershaft, reverse idler shaft and three fork rods, and bolted at the front to the transmission case and, at the rear, to the rear extension by means of through-bolts.

By removing these through-bolts all gears and shafts are stripped.



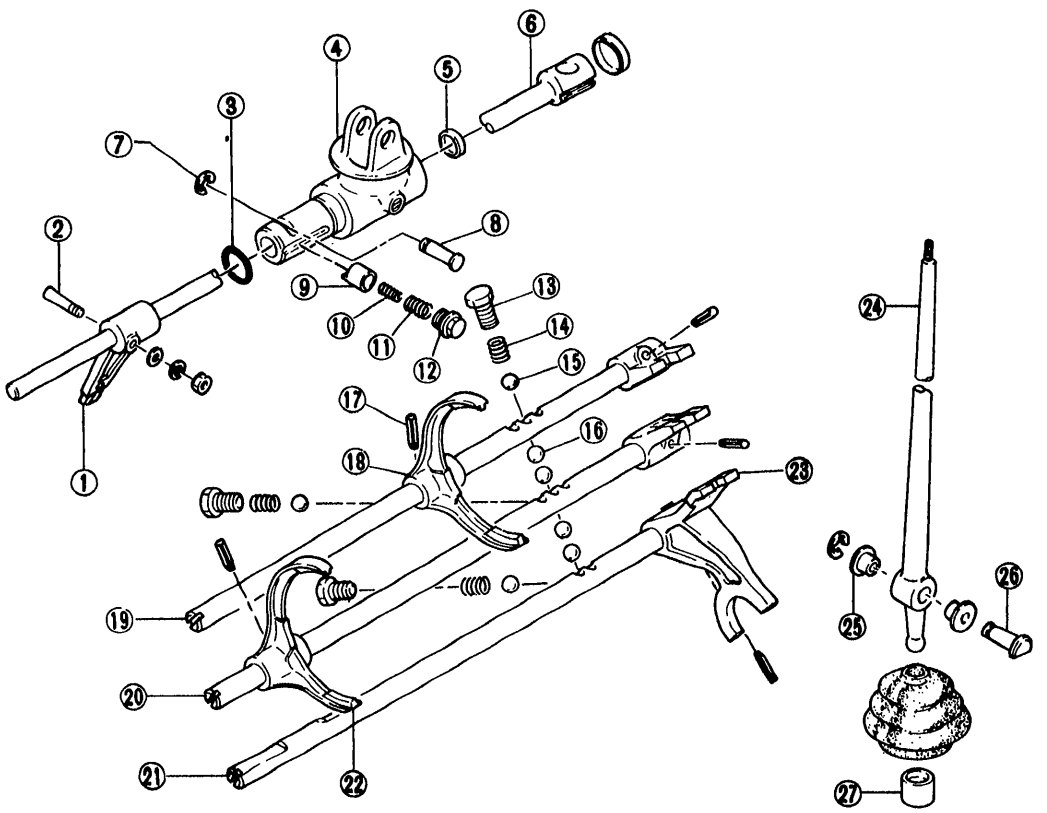
1 Front cover
2 Transmission case
3 Adapter plate
4 Bearing retainer
5 Rear extension housing

Fig. MT-1 F4W71B transmission case components



1 Main drive gear
2 Baulk ring
3 Synchronizer hub, 3rd & 4th
4 Shifting insert spring
5 Shifting insert
6 Coupling sleeve
7 3rd main gear
8 Mainshaft
9 2nd main gear
10 1st main gear
11 1st gear spacer
12 Reverse main gear
13 Counter drive gear
14 Countershaft
15 Reverse counter gear
16 Reverse idler shaft
17 Reverse idler gear

Fig. MT-2 F4W71B transmission gear components



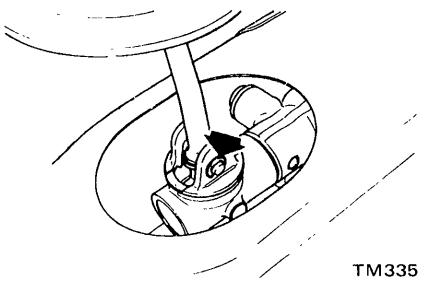
1 Striking lever
2 Lock pin
3 O-ring
4 Striking guide
5 Oil seal
6 Striking rod
7 E-ring
8 Stopper guide pin
9 Return spring plunger
10 Return spring
11 Reverse check spring
12 Return spring plug
13 Check ball plug
14 Check spring
15 Check ball
16 Interlock ball
17 Retaining pin
18 1st & 2nd shift fork
19 1st & 2nd fork rod
20 3rd & 4th fork rod
21 Reverse fork rod
22 3rd & 4th shift fork
23 Reverse shift fork
24 Control lever
25 Control lever bushing
26 Control lever pin
27 Control lever bushing

Fig. MT-3 F4W71B transmission shift control components

REMOVAL

In dismounting transmission from the vehicle, proceed as follows:

1. Disconnect battery ground cable from terminal.
2. Disconnect accelerator linkage.
3. Remove floor console. Refer to Section BF (Page BF-27) for Removal.
4. Remove E-ring and control lever pin from transmission striking rod guide, and remove control lever. See Figure MT-4.



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Fig. MT-4 Removing control lever

5. Jack up the vehicle and support its weight on safety stands. Use a hydraulic hoist or open pit, if available.

Confirm that safety is insured.

6. Disconnect exhaust front tube from exhaust manifold.
7. Remove front tube bracket from rear extension housing. Refer to Section ER for Removal.

Note: Hold front tube end up with a thread or wire to prevent tube from falling.

8. Disconnect wires (1) from reverse lamp switch and neutral switch. See Figure MT-5.
9. Remove clutch operating cylinder (2) from transmission case. See Figure MT-5.
10. Disconnect speedometer cable (3) from rear extension housing. See Figure MT-5.
11. Remove insulator securing bolts and place insulator on exhaust tube.
12. Remove propeller shaft.

Refer to Section PD (Page PD-2) for Removal.

Note: Plug up the opening in the rear extension housing to prevent oil from flowing out.

13. Support engine by locating a jack under oil pan with a wooden block used between oil pan and jack.
14. Support transmission with a transmission jack.
15. Remove nut attaching mounting member to rear mounting insulator. Remove two mounting member attaching bolts and then remove mounting member.

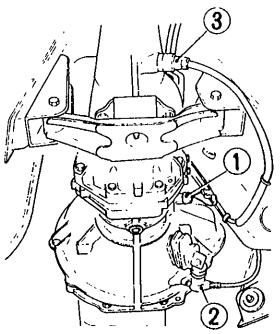


Fig. MT-5 Bottom view of car

16. Remove starter motor.
17. Remove bolts securing transmission to engine.

After removing these bolts, support the engine and transmission with jacks, and then slide transmission rearward away from engine and remove from the vehicle.

Note: Take care in dismounting transmission not to strike any adjacent parts and main drive shaft.

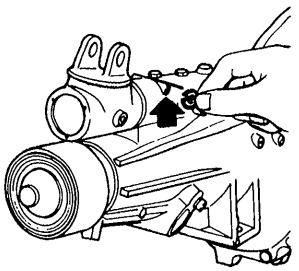
DISASSEMBLY

TRANSMISSION CASE DISASSEMBLY

1. Prior to disassembling transmission, thoroughly wipe off dirt and grease from it.
2. Drain oil thoroughly.
3. Remove dust cover from transmission case.

Remove release bearing and withdrawal lever.

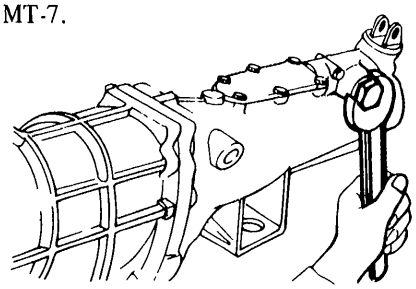
4. Remove reverse lamp switch.
5. Move gear to Neutral.
6. Remove speedometer pinion and pinion sleeve by taking off lock plate.
7. Remove E-ring and stopper guide pin from rear end of rear extension. See Figure MT-6.



TM337

Fig. MT-6 Removing striking rod E-ring and stopper pin

8. Remove return spring plug, return spring, reverse check spring, and plunger from rear extension. See Figure MT-7.

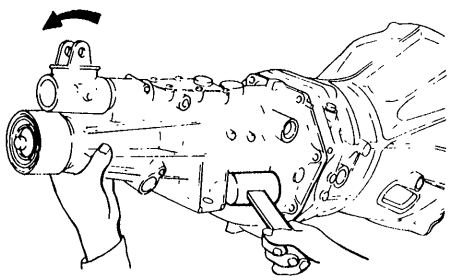


TM338

Fig. MT-7 Removing return spring plug

9. Remove rear extension securing bolts and turn the striking rod toward left.

Drive out rear extension backward by lightly tapping around it with a soft hammer. See Figure MT-8.



TM339

Fig. MT-8 Removing rear extension

10. Remove front cover securing bolts and remove front cover.

Detach countershaft front bearing shim.

11. Remove main drive bearing snap ring with Expander. See Figure MT-9.

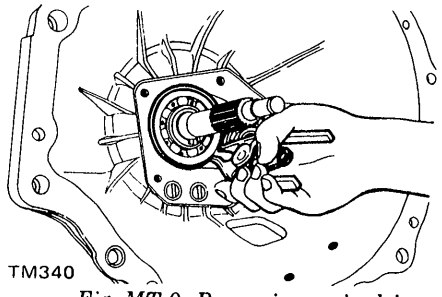


Fig. MT-9 Removing main drive bearing snap ring

12. Separate transmission case from adapter plate with a soft hammer. See Figure MT-10.

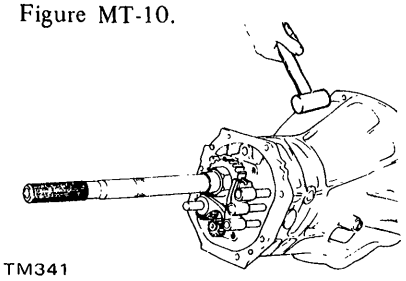


Fig. MT-10 Removing transmission case

13. Set up Setting Plate Adapter ST23810001 on adapter plate.

With countershaft side up, place the above assembly in a vise. See Figure MT-11.

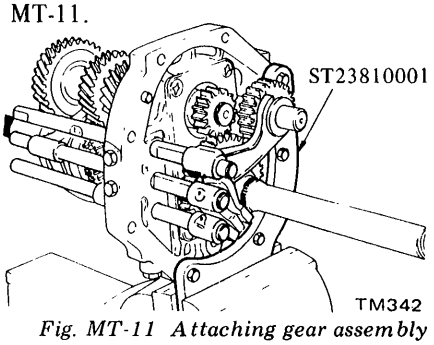


Fig. MT-11 Attaching gear assembly to special tool

DISASSEMBLY OF GEAR ASSEMBLY

Fork rod

1. Drive out retaining pins from each fork rod with Fork Rod Pin Punch ST23540000. See Figure MT-12.

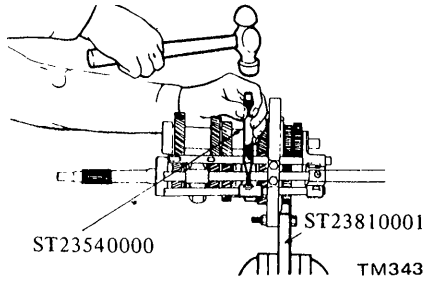


Fig. MT-12 Drive out retaining pins

2. Remove three(3) check ball plugs, and drive out fork rods from adapter plate by lightly tapping on the front end.

Be careful not to lose three(3) check balls and four(4) interlock balls. See Figure MT-13.

Note: Each gear and shaft can be detached from adapter plate without removing each fork rod.

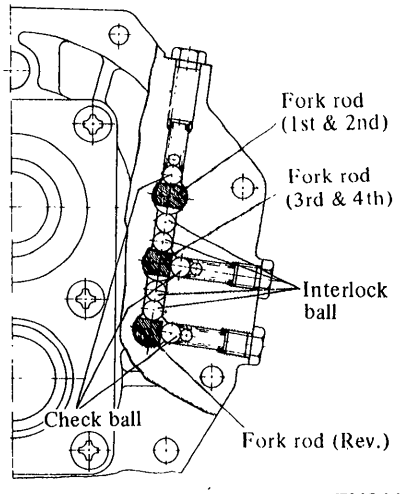


Fig. MT-13 Layout of check ball and interlock ball

Gear assembly

1. With gears doubly engaged, draw out countershaft front bearing using a suitable gear puller. See Figure MT-14.
2. Remove counter drive gear snap ring.
3. Draw out counter drive gear complete with main drive gear assembly by means of a gear puller.

When drawing out main drive gear assembly, be careful not to drop pilot needle bearing onto floor from the front end of mainshaft. See Figure MT-15.

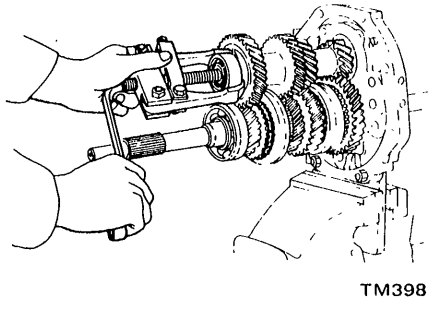


Fig. MT-14 Removing countershaft front bearing

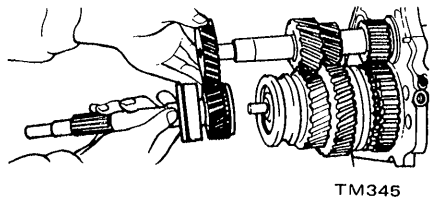


Fig. MT-15 Removing counter drive gear and main drive gear

4. Remove snap ring and then thrust washer from mainshaft front end.

Draw out 3rd & 4th synchronizer assembly and remove 3rd gear assembly.

5. Release caulking on mainshaft nut and loosen it. See Figure MT-16.

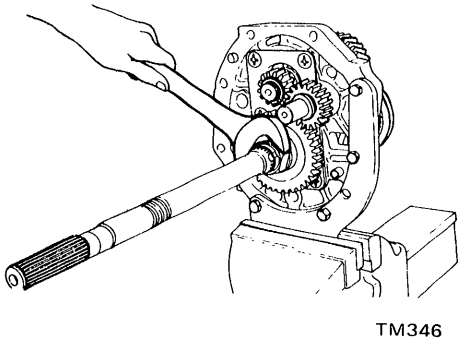


Fig. MT-16 Removing mainshaft nut

6. Remove mainshaft nut, thrust washer and mainshaft reverse gear.
7. Remove snap ring from countershaft rear end, and remove reverse idler gear.
8. Draw out mainshaft gear assembly together with countershaft by lightly tapping the rear end with a soft hammer while holding the front of mainshaft gear assembly by hand.

Be careful not to drop off gear shaft. See Figure MT-17.

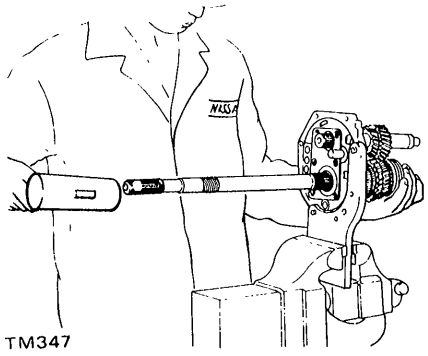


Fig. MT-17 Driving out gear assembly

Mainshaft assembly

1. Remove thrust washer, steel ball, 1st gear and needle bearing. Be careful not to lose steel ball retaining thrust washer.

2. Press out 1st gear mainshaft bushing together with 2nd gear and 1st & 2nd speed synchronizer using Bearing Puller ST30031000. See Figure MT-18.

Note: When pressing out bushing, hold mainshaft by hand so as not to drop it.

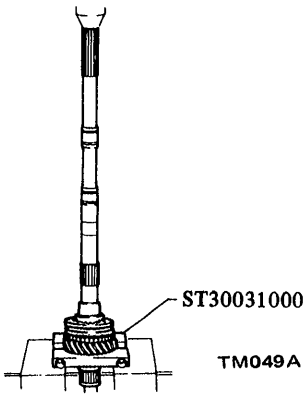
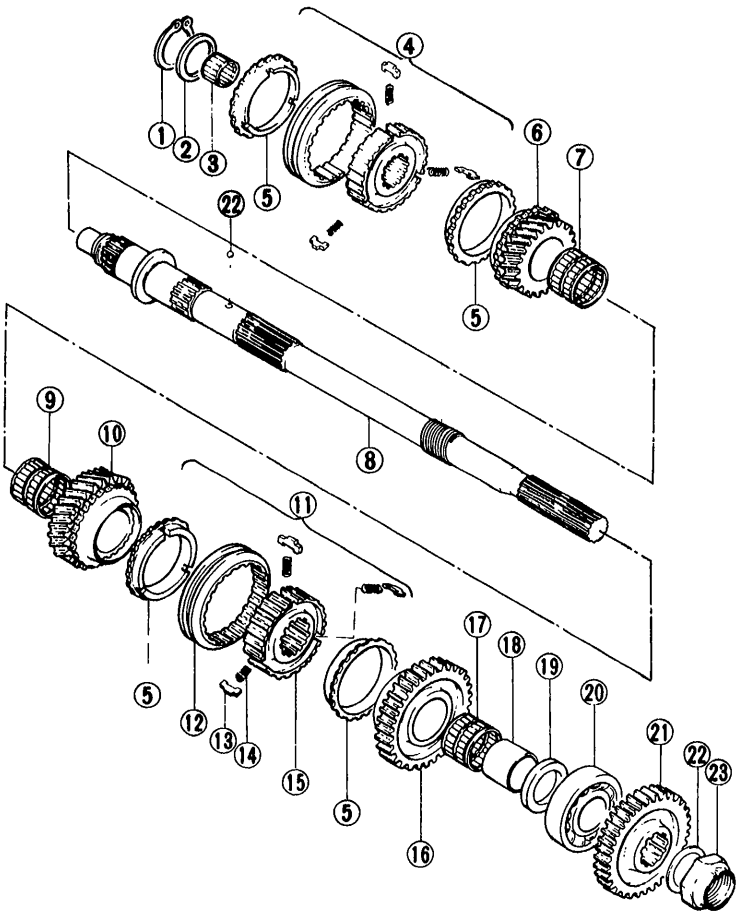


Fig. MT-18 Removing 1st gear mainshaft bushing



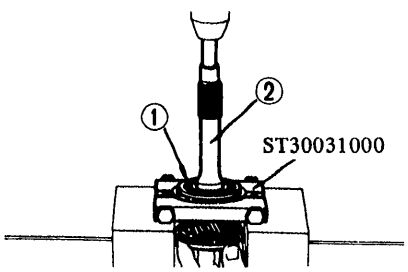
1 Snap ring
2 Thrust washer
3 Pilot bearing
4 3rd & 4th synchronizer assembly
5 Baulk ring
6 3rd main gear
7 Needle bearing
8 Mainshaft
9 Needle bearing
10 2nd main gear
11 1st & 2nd synchronizer assembly
12 Coupling sleeve
13 Shifting insert
14 Shifting insert spring
15 Synchronizer hub
16 1st main gear
17 Needle bearing
18 1st gear bushing
19 Thrust washer
20 Mainshaft bearing
21 Reverse main gear
22 Thrust washer
23 Nut
24 Steel ball

TM348

Fig. MT-19 Exploded view of mainshaft assembly

Main drive gear

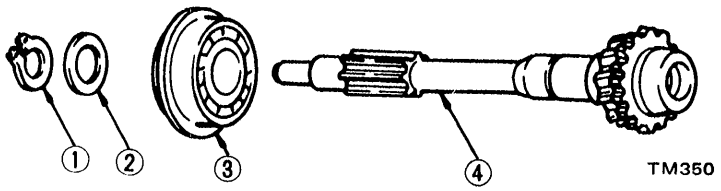
1. Remove main drive gear snap ring and spacer.
2. Remove main drive bearing with Bearing Puller ST30031000 and a suitable press. See Figure MT-20.



1 Main drive bearing
2 Main drive gear

TM349

Fig. MT-20 Removing main drive bearing



1 Snap ring
2 Spacer
3 Main drive bearing with snap ring
4 Main drive gear

Fig. MT-21 Exploded view of main drive gear

Countershaft assembly

Install Bearing Puller ST30031000 on countershaft rear bearing; press out countershaft rear bearing through a rod.

See Figure MT-22.

Note: When pressing out bearing, hold shaft by hand so as not to drop shaft onto floor.

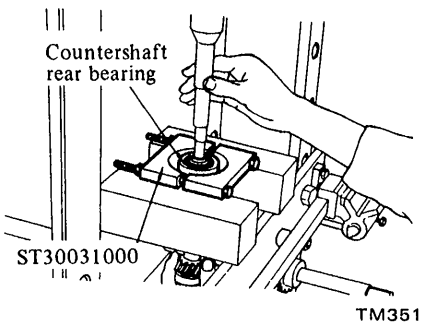
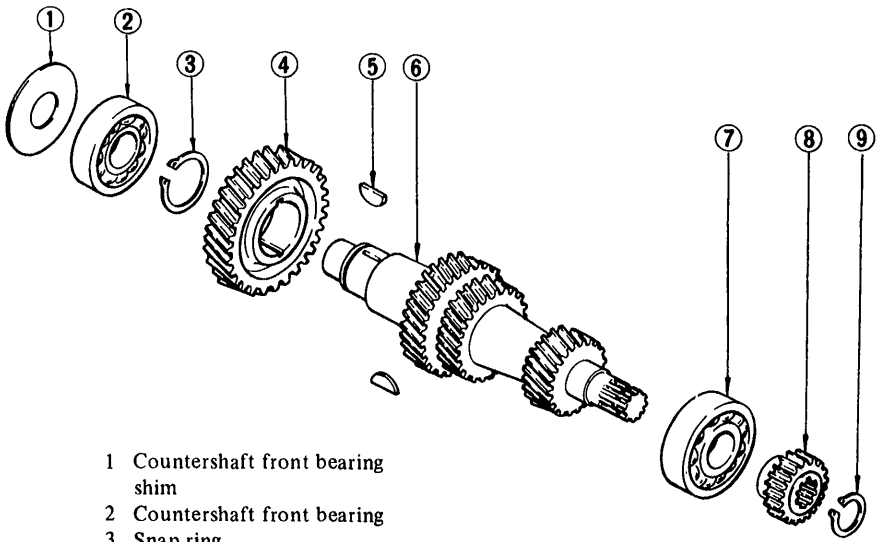


Fig. MT-22 Removing countershaft bearing



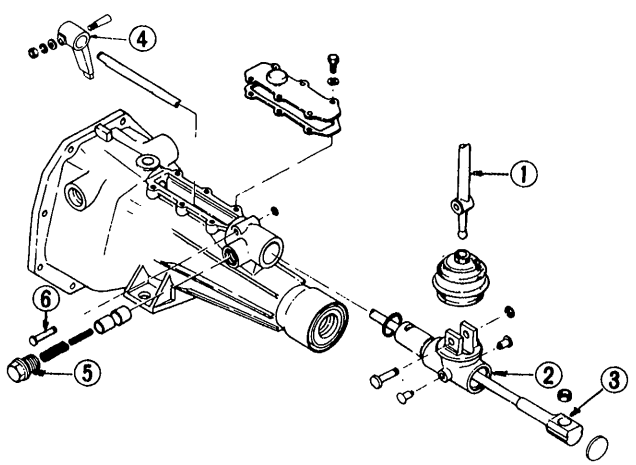
1 Countershaft front bearing shim
2 Countershaft front bearing
3 Snap ring
4 Countershaft drive gear
5 Woodruff key
6 Countershaft
7 Countershaft rear bearing
8 Reverse counter gear
9 Snap ring

Fig. MT-23 Exploded view of countershaft assembly

REAR EXTENSION DISASSEMBLY

Remove lock pin from striking lever, and remove striking rod.

Note: Do not disassemble rear extension bush from rear extension.



1 Control lever
2 Striking rod guide
3 Striking rod
4 Striking lever
5 Return spring plug
6 Stopper pin

Fig. MT-24 Exploded view of shifting mechanism

ADAPTER PLATE DISASSEMBLY

1. Remove six(6) bearing retainer attaching screws with an impact wrench and remove bearing retainer from adapter plate.
2. Remove reverse idler shaft.
3. Remove mainshaft bearing from the rear extension side.

INSPECTION

Wash all parts in a suitable cleaning solvent and check for wear, damage or other faulty conditions.

Notes:

a. Be careful not to damage any parts with scraper.

b. Do not clean, wash or soak oil seals in solvent.

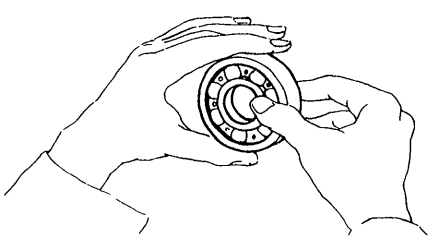
TRANSMISSION CASE AND REAR EXTENSION HOUSING

1. Clean with solvent thoroughly and check for cracks which might cause oil leak or other faulty conditions.
2. Check mating surface of the case to engine or adapter plate for small nicks, projection or sealant.

   Remove all nicks, projection or sealant with a fine stone.
3. If rear extension bush is worn or cracked, replace it as an assembly of bush and rear extension housing.

BEARING

1. Thoroughly clean bearing and dry with a compressed air.
2. When race and ball surfaces are worn or rough, or when balls are out-of-round or rough, replace bearing with a new one. See Figure MT-25.



TM372

Fig. MT-25 Inspecting ball bearing

3. Replace needle bearing if worn or damaged.

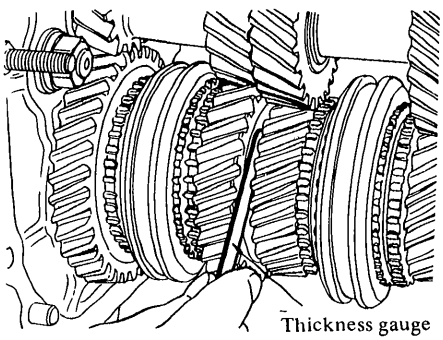
GEARS AND SHAFTS

1. Check all gears for excessive wear, chips or cracks; replace as required.
2. Check shaft for bending, crack, wear, and worn spline; if necessary, replace.
3. Measure backlash in gears.

   Standard:
   0.05 to 0.10 mm
   (0.0020 to 0.0039 in)

   If the above limits are exceeded, replace drive and driven gears as a set.
4. Measure gear end play:

   1st gear:
   0.32 to 0.39 mm
   (0.0126 to 0.0154 in)
   2nd gear:
   0.12 to 0.19 mm
   (0.0047 to 0.0075 in)
   3rd gear:
   0.13 to 0.37 mm
   (0.0051 to 0.0146 in)



TM374

Fig. MT-26 Measuring end play

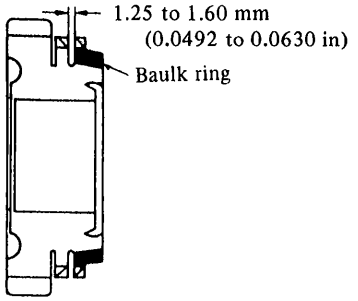
5. Check for stripped or damaged speedometer pinion gear. If necessary, replace.

BAULK RING

1. Replace baulk ring if found to be deformed, cracked or otherwise damaged excessively.
2. Place baulk ring in position on gear cone.

   While holding baulk ring against gear as far as it will go, measure gap between baulk ring and outer gear.

   If gap is small, discard baulk ring. See Figure MT-27.



TM375

Fig. MT-27 Baulk ring-to-cone gap

OIL SEAL

Discard O-ring or oil seal which is once removed. Replace oil seal if sealing lip is deformed or cracked. Also discard oil seal if spring is out of position.

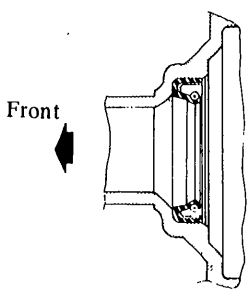
ASSEMBLY

To assemble, reverse the order of disassembly. Observe the following instructions.

FRONT COVER ASSEMBLY

1. Wipe clean seal seat in front cover, then press fit oil seal in place.

   Coat oil seal with gear oil to provide initial lubrication.



TM354

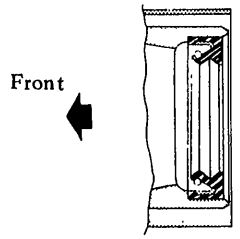
Fig. MT-28 Front cover oil seal

2. Apply sealant to withdrawal lever ball pin screw. Install withdrawal lever ball pin to front cover and tighten screw to 1.6 to 2.1 kg-m (12 to 15 ft-lb) torque.

REAR EXTENSION ASSEMBLY

1. Wipe clean seal seat in rear extension housing; press fit oil seal in place.

Coat oil seal and bushing with gear oil for initial lubrication.



TM355

Fig. MT-29 Rear extension oil seal

2. Apply grease to O-ring and plunger grooves in striking rod.

Insert striking rod with striking rod guide through rear extension.

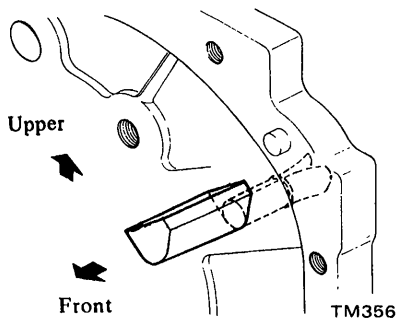
3. Install striking lever on front end of striking rod. Install lock pin and torque screw to 0.9 to 1.2 kg-m (7 to 9 ft-lb).

ADAPTER PLATE ASSEMBLY

1. Place dowel pin, mainshaft bearing and oil gutter on adapter plate, and tap with a soft hammer until they are properly positioned in place.

Use a new dowel pin.

Bend oil gutter on front side and expand on rear side. See Figure MT-30.



TM356

Fig. MT-30 Oil gutter

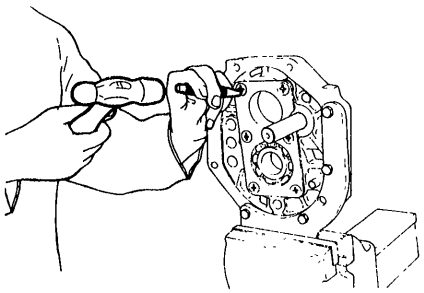
2. Install mainshaft bearing by lightly tapping around it with a soft hammer.

3. Insert reverse idler shaft in adapter plate by 1/3 of its entire length.

Make sure that the cut-out portion of reverse idler shaft is lined up with inner face of adapter plate.

4. Install bearing retainer in adapter plate.

Align bearing retainer with reverse idler shaft at the cut-out portion of this shaft, torque screws to 1.9 to 2.5 kg-m (14 to 18 ft-lb) and stake each screw at two points with a punch. See Figure MT-31.



TM400

Fig. MT-31 Staking screw

5. Install countershaft rear bearing in adapter plate by lightly tapping around it with a soft hammer.

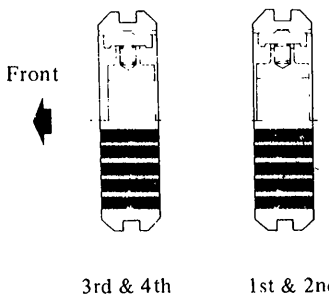
GEAR ASSEMBLY

Clean all parts in solvent and dry with compressed air.

Synchronizer assembly

Assemble synchronizer assembly.

Position shifting insert springs and shifting inserts in three(3) slots in synchronizer hub; put coupling sleeve on synchronizer hub.

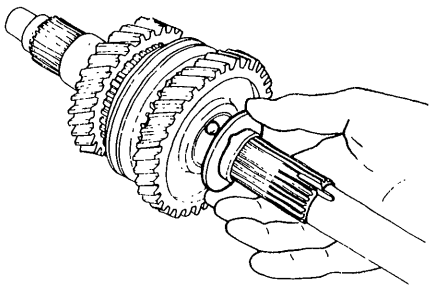


TM357

Fig. MT-32 Installing synchronizer hub

Mainshaft assembly

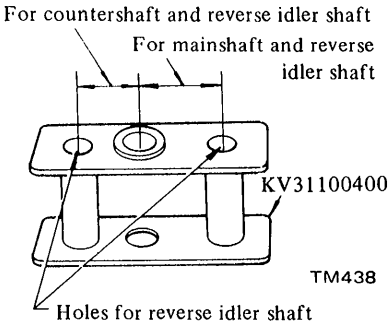
1. Assemble 2nd gear needle bearing, 2nd gear, baulk ring, 1st & 2nd speed synchronizer assembly, 1st gear baulk ring, 1st gear bush, needle bearing, 1st gear, steel ball, and thrust washer on mainshaft. Before installing a steel ball, apply grease to it. See Figure MT-33.



TM358

Fig. MT-33 Installing thrust washer

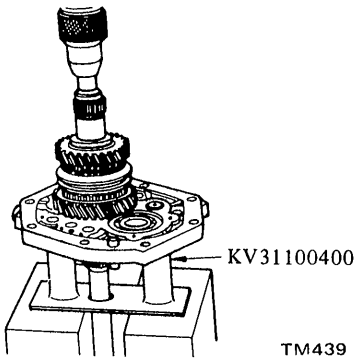
2. Set Transmission Press Stand KV31100400 and place adapter plate assembly on it. See Figure MT-34.



TM438

Fig. MT-34 Transmission Press Stand

3. Install mainshaft assembly to adapter plate assembly. Be sure to place bearing squarely against shaft and press it into place on shaft gradually. See Figure MT-35.



TM439

Fig. MT-35 Installing mainshaft assembly

Countershaft assembly

1. Place new woodruff keys in grooves in countershaft and tap them lightly until they are seated securely.

Use a soft hammer to avoid damaging keys.

2. Place adapter plate assembly and mainshaft assembly so that countershaft rear bearing rests on Transmission Press Stand KV31100400 properly.
3. Install countershaft into adapter plate by pressing it. See Figure MT-36.

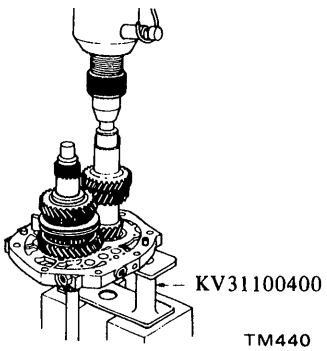


Fig. MT-36 Installing countershaft

4. Position 3rd gear needle bearing, mainshaft 3rd gear, baulk ring, and 3rd & 4th synchronizer assembly on the front of mainshaft.
5. Install thrust washer on mainshaft and secure it with snap ring of proper thickness that will fit the groove in mainshaft. See Figure MT-37.

Available snap ring

No.	Thickness mm (in)
1	1.4 (0.055)
2	1.5 (0.059)
3	1.6 (0.063)

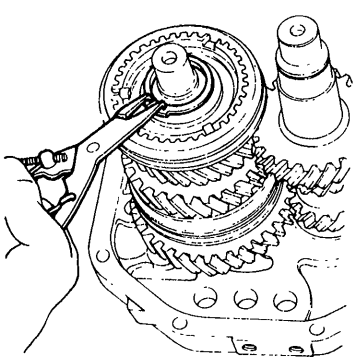


Fig. MT-37 Installing snap ring

Main drive gear assembly

1. Using Transmission Adapter ST23800000, press main drive bearing onto the shaft of main drive gear. Make sure that snap ring groove on shaft clears bearing.
2. Place main drive bearing spacer on main drive bearing and secure main drive bearing with thicker snap ring that will eliminate end play. See Figure MT-38.

Available snap ring

No.	Thickness mm (in)
1	1.80 (0.0709)
2	1.87 (0.0736)
3	1.94 (0.0764)
4	2.01 (0.0791)
5	2.08 (0.0819)
6	2.15 (0.0846)

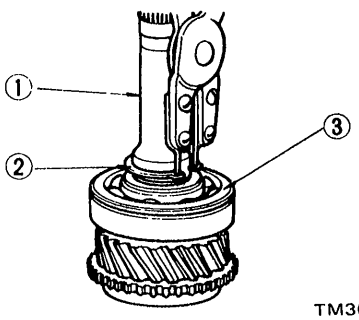


Fig. MT-38 Installing snap ring

3. Position baulk ring on cone surface of main drive gear. Apply gear oil to mainshaft pilot bearing and install it on mainshaft.

Assemble main drive gear assembly on the front end of mainshaft.
4. Press counter drive gear onto countershaft with Counter Gear Drift ST23860000 by meshing gears and secure counter drive gear with thicker snap ring. See Figures MT-39 and MT-40.

Note: Be sure to drive in counter drive gear and main drive gear simultaneously.

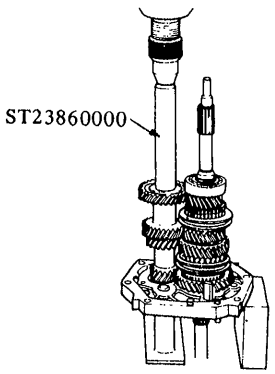


Fig. MT-39 Installing countershaft drive gear

Available counter drive gear snap ring

No.	Thickness mm (in)
1	1.4 (0.055)
2	1.5 (0.059)
3	1.6 (0.063)

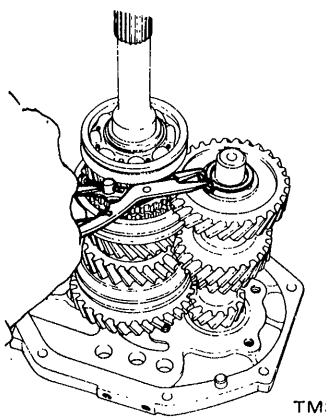


Fig. MT-40 Installing snap ring

5. Press countershaft front bearing onto countershaft with Drift C ST22360002. See Figure MT-40.

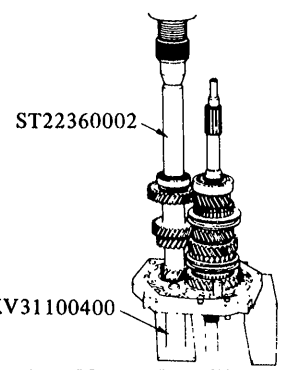


Fig. MT-41 Installing countershaft front bearing

6. Support adapter plate in a vise with Setting Plate Adapter ST23810001, with mainshaft facing down.

7. Install mainshaft reverse gear, plain washer on the rear of mainshaft and install mainshaft nut.

Tighten mainshaft nut temporarily.

8. Install counter reverse gear on the rear of countershaft and secure with snap ring.

Use snap ring to give a minimum gear end play. See Figure MT-42.

No.	Thickness mm (in)
1	1.4 (0.055)
2	1.5 (0.059)
3	1.6 (0.063)

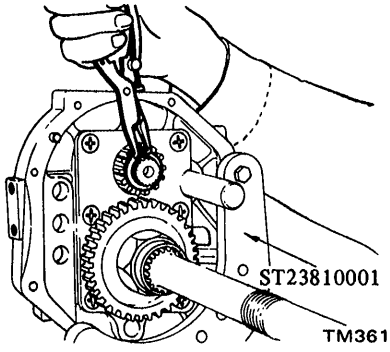


Fig. MT-42 Installing counter reverse gear snap ring

9. Install reverse idler gear on reverse idler shaft.

10. With 1st and 2nd gears doubly engaged, tighten mainshaft nut to the converted torque "C" (See Figure MT-45) using Wrench ST22520000. See Figure MT-43.

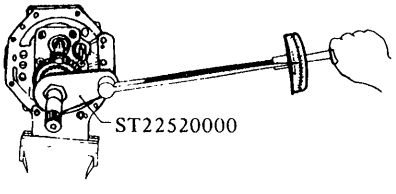


Fig. MT-43 Tightening mainshaft nut

Explanation of converted torque

Mainshaft nut should be tightened to 14 to 17 kg-m (101 to 123 ft-lb) torque with the aid of Wrench ST22520000. When doing so, the amount of torque to be read on wrench needle should be modified according to the following formula:

$$C\ \text{kg-m} = 14 \times \left(\frac{L}{L + 0.10}\right) \text{ to } 17 \times \left(\frac{L}{L + 0.10}\right)$$

or

$$C\ \text{(ft-lb)} = 101 \times \left(\frac{L}{L + 0.33}\right) \text{ to } 123 \times \left(\frac{L}{L + 0.33}\right)$$

Where,

C: Value read on the torque wrench kg-m (ft-lb)

L: Effective length of torque wrench m (ft)

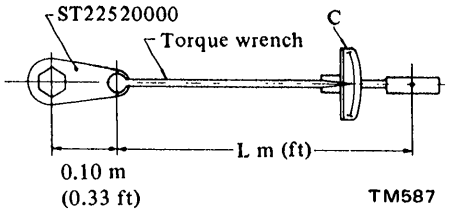


Fig. MT-44 Setting wrench

Example,

When a 0.40 m (1.31 ft)-long torque wrench is used, the "C" in Figure MT-45 will be 11.2 to 13.6 kg-m (81 to 98 ft-lb).

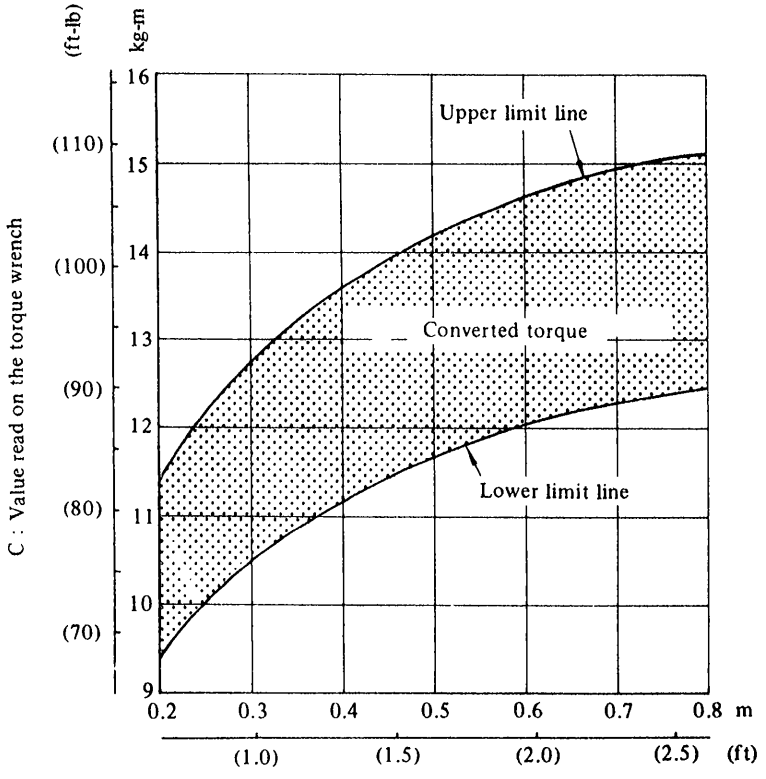


Fig. MT-45 Converted torque

11. Tighten mainshaft nut to 14.0 to 17.0 kg-m (101 to 123 ft-lb) torque, and stake mainshaft nut to groove of mainshaft with a punch. See Figure MT-46.

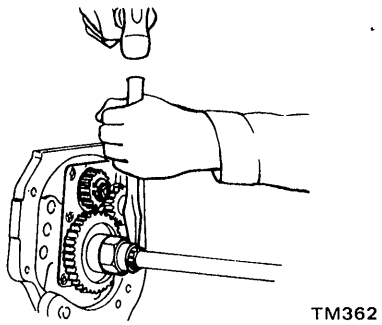

TM362

Fig. MT-46 Staking mainshaft nut

12. Measure gear end play and backlash.

Make sure that they are held within the specified values.

For details, refer to the instructions under topic "Inspection".

Note: The main drive gear and counter drive gear should be handled as a matched set.
When you replace a main drive gear or counter drive gear, be sure to replace as a set of main drive gear and counter drive gear.

Shift forks and fork rods assembly

1. Place 1st & 2nd shift fork in groove in 1st & 2nd coupling sleeve, and slide 1st & 2nd fork rod through adapter plate and 1st & 2nd shift fork. Prior to installing 1st & 2nd fork rod, install 3rd & 4th shift fork in groove in 3rd & 4th coupling sleeve.

Note: Shift forks for 1st & 2nd and 3rd & 4th are one and the same parts.
Make sure that the long end of shift fork for 1st & 2nd is placed on the counter gear side and the long end for 3rd & 4th is on the opposite side.

Secure 1st & 2nd fork rod to shift fork with a new retaining pin.

2. Install check ball, check ball spring, and check ball plug. Prior to tightening check ball plug, apply sealant to check ball plug.

Align notch in 1st & 2nd fork rod with check ball. See Figure MT-47.

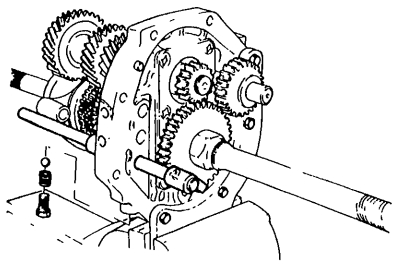

TM367

Fig. MT-47 Installing 1st & 2nd fork rod

3. Slide 3rd & 4th fork rod through adapter plate and 3rd & 4th shift fork, and secure with a new retaining pin.

Note: Prior to assembling 3rd & 4th fork rod, install two(2) interlock balls into adapter plate as shown in Figure MT-13.

4. Install check ball and check ball spring.

Apply sealant to check ball plug and install it in place.

Align notch in 3rd & 4th fork rod with check ball by sliding 3rd & 4th fork rod as necessary. See Figure MT-48.

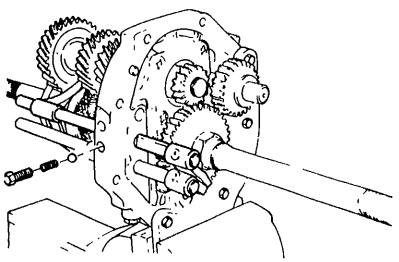

TM368

Fig. MT-48 Installing 3rd & 4th fork rod

5. Place reverse shift fork in reverse idler gear.

Slide reverse fork rod through reverse shift fork and adapter plate, and secure with a new retaining pin.

Note: Prior to assembling reverse fork rod, install two(2) interlock balls into adapter plate as shown in Figure MT-13.

6. Install check ball and check ball spring.

Apply sealant to check ball plug and install it in place.

Align notch in reverse fork rod with check ball. See Figure MT-49.

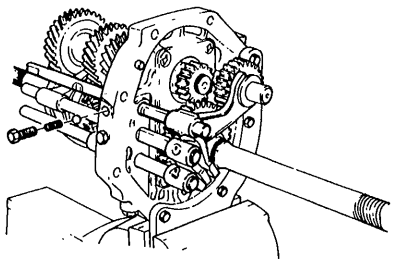

TM369

Fig. MT-49 Installing reverse fork rod

7. Torque each check ball plug to 1.9 to 2.5 kg-m (14 to 18 ft-lb).

Note: Ball plug for 1st & 2nd fork rod is longer than those for reverse shift fork rod and 3rd & 4th fork rod.

8. Apply gear oil to all sliding surfaces and check to see that shift rods operate correctly and gears are engaged smoothly.

TRANSMISSION ASSEMBLY

Transmission case assembly

1. Clean mating surfaces of adapter plate and transmission case.

Apply sealant to mating surfaces of adapter plate and transmission case.

2. Slide transmission case onto adapter plate by lightly tapping with a soft hammer until case bears against adapter plate.

Carefully install main drive bearing and countershaft front bearing.

Make certain that mainshaft rotates freely.

3. Fit main drive bearing snap ring to groove in main drive bearing by using Expander. See Figure MT-50.

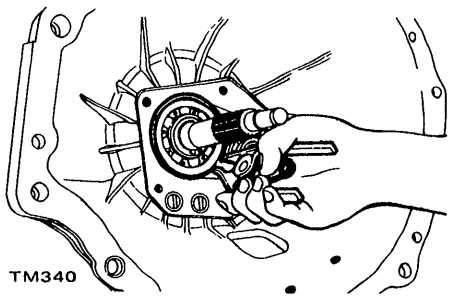


Fig. MT-50 Fitting main drive bearing snap ring

Rear extension assembly

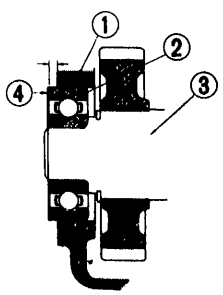
1. Clean mating surfaces of adapter plate and rear extension.

Apply sealant to mating surfaces of adapter plate and rear extension.

2. With fork rods in their neutral positions, gradually slide rear extension onto adapter plate, making sure that speed change cross lever engages with fork rod brackets correctly.
3. Install washers and through-bolts and torque to 1.6 to 2.1 kg-m (12 to 15 ft-lb)

Front cover assembly

1. Select countershaft front bearing shim as follows: See Figure MT-51.
(1) Measure depth "A" from front end of transmission case to countershaft front bearing.
(2) Select a shim of thickness "A" measured.



1 Transmission case
2 Countershaft front bearing
3 Countershaft
4 Shim

TM371

Fig. MT-51 Selecting countershaft front bearing shim

Available shim

No.	"A" mm (in)	Countershaft front bearing shim mm (in)
1	2.92 to 3.01 (0.1150 to 0.1185)	0.6 (0.024)
2	3.02 to 3.11 (0.1189 to 0.1224)	0.5 (0.020)
3	3.12 to 3.21 (0.1228 to 0.1264)	0.4 (0.016)
4	3.22 to 3.31 (0.1268 to 0.1303)	0.3 (0.012)
5	3.32 to 3.41 (0.1307 to 0.1343)	0.2 (0.008)
6	3.42 to 3.51 (0.1346 to 0.1382)	0.1 (0.004)
7	3.52 to 3.61 (0.1386 to 0.1421)	–
8	3.62 to 3.71 (0.1425 to 0.1461)	–

2. Clean mating surfaces of front cover and transmission case.

Apply grease to shim selected to retain it on front cover; install front cover to transmission case with gasket in place.

Install through-bolts with washers under them and tighten to 1.6 to 2.1 kg-m (12 to 15 ft-lb) torque.

Apply sealant to threads of through-bolts before installation.

3. Install speedometer pinion assembly on rear extension. After making sure that lock plate is lined up with groove in speedometer pinion sleeve, install through-bolts and torque to 0.4 to 0.5 kg-m (3 to 4 ft-lb).
4. Install back-up lamp switch and torque to 2.0 to 3.0 kg-m (14 to 22 ft-lb).

Be sure to apply sealant before installation.

5. Apply a light coat of multi-purpose grease to withdrawal lever, release bearing and bearing sleeve; install them on clutch housing.

After connecting them with holder spring, install dust cover on clutch housing.

6. Install control lever temporarily, and shift control lever through all gears to make sure that gears operate smoothly.

Note: Install drain plug and filler plug with sealant in place.

INSTALLATION

Install the transmission in the reverse order of removal paying attention to the following points.

1. Before installing, clean mating surfaces of engine rear plate and transmission case.
2. Before installing, lightly apply grease to spline parts of clutch disc and main drive gear.
3. Tighten bolts securing transmission to engine to specifications. See Figure MT-52.

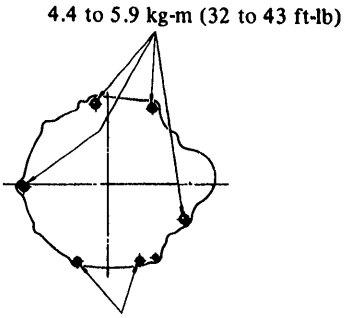


Fig. MT-52 Tightening torque

4. Remove filler plug and fill transmission with recommended gear oil to the level of the plug hole. [Approximately 1.7 liters (3⅝ pt, 3 pt)].

5-SPEED TRANSMISSION (TYPE : FS5W71B)

CONTENTS

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GEAR ASSEMBLY MT-19
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INSTALLATION MT-19

DESCRIPTION

The transmission is of a 5-speed forward with overdrive (4 + OD speed), fully synchronized constant-mesh type that uses helical gears.

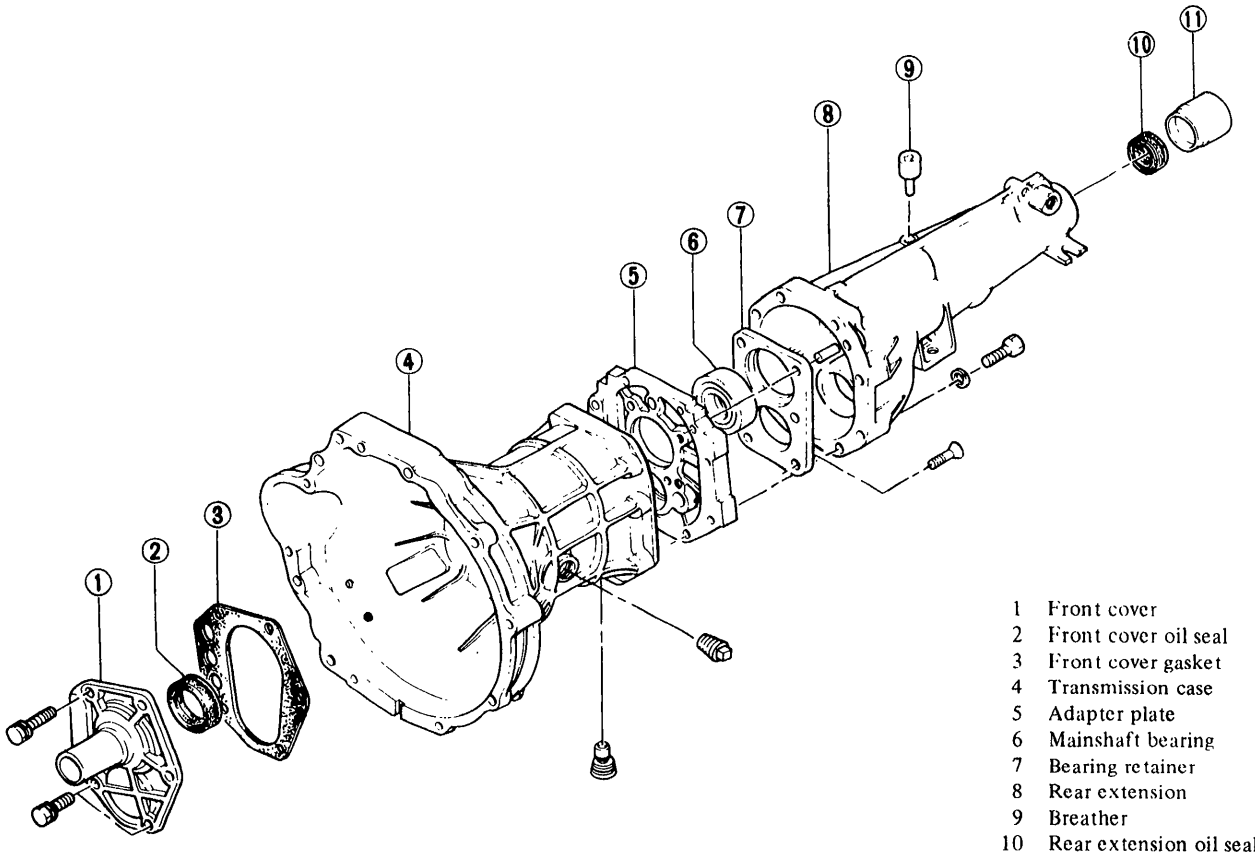
The 5-speed transmission covered in this section is similar in all respects to the 4-speed transmission (type: F4W71B) stated previously except the overdrive position of it.

On 5-speed transmission, the reverse & OD speed position is reverse position of 4-speed version.

The overdrive gear rides on the mainshaft freely through the needle roller bearing and counter overdrive gear is fitted to the countershaft by splines.

The overdrive synchronizer system is on the mainshaft rear side.

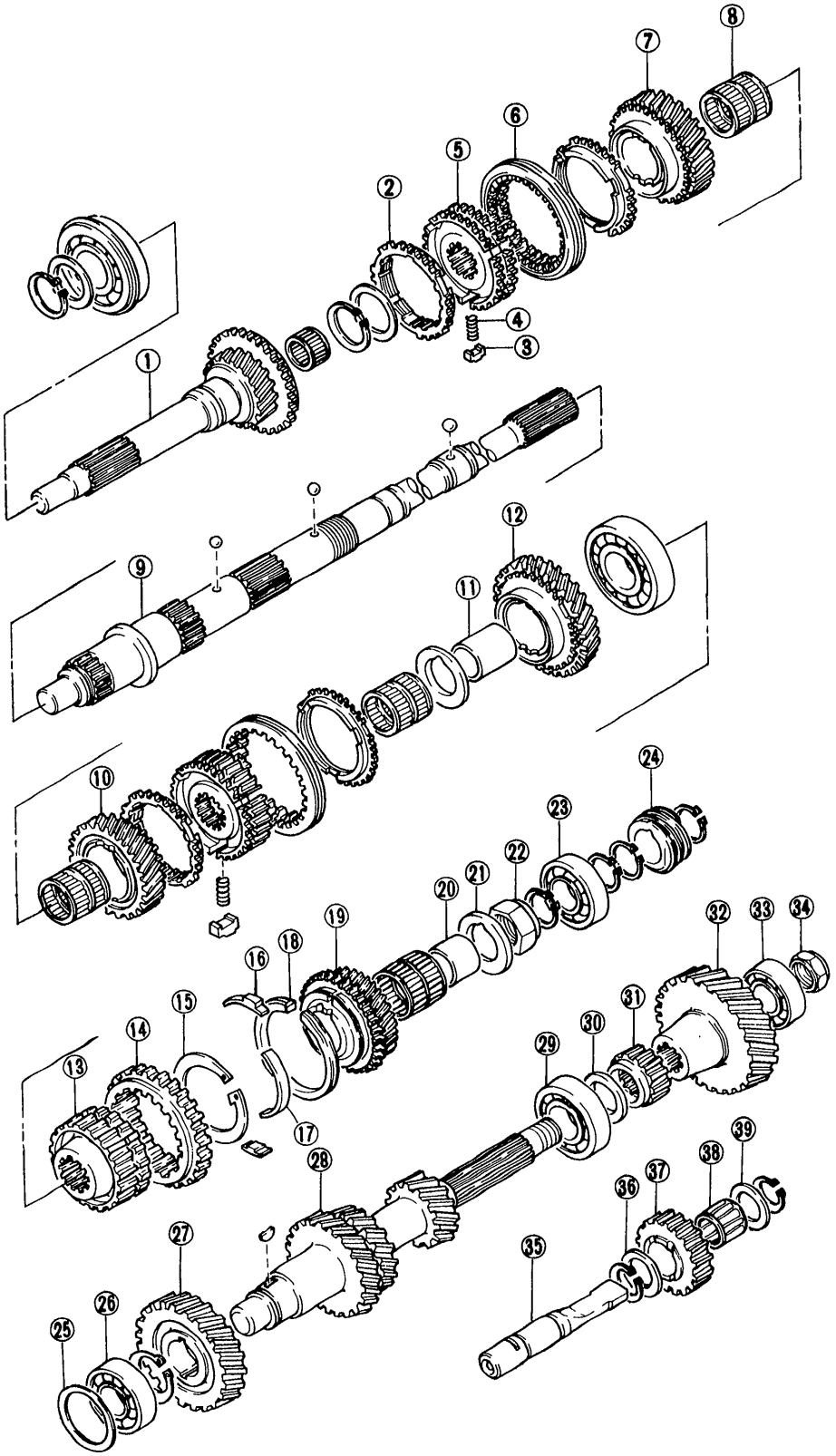
Placing the control lever in overdrive position brings the reverse & OD coupling sleeve (reverse gear) on mainshaft into mesh with overdrive clutch gear. The reverse & OD synchronizer hub is fitted to the mainshaft by splines so the overdrive gear on mainshaft turns together with the mainshaft.



1 Front cover
2 Front cover oil seal
3 Front cover gasket
4 Transmission case
5 Adapter plate
6 Mainshaft bearing
7 Bearing retainer
8 Rear extension
9 Breather
10 Rear extension oil seal
11 Sleeve yoke dust cover

TM046A

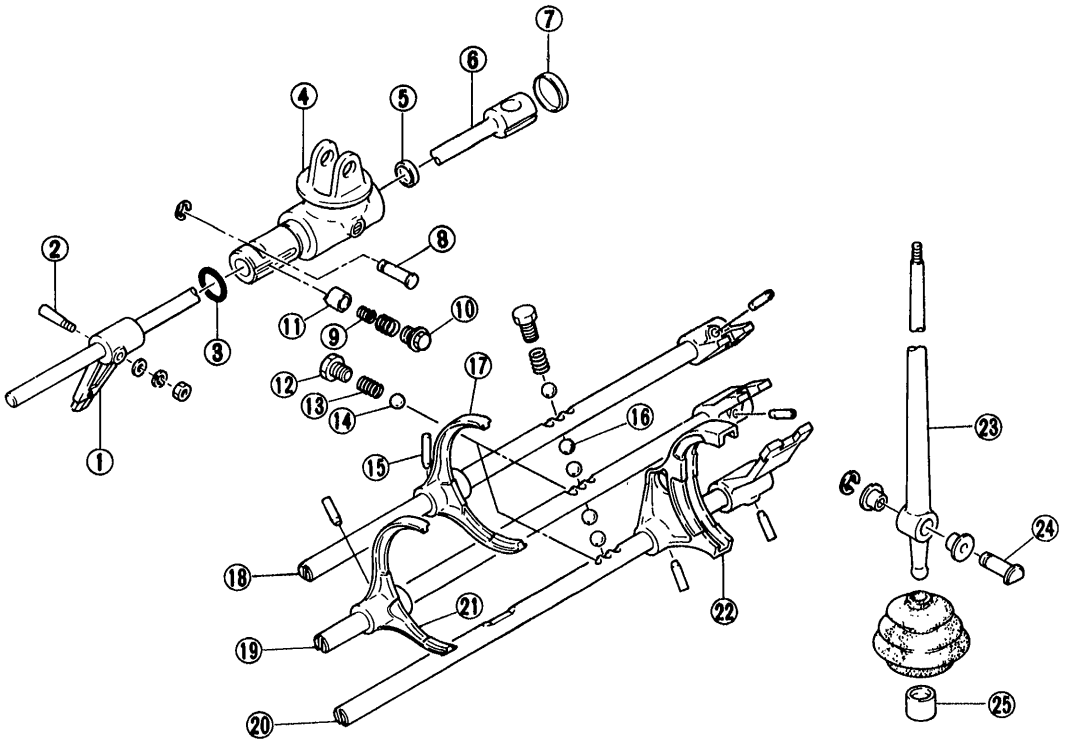
Fig. MT-53 FS5W71B transmission case components



1 Main drive gear
2 Baulk ring
3 Shifting insert
4 Shifting insert spring
5 Synchronizer hub
6 Coupling sleeve
7 3rd main gear
8 Needle bearing
9 Mainshaft
10 2nd main gear
11 Bushing
12 1st main gear
13 OD-reverse synchronizer hub
14 Reverse gear
15 Circlip
16 Thrust block
17 Brake band
18 Synchronizer ring
19 Overdrive main gear
20 Overdrive gear bushing
21 Washer
22 Mainshaft nut
23 Overdrive mainshaft bearing
24 Speedometer drive gear
25 Countershaft front bearing shim
26 Countershaft front bearing
27 Countershaft drive gear
28 Countershaft
29 Countershaft bearing
30 Reverse counter gear spacer
31 Reverse counter gear
32 Overdrive counter gear
33 Countershaft rear bearing
34 Countershaft nut
35 Reverse idler shaft
36 Reverse idler thrust washer
37 Reverse idler gear
38 Reverse idler gear bearing
39 Reverse idler thrust washer

TM047A

Fig. MT-54 FS5W71B transmission gear components



1 Striking lever
2 Lock pin
3 O-ring
4 Striking guide
5 Oil seal
6 Striking rod
7 Expansion plug
8 Stopper guide pin
9 Return spring
10 Return spring plug
11 Return spring plunger
12 Check ball plug
13 Check spring
14 Check ball
15 Retaining pin
16 Interlock ball
17 1st & 2nd shift fork
18 1st & 2nd fork rod
19 3rd & 4th fork rod
20 Reverse & OD fork rod
21 3rd & 4th shift fork
22 Reverse & OD shift fork
23 Control lever
24 Control lever pin
25 Control lever bushing

TM048A

Fig. MT-55 FS5W71B transmission shift control components

REMOVAL

Same as for the F4W71B.

DISASSEMBLY

TRANSMISSION CASE DISASSEMBLY

Same as for the F4W71B.

DISASSEMBLY OF GEAR ASSEMBLY

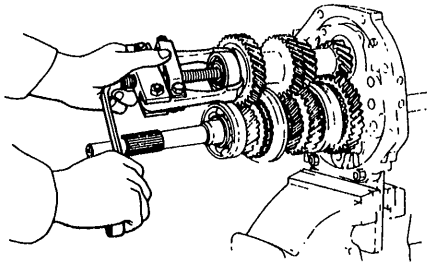
Fork rod

Same as for the F4W71B.

Gear assembly

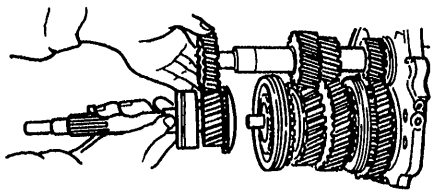
1. With gears doubly engaged, draw out countershaft front bearing using a suitable gear puller. See Figure MT-56.
2. Remove counter drive gear snap ring.
3. Draw out counter drive gear complete with main drive gear assembly by means of a gear puller.

When drawing out main drive gear assembly, be careful not to drop pilot needle bearing onto floor from the front end of mainshaft. See Figure MT-57.



TM398

Fig. MT-56 Removing countershaft front bearing



TM756

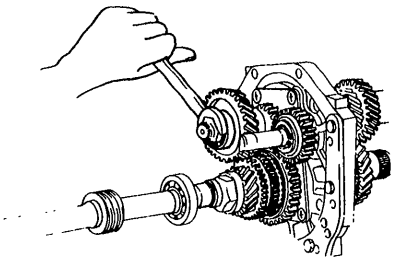
Fig. MT-57 Removing counter drive gear and main drive gear

4. Remove snap ring and then thrust washer from mainshaft front end.

Draw out 3rd & 4th synchronizer assembly and remove 3rd gear assembly.

5. Remove snap ring and then draw out speedometer gear and bearing from mainshaft rear side.
6. With gears doubly engaged, release caulking on countershaft and mainshaft nuts then loosen them.

Remove countershaft nut.

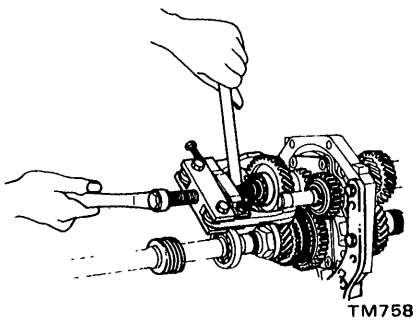


TM757

Fig. MT-58 Removing countershaft nut

Note: When removing mainshaft assembly, loosen mainshaft nut.

7. Draw out counter overdrive gear and bearing from countershaft rear end by using a suitable gear puller. See Figure MT-59.



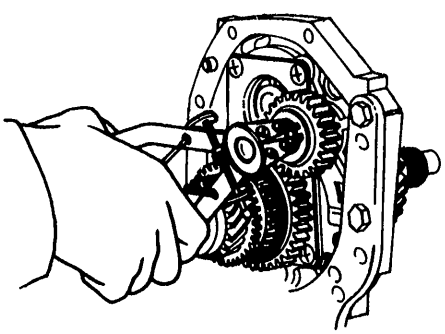
TM758

Fig. MT-59 Removing counter overdrive gear and bearing

8. Remove counter reverse idler gear and spacer.
9. Remove countershaft by lightly tapping the rear end with a soft hammer.

Be careful not to drop off gear shaft.

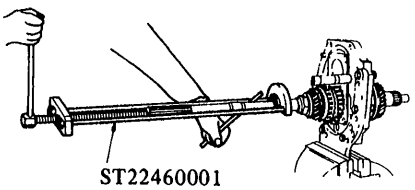
10. Remove reverse idler gear snap ring.



TM759

Fig. MT-60 Removing reverse idler gear snap ring

11. Remove reverse idler gear.
12. Remove snap ring of mainshaft end bearing. Draw out bearing using Mainshaft Rear Bearing Puller KV32101330. Remove other snap ring of mainshaft end bearing. See Figure MT-61.

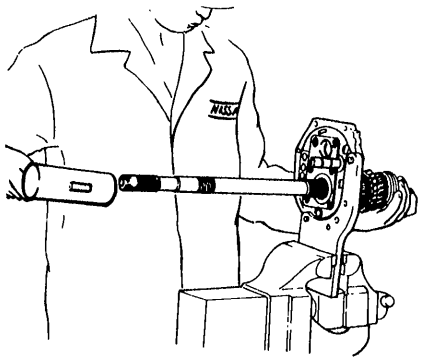


TM760

Fig. MT-61 Removing mainshaft end bearing

13. Remove mainshaft nut, thrust washer, mainshaft reverse gear, OD synchronizer and overdrive gear.
14. Draw out mainshaft gear assembly together with countershaft by lightly tapping the rear end with a soft hammer while holding the front of mainshaft gear assembly by hand.

Be careful not to drop off gear shaft. See Figure MT-62.



TM761

Fig. MT-62 Driving out gear assembly

Main drive gear

Same as for the F4W71B.

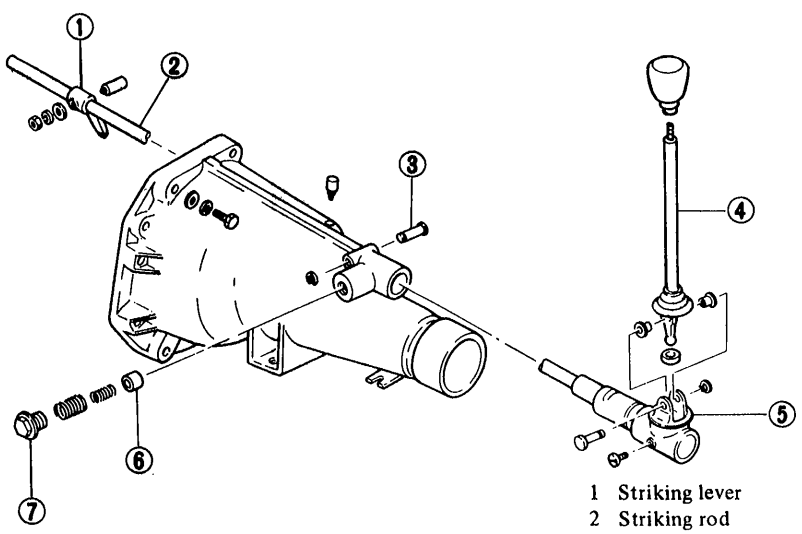
Countershaft assembly

Same as for the F4W71B.

REAR EXTENSION DISASSEMBLY

Remove lock pin from striking lever, and remove striking rod.

Note: Do not disassemble rear extension bushing from rear extension.



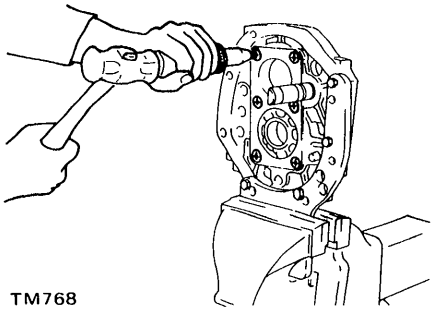
1 Striking lever
2 Striking rod
3 Stopper pin
4 Control lever
5 Striking rod guide
6 Reverse select plunger
7 Reverse select plug

TM767

Fig. MT-63 Exploded view of shifting mechanism

ADAPTER PLATE DISASSEMBLY

1. Remove six(6) bearing retainer attaching screws with an impact driver and remove bearing retainer from adapter plate. See Figure MT-64.



TM768

Fig. MT-64 Removing screws

2. Remove mainshaft bearing from the rear extension side.
3. To remove outer race of counter gear rear bearing, apply a brass drift to race side surface, and withdraw it by tapping the top of drift with a hammer.

INSPECTION

Wash all parts in a suitable cleaning solvent and check for wear, damage or other faulty conditions.

Notes:

a. **Be careful not to damage any parts with scraper.**
b. **Do not clean, wash or soak oil seals in solvent.**

TRANSMISSION CASE AND REAR EXTENSION HOUSING

Same as for the F4W71B.

BEARING

Same as for the F4W71B.

GEARS AND SHAFTS

1. Check all gears for excessive wear, chips or cracks; replace as required.
2. Check shaft for bending, crack, wear, and worn spline; if necessary, replace.
3. Measure backlash in gears.

Main drive and
counter drive gear:
0.05 to 0.10 mm
(0.0020 to 0.0039 in)
1st, 2nd, 3rd, 5th and
reverse gears:
0.05 to 0.20 mm
(0.0020 to 0.0040 in)

If the above limits are exceeded, replace drive and driven gears as a set.

4. Measure gear end play:

1st gear:
0.32 to 0.39 mm
(0.0126 to 0.0154 in)
2nd gear:
0.12 to 0.19 mm
(0.0047 to 0.0075 in)
3rd gear:
0.13 to 0.37 mm
(0.0051 to 0.0146 in)
OD gear (on mainshaft):
0.32 to 0.39 mm
(0.0126 to 0.0154 in)

BAULK RING

Same as for the F4W71B.

OIL SEAL

Same as for the F4W71B.

ASSEMBLY

To assemble, reverse the order of disassembly. Observe the following instructions.

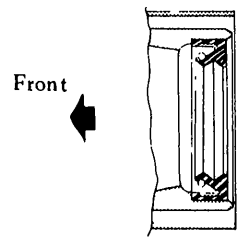
FRONT COVER ASSEMBLY

Same as for the F4W71B.

REAR EXTENSION ASSEMBLY

1. Wipe clean seal seat in rear extension housing; press fit oil seal in place.

Coat oil seal and bushing with gear oil for initial lubrication. See Figure MT-65.



TM355

Fig. MT-65 Rear extension oil seal

2. Apply multi-purpose grease to O-ring and plunger grooves in striking rod.

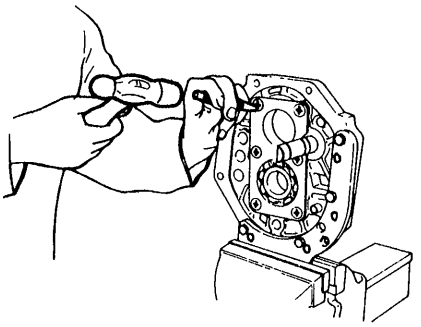
Insert striking rod with striking rod guide through rear extension.

3. Install striking lever on front end of striking rod. Install lock pin and torque screw to 0.9 to 1.2 kg-m (7 to 9 ft-lb).
4. Install mainshaft bearing by lightly tapping around it with a soft hammer.
5. Insert reverse idler shaft in adapter plate.

Make sure that the cut-out portion of reverse idler shaft is lined up with inner face of adapter plate.

6. Install bearing retainer in adapter plate.

Align bearing retainer with reverse idler shaft at the cut-out portion of this shaft, torque screws to 1.9 to 2.5 kg-m (14 to 18 ft-lb) and stake each screw at two points with a punch. See Figure MT-66.



TM764

Fig. MT-66 Staking screw

7. Install countershaft rear bearing in adapter plate by lightly tapping around it with a soft hammer.

GEAR ASSEMBLY

Clean all parts in solvent and dry with compressed air.

Synchronizer assembly

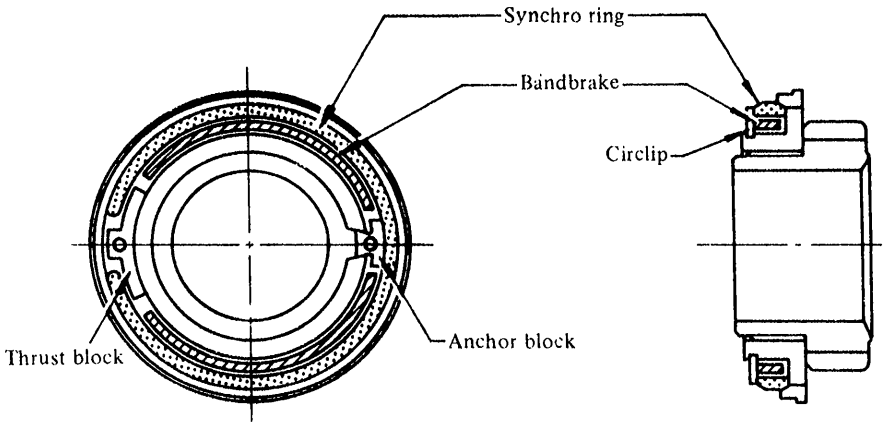
Same as for the F4W71B.

Overdrive gear synchronizer assembly

1. Assemble reverse & OD synchronizer assembly.

2. Assemble overdrive gear assembly.

Position synchronizer ring, band brake, thrust block and anchor block on overdrive clutch gear; install circlip.



TM449

Fig. MT-67 Installing overdrive gear assembly

Mainshaft assembly

Same as for the F4W71B.

Countershaft assembly

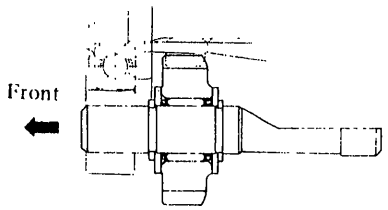
Same as for the F4W71B.

Main drive gear assembly

Procedures are the same as for the F4W71B transmission, except as follows:

1. Insert countershaft and mainshaft into adapter plate, and place adapter plate in a vise with setting plate.

Install snap ring, spacer, needle roller bearing, reverse idler gear, spacer and snap ring.



TM451

Fig. MT-68 Reverse idler gear

2. Assemble OD & reverse synchronizer assembly, OD gear bushing, needle bearing, OD gear assembly, steel ball, and thrust washer on mainshaft rear side. Before installing steel ball, apply grease to it.
3. Install new mainshaft nut, and tighten it temporarily.
4. Install counter reverse gear, counter 5th gear, bearing and new countershaft nut. Tighten nut temporarily.
5. Tighten mainshaft countershaft nuts and stake nuts at groove in shafts with a punch. Tightening procedures for the mainshaft nut are the same as those for the F4W71B.

Shift forks and fork rods assembly

Same as for the F4W71B.

TRANSMISSION ASSEMBLY

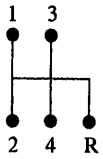
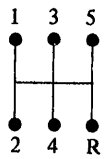
Same as for the F4W71B.

INSTALLATION

Same as for the F4W71B.

SERVICE DATA AND SPECIFICATIONS

GENERAL SPECIFICATIONS

Transmission type	F4W71B	FS5W71B
Synchromesh type	Warner	Warner + Servo
Shift type		
Gear ratio		
1st	3.321	3.321
2nd	2.077	2.077
3rd	1.308	1.308
4th	1.000	1.000
5th	–	0.864
Reverse	3.382	3.382
Final gear ratio	3.545	3.545
Speedometer gear ratio	17/6	17/6
Oil capacity (US pt, Imp pt)	1.7 (3⅝, 3)	2.0 (4¼, 3½)

TIGHTENING TORQUE

Installation	Unit: kg-m (ft-lb)
Engine to transmission installation bolt	4.4 to 5.9 (32 to 43)
Transmission to engine rear plate bolt	0.9 to 1.2 (7 to 9)
Clutch operating cylinder installation bolt	2.5 to 3.0 (18 to 22)
Rear mounting insulator to transmission installation bolt	0.8 to 1.1 (6 to 8)
Crossmember mounting bolt	3.2 to 3.7 (23 to 27)
Propeller shaft to diff. installation bolt	3.5 to 4.5 (25 to 33)
Gear assembly	
Rear extension installation bolt	1.6 to 2.1 (12 to 15)
Front cover installation bolt	1.6 to 2.1 (12 to 15)
Bearing retainer to adapter plate screw	1.9 to 2.5 (14 to 18)
Mainshaft nut	14.0 to 17.0 (101 to 123)
Check ball plug	1.9 to 2.5 (14 to 18)
Striking lever lock pin	0.9 to 1.2 (7 to 9)
Reverse select return plug	0.9 to 1.2 (7 to 9)
Speedometer sleeve locking plate nut	0.4 to 0.5 (3 to 4)
Reverse lamp switch	2.0 to 3.0 (14 to 22)
Gear oil filler plug	2.5 to 3.5 (18 to 25)
Gear oil drain plug	2.5 to 3.5 (18 to 25)

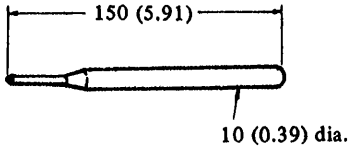
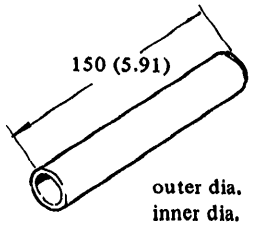
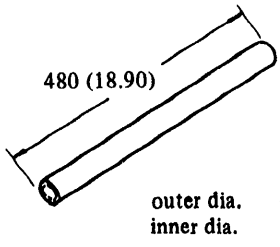
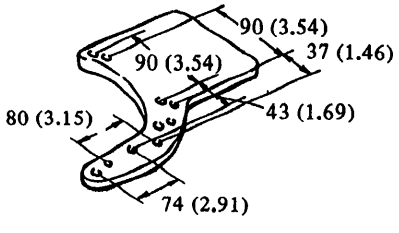
SPECIFICATIONS

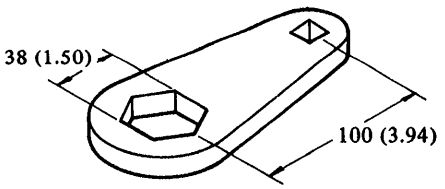
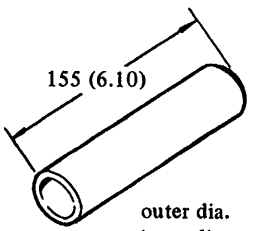
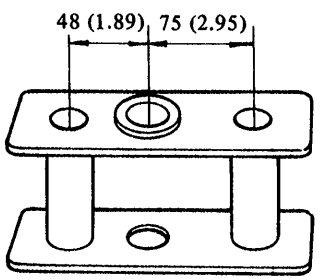
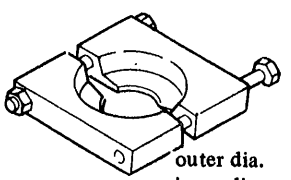
Gear backlash	Unit: mm (in)
Maindrive gear to counter drive gear	0.05 to 0.10 (0.0020 to 0.0039)
1st gear	0.05 to 0.20 (0.0020 to 0.0079)
2nd gear	0.05 to 0.20 (0.0020 to 0.0079)
3rd gear	0.05 to 0.20 (0.0020 to 0.0079)
OD gear	0.05 to 0.20 (0.0020 to 0.0079)
Gear end play	
1st gear	0.32 to 0.39 (0.0126 to 0.0154)
2nd gear	0.12 to 0.19 (0.0047 to 0.0075)
3rd gear	0.13 to 0.37 (0.0051 to 0.0146)
OD gear	0.32 to 0.39 (0.0126 to 0.0154)
Counter gear	0.01 to 0.21 (0.0004 to 0.0083)
Reverse idler gear	0.05 to 0.20 (0.0020 to 0.0079)
Clearance between baulk ring and gear	
All gears	1.25 to 1.60 (0.0492 to 0.0630)
Counter bearing adjusting shim	0.6 (0.024) 0.5 (0.020) 0.4 (0.016) 0.3 (0.012) 0.2 (0.008) 0.1 (0.004)

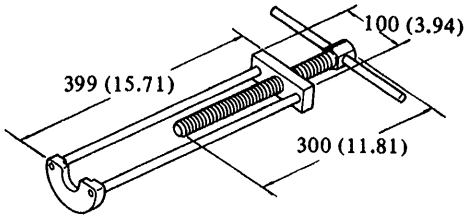
TROUBLE DIAGNOSES AND CORRECTIONS

Condition	Probable cause	Corrective action
Difficult to intermesh gears Causes for difficult gear shifting are classified to troubles concerning control system and transmission. When gear shift lever is heavy and it is difficult to shift gears, clutch disengagement may also be unsmooth. First, make sure that clutch operates correctly, and inspect transmission.	Worn gears, shaft, and/or bearing. Insufficient operating stroke due to worn or loose sliding part. Faulty or damaged synchronizer.	Replace. Repair or replace. Replace.
Gear slips out of mesh. In most cases, this trouble occurs, when interlock ball, check ball, and/or spring is worn or weakened, or when control system is faulty. In this case, the trouble cannot be corrected by replacing gears, and therefore, trouble shooting must be carried out carefully. It should also be noted that gear slips out of mesh due to vibration generated by weakened front and rear engine mounts.	Worn interlock ball. Worn check ball and/or weakened or broken spring. Worn fork rod ball groove. Worn or damaged bearing. Worn or damaged gear.	Replace. Replace. Replace. Replace. Replace.
Noise When noise occurs with engine idling and ceases when clutch is disengaged, or when noise occurs while shifting gears, it is an indication that the noise is from transmission. (Transmission may rattle during engine idling. Check air-fuel mixture and ignition timing. After above procedure, readjust engine idling.)	Insufficient or improper lubricant. Oil leaking due to faulty oil seal or sealant, clogged breather, etc. Worn bearing (High humming occurs at a high speed.). Damaged bearing (Cyclic knocking sound occurs also at a low speed.). Worn spline. Worn bushing.	Add oil or replace with designated oil. Clean or replace. Replace. Replace. Replace. Replace.

SPECIAL SERVICE TOOLS

No.	Tool number & tool name	Description Unit: mm (in)	For use on	Reference page or Figure No.
1.	ST23540000 Fork rod pin punch	For removal of fork rod retaining pin.  	All models	Fig. MT-12
2.	ST22360002 Drift C	For assembly of counter drive bearing.  	F4W71B FS5W-71B FS5W-63A	Fig. MT-39
3.	ST23800000 Transmission adapter	For assembly of main bearing.  	F4W71B FS5W-71B F4W63L	Page MT-10
4.	ST23810001 Setting plate adapter	For setting adapter plate in a vise.  	F4W71B FS5W-71B	Fig. MT-11 Fig. MT-12

No.	Tool number & tool name	Description Unit: mm (in)	For use on	Reference page or Figure No.
5.	ST22520000 Wrench [38 mm (1.50 in)]	For removal and assembly of mainshaft nut.  SE313	F4W71B FS5W-71B FS5W-63A	Fig. MT-43
6.	ST23860000 Counter gear drift	For assembly of counter drive gear.  outer dia. 38 (1.50) inner dia. 33 (1.30) SE039	F4W71B FS5W-71B	Fig. MT-39
7.	KV31100400 Transmission press stand	For assembly of mainshaft, countershaft, counter drive gear and counter drive bearing.  TM438	F4W71B FS5W-71B	Fig. MT-34 Fig. MT-36 Fig. MT-41
8.	ST30031000 Bearing puller	For replacing bearing.  outer dia. 80 (3.15) inner dia. 50 (1.97) SE041	All except F4W60A	Fig. MT-20 Fig. MT-22

No.	Tool number & tool name	Description Unit: mm (in)	For use on	Reference page or Figure No.
9.	KV32101330 Bearing puller	For removal of mainshaft end bearing, counter overdrive gear and bearing.  	FS5W-71B	Fig. MT-61