SERVICE MANUAL

DATSUN 200SX
MODEL S10 SERIES

NISSAN

NISSAN MOTOR CO., LTD.
TOKYO, JAPAN

SECTION MT

TRANSMISSION

MT

5-SPEED TRANSMISSION (Type : FS5W63A)

CONTENTS

DESCRIPTION

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

The reverse gear is a sliding mesh type using spur gear provided on the outer side of 1st & Reverse coupling sleeve.

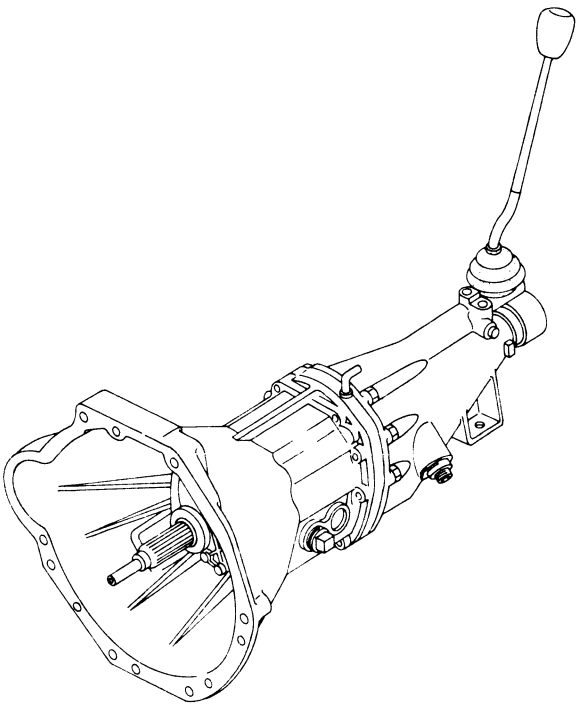
In construction, the main drive gear is meshed with the counter drive gear. The forward speed gears provided on the countershaft are in constant mesh with the main gears which ride on the mainshaft freely through the needle bearings.

When the transmission is shifted, the action causes the coupling sleeve to slide on the synchronizer hub. This engages its inner teeth with the other teeth formed on the mainshaft gear. The synchronizer hub is fitted to the mainshaft by splines so they turn together as a unit as the mainshaft is rotated. The transmission is a Warner type. On Warner types, the baulk rings synchronize the coupling sleeve with the mainshaft gear. When the transmission is shifted into reverse position, the mainshaft reverse gear provided on the outer side of 1st & Reverse coupling sleeve, moves to mesh with the reverse idler gear; the transmission is reversed.

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

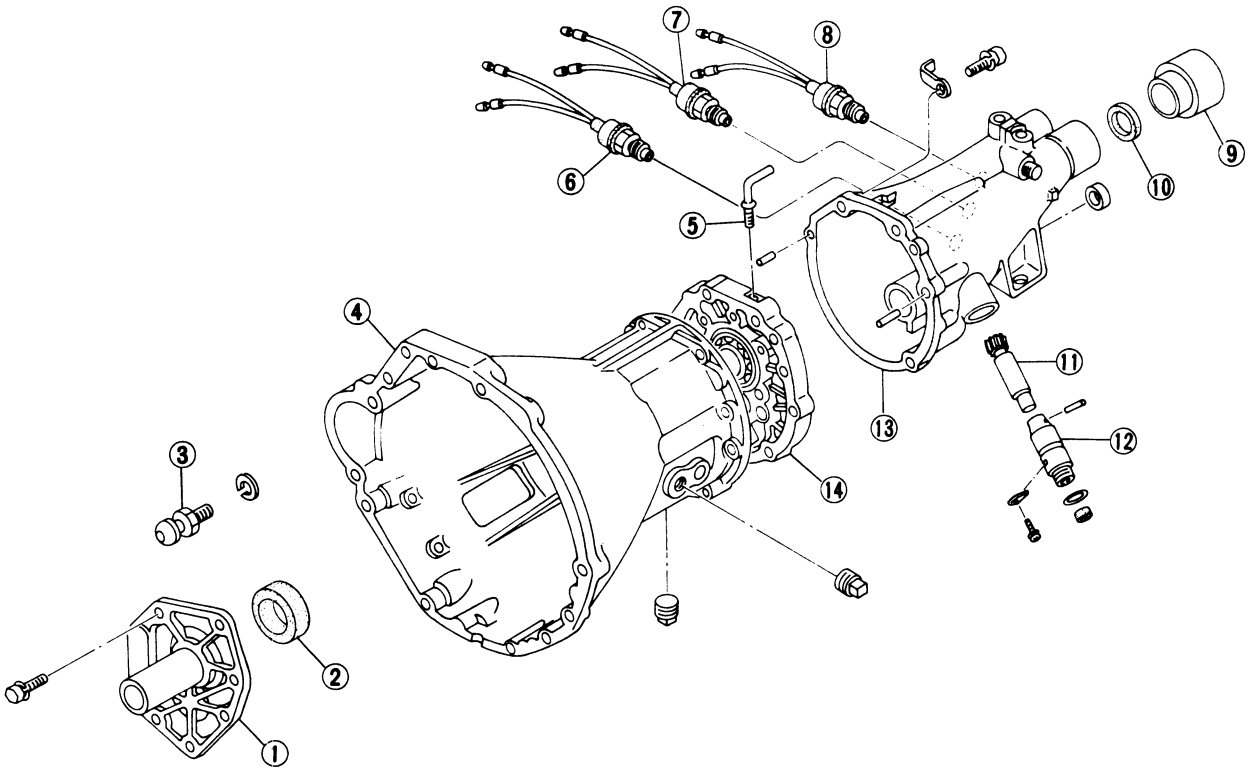
The cast-iron adapter plate supports the mainshaft, countershaft, reverse idler shaft and three fork rods, and is bolted at the front to the transmission case and, at the rear, to the rear extension by means of through-bolts.

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



TM057A

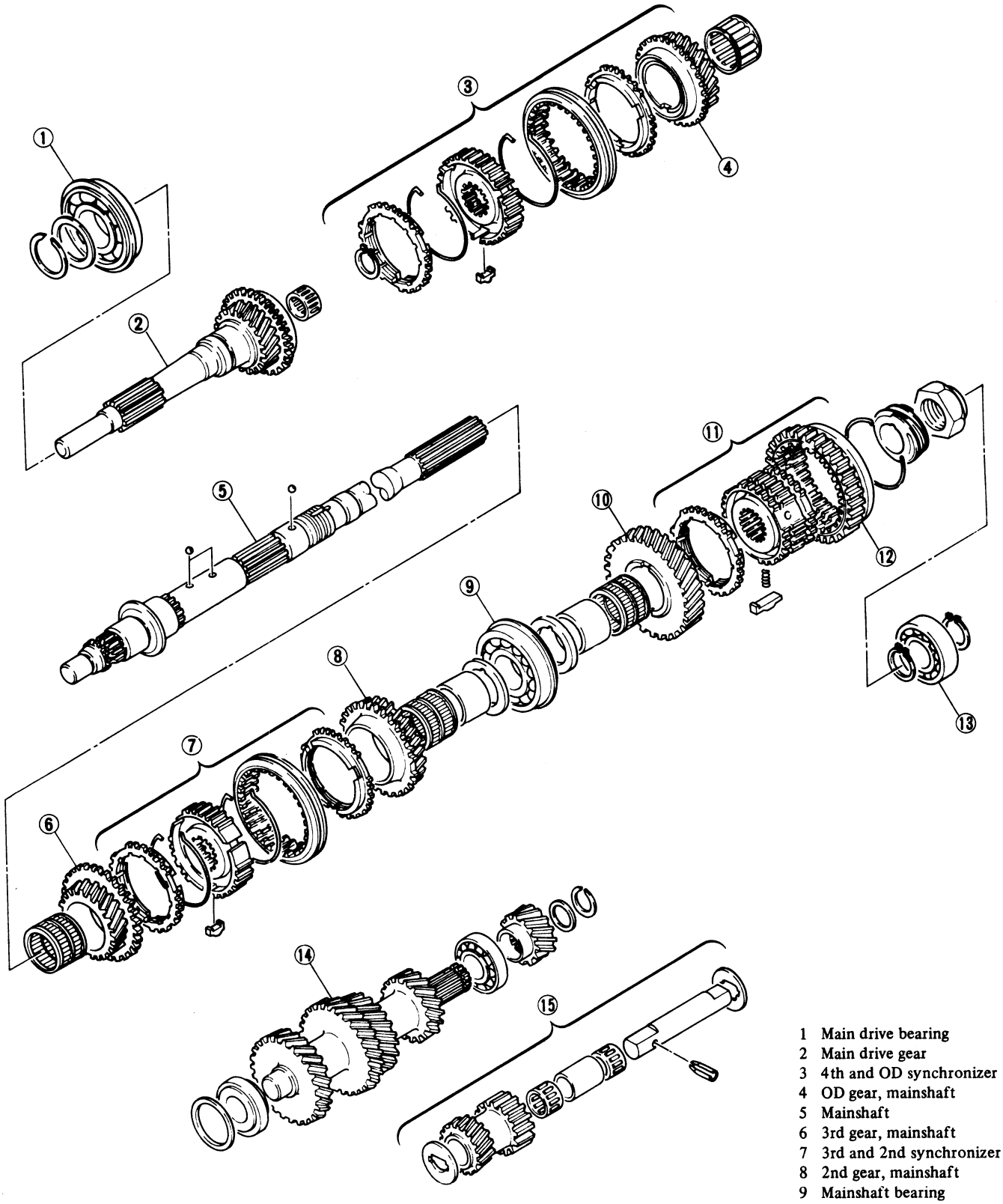
Fig. MT-1 FS5W63A transmission



1 Front cover
2 Front cover oil seal
3 Withdrawal lever ball pin
4 Transmission case
5 Breather
6 Top switch
7 Buck-up lamp switch
8 Neutral switch (Canada models)
9 Sleeve yoke dust cover
10 Rear extension oil seal
11 Speedometer pinion
12 Speedometer sleeve
13 Rear extension
14 Adapter plate

TM058A

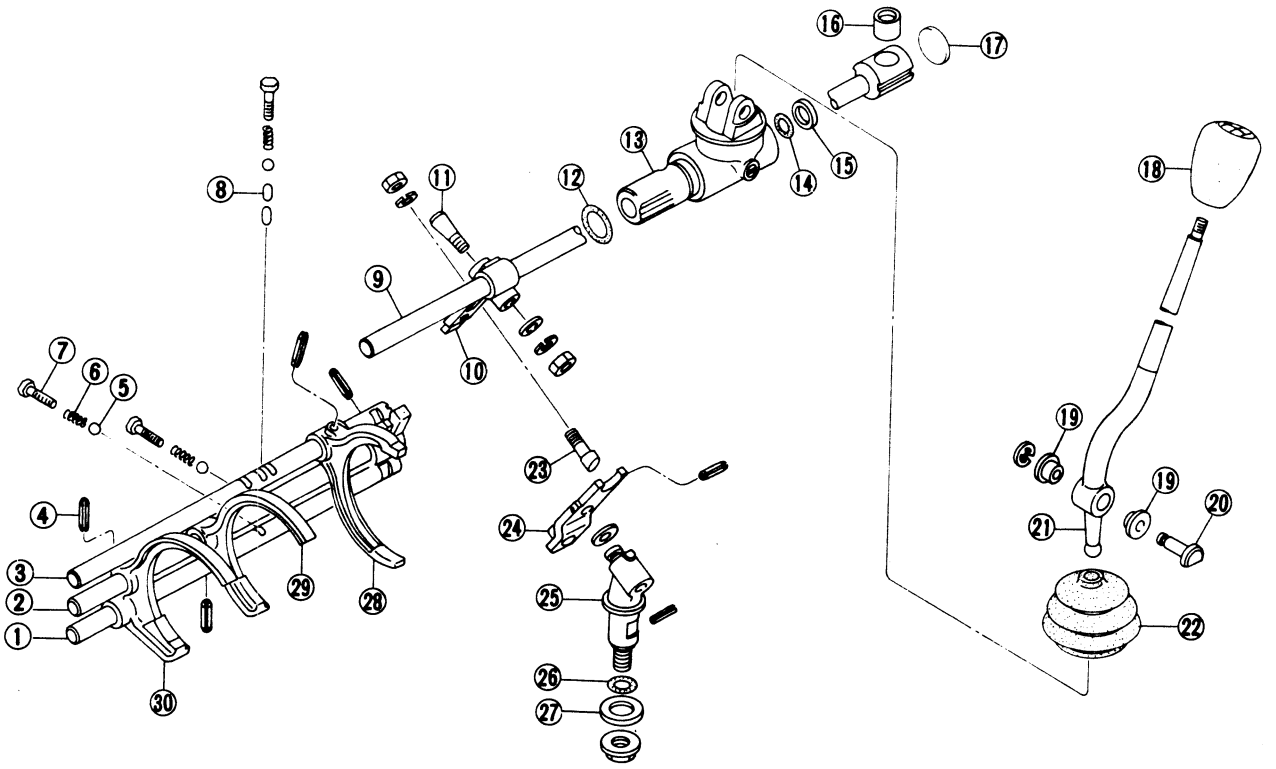
Fig. MT-2 FS5W63A transmission case components



1 Main drive bearing
2 Main drive gear
3 4th and OD synchronizer
4 OD gear, mainshaft
5 Mainshaft
6 3rd gear, mainshaft
7 3rd and 2nd synchronizer
8 2nd gear, mainshaft
9 Mainshaft bearing
10 1st gear, mainshaft
11 Reverse and 1st synchronizer
12 Reverse gear, mainshaft
13 Mainshaft end bearing
14 Counter gear assembly
15 Idler gear assembly

TM059A

Fig. MT-3 FS5W63A transmission gear components



1 4th and OD fork rod
2 2nd and 3rd fork rod
3 1st and reverse fork rod
4 Retaining pin
5 Checking ball
6 Poppet spring
7 Checking ball plug
8 Interlock plunger
9 Striking rod
10 Striking lever
11 Lock pin
12 O-ring
13 Striking guide
14 O-ring
15 O-ring cap
16 Control lever bushing
17 Expansion plug
18 Control lever knob
19 Control pin bushing
20 Control arm pin
21 Control lever
22 Control lever boot
23 Striking pin
24 Shift arm
25 Shift arm bracket
26 Arm bracket O-ring
27 Arm bracket plain washer
28 1st and reverse shift fork
29 2nd and 3rd shift fork
30 4th and OD shift fork

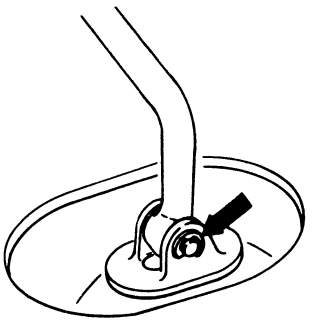
TM060A

Fig. MT-4 FS5W63A transmission shift control components

REMOVAL

To dismount transmission from the car, proceed as follows:

1. Disconnect battery ground cable from terminal.
2. Remove console box and floor hole cover. Detach rubber boots.
3. Place transmission control lever in neutral position.
4. Remove snap ring and control lever pin from transmission striking rod guide, and remove control lever.



TM0013A

Fig. MT-5 Removing control lever

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

Note: Confirm that safety is insured.

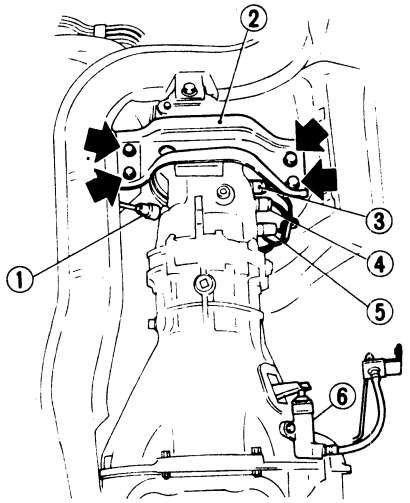
6. Disconnect front exhaust tube from exhaust manifold.
7. Remove bolts securing front exhaust tube to rear engine mounting member.
8. Remove wire for Neutral switch (Canada models), Back-up lamp switch and Top switch. See Figure MT-6.
9. Disconnect speedometer cable from rear extension housing. See Figure MT-6.
10. Remove clutch operating cylinder from transmission case.
11. Remove propeller shaft. Refer to Section PD for Removal.

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

12. Support engine by locating a jack under oil pan with a wooden block placed between oil pan and jack.

CAUTION:
Do not place jack under oil pan drain plug.

13. Support transmission with a transmission jack.
14. Remove bolts securing rear engine mounting member to body.



1 Speedometer cable
2 Rear engine mounting member
3 Neutral switch (Canada models)
4 Buck-up lamp switch
5 Top switch
6 Clutch operating cylinder TM061A

Fig. MT-6 Bottom view of car

15. Remove starter motor.
16. Remove bolts securing transmission to engine.
17. After removing these bolts.
(1) Support the engine and transmission with jacks.
(2) Slide transmission to the rear, away. from engine.
(3) Remove transmission from the car.

CAUTION:
Take care in dismounting transmission not to strike any adjacent parts or 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 Neutral switch (Canada models), Back-up lamp switch and Top switch.
5. Remove speedometer pinion and pinion sleeve by taking off lock plate.
6. Remove front cover securing bolts and remove front cover.

Detach countershaft front bearing thrust washer.

7. Remove main drive bearing snap ring with Expander.

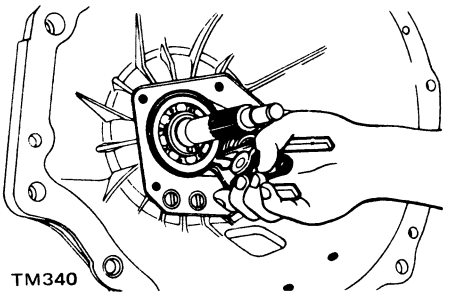


Fig. MT-7 Removing main drive bearing snap ring

8. Remove reverse select return plug, reverse select return spring and plunger from rear extension.

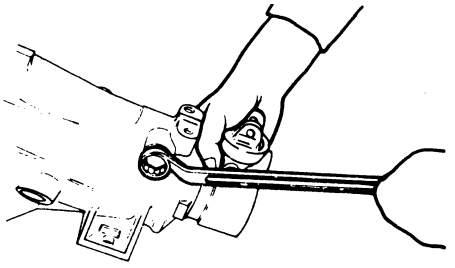


Fig. MT-8 Removing reverse select return plug

9. Remove rear extension securing bolts. Extract rear extension backward using a standard puller.

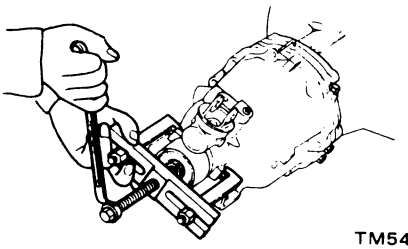


Fig. MT-9 Removing rear extension

10. Separate transmission case from adapter plate with a soft hammer.

CAUTION:
Do not pry transmission case or rear extension from adapter plate with screwdriver.

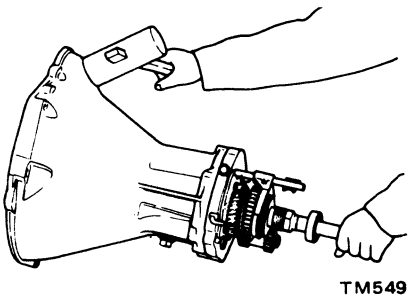


Fig. MT-10 Removing transmission case

11. Install Adapter Setting Plate ST22490000 on adapter plate.

With countershaft side up, place this assembly in a vise.

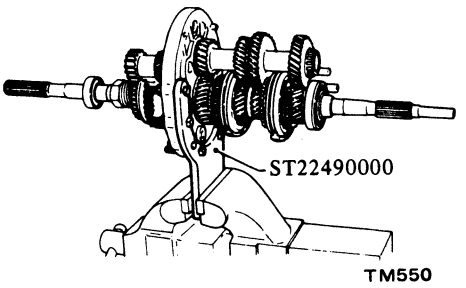


Fig. MT-11 Attaching gear assembly to special tool

DISASSEMBLY OF GEAR ASSEMBLY

Shift forks and fork rods

1. Drive out retaining pins from each fork rod with Fork Rod Pin Punch ST23540000.

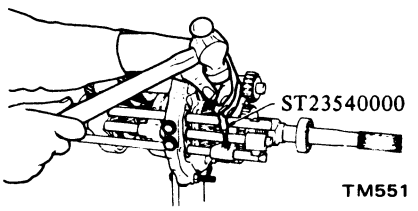


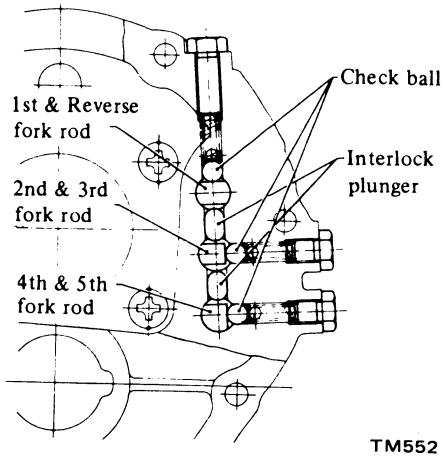
Fig. MT-12 Driving out retaining pins

2. Remove three(3) check ball plugs, and drive out fork rods from adapter plate by lightly tapping on the front end. See Figure MT-13.

Notes:

a. **Be careful not to lose the three(3) check balls and two(2) interlock plungers.**

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

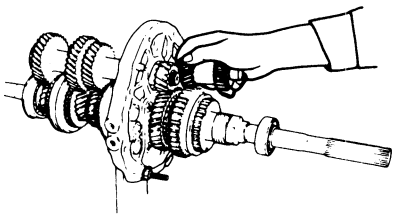


TM552

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

Gear assembly

1. Remove reverse idler gear together with shaft.

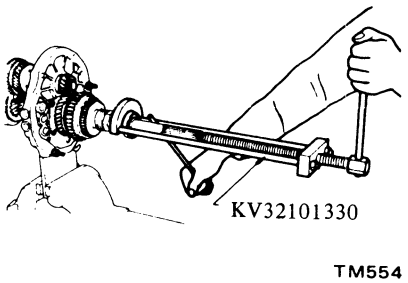


TM553

Fig. MT-14 Removing reverse idler gear

2. Remove following parts from end of mainshaft:

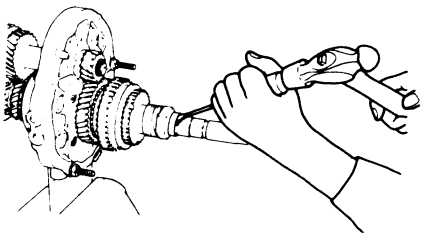
(1) Snap ring from mainshaft end bearing.
(2) Mainshaft end bearing, using Rear Bearing Puller KV32101330.
(3) Another snap ring from mainshaft end bearing.



TM554

Fig. MT-15 Removing mainshaft end bearing

3. With 1st and 2nd gears doubly engaged, release caulking on mainshaft nut and loosen it.



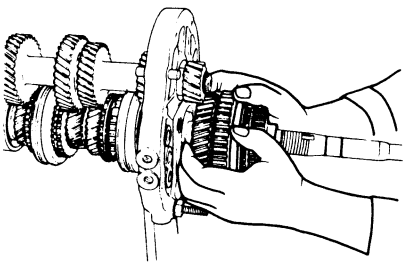
TM555

Fig. MT-16 Releasing caulking on mainshaft nut

4. Remove following parts from mainshaft in rear extension side:

(1) Mainshaft nut.
(2) Speedometer drive gear and steel ball.
(3) Synchro hub with reverse gear.
(4) 1st gear together with needle bearing and bushing.
(5) Thrust washer and steel ball.

Note: Be careful not to lose steel ball retaining speedometer drive gear and thrust washer.

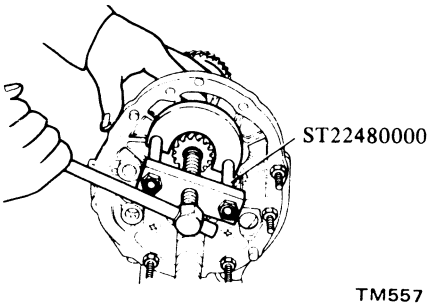


TM556

Fig. MT-17 Removing reverse and 1st gears

5. Remove following parts from counter gear rear end:

(1) Snap ring and thrust washer.
(2) 1st counter gear, using Gear Puller ST22480000.

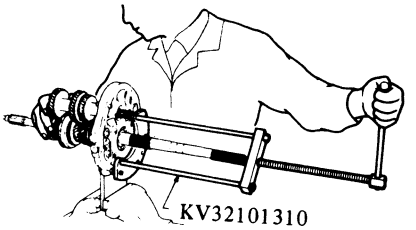


TM557

Fig. MT-18 Removing 1st counter gear

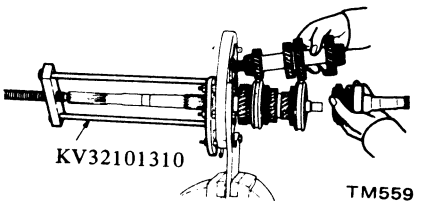
6. Drive out mainshaft as follows, using Mainshaft Puller KV32101310.
(1) Install Mainshaft Puller on adapter plate, holding the front of mainshaft gear assembly and counter gear assembly by hand. See Figure MT-19.
(2) Remove main drive gear and counter gear after driving out mainshaft roughly 10 mm (0.39 in). See Figure MT-20.
(3) Remove mainshaft and mainshaft gear as an assembly.

CAUTION:
Be careful not to drop gears.



TM558

Fig. MT-19 Removing mainshaft gear



TM559

Fig. MT-20 Removing main drive gear and counter gear

Mainshaft

1. Remove following parts from the area in the vicinity of the 2nd gear:

(1) Thrust washer and steel ball.
(2) 2nd gear and needle bearing.

Note: Be careful not to lose steel ball retaining thrust washer.

2. Press following parts out together from 2nd and 3rd gear segment using Bearing Puller ST30031000:

(1) 2nd gear mainshaft bushing.
(2) 3rd gear and 2nd & 3rd speed synchronizer. See Figure MT-21.

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

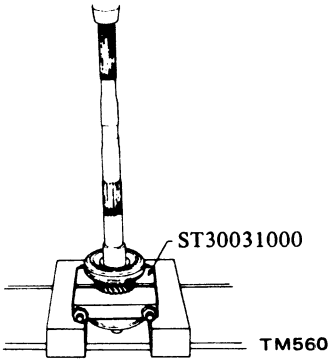


Fig. MT-21 Removing 2nd gear mainshaft bushing

3. Pry off snap ring on the front end of mainshaft, and remove 4th & 5th speed synchronizer and 5th gear.

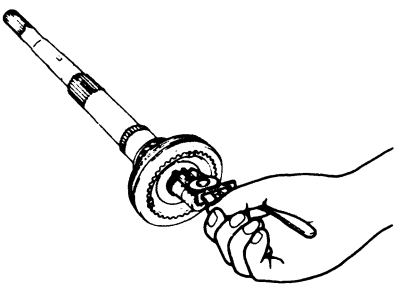
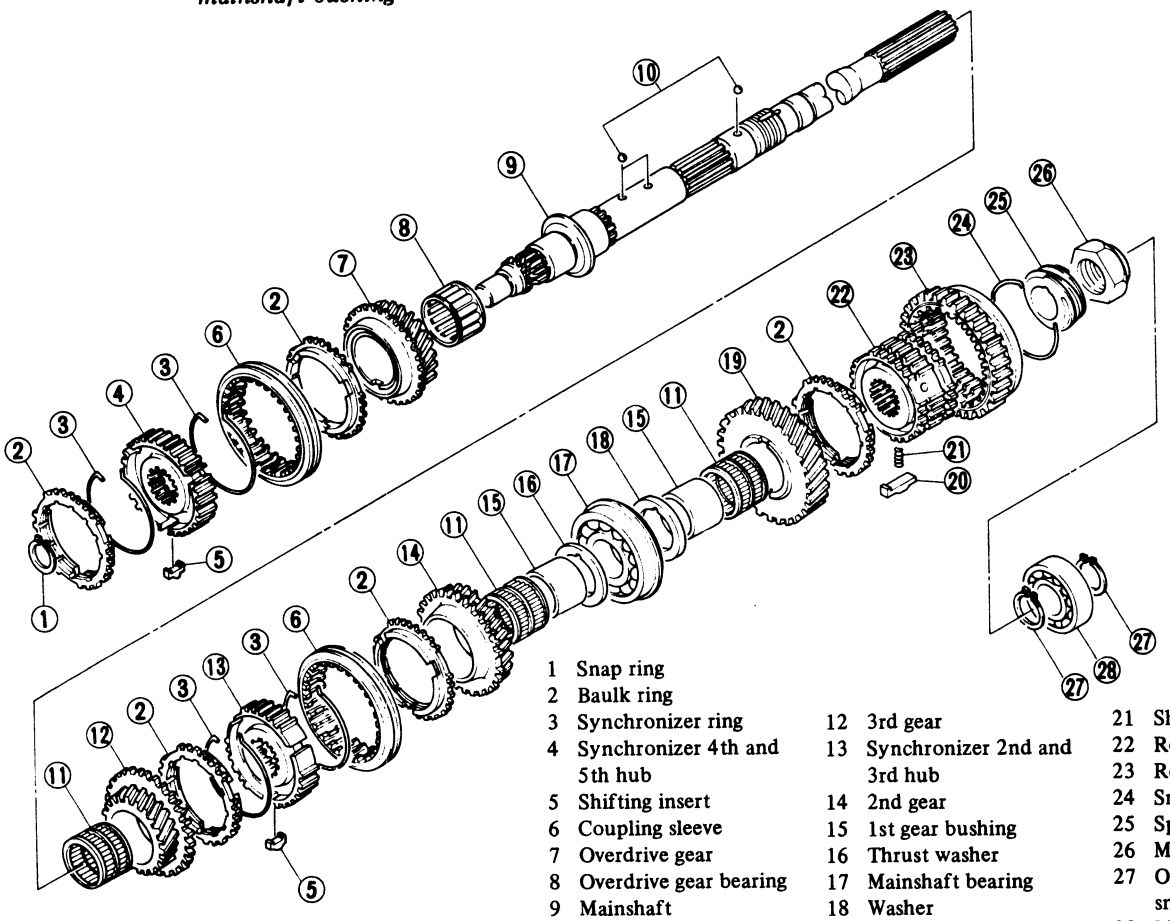


Fig. MT-22 Removing snap ring



1 Snap ring
2 Baulk ring
3 Synchronizer ring
4 Synchronizer 4th and 5th hub
5 Shifting insert
6 Coupling sleeve
7 Overdrive gear
8 Overdrive gear bearing
9 Mainshaft
10 Steel ball
11 Needle bearing
12 3rd gear
13 Synchronizer 2nd and 3rd hub
14 2nd gear
15 1st gear bushing
16 Thrust washer
17 Mainshaft bearing
18 Washer
19 1st gear
20 Shifting insert
21 Shifting insert spring
22 Reverse mainshaft hub
23 Reverse gear
24 Snap shifting insert ring
25 Speedometer drive gear
26 Mainshaft nut
27 Overdrive bearing front snap ring
28 Mainshaft end bearing

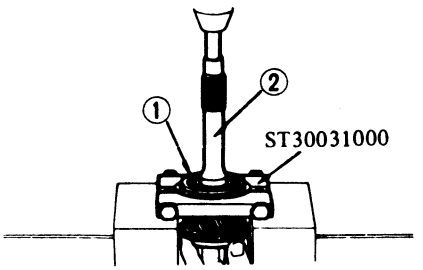
TM062A

Fig. MT-23 Exploded view of mainshaft assembly

Main drive gear

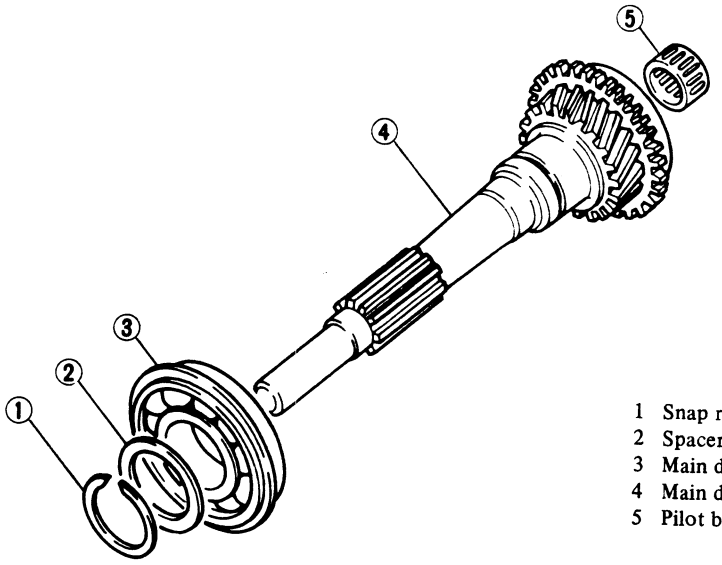
1. Pry off snap ring and remove spacer.
2. Press out main drive bearing using Bearing Puller ST30031000. See Figure MT-24.

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



1 Main drive bearing
2 Main drive gear

Fig. MT-24 Remvoing main drive bearing



1 Snap ring
2 Spacer
3 Main drive bearing
4 Main drive gear
5 Pilot bearing

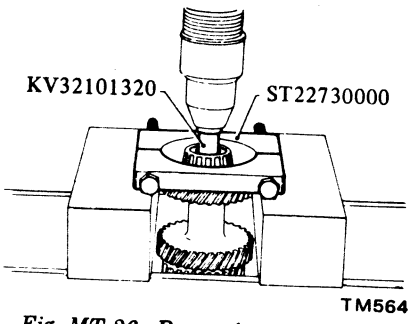
TM063A

Fig. MT-25 Exploded view of main drive gear assembly

Counter gear

1. Press out counter gear front bearing using Bearing Puller ST22730000 and Adapter KV32101320. See Figure MT-26.

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

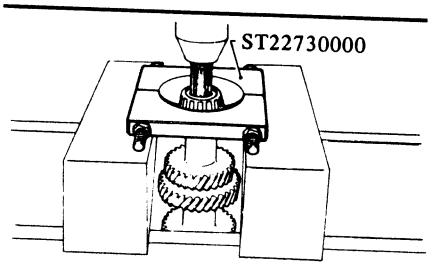


TM564

Fig. MT-26 Removing counter gear front bearing

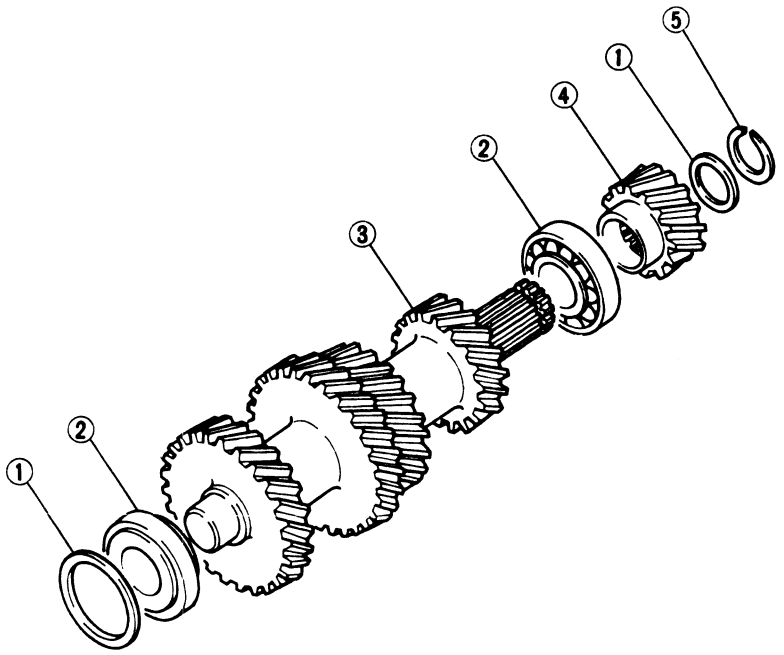
2. Press out counter gear rear bearing using Bearing Puller ST22730000. See Figure MT-27.

CAUTION:
Be careful not to drop off counter gear.



TM565

Fig. MT-27 Removing counter gear rear bearing



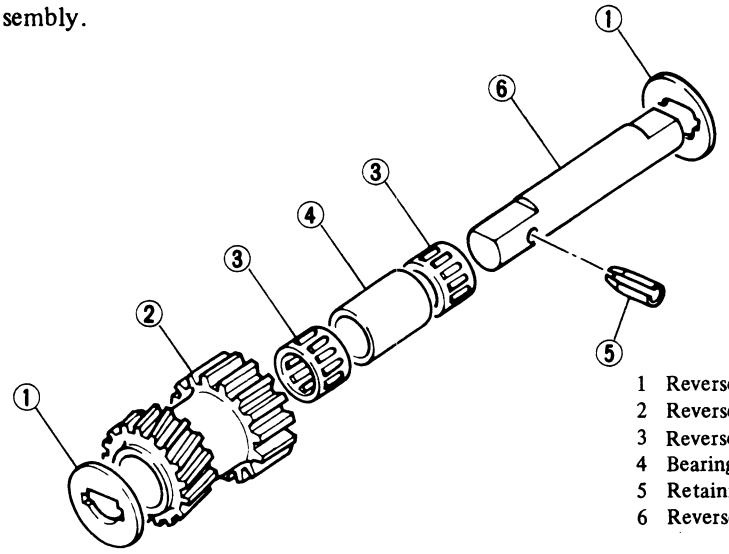
1 Thrust washer
2 Bearing
3 Counter gear
4 1st counter gear
5 Snap ring

TM064A

Fig. MT-28 Exploded view of counter gear assembly

Reverse idler gear

Disassemble reverse idler gear assembly.



1 Reverse idler thrust washer
2 Reverse idler gear
3 Reverse idler gear bearing
4 Bearing needle spacer
5 Retaining pin
6 Reverse idler shaft

TM065A

Fig. MT-29 Exploded view of reverse idler gear assembly

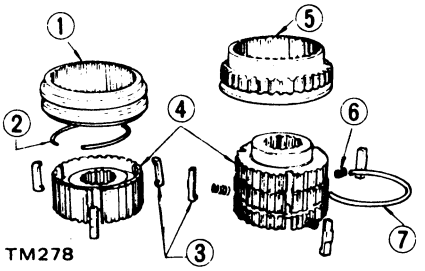
Synchronizer

1. 2nd & 3rd, 4th & 5th speed synchronizer:

Remove spread springs ② and take out shifting inserts ③. Separate coupling sleeve ① from synchronizer hub ④. See Figure MT-30.

2. 1st & reverse synchronizer:

Separate reverse main gear ⑤ from synchronizer hub ④. Take out shifting inserts ③ and synchro springs ⑥. Pry off stopper ring ⑦.



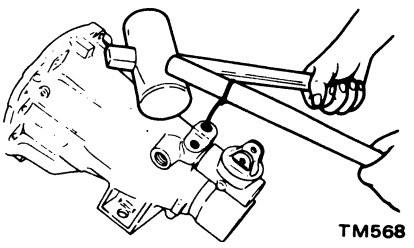
TM278

1 Coupling sleeve
2 Spread spring
3 Shifting insert
4 Synchro hub
5 Reverse gear
6 Synchro spring
7 Stopper ring

Fig. MT-30 Exploded view of synchronizer assembly

REAR EXTENSION DISASSEMBLY

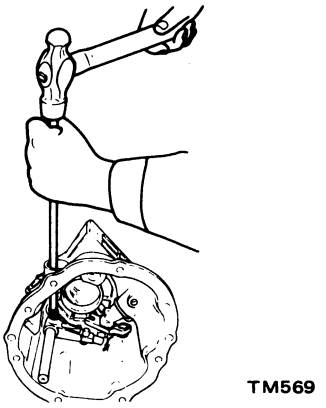
1. Remove screw and stopper pin from rear extension.



TM568

Fig. MT-31 Removing stopper pin

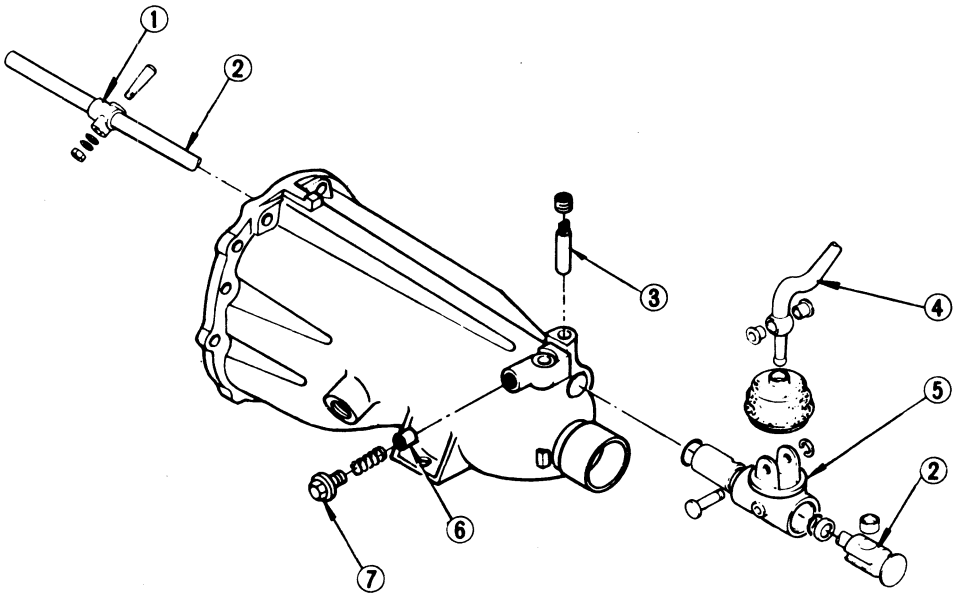
2. Remove lock pin from striking lever, and remove striking rod.



TM569

Fig. MT-32 Removing lock pin

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



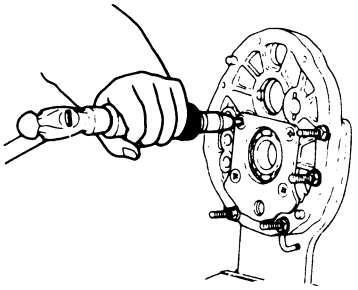
1 Striking lever
2 Striking rod
3 Stopper pin
4 Control lever
5 Striking rod guide
6 Reverse select plunger
7 Reverse select plug

TM570

Fig. MT-33 Exploded view of shifting mechanism

ADAPTER PLATE DISASSEMBLY

1. Remove four bearing retainer attaching screws with an impact driver and remove bearing retainer from adapter plate.



TM571

Fig. MT-34 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.

CAUTION:
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

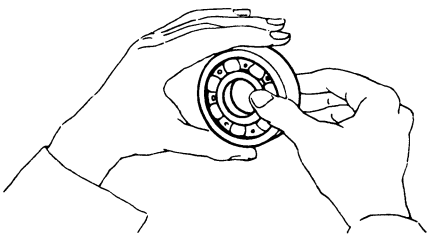
1. Clean thoroughly with solvent and check for cracks which might cause oil leak or other faulty conditions.
2. Check mating surface of case to engine or adapter plate for small nicks, projection or sealant.

Remove all nicks, projection or sealant with a fine stone.

3. If rear extension bushing is worn or cracked, replace it as an assembly of bushing and rear extension housing.

BEARING

1. Thoroughly clean bearing and dry with 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.



TM372

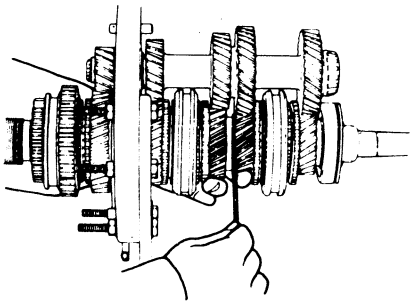
Fig. MT-35 Inspecting ball bearing

3. Replace needle bearing and taper roller 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, cracks, wear, or worn spline; if necessary, replace.
3. Measure gear end play. See Figure MT-36.

Standard end paly:
1st gear:
0.27 to 0.37 mm
(0.0106 to 0.0146 in)
2nd gear:
0.20 to 0.30 mm
(0.0079 to 0.0118 in)
3rd and 5th gear:
0.05 to 0.15 mm
(0.0020 to 0.0059 in)



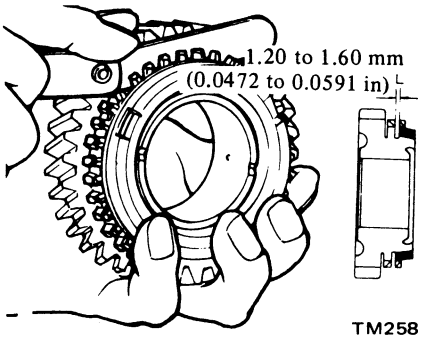
TM572

Fig. MT-36 Measuring end play

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

BAULK RINGS

1. Replace any baulk ring which is deformed or cracked.
2. Position baulk ring in place on gear cone, and measure the baulk ring-to-gear clearance with baulk ring pushed toward gear. See Figure MT-37. If the clearance is smaller than the specified value 1.20 to 1.50 mm (0.0472 to 0.0591 in), replace baulk ring.



TM258

Fig. MT-37 Measuring baulk ring-to-gear clearance

OIL SEALS

It is advisable not to reuse oil seals that have been removed. Always install new oil seals.

Replace oil seal if sealing lip is deformed or cracked. Also discard seal if spring is out of position. Check the oil seal lip contact face on shaft; if necessary, replace seal and shaft as a set.

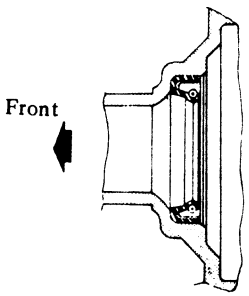
ASSEMBLY

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

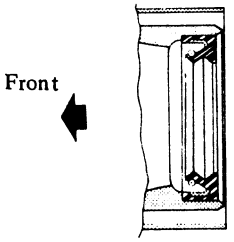
Fig. MT-38 Front cover oil seal

2. Apply sealant to withdrawal lever ball pin screw. Install withdrawal lever ball pin to front cover and tighten screw to 3.0 to 5.0 kg-m (22 to 36 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-39 Rear extension oil seal

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

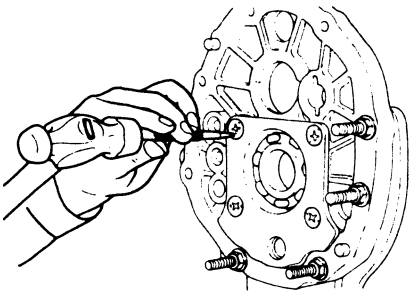
Insert striking rod with striking rod guide through rear extension.

3. Install striking lever on front end of striking rod. Install lock pin and tighten screw to 0.9 to 1.2 kg-m (6.5 to 8.7 ft-lb).

ADAPTER PLATE ASSEMBLY

1. Install outer race of counter gear rear bearing by lightly tapping around it with a brass drift and a hammer.
2. Install mainshaft bearing by lightly tapping around it with a soft hammer.
3. Install bearing retainer in adapter plate.

Tighten screws to 0.8 to 1.3 kg-m (5.8 to 9.4 ft-lb) and stake each screw at two points with a punch.



TM573

Fig. MT-40 Staking screw

ASSEMBLY OF GEAR ASSEMBLY

Clean all parts in solvent and dry with compressed air.

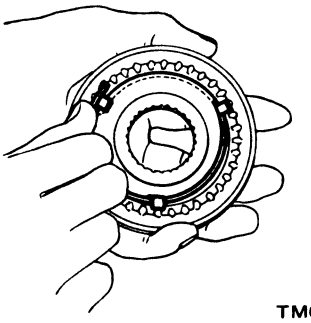
Synchronizers

1. 2nd & 3rd, 4th & 5th speed synchronizers:

(1) Place synchro-hub into coupling sleeve.

(2) Fit shifting inserts in three grooves in synchronizer hub.

(3) Locate one spread spring on the lower side of shifting inserts to secure them to the inner side of coupling sleeve. Properly install the other spring on the opposite side of coupling sleeve. Make sure that they are installed opposite each other.



TM077

Fig. MT-41 Installing spread spring

2. 1st & reverse synchronizer:

(1) Position shifting insert springs and shifting inserts in three slots in synchronizer hub.

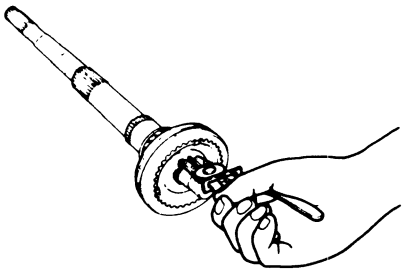
(2) Put coupling sleeve on synchronizer hub.

Mainshaft

1. Position 5th gear needle bearing, mainshaft 5th gear, baulk ring and 4th & 5th speed synchronizer on the front of mainshaft.
2. Fit snap ring of proper thickness so that it will fit the groove in mainshaft.

Available snap ring

Thickness mm (in)
1.40 to 1.45 (0.0551 to 0.0571)
1.45 to 1.50 (0.0571 to 0.0591)
1.50 to 1.55 (0.0591 to 0.0610)
1.55 to 1.60 (0.0610 to 0.0630)
1.60 to 1.65 (0.0630 to 0.0650)



TM574

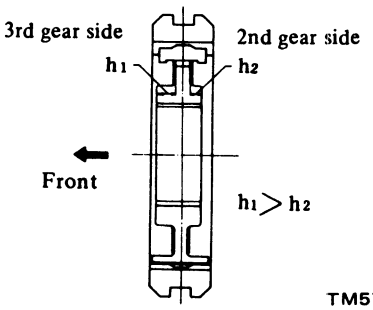
Fig. MT-42 Installing snap ring

Available snap ring

Thickness mm (in)
1.49 to 1.55 (0.0587 to 0.0610)
1.56 to 1.62 (0.0614 to 0.0638)
1.62 to 1.68 (0.0638 to 0.0661)
1.68 to 1.74 (0.0661 to 0.0685)
1.74 to 1.80 (0.0685 to 0.0709)
1.80 to 1.86 (0.0709 to 0.0732)
1.86 to 1.92 (0.0732 to 0.0756)

3. Install the following parts on mainshaft in the order listed: 3rd gear needle roller bearing, 3rd gear, 3rd gear baulk ring, 2nd & 3rd speed synchronizer. Then fit 2nd gear bushing onto mainshaft and mainshaft bearing thrust washer by lightly tapping with soft hammer.
4. Install 2nd gear baulk ring, needle bearing, 2nd gear, steel ball and thin thrust washer.

Note: Assemble 2nd & 3rd speed synchronizer, paying attention to its direction. See Figure MT-43.



TM576

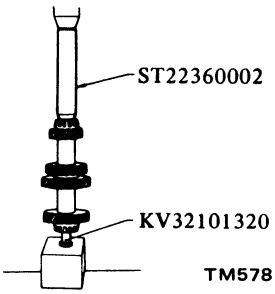
Fig. MT-43 Installing 2nd & 3rd speed synchronizer

Main drive gear

1. Press main drive bearing onto the shaft of main drive gear using Mainshaft Bearing Drift ST22452000. 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 a new thicker snap ring that will eliminate end play.

Counter gear

1. Press counter gear front bearing onto counter gear using Drift ST22360002.
2. Press counter gear rear bearing onto counter gear using Drift ST22360002 and Adapter KV32101320.



TM578

Fig. MT-44 Installing counter gear rear bearing

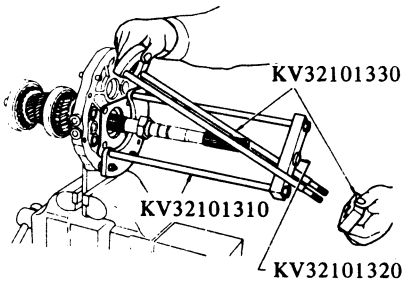
Reverse idler gear

Assemble reverse idler gear assembly.

Note: When positioning thrust washers on shaft, make sure that the brown surfaces are facing toward gears.

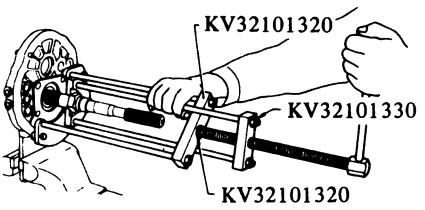
Gear assembly

1. Attach Setting Plate Adapter ST22490000 to adapter plate and place it in a vise.
2. Place mainshaft assembly into adapter plate assembly. Place mainshaft nut onto mainshaft.
3. Pull mainshaft assembly into adapter plate using Mainshaft Puller KV32101310, Mainshaft Rear Bearing Puller KV32101330 and Adapter KV32101320 until the thrust washer-to-bearing clearance reaches approximately 10 mm (0.39 in).



TM579

Fig. MT-45 Setting special tools



TM580

Fig. MT-46 Installing mainshaft assembly

4. 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.

Assemble counter gear assembly on mainshaft and main drive gear.

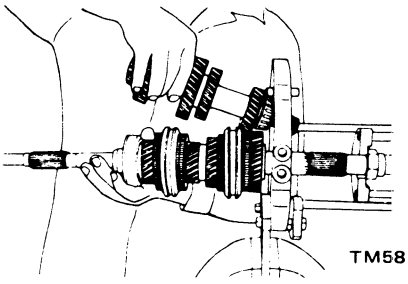


Fig. MT-47 Installing main drive gear and counter gear

5. Pull mainshaft assembly into adapter plate together with main drive gear and counter gear.

CAUTION:
When installing mainshaft, hold gears carefully by hand and do not drop gears on floor.

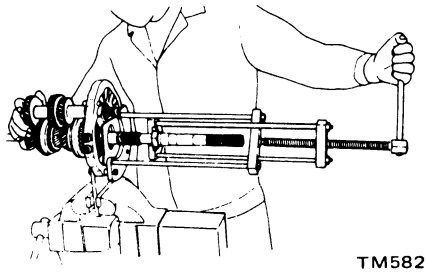


Fig. MT-48 Installing mainshaft assembly

6. Press 1st counter gear onto counter shaft using Drift ST22360002 and Adapter KV32101320.

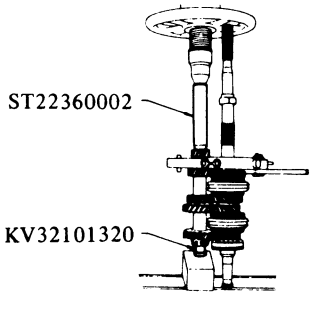


Fig. MT-49 Installing 1st counter gear

7. Place spacer on the rear end of 1st counter gear and secure it with a new snap ring.
8. Install the following parts to the rear of mainshaft in the order listed: Steel ball, thick thrust washer, 1st gear bushing, needle bearing, 1st gear, 1st gear baulk ring, 1st synchronizer together with reverse main gear, steel ball, speedometer drive gear and mainshaft nut.

Tighten mainshaft nut temporarily.

9. With 1st and 2nd gears doubly engaged, tighten mainshaft nut to the converted torque "C" (See Figure MT-50) using Wrench ST22520000.

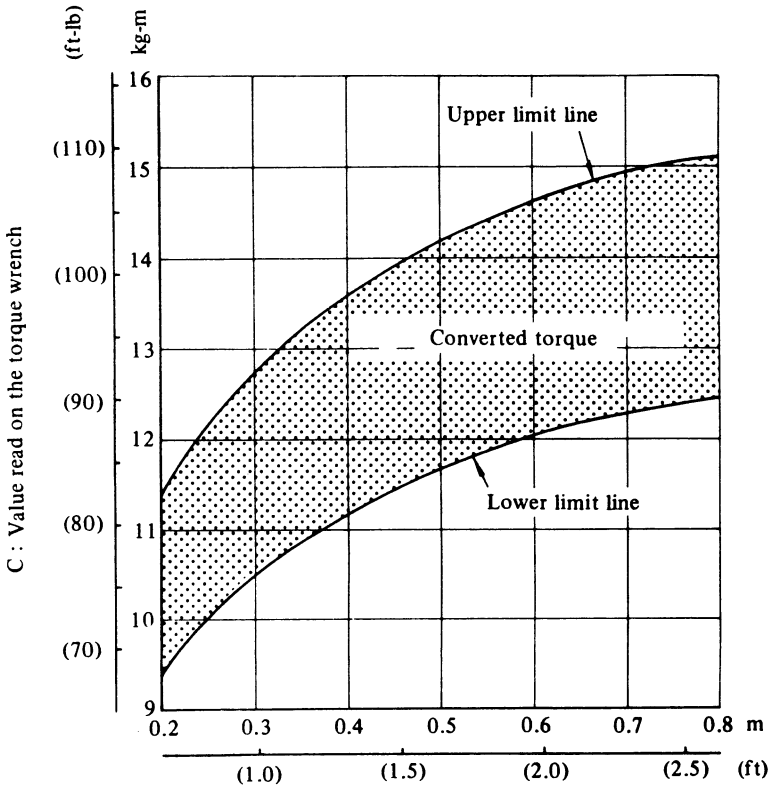


Fig. MT-50 Converted torque

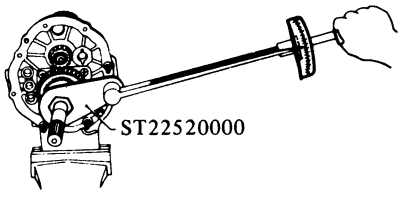


Fig. MT-51 Tightening mainshaft nut

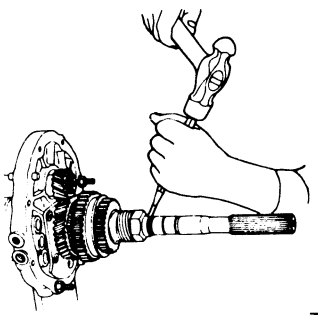


Fig. MT-52 Staking mainshaft nut

Stake mainshaft nut to groove of mainshaft with a punch. See Figures MT-51 and MT-52.

Explanation of converted torque

Mainshaft nut should be tightened to 14.0 to 17.0 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:

$$C \text{ kg-m} = 14 \times \left(\frac{L}{L + 0.1}\right) \text{ to } 17 \times \left(\frac{L}{L + 0.1}\right)$$

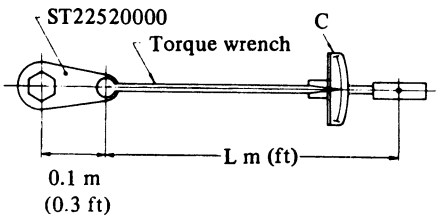
or

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

Where,

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

L: Effective length of torque wrench m (ft)



TM587

Fig. MT-53 Setting wrench

Example,

When a 0.4 m-long torque wrench is used, the "C" in Figure MT-50 will be 11.2 to 13.6 kg-m (81 to 98 ft-lb).

10. Measure gear end play.

Make sure that they are held within the specified values.

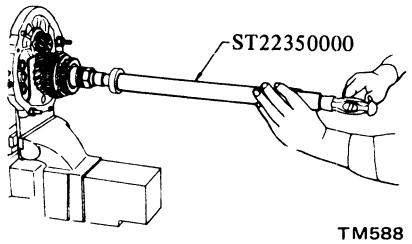
For details, refer to Page MT-11 for Inspection.

11. Fit 1.1 mm (0.043 in) thick snap ring to the front side of mainshaft end bearing.

12. Install mainshaft end bearing using Bearing Drift ST22350000. Fit thick snap ring to the rear side of bearing to eliminate end play.

Available snap ring.

Thickness mm (in)
1.1 (0.043)
1.2 (0.047)
1.3 (0.051)
1.4 (0.055)



TM588

Fig. MT-54 Installing mainshaft end bearing

13. Install reverse idler gear assembly.

Shift forks and fork rods

1. Place three(3) shift forks in groove in each coupling sleeve. Be careful not to drop off shift forks.

2. Install 1st & reverse fork rod through 1st & reverse shift fork and adapter plate.

Secure 1st & reverse fork rod to shift fork with new retaining pin.

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

Align center notch in 1st & reverse fork rod with check ball.

Note: Ball plug for 1st & reverse fork rod is longer than those for 2nd & 3rd fork rod and 4th & 5th fork rod. See Figure MT-13.

4. Install interlock plunger on adapter plate. See Figure MT-13.

5. Install 2nd & 3rd fork rod through adapter plate, 2nd & 3rd shift fork and 4th & 5th shift fork, and secure with new retaining pin.

6. Install check ball and check ball spring.

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

Align center notch in 2nd & 3rd fork rod with check ball.

7. Install interlock plunger on adapter plate.

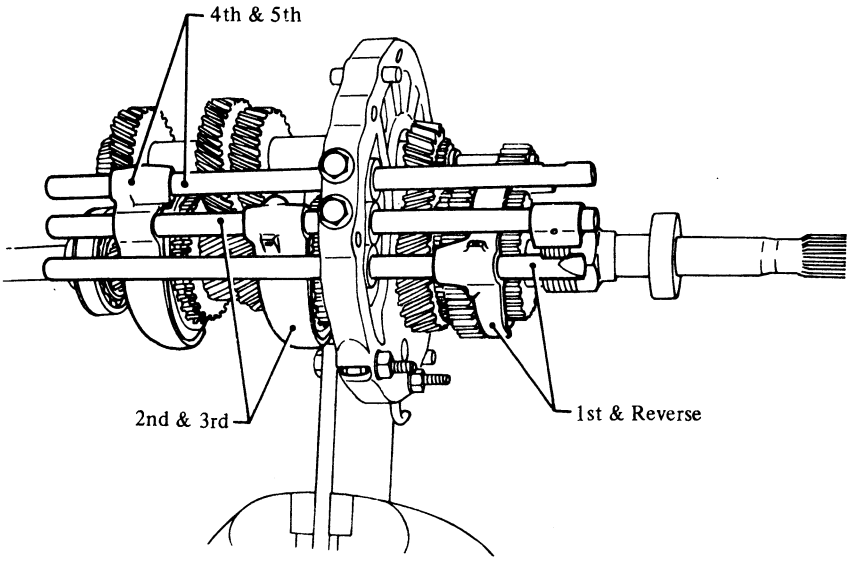
8. Install 4th & 5th fork rod through adapter plate and 4th & 5th shift fork, and secure with new retaining pin.

9. Install check ball and check ball spring.

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

10. Torque each check ball plug to 1.6 to 2.2 kg-m (12 to 16 ft-lb).

11. Apply gear oil to all sliding surfaces and check to see that shift rods operate correctly and gears engage smoothly.



TM589

Fig. MT-55 Installing shift forks and fork rods

TRANSMISSION ASSEMBLY

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 5th positions, gradually slide rear extension onto adapter plate.

Note:

a. **Use care when installing, not to come shift arm off striking lever pin.**
b. **Install shift arm onto 4th & 5th fork rod, and then fit striking lever pin into other fork rods.**

3. Check to see that shift rods operate correctly.

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 presses against adapter plate.

Carefully install main drive bearing and countershaft front bearing.

Make certain that mainshaft rotates freely.

3. Install washers and through-bolts and tighten to 1.3 to 1.8 kg-m (9 to 13 ft-lb).

4. Fit main drive bearing snap ring to groove in main drive bearing by using Expander.

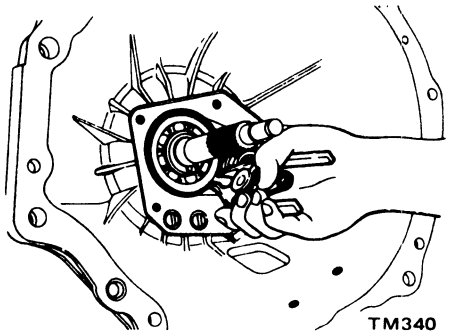


Fig. MT-56 Fitting main drive bearing snap ring

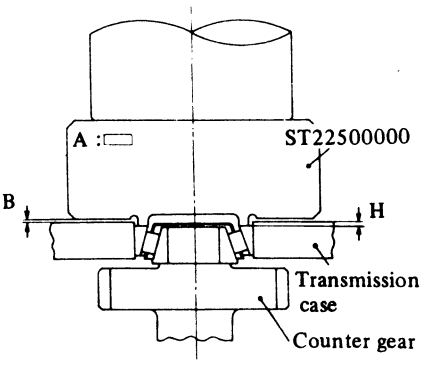
Front cover assembly

1. Select countershaft front bearing shim as follows:

(1) Support transmission assembly with its front side up.

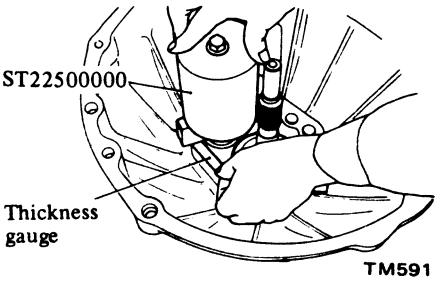
(2) Place Counter Bearing Setting Gauge ST22500000 on countershaft front bearing, and turn main drive shaft until bearing is settled down.

(3) Measure the clearance (B) between the setting gauge and the front end of transmission case, using a thickness gauge.



TM590

Fig. MT-57 Adjusting countershaft front bearing shim



TM591

Fig. MT-58 Measuring clearance

(4) The depth (H) can be obtained from the following formula:

$H = A - B$

Where,

H: Depth from front end of transmission case to countershaft front bearing. mm (in)
A: Figure marked on the setting gauge mm (in)
B: Measured value using thickness gauge mm (in)

(5) Select a shim of thickness "H" measured.

Available shim

"H" mm (in)	Thickness of countershaft front bearing shim mm (in)
1.185 to 1.210 (0.0467 to 0.0476)	1.200 (0.0472)
1.210 to 1.235 (0.0476 to 0.0486)	1.225 (0.0482)
1.235 to 1.260 (0.0486 to 0.0496)	1.250 (0.0492)
1.260 to 1.285 (0.0496 to 0.0506)	1.275 (0.0502)
1.285 to 1.310 (0.0506 to 0.0516)	1.300 (0.0512)
1.310 to 1.335 (0.0516 to 0.0526)	1.325 (0.0522)
1.335 to 1.360 (0.0526 to 0.0535)	1.350 (0.0531)
1.360 to 1.385 (0.0535 to 0.0545)	1.375 (0.0541)
1.385 to 1.410 (0.0545 to 0.0555)	1.400 (0.0551)
1.410 to 1.435 (0.0555 to 0.0565)	1.425 (0.0561)
1.435 to 1.460 (0.0565 to 0.0575)	1.450 (0.0571)
1.460 to 1.485 (0.0575 to 0.0585)	1.475 (0.0581)
1.485 to 1.510 (0.0585 to 0.0594)	1.500 (0.0591)
1.510 to 1.535 (0.0594 to 0.0604)	1.525 (0.0600)
1.535 to 1.560 (0.0604 to 0.0614)	1.550 (0.0610)
1.560 to 1.585 (0.0614 to 0.0624)	1.575 (0.0620)
1.585 to 1.610 (0.0624 to 0.0634)	1.600 (0.0630)
1.610 to 1.635 (0.0634 to 0.0644)	1.625 (0.0640)
1.635 to 1.660 (0.0644 to 0.0654)	1.650 (0.0650)

Example,

A = 1.75 mm, B = 0.22 mm

H = A – B
= 1.75 – 0.22
= 1.53 mm

The correct shim is 1.525 mm thick.

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

Apply grease to shim selected to retain it on countershaft front bearing; install front cover to transmission case. Apply sealant to both surfaces of front cover and transmission case before installation.

Install through-bolts with washers under them and tighten to 1.3 to 1.8 kg-m (9 to 13 ft-lb) torque.

Apply sealant to threads of through-bolts before installation.

3. Apply grease to reverse select return plunger; install it in rear extension.

Install reverse select return springs, and install reverse select return plug with sealant in place and tighten to 0.8 to 1.0 kg-m (5.8 to 7.2 ft-lb).

4. 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 0.32 to 0.44 kg-m (2.3 to 3.2 ft-lb).

5. Install back-up lamp switch and tighten to 2.0 to 3.0 kg-m (14 to 22 ft-lb).

6. 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.

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

INSTALLATION

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

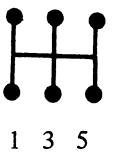
1. Before installing, clean mating surfaces of engine rear plate and transmission case.

2. Before installing, lightly apply grease to spline parts of clutch disc and main drive gear.

3. Remove filler plug and fill transmission with recommended gear oil to the level of the plug hole. [Approximately 1.7 liters (3 ⅝ US pt, 3 Imp pt)].

SERVICE DATA AND SPECIFICATIONS

GENERAL SPECIFICATIONS

Transmission type	FS5W63A
No. of speeds	5
Synchromesh type	Warner
Control system	Floor shift
Shift pattern	
Gear ratio	
1st	3.382
2nd	2.013
3rd	1.312
4th	1.000
5th	0.854
Reverse	3.570
Speedometer gear ratio	
Standard	17/5
Final gear ratio	3.889
Oil capacity liters (US pt, Imp pt)	1.7 (3⅝, 3)

TIGHTENING TORQUE

Installation

Engine to transmission installation bolt	kg-m (ft-lb)	3.7 to 5.0 (27 to 36)
Engine rear plate to transmission installation bolt	kg-m (ft-lb)	0.32 to 0.44 (2.3 to 3.2)
Clutch operating cylinder installation bolt	kg-m (ft-lb)	3.1 to 4.1 (22 to 30)
Rear mounting insulator to transmission installation bolt	kg-m (ft-lb)	2.6 to 3.2 (19 to 23)
Crossmember mounting bolt	kg-m (ft-lb)	3.2 to 4.0 (23 to 29)
Starter motor to transmission installation bolt	kg-m (ft-lb)	3.0 to 4.0 (22 to 29)
Propeller shaft to diff. installation bolt	kg-m (ft-lb)	2.4 to 3.3 (17 to 24)

Gear assembly

Rear extension installation bolt	kg-m (ft-lb)	1.3 to 1.9 (9 to 14)
Front cover installation bolt	kg-m (ft-lb)	1.3 to 1.8 (9 to 13)
Speedometer pinion installation bolt	kg-m (ft-lb)	0.32 to 0.44 (2.3 to 3.2)
Back-up lamp switch	kg-m (ft-lb)	2.0 to 3.0 (14 to 22)
Top switch	kg-m (ft-lb)	2.0 to 3.0 (14 to 22)
Neutral switch	kg-m (ft-lb)	2.0 to 3.0 (14 to 22)
Gear oil filler plug	kg-m (ft-lb)	2.5 to 3.5 (18 to 25)
Gear oil drain plug	kg-m (ft-lb)	2.5 to 3.5 (18 to 25)
Withdrawal lever ball pin	kg-m (ft-lb)	3.0 to 5.0 (22 to 36)
Striking lever lock pin	kg-m (ft-lb)	0.9 to 1.2 (6.5 to 8.7)
Striking lever pin	kg-m (ft-lb)	0.33 to 0.45 (2.4 to 3.3)
Check ball plug	kg-m (ft-lb)	1.6 to 2.2 (12 to 16)
Bearing retainer to adapter plate screw	kg-m (ft-lb)	0.8 to 1.3 (5.8 to 9.4)
Mainshaft lock nut	kg-m (ft-lb)	14.0 to 17.0 (101 to 123)
Return spring plug	kg-m (ft-lb)	0.8 to 1.0 (5.8 to 7.2)
Shift arm bracket	kg-m (ft-lb)	8.2 to 10.0 (59 to 72)

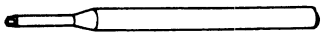
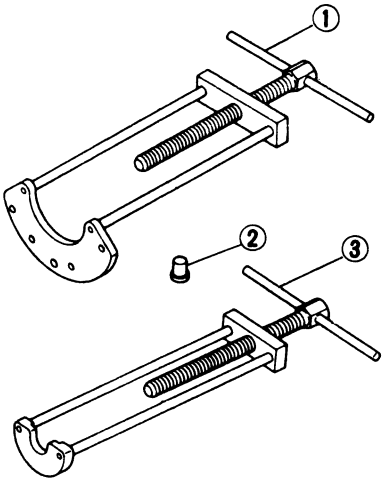
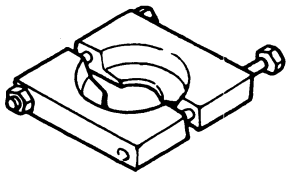
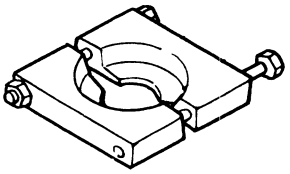
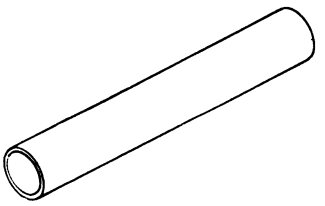
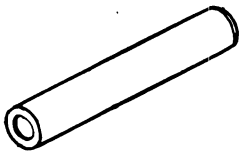
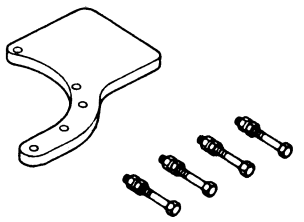
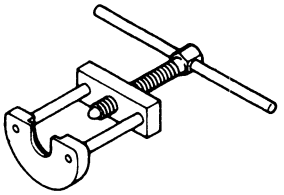
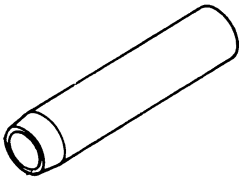
SPECIFICATIONS

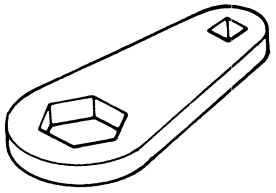
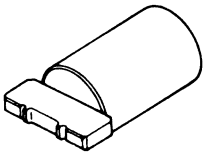
Gear backlash		
1st, 2nd, 3rd, OD, Reverse and Drive	mm (in)	0.05 to 0.20 (0.0020 to 0.0079)
Gear end play		
1st gear	mm (in)	0.27 to 0.37 (0.0106 to 0.0146)
2nd gear	mm (in)	0.20 to 0.30 (0.0079 to 0.0118)
3rd gear	mm (in)	0.05 to 0.15 (0.0020 to 0.0059)
5th gear	mm (in)	0.05 to 0.15 (0.0020 to 0.0059)
Reverse idler	mm (in)	0.15 to 0.40 (0.0059 to 0.0157)
Clearance between baulk ring and gear	mm (in)	1.20 to 1.50 (0.0472 to 0.0591)

TROUBLE DIAGNOSES AND CORRECTIONS

Condition	Probable cause	Corrective action
Difficult to intermesh gears Causes for difficult gear shifting are classified to malfunctions 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. Worn or damaged synchronizer.	Replace. Repair or replace. Replace.
Gear slips out of mesh. In most cases, this malfunction occurs, when interlock plunger, check ball, and/or spring is worn or weakened, or when control system is inoperative. In this case, the malfunction cannot be corrected by replacing gears, and therefore, trouble diagnoses 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 plunger. 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, as a rear extension housing assembly.

SPECIAL SERVICE TOOLS

Tool number & tool name	Kent-Moore No. / Reference page or Fig. No.	Tool number & tool name	Kent-Moore No. / Reference page or Fig. No.
ST23540000 Fork rod pin punch 	J 25689 Fig. MT-12	KV321013S0 Puller set ① KV32101310 Mainshaft puller ② KV32101320 Adapter ③ KV32101330 Bearing puller 	——— Fig. MT-15 Fig. MT-19 Fig. MT-20 Fig. MT-26 Fig. MT-44 Fig. MT-45 Fig. MT-46 Fig. MT-49
ST30031000 Bearing puller 	J 25733-1 Fig. MT-21 Fig. MT-24		
ST22730000 Bearing puller 	J 25681 Fig. MT-26 Fig. MT-27	ST22452000 Mainshaft bearing drift 	———
ST22350000 Mainshaft bearing drift 	J 25678 Fig. MT-54	ST22490000 Setting plate adapter 	——— Fig. MT-11 Page MT-13
ST22480000 Gear puller 	——— Fig. MT-18	ST22360002 Bearing drift 	J 25679 Fig. MT-44 Fig. MT-49

Tool number & tool name	Kent-Moore No. / Reference page or Fig. No.	Tool number & tool name	Kent-Moore No. / Reference page or Fig. No.
ST22520000 Wrench 	——— / Fig. MT-51 Fig. MT-53	ST22500000 Counter bearing setting tool 	——— / Fig. MT-57 Fig. MT-58