

Manual Transmission (M2S5,M3S5)

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Manual Transmission

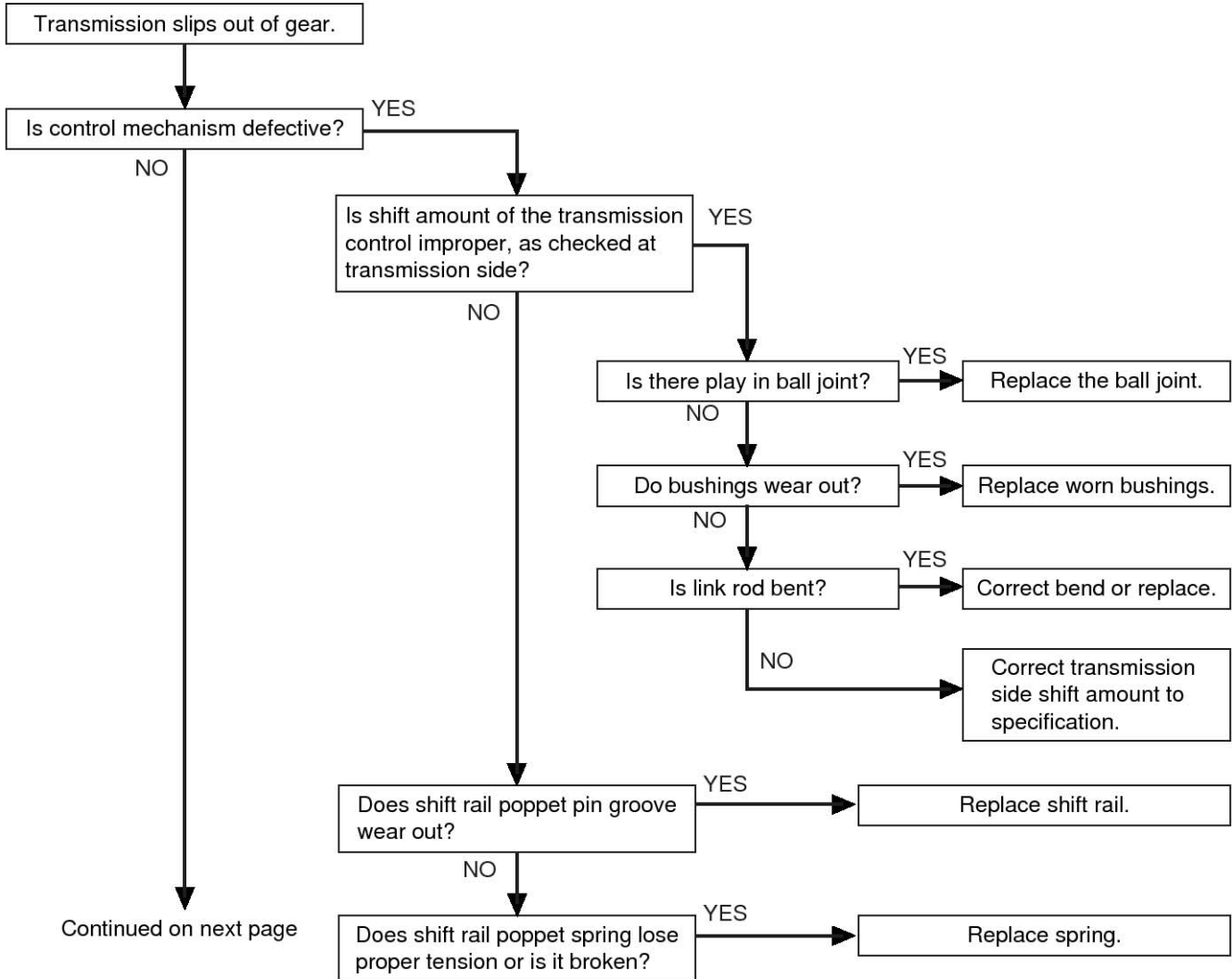
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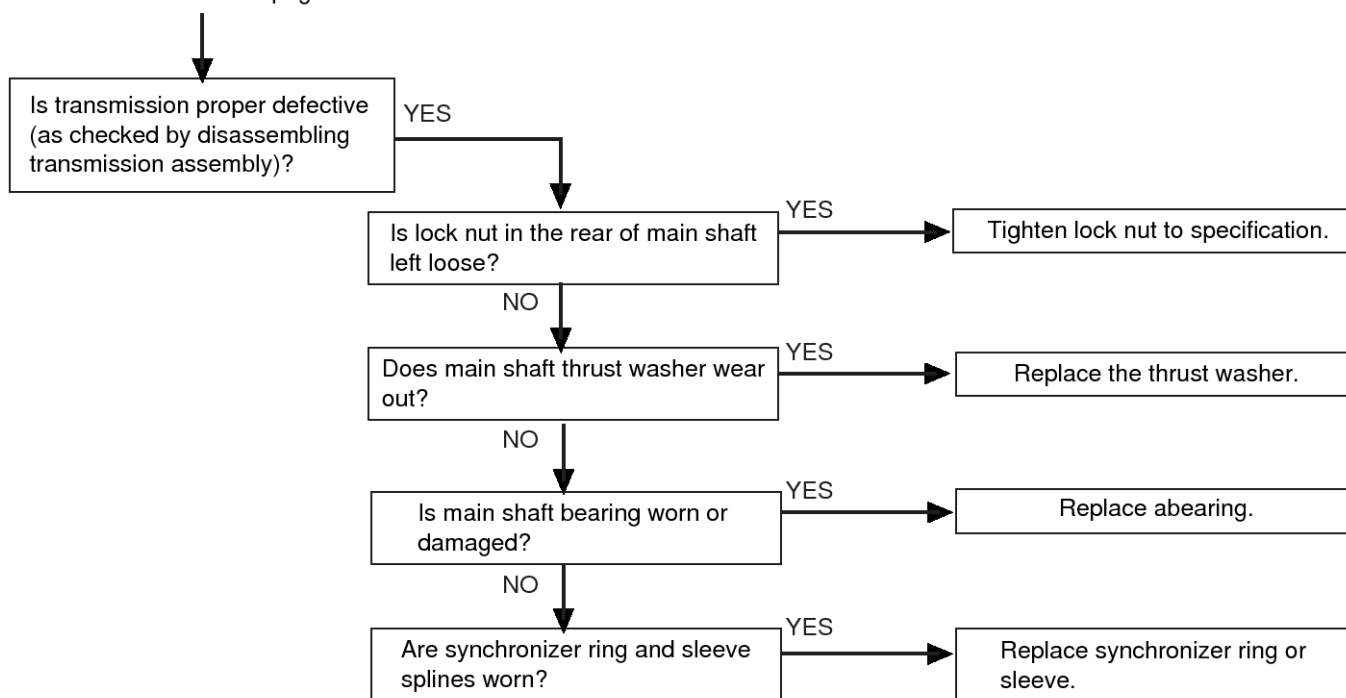
Manual Transmission

General

TROUBLESHOOTING



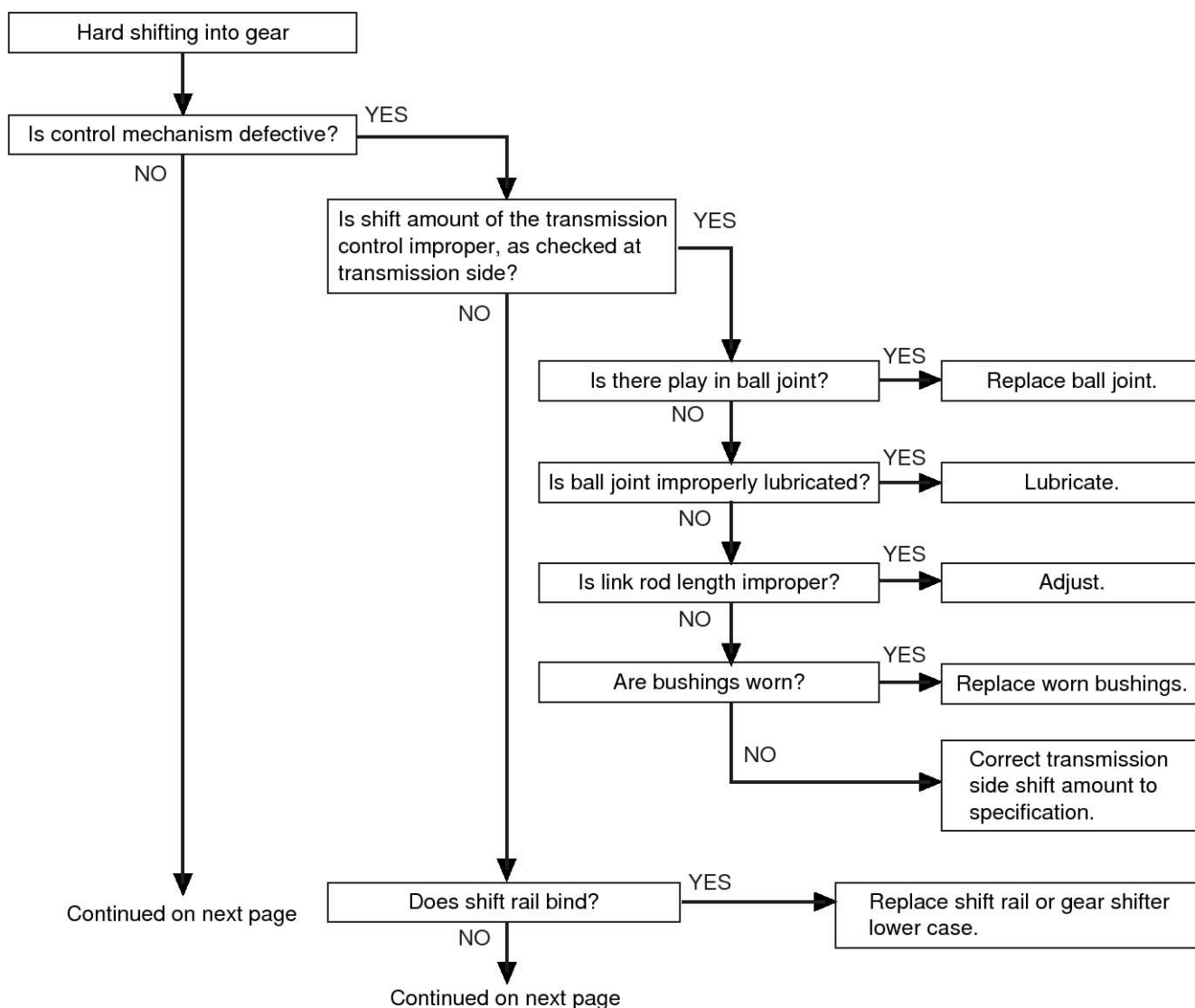
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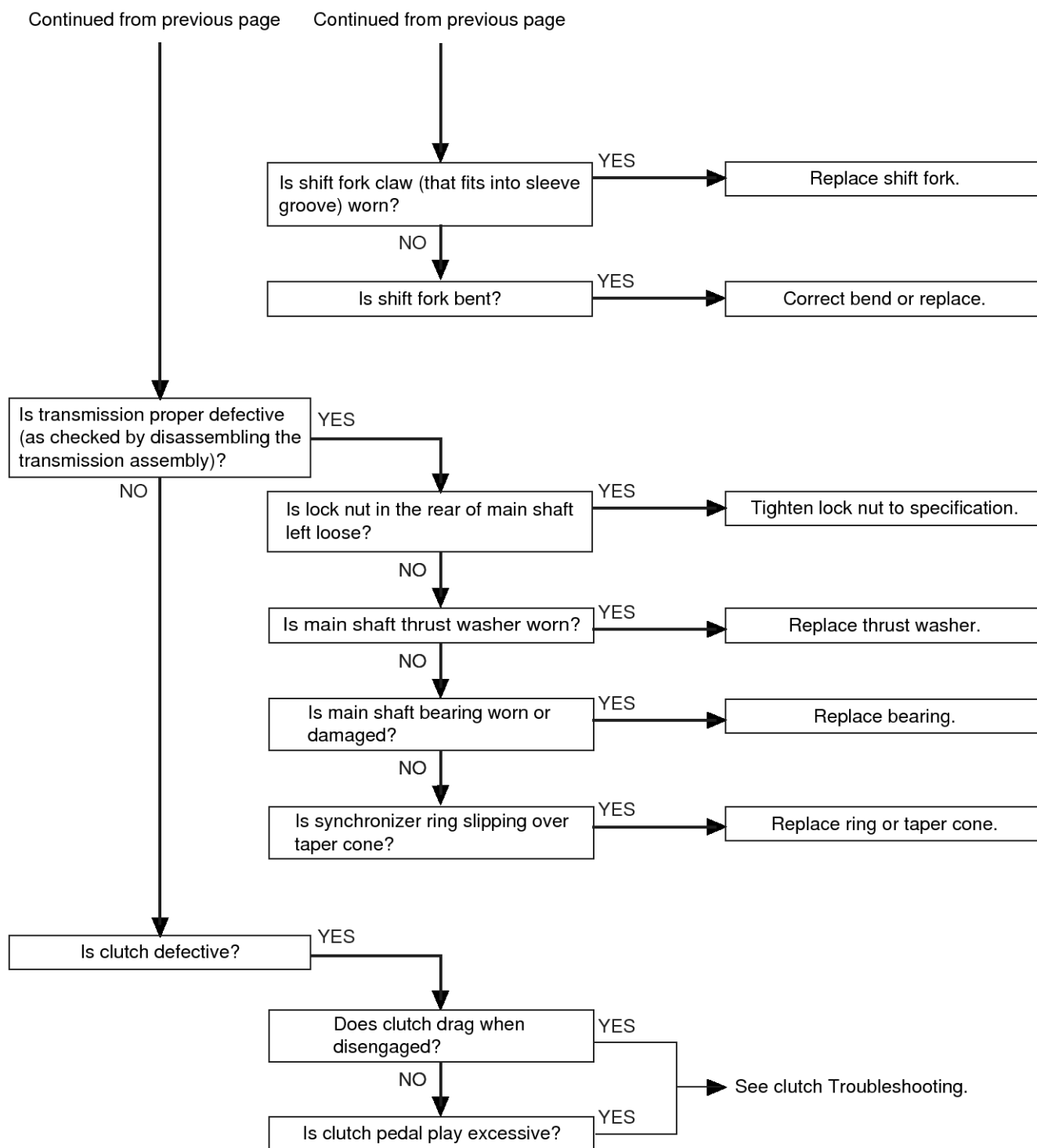
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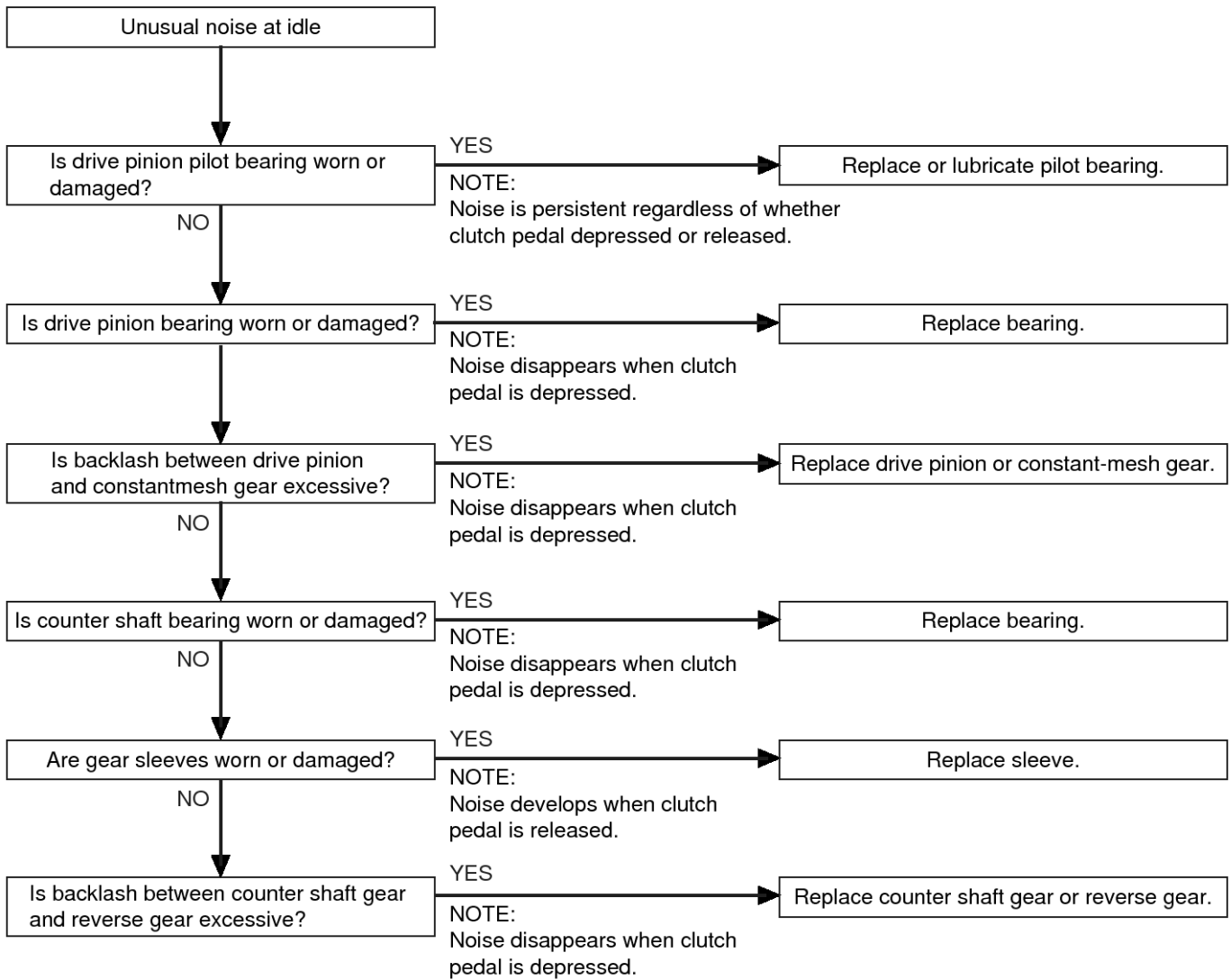
General

MTA-5



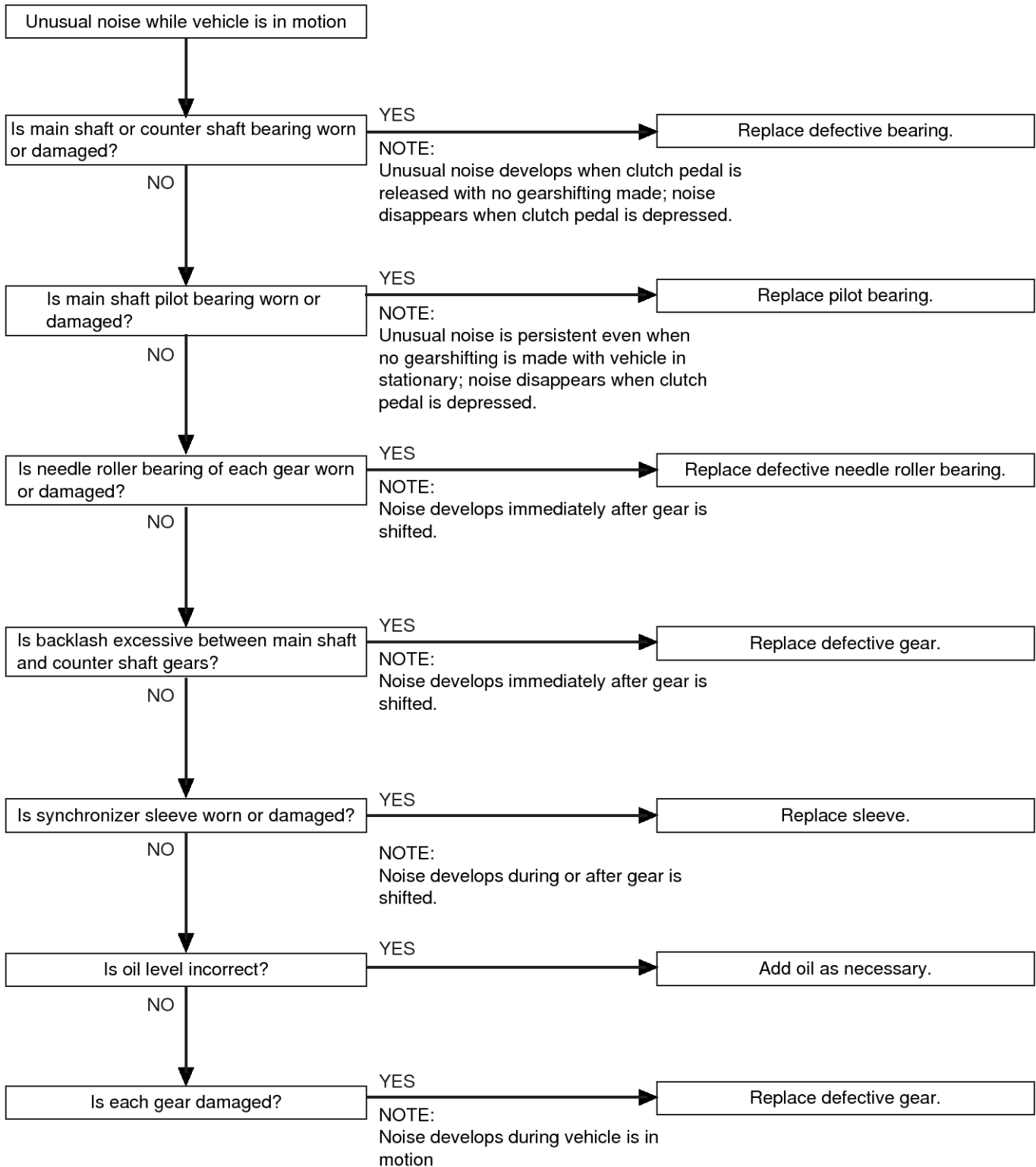
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Manual Transmission



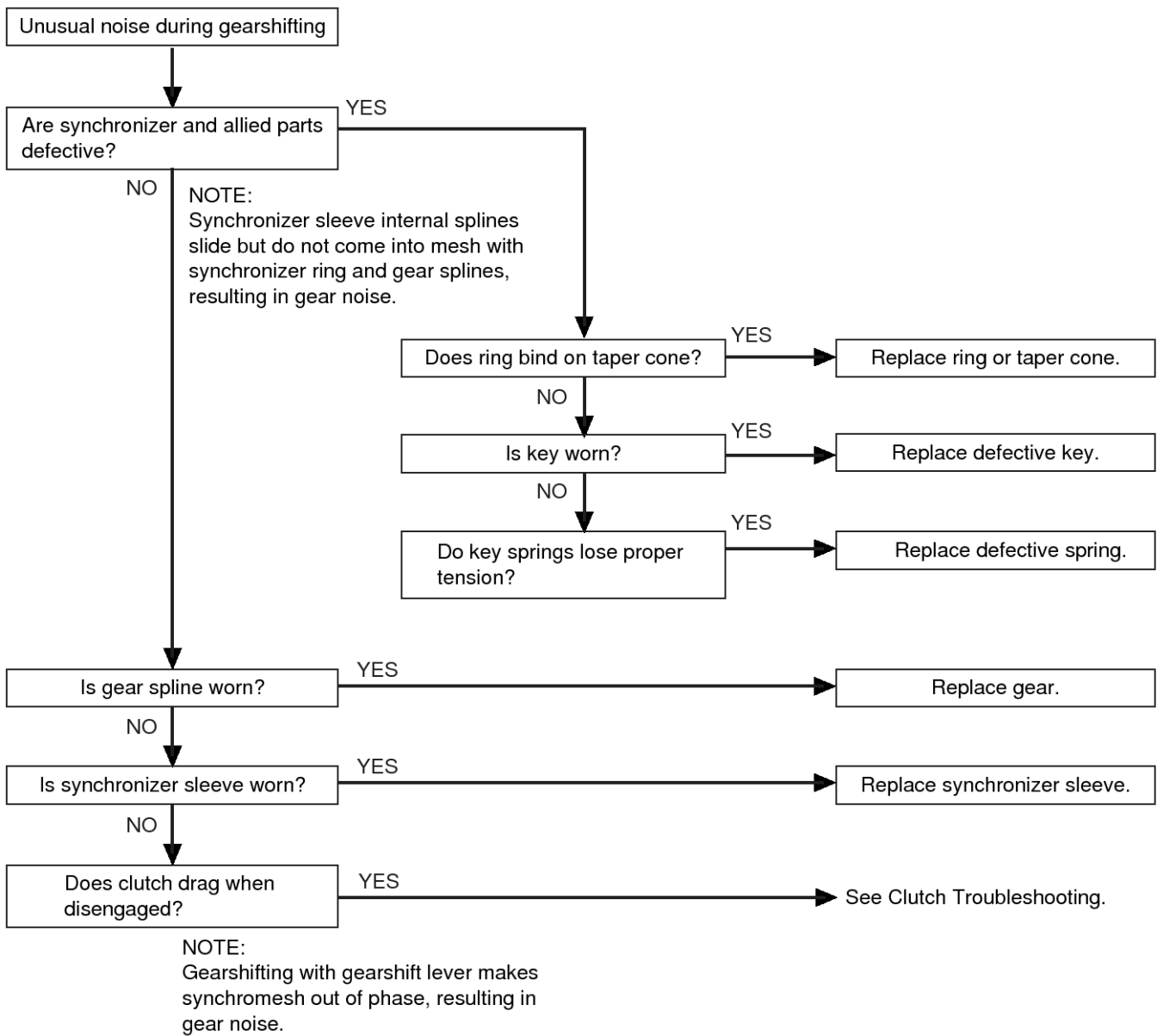
General

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Manual Transmission



General

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Specifications

Item		M2S5	M3S5
Gear ratio	First	5.494	5.181
	Second	2.836	2.865
	Third	1.592	1.593
	Fourth	1.000	1.000
	Fifth	0.746	0.739
	Reverse	5.494	5.181
Transmission gear oil		API GL-4 80W 90	
		API GL-4 SAE 90 (Tropics)	
Oil quantity (ℓ)		4.0, 4.5(with PTO)	3.4, 3.9(with PTO)
Gear backlash (mm.)	1ST	0.035~0.196	0.032~0.163
	2ND	0.038~0.214	0.039~0.214
	3RD	0.033~0.196	0.034~0.196
	4TH	0.041~0.215	0.030~0.190
	5TH	0.04~0.213	0.042~0.208
	REV.(C/S ~ Rev.Idler)	0.034~0.201	0.034~0.201
	REV.(Rev.Idler~M/S)	0.047~0.228	0.047~0.228
End play (mm.)	1ST	0.031~0.460	0.031~0.460
	2ND	0.031~0.610	0.031~0.610
	3RD	0.160~0.460	0.160~0.460
	4TH	-	-
	5TH	0.210~0.560	0.210~0.560
	REV.(C/S ~ Rev.Idler)	0.200~0.500	0.200~0.500
	REV.(Rev.Idler~M/S)	0.160~0.460	0.160~0.460
Radial clearance (mm.)	1ST	0.023~0.057	0.023~0.061
	2ND	0.023~0.057	0.023~0.061
	3RD	0.024~0.060	0.024~0.060
	REV	0.044~0.080	0.044~0.080

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Manual Transmission

Service Standards

Description			Nominal value (Basic diameter in [J])	Limit	Correction and r- emarks
Clearance in diametric direction of drive pinion pilot bearing after assembly			0.016 ~ 0.064	0.12	Replace
Reverse gear to reverse shaft clearance			[24] 0.05 ~ 0.09	0.2	Replace
Synchronizer	Synchronizer back to gear clearance		1.67 ~ 1.87	0.2 or less	Replace
	Synchronizer hub groove to shifting key clearance		0.05 ~ 0.20	0.5	Replace
	Synchronizer ring key way to shifting key clearance	4th & O.D.	4.33 ~ 4.53	5.3	
		2nd & 3rd	4.75 ~ 4.95		
		1st & Rev.	4.75 ~ 4.95	5.8	
	Shifting key spring free length		5.39	5.16	Replace
Gear shifter lower & upper case	Side clearance between shift fork and synchronizer sleeve groove		0.3 ~ 0.5	1.0	Replace
	Displacement of bar with respect to shift fork hole		0.1 or less	0.2	
	Shift rail bend	1st & Rev.	0.02 or less	0.03	Replace or correction
		2nd & 3rd			
		4th & O.D.	0.03 or less	0.04	
	Shift rail to gear shift lower case hole clearance		[16] 0.05 ~ 0.09	0.2	Replace
	Lower case poppet spring free length		24.85	23.8	Replace
	Torsion shaft return spring free length	1st & Rev.	49.7	45.1	
		4th & O.D.	32.9	30.9	
Speedometer gear	Speedometer gear shaft to bushing clearance		[12] 0.02 ~ 0.07	0.15	Replace
	Speedometer gear end to rear cover clearance	Rear cover	[6] 0.03 ~ 0.34	0.6	

unit : mm

General

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Tightening Torque Table

Description		Tightening Torque			Remarks
		Nm	kgf.m	lb-ft	
Transmission proper	Transmission (clutch housing) and engine (flywheel housing) mounting bolt	40	4.1	29.5	
		47	4.8	34.7	
		74	7.5	54.6	
	Exhaust pipe bracket mounting bolt	40	4.1	29.5	
	Power cylinder mounting bolt	47	4.8	34.7	
	Backup lamp switch installation	29 ~ 39	3.0 ~ 4.0	21.4 ~ 28.8	
	Speedometer bushing	83	8.5	61.2	
	Drain plug and inspection plug	54 ~ 83	5.5 ~ 8.5	39.8 ~ 61.2	Apply THREEBOND 105D or equivalent to threads
	Gearshift upper case mounting bolt	24	2.4	17.7	
	Gearshift lower case mounting bolt	24	2.4	17.7	
	Rear cover mounting bolt	40	4.1	29.5	
	Reverse shaft lock piece bolt	40	4.1	29.5	Apply THREEBOND 104J or equivalent to threads or upper 4 bolts
	Poppet spring screw plug	39	4.0	28.8	Apply THREEBOND 1215 or equivalent to threads
	Main shaft rear lock nut	245 ~ 345	25 ~ 35	180.7 ~ 254.5	
	Shift jaw set screw	29	3.0	21.4	
	Gear shift upper gear select lever tightening nut	69	0.7	50.9	
	Interlock switch	46 ~ 52	4.7 ~ 5.3	33.9 ~ 38.4	Apply THREEBOND 104J or equivalent to threads
	Clutch housing and transmission case mounting bolt	115	11.9	84.8	
	Rocker arm pivot	57	5.8	42.0	
	Rear plate mounting bolt	40	4.1	29.5	

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Manual Transmission

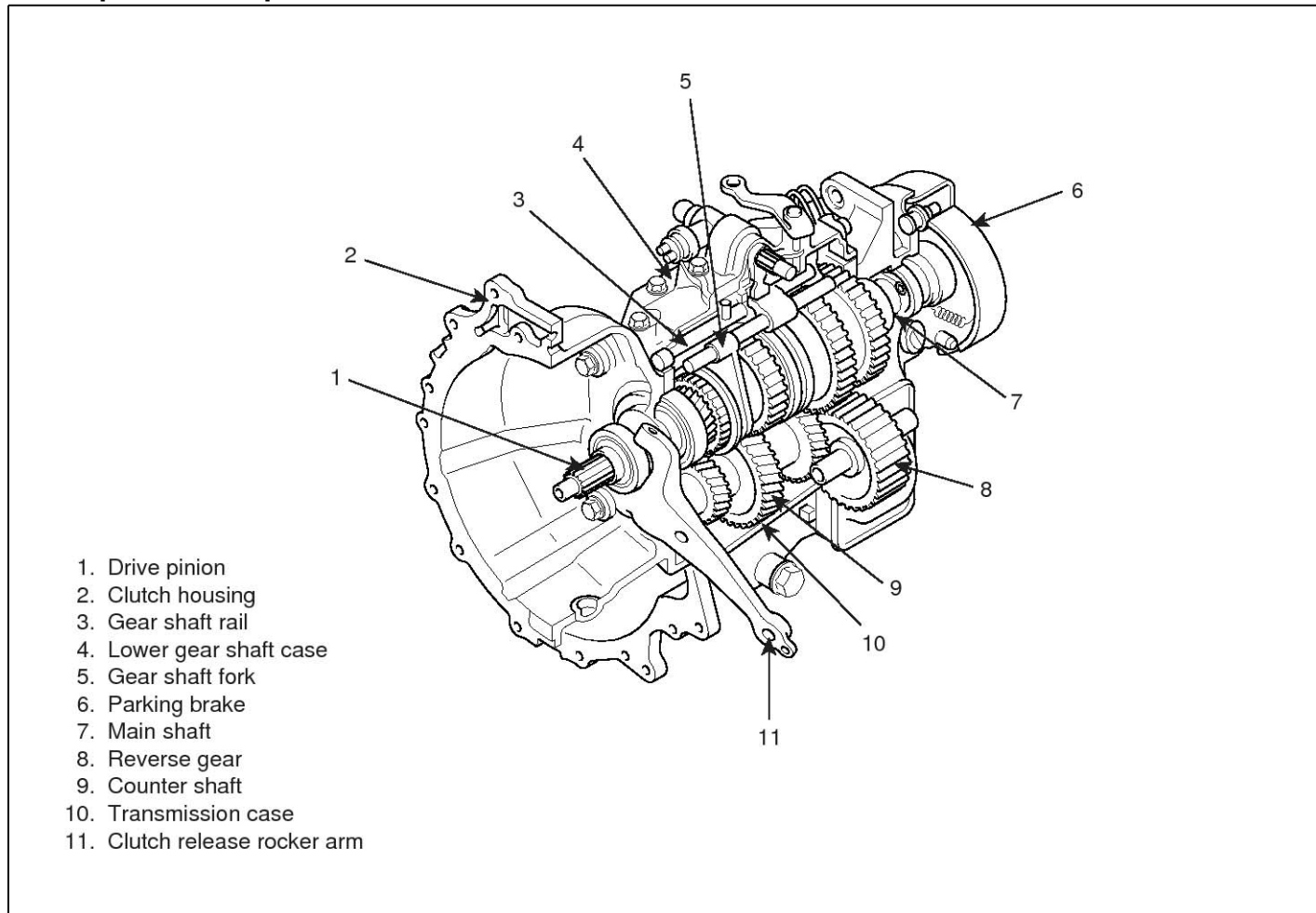
Description		Tightening Torque			Remarks
		Nm	kgf.m	lb-ft	
Transmission c-control	Change lever bracket mounting bolt and nut	9.8 ~ 15	1.0 ~ 1.5	7.2 ~ 11.1	
	Shift lever bracket and shift lever No. 2 mounting nut	27 ~ 34	2.8 ~ 3.5	19.9 ~ 25.1	
	Lever bracket and select lever No.2 mounting nut	27 ~ 34	2.8 ~ 3.5	19.9 ~ 25.1	
	Cross sleeve and change lever assembly mounting nut	34 ~ 54	3.5 ~ 5.5	25.1 ~ 39.8	
	Cross sleeve and change lever bracket	44 ~ 59	4.5 ~ 6.0	32.5 ~ 43.5	
	Select lever and change lever bracket mounting nut	8.8 ~ 14	0.9 ~ 1.4	6.5 ~ 10.3	
	Select lever No. 1 and change lever bracket mounting nut	27 ~ 34	2.8 ~ 3.5	19.9 ~ 25.1	

Manual Transmission

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Manual Transmission

Description and Operation



EMTTM5028A

The transmission converts the engine power to the rotation power required for driving a vehicle. The torque and the driving force are changed by shifting one gear. The transmission system can reverse the rotating direction of the engine for allowing backing a vehicle.

The transmission gears include the constant mesh gear, main shaft gear, and counter shaft gear, each of which evenly meshes with the drive pinion. Then rotational motion transmitted by the drive pinion to the constant mesh gear is then transmitted to the main shaft gear idling.

As the gearshift fork moves according to the gearshift lever action, the synchronizer sleeve becomes in mesh with the gear due to the synchromesh function. As a result, the rotation speed of the pinion changes and it is transmitted to the rear axle.

The constant mesh slide type is used between the 1st gear and the rear gear.

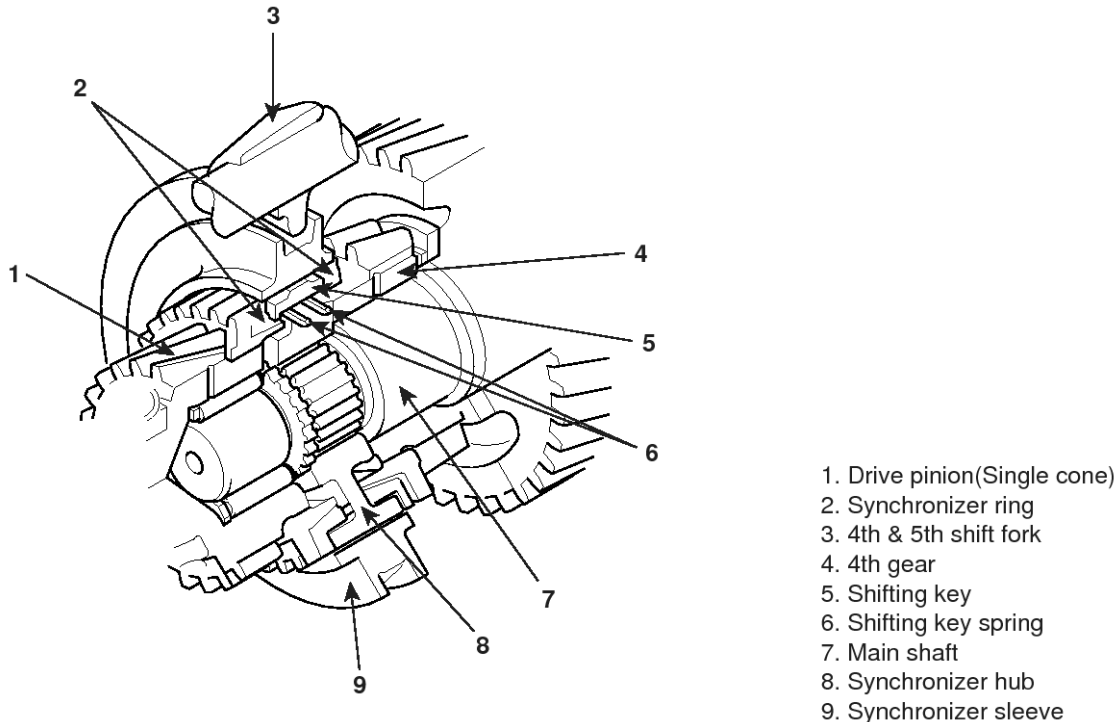
The interlock mechanism in the gearshift lower case prevents more than one gear to be engaged at a time.

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Manual Transmission

Synchro Mesh Mechanism

Single Cone type



EMTTM5029A

The 4th and 5th gear are described above. As well as the other gears have the same structures.

The synchronizer hub, whose inside diameter is the same size of the main shaft spline, rotates with the main shaft.

The spline, whose upper side is aligned with the synchronizer sleeve, and three separate keyways are on the circumference of the synchronizer hub. Into these keyways, the shifting key is fitted. The protrusion on the center of the shifting key enters into the groove inside the synchronizer sleeve at neutral position.

Due to the shifting key spring, it is forced down into the inside of the synchronizer sleeve.

Each synchronizer ring is inserted into the drive pinion in front and rear of the synchronizer hub and the taper cone part of the 4th gear respectively. A small screw is on the taper part inside the synchronizer ring.

The upper part of the spline on the circumference is aligned with the synchronizer sleeve.

On the side to the hub, there are three separate

keyways. The section of the shifting key is sunken and complex. The width of this keyway is larger than that of the shifting key.

This clearance allows the synchronizer ring to rotate smoothly against the synchronizer sleeve.

At neutral position (Fig. B), the synchronizer sleeve moves slightly to the left as the shift fork moves in a direction of the arrow shown in the figure. Since the upper part of the projection in the center of the shifting key is aligned with the synchronizer sleeve, it also moves slightly to the left. The synchronizer ring is pressed by the taper cone of the drive pinion (Fig. C).

In spite that the taper part of the synchronizer ring is contacted with the taper cone of the drive pinion, the clearance between the synchronizer ring and the shifting key is made due to the friction torque generated on the taper part by the action of the cone clutch, allowing the synchronizer ring to rotate in the same direction of the drive pinion rotation.

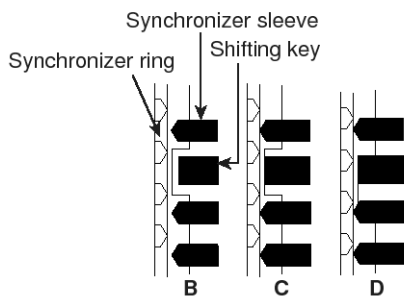
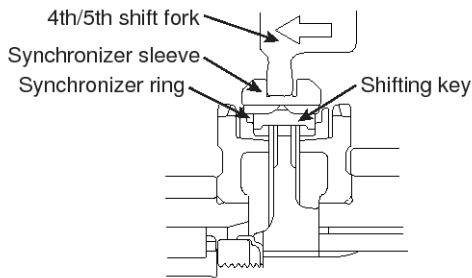
Manual Transmission

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The chamfered side of the synchronizer ring spline is cross-aligned with that of the synchronizer sleeve spline (Fig. D).

The crossing direction of the synchronizer ring is dependent on the rotation speed of the synchronizing part (sleeve) and the synchronized part (drive pinion).

For the increase of the vehicle speed, it crosses to the reverse direction of the rotation. For the decrease, it crosses to the rotating direction.



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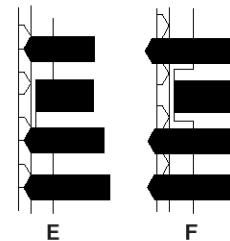
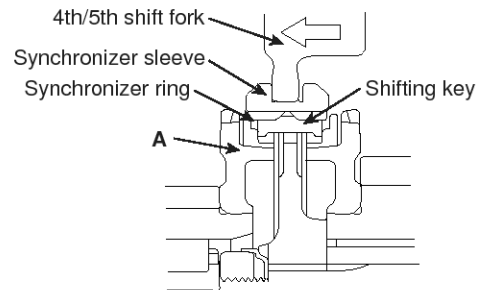
As the synchronizer ring moves to the left, the shifting key interrupts the further movement along the side of the synchronizer ring.

The synchronizer sleeve and the projection of the shifting key are not aligned with each other.

In case that the synchronizer ring deviates, the chamfered part of the synchronizer sleeve spline presses that of the synchronizer ring spline and then the taper cone of the drive pinion presses the synchronizer ring.

Due to the small friction torque on the taper surface, the speed of the synchronized part is relatively lower than that of the synchronizing part.

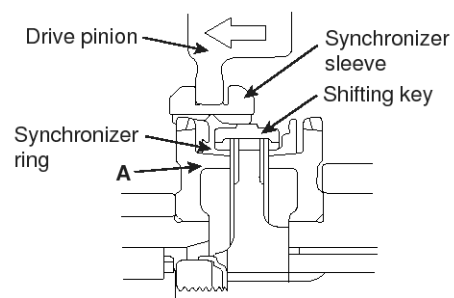
E : In synchronization, F : After synchronization



EMTTM5031A

As the synchronizer ring can no longer resist the movement of the synchronizer sleeve even though the synchronizer sleeve and the drive pinion rotate at a uniform speed, the synchronizer sleeve moves to the left again.

Smoothly it is aligned with the spline on the taper cone of the drive pinion to transmit the power.

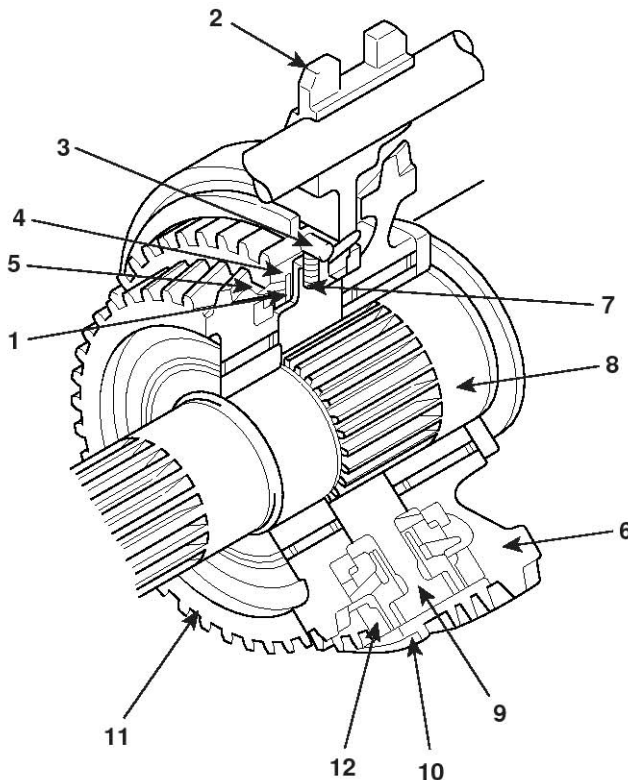


EMTTM5032A

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Manual Transmission

Double Cone Type



EMTTM5033A

The 2nd and 3rd gears are described below. The other gears have the same structure.

Basically, the structure and the operation of the synchromesh mechanism is the same as those of the synchro type. The taper cone independent from the 2nd/3rd gear inserts the synchronizer center cone (whose inner and outer surface are of the taper cone form) between the synchronizer inner ring and the synchronizer outer ring.

Due to such a structure, the synchro capacity is enhanced.

The center cone and the gear are perfectly fitted with each other while each of six projections on the circumference of the center cone fits in a gear hole respectively as the taper cone of the single cone type does.

As the cylindrical shifting key is longitudinally aligned with the circumference of the synchronizer hub, it is easier to assemble it. The shifting key spring includes the coil spring.

Insert the synchronizer hub into the hole.

Press the shifting key to the inside of the synchronizer sleeve with a force.

The 4th gear of the O/D is of the double cone type, however, the shifting key and the shifting key spring have the structure of the single cone type.

At neutral position (Fig. A), the synchronizer sleeve moves slightly to the left as the shift fork moves in a direction of the arrow shown in the figure. Since the upper part of the projection in the center of the shifting key is aligned with the synchronizer sleeve, it also moves slightly to the left. The synchronizer outer ring is pressed by the synchronizer center cone (Fig. B).

The taper part of the synchronizer outer ring is contacted with the taper cone of the synchronizer center cone.

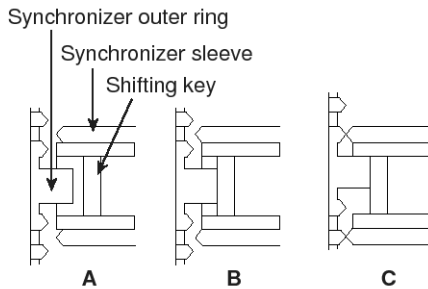
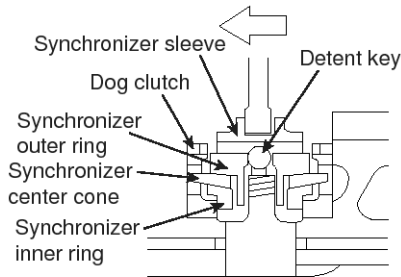
The clearance between the synchronizer outer ring and the synchronizer hub is made due to the friction torque generated on the taper part by the action of the cone clutch allows the synchronizer outer ring to rotate in the same direction of the 3rd gear rotation.

The chamfered side of the synchronizer outer ring spline

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is cross-aligned with that of the synchronizer sleeve spline (Fig. C).



EMTTM5034A

The crossing direction of the synchronizer outer ring is dependent on the rotation speed of the synchronizing part (sleeve) and the synchronized part (2nd gear).

For the increase of the vehicle speed, it crosses to the reverse direction of the rotation. For the decrease, it crosses to the rotating direction.

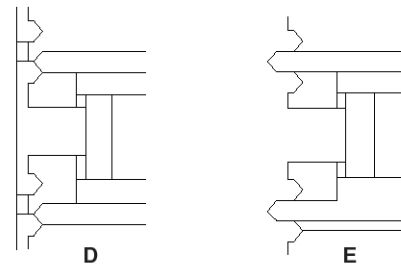
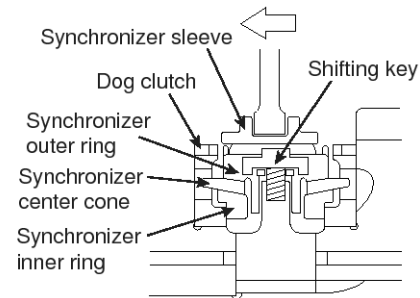
As the synchronizer sleeve moves to the left again, the shifting key interrupts the further movement along the side of the synchronizer outer ring.

The synchronizer sleeve and the upper part of the shifting key projection are not aligned with each other.

In case that the synchronizer outer ring deviates, the chamfered part of the synchronizer sleeve presses that of the synchronizer outer ring spline and then the taper cone of the synchronizer center cone presses the synchronizer outer ring with a large force, causing the generation of the friction torque on the taper surface.

Additionally, the friction torque is generated on the taper surface of the synchronizer inner ring, so the speed of the synchronized part is relatively lower than that of the synchronizing part.

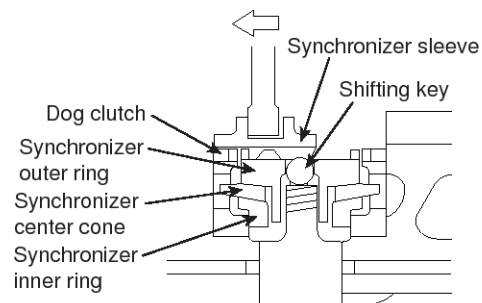
D : in synchronization, E : After synchronization



EMTTM5035A

As the synchronizer outer ring can no longer resist the movement of the synchronizer sleeve even though the synchronizer sleeve and the 2nd gear rotate at a uniform speed, the synchronizer sleeve moves to the left again.

Smoothly it is aligned with the dog clutch spline of the 3rd gear to transmit the power.



EMTTM5036A

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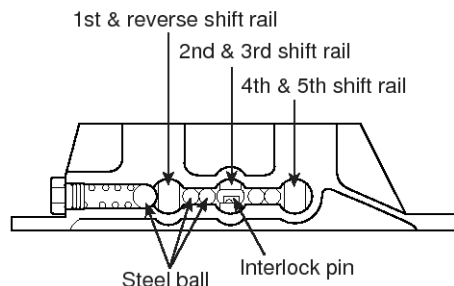
Interlock Mechanism

The interlock mechanism, which is installed in the gear shaft lower case, prevents the double mesh of a gear.

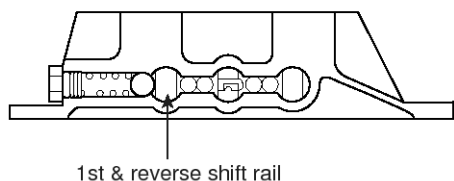
When a shift rail is shifted, the steel ball enters the shift rail groove to fix the other shift rails.

For example, when the 1st and reverse shift rail are shifted, the steel ball on the right of the shift rail moves to the right to fix the 2nd & 3rd shift rail and then it pushes the interlock pin B to fix the 4th & 5th shift rail.

<At neutral>



<At shifting>

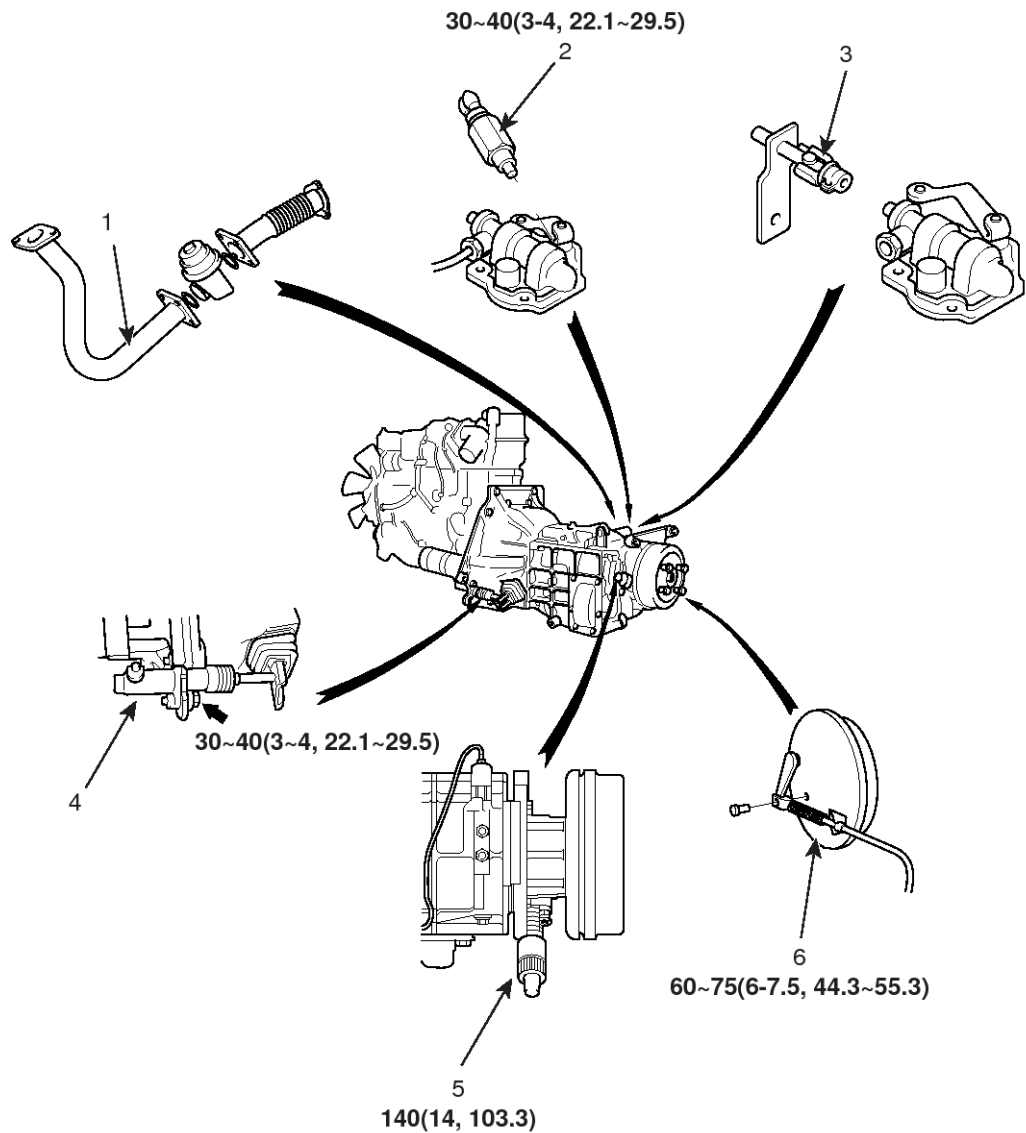


EMTTM5037A

Manual Transmission

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COMPONENTS



1. Front exhaust pipe
2. Backup lamp switch
3. Cross shaft
4. Power cylinder
5. Speed sensor
6. Parking brake

Tightening torque : Nm(kgf.m, lb-ft)

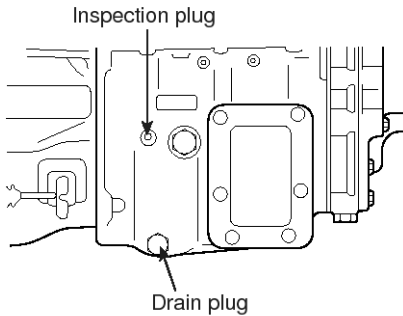
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Manual Transmission

Inspection of the Transmission Fluid Level

Park the vehicle on level ground with the engine off.

1. Using a wrench of the correct size, loosen the oil filler plug by turning it counterclockwise and remove it with your fingers.



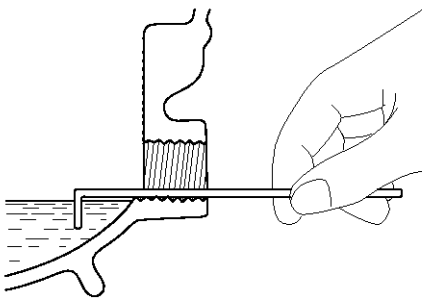
EMTTM5040A

2. Use your finger to feel inside the hole. The oil level should be at its bottom edge. If it is not, check for leaks before adding oil. To refill the transmission or bring the oil level up, add oil slowly until it reaches the proper level. Do not overfill.

Recommended Oil

API GL-3 SAE 80 or API GL-4 80W90

API GL-4 SAE 90(Torpics)



EMTTM5041A

3. Replace the plug, screw it in with your fingers and then tighten securely with the wrench.

Tightening torque : 54~83Nm(5.5~8.5kgf.m, 39.8~61.2lb-ft)

CHANGING OIL

1. Remove the transmission drain plug.
2. Drain oil.
3. Tighten drain plug to specified torque.

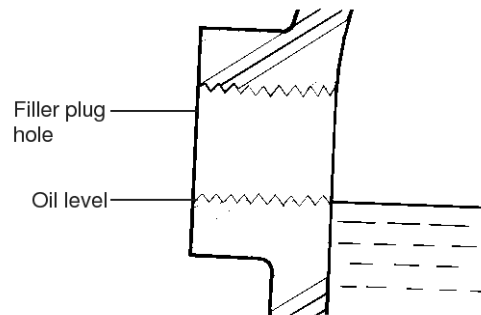
Tightening torque : 35~45Nm(3.5~4.5kgf.m, 25~33lb-ft)

4. Remove filler plug and fill with specified oil till the level comes to the lower portion of filler plug hole.

Speified transmission oil :

API GL-3 SAE 80 or GL-4 80W 90,

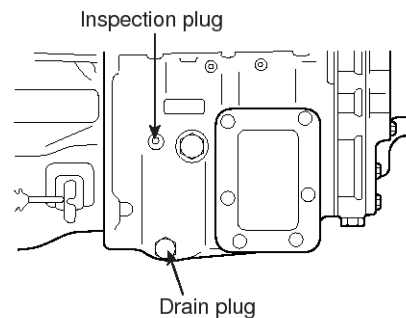
API GL-4 SAE 90(Tropics)



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5. Tighten filler plug to specified torque.

Tightening torque : 30~35Nm(3.0~3.5kgf.m, 22~25lb-ft)



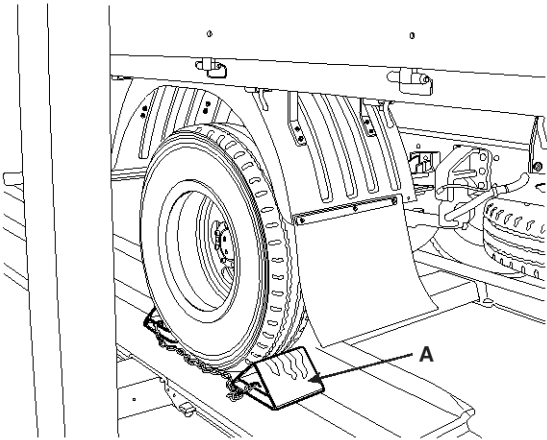
EMTTM5040A

Manual Transmission

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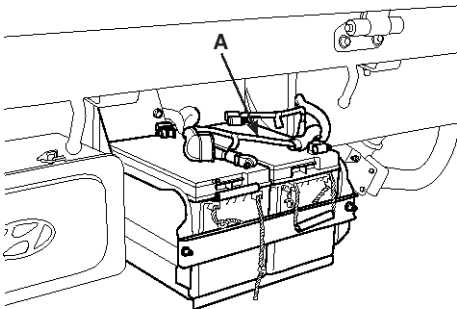
Removal

1. Place the wooden block(A) to the front and rear sides of the both sides rear wheels.



KMTTM5513A

2. Disconnect battery (-) cable(A) from the battery.

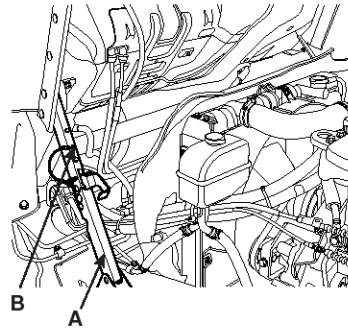


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3. Lift up the cab.

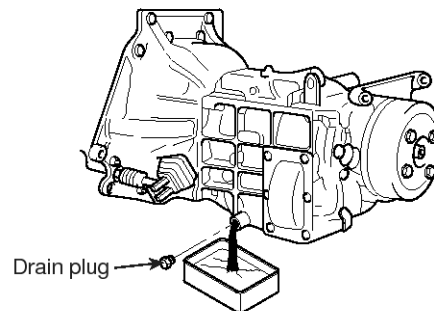
CAUTION

Insert suerly the safety pin(B) into the cab stay(A) hole to prevent the cab from lowering.



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4. Drain transmission oil.



EMTTM5042A

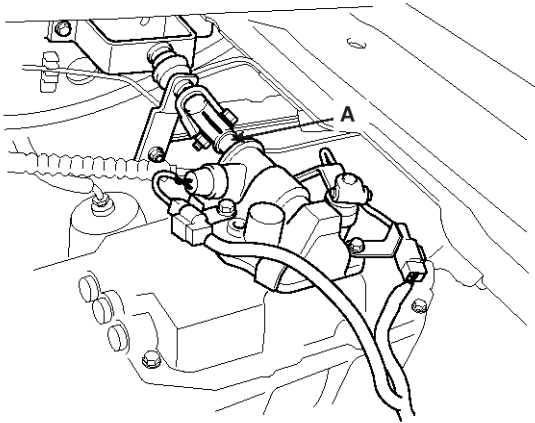
5. Disconnect the speedmeter cable connector, battery (-) cable and the back-up switch connector from the transmission.
6. Remove the shift cable and the select rod(A) from the transmission.

NOTICE

Put the transmission to the neutral position before removing the shift cable and the select rod from the transmission.

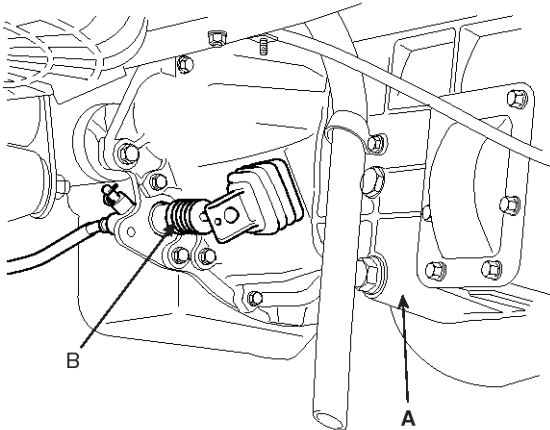
MTA-22

Manual Transmission



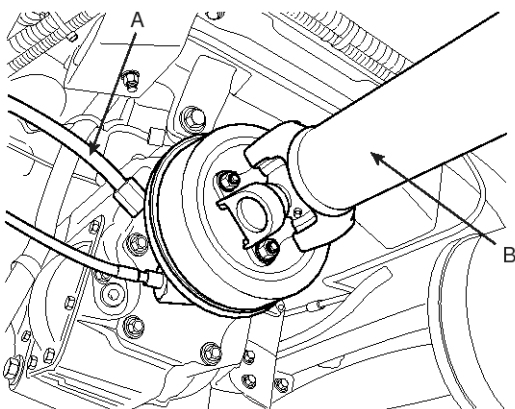
EMTTM5064A

7. Remove the release cylinder(B) from the transmission(A).



KMTTM5517A

8. Remove the speed cable(A) from the transmission.
9. Remove the propeller shaft(B) from the transmission.



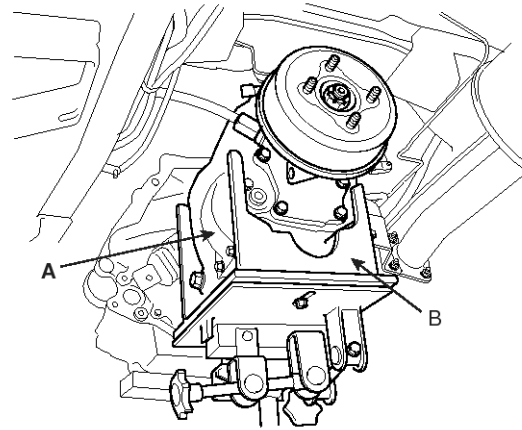
KMTTM5518A

10. Detach the parking brake cable from the parking brake drum.

11. Support the transmission(A) with a jack(B) and remove the body mounting bolts and engine mounting bolts. Then remove the transmission from the engine.

CAUTION

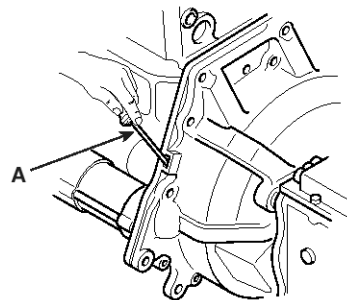
Be careful not to fall down the transmission.



KMTTM5519A

NOTICE

If the transmission is not separated from the engine, detach the transmission by inserting a flat drive(A) into grooves (three locations) on the clutch housing.



EMTTM5004A

Manual Transmission

MTA-23

INSTALLATION

CAUTION

Installation is the reverse of removal.

Be careful not to fall down the transmission.

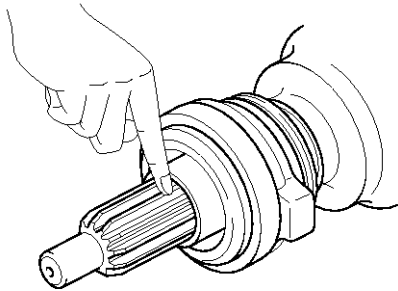
1. Check the drive pinion splines for rust. If rust is found, remove by wire brushing.

Then, apply grease to the clutch disc sliding surface of the drive pinion, working in with fingers.

Slide the release bearing two or three times to remove excess grease from outside. (Do not remove grease from the cylindrical portion over which the release bearing slides.)

NOTICE

If excess grease is not removed, grease could drip, causing a slippery clutch.



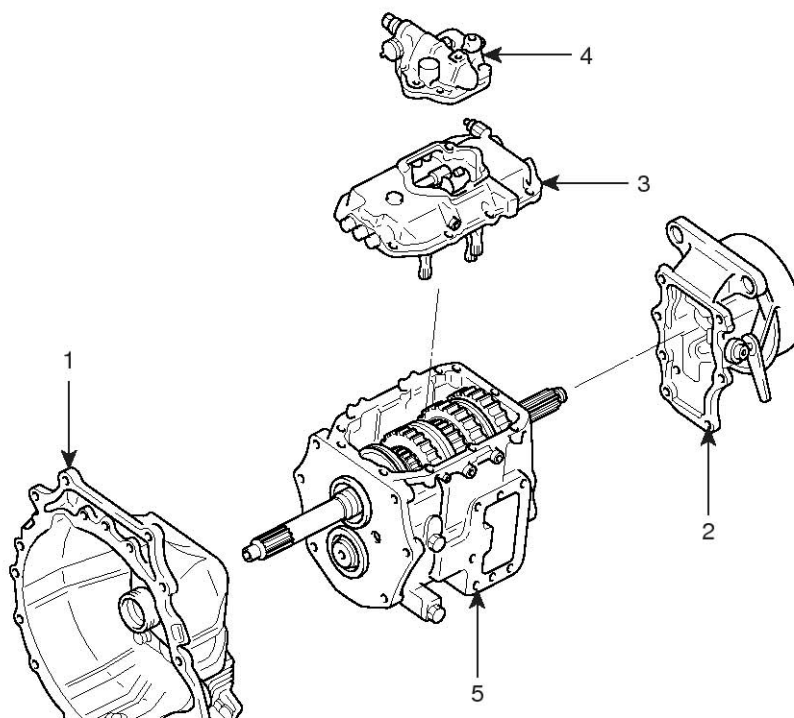
EMTTM5043A

2. Tighten in accordance with the specifications.

MTA-24

Manual Transmission

Disassembly



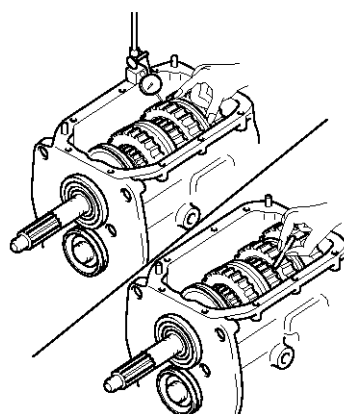
Disassembly sequence

1. Clutch housing
2. Rear cover
3. Gearshift lower
4. Gearshift upper
5. Transmission proper

EMTTM5005A

1. Before disassembly, measure backlash and end play of each gear.

If the measured value exceeds the service limit, replace the defective parts.

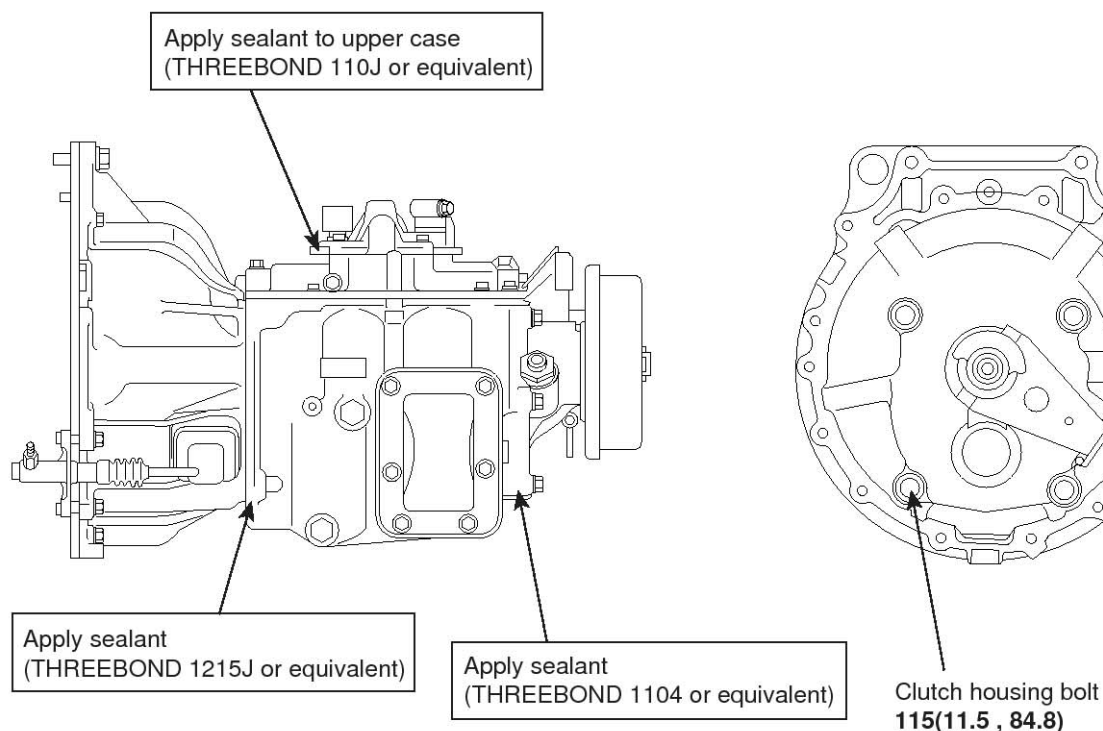
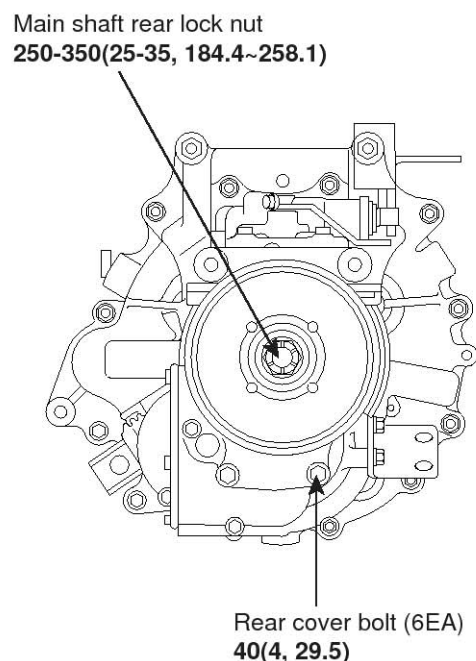
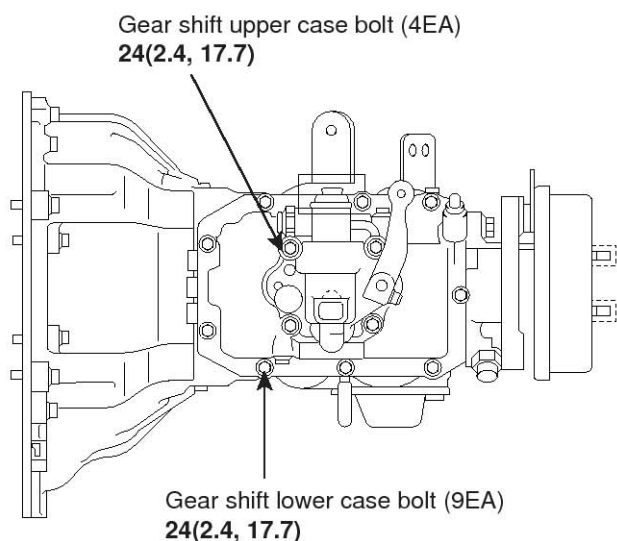


EMTTM5044A

Manual Transmission

MTA-25

Reassembly



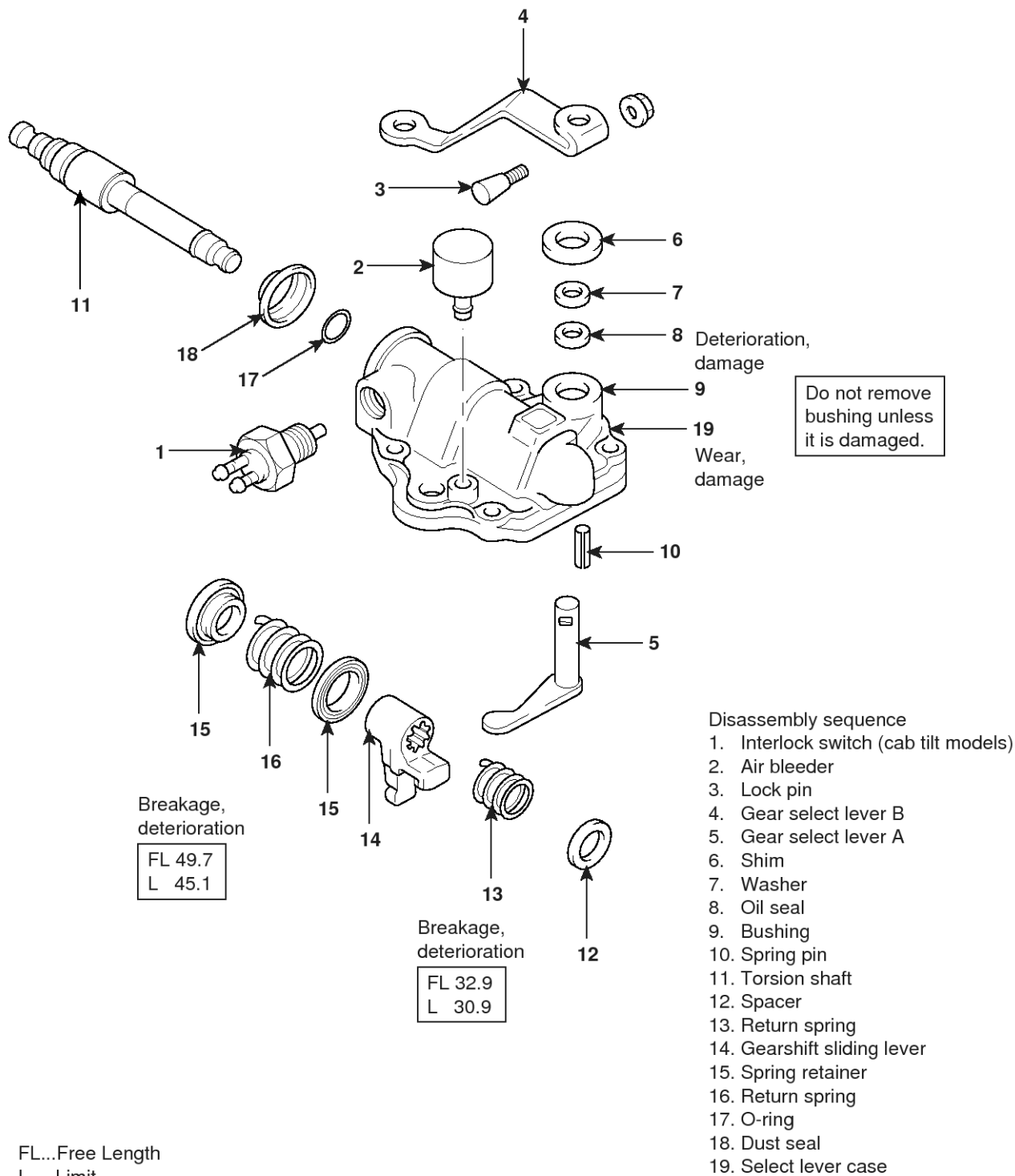
Tightening torque : Nm(kgf.m, lb-ft)

MTA-26

Manual Transmission

Gear Shift Upper

Disassembly and Inspection



FL...Free Length
L.....Limit

Manual Transmission

MTA-27

Reassembly

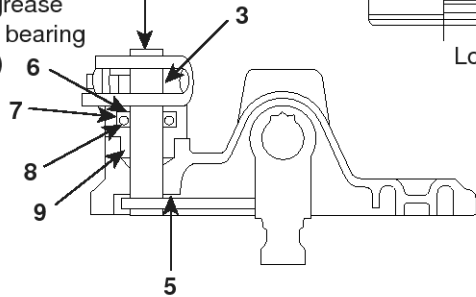
End play of select lever shaft A

Adjust to 0.3 ~ 0.6 mm play with shim

Pay attention to oil seal mounting direction

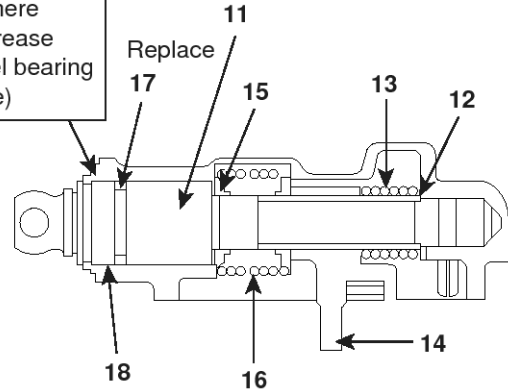
Upper
Lower

Apply grease
(Wheel bearing grease)

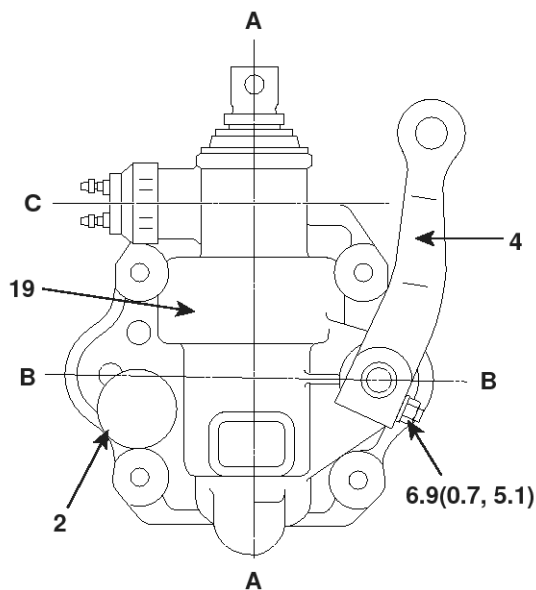


Apply sealant
(THREEBOND 1104J
or equivalent)

Pack here
with grease
(Wheel bearing grease)



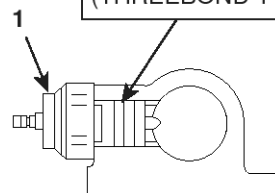
Section B-B



Section A-A

46 ~ 52
(4.7 ~ 5.3,
33.9 ~ 38.4)

Apply sealant to threaded portion
(THREEBOND 1104J or equivalent)



Section C-C

Tightening torque : Nm(kgf.m, lb-ft)

NOTE:

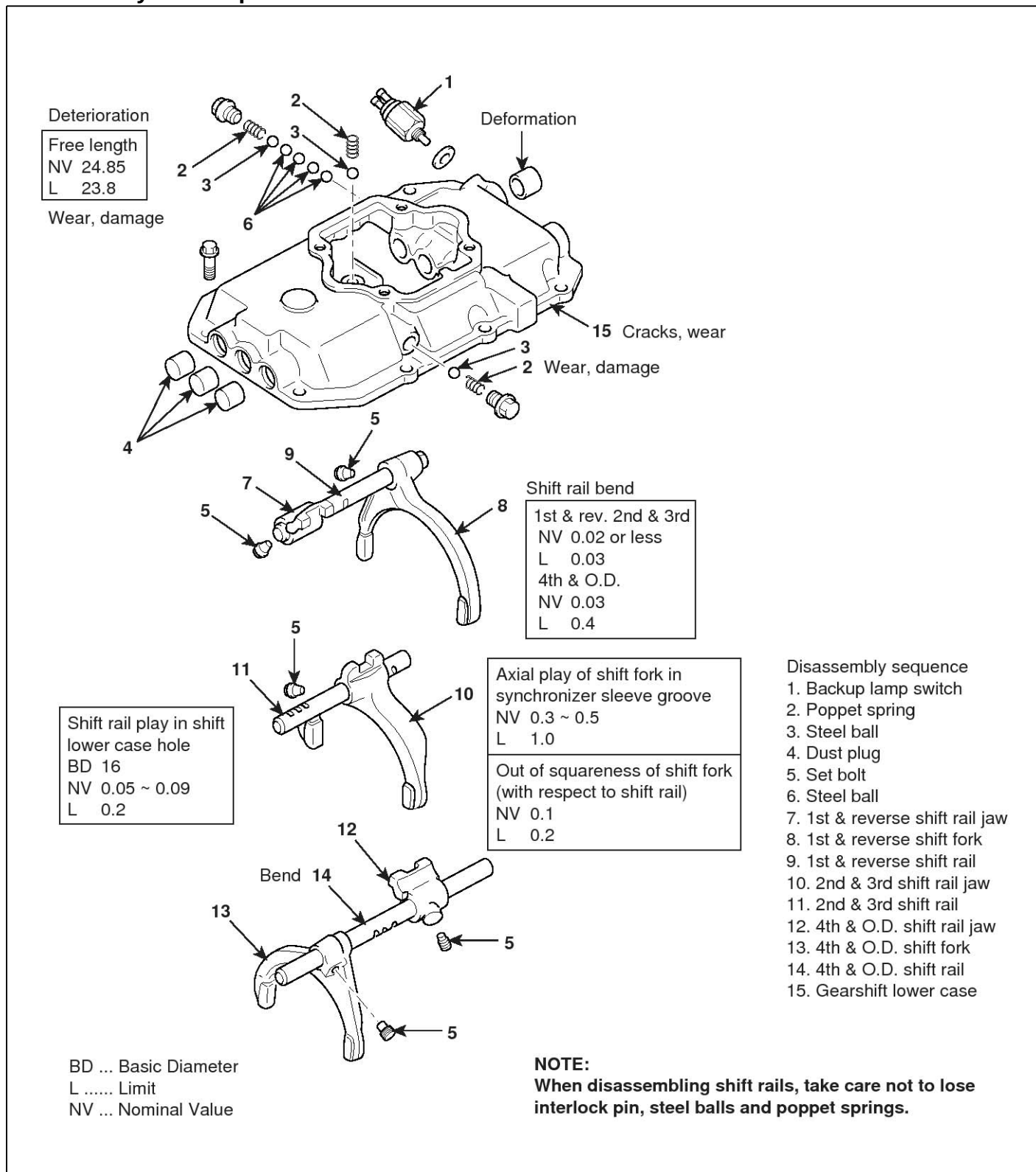
1. When installing the sliding lever over the torsion shaft spline, make sure that the sliding lever and torsion shaft big end pin hole are vertical.
2. Install the oil seal for gear select lever A mounting hole with its lip facing down, Replace the seal if the lip is damaged. Pack grease between lips at installation
3. To mount the gear select lever A, turn it to prevent damage to oil seal lips.

MTA-28

Manual Transmission

Gear Shift Lower

Disassembly and Inspection



Manual Transmission

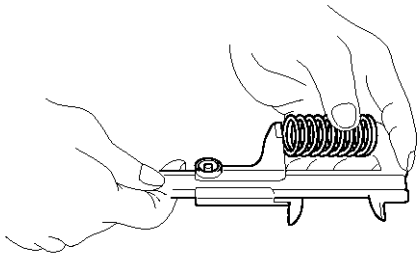
MTA-29

1. Springs

Measure free length of each spring and replace if the limit has been reached.

NOTICE

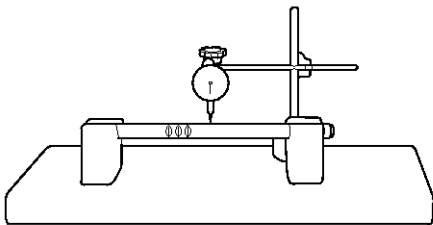
Do not stretch the spring when it is used.



EMTTM5059A

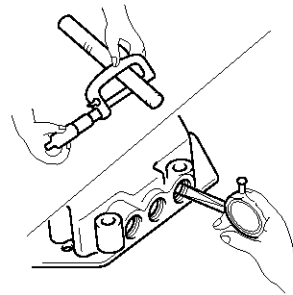
2. Shift rails

Check the shift rail for bend. (Bend is a half of the reading of a dial gauge.) Correct or replace the part if the limit has been reached.



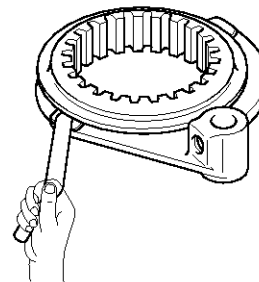
EMTTM5060A

Measure the shift rail outer diameter(O.D) and shift rail hole inner diameter(I.D) in the gearshift lower case to obtain the clearance. If it exceeds the limit, replace the parts.



EMTTM5061A

3. Shift Fork and Synchronizer sleeve

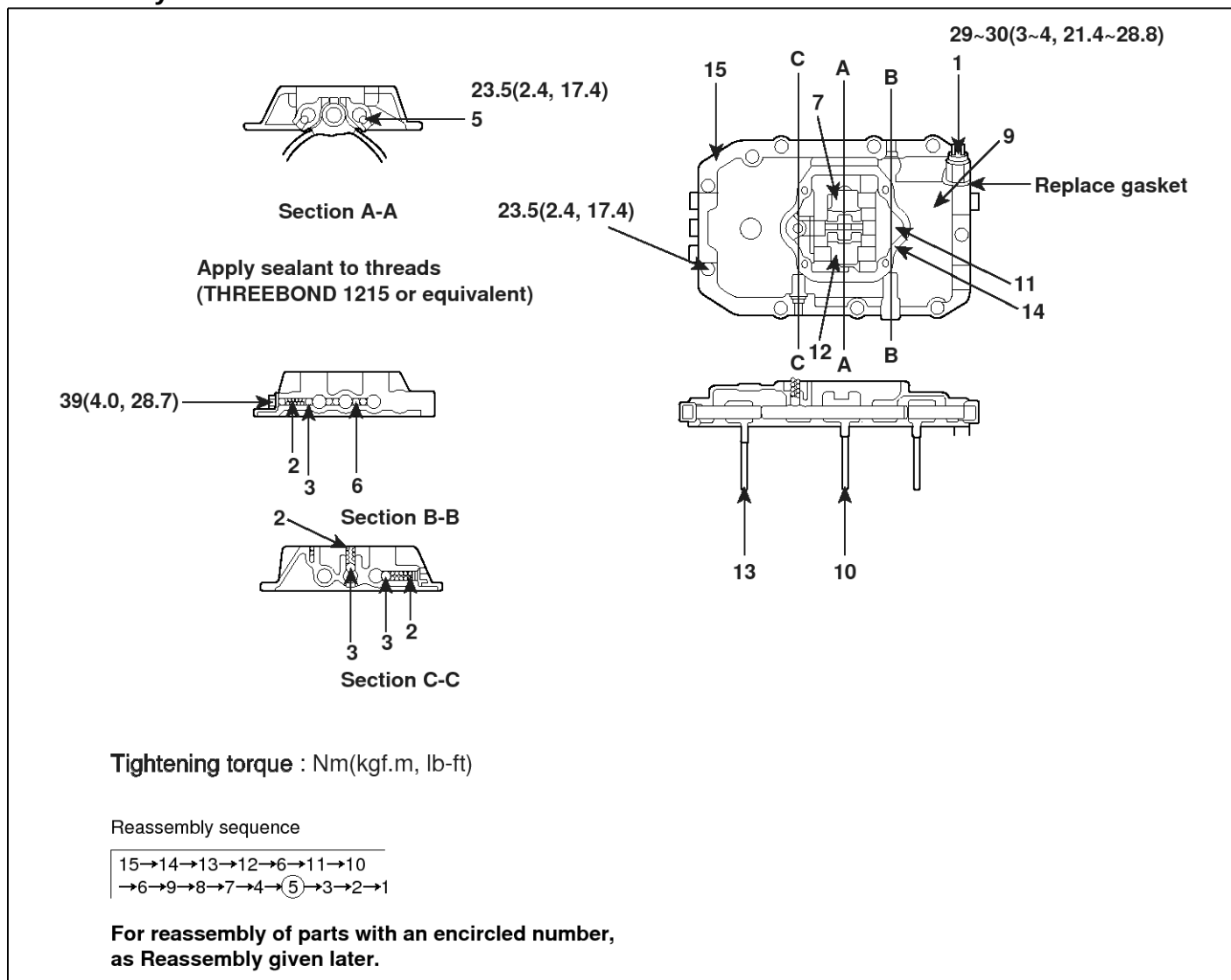


EMTTM5062A

MTA-30

Manual Transmission

Reassembly



EMTTM5019A

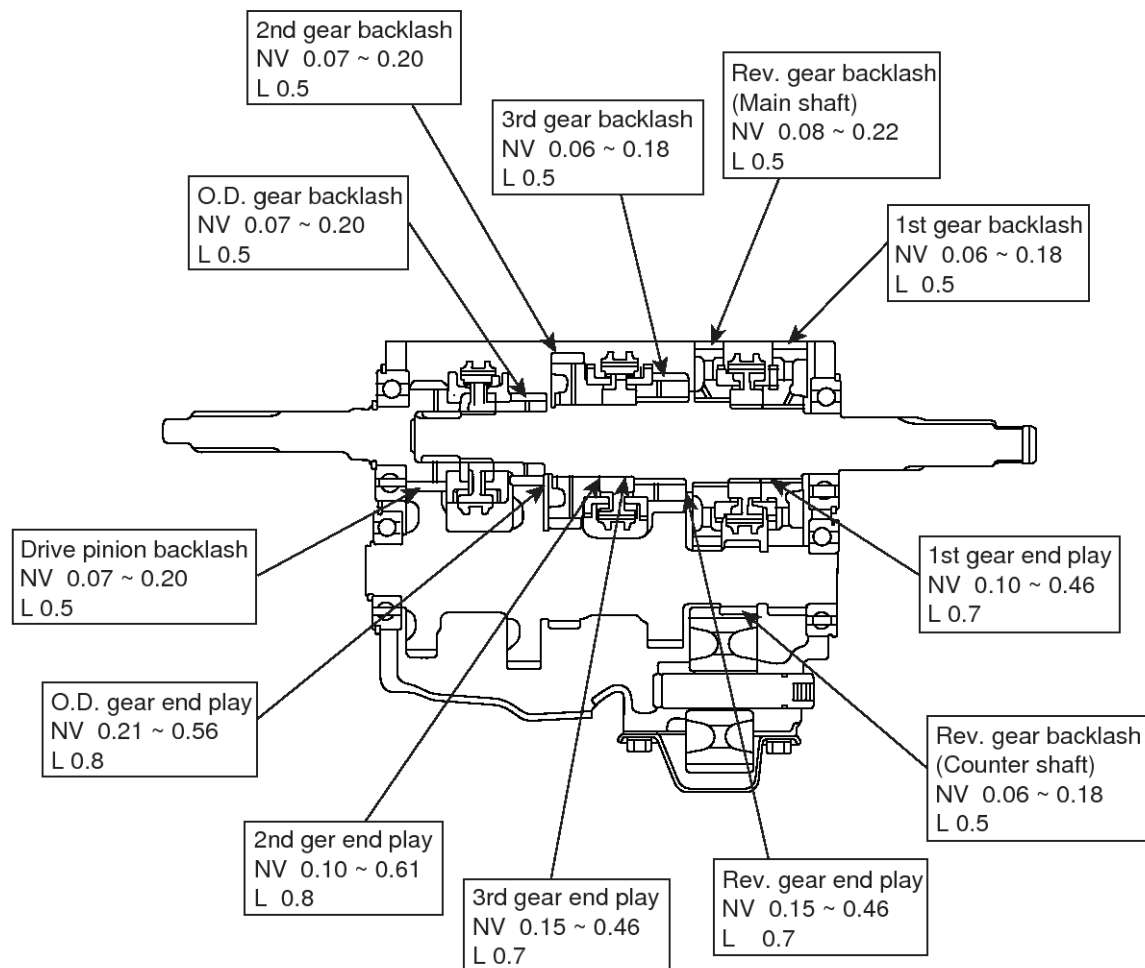
1. After installation, stake the shift rail set bolt at more than three place by punching.

Manual Transmission

MTA-31

Transmission Assembly

INSPECTION



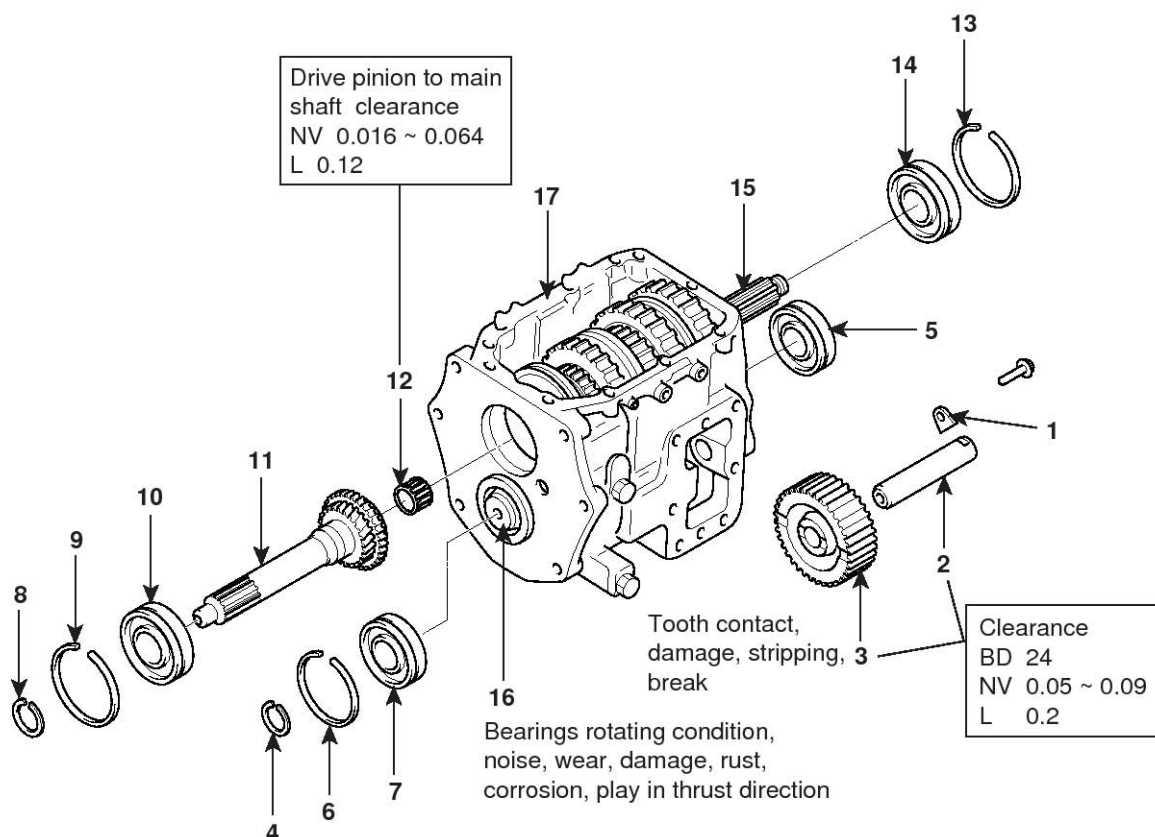
L Limit
NV Nominal Value

Unit : mm

MTA-32

Manual Transmission

Disassembly and Inspection



1. Lock piece
2. Reverse gear shaft
3. Reverse gear
4. Snap ring
5. Bearing
6. Snap ring
7. Bearing
8. Snap ring
9. Snap ring

10. Bearing
11. Drive pinion
12. Pilot bearing
13. Snap ring
14. Bearing
15. Main shaft
16. Counter shaft
17. Transmission case

BD .. Basic diameter
L Limit
NV .. Nominal Value

Unit : mm

NOTE:

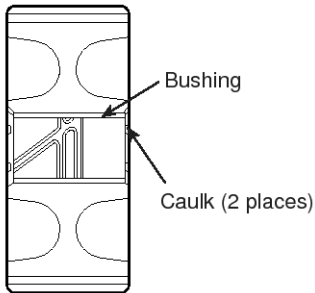
Before removing the main shaft assembly, remove ball bearings from front and rear ends of the counter shaft and lay the counter shaft in the transmission case.

Manual Transmission

MTA-33

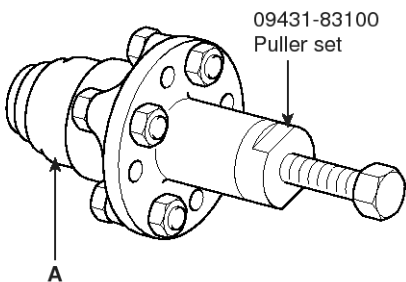
NOTICE

When the bushing of the reverse idler gear assembly is replaced, install the bushing and then caulk its both ends at two locations as illustrated and ream the bore to the nominal value.



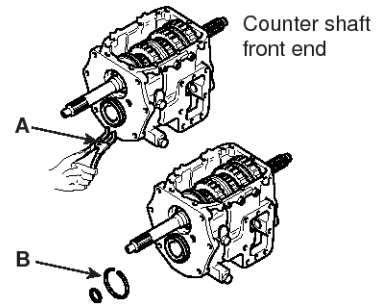
EMTTM5046A

1. Use the puller set (09431-83100) to remove the companion flange(A).



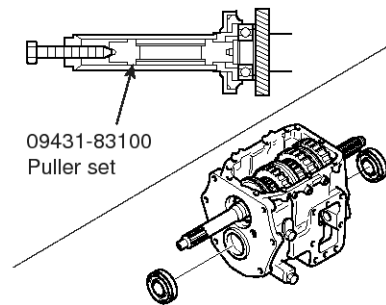
EMTTM5008A

2. Use a Snap Ring Plier(A) to remove snap rings(B).



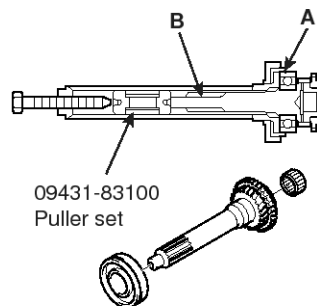
EMTTM5009A

3. Use the Puller set (09431-83100) to remove front and rear bearings from the counter shaft.



EMTTM5047A

4. Use the Puller Set (09431-83100) to remove bearing(A) and to remove drive pinion(B) and pilot bearing.

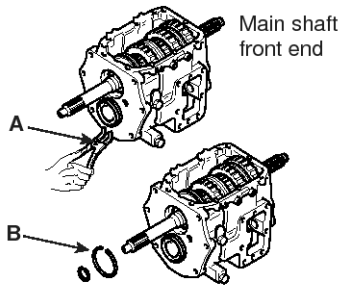


EMTTM5010A

MTA-34

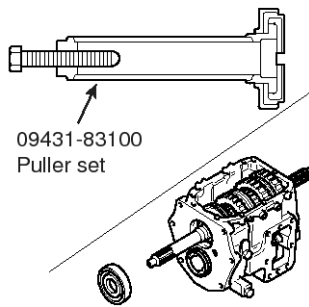
Manual Transmission

5. Use a snap ring plier(A) to remove the snap ring(B).



EMTTM5011A

6. Use the Puller Set (09431-83100) to remove the bearing from the rear of the main shaft.

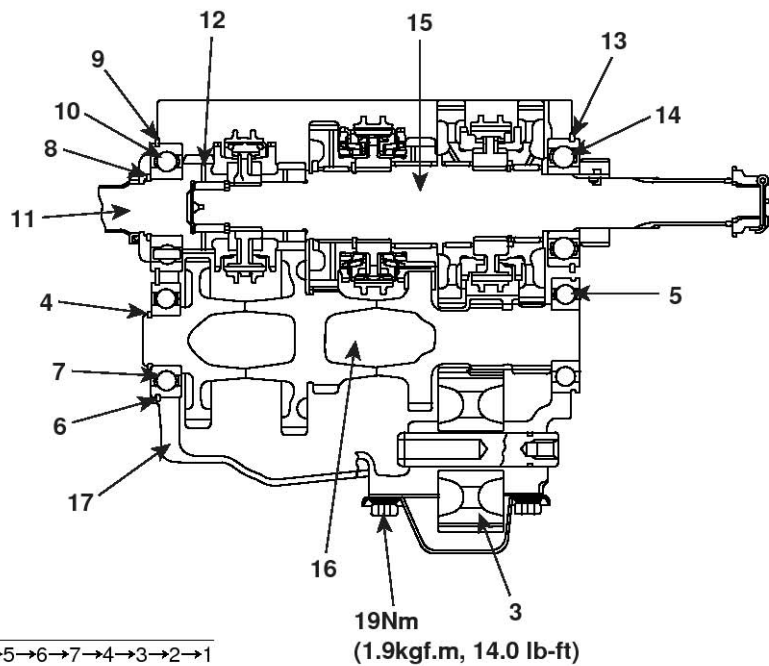


EMTTM5012A

Manual Transmission

MTA-35

Reassembly



Reassembly sequence

17→16→15→14→12→13→5→6→7→4→3→2→1
11→10→9→8

For reassembly of parts with an encircled number, see reassembly given later.

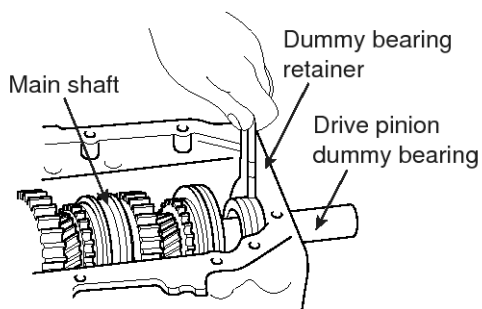
NOTE:

Fit snap ring over the bearing before installing the bearing

EMTTM5013A

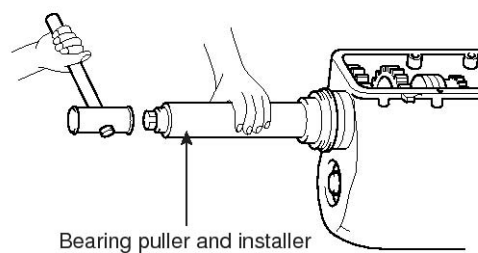
1. Main Shaft Assembly

Support the front of the main shaft and install the rear bearing.



EMTTM5048A

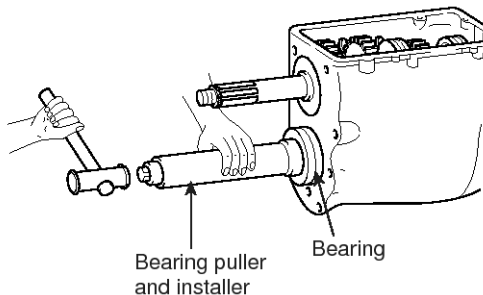
2. Use proper tool to install the ball bearing fitted with snap ring to the rear end of the main shaft.



EMTTM5049A

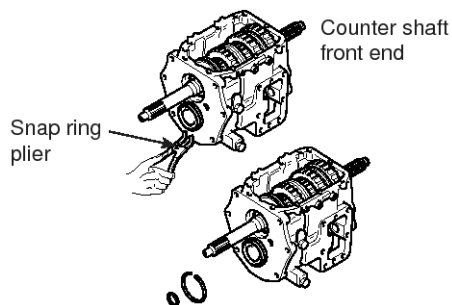
MTA-36

3. Use proper tool when installing the bearing to the drive pinion and when installing the drive pinion to the transmission case.



EMTTM5050A

4. Support the rear of the counter shaft and install the ball bearing fitted with the snap ring. Then, install the snap ring.



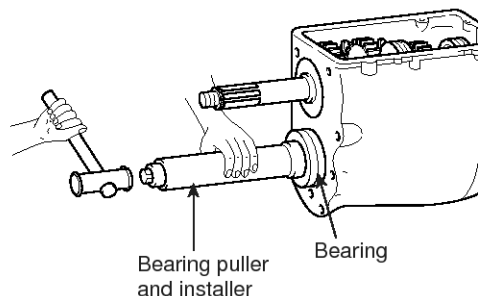
EMTTM5051A

Manual Transmission

5. Remove the special tool from the rear end of the counter shaft and install the ball bearing.

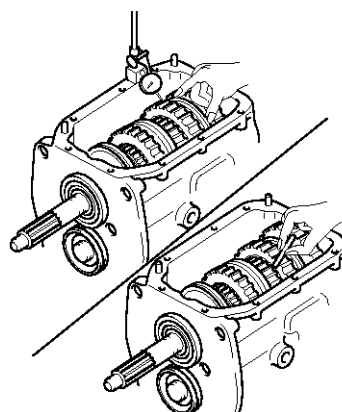
NOTICE

Check rotation of each gear.



EMTTM5050A

6. After assembly, check backlash and end play of each gear.



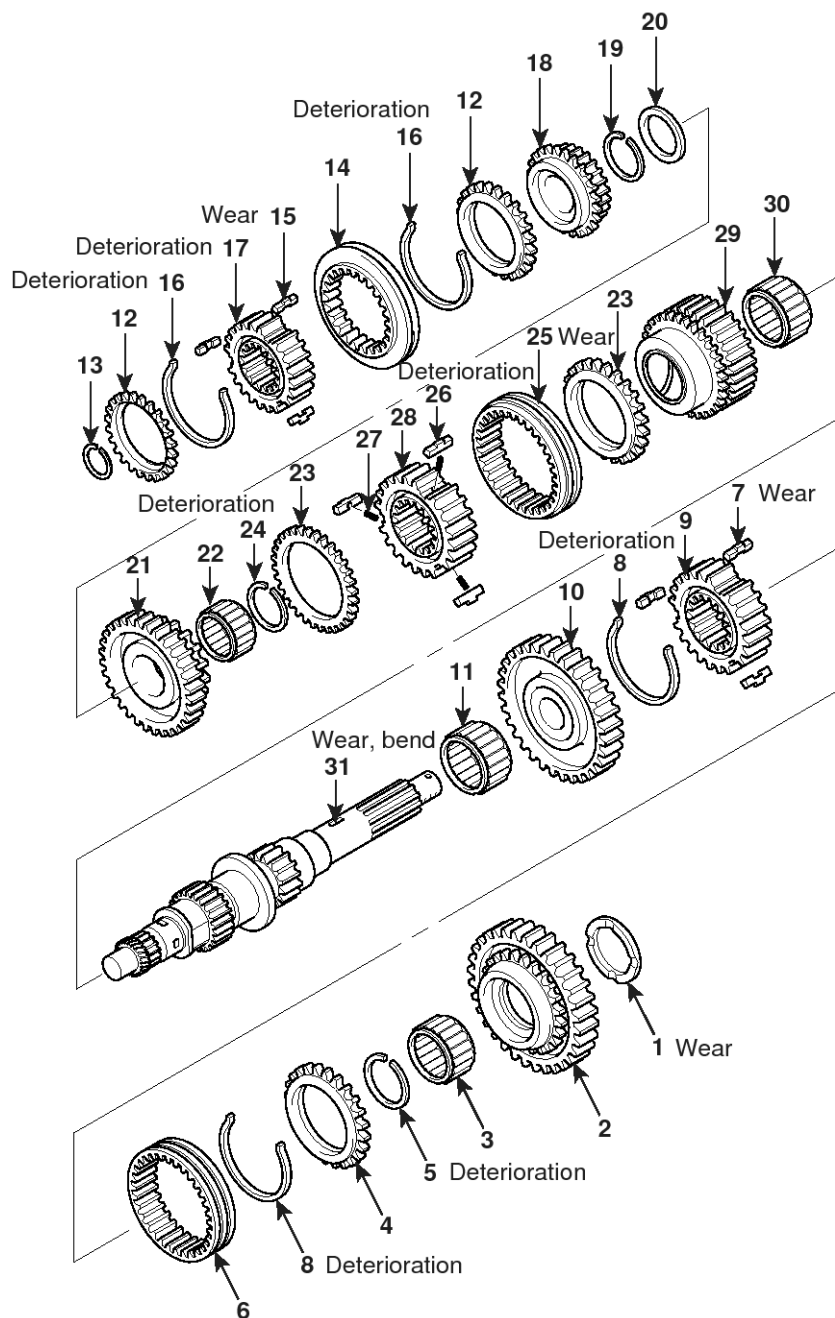
EMTTM5044A

Manual Transmission

MTA-37

Main Shaft

Disassembly



Disassembly sequence

1. 1st gear thrust washer
2. 1st gear
3. Needle roller bearing
4. 1st synchronizer ring
5. Snap ring
6. Synchronizer sleeve
7. Shifting key (except M3S)
8. Shifting key spring (except M3S)
9. Synchronizer hub
10. Reverse gear
11. Needle roller bearing
12. 4th & O.D. synchronizer ring
13. Snap ring
14. 4th & O.D. synchronizer sleeve
15. Shifting key
16. Shifting key spring
17. 4th & O.D. synchronizer hub
18. O.D. gear
19. Snap ring
20. 2nd gear thrust washer
21. 2nd gear
22. Needle roller bearing
23. 2nd & 3rd synchronizer ring
24. Snap ring
25. 2nd & 3rd synchronizer sleeve
26. Shifting plunger
27. Synchronizer spring
28. 2nd & 3rd synchronizer hub
29. 3rd gear
30. Needle roller bearing
31. Main shaft

For disassembly of parts with an encircled number, see Disassembly given later.

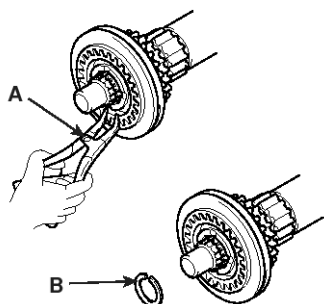
Bearing rotating condition

Gear and spline tooth contact, damage, stripping, break

MTA-38

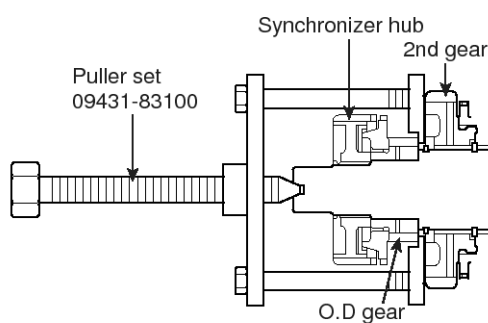
Manual Transmission

1. Use a Snap Ring Plier(A) to remove snap rings(B) from the main shaft.



EMTTM5015A

2. Use the puller set (09431-83100) to remove the 4th & outer diameter(O.D) synchronizer hub and outer diameter(O.D) gear.



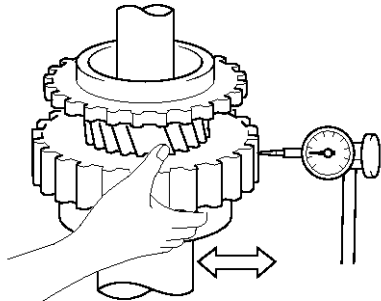
EMTTM5052A

Manual Transmission

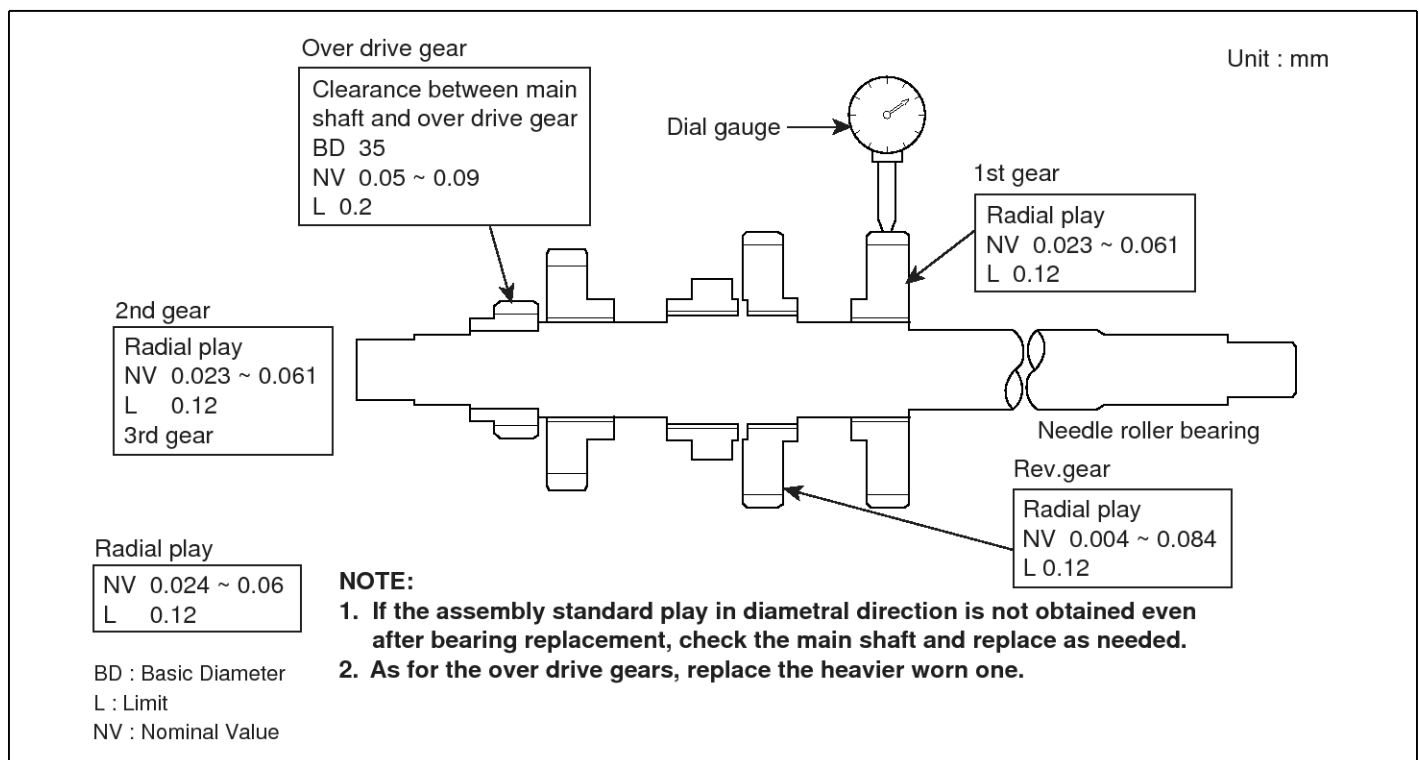
MTA-39

Inspection

1. Measure the play in diametral direction of main shaft gears and needle roller bearing. If the play exceeds the service limit, replace the parts.



EMTTM5053A

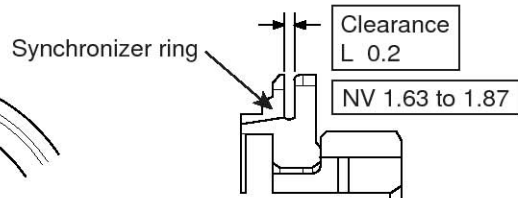
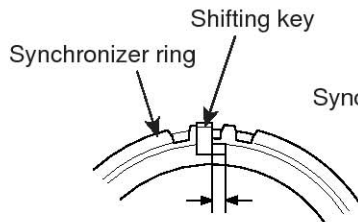
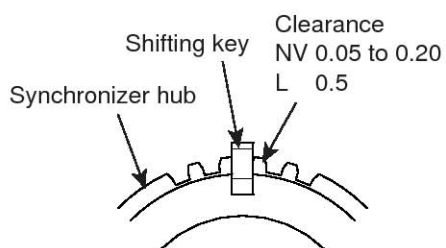
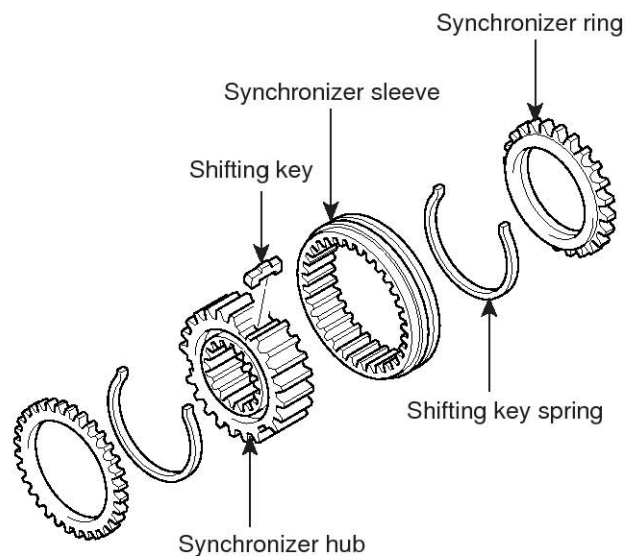


EMTTM5016A

MTA-40

Manual Transmission

2. Synchronizer



Clearance between synchronizer key way and shifting key

	4th & O.D.	2nd & 3rd	1st. & rev.
NV	4.33 ~ 4.53	4.75 ~ 4.95	4.75 ~ 4.95
L	5.3	5.3	5.8

L Limit
NV .. Nominal Value

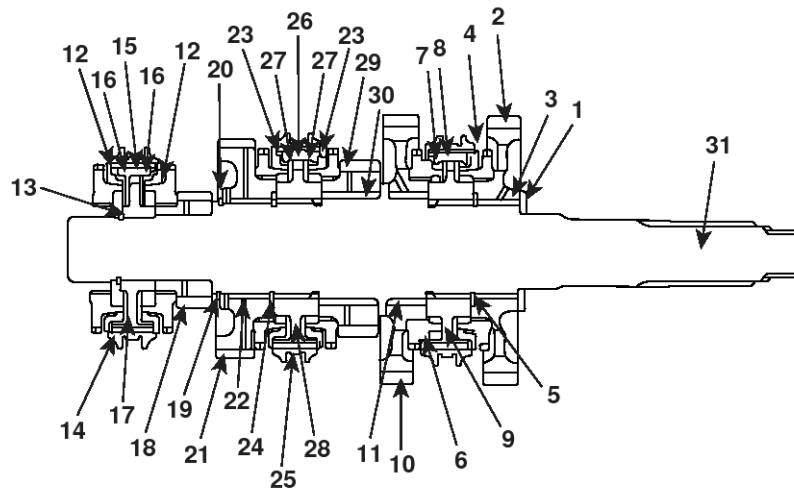
NOTE:

If a gear slip off occurred, check the synchronizer cone of each gear assembly and synchronizer sleeve spline and chamfered portions and replace defective parts.

Manual Transmission

MTA-41

Reassembly



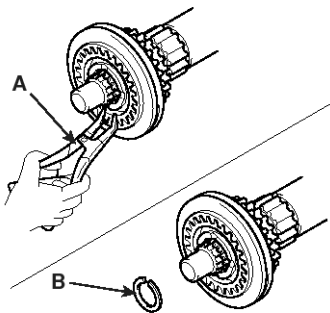
For reassembly of parts with an encircled number, see Reassembly given later.

Reassembly sequence

31→30→29→23→②4→23→22→21→
28→②5→②6→27→
→②0→②9→18→12→②3→12→
17→14→15→16
→11→10→②5→3→2→②1
9→②6

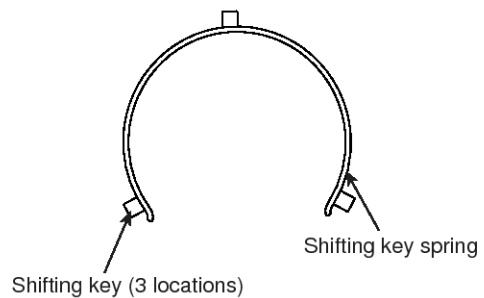
EMTTM5017A

1. Use a Snap ring plier(A) to install snap rings(B).



EMTTM5018A

2. To install the shifting key spring, proceed as follows:
Install so that none of shifting keys is positioned within the shifting key spring end gap.
When installing, take care not to lose the shifting key spring.

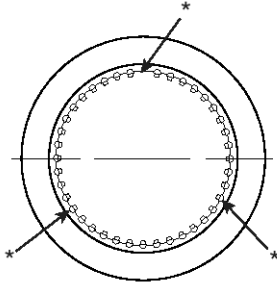


EMTTM5055A

MTA-42

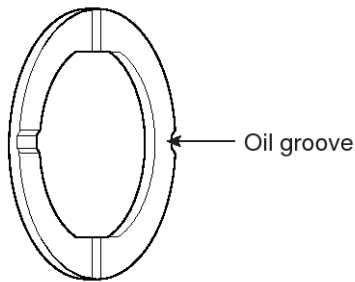
Manual Transmission

3. Install the synchronizer sleeve so that shifting keys are positioned at three locations marked in the illustration.



EMTTM5056A

4. Install the thrust washer with the side having oil grooves facing toward the gear.



EMTTM5057A