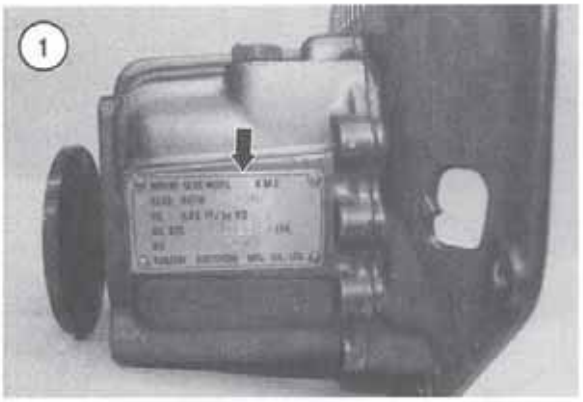
Chapter Ten

Transmission—KM Series



This chapter covers the Kanzaki KM2A, KM2C, KM2P, KM3A and KM3P marine transmissions that are attached to Yanmar 1GM, 1GM10, 2GM, 2GM20, 3GMD and 3GM30 engines. Refer to **Table 1** for a cross-reference of engine and transmission models. The identification plate located on the transmission case (**Figure 1**, typical) specifies the transmission model.

The KM2 and KM3 series transmissions are inline transmissions that provide forward and reverse direction. All gears are constant mesh. A cone-type clutch engages internally tapered gears to transmit power to the output shaft. Oil contained in the transmission case lubricates the internal transmission components.

Basic design is the same for all the transmissions with the exception of the shifting mechanism. Transmissions with a P suffix are equipped with a shifting device that engages detent notches in the shifter housing. All other models use spring-loaded pins and a spring-loaded actuator that engage detents and ramps on the shift shaft.

Refer to Chapter Three for maintenance information.

Tables 1-7 are located at the end of this chapter.

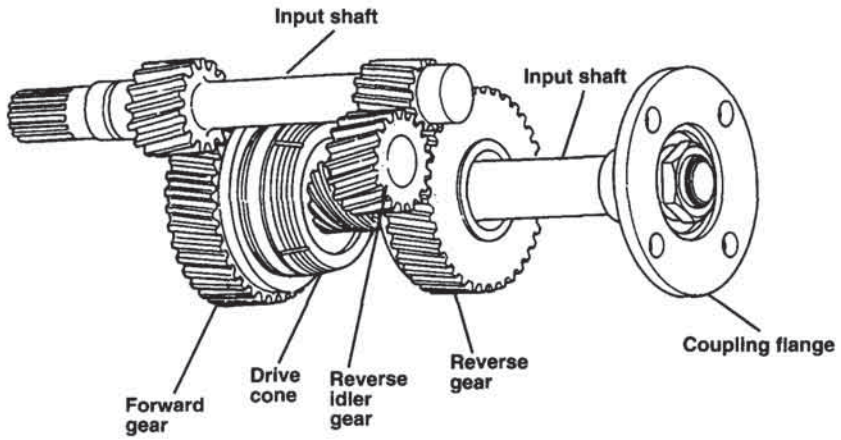
OPERATION

The input shaft on the transmission engages the drive disc attached to the engine flywheel. Because this is a constant-mesh transmission, engine power is transmitted to all gears. Power flows to the output shaft when the cone clutch engages either the forward gear or the reverse gear. In **Figure 2**, the cone clutch is shown engaged with the forward gear. Because power flows from the input shaft gear through the reverse idler gear to the reverse gear, the reverse gear rotates in the opposite direction of the forward gear. When the cone clutch engages the reverse gear, the output shaft rotates in reverse.

On Model KM2A, KM2C and KM3A transmissions, moving the shift lever (**Figure 3**) rotates the shift shaft. When the shift shaft rotates, the shifter slides the cone clutch into engagement with the forward or reverse gear, or into neutral. When the shifter reaches the proper position, the upper spring-loaded detent pin sits on a ramp that

(2)

CONE CLUTCH



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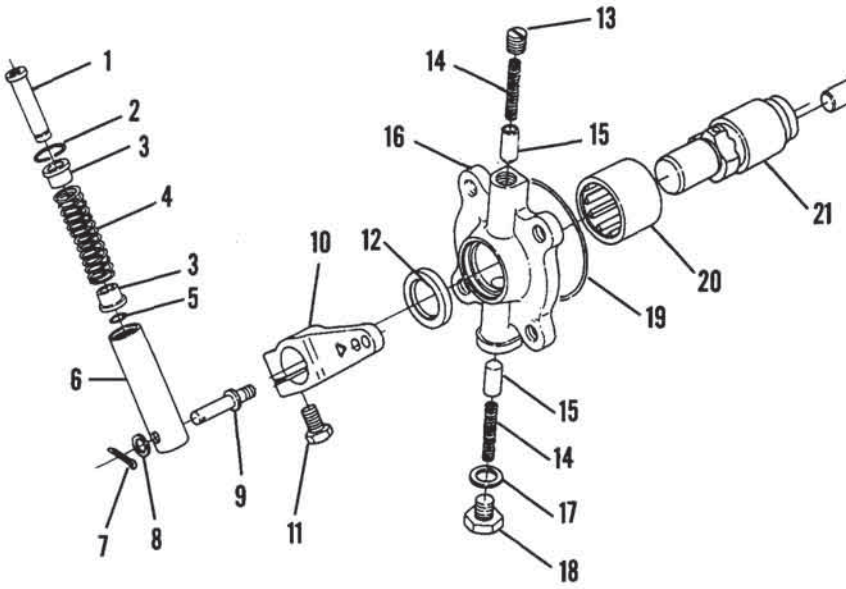
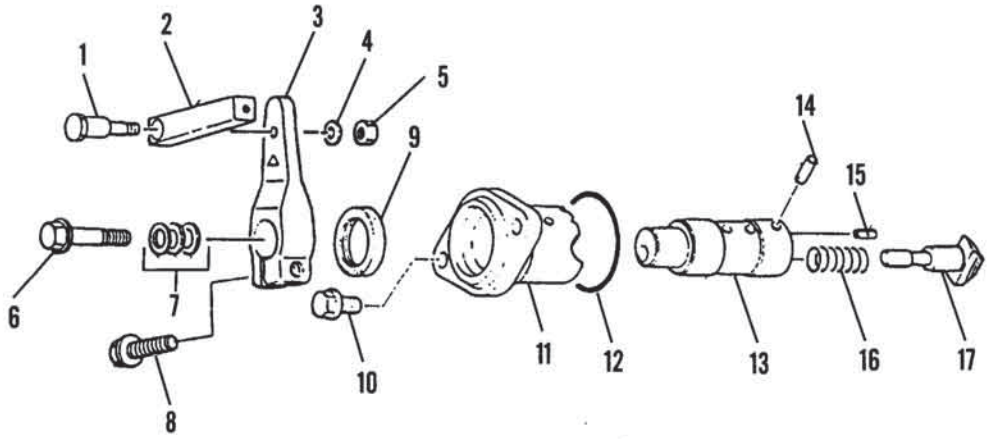
SHIFTER (KM2A, KM2C AND KM3A MODELS)



1. Connector
2. Circlip
3. Spring retainer
4. Spring
5. Circlip
6. Holder
7. Cotter pin
8. Washer
9. Stud
10. Shift lever
11. Bolt
12. Seal
13. Setscrew
14. Spring
15. Detent pin
16. Body
17. Gasket
18. Plug
19. O-ring
20. Bearing
21. Shift shaft
22. Shifter

(4) **SHIFTER (KM2P AND KM3P MODELS)**



1. Shoulder bolt
2. Connector
3. Shift lever
4. Washer
5. Nut
6. Stop bolt
7. Shims
8. Bolt
9. Seal
10. Bolt
11. Shift body
12. O-ring
13. Shift shaft
14. Detent pin
15. Pin
16. Spring
17. Shifter

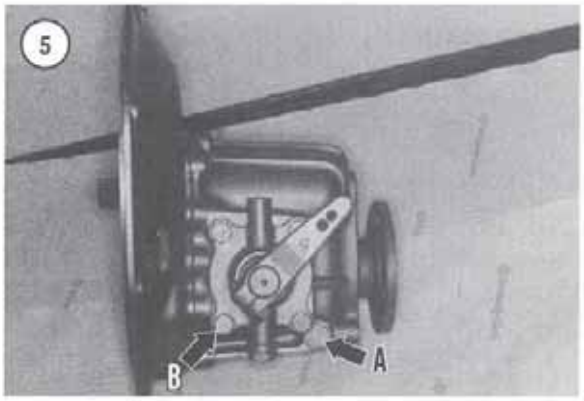
forces the shifter to push the clutch cone into the gear. The springs in the shift actuator hold the shifter in position.

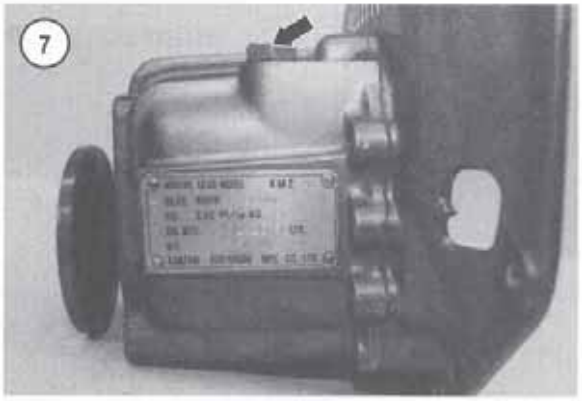
The shifter mechanism on Model KM2P and KM3P transmissions includes a spring-loaded shifter (**Figure 4**). Movement of the shift lever forces the shifter to move the cone clutch against the forward or reverse gear. Detent notches in the shift housing hold the shifter pin in position.

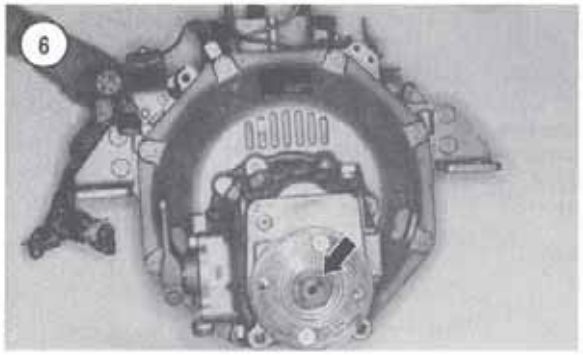
REMOVAL/INSTALLATION

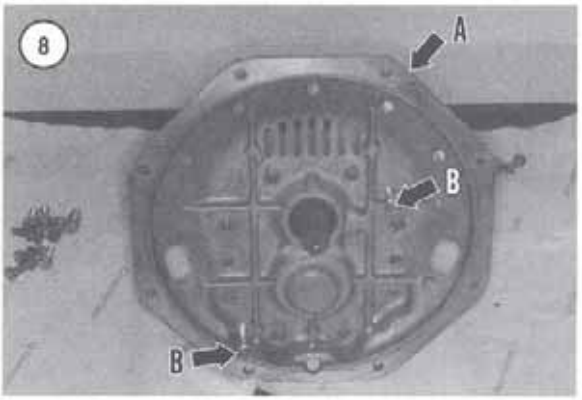
The following procedure addresses units that are accessible. In some cases, it may be necessary to remove the engine and transmission as a unit before removing the transmission from the engine. If engine removal is necessary, refer to Chapter Five for single-cylinder models and Chapter Six for multi-models.

1. If not previously disconnected, disconnect the remote control cable from the transmission shift lever.
2. If not previously disconnected, disconnect the drive coupling from the transmission drive flange.
3. Remove the bolts that secure the transmission to the engine bellhousing.
4. Remove the transmission from the engine.
5. Reinstall the transmission by reversing the removal procedure. Make sure to align the splines on the transmission input shaft and the drive disc during installation. Tighten the transmission retaining bolts to the torque specified in **Table 2**.









OVERHAUL

Disassembly

1. Remove the drain plug (A, **Figure 5**) and drain the transmission oil.

2. The output flange retaining nut is staked (**Figure 6**). Use a chisel to cut away the staked portion so the nut will rotate.

NOTE

The output flange retaining nut has left-hand threads.

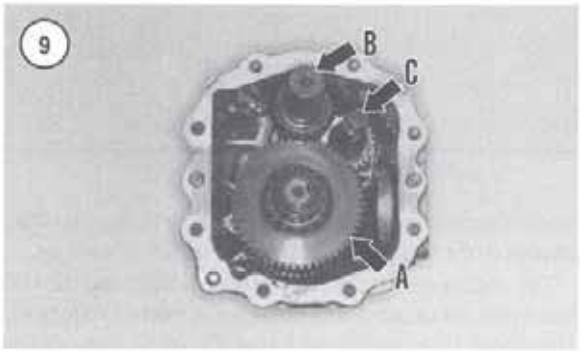
3. Use a tool or other device to hold the output flange so it cannot rotate.

4. Unscrew the output flange retaining nut by rotating the nut clockwise (left-hand threads).

5. Remove the oil dipstick (**Figure 7**).

6. Remove the shifter retaining bolts (B, **Figure 5**) and remove the shifter assembly.

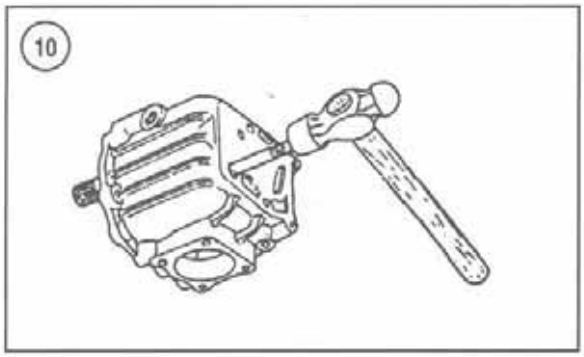
7. Remove the transmission flange retaining bolts.

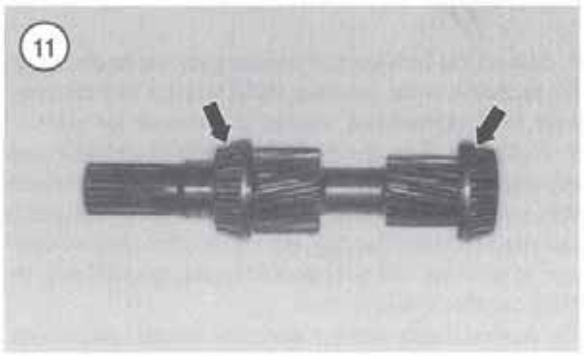


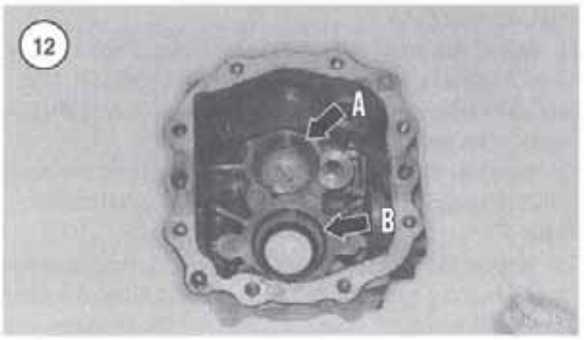
NOTE

In Step 8, position the transmission so the transmission input shaft is up when removing the transmission flange so the transmission shafts will not fall out.

8. Tap on the transmission flange (A, **Figure 8**) using a soft-faced hammer to dislodge the flange. If tapping will not dislodge the flange, install jackscrews (B) into the





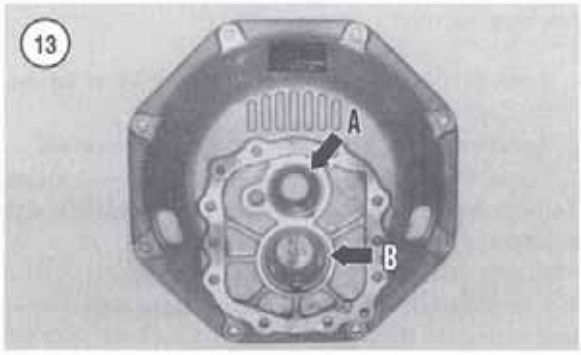


threaded holes in the flange and rotate the jackscrews to force the flange off the transmission case. Position the transmission with the input shaft up, then remove the flange from the transmission case.

9. Remove the output shaft (A, **Figure 9**) assembly from the transmission case and set aside for disassembly.

10. The input shaft (B, **Figure 9**) and intermediate shaft (C) assemblies must be removed together. Proceed as follows:

a. Insert a suitably sized bolt or rod through the hole in the rear of the transmission that supports the intermediate shaft (**Figure 10**).



b. Carefully drive out the intermediate shaft while removing the intermediate and input shaft assemblies from the transmission case.

11. Using a large screwdriver, pry out the oil seal in the transmission case. Be careful not to damage the case or the adjacent bearing race.

12. Using a large screwdriver, pry out the oil seal in the transmission mounting flange. Be careful not to damage the case or the adjacent bearing race.

13. If inspection indicates additional disassembly is necessary, refer to the following sections.

10

Inspection

Input shaft

1. Check the gear teeth for excessive wear, corrosion and mechanical damage. Check the teeth for galling, chips, cracks, missing pieces, distortion or discoloration from overheating. Replace the input shaft if the gears are damaged.

2. Inspect the input shaft bearings (**Figure 11**) and seal surfaces for excessive wear, grooves, metal transfer and discoloration from overheating. Use a press to remove damaged bearings and to install new bearings.

NOTE

Shims behind the outer bearing race in the mounting flange determine bearing preload for the input shaft bearings. Save the shims and reinstall them if reusing the original parts.

3. Inspect the input shaft bearing outer races in the transmission case (A, **Figure 12**) and mounting flange (A, **Figure 13**). If either race is damaged or excessively worn, remove it using a suitable puller.

Intermediate shaft

1. Remove and discard the O-ring (**Figure 14**) at the end of the shaft.
2. Remove the thrust washer, gear and roller bearings.
3. Inspect the bearings, shaft and reverse idler gear inside diameter for excessive wear, grooves, metal transfer and discoloration from overheating. If necessary, replace the shaft, gear and bearings.
4. Check the idler gear teeth for excessive wear, corrosion or rust and mechanical damage. Check the teeth for galling, chips, cracks, missing pieces, distortion or discoloration from overheating. If necessary, replace the gear.
5. Reassemble the intermediate shaft. Install a new O-ring on the shaft.

Output shaft

Refer to **Figure 15**.

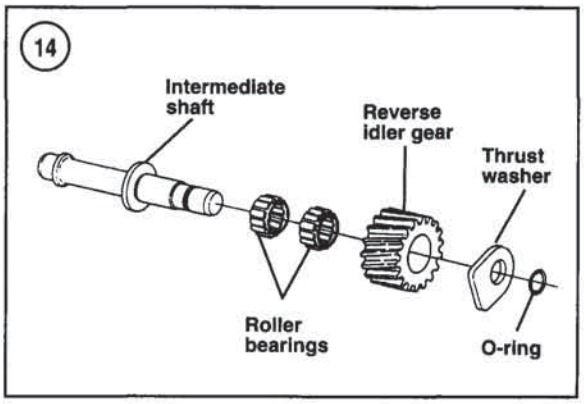
1. Using a suitable puller (**Figure 16**), remove the bearing, spacer and reverse gear from the output shaft.
2. The retaining nut at the end of the shaft is staked. Use a chisel to cut away the staked portion so the nut will rotate. To hold the output shaft, position the coupling flange in a vise, then set the output shaft into the splines in the flange as shown in **Figure 17**.

NOTE
The retaining nut has left-hand threads.

3. Unscrew the retaining nut by rotating the nut clockwise (left-hand threads).
4. Using a suitable puller, pull the bearing, spacer and forward gear off the output shaft.
5. Remove the pin from the shaft.

NOTE
Mark the clutch cone in Step 6 according to forward or reverse end so it can be reinstalled in its original position.

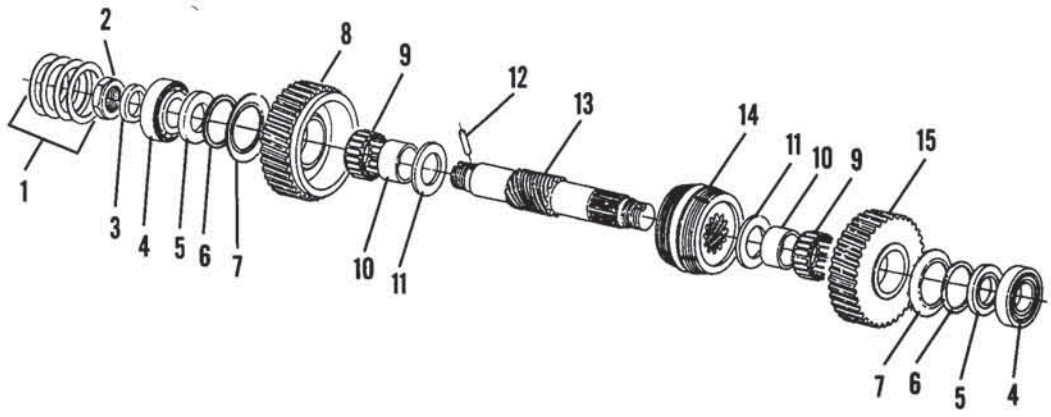
6. While holding the clutch cone, tap the end of the shaft with a soft-faced hammer to remove the inner roller bearing race, spacer and cone clutch. A suitable puller or press may also be used. Remove the remaining inner bearing race and spacer.
7. Check the forward and reverse gear teeth for excessive wear, corrosion and mechanical damage. Check the teeth for galling, chips, cracks, missing pieces, distortion or discoloration from overheating. If necessary, replace the gears.



8. Inspect the forward and reverse gear inside diameters for excessive wear, grooves, metal transfer and discoloration from overheating. If necessary, replace the gears.
9. Install the cone clutch on the output shaft and check movement of the clutch on the output shaft. If the clutch does not move smoothly, inspect the splines on the clutch and shaft for burrs, scoring, galling or other signs of damage. If dressing will not correct the damaged splines, replace the clutch and/or shaft.
10. Inspect the tapered surface of the forward and reverse gears for galling, scoring or other damage that will prevent smooth cone clutch engagement. If necessary, replace the gears.
11. Install the cone clutch into the forward and reverse gears. Measure clutch depth as shown in **Figure 18**. Compare the measurement with the specification in **Table 3**. Replace the part, in necessary.
12. Measure the width of the shifter groove in the cone clutch (**Figure 19**) and compare with the specification in **Table 4**.
13. Inspect the roller bearings and inner bearing races for excessive wear, grooves, metal transfer and discoloration from overheating. If necessary, replace the bearings and inner races.
14. Measure the wear surface of the thrust washers. If wear exceeds 0.20 mm (0.008 in.) on the thin thrust washer, replace the washer. If wear exceeds 0.05 mm (0.002 in.) on the thick thrust washer, replace the washer.
15. On KM2P and KM3P transmissions—Measure the width of the spring cups and compare them with the specifications in **Table 5**.
16. On KM2P and KM3P transmissions—Measure the width of the spring cup retainers and compare them with the specifications in **Table 5**. If any surface wear on the retainer exceeds 0.10 mm (0.004 in.), replace the retainer.
17. Assemble the output shaft by reversing the disassembly procedure while noting the following:

(15)

OUTPUT SHAFT



1. Shims
2. Nut (LH)
3. Washer
4. Roller bearing
5. Thrust washer
6. Retainer (KM2P and KM3P)
7. Spring cup (KM2P and KM3P)
8. Forward gear
9. Needle bearing
10. Inner bearing race
11. Thrust washer
12. Pin
13. Output shaft
14. Clutch cone
15. Reverse gear

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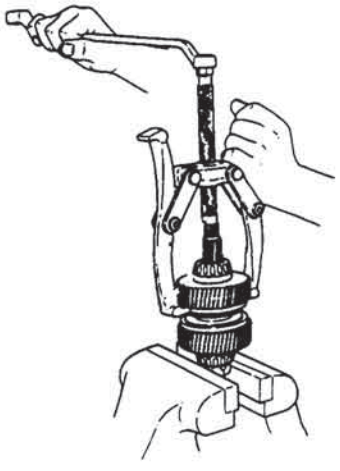
(16)



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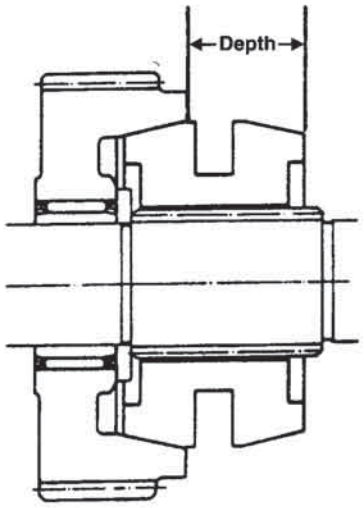
(18)



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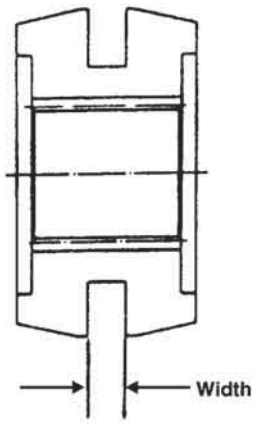
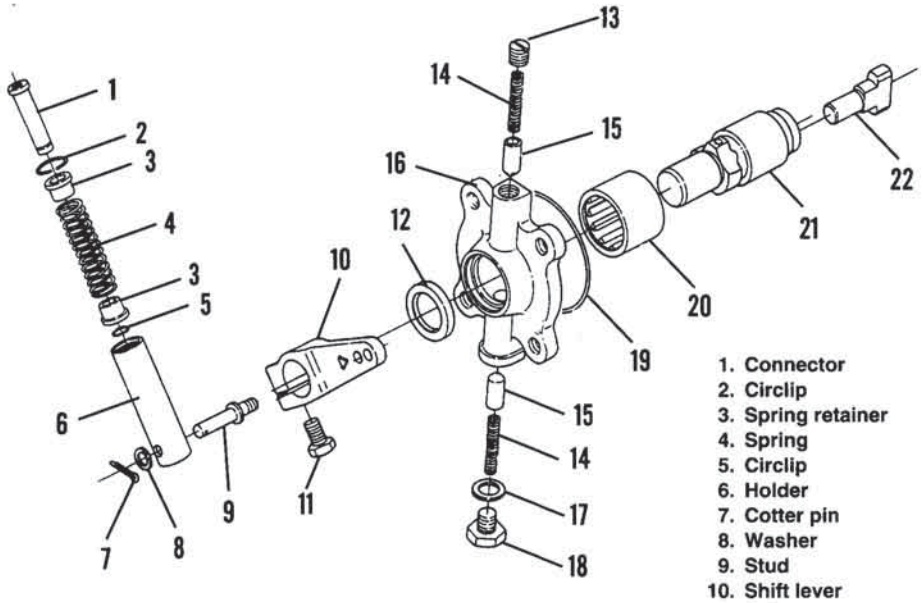
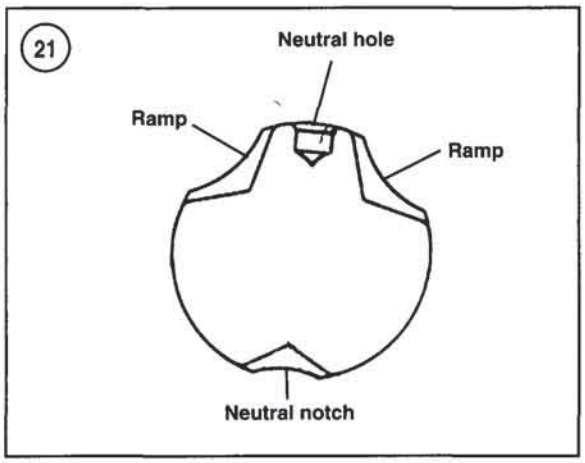


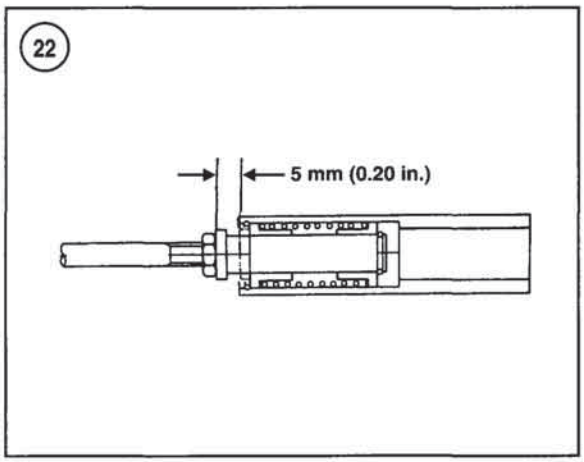
(20)

SHIFTER (KM2A, KM2C AND KM3A MODELS)



1. Connector
2. Circlip
3. Spring retainer
4. Spring
5. Circlip
6. Holder
7. Cotter pin
8. Washer
9. Stud
10. Shift lever
11. Bolt
12. Seal
13. Setscrew
14. Spring
15. Detent pin
16. Body
17. Gasket
18. Plug
19. O-ring
20. Bearing
21. Shift shaft
22. Shifter





a. If reinstalling the original clutch cone, install it in its original position—forward end toward the forward gear.
b. Install the pin before installing the inner roller bearing race.
c. Use a suitable tool or sleeve to drive the inner roller bearing race onto the shaft. Do not use excessive force. Drive the race onto the shaft until it bottoms.
d. Use a suitable tool or sleeve to drive the tapered roller bearing onto the shaft. Do not use excessive force. Drive the bearing onto the shaft until it bottoms.
e. On KM2P and KM3P transmissions—Install the spring cups so the cupped side is toward the gear.
f. Install each thick thrust washer so the stepped side is toward the tapered roller bearing.
g. Install the washer so the pin in the output shaft fits in the groove in the washer.
h. Tighten the nut (left-hand threads) to the torque specified in **Table 2**.
i. Make sure the gears rotate freely.
j. Stake the nut to lock the nut in place.

Shifter (KM2A, KM2C and KM3A models)

Refer to **Figure 20**.

1. If not previously removed, detach the cotter pin and remove the actuator from the shift lever.
2. Remove the shifter.

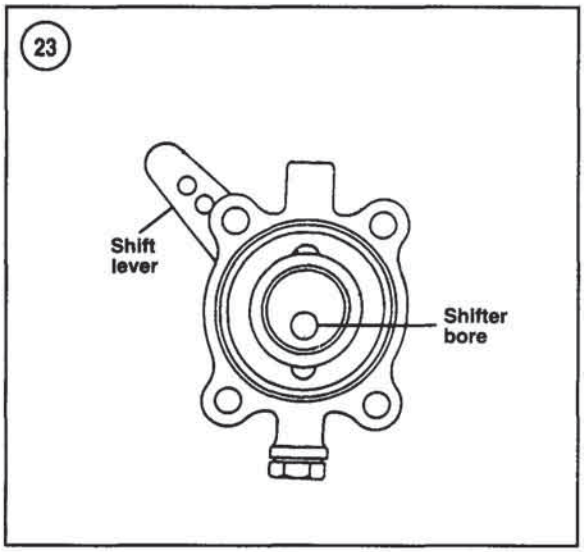
NOTE
Make alignment marks on the shift lever and shift shaft so the shift lever can be reinstalled in its original position.

3. Loosen the clamp bolt and remove the shift lever.

NOTE
The setscrew and plug contain the springs and may fly out.

4. Remove the setscrew and plug, then remove the springs and detent pins.
5. Remove the shifter shaft.
6. Remove and discard the O-ring.
7. Use a screwdriver or suitable tool to pry out the seal. Be careful not to damage the bearing.
8. Inspect the bearing. If it is faulty, replace it as follows:
   a. Heat the shifter body to 212° F (100° C), then drive out the bearing.
   b. Install the new bearing with the stamped end out. Push in the bearing until it bottoms.
9. Inspect the shift shaft. Check the detent portion of the shaft for cracks or excessive wear that will allow poor clutch engagement. The ramps should be smooth and the neutral detent hole should be unworn (**Figure 21**).
10. Inspect the detent pins. Replace the pins if they are damaged or excessively worn.
11. Inspect the springs for deformation or other damage. Specified spring free length is 34 mm (1.34 in.).
12. Inspect the shifter for damage and excessive wear. Measure the shifter width and shaft diameter. Replace the shifter if the measurements exceed the specifications in **Table 6**.
13. Check the internal movement of the actuator. The actuator should slide without binding. To check spring tension, attach a spring scale to the threaded end of the actuator and measure the spring tension when the actuator rod is pulled 5 mm (0.20 in.) from the end of the tube (**Figure 22**). If the spring tension is not as specified in **Table 6**, replace the spring.

14. Reassemble the shifter by reversing the disassembly procedure. Note the following during reassembly:
   a. Apply sealant to the detent setscrew threads.
   b. Install the shift lever on the shift shaft while aligning the marks made during disassembly.
   c. If no alignment marks are available when installing the shift lever, rotate the shift shaft so the shifter bore is down as shown in **Figure 23**. The shift shaft should engage the neutral detent. Install the shift lever at a 45° angle as shown in **Figure 23**.
   d. Install the shift lever on the shift shaft so the side clearance between the lever and body is approximately 0.5 mm (0.020 in.).



Shifter (KM2P and KM3P models)

Refer to **Figure 24**.

1. If not previously removed, remove the control cable connector from the shift lever.
2. Remove the shifter and spring.
3. Remove the stop bolt and shims.
4. Loosen the clamp bolt and remove the shift lever.
5. Remove the shifter shaft.
6. Remove and discard the O-ring.
7. Use a screwdriver or suitable tool to pry out the seal. Be careful not to damage the bearing.
8. Inspect the shift shaft. Check the detent pin for damage and excessive wear. If necessary, replace the detent pin. Measure the shifter shaft bore in the shift shaft and compare with the specifications in **Table 7**.
9. Inspect the body for galling, scoring or other damage to the bore. Inspect the detents for damage and excessive wear that will cause poor clutch engagement (**Figure 25**).
10. Inspect the spring for deformation or other damage. Specified spring free length is 22.6 mm (0.89 in.). Minimum spring length is 19.8 mm (0.78 in.).
11. Inspect the stop bolt. Replace it if it is excessively worn.
12. Inspect the shifter. Measure the large diameter of the shifter shaft and compare it with the specifications in **Table 7**.
13. Reassemble the shifter by reversing the disassembly procedure, but do not install the stop bolt until final installation of the shifter assembly on the transmission.
14. Reassemble the shifter by reversing the disassembly procedure. Note the following during reassembly:
   a. Do not install the stop bolt until final installation of the shifter assembly on the transmission.
   b. Rotate the shift shaft so the detent pin engages the neutral detent (**Figure 25**). On the KM2P transmission, install the shift lever so the side with the triangle mark (A, **Figure 26**) is out. On the KM3P transmission, install the shift lever so the side with the triangle mark is toward the shifter body. With the shift shaft in neutral, position the shift lever at a 45° angle as shown in **Figure 26** and tighten the clamp bolt.

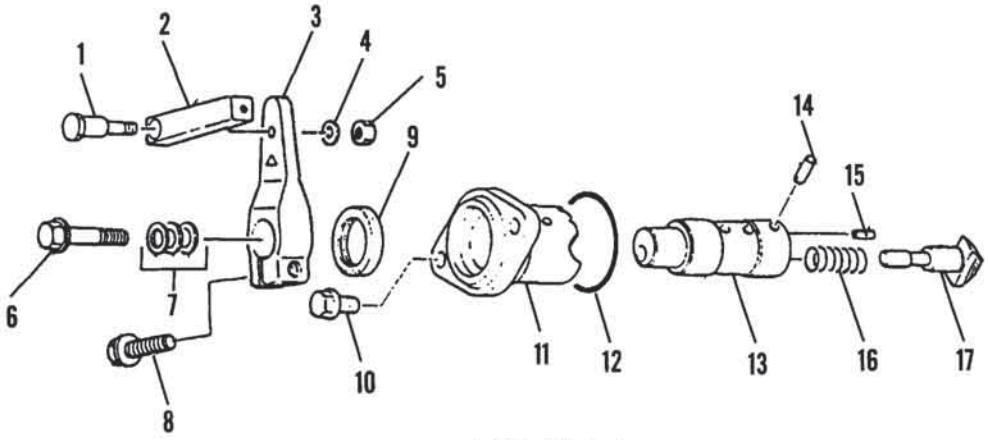
REASSEMBLY

NOTE

*On KM2P and KM3P transmissions, refer to the **Bearing Adjustment** section prior to reassembly if the following components have been replaced: input shaft, input shaft bearings, output shaft, thrust washers and output shaft bearings.*

1. If removed, install the outer bearing races into the transmission case and mounting flange.
2. Apply sealer to the outside diameter of the oil seals and install them into the transmission case and mounting flange with the open side to the inside.
3. Install the input shaft into the transmission case.
4. Install the intermediate shaft assembly into the transmission case. Install a new O-ring on the intermediate shaft. Use a soft-faced hammer to tap the shaft into the case.
5. While holding the input shaft out of the way, insert the output shaft assembly into the transmission case. Move the gears into mesh on the intermediate shaft, input shaft and output shaft while installing the output shaft.
6. If the following components have been replaced, refer to the *Bearing Adjustment* section: input shaft, input shaft bearings, output shaft, thrust washers and output shaft

(24) **SHIFTER (KM2P AND KM3P MODELS)**



1. Shoulder bolt
2. Connector
3. Shift lever
4. Washer
5. Nut
6. Stop bolt
7. Shims
8. Bolt
9. Seal
10. Bolt
11. Shift body
12. O-ring
13. Shift shaft
14. Detent pin
15. Pin
16. Spring
17. Shifter

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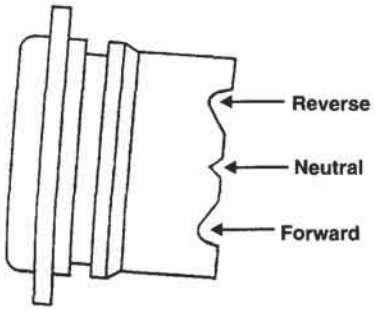
(25) **SHIFTER DETENTS (KM2P AND KM3P MODELS**



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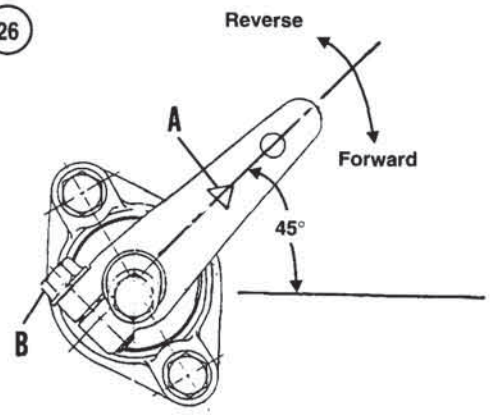


bearings. After adjusting the bearings, continue to reassemble the transmission as described in the following steps. If the preceding components have not been replaced, bearing adjustment is not necessary and the orginal shims may be reused. Proceed to the following step.

7. Position the transmission on a vise with soft jaws so the input shaft is held by the vise jaws.
8. Apply sealer to the mounting flange and install it onto the transmission case.
9. Tighten the mounting flange retaining bolts to the torque in **Table 2**.
10. Install the output flange on the output shaft.
11. Install the O-ring on the output shaft.

NOTE

The output flange retaining nut has left-hand threads.

12. Install the output flange retaining nut by rotating the nut counterclockwise (left-hand threads). Tighten the nut to the torque specified in **Table 2**.
13. Stake the nut to lock the nut in place.

14A. On KM2A, KM2C and KM3A transmissions—Install the shifter assembly on the transmission using the following procedure:

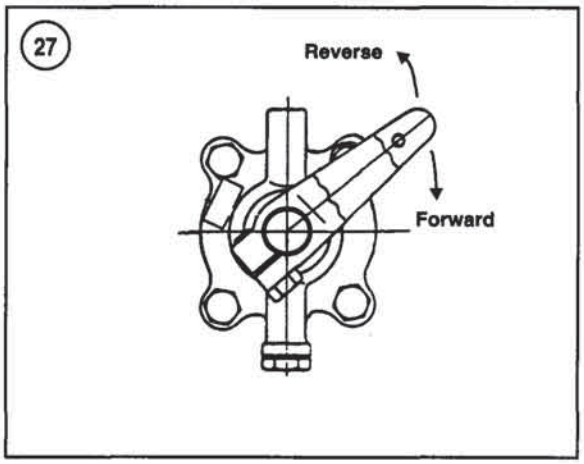
NOTE

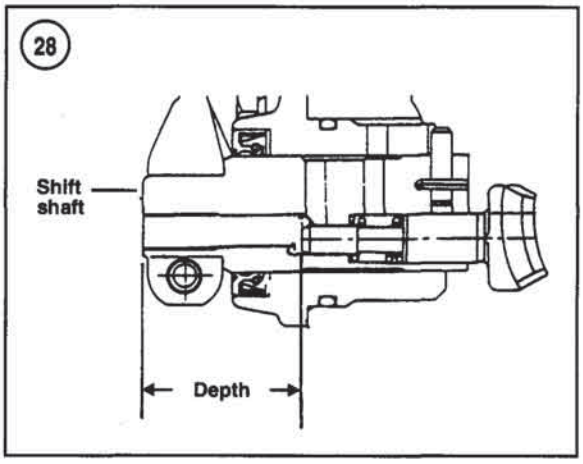
Note that the bolt holes in the shifter mounting flange are sufficiently large to allow movement of the flange around the bolts.

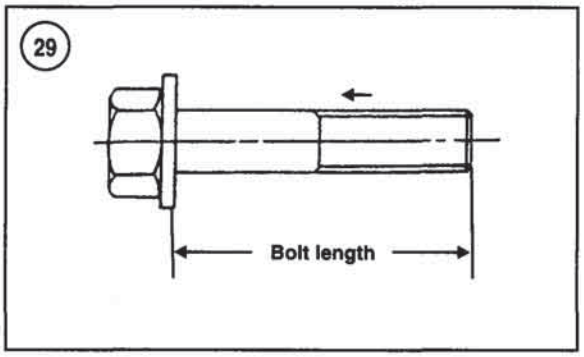
a. Install the shifter assembly on the transmission and tighten the retaining bolts.
b. Measure the amount of shift lever travel from neutral to forward and from neutral to reverse (**Figure 27**). The measurement should be equal from neutral to either forward or reverse.
c. Loosen the shifter retaining bolts and slide the shifter assembly fore or aft as needed to obtain equal shift lever movement.

14B. On KM2P and KM3P—Install the shifter assembly on the transmission using the following procedure.

a. Position the shifter so its curvature is as shown in **Figure 28**.
b. Install the shifter assembly on the transmission and tighten the retaining bolts.
c. Move the shift lever 10-15° from the neutral position to either forward or reverse position.
d. Measure the depth of the end of the shifter shaft from the end of the shift shaft as shown in **Figure 28**. Measure the length of the stop bolt (**Figure 29**).

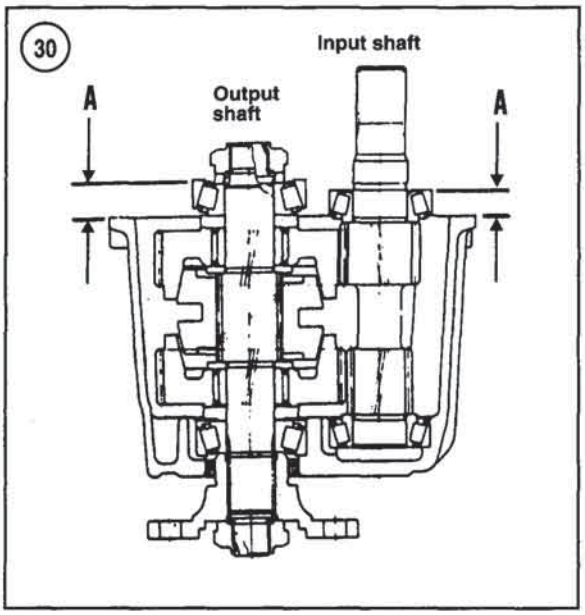


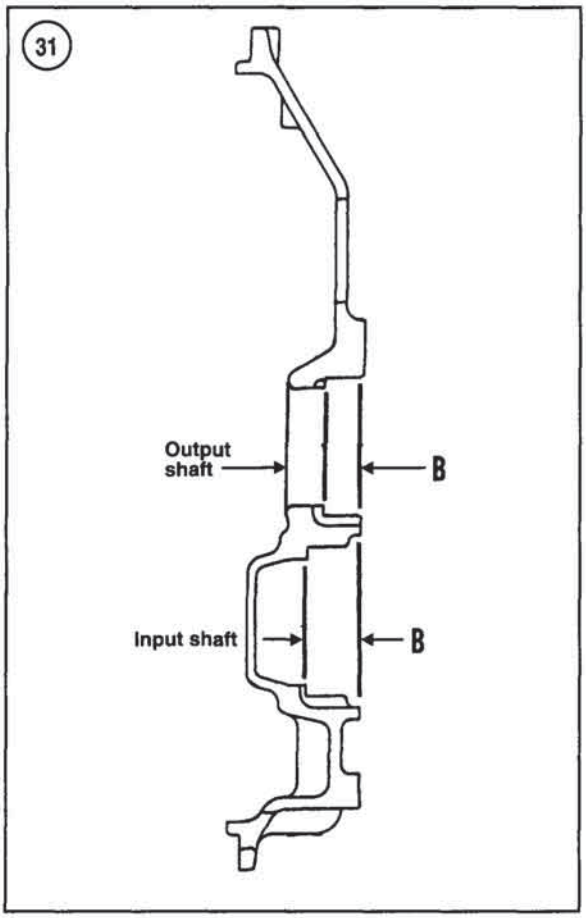




e. Subtract the length of the stop bolt from the shifter shaft depth.

f. Install shims on the stop bolt that equal the result of substep e.





g. Apply sealer to the stop bolt threads, but not to the threads at the end of the bolt (approximately 0.20 in.). Install the stop bolt into the shifter.

BEARING ADJUSTMENT

Perform the following procedure if the following components have been replaced: input shaft, input shaft bearings, output shaft, thrust washers and output shaft bearings. This procedure determines the thickness of shims that must be installed so the tapered roller bearings properly contact the bearing outer races.

KM2A, KM2C and KM3A

1. Install the input shaft, intermediate shaft and output shafts as described in the *Reassembly* section.
2. Position the transmission case so the open end is up and no pressure is being applied to the splined end of the output shaft.
3. Install the outer bearing races on the input and output shaft tapered bearings.
4. Measure the distance (A, **Figure 30**) in millimeters from the mounting flange mating surface on the case to the top of each bearing race. Record the measurements.
5. Measure the distance (B, **Figure 31**) from the mounting flange mating surface to the bottom of the bearing race bore for both the input and output shaft bearings.
6. Subtract the A measurement from the B measurement for each shaft.
7. From the result obtained in Step 6, subtract 0.0-0.05 mm. This result equals the thickness of the shim(s) that must be installed in the bearing bores in the mounting flange.
8. Install the shim(s) in the bearing bores in the mounting flange, then press the bearing outer races into the mounting flange on top of the shims. Make sure the races are bottomed.

KM2P and KM3P

Input shaft

NOTE

The following procedure for adjusting the input shaft bearings is similar to the procedure for the KM2A, KM2C KM3A transmissions, but only use the callouts in ***Figure 30*** *and* ***Figure 31*** *that pertain to the input shaft.*

1. Install the input shaft assembly in the transmission case.
2. Position the transmission case so the open end is up.
3. Install the outer bearing race on the input shaft tapered bearing.
4. Measure the distance (A, **Figure 30**) in millimeters from the mounting flange mating surface on the case to the top of the bearing race. Record the measurement.
5. Measure the distance (B, **Figure 31**) from the mounting flange mating surface to the bottom of the bearing race bore for the input shaft bearing.
6. Subtract the A measurement from the B measurement.
7. From the result obtained in Step 6, subtract 0.0-0.05 mm. This result equals the thickness of the shim(s) that must be installed in the bearing bore in the mounting flange.
8. Install the shim(s) in the bearing bore in the mounting flange, then press the bearing outer race into the mounting flange on top of the shims. Be sure the race is bottomed.

Output Shaft

In the following procedure to adjust bearing preload, the neutral position of the clutch cone must be established for proper transmission operation. The desired clutch cone groove centerline on Model KM2P is 48.3 mm from the mating surface of the transmission case. On Model KM3P the desired clutch groove centerline is 47.3 mm from the mating surface of the transmission case.

NOTE

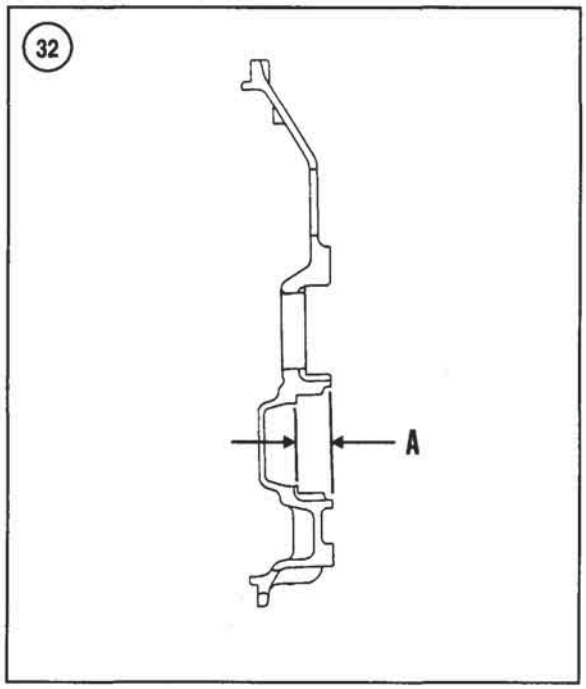
To perform the following bearing adjustment procedure, the output shaft must be out of the case and the outer bearing races must be on the bearings and not installed in the case or mounting flange.

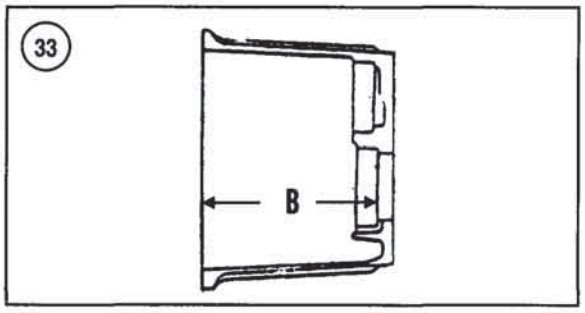
1. Measure and record the distance (A, **Figure 32**) from the mounting flange mating surface to the bottom of the bearing race bore for the output shaft bearing.
2. Measure and record the distance (B, **Figure 33**) from the mounting surface of the case to the bottom of the bearing race bore for the output shaft bearing.
3. Measure and record the distance (C, **Figure 34**) from the faces of the output shaft bearing races.

NOTE

In Steps 4 and 5, force the gears toward the cone clutch.

4. Measure and record the distance (D, **Figure 34**) between the faces of the forward and reverse gears.



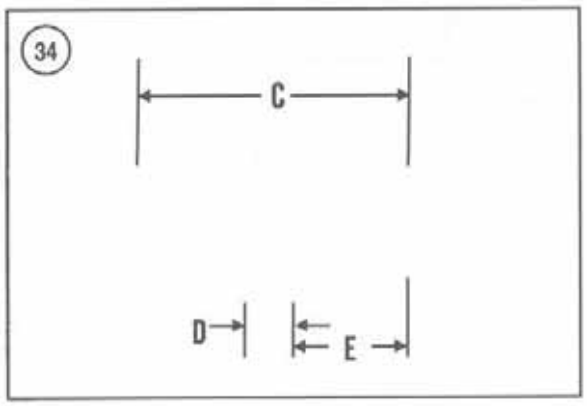


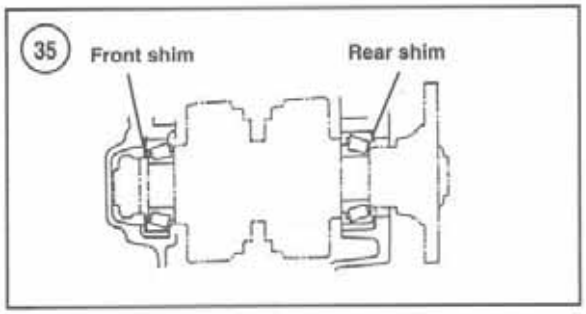
5. Measure and record the distance (E, **Figure 34**) from the face of the reverse gear and the face of the rear bearing race.

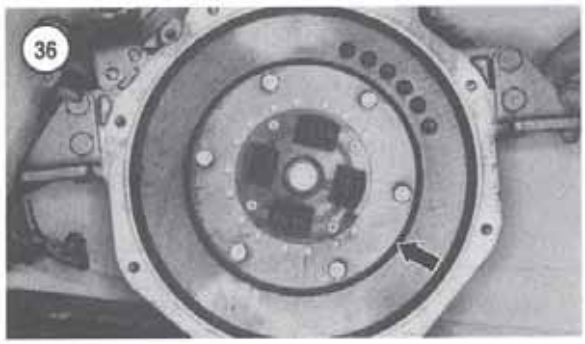
6A. On KM2P transmissions—To determine rear shim thickness (**Figure 35**), proceed as follows:

a. Subtract 48.3 mm from measurement (B, **Figure 33**).
b. Divide measurement (D, **Figure 34**) by 2.
c. Subtract substep b from substep a.
d. Subtract measurement (E, **Figure 34**) from substep c.
e. Subtract 0.0-0.05 mm from substep d. The result is the required rear shim thickness.

6B. On KM3P transmissions—To determine rear shim thickness (**Figure 35**), proceed as follows:

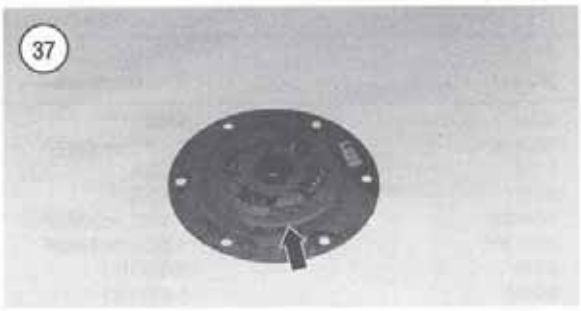






a. Subtract 47.3 mm from measurement (B, **Figure 33**).
b. Divide measurement (D, **Figure 34**) by 2.
c. Subtract substep b from substep a.
d. Subtract measurement (E, **Figure 34**) from substep c.
e. Subtract 0.0-0.05 mm from substep d. The result is the required rear shim thickness.

7. To determine front shim thickness (**Figure 35**), proceed as follows:
a. Add measurement (A, **Figure 32**) to measurement (B, **Figure 33**).



b. Subtract measurement (C, **Figure 34**) from substep a.
c. Subtract the rear shim thickness (determined in Step 6A) from Step b.
d. Subtract 0.0-0.05 mm from substep c. The result is the required front shim thickness.

8. Install the shim(s) in the bearing bores in the mounting flange and case, then press the bearing outer races on top of the shims. Make sure the races are bottomed.

DRIVE DISC

The drive disc attached to the engine flywheel transmits power from the engine flywheel to the transmission input shaft. Bolts secure the disc to the flywheel while the transmission input shaft engages the splined hub on the drive disc. The drive disc incorporates springs that dampen driveline shocks between the engine and transmission.

Removal/Installation

1. Remove the engine from the boat.
2. Remove the transmission.
3. Remove the drive disc (**Figure 36,** typical).
4. Install the drive disc by reversing the removal procedure. Install the drive disc so the side marked FLYWHEEL SIDE (**Figure 37**) is toward the flywheel. Tighten the drive disc retaining bolts to the torque specified in **Table 2**.

Inspection

Replace the drive disc if any of the following conditions exist:

1. Broken spring.
2. Worn or damaged splines in hub.
3. Damaged disc.
4. Damaged pins.

Table 1 ENGINE/TRANSMISSION MODELS

Model	Transmission	Transmission ratio (forward gear)
1GM	KM2A	2.21, 2.62 or 3.22
1GM10	KM2C or KM2P	2.21, 2.62 or 3.22
2GM	KM2A	2.21, 2.62 or 3.22
2GMF	KM2A	2.21, 2.62 or 3.22
2GM20	KM2C or KM2P	2.21, 2.62 or 3.22
2GM20F	KM2C or KM2P	2.21, 2.62 or 3.22
3GM	KBW10D	2.14, 2.63 or 2.83
3GMF	KBW10D	2.14, 2.63 or 2.83
3GMD	KM3A	2.36, 2.61 or 3.20
3GM30	KM3A or KM3P	2.36, 2.61 or 3.20
3GM30F	KM3A or KM3P	2.36, 2.61 or 3.20
3HM	KBW10E	2.14 or 2.83
3HMF	KBW10E	2.14 or 2.83
3HM35	KBW10E	2.14 or 2.83

Table 2 TIGHTENING TORQUES

Fastener	N•m	ft.-lb.
Transmission mounting flange	20-25	15-18
Output shaft nut	85-115	63-85
Output flange nut	85-115	63-85
Drive disc	25	18

Table 3 CLUTCH DEPTH

	Normal depth	Wear limit
KM2A, KM2C	24.4-24.7 mm (0.961-0.972 in.)	24.1 mm (0.949 in.)
KM2P	29.2-29.8 mm (1.150-1.173 in.)	28.1 mm (1.106 in.)
KM3A	29.9-30.2 mm (1.177-1.189 in.)	29.6 mm (1.165 in.)
KM3P	32.7-33.3 mm (1.287-1.311 in.)	32.4 mm (1.276 in.)

Table 4 CLUTCH GROOVE WIDTH

	Standard width	Wear limit
KM2A, KM2C and KM3A	8.0-8.1 mm (0.315-0.319 in.)	8.3 mm (0.327 in.)

Table 5 OUTPUT SHAFT

	Standard width	Wear limit
Thrust washer		
Thin washer	–	0.20 mm (0.008 in.)
Thick washer	–	0.05 mm (0.002 in.)

(continued)

Table 5 OUTPUT SHAFT (continued)

Spring cup (KM2P, KM3P)	2.8-3.1 mm (0.110-0.122 in.)	2.6 mm (0.102 in.)
Spring cup retainer (KM2P, KM3P)	2.92-3.08 mm (0.115-0.121 in.)	2.8 mm (0.110 in.)

Table 6 SHIFTER (KM2A, KM2C AND KM3A)

Shifter width	
Standard	7.80-7.85 mm (0.3071-0.3091 in.)
Wear limit	7.7 mm (0.303 in.)
Shifter shaft diameter	
Standard	9.986-9.995 mm (0.3931-0.3935 in.)
Wear limit	9.95 mm (0.392 in.)
Detent spring free length	34 mm (1.34 in.).
Actuator spring tension	
Standard	2.8 kg (6.2 lb.)
Min.	2.5 kg (5.5 lb.)

Table 7 SHIFTER (KM2P AND KM3P)

Shifter spring free length	
Standard	22.6 mm (0.89 in.)
Min.	19.8 mm (0.78 in.).
Shifter shaft diameter	
Standard	11.966-11.984 mm (0.4711-0.4718 in.)
Wear limit	11.95 mm (0.470 in.)
Shift shaft bore	
Standard	12.0-12.018 mm (0.4724-0.4731 in.)
Wear limit	12.05 mm (0.474 in.)