

2. Installation

2-1 Installation angle

During operation the angular inclination of the gearbox in the longitudinal direction must be less than 20° relative to the water line.

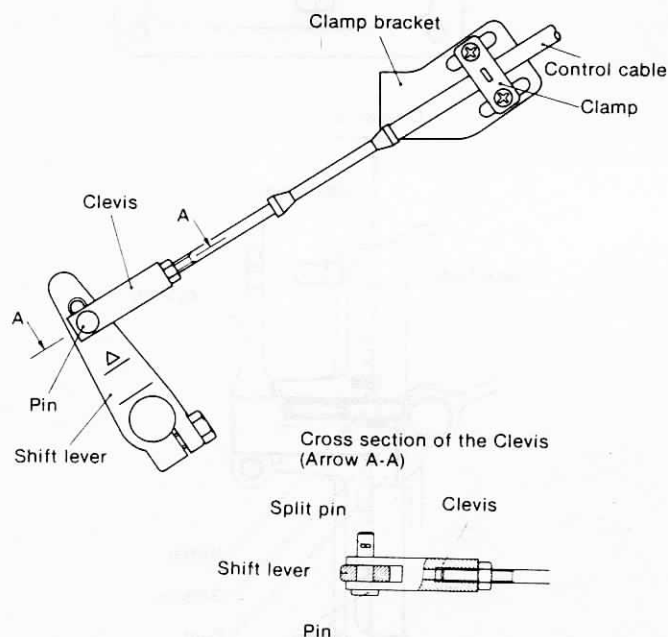
2-2 Remote control unit

This marine gearbox is designed for single lever control to permit reversing at full engine speed (e.g. to avoid danger, etc.). Normally, Morse or Teleflex single lever control is employed. During installation, make sure that the remote control lever and shift lever on the marine gearbox are coordinated. Shifting the lever toward the propeller side produces forward movement, while moving the lever toward the engine side causes the vessel to move in the reverse direction.

To connect the linkage, the operating cable must be positioned at right angles to the shift lever when the shift lever is in the neutral position.

The shift play, measured at the pivot point of the shift lever, must be at least 35mm on each side (reverse and forward) of the neutral position. Greater shift play has no adverse effect on the marine gearbox. After connecting the linkage, confirm that the remote control and the shift lever on the marine gearbox work properly.

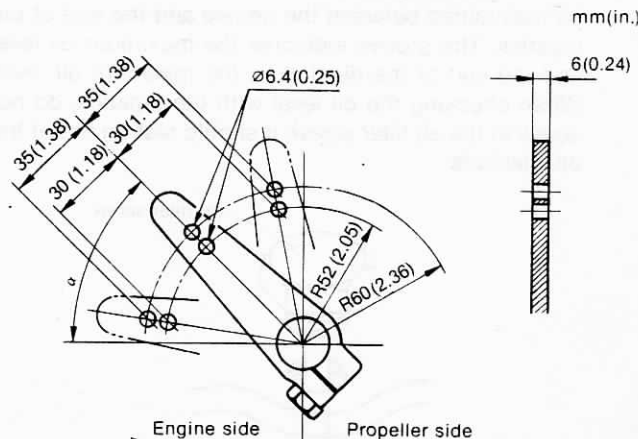
A typical linkage arrangement is illustrated in the figure below.



NOTE: Since the cable stroke may be insufficient, two holes are drilled in the shift lever.

When the cable is attached to the hole 60mm (2.3622in.) from the center of the rotation of the shift lever, the strokes from the center to the forward and reverse sides must both be 35mm (1.3780in.).

When the cable is attached to the hole 52mm (2.0472in.) from the center of the rotation of the shift lever, these strokes must be 30mm (1.1811in.)



Side view of clutch

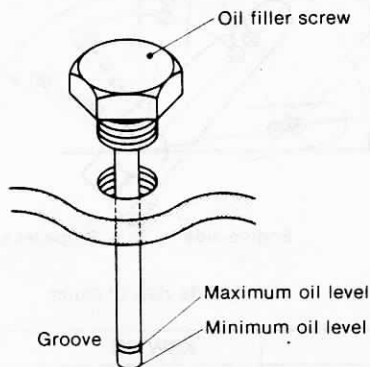
	KBW10D	KBW10E
α	55°	43°

3. Operation and Maintenance

3-1 Lube oil

(1) Oil level

The oil level should be checked each month and must be maintained between the groove and the end of the dipstick. The groove indicates the maximum oil level and the end of the dipstick is the minimum oil level. When checking the oil level with the dipstick, do not screw in the oil filler screw; it should rest on top of the oil filler hole.



(2) Oil change

Change the oil after the first 100 hours of operation, and every 300 hours of operation thereafter. When adding oil between oil changes, always use the same type of oil that is in the marine gearbox.

(3) Recommended brands of lube oil

Supplier	Brand name
SHELL	SHELL DEXRON
CALTEX	TEXAMATIC FLUID (DEXRON)
ESSO	ESSO ATF
MOBIL	MOBIL ATF220
B.P. (British Petroleum)	B.P. AUTRAN DX

3-2 Precautions

Do not stop the shift lever halfway between the neutral and forward or reverse positions. The lever must be set to the neutral position or shifted into forward or reverse in a single motion.

3-3 Side cover

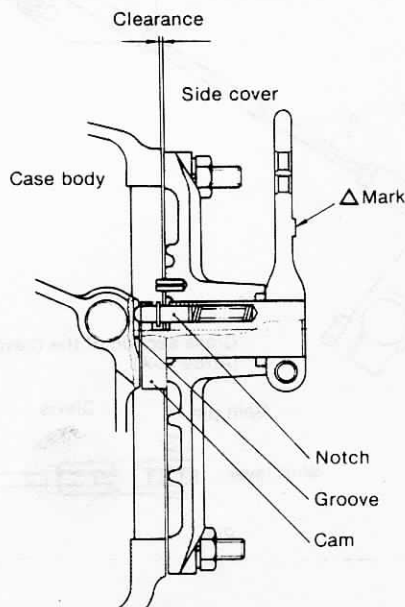
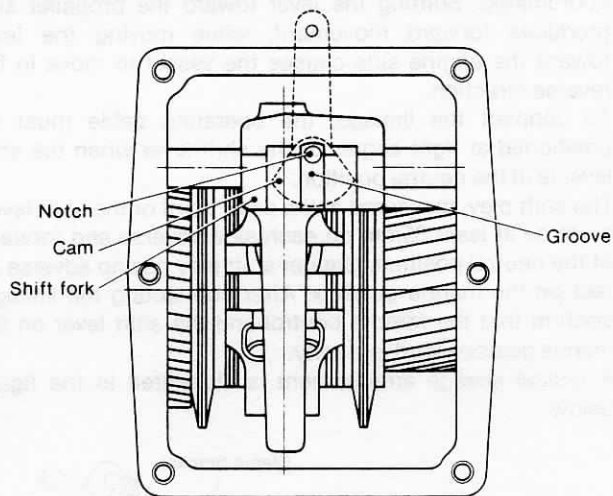
The internal shifting mechanism has been carefully aligned at the factory. Improper removal of the side cover can cause misalignment. If the side cover must be removed, proceed as follows:

—Before removing the cover, put alignment marks on the side cover and the case to facilitate accurate installation.

—When installing the side cover, put the shift lever in neutral so that the cam lobe on the shift lever engages the groove on the internal shift mechanism. When the cam

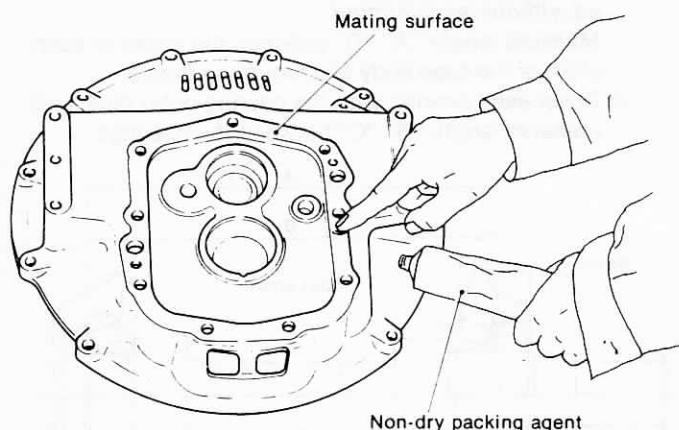
lobe and groove are engaged properly there will be no clearance between the body and the side cover. Do not use packing or gaskets when installing the side cover.

—After making sure that the cam lobe and notches are aligned properly, securely tighten all the bolts. After tightening the bolts, move the lever back and forth. Positive contact should be felt and a click should be clearly audible as the gears shift; otherwise, the cam and notch are not properly engaged, and the cover must be loosened and readjusted until proper engagement is achieved.



- (4) Coat the mating surfaces of the mounting flange and case with a non-dry packing agent.

Wipe off oil and dirt on the mating surface of the case and coat with a thin film of non-dry packing agent.

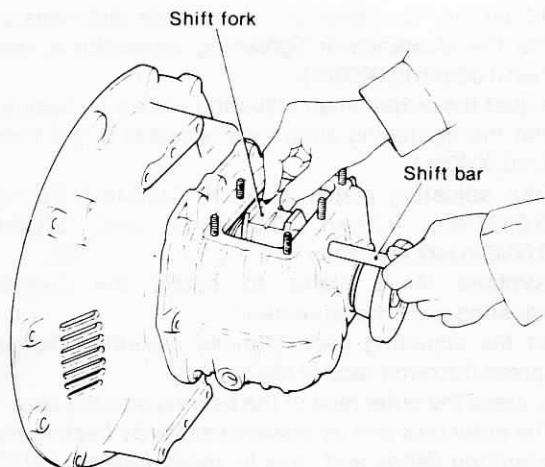


- (5) Insert the input shaft into the case, assemble the intermediate shaft as described in section 6-4 and then insert the output shaft into the case.
- (6) Align the mounting flange with the case, and insert the parallel pin by tapping the mounting flange with a plastic hammer.
- (7) Insert the super lock washer and tighten the M10 bolt.
- (8) Install the dipstick and packing.
- (9) Install the drain plug and packing.

6-6 Reassembling and installing the operating system

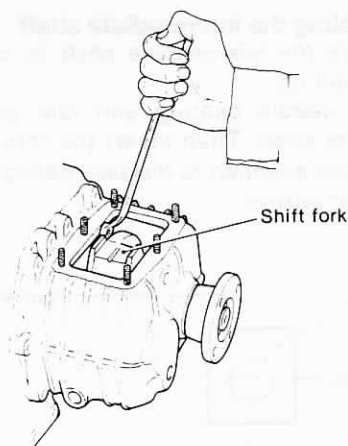
- (1) Insert the shift fork into the case from the side, insert the shift bar.

NOTE: Insert the shift bar with the threaded end towards the outside (output shaft coupling side).



- (2) Coat the threaded part of the shift bar plug with a non-dry packing agent and secure it to the case with a hexagonal bar spanner (width across flats: 8mm (0.3150in.).

NOTE: Put the shift fork into neutral before installing.



- (3) Coat the circumference of the oil seal with a non-dry packing agent and press the seal to the case cover.
- (4) Insert the spring into the shift cam.
- (5) Insert the knock pin into the shift cam from the front end, and lock with the circlip.
- (6) Insert the assembled shift cam into the case cover.
- (7) Fit the shift lever to the shift cam, and tighten the M8 bolt.

NOTE: The shift cam must rotate smoothly.

- (8) Replace the packing if it is damaged.
- (9) Attach the case side cover together with the operating system to the case body.

At this time, make sure that the shift cam is fitted to the shift fork, and that the shift lever is in neutral.

NOTE: Put the shift fork into neutral before installing.

- (10) Insert the super lock washer, and tighten the M8 nut.
- (11) Shift the shift lever to forward and reverse to make sure that the lever operates normally.

If the lever does not operate normally, loosen the M8 nut, slide the case side cover forward, backward, and to the left and right, then re-tighten with the M8 nut in the position at which the lever operates normally.

NOTE: If the lever operates normally a click will be heard when it is put into forward and reverse.