



# Marine Transmission

## Owner's Manual

### Models:

10-04/10-05

10-06

10-13/10-14

10-17/10-18

**Warner Gear**

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### Owner's Responsibilities...

It is the owner's/operator's responsibility to perform the necessary safety checks to ensure that all lubrication, cooling, maintenance and recommended practices are followed for safe, enjoyable operation.

Proper care and maintenance will only help ensure long service life from your Velvet Drive® transmission.

## SECTION I GENERAL INFORMATION

1-1. Every Velvet Drive® marine transmission is self-contained, having its own sump and hydraulic pump separate from the engine. The gear driven pump affords assurance of positive lubrication.

1-2. The Velvet Drive® In-Line hydraulic transmission is available in three (3) models with numerous final drive ratios suitable for inboard pleasure and work boats.

1-3. The Velvet Drive® CR2 was designed specifically for twin screw applications. The counter rotating (CR) capability eliminates the need for opposite rotating engines.

1-4. The two (2) models of the V-Drive transmissions deliver the same horsepower ratings as the CR2. Gear or chain driven final drive will accommodate twin screw applications using same rotating engines.

1-5. The identification tag that appears on all Velvet Drive® transmissions is located on the top of the left-hand transmission mount and contains valuable information concerning the transmission. This information is as follows:

- a. **Model Number** — This appears below the words "Velvet Drive."
- b. **Ratio** — The gear ratio appears in the left-center of the identification tag.
- c. **Serial Number** — Appears at the right-center under the model number.

1-6. Transfer the information on your identification tag to the Maintenance Record Chart on page 10 of this manual. Additionally, the color of the identification tag should be noted in the appropriate space and the date placed in operation.

1-7. The model number and serial number is required on all correspondence.

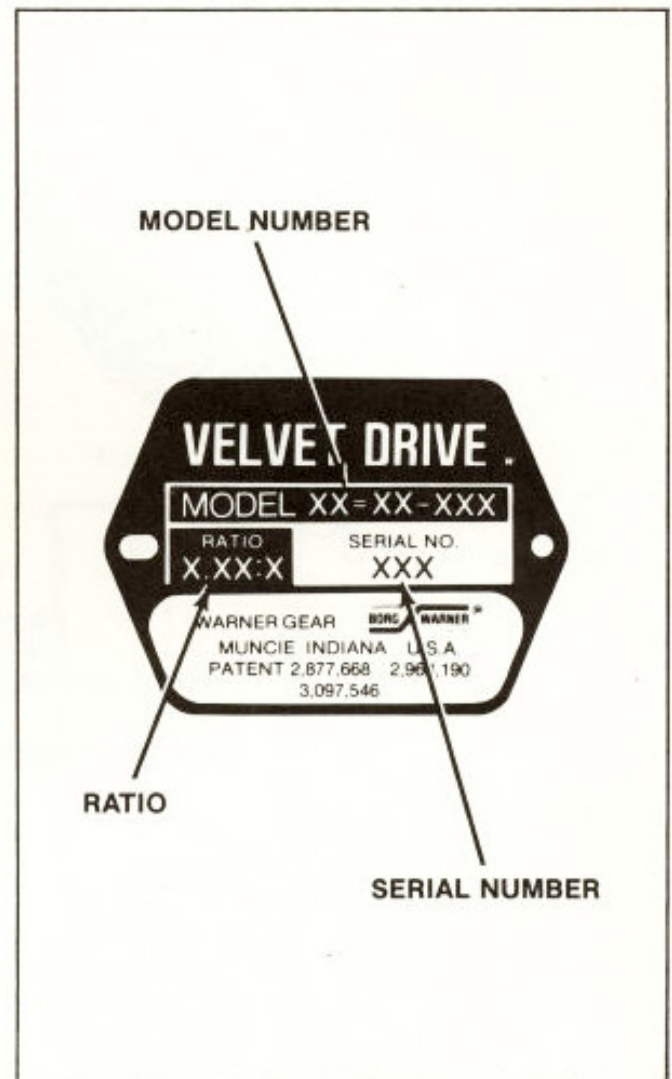


Figure 1-1. Identification Tag

Table 1-1. General Specifications

Model	Ratios*	Fluid Capacity** Qts./Liters	Dry Weight Lbs./Kgs.
10-04	1.21:1 thru 2.50:1	4/3.8	190/86.2
10-05	1.21:1 thru 2.50:1	4/3.8	203/92.1
10-06	1:1	2/1.9	135/61.2
10-06	1.5:1 thru 3:1	3/2.8	185/83.9
10-13	1.58:1 thru 2.93:1	4/3.8	162/73.5
10-14	2.47:1 thru 2.93:1	4/3.8	175/79.4
10-17	1:1	2/1.9	95/43.1
10-17	1.52:1 thru 2.91:1	3/2.8	145/65.8
10-18	1:1	2/1.9	109/49.4
10-18	1.52:1 thru 2.91:1	3/2.8	154/69.9

\* Gear ratios vary depending on model number.

\*\* Fluid capacity is approximate and depends on installation angle and cooling system.

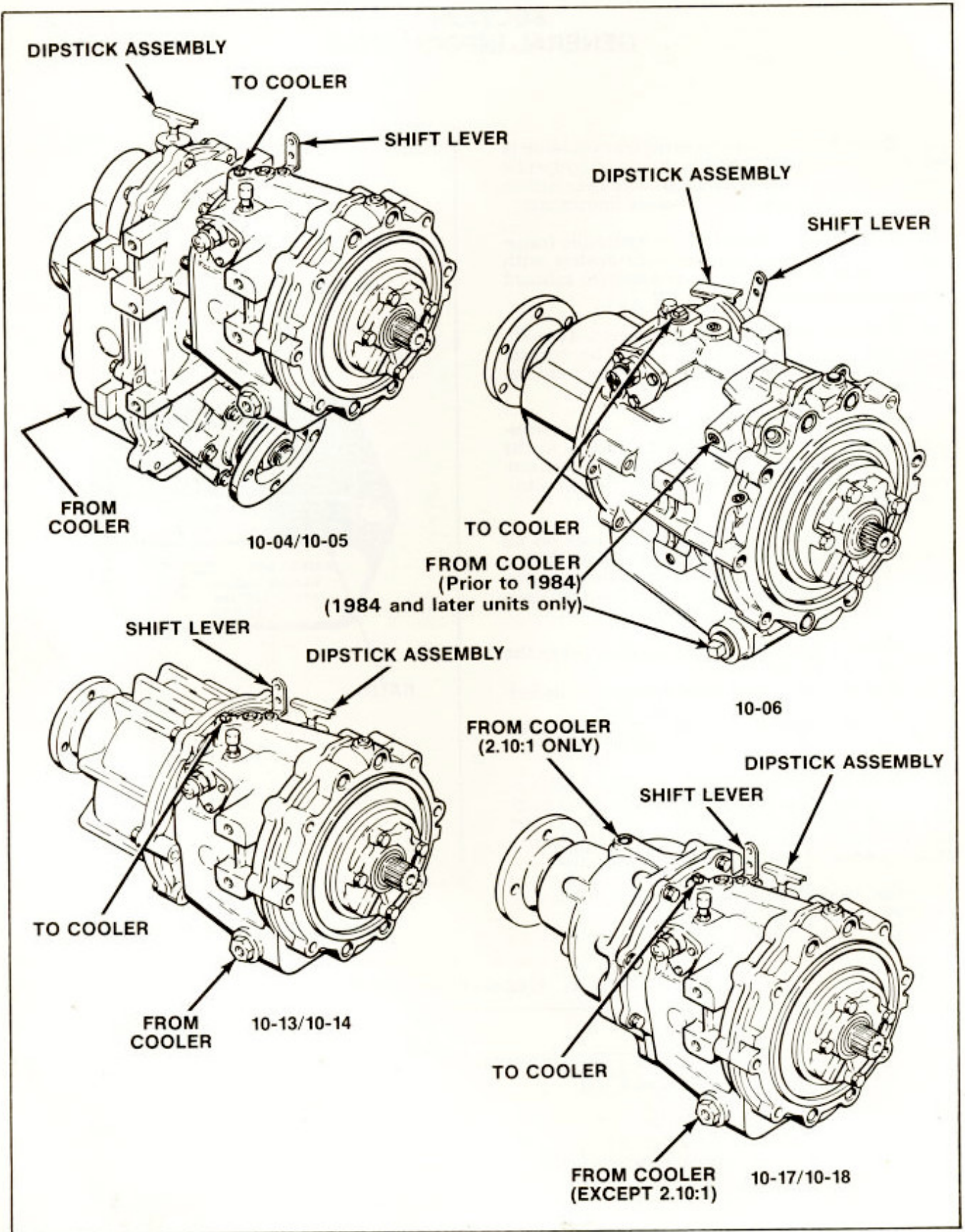


Figure 1-2. General View of Velvet Drive® Transmissions

## SECTION II LAUNCH MAINTENANCE

2-1. The following maintenance should be performed after launching your boat to ensure optimum performance and life from your Velvet Drive® transmission.

### CAUTION

Vibration, gear noise, loss of rpm and premature oil seal and bearing failure can be caused by misalignment of propeller shaft coupling and transmission output coupling flange.

2-2. Propeller shaft coupling flange and transmission output flange alignment is performed after launching of your boat as well as any time your boat strikes a heavy object or after your boat has been hoisted or pulled from the water.

### CAUTION

Remove attaching hardware from transmission output flange and propeller shaft coupling flange before removing boat from water and separate flanges.

2-3. Check the alignment of the transmission output flange and propeller shaft coupling flange using the following procedure with boat in water:

- a. Disconnect the battery.
- b. Remove attaching hardware from coupling flanges.
- c. Check clearance around coupling flanges with .003 feeler gage and flange pilot engaged.
- d. Rotate coupling flanges together one complete revolution, stopping every 90° to check clearance with .003 feeler gage.
- e. Alignment is satisfactory when the transmission output flange and propeller shaft coupling flange with pilot seated are within .003 inch (.076mm) of parallel.
- f. If alignment is unsatisfactory, an adjustment is required (see paragraph 2-4).
- g. When alignment is satisfactory, tighten attaching hardware.

2-4. Propeller and Output Shaft Adjustment

### CAUTION

Do not lift or pry against transmission output flange or coupling to move engine.

This adjustment is accomplished at the boat motor and transmission mounts **ONLY**. This procedure should be accomplished by a skilled marine mechanic.

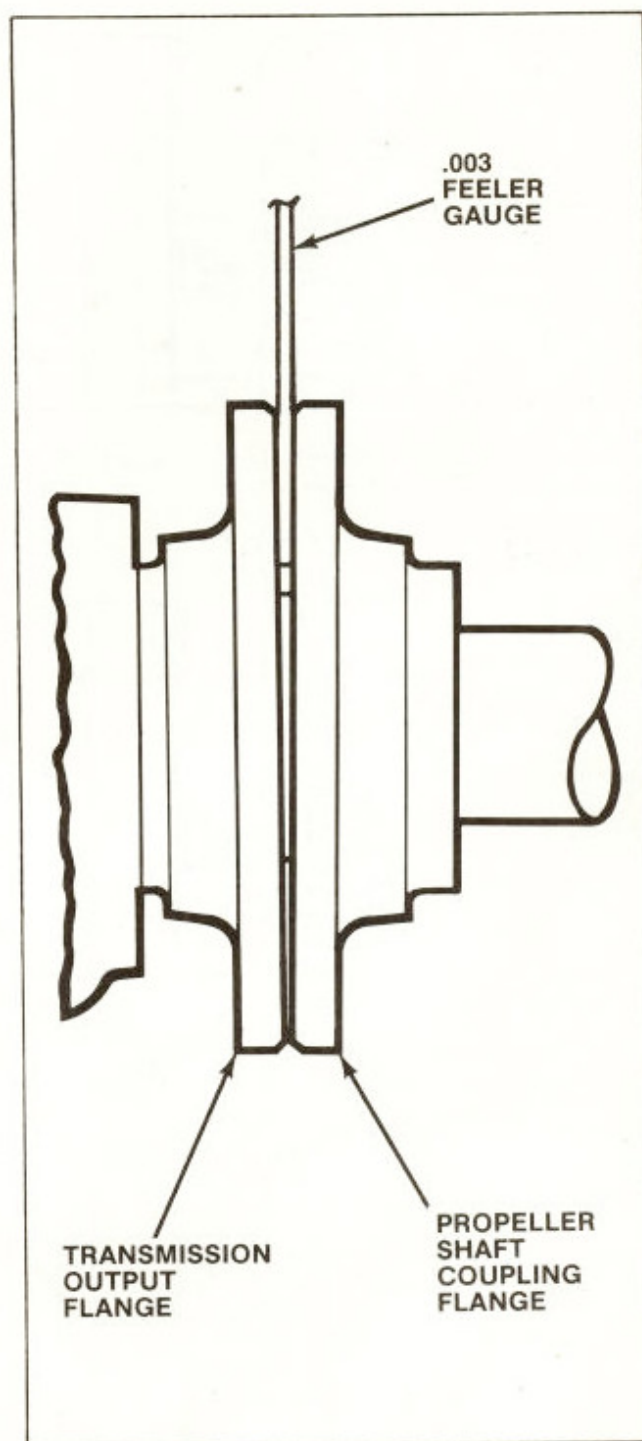


Figure 2-1. Coupling Shaft Alignment

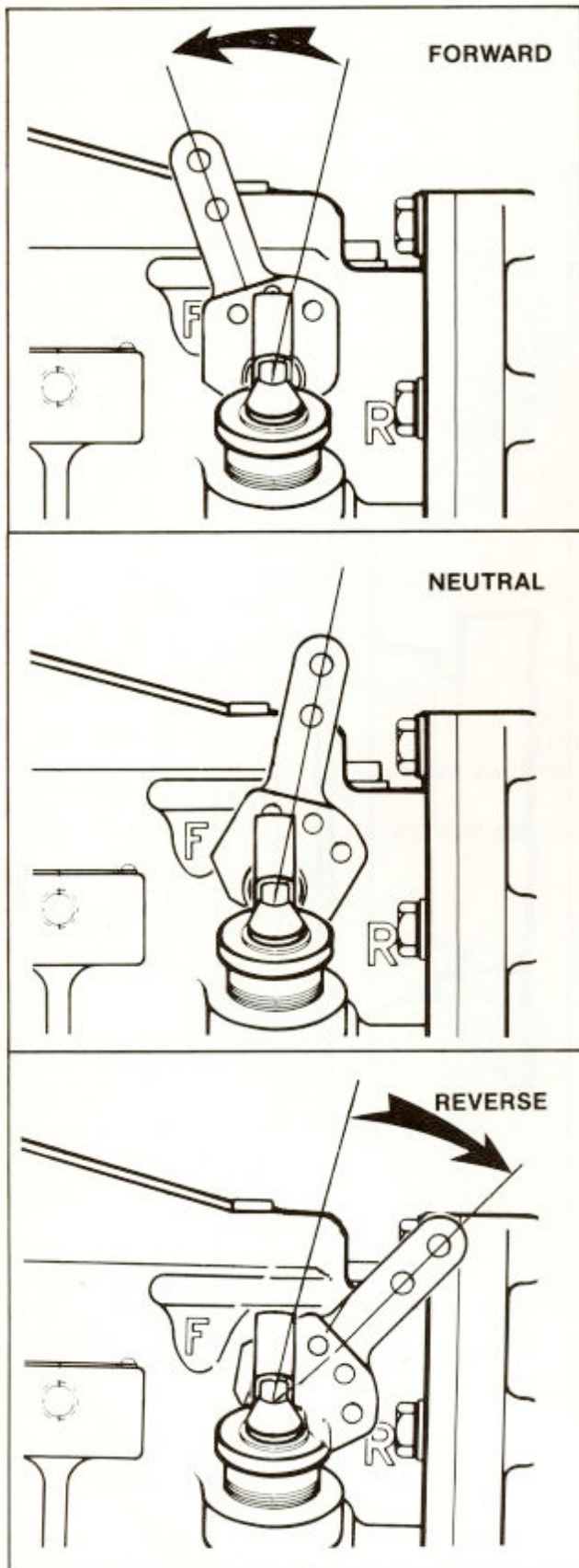


Figure 2-2.  
Transmission Shift Lever Positions

#### 2-5. Shift Lever Positioning

The selector control mechanism and linkage must position the shift lever on the transmission exactly in Forward (F), Neutral (N), and Reverse (R) shifting positions. A detent ball located behind the transmission shift lever must work freely to center the lever in each position. (see Figure 2-2). The selector control positions at the helm(s) must be coordinated with those of the Velvet Drive® shift lever through shift mechanism adjustments. An improperly adjusted shift mechanism can cause damage to the transmission.

**NOTE:** When moving from Neutral Position to:  
Forward is always towards engine.  
Reverse is always away from engine.

#### CAUTION

**Clutch failure will occur if transmission shift lever does not fully engage detent ball positions.**

The shifting mechanism and transmission shift lever should be free of dirt to ensure proper operation.

#### CAUTION

**Do not remove detent ball.**

#### 2-6. Transmission Connections

- a. Visually check for oil leaks at hydraulic connections, worn hydraulic lines.
- b. Check for broken or loose fasteners.
- c. Replace all worn hydraulic lines, tighten all connections where an oil leak has occurred, and secure all hydraulic lines.
- d. Visually check all electrical connections for loose terminals and worn wires.
- e. Repair or replace all worn or broken wires to U.S. Coast Guard specifications and tighten all loose connections.

#### 2-7. Transmission Bolts

- a. Check all exterior transmission bolts for tightness.
- b. Tighten all loose bolts to recommended torque specifications.
- c. Tighten all coupling bolts.

#### 2-8. Change Transmission Oil

A seasonal transmission oil change is recommended for all pleasure boats. Work boats require transmission oil changes every 1,000 hours. Oil must be changed anytime it becomes contaminated, changes color, or becomes rancid smelling.

#### WARNING

**Do not use gasoline or any other volatile or highly combustible liquid as a solvent.**

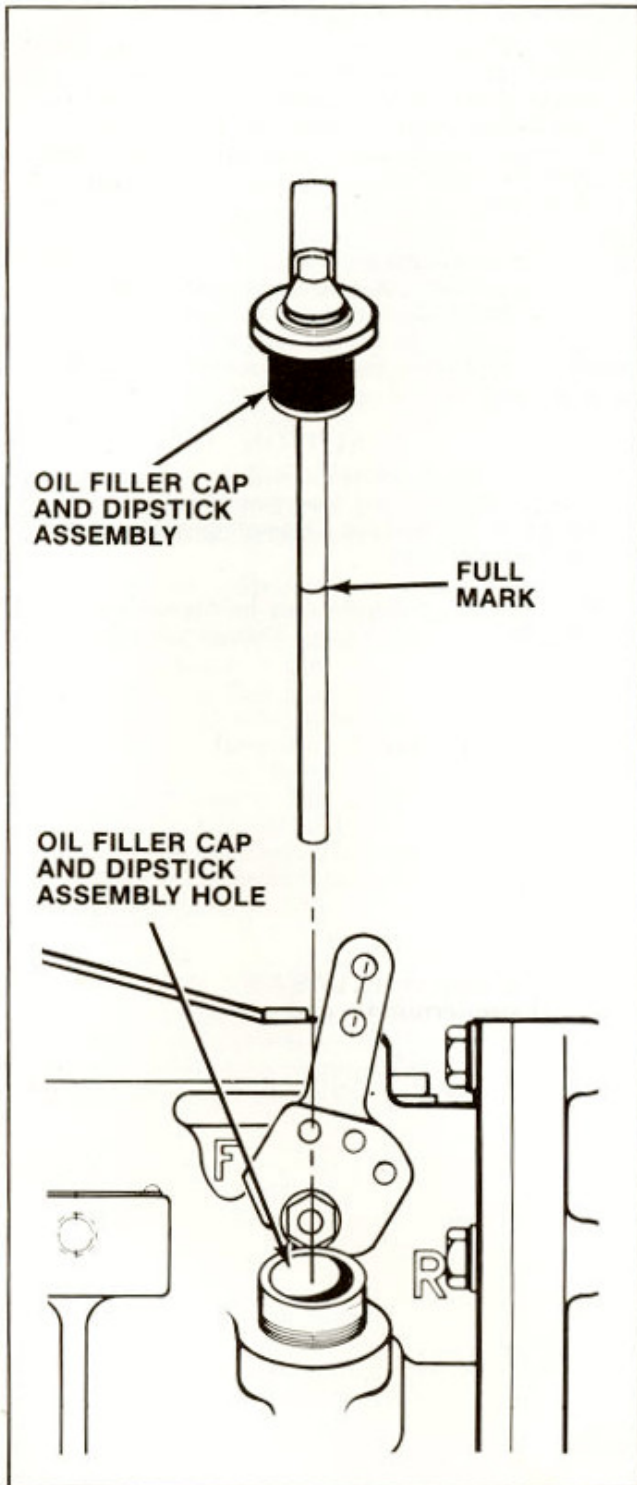


Figure 2-3. Dipstick Assembly

- 2-9. Removing Transmission Oil (Oil Filler Cap)
- Place an appropriate size container near oil cooler return line.
  - Remove oil filler cap and dipstick assembly (see Figure 2-3).
  - Remove oil cooler return line.
  - Allow oil from return line to drain into container.
  - Connect oil cooler return line and torque to 25-35 ft.-lbs. (34-47 N•m).
  - Use a suction pump in the oil filler cap hole to remove remaining oil in the transmission.
  - Remove suction pump from transmission.

2-10. Fill Transmission With Oil

The quantity of oil depends upon the model Velvet Drive® (see Table 1-1 for capacity) angle of installation and oil cooling system capacity.

**NOTE:** Oil capacities in Table 1-1 are for transmission only. Additional oil will be required for oil cooling system.

- Using suitable transmission oil (see Table 2-1), fill transmission through dipstick hole until oil reaches full mark on dipstick.
- Replace oil filler cap and dipstick assembly in hole. Press to bottom and turn clockwise until finger tight.

**CAUTION**

Before running engine replace oil filler cap and dipstick assembly. Hot oil through dipstick hole could cause burns.

- Connect battery and run engine to fill oil cooling system. With engine off promptly recheck oil with dipstick and fill as required.

Table 2-1. Recommended Transmission Oil

Oil+	Conditions
Dexron® II, Type F Transmission Fluid*	Recommended
SAE #30*	Preferred**
SAE #40*	Acceptable** (High Temperature Only)
Multi-Viscosity Oil	Not Acceptable

\* Detroit Diesel Allison Type C3 Specification

\*\*Detroit Diesel Allison Type C3 Specification, Engine Speed Below 3,000 rpm.

+ SAE-AP1 Service Class CD Recommended, Class CC Acceptable.

- 2-11. Transmission Housing
- Wipe transmission housing free of dirt and grease and visually check for wear points and stress cracks.
  - Make a note of these areas on the Maintenance Record.
  - Make necessary adjustments to allow clearance in these areas.
  - Using suitable paint, touch up these areas.

- 2-12. Preoperation maintenance is a precaution against a potentially costly major overhaul. The preoperation maintenance procedure needs to be completed on a daily basis before starting engine.
- Check transmission oil level on dipstick before operation. Add suitable oil as required (See Table 2-1).
  - Check for oil leakage in the bell housing, output shaft and other gasket sealed areas.
  - Visually check the general condition of the transmission and wipe clean.

- 2-13. During operation, be aware of any unusual noises or vibrations and investigate to determine the cause.

#### CAUTION

**System related noises or vibrations can occur at low engine speeds which can cause gear rattle resulting in damage to the boat engine and/or transmission. Warner Gear is not responsible for total system related torsional vibration of this type.**

- 2-14. Oil temperature maximum is 190°F (105°C) during operation. A transmission warning light (optional) will illuminate if oil temperature is too high. Should this occur, check transmission oil level or consult your nearest Velvet Drive® distributor.

#### CAUTION

**If drainback occurs, oil level must be compensated. To correct this, see your authorized Velvet Drive® transmission service facility.**

- 2-15. Service manuals can be obtained by contacting the nearest Velvet Drive® distributor.



## SECTION III OPERATION

3-1. Perform all preoperation maintenance on the Velvet Drive® transmission (see paragraph 2-12).

3-2. At the helm place transmission selector control in Neutral before starting engine. Shifts from any selector position to any other selector position may be made at any time below 1000 rpm and in any order. Shifts should be made at the lowest practical engine speed.

### CAUTION

**Shifting above 1000 rpm can severely damage boat, transmission and engine.**

- a. **Neutral** — Move selector lever to the middle position. You should feel the detent center the shift lever on the transmission through the linkage to the selector lever. With the control in this position, hydraulic power is completely interrupted and the output shaft of the transmission does not turn.
- b. **Forward** — Move selector lever to the forward position. You should feel the detent. The shift lever on the transmission in the forward position. The output shaft and the propeller should move the boat in a forward direction.

### WARNING

**If boat moves backwards with the selector control in the forward position, shut off engine (see paragraph 2-5) or consult your nearest Velvet Drive® distributor.**

**NOTE:** This problem can be a result of improper installation by the boat builder or service facility.

### CAUTION

**Early gear failure will occur when the transmission is operated in reverse to obtain forward propulsion.**

- c. **Reverse** — Move selector lever to the rearward position. You should feel the detent. The shift lever on the transmission is in the reverse position. The output shaft and the propeller should move the boat in a reverse direction.
- 3-3. Velvet Drive® Transmission Operation
- a. Place selector control in the Neutral position.
  - b. Start engine and set throttle at idle speed and warm up transmission oil for a few minutes.
  - c. Be aware of any unusual noises or vibrations and investigate to determine the cause.

### CAUTION

**Before checking oil, shut off engine. Hot oil could cause burns.**

- d. Shut off engine and check transmission oil level and add oil, if required, to the full mark on the dipstick.
- e. Restart engine.

## SECTION IV WINTER STORAGE

4-1. Storage requires special care. Before winter storage one must:

- a. Disconnect battery.
- b. Drain water from the transmission oil cooling system.
- c. Wipe transmission free of dirt, grime and grease.
- d. Touch up unpainted areas of the transmission using suitable paint.
- e. Loosen attaching hardware from transmission output flange and propeller shaft coupling flange before removing boat from water and separate flanges.