

Section 1

Introduction and Description

1-1. INTRODUCTION

1-2. PURPOSE. This manual contains maintenance, service and parts information for the Series 5000 Velvet Drive® Marine Transmission (see figure 1-1).

1-3. SCOPE. This manual provides information for maintenance, troubleshooting, removal, disassembly, cleaning, inspection, repair or replacement, assembly and installation of the transmission.

1-4. Section P contains an illustrated parts list. The arrangement of the exploded view illustrations is described in the introduction to Section P. Each detailed part shown in the exploded views is assigned

an index number. This same index number is used to identify the part throughout this manual. For example, index number 27 (in parentheses in the text) refers to the output shaft regardless of the manual section or the specific transmission being serviced.

1-5. The exploded view illustrations in Section P make it possible to view the complete assembly and major subassemblies, in addition to the illustrations, in the service sections relating to a specific service procedure.

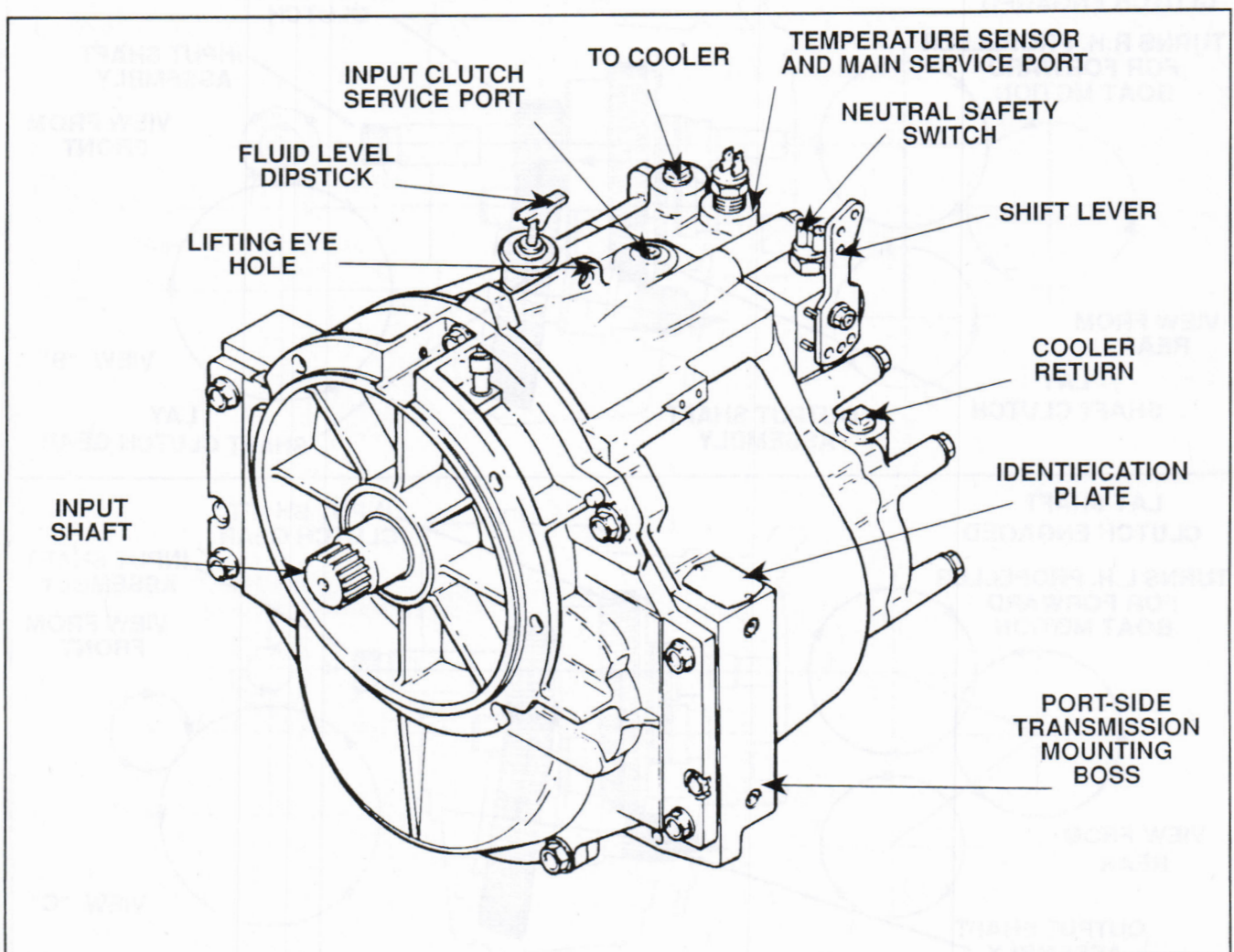


Figure 1-1. 5000 Series Marine Transmission

TRANSMISSION POWER FLOW

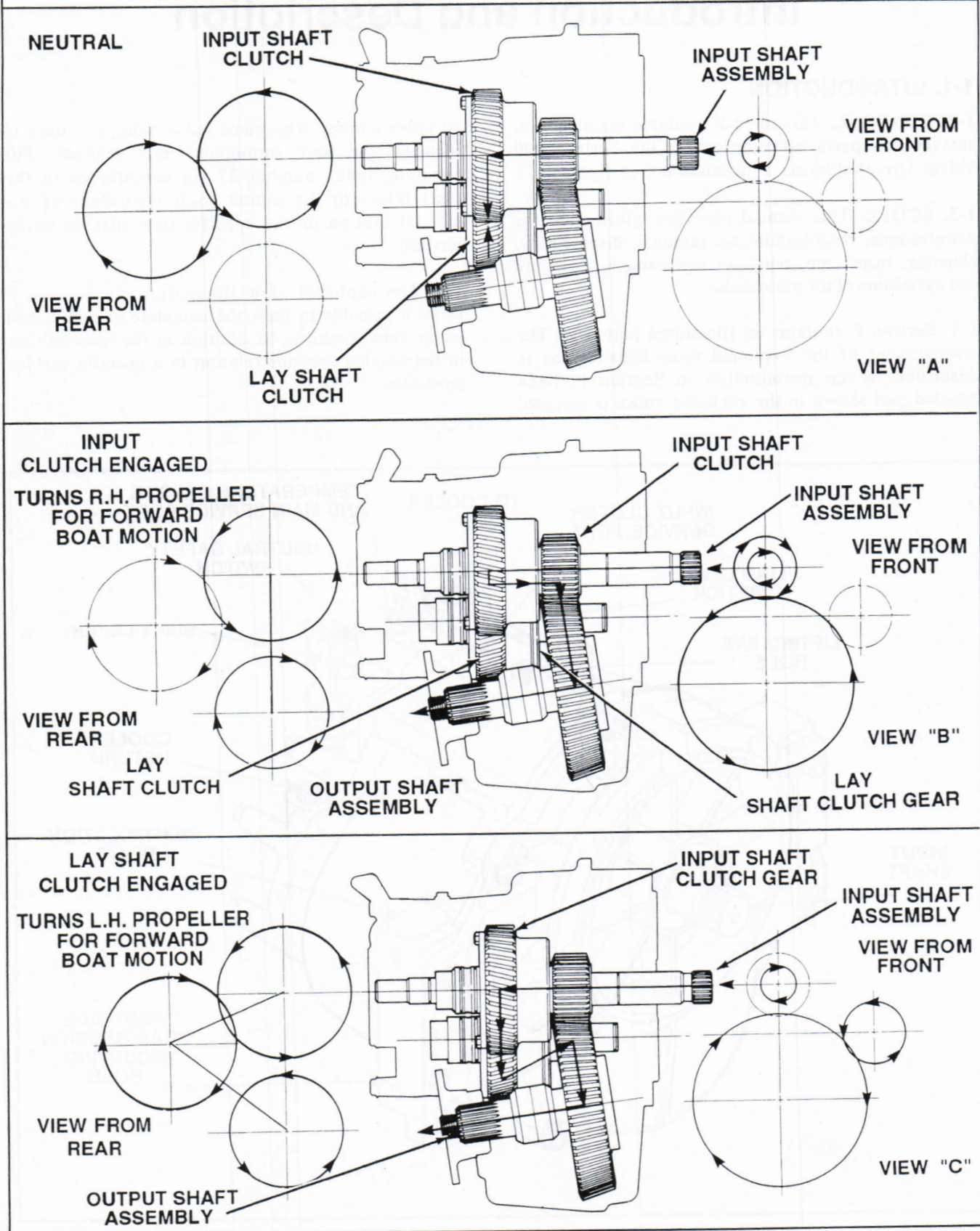


Figure 1-2. Series 5000 Transmission Operation

1-6. Section T lists special tools. These tools, or their equivalent are required for proper disassembly and assembly of the transmission.

1-7. ABBREVIATIONS. Abbreviations, other than those in common use, found in this manual are identified in Table 1-1.

Table 1-1. Abbreviations

| | |
|------|---------------------|
| AR | As Required |
| ASSY | Assembly |
| ID | Inside Diameter |
| NSS | Not Sold Separately |
| OD | Outside Diameter |
| PN | Part Number |
| QTY | Quantity |
| REF | Reference |

1-8. DESCRIPTION

1-9. GENERAL DESCRIPTION. The Velvet Drive ®Series 5000 is a single-speed, forward/reverse, hydraulic-shift transmission. The gear ratio varies from model to model and is listed in Table 1-2.

1-10. The input, lay and output shafts are supported by tapered roller bearings. Needle bearings are used between the shafts and clutch gears on the input and

lay shaft assemblies. Helical gearing is used throughout. The transmission has separate, multi-disc clutches for each direction of output shaft rotation.

1-11. APPLICATION. The Series 5000 is a drop center, 8 degree down-angle transmission, specifically designed for twin engine applications requiring nearly horizontal engine installation. It will operate only behind engines with counter clockwise rotation (viewed from flywheel end). This is commonly termed automotive rotation. The Series 5000 transmission's full reversing feature eliminates the need for opposite rotating engines. Thus, a right-hand or left-hand propeller can be used with an automotive rotation engine.

1-12. DESCRIPTION OF OPERATION. (See figure 1-2) The transmission input shaft and lay shaft assemblies are geared together and rotate in opposite directions when the engine is running. Each of these shaft assemblies has a hydraulic clutch that engages a clutch gear. Each clutch gear "floats" on needle bearings on its respective shaft and engages the output shaft assembly gear. As shown in view A, with the transmission in neutral and the engine running, the input and lay shaft assemblies rotate in opposite directions with the output shaft stationary. View B shows the power flow when the input shaft hydraulic clutch is engaged (refer to paragraph 1-13, step 2). Output shaft rotation is clockwise or opposite to the engine rotation. View C shows the power flow when the lay shaft hydraulic clutch is engaged (refer to paragraph 1-13, step 3). Output shaft rotation is counterclockwise or the same as engine rotation.

Table 1-2. General Specifications

| ASSEMBLY No. | NOMINAL RATIO | ACTUAL RATIO | FLUID CAPACITY* QT/LITER | DRY WEIGHT LB/KG |
|--------------------------|---------------|--------------|--------------------------|------------------|
| 2001-000-001, R01 & -011 | 1.00:1 | 1.054:1 | 2.01/1.90 | 100/45 |
| 2001-000-002, R02 & -012 | 1.25:1 | 1.303:1 | 2.01/1.90 | 100/45 |
| 2001-000-003, R03 & -013 | 1.50:1 | 1.586:1 | 2.01/1.90 | 100/45 |
| 2001-000-004, R04 & -014 | 2.00:1 | 2.040:1 | 2.01/1.90 | 100/45 |
| 2001-000-005, R05 & -015 | 2.50:1 | 2.454:1 | 2.01/1.90 | 100/45 |
| 2001-000-006, R06 & -016 | 2.80:1 | 2.800:1 | 2.01/1.90 | 100/45 |

* Approximate, depending on angle of transmission installation, for transmission only. Capacity given does not include oil (fluid) cooler and connection lines.

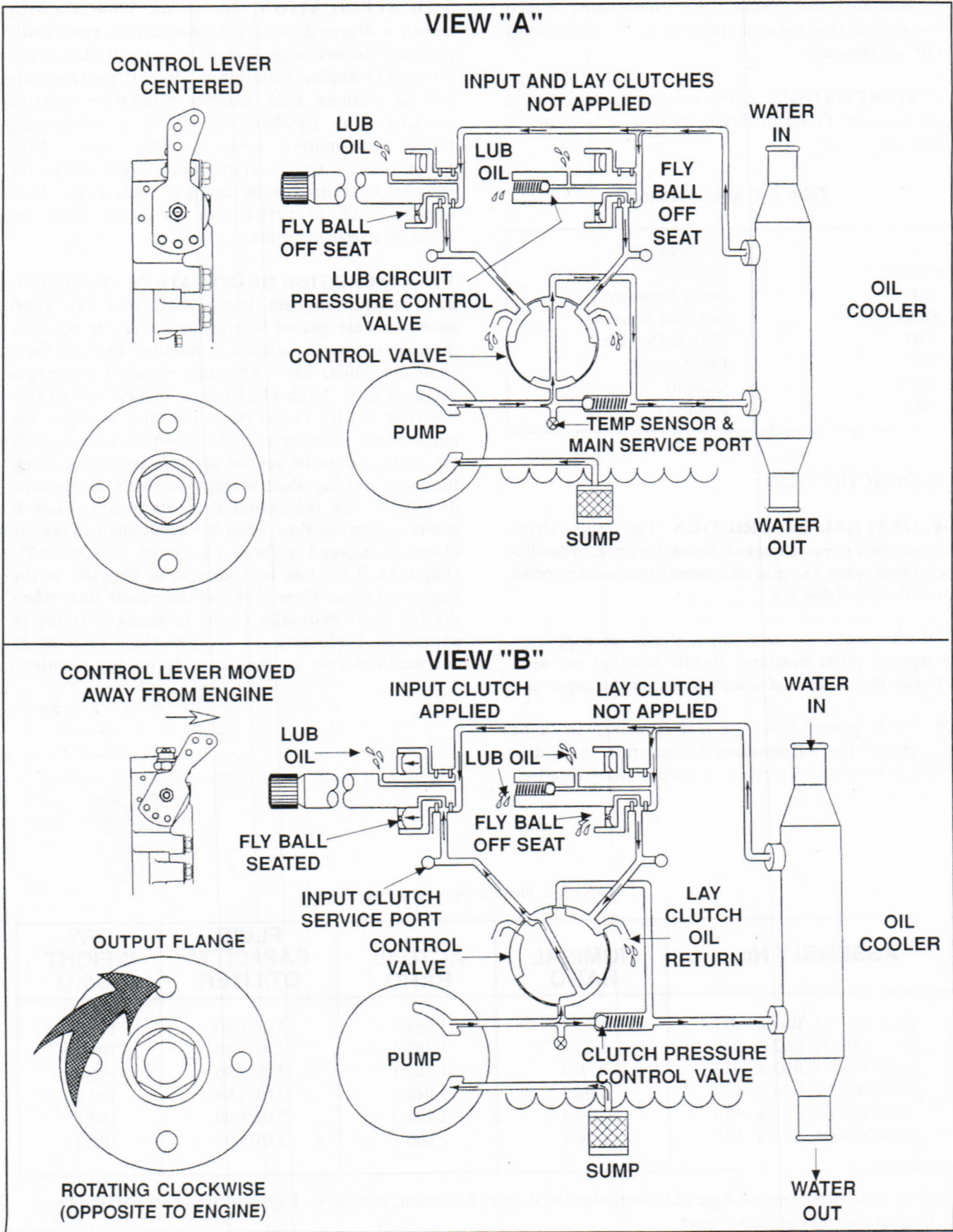
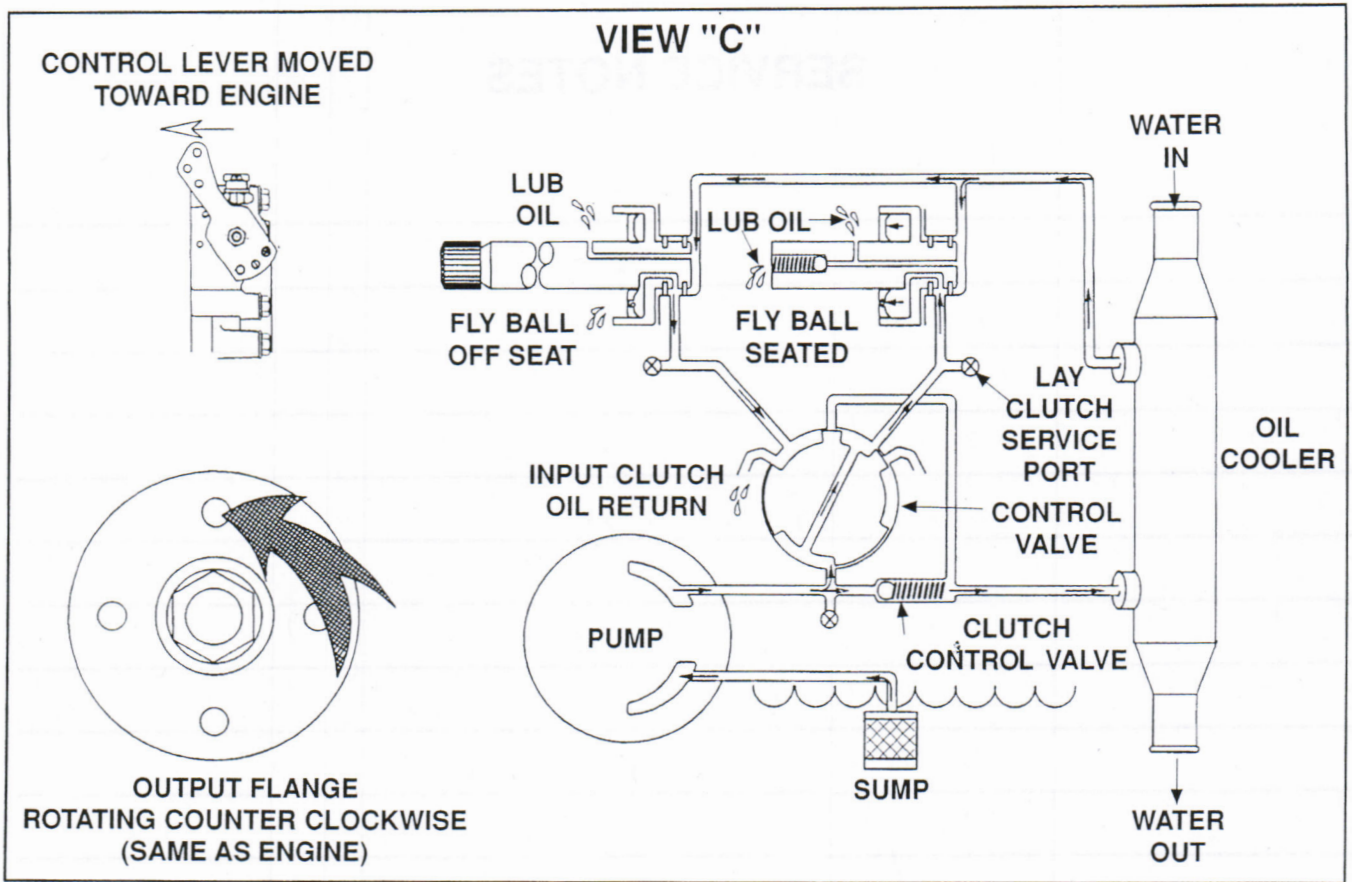


Figure 1-3. Hydraulic Clutch Operation



1-13. DESCRIPTION OF HYDRAULIC SYSTEM OPERATION. (See figure 1-3) The transmission hydraulic pump, driven by the input shaft assembly, delivers fluid to the full flow hydraulic system whenever the engine is running. All lubricating fluid must pass through the cooler before returning to the transmission lubrication system.

CAUTION: operating the transmission with the oil cooler disconnected, plugged or bypassed will cause immediate damage to the transmission.

1. When the shift lever is in the center position or neutral as shown in view A, fluid is drawn through the filter screen and flows directly to the cooler, bypassing the clutch pressure control valve. From the cooler, fluid returns to both the lay and input shaft assemblies, cooling the clutches and lubricating the bearings. A relief valve in the lay shaft assembly prevents excessive pressure build up in the lubrication circuit.

2. When the transmission shift lever is moved away from the engine as shown in view B, the

pressure control bypass circuit is interrupted, causing fluid to back up against the clutch pressure control valve. The increased fluid pressure is directed to the clutch piston on the input shaft assembly. Fluid pressure closes the fly-ball and moves the piston to engage the clutch plates. With the input shaft assembly clutch engaged, the output shaft turns clockwise, or the opposite direction as the engine.

3. When the transmission shift lever is moved toward the engine as shown in view C, the pressure control bypass circuit is interrupted causing fluid to back up against the clutch pressure control valve. The increased fluid pressure is directed to the clutch piston on the lay shaft assembly. Fluid pressure closes the fly-ball and moves the piston to engage the clutch plates. With the lay shaft assembly clutch engaged, the output shaft turns counterclockwise, or the same direction as the engine.

4. When either clutch is engaged, all fluid must flow past the pressure control valve. When the shift lever is returned to the center position and both clutches are released, fluid is allowed to vent back to the sump. In addition the fly-ball unseats permitting the clutch piston return springs to release the clutch faster.