

SECTION III

PREPARING VEHICLE FOR TRANSMISSION INSTALLATION

3-1. CHECKING FLEX PLATE DRIVE ASSEMBLY (transmission engine-mounted)

- Inspect the flex plate. Replace it if worn or damaged. Examine the flex plate for cracks, distortion and elongated bolt holes.
- Check the engine crankshaft end play. It must be within the limits prescribed by the engine manufacturer.
- Install the plate assembly onto the engine crankshaft, using the bolts and torques prescribed by the engine or vehicle manufacturer. Refer to figure 1-1 for proper position of flex plate, installed.
- Check the concentricity of the engine crankshaft hub with the flywheel housing. Refer to engine specifications for run-out limits.

3-2. CHECKING INPUT DRIVE COMPONENTS (transmission remote-mounted)

- Inspect shaft for condition. Tubular shaft must not be dented or bent. Welds must be sound.
- Remove any accumulation of grease and dirt.
- Inspect universal joints, yokes, coupling flanges and slip joint splines for wear or damage.
- Lubricate universal joints and slip joints, using the vehicle manufacturer's recommendation for lubricants.
- Check universal joints or slip joints for indexing to conform to vehicle manufacturer's specifications.

3-3. CHECKING CHASSIS, DRIVELINE

Inspect the chassis and driveline for the following, and correct any faulty conditions found.

- Broken or worn transmission mounts
- Damaged or missing isolators (rubber mounts)
- Improper or damaged bolts, hardware
- Cross-frame members, rear-support members
- Front mounting spacers (some installations have spacers to adapt narrow converter housing mounts to wider mountings on frame)
-) ● Driveline midship or hanger bearings
- Driveline yoke slip joints for freedom of movement, wear, damage, lubrication and indexing.
- Universal joints for freedom of movement, wear, damage and lubrication.
- Auxiliary transmission or transfer case for mountings, alignment, flanges or yokes, backlash, and oil leaks.
- PTO driven equipment, shafts and couplings for condition and alignment.

3-4. OIL COOLER, OIL FILTER AND LINES

Inspect chassis and transmission-related plumbing for condition of the following, and correct any faulty conditions found.

- Oil cooler (heat exchanger)—clean and flush
- Oil cooler connecting lines—clean and flush; inspect for deterioration, faulty connectors, kinks
- External oil filter—replace filter element; inspect fittings, threads, mounting
- Oil filter lines—clean and flush; inspect for deterioration, faulty connectors, kinks
-) ● After a transmission failure that introduces debris into the oil system, complete clean-up of the system cannot be assured. Repeated cleaning and flushing may not remove all debris from the oil cooler. Installation of an auxiliary

filter between the cooler and transmission (in return line) is recommended for only the CLT 750. The filter must be equivalent in specifications to the filter already used in the external filter circuit (P/N 5575224 or equal). The only absolutely effective remedy to prevent recirculation of debris into the CLBT model transmission is replacement of the oil cooler.

3-5. CHECKING CONTROLS

Inspect transmission control components on vehicle for the following, and correct any faulty conditions found.

- Range selector control for freedom of movement, frayed or kinked cables, lubrication, worn rod ends or clevis pins, cotter pins, loose parts, damaged threads, and proper routing
- Mechanical modulator control components for freedom of movement, frayed or kinked cables, lubrication, worn rod ends or clevis pins, cotter pins, damaged threads, and proper routing
- Parking brake control for cracks, bends, wear, damaged threads, worn rod ends and clevis pins, cotter pins, and proper operation
- PTO controls for damage, wear, lubrication, and proper operation
- Hydraulic retarder control for damage, wear, frayed or kinked cable, worn rod ends and clevis pins, cotter pins, lubrication, and proper operation. When control is connected to the hydraulic retarder control valve, the valve must have full travel from On to Off positions
- Speedometer drive cable for wear, damage, kinks, lubrication, and proper routing
- Wiring and related electrical components of signals, sensors or switches for poor connections, frayed wiring, and damage
- Capillary tubes or sensors for temperature gages
- Oil pressure gage tubing for damage, kinks, and proper routing

SECTION IV

INSTALLING TRANSMISSION INTO VEHICLE

4-1. HANDLING

- Handle the transmission carefully to prevent damaging the transmission and components in the vicinity of installation procedures.
- Use a hoist or transmission jack of a type that permits precise control of transmission movements during installation.

4-2. MOUNTING TO ENGINE (transmission engine-mounted)

- Aline one of the twelve bolt holes in the flex plate with the access opening at the front of the engine flywheel housing.
- Install a headless ½-20 guide bolt into one of the tapped holes in the flywheel. Aline the guide bolt with the flex plate hole at the access opening.
- Lubricate the pilot boss at the center of the flywheel with molybdenum disulphide grease.
- Move the transmission toward the engine while guiding the pilot boss on the flywheel into the flex plate hub (adapter) and the guide bolt into the hole in the flex plate.
- Seat the transmission squarely against the engine flywheel housing. No force is required—if interference is encountered, move the transmission away from the engine and investigate the cause.
- Aline the bolt holes in the converter housing with those in the engine flywheel housing. Install all of the bolts, finger-tight, that retain the transmission to the engine.

CAUTION: *The converter housing must be flush against the engine flywheel housing before tightening any bolts. Do not use the bolts to seat the housing.*

- Tighten four bolts at 90° intervals around the converter housing bolt circle. Then tighten the remaining bolts. Use the torque recommended by the vehicle or engine manufacturer.
- Remove the guide bolt through the access opening in the engine flywheel housing. Replace it with a ½-20 x 1 inch self-locking bolt. Tighten the bolt finger-tight at this time.
- While rotating the engine, install the eleven remaining ½-20 x 1 inch self-locking bolts into the flywheel, finger-tight. When all bolts are in place, tighten them to 96-115 lb ft (131-156 Nm) torque.
- Install the flywheel housing access cover.

4-3. INSTALLING TRANSMISSION MOUNTING COMPONENTS

- Install all bolts, washers, spacers, isolators, supports or cross members required to support the transmission in the vehicle frame.

CAUTION: *Use the type and grade of mounting bolts recommended by the vehicle manufacturer. The ⅝-11 bolts in the converter housing must have at least 1¼ inches (35.54 mm) thread engagement. The ¾-10 bolts in the rear adapter housing must have at least 1½ inches (38.1 mm) thread engagement, but must not bottom in the adapter housing.*

- Tighten the bolts to the torque recommended by the vehicle manufacturer.

4-4. COUPLING TO ENGINE (transmission remote-mounted)

- Install (if removed) the input drive shaft components that connect the engine and transmission.

- Couple the flange or yoke to the flange or yoke at the front of the transmission. Use the bolts and torque recommended by the vehicle manufacturer.
- Check the alinement of the transmission with the engine against the vehicle manufacturer's specifications.

4-5. COUPLING TO DRIVELINE

- Couple the driveline companion flange or universal joint yoke to the flange or yoke on the transmission. Use the bolts and torque recommended by the vehicle manufacturer.
- Check the universal joint angularity (all joints in driveline) to determine if they are within the specifications of the vehicle manufacturer.

4-6. CONNECTING COOLER, OIL FILTER LINES

Figures 4-1 through 4-5 show the oil cooler and oil filter line locations on both CLT and CLBT 750 transmissions.

- On CLBT 750 models, be sure that the plugs closing certain oil and temperature bulb openings are installed and tightened to 40 to 60 lb ft (55 to 81 Nm) torque. The hexagon-head plugs seat on O-ring seals.
- Be sure that oil lines are of the proper size and type recommended. Use new O-ring seals where required.
- Connect the oil lines to the transmission and to the oil cooler and external oil filter, checking to see that the lines are clean and unobstructed.
- The lines should be tightened in the transmission to not more than 50 lb ft (68 Nm) torque.
- Check for sharp bends, kinks, twists and contact with components that will chafe the oil lines.
- Check for proximity to manifolds or exhaust pipes. Excessive heat will hasten the deterioration of oil lines.
- Recheck the routing of all lines with the applicable illustration (fig. 4-1, 4-2, 4-3, 4-4, and 4-5).

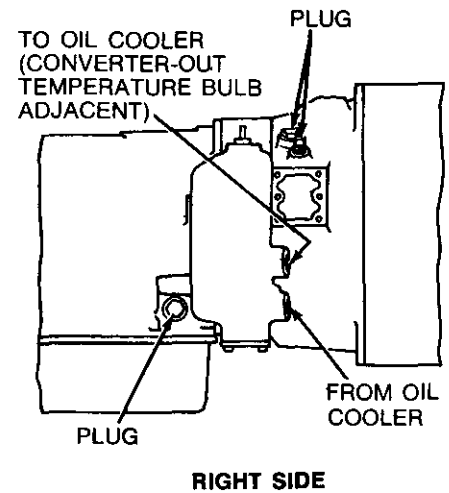
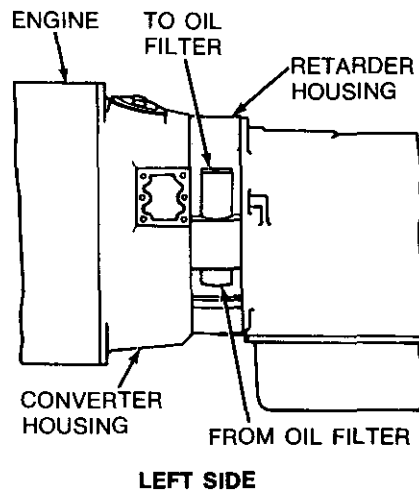


Fig. 4-1. Early CLBT 750 without engine-driven PTO

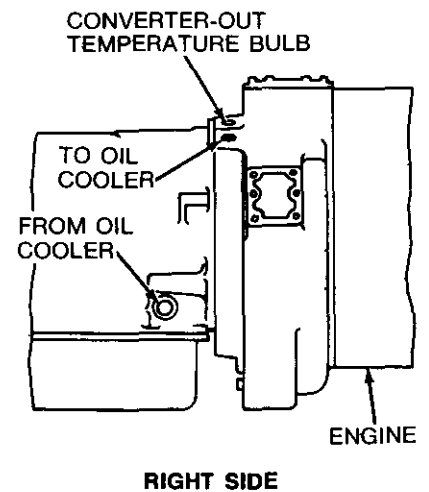
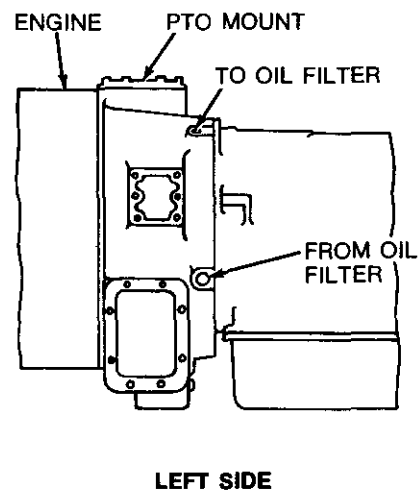


Fig. 4-2. CLT 750 with engine-driven PTO

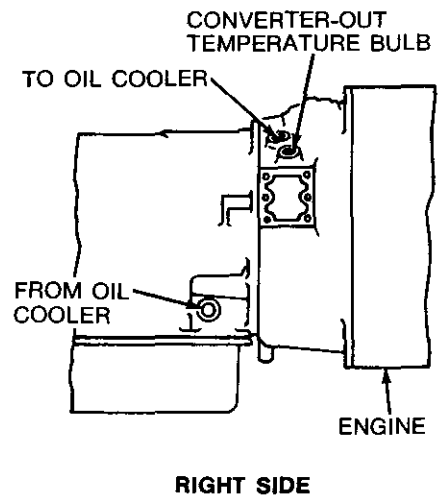
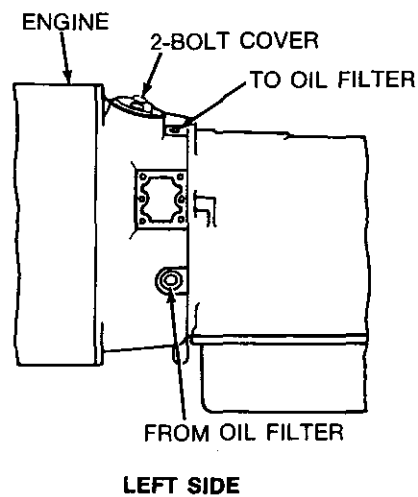


Fig. 4-3. CLT 750 without engine-driven PTO

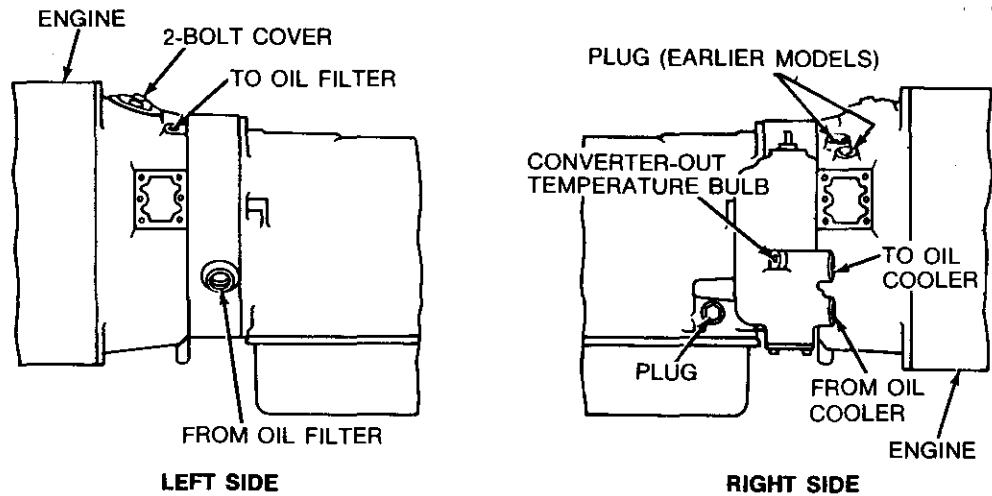


Fig. 4-4. Current CLBT 750 without engine-driven PTO

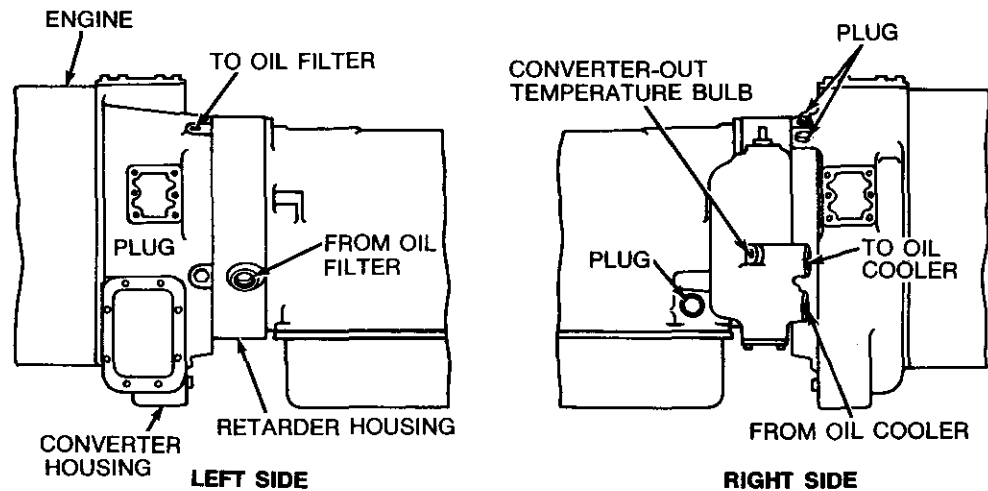


Fig. 4-5. CLBT 750 with engine-driven PTO

4-7. CONNECTING RANGE SELECTOR CONTROL

- Place the operator's range selector control at the neutral (N) position. Place the transmission selector lever at the neutral position (first detent clockwise from stop at extreme counterclockwise position when lever is installed to point downward).
- Adjust linkage so that rod end or clevis pin hole registers with hole in the transmission selector lever. Connect the linkage to the lever.
- Shift through all selector positions, checking each to ensure that the valve body detents correspond to respective selector positions.

4-8. CONNECTING HYDRAULIC RETARDER CONTROL (CLBT models)

- Place the operator's control at the Off (disengaged) position.
- Check the hydraulic retarder control valve. The valve is spring-loaded to retract into the valve body when the retarder is Off. Lift the valve upward, to On position, to check for full travel (1½ inches—38.1 mm) from Off to On position.
- Release the valve, permitting the spring to retract the valve.
- Adjust the linkage so that rod end or clevis registers with the pin hole in the retarder valve. Connect the linkage to the retarder valve, and check the operation of the valve. The valve must be fully extended when the operator's control is at On; the valve must be fully retracted when the control is at Off.

4-9. CONNECTING MODULATOR CONTROL

- Install the modulator actuator rod into the modulator valve body, through the modulator mounting hole in the transmission housing (fig. 4-6).
- Connect the engine (throttle) end of the modulator cable housing to its mounting.

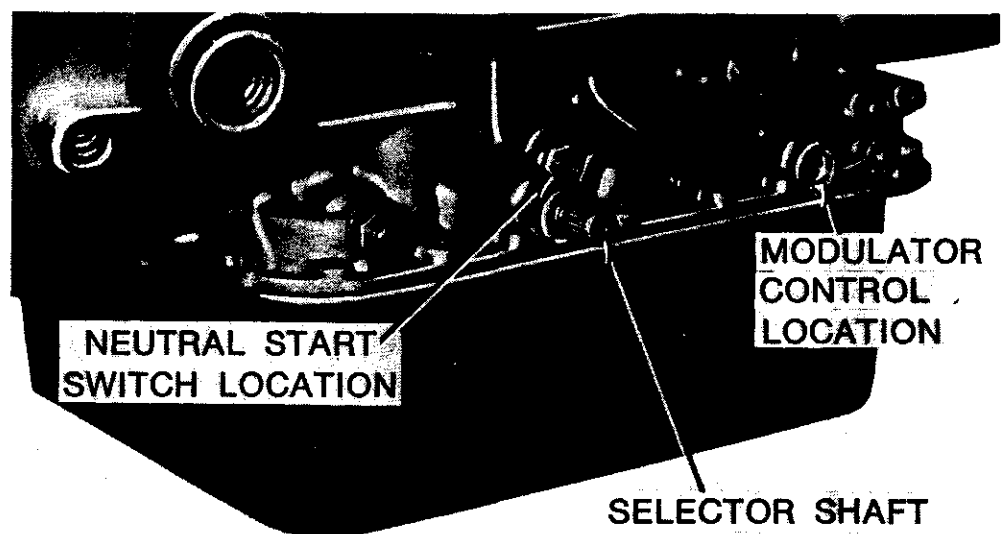


Fig. 4-6. Partial view of transmission left side

- Open the engine throttle fully and check whether the throttle linkage will push or pull the cable core when the throttle linkage is moving toward full-throttle position. If it will push the cable core, then push the cable core until it reaches the end of its travel. If movement of the throttle linkage toward full-throttle position will pull the cable, then pull the cable to the end of its travel.
- Adjust the clevis or rod end on the cable core until it registers with the hole in the throttle linkage lever, and the connecting pin can be freely inserted. With the pin removed, rotate the clevis or rod end one additional turn counterclockwise (viewing cable core from its end) for pull-type arrangement, or one additional turn clockwise for push-type arrangement. Install the clevis pin or rod end to connect the throttle linkage and cable. Tighten the lock nut against the clevis or rod end.
- Check the travel of the cable core when the throttle is moved from fully open to fully closed position. The system is designed to provide a minimum travel of 1.187 inches (30.149 mm), and a maximum of 1.56 inches (39.62 mm).
- Various kind of modulator controls may be used, but the object of each is to apply increasing force to the modulator actuator rod as the engine fuel control is moved from closed to open position. The most common type of control is the cable-operated mechanical actuator, with either a lever or sliding wedge to vary the force on the modulator valve. Both of these types are convertible to use either push or pull force on the cable when the throttle is opened. Make sure the modulator control, when connected to the throttle linkage, provides an increasing force against the modulator actuator rod in the transmission when the engine throttle is moved toward the open throttle position.
- Current actuators include a lever that is marked PUSH on one side, and PULL on the opposite side. When the modulator control cover is removed, the word PUSH or PULL can be seen and will indicate how the device is assembled.

- Earlier mechanical actuators include a sliding wedge. When the cover is removed, the position of the wedge can be seen. When the smaller end of the wedge is toward the cable housing, the device is the “pull” type; when the larger end of the wedge is toward the cable housing, the device is the “push” type.
- The conversion of either the lever or wedge type to the opposite mode of operation is only a matter of reassembling the internal parts. Reverse the positions of the lever, spring, and thimble in the lever type to convert it; reverse the wedge in the wedge type.
- Be sure the modular control action is as required.
- Install the O-ring seal onto the modulator control. Coat the O-ring with oil-soluble grease.
- Install the modulator control into the transmission. Retain the control housing with the spring clip and the $\frac{5}{16}$ -18 x $\frac{3}{4}$ inch bolt provided. The convex side of the formed end of the clip must be toward the transmission, and against the shoulder of the actuator stem. Tighten the bolt to 10 to 13 lb ft (14-18 Nm) torque.
- Check the cable routing. Bends must not be of less than 8 inches (204 mm) radius. The cable should not be nearer than 6 inches (153 mm) to the engine exhaust pipe or manifold. The cable must follow the movements of the throttle linkage—it may be necessary to add a spring to ensure that the movement occurs smoothly.
- Adjust other types of modulator controls as recommended by the vehicle manufacturer.

4-10. CONNECTING POWER TAKEOFF CONTROLS

- If not previously installed, mount the PTO onto the transmission. Refer to paragraph 2-5.
- Connect controls to the PTO. Check for proper operation of the controls.

- Check for cable or linkage rod routing. Kinks, sharp bends, and proximity of the cable to exhaust pipes or manifold must be avoided. Rods or linkage must not rub or interfere with adjacent parts.
- Couple the PTO output to its driven equipment. Check couplings or universal joints for proper assembly and alignment.

4-11. CONNECTING PARKING BRAKE CONTROLS

- Connect and properly adjust the parking brake linkage.
- Adjust the brake shoe-to-drum clearance, or disc brake pads as specified by the manufacturer.

4-12. CONNECTING SPEEDOMETER DRIVE

- Install the speedometer driven gear assembly into the transmission. Tighten the body in the transmission rear cover to 40-50 lb ft (54-68 Nm) torque. If no speedometer drive is provided, be sure the plug is installed to close the hole in the housing (torque is same as for driven gear body).
- Install the speedometer drive cable onto the driven gear assembly. Tighten the nut to 50 lb in (5.65 Nm) torque. Avoid kinks or sharp bends in the cable assembly. All bends must have a radius of 6 inches (153 mm) or more. No more than one 90° bend is allowed.

4-13. INSTALLING TEMPERATURE AND PRESSURE SENSORS, ELECTRICAL COMPONENTS

- Install temperature sensors (capillary tube and bulb) into the converter housing or hydraulic retarder valve.
- Refer to figures 4-1 through 4-5 for various locations. Tighten the ½-inch pipe thread adapter sufficiently to prevent leakage.
- Install the bulb into the adapter and tighten the nut into the adapter.

- Check the capillary tube for interference with parts that might chafe or damage the tube. Long tubes may require clips or brackets for support.
- Install electrical temperature sensors into the proper openings (refer to fig. 4-1 through 4-5). Connect electrical leads to the sensors.
- Check that all openings in CLBT models that require plugs are plugged (fig. 4-1 through 4-5).
- Install the neutral start switch (if so equipped) into the opening in the left side of the transmission housing (fig. 4-6). The switch must include an aluminum washer (gasket) approximately 0.090 inch (2.29 mm) thick. Tighten the switch to 50-60 lb ft (68-81 Nm) torque.
- If the neutral start switch is not mounted at this location, the opening must be plugged.
- Connect the wire leads that serve the neutral start switch.
- If so equipped, install the reverse signal switch at the right side of the transmission housing. Tighten the switch to 4-5 lb ft (5.42-6.78 Nm) torque. Connect the electrical leads.
- Install and connect other electrical components such as heaters, winterization equipment, and pressure sensors.
- Install the pressure gage tubes, if so equipped.
- Check the starting circuit. The starter should operate only when the transmission range selector is at the neutral position.

4-14. FILLING THE OIL SYSTEM

- Be sure the oil system is properly filled before starting the engine. Refer to Section V, OIL SYSTEM.

OIL SYSTEM

5-1. FILLING THE SYSTEM

- After overhaul or rebuild, the system, including all external plumbing and components such as filters and heat exchanger, must be refilled.
- Because the initial running of the engine after overhaul will cause a rapid draw-down of the transmission oil level, check the oil level several times during the first few minutes of operation, and add oil as needed to maintain the level at or slightly above the Add mark.
- Make an accurate check after the level has stabilized and the oil is hot ($160\text{-}200^{\circ}\text{F}$ [$71\text{-}93^{\circ}\text{C}$]). Refer to the following paragraphs in this section for oil system data.

5-2. OIL LEVEL IN OIL PAN

- The proper Full and Add oil levels (hot) in the transmission oil pan are shown in figure 5-1.
- Note that those levels are on a vertical line through the oil fill tube opening.
- The Full and Add marks on the dipstick should coincide with the oil levels shown in figure 5-1.

NOTE: Vehicle must be level, transmission must be in neutral, oil must be at $160\text{-}200^{\circ}\text{F}$ ($71^{\circ}\text{-}93^{\circ}\text{C}$), engine must be at idle speed when oil is checked.

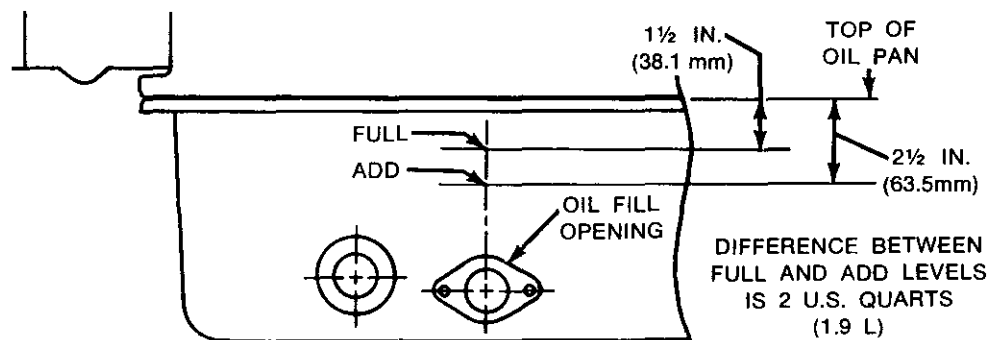


Fig. 5-1. Transmission oil levels

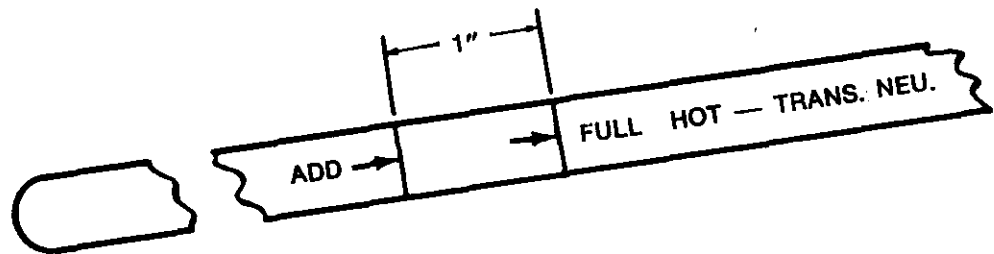


Figure 5-2. Typical markings on dipstick.

- Figure 5-2 shows the markings on a typical dipstick.
- Note carefully the conditions, specified in figure 5-1, under which the oil must be checked.
- The transmission must not be operated when the oil level is above the Full or below the Add mark. However, when the transmission is cold, do not add more oil than that required to raise the level to the Add mark. It is normal for the oil level to be below the Full mark, when the engine is running, until the oil heats up.

5-3. OIL SPECIFICATIONS

- Only Hydraulic Transmission Fluid Type C2 is recommended.
- When the oil sump temperature is below -10°F (-23°C), pre-heating of the oil is required to raise the oil sump temperature to at least -10°F (-23°C).

5-4. OIL CHANGE, FILTER REPLACEMENT

- Oil change and filter replacement frequency is determined by the transmission application and the severity of operating conditions.
- In general, the oil and the external oil filter element(s) should be changed after each 1000 hours of operation. Severe operating conditions may require more frequent changes.
- The suction screen in the oil pan should be cleaned at each oil change. Replace the screen if there is visible damage.

- To drain the oil, remove the 1-inch pipe plug behind the oil filler tube flange. The oil will drain better if the transmission is hot. Replace the plug when the oil pan is thoroughly drained.
- Remove the external oil filter element(s) and seal rings. Install a new element(s) and new seal rings.
- Pour 24 U.S. Quarts (22.7 litres) of Hydraulic Transmission Fluid, Type C2 into the transmission. Check the oil level as outlined in paragraphs 5-1 and 5-2.

SECTION VI

TESTS AND ADJUSTMENTS

- Refer to Operators Manual (SA 1475) for operating instructions.
- Operate the vehicle to determine if the transmission is functioning properly. Test operation should include a variety of conditions and terrain that will reveal any deficiency in transmission performance, or need for adjustment.
- Check the neutral start switch by trying to actuate the starter at selector positions other than neutral. The starter should operate only when the selector is at neutral (N) position.
- Check the position of the operators selector lever in each drive range and neutral. The lever should align with a mark indicating each range when the vehicle is operating in that range.
- Check all instruments associated with the transmission. These include transmission oil pressure, oil temperature, and speedometer (if so equipped).
- Check application and release of the parking brake. Make sure it is not dragging or heating up while the vehicle is traveling.
- Check operation of the hydraulic retarder (CLBT model). Refer to paragraph 4-8.
- Check operation of the power takeoff. Refer to paragraph 4-10.
- Refer to the current issue of the CLT, CLBT 700 Series Service Manual (SA 1314) for detailed instructions for service, maintenance and overhaul of the transmission or its components.

INSTALLATION CHECK LIST

1. PROPER TORQUE

- a. Flex plate bolts (96-115 lb ft [131-156 Nm]) ☐
- b. Flex plate hub bolts* ☐
- c. Transmission-to-engine bolts* ☐
- d. Transmission-to-frame or mounting bolts* ☐
- e. Input flange nut (600-800 lb ft [814-1084 Nm]) . . ☐
- f. Output flange nut (750-1000 lb ft [1017-1356 Nm]) ☐
- g. Companion flange or universal joint bolts* ☐
- h. Selector lever clamp bolt* ☐
- i. PTO mounting bolts* ☐
- j. Modulator control retainer bolt (10-13 lb ft [14-18 Nm]) ☐
- k. Oil filler tube bolts (14-18 lb ft [19-24 Nm]) ☐
- l. Speedometer cable nut (50 lb in. [5.65 Nm]) ☐
- m. Neutral start switch (50-60 lb ft [68-81 Nm]) . . . ☐
- n. Reverse signal switch (4-5 lb ft [5.42-6.78 Nm]) . ☐
- o. Oil lines-to-transmission (50 lb ft [68 Nm] max) . . ☐

*Tighten to vehicle manufacturer's recommendation

2. OIL LINES (cooler, filter, PTO lubrication, gages)

- a. Check for leaks ☐
- b. Check for tightness of connections ☐
- c. Check for routing ☐

3. LINKAGE

- a. Manual selector
 - Adjustment at all range positions ☐
 - Ease of shifting ☐
 - Neutral start switch (starts only in neutral) . . . ☐
- b. Modulator control
 - Adjustment ☐
 - Ease of operation ☐
 - Routing ☐
- c. Parking brake
 - Shoe-to-drum adjustment ☐
 - Adjustment for full apply ☐
 - Check for full release ☐

d. Hydraulic retarder (CLBT model)

- Ease of operation ☐
- Full apply, full release ☐
- Routing of control cable ☐

4. DRIVELINE

- a. Check for proper indexing of universal joints .. ☐
- b. Check for proper drive shaft angles ☐
- c. Check driveline backlash ☐
- d. Lubricate universals and slip-joints ☐

5. OIL SYSTEM

- a. Recommended oil (Hydraulic Transmission Fluid, Type C2) ☐
- b. Proper oil level in transmission ☐
- c. Dipstick properly calibrated ☐
- d. Filler tube vented ☐
- e. Filler tube tight at oil pan ☐
- f. Filler cap tight ☐
- g. Breather clean, free of restriction ☐
- h. Checked for oil leaks during operation ☐
- i. Proper oil pressures (refer to SA1314 S/M) ☐

6. POWER TAKEOFF

- a. Proper backlash ☐
- b. Controls connected and operational ☐
- c. Properly coupled to driven equipment ☐

7. INSTRUMENTS, ELECTRICAL EQUIPMENT

- a. Speedometer connected ☐
- b. Capillary tubes installed ☐
- c. Wiring and electrical connections checked ☐
- d. Reverse signal circuit checked ☐
- e. Neutral-start circuit checked ☐
- f. Instruments, gages function properly ☐

8. SHIFT POINTS

- a. Full-throttle upshifts occur within 100 rpm of full-load governed speed ☐
- b. Full-throttle shifts are smooth ☐
- c. Closed-throttle shifts are smooth ☐

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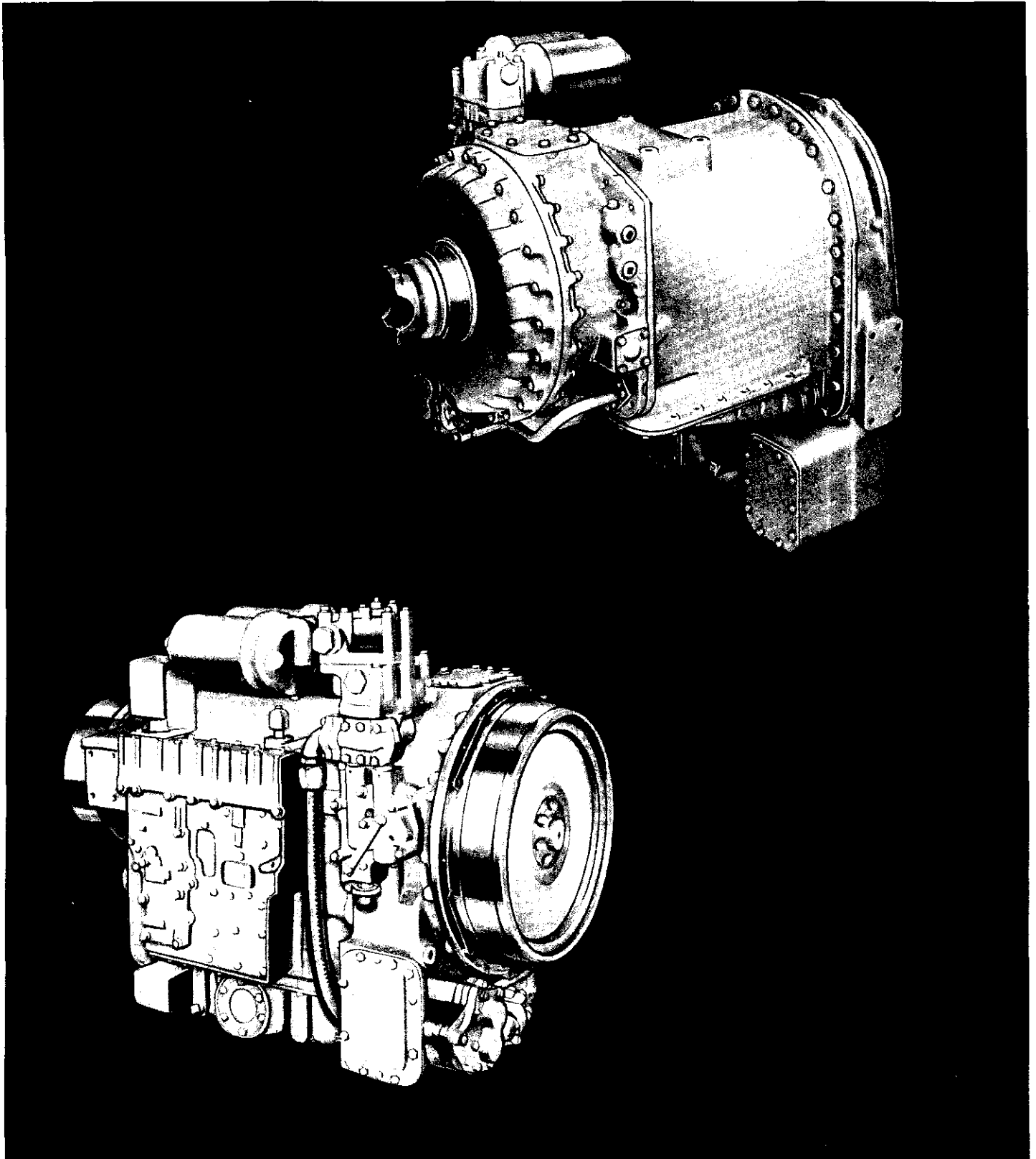


Allison Transmissions

hauling models

CL(B)T 5-6000

475 to 675 hp*
(354 to 503 kW)*



*For engines up to 675 hp (503 kW) gross

specifications

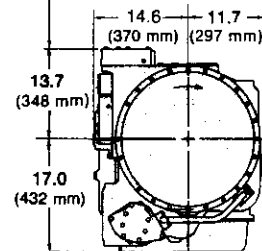
		5860	5960	6061
applicable power	Input (gross)	475 hp (354 kW)	525 hp (391 kW)	675 hp (503 kW)
rating	Input speed, max	2500 rpm	2500 rpm	2500 rpm
	Input torque, max (net):			
	General	1100 lb ft (1491 N•m)	1270 lb ft (1722 N•m)	1660 lb ft (2251 N•m)
	Truck	1195 lb ft (1620 N•m)	1350 lb ft (1830 N•m)	1800 lb ft (2439 N•m)
rotation	Input—right hand	Output—right hand (forward ranges)		
mounting	Direct mounted Remote mounted	SAE 1 flywheel housing (wet) modified; two mounting pads at rear Trunnion mount at front; two mounting pads at rear		
torque converter	Type	Single-phase, 3-element		
	Stall torque ratio	TC 530—3.58 TC 540—2.89 TC 550—3.36 TC 560—2.69 TC 570—3.19 TC 580—2.63 TC 590—2.50 VTC 550 —3.34 (open) —2.24 (closed) VTC 570 —3.34 (open) —2.18 (closed) VTC 690 —2.38 (open) —1.78 (closed)	TC 680—2.16 TC 690—2.56 VTC 690 —2.38 (open) —1.78 (closed)	TC 680—2.16 TC 690—2.56 VTC 690 —2.38 (open) —1.78 (closed)
	Lockup clutch, automatic	Effective all forward ranges or 2nd thru 6th (optional)		
hydraulic retarder	Type Capacity (torque absorption)	Vaned rotor between fixed vanes 1500 lb ft (2033 N•m) at 2100 rpm; 600 hp (447 kW) at 2100 rpm		
gearing	Type: Range gearing Transfer gearing (5000 series only) Ratios	Constant mesh, involute spur, planetary Constant mesh, involute spur, in-line First —4.00 Second—2.68 Third —2.01 Fourth —1.35 Fifth —1.00 Sixth —0.67 Reverse—5.15 Transfer Gear—1.00 (5000 series only)		
	clutches	Hydraulically-actuated, spring-released, oil-cooled, multidisk, self-adjusting (automatic compensation for wear)		
flanges	Input (remote mounted)	Spicer 1700, 1800, 1850; Mechanics 8C, 9C; Twin Disc J230	Spicer 1800; Mechanics 8C, 9C; Twin Disc J230	Spicer 1800, 1850; Mechanics 8C, 9C; Twin Disc J230
	Output	Spicer 1800, 1850; Mechanics 8C, 9C, 10C	Spicer 1800, 1850; Mechanics 8C, 9C, 10C	Spicer 1800, 1850; Mechanics 9C
parking brake	Type Size	Drum, internal-expanding shoe 12 x 5 in. (343 x 127 mm)		
power takeoff (2)	Size Engine driven Rating (either top, side, or total of both) Ratio	SAE 8-bolt, heavy duty Top, side, or both Intermittent—200 hp (149 kW) Continuous—125 hp (93 kW) Top—1.21 x engine speed Side—1.00 x engine speed		
speedometer drive	Size Ratio	SAE 5/32 (3.96 mm), heavy duty Straight through models—0.5 x output speed Transfer gear models—1.0 x output speed		
control valve body	Manual Electric Shift Control (12- or 24-volt)—standard Automatic Electric Shift Control (24-volt)—optional			
oil system	Oil Type Capacity (excluding external circuit) Sump Filter (Remote or direct mounted) Cooler (customer furnished)	Hydraulic transmission fluid, type C-3 Straight through models—18 US gal (68 litres) Transfer case models—13 US gal (49 litres) Integral Full-flow, replaceable elements Remote mounted		
size	Length, max (w/hydraulic retarder) Width (w/direct mounted oil filter) Height (w/direct mounted oil filter) Weight (dry)	Straight through models		Transfer case models
		56.92 in. (1445 mm) 29.40 in. (746 mm) 34.85 in. (885 mm) 2165 to 2445 lb (980 to 1109 kg)	57.66 in. (1464 mm) 29.69 in. (755 mm) 44.52 in. (1130 mm) 2165 to 3090 lb (980 to 1490 kg)	

Note: All data and specifications subject to change without notice.

mounting dimensions

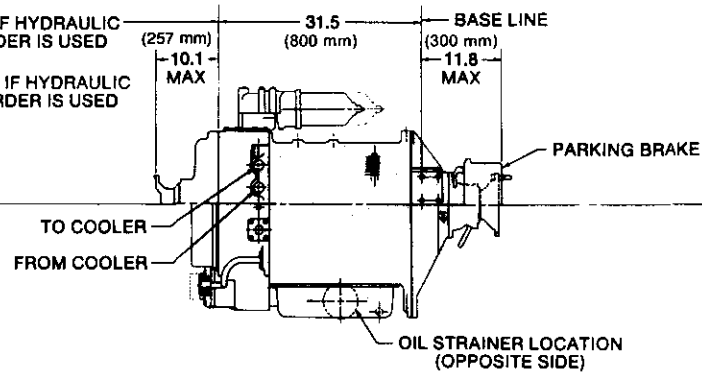
CL(B)T 5000-8000 SERIES STRAIGHT THROUGH MODELS

FOR REMOTE
FILTER OPTION

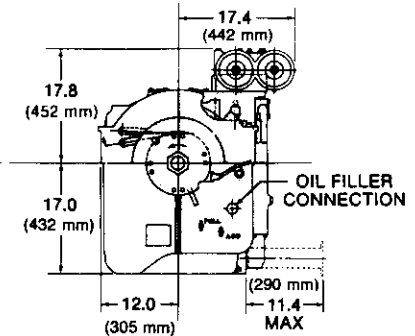


FRONT VIEW

ADD 3.4 IF HYDRAULIC
RETARDER IS USED
ADD 3.1 IF HYDRAULIC
RETARDER IS USED



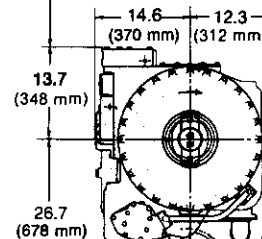
SIDE VIEW



REAR VIEW

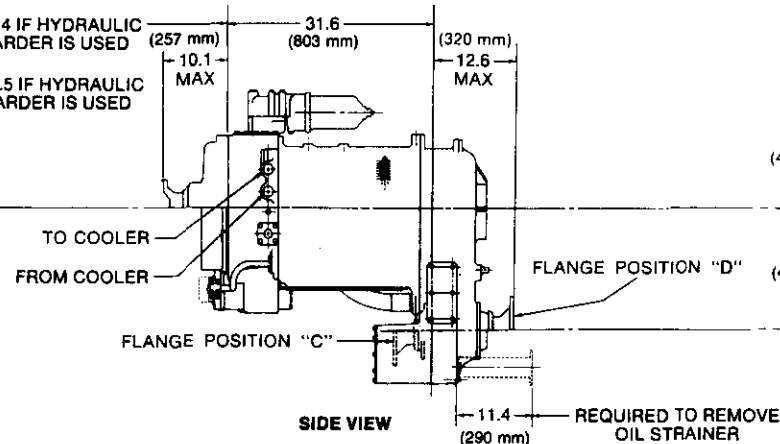
CL(B)T 5000 SERIES TRANSFER GEAR MODELS

FOR REMOTE
FILTER OPTION

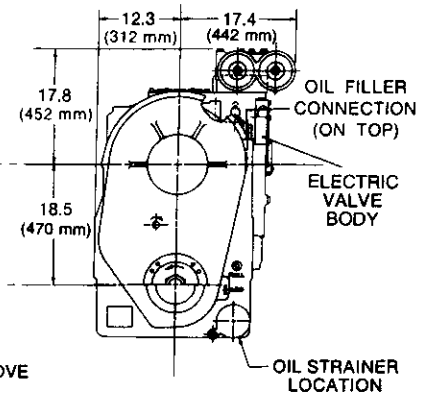


FRONT VIEW

ADD 3.4 IF HYDRAULIC
RETARDER IS USED
ADD 2.5 IF HYDRAULIC
RETARDER IS USED



SIDE VIEW



REAR VIEW

FLANGE POSITION "B", "C", AND/OR "D" MAY BE USED
ON BOTH 5860 AND 5960. A DISCONNECT IS ALSO
AVAILABLE AT "B" & "C" OR "B" & "D" POSITION
BUT NOT BOTH "C" AND "D".

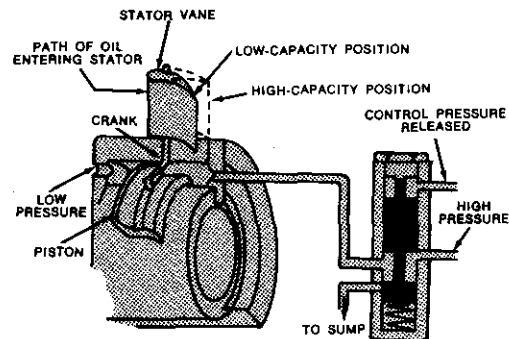
Note: Dimensions are given in inches with metric value in parentheses.

options

- Transmission remote mounted, or direct mounted on engine
- Automatic Electric shift controls (24-volts) with downshift inhibitors
- Hydraulic retarder
- Parking brake
- Oil filter remote mounted or on transmission
- Choice of power takeoff locations
- Variable input capacity converter
- Choice of popular drive flanges
- Transfer gearing (5000 series only)
- Output at front, rear or both with transfer gearing (5860 and 5960).

variable input capacity converter

Among optional features available for the 5000-6000 series hauling transmissions is the variable input capacity converter. A variable position stator blade assembly in the torque converter provides ability to vary converter absorption capacity. It allows the converter to match auxiliary or primary power requirements without compromising performance. Only one engine is necessary to provide a desired degree of power at the point where it is needed most at the moment—the auxiliary equipment for work, the wheels for roading, or the desired combination of both.



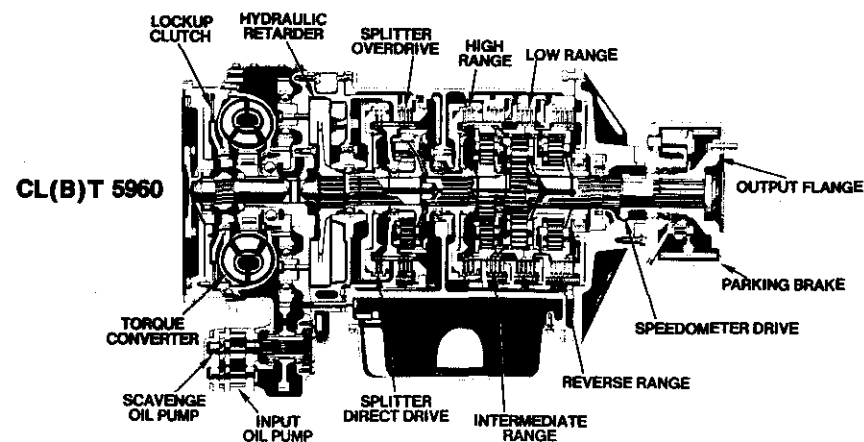
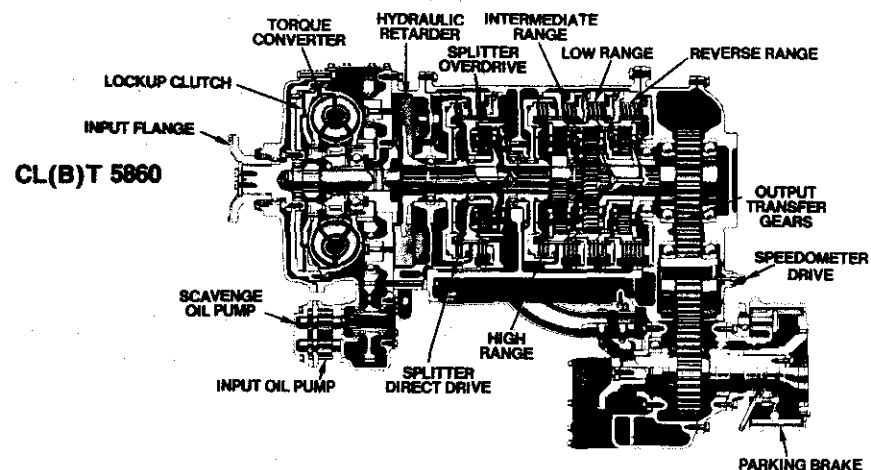
The stator vanes are located on cranks which fit in a groove in the hydraulic piston. As the piston moves, the angle of the stator vane changes. The piston movement is controlled by manual release of a valve which directs high pressure oil against one side of the piston, acting against a constant low pressure oil applied to the other side.

With the stator vanes in the normal or high-capacity (fully open) position, all of the power is absorbed by the converter and transmitted through the drive line to the wheels. Applying high pressure causes the piston to move the vanes to the low capacity (partially closed) position. Less power is absorbed by the converter and more power is directed to the power takeoff and auxiliary equipment.

electric shift control

An exclusive feature for the 5000-6000 Series transmission is the Manual Electric Shift Control system. It consists of only three major parts—shift tower, wiring harness, and valve body—and operates on a 12-volt or 24-volt system. The shift tower houses snap action switches which are activated by movement of the shift lever. An engine overspeed down-shift inhibitor is also featured in the shift tower. The wiring harness, which replaces all of the complex, mechanical linkage, transmits electrical power to the valve body where electric solenoids actuate hydraulic forces which move the shift valves. The operator has positive shift control with no false or partial shifts. If the need arises, this system can be quickly disconnected and reconnected.

CL(B)T 5000-6000 powershift transmission



Detroit Diesel Allison
Division of General Motors Corporation
Indianapolis, Indiana 46206



Date April, 1977 No. 53K

CLBT 5000 AND 6000 SERIES TORQMATIC TRANSMISSIONS

I. INTRODUCTION

The CLBT 5000 and 6000 Series transmissions are designed and built for engines in the 475 to 675 HP (354 - 503 kW) gross horsepower range. They are applicable for use in Off-Highway trucks, scrapers, oil field equipment and other related applications.

This series of transmissions offer a single stage multiphase, three element, torqmatic converter; constant mesh planetary gear train, hydraulically actuated multiplate friction clutches; hydraulic retarder; integral lockup clutch, an oil supply and sump, plus a hydraulic control system. The integral design saves space, provides strength and durability, simplifies mounting and requires minimum maintenance.

The CLBT - 5000 & 6000 series input ratings by model are as follows:

	<u>5860</u>		<u>5960</u>		<u>6061</u>	
Maximum Torque	<u>lb.ft.</u>	<u>Nm</u>	<u>lb.ft.</u>	<u>Nm</u>	<u>lb.ft.</u>	<u>Nm</u>
(General)	1100	1491	1270	1722	1660	2251
(Truck)	1195	1620	1350	1830	1800	2439
Maximum Speed	2500 RPM		2500 RPM		2500 RPM	
Maximum Gross Eng. Power	<u>HP</u>	<u>kW</u>	<u>HP</u>	<u>kW</u>	<u>HP</u>	<u>kW</u>
	475	354	525	391	675	503

NOTE: During Derrick Operations when the hook or boom is required to free fall, the transmission should be placed in Neutral Range with engine RPM 900-1050 minimum; additionally the output shaft reverse rotation should not exceed 1500 RPM maximum.

II. PRODUCT DESCRIPTION

1. MOUNTING:

Direct Engine - SAE #1 (wet) Flywheel housing with two mounting pads at rear. Flex discs complete with adapter are available.

Remote - Trunnion mounting at front with two mounting pads at rear.

2. TORQUE CONVERTER

The following Torqmatic Converter models are available as shown in the table.

<u>Model</u>	<u>Stall Torque Ratio</u>	<u>5860</u>	<u>5960 & 6061</u>
TC 530	3.51	X	
TC 540	2.89	X	
TC 550	3.36	X	
TC 560	2.69	X	
TC 570	3.19	X	
TC 580	2.63	X	
TC 590	2.50	X	
TC 680	2.16		X
TC 690	2.56		X
VTC 550	3.34-2.24	X	
VTC 570	3.34-2.18	X	
VTC 690	2.38-1.78	X	X

3. LOCKUP CLUTCH:

Lockup is standard in all forward ranges, neutral and reverse. Optional lockup control is available with lockup eliminated in first, neutral, and reverse.

4. OUTPUT CONFIGURATION:

The straight through inline output is standard on the 5000 and 6000 series and is the only configuration available on the CLBT 6000. A transfer case (dropbox) version is an option on the 5000 series with a transfer gear ratio of 1.00:1. The following table illustrates the outputs available with the transfer gear models.

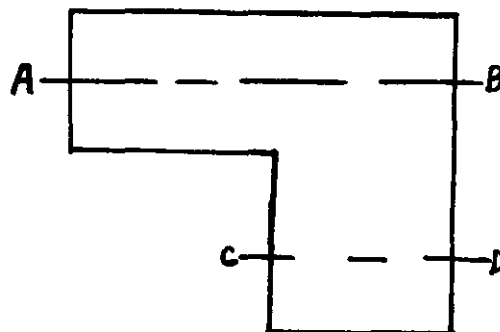
<u>Output</u>	<u>5860</u>	<u>5960</u>
Front and Rear (dual)	X	X
Front or Rear (single)	X	X

A disconnect is available at B & C or D positions; and both C or D.

Reference the general and specific guidelines stated in this Sales Brief (Page 1), single or dual outputs are available on the CL(B)T 5960 drop box model. The rating of these outputs are equal to the ratings of the 5960 transmission in the application for which it is being used.

The diagram below gives the positions available and approved for the transmission outputs.

- "C" Normal
- "D" Normal
- "C" Normal, "D" Disconnect
- "C" Disconnect, "D" Normal
- "C" Normal, "D" Normal



5. OIL FILTER:

A high capacity oil filter assembly is shipped integral with 5860, 5960, and 6061 models. This assembly can be remote mounted by the customer.

6. SPEEDOMETER DRIVE:

Type - SAE 5/32 (3,96 mm) Heavy Duty Regular

Ratio - On straight through models the speedometer shaft speed is .5 times transmission output shaft speed.

On transfer case models the speedometer shaft speed is equal to the transmission output shaft speed.

NOTE: Right angle speedometer drive adapters are available (5860 only - straight through or transfer case models) from the AC Spark Plug Division, GMC, and the Stewart Warner Corporation.

7. TRANSMISSION BREATHER:

Integral Mounted - If the transmission application is such that the integral breather is exposed to unusually severe dirt conditions or is inaccessible for servicing, a plug with a 1/4 NPSC female straight plug thread will fit the present opening and can be ordered. A hose assembly to remote mount the breather in an accessible and clean location can be added to this adapter.

NOTE: Only one breather is required. Do not install a second breather on the oil fill tube. The oil fill tube covers must fit tightly to prevent dirt infiltration.

8. MANUAL ELECTRIC SHIFT CONTROLS

The manual electric shift control system is standard for the CLBT 5000/6000 June, 1977. This system has simplified installation requirements and reduced service problems created by worn or misadjusted linkage. The manual electric system consists of three major components: 1) Shift tower, 2) Wiring harness and 3) An electric valve body.

III. OPTIONAL FEATURES1. TORQMATIC RETARDER:

The Torqmatic Retarder is an integral component especially desirable for downhill braking in hauling applications. The retarder is rated at a maximum of 1500 lb. ft. (2033 Nm) of torque at 2100 RPM rotor speed; 600 HP (447 Kw) at 2100 RPM.

2. PARKING BRAKE:

Type - Bendix 12" x 5" (343 x 127mm) with or without drum.

Rating - 90,000 inch lbs. (10,168 Nm) (manufacturer's rating for run-in condition - burnished).

3. FLANGES:

Flanges are available, and AS 58-035 shows those designed. For availability, contact Transmission Sales Department, Indianapolis, Indiana.

4. POWER TAKE-OFFS:

Power take-offs are available at top and/or side locations with an SAE 8-bolt heavy duty mounting flange. The maximum intermittent rating is 500 lb.ft. (678 Nm) up to 2100 engine RPM and 200 HP (149 kW) from 2100 to 2500 RPM engine speed, and the maximum continuous rating is 125 HP (93 kW) at 2100-2500 RPM engine speed. These ratings are applicable for dual PTO operations as well as single PTO operation. It is imperative that the above ratings not be exceeded in special applications when dual PTO's are operating simultaneously. The following ratios and gear data describe the PTO's available.

Top Mounted:

Ratio - PTO Gear Speed is equal to 1.21 times engine speed.

Gear Data - 25 degrees pressure angle
P. D. = 6.333 inches (161 mm), 38 teeth

Side Mounted:

Ratio - PTO Gear Speed is equal to 1.00 times engine speed.

Gear Data - 25 degree pressure angle
P. D. = 7.667 inches (195 mm), 46 teeth

5. VIP (Variable Input Power) STATOR:

The VIP Stator is available on the CLBT-5000 and 6000 transmissions. The VIP converter provides two converter capacities in one; full or normal capacity to match full rated power of the engine, and partial capacity to match available engine power when accessory loads are being utilized. The capacity is controlled by stator vane position (normal-open or partial capacity towards closed) which is selected by an external control valve. The external valve can be actuated by mechanical, electrical, hydraulic or pneumatic means - as furnished by the vehicle manufacturer.

The VIP feature controls are shown on drawing AS 58-048.

6. AUTOMATIC ELECTRIC SHIFT CONTROL

The automatic electric shift control system is now available as an option. Designed to again improve the transmission by optimizing performance and improving transmission, engine, and driveline life, the automatic electric consists of seven major components:

AUTOMATIC ELECTRIC SHIFT CONTROL - Continued

1. Shift tower
- *2. Cab harness and shift pattern generator
- *3. Engine throttle potentiometer
- *4. Transmission output speed pickup
5. Electric valve body
6. Power supply (24 volt overload protector or a 12 to 24 volt converter)
7. Wiring harness

This system is applicable in vehicles with 12 or 24 volt electrical systems and requires only ten watts for its operation.

The automatic electric control system is an electrically operated control system by which the driver may select any one of six forward or one reverse positions on a shift tower which provides fully automatic transmission operation. The following items are required for automatic electric shift in the CL(B)T 5/6000 transmissions. All price quotes should be obtained from Detroit Diesel Allison Parts Department, Indianapolis, Indiana.

Automatic Electric Shift Control

<u>Part Name</u>	<u>Part No.</u>
Gen. Assembly	
SPG 2100	6882674
2000	6880584
2300	6880585
Cab Harness	6834896**
Vehicle Harness 20'	6835134
27'	6834897
24 Volt Kit	6882075
Shift Tower 12V	6837301
24V	6836517**
Voltage Converter 12V (12-24 Volts)	6835105
Voltage Regulator 24V	6838380**
Throttle Potentiometer	6837296**
Magnetic Pickup	6834882
Instruction Sheet	6881077**

Electric Shift Harnesses:

All wiring harnesses for the manual/automatic electric systems must now be procured directly from Detroit Diesel Allison, Indianapolis, Indiana. Listed below are currently available harnesses. Applications which cannot be satisfied with available harnesses should be brought to the attention of the Transmission Sales Department, Indianapolis, Indiana.

*Required for Manual Electric Only.

**Included in 24 Volt Kit

ELECTRIC SHIFT HARNESSES (FOR CLBT 5/6000)

<u>Type</u>	<u>Cable Length</u>	<u>Automatic/Manual</u>	<u>Part No.</u>
Tower - Body	7'	Manual	6834077
Tower - Body	20'	Manual	6836694
Tower - Body	27'	Manual	6834075
Tower - Ext.		Manual	6836600
Y Harness - Ext.		Manual	6836601
Ext. - Body		Manual	6836602
SPG - Body	20'	Automatic	6835134
SPG - Body	27'	Automatic	6834897
Restrictor 1-4		Automatic	6837318
Restrictor 1-5		Automatic	6837319
Tower - SPG		Automatic	6834896

7. MANUAL SHIFT CONTROL

Manual shift control is available as an option only for oil field pumping rigs.

IV. SPECIFICATIONS:1. Dry Weight (Approximate)

<u>Model</u>	<u>Pounds</u>	<u>Kilograms</u>
Basic 5860, 5960 and 6061	2100	4620
With the Torqmatic Retarder (Add)	165	363
With Remote Mounting (Add)	55	121
With Transfer Case (Add) (5000 only)	645	1419
With Parking Brake (Add)	60	132

2. Oil System:

Sump - Integral

Input Pressure and Scavenge Pumps - Positive Displacement, gear type.

Oil Capacity - Straight Through Models - 18 gallons (68 liters)
 Transfer Case Models - 13 Gallons (49 liters)

Oil Type - Hydraulic Transmission Fluid, Type C-3.

Converter Oil Outlet Pressure - Minimum - 30 PSI (20.7 kPa)
 Maximum - 65 PSI (44.8 kPa)

Main Pressure - all ranges - 170-185 PSI (117-127 kPa)

Lubricating Oil Pressure - 20 PSI (13.8 kPa)

3. Input Inertia

Engine Mounted Models - 2.6809 lb.ft.sec² (3.64 Kgm²)
 Remote Mounted Models - 1.9744 lb.ft.sec² (2.68 Kgm²)

NOTE: The input inertia values for engine mounted transmissions will vary slightly dependent on the flywheel and starter ring gear configurations. The above referenced values are representative of typical applications - these figures represent the inertia of the parts mechanically attached to the engine during converter operation.

4. Overall Transmission Gear Ratios:

<u>Transmission Range</u> (Selector Valve Position)	<u>Ratio</u>
First	4.00:1
Second	2.68:1
Third	2.01:1
Fourth	1.35:1
Fifth	1.00:1
Sixth	0.67:1
Reverse	5.12:1
Transfer Gear Ratio (5000 only)	1.00:1

V. REFERENCES:1. Sales Briefs

<u>Number</u>	<u>Subject</u>
9	Temperature and Pressure Gauges
37	Housing Gasket
42	Oil Recommendations
56	Paint Specifications
65	General Recommendations for Driveline Angularity

2. Manuals and Catalogs

<u>SA Number</u>	<u>Publication</u>
SA-1077	5640 - 5840 - 5660 - 5860 Parts Catalog
SA-1078	CBT - 5640 - 5840 Service Manual
SA-1247	5900 - 6000 Parts Catalog
SA-1110	5960 - 6060 - 6061 Service Manual
SA-1318	Operators Manual

3. Match Charts

<u>SA Number</u>	<u>Converter Model</u>
SA-1180	TC 680
SA-1181	TC 690
SA-1207	VTC 690
SA-1198	TC 530
SA-1199	TC 540
SA-1200	TC 550
TC-12478	VTC 550
SA-1201	TC 560
SA-1202	TC 570
TC-12479	VTC 570
SA-1203	TC 580
SA-1204	TC 590

4. Installation Drawings

<u>Drawing No.</u>	<u>Subject</u>
AS 00-001	Master Physical Adaptation Chart-Also see AS-04 Section
AS 00-002	Engine-Transmission Converter Adaptation Requirements
AS 00-003	Transmission Support Diagram
AS 00-014	Shift Control Tower - Recommended Design
AS 00-019	Remote Mounted Breather
AS 00-033	Wire Harness, Manual Electric
AS 00-043	Installation Requirements for Voltage Converter
AS 00-046	Filter Bypass Switch
AS 58-004	Filter Installation Drawing
AS 58-029	Installation Diagram - Straight Thru Models
AS 58-031	Installation Diagram - Transfer Case Models
AS 58-032	Retarder Horsepower - Absorption Characteristics
AS 58-034	Cooler Oil Flow - CLBT-5000/6000 Transmissions
AS 58-035	Drive Flange Chart
AS 58-036	Installation Diagram - Torqmatic Retarder
AS 58-037	Torqmatic Retarder - Low Profile Valve Body (5860 only)
AS 58-038	Top PTO Installation Diagram
AS 58-039	Side PTO Installation Diagram
AS 58-040	External Hydraulic Circuit (CT & CLT)
AS 58-041	External Hydraulic Circuit (CBT & CLBT)
AS 58-042	Reversed Filter Installation
AS 58-048	Variable Capacity Converter Air Control Option
AS 58-057	Electric Shift Control Option
AS 58-062	Magnetic Pick-up Straight Thru
AS 58-063	Magnetic Pick-up Transfer Gear
AS 58-064	Oil Level Sight Gage
AS 58-065	Cooler Circuit Oil Flow - CLBT-5000/6000
AS 58-066	Cooler Circuit Oil Flow - CLBT-5000/6000
AS 58-067	Cooler Circuit Oil Flow - CLBT-5000/6000
AS 58-068	Cooler Circuit Oil Flow - CLBT-5000/6000
AS 58-069	Cooler Circuit Oil Flow - CLBT-5000/6000 Instruction
(Sheets 1 & 2)	Sheets

For further information, contact Transmission Sales Department, Detroit Diesel Allison Division, GMC, P. O. Box 894, Indianapolis, Indiana.



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Allison Powershift Transmissions

Operators Manual

5000-6000-8000 Series



CT, CBT	}	}	5600
CLT, CLBT			5800
VCLT, or	}	}	5900
VCLBT			6000

DP 8800

DP 8900

OPERATING INSTRUCTIONS

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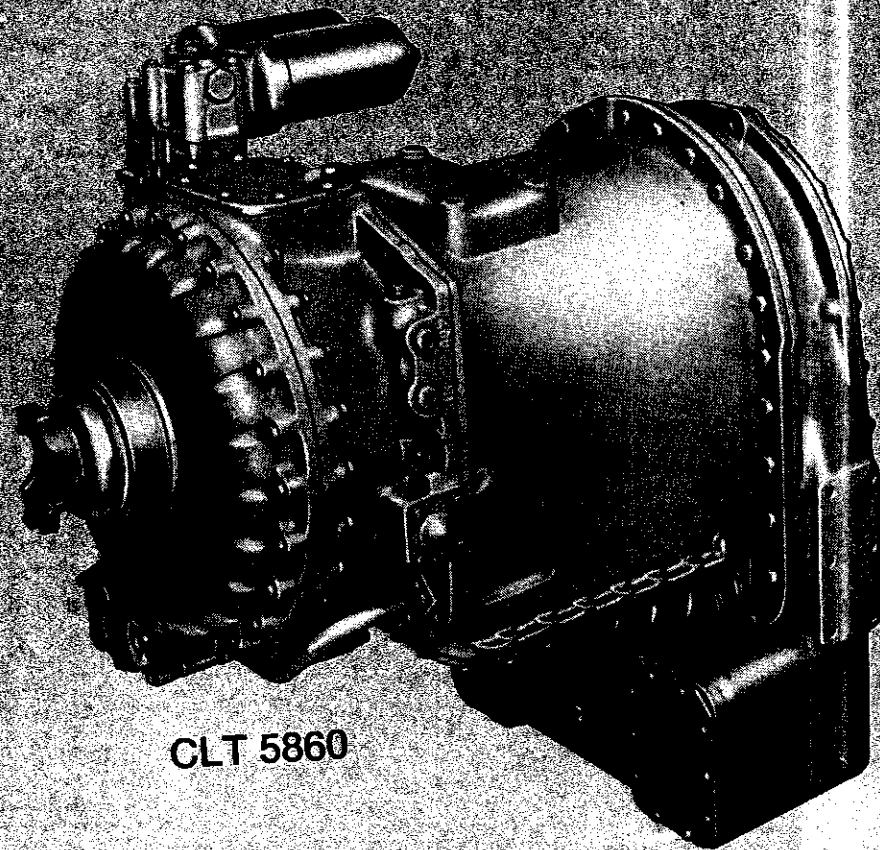
OPERATING INSTRUCTIONS

A LOOK AT THE 5000-6000 SERIES

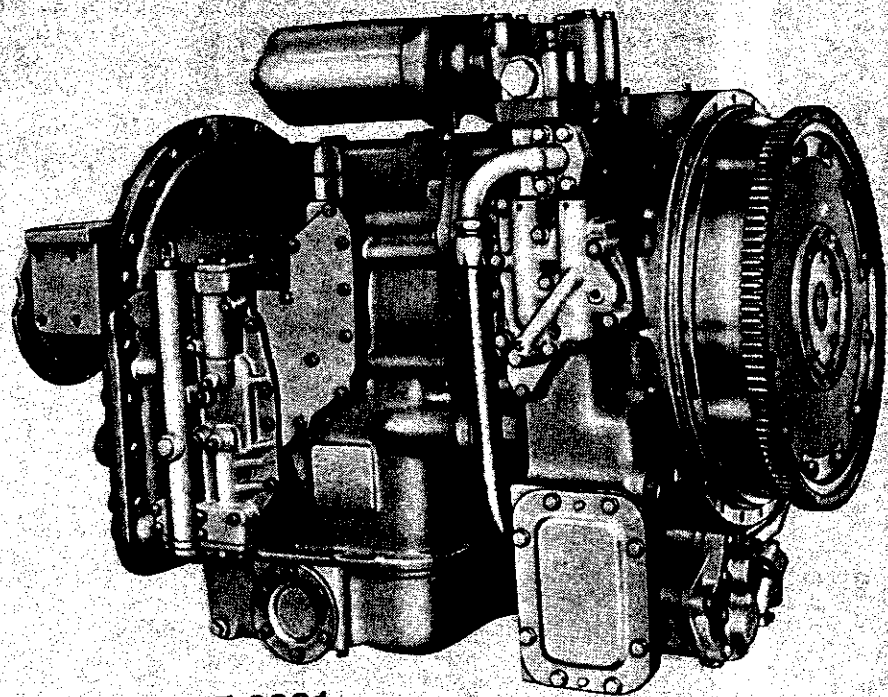
The transmissions that haulers want for off-highway vehicles just about anywhere—the 325 to 635 horsepower range is the kind that moves higher tonnage and greater yardage, easier, smoother and faster. The power shift CLBT 5000-6000 series is that kind of transmission.

Rugged and complete, these units contain all transmission elements in one package including: a hydraulic torque converter for powerful starting torque . . . planetary gears and clutches to provide six ranges forward and one range reverse . . . hydraulically operated range clutches . . . lockup clutch for direct drive . . . drum-type parking brake.

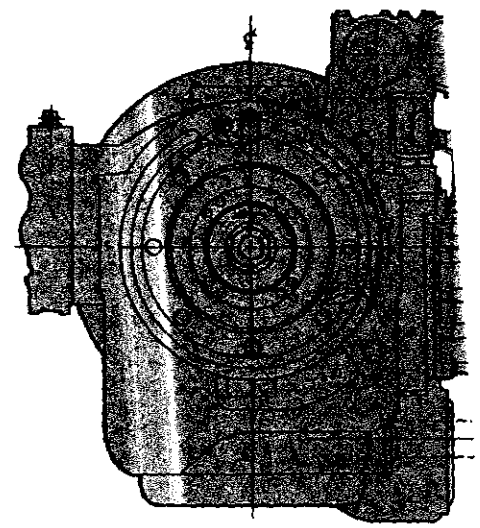
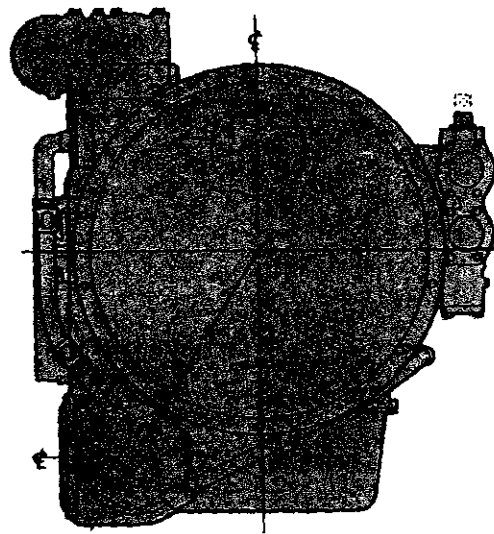
Optional features include: integral on-piece hydraulic retarder for downhill braking—variable pitch stator vanes in the converter to match power to auxiliary equipment or the wheels—transfer case configuration—remote or direct engine mounting—two power takeoff locations—seven torque converter ratios—popular drive flanges—manual—electric shift control system.



CLT 5860



CLBT 6061



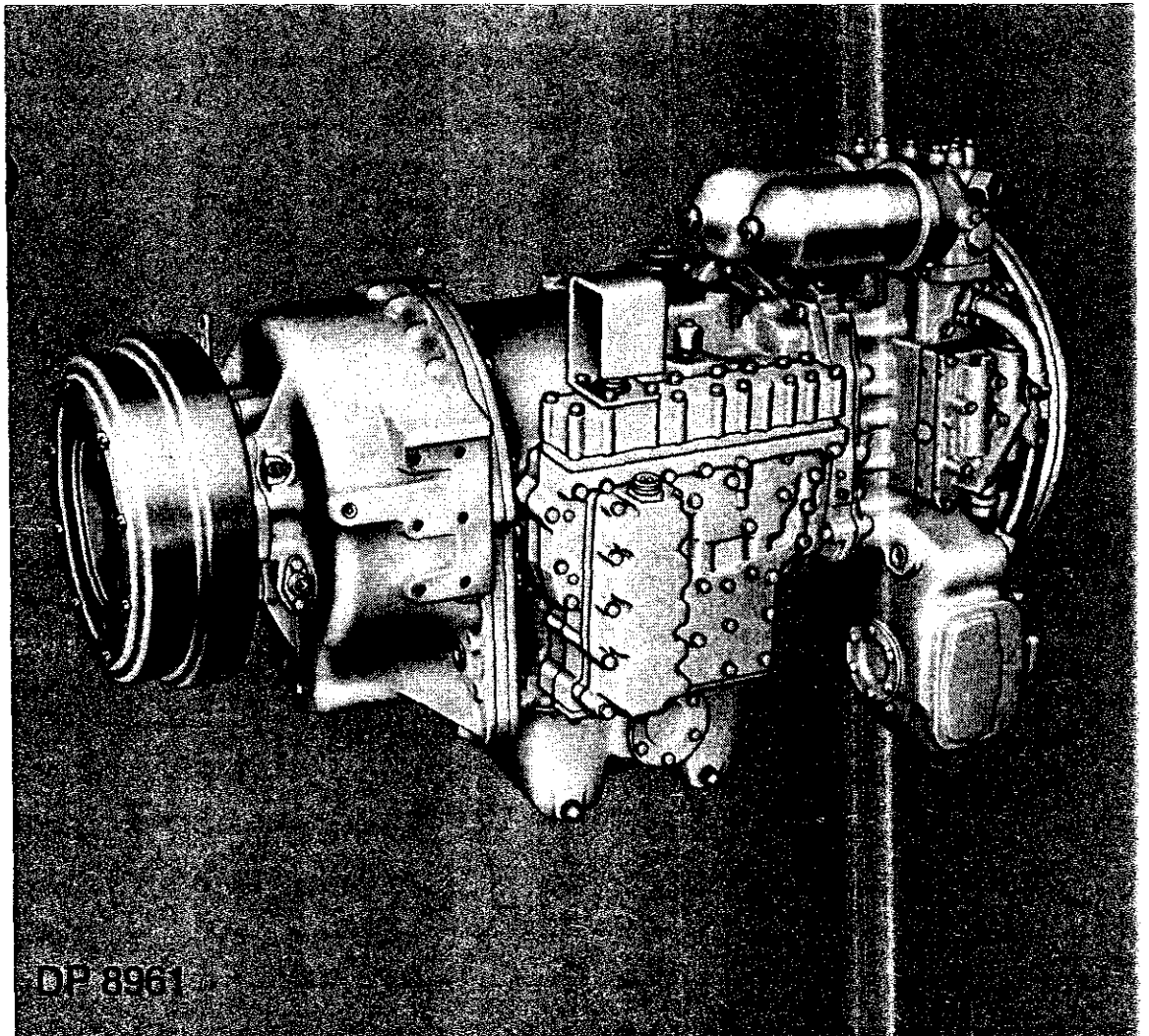
A LOOK AT THE DP 8000 SERIES

This series of transmissions is designed for the biggest hauling jobs. Designed for engines in the 700 to 1000 horsepower range, these transmissions are designed for heavy loads, rough terrain, heavy shocks, and tight work schedules.

Of one-package, compact design, the transmissions include a hydraulic torque converter, lockup clutch, hydraulic retarder, planetary gear sets and clutches to provide six ranges forward and one range reverse, and a manual-electric control system.

A special feature is the dual torque path concept. In first gear, where high torque is needed, the torque from the converter is transmitted by the main shaft through the transmission to a high-reduction combining output gear set. In each succeeding gear (2 through 6), where a balance of speed and torque is needed, the torque from the converter is divided between the main shaft and the planetary gearing. As the transmission is powershifted into higher gears, an increasing amount of power is directed through the range section—and less through the main shaft. The two power paths are then recombined at the output gear.

Options include: engine or remote mounting—in-line or transfer case output—two power takeoff locations—drum type parking brake—popular drive flanges—automatic-electric control system.

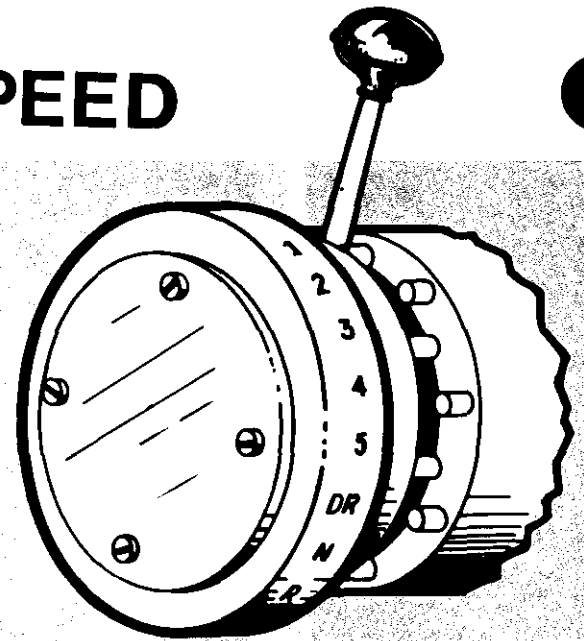


THE RANGE SELECTOR

The transmission is controlled by a range selector lever. Proper range selection provides better vehicle performance and control. The following are the range selections by models and their use. Although these shift quadrants are typical, your quadrant may have some other designation. Whatever designation you have, the proper gear is the key to the best performance. These illustrations will assist you in making that selection.

6 SPEED

8000 Series
Automatic-Electric Shift



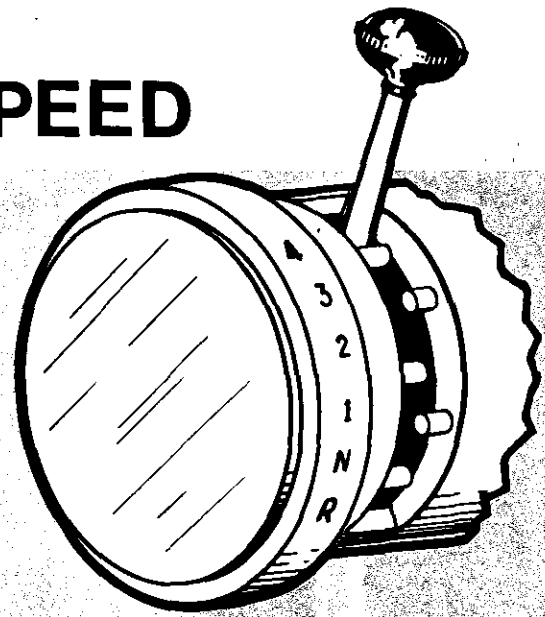
- 1—First Gear Only
- 2—Automatic Shifting, First and Second Gears
- 3—Automatic Shifting, First Through Third Gears
- 4—Automatic Shifting, First Through Fourth Gears
- 5—Automatic Shifting, First Through Fifth Gears
- DR—Automatic Shifting, First Through Sixth Gears
- *N—Neutral
- R—Reverse—No Automatic Shift

*Use this position to start engine and to operate power takeoff with vehicle standing still. When shifting from neutral to a drive range, the engine should be at idle speed. Apply the parking brake if vehicle is left unattended.

4 SPEED

5600, 5800, 5900 Series
Manual Shift

- 4—Fourth (High) Gear
- 3—Third Gear
- 2—Second Gear
- 1—First (Low) Gear—Use for starting extra heavy loads
- *N—Neutral
- R—Reverse Gear



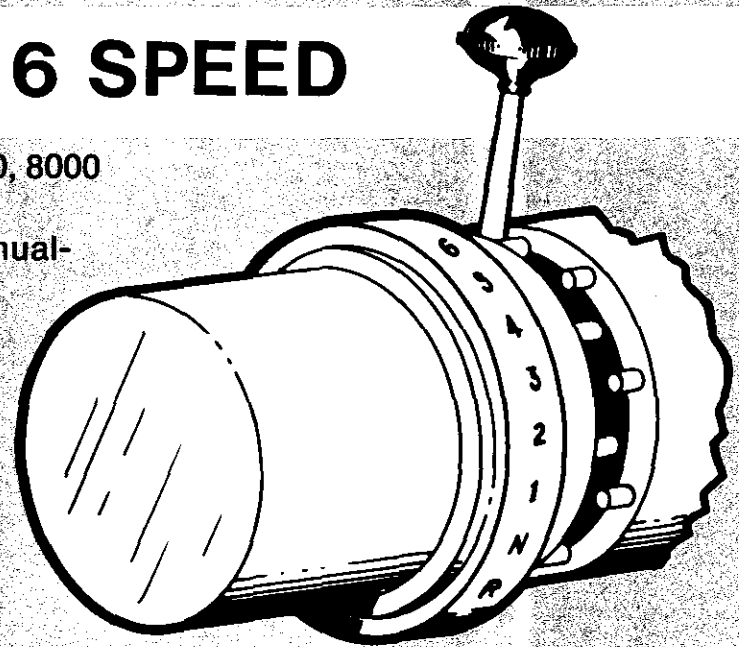
*Use this position to start engine and to operate power takeoff with vehicle standing still. When shifting from neutral to a drive range, the engine should be at idle speed. Apply the parking brake if vehicle is left unattended.

6 SPEED

5600, 5800, 5900, 6000, 8000
Series Manual Shift.
6000, 8000 Series Manual-
Electric Shift

- 6—Sixth (High) Gear
- 5—Fifth Gear
- 4—Fourth Gear
- 3—Third Gear

- 2—Second Gear
- 1—First (Low) Gear—Use for starting extra heavy loads
- *N—Neutral
- R—Reverse Gear



*Use this position to start engine and to operate power takeoff with vehicle standing still. When shifting from neutral to a drive range, the engine should be at idle speed. Apply the parking brake if vehicle is left unattended.

OPERATING TIPS

Neutral Start Switch

Place the selector lever in neutral position before starting the engine. A switch prevents starting the engine unless the selector lever is in neutral. If the starter will not operate in neutral, or will operate in any range other than neutral, call this to the attention of your maintenance personnel.

Pressures, Temperatures

When gages are provided for indicating transmission pressures and temperature, check them frequently to determine if readings are within normal range. Normal operating range is 180° to 200°F. The oil temperature should never exceed 300°F. Should the temperature reach this limit, the vehicle should be stopped, shifted to neutral, and the engine operated at 1200 to 1500 rpm for a short time. The temperature should fall to normal before operating the vehicle any further. If the high temperature persists, stop the engine and have the overheating condition investigated by your service personnel. An oil filter signal is provided in some installations. If the warning light comes on, the oil flow through the filter has been affected by a dirty or clogged filter. The filter should be replaced immediately. If there is no warning light available, a regular oil change that is keyed to operating conditions should be established.

CAUTION: The engine should never be operated for more than 30 seconds at full throttle with the transmission in an operating range and the vehicle not moving. Prolonged operation of this type will cause excessively high transmission oil temperature which will damage the transmission.

Speed Limitations When Shifting

The transmission can be manually upshifted or downshifted even at full throttle. There are no speed limitations on upshifting. However, a downshift must not be made if the vehicle speed exceeds the maximum speed normally attainable in the next lower range. Downshifting at excessive speed will overspeed the engine.

CAUTION: *When the vehicle is moving in either forward or reverse direction, before shifting to the opposite direction, stop the vehicle and reduce the engine speed to idle.*

Downshift Inhibitor (MANUAL- ELECTRIC)

Some transmissions are equipped with a manual-electric system of shift control. This system contains a downshift inhibitor which is energized whenever the lockup clutch engages. This engages a dog clutch which prevents the range selector lever from being moved to a lower gear position. The selector lever can be upshifted, however.

Downshift Inhibitor (AUTOMATIC- ELECTRIC)

Some transmissions are equipped with an automatic-electric shift control. In this system, the shift pattern generator includes electronic components that protect the transmission against downshifts occurring at excessively high speeds. Regardless of what lower range at the shift tower is selected, or if reverse or neutral is selected, downshifts will occur in sequence until the highest gear in the range selected (or neutral or reverse) is reached. Each downshift will automatically occur at the greatest speed permissible for each gear in the descending sequence. Throttle position will not influence such downshifts.

Hydraulic Retarder

This is a simple device having only one moving part—a vaned rotor that resembles a paddle wheel. When the retarder is activated (by foot pedal or lever), a valve is opened, sending a surge of oil to the rotor cavity. The retarder may be applied in any range. However, the lower the range, the greater the braking effect. The transmission may be shifted while the retarder is in operation, except a downshift should not be made during converter lockup with the retarder applied.

It is permissible to partially apply the retarder. However, if the oil tends to overheat during long periods of partial application, fully apply and fully release the retarder alternately as required.

Power Takeoff Operation

A power takeoff (PTO) may be mounted on the top of the transmission, the side or both the top and side. Being engine-driven, the PTO rotates whenever the engine is running.

In most applications, the power takeoff is continuous and is used to drive a hydraulic pump which supplies hydraulic pressure for the operation of various accessories.

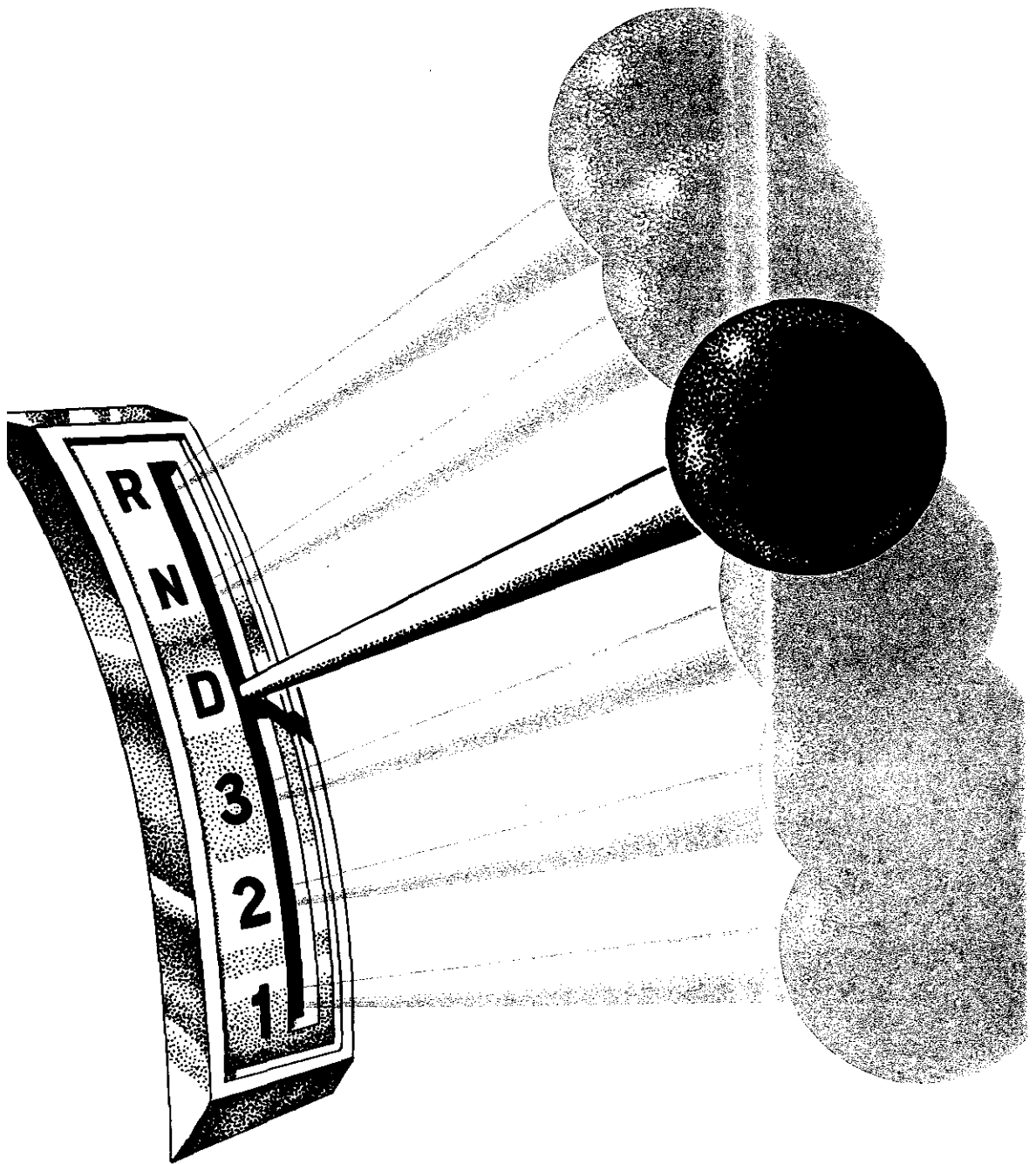
In some applications it is desirable to engage or disengage the power takeoff from the engine. One method is to provide the operator with a clutch. With this method, the engine should be at idle speed before engagement or disengagement. Another method is to use a mechanical disconnect. With this method, the operator must stop the engine before engaging or disengaging the power takeoff.

Variable-Pitch Stator Operation

Another useful option is the variable capacity converter in which the operator can change the stator vane angle in the converter. With these variable-pitch vanes open, all engine power is absorbed by the torque converter and transmitted through the drive line to the wheels. But, with the vanes partially closed less power is absorbed by the converter and is directed instead to the power takeoff driven equipment. Thus, the desired degree of power can be directed to the point where it is needed the most—the PTO driven equipment, the wheels, or the desired combination of both.

Towing or Push Starting

Before towing the vehicle, be sure to lift the rear wheels off the ground or disconnect the driveline to avoid damage to the transmission during towing. Because of the design of the hydraulic system, the engine cannot be started by pushing or towing the vehicle.



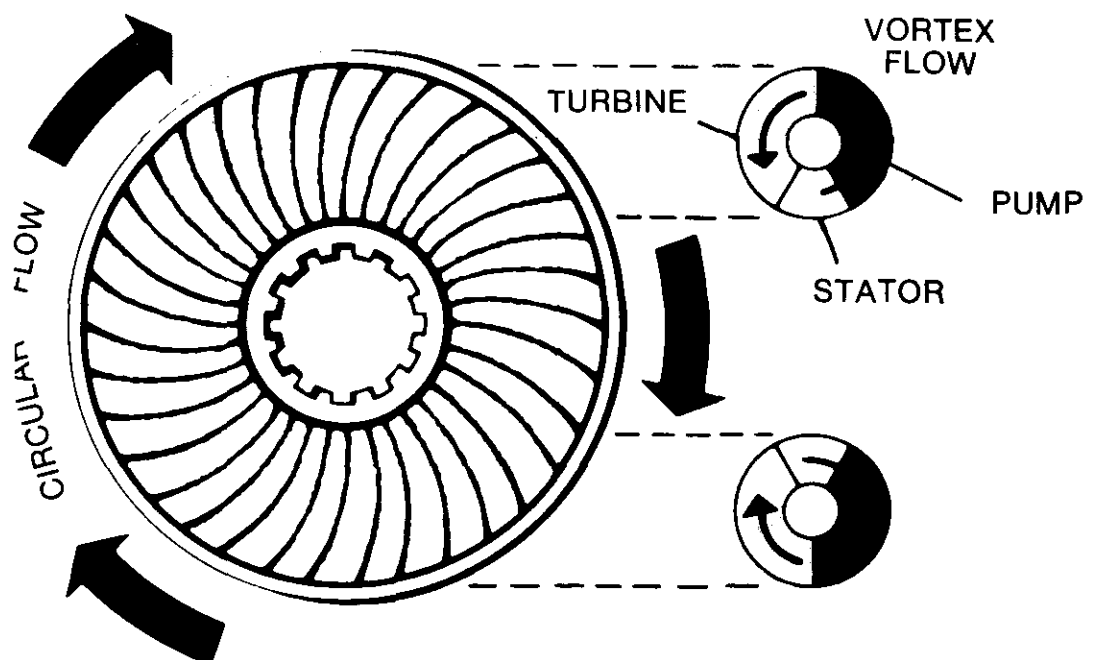
Parking Brake

There is no “park” position in the transmission shift pattern. Therefore, the parking brake must be applied to hold the vehicle when it is unattended.

MAINTENANCE INSTRUCTIONS

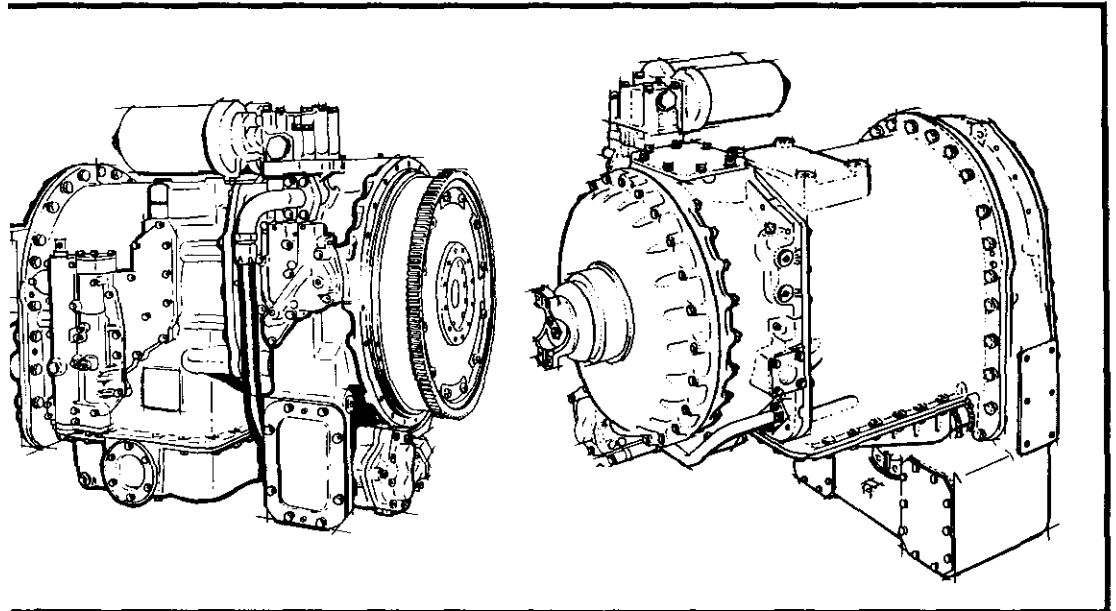
OPERATION AND FUNCTION OF THE TORQUE CONVERTER

The torque converter, connected to the engine crankshaft, is the input member of the transmission. It multiplies engine torque and provides a hydraulic cushion between the engine and the load. No mechanical disconnect clutch is needed.



The torque converter includes the pump, stator and turbine. The engine drives the pump which throws oil against the turbine vanes. The turbine transmits torque to the transmission gearing. The stator redirects the oil to the pump in a direction which will assist pump rotation. This is the key to torque multiplication.

The lockup clutch is an automatic function that provides direct drive from this engine to the transmission gearing. During upshifting and downshifting the lockup clutch automatically disengages for a moment, bringing the torque converter back into play as a fluid coupling to absorb the shock of the gear ratio change.



SIDE THE 5000-6000 SERIES

**que
verter**
(D CAPACITY)

The torque converter includes the pump, stator and turbine. It functions as a torque multiplier, or as a fluid coupling, depending upon load and operating conditions.

Torque Converter *(VARIABLE CAPACITY)*

The variable-capacity converter, like the fixed-capacity converter contains a pump, stator and turbine. The one difference is that in the variable-capacity converter, the angle of the stator vanes can be changed by the operator so that a greater portion of the engine power can be diverted to the power takeoff. When the needs of the power takeoff have been satisfied, the operator can again change the angle of the stator vanes to restore engine power to the drive wheels.

Lockup Clutch

The automatically controlled lockup clutch is designed to hydraulically engage and disengage at predetermined vehicle speeds. When engaged, the lockup clutch connects the engine directly to the range gearing. When disengaged, the converter is free to act as a torque multiplier or as a fluid coupling.

Hydraulic Retarder

This simple device is a paddle-wheel type rotor in a sealed housing which has cast vanes as reaction members. When descending grades, the operator can call upon the transmission for braking power by actuating a control valve. This valve permits transmission oil to enter the retarder cavity. The oil resists the rotation of the rotor, thus slowing the range gearing. The retarder can be operated in all forward ranges.

Planetary Gearing

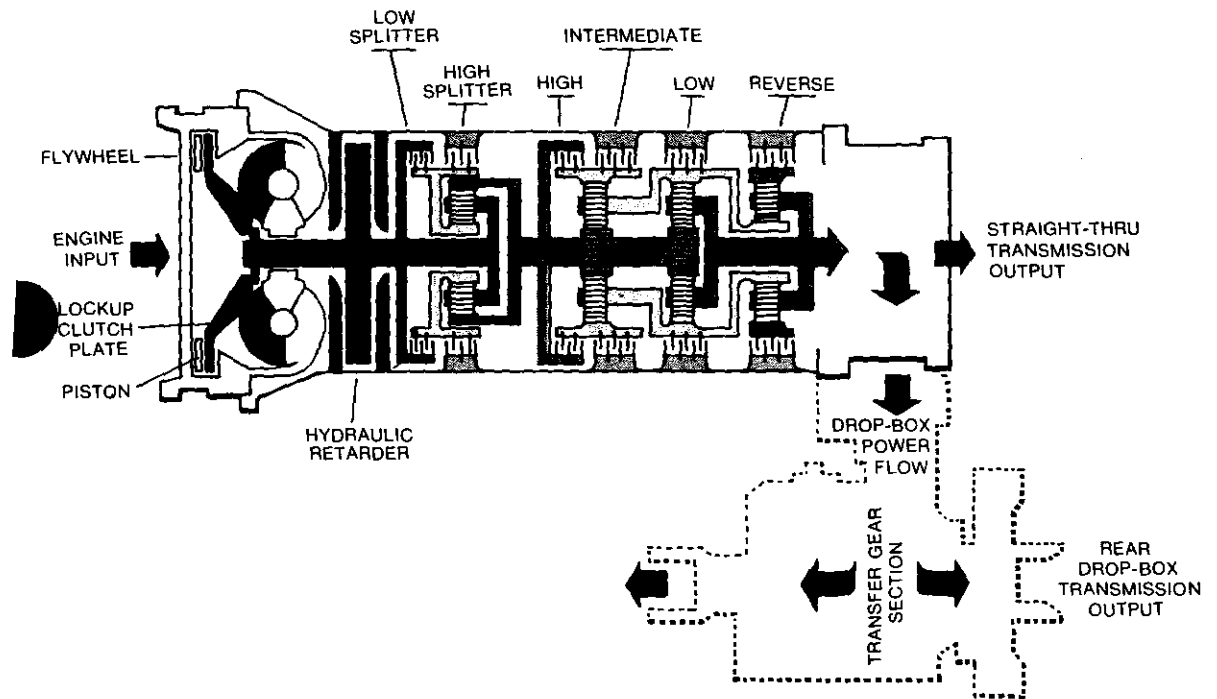
The planetary gear train consists of four constant mesh planetary gear sets. The forward set is the splitter, the three rear sets are the intermediate, low and reverse ranges. These planetaries are combined with six clutches to provide six ranges forward and one range reverse. The operator controls the application of the various clutches by moving the range selector lever.

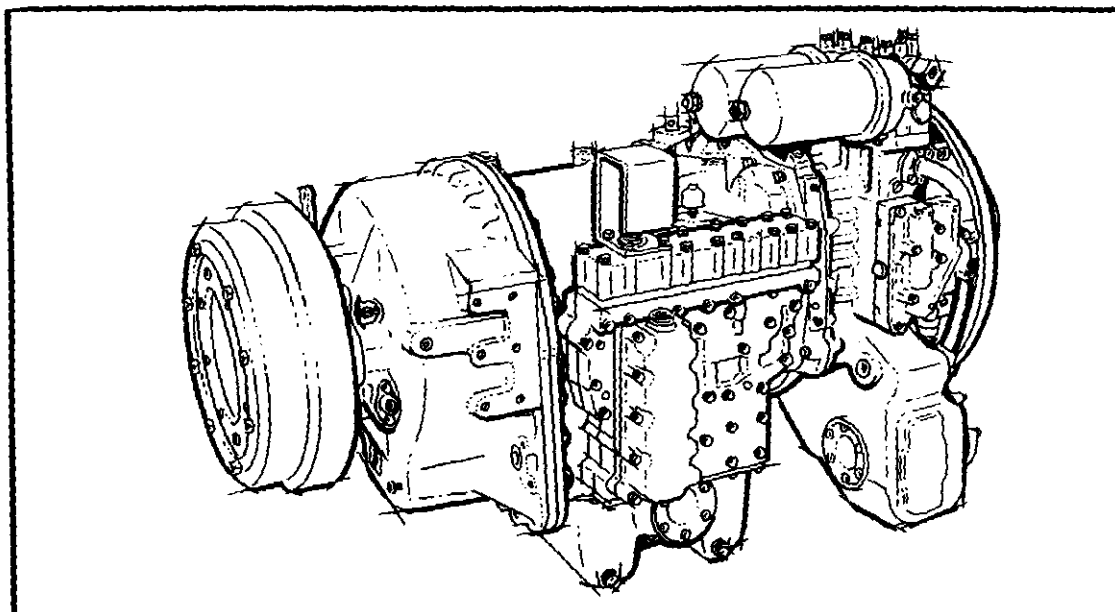
Transfer Case Models

Some models are equipped with a transfer case (drop-box) configuration which places the transmission output on a lower plane than the input. This will also permit a forward output. A manual disconnect clutch may be provided for the front or rear output.

Hydraulic system

A single, integral hydraulic system serves the converter, hydraulic retarder and the transmission gearing. Oil for all hydraulic operations is supplied by the same sump and is returned to it.





INSIDE THE 8000 SERIES

Torque Converter

The torque converter includes the pump, stator, and turbine. It functions as a torque multiplier, or as a fluid coupling, depending upon load and operating conditions.

Lockup Clutch

The automatically controlled lockup clutch is designed to hydraulically engage and disengage at predetermined vehicle speeds. When engaged, the clutch connects the engine directly to the range gearing. When disengaged, the converter is free to act as a torque multiplier or as a fluid coupling.

Hydraulic Retarder

This simple device is a paddle-wheel type rotor in a sealed housing which has cast vanes as reaction members. When descending grades, the operator can call upon the transmission for braking power by actuating a control valve. This valve permits oil to enter the rotor cavity. The oil resists the rotation of the rotor, thus slowing the range gearing. The retarder can be operated in all forward ranges.

Planetary Gearing

The planetary gear train consists of five constant mesh planetary gear sets. The forward set is the splitter. The four rear sets are 3rd and 4th gear, 2nd gear, 1st gear, and reverse.

gear. These planetaries are combined with seven clutches to provide six ranges forward and 1 range reverse.

The dual torque path principle is used in this series. In first range, where high tractive effort is needed, the torque from the engine is directed through.

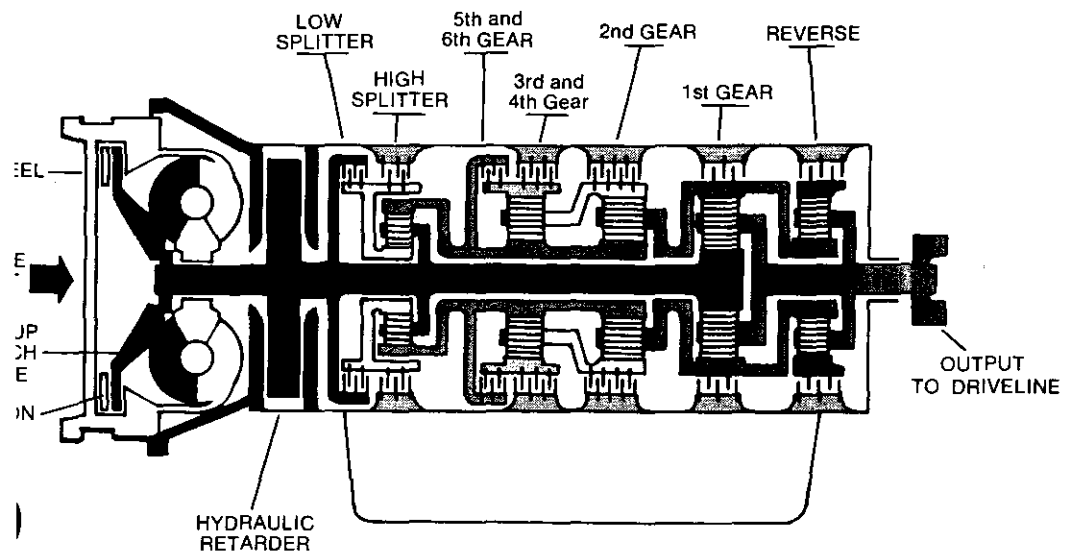
One path, for first range, leads directly from the converter through the main shaft to the heavy duty combining planetary set at the rear of the transmission. Another path, for the remaining forward ranges, leads from the converter through the planetary gearing and then is joined with the other path at the combining planetary gear set.

Transfer Case Models

Some models are equipped with a transfer gear case (drop-box) configuration which places the transmission output on a lower level than the input. This will provide a forward output or a rear output.

Hydraulic System

A single integral hydraulic system serves the converter, hydraulic retarder and the transmission gearing and clutches. Oil for all hydraulic operations is supplied by the same sump and is returned to it.



CARE AND MAINTENANCE

Periodic Inspections

A minimum of maintenance is necessary on your ALLISON POWERSHIFT transmission. However, careful attention should be given to all control linkages and to the oil level. For easier inspection, the transmission should be kept clean. Make periodic inspections for loose bolts, leaking oil lines or wet split lines.

Importance of Proper Oil Level

Maintaining the proper oil level is very important. Transmission oil cools, lubricates, and transmits power. If the oil level is too low, the converter and clutches will not get a proper oil supply, resulting in poor performance. If the oil level is too high, the oil will become aerated and cause overheating.

Daily Pre-start Checks

Control Linkage

1

Check the transmission shift control linkage to ensure that the linkage is free and that the selector lever is properly positioned. The shift lever should engage in all shift tower positions freely. Check the hydraulic retarder valve to be sure it is in the OFF position. Inspect the linkage for binding, wear, cracks, breaks or defective cotter pins.

Oil Level Check

2

The cold check (engine not running) is made to determine if there is sufficient oil to safely start the engine—especially if the vehicle has been idle. The oil level should be at or near the full-level check plug. Some transmissions have one plug, others have two plugs—an ADD and a FULL plug.

Oil Level Check

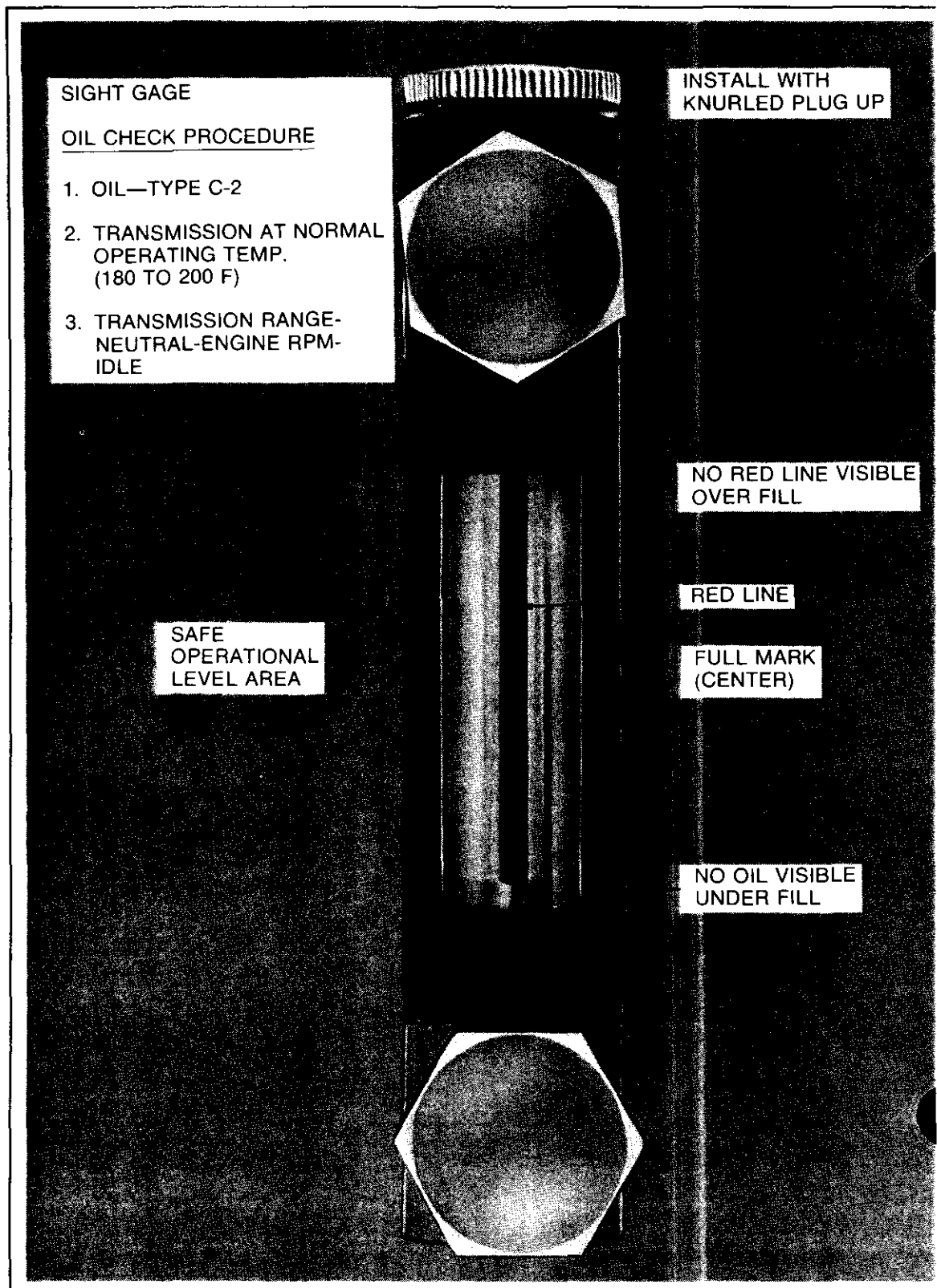
3

Oil level must be checked with the engine running at 1000 rpm, transmission in neutral and at normal operating temperature (180° to 200°F). The hydraulic retarder must be in the OFF position. The upper check plug (if there are two plugs) indicates the full oil level, while the lower plug is the add level. The oil must be maintained at the FULL level. If there is only one check plug, the oil level must be maintained at this level. Add oil if necessary to bring the level to the FULL mark. Approximately 1½ gallons are required to bring the level from the ADD to the FULL mark.

NOTE: Observe the type of flow from the plug opening. If it is aerated or flows freely in a full stream, allow the oil to drain down to the full level before replacing the plug.

Oil Level Sight Gage

Later models of the 5000, 6000 and 8000 series are equipped with an oil level sight gage which is mounted on the lower—left side of the transmission main housing. The gage provides a quick and easy method of checking the oil level. The illustration shows how to read the gage.



Oil, Filter Change

The oil should be changed every 1000 hours of operation or sooner depending upon operating conditions. Also, the oil must be changed whenever there are traces of dirt or evidence of high temperature indicated by discoloration or strong odor. The filter screen in the sump should be removed and cleaned with mineral spirits at each oil change.

The filter elements should be replaced at each oil change and at 200 hour intervals between oil changes. The filter shells should be cleaned. New gaskets and seal rings must be used when replacing filter elements. After installation, check the filter for oil leakage while the vehicle engine is running.

Keeping Oil Clean

It is absolutely necessary that the oil put in the transmission be clean. Oil must be handled in clean containers, filler etc., to prevent foreign material from entering the system.

Filling Transmission

At temperatures above -10°F , pour hydraulic transmission fluid type C-2 into the filler opening. At temperatures below -10°F , an auxiliary preheat is required to raise the temperature in the sump. Use only C-2 fluids from approved manufacturers. See your dealer for an approved list. For the 8000 Series the refill capacity is approximately 19 US gallons for straight-through models and 32 US gallons for drop box models (exclusive of external systems). For the 5000 Series the capacities are approximately $14\frac{1}{2}$ US gallons for the straight-through and 10 US gallons for the drop box models. Make the Cold Oil Level check and the Hot Oil Level check as described above.

Care of Breather

The breather should be kept clean at all times. It should be checked and cleaned regularly and as frequently as necessary, depending on the operating conditions. A badly corroded or plugged breather restricts proper breathing, causing a buildup of condensation and subsequent oil deterioration.

Shift and Retarder Linkage Adjustment

Manual shift linkage must be adjusted so that the operator's control is positioned to correspond exactly to the detent positions of the selector valve on the transmission. With the linkage disconnected, place the selector valve and the operator's control in third gear for the 6 speed models or in second gear for 4 speed models. Then, adjust the linkage so that it can be freely connected without moving either the selector valve or the operator's control. Then operate the control in each range. Make minor adjustments, if necessary, to insure that the selector valve detent seats in every range of the operator's control.

The DP 8000 retarder valve must be adjusted (when the retarder is released) so that the valve is held firmly downward (into the valve body) to its stop. When the retarder is applied, make sure that the retarder valve is all the way up (out of the valve body).

The 5000-6000 retarder valve must be adjusted (when the retarder is released) so that the valve is held firmly upward (out of the valve body) to its stop. When the retarder is applied, make sure the retarder valve is all the way down (into the valve body).

If the linkage allows the retarder to be partially applied, excessive drag and overheating will result. Inspect the control linkage for binding wear breaks.

Parking Brake Adjustment

The internal, expanding shoe-type of parking brake is mounted on the rear of the transmission housing at the output. The following describes the procedure for adjusting the parking brake.

- Adjust the brake shoes for proper drum clearance by inserting a screwdriver or brake adjusting tool into a hole at the rear of a brake drum, and rotating the star wheel between the lower ends of the brake shoes. The star wheel should be rotated until 0.010-inch thick feeler gages are held snugly between the adjusting ends of the shoes and the brake drum. Use two thickness gages simultaneously—one on each shoe.
- Adjust the vehicle brake linkage by releasing the hand lever fully, and adjusting the connecting linkage so that it can be freely connected to the apply lever on the brake. All slack should be taken out of the brake, without actually moving the brake shoes, when the linkage adjustment is made.

TROUBLESHOOTING

A transmission malfunction should be investigated immediately to protect the life of the transmission. Some evidences of malfunctioning are overheating, poor performance and unusual sounds.

The following chart lists the possible causes of, and remedies for, transmission troubles. As indicated in the chart, the engine and transmission must be considered as a single package when searching for trouble.

(A) LOW CLUTCH APPLY PRESSURE (transmission oil pressure gage)

Cause	Remedy
1. Low oil level	1. Add oil to correct level
2. Clogged oil strainer	2. Clean strainer
3. Clogged oil filter	3. Replace filter element
4. Air leak at intake side of oil pump	4. Check pump mounting bolts
5. External oil leakage	5. Tighten bolts or replace gaskets
6. Internal failure	6. Overhaul transmission, or repair subassembly

(B) OVERHEATING

1. High oil level	1. Restore proper oil level
2. Clutch failed	2. Rebuild transmission
3. Vehicle overloaded	3. Reduce load
4. Low clutch apply pressure	4. Refer to (A)
5. Engine water overheated	5. Correct engine overheating
6. Cooler oil or water line kinked or clogged	6. Clean or replace line

Ⓒ AERATED (foaming) OIL

Cause	Remedy
1. Incorrect type oil used	1. Change oil; use proper type
2. High oil level	2. Restore proper oil level
3. Low oil level	3. Restore proper oil level
4. Air entering suction side of oil pump	4. Check oil pump bolts and gasket

Ⓓ VEHICLE WILL NOT TRAVEL

1. Low clutch apply pressure	1. Refer to Ⓐ
2. Selector linkage broken or disconnected	2. Repair or connect linkage
3. Internal mechanical failure	3. Overhaul transmission

Ⓔ VEHICLE TRAVELS IN NEUTRAL WHEN ENGINE IS ACCELERATED

1. Selector linkage out of adjustment	1. Adjust linkage
2. Clutch failed (won't release)	2. Overhaul transmission

Ⓕ VEHICLE LACKS POWER AND ACCELERATION AT LOW SPEED

1. Low clutch apply pressure	1. Refer to Ⓐ
2. Turbine freewheel clutch failed	2. Overhaul transmission
3. Engine malfunction	3. Check engine; refer to engine service manual
4. Aerated oil	4. Refer to Ⓒ

PRESERVATION AND STORAGE

Preservative Method Selection

When transmissions are to be stored or remain inactive for extended periods of time specific preservative methods are recommended to prevent rust and corrosion damage. The length of storage will usually determine the preservative method to be used. Various methods are described below.

- (1) The following procedures will prepare a transmission for a month to 6 weeks storage, depending on the environment.
- (2) Drain the oil. Remove the transmission oil filter element(s).
- (3) Install the drain plugs and new filter element(s).
- (4) Fill the unit to operating level with any commercial preservative oil which meets the US Military Specification MIL-L-21260 Grade 1.
- (5) Operate the unit for at least 5 minutes at a minimum of 1000 rpm.

Shift the transmission slowly through all selector positions to thoroughly distribute the oil, then stall the converter to raise the oil temperature to 225°F.

CAUTION: Do not allow temperature to exceed 225°F. If the unit does not have a temperature gage, do not stall for more than 10 seconds.

- (6) As soon as the unit is cool enough to touch, seal all openings and breather tubes with moisture-proof tape.

Storage, 1 Year Without Oil

- (7) Coat all exposed, unpainted surfaces with a good grade of preservative grease, such as a petrolatum that meets U.S. Military Specification (MIL-C-11796), Class 2.
- (8) Repeat the above procedures (5) through (7) at monthly intervals for indefinite storage.

Storage, 1 Year With Oil

- (1) Drain the oil.
- (2) Seal all openings and breathers with moisture-proof tape.
- (3) Coat all exposed, unpainted surfaces with a good grade of preservative grease.
- (4) Atomize or spray 2 ounces of Motorstor*, or equivalent, into the transmission through the oil pan drain plug.
- (5) If additional storage time is required, (3) and (4), above, should be repeated at yearly intervals.

- (1) Drain the oil. Remove the transmission oil filter element(s).
- (2) Install the drain plugs and new filter element(s).
- (3) Fill the transmission to operating level with a mixture of 30 parts type C-2 transmission fluid to 1 part Motorstor, or equivalent.
- (4) Operate the unit for approximately 5 minutes at a minimum of 1000 rpm. Shift the transmission slowly through all selector positions to thoroughly distribute the oil, then shift to a forward range and stall the transmission output to raise the temperature to 225°F.

CAUTION: Do not allow temperature to exceed 225°F. If the unit does not have a temperature gage, do not stall for more than seconds.

- (5) As soon as the unit is cool enough to touch, seal all openings and breathers with moisture-proof tape.
- (6) Coat all exposed, unpainted surfaces with a good grade of preservative grease.

- (7) If additional storage time is required, (3) through (6), above, should be repeated at yearly intervals, except it is not necessary to drain the transmission each year—just add the Motorstor, or equivalent.

Restoring Units to Service

- (1) If Motorstor, or equivalent, was used in preparing the transmission for storage, use the following procedures to restore the unit to service.
- (2) Remove the tape from openings and breather.
- (3) Wash off all the external grease with solvent.
- (4) Add hydraulic transmission fluid, type C to proper level.

NOTE: It is not necessary to drain C-2 oil and Motorstor mixture from the transmission.

- (5) If Motorstor, or equivalent, was not used in preparing the transmission for storage, use the following procedures to restore the unit to service.
- (6) Remove the tape from openings and breathers.
- (7) Wash off all the external grease with solvent.
- (8) Drain the oil.
- (9) Install a new oil filter element(s).
- (10) Refill transmission with hydraulic transmission fluid, type C-2 to proper level.

***Motorstor is a preservative additive manufactured by the Daubert Chemical Company, Chicago, Illinois. Motorstor (under the designation of "Nucle Oil") is covered by US Military Specifications MIL-L-46002 (ORD) and MIL-I-23310 (WEP).**

SERVICE LITERATURE

The following Allison publications covering the operation, servicing and overhaul of your Allison transmission can be ordered from your dealer or distributor.

		Publication No.
5640-5660-5840-5860	Service Manual	SA 1078
5000-6000 Manual- Electric Control System	Supplement	SA 1242
5900-6000	Service Manual	SA 1110
DP 8000 Manual- and Automatic-Electric Control System	Supplement	SA 1236
DP 8861-8961	Service Manual	SA 1228
5600-5800	Parts Catalog	SA 1077
5900-6000	Parts Catalog	SA 1247
DP 8861-8961	Parts Catalog	SA 1249