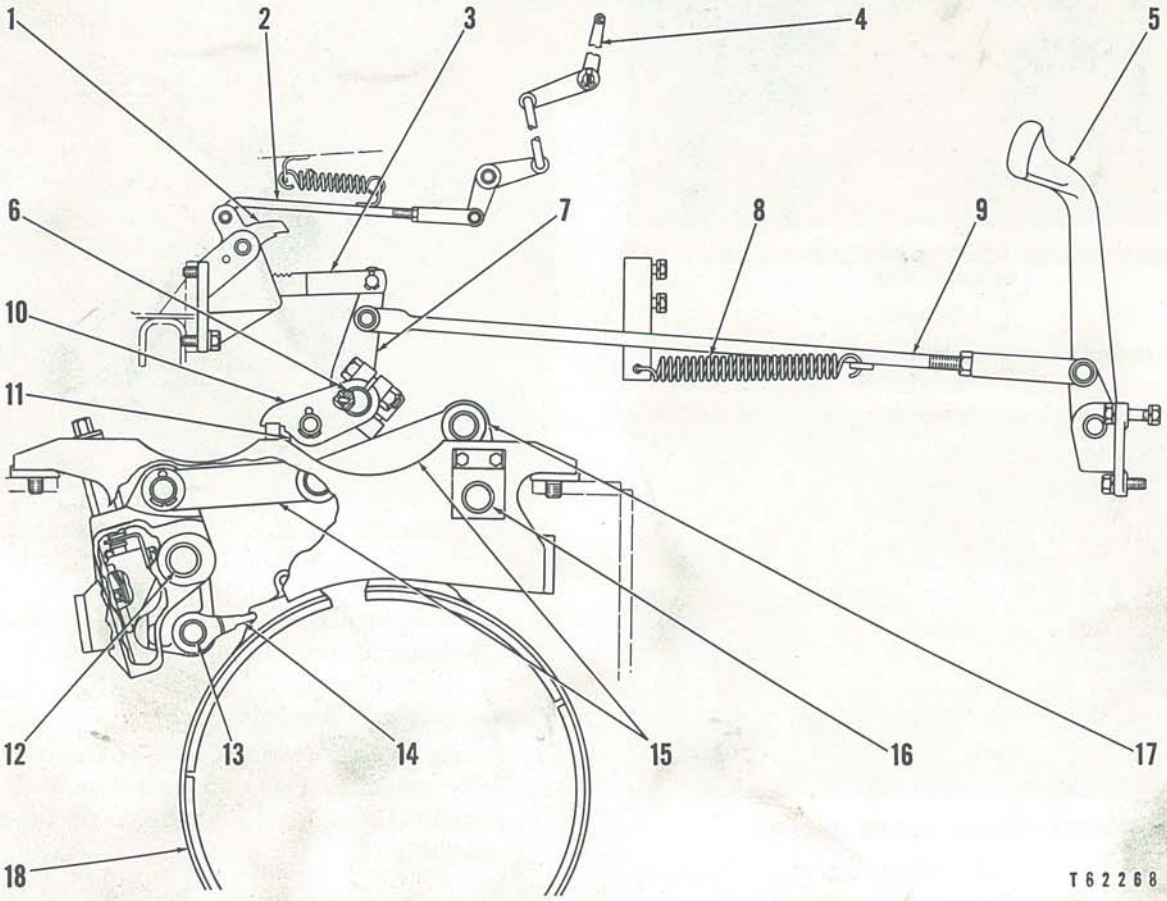
Brakes

OPERATION



BRAKE OPERATION

1–Lock pawl.
2–Parking brake linkage.
3–Ratchet.
4–Parking brake lever.
5–Pedal.
6–Shaft.
7–Control lever.
8–Spring.
9–Control linkage.
10–Lever.
11–Link.
12–Lever shaft.
13–Strut support lever assembly.
14–Strut.
15–Toggle link.
16–Lever shaft.
17–Lever assembly.
18–Band.

Two contracting-band-type brakes, which operate independently of one another, are used to supplement the action of the steering clutch or to stop the tractor. Either or both brakes can be held in the locked position by the brake lock pawls **(1)**. These pawls are actuated by a single hand lever.

The operation of both brakes is the same. When pedal **(5)** is depressed, control linkage **(9)** moves control lever **(7)** forward. Shaft **(6)** and lever **(10)** rotate and pull up on link **(11)**. This flattens toggle links **(15)** and causes strut support lever assembly **(13)** and lever assembly **(17)** to rotate about lever shafts **(12)** and **(16)**. Struts **(14)** are forced against lugs on band **(18)**, causing band to contract on drum.

When pedal is released, spring **(8)** returns pedal, linkage and brake band to brake released position.

The parking brake is engaged by depressing either or both pedals and pushing parking brake lever **(4)** down. This moves parking brake linkage **(2)** forward, engaging pawl **(1)** with ratchet **(3)**. The brakes are held in applied position by the pawls that hold linkage in engaged position.

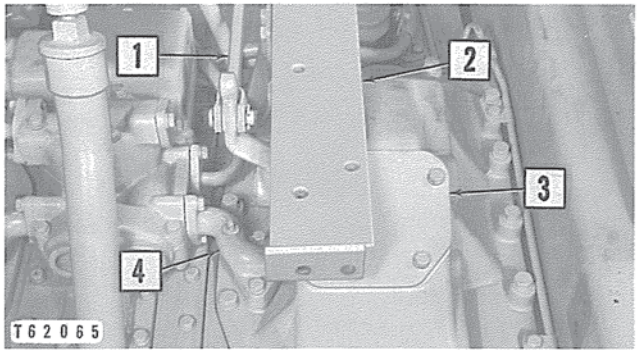
CAUTION

To prevent damage to ratchet or pawl, pedals should be depressed before lever **(4)** is pulled upward to release brakes.

BRAKE ENGAGING MECHANISM

Removal and Installation

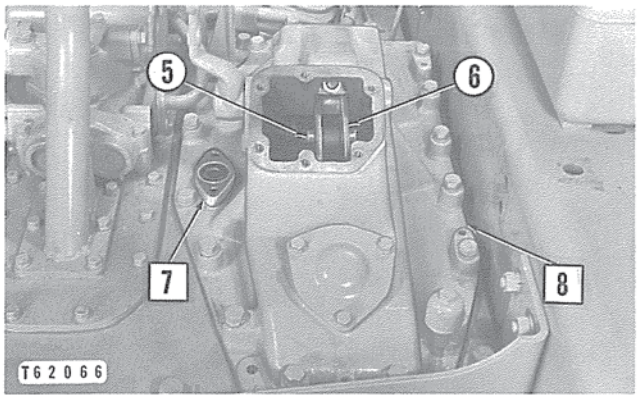
1. Remove seat and seat frame, floor plates, fuel tank and rear cross member. See covering topics.



PREPARING TO REMOVE BRAKE ENGAGING MECHANISM

☐ Remove

1–Brake control rod. 2–Seat, frame and floor plate support. 3–Cover. 4–Elbow.

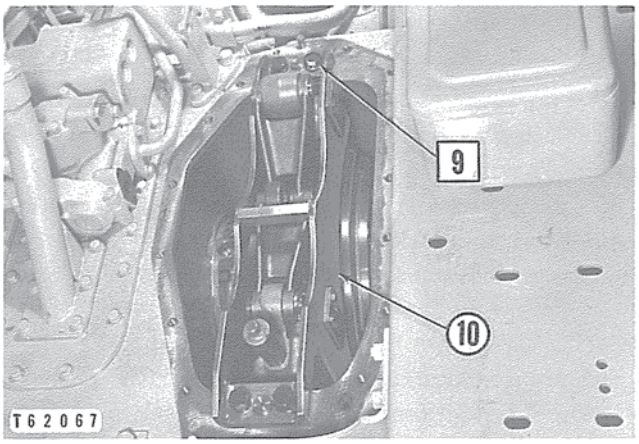


DISCONNECTING BRAKE LINKAGE

☐ Remove

5–Pin. 6–Brake lever. 7–Adapter and tube. 8–Steering clutch cover.

2. Remove pin **(5)** securing brake link to lever **(6)**.

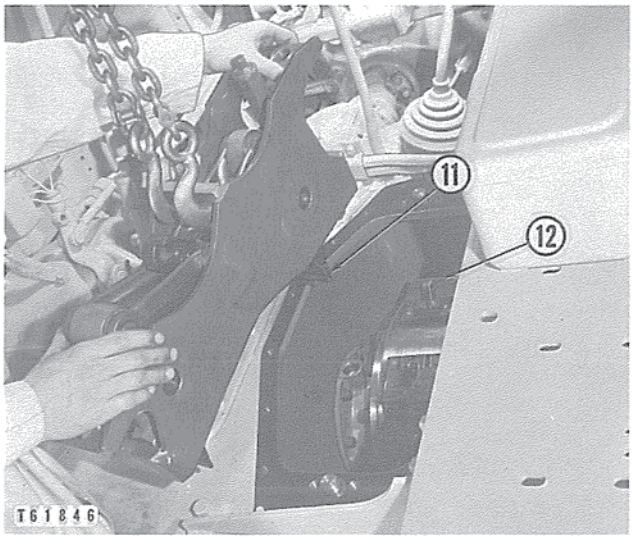


PREPARING TO REMOVE BRAKE ENGAGING MECHANISM

☐ Remove

9–Bolt (four). 10–Brake engaging mechanism.

3. Attach a suitable hoist and remove engaging mechanism **(10)** by lifting it straight up. Brake band struts will disengage from lugs. Engaging mechanism weighs approximately 80 lbs.

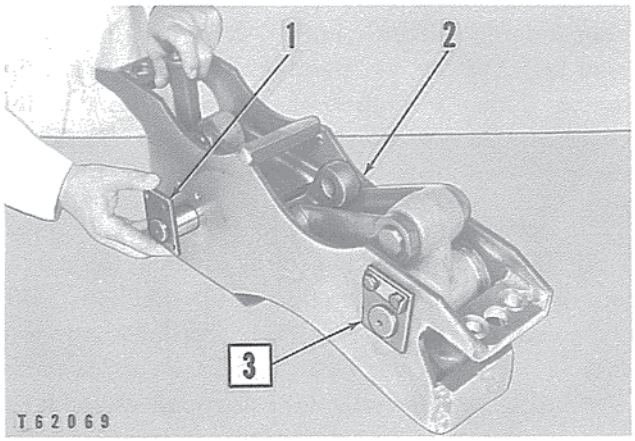


INSTALLING BRAKE ENGAGING MECHANISM
11–Strut. 12–Lug.

4. Install in reverse order of removal. Be sure struts **(11)** engage lugs **(12)** on brake band.

Disassembly and Assembly

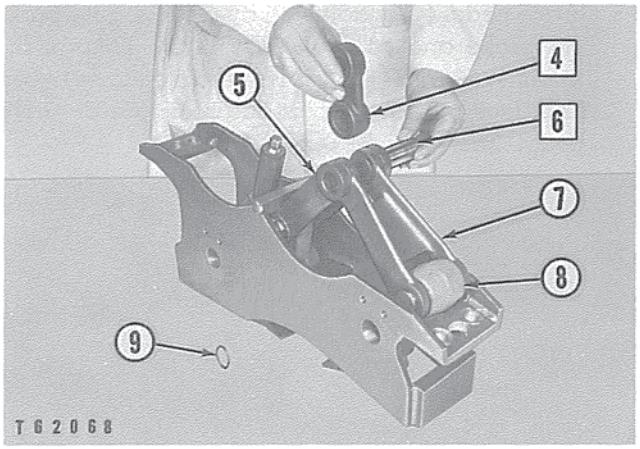
1. Remove brake lever shaft **(1)**. This shaft joins lever assembly **(14)** and strut support lever assembly **(15)** and secures them to linkage support assembly **(2)**.
2. Remove snap ring **(9)**. Pull pin **(6)** securing toggle links **(5)** and **(7)** to link **(4)**.
3. Remove brake toggle link **(7)** and brake front lever assembly **(8)** as a unit.
4. Guide links **(5)** between the two support assembly braces and lift off support assembly.



REMOVING SHAFTS

☐ Remove

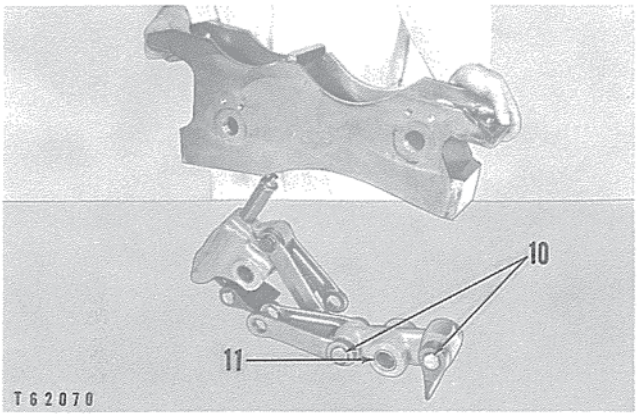
1–Brake lever shaft. 2–Brake linkage support assembly. 3–Brake lever shaft.



SEPARATING LEVER ASSEMBLIES

☐ Remove

4–Link. 5–Toggle link. 6–Pin. 7–Toggle link.
8–Lever assembly. 9–Snap ring.



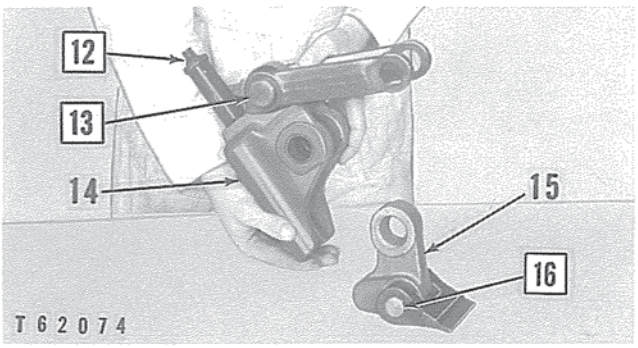
REMOVING SUPPORT ASSEMBLY
10–Pins. 11–Bearing.

5. Remove snap rings on pins **(10)** and **(16)** and inspect the bearings.

NOTE

An arbor press can be used to facilitate all bearing removal and installation.

6. Inspect bearing **(11)**.

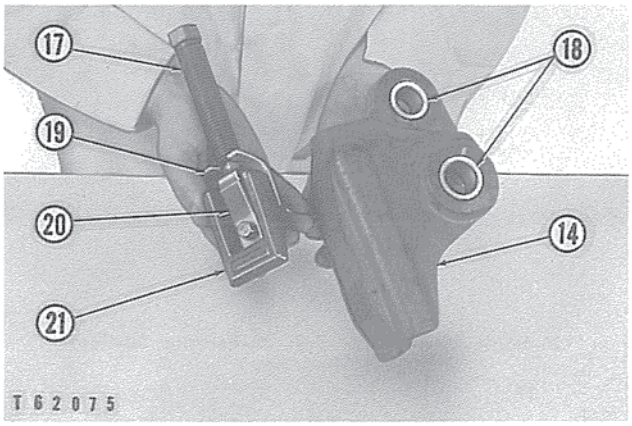


SEPARATING LEVER ASSEMBLIES

☐ Remove

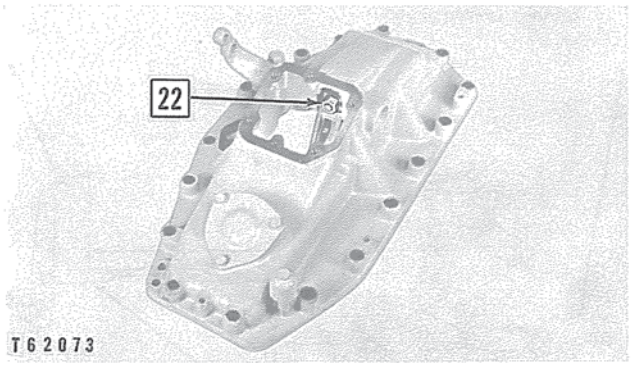
12–Socket assembly. 13–Pin. 14–Lever assembly. 15–Strut support lever assembly. 16–Pin.

7. Remove bolt securing wedge support **(19)** to adjustment wedge **(21)**. Back off adjusting screw **(17)** until support **(19)**, adjusting screw spring **(20)**, and wedge **(21)** are free and can be removed as a unit from bottom of lever assembly **(14)**. Remove adjusting screw from top of lever assembly.



ADJUSTING MECHANISM
(Shown in Assembled Position for Purpose of Illustration)
14–Lever assembly. 17–Adjusting screw. 18–Bearings.
19–Wedge support. 20–Adjusting screw spring.
21–Adjustment wedge.

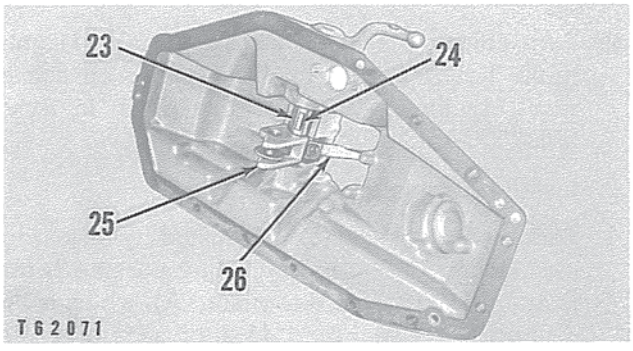
8. Inspect bearings **(18)**.



PREPARING TO REMOVE BRAKE LINKAGE FROM CLUTCH COVER

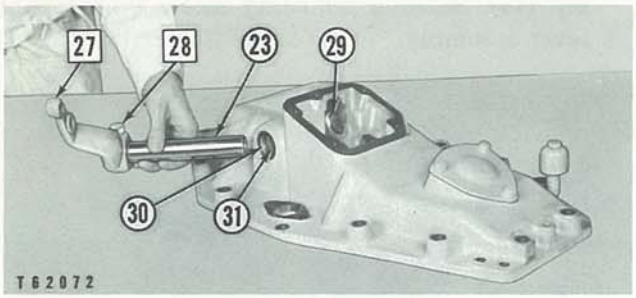
☐ Remove

22–Bolt.



PREPARING TO REMOVE SHAFT
23–Shaft. 24–Key. 25–Lever. 26–Wedge.

9. Drive wedge **(26)** into the slot in lever **(25)** and slide shaft **(23)** out of lever far enough to remove key **(24)**.
10. Remove shaft **(23)** and lever **(25)**.



REMOVING SHAFT

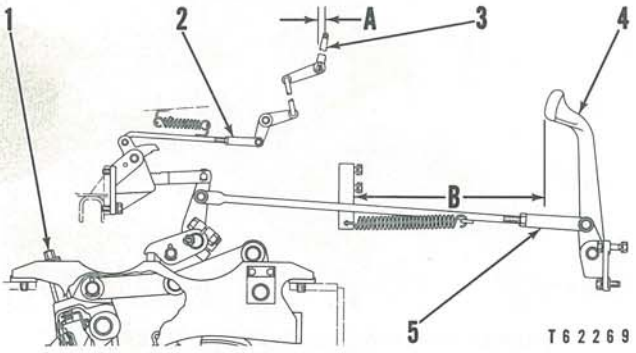
☐ **Remove**

23–Shaft. 27–Lever. 28–Bolt. 29–Bearing. 30–Seal. 31–Bearing.

11. Inspect bearings **(29)** and **(31)**.
12. Inspect seal **(30)**. The seal is installed with spring-loaded sealing lip toward bearing **(31)**.

ADJUSTMENTS

1. Install support assembly and steering clutch cover assembly.



ADJUSTING BRAKES

1–Band adjusting screw. 2–Parking brake linkage. 3–Parking brake lever. 4–Brake pedal. 5–Linkage. A–Dimension to be checked. B–Dimension to be checked.

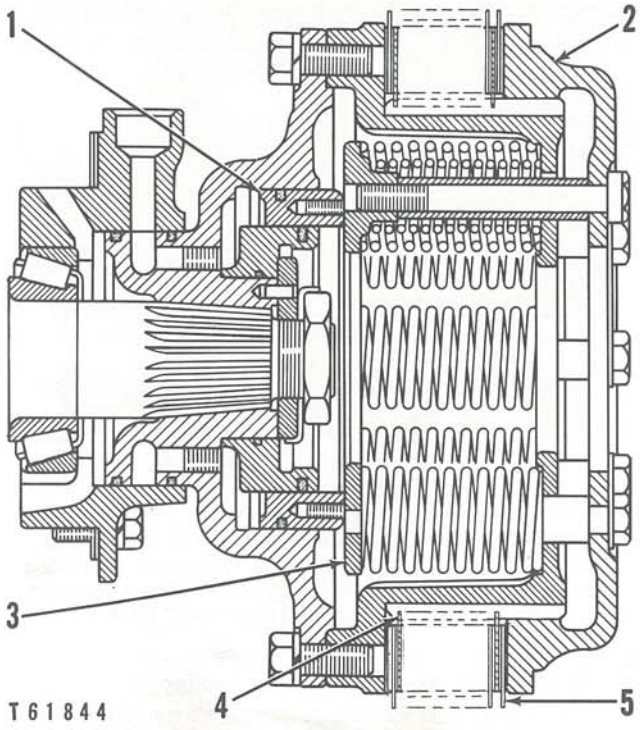
2. Turn adjusting screw socket assembly **(1)** until brake band is tight on drum. Back off socket assembly the number of turns given in topic, SPECIFICATIONS.
3. Install remaining brake linkage.
4. Parking brake lever **(3)** is adjusted by disengaging parking brake and adjusting parking brake linkage **(2)** to obtain dimension **(A)**, which is the distance between front face of seat arm rest support and centerline of parking brake lever. See topic, SPECIFICATIONS.
5. Brake pedal **(4)** is adjusted by disengaging parking brake and adjusting the brake linkage **(5)** to dimension **(B)**, which is the distance between front face of seat support and rear face of brake pedal. See topic, SPECIFICATIONS.

Steering Clutches

The multiple disc, oil-type steering clutches are held in engagement by springs, and are disengaged hydraulically.

The steering clutch disc assemblies have teeth on the outer diameter which mesh with splines in the outer drum. The steering clutch driving discs have lugs on the inside diameter which interlock with the tapered recesses on the inner drum.

The steering clutches are disengaged by oil pressure acting behind piston **(1)** which causes the piston to move outward against spring retainer **(3)**. This moves pressure plate **(2)** out of contact with the discs to disengage the clutch.



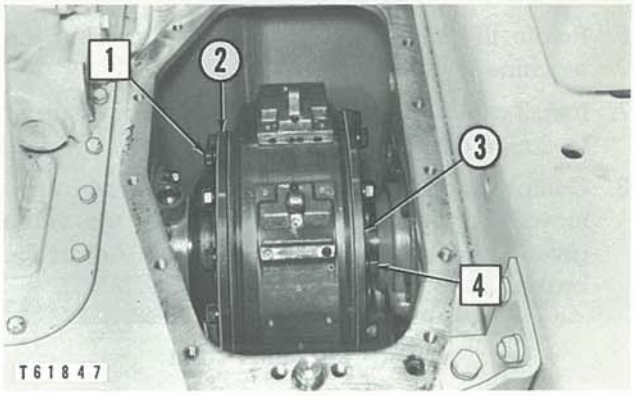
STEERING CLUTCH OPERATION
1–Piston. 2–Pressure plate. 3–Spring retainer. 4–Driving disc (six). 5–Disc assembly (seven).

REMOVAL AND INSTALLATION

1. Remove the fuel tank, rear crossmember, and brake engaging mechanism as outlined in the covering topics.

NOTE

To prevent the possibility of the outer drum slipping off driven drum flange **(3)** and the inner drum slipping off the driving hub **(2)**, causing steering clutch assembly to drop, leave two bolts **(1)** securing the inner drum to the hub until a sling is attached. The bolts holding the outer drum to the flange can be removed, replaced, and tightened through the opening in the side of the steering clutch and bevel gear case, after removing the plug. Rotate the steering clutch assembly after each bolt is removed to gain access to the next one.

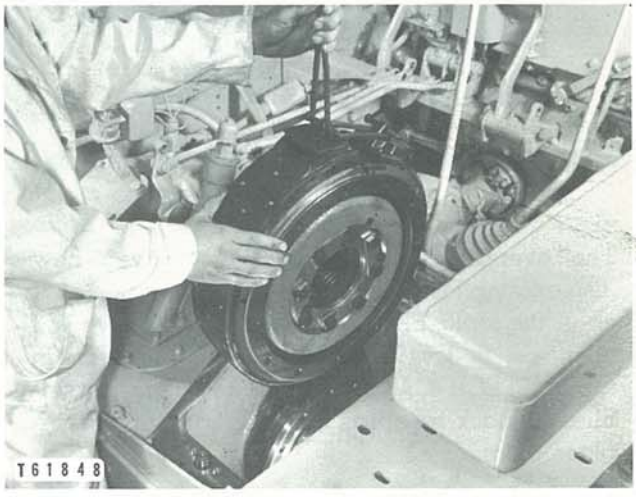


PREPARING TO REMOVE STEERING CLUTCH ASSEMBLY
1–Bolt. 2–Driving hub. 3–Driven drum flange. 4–Bolt.

2. Attach a hoist and sling to the brake band and pry the outer drum away from the flange.
3. Remove the two bolts securing the inner drum to the hub, pry the drum away from the hub, and remove the steering clutch assembly.

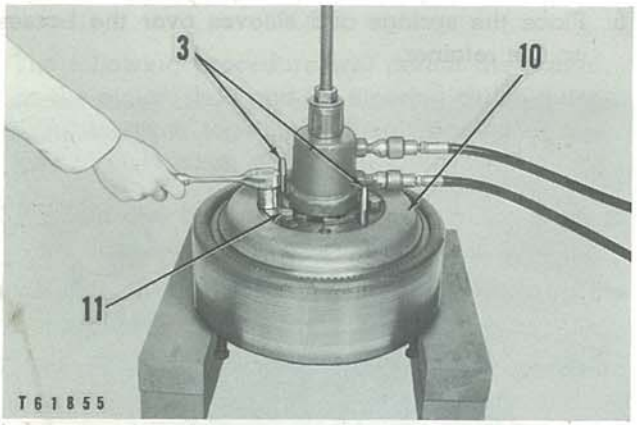
CAUTION

Keep the steering clutch assembly level since the clutch is free to slide out of the outer drum.



REMOVING STEERING CLUTCH ASSEMBLY

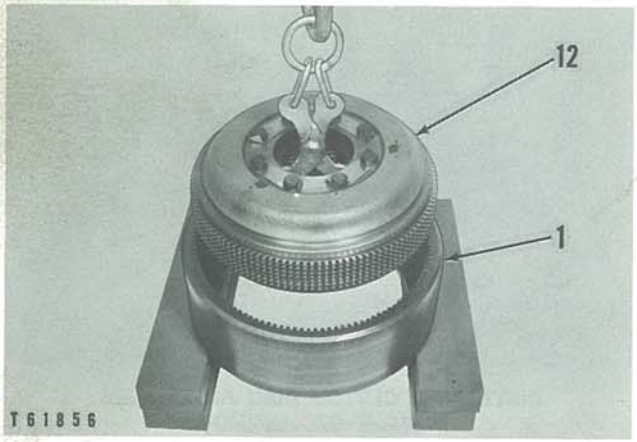
4. Before installing the clutch assembly, inspect the splines of the outer drum and the teeth of the discs for roughness and excessive wear.



COMPRESSING STEERING CLUTCH SPRINGS
3–Guide pins. 10–Pressure plate. 11–Bolts.

10. Compress the springs with the same tool arrangement used to disassemble the clutch assembly, and tighten the retaining bolts.

11. Remove the compressor tools and guide pins and install the remaining bolts. After tightening all the bolts securely, bend the metal locks.



REMOVING STEERING CLUTCH ASSEMBLY FROM OUTER DRUM
1–Driven drum (outer drum). 12–Steering clutch assembly.

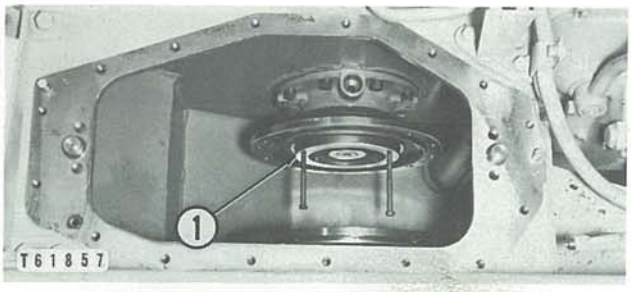
12. Using a suitable lifting hook, remove steering clutch assembly **(12)** from outer drum. Remove forcing screws **(2)**, invert the outer drum and place it on the clutch assembly.

13. Install the brake band.

STEERING CLUTCH DRIVING HUB

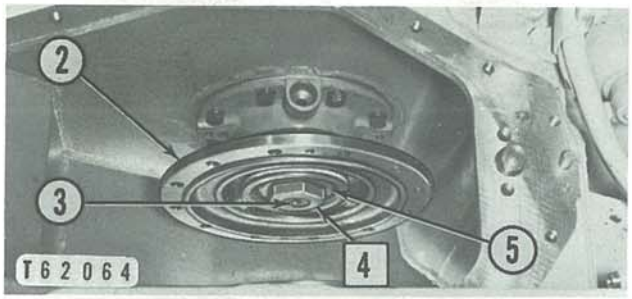
Removal and Installation

1. Install two 5/16" - 18 NC bolts approximately 3" long in clutch piston **(1)**. Remove piston by pulling toward the outside of the tractor.



REMOVING STEERING CLUTCH PISTON
1–Clutch piston.

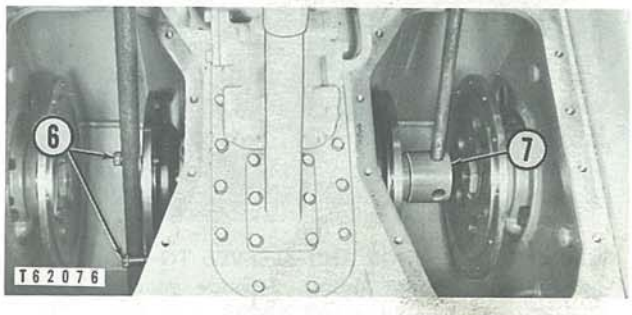
2. Straighten lock **(18)** securing the hub retaining nut **(4)**.



PREPARING TO REMOVE HUB RETAINING NUT
2–Driving hub. 3–Steering clutch shaft. 4–Retaining nut. 5–Retainer washer.

NOTE

To facilitate retaining nut removal, with both steering clutches removed, install two 5/8" - 11 NC bolts **(6)**, approximately 3" long, into the opposite clutch hub clearance holes and insert a bar to retain steering clutch shaft **(3)**. Using wrench **(7)**, remove the retaining nut. This procedure can be used when installing the retaining nut, after placing the opposite clutch hub on the clutch shaft temporarily, and inserting bolts **(6)** to retain the clutch shaft. With one steering clutch removed, the clutch shaft can be retained by applying the opposite brake.

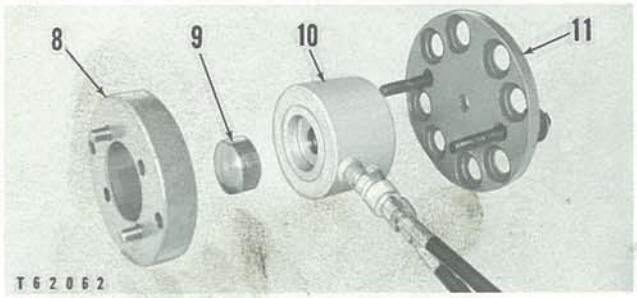


REMOVING HUB RETAINING NUT
(Viewed from the rear)
6–Bolts. 7–3B6352 Socket Wrench.

3. Remove the lock and retainer washer **(5)**.

4. Remove piston pilot **(14)** by inserting a screwdriver in machined groove **(17)** and prying against the end of the clutch shaft.

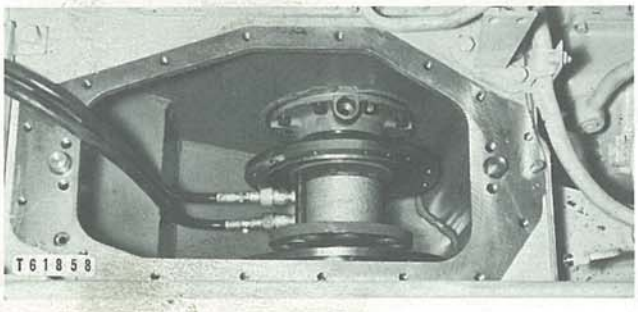
5. Install retaining nuts **(4)** on the clutch shaft so there is approximately 3/8" clearance between the nut and clutch hub.



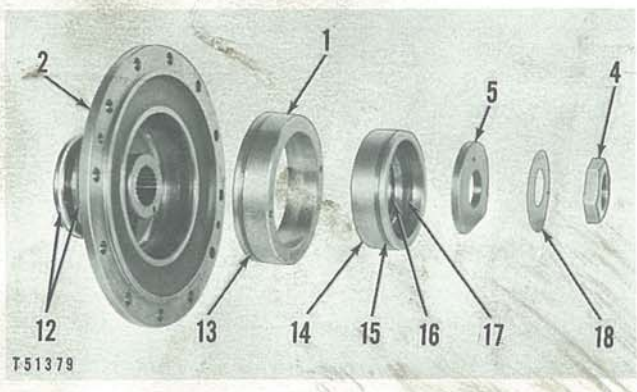
PULLER TOOLS
8–8M9011 Puller. 9–Spacer (2½" dia. x 1¼"). 10–1S4233 Hydraulic Puller. 11–5F5039 Plate.

6. Fasten 8M9011 Puller **(8)** to the clutch hub using two 5/8" - 11 NC bolts approximately 2½" long.

7. Install spacer **(9)** between hydraulic puller **(10)** and the end of the clutch shaft. Attach plate **(11)** to puller **(8)** with two 3/4" - 10 NC bolts 6" long. Using 6F25 Pump Group, pull the hub from shaft.



PULLING HUB

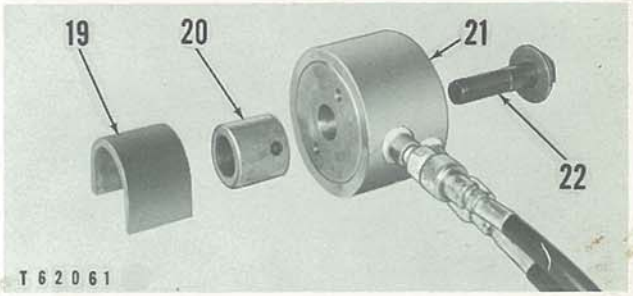


STEERING CLUTCH HUB ASSEMBLY
(Exploded View)

1–Piston.
2–Driving hub.
4–Retaining nut.
5–Retainer washer.
12–Seal ring.
13–Seal ring.
14–Piston pilot.
15–Seal ring.
16–O-ring seal.
17–Groove.
18–Lock.

8. Remove the puller tools and the nut and remove the hub.

9. Inspect the following: seal rings **(12)**, **(13)** and **(15)** and O-ring seal **(16)**.



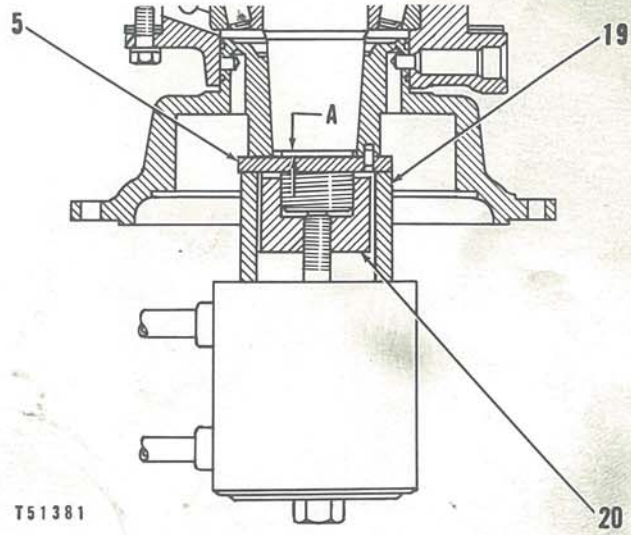
INSTALLATION TOOLS
19–8M9008 Spacer. 20–1S6561 Adapter. 21–1S4233 Hydraulic Puller. 22–8F1156 Bolt.

10. Place the hub on the clutch shaft.

11. Align the dowel in retainer washer **(5)** with the dowel hole in the hub. Install the washer.

12. Bolt 1S6561 Adapter **(20)** to 1S4233 Hydraulic Puller **(21)** with 8F1156 Bolt **(22)** and install adapter **(20)** on the clutch shaft.

13. Place 8M9008 Spacer **(19)** over the adapter.



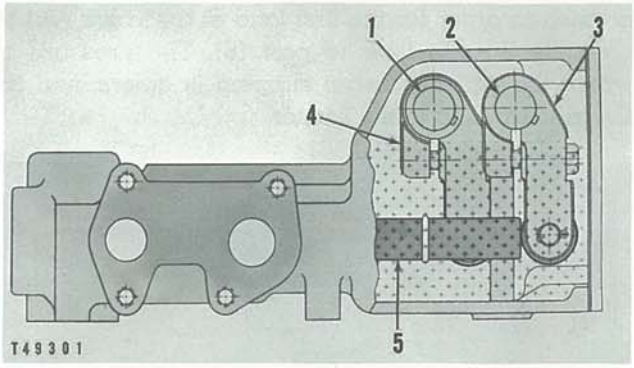
INSTALLING HUB
5–Retainer washer. 19–8M9008 Spacer. 20–1S6561 Adapter. A–Dimension to be checked.

14. Press the hub onto the shaft to the pressure given in the topic, SPECIFICATIONS. Measure the distance **(A)**, from the shoulder on the clutch shaft to the face of the clutch hub. See the topic, SPECIFICATIONS, for the correct dimension.

15. Install pilot **(14)**, lock **(18)**, nut **(4)** and piston **(1)** in reverse order of removal.

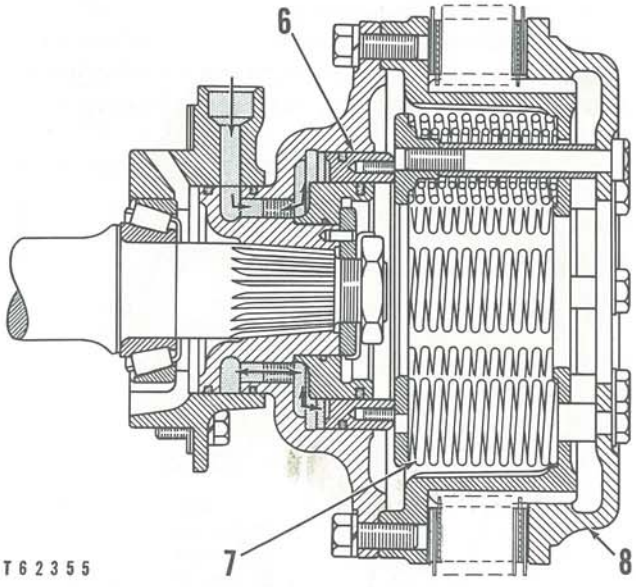
OPERATION

Filtered oil is delivered by the steering clutch hydraulic oil pump to the steering clutch control valve housing. A relief valve is provided to protect the system from excessive pressure.



STEERING CLUTCH HYDRAULIC CONTROL
(Side View of Direct Drive Model)
1–Shaft. 2–Shaft. 3–Lever. 4–Lever. 5–Plunger.

The steering clutch control levers are connected, through mechanical linkages, to levers on the shafts **(1)** and **(2)**. When the control levers are pulled to release the steering clutches, the shafts **(1)** and **(2)** rotate, causing the levers **(3)** and **(4)** to contact the plungers **(5)** and move them to the rear. The plungers operate the control valves which direct oil to the control pistons **(6)** in the steering clutch hubs. The oil behind the pistons moves them toward the steering clutches, compressing the steering clutch springs **(7)** and moving the pressure plate **(8)** out of contact with the clutch discs.



CONTROL PISTON OPERATION
6–Piston. 7–Spring. 8–Pressure plate.

FLOW OF OIL

Oil enters the control valve housing through port **(2)**. When both steering clutches are engaged (Fig. 1), the oil flows through cored passages in the housing, around the lands on the valves, and through outlet port **(6)** to the transmission oil manifold on direct drive models. An orifice **(3)** allows a portion of the oil to be bled off for lubrication of the hydraulic control operating mechanism. The level in the operating mechanism compartment is maintained by a standpipe **(4)**, and the overflow oil lubricates the bevel gear and pinion and the bevel gear bearings.

NOTE

The following illustrations are of the direct drive model control valve. The power shift control valve has no outlet port **(6)**. The operating characteristics of the valve are the same for both models. The only oil flowing through the valve when the steering clutches are engaged is oil to lubricate the bevel gear and pinion and the bevel gear bearings.

The outlet ports **(1)** and **(5)** connect to lines leading to the steering clutch hubs. The oil in these lines is inactive and under no pressure when the clutches are engaged.

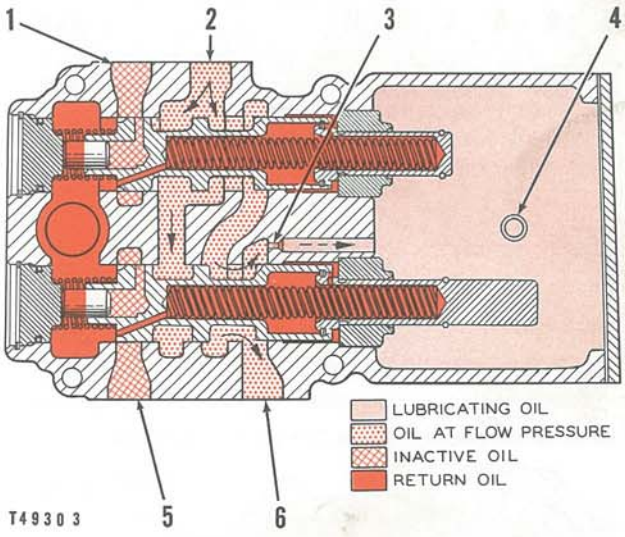


FIG. I
FLOW OF OIL — BOTH CLUTCHES ENGAGED — SCHEMATIC
1–Outlet port to left steering clutch. 2–Inlet port. 3–Orifice. 4–Standpipe. 5–Outlet port to right steering clutch. 6–Outlet to transmission oil manifold.

When the right control lever is pulled back to disengage the right steering clutch, plunger **(11)** and valve **(10)** move to the rear, compressing the light spring **(8)**, opening port **(5)** and directing all the oil behind the right steering clutch control piston (Fig. II). The outlet port **(6)** is momentarily blocked by the first land on valve **(10)** while the clutch is being released. Oil displaced by the movement of plunger **(11)** and valve **(10)** returns to the sump through orifice **(9)** and standpipe **(7)**.

As the right steering clutch springs are compressed, the oil pressure rises. When the pressure in the chamber **(12)** becomes high enough to overcome the force of spring **(13)**, the valve moves forward until the throttling slots open to outlet port **(6)**, and the oil again is directed to the transmission (Fig. III). Thus, the control valve stem acts as a pressure relief valve, maintaining the proper oil pressure to hold the steering clutch in the released condition.

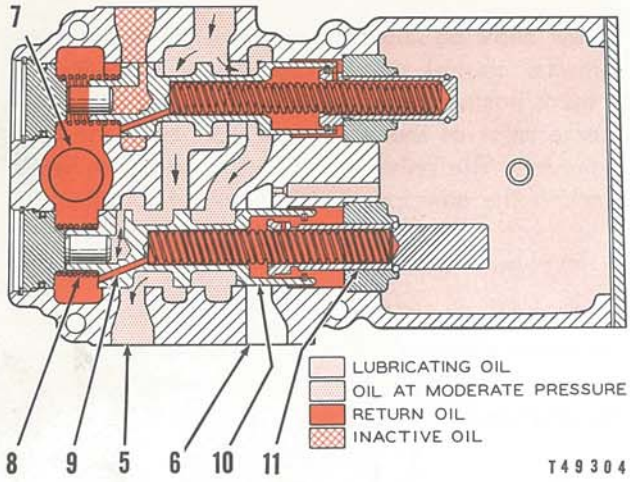


FIG. II
FLOW OF OIL — LEFT CLUTCH ENGAGED, RIGHT CLUTCH BEING RELEASED — SCHEMATIC
5–Outlet port to right steering clutch. 6–Outlet port to transmission. 7–Standpipe. 8–Spring. 9–Orifice. 10–Valve. 11–Plunger.

Either or both steering clutches may be partially released by pulling the control levers part way back. When the right control lever is pulled part way back, the opening to outlet port **(6)** is restricted, causing a pressure rise to the right steering clutch control piston which compresses the clutch springs.

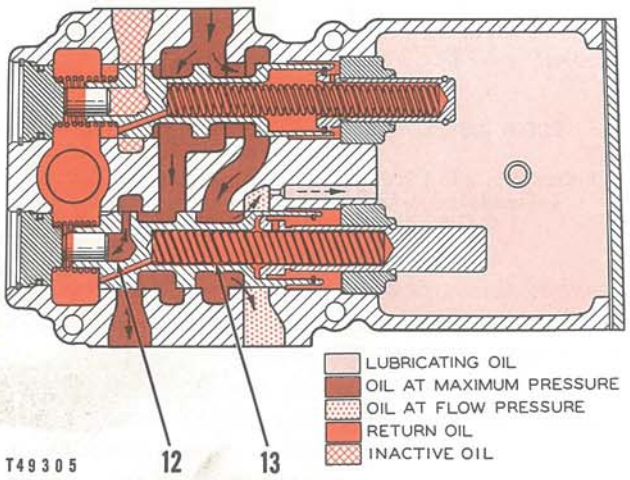


FIG. III
FLOW OF OIL — LEFT CLUTCH ENGAGED, RIGHT CLUTCH FULLY RELEASED — SCHEMATIC
12–Chamber. 13–Spring.

As pressure rises, valve **(10)** moves forward against spring **(13)** and enlarges the opening to port **(6)** until the oil pressure and spring pressure are balanced (Fig. IV). The pressure existing in the system is established by the position of the plunger **(11)**. This determines the amount the spring must be compressed in order for the first land of the valve **(10)** to correctly throttle flow to port **(6)**. The pressure at which the clutches begin slipping is determined by the load applied to the tractor.

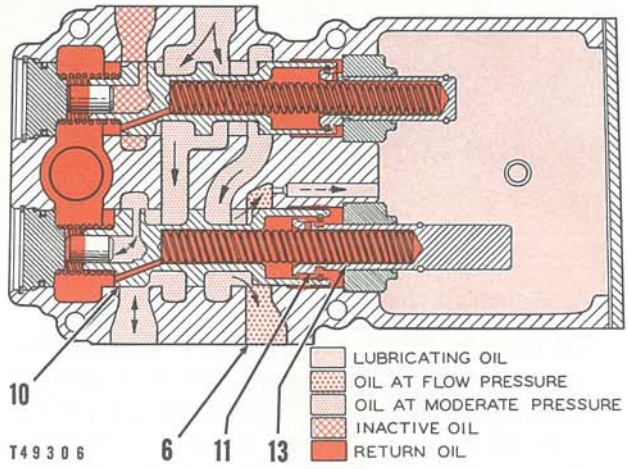


FIG. IV
FLOW OF OIL — LEFT CLUTCH ENGAGED, RIGHT CLUTCH SLIPPING — SCHEMATIC
6–Outlet port to transmission. 10–Valve. 11–Plunger. 13–Spring.

When the right clutch control lever is moved forward to engage the clutch, the force against spring **(13)** is released. The pressure in chamber **(12)**, created by the clutch springs in the right steering clutch, then moves valve **(10)** forward against the force of spring **(13)**, opening port **(14)** and allowing the oil

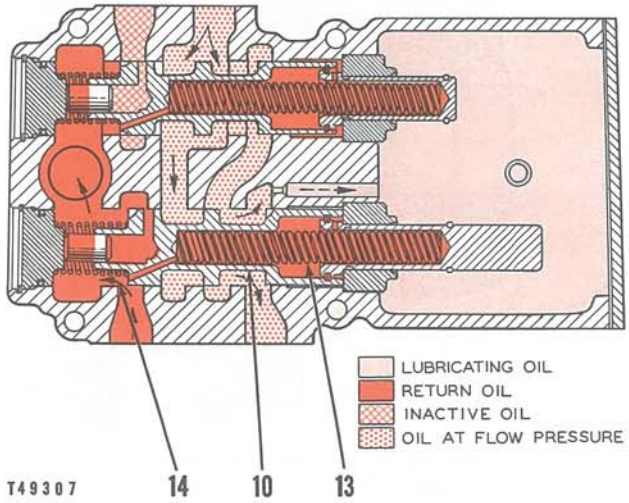


FIG. V
FLOW OF OIL — LEFT CLUTCH ENGAGED, RIGHT CLUTCH ENGAGING — SCHEMATIC
10–Valve. 13–Spring. 14–Port.

behind the control piston to return to the sump through standpipe **(7)** (Fig. V). As the oil empties from behind the control piston, the pressure lessens and valve **(10)** returns to the NEUTRAL position.

When the left control lever is pulled part way back while the right clutch is fully released, the pressure in the system, due to the position of the right valve is more than enough to cause the left clutch to slip. Therefore, as pressure in chamber **(16)** behind the left valve **(17)** builds up, the left valve moves forward until port **(15)** opens enough to maintain oil pressure at the desired level (Fig. VI). Otherwise, the operation of both control valves is the same.

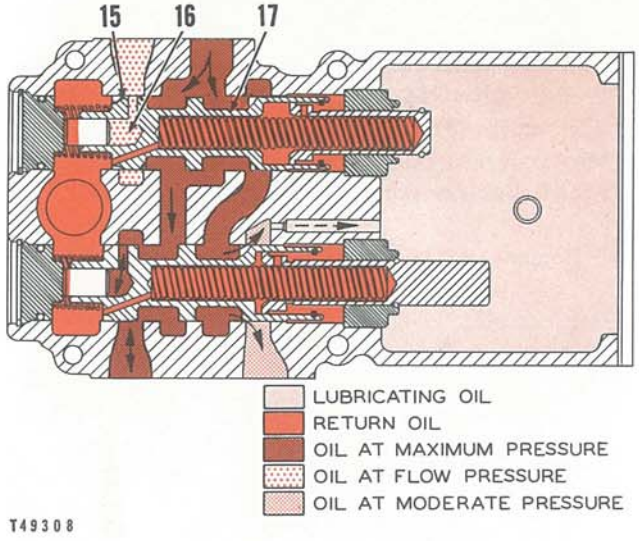


FIG. VI
FLOW OF OIL — LEFT CLUTCH SLIPPING, RIGHT CLUTCH RELEASED — SCHEMATIC
15–Port. 16–Chamber. 17–Valve.

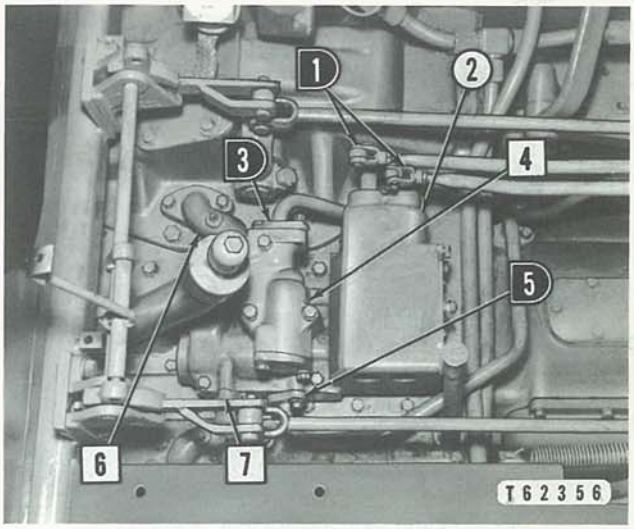
If either control valve should stick in the bore of the housing, the oil pressure could reach a point that would cause damage to the oil pump, filter, or other parts. To prevent this, a pressure relief valve is provided on the direct drive model. This valve allows the oil to bypass the steering clutch hydraulic controls when the oil pressure reaches a value given in the topic, SPECIFICATIONS. The power shift model operates at the pressure regulated by the sequence relief valve at all times.

REMOVAL AND INSTALLATION

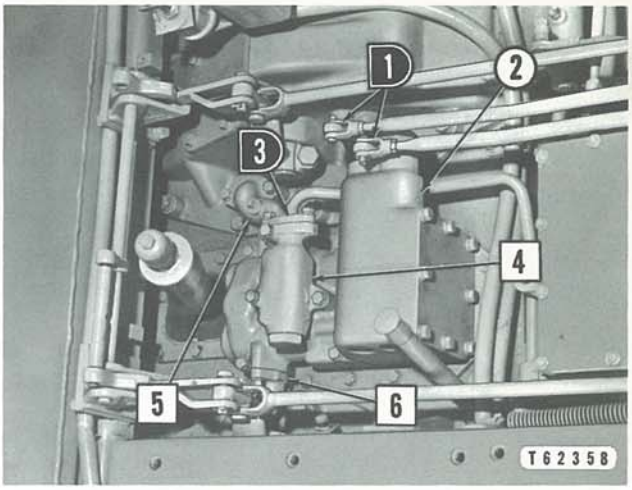
Remove the seat and seat frame.

Remove the bolts that secure the hydraulic control **(2)** to the steering clutch and bevel gear case and remove it from the machine.

Install in the reverse order of removal. Inspect the seals and replace if worn or damaged.



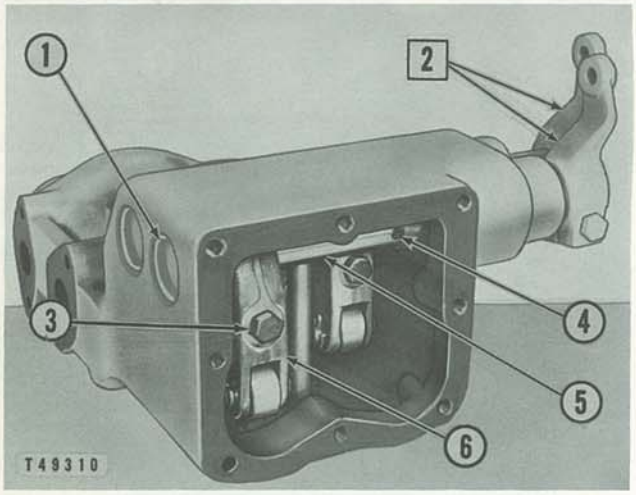
PREPARING TO REMOVE THE HYDRAULIC CONTROL (Direct Drive Model)
1–Steering clutch control rods. 2–Hydraulic control. 3–Pressure oil line. 4–Pressure relief valve. 5–Oil line. 6–Elbow. 7–Elbow.



PREPARING TO REMOVE THE HYDRAULIC CONTROL (Power Shift Model)
1–Steering clutch control rods. 2–Hydraulic control. 3–Pressure oil line. 4–Pressure check valve. 5–Elbow. 6–Elbow.

DISASSEMBLY AND ASSEMBLY

1. Remove the front cover plate.
2. Loosen the bolt **(3)** clamping the lever **(6)** to the shaft **(5)**.
3. Remove the pin **(4)** from the shaft **(5)**.
4. Drive the shaft to the left to force the plug **(1)** out of the housing.
5. Drive the shaft back to the right until the lever **(6)** can be removed.
6. Remove the key that held the lever on the shaft.



DISASSEMBLING HYDRAULIC CONTROL
(Direct Drive Model)
1–Plug. 2–Levers. 3–Bolt. 4–Pin. 5–Shaft. 6–Lever.

7. Remove the shaft from the housing.

NOTE

The tube and washer on the shaft will come off the shaft; be sure they are replaced at assembly. The washer should be installed between the tube and the bearing.

8. The bearing and lip-type seal can be removed from the housing after the shaft is removed.

NOTE

When installing the seal, be sure the lip faces inward.

9. Remove the remaining shaft and lever in the same manner as the first.

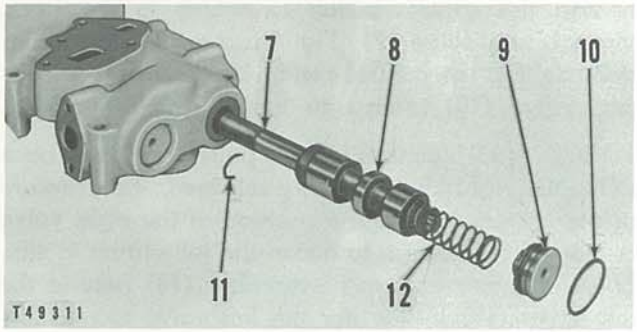
10. Remove the ring **(11)** from the plunger **(7)** through the front of the housing.

11. Remove the retaining ring **(10)** holding the stop plug **(9)** in the housing.

12. Remove the stop plug **(9)** using a puller consisting of a 3/8" - 16 NC bolt, a nut, and a flat washer with approximately 1¾" O.D. Thread the nut on the bolt and place the washer on the bolt. Screw the bolt into the stop plug and tighten the nut against the washer while holding the head of the bolt to keep it from turning.

13. Remove spring **(12)**, valve **(8)** and plunger **(7)** from the rear of the housing.

14. Remove retainer ring **(13)** from bore in valve **(8)** and remove plunger **(7)** and spring **(14)**.

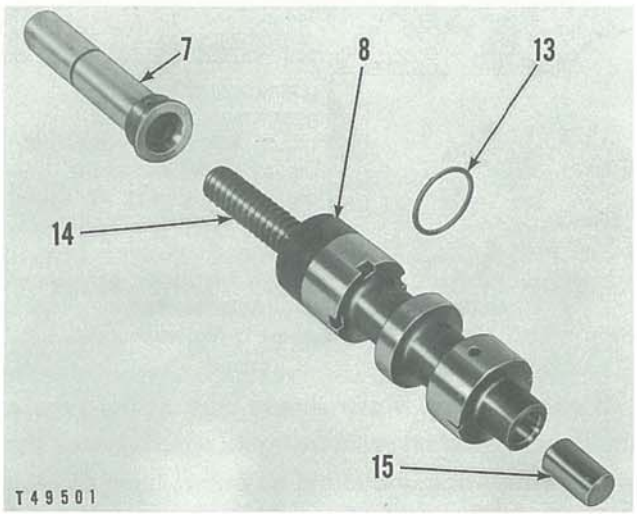


REMOVING CONTROL VALVES
7–Plunger. 8–Valve. 9–Stop plug. 10–Ring. 11–Ring. 12–Spring.

NOTE

To remove the retaining ring **(13)** from the bore in the valve **(8)**, plunger **(7)** must be pushed into valve **(8)** compressing the spring **(14)**. A vise or press can be used if care is exercised not to damage parts.

15. Remove the piston **(15)** from the valve **(8)**.



DISASSEMBLING CONTROL VALVE
7–Plunger. 8–Valve. 13–Ring. 14–Spring. 15–Piston.

CAUTION

Extreme care should be taken when assembling the hydraulic control to avoid introducing dirt into the system. Dirt or burrs on the valve or in the housing may lead to malfunction and possible damage to the hydraulic control mechanism.

16. To remove the plunger bushing, remove the bolt and the bushing retaining plate, and remove the bushing through the opening in the front of the housing.

17. Assemble in the reverse order of removal. Lubricate the O-ring seals with liquid soap to avoid damaging them during assembly.