

210-2500L

Hydrostatic Drive Axle

Service and Repair Manual

BLN-50308
January 2009

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Introduction

The purpose of this manual is to provide information in servicing the Hydrostatic Drive Axle. This manual includes unit and component description, troubleshooting, maintenance, and repair procedures.

The transaxle normally will not require servicing, other than the vehicle manufacturer's recommended fluid and filter changes during the life of the vehicle in which it is installed. Should other servicing be required, the transaxle will need to be thoroughly cleaned before beginning most procedures.

General Description

The 210-2510L transaxle combines the BDU-10L style transmission with a commercial grade gear-reducing axle. This product is designed for use in Zero-Turn Machines and commercial Walk-Behind mowers.

The 210-2510L transaxle is designed for the transfer and control of power. It provides an infinitely variable speed range between zero and maximum in both forward and reverse modes of operation.

The 210-2510L transaxle is a package consisting of two primary components, 210-2500 axle assembly and the BDU-10L transmission.

The BDU-10L transmission is a "U" style transmission with a variable displacement pump and fixed displacement motor. The variable displacement pump features a cradle swashplate with a direct-proportional displacement control. Reversing the direction of the swashplate reverses the flow of oil from the pump and thus reverses the direction of the motor output rotation. The pump and motor are of the axial piston design and utilize spherical nosed pistons which are held against a thrust race by internal compression springs.

The fluid supply for the BDU-10L is supplied by an external reservoir. The oil passes from an external reservoir through a filter prior to entering the transmission and feeding the fixed displacement gerotor charge pump. Excess fluid in the charge circuit is discharged over the charge relief valve back to the charge pump inlet. Flow across a small fixed orifice connecting the charge circuit to the transmission housing supplements the cooling flow. Charge check valves in the center section are used to control the makeup flow of the fluid to the low pressure side of the loop.

A spool type bypass valve is utilized in the BDU-10L transmission to permit moving the vehicle for short distances at low speeds (2mph) without starting the engine.

Technical Specifications

210-2510L Single Axle Drive with BDU-10L

Overall Transaxle Reduction

23.1:1

Input Speeds

Maximum (No Load): 3600 RPM

Maximum (Loaded): 3600 RPM

Minimum: 1800 RPM

Output Torque

Intermittent: 366 lb-ft; 496 N-m

Continuous: 195 lb-ft; 264 N-m

Maximum Tire Diameter

20 inch; 508 mm

Weight on Tires

Maximum with 18" tires 661 lb; 300 kg

Maximum with 20" tires 578 lb; 262 kg

Axle Shaft Options

Type: Keyed

Diameter: 0.984 inch; 25 mm

Type: Flanged with four 1/2-20 studs

Brake Type

Disc/Band

Weight of Unit

38 lbs; 17 kg

210-2510L

Technical Specifications

Fluids/ Greases

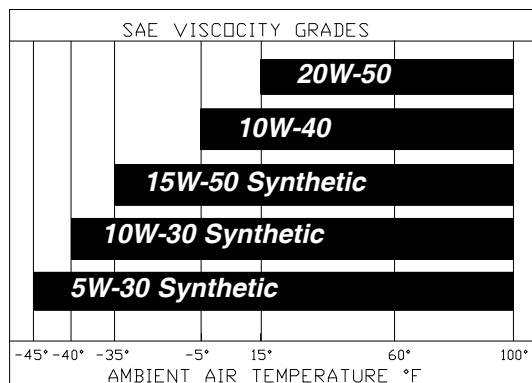
The fluids used in Hydro-Gear products have been carefully selected, and only equivalent, or better products should be substituted. The oil used in the 210-2510L is determined by the vehicle manufacture. Please insure only the manufacturer's suggested oil, or a equivalent product is used if the manufacturer's suggested oil is not readily available in your area.

Typically, an engine oil with a minimum rating of 9.0 cSt (55 SUS) at 230°F (110°C) and an API classification of SH/CD is recommended. A 20W-50 engine oil has been selected for use by the factory and is recommended for normal operating temperatures. For colder climate operation (see chart), a change of the engine oil may be necessary. Hydro-Gear suggestion for alternative engine oils that will provide excellent all climate performance and extend time between oil and filter changes is either a 15W-50 synthetic engine oil or 5W-30 synthetic engine oil.

The following oils have been approved by Hydro-Gear Engineering for use:

Mobil	5w-30 API - SH
(Synthetic)	10w-30 API - SH
	15w-50 API - SH
Mobile Motor Oil	10w-40 API - SH
	20w-50 API - SH
Amoco Ultimate	10w-40 API - SH
Viscosity Oil	10w-40 API - SH
Shell Gemini	10w-40 API - SH
Aero Shell	15w-50 API - SH
Helix	5w-40 API - SH
	10w-40 API - SH

The grease used in the manufacture of Hydro-Gear products is Chemplus 1-LP. This should only be substituted with an equivalent product if Chemplus 1-LP is not readily available in your area. (Chemplus is a Polyuria base grease).



Axle Assembly Grease Volume

Part Description	Volume
Chemplus 1-LP	20 Ounces

BDU/10 Oil Volume

Part Description	Volume
Manufacture Suggestion	Manufacture Suggestion

Axle Assembly Torque Specifications

Operation	Torque	Part Description
Housing Screw(s)	120-160 lb-in	1/4-20 x 2 1/2
Brake Screw(s)	80-120 lb-in	4-20 x 2 1/2
Housing Screw(s)	87-108 lb-in	m6 x 1

BDU/10 Torque Specification

Operation	Torque	Part Description
Bypass Plug	84-120 lb-in	7/16-20 SAE
Check Plug(s)	180-240 lb-in	9/16-20 SAE
Steel Plug	96-120 lb-in	7/16 SAE
Steel Plug	180-240 lb-in	9/16-20 SAE
Steel Plug	180-240 lb-in	3/4 SAE
Steel Plug	180-240 lb-in	7/8 SAE
Housing Screw(s)	120-180 lb-in	M8 x 1.25
Charge Pump Housing Screws	87-108 lb-in	M6 x 1

Safety

Certain procedures may require the vehicle to be disabled in order to prevent possible injury/ death to the servicing technician and/or bystanders.

Some cleaning solvents are flammable. To avoid possible fire do not use cleaning solvents in an area where a source of ignition may be present.

Troubleshooting

WARNING!

Do not attempt any adjustments with the engine running.

Use extreme caution while inspecting the drive belt assembly, and all vehicle linkage! Follow all safety procedures outlined in the vehicle owners manual!

No or low power symptoms:

Inspect the axle parking brake and vehicle linkage to insure proper actuation of the parking brake.

Inspect the vehicle control linkage to the directional control arm on transmission. Also, insure the control arm is securely fastened to the trunnion shaft of the transmission.

Inspect the bypass actuator (freewheel button) on the transmission and vehicle linkage to insure it actuates and releases fully.

Inspect the vehicle drive belt, idler pulley(s), and idler spring(s). Insure that no belt slippage can occur, because this will result in low input RPM to the transmission.

Check reservoir oil level in accordance with the vehicle owners manual.

Inspect the hoses, filter, and fittings and insure they are secure.

Note: Only the manufacturer suggested filter, or equivalent should be installed. Incorrect filtration will result in damage to the transmission!

If an inlet leak has occurred or the system has been opened, air purging the transmission may be required.

Transmission overheating:

Inspect the axle parking brake and vehicle linkage to insure proper actuation and release of the parking brake.

Check reservoir oil level in accordance with the vehicle owners manual.

Inspect the hoses, filter, and fittings and insure they are secure.

Inspect the filter to insure adequate flow through the filter is being maintained.

Note: Only the manufacturer suggested filter, or equivalent should be installed. Incorrect filtration will result in damage to the transmission!

If an inlet leak has occurred or the system has been opened, air purging the transmission may be required.

Inspect the transmission cooling fan for broken or distorted blades and remove any obstructions (grass clippings, leaves, dirt, etc.).

Check the vehicle operators manual for the recommended load ratings. Insure that the current application does not exceed load rating.

DO NOT EXCEED LOAD RATING

Transaxle leaks oil or grease:

Inspect the hoses, filter, and fittings and insure they are secure.

If an inlet leak has occurred or the system has been opened, air purging the transmission may be required.

Inspect the transmissions seals, gasket, and housing for damage.

Note: All 210-2500 axle assemblies manufactured before serial date 3215A### were not equipped with an axle housing gasket. If a axle assembly produced before serial date 3215A### is leaking grease the installation of the housing gasket and the current recommended Hydro-Gear grease will be necessary. Refer to the disassembly/ reassembly section of this manual for procedures.

Brake fails to stop vehicle or hold on hills:

Inspect the axle parking brake assembly (pucks, pins, etc.), and vehicle linkage to insure proper actuation of the parking brake.

Engage the parking brake several times to verify actuation of brake. Please refer to page 10 parking brake section of this manual if the axle parking brake setting is incorrect.

Most commonly reported symptoms:

Loss of drive, one side locked up, or no neutral. The most common remedy for these symptoms is quite often a vehicle linkage adjustment and/ or repair.

Troubleshooting misdiagnosis:

In many cases these symptoms described above and on the previous pages have not been related to a defective transmission or axle, but are caused by slipping drive belts, partially engaged bypass valves, loose or damaged control linkages, inadequate oil flow to the transmission oil inlet due to restriction, blockage, loose, and/or damaged inlet hoses, fittings, and filter.

Note: Verification of the defect should always be made prior to the repair or replacement of the unit. Misdiagnosis and faulty repairs may not be honored under Hydro-Gear warranty policies (See: Hydro-Gear Warranty Policies and Procedures BLN-50225).

Maintenance

Removal of the 210-2510L Drive Axle from its installed location will be required for the following assembly/disassembly section. Remove any external components such as a cooling fan, input pulley, or frame mounting hardware.

NOTICE: Any servicing dealer attempting a warranty repair must have prior approval before conducting maintenance of a Hydro-Gear product, unless the servicing dealer is a current Authorized Hydro-Gear Service Center.

Cleanliness is a primary means of assuring satisfactory life on repaired units. Thoroughly clean all exposed surfaces prior to any type of maintenance. Cleaning of all parts by using a solvent wash and air drying is usually adequate. As with any precision equipment, all parts must be kept free of foreign material and chemicals.

Protect all exposed sealing surfaces and open cavities

from damage and foreign material. The external surfaces should be cleaned before beginning any repairs.

It is recommended that all seals, O-rings, and gaskets be replaced. During installation lightly lubricate all seals, O-rings, gaskets with a clean petroleum jelly prior to assembly.

It is recommended that parts requiring replacement be replaced with the kit assembly as shown in the Service Parts and always replace seals.

Required Tools

Axle Assembly

- (1 ea) 7/16", 1/2" Sockets
- (1ea) Socket Driver
- (1ea) 7/16", 1/2" Open End or Box Wrenches
- (2) #9 Standard (Flat Blade) Screwdrivers
- (1ea) Needle Nose Pliers
- (1ea) External Snap Ring Pliers
- (1ea) Rubber Mallet
- (1ea) Feeler Gage
- (1ea) Inch Type Torque Wrench
- (1ea) BLN-50308 210-2510L Hydrostatic Drive Axle Service & Repair Manual

Transmission

- (1 ea) 5mm Allen Wrench
- (1 ea) 6mm Allen Wrench
- (1 ea) 1/4" Allen Wrench
- (1ea) Internal Snap Ring Pliers
- (1ea) External Snap Ring Pliers
- (1ea) 9/16" Open End or Box Wrench
- (1ea) BLN-50308 210-2510L Hydrostatic Drive Axle Service & Repair Manual

Disassembly /Assembly

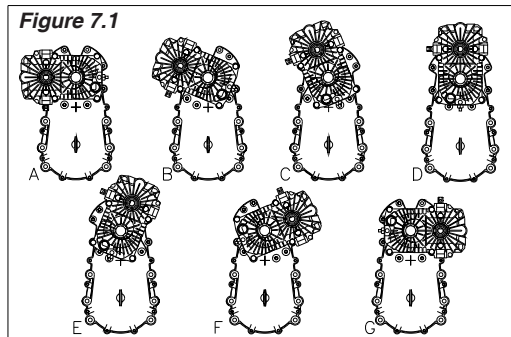
Note: Throughout the Assembly/ Disassembly procedures you will notice a number in parenthesis (#), this is a reference to the item number of the parts drawing. Part drawings are found on pages 14 -19.

Axle Disassembly

Remove the bolts and spacer (18) securing the transmission to the axle assembly.

Pull the transmission from the axle mounting housing, and set the transmission aside.

Note: The transmission can be mounted to the axle assembly in 7 different configurations. Mark the orientation of the transmission to the axle assembly for ease during reassembly. (Fig. 7.1)



Brake Disassembly

The brake is factory set for a specific brake clearance. Periodic brake adjustments are necessary due to normal wear of the brake assembly.

Disc Brake Disassembly (Fig. 7.2)

First remove the cotter pin (31), castle nut (30), flat washer (29), and actuator arm (24) from the brake yoke assembly.

Remove two brake pins (32) from the brake yoke assembly. Inspect for excessive wear or damage.

Next remove the bolt (40), spacer (35), and remaining bolt (39) securing the brake yoke assembly.

Remove the brake yoke (25), brake puck (28), and puck plate (27). Inspect for excessive wear or damage.

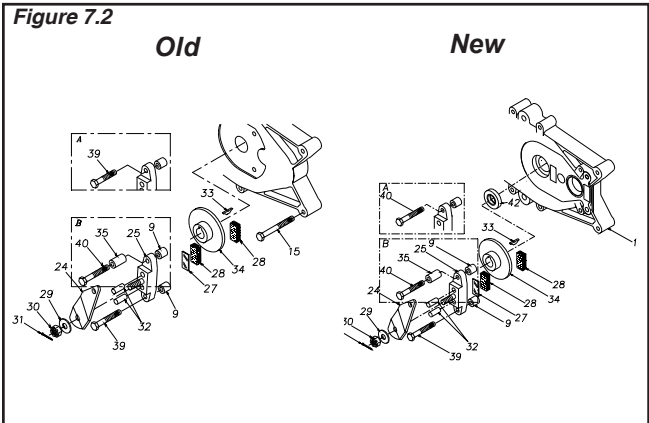
Note: Puck plate and brake puck are not attached to the brake yoke.

Pull the brake disc (34), and Hi-Pro key (33) from the

brake shaft (10).

Remove the brake puck (28).

Inspect the brake shaft (10) and seal (42) for excessive wear or damage.



Band Brake Disassembly (Fig. 7.3)

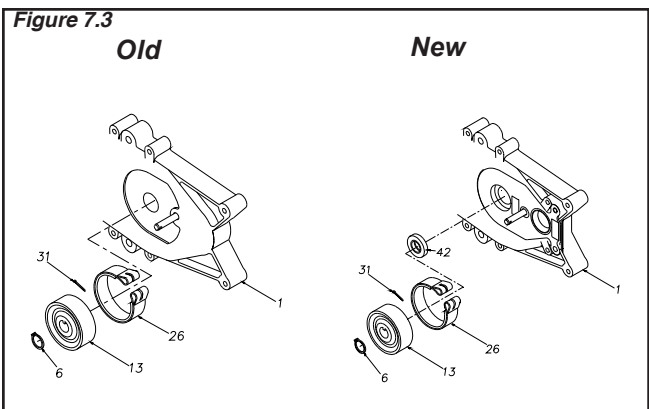
Remove the cotter pin (31), and brake band (26).

Remove the retaining ring (6), and pull the brake drum (13) from the brake shaft.

Inspect the band brake, and brake drum for excessive wear or damage.

Inspect the brake shaft and seal for excessive wear or damage.

Set the brake assembly aside.



Drive Axle Disassembly

Remove eight (or ten) self-tapping housing bolts (14).

Position the drive axle assembly so the axle carrier housing (2) is down, and carefully pry axle carrier housings (1),(2) apart.

Remove axle housing carrier assembly (2).

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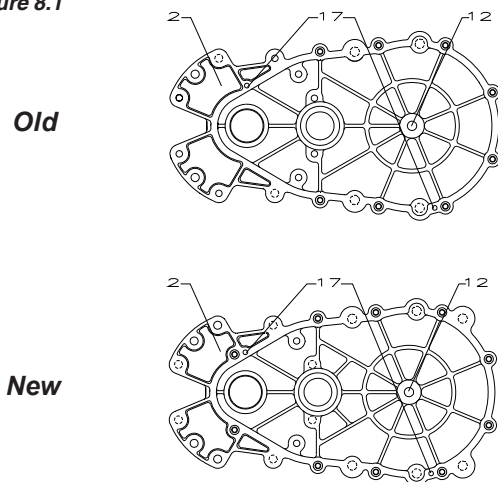
Note: The 3/8" ball (12), which the axle shaft (5) rides on, should remain located in the housing seat. (Fig. 8.1)

Remove and discard the housing gasket (41).

Remove the 3/8" ball (12). (Fig. 8.1)

Inspect the two spring pins (17) (housing alignment pins). These pins should remain in the axle housing. (Fig. 8.1)

Figure 8.1

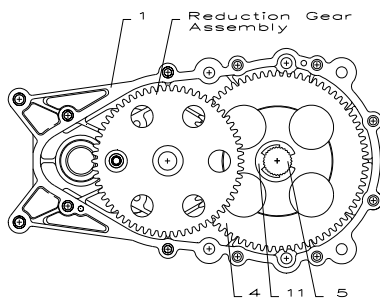


Remove the E-ring (11) from the axle shaft (5). (Fig. 8.2)

Next simultaneously remove the final drive gear (4) from the axle shaft (5), and reduction gear assembly from the axle carrier housing (1). (Fig. 8.2)

Note: If the gear set is not a slip fit it may be necessary to tap the shafts with a rubber mallet during disassembly.

Figure 8.2



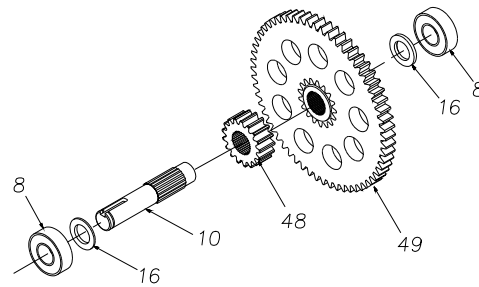
Reduction Gear Assembly -- Disassembly

Note: Two reduction gear assemblies exist. An older style reduction gear assembly, and a newer style reduction gear assembly. Only the newer style reduction gear assembly should be used for repairs.

Disassembly of the reduction gear assembly may be accomplished after it is removed from the axle carrier housing (1). The disassembly of each style follows:

Axle Disassembly

Figure 8.3



New Reduction Gear Assembly (Fig. 8.3)

For disassembly of the newer style reduction gear assembly you will need to use a arbor press.

First position the reduction gear assembly on the press so it rests on the 60T gear (49). The ball bearing (8) should sit in the arbor press rest hole freely.

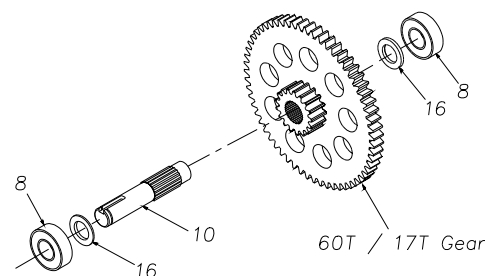
Next carefully press down on the extended portion of the brake shaft (10), until it clears the upper ball bearing (8). The lower ball bearing (8), washer (16), and brake shaft (10) should slip freely out of the reduction gear assembly.

Remove the washer (16) from the brake shaft (10).

Inspect the brake shaft (10) and ball bearing (8).

Next inspect the 60T gear (49), 17T steel cut gear (48), washer (16), and the ball bearing (8).

Figure 8.4



Old Reduction Gear Assembly (Fig. 8.4)

For disassembly of the older style reduction gear assembly you will need to use a press.

First position the reduction gear assembly on the press so it rests on the 60T/ 17T gear. The ball bearing (8) should sit in the arbor press rest hole freely.

Axle Assembly

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Next carefully press down on the extended portion of the brake shaft (10), until it clears the upper ball bearing (8).

The lower ball bearing (8), washer (16), and brake shaft (10) should slip freely out of the reduction gear assembly.

Remove the washer (16) from the brake shaft (10).

Inspect the brake shaft (10) and ball bearing (8).

Next inspect the 60T/ 17T gear, washer (16), and the ball bearing (8).

Axle Disassembly (Continued)

Inspect the final drive gear (4) for excessive wear or damage.

Remove and discard the brake shaft seal (42).

Remove the axle shaft (5) from the axle carrier housing.

Tip: If the axle shaft (5) will not slip out it may be necessary to tap the axle shaft (5) with a rubber mallet during removal.

Inspect the axle shaft (5), and splines for excessive wear or damage.

Finally inspect the axle carrier housings (1), (2) for excessive wear or damage.

Axle Assembly

Inspect the axle carrier housing assembly (1), bearing bores, bushing, and seal area for wear or damage.

Install the axle shaft (5) into the axle housing (1).

Position the axle assembly so that the axle horn is down.

Install the brake shaft seal (42) into the axle carrier housing (1).

Apply five ounces of the manufacturer suggested grease around the axle shaft bore of the axle carrier housing (1).

Reduction Gear Assembly (Fig. 9.2)

For field repairs of the axle assembly only reassemble with the newer style reduction gears (48), (49), you will need to use a press for this assembly procedure.

Install the washer (16) onto the brake shaft (10).

Press the ball bearing (8) onto the brake shaft (10) up to the shoulder of the brake shaft (10).

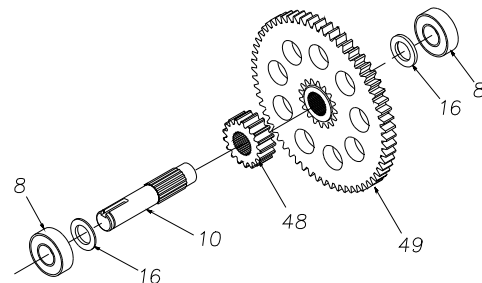
Next install the 60T gear (49) onto the brake shaft (10) raised gear shadow is positioned up.

Install the 17T gear (48) onto the brake shaft (10), so that it sits on the raised gear shadow of the 60T gear (49).

Install the washer (16) onto the brake shaft (10).

Next press the last ball bearing (8) onto the brake shaft (10) until it seats on the washer.

Figure 9.2



Next apply cellophane (plastic wrap) over the extended portion of the brake shaft (10).

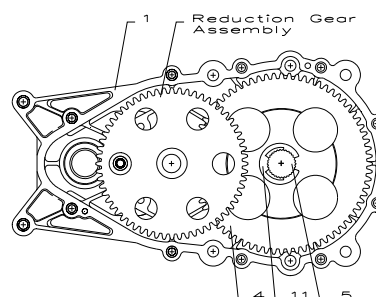
Note: This procedure is used to protect the inner diameter of the brake shaft lip seal (42).

Axle Assembly (Continued)

Simultaneously install the final drive gear (4) onto the axle shaft (5), and reduction gear assembly into the axle carrier housing (1). (Fig. 9.3)

Tip: If the gear set is not a slip fit it may be necessary to tap the shafts with a rubber mallet during assembly.

Figure 9.3



Next install E-ring (11) into the groove on the axle shaft (5). Then rotate axle shaft (5) to insure smooth movement. (Fig. 9.3)

Insure the two spring pins (17) (housing alignment pins) are installed in the axle carrier housing (2). (Fig. 9.3)

Apply fifteen ounces of the grease into the axle carrier housing (2).

Install a new housing gasket (41) onto the axle carrier housing (2).

Install the 3/8" ball (12) into its seat in the axle carrier housing (2). (Fig. 8.1)

Then place the axle carrier housing (2) onto the axle drive assembly, and guide the brake shaft ball bearing (8) into the bore of the axle carrier housing (2).

Note: Use caution when assembling the axle carrier housing (2) on to the axle drive assembly, to insure that the 3/8" ball (12) stays in its seat. (Fig. 8.1)

Once the axle carrier housing (2) is assembled position the entire assembly so it rests on the axle carrier housing (2).

Install eight self tapping bolts (14).

Tip: Always hand start all bolts during assembly to help prevent cross-threading.

Brake Assembly

Disc Brake Assembly (Fig. 7.2)

Install the brake puck (28) into the brake puck seat of the axle carrier housing (1).

Next install the Hi-Pro key (33), and then the brake disc (34) onto the brake shaft (10).

Then install the puck plate (27), and brake puck (28) into the brake yoke (25).

Install the brake yoke assembly (25) onto the brake disc (34), and secure using bolt (40), spacer (35), and bolt (39).

Next install two brake pins (32) into the brake yoke assembly.

Install the brake actuator arm (24), washer (29), and

castle nut (30) onto the brake yoke (25) stud bolt.

Insert a 0.015" feeler gage between the brake disc (34) and top brake puck (28), and then set the brake by tightening or loosening castle nut (30).

The brake gap must be adjusted to the 0.015" (0.010" to 0.020") clearance.

Then install the cotter pin (31) to secure the castle nut (30).

Band Brake Assembly (Fig. 7.3)

Install the brake drum (13) onto the brake shaft (5), and secure with the retaining ring (6).

Next install the brake band (26), and the cotter pin (31).

Transmission Disassembly

Remove bolts and spacer (18) securing the transmission to the axle assembly.

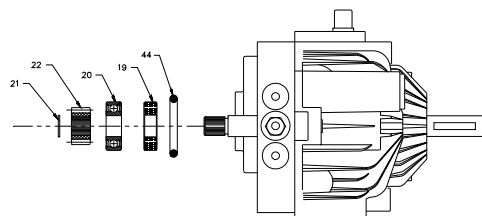
Pull the transmission from the axle mounting housing, and drain oil from unit.

Input Gear Disassembly (Fig. 10.1)

Remove and inspect the O-ring (44) for flattening, cracking or hardening.

Next remove and inspect the retaining ring (21), input gear (22), ball bearing (20), and the bearing spacer (19).

Figure 10.1



Bypass Valve Disassembly (Fig. 11.1)

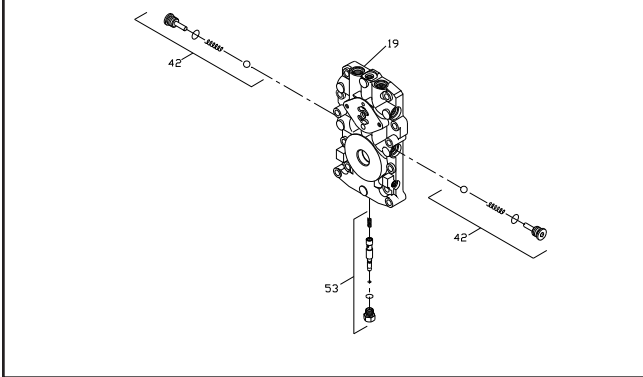
Removal of the bypass valve kit (53) from the transmission.

Inspect the bypass valve spool (53) and mating bore in the center section (19) for damage or foreign material.

Check Valve(s) Disassembly (Fig. 11.1)

Next disassemble the check valve assembly (42) by

Figure 11.1



removing the check plug, spring, and check ball/ poppet from the center section (19).

Note: Do not allow the check ball (or poppet) to fall into the closed loop passage in the center section.

Inspect the check ball/ poppet seats in the center section (42) for wear or damage.

Charge Pump Disassembly (Fig. 11.2)

Note: The correct charge pump orientation is determined by the rotation of the pump shaft. Always make note or mark the position of the charge pump cover.

Remove the two screws (67) securing the charge pump cover.

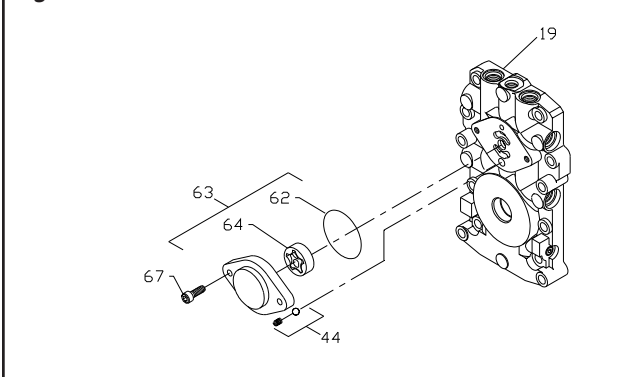
Next remove the charge pump cover by lifting it straight off the center section (19). Avoid twisting or turning the charge pump cover to prevent damaged to the charge relief spring.

Inspect the charge pump cover and O-ring (63).

Remove the charge relief spring and ball (44).

Next remove and inspect the charge pump gerotor assembly (64).

Figure 11.2



Transmission Disassembly

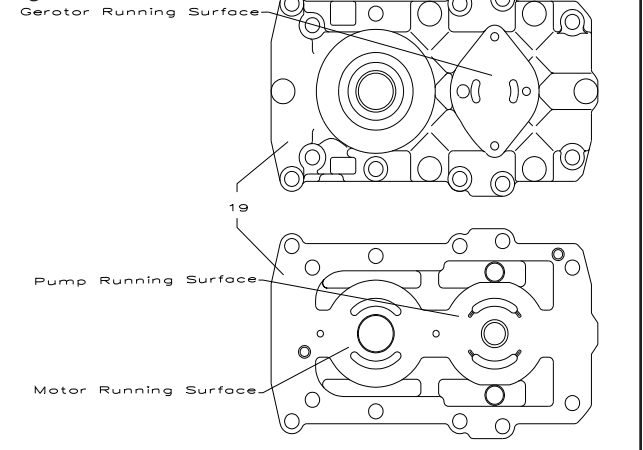
Remove the eight housing screws (47), and the center section (19). The internal spring pressure of the cylinder blocks (32) pistons should separate the center section (19) from the housing (15).

Note: The cylinder blocks (32) may stick to the surface of the center section. Exercise caution during removal of the center section to prevent damage to the internal components.

Inspect the center section (19) for wear or damage.

Note: The center section (19) will develop a normal wear pattern of three distinct rings where the cylinder blocks (32) rides on the center section (19). (Fig. 11.3)

Figure 11.3



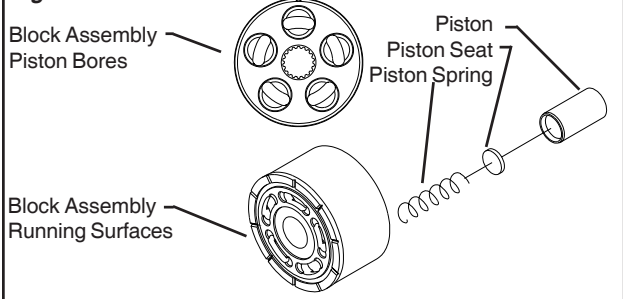
Next remove the housing gasket (38), and two aligning pins (37) from the housing (15). The gasket (38) is not reusable.

Note: Use care while removing the cylinder block assemblies (32) to prevent damage to the components.

Remove the motor cylinder block assembly (32). Inspect the motor shaft (22) and the motor cylinder block (32) for wear or damage. (Fig. 11.4)

Inspect the motor shaft bearing area of the housing (15) for wear or damage.

Figure 11.4



Remove the pump cylinder block assembly (32). Inspect the pump cylinder block (32) for wear or damage. (Fig. 11.4)v

Inspect each block assembly running surfaces and piston bores for excessive wear or damage. (Fig. 11.4)

Remove the pump cylinder block spring (60) and thrust washer (23).

Remove the motor thrust bearing assembly (17) from the housing (15).

Remove the swashplate assembly (25)(17). Remove and inspect thrust bearing (17) assembly for wear or damage.

Next Inspect the cradle bearing area of the swashplate (25) and cradle bearings in the housing (15).

Note: The cradle bearings (8) are not removable. If damage is present, a new housing kit (15) is necessary.

Remove the slot guide (14) from the trunnion shaft (13).

Next remove the input shaft retaining ring (6).

Remove the input shaft lip seal (5), and bearing spacer (4).

Remove the input shaft assembly (1). Inspect the input shaft assembly (5, 3) for excessive wear or damage.

Next remove the trunnion shaft (13) (displacement control shaft).

Remove the trunnion shaft lip seal (12). Inspect the trunnion shaft journal bearing area of the housing (15).

After disassembly thoroughly clean all parts.

Inspect all parts for damage, unusual or excessive wear patterns.

Transmission Assembly

Clean and lightly oil internal parts prior to assembly of the BDU transmission.

Be sure to torque all threaded parts to the recommended torque specifications (page 4).

Replace all O-rings, gaskets, and seals.

Note: Most parts have critical tolerance surfaces. Exercise caution to prevent damage to these surfaces during assembly. Protect exposed surfaces, openings, and ports from damage or foreign material.

Install the trunnion shaft (13) into the housing (15).

Next install the input shaft assembly (1) into the housing (15).

Install the bearing spacer (4).

Next protect (use plastic wrap) the trunnion shaft (13), slightly oil the lip seal (12), and install the lip seal (12).

Install retaining ring (6).

Protect (use plastic wrap) the shaft assembly (1), slightly oil the lip seal (5), and install the lip seal (5).

Inspect the cradle bearings and the housing (15) cradle bearing area for wear or damage.

Next install slot guide (14) onto the trunnion shaft (13).

Install the swashplate (25) into the housing (15). The swashplate (25) will couple with the slot guide block (14).

Tip: For ease of installing the swashplate (25) use a standard flat head screwdriver to hold the slot guide (14) in place during assembly.

Install the pump cylinder block thrust washer (23) and spring (60) onto the input shaft assembly (1).

Tip: It will be necessary to have a dry journal bearing in the housing (15) to prevent a hydraulic lock while installing the motor shaft assembly (32).

Note: Insure that each spring, piston seat, and piston is installed in the cylinder block assemblies (32). Check each piston for free movement in the cylinder block.

Tip: For ease of installation wrap a rubber band around the pistons of the cylinder block assemblies (32). This procedure is intended to help hold the pistons in place during assembly.

Next install the pump cylinder block assembly (32).

Install the motor thrust bearing assembly (17).

Install the motor cylinder block assembly (32).

Next install two housing alignment pins (37) in the housing (15).

Install the housing gasket (38) onto the housing (15).

Lightly oil the cylinder blocks assemblies (32), and center section (19) running surfaces.

Install the center section (19) onto the housing (15) while holding the motor shaft assembly (22) in position.

Note: Make sure all parts are properly aligned to prevent damage to the transmission. Do not use excessive force.

Install the eight housing screws (47).

Rotate the shafts a minimum of two turns to assure correct assembly. When properly assembled the shafts should require minimal torque to turn. (Approximately 15 in. lbs.)

Charge Pump Assembly (Fig. 11.2)

Note: The correct charge pump cover orientation is determined by the rotation of the pump shaft. Always make note or mark the position of the charge pump cover.

Install the charge pump gerotor assembly (64).

Install the charge relief ball and spring (44).

Note: Application of a petroleum jelly to the gerotor assemble may aid in the priming of the charge pump circuit.

Next install the charge pump cover and O-ring straight onto the center section (19). Avoid twisting or turn the charge pump cover to prevent damaged to the charge relief spring (44).

Install the two screws (67) securing the charge pump cover to the transmission.

Check Valve(s) Assembly (Fig. 11.1)

Inspect the check ball/ poppet seats in the center section (19) for wear or damage. Next assemble the check valve assembly (42). Then install the check ball/ poppet, spring, and plug into the center section (19).

Note: Do not allow the check ball/ poppet to fall into the closed loop passage in the center section.

Bypass Valve Assembly (Fig. 11.1)

Inspect the bypass valve kit (53) and mating bore in the center section (19) for damage or foreign material.

Install the bypass valve kit (53) into the center section (19).

Actuate the bypass valve (53) to insure smooth operation. The bypass "button" should extend 0.22 in. out of the assembly when fully released.

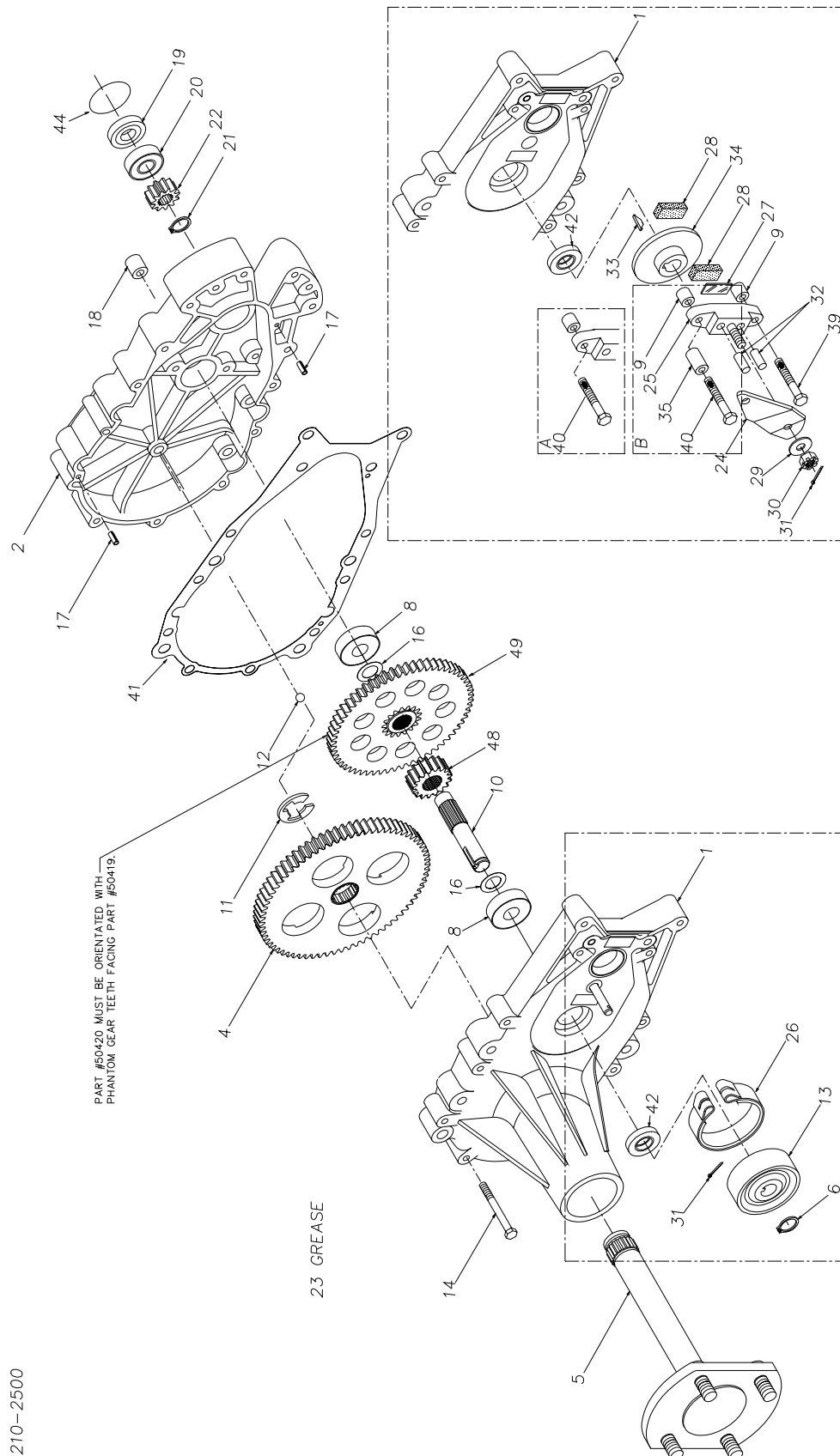
Input Gear Assembly

Next inspect and install the bearing spacer (19), ball bearing (20), input gear (22), and retaining ring (21) onto the input shaft assembly (22).

Transmission / Drive Axle Assembly

Install the transmission onto the axle mounting housing.

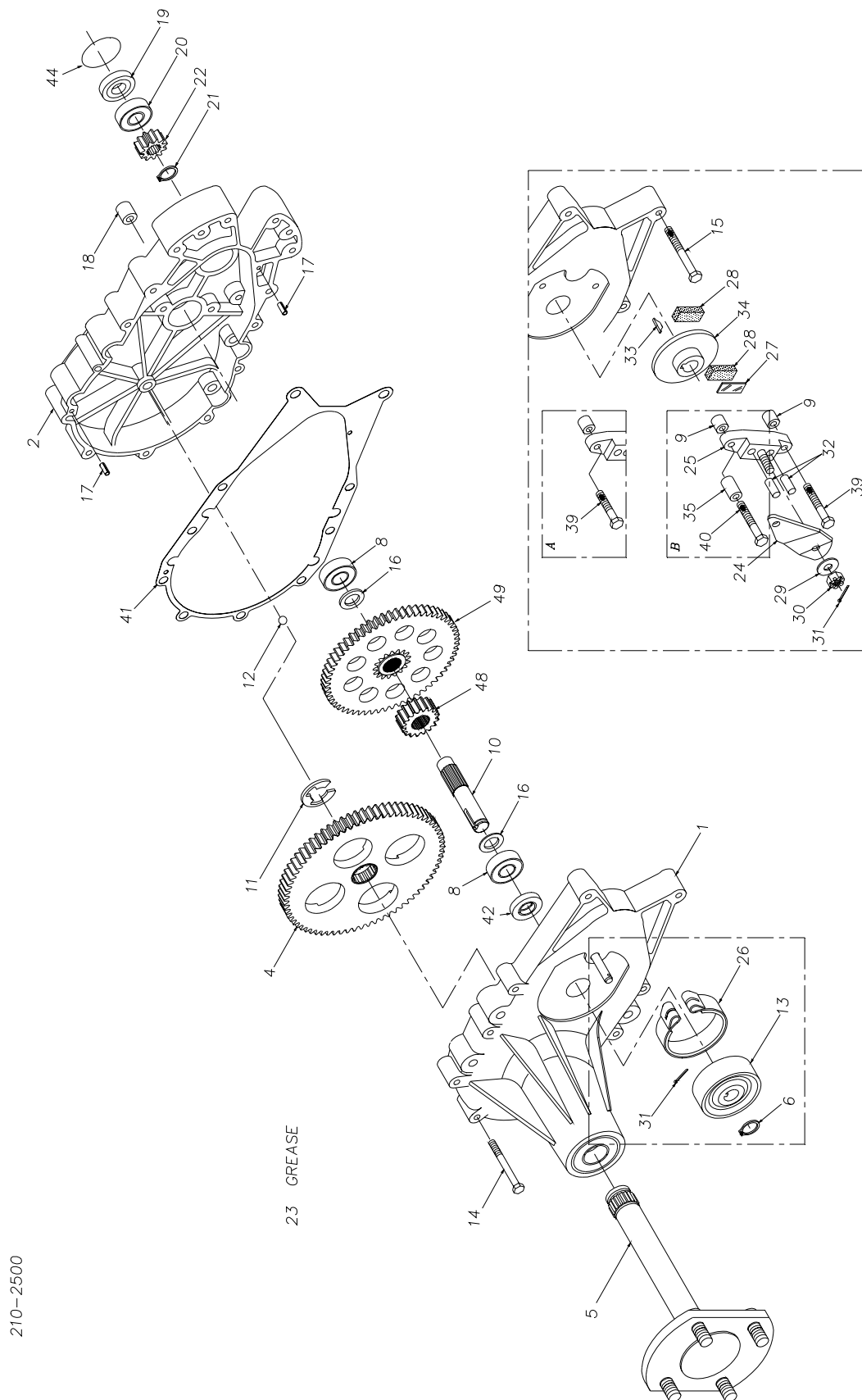
Next install the bolts and spacer (18) securing the transmission to the axle assembly.



210-2500

PARTS LIST

NO.	DESCRIPTION	NO.	DESCRIPTION
1	AXLE CARRIER ASSEMBLY	23	RYKON GREASE
2	HYDRO MOUNT HOUSING	24	BRAKE ARM
4	SPLINE 72 TOOTH FINAL DRIVE GEAR	25	BRAKE YOKE
5	AXLE SHAFT	26	BAND BRAKE
6	RETAINING RING	27	PUCK PLATE
8	BALL BEARING	28	BRAKE PUCK
9	BRAKE SPACER	29	WASHER
10	BRAKE SHAFT	30	SLOTTED NUT
11	E-RING	31	COTTER PIN
12	BALL	32	BRAKE ACUTUATING PIN
13	BRAKE DRUM	33	HI-PRO KEY
14	BOLT, 1/4-20 X 2 1/2	34	BRAKE DISC
15	BOLT, 5/16-18 X 2	35	SPACER
16	WASHER	39	BOLT, 1/4-20 X 1 1/2
17	SPRING PIN	40	BOLT, 1/4-20 X 2 1/2
18	MOUNTING SPACER	41	HOUSING GASKET
19	BEARING SPACER	42	OIL SEAL
20	BALL BEARING	44	O-RING
21	RETAINING RING	48	17 TOOTH REDUCTION GEAR
22	INPUT GEAR	49	60 TOOTH REDUCTION GEAR

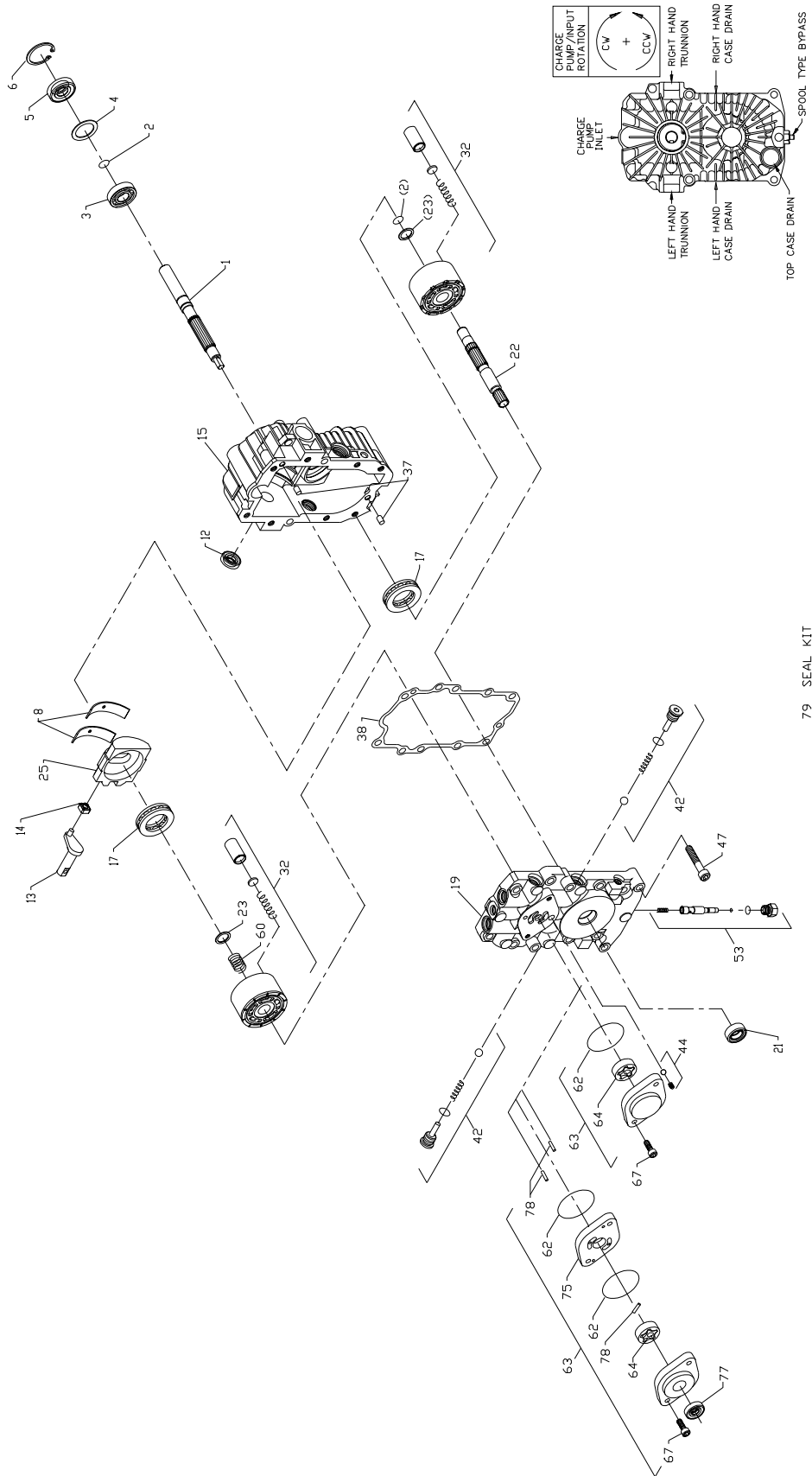


210-2500

PARTS LIST

NO.	DESCRIPTION	NO.	DESCRIPTION
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2	HYDRO MOUNT HOUSING	24	BRAKE ARM
4	SPLINE 72 TOOTH FINAL DRIVE GEAR	25	BRAKE YOKE
5	AXLE SHAFT	26	BAND BRAKE
6	RETAINING RING	27	PUCK PLATE
8	BALL BEARING	28	BRAKE PUCK
9	BRAKE SPACER	29	WASHER
10	BRAKE SHAFT	30	SLOTTED NUT
11	E-RING	31	COTTER PIN
12	BALL	32	BRAKE ACUTUATING PIN
13	BRAKE DRUM	33	HI-PRO KEY
14	BOLT, 1/4-20 X 2 1/2	34	BRAKE DISC
15	BOLT, 5/16-18 X 2	35	SPACER
16	WASHER	39	BOLT, 1/4-20 X 1 1/2
17	SPRING PIN	40	BOLT, 1/4-20 X 2 1/2
18	MOUNTING SPACER	41	HOUSING GASKET
19	BEARING SPACER	42	OIL SEAL
20	BALL BEARING	44	O-RING
21	RETAINING RING	48	17 TOOTH REDUCTION GEAR
22	INPUT GEAR	49	60 TOOTH REDUCTION GEAR

BDU-10L



PARTS LIST

NO.	DESCRIPTION	NO.	DESCRIPTION
1	PUMP SHAFT	25	VARIABLE SWASHPLATE
2	WIRE RETAINING RING	32	BLOCK ASSEMBLY
3	SHAFT BALL BEARING	37	PIN ST HDLS
4	SPACER	38	CENTER SECTION GASKET
5	LIP SEAL	42	CHECK VALVE KIT
6	RETAINING RING	44	CHARGE RELIEF KIT
8	CRADLE BEARING	47	SOCKET HEAD CAP SCREW
12	LIP SEAL	53	BYPASS VALVE KIT
13	TRUNNION ARM	60	BLOCK SPRING
14	SLOT GUIDE	62	O-RING
15	HOUSING KIT	63	CHARGE PUMP KIT
17	THRUST BALL BEARING ASSEMBLY	64	GEROTOR ASSEMBLY
19	CENTER SECTION ASSEMBLY	67	CAP SCREW
21	LIP SEAL	75	SPACER PLATE
22	MOTOR SHAFT	77	SEAL-LIP
23	BLOCK THRUST WASHER	78	PIN-NEEDLE DOWEL

210-2510L Hydrostatic Zero-Turn Transaxle

HYDROSTATIC FLOW ILLUSTRATION DESCRIPTION

The oil supply for the 210-2510L is supplied through an external reservoir. This design allows for a larger fluid volume, which in turn improves the overall cooling capacity of the transaxle by increasing surface area of the fluid. The fluid volume varies for each 210-2510L application. The volume of fluid is set by each vehicle manufacturer.

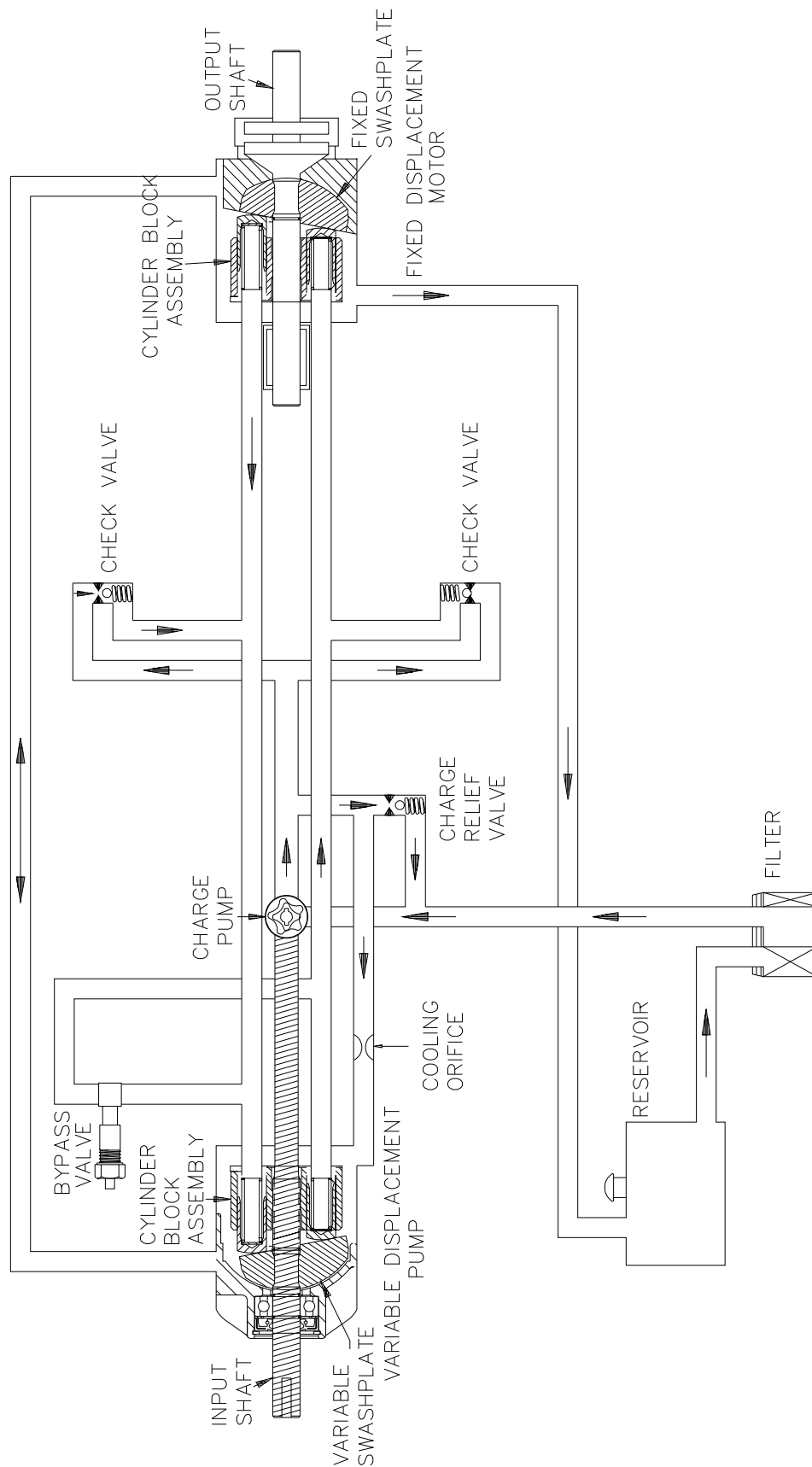
The input shaft and pump cylinder block is turned in one direction only by the engine/drive belt/pulley combination, output of the oil flow is controlled by the direction and amount that the swashplate is angled. As the pump pistons compress they force the oil to flow through one of two passageways (forward or reverse) in the center section (or valve body) to the motor cylinder block and shaft. Since the motor has a fixed displacement angle it is forced to turn with the flow of oil. As the angle of the swashplate is increased the amount of oil being pumped also will increase and cause a higher RPM output of the motor. Reversing the angle of the swashplate will reverse the direction of oil flow.

During the operation of the transaxle, fluid is "lost" from the hydraulic loop through leak paths designed into the product for lubrication purposes (around pistons, under the rotating cylinder blocks, etc.), this "lost" fluid returns to the transmission housing and must be made up for in the loop. A charge pump is included on the BDU transmission to supply this makeup flow. The makeup flow is controlled (or directed) by the check valves. Each check valve will either be held open or closed (depending upon the direction of vehicle operation) by the system operating pressure (closed) or by charge pressure (open) from the charge pump.

The charge pump maintains a continuous pressure and flow of oil as long as the input shaft is turning. All of the oil being pulled into the charge pump first must pass through an external vacuum type filter. Any oil not needed by the transmission for make up flow is discharged across a small orifice back to the transmission housing allowing for the constant flow of oil through the filter or recirculated back into the inlet line through the charge relief valve. The charge relief valve maintains the charge pressure at no more than 75 PSI.

The bypass feature is a spool type valve in the hydraulic loop that allows a fluid to bypass the cylinder blocks and flow from one passageway to the other.

The BDU is mounted to the 210-2500 axle assembly which is a spur gear reduction transfer case with a spur final drive gear. The axle assembly is driven by the motor shaft of the BDU transmission.



Notes

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