

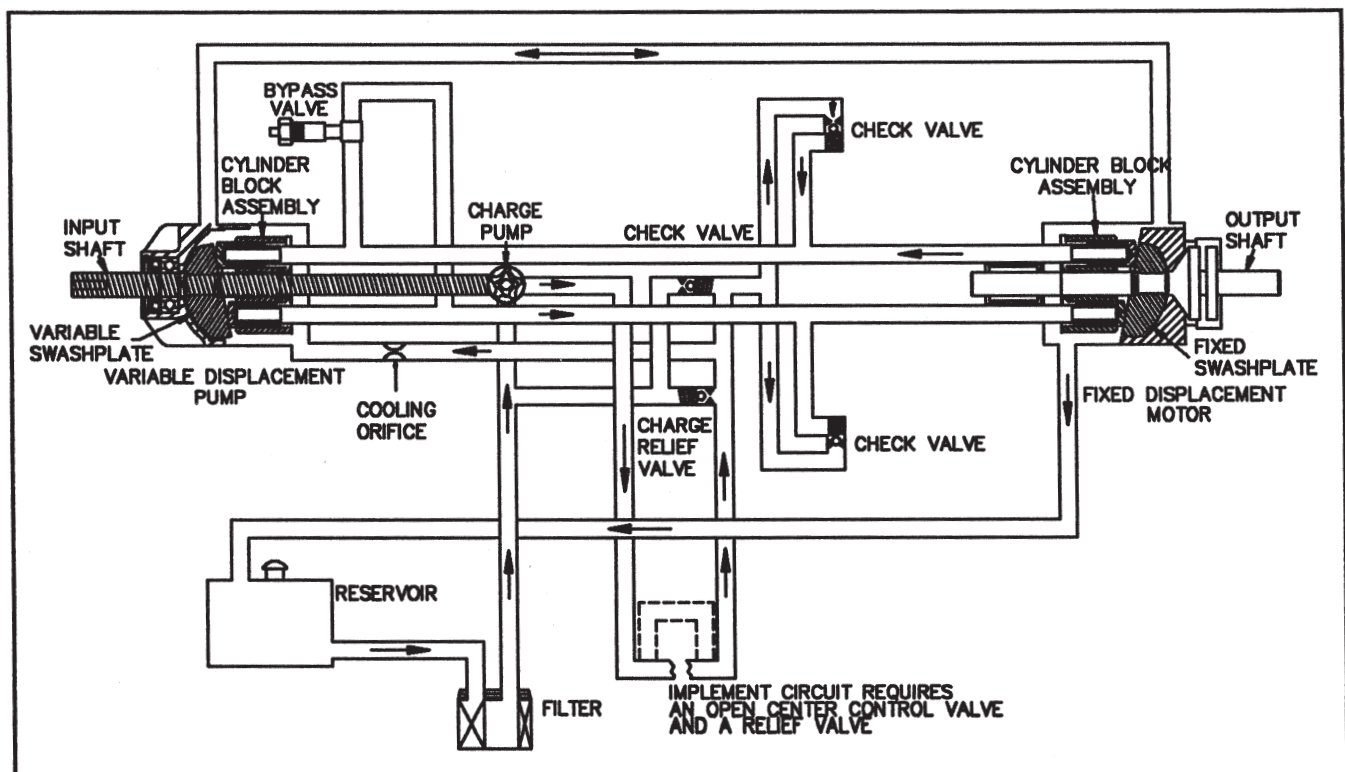
The BDU-21L transmission offers an optional Implement (auxiliary) pump. The auxiliary circuit provides a rated flow of 1.5 gpm and 500 PSI operating pressure at a 3200 RPM pump speed.

Fluid from the charge pump flows first to the implement control valve, then to the charge relief valve and charge check valves in the center section. This requires an "open center" type control valve to allow fluid flow to return to the transmission. A check valve is included to allow oil to be drawn into the charge circuit should flow returning from the implement circuit be insufficient to charge the closed loop. A relief valve must be included in addition to the implement control valve.

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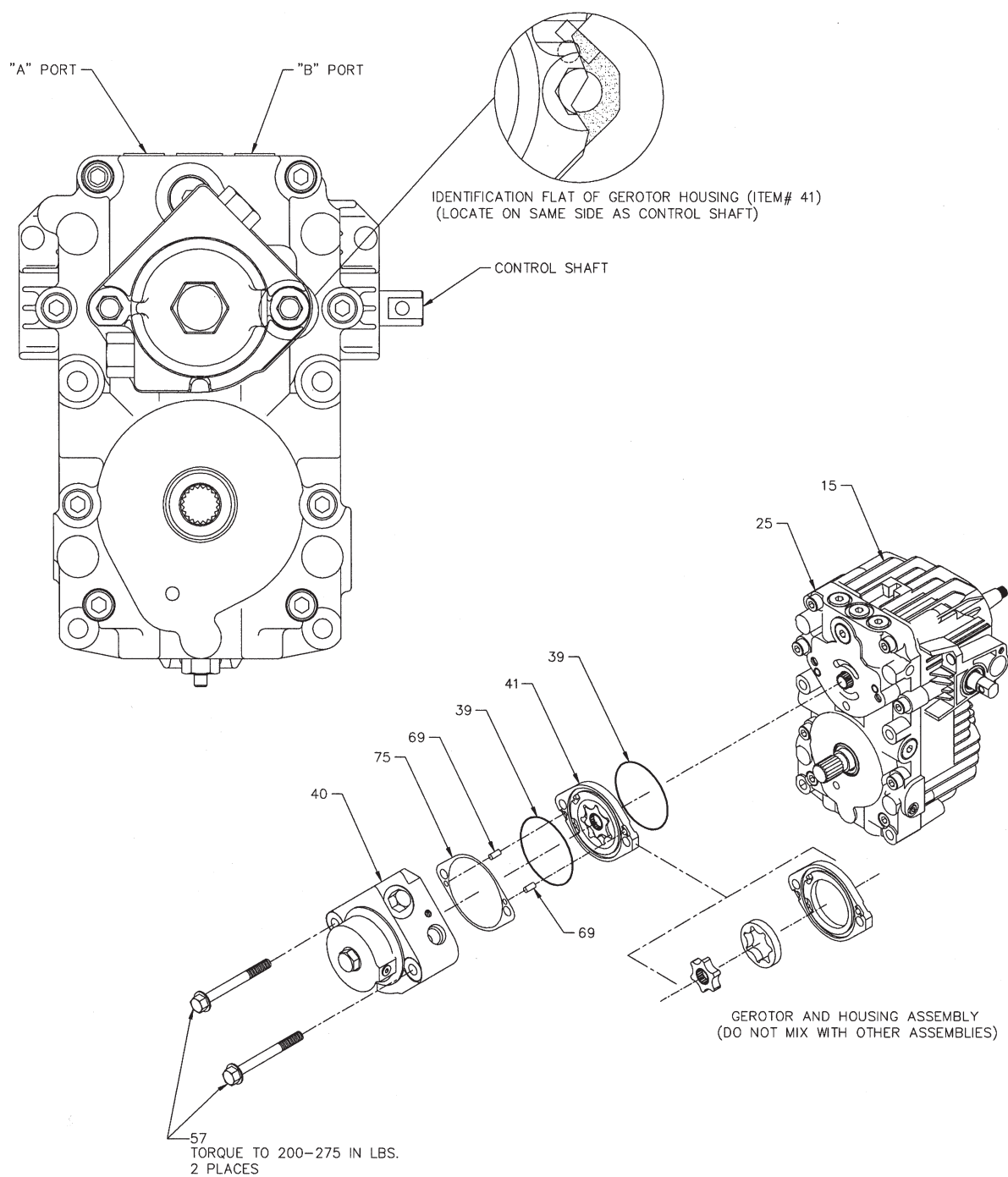
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The BDU-21L offers an Easy Ride Valve option. The Easy Ride Valve acts like a high pressure spike suppressor in the system loop. The valve opens under high acceleration loads. The result is a dampening of the aggressiveness, without affecting the overall efficiency of the transmission.



BDU-21L/A Hydrostatic Flow Illustration

Cub Cadet 3000



FLUIDS

Fluids used in Cub Cadet 3000 Series tractors have been carefully selected. Only use Cub Cadet oil part no. 737-3055A for quarts or 737-3054A for gallons.

SAFETY PRECAUTIONS

Certain procedures may require the vehicle to be disabled (wheels raised off the ground, engine disconnected, etc.) in order to prevent possible injury to the technician and 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.

The loss of hydrostatic driveline power may result in the loss of hydrostatic braking capacity. Proper brake maintenance becomes very important should this condition develop.

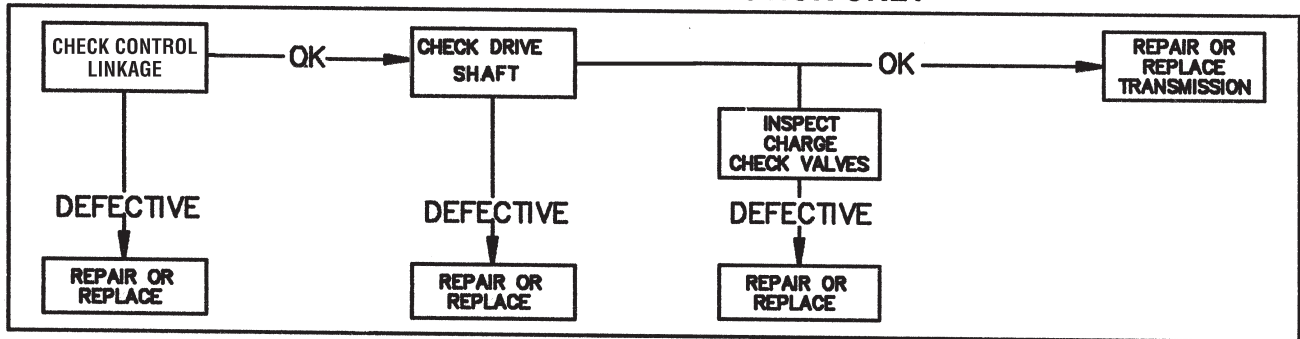
MAINTENANCE

Check the transmission cooling fan for broken or distorted blades, and check to see that the fan is securely fastened. Replace the fan if damaged.

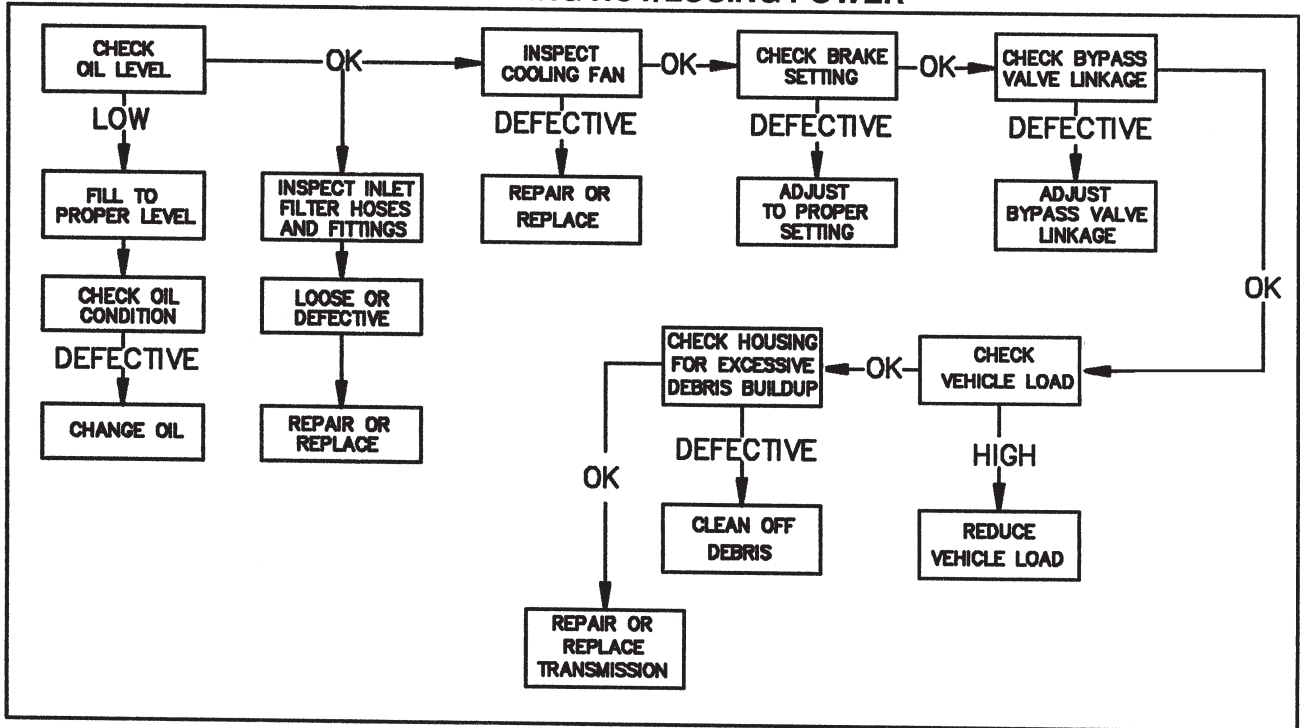
Keep the transmission clean. Grass clippings and dirt will influence the cooling efficiency of the fins on the transmission housings. Avoid high pressure fluid washes, compressed air is the preferred method of removing loose debris. Avoid the immediate area of the lip seals or damage may occur.

Inspect the transmission for leaks at the lip seals, damage to fittings, hoses, the filter, or to the housings. Check the oil level and add oil as necessary to bring it up to the proper level. Refer to vehicle owners manual.

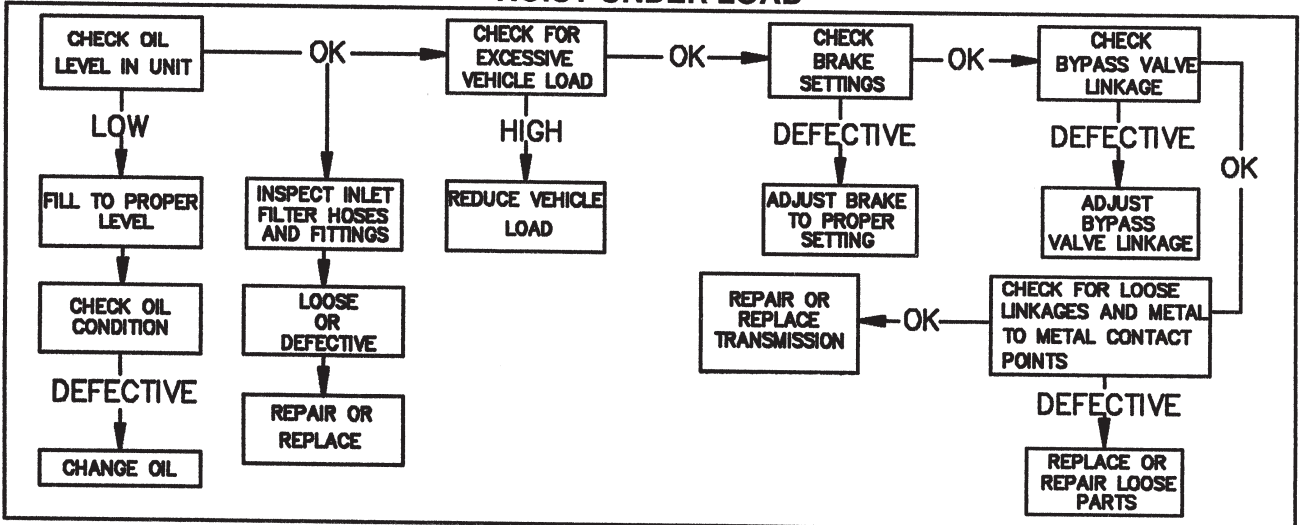
OPERATES IN ONE DIRECTION ONLY



OPERATING HOT/LOSING POWER



NOISY UNDER LOAD



WARNING!!!
THE VEHICLE SHOULD BE ON LEVEL GROUND AND
THE ENGINE DISABLED BEFORE PERFORMING ANY ADJUSTMENTS

SYMPTOM - OPERATES IN ONE DIRECTION ONLY

POSSIBLE CAUSE

- Inspect control linkage
- Inspect check valves

CORRECTIVE ACTION

- Repair or replace
- Repair or replace

SYMPTOM - NOISY

POSSIBLE CAUSE

- Check oil level & condition
- Check for excessive loading
- Check brake setting
- Check for loose parts
- Check bypass valve operation
- Check inlet flow conditions
- Inspect check valves
- Inspect auxiliary circuit

CORRECTIVE ACTION

- Fill to proper level or change oil
- Reduce vehicle loading
- Adjust brake to proper setting
- Repair or replace loose parts
- Repair or replace valve or linkage
- Repair or remove obstruction or leaks
- Repair or replace
- Repair or replace

SYMPTOM - LOW POWER

POSSIBLE CAUSE

- Check engine RPM
- Check oil level & condition
- Check for excessive loading
- Check brake setting
- Check for loose parts
- Check bypass valve operation
- Check inlet flow conditions
- Check operating temperature
- Inspect check valves
- Inspect auxiliary circuit

CORRECTIVE ACTION

- Adjust to correct setting
- Fill to proper level or change oil
- Reduce vehicle loading
- Adjust brake to proper setting
- Repair or replace loose parts
- Repair or replace valve or linkage
- Repair or remove obstruction or leaks
- Repair or replace unit
- Repair or replace
- Repair or replace

SYMPTOM - OPERATING HOT

POSSIBLE CAUSE

- Check bypass valve operation
- Check for debris buildup
- Check oil level & condition
- Check for excessive loading
- Check brake setting
- Check cooling fan for damage
- Inspect check valves
- Inspect auxiliary circuit

CORRECTIVE ACTION

- Repair or replace
- Clean off debris
- Fill to proper level or change oil
- Reduce vehicle loading
- Adjust brake to proper setting
- Repair or replace
- Repair or replace
- Repair or replace

MINOR REPAIR

GENERAL INFORMATION

Minor repairs may be performed, following the procedures in this section, without voiding the unit warranty.

Cleanliness is a primary means of assuring satisfactory life on either new or repaired units. Cleaning parts by using a clean solvent wash and air drying is usually adequate. As with any precision equipment, all parts must be kept free of foreign materials and chemicals.

Protect all exposed sealing surfaces and open cavities from damage and foreign material. The outer surfaces must be cleaned before beginning any repairs.

It is recommended that all O-rings and seals be replaced. Lightly lubricate all O-rings and seals with a clean petroleum jelly prior to assembly.

PLUG/FITTING TORQUES

If any plugs were removed during servicing, they should be torqued as indicated in the accompanying table:

TORQUE SPECIFICATIONS		
OPERATION	TORQUE	PART DESCRIPTION
Bypass Plug	84-120 in lbs	7/16-20 SAE Straight Thread
Check Plug(s)	180-240 in lbs	9/16-18 SAE Straight Thread
Easyride Plug	180-240 in lbs	9/16 SAE Straight Thread
Steel Plug/Fitting	96-120 in lbs	7/16 SAE Straight Thread
Steel Plug/Fitting	180-240 in lbs	9/16 SAE Straight Thread
Steel Plug/Fitting	180-240 in lbs	3/4 SAE Straight Thread
Steel Plug/Fitting	180-240 in lbs	7/8 SAE Straight Thread

SHAFT SEALS

Lip type seals are used on the input shaft, pump through shaft (not all models use the through shaft), motor output shaft and displacement control shaft. These seals can be replaced without major disassembly of the unit. However, replacement of the seals generally requires removal of the transmission from the machine.

To replace the pump input shaft seal, first remove the retaining ring from the housing.

Carefully pull the seal out of the housing bore. A "hook" type tool may be used to grasp the seal and pull it out, or a slide hammer type puller may be used to remove the seal. Care must be taken so as not to damage the housing bore, shaft sealing surface, or bearing. Once removed, the seal is not reusable.

Inspect the sealing area on the shaft for rust, wear, or contamination. Polish the sealing area on the shaft if necessary.

Wrap the spline or keyed end of the shaft with a thin plastic or cellophane to prevent damage to the seal lip during installation.

Lubricate the new seal with petroleum jelly and slide the seal over the shaft and press it into the housing bore. Be careful not to damage the seal.

Install the retaining ring in the housing.

The pump through shaft, motor output shaft and displacement control shaft may be replaced following a similar procedure as outlined for the pump input shaft seal. These seals are not held in position by a retaining ring.

CHARGE CHECK VALVES

Remove the check valve plug with a 1/4" internal hex wrench.

Remove the check valve spring and check ball (or poppet) from the center section.

CAUTION: Do not allow the check ball to fall into the closed loop passages in the center section. Removal may be difficult but can be accomplished with a magnet, or by removing the plug from the end of the center section. Do not allow contaminants to be introduced to the system.

Inspect the check balls (or poppets) and mating seats in the center section for damage or foreign material.

Position the transmission so that the check valve port will be in the upright position (as shown) and install the check ball (or poppet), spring and plug (with o-ring) into the center section. Make sure the plug stem is properly positioned into the poppet or damage and failure will occur. Be certain the check ball does not fall into the closed loop passage.

Torque the plug to 15-35 ft. lbs.

Turn the unit over and repeat the procedure for the other side.

BYPASS VALVE

Remove the bypass valve plug with a 9/16" hex wrench.

Remove the bypass valve plug, spool and spring from the transmission center section.

Inspect the valve spool and mating bore in the center section for damage or foreign material. The spool must move freely. It is recommended that the o-rings be replaced.

Retain the valve spring to the valve spool with petroleum jelly. Install the valve spool, spring and plug (with o-ring) into the center section. Torque the plug to 7-10 ft. lbs.

Depress the bypass valve several times to insure that it operates smoothly and fully closes. The bypass "button" should extend from the hex plug approximately 0.22" when fully released (closed).

CHARGE PUMP

ASSEMBLY PROCEDURES

For BDU-21L with implement circuit: Install the drive pin. Install a new o-ring on each side of the gerotor assembly and position the gerotor assembly onto the aligning pins in the same orientation as it was removed. Install the charge pump shim and the charge pump cover. Torque the bolts evenly to 18-25 ft. lbs.

MAJOR REPAIR

GENERAL INFORMATION

Major repairs described in the following sections are for the complete disassembly and reassembly (Major Repair) of the transmission and will void all product warranty, unless license to perform said major repairs was previously obtained from an authorized representative of Cub Cadet.

Cleanliness is a primary means of assuring satisfactory life on repaired units. Cleaning parts by using solvent wash and air drying is usually adequate. As with any precision equipment, all parts must be kept free of foreign materials and chemicals.

Protect all exposed sealing surfaces and open cavities from damage and foreign material. The outer surfaces should be cleaned before beginning any repairs.

It is recommended that all O-rings and seals be replaced. Lightly lubricate all O-rings and seals with a clean petroleum jelly prior to assembly.

It is recommended that parts requiring replacement be replaced with the complete assembly (kit) as shown in the service parts drawings.

Prior to performing major repairs on the BDU Hydrostatic Transmission, remove the transmission from its installed location and remove any external components such as a cooling fan and input pulley or frame mounting hardware.

NOTE: Thoroughly clean all exposed surfaces prior to any further disassembly.

Remove the oil lines (hoses and fittings) so that as much oil as possible can be drained from the housing.

DISASSEMBLY PROCEDURES

Prior to performing major repairs on the BDU remove the external components as described in the Minor Repairs section of this manual. These include the following:

- Bypass Valve
- Charge Check Valves
- Charge Pump Assembly

Using a 6 mm internal hex wrench, remove the eight screws which retain the center section to the housing.

The internal springs of the pistons should separate the center section from the housing. Remove the center section from the housing.

CAUTION: The cylinder blocks may stick to the surface of the center section. Exercise caution to prevent damage to the components.

Remove the gasket and two aligning pins from the housing. The gasket will not be reusable.

For BDU remove the filter element, filter washer and spring from the housing.

Remove the pump cylinder block kit from the pump shaft. Inspect the splines on the shaft and in the pump block for damage or excessive wear. Check the pistons and block bores for excessive wear. The pistons should fit with very little side clearance in the block bores, but must slide freely.

Remove the pump cylinder block spring and thrust washer from the pump shaft.

Remove the motor cylinder block kit and shaft assembly from the housing. Check the pistons and block bores for excessive wear. The pistons should fit with very little side clearance in the block bores, but must slide freely. Inspect the splines for damage or unusual wear. Replacement of the complete assembly is recommended if damage or excessive wear is found.

Remove the motor thrust bearing assembly from the housing.

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Remove the swashplate assembly and cradle bearings from the housing.

NOTE: The cradle bearings in newer BDU-21L transmissions are not removable from the housing. If damage is present, a new housing kit is necessary.

Inspect the cradle bearing's low friction coating for wear. Inspect the swashplate and thrust bearing for any unusual wear or damage. If damage to the swashplate or cradle bearings is found then inspect the housing for possible damage. Replace complete assemblies as necessary.

Remove the slot guide block from the displacement control shaft.

Remove the input shaft lip seal retaining ring.

Pull the lip seal out of the housing bore. A hook type tool may be used to pry the seal out. Care must be taken to avoid damage to the housing bore, shaft sealing surface or bearing. Once removed, the seal is not reusable.

Remove the bearing spacer washer.

Remove the pump shaft assembly from the housing.

Inspect the splines on the shaft for damage or unusual wear.

Inspect the bearing. Replacement of the assembly is recommended if any damage or excessive wear is found.

Remove the displacement control shaft from the housing.

Remove the displacement control shaft lip seal from the housing. Care must be taken to avoid damage to the housing bore. Inspect the housing for damage.

DISASSEMBLY PROCEDURES

Inspect the control shaft journal bearing for excessive wear. The BDU 21 control shaft journal bearing should be 0.5904 to 0.5908.

Inspect the BDU-21 motor shaft needle bearing for damage.

If excessive wear or damage is found, replace the complete housing assembly.

Inspect the center section for damage to the cylinder block running surface.

Inspect the needle bearing for damage. If any damage or excessive wear is found, replace the complete center section assembly.

RECONDITIONING AND REPLACEMENT OF PARTS

After disassembly, all parts should be thoroughly cleaned in a suitable solvent.

Inspect all parts for damage, nicks or unusual wear patterns. Replace all parts having unusual, excessive wear or discoloration.

Inspect the sealing surfaces, bearing surfaces, and shaft splines. Polish the sealing areas on the shafts if necessary. Replace any worn or damaged parts.

The running surfaces of the cylinder blocks MUST be flat and free from scratches. If scratches or wear are found on the running surface of the cylinder block or center section, polish or replace the parts. When polishing these surfaces, up to 0.0004 in. may be removed. If this is not sufficient to obtain a flat surface free of scratches, the part should be replaced.

ASSEMBLY PROCEDURES

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

Be sure to torque all threaded parts to the recommended torque levels.

Replace all o-rings, gaskets and shaft seals.

CAUTION: Most parts have critical high tolerance surfaces. Care must be exercised to prevent damage to these surfaces during assembly. Protect exposed surfaces, openings, and ports from damage or foreign material.

Install the displacement control shaft.

Install the pump shaft assembly into the housing.

Install the bearing spacer washer.

Install the lip seal and retaining ring as described in the minor repair section.

Install the slot guide block onto the displacement control shaft.

Install the swashplate into the housing. The slot on the swashplate must engage the slot guide block on the displacement control shaft. Use a tool such as a screwdriver or scribe to hold the guide block in position while installing the swashplate.

Hold the swashplate in position and measure the end play of the displacement control shaft using a dial indicator or a depth gauge. Using a suitable sleeve, press the control shaft bearing into the housing until the control shaft end play is between 0.020" and 0.060".

Install the thrust washer and pump cylinder block spring onto the pump shaft.

Install the springs piston washers and pistons into the cylinder block. The pistons must move freely in their bores.

ASSEMBLY PROCEDURES

NOTE: To simplify the installation of both the motor block and the pump block kits, wrap a rubber band snugly around the pistons. This is intended to hold the pistons in their bores as the block kits are handled during installation.

With the swashplate in the “neutral” (0 angle) position and the transmission housing laying on its side, install the pump cylinder block kit onto the pump shaft in the housing.

Install the motor thrust bearing into the housing.

NOTE: It will be necessary to have a DRY journal bearing to prevent a hydraulic lock while installing the motor shaft.

Install the motor shaft/cylinder block kit. Use caution to prevent damage to the journal bearing while guiding the shaft into position. Once installed, it will be necessary to hold the assembly in position until the center section has been installed.

Install the two aligning pins, and install a new gasket onto the housing.

Lubricate the running surfaces of the cylinder blocks and the center section.

Position the housing with the housing opening UP, and install the center section onto the housing while holding the motor shaft in position in the housing journal bearing.

CAUTION: Make sure all parts are properly aligned. Do not use excessive force.

Install the eight bolts and torque evenly to 18-21 ft. lbs.

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

Refer to the Minor Repairs section in this manual to complete reassembly of the BDU transmission.