

# HYDRO-GEAR ADJUSTMENTS

## INTRODUCTION

Since the introduction of the Hydrostatic XL/LT Lawn Tractor in 1993, several drive system improvements and changes have occurred. Through testing of returned transaxles, we have found warranty replacements are not necessarily internal transaxle failures but can be related to external problems such as misadjusted brakes or linkage. The following presentation is intended to help familiarize the technician with the proper operation and adjustments of the Hydrostatic XL/LT Lawn Tractor drive system so transmissions are not replaced unnecessarily.

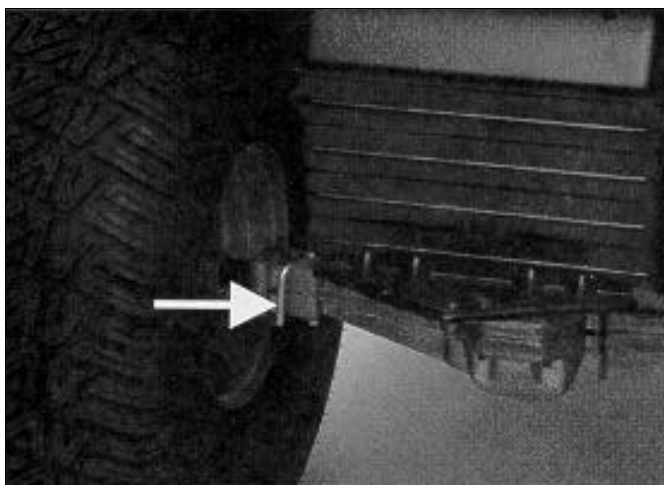


### Pushing By Hand

To hand push the machine, hook the bypass lever in the push position. This engages the bypass valve located on top of the transmission.

To drive the machine, move the bypass lever to the disengaged position. Operating the hydro pedal or brake does not automatically re-engage the bypass lever.

Note: Never tow the machine. Transaxle damage may occur.



## BASIC INSPECTION

### Fluid Level, Checking

Remove the battery to provide access to the vent plug. The fluid level is checked through the vent hole.

Note: Prior to checking the fluid level, clean the surrounding area to prevent contaminants from entering the transmission



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## BASIC INSPECTION (cont'd)

### Fluid Level, Checking (cont'd)

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To check the fluid level, remove the vent tube and then remove the fitting (vent) from the housing. Fluid should be checked when the transmission is cold

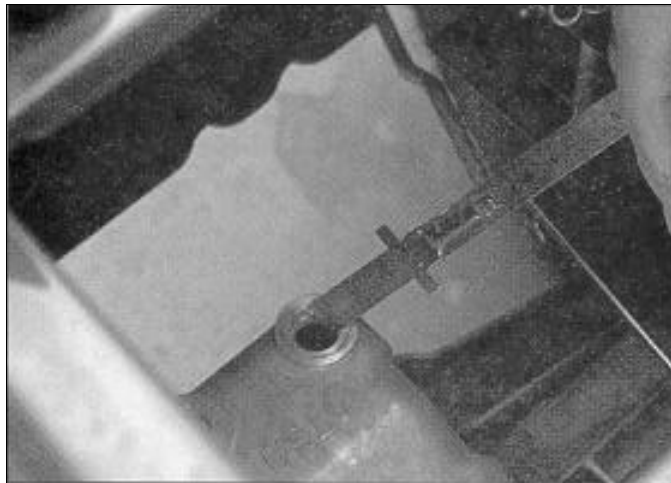
Note: Early production plugs do not have the vent tube attached.



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The fluid level should be measured from the top of the housing. Specifications vary from unit to unit, refer to chart for proper measurement

Model	Serial Number	Fluids
71181	39000001 - 49999999	1.75" - 2.00"
71191	59000001 - 59999999	1.75" - 2.00"
71192	59000001 - 59999999	1.25" - 1.62"
71193	69000001 & Up	1.75" - 2.00"
71196	69000001 & Up	1.25" - 1.62"



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If the unit requires fluid, slowly fill through the vent plug opening with SAE20w-50 engine oil (API SG/CD, or later)



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## BASIC INSPECTION (cont'd)

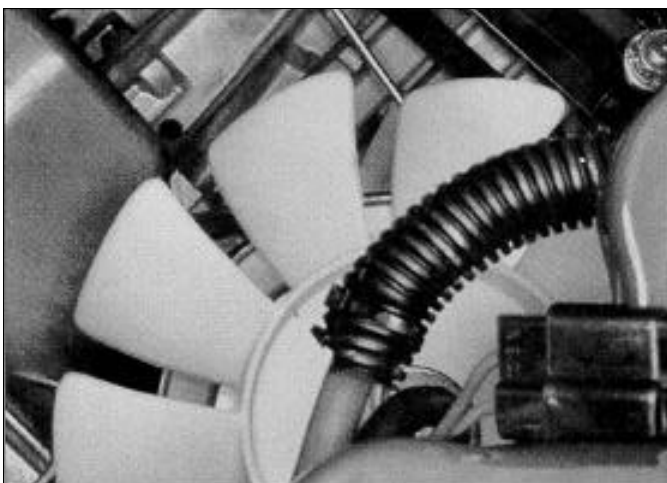
### Inspection - Drive Belt

Before making any adjustments to the drive system, it is a good idea to make an external inspection. First, inspect the transmission drive belt to make sure it is in good condition and is properly tensioned.



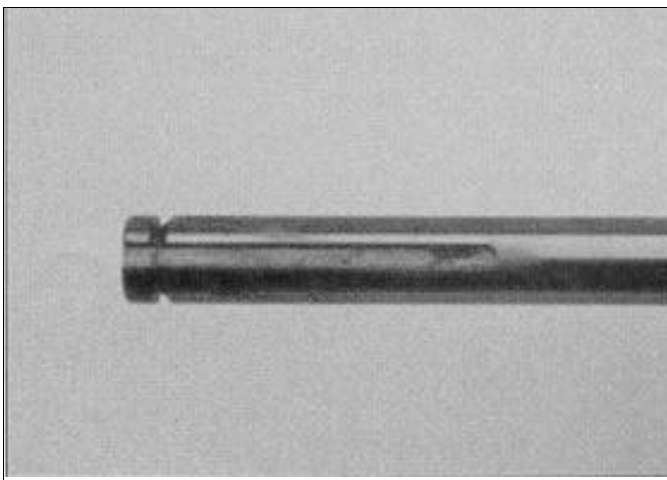
### Inspection - Cooling Fan

Make sure the cooling fan is installed properly and is free of dirt and debris. Also inspect the drive linkage to insure it moves freely and does not bind.



### Inspection - Keys

In a no drive situation, check the key in the input shaft and both axle keys to make sure they are not sheared or missing.



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## BRAKE SERVICE

### Brake Testing

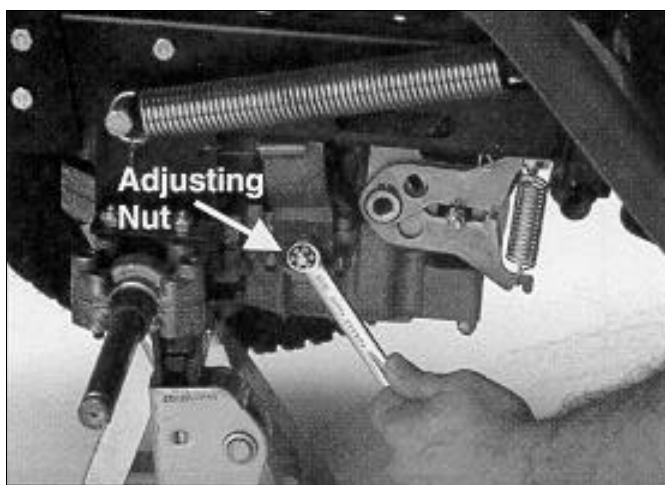
In order to check the brakes, park the machine on a level surface. Set the parking brake. Move the bypass lever to the push position. Push the tractor forward. If the rear wheels lock and skid, no adjustment is necessary.



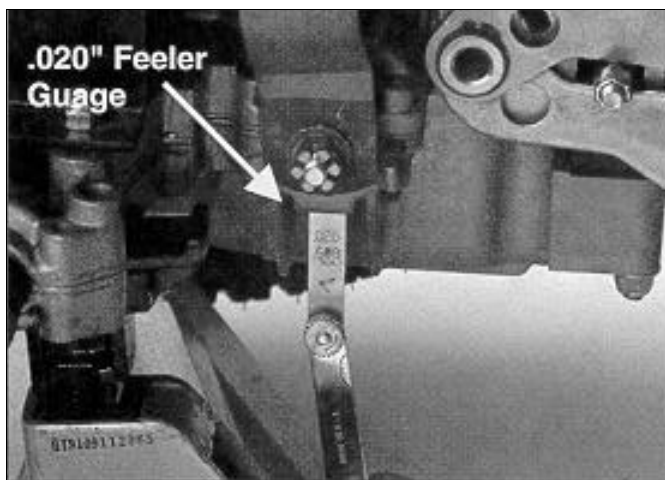
### Brake Adjustment

When adjusting the brake, a .020" (.5 mm) feeler gauge is required. Make sure the parking brake is released. To adjust the brake, loosen the brake adjusting nut slightly.

Note: Two versions of the brake adjusting nut have been used. Early production employed a "Nylock" type nut, while current production is using a castellated nut with a cotter pin.



Insert a .020" (.5 mm) feeler gauge between the two outer brake pads. Tighten the brake adjustment nut until slight resistance is felt on the feeler gauge when sliding it in or out. Check brake operation again.



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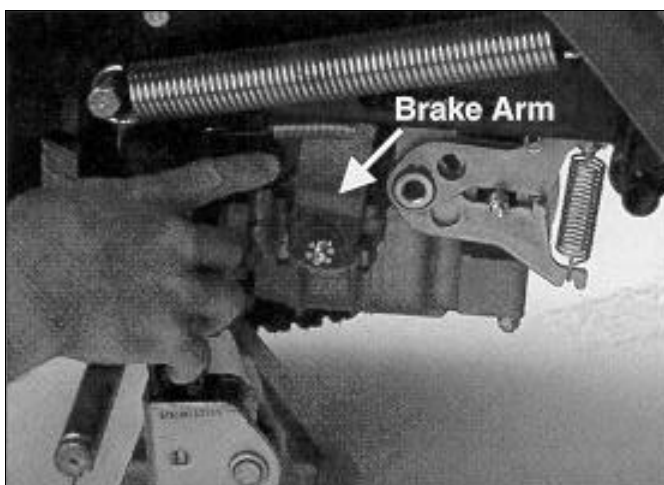
## BRAKE SERVICE (cont'd)

### Brake - Sticking

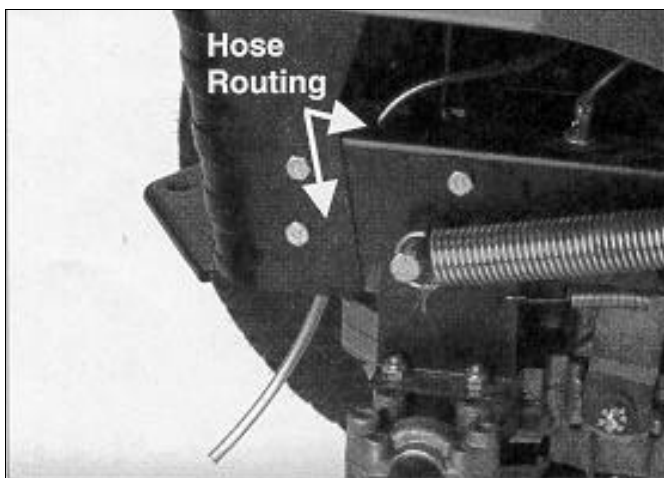
We have received field reports of the brake not releasing properly even though the brake pedal is released. Some technicians may mistake this for a failed transaxle because the symptom(s) may be similar. If the brake is sticking, it may not allow the tractor to move while at the same time make a whining or growling sound.



In order to verify proper brake operation, first make sure the brake arm is moving freely and that it returns to the released (vertical) position when the brake pedal is released. Make sure the brake pins are free to slide in their bores. Then verify the brake is adjusted to the .020" (.5 mm) specification. If either or both of these requirements are not met, investigate and further service the brake.



Many brake problems have been due to the brake assembly corroding, especially in the area of the actuating pins. One major contributor to the corrosion is an improperly routed battery overflow tube. This may allow battery acid to corrode the braking mechanism. When servicing the brake or battery, make sure the overflow tube is connected to the battery and is routed through the holes provided in the frame rail.



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## DRIVE ADJUSTMENT

### Neutral Adjustment

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To test the neutral adjustment, start the tractor and operate the engine at 3/4 throttle or higher. Move the motion control pedal to the reverse position, the forward position and then release the pedal allowing it to return to neutral. If the tractor does not stop, the drive system needs to be neutralized.

Before making the adjustment, drive the unit for 15 minutes to bring it up to operating temperature. Then place the unit on jack stands so the rear tires are off the ground.



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Loosen the locknut located between the neutral return levers.



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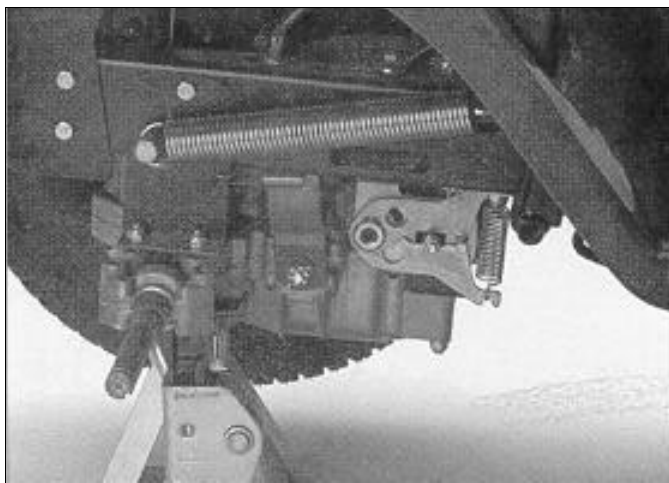
Move the bolt up or down until creep is minimized. (There still may be slight creep with the wheels off the ground.)



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## DRIVE ADJUSTMENT (cont'd)

Tighten the locknut. Move the pedal forward and reverse to allow transmission to recenter. Verify there is still no creep. Retest with the wheels on the ground.

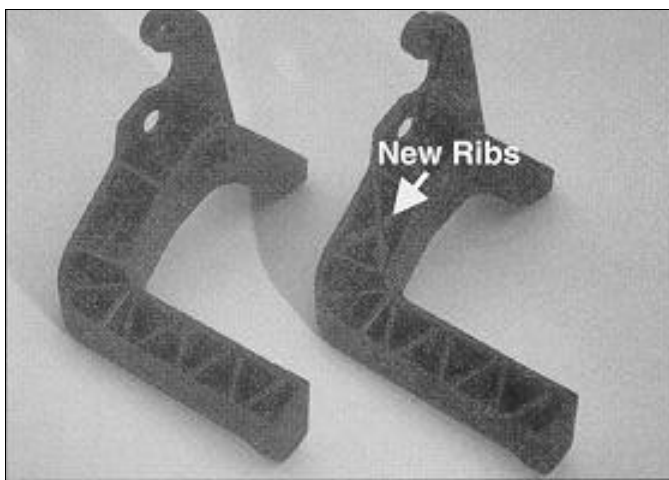


### Control Pedal Adjustment

If unit lacks speed in either forward or reverse, the problem could be related to the hydro pedal being misadjusted. To verify full travel of the pedal, remove the extension spring from the neutral return levers. Move the pedal forward and verify through the window in the control arm that the control arm is coming in contact with the stop.



If full travel is not achieved, check to make sure the latest pedal is installed on the unit. Early production pedals (1993 & 1994) had a tendency to flex and would give the symptom of a misadjusted pedal. Newer pedals are made from a stronger material and have additional strengthening ribs added. Replace pedal if necessary.



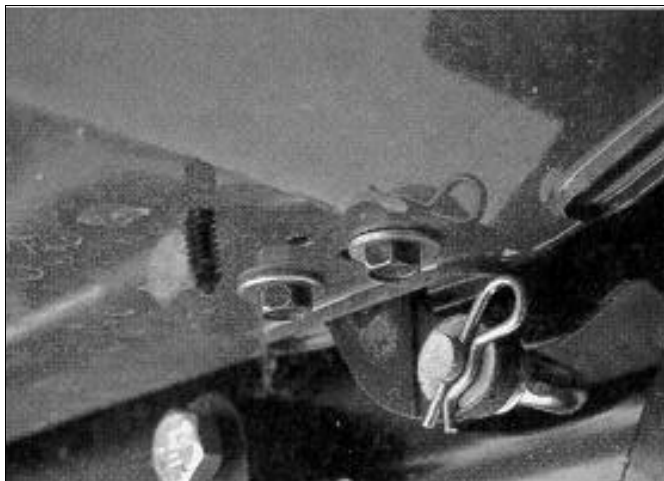
# HYDRO-GEAR ADJUSTMENTS

## DRIVE ADJUSTMENT (cont'd)

### Control Pedal Adjustment (cont'd)

If full travel is still not achieved, adjustment of the the foot control pedal is necessary. From underneath the footrest, locate the two screws attaching the the foot pedal to the footrest. Loosen the screws and slide the pedal forward or backward to obtain full pedal travel. Retighten the screws.

Note: On 1993 and 1994 models, the mounting holes must be slotted with a file or drill before making this adjustment.

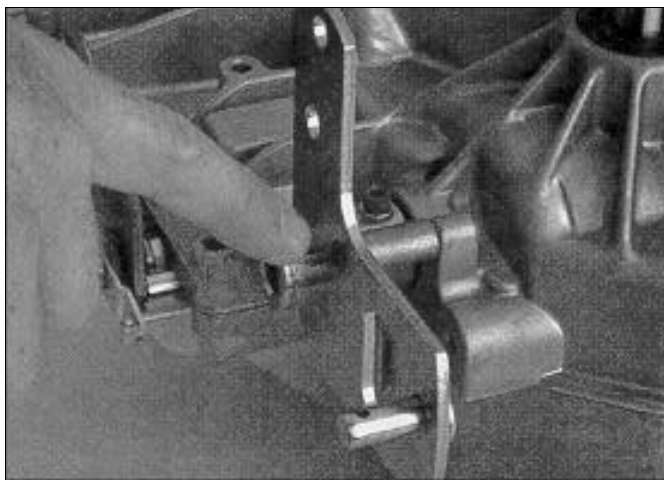


Note: On 1993 product, if full travel cannot be reached, the linkage should be updated to 1994 specifications. The 1993 linkage adjustment was mounted to the frame, which can permit more variation due to frame flexing. 1994 and later units have eliminated this possibility by mounting the linkage adjustment to the transaxle.

Qty	Part Number	Description
1	92-9792	Control Arm Assembly
1	92-9793	Speed Control Rod
1	3256-23	Flat Washer
3	3296-29	Lock Nut
1	88-5460	Transmission Belt Guide
1	3230-2	Carriage Bolt
5	4460	Fender Washer
1	92-6013	Speed Control Bracket
1	65-5080	Flanged Bushing
1	3230-5	Carriage Bolt

### Drive, Lack of - Replacement Units

We have received field reports from technicians installing a new transmission and failing to verify that the "shipping bolt" in the control arm was removed. If this bolt is not removed, the new transmission may not drive or will only operate at a slow speed.

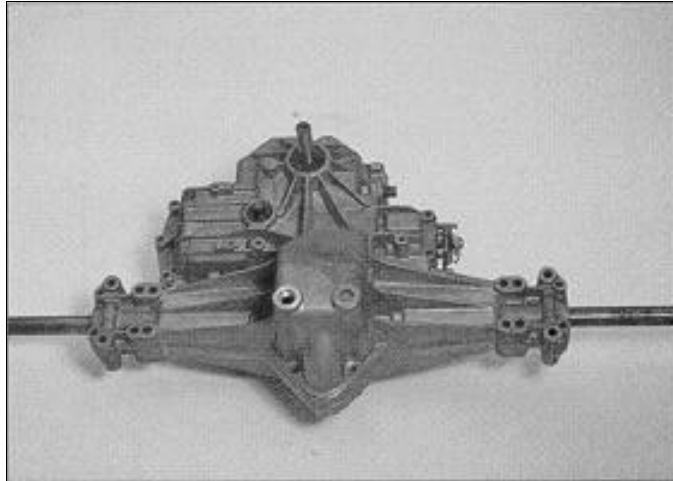


# HYDRO-GEAR ADJUSTMENTS

## INTERNAL INSPECTION

Test run the tractor after checking the fluid levels and linkage adjustments. Bring the tractor up to operating temperature and check for loss of power or speed. If a loss of power or speed is evident, it will be necessary to disassemble and inspect the transaxle.

Note: Before removing and disassembling the transaxle note the condition of the cooling fan and cooling fins. Excessive debris buildup or a broken or loose fan will contribute to some of the following failures.



### Cooling Fan/Fins

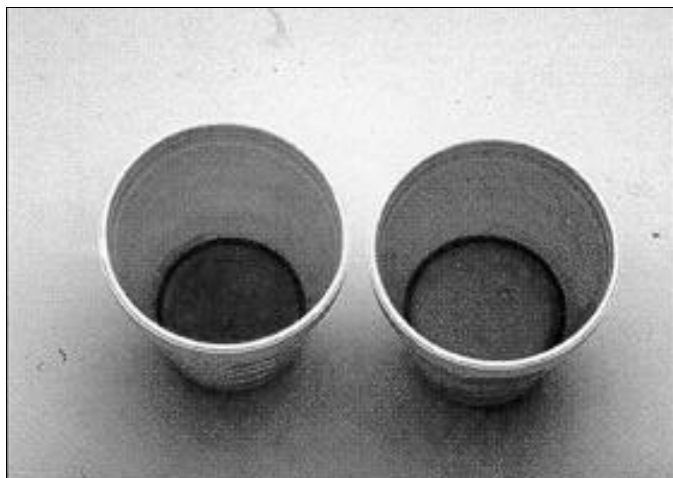
The transaxle is cooled by a fan located on the input shaft. The fan blows cool air across the cooling fins on the housing to keep the transaxle within operating temperature. If the fan is damaged or the fins have debris on/in them, the transmission will overheat. If the oil is black in color or has a burnt odor, damage to the cylinder block and center section may have occurred.



### Oil Condition

Drain the transmission while watching for signs of dirt or water in the oil. Black or burnt oil with metal flakes indicates excessive wear or damage in the transmission.

Verify the correct amount and type of oil were used. Operation with an incorrect amount or viscosity of oil may cause considerable damage.



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## INTERNAL INSPECTION (cont'd)

### Oil Filter

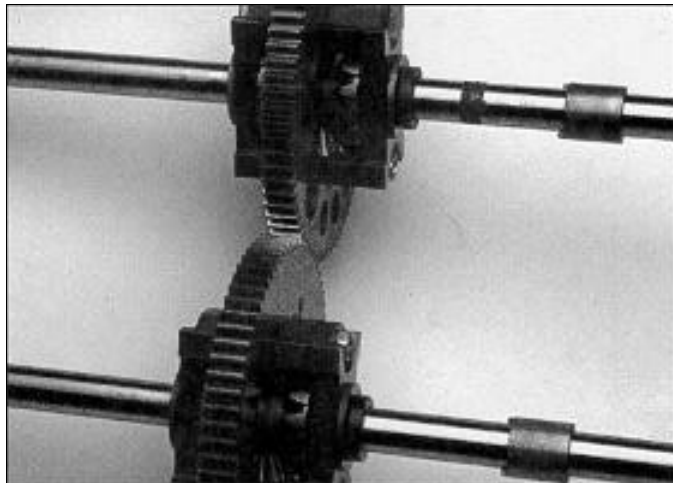
The oil filter is located on the top of the center section (with the transaxle upside down). It can only be serviced when the transaxle is disassembled. The filter should be clean and free of dirt and debris. If metal particles or excessive dirt are visible within the filter, inspect the unit for excessive wear. Always replace the filter before reassembly.



### Axles/Bushings

The axles and bushings are lubricated by a separate grease cavity located in the axle housing. They are greased at the factory and should only need lubrication when the transmission is disassembled.

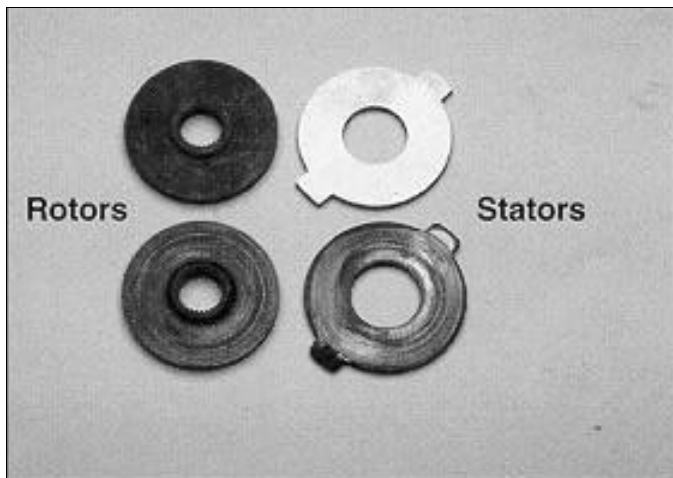
Excessive wear or corrosion on either the bushings or the axle would indicate contaminants in the grease cavity. Replace the axles and bushings as necessary. The grease and axle seals should always be replaced.



### Brakes

The brakes are located on the motor shaft within the transaxle. They are adjustable externally, but require the transaxle to be disassembled for replacement.

The stators (metal stationary disks) and rotors (composite rotating disks) should be free of deep grooves or signs of heat (bluing). These conditions indicate either brake linkage binding or improper braking habits of the operator. The stators and rotors should be replaced as an assembly.



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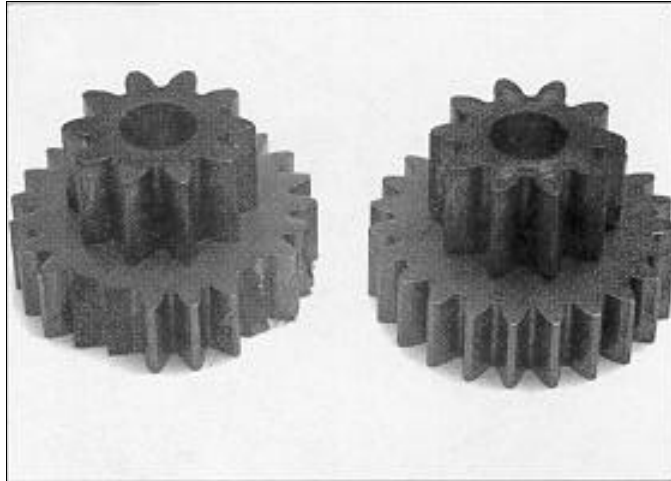
## INTERNAL INSPECTION (cont'd)

### Gears

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The gears used in Hydro-Gear transaxles are made of a powdered metal material and are very durable.

The differential set should rotate freely with no tight spots. Inspect the gears for broken or missing teeth. Replace worn/broken gears as a set since wear patterns will form with the damaged gears.

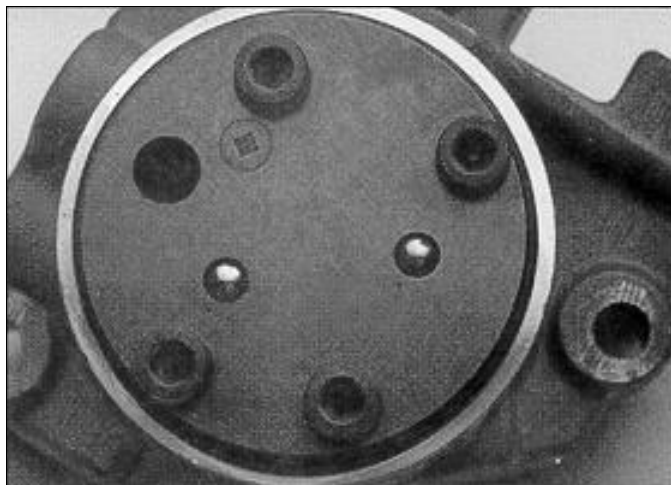


### Check Valves

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The check valves are located beneath the oil filter (with the transaxle upside down). Look for debris in the check valve area. The check balls should have a smooth surface and move freely.

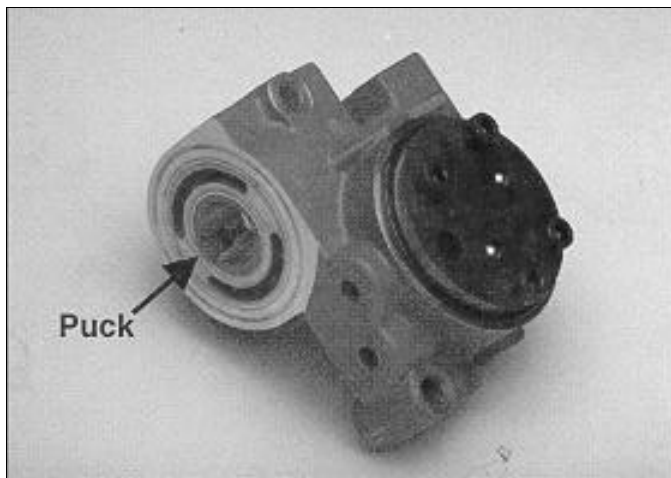
The check ball bypass orifice should also be inspected for dirt.



### Push Valve

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The push valve consists of a puck, that when actuated, lifts the motor assembly off of the center section. This lets the motor turn without creating any pressure. The puck and actuator arm should move freely and have no signs of wear.



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### INTERNAL INSPECTION (cont'd)

#### Cylinder Blocks and Center Section

The cylinder blocks are the most critical parts in the transaxle. Inspect both the pump and motor looking for signs of wear and scratches.

The machined surface should be free of excessive scratches or wear, no matter how small they may seem. (If your finger nail catches on a scratch, it's too large). The center section, where the cylinders blocks rotate, should also be smooth and free of wear. If any wear is present, replace all associated parts.

