Form No. 3403-493 Rev A

Wheel Motor Kit

Reelmaster® 5410, 5510, 5610 or Groundsmaster® 4300-D Traction Unit

Model No. 133-2955

Installation Instructions

⚠ WARNING

CALIFORNIA
Proposition 65 Warning

This product contains a chemical or chemicals known to the State of California to cause cancer, birth defects, or reproductive harm.

Important: These instructions cover the removal and installation of new wheel motors, wheel-motor components, and hydraulic filters. If the original traction-circuit components have been damaged, additional repairs and high-pressure hydraulic-system flushing must be performed prior to installing new wheel motors. Contact your local distributor for additional information.

⚠ WARNING

Hydraulic fluid escaping under pressure can have sufficient force to penetrate the skin and cause serious injury. If fluid is injected into the skin, it must be surgically removed within a few hours by a doctor familiar with this type of injury. Gangrene may result from such an injury.

Before disconnecting or performing any work on the hydraulic system, relieve all pressure in the system. Shut off the engine; lower or support all cutting units.

Keep your body and hands away from pinhole leaks or nozzles that eject hydraulic fluid under high pressure. Use paper or cardboard, not hands, to search for leaks.

⚠ CAUTION

If the machine is not properly supported, the machine may move or fall, which may result in personal injury.

When changing attachments or tires or performing other service, use correct blocks, hoists, and jacks. Make sure that the machine is parked on a solid, level surface such as a concrete floor. Prior to raising the machine, remove any attachments that may interfere with the safe and proper raising of the machine. Always ensure that the machine is secure from movement before you start to work on it. Use jack stands or other appropriate load-holding devices to support the raised machine.

8111 Lyndale Avenue South
Bloomington, MN 55420

Register at www.Toro.com.

CE

Original Instructions (EN)
Printed in the USA

3403-493 A

Inspecting the Wheel Motors

1. Park the machine on a level surface, engage the parking brake, lower the cutting units, and shut off the engine. Remove the key from the ignition switch.
2. Refer to Toro Service Bulletins LR08–35 and R08–41 for the list of machines with affected motors.
3. Inspect the wheel-motor serial plate (Figure 1). This can be viewed from beneath the machine.

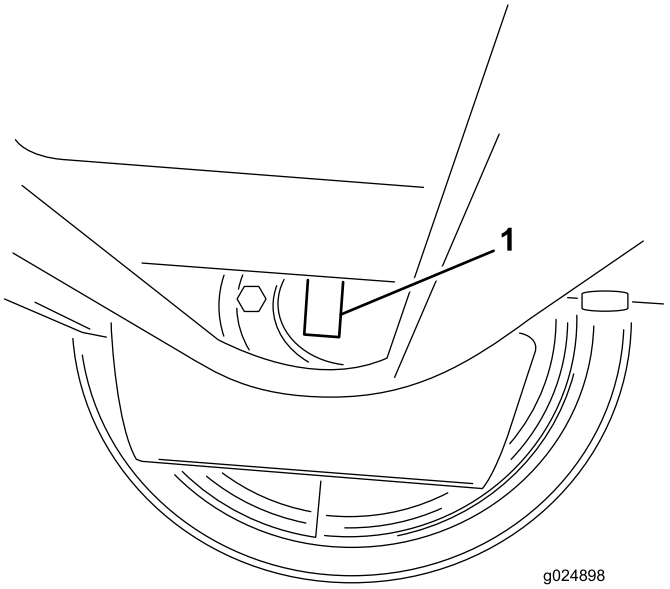

Figure 1

1. Wheel-motor serial plate

Note: The Julian date code (Figure 2) confirms whether the motor is part of the affected lot. Affected motors have a date code of 14311 to 19511.

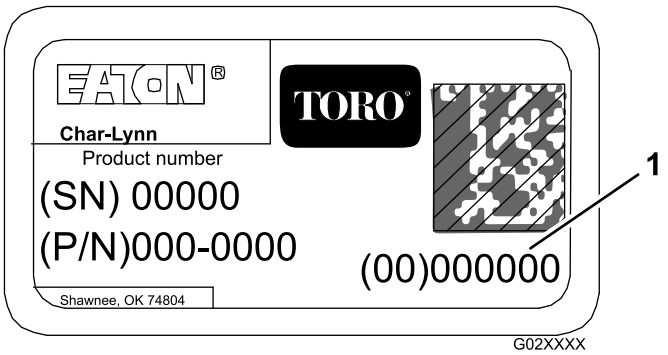

Figure 2

1. Julian date code

4. When an affected wheel motor is identified, photograph the serial plate. Submit the photo with the model and serial number information to TAC via PER case.

   Note: If the wheel motor is not within the affected range no further action is required.

Gathering the Necessary Tools

Note: The following special tools (or equivalent) are required to diagnose and repair affected units:

- Wheel-hub puller (Toro Part No. TOR6004)
- High-pressure filter kit (Toro Part No. TOR6011)
- Hydraulic hose kit (Toro Part No. TOR6007)
- 0 to 3450 kPa (0 to 500 psi) hydraulic pressure gauge
- 0 to 34500 kPa (0 to 5000 psi) hydraulic pressure gauge
- 542 N·m (400 ft-lb) torque wrench (or torque multiplier)
- Flow meter capable of measuring 114 L (30 US gallons) per minute (K-Line Part No. AT40004)
- Wheel-motor bypass components for repair: the following components are used in place of the wheel motors so that the circuits can be flushed without damaging the new wheel-motor assemblies. You can have the hydraulic hoses fabricated locally by a qualified shop or you can purchase Toro hydraulic lines. Refer to the Flushing and Filtering the Machine (page 6) in these instructions for additional details. The following components are required:

Toro Part Number	Description	Quantity
93-6834	Straight fitting	4
108-1686	Hydraulic-hose assembly	2

Testing the Machine

1. Remove the front wheels from the machine as follows:
   A. Ensure that the machine is secure from movement.
   B. Loosen the lug nuts on the front wheels.
   C. Using a jack, raise the machine so that the wheel is off the ground. Support the machine with jack stands. Refer to your *Operators Manual* for the proper jacking instructions.
   D. Release the parking brake.
   E. Remove the lug nuts and then remove the wheels and brake drums from the machine.
2. Remove the front wheel motors from the traction circuit by attaching a bypass hose at each wheel motor, positioning as shown in Figure 3. The bypass loop hose needs to be capable of handling 25000 kPa (3625 psi).

   Note: If the machine is equipped with CrossTrax (4-wheel drive), install 2 additional bypass hoses to the rear manifold, as shown in Figure 4.

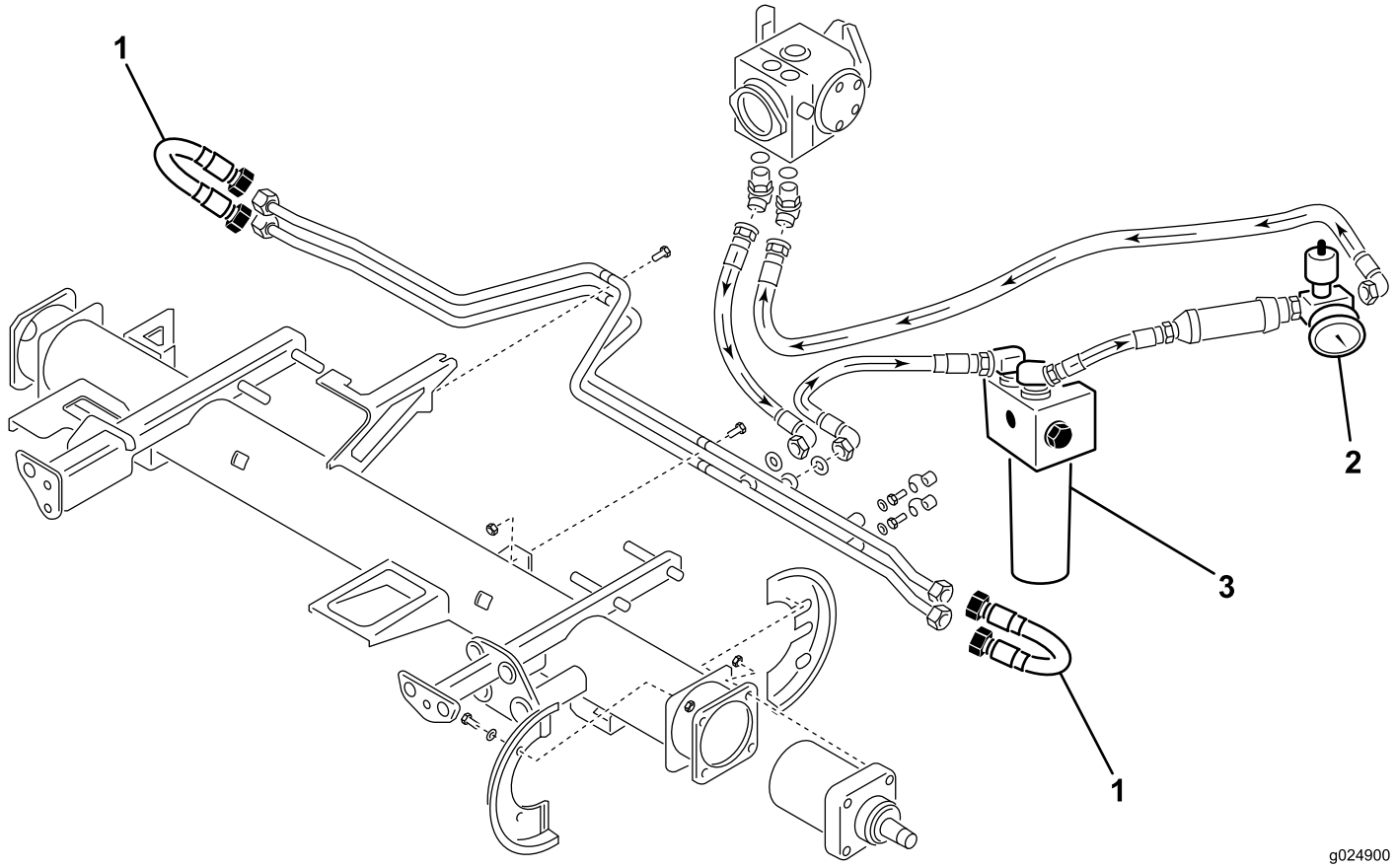

Figure 3
2-wheel drive shown

1. Bypass loop (2)
2. Flow meter
3. Filter

3. After all the loops are installed, install a high-pressure filter and flow meter capable of measuring 114 L (30 US gallons) per minute into the return line of the traction circuit as shown in Figure 3 and Figure 4.

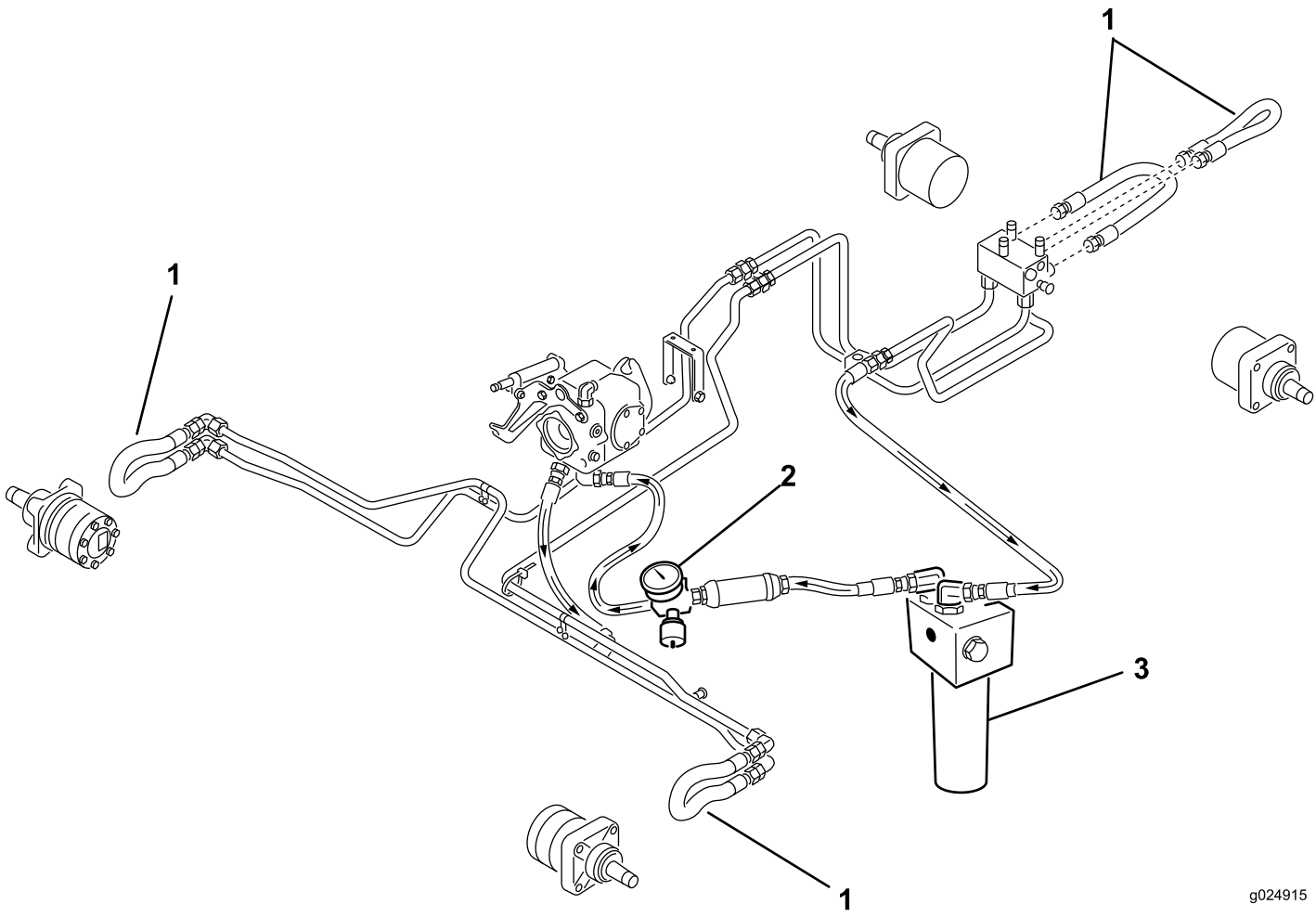

Figure 4
4-wheel drive shown

1. Bypass loop (4)
2. Flow meter
3. Filter

Important: When performing tests, do not operate the traction circuit in reverse.

4. Remove the smaller charge hydraulic filter-head assembly and install a 3450 kPa (500 psi) pressure gauge in line with the charge supply tube as shown in Figure 5. If the pressure gauge is part of a flow meter assembly, ensure that the flow meter is unrestricted before performing the following tests.

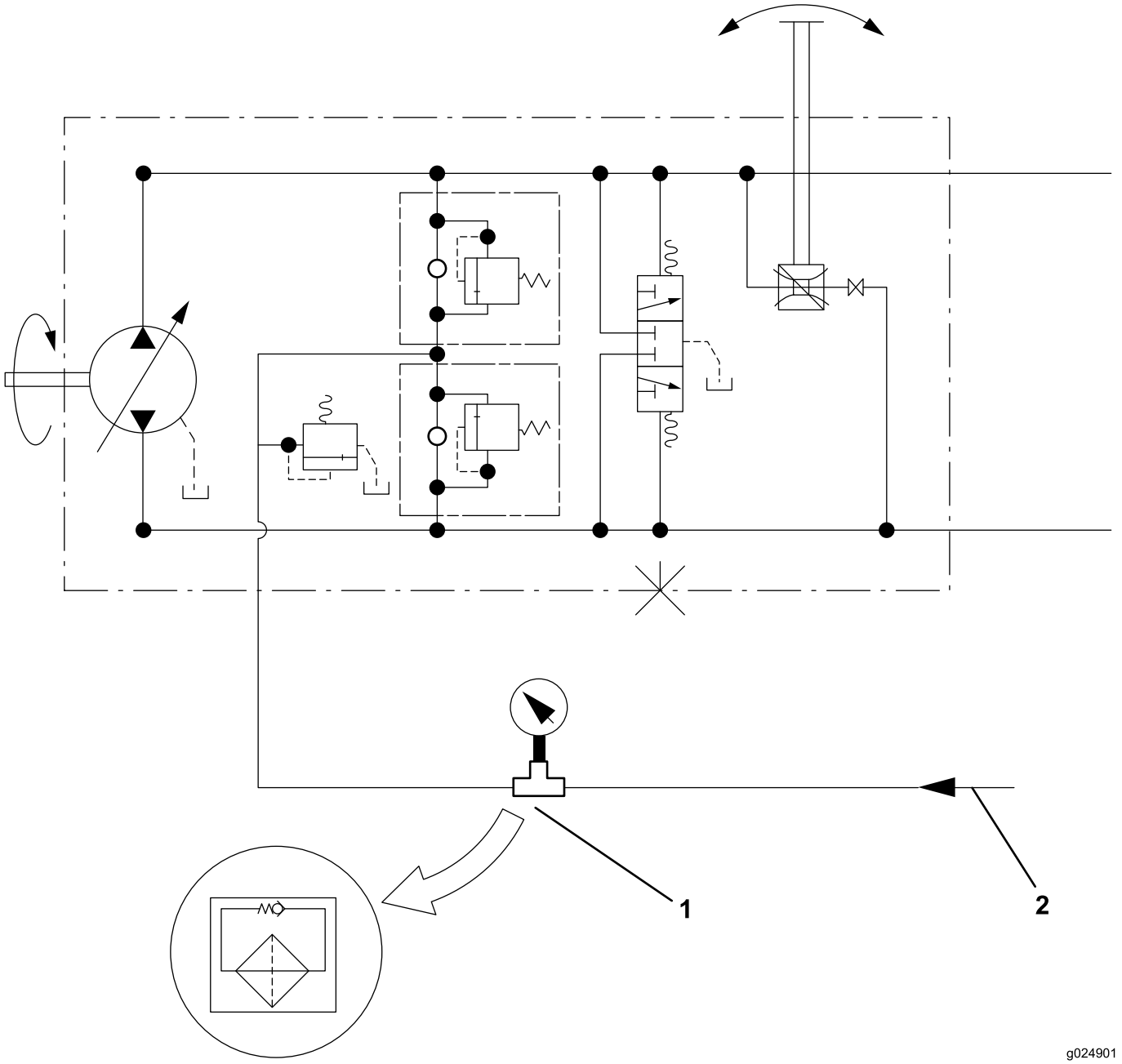

Figure 5

1. Pressure gauge (oil filter removed)
2. Flow from steering valve

Perform the following tests and record the results in the blank fields on this form. All hydraulic test results must be submitted to TAC when seeking approval for repairing any components in addition to the affected wheel motors.

5. With the machine securely on jack stands or a lift, ensure that all the wheels of the machine are off the ground. Start the engine and increase the engine speed to full throttle. Allow the machine to reach operating temperature.
6. Record the charge pressure reading with the machine in neutral. The charge pressure is _____ psi.
7. Step on the traction pedal in the forward direction. With the flow meter unrestricted there should be very little load on the hydrostat. Record the gallons per minute being pumped from the hydrostat, record the pressure on the traction loop flow meter and record the charge pressure.

   The hydrostat output is _____ L (_____ US gallons) per minute at _____ kPa (_____ psi) and the charge pressure is _____ kPa (_____ psi).
8. With the traction pedal fully depressed in the forward direction slowly restrict the flow meter in the traction loop until the pressure gauge on the flow meter reaches

6900 kPa (1000 psi). Record the output of the hydrostat and charge pressure.

The hydrostat output is _____ L (_____ US gallons) per minute at 6900 kPa (1000 psi) and the charge pressure is _____ psi.

9. Continue to restrict the flow meter in the traction loop until the gauge on the flow meter reads 13800 kPa (2000 psi). Record the output of the hydrostat and charge pressure.

   The hydrostat output is _____ L (_____ US gallons) per minute at 13800 kPa (2000 psi) and the charge pressure is _____ kPa (_____ psi).

10. Continue to restrict the traction loop flow meter until the traction pressure reaches relief, stops increasing, or the engine stalls. Record the pressure reading on the flow meter gauge.

    The hydrostat is capable of producing _____ kPa (_____ psi) of pressure.

11. If the hydrostat produced 76 L (20 US gallons) per minute or more at 6900 kPa (1000 psi), and the charge pressure was 1040 kPa (150 psi) or higher with a constant traction circuit pressure greater than 6900 kPa (1000 psi), proceed to Flushing and Filtering the Machine (page 6) as no further diagnostics are required.

12. If the hydrostat produced less than 76 L (20 US gallons) per minute at 6900 kPa (1000 psi) or, if charge pressure dropped below 517 kPa (75 psi) with traction pressures greater than 6900 kPa (1000 psi), the hydro will need to be rebuilt, but additional testing is required first. **Do not rebuild the hydro at this time.**

    Remove the flow meter from the traction circuit and install it onto the gear pump section P1 outlet. Measure the gear pump section P1 flow at 13800 kPa (2000 psi).

    The output of gear pump section P1 at 13800 kPa (2000 psi) is _____ L (_____ US gallons) per minute.

    If the gear pump flow is less than 20 L (5.4 US gallons) per minute on the Reelmaster 5410, less than 27 L (7.1 US gallons) per minute on the Reelmaster 5510/5610 or less than 41.6 L (11.0 US gallons) per minute on the Groundsmaster 4300, the gear pump needs to be replaced, but additional steps to flush the system are required first. **Do not replace the gear pump at this time.**

13. If the machine is configured with CrossTrax (4-wheel drive) and the hydrostat produced less than 76 L (20 gallons) per minute at 6900 kPa (1000 psi) or if charge pressure dropped below 520 kPa (75 psi) with traction pressures greater than 6900 kPa (1000 psi), the rear wheel motors also need to be replaced. **Do not replace them at this time.**

Flushing and Filtering the Machine

1. If the high-pressure filter and flow-meter assembly was moved to the gear pump for testing in step 13 in Testing the Machine (page 2), return it to the hydrostat loop as installed in step 4.

2. Remove the cutting-unit motors or back off the reel-to-bedknife adjustment on each reel to eliminate light contact. Lower the cutting unit arms to allow circuit engagement.

3. With the wheels of the machine off the ground, start the engine and increase the engine speed to full throttle.

4. Slowly press the traction pedal until it is fully pressed. Slowly close the flow meter until the pressure gauge reads 6900 kPa (1000 psi). Allow the tractor to run in this condition for 10 minutes.

   Note: This removes any remaining debris from the traction circuit.

5. Disengage the traction circuit and then engage the reel drive to clean the fluid in that circuitry. Allow it to run/filter for 10 minutes. After that time, shut off the engine

6. Drain the hydraulic reservoir but leave the tank in place.

   Note: Remove the large metal hydraulic-tank cap that is retained by screws on the top of the tank. Siphon or draw the remaining fluid from the tank. Use either a clean shop towel and/or wet vacuum to remove any metal debris from the bottom of the tank. Also, be sure that the surface of the suction screen is clean and free of debris. For severe contamination, the tank and strainer may have to be removed for cleaning and rinsing.

7. Disconnect the traction-circuit lines at the fittings and blow through the individual lines with compressed air to clear any remaining debris.

   Note: Use shop towels to catch oil and debris at the ends of the lines. 4-wheel-drive units require the removal of the relief valve and check valves within the 4-wheel-drive manifold in order to thoroughly clean the system.

Removing the Test Equipment

Remove high-pressure filter, the flow-meter assembly, and the charge-pressure gauge.

Removing the Old Components

1. Loosen, but do not fully remove, the locknut that secures the wheel hub to the wheel motor. Loosen the locknut at least 2 turns. This prevents the hub from flying off as the taper releases.

   Important: Do not hit the wheel hub, puller, or wheel motor with a hammer during removal or installation of the wheel hub. Hammering may cause damage to the wheel motor.

2. Use a appropriate puller (Toro Part No. TOR6004) to loosen the wheel hub from the wheel motor.
3. Remove the locknut and wheel hub from the motor shaft.
4. Remove the 4 screws securing the brake assembly to the brake adapter. Remove the brake assembly.

   Note: There is no need to remove the brake cable from the brake assembly.

5. Thoroughly clean the hydraulic line ends and fittings on the wheel motor to prevent contaminating the hydraulic system.
6. Label the hydraulic connections at the wheel motor for assembly purposes.
7. Disconnect the hydraulic lines from the fittings on the wheel motors. Allow the lines to drain into a suitable container.
8. Put caps or plugs on the disconnected lines and fittings to prevent contamination.
9. Support each wheel motor to prevent them from falling.
10. Remove the 4 locknuts securing the brake adapter, wheel motor and spring clip to the frame.
11. Remove the brake adapter, wheel motor, and brake spring bracket from the machine.
12. Note the orientation of the fittings to simplify the installation on the new motor assemblies. Remove the fittings from the motor and discard the O-rings.

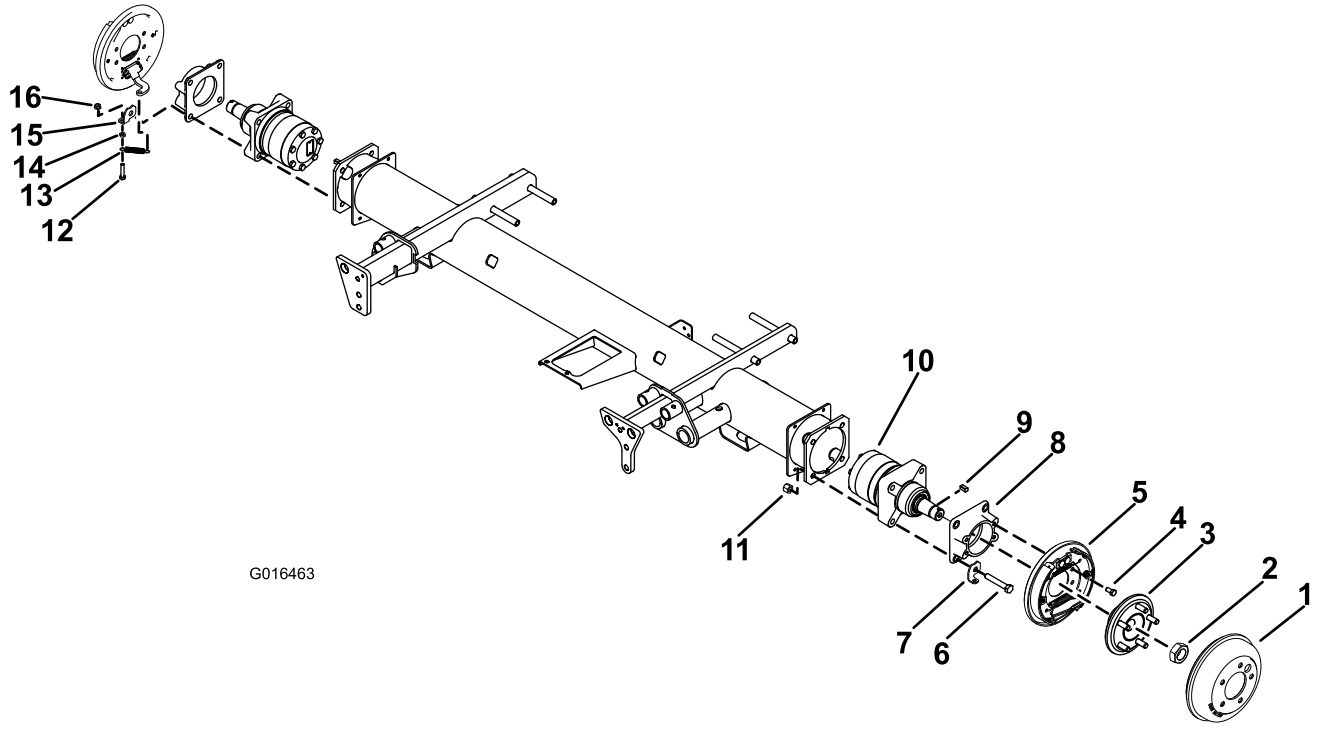

Figure 6

1. Brake drum
2. Hex nut
3. Hub assembly
4. Screw (3/8 x 3/4 inch)
5. Brake assembly (left)
6. Screw (1/2 x 3 inch)
7. Brake spring bracket or spring clip (left)
8. Brake adapter
9. Square key
10. Wheel motor (left)
11. Locknut (1/2 inch)
12. Screw (5/16 x 1-1/2 inch)
13. Extension spring
14. Jam nut (5/16 inch)
15. Brake spring bracket or Spring clip (right)
16. Flange nut (5/16 inch)

Installing the New Components

1. Lubricate and install the new O-rings onto the fittings previously removed from the wheel motors.
2. Install the fittings into the wheel motor ports, orientating them as noted in the removal process.

   Note: The left wheel motor is identified with either a yellow dot or with a ring machined into the shaft of the motor, shown in Figure 7.

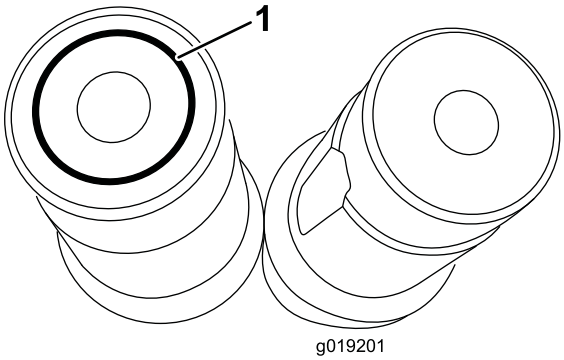

Figure 7

1. Machined ring in shaft

3. Position the wheel motor to the frame. Mount the spring clip, the brake adapter, and the wheel motor to the frame with 4 cap screws (1/2 x 3 inch).
4. Install and tighten the 4 locknuts (1/2 inch) onto the cap screws to secure the motor, the brake adapter, and the spring clip to the frame.

   Note: Torque the screws to 91 to 113 N·m (67 to 83 ft-lb). Make sure that the spring clip is positioned as shown in figure Figure 6.
5. Mount the brake assembly to the brake adapter with 4 cap screws (3/8 x 3/4 inch). Torque the capscrews to 27 to 45 N·m (27 to 33 ft-lb).
6. Thoroughly clean the wheel-motor shaft and the wheel-hub taper. **Do not apply anti-seize compound or grease to the hub or the wheel-motor shaft.**
7. Install the square key into the key slot of the wheel-motor shaft. Align the wheel hub with the square key and slide the wheel hub onto the motor shaft. Secure the hub with the locknut. Torque the locknut to 549 to 671 N·m (405 to 495 ft-lb).

   Important: Use of a torque multiplier with a standard torque wrench is not recommended, but is a possible alternative to having a torque wrench capable of 678 N·m (500 ft-lb).
8. Remove the caps or plugs from the disconnected hydraulic lines and fittings.
9. Secure the brake cable clevis to the brake actuator lever with a clevis pin and a cotter pin, if previously removed.
10. Install the brake drum, front wheel, and extension spring to the machine. Torque the lug nuts to 95 to 122 N·m (70 to 90 ft-lb).
11. Repeat the procedure on the opposite wheel motor.

Updating the Components

As Required

- Rebuild the Hydrostat. Use kit 120-6285 (Kit – Repair, Hydrostat). Upon disassembly of the hydrostat, photograph the damage and submit with hydraulic test results. Refer to the Service Manual for hydrostat rebuild instructions.
- If the gear pump failed the hydraulic tests, disassemble and photograph the components shown on the following page and submit them with the test results. Replace the gear pump. Refer to the service manual for the instructions on replacing the gear pump.
- If testing on a CrossTrax (4-wheel-drive) machine indicated the rear motors need to be replaced, do so at this time. To replace the rear motors, follow the procedure for replacing the front wheel motors, which is very similar.

Replacing the Hydraulic Filters

Replace the hydraulic filters as follows:

1. Clean the area around the charge circuit/steering filter (Toro Part No. 86-3010) mounting area and place a drain pan under the filter.
2. Remove the filter.
3. Lubricate the gasket on the new filter with hydraulic oil.
4. Ensure that the filter mounting area is clean.
5. Install the filter by hand until the gasket contacts the mounting surface, then rotate it an additional 1/2 turn.
6. Repeat the procedure on the reservoir filter (Toro Part No. 94-2621).
7. Start the engine and let it run for about 2 minutes to purge air from the system.
8. Shut off the engine and check for leaks.

Rebuilding the Hydraulic Reservoir

1. Assemble components to the hydraulic reservoir.
2. Ensure that all hydraulic lines have been assembled and tightened.
3. Fill the hydraulic reservoir with new fluid.

Completing the Installation

1. Check the level of the hydraulic fluid and replenish the fluid as needed.
2. Test run the machine for a short period to check all connections for leaks prior to installing the wheels.
3. Check the level of the hydraulic fluid again and replenish the fluid as needed.
4. Install the wheels.
5. Remove the jack stands and test drive the machine to check the performance.

Submitting the Information

Via PER case, submit the following items:

- Model and serial number
- Legible, clear photos of the previously removed wheel-motor serial tags
- All hydraulic pressure and flow measurements logged in steps 7 through 13 in Testing the Machine (page 2).
- Photographs of damaged components (if needed)

Notes:

Notes:

Count on it.