Form No. 3323-263

# Broom

## Sitework Systems Attachment

**Model No. 22415—990001 & Up**

PROTOTYPE

## Operator's Manual

English (CE)

# Contents



# Introduction

We want you to be completely satisfied with your new product, so feel free to contact your local Authorized Service Dealer for help with service, genuine replacement parts, or other information you may require.

Whenever you contact your Authorized Service Dealer or the factory, always know the model and serial numbers of your product. These numbers will help the Service Dealer or Service Representative provide exact information about your specific product. You will find the model and serial number on a plate located on the product. For your convenience, write the product model and serial numbers in the space below.

**Model No:** _____

**Serial No.** _____

The warning system in this manual identifies potential hazards and has special safety messages that help you and others avoid personal injury, even death. DANGER, WARNING and CAUTION are signal words used to identify the level of hazard. However, regardless of the hazard, be extremely careful.

**DANGER** signals an extreme hazard that will cause serious injury or death if the recommended precautions are not followed.

**WARNING** signals a hazard that may cause serious injury or death if the recommended precautions are not followed.

**CAUTION** signals a hazard that may cause minor or moderate injury if the recommended precautions are not followed.

Two other words are also used to highlight information. “Important” calls attention to special mechanical information and “Note” emphasizes general information worthy of special attention.

The left and right side of the machine is determined by standing in the normal operator’s position.

# Safety

**Improper use or maintenance by the operator or owner can result in injury. To reduce the potential for injury, comply with the safety instructions in the traction unit operator’s manual and always pay attention to the safety alert ⚠ symbol, which means CAUTION, WARNING, or DANGER—“personal safety instruction.” Failure to comply with the instruction may result in personal injury or death.**




**8111 Lyndale Ave. South**
**Bloomington, MN 55420–1196**

**WARNING**

**POTENTIAL HAZARD**
- **Contact with rotating bristles may cause injury.**

**WHAT CAN HAPPEN**
- **Rotating bristles can injure hands, feet or other body parts.**

**HOW TO AVOID THE HAZARD**
- **Keep your hands, feet, and any other part of your body or clothing away from rotating parts.**
- **Before adjusting, cleaning, repairing and inspecting the broom, lower the broom to the ground and stop the engine. Remove the key.**

**WARNING**

**POTENTIAL HAZARD**
- **Small stones, dirt clumps, or other debris may be thrown during sweeping.**

**WHAT CAN HAPPEN**
- **Serious injury may result.**

**HOW TO AVOID THE HAZARD**
- **Keep children and bystanders out of the work area.**
- **Always wear safety glasses or goggles when operating the broom.**

**WARNING**

**POTENTIAL HAZARD**
- **When the engine is off, attachments in the raised position can gradually lower.**

**WHAT CAN HAPPEN**
- **Someone nearby may be pinned or injured by the attachment as it lowers.**

**HOW TO AVOID THE HAZARD**
- **Always lower the attachment lift each time you shut off the traction unit.**

## Safety Decals

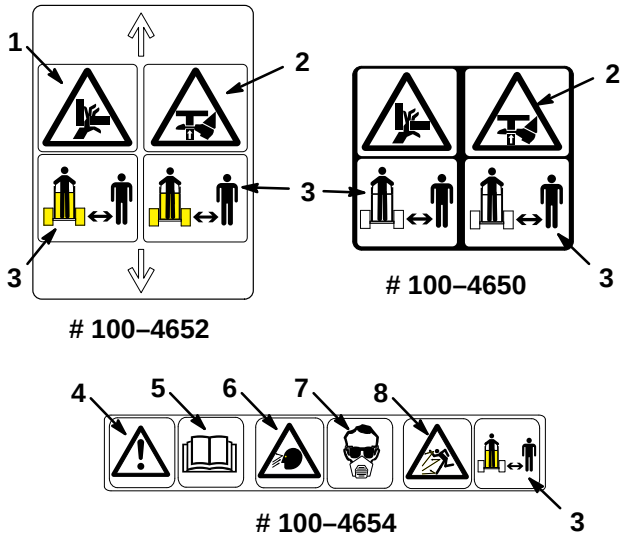



**Figure 1**

1. Pinching/crushing hazard—hand
2. Pinching/crushing hazard—foot
3. Keep bystanders away
4. Safety alert symbol
5. Read operator's manual
6. Thrown object hazard—face
7. Wear eye and breathing protection
8. Thrown object hazard—whole body



# Specifications

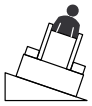
**Note:** Specifications and design are subject to change without notice.

| | |
|---|---|
| Width | 53 inches (135 cm) |
| Length | 40 inches (102 cm) |
| Height | 50 inches (127 cm) |
| Weight | 476 lbs (216 Kg) |

| | |
|---|---|
| Maximum swing angle | 25 degrees |
| Sweeping width<br>with no swing rotation<br>With 25 degree swing rotation | <br>48 inches (122 cm)<br>42 inches (106.6 cm) |
| Broom diameter | 24 inches (51 cm) |
| Number of brushes | 27 |
| Brush material | Polypropylene and/or steel |
| Brush rotation speed | 150 rpm |
| Hydraulic drive | Direct drive, 11.9 cu. in. (195 cc) geroler motor |
| Castor wheels | Two 8.5 in. (21.5 cm) x 3.5 in. (8.9) pneumatic tires |

## Stability Ratings

To determine the degree of slope you can traverse with the broom installed on a traction unit, find the stability rating for the hill position you want to travel in the table below, then find the degree of slope for the same rating and hill position in the Stability Data section of the traction unit operator's manual.

| Orientation | Stability Rating |
|---|---|
| **Front Uphill**  | C |
| **Rear Uphill**  | C |
| **Side Uphill**  | C |

**Note:** On traction units with a rear operator platform, the broom is rated for use without the counterweight. If you use the counterweight with the broom, the traction unit will be less stable in the front and side uphill positions.

**WARNING**

**POTENTIAL HAZARD**
- **Exceeding the maximum recommended slope can cause the traction unit to tip.**

**WHAT CAN HAPPEN**
- **If the traction unit tips, you or bystanders could be crushed.**

**HOW TO AVOID THE HAZARD**
- **Do not drive the traction unit on a slope steeper than the maximum recommended slope, as determined in the previous table and the traction unit operator's manual.**

# Installation

## Loose Parts

**Note:** Use the chart below to identify parts for assembly.

| DESCRIPTION | QTY. | USE |
|---|---|---|
| Pivot frame | 1 | Assemble broom |
| Broom head | 1 | |
| Attachment frame | 1 | |
| Swing arm | 1 | |
| Bolt, 3/4 in. (1.9 cm) x 10 1/2 in. (26.7 cm) | 1 | |
| Nut, 3/4 in. (1.9 cm) | 4 | |
| Thrust washer, large | 1 | |
| Pivot cap | 2 | |
| Bolt, 3/4 in. (1.9 cm) x 4 in. (10 cm) | 2 | |
| Spacer | 4 | |

## Assembling the Broom

1. Slide the thrust washer and the pivot frame onto the shaft on the back of the broom head (Fig. 2)
2. Secure the pivot frame with a pivot cap, 3/4 in. (1.9 cm) x 10 1/2 in. (26.7 cm) bolt, and 3/4 in. (1.9 cm) nut (Fig. 2).

**Note:** Ensure that the pivot frame rotates around the shaft. If it cannot, the bolt and nut are too tight.

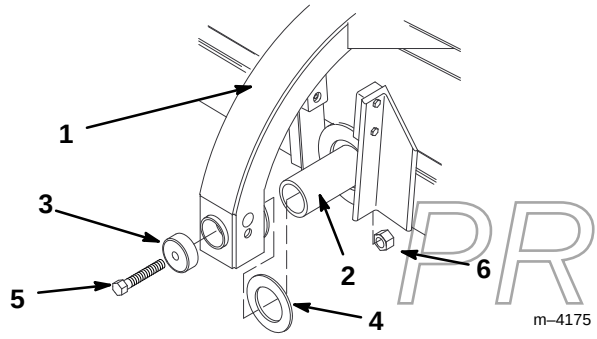



**Figure 2**

1. Pivot frame
2. Shaft
3. Pivot cap
4. Thrust washer
5. Bolt, 3/4 in. (1.9 cm) x 10 1/2 in. (26.7 cm)
6. Nut, 3/4 in. (1.9 cm)

3. Lubricate the shaft on the top of the pivot frame (Fig. 3) with a corrosion resistant, calcium-sulphonate based grease.
4. Slide the attachment frame onto the shaft on the top of the pivot frame (Fig. 3).
5. Secure the attachment frame with a pivot cap and 3/4 in. (1.9 cm) nut (Fig. 3).

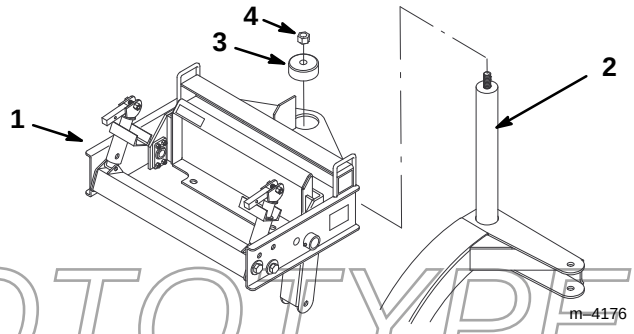



**Figure 3**

1. Assembly frame
2. Shaft
3. Pivot cap
4. Nut, 3/4 in. (1.9 cm)

6. Torque the nut to 265 ft·lbs (359 Nm).
7. Connect the swing arm to the swing bracket on the pivot frame with two spacers, a 3/4 in. (1.9 cm) x 4 in. (10 cm) bolt, and a 3/4 in. (1.9 cm) nut (Fig. 4). Torque to 265 ft·lbs (359 Nm).

**8.** Route the hydraulic hoses through the ring on the back of the pivot frame (Fig. 4)

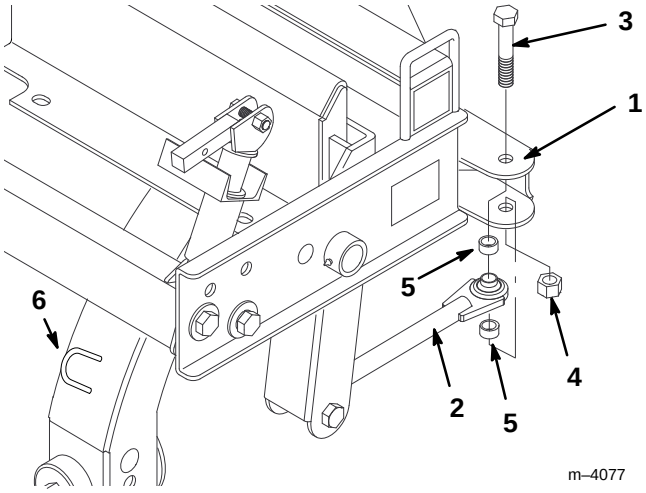



**Figure 4**

1. Swing bracket
2. Swing arm
3. Bolt, 3/4 in. (1.9 cm) x 4 in. (10 cm)
4. Nut, 3/4 in. (1.9 cm)
5. Spacer
6. Ring

**9.** Thread the clamp levers into the clamp bases until they are approximately 1/4 in. (0.6 cm) from the rubber springs (Fig. 5)

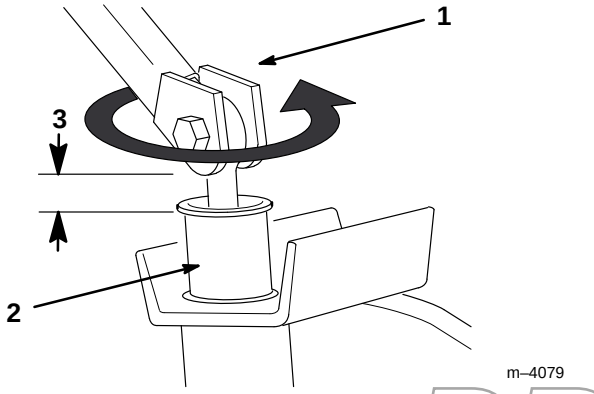



**Figure 5**

1. Clamp lever
2. Rubber spring
3. 1/4 in. (0.6 cm)

# Greasing the Broom

Before using the broom for the first time, grease all of the fittings and the loader arm clamps; refer to Greasing and Lubrication, page 10.

# Checking Castor Tire Pressure

Before using the broom, ensure that the castor tires are filled to 50 psi (344.75 kPa).

# Installing the Broom on the Traction Unit

**IMPORTANT: Before connecting any attachments to machine, make sure mount plates are free of any dirt or debris.**

**1.** Position the broom on a level surface with enough space behind it to accommodate the traction unit.

**2.** Start the engine.

**3.** Tilt the attachment mount plate forward.

**4.** Lift the loader arms so the mount plate is above the rear beam on the broom.

**5.** Drive forward, positioning the mount plate into the upper lip of the receiver plate (Fig. 6).

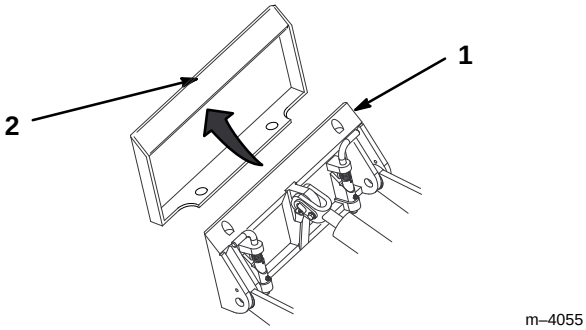



**Figure 6**

1. Mount plate
2. Receiver plate

**6.** Tilt the mount plate back until the receiver plate contacts the mount plate

**7.** Engage the attachment lock pins (Fig. 7).

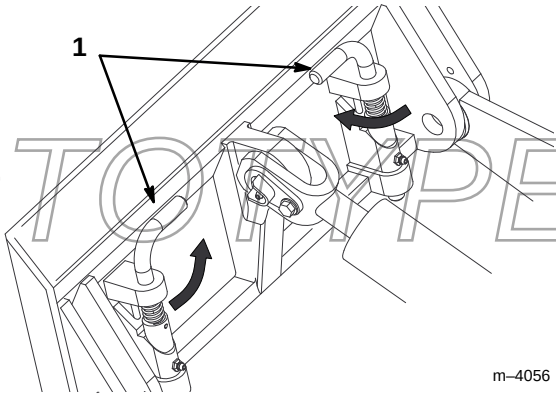



**Figure 7**

1. Attachment lock pins (shown in engaged position)

**8.** Raise the broom about 6 in. (15 cm) off the ground.

**9.** Remove the front legs/clamp levers (Fig. 8).

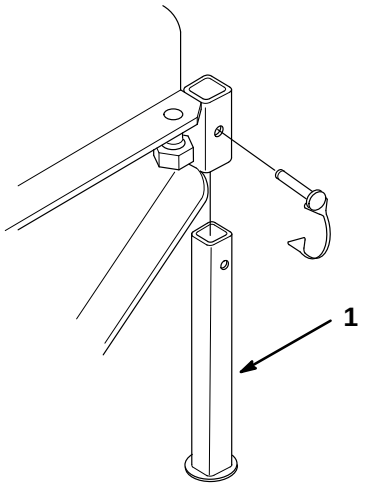



**Figure 8**

1. Front leg/clamp lever

**10.** Install the clamp levers on the loader arm clamps and secure them with latch pins (Fig. 9).

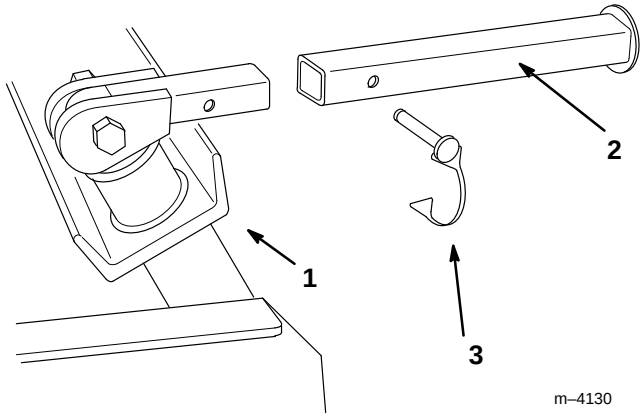



**Figure 9**

1. Loader arm clamp
2. Clamp lever
3. Latch pin

**11.** If necessary, release the loader arm clamps by swinging the clamp levers up and over the clamps.

**WARNING**

**POTENTIAL HAZARD**

- **The loader arm clamps are spring loaded and can propel the clamp levers up and forward at great speeds when released.**

**WHAT CAN HAPPEN**

- **The clamp lever could strike you or a bystander causing severe injury.**

**HOW TO AVOID THE HAZARD**

- **Ensure that you do not stand in the path of the clamp lever and that all bystanders are clear of the area.**

**12.** Swing the loader arm clamps over the loader arms and secure them by pulling the clamp levers down and back (Fig. 10).

**Note:** Ensure that the rubber spring is compressed approximately 1/4 in. (0.6 cm) when the clamp is secured.

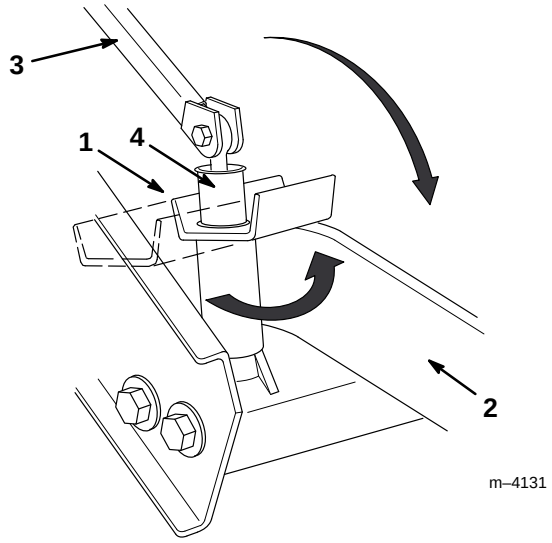



**Figure 10**

1. Loader arm clamp
2. Loader arm
3. Clamp lever
4. Rubber spring

## Connecting the Hydraulic Hoses

**WARNING**

**POTENTIAL HAZARD**
- **Hydraulic fluid escaping under pressure can penetrate skin and cause injury.**

**WHAT CAN HAPPEN**
- **Fluid accidentally injected into the skin must be surgically removed within a few hours by a doctor familiar with this form of injury or gangrene may result.**

**HOW TO AVOID THE HAZARD**
- **Keep body and hands away from pin hole leaks or nozzles that eject high pressure hydraulic fluid.**
- **Use cardboard or paper to find hydraulic leaks, never use your hands.**

1. Stop the engine.
2. Move the auxiliary hydraulic lever forward, backward, and back to neutral position to relieve hydraulic pressure at the hydraulic couplers.

**IMPORTANT: Ensure that all foreign matter is cleaned from hydraulic connections before making connections.**

3. Remove protective covers from hydraulic couplers on the traction unit. Connect covers together to prevent contamination during operation.
4. Slide collar back on hydraulic coupler and connect attachment couplers to machine couplers.
5. Confirm that connection is secure by pulling on hoses.

## Removing the Broom from the Traction Unit

1. Start the engine and lower the broom to the ground or onto a trailer.
2. Slide collar back on hydraulic couplers and disconnect them.
3. Install protective covers onto the hydraulic couplers on the traction unit.

**IMPORTANT: Connect attachment hoses together to prevent hydraulic system contamination during storage.**

4. Swing the clamp levers up to release the loader arm clamps.

**WARNING**

**POTENTIAL HAZARD**
- **The loader arm clamps are spring loaded and can propel the front legs up and forward at great speeds when released.**

**WHAT CAN HAPPEN**
- **The front leg could strike you or a by stander causing severe injury.**

**HOW TO AVOID THE HAZARD**
- **Ensure that you do not stand in the path of the front leg and that all bystanders are clear of the area.**

5. Swing the clamps off of the loader arms.
6. Remove the front legs/clamp levers from the loader arms.
7. Raise the broom about 6 in. (15 cm) off of the ground, and install the front legs in front of the broom.
8. Lower the broom to the ground.
9. Disengage the attachment lock pins by turning them to the outside.
10. Start the engine, tilt the mount plate forward and back the traction unit away from the drive head.

## Adjusting the Downward Pressure of the Broom

Improper downward pressure can decrease broom life up to 95% (depending on the incorrect amount of pressure).

A broom sweeps with the tips of its bristles. When too much down pressure is applied, the broom is no longer using it's tips; the broom is now working with the sides of the bristles. This limits the flicking action of the bristles and limits it's sweeping effectiveness.



To check for correct downward pressure, operate the broom on the ground, rotating at normal operating speed with traction unit remaining stationary. Stop and raise the broom. Measure the width of swept area (Fig. 11). A properly adjusted broom will have a sweeping path width of 2 to 4 inches (5 to 10 cm).

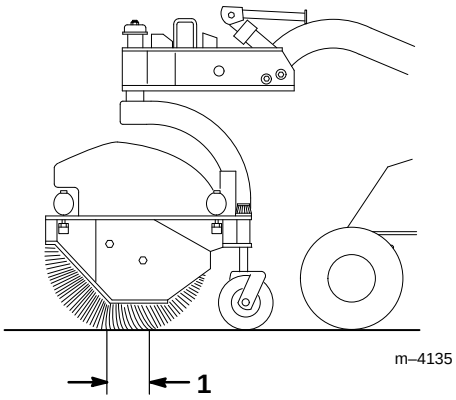



**Figure 11**

1. 2 to 4 inches (5 to 10 cm)

Adjust castor height for proper broom ground pressure. The castor wheel height is adjustable from 4 to 7 inches (10 to 18 cm) in 1/2 inch (1.2 cm) increments by adding or removing an equal amount of spacers from each castor wheel.

**1.** Start the engine and raise the broom.

**2.** Stop the engine.

**3.** Remove the cap securing the castor spindle to the frame bracket (Fig. 12).

**4.** Move desired amount of spacers to the top or bottom of the bracket (Fig. 12). Ensure that the spacers are equal on both castor wheels and that a thrust washer is positioned on each side of the frame bracket.

**5.** Install the cap and lower the broom (Fig. 12).

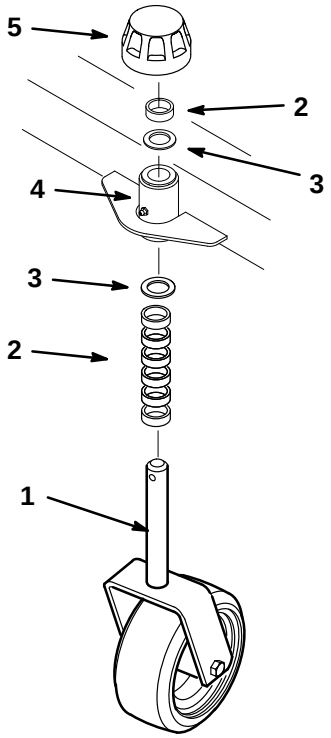



**Figure 12**

1. Castor spindle
2. Spacers
3. Thrust washer
4. Frame bracket
5. Cap

# Operation

**Note:** Always use the traction unit to lift and move the attachment.

To operate the broom, pull the auxiliary hydraulics lever to the operator grip and hold it there.

## Tips for Sweeping



- If ground speed is too fast, debris will pile up in front of the broom, causing it to bulldoze instead of sweep. This can damage the broom.
- More pressure will not give a better sweep, but it will wear out the broom faster.
- A level broom lasts longer.

- When sweeping, try to keep the flange on the top of the pivot pin level with the gage plate (Fig. 13). This will allow you adequate room for movement if you run over bumps or low areas.

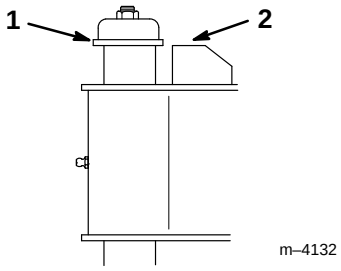



**Figure 13**

1. Pivot pin
2. Gage plate

# Maintenance

## Service Interval Chart

| Service Operation | Each Use | 8 Hours | 200 Hours | Storage Service | Notes |
|---|---|---|---|---|---|
| Main pivot shaft–lubricate | X | | | X | |
| Grease fittings | | X | | X | |
| Change brushes | | | | | As required |
| Replace castor fork bushings | | | X | | |
| Replace castor wheel bearings | | | | | When the castor wheel is wobbly. |
| Chipped surfaces–paint | | | | X | |

**CAUTION**

**POTENTIAL HAZARD**
- **If you leave the key in the ignition switch, someone could start the engine.**

**WHAT CAN HAPPEN**
- **Accidental starting of the engine could seriously injure you or other bystanders.**

**HOW TO AVOID THE HAZARD**
- **Remove the key from the ignition switch before you do any maintenance.**



## Greasing and Lubrication

### Service Interval/Specification

Grease one fitting on the broom pivot shaft (Fig. 14) with a corrosion resistant, calcium-sulphonate based grease before each use. Grease 8 other fittings, located on each castor shaft (Fig. 15, only one side shown), on the right of the the axle (Fig. 16), on the motor/axle linkage (Fig. 17), on the right and left arms (Fig. 18, only one side shown), and on the loader arm clamps (Fig. 9, only one side shown), every 8 operating hours. Grease all fittings immediately after every washing.

Grease Type: corrosion resistant, calcium-sulphonate based grease (pivot shaft only) and general-purpose grease (all other fittings).

## Fitting Locations

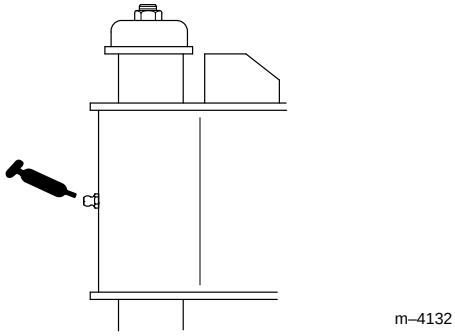



**Figure 14**

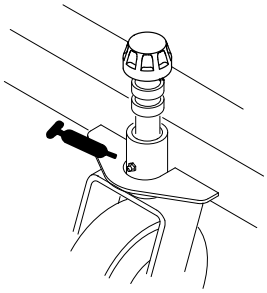


**Figure 15**

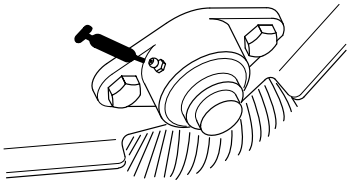



**Figure 16**

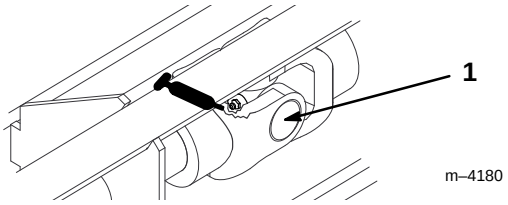



**Figure 17**

1. Knuckle joint inside the broom axle

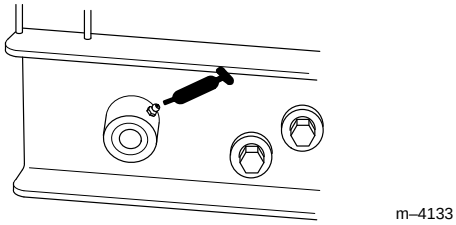



**Figure 18**

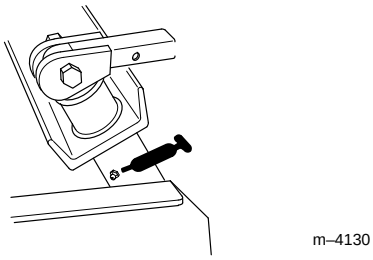



**Figure 19**

## How to Grease

1. Lower the broom/loader arms and stop the engine. Remove the key.
2. Clean the grease fittings with a rag.
3. Connect a grease gun to the fittings.
4. Pump grease into the fittings until grease begins to ooze out of the bearings.
5. Wipe up any excess grease.

# Changing Brushes

The axle of the broom holds 27 removable brushes. In Summer, install all polypropylene brushes. In the Winter, alternate polypropylene and steel brushes to aid in removing hard packed snow and ice.

1. Remove the two bolts securing the side guard plate and remove the plate (Fig. 20).
2. Remove the two bolts securing the hydraulic motor housing (Fig. 20)

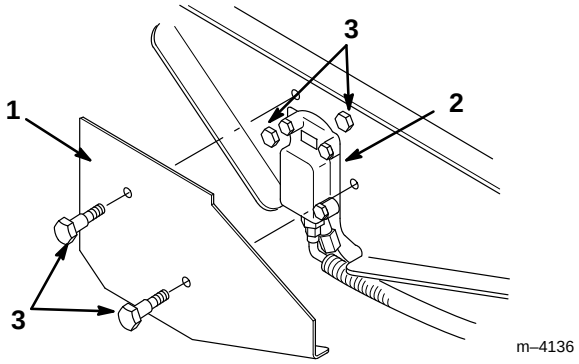



**Figure 20**

1. Side guard plate
2. Hydraulic motor and motor housing
3. Remove

3. Carefully remove the hydraulic motor and motor housing with the axle attached.
4. Loosen the two bolts securing the axle locking collar. (Fig. 21).

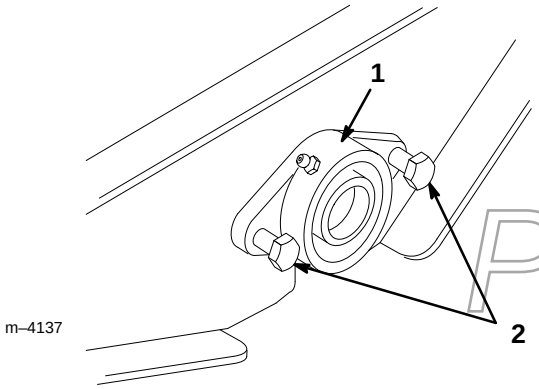



**Figure 21**

1. Axle locking collar
2. Loosen

5. Remove the three bolts and washers securing the axle plate on the axle and remove the plate (Fig. 22)
6. Slide the brushes off of the axle assembly (Fig. 22).
7. Slide a new brush onto the axle assembly so the alignment pins of the brush ride over **the bottom** bar of the axle assembly (Fig. 22).
8. Rotate the next brush 180° from side to side and top to bottom and slide it onto the axle assembly so the alignment pins of the brush ride over **top** bar of axle assembly (Fig. 22).

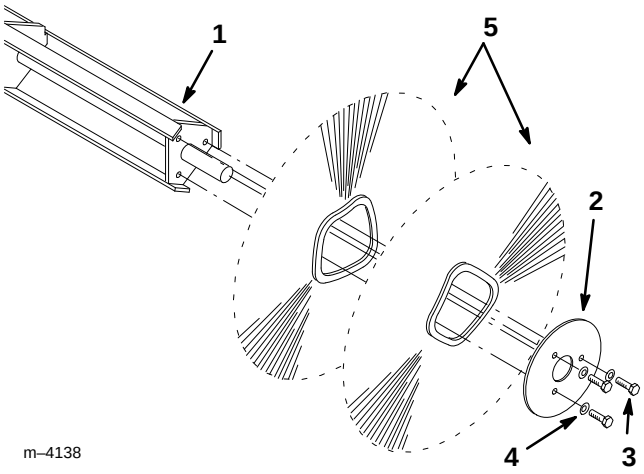



**Figure 22**

1. Axle
2. Axle plate
3. Bolt (3)
4. Washer (3)
5. Brushes

9. Repeat steps 7 and 8 until all brushes are installed.
10. Replace the axle plate and secure it with the bolts and washers removed in step 5.
11. Secure the axle locking collar.
12. Slide the hydraulic motor and motor housing into position and secure it with the bolts removed in step 2.
13. Install the side guard and secure it with the bolts removed in step 1.



# Replacing the Castor Fork Bushings

After many hours of operation, the bushings pressed into the top and bottom of the frame bracket will wear. To check the bushings, move the castor fork fore and aft and from side to side. If the castor spindle is loose in the bushings, the bushings are worn and must be replaced.

1. Start the engine and raise the broom to highest possible position.
2. Install the cylinder locks then stop the engine.
3. Remove the cap and thrust washers from top of castor spindle.

4. Pull the castor spindle out of the bracket, allowing the thrust washers to remain on the bottom of the spindle.

5. Using a pin punch, drive the bushings out of the bracket (Fig. 23).

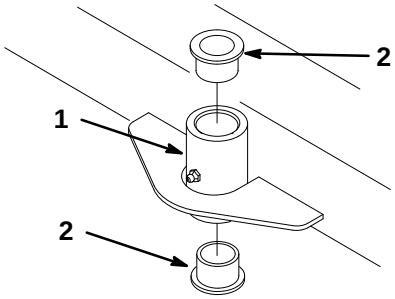



**Figure 23**

1. Frame bracket
2. Bushing

6. Clean inside of the bracket to remove any dirt.

7. Apply grease to the inside and outside of the new bushings.

8. Using a hammer and a flat plate, drive the bushings into the bracket (Fig. 23)

9. Inspect the castor shaft for wear and replace it if necessary.

10. Install the castor spindle into the bracket, place the thrust washers onto the spindle, and secure it with the cap.

## Servicing a Castor Wheel

When a castor wheel becomes wobbly, it usually indicates that the wheel bearings are worn. Perform this procedure to fix a wobbly castor wheel.

1. Start the engine and raise the broom to highest possible position.

2. Install the cylinder locks then stop the engine.

3. Remove locknut and capscrew that secure the castor wheel assembly in the castor fork (Fig. 24).

4. Remove the castor wheel from the fork (Fig. 24).

5. Remove the outer bearing from wheel hub and allow the bearing spacer to fall out (Fig. 24).

6. Remove the other outer bearing (Fig. 24).

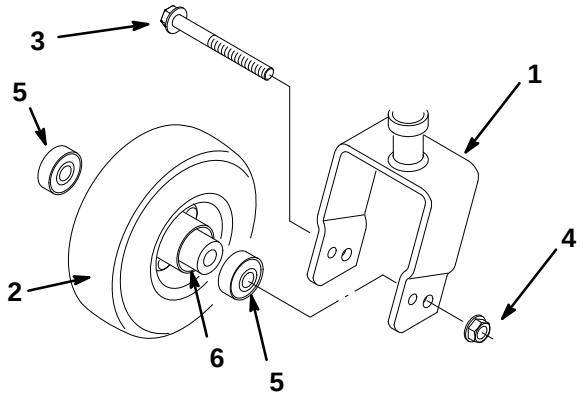



**Figure 24**

1. Castor fork
2. Castor wheel
3. Capscrew
4. Locknut
5. Outer bearing
6. Bearing spacer

7. Check the bearings, spacer, and inside of wheel hub for wear. Replace any defective parts.

8. Push an outer bearing into the wheel hub.

9. Slide the bearing spacer into the wheel hub.

10. Push other bearing into the open side of the wheel hub to captivate the spacer inside.

11. Install castor wheel assembly in the castor fork and secure it in place with a capscrew and locknut.

## Storage

1. Before long term storage wash the attachment with mild detergent and water to remove dirt and grimee.

2. Check the condition of the brushes and replace if necessary.

3. Apply grease to all grease fittings.

4. Check and tighten all bolts, nuts, and screws. Repair or replace any part that are damaged or worn.

5. Paint all scratched or bare metal surfaces. Paint is available from your Authorized Service Dealer.

6. Store the broom in a clean, dry garage or storage area. Cover it to protect it and keep it clean.

# Troubleshooting

| PROBLEM | POSSIBLE CAUSES | CORRECTIVE ACTION |
|---|---|---|
| Broom does not rotate. | 1. Hydraulic coupler not completely connected | 1. Check and tighten all couplers. |
| | 2. Defective hydraulic coupler | 2. Check couplers and replace any that are defective. |
| | 3. An obstruction in a hydraulic hose | 3. Find and remove the obstruction. |
| | 4. Auxiliary valve on the traction unit is not opening. | 4. Repair the valve. |

PROTOTYPE


PROTOTYPE