



## OPERATOR'S AND PARTS MANUAL

### D-4 Series Power Box Rake



SERIAL NUMBER: \_\_\_\_\_  
MODEL NUMBER: \_\_\_\_\_


Manual Number: 51-4416  
Release Date: August 2014  
Serial Number: 1203400 & Up  
Rev. 1

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## PREFACE

### GENERAL INFORMATION

This product was carefully designed and manufactured to give you many years of dependable service. Only minor maintenance (such as cleaning and lubricating) is required to keep it in top working condition. Be sure to observe all maintenance procedures and safety precautions in this manual and on any safety decals located on the product and on any equipment on which the attachment is mounted.

**WARNING!**  Never let anyone operate this unit without reading the "Safety Precautions" and "Operating Instructions" sections of this manual. Always choose hard, level ground to park the vehicle on and set the brake so the unit cannot roll.


Unless noted otherwise, right and left sides are determined from the operator's control position when facing the attachment.

**NOTE:** The illustrations and data used in this manual were current (according to the information available to us) at the time of printing, however, we reserve the right to redesign and change the attachment as may be necessary without notification.

### BEFORE OPERATION

The primary responsibility for safety with equipment falls to the operator. Make sure the equipment is operated only by trained individuals that have read and understand this manual. If there is any portion of this manual or function you do not understand, contact your local authorized dealer or manufacturer to obtain further assistance. Keep this manual available for reference. Provide this manual to any new owners and/or operator's.

### SAFETY ALERT SYMBOL

 This is the "Safety Alert Symbol" used by this industry. This symbol is used to warn of possible injury. Be sure to read all warnings carefully. They are included for your safety and the safety of others working with you.

### SERVICE

Use only manufacturer replacement parts. Substitute parts may not meet the required standards. Record the model and serial number of your unit on the cover of this manual. The parts department needs this information to insure that you receive the correct parts.

### SOUND AND VIBRATION

\*Sound pressure levels and vibration data for this attachment are influenced by many different parameters; some items are listed below (not inclusive):

- prime mover type, age, condition, with or without cab enclosure and configuration
- operator training, behavior, stress level
- job site organization, working material condition, environment

Based on the uncertainty of the prime mover, operator, and job site, it is impossible to get precise machine and operator sound pressure levels, or vibration levels for this attachment.\*

**NOTE:** A list of all Paladin Patents can be found at <http://www.paladinbrands.com/patents.asp>.


2

D-4


## SAFETY STATEMENTS

**DANGER!**  THIS SIGNAL WORD IS USED WHERE SERIOUS INJURY OR DEATH WILL RESULT IF THE INSTRUCTIONS ARE NOT FOLLOWED PROPERLY.

**WARNING!**  THIS SIGNAL WORD IS USED WHERE SERIOUS INJURY OR DEATH COULD RESULT IF THE INSTRUCTIONS ARE NOT FOLLOWED PROPERLY.


**CAUTION!**  THIS SIGNAL WORD IS USED WHERE MINOR INJURY COULD RESULT IF THE INSTRUCTIONS ARE NOT FOLLOWED PROPERLY.


**NOTICE!**  NOTICE INDICATES A PROPERTY DAMAGE MESSAGE.


 THIS SYMBOL BY ITSELF OR USED WITH A WARNING WORD THROUGHOUT THIS MANUAL IS USED TO CALL YOUR ATTENTION TO INSTRUCTIONS INVOLVING YOUR PERSONAL SAFETY OR THE SAFETY OF OTHERS. FAILURE TO FOLLOW THESE INSTRUCTIONS CAN RESULT IN INJURY OR DEATH.

## GENERAL SAFETY PRECAUTIONS

**WARNING!**  **READ MANUAL PRIOR TO INSTALL**  
Improper installation, operation, or maintenance of this equipment could result in serious injury or death. Operators and maintenance personnel should read this manual as well as all manuals related to this equipment and the prime mover thoroughly before beginning installation, operation, or maintenance. **FOLLOW ALL SAFETY INSTRUCTIONS IN THIS MANUAL AND THE PRIME MOVERS MANUAL.**

**WARNING!**  **READ AND UNDERSTAND ALL SAFETY STATEMENTS**  
Read all safety decals and safety statements in all manuals prior to operating or working on this equipment. Know and obey all OSHA regulations, local laws and other professional guidelines for your operation. Know and follow good work practices when assembling, maintaining, repairing, mounting, removing or operating this equipment.


**KNOW YOUR EQUIPMENT**  
 Know your equipment's capabilities, dimensions and operations before operating. Visually inspect your equipment before you start, and never operate equipment that is not in proper working order with all safety devices intact. Check all hardware to assure it is tight. Make certain that all locking pins, latches, and connection devices are properly installed and secured. Remove and replace any damaged, fatigued or excessively worn parts. Make certain all safety decals are in place and are legible. Keep decals clean, and replace them if they become worn and hard to read.


**WARNING!**  **PROTECT AGAINST FLYING DEBRIS**  
Always wear proper safety glasses, goggles or a face shield when driving pins in or out or when operation causes dust, flying debris, or any other hazardous material.

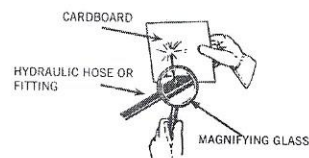
D-4


3

## GENERAL SAFETY PRECAUTIONS

**WARNING!**  **LOWER OR SUPPORT RAISED EQUIPMENT**  
Do not work under raised booms without supporting them. Do not use support material made of concrete blocks, logs, buckets, barrels or any other material that could suddenly collapse or shift positions. Make sure support material is solid, not decayed, warped, twisted, or tapered. Lower booms to ground level or onto blocks. Lower booms and attachments to the ground before leaving the cab or operator's station.

**WARNING!**  **USE CARE WITH HYDRAULIC FLUID PRESSURE**  
Hydraulic fluid under pressure can penetrate the skin and cause serious injury or death. Hydraulic leaks under pressure may not be visible. Before connecting or disconnecting hydraulic hoses, read your prime movers operator's manual for detailed instructions on connecting and disconnecting hydraulic hoses or fittings.  
• Keep unprotected body parts, such as face, eyes, and arms as far away as possible from a suspected leak. Flash injected with hydraulic fluid may develop gangrene or other permanent disabilities.  
• If injured by injected fluid, see a doctor at once. If your doctor is not familiar with this type of injury, ask him to research immediately to determine proper treatment.  
• Wear safety glasses, protective clothing, and use a sound piece of cardboard or wood when searching for hydraulic leaks.  
**DO NOT USE YOUR HANDS!**  
**SEE ILLUSTRATION.**



**WARNING!**  **DO NOT MODIFY MACHINE OR ATTACHMENTS**  
Modifications may weaken the integrity of the attachment and may impair the function, safety, life and performance of the attachment. When making repairs, use only the manufacturer's genuine parts, following authorized instructions. Other parts may be substandard in fit and quality. Never modify any ROPS (Roll Over Protection System) equipment or device. Any modifications must be authorized in writing by the manufacturer.

4

D-4

## GENERAL SAFETY PRECAUTIONS

**WARNING!** **SAFELY MAINTAIN AND REPAIR EQUIPMENT**

- Do not wear loose clothing, or any accessories that can catch in moving parts. If you have long hair, cover or secure it so that it does not become entangled in the equipment.
- Work on a level surface in a well-lit area.
- Use properly grounded electrical outlets and tools.
- Use the correct tool for the job at hand. Make sure they are in good condition for the task required.
- Wear the protective equipment specified by the tool manufacturer.

**WARNING!** **SAFELY OPERATE EQUIPMENT**

Do not operate equipment until you are completely trained by a qualified operator in how to use the controls, know its capabilities, dimensions, and all safety requirements. See your prime movers manual for these instructions.

- Keep all step plates, grab bars, pedals, and controls free of dirt, grease, debris, and oil.
- Never allow anyone to be around the equipment when it is operating.
- Do not allow riders on the attachment or the prime mover.
- Do not operate the equipment from anywhere other than the correct operators position.
- Never leave equipment unattended with the engine running or with this attachment in a raise position.
- Do not alter or remove any safety feature from the prime mover or this attachment.
- Know your work site safety rules as well as traffic rules and flow. When in doubt on any safety issue, contact your supervisor or safety coordinator for an explanation.

## EQUIPMENT SAFETY PRECAUTIONS

**WARNING!** **EXPOSURE TO RESPIRABLE CRYSTALLINE SILICA DUST ALONG WITH OTHER HAZARDOUS DUSTS MAY CAUSE SERIOUS OR FATAL RESPIRATORY DISEASE.**

It is recommended to use dust suppression, dust collection and if necessary personal protective equipment during the operation of any attachment that may cause high levels of dust.

**WARNING!** **REMOVE PAINT BEFORE WELDING OR HEATING.**

Hazardous fumes/dust can be generated when paint is heated by welding, soldering or using a torch. Do all work outside or in a well ventilated area and dispose of paint and solvent properly. Remove paint before welding or heating.

When sanding or grinding paint, avoid breathing the dust. Wear an approved respirator. If you use solvent or paint stripper, remove stripper with soap and water before welding. Remove solvent or paint stripper containers and other flammable material from area. Allow fumes to disperse at least 15 minutes before welding or heating.

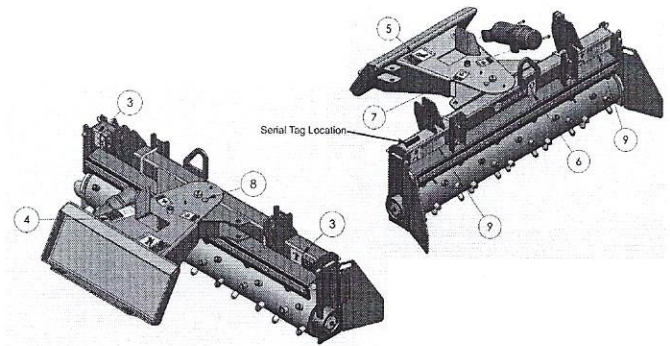
**WARNING!** **END OF LIFE DISPOSAL.**

At the completion of the useful life of the unit, drain all fluids and dismantle by separating the different materials (rubber, steel, plastic, etc.). Follow all federal, state and local regulations for recycling and disposal of the fluid and components.

D-4

5

## SAFETY DECALS & LABELS



Item	Qty	Part	Description
3.	2	50-0721	Label, Warning, Crush Hazard
4.	1	50-0723	Label, Warning, Misuse Hazard
5.	1	50-0724	Label, Warning, High Pressure Fluid Hazard
6.	1	50-0769	Label, Lift Point, ISO
7.	2	50-0775	Label, Warning, Crush Hazard
8.	1	50-0909	Decal, Mandatory Action, Lube, ISO
9.	2	P970251	Decal, Warning, Danger Roller

Use part numbers to order replacements for lost or damaged decals. Be sure to read all decals before operating the attachment. They contain information you need to know for both safety and longevity.

### Placement or replacement of Safety Signs

1. Clean the area of application with nonflammable solvent, and then wash the same area with soap and water.
2. Allow the surface to fully dry.
3. Remove the backing from the safety sign, exposing the adhesive surface.
4. Apply the safety sign to the position shown in the diagram above and smooth out any bubbles.

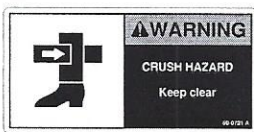
### Instructions

1. Keep all safety signs clean and legible.
2. Replace all missing, illegible, or damaged safety signs.
3. Replacement parts, for parts with safety signs attached, must also have safety signs attached.
4. Safety signs are available, free of charge, from your dealer or from SWEEPSTER.

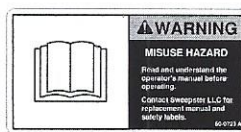
6

D-4

## SAFETY DECALS & LABELS



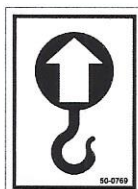
3. 50-0721



4. 50-0723



5. 50-0724



6. 50-0769



7. 50-0775



8. 50-0909



9. P970251

D-4

7

## INSTALLATION & SET-UP

### SET-UP INSTRUCTIONS

The D-4 power rake (Manual or Hydraulic angling) is shipped assembled. The only adjustment is to lower the caster wheels to operating position.

Select a suitable working area. Refer to illustrations, accompanying text, parts lists, and exploded view drawings.

For reference, front, back, left and right directions are determined by sitting in the prime movers operator's seat.

It is advisable to have a mechanical lifting device to facilitate uncrating.

### UNPACKING CRATE

Be careful of nails in boards when uncrating.

1. Remove top, sides, and ends of crate.
2. Remove rake assembly from crate.
3. Remove loose nails from boards and dispose of crate according to local codes.

If you have purchased the rake frame assembly and a mounting system separately, it will be necessary to clamp the mounting frame to the rake assembly.

### ANGLING MODEL ASSEMBLY PROCEDURE

1. Install power cord by connecting the red clamp to a positive 12 volt power source and the black clamp to ground. The power cord includes an in-line fuse and spring-loaded battery clamps. The red (positive) cable is fused and should always be connected to the positive side of the battery to ensure proper operation of the electrical circuit. Be careful when routing the cable that sharp edges or moving parts will not damage it.

### Initial Set-up and Systems Check:

1. Always check with your Loader manual or dealer for counter weight ballast that may be required for machine stability.
2. Air in hydraulic systems can cause erratic operation and allows loads or equipment components to drop unexpectedly.
3. Before operating equipment purge any air in the system by engaging all hydraulic functions.
4. Check that all control lever positions function as instructed in the Operator's Manual. Do not operate until control lever and equipment movements are correct.

8

D-4

## INSTALLATION & SET-UP

5. Make sure all hydraulic hoses, fittings, and valves are in good condition and not leaking before starting power unit. Check and route hoses carefully to prevent damage.
6. Hoses must not be twisted, bent sharply, kinked, frayed, pinched, or come into contact with any moving parts.
7. Operate moveable components through full operational range to check clearances. Replace damaged hoses immediately.
8. Ensure implement is properly attached, adjusted, and in good condition. Loader coupler lock-pins must be fully extended and properly engaged into attachment retaining slots.
9. If the loader is equipped with ROPS and seat belt/operator restraint, keep ROPS systems in place and keep seat belt/operator restraint securely fastened/engaged. Falling off Loader can result in death from being run over or crushed.

D-4

9

## OPERATION

### Intended Use:

This power rake is designed for removing rock, small debris and for thatching. Use in any other way is considered contrary to the intended use. Compliance with and strict adherence to operation, service and repair conditions as specified by the manufacturer, are also essential elements of the intended use.

### WARNING! IMPROPER OPERATION CAN CAUSE THE MACHINE TO TIP OR ROLL OVER AND CAUSE INJURY OR DEATH.



1. Keep Loader lift arms and attachment as low as possible.
2. Do not travel or turn with Loader lift arms and attachment raised.
3. Turn on level ground.
4. Go up and down slopes, not across them.
5. Keep the heavy end of the machine uphill.
6. Do not overload the machine.
7. Never use the Loader attachment to carry loads that exceed Loader rated operating capacity or other Loader specifications. Check your Loader manual or with your dealer for Loader rated operating capacity. Exceeding this capacity can cause machine to tip or roll over and cause injury or death.
8. Use of a front safety door, if equipped, on the Loader is recommended for operation of the Power Box Rake®.
9. Only engage power when equipment is at ground level. Always disengage power when equipment is raised off the ground.
10. Do not disconnect hydraulic lines until all system pressure is relieved.
11. Hydraulic system leak down, hydraulic system failures, mechanical failures, or movement of control levers can cause equipment to drop or rotate unexpectedly and cause severe injury or death.
12. Never direct discharge toward people, animals, or property.
13. Do not operate equipment while under the influence of alcohol or drugs.
14. Operate only in the daylight or good artificial lighting.
15. Always comply with all state and local lighting and marking requirements.
16. Ensure equipment is properly attached, adjusted, and in good operating condition. Loader coupler lock-pins must be fully extended and properly engaged into attachment retaining slots.

10

D-4

## OPERATION

### WARNING! WATCH FOR OPERATING HAZARDS.



1. Look down and to the rear and make sure area is clear before operating in reverse.
2. Watch for hidden hazards on the terrain during operation.
3. Use extreme care when working close to fences, ditches, other obstructions, or on hillsides.
4. Reduce ground speed on slopes and rough terrain.
5. Do not operate on steep slopes.
6. Do not stop, start, or change directions suddenly on slopes.
7. Stop Loader and implement immediately upon striking an obstruction. Dismount Loader using proper procedure. Inspect and repair any damage before resuming operation.

D-4

11

## OPERATION

**NOTICE!** Loaders must be equipped with an auxiliary hydraulic system capable of supplying continuous flow for hydraulic motor operation. This manual contains information for the manual and hydraulic angling models. Refer to the information in this manual for specifications, parts, assemblies, and adjustments.

**WARNING!** Pressurized fluid or air could pierce skin and cause injury or death. Before disconnecting a hydraulic line, turn engine off and operate all controls to relieve pressure. Catch all fluids in a container.



### ATTACHING POWER RAKE TO LOADER

Read the loader Operator's Manual connecting and removing instruction.

1. Cycle attachment drive control to relieve residual pressure at hydraulic couplers.
2. Position attachment on level surface with enough space behind it to accommodate unit.
3. Position hydraulic hoses so they will not be pinched when connecting the power rake.
4. Connect hydraulic hoses to loader auxiliary quick couplers.

For optional hydraulic angling models, mount the angle control switch in a convenient, easy-to-reach location. The switch bracket is magnetic and will attach to any flat steel surface. Connect the power cord to the cable coming from the switch. Be careful when routing the cable that sharp edges or moving parts will not damage the cable.

The loader coupler handles should be in the unlocked position and the lock pins retracted.

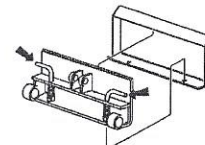


Figure 1. Loader Coupler Handles - Unlocked

5. Ensure that connections are secure by pulling on hoses.
6. Move to the loader operator's position and start engine.
7. Lower the loader lift arms to their lowest position and tilt mount plate forward..
8. Raise lift arms while tilting back mount plate. (figure 2)
9. Roll the loader coupler into the power rake so the coupler handles can be engaged.

12

D-4

## OPERATION

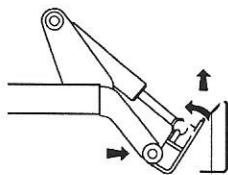


Figure 2. Attaching Power Rake to Loader

10. Turn ignition switch off, set brake, and remove key.
11. Engage lock pin handles to secure attachment to lift plate.

**NOTICE!** To ensure proper connection, verify that bottoms of lock pins are visible under attachment receiver plate. (figure 3)

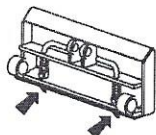


Figure 3. Lock pin connection

### POWER RAKE FUNCTION

The power rake hydraulic motor drives the roller, which digs into the ground, cultivating and pulling up rocks, roots, and debris.

The clean soil goes between the roller and barrier, while the rocks, roots, and debris work to the side in a windrow.

With the endplates mounted in the working position and the rake straight (endplates parallel with loader tires), material can be moved along, filling in the low spots. Also, rocks, roots, and debris can be collected and moved to another location for hauling away.

D-4

13

## OPERATION

Start prime mover engine.

Lower power rake slowly to the ground.

Engage hydraulic control lever for auxiliary implements.

Increase engine rpm to give desired rpm at the roller. Normal operating speed is approximately 270 rpm. If operating in heavy rock, reduce the speed slightly.

Move the prime mover forward or backward as desired. For the roller to operate effectively, it must rotate in the opposite direction of the prime mover wheels, see figure 6. Roller rotation direction is controlled by prime mover hydraulic controls.

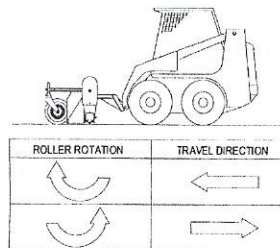


Figure 6. Roller Rotation

### Ground Speed

Ground speed should be between 3 and 5 mph under normal conditions. In heavy rock, reduce the ground speed to 1 to 3 mph.

### Direction Control Switch (HYDRAULIC ANGLING MODEL ONLY)

A three position switch is provided to angle the rake left or right. The switch is equipped with a magnetic mount and may be attached to a convenient steel surface near the operator. The direction valve uses a small amount of hydraulic oil bypassed from the roller drive motor and will only operate with the prime mover auxiliary hydraulic system engaged and with the roller turning clockwise.

With the prime mover auxiliary hydraulic system engaged, move the spring loaded switch in one direction and the rake will angle left or right. Return the switch to center position and rake will maintain the angle selected. Pivot rake to place the windrow left or right of the Loader.

### Hydraulic Drive Motor

The hydraulic drive motor runs off the auxiliary circuit of the prime mover. The power rake should be run at 30% power for one hour for proper motor break-in.

14

D-4

## OPERATION

### Power Roller

Roller should be level with the ground. The power rake should also be level with the ground front to back. To accomplish this, raise or lower casters and/or use the prime mover tilt cylinder.

**WARNING!** DO NOT ADJUST CASTER POSITION WHILE MACHINE IS RUNNING. Make sure machine has been shut down and all moving parts have stopped.

To allow the roller to penetrate deeper into the ground, remove the ball pin and raise the casters. Re-pin in new position. To achieve the opposite, lower the casters.

During operation, further depth control can be achieved by tilting the rake forward on the casters to raise roller, or by tilting the rake back to raise casters and allow more roller penetration.

Be sure to check the air pressure in each tire regularly so that an even, consistent grade will be maintained.

The normal gap between the roller and barrier for average conditions is about 1-1/4". This gap can be adjusted either wider or narrower by loosening the 3/8" U-bolts (2) that holds the barrier mount and sliding it up or down. A wider opening will allow more dirt and rock to pass through. For finer raking, reduce the gap. Be careful not to let roller hit barrier. The gap should be the same all the way across. Barrier adjustment is shown in figure 7.

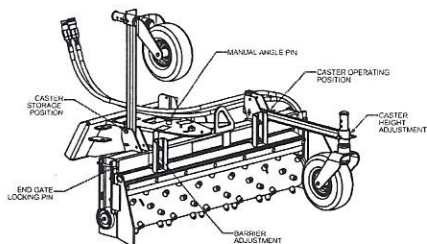


Figure 7. Adjustments

The roller on the power rake is bi-rotational. You can operate the roller in both directions clockwise and counter-clockwise. The roller operates most efficiently when it rotates in the opposite direction of the prime mover wheels.

### Operating Depth

When power raking, the depth will determine how much dirt is carried ahead of the roller. The ideal depth will vary with conditions and can be anywhere from skimming the surface to about 3" deep. See instructions in Power Roller above to set roller depth.

When making the first windrow the level of dirt may be halfway up on the barrier. When moving the windrow two or three times, the level of the dirt may be to the top of the barrier. However, try to prevent material from flowing over the top.

D-4

15

## OPERATION

The power rake allows fast raking of large areas of ground by being able to move windrows several times. Of course, the volume or density of the material being raked will dictate how many times a windrow can be moved.

### Endplates

The function of the endplates is to contain the material in front of the roller while the clean material passes between the roller and barrier.

With the endplates mounted in the working position and the roller straight (parallel with prime mover), material can be moved along, filling in the low spots. By decreasing the gap between the roller and barrier, more material can be pulled along. Barrier adjustment is shown in figure 7.

These plates can be mounted to the front or back of the power rake, depending on the raking direction. When you move the endplates from front to back, you can move the left one to the right side and the right one to the left side.

Make sure the disconnected power rake is stored on a hard, level surface. Use the endplates mounted on attachment side of rake to ensure stability.

### Operator Production

Successful operation of the power rake will come with operator experience. The rake's performance also depends on the type and size of the prime mover it's mounted on.

An operator that masters the technique of adjusting the angle of attack of the roller against the soil will also find ideal settings under various conditions to give the desired results.

**NOTICE!** Do not drop power rake to the ground with the roller turning. Sudden high speed jolts multiply stress to the drive line and can cause extreme damage.

### Application Techniques

The power rake is capable of many applications. The following are some of the common applications:

#### Pulverizing Topsoil

For breaking up compacted soil or conditioning hardened baseball diamonds, the attachment plate is rolled back to take the guide wheels off the ground so only the toothed roller is in contact with the ground. Maintain sufficient RPM to avoid stalling the toothed roller in its progress. The rake can be straight or angled, but the endplates should not be mounted in order to allow material to move out of the way and not slow the process.

#### Debris Removal

Once the surface has been loosened, the process of removing debris can begin. The prime mover attachment plate is tilted forward until the guide wheels control the depth of the toothed roller. The roller can be angled at this time for windrowing debris or the roller can be set straight with both endplates installed to collect debris. Prime mover travel speed should be increased for this process.

#### Finish Grading

The rake is tilted forward until the teeth of the toothed roller are barely touching the soil. Prime mover speed can be increased for this operation, the idea being to collect material from the high spots and leave it in the

16

D-4

## OPERATION

low areas.

### Spreading Fill and Topsoil

Position rake so it is tilted on casters, since depth of cut is not the objective. Endplates can be installed and the windrow angle set as needed to control the material movement.

### Changing Grade

Grade modification can be accomplished during finish grading by angling the rake to collect and windrow the maximum amount of material toward targeted areas.

### Thatching Existing Grass Areas

The prime mover attachment plate should be tilted forward to support the rake on the front casters and toothed roller raised so teeth are just grazing the surface. Travel speed should be slow and careful.

### Shutting Down

Stop engine.

Lower the lift arms and power rake to the ground.

Purge any air in the system. Hydraulic system leak down, hydraulic system failures, mechanical failures, or movement of control levers can cause equipment to drop or rotate unexpectedly.

Shut off engine, set brake and remove key.

### Removing Power Rake From Prime Mover

Install endplates on attachment side of power rake as shown in figure 7. On a hard level surface, lower attachment to the ground.

Shut off engine, set brake and remove key.

Move attachment coupler latches to the unlocked position (lock pins must be disengaged).

Disconnect hydraulic hoses from quick couplers. Install dust plugs and couple hoses together for storage. Disconnect direction control switch from prime mover power cord and remove switch.

Move to the operator's position and start engine. Release brake and roll attachment coupler until it is disengaged from the attachment. The attachment should rest in a stable position for storage.

D-4

17

## OPERATION

### STORAGE

Make sure the disconnected power rake is stored on a hard, level surface. Endplates mounted on attachment side of rake increase stability.

**WARNING!** Block equipment securely for storage.



**CAUTION!** Keep children and bystanders away from storage area.



### General Storage:

Storage:

- Clean the unit thoroughly, removing all mud, dirt and grease.
- Inspect for visible signs of wear, breakage or damage. Order any parts required and make the necessary repairs to avoid delays upon removal from storage.
- Tighten loose nuts, capscrews and hydraulic connections.
- Coat exposed portions of the cylinder rods with grease.
- Lubricate grease fittings.
- Seal hydraulic system from contaminants and secure all hydraulic hoses off the ground to help prevent damage.
- Store unit in a dry and protected place. Leaving the unit outside will materially shorten its life.

Additional Precautions for Long Term Storage:

- Touch up all unpainted surfaces with paint to avoid rust.
- Inflate tires to recommended tire pressure.

Removal from Storage:

- Remove cover.
- Wash unit and replace any damage and/or missing parts.
- Lubricate grease fittings.
- Check hydraulic hoses for damage and replace as necessary.

18

D-4

## OPERATION

### LIFT POINTS

Lifting points are identified by lifting decals where required. Lifting at other points is unsafe and can damage attachment. Do not attach lifting accessories around cylinders or in any way that may damage hoses or hydraulic components. See diagram:

- Attach lifting accessories to unit at recommended lifting points.
- Bring lifting accessories together to a central lifting point.
- Lift gradually, maintaining the equilibrium of the unit.

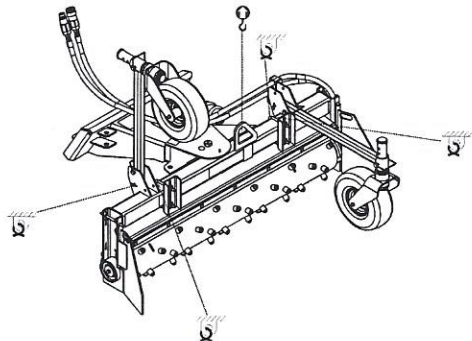
**WARNING!** USE LIFTING ACCESSORIES (CHAINS, SLINGS, ROPES, SHACKLES AND ETC.) THAT ARE CAPABLE OF SUPPORTING THE SIZE AND WEIGHT OF YOUR ATTACHMENT. Secure all lifting accessories in such a way to prevent unintended disengagement. Failure to do so could result in the attachment falling and causing serious personal injury or death.

### TIE DOWN POINTS

Tie down points are identified by tie down decals where required. Securing to trailer at other points is unsafe and can damage attachment. Do not attach tie down accessories around cylinders or in any way that may damage hoses or hydraulic components. See diagram:

- Attach tie down accessories to unit as recommended.
- Check unit stability before transporting.

**WARNING!** VERIFY THAT ALL TIE DOWN ACCESSORIES (CHAINS, SLINGS, ROPES, SHACKLES AND ETC.) ARE CAPABLE OF MAINTAINING ATTACHMENT STABILITY DURING TRANSPORTING and are attached in such a way to prevent unintended disengagement or shifting of the unit. Failure to do so could result in serious personal injury or death.



D-4

19

## MAINTENANCE

The information in this section is written for operators who possess basic mechanical skills. Should you need help, your dealer has trained service technicians available. For your protection, read and follow all safety information in this manual.

Regular preventive maintenance and immediate repair of broken or worn parts will ensure maximum efficiency and long life.

Because of the nature of the jobs the power rake does, site preparation and rock raking, the power rake is constantly vibrating and shaking. Parts may loosen as it is used. One of the most important functions an operator can perform is observing and inspecting the equipment for loose or worn parts to prevent damage or excessive downtime.

### MAINTENANCE SAFETY

1. Your dealer can supply original equipment hydraulic accessories and repair parts. Substitute parts may not meet original equipment specifications and may be dangerous.
2. Avoid electrical system hazards. Never work on the electrical system unless you are qualified and thoroughly familiar with system details and the special handling requirements.
3. Disconnect battery before working on electrical system. Remove "ground" cable first. When reconnecting battery, connect "ground" cable last.
4. Never perform service or maintenance with engine running.
5. Tighten all bolts, nuts, and screws, and check that all cotter pins are installed securely to ensure equipment is in a safe condition before operating.

Procedure	Before each use	40 Hours
Inspect prime movers hydraulic system to be sure hydraulic oil level is adequate	✓	
Repair hydraulic oil leaks	✓	
Lubricate all grease fittings		✓
Check tire pressure		✓
Inspect and clean safety decals. Replace if damaged. (See safety decal section for location)	✓	

20

D-4