

# Harley POWER BOX RAKE® MODEL M4



## OPERATOR'S MANUAL

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DATE PURCHASED

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SERIAL NUMBER

PN-P970637 (01/2004)

**Glenmac**  
INC

# INTRODUCTION

GLENMAC, INC., based in Jamestown, North Dakota, along with your authorized Harley dealer, are proud that you chose to purchase a Harley Power Box Rake®. Equipment under the Harley name has been built and sold worldwide for over 35 years. GLENMAC, INC. specializes in the manufacturing of construction and landscape attachments designed to make your job more efficient, cleaner, and easier regardless of the complexity of the job. The Harley Power Box Rake® brings state-of-the-art design, ruggedness, and maneuverability to jobs such as: landscaping, seedbed preparation, site development, rock raking and picking, golf course construction, ball field renovation and maintenance, liner installation, horse track screening, sod farm ground work, beach cleaning - and the job for which you purchased your Harley.

This manual will provide you, the operator, with instructions for proper safety, assembly, and operation procedures so you can benefit from the equipment's optimum level of performance. Successful operation and long-life of your Harley Power Box Rake® depends on you. As owner and operator of your new Harley, it is your responsibility to become familiar with the proper operation and care required to operate it safely and efficiently and to maintain the equipment in top condition.

To keep your Harley equipment at peak performance, please READ THIS MANUAL CAREFULLY several times and follow the directions as specified for each operation. Correct operation and maintenance will save you time and expense.

REMINDER: Fill in the warranty card and mail within 10 days of your purchase date. While filling in the card with the correct information, put the date purchased and serial number on the front cover of this manual. Should you need to call your dealer or GLENMAC, INC., this information will help them to more quickly provide accurate service for you.

Thank you for purchasing a Harley Power Box Rake®.

For more information, contact your local Harley dealer or call:

**GLENMAC INC.**  
PO Box 2135  
Jamestown, North Dakota 58402-2135 U.S.A.

800/437-9779  
701/252-9300  
FAX 701/252-1978  
Email: [sales@glenmac.com](mailto:sales@glenmac.com)



This Safety-Alert Symbol indicates a hazard and means **ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED!**



## **DANGER**

Indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury.



## **WARNING**

Indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury, and includes hazards that are exposed when guards are removed.



## **CAUTION**

Indicates a potentially hazardous situation that, if not avoided, may result in minor or moderate injury.

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## SPECIFICATIONS

Raking Width .....	48 Inches
Roller Type .....	Tooth Roller Standard 7" Diameter
Roller Angle (Angling Model ONLY) .....	20 Degrees Both Directions
Gap (Tube to Barrier) .....	1-1/8" - 1-3/4" Adjustable
Skid-steer Lift Capacity Requirement .....	SAE Lift Capacity 500 lbs
Skid-steer Hydraulic Requirement .....	8 GP @ 2200 psi (min.)
Tires .....	13 x 5.00
Tire Pressure .....	20 psi
Weight .....	Straight Rake - 440 lbs Max. ..... Angling Rake - 510 lbs Max.
Oil Capacity of Chain Case .....	Approximately 1.5 Pints

# OWNER ASSISTANCE

GLENMAC, INC. and your authorized Harley Dealer want you to be completely satisfied with your investment. Sometimes, however, misunderstandings can occur. To resolve any problem that may occur, please follow the instructions below.

1. If you did not purchase your rake from an authorized Harley Dealer, go to number 2 below.
  - A. Contact the Service Manager of the dealership, explain the problem, and request assistance. If additional assistance is needed, your dealer has direct access to our home office.
  - B. If your problem has not been handled to your satisfaction, contact:  
  
CUSTOMER SERVICE (8:00 am - 5:00 pm CT)  
GLENMAC, INC.  
PO BOX 2135  
JAMESTOWN ND 58402-2135  
701/252-9300  
800/437-9779
  - C. Please be prepared to provide the following information:
    - Your name, address, and telephone number,
    - Machine model and SERIAL NUMBER,
    - Dealership name and address,
    - Machine purchase date,
    - Nature of problem.

Your problem will likely be resolved in the dealership using the dealer's facilities, equipment, and personnel. Therefore, it is important that your initial contact be with the dealer.

2. If you did not purchase your equipment from an authorized dealer, call GLENMAC, INC., (see "B" above). There may be a new dealer in your area since you purchased your Harley Power Box Rake®. If there is no dealer in your area, our Customer Services Department can and will help you obtain the parts and information you may need. Please be prepared to provide the information requested under "C" above.

# GENERAL INFORMATION

The purpose of this manual is to assist you in operating and maintaining your Power Box Rake®. Read it carefully. It furnishes information and instructions that will help you achieve years of dependable performance. These instructions have been compiled from extensive field experience and engineering data. Some information may be general in nature due to unknown and varying operating conditions. However, through experience and these instructions, you should be able to develop procedures suitable to your particular situation.

The illustrations and data used in this manual were current at the time of printing, but due to possible inline production changes, your machine may vary slightly in detail. We reserve the right to redesign and change the machines as may be necessary without notification.

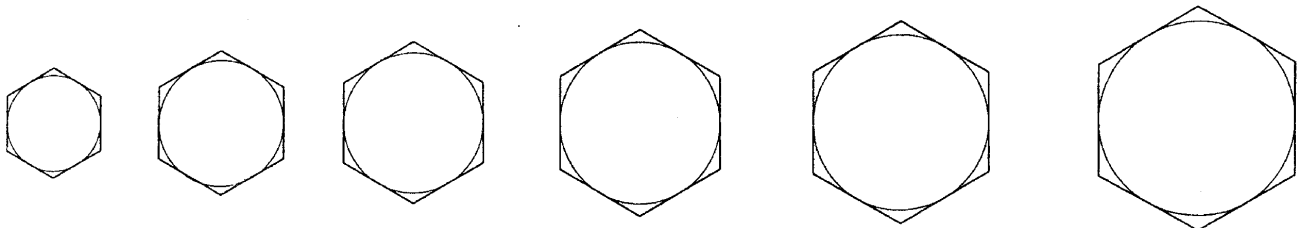
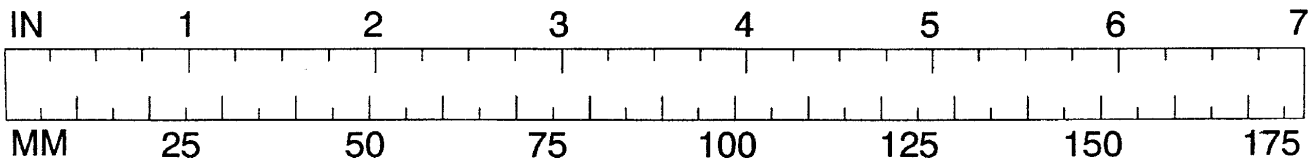
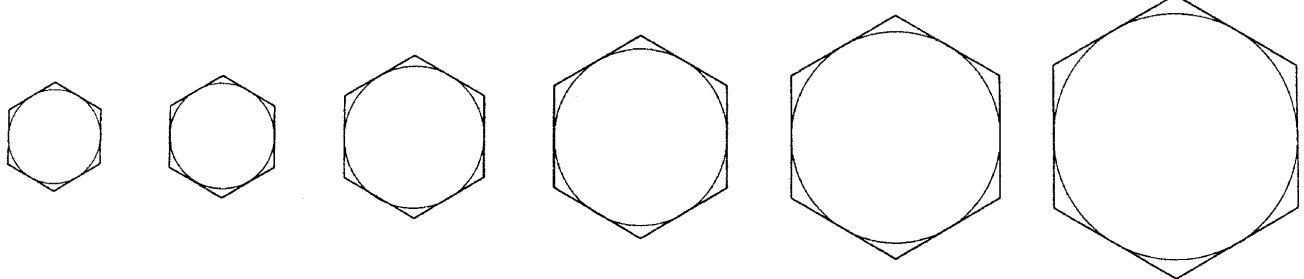
Throughout this manual, references are made to front, back, right and left directions. These are determined by sitting in the operator's seat of the skid-steer.

## BOLT SIZE CHART

**NOTE:** Chart shows bolt thread sizes and corresponding head (wrench) sizes for standard SAE and Metric Bolts.

### SAE Bolt Thread Sizes

**5/16      3/8      1/2      5/8      3/4      7/8**



### Metric Bolt Thread Sizes

**8MM      10MM      12MM      14MM      16MM      18MM**

# BOLT TORQUE CHART

After every ten (10) hours of operation, check all hardware and tighten where required.

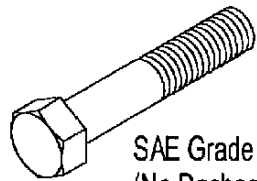
## SAE Series Torque Chart

DO NOT use these values if a different torque value or tightening procedure is listed for a specific application. Torque values listed are for general use only.

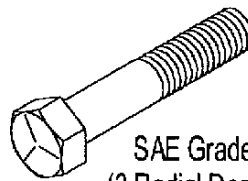
Fasteners should be replaced with the same grade.

Make sure fastener threads are clean and you properly start thread engagement. This will prevent them from failing when tightening.

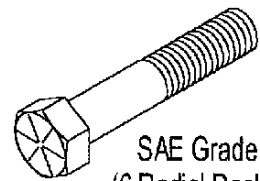
SAE  
Bolt Head  
Identification



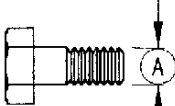
SAE Grade 2  
(No Dashes)



SAE Grade 5  
(3 Radial Dashes)



SAE Grade 8  
(6 Radial Dashes)

Bolt Diameter "A"	Wrench Size	MARKING ON HEAD					
		SAE 2		SAE 5		SAE 8	
		Lbs.-Ft	(N-m)	Lbs.-Ft	(N-m)	Lbs.-Ft	(N-m)
1/4	7/16	6	(8)	11	(15)	14	(19)
5/16	1/2	13	(18)	21	(28)	25	(34)
3/8	9/16	23	(31)	38	(52)	55	(75)
7/16	5/8	37	(50)	55	(75)	80	(110)
1/2	3/4	57	(77)	85	(115)	120	(165)
9/16	13/16	82	(111)	125	(170)	180	(245)
5/8	15/16	111	(150)	175	(240)	230	(310)
3/4	1 1/8	200	(270)	300	(410)	440	(600)
7/8	15/16	280	(380)	450	(610)	720	(975)
1"	1 1/2	350	(475)	680	(925)	1035	(1400)
1 1/8	1 11/16	450	(610)	885	(1200)	Bolt Diameter 	
1 1/4	1 7/8	600	(815)	1255	(1700)		
1 3/8	2 1/16	675	(915)	1620	(2200)		
1 1/2	2 1/4	920	(1250)	2200	(2900)		

# BOLT TORQUE CHART

## Metric Series Torque Chart

Use only metric tools on metric hardware. Other tools may not fit properly. They may slip and cause injury.

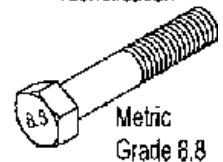
DO NOT use these values if a different torque value or tightening procedure is listed for a specific application. Torque values listed are for general use only.

Fasteners should be replaced with the same grade.

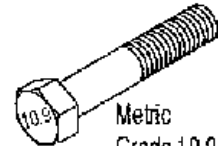
Make sure fastener threads are clean and you properly start thread engagement. This will prevent them from failing when tightening.

Bolt Diameter "A"	Wrench Size	MARKING ON HEAD			
		8.8		10.9	
		N-m	(Lbs.-Ft)	N-m	(Lbs.-Ft)
5 mm	8 mm	6	(4.5)	9	(6.5)
6 mm	10 mm	10	(7.5)	15	(11)
8 mm	13 mm	25	(18)	35	(26)
10 mm	16 mm	50	(37)	75	(55)
12 mm	18 mm	85	(63)	130	(97)
14 mm	21 mm	110	(80)	150	(110)
16 mm	24 mm	215	(159)	315	(232)
20 mm	30 mm	435	(321)	620	(457)
24 mm	36 mm	750	(553)	1070	(789)
30 mm	46 mm	1495	(1103)	2130	(1571)

Metric  
Bolt Head  
Identification



Metric  
Grade 8.8



Metric  
Grade 10.9

After every ten (10) hours of operation, check all hardware and tighten where required.

## SAFETY RULES\*



**ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED!**



*Safety is a primary concern in the design and manufacture of our products. Unfortunately, our efforts to provide safe equipment can be wiped out by a single careless act of an operator. In addition to the design and configuration of equipment, hazard control and accident prevention are dependent upon the awareness, concern, prudence and proper training of personnel involved in the operation, transport, maintenance and storage of equipment. It has been said, "The best safety device is an informed, careful operator." We ask you to be that kind of operator.*

The designed and tested safety of this equipment depends on it being operated within the limitations as explained in this manual.

**\*The Harley M4 Power Box Rake® was designed for use on smaller standard skid-steer loaders and stand-on walk behind or skid-steer power units. For clarity, in this manual all power units will be referred to as a skid-steer. Safety precautions for all units must be followed.**

# SAFETY RULES



**ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED!**



## TRAINING

- Safety instructions are important! Read all attachment and power unit manuals; follow all safety rules and safety decal information. (Replacement manuals are available from dealer or, in the United States and Canada, call 1-800-437-9779.) Failure to follow instructions or safety rules can result in serious injury or death.
- If you do not understand any part of this manual and need assistance, see your dealer.
- Know your controls and how to stop engine and attachment quickly in an emergency.
- Operators must be instructed in and be capable of the safe operation of the equipment, its attachments and all controls. Do not allow anyone to operate this equipment without proper instructions.
- Keep hands and body away from pressurized lines. Use paper or cardboard, not body parts to check for leaks. Wear safety goggles. Hydraulic fluid under pressure can easily penetrate skin and will cause serious injury or death.
- Make sure that all operating and service personnel know that in the event hydraulic fluid penetrates skin, it must be surgically removed as soon as possible by a doctor familiar with this form of injury, or gangrene, serious injury or death will result. **CONTACT A PHYSICIAN IMMEDIATELY IF FLUID ENTERS SKIN OR EYES. DO NOT DELAY.**
- Do not allow children or untrained persons to operate equipment.
- After connecting hoses, 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.
- Make sure all hydraulic hoses, fittings and valves are in good condition and not leaking before starting power unit or using equipment. Check and route hoses carefully to prevent damage. Hoses must not be twisted, bent sharply, kinked, frayed, pinched, or come into contact with any moving parts. Operate moveable components through full operational range to check clearances. Replace any damaged hoses immediately.
- Always wear relatively tight and belted clothing to avoid entanglement in moving parts. Wear sturdy, rough-soled work shoes and protective equipment for eyes, hair, hands, hearing and head.
- Ensure implement is properly attached, adjusted and in good operating condition. Skid-steer coupler lock-pins must be fully extended and properly engaged into attachment retaining slots.
- Skid-steer must be equipped with ROPS and seat belt/operator restraint. Keep seatbelt/operator restraint securely fastened/engaged. Falling off skid-steer can result in death from being run over or crushed. Keep ROPS systems in place at all times.
- Ensure all safety decals are installed. Replace if damaged. (See **Safety Decals** section for location.)
- Ensure shields and guards are properly installed and in good condition. Replace if damaged.

## PREPARATION

- Always check with your skid-steer manual or dealer for counter weight ballast that may be required for machine stability.
- Air in hydraulic systems can cause erratic operation and allows loads or equipment components to drop unexpectedly. Before operating or allowing anyone to approach the equipment, purge any air in the system by operating all hydraulic functions several times after connecting equipment, connecting hoses, or doing any hydraulic maintenance.

## OPERATIONAL SAFETY

- Improper operation can cause the machine to tip or roll over and cause injury or death.
  - Keep skid-steer lift arms and attachment as low as possible.
  - Do not travel or turn with skid-steer lift arms and attachment raised.
  - Turn on level ground.
  - Go up and down slopes, not across them.
  - Keep the heavy end of the machine uphill.
  - Do not overload the machine.



# SAFETY RULES



## ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED!



- Never use the skid-steer attachment to carry loads that exceed skid-steer rated operating capacity or other skid-steer specifications. Check your skid-steer manual or with your dealer for skid-steer rated operating capacity. Exceeding this capacity can cause machine to tip or roll over and cause injury or death.
- Do not allow other people in the area when operating, attaching, removing, and assembling or servicing equipment.
- Only engage power when equipment is at ground operating level. Always disengage power when equipment is raised off the ground.
- Do not disconnect hydraulic lines until all system pressure is relieved. Lower unit to ground, stop engine, and operate all hydraulic control levers.
- Keep bystanders away from equipment while it is in operation.
- Never go underneath equipment lowered to the ground or raised. Never place any part of the body underneath equipment or between moveable parts even when the engine has been turned off. 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.
- Service work does not require going underneath.
- Read Operator's Manual for service instructions or have done by a qualified dealer.
- Never direct discharge toward people, animals or property.
- Do not operate equipment while under the influence of alcohol or drugs.
- Operate only in the daylight or good artificial light.
- Keep hands, feet, hair and clothing away from equipment while engine is running. Stay clear of all moving parts.
- Always comply with all state and local lighting and marking requirements.
- Do not allow riders. Do not lift or carry anybody on the skid-steer or attachments.
- Always sit in skid-steer seat when operating controls or starting engine. Securely fasten seat belt/operator restraint, place transmission in park

or neutral, engage brake and ensure all other controls are disengaged before starting skid-steer engine.

- Look down and to the rear and make sure area is clear before operating in reverse.
- Use extreme care when working close to fences, ditches, other obstructions, or on hillsides.
- Do not operate on steep slopes.
- Do not stop, start or change directions suddenly on slopes.
- Use extreme care and reduce ground speed on slopes and rough terrain.
- Watch for hidden hazards on the terrain during operation.
- Stop skid-steer and implement immediately upon striking an obstruction. Dismount skid-steer using proper procedure. Inspect and repair any damage before resuming operation.
- Before leaving skid-steer operator's seat, follow skid-steer manual instructions. Lower skid-steer lift arms and put attachment on the ground. Stop engine, remove key, engage brake, and remove seat belt/operator restraint.

## MAINTENANCE SAFETY

- Your dealer can supply original equipment hydraulic accessories and repair parts. Substitute parts may not meet original equipment specifications and may be dangerous.
- Always wear relatively tight and belted clothing to avoid entanglement in moving parts. Wear sturdy, rough-soled work shoes and protective equipment for eyes, hair, hands, hearing and head.
- Do not allow other people in the area when operating, attaching, removing, and assembling or servicing equipment.
- Never go underneath equipment lowered to the ground or raised. Never place any part of the body underneath equipment or between moveable parts even when the engine has been turned off. 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

# SAFETY RULES



## ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED!



death. Service work does not require going underneath equipment. Read Operator's Manual for service instructions or have done by a qualified dealer.

- 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. Disconnect battery before working on electrical system. Remove "ground" cable first. When reconnecting battery, connect "ground" cable last.
- Ensure implement is properly attached, adjusted and in good operating condition. Skid-steer coupler lock-pins must be fully extended and properly engaged into attachment retaining slots.
- Never perform service or maintenance with engine running.
- Keep all persons away from operator control area while performing adjustments, service or maintenance.

- 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.
- Ensure all safety decals are installed. Replace if damaged. (See **Safety Decals** section for location.)
- Ensure shields and guards are properly installed and in good condition. Replace if damaged.
- Before leaving skid-steer operator's seat, follow skid-steer manual instructions. Lower skid-steer lift arms and put attachment on the ground. Stop engine, remove key, engage brake, and remove seat belt/operator restraint.
- Do not disconnect hydraulic lines until all system pressure is relieved. Lower unit to ground, stop engine, and operate all hydraulic control levers.

### STORAGE

- Follow manual instructions for storage.
- Keep children and bystanders away from storage area.

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### NOTES

# SAFETY DECALS



REPLACE IMMEDIATELY IF DAMAGED!



## WARNING

Do not allow anyone to operate the Power Box Rake® or skid steer loader who has not been properly trained in it's safe operation and has not read and understood the operator's manuals.

Before attaching, check skid steer loader lift capacity to insure its ability to safely handle the weight.

Do not operate without guards/shields in place and in good working order.

Stop all moving parts including skid steer loader engine before cleaning, unplugging, adjusting and/or performing maintenance.

Keep bystanders 10 feet from Power Box Rake® when in operation.

Failure to follow the above safety suggestions and those in the operator's manual can result in serious injury or death.

P970004

#1 - PN: P970004



## DANGER



### ROTATING PART HAZARD

- KEEP HANDS, HAIR AND CLOTHING AWAY FROM MOVING PARTS.
- CLOSE AND SECURE ALL SHIELDS BEFORE OPERATING.

FAILURE TO DO SO COULD RESULT IN SERIOUS INJURY OR DEATH

#2 - PN: P970300



## DANGER

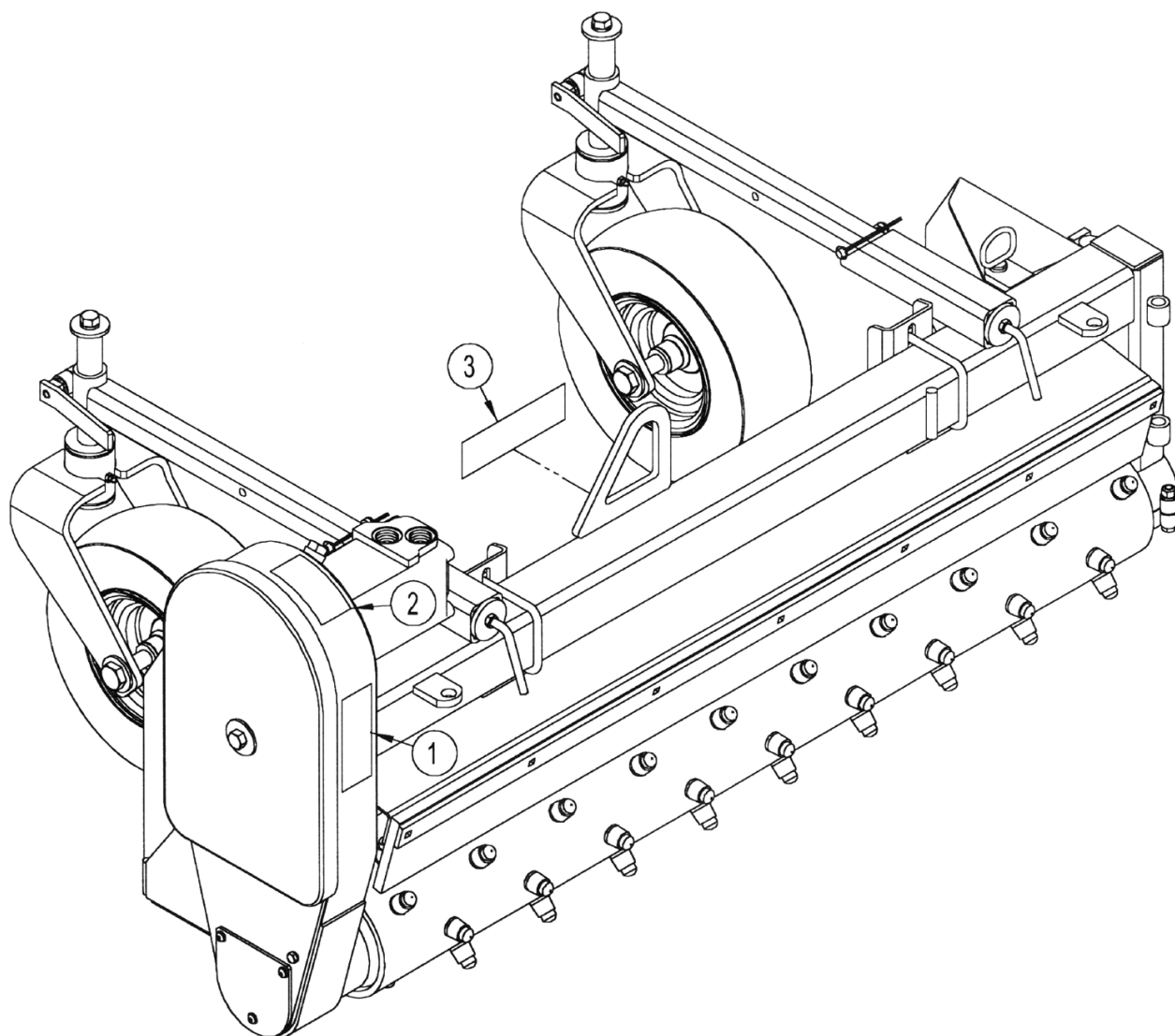
Stay at least 9 feet (3m) away from operating equipment. Flying objects and rotating parts can cause injury or death. Stop engine before cleaning or servicing. Keep all guards in place.

#3 - PN: P970251

# SAFETY DECALS



**ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED!**  
***REPLACE IMMEDIATELY IF DAMAGED!***



**Figure 1.** Safety Decals

# OPERATION

Safety is a primary concern in the design and manufacture of our products. Unfortunately, our efforts to provide safe equipment can be wiped out by a single careless act of an operator.

In addition to the design and configuration of equipment, hazard control and accident prevention are dependent upon the awareness, concern, prudence, and proper training of personnel involved in the operation, transport, maintenance, and storage of equipment.

It has been said, *"The best safety device is an informed, careful operator."* We ask you to be that kind of an operator.

The operator is responsible for the safe operation of this equipment. Operators must be instructed in and be capable of the safe operation of the equipment, its attachments, and all controls. Do not allow anyone to operate this equipment without proper instructions.

The M4 Power Box Rake® is designed for removing rock and small debris, and for thatching. Skid-steers must be equipped with an auxiliary hydraulic system capable of supplying continuous flow for hydraulic motor operation. This manual contains information for the M4 model. Refer to the information in this manual for specifications, parts, assemblies, and adjustments.



## WARNING

- **Safety instructions are important! Read all attachment and power unit manuals; follow all safety rules and safety decal information.** (Replacement manuals are available from dealer or, in the United States and Canada, call 1-800-437-9779.) Failure to follow instructions or safety rules can result in serious injury or death.
- **Do not allow children or untrained persons to operate equipment.**
- **Skid-steer must be equipped with ROPS and seat belt/operator restraint. Keep seat belt/operator restraint securely fastened/engaged. Falling off skid-steer can result in death from being run over or crushed. Keep ROPS systems in place at all times.**
- **Do not allow other people in the area when operating, attaching, removing, assembling, or servicing equipment.**
- **Never go underneath equipment lowered to the ground or raised. Never place any part of the body underneath equipment or between moveable parts even when the engine has been turned off. 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.**

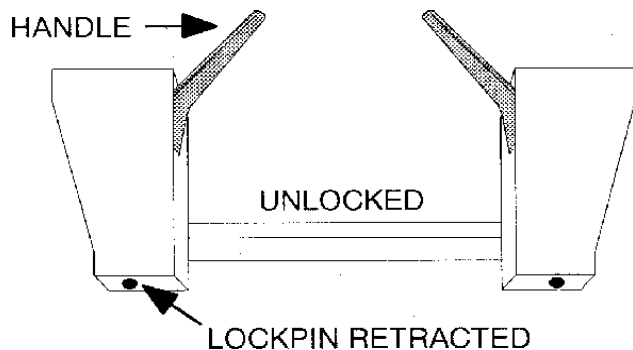
- **Service work does not require going underneath.**
- **Read Operator's Manual for service instructions or have done by a qualified dealer.**
- **Before leaving skid-steer operator's seat, follow skid-steer manual instructions. Lower skid-steer lift arms and put attachment on the ground. Stop engine, remove key, engage brake, and remove seat belt/operator restraint.**

## ATTACHING POWER RAKE TO SKID-STEER

Read the skid-steer Operator's Manual connecting and removing instruction.

Position hydraulic hoses so they will not be pinched when connecting the power rake.

The skid-steer coupler handles should be in the unlocked position and the lockpins retracted.



**Figure 2.** Skid-Steer Coupler Handles - Unlocked

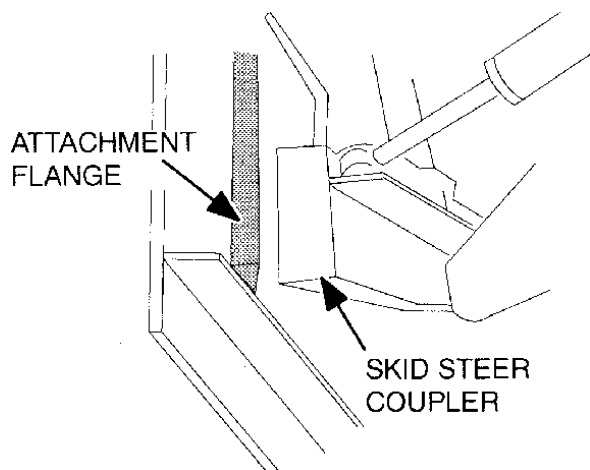
Move to the skid-steer operator seat and start engine.

Lower skid-steer lift arms to their lowest position.

Carefully move and align the skid-steer to the power rake. The top of the skid-steer coupler must index into the power rake flange, **Figure 3**.

Roll the skid-steer coupler into the power rake so the coupler handles can be engaged.

# OPERATION



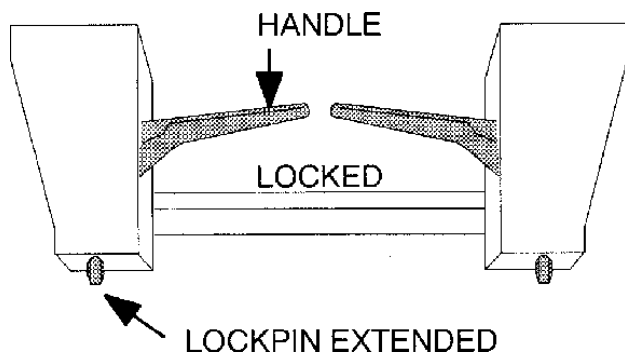
**Figure 3.** Attaching Power Rake to Skid-Steer

Shut off the engine, set brake, and remove key. Dismount the skid-steer.

Move the skid-steer coupler handles to the locked position. The lockpins must be completely extended and secured into the slots provided on the power rake, **Figure 4** and **Figure 5**.

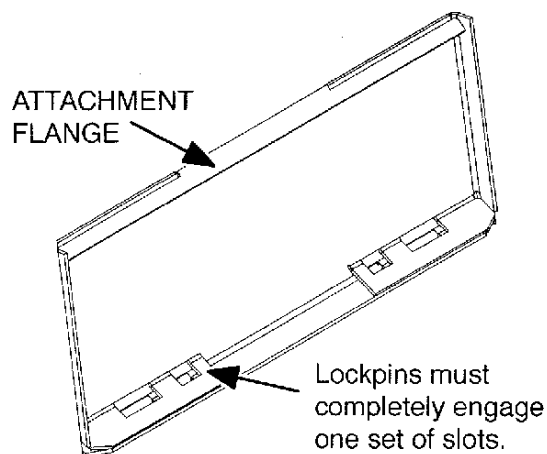
Connect hydraulic hoses to skid-steer auxiliary quick couplers.

For 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.



**Figure 4.** Skid-Steer Coupler Handles - Locked

## Back View of Attachment



**Figure 5.** Back of Attachment - Slot Locations

## 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, or gathered in front of roller on straight models.

With the endplates mounted in the working position and the rake straight (endplates parallel with skid-steer 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.

## PRE-OPERATION CHECK LIST (OWNER'S RESPONSIBILITY)

- \_\_\_\_\_ Review and follow all safety rules and safety decal instructions on pages 6 through 11.
- \_\_\_\_\_ Check that all safety decals are installed and in good condition. Replace if damaged.
- \_\_\_\_\_ Check that all shields and guards are properly installed and in good condition. Replace if damaged.
- \_\_\_\_\_ Check that all hardware and cotter pins are properly installed and secured.
- \_\_\_\_\_ Check that equipment is properly and securely attached to skid-steer.
- \_\_\_\_\_ Do not allow riders.
- \_\_\_\_\_ Check and keep all bystanders away from equipment working area.

# OPERATION

Check all lubrication points and grease as instructed in the **Maintenance** section starting on page 18.

Check that all hydraulic hoses and fittings are in good condition and not leaking before starting skid-steer. Check that hoses are not twisted, bent sharply, kinked, frayed, or pulled tight. Replace any damaged hoses immediately.

Make sure skid-steer ROPS and seat belt are in good condition. Keep seat belt securely fastened during operation.

## OPERATING INSTRUCTIONS

Read and understand the power rake and skid-steer Operator's Manuals before operating the power rake. Failure to do so may result in death, serious personal injury, or property damage.

Never raise the power rake more than a few inches off the ground when traveling from job site to job site.

Shut off the engine, set brake, remove key, remove seat belt, and release operator restraint. Dismount the skid-steer.



### WARNING

- **Improper operation can cause the machine to tip or roll over and cause injury or death.**
  - Keep skid-steer lift arms and attachment as low as possible.
  - Do not travel or turn with skid-steer lift arms and attachment raised.
  - Turn on level ground.
  - Go up and down slopes, not across them.
  - Keep the heavy end of the machine uphill.
  - Do not overload the machine.
- Look down and to the rear and make sure area is clear before operating in reverse.
- Never direct discharge toward people, animals, or property.
- Only engage power when equipment is at ground operating level. Always disengage power when equipment is raised off the ground.

### Start-up Sequence



### WARNING

- Only engage power when equipment is at ground operating level. Always disengage power when equipment is raised off the ground.

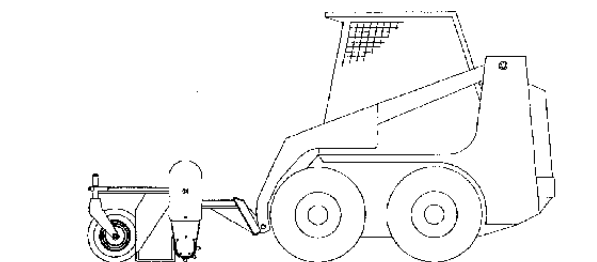
Start skid-steer engine.

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 skid-steer forward or backward as desired. For the roller to operate effectively, it must rotate in the opposite direction of the skid-steer wheels (see **Figure 6**). Roller rotation direction is controlled by skid-steer hydraulic controls.



ROLLER ROTATION	TRAVEL DIRECTION

**Figure 6.** Roller Rotation

### Ground Speed

Ground speed should be between 2 and 5 mph under normal conditions. In heavy rock, reduce the ground speed to 1 to 3 mph.

### Direction Control Switch (Hydraulic Angling Models 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 skid-steer auxiliary hydraulic system engaged and with the roller turning clockwise.

With the skid-steer 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 skid-steer.

# OPERATION

## Hydraulic Drive Motor

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

## 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 gauge wheels and/or use the skid-steer's tilt cylinder.

To allow the roller to penetrate deeper into the ground, loosen the handle and raise the gauge wheels. To achieve the opposite, lower the gauge wheels.

The chain case end of roller weighs about 60 lbs. more than the other end of roller. To compensate for this, you should set the tire closest to the chain case down 3/4" lower than opposite tire. This will still give an even grade when landscaping.

During operation, further depth control can be achieved by tilting the rake forward on gauge wheels to raise roller, or by tilting the rake back to raise gauge wheels 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 U-bolt 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**.

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 skid-steer 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.

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 rake straight (parallel with skid-steer tires), 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 must 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 skid-steer 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.

## IMPORTANT

- **Do not drop power rake to the ground with the roller turning. Sudden high speed jolts multiply stress to the driveline 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.



# OPERATION

## Debris Removal

Once the surface has been loosened, the process of removing debris can begin. The skid-steer attachment plate is tilted forward until the guide wheels control the depth of the toothed roller. The rake can be angled at this time for windrowing debris or the rake can be set straight with both endplates installed to collect debris. Skid-steer 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. Skid-steer speed can be increased for this operation, the idea being to collect material from the high spots and leave it in the low areas.

## Spreading Fill and Topsoil

Position rake so it is tilted on gauge wheels, 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 skid-steer attachment plate should be tilted forward to support the rake on the front gauge wheels 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, remove key, remove seat belt, and release operator restraint before leaving the skid-steer operator's seat.



### WARNING

- **Do not disconnect hydraulic lines until all system pressure is relieved. Lower unit to ground, stop engine, and operate all hydraulic control levers.**

## REMOVING POWER RAKE FROM SKID-STEER



### WARNING

- **Do not allow other people in the area when operating, attaching, removing, assembling, or servicing equipment.**

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, remove key, remove seat belt, and release operator restraint before leaving the skid-steer operator's seat.



### WARNING

- **Do not disconnect hydraulic lines until all system pressure is relieved. Lower unit to ground, stop engine, and operate all hydraulic control levers.**

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

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

Move to skid-steer seat 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.

## STORAGE

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



### WARNING

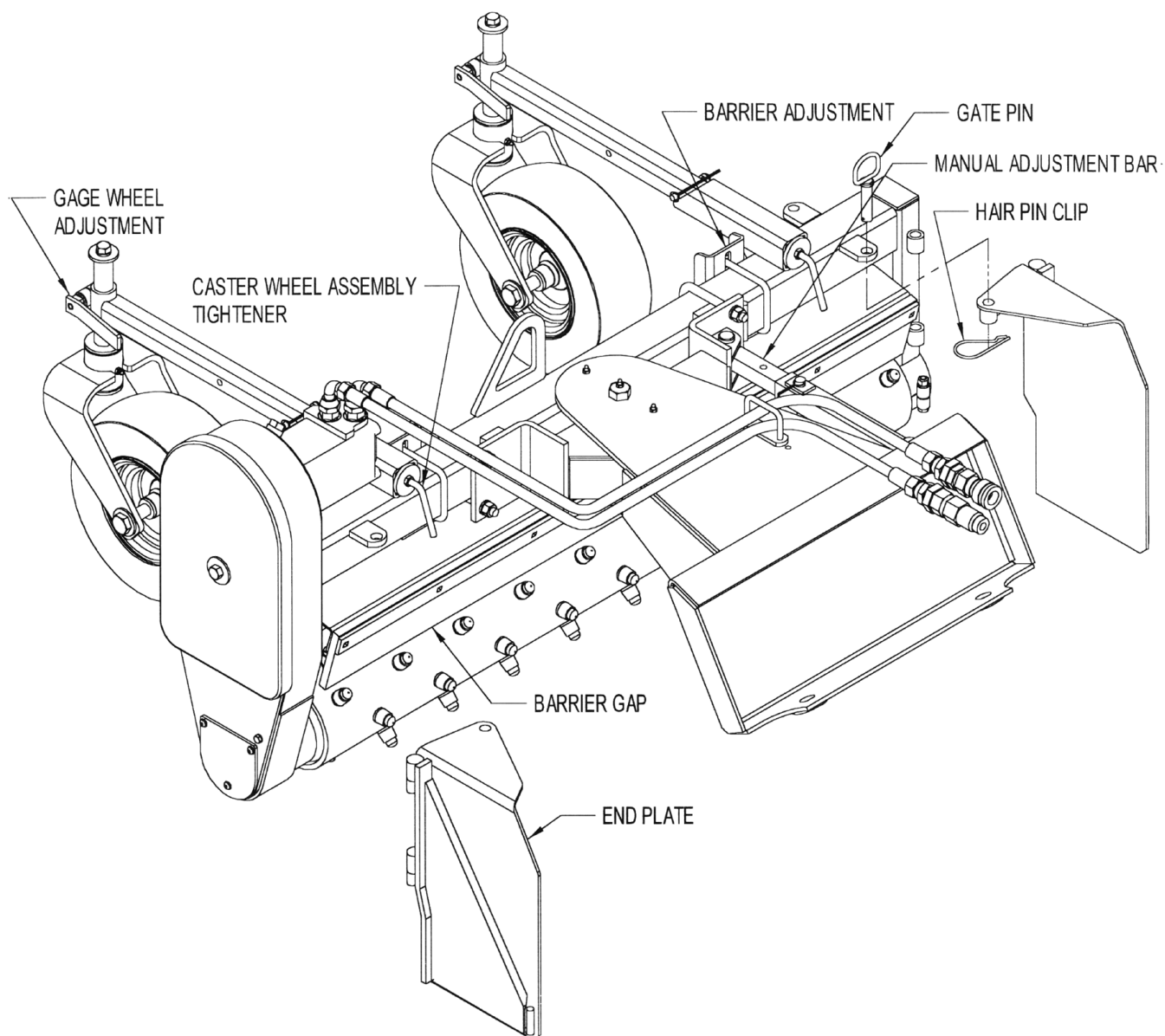
- **Block equipment securely for storage.**



### CAUTION

- **Keep children and bystanders away from storage area.**

# OPERATION



**Figure 7.** Adjustments

# 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, such as site preparation and rock raking, the power rake is constantly vibrating and shaking. Parts may loosen up 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 further damage or excessive downtime.



## WARNING

- **Never go underneath equipment lowered to the ground or raised. Never place any part of the body underneath equipment or between moveable parts even when the engine has been turned off. 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.**
  - Service work does not require going underneath.
  - Read Operator's Manual for service instructions or have done by a qualified dealer.
- **Before leaving skid-steer operator's seat, follow skid-steer manual instructions. Lower skid-steer lift arms and put attachment on the ground. Stop engine, remove key, engage brake, and remove seat belt/operator restraint.**
- **Do not allow other people in the area when operating, attaching, removing, assembling, or servicing equipment.**
- **Never perform service or maintenance with engine running.**
- **Ensure shields and guards are properly installed and in good condition. Replace if damaged.**
- **Keep hands and body away from pressurized lines. Use paper or cardboard, not body parts, to check for leaks. Wear safety goggles. Hydraulic fluid under pressure can easily penetrate skin and will cause serious injury or death.**



- **Make sure that all operating and service personnel know that in the event hydraulic fluid penetrates skin, it must be surgically removed as soon as possible by a doctor familiar with this form of injury or gangrene, serious injury or death will result. CONTACT A PHYSICIAN IMMEDIATELY IF FLUID ENTERS SKIN OR EYES. DO NOT DELAY.**
- **Make sure all hydraulic hoses, fittings, and valves are in good condition and not leaking before starting power unit or using equipment. Check and route hoses carefully to prevent damage. Hoses must not be twisted, bent sharply, kinked, frayed, pinched, or come into contact with any moving parts. Operate moveable components through full operational range to check clearances. Replace any damaged hoses immediately.**



## CAUTION

- **Your dealer can supply original equipment hydraulic accessories and repair parts. Substitute parts may not meet original equipment specifications and may be dangerous.**
- **Always wear relatively tight and belted clothing to avoid entanglement in moving parts. Wear sturdy, rough-soled work shoes and protective equipment for eyes, hair, hands, hearing, and head.**



## WARNING

- **Do not modify or alter, or permit anyone else to modify or alter, the equipment or any of its components in any way.**
- **Ensure all safety decals are installed. Replace if damaged. (See Safety Decals section for location.)**

## DAILY MAINTENANCE

When operating the power rake, check the skid-steer hydraulic system to be sure the level of hydraulic oil is adequate. If necessary, add hydraulic oil as recommended in your skid-steer operator's manual.

Repair hydraulic oil leaks promptly to avoid loss of oil and serious personal injury from escaping oil.

After every 10 hours of operation, check all hardware and tighten where required.

# MAINTENANCE

## WEEKLY MAINTENANCE

Lubricate all pivot points.

Lightly (1-2 pumps) lubricate bearing at each end of roller.

Check tire pressure. Maintain 20 psi cold.

## MONTHLY MAINTENANCE

Inspect and clean safety decals. Replace if damaged. (See **Safety Decals** section for location.)

Inspect drive chain.

Check oil level in chain case.

## QUARTERLY MAINTENANCE

Change oil in chain case and add 1.5 pints of 85-140 wt. lube.

## PRELIMINARY CHECK

The best maintenance is regular preventive checks, particularly when the machine is new. Check that all nuts and bolts are tight.

## CHAIN MAINTENANCE

The drive chain should be inspected monthly. New chain has a tendency to stretch, so it is necessary to

check the chain tension to prevent flopping around, thus causing potential problems.

Chain tension is preset with the extension spring. If the chain becomes excessively loose, it may be necessary to remove one link (two pitches). If unable to reassemble, add an offset link to lengthen the chain.

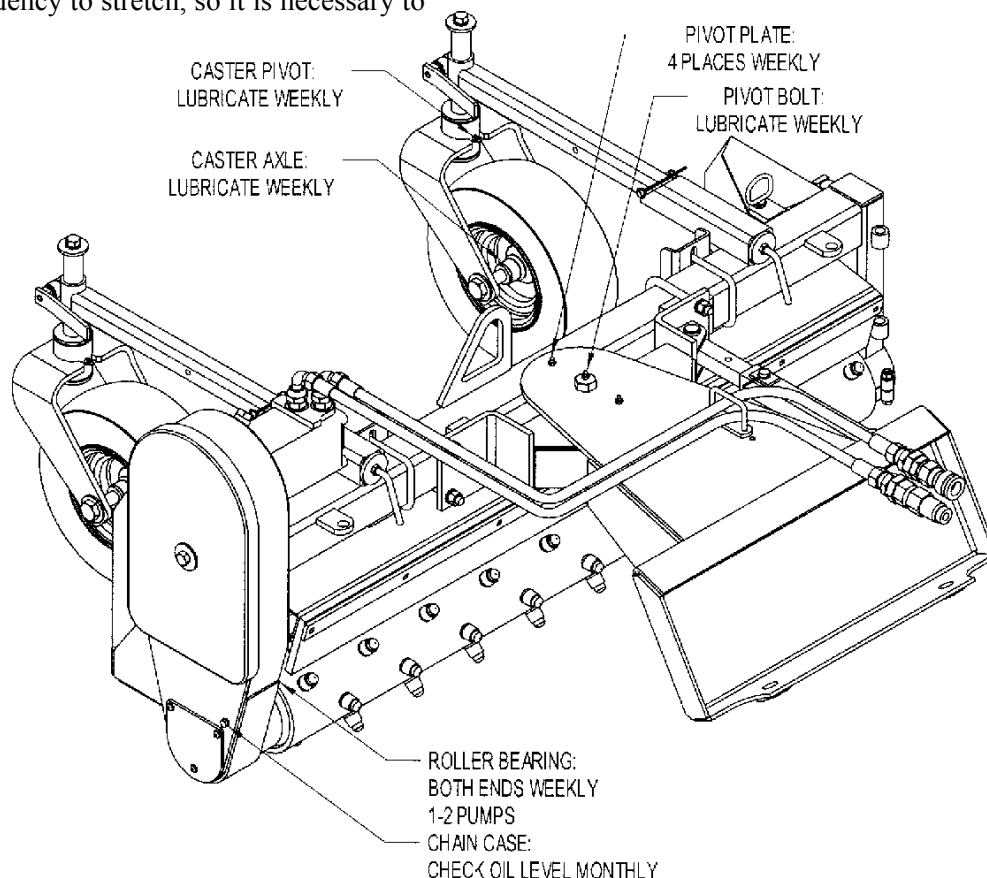
## IMPORTANT

- **Replacement chain should be only high quality original equipment chain for longer life.**

When being stored for a long period or at end of season, change the oil, adding EP 85-140 wt. oil, and rotate the roller several times allowing the chain to be coated with oil, enhancing chain life. Rotate the roller periodically to maintain lubrication. In order to rotate the roller and chain you must hook the two hydraulic hoses together.

## SPROCKETS

Sprockets should be checked to be sure slotted hex nut or hex bolt is tight, the cotter pin is in place, and the sprocket cannot move on shaft.



**Figure 8.** Lubrication Maintenance

# TROUBLE SHOOTING

Problem	Possible Cause	Solution
Roller will not turn	Hydraulic valve on skid-steer not engaged	See skid-steer Operator's Manual for auxiliary hydraulic operation procedure.
	Relief valve setting on skid-steer not properly adjusted	Have skid-steer dealer set relief valve at correct pressure.
	Worn, damaged, insufficient, or inadequate pump	Repair or replace hydraulic pump.
	Insufficient oil in system	Service the skid-steer hydraulic reservoir.
	Hose ends not completely engaged	Check hose coupling and engage properly.
	Air in hydraulic lines	Cycle skid-steer auxiliary system several times to remove air from lines.
	Obstruction in hydraulic lines	Replace obstructed or damaged line.
	Obstruction between roller and barrier	Reverse roller to clear obstruction.
Oil leaks.	Chain off	Repair or replace chain.
	Worn or damaged seal	Replace leaking seal.
	Loose or damaged hoses	Replace damaged hoses and secure loose hoses.
	Loose or damaged connections	Replace damaged hose connections and tighten loose fittings.
	Worn or damaged housing	Replace damaged housing.
	Roller out of position	Loosen bearing collar on frame and chain case. Force roller toward chain case, then tighten bearing collars on chain case and frame.
Angle cylinder will not extend or retract	Electrical failure	Check electrical power circuit.
	Hydraulic system not activated	Engage roller drive motor before attempting to move angle cylinder.
Angle cylinder will not hold position	Check-valve in manifold malfunctioning	Repair or replace check-valve.
	Solenoid cartridge not returning to closed position	Repair or replace solenoid cartridge.

# MAINTENANCE

The information in this section is written for dealer service personnel. The repair described herein requires special skills and tools. If your shop is not properly trained in this type of repair, you may be time and money ahead to replace complete assemblies.



## WARNING

- **Never go underneath equipment lowered to the ground or raised. Never place any part of the body underneath equipment or between moveable parts even when the engine has been turned off. 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.**
- **Service work does not require going underneath.**
- **Read Operator's Manual for service instructions or have done by a qualified dealer.**



## CAUTION

- **Always wear relatively tight and belted clothing to avoid entanglement in moving parts. Wear sturdy, rough-soled work shoes and protective equipment for eyes, hair, hands, hearing, and head.**
- **Do not allow other people in the area when operating, attaching, removing, assembling, or servicing equipment.**
- **Do not modify or alter, or permit anyone else to modify or alter, the equipment or any of its components in any way.**
- **Do not disconnect hydraulic lines until all system pressure is relieved. Lower unit to ground, stop engine, and operate all hydraulic control levers.**
- **Ensure implement is properly attached, adjusted, and in good operating condition.**
- **Ensure all safety decals are installed. Replace if damaged. (See Safety Decals section for location.)**
- **Ensure shields and guards are properly installed and in good condition. Replace if damaged.**

## HYDRAULIC MOTOR

### Removal

Remove chain from top sprocket. Then remove top sprocket by removing the hex bolt and washers.

### Reassembly

Apply a liberal amount of silicone sealer to inside of flange. Attach hydraulic motor to chain case with two bolts, lock washers, and nuts. Replace collar and snap ring over shaft. Carefully insert snap ring into groove on collar as collar slides past the spline. Slide top sprocket, sprocket teeth first, onto shaft. Use machine bushings on the inside or outside of sprocket for proper alignment.

## BEARINGS

Highest quality bearings are used on the power rake. Only triple-seal bearings are used on the roller which operates down in the dirt. Lubrication of bearings will vary considerably with conditions. As a rule, bearings should be under-lubricated rather than over-lubricated. Over-lubrication can cause seals to blow out.

## IMPORTANT

- **Replacement bearings should be only high quality original equipment bearings for longer life.**

Install new complete bearing housing if needed or just replace the bearing insert.

The shafts should be straight, free of burrs, and up to size. If shaft is worn, replace or have the shaft built up to standard prior to completing assembly.

### Protective Collars

The special protective collars protect bearings from vine and wire wrap, and dirt buildup next to the bearing seal. The bearing protector is sandwiched onto the shaft which rotates within a close clearance from the outer race of the bearing. Grease coming from the bearing oozes into the protecting collar, keeping dust and particles from entering the seal area, increasing the bearing life.

# MAINTENANCE

## Left Roller Bearing

Remove drive chain. Then remove lower sprocket by removing cotter pin, slotted hex nut, and washers.

Remove the two bolts holding the chain case to the frame.

**NOTE:** Have roller blocked up or supported and slide chain case and bearing off roller shaft.

Loosen bolt on the bearing tube that holds cartridge bearing in place. Remove bearing and O-ring.

To replace, reverse the procedure. Be sure all parts and wear surfaces are thoroughly clean and in good condition. Be sure O-ring is also in good condition.

When replacing bearing, first put O-ring on bearing. Apply a coat of grease on O-ring. Slide bearing in and apply moderate pressure on bearing so O-ring will seat and spread slightly, thus keeping the oil in chain case from escaping through the bearing.

## Right Roller Bearing

Remove the hex bolt and bearing cap from outside of bearing.

Loosen bolt on the bearing tube that holds cartridge bearing in place. Pry bearing tube apart to free bearing assembly.

**NOTE:** Have roller blocked up or supported. Pry bearing off of shaft and out of bearing holder.

To replace, reverse the procedure. Be sure all parts and wear surfaces are thoroughly clean and in good condition.

## ROLLER REPLACEMENT

It will be necessary to have a lifting device or additional help while removing and replacing the roller. The roller weighs approximately 80 lbs.

Remove upper and lower chain case covers.

Disconnect the two hydraulic hoses from motor. Protect hose ends and fittings from being contaminated.

Remove tension spring and drive chain. Then remove lower sprocket by removing cotter pin, slotted nut, and washers. Remove the sleeve behind the sprocket you just removed.

**NOTE:** Have the roller blocked up or supported.

Remove the two bolts holding chain case to frame and slide chain case, with hydraulic motor attached, off of roller shaft. The roller bearing will stay in the chain case.

**NOTE:** If chain case bearing is also being replaced, see **Left Roller Bearing** (above).

Loosen the bolt on the bearing tube of the non-drive end, sliding roller and bearing out of frame.

Remove hex bolt, bearing cap, bearing, and protective collar from roller. On roller to be installed, place machine bushing and protective collar against endplate of roller. Place bearing and bearing cap on roller. Clamp in place with hex bolt and lockwasher into end of roller shaft.

Slide roller and bearing into bearing tube on non-drive end of frame. Do **not** tighten bearing tube at this time.

Place spacer, protective collar, and O-ring from splined end of removed roller onto replacement roller. Check O-ring for cuts or nicks. Apply sealant to bearing area of shaft. Slide chain case back onto roller and bolt to frame.

Replace sleeve, sprocket, and washers on driveshaft. Clamp solid with the 3/4" slotted nut. Check that roller clears frame on both ends. Adjust if required.

Now, tighten 3/8" bolt in bearing tube on non-drive end of frame.

Reinstall chain and tension spring.

Replace lower cover, being careful not to pinch the O-ring. Fill the chain case with 1.5 pints of 140 wt. gear oil. Replace upper cover.

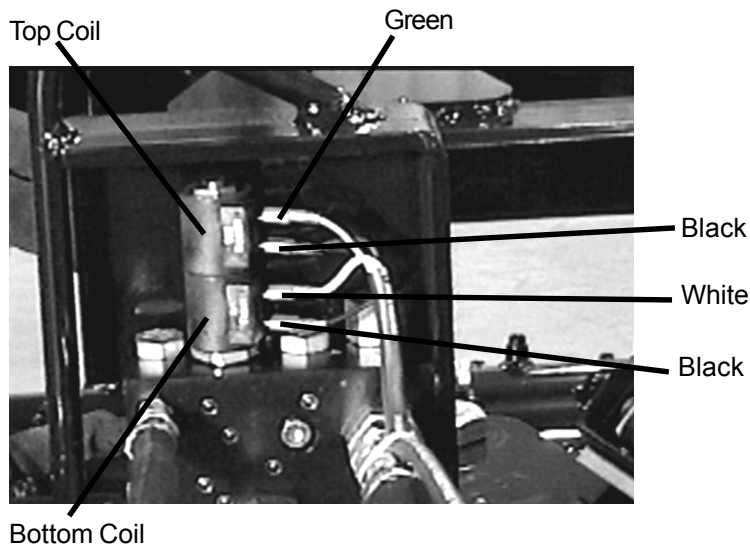
Run power rake and watch for any interference between roller and frame.

# MAINTENANCE

## **DIRECTION CONTROL VALVE (Hydraulic Angle Model Only)**

A three position switch (normally open) is used to operate the direction control valve. 12V control power is supplied by the skid-steer power cord attached to the skid-steer electrical system. The switch wires are connected to the direction control valve as shown in **Figure 9**.

The direction control valve uses a small amount of hydraulic oil bypassed from the roller drive motor circuit. The skid-steer auxiliary hydraulic system must be connected and engaged to provide angle direction adjustment; the roller must be rotating clockwise.



**Figure 9.** Direction Control Valve



# ASSEMBLY



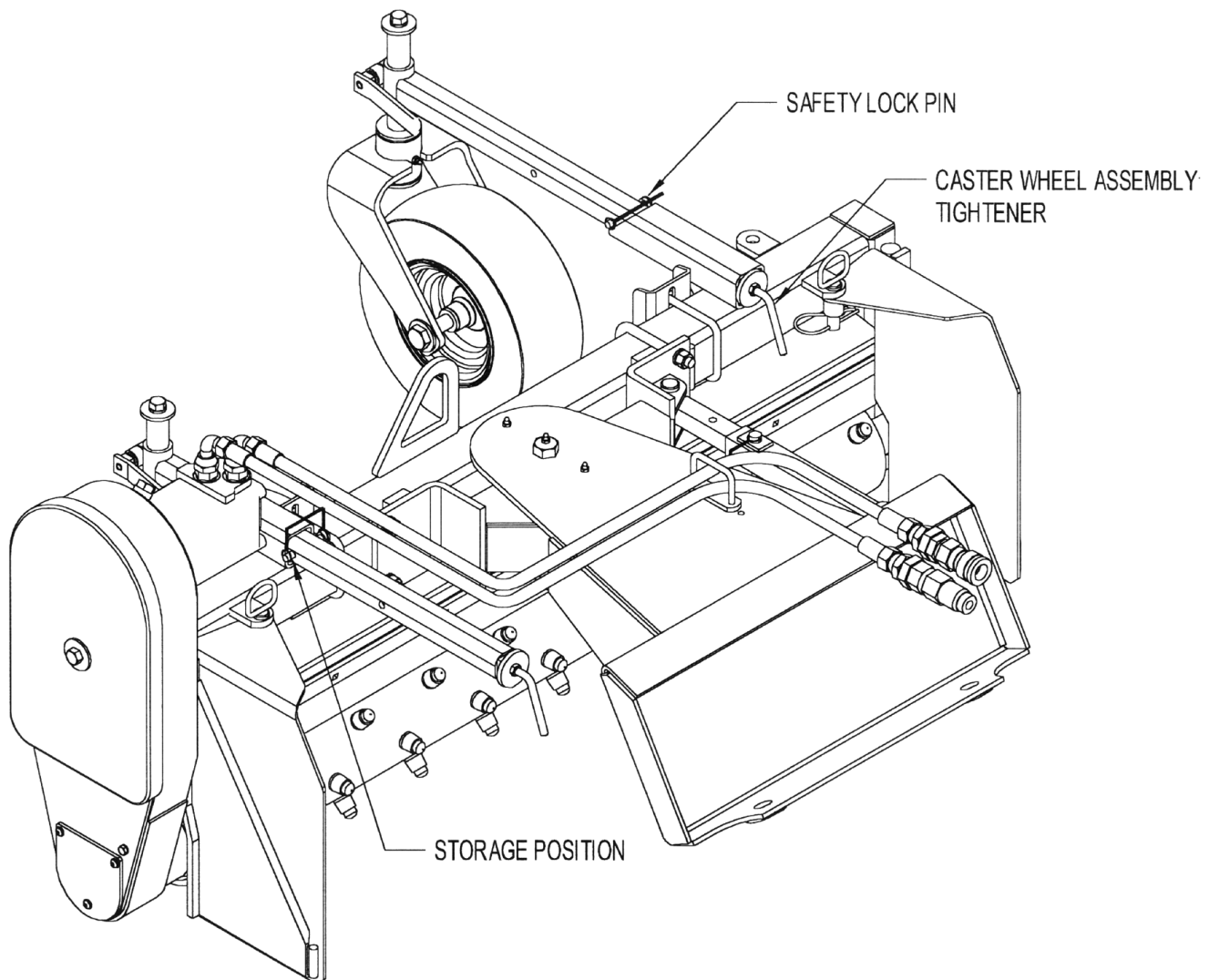
## CAUTION

- Always wear relatively tight and belted clothing to avoid entanglement in moving parts. Wear sturdy, rough-soled work shoes and protective equipment for eyes, hair, hands, hearing, and head.



## WARNING

- Keep hands and body away from pressurized lines. Use paper or cardboard, not body parts, to check for leaks. Wear safety goggles. Hydraulic fluid under pressure can easily penetrate skin and will cause serious injury or death.
- Make sure that all operating and service personnel know that in the event hydraulic fluid penetrates the skin, it must be surgically removed as soon as possible by a doctor familiar with this form of injury or gangrene, serious injury, or death will result. **CONTACT A PHYSICIAN IMMEDIATELY IF FLUID ENTERS SKIN OR EYES. DO NOT DELAY.**



**Figure 10.** Power Rake Assembly

# ASSEMBLY

- **Route hydraulic hoses carefully to prevent damage. Hoses must not be twisted, bent sharply, kinked, frayed, pinched, or come into contact with any moving parts. Operate moveable components through full operational range to check clearances. Replace any damaged hose immediately.**
- **Do not allow other people in the area when operating, attaching, removing, assembling, or servicing equipment.**
- **Do not modify or alter, or permit anyone else to modify or alter, the equipment or any of its components in any way.**

## SET-UP INSTRUCTIONS

The standard M4 Model (straight or angling) comes assembled in the crate. The only adjustment is to extend the caster wheels out to operating position, as shown in **Figure 10**.

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

## Tools Required

3/4" Combination wrench, if attaching mounting frame. It is advisable to have a mechanical lifting device to facilitate uncrating.

## Unpacking Crate

Be careful of nails in boards when uncrating.

Remove top, sides, and ends of crate.

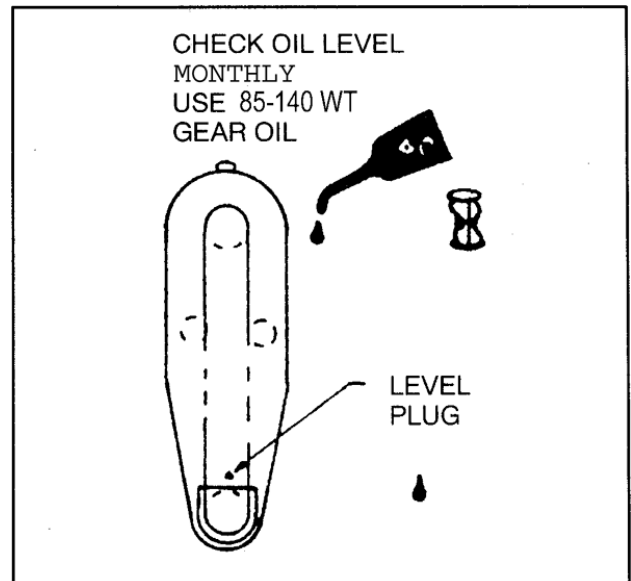
Remove power rake from crate. Remove loose nails from boards and dispose of crate according to local codes.

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. Position the mounting frame on the rake assembly with the right side resting against the stop. Clamp in place with two 1/2" U-bolts, lock washers and nuts. If installing an angling mounting system, grease the pivot area before using rake. See **Figure 8**.

For hydraulic angling model, install skid-steer power cord by connecting the red wire to a positive 12 volt power source and the white wire 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.

Check the oil level in the chain case. If needed, add EP 85-140 wt. gear oil. See instructions near fill/vent plug, **Figure 11**.



**Figure 11.** Chain Case Oil Level



## WARNING

- **Make sure all hydraulic hoses, fittings, and valves are in good condition and not leaking before starting power unit or using equipment. Check and route hoses carefully to prevent damage. Hoses must not be twisted, bent sharply, kinked, frayed, pinched, or come into contact with any moving parts. Operate moveable components through full operational range to check clearances. Replace any damaged hoses immediately.**

Check that shields and guards are properly installed and in good condition. Replace if damaged.

# STRAIGHT MOUNTING SYSTEM

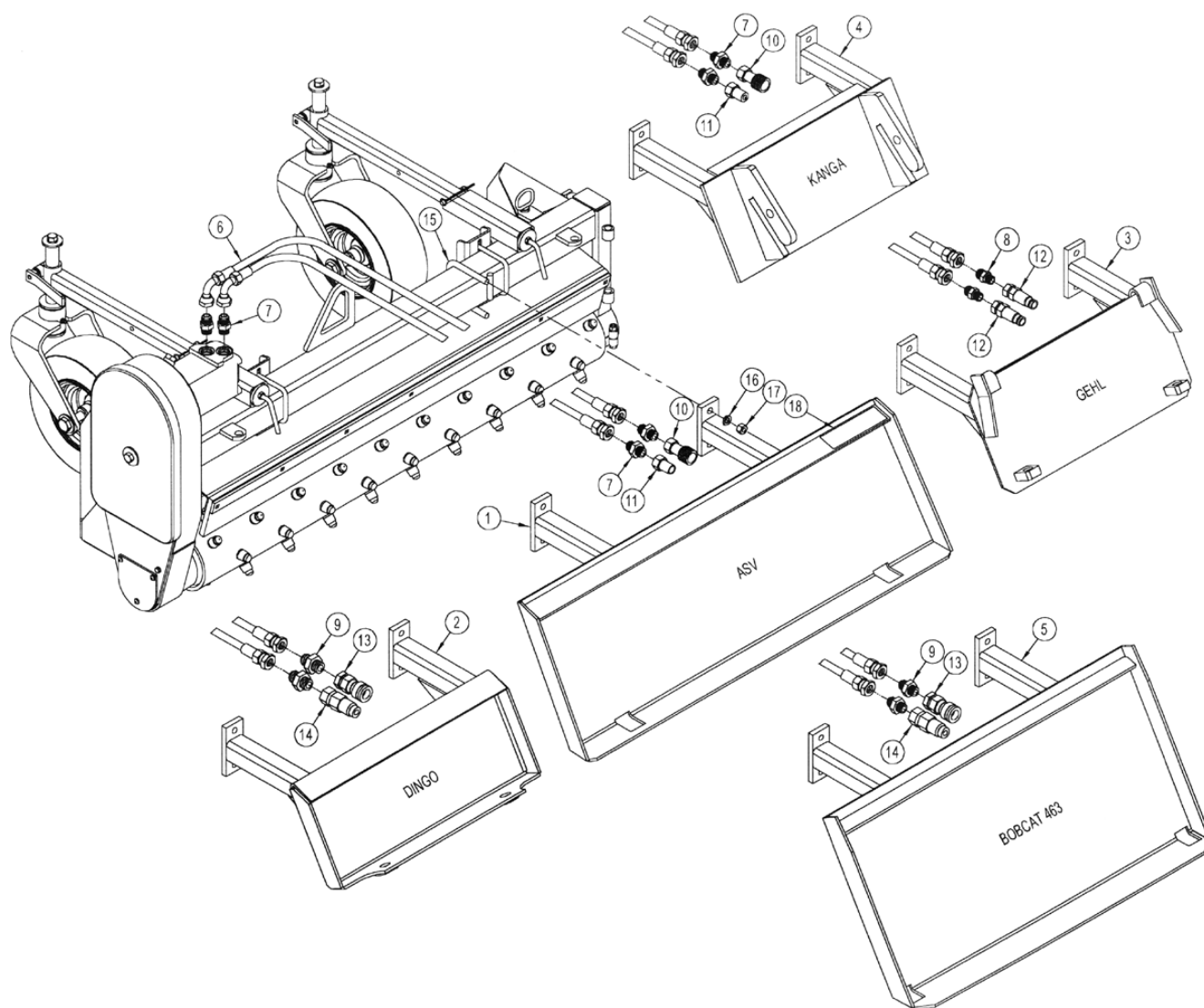


Figure 12

# STRAIGHT MOUNTING SYSTEM PARTS LIST

ITEM	QTY	PART NO.	DESCRIPTION
			MAIN ASSEMBLY – SEE PAGE 36
1	1	M14026	ASV STRAIGHT ATTACHMENT MOUNT
2	1	M14012	DINGO STRAIGHT ATTACHMENT MOUNT
3	1	M14020	GEHL STRAIGHT ATTACHMENT MOUNT
4	1	M14022	KANGA STRAIGHT ATTACHMENT MOUNT
5	1	M14083	BOBCAT 463 STRAIGHT ATTACHMENT MOUNT
6	2	P252720	1/2 HOSE X 72.00 10FJX-10FJX90°
7	6	P276200	ADAPTER 10MB-10MJ
8	2	P276405	ADAPTER 8MB-10MJ
9	4	P276458	ADAPTER 12MB-10MJ
10	2	P272660	FEMALE COUPLER
11	2	P272661	MALE COUPLER
12	2	P272664	MALE COUPLER
13	2	P272670	FEMALE COUPLER
14	2	P272671	MALE COUPLER
15	2	P128318	U-BOLT 1/2" X 3" X 4-1/4"
16	4	P851108	1/2" LOCK WASHER
17	4	P150800	1/2" NUT
18	1	P976200	SAFETY TREAD 2" X 6"

# ANGLE MOUNTING SYSTEM

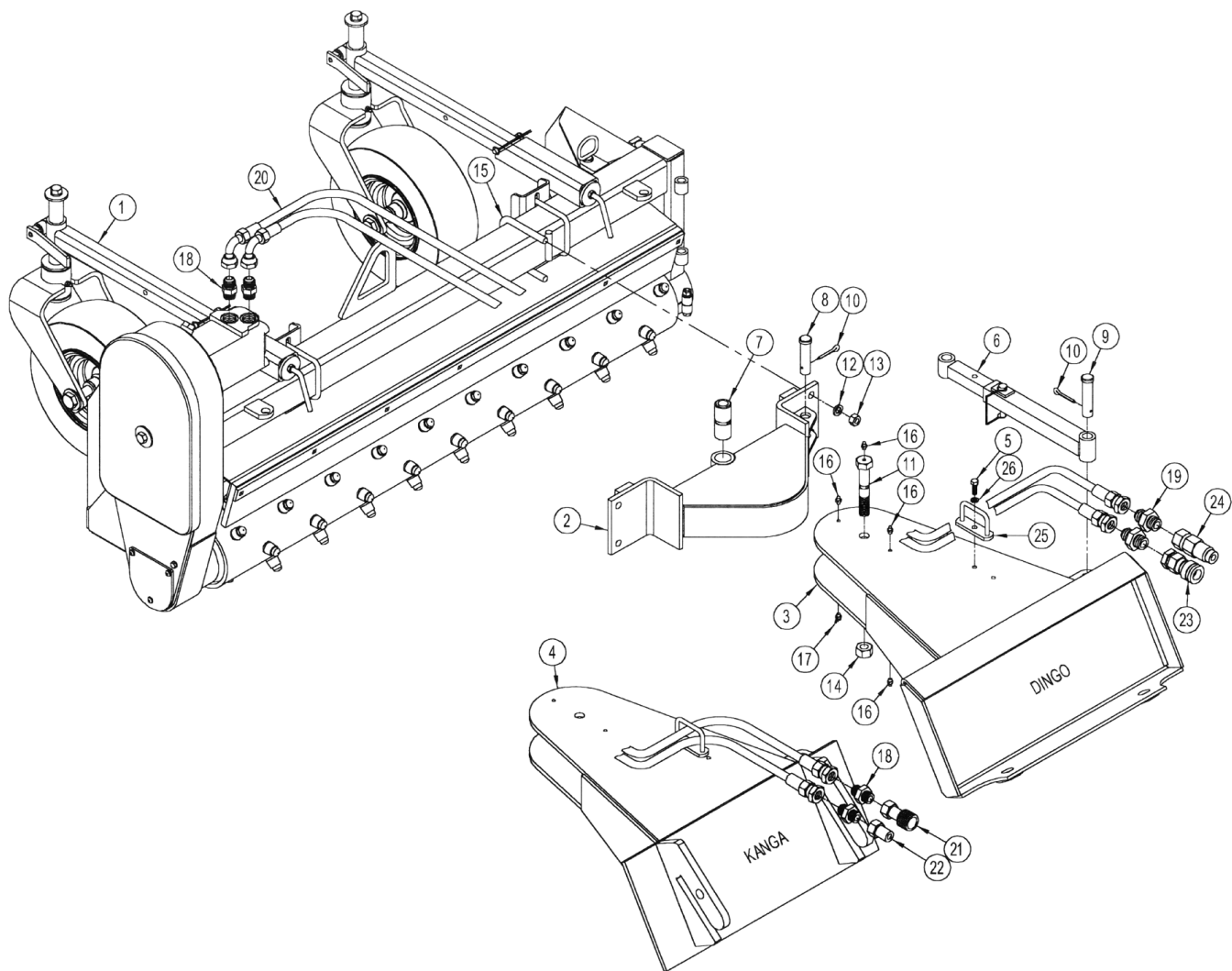


Figure 13

# ANGLE MOUNTING SYSTEM PARTS LIST

ITEM	QTY	PART NO.	DESCRIPTION
1			MAIN ASSEMBLY – SEE PAGE 36
2	1	M14042	PIVOT MOUNT
3	1	M14053	DINGO ANGLING ATTACHMENT MOUNT
4	1	M14054	KANGA ANGLING ATTACHMENT MOUNT
5	1	P100504	5/16" X 1" HEX BOLT
6	1	M5471	MANUAL ADJUSTMENT BAR
7	1	M14045	PIVOT BUSHING
8	1	P120600	3/4" X 2-7/8" CLEVIS PIN
9	1	P120150	3/4" X 3-1/4" CLEVIS PIN
10	2	P116256	5/32" X 1-1/2" COTTER PIN
11	1	M14051	PIVOT BOLT
12	4	P851108	1/2" LOCK WASHER
13	4	P150800	1/2" HEX NUT
14	1	P157120	3/4" –10 TOP LOCK NUT
15	2	P128318	U-BOLT 1/2" X 3" X 4-1/4"
16	3	P620200	1/4" –28 STR GREASE FITTING
17	1	P620000	1/4" –29 45° GREASE FITTING
18	4	P276200	ADAPTER 10 MB–10MJ
19	2	P276458	ADAPTER 12 MB–10MJ
20	2	P252720	1/2" HOSE X 72" 10 FJX-10FJ X 90°
21	1	P272660	FEMALE COUPLER
22	1	P272661	MALE COUPLER
23	1	P272670	FEMALE COUPLER
24	1	P272671	MALE COUPLER
25	1	M14059	HOSE LOOP
26	1	P851105	5/16" LOCK WASHER

# ANGLE MOUNTING SYSTEM

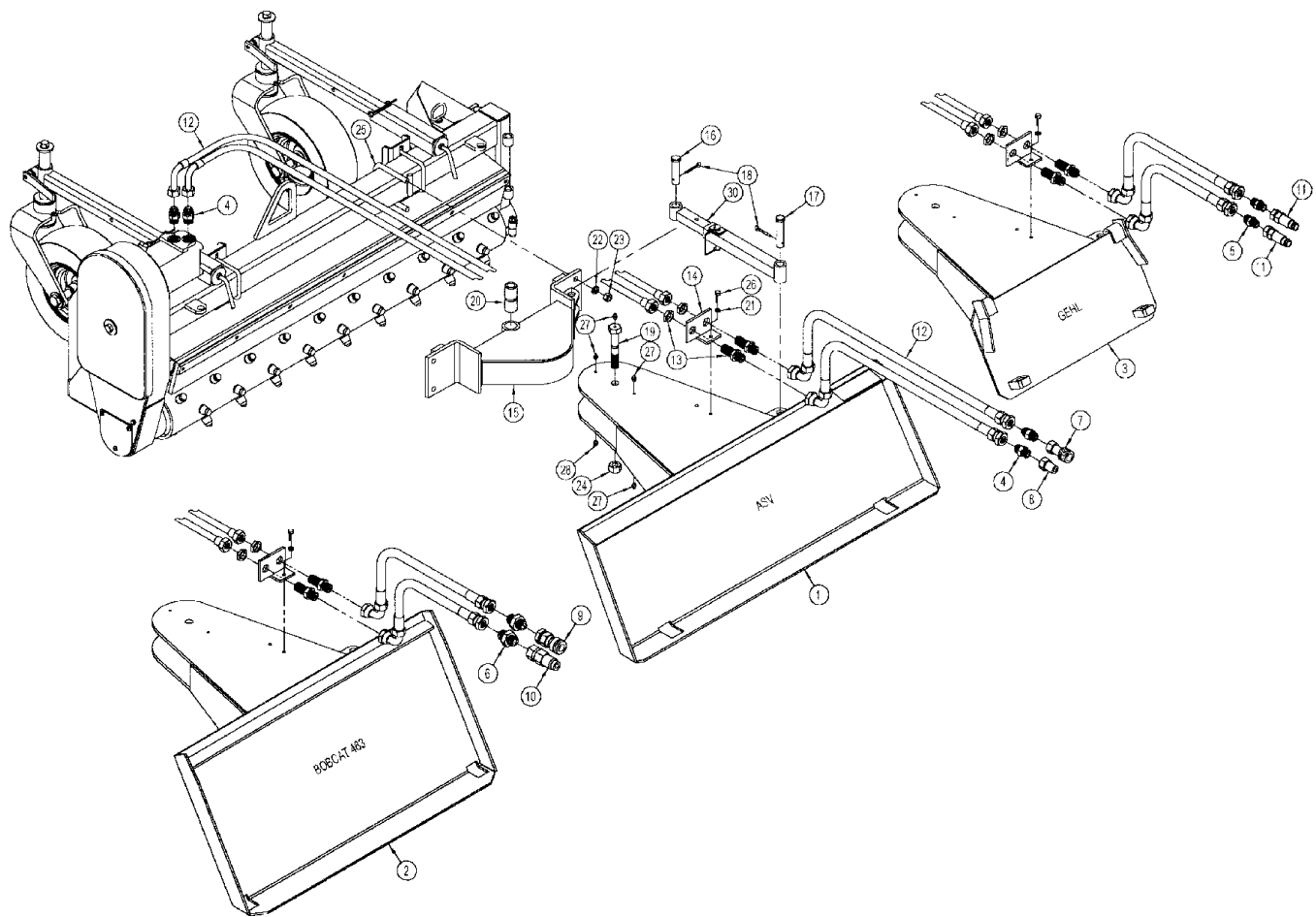


Figure 14

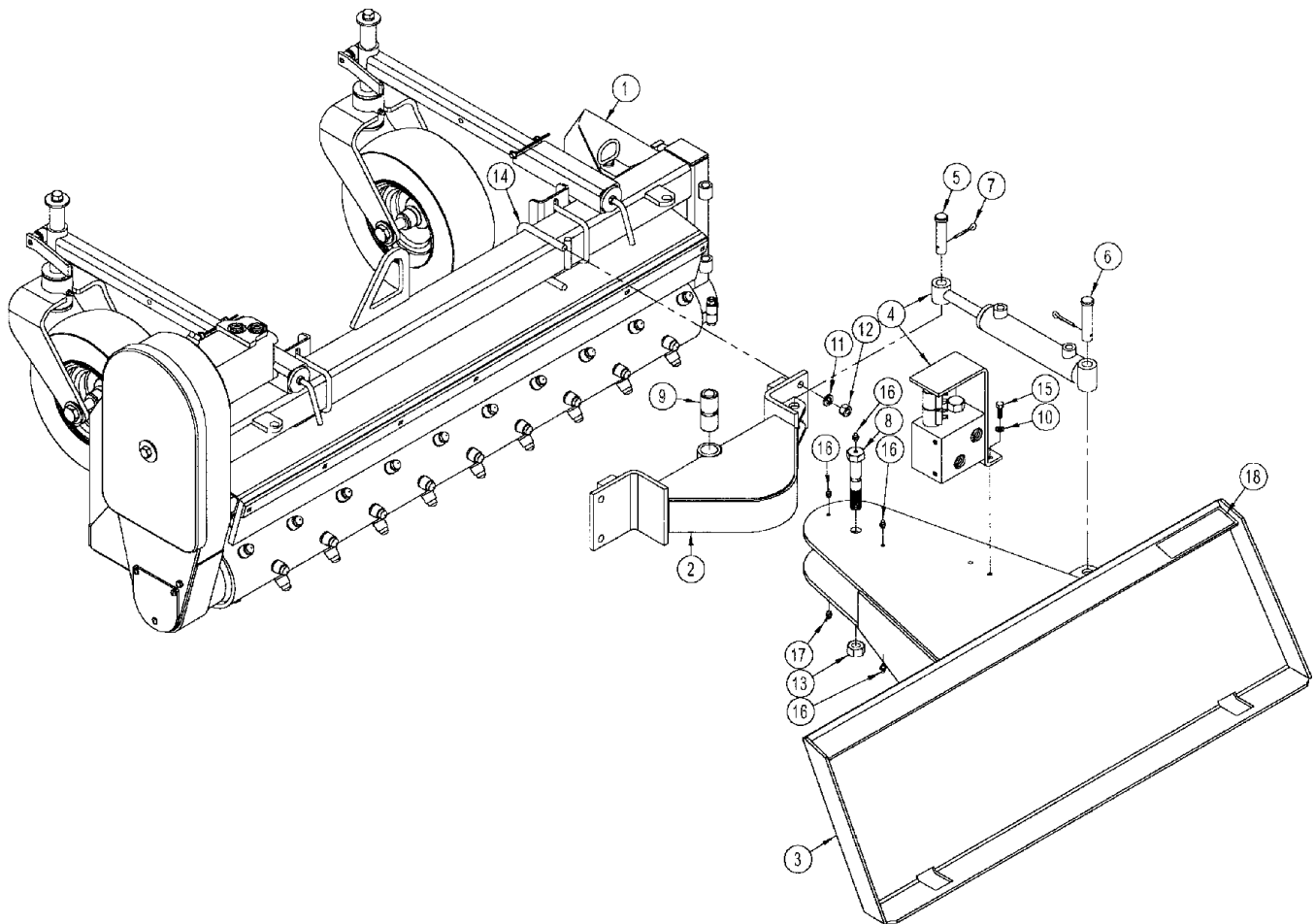
# ANGLE MOUNTING SYSTEM PARTS LIST

## ITEM QTY PART NO. DESCRIPTION

			MAIN ASSEMBLY - SEE PAGE 36
1	1	M14052	ASV ANGLING ATTACHMENT MOUNT
2	1	M14079	BOBCAT 463 ANGLING ATTACHMENT MOUNT
3	1	M14055	GEHL ANGLING ATTACHMENT MOUNT
4	4	P276200	ADAPTER 10MB-10MJ
5	2	P276405	ADAPTER 8MB-10MJ
6	2	P276458	ADAPTER 12MB-10MJ
7	1	P272660	FEMALE COUPLER
8	1	P272661	MALE COUPLER
9	1	P272670	FEMALE COUPLER
10	1	P272671	MALE COUPLER
11	2	P272664	MALE COUPLER
12	4	P251642	1/2" HOSE X 42" 10FJX-10FJX90°
13	2	P276210	-10-10S BULK HEAD FITTING
14	1	M14075	BULK HEAD FITTING MOUNT
15	1	M14042	PIVOT MOUNT
16	1	P120600	3/4" X 2-7/8" CLEVIS PIN
17	1	P120150	3/4" X 3-1/4" CLEVIS PIN
18	2	P116256	5/32" X 1-1/2" COTTER PIN
19	1	M14051	PIVOT BOLT
20	1	M14045	PIVOT BUSHING
21	2	P851105	5/16" LOCK WASHER
22	4	P851108	1/2" LOCK WASHER
23	4	P150800	1/2" HEX NUT
24	1	P157120	3/4"-10 CENTER LOCK NUT
25	2	P128318	U-BOLT 1/2" X 3" X 4-1/4"
26	2	P100504	5/16" X 1" HEX BOLT
27	4	P620200	1/4"-28 STR GREASE FITTING
28	1	P620100	1/4"-28 X 90° GREASE FITTING
29	1	P976200	SAFETY TREAD 2" X 6"
30	1	M5471	MANUAL ADJUSTMENT BAR



# HYDRAULIC ANGLE SYSTEM



Similar valve and cylinder arrangement for all power units.

Figure 15

# HYDRAULIC ANGLE SYSTEM PARTS LIST

ITEM	QTY	PART NO.	DESCRIPTION
1			MAIN ASSEMBLY - SEE PAGE 36
2	1	M14042	PIVOT MOUNT
3	1	M14052	ASV ANGLING ATTACHMENT MOUNT
			HYDRAULIC ASSEMBLY - SEE PAGE 34
5	1	P120600	3/4" X 2-7/8" CLEVIS PIN
6	1	P120150	3/4" X 3-1/4" CLEVIS PIN
7	2	P116256	5/32" X 1-1/2" COTTER PIN
8	1	M14051	PIVOT BOLT
9	1	M14045	PIVOT BUSHING
10	2	P851105	5/16" LOCK WASHER
11	4	P851108	1/2" LOCK WASHER
12	4	P150800	1/2" HEX NUT
13	1	P157120	3/4"-10 CENTER LOCK NUT
14	2	P128318	U-BOLT 1/2" X 3" X 4-1/4"
15	2	P100504	5/16" X 1" HEX BOLT
16	4	P620200	1/4"-28 STR GREASE FITTING
17	1	P620000	1/4"-28 45 DEGREE GREASE FITTING
18	1	P976200	SAFETY TREAD 2" X 6"

# HYDRAULIC ANGLE ASSEMBLY & SCHEMATIC

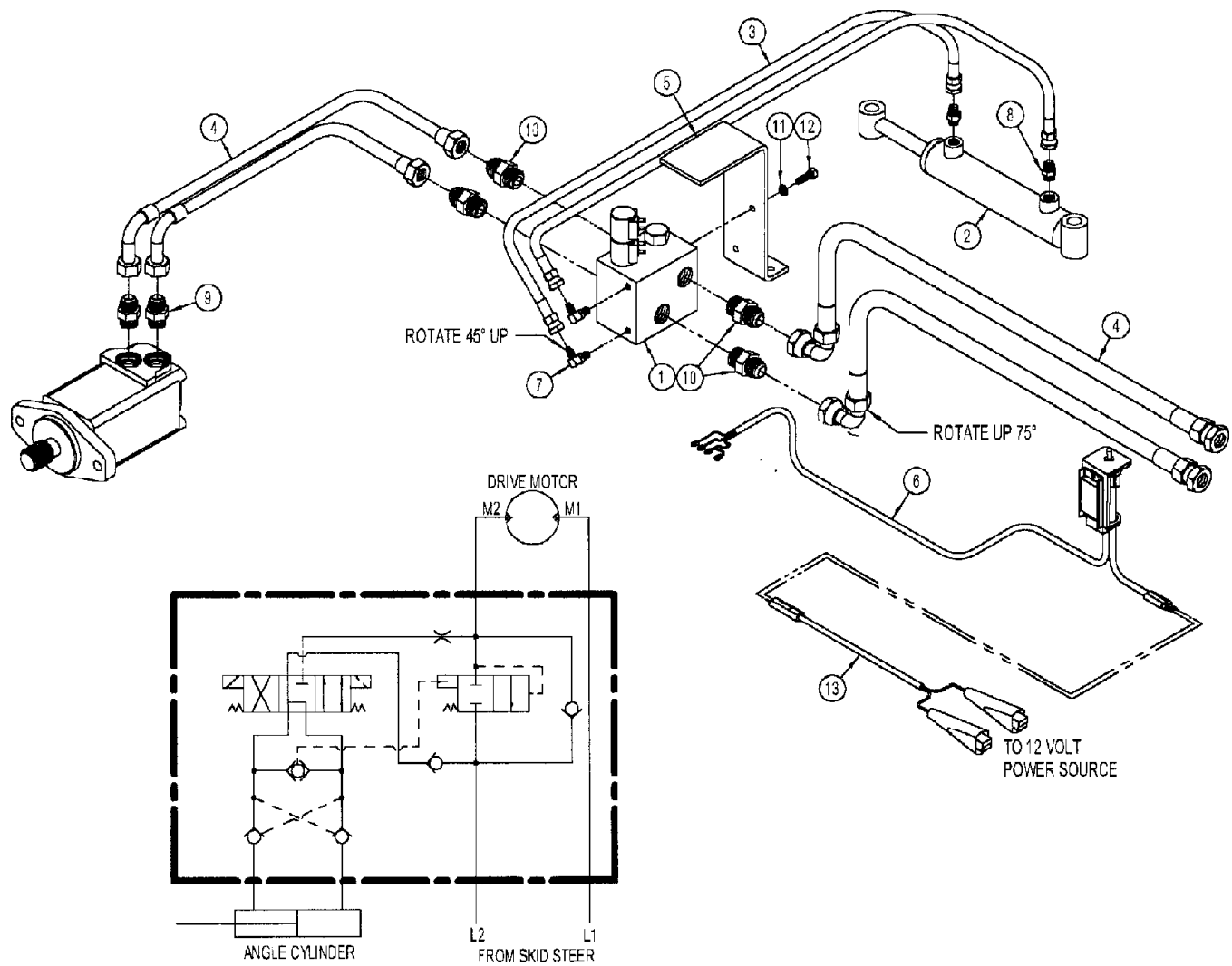


Figure 16

# HYDRAULIC ANGLE ASSEMBLY & SCHEMATIC PARTS LIST

ITEM	QTY	PART NO.	DESCRIPTION
1	1	P243000	HYDRAULIC VALVE
2	1	P256250	1-1/2" X 6" HYDRAULIC CYLINDER
3	2	P246000	1/4" HOSE X 27" 4FJX-6FJX
4	4	P251642	1/2" HOSE X 42" 10FJX-10FJX90
5	1	M14041	VALVE BRACKET
6	1	M6725	SWITCH ASSEMBLY
7	2	P261400	ELBOW -4MB-4MJ90
8	2	P276101	ADAPTER 6MB-6MJ
9	2	P276200	ADAPTER 10MB-10MJ
10	4	P276458	ADAPTER 12MB-10MJ
11	2	P851105	5/16" LOCK WASHER
12	2	P100504	5/16" X 1" HEX BOLT
13	1	M6726	POWER CORD

# RAKE ASSEMBLY

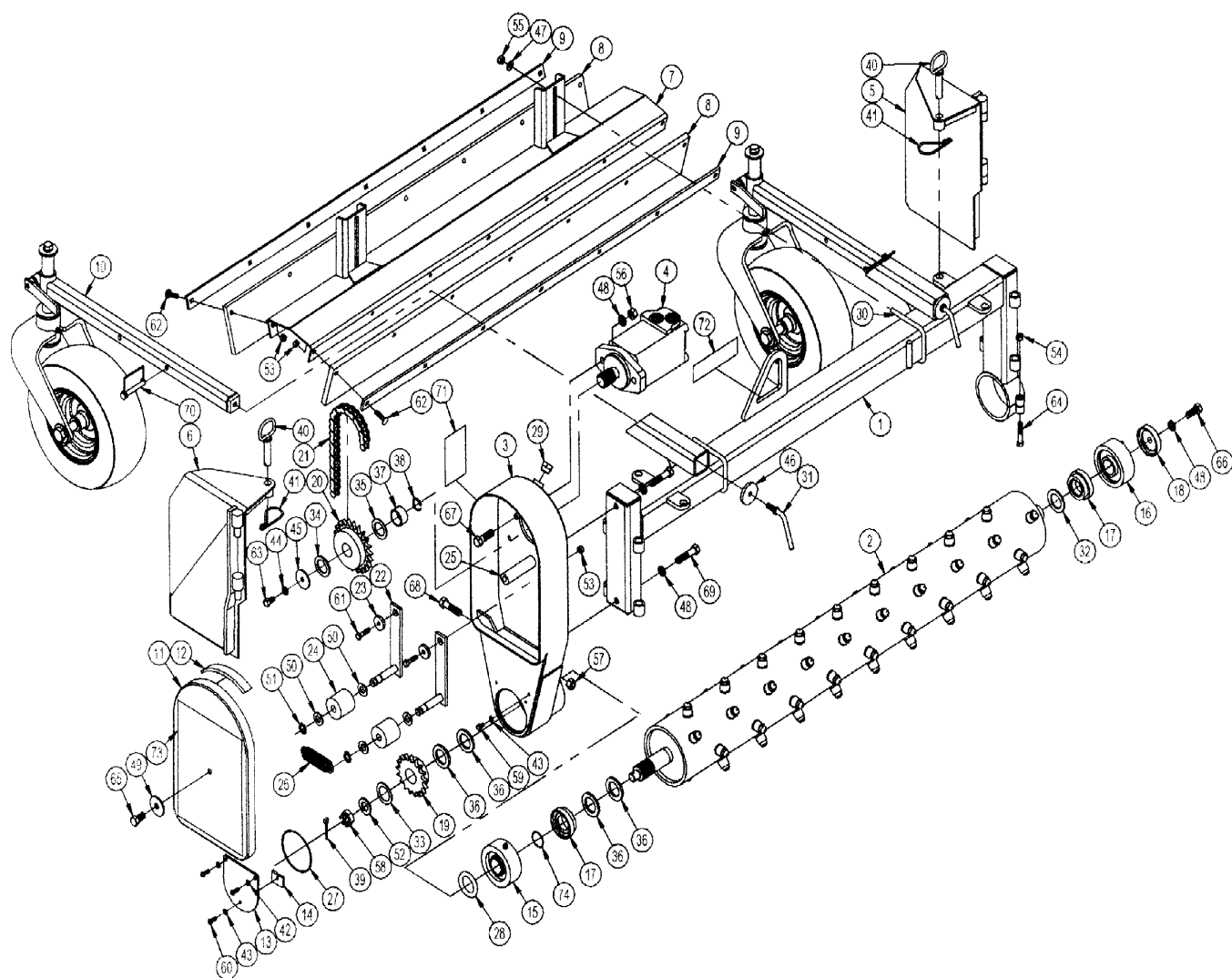


Figure 17

# RAKE ASSEMBLY PARTS LIST

ITEM	QTY	PART NO.	DESCRIPTION	ITEM	QTY	PART NO.	DESCRIPTION
1	1	M14105	MAIN FRAME	40	2	M5433	5/8" X 2-1/2" LOCK PIN
2	1	M4453	CARBIDE TOOTH ROLLER	41	2	P622600	HAIR PIN CLIP
3	1	M4410	CHAIN CASE	42	2	P851104	1/4" LOCK WASHER
4	1	P350500	HYDRAULIC MOTOR (2000, 104-1031)	43	2	P500300	1/4" O-RING WASHER
5	1	M5426	RIGHT GATE ASSEMBLY	44	1	P851106	3/8" LOCK WASHER
6	1	M5427	LEFT GATE ASSEMBLY	45	1	M5009-2	3/8" WASHER
7	1	M14039	BARRIER MOUNT	46	2	M14038	3/8" X 2" OD WASHER
8	2	M14025	BARRIER	47	4	P851606	3/8" HEAVY WASHER
9	2	M4429	BARRIER STRAP	48	5	P851108	1/2" LOCK WASHER
10	2	M14050	CASTOR WHEEL ASSEMBLY	49	1	M5009-5	1/2" X 1-3/4" WASHER
11	1	M4416	COVER	50	2	P850609	9/16" FLAT WASHER
12	1	M4418	COVER SEAL	51	2	P952224	5/8" HEAVY SNAP RING
13	1	M6240	LOWER COVER	52	1	P850612	3/4" WASHER
14	1	M6243	COVER TAB	53	16	P155350	5/16" LOCK NUT
15	1	M5440	BEARING ASSEMBLY DRIVE	54	1	P155450	3/8" TOP LOCK NUT
16	1	M5441	BEARING ASSEMBLY IDLE	55	4	P158007	3/8" ELASTIC STOP NUT
17	2	M20192	1-3/8" BEARING COLLAR	56	2	P150800	1/2" HEX NUT
18	1	P015310	1-3/8" BEARING CAP	57	1	P155852	1/2"-20 LOCK NUT
19	1	P651700	SPROCKET 17 TOOTH #50-1-3/8"	58	1	P158000	3/4"-16 SLOTTED HEX NUT
20	1	P652202	SPROCKET 22 TOOTH #50-1-1/4"	59	1	P100402	1/4" X 1/2" HEX BOLT
21	1	M4450	DRIVE CHAIN #50 75P W/CONN	60	3	P110901	1/4" X 3/4" BUTTON HEAD SCREW
22	2	M16113	TENSION ARM	61	2	P100505	5/16" X 1-1/4" HEX BOLT
23	2	M6630	PIVOT BUSHING	62	14	P104505	5/16" X 1-1/4" CARRIAGE BOLT
24	2	M6628	TENSION ROLLER	63	1	P100604	3/8" X 1" HEX BOLT
25	1	M4449	COVER SPACER	64	1	P100608	3/8" X 2" HEX BOLT
26	1	P604800	EXTENSION SPRING	65	1	P100804	1/2" X 1" HEX BOLT
27	1	P500200	O-RING 3/32" X 3-3/4"	66	1	P102805	1/2" X 1-1/4" FINE THD HEX BOLT
28	1	P500201	O-RING 3/8" X 2-3/8"	67	2	P100807	1/2" X 1-3/4" HEX BOLT
29	1	P278001	VENT PLUG	68	1	P102808	1/2" X 2" FINE THD HEX BOLT
30	2	P128393	U-BOLT 3/8" X 3" X 4"	69	2	P100812	1/2" X 3" HEX BOLT
31	2	M14106	CASTER ARM HANDLE	70	2	P126215	3/8" SAFETY PIN
32	1	P855122	1-3/8" 10GA MACHINE BUSHING	71	4	P970003	DECAL: LUBRICATION
33	1	P855322	1-3/8" 14GA MACHINE BUSHING	72	1	P975801	DECAL: HARLEY
34	1	P855120	1-1/4" 10GA MACHINE BUSHING	73	1	P975934	DECAL: M4 POWER BOX RAKE
35	1	P855320	1-1/4" 14 GA MACHINE BUSHING	74	1	P500138	O-RING .06 X 1-3/8"
36	4	M5463	BEARING SPACER				
37	1	M4409	COLLAR				
38	1	P952251	1-3/16" SNAP RING				
39	1	P116256	5/32" X 1-1/2" COTTER PIN				

# CASTOR WHEEL

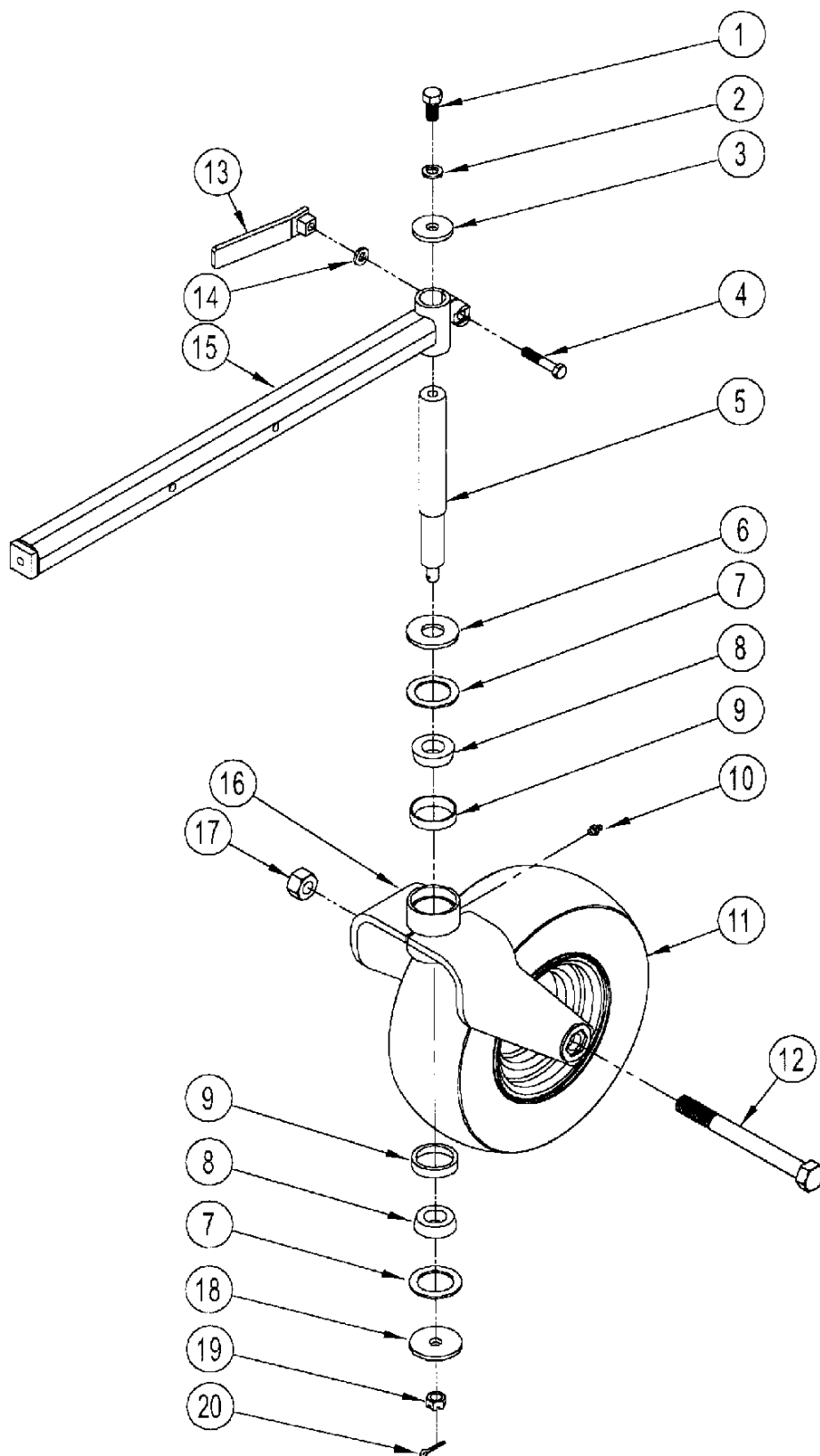


Figure 18

# CASTOR WHEEL PARTS LIST

ITEM	QTY	PART NO.	DESCRIPTION
1	1	P100804	1/2" X 1" HEX BOLT
2	1	P851108	1/2" LOCK WASHER
3	1	M5009-5	1/2" X 1-3/4" OD WASHER
4	1	P102608	3/8" X 2" FINE THD HEX BOLT
5	1	M5450	CASTOR SHAFT
6	1	M5464	1" ID X 2-1/4" OD WASHER
7	2	P852300	FELT WASHER
8	2	P762200	BEARING CONE
9	2	P762100	BEARING CUP
10	1	P620200	1/4"-28 STR GREASE FITTING
11	1	P752100	5" X 13" WHEEL AND TIRE
12	1	P101230	3/4" X 7-1/2" HEX BOLT
13	1	M5454	HANDLE
14	1	P851606	3/8" HEAVY WASHER
15	1	M14015	CASTOR SUPPORT ARM
16	1	M5488	CASTOR FORK
17	1	P157600	3/4" LOCK NUT
18	1	M5462	2-1/4" OD X 17/32" ID WASHER
19	1	P158006	1/2" SLOTTED HEX NUT
20	1	P116204	1/8" X 1" COTTER PIN



## NOTES

# LIMITED WARRANTY

**Glenmac Inc warrants** its line of Harley equipment to be free from defects in material and factory workmanship for a period of twelve (12) months. Exception to this warranty period will be Harley Rock Pickers, which will carry a six- (6) month warranty.

**Warranty registration** form must be filled out, signed by the customer and returned to Glenmac within thirty (30) days from the date of purchase before any warranty claim will be considered. Dealer rental units are considered sold units and the same warranty policy applies.

**This warranty is limited** exclusively to equipment manufactured by Glenmac Inc and is subject to inspection by Glenmac Inc to identify the nature and cause of failure. This company in no way warrants belts, bearings, hydraulics, chains, sprockets, tires or any other trade accessory not manufactured by Glenmac Inc since these items are warranted separately by their respective manufactures.

**This warranty shall become void** if in the best judgement of Glenmac Inc the equipment has been subject to misuse, negligence, alterations, and damage by accident or lack of required maintenance or if the product has been used for a purpose for which it was not intended. Wear items such as, but not limited to, rollers and drive chains will not be covered under warranty. Normal wear depreciation is not covered by warranty. Claims for equipment damaged in transit should be referred to the freight carrier. Glenmac will not be responsible for damages incurred in transit.

**Glenmac Inc obligations** under this warranty shall be limited to repair or replacement at its option of the equipment or trade accessories as they conform to this policy. Trade accessories such as but not limited to bearings, tires and wheels etc will be sent to the respective manufacturer for warranty consideration. Any warranty reimbursement as related to these items will rely solely on the decision of each separate manufacture including Glenmac Inc. Reimbursement on parts will be at dealer net and labor allowances are calculated according to Glenmac's predetermined flat time and rate. Freight charges and misc. shop supplies are not covered under warranty.

**Dealer's responsibility** is to fully explain the warranty policy to the customer before starting any repairs. Return the defective parts (prepaid) along with a completed Glenmac Inc warranty form. All replacement parts used in warranty must be furnished by Glenmac Inc. (Please refer to warranty procedures). The selling dealer has no authority to make any representation or promise on behalf of Glenmac/Harley Enterprises or to modify the terms or conditions of this warranty in any way.

**Owner's responsibility** is to complete and return the warranty registration within thirty (30) days from the date of purchase. Operate and maintain the equipment according to the recommendations in the owner's manual. The owner is responsible for freight and transportation to and from the dealership or any service calls made by the dealer.

This warranty is subject to any conditions of supply, which may directly affect our ability to obtain materials or manufacture replacement parts.

Glenmac Inc reserves the right to make improvements in design or change in specifications of its products without notice and is not obligated to make the same improvements to equipment previously manufactured.

THERE IS NO OTHER EXPRESSED OR IMPLIED WARRANTY ON THIS PRODUCT OR ON ITS MERCHANTABILITY OR ON ITS FITNESS. TO THE EXTENT ALLOWED BY LAW NIETHER GLENMAC INC NOR THE SELLING HARLEY DEALER SHALL HAVE ANY RESPONSIBILITY FOR LOSS OF USE OF THE PRODUCT, LOSS OF TIME, INCONVENIENCE, COMERCIAL LOSS OR CONSEQUENTIAL DAMAGES.

# Harley

by

**Glenmac**  
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