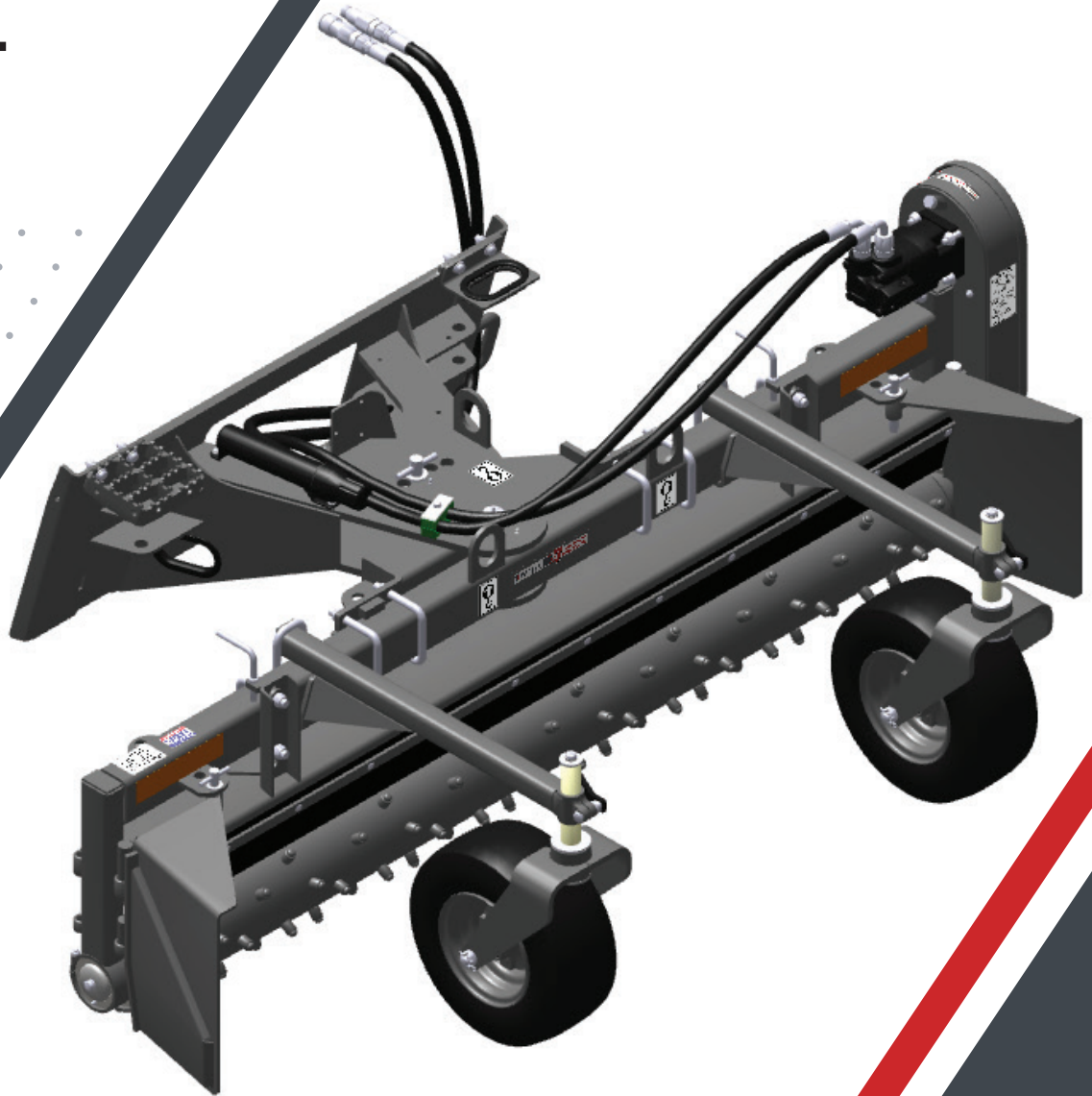




# PALADIN®

## OPERATOR'S MANUAL



### **POWER BOX RAKE®** **M Series (M4 / M5 / M6 / Mx7 / Mx8)** *for Skidsteer Loaders*

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

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

Manual Number: P970637

Date: July 2024

Rev. 5



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# Preface



## General Comments

Congratulations on the purchase of your new product! 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.

This manual has been designed to help you do a better, safer job. Read this manual carefully and become familiar with its contents.



### **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 forward.

### **IMPORTANT**

**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 this 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 the manufacturer to obtain further assistance. Keep this manual available for reference. Provide the manual to any new owners and/or operators.



### **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 for 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 not possible 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.paladinattachments.com/patents.asp>.**

# Safety Statements



THIS SYMBOL BY ITSELF OR 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.



## **DANGER!**

INDICATES A HAZARDOUS SITUATION WHICH, IF NOT AVOIDED, WILL RESULT IN DEATH OR SERIOUS INJURY



## **WARNING!**

INDICATES A HAZARDOUS SITUATION WHICH, IF NOT AVOIDED, COULD RESULT IN DEATH OR SERIOUS INJURY



## **CAUTION!**

INDICATES A HAZARDOUS SITUATION WHICH, IF NOT AVOIDED, COULD RESULT IN MINOR OR MODERATE INJURY

## **NOTICE**

NOTICE IS USED TO ADDRESS PRACTICES NOT RELATED TO PHYSICAL INJURY.

## General Safety Precautions



## **WARNING!**



### **READ AND UNDERSTAND MANUAL**

- ▶ Read and understand this manual and other safety information provided with this equipment and base machine (prime mover) and be sure all controls and instructions are understood before attempting to install, operate or maintain this equipment.
- ▶ Read and follow all safety warnings and instructions.
- ▶ Do not discard safety instructions. Give to the operator.
- ▶ Improper installation, operation or maintenance of this equipment could result in serious injury, death or property damage.

### **READ AND UNDERSTAND ALL SAFETY STATEMENTS**

- ▶ Read all safety statements in this manual and on your equipment safety decals.
- ▶ Keep safety decals in good condition. Replace missing or damaged safety decals.
- ▶ Because the manufacturer cannot foresee all hazardous circumstances, the precautions listed in this manual and on the equipment are not all-inclusive. If a procedure, method, tool or part is not specifically recommended by the manufacturer, determine whether it is safe for you and others, and that the equipment will not be damaged or made unsafe as a result of your decision to implement it.



## PERSONAL PROTECTIVE EQUIPMENT (PPE)

- ▶ Always wear personal protective equipment (PPE) appropriate for the job, such as eye protection, ear protection, gloves, head protection, breathing protection and safety shoes. PPE should be worn at all times when operating, maintaining or observing the tool.
- ▶ Use PPE that conforms to standards ANSI Z87.1 (Eye and Face Protection), ANSI Z89.1 (Head Protection), ANSI Z41.1 (Foot Protection) and ANSI S12.6 (S3.19) (Hearing Protection).
- ▶ Do not wear loose fitting clothing, jewelry, long hair or gloves with cut or frayed fingers. These items can become entangled in the equipment causing hazards such as choking, scalping, lacerations, severed or broken appendages.



M003  
Wear Ear  
Protection



M004  
Wear Eye  
Protection



M016  
Wear a Mask

## KNOW YOUR EQUIPMENT

- ▶ Know your equipment's capabilities, dimensions, and controls before operating.
- ▶ Do not operate a damaged, improperly adjusted, modified or incompletely assembled tool.
- ▶ Make sure all safety guards and devices are installed.
- ▶ Check all hardware to ensure 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.
- ▶ Inspect the tool before each use and ensure all safety decals are in place and legible. Contact manufacturer if replacement decals are needed.
- ▶ Know and follow good work practices when assembling, maintaining, repairing, mounting, removing or operating this equipment.

## SAFELY OPERATE EQUIPMENT

- ▶ Establish a training program for all operators to ensure safe operation.
- ▶ Do not operate the tool unless thoroughly trained or under the supervision of a qualified operator or instructor.
- ▶ Know and obey all OSHA regulations, local laws, and other professional guidelines for your operation.
- ▶ Know your work site safety rules. When in doubt on any safety issue, contact your supervisor or safety coordinator.
- ▶ Assess hazards to yourself and others around you before operating the tool. Start in a work area without bystanders. A hazard to bystanders can include, but is not limited to, the risk of serious injury or death caused by the tool or accessories being dropped from an elevated height. Keep children out of the work area.
- ▶ Do not operate the equipment from anywhere other than the correct operator's position.
- ▶ Do not alter or remove any safety feature from the prime mover or tool.
- ▶ Stay alert, watch what you are doing and use common sense when operating the tool. Do not operate the tool if you are tired or under the influence of drugs, alcohol or medication. A moment of inattention while operating the tool may result in serious

# General Safety Precautions



injury.

## **CALIFORNIA PROPOSITION 65 WARNING**

- ▶ This product may contain a chemical known to the State of California to cause cancer, or birth defects or other reproductive harm. [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov)

## **DUST AND FUMES**

- ▶ **WARNING:** Dust created by power sanding, sawing, grinding, drilling, and other job site activities may contain chemicals known to cause cancer, birth defects or other reproductive harm. Some examples of these chemicals are:
  - Lead from lead-based paints
  - Crystalline silica from quartz, bricks, cement and other masonry products
  - Arsenic and chromium from chemically-treated lumber
- ▶ To reduce your exposure to these chemicals: work in a well ventilated area and work with approved safety equipment, such as dust masks that are specially designed to filter out microscopic particles. Protect yourself and those around you.
- ▶ Research and understand materials you are working with.
- ▶ Follow correct safety procedures and comply with all applicable national, state or provisional health and safety regulations relating to them, including, if appropriate, arranging for the safe disposal of the materials by a qualified person.
- ▶ Use dust suppression or dust collection methods when using a tool that may cause high levels of dust.
  - Control dust or fumes at the point of emission.
  - Direct tool exhaust to minimize disturbance of dust.
  - Operate and maintain the tool as recommended in this manual to minimize dust.
  - Use respiratory protection in accordance with employers instruction or as required by occupational health and safety regulations.
  - Avoid prolonged contact with dust. Allowing dust to get into your mouth, eyes or on the skin may promote absorption of harmful chemicals.



## **SAFELY MAINTAIN AND REPAIR EQUIPMENT**

- ▶ Work in a clean and dry area.
- ▶ Keep the work area well lit.
- ▶ Work on a level surface.
- ▶ Use properly grounded electrical outlets and tools.
- ▶ Use the correct tools for the job at hand.
- ▶ Ensure tools are working properly and safely by performing preventative maintenance procedures.
- ▶ Wear protective equipment specified by the tool manufacturer.
- ▶ Do not perform any work on the tool unless you are authorized and qualified to do so. Always read the operator service manuals before any repair is made.





- ▶ After completing maintenance or repair, remove all maintenance tools and unused parts from equipment.
- ▶ Check for correct operation of the tool. If not operating properly, shut down the prime mover, follow proper Lock-Out / Tag-Out procedures and tag “DO NOT OPERATE” until all problems are corrected.

### **USE CARE WITH HYDRAULIC FLUID PRESSURE**

- ▶ **DO NOT** attempt to make repairs to hydraulic lines or components while the system is pressurized. Hydraulic fluid under pressure can penetrate the skin and cause serious injury or death. Follow proper procedures for relieving pressure from hydraulic system before connecting or disconnecting hydraulic lines or components.
- ▶ Wear personal protective equipment (PPE) such as safety glasses, gloves and protective clothing at all times.
- ▶ Hydraulic leaks under pressure may not be easily visible. Keep hands and other body parts away from a suspected leak. Flesh injected with hydraulic fluid may develop gangrene or other permanent disabilities. Use a piece of cardboard or wood when searching for hydraulic leaks.
- ▶ If injured by injected fluid, seek immediate medical attention.
- ▶ Hydraulic fluid can become hot during operation. **DO NOT** come in contact with hot hydraulic fluid as it could cause severe burns.
- ▶ If exposed to hydraulic fluid, wash hands immediately.
- ▶ Inspect and clean couplers before use. Replace damaged couplers immediately.
- ▶ Ensure the couplers are properly connected and are tight.
- ▶ Do not smoke while working on the hydraulic system.



### **DO NOT MISUSE OR MODIFY EQUIPMENT**

- ▶ Use and maintain the tool as stated in this manual. Misuse of the tool can cause serious injury.
- ▶ Do not modify the tool in any way. Modifications may weaken its integrity and may impair its function, safety, life and performance. When making repairs use only factory recommended replacement parts, following authorized instructions. Use of parts that are not factory approved may be substandard in fit and quality and may cause damage and void the warranty.
- ▶ Do not modify any ROPS (Roll Over Protective Structure) or FOPS (Falling Object Protective Structure) equipment or device. Any modifications must be authorized in writing by the manufacturer.

### **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.

# Equipment Safety

## Precautions



### **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.

#### **PROTECT AGAINST FLYING DEBRIS**

Always wear proper safety glasses, goggles, or a face shield when driving pins in or out, or when any operation causes dust, flying debris, or any other hazardous material.

#### **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 on blocks. Lower booms and attachments to the ground before leaving the cab or operator's station.

#### **OPERATING THE ATTACHMENT**

- ▶ Keep bystanders clear of discharge area during operation. Flying debris can cause severe injury or death.
- ▶ Do not direct discharge towards people, livestock or where property damage can occur. Keep children and others away from discharge area.
- ▶ Do not operate without good visibility or light.
- ▶ Do not exceed the lifting capacity of your prime mover.
- ▶ Operate only from the operator's station.
- ▶ When operating on slopes, drive up and down, not across. Avoid steep hillside operation, which could cause the prime mover to overturn.
- ▶ Reduce speed when driving over rough terrain, on a slope, or turning, to avoid overturning the vehicle.
- ▶ Keep the heavy end of the machine uphill.
- ▶ Do not operator equipment if tired or under the influence of drugs or alcohol, which can impair alertness or coordination. A person taking prescription or over-the-counter medications should seek medical advice before he or she can safely operate equipment.
- ▶ Before exiting the prime mover, lower the attachment to the ground, apply the brakes, turn off the prime mover's engine and remove the key.





## **WARNING!**

### **TRANSPORTING THE ATTACHMENT**

- ▶ Travel only with the attachment in a safe transport position to prevent uncontrolled movement. Drive slowly over rough ground and on slopes.
- ▶ When transporting on a trailer: Secure attachment at recommended tie down locations using tie down accessories that are capable of maintaining attachment stability.
- ▶ When driving on public roads use safety lights, reflectors, Slow Moving Vehicle signs etc., to prevent accidents. Check local government regulations that may affect you.
- ▶ Do not drive close to ditches, excavations, etc., cave in could result.
- ▶ Do not smoke when refueling the prime mover. Allow room in the fuel tank for expansion. Wipe up any spilled fuel. Secure cap tightly when done.

### **MAINTAINING THE ATTACHMENT**

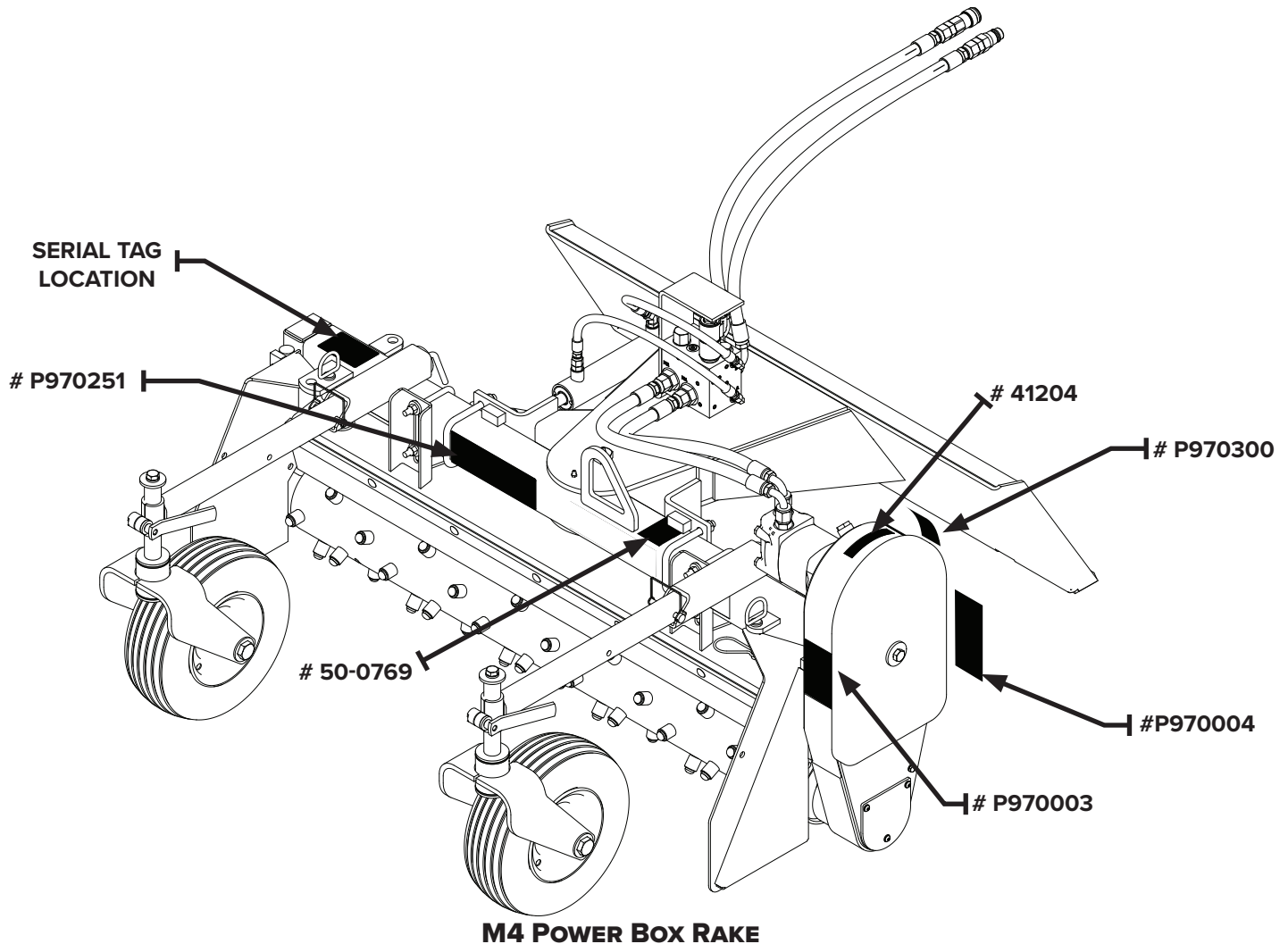
- ▶ Before performing maintenance lower the attachment to the ground, apply the brakes, turn off the engine and remove the key.
- ▶ Never perform any work on the attachment unless you are authorized and qualified to do so. Always read the operator service manuals before any repair is made. After completing maintenance or repair, check for correct functioning of the attachment. If not functioning properly, shut down the machine, follow proper Lock-Out / Tag-Out procedures and tag “DO NOT OPERATE” until all problems are corrected.
- ▶ Worn, damaged, or illegible safety decals must be replaced. New safety decals can be ordered from Paladin.
- ▶ Never make hydraulic repairs while the system is under pressure. Serious personal injury or death could result.
- ▶ Never work under a raised attachment.
- ▶ Stop the prime mover engine and cycle control levers to release hydraulic pressure before servicing or adjusting attachment hydraulic systems.

# Decals

## Decal Placement

### GENERAL INFORMATION

The diagrams on this page show the location of the decals used on your attachment. The decals are identified by their part numbers, with reductions of the actual decals located on the following page. Use this information 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 product longevity.



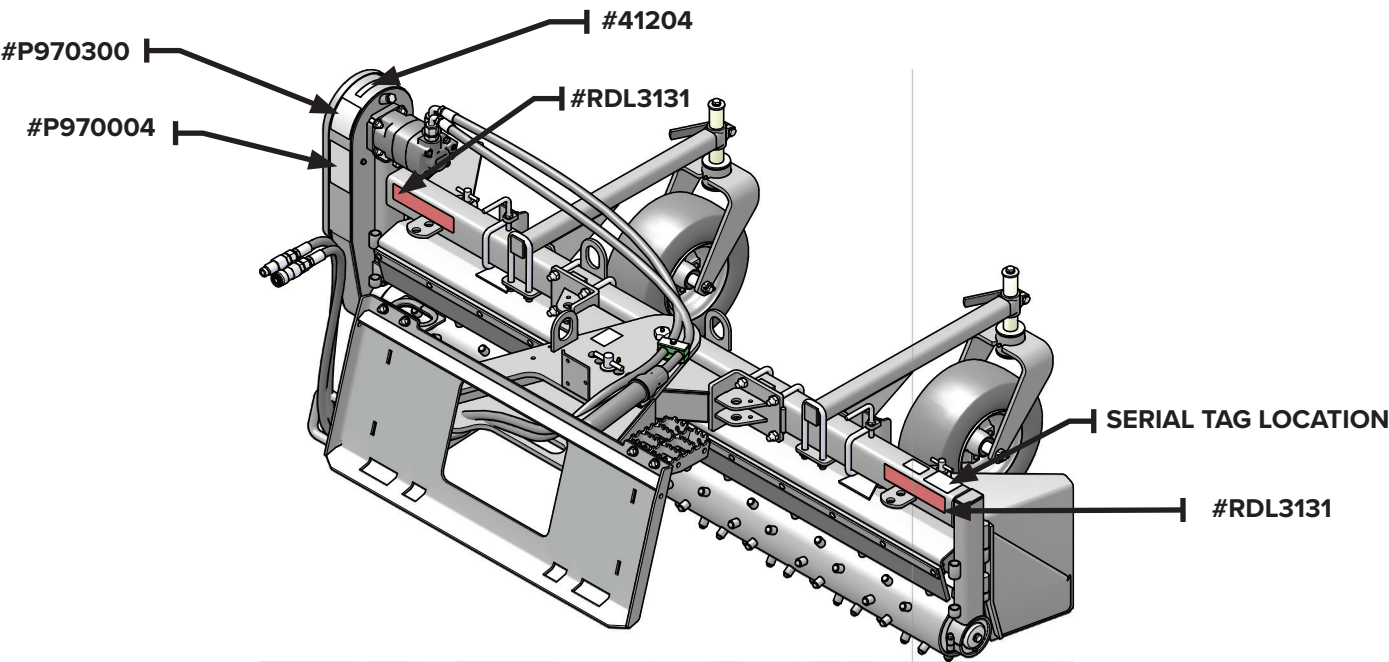
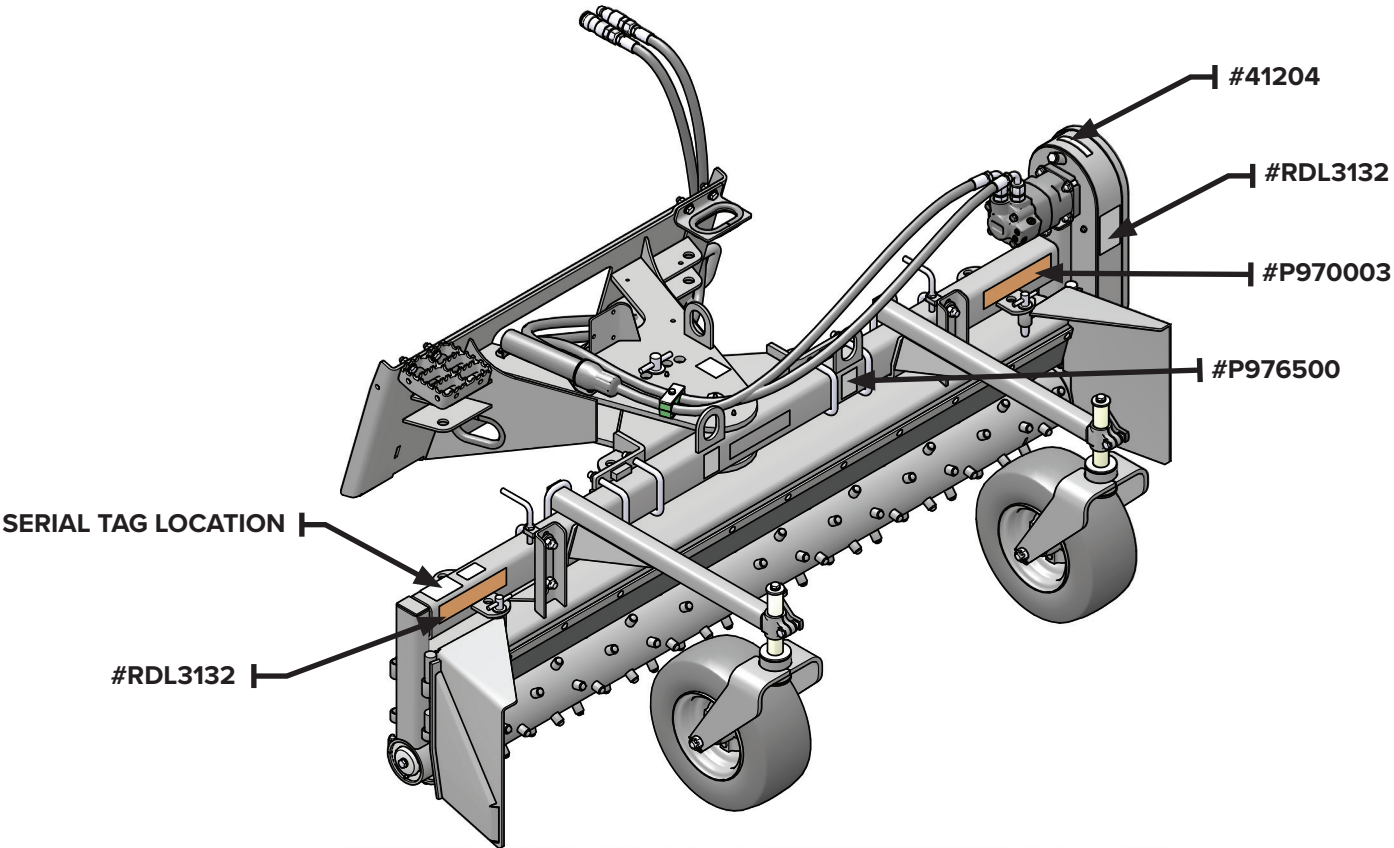
### IMPORTANT

Keep all safety decals clean and legible. Replace all missing, illegible, or damaged safety decals. When replacing parts with safety decals attached, the safety decals must also be replaced. Safety decals are available, free of charge, from your local dealer or Paladin.

**REPLACING SAFETY DECALS:** Clean the area of application with nonflammable solvent, then wash the same area with soap and water. Allow the surface to fully dry. Remove the backing from the safety decal, exposing the adhesive surface. Apply the safety decal to the position shown in the diagram above and smooth out any bubbles.

# Decals

## Decal Placement



M5, M6, Mx7, Mx8 POWER BOX RAKES



# Decals

## Decal Placement



**WARNING!**  
# P970004 - SAFETY OPERATE. READ MANUAL.



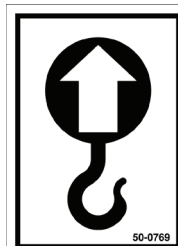
**DANGER!**  
# P970300 - ROTATING PART HAZARD



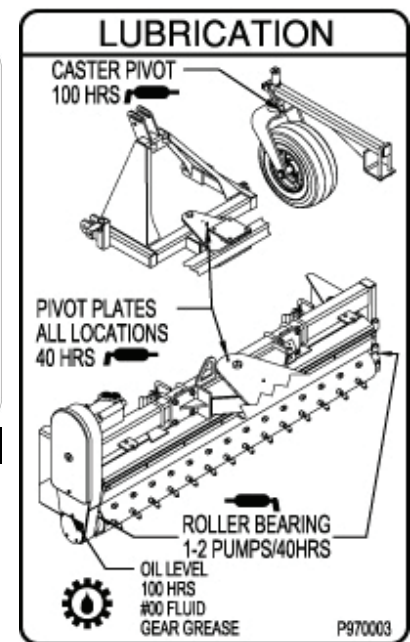
**DANGER!**  
# P970251 - KEEP BACK. FLYING AND ROTATING PARTS.



**DANGER!**  
# P970250 - KEEP BACK FLYING OBJECTS AND ROTATING PARTS



#50-0769 LIFT POINT



#P970003 LUBRICATION



# RDL3131 - REFLECTIVE TAPE - RED



# RDL3132 - REFLECTIVE TAPE - AMBER



#41204 - PATENT COVERAGE

### NOTE

Contact your local dealer for model number and logo decals

# Installation



## GENERAL INFORMATION

The M-Series Power Box Rakes are designed for removing rock and small debris, and for thatching. Prime movers must be equipped with an auxiliary hydraulic system capable of supplying continuous flow for hydraulic motor operation. This manual contains information for the M-Series fixed, angling, and float models. Refer to the information in this manual for specifications, parts, assemblies, and adjustments.

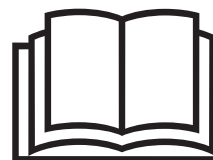
Remember to read all safety warnings, decals and operating instructions before operating the attachment. If there is any portion of this manual that you do not understand, contact your dealer.



### **WARNING!**

#### **READ MANUAL PRIOR TO INSTALLATION**

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 MOVER'S MANUAL(S).**

## SET-UP INSTRUCTIONS

The M-series power rakes are shipped assembled. The only adjustment needed is to extend the caster/gauge wheels out to the operating position. Refer to Bolt Torque Specifications for all hardware unless otherwise noted. Select a suitable work area with a mechanical lifting device to assist in uncrating the attachment. Front, back left and right are determined by sitting in the prime mover operator's seat facing forward.

### **NOTICE!**

*Lubricate all grease fittings before connecting this product to your prime mover's hydraulic system. Refer to Lubrication page and follow the instructions.*

## INSTALLATION

1. Remove any attachment from the front of the prime mover.
2. Following all standard safety practices and the instructions for installing an attachment in your prime mover operator's manual, install the attachment onto your prime mover.



### **WARNING!**

**To avoid serious personal injury, make sure the attachment is securely latched to the attachment mechanism of your unit. Failure to do so could result in separation of the attachment from the prime mover.**

# Installation



3. Lower the unit to the ground and relieve pressure to the auxiliary hydraulic lines.
4. Following the safety shut down procedure for your prime mover, shut down and exit the prime mover.
5. After making sure that the hydraulic couplers are free from any foreign material or contaminants, connect the couplers to the auxiliary hydraulic system of your prime mover.
6. For Hydraulic Angling Models Only: 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.
7. Following the standard start up procedure for your prime mover, start the prime mover and run all cylinders (if so equipped) on the attachment to purge any air from the system. Check for proper hydraulic connection, hose routing and hose length.



## **WARNING!**

**Do not lock the auxiliary hydraulics of your prime mover in the “ON” position. Failure to obey this warning could result in death or serious injury.**

8. Attachment installation is complete.

## **DETACHING**

1. Place the endplates in the storage position for added stability (towards the prime mover). See Endplates.
2. Before exiting the prime mover, lower the attachment to the ground, apply the brakes, turn off the prime mover's engine, and remove the key.
3. Follow prime mover operator's manual to relieve pressure in the hydraulic lines.
4. Disconnect power and return hoses from the auxiliary hydraulics.
5. For Hydraulic Angling Models Only: Disconnect power cord cable from the switch.
6. Follow your prime mover operator's manual for detaching (removing) an attachment.
7. Connect hydraulic couplers together or install caps to prevent contaminants from entering the hydraulic system. Store hoses off of the ground to help prevent damage.

## **FIXED ASSEMBLY PROCEDURE**

1. Position the mounting frame on the rake assembly with the right side resting against the stop.
2. Clamp in place with two U-bolts, lock washers and nuts.
3. Check the oil level in the chain case. If needed, add #00 fluid gear grease. See Lubrication section.





## MANUAL OR HYDRAULIC ANGLE ASSEMBLY PROCEDURE

1. Position the mounting frame on the rake assembly with the right side resting against the stop.
2. Clamp in place with two U-bolts, lock washers and nuts.
3. Install the power cord. The red (positive) cable has an inline fuse and should always be connected to the positive side of the battery to ensure proper operation of the electrical circuit. The black (negative) cable connects to ground. Be careful when routing the cable that sharp edges or moving parts will not damage the cord.
4. Check the oil level in the chain case. If needed, add #00 fluid gear grease. See Lubrication section.



### CAUTION!

Failure to obey the following procedures may result in personal injury. To avoid electric shock during the wiring harness installation, remove the ground cable from the battery of your prime mover.



### WARNING!

When working around batteries, remember that all of the exposed metal parts are “live”. Never lay a metal object across the terminals because a spark or short circuit may result.



### DANGER!

**BATTERY ACID CAUSES SEVERE BURNS.** Batteries contain sulfuric acid. Avoid contact with skin, eyes or clothing.

**Antidote: EXTERNAL** - flush with water. **INTERNAL** - drink large quantities of water or milk. Follow with milk of magnesia, beaten eggs or vegetable oil. Call physician immediately. **EYES** - flush with water for 15 minutes and get prompt medical attention.

## HYDRAULIC ANGLING ASSEMBLY WITH FLOAT PROCEDURE

1. Raise front of rake up so pivot frame is horizontal.
2. Mount left and right endplates.
3. Move attachment mounting plate into position.
4. Attach four link arms to the attachment plate (lower arms first).
5. Tighten nuts after all four arms are in place.
6. Replace the .75" X 4.75" pins in either the “lockout” or “float” positions.
7. Attach the two gauge wheel assemblies to main frame with two U-bolts and lock nuts.
8. Check the oil level in the chain case. If needed, add #00 fluid gear grease. See instructions near fill/vent plug. See Lubrication section.

# Operation



## INTENDED USE

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

## MOTOR BREAK-IN

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.

## CONTROLS

### Power Roller

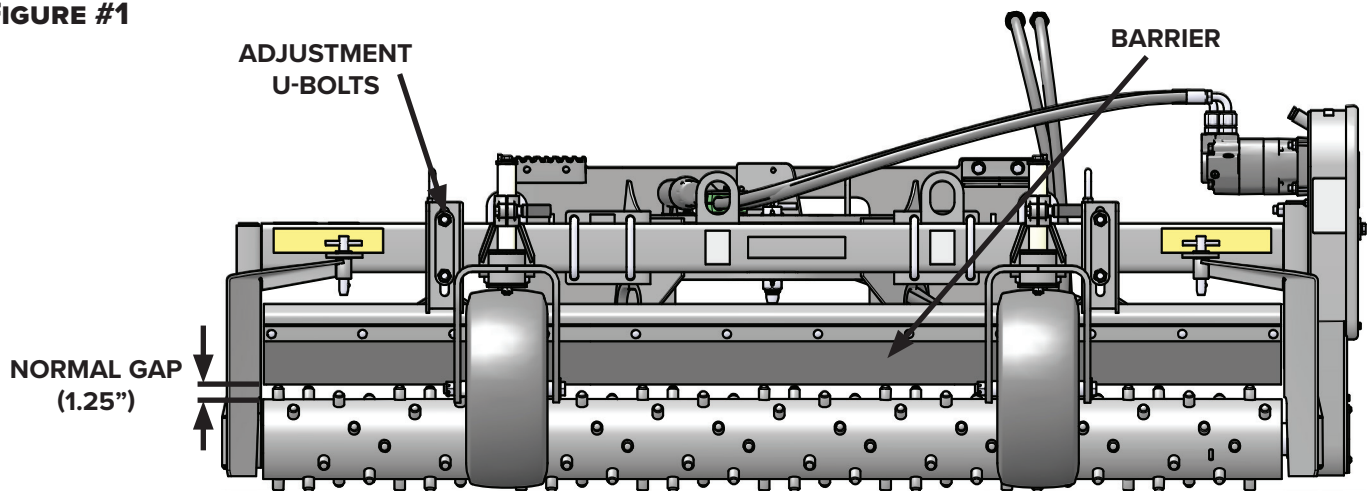
Roller should be level with the ground. The power rake should also be level with the ground front to back. To accomplish this, raise or lower gauge wheels and/or use the prime mover tilt cylinder. Because the chain case end of roller weighs more, the tire closest to the chain case should be set 1" (.75" on M4 rakes) lower than the opposite tire. This will give an even grade when landscaping.

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. 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.

### Roller Barrier

The normal gap between the roller and barrier for average conditions is about 1.25". This gap can be adjusted either wider or narrower by loosening the U-bolts that hold 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. See Figure #1

**FIGURE #1**



## 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. Refer to Figure #3

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.

## 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. See Figure #2

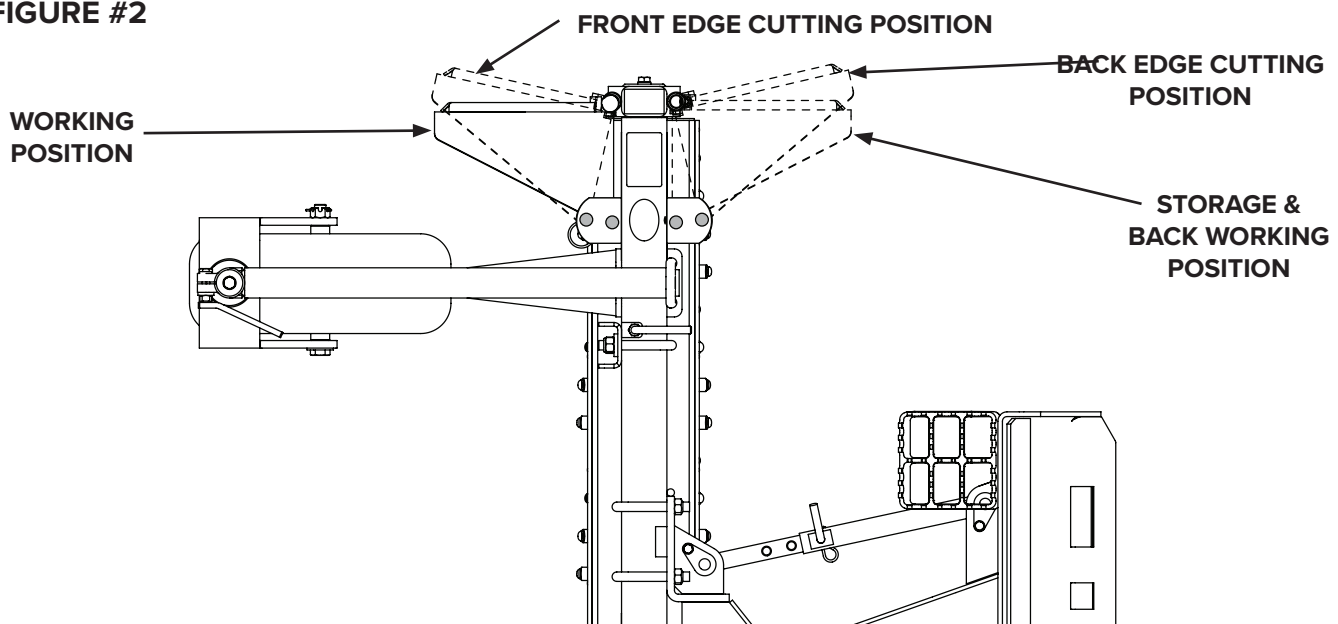
With the endplates mounted in the working position and the roller straight (parallel with prime mover), material can be moved along, filling in the low spots.

When windrowing along an edge, the endplates can be moved from their working position outward slightly to the Edge Cutting position to allow for the rake to ride along the edge of the work area.

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 endplate to the right side and the right endplate to the left side.

When disconnecting the attachment, place the power rake on a hard level surface and position the endplates in the storage position to ensure stability.

**FIGURE #2**



# Operation



## GENERAL OPERATION

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 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. The power rake allows fast raking of large areas of ground.

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 approximately 3" deep. See instructions in Power Roller section to set roller depth.

When windrowing (manual and hydraulic angle units only) the level of dirt may be halfway up on the barrier. The volume or density of the material being raked will dictate how many times a windrow can be moved. When moving the windrow the level of the dirt may be to the top of the barrier. Try to prevent material from flowing over the top.

Follow your prime mover operator's manual for safely starting up the prime mover.

1. Lower power rake slowly to the ground.
2. Engage hydraulic control lever for auxiliary attachment.
3. 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.
4. Move the prime mover forward or backward as desired. Ground speed should be between 3 and 5 mph under normal conditions. In heavy rock, reduce the ground speed to 1 to 3 mph. For the roller to operate effectively, it must rotate in the opposite direction of the prime mover wheels. Roller rotation direction is controlled by prime mover hydraulic controls. See Figure #3

# Operation



## PARALLEL ARMS (M6 FLOAT MODEL ONLY)

The function of the parallel arms is to allow the power rake to “float” and follow the contour of the ground. Lock-out pins are supplied to allow more aggressive action. However, the hydraulic motor may stall out if too much down-pressure is applied.

## OPERATING TIPS

### Pulverizing Topsoil

For breaking up compacted soil or conditioning hardened baseball diamonds:

- ▶ Remove the endplates to allow for material to be moved out of the way and not slow the raking process.
- ▶ Roll attachment plate back to lift gauge wheels so only the toothed roller is in contact with the ground.
- ▶ Maintain sufficient RPM to avoid stalling the roller.

### Debris Removal

Once the surface material has been loosened the process of removing debris can begin. Positioning of roller and endplates will be determined by your worksite and model of your rake. Fixed rakes will move the debris forward while manual and hydraulic angled models can either move the debris forward to collect at end of the pass or windrow debris to the outside for collecting.

- ▶ Endplates should be installed in either the working or edging position for collecting debris or removed to windrow debris.
- ▶ Tilt the attachment plate forward using the gauge wheels to control the depth of the roller.
- ▶ On both manual and hydraulic angle units the roller can be angled to windrow the debris to the outside for collecting.
- ▶ Travel speed should be increased for this process.

### Finish Grading

Once the surface material has been loosened the process of removing debris can begin. Positioning of roller and endplates will be determined by your worksite and model of your rake. For finish grading you will collect material from the high spots and deposit it in the low areas.

- ▶ Tilt the rake forward so the teeth on the roller are barely touching the ground.
- ▶ Travel speed should be increased for this process.

### Spreading fill and topsoil

Position the rake so it is tilted on the gauge wheels. (Depth of cut is not the objective.)

- ▶ Endplates installed.
- ▶ Set angle (if so equipped) to windrow as needed to control material movement.

### Thatching Existing Grass Areas

The prime mover attachment plate should be tilted forward to support the rake on the front gauge

# Operation



wheels and toothed roller raised so teeth are just grazing the surface. Travel speed should be slow and careful.

## SHUTTING DOWN

1. Turn off hydraulic flow to your power rake to stop drum rotation.
2. Lower the lift arms and power rake to the ground.
3. Purge any air in the system.



### **WARNING!**

**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.**

4. Follow your prime mover operator's manual for safely shutting down and exiting the prime mover.

## STORAGE

- ▶ Clean the unit thoroughly, removing all snow, 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.
- ▶ Disconnect control box & store in a safe location.
- ▶ Replace decals that are damaged or in unreadable condition.
- ▶ 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 prevent rust.

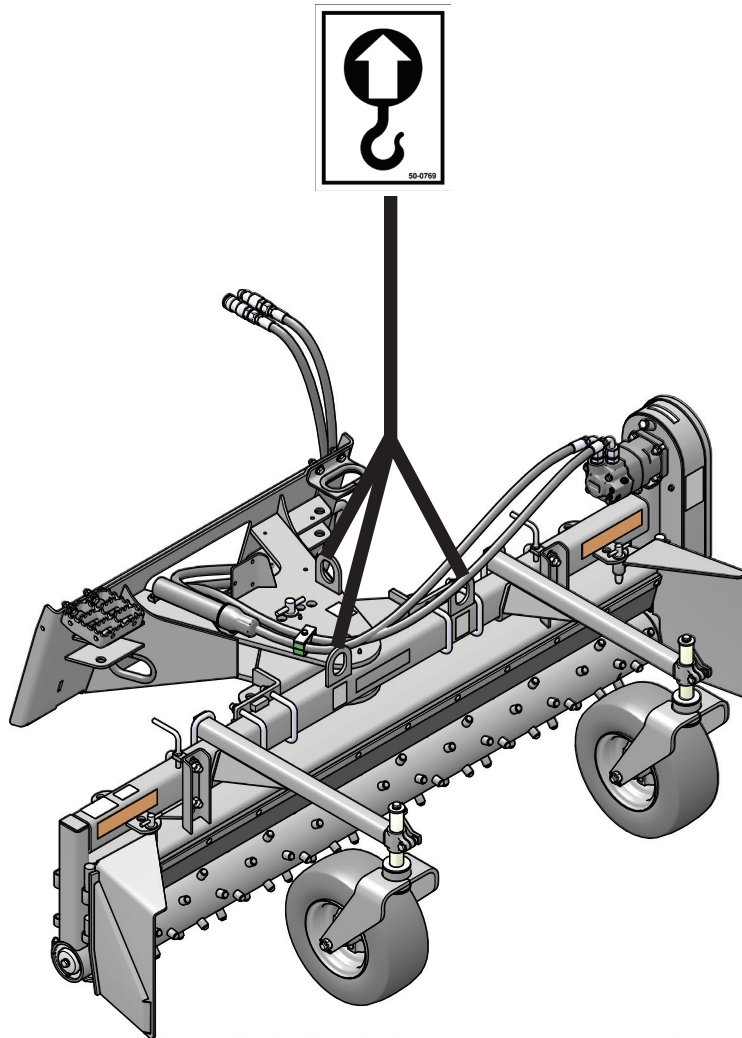
## REMOVAL FROM STORAGE

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



## 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!**

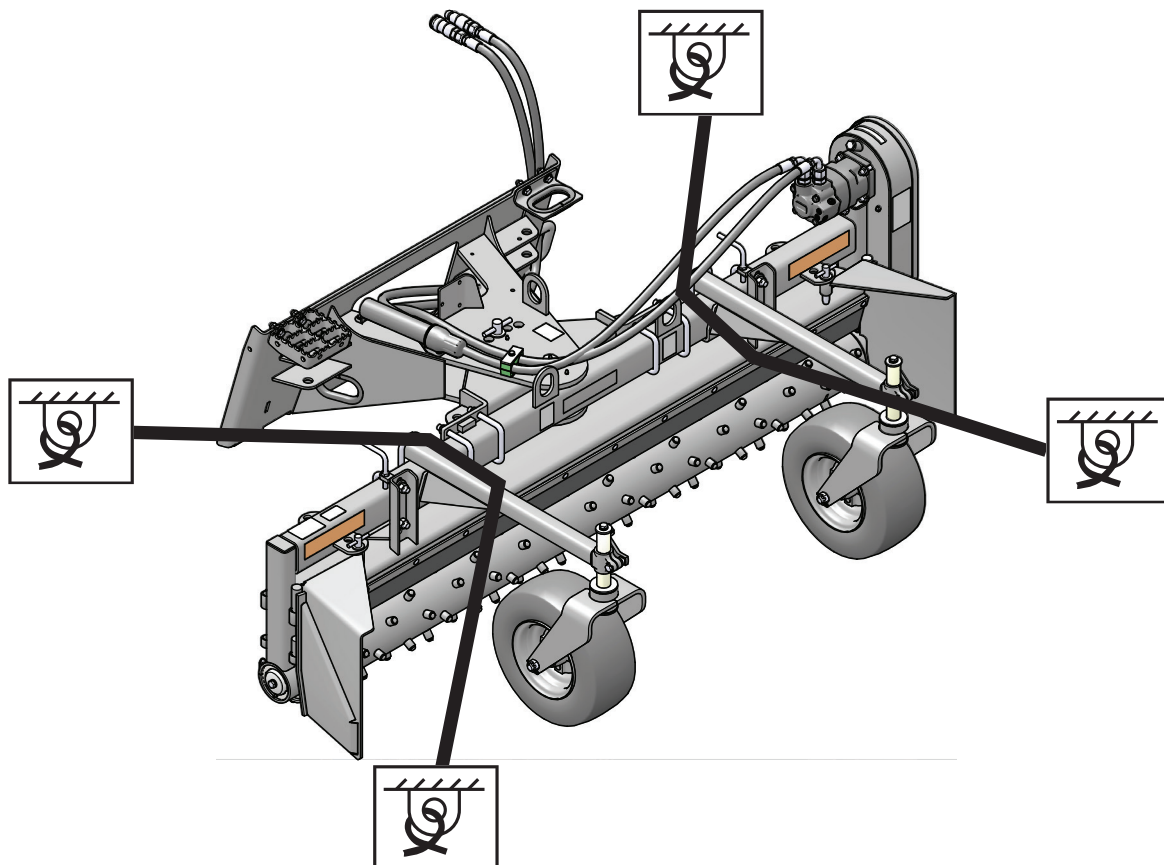
Use lifting accessories (chains, slings, ropes, shackles and etc.) that are capable of supporting the size and weight of your attachment. Secure all lifting accessories in such a way to prevent unintended disengagement. Failure to do so could result in the attachment falling and causing serious personal injury or death.



# Operation

## 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.

## TRANSPORTING

Follow all local government regulations that may apply along with recommended tie down points and any equipment safety precautions at the front of this handbook when transporting your attachment.





# Lubrication

## LUBRICATION

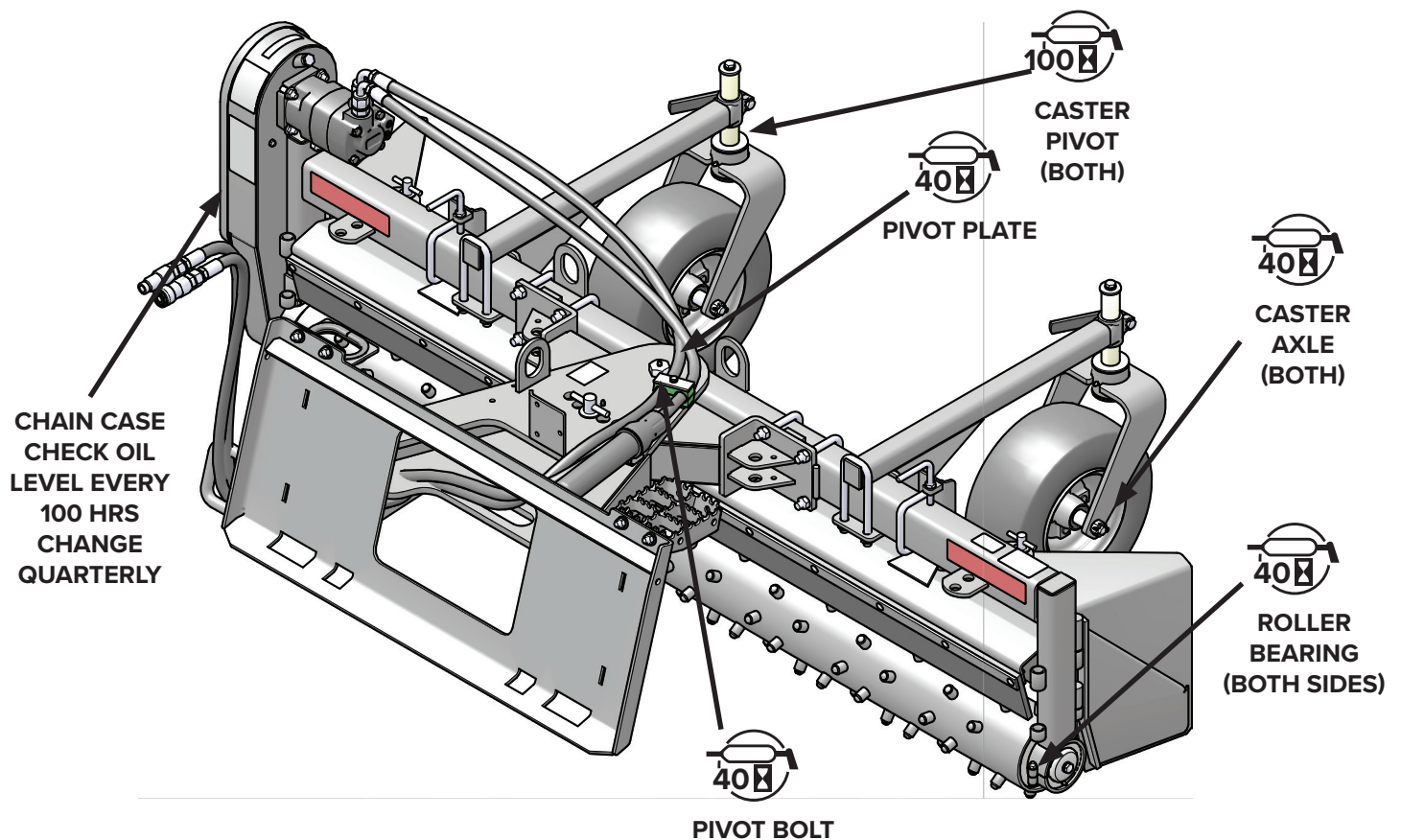
All parts provided with grease fittings should be lubricated as indicated. If any grease fittings are missing, replace them immediately. Clean all fittings thoroughly before using grease gun.



Lubricate weekly or every 40 hours of operation, whichever comes first, with SAE Multi-Purpose Lubricant or an equivalent SAE Multi-Purpose type grease.



Lubricate monthly or every 100 hours of operation, whichever comes first, with SAE Multi-Purpose Lubricant or an equivalent SAE Multi-Purpose type grease.



### IMPORTANT

Avoid excessive greasing. Dirt collects on exposed grease and greatly increases wear. After greasing, wipe off excessive grease from fittings.

# Maintenance



## GENERAL INFORMATION

Regular maintenance is the key to long equipment life and safe operation. Maintenance requirements have been reduced to an absolute minimum. However it is very important that these maintenance functions be performed as described below.

PROCEDURE	EVERY 8 HOURS (DAILY)	EVERY 40 HOURS (WEEKLY)	EVERY 100 HOURS (MONTHLY)	EVERY 3 MONTHS (QUARTERLY)
Check prime mover hydraulic system to ensure an adequate level and cleanliness of hydraulic oil.	✓			
Check for missing or loose hardware. Replace or tighten as necessary. See bolt torque specifications	✓			
Check hydraulic system for leaks and tighten as necessary. Check for damage and replace as needed.	✓			
Check for missing or damaged safety decals and replace as necessary.	✓			
Inspect attachment for any worn parts or cracked welds. Repair as required.	✓			
Lubricate & retract cylinder rods.	✓			
Check tire pressure. (20 PSI cold)		✓		
Lubricate caster axle, pivot plate, pivot bolt, & roller bearing.		✓		
Lubricate caster pivot.			✓	
Inspect drive chain for correct tension.			✓	
Check oil level in chain case.			✓	
Change lubrication in chain case. (Add 1.5 pints [8 dL] of #00 fluid gear grease)				✓

# Maintenance



## 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 mover's 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. Flesh 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 it immediately to determine proper treatment.
- ▶ Wear safety glasses, protective clothing, and use a piece of cardboard or wood when searching for hydraulic leaks. **DO NOT USE YOUR HANDS!**



## CHAIN MAINTENANCE

The drive chain should be inspected monthly. A new chain has a tendency to stretch, so it is necessary to check the chain tension to prevent excessive play, thus causing potential problems.

Inspect the sprockets along with the drive chain to ensure the slotted hex nut or hex bolt is tight, the cotter pin is in place, and the sprocket cannot move on shaft.

Chain tension is preset with the extension spring. If the chain becomes excessively loose, it may be necessary to remove one link (two pitches). Disconnect chain at the master link and if unable to reassemble, add an offset link to lengthen the chain. Refer to Figure #1

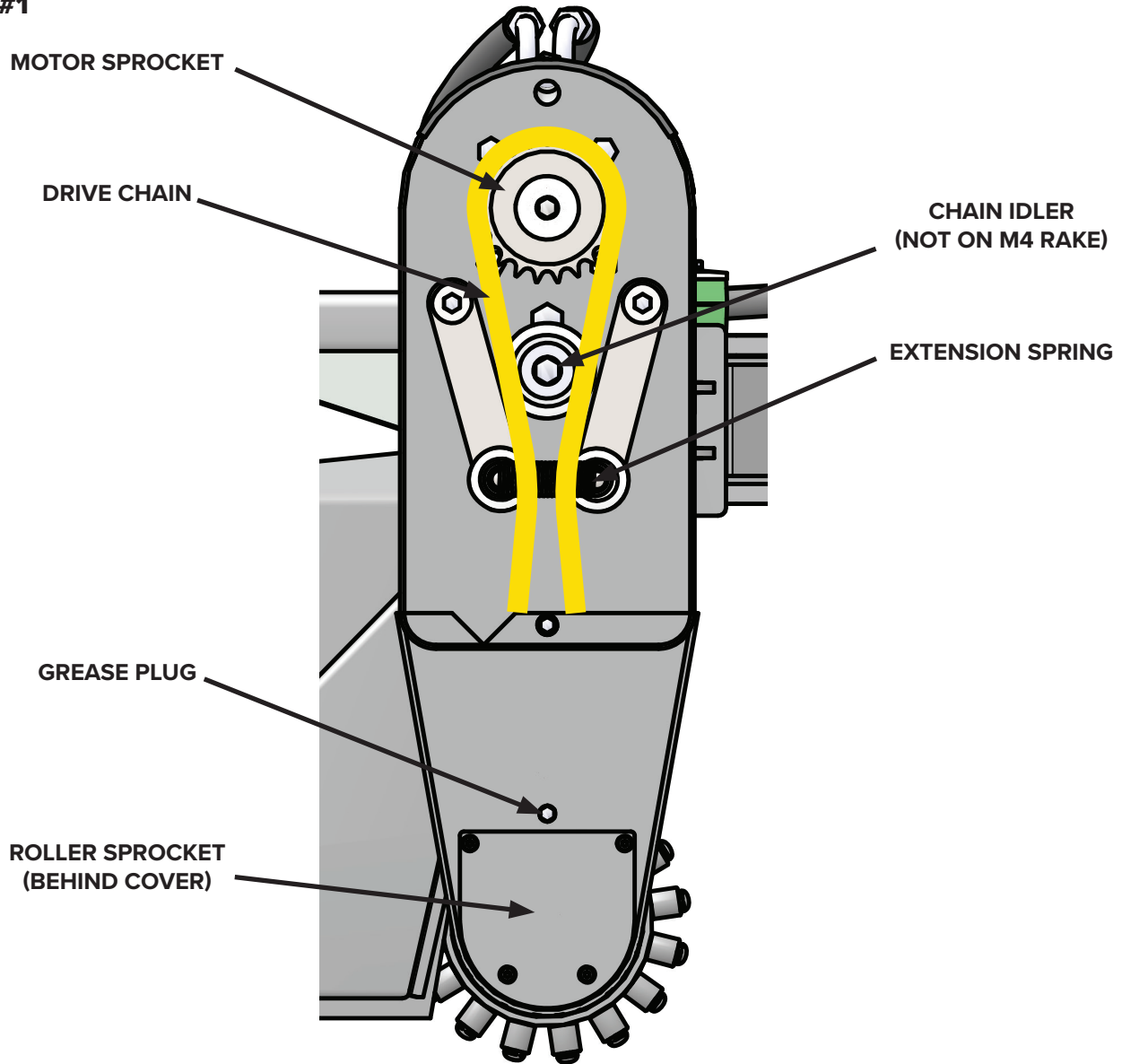
### NOTICE!

***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 #00 fluid gear grease, and rotate the roller several times allowing the chain to be coated with lubricant, enhancing chain life. With the hydraulic hoses connected together, rotate the roller periodically to maintain lubrication.

# Maintenance

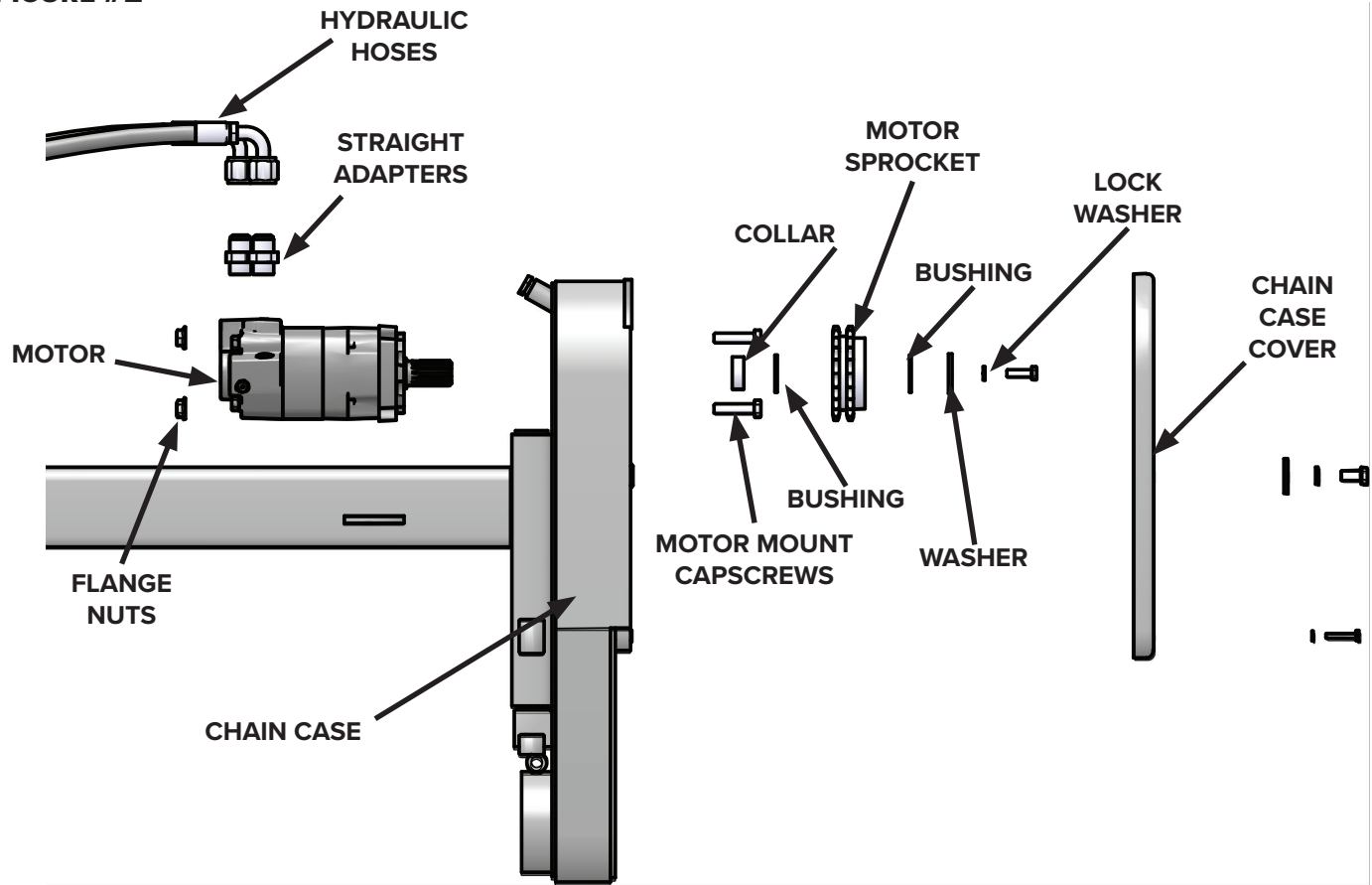
**FIGURE #1**



## HYDRAULIC MOTOR REPLACEMENT

1. Remove tension spring and drive chain from motor sprocket.
2. Unbolt motor sprocket & bushing by removing the capscrew and washers. See Figure #2
3. Remove hydraulic motor by removing the capscrews behind the sprocket & flange nuts.
4. Slide the bushing & shaft collar off the motor shaft.
5. Tag and remove hydraulic hoses.
6. Apply a liberal amount of silicone sealer to inside of flange.
7. Attach new hydraulic motor to chain case with capscrews and flange nuts.
8. Reattach hydraulic hoses.
9. Replace shaft collar. Slide top sprocket (teeth first) onto shaft. Use bushings on the inside or out-

**FIGURE #2**



side of sprocket for proper alignment.

10. Reinstall drive chain and tension spring.

## BEARINGS

Highest quality triple-seal bearings are used on the power rake. Lubrication of the bearings will vary considerably with conditions. As a rule, bearings should be under-lubricated rather than over-lubricated. Over lubrication can cause seal damage.

### **NOTICE!**

***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.

The special protective collars protect bearings from vine, 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,

# Maintenance



keeping dust and particles from entering the seal area, increasing the bearing life.

## LEFT ROLLER BEARING REPLACEMENT

1. Remove tension spring and drive chain. Then remove lower sprocket by removing cotter pin, slotted hex nut, and washers.
2. With roller supported with blocks, remove the two bolts holding the chain case to the frame.
3. Slide chain case and bearing off roller shaft.
4. Loosen bolt on the bearing tube that holds cartridge bearing in place.
5. Remove bearing and O-ring.

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

1. Remove the hex bolt and bearing cap from outside of bearing.
2. Loosen bolt on the bearing tube that holds cartridge bearing in place.
3. With roller supported with blocks, pry bearing tube apart to free bearing assembly.


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

## ROLLER REPLACEMENT

### **NOTICE!**

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

1. Remove upper and lower chain case covers.
2. Remove tension spring and drive chain.
3. Remove lower sprocket by removing cotter pin, slotted nut, and washers.
4. With roller supported with blocks, remove spacers behind the lower sprocket.
5. Remove two bolts holding chain case to frame and slide chain case, with hydraulic motor attached, off of the roller shaft. The roller bearing will stay in the chain case.
6. Loosen the bolt on the bearing tube of the non-drive end.
7. Slide roller and bearing out of frame.

- 
8. Remove hex bolt, bearing cap, bearing, and protective collar from roller.
  9. On new roller, place machine bushing and protective collar against end plate on roller.
  10. Place bearing and bearing cap on roller. Clamp in place with hex bolt and lock washer into end of roller shaft.
  11. Slide roller and bearing into bearing tube on non-drive end of frame. Do not tighten bearing tube at this time.
  12. Place spacer, protective collar, and O-ring from splined end of removed roller onto replacement roller. Check O-ring for cuts and nicks and replace if necessary.
  13. Apply sealant to bearing area on shaft.
  14. Slide chain case back onto roller and bolt to frame.
  15. Replace sleeve, sprocket, and washers on drive shaft.
  16. Clamp solid with a slotted jam nut.
  17. Check that roller clears the frame on both ends (adjust, if required).
  18. Tighten .38" bolt in bearing tube on non-drive end of frame.
  19. Reinstall drive chain and tension spring.
  20. Replace lower cover, being careful not to pinch the O-ring.
  21. Fill the chain case with 1.5 pints of #00 fluid gear grease
  22. Replace upper cover.
  23. Run power rake and watch for any interference between roller & frame.

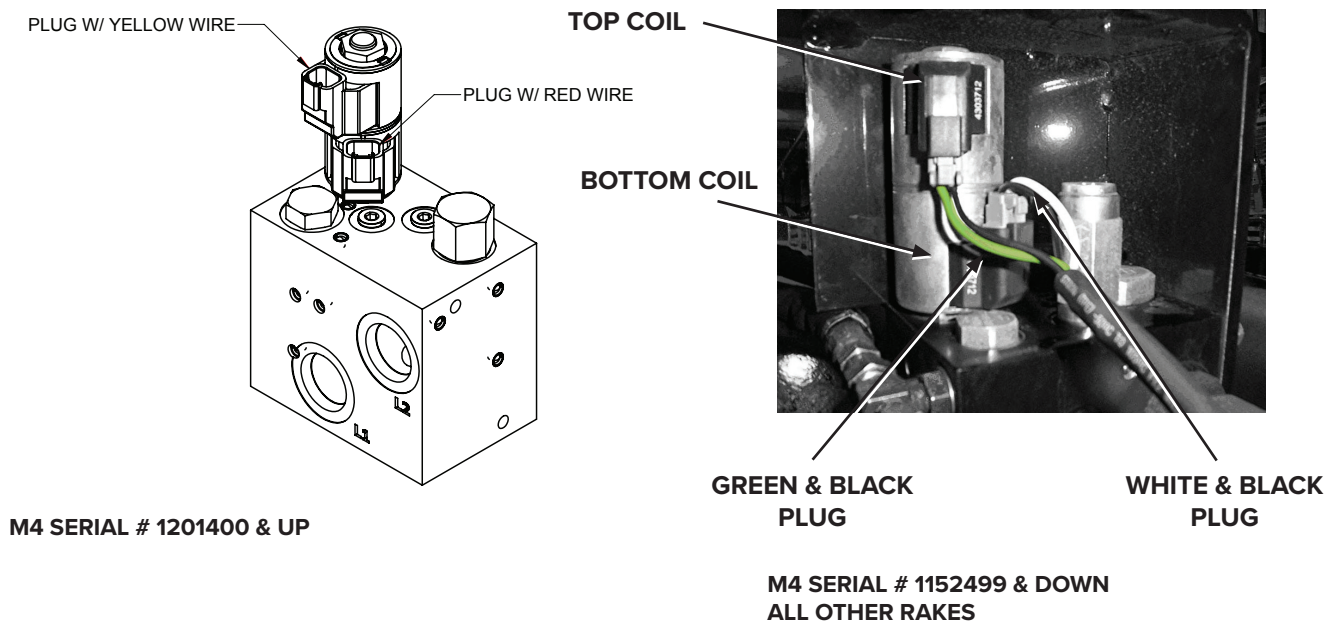
## **DIRECTIONAL CONTROL VALVE (HYDRAULIC ANGLE MODEL ONLY)**

A three position switch (normally open) is used to operate the direction control valve. Control power (12 volt) is supplied by the power cord attached to the prime mover electrical system. The switch wires are connected to the direction control valve as shown in Figure #1 below.

The direction control valve uses a small amount of hydraulic oil bypassed from the roller drive motor circuit. The prime movers auxiliary hydraulic system must be connected and engaged to provide angle direction adjustment. The roller must be rotating clockwise when viewed from the left side.

# Maintenance

**FIGURE #1**



## Tool Disposal

### Hydraulic Oil

Hydraulic oil can contaminate the air, ground and water if not properly recycled. Recycle hydraulic oil in accordance with all State, Federal and local laws, at your local oil recycling facility.

### Hydraulic Hoses

Hang hydraulic hoses to drain. Collect the oil for recycling. Contact your local municipal recycling authorities for an approved hydraulic hose recycling site.

### Gear Oil

Drain the gear oil and collect it for recycling. Do not throw away or pour down the drain. Contact your local municipal recycling authorities for recycling instructions.

### Tool Body

Disassemble the tool and dispose of all non-metal parts. Recycle the metal components. Contact your local municipal recycling authorities for recycling instructions.



# Troubleshooting



## NOTICE!

***Air in hydraulic systems can cause erratic operation and allows loads or equipment components to drop unexpectedly.***

PROBLEM	POSSIBLE CAUSE	POSSIBLE SOLUTION
ROLLER WILL NOT TURN.	Hydraulic valve on prime mover not engaged.	See prime mover Operator's Manual for auxiliary hydraulic operation procedure.
	Relief valve setting on prime mover not properly adjusted.	Have prime mover dealer set relief valve at correct pressure.
	Worn, damaged, insufficient, or inadequate pump.	Repair or replace hydraulic pump on prime mover.
	Insufficient oil in system.	Service the prime mover hydraulic reservoir.
	Hose ends not completely engaged.	Check hose coupling for debris or damage and engage properly.
	Air in hydraulic lines.	Cycle prime mover 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.	Drive chain off.	Repair or replace drive 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.
HYDRAULIC CYLINDER WILL NOT EXTEND OR RETRACT.	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.
	Electrical failure.	See prime mover Operator's Manual.
	Hydraulic system not activated.	Engage roller drive motor before attempting to move angle cylinder.

# Troubleshooting



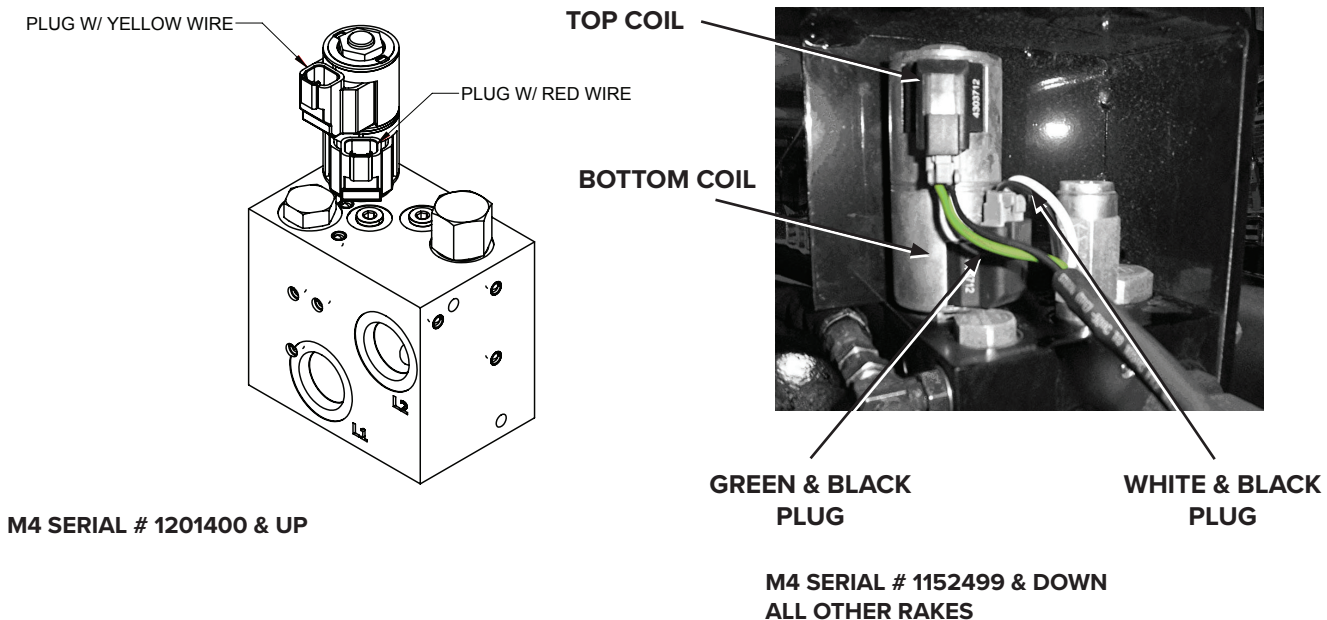
PROBLEM	POSSIBLE CAUSE	POSSIBLE SOLUTION
<b>ANGLE CYLINDER WILL NOT HOLD POSITION.</b>	Check valve in manifold malfunctioning.	Repair or replace check valve.
	Solenoid cartridge not returning to closed position.	Repair or replace solenoid cartridge.
<b>HYDRAULIC CYLINDER ONLY EXTENDS OR ONLY RETRACTS</b>	Bent spool	Contact Paladin technical service
	Dirt or debris in spools	Contact Paladin technical service
<b>HYDRAULIC MOTOR SEALS LEAK</b>	Back pressure exceeds 1000 PSI	Contact Paladin technical service
	Motor is failing	High number of hour on motor; Contact dealer to rebuild or replace.
<b>HYDRAULIC SYSTEM OVERHEATS</b>	Hydraulic oil level too low.	Add hydraulic oil to system, see prime mover Operator's Manual.
	Restriction in hoses.	Remove bends in hoses; remove obstructions inside hoses; replace hose.

## DIRECTIONAL CONTROL VALVE (HYDRAULIC ANGLE MODEL ONLY)

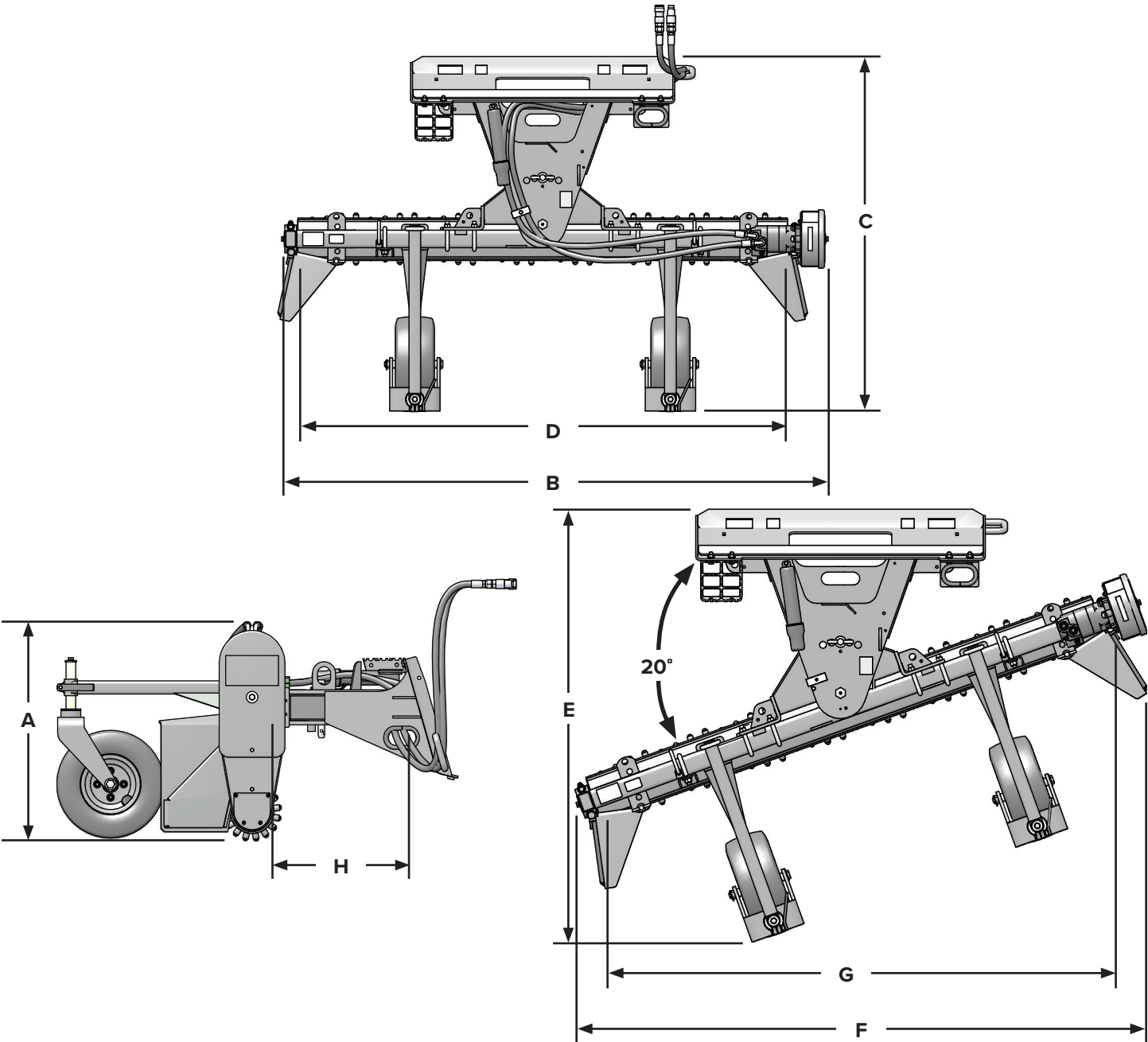
A three position switch (normally open) is used to operate the direction control valve. Control power (12 volt) is supplied by the power cord attached to the prime mover electrical system. The switch wires are connected to the direction control valve as shown in Figure #1 below.

The direction control valve uses a small amount of hydraulic oil bypassed from the roller drive motor circuit. The prime movers auxiliary hydraulic system must be connected and engaged to provide angle direction adjustment. The roller must be rotating clockwise when viewed from the left side.

**FIGURE #1**



# Specifications



FIXED ANGLE				
DESCRIPTION		M4	M5	M6
A.	Overall Height	26.40"	32.50"	33.20"
B.	Overall Width	57.40"	71.70"	81.70"
C.	Overall Length	44.00"	60.10"	60.10"
D.	Raking Width	48.00"	62.00"	72.00"
H.	Center of Gravity	19.40"	23.30"	23.30"
Weight (lbs)		350#	770#	825#

# Specifications



MANUAL ANGLE						
DESCRIPTION		M4	M5	M6	Mx7	Mx8
A.	Overall Height	26.40"	32.90"	33.20"	33.20"	35.90"
B.	Overall Width	57.40"	71.70"	81.70"	93.60"	100.70"
C.	Overall Length	51.90"	61.30"	61.30"	61.30"	72.60"
D.	Raking Width	48.00"	62.00"	72.00"	84.00"	90.00"
E.	Overall Length @ 20°	55.10"	67.10"	68.60"	70.80"	82.90"
F.	Overall Width @ 20°	56.80"	68.60"	78.00"	89.20"	96.10"
G.	Raking Width @ 20°	45.00"	58.00"	68.00"	79.00"	85.00"
H.	Center of Gravity	24.90"	22.20"	23.80"	23.80"	27.20"
Weight (lbs)		415#	920#	980#	1030#	1305#

HYDRAULIC ANGLE							
DESCRIPTION		M4	M5	M6	M6 (FLOAT)	Mx7	Mx8
A.	Overall Height	26.40"	32.90"	33.20"	33.20"	33.20"	35.90"
B.	Overall Width	57.40"	71.70"	81.70"	81.70"	93.60"	100.70"
C.	Overall Length	51.90"	61.30"	61.30"	68.32"	61.30"	72.60"
D.	Raking Width	48.00"	62.00"	72.00"	72.00"	84.00"	90.00"
E.	Overall Length @ 20°	55.10"	67.10"	68.60"	72.62"	70.80"	82.90"
F.	Overall Width @ 20°	56.80"	68.60"	78.00"	76.77"	89.20"	99.70"
G.	Raking Width @ 20°	45.00"	58.00"	68.00"	67.66"	79.00"	85.00"
H.	Center of Gravity	24.40"	22.10"	23.70"	23.80"	23.50"	26.90"
Weight (lbs)		425#	930#	985#	1044#	1055#	1325#

PRIME MOVER REQUIREMENTS					
DESCRIPTION	M4	M5	M6	Mx7	Mx8
Maximum Pressure	3000 PSI	3000 PSI	3000 PSI	3000 PSI	3000 PSI
Hydraulic Flow	8-20 GPM	13-20 GPM	13-25 GPM	15-25 GPM	17-40 GPM

**NOTE:** Specifications and design are subject to change without notice and without liability therefor.

MANUAL ANGLE MX7 SHOWN

# Bolt Torque Specifications

## GENERAL TORQUE SPECIFICATION TABLES

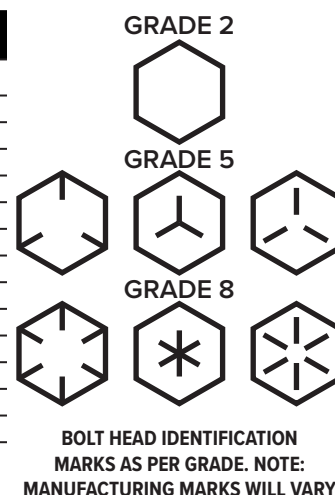
Use the following charts when determining bolt torque specifications when special torques are not given. Always use grade 5 or better when replacing bolts.

### SAE BOLT TORQUE SPECIFICATIONS

#### IMPORTANT

The following torque values are for use with extreme pressure lubricants, plating or hard washer applications Increase torque 15% when using hardware that is unplated and either dry or lubricated with engine oil.

		SAE GRADE 5 TORQUE				SAE GRADE 8 TORQUE			
BOLT SIZE		POUNDS FEET		NEWTON-METERS		POUNDS FEET		NEWTON-METERS	
Inches	Millimeters	UNC	UNF	UNC	UNF	UNC	UNF	UNC	UNF
1/4	6.35	8	9	11	12	10	13	14	18
5/16	7.94	14	17	19	23	20	25	27	34
3/8	9.53	30	36	41	49	38	46	52	62
7/16	11.11	46	54	62	73	60	71	81	96
1/2	12.70	68	82	92	111	94	112	127	152
9/16	14.29	94	112	127	152	136	163	184	221
5/8	15.88	128	153	174	207	187	224	254	304
3/4	19.05	230	275	312	373	323	395	438	536
7/8	22.23	340	408	461	553	510	612	691	830
1	25.40	493	592	668	803	765	918	1037	1245
1-1/8	25.58	680	748	922	1014	1088	1224	1475	1660
1-1/4	31.75	952	1054	1291	1429	1547	1700	2097	2305
1-3/8	34.93	1241	1428	1683	1936	2023	2312	2743	3135
1-1/2	38.10	1649	1870	2236	2535	2686	3026	3642	4103



### METRIC BOLT TORQUE SPECIFICATIONS

#### NOTE

The following torque values are for use with metric hardware that is unplated and either dry or lubricated with engine oil. Reduce torque 15% when using hardware that has extreme pressure lubricants, plating or hard washer applications.



Size of Bolt	Grade No.	Pitch (mm)	Pounds Feet	Newton-Meters	Pitch (mm)	Pounds Feet	Newton-Meters
M6	5.6	1.0	3.6-5.8	4.9-7.9	-	-	-
	8.8		5.8-4	7.9-12.7		-	-
	10.9		7.2-10	9.8-13.6		-	-
M8	5.6	1.25	7.2-14	9.8-19	1.0	12-17	16.3-23
	8.8		17-22	23-29.8		19-27	25.7-36.6
	10.9		20-26	27.1-35.2		22-31	29.8-42
M10	5.6	1.5	20-25	27.1-33.9	1.25	20-29	27.1-39.3
	8.8		34-40	46.1-54.2		35-47	47.4-63.7
	10.9		38-46	51.5-62.3		40-52	54.2-70.5
M12	5.6	1.75	28-34	37.9-46.1	1.25	31-41	42-55.6
	8.8		51-59	69.1-79.9		56-68	75.9-92.1
	10.9		57-66	77.2-89.4		62-75	84-101.6
M14	5.6	2.0	49-56	66.4-75.9	1.5	52-64	70.5-86.7
	8.8		81-93	109.8-126		90-106	122-143.6
	10.9		96-109	130.1-147.7		107-124	145-168
M16	5.6	2.0	67-77	90.8-104.3	1.5	69-83	93.5-112.5
	8.8		116-130	157.2-176.2		120-138	162.6-187
	10.9		129-145	174.8-196.5		140-158	189.7-214.1
M18	5.6	2.0	88-100	119.2-136	1.5	100-117	136-158.5
	8.8		150-168	203.3-227.6		177-199	239.8-269.6
	10.9		175-194	237.1-262.9		202-231	273.7-313
M20	5.6	2.5	108-130	146.3-176.2	1.5	132-150	178.9-203.3
	8.8		186-205	252-277.8		206-242	279.1-327.9
	10.9		213-249	288.6-337.4		246-289	333.3-391.6



# Parts



In order to provide you with the most UP-TO-DATE part information, all parts for this attachment have been moved to our website at [www.paladinattachments.com](http://www.paladinattachments.com). Please use these diagrams and parts lists to locate replacement parts.

When servicing your attachment, remember to use only original manufacturer replacement parts. Substitute parts may not meet the standards required for safe, dependable operation.

To facilitate parts ordering when contacting the factory, please have the product control number (PCN or C/N) or model and serial number of your product ready to ensure that you receive the correct parts for your specific attachment.

The product control number, model and serial number for your attachment should be recorded in the space provided on the cover of this manual. This information may be obtained from the serial number identification plate located on your attachment.

## IMPORTANT

**Most daily and emergency parts orders (in stock) received by 10:30 A.M. (Eastern Standard Time) will be shipped UPS Ground the same day received. UPS Next Day orders must be received by 1:30 PM (Eastern Standard Time.)**

## SERVICE DEPARTMENT

(734) 996-9116

(800) 456-7100

## For Fax and E-mail Orders

PLC\_Sales@paladinattachments.com

(734) 996-9014

# Warranty



In order to provide you with the most UP-TO-DATE Warranty information, Paladin Warranty Statement and Warranty Procedures along with Warranty Registration and Claim Forms have been moved to our website at [www.paladinattachments.com](http://www.paladinattachments.com).



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