SPARTAN EQUIPMENT®

Soil Conditioner

Models SE5672, SE5690, SE5676, SE5697, SE5694 SE5698

Operator's Manual

Read this Manual Before Use

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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.

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

BEFORE OPERATION

The primary responsibility for safety with 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.

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	**THIS SIGNAL WORD INDICATES A HAZARDOUS SITUATION WHICH, IF NOT AVOIDED, WILL RESULT IN DEATH OR SERIOUS INJURY.**
WARNING	**THIS SIGNAL WORD INDICATES A HAZARDOUS SITUATION WHICH, IF NOT AVOIDED, COULD RESULT IN DEATH OR SERIOUS INJURY.**
CAUTION	**THIS SIGNAL WORD 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 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).**

READ AND UNDERSTAND ALL SAFETY STATEMENTS

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

KNOW YOUR EQUIPMENT

Know your equipment's capabilities, dimensions, and operations before operating. Visually inspect your equipment before you start, and never operate equipment that is not in proper working order with all safety devices intact. Check all hardware to 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. Make certain all safety decals are in place and are legible. Keep decals clean, and replace them if they become worn or hard to read.

GENERAL SAFETY PRECAUTIONS

WARNING!

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.

WARNING!

LOWER OR SUPPORT RAISED EQUIPMENT

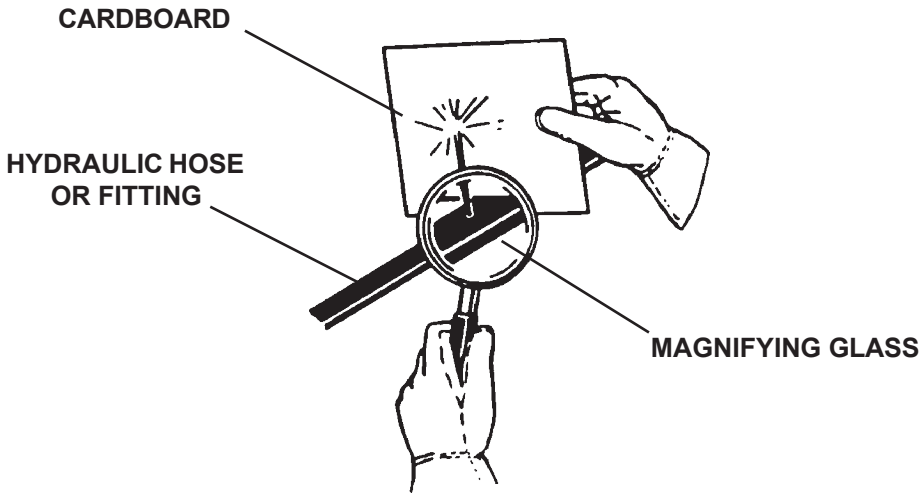
Do not work under raised booms without supporting them. Do not use support material made of concrete blocks, logs, buckets, barrels, or any other material that could suddenly collapse or shift positions. Make sure support material is solid, not decayed, warped, twisted, or tapered. Lower booms to ground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

WARNING!

USE CARE WITH HYDRAULIC FLUID PRESSURE

Hydraulic fluid under pressure can penetrate the skin and cause serious injury or death. Hydraulic leaks under pressure may not be visible. Before connecting or disconnecting hydraulic hoses, read your prime 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! SEE ILLUSTRATION.**



GENERAL SAFETY PRECAUTIONS

WARNING!

DO NOT MODIFY MACHINE OR ATTACHMENTS

Modifications may weaken the integrity of the attachment and may impair the function, safety, life, and performance of the attachment. When making repairs, use only the manufacturer's genuine parts, following authorized instructions. Other parts may be substandard in fit and quality. Never modify any ROPS (Roll Over Protective Structure) or FOPS (Falling Object Protective Structure) equipment or device. Any modifications must be authorized in writing by the manufacturer.

WARNING!

SAFELY MAINTAIN AND REPAIR EQUIPMENT

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

SAFELY OPERATE EQUIPMENT

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

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

WARNING!

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

EQUIPMENT SAFETY PRECAUTIONS

WARNING!

KNOW WHERE UTILITIES ARE

Observe overhead electrical and other utility lines. Be sure equipment will clear them. When digging, call your local utilities for location of buried utility lines, gas, water, and sewer, as well as any other hazard you may encounter.

WARNING!

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

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

WARNING!

REMOVE PAINT BEFORE WELDING OR HEATING

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

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

WARNING!

END OF LIFE DISPOSAL

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

OPERATING THE ATTACHMENT

- 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.
- Keep the heavy end of the machine uphill.
- Reduce speed when driving over rough terrain, on a slope, or turning, to avoid overturning the vehicle.
- An operator must not use drugs or alcohol, which can change his or her alertness or coordination. An operator taking prescription or over-the-counter drugs should seek medical advice on whether or not he or she can safely operate equipment.
- Before exiting the prime mover, lower the attachment to the ground, disengage PTO (if so equipped), apply the brakes, turn off the prime mover's engine and remove the key.
- Clear work area of all objects that could be thrown or picked up by the attachment.
- All bystanders should be kept a minimum of 10 feet (3 meters) away from the working area of the soil conditioner.
- Never direct discharge toward people, animals, or property.

EQUIPMENT SAFETY PRECAUTIONS

OPERATING THE ATTACHMENT

- Do not raise the attachment when the drum is rotating.
- Do not exceed specified RPM of your soil conditioner.
- Be sure all guards, shields and covers are properly installed before operating attachment.
- Never try to board or exit equipment while it is running.
- Test all controls before you begin operation.
- Never leave the attachment unattended when in the raised position.

OPERATING THE ATTACHMENT - 3- POINT HITCH MOUNTING

- PTO Operated Attachment: Rotating driveline contact can cause death. Do not operate without all driveline, tractor and equipment shields in place.
- Check driveline shields turn freely on driveline.
- Check driveline connections before operation. Be sure quick disconnect locks are operating and locked.
- Keep hands, feet and clothing away from power driven parts while tractor engine is running. Failure to do so will result in serious injury or death from rotating drum or PTO shaft.
- Do not use a PTO drive adapter to attach your soil conditioner driveline to a non-matching tractor PTO.
- Do not stand between prime mover and attachment during installation.
- Ballast weights may need to be added to your tractor to maintain 20% weight on front axle.

TRANSPORTING THE ATTACHMENT

- Disengage PTO before transporting.
- 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.

EQUIPMENT SAFETY PRECAUTIONS

MAINTAINING THE ATTACHMENT

- Before performing maintenance, lower the attachment to the ground, disengage PTO (if so equipped), apply the brakes, turn off the prime mover's engine and remove the key. Be sure all rotation has stopped before approaching the soil conditioner.
- 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, always 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 Spartan.
- Never make hydraulic repairs while the system is under pressure. Serious personal injury or death could result.
- Never work under a raised attachment unless PTO has been disengaged and soil conditioner is securely blocked. If attachment must be left raised for maintenance or any other reason, block the unit securely to prevent accidental release of the lifting mechanism. Serious damage or personal injury could result.

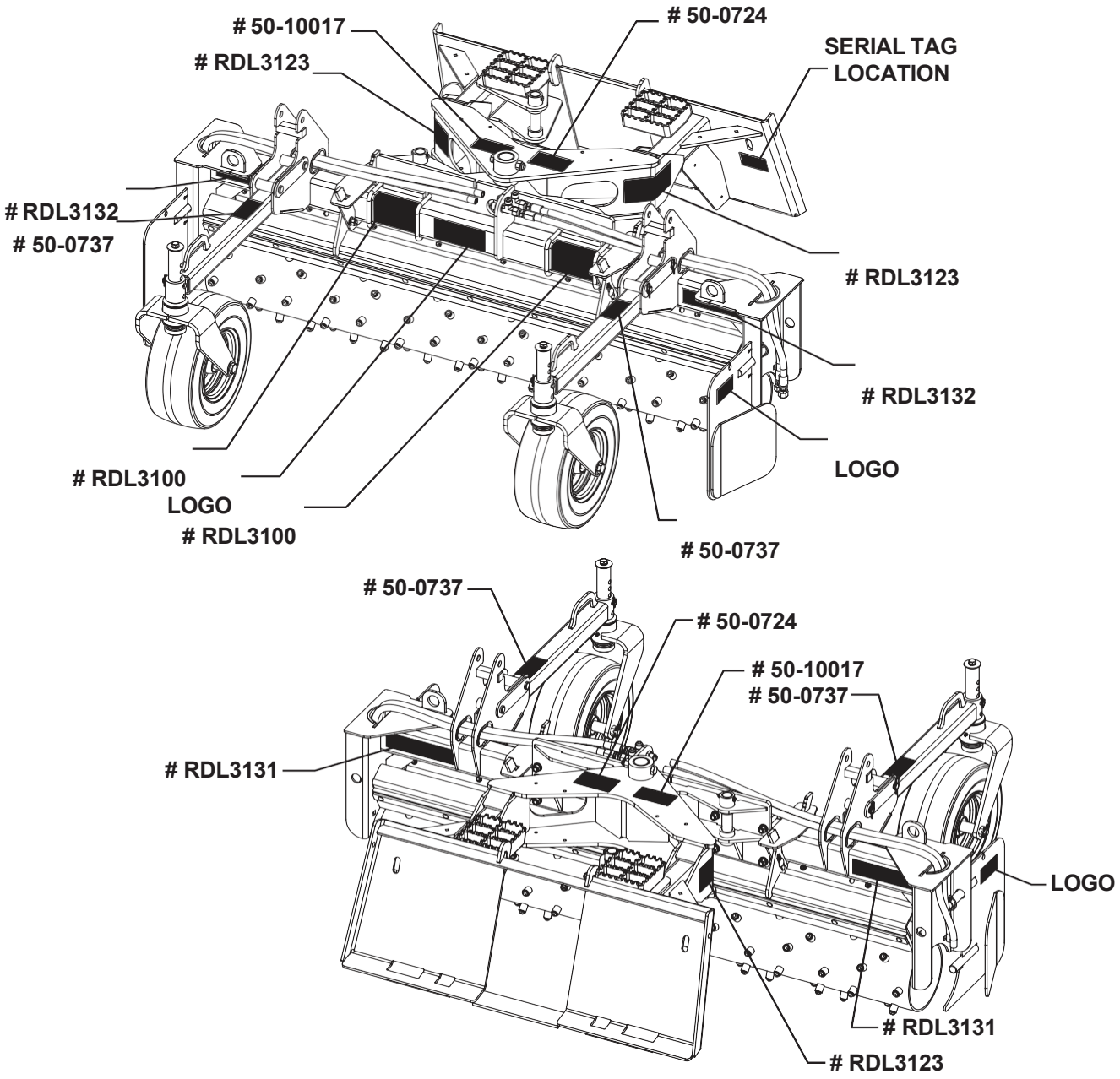
SAFETY SIGN LOCATIONS

The diagrams on these pages 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 Spartan.

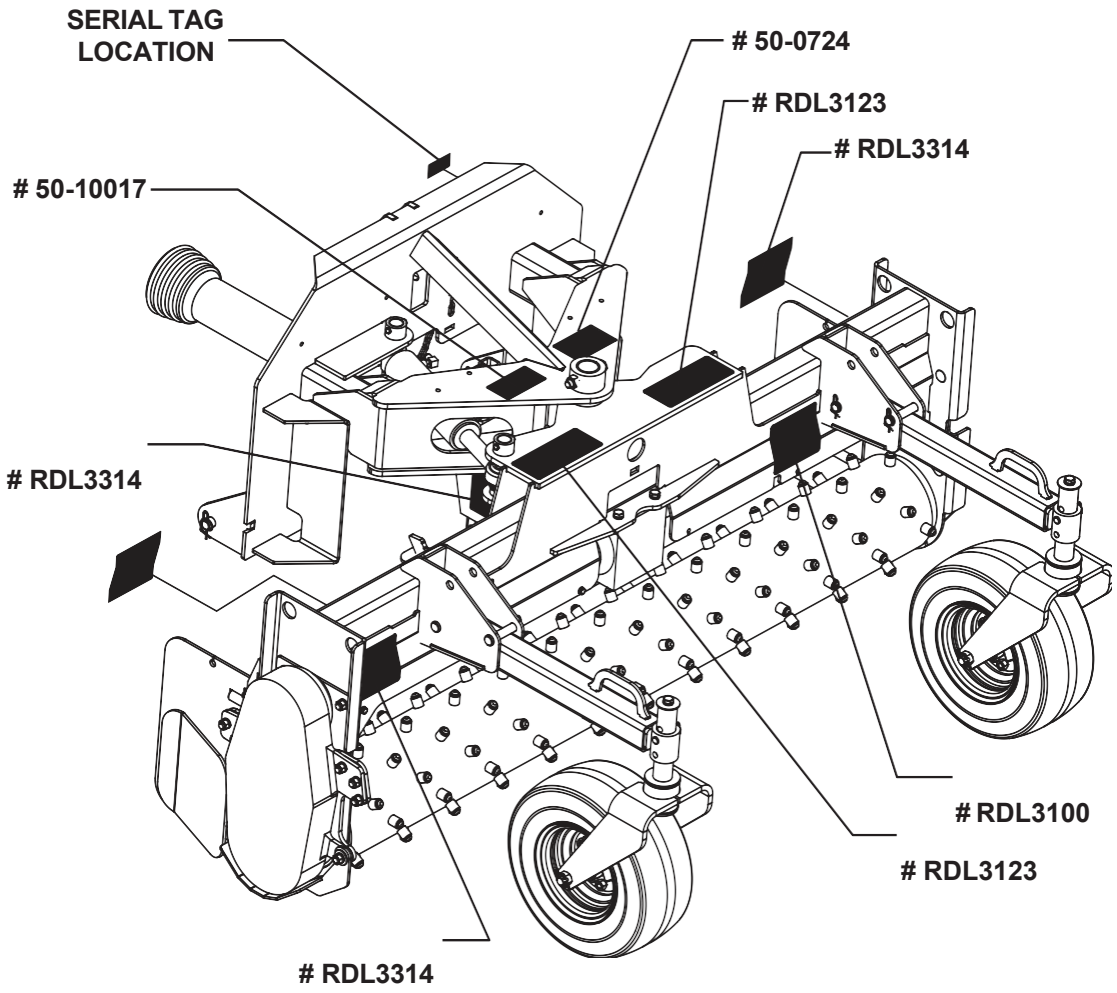
REPLACING SAFETY DECALS: Clean the area of application with nonflammable solvent, then wash the same area with soap and water. Allow the surface to fully dry. Remove the backing from the safety decal, exposing the adhesive surface. Apply the safety decal to the position shown in the diagram above and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

LOADER MOUNT



SAFETY SIGN LOCATIONS

3-POINT HITCH



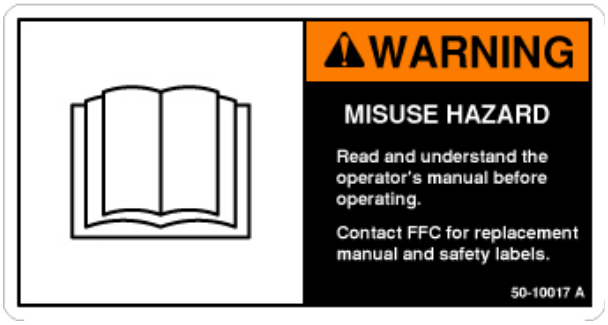
SAFETY SIGNS

 # 50-0724 WARNING! HIGH PRESSURE FLUID

 # RDL3314 DANGER! ROTATING DRIVELINE

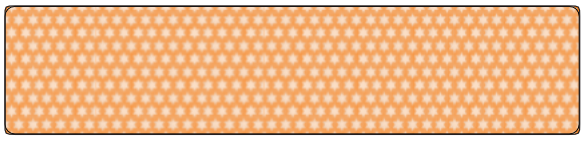
 # RDL3123 WARNING! PIVOTING ATTACHMENT

 # RDL3100 WARNING! FLYING OBJECTS

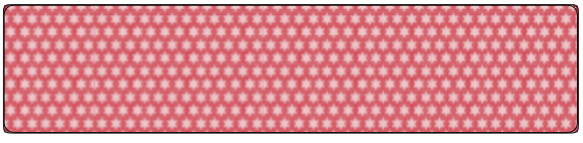


 # 50-10017 WARNING! MISUSE HAZARD

 # 50-0737 WARNING! PINCH POINT



 # RDL3132 AMBER REFLECTIVE TAPE



 # RDL3131 RED REFLECTIVE TAPE

NOTE: CONTACT YOUR LOCAL DEALER FOR MODEL NUMBER AND LOGO DECALS

INSTALLATION

GENERAL INFORMATION

The following instructions will help you to mount your soil conditioner onto your prime mover. On loaders the soil conditioner uses the quick-attach system for ease of installation and the SAE Category I or Category II 3-point hitch system on tractors.

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.

INSTALLATION - LOADER MOUNT

NOTICE! Lubricate all grease fittings before connecting this product to your prime mover's hydraulic system. Refer to Lubrication Section

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.**

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 Angle 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. Route the cable in such a fashion to avoid sharp edges and moving parts. Connect the two eye terminal wire ends (black = positive / white = negative) to the prime mover battery.

NOTICE! Disconnect battery before working on electrical system. Remove "ground" cable first. When reconnecting battery, connect "ground" cable last.

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.**

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.**

INSTALLATION

7. Following the safety start up procedure for your prime mover, start the prime mover and run all cylinders on the attachment to purge any air from the system. Check for proper hydraulic connection, hose routing and hose length.
8. Attachment installation is complete.

INSTALLATION - 3- POINT HITCH

1. Remove any attachment from the rear 3-point hitch of the prime mover.
2. Move the prime mover into position in front of the soil conditioner. Back up slowly and carefully with the lower 3-point hitch arms positioned at the same height and to the outside of the hitch pin ears on the mast frame.

WARNING: **DO NOT ALLOW ANYONE BETWEEN THE TRACTOR AND THE SOIL CONDITIONER WHILE TRACTOR IS RUNNING.**

3. Turn off the prime mover and relieve pressure to the auxiliary hydraulic lines. Following the safety shut down procedure for your prime mover, shut down and exit the operator's station.
4. Attach the 3-point hitch arms to the soil conditioner for CAT I or II and install the hitch pin provided. Secure with lynch pin.
5. Attach the top link to the mounting frame using the pin provided. Secure in place with cotter pin provided.
6. Adjust the lower link sway chains to prevent the soil conditioner from swaying side to side.
7. Attach the PTO from the soil conditioner to the prime mover. (Slide the front section of the PTO into the back section that is already attached to the soil conditioner.) Attach PTO to the rear of the prime mover. (Pull back on the driveline yoke collar and align the splines of the yoke with the PTO shaft. Push yoke onto the PTO shaft releasing the locking collar.) Push and pull the driveline back and forth until locked in place.

WARNING! **The locking collar must slide freely and the locking balls seated in the groove on the tractor PTO shaft before operating. A driveline not attached correctly could come loose from the tractor resulting in personal injury and damage to the attachment.**

8. Attach the driveline chains to the soil conditioner and tractor to prevent shields from turning. **NOTE: If driveline chains are damaged or missing replace before operating.**

NOTE: It may be necessary to shorten the telescoping shaft. The shaft must slip freely as the attachment is raised and lowered. Raise and lower the attachment slowly to check that the telescoping shaft is the proper length. See "Power (PTO) Shaft Adjustment".

NOTICE! Avoid driveline damage. Check the length of the telescoping members to insure the driveline will not bottom out or separate when turning and/or going over rough terrain.

INSTALLATION

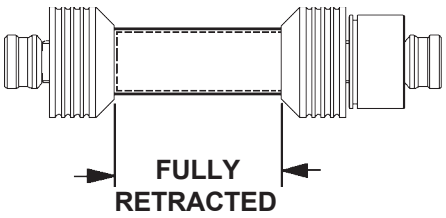
NOTICE! The PTO is customized for your specific application. If the PTO shaft is too long, severe PTO and gearbox damage is possible. DO NOT FORCE THE PTO TO FIT. Warranty is void if the correct PTO is not installed. There should never be less than .50" of overlap within the PTO.

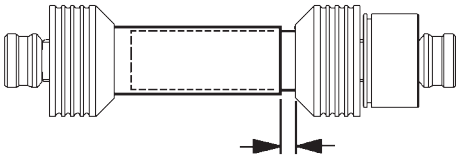
WARNING! **Do not use a PTO adapter to attach your sweeper to a non-matching tractor PTO. Serious personal injury and/or equipment failure can result. Consult an authorized dealer for assistance if the sweeper PTO does not match the tractor PTO.**

9. **For Hydraulic Angle Models Only:** 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.
10. Raise jack stand and secure in operating position.
11. Following the safety start up procedure for your prime mover, start the prime mover and run all cylinders on the attachment to purge any air from the system. Check for proper hydraulic connection, hose routing and hose length.
12. Attachment installation is complete.

POWER (PTO) SHAFT ADJUSTMENT

Confirm the minimum and maximum working lengths of the driveshaft. The telescoping tubes must overlap by at least ⅓ of their length while in use. The (PTO) drive assembly may need to be shortened to fit up to your tractor correctly and to prevent the drive assembly from "bottoming out" and causing extensive damage to the tractor PTO drive assembly.





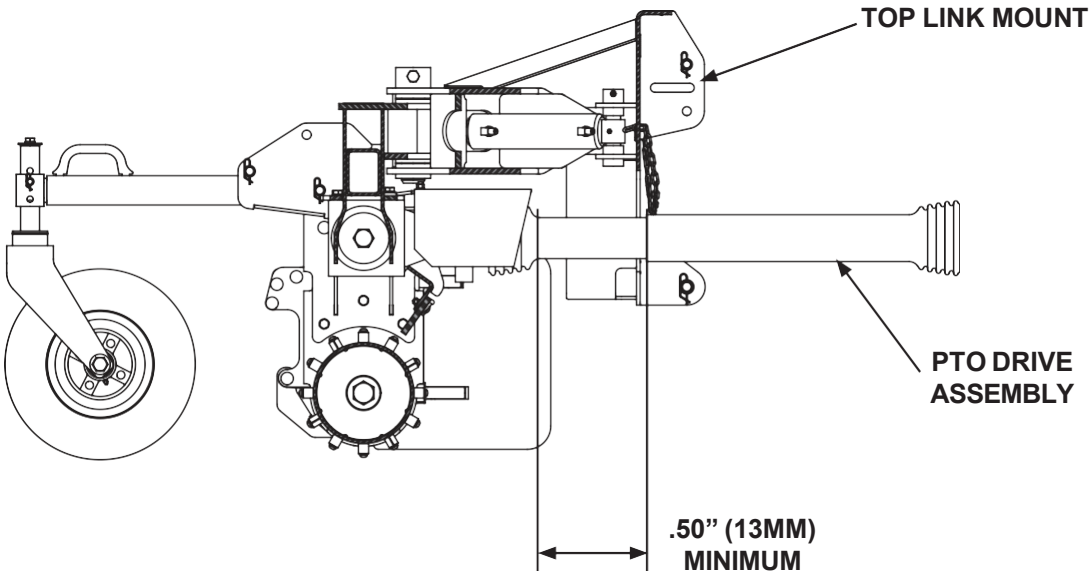
The shaft assembly is shortest when the shaft is straight inline with the attachment. There should be a minimum of .50" (13mm) of free travel before the shaft is fully retracted. To check:

1. Lower the attachment until the shaft is parallel to the ground and is straight inline with the attachment gearbox.
2. Check to see if there is a minimum of .50" free travel.

If there is not at least .50" (13mm) of free travel DO NOT OPERATE ATTACHMENT.

NOTICE! If the drive shaft "bottoms out" before it is straight inline with the attachment, stop and call your nearest dealer or the attachment manufacturer before operating.

INSTALLATION



CAUTION!

Failure to have the required distance of clearance will damage the power take off (PTO) of your tractor. The minimum and maximum length of the PTO must be checked whenever this attachment is used on a different tractor.

DETACHING - LOADER MOUNTING

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.

DETACHING - 3- POINT HITCH MOUNTING

1. Place the endplates in the storage position for added stability (towards the prime mover). See Endplates.
2. Lower jack stand to storage position.
3. Before exiting the prime mover, lower the attachment to the ground, disengage PTO, apply the brakes, turn off the prime mover’s engine, and remove the key.
4. Follow prime mover operator’s manual to relieve pressure in the hydraulic lines.
5. Disconnect driveline from tractor PTO shaft and support with storage chain.
6. Disconnect 3-point upper and lower links from soil conditioner.
7. **For Hydraulic Angling Models Only:** Disconnect power and return hoses from the auxiliary hydraulics.
8. 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.

OPERATION
CONTROLS

POWER ROLLER

Roller should be level with the ground. The soil conditioner should also be level with the ground front to back. To accomplish this, adjust the prime mover mount and/or raise or lower gauge wheels. Because the gear case end of roller on 3-point hitch soil conditioners weighs more, the tire closest to the gear case should be set 1” lower than the opposite tire. This will give an even grade when landscaping.

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

ROLLER DEFLECTORS

The soil conditioner has deflectors allowing for the operator to choose the size of material left on the seedbed. On loader mount soil conditioners the gap between the roller and deflectors can be adjusted for the front or rear deflector. (The deflectors are stiff enough for pushing but also flexible enough to allow debris to pass depending on how the material should be handled by the roller.)

GAP ADJUSTMENT: The normal gap between the roller and deflectors are approximately 1.25”. This gap can be adjusted by loosening the bolts that hold the deflectors and sliding the adjustment bars down the mount. A wider opening allows more dirt and rock to pass through and reducing the opening allows for finer conditioning. Take care to ensure that the roller does not hit the deflector and that the gap is equal all the way across the roller. See Figures #1 & 2

FIGURE #1

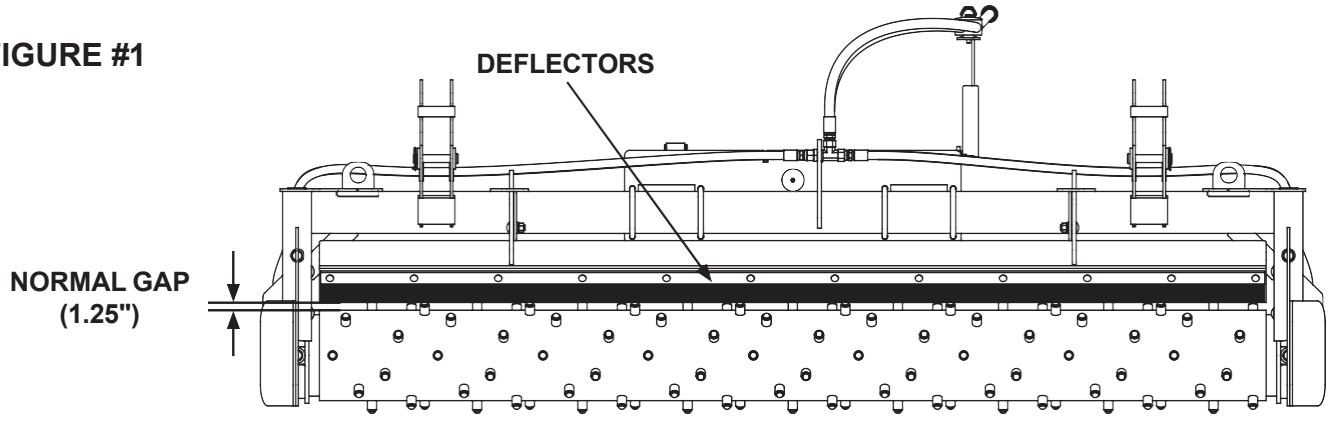
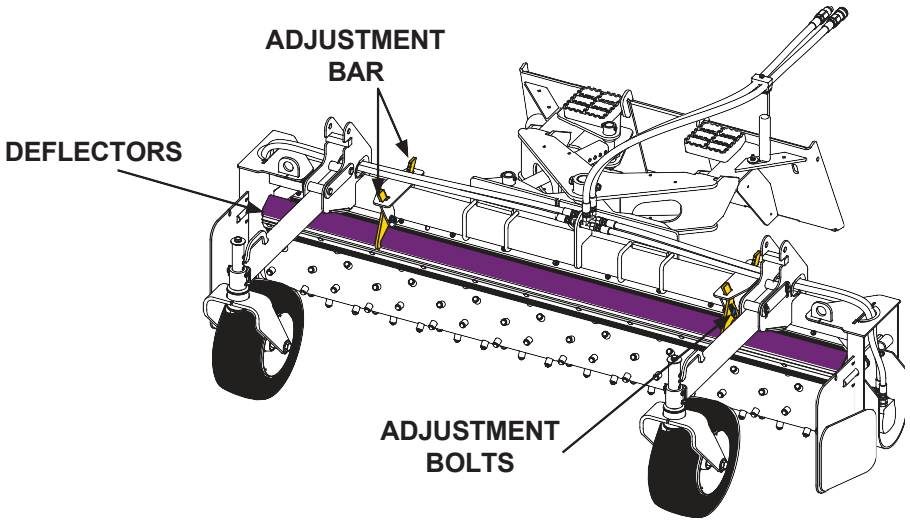


FIGURE #2



OPERATION
CONTROLS

DIRECTION CONTROL SWITCH - HYDRAULIC ANGLE ONLY

For Loader Mount Only: A control box is provided to angle the soil conditioner left or right. The control box 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 and will only operate with the prime mover auxiliary hydraulic system engaged.

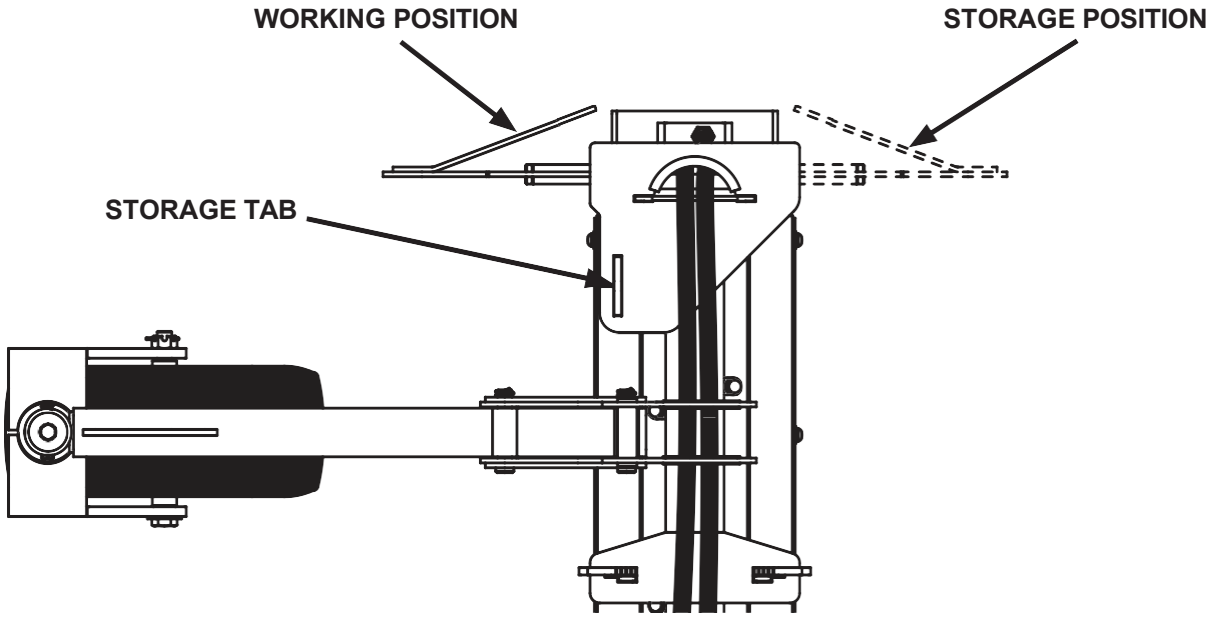
With the prime mover auxiliary hydraulic system engaged, move the spring loaded switch in one direction and the soil conditioner will angle left or right. Return the switch to center position and soil conditioner will maintain the angle selected. Angle soil conditioner to place the windrow left or right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

For 3-Point Hitch Only: With the soil conditioner angle cylinder connected to a tractor hydraulic control valve, move tractor control valve to select the desired angle. Return the tractor control to neutral to maintain the selected angle.

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 deflectors. See Figure #3

FIGURE #3



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

These endplates can be mounted to the front or back of the soil conditioner, 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 soil conditioner on a hard level surface and position the endplates in the storage position to ensure stability.

The endplates can be stored on the soil conditioner when not in use by using the top bushing and storage tab. See Figure #3

OPERATION

INTENDED USE

This soil conditioner 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.

GENERAL OPERATION

The prime mover drives the roller, which digs into the ground, cultivating and pulling up rocks, roots, and debris. The clean soil goes between the roller and deflectors, while the rocks, roots, and debris work to the side in a windrow. With the endplates mounted in the working position and the soil conditioner straight (endplates parallel with prime mover 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 soil conditioner allows fast conditioning of large areas of ground.

When soil conditioning, 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 Power Roller Controls to set roller depth.

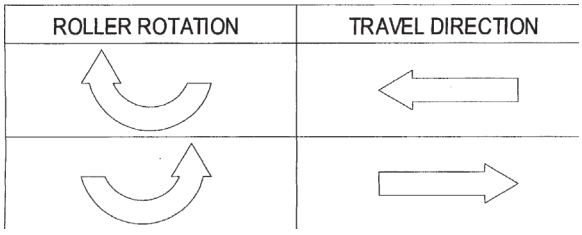
When windrowing, the level of dirt may be halfway up on the deflectors. The volume or density of the material being raked will dictate how many times a windrow can be moved. When moving the windrow the level of the dirt may be to the top of the deflectors. Try to prevent material from flowing over the top.

NOTE: Soil can be removed from the windrow of rocks by moving it back and forth a few times onto the clean area. If dirt clods are a problem, running the prime mover tire over the windrow and then moving it a final time will help to break up and cut down on dirt clods.

1. Follow your prime mover operator's manual for safely starting up the prime mover.
2. Lower soil conditioner slowly to the ground.
3. **For Loader Mount Only:** Engage hydraulic control lever for auxiliary attachment. **For 3-Point Hitch Only:** Engage tractor PTO and hydraulic control lever for auxiliary attachment.
4. Increase engine RPM to give desired RPM at the roller. Normal operating speed for **loader mounted** power rollers must not exceed 170 RPM, and 211 RPM for **3-point hitch** power rollers. If operating in heavy rock, reduce the speed slightly.

NOTICE! Do not exceed a PTO operating speed of 540 RPM.

5. Move the prime mover forward or backward as desired. Ground speed should be between 3 - 5 MPH under normal conditions. In heavy rock, reduce the ground speed to 1 - 3 MPH. For the roller to operate effectively, it must rotate in the opposite direction of the prime mover wheels. Lift the soil conditioner off the ground when reversing.



OPERATION

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 conditioning 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 soil conditioner. Angling the soil coonditioner 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 for collecting debris or removed to windrow debris.
- Tilt the attachment plate forward using the gauge wheels to control the depth of the roller.
- Angle 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 soil conditioner. For finish grading you will collect material from the high spots and deposit it in the low areas.

- Endplates should be installed for collecting debris.
- Tilt the soil conditioner 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 soil conditioner so it is tilted on the gauge wheels. (Depth of cut is not the objective.)
- Endplates should be removed to windrow debris.
- Set angle to windrow as needed to control material movement.

CHANGING GRADE

- Endplates should be removed to windrow debris.
- Set angle to windrow as needed to control material movement.

THATCHING EXISTING GRASS AREAS

The prime mover attachment plate should be tilted forward to support the soil conditioner on the front gauge wheels and roller raised so teeth are just grazing the surface. Travel speed should be slow and careful. Endplates should be removed.

OPERATION

SHUTTING DOWN - LOADER MOUNT

1. Turn off hydraulic flow to your soil conditioner to stop drum rotation.
2. Lower the lift arms and soil conditioner 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's safety shutdown procedure before exiting the prime mover.

SHUTTING DOWN - 3- POINT HITCH

1. Disengage PTO and turn off hydraulic flow to your attachment.
2. Lower the attachment to the ground and relieve hydraulic pressure.
3. After all movement has stopped, follow your prime mover's safety shutdown procedure before exiting the prime mover.

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

STORAGE

The following storage procedure will help you to keep your product in top condition. It will also help you get off to a good start the next time your attachment is needed. We therefore strongly recommend that you take the extra time to follow these procedures whenever your unit will not be used for an extended period of time.

IMPORTANT: When detaching your unit for short or long term storage be sure to follow the Detaching Instruction in the Installation Section of this manual.

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

OPERATION

LIFT POINTS

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

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

WARNING!

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

TIE DOWN POINTS

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

- 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

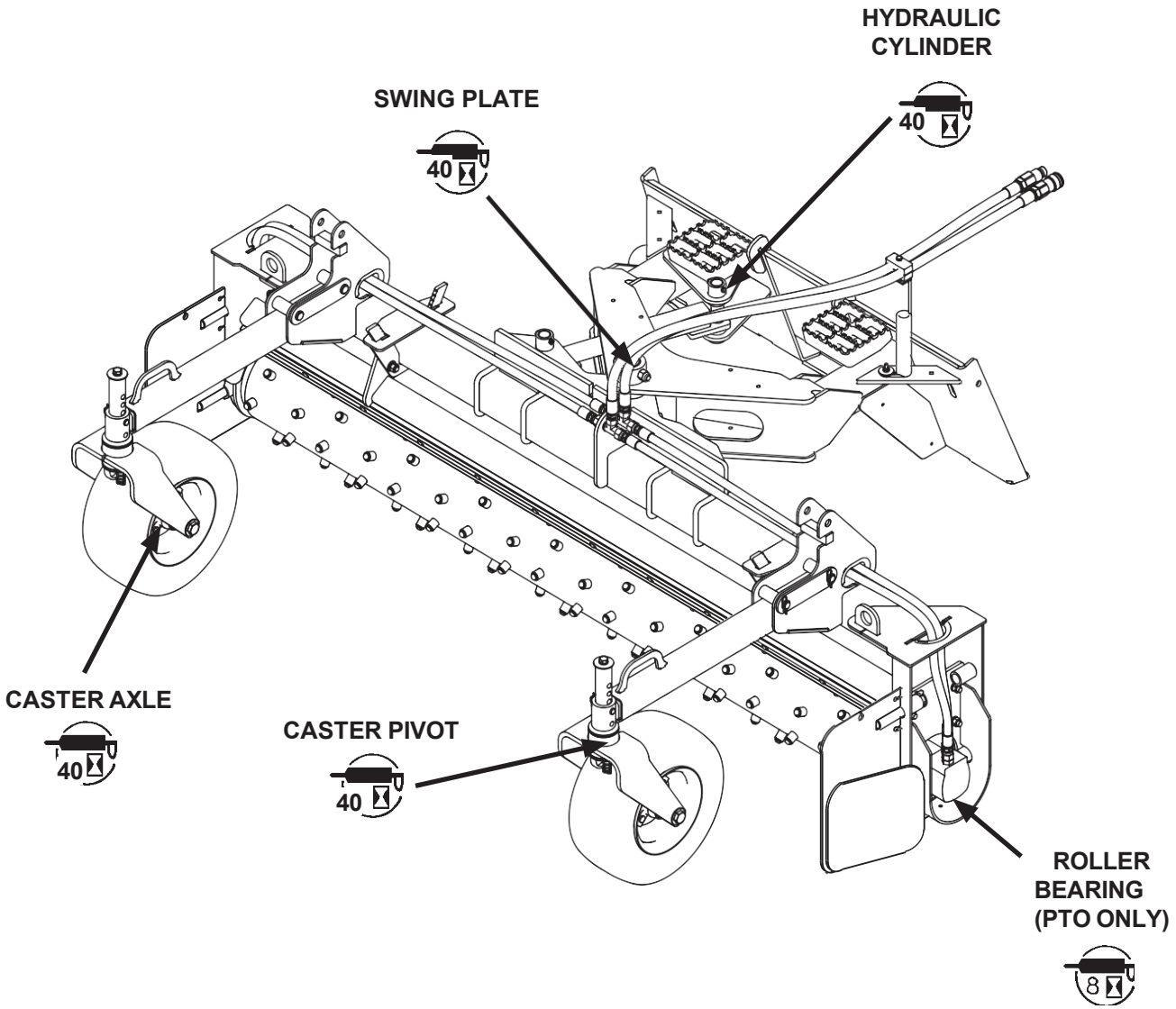
LUBRICATION SYMBOLS

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 daily or every 8 hours of operation, whichever comes first, with SAE Multi-Purpose Lubricant or an equivalent SAE Multi-Purpose type grease.

Lubricate after every 20 hours of operation, with SAE Multi-Purpose Lubricant or an equivalent SAE Multi-Purpose type grease.

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



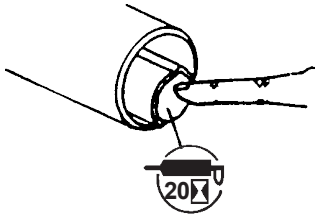
IMPORTANT: Avoid excessive greasing. Dirt collects on exposed grease and greatly increases wear. After greasing, wipe off excessive grease from fittings.

LUBRICATION

PTO DRIVELINES

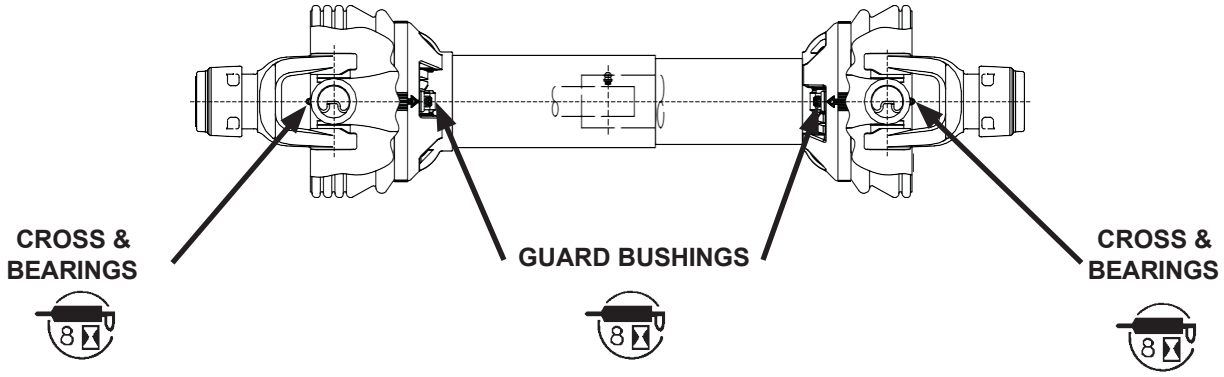
- Lubricate the outboard hub and the PTO every (8) eight hours.
- Grease PTO driveline inner tube before putting attachment into operation and every (20) twenty hours thereafter.

GREASE INSIDE OF OUTER TELESCOPING TUBE (EVERY 20 HOURS)



NOTE: When used in winter the outer tube must be greased to prevent it freezing solid!

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



NOTE: It is recommended to use NLGI #2 grease or equivalent for all grease points.

GEARBOX

To check gearbox lubricant level, remove the plug located top of the gearbox.

- Lubricant should half-fill the gearbox.
- If not, add multipurpose 80-weight gear lubricant.

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	DAILY (EVERY 8 HOURS)	WEEKLY (EVERY 40 HOURS)	QUARTERLY (EVERY 3 MONTHS)	ANNUALLY (EVERY 12 MONTHS)
Check prime mover hydraulic system to ensure an adequate level and cleanliness of hydraulic oil.	✔			
Check hydraulic system for leaks or damage. Replace or tighten as necessary.	✔			
Check for missing or loose hardware. Replace or tighten as necessary. See Bolt Torque Specifications	✔			
Check for missing or damaged safety decals and replace as necessary.	✔			
Lubricate PTO U-Joints, roller bearings, & PTO shafts.	✔			
Check tire pressure. (refer to tire)		✔		
Lubricate caster, pivot plate, pivot bolt, & PTO telescoping shafts.		✔		
Change oil level in PTO gearbox and bearing housing.			✔	
Repack caster bearings				✔

BREAK-IN PERIOD

For 3-Point Hitch Only: Change oil in gearbox after the first 100 hrs or 30 days of operating and then quarterly.

WARNING!

Escaping hydraulic / diesel fluid under pressure can penetrate the skin causing serious injury. Fluid escaping from a very small hole can be almost invisible. Use a piece of cardboard or wood, rather than hands to search for suspected leaks.

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.

Stop the engine and relieve pressure before connecting or disconnecting lines. Tighten all connections before starting engine or pressurizing lines.

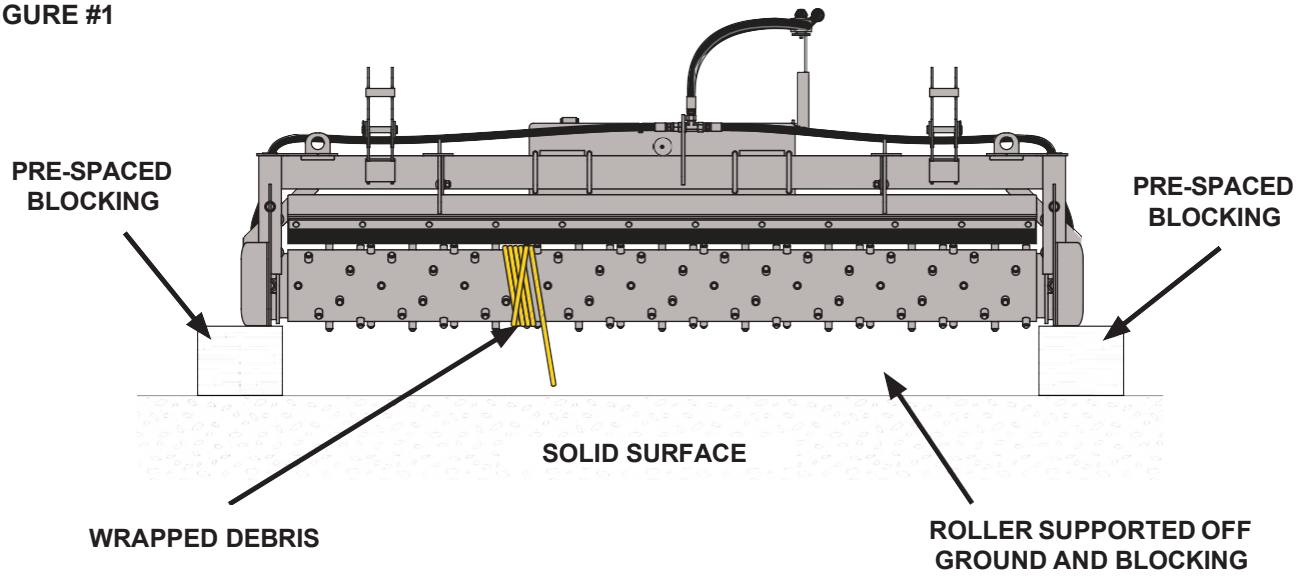
MAINTENANCE

REMOVING WRAPPED DEBRIS

1. Park the prime mover on a hard level surface.
2. Lower soil conditioner onto pre-spaced blocking that supports the motor guards on each side of the soil conditioner. The roller must clear the ground and blocking allowing it to turn freely. See Figure #1

WARNING! **Do not use blocking made of concrete blocks, logs, buckets, barrels or any other material that could suddenly collapse or shift positions. Do not use wood or steel blocking that is warped, twisted, or tapered. Failure to obey this warning could result in death or serious injury.**

FIGURE #1



3. Before exiting the prime mover, make sure all rotation has stopped, relieve pressure in the hydraulic lines, disengage PTO (if so equipped), apply the brakes, turn off the engine and remove the key.
4. To allow the roller to turn freely, disconnect the hydraulic lines from your prime mover and connect the two ends together. Disconnect PTO driveline (if so equipped).
5. Pull the material from the roller while allowing it to rotate.

Alternate Method For Loader Mount Soil Conditioners

If your prime mover is equipped with raised lift arm safety stops that can be activated from the operators station or a second person is present to activate from outside the operator's station the following method is an option.

1. Park the prime mover on a hard level surface.
2. To allow the roller to turn freely, disconnect the hydraulic lines from your prime mover and connect the two ends together.
3. Raise the loader arms and extend (rollout) the tilt cylinders to the full dump position.
4. Activate the lift arm safety stops to lock the lift arms in the raised position.
5. Before exiting the prime mover, apply the brakes, turn off the engine and remove the key.
6. Pull the material from the roller while allowing it to rotate.

MAINTENANCE

REPACKING CASTER BEARINGS

1. Relieve all weight from the caster wheels.
2. Before exiting the prime mover, make sure all rotation has stopped, disengage PTO (if so equipped), apply the brakes, turn off the engine and remove the key.
4. Remove the wheel by unbolting the axle. Remove the bearing hub from the wheel.
5. Clean the bearing components, and using a high quality grease, repack the bearing components and hub.
6. Replace the seal and reassembly all components.

HYDRAULIC MOTOR REPLACEMENT

An overhead hoist is required when replacing the motors.

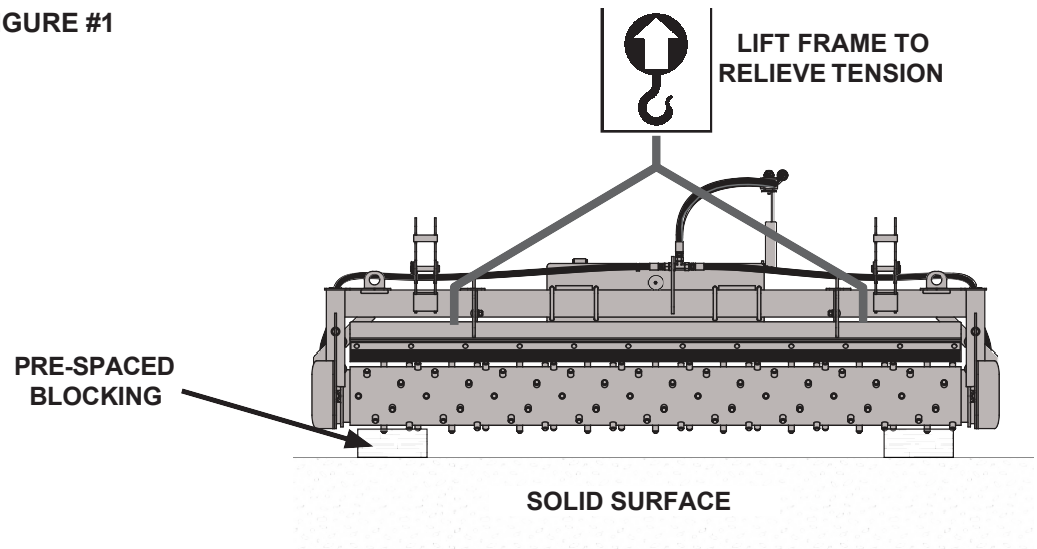
1. Park the prime mover on a hard level surface with a suitable hoist available to support the size and weight of your soil conditioner.
2. Lower the soil conditioner onto pre-spaced blocking to support the roller off the ground. Block roller only allowing the motor buckets to be removed.
3. Before exiting the prime mover, relieve pressure in the hydraulic lines, disengage PTO (if so equipped), apply the brakes, turn off the engine and remove the key.
4. Attach lifting accessories to the soil conditioner at the recommending lifting points.

CAUTION! **Use lifting accessories that are capable of supporting the size and weight of your attachment. Secure in such a way to prevent unintended disengagement.**

5. Using the hoist, lift the frame just enough to relieve tension on the motor shafts and keep it from falling when the motor buckets are removed. See Figure #1

CAUTION! **KEEP HANDS AND FEET FROM UNDER ATTACHMENT WHEN REPLACING HYDRAULIC MOTOR(S).**

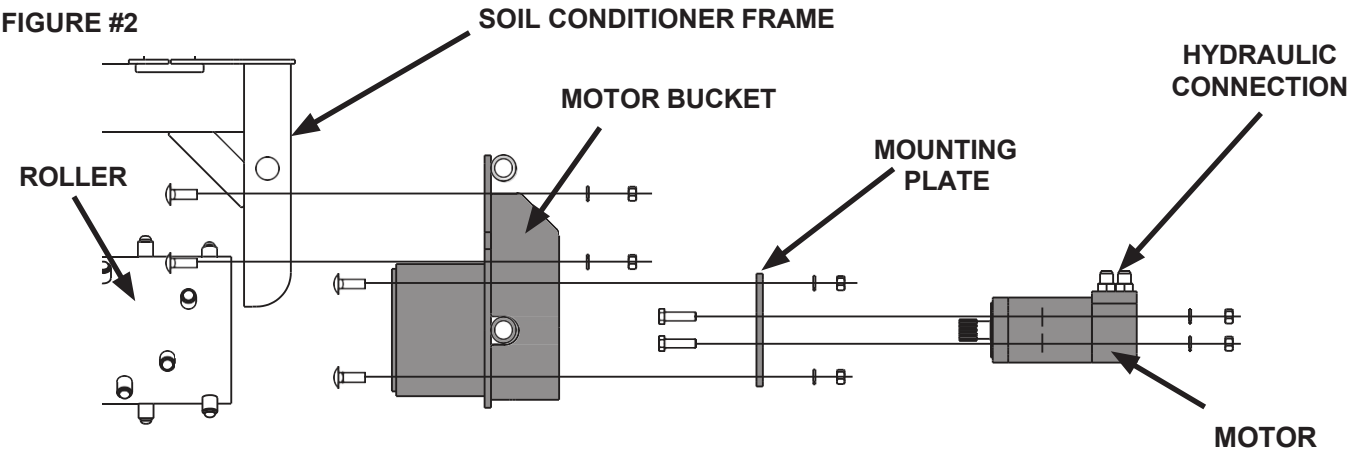
FIGURE #1



MAINTENANCE

6. Tag and disconnect the hydraulic lines from the motor.
7. Remove bolts and slide the motor bucket out from the frame and roller. See Figure #2

FIGURE #2



8. Remove the motor and mounting plate from the motor bucket.
9. Unbolt the motor from the mounting plate and replace using the existing hardware.
10. Reverse the procedure to reinstall motor.

DEFLECTOR RUBBER REPLACEMENT

1. Stop your prime mover on a level surface with this product properly attached.
2. Before exiting the prime mover, make sure all rotation has stopped, relieve pressure in the hydraulic lines, disengage PTO (if so equipped), apply the brakes, turn off the engine and remove the key.
3. Remove the worn barrier by removing the bolts and nuts that secure the clamp plate.
4. Replace the rubber barrier and secure in place by reinstalling the clamp plate using the existing bolts and nuts.

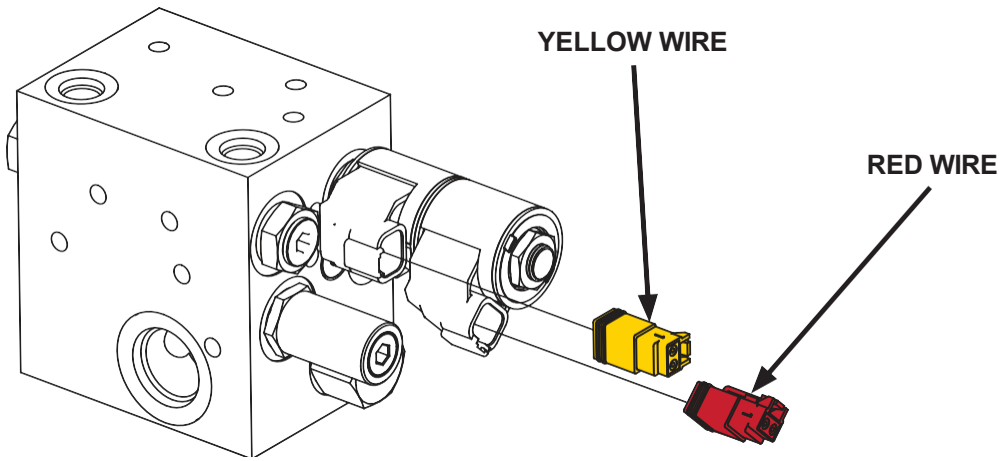
DIRECTIONAL CONTROL VALVE

Loader Mount 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



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.	Tractor PTO not engaged.	Engage PTO. See prime mover Operator's Manual.
	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.	Check flow and pressure output of prime mover hydraulics. See prime mover Operator's Manual.
	Insufficient oil in prime mover hydraulic system.	See prime mover Operator's Manual.
	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 purge air from lines.
	Obstruction in hydraulic lines.	Replace obstructed or damaged line.
	Obstruction between roller and barrier.	Clear obstruction.
	Gearbox damaged.	Check that output shaft rotates. Replace if required.
Hydraulic cylinder will not extend or retract	Hydraulic couplers not completely engaged.	Engage couplers.
	Insufficient oil in prime mover hydraulic system.	See prime mover Operator's Manual.
	Air in hydraulic system.	Cycle prime mover auxiliary system several times to purge air from lines.
	Broken hose.	Replace hose.
	Worn, damaged, insufficient, or inadequate pump.	Check flow and pressure output of prime mover hydraulics. See prime mover Operator's Manual.
	Electrical failure.	See prime mover Operator's Manual.
	Obstruction between roller and barrier.	Clear obstruction.

TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE	POSSIBLE SOLUTION
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.
Oil leaks from the motor	Motor seals damaged.	Replace motor shaft seal or motor if necessary.
	Seals on hydraulic fitting damaged.	Replace hydraulic fitting.
	Hydraulic fittings loose or damaged.	Tighten or replace as required.
	Hydraulic lines loose or damaged.	Tighten or replace as required.
Hydraulic quick coupler leaks	Quick coupler poppet is unseated.	Tighten or replace quick couplers.

BOLT TORQUE SPECIFICATION

GENERAL TORQUE SPECIFICATION TABLES

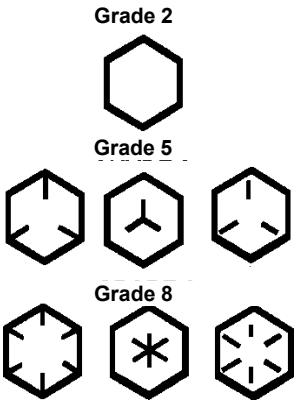
Use the following charts when determining bolt torque specifications, when special torques are not given. Always use grade 5 or better when replacing bolts.

SAE BOLT TORQUE SPECIFICATIONS

NOTE: 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.

Bolt Size		SAE GRADE 5 TORQUE Ft-lbs		SAE GRADE 5 TORQUE Newton-Meter		SAE GRADE 8 TORQUE Ft-lbs		SAE GRADE 8 TORQUE Newton-Meter	
Inches	mm	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

Bolt head identification marks as per grade.
NOTE: Manufacturing Marks Will Vary



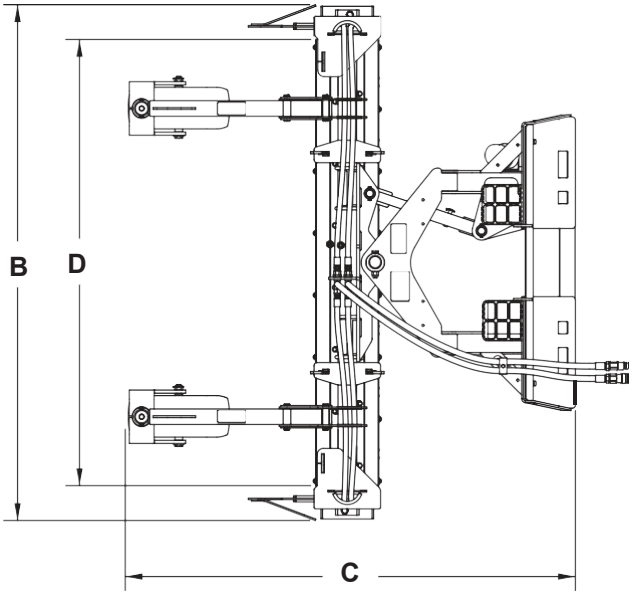
METRIC BOLT TORQUE SPECIFICATIONS

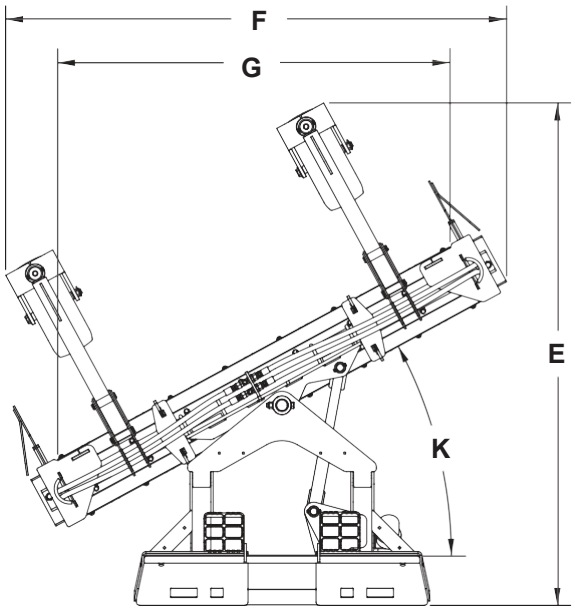
NOTE: The following torque values are for use with metric hardware that is unplated and either dry or lubricated with engine oil. Reduce torque 15% when using hardware that has extreme pressure lubricants, plating or hard washer applications.

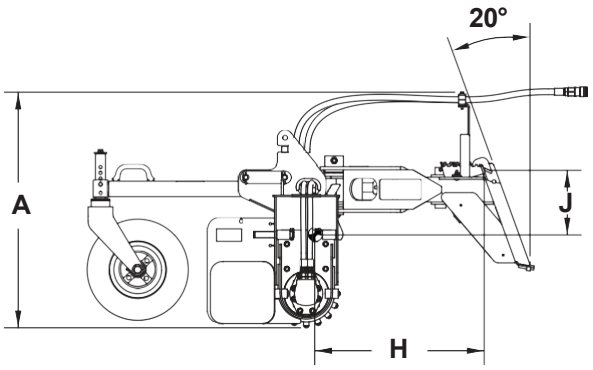
Bolt head identification marks as per grade.

Bolt Size	Grade No.	Pitch (mm)	Ft-lbs	Newton-Meter	Pitch (mm)	Ft-lbs	Newton-Meter
	5.6		3.6-5.8	4,9-7,9		-	-
M6	8.8	1,0	5.8-.4	7,9-12,7	-	-	-
	10.9		7.2-10	9,8-13,6		-	-
	5.6		7.2-14	9,8-19		12-17	16,3-23
M8	8.8	1,25	17-22	23-29,8	1,0	19-27	25,7-36,6
	10.9		20-26	27,1-35,2		22-31	29,8-42
	5.6		20-25	27,1-33,9		20-29	27,1-39,3
M10	8.8	1,5	34-40	46,1-54,2	1,25	35-47	47,4-63,7
	10.9		38-46	51,5-62,3		40-52	54,2-70,5
	5.6		28-34	37,9-46,1		31-41	42-55,6
M12	8.8	1,75	51-59	69,1-79,9	1,25	56-68	75,9-92,1
	10.9		57-66	77,2-89,4		62-75	84-101,6
	5.6		49-56	66,4-75,9		52-64	70,5-86,7
M14	8.8	2,0	81-93	109,8-126	1,5	90-106	122-143,6
	10.9		96-109	130,1-147,7		107-124	145-168
	5.6		67-77	90,8-104,3		69-83	93,5-112,5
M16	8.8	2,0	116-130	157,2-176,2	1,5	120-138	162,6-187
	10.9		129-145	174,8-196,5		140-158	189,7-214,1
	5.6		88-100	119,2-136		100-117	136-158,5
M18	8.8	2,0	150-168	203,3-227,6	1,5	177-199	239,8-269,6
	10.9		175-194	237,1-262,9		202-231	273,7-313
	5.6		108-130	146,3-176,2		132-150	178,9-203,3
M20	8.8	2,5	186-205	252-277,8	1,5	206-242	279,1-327,9
	10.9		213-249	288,6-337,4		246-289	333,3-391,6

SPECIFICATIONS







SPECIFICATIONS AND DESIGN ARE SUBJECT TO CHANGE WITHOUT NOTICE AND WITHOUT LIABILITY THEREFOR.

SPECIFICATIONS

LOADER MOUNT SOIL CONDITIONERS

	DESCRIPTION	72"	72" FLOAT	90"	90" FLOAT
A.	Overall Height	38.00”	38.00”	38.00”	38.00”
B.	Overall Width	83.30"	83.30"	101.40"	101.40"
C.	Overall Length	72.70"	73.80"	72.70"	73.80"
D.	Conditioning Width	72.00”	72.00"	90.00″	90.00"
E.	Overall Length @ 28.5°	81.10"	82.20"	85.40"	86.50"
F.	Overall Width @ 28.5°	80.80"	80.80"	96.10"	96.10"
G.	Conditioning Width @28.5°	63.30"	63.30"	79.20"	79.20"
H.	Center of Gravity - Horizontal	27.30"	25.70"	27.40"	25.90"
J.	Center of Gravity - Vertical	10.40"	10.10"	10.70"	10.40"
K.	Swing Angle	28.50°	28.50°	28.50°	28.50°
	Weight - Manual Angle (lbs)	1040#	1115#	1120#	1195#
	Weight - Hydraulic Angle (lbs)	1045#	1120#	1125#	1200#

Flow Range	12-40 GPM
Hydraulic Pressure	3500 PSI

3-POINT HITCH SOIL CONDITIONERS

	DESCRIPTION	72"	90"
A.	Overall Height	38.50”	38.50”
B.	Overall Width	84.10"	102.10"
C.	Overall Length	60.50"	60.50"
D.	Conditioning Width	72.00"	90.00"
E.	Overall Length @ 30°	69.70"	74.20"
F.	Overall Width @ 30°	81.60"	97.20"
G.	Conditioning Width @30°	62.40"	77.60"
H.	Center of Gravity - Horizontal	24.50"	24.70"
J.	Center of Gravity - Vertical	16.40"	16.60"
K.	Swing Angle	30°	30°
	Weight - Manual Angle (lbs)	1130#	1220#
	Weight - Hydraulic Angle (lbs)	1135#	1225#

Tractor 3-Point Mount	Cat. I or II
PTO Speed	540 RPM
Horsepower Range	25-100 HP
Hydraulic Pressure (Hydraulic Angle Only)	3500 PSI

LIMITED WARRANTY

Spartan Equipment products are warranted to be free of defects in materials and workmanship under normal use and service, for a period of one year from the date of purchase, when operated and maintained in accordance with the operating and maintenance instructions supplied with the unit. Warranty is limited to the repair of the product and/or replacement of parts.

This warranty is extended only to the original purchaser and is not transferable.

Repairs must be done by an authorized dealer. Products will be returned to the dealer at the customer's expense. Include the original purchase receipt with any claim.

This warranty does not cover the following:

1) Normal maintenance or adjustments
2) Normal replacement of wearable and service parts
3) Consequential damage, indirect damage, or loss of profits
4) Damages resulting from:
    - Misuse, negligence, accident, theft or fire
    - Use of improper or insufficient fuel, fluids or lubricants
    - Use of parts or aftermarket accessories other than genuine Spartan Equipment parts
    - Modifications, alteration, tampering or improper repair performed by parties other than an authorized dealer
    - Any device or accessories installed by parties other than an authorized dealer

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