FFC BY PALADIN

OPERATOR'S MANUAL

HYDRAULIC SNOW BLOWER

SERIAL NUMBER: _____

MODEL NUMBER: _____

Manual Number: 51-4694
Date: February 2019
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.

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.

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 — **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.

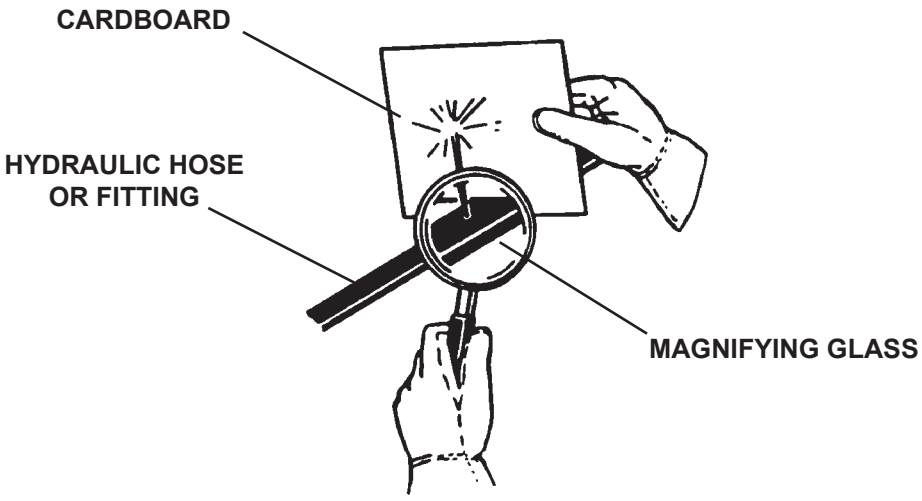
WARNING! LOWER OR SUPPORT RAISED EQUIPMENT

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

- 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 reach into the auger area or chute until the prime mover engine is turned off, the hydraulic pressure has been relieved and key is removed.
- The chute rotation motor and chute deflector actuator are still live and remain powered when the prime mover is shut off. Disconnect the negative battery cable to cut power to the motor and actuator.
- Do not reach into or force objects into the chute.
- Use extreme caution when operating on or crossing gravel drives, walkways or roads.
- Do not operate without good visibility or light.
- Do not overload machine capacity by attempting to clear snow too fast.

EQUIPMENT SAFETY PRECAUTIONS

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.
- 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, apply the brakes, turn off the prime mover's engine and remove the key.

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.

MAINTAINING THE ATTACHMENT

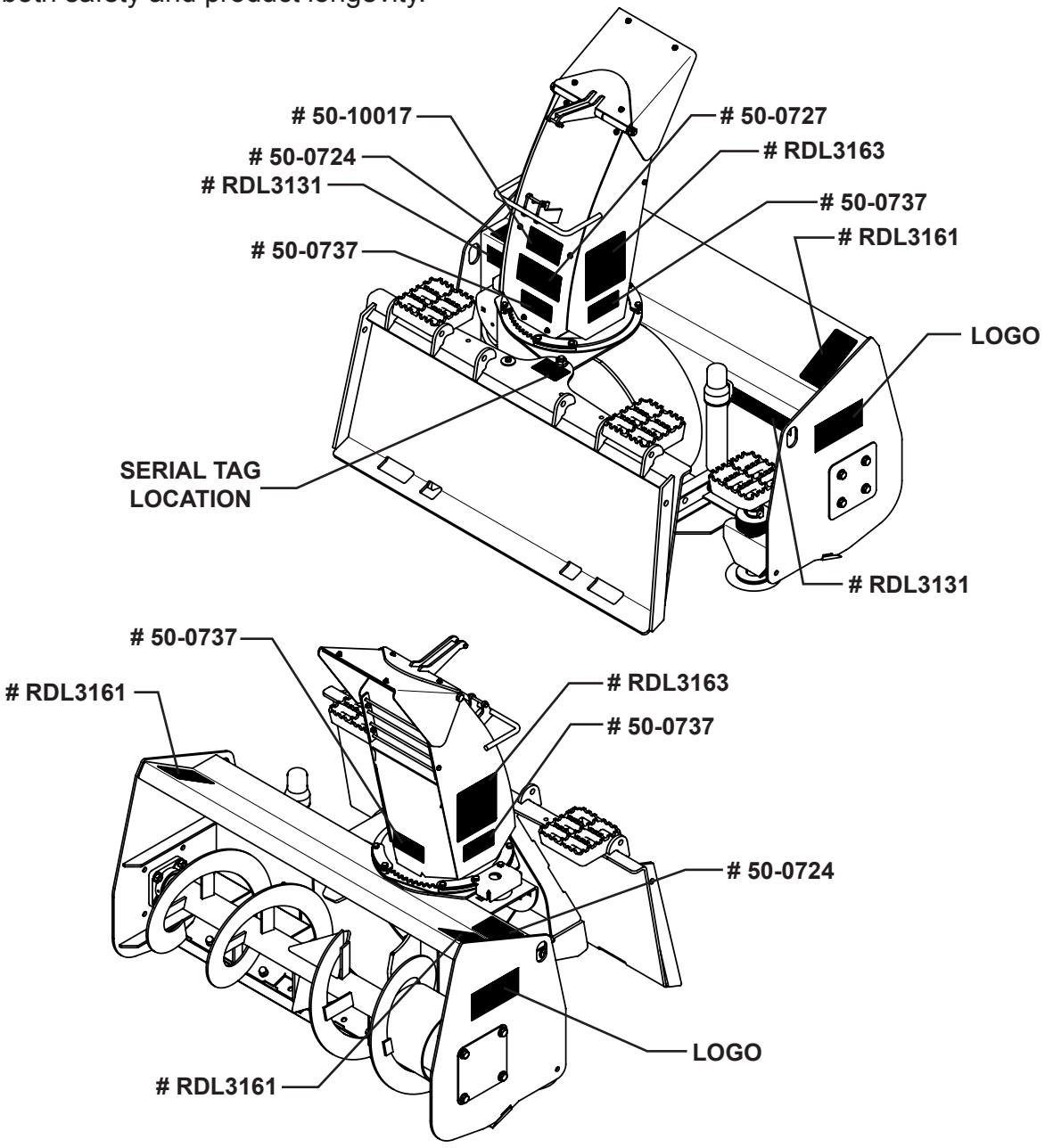
- Before performing maintenance lower the attachment to the ground, apply the brakes, turn off the engine and remove the key.
- Never perform any work on the attachment unless you are authorized and qualified to do so. Always read the operator service manuals before any repair is made. After completing maintenance or repair, check for correct functioning of the attachment. If not functioning properly, 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 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.

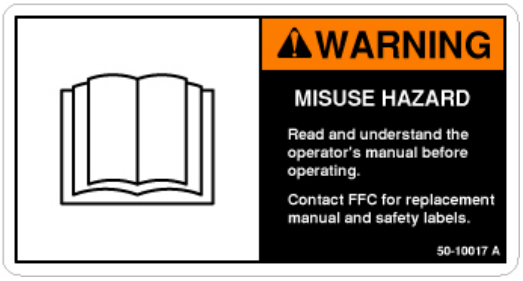


STANDARD FLOW SHOWN

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



 # 50-10017 WARNING! READ MANUAL

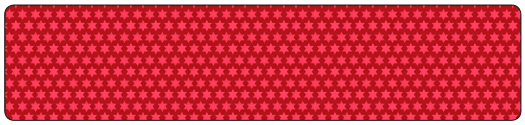
 # RDL3161 DANGER! ROTATING AUGER

 # 50-0724 WARNING! HIGH PRESSURE FLUID

 # RDL3163 DANGER! ROTATING FAN

 # 50-0727 WARNING! FLYING OBJECTS

 # 50-0737 WARNING! PINCH POINT



 # RDL3131 - REFLECTIVE TAPE - RED

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

INSTALLATION

GENERAL INFORMATION

The following instructions will help you to mount your Hydraulic Snow Blower onto your prime mover. The snow blower uses the quick-attach system for ease of installation. Therefore, if you know how to attach your loader bucket, attaching the snow blower should prove no problem.

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).

INSTALLATION

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

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. Following the standard 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.
7. Attachment installation is complete, proceed to Control System Installation.

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.

INSTALLATION

CONTROL SYSTEM INSTALLATION

Prime mover in cab multi-function controls: Connect the electrical wire harness from the snow blower to the auxiliary electrical connector on the front of the prime mover.

If using the Paladin electrical control box:

1. Attach the control box to a location convenient for the operator to control the attachment without hindering operation of the prime mover. Use the magnet on the back of the control box to secure the control box with the toggle switches on top.

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.

2. Disconnect the positive & negative cables from the prime mover's battery.
3. Remove the nut from the positive cable clamp and slide the red (positive) wire ring terminal from the wiring harness over the cable clamp bolt. Secure the ring terminal with the nut.
4. Remove the nut from the negative cable clamp and slide the black (negative) wire ring terminal from the wiring harness over the cable clamp bolt.
5. Route & secure the wiring harness from the control box to the battery with nylon cable ties.

NOTICE! Route wires away from hot and/or moving parts to avoid wire damage.

6. Verify wiring is correct and reconnect the battery.
7. Feed the wiring harness cable from the control box to the rear of the prime mover, past the load arm's hinge point by following the hydraulic hoses where possible.
8. Continue routing down the loader arm, following the hydraulic hoses.
9. Secure the male connector to the hydraulic lines next to the quick couplers.
10. Straighten the cable and secure it to the hydraulic lines using nylon cable ties, working towards the rear.
11. Secure the cable to the prime mover below the hinge point and back to the control box.

INSTALLATION

NOTICE! Ensure there is sufficient slack in the cable to allow for a full range of motion of the loader arms.

12. Connect the female electrical connector from the attachment to the male connector on the prime mover.

DETACHING

1. 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.
2. Follow prime mover operator's manual to relieve pressure in the hydraulic lines.
3. Disconnect power and return hoses from the auxiliary hydraulics.
4. Disconnect the electrical wire harness from the auxiliary electrical connector or Paladin control box.
5. Follow your prime mover operator's manual for detaching (removing) an attachment.
6. 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

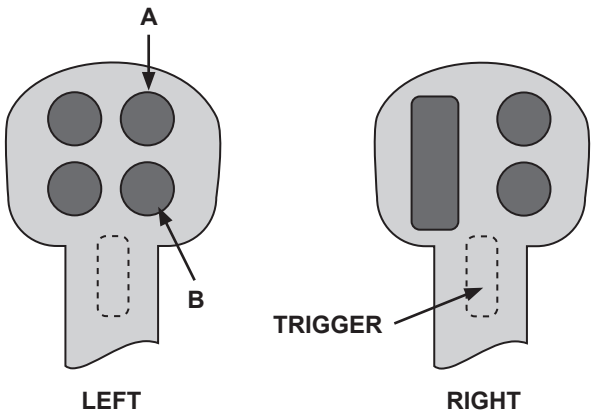
GENERAL INFORMATION

The deflector and chute position on the FFC Snow Blowers are operated with either a Paladin control box or an in-cab multi-function control handle.

PALADIN CONTROL BOX

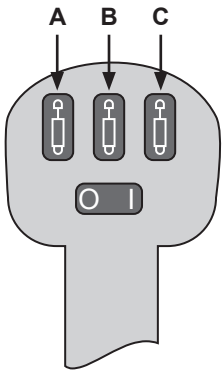
MULTI-FUNCTION CONTROL HANDLES

CATERPILLAR



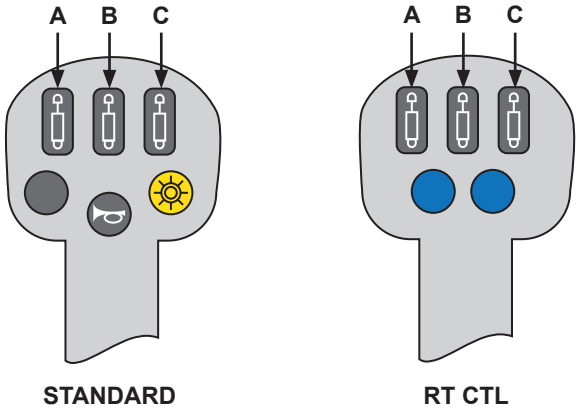
DEFLECTOR UP: BUTTON A
DEFLECTOR DOWN: BUTTON B
CHUTE ROTATION RIGHT: TRIGGER & BUTTON B
CHUTE ROTATION LEFT: TRIGGER & BUTTON A

CASE & NEW HOLLAND



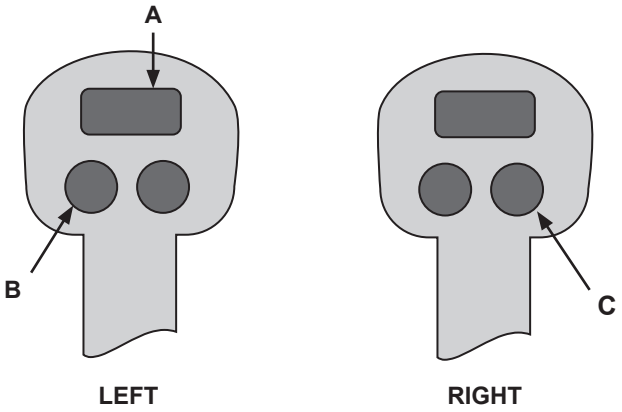
DEFLECTOR UP: SWITCH A UP
DEFLECTOR DOWN: SWITCH A DOWN
CHUTE ROTATION RIGHT: SWITCH C UP
CHUTE ROTATION LEFT: SWITCH C DOWN

GEHL



DEFLECTOR UP: SWITCH A UP
DEFLECTOR DOWN: SWITCH A DOWN
CHUTE ROTATION RIGHT: SWITCH B UP
CHUTE ROTATION LEFT: SWITCH B DOWN

KOMATSU



DEFLECTOR UP: SWITCH A RIGHT
DEFLECTOR DOWN: SWITCH A LEFT
CHUTE ROTATION RIGHT: BUTTON B
CHUTE ROTATION LEFT: BUTTON C

OPERATION

INTENDED USE

This Hydraulic Snow Blower has been designed and built to move loose snow. Use in any other way is considered contrary to the intended use. Compliance with and strict adherence to operation, service and repair conditions as specified by the manufacturer, are also essential elements of the intended use.

SKID SHOE ADJUSTMENT

Skid shoes are mounted on the back of both sides of the snow blower housing. They adjust up and down to regulate the distance between the cutting edge and the plowing surface. When removing snow from gravel or uneven surfaces it is recommended lowering the skid shoes to keep the cutting edge as high above the surface as possible to prevent possible damage to the unit. For smoother surfaces such as blacktop or concrete we recommend raising the skid shoes which will lower the cutting edge placing it closer to the surface.

After determining the surface beneath the snow, adjust the skid shoes.

NOTE: The skid shoes are shipped in the raised position for hard smooth surfaces such as concrete or asphalt. If the surface is soft or uneven, then you will need to lower the skid shoes.

1. Park your prime mover on a level surface with this product properly attached.
2. Place your prime mover's transmission in "Park" and apply the brakes.
3. Lower this product's cutting edge onto wood or steel blocking that is adequate to safely hold the base of the skid shoes 2.50" to 3" off of the level surface OR tilt the snow blower forward (keeping the loader arms locked to the attachment mounting plate), holding the skid shoes 2.50" to 3" off the ground.
4. Turn off your prime mover's engine, remove the key, wait for all moving parts to come to a stop. Follow prime mover operator's manual to relieve pressure in the hydraulic lines.
5. Remove the lynch pin that secures the skid shoe.
6. Adjust the positioning and/or quantity of the washers to raise or lower the skid shoe. Re-secure the skid shoe with the lynch pin at the desired height.
7. Repeat for the other skid shoe.

OPERATION

Try to remove snow as soon as possible after the snow falls; snow becomes more compact and difficult to throw the longer it lies on the ground. To maximize the snow moving capabilities, try to remove snow before the accumulation reaches 12". Snow removal conditions vary greatly from light fluffy snow to wet heavy snow. Operating instructions must be flexible enough to fit the conditions encountered. The operator must adapt to depth of snow, wind conditions, type of snow, temperature and surface conditions.

1. Remove all foreign objects, such as sleds, boards, and wire from the snow removal area.
2. Rotate the chute and adjust the deflector so thrown snow is directed into open areas.

NOTE: Never direct the discharge towards people, livestock or where property damage can occur. Keep children and all bystanders away from discharge area.

3. Adjust skid shoes according to the surface being cleared.
4. When blowing snow, approach the snow with the wind at the operator's back whenever possible.
5. Auger speed is directly related to engine speed. Start the prime mover and engage the auger. Increase engine speed and start forward travel.

NOTICE! Placing the loader arm hydraulics in the float position decreases the prime mover's capability to provide the desired hydraulic flow and pressure to your snow blower's motors. Snow throwing performance will therefore be reduced.

NOTICE! Holding the toggle switches in the powered position after the actuator has reached the end of that device's cycle of movement can result in damage to this product and will void all Paladin warranties.

NOTICE! Applying force on the deflector from any source, other than blown snow, causing the deflector to either compress or extend the deflector's actuator can result in damage to this product and will void all Paladin warranties.

NOTICE: using your snow blower as a "plow" can result in damage to this product and will void all Paladin warranties.

6. When clearing a large area, cut the first pass on the upwind side and work downwind.
7. If an excessive amount of snow is being pushed in front of the auger housing, ***SLOW DOWN!!*** Allow the auger and fan enough time to properly collect and throw the snow.

FOREIGN OBJECT IN AUGER

If a foreign object becomes wedged in the auger, the auxiliary hydraulics on the prime mover may be reversed to reverse the auger. Reversing the auger rotation may remove the obstruction.

FOREIGN OBJECT IN FAN

If a foreign object becomes wedged in the fan:

1. Move to a level surface, lower the attachment to the ground, apply the brakes, turn off the engine and remove the key. Relieve all pressure in the hydraulic lines.
2. Disconnect the hydraulic couplers from your prime mover and connect them together to prevent foreign material from entering the hydraulic system.
3. Using a wooden stick and not your hands, the fan can now be manual turned in a reverse direction, allowing the foreign object to be removed.
4. Once the fan is free, reconnect the hydraulic couplers.

OPERATING TIPS

- Discharge snow downwind whenever possible
- Allowing the snow blower to reach outside temperature before operating will help prevent snow from sticking to the snow blower. Applying a light coat of wax on the inside surfaces will also help.
- Remove stones, sticks and other foreign objects before they become hidden by the first snowfall will help to eliminate them from become wedged in the auger or fan.

OPERATION

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:

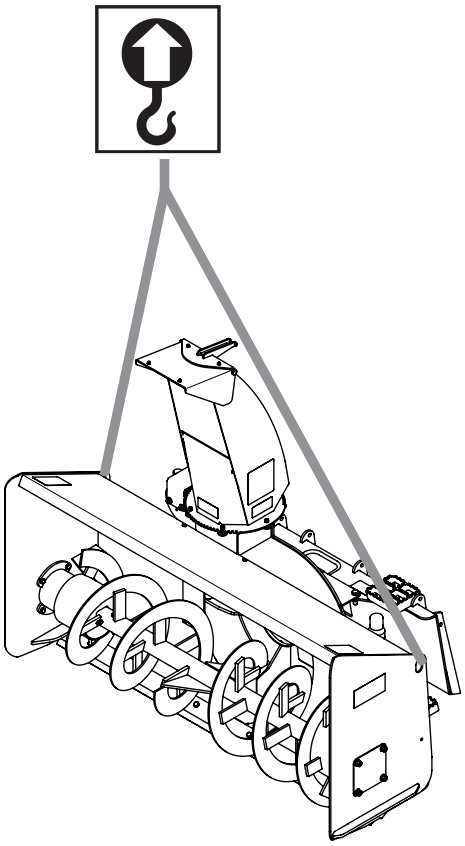
- Touch up all unpainted surfaces with paint to prevent rust.

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



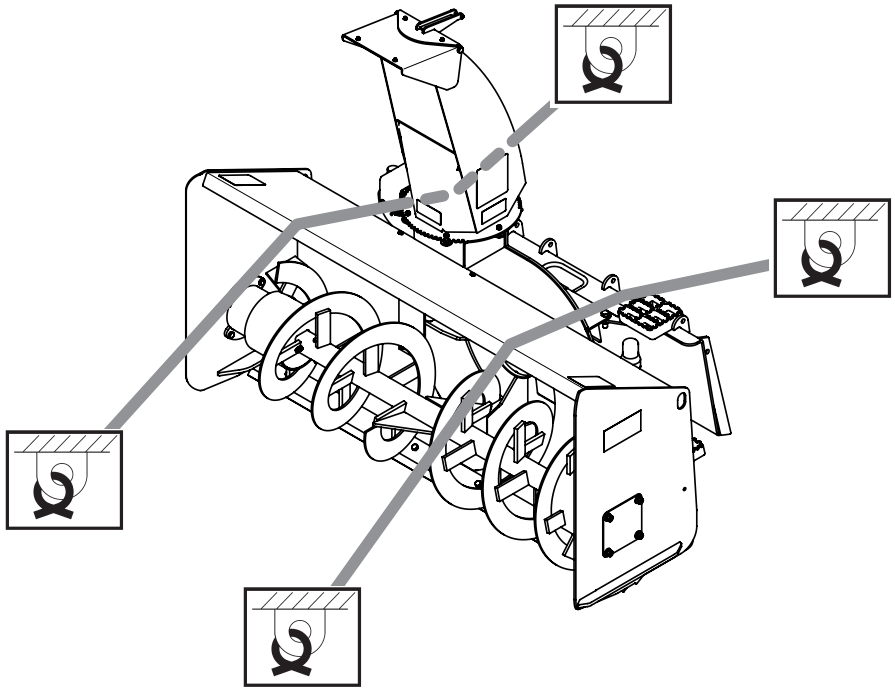
OPERATION

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

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

TIE DOWN POINTS

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



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

WARNING! Verify that all tie down accessories (chains, slings, ropes, shackles and etc.) are capable of maintaining attachment stability during transporting and are attached in such a way to prevent unintended disengagement or shifting of the unit. Failure to do so could result in serious personal injury or death.

TRANSPORTING

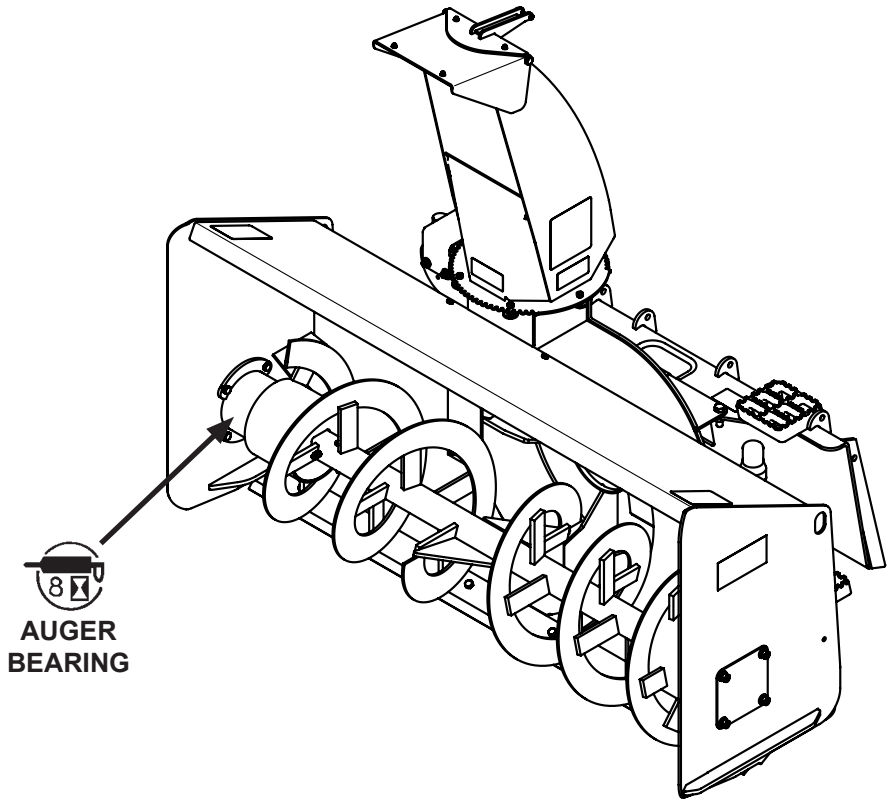
Follow all local government regulations that may apply along with recommended tie down points and any equipment safety precautions at the front of this handbook when transporting your attachment.

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 daily or every 8 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.

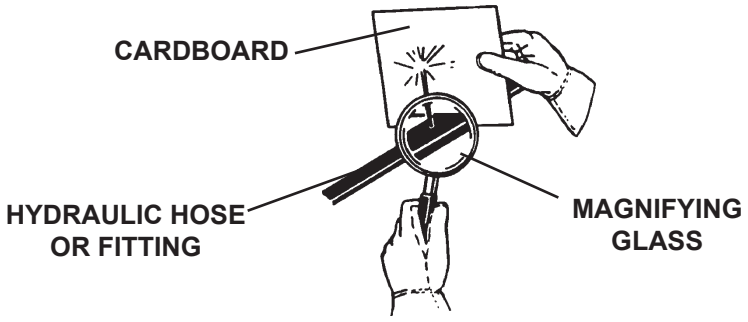
Procedure	Every 8 Hours (Daily)
Check prime mover hydraulic system to ensure an adequate level and cleanliness of hydraulic oil.	✔
Check for missing or loose hardware. Replace or tighten as necessary. See Bolt Torque Specifications	✔
Check hydraulic system for leaks and tighten as necessary. Check for 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 grease fittings.	✔
Lubricate & retract cylinder rods.	✔
Make sure chute and deflector are not frozen.	✔

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

REPLACING THE CUTTING EDGE

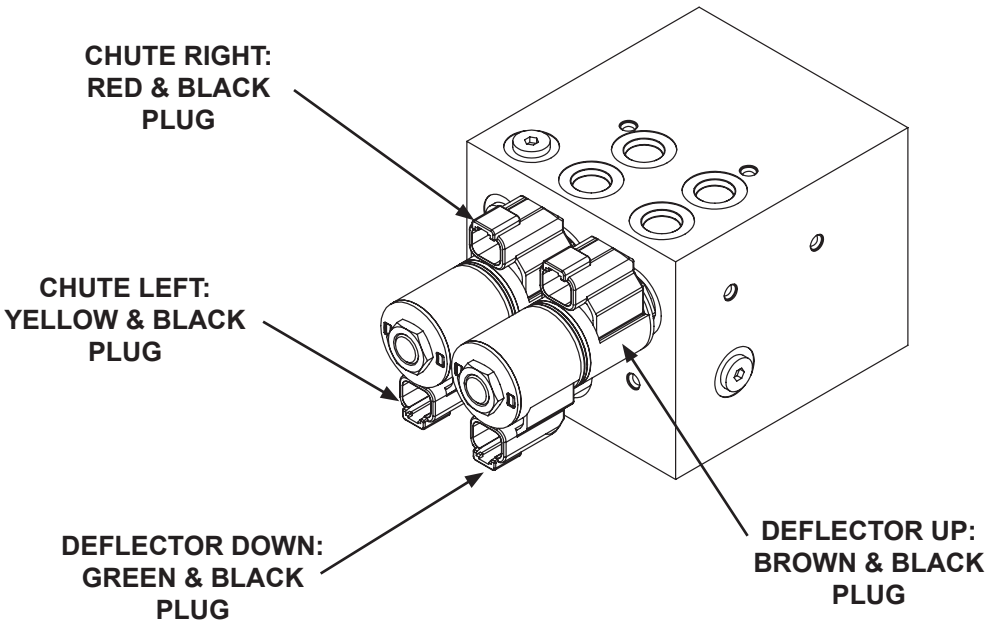
1. Park your prime mover on a level surface with this product properly attached.
2. Lower this product's skid shoes onto wood or steel blocking that is adequate to safely hold the base of the skid shoes 2.50" to 3" off the level surface.
4. Apply the parking brakes, turn off the engine and remove the key. Wait for all moving parts to come to a stop, and relieve all pressure in the hydraulic lines.
5. Remove all but the end nuts, lock washers, and bolts from the cutting edge.
6. On one end of the cutting edge, remove the remaining nut and lower the cutting edge to the work surface. Repeat for other end.
7. Properly dispose of the old cutting edge and install a new cutting edge by reversing the above procedure.

HYDRAULIC CONTROL VALVE

A multi-position switch (normally open) is used to operate the 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 control valve uses a small amount of hydraulic oil bypassed from the auger & fan drive motor circuits. The prime movers auxiliary hydraulic system must be connected and engaged to provide adjustment.

FIGURE #1



MAINTENANCE

CYLINDER SEAL REPLACEMENT

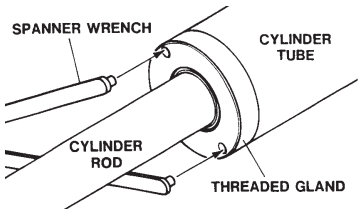
The following information is provided to assist you in the event you should need to repair or rebuild a hydraulic cylinder. When working on hydraulic cylinders, make sure that the work area and tools are clean and free of dirt to prevent contamination of the hydraulic system and damage to the hydraulic cylinders. Always protect the active part of the cylinder rod (the chrome section). Nicks or scratches on the surface of the rod could result in cylinder failure. Clean all parts thoroughly with a cleaning solvent before reassembly.

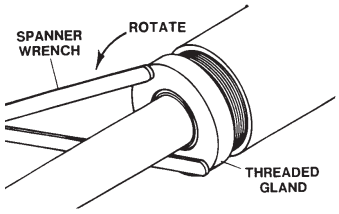
DISASSEMBLY PROCEDURE

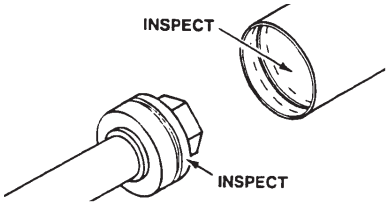
IMPORTANT: Do not contact the active surface of the cylinder rod with the vise. Damage to the rod could result.

THREADED TYPE GLAND

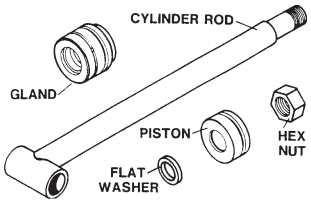
1. Rotate the gland with a spanner wrench counterclockwise until the gland is free of the cylinder tube.
2. Pull the cylinder rod from the cylinder tube and inspect the piston and the bore of the cylinder tube for deep scratches or galling. If damaged, the piston AND the cylinder tube must be replaced.

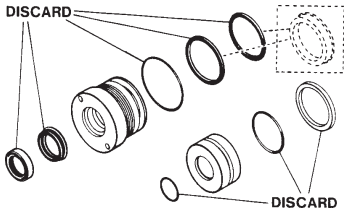






3. Remove the hex nut, piston, flat washer or spacer tube (if so equipped), and gland from the cylinder rod. If the cylinder rod is rusty, scratched, or bent, it must be replaced.
4. Remove and discard all the old seals.



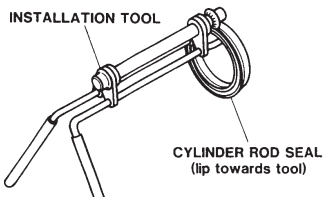


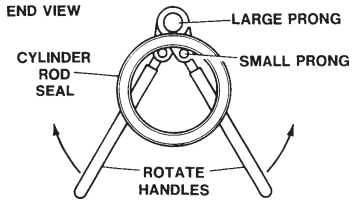
ASSEMBLY PROCEDURE

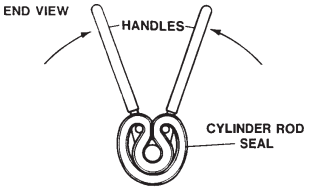
IMPORTANT: Replace all seals even if they do not appear to be damaged. Failure to replace all seals may result in premature cylinder failure. NOTE: Seal kits will service most cylinders of similar bore size and rod diameter.

1. Install the cylinder rod seal in the gland first. Be careful not to damage the seal in the process, as it is somewhat difficult to install.

NOTE: A special installation tool (Part #65349) is available to help with installing the seal. Simply fit the end of the tool over the seal so that the large prong of the tool is on the outside of the seal, and the two smaller prongs on the inside. The lip of the seal should be facing towards the tool. Rotate the handles on the tool around to wrap the seal around the end of the tool.

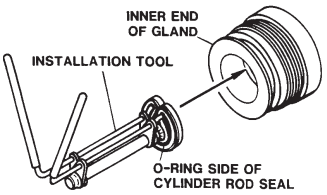






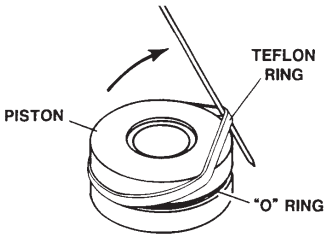
Rotate the handles on the tool around to wrap the seal around the end of the tool.

Now insert the seal into the gland from the inner end. Position the seal in its groove, and release and remove the tool. Press the seal into its seat the rest of the way by hand.



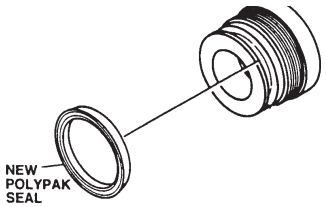
2. Install the new piston ring, rod wiper, O-rings and backup washers, if applicable, on the piston.

   Be careful not to damage the seals. Caution must be used when installing the piston ring. The ring must be stretched carefully over the piston with a smooth, round, pointed tool.



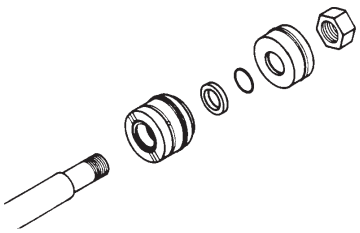
3. After installing the rod seal inside the gland, as shown in step #1, install the external seal.

NOTE: Threaded glands may have been equipped with a separate O-ring and backup washer system or a polypak (all in one) type seal. Current seal kits contain a polypak (all in one) type seal to replace the discarded seal types on ALL THREADED GLANDS.

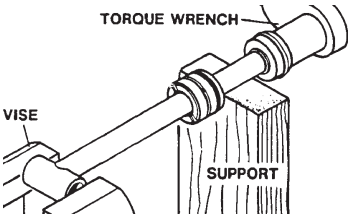


4. Slide the gland onto the cylinder rod, being careful not to damage the rod wiper. Then install the spacer, or flat washer (if so equipped), small o-ring, piston, and hex nut onto the end of the cylinder rod.

5. Secure the cylinder rod (mounting end) in a vise with a support at its center. Torque the nut to the amount shown for the thread diameter of the cylinder rod (see chart).



Thread Diameter	POUNDS - FEET
7/8"	150-200
*1"	230-325
1-1/8"	350-480
1-1/4"	490-670
1-3/8"	670-900
*** 1" Thread Diameter WITH 1.25" Rod Diameter Min. 230 ft. lbs. Max. 250 ft. lbs.**	



IMPORTANT: Do not contact the active surface of the cylinder rod with the vise. Damage to the rod could result.

6. Apply a lubricant (such as Lubriplate #105) to the piston and teflon ring. Insert the cylinder rod assembly into the cylinder tube.

IMPORTANT: Ensure that the piston ring fits squarely into the cylinder tube and piston groove, otherwise the ring may be damaged and a leak will occur.

7. Use a spanner wrench to rotate the gland clockwise into the cylinder. Continue to rotate the gland with the spanner wrench until it is tight.

WARNING! **Cylinders serviced in the field are to be tested for leakage prior to the attachment being placed in work. Failure to test rebuilt cylinders could result in damage to the cylinder and/or the attachment, cause severe personal injury or even death.**

TROUBLESHOOTING

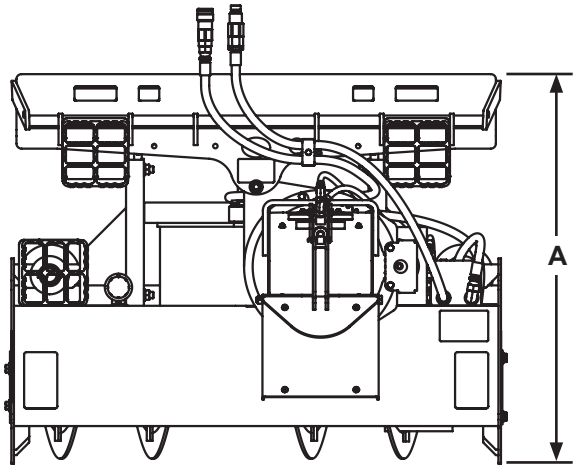
PROBLEM	POSSIBLE CAUSE	POSSIBLE SOLUTION
AUGER WILL NOT ROTATE	Hoses installed incorrectly.	Switch quick coupler fittings.
	Hydraulic valve on prime mover not engaged.	See prime mover operator's manual.
	Worn, damaged, insufficient or inadequate pump.	Repair or replace hydraulic pump.
	Insufficient oil in system.	See prime mover operator's manual.
	Hose ends not completely engaged.	Check hose couplings 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.
CHUTE WILL NOT ROTATE/ANGLE	Hydraulic valve on prime mover not engaged.	See prime mover operator's manual.
	Worn, damaged, insufficient or inadequate pump.	Repair or replace hydraulic pump.
	Insufficient oil in system.	See prime mover operator's manual.
	Hose ends not completely engaged.	Check hose couplings 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.
	Electrical failure.	See prime mover operator's manual.
OIL LEAKS	Worn or damaged seal.	Replace leaking seal.
	Loose or damaged hoses.	Replace damaged hoses and tighten loose hoses.
	Loose or damaged connections.	Replace damaged connectors and tighten loose fittings.

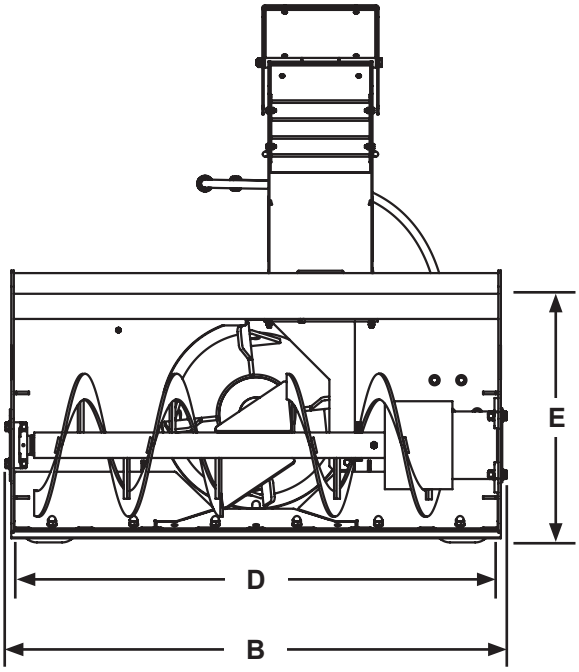
HOSE ROUTING - STANDARD FLOW MODELS

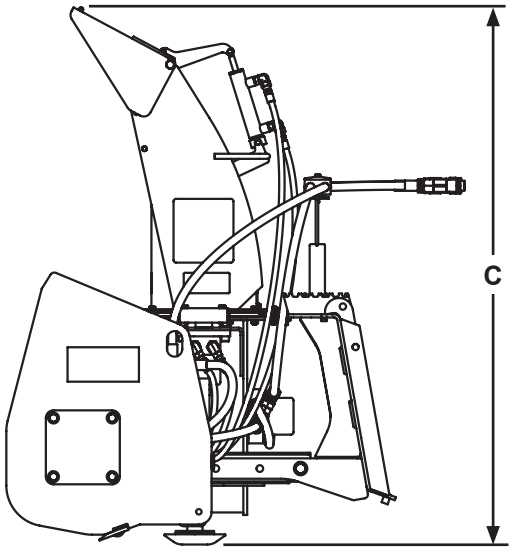
To make sure that the fan and auger motors' rotation is correct, the hose path must be:

- from the prime mover to the top port of the fan motor
- from the bottom port of the fan motor to the top port of the auger motor
- from the bottom port of the auger motor to the prime mover

SPECIFICATIONS





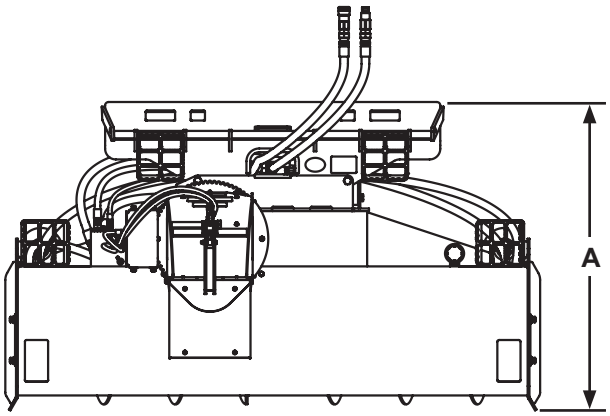


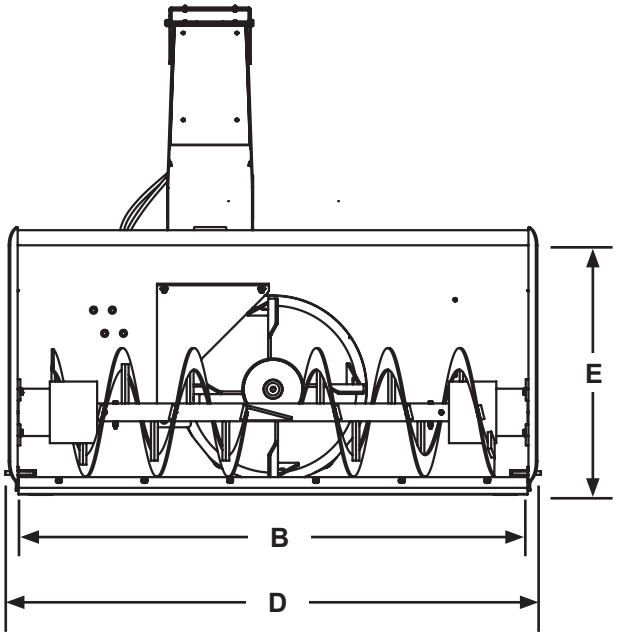
SPECIFICATIONS AND DESIGN ARE SUBJECT TO CHANGE WITHOUT NOTICE AND WITHOUT LIABILITY THEREFOR.

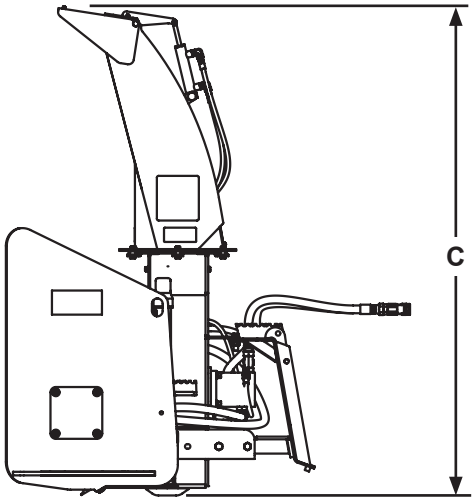
STANDARD FLOW SNOW BLOWERS					
DESCRIPTION	**48”**	**60”**	**72”**	**78”**	**84”**
A. Overall Length	38.23″	38.83″	40.35	41.41″	42.66″
B. Overall Width	49.10″	61.10″	73.10	79.10″	85.10″
C. Overall Height	57.00″	57.00″	57.00″	57.00″	57.00″
D. Cutting Width	48.00″	60.00″	72.00″	78.00″	84.00″
E. Cutting Height	25.00″	25.00″	25.00″	25.00″	25.00″
Weight (lbs)	745#	795#	845#	878#	895#
Motor Option	A	C – E	D – E	D – E	D – E

Hydraulic Pressure	2000-3000 PSI
Motor **A** Flow Range	8-13 gpm
Motor **C** Flow Range	12-16 gpm
Motor **D** Flow Range	14-21 gpm
Motor **E** Flow Range	18-27 gpm

SPECIFICATIONS







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

HIGH FLOW SNOW BLOWERS				
DESCRIPTION	**72”**	**78”**	**84”**	**96”**
A. Overall Length	45.39″	46.34″	47.56″	50.36″
B. Overall Width	75.00″	81.00″	87.00″	99.00″
C. Overall Height	74.00″	74.00″	74.00″	74.00″
D. Cutting Width	72.00″	78.00″	84.00″	96.00″
E. Cutting Height	36.00″	36.00″	36.00″	36.00″
Single Motor Weight (lbs)	1150#	1200#	1190#	N/A
Dual Motor Weight (lbs)	1160#	1200#	1240#	1320#
Motor Option	F – H	F – H	F – H	G – H

Hydraulic Pressure	2500-3500 PSI
Single Motor **F** Flow Range	22-34 gpm
Dual Motor **G** Flow Range	19-34 gpm
Dual Motor **H** Flow Range	30-42 gpm

BOLT TORQUE SPECIFICATION

GENERAL TORQUE SPECIFICATION TABLES

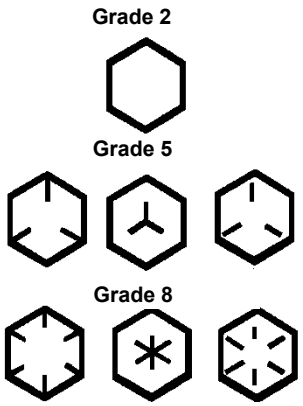
Use the following charts when determining bolt torque specifications, when special torques are not given. Always use grade 5 or better when replacing bolts.

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				SAE GRADE 8 TORQUE			
		Ft-lbs		Newton-Meter		Ft-lbs		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

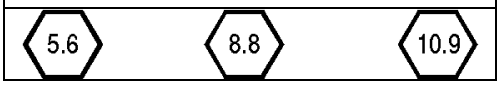
Bolt head identification marks as per grade.
NOTE: Manufacturing Marks Will Vary



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

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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/Manuals***. 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.

NOTE: 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***.