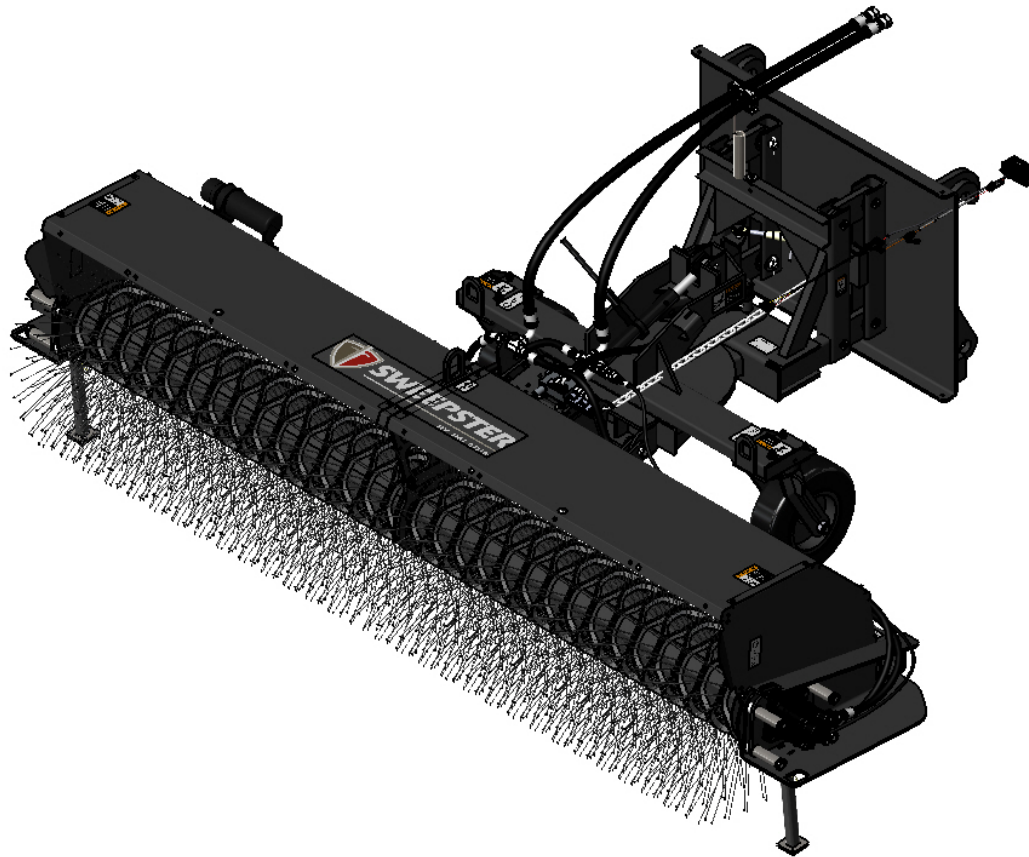




PALADIN™
POWERFUL ATTACHMENT TOOLS

OPERATOR'S HANDBOOK

WLA SERIES 213 Model



SERIAL NUMBER: _____

MODEL NUMBER: _____

Manual Number: 51-4005-X
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NOTES

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PREFACE

GENERAL INFORMATION

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

WARNING!



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

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

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

BEFORE OPERATION

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

SERVICE

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

SOUND AND VIBRATION

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

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

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

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

SAFETY STATEMENTS

DANGER!



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

WARNING!



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

CAUTION!



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

NOTICE!

NOTICE INDICATES A PROPERTY DAMAGE MESSAGE.



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

GENERAL SAFETY PRECAUTIONS

WARNING!



READ MANUAL PRIOR TO INSTALL

Improper installation, operation, or maintenance of this equipment could result in serious injury or death. Operators and maintenance personnel should read this manual as well as all manuals related to this equipment and the prime mover thoroughly before beginning installation, operation, or maintenance. **FOLLOW ALL SAFETY INSTRUCTIONS IN THIS MANUAL AND THE PRIME 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 assure it is tight. Make certain that all locking pins, latches, and connection devices are properly installed and secured. Remove and replace any damaged, fatigued or excessively worn parts. Make certain all safety decals are in place and are legible. Keep decals clean, and replace them if they become worn or hard to read.

WARNING!



PROTECT AGAINST FLYING DEBRIS

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

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.

GENERAL SAFETY PRECAUTIONS

WARNING!

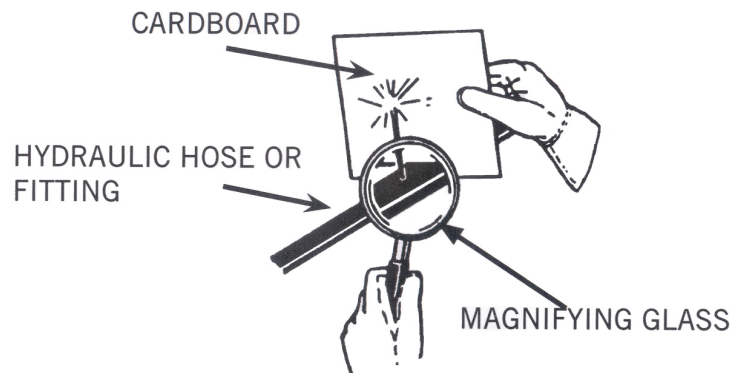


USE CARE WITH HYDRAULIC FLUID PRESSURE

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.



WARNING!



DO NOT MODIFY MACHINE OR ATTACHMENTS

Modifications may weaken the integrity of the attachment and may impair the function, safety, life and performance of the attachment. When making repairs, use only the manufacturer's genuine parts, following authorized instructions. Other parts may be substandard in fit and quality. Never modify any ROPS (Roll Over Protection System) 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 tool for the job at hand. Make sure they are in good condition for the task required.
- Wear the protective equipment specified by the tool manufacturer.

GENERAL SAFETY PRECAUTIONS

WARNING!



SAFELY OPERATE EQUIPMENT

- Do not operate equipment until you are completely trained by a qualified operator in how to use the controls, know its capabilities, dimensions, and all safety requirements. See your 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 operators position.
- Never leave equipment unattended with the engine running or with this attachment in a raise position.
- Do not alter or remove any safety feature from the prime mover or this attachment.
- Know your work site safety rules as well as traffic rules and flow. When in doubt on any safety issue, contact your supervisor or safety coordinator for an explanation.

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.

SAFETY SIGNS & LABELS

There are several specific signs on this sweeper. The exact location of hazards and description of hazards are reviewed.

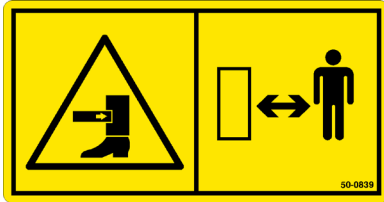
Placement or replacement of Safety Signs

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

Instructions

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

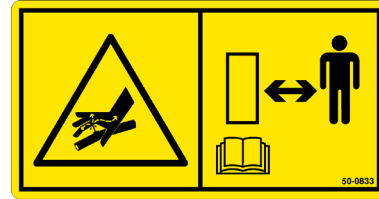
SAFETY SIGNS & LABELS



6. 50-0839

HAZARD: WARNING! PINCH POINT HAZARD.

AVOIDANCE: KEEP HAND SAFE DISTANCE AWAY FROM HAZARD. *Failure to heed this warning could result in serious injury or death.*



9. 50-0833

HAZARD: WARNING! HIGH PRESSURE FLUID HAZARD. ESCAPING HYDRAULIC FLUID CAN HAVE ENOUGH PRESSURE TO PENETRATE SKIN. Consult physician immediately if skin penetration occurs.

AVOIDANCE: KEEP SAFE DISTANCE AWAY FROM HAZARD. RELIEVE PRESSURE BEFORE DISCONNECTING LINES. DO NOT use hands to check for leaks. *Failure to heed this warning could result in serious injury or death.*



7. 50-0830

HAZARD: GENERAL WARNING.

AVOIDANCE: READ HANDBOOK - DO NOT OPERATE OR SERVICE UNLESS YOU HAVE READ AND UNDERSTAND THE INSTRUCTIONS AND SAFETY INFORMATION IN THE OPERATOR'S HANDBOOK AND ALL PRIME MOVER MANUALS. *Failure to follow the instructions or heed the warnings could result in serious injury or death.*



8. 50-0832

HAZARD: WARNING! HIGH PRESSURE FLUID HAZARD. ESCAPING HYDRAULIC FLUID CAN HAVE ENOUGH PRESSURE TO PENETRATE SKIN. Consult physician immediately if skin penetration occurs.

AVOIDANCE: KEEP SAFE DISTANCE AWAY FROM HAZARD. RELIEVE PRESSURE BEFORE DISCONNECTING LINES. DO NOT use hands to check for leaks. *Failure to heed this warning could result in serious injury or death.*

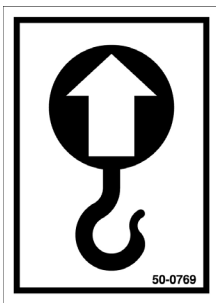
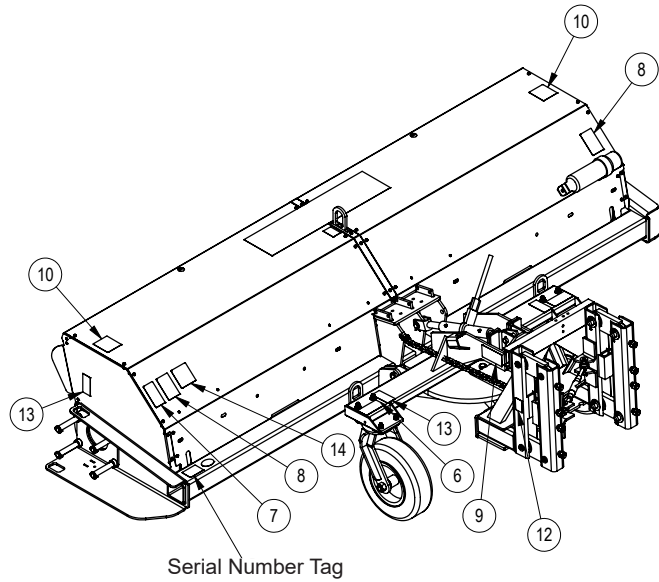


10. 50-0862

HAZARD: WARNING! FLYING OBJECTS HAZARD. HAZARD: WARNING! ENTANGLEMENT HAZARD

AVOIDANCE: KEEP SAFE DISTANCE AWAY FROM HAZARD. REMOVE ALL PEOPLE, ANIMALS AND PROPERTY THAT COULD BE INJURED OR DAMAGED BY FLYING DEBRIS FROM THE AREA. *Failure to heed this warning could result in serious injury or death.*

SAFETY SIGNS & LABELS



11. 50-0769

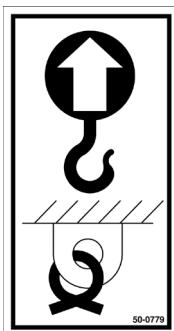
Lift Location



12. 50-0834

HAZARD: WARNING! CRUSH-HAND HAZARD

AVOIDANCE: Keep hand safe distance away from hazard. Failure to heed this warning could result in serious injury or death.



13. 50-0779

**Lift Location
& Tie Down**



14. 50-0897

HAZARD: WARNING! DUST INHALATION.

AVOIDANCE: READ HANDBOOK - DO NOT OPERATE UNTIL THE RECOMMENDED DUST SUPPRESSION, DUST COLLECTION OR PERSONAL PROTECTION EQUIPMENT PRECAUTIONS HAVE BEEN REVIEWED AND IMPLEMENTED. Failure to follow the instructions or heed the warnings could result in serious injury or death.

INSTALLATION & SET-UP

Sweeper Installation

WARNING!



Improper attachment of sweeper could result in injury or death. Do not operate this machine until you have positive indication that the attachment is securely mounted.

1. Position broom on level surface.
2. Enter prime mover.
3. Fasten safety restraints.
4. Start engine.
5. Disengage parking brake.
6. Align attachment mechanism with mounting on broom, attach to prime mover. Follow attaching procedure in the prime mover owners manual.
7. Engage parking brake and shut down prime mover. Be sure to relieve pressure to auxiliary hydraulic lines.
8. Unfasten safety restraints and exit prime mover.
9. Lock jack stands in stowed position. (if available)
10. Ensure that the hydraulic quick couplers are clean. Connect hydraulic lines for the broom to prime mover. Twist collar of the quick couplers one quarter turn to secure the hydraulic connections.
11. While loader arms are lowered, visually inspect attachment mechanism to ensure that it is securely mounted.
12. Enter prime mover, fasten safety restraints and start prime mover.
13. Carefully raise loader and cycle rollback/dump cylinders to check clearances that limiting stops make proper contact and verify that all mounting procedures have been successfully completed. Contact Paladin for instructions if the limiting stops do not contact properly.

OPERATION

Intended Use

This sweeper is designed solely for use in construction cleanup, road maintenance and similar operations. 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.

CAUTION!



A SWEEPER IS A DEMANDING MACHINE. Only fully trained operators or trainee operators under supervision of a fully trained person should use machine.

Before operating sweeper:

- Learn sweeper and prime mover controls in off-road location.
- Be sure you are in a safe area, away from traffic or other hazards.
- Check hardware holding sweeper to host machine, making sure it is tight.
- Replace damaged or fatigued hardware.
- Make sure hydraulic hardware and fittings are tight.
- Replace damaged or fatigued fittings or hoses.
- Check tire pressures.
- Check tire ratings to be sure they match the prime mover load. Weigh sweeper end of prime mover to insure proper tire rating.
- Remove all property that could be damaged by flying debris from sweeping area.
- Be sure all persons not operating the sweeper are clear of sweeper discharge area.
- Always wear proper apparel, long sleeved shirt buttoned at cuffs; safety glasses, goggles or face shield; ear protection; and dust mask.

While operating sweeper:

- When operating sweeper, adhere to all government rules, local laws and other professional guidelines for your sweeping application.
- Before leaving operators area for any reason, lower sweeper to ground. Stop prime mover engine, set brakes, remove key from ignition.
- Minimize flying debris - use slowest rotating speed that will do the job.

OPERATION

- Keep hands, feet, hair and other loose clothing away from all moving parts.
- Leave brush hood (shield) and all other shields and safety equipment in place when operating sweeper and primer mover.
- Be aware of extra weight and width a sweeper adds. Reduce travel speed accordingly.
- When sweeping on rough terrain, reduce speed to avoid “bouncing” the sweeper. Loss of steering can result.
- Never sweep toward people, buildings, vehicles or other objects that can be damaged by flying debris.
- Only operate sweeper while you are in the seat of the prime mover. Seat belt must be fastened while you operate prime mover. Only operate controls while the engine is running. Protective glasses must be worn while you operate prime mover and while you operate sweeper.
- Operate sweeper slowly in open area, check for proper operation of all controls and all protective devices. Note any repairs needed. Report any needed repairs.

Before Each Use

Perform daily maintenance as indicated in Maintenance Schedule.

Run prime mover and sweeper at low idle. Check for hydraulic leaks or other problems, make corrections, if necessary, before using sweeper.

WARNING!



AVOID SERIOUS INJURY. Check for large objects that could harm operator or others if thrown by sweeper. Remove items before operating.

During Use

Carry sweeper low to ground so operator has good visibility and stability. Avoid sudden movements from one side to the other side when you carry a sweeper.

Avoid excessive downward pressure on brush sections to prevent excessive wear. A 2 to 4 inch (5-10 cm) wide pattern is sufficient for most applications. Ensure that motor and bearing plates are equally adjusted to prevent uneven wear pattern.

OPERATION

Directing Debris

NOTICE! *Avoid sweeper damage. DO not ram into piles.*

Brush, Engine & Travel Speeds

Vary brush, engine and travel speeds to match sweeping conditions.

Large Areas

When sweeping a large area, as a parking lot, make a path down the middle and sweep to both sides. This reduces the amount of debris that the sweeper must sweep to one side.

Snow

Fast brush speeds and slow travel speeds are needed to sweep snow effectively. Start at 3/4 throttle and lowest gear of prime mover. For wet and/or deep snow, increase to almost full throttle. This helps keep snow from packing up inside brush hood.

In deep snow you may need to make multiple passes to get down to a clean surface.

To keep snow from blowing back onto a swept area, always sweep so the wind is at your back.

Dirt & Gravel

To keep dust at a minimum, use optional dust suppression kit or plan sweeping for overcast and humid days or after it has rained. Sweep so the wind blows at your back.

Low brush speeds and moderate travel speeds are best for cleaning debris from hard surfaces. Brush speeds that are too fast tend to raise dust because of the aggressive sweeper action.

To sweep gravel, use just enough brush speed to “roll” the gravel, not throw it.

Heavy Debris

Travel slowly - 2-3 mph. (3-5 kph)

Sweep a path less than the full width of the sweeper.

Increase engine speed if debris becomes very heavy.

OPERATION

Sweeping

To sweep:

1. Manual angle only - Swing brush head assembly the direction that you want to direct debris.
2. Start prime mover at idle and raise brush.
3. Hydraulic angle only - Swing brush head assembly the direction that you want to direct debris.
4. Engage brush and lower to ground.
5. Increase prime mover engine rpm to sweeping speed.
6. Travel forward at 5 mph (8 kph) or less.

Aligning Mounting

The mounting incorporates a four-bar linkage system that allows the sweeper to move up and down independently of the loader arms. This feature is very important because it permits the sweeper to follow the contours of the ground, offering a good sweep.

NOTICE! ***Adjust the four-bar linkage before each operation to avoid sweeper damage.***

Sweeping with a properly adjusted mounting offers efficient performance, while using the mounting out of adjustment can cause severe damage to the sweeper and can result in a poor sweep. If the U-channels on the loader arms are positioned too low, the sweeper must support the loader arms, an amount of weight far greater than the sweeper is designed to carry. If the U-channels on the loader arms are too high, the sweeper cannot sweep into the low areas.

To adjust the mounting:

1. Drive the loader and sweeper to a flat surface.
2. Lower the sweeper so the casters sit on the ground.
3. Adjust the loader arms so the tops of the U-channels on the sweeper and the tops of the U-channels on the loader arms are even (figure 1).
4. Adjust the brush height according to Setting Brush Pattern.

OPERATION

Leveling

Level sweeper for even brush wear and effective use.

CAUTION!



Avoid injury. Before adjusting sweeper, always turn off sweeper and prime mover engine and remove the key.

1. Move sweeper to a flat, paved surface.
2. Lower brush head assembly so brush is 2 inches (51 mm) above the ground.
3. Engage parking brake and shut down prime mover. Be sure to relieve pressure to auxiliary hydraulic lines.
4. Unfasten safety restraints and exit prime mover.
5. Check if swing assembly is level by using a bubble level. To make corrections: Adjust tilt cylinders. If front of swing assembly is high, extend tilt cylinders. If low, retract cylinders.
6. Position brush head assembly straight ahead. On each side, measure from brush frame to ground (figure 2). If measurements are not equal:

Loosen hardware that attaches swing assembly to brush head assembly; lower the high side of brush head until both sides are an equal distance above ground. Tighten hardware. (figure 3)

Align top edges of U-channels

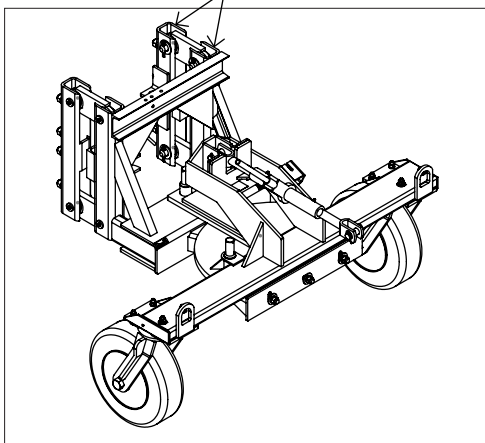


figure 1

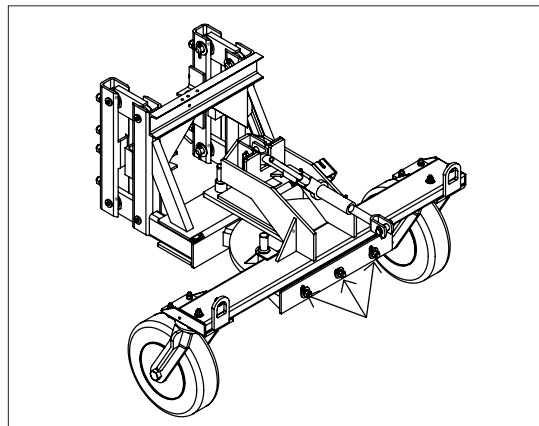


figure 3

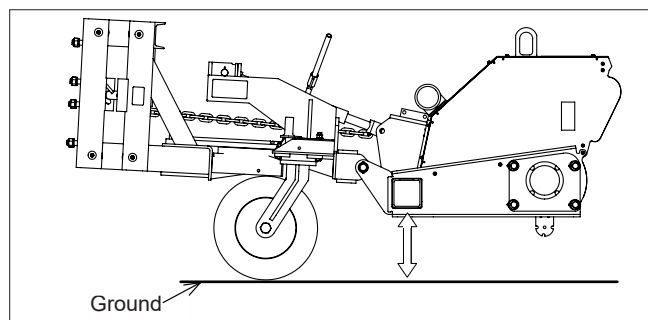


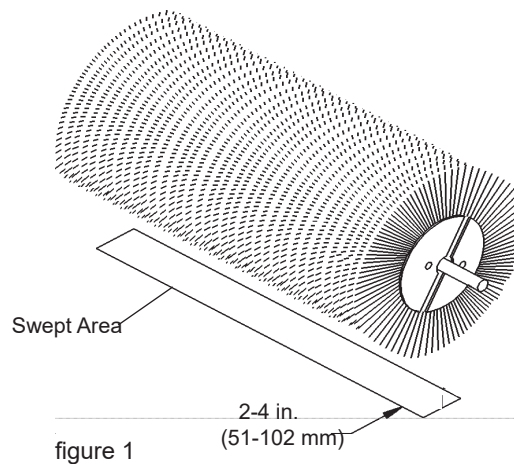
figure 2

OPERATION

Setting Brush Pattern

A properly adjusted brush offers best sweeper performance. To check brush pattern:

1. Move sweeper to a dusty, flat surface.
2. Set prime mover's parking brake and leave engine running.
3. Start sweeper at a slow speed: lower it so bristle tips touch ground. Run sweeper in a stationary position for 10 seconds.
4. Raise sweeper and back away; switch off engine and remove key. The brush pattern left in dust should be 2-4 inches (51-102 mm) wide, running the length of brush. (Compare swept area with figure 1.)
5. Adjust brush pattern as necessary according to instructions found in adjusting Spring-Chain Assembly.



OPERATION

Storage

NOTICE! *Do not store the sweeper with weight on the brush. Weight will deform the bristles, destroying the sweeping effectiveness. To avoid this problem, place the sweeper on blocks or use storage stands.*

Do not store polypropylene brushes in direct sunlight. The material can deteriorate and crumble before the bristles are worn out.

Keep polypropylene brush material away from intense heat or flame.

General Storage:

Storage:

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

Additional Precautions for Long Term Storage:

- Touch up all unpainted surfaces with paint to avoid rust.
- Inflate tires to recommended tire pressure.
- Fill fuel tank and hydraulic oil tank to maximum.
- Check antifreeze properties and drain fluids as appropriate.

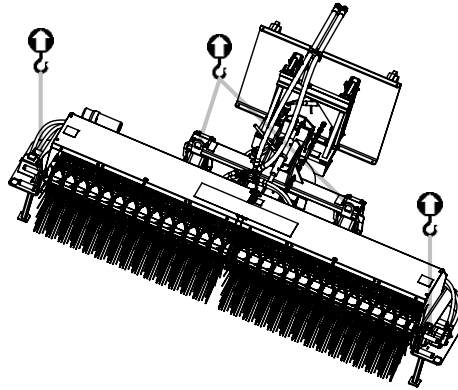
Removal from Storage:

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

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.

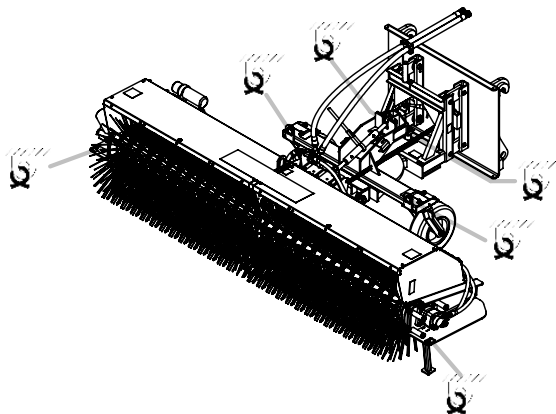
WARNING!



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.

MAINTENANCE

CAUTION!



DO NOT MODIFY THE SWEEPER IN ANY WAY. Personal injury could result. If you have questions, contact your dealer or Paladin.

Repair or adjust sweeper in safe area, away from traffic and hazards.

Before adjusting or servicing sweeper, lower sweeper to ground, stop prime mover engine, set brakes and remove key from ignition.

When working on or around sweeper, lower it to ground or secure with transport chains or cylinder-stop locks.

Stop prime mover engine and cycle control levers to release hydraulic pressure before servicing or adjusting sweeper hydraulic systems.

WARNING!



ESCAPING HYDRAULIC FLUID can have enough pressure to penetrate skin, causing serious personal injury.

Do not bend high pressure lines. Do not strike high pressure lines. Do not install bent lines, bent tubes, or kinked hoses. Do not install damaged lines, tubes, or hoses.

Repair damaged or loose lines, tubes and hoses. Leaks can cause fires. See your Paladin dealer for repair or replacement parts.

Replace parts if following conditions are present:

- End fittings are damaged or leaking.
- Outer covering is chafed or cut.
- Reinforcing wire layer is exposed.
- Outer covering is ballooning locally.
- Hose is kinked or crushed.
- Hose has been pulled or stretched.

Make sure all clamps, guards, and shields are installed correctly.

MAINTENANCE

Removing the Sweeper

WARNING!



Serious injury or death may result from disengaging the sweeper when the sweeper is in an unstable position or carrying a load. Place the sweeper in a stable position before disengaging.

NOTICE!

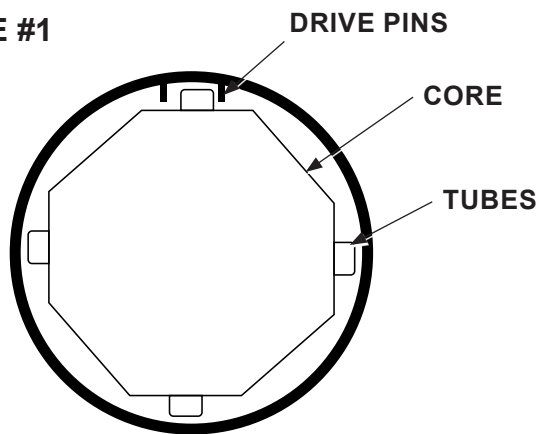
Hoses for the sweepers must be removed before quick attach is disengaged. Pulling sweeper with hoses could result in damage to prime mover or sweeper.

1. Lower broom to ground.
2. Engage parking brake and shut down prime mover. Be sure to relieve pressure to auxiliary hydraulic lines.
3. Unfasten safety restraints and exit prime mover.
4. Lock jack stands in lowered position. (if available)
5. Disconnect broom hydraulic lines from prime mover. Connect quick couplers together to keep clean.
6. Disengage attachment locking mechanism. (mechanical type)
7. Enter prime mover, fasten safety restraints and start prime mover.
8. Disengage attachment mechanism. (hydraulic type)
9. Disengage parking brake, and back away from broom.

MAINTENANCE

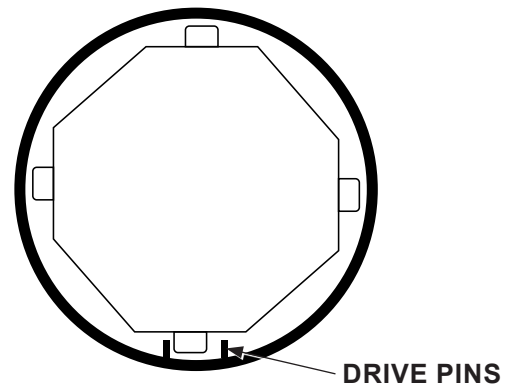
1. Remove lynch pins and bushings. Retain hardware for reinstallation. Remove motor.
2. Remove core from brush head assembly.
3. Remove lynch pins, bushings and motor from the other side of brush head.
4. Remove idler bearing shaft mounting plate, retaining hardware.
5. Remove second core from brush head assembly.
6. Remove old sections.
7. Install new sections by doing the following:
 - a. Slide the first section onto the core with the drive pins on each side of a tube. Make sure that the drive pins angle up. (figure 1)
 - b. Install a second section with drive pins rotated 180° from those on the first section. (figure 2)
 - c. Continue installing sections, rotating each section 180° until the core is full.
8. Re-attach the section retainer with previously removed hardware.
9. Lay cores on ground. Lower frame over cores.
10. Re-attach idler bearing mounting plate with previously removed hardware.
11. Re-attach motors with lynch pins and bushings.

FIGURE #1



FIRST SECTION

figure 2



SECOND SECTION

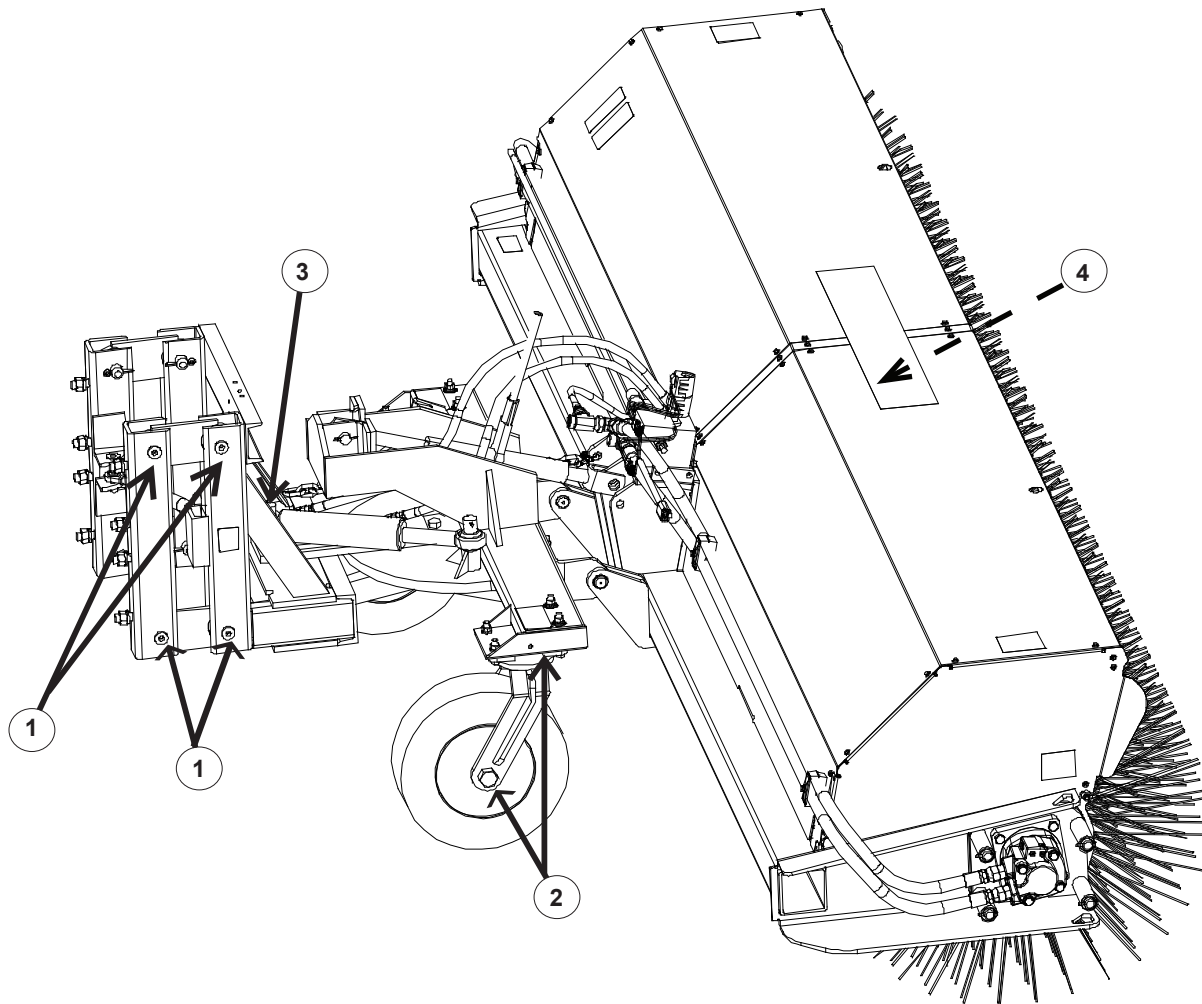
Worn Section Standard				Reference Information	
Section OD, New	Ring ID	Section OD, Worn	Exposed Bristle, Worn	Bristle Length	Exposed Bristle, New
24	6.38	17	3.8	8.50	7.5
26	8.00	18	4.0	9.00	8.0
32	10.00	22	5.0	11.00	10.0
36	10.00	24	6.0	13.00	12.0
36	10.63	25	6.0	12.69	11.4
46	19.38	34	6.0	13.31	12.1

MAINTENANCE

Lubrication Points

The following grease fittings should be greased before each use. See figure for locations.

1. Parallel Link Pins (8 fittings)
2. Caster Assembly (2 fittings)
3. Hydraulic Angle Cylinder (1 fitting)
4. Center Bearing, Between Cores (1 fitting)



MAINTENANCE

Procedure	Before Each Use	After Each Use	Every 100 Hours	Every 500 Hours	See Prime Mover Manual
Brush Head Assembly - Level	✓				
Brush Pattern - Check (See Pattern Adjustment)	✓				
Cylinders - Retract rods		✓			
- Grease threaded and ball ends to prevent rust.		✓			
Filter, Air, Prime Mover - Clean					✓
Fittings/Hoses, Hydraulic - Check for leaks/Tighten Check for damage	✓				
Fittings, Zerk - Grease (See lubrication points)	✓				
Oil, Hydraulic - Check level	✓				
Hardware - Check for tightness	✓				

Oil Cleanliness Requirements

NOTICE! *All hydraulic fluid shall be filtered before use in any Paladin product to obtain the ISO cleanliness standard of 4406:20/18/13 or better, unless explicitly specified otherwise.*

TROUBLESHOOTING

Brush Head Assembly

Problem	Possible Cause	Possible Solution
Brush rotates in wrong direction	Hoses installed incorrectly	Switch hoses at brush head tubes
Brush slows or stops when sweeping	Brush pattern too wide	Adjust brush pattern to 2-4 inches (5-10cm) wide: see: Adjusting Brush Pattern
	Travel speed too fast	Travel no more than 5 mph (8 kph) while sweeping (2-3 mph recommended)
	Trying to sweep too much material at once	Make several passes with sweeper
	Relief pressure set too low	Set relief pressure to 2000 psi (138.0 bars)
	Filter plugging	Change or clean hydraulic oil filter
Brush head assembly “bounces” during sweeping	Travel speed too fast and/or brush speed too slow	Find correct combination of ground and brush speeds: do not travel at more than 5 mph (8 kph)
Brush wears into cone shape	Sweeper is not level	Level sweeper before each use: see: Leveling
	Tires on prime mover at different pressures or are different sizes	Check tire sizes and rating: make corrections as necessary
Brush wears very quickly	Brush pattern too wide	Adjust brush pattern to 2-4 inches (5-10cm) wide: see: Setting Brush Pattern

TROUBLESHOOTING

Hydraulic Cylinders - Lift & Swing

Problem	Possible Cause	Possible Solution
Hydraulic cylinder neither extends nor retracts	No power from controls because wires are broken or disconnected	Reconnect wires if disconnected; replace wires if broken
	No power from controls because switch is broken	Replace switch
	Hydraulic oil level too low	Fill tank to 2-4 inches (51-102mm) from top of tank with ISO VG-46 oil
	Hoses or fittings loose or disconnected	Tighten hoses and fittings
	Restriction in hoses	Remove bends in hoses, remove obstructions inside hoses
Hydraulic cylinder only extends or only retracts	Dirt or debris in spools	Contact Paladin Technical Service

TROUBLESHOOTING

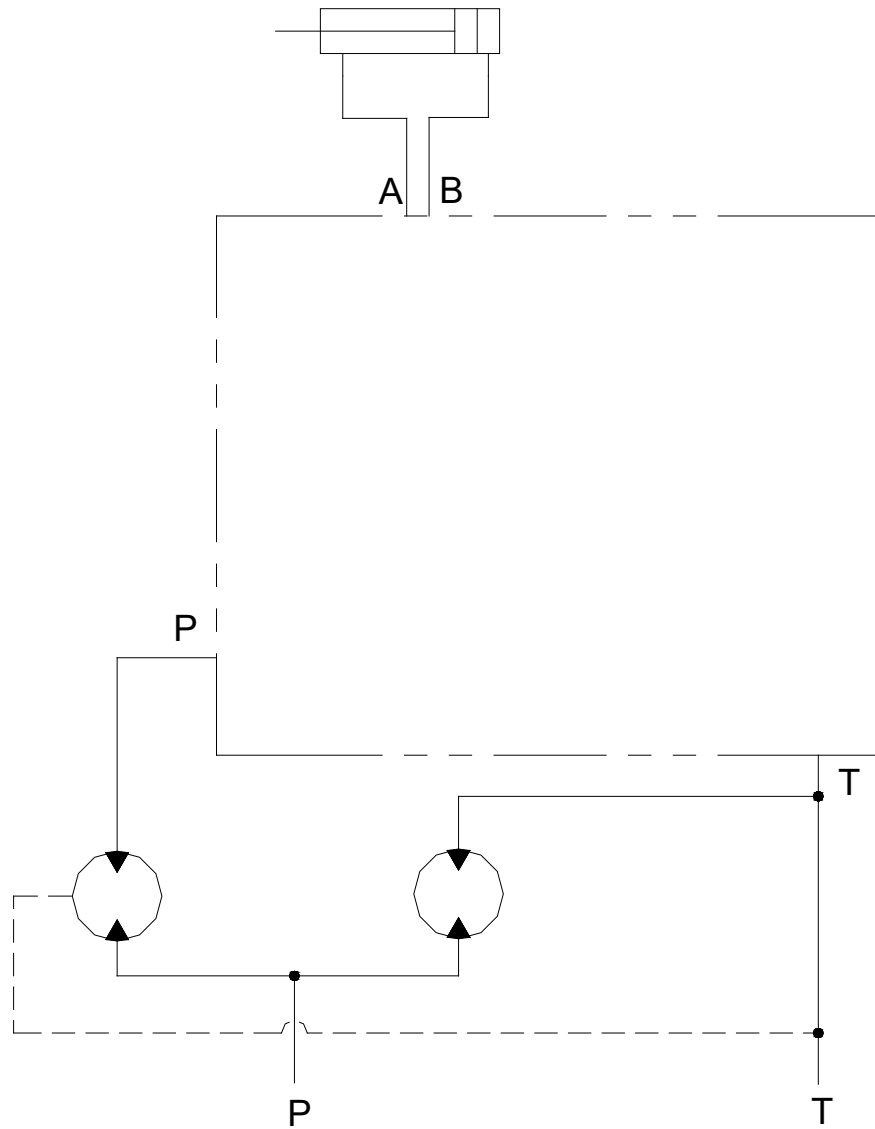
Hydraulic System

Problem	Possible Cause	Possible Solution
Hydraulic system overheats	Hydraulic oil level too low	Add hydraulic oil to tank until it comes to 2 inches (51mm) from top
	Restriction in hoses	Remove bends in hoses; remove obstructions inside hoses / Replace Hose
	Host pump flow rate exceeds maximum rate of broom	Contact host manufacturer for proper flow control method
Hydraulic motor seals leak	Back pressure exceeds 1000 psi	Contact Paladin
	Motor is failing	High number of hours on motor; Contact dealer to rebuild or replace

TROUBLESHOOTING

Hydraulic Schematic

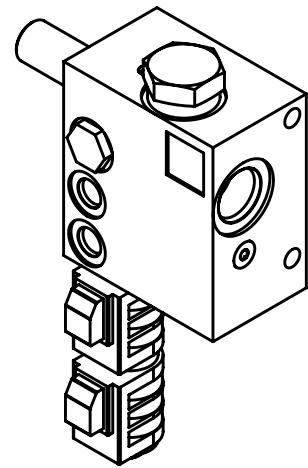
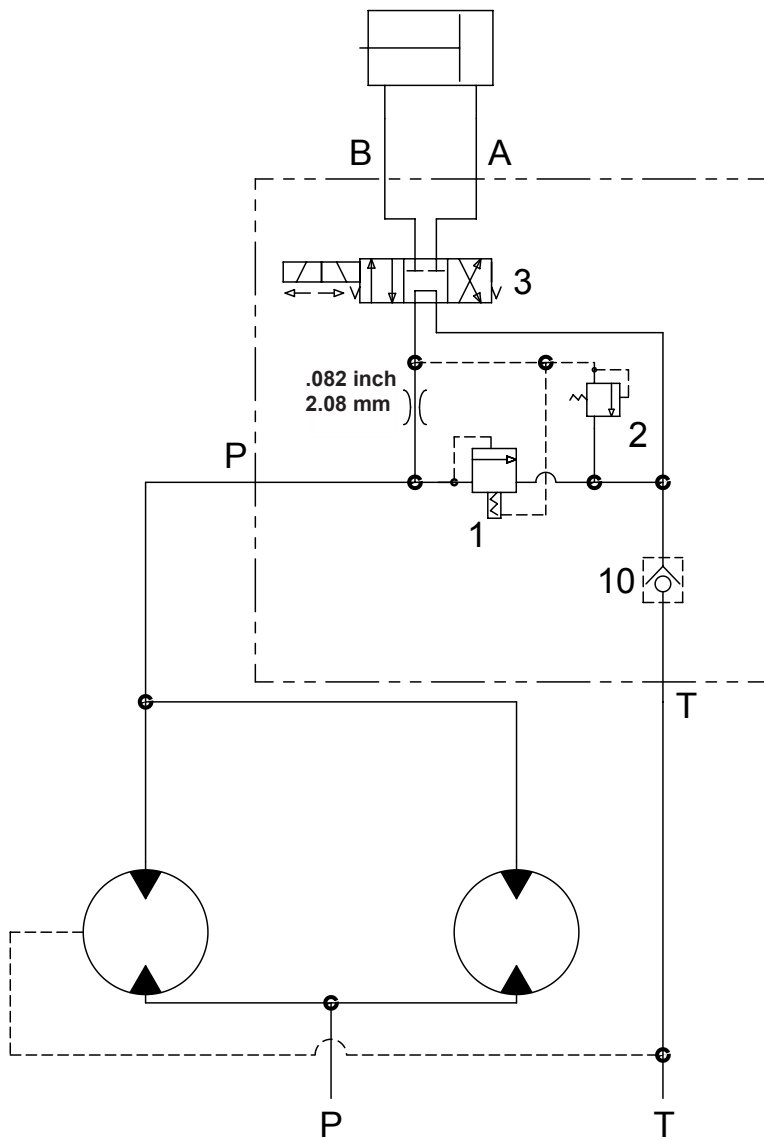
03-5215
12 Volt Manifold



TROUBLESHOOTING

Hydraulic Schematic

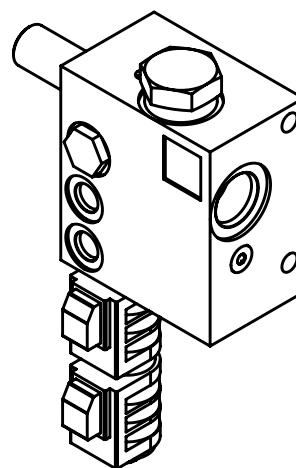
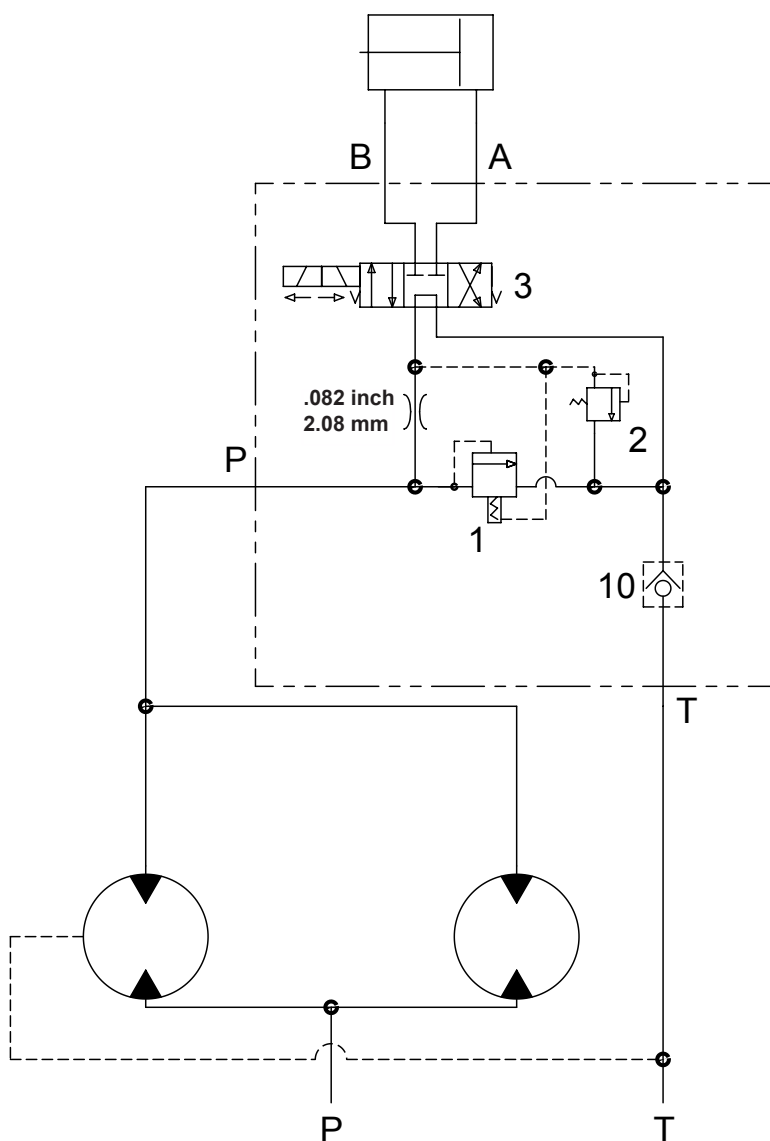
03-5835
12 Volt Manifold



TROUBLESHOOTING

Hydraulic Schematic

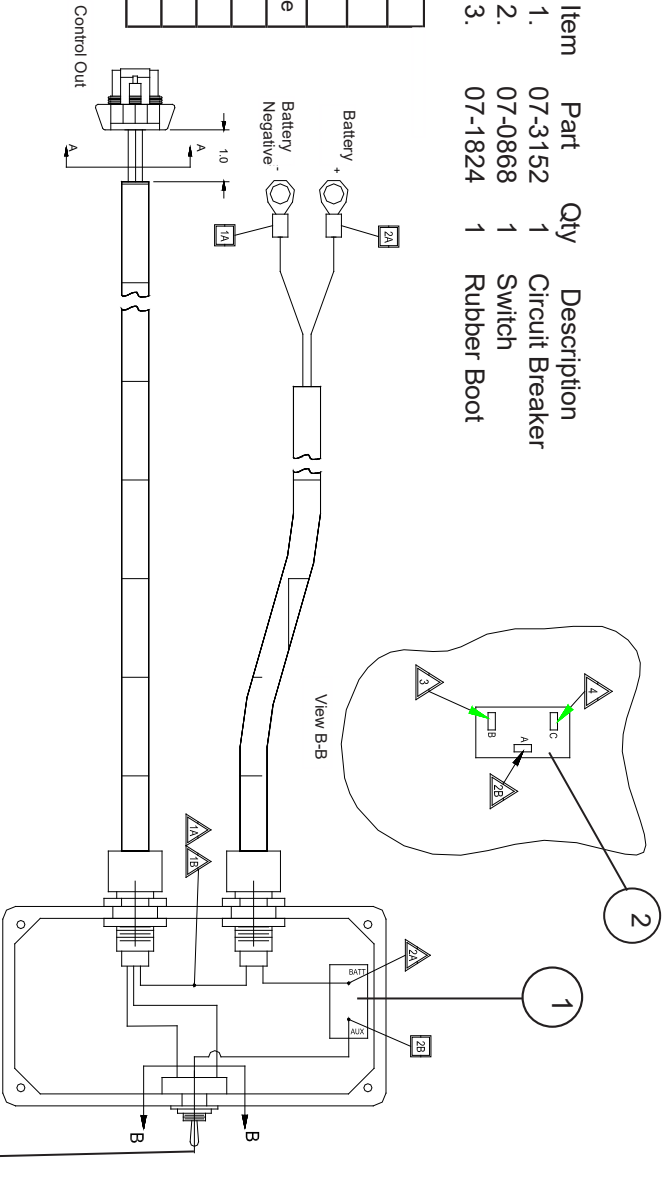
03-5836
24 Volt Manifold



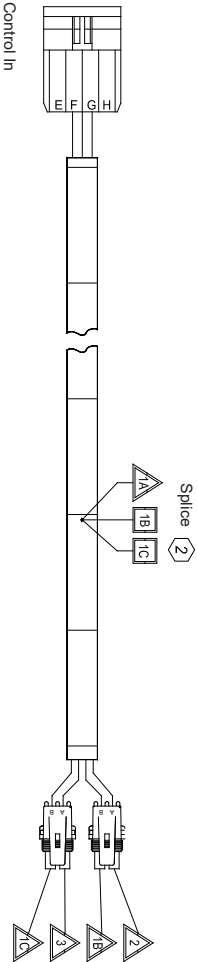
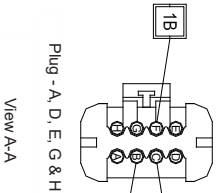
TROUBLESHOOTING

- | Item | Part | Qty | Description |
|------|---------|-----|-----------------|
| 1. | 07-3152 | 1 | Circuit Breaker |
| 2. | 07-0868 | 1 | Switch |
| 3. | 07-1824 | 1 | Rubber Boot |

LAF9441 Wire Harness			
	Identification	Application	
		From	To
1A	16	Black	Packard Pin F
1B	16	Black	Ultra Sonic Splice
1C	16	Black	Ultra Sonic Splice
2	16	Red	Packard Pin B
3	16	Yellow	Packard Pin C



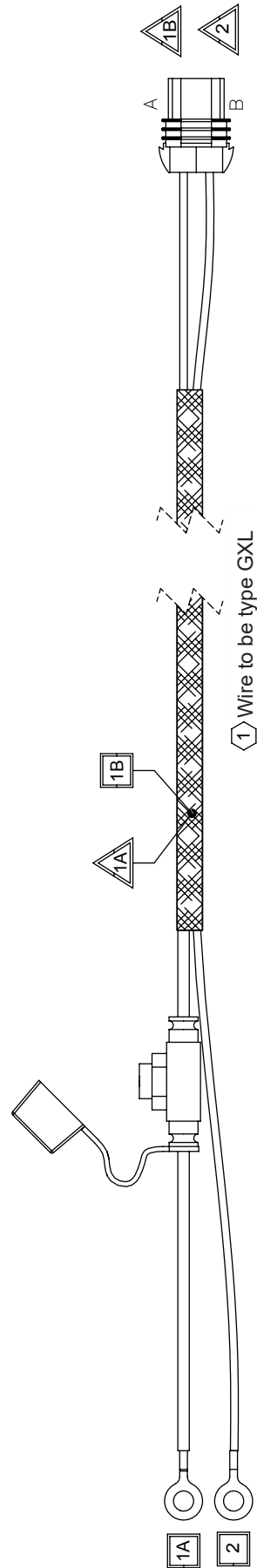
LAF9444 Wire Harness			
	Identification	Application	
		From	To
1A	16	Black	Battery-12V
1B	16	Black	Packard Conn Pin F
2A	16	Red	Battery +
2B	16	Red	Circuit Breaker 10A-Aux
3	16	Red	Packard Conn Pin B-Depth
4	16	Yellow	Packard Conn Pin C-Tilt



Wiring Harness

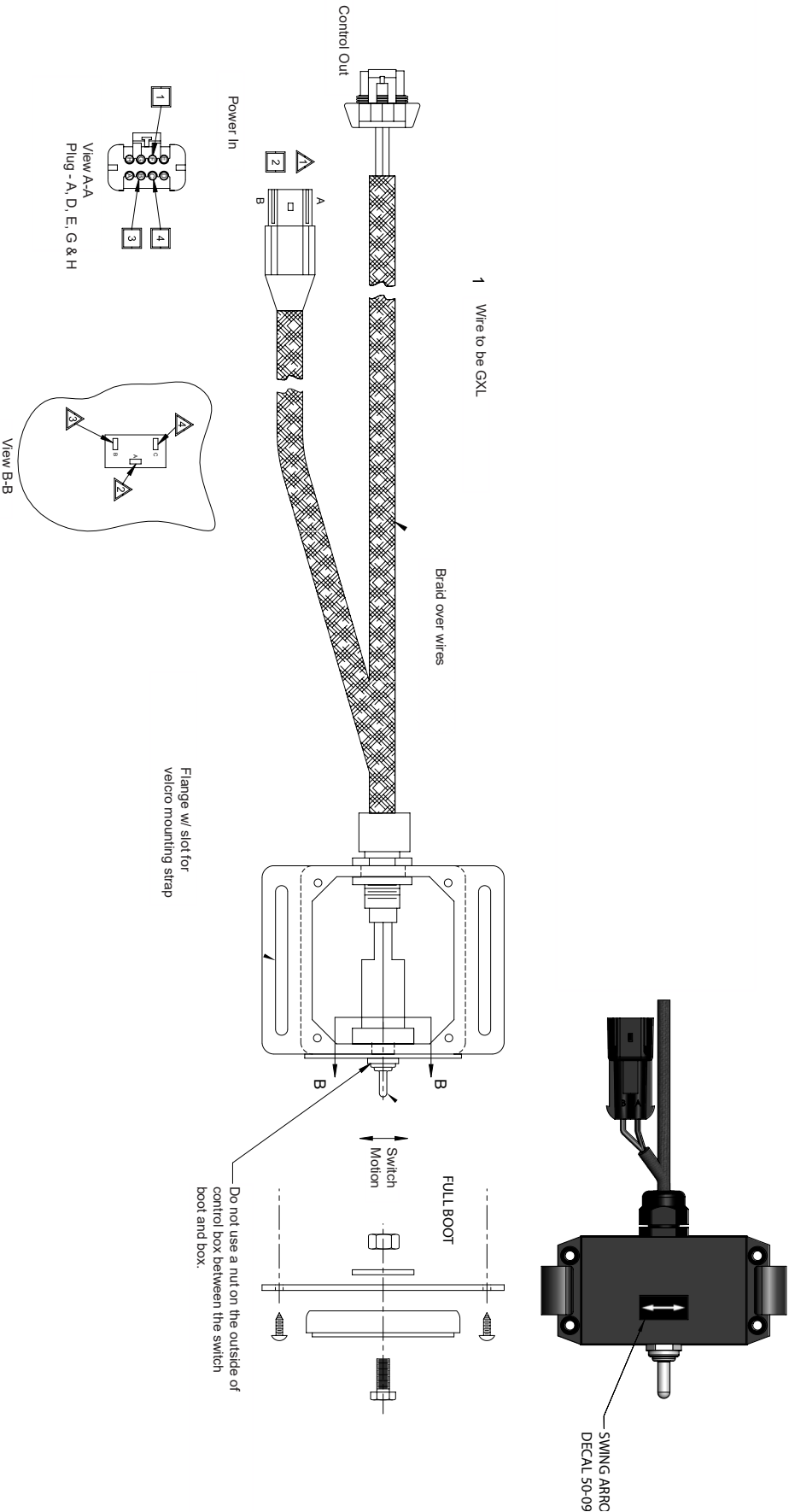
TROUBLESHOOTING

WIRE NO		WIRE				END (LEFT) (BEYOND HARNESS)				END (LEFT) (BEYOND HARNESS)				WIRE NO.		
		GAUGE	IDENTIFICATION	APPLICATION		TERMINAL			EXTRA WIDE PROTECTION		TERMINAL		EXTRA WIDE PROTECTION			
						SIZE	TYPE	YES	NO	SIZE	TYPE	YES	NO			
1A	12	RED		FROM	TO		0.38	RING TERMINAL (WAYTEK # 32205)	-	X	-	ULTRA SONIC SPLICE	-	X	1A	
1B	12	RED		ULTRA SONIC SPLICE	PACKARD PIN A		-	ULTRA SONIC SPLICE	-	X	-	PACKARD 12129493 & SEAL	-	X	1B	
2	12	BLACK		BATTERY (-)	PACKARD PIN B		0.38	RING TERMINAL (WAYTEK # 32205)	-	X	-	PACKARD 12129493 & SEAL	-	X	2	



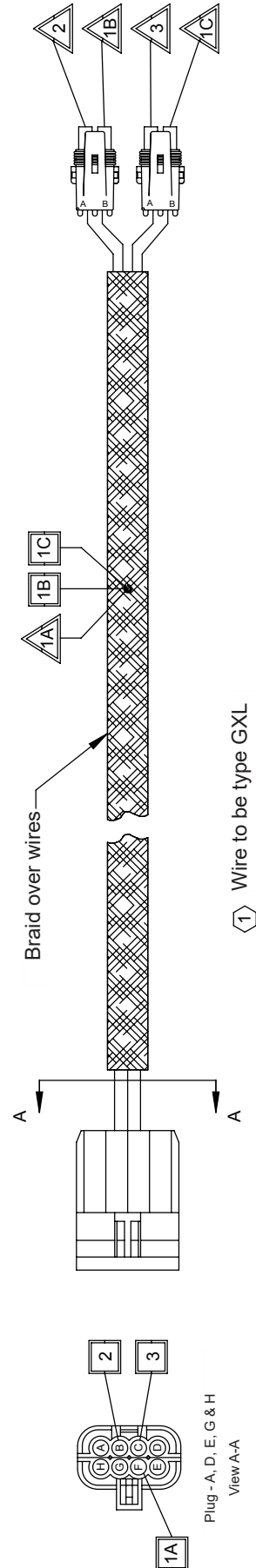
TROUBLESHOOTING

WIRE NO		WIRE				END (LEFT) (BEYOND HARNESS)				END (RIGHT) (BEYOND HARNESS)			
		IDENTIFICATION		APPLICATION		TERMINAL		EXTRA WIDE PROTECTION		TERMINAL		EXTRA WIDE PROTECTION	
GAUGE		FROM	TO	SIZE	TYPE	YES	NO	SIZE	TYPE	YES	NO	WIRE NO.	
1	16	BLACK	PACKARD PIN F (8-PIN)	PACKARD PIN A (2-PIN)	-	PACKARD 12048159 & SEAL	-	X	-	PACKARD 12048074 & SEAL	-	X	1
2	16	RED	PACKARD PIN B (2-PIN)	SWITCH 1-A	-	PACKARD 12048159 & SEAL	-	X	0.25	SPADE TERMINAL (FEMALE)	-	X	2
3	16	RED	PACKARD PIN B (8-PIN) PACKARD PIN C (8-PIN)	SWITCH 1-B	-	PACKARD 12048074 & SEAL	-	X	0.25	SPADE TERMINAL (FEMALE)	-	X	3
4	16	YELLOW	PACKARD PIN C (8-PIN)	SWITCH 1-C	-	PACKARD 12048074 & SEAL	-	X	0.25	SPADE TERMINAL (FEMALE)	-	X	4

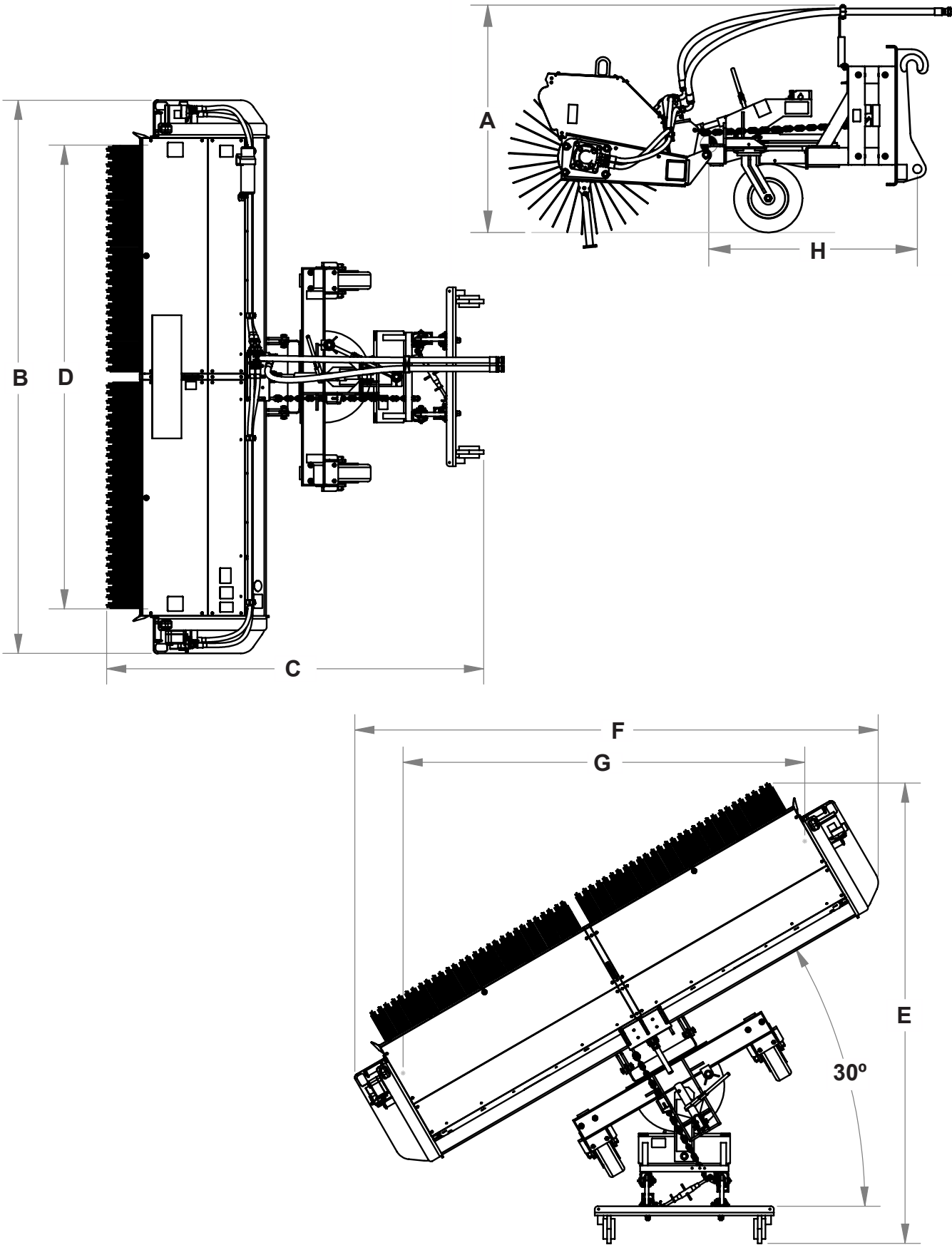


TROUBLESHOOTING

WIRE NO	WIRE			END (LEFT) (BEYOND HARNESS)				END (RIGHT) (BEYOND HARNESS)				WIRE NO.			
	GAUGE	IDENTIFICATION	APPLICATION		TERMINAL			EXTRA WIDE PROTECTION		TERMINAL			EXTRA WIDE PROTECTION		
			FROM	TO	SIZE	TYPE	YES	NO	SIZE	TYPE	YES		NO		
1A	16	BLACK	PACKARD PIN F	ULTRA SONIC SPLICE	-	PACKARD 12045773 & SEAL	-	X	-	ULTRA SONIC SPLICE	-	X	1A		
1B	16	BLACK	ULTRA SONIC SPLICE	DEUTSCH 1 PIN B	-	ULTRA SONIC SPLICE	-	X	0.25	DUETSCH 0462-201-16141 & SEAL	-	X	1B		
1C	16	BLACK	ULTRA SONIC SPLICE	DEUTSCH 2 PIN B	-	ULTRA SONIC SPLICE	-	X	0.25	DUETSCH 0462-201-16141 & SEAL	-	X	1C		
2	16	RED	PACKARD PIN B	DEUTSCH 1 PIN A	-	PACKARD 12045773 & SEA	-	X	0.25	DUETSCH 0462-201-16141 & SEAL	-	X	2		
3	16	YELLOW	PACKARD PIN C	DEUTSCH 2 PIN A	-	PACKARD 12045773 & SEA	-	X		DUETSCH 0462-201-16141 & SEAL	-	X	3		



PRODUCT SPECIFICATIONS



PRODUCT SPECIFICATIONS

	21319	21320	21321	21343	21344	21345
A. Overall Height	53.2 inches (135.1 cm)					
B. Overall Width @ 0°	143.7 inches (365 cm)			167.7 inches (426 cm)		
C. Overall Length @ 0°	97.9 inches (249 cm)					
D. Sweeping Width @ 0°	120 inches (304.8 cm)			144 inches (365.8 cm)		
E. Overall Length @ 30°	119.5 inches (303.5 cm)			125.5 inches (318.8 cm)		
F. Overall Width @ 30°	135.9 inches (345.2 cm)			156.7 inches (398 cm)		
G. Sweeping Width @ 30°	104 inches (264.2 cm)			129 inches (327.7 cm)		
H. Center of Gravity	48.7 inches (123.7 cm)		48.8 inches (123.9 cm)	50 inches (127 cm)		50.1 inches (127.3 cm)
Approx Weight	2240 lbs (1016 kg)			2365 lbs (1073 kg)		
Flow Range	12-30 gpm (45-114 lpm)	18-45 gpm (68-170 lpm)	24-60 gpm (91 -227 lpm)	12-30 gpm (45-114 lpm)	18-45 gpm (68-170 lpm)	24-60 gpm (91 -227 lpm)
Hydraulic Motor Displacement	11.9 CI	11.9 / 23.9 CI	23.9 CI	11.9 CI	11.9 / 23.9 CI	23.9 CI
Maximum Pressure	3000 psi (207 bar)					
Maximum Articulation	30 Degrees					

TORQUE BOLT SPECIFICATIONS

GENERAL TORQUE SPECIFICATION TABLES


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

SAE BOLT TORQUE SPECIFICATIONS


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


GRADE 2




GRADE 5









GRADE 8










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.		
		

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



PALADINTM
CONSTRUCTION GROUP



EU DECLARATION OF CONFORMITY

I, the undersigned, on behalf of:

Manufacturer/Technical Document Holder

Paladin Construction Group
2800 N. Zeeb Road
Dexter, MI 48130 USA
Phone: 734-996-9116
Fax: 734-996-9014

hereby declare that the following product:

Description of Equipment:

Hydraulically driven Angle Broom for loader applications. Used for construction cleanup, road maintenance and similar operations.

Attachment Model:

213

Serial Number:

Conforms to:

2006/42/EC Machinery Directive

Certification method:

Self-certified, per Annex V of the Directive

**EN982:2008; EN ISO 14121-1:2007;
EN ISO 474-1:2009; EN ISO 12100-1:2009; EN ISO 12100-2:2003; EN
ISO 2860:1992; EN ISO
2867:2006**

Name and address of the person in the Community authorized to compile the technical construction file:

GENESIS GmbH
Alpenstrasse 71
Memmingen, GERMANY D – 87700

At Dexter, Signature, Title, Date

Signature: _____

Title: _____

Date: _____

F-1210
3-28-11-2

UKCA DECLARATION OF CONFORMITY

The undersigned, representing the following manufacturer:

Manufacturer: Paladin Attachments
2800 N Zeeb Rd.
Dexter, MI 48130
United States

Declares that the product(s)

Product identification:

Description: HYDRAULIC CABLES CUTTING TOOLS WITH 18V RECHARGEABLE BATTERY
Model: **BCP040GC - BCP045GC - BCP055GC - BCP065CC - BCP085G+**
Serial number: L-00001 à L-99999

Conforms to the UK Regulations:

The supply of Machinery (Safety) Regulations 2008, S.I. 2008/1597 (as amended)

Electromagnetic Compatibility Regulations, 2016, S.I. 2016/1091 (as amended)

The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012, S.I. 2012/3032 (as amended)

Designated Standards:

SI 2008/1597 NF EN ISO 15744 (December 2008)
NF EN ISO 3744 (February 2012)
NF EN ISO 20643 (September 2008)
NF EN ISO 11201 (December 2010)
NF EN 12096 (September 1997)

SI 2016/1091 EN 62233 (September 2013)
EN 55014-1 (June 2017)
EN 55014-2 (July 2015)
EN 62311 (October 2008)

S.I. 2012/3032 NF EN IEC 63000 (December 2018)

The undersigned is responsible for compilation of the technical file and makes this declaration on behalf of DUBUIS.

Signature

Blois, July 28, 2021

Patrick VERVIER,

Engineering Manager