BRADCO
BY PALADIN

OPERATOR'S AND PARTS MANUAL

FLAIL MOWER

Serial Number: _____

Model Number: _____

Manual Number: 51-4644
Part Number: 23130, 23131, 23140
Release Date: April 2015
Rev. 3

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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 operator's.

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 USED 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 MOVERS MANUAL.**

WARNING! **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 and 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.

GENERAL SAFETY PRECAUTIONS

WARNING! **LOWER OR SUPPORT RAISED EQUIPMENT**

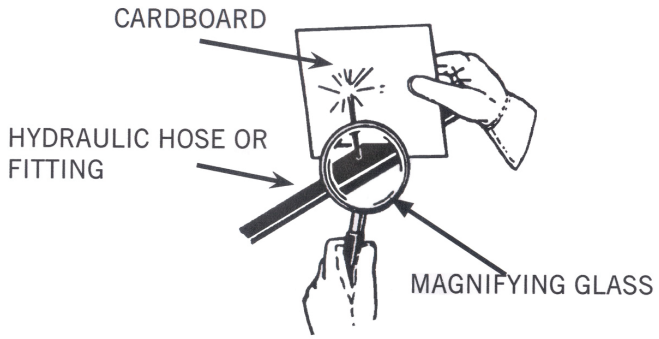
Do not work under raised booms without supporting them. Do not use support material made of concrete blocks, logs, buckets, barrels or any other material that could suddenly collapse or shift positions. Make sure support material is solid, not decayed, warped, twisted, or tapered. Lower booms to ground level or onto 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 movers 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 immediately to determine proper treatment.
- Wear safety glasses, protective clothing, and use a sound 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) equipment or device. Any modifications must be authorized in writing by the manufacturer.

GENERAL SAFETY PRECAUTIONS

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.

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 prime movers 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.

EQUIPMENT SAFETY PRECAUTIONS

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.

EQUIPMENT SAFETY PRECAUTIONS

WARNING! KNOW WHERE UTILITIES ARE.

Observe overhead electrical and other 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.

OPERATING THE FLAIL MOWER

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

TRANSPORTING THE FLAIL MOWER

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

MAINTAINING THE FLAIL MOWER

- Before performing maintenance, lower the attachment to the ground, turn off the engine, remove the key and apply the brakes.
- Never perform any work on the attachment unless you are authorized and qualified to do so. Always read the operator service manual's 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 BRADCO.
- Never make hydraulic repairs while the system is under pressure. Serious personal injury or death could result.
- Never work under a raised attachment.

DECALS

Use part numbers 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 longevity.

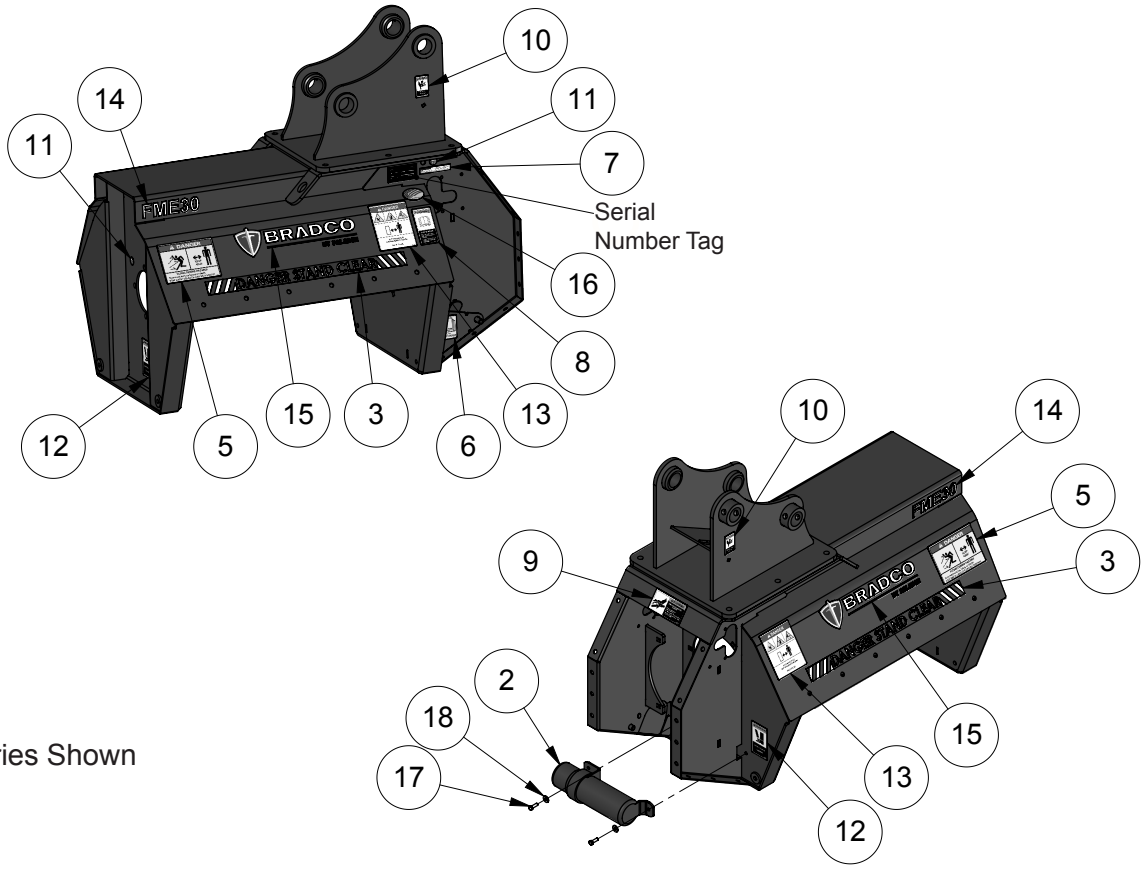
Placement or replacement of Safety Decals

1. Clean the area of application with nonflammable solvent, and then wash the same area with soap and water.
2. Allow the surface to fully dry.
3. Remove the backing from the safety sign, exposing the adhesive surface.
4. Apply the safety sign to the position shown in the diagram above and smooth out any 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 also have safety signs attached.
4. Safety signs are available, free of charge, from your dealer or from Bradco.

DECALS



30” Series Shown

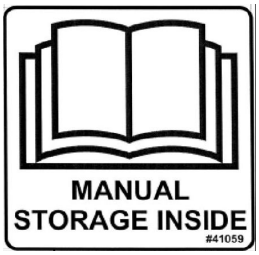
Item	Part	Qty	Description
2.	07-6869	1	Manual Holder
3.	4105	2	Decal, Danger, Stand Clear
5.	40719	2	Decal, Danger, Flying Debris
6.	50-0722	1	Decal, Warning, Misuse Hazard
7.	50-0725	1	Decal, Warning, High Pressure Fluid
8.	50-0775	2	Decal, Warning, Crush Hazard
9.	50-0907	2	Decal, Mandatory Action, Lube 8 hours
10.	50-0958	3	Decal, Warning, Foot Crush
11.	50-0996	2	Decal, Danger, Cutting & Entanglement
12.	50-0997	2	Decal, Flail Mower FME30 (30 inch Series)
	50-0998	2	Decal, Flail Mower FME40 (40 inch Series)
13.	50-1001	2	Decal, Logo, Bradco, 3.88 x 16
14.	RDL3137	1	Decal, Made in the USA
15.	RHW1105	2	Screw, HHC, Gr5, 5/16-18 x 1
16.	RHW5162	2	Washer, Flat, Gr5, .31
17.	RHW8642	2	Nut, Rivet, 5/16-18

DECALS

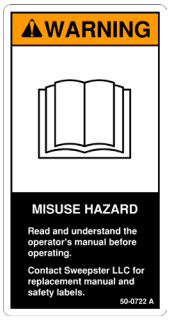
3. 4105

7. 41204

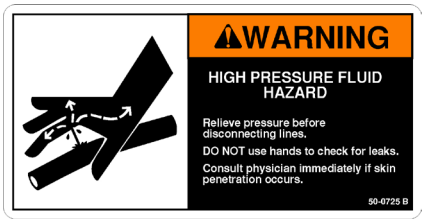
5. 40719



6. 41059



8. 50-0722



9. 50-0725

10. 50-0775

11. 50-0907

12. 50-0958

13. 50-0996

FME30

14. 50-0997

FME40

14. 50-0998

15. 50-1001

16. RDL3137

INSTALLATION

Installation

Your mower was shipped complete with appropriate mounting for your specific unit. Hoses and couplers of proper length and size must be furnished by you or your dealer.

NOTE: A case drain **is** required when the prime mover is set to single direction auxiliary flow or bidirectional auxiliary flow.

NOTICE! AVOID HOSE DAMAGE. Route hoses away from hot and/or moving parts.

Install hydraulic hoses, adapter fittings and quick disconnects as required.

WARNING! TO AVOID SERIOUS PERSONAL INJURY. Hoses must be rated for 4000 psi (276 bar) or greater.

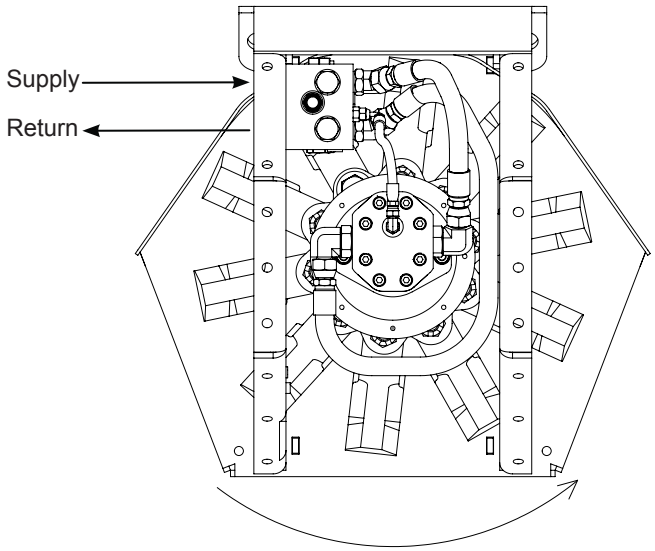
Secure all hoses with hose clamps or zip ties.

Install the mower by following your prime mover operator's manual for installing an attachment.

Start engine and slowly cycle the auxiliary circuit several times to purge system of air and check for proper hydraulic connection, hose routing and hose length.

Check the attachment for proper direction, installation and hydraulic leaks.

WARNING! TO AVOID SERIOUS PERSONAL INJURY make sure the mower is securely engaged and locked to the attachment mechanism of your unit. Failure to do so could result in separation of the attachment from the unit.



Blades moving in prefered (counter-clockwise) direction.
From operators point of view.

OPERATION

INTENDED USE:

This mower is designed to cut grasses, weeds, light to medium brush and saplings/trees up to 4 inches diameter. Consistent cutting of material larger than 4 inch diameter will result in accelerated blade wear and blade breakage. 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.

CAUTION! **A FLAIL MOWER IS A DEMANDING MACHINE.** Only fully trained operators or trainee operators under supervision of a fully trained person should use this machine.

Before operating mower:

- •Learn mower and prime mover controls in an off-road location.
- •Be sure that you are in a safe area, away from traffic or other hazards.
- •Check all hardware holding the mower to the prime mover, making sure it is tight.
- •Replace any damaged or fatigued hardware with properly rated fasteners.
- •Make sure all hydraulic hardware and hydraulic fittings are tight.
- •Replace any damaged or fatigued fittings or hoses.
- •Be sure all persons not operating the mower are clear of the area being cleared.
- •Always wear proper apparel; such as safety glasses, goggles or a face shield and ear protection.

While operating mower:

- •When operating the mower, adhere to all government rules, local laws and other professional guidelines for your application.
- •Before leaving the operators area for any reason, lower the mower to the ground. Stop the prime mover engine, set the brakes and remove the key from the ignition.
- •Keep hands, feet, hair and other loose clothing away from all moving parts.
- •Leave all shields and safety equipment in place when operating the mower.
- •Be aware of extra weight and width a mower adds. Reduce travel speed accordingly.
- •When operating on rough terrain, reduce speed to maintain control of steering.

OPERATION

•Only operate the mower while you are in the operator's position of the prime mover.

•Protective glasses must be worn while you operate the prime mover and while you operate the mower.

NOTICE! ***Operate the mower only when you are at the operator's station.***

Reduce speed when driving over rough terrain, on a slope or turning to avoid overturning the vehicle.

Avoid side slope travel whenever possible. Drive up and down the slope.

Before exiting the prime mover, lower the mower to the ground, turn off the prime mover engine, remove the key and apply the brakes.

Detaching

On firm level ground, lower the mower to the ground.

Turn off the engine. Follow prime mover instructions for relieving pressure in lines.

Disconnect couplers.

NOTICE! ***Connect couplers together or install caps to prevent contaminants from entering the hydraulic system.***

Follow your prime mover operator's manual for detaching (removing) an attachment.

OPERATION

General Storage:

NOTICE! ***Do not store in direct sunlight. Materials will deteriorate prematurely if stored in direct sunlight. Do not store near intense heat.***

Storage:

- Clean the unit thoroughly, removing all mud, dirt and grease.
- Inspect for visible signs of wear, breakage or damage. Order any parts required and make the necessary repairs to avoid delays upon removal from storage.
- Tighten loose nuts, capscrews and hydraulic connections.
- 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.

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 SCHEDULE

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

Procedure	Before Each Use	After Each Use	Every 40 Hours	Every 160 Hours
Fittings/Hoses, Hydraulic - Check for leaks/Tighten Check for damage	✓			
Fittings, Zerk - Grease (See lubrication points) NOTE: Always Grease Bearings after use when bearings are hot.		✓		
Hardware - Check for tightness	✓			
Worn parts and Cracked Welds - Visually inspect				✓
Flail knives - Check for wear/Damage	✓			
Deflector Flap - Check for Damage	✓			
Hoses - Check for kinked/Pinched	✓			
Excavator mounting bolts - Re-torque as necessary			✓	
Decals - Check for missing/damaged safety decals	✓			
Case drain coupler - Check for engagement	✓			
Roll Pins - Check for proper installation in flail bolts	✓			
Rotor - Check for dirt/debris	✓			
Clean Unit - Remove all mud, dirt and grease		✓		

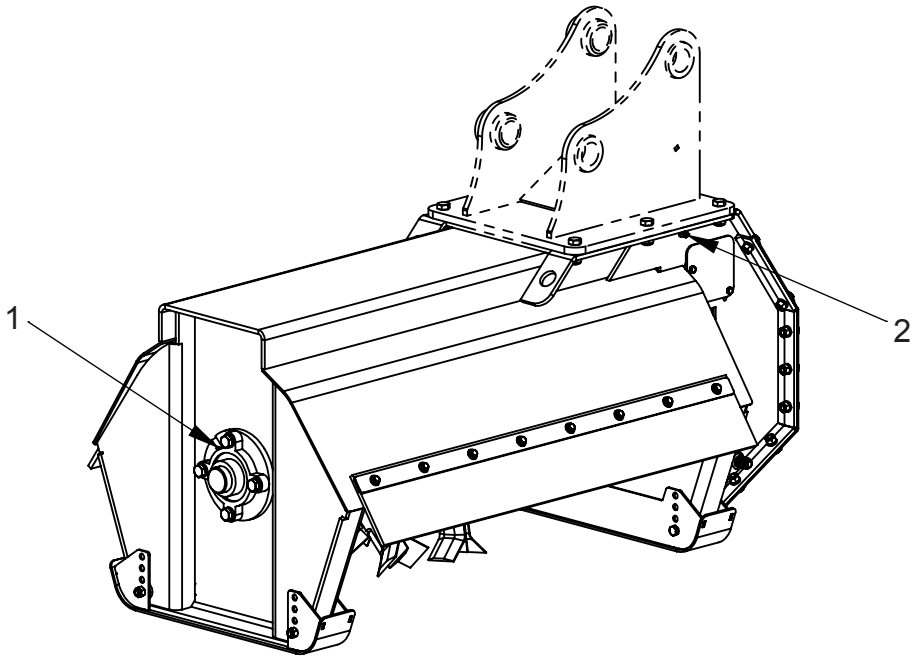
MAINTENANCE

Lubrication Points

NOTICE! ***Frequent lubrication of grease fittings at the bearings will greatly increase life of the product.***

Lubricate all grease fittings with Mobil XHP 222 grease or similar high quality NLGI 2 Lithium-Complex grease.

1. Bearing - 1 Zerk
2. Drive Side Bearing - 1 Zerk



NOTICE! ***Each zerk should be greased <u>AFTER</u> each use while the bearings are still warm to allow the grease to properly saturate.***

MAINTENANCE

Flail Blade Replacement

1. Position mower with rotor axis perpendicular to the ground, with the motor side pointing upward and the idler end resting on the ground.
2. Drive roll pin out of the slotted nut.
3. Unbolt flail blade assembly.
4. Replace damaged blades.
5. Re-assemble flail blade, tighten slotted nut until snug with mounting tabs, install roll pin.

Deflector Flap Replacement

1. Position mower with rotor axis parallel to the ground, with the skid shoes on the ground.
2. Unbolt hardware from retaining strap.
3. Remove damaged deflector flap and install new deflector flap.
4. Re-install hardware.

MAINTENANCE

Motor/Torsion Disc/Manifold Replacement

Never perform any work on the attachment unless you are authorized and qualified to do so. 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.

Disassemble

1. Position mower with rotor axis perpendicular to the ground, with the motor side pointing upward and the idler end resting on the ground.

2. Unbolt the thumb saddle/end cover and remove.

3. Disconnect hydraulic lines from the motor and set aside.

4. Unbolt mounting plate bolts from the flail mower body.

5. Lift the motor/torsion disc assembly off of the splined rotor shaft (use of a shop crane is suggested).

6. Disassemble the torsion disc from the adapter hub, note that the torsion disc backing plate may be stuck to the adapter hub. There are two threaded holes, each in between the mounting holes. A bolt can be threaded into the back side of the adapter hub to break the torsion disc backing plate from the adapter hub.

7. Disassemble the B-loc by loosening all locking screws by approximately four complete turns and transferring at least 3 screws to the push-off threads located in flange of collar.

8. Release connection by evenly tightening all push-off screws (not exceeding 1/4 turns) in a diametrically opposite sequence.

9. Remove B-loc and adapter hub from motor shaft.

10. Unbolt motor from mounting plate.

11. Remove hoses from manifold and unbolt/remove manifold.

12. Replace damaged components as required.

MAINTENANCE

To Re-Assemble

1. Bolt the motor to the mounting plate.

2. Use a 0.12 inch (11 ga) spacer to gap the motor plate to the adapter hub (or spacer tool, 13-18341, not included).

3. Install B-loc and tighten to 12.5 ft-lbs in a clock-wise or counterclockwise sequence, using only 1/4 (i.e. 90º) turns for several passes until 1/4 turns can no longer be achieved. Continue to apply torque for 1 to 2 more passes.

4. Reset torque wrench to 12 ft-lbs and check all locking screws. No screw should turn at this point, if so, repeat step 3.

5. Apply Loctite #262 (or equivalent) to bolts and fasten the torsion disc assembly to the adapter hub, making sure that the shorter side of the spline coupling is facing the adapter hub.

6. Loosely install hydraulic fittings on motor.

7. Apply anti-seize to the spline shaft.

8. Lift the motor/torsion disc assembly and slide onto rotor spline shaft, making sure the splines fully engage the coupling.

9. Bolt the motor mounting plate to the housing.

10. Bolt the hydraulic manifold to the housing and loosely connect hydraulic hoses.

11. Connect hydraulic hoses to the motor and tighten all connections making sure the hoses have clearance to sharp edges.

12. Bolt the thumb saddle/end cover to the housing.

13. Connect hydraulic hoses to the prime mover and check for leaks.

WARNING! ESCAPING HYDRAULIC FLUID CAN HAVE ENOUGH PRESSURE TO PENETRATE THE SKIN, CAUSING SERIOUS PERSONAL INJURY.

Do not use your hand to check for leaks. Use a sound piece of cardboard or wood to check for leaks. Tighten all connections to the recommended torque.

MAINTENANCE

Drive Bearing Replacement

1. Follow disassembly for Motor/Torsion Disc Replacement.

2. Loosen set screws on flanged bearing.

3. Unbolt from the drive mounting plate.

4. Remove bearing from rotor shaft.
   Note: the use of a 3-jaw puller may be required to remove the bearing.

5. Clean the shaft with emery paper to ensure a good fit with the new bearing.

6. Apply anti-seize to the shaft then install the new bearing.

7. Apply Loctite #262 (or equivalent) to the bolts and fasten the bearing to the drive mounting plate.

8. Tighten the set screws to 273 in-lbs.

9. Follow Re-assembly for Motor/Torsion Disc Replacement.

Idler Bearing Replacement

1. Position mower with rotor axis parallel to the ground, with the skid shoes on the ground.

2. Loosen set screw on flanged bearing.

3. Unbolt bearing from housing.

4. Remove bearing from rotor shaft.
   Note: the use of a 3-jaw puller may be required to remove the bearing.

5. Clean the shaft with emery paper to ensure a good fit with the new bearing.

6. Apply anti-seize to the shaft then install the new bearing.

7. Apply Loctite #262 (or equivalent) to the bolts and fasten the bearing to the drive mounting plate.

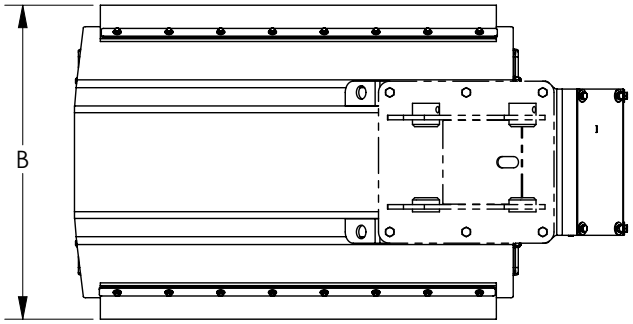
8. Tighten the set screws to 273 in-lbs.

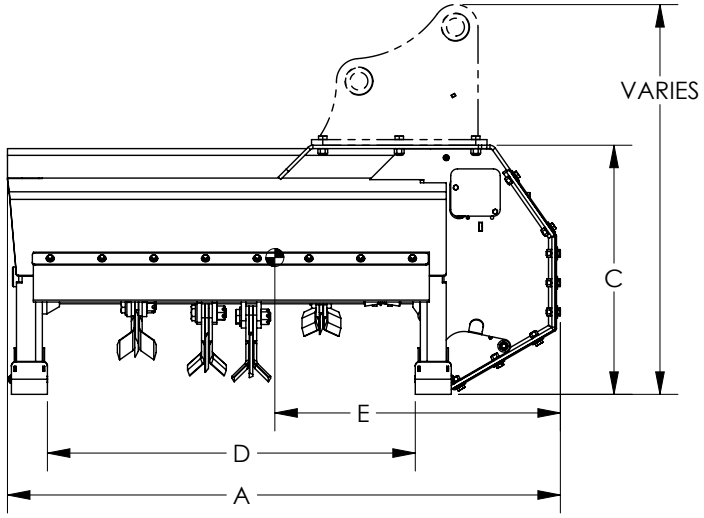
TROUBLESHOOTING

Problem	Possible Cause	Possible Solution
Excessive vibration	Damaged/missing blade	Replace blade
	Worn blades	Replace blades as matched set
	Loose mounting bolts	Tighten mounting bolts
	Worn idler/drive bearing	Replace bearing(s)
	Bent rotor	Replace rotor
Rotor not turning	Auxiliary hoses not hooked up to the prime mover	Check coupler engagement
	Obstruction in hydraulic lines	Remove obstruction. Replace if necessary
	Hydraulic motor damaged or seals blown	Call Paladin service department for instructions
	Auxiliary control valve not engaged	Verify hydraulic flow using in-line flow meter or other attachment
Rotor rotates sluggishly	Insufficient hydraulic flow from prime mower	Refer to prime mover manual, verify hydraulic flow using in-line flow meter or other attachment
	Damaged quick coupler	Replace if necessary
	Hydraulic motor damaged or seals blown	Call Paladin service department for instructions
Leaking oil	Loose or damaged hydraulic line	Tighten or replace
	O-Rings on hydraulic fittings damaged	Replace if necessary
	Hydraulic motor damaged or seals blown	Call Paladin service department for instructions
	Case drain not properly connected or coupler damaged	Engage coupler or replace

PRODUCT SPECIFICATIONS

Specifications and Model Views





	23130	23131	23140
A. Overall Length	51.5 inches (130.8 cm)		61.5 inches (156.2 cm)
B. Overall Width	34.9 inches (88.6 cm)		
C. Overall Height	27.7 inches (70.4 cm)		
D. Cutting Width	30 inches (76 cm)		40 inches (102 cm)
E. Center of Gravity	26.8 inches (68 cm)		31.8 inches (81 cm)
Weight	830 lbs (376.5 kg)	855 lbs (388 kg)	1175 lbs (533 kg)
Flow Range	See Chart		
Maximum Pressure	3500 psi (241 bar)		

Motor Code	Flow Range
A	8-9gpm (30-34 lpm)
B	10-11gpm (38-42 lpm)
C	12-14gpm (45-53 lpm)
D	14-16gpm (53-61 lpm)
E	17-22gpm (64-83 lpm)
F	22-28gpm (83-106 lpm)
G	27-33gpm (102-125 lpm)
H	32-40gpm (121-151 lpm)

BOLT TORQUE SPECIFICATIONS

GENERAL TORQUE SPECIFICATION TABLES

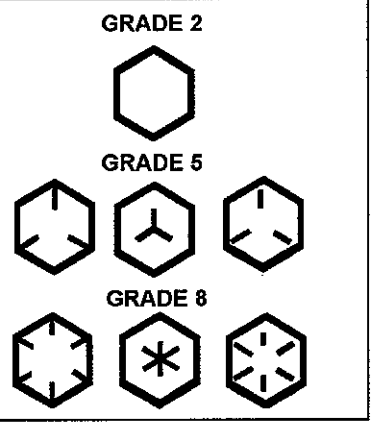
Use the following charts when determining bolt torque specifications when special torques are not given. Always use grade 5 or better when replacing bolts.

SAE BOLT TORQUE SPECIFICATIONS

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			
		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

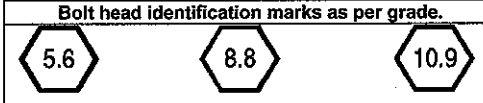
Bolt head identification marks as per grade.
NOTE: Manufacturing Marks Will Vary



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.

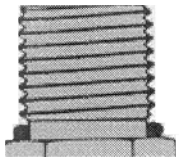


Size of Bolt	Grade No.	Pitch (mm)	Pounds Feet	Newton-Meters	Pitch (mm)	Pounds Feet	Newton-Meters
M6	5.6	1.0	3.6-5.8	4.9-7.9	-	-	-
	8.8		5.8-.4	7.9-12.7		-	-
	10.9		7.2-10	9.8-13.6		-	-
M8	5.6	1.25	7.2-14	9.8-19	1.0	12-17	16.3-23
	8.8		17-22	23-29.8		19-27	25.7-36.6
	10.9		20-26	27.1-35.2		22-31	29.8-42
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

NOTE - Nylock nuts are utilized when greater resistance to vibrating loose is required, and greater operating temperatures are not a factor. In addition, like lock nuts, nylock nuts have a safety feature that if the bolt does vibrate loose, the nut will remain on the screw. Install nylock nuts to the standard torque shown above.

HYDRAULIC TORQUE SPECIFICATIONS

Straight Thread O-ring Fitting: Assembly, Fitting to Port

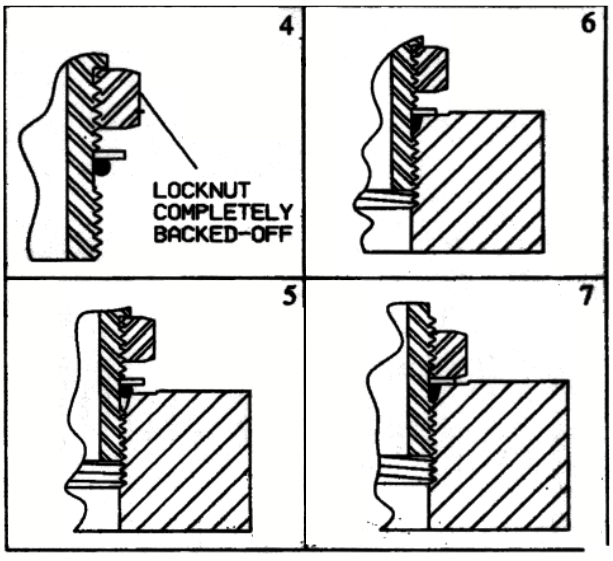


NOTE - Straight thread o-ring fittings are utilized to adapt hydraulic systems to motors, pumps, cylinders, and valves.

Installation (Adjustable Fitting)

1. Make sure threads and sealing surfaces are free of burrs, nicks, scratches, or any foreign materials.
2. Install proper SAE O-ring on port end of fitting if not already installed. Ensure O-ring is fully seated and retained properly.
3. Lubricate O-ring with a light coating of clean hydraulic oil.
4. Back off nut as far as possible and push washer up as far as possible. (figure 4 & 5)
5. Screw fitting into port. Hand tighten fitting until backup washer contacts face of port. (figure 6)
6. To position the fitting, unscrew to desired position, but not more than one full turn.
7. Hold fitting in position with wrench. Using appropriate torquing device, tighten nut to given torque rating from table. (figure 7)

Fitting Size	SAE Port Thread Size	In-lbs	Ft-lbs
-4	7/16 - 20	190 ± 10	16 ± 1
-6	9/16 - 18	420 ± 15	35 ± 1
-8	3/4 - 14	720 ± 25	60 ± 2
-10	7/8 - 14	1260 ± 50	105 ± 5
-12	1 1/16 - 12	1680 ± 75	140 ± 6
-16	1 5/16 - 12	2520 ± 100	210 ± 8
-20	1 5/8 - 12	3100 ± 150	260 ± 12
-24	1 7/8 - 12	3800 ± 150	315 ±12



NOTE - ft-lb may be converted to Newton Meters by multiplying by 1.35582.
NOTE - in-lbs may be converted to Newton Meters by multiplying by 0.11298.

WARRANTY

Limited Warranty

Except for the Excluded Products as described below, all new products are warranted to be free from defects in material and/or workmanship during the Warranty Period, in accordance with and subject to the terms and conditions of this Limited Warranty.

1. Excluded Products. The following products are excluded from this Limited Warranty:

(a) Any cable, part that engages with the ground (i.e. sprockets), digging chain, bearing, teeth, tamping and/or demolition head, blade cutting edge, pilot bit, auger teeth and broom brush that either constitutes or is part of a product.

(b) Any product, merchandise or component that, in the opinion of Paladin Light Construction[1], has been (i) misused; (ii) modified in any unauthorized manner; (iii) altered; (iv) damaged; (v) involved in an accident; or (vi) repaired using parts not obtained through Paladin Light Construction.

2. Warranty Period. The Limited Warranty is provided only to those defects that occur during the Warranty Period, which is the period that begins on the first to occur of: (i) the date of initial purchase by an end-user, (ii) the date the product is first leased or rented, or (iii) the date that is six (6) months after the date of shipment by Paladin Light Construction as evidenced by the invoiced shipment date (the "Commencement Date") and ends on the date that is twelve (12) months after the Commencement Date.

3. Terms and Conditions of Limited Warranty. The following terms and conditions apply to the Limited Warranty hereby provided:

(a) Option to Repair or Replace. Paladin Light Construction shall have the option to repair or replace the product.

(b) Timely Repair and Notice. In order to obtain the Limited Warranty, (i) the product must be repaired within thirty (30) days from the date of failure, and (ii) a claim under the warranty must be submitted to Paladin Light Construction in writing within thirty (30) days from the date of repair.

(c) Return of Defective Part or Product. If requested by Paladin Light Construction, the alleged defective part or product shall be shipped to Paladin Light Construction at its manufacturing facility or other location specified by Paladin Light Construction, with freight PRE-PAID by the claimant, to allow Paladin Light Construction to inspect the part or product.

Claims that fail to comply with any of the above terms and conditions shall be denied.

LIMITATIONS AND EXCLUSIONS.

THIS LIMITED WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND ANY WARRANTY BASED ON A COURSE OF DEALING OR USAGE OF TRADE.

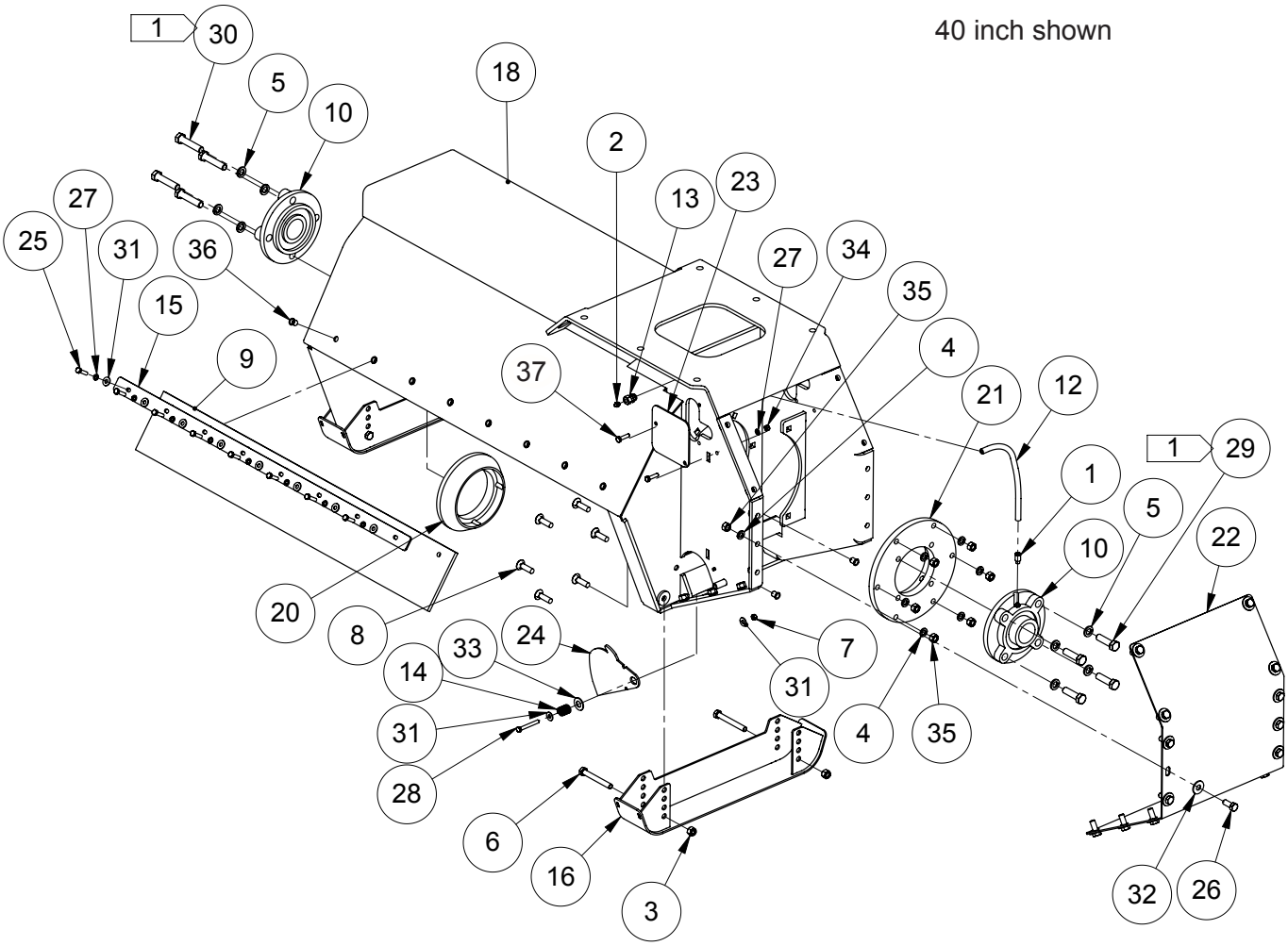
IN NO EVENT SHALL PALADIN LIGHT CONSTRUCTION BE LIABLE FOR CONSEQUENTIAL OR SPECIAL DAMAGES.

IN NO EVENT SHALL PALADIN LIGHT CONSTRUCTION BE LIABLE FOR ANY LOSS OR CLAIM IN AN AMOUNT IN EXCESS OF THE PURCHASE PRICE, OR, AT THE OPTION OF PALADIN LIGHT CONSTRUCTION, THE REPAIR OR REPLACEMENT, OF THE PARTICULAR PRODUCT ON WHICH ANY CLAIM OF LOSS OR DAMAGE IS BASED. THIS LIMITATION OF LIABILITY APPLIES IRRESPECTIVE OF WHETHER THE CLAIM IS BASED ON BREACH OF CONTRACT, BREACH OF WARRANTY, NEGLIGENCE OR OTHER CAUSE AND WHETHER THE ALLEGED DEFECT IS DISCOVERABLE OR LATENT.

[1]Attachment Technologies Inc., a subsidiary of Paladin Brands Holding, Inc. (PBHI) is referred to herein as Paladin Light Construction.

February 10, 2010

HOUSING ASSEMBLY

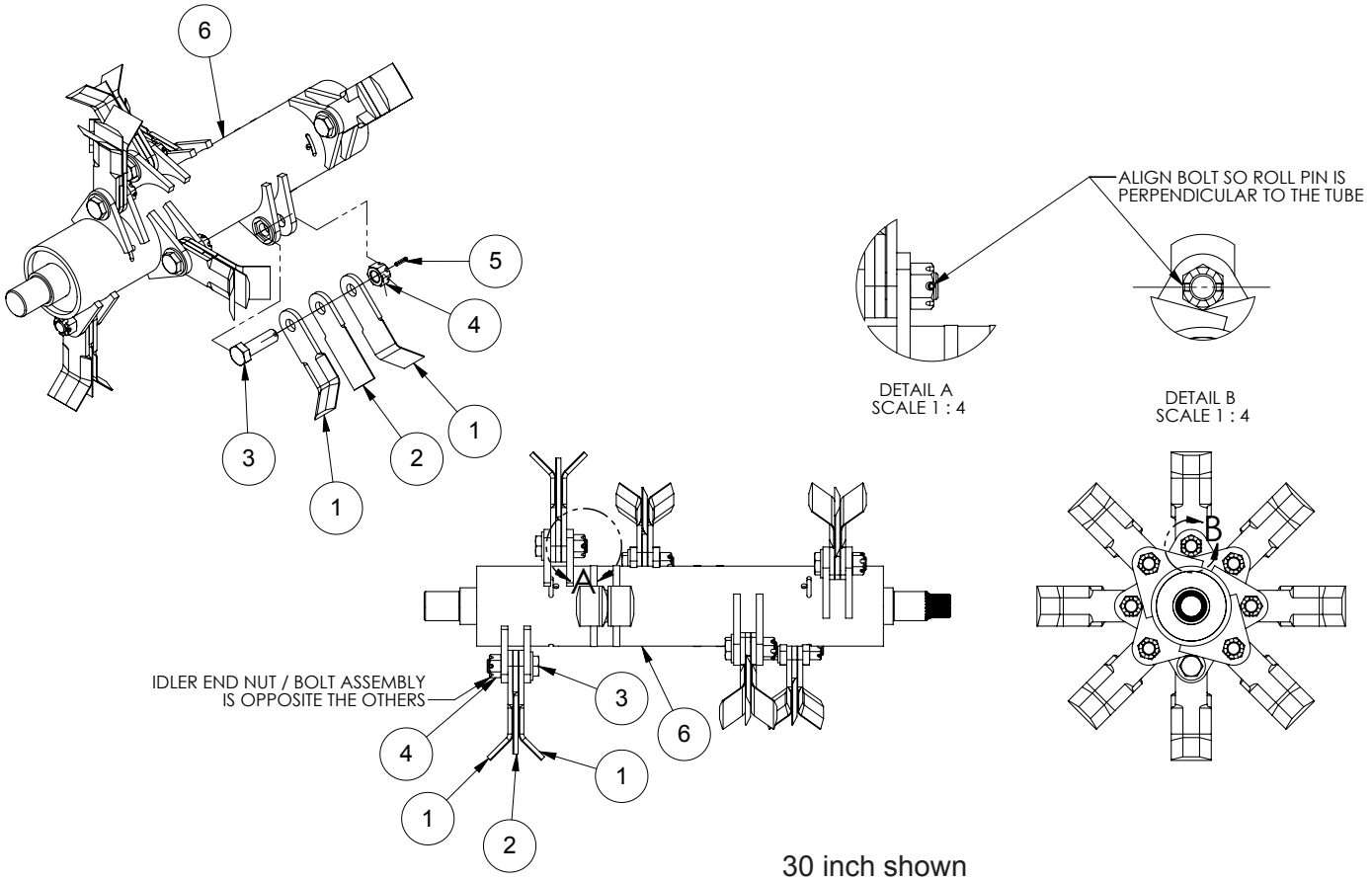


1 Apply permanent thread lock

HOUSING ASSEMBLY

Item	Part	Qty	Description
1.	03-6578	1	Fitting, 2MP-.31 Diameter Internal Hex
2.	07-0223	1	Fitting, Zerk, Straight, 1/8 NPT
3.	07-4037	4	Nut, Hex, Nylock, Gr8, 1/2-13
4.	07-1762	22	Washer, Lock, Split, Medium, 1/2
5.	07-1872	8	Washer, Lock, Split, Medium, 5/8
6.	07-2360	4	Screw, HHC, Gr8, 1/2-13 x 4
7.	07-3270	1	Nut, Hex, Nylock, Gr8, 5/16-18
8.	07-3709	6	Bolt, Carriage, Gr5, 1/2-13 x 1 3/4
9.	07-8245	2	Deflector, .38 x 5.5 x 34 (30 inch)
	07-8232	2	Deflector, .38 x 5.5 x 44 (40 inch)
10.	07-8242	2	Bearing, Flanged
12.	09-0296	1.2ft	Nylon Tube, .313 x .232
13.	30466	1	Connector, Bulkhead, 2FP-.31 Tube
14.	110724	1	Spring, Access Door
15.	13-18017	2	Plate Deflector Retainer (30 inch)
	13-18000	2	Plate Deflector Retainer (40 inch)
16.	13-18015	2	Weld, Skid Shoe
18.	13-18074	1	Weld, Body (30 inch)
	13-18418	1	Weld, Body, Thumb Ready (30 inch)
	13-18020	1	Weld, Body (40 inch)
20.	13-18083	1	Ring, Inner, Bearing, End
21.	13-18084	1	Ring, Mounting, Drive, Bearing
22.	13-18131	1	Cover
23.	13-18132	1	Cover, Manifold, Opening
24.	13-18261	1	Plate, Cover, Manual Tube
25.	P100505	12	Bolt, Hex, Gr5, 5/16-18 x 1 1/4 (30 inch)
		16	Bolt, Hex, Gr5, 5/16-18 x 1 1/4 (40 inch)
26.	P100805	16	Bolt, Hex, Gr5, 1/2-13 x 1 1/4
27.	P851105	14	Washer, Lock, 5/16 (30 inch)
		18	Washer, Lock, 5/16 (40 inch)
28.	RHW1112	1	Screw, HHC, Gr5, 5-16-18 x 2 1/2
29.	RHW1605	4	Screw, HHC, Gr5, 5/8-11 x 2 1/4
30.	P101010	4	Screw, HHC, Gr5, 5/8-11 x 2 1/2
31.	RHW5162	14	Washer, Flat, Gr5, 5/16 (30 Inch)
		18	Washer, Flat, Gr5, 5/16 (40 Inch)
32.	RHW5462	16	Washer, Flat, Gr5, 1/2
33.	RHW5632	1	Washer, Flat, Gr5, 5/8
34.	RHW7101	2	Nut, Hex, Gr5, 5/16-18
35.	RHW7401	22	Nut, Hex, Gr5, 1/2-13
36.	RHW8642	14	Nut, Rivet, 5/16-18, .15-.312 Grip (30 inch)
		18	Nut, Rivet, 5/16-18, .15-.312 Grip (40 inch)
37.	P100503	2	Bolt, Hex, Gr5, 5/16-18 x 3/4

ROTOR ASSEMBLY

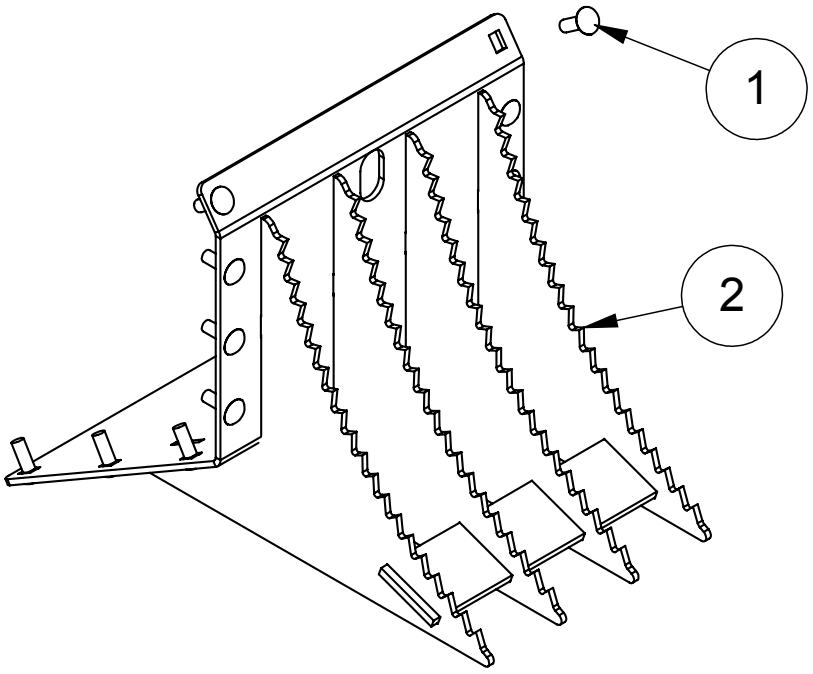


30 inch shown

Item	Part	Qty	Description
1.	07-8235	16	Blade, Side (30 inch)
		20	Blade, Side (40 inch)
2.	07-8236	8	Blade, Flail center (30 inch)
		10	Blade, Flail center (40 inch)
3.	07-8240	8	Screw, HHC, Gr8, 1-8 x 3.25, Short thread (30 inch)
		10	Screw, HHC, Gr8, 1-8 x 3.25, Short thread (40 inch)
4.	07-8241	8	Nut, Slotted, 1-8 (30 inch)
		10	Nut, Slotted, 1-8 (40 inch)
5.	07-8266	8	Pin, Roll, .25 x 1.5 (30 inch)
		10	Pin, Roll, .25 x 1.5 (40 inch)
6.	13-18026	1	Weld, Rotor (30 inch)
	13-18027	2	Weld, Rotor (40 inch)

THUMB SADDLE ASSEMBLY

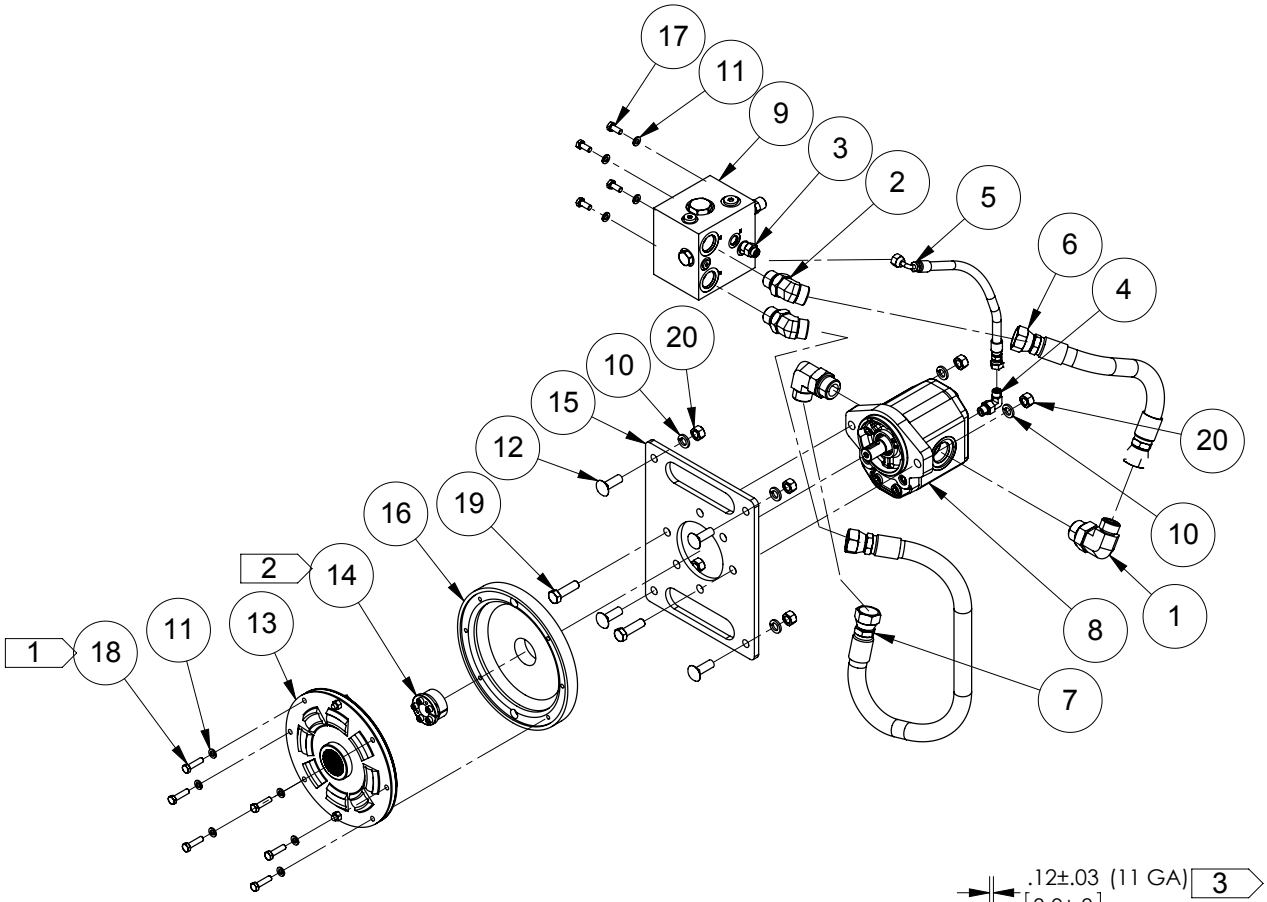
28-10747 Factory Install
28-10833 Field Install

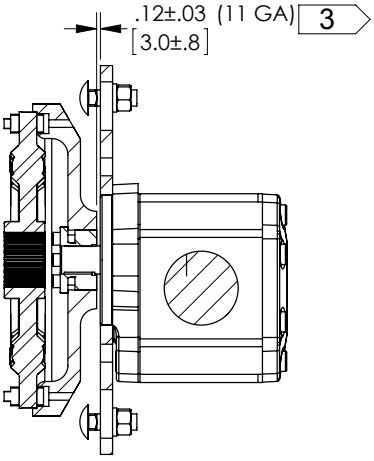


Item	Part	Qty	Description
1.	07-3708	14	Bolt, Carriage, Gr5, 1/2-13 x 1 1/2
2.	13-18008	1	Weld, Thumb

HYDRAULIC ASSEMBLIES

Motors A,B,C,D & E





1 Apply permanent thread lock
2 Torque to 150 lb-in (17 N-m)
3 Use assembly tool 13-18341(not included)

HYDRAULIC ASSEMBLIES

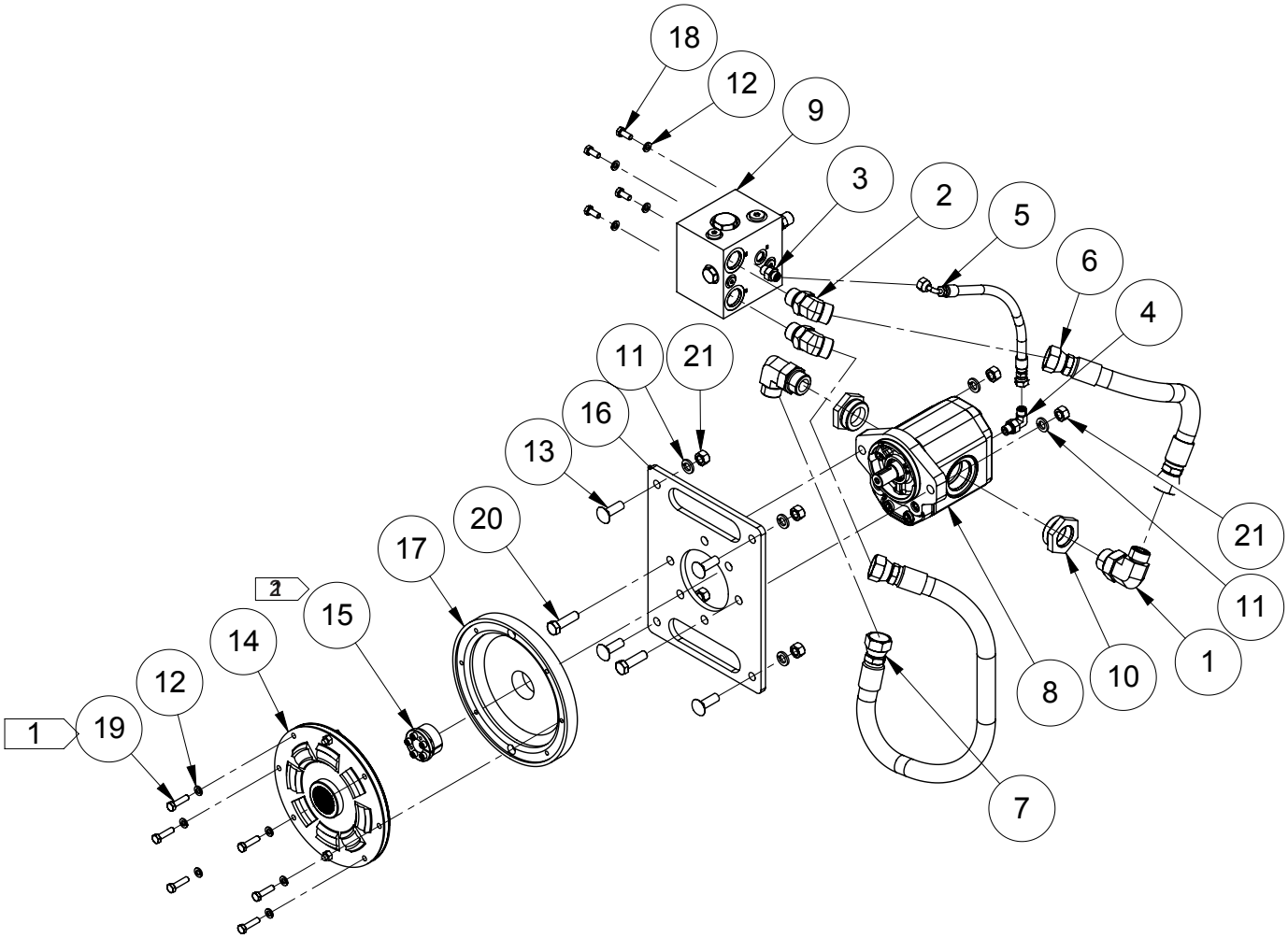
Motors A,B,C,D & E

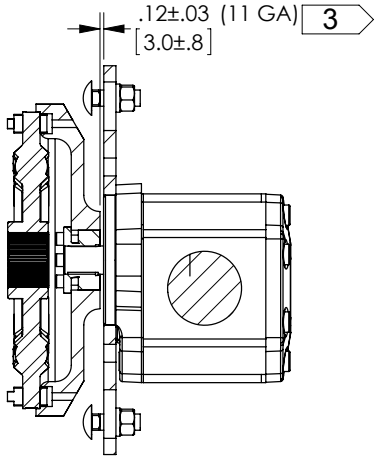
Item	Part	Qty	Description
1.	03-2177	2	Elbow, 90º, 12MB-12MFS (Motors A,B)
	03-1956	2	Elbow, 90º, 12MFS-16MB (Motors C,D,E)
2.	03-2182	2	Elbow, 45º, 12MB-12MF
3.	03-3400	1	Fitting, 4MFS-6MB
4.	03-3734	1	Elbow, 90º, 4MFS-6MB
5.	03-4358	1	Hose, .25 x 18, 4FFS-4FFS90, 3K
6.	03-6576	1	Hose, .75 x 15, 12FFS-12FFS, 4K
7.	03-6577	1	Hose, .75 x 32, 12FFS-12FFS, 4K
8.	03-6579	1	Motor, Gear, 2 Bolt-B (Motor A, 8-9 gpm)
	03-6580	1	Motor, Gear, 2 Bolt-B (Motor B, 10-11 gpm)
	03-6581	1	Motor, Gear, 2 Bolt-B (Motor C, 12-14 gpm)
	03-6582	1	Motor, Gear, 2 Bolt-B (Motor D, 14-16 gpm)
	03-6583	1	Motor, Gear, 2 Bolt-B (Motor E, 17-22 gpm)
9.	03-6587	1	Manifold, 40gpm, Bidirectional, 3.5K
10.	07-1762	6	Washer, Lock, Split, Medium, 1/2
11.	07-3273	10	Washer, Lock, Split, Medium, 5/16
12.	07-3708	4	Bolt, Carriage, Gr5, 1/2-13 x 1 1/2
13.	07-8243	1	Torsion Disc, 8.42 Inch BC, 1.75, 27T
14.	07-8244	1	B-Loc Keyless Bushing, 7/8
15.	13-18085	1	Plate, Mounting, Motor
16.	13-18092	1	Hub, Torsion, Disc
17.	P100503	4	Bolt, Hex, Gr5, 5/16-18 x 3/4
18.	P100505	6	Bolt, Hex, Gr5, 5/16-18 x 1 1/4
19.	P100807	2	Bolt, Hex, Gr5, 1/2-13 x 1 3/4
20.	RHW7401	6	Nut, Hex, Gr5, 1/2

Spacer Tool 13-18341 Not included

HYDRAULIC ASSEMBLIES

Motors F,G & H





1 Apply permanent thread lock

2 Torque to 150 lb-in (17 N-m)

3 Use assembly tool 13-18341(not included)

HYDRAULIC ASSEMBLIES

Motors F,G & H

Item	Part	Qty	Description
1.	03-2177	2	Elbow, 90º, 12MB-12MFS (Motors F,G)
	03-1956	2	Elbow, 90º, 12MFS-16MB (Motor H)
2.	03-2182	2	Elbow, 45º, 12MB-12MFS
3.	03-3400	1	Fitting, 4MFS-6MB
4.	03-3734	1	Elbow, 90º, 4MFS-6MB
5.	03-4358	1	Hose, .25 x 18, 4FFS-4FFS90, 3K
6.	03-6576	1	Hose, .75 x 15, 12FFS-12FFS, 4K
7.	03-6577	1	Hose, .75 x 32, 12FFS-12FFS, 4K
8.	03-6584	1	Motor, Gear, 2 Bolt-B (Motor F, 22-28 gpm)
	03-6585	1	Motor, Gear, 2 Bolt-B (Motor G, 27-33 gpm)
	03-6586	1	Motor, Gear, 2 Bolt-B (Motor H, 32-40 gpm)
9.	03-6587	1	Manifold, 40gpm, Bidirectional, 3.5K
10.	03-3950	2	Fitting, 12FB-20MB (Motor F, G)
	03-6588	2	Fitting, 16FB-24MB (Motor H)
11.	07-1762	6	Washer, Lock, Split, Medium, 1/2
12.	07-3273	10	Washer, Lock, Split, Medium, 5/16
13.	07-3708	4	Bolt, Carriage, Gr5, 1/2-13 x 1 1/2
14.	07-8243	1	Torsion Disc, 27T
15.	07-8244	1	B-Loc Keyless Bushing, 7/8
16.	13-18085	1	Plate, Mounting, Motor
17.	13-18092	1	Hub, Torsion, Disc
18.	P100503	4	Bolt, Hex, Gr5, 5/16-18 x 3/4
19.	P100505	6	Bolt, Hex, Gr5, 5/16-18 x 1 1/4
20.	P100807	2	Bolt, Hex, Gr5, 1/2-13 x 1 3/4
21.	RHW7401	6	Nut, Hex, Gr5, 1/2

Spacer Tool 13-18341 Not included