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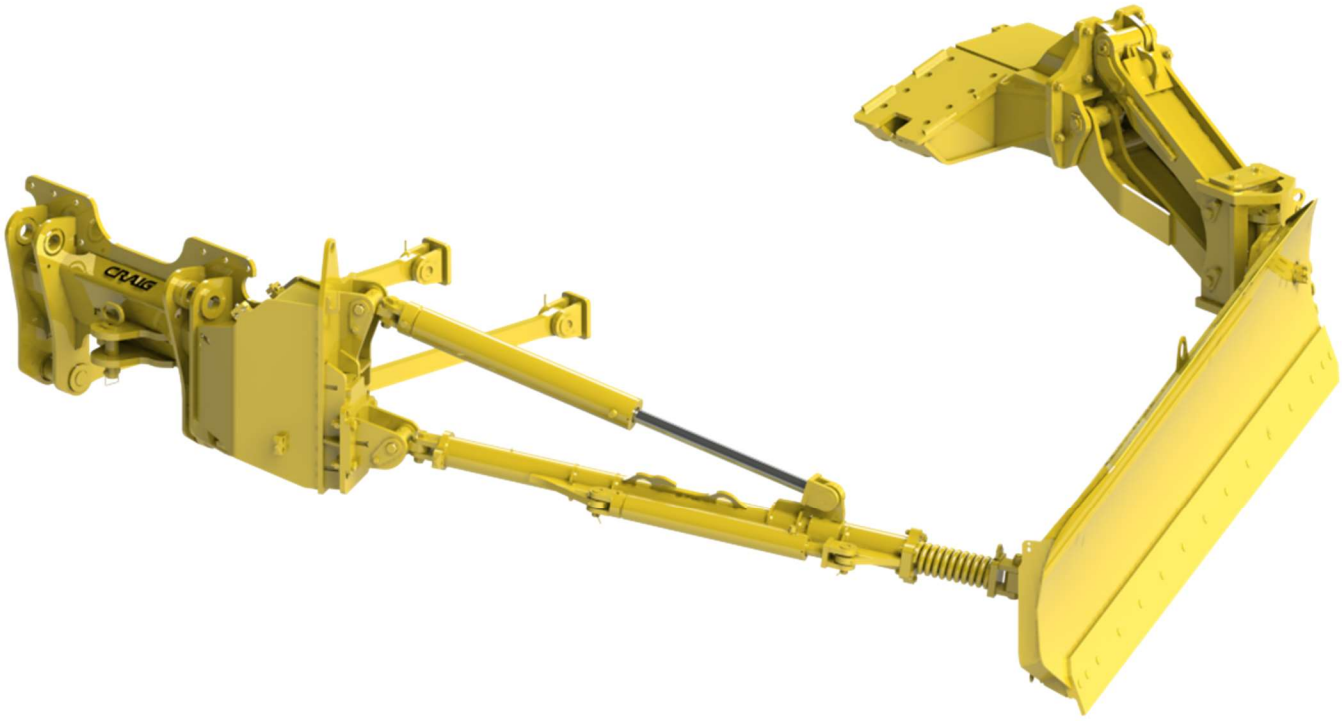

MG-300

GRADER 300 SERIES POSTLESS SNOW WING

OWNER'S MANUAL

Important safety and operation instructions inside

Read thoroughly before operating

CRAIG MANUFACTURING LTD.
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TABLE OF CONTENTS

PREFACE

Congratulations on the purchase of your new Craig Manufacturing Ltd. product. This manual provides safety, operation, and maintenance information. To keep your product in good condition, please read this manual and follow all recommendations. Failure to do so may invalidate your warranty.

When parts or service are necessary contact Craig at 1-800-565-5007 for genuine Craig Parts. Before using your product, make sure your machine is equipped with all the OEM recommended requirements for your product application.

CRAIG FACTORY ORIGINAL PARTS

CRAIG
CUSTOMER SUPPORT CENTER
1-800-565-5007

The best way to ensure equipment reliability is to use only genuine Craig Manufacturing Ltd. Factory Original Parts. Our parts department can help you not only find the right part for your application but also offers advice and support for the repair. Using aftermarket non-approved parts can alter your product's performance characteristics and may affect your warranty.

To help ensure that correct parts are ordered, please record the serial number of your product. Over time serial tags can become tarnished or difficult to read. Please supply this serial number to your dealership when ordering parts and it will ensure the correct part gets ordered.

Serial: _____

Machine: _____

Model: _____

In-Service Date: _____

Purchased From: _____

Never let anyone operate this unit without reading the "SAFETY INSTRUCTIONS" and "OPERATION INSTRUCTIONS" sections of this manual.

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.

INTRODUCTION

As the new owner and/or operator of the Craig 301 snow wing we require you take the time to read this Operator's Manual carefully before commencing work.

FOLLOW THE SAFETY INSTRUCTIONS

- Carefully read all the safety information contained in this manual.
- Make sure all safety decals are securely fitted in the cab.
- Immediately replace any safety decals that are missing or damaged.
- Before starting work make sure you have a copy of this Operator's Manual in the cab and are familiar with all the safety procedures and instructions contained in this manual.

INFORMATION FOR THE USER

The user of the Craig attachment is obliged to ensure that the equipment is always in safe working order in accordance with accident prevention regulations, Occupational Safety and Health regulations or any other official instructions.

ENHANCED WARRANTY FOR ELIGIBLE PRODUCTS

Craig offers an enhanced warranty from 12 months (or 2,000 hours which ever comes first) to 36 months (or 6,000 hours) for **eligible products**. To take advantage of this enhanced warranty the eligible product must be registered within 30 days of receiving the product. You can register your product at the following website:

https://www.craigattachments.com/product-registration/

Refer to the contents of this manual to remedy faults and contact Craig at 1-800-565-5007 if you require assistance. Notice that unauthorized modifications to this equipment is prohibited and will void warranty.

SAFETY INSTRUCTIONS

This is an alert symbol. It indicates an imminent or potential hazard. Signal words "DANGER", "WARNING", and "CAUTION" qualify this alert symbol into the following categories:

DANGER Hazardous situation which, if not avoided, WILL result in death or serious injury

WARNING Hazardous situation which, if not avoided, COULD result in death or serious injury

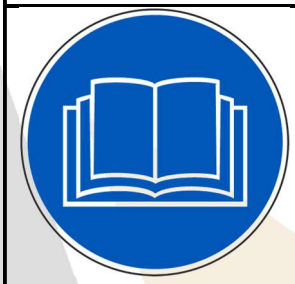
CAUTION Hazardous situation which, if not avoided, could result in minor or moderate injury

The signal word "***NOTICE***" indicates important information that, if not followed, could result in severe damage to equipment or property.

SAFETY PRECAUTIONS BEFORE OPERATION

The primary responsibility for safety with this product falls to the operator. Make sure the product is operated only by trained individuals that have read and understood this manual. If there is any portion of this manual or function you do not understand, contact your local authorized dealer, or Craig Manufacturing Ltd. Keep this manual available for reference.

WARNING!



Read Manual Prior to Installation, Operation or Maintenance
Improper installation, operation, and/or maintenance of your Craig Manufacturing Ltd. attachments can cause death or bodily injury, property damage, or damage to your equipment. Read and understand this manual and all labels before operating or doing any work on the equipment. NEVER allow anyone to operate this unit without first reading the safety and operating instructions. Failure to do so may affect your warranty.

Read your machines owner's manual and always be aware of capacities and heights of all materials moved are within the machines stated operational capacity.

Understand All Safety Decals and Statements
Become familiar with and inform users about all safety decals and safety statements in all manuals and on the back of the attachment prior to operating or working on this product. Know and follow all national occupational safety regulations, local laws, and other professional guidelines. As well as all good work practices when working on or with this product. Know your equipment capabilities and operations.

Worn, damaged, or illegible safety decals must be replaced. New safety decals can be ordered from your local dealer.

SAFETY INSTRUCTIONS

WARNING!

Inspect all equipment prior to operating and ensure all components are in proper working order. Check hardware for tightness and that all guards and safety devices are in place. Know all decals and check for legibility. Replace anything damaged, worn or missing. Make sure operator cab is clean and free of any distracting objects or spills.

Be aware of overhead or buried utilities. Contact your local utilities to locate any underground lines or other hazards.

Make sure all levers, pedals, switches, or other controls are in neutral position prior to starting the engine.

Before exiting the machine, for any reason, follow the "MANDATORY SHUT DOWN PROCEDURE".

MANDATORY SHUT DOWN PROCEDURE

1. Stop the machine on level ground.
2. Lower the attachment to the ground.
3. Move throttle to the idle position.
4. Disengage all power to the attachment.
5. Apply the brakes.
6. Turn off the engine and remove the key.

Never use your attachment as a work platform or personnel carrier

Never lift, move, or swing an attachment over anyone.

Do not use attachment for lifting materials outside of its purpose. This attachment is not a lifting device unless approved for your jurisdiction.

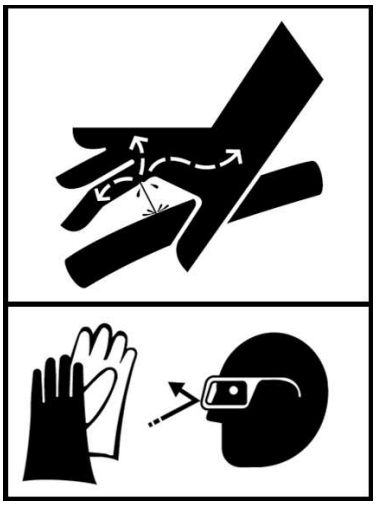
Never perform any work on the attachment unless you are authorized and qualified to do so. Work in pairs. Always read the operator service manuals before any repair is made. Wear proper PPE.

Personal Protective Equipment (PPE) Required
Remove ignition key and immobilize the machine during installation, inspection, or service. Always follow safe work practices when installing, servicing, or inspecting your product by wearing only snug-fitting clothing, removing jewelry, and securing long hair. Wear safety goggles to protect your eyes from hydraulic fluid, sparks, dirt, and dust. Always have a fire extinguisher rated BC on hand for flammable liquid and electrical fires. Lastly, always lift with your legs, and use lifting equipment when applicable.

SAFETY INSTRUCTIONS

WARNING!

CRUSH HAZARD – DO NOT work under or around raised arm or attachment.
Lower or Support Unstable/Raised Equipment. NEVER trust that the hydraulic system will not fail. ALWAYS lower booms and attachments to the ground before leaving the cab or operator's station. DO NOT work under or around attachments or heavy items not supported by stands, blocks or safety chains. Furthermore, it is important to use chains and/or stands to steady unstable attachments or heavy components that may fall if being disconnected.



Skin Injection Hazard

- Relieve pressure before working on system
- Wear gloves & eye protection
- Detect leaks with wood or cardboard
- NEVER use hands to detect leaks
- Fluid injected in skin must be surgically removed

Hydraulic Safety

Always inspect hydraulic components before operating your product. Replace any damaged or worn parts immediately. Temperature changes can change hydraulic pressure, which allow the cylinders to drop unexpectedly, causing injury or damaging hydraulic components. Hydraulic fluid under pressure can cause bodily harm. If you suspect a hydraulic leak note the following:

- The high pressure of the hydraulic lines can cause leaks that can puncture flesh. Therefore, it is important to keep uncovered body parts such as face, eyes, and arms away from a suspected leak.
- Flesh injected with hydraulic fluid may develop gangrene or other permanent disabilities. If injured by leaking hydraulic fluid, see a doctor immediately. Hydraulic fluid could have injected into the wound, and it may not be known.
- Before disconnecting hydraulic lines, wait until the fluid cools down. Hot hydraulic fluid can cause severe burns.
- Always wear protective clothing, such as gloves and safety glasses, and use a piece of cardboard when searching for hydraulic leaks. DO NOT USE YOUR HANDS.

Never make hydraulic repairs while the system is under pressure. Serious personal injury or death could occur. Never work under a raised attachment. Check the weight of the attachment and use handling equipment of sufficient capacity.
Always tag "DO NOT OPERATE" until all problems are corrected.

SAFETY INSTRUCTIONS

WARNING!

Lubricants may contain toxins, cause adverse health effects or be hazardous to the environment. Ensure environmentally safe disposal. Observe all safety labels.

Do Not Alter Attachment

Any alterations to this product could affect the safety and performance of the attachment. When making repairs, use only Craig Manufacturing Ltd. parts, and follow the provided procedures. If the parts and procedures are not used the warranty is void and any alterations may cause the attachment to become unsafe. Any modifications must be authorized in writing by Craig Manufacturing Ltd.

Safe Transport

- Travel only with the attachment in a safe transport position to prevent uncontrolled movement. Drive slowly over rough terrain and slopes.
- When transporting on a trailer, secure attachment using tie downs in recommended locations to maintain attachment stability.
- When driving on public roads use safety lights, reflectors, and slow-moving vehicle signs to prevent accidents. Check local government regulations that may affect you.
- Do not drive close to ditches or excavations, because a cave-in could occur.

Keep attachment close to the ground when engaging/disengaging attachments!

It is possible to drop an attachment during engaging and disengaging procedures. Therefore, it is best to make sure the attachment is kept close to the ground. Visually check that the attachment is securely locked before operating. Follow the procedures outlined in the operation section of this manual. If coupler is not functioning properly, it must be checked/repaired by a qualified service technician prior to use. Failure to do so could result in serious injury or death.

SAFETY INSTRUCTIONS

CAUTION!

Remove Paint Before Welding or Heating

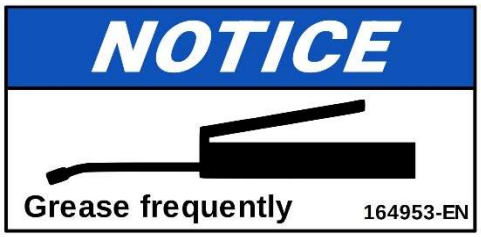
When paint is heated by welding, or by using a torch, hazardous fumes/dust can be generated. Therefore, it is important to do all work in a well-ventilated area and dispose of paint and solvent properly. TURN OFF ENGINE AND DISCONNECT BATTERY PRIOR TO WELDING. Refer to machine's owner's manual for procedure.

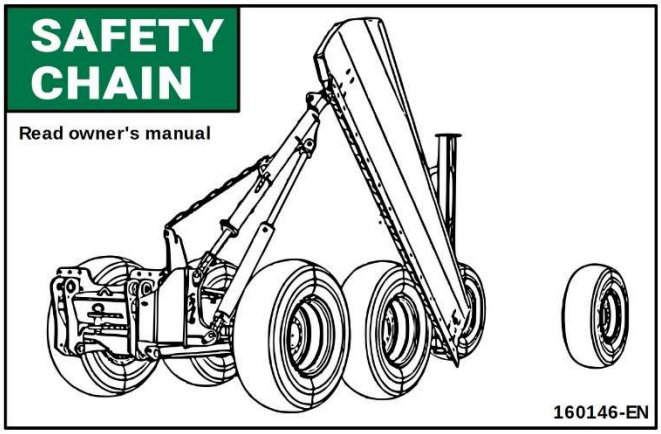
When removing paint:

- It is important to wear an approved respirator when sanding or grinding paint.
- If you use a paint stripper or solvent, remove the stripper with soap and water.
- Remove solvent or paint stripper containers and other flammable material from the welding/heating area.
- Allow fumes to disperse at least 15 minutes before welding or heating.

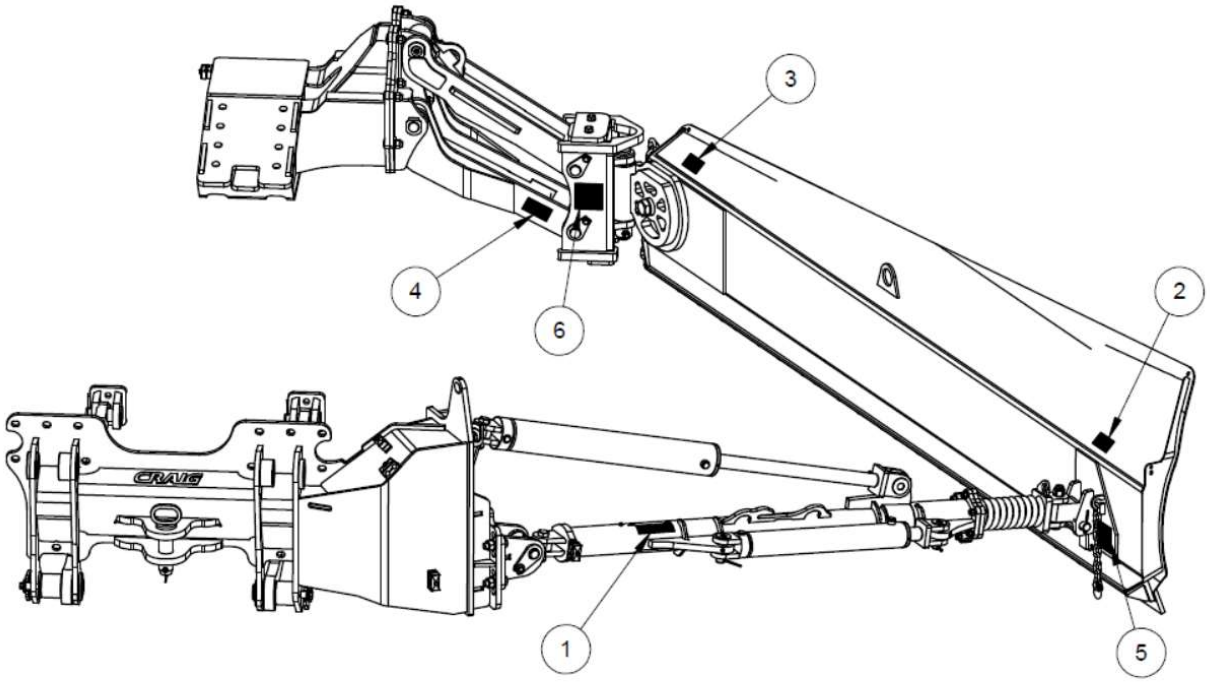
DECALS

Item	Part #	Description	Quantity
1	159377-XX	Decal, shim bolt	1
2	159478-XX	Decal, read owners manual	1
3	160957-XX	Decal, wing bolt	1
4	164953-XX	Decal, grease frequently	1
5	160146-XX	Decal, safety chain	1
6	164958-XX	Decal, pinch point hazard	1





DECALS

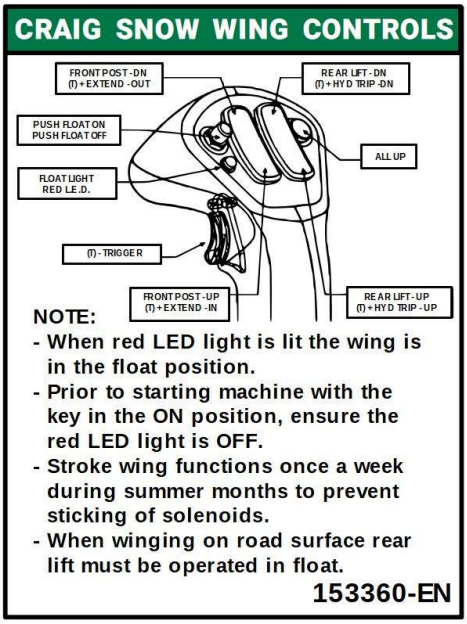


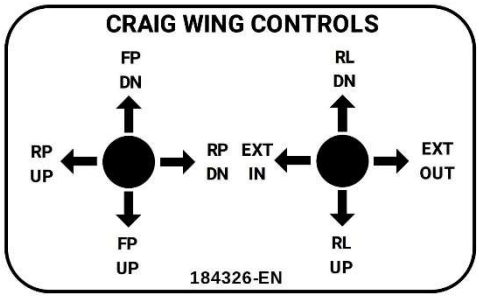
NOTE: *YOUR PRODUCT MAY NOT APPEAR EXACTLY AS SHOWN*

DECALS

OPTION: CRAIG JOYSTICK/CONTROLS DECAL

Item	Part #	Description	Quantity
1	153360-XX	Decal, snow wing controls	1
2	117070-XX	Decal, snow wing operation	1
3	184326-XX	Decal, wing controls	1





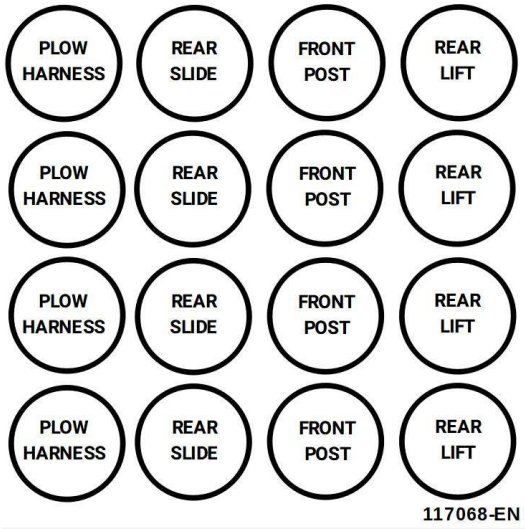
OPTION: CRAIG VALVE INSTALLED

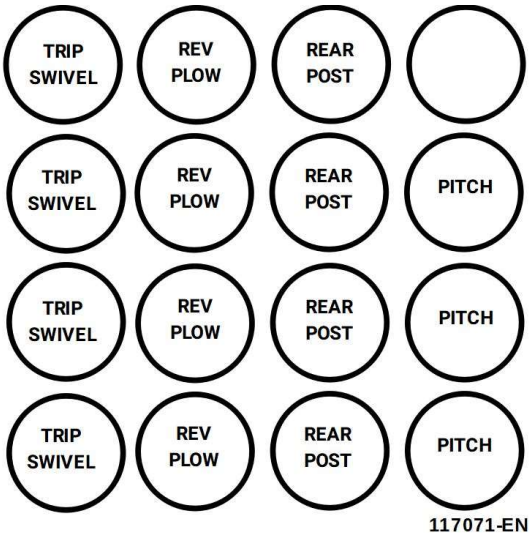
Item	Part #	Description	Quantity
1	177728-XX	Decal, valve grease manual override	1
2	177749-XX	Decal, do not pressure wash	1

DECALS

OPTIONAL DECALS (WITH MANUAL)

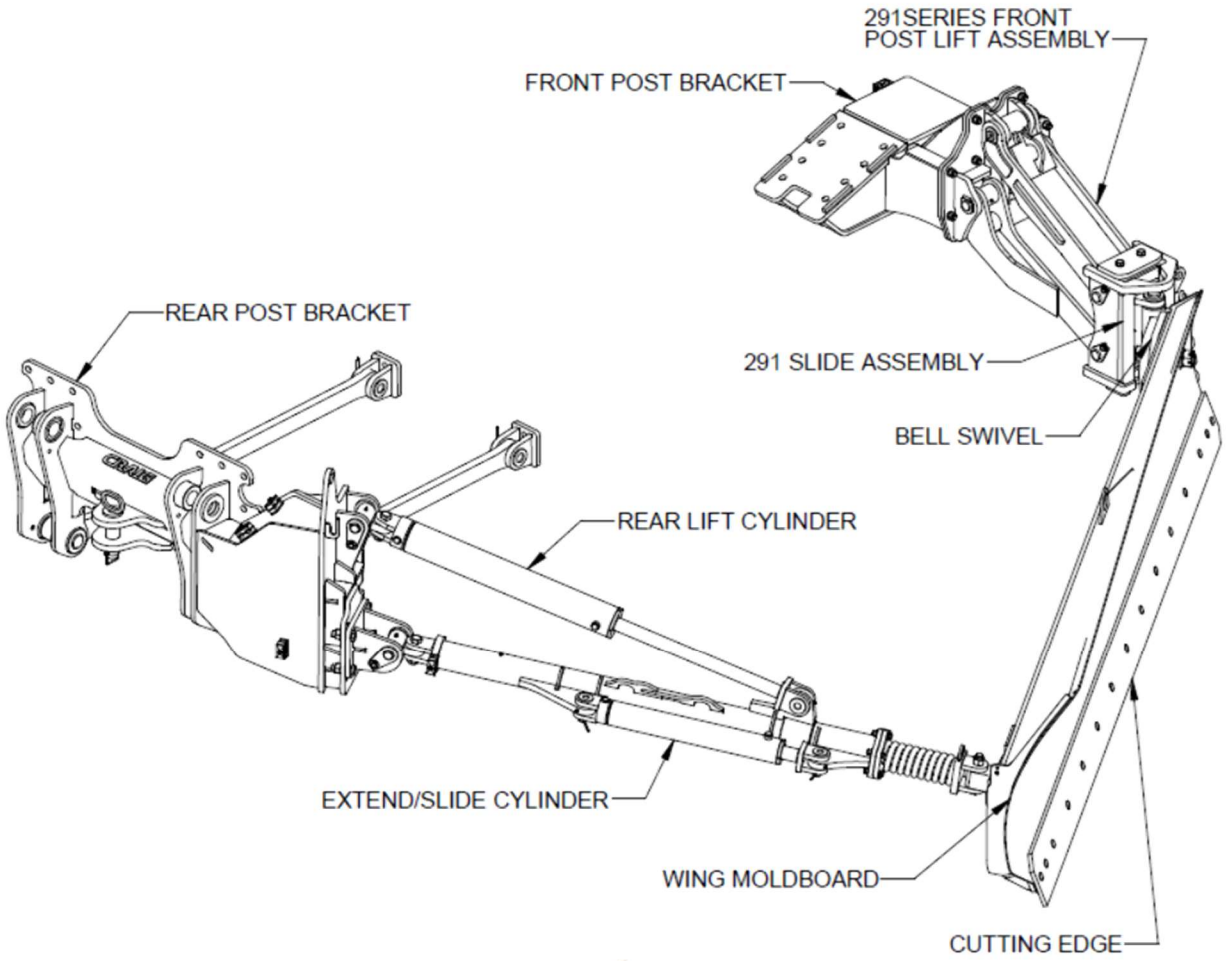
Item	Part #	Description	Quantity
1	117068-XX	Decal, wing labels 1	1
2	117071-XX	Decal, wing labels 2	1





INSTALLATION INSTRUCTIONS

NOMENCLATURE



NOTE: *YOUR PRODUCT MAY NOT APPEAR EXACTLY AS SHOWN*

INSTALLATION INSTRUCTIONS

TERMINOLOGY

Cutting Edge:	The consumable wear component located on the bottom of the base edge. Cutting edge must be replaced periodically to protect the moldboard.
Wing Moldboard:	The working face of the wing.
Bell Swivel:	The connection between the front post and the wing moldboard.
291 Series front post lift assembly:	This is what lifts the front of the wing moldboard and allows for it to float mechanically along the road surface.
291 Slide assembly:	The sliding element of the lift assembly that allows the bell swivel for the wing to move up and down for mechanical float.
Front Post Bracket	This attaches onto the grader frame. It controls the front height of the wing.
Rear Post Bracket:	This attaches directly to the grader frame and the push pole/lift group.
Rear lift cylinder:	The cylinder that raised the push pole/lift group at the back of the wing.
Extend/slide cylinder:	The cylinder that extends the push pole to slide the back of the wing outwards.
Valve:	The Craig wing assembly usually uses its own valve to operate the three or four hydraulic sections on the wing. This valve can vary in position depending on the loader make and model but is always covered by a steel valve cover.

ACCESSORIES AND OPTIONS

Hydraulic Trip Swivel:	This is a resettable hydraulic circuit that allows the wing moldboard to trip or dump when hitting an obstacle.
Carbide Edge:	Superior wear resistance intended for short passes such as ramp clearing. Prolonged passes can generate heat and premature wear.
High Visibility Kit:	Includes high visibility flag sticks, reflectors and all necessary mounting hardware.
Cast Curb Shoe:	Replaceable and protects the wing moldboard from curbs.
Trip Edge:	Allows the entire cutting edge to trip when hitting an obstacle.
Hydraulic Quick Disconnect:	Allows hosing to be attached and detached quickly via quick disconnects.

INSTALLATION INSTRUCTIONS

INSTALLATION AND REMOVAL

Read all safety precautions before installing the attachment. Refer to the machine's owner's manual for additional information. If a coupler system is involved ensure that the coupler is working properly before use. In addition, refer to the manufacturer for the coupler owner's manual to familiarize yourself with its proper procedures and operations. Craig coupler owner's manuals can be found by going to:

www.craigattachments.com/technicaldocuments

PRIOR TO WORKING ON THE MACHINE

WARNING Turn off the machine during install/maintenance. Never leave equipment unattended with the engine running or with attachment in a raised position.

CAUTION REMOVE PAINT BEFORE WELDING OR HEATING. When paint is heated by welding, or by using a torch, hazardous fumes/dust can be generated. Therefore, it is important to do all work in a well-ventilated area and dispose of paint and solvent properly. TURN OFF ENGINE AND DISCONNECT BATTERY PRIOR TO WELDING. Refer to machine's owner's manual for procedure.

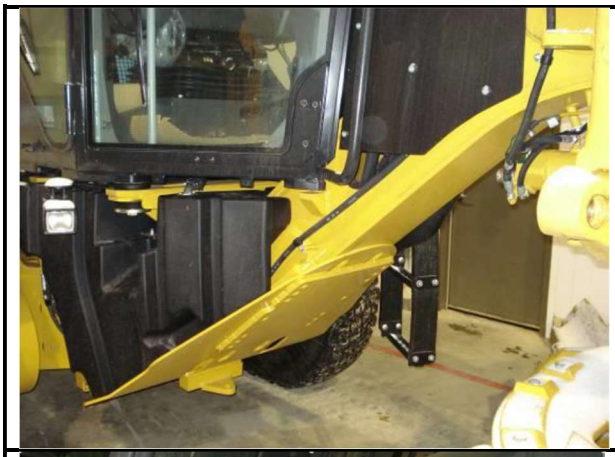
Be sure to cover all windows and cylinder shafts in the direct vicinity of the welding location to protect from unwanted weld spatter.

GENERAL NOTES:

- Always check your machines articulation to make sure any hoses are routed safely through the articulation point.
- To finish the install, confirm operation of all components. Check hoses and connections for leaks. Ensure hoses are secure and have enough room for movement if required. Check the location of components when articulated, and in different positions prior to operation in the field.
- Be sure to top up the machine hydraulic tank with an OEM approved oil. It usually takes about one 20L pail to fill all new cylinders and hoses.
- Extend all hydraulic components through their full range to purge air from the system.

INSTALLATION INSTRUCTIONS

INSTALLING BRACKETS



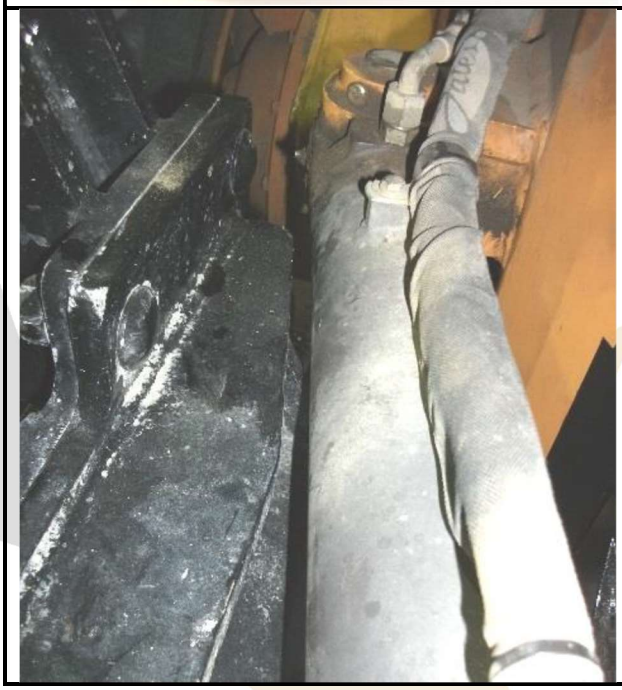
1. If there is a ladder on the operator's right-hand side, it must be removed.
2. Remove covers to expose grader valve, ensure there are enough sections for the functions required.

3. If there are hoses for AWD running along the right-hand side of the cab, they will need to be rolled up to make room for the front lift assembly.

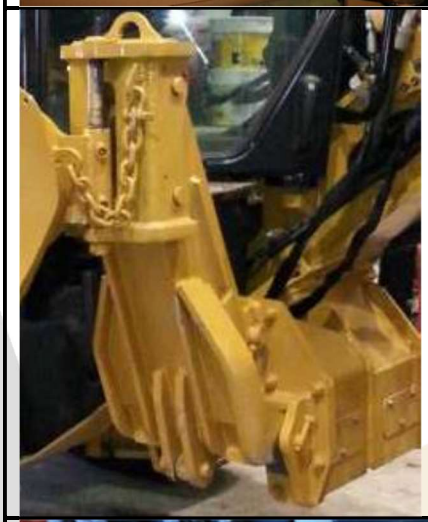
4. If the front post bracket bolts directly to the belly pan of the grader, visually check the holes to ensure they can freely accept the bolts. Mount the front post bracket using supplied bolts and washers.

NOTE: It will be easier to handle and mount the front post bracket (FPB) with the lift group disconnected.

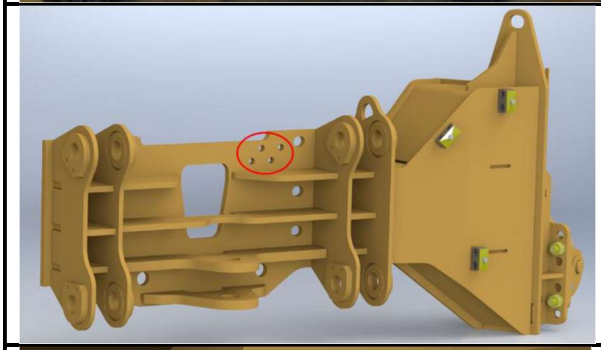
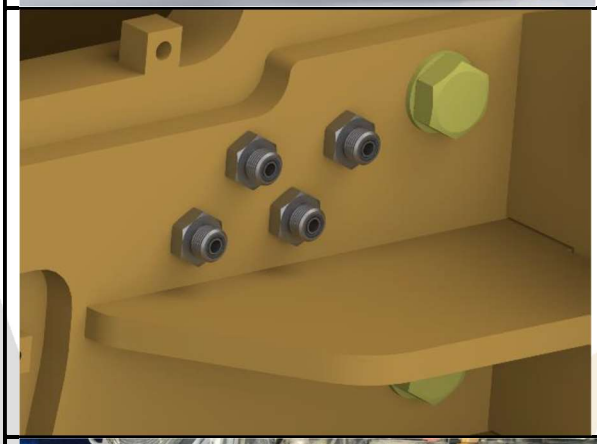
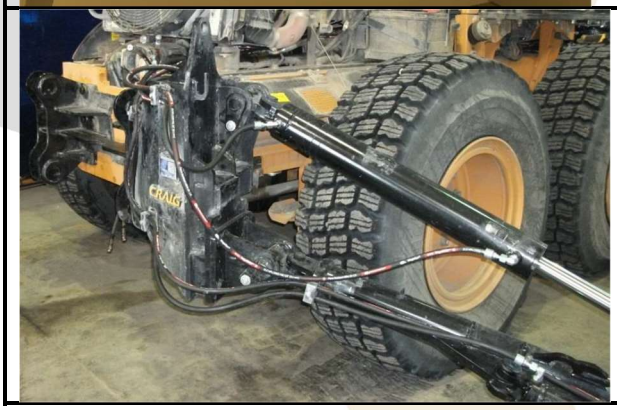
INSTALLATION INSTRUCTIONS

	5. If the FPB cannot be bolted directly to the grader it will have weld on pieces such as shown in blue in the picture to the left. They weld to the bottom of the grader near the articulation point. Ensure that the mounting plates are bolted securely to the FPB, so they won't move while tacking in place under the machine.
	6. There may be a mounting plate on the FPB that is tacked only (such as shown in blue) that may need to be adjusted during install to fit properly. Ensure that it is fully welded after fitment to the machine.
	7. Ensure that the machine can be fully articulated to the left and that there is clearance between the bracket and articulation cylinder.

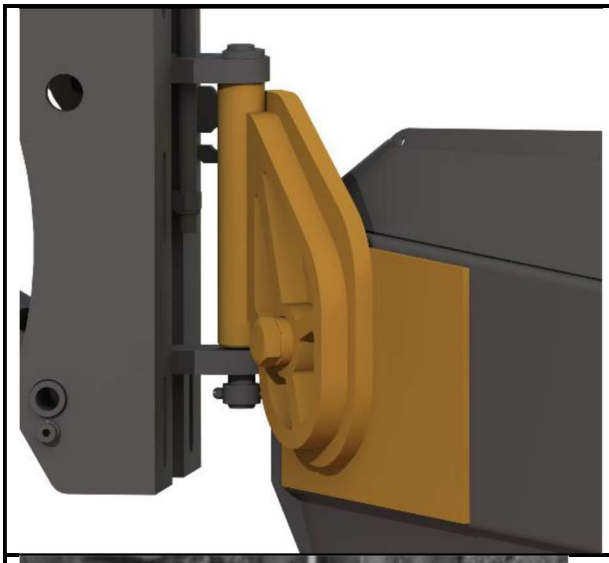
INSTALLATION INSTRUCTIONS

	8. If a Craig valve is provided, install the valve plate prior to replacing the front lift group.
	9. Ensure that the valve is centered in the opening and has ample clearance for hose that is coming off the side of the inlet section
	10. Mount the front post lift group to the bracket and tightly secure all bolts. Refer to "SPECIFICATIONS" section for bolt torque specs.
	11. If the machine is equipped with a ripper, it must be removed as well as the ripper lock valve, the hard lines and the cover plate from the rear bumper of the grader.

INSTALLATION INSTRUCTIONS

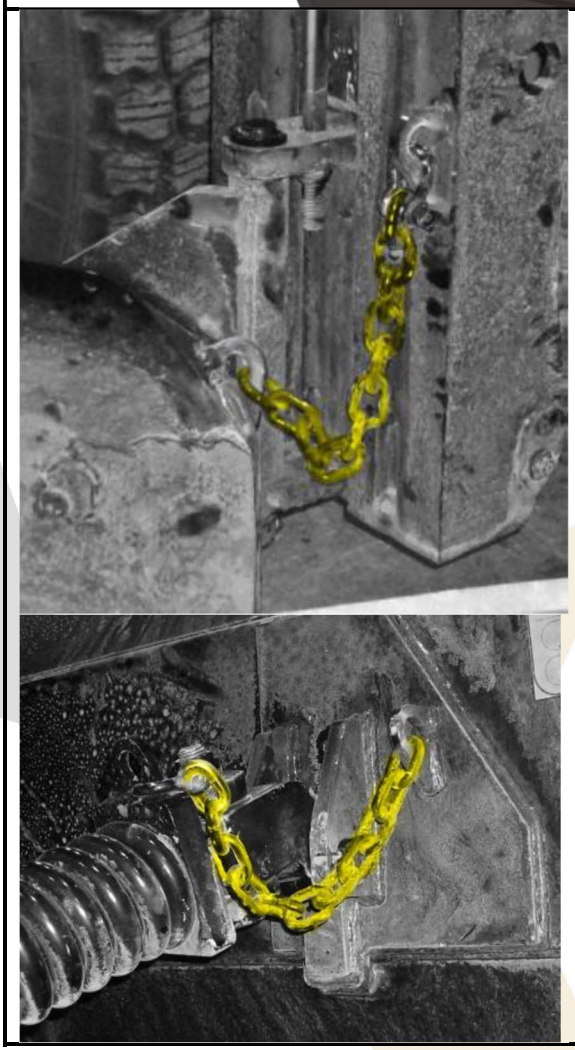
	12. Mount the rear post bracket (RPB) to the rear bumper using provided bolts and washers. DO NOT damage hydraulic adapters. NOTE: there may be ripper braces that must be connected underneath the frame.
	13. There are 4 holes in the RPB for hydraulic bulkhead adapters (locations may vary). These holes may need to be drilled through the bumper.
	14. Install bulkhead adapters for the rear lift hoses in the RPB. NOTE: The nut for the bulkhead adapter goes on the back side of the bumper. Ensure fastening bolts for the bracket are completely tightened before the bulkhead adapters are installed.
	15. Mount the rear lift group to the RPB. NOTE: Ensure the lift cylinder is mounted to the top swivel. This is opposite to the standard wing offering. The adjustment should be in the center position for the initial setup.

INSTALLATION INSTRUCTIONS



16. Mount the bell swivel (if it isn't mounted already) to the front of the wing moldboard using the 1-1/2" bolt and castle nut.

NOTE: Ensure the face of the bell swivel, the back of the wing and the slide are well greased prior to operation.



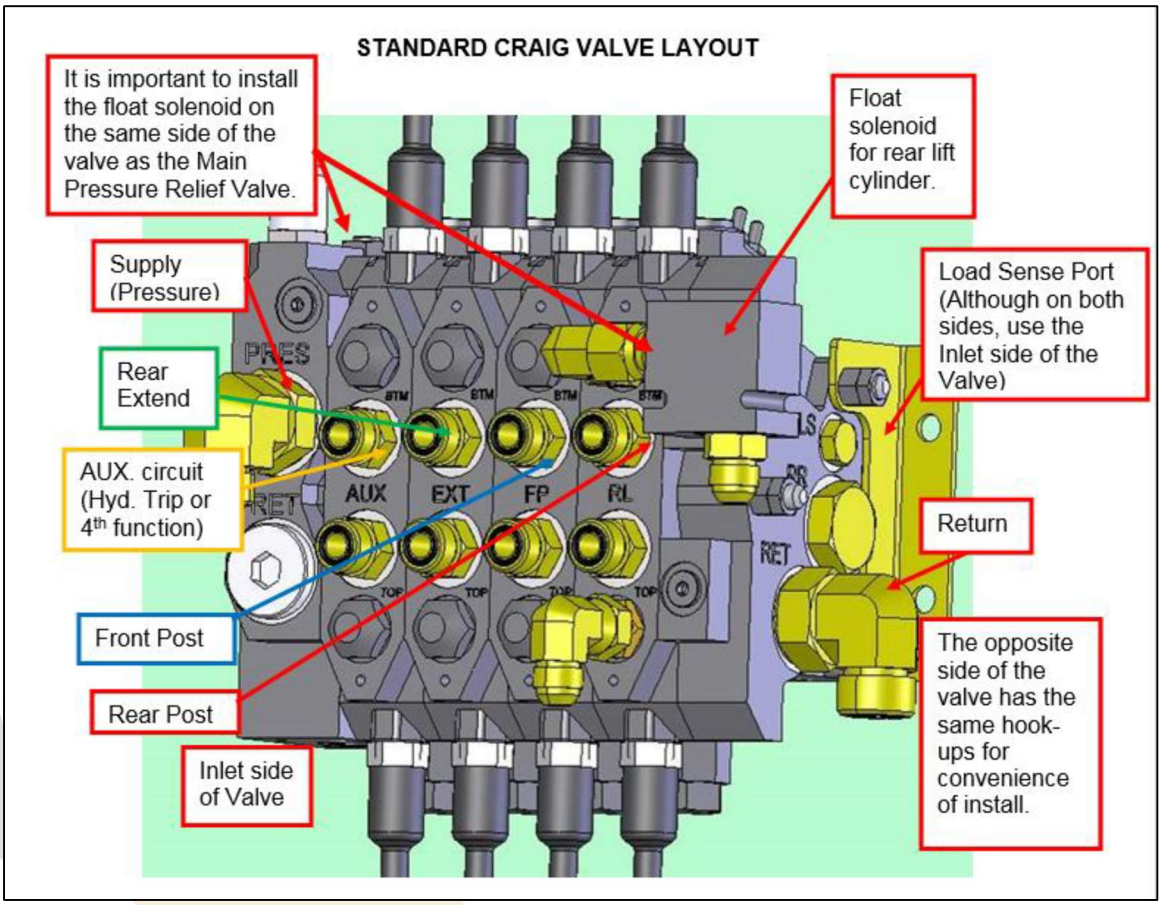
17. There are 2 safety chains already attached to the back of the wing. Attach them to the front and rear lift groups.

INSTALLATION INSTRUCTIONS

INSTALL HYDRAULIC HOSES AND ADAPTERS

It is recommended to route your hoses to check hose lengths before attaching them. Zip ties are used to mark hoses from Craig.

WING ASSEMBLY KIT - HOSE TIE COLOR CODE		
FUNCTION	ZIP TIE COLOR	SPECIAL
REAR LIFT	RED	AN ADDITIONAL GREY IS USED ON THE HOSES THAT RUN TO THE BARREL END OF THE CYLINDERS
FRONT POST	BLUE	
REAR EXTEND	GREEN	
PLOW HARNESS	ORANGE	
TRIP SWIVEL	YELLOW	
REAR POST (302)	PURPLE	
REVERSIBLE PLOW	PURPLE	



INSTALLATION INSTRUCTIONS

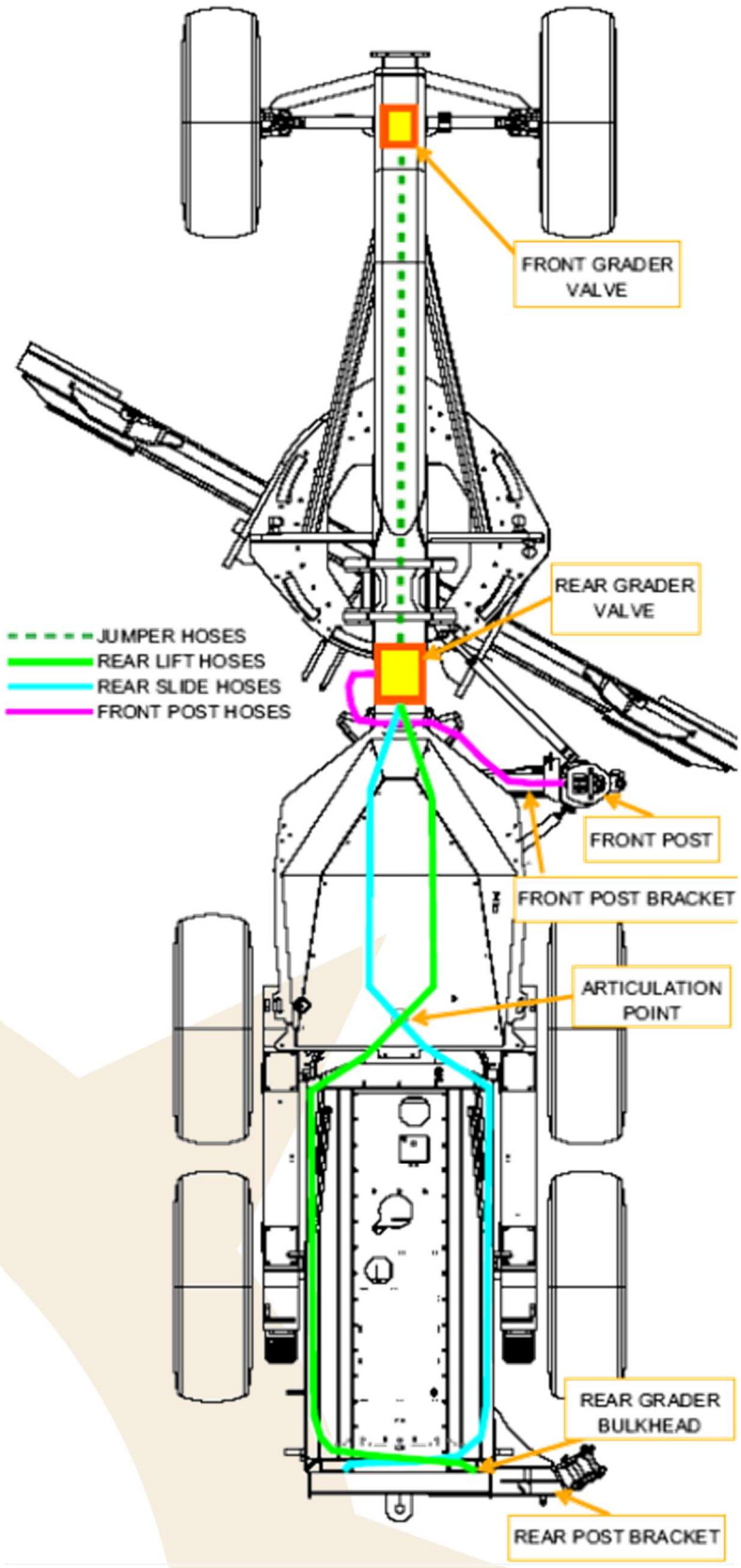
RECOMMENDED FLOW RATES

To operate the standard 300 wing assembly the grader will require 3 free spools. Another free spool is required for extra accessories. For warranty purposes one section must have float, and a second section must have a work port relief.

300 Wing Assembly Recommended Hydraulic Cylinder Flow Rates

Rear Extend (recommended)	• Work port relief at 1100 psi/Anti-Cavitation • 8-15 GPM (30-57 L/min)
Rear Lift	• Float required • 20 GPM (76 L/min)
Front Post	• Minimum of 5 GPM (19 L/min)

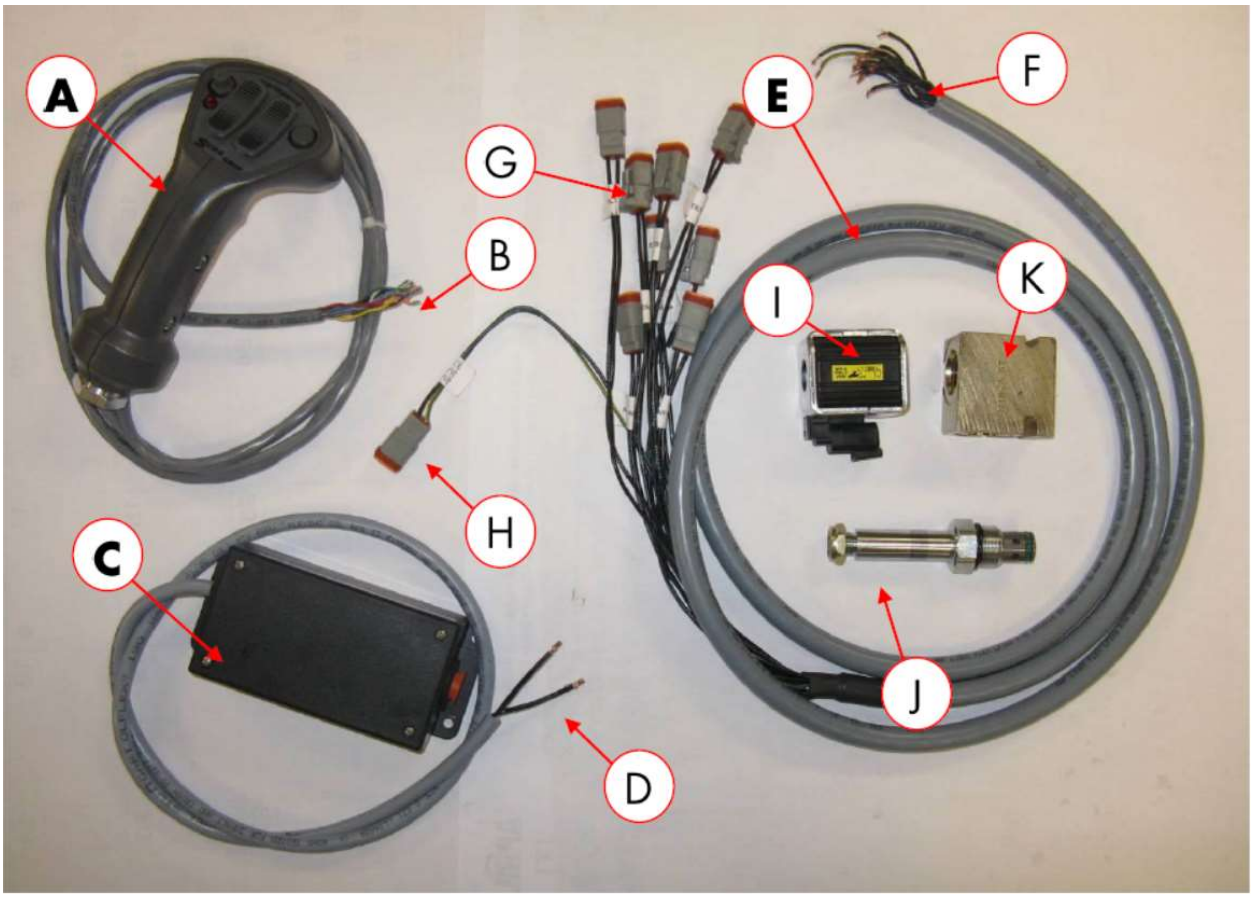
INSTALLATION INSTRUCTIONS



OWNER'S MANUAL

INSTALLATION INSTRUCTIONS

GENERIC ON/OFF JOYSTICK KIT



Joystick Kit Components

A – On/Off joystick wiring harness

B – Color coded wires to connect inside control box

C – Joystick control box (2A fuse inside for float circuit)

D – Numbered wires for power and ground

E – Valve wiring harness

F – Numbered wires to connect inside control box

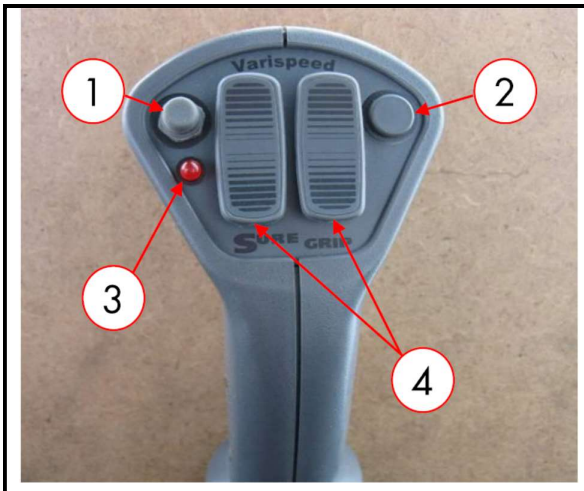
G – "DEUTSCH" connectors to connect to Craig valve

H – "DEUTSCH" for float solenoid

I – Float solenoid insert

K – Float valve body

INSTALLATION INSTRUCTIONS



ON / OFF Joystick Controls

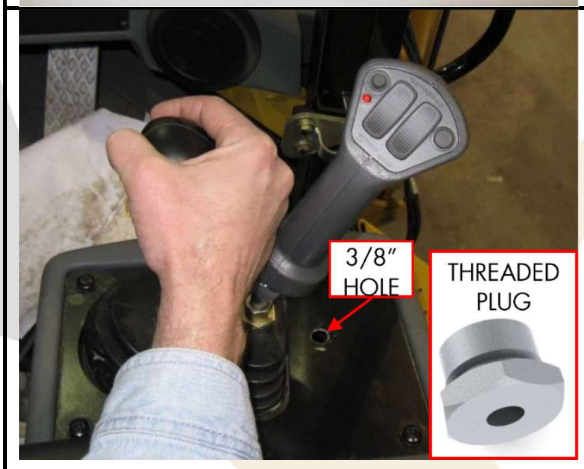
1. Turns float valve on and off
2. "Emergency Up" button (front and rear of wing will raise simultaneously)
3. Red light indicates that float is active
4. Toggle switches operate the wing functions

Note:

- The trigger on the underside of the joystick, when held, allow the toggle switches to operate two different functions, i.e. Wing extension, HTS, Reversible plow, Snow gate…

Joystick Wiring Harness

The joystick leads are shipped loose to allow the cable to be routed through the console in the cab using a small hole (3/8")



- Install Craig joystick. Generally, the joystick can be installed on top of the factory 3rd spool lever.
- Remove the plug from the bottom of the joystick. Drill and tap it to match the post in the existing lever.
- The existing post may need modified to allow the use of both levers without contacting the opposite lever.
- Drill a 3/8" hole next to this location for joystick leads.
- Be careful not to drill through anything that may be under the console.
- Be sure that there is enough cable to allow the lever to move through the full range of motion.

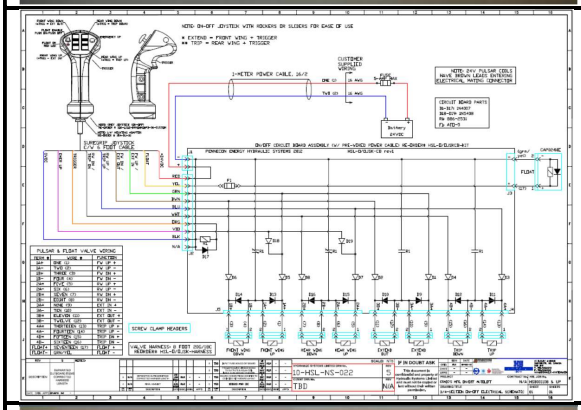
INSTALLATION INSTRUCTIONS

Valve Wiring Harness

Valve harness leads are also loose to allow the cable to be routed into the console through a single small hole drilled in the cab floor (13/16")

Note:

All wires have a specific location that they must be connected. If any wire is not connected on the proper location the joystick may not function properly.

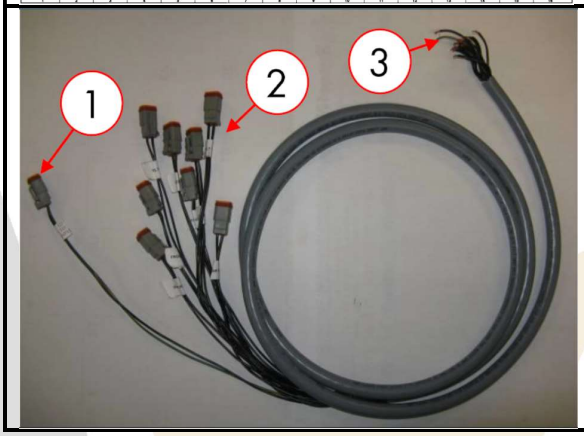


Wiring Schematic

There is a full wiring schematic located at the back of this manual.

Use the supplied wiring schematic to match all numbered and colored wires with the proper location in the control box.

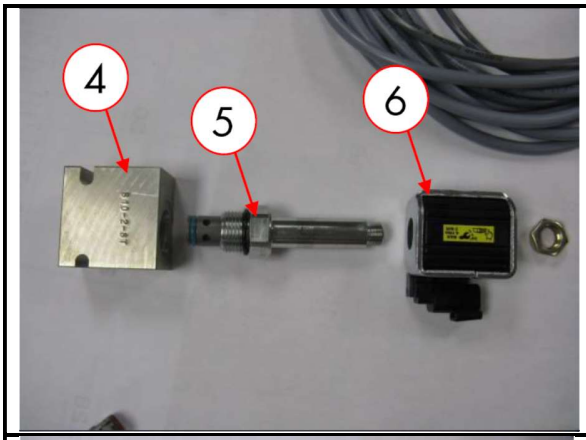
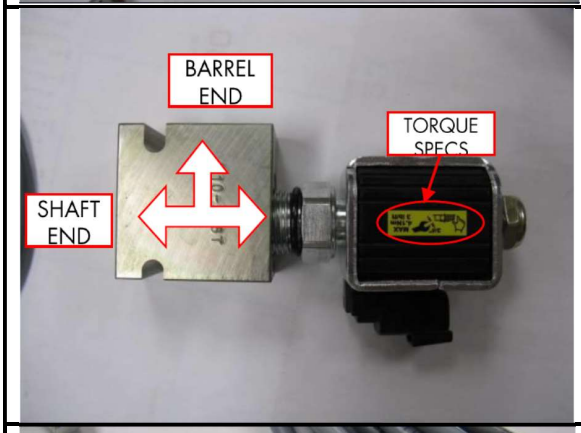
If you have any problems with this call our technical support team at 1-800-565-5007.



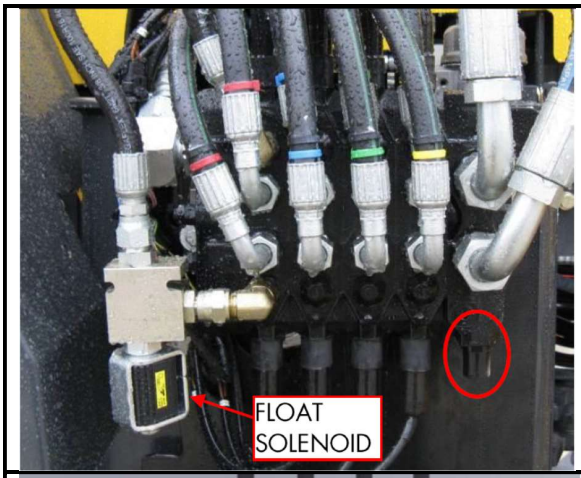
Valve Wiring Harness

1. This connector is for the float circuit and is connected to the float solenoid on the Craig valve.
2. These ends with connectors are labeled as to which function they control and are connected to the corresponding function on the Craig valve.
3. All loose wires on this end go inside the control box.

INSTALLATION INSTRUCTIONS

	4. Solenoid Valve Block – Connects to the "REAR LIFT" section of the Craig valve 5. Solenoid switch cartridge – controls the oil flow for the float circuit 6. Electro-Magnet – controlled by the "FLOAT" button on the Craig joystick
	Assembly the float solenoid assembly as shown in photo **Note:** • The orientation of the block is critical for proper orientation • The torque specifications for the nut are written on the electro-magnet **(DO NOT over tighten)**
	Designated connector on valve harness connects to the float solenoid as shown in photo following installation on Craig valve

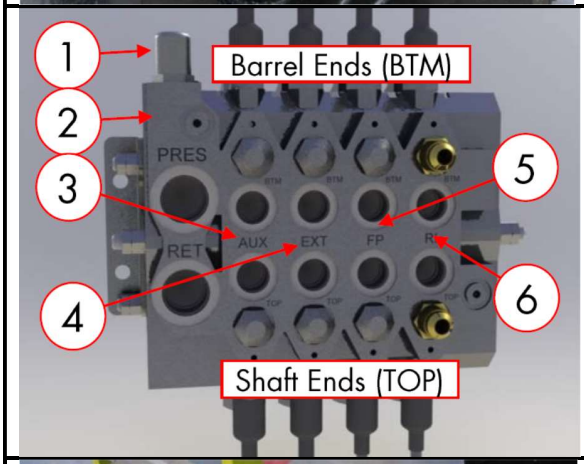
INSTALLATION INSTRUCTIONS



IMPORTANT

- Regardless of the orientation of the Craig valve, the float solenoid **MUST** be installed in the proper orientation.
- The valve shown here is oriented upside down due to the path chosen for routing the hoses.
- Circled in the photo is an aluminum cap (pilot control cartridge)

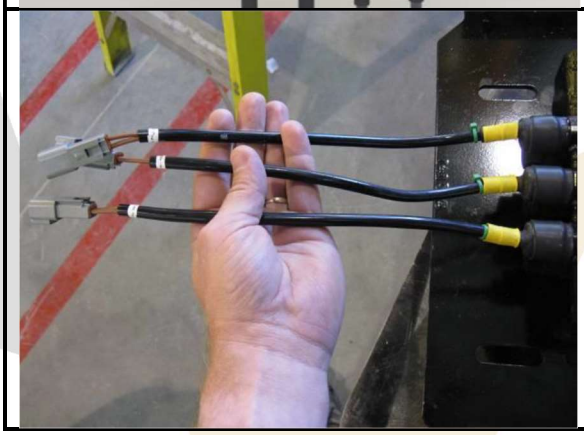
The float solenoid must be installed on the same side as this cap in order for controls to operate properly.



Craig Valve

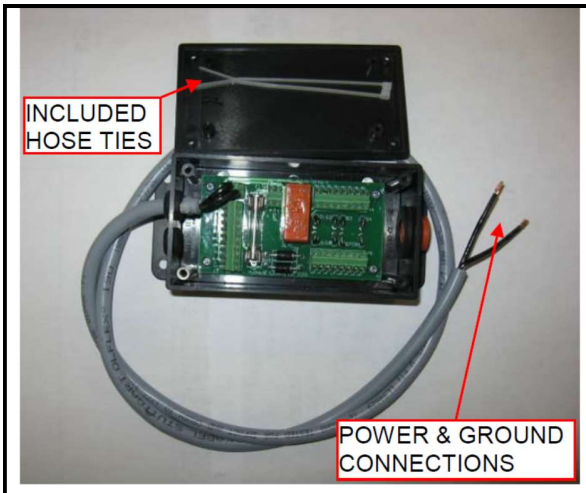
1. Pilot control cartridge (Aluminum Cap)
2. Inlet valve section
3. Aux valve section (HTS, Reversible Plow, Snow Gate, etc.…)
4. Push pole extension section
5. Front post section
6. Push pole rear lift section

Note: Item #1 will always locate the ports that are to be connected to the BTM (barrel end) of the cylinder.



"DEUTSCH" female valve connector will come pre-assembled with the valve

INSTALLATION INSTRUCTIONS

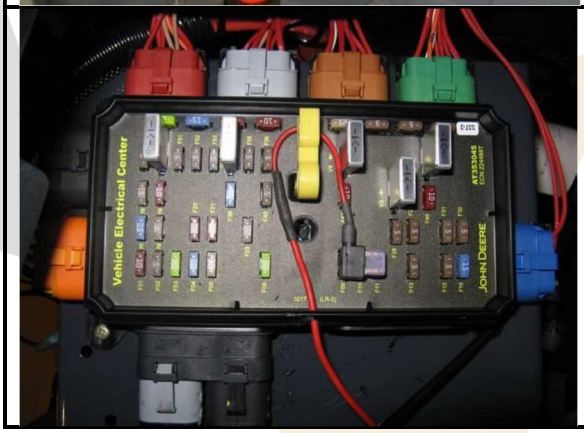


Joystick Control Box

- Prior to beginning connections in the control box, find a location inside the cab (usually in the fuse box area) where the box will be protected from the weather.
- All loose wires are to be connected inside of this box. They are either numbered or color coded for ease of locating on the wiring schematic supplied at the rear of this manual.
- The fuse located inside the control box is intended to protect the float solenoid circuit only.

Power Connection

The power connection must be connected to fused 24V keyed power. This fused connection will protect the joystick control box from any electrical surges.
The easiest location to get keyed 24V power to the control box is in the machines fuse panel. There will be an "Add a circuit" included in the HYDK supplied, this will take one existing fuse and convert it to two fuses each on its own circuit. So if one blows (if installed correctly) the other still has power.



Locate an existing fuse (keyed power) less than 10A. Install the "Add a Circuit" according to the instructions printed on the package and both the existing and the new fuse will work independently.

Note:

- Slight modifications to the fuse panel cover (if equipped) may be required in some cases to allow the cover to close tightly.

INSTALLATION INSTRUCTIONS

	Locate a suitable ground connection to ground the control box. Generally, there will be a suitable ground post in the same location as the fuse box of the machine.
	**Finish Installation** • After all connections have been made and are secure inside the control box, use the included hose ties and clamp ends of cables inside the box tightly. This will help to keep the wires securely in the box and prevent them from accidentally being pulled out. **Note:** DO NOT complete these final steps until the entire installation is complete (including the hydraulics) and tested to ensure proper operation.
	Replace the cover on the control box and install the supplied decal on top of the box. The joystick installation is complete. If you encounter any problems or have a suggestion about something that may not have been clear in this manual please feel free to call us toll free at 1-800-565-5007, or send us an e-mail at techsupport@craigattachments.com

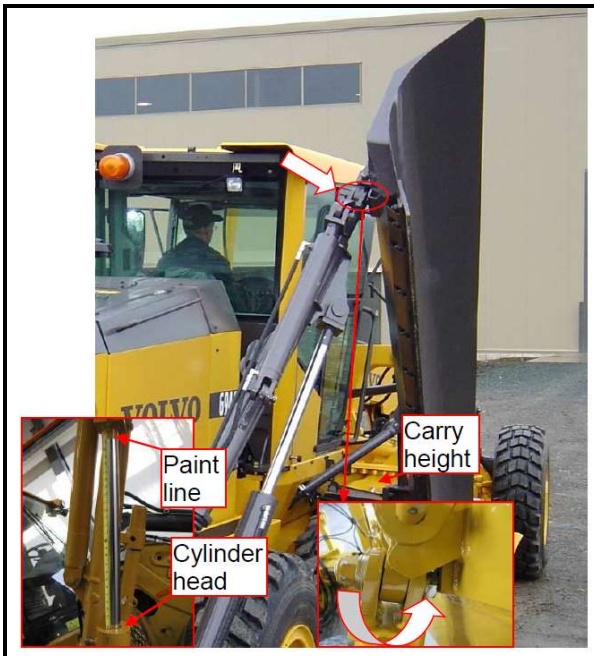
The final test procedure involves:

- Stroking all functions of the wing assembly to ensure that all cylinders are full of oil and are operating to the full range of motion. **Note:** All strokes of the cylinders are stamped on the barrel of the cylinder.

INSTALLATION INSTRUCTIONS

SETTING WING STOP

This procedure should be performed with all snow gear installed on the machine. There is no front plow installed on this machine. This illustration is for demonstration purposes only.



Following this procedure is the responsibility of the installer and will ensure that when the wing is being transported in the carry position there is no excessive "slap" or movement in the wing, which may cause premature damage to the equipment. This procedure should be repeated periodically or as required.

NOTICE **Failure to complete this procedure may result in damage to the snow gear or to the machine and may void manufacturer's warranty.**

1. Raise front of wing to height off the ground at which you will be carrying your wing in travel (approx. 10-12")
2. Completely raise the rear lift group.
3. Measure the full stroke of the lift cylinder from the top of the cylinder head to the paint line on the shaft. As shown in the lower left picture.
4. Have someone lower the lift cylinder so that the measurement is now ½" less than the full stroke, note this measurement. i.e. if the full stroke measurement is 26", lower to 25 ½". Use this measurement for the rest of the procedure.
5. The bolt head at the end of the lift group (indicated by the block arrow) should contact the back of the wing at this point.
6. Visually measure the distance between the bolt and the back of the wing.
7. Lower wing to a height where this bolt is easily accessible.
8. Apply a slight amount of upward pressure on the wing moldboard to support it while the bolt is removed. Make sure the wing **CANNOT** accidentally fall.
9. Remove washers from the locknut side of the bolt and add them to the bolt head side until the head of the bolt contacts the back of the wing.
10. Raise wing fully to ensure all moving parts tighten up and there is no excessive movement in this position.

OPERATION INSTRUCTIONS

INTENDED USE

Craig 300 snow wings are intended for low to mid speed road use under harsh conditions. Use outside of this scope is considered misuse.

WARNING Operator and maintenance personnel must be trained and familiar with the entire manual. The operator is responsible for safety. If there is any portion of this manual or function you do not understand, contact your local authorized dealer, or Craig Manufacturing Ltd.

PRIOR TO OPERATION

- Inspect machine and all equipment prior to use. Refer to "MAINTENANCE" section and perform all periodic inspections and maintenance.
- Ensure operator cab is clean and free of distracting objects or spills.
- No passengers allowed.
- Make sure all levers, pedals, switches, or other controls are in neutral position prior to starting the engine.

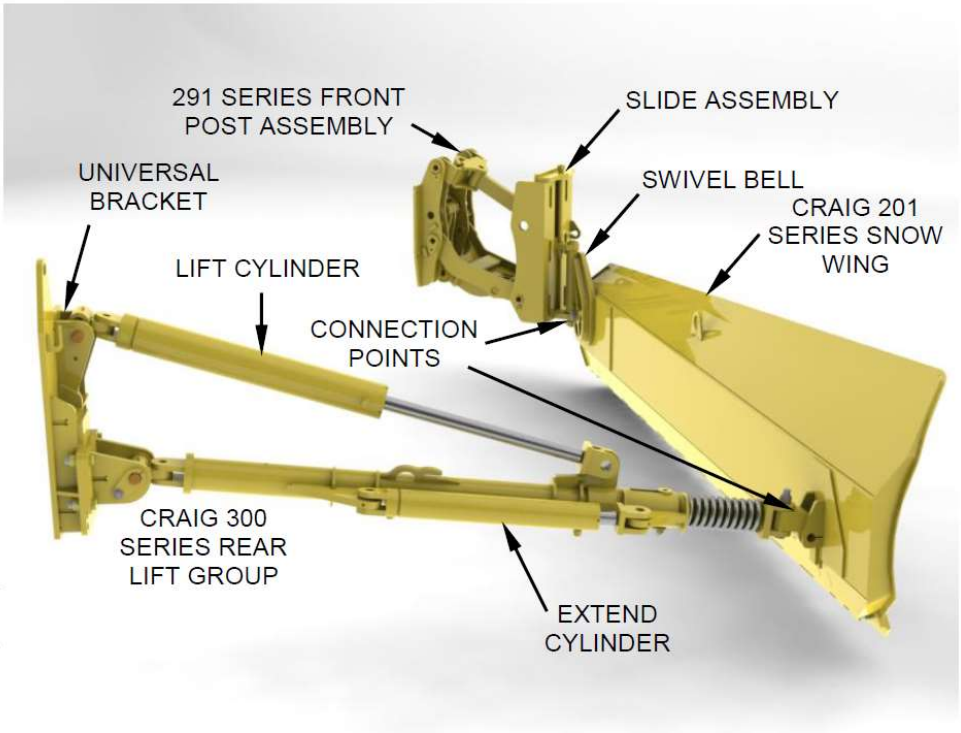
OPERATION

- The operator should be familiar with all controls. Refer to the machine owner's manual for further operation instructions.

NOTICE Ensure plow harness is operated level (90°) to the ground. This will help the wing moldboard operate at the correct plowing angle and not chatter or dig into the road shoulder. The bottom of the plow harness should be 10-12" from the ground, which will help to ensure that the harness does not bottom out on the road surface and cause premature wear.

- When raising the wing, raise the front first, then the back. This ensures that the front will not dig into the road surface. When lowering, lower the rear first and then the front for the same reason.
- Operate the wing with the extend cylinder extended. This allows the cylinder work port relief (discussed in the wing features section) to function as a shock absorber.
- Use the float function (float button) when winging on a road surface or the shoulder (discussed in the wing features section).

OPERATION INSTRUCTIONS



NOTE:
FRONT AND REAR POST BRACKETS ARE NOT SHOWN, AS THEY WILL VARY FOR ALL DIFFERENT MAKES OF MACHINE

NOTE: The Craig 300 series wing mounts in the same location as the standard 301 & 302 series wings. The 300 series offers a few options that were not previously available on other models. The additional options depend on the model that has been ordered. All 300 series models offer access from both of the cab doors (no ladder is supplied for right had side door). Model options are listed below:

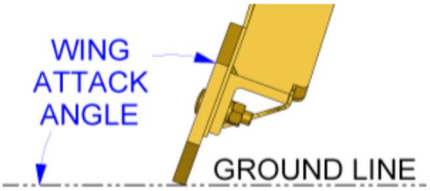
1. STD 300-12 (-00)
    a. Up to 30" level bench (shelf) height.
    b. 21-1/2" of extra reach at the rear of the wing.
    c. 12" mechanical float at front of wing.
    d. Easily replaceable plunger assembly on push pole
2. Hydraulically Adjustable 300-12 (-02)
    a. Hydraulically adjustable pitch control (see following pages)
    b. Up to 30" level bench (shelf) height.
    c. 21-1/2" of extra reach at the rear of the wing.
    d. 12" mechanical float at front of wing.
    e. Easily replaceable plunger assembly on push pole

OPERATION INSTRUCTIONS

WING MOLDBOARD MANIPULATION

Depending on the type of snow you are plowing (wet, fluff, frozen…) sometimes a slight tweak to the wing's attack angle or moldboard pitch can be quite helpful in achieving the required results.

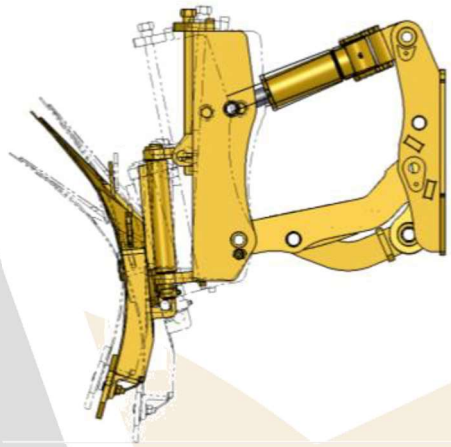
NOTE: this may not be an option with the model that you have received. The base model 300 series has a rigid attack angle and allows for no moldboard pitch control.



Wing attack angle is the angle to which the base edge of the wing contacts the ground. The act of changing this angle is known as moldboard pitch. See illustration.

There is one (1) option above the base model, and both allow for moldboard pitch adjustment.

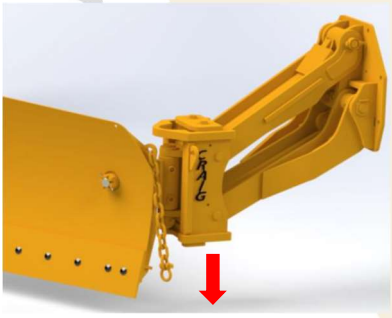
When the slide assembly is vertical (90° to ground), the Craig wing is designed to give the best overall performance for most types of snow. However, the need to adjust the pitch can still be required in some situations.



HYDRAULICALLY ADJUSTABLE PITCH CONTROL

The wing moldboard can be set to any angle within the stroke of the cylinder to achieve the desired result. All adjustments can be completed from inside the cab. (Range of motion shown here)

PLOWING SNOW



When plowing snow with the Craig 300 series wing, the front post should be fully lowered. This will allow the wing to float approximately 5" down and 7" up. The rear lift (connected to a valve section equipped with float capability) **must be operated in the float position.** Doing this will allow the Craig wing to follow any imperfections in the road surface. Also, if an object is struck while plowing, the wing will float over the obstacle to avoid damaging any part of the Craig snow gear or your machine.

OPERATION INSTRUCTIONS

TRIP SPRING BRACE ADJUSTMENT (OPTION)

Adjusting the tension should only be completed in a controlled environment, and only if it is absolutely necessary. The trip springs are pre-tensioned to approximately 2500 lbs when they leave the factory.

In order to adjust the spring tension, the pin must be removed connecting the brace to the rear of the slide assembly (indicated by RED arrow above).

NOTE: For safety reasons it is recommended that the wing is supported during this procedure.

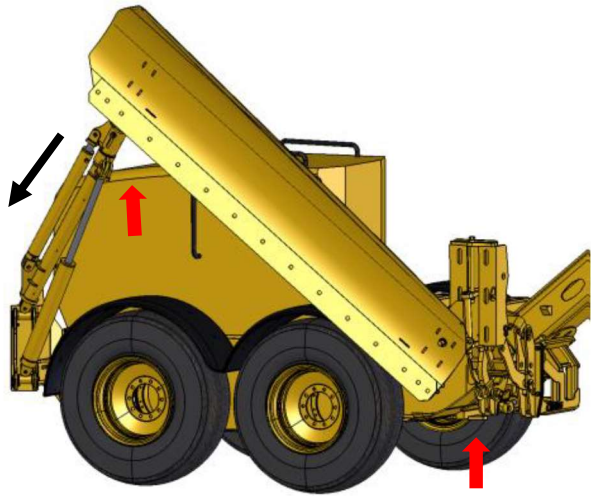
- Before the pin is removed, loosen the jam nut at the rear of the spring keeper bar (circled in BLUE).
- Remove the pin and rotate the slide assembly forward enough to allow the spring brace to swing up enough to get at the end lug.
- Turn the end lug like you are tightening a bolt to increase the tension on the springs or loosen if there is too much tension on the springs.

NOTE: When tightening or loosening the spring, every 1/2" of movement in the springs is equal to about 600 lbs.

- Adjust to required spring tension and reconnect the front pin to the slide assembly.
- Ensure that the grease fitting is up for ease of lubrication.
- Tighten the jam nut at rear of spring keeper.

OPERATION INSTRUCTIONS

RAISING TO CARRY POSITION



When raising the wing from the ground the front of the wing should be raised first. This will avoid the wing gouging into the ground when the rear is raised.

When you are travelling from site to site you put the wing in what is called the "carry position". In this position the wing is at its closest point to the grader to avoid any unnecessary movement from the wing. This is achieved by raising the front lift fully and raising the rear of the wing fully. The extend cylinder should be retracted in this position.

LOWERING TO PLOW POSITION

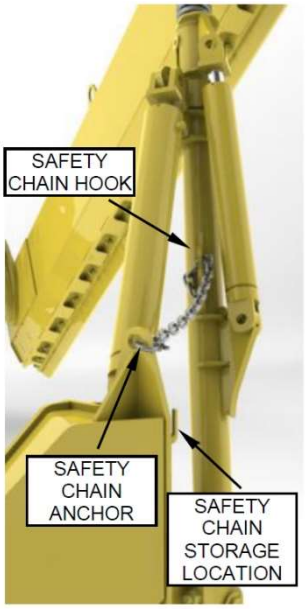
When lowering the wing to start plowing, the front post will lower much faster than the rear of the wing. A good practice to get into is to lower the rear of the wing prior to lowering the front.

It is ideal to lower the wing so that the wing either contacts the ground level or the rear of the wing contacts slightly before the front.

STOWING WING

When you are travelling for long distances or if you are done plowing for the day and are heading back, then the wing should be raised to the carry position and the safety chain fastened from the rear post bracket to the hook on the rear lift group. This will catch the wing in case anything would happen to the hydraulics holding the wing up. In the case of overnight storage, it will keep the wing from seeping down onto something that it shouldn't.

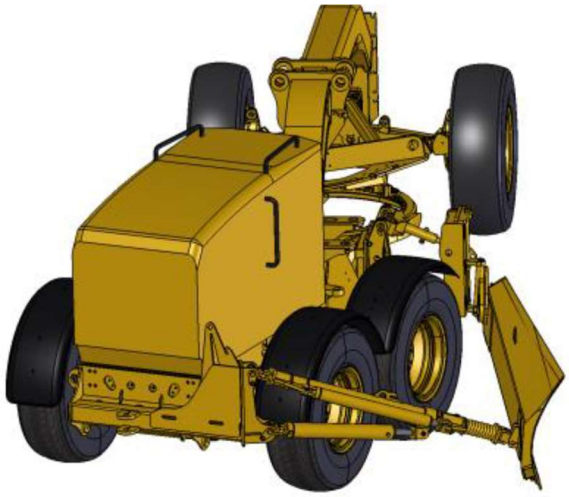
NOTE: Ensure that the safety chain is removed before attempting to lower the wing, severe damage may occur.



OPERATION INSTRUCTIONS

ARTICULATION OF GRADER

In order to articulate the grader and know that there will be no unwanted contact with the grader the wing needs to be either fully raised (front and back) or on the ground plowing snow. The design of the 300 series, in one of these two (2) positions, will allow the grader to have the full range of motion whether the machine is articulated (left or right) or is being articulated… See below for important notes.



NOTE:

- If you have received the hydraulic adjustable moldboard option, there are a couple of positions when articulated or articulating to the left that the wing moldboard could contact the fenders or possibly the rear tires.
    - When the moldboard is tilted all the way forward being raised.
    - When the moldboard is tilted all the way forward being lowered.
- This should be tested in a controlled environment, prior to releasing the grader into the field to ensure the operator knows the limitations, if there are any.

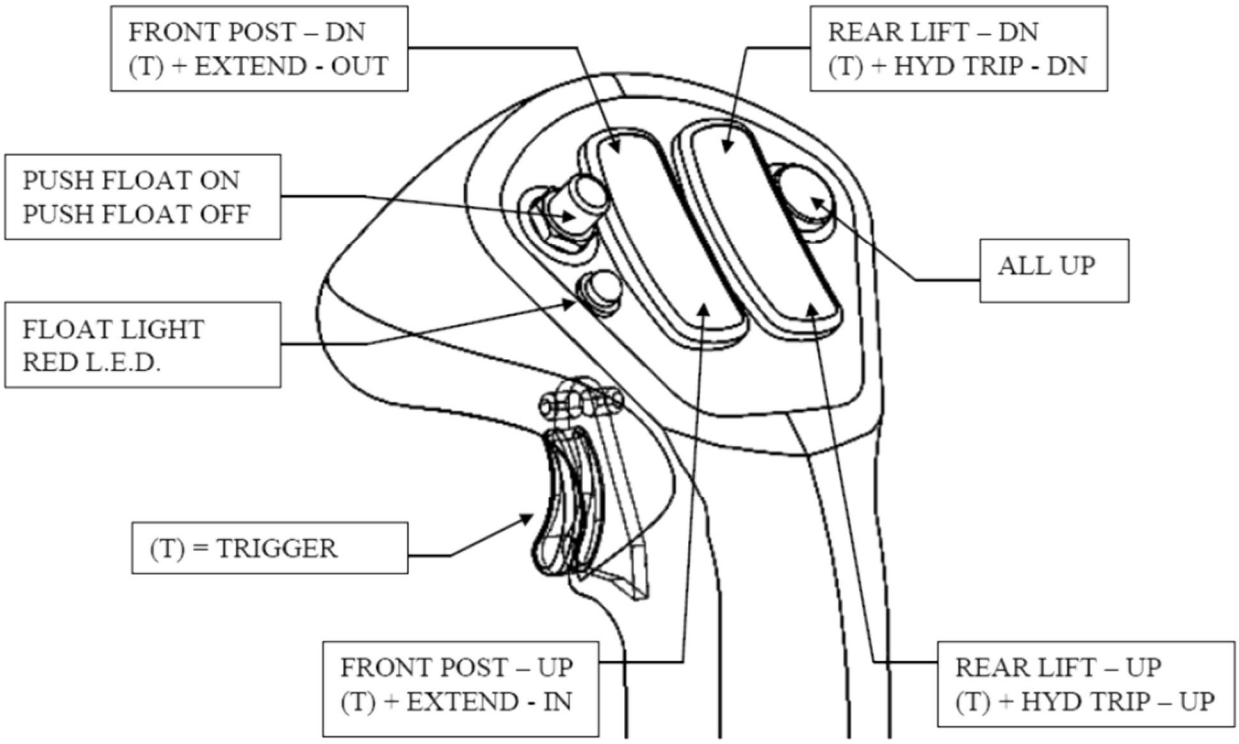
NOTICE

Failure to raise the wing to the appropriate articulation height could damage the snow gear, the machine, and could affect the manufacturer's warranty.

OPERATION INSTRUCTIONS

CONTROLS

Before using your new wing, be sure to familiarize yourself with the joystick wing controls. The diagram below shows the Craig joystick and the controls.



OPERATION INSTRUCTIONS

FEATURES

There are some built in features of the Craig wing that may not be obvious. Among them are:

- Hydraulic work port relief
- Emergency up function
- Wing float
- Front mechanical float
- Front post shear bolt

Hydraulic work port relief allows the extend/slide cylinder to collapse on heavy impacts, like a shock absorber. This is achieved hydraulically via a relief in the hydraulic circuit that activates when the pressure in the extend cylinder reaches 900 psi. This feature allows the cylinder to completely collapse in the event of striking a large obstruction, protecting other components in the wing assembly. It is resettable by operating the extend joystick function.

The "emergency up" or "all up" button on the joystick is another important feature of the joystick. Pressing this button will fire the front and rear lift cylinders and pick up the wing. This is an ideal function when coming up to an obstruction (i.e. A curb) the entire wing can be raised quickly to avoid damage. Alternatively, the front and rear lift joystick rocker switches can be used to accomplish the same result. Firing the front lift then the rear lift separately will lift the wing slightly quicker but utilizing the "emergency up" button as a reaction button is a good operating practice.

The float button on the joystick is an important wing function as it allows the wing to "float" over the road surface, following its contours up and down. The float button opens up a passage in the Craig valve, allowing the A and B cylinder ports on the rear lift cylinder to extend and retract with the weight of the wing. Pressing the float button with the wing in a raised position will allow the wing to lower slowly. You will notice after pressing the float button that the red light will light up below the float button. This is an indication that the float circuit is active. To turn off the float function, simply press the button again.

The front of the wing assembly is equipped with a mechanical float pin, allowing the wing to travel 14-3/4" on the front post as the lower slide moves freely on the lift bolt.

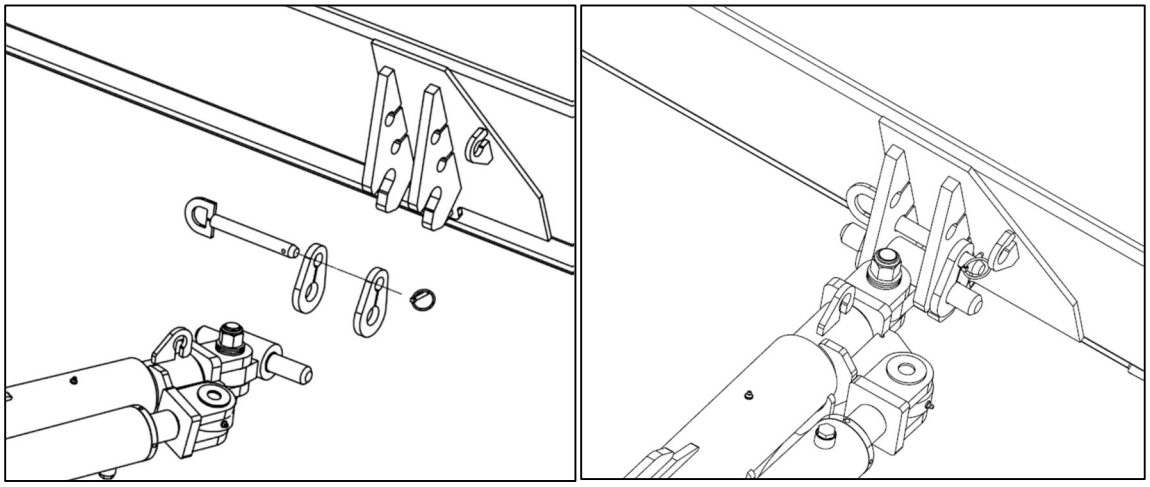
The Craig wing contains a 1-1/2" bolt which attaches the wing moldboard to the front bell swivel. This bolt is intended to be a shear bolt and in the event that it does shear it must not be replaced with any bolt above Grade 2.

OPERATION INSTRUCTIONS

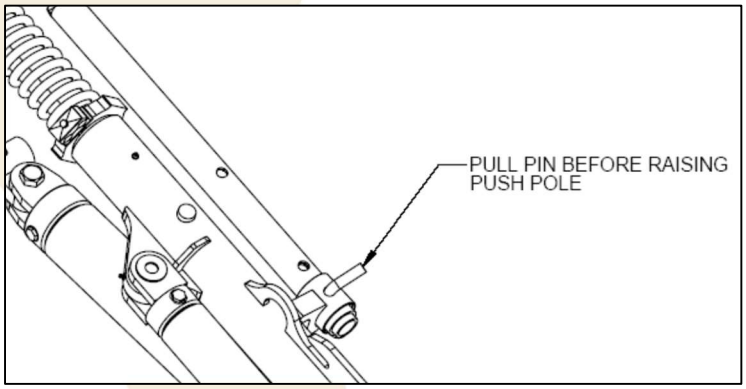
ATTACHMENT THE WING

Attaching and detaching the wing from your loader is a common practice throughout the winter months. Craig recommends the following practice for attaching the wing to the loader.

1. Engage the loader coupler into the plow harness and roll back the coupler until the hookup has seated, then extend the locking pins. Visually check the pins to ensure that they are securely attached, then attach hydraulic lines running to the plow harness and front plow.
2. Attach the push pole swivel into the wing bracket slot as shown below. This is easiest when the extend cylinder has been extended about 12". Insert the lock pin, locking lugs, and lynch pin. Then connect the safety chain.



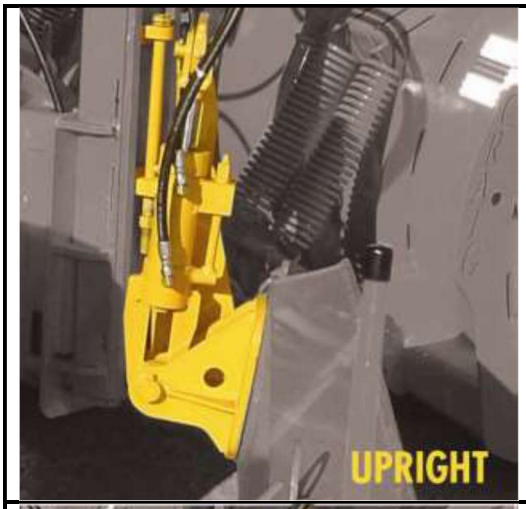
3. Before raising the wing, ensure that the pin holding the adjustable brace onto the push pole is pulled as shown below. Failing to do so can cause the adjustable brace to bend or break. This brace is only intended to provide stability to the push pole when detached from the wing moldboard. Once connected to the wing moldboard it should be free to move.



OPERATION INSTRUCTIONS

HYDRAULIC TRIP SWIVEL (HTS-200) OPERATION

The optional hydraulic trip swivel adds versatility to your Craig wing assembly. When plowing snow, it is difficult to see what lies beneath that fresh blanket of snow. The Craig HTS is designed to work with virtually any Craig wing package. Having a Craig HTS package on your snow wing will aid in the protection of your machine and snow gear. It can be used for adjusting the angle of attack that the wing cutting edge makes with the ground, with its full range of motion shown below. It's important to note that although leaning a wing moldboard ahead can help to scrape the ground, the wing may be prone to "chatter" or bounce on the ground. These adjustments are entirely an operator preference.



- The hydraulic trip swivel (shown in yellow) is shown here in the full upright position. This is the position that the wing should be in for everyday plowing.
- The trip swivel can also be used to adjust the angle at which the cutting edge hits the ground. This can be useful in different types of snow conditions.
- The joints on your trip swivel should be greased as specified in the maintenance section of this manual.

- When a solid object is struck while plowing, the wing will "trip" over to help protect your machine and the snow gear.
- When the HTS trips it can be stood up from inside the cab. There is a decal located inside the cab that shows how to operate the controls of your wing.
- To reset the trip swivel, hold the trigger down and press the lower right rocker switch on the joystick as shown in the photo.

NOTICE DO NOT raise the wing while in a tripped position – this can damage the front post and wing moldboard.

OPERATION INSTRUCTIONS

WING ASSEMBLY AND HYDRAULICS

Hydraulic Adjustments

The following adjustments can be made to the Craig hydraulic system. Before making any adjustment on the system, be sure the system is operating correctly, and all linkages are free and lubricated. Once the system is adjusted properly it should need no further adjustment.

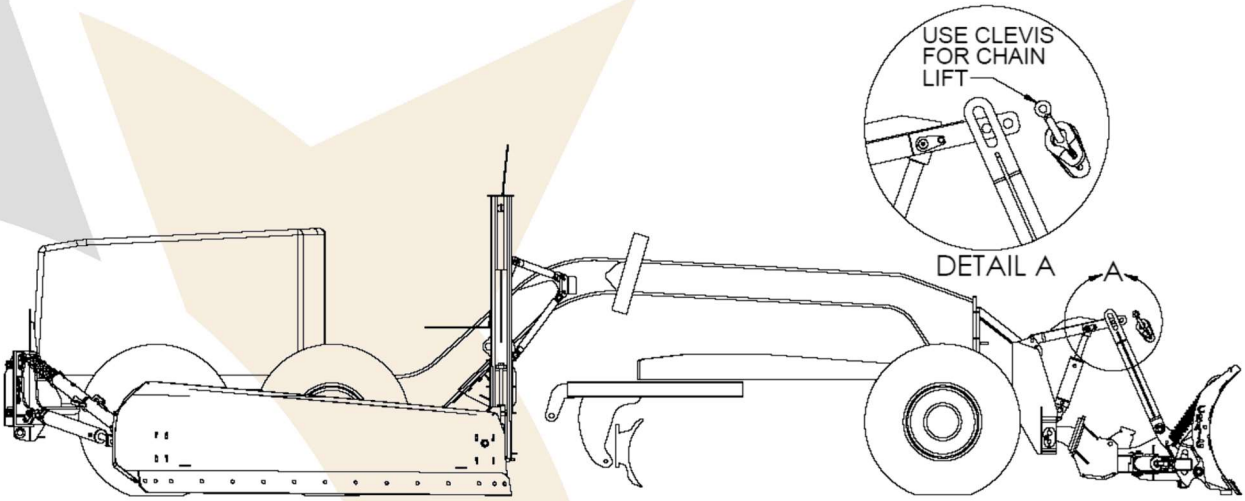
Do not make any adjustments to your loader hydraulic system until you have referred to the loader operator's manual.

Valve handles with Cable hookup

To adjust the cables that control the valve, loosen the Allen screws that hold the ring on to the valve spool. With the ring loose, turn the sleeve. As you turn the sleeve you will notice the valve handle moving. Adjust the sleeve until the lever is in the proper centered position. Ensure that the lever has a full range of motion in both directions and can fully open and close the valve. Finish by tightening the Allen screws so the ring is tight against the valve spool.

HYDRAULIC REVERSIBLE PLOW

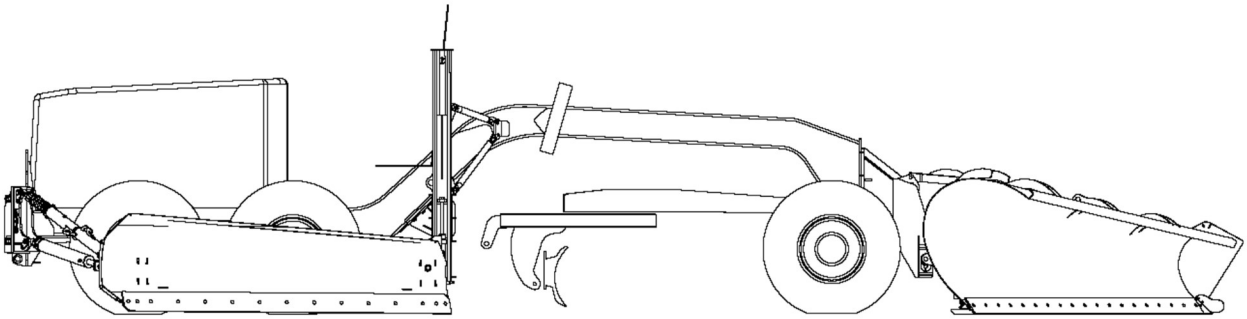
Grader is shown with Craig 0600 Series Hydraulic Reversible Plow c/w Down Pressure arms. The detail shows the plow in float position. To apply down pressure, lower the lift group to bottom out the lift pin in this slot. (NOTE: THIS IS NOT INTENDED TO LIFT THE FRONT WHEELS OF THE GRADER OFF THE GROUND). In the float position this plow is designed to follow any imperfections in the road as pitch side to side to follow the crown. When applying too much down pressure this will be restricted.



OPERATION INSTRUCTIONS

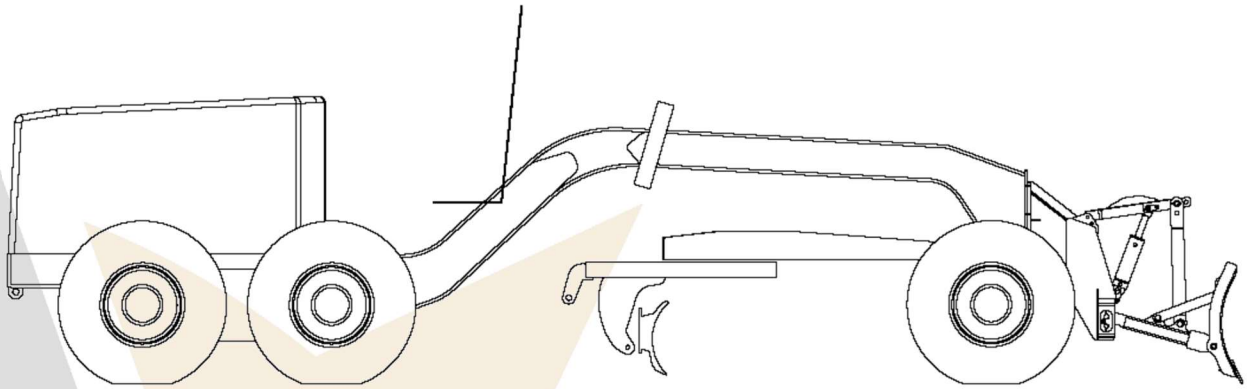
CHAIN LIFT ONE-WAY PLOW

Grader is shown with Craig 600 Series One Way Plow with chain lift. When this plow is installed, there should be a small amount of slack in the chains that lift the plow. This will allow the plow to follow the imperfections in the road as well as pitch side to side to follow the crown when properly adjusted.



CRAIG DOZER BLADE

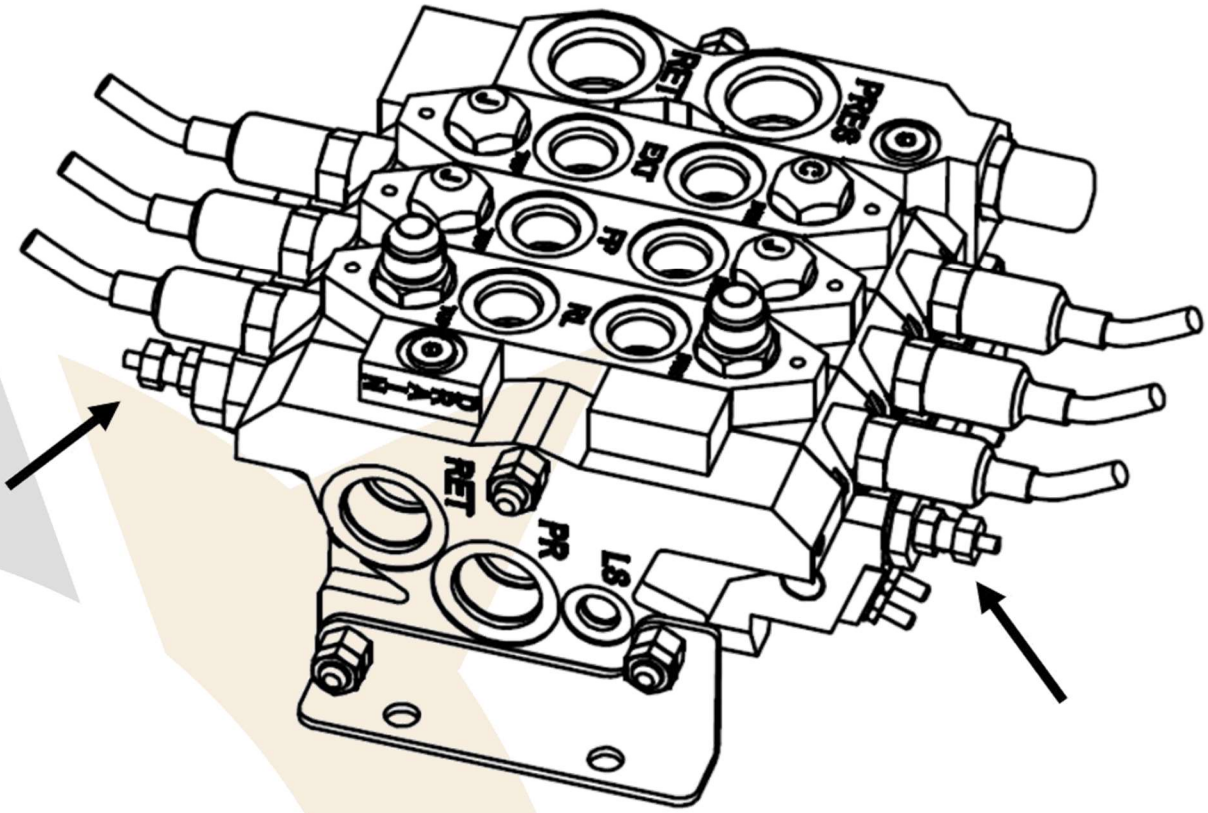
Grader is shown with Craig 850 Dozer Blade c/w Down Pressure. This is a rigid design any float capability should be done through the cylinder. It is designed to give you a minimum of 4" of dig depth in loose earth. (NOTE: THIS IS NOT MEANT TO LIFT THE FRONT WHEELS OF THE GRADER OFF THE GROUND).



TROUBLESHOOTING

Problem	Possible Cause	Remedy
Cracks in steel structure or weld	Overloading or side loading	Immediately stop use and contact Craig Tech Support at 1-800-565-5007
Cylinder is slow or fails to actuate	Leaking hose or fittings	Check for pinched hose or damaged fittings. Refer to safety instructions for proper procedure to check for leaks.
	Insufficient hydraulic flow	Refer to recommended flow rates in installation section.
Excessive wear on pins	Lack of grease	Ensure all pins are greased regularly. Replace any worn parts.

In the event that you experience trouble with your joystick during plowing, the wing can be operated using the manual overrides on the Craig valve itself. Lift the front of the wing using the machine boom arms and use the manual override to lift the rear of the wing in order to get the machine back to the shop. Manual overrides shown below:



MAINTENANCE

GENERAL INFORMATION

It is the operator's responsibility to inspect all equipment daily. Regular maintenance is necessary to prolong the life of the equipment, avoid costly shutdowns, and keep things running optimally.

WARNING Operator and maintenance personnel must be trained and familiar with the entire manual. Refer to the "SAFETY INSTRUCTIONS" section and follow the "MANDATORY SHUTDOWN PROCEDURE" prior to doing any work on the machine.

PERIODIC MAINTENANCE TABLE		
Procedure	Daily	Weekly
Clean attachment of snow/debris prior to inspection, especially around cylinder.	X	
Inspect all equipment for damage, worn parts, cracked welds, etc. If a crack is found in either the steel structure or welds, the attachment must be removed from the machine and Craig Contacted immediately. *Contact Craig Tech Support (1-800-565-5007) for recommended weld procedures.*	X	
Check pins and bushings for play or wear. Replace if worn	X	
Check cutting edge for wear. When the cutting edge needs to be replaced, also replace all bolts, nuts and lock washers with new ones.	X	
Hardware - replace missing or damaged bolts/fasteners, tighten as necessary	X	
Check for kinked/pinched or worn hoses. *Repair/reroute as necessary*	X	
Hoses - check for leaks. *Repair/tighten as necessary*	X	
Decals - replace worn or missing	X	
Check all equipment for grease and excessive wear. See following page for instructions.	X	
Grease all rear lift group fittings		X
Grease/coat manual overrides on valve		X
Ensure daily checks are completed		X

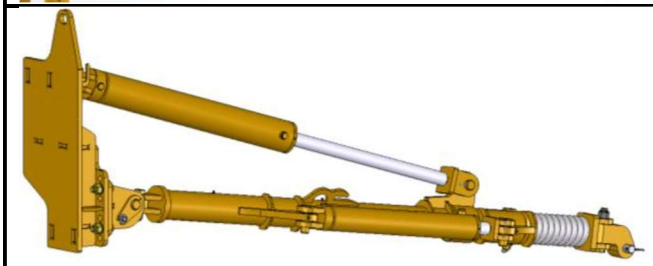
LUBRICATION

The most crucial maintenance tip required for a snow wing is greasing. Greasing the pivot points on your attachment daily with use will help to ensure smooth operation over its lifetime. A well-greased point keeps the metal-to-metal contact to a minimum and with it minimizes wear. A proper greasing technique involves pumping grease onto the fitting until you can visibly see the grease coming out around the joint.

MAINTENANCE

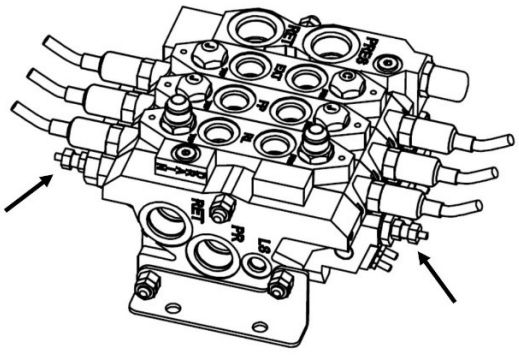
GREASE LOCATIONS

Grease Points – Craig Front Post
This process should be done periodically, check all equipment for grease and excessive wear each day of use to ensure proper lubrication is maintained.
Locate all grease fittings on front post assembly, there should be fittings on all pivot points and there are two (2) located on the slide assembly. The area behind the slide should be greased thoroughly prior to operation. The connection between the swivel bell and the wing should also be greased thoroughly.



Grease Points – Craig Rear Lift Group

1. Thoroughly grease all fittings on the rear lift group once a week… they are not all shown in this photo.
2. Operate wing through its full range of motion to ensure that everything moves freely without binding or sticking.



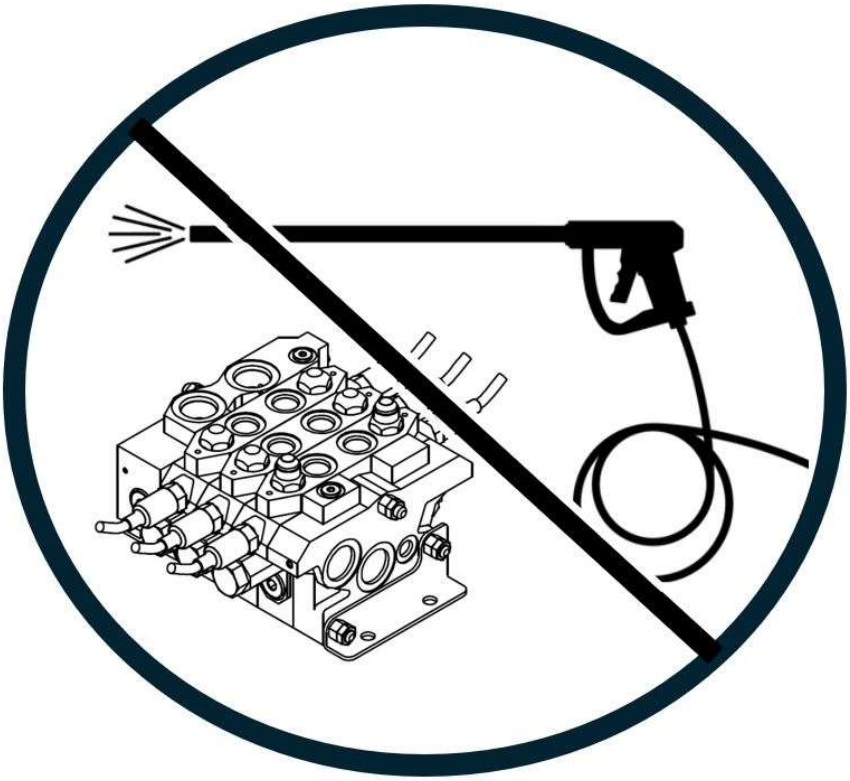
Grease Valve – Manual Overrides

- Ensure manual overrides are coated weekly with grease or penetrating fluid for protection from the elements.

CLEANING

Often snow equipment is pressure washed after usage and washing grime from your wing assembly is a good practice. However, it's important to take note of where the Craig valve is located – **DO NOT pressure wash the valve**. Pressure washing the valve can damage electrical components and hosing. Instead of pressure washing the valve area, washing it with a low-pressure hose is suggested.

MAINTENANCE



The Craig valve is vital to the performance of your wing assembly and requires very little maintenance. With the harsh environment that loaders work in, corrosion on the valve is commonplace. Ensure that your valve cover is always on to protect the valve from debris which can damage electrical solenoid connections and refrain from pressure washing the valve itself or chipping out ice buildup on the valve.

MAINTENANCE

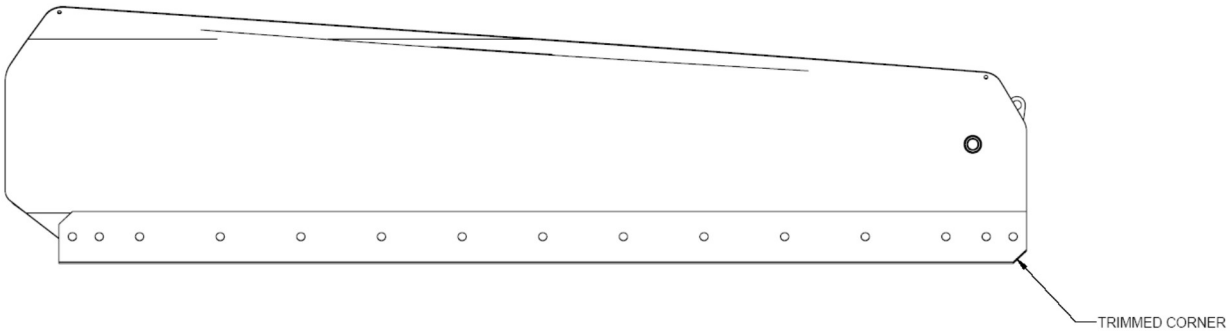
MAINTENANCE OF G.E.T HARDWARE

CAUTION Do Not Apply Any Lubricant of Any Type to G.E.T. Hardware. Any type of fasteners, like bolts and pins, work because of friction. If you apply lubricant to such fasteners, then it will be much easier for them to back off during operation.

CAUTION Safety Glasses Must Be Worn When Striking Bolt Heads. When striking the head of a bolt, it is possible for either sparks to develop or for pieces of the head to break off. ALWAYS WEAR SAFETY GLASSES

WING CUTTING EDGE

The standard cutting edges on a Craig wing are reversible, doubling the life of your edge. When flipping a cutting edge or replacing your edge with a new one, ensure that the leading edge is trimmed at a 45° angle as shown below. This helps keep the wing moldboard from digging into the ground when it is lowered.



INSTALLING BOLT-ON EDGES

Use the following procedure for installing bolt-on edges:

1. Clean all surfaces of rust, paint, nicks, and burrs.
2. Tighten bolts securing the bolt on edge to listed plow bolt torque specifications. Then apply final torque. It is important to only tighten the bolts first, and not torque them up. This is because the previous torqued bolts could back off as the current bolts are torqued.

MAINTENANCE OF BOLT-ON EDGES

Periodically check bolt torque. Insufficient bolt torque can result in cutting edge failure in heavy-duty applications. Therefore, it is important to check the bolts regularly to make sure they are not becoming too loose.

MAINTENANCE

NOTICE Re-torque Bolts After Approximately 4 Hours of Service. This will ensure the bolt on edge is safely secured, and that it has a maximum service life. Refer to specifications section for bolt torque chart when special torques are not specified.

TECHNICAL SUPPORT

If you have followed the maintenance instructions contained in this manual, you should have years of trouble-free operation from your Craig attachment. Should you encounter any issue or have any questions about your attachment please contact us at 1-800-565-5007 and ask for technical support.

READING PRODUCT TAG

Craig Manufacturing Ltd. stamps a blue serial tag onto every attachment. The tag is often located on the rear of the attachment in the upper left corner. The information contained on this tag will be required for parts and support. Craig serial numbers begin with a "T" followed by the year then month of construction. For example, T1203 would denote the year 2012 and 03 the month of March.

STORAGE

WARNING Disconnection from the machine and installation must be done by a qualified technician. NEVER trust that the hydraulic system will not fail. ALWAYS lower booms and attachments to the ground before leaving the cab or operator's station. DO NOT work under or around attachments or heavy items not supported by stands, blocks or safety chains. Furthermore, it is important to use chains and/or stands to steady unstable attachments or heavy components that may fall if being disconnected.

END OF SEASON

- Thoroughly clean the snow wing assembly of salt and grime.
- Store your wing assembly off the ground. Laying the plow on a simple set of 4" x 4" blocks can keep your plow from sitting in water or damp ground.
- Inspect for damage and order any replacement parts.
- Tighten all hardware and make sure there are no loose connections.
- Paint all replacement parts.
- Paint any bare surfaces to prevent rust.
- Lubricate all grease points. Refer to maintenance section.
- Apply penetrating oil/rust inhibitor to trip assembly.
- Coat exposed portions of cylinder rods with grease.
- Seal hydraulic system from contaminants.
- Secure all hoses in a manner that prevents potential damage during transport.
- Replace any illegible or missing decals.
- Store unit inside a clean, dry area to prolong life.

BEGINNING OF SEASON

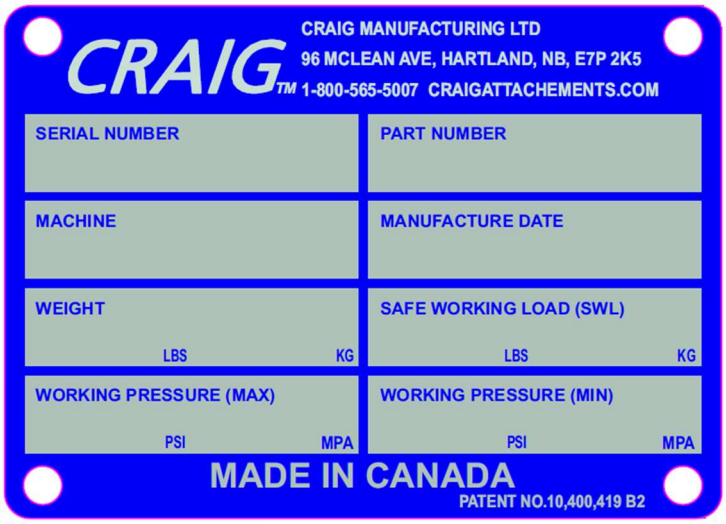
- Review entire operator's manual.
- Clean equipment
- Install any replacement parts.
- Secure all fasteners.
- Check hydraulic hoses for damage and replace as necessary.
- Replace missing or illegible decals.
- Refer to installation section for important information.
- Fully understand this manual and the prime mover operator's manual and take proper precautions prior to testing.

SPECIFICATIONS

TORQUE CHART - COURSE THREAD

Nominal Dia. (in.)	Threads per inch	SAE J429 Grade 5 Clamp Load (lbs.)	SAE J429 Grade 5 Tightening Torque (ft-lbs) Lubricated K = 0.15	SAE J429 Grade 5 Tightening Torque (ft-lbs) Thread-locker K = 0.17	SAE J429 Grade 5 Tightening Torque (ft-lbs) Zinc & Dry K = 0.20	SAE J429 Grade 8 Clamp Load (lbs.)	SAE J429 Grade 8 Tightening Torque (ft-lbs) Lubricated K = 0.15	SAE J429 Grade 8 Tightening Torque (ft-lbs) Thread-locker K = 0.17	SAE J429 Grade 8 Tightening Torque (ft-lbs) Zinc & Dry K = 0.20
1/4	20	2029	6.3	7.2	8.5	2864	9.0	10.1	11.9
5/16	18	3342	13	15	17	4719	18	21	25
3/8	16	4940	23	26	31	6974	33	37	44
7/16	14	6777	37	42	49	9568	52	59	70
1/2	13	9046	57	64	75	12771	80	90	106
9/16	12	11599	82	92	109	16375	115	130	154
5/8	11	14408	113	128	150	20340	159	180	212
3/4	10	21322	200	227	267	30101	282	320	376
7/8	9	29436	322	365	429	41556	455	515	606
1	8	38616	483	547	644	54517	681	772	909
1 1/4	7	53786	840	952	1121	87220	1363	1545	1817
1 3/8	6	64096	1102	1249	1469	103939	1786	2025	2382
1 1/2	6	77991	1462	1657	1950	126473	2371	2688	3162

Refer to serial tag on the attachment for identification. NOTE: your serial tag may not appear exactly as shown below.



PARTS

To provide you with the most UP-TO-DATE part information, parts diagrams for this attachment have been moved to our Portal website. Please use these diagrams and parts lists to locate your replacement parts.

https://portal.craigattachments.com/

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

To facilitate parts ordering when contacting any of our branches, please have the product serial number or product part number for your attachment ready to ensure that you receive the correct parts for your attachment.

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

NOTE: Most parts orders (in stock) received by 12:00pm (Atlantic Standard Time) can be shipped the same day or following business day.

WARRANTY

To provide you with the most UP-TO-DATE warranty information, warranty procedures, technical documents, product terms, and product registration, please go to our website at:

https://www.craigattachments.com/

NOTES

NOTES

CRAIG™
ENGINEERING. MANUFACTURING. SERVICE.

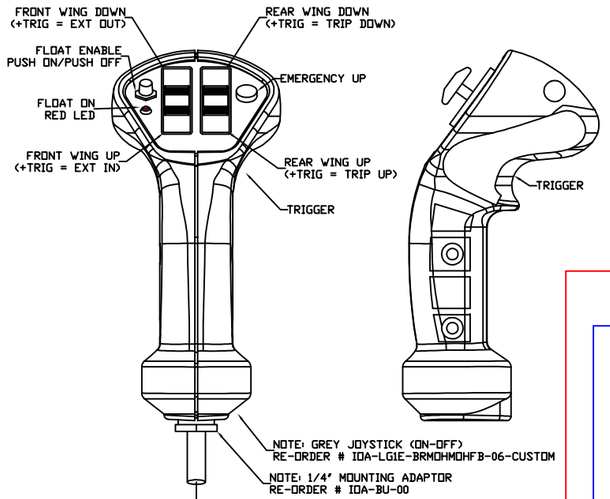
HARTLAND BRANCH
96 McLean Avenue
Hartland, New Brunswick
E7P 2K5 Canada

CAMBRIDGE BRANCH
315 Thompson Drive
Cambridge, Ontario
N1T 2B3 Canada

BLACKFALDS BRANCH
88 27323 TWP Rd 394
Lacombe County, Alberta
T4M 0S1 Canada

LAWRENCEBURG BRANCH
408 Commerce Way
Ethridge, Tennessee
38456 USA

1-800-565-5007 • WWW.CRAIGATTACHMENTS.COM



NOTE: ON-OFF JOYSTICK WITH ROCKERS OR SLIDERS FOR EASE OF USE

* EXTEND = FRONT WING + TRIGGER
** TRIP = REAR WING + TRIGGER

SUREGRIP JOYSTICK
C/W 6 FOOT CABLE

CUSTOMER SUPPLIED WIRING

1-METER POWER CABLE, 16/2

ONE (1) 16 AWG

TWO (2) 16 AWG

FUSE
5-AMP MAX

Battery
24VDC

NOTE: 24V PULSAR COILS HAVE BROWN LEADS ENTERING ELECTRICAL MATING CONNECTOR

CIRCUIT BOARD PARTS
D1-D17: 1N4007
D18-D19: 1N5408
R1: 886-2531
F1: ATO-5

ON/OFF CIRCUIT BOARD ASSEMBLY (W/ PRE-WIRED POWER CABLE) RE-ORDER# HSL-0/0JSKCB-KIT

PENNECON ENERGY HYDRAULIC SYSTEMS 2012 HSL-0/0JSK-CB rev1

0VDC, EMER UP, TRIGGER, RW DN / TRIP DN, RW UP / TRIP UP, FW DN / EXT OUT, FW UP / EXT IN, FLOAT, +24VDC

RED, YEL, GRN, BWN, BLU, WHT, ORG, VIO, BLK, N/A

J1, J2, J3, J4, J5

F1

R1

D17, D18, D19, D6, D5, D8, D7, D2, D1, D4, D3, D14, D13, D16, D15, D10, D9, D12, D11

(grn/yel) 2 — FLOAT — (17) 1 — CAP024HE

PULSAR & FLOAT VALVE WIRING		
TERM #	WIRE #	FUNCTION
1A+	ONE (1)	FW UP +
1A-	TWO (2)	FW UP -
1B+	THREE (3)	FW DN +
1B-	FOUR (4)	FW DN -
2A+	FIVE (5)	RW UP +
2A-	SIX (6)	RW UP -
2B+	SEVEN (7)	RW DN +
2B-	EIGHT (8)	RW DN -
3A+	NINE (9)	EXT IN +
3A-	TEN (10)	EXT IN -
3B+	ELEVEN (11)	EXT OUT +
3B-	TWELVE (12)	EXT OUT -
4A+	THIRTEEEN (13)	TRIP UP +
4A-	FOURTEEN (14)	TRIP UP -
4B+	FIFTEEN (15)	TRIP DN +
4B-	SIXTEEN (16)	TRIP DN -
FLOAT+	SEVENTEEN (17)	FLOAT +
FLOAT-	GRN/YEL	FLOAT -

SCREW CLAMP HEADERS

VALVE HARNESS: 8 FOOT 20G/18C
REORDER# HSL-0/0JSK-HARNESS

FRONT WING DOWN — FRONT WING UP — REAR WING DOWN — REAR WING UP — EXTEND OUT — EXTEND IN — TRIP DOWN — TRIP UP

REV	DESCRIPTION	DATE	ORIG	APP'D
5	SEPARATED OUTBOARD ITEMS CORRECTED HARNESS LENGTH	28-JAN-14	RLR	-

NOTES:

HSL REV	CLIENT REV	DESCRIPTION	DATE	EXEC.	VERIF.	APP'D
5	N/A	SEPARATED OUTBOARD ITEMS CORRECTED HARNESS LENGTH	28 JAN 2014	RLR	-	-
4	N/A	FINAL AS-BUILT	AUG 2012	RLR	-	-
3	TBD	INPUT FUSE MOVED OFF BOARD	18 MAY 2012	RLR	-	-
2	TBD	FREE-WHEELING DIODES ADDED TO OUTPUTS & RELAY COIL INPUT FUSE MOVED TO BOARD	15 MAY 2012	RLR	-	-
1	TBD	BOARD CONNECTIONS MODIFIED TO COINCIDE WITH BOARD LAYOUT	5 DEC 2011	RLR	-	-
0	TBD	ISSUED FOR IDC	11 AUG 2010	RLR	-	-

SCALE: NTS

HYDRAULIC SYSTEMS LIMITED DRN No. 10-HSL-NS-022 REV 5

CLIENT DRN No. TBD REV N/A

IF IN DOUBT ASK

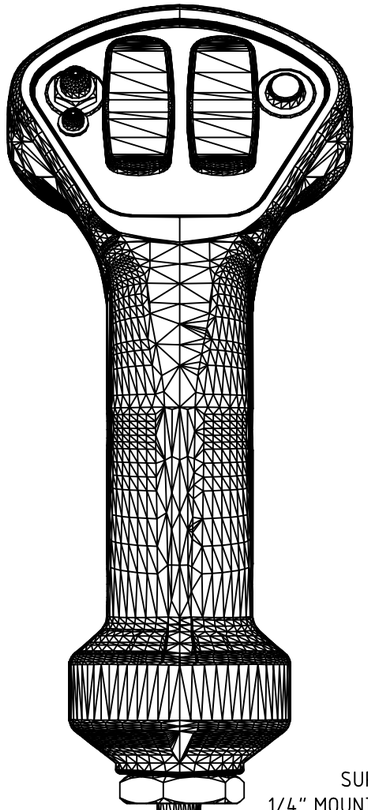
This document is confidential and property of Hydraulic Systems Limited and must not be copied or lent without their written permission.

	SIGN	DATE
ORIG	RLR	18-MAY-12
CHK'D	-	-
APP'D	-	-

41 ILSLEY AVENUE
DARTMOUTH, NS, CANADA
B3B 1K9
T. 902.468.6640
F. 902.468.3212
WWW.HYDRAULIC-SYSTEMS.COM

PROJECT: CRAIG'S MFG. ON/OFF AUTOLIFT
CONTRACT No.: N/A
HSL JOB No.: HSB001108 & UP
DRAWING TITLE: 3/4-SECTION ON-OFF ELECTRICAL SCHEMATIC
SHEET: 01
SHEETS: 01

SUREGRIP CUSTOM JOYSTICK
#10A-LG1E-BRMOHMOHFB-06-CUSTOM



SUREGRIP
1/4" MOUNTING ADAPTOR
#10A-BU-00

NUMBERED CABLE STANDARD, COLOURED CABLE SHOWN AS ALTERNATE

CUSTOMER SUPPLIED FUSE
5-AMP MAXIMUM

(or RED)
(or BWN)
+24VDC
1 (+)

2 (-)
0VDC
(or BLK)
(or BLU)

INPUT
KEYED
POWER

1m 16/2 CABLE

2 (-)
1 (+)

SUREGRIP 6-FT MULTI-CONDUCTOR CABLE
(INCLUDED W/ JOYSTICK)

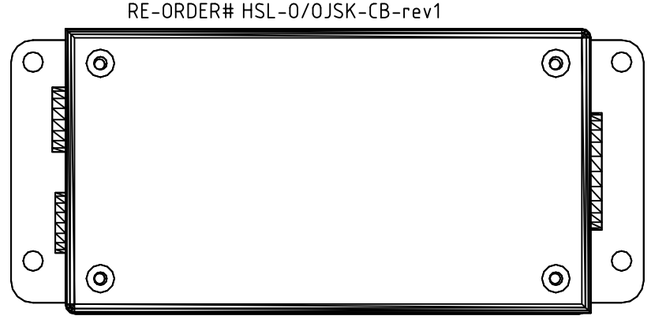
RED
YEL
GRN
BWN
BLU
WHT
ORG
VIO
BLK

CUSTOMER TO
INSTALL
JOYSTICK

WIRING TO CIRCUIT BOARD HEADER CONNECTION POINTS
(CUSTOMER TO INSTALL JOYSTICK CABLE)

NOTE: INCLUDE 2 SPARE TY-RAPS IN ENCLOSURE FOR CUSTOMER WIRING
INCLUDE 1 SPARE JOYSTICK GROMMET # GRM-321
INCLUDE 1 SPARE VALVE HARNESS GROMMET #GRM-1102-2

ON/OFF CIRCUIT BOARD ASSEMBLY (W/O CABLES)
RE-ORDER# HSL-0/0JSK-CB-rev1



TO PULSAR
VALVE
SEE PAGE 2

JOYSTICK WIRING	
RED	+24VDC
YELLOW	FLOAT (PUSH ON/PUSH OFF)
GREEN	FRONT WING UP / EXT IN
BROWN	FRONT WING DOWN / EXT OUT
BLUE	REAR WING UP / TRIP UP
WHITE	REAR WING DOWN / TRIP DOWN
ORANGE	TRIGGER
VIOLET	EMERGENCY UP
BLACK	0VDC

REV	DESCRIPTION	DATE	EXEC.	VERIF.	APP'D
2	WIRING ID ERROR PAGE 02	17 AUG 2012	RLR	RLR	RLR
1	NEW CIRCUIT BOARD DESIGN	7 AUG 2012	RLR	RLR	RLR
0	ISSUED FOR IDC	16 AUG 2010	RLR	RLR	RLR

NOTES:

SCALE: NTS

HYDRAULIC SYSTEMS LIMITED DRN No. 10-HSL-NS-023-01 REV 2

CLIENT DRN No. TBD REV N/A

	SIGN	DATE
ORIG	RLR	17-AUG-12
CHK'D	RLR	17-AUG-12
APP'D	RLR	17-AUG-12

PENNECON

HYDRAULIC SYSTEMS LIMITED
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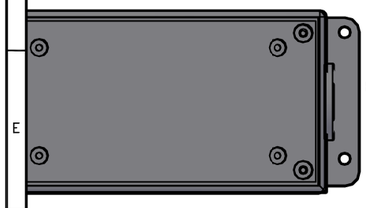
DARTMOUTH, NS, CANADA
B3B 1K9
T. 902.468.6640
F. 902.468.3212
WWW.HYDRAULIC-SYSTEMS.COM

PROJECT: CRAIG'S MFG. ON-OFF JOYSTICK SYSTEM
CONTRACT No.: TBD
HSL JOB No.: HSB001108 & UP
DRAWING TITLE: CIRCUIT BOARD WIRING HARNESS LAYOUT WITH DEUTSCH
SHEET: 01
SHEETS: 02

TOP ROW	
CIRCUIT BOARD NUMBER	WIRE NUMBER
3A+	NINE (9)
3A-	TEN (10)
3B-	TWELVE (12)
3B+	ELEVEN (11)
4A+	THIRTEEN (13)
4A-	FOUTEEN (14)
4B-	SIXTEN (16)
4B+	FIFTEEN (15)

BOTTOM ROW	
CIRCUIT BOARD NUMBER	WIRE NUMBER
1A+	ONE (1)
1A-	TWO (2)
1B-	FOUR (4)
1B+	THREE (3)
2A+	FIVE (5)
2A-	SIX (6)
2B-	EIGHT (8)
2B+	SEVEN (7)



STRIP 4" FOR FLOAT WIRES
CUT REMAINING WIRES TO 3"

STRIP CABLE TO EXPOSE
WIRES BY 13"
TRIM AS SHOWN

12"

20 GA / 18-CONDUCTOR CABLE

CUSTOMER TO INSTALL VALVE HARNESS IN FIELD

HOT MELT HEAT SHRINK CABLE END

7 ft (APPOX)

1 (+)
2 (-)
DEUTSCH CONNECTOR DT06-2S W2S

TO 24V FLOAT VALVE COIL W/INTEGRAL DIODE

SEVENTEEN (17) GRN/YEL

INCLUDED ON 3-SPOOL SYSTEM ALSO

DEUTSCH CONNECTOR DT06-2S W2S

REAR WING DOWN — SEVEN (1), EIGHT (2)
FRONT WING DOWN — THREE (1), FOUR (2)
EXTEND OUT — ELEVEN (1), TWELVE (2)
TRIP DOWN — FIFTEEN (1), SIXTEEN (2)

SEVEN (7)
EIGHT (8)
THREE (3)
FOUR (4)
ELEVEN (11)
TWELVE (12)
FIFTEEN (15)
SIXTEN (16)

FOUTEEN (14)
THIRTEEN (13)
TEN (10)
NINE (9)
TWO (2)
ONE (1)
SIX (6)
FIVE (5)

4"

DEUTSCH CONNECTOR DT06-2S W2S

FIVE (1), SIX (2) — REAR WING UP
ONE (1), TWO (2) — FRONT WING UP
NINE (1), TEN (2) — EXTEND IN
THIRTEEN (1), FOURTEEN (2) — TRIP UP

INCLUDED ON 3-SPOOL SYSTEM ALSO

2" 1.5" 1.5" 1.5"

NOTE: INCLUDE 1 SPARE JOYSTICK GROMMET #GRM-321
AND 1 SPARE VALVE CABLE GROMMET #GRM-1102-2
FOR CUSTOMER CABLE ROUTING

REV	2
DESCRIPTION	WIRING ID ERROR PAGE 02
DATE ORIG APP'D	17-AUG-12 RLR RLR

NOTES:

REV	HSL REV	CLIENT REV	DESCRIPTION	DATE	EXEC.	VERIF.	APP'D
2	TBD		WIRING ID ERROR PAGE 02	17 AUG 2012	RLR	RLR	RLR
1	TBD		NEW CIRCUIT BOARD DESIGN	3 AUG 2012	RLR	RLR	RLR
0	TBD		ISSUED FOR IDC	16 AUG 2010	RLR	RLR	RLR

SCALE: NTS

HYDRAULIC SYSTEMS LIMITED DRN No. 10-HSL-NS-023-02 REV 2

CLIENT DRN No. TBD REV N/A

	SIGN	DATE
ORIG	RLR	17-AUG-12
CHK'D	RLR	17-AUG-12
APP'D	RLR	17-AUG-12

PENNECON
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WWW.HYDRAULIC-SYSTEMS.COM

PROJECT: CRAIG'S MANUFACTURING ON-OFF AUTOLIFT
CONTRACT No.: TBD
HSL JOB No.: HSB001108 & UP

DRAWING TITLE: CIRCUIT BOARD WIRING HARNESS LAYOUT WITH DEUTSCH
SHEET: 02
SHEETS: 02