



SHADOW BLADE™

Owners Manual



INSTALLATION & SETUP

Introduction:

The Kage Shadow Blade was designed to increase the efficiency of the snow removal contractor. The Shadow Blade is a wing plow that can change direction (go out on either side of the vehicle).

Combining this new versatility of a wing plow, with the front blade, an operator is sure to find increased plowing width and effective passes. Use the Shadow Blade to not only increase the swath width of the front plow, but also to counteract the crab walk effect when you are plowing heavy snow to one side. The Shadow Blade may also be used for benchwinging and plowing back banks of snow that lie along the curb and in ditches.

Caution: Use extreme caution when operating snow plow equipment. Know your surroundings at all times. This is heavy equipment, and must be treated with respect. The operator is responsible for using extreme caution. Bystanders and parked or moving vehicles must be watched for at all times. Every piece of equipment requires training. Get to know your machine and equipment. Check over your equipment after every use for missing and/or loose hardware or damage.

Installation on tractor:

Mount onto 3-point hitch. **Note:** use the Kage supplied top link. This is a Category II standard width 3-point hitch. The top link pin (supplied) is 1", and the lower two pins (supplied) are 1.125".

With the Shadow Blade now hooked up, slowly lift the 3-point arms to the maximum height, watching to ensure that there is no interference with the cab or windows of the tractor if the 3-point is fully raised.

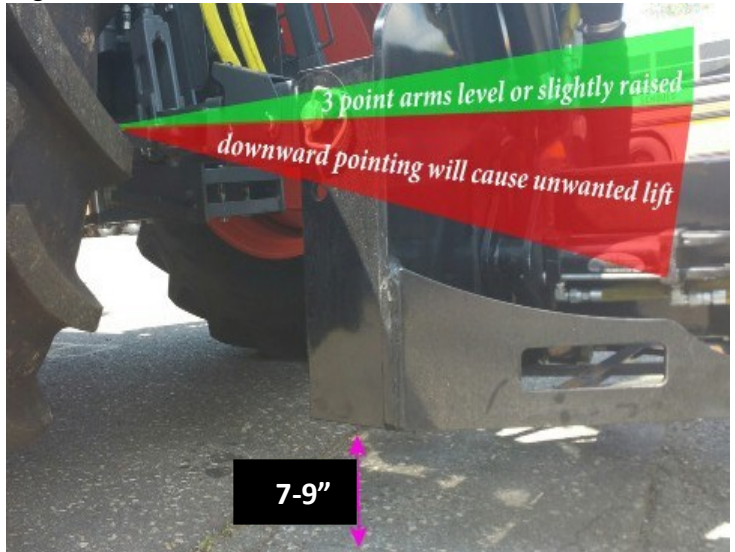
Bring the 3 point down until the front bottom edge of the Shadow Blade is approximately 7-9" off the ground.

Make sure that the lower 3-point arms are as close to level or slightly raised as possible (Figure B). It may be necessary to relocate the arms to a higher hole position on the Shadow Blade to achieve optimum towing. (If the 3 point arms are pitched downward too much, the weight of the snow being towed will raise the implement leaving snow behind.)

Figure A



Figure B



INSTALLATION & SETUP

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STEP 1

Figure C

Setting the proper 3-point height: While the tractor is parked on a level surface, rest the Shadow Blade on 8" blocks in 3 points. In order to achieve level, you may need to remove and adjust the top link.



Figure G



Float Gap

2

STEP 2

Using the standard tractor 3-point height adjustments (if equipped), lock the 3-point arms at this position.

This will be your 'normal plowing height,' and you should not have to move or reposition the 3-point arms unless you are bench plowing.

Figure D



Figure E



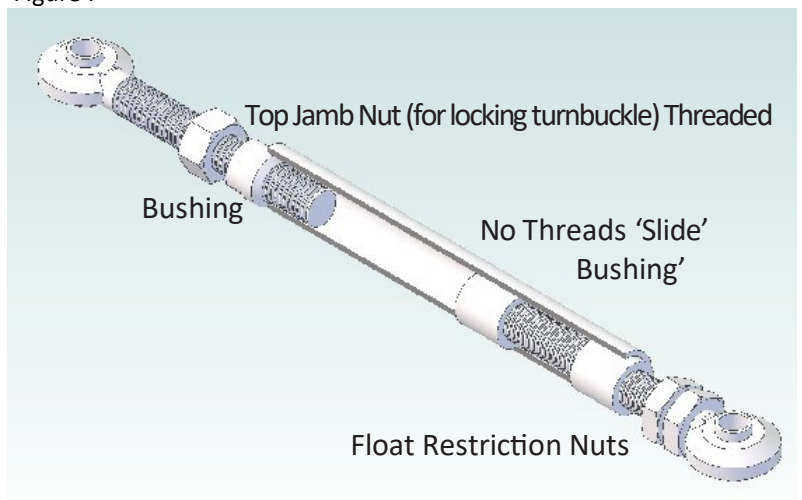
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STEP 3

Adjust the floating top link: The Shadow Blade is equipped with a floating top link so that the blade can float up and down, following contours of the pavement.

Without instantaneous float up and down, the blade would inevitably leave snow behind.

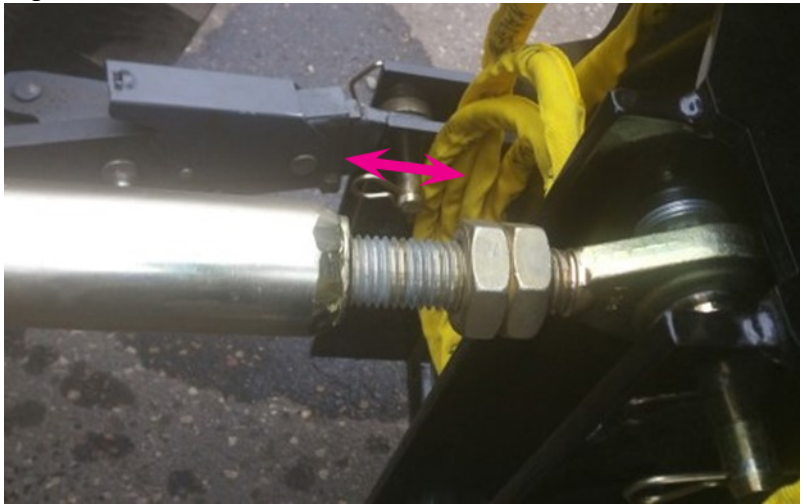
Figure F



With the plow at the 'normal plowing height' ensure that your top link is in the middle of its float range. There is 5" of total travel.

Adjust the turnbuckle until you have approximately 2.5" of thread (float gap) showing at the 'sliding end.'

Figure G



Float Gap 2.5"

4

STEP 4

Tighten the 'Top Jamb Nut' so that the turnbuckle does not loosen.

5

STEP 5

Note: Later on, if you determine that there is too much float, or the heel of the Shadow Blade is too low to the ground, you can adjust the height of that by increasing the 'float gap' to 3.5" or greater, then use the 'Float Restriction Nuts' to reduce the amount of total travel.

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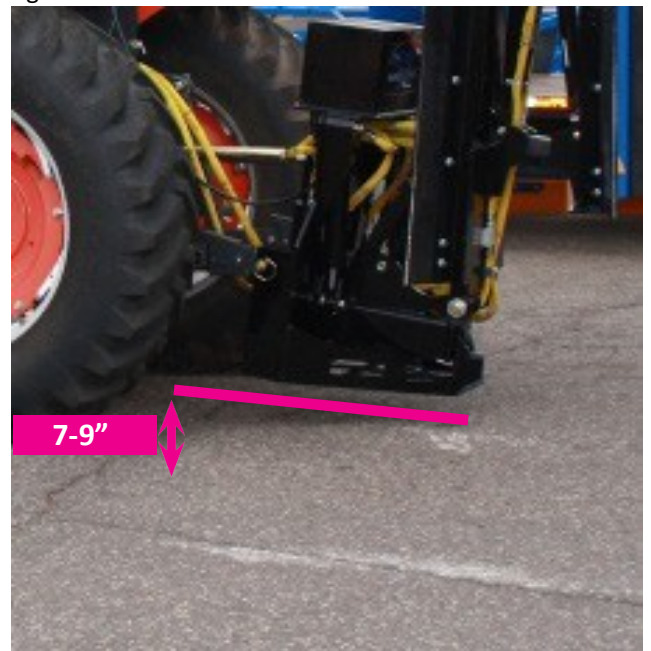
STEP 6

Pull the tractor straight forward off the blocks. The front height of the Shadow Blade off the ground should remain between 7" - 9".

It is normal that the Shadow Blade has a slight pitch downward once it is pulled off the blocks. This enables the blade to have 'float' when it is down in the plowing position.

If the front height of the shadow blade is not within this 7" - 9" range, repeat steps 4 - 5, making slight adjustment to the height of your blocks .

Figure H



Downward pitch allows for float when blade is down.

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STEP 7

Locate your 'pressure detent circuit' rear auxiliary. If you do not know which auxiliary that is, check for a 'detent' in one of your auxiliary levers. The detent is an automatic 'lock' that keeps the lever in the active position.

Now you need to determine if that detent valve is providing power, or float.

Start the tractor and momentarily activate the valve to its detent position. If there is audible pressure build up that seems to cause a 'dead head,' that is the valve you need. If the valve simply does nothing when the tractor is running, and the valve is in detent, then that is a float valve and will not work for this application. Try another valve or another method of locking valve in "on" position.

NOTE: Some models of tractor are equipped with a 'safety detent pressure kickoff.' If the valve builds pressure in the detent position, but automatically 'kicks out' you will need to adjust the pressure at which the valve 'kicks out.' Refer to your owner's manual for adjustment. One example of that adjustment is shown in the picture here.



Figure I



Figure J

Figure K



8

STEP 8

Determine your pressure (P) and tank (T) lines by looking at the Shadow Blade valve.

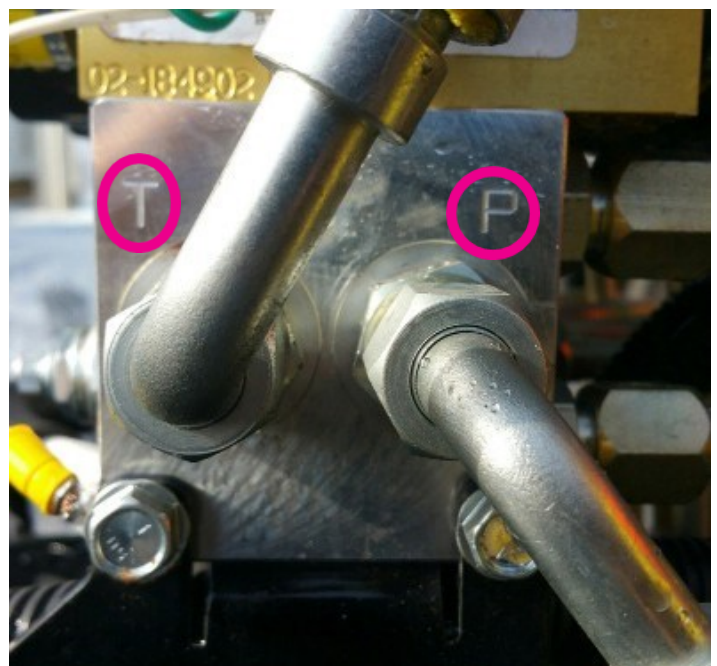
Hook them up to their respective outlets on the 'pressure detent circuit' tractor auxiliary.

If you are not sure which port is which, hook them up and activate the valve with the tractor running at idle.

If the fluid, simply 'hums' through the valve circuit it is correct.

If the circuit builds pressure and seems to 'dead head' then reverse the hoses, or the valve lever.

Figure L



STEP 8

The Shadow Blade has a built-in check valve that prevents fluid from travelling in the wrong direction.

Figure M



9

STEP 9

Look for a plug inside the cab of your tractor that resembles the picture to the right.

If you can locate this plug, you can simply plug the two-wire lead coming from the joystick into that plug.

Figure N



High amp plug

If not, you will need to run the long two-wire lead to the battery.

Install Leads to Battery: Install the harness:

Connect the red and black wires of the Tractor Harness to a 12VDC, 20 amp source (typically directly to the battery terminals). Run the wires carefully to avoid excessive heat, or rubbing that can cause shorts.

Connect the red wire to the positive, and the black to the negative. Make secure connections. If you lose power during operation, the Shadow Blade will not operate.

Mount the joystick in a convenient location for the operator. Typically, this is mounted directly onto the joystick which operates the

front plow.

The joystick bracket is able to be hand-formed with large pliers to achieve good ergonomics. It may be necessary to rotate the joystick so that the x and y axis are correct. Forward is indicated on the joystick.

Figure O

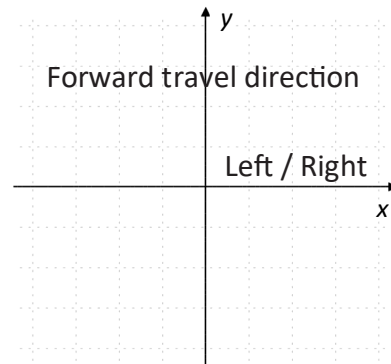


Figure P



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STEP 10

Run the other side of the Tractor Harness through the back of the tractor cab (usually through the window seal), and plug into the receptacle underneath the Shadow Blade control box.

Figure Q

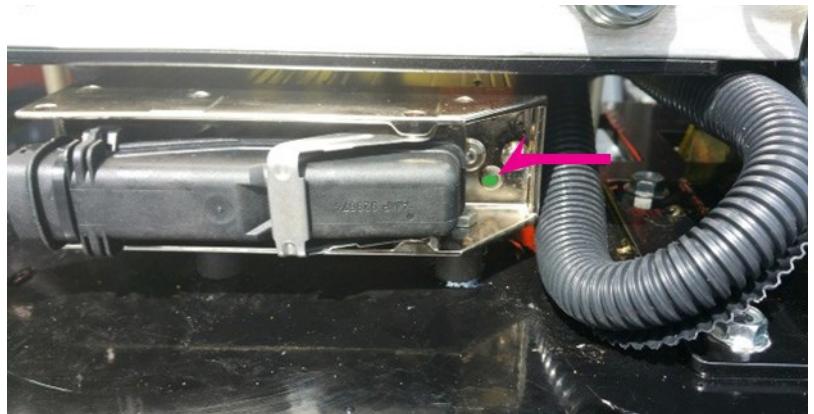


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STEP 11

Confirm that the LED light on the controller is blinking green.

Figure R



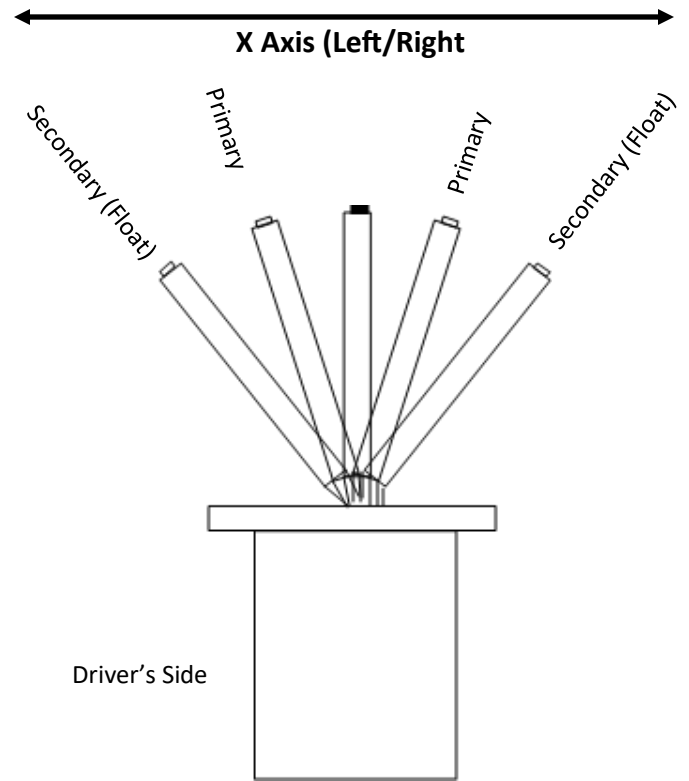
Operation:

Familiarize yourself with the joystick. The X axis (left and right) controls the Shadow Blade rotation (which side the blade is on). The Y axis controls the amount of angle, as well as the 'fold' function. There is also a pushbutton at the top. The pushbutton must be pressed initially to verify operator presence, and activates 'fold mode.'

X Axis: The X axis has a center position, and two positions (Primary and Secondary) on each side of center. (It changes about halfway through its range; however, you do not feel the transition.)

These different ranges make it possible to 'manually' manipulate the rotation of the plow if you want to stop rotation of it in any position other than Top Dead Center (TDC), Float Passenger (fully down and floating on passenger side), or Float Driver (fully down and floating on driver side). Once you move it into the secondary position, it detects what position it is currently in, then reacts accordingly.

- A) If the plow is TDC and you move the joystick to the secondary position on the left (driver side), the plow will begin to rotate to the driver side. After about 15 degrees, and if you are still holding the joystick in the same position, the plow will go into 'driver side float mode,' and gently drop to the ground. At any point during the rotation, you can quickly move the joystick in the opposite direction and then let go to instantly stop the rotation of the plow.
- B) If the plow is down in the 'driver side float position,' and you momentarily hold the joystick in the secondary float position to the right (passenger side), the plow will automatically rotate up, and stop once it reaches TDC. **NOTE:** Usually you will use the secondary ranges of the joystick to operate the Shadow Blade. The Primary ranges



es are only used if you want to rotate the blade in short bursts, and lock it in the position where you let go of the joystick.

Y Axis: The Y Axis is the movement back and forth. Unlike the X Axis, the Y Axis does not have dual ranges. When you move the joystick forward, the shadow blade will angle forward. Back will angle backward.

If you want to fold the Shadow Blade at the hinge point, depress and hold the button at the top of the joystick, while moving the joystick back or forward. The Shadow Blade does not 'fold' automatically, so in order to put it into the Stowed Position, raise the plow to TDC, depress and hold the button while moving the joystick back until the plow is folded. To deploy, move the joystick to either secondary position, and after about 15 degrees of rotation, let the joystick return to center.

The Shadow Blade will continue to ease down the ground, and while that is happening depress and hold the button while you move the joystick forward.

Positions

Float Driver



Top Dead Center



Stowed



Float Passenger



Try It Out:

Start the Tractor. Move the 'pressure detent circuit' lever into the detent position. This activates the Shadow Blade circuit, and now the valve is ready to take your commands.

Once you are clear of obstacles around you, gently press the button on the joystick. This tells the Shadow Blade that you are present. You will need to perform this anytime that you disconnect power from the controller.

Now, move the joystick to the left in the primary range. You will see that the blade will start to rotate to the driver side. If you let go, the rotation stops.

Now, hold the joystick all the way to the left until the blade is sitting on the ground. This is now in float mode, allowing the rotate cylinders to freely move in and out, and the blade to follow contours in the pavement.

To raise, simply hold the joystick to the right in the Primary range. If you let go, you will notice that the rotation will stop.

Now, assuming that you are about halfway up, hold the joystick all the way to the right for 1 second and let go. You will notice that the Shadow Blade will continue and complete its rotation to TDC (top dead center +/- 3 degrees).

Now hold the joystick all the way to the right (secondary range) for about 2 seconds, then let go. This will allow the blade to drop into the passenger side float position. Pull the tractor forward a few inches so that the Shadow Blade levels itself on the floating top link.

Push and hold the button while moving the joystick forward. Now you are ready to plow.

Drive forward slowly, adjusting your plowing angle with the back and forth (Y Axis) of the joystick.

Understanding the Accumulator: The Shadow Blade is equipped standard with a hydraulic piston accumulator which cushions blows that the blade will encounter, and also helps maintain curb lines.

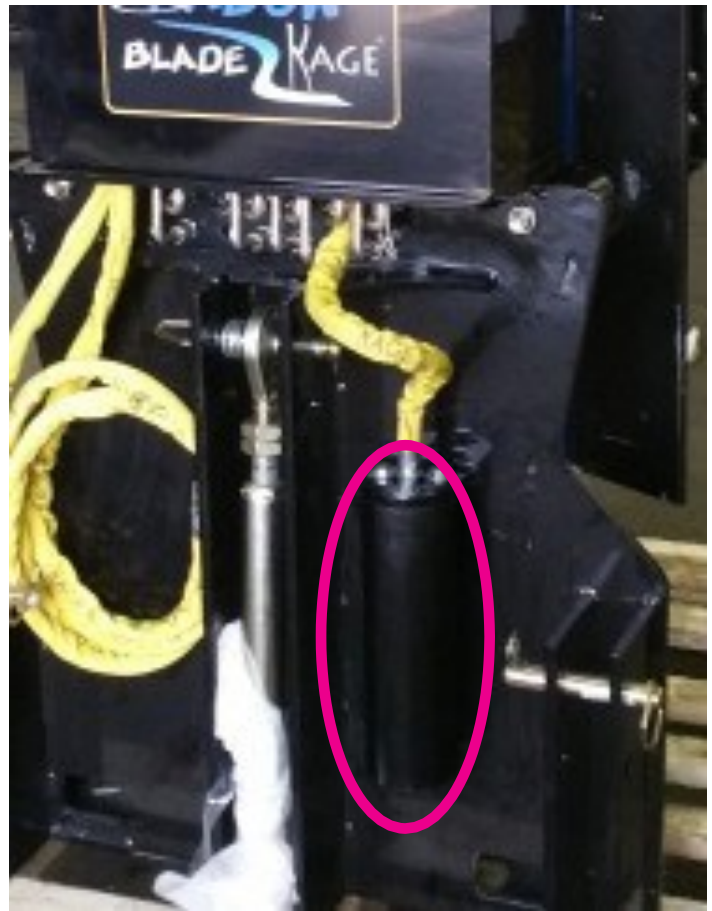
The accumulator acts as a high-pressure gas spring. If you hit a large obstacle with the shadow blade, it will angle backward until it clears the obstacle.

NOTE: *If you angle the shadow blade full forward, and continue to hold the joystick, you are filling the accumulator, and essentially overriding it's effectiveness. When changing the angle in a forward motion, never hold the joystick down longer than you have to.*

Adjusting the Accumulator: The accumulator can be downward adjusted to less aggressive by letting some of the nitrogen out of the bottom air valve. Keep in mind that the nitrogen tank is much higher pressure (400 PSI) than standard air compressors, so if you let out too much it can be difficult to refill.

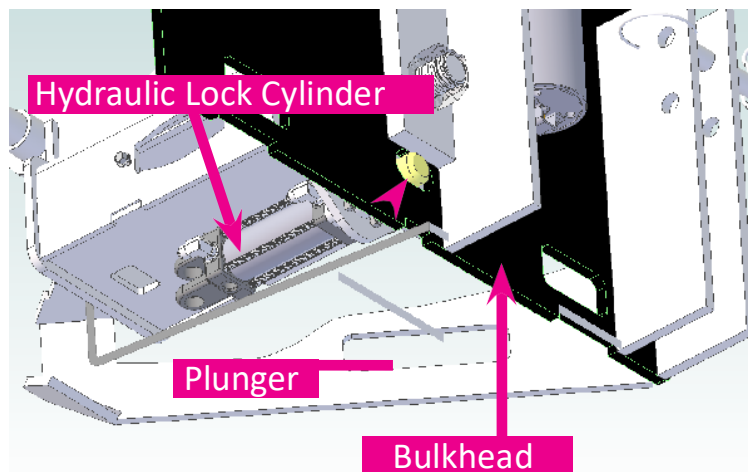
The 'softer' the accumulator is, the easier it is to follow a curb line. On the other hand, the softer it is the less snow it can withstand. For instance, if you hit wet heavy snow, the blade may unnecessarily angle backward. The best thing to do is to try plowing snow, and if the blade is not moving back as easily as it should, let out a few PSI, and retest. Repeat this until you have a satisfactory result.

Understanding the locking pin: The locking plunger mechanism is a mechanical lock that prevents in-advertent drop of the Shadow Blade when it is in the 'carry' or stowed position, regardless of hydraulic failure. The hydraulic cylinder has a spring built into the extension function, thereby always pushing the plunger against the bulkhead trying to engage the pin in the slot.



Not until the operator activates the rotate function, does the pin retract.

When the wing is within +/- 5 degrees of TDC, the pin will engage a 'holding slot' in the bulkhead. When the pin is engaged in the slot, the wing cannot fall. Grease the pin with light-weight grease every 20 hrs., or twice a year so that it does not seize up.



Installing Optional Laser Guidance System:

The Shadow Blade has an optional laser guidance system that helps to remind the operator when the shadow blade is deployed off to either side, and helps keep the operator's attention focused forward, rather than constantly looking backwards to see what is happening.

Mount both suction cup mounts to the inside of the windshield. Mount them in a manner that does not obstruct the view of the operator (typically, in the upper right and left hand corners).

Attach the adjustable arm to each, then clamp each laser into the arm.

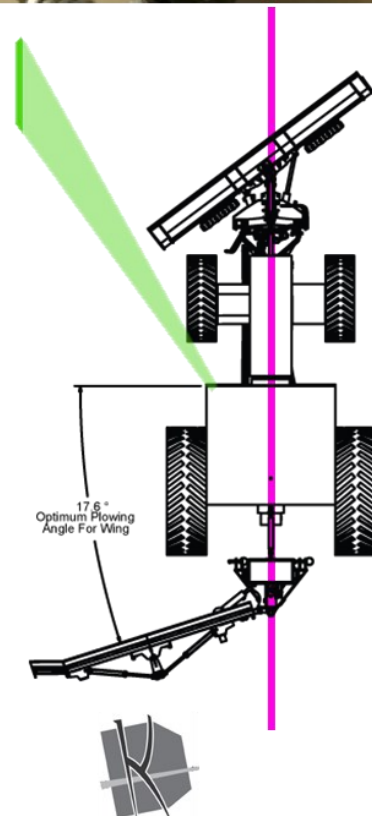
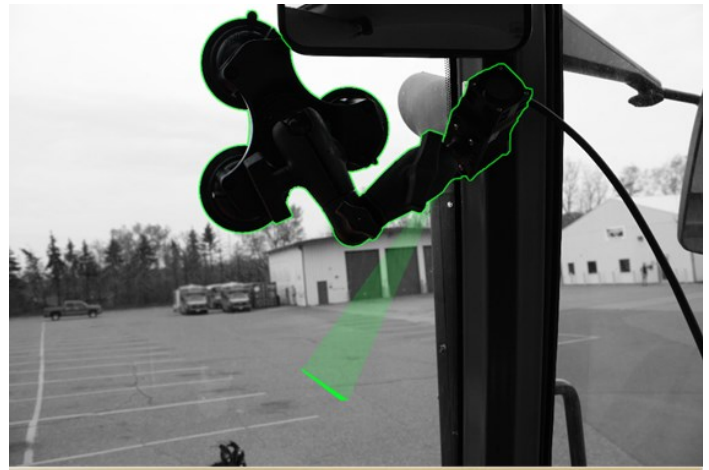
Carefully route the wire back to the plug at the bottom of the joystick.

With the Shadow Blade in the Driver Side Position, angle the wing until it is at the 'optimum' plowing angle (approximately 17 degrees from perpendicular).

Center the tractor over a straight paint line on the road (a standard white or yellow traffic line works well).

Measure from the center line, to the extent of the wing. Then, using the adjustable arm, align the laser so that it matches the same centerline measurement.

Once the driver side laser is complete, switch the wing to the passenger side and repeat the process for the passenger side laser.



NOTE: This is only a reference guide. The laser line does NOT automatically adjust as the plowing width changes, or as the tractor maneuvers around in a radius. Operators should always be aware of these conditions, and only use the laser line as a reference. Perfect accuracy will not be obtained using the laser line.



SAFE USE GUIDANCE - GENERAL

A Class 3R laser is low powered. It normally would not harm eyes during a momentary exposure of less than $\frac{1}{4}$ second. This is within the aversion response, where a person turns away and/or blinks to avoid bright light.

Do not deliberately look or stare into the laser beam. Laser protective eyewear is normally not necessary. A Class 3R laser is not a skin or materials burn hazard.

However, a Class 3R laser can be a distraction, glare or flash blindness hazard for pilots and drivers.

NEVER aim any laser towards an aircraft or vehicle that is in motion. This is unsafe and is illegal -- you could be arrested and jailed.