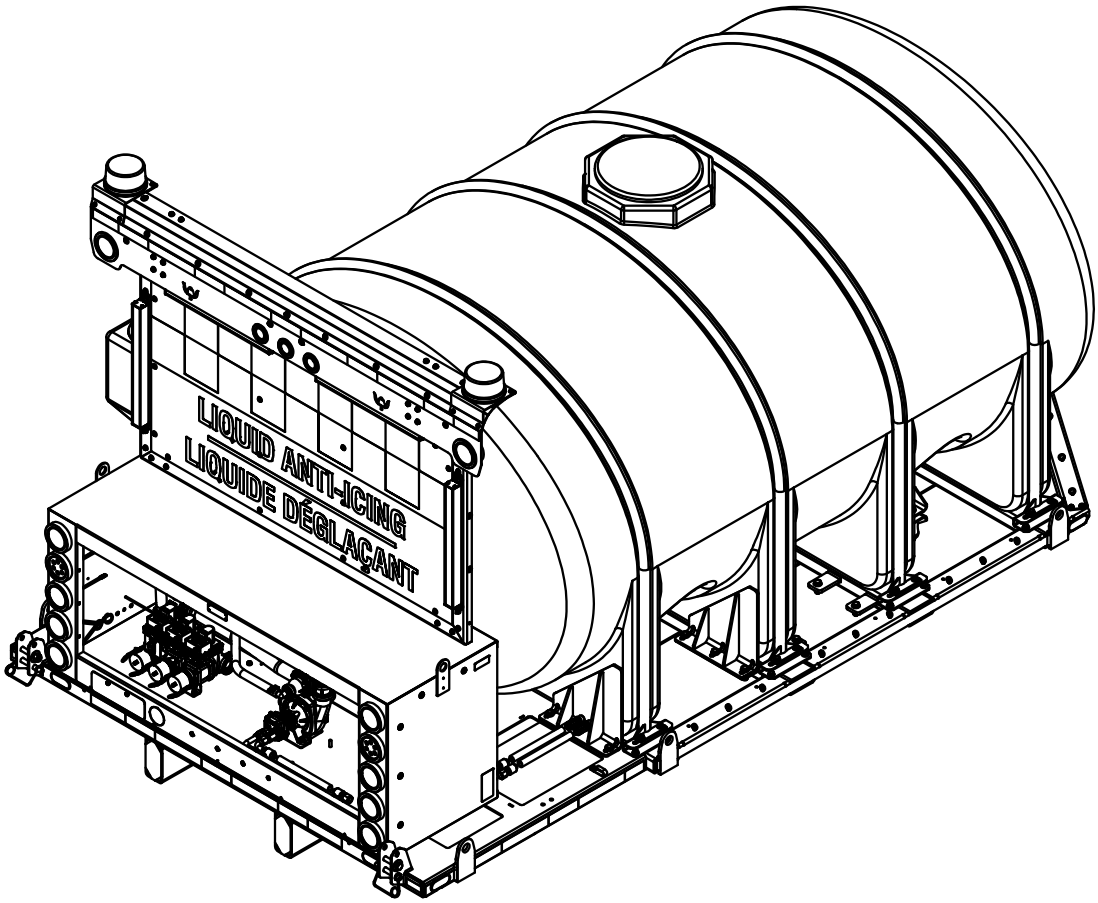
OWNER'S MANUAL

DIRECT LIQUID APPLICATION UNIT



EQUIPMENT MAY NOT BE EXACTLY AS SHOWN. SOME COMPONENTS MAY BE OPTIONAL.
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DIRECT LIQUID APPLICATION (DLA) ATTACHMENT INSTALLATION

SAFETY FIRST!! READ AND UNDERSTAND THE SAFETY INSTRUCTIONS BEFORE PROCEEDING WITH ANY INSTALLATION.

Note : these installation instructions are intended as a guide to aid in the attachment of your Viking- Cives Frame Mounted or Roller Pro DLA Attachment.

PRELIMINARY WARNINGS AND NOTICES

WARNING! When the hydraulics or the anti-icing liquid are under pressure – STAND CLEAR!

WARNING! The driver of the truck must understand the behaviour of towing liquid tanks. The water moving around in the tank may cause truck stability and braking issues. The behaviour of the truck will change as the level of liquid in the tank changes.

Note : this attachment may only be loaded or unloaded at a **maximum** of half the capacity of the tank; otherwise, the tank will fracture causing equipment damage. There is a decal located at the pull hook as a reminder of this.

Note : there is a rear bumper mounted rubber flap that should be mounted prior to use of the DLA Attachment. Its intended function is to protect the truck from spray of anti-icing/de-icing solutions, and also to reduce the effect of the wind on the spray stream/pattern.

ROLLER PRO DLA SPECIFIC OPERATION

For loading and unloading of the DLA attachment, follow the instructions provided in the Roller Pro Transfer System Manual.

The following steps and considerations must be taken prior to loading, operation, and unloading.

Prior to Loading

- The spray bar must be flipped up and pinned
- All electrical cables, hydraulic hoses, and air lines must be secured to the tipping frame

Prior to Operation

- The spray bar must be flipped down and pinned
- All necessary electrical cables, hydraulic hoses, and air lines must be connected to their respective location

Prior to Unloading

- The spray bar must be flipped up and pinned
- All necessary electrical cables, hydraulic hoses, and air lines must be disconnected and secured to the tipping frame
- End caps should be put on the electrical cables, hydraulic hoses, etc. to prevent contamination.

General Notes

The DLA Attachment must be placed on a firm, level surface (such as a concrete garage floor or paved area) that is large enough to safely accommodate this product.

Store the hoses and quick disconnect couplings in the tipping frame storage plate so that they are not resting on the ground and are out of the way to prevent damage.

Be sure to cap all hose ends to prevent damage to the quick disconnect hose ends and prevent the introduction of foreign materials into the hydraulic system.

Note : if equipped with a Force America 6100 CANBUS control system there will be an electrical connection at the pintle plate of the chassis. Be sure to disconnect this cable prior to unloading.

PRE-OPERATION TESTING & CHECKS

With prime mover running, test all functions to ensure proper operation prior to taking the unit out on the roadways. Test and check the following list after the DLA Attachment is connected properly to the prime mover frame or Roller Pro Tipping Frame.

1. All lights on the DLA Attachment are in working condition and meet regulatory standards.
2. The manual, electric and air ball valves all turn on and off.
3. The hydraulic pump and plumbing system operate as expected. While testing, check that the spray nozzles are aimed for the desired spray pattern by running the spreader control in manual unload. Be sure to unload in an environmentally safe manner.
4. You must have liquid in the tank and follow operating instructions listed under the DLA ATTACHMENT OPERATING INSTRUCTIONS in this manual. If the pump does not sound right, it may be drawing air. See the AIR BLEEDING PROCEDURE in this section.

DLA ATTACHMENT OPERATING INSTRUCTIONS

SAFETY FIRST!! READ AND UNDERSTAND THE SAFETY INSTRUCTIONS BEFORE PROCEEDING WITH ANY SET-UP AND/OR OPERATION.

When all conditions of installation and setup have been met, the DLA Attachment is ready to operate. The switches for controlling the DLA Attachment pump functions are located in the cab of the prime mover.

WARNING! When the hydraulics or the anti-icing liquid are under pressure – STAND CLEAR!

GENERAL OPERATING INSTRUCTIONS

1. The operator should become familiar with all equipment prior to operation. The cab controls are placed within a comfortable reach of the operator, with an allowable amount of adjustment. If necessary, the controls can usually be adjusted for either driver or passenger use.
2. The in-cab controls should be clearly marked as to the equipment/function they control.
3. To operate the anti-icing functions of the attachment, the operator should become familiar with the particular spreader control functions of the prime mover.
4. When operating this equipment, listen for any unusual sounds which may indicate improper use or worn/damaged parts. Repair or replace as necessary.

DLA ATTACHMENT OPERATING INSTRUCTIONS

WARNING! Be aware of traffic and pedestrians when spraying, especially when using the side booms!

Prior to roadway operation, ensure the pre-operation testing and checks have been completed as listed in PRE-OPERATION TESTING & CHECKS part of this section.

Refer to the liquid plumbing schematic at the end of this instructional section for assistance with the following instructions.

1. Check that the electric ball valves - Valve F, Valve G, and Valve H are closed. There are indicators on top of the ball valve manifold. They can be turned to the OFF position using the controls in the cab of the prime mover.
2. Ensure that Valve A, Valve D, and if equipped, Valve I, Valve J, Valve K are turned off.
3. Turn Valve B and Valve C to the RUN position.
4. Open Valve A, and visually check for any leaks. The unit can now be controlled from the cab of the prime mover.
5. Once in the cab, select your rates on the spreader control. Refer to your spreader control manual for more information.
6. Open the safety shut off, Valve E, with the air switch in the cab of the prime mover.
7. Select the booms that you are going to initially spray with. This will open a combination of Valve F, Valve G and Valve H based on your selection.
8. Engage the spreader control.
9. You can now begin spraying on the roadway. Note : the unit may not start spraying until it reaches a predetermined ground speed based on your spreader control settings.
10. You may turn booms on and off as you drive, but depending on the spreader control system on your prime mover, you may or may not have to adjust your spreading rates.
11. Each boom is controlled by its own electric ball valve.

When parking the DLA Attachment after use, follow the listed steps.

1. Turn off all boom electric ball valves - Valve F, Valve G and Valve H in the cab of the prime mover.
2. Close the safety shut off air (pneumatic) ball valve - Valve E in the cab of the prime mover
3. Ensure Valve B and Valve C are in the RUN position.
4. Ensure that Valve I, Valve J, and Valve K are closed.
5. Ensure that electrical ball valves -Valve F, Valve G and Valve H are physically closed. The dials on the top of the electric ball valve indicate their position.
6. Visually check for leaks.

CAUTION! Be aware of conditions where the liquid in the attachment may freeze. This can cause damage to the plumbing components. If freezing conditions are expected, take the appropriate precautions to avoid freezing or drain the system completely.

FILL PROCEDURE

1. With Valve C in the PURGE position ,Valve A in ON position, and Valve B in the RUN position, remove the camlock plug at Valve B and connect a hose with a 2" camlock male connector from your fill station.
2. With the filling hose securely connected, turn Valve B to the FILL position.
3. Begin pumping liquid from the fill station at a maximum rate of 225 GPM. Visually inspect for leaks. Note: The tank vent has a maximum rate of 450 GPM for intermittent flow only.
4. Continue filling until the desired level has been reached in tank. Note: The tank has volume marked in gallons to assist with filling.
5. Turn off the filling station and turn Valve B to the RUN position.
6. Disconnect the filling hose and replace the camlock plug into the female camlock connector. Note: Be aware that some liquid may initially leak from the filling hose and the trailer plumbing when disconnecting the fill hose.

UNLOAD PROCEDURE

The Viking-Cives DLA Attachment has been designed and built to provide more function during the off season. The DLA Unit can be equipped with three versatile powered unload options.

Note : the rear electric ball valves must be closed during the operation of any of the powered unload options. The manual option override switch will need to be used to operate any of the rear options.

OPTION 1 : Rear Powered Unload

1. Ensure that the electric ball valves are all closed.
2. Turn on the manual override switch.
3. With Valve B and Valve C in the RUN position and Valve I, Valve J, and Valve K closed, remove the camlock cap on Valve I.
4. With the air safety ball valve E closed, open Valve I. The unload will now be controlled from the cab of the prime mover.
5. Once in the cab of the prime mover, select the manual unload option in your spreader control. Refer to your spreader control manual for more information..
6. Open the air safety ball Valve E using the switch in the cab.
7. Engage the spreader control to begin unloading.

Note: It is the owner's/operator's responsibility to ensure that the liquid is unloaded in an environmentally safe manner.

CAUTION! Once the pump draws air, turn off the spreader control immediately to turn off the pump. The pump can be damaged if it continues to pump air.

8. With the spreader control and pump disengaged, leave Valve I open to allow gravity to clear the remaining liquid in the lines.
9. Once fully unloaded, close Valve I. Replace the camlock cap and plug.
10. Close the air safety ball Valve E using the switch in the cab of the prime mover.

CAUTION! After fully draining the system, you will need to bleed the air in the plumbing prior to operating the DLA Attachment when it is refilled with liquid. See the AIR BLEEDING PROCEDURE.

OPTION 2 : Powered Unload (Hose Reel / Flusher)

1. Ensure that the electric ball valves are all closed.
2. Turn on the manual override switch.
3. Turn Valve B and Valve C to the RUN position.
4. With the air safety ball valve E closed, open Valve J. Ensure Valves I and K are closed. The unload will now be controlled from the cab of the prime mover.
5. Once in the cab of the prime mover, select the manual unload option in your spreader control. Refer to your spreader control manual for more information..
6. Open the air safety ball Valve E using the switch in the cab.
7. Engage the spreader control to begin unloading.

Note: It is the owner's/operator's responsibility to ensure that the liquid is unloaded in an environmentally safe manner.

CAUTION! Once the pump draws air, turn off the spreader control immediately to turn off the pump. The pump can be damaged if it continues to pump air.

8. With the spreader control and pump disengaged, leave Valve J open to allow gravity to clear the remaining liquid in the lines.
9. Once fully unloaded, close Valve J and move Valve "C" to the PURGE position. Replace the camlock cap.
10. Close the air safety ball Valve E using the switch in the cab of the prime mover.

CAUTION! After fully draining the system, you will need to bleed the air in the plumbing prior to operating the DLA Attachment when it is refilled with liquid. See the AIR BLEEDING PROCEDURE.

FLUSH PLUMBING PROCEDURE

Note: It is the owner's/operator's responsibility to ensure that the liquid is unloaded in an environmentally safe manner.

To flush the plumbing system, follow the instructions below.

1. Ensure that the flush tank is full of the flushing liquid that is suitable for winter weather conditions (i.e. a glycol based windshield washer fluid).
2. Move Valve B to the RUN position and Valve C to the FLUSH position.
3. Open Valve D located on the flush tank.
4. Have one person in the cab of the prime mover and another at the attachment.
5. In the cab, select manual unload on the spreader control and set it to the lowest rate. Refer to the spreader control manual for more information.
6. Turn on all three booms in the cab (Valve F, Valve G and Valve H) and open the air safety ball valve, Valve E, using the switch in the cab.
7. Engage the spreader control to begin flushing.

8. The person at the Attachment will be waiting to signal the person in the cab to turn off the spreader control (pump) when the coloured flush liquid begins coming through all of the nozzles. The total flush time varies based on the spreading rate, but will usually take less than 30 seconds.
9. Turn off the three booms in the cab (Valve F, Valve G and Valve H) and close the air safety ball valve, Valve E, using the switch in the cab.
10. Close Valve D, and move Valve C to the RUN position.

CAUTION! It is important not to allow the pump to draw air. Never let the flush tank go completely empty. The size of the flush tank has been designed to completely flush the plumbing without emptying.

If you do draw air into the pump, shut off the pump immediately from the spreader control and follow the AIR BLEEDING PROCEDURE.

AIR BLEEDING PROCEDURE (IF EQUIPPED)

If air gets into the plumbing, you will notice the pump making an unusual sound. Turn off the pump immediately to avoid damaging the pump and follow this bleeding procedure.

1. With liquid in the main tank, move Valve B and Valve C to the RUN position.
2. Ensure that safety shut off valve E is closed. If not, close using the switch in the cab of the prime mover.
3. Open the main tank shut off valve - Valve A.
4. Place a container or bucket under the bleed line. Open Valve L, the bleed valve. Note: It is the owner's/operator's responsibility to ensure that the liquid is unloaded in an environmentally safe manner.
5. Let the attachment sit for a few minutes or until liquid begins to flow out of the bleed valve. Note : there may be some residual liquid in the bleed valve line, in which case there will be a small amount of liquid that will bleed out before the air is bled out of the plumbing system.
6. Close the bleed valve.
7. Close Valve A, the main tank shut off valve.
8. The system is now primed.

MAINTENANCE

SAFETY FIRST!! READ AND UNDERSTAND THE SAFETY INSTRUCTIONS BEFORE BEGINNING ANY MAINTENANCE OPERATION.

In preparation for the snow & ice control season, a visual equipment inspection must be performed. Look for any damaged components, bends, cracked welds, hydraulic leaks, etc. Inspect all fasteners; tighten any that have loosened and replace any that are damaged. Check all plumbing and hydraulic hoses for cuts, cracks, and/or leaks. Visually check cable(s) for loose clamps and frays. Immediately replace any damaged or frayed cables or hoses.

DAILY INSPECTION AND LUBRICATION

Daily inspection along with periodic preventive maintenance will reduce the chance of any major repairs and down time during equipment use. Before the unit is operated, all equipment should be inspected and checked to ensure that everything is in safe operating condition. Any and all defects, when noted, should be scheduled for repair or immediate replacement. The following checklist should be performed prior to and at the completion of each anti-icing/de-icing shift to ensure operational readiness.

1. Check the fluid level in the hydraulic oil reservoir. If the sight gauge indicates low oil level, add the appropriate amount of the specified hydraulic fluid.
2. Check the level of liquid in the DLA main tank.
3. Check that all connections are correctly connected and are in working order.
4. Visually inspect the working operation of all lights, including the flashing warning lights.
5. Grease all required components (i.e. front guide rollers on the attachment).
6. Check all components for loose and/or missing fasteners. Tighten and/or replace as necessary.
7. Visually inspect all hydraulic connections and hoses for cracks and/or leaks.
8. Visually inspect all anti-icing/de-icing plumbing connections, hoses and fittings for cracks and/or leaks.
9. Check all cables for excessive wear or damage.
10. Visually inspect all caution and warning decals, including the anti-icing/de-icing sign. All decals should be complete and legible. If cleaning the decals does not make them legible, install new decals.

VARIABLE ORIFICE NOZZLE SET-UP

Refer to the Variable Orifice Spray Pattern Set-up diagram for assistance with the following instructions.

1. Mark targets on the ground with the dimensions given in the Spray Pattern Set-up diagram. This is the recommended pattern, but can be changed to suit specific applications.
2. The group of four nozzles on the left will cover the left side lane. The group of four nozzles on the right will cover the right side lane. Lastly, the two groups of two nozzles are to be directed to opposite sides of the centre lane for proper coverage.
3. Adjust each nozzle to their appropriate directions by loosening the nut, rotating the nozzle and ball assembly, and then securing in position by tightening the nut. Hand tightening is all that is required to secure in place.
4. Using water as the liquid for aiming and set ground speed at 80km/hr and enter 80 litres per lane kilometre. Use these values to aide in aiming the nozzles or enter the most frequently used speed and rate values. When the system is operational, use the adjusting nut to position the nozzles to the correct spread pattern as water is being sprayed. Take precautions to avoid the stream itself. Wind may affect the spread pattern; adjust the aiming of the nozzles to compensate.
5. The spread pattern may need to be adjusted if there is a wide range of rates to address.
6. Drain the water once the spray pattern has been set and fill the tank with your anti-icing/de-icing liquid.

FIXED ORIFICE NOZZLE SET-UP

Refer to the Fixed Orifice Spray Pattern Set-up diagram for assistance with the following instructions.

1. The spray pattern for this set-up can only be fine tuned and not altered like that of the variable orifice nozzle set-up.
2. The group of nozzles along the centre stainless spray bar cover the centre lane, while the group of nozzles on both the left side and right side stainless spray bars cover the left and right lanes respectively.
3. The centre lane nozzles are set a fixed distance apart from one another, but can be aimed slightly by loosening the nut and rotating the nozzle and ball assembly to the needed position. Once the position has been located, tighten the nut to secure. Hand tightening is all that is required. The left and right groups of nozzles are stacked vertically and must be positioned independently of each other for proper lane coverage.
4. Using water as the liquid for aiming, set ground speed to 80km/hr and enter 80 litres per lane kilometre. Use these values to aide in aiming the nozzles or enter the most frequently used speed and rate values. Wind may affect the spread pattern, adjust the nozzles to compensate.
5. The spread pattern may need to be adjusted if there is a wide range of rates to address. The nozzle tips can also be changed to provide more backpressure depending on the rates required.
6. Drain the water once the spray pattern has been set and fill the tank with your anti-icing/de-icing liquid.

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