MaineDOT

Material Spreaders

9/13/2010

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About our Material Spreaders

General Information

MaineDOT has over 400 vehicles equipped with some type of granular/liquid material spreading apparatus. Of these, just over 200 are hopper units, 200 are front dumping patrol trucks, and a couple dozen others are either Henderson bodies or specialty hoppers manufactured by Schmidt Stratos.

With very few exceptions, the hoppers have an 8 cubic yard capacity and are installed on dual axle, 10 wheel dump trucks (wheelers). Most of these hoppers also have liquid tanks attached that are capable of carrying 120 gallons each, with a total truck capacity of 240 gallons. Some of the newer or modified units have larger capacity tanks to accommodate greater liquid application rates with the granular salt or even the capability for DLA (Direct Liquid Applications). This is discussed in more detail in the Truck Mounted Liquid Systems section of this manual.

Most of the hoppers use a chain driven system to deliver material to the rear of the hopper. However, MaineDOT has been utilizing more belt driven systems in its newer and modified units because these systems deliver a more uniform application of material, eliminating the skipping action common with chain systems.

The front dumping patrol trucks have a 5 yard body that can also be used for ditching, material transportation, patching and other operations that requires material be dumped out the rear of the truck. The body can be changed from rear dumping to front dumping simply by pulling the body latch pins and moving them to the front hinge point location. These latches are located at each side of the truck frame.

In most of the patrol trucks, a bed chain running perpendicular, and at the front of the dump body, carries granular material to the driver's side of the truck and drops it on a spinner located just in front of the rear wheels. In several instances, the passing lane of the Interstate for example, material is delivered to the passenger side of the vehicle. A plate covers the bed chain when the body is in the rear dumping position.

Henderson bodies are designed similar to a hopper, but remain permanently in place. In winter operations, material is discharged at the rear of the truck utilizing a belt driven system running along the bottom of the body. When transporting gravel, pavement, or other material, the body can be used either as a fully functional dumping body, or the belt system can be used to move material to the rear opening.

Another piece of equipment gaining popularity is the swap loader. These trucks have the capability to swap between several different types of bodies. Hoppers, dump bodies, water tanks, etc., are mounted on a frame and can be quickly removed and replaced using a hydraulic arm that pulls the frame up onto the truck body.

The Schmidt Stratos spreaders are currently located at the Region 4, Bangor maintenance facility. The spreaders are hopper systems with integrated legs for storage. What sets the Schmidt spreaders apart from our standard hoppers is the ability to apply significant amounts of liquid to the granular salt being discharged. A mixture of 70 percent granular material is typically applied with 30 percent liquids. This equates to approximately 58 gallons of liquid for every ton of granular salt applied. By comparison, our standard hopper systems apply a liquid application of between 6 and 10 gallons per ton of granular

salt. The additional liquid application is designed to further minimize bounce and scatter of the granular material and activate the salt more quickly.

The Schmidt spreader is widely used in Europe and was originally introduced to MaineDOT in 2004 as part of a Research project. This technology is described in more detail in the Truck Mounted Liquid Systems section of this manual.

Each of these spreading devices requires specific maintenance, adjustments and installation and removal procedures to operate properly and efficiently. Each device also presents its own set of potential hazards to be aware of during installation, removal and adjustment. You should always consider safety your top priority when completing these tasks.

Hoppers

MaineDOT has two primary techniques for hopper storage; the hopper stand system and the gantry system. The hopper stand design incorporates legs as part of the hopper and enables the hopper to simply stand in position; usually on a concrete or paved pad. The gantry system allows the hopper to hang using approved chains and inspected chain falls.

Hopper installation and removal is typically completed each fall and spring and with every 50 hour service.

Hazards to Consider/Avoid When Installing and Removing the Hopper

- This procedure should always be completed with a minimum of two persons.
- Communication between the driver and one spotter is critical to a safe and successful hopper installation.
- The operator will keep visual contact with the spotter at all times
- The immediate area around the hopper should be checked for all hazards (including overhead) and additional persons should not be allowed in this area until the installation is complete.
- No person is allowed under the hopper when the vehicle is in motion, or when the legs are not locked and in the down position (hopper stand system).
- Always wear the required PPE, including; hardhat, gloves, eye protection, face protection and proper foot protection (steel toed boots).
- Work with an experienced person until you are comfortable completing this process.

For the Gantry Systems….

- Check all chain falls and chains to assure they are in good working order.
- Verify the gantry structure is sound and in good shape (no dents, damage, etc.)
- Make sure the gantry has been inspected and rated for the weight of the hopper. A weight rating tag should be located on the gantry (see picture to right).

Gantry Weight Rating Tag

Hopper Installation – Hopper Stand System

1) The first step in the hopper installation procedure is to remove the tailgate and apron, if attached. The apron must be removed for proper installation of a hopper stand system. To achieve this, first move the truck to a designated area to have the lifting tailgate removed using a bucket loader if a tailgate stand is not available. Attach a properly rated lifting chain to the link on the top of the tailgate and apply enough upward pressure to allow the tailgate pins to be removed. After the pins have been removed, check to see that the spreader/tailgate chains have been detached. Lift the tailgate out of position and reinsert the pins into the tailgate. Store the tailgate in the designated storage area.

2) During summer use, the body of the truck can become cluttered with gravel, pavement, miscellaneous tools and even an occasional bottle or can. Make certain the body is completely clean of all debris before installing the hopper.

3) Before positioning the truck for the installation, check the hopper for mechanical issues and grease the hopper if necessary or scheduled. Check the limiter strap for any cuts, tears or excessive wear.

4) Under the direction of the spotter, the operator will back slowly and squarely to the hopper.

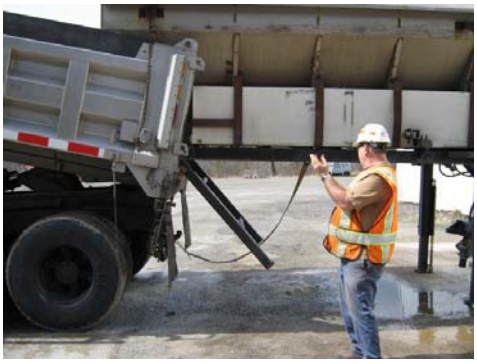
5) The spotter will then direct the operator to raise the truck body so as to clear the rollers and slowly back up until the body is within a couple of inches of the front legs of the hopper stand unit. The spotter will then direct the operator to stop and secure the vehicle by putting the truck in neutral and applying the parking brake.

6) At this point, the spotter will indicate that he is going under the hopper to attach the limiter strap to the truck. The strap is designed to prevent the hopper from coming out of the body before the legs are down and locked. Check the strap to ensure it has been adjusted to the proper length. **Note: The legs of the hopper stand device are still in the down and locked position.**

7) With the spotter once again in view of the operator, he will direct the operator to lower the body of the truck until the front legs of the hopper stand unit just clear the ground.

8) The spotter will then unlock the front legs without going under the hopper.

9) The spotter will then direct the operator to back up slowly. The front legs will fold up as the hopper continues to roll into the truck body. **Note: Spotter should make certain the limiter strap does not get pinched or cut as the hopper is placed into the truck.**



10) At the direction of the spotter, the operator will continue to slowly back the truck while slowly lowering the body until the tailgate latch contacts the pins of the hopper stand and the spotter directs the operator to stop. The operator will secure the vehicle by putting the truck in neutral and applying the parking brake. **Note: The operator must maintain a dump angle that allows the hopper to roll into place. If this angle is too steep, the truck will actually push the hopper away. If it's too low, the back of the truck body will actually hit the hopper stand.**

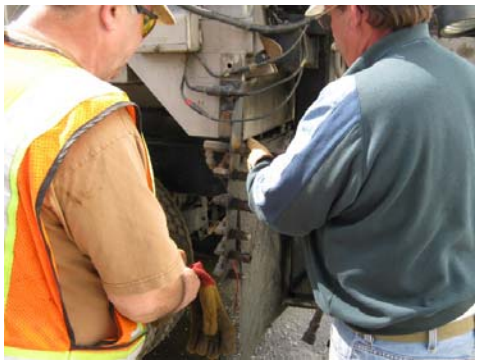
11) With the hopper in the proper position, the spotter will close and lock the tailgate latch.

12) The spotter will then direct the operator to lower the body completely.

13) With the truck already secured, it is now safe for the operator to exit the vehicle and assist the spotter with unpinning, lifting and re-pinning the rear legs of the hopper stand unit.

14) Next, the operator and spotter will completely secure the hopper by fastening all the safety chains and latches provided. These should consist of two sets of safety chains; one on either side of the bottom rear corners and a chain and binder located on each of the front upper corners. **Note: When tightening the front binders use caution not to over tighten, as this can cause damage to the hopper.**

15) Connect all of the hydraulic fittings.



16) Connect all wiring for lighting, controller (Compu-Spread, Cirus, Schmidt), etc. **Note: Check the controller connector to assure a liberal amount of dialectic grease is present.**

17) Confirm all lighting is working properly.

18) Confirm the gate is positioned at the proper gate setting.

19) Confirm the bed chain or belt is working properly by running the truck in the “unload” mode.

20) Check for hydraulic leaks.

21) To complete the installation process, make one final and overall check of the hopper to confirm safety chains, hydraulic fittings and electrical connections are properly attached.

Hopper Installation – Gantry System

1) The first step in the hopper installation procedure is to remove the tailgate. To achieve this, first move the truck to a designated area to have the tailgate removed using a bucket loader if a tailgate stand is not available. Attach a properly rated lifting chain to the link on the top of the tailgate and apply enough upward pressure to allow the tailgate pins to be removed. After the pins have been removed, check to see that the spreader/tailgate chains have been detached. Lift the tailgate out of position and reinsert the pins into the tailgate. Store the tailgate in the designated storage area.

2) During summer use, the body of the truck can become cluttered with gravel, pavement, miscellaneous tools and even an occasional bottle or can. Make certain the body is completely clean of all debris before installing the hopper.

3) Before positioning the truck for the installation, check the hopper for mechanical issues and grease the hopper if necessary or scheduled.

4) Under the direction of the spotter, the operator will back slowly and squarely to the hopper.

5) With the truck body in the down position and at the direction of the spotter, the operator will slowly back under the hopper so as to allow the hopper to slide into the truck body. **Note: The spotter must check the hopper height to assure it will clear the truck body.**

6) The spotter will continue to direct the operator to back until the rear of the hopper latches into the tailgate latches. The operator will secure the vehicle by putting the truck in neutral and applying the parking brake. **Note: The spotter may need to adjust the two chain falls on either side at the rear of the hopper to insure proper fit into the tailgate latches.**

7) The spotter will close and lock the tailgate latch and hook the two safety chains located at either side of the rear of the hopper.

8) At this point, the spotter will release the chain falls from the back of the hopper and secure them to the side of the gantry.

9) The operator will raise the body until there is slack in the front chain that suspends the hopper in the gantry. The spotter will notify the operator that they are climbing between the cab and body to release the front chain. **Note: The chain should be hooked to the gantry so as to clear the hopper when driving away.**

10) After the spotter has climbed down and is in direct view of the operator, the operator will lower the body.

11) With the truck already secured, the operator can safely exit the cab and assist the spotter in hooking the two remaining chains and binders located at the front upper corners of the dump body. **Note: When tightening the front binders use caution not to over-tighten, as this can cause damage to the hopper.**

12) Connect all of the hydraulic fittings.

13) Connect all wiring for lighting, controller (Compu-Spread, Cirus, Schmidt), etc. **Note: Check the controller connector to assure a liberal amount of dialectic grease is present.**

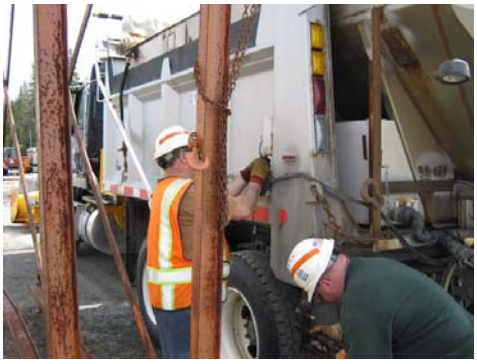
14) Confirm all lighting is working properly.

15) Confirm the gate is positioned at the proper gate setting.

16) Confirm the bed chain or belt is working properly by running the truck in the “unload” mode.

17) Check for hydraulic leaks.

18) To complete the installation process, make one final and overall check of the hopper to confirm safety chains, hydraulic fittings and electrical connections are properly attached.



Hopper Removal (Hopper Stand System)

1) To begin the hopper removal procedure, position the vehicle at the appropriate stockpile location and completely empty the hopper of all granular material.

2) The liquid tanks should be completely emptied before removing the hopper. In no instance should the tanks be left partially full. A potential hazard exists when liquid in partially full tanks begins "sloshing" around during removal; causing the hopper to move quickly from the force of the moving liquid and potentially fall to the ground.
Note: Rubber gloves and face shield must be worn

3) Choose a firm, level landing place for unloading the hopper. Concrete or pavement is preferable.
Note: Extreme heat during summer storage can cause the hopper legs to sink into the pavement, requiring adjustment before the hopper can be inserted into the truck body. *Placing pieces of plywood under the legs can help prevent this from occuring

4) Move truck to the desired drop location. Under the direction of the spotter, the operator will slowly back up until the truck is positioned at the drop location. The spotter will direct the operator to secure the vehicle by putting the truck in neutral and applying the parking brake. **Note: It is now safe for the operator to exit the vehicle and assist the spotter.**

4A) For the Schmidt Stratos Spreader, the chute/spinner assembly must be raised when removing the hopper.

5) Next, the spotter and operator will unhook all hydraulic and electrical connections. **Note: Absorbent pads should be available to collect any leaked hydraulic fluid and hydraulic and electrical connections should be capped or plugged.**

6) The operator and spotter will remove the rear leg locking pins, lower the rear legs into position and re-insert the locking pins.

7) At this point, the operator and spotter will remove the safety chains and binders from the front of the hopper and safety chains from the rear of the hopper.

8) With the operator back in the vehicle and the spotter in full view, the operator will raise the dump until the rear legs make contact with the ground and stop the vehicle when directed by the spotter.

9) The spotter will then unlatch the tailgate.

10) The operator will raise the dump body until the rear of the hopper begins to come off the floor of the dump.

11) At the direction of the spotter, the operator will slowly pull forward, adjusting the dump angle as directed, to keep the frame of the hopper stand from rubbing against the floor of the dump body.

12) The operator will continue to pull forward until the hopper is positioned to allow the front legs of the hopper stand to drop. The spotter will direct the operator to stop and secure the vehicle by putting the vehicle in neutral and applying the parking brake.

13) The operator will exit the vehicle and assist the spotter with lowering the front legs into position and locking them into place.

14) The operator will re-enter the vehicle and with the spotter in full view, raise the body until the front legs have contacted the ground. The operator will stop and secure the vehicle.

15) The spotter will indicate to the operator that they are going under the hopper to unhook the limiter strap. **Note: The strap should be draped over the hopper stand in such a way that keeps the strap from contacting the ground.**

16) To complete the removal process, the spotter will perform a final check to confirm all fittings have been disconnected and then indicate to the operator that it is safe to move the vehicle away from the hopper.

17) Whenever possible, the hopper should be completely washed after removal. **Note: Wear all appropriate PPE.**

Hopper Stand Maintenance

There are several items that should be considered in keeping the Hopper Stand functioning smoothly and safely. The following items should be addressed each time the hopper is removed from the truck body:

- The hopper stand will be inspected for cracks, cracked welds, bent legs and pins, excessive corrosion or other deficiencies that can potentially cause the hopper stand to fail.

- If present, all grease fittings should be greased.

- A liberal amount of graphite shall be applied to the portion of the rear legs that slide into the hopper stand frame.

- Front leg pins and locks should receive a liberal application of chain and cable lube.

- Front, side and rear rollers should receive a liberal application of chain and cable lube.

- The limiter strap will be inspected for rips, cuts, frays, or other deficiencies that can potentially affect the straps integrity.

- Connections on the limiter strap must be checked and found to be secure and functional.

Hopper Removal (Gantry System)

1) To begin the hopper removal procedure, position the vehicle at the appropriate stockpile location and completely empty the hopper of all granular material.

2) The operator will then move the vehicle to the liquid storage area and completely empty the on-board liquid tanks. Proper PPE to include rubber gloves and face shield must be worn. **Note: Under no circumstance should a hopper be stored in a Gantry system with liquid remaining in the liquid tanks.**

3) Under the direction of the spotter, the operator will slowly back the truck under the desired gantry system. The spotter will take particular care to position the truck directly under the hook points to assure the hopper is lifted straight off the truck body. The spotter will direct the operator to secure the vehicle by putting the truck in neutral and applying the parking brake. **Note: It is now safe for the operator to exit the vehicle and assist the spotter.**

4) Next, the spotter and operator will unhook all hydraulic and electrical connections. **Note: Absorbent pads should be available to collect any leaked hydraulic fluid and hydraulic and electrical connections should be capped or plugged.**

5) At this point, the operator and spotter will remove the safety chains and binders from the front of the hopper and safety chains from the rear of the hopper.

6) The operator will re-enter the vehicle and raise the dump until the front of the hopper is high enough to hook the front chain located on the gantry system. The spotter will direct the operator to secure the vehicle.

7) The spotter will then notify the operator that he is going to climb between the cab and body of the vehicle to attach the front chain.

8) After the spotter has climbed down and is in direct view of the operator, the spotter will direct the operator to lower the front of the dump body. **Note: The spotter must check to assure the hopper has lifted slightly off the dump body floor.**

9) The spotter will then hook the chain falls located on the gantry to both sides of the rear of the hopper. **Note: The spotter will remove all slack from the chains by adjusting the chain falls.**

10) The spotter will then unlatch the tailgate.

11) The spotter will raise the hopper utilizing the chain falls until the rear of the hopper has lifted slightly off the dump body floor.

12) The spotter will then direct the operator to slowly pull forward until the tailgate latch clears. The spotter will direct the operator to stop and secure the vehicle by putting the truck in neutral and setting the parking brake.

13) The spotter will then raise the hopper using the chain falls, so it clears the truck body by several inches.

14) To complete the removal process, the spotter will perform a final check to confirm all fittings have been disconnected and then indicate to the operator that it is safe to move the vehicle away from the hopper.

15) Whenever possible, the hopper should be completely washed after removal. **Note: Wear all appropriate PPE.**

Hopper Maintenance

Maintenance of the hopper should be completed as part of every 50 hour service of the vehicle. When performing the 50 hour service during the summer, the driver should conduct a visual check of the hopper. If time allows, connect the hydraulic fittings and run the bed chain for 30 seconds to assure the hopper will perform when the winter season arrives.

Below is a list of items to perform as part of the hopper maintenance.

- Remove and thoroughly wash the hopper, making certain to wear all appropriate PPE.
- Complete a visual inspection of the hopper. Check all welds, bolts, etc.
- Check all hydraulic hoses and fittings.
- Check all electronic fittings.
- Grease all fittings. These are typically located on either side at the front, near the top of the hopper, at the rear of the hopper near the bed chain shaft and at the spinner.
- Check the bed chain or belt for proper tightness and alignment.

- Check the gear box for proper fluid level.

Front Dump Systems

MaineDOT Front Dump Systems can be quickly switched from rear dumping mode to winter maintenance, front dumping mode by removing the pins or locks from the rear hinge points and moving them to the front hinge point locations.

There are several hazard or safety considerations to be aware of when working with this system. These are discussed below.

Hazards to Consider/Avoid When Working with the Front Dump System

- The immediate area around the truck should be checked for all hazards (including overhead) and additional persons should not be allowed in this area until all changes are complete.
- Dump Props must always be in position when body is raised and maintenance, cleaning, greasing, etc. are being performed.
- When changing the dump position of the body, pins or locks must be switched on both sides of the truck.
- Always wear the required PPE, including; hardhat, gloves, eye protection, face protection and proper foot protection (steel toed boots).
- Work with an experienced person until you are comfortable completing these procedures.

Procedure for Changing from Rear Dump to Front Dump Position

1) When preparing for a winter storm event, check and completely clean the body of all tools, gravel material, pavement, etc.

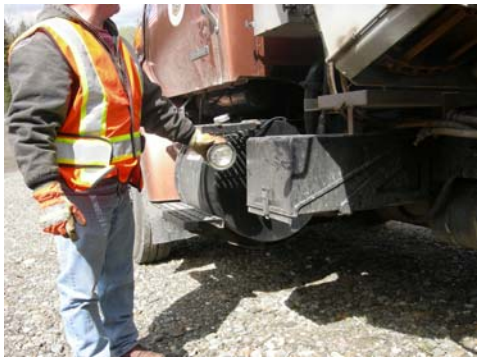
2) Remove and properly store the bed chain plate cover.

3) Next, remove the pins or locks from the rear hinge point locations and move them to the front locations. **Note: Make certain this process is completed on both sides of the truck body.**

4) Install the chute, if not already in place.

5) If necessary, install the spinner.

6) Confirm the gate is positioned at the proper gate setting.



7) Confirm all lighting is working properly.

8) Before loading the truck with material, confirm the bed chain is working properly by running the truck in the "unload" mode.

Front Dump Maintenance

Maintenance of the Front Dump should be completed as part of every 50 hour service of the vehicle. When performing the 50 hour service during the summer, the driver should conduct a visual check of the body and run the bed chain for 30 seconds to assure the equipment will be ready when the winter season arrives.

Below is a list of items to perform as part of the Front Dump maintenance.

- Lift dump body and place dump props into position

- Thoroughly wash the dump body, and the inside and outside of the frame and sub-frame, making certain to wear all appropriate PPE.

- Grease all fittings. These are typically located on each end of the idler sprocket shaft and on the drive shaft, opposite the gear box. Fittings may also be located at the rollers, if so equipped.

- Lubricate the dump scissors

- Next, complete a visual inspection of the body. Check all welds, bolts, etc.

- Check the bed chain or belt for proper tightness and alignment.

- As a final step, check the gear box for proper fluid level.

Henderson Body Systems

MaineDOT Henderson Body Systems are very similar to the hopper systems, except they remain permanently attached to the truck frame. For summer use, the belt running along the bottom of the body is typically covered with a plate and material is removed from the body by lifting the dump body. In winter conditions, the plate covering the belt is removed and a spinner assembly system is attached to the back of the truck.

There are several hazard or safety considerations to be aware of when working with this system. These are listed below.

Hazards to Consider/Avoid When Working with the Henderson System

- The immediate area around the truck should be checked for all hazards (including overhead) and additional persons should not be allowed in this area until all changes are complete.
- Dump Props must always be in position when body is raised and maintenance, cleaning, greasing, etc. are being performed.
- Always wear the required PPE, including; hardhat, gloves, eye protection, face protection and proper foot protection (steel toed boots).
- Work with an experienced person until you are comfortable completing these procedures.

Preparing the Henderson Body System for Winter Maintenance Conditions

1) When preparing for a winter storm event, check and completely clean the body of all tools, gravel material, pavement, etc.

2) Remove and properly store the belt assembly plate cover.

3) The next step is to install the spinner assembly.

4) Once the two assembly arms have been inserted into the sleeves, insert the two locking pins. These are located at either side and under the truck body.

5) Next, connect all air fittings/couplings.

6) Connect all hydraulic fittings.

7) To complete the spinner assembly installation, connect the liquid/brine fittings

8) Next, confirm the gate is positioned at the proper gate setting.

9) Confirm all lighting is working properly.

10) Before loading the truck with material, confirm the bed chain is working properly by running the truck in the "unload" mode.

Henderson Body Maintenance

Maintenance of the Henderson Body should be completed as part of every 50 hour service of the vehicle. When performing the 50 hour service during the summer, the driver should conduct a visual check of the body and run the bed chain for 30 seconds to assure the equipment will be ready when the winter season arrives.

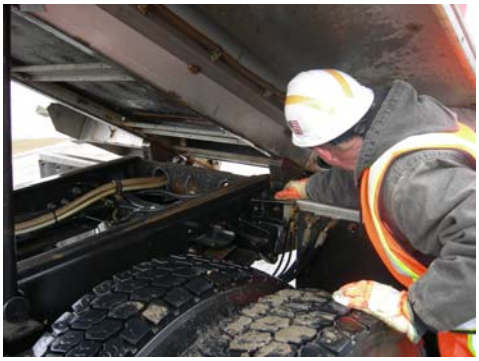
Below is a list of items to perform as part of the Henderson Body maintenance.

- Lift the dump body and place dump props into position

- Thoroughly wash the dump body, and the inside and outside of the frame and sub-frame, making certain to wear all appropriate PPE.

- Grease all fittings. These are typically located on each end of the idler sprocket shaft and on the drive shaft, opposite the gear box. Fittings may also be located at the rollers, if so equipped.

- Next, complete a visual inspection of the body. Check all welds, bolts, etc.



- To complete the maintenance procedure, check the bed chain or belt for proper tightness and alignment.

Swap Loader System

The Swap Loader system has a unique set of procedures for removing and installing the hopper attachment. Unlike the Stand Alone or Gantry system discussed previously, the Swap Loader has a mechanical arm used to lift the hopper onto and off of the truck body.

Hopper Installation – Swap Loader

1) To begin the installation process, check the hopper for mechanical issues and grease the hopper if necessary or scheduled. Also make certain that no equipment or tools have been placed in close proximity to the hopper that might become damaged during the loading process.

2) Under the direction of the spotter, the operator will then back slowly and squarely to the hopper.

3) Next, the operator will position the hook into the lifting point of the hopper frame and begin pulling the hopper onto the truck. This will pull the truck back and under the hopper as its being lifted.

4) With the hopper just off the ground, the spotter will direct the operator to apply the parking brake and complete the loading process.

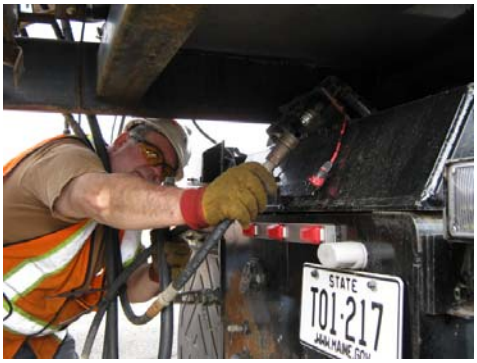
5) With the hopper successfully loaded, the operator can safely exit the vehicle and assist the spotter.

6) The spotter will then plug in the electric winch.

7) Next, disconnect the safety chain. **Note: It may be necessary to adjust the chute assembly using the electric winch.**

8) The spotter will then operate the winch controls to lower the spinner/chute assembly. **Note: At no time will any person stand under the assembly during this procedure.**

9) The next step is to insert the spinner and chute assembly locking pin, located at the rear and to the right on the hopper.



10) The spotter and operator will then connect all hydraulic fittings.

11) Next, connect all wiring for lighting, controller (Compu-Spread, Cirus), etc. **Note: Check the controller connector to assure a liberal amount of dialectic grease is present.**

12) Confirm all lighting is working properly.

13) Confirm the gate is positioned at the proper gate setting.

14) Confirm the bed chain or belt is working properly by running the truck in the “unload” mode.

15) Check to make certain there are no hydraulic leaks.

16) To complete the installation process, make one final and overall check of the hopper to confirm all hydraulic fittings and electrical connections are properly attached.

Hopper Removal – Swap Loader

1) To begin the hopper removal procedure, position the vehicle at the appropriate stockpile location and completely empty the hopper of all granular material.

2) Next, position the vehicle at the storage tank area and completely empty the liquid storage tanks. Rubber gloves and face shield must be worn **Note: A potential spilling hazard exists if liquid is present in tanks during the hopper off-load. Shifting liquid can spill out from the over-fill tubes during removal.**

3) Select the drop location for the hopper. A firm, level surface is required.

4) Move truck to the desired drop location. Under the direction of the spotter, the operator will slowly back the truck into position. The spotter will direct the operator to secure the vehicle by putting the truck in neutral and applying the parking brake. **Note: It is now safe for the operator to exit the vehicle and assist the spotter.**

5) Next, the spotter and operator will disconnect all hydraulic fittings and electrical connections, except the electric winch connection.

6) The spotter will then remove the spinner and chute assembly locking pin, located at the rear and to the right on the hopper.

7) After an additional check to determine all hydraulic and electrical connectors (except the electrical winch) have been disconnected, the spotter will operate the winch controls to lift the spinner/chute assembly. **Note: At no time will any person stand under the assembly during this procedure.**

8) With the assembly in the full upright position, the spotter will then hook the safety chain to secure the spinner/chute assembly.

9) The spotter will then re-insert the spinner and chute assembly locking pin.

10) Next, the spotter will disconnect the electric winch connector. **Note: Before completing this step, make certain the winch cable is tight and lying firmly against the back of the chute assembly.**

11) Before unloading, complete one final check to make certain all fittings and connectors have been disconnected.

12) Next, the operator will re-enter the vehicle, making certain the truck is in neutral and the parking brake is applied.

13) With the spotter monitoring at a safe distance, it is now safe for the operator to begin the unloading process.

14) As the back of the hopper frame touches the ground, the spotter will direct the operator to release the parking brake. This will cause the truck to be pushed forward as the hopper is lowered.

15) With the hopper completely at rest on the ground, the operator will maneuver the hook away from the lifting point and fully retract the lifting arm into the transport position.

16) To complete the removal process, the hopper should be completely washed. **Note: Wear all appropriate PPE.**

Other Specialty Hoppers – Schmidt, Modified Units and Precision Placement System (PPS)

Schmidt and Modified Spreaders

The Schmidt Stratos spreaders and the Modified spreaders are similar to our standard hopper spreaders, with a few exceptions. They are equipped with higher capacity liquid tanks to accommodate higher liquid applications to the granular salt; they utilize a belt system to deliver salt to the rear of the hopper and they are designed to spread the salt using the material spinner, instead of concentrating the salt in a wind row.

The Schmidt Stratos is designed and used primarily in Europe and it incorporates a specially designed spinner to mix and distribute the treated salt. One additional feature of the Stratos is its ability to spread material in multiple lanes by rotating the spinner opening relative to the road alignment (see picture at left).

The Modified spreaders are so named because they are simply a standard spreader "modified" by Fleet Services to perform similarly to the European spreaders. These modifications include; four 135 gallon liquid tanks coupled together to provide a total capacity of 540 gallons and a belt over chain delivery system. The modified units also have modified chute/spinner systems to enhance material delivery.

Each of these spreaders is stored using a hopper stand system. The modified spreaders are installed and removed in the same manner as the standard hoppers, while the Stratos system has one additional requirement. The chute/spinner assembly must be raised when removing the spreader. This additional step is documented as step 4A in the Hopper Removal (Hopper Stand System) section.

Maintenance of the Hopper and Hopper Stand System for these spreaders is identical to that of the standard hopper system.

Consideration of the hazards associated with the installation and removal of these spreaders is also the same as the standard spreaders.

Precision Placement System (PPS)

Auger System

The Precision Placement System (PPS) is manufactured by the Swenson Spreader Company of Lindenwood, Illinois. It is designed to place salt in a windrow pattern at the centerline of the roadway. The PPS is an add-on to our standard hoppers that consists of an auger or chute and a high speed, shrouded spinner

Granular salt is moved from the center of the dump body (with either an auger or chute) to the centerline side of the truck and dropped onto the spinner. The speed of the spinner is directly proportional to the speed of the truck, only in the reverse direction, which negates the speed of the truck and drops the salt directly onto the pavement.

Chute System

Installation and removal of PPS equipped hoppers is the same as our standard hopper. **Caution must be used when installing or removing a hopper stand PPS system, so as to not allow the spinner to come in contact with the ground.**

Maintenance of the PPS system is also the same, except for additional grease fittings located on the auger and spinner mechanisms.