NEW LEADER

MODEL NL345
Operator's Manual

NL4500G4 SERIAL NO. _____

TR3000 SERIAL NO._____

MULTAPPLIER SERIAL NO._____

MANUAL NUMBER: 312884-AA-A-01

EFFECTIVE 10/2016

Hi-Way NEW LEADER

Highway Equipment Company

Building the best since 1939.

1330 76TH AVE SW
CEDAR RAPIDS, IA 52404-7052
PHONE (319) 363-8281 | FAX (319) 286-3350
www.highwayequipment.com

NOTE:	This manual incorporates several interactive features to provide supplemental information and ease of navigation. The information below is to aid in the identification and use of these features.

Hyperlinks

Hyperlinks provide direct access to a specific destination when clicked. The entire Table of Contents of this manual is hyperlinked to provide quick access to all sections of this manual when viewing the electronic version.

Hyperlinks within the content are denoted by **blue, bold underlined text**. Electronic format viewers can click these links for direct access to New Leader online features. Internet access is required.

Quick Reference (QR) Codes

Quick reference codes provide direct access to a specific destination when activated. An example is provided below. In the printed version of this manual, viewers may scan the codes with a supporting mobile device for direct access to New Leader online features. Mobile data is required.

The electronic version of this manual provides the option to scan codes on-screen, or to click the code like a button. Internet access/mobile data is required.

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Insert Current New Leader Warranty

PLEASE ! ALWAYS THINK SAFETY FIRST !!

The purpose of this manual is to familiarize the person (or persons) using this unit with the information necessary to properly install, operate, and maintain this system. The safety instructions indicated by the safety alert symbol in the following pages supersede the general safety rules. These instructions cannot replace the following: the fundamental knowledge that must be possessed by the installer or operator, the knowledge of a qualified person, or the clear thinking necessary to install and operate this equipment. Since the life of any machine depends largely upon the care it is given, we suggest that this manual be read thoroughly and referred to frequently. If for any reason you do not understand the instructions, please call your authorized dealer or our Product Sales and Support Department at 1-888-363-8006.

It has been our experience that by following these installation instructions, and by observing the operation of the spreader, you will have sufficient understanding of the machine enabling you to troubleshoot and correct all normal problems that you may encounter. Again, we urge you to call your authorized dealer or our Product Sales and Support Department if you find the unit is not operating properly, or if you are having trouble with repairs, installation, or removal of this unit.

We urge you to protect your investment by using genuine HECO parts and our authorized dealers for all work other than routine care and adjustments.

Highway Equipment Company reserves the right to make alterations or modifications to this equipment at any time. The manufacturer shall not be obligated to make such changes to machines already in the field.

This Safety Section should be read thoroughly and referred to frequently.

ACCIDENTS HURT !!!

ACCIDENTS COST !!!

ACCIDENTS CAN BE AVOIDED !!!

TAKE NOTE! THIS SAFETY ALERT SYMBOL FOUND THROUGHOUT THIS MANUAL IS USED TO CALL YOUR ATTENTION TO INSTRUCTIONS INVOLVING YOUR PERSONAL SAFETY AND THAT OF OTHERS. FAILURE TO FOLLOW THESE INSTRUCTIONS CAN RESULT IN INJURY OR DEATH.

In this manual and on the safety signs placed on the unit, the words "DANGER," "WARNING," "CAUTION," and "NOTICE" are used to indicate the following:

DANGER	Indicates an imminently hazardous situation that, if not avoided, WILL result in death or serious injury. This signal word is to be limited to the most extreme situations and typically for machine components that, for functional purposes, cannot be guarded.
WARNING	Indicates a potentially hazardous situation that, if not avoided, COULD result in death or serious injury, and includes hazards that are exposed when guards are removed. It may also be used to alert against unsafe practices.
CAUTION	Indicates a potentially hazardous situation that, if not avoided, MAY result in minor or moderate injury. It may also be used to alert against unsafe practices.
NOTICE!	Is used for informational purposes in areas which may involve damage or deterioration to equipment but generally would not involve the potential for personal injury.
NOTE:	Provides additional information to simplify a procedure or clarify a process.

The need for safety cannot be stressed strongly enough in this manual. At Highway Equipment Company, we urge you to make safety your top priority when operating any equipment. We firmly advise that anyone allowed to operate this machine be thoroughly trained and tested, to prove they understand the fundamentals of safe operation.

The following guidelines are intended to cover general usage and to assist you in avoiding accidents. There will be times when you will run into situations that are not covered in this section. At those times the best standard to use is common sense. If, at any time, you have a question concerning these guidelines, please call your authorized dealer or our Product Sales & Support Department at (888) 363-8006.

SAFETY DECAL MAINTENANCE INSTRUCTIONS

1. Keep safety decals and signs clean and legible at all times.

2. Replace safety decals and signs that are missing or have become illegible.

3. Replaced parts that displayed a safety sign should also display the current sign.

4. Safety decals or signs are available from your dealer's Parts Department or our Cedar Rapids factory.

SAFETY DECAL INSTALLATION INSTRUCTIONS

1. Clean Surface
   Wash the installation surface with a synthetic, free-rinsing detergent. Avoid washing the surface with a soap containing creams or lotion. Allow to dry.

2. Position Safety Decal
   Decide on the exact position before application. Application marks may be made on the top or side edge of the substrate with a lead pencil, marking pen, or small pieces of masking tape. NOTE: Do not use chalk line, china marker, or grease pencil. Safety decals will not adhere to these.

3. Remove the Liner
   A small bend at the corner or edge will cause the liner to separate from the decal. Pull the liner away in a continuous motion at a 180-degree angle. If the liner is scored, bend at score and remove.

4. Apply Safety Decal
   a. Tack decal in place with thumb pressure in upper corners.
   b. Using firm initial squeegee pressure, begin at the center of the decal and work outward in all directions with overlapping strokes. NOTE: Keep squeegee blade even—nicked edges will leave application bubbles.
   c. Pull up tack points before squeegeeing over them to avoid wrinkles.

5. Remove Pre-mask
   If safety decal has a pre-mask cover remove it at this time by pulling it away from the decal at a 180 degree angle. NOTE: It is important that the pre-mask covering is removed before the decal is exposed to sunlight to avoid the pre-mask from permanently adhering to the decal.

6. Remove Air Pockets
   Inspect the decal in the flat areas for bubbles. To eliminate the bubbles, puncture the decal at one end of the bubble with a pin (never a razor blade) and press out entrapped air with thumb moving toward the puncture.

7. Re-Squeegee All Edges.

SAFETY DECALS

1. DANGER: FLYING MATERIAL & ROTATING SPINNER HAZARD

To prevent death or serious injury:

- Wear eye protection.
- Stop machine before servicing or adjusting.
- Keep bystanders at least 60 feet away.

2. DANGER: PINCH POINT HAZARD

To prevent death or serious injury:

- Keep all persons and objects clear while any part of this machine is in motion.
- Keep hands, feet, hair and clothing away from moving parts.

3. WARNING: FALLING HAZARD

To avoid death, serious injury or machine damage:

- Do not climb or stand on guard.

4. WARNING: MOVING PART HAZARD

To prevent death or serious injury:

- Close and secure guards before starting.
- Do not stand on or climb machine.
- Disconnect and lockout power source before servicing or adjusting.
- Keep hands, feet and hair away from moving parts.

5. WARNING: MOVING PART HAZARD

To prevent death, serious injury or machine damage:

- Close and secure guards before starting.
- Do not stand on or climb machine.
- Disconnect and lockout power source before servicing or adjusting.
- Keep hands, feet and hair away from moving parts.

6. WARNING: FALLING HAZARD

To prevent death, serious injury or machine damage:

- Do not climb or stand on guard.

7. CAUTION: DO NOT EXCEED GOVERNMENT WEIGHT RESTRICTIONS

To prevent injury or machine damage:

- Consult federal, state and local laws to ensure the gross weight on any one axle of a vehicle, or combination of vehicles, operated on the highways, does not exceed government weight restrictions.

8. CAUTION: BRAKING SYSTEM REQUIREMENTS

Per ANSI/SAE S365.8 MAY2007:

- Do not tow equipment that has brakes:
  - at speeds over 32 mph (50 km/h); or
  - at speeds above that recommended by the manufacturer; or
  - that, when fully loaded, has a weight of more than 4.5 times the weight of the towing unit.
- Do not tow equipment that does not have brakes:
  - at speeds over 20 mph (32 km/h); or
  - at speeds above that recommended by the manufacturer; or
  - that, when fully loaded, has a weight over 3300 lbs (1496 kg) and more than 1.5 times the weight of the towing unit.

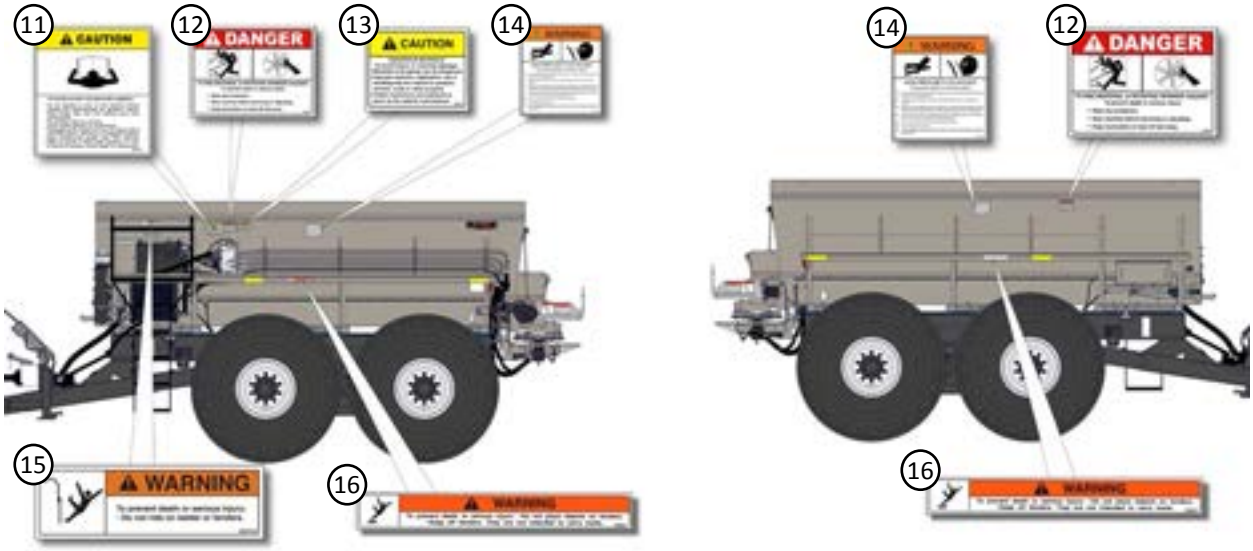
9. CAUTION: TOWING REQUIREMENTS

- Tow only with tractors equipped with CAT III/IV hitch and brakes. Towing with light or medium duty trucks may result in loss of control, causing damage or injury.

10. CAUTION: TIPPING HAZARD

To avoid injury or machine damage:

- Make sure material is not concentrated at the rear of the machine before unhitching. Material at the rear of the machine may cause the trailer hitch to tip upward.



11. CAUTION: OPERATOR'S RESPONSIBILITIES

To avoid injury or machine damage:

- Do not operate or work on this machine without reading and understanding the operator's manual.
- Keep hands, feet, hair and clothing away from moving parts.
- Do not allow riders on machine.
- Avoid unsafe operation or maintenance practices.
- Disengage power take-off and shut off engine before removing guards, servicing or unclogging machine.
- Keep unauthorized persons away from machine.
- Keep all guards in place when operating machine.
- If operator's manual is missing, contact your local New Leader dealer or print a new copy from www.highwayequipment.com.

12. DANGER: MOVING PART HAZARD

To death or serious injury:

- Stay out of spreader while conveyor is moving.
- Disconnect and lock out power source before adjusting or servicing machine.
- Do not ride on the spreader.

13. CAUTION: HAZARDOUS MATERIALS

To avoid injury or machine damage:

- Materials to be spread can be dangerous.
- Improper selection, application, use or handling may be hazardous to persons, animals, crops or other property.
- Follow all instructions and precautions given by material manufacturer.

14. WARNING: HIGH-PRESSURE FLUIDS

To avoid serious injury or machine damage:

- Inspect hoses periodically - at least once per year - for leakage, cuts, cracks, abrasions, kinking, corrosion, exposed wire braid or any other signs of damage or wear.
- Replace worn or damaged hose assemblies immediately with properly rated replacement parts.
- Escaping fluid under high pressure can penetrate the skin causing serious injury.
- Avoid hazards by relieving pressure before disconnecting hydraulic lines. Tighten all connections before running system.
- Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids.
- If penetrated by high-pressure fluid, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.

15. WARNING: FALLING HAZARD

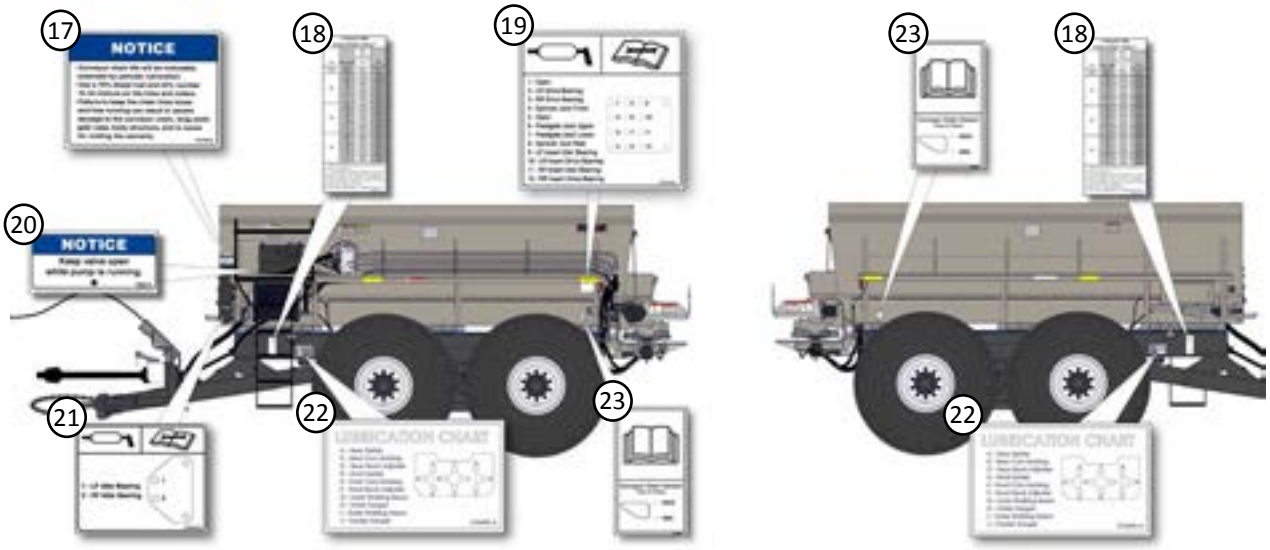
To prevent death or serious injury:

- Do not ride on ladder or fenders.

16. WARNING: FALLING HAZARD

To prevent death, serious injury or machine damage:

- Do not place objects on fenders. They are not intended to carry loads.



17. NOTICE: CONVEYOR CHAIN LUBRICATION

To prevent machine damage:

- Conveyor chain life will be noticeably extended by periodic lubrication.
- Use a 75% diesel fuel and 25% number 10 oil mixture on the links and rollers.
- Failure to keep the chain links loose and free running can result in severe damage to the conveyor chain, drag shaft, gearcase, body structure, and is cause for voiding the warranty.

18. TUBELESS TIRE ROAD SPEED TABLE

To prevent machine damage:

- Refer to “Operations” section of this manual for details.

19. LUBRICATION CHART

To prevent machine damage:

- Periodically lubricate the spreader components.
- Refer to “Lubrication and Maintenance” section of this manual for details.

20. NOTICE:

To prevent machine damage:

- Keep all reservoir valves open while pump is runnning.

21. LUBRICATION CHART

To prevent machine damage:

- Periodically lubricate the spreader components.
- Refer to “Lubrication and Maintenance” section of this manual for details.

22. LUBRICATION CHART

To prevent machine damage:

- Periodically lubricate the trailer components.
- Refer to “Lubrication and Maintenance” section of this manual for details.

23. CONVEYOR CHAIN TENSION

To prevent machine damage:

- Periodically inspect conveyor chain through sight window to ensure proper tension.
- Refer to “Lubrication and Maintenance” section of this manual for details.

24. NOTICE: SPREAD PATTERN TESTING

To obtain optimal machine performance:

Before spreading material, a spread pattern test must be conducted to properly adjust the spread pattern. Refer to the “Spread Pattern” section of this manual for adjustment instructions.

A spread pattern test kit is supplied with this spreader. Replacement kits are available from your local New Leader dealer.

Wind, humidity, rain and other adverse weather conditions can affect spread pattern, resulting in uneven crop growth and loss of yields.

THE MANUFACTURER OF THIS SPREADER WILL NOT BE LIABLE FOR MISAPPLIED MATERIAL DUE TO AN IMPROPERLY ADJUSTED SPREADER OR ADVERSE WEATHER CONDITIONS.

It is recommended that a spread pattern test be conducted prior to each spreading season, after any spreader maintenance, and periodically during the spreading season. Spread pattern tests must be conducted whenever a new product is applied.

25. NOTICE: WHEEL LUG TIGHTENING

To prevent injury or machine damage:

Repeat the following procedure on 22mm wheel studs each time the wheel is replaced:

1. Snug each wheel bolt to 68 N-m (50 lb-ft).
2. Torque each wheel bolt to 610 - 678 N-m (450 - 500 lb-ft).
3. Retorque after 10 hours of operation.

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GENERAL SAFETY RULES
OPERATIONS

1. Before attempting to operate this unit, read and be sure you understand the operation and maintenance manual. Locate all controls and determine the use of each. Know what you are doing!

2. When leaving the unit unattended for any reason, be sure to:
   a. Take power take-off out of gear.
   b. Shut off conveyor and spinner drives.
   c. Shut off vehicle engine and unit engine (if so equipped).
   d. Place transmission of the vehicle in “neutral” or “park”.
   e. Set parking brake firmly.
   f. Lock ignition and take keys with you.
   g. Lock vehicle cab.
   h. If on steep grade, block wheels.

   These actions are recommended to avoid unauthorized use, runaway, vandalism, theft and unexpected operation during start-up.

3. Do not read, eat, talk on a mobile phone or take your attention away while operating the unit. Operating is a full-time job.

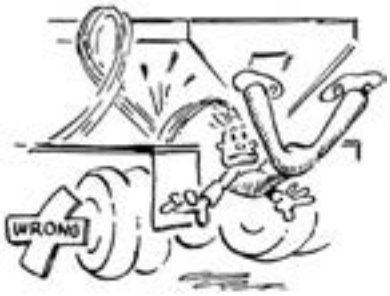
4. Stay out of the spreader. If it’s necessary to enter the spreader, return to the shop, empty body, turn off all power, set vehicle brakes, lock engine starting switch and remove keys before entering. Tag all controls to prohibit operation. Tags should be placed, and later removed, only by person working in the body.

5. Guards and covers are provided to help avoid injury. Stop all machinery before removing them. Replace guards and covers before starting spreader operation.

6. Stay clear of any moving members, such as shafts, couplings and universal joints. Make adjustments in small steps, shutting down all motions for each adjustment.

7. Before starting unit, be sure everyone is clear and out of the way.

8. Do not climb on unit. Use the inspection ladder or a portable ladder to view the unit. Be careful in getting on and off the ladder, especially in wet, icy, snowy or muddy conditions. Clean mud, snow or ice from steps and footwear.



9. Do not allow anyone to ride on any part of unit for any reason.

10. Keep away from spinners while they are turning:
    a. Serious injury can occur if spinners touch you.
    b. Rocks, scrap metal or other material can be thrown off the spinner violently. Stay out of discharge area.
    c. Make sure discharge area is clear before spreading.

11. Inspect spinner fins, spinner frame mounting and spinner fin nuts and screws every day. Look for missing fasteners, looseness, wear and cracks. Replace immediately if required. Use only new SAE grade 5 or grade 8 screws and new self-locking nuts.

12. Inspect all bolts, screws, fasteners, keys, chain drives, body mountings and other attachments periodically. Replace any missing or damaged parts with proper specification items. Tighten all bolts, nuts and screws to specified torques according to the torque chart in this manual.

13. Shut off engine before filling fuel and oil tanks. Do not allow overflow. Wipe up all spills. Do not smoke. Stay away from open flame. FIRE HAZARD!

14. Starting fluids and sprays are extremely flammable. Don't smoke. Stay away from flame or heat!

15. All vehicles should be equipped with a serviceable fire extinguisher of 5 BC rating or larger.

16. Hydraulic system and oil can get hot enough to cause burns. DO NOT work on system that is hot. Wait until oil has cooled. If an accident occurs, seek immediate medical assistance.

17. Wear eye protection while working around or on unit.
18. Read, understand and follow instructions and precautions given by the manufacturer or supplier of materials to be spread. Improper selection, application, use or handling may be hazardous to people, animals, plants, crops or other property.

CAUTION	If spreader is used to transport chemicals, check with your chemical supplier regarding DOT (Department of Transportation) requirements.

19. Cover all loads that can spill or blow away. Do not spread dusty materials where dust may create pollution or a traffic visibility problem.

20. Turn slowly and be careful when traveling on rough surfaces and side slopes, especially with a loaded spreader. Load may shift causing unit to tip.

21. Read and understand the precautionary decals on the spreader. Replace any that become defaced, damaged, lost or painted over. Replacement decals can be ordered from your dealer's parts department or from Highway Equipment Company by calling (319) 363-8281.

SAFETY

GENERAL SAFETY RULES
MAINTENANCE

1. Maintenance includes all lubrication, inspection, adjustments (other than operational control adjustments such as feedgate openings, conveyor speed, etc.) part replacement, repairs and such upkeep tasks as cleaning and painting.

2. When performing any maintenance work, wear proper protective equipment—always wear eye protection—safety shoes can help save your toes—gloves will help protect your hands against cuts, bruises, abrasions and from minor burns—a hard hat is better than a sore head!

3. Use proper tools for the job required. Use of improper tools (such as a screwdriver instead of a pry bar, a pair of pliers instead of a wrench, a wrench instead of a hammer) not only can damage the equipment being worked on, but can lead to serious injuries. USE THE PROPER TOOLS.

4. Before attempting any maintenance work (including lubrication), shut off power completely. DO NOT WORK ON RUNNING MACHINERY!

5. When guards and covers are removed for any maintenance, be sure that such guards are reinstalled before unit is put back into operation.

6. Check all screws, bolts and nuts for proper torques before placing equipment back in service. Refer to torque chart in this manual.

7. Some parts and assemblies are quite heavy. Before attempting to unfasten any heavy part or assembly, arrange to support it by means of a hoist, by blocking or by use of an adequate arrangement to prevent it from falling, tipping, swinging or moving in any manner which may damage it or injure someone. Always use lifting device that is properly rated to lift the equipment. Do not lift loaded spreader. NEVER LIFT EQUIPMENT OVER PEOPLE.

8. If repairs require use of a torch or electric welder, be sure that all flammable and combustible materials are removed. Fuel or oil reservoirs must be emptied, steam cleaned and filled with water before attempting to cut or weld them. DO NOT weld or flame cut on any tank containing oil, gasoline or their fumes or other flammable material, or any container whose contents or previous contents are unknown.

9. Keep a fully charged fire extinguisher readily available at all times. It should be a Type ABC or a Type BC unit.

10. Cleaning solvents should be used with care. Petroleum based solvents are flammable and present a fire hazard. Don't use gasoline. All solvents must be used with adequate ventilation, as their vapors should not be inhaled.

11. When batteries are being charged or discharged, they generate hydrogen and oxygen gases. This combination of gases is highly explosive. DO NOT SMOKE around batteries—STAY AWAY FROM FLAME—don't check batteries by shorting terminals as the spark could cause an explosion. Connect and disconnect battery charger leads only when charger is "off". Be very careful with "jumper" cables.

12. Batteries contain strong sulfuric acid—handle with care. If acid gets on you, flush it off with large amounts of water. If it gets in your eyes, flush it out with plenty of water immediately and get medical help.

13. Hydraulic fluid under high pressure leaking from a pin hole are dangerous as they can penetrate the skin as though injected with a hypodermic needle. Such liquids have a poisonous effect and can cause serious wounds. To avoid hazard, relieve pressure before disconnecting hydraulic lines or performing work on system. Any fluid injected into the skin must be treated within a few hours as gangrene may result. Get medical assistance immediately if such a wound occurs. To check for such leaks, use a piece of cardboard or wood instead of your hand. Make sure all hydraulic fluid connections are tight and all hydraulic hoses and lines are in good condition before applying pressure to system. Wear protective gloves and safety glasses or goggles when working with hydraulic systems.

14. The fine spray from a small hydraulic oil leak can be highly explosive—DO NOT SMOKE—STAY AWAY FROM FLAME OR SPARKS.

1. The selection of the vehicle on which a spreader body is to be mounted has important safety aspects. To avoid overloading:
   a. Do not mount spreader on a chassis which, when fully loaded with material to be spread, will exceed either the Gross Axle Weight Rating (GAWR) or the Gross Vehicle Weight Rating (GVWR) for the chassis.
   b. Do install the spreader only on a vehicle with cab-to-axle dimension recommended for the spreader body length shown.

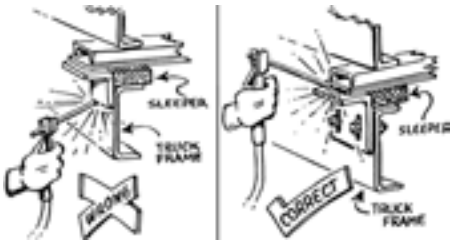
2. Follow mounting instructions in the Installation section of this manual. If mounting conditions require deviation from these instructions refer to factory.

3. When making the installation, be sure that the lighting meets Federal Motor Vehicle Safety Standard (FMVSS) No. 108, ASABE S279 and all applicable local and state regulations.

4. When selecting a PTO to drive hydraulic pump, do not use a higher percent speed drive than indicated in the Installation section of this manual. Too high a percent PTO will drive pump at excessive speed, which can ruin the pump, but more importantly, will overheat the hydraulic oil system and increase the possibility of fire.

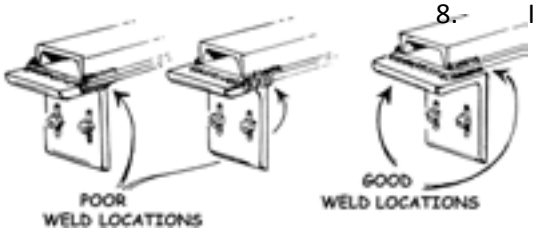
5. When truck frame must be shortened, cut off only the portion that extends behind rear shackle in accordance with the truck manufacturer's recommendations. If a torch is used to make the cut, all necessary precautions should be taken to prevent fire. Cuts should not be made near fuel tanks and hydraulic oil reservoirs, fuel, brake, electric or hydraulic lines and such lines should be protected from flame, sparks or molten metal. Tires should be removed if there is any chance of their being struck by flame, sparks or molten metal. Have a fire extinguisher handy.

6. Do not weld on vehicle frame as such welding can lead to fatigue cracking and must be avoided. When drilling holes in frame member, drill only through the vertical web portions do not put holes in top or bottom flanges. Refer to truck manufacturer's recommendations.



7. Be sure that welds between mounting bars and sill or between mounting angles and spreader cross sills are sound, full fillet welds. Center mounting angles so that good fillet welds can be made on three sides—an edge bead weld is not a satisfactory weld for this service. Use 309 rod/wire for carbon steel and 409 steel. On 304 stainless steel bodies use SAE grade 8 bolts—welding is recommended if type 308 welding rod is available.

8. Install controls so that they are located of convenient use. Position them so that they do not interfere with any vehicle control and that they do not interfere with driver or passenger or with access to or exit from the vehicle.



9. Check for vehicle visibility, especially toward the rear. Reposition or add mirrors so that adequate rearward visibility is maintained.

10. Add Caution, Warning, Danger and Instruction decals as required. Peel off any label masking which has not been removed.

11. Install all guards as required.

12. Check installation completely to be sure all fasteners are secure and that nothing has been left undone.

HYDRAULIC REQUIREMENTS

Hydraulics		GPM (LPM) (Gallons/Liters per Minute)	Maximum Pressure (PSI)
Spinner/Conveyor	PTO Gear Pump - 1000 RPM	42.0 (159)	2500 Continuous
			3100 Intermittent
MULTAPPLIER	Tractor Supplied	9.0 (34)	1500

HITCH REQUIREMENTS

- The NL345 is equipped with a category 4 receiver hitch, requiring a 2” (51mm) hitch pin.

ELECTRICAL REQUIREMENTS

- The NL345 is equipped with a standard 7-pin connector for operation of lights.
- See “ISOBUS Connections” on page 25 for controller connections.

CONTROLLER REQUIREMENTS

The spreader is equipped with an ISO 11783 compatible control system and will connect to any ISO 11783 compliant virtual terminal with a task controller that supports multi-channel dry granular applicators.

IMPLEMENT PREPARATION AND CONNECTION

WARNING	Make sure area is clear between the tractor and implement when backing up to implement.

WARNING	DO NOT wear loose clothing. Keep hands and other body parts away from connecting parts of tractor and implement. Entanglement could cause serious injury.

WARNING	DO NOT stand on PTO, PTO driveline, tongue, or draw bar. Falling could cause death or serious injury.

WARNING	DO NOT use intermediate support as attaching point.

NOTICE!	Make sure safety chain is stored safely when not in use.

NOTICE!	Inspect the cleanliness of connecting parts. All areas must be free of debris and dirt to ensure a secure connection.

IMPLEMENT HITCH ADJUSTMENT

Factory installs implement hitch in lower two holes of hitch holder. Dealer/customer must adjust hitch position to match tractor drawbar. When hitch is in correct position, tighten grade 8 bolts to torque per "Standard Torques" chart in this manual.

IMPLEMENT CONNECTION

1. Check visible wear and make sure hitch and draw pin are clear of debris and dirt.
2. Raise hitch by turning the jack handle to extend the jack.
3. Pull out draw pin on tractor hitch. (Figure 1)
4. Back up tractor and align holes on implement hitch and hitch on tongue of implement. (Figure 2)
5. Insert draw pin through implement hitch and tractor drawbar. Insert hitch pin and lock to secure. (Figure 3)
6. Lower handle on draw pin into locking position. Insert securing pin through hole at bottom of draw pin and lock. (Figure 4)
7. Lube implement hitch.
8. Retract jack to storage position.

Figure 1

Figure 2

Figure 3

Figure 4

9. Attach safety chain.
   a. On left side of hitch, loop safety chain through tractor intermediate support (Figure 5).
   a. On left side of hitch, loop safety chain around tractor drawbar (Figure 6).
   b. Hook on chain (Figure 7). Allow only adequate slack for articulation.
   c. Slide clasp on safety chain to secure locked position (Figure 8). Excess chain will hang between tractor and implement (Figure 9).
   NOTE: Replace safety chain if one of more links are damaged, deformed or damaged.

Figure 5

Figure 6

Figure 7

Figure 8

Figure 9

INSTALLATION

10. Attach PTO driveline to tractor PTO.
    a. Inspect, clean and lube PTO and PTO driveline.
    b. Inspect all shields, make sure they are in proper working order.
    c. Lift tractor's PTO cover.
    d. Slide PTO driveline coupler onto tractor PTO and lock into place on driveline groove (Figure 10-12).
    e. Place tractor cover back in lowered position.
    f. Attach PTO driveline shield chain to tractor.

Figure 10

Figure 11

Figure 12

NOTICE!	Route all hoses and wiring through hose support (Figure 13). Avoid entanglement of hoses and wiring with the PTO driveline, hitch, or tongue. Damage to equipment can occur if hoses and wires are not routed correctly.

11. Make sure all hoses and wires run through the hose support to remain clear of PTO driveline. If needed, add additional clamps. (Figure 13)

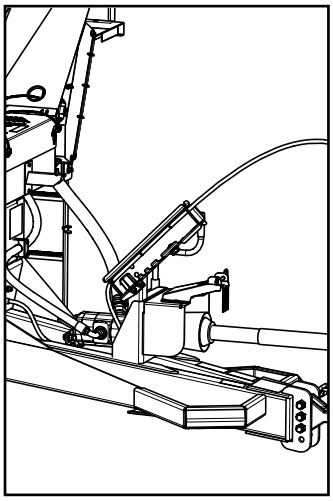


Figure 13

ISOBUS CONNECTIONS

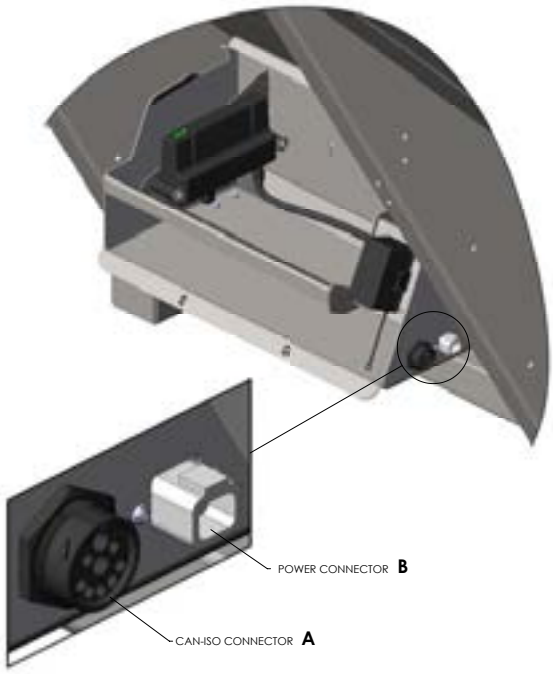


Figure 8

A: Factory Supplied CAN-ISO Connector - Deutsch part no. HDP24-24-91PN-P064
Connects to: ISOBUS Implement Extension Harness - HECO part no. 312894

- Pin 1 - Battery Ground
- Pin 2 - ECU Return (ECU Ground)
- Pin 3 - 60-amp fused power
- Pin 4 - ECU Power (Switched)
- Pin 5 - N/A
- Pin 6 - TBC Power
- Pin 7 - TBC Return
- Pin 8 - ISO-BUS Can High
- Pin 9 - ISO-BUS Can Low

B: Factory Supplied Power Connector - Deutsch part no. DTP04-4P-L012
Connects to: TR3000 Main Harness - HECO part no. 312893

- Pin 1 - Hydraulic cooler fan power (Switched
- Pin 2 - Hydraulic cooler fan ground
- Pin 3 - N/A
- Pin 4 - N/A

HYDRAULIC HOSE INSTALLATION

CAUTION	If a threaded connection is tightened too tightly, the fitting or housing into which the fitting is placed could be distorted and an unstoppable leak could occur.

WARNING	Do not use one manufacturer's hose with another manufacturer's fittings! Such will void any warranty and may cause premature burst or leak of hydraulic fluids! Severe injury and/or fire could result!

Determine pressure port of pump. Install pressure hose into this port as shown in Figure 7. Connect suction hose to opposite port and to tank outlet on hydraulic tank. Use plastic tie straps as necessary to support hoses so they will not catch on field obstructions or contact hot or moving parts.

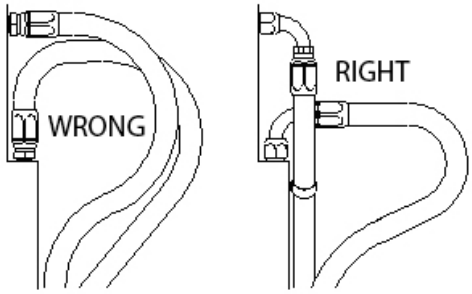
FILLING HYDRAULIC SYSTEM

NOTICE!	DO NOT attempt to run pump without first filling hydraulic reservoir and opening suction line valve, or damage to pump may occur.

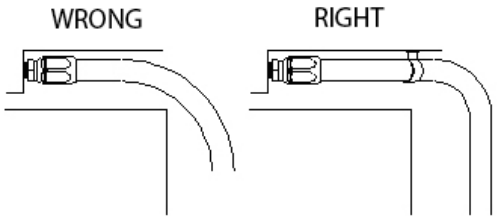
Fill reservoir with hydraulic oil as specified in the "Lubrication and Maintenance" section in the operator's manual. Be sure oil is clean, free from dirt, water and other contaminants.

Lubricate all points necessary per Lubrication Chart in "Lubrication and Maintenance" section of operator's manual.

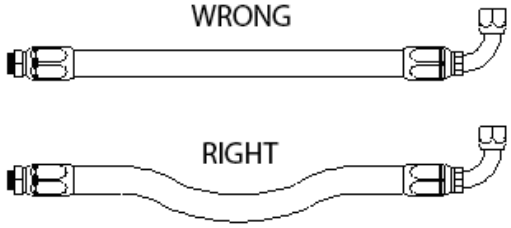
HYDRAULIC HOSE INSTALLATION GUIDE



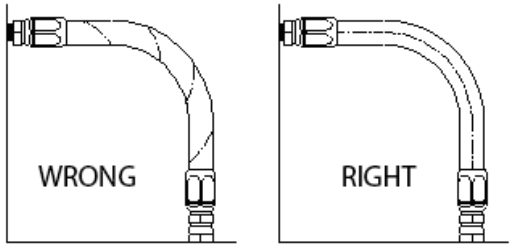
1. Use elbows and adapters in the installation to relieve strain on the assembly, and to provide easier and neater installations that are accessible for inspection and maintenance. Remember that metal end fittings cannot be considered as part of the flexible portion of the assembly.



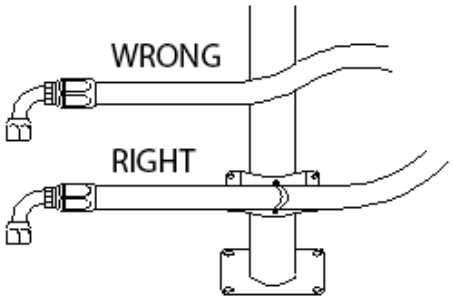
2. Install hose runs to avoid rubbing or abrasion. Clamps are often needed to support long runs of hose or to keep hose away from moving parts. It is important that the clamps be of the correct size. A clamp that is too large will allow the hose to move in the clamp causing abrasion at this point.



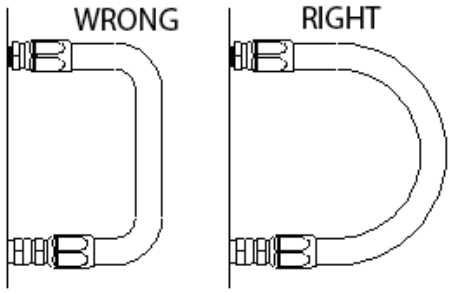
3. In straight hose installations allow enough slack in the hose line to provide for changes in length that will occur when pressure is applied. This change in length can be from +2% to -4%.



4. Do not twist hose during installation. This can be determined by the printed layline on the hose. Pressure applied to a twisted hose can cause hose failure or loosening of the connections.



5. Keep hose away from hot parts. High ambient temperature will shorten hose life. If you cannot route it away from the heat source, insulate it.



6. Keep the bend radii of the hose as large as possible to avoid hose collapsing and restriction of flow. Follow catalog specs on minimum bend radii.

(Used with the permission of The Weatherhead Company.)

INSTALLATION

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NOTES

Recommended sequence of installation is:

1. Spreader preparation.
2. Insert preparation.
3. Mounting of insert.
4. Connecting hydraulic hoses.
5. Installation of hillside divider and conveyor cover.
6. Checking installation.
7. Checking for leaks and proper functioning.

HYDRAULIC REQUIREMENTS

Refer to"Hydraulic Requirements" on page 23 for specifications required for insert installation.

SPREADER PREPARATION

⚠	**WARNING**	Use only lifting devices that meet or exceed OSHA standard 1910.184. Never exceed work load limits or lift equipment over people. Empty spreader before lifting. Loads may shift or fall if improperly supported, causing injury.

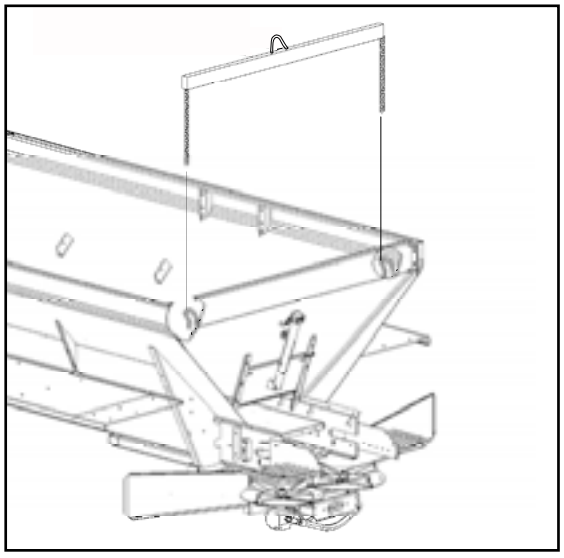


Figure 1

Remove the Inverted "V" and Hillside Divider from the spreader, if so equipped, and set hardware aside.

Remove Feedgate Jack Handle and set aside. Support endgate by attaching a hoist to the lift hooks. Remove hardware from both sides of the endgate and carefully remove from the spreader as shown in Figure 1.

NOTE: Always use a sling, spreader bar, or lifting bar that attaches to the lifting points with a minimum of 60 degrees from horizontal. It is preferable to use a straight style lifting bar that keeps the attaching chains in a near vertical orientation.

NOTE: Always inspect unit lift hooks for signs of wear, cracking, corrosion, gouges, alterations, or distortion before use.

FEEDGATE ADJUSTMENT

WARNING	Stay out of the spreader. If it's necessary to enter the spreader, return to the shop, empty body, turn off all power, set vehicle brakes, lock engine starting switch and remove keys before entering. Tag all controls to prohibit operation. Tags should be placed, and later removed, only by person working in the body.

Adjust the insert's front feedgate prior to installation.

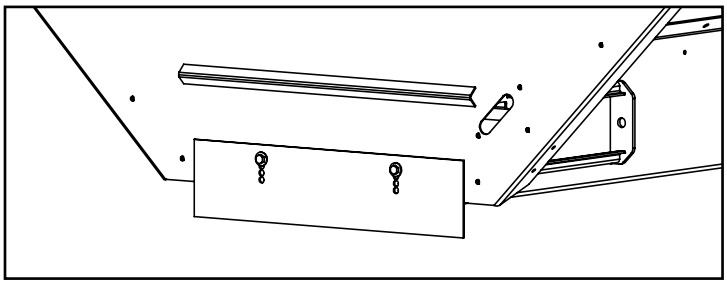


Figure 2

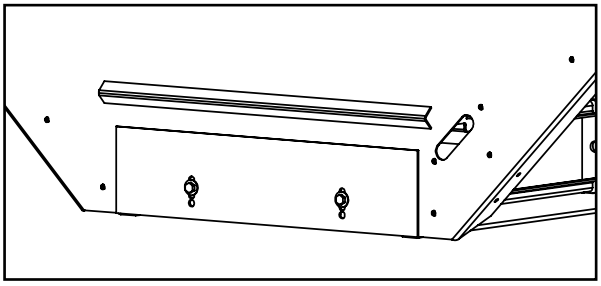


Figure 3

To adjust main bin's feedgate opening, position front feedgate on insert as necessary to achieve a 1-1/2 inch (3.81 cm) (Figure 2) to 4 inch (10.16 cm) (Figure 3) opening in 1/2 inch increments.

NOTE:	Visit **www.newleadervip.com** and enter parameters to determine minimum and maximum application rates and feedgate openings for optimal performance of your spreader.

INSERT INSTALLATION

WARNING	Use only lifting devices that meet or exceed OSHA standard 1910.184. Never exceed work load limits or lift equipment over people. Empty spreader before lifting. Loads may shift or fall if improperly supported, causing injury.

Before installing the insert:

Parts Needed:

Description	Qty
MULTAPPLIER/MULTIBIN	1
Capscrew - 1/2 x 1 1/4 Grade 8	8
Flat Washer - 1/2 Grade 8	16
Lock Washer - 1/2 Grade 8	8
Hex Nut - 1/2 Grade 8	8

INSTALLATION

1. Make sure rubber sealer hardware is loose. If not, loosen.

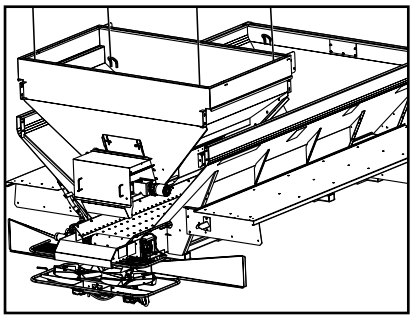


Figure 4A

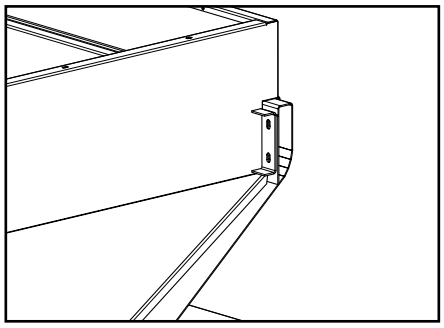


Figure 4B

2. To install MULTAPPLIER:
   a. Figure 4A - Hoist and slide MULTAPPLIER into position between main bin's side sheets.
   b. Figure 4B - Align MULTAPPLIER's and main bin's front and rear mount brackets.
   c. Make sure MULTAPPLIER is resting on inside of main bin, and not resting on tops of side sheets.
   d. Release tension on hoist but do not remove.

Figure 5A (uninstalled)

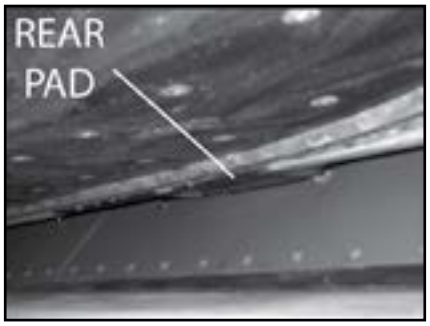


Figure 5B (shown installed)
View from rear of unit.

3. Figures 5A-5B - Visually make sure insert is centered from side to side in main bin and rear pads are resting on main bin.

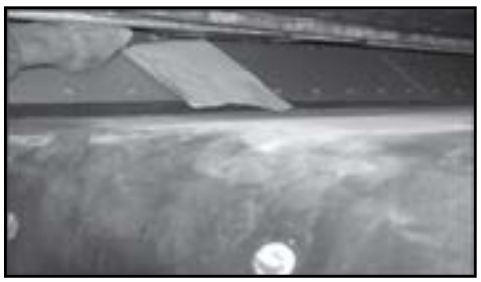


Figure 6

Figure 7

4. Figure 6 - There must be contact between rear pads and main unit. Check for contact by trying to slide paper between pads and main bin. If no contact, adjust insert.

5. Figure 7 - Inside main unit, locate front pads by lifting rubber sealers on front endgate.

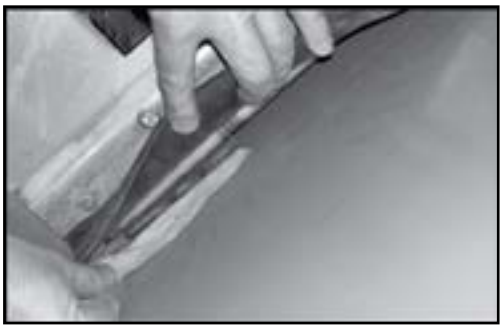


Figure 8A

Figure 8B

6. Figures 8A-8B - There must be contact between front pads and main bin. Check for contact by trying to slide paper between pads and main bin. If no contact, adjust insert.
NOTE: Pry insert at mount brackets if necessary.

Figure 9

Figure 10

Figure 11

7. Figure 9 - Once both front pads make contact, insert hardware in front mount brackets' lower holes. Shim between main bin and insert brackets if distance is larger than 1/8" (.32cm). Tighten hardware per torque recommendations in this manual.

8. Figure 10 - Make sure front feedgate is level. Lower endgate sealers so flush with chain shields and tighten hardware.

NOTICE!	Leakage of material may occur if the sealer belts are not set properly on the front of the insert. Highway Equipment Company is not liable for lost material due to improperly installed sealer belts.

9. Figure 11 - Make sure there is a complete seal covering the gap between the insert and the main bin's side sheets. Tighten all hardware on rubber sealers at front of insert.

10. Make sure rear pads are still in place against main bin. Install hardware in lower holes of rear mount brackets. Shim between main bin and insert brackets if distance is larger than 1/8" (.32cm). Tighten hardware per torque recommendations in this manual.

11. Make sure insert's side sheets are not resting on top of main bin's side sheets.

12. Install hardware in all four mount brackets' upper holes. Tighten hardware per torque recommendations.

13. Remove hoist.

14. Inspect unit for foreign debris in conveyor area.

HYDRAULICS

Attach insert hoses to spreader hoses as shown in Figure 12. Plug in rate sensor.

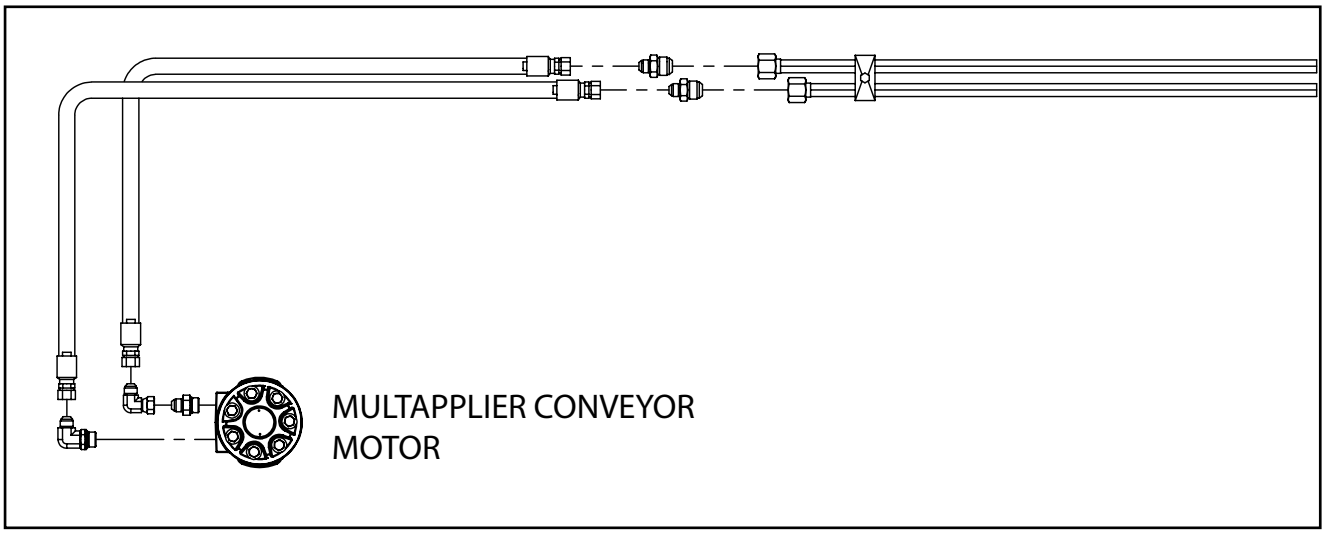


Figure 12 - MULTAPPLIER Operation

HYDRAULIC HOSE INSTALLATION

Refer to "Installation Guide" for proper hydraulic hose installation guidelines.

If insert was purchased separately from spreader, refer to parts pages for hydraulic installation. Install valve mounting bracket on two right hand front stakes as shown in Figure 13.

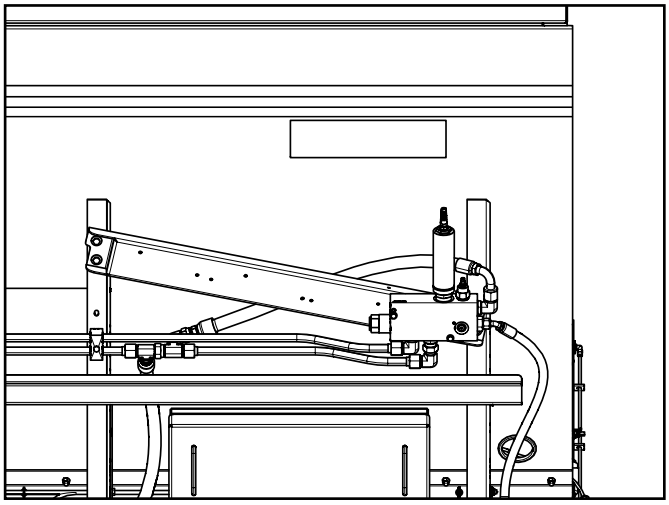


Figure 13 - Hydraulic Installation

INSTALLATION

HILLSIDE DIVIDER & CONVEYOR COVER - MULTAPPLIER

NOTICE!	Highway Equipment Company will not be liable for misapplied material due to an improperly adjusted divider, spreader or both.

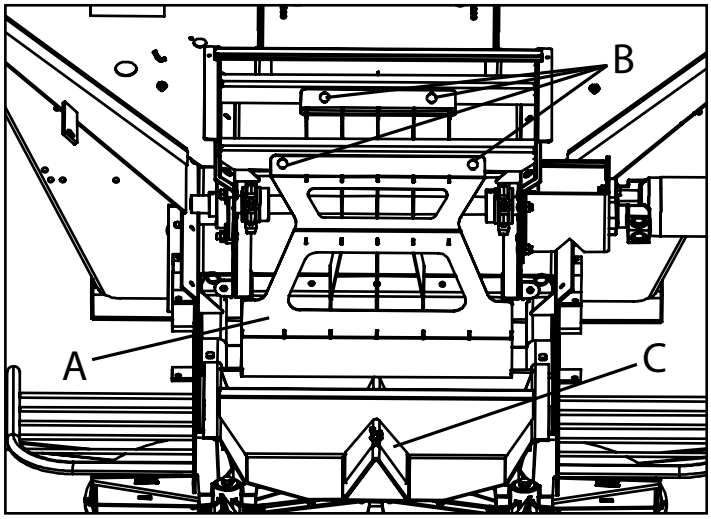


Figure 14 - MULTAPPLIER Hillside Divider

Loosen hardware from rear two chain shield holes on each side of MULTAPPLIER. Install MULTAPPLIER Hillside Divider (A) and fasten to Support using single bin Hillside Divider hardware removed before MULTAPPLIER installation (B). Adjust Hillside Divider so that the middle divider is centered over both conveyors and the Material Divider (C) as shown in Figure 15. Tighten all hardware to recommended torque.

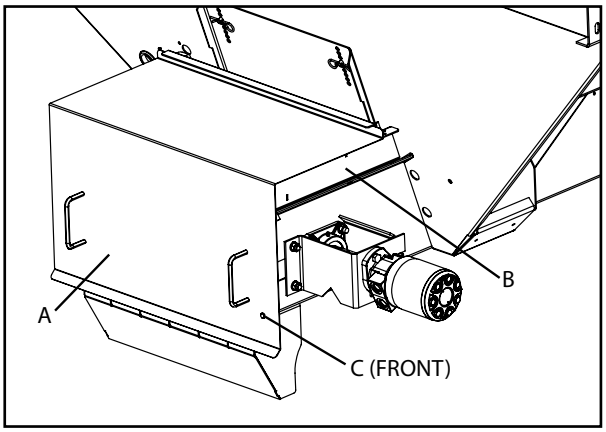


Figure 15 - MULTAPPLIER Dual Conveyor Cover

Parts Needed:

Description	Qty
Cover	**1**
Hair Pin	**2**

ELECTRICAL CONNECTIONS

Connect all electrical control circuits. The supply conductor should be connected directly to the battery. All wiring should be approved automotive insulated wire, supported adequately with insulating ties or straps, and located where it will not interfere with any control or access. Make sure wiring does not contact any moving parts or sharp edges and is kept away from hydraulic lines and heated parts.

Refer to “Controller” parts pages for illustrations of master/slave control modules.

INSERT REMOVAL/ENDGATE INSTALLATION

Remove insert and reinstall endgate, Inverted "V", single conveyor Hillside Divider, etc. by following applicable installation instructions in reverse order. Make sure the insert hydraulics, electrical connections and air lines are disconnected from the spreader before removal. See "Inverted V" in spreader parts manual.

Hydraulics Removal

Route hydraulic hoses on the spreader and the insert as shown in Figure 16.

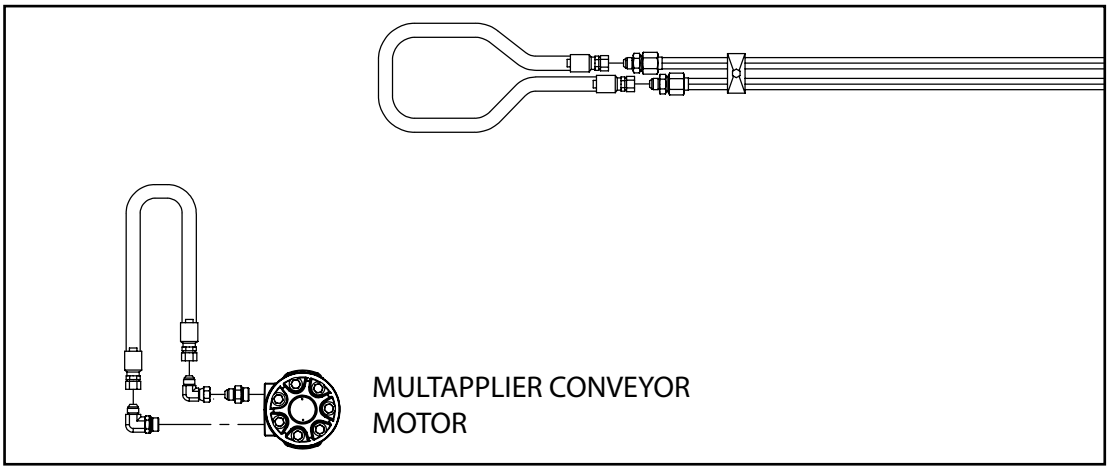


Figure 16 - Detach MULTAPPLIER

The NL345 is a pull-type spreader intended for spreading free flowing granular agricultural materials, such as chemical fertilizers, agricultural limestone, and gypsum. It comprises of a NL4500G4 EDGE spreader and a TR3000 trailer.

The TR3000 is an agricultural implement flotation trailer designed for attachment to specially equipped tractors by means of a category 4 receiver hitch. The TR3000 is equipped with hydraulic brakes and walking beam suspension.

The unit is powered hydraulically and provides independent variable speed control for the spinners and full automatic ground speed control for the conveyor.

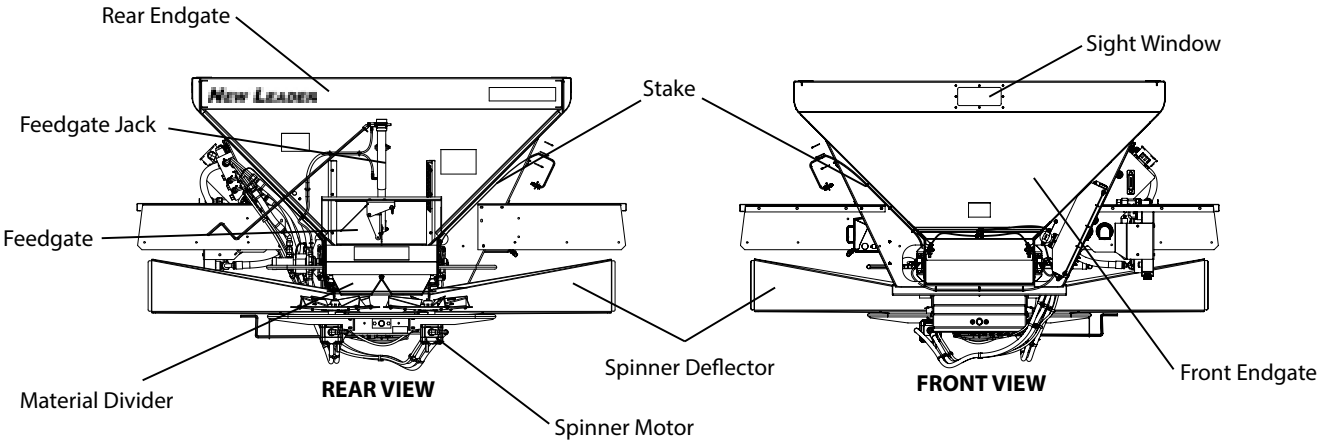
The 30-inch (76cm) wide conveyor delivers material to the spinners through an adjustable metering gate at the rear of the hopper body. Orbital type hydraulic motors mounted to 6-to-1 ratio spur gear case drive the conveyor. The (#4) belt-over-chain type conveyor consists of parallel strands of pintle type chain joined by cross bars every other link with moderately oil resistant (MOR) belting fastened to each bar.

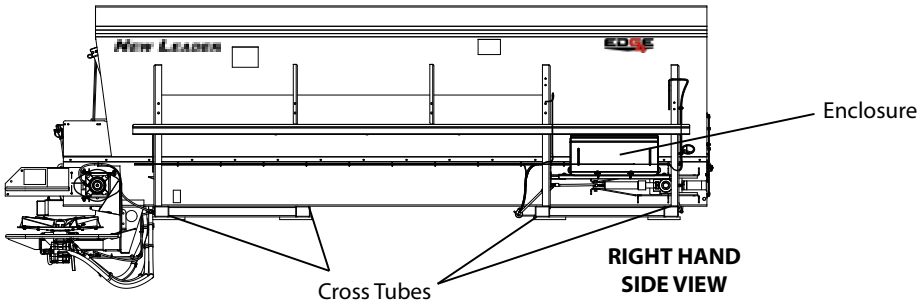
The spinner assembly has two 24-inch (61cm) diameter dished discs. Each disc has four formed and heat treated fins that are adjustable to radial angle. The spinner is fully adjustable by means of a rotating handle. The spinner assembly features independent spinner speed control, allowing for boundary spreading capabilities.

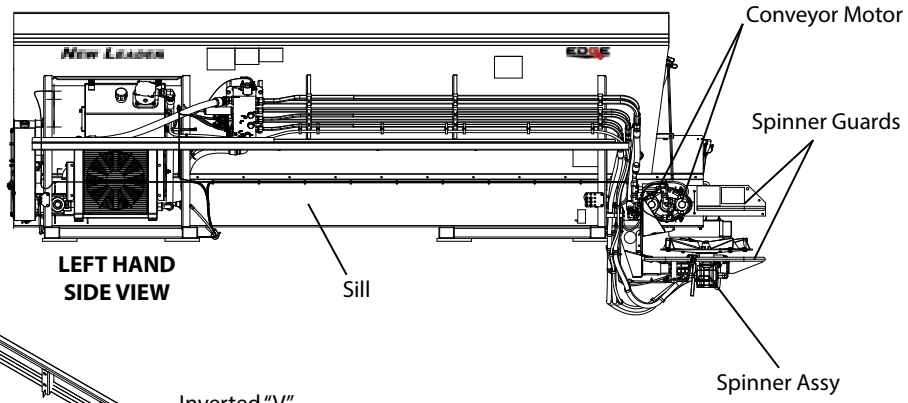
The optional 304 stainless steel hopper style spreader MULTAPPLIER may be insterted in the main bin.

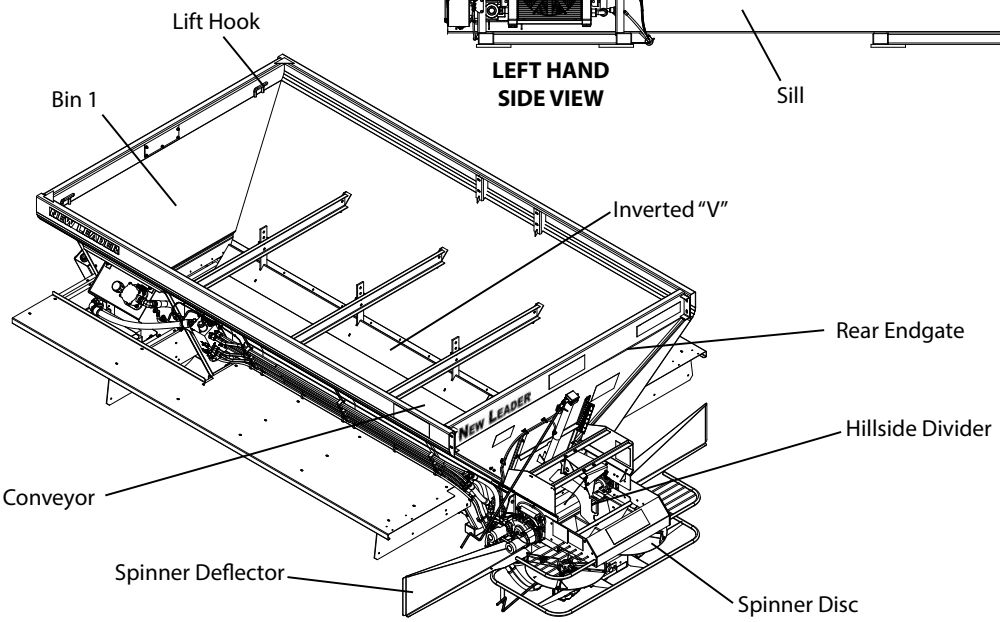
- Inserting the MULTAPPLIER allows for two separate materials to be spread simultaneously. It features a 24-inch (61cm) wide #4 belt-over-chain type conveyor having parallel strands of pintle type chain joined by cross bars every other link. The direct driven conveyor is also controlled independently, enabling the delivery of material at variable rates through the adjustable gate at the rear of the hopper. The hillside divider improves material placement on the spinner for a more effective spread pattern.

This product is intended for commercial use only.


Rear Endgate
Feedgate Jack
Feedgate
Material Divider
REAR VIEW
Stake
Spinner Motor
Spinner Deflector
Sight Window
FRONT VIEW
Front Endgate


Enclosure
Cross Tubes
RIGHT HAND
SIDE VIEW


Conveyor Motor
Spinner Guards
LEFT HAND
SIDE VIEW
Sill
Spinner Assy


Lift Hook
Bin 1
Inverted "V"
Rear Endgate
Hillside Divider
Conveyor
Spinner Deflector
Spinner Disc

Stake: Side support for machine walls.

Rear Endgate: Welded or bolt-in endgate (depending on model) furthest from chassis cab (Rear based on direction of travel). Holds mounted Feedgate, allowing for rear release of material from bin.

Bin 1: Main holding bin for material or Insert. MultApplier and MultiBin inserts (shown on following pages) are configured as Bins 2-4 depending on type used.

Feedgate: Adjustable gate mounted into Rear Endgate. Allows for variable rates of material flow by adjusting jack to desired height.

Conveyor: Conveys material to rear of unit.

Inverted "V": Mounted inside Main Hopper when Insert not installed. Distributes weight pressure across conveyor, allowing for consistent material flow to Feedgate, and promotes an improved blend when spreading fertilizer.

Material Divider: Ensures uniform spread pattern by directing material off of conveyor onto spinner discs.

Hillside Flow Divider: Ensures balanced flow of material across conveyor when on hillsides or uneven terrain.

Sill: Base of Main Hopper side walls. Contains Conveyor and supports machine walls.

Cross Tubes: Supports body, attaches to Chassis frame. Transfers weight from Main Hopper to Chassis.

Spinner Assembly: Contains adjustable G4 Spreader system, consisting of hydraulic spinners used for dispersal of various materials at different positioned settings allowing for consistent, even spread patterns across a wide variety of material with a high rate of accuracy.

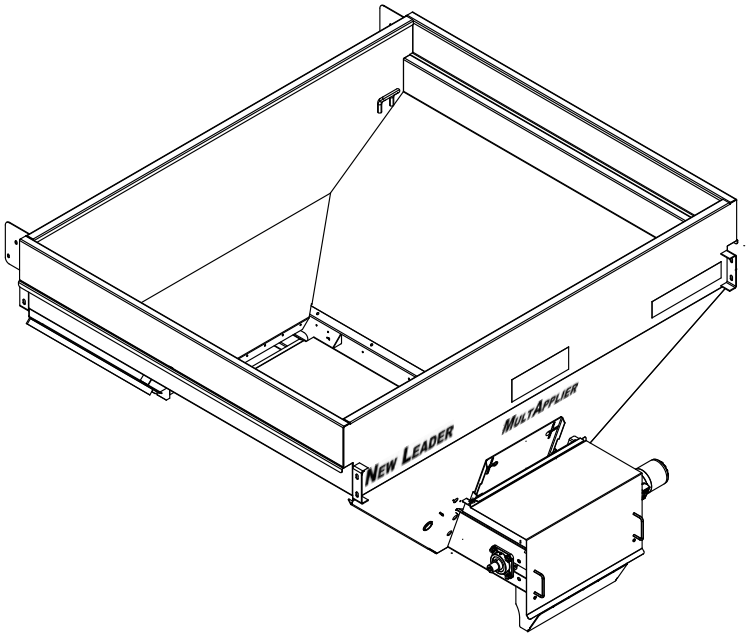
Spinner Guards: Upper and Lower guards, protects operators from spinner discs. Must be in place during any operation.

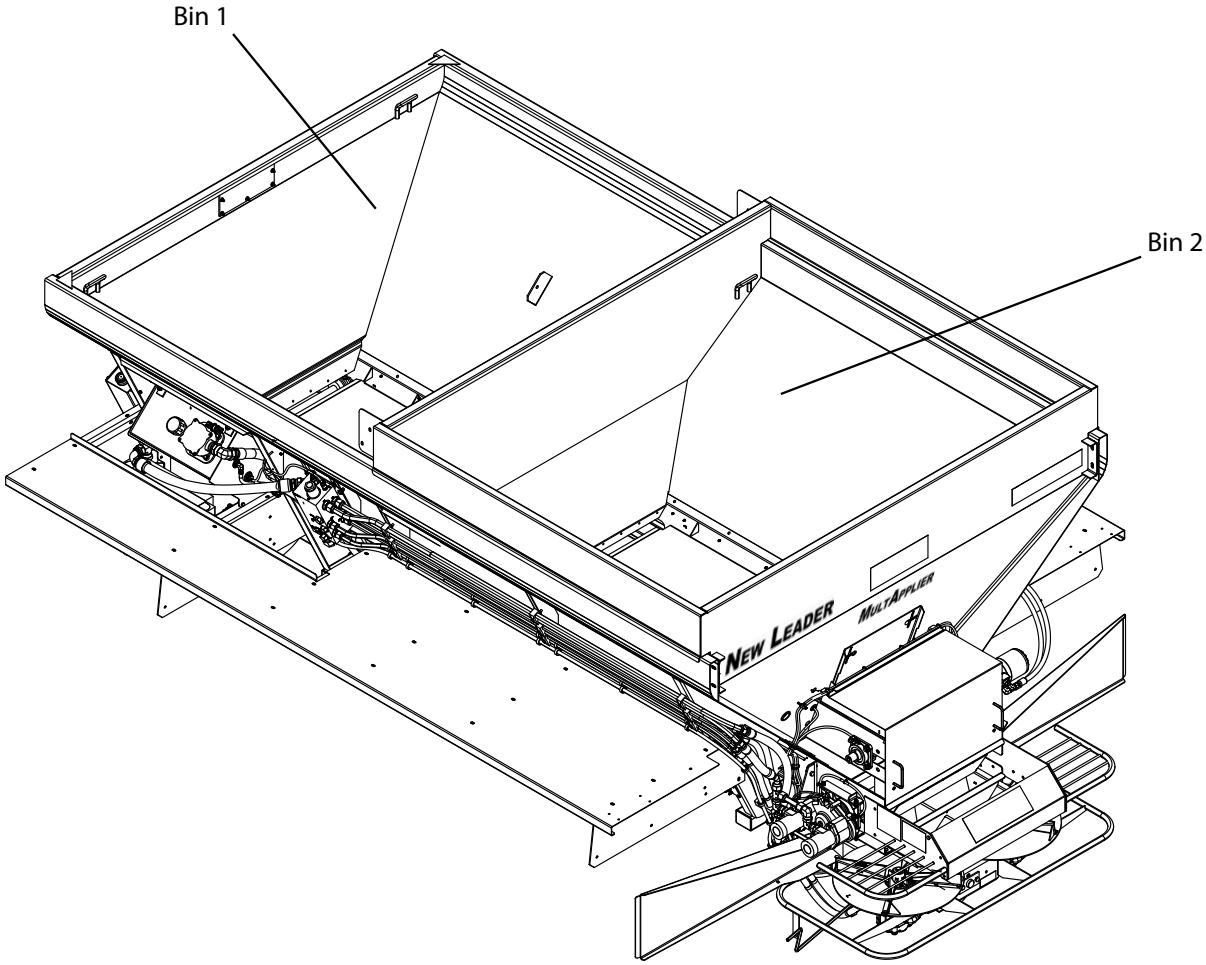
Spinner Deflectors: Deflect material away from machine.

Lift Hooks: Used to lift unit or insert with appropriately rated lifting device.

Enclosure: Houses spreader control modules, protects them from the elements

MULTAPPLIER





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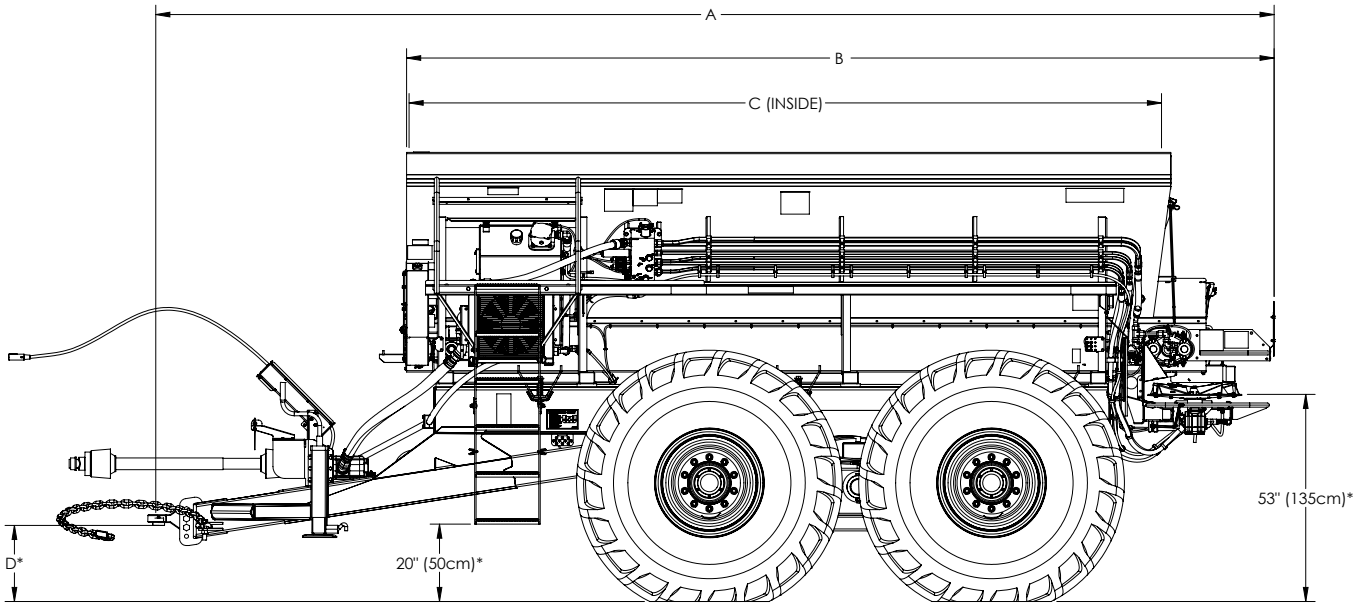
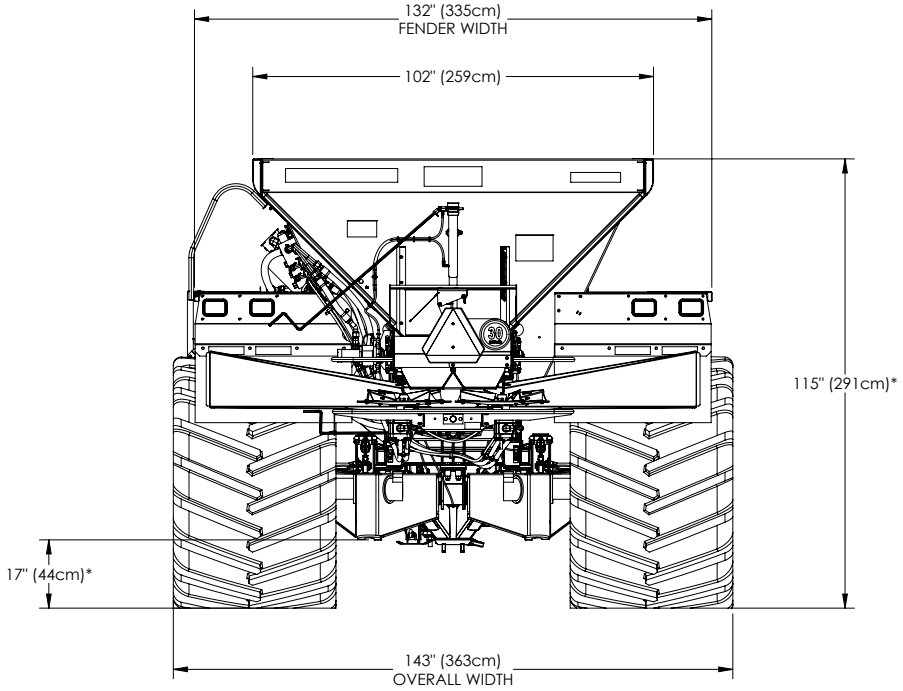
NL345, SINGLE BIN





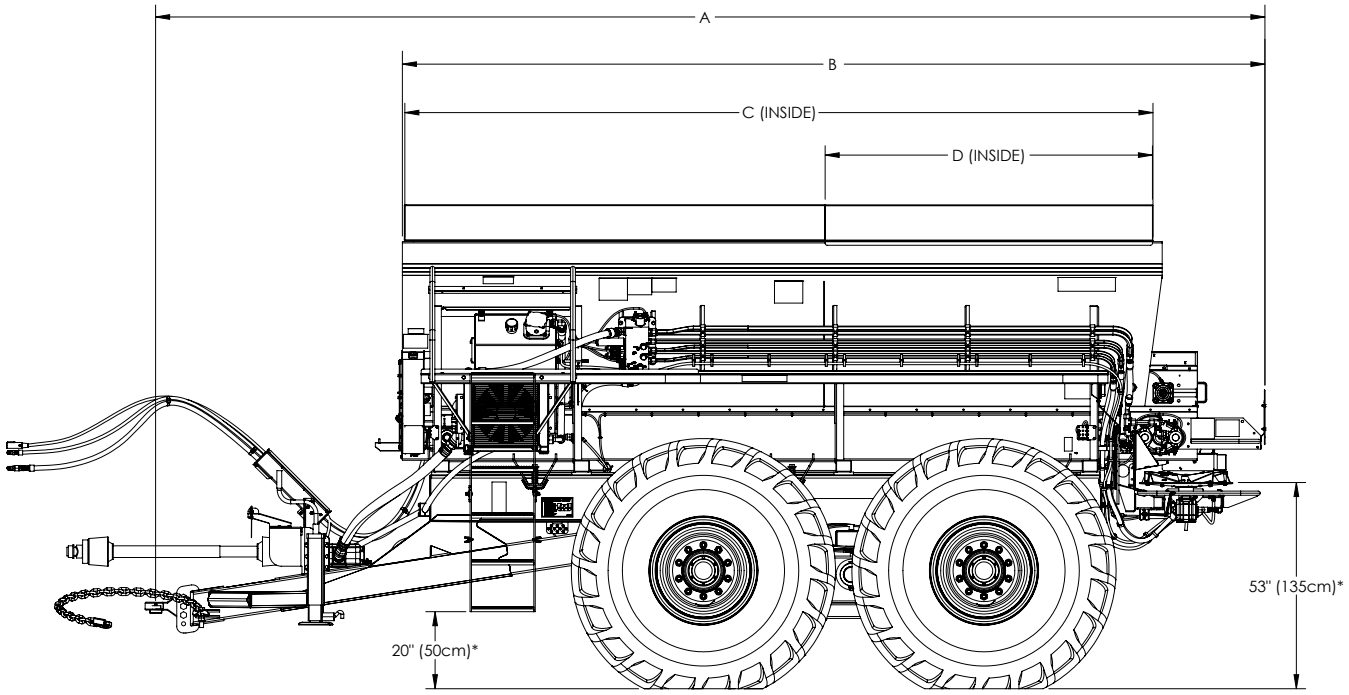
*Height dimensions shown with static loaded, OEM-size tires.

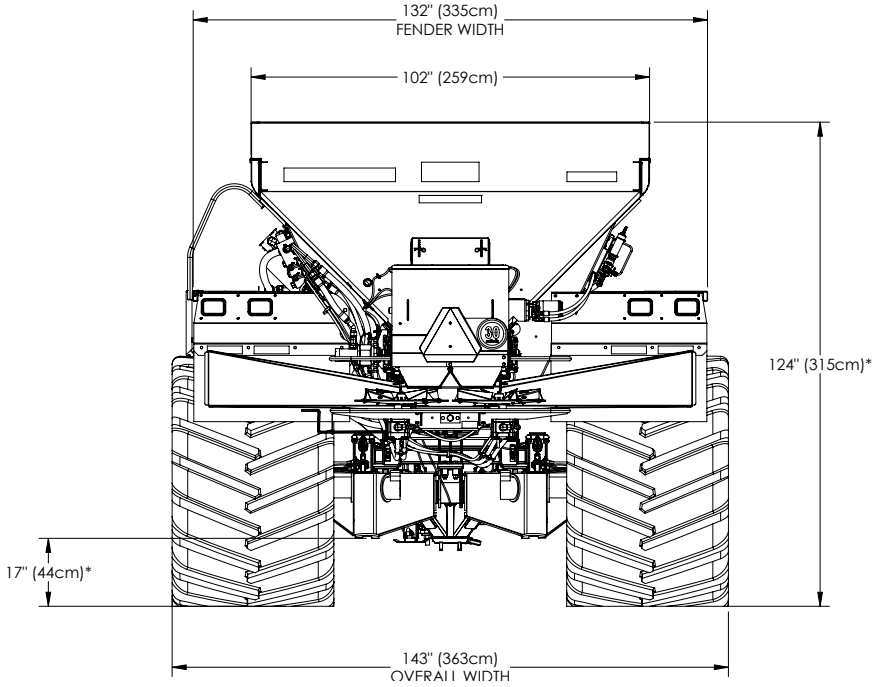
NL345, SINGLE BIN WEIGHTS & CAPACITIES

Unit Length	Overall Length A	Spreader Length B	Body Length C	Approximate Weight Lbs (Kg)	Struck Capacity Cu Yd (Cu M) Cu Ft
16’ (4.88m)	285” (7.23m)	220” (559cm)	192” (488cm)	19,802 (8982.6)	12.56 (9.60) 339

	Hitch Height D*
Position 1	19” (49cm)
Position 2	17” (44cm)

NL345 WITH MULTAPPLIER





*Height dimensions shown with static loaded, OEM-size tires.

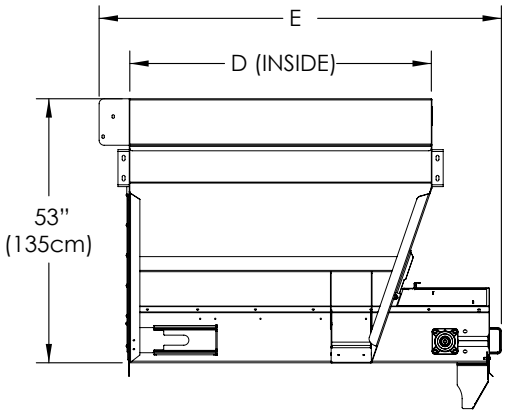
NL345 WITH MULTAPPLIER WEIGHTS & CAPACITIES

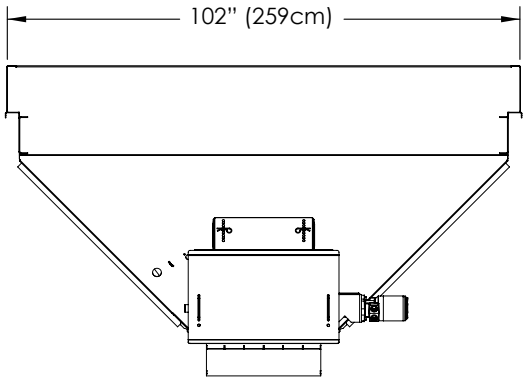
With 7' MultApplier					
Unit Length	Overall Length A	Spreader Length B	Body Length C	Approximate Weight Lbs (Kg)	Struck Capacity Cu Yd (Cu M) Cu Ft
16' (4.88m)	285" (7.23m)	220" (559cm)	192" (488cm)	20,805 (9437.1)	7.15 (5.47) 193

*Height dimensions shown with static loaded, OEM-sized tires.

MULTAPPLIER ALONE DIMENSIONS & CAPACITIES

Insert Unit Length	Inside Length D	Overall Length E	Approximate Weight Lbs (Kg)	Struck Capacity Cu Yd (Cu M) Cu Ft
7' (2.13m) MultApplier	84" (213cm)	104" (264.2cm)	1,303 (591.0)	5.96 (4.60) 161





WARNING Stand clear of moving machinery.

NOTE: Do not load spreader with material.

1. Check entire unit to make sure all fasteners are in place and properly tightened per “Standard Torques” section in this manual.
2. Make sure no other persons are in vicinity of spreader.
3. Make sure no loose parts are in unit or on conveyor or spinner.
4. Check oil level in hydraulic reservoir; fill as necessary. Refer to “Lubricant & Hydraulic Oil Specifications” section of this manual for proper oil. Completely open reservoir valves.
5. Start engine and turn on hydraulics. Allow hydraulics to circulate until oil is warm.
6. Run spinner at 300 RPM. Allow to run until spinner is operating smoothly and all air has been purged from system.
7. Run conveyor at 20 RPM and spinner at 300 RPM. Run until conveyor is operating smoothly.
8. Run conveyor at 20 RPM and spinner at 700 RPM. Allow both conveyor and spinner to run until operating smoothly.
9. Enable boundary left and right and verify that RPM adjust accordingly.
10. Run conveyor at 0RPM and spinner at 0RPM. Make sure both conveyor and spinner do not move.
11. Calibrate spreader as defined in the manual for the controller that is supplied with your machine.
12. Complete spread pattern test per “Spread Pattern” section in this manual.
13. Shut system down.

WARNING DO NOT check leaks with hands while system is operating as high pressure oil leaks can be dangerous! If skin is pierced with hydraulic fluid at high pressure seek immediate medical attention as fluid injected into the skin could cause gangrene if left untreated. Relieve pressure before disconnecting hydraulic lines or working system. Make sure all hydraulic fluid connections are tight and all hydraulic hoses and lines are in good condition before applying pressure to the system. Wear protective gloves and safety glasses or goggles when working with hydraulic systems.

WARNING DO NOT check for leaks adjacent to moving parts while system is operating as there may be danger of entanglement!

14. Check all connections in hydraulic system to make sure there are no leaks.
15. Check hydraulic oil tank and refill to maintain level at mid-point of gauge.
    Unit is now ready for field testing.

1. Make sure unit has been properly serviced and is in good operating condition. It is recommended to run the spreader prior to loading material to ensure acceptable operation.
2. Set manual machine settings in controller per *Controller* section in this manual.
3. Program controller with correct data for material and application.
4. Adjust feedgate to appropriate setting.
5. Adjust spinner to give spread pattern desired. See “Spread Pattern” and “Controller” sections for details. Calibrate and spread pattern test for any new material.
6. Fill unit with material to be spread.
7. Engage hydraulics.
8. Begin spreading.

CAUTION Drive only at speeds which permit good control of vehicle!

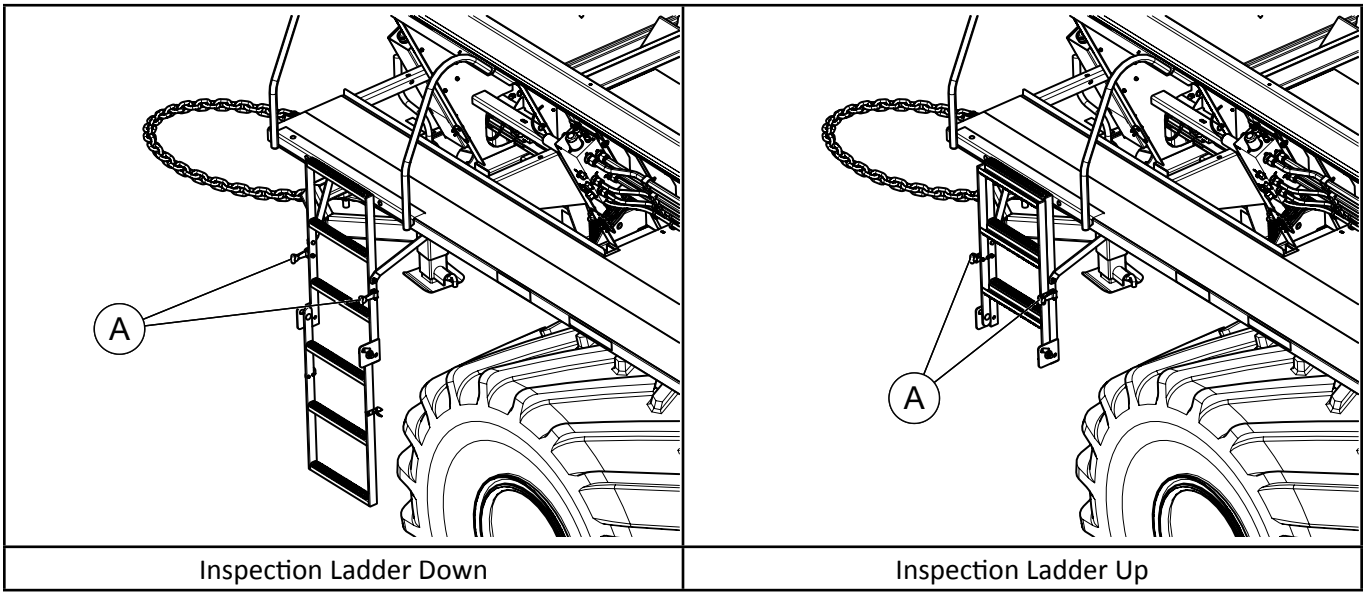
NOTICE! CHANGE HYDRAULIC OIL FILTER AFTER FIRST WEEK (OR NOT MORE THAN 50 HOURS) OF OPERATION ON A UNIT.

*Visit **www.newleadervip.com** for interactive tools to calculate yield, proper feedgate opening, conveyor revolutions per minute, and mph to maximize the performance of your spreader.

INSPECTION LADDER

WARNING KEEP OFF FENDERS. Do not place objects on fenders. They are not intended to carry loads. Falling from the fenders could cause death or serious injury.

NOTICE! Figure 1 - Always place the inspection ladder in the storage position while unit is in transit with rubber latches (A) secured.



Inspection Ladder Down	Inspection Ladder Up

Figure 1

BACK PLATE STORAGE

Figure 2 - When spreading without the Material Divider Back Plate (A) equipped, it can be stored at the front of the unit.

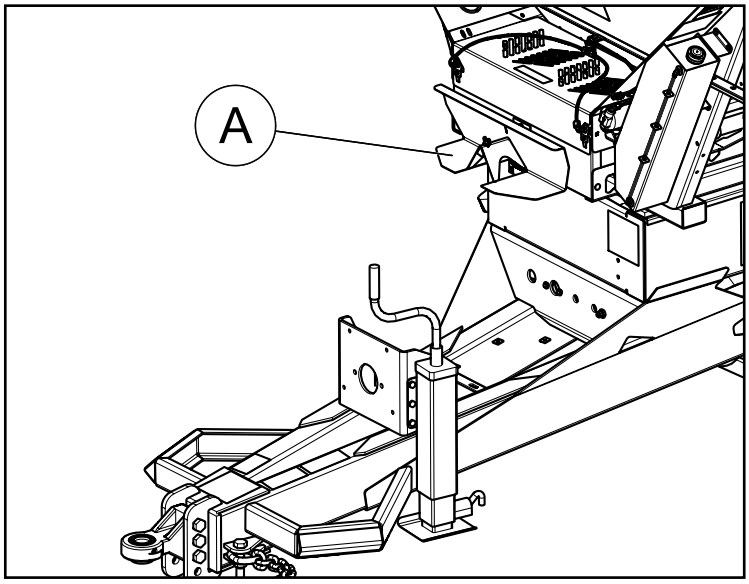


Figure 2

TIRE PRESSURE AND TRANSPORT SPEEDS

TRAILER TIRE ROAD SPEED TABLE[3]			
Tire Pressure (PSI)	Max Road Speed (MPH)	Max Gross Combined Axle Loads[2]	Max Payload[1] (LBS)
20	30	35200	19600
	25	37300	22000
	20	39400	24400
	15	42900	28300
	10	46400	32200
	5	53000	35000
	0	53000	35000
25	30	39600	24600
	25	41900	27200
	20	44300	29900
	15	48300	34300
	10	52200	35000
	5	53000	35000
	0	53000	35000
30	30	44000	29500
	25	46600	32400
	20	49200	35000
	15	53000	35000
	10	53000	35000
	5	53000	35000
	0	53000	35000

Proper air pressure achieves maximum tire performance. The following table should be used as a guide.

WARNING Drive at a reasonable and safe speed according to weather, field and road conditions. Loss of tractor or implement control could cause serious injury or death.

NOTICE! Consult federal, state and local weight laws to ensure government weight, speed, and road restrictions are not exceeded.

1. Maximum payload assumes evenly distributed product in a single bin.
2. Consult federal, state and local laws to ensure the gross weight on any one axle or combination of axles, operated on highways, does not exceed government weight restrictions.
3. This chart is applicable for OEM tires and rims.

IMPLEMENT MANEUVERING

WARNING	Make sure the area behind the trailer is clear of obstructions and personnel. Turning or backing may result in limited visibility. Check blind spots. Back and/or turn cautiously. Failure to do so could result in death, serious injury or damage to the implement.

WARNING	Maintain reasonable speeds. Consider rough terrain including obstacles such as terraces, ditches, and approaching angles. Know the limits of hitch angles. Failure to do so could result in tipping of implement, bottoming of suspension, jack-knifing, spillage or loss of material and other damages to the implement and/or tractor, resulting in serious injury or death.

BACKING AND TURNING TIPS

NOTICE!	Turning and backing at sharp angles will cause the tractor and implement to jack-knife. DO NOT exceed maximum turning angle of 60°.

MAXIMUM HITCH ANGLES AND WALKING BEAM TRAVEL

CAUTION	DO NOT max out suspension travel. Damage may occur to implement. The manufacturer will not be liable for damage to implement due to improper usage.

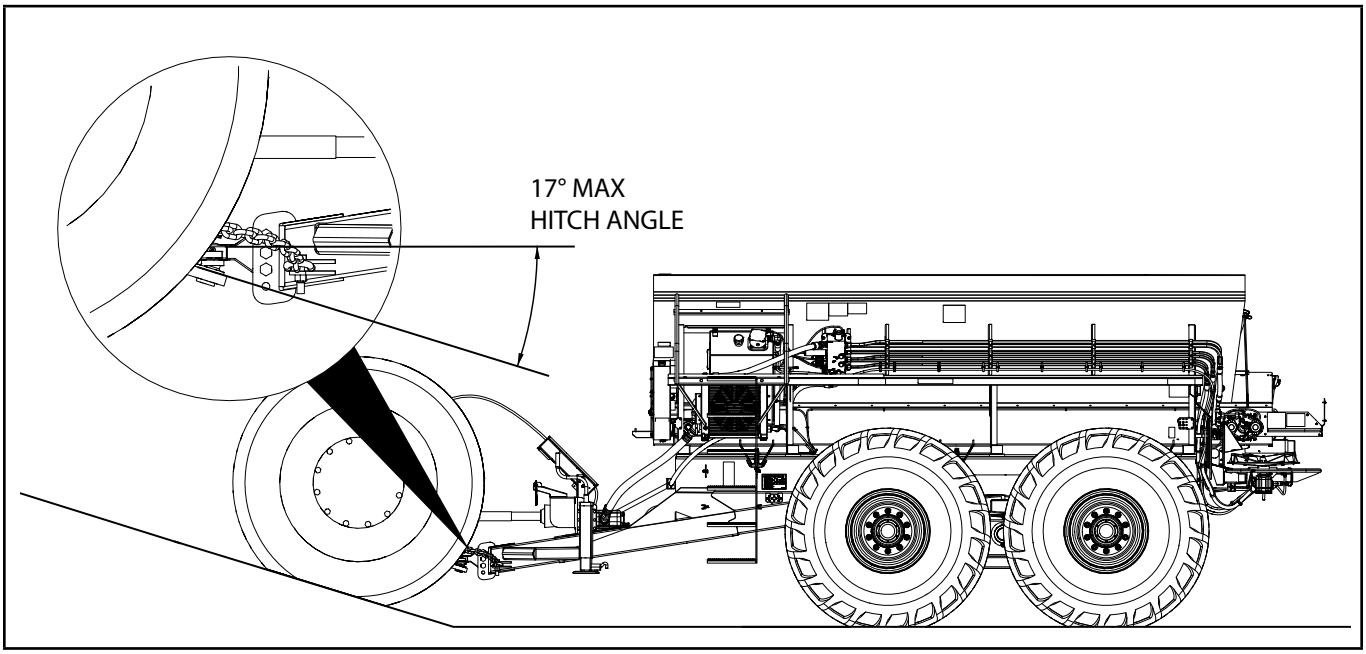


Figure 3 - Maximum Hitch Angles

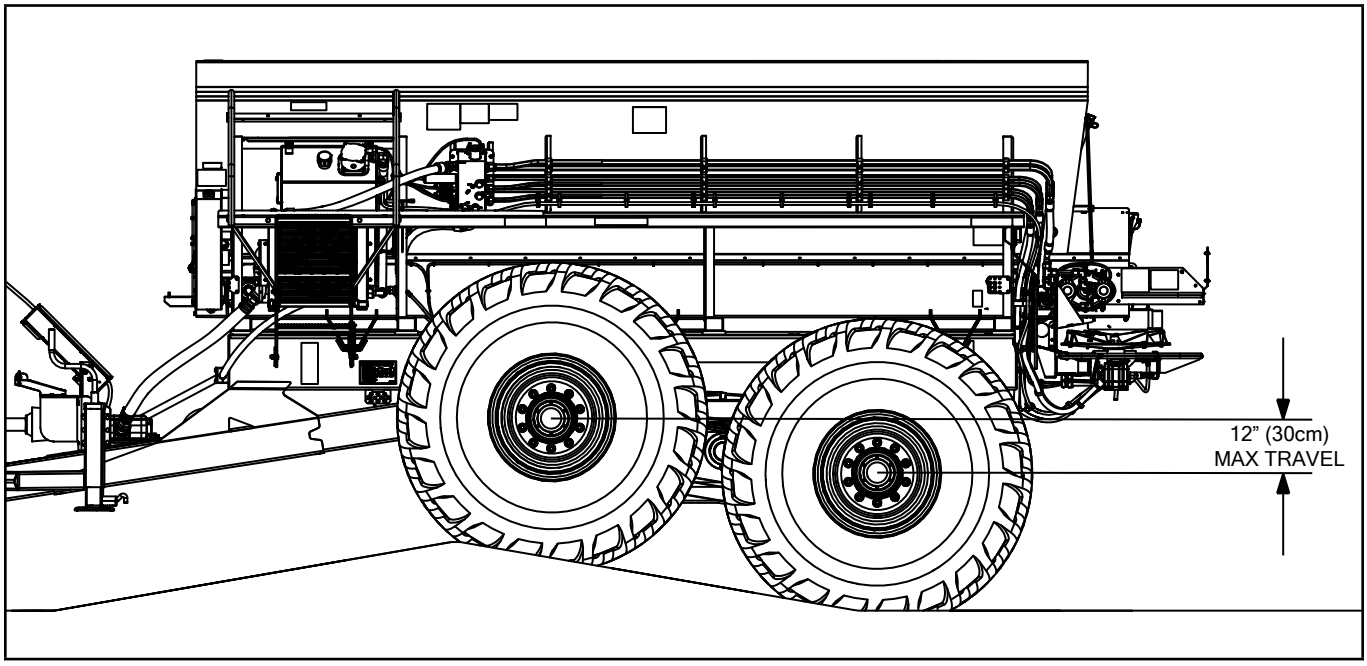


Figure 4 - Walking Beam Travel

REAR PULLING LUGS

NOTICE!	Do not pull implement sideways—always pull straight. Always disconnect tractor from implement before using rear lugs. Otherwise, damage to implement may occur.

NOTICE!	Failure to raise jack before pulling stuck implement will destroy jack.

If implement becomes stuck in field and cannot be freed by towing through:

1. Empty spreader, shut off tractor power and lower jack.
2. Disconnect implement from tractor.
3. Hook appropriately rated chain to both the left and right hand rear pulling lugs as shown in Figure 5.
4. Fasten chains to tractor.
5. Raise jack.
6. Engage tractor to dislodge implement.

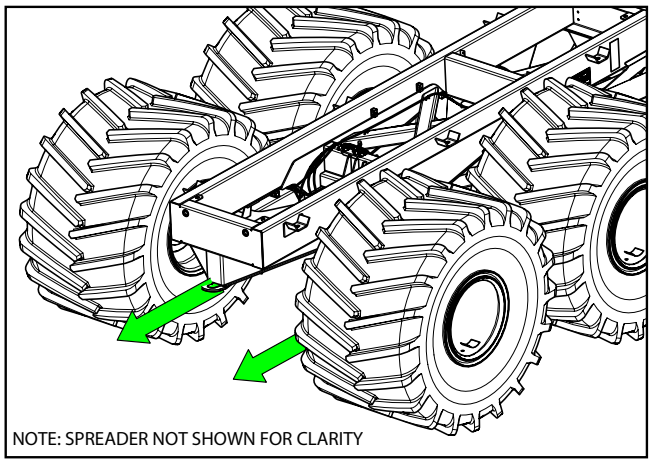


Figure 5 - Rear Pulling Lugs

OPERATIONS

NOTES

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PREVENTATIVE MAINTENANCE PAYS!

The handling and spreading of commercial fertilizers is a most severe operation with respect to metal corrosion. Establish a frequent, periodic preventative maintenance program to prevent rapid damage to spreading equipment. Proper cleaning, lubrication and maintenance will give you longer life, more satisfactory service and more economical use of your equipment.

	**WARNING**	Shut off all power and allow all moving parts to come to rest before performing any maintenance operation.

HYDRAULIC SYSTEM

Proper oil in the hydraulic system is one of the most important factors for satisfactory operation. Utmost cleanliness in handling the oil cannot be stressed enough. Keep hydraulic oil in original closed containers, clean top of container before opening and pouring, and handle in extremely clean measures and funnels.

Refer to “Lubricant & Hydraulic Oil Specifications” on page 65 for selection of the proper hydraulic fluid for use in the hydraulic system.

SERVICE SCHEDULE

	**WARNING**	DO NOT check leaks with hands while system is operating as high pressure oil leaks can be dangerous! If skin is pierced with hydraulic fluid at high pressure seek immediate medical attention as fluid injected into the skin could cause gangrene if left untreated. Relieve pressure before disconnecting hydraulic lines or working system. Make sure all hydraulic fluid connections are tight and all hydraulic hoses and lines are in good condition before applying pressure to the system. Wear protective gloves and safety glasses or goggles when working with hydraulic systems.

	**WARNING**	DO NOT check for leaks adjacent to moving parts while system is operating as there may be danger of entanglement!

Check hydraulic oil daily by means of sight gauge on hydraulic tank. Add oil as necessary to maintain level around mid-point of sight gauge. Periodically inspect hoses and fittings for leaks.

NOTICE!	Change hydraulic oil filter after first week (or not more than 50 hours) of operation on a unit.

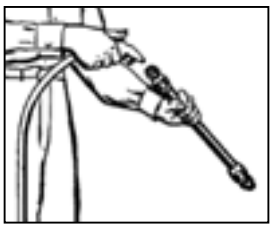
Controller will warn when filter is restricted. Change filter when warning sounds.

Drain hydraulic tank through drain plug (not through suction outlet), flush, and refill and change filter element annually. Oil and filter should also be changed whenever oil shows any signs of breaking down under continued high-pressure operation. Discoloration of oil is one sign of breakdown.

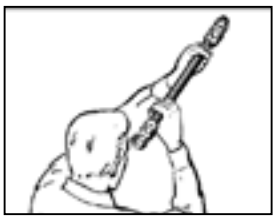
HYDRAULIC HOSE

Hose assemblies in operation should be inspected frequently for leakage, kinking, abrasion, corrosion or other signs of wear or damage. Worn or damaged hose assemblies should be replaced immediately. When replacing, use hoses of same or better rating and construction.

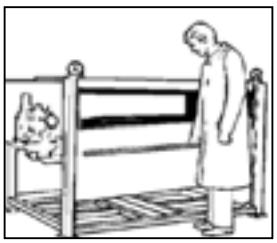
WARNING Testing should be conducted in approved test stands with adequate guards to protect the operator.



Clean
Clean assembly by blowing out with clean compressed air. Assemblies may be rinsed out with mineral spirits if the tube stock is compatible with oil, otherwise hot water at 150°F (65.55° C) maximum may be used. Ensure all are dry before assembly.



Inspect
Examine hose assembly internally for cut or bulged tube, obstructions, and cleanliness. For segment style fittings, be sure that the hose butts up against the nipple shoulder; band and retaining ring are properly set and tight, and segments are properly spaced. Check for proper gap between nut and socket or hex and socket. Nuts should swivel freely. Check the layline of the hose to be sure the assembly is not twisted. Cap the ends of the hose with plastic covers to keep clean.



Test
The hose assembly should be hydrostatically tested at twice the recommended working pressure of the hose.
Test pressure should be held for not more than one minute and not less than 30 seconds. When test pressure is reached, visually inspect hose assembly for: 1. Any leaks or signs of weakness. 2. Any movement of the hose fitting in relation to the hose. Any of these defects are cause for rejection.

Storage and Handling

Hose should be stored in a dark, dry atmosphere away from electrical equipment, and the temperature should not exceed 90° F (32.22° C).

CONVEYOR CHAIN

WARNING	Stay out of the spreader. If it's necessary to enter the spreader, return to the shop, empty body, turn off all power, set vehicle brakes, lock engine starting switch and remove keys before entering. Tag all controls to prohibit operation. Tags should be placed, and later removed, only by person working in the body.

Hose down unit and remove any material build-up on sprockets and under chain.

NOTICE!	The conveyor will move away from the bottom panel if material accumulates under the conveyor or on the sprockets. The more material that accumulates, the closer the chain will come to the chain shields. If the conveyor should catch a chain shield, it could permanently damage the conveyor, the chain shields or the unit. Do not remove material while conveyor or spinner is running!

Lubrication

Make sure unit is clean and completely dry. Lubricate conveyor chain via display at an interval of 10 hours of spreading, or at the end of each day of usage.

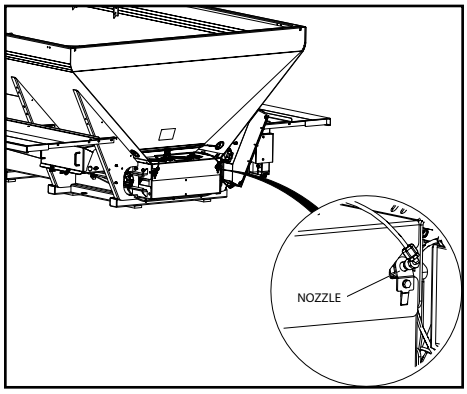


Figure 1

Tension

Proper chain tension is a factor in chain and sprocket life. Measuring from rear of unit, conveyor should touch at 36" - 40" (91 - 102cm) mark, and top of chain should appear between MIN and MAX lines in sight window (Figure 1). If manual adjustments need to be made, on valve block, loosen jam nut, turn counterclockwise to lower tension, or turn clockwise to increase tension (Figure 2). All tension adjustments must be made when machine is unloaded and conveyor running 15-20 RPM.

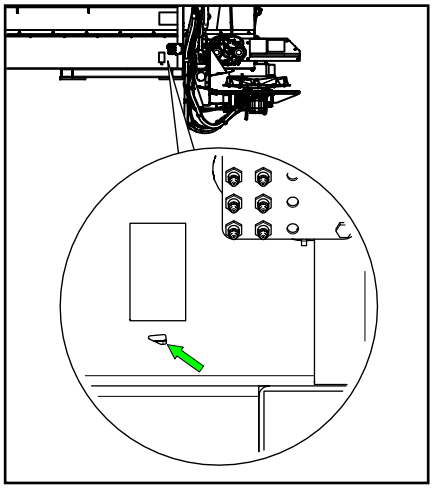


Figure 2A

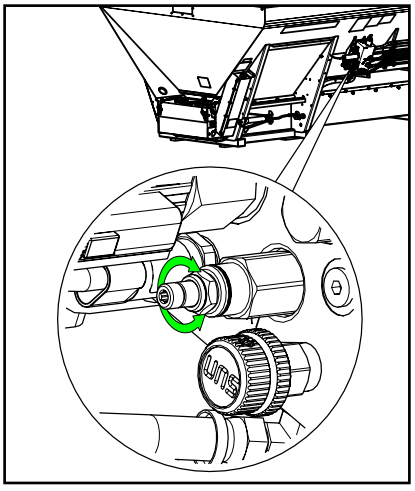


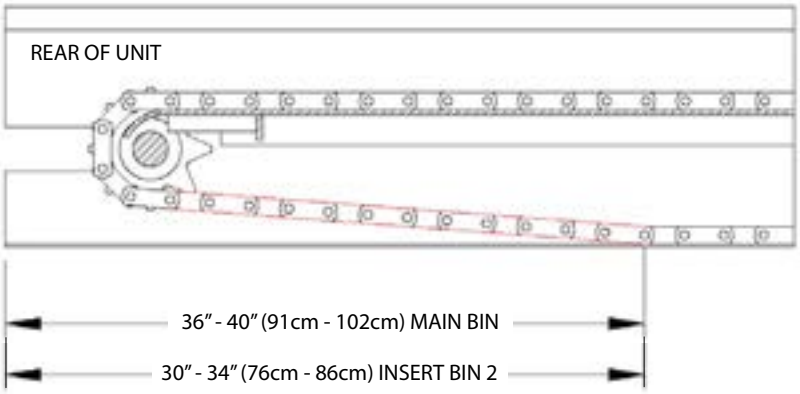
Figure 2B

Over-tensioning of conveyor chain will lead to excessive load on the system which will cause excessive chain and sprocket wear and can cause extremely high starting pressures. Under-tensioning allows conveyor chain to "wrap" around drive sprockets and not exit sprocket freely, causing excessive excessive chain stretch and surging of the conveyor which will result in interrupted flow of material to the spinners.

Proper Tension

Main Bin Conveyor
36” to 40”
(91cm - 102cm)

Bin 2 Conveyor
30” to 34”
(76cm - 86cm)



CONVEYOR BELT MAINTENANCE

Standard belt for the #4 chain is moderate oil resistant that is impervious to moisture, weathering, or normal action which can be used with chemical impregnated fertilizer or oil based additives.

- Inspect belt fastener occasionally for wear or “raveling” of belt grip area.
- Make sure belt connecting pin is positioned correctly as shown in Figure 3.

NOTICE! Pin must not rotate. If pin ends are not bent down and tight against lacing, the ends may cut into the chain shield sealers or belt wipers.

BOTH PIN ENDS MUST BE BENT DOWN & TIGHT AGAINST ENDS OF LACING

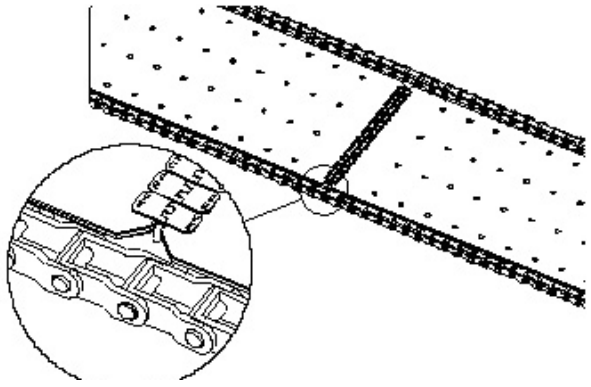


Figure 3 - Conveyor Belt Pin Installation

BIN SENSOR

WARNING Stay out of the spreader. Do not climb on spreader. Use a portable ladder to inspect, clean and maintain the bin sensor from outside the spreader. Failure to do so could result in injury from falling.

NOTICE! Wipe sensor clean periodically to prevent accumulation of product. Avoid wet material as it may stick to sensor. If material sticks to sensor it won’t warn user when bin is low.

Clean sensor with long handled brush or hose from outside of spreader. Do not aim high pressure sprayer directly at sensor—it could damage the components.

Spinner Fins

Visually inspect spinner fins (Figure 4) daily for build-up of material and wear. Spinner discs and fins must be kept clean and polished. Even a small build-up of material on a spinner can significantly affect the spread pattern. Rough, bent or worn fins will produce bad spread patterns. Replace worn fins or discs as needed. See *Fin Kit Installation Instructions* for replacement part numbers and instructions.

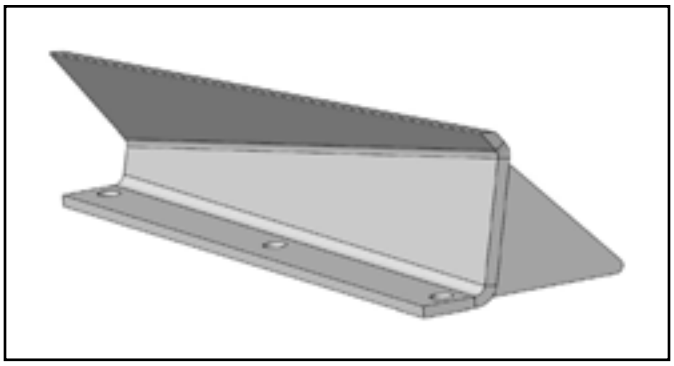


Figure 4 - Fin

Spinner Deflectors

Visually inspect spinner deflectors (Figure 5) daily for build-up of material and damage. Clean as needed. Even a small build-up of material on a spinner deflector can affect the spread pattern. If damaged, bent or otherwise, replace. See *Parts List* in this manual for replacement part numbers.

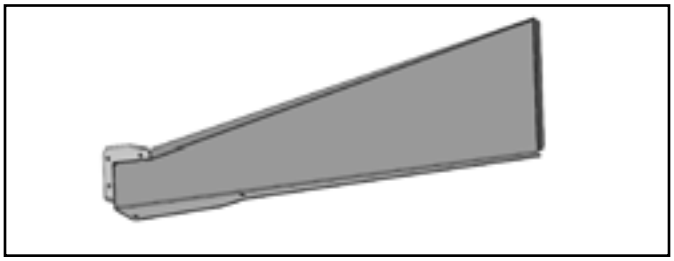


Figure 5 - Spinner Deflector

Material & Hillside Flow Dividers

Visually inspect material divider (Figure 6) and hillside flow dividers (as equipped) daily for build-up of material and wear. Any build-up of material on divider components can affect performance. Clean as needed. Replace worn or damaged parts as necessary. See *Parts List* in this manual for replacement part numbers.

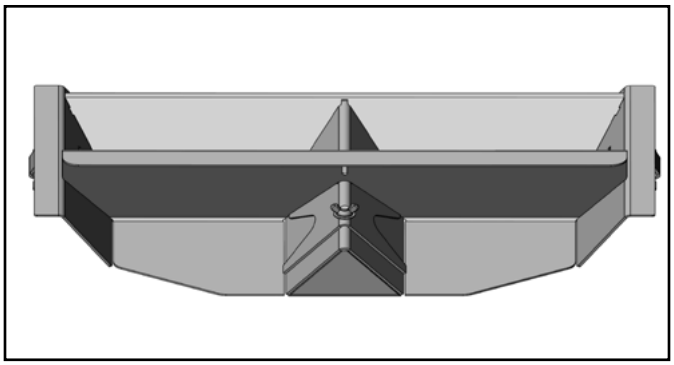


Figure 6 - Material Divider

CONVEYOR GEARCASE

Drain oil in a new unit after first two weeks (or not more than 100 hours) of operation, and flush gear case thoroughly with light oil. Refer to "Lubricant and Hydraulic Oil Specifications" section for proper grade oil and recommended amounts of lubricant. After initial change, oil should be changed every 2,000 hours of operation or annually, whichever occurs first.

Check gearcase oil level monthly.

LUBRICATION OF BEARINGS

Grease in a bearing acts to prevent excessive wear of parts, protects ball races, and balls from corrosion and aids in preventing excessive heat within the bearing. It is very important the grease maintain its proper consistency during operation. It must not be fluid and it must not channel.

Make sure all fittings are thoroughly cleaned before grease is injected. Points to be lubricated by means of a grease gun have standard grease fittings.

Lubricate bearings by pumping grease slowly until it forms a slight bead around the seals. This bead indicates adequate lubrication and also provides additional protection against the entrance of dirt.

FASTENERS

Tighten all screws fasteners to recommended torque's after first week of operation and annually thereafter. If loose fasteners are found at anytime, tighten to recommended torque. Replace any lost or damaged fasteners or other parts immediately. Check body mounting hardware every week.

Check torque on body mounting, hitch, wheels and suspension hardware every week. Tighten front mount hardware so springs are compressed from 3.5" - 3.75" (8.89 - 9.53 cm) (Figure 7A). Tighten each back mount hardware to 80 - 90 ft-lb (108.5 - 122 N-m) (Figure 7B).

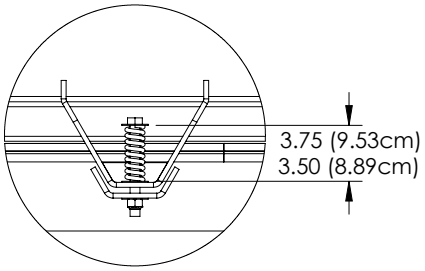


Figure 7A - Front Spring Compression

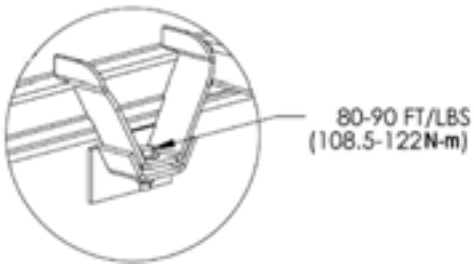


Figure 7B - Spring Torque on Rear Mount

TRAILER BRAKES

WARNING!	Perform maintenance on level surface with wheels blocked. There is no parking brake on the TR3000. Block the wheels prior to unhitching or any maintenance of the TR3000. Uncontrolled movement of the trailer could cause death or serious injury.

Using sight window on drums' dust shields, adjust brakes, tighten slack adjuster until brake pads touch brake drums, then back off 1/4 turn.

Brake noise and/or sluggish brake response may indicate air in the brake line. To correct this problem perform the bleeding procedure listed below.

Bleeding Procedure:

1. Modulate tractor brakes to low pressure and flow.
2. On top of rams, loosen bleeder plugs to fill system.
3. Attach supply line to tractor. Press brake pedal or operate a pump to charge system.

DANGER	Do not check leaks with hands while system is operating as high pressure leaks can be dangerous! If skin is pierced with hydraulic fluid at high pressure seek immediate medical attention as fluid injected into the skin could cause gangrene if left untreated. Relieve pressure before disconnecting hydraulic lines or working with system. Make sure all hydraulic fluid connections are tight and all hydraulic hoses and lines are in good condition before applying pressure to the system. Wear protective gloves and safety glasses or goggles when working with hydraulic systems.

4. When fluid is seeping from bleeder holes, release brake pedal or turn off hydraulic power unit pump and install bleeder plugs.
5. Loosen one bleeder plug a 1/2 turn and apply brakes to remove remaining air.
6. Tighten bleeder plug.
7. Make sure ram is free of air.
8. Complete steps 5-7 for all four rams.
9. Allow system to set for five or more minutes. This will allow any additional trapped air to rise to the top of the system.
10. Break the line at the highest point. This is located in the center of the bulkhead assembly.

NOTICE!	Fittings must be tightened under hydraulic pressure or air may be drawn back into system.

11. Apply pressure to brake to remove any air from the system and tighten fittings.
12. Apply brakes and check for leaks. Make sure all rams are fully extended while applying braking force to brake drums. If done correctly, the ram and slack adjuster will be at 90° to each other (Figure 8). The ram should extend approximately 1 1/2 inch (38 mm) to 1 3/4 inch (44 mm).
13. If brakes chatter or rams do not fully extend repeat steps 5-12.
14. When complete, rams must be fully retracted.

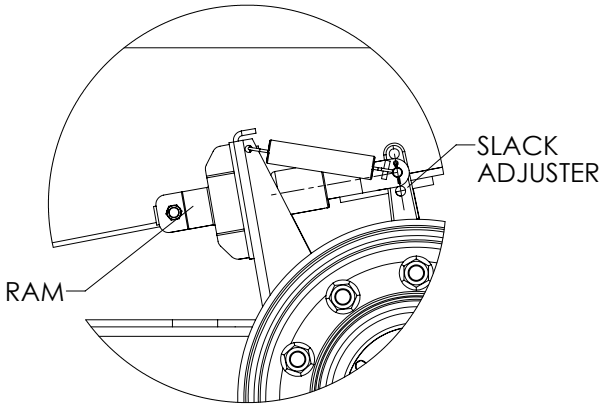


Figure 8

TIRES

NOTICE!	Inspect tires and wheels daily for wear and/or loose hardware.

WARNING	Service of tires and rims can be dangerous. Follow all safety rules. Only specialized personnel should mount tires. Use proper equipment and procedures. Damaged tires can explode causing injury. Falling and/or rolling tires may cause injury.

WARNING	Do not over inflate tires. DO NOT stand in front of or over tires when inflating. If necessary, use a clip-on air chuck and extension hose. Over-inflating can cause tire to explode, causing serious injury. Always inflate tire/rim assembly with an OSHA approved cage or restraining device. Tire and rim diameters should always match.

Always maintain correct tire pressure. Set tire pressure at 20 PSI (1.38 bar) to minimize ground compaction. See "General Operating Procedures" section.

Check tires frequently during extreme temperatures.

Refer to tire manufacturer for additional information.

WHEELS & LUG NUTS

Wheel Installation

CAUTION	Retorque wheel studs after 10 hours of operation.

1. Make sure brakes are not engaged.
2. Check all parts are free of dirt and grease. Make sure all parts are free of damage. The hub or drum mounting face must be cleaned and kept flat.
3. Ensure that the brake drum is on the pilots' raised step, seated fully against the hub.
4. Clean the wheel's center hole as necessary so it will fit easily on the hub pilots.
5. Apply two drops of oil between the nuts and flange and two drops to the last 2 or 3 threads at the end of each stud. Lightly lubricate the pilots on the hub to ease wheel installation and removal.

NOTICE!	DO NOT get lubricant on the mounting face of the drum or wheel. This will cause hardware to loosen prematurely.

6. Position hub with one pilot at 12 o'clock position. Place wheel onto hub carefully so as not to damage stud threads. Make sure wheel is fully seated against drum.
7. Install hardened spacer and nuts, finger-tight, at 12 o'clock and 6 o'clock positions. Rotate wheel 180° and make sure wheel is fully seated against drum. Repeat as needed. Install spacers and nuts finger-tight on remaining studs.

8. Tighten nuts to 50 ft-lb (67.8 N-m) following a crisscross sequence as shown in Figure 9.
9. After the wheel is installed inspect the seating of the wheels on all four pilots and turn the wheel checking for irregularity of the wheel assembly. This will ensure the wheel is seated on the pilots and flat against the drum.
10. Tighten all nuts to 450-500 ft-lb (610.2-678 N-m) using the crisscross sequence as shown in Figure 32.
11. Repeat torque sequence until all nuts are consistent to 450-500 ft-lb (610.2-678 N-m).

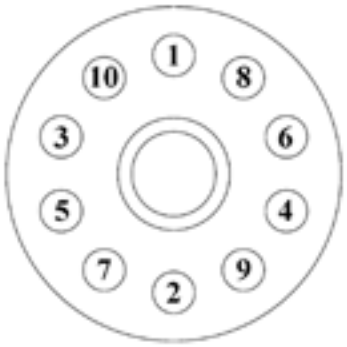


Figure 9

END-OF-SEASON STORAGE

⚠	**WARNING**	Never store implement with material in bin. Implement could tip and crush or strike someone causing serious injury or even death.

1. Refer to "Pre- & Post-Season Checklists" at the end of this section. Complete End-of-Season Checklist as required.
2. Store implement indoors on a hard, level surface, with wheels blocked to prevent rolling.
3. Lower jack to support the implement so that it is level. Ensure that the jack is placed securely on a hard surface.
4. Place all power connections in storage positions as shown in Figure 10:

- If implement is equipped with MULTAPPLIER, store auxiliary hose in provision on hose guide (A).
- Place PTO shaft in storage position and secure with pin (B).
- Store light connector in storage bracket located on hose guide (C).

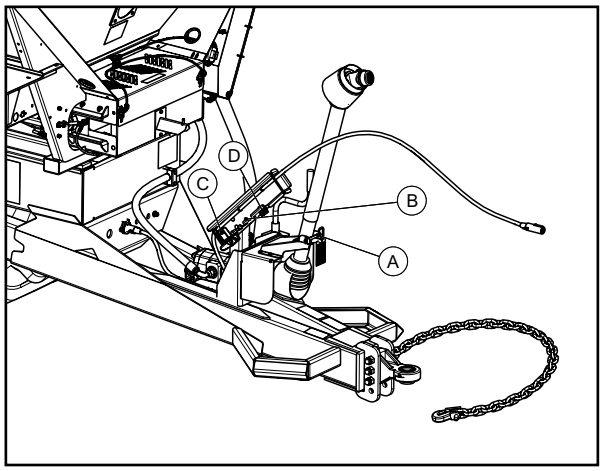


Figure 10

- Plug ISOBUS connector into storage provision to prevent entry of dirt and debris (D).

5. Disconnect implement from tractor.

CLEAN UP

NOTICE!	High pressure wash can inject water and/or fertilizer into control components, causing damage. Use caution when cleaning these areas.

Thoroughly wash unit every two to three days during the operating season to maintain minimal maintenance operation. Hose unit down under pressure to free all sticky and frozen material.

It is important the unit be thoroughly cleaned at the end of each operating season. All lubrication and maintenance instructions should be closely followed. Repaint worn spots to prevent formation of rust.

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NOTES

NOTICE!	The lubricant distributor and/or supplier is to be held responsible for results obtained from their products. Procure lubricants from distributors and/or suppliers of unquestionable integrity, supplying known and tested products. Do not jeopardize your equipment with inferior lubricants. No specific brands of oil are recommended. Use only products qualified under the following oil viscosity specifications and classification recommended by reputable oil companies.

HYDRAULIC SYSTEM

Use premium quality lubricants with 100-200 SUS or 20-43 cSt viscosity at operating temperatures. The hydraulic fluid's specifications in the table below are for normal operating conditions. Extreme environments or dirty conditions may require the use of different oils. Consult your New Leader dealer or the Product Support Department at Highway Equipment Company for systems operating outside normal conditions.

Ideal Oil Operating Temperature	115-158°F (46.11-70° C)
Recommended Premium Lubricant	Multi-Purpose Agriculture Hydraulic & Transmission Oil
Lubricant Specifications Viscosity Index Viscosity at 40°C, cst Viscosity at 100°C, cst	 Greater than 130 Less than 68 Greater than 9
Acceptable Fluid Example	Mobil 424

GEARCASE LUBRICANT

Lubricate these assemblies with non-corrosive type extreme pressure (E.P.) gear oil conforming to MIL-L2105 B multi-purpose gear lubricating oil requirements (API Service GL 4) based on ambient temperatures listed below. Refill gearcase with one and a half (1-1/2) pints (.70 liters) of recommended lubricant.

Ambient Temperature	Oil Type
Below 40°F (4.4°C)	SAE 80 E.P.
40° - 100° F (4.4° - 38° C)	SAE 90 E.P.
Above 100° F (38° C)	SAE 140 E.P.

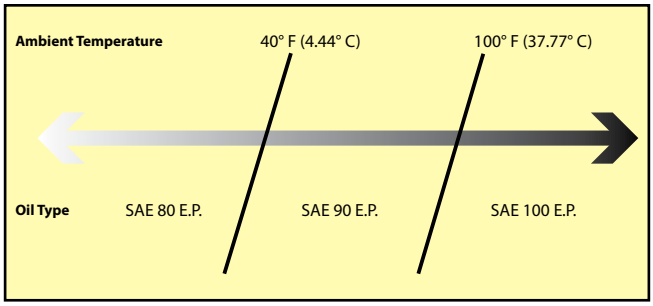

Figure 7

GREASE GUN LUBRICANT

Use a waterproof ball and roller bearing lithium base lubricant with a minimum melting point of 300°F (148.8° C). This lubricant should have a viscosity which assures easy handling in the pressure gun at prevailing atmospheric temperatures. The grease should conform to NLGI No. 2 consistency.

CHAIN OILER MIXTURE

Use a mixture of 75% diesel fuel mixed with 25% SAE 10 engine oil (use clean oil, not pre-used oil).

WARNING Shut off all power and allow all moving parts to come to rest before performing any maintenance operation.

The spreader should be regularly lubricated with the lubricants recommended in this manual in accordance with the following chart:

Location	Places	Method	Frequency
Hydraulic System			
Hydraulic Reservoir	1	Check Daily. Change Annually	
Filter	1	Check daily; Change when indicated by controller	
Conveyor			
Idler Bearings (1, 2 - Front Bank)	2	Grease Gun	Weekly
Driveshaft Bearings (2, 3 - Rear Bank)	2		
Chain Oiler	1	Oil Mixture	Daily, After first 10 hours spreading
Gearcase	1	Gear Oil	Check Monthly; Change Annually
Feedgate			
Jack Assembly (6, 7 - Rear Bank)	2	Grease Gun	Weekly
Spinner Assembly			
Jack Assembly (4, 8 - Rear Bank)	2	Grease Gun	Weekly
Bin 2 Insert Conveyor			
Idler Bearings (9, 11 - Rear Bank)	2	Grease Gun	Weekly
Driveshaft Bearings (10, 12 - Rear Bank)	2		
Idler Take -Up Screws	2	Hand Grease	Annually

NOTE: Unusual conditions, such as excessive dust, temperature extremes or excessive moisture may require more frequent lubrication of specific parts.

*See “Lubricant and Hydraulic Oil Specifications” for types of lubricants and oil to be used.

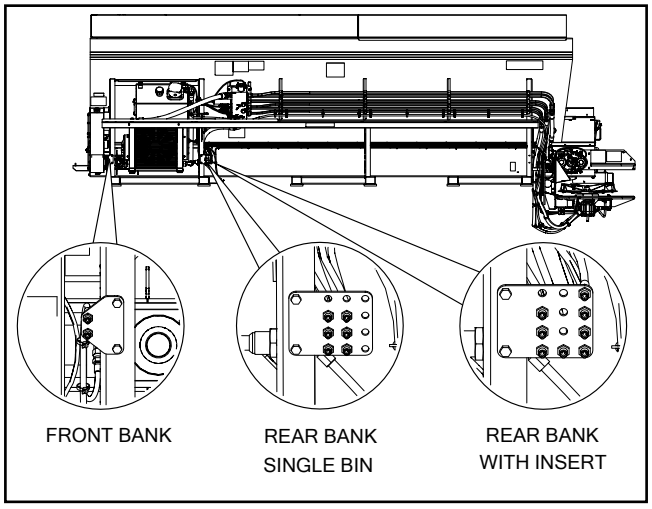

Figure 7

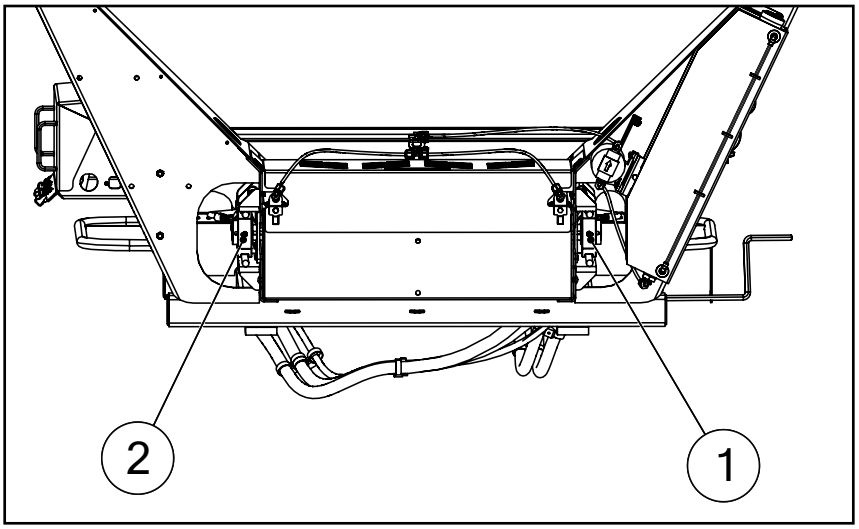

Figure 8 - Front Grease Bank Locations

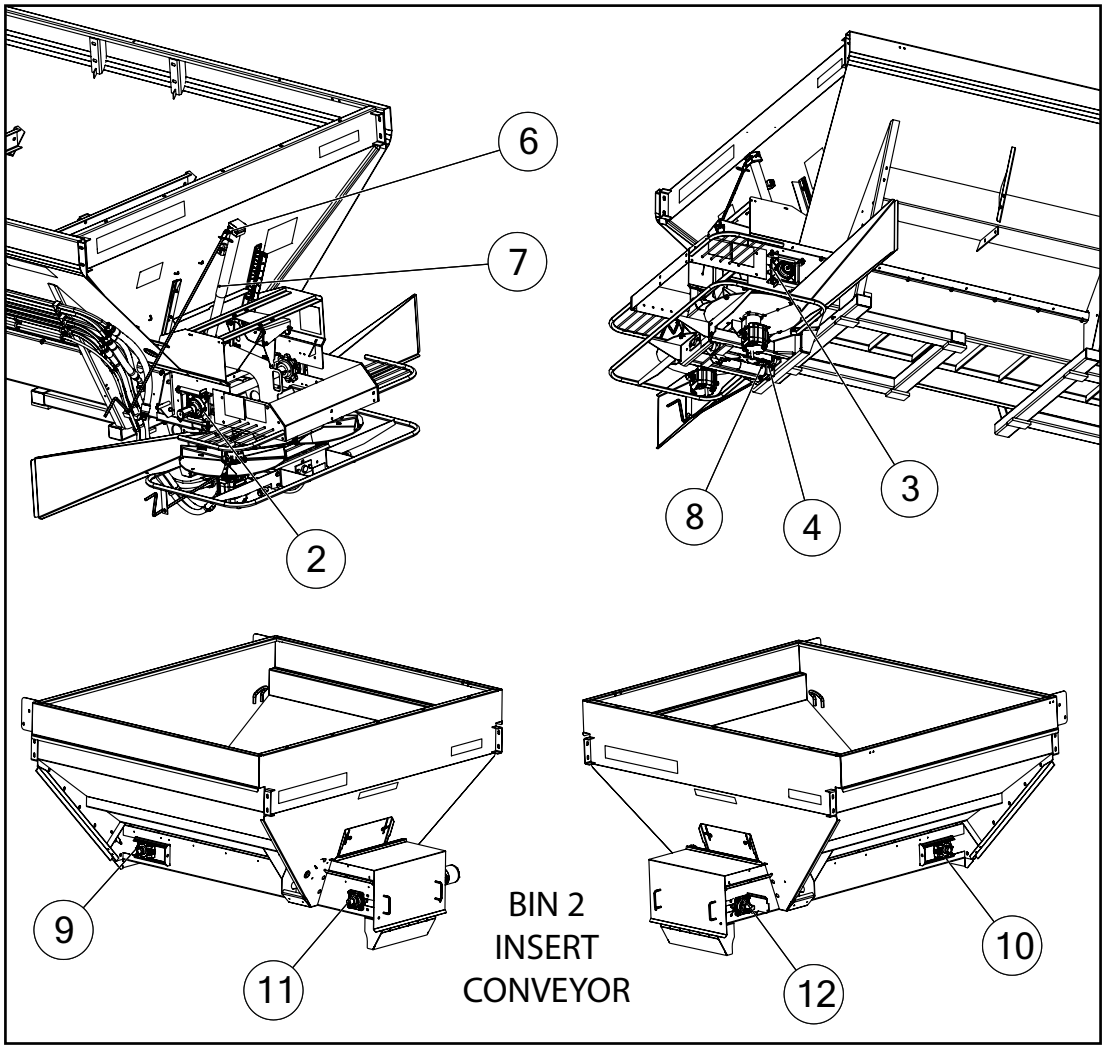

Figure 9 - Rear Grease Bank Locations

WARNING Shut off all power and allow all moving parts to come to rest before performing any maintenance operation.

The implement should be regularly lubricated with the lubricants recommended in this manual in accordance with the following chart:

Location	Places	Method	Frequency
1. PTO Shaft			
Inner/Outer Tube Profile (a)	1	Grease Gun 6 - 10 Pumps	Every 8 hours of operation
Nylon Bearing Ring (b)	1	Grease Gun 2 - 3 Pumps	
**Double Yoke/Housing (c)	1	Grease Gun 15 Pumps	
Tractor Yoke - Cross & Bearing (d)	1	Grease Gun 5 - 6 Pumps or until purge	
**CV Yoke - Cross & Bearing (e)	1	Grease Gun 15 Pumps	
Pump Yoke - Cross & Bearing (f)	1	Grease Gun 4 - 5 Pumps or until purge	
Shield (g)	2	Grease Gun 2 - 3 Pumps ea.	
*Tractor PTO Spline (h)	1	Hand Grease	See above or each time implement is attached
** - Also feeds ball cavity * - Not shown			
2. Tongue			
Trailer Jack (a)	1	Grease Gun	Weekly
Bull-Pull Hitch (b)	1	Grease Gun	
3. Wheel End & Axles			
Spindle Bushings (A, D - Grease Banks)	4	Grease Gun	Weekly
Cam Bushings (B, E - Grease Banks)	4	Grease Gun	
Slack Adjusters (C, F - Grease Banks)	4	Grease Gun	
Inner Walking Beam (G - Grease Banks)	2	Grease Gun	
Outer Hanger (H - Grease Banks)	2	Grease Gun	
Outer Walking Beam (I - Grease Banks)	2	Grease Gun	
Center Hanger (J - LH Grease Bank)	1	Grease Gun	
Wheel Bearing (K)	4	Replace synthetic "Semi-Fluid" long-life grease if hub is removed for servicing.	

NOTE: Unusual conditions, such as excessive dust, temperature extremes or excessive moisture may require more frequent lubrication of specific parts.

*See "Lubricant and Hydraulic Oil Specifications" for types of lubricants and oil to be used.

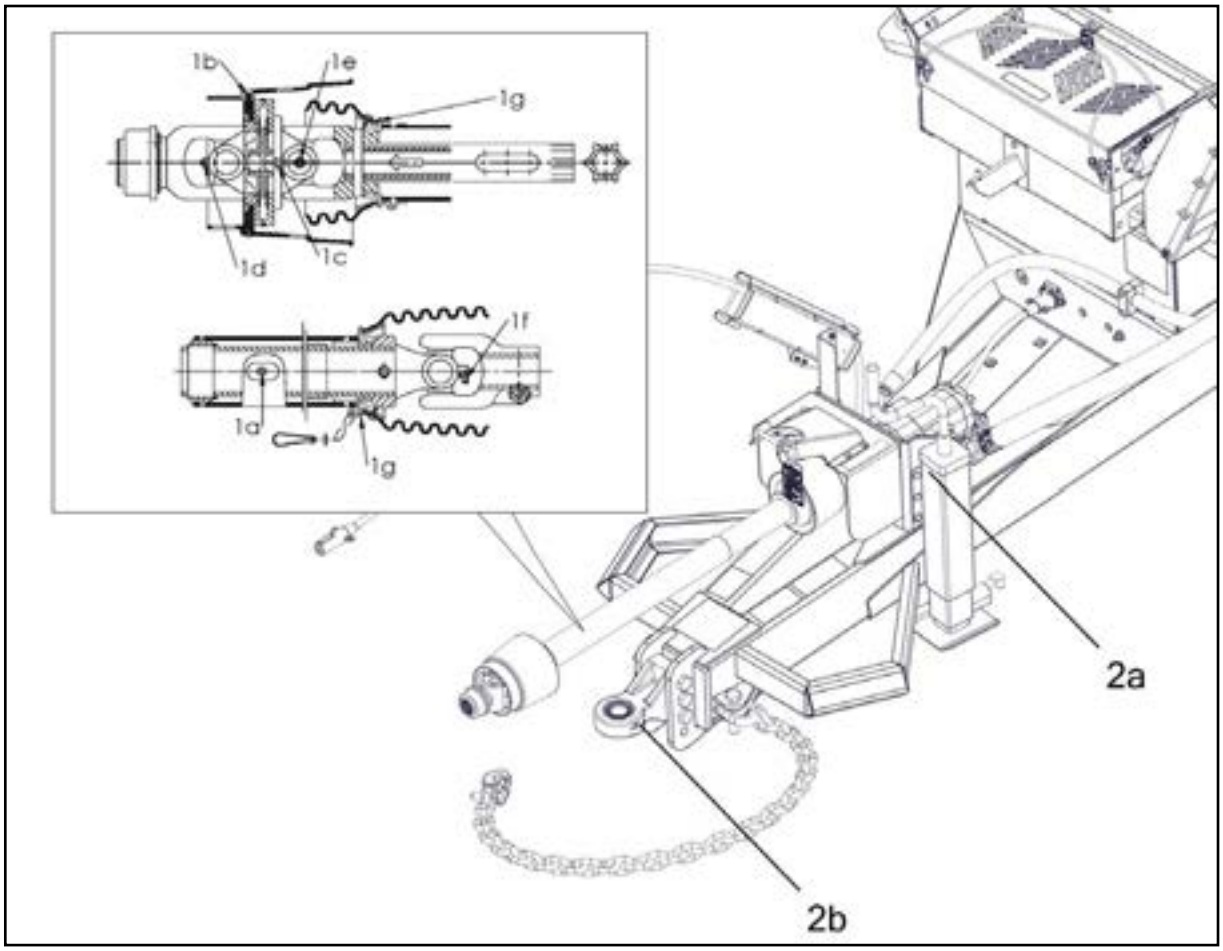

Figure 12 - Trailer Tongue Grease Locations

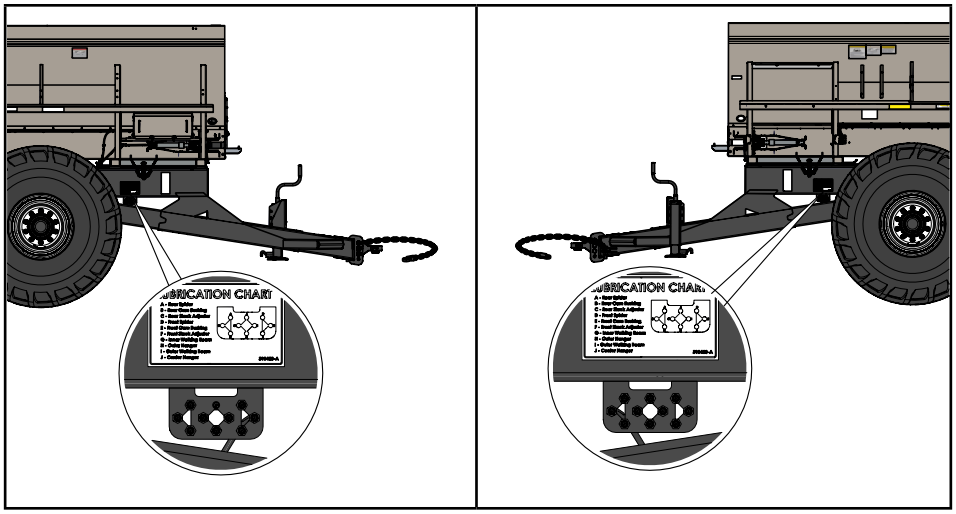

Figure 10 - TR3000 Grease Banks

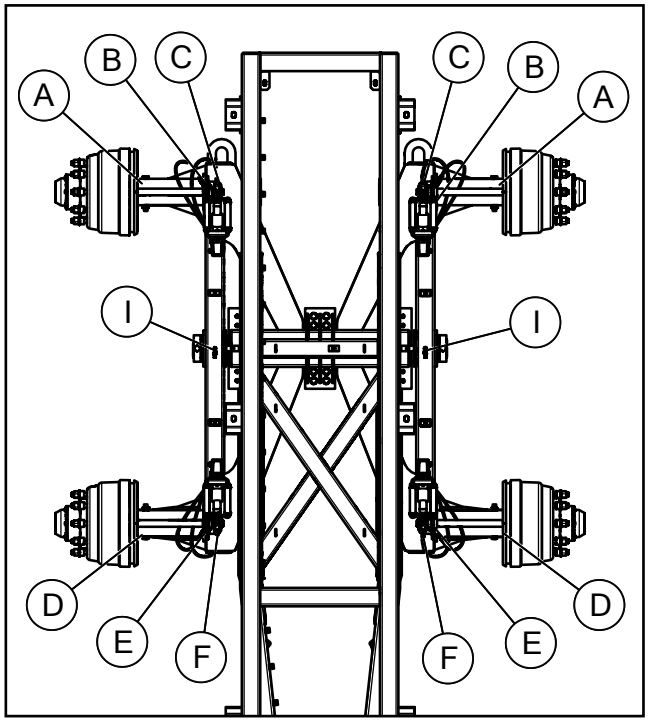

Figure 11A - TR3000 Grease Locations Top Side

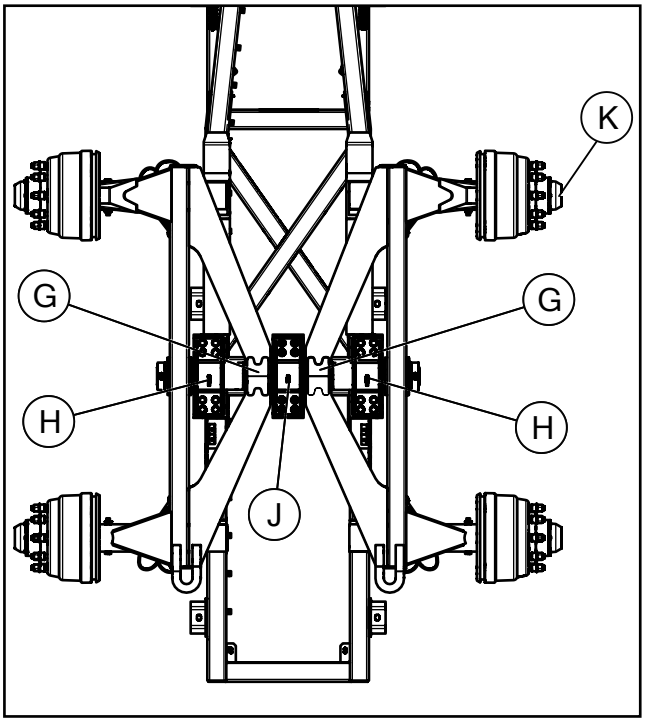

Figure 11B - TR3000 Grease Locations Underside

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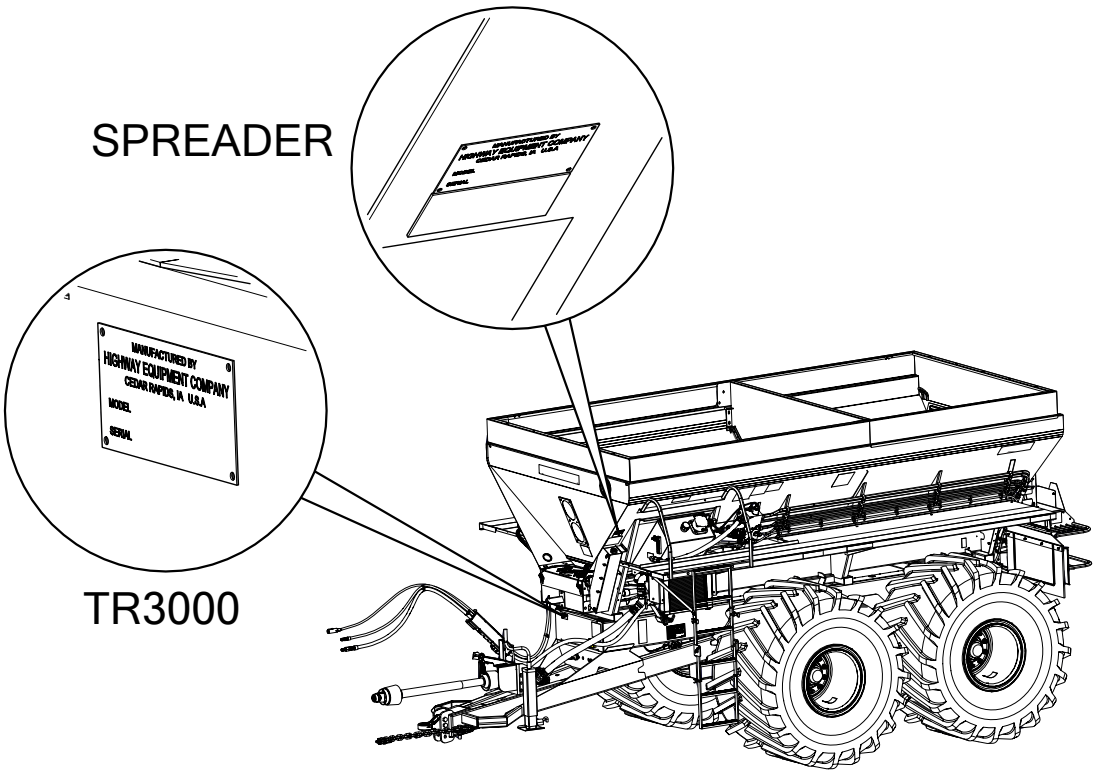
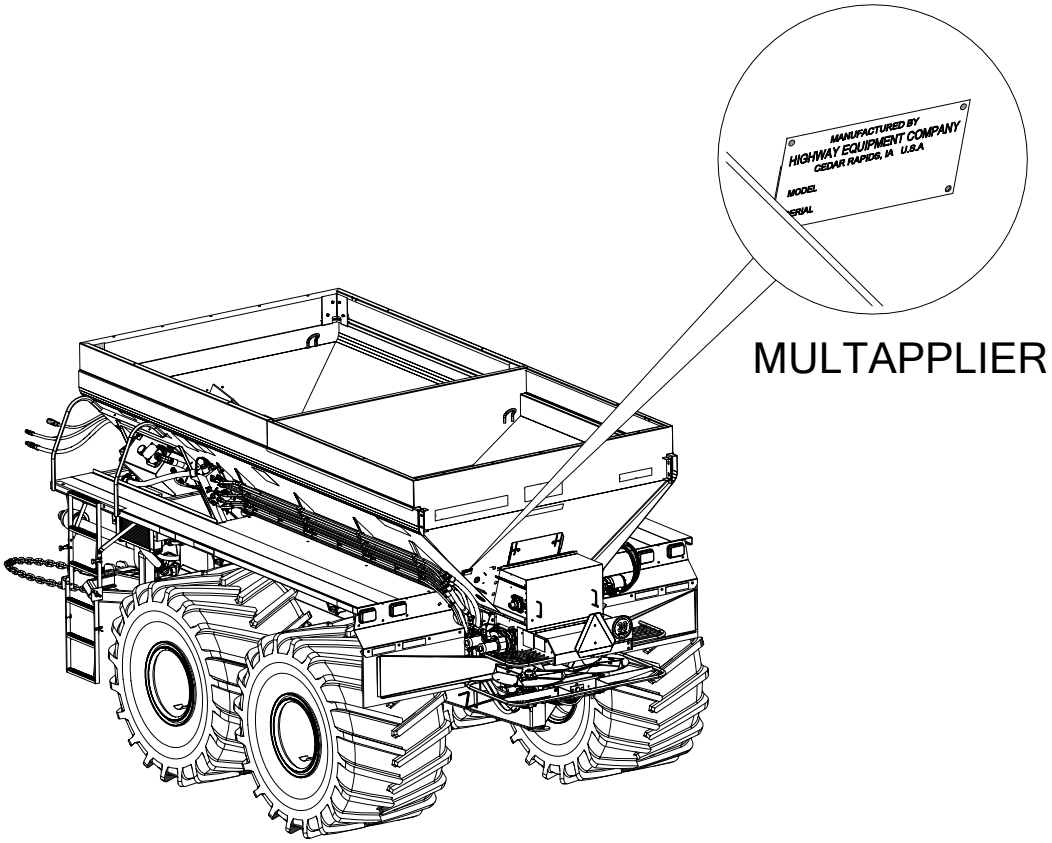
SPREADER



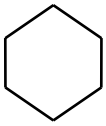
TR3000

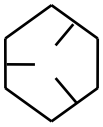


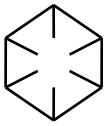
MULTAPPLIER

STANDARD TORQUES
NATIONAL COARSE (NC) CAPSCREWS

CAP SCREW GRADE IDENTIFICATION - MARKINGS ON HEAD

SAE GRADE 2  NO MARKINGS

SAE GRADE 5  THREE MARKS - 120 DEGREES APART

SAE GRADE 8  SIX MARKS - 60 DEGREES APART

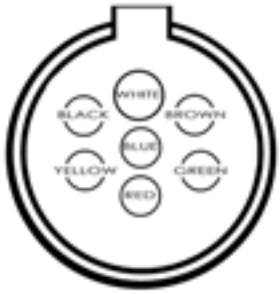
USE GRADE 2 TORQUES FOR STAINLESS STEEL FASTENERS AND CARRIAGE BOLTS.

	TORQUE - FOOT-POUNDS					
CAP SCREW SIZE	GRADE 2		GRADE 5		GRADE 8	
	DRY	LUBE	DRY	LUBE	DRY	LUBE
1/4”	5	4	8	6	12	9
5/16”	11	8	17	13	25	18
3/8”	20	15	30	23	45	35
7/16”	30	24	50	35	70	55
1/2”	50	35	75	55	110	80
9/16”	65	50	110	80	150	110
5/8”	90	70	150	110	220	170
3/4”	100	120	260	200	380	280
7/8”	140	110	400	300	600	460
1”	220	160	580	440	900	650

Symptom:	Reason:	Correction:
Spinner will not run	Defective Spinner Control Valve	Replace spinner control valve cartridge and coil.
	No voltage at valve	Verify spinner switch is on.
		Verify spinner enable is checked.
		Verify controller has a target spinner RPM entered.
		Check WSM 7.5 amp fuse is not blown.
		Verify spinner control harness is not damaged.
		Verify system was configured as Basic independent.
	No hydraulic flow	Verify hydraulics are on.
		Pressure test pump - replace as needed.
		System is going over relief - test & replace as needed.
Spinner will not shut off	Defective spinner control valve	Replace spinner control valve cartridge.
	Control valve is manually overrode	Loosen jam nut on control valve cartridge and back set screw out until spinner stops.
Spinner runs erratic	Defective spinner control valve	Replace spinner control valve cartridge.
	Spinner speed sensor harness failure	Replace sensor harness.
	Spinner speed sensor not properly installed	Adjust sensor so that gap between sensor and fin mounting bolt is less than 1/8”.
Spinner speed drops off when turning around	Improper control settings	Verify PWM control is set properly (HOLD for gear pumps, CONTROL for variable displacement).
Spinner speed does not hit target	Defective spinner control valve	Replace spinner control valve cartridge.
	Pump failure	Flow and pressure test pump.
	Spinner speed sensor not properly installed	Adjust sensor so that gap between sensor and fin mounting bolt is less than 1/8”.
	Hydraulic flow dropping off	Adjust settings and speed. Pressure test relief (adjust or replace as needed).
	Spinner speed sensor harness failure	Replace sensor harness.
	Spinner speed sensor failure	Replace spinner speed sensor.
Conveyor will not run	Defective conveyor control valve	Replace conveyor valve cartridge.
	No voltage at valve	Verify bin switch and master switches on.
		Verify in controller that target rate, density, ground speed and a CFR number are all entered.
		Check WSM 7.5 amp fuse is not blown.
		Verify conveyor control harness is not damaged.
	No hydraulic flow	Verify hydraulics are on.
		Pressure test pump - replace as needed.
		System is going over relief - test & replace as needed.
		Conveyor is going over relief - test & replace as needed.

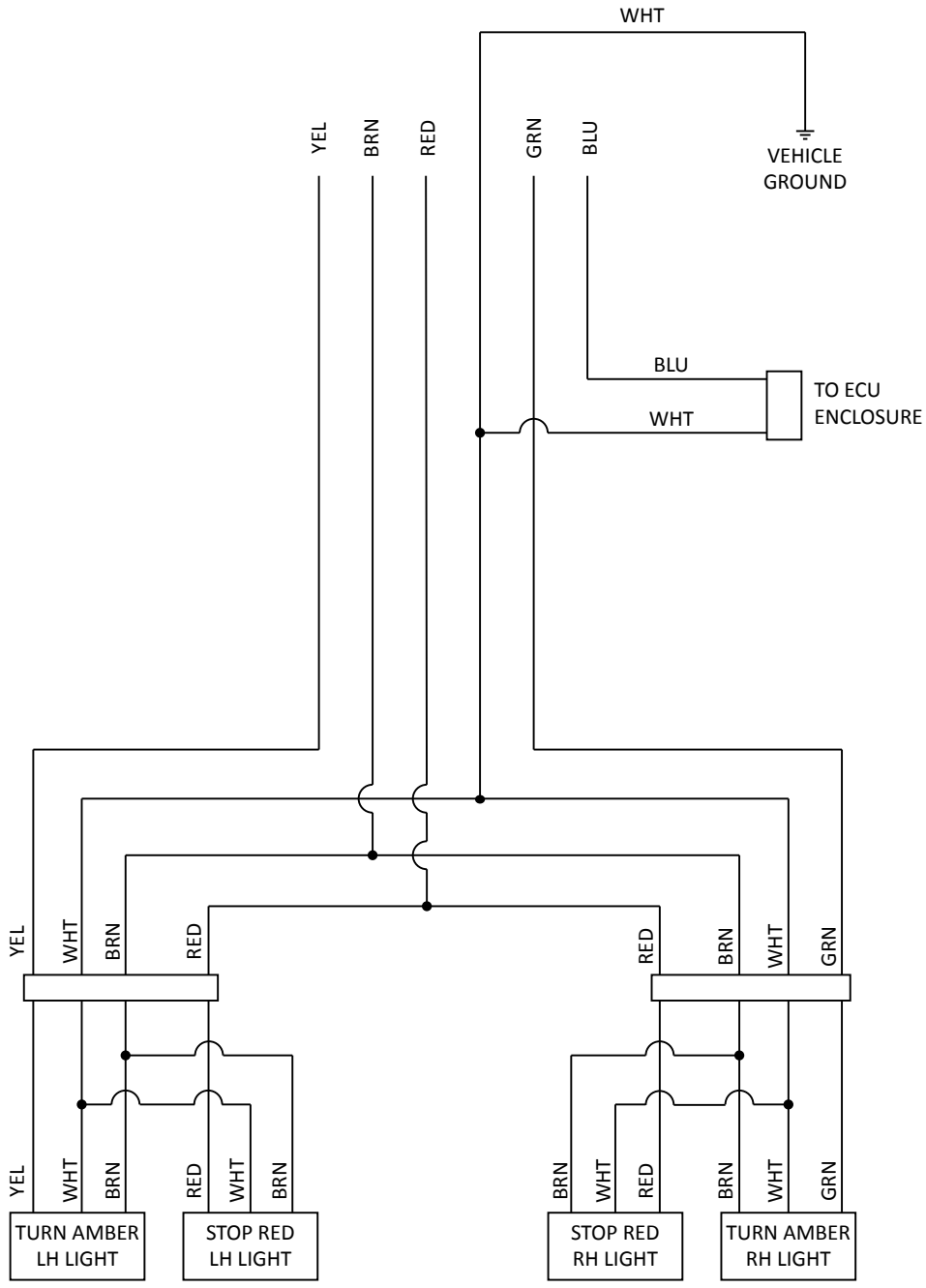
Symptom:	Reason:	Correction:
Conveyor will not shut off	Defective conveyor cartridge	Replace conveyor control valve cartridge.
	Control valve is out of time	Adjust cartridge timing.
Conveyor runs erratic	Defective conveyor cartridge	Replace conveyor control valve cartridge.
	Encoder failure	Replace encoder.
	Encoder harness failure	Replace harness.
	Rates smooting is disabled	Enable rate smoothing.
Bin will not hit target rate	Defective conveyor cartridge	Replace conveyor control valve cartridge.
	Pump failure	Flow and pressure test pump.
	Going over relief	Adjust setting and speed. Pressure test relief (adjust or replace as needed).
	Encoder failure	Replace encoder.
	Encoder harness failure	Replace harness.
Hydraulics over-heating	Pump failure	Flow and pressure test pump.
	Too much flow	Flow test pump.
	System relief	Pressure test relief (adjust or replace as needed). Adjust settings and speed.
	Conveyor valve relief	Pressure test relief (adjust or replace as needed). Adjust settings and speed.
	Oil cooler fan failure	see cooler fan failures.
	Case drain on mono valve is plugged.	Case drain requires zero pressure line back to tank.
Cooler Fan failure	No power at fan	Verify FAN 30-amp fuse is not blown. Verify relay is working properly.
	Fan failure	Replace fan.
No warnings being displayed	Warnings are only shown when VT screen is active on monitor	Switch from viewing map to viewing VT.
Bin level sensors not working properly	Not enabled	Verify system was configured with bin level snesors installed.
	Bin level sensor failure	Replace sensor.
	Bin level sensor harness failure	Replace harness.
Not applying correct rate	Incorrect settings	Verify density, swath width, gate opening, encoder pulses, and CFR number are all adjusted as needed.
No ground speed	Manual speed is enabled, but set to 0	Enter correct speed or disable manual speed
	AUX broadcast speed is enabled but radar not installed	Disable broadcast AUX speed.
	Incorrect speed source is selected	Select correct speed source.
Conveyor tensioning incorrect	Cartridge isn't adjusted properly	Adjust valve to achieve correct tension.
	Cartridge has failed	Replace cartridge.

ELECTRICAL SCHEMATIC - 12 VOLT DC



WIRING CODE

- 12GA White Wire (Ground)
- Black Wire (Not Used)
- 12GA Yellow Wire (LH Flash Warning & Turn Light)
- 12GA Red Wire (Stop Lights)
- 12GA Green Wire (RH Flash Warning & Turn Light)
- 12GA Brown Wire (Tail Lights)
- 12GA Blue Wire (Oil Cooler)



LED Light alerts - located directly on modules on machine

Power LED

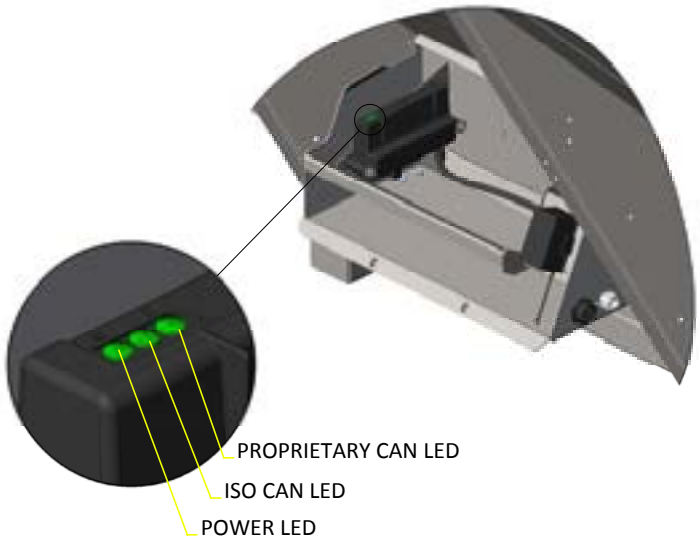
	Off	Solid Red	Flashing Red	Solid Amber	Flashing Amber	Solid Green	Flasing Green
Boot	No Power	N/A	No App	Running	N/A	N/A	N/A
Upgrage		N/A	N/A	N/A	Running	N/A	
Main Application		High Current Power Low	N/A	N/A	N/A	Power OK	

ISO CAN LED

	Off	Solid Red	Flashing Red	Solid Amber	Flashing Amber	Solid Green	Flasing Green
Boot	X	N/A	N/A	N/A	N/A	N/A	N/A
Upgrage	Idle	Bus Off		Bus Error Passive	Bus Error Active		TX / RX
Main Application							TX / RX

Proprietary CAN LED

	Off	Solid Red	Flashing Red	Solid Amber	Flashing Amber	Solid Green	Flasing Green
Boot	X	N/A	N/A	N/A	N/A	N/A	N/A
Upgrage	X	N/A		N/A	N/A		N/A
Main Application	Idle	Bus Off		Bus Error Passive	Bus Error Active		TX / RX



IMPORTANT!	Do not operate or work on machine without reading and understanding the operator's manual.

Before starting engine/before starting machine operation

___ Program rate controller and document settings
___ All stop, tail, and turn lights function properly
___ Tire pressures are equal on each side of chassis
___ Battery condition and connection
___ Electrical connections are tight and secure
___ All fasteners are secure
___ Inverted V is secure and installed properly
___ Sensor(s) are functioning properly
___ Lubricate all grease fittings
___ Hydraulic oil level and line connections are tight
___ Hydraulic filters are current and gauge is functional
___ Chain oiler tank is full and operates correctly
___ Hydraulic hoses are secured properly
___ Gearcase oil level is correct
___ All guards and shields in place
___ Spinner assy moves through full range of operation
___ Spinner discs and fins installed properly
___ Spinner discs and fins are in acceptable condition
___ Material Divider assembly is square and secure
___ Material Divider is clean of build-up
___ Feedgate assembly is level and clean of build-up
___ Encoder installed and secured
___ Spinner sensor adjusted to proper gap

Start engine/Start and run to operational temperatures

___ Hydraulic fittings are tight and no leaks *
___ All pressure transducers are operating correctly
___ Check operation of all alarms
Hydraulic flow test: ____GPM @ operating engine RPM
___ Check main relief valve setting :_____ PSI
___ Conveyor control valve is operating correctly
___ Calibrate radar/ground speed input
___ Test maximum conveyor RPM's
Test right and left hand spinner speed; ensure difference is less than 5 RPM (when at operating RPM)

Stop operation/Turn off engine and engage parking brake

___ Visually check for leaks
___ Check belt/chain tension and alignment
___ All oil levels full

Perform Calibrations

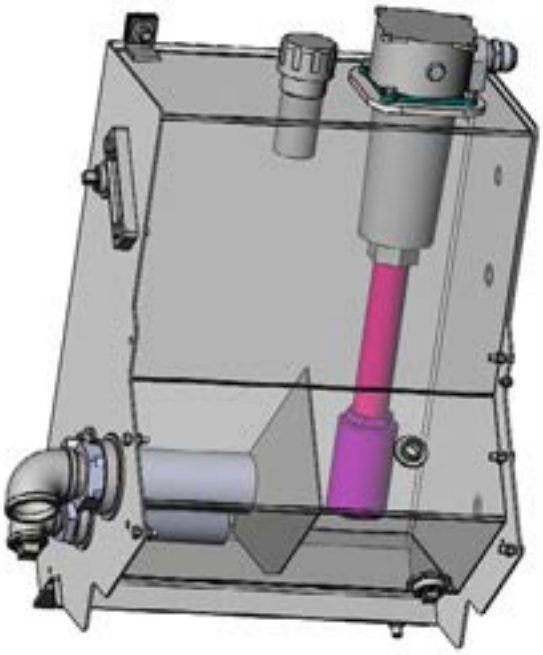
___ Product density testing, crush strength, and SGN scale (See *Spread Pattern Calibration* section for instructions).
___ Catch tests <u>of all products and at least 1 blend</u> for conveyor calibration and document settings and product characteristics
___ Spread pattern tests <u>of all products and at least 1 blend</u> and document settings and product characteristics

End of Season

___ Empty unit of all material
___ Sand and touch-up paint as necessary
___ Wash chain conveyor, lube thoroughly when dry
___ Check spinner discs and fins for wear
___ Clean unit inside and out
___ Check for leaks
___ Lubricate all grease fittings
___ Ensure all fasteners are secure

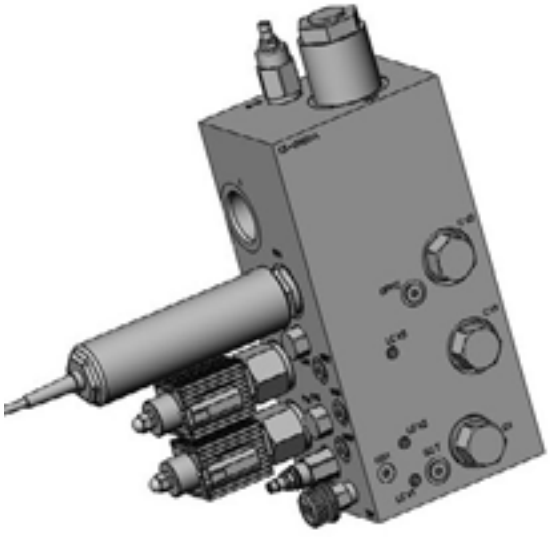
The following pages contain representative hydraulic schematics and flow diagrams for the NL345 model spreader.

Hydraulic Components

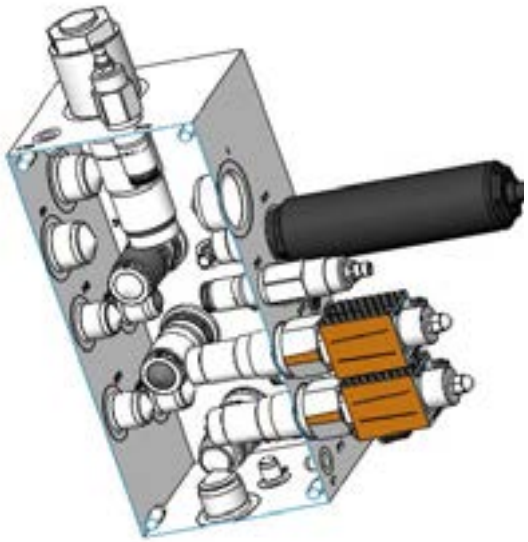


Hydraulic Reservoir

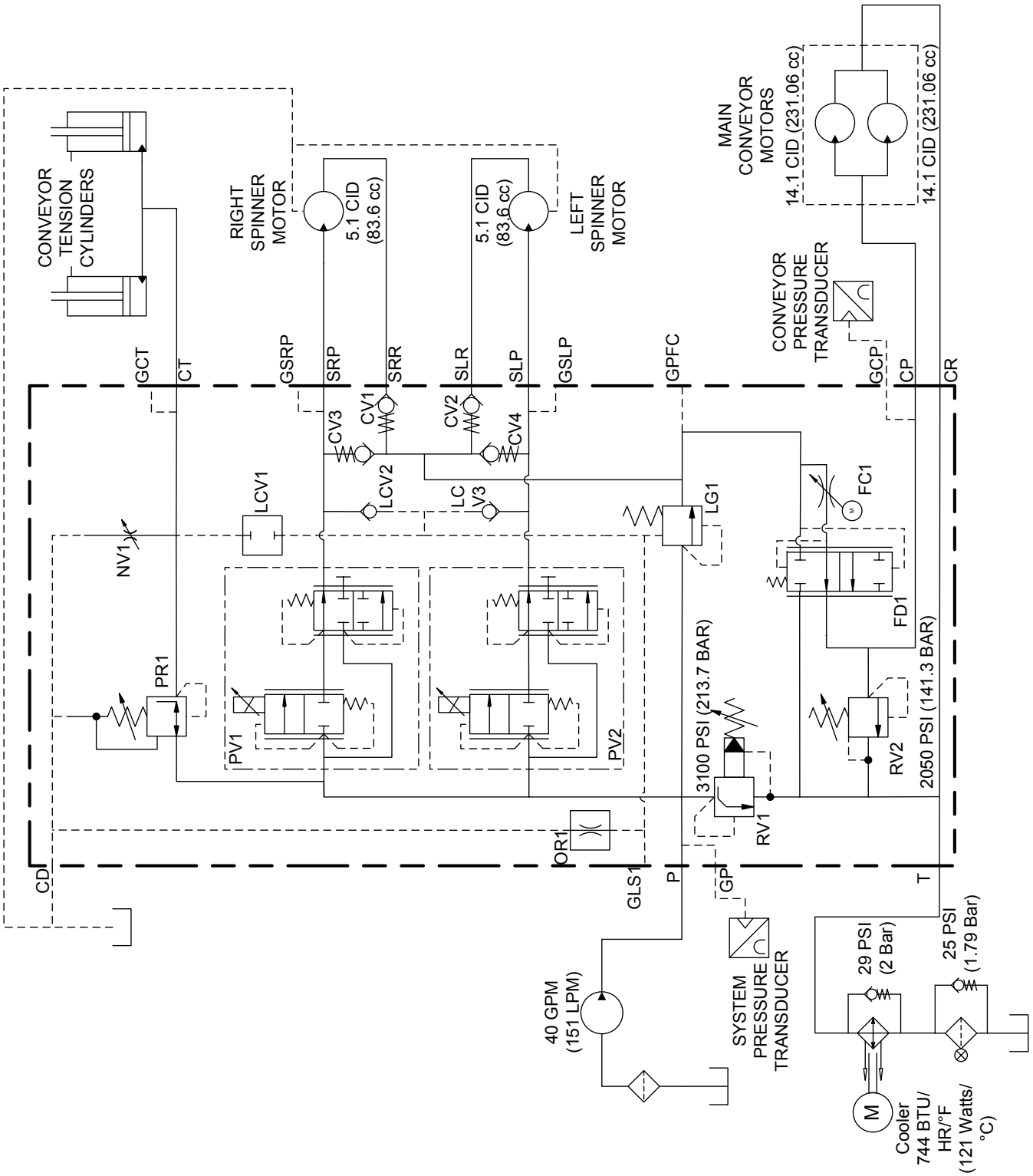
Spinner Motor



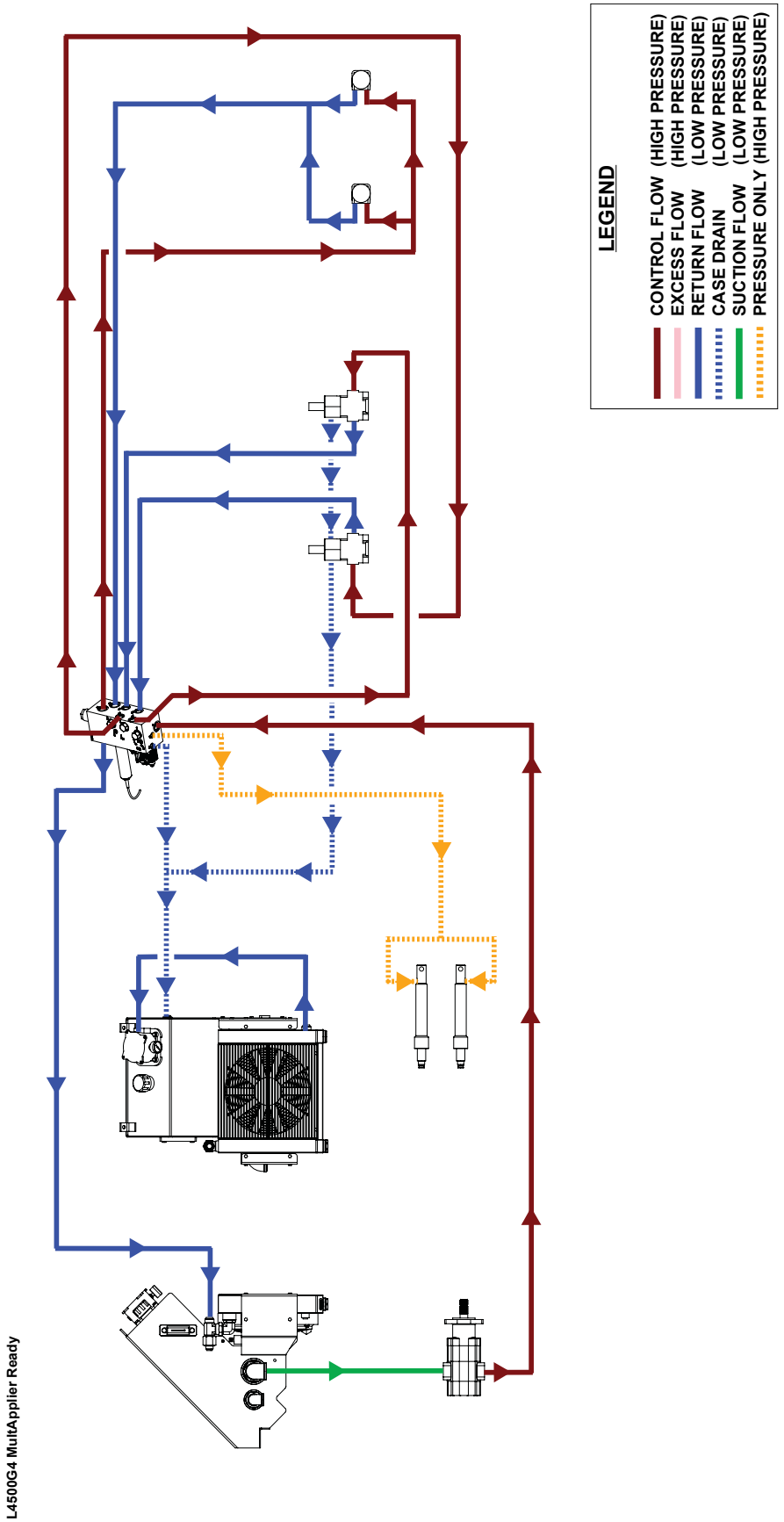
Valve Block - Face

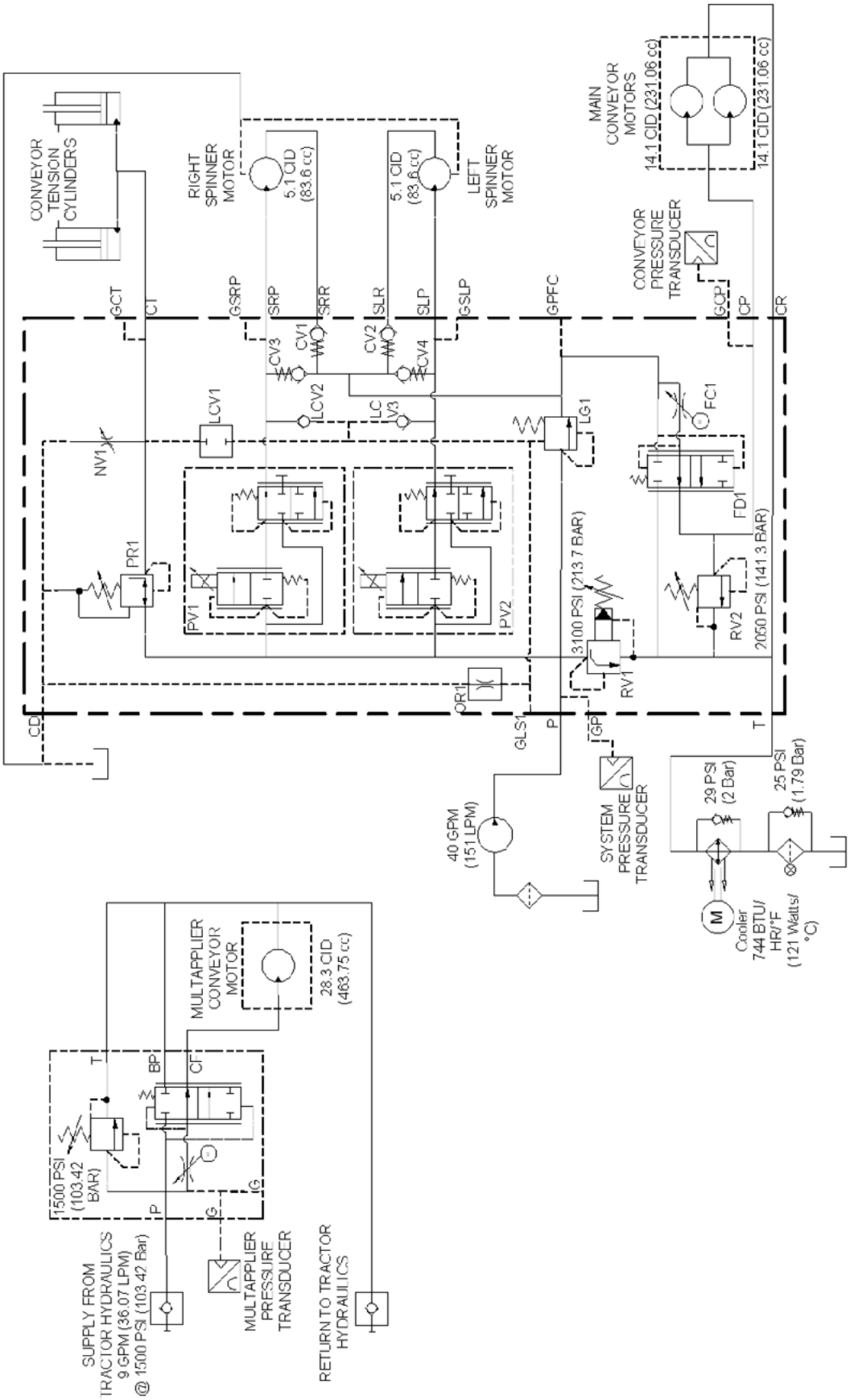


Valve Block - Rear (cut-away)

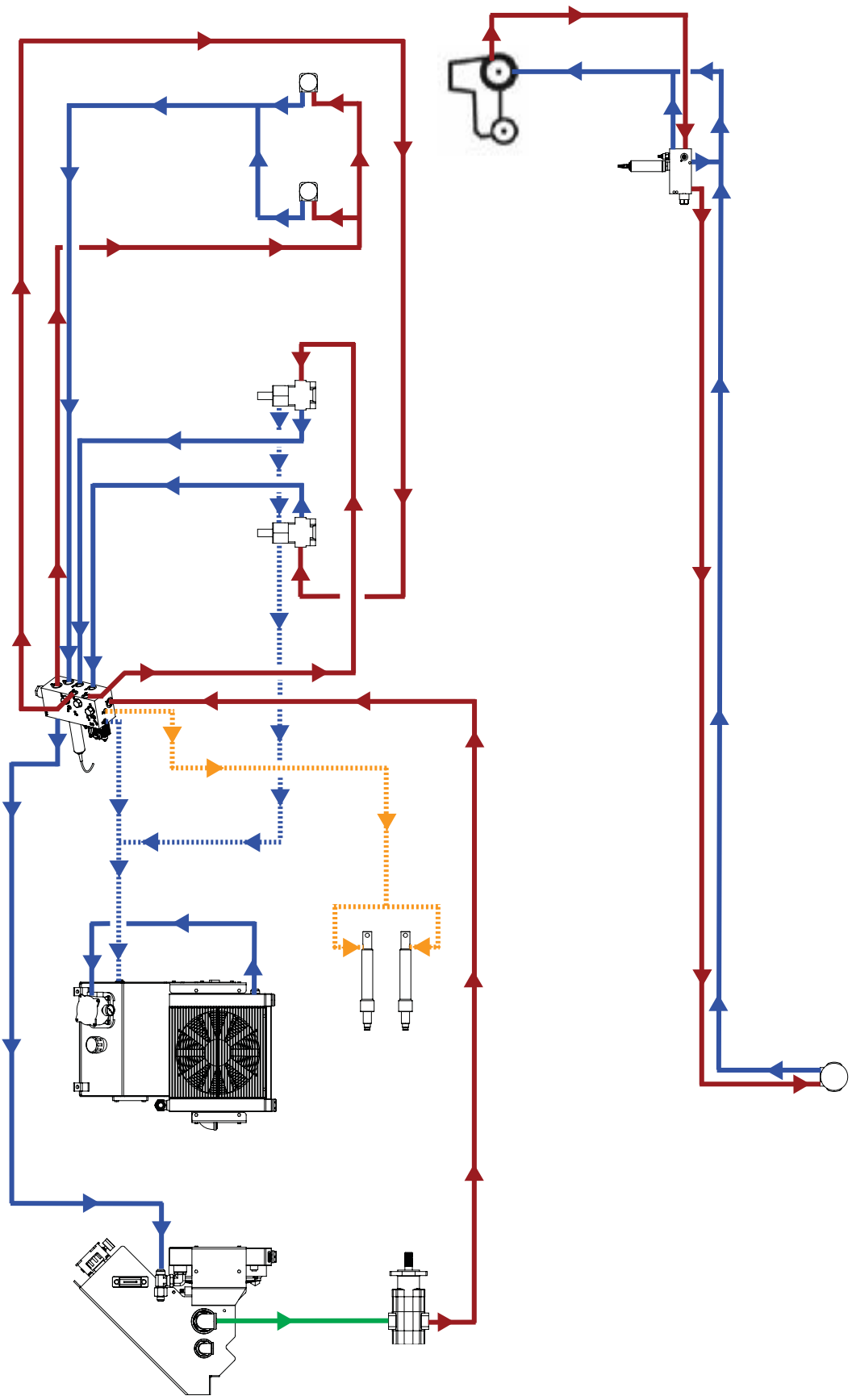

CONVEYOR TENSION CYLINDERS
RIGHT SPINNER MOTOR
5.1 CID (83.6 cc)
5.1 CID (83.6 cc)
LEFT SPINNER MOTOR
MAIN CONVEYOR MOTORS
14.1 CID (231.06 cc)
14.1 CID (231.06 cc)
CONVEYOR PRESSURE TRANSDUCER
GCT
CT
GSRP
SRP
SRR
SLR
SLP
GSLP
GPFC
GCP
CP
CR
CV3
CV1
CV2
CV4
LCV1
LCV2
LC V3
LG1
FC1
NV1
FD1
PR1
PV1
PV2
3100 PSI (213.7 BAR)
2050 PSI (141.3 BAR)
RV2
RV1
OR1
CD
GLS1
P
GP
T
40 GPM (151 LPM)
SYSTEM PRESSURE TRANSDUCER
29 PSI (2 Bar)
25 PSI (1.79 Bar)
M
Cooler 744 BTU/ HR/°F (121 Watts/ °C)

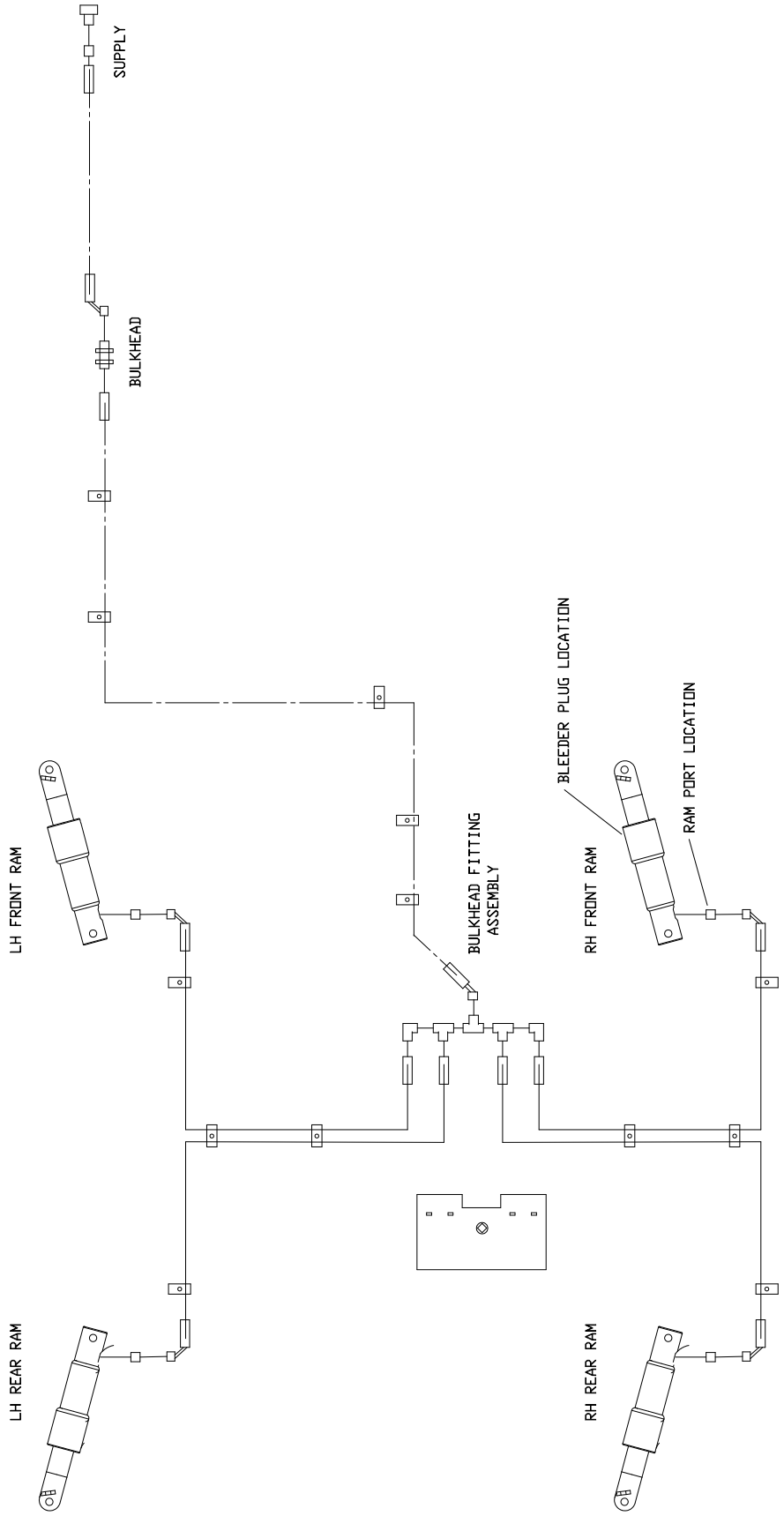
MULTAPPLIER READY FLOW DIAGRAM




CONVEYOR TENSION CYLINDERS
RIGHT SPINNER MOTOR
5.1 CID (83.6 cc)
5.1 CID (83.6 cc)
LEFT SPINNER MOTOR
MAIN CONVEYOR MOTORS
14.1 CID (231.06 cc)
14.1 CID (231.06 cc)
CONVEYOR PRESSURE TRANSDUCER
GCT
CT
GSRP
SRP
SRR
SLR
SLP
GSLP
GPFC
GCP
CP
CR
CV3
CV1
CV2
CV4
LCV1
LCV2
LC V3
LG1
FC1
NV1
PR1
PV1
PV2
FD1
3100 PSI (213.7 BAR)
2050 PSI (141.3 BAR)
RV2
RV1
OR1
GLS1
P
GP
T
CD
40 GPM (151 LPM)
SYSTEM PRESSURE TRANSDUCER
29 PSI (2 Bar)
25 PSI (1.79 Bar)
M
Cooler 744 BTU/HR/°F (121 Watts/°C)
MULTAPPLIER CONVEYOR MOTOR
28.3 CID (463.75 cc)
T
BP
CF
1500 PSI (103.42 BAR)
G
P
G
SUPPLY FROM TRACTOR HYDRAULICS 9 GPM (36.07 LPM) @ 1500 PSI (103.42 Bar)
MULTAPPLIER PRESSURE TRANSDUCER
RETURN TO TRACTOR HYDRAULICS

MULTAPPLIER COMPLETE FLOW DIAGRAM




SUPPLY
BULKHEAD
BLEEDER PLUG LOCATION
RAM PORT LOCATION
LH FRONT RAM
BULKHEAD FITTING ASSEMBLY
RH FRONT RAM
LH REAR RAM
RH REAR RAM

INTRODUCTION

ISOBUS is a protocol standardizing communication between chassis, displays, farm management software, and implements. Adhering to ISO 11783 standards, ISOBUS allows chassis and implements of different colors to share information through a common display. The use of ISOBUS technology allows the end user to minimize the number of necessary monitors in the cab of the chassis, while still enabling full functionality of the implements. The data displays the same way on any monitor.

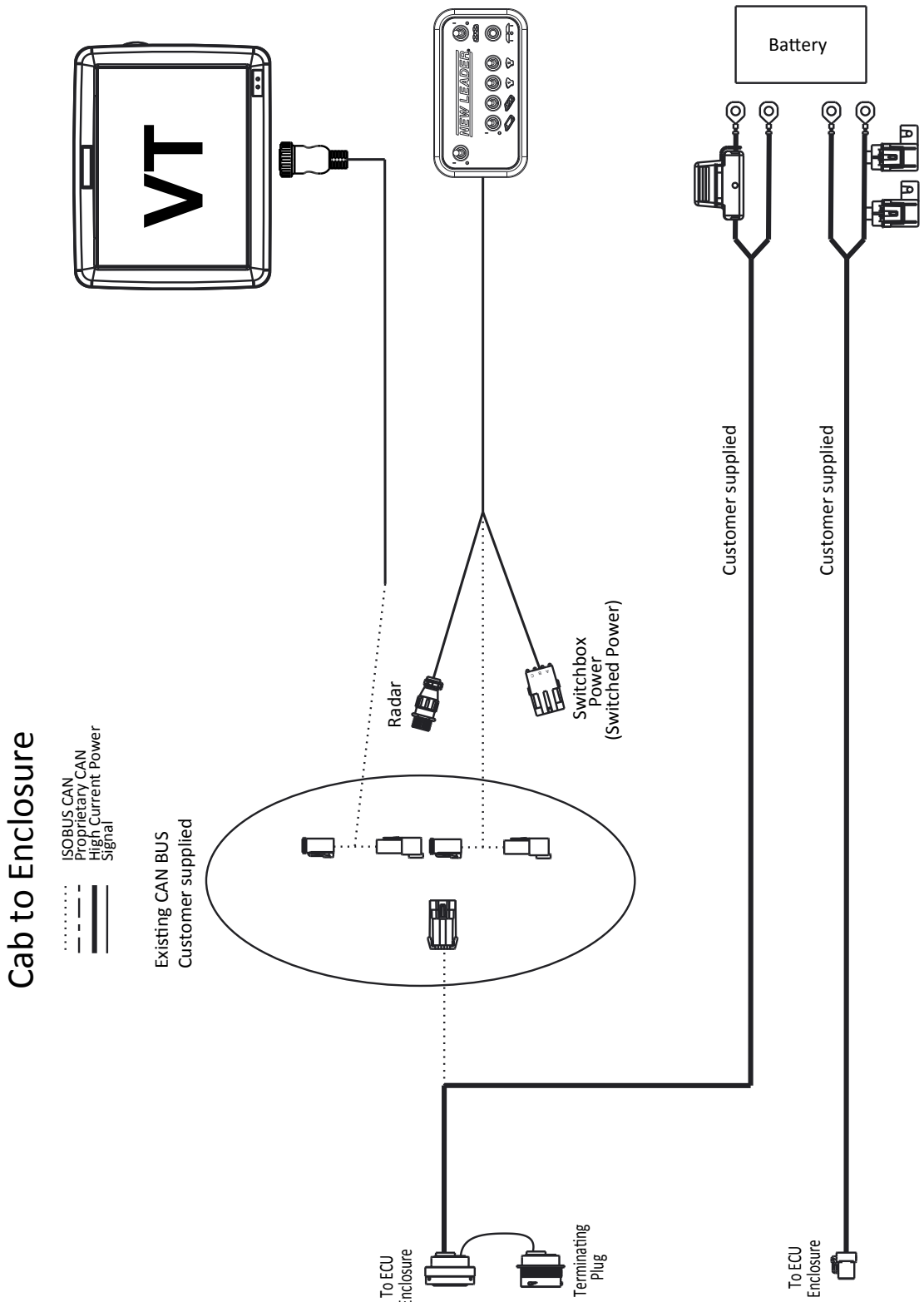
HOW THE ISOBUS WORKS

The BUS is a distinct set of conductors designed to carry data and control signals within a system of parallel connected equipment. Information from the equipment modules is transmitted through the BUS to a Virtual Terminal (VT) in the cab. The Virtual Terminal (VT) uploads a User Interface (UI) which feeds into any Display Monitor. From one Display Monitor, the user can read information and make control changes to the implement(s). Since everything is virtual, multiple implements can be controlled with one monitor by switching back and forth between different VT's.

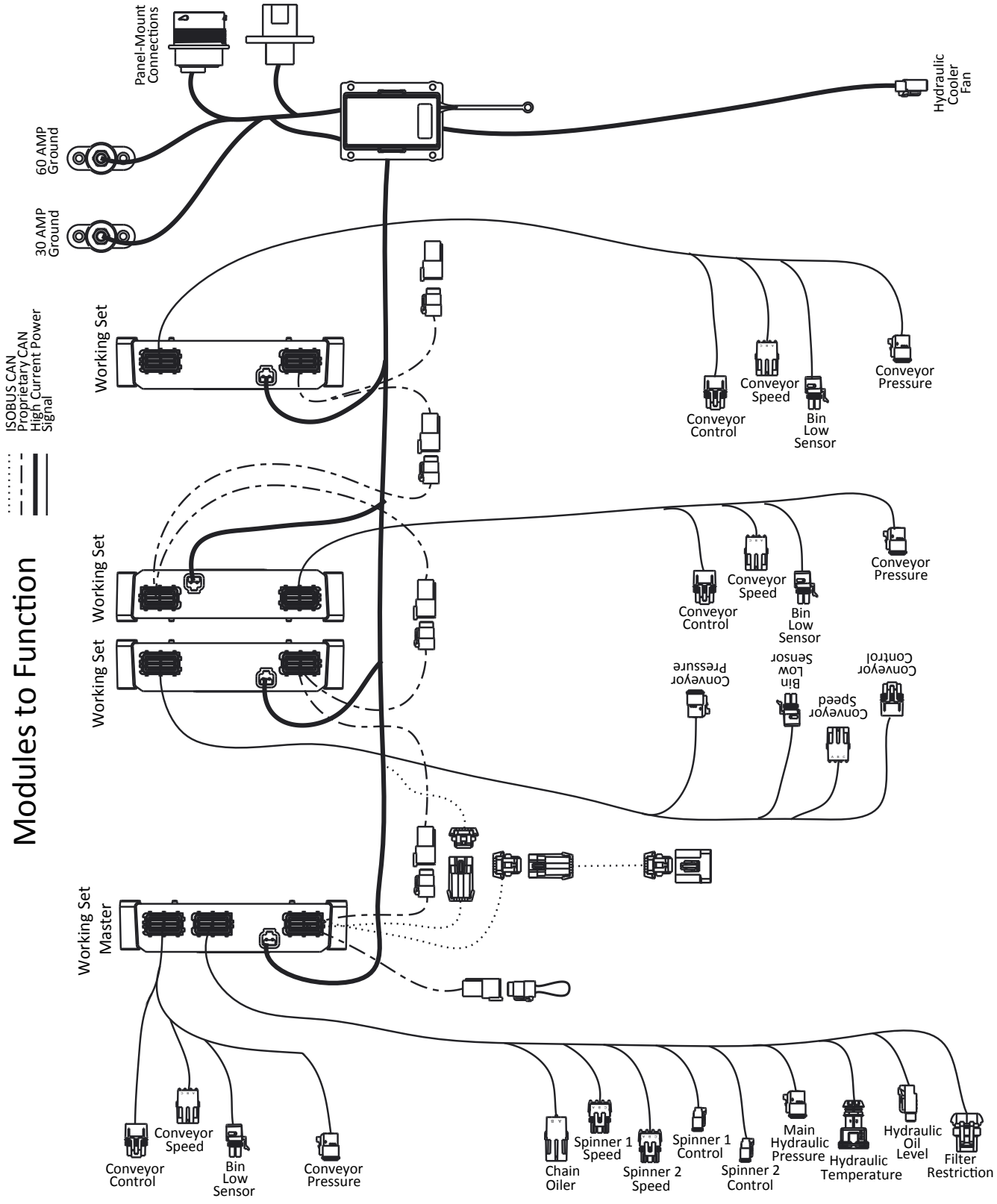
TERMINOLOGIES

- ISOBUS - An electronic communications network used on agricultural and forestry equipment that adheres to the ISO 11783 standards.
- VT (Virtual Terminal) - The electronic interface that resides within the system, rather than on the Display Monitor. By being virtual, the information will display consistently the same on any monitor being used.
- UI (User Interface) - The displayed information and controls the user interacts with on the Display Monitor to make any necessary changes to implement performance.
- ECU (Electronic Control Unit) - New Leader module that controls specific functions of the implement and is attached to the BUS.
- Task Controller - A crucial software component that resides within the Virtual Terminal and is required to provide support for Data Logging, Variable rate application via prescription maps, and on/off implement section control via AutoSwath.
- CANBUS - A CAN (Controller Area Network) BUS system is a vehicle bus standard that allows microcontrollers and devices to communicate with each other within a vehicle without a host computer.
- Display Monitor - The physical monitor used in the cab that communicates with the VT to run the implement(s) and display data from the operations.

CAB TO ENCLOSURE DIAGRAM



MODULES TO FUNCTION DIAGRAM



REQUIREMENTS

System Requirements:

- Virtual Terminal version 3 that supports AUX-N functionality
- Task Control (Multi-product up to 4 bins)
  - TC-BAS
  - TC-GEO
  - TC-SC

Function:

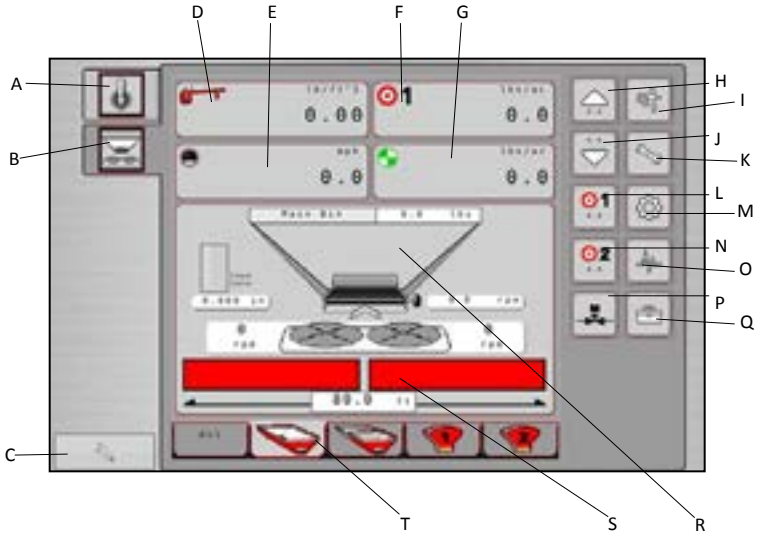
- VT will load New Leader UI and support the New Leader switch-box
  - Ability to track totals.
  - Ability to log as-applied maps and load prescription maps.
  - Ability to activate section control or AutoSwath.

NAVIGATION

To activate the New Leader Controller Interface, power up the monitor and activate the VT settings. For instructions on how to activate the VT, see the Manufacturer's Operations Manual for the specific monitor being used. For reference, John Deere and AgLeader are shown in Figure 1.

Figure 1 - Virtual Terminal activation examples

Activation of VT will bring up the New Leader Home Screen (also called the "Run Screen"), as shown in Figure 2.



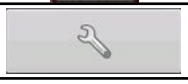
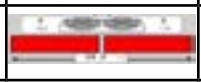
A		Axillary Input	K		Settings
B		Spreader Operations	L		Target Rate 1
C		Virtual Terminal Settings	M		Calibration
D		Density	N		Target Rate 2
E		Speed Source	O		Diagnostics
F		Target Rate	P		Manual Conveyor Mode
G		Actual Rate	Q		Tools
H		Increase Rate Value	R		Bin/Gate settings
I		Run Screen	S		Spinner Settings
J		Decrease Rate Value	T		Bin Selection

Figure 2 - New Leader Home Screen

An on-screen Numeric Keypad is made available for changing configuration settings and calibration numbers. Press the keypad button to access the on-screen numeric entry screen. Keypads may look different depending on VT being used.

Figure 3 - Numeric Keypad

NAVIGATION CONTROL BUTTONS

	Back Button
	Forward Button
	Return to Previous Screen
	Accept Entry
	Cancel

REGISTRATION

1. Power up Display Monitor and activate VT by pressing appropriate button:

2. Alert screen appears identifying that system is in Demonstration Mode. Press to continue operating in Demonstration Mode.

MACHINE CONFIGURATION

NOTE:	Refer to default settings table at end of controller section for factory setup defaults.

NOTE:	Before use, Display Monitor must be setup to enable VT connection and a machine configuration may need to be built. See Manufacturer's Operations Manual for detailed instructions on these processes.

1. Perform initial configuration/Factory Setup:
   (Only seen on first boot, or if system is reset/reconfigured)

- Power up Display Monitor and activate VT by pressing appropriate button:

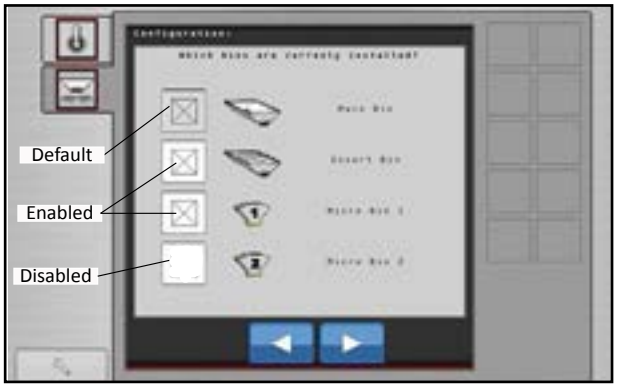
- Alert screen appears identifying that system is not configured. Press to continue.

Overview of attached modules:

- Number of spreader modules will be shown along with any add on modules. Press ▶ to continue.

2. Enable installed bins (Select which bins are installed)

- Enable all bins that are installed on the unit by pressing the button next to each. A ☒ will appear next to enabled bins as shown. Press ▶ to continue.



3. Enter Bin Settings:
   Bin settings include Name, Capacity, Bin Sensor, Feedgate enabled/disabled, and Pressure Transducer calibration.

- Enter Capacity for Main Bin using keypad. Enable or disable bin level sensor as required. Press ⚙ to edit pressure transducer settings. If standard transducers are being used, press ▶ to continue.

- Enable transducers and set calibration settings as necessary (adjust only if standard HECO provided transducers are not being used). Press ▶ to continue.

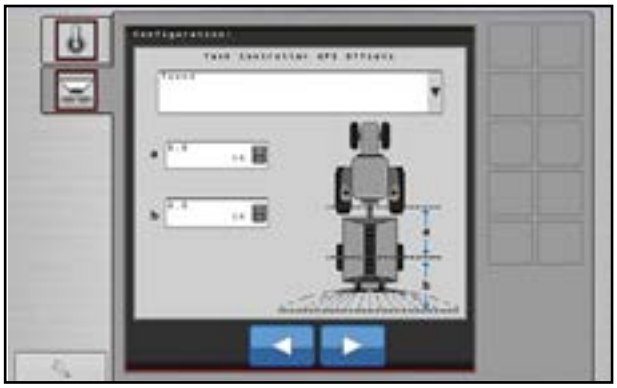
- Repeat step 3 for MultApplier or MultiBin Bin 2 as necessary. Press ▶ to continue.

- Repeat step 3 for MultiBin Micro 1 as necessary. Press ▶ to continue.

- Repeat step 3 for MultiBin Micro 2 as necessary. Press ▶ to continue.

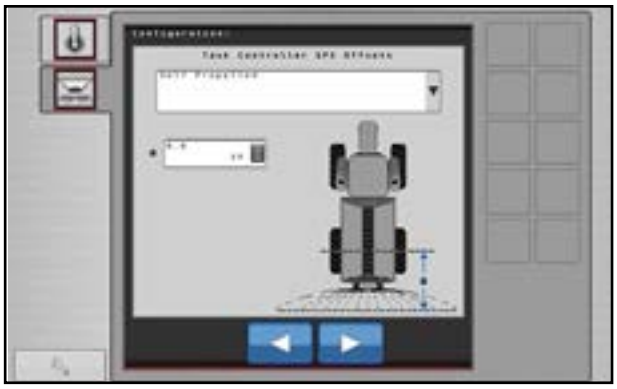
4. Select Spinner Control Mode:
   Determines how spinners are controlled: Basic single, Basic independent, or Monitor.

- Select Basic Independant for L4500 (two PWM) Press ▶ to continue.



5. Input Task Controller GPS Offsets:
   Editing these settings will determine drop point of material behind chassis.

- Select Towed or Self Propelled and enter GPS Offset using keypad. Press ▶ to continue.



6. Review System Setup Summary:

- Verify all settings are correct. Press ✓ to continue or ◀ to go back and adjust as necessary.

7. Configure Auxiliary Switches:

- Switches must be configured before calibration.
- Switchbox switches need to be mapped. Use the Display Monitor's operations manual to map all switches as necessary.

SETTINGS

Changing machine calibrations allows operator to enable/disable bins, adjust valve calibration numbers, change alarm settings and reset modules. Press  to change these settings:

Press 

to to enable/disable bins.

1. Enable/Disable bins:

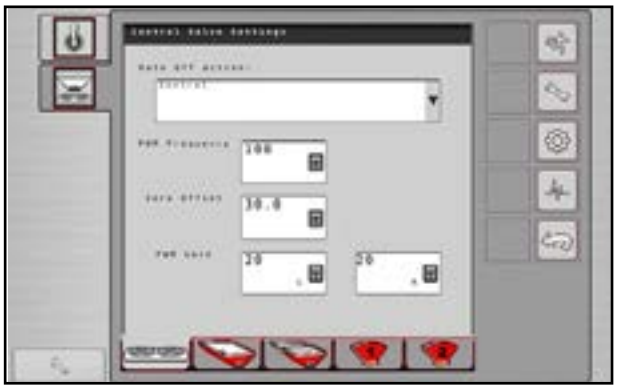
- Each Installed Bin (as set up in Step 4) will appear. Press each "Enable" button to enable or disable each bin as appropriate for the current job.

2. Press 

to adjust valve calibration numbers.

NOTE:	Default settings from the factory should ONLY be changed if absolutely necessary. Changing defaults without researching the specific component may result in erratic behavior of unit.

- Press  to set spinners. Enter appropriate settings:
  - PWM Valve settings:
    - "Monitor" - no PWM control
    - "Control" - tries to maintain spinner speed at all times regardless of available hydraulic flow. Best for hydrostatic or CVT drives.
    - "Hold" - Preserves last PWM signal to valve when conveyor is deactivated. Best for geared transmitions with gear pumps.
  - PWM Frequency - Frequency that PWM control valve is pulsed at. Settings can be found from valve manufacturer.
  - Zero Flow Offset - Represents maximum duty cycle sent to control valve without producing any hydraulic flow from. Increase this number to hit target rate sooner.



IMPORTANT!	Setting Zero Flow Offset too high will cause spinners to overshoot Low Spinner Speeds and could cause delay in reaching set speed. Adjust as needed in small increments.

  - PWM Gain - Determines how aggressively control valve responds when making rate adjustments. Higher value means more aggresseive system response.

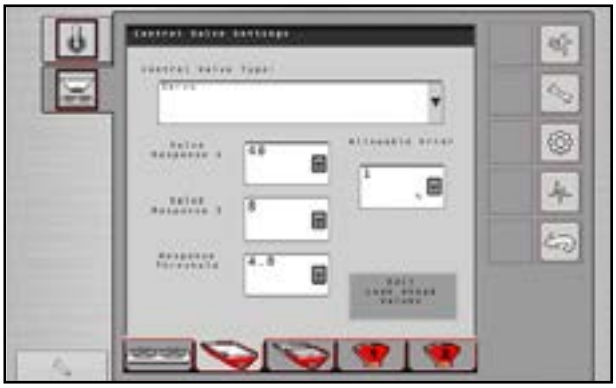
IMPORTANT!	Setting PWM Gain too high spinners will become erratic. Adjust as needed in small increments.

- Set Conveyors by selecting each bin at bottom of screen.

NOTE:	If using PWM valves instead of Servo valved, select “PWM” from “Control Valve Type” list and enter settings as per notes on Spinner valves and test for accuracy.

Enter appropriate settings:

- Valve Response 1 - Determines speed of servo valve when product control error exceeds Response Threshold setting. Represents fast speed of servo valve. Decreasing value will cause servo valve to run slower. Default setting is 40%.
- Valve Response 2 - Determines speed of servo valve when product control error is less than Response Threshold setting. Represents slow speed of servo valve. Decreasing value causes servo valve to run slower. Default setting is 8%.
- Response Threshold - Determines where control channel switches between using Valve Response 1 and Valve Response 2 speed setting. Leaving all other valve control settings at default value and making small adjustments to this settting is usually all that is required to fine-tune system performance. Default setting is 4.



NOTE:	• Decreasing Response Threshold value will have overall effect of speeding up servo valve response. • Increasing Response Threshold value will have overall effect of slowing servo valve response.

- Allowable Error - Determines the percent of error that is allowed prior to product control system making any flow rate changes. 2% - 3% is normal dead band setting range.

NOTE:	• Setting value too low can cause product control system to continually hunt for target application rate. • Setting too high will cause excessive product application error and a delay in target rate being reached.

3. Adjust Alarm Settings:

- Press Alarm Settings to adjust alarm settings.

- Edit each Alarm setting as desired.

4. Reconfigure System:

- Press System Settings to reset/reconfigure system.

- "Reconfigure" allows the user to adjust any of the system settings made during first time start up ("Initial Configuration" steps 1-6). "Reset" will restore all settings to factory default and all calibration numbers will be lost. These should only be pressed if instructed to do so by service technician or New Leader product support.

COMPONENT CALIBRATION

NOTE: Before regular use, system must be calibrated to ensure accurate spreading.

1. Power up Display Monitor and activate VT by pressing appropriate button: 

- The Run screen will appear. Press calibration button  to continue.

2. Calibrate Spinner:

- Press  to calibrate spinner.

- Use keypad to edit numeric setting as necessary:
  - Standard spinner discs, set to 4.
  - If using 5 fin discs, set to 5.
  - If using 6 fin discs, set to 6.

  Press  to accept change and continue, or  to cancel.

3. Calibrate Rate Encoder

- Press Rate Encoder to calibrate encoder.

- Use keypad to edit setting as necessary. Enter 180 or 360 as labeled on back of encoder. Press to continue.

4. Calibrate Conveyor

- Press Conveyor to calibrate conveyor.

- Manually cubic feet per revolution (CFR) rate using keypad.
- To begin catch test, press Static Routine.
- To perform in-field calibration, press Field Routine.

WARNING Do not work near rotating spinners. Severe injury can result from contact with moving parts.

- Spinners will automatically shut off. For added safety, disconnect PWM valves. Press to continue.

- Verify Feed Gate Height and Product Density are correct. Use keypad to edit as needed. Enter Dispense Amount using keypad. Press to continue.

IMPORTANT! For best results, a catch test must be done for each product to be spread before season begins, or any time a new supply of product is received. Refer to *SGN & Hardness Test Instructions* and *G4 Spread Pattern* manuals for instructions and more information.

- Using the control buttons (Reset, Play, Stop), run a catch test. If spreading product that has already been tested, press to continue. To begin a test, press . Conveyor will run. Once controller dispenses specific amount, conveyor will stop. Weigh actual material dispensed and enter actual weight. Press to continue.

- It is recommended a minimum of three (3) tests be done PER PRODUCT to ensure accuracy. Once each test is done, press "Repeat Calibration" to run a subsequent test. When finished, press ✓ .

- The main Calibration screen will appear. To calibrate with a known amount brought to a field, press Field Routine .

Note:	Field totals can be reset from Summary Screen if needed.

- After dispensing product in field, screen displays system perceived total of dispensed product. To enter actual dispensed amount, press ▶ .

- Using keypad, enter actual weight of product dispensed. Press ▶ to continue.

- New cubic feet per revolution (CFR) rate will be displayed. Press  when finished.

OPERATIONS/FEATURES

CREATE NEW JOB

These steps are a guide in running system for first time.

1. Create Job in display.

This operation will vary from display to display. Refer to display manual on how to create a job using Task Control. When finished, activate VT by pressing appropriate button:

2. Verify Product Density.

Material Density will vary from product to product. It is imperative that correct density is entered in controller for rates to come out correctly.

- To change product density, press Density button 

.

- Use keypad to enter density. Press  to accept change and continue, or  to cancel.

3. Verify task control in Target Rate 1.

- Rate will be driven by job setup in display. To verify this, TC should show in place of target rate 1. If not, verify job has been created correctly. Refer to display manual.

4. Verify total spread width and spinner speed:

- Different products may require different spread widths or spinner speeds. Always verify these settings are correct before applying product.
- Press  to set spinner speed.

- Enable Spinner Circuit. Using keypads, enter Spinner Speed and Total Spread Width. If desired, enter Spinner Offset (see *Boundary Spreading* section of this manual for instructions).

5. Verify gate opening:

- Press  to set bin levels and change gate opening.

- Use keypad to set feedgate opening to correct reading.

6. Verify CFR number is correct:

Different products may require different calibration numbers. Verify the CFR number is correct before applying product.

- Press  then  .
- Use keypad to change CFR number as needed.

BIN FILL

NOTE:	The interface will provide the operator with a visual representation of how much product is left in each bin, and will adjust accordingly as well as change color. If needed, it can be manually overridden.

1. Power up Display Monitor and activate VT by pressing appropriate button: 

- The Run screen will appear. Select appropriate bin button at bottom of screen. Press  to continue.

2. Set Bin Level as appropriate:
   - The Bin Events screen will appear. If bin is filled to full capacity based on density, press  .

   - If bin is partially filled based on a known amount, press  and use keypad to enter weight.

- If bin is emptied completely, press  .

3. Set alarms:
- Press  to continue.

- Use keypad to set alarms.
  - "Low Bin Alarm Threshold" will set a weight limit based on total weight in bin and application rate.
  - "Low Bin Alarm Time Delay" will set a time (in seconds) for alarm to sound after the Bin Level Sensor is activated due to actual product reduction.
  - Press  to accept change and continue, or  to cancel.

FEEDGATE OPTIMIZER

NOTE:	This program will help to determine the ideal gate position for each specific application, based on speed, swath width, density, and application rate.

1. Power up Display Monitor and activate VT by pressing appropriate button: 

- The Run screen will appear. Select appropriate bin button at bottom of screen. Press  to continue.

- The Bin Events screen will appear. Press  to continue.

2. Enter average speed and target rate:
- The Feedgate Optimizer screen will appear. Using keypads, enter Average Speed and Target Rate into appropriate fields for each bin.

3. Accept recommended settings:
- Recommended feedgate opening will be displayed along with minimum and maximum rates. If  is selected, new feedgate setting will be saved and operator must manually adjust feedgate to proper height. If  is selected, new settings are ignored and system settings are kept.

BOUNDARY SPREADING

NOTE:	This program allows the operator to independently modify spinner speeds to change the width of spread to either side, creating a "boundary" line to maximize spreading efficiency.

1. Power up Display Monitor and activate VT by pressing appropriate button:  

- The Run screen will appear. Press  to continue.

2. Enter spinner offset:
- The Spinner Settings screen will appear. To create a Boundary, use the keypad to enter a specific Spinner Offset. Spinner tests should be completed for each product (see *G4 Spread Pattern* section) to determine best offset settings for each product that might be run based on density/hardness and size. For density/hardness testing, see *SGN & Hardness Test Instructions* Manual. Press  to save and return.

3. Enable boundary spreading:
- When running normally, Run Screen will display both spinners as full green bars. To activate the Boundary, flip the spinner switch on the switch box to the appropriate side.

- When Boundary is activated, Run Screen will display with boundary showing on the appropriate side (right hand boundary activation shown for reference).

DIAGNOSTICS

NOTE:	Advanced diagnostic features are available that allow the operator to quickly diagnose most issues that could occur.

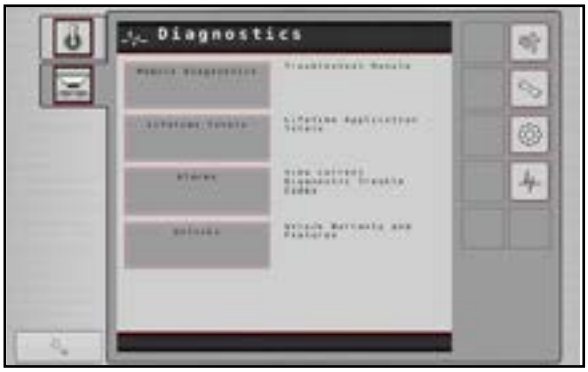
1. Power up Display Monitor and activate VT by pressing appropriate button: 

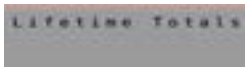
- The Run screen will appear. Press Diagnostics  to continue.

- The Diagnostics screen will appear. To view Bin Diagnostics, press 

.

- Diagnostic information for each bin will display (these are used for troubleshooting). Press  to return to Diagnostics screen.



- To view machine lifetimes totals, press 

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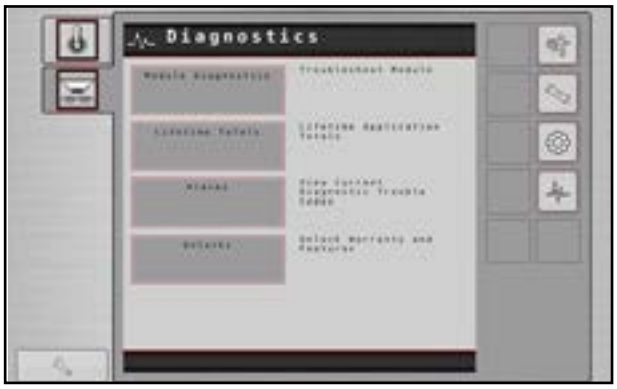
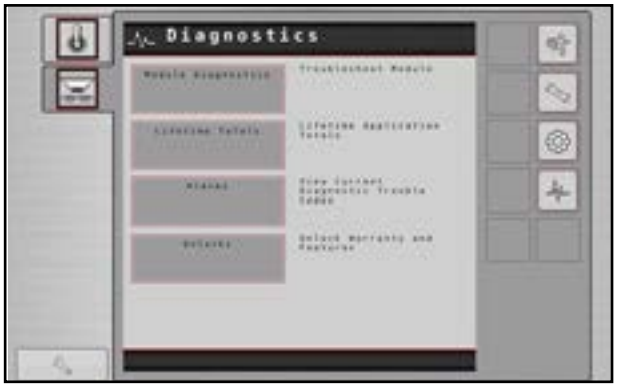
- At top of screen, each bin's lifetime totals for acres and weight appears. At bottom of screen, cumulative Acres(ac) and Weight(lbs) will appear. Hours(hrs) will be on main bin only. Press  to return to Diagnostics screen.



- To view active alarms, press Alarms.

- Current active alarms will display. When an alarm code is highlighted, a description will appear at bottom of screen. This is used for troubleshooting. Press  to return to Diagnostics screen.



- To view unlocked features, press Unlocks.

- Current unlocked features will display. Press “Unlock” to display module serial number and registration number. Press  to return.

HYDRAULICS

NOTE:	This program will show a visual representation of hydraulic monitoring, including system pressure, temperature, conveyor pressure, and indicators for low fluid level and filter restriction. Individual bins can be viewed by pressing the bin icons along the bottom of the screen.

1. Power up Display Monitor and activate VT by pressing appropriate button: 

- The Run screen will appear. Press Tools  to continue.

- The Tools main screen will appear. Press  to continue.

2. View hydraulic monitoring:
- Hydraulics - System pressure, Temperature, and status of Fluid Level and Filter Restrictions will show system wide. Conveyor Pressure will display for Bin 1, and cumulatively for Bins 2-4. Fluid Level and Filter Restriction warnings will display red with warning sign (as shown) if levels are low or if filter is restricted. If neither is at issue, they will display in green without warning sign.

Press  to return to Tools Screen.

BIN FLUSH

NOTE:	This program is used to quickly empty each bin. Spinners will automatically shut off and allow the operator to select which bins to empty.

1. Power up Display Monitor and activate VT by pressing appropriate button:  

- The Run screen will appear. Press Tools  to continue.

- The Tools main screen will appear. Press  to continue.

WARNING	Do not work near rotating spinners. Severe injury can result from contact with moving parts.

WARNING	Unplug PWM valve to ensure spinners cannot run while in Bin Flush mode to avoid injury.

- Bin Flush will automatically disable spinners. Press  to continue.

2. Select bins:
- Select bins to be flushed by pressing enable buttons next to each. To adjust conveyor RPM for flush, press Bin Rate Settings.

3. Set conveyor RPM:
- Use keypads to set conveyor RPM for each bin. 20 RPM is default.
  - Bin 1 Maximum = 50 RPM
  - Bin 2 Maximum = 60 RPM
  - Bins 3 & 4 Maximum = 85 RPM

  Press ✓ to continue.

4. Perform bin flush:
- To flush bins, press ▷. Conveyors will run until □ is pressed.

  When process completes, press ↩ to continue.

WARNING Do not work near rotating spinners. Severe injury can result from contact with moving parts.

- When exiting Bin Flush process, spinners will restart. Plug PWM valve back in if it was previously disabled. Press ✓ to continue.

CHAIN OILER

NOTE: This program is used to manually oil the chain, set alarm frequency, and set auto-lube settings.

1. Power up Display Monitor and activate VT by pressing appropriate button:  

- The Run screen will appear. Press Tools  to continue.

- The Tools main screen will appear. Press  to continue.

2. Set duration:
- Use keypads to set oil chain duration (recommended 1 revolution). Lube routine is not used at this time.

3. Set conveyor dimensions:
- Press “Dimensions” to input conveyor dimensions. Use keypads to input conveyor length and sprocket diameter.

Press  to return to Chain Oiler screen.

Press  to return to Tools Screen.

4. Set service reminder:
- Press “Service Reminder” to set chain oiler reminder. Enable Reminder and use keypad to enter interval hours desired. To restart reminder after manually oiling conveyor, press  .

Press  to return to Chain Oiler Screen.

BIN SEQUENCING

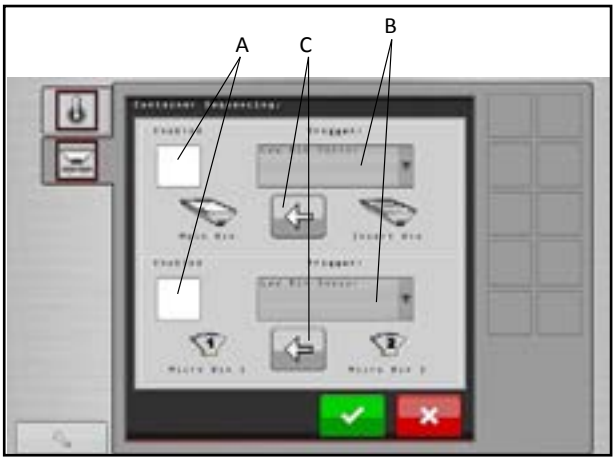
NOTE:	This program allows the operator to run same product out of two bins, chaining them together so bin 2 starts emptying immediately after bin 1 is empty.

1. Power up Display Monitor and activate VT by pressing appropriate button:  

- The Run screen will appear. Press Tools  to continue.

- The Tools main screen will appear. Press  to continue.

2. Setup Bin Sequencing (Chaining):



A. Enable bin chaining for Bins 1 & 2, or Bins 3 & 4 as applicable.

B. Select trigger type (Manual Only, Low Bin Threshold, Low Bin Sensor, Container Reaches 0).

C. Select which bin to empty first by pressing arrow button until arrow points to second bin to empty. Figure at right shows Insert Bin emptying first and Main Bin second; Micro Bin 2 emptying first and Micro Bin 1 second.

Press  to continue.

3. To manually switch bins:
- When Bin Sequencing is enabled, Manual Override button appears on Run Screen to force switchover to next bin.

ALARM LIST

Warning	Message	Trigger
Rate sensor error during calibration	“Calibration error, lost or intermittent signal from rate sensor. Check sensor and related wiring prior to calibrating conveyor.”	Rate sensor signal is lost for a period of two or more consecutive seconds during the Static Conveyor Calibration Routine.
Rate Sensor Error During Conveyor Flush	"Lost or intermittent signal from rate sensor. Check sensor and related wiring prior to continuing Conveyor Flush Routine."	Rate sensor signal is lost for a period of two or more consecutive seconds during the Conveyor Flush Routine.
Low Bin Sensor	"Low Bin Sensor." + channel name.	Bin Level Sensor is installed, metering circuit is commanded on, and the product in the bin does not cover the sensor for a consecutive period of time greater than current [Low Bin Time Delay] setting.
Disable Spinners	"Manually disable or shut off the spinner hydraulic circuit."	At the beginning of the Static Conveyor Calibration and Conveyor flush routine.
Enable Spinners	"Return the spinner hydraulic control to a field ready condition. The spinners will now restart."	At the end of the Static Conveyor Calibration routine and Conveyor flush routine.
Boundary Spinner Not Responding	"Boundary Spinner Not Responding." + Spinner Name.	Automatic control for spinners must be enabled. At least one conveyor must be commanded on. Perceived spinner speed is greater than 30RPM in error from the [Boundary Spreading Spinner RPM Offset].
CLF Basic Single Spinners Not Responding	"Spinners Not Responding."	Automatic control for spinners must be enabled. [CLF Mode] {Basic Single} must be selected. At least one product bin must be commanded on. Perceived spinner speed is greater than 30RPM in error from the [Target Spinner Speed] setting for a period of 5 or more consecutive seconds.
CLF Basic Independent Spinners Not Responding	"Spinner Not Responding." + Spinner Name.	Automatic control for spinners must be enabled.[CLF Mode]{Basic Independent} must be selected. At least one product bin must be commanded on. Perceived spinner speed is greater than 30RPM in error from the [Target Spinner Speed] setting for a period of 5 or more consecutive seconds.
Spinners Off	"Stop Application, Spinners Off!"	CLF is enabled, no spinner speed detected, one or more control channels is commanded on.
Spinners On	"Turn spinner switch off to prevent spinners from running!"	Upon system start up, [CLF Mode] enabled, spinner functionality switch detected in the ON position.
Disable Spinners	Manually disable or shut off the spinner hydraulic circuit.	The point the user selects to run the chain oiler routine.

Warning	Message	Trigger
Enable Spinners	Return the spinner hydraulic circuit to a field ready condition.	The point the user exits the chain oiler routine.
Conveyor Lubrication Required	Conveyor Chain Lubrication Is Required.	[Service Reminder On] setting is enabled and [Service Reminder Interval] has expired.
Rate Not Responding	“Rate Not Responding.” + Channel Name.	Control channel is commanded on using automatic control mode. Application rate is +/- [Rate Not Responding Threshold] from target rate for a period of [Rate Not Responding Timeout] or more.
Maximum Conveyor Speed	Conveyor At Maximum RPM, Slow Down + Channel Name.	Product channel is commanded on and conveyor is run at or above maximum speed for a period of 5 or more consecutive seconds.
Minimum Conveyor Speed	Conveyor At Maximum RPM, Slow Down + Channel Name.	Product channel is commanded on and conveyor is run at or below minimum speed for a period of 5 or more consecutive seconds.
Conveyor Not Responding	Conveyor Running While Turned Off + Channel Name.	Product bin is commanded off and conveyor speed >0 and <1 RPM for a period of 30 or more consecutive seconds. Or conveyor speed is >=1 RPM for a period of 5 or more consecutive seconds.
Container Advance	Moving to next container in the sequence.	At the point when the [Container Advance] criteria has been met.
Containers Not Ready to Apply	Containers are not ready to apply check container settings.	At the point the user starts the container sequence and the system perceives all containers not to be in a ready to apply state.
End of Sequence	End of container sequence, do you wish to start the sequence from the beginning?	At the point the last container in the sequence has met the [Container Advance] criteria.

DEFAULT SETTINGS

CONFIGURATION

Main Bin Capacities (Cu Ft)					
	Unit Length				
Configuration	12’	13’	14’	15’	16’
NL345 MR	251	273	295	317	339
NL345 MC 5’	149	171	194	216	238
NL345 MC 5’ w/ Side Boards	196	224	254	283	311
NL345 MC 7’	105	127	149	171	193
NL345 MC 7’ w/ Side Boards	152	180	209	238	266

Insert Bin Capacities (Cu Ft)		
Component	Bin No.	Capacity
5’ MultApplier	2	115
7’ MultApplier	2	161

Pressure Transducer Settings	
Min PSI	0
Max PSI	5000
Min voltage	1
Max voltage	5

Spinner Settings	
PWM Frequency	50 Hz
Zero Flow Offset	30
PWM Gain	20

CALIBRATION

CFR Values	
Bin	Value
Main Bin	0.256
Insert Bin	0.144

Control Valve Settings				
	Control Valve			
Control Variable	Main	Insert	Micro 1	Micro 2
Control Valve Type	Servo	Servo	Servo	Servo
Valve Response 1	40	40	40	40
Valve Response 2	8	8	8	8
Response Threshold	4.0	4.0	4.0	4.0
Allowable Error	1	1	1	1

Sensor Settings	
Encoder pulses	180 or 360 - verify by looking on encoder
Spinner pulses	4

ALARMS

Alarm Settings		
Alarm Variable	Bin	
	Main (PSI)	Insert (PSI)
Min Conveyor Speed	5	5
Max Conveyor Speed	50	60
Max Conveyor Pressure - Std Hydraulics	2000	1500
Max Conveyor Pressure - HP Hydraulics	3400	1500
Rate Responding Time	5	5
Rate Responding Threshold	30	30
Max System Pressure - Spinner	3100	-

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NOTES

The following information will guide you through using the SGN & Crush Strength Test Kit for your New Leader G4 Spreader. Refer to operator's manual for details on unit safety, operation and maintenance.

PART NUMBER	DESCRIPTION	QUANTITY
308907	Kit - SGN & Crush Strength Test Kit	1
308908	Tester - Crush Strength	1
308909	Scale - SGN	1

WARNING Use great caution while working around the spreader. Contact with spinners and other moving parts is very dangerous. Do not adjust while machinery is moving, wear eye protection and avoid discharge from spinners. Do not ride on moving spreader.

It is highly recommended to perform a Catch Test, Crush Strength Test and SGN Scale Test prior to each season, before using a new product, or if a significant visible change has occurred with a product. Testing will define granular characteristics and help determine proper spinner settings for optimal product spread.

Conduct a G4 Spread Pattern test to check settings based on test results. Refer to *G4 Spreader Installation Instructions* and *G4 Spread Pattern Manual* for installation and adjustment instructions.

CRUSHING STRENGTH

Crushing strength is the minimum pressure needed to crush individual particles.

Testing and knowing the crushing strength of a particular product will help determine maximum spinner RPM. For example: Any granule with less than three (<3) crush strength should not be broadcast with spinner speeds over 700RPM. Verify granules are not pulverized before increasing spinner speed. Refer to *Product Setup Guidelines* for additional spinner speed settings with different crush strength.

SGN

SGN (Size Grade Number) is the measurement of granule size in millimeters multiplied by 100. A product's SGN will affect spread width.

Materials with poor uniformity (a significant percentage in 3 or more colums of scale device) may be difficult to spread accurately. Spread Pattern testing should ALWAYS be performed on any new or different material to determine actual spread width.

NOTE: SGN and Crush Strength together determine spread width.

General Rules:

A small product with low crush strength will have limited spread width capabilities. Spinner RPM must remain lower to keep from pulverizing the soft product, limiting your overall spread width. Additionally, a smaller product has less mass than that of a larger product, and in this case is another limiting factor for overall spread width.

A small product with high crush strength will have limited spread width capabilities. While spinner RPM can be increased with little worry of pulverizing the product, a smaller product has less mass than that of a larger product, which limits how far the product will carry in the spread pattern.

A large product with low crush strength will have limited spread width capabilities. While a larger product with more mass will carry farther, spinner RPM must remain lower to keep from pulverizing the soft product, limiting the overall spread width.

A large product with high crush strength has minimal spread width limitations. Spinner RPM can be increased with little worry of pulverizing the product. Additionally, a large product has more mass than that of a smaller product, allowing the product to carry farther, resulting in a wider spread width.

PRODUCT SETUP GUIDELINES

Granule Mesh	Crush Strength	Maximum Spinner RPM	Flotation Machine (Spinner Height 52") Spread Width ft(m)	Post Machine (Spinner Height 72") Spread Width ft(m)
140-200	1	600	60-65(18-20)	70-75(21-23)
	3	650-700	65-70(20-21)	75-80(23-24)
	6	750-800	70-75(21-23)	80-85(24-26)
	8	850-900	75-80(23-24)	85-90(26-27)
220-300	1	600	70-75(21-23)	80-85(24-26)
	3	650-700	75-80(23-24)	85-90(26-27)
	6	750-800	80-85(24-26)	90-95(27-29)
	8	850-900	85-90(26-27)	95-100(29-30)
320-400	1	600	80-85(24-26)	90-95(27-29)
	3	650-700	85-90(26-27)	95-100(29-30)
	6	750-800	90-95(27-29)	100-105(30-32)
	8	850-900	95-100(29-30)	105-110(32-33)
>400	1	600	90-95(27-29)	100-105(30-32)
	3	650-700	95-100(29-30)	105-110(32-33)
	6	750-800	100-105(30-32)	110-115(33-35)
	8	850-900	105-110(32-33)	115-120(35-37)

IMPORTANT! Always check crush strength prior to selecting spinner speed. Pan testing should ALWAYS be performed on any new or different material to determine actual spread width.
Verify granules are not pulverized by looking in the three center vials following a pan test before increasing spinner speed.

CRUSH TEST

Click or Scan - Crush Test Procedure

IMPORTANT!	Select granules of the most typical size and uniform shape as determined by SGN scale. Crushing strength can significantly increase with particle size.

Figure 1

1. Figure 1 - Place individual granule on solid, smooth surface.
2. Place New Leader crush strength tester over granule, open end flush with surface.

   Ensure marker is next to handle.

Figure 2

3. Figure 2 - With one hand on handle, press tester down until granule breaks.

Figure 3

4. Figure 3 - Release handle and note where marker rests on number scale. This is granule crushing strength.

   For example, the marker in Figure 3 is between 3 and 4 on the scale. Thus, crushing strength is 3.5.

5. Repeat 10 times and average the values.

SGN SCALE TEST

Click or Scan -
SGN Scale Test Procedure

The SGN scale is an instrument designed for simple screen test of fertilizer samples. A small box fitted with five sieves, it directly produces a size histogram of the test sample. From this, the SGN can be estimated.

Figure 4

1. Figure 4 - To determine SGN, place scale on flat surface and open lid.
2. Fill end column with selected product to fill line.
3. Close lid securely.

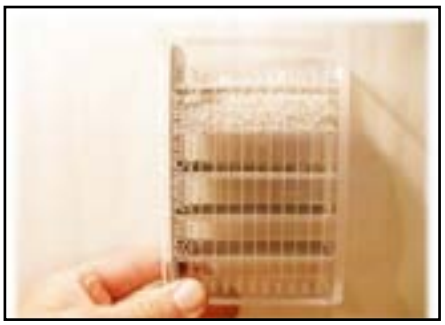

Figure 5

4. Figure 5 - Rotate scale vertical and shake to separate material, usually less than two minutes.
5. When material finishes dispersing, turn scale to starting position.

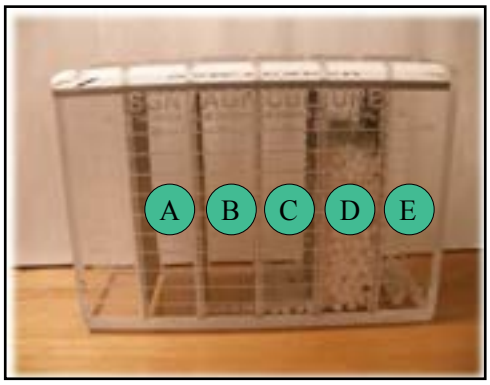

Figure 6

6. Figure 6 - View level of material in each compartment and determine SGN level based on markings.

SGN
Size Grade Number

View each column for percentage
- Column A (120) = 0 material
- Column B (170) = 0 material
- Column C (240) = 5% of 240 equals 12
- Column D (340) = 90% of 340 equals 306
- Column E (400>) = 5% of 400 equals 20
- Total: 12+306+20 = 338 as average SGN

Figure 7

7. Figure 7 - Based on column headings and percent in each field, calculate overall SGN of the sample.

Using the above crush strength example of 3.5 and average SGN size of 338, we can now use the chart to determine our maximum spread width. In this case a maximum spinner speed of 650-700 RPM will produce a spread width of 85' to 100' depending on spinner height.

Granule Mesh	Crush Strength	Maximum Spinner RPM	Flotation Machine (Spinner Height 52") Spread Width ft(m)	Post Machine (Spinner Height 72") Spread Width ft(m)
320-400	1	600	80-85(24-26)	90-95(27-29)
	3	650-700	85-90(26-27)	95-100(29-30)
	6	750-800	90-95(27-29)	100-105(30-32)
	8	850-900	95-100(29-30)	105-110(32-33)

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PERFORMING A SPREAD PATTERN TEST

Click or Scan - Spread Pattern Test Procedure

⚠	**WARNING**	Use great caution while working around the spreader. Contact with spinners and other moving parts is very dangerous. Do not adjust while machinery is moving, wear eye protection and avoid discharge from spinners. Do not ride on moving spreader.

It is recommended that spread pattern tests be conducted prior to each spreading season, after any spreader maintenance, and periodically during the spreading season. Spread pattern tests must be performed for each product and application rate.

Spread pattern is affected by many factors. Among the more significant of these are:

- Spinner speed
- Material density
- Material granule size
- Material flow characteristics
- Rate of material delivery
- Point of material delivery on spinner discs
- Angle of the distributor fins on the spinner discs
- Cleanliness of the spinner fins and discs
- Wind and humidity
- Spacing of swaths
- Wear on spinner fins

Since many of these factors will vary for each job, trial and experience must be used to determine the adjustments required to obtain the spread width and spread pattern desired. The following instructions outline the adjustments available and the effect that each will have on the spread pattern.

SPREAD PATTERN TEST KIT

300508 Spread Pattern Test Kit, includes the following:

PART NO.	DESCRIPTION	QTY	PART NO.	DESCRIPTION	QTY
70890	Collection Tray	21	99418	Data Sheets	100
87200	Divider	21	300503	Screw – #6-32 x 3/8	42
300506	Rack – Tube	1	300504	Nut – Lock #6-32	42
300507	Test Tubes	21	70897	Flags	5
300505	Clip – Molded	21	87199	Rope – 120’ marked	1
87332	Funnel	1	87201	Stakes	2
58897	Scale – Density	1			

SPINNERS

NOTICE!	Spinner discs and fins must be kept clean and polished. Even a small build-up on a spinner fin can significantly affect the spread pattern. Rusty, rough, bent or worn fins will produce poor spread patterns.

Spinner speed is adjustable from approximately 400 to 900 RPM. This is accomplished by changing the settings in the controller. Proper spinner speed adjustment is very important in obtaining optimal spread patterns. The best spinner speed to use will depend entirely on the material being spread, and must be determined by testing.

A major factor of maximum pattern width is particle size. Pattern width may vary anywhere from 25 feet (7.6 m) for very finely ground dry lime up to 120 feet (37 m) or more for extremely large fertilizer pellets.

For every material there is a critical spinner speed. In other words, there is a speed which will result in the maximum obtainible spread width. Going beyond this speed will not increase spread width, but will result in a poor pattern.

Too high of a spinner speed could result in a heavy deposit behind the truck due to break-down of material. This upper speed limit will be quite low for finely powdered material, and can be quite high for extremely coarse materials. In general, this critical speed will fall somewhere between 600 and 800 RPM for typical materials.

It is recommended that a spread pattern test be performed for each product and application rate you handle. Once initial testing is completed, testing should be repeated at the beginning of every season, or any time maintenance is performed on any component affecting spread patterns.

SPREADER PREPARATION

The spreader to be tested shall be in good mechanical condition and properly adjusted according to the Operation and Maintenance sections in this Manual.

All damaged and worn parts must be replaced. Spinner discs and fins must be free of any material build-up, rust or paint.

Fill the hopper with the material to be spread. Run the material out to the end of the conveyor.

Set the feedgate to deliver the required rate per acre. Make sure the feedgate is level and the indicator reflects the actual gate opening measured by standing a tape measure vertically in the fertilizer.

NOTE: Do not match slope of endgate when making this measurement.

Adjust the spinner assembly by turning the crank or, if an actuator is installed, change the setting in the controller. To begin testing, position the spinner according to the chart below.

NOTE: This chart is to be used as a reference only to begin testing.

MATERIAL	DENSITY lbs/cu ft (kg/cu m)	SPINNER ASSEMBLY POSITION in (cm)
Lime	80-100 (1281-1601)	0 - 1 (0 - 2.5)
Fertilizer	65 (1040)	3.5 - 3.75 (9 - 9.5)
Urea, Light Rate - 50-200 lb/acre (56-224 kg/hectare)	48 (769)	3.5 - 3.75 (9 - 9.5)
Urea, Heavy Rate - >200 lb/acre (>224 kg/hectare)		2.0 - 2.5 (5 - 6.5)
Mixed Product, MultApplier	65 (1040)	3.75 (9.5)

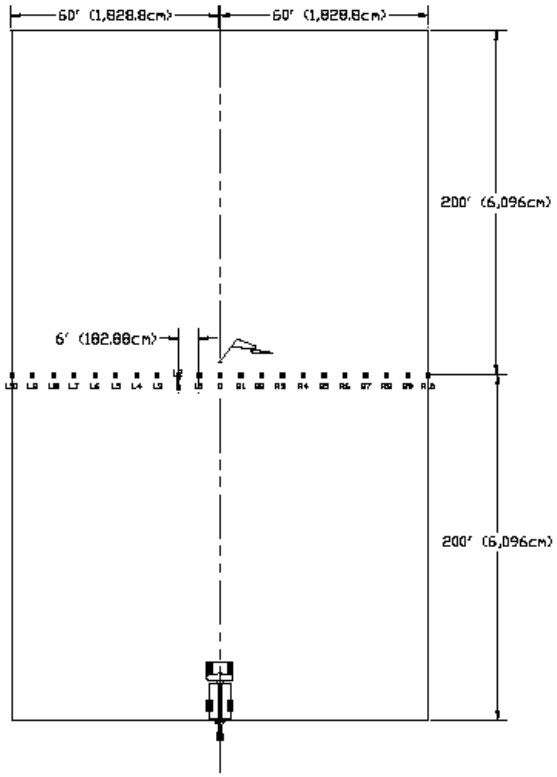
TEST PROCEDURE

The area selected for testing, measuring 120 feet x 400 feet (37 m x 122 m), should have a slope of less than two degrees.

Insert a plastic grid into each of the 21 collection trays. Position the 21 collection trays on six-foot (6') (182.88cm) centers with the longest dimension of the tray parallel to the direction of travel. (Figure 1A)

DIRECTION OF TRAVEL
COURSE SET UP FOR PATTERN TEST

Figure 1A – Tray Positions



DIRECTION OF TRAVEL
COURSE SET UP FOR PATTERN TEST

Figure 1B – Spreader Position

All testing should be done when the wind velocity is less than 5 MPH (8.05 km). If wind is present, testing must be done with spreader traveling parallel (within ± 15 degrees) to the wind direction.

Do not allow loaded spreader to sit for more than four hours prior to testing.

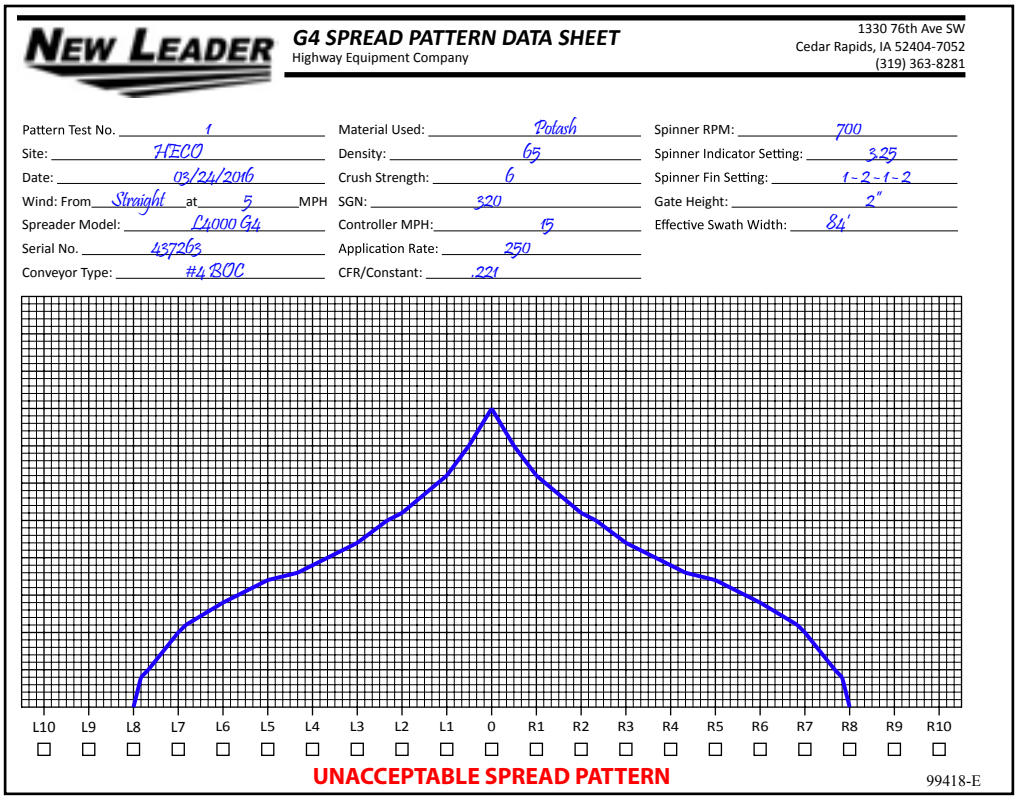
Prior to driving the spreader through the test course, it should be driven at least 450 feet (137 m) at spreader test speeds.

Spreader must be driven over the collection trays in ONLY ONE DIRECTION.

Position spreader at the beginning of the course so that vehicle will straddle center collection tray. (Figure 1B) Set gate opening based on desired rate/acre according to theoretical application charts supplied with each unit.

Drive spreader completely through course at normal operating speeds.

DATA RECORDING



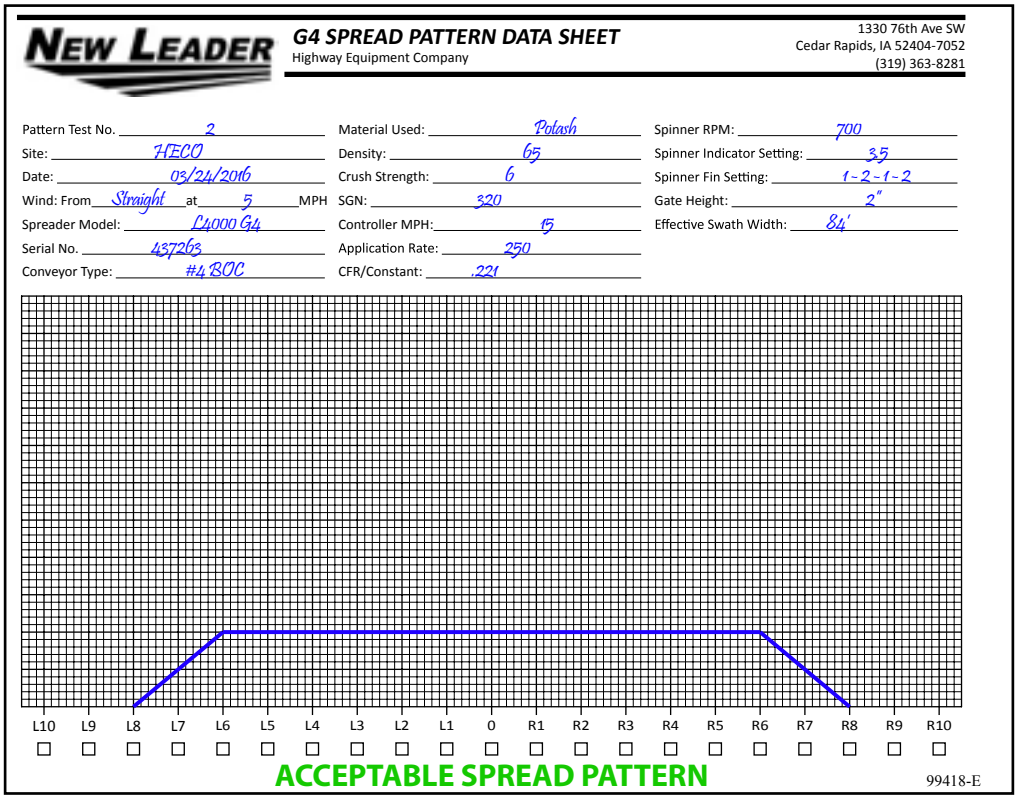


Figure 2 – Spread Pattern Data Sheet Example

Using the data sheets supplied with the kit, document all spreader adjustments required.

Using the funnel, transfer the contents of each collection tray into its corresponding test tube beginning at one end of the trays and working towards the opposite end.

Record the volume in each test tube in the box on the data sheet under the corresponding tray position. (Figure 2) NOTE: It is highly recommended that ONLY ONE ADJUSTMENT be made between test samples taken. If more than one adjustment is made, it will be difficult to determine which adjustment was responsible for the change in pattern shape.

Once a desirable pattern is obtained (Figure 5), optimum driving centers can be determined. To determine optimum driving centers (effective swath width), locate the points on both the left and right side of the pattern where the amount of material applied is half the amount at the center of the pattern. The distance between these two points represents the driving centers to be used.

When blended fertilizers are being applied, a visual inspection of the samples should be made to determine whether the blend within the effective swath width is consistent with the desired blend. If the blend is not consistent, a narrower overall swath width should be used and a new optimum driving center (effective swath width) should be determined.

Once the effective swath width has been established, a change in the controller may be required.

DRIVING METHODS

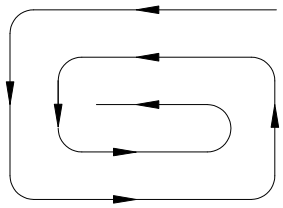


Figure 3 – Perimeter Method

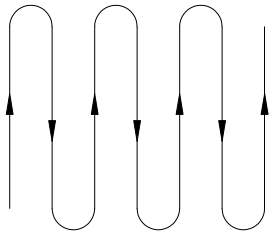


Figure 4 – Switch Back Method

The perimeter (Figure 3) and switch back (Figure 4) driving methods are both acceptable. NOTE: Utilizing the switch back method amplifies non-symmetrical patterns by blending right side on right and left side on left. The perimeter method compensates for non-symmetrical patterns by blending the right side of the pattern with the left side of the adjacent pattern or vice versa.

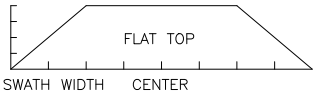
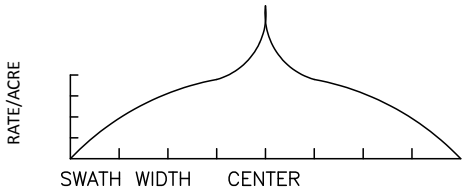
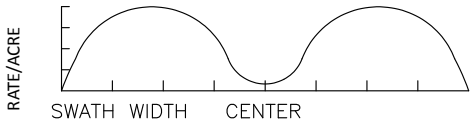
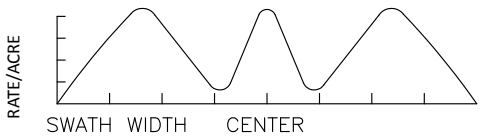
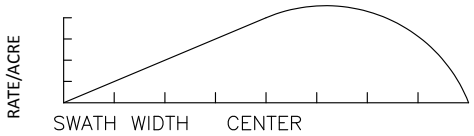
FLAT TOP	
IDEAL PATTERN OVERLAP	

Figure 5 – Ideal Pattern

TROUBLESHOOTING

Problem	Pattern	Recommended Adjustments
Heavy Directly Behind the Vehicle		1. Move the spinner forward (toward the conveyor). 2. Decrease spinner RPM. 3. Check spinner fin quality. 4. Move one or two spinner fins to a lower numbered hole.
Light Directly Behind the Vehicle		1. Move the spinner rearward (away from conveyor). 2. Increase spinner RPM. 3. Check spinner fin quality. 4. Move one of two spinner fins to a higher numbered hole.
Light Outside Vehicle's Tire Tracks		1. Check spinner fin quality. 2. Decrease spinner RPM. 3. Move one or two spinner fins to a lower numbered hole.
Pattern Off Center		1. Check to see feedgate is level and free of caked material. 2. Make sure hillside divider is mounted squarely and centered. 3. Check to be sure spinner assembly is mounted squarely and centered. 4. Make sure material divider is mounted squarely and centered. 5. Testing should be done parallel to wind.