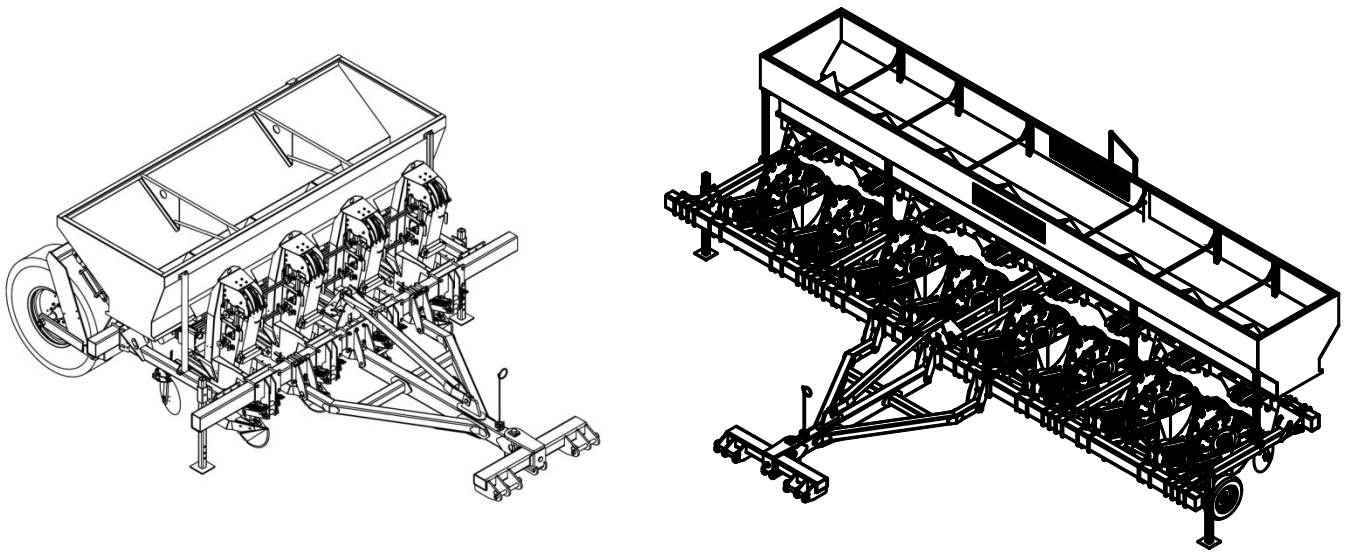


# Harriston

*When Quality Counts*



## **Bowl Level Control Kit Operator's Manual 2017**

## **LIMITED WARRANTY**

Harriston Industries, hereinafter called Harriston, extends a Limited Warranty on the products it manufactures to be free from defects in material and workmanship for a period of one (1) year from the date of sale to the original purchaser. Under this Warranty, parts and labor are covered for replacement of warrantable parts or components as determined by Harriston. Exclusions to the warranty include normal wear items and the following parts: tires, planter picks, and accessories installed which are not of Harriston's manufacture. No warranty is extended to paint and regular service items such as lubricants. All warranty work must be done by an authorized Harriston dealer.

The Warranty is void if the product has been subjected to abuse, misuse, misapplication, neglect (including but not limited to improper maintenance), accident, submersion, improper installation, modification (including but not limited to use of unauthorized parts), and improper adjustment or repair. Component parts furnished with Harriston products which are not manufactured by Harriston are not warranted by Harriston, but are warranted according to the manufacturer of the component part.

**THIS WARRANTY IS IN LIEU OF ALL OTHER EXPRESS OR IMPLIED WARRANTIES. IMPLIED WARRANTIES INCLUDING THE WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE ARE LIMITED TO A PERIOD OF ONE YEAR.** Under no circumstances shall Harriston be obligated for incidental or consequential damages. This Warranty gives you specific legal rights, and you may also have other rights which may vary from state to state and country to country. Some states and countries do not allow the exclusion or limitation of incidental or consequential damages, so certain limitations or exclusions under this Warranty may not apply to you.

It is expressly understood that the liability of Harriston for its products, whether due to breach of warranty, negligence, strict liability, or otherwise, is limited to the furnishing or repair of such replacement parts. Harriston is not liable for any other injury, loss, damage, or expense, whether direct or consequential, including but not limited to loss of use, income, profit, or increased cost of operation.

Any operation prohibited in the Operator's Manual or any other manuals furnished with the product, or any adjustment or assembly procedure not recommended or authorized in the operating or service instructions shall void such warranty.

No one is authorized to modify this Warranty or to make additional warranties on behalf of Harriston. Harriston reserves the right to change, modify, or improve its products without obligation to retrofit existing models.

Harriston is not liable for any accidents or damage which may occur from the operation of its equipment. The purchaser assumes all responsibility for proper use, care, maintenance, and safe operation.

This Warranty is void if the signed warranty registration form is not returned to Harriston within 30 days of purchase or if serial number has been removed or altered in any way.

Service parts sold and distributed by Harriston carry a 90 day warranty from date of sale.

All warranty claims should be made through the dealer it was purchased from and proof of serial number and purchase date must be provided when the warranty claim is made. All warranty claims must be preauthorized by Harriston.

**Warranty void if product is not registered.**

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## **1 System Overview**

Congratulations on your choice of the Harriston bowl level control kit. The kit was designed to maintain a consist amount of seed in the seed bowl. Safe, efficient, and trouble-free operation of your Harriston planter requires that you and anyone else who will be operating or maintaining the Planter read and understand all of the safety, operation, maintenance, and troubleshooting information contained in this Operator's Manual.

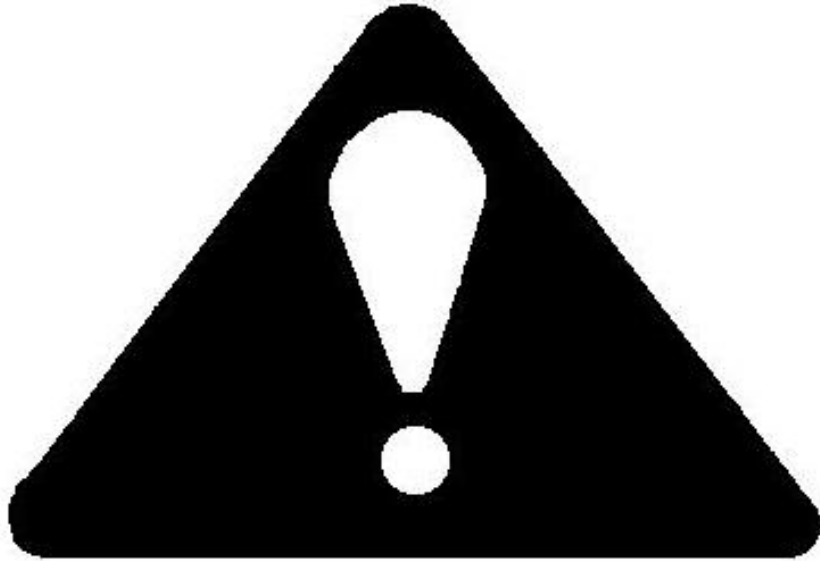
The system is designed for 4, 6, or 8 rows. The system is compatible with all Harriston planters manufactured after 2010. Older planters may require new hydraulic components in order to function properly. Ultrasonic sensors are used to transmit the height of seed in the bowl. The system is able to interpret the height of seed in the bowl and turn on the seed feed chains accordingly. All seed bowl heights can be adjusted from the tractor cab individually by row or all rows can be adjusted. Using the minimum and maximum adjustment limits the seed bowl can be kept to a consistent height.

## 2 Safety

### ***SAFETY ALERT SYMBOL***

This Safety Alert symbol means **ATTENTION!**  
**BECOME ALERT! YOUR SAFETY IS INVOLVED!**

The Safety Alert symbol identifies important safety messages on the Harriston Planter and in the manual. When you see this symbol, be alert to the possibility of personal injury or death. Follow the instructions in the safety message.



**Why is SAFETY Important to you?**

**3 Big Reasons**  
**Accidents Disable and Kill**  
**Accidents Cost**  
**Accidents Can Be Avoided**

#### **SIGNAL WORDS:**

Note the use of the signal words **DANGER**, **WARNING**, AND **CAUTION** with the safety messages. The appropriate signal word for each message has been selected using the following guidelines:

<p><b>DANGER</b> - An immediate and specific hazard, which <b>WILL</b> result in severe personal injury or death if the proper precautions are not taken.</p> <p><b>WARNING</b> - A specific hazard or unsafe practice, which <b>COULD</b> result in severe personal injury or death if proper precautions are not taken.</p> <p><b>CAUTION</b> - Unsafe practices which could result in personal injury if proper practices are not taken, or as a reminder of good safety</p>
---

**SAFETY**

**YOU** are responsible for the SAFE operation and maintenance of your Harriston Potato Planter. **YOU** must ensure that you and anyone else who is going to operate, maintain, or work around the Planter be familiar with the operating and maintenance procedures and related SAFETY information contained in this manual. This manual will take you step-by-step through your working day and alerts you to all good safety practices that should be adhered to while operating the planter.

Remember, **YOU** are the key to safety. Good safety practices not only protect you but also the people around you. Make these practices a working part of your safety program. Be certain that **EVERYONE** operating this equipment is familiar with the recommended operating and maintenance procedures and follows all the safety precautions. Most accidents can be prevented. Do not risk injury by ignoring good safety practices.

Planter owners must give operating instructions to operators or employees before allowing them to operate the Planter, and at least annually thereafter per OSHA (Occupational Safety and Health Administration) regulation 1928.57.

The most important safety device on this equipment is a SAFE operator. It is the operator's responsibility to read and understand ALL safety and operating instructions in the manual and to follow them. Most accidents can be avoided.

A person who has not read and understood all operating and safety instructions is not qualified to operate the machine. An untrained operator exposes himself and bystanders to possible serious injury or death.

Do not modify the equipment in any way. Unauthorized modification may impair the function and/or safety and could affect the life of the equipment.

Think SAFETY! Work SAFELY!

## 2.1 GENERAL SAFETY

1. Read and understand the Operator's Manual and all safety signs before operating, maintaining, or adjusting the planter.



2. Provide a first-aid kit for use in case of an accident. Store in a highly visible place.



3. Provide a fire extinguisher for use in case of an accident. Store in a highly visible place.



4. Wear appropriate protective gear. This list includes, but is not limited to:

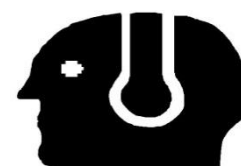
- A hard hat
- Protective shoes with slip resistant soles
- Protective glasses or goggles
- Heavy gloves
- Wet weather gear
- Hearing protection
- Respirator or filter mask



5. Install and secure all guards before starting.

6. Do not allow riders.

7. Wear suitable ear protection for prolonged exposure to excessive noise.



8. Stop tractor engine, lower machine to the ground, place all controls in neutral, set park brake, remove ignition key, and wait for all moving parts to stop before servicing, adjusting, repairing, or unplugging.

9. Clear the area of people, especially small children, before starting the unit.

10. Review safety related items annually with all personnel who will be operating or maintaining the planter.

## 2.2 OPERATING SAFETY

1. Read and understand the Operator's Manual and all safety signs before operating, servicing, adjusting, repairing, unplugging, or filling.
2. Do not allow riders.
3. Install and secure all guards and shields before starting or operating.
4. Keep hands, feet, hair, and clothing away from moving parts.
5. Stop tractor engine, lower machine to the ground, place all controls in neutral, set park brake, remove ignition key, and wait for all moving parts to stop before servicing, adjusting, repairing, unplugging, or filling.
6. Place all tractor controls in neutral before starting.
7. Operate machine only while seated on the tractor seat.
8. Clear the area of bystanders, especially small children, before starting.
9. Keep all hydraulic lines, fittings, and couplers tight and free of leaks before using.
10. Clean reflectors, slow moving vehicle sign, and lights before transporting.
11. Add extra lights and use pilot vehicle when transporting during times of limited visibility.
12. Use hazard flashers on tractor when transporting.
13. Install safety chain when attaching to tractor.
14. Follow chemical manufacturers' handling and safety instructions exactly when using chemicals with machine.
15. Review safety instructions with all operators annually.

## 2.3 MAINTENANCE SAFETY

1. Follow all the operating, maintenance, and safety information in the manual.
2. Support the machine with blocks or safety stands when changing tires or working beneath it.
3. Stop tractor engine, lower machine to the ground, place all controls in neutral, set park brake, remove ignition key, and wait for all moving parts to stop before servicing, adjusting, repairing, unplugging, or filling.
4. Make sure all guards are in place and properly secured when maintenance work is completed.
5. Never wear ill-fitting, baggy, or frayed clothing when working around or on any of the drive system components.
6. Before applying pressure to a hydraulic system, make sure all lines, fittings, and couplers are tight and in good condition.
7. Install safety rod and pin securely in position on hitch cylinder frame before working under frame.
8. Relieve pressure from hydraulic circuit before servicing or disconnecting from tractor.
9. Keep hands, feet, hair, and clothing away from moving or rotating parts.
10. Clear the area of bystanders, especially small children, when carrying out any maintenance and repairs or making adjustments.
11. Wear appropriate protective gear when contacting chemical handling components on machine.



## 2.4 CHEMICAL SAFETY

1. Some agricultural chemicals are among the most toxic substances known to man. Minute quantities can contaminate clothing, machinery, the workplace, and the environment. Follow the chemical manufacturers' instructions exactly. Death can result from their improper use.

2. Misuse, including excessive rates, uneven application, and label violations, can cause injury to crops, livestock, people, and the environment.

3. Do not breathe, touch, or ingest chemicals or the dust. Always wear protective clothing and follow safe handling procedures.

4. Follow the manufacturers' instructions for chemical storage. Avoid unnecessary storage by purchasing only the quantity needed for the crop year.

5. Keep all chemicals out of the reach of children and away from livestock and animals.

6. Store chemicals only in their original containers in a locked area.

7. Check with local authorities regarding the disposal of small quantities of chemicals, chemical containers and wash water.

8. Do not burn the containers or leave them lying in the field or ditches. Take them to your local container disposal site.

9. Wash thoroughly before eating. Use detergent to remove all chemical residue. Rinse carefully and dry with disposable towels.

10. Do not eat in the field where chemicals are being applied.

11. In case of chemical poisoning, get immediate medical attention.

12. Know the Poison Control Emergency telephone number for your area before using agricultural chemicals.

**United States – 1-800-222-1222**

**Alberta – 1-800-332-1414**

**Manitoba – (204)-787-2591**

**Ottawa – 1-800-267-1373**

13. Thoroughly wash clothing and equipment contaminated by chemicals.

14. Wash the applicators immediately after field work. Dispose of wash water in an environmentally safe manner. Wash water can contaminate the soil or a clean water supply.

## 2.5 HYDRAULIC SAFETY

1. Make sure that all components in the hydraulic system are kept in good condition and are clean.
2. Replace any worn, cut, abraded, flattened, or crimped hoses and metal lines.
3. Do not attempt any makeshift repairs to the hydraulic lines, fittings, or hoses by using tape clamps, or cements. The hydraulic system operates under extremely high pressure. Such repairs will fail suddenly and create a hazardous and unsafe condition.

4. Wear proper hand and eye protection when searching for a high-pressure hydraulic leak. Use a piece of wood or cardboard



as a backstop instead of hands to isolate and identify a leak.



5. If injured by a concentrated high-pressure stream of hydraulic fluid, seek medical attention immediately. Serious infection or toxic reaction can develop from hydraulic fluid piercing the skin surface.
6. Before applying pressure to the system, make sure all components are tight and that lines, hoses, and couplings are not damaged.

## 2.6 TRANSPORT SAFETY

1. Make sure you are in compliance with all local regulations regarding transporting equipment on public roads and highways.
2. Make sure the SMV (Slow Moving Vehicle) emblem and all the lights and reflectors that are required by the local highway and transport authorities are in place, are clean, and can be seen clearly by all overtaking and oncoming traffic.
3. Do not allow anyone to ride on the Planter or tractor during transport.
4. Do not exceed 32 km/h (20 mph). Reduce speed on rough roads and surfaces.
5. Do not transport with a full seed tank.

## **2.7 STORAGE SAFETY**

1. Store away from areas of human activity. Do not permit children to play on or around the stored machine.
2. Make sure the unit is sitting, or blocked up firm and solid and will not tip or sink into a soft area.
3. Cover with a weather - proof tarpaulin and tie down securely.

## **2.8 TIRE SAFETY**

1. Failure to follow proper procedures when mounting a tire on a wheel or rim can produce an explosion, which may result in serious injury or death.
2. Do not attempt to mount a tire unless you have the proper equipment and experience to do the job.
3. Have a qualified tire dealer or repair service perform required tire maintenance.

## **2.9 ASSEMBLY SAFETY**

1. Assemble in an area with sufficient space to handle the largest component and access to all sides of machine.
2. Use only lifts, cranes, jacks, and tools, with sufficient capacity for the load.
3. Use two people to handle the large bulky components.
4. Do not allow spectators in the working area.

## **2.10 SAFETY DECALS**

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 Parts Department.

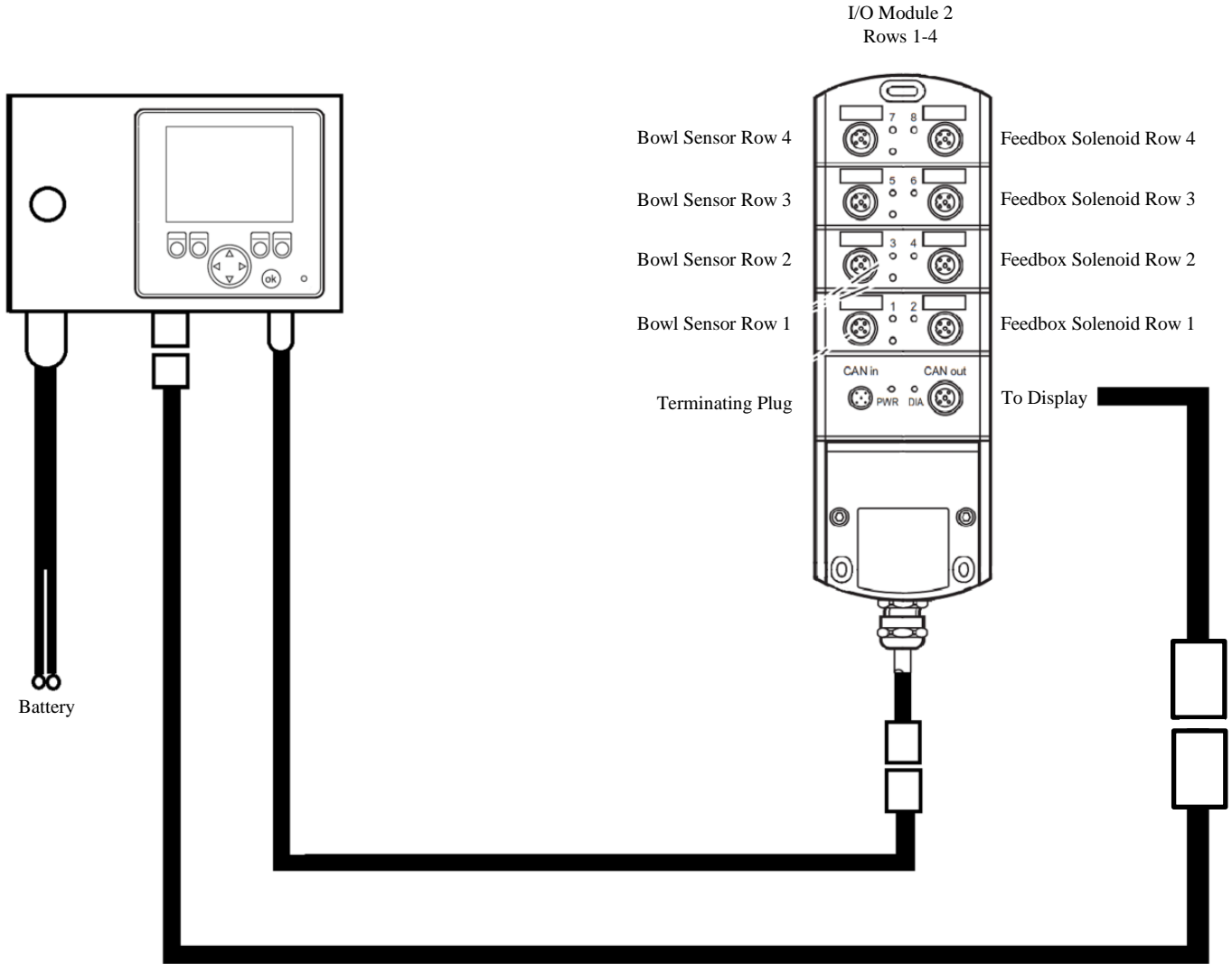
### **HOW TO INSTALL SAFETY DECALS:**

1. Be sure that the installation area is clean and dry.
2. Decide on the exact position before you remove the backing paper.
3. Remove the smallest portion of the split backing paper.
4. Align the decal over the specified area and carefully press the small portion with the exposed sticky backing in place.
5. Slowly peel back the remaining paper and carefully smooth the remaining portion of the decal in place.

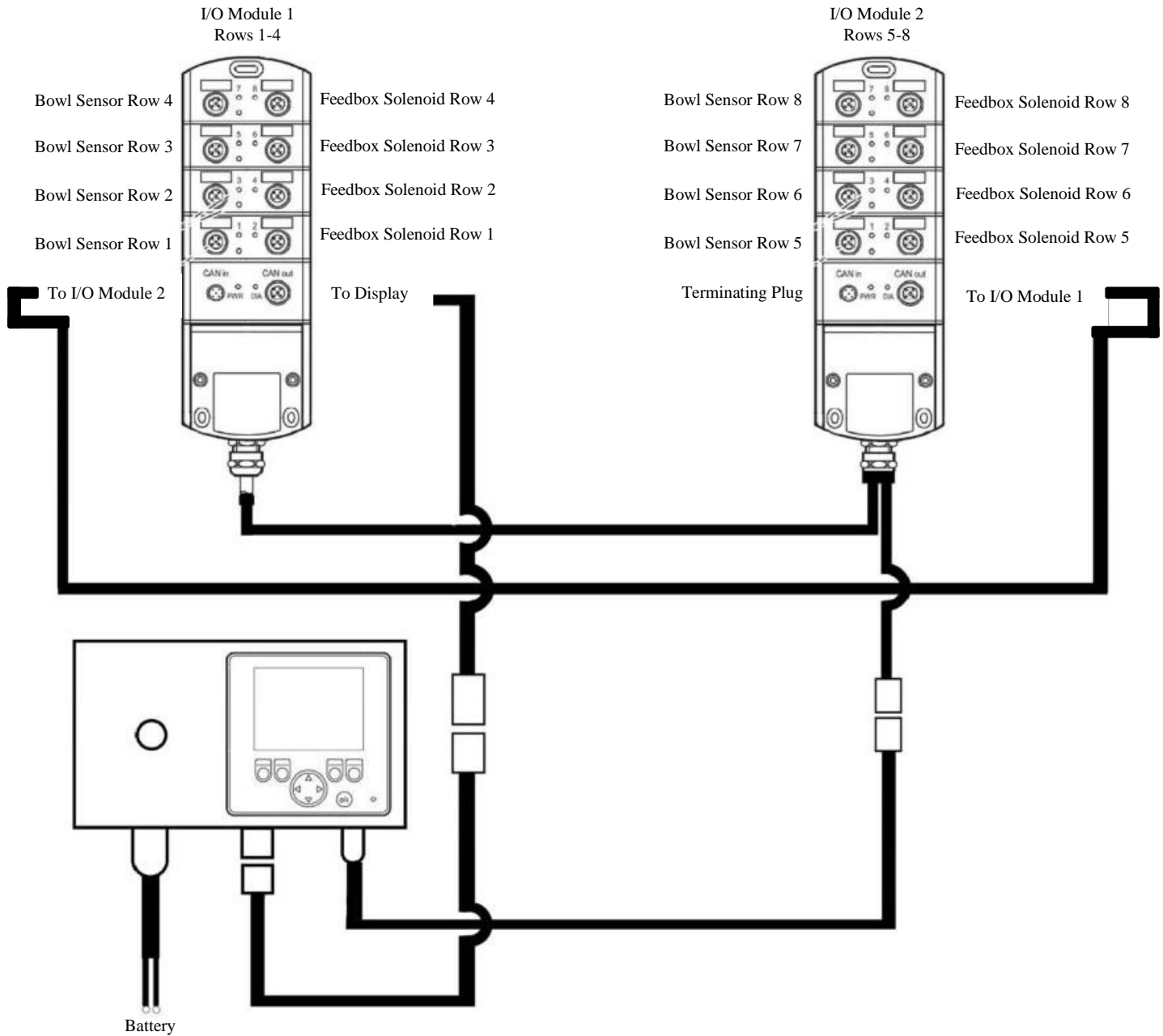
Small air pockets can be pierced with a pin and smoothed out using the piece of decal backing paper.

### 3 Installation

## 4 Row Planter Installation



# 6 & 8 Row Planter Installation



## 4 Operation



1. Read and understand the Operator's Manual and all safety signs before operating, servicing, adjusting, repairing, unplugging, or filling.
2. Do not allow riders.
3. Install and secure all guards and shields before starting or operating.
4. Keep hands, feet, hair, and clothing away from moving parts.
5. Stop tractor engine, lower machine to the ground, place all controls in neutral, set park brake, remove ignition key, and wait for all moving parts to stop before servicing, adjusting, repairing, unplugging, or filling.
6. Place all tractor controls in neutral before starting.
7. Operate machine only while seated on the tractor seat.
8. Clear the area of bystanders, especially small children, before starting.
9. Keep all hydraulic lines, fittings, and couplers tight and free of leaks before using.
10. Clean reflectors, SMV, and lights before transporting.
11. Add extra lights and use pilot vehicle when transporting during times of limited visibility.
12. Use hazard flashers on tractor when transporting.
13. Install safety chain when attaching to tractor.
14. Follow chemical manufacturers' handling and safety instructions exactly when using chemicals with machine.
15. Review safety instructions with all operators annually.

## 4.1 Start-Up

1. To turn the bowl level system on, use the red illuminated rocker switch. This switch turns on or off all power to the system. A screen with the Harriston logo should be displayed briefly while the system initiates. The main screen should then be displayed as shown in Fig. 1.

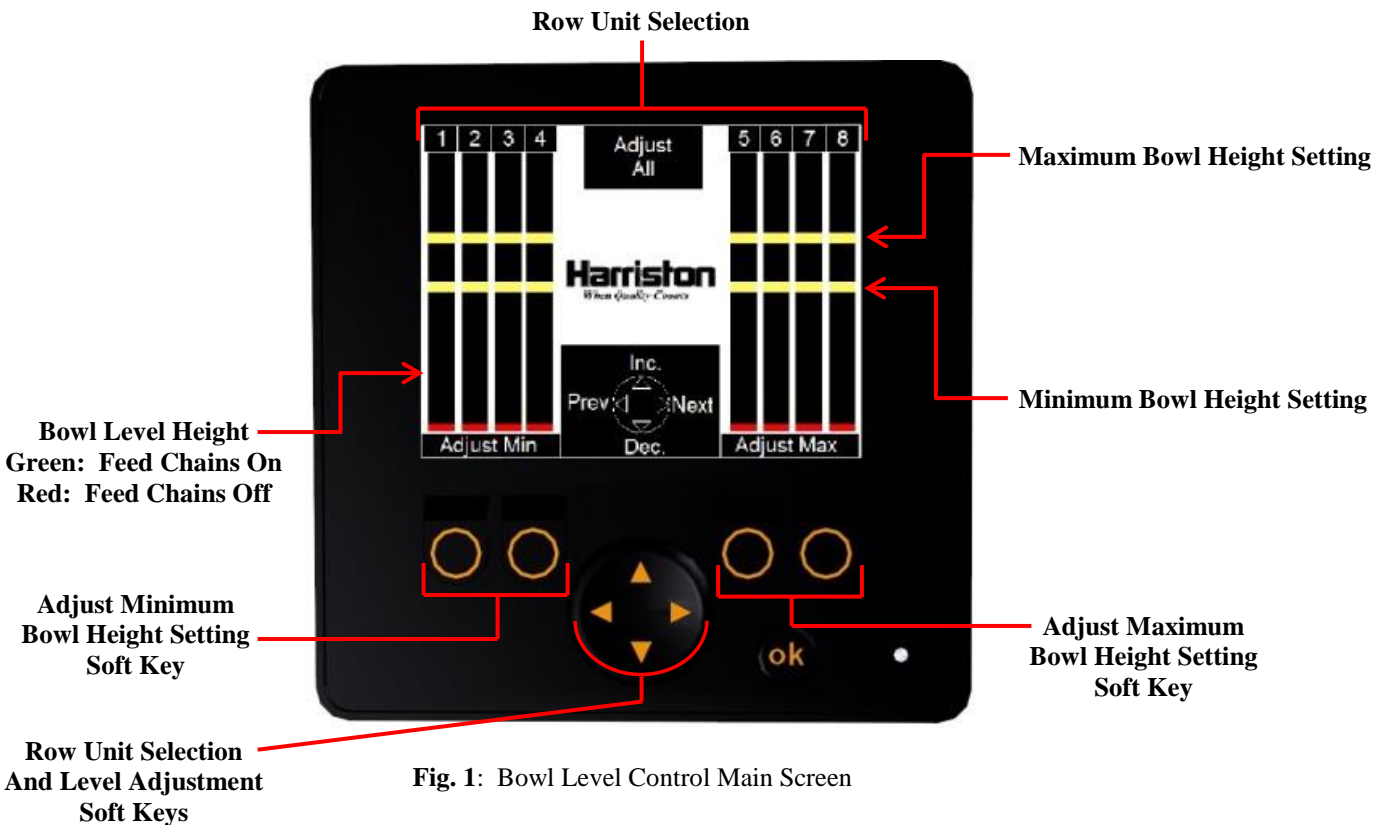


Fig. 1: Bowl Level Control Main Screen

2. To adjust the height of seed in the bowls: Press the left or right key to select which row to adjust. The box with the row number will be displayed in a different color when selected. To adjust all rows simultaneously, press the right arrow key until the Adjust All box is highlighted. The rows are numbered from left to right starting from the tractor's driver side.
3. To adjust the minimum bowl level: Press and hold one of the two buttons below the Adjust Min while pressing up or down. This setting determines when the seed feed chains will start moving and fill the bowl with more seed.

**Note: This is the critical adjustment for proper seed height control. Setting the minimum too low may cause the bowl to run out of seed and cause skips. Setting the minimum too high will allow too much seed in the bowl which in turn will create more skips and doubles.**

4. To adjust the maximum bowl level: Press and hold one of the two buttons located below the Adjust Max while pressing up or down. This setting determines when the seed feed chains will stop moving preventing more seed from filling the bowl.

Note: To keep a consistent height of seed in the bowl this setting should be kept close to the minimum level bar. If the setting is too close to the minimum the feed chains will turn on and off repeatedly causing excessive wear.

5. Set seed feed chain speed. When starting to plant, set feed chain flow control to 2 or 3. Observe seed bowls to make certain feed chains run just fast enough to keep an adequate supply to prevent planter from skipping. Tests have shown the planter performs best when seed bowl load is kept to a minimum. Feed chain speed should be slow enough so that chains run as close to continuously as possible. Adjust flow control on seed feedboxes as needed.

Note: Turning off the rows will turn the seed feedbox off only. The row unit will continue to plant the remaining seed in the bowl. This feature can be used to remove any excess seed in the bowl by turning off all rows and running the planting function.



## 5 Principle Components

### Display Module

The display module controls the function of the bowl level height system, and displays the information on the screen. Software is loaded into the display at the factory. There are different software versions that are loaded for 4, 6, and 8 row planters. Power to the display goes through the rocker switch found on the main control box. The power must be taken directly from the battery for adequate and consistent voltage and amperage. **ANY MALFUNCTION CAUSED BY IMPROPER BATTERY CONNECTION WILL NOT BE COVERED BY WARRANTY.** The display has a status indicator light in the bottom right corner. The light will flash once during start-up, and then change to 2 Hz flashing green light during normal operation. Off indicates no voltage is being applied to the display. The display will flash a green light at 5 Hz to indicate no software has been loaded to the display. A solid green light indicates the software has stopped. A flashing red light indicates that the display does not have the proper voltage applied and the software has stopped. A solid red light indicates a system fault.

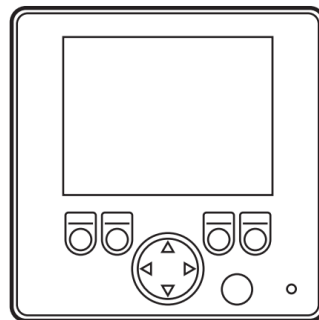


Fig. 2: Display CR 0451

### Input / Output Module

The input / output module analyzes the signals sent from the input sensors and allows the display to output to the feedbox motor solenoids. I/O modules are model number CR2033, with module 1 set to node ID#1 and module 2 set to node ID#3.

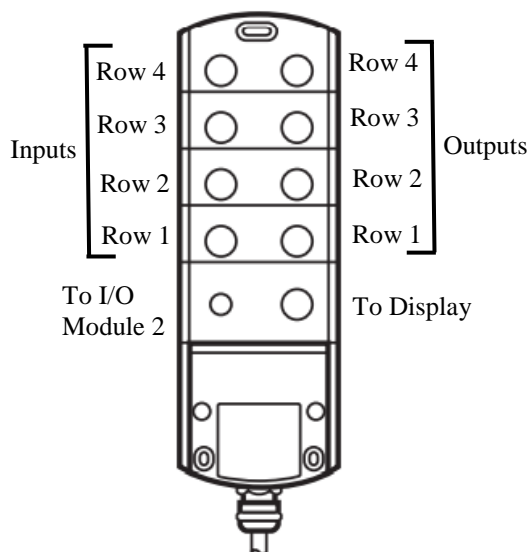


Fig. 3a.: I/O Module 1  
(Standard on all Versions)

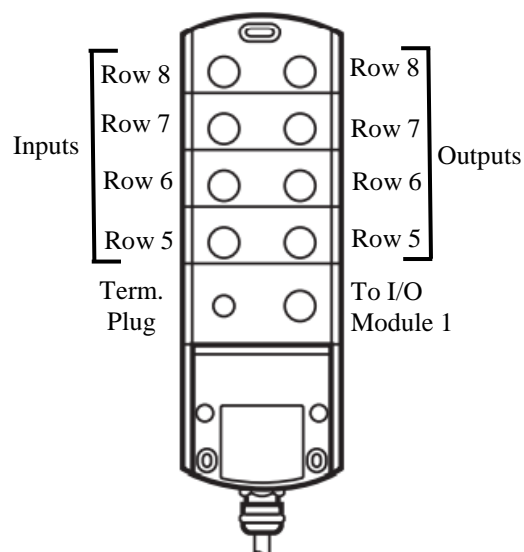


Fig. 3b.: I/O Module 2  
(for 6 and 8 Row Versions)

Each I/O module has two status LEDs for the module labeled PWR and DIA. During normal operation the PWR light will flash green. In stand-by mode the PWR will be a solid green, and with no voltage supplied will not be lit. The DIA light will be off during normal operation, and will only turn on when communication with the display has failed. Each Input and Output has a status light that will flash on and off when the sensors switch on and off. Figure 4 illustrates the wiring within the I/O module. The system comes from the factory setup with separate 12 V power sources to the input and output sensors. Separate power is supplied to the input sensors to allow for connecting a 24V power source for better resolution if desired. The dials located within the panel inside the I/O module should be factory set to have the left dial set to 3 and the center dial set to 0. The right most dial is the node ID which is set to 2 for the module for rows 1-4 and set to 3 for the module for rows 5-8.

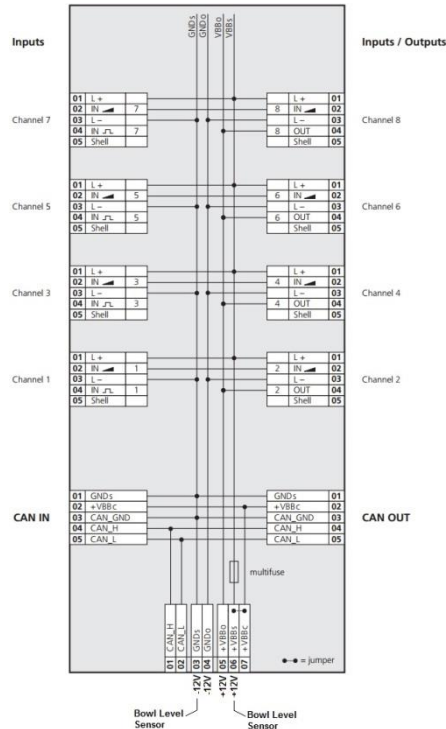


Fig. 4: I/O Module Wiring Diagram

## Ultrasonic Bowl Level Sensor

An ultrasonic bowl level sensor is used to analyze the height of seed within the seed bowl. Figure 5 shows the sensor. These sensors are teachable to learn the height range that is required to be viewed for this application. They will come taught from the factory. **ANY MODIFICATIONS TO THE WIRING MAY HAVE ADVERSE EFFECTS TO THE SENSOR AND WILL VOID ANY WARRANTY.** The sensor is able to function with 12-24V applied. Better resolution will occur at higher voltages. For the application of sensing bowl height a voltage of only 12 V is required. The sensor has three lights on the back of the sensor. During normal operation the light will be yellow if no seed is visible in the sensing window. When seed becomes visible in the sensing window the light will turn green, and a red light will turn on. The red light will become brighter as the seed comes closer to the sensor.



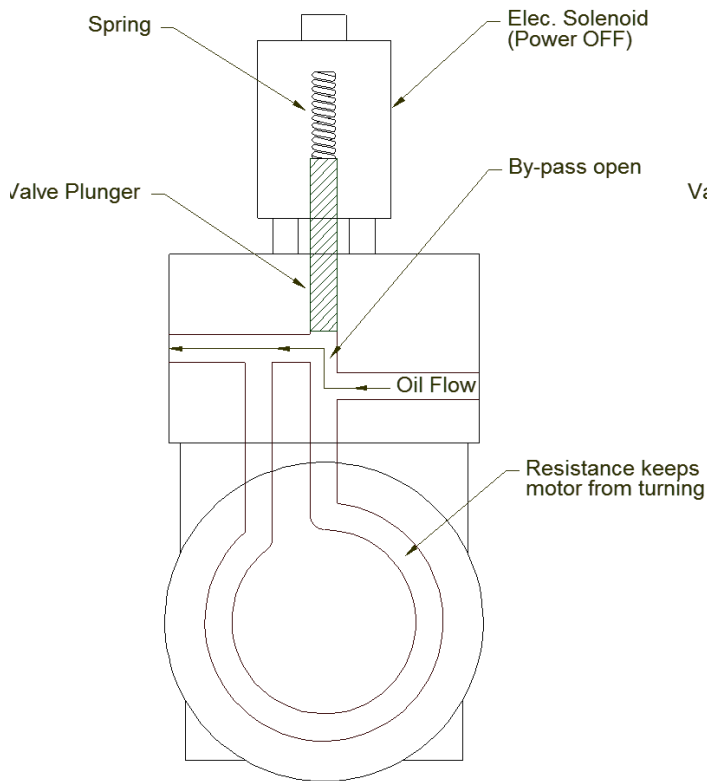
Fig. 5: Ultrasonic Seed Bowl Height Sensor

## **Feedbox Motor Control Solenoid**

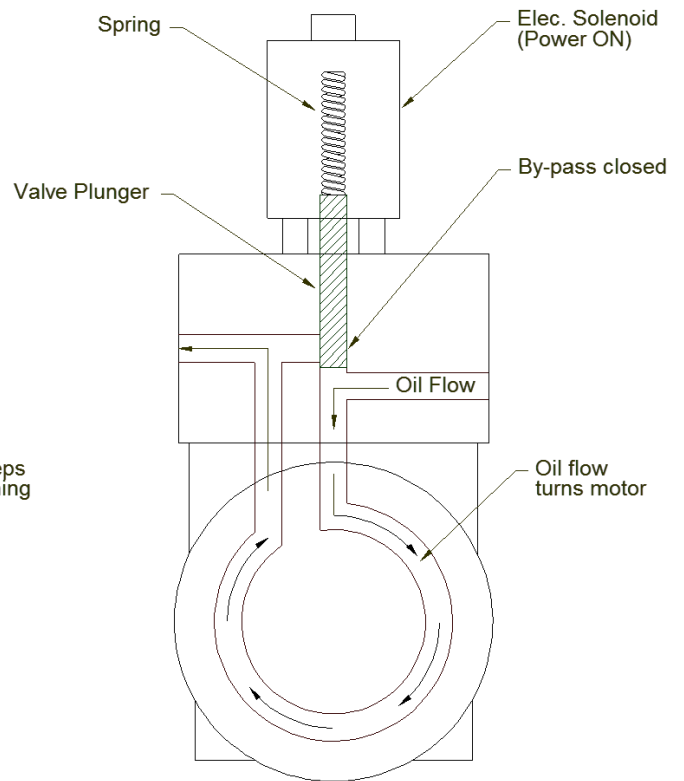
On Harriston planters, the feedbox providing seed to the planter bowl is controlled by an electric solenoid mounted on a hydraulic motor. Oil for the hydraulic motor flows from the return side of the planter shaker drive motor. Oil flow is regulated by a manual flow control. An electric sensor in the feed bowl provides 12 V.D.C. to the solenoid for control of oil flow for each individual feedbox. When the seed bowl is being filled, the electric sensor is closed, which sends current to the solenoid. The solenoid closes the by-pass line in the motor manifold, which directs oil to the hydraulic motor.

In Figure 1, electric current is off, the by-pass is open, which diverts hydraulic oil away from motor; therefore the motor does not run.

In Figure 2, Electric current activates magnetic solenoid. The solenoid closes the by-pass and directs oil flow to the hydraulic motor (motor runs).



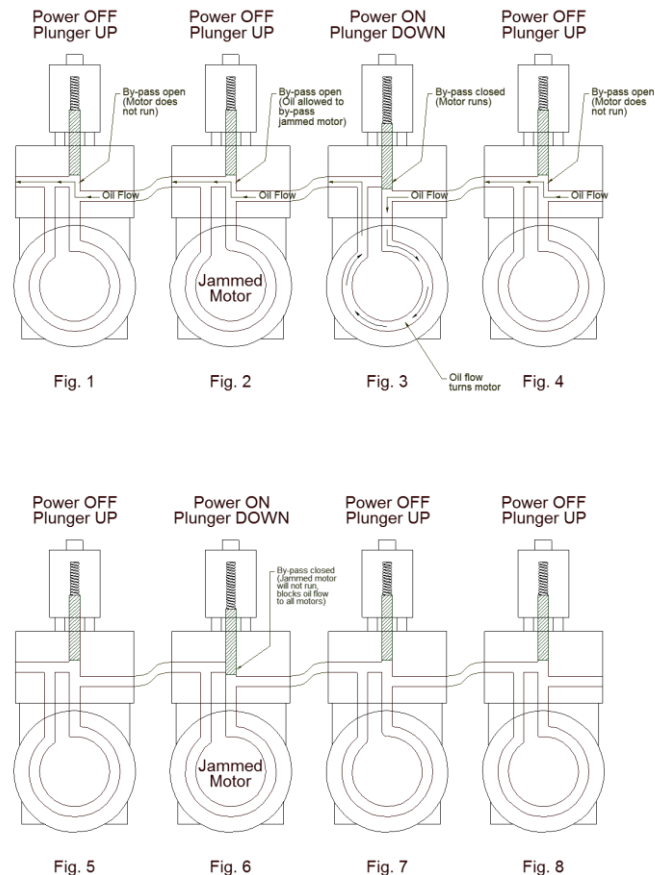
**Fig. 1**



**Fig. 2**

All feedbox motors are connected in a hydraulic series, which means hydraulic oil flows from one motor to the next. Oil flow is the same regardless of how many motors are in the circuit. As the number of motors (rows) increase, oil pressure increases proportionally. Example: one motor requires 150 P.S.I., 4 motors require 600 P.S.I. Motors that are operating require pressure. Motors that are not operating (because solenoid has opened by-pass) will not increase pressure. Pressure will continuously vary, depending upon how many motors are operating at any given time. Because all motors are connected in a series, if one stalls because of a jammed feed chain, all motors will stall because oil flow will be blocked.

## **Feedbox Motor Troubleshooting**



If a piece of seed or foreign material jams one feedbox motor, oil flow will be stopped, therefore all motors will stop. To determine which motor is jammed, follow this procedure:

1. Empty out all feedboxes so the bowl switches are closed (calling for seed).
2. Turn feed chain switch **OFF** on switchbox in cab.
3. Disconnect power wire connectors from all feedbox solenoids.
4. Turn hydraulic system on & set row units to run as slow as possible to have oil flow to the feedbox motors.
5. Turn feedbox chain switch **ON**.
6. **STAND BEHIND THE PLANTER!** Starting at one end of the planter, use a tester to verify 12 volts between the terminals on the connector. Connect one feed box solenoid power connector. If feedbox runs, it is **NOT** the jammed motor. Disconnect the power connector and move on to the next feedbox solenoid.

7. Repeat step 6 until you encounter a motor that **DOES NOT** run when you connect the power connector. This is the jammed motor. Oil will not flow through a jammed motor. Refer to the diagrams below to visualize how the oil flow is directed by the solenoids.
8. Place all controls in NEUTRAL, stop engine, place tractor in PARK, remove key.
9. Remove the object that is causing the problem.
10. Repeat step 6 to check feedbox that was jammed. If it functions now, reconnect all other feedbox solenoids and continue planting.

In Figures 1-4 to the right, Figure 2 is jammed. Power is connected to solenoid on Figure 3, which makes motor run. Oil can flow past jammed motor in Figure 2. Every motor that is not jammed will run when power is present at solenoid.

In Figures 5-8, Figure 6 is jammed. Power is connected to solenoid on Figure 6. Plunger is pushed down, attempting to force oil through the motor. Motor does not run. Because the motor is jammed, oil cannot flow through it.

## 6 Daily Inspection

The planter should be thoroughly inspected at the start of each working day to ensure that all parts and systems are in good condition and working properly. If this inspection is not done, minor problems could result in poor planting performance in the field.

### **ELECTRICAL SYSTEM:**

- a. Damage to wiring harness components
- b. Damage to connections at solenoids.
- c. Function of seed bowl ultrasonic sensors
- d. Condition of switch on electrical box and power connections

### **HYDRAULIC SYSTEM:**

- a. Routing and condition of all components
- b. Tighten or repair all leaking components
- c. Make sure all electrical connections are tight

It is very important to correct each problem found during the inspection before starting to work. This will insure good field performance. Small problems won't become big problems, and the machine will perform as expected.

### **SEED SENSING SYSTEM:**

- a. Clear any blockage of bowl level sensors.

## 7 Maintenance

Follow all maintenance guidelines that apply to your Harriston planter as described in your owner's manual. Doing so will ensure proper function of your planter.

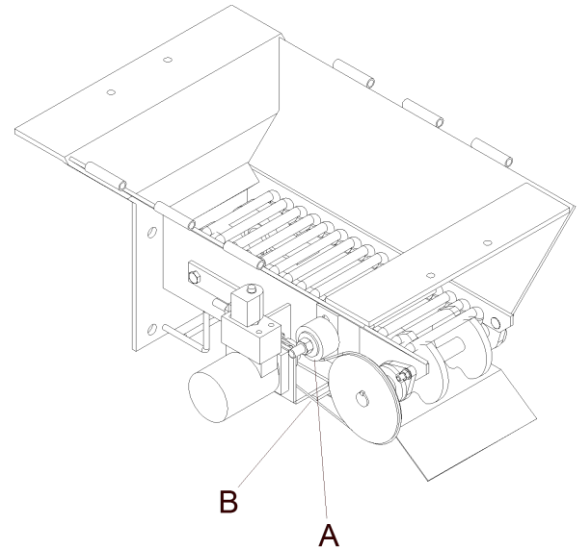
The feed chains will need to be greased annually. The feedbox drive chains will need to be lubricated every 50 hours.

### **Seed Feed System**

#### **Feedbox Roller Chain Drive**

Each feed chain is driven by a hydraulic motor / roller chain. To adjust chain tension, follow this procedure:

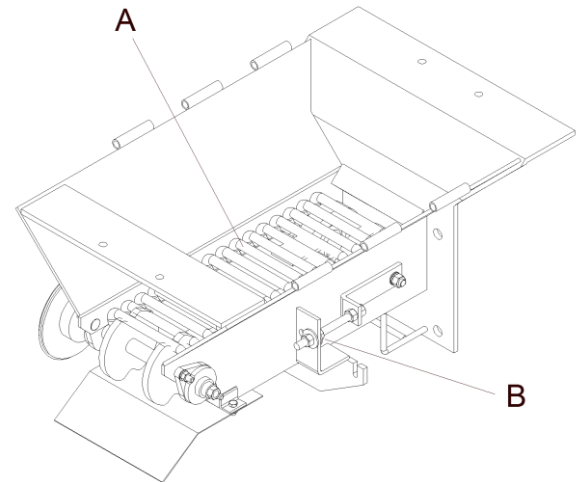
1. Place all controls in NEUTRAL, stop engine, place tractor in PARK, remove key.
2. Loosen the nut securing the idler roller (A).
3. Slide or tap the idler into its required position.
4. The chain should have approx. 1/4" slack on the long span (B).
5. Tighten the nut securing the idler roller.
6. Repeat procedure for each row unit.



#### **Feed Chain Tension**

The Feed Chain (A) moves seed pieces from the hopper into the seed bowls. To adjust the tension, follow this procedure:

1. Place all controls in NEUTRAL, stop engine, place tractor in PARK, remove key.
2. Loosen the chain idler bolts on both sides of the feed chain. (B)
3. Adjust both sides evenly until there is approx. 1" of sag on the loose side (underneath) of chain.
4. Tighten the chain idler bolts on both sides of the feed chain to their specified torque.
5. Adjust all other feed chains as required.



## FLUIDS AND LUBRICANTS

1. Grease

Use an SAE multi-purpose high temperature grease for all applications Also acceptable is an SAE multi-purpose lithium base grease.

2. Roller Chain Lubricant

Use WD-40, LPS-2, or equivalent to coat roller chains and bushings to prevent rusting or seizing.

3. Storing Lubricants

Your machine can operate at top efficiency only if clean lubricants are used. Use clean containers to handle all lubricants. Store them in an area protected from dust, moisture, and other contaminants.

4. **When pressure washing, do not directly spray the side (seal) of the bearing. This will damage the seal and reduce the life of the bearing.**

### 5.1.2 GREASING

Refer to Section 5.1.1 for recommended grease.

Use the Maintenance Checklist provided to keep a record of all scheduled maintenance.

1. Use only a hand-held grease gun for all greasing. Air powered greasing systems can damage the seals on bearings and lead to early bearing failure.

**IMPORTANT**

Over-greasing can damage bearing seals. A damaged seal will lead to early bearing failure. Replace all bearings with damaged seals immediately.

2. Wipe grease fitting with a clean cloth before greasing, to avoid injecting dirt and grit.

3. Replace and repair broken fittings immediately.

4. If a fitting will not take grease, remove and clean thoroughly. Also clean lubricant passageway. Replace fitting if necessary.



## 8 Bowl Level Control System Trouble Shooting

PROBLEM	CAUSE	SOLUTION
<p>Feedboxes and Shakers do not run</p> <p><b>NOTE:</b> this will not indicate an electrical problem</p> <p><b>NOTE:</b> Hydraulic feed is equipped with a one way check valve to prevent system from running in reverse</p>	Hydraulic lever on tractor in neutral position.	Place hydraulic lever in work position.
	Hydraulic hose not connected.	Plug hose into tractor
	Operator is attempting to operate hydraulic drive in reverse.	Run hydraulic drive in proper direction.
	One way check valve malfunctioning	Replace check valve. (Valve is located behind hydraulic coupler on inlet line).
	Malfunctioning hydraulic coupler.	Check coupler for foreign object, replace if necessary
<p>Fuse blows when Feedbox Switch is turned on</p>	Malfunctioning tractor hydraulic coupler	Plug couplers into another valve if available, check with tractor dealer.
	Hydraulic flow control set too low or shut off.	Increase Tractor hydraulic flow
	Faulty solenoid coil	Remove all wires from solenoid coils. Replace fuse. If fuse does not blow, re-connect wires to solenoid one at a time to locate faulty solenoid coil.
	Feedbox wire shorted out	If fuse still blows without wires connected, disconnect all bowls sensor wires, replace fuse. If fuse blows, examine all feedbox wires from I/O modules at center of planter to each bowl sensor wire. Replace or repair shorted wire.
	Faulty bowl sensor	Replace Bowl Sensor

## BOWL LEVEL CONTROL SYSTEM TROUBLE SHOOTING

PROBLEM	CAUSE	SOLUTION
One feedbox hydraulic drive does not run, all others O.K (Continued)	(No power at bowl sensor). Broken or unplugged wire between junction box and bowl sensor	Plug wire back in. Repair broken wire. Correct problem that broke wire.
	(Power at bowl sensor). Faulty sensor	Replace sensor
	(Power at bowl sensor, no power at solenoid). Broken wire between junction box and solenoid.	Repair broken wire, correct problem that broke wire.
One feedbox runs continuously, All other feedboxes & shakers work properly	Faulty bowl sensor	Replace sensor
	Defective solenoid valve body	Replace solenoid valve body (See procedure previously mentioned to determine whether to replace sensor or solenoid)
Feed chains constantly over-fills seed bowls.	Maximum bowl level set too high	Adjust maximum bowl level height at display. (See page 11)
	Feed chains running too fast	Reduce speed of feed chains
Feed chains constantly running without reaching minimum level setting	Not enough oil flow to feedbox motors	Adjust flow control valve to increase oil flow
Bowl not filling with enough seed	Minimum bowl level set too low	Adjust minimum bowl level height at display. (See page 11)

**BOWL LEVEL CONTROL SYSTEM TROUBLE SHOOTING**

PROBLEM	CAUSE	SOLUTION
Console will not turn on	Console not connected to 12V.	Console must be connected to 12V. Console must be connected directly to battery. Do not connect to convenience outlet in tractor.
	Broken wire.	Check all connections. Repair broken wire.
	Poor or corroded connection	Clean connection. Always coat electrical connections with dielectric grease Replace corroded wire.
	Blown fuse	Find cause of blown fuse. Replace fuse. (20 Amp located in display console)
Console comes on momentarily, no display	Poor battery connections	Clean / repair connections as needed.
	Weak tractor battery	Console must have 12 V. D.C. Charge or replace battery as needed.

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