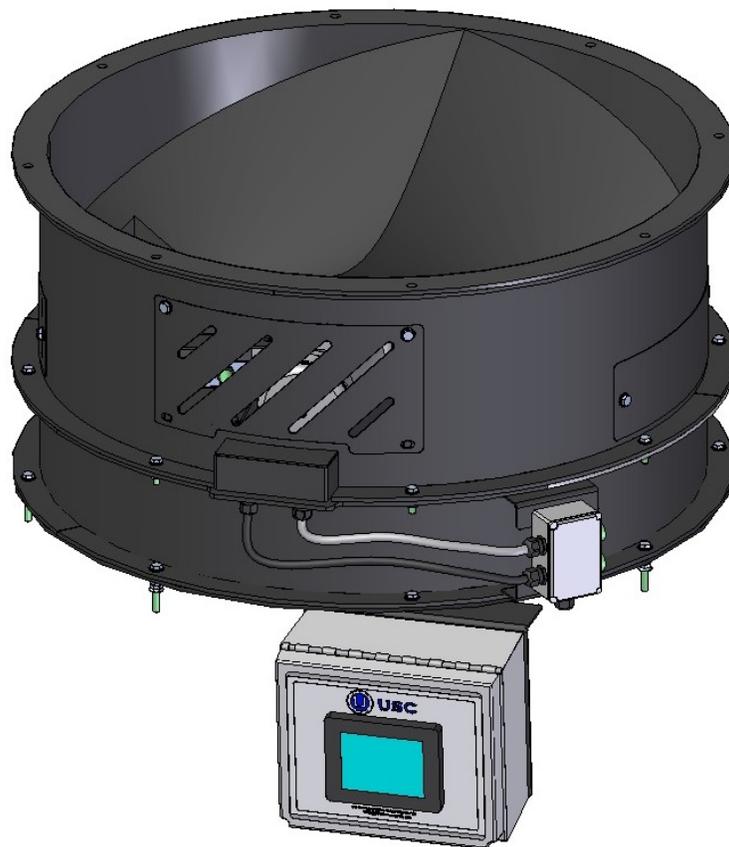




# SEED WHEEL

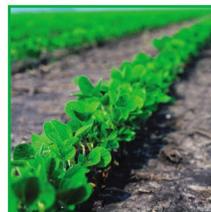
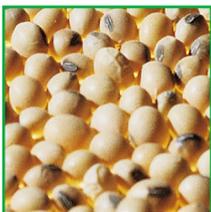
## Operators Manual



Software Release: v2.1.0 STU855

Document: TD-09-06-1007

Revision: A



## **INTRODUCTION**

Thank you for choosing USC, LLC for your equipment needs. We appreciate your business and will work diligently to ensure that you are satisfied with your choice.

### **OVERVIEW**

The purpose of this manual is to provide you with the basic information needed to operate and maintain the Seed Wheel. It does not hold USC, LLC liable for any accidents or injuries that may occur.

### **OPERATOR RESPONSIBILITIES**

As the purchaser/owner/operator of this equipment and control system, you have an obligation to install, operate, and maintain the equipment in a manner that minimizes the exposure of people in your care to any potential hazards inherent in using this equipment. It is critical that the owner of this equipment:

- Has a clear and documented understanding of the process this machine is being used in and of any resulting hazards or special requirements arising from this specific application.
- Allow only properly trained and instructed personnel to install, operate, or service this equipment.
- Maintain a comprehensive safety program involving all who work with this machine and other associated process equipment.
- Establish clear areas of staff responsibility (e.g. operation, setup, sanitation, maintenance, and repairs).
- Provide all personnel with necessary safety equipment.
- Periodically inspect the equipment to insure that the doors, covers, guards, and safety devices are in place and functioning, that all safety instructions and warning labels are intact and legible, and that the equipment is in good working order.
- In addition to the operating instructions, observe and enforce the applicable legal and other binding regulations, national and local codes.

As the person with the most to gain or lose from working safely, it is important that you work responsibly and stay alert. By following a few simple rules, you can prevent an accident that could injure or kill you or a co-worker.

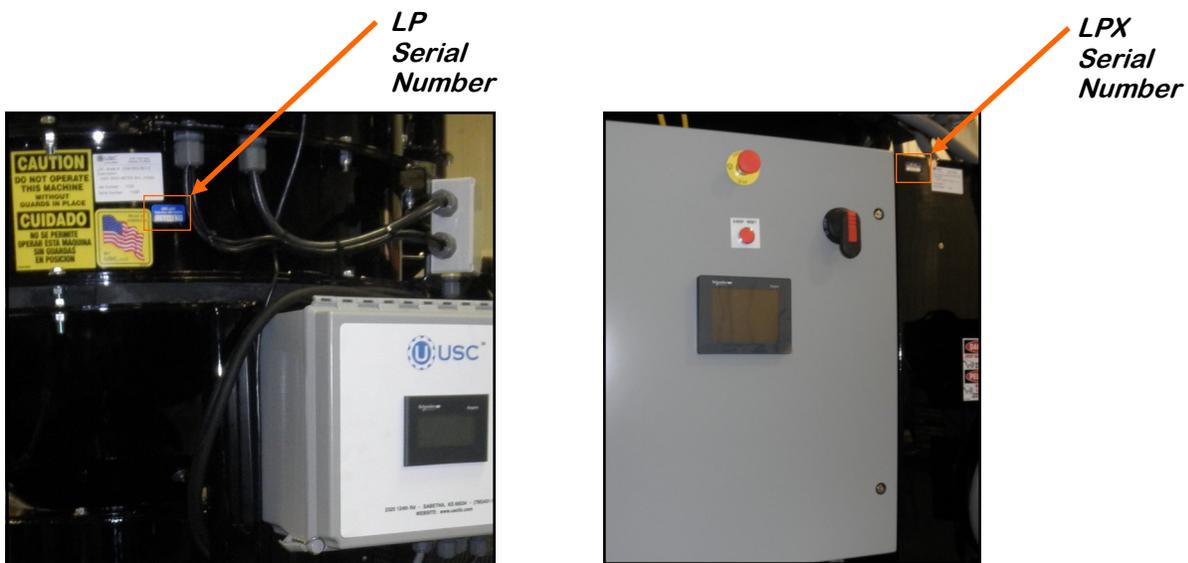
## SEED WHEEL

- Do not operate, clean, or service this equipment until you have read and understood the contents of this manual. If you do not understand the information in this manual, bring it to the attention of your supervisor, or call USC at (785) 431-7900 for assistance.
- Any operator who is known or suspected to be under the influence of alcohol or drugs should not be allowed to operate the equipment.
- Understand and follow the safety practices required by your employer and this manual.
- **PAY ATTENTION** to what you and other personnel are doing and how these activities may affect your safety.
- **Failure to follow these instructions may result in serious personal injury or death.**

## RECEIVING YOUR EQUIPMENT

As soon as the equipment is received, it should be carefully inspected to make certain that it has sustained no damage during shipment and that all items listed on the packing list are accounted for. If there is any damage or shortages, the purchaser must immediately notify USC, LLC. Ownership passes to purchaser when the unit leaves the USC, LLC. premises. The purchaser is responsible for unloading and mounting all components of the equipment.

Document the serial number of the machine for future reference. The serial number is located on the upper left corner of the main panel mounting bracket.



SERIAL NUMBER: \_\_\_\_\_

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# SAFETY INSTRUCTIONS

## SECTION A

Every year accidents in the work place maim, kill and injure people. Although it may be impossible to prevent all accidents, with the right combination of training, operating practices, safety devices, and operator vigilance, the number of accidents can be significantly reduced. The purpose of this section is to educate equipment users about hazards, unsafe practices, and recommended hazard avoidance techniques.

### SAFETY WORDS AND SYMBOLS

It is very important that operators and maintenance personnel understand the words and symbols that are used to communicate safety information. Safety words, their meaning and format, have been standardized for U.S. manufacturers and published by the American National Standards Institute (ANSI). The European Community (E.C.) has adopted a different format based on the International Standards Organization (I.S.O.) and applicable machinery directives. Both formats are presented below. Graphic symbols are not standardized, but most manufacturers will use some variation of the ones seen in this manual.



Indicates an imminently hazardous situation which, if not avoided, **will** result in death or serious injury.



Indicates a potentially hazardous situation which, if not avoided, **could** result in death or serious injury.



Indicates a potentially hazardous situation which, if not avoided, **may** result in minor or moderate injury and/or property damage.



Provides additional information that the operator needs to be aware of to avoid a potentially hazardous situation.



**Mandatory Lockout Power Symbol.** Disconnect, lockout and tagout electrical and other energy sources before inspecting, cleaning or performing maintenance on this panel.



**International Safety Alert Symbol.** The exclamation point (!) surrounded by a yellow triangle indicates that an injury hazard exists. However, it does not indicate the seriousness of potential injury. The exclamation point (!) is also used with the DANGER, WARNING and CAUTION symbols so the potential injury is indicated.



**Electrocution Hazard Symbol.** This symbol indicates that an electrocution hazard exists. Serious injury or death could result from contacting high voltage.



**International Electrocution Hazard.** This symbol indicates that an electrocution hazard exists. Serious injury or death could result from contacting high voltage.



**Mandatory Read Manual Action Symbol.** (I.S.O. format) This symbol instructs personnel to read the Operators Manual before servicing or operating the equipment.



**Mandatory Read Manual Action Symbol.** This symbol instructs personnel to read the Operators Manual before servicing or operating the equipment.



Notice is used to notify people of important installation, operation or maintenance information which is not hazard related.

## **LOCKOUT / TAGOUT PROCEDURES**

Lockout/Tagout is the placement of a lock/tag on an energy isolating device in accordance with an established procedure. When taking equipment out of service to perform maintenance or repair work, always follow the lockout/tagout procedures as outlined in ANSI Z344.1 and/or OSHA Standard 1910.147. This standard “requires employers to establish a program and utilize procedures for affixing appropriate lockout devices or tagout devices to energy isolating devices and to otherwise disable machines or equipment to prevent unexpected energizing, start-up, or release of stored energy in order to prevent injury to employees.”

## **CONTROLLED STOP**

This is the stopping of machine motion by reducing the electrical command signal to 0 (zero) once the stop signal has been recognized.

## **HAZARD REVIEW**



### **Electrocution Hazard**

Electrocution accidents are most likely to occur during maintenance of the electrical system or when working on or near exposed high voltage wiring. This hazard does not exist when the electrical power has been disconnected, properly locked, and tagged out.



### **Automatic Start Hazard**

The Seed Wheel may be controlled by an automated system and may start without warning. Failure to properly disconnect, lockout, and tagout all energy sources of remotely controlled equipment creates a very hazardous situation and could cause injury or even death. PLEASE STAY CLEAR AND BE ALERT.

## SEED WHEEL

**YOU** are responsible for the **SAFE** operation and maintenance of your USC, LLC Seed Treating System. **YOU** must ensure that you and anyone else who is going to operate, maintain, or work around the Seed Wheel 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 alert you to good safety practices that should be adhered to while operating the Seed Wheel.

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 or death by ignoring good safety practices.

- Seed Wheel owners must give operating instructions to operators or employees before allowing them to operate the machine, 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. All 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!

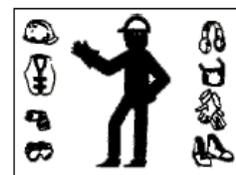
### GENERAL SAFETY

1. Read and understand the Operator's Manual and all safety signs before operating, maintaining, adjusting or unplugging the Seed Wheel .
2. Only trained persons shall operate the Seed Wheel. An untrained operator is not qualified to operate the machine.
3. Have a first-aid kit available for use should the need arise, and know how to use it.



## SEED WHEEL

4. Provide a fire extinguisher for use in case of an accident. Store in a highly visible place.
5. Do not allow children, spectators or bystanders within hazard area of machine.
6. Wear appropriate protective gear. This includes but is not limited to:
  - A hard hat
  - Protective shoes with slip resistant soles
  - Protective goggles
  - Heavy gloves
  - Hearing protection
  - Respirator or filter mask
7. Place all controls in neutral or off, stop motor, and wait for all moving parts to stop. Then disable power source before servicing, adjusting, repairing, or unplugging.
8. Review safety related items annually with all personnel who will be operating or maintaining the Seed Wheel.



### **OPERATING SAFETY:**

1. Read and understand the Operator's Manual and all safety signs before using.
2. Disconnect and disable electrical supply completely and wait for all moving parts to stop before servicing, adjusting, repairing or unplugging.
3. Clear the area of bystanders, especially children, before starting.
4. Be familiar with the machine hazard area. If anyone enters hazard area, shut down machine immediately. Clear the area before restarting.
5. Keep hands, feet, hair and clothing away from all moving and/or rotating parts.
6. Stay away from overhead obstructions and power lines during operation and transporting. Electrocutation can occur without direct contact.
7. Do not operate machine when any guards are removed.
8. Inspect welds and repair if needed.

### **PLACEMENT SAFETY**

1. Move only with the appropriate equipment
2. Stay away from overhead power lines when moving the Seed Wheel. Electrocutation can occur without direct contact.
3. Be familiar with machine hazard area. If anyone enters hazard areas, shut down machine immediately. Clear the area before restarting.
4. Operate the Seed Wheel on level ground free of debris. Anchor the Seed Wheel to prevent tipping or upending.



Before placement of the Seed Wheel, be sure that ground is reasonably level. The Seed Wheel may topple or work improperly if the ground is too uneven, damaging the equipment and/or causing personal injury.

### **MAINTENANCE SAFETY**

1. Review the Operator's Manual and all safety items before working with, maintaining or operating the Seed Wheel .
2. Place all controls in neutral or off, stop motors, disable power source, and wait for all moving parts to stop before servicing, adjusting, repairing or unplugging.
3. Follow good shop practices:  
Keep service area clean and dry.  
Be sure electrical outlets and tools are properly grounded.  
Use adequate light for the job at hand.
4. Keep hands, feet, hair and clothing away from all moving and/or rotating parts.
5. Clear the area of bystanders, especially children, when carrying out any maintenance and repairs or making any adjustments.
6. Before resuming work, install and secure all guards when maintenance work is completed.
7. Keep safety signs clean. Replace any sign that is damaged or not clearly visible.



## SAFETY SIGNS

1. Keep safety signs clean and legible at all times.
2. Replace safety signs that are missing or have become illegible.
3. Replaced parts that displayed a safety sign should also display the current sign.
4. Replacement safety signs are available. Contact USC at (785) 431-7900 .

### How to Install Safety Signs:

- Be sure that the installation area is clean and dry.
- Be sure temperature is above 50°F (10°C).
- Decide on the exact position before you remove the backing paper.
- Remove the smallest portion of the split backing paper.
- Align the sign over the specified area and carefully press the small portion with the exposed sticky backing in place.
- Slowly peel back the remaining paper and carefully smooth the remaining portion of the sign in place.
- Small air pockets can be pierced with a pin and smoothed out using the piece of sign backing paper.



Located on the USC equipment you will find safety labels. Always be sure to read and follow all directions on the labels.



Part # 09-02-0001



Part # 09-02-0002



Guards provided with USC Seed Wheel are to remain in place during operation.

## SECTION B INSTALLATION

**This section explains how to install a seed wheel to an existing seed treater. If seed wheel is already mounted to a seed treater, skip this section.**

**⚠ DANGER**

**HIGH VOLTAGE** ~ Always disconnect the power source before working on or near the control panel or lead wires.

**⚠ DANGER**

**HIGH VOLTAGE** ~ Use insulated tools when making adjustments while the controls are under power.

**NOTICE**

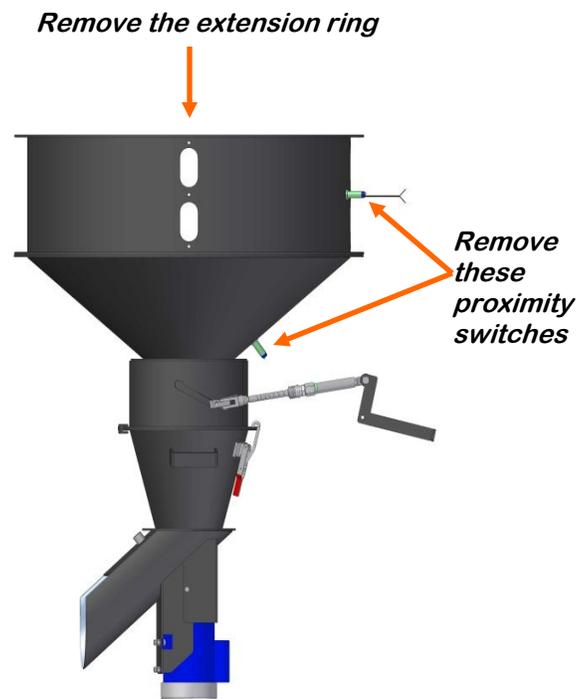
Permanent installation may require additional electrical cables, liquid hose, and air lines, since each installation is unique.

1. Clear the area of bystanders, especially small children, before installing.
2. Disconnect power from the seed treater.
3. Be sure there is enough clearance from overhead obstructions and power lines or other equipment to move the machine into its working position.
4. Disconnect and remove the proximity switches located in the supply hopper of the seed treater (figure 1). The Seed Wheel is supplied with proximity switches which must be used.

**NOTICE**

Failure to disconnect the proximity switches may cause later issues with the pump(s) and inlet conveyor.

5. Install the plug provided to replace the lower proximity switch.
6. Remove the extension ring from the seed treater (figure 1).

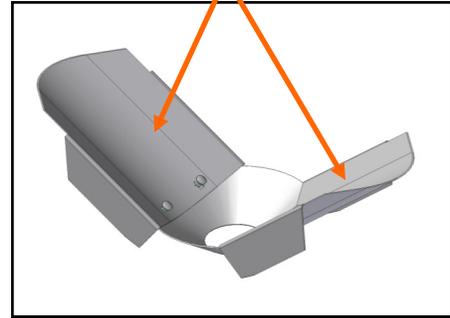


*Figure 1*

## SEED WHEEL

- On LP800 models only, insert the flow balancer (figure 2) in the cone of the seed treater so the ends of the flow balancer are directly under the bottom openings of the seed wheel. Holes can be drilled to mount the flow balancer permanently in the seed treater.

*Place these ends directly under the bottom openings of the seed wheel. (LP800 models only)*

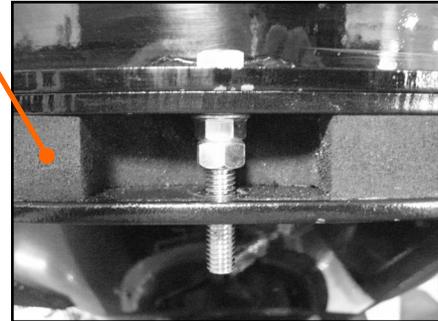


*Figure 2: Flow Balancer (LP800)*

- Install the four pieces of foam seal on top of the seed treater flange.

*Foam Seal*

- Set the seed wheel on the seed treater using the alignment bolts on the seed wheel. The junction box should be facing forward above the seed treater panel. The seed wheel will rest on top of the foam seal. (figure 3)

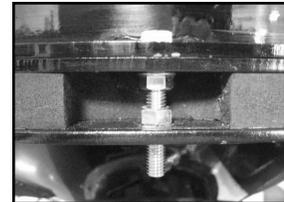


*Figure 3*

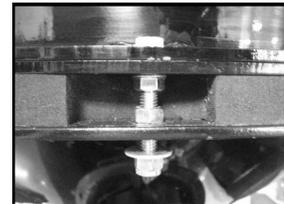
**NOTICE** **DO NOT** remove the two nuts from the alignment bolts of the seed wheel. The two nuts should be threaded next to each other.

- After setting the seed wheel on the seed treater, use the 3/8 flange nuts to tighten the seed wheel to the seed treater. Use the following steps to secure the seed wheel to the treater.

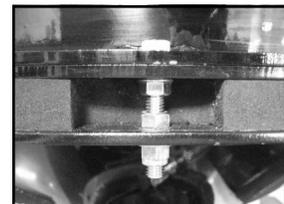
(A): Use the center nut and thread it to the bottom flange.



(B): Install the 3/8" flange nut to the alignment bolt.



(C): Tighten the bottom nut and center nut together against the seed treater flange. This will secure the seed wheel to the treater and keep the bottom plate of the seed wheel flat so the wheel does not bind.

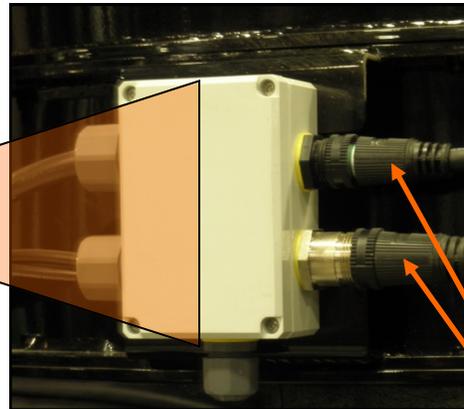


SEED WHEEL

11. For LP treaters, use one of the alignment bolts to mount the seed wheel control panel to the bottom flange of the seed treater (figure 4).
12. For LP treaters, connect the two cables from the seed wheel junction box to the seed wheel control panel (figure 4). For LPX Manual treaters, connect the two yellow cables to the junction box on the seed wheel (page 15).



**Figure 4**



**Figure 5**  
*(Seed Wheel junction Box)*

*Cables coming from LP Treater control panel or LPX Treater control panel*

*LP seed wheel control panel*

*LP Treater control panel*

## SEED WHEEL

13. For LPX Manual treaters (left) and LPX Automated treaters (right) , the system is run from an HMI touch screen located on the LPX treater control panel.

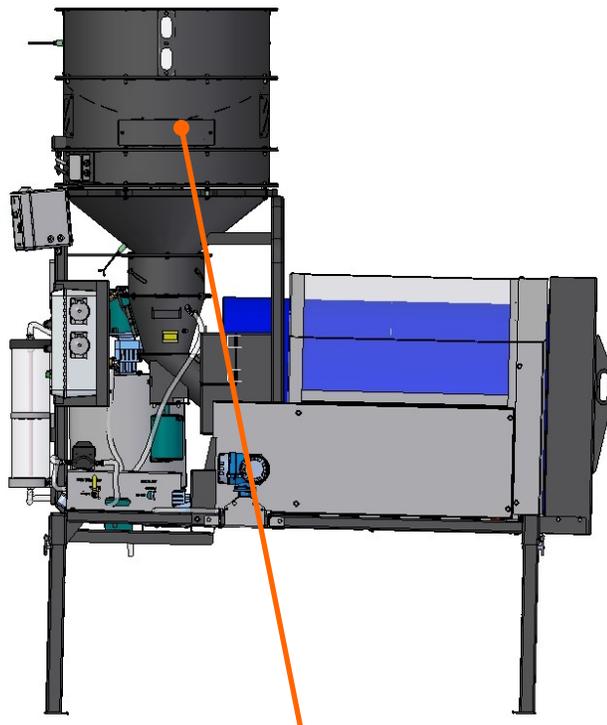


*HMI screen on  
LPX Manual  
Control Panel*



*HMI screen on  
LPX Automated  
Control Panel*

14. If needed, mount the extension ring back on top of the seed wheel.
15. Install the proximity switch supplied with the seed wheel back into the extension ring and wire into the junction box of the seed wheel. (See wiring instructions on page 18)
16. Open the adjustable seed gate as far as possible . If the seed gate is not open fully, seed flow will be diminished and may even back up into the seed wheel.



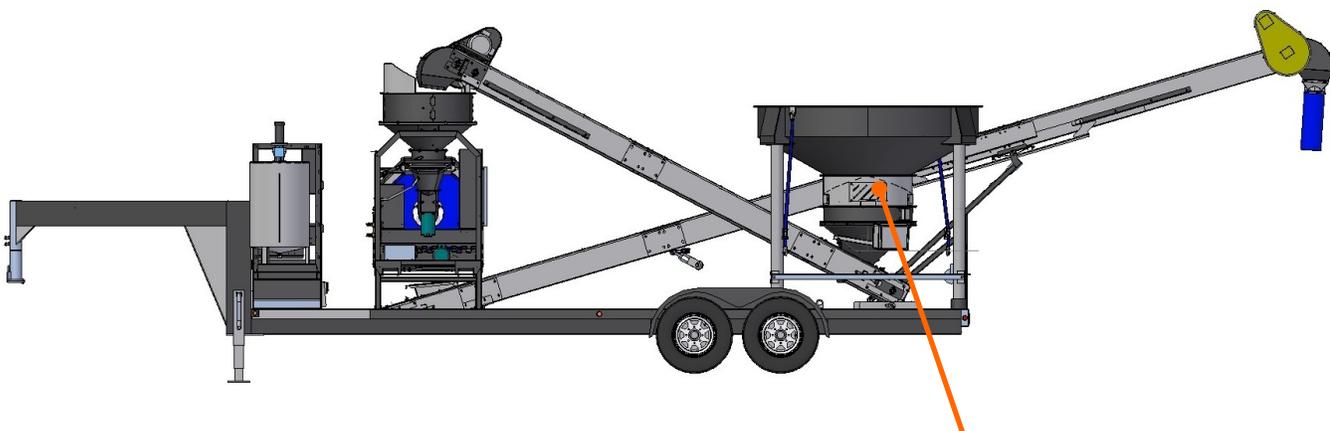
*Seed Wheel on LP Seed Treater*

**MOUNTING SEED WHEEL TO PORTABLE SEED TREATER**  
**(LPX MANUAL AND LPX AUTOMATIC ONLY)**

1. Clear the area of bystanders, especially small children, before installing.
2. Be sure there is enough clearance from overhead obstructions and power lines or other equipment to move the machine into its working position.
3. Disconnect and remove the proximity switches located in the supply hopper of the seed treater. Replace with the proximity switches supplied with the seed wheel.

**NOTICE** Failure to disconnect the proximity switches may cause later issues with the pump(s) and inlet conveyor.

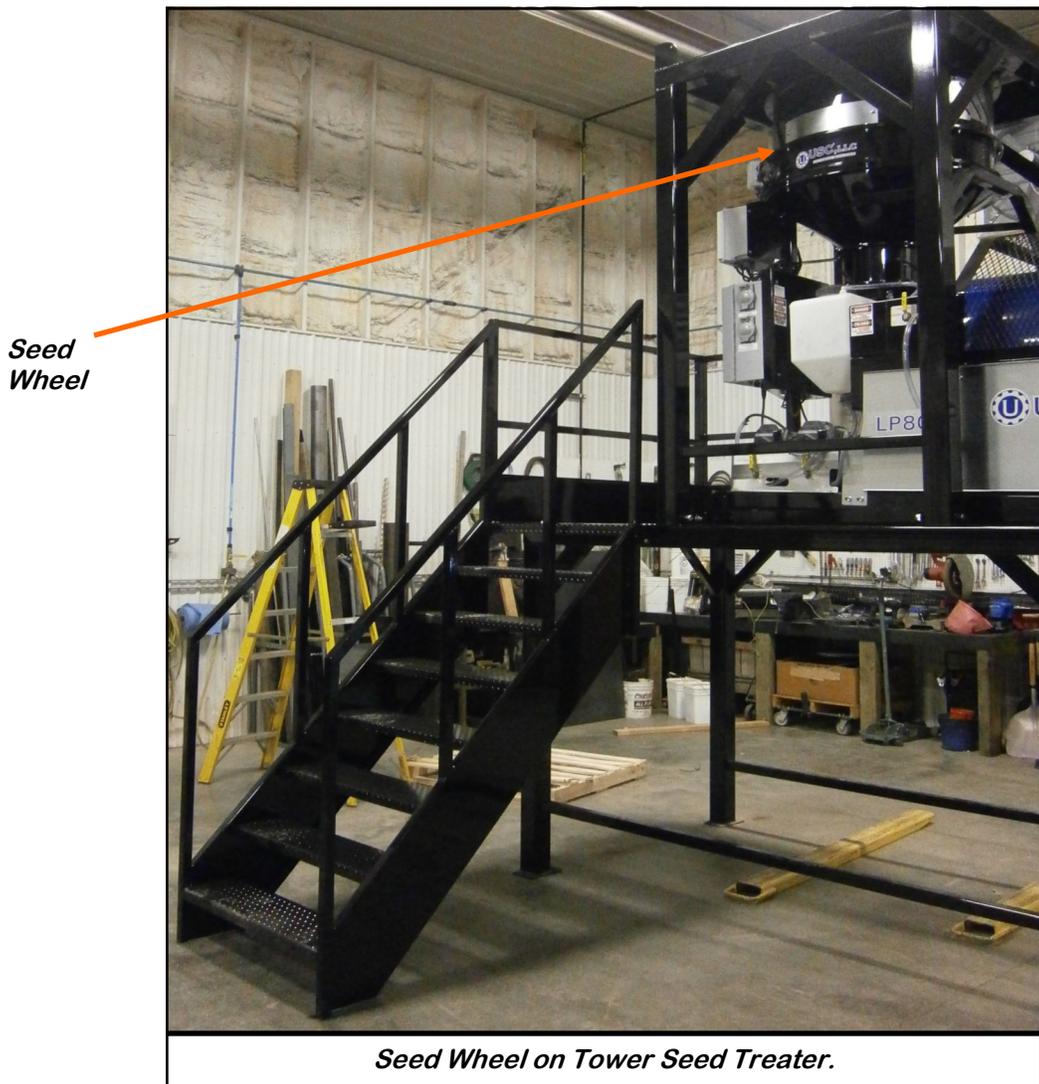
4. When mounting a seed wheel to a portable seed treater, a special hopper is used. The seed wheel does **not** mount to the top of the seed treater as on a standard treater because of height issues. Remove the existing hopper on the trailer and mount the new hopper with seed wheel to the trailer (below).
5. Using one of the alignment bolts, mount the LPX Manual seed wheel control panel to the bottom flange of the seed wheel.
6. Connect the two cables from the seed wheel control panel to the junction box on the seed wheel. On LP Manual treaters only, mount the manual seed wheel control panel, as well, at a location that is comfortable for the operator and then connect the two cables to the bottom of the seed wheel control panel.
7. Power can be brought to the seed wheel from the junction box on the seed treater.
8. A diverter is mounted in the seed treater supply hopper to spread seed out to go through the atomizer.
9. Open the adjustable seed gate to its most wide open position. If the seed gate is not open fully, seed flow will be diminished and may even back up into the seed wheel.



*Seed Wheel under hopper on  
Portable Seed Treater.*

## **MOUNTING SEED WHEEL TO TOWER TREATER**

1. To install a seed wheel on an existing tower seed treater, you must first remove the seed treater from the tower. This will allow for easier installation. After the treater has been removed, follow steps 1 through 16 on pages 12-15 to install the seed wheel.
2. Set the seed treater back on the tower stand.
3. Install the tower leg extensions on box stand and mount box stand back over the seed treater.
4. Open the adjustable seed gate to its most wide open position. If the seed gate is not open fully, seed flow will be diminished and may even back up into the seed wheel.
5. Set the platform steps on the tower platform. The steps will allow easier access to the gate on the seed box and the Seed Wheel control panel.



## WIRING INSTRUCTIONS



**HIGH VOLTAGE** ~ Always disconnect the power source before working on or near the control panel or lead wires.



**HIGH VOLTAGE** ~ Use insulated tools when making adjustments while the controls are under power.



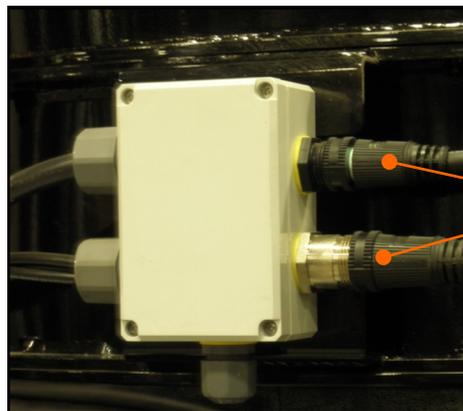
Permanent installation may require additional electrical cables and liquid hose, since each installation is unique.



Refer to the electrical schematic supplied with the piece of equipment for further electrical details.

On LP seed treaters, power to the seed wheel panel is supplied from a standard 110V plug. For all LPX seed treaters, the seed wheel will receive its incoming power from the treater main panel via the plug connected cables.

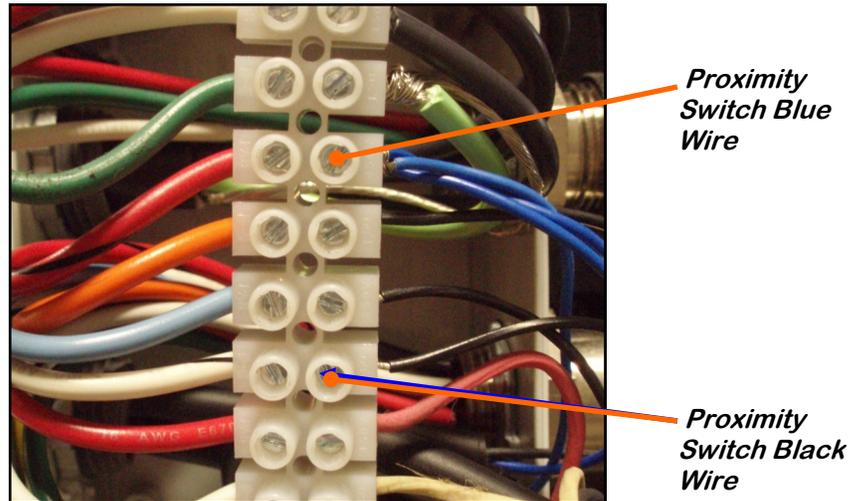
1. The proximity switches must be removed from the seed treater. Replacement proximity switches are provided with the seed wheel. The pump(s) proximity switches are already wired into the seed wheel control panel. If you are using a conveyor to feed the treater, the top proximity switch must be wired into the seed wheel junction box.
2. On LP seed treaters, connect the two cables coming from seed wheel control panel, into the junction box. For all LPX seed treaters, the two cables connect to the treater control panel.



*Cables from  
Seed Wheel  
Panel*

## SEED WHEEL

3. Wire the Inlet Conveyor Proximity Switch into the small junction box located on the Seed Wheel. The Blue wire on the proximity switch will connect to the terminal opposite of the Red wire with Black stripe. Two other Blue wires will also be connected into this terminal. The Black wire on the proximity switch will connect opposite of the White wire with Black stripe.



4. On LP seed treaters **ONLY**, the 4-pin cable coming out of the bottom of the seed wheel control panel wires into the seed treater panel.

**NOTICE** Seed Wheels installed on LP portable units will have a 2-pin cable coming from the bottom of the seed wheel panel to connect in the seed treater panel.

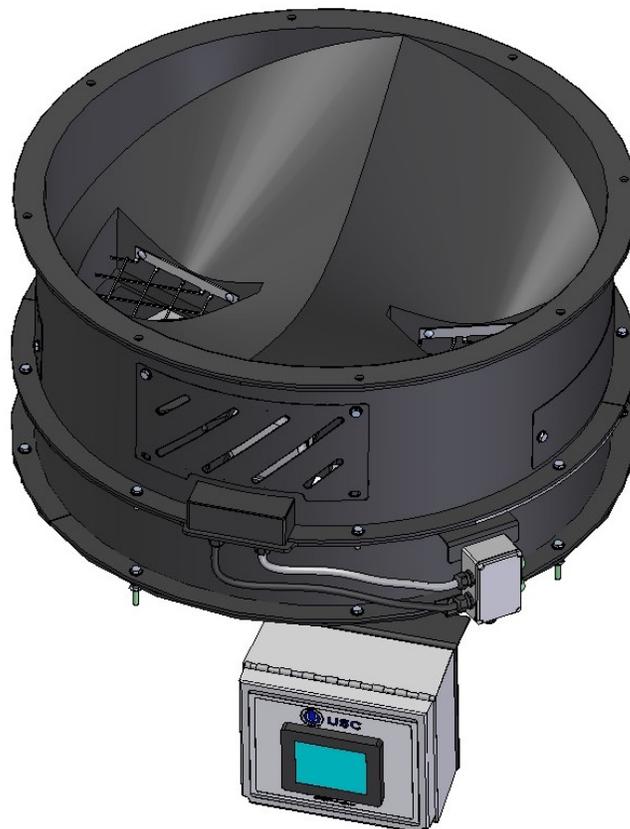
- Wire number 2141 (BLACK) from the seed wheel panel is connected to 120volts in the seed treater panel.
- Wire number 4061 (RED) from the seed wheel panel is hooked to the pump(s) auto shut-off in the seed treater panel. The terminal number is 6, 38, or 4061, depending on the year.
- Wire number 3071 (ORANGE) from the seed wheel panel is hooked to the inlet conveyor shut-off in the seed treater panel. The terminal number is 10, 15, 22, or 3071, depending on the year.
- The WHITE wire will be connected to Neutral in the seed treater panel.

**SYSTEM OVERVIEW**

The Seed Wheel is designed to simplify and increase seed flow calibration accuracy. A rotating wheel is driven by a variable speed motor, which is set prior to treating the seed. This is mounted above the atomizer. The wheel consists of 8 identical pockets approximately 4 inches deep. As it rotates, the wheel captures a certain amount of seed in each pocket. After the seed is caught, the wheel continues rotation and dispenses the seed into the atomizer chamber. With the constant turn of the wheel, there is a consistent amount of seed always sent through the atomizer.

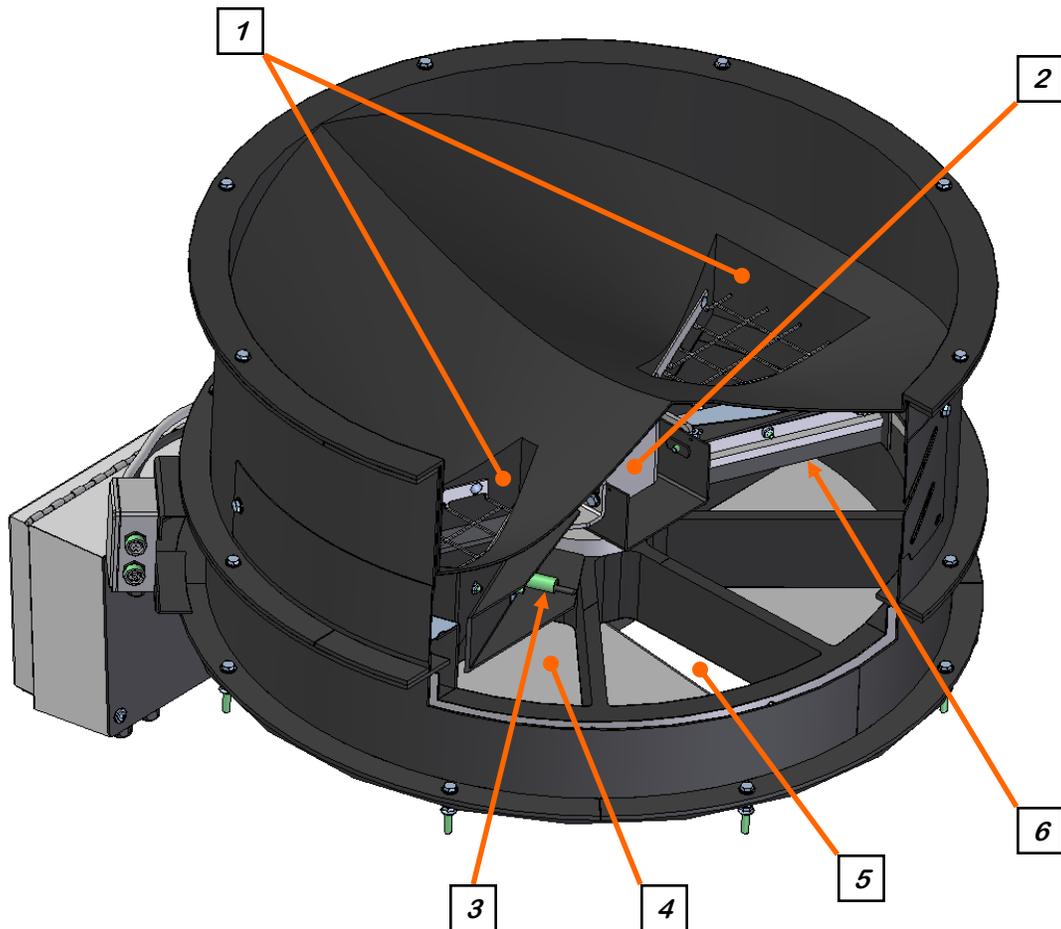
A cup is used to represent a certain percentage of one of the wheels pockets. To calibrate the seed flow, take a sample of the seed to be treated using the cup and weigh it (see page 30). From the weight of the seed sample and by also knowing the RPM of the wheel, you can determine how fast that seed type will pass through the seed treater.

The purpose of the seed wheel is to simplify calibration and make seed flow calibration more accurate. The seed wheel saves time when switching to different seed sizes and seed types, and can be mounted to most LP and LPX models.



## SEED WHEEL

### SEED WHEEL CUT-AWAY



**1. Openings to Wheel:** This is where the seed is dispensed into the wheel pockets.

**2. Variable Speed Motor:** Drives the wheel and the speed can be adjusted to fit your desired seed flow.

**3. Proximity Switch:** Controls when the pump(s) turn on and off when the pump switch on the seed treater is in the Automatic position. When seed is covering this sensor and the pump switch is in Auto, the pump(s) will run. When seed is no longer covering this sensor, the pump(s) will shut off.

**4. Seed Wheel Pocket:** Catches the seed as the wheel rotates. Approximately 7 to 9 pounds are held in each pocket, depending on the type and size of seed.

**5. Opening to Atomizer:** This is where the seed is dispensed from the pockets into the atomizer chamber.

**6. Brush:** The brush levels off the top of each pocket as the wheel rotates to ensure each pocket contains the same amount of seed.

## SEED WHEEL

### SEED WHEEL CONTROL PANEL

Refer to the control panel and the electrical schematic for proper voltage and amperage of the machine. On LP treaters only, there is a separate control panel that requires a 120V single-phase power supply with neutral. The LPX treaters do not require a separate control panel or power supply for the Seed Wheel. The cables run directly from the Seed Wheel junction box to the LPX seed treater control panel.



**HIGH VOLTAGE** ~ Always disconnect the power source before working on or near the control panel or lead wires.



**HIGH VOLTAGE** ~ Use insulated tools when making adjustments while the controls are under power.



**AUTHORIZED PERSONNEL** only shall work on the control panel. Never allow anyone who has not read and familiarized themselves with the owner's manual to open or work on the control panel.



### SEED WHEEL CONTROL PANEL (LP TREATERS ONLY)

**SEED WHEEL CONTROL PANEL**

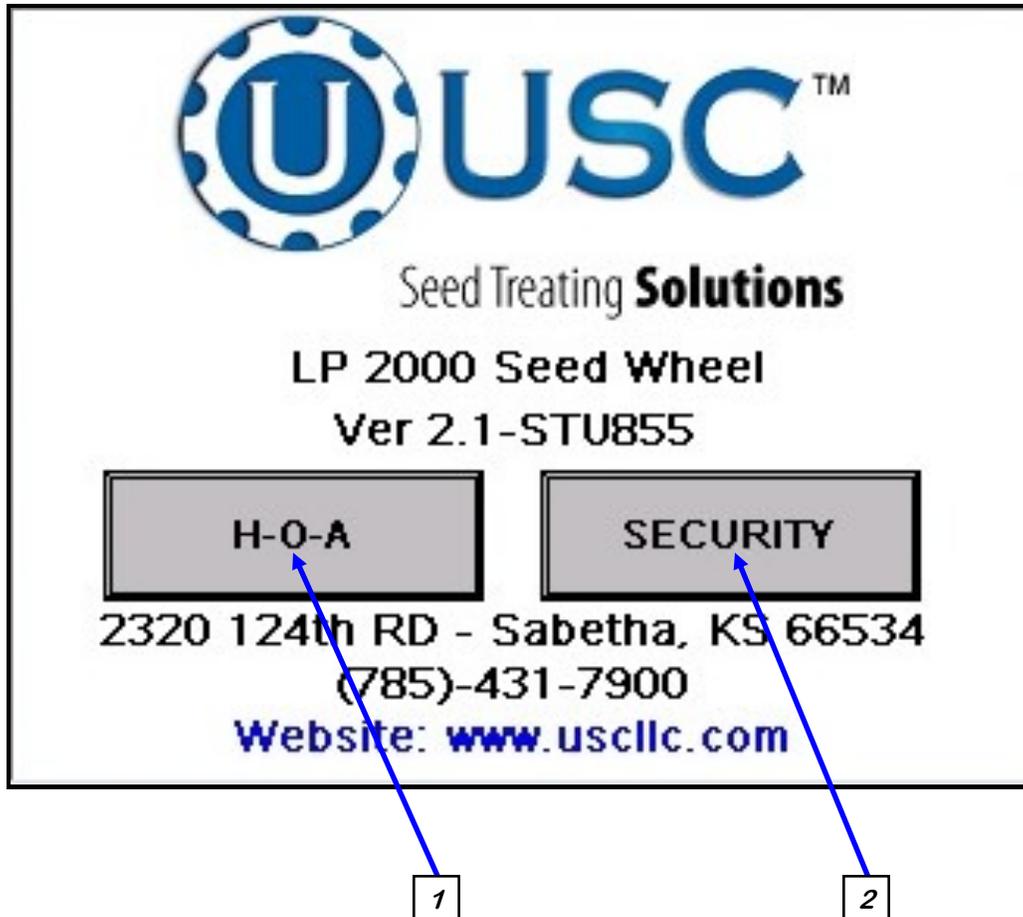
The following pages explain the function of the touch screen controls.

**USC START UP SCREEN**

While the system is booting up, the pump stand controller touch screen will display a timer bar at the bottom of the Start Up Screen. Once the timer bar reaches the end it will advance the user to the Main Screen.

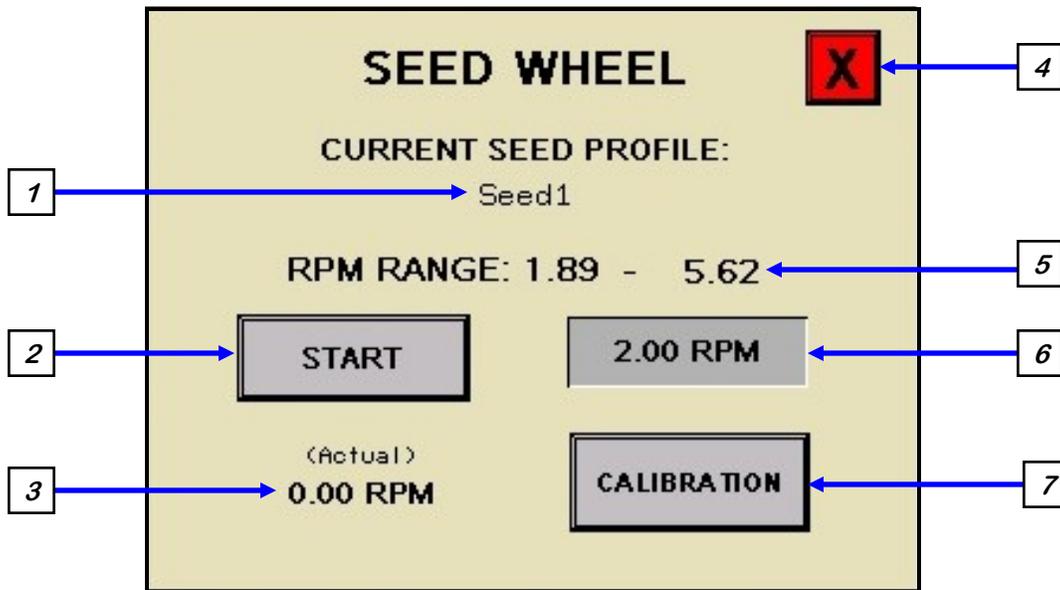


**MAIN SCREEN**



1. **H - O - A (Hand-Off-Auto):** This button advances the operator to the H-O-A screen (page 25).
2. **SECURITY:** This button advances the operator to the Security screen. This screen is for setting up the basic parameters of the system. It will only be used by a system administrator or USC service personnel.

**H-O-A (HAND-OFF-AUTO) SCREEN**



**1. CURRENT SEED PROFILE DISPLAY:** This displays the name of the seed type currently active in the system.

**2. START BUTTON:** This button starts the Seed Wheel in motion. Once pressed, this button toggles to STOP.

**3. SEED WHEEL RPM DISPLAY:** This display shows the actual RPMs of the Seed Wheel.

**4. EXIT BUTTON:** This button returns the operator to the Main screen.

**5. RPM RANGE:** This informs the operator of the minimum and maximum RPMs the Seed Wheel should be set for.

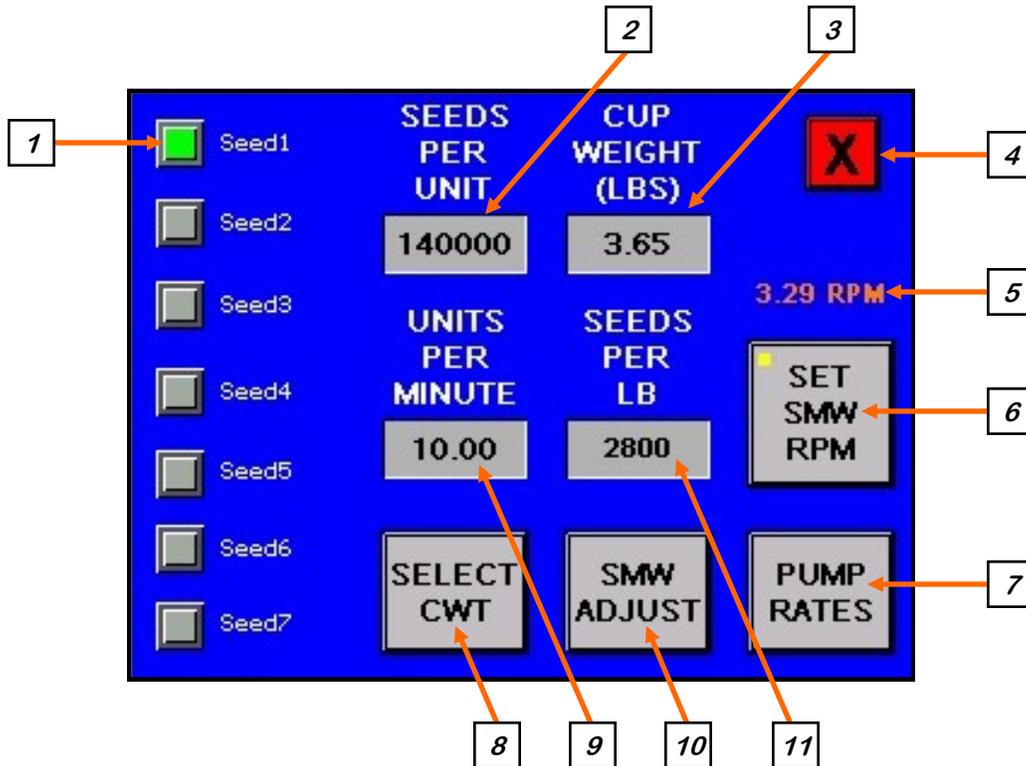
**6. RPM SETTING:** When this button is pressed, a numeric touch pad (bottom) will appear to allow the operator to manually adjust the speed of the Seed Wheel.

**7. CALIBRATION BUTTON:** This button takes the operator to the Calibration screen. (see page 26).



**CALIBRATION SCREEN - SCU**

This screen allows the operator to select seed type, unit of measurement, pump rates and Seed Wheel settings if the treater is equipped with one. The default setting is Seed Counts per Unit. It can also be set to Cut Weight.



**1. SELECT SEED TYPE MODULE:** The operator can select between seven different pre-determined seed types. Press the name of the Seed Type and an alpha numeric keyboard will popup allowing the operator to change the name.

**2. SEEDS PER UNIT:** Pressing this button will bring up a numeric keypad which allows the operator to input the number of seeds per unit.

**3. CUP WEIGHT:** Pressing this button will bring up a numeric keypad which allows the operator to input the cup weight for the Seed Wheel (see page 30).

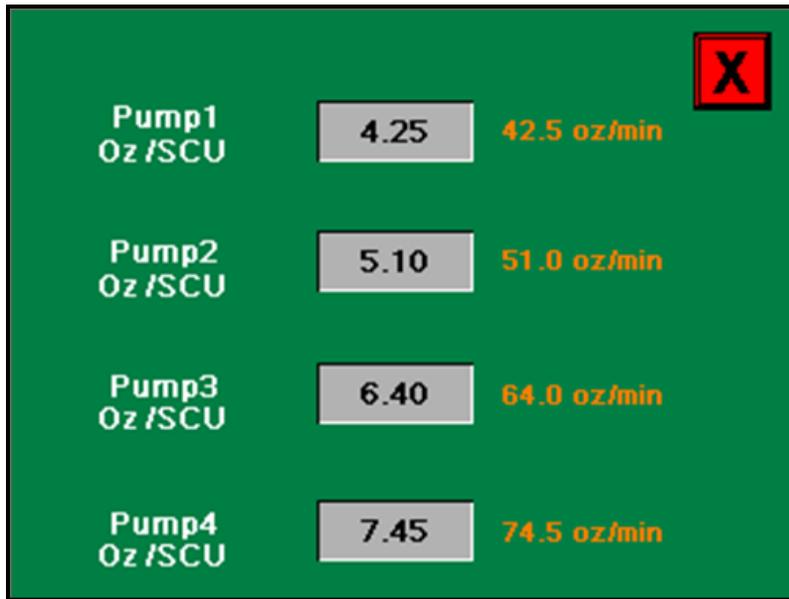
**4. SCREEN EXIT BUTTON:** This button is used to exit back to the previous screen. Its functionality is the same throughout the HMI display.

**5. RPM INDICATOR:** When any of the parameters on this screen are changed the indicator modifies the Seed Wheel RPM. The operator must press the SET SMW RPM button below it to actually make the change on the H-O-A screen. It also changes colors / states if it is different than the current Seed Wheel setting.

**6. SET SEED METERING WHEEL RPM:** Pressing this button will change the RPM setting on the H-O-A screen to match the number on the RPM Indicator.

**CALIBRATION SCREEN - SCU**

7. **PUMP RATES:** Pressing this button takes the operator to the screen below. By pressing the pump name an alphanumeric keypad will popup allowing the operator to key in a new name (below left). Press the grey buttons in the center, a numeric keypad will popup to change the value of the amount of chemical per Seed Count Unit (below right). This is only a calculator. The number to the right will give the operator the ounces per minute required based on the current flow rate. Manually adjust your flow meter to reflect the change. If not using a flow meter, make the adjustment on the liquid adjustment dial on the Pump Stand Control Panel.



8. **SELECT CWT:** Pressing this button toggles back and forth between the default of Seed Count Units and Cut Weight.

9. **UNITS PER MINUTE:** Pressing this button will bring up a numeric keypad which allows the operator to change the number of units treated per minute.

10. **SMW ADJUST:** This button takes the operator to the Seed Metering Wheel adjustment screen (see page 29).

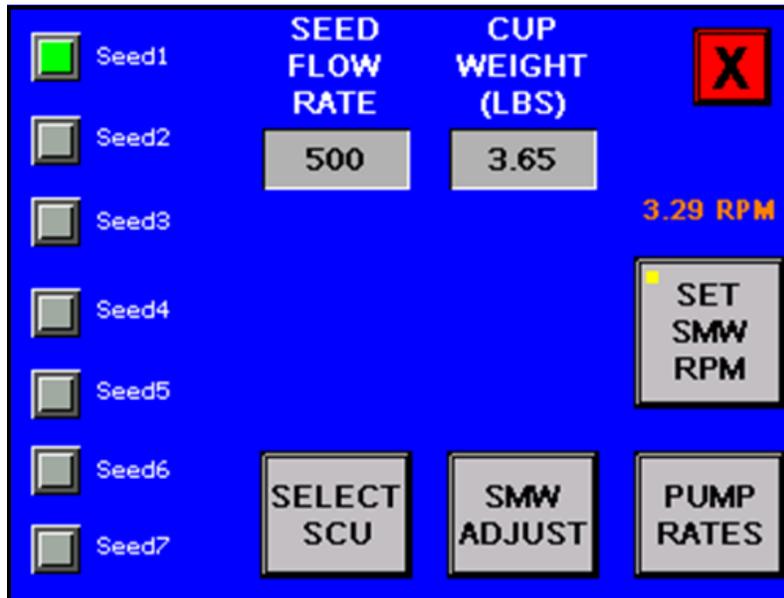
11. **SEEDS PER POUND:** Pressing this button will bring up a numeric keypad which allows the operator to change the number of seeds per pound of a given seed type.



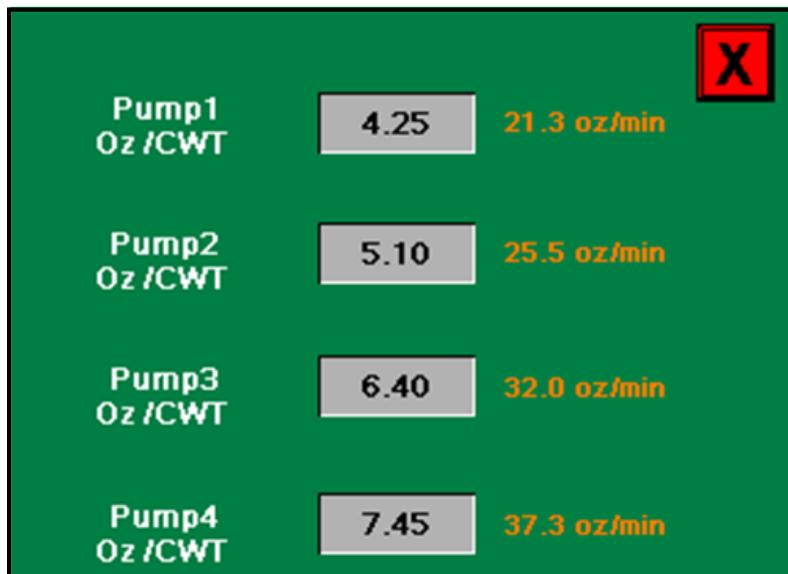
SEED WHEEL

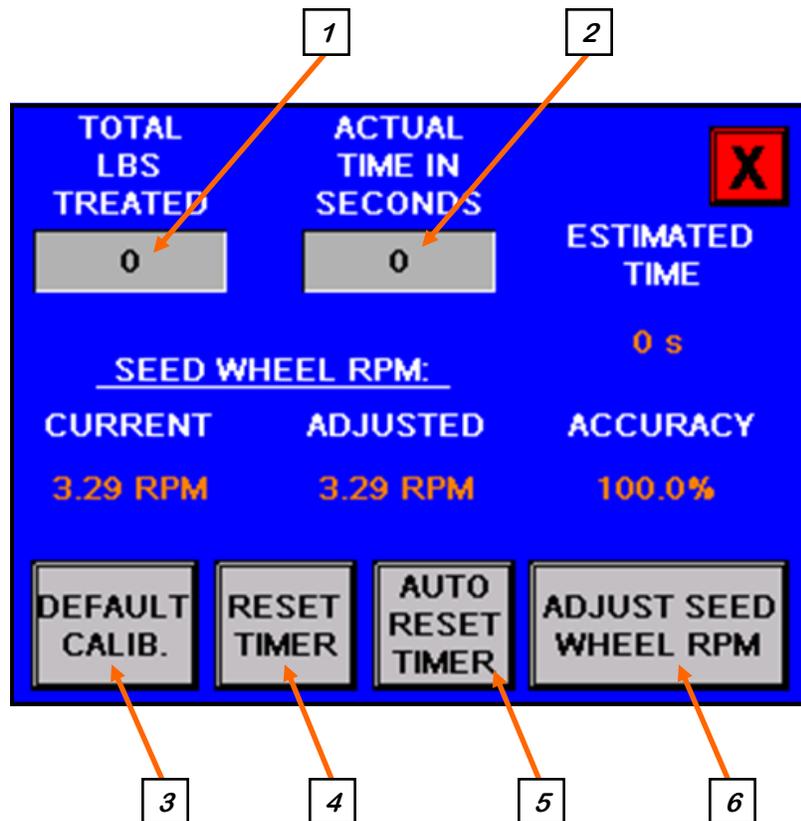
**CALIBRATION SCREEN - CWT**

When the operator chooses SELECT CWT from the calibration screen it will change to the screen below. If they re-select the same button it will toggle back to the default.



When the operator chooses PUMP RATES from the calibration screen it will change to the screen below. All pump settings are now in CWT.



**SEED METERING WHEEL ADJUSTMENT SCREEN**

**1. TOTAL POUNDS TREATED:** Pressing this button will bring up a numeric keypad which allows the operator to manually input the amount that was treated.

**2. ACTUAL TIME IN SECONDS:** This button indicates the time it took to complete the previous run. Pressing this button will bring up a numeric keypad which allows the operator to input the amount of time they want it to take to treat that amount of seed. After the new time is entered, press the ADJUST SEED WHEEL RPM button. This returns the operator to the previous screen, now press the SET SMW RPM to complete the change.

**3. DEFAULT CALIB.:** Pressing this button resets calibration back to factory settings.

**4. RESET TIMER:** Pressing this button zeroes out the timer.

**5. AUTO RESET TIMER:** Pressing this button resets the timer to zero at the beginning of every run if more than ten seconds has passed. This button turns green when activated and stays green until deactivated.

**6. ADJUST SEED WHEEL RPM:** Pressing this button activates any of the changes made from this screen and automatically returns them to the first calibration screen.

## SECTION D CALIBRATION

The following is a list of steps to use when calibrating the seed wheel. A seed calibration cup, funnel, stand, and scale are used to calibrate the seed wheel.

1. Set the empty seed calibration cup on the scale and zero out the weight of the cup.
2. Place the funnel and stand in the seed to be treated or a separate container (figure 1). This will help to avoid any unnecessary clean-up while filling and leveling the top of the seed calibration cup.
3. Place your hand under the bottom of the funnel and fill the funnel up with seed.
4. Place the calibration cup under the funnel stand and remove your hand from the bottom of the funnel, and allow the cup to be filled. (figure 1)
5. After the cup has been filled, strike off the top of the calibration cup with a straight edge. (figure 2)

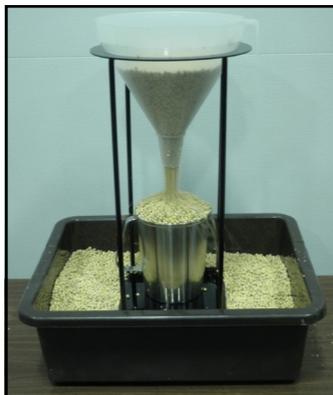


*Seed Calibration Cup*

**NOTICE** DO NOT shake the cup.

6. Weigh the sample of seed. (figure 3)

**NOTICE** A typical weight of the sample of seed will be anywhere between 2.8 to 4.0 lbs. Anything over or under this range could be caused by not zeroing out the weight of the cup, or the scale may be set on the wrong units.



*Figure 1*



*Figure 2*



*Figure 3*

**MANUAL METHOD FOR SEED FLOW CALCULATIONS**

The following steps illustrate how to determine the RPM for your desired seed flow rate. Different seed types will fill the pocket differently. When figuring your seed flow rate, be sure to use the chart below for the type of seed.

1. Determine a seed flow rate.

**EXAMPLE:** *Desired Seed Flow Rate = 700 lbs./min.*

2. Determine the number of pounds per wheel revolution which will be dispensed through the seed wheel. This can be found by dividing the desired seed flow rate by the number of pockets dispensed per revolution.

**EXAMPLE:** Seed Flow Rate = 700 lbs./min.  
 $700 / 16 = 43.75$  lbs.  
***43.75 lbs. per wheel revolution.***

3. Find the weight of seed in each pocket. This can be done by taking a sample of the seed to be treated (follow the steps on page 30). Divide the weight of the sample by the Cup Percentage for the type of seed you are treating.

**EXAMPLE:** Weight of seed in cup = 3.58  
 Cup Percentage for Soybeans = 0.38501  
 $3.58 / 0.38501 = 9.298$   
***9.298 lbs. per wheel pocket.***

4. Determine the RPM of the Seed Wheel to match your desired seed flow rate. Take the lbs per wheel revolution and divide it by the lbs per wheel pocket. Then add in a 0.04 factor to compensate for the drop in wheel RPM under a load of seed.

**EXAMPLE:** Pounds per wheel revolution = 43.75  
 Pounds per wheel pocket = 9.298  
 $43.75 / 9.298 = 4.71$   
 $4.71 + 0.04 = 4.75$   
***4.75 RPM is the number the seed wheel needs to be set at to match your desired seed flow rate.***

Seed Type	Cup Percentage
CORN	0.38080
COTTON	0.38153
PEAS	0.38979
RICE	0.37936
SOYBEANS	0.38501
WHEAT	0.36527
OTHER	0.38029

**TREATING SEED WITH STANDARD LP OR LPX TREATER**

1. Prime the line going to the atomizer by turning the Atomizer switch to ON and turn the SEED TREATMENT valve to PROCESS. Next turn the pump direction switch to FORWARD and the HAND / OFF / AUTO switch to Hand. Liquid should begin pumping up to the atomizer. After the line has been primed, turn the HAND / OFF / AUTO switch to AUTO. Additional liquid may be pumped up into the atomizer and into the drum to guarantee coverage of the first seed that passes through the machine.



Do **NOT** pump liquid into the atomizing chamber when the atomizer is OFF.

2. Position the SEED TREATMENT SOURCE valve to MIX TANK.



If you desire to check the total ounces used per batch of seed. Fill the calibration tube with the amount needed for the batch of seed (about 10 ounces extra is a good practice). Then position the SEED TREATMENT SOURCE valve to CALIBRATION TUBE and go on to step 3.

3. Begin feeding seed into the Seed Wheel until the supply hopper is full. This will ensure that the first pockets are full when the wheel is turned on. At this time, ensure the seed gate on the seed treater is wide open.
4. Turn the switches to ON for the Drum, Atomizer, and any Conveyors being used. Also turn the HAND / OFF / AUTO switch to AUTO. The pumps will **NOT** start until the Seed Wheel switch has been activated.
5. Turn the Seed Wheel to ON. The Seed Wheel will slowly speed up to the dialed-in RPM. The pumps will also begin pumping liquid into the atomizer, this will start the seed treating process.



You may notice the RPM will run at a lower RPM under the load of seed. Do not adjust the RPM back up. The program already has figured in the factor for the drop in RPM.

6. As you are treating the first batch of seed, time the seed as it begins flowing out the atomizer chute (right).
7. Once all the seed has passed through the seed wheel and atomizer, stop timing. The pump(s) will automatically shut off.

*Begin timing when seed starts flowing out of the chute*



**TREATING SEED WITH PORTABLE LP TREATER**

1. Prime the line going to the atomizer by turning the Atomizer switch to ON and turn the SEED TREATMENT valve to PROCESS. Next turn the pump direction switch to FORWARD and the HAND / OFF / AUTO switch to HAND. Liquid should begin pumping up to the atomizer. After the line has been primed, turn the HAND / OFF / AUTO switch to AUTO. Additional liquid may be pumped up into the atomizer and into the drum to guarantee coverage of the first seed that passes through the machine.



Do **NOT** pump liquid into the atomizing chamber when the atomizer is OFF.

2. Position the SEED TREATMENT SOURCE valve to MIX TANK.

**NOTICE**

If you desire to check the total ounces used per batch of seed. Fill the calibration tube with the amount needed for the batch of seed (about 10 ounces extra is a good practice). Then position the SEED TREATMENT SOURCE valve to CALIBRATION TUBE and go on to step 3.

3. Fill the supply hopper on the trailer with the seed to be treated. This will ensure that the first pockets are full when the wheel is turned on. At this time, ensure the seed gate on the seed treater is wide open.
4. Turn the switches to ON for the Drum, Atomizer, and any Conveyors being used. Also turn the HAND / OFF / AUTO switch to AUTO. The pumps will **NOT** start until the Seed Wheel switch has been activated.
5. Turn the Seed Wheel to ON. The seed wheel will slowly speed up to the dialed-in RPM. The pumps will start after a pre-determined time that is set on a timer located in the Seed Wheel control panel (right). This allows the seed to travel from the hopper to the Atomizer before the pump begins. After the specified time has elapsed, the pump will start and the seed treating process will begin.

**NOTICE**

You may notice the RPM will run at a lower RPM under the load of seed. Do not adjust the RPM back up. The program already has figured in the factor for the drop in RPM.



6. As you are treating the first batch of seed, time the seed as it begins flowing out the atomizer chute (see picture on page 32).
7. Once all the seed has passed through the seed wheel and atomizer, stop timing. The pump(s) will automatically shut off after a pre-determined time. This time is set in the seed treater control panel. See seed treater manual for more details.

### **TREATING SEED WITH TOWER LP OR LPX TREATER**

1. Prime the line going to the atomizer by turning the Atomizer switch to ON and turn the SEED TREATMENT valve to PROCESS. Next turn the pump direction switch to FORWARD and the HAND / OFF / AUTO switch to HAND. Liquid should begin pumping up to the atomizer. After the line has been primed, turn the HAND / OFF / AUTO switch to AUTO. Additional liquid may be pumped up into the atomizer and into the drum to guarantee coverage of the first seed that passes through the machine.



Do **NOT** pump liquid into the atomizing chamber when the atomizer is OFF.

2. Position the SEED TREATMENT SOURCE valve to MIX TANK.

#### **NOTICE**

If you want to check the total ounces used per batch of seed. Fill the calibration tube with the amount needed for the batch of seed (about 10 ounces extra is a good practice). Then position the SEED TREATMENT SOURCE valve to CALIBRATION TUBE and go on to step 3.

3. Place a full box of the seed to be treated above the seed treater. Open the bottom of the box to allow the seed wheel to fill. This will ensure that the first pockets are full when the wheel is turned on. At this time, ensure the seed gate on the seed treater is wide open.
4. Turn the switches to ON for the Drum, Atomizer, and any Conveyors being used. Also turn the HAND / OFF / AUTO switch to AUTO. The pumps will **NOT** start until the Seed Wheel switch has been activated.
5. Turn the Seed Wheel to ON. The Seed Wheel will slowly speed up to the dialed-in RPM. The pumps will also begin pumping liquid into the atomizer, this will start the seed treating process.

#### **NOTICE**

You may notice the RPM will run at a lower RPM under the load of seed. Do not adjust the RPM back up. The program already has figured in the factor for the drop in RPM.

6. As you are treating the first batch of seed, time the seed as it begins flowing out the atomizer chute (see picture on page 32).
7. Once all the seed has passed through the seed wheel and atomizer, stop timing. The pump(s) will automatically shut off after a pre-determined time. This time is set in the seed treater control panel. See seed treater manual for more details.

**TROUBLESHOOTING****SECTION  
E**

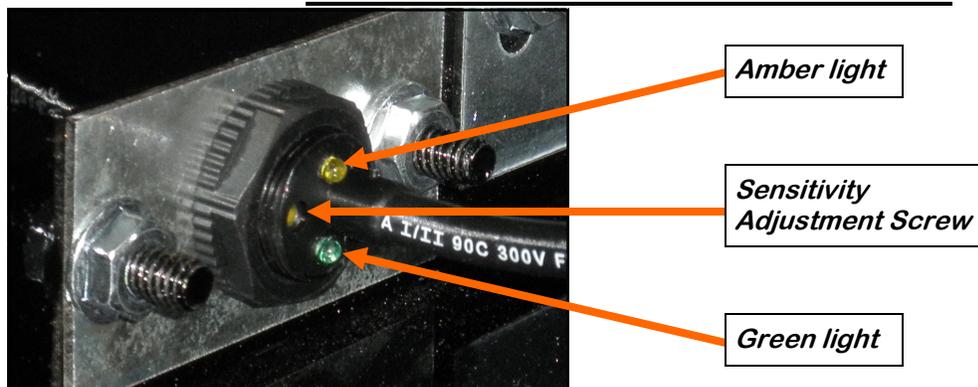
Below is a table describing the most frequent problems and solutions with the USC Seed Wheel. For further assistance, contact the USC Service department at (785) 431-7900.

Problem	Possible Cause	Solution
Pump will not turn off in AUTO when seed runs out.	<ol style="list-style-type: none"> <li>1. Proximity switch is dirty.</li> <li>2. Proximity switch is set too sensitive.</li> </ol>	<ol style="list-style-type: none"> <li>1. Clean proximity switch.</li> <li>2. Adjust the pump proximity switch sensitivity by turning adjustment screw counter-clockwise (page 36).</li> </ol>
Pump will not turn on in AUTO”	<ol style="list-style-type: none"> <li>1. Proximity switch is not staying covered.</li> <li>2. Atomizer or Seed Wheel is not on.</li> <li>3. Proximity switch is not sensitive enough.</li> </ol>	<ol style="list-style-type: none"> <li>1. Make sure proximity switch is staying covered with seed.</li> <li>2. Turn on Atomizer and Seed Wheel. Atomizer and Seed Wheel must be on to run pump #1 <u>and</u> #2 in Auto.</li> <li>3. Adjust pump proximity switch sensitivity by turning the adjustment screw clockwise (page 36).</li> </ol>
Seed Wheel will not turn on.	<ol style="list-style-type: none"> <li>1. VFD inside of control panel has a fault.</li> <li>2. Loose wire connection.</li> <li>3. Incorrect incoming power.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check VFD for faults. Shut off power until the VFD turns off completely, then restore power to seed wheel.</li> <li>2. Check all wire connections.</li> <li>3. Check incoming power. Should be 120 volts.</li> </ol>
Seed Wheel keeps shutting off	<ol style="list-style-type: none"> <li>1. Seed Wheel drawing too many amps.</li> <li>2. Seed Wheel is binding.</li> <li>3. Seed Wheel is incorrectly mounted.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check motor amperage.</li> <li>2. Check to make sure nothing is pressing down on the seed wheel.</li> <li>3. Loosen up the seed wheel from the seed treater and check again.</li> </ol>
Chemical rates are off; I am applying to much or not enough chemical.	<ol style="list-style-type: none"> <li>1. Pockets in seed wheel are not staying full.</li> <li>2. Calculations are off.</li> </ol>	<ol style="list-style-type: none"> <li>1. Ensure that the pockets are staying full while treating.</li> <li>2. Re-check calculations. If this is the first batch treated, you may have to adjust your numbers in the formula.</li> </ol>

## SEED WHEEL

Problem	Possible Cause	Solution
Seed is backing up into the seed wheel	<ol style="list-style-type: none"> <li>1. Seed gate on treater is closed down.</li> <li>2. Seed wheel is turning too fast.</li> <li>3. Restriction above seed gate.</li> </ol>	<ol style="list-style-type: none"> <li>1. Open seed gate wide open.</li> <li>2. Slow down the seed wheel to accommodate your seed treater.</li> <li>3. Remove restriction.</li> </ol>

### PROXIMITY SWITCH ADJUSTMENT GUIDE



The proximity switches mounted in the extension ring and the seed wheel detect when seed is present.

The proximity switch located in the extension ring is used to automatically shut off the inlet conveyor when the surge hopper is full. This proximity switch is not present on tower systems.

The proximity switches located in the seed wheel automatically shut off the pump when all seed has left the hopper.

If the proximity switch is not working properly, this can be caused by wear, dust, or even moisture. The first step is to clean the lens of the proximity switch. If this does not solve the problem, the next step would be to adjust the sensitivity of the proximity switch.

The green light indicates the power status. If it is active the device is powered.

The amber light indicates when seed is being detected. If it is active it detects seed, if inactive it does not detect seed.

Using the small screwdriver provided inside the control panel, you can adjust the proximity switch by turning the adjusting screw on the back of the proximity switch.

- Turn Clockwise to make the proximity switch more sensitive.
- Turn Counterclockwise to make the proximity switch less sensitive.

Proper maintenance of the USC Seed Wheel is critical for peak performance, reliability and accuracy of this system. The following is a guideline for the type of maintenance and servicing that should be performed on this unit. Your environment and uses may require additional maintenance and service beyond this list to assure a reliable and safe unit. The operator of this unit has ultimate responsibility to identify areas of concern and rectify them before they become a hazard or safety issue. There is no substitute for a trained, alert operator.



Do not put this unit into operation with any questionably maintained parts. Poor performance or a hazard may occur.

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### **SEED WHEEL**

- Inspect all welds and structural components for bends, cracks and damage.
- Remove shields to inspect wheel, brushes and proximity switches.
- Use compressed air to blow out any seeds and excess build-up that may have occurred during operation.

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### **CONTROL PANEL**

- Check and tighten wire connections.
- Check starters and overloads.
- Check timers and relays.
- Inspect breakers.
- Check and set the proximity switches.
- Check the VFD .

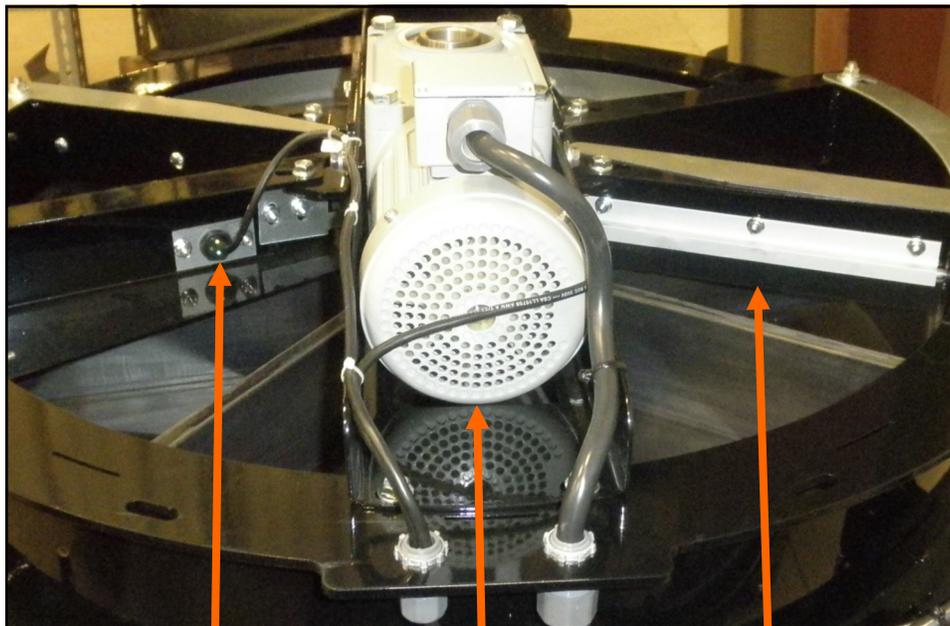
## SECTION G STORAGE

When storing the USC Seed Wheel for long periods of time, the following procedure must be followed to reduce the chance of rust, corrosion and fatigue of the machine. You can also use these steps when storing the machine for the winter.



A dust mask and protective rubber gloves shall be used when cleaning the machine.

1. Disconnect Power
2. Remove shields from the seed wheel and remove any debris or build-up. Compressed air can be used to blow out any foreign material.
3. Re-connect power and run seed wheel to help remove any additional debris. Compressed air can be used to blow out any foreign material.
4. Check brushes (below).
5. Wipe off and clean the lens of the proximity switches (below).
6. Disconnect Power and mount all guards back in place.
7. Tarp or cover the seed wheel to keep out any dirt or unwanted pests.

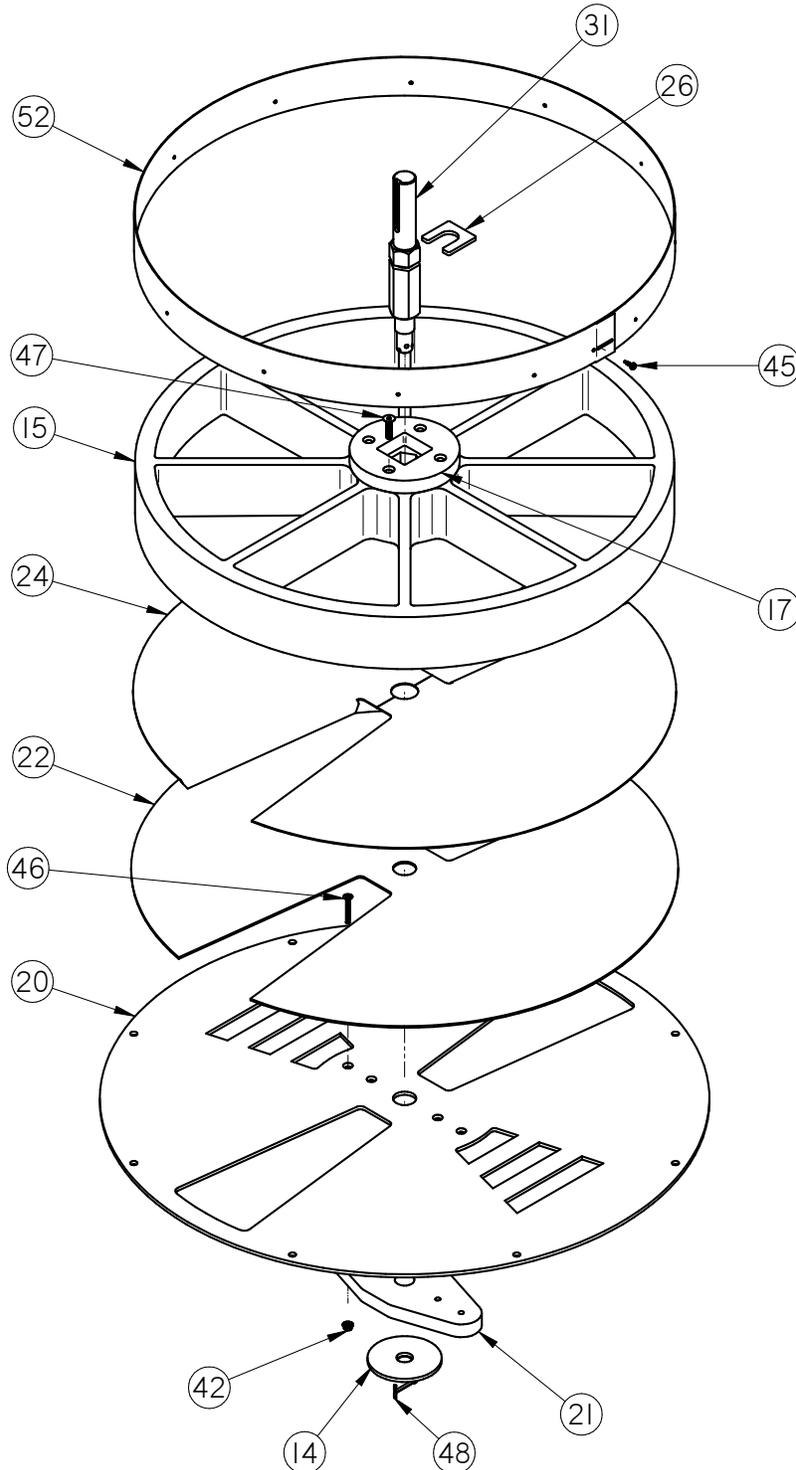


*Proximity Switch*

*Motor*

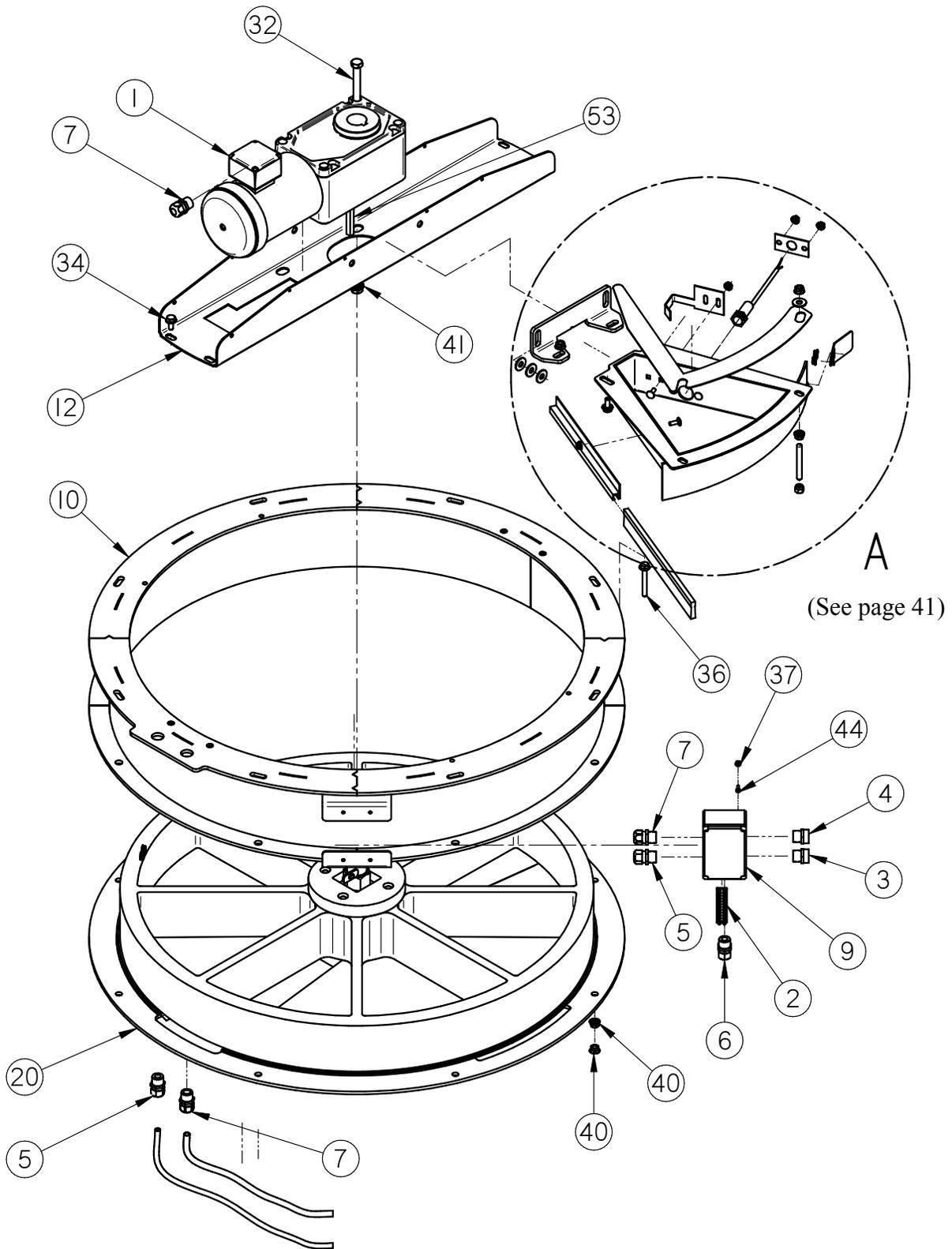
*Brush*

**Seed Wheel Assembly (13-04-0161)**



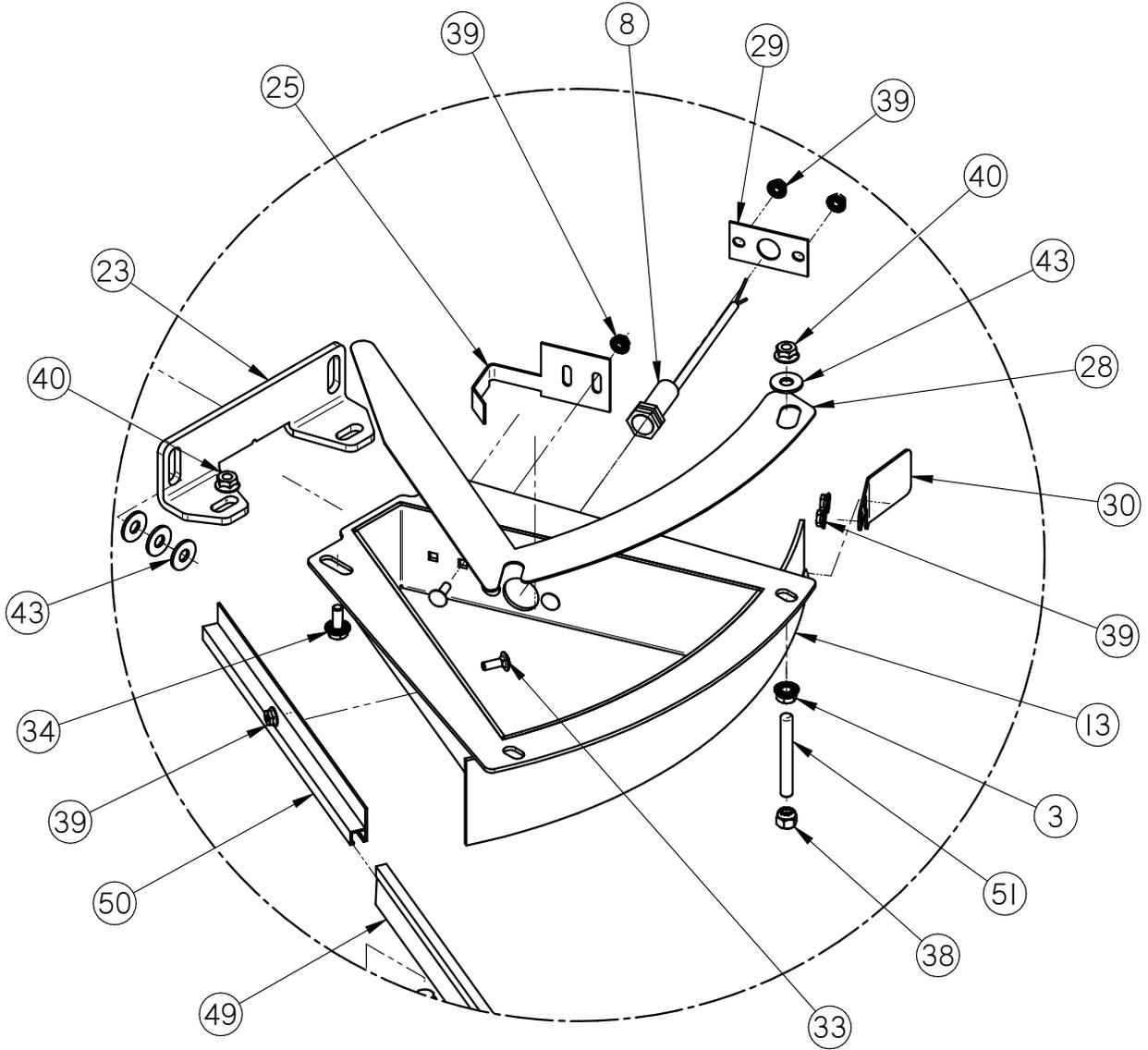
SEED WHEEL

**Seed Wheel Assembly (13-04-0161)**



SEED WHEEL

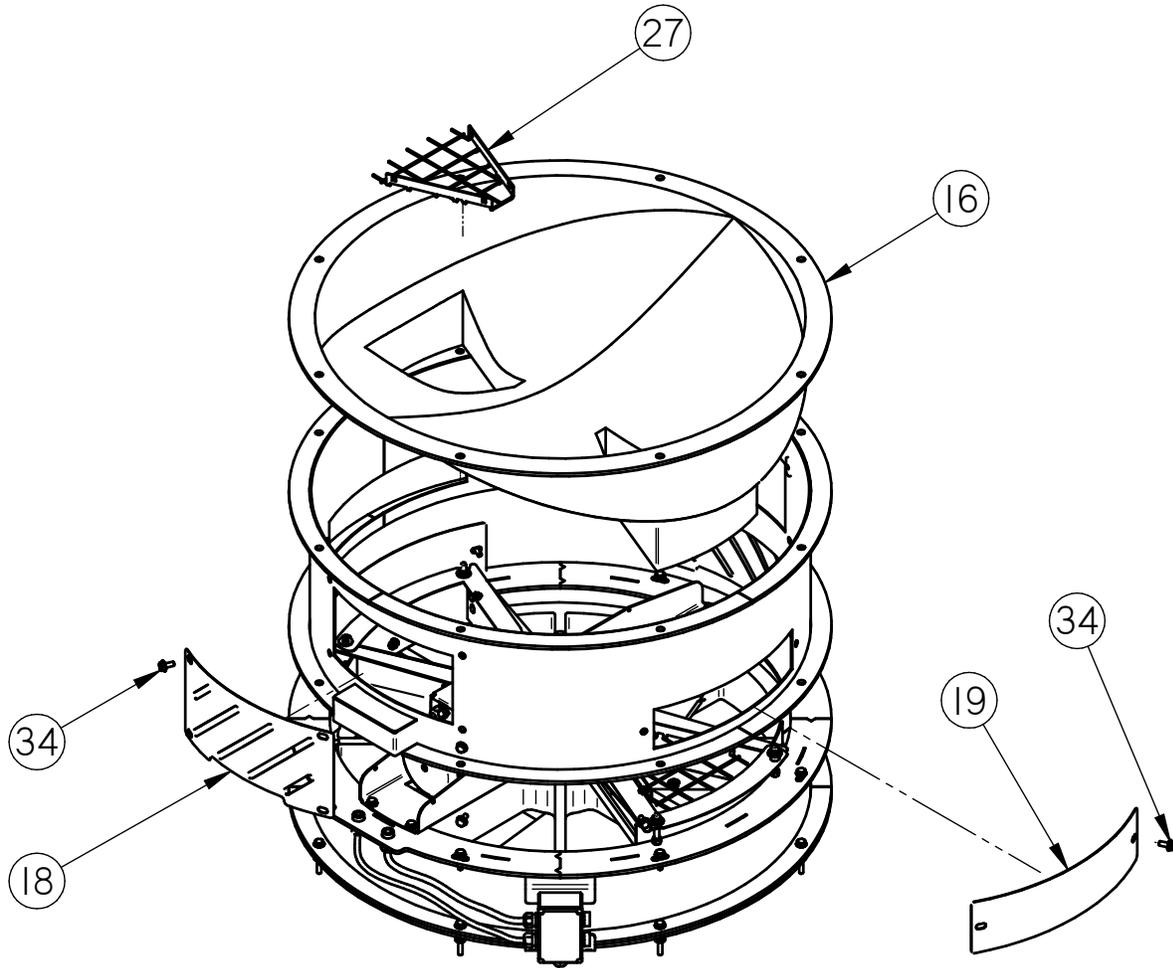
**Seed Wheel Assembly (13-04-0161)**



DETAIL A

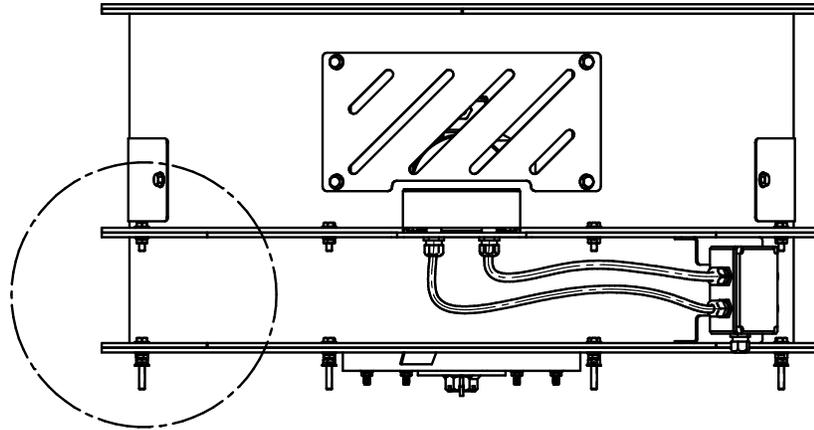
SEED WHEEL

**Seed Wheel Assembly (13-04-0161)**

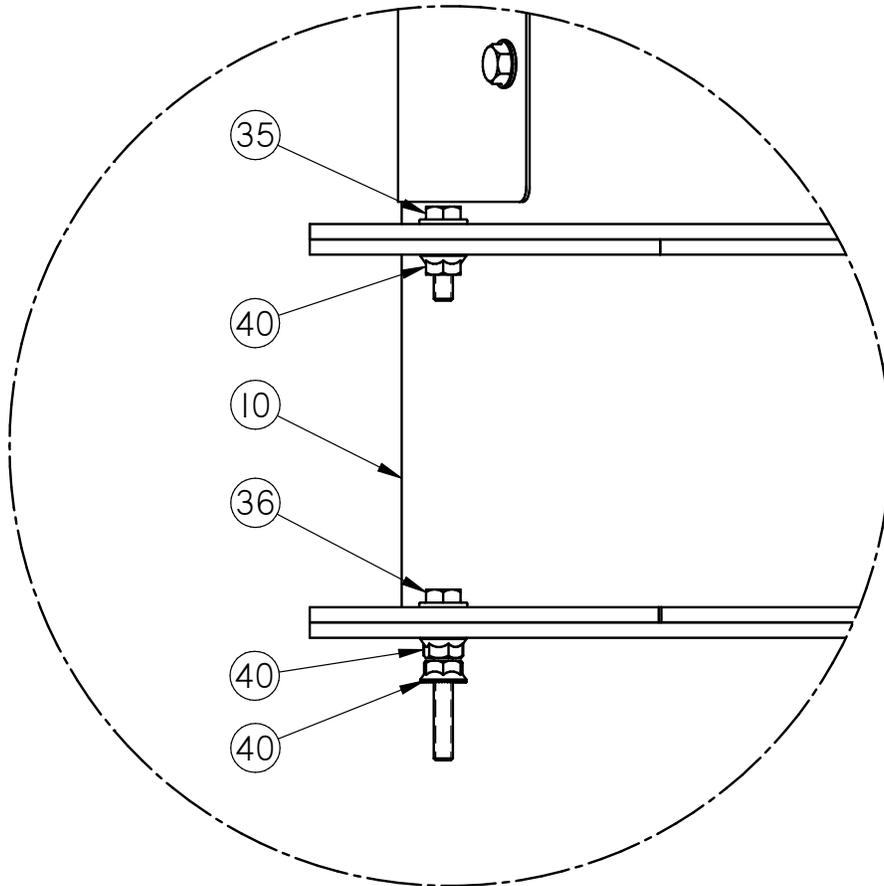


SEED WHEEL

**Seed Wheel Assembly (13-04-0161)**



B



DETAIL B

## SEED WHEEL

**Seed Wheel (13-04-0161)**

Item #	Part #	Description	Qty
1	01-01-0096	GMTR RA .50 HP 11RPM 3PH HLLW SHAFT	1
2	03-05-0042	TMNL BARRIER STRIP IDEAL 89-608	1
3	03-06-0059	RECP 8PL ML PIN HBMS08501	1
4	03-06-0101	RECP 4PL ML PIN HBMS04501	1
5	03-08-0064	CONN CG PLASTIC 0.5NPT .200-.472	2
6	03-08-0134	CONN CG PLAS 0.5NPT .100-.300	1
7	03-08-0138	CONN CG PLAS 0.5NPT .375-.750	3
8	03-10-0051	SENS PROX 24-240 AC AB 875CPG8N18A2	2
9	03-11-0081	ENCL 4.5X3X2 POLY HOF Q1286PCD	1
10	05-03-0164	WDMT SEED METER BODY EXTEN	1
11	05-03-0169	WDMT SEED METER EXTENSION	1
12	05-03-0232	WDMT SMW UPPER BRG BRKT	1
13	05-03-0240	WDMT SMW BRSH PCKT	2
14	05-04-0049	WDMT SEED WHEEL SHAFT NUT	1
15	05-07-0196	MOLDED SEED WHEEL INSERT	1
16	05-07-0197	HPPR SMW DUAL DSCHG ROTO-MLDD	1
17	05-07-0203	MOLDED SEED WHEEL INSERT TOP	1
18	05-10-0890	CVR #1 SEED METER	2
19	05-10-0891	CVR #2 SEED METER	2
20	05-10-0893	PLATE SUPPORT SEED METER STEEL	1
21	05-10-1213	SUPP BTM BRG UHMW SEED METER	1
22	05-10-1306	PAD SEED WHL FOAM RBBR FLOATING	1
23	05-10-1392	BRKT SMW BRSH PCKT HLDR	2
24	05-10-1426	14GA WEAR SPLATE HALF	2
25	05-10-1449	PLT SMW CTR HUB WIPER	2
26	05-10-1588	PLT SHAFT CLIP SMW	1
27	05-10-1872	GRD SMW INLET HOPP PCKT	2
28	05-10-2166	CVR TEST	2
29	05-10-3316	SMW PROX SW HOLDER	2
30	05-10-4192	PLT SMW POCKET SCRAPER	2
31	05-11-0075	DRIVE SHAFT 1.4375 SHAFT	1
32	06-01-0106	BOLT .500-13 X 5.50 ZP GR5	1
33	06-01-0122	BOLT, CARRIAGE, .250-20x.75 G5 ZP	18
34	06-01-0124	BOLT, FLG .375-16 UNC ZP GRADE 5; 3/4" LG	18
35	06-01-0189	BOLT, FLG .375-16 UNC ZP GRADE 5; 1-1/4" LG	1

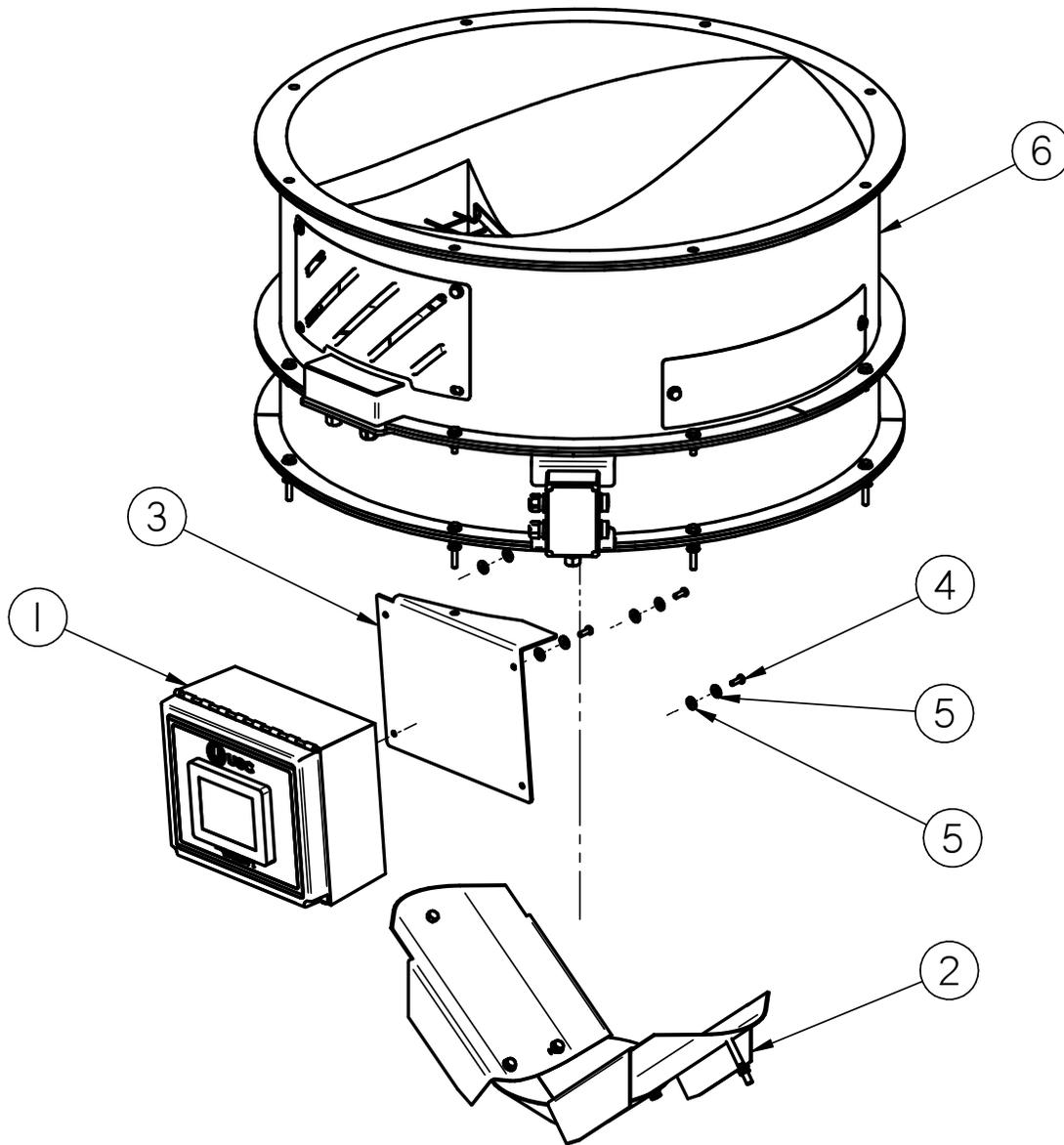
## SEED WHEEL

**Seed Wheel (13-04-0161)**

Item #	Part #	Description	Qty
36	06-01-0204	BOLT FLG .375-16 X 2.50 ZP GR5 FTH	8
37	06-02-0034	NUT 8-32 K-LOCK ZP	1
38	06-03-0003	NUT NYL LOCK .375-16 ZP GR5	3
39	06-03-0013	NUT,LOCK, FLG .250-20 ZP SERRATTED	26
40	06-03-0014	NUT LOCK FLG .375-16 ZP GR5	13
41	06-03-0015	NUT LOCK FLG .500-13 ZP GR5	1
42	06-03-0019	NUT LOCK FLG .3125-18 ZP GR5	1
43	06-05-0004	WSHR FLAT .375 ZP	10
44	06-06-0004	SCRW MACH 8-32 X .500 PHLP RDHD ZP	1
45	06-06-0023	SCRW, SELF TAPPING, 10-16 ZP X .750	14
46	06-06-0046	SCRW .313-18 X 2.0 ZP FLAT HD PHLP	1
47	06-06-0070	SCRW MACH .375-16 X 1.50 SH FLHD BO	1
48	06-09-0023	PIN CTTR .188 X 2.00 ZP	1
49	06-10-0019	SEAL BRSH 12.75 OAL 1IN EXP LG	2
50	06-10-0020	12 IN LG BRUSH HOLDER	2
51	06-14-0013	.375-16 THD RD CS	3
52	101BC9	PSM SMW GALV RING	1
53	11-13-0004	KEYSTOCK 3/8 X 3/8 CS	1

SEED WHEEL

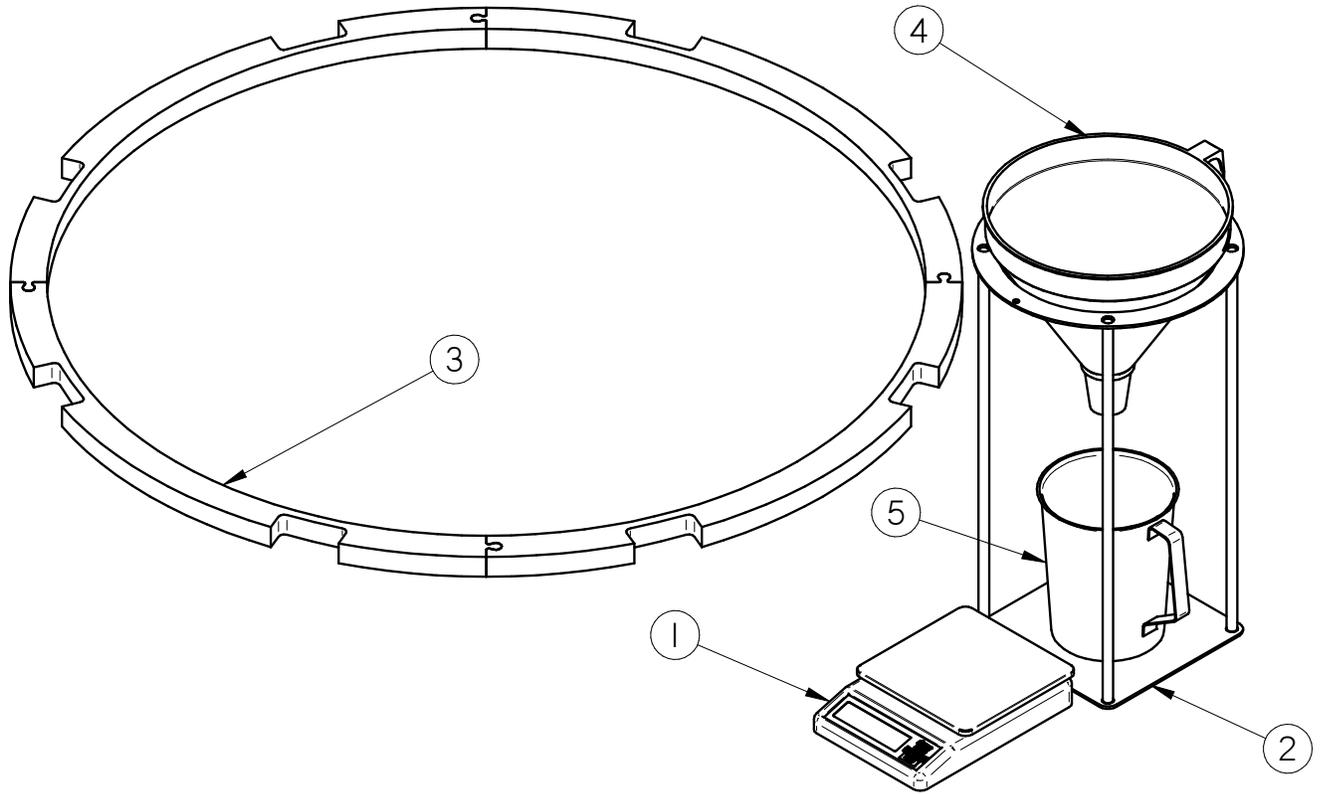
**SEED WHEEL CONTROL PANEL (LP ONLY) - FLOW BALANCER (LP800 ONLY)**



Item #	Part #	Description	Qty
1	03-12-0349	SEED WHEEL CONTROL PANEL	1
2	05-07-0119	LP800 SEED WHEEL FLOW BALANCER	1
3	05-10-1059	SEED WHEEL PANEL MOUNT PLATE	1
4	06-01-0215	SCRW MACH #14 X .750 SS PLASTITE	4
5	06-05-0001	WASHER, FLAT .250	8
6	13-04-0161	ASSY SEED METER WHL LX2000 UL	1

SEED WHEEL

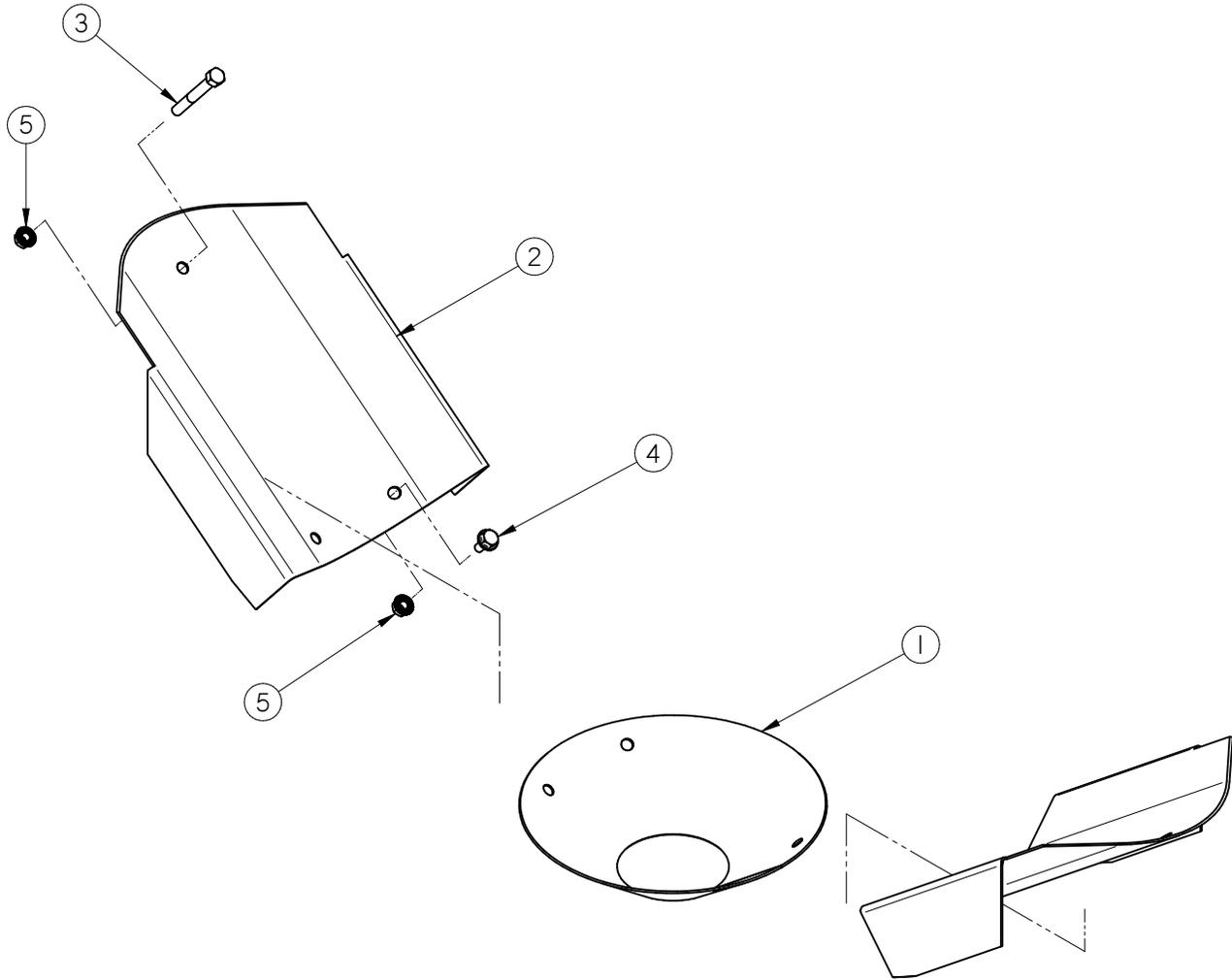
**Seed Wheel Scale Kit (13-04-0058)**



Item #	Part #	Description	Qty
1	03-19-0051	SCL CARDINAL 6.89 X 6.5 11 LBS	1
2	05-03-0248	WDMT CAL CUP FILL FR	1
3	05-10-2463	SEAL BETWEEN FLANGES SMW TO TRTR	4
4	05-11-0123	FUNNEL SMW CALB CUP FILL	1
5	07-02-0008	CUP MEASURE 64OZ SS GRADUATED	1

SEED WHEEL

**Seed Wheel Flow Balancer - LP800 Only (05-07-0119)**



Item #	Part #	Description	Qty
1	05-10-1479	SMW FLOW BALANCER BASE CONE	1
2	05-10-1480	SMW FLOW BALANCER CHUTE	2
3	06-01-0021	BOLT, .375-16 X .300 ZP GRADE 5	2
4	06-01-0124	BOLT, FLG .375-16 UNC ZP GRADE 5, .75 LG	4
5	06-03-0014	NUT, LOCK, FLG .375-16 ZP SERRATED	6

# USC LIMITED WARRANTY

## SECTION I

USC, LLC, (Manufacturer) warrants its seed treating equipment as follows:

1. **Limited Warranty:** Manufacturer warrants that the Products sold hereunder will be free from defects in material and workmanship for a period of 18 months from date of shipment. If the Products do not conform to this Limited Warranty during the warranty period, Buyer shall notify Manufacturer in writing of the claimed defects and demonstrate to Manufacturer satisfaction that said defects are covered by this Limited Warranty. If the defects are properly reported to Manufacturer within the warranty period, and the defects are of such type and nature as to be covered by this warranty, Manufacturer shall, at its expense, furnish replacement Products or, at Manufacturer's option, replacement parts for the defective products. Shipping and installation of the replacement Products or replacement parts shall be at the Buyer's expense.

2. **Other Limits:** THE FOREGOING IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Manufacturer does not warrant against damages or defects arising from improper installation (where installation is by persons other than Manufacturer), against defects in products or components not manufactured by Manufacturer, or against damages resulting from such non-Manufacturer made products or components. Manufacturer passes on to the Buyer the warranty it received (if any) from the maker of such non-Manufacturer made products or components. This warranty also does not apply to Products upon which repairs and/or modifications have been effected or attempted by persons other than pursuant to written authorization by Manufacturer. Manufacturer does not warrant against casualties or damages resulting from misuse and/or abuse of product(s), acts of nature, effects of weather, including effects of weather due to outside storage, accidents, or damages incurred during transportation by common carrier.

3. **Exclusive Obligation:** THIS WARRANTY IS EXCLUSIVE. The sole and exclusive obligation of Manufacturer shall be to repair or replace the defective Products in the manner and for the period provided above. Manufacturer shall not have any other obligation with respect to the Products or any part thereof, whether based on contract, tort, strict liability or otherwise. Under no circumstances, whether based on this Limited Warranty or otherwise, shall Manufacturer be liable for incidental, special, or consequential damages.

4. **Other Statements:** Manufacturer's employees or representatives' oral or other written statements do not constitute warranties, shall not be relied upon by Buyer, and are not a part of the contract for sale or this limited warranty.

5. **Return Policy:** Approval is required prior to returning goods to USC, LLC. A restocking fee will apply.

6. **Entire Obligation:** This Limited Warranty states the entire obligation of Manufacturer with respect to the Products. If any part of this Limited Warranty is determined to be void or illegal, the remainder shall remain in full force and effect.





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