Read the operator’s manual entirely. When you see this symbol, the subsequent instructions and warnings are serious - follow without exception. Your life and the lives of others depend on it!

Illustrations may show optional equipment not supplied with standard unit.
Machine Identification

Record your machine details in the log below. If you replace this manual, be sure to transfer this information to the new manual.

If you or the dealer have added options not originally ordered with the machine, or removed options that were originally ordered, the weights and measurements are no longer accurate for your machine. Update the record by adding the machine weight and measurements with the option(s) weight and measurements.

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Dealer Contact Information

Name: ___________________________________________
Street: _______________________________________
City/State: __________________________________
Telephone: ___________________________________
Email: _______________________________________
Dealer’s Customer No.: _________________________

⚠️ WARNING: Cancer and Reproductive Harm - www.P65Warnings.ca.gov
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Great Plains | 196-522M | 08/03/2020

Cover Index
Important Safety Information

Look for Safety Symbol

The SAFETY ALERT SYMBOL indicates there is a potential hazard to personal safety involved and extra safety precaution must be taken. When you see this symbol, be alert and carefully read the message that follows it. In addition to design and configuration of equipment, hazard control and accident prevention are dependent upon the awareness, concern, prudence and proper training of personnel involved in the operation, transport, maintenance and storage of equipment.

Be Aware of Signal Words

Signal words designate a degree or level of hazard seriousness.

DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. This signal word is limited to the most extreme situations, typically for machine components that, for functional purposes, cannot be guarded.

WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury, and includes hazards that are exposed when guards are removed. It may also be used to alert against unsafe practices.

CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

Prepare for Emergencies

s Be prepared if a fire starts

s Keep a first aid kit and fire extinguisher handy.

s Keep emergency numbers for doctor, ambulance, hospital and fire department near phone.

Be Familiar with Safety Decals

s Read and understand “Safety Reflectors and Decals” on page 6, thoroughly.

s Read all instructions noted on the decals.

s Keep decals clean. Replace damaged, faded and illegible decals.
Avoid High Pressure Fluids
Escaping fluid under pressure can penetrate the skin, causing serious injury.

- Avoid the hazard by relieving pressure before disconnecting hydraulic lines.
- Use a piece of paper or cardboard, NOT BODY PARTS, to check for suspected leaks.
- Wear protective gloves and safety glasses or goggles when working with hydraulic systems.
- If an accident occurs, seek immediate medical attention from a physician familiar with this type of injury.

Use A Safety Chain

- Use a safety chain to help control drawn machinery should it separate from tractor drawbar.
- Use a chain with a strength rating equal to or greater than the gross weight of towed machinery.
- Attach chain to tractor drawbar support or other specified anchor location. Allow only enough slack in chain to permit turning.
- Replace chain if any links or end fittings are broken, stretched or damaged.
- Do not use safety chain for towing.

Keep Riders Off Machinery
Riders obstruct the operator’s view. Riders could be struck by foreign objects or thrown from the machine.

- Never allow children to operate equipment.
- Keep all bystanders away from machine when folding/unfolding, raising/lowering markers, raising/lowering openers, and transporting.

Check for Overhead Lines
Drill markers contacting overhead electrical lines can introduce lethal voltage levels on drill and tractor frames. A person touching almost any metal part can complete the circuit to ground, resulting in serious injury or death. At higher voltages, electrocution can occur without direct contact.

- Avoid overhead lines during seed loading/unloading and marker operations.
Use Safety Lights and Devices

Slow-moving tractors and towed drills can create a hazard when driven on public roads. They are difficult to see, especially at night.

- Use flashing warning lights and turn signals whenever driving on public roads.
- Use lights and devices provided with the drill.

Transport Machinery Safely

Maximum transport speed for drill is 20 mph (32 kph). Rough terrains may require a slower speed. Sudden braking can cause a towed load to swerve and upset.

- Do not exceed 20 mph (32 kph). Never travel at a speed which does not allow adequate control of steering and stopping. Reduce speed if towed load is not equipped with brakes.
- Comply with national, regional and local laws.
- Follow your tractor manual recommendations for maximum hitch loads. Insufficient weight on tractor steering wheels will result in loss of control.
- Carry reflectors or flags to mark drill in case of breakdown on the road.
- Keep clear of overhead power lines and other obstructions when transporting. Refer to transport dimensions under “Specifications and Capacities” on page 87.

Wear Protective Equipment

- Wear protective clothing and equipment.
- Wear clothing and equipment appropriate for the job. Avoid loose-fitting clothing.
- Because prolonged exposure to loud noise can cause hearing impairment or hearing loss, wear suitable hearing protection such as earmuffs or earplugs.
- Because operating equipment safely requires your full attention, avoid wearing entertainment headphones while operating machinery.
Handle Chemicals Properly

Agricultural chemicals can be dangerous. Improper use can seriously injure persons, animals, plants, soil and property.

- Do not use liquid treatments with drill.
- Read and follow chemical manufacturer’s instructions.
- Wear protective clothing.
- Handle all chemicals with care.
- Avoid inhaling smoke from any type of chemical fire.
- Never drain, rinse or wash dispensers within 100 feet (30m) of a freshwater source, nor at a car wash.
- Store or dispose of unused chemicals as specified by chemical manufacturer.
- Dispose of empty chemical containers properly. Laws generally require power rinsing or rinsing three times, followed by perforation of the container to prevent re-use.

Shutdown and Storage

- Clean out and safely store or dispose of residual chemicals.
- Secure drill using blocks and transport locks.
- Lock up openers.
- Store in an area where children normally do not play.

Practice Safe Maintenance

- Understand procedure before doing work. Use proper tools and equipment. Refer to this manual for additional information.
- Work in a clean, dry area.
- Put tractor in park, turn off engine, and remove key before performing maintenance.
- Make sure all moving parts have stopped and all system pressure is relieved.
- Disconnect battery ground cable (-) before servicing or adjusting electrical systems or before welding on drill.
- Inspect all parts. Make sure parts are in good condition and installed properly.
- Remove buildup of grease, oil or debris.
- Remove all tools and unused parts from drill before operation.
Tire Safety

Tire changing can be dangerous and should be performed by trained personnel using correct tools and equipment.

- When inflating tires, use a clip-on chuck and extension hose long enough for you to stand to one side—not in front of or over tire assembly. Use a safety cage if available.

- When removing and installing wheels, use wheel-handling equipment adequate for weight involved.

Safety At All Times

Thoroughly read and understand the instructions in this manual before operation. Read all instructions noted on the safety decals.

- Be familiar with all drill functions.

- Operate machinery from the driver’s seat only.

- Do not leave drill unattended with tractor engine running.

- Do not dismount a moving tractor. Dismounting a moving tractor could cause serious injury or death.

- Do not stand between the tractor and drill during hitching.

- Keep hands, feet and clothing away from power-driven parts.

- Wear snug-fitting clothing to avoid entanglement with moving parts.

- Watch out for wires, trees, etc., when folding and raising drill. Make sure all persons are clear of working area.

- Do not turn tractor too tightly, causing drill to ride up on wheels. This could cause personal injury or equipment damage.
Safety Reflectors and Decals

Your drill comes equipped with all lights, safety reflectors and decals in place. They were designed to help you safely operate your drill.

s Read and follow decal directions.
s Keep lights in operating condition.
s Keep all safety decals clean and legible.
s Replace all damaged or missing decals. Order new decals from your Great Plains dealer. Refer to this section for proper decal placement.
s When ordering new parts or components, also request corresponding safety decals.

To install new decals:
1. Clean the area on which the decal is to be placed.
2. Peel backing from decal. Press firmly on surface, being careful not to cause air bubbles under decal.

Red Reflectors
838-266C (S/N B1077-)

on rear face of rear casters;
2 total

Red Reflectors
838-266C (S/N B1078+)

rear face of rear casters,
center section of walkboard;
4 total
Amber Reflectors
838-265C (S/N B1077-)
outside face of rear casters,
rear face, inside ends, wing walkboards,
rear face, outside ends, wing walkboards,
outside face of wing walkboards;
8 total

Amber Reflectors
838-265C (S/N B1078+)
outside face of rear casters,
rear face, inside ends, wing walkboards,
rear face, outside ends, wing walkboards,
outside face of wing walkboards,
each side of center section;
10 total

Daytime Reflectors
838-267C (S/N B1077-)
rear face, rear casters, below red reflectors;
2 total
Daytime Reflectors
838-267C (S/N B1078+)

rear face, rear casters, below red reflectors, center walkboard to the inside of red reflector; 4 total

Danger: Read Manual
848-512C

On tongue at hitch; 1 total

Danger: Pinch/Crush Hazard
818-590C

On outside of left tongue near hitch; 1 total
Warning: Pinch/Crush Hazard
818-045C

**WARNING**
PINCH POINT OR CRUSHING HAZARD
To prevent serious injury or death from pinching or crushing:
- Folding
- Raising
- Unfolding
- Lowering

Inside and outside faces, all caster pivots; 8 total

Warning: Excessive Speed Hazard
818-188C

**WARNING**
EXCESSIVE SPEED HAZARD
To Prevent Serious Injury or Death:
- Do Not exceed 20 mph maximum transport speed. Loss of vehicle control and/or machine can result.

On outside of left tongue near hitch; 1 total

Warning: High Pressure Fluid
818-339C

**WARNING**
HIGH PRESSURE FLUID HAZARD
To Prevent Serious Injury or Death:
- Relieve pressure on system before inspecting, adjusting or disassembling.
- Wear proper hand and eye protection when working on fluid. Use wood or cardboard instead of hands.
- Keep all components in good repair.

On outside of left tongue near hitch; 1 total
Warning Marker Pinch Point (Option)  
818-579C

**WARNING**  
On either side of inner marker arm, two each marker installed; 2 or 4 total

**Warning Overhead Marker (Option)  
818-580C**

**WARNING**  
On either side of inner marker arm, two each marker installed; 2 or 4 total

**Warning: Falling Hazard  
838-102C**

**WARNING**  
Top forward at each walkboard ladder; 2 total

**Caution: Tires Not A Step  
818-398C**

**CAUTION**  
Top face, each side of rockshaft; 2 total
Caution: General
818-587C

On outside of left tongue near hitch; 1 total

Caution: 85 PSI Tire Pressure
848-147C

On rim of each wheel; 6 total
Introduction

Great Plains welcomes you to its growing family of new product owners. Your 3-Section 40-Foot Heavy Duty Drill has been designed with care and built by skilled workers using quality materials. Proper setup, maintenance, and safe operating practices will help you get years of satisfactory use from the machine.

Document Family

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<td>196-522M</td>
<td>Operator Manual (this document)</td>
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<tr>
<td>196-522P</td>
<td>3S-4010HD/HDF Parts Manual</td>
</tr>
<tr>
<td>196-522B</td>
<td>Seed Rate Manual</td>
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Description of Unit

The 3S-4010HD/HDF is a pull-type 3-section fluted feed folding drill with a working width of 40 feet (12.2m) and 10HD Series Heavy Duty parallel-arm double disk openers. Opener disks make a seed bed, and seed tubes between the disks place seed in the furrow. Press wheels following the disks close the furrow and gauge opener seeding depth. Opener bodies are independently adjustable for seeding depth and row unit down-force.

Intended Usage

Use this drill to seed production-agriculture crops in no till or minimum tillage applications. Do not modify the drill for use with attachments, accessories or uses other than those specified by Great Plains.

Models Covered

Seed-only models:
- 3S4010HD-481048 row 10in (25cm)
- 3S4010HD-647564 row 7.5in (19cm)
Fertilizer models:
- 3S4010HDF-481048 row 10in (25cm)
- 3S4010HDF-647564 row 7.5in (19cm)

Using This Manual

This manual familiarizes you with safety, assembly, operation, adjustments, troubleshooting, and maintenance. Read this manual and follow the recommendations to help ensure safe and efficient operation.

The information in this manual is current at printing. Some parts may change to assure top performance.

Definitions

The following terms are used throughout this manual.

- Notice: Paragraphs in this format present a crucial point of information related to the current topic. Read and follow the directions to:
  - remain safe,
  - avoid serious damage to equipment and
  - ensure desired field results.

- Left/Right Notation: Paragraphs in this format provide useful information related to the current topic.
Owner Assistance

If you need customer service or repair parts, contact a Great Plains dealer. They have trained personnel, repair parts and equipment specially designed for Great Plains products.

Refer to Figure 3

Your drill’s parts were specially designed and should only be replaced with Great Plains parts. Always use the serial and model number when ordering parts from your Great Plains dealer. The serial-number plate is located on the front face, left end, of the center section opener tool bar.

Record your drill model and serial number here for quick reference:

Model Number:__________________________
Serial Number: __________________________

Your Great Plains dealer wants you to be satisfied with your new drill. If you do not understand any part of this manual or are not satisfied with the service received, please take the following actions.

1. Discuss the matter with your dealership service manager. Make sure they are aware of any problems so they can assist you.
2. If you are still unsatisfied, seek out the owner or general manager of the dealership.

For further assistance write to:

Product Support
Great Plains Mfg. Inc., Service Department
PO Box 5060
Salina, KS 67402-5060

gp_web_cs@greatplainsmfg.com
785-823-3276
Preparation and Setup

This section helps you prepare your tractor and drill for use. Before using the drill in the field, you must hitch the drill to a suitable tractor and also setup the drill.

Initial Setup

Prior to first use, see "Install Clutch Switch Module in Cab" on page 103. See that manual section for other Options that may not have been factory- or dealer-installed.

Pre-Setup Checklist

1. Read and understand “Important Safety Information” on page 1.
2. Check that all working parts are moving freely, bolts are tight, and cotter pins are spread.
3. Check that all grease fittings are in place and lubricated. See “Lubrication” on page 73.
4. Check that all safety decals and reflectors are correctly located and legible. Replace if damaged. See “Safety Reflectors and Decals” on page 6.
5. Inflate tires to pressure recommended and tighten wheel bolts as specified. “Appendix A - Reference Information” on page 87.

Hitching to Tractor

Crushing Hazard:
You may be severely injured or killed by being crushed between the tractor and drill. Do not stand or place any part of your body between machines being hitched. Stop tractor engine and set park brake before installing hitch pin.

Choose a drill-hitch option (page 81) that is compatible with your tractor drawbar.

The 3S-4010HD/HDF has four hitch options:
• a clevis hitch,
• a small-hole, single-strap hitch,
• a large-hole, single-strap hitch, or;
• a large cast strap hitch.

Always use a locking-style hitch pin sized to match the holes in the hitch and drawbar, and at least 1\(\frac{1}{2}\)in (3.8cm) in diameter.
Refer to Figure 5
1. Adjust the drill hitch to match your tractor-drawbar height, using crank of tongue jack on side of tongue.
   & The precise height is not critical, as the drill leveling is set at the mainframe and is independent of tongue level.
   & The hitch may be mounted inverted if necessary, but always have two (2) bolts in two holes of both tongue and hitch.
2. Securely attach safety chain to an anchor on a tractor capable of pulling the drill.

Refer to Figure 6
3. Use crank to raise jack foot. Remove pin and jack.
4. Store jack on top of tongue.

Tractor Electrical Connections

Lighting Harness

Refer to Figure 7
Plug drill electrical lead into tractor seven-pin connector. If your tractor is not equipped with a seven-pin connector, contact your dealer for installation.
Electric Clutch Harness

*Refer to Figure 8*
Mate the connector for the cab clutch control.

![Figure 8: Section Clutch Connector](26469)

---

Shaft Monitor Harness (Option)

*Refer to Figure 9*
If the drill is equipped with the optional shaft monitor, mate the connector for the cab display.
See “Shaft Monitor” on page 81 for ordering information.

![Figure 9: Shaft Monitor Connector](26468)
Tractor Hydraulic Hose Hookup

High Pressure Fluid Hazard:
Only trained personnel should work on system hydraulics! Escaping fluid under pressure can have sufficient pressure to penetrate the skin, causing serious injury. Avoid the hazard by relieving pressure before disconnecting hydraulic lines. Use a piece of paper or cardboard, NOT BODY PARTS, to check for leaks. Wear protective gloves and safety glasses or goggles when working with hydraulic systems. If an accident occurs, seek immediate medical attention from a physician familiar with this type of injury.

Refer to Figure 10

Current Style Color Coded Hose Handles
Great Plains hydraulic hoses have color coded handle grips to help you hookup hoses to your tractor outlets. Hoses that go to the same remote valve are marked with the same color.

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</table>

& Markers are normally on Fold circuit.

To distinguish hoses on the same hydraulic circuit, refer to the symbol molded into the handle grip. Hoses with an extended-cylinder symbol feed cylinder base ends. Hoses with a retracted-cylinder symbol feed cylinder rod ends.

Older Style Hoses with Color Ties

Refer to Figure 11
Hoses that go to the same remote valve are marked with the same color tie.
To distinguish hoses on the same hydraulic circuit, refer to plastic hose label. The hose under an extended-cylinder symbol feeds a cylinder base end. The hose under a retracted-cylinder symbol feeds a cylinder rod end.
1. Connect transport-lift hoses to tractor remote valve.
2. Connect fold hoses to tractor remote valve.
3. Connect lock hoses to tractor remote valve.
4. Connect marker hoses to tractor remote valve.

<table>
<thead>
<tr>
<th>Color</th>
<th>Hydraulic Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blue</td>
<td>Lift Cylinders</td>
</tr>
<tr>
<td>White</td>
<td>Fold Cylinders</td>
</tr>
<tr>
<td>Orange</td>
<td>Lock Cylinders</td>
</tr>
<tr>
<td>Yellow</td>
<td>Markers (Optional)</td>
</tr>
</tbody>
</table>
Hydraulic Charge

The hydraulic system was fully charged and bled when the drill left the factory.

After some use, it is normal for the lift cylinders to get out of phase. If one or more sections are not fully lifting, or are lifting to different heights, see “Re-phasing Lift System” on page 22.

Drill Level

A new drill has been aligned at the factory and should not require adjustment prior to first use. Level needs to be checked periodically, and possibly adjusted.

See “Leveling Drill” on page 65
- “Side-to-Side Level” on page 65
- “Front-to-Back Level” on page 66
- “Section Alignment” on page 67

Marker Setup

If markers were ordered with the drill, they were factory-installed. If they were ordered separately, install them now, per the instructions included with the markers.

2. If you know that your conditions require a specific marker disk orientation, change it now. See “Marker Disk Adjustment” on page 55.
3. Set the initial marker extension, below.
4. Fold the markers.

Initial Marker Extension

Marker Extension is the distance from the centerline of the outboard row unit on each side to the centerline of the mark left in the ground by the marker.

The 3S-4010HD and 3S-4010HDF is symmetrical, and the values are the same on each side and independent of next pass direction. On a dual-marker drill, set each side.
To change marker extension:
If this is not the first adjustment to marker length.
1. Position drill on level ground and lower to planting position.
2. Fully extend a marker.
3. If you plan to change the marker blade angle or invert the blade, make that adjustment now (see page 55).
4. Pull forward several feet to leave a mark.
5. Sighting along a line parallel to a tool bar, measure the distance from the outside row unit centerline (opener discs or furrow) to the mark. If the distance matches the suggested value above, no marker extension adjustment is needed.
7. Slide the tube in or out to change extension. Secure the nuts.
8. Pull forward and re-measure new mark. Return to step 6 if further adjustment is needed.
Operating Instructions

This section covers general operating procedures. It assumes that Setup items have been completed for the drill.

Experience, machine familiarity and the following information will lead to efficient operation and good working habits. Always operate farm machinery with safety in mind.

General Description

All drill hydraulic functions are on separate circuits. Field operations are entirely controlled from the tractor cab.

Planting Operation

Seed and fertilizer are delivered to the row units by gravity, from fluted feed meters powered by ground drive. Material rate setup varies by box, but always includes a rate handle/knob for fine control, and may include sprocket pairings for coarse control. Meter rate self-adjusts for changes in ground speed.

Seeding stops when motion stops or the drill is raised. A height switch on the drill controls meter drive clutches, turning them on and off as the drill is lowered and raised. A cab console switch box provides clutch control by drill section for point row operation.

Seeding depth and furrow coverage are controlled by row unit down pressure and depth adjustments.
Pre-Start Checklist

- Lubricate the drill as indicated under Lubrication, "Maintenance and Lubrication" on page 60.
- Check the tires for proper inflation according to "Tire Inflation Chart" on page 87.
- Check for worn or damaged parts and repair or replace before going to the field.
- Check all nuts, bolts and screws. Tighten bolts as specified on "Torque Values Chart" on page 88.
- Check drill height switch on drill.

Raising and Lowering (Lift)

The drill Lift function is used only when the drill is unfolded. The drill must be fully lifted and locked when folded.

When unfolded, the lift function is used for headland turns, adjustments and maintenance, and in preparation for folding.

Raising

1. Operate the tractor lever for the Lift circuit to fully extend the lift cylinders. Set lever to Neutral to hold at lift. If raising for turns or short field moves, lift is complete.
2. If lifting for adjustments, maintenance or in preparation for Fold, install lift locks.

Lift Locks

Refer to Figure 16 and Figure 17

3. Remove lock channels from storage locations on the rockshaft.
4. Install lock channels over extended lift cylinder rods. Six cylinder rods total.

Lowering

Lower drill only when fully unfolded.

1. Extend lift cylinders to fully raised (in case cylinders have settled against lock channels). Set circuit lever to neutral.
2. Remove lock channels and stow them at their storage locations.
3. Retract lift cylinders and fully lower drill.
Re-phasing Lift System
Over a period of normal use the cylinders may get out of phase. This will cause some drill sections to run higher than others. To re-phase cylinders:

1. Raise the drill completely and hold the hydraulic remote lever on for several seconds until all cylinders are fully extended. Do this every 3 or 4 times you raise drill out of ground.
2. When all cylinders are fully extended, momentarily reverse hydraulic remote lever to Retract height ½in (6.3cm) to maintain levelness.

Folding

Pinch Point and Crushing Hazard:
To prevent serious injury or death:

s Always use transport locks when drill is folded.

s Stay away from frame sections when they are being raised or lowered.

s Keep away and keep others away when folding or unfolding drill.

Fold the drill on level ground with the tractor in neutral.

NOTICE

Clearance/Equipment Damage Risk:
The hitch-to-hitch length of the 3S-4010HD/HDF increases by 12 feet (3.7m) during folding. Allow at least 12 feet (3.7m) of clearance ahead of and behind the drill when folding.

Tractor can move forward during folding, if tractor is in neutral with brakes released.

Center section of drill can move backward during folding if tractor is in Park, has brakes set, or otherwise cannot move.

1. Raise drill with lift cylinders until cylinders are fully extended.
2. Install lift locks. See “Raising” on page 21.
3. Retract the Lock cylinder circuit lever to:
   - disengage the tool bar lock,
   - disengage swivel locks,
   - disengage caster locks, and
   - enable the self-latching transport lock.
   Set circuit to neutral.

4. Extend the Fold cylinder circuit lever to slowly fold wings forward. The transport lock automatically captures the right wing tool bar for transport.

It may be necessary to ease forward slightly with the tractor to assist wings in folding completely.

**Unfolding**

Unfold the drill on level ground with the tractor transmission in neutral.

1. Fold markers, if installed.
2. Extend the Lock circuit lever to:
   - enable the tool bar lock,
   - enable the swivel locks,
   - enable the caster locks, and
   - release the transport lock.
   Set circuit to neutral.
3. Retract the Fold circuit to unfold drill.

The tool bar, swivel and caster locks automatically engage, either at the completion of unfolding, or during next forward movement of the drill.

4. Extend the Lift circuit as needed to raise the lift cylinder bodies off their lock channels.
5. Remove lock channels from all six lift cylinders.
6. Store lock channels.

---

*Pinch Point and Crushing Hazard:*

To prevent serious injury or death:

- Always use transport locks when drill is folded.
- Stay away from frame sections when they are being raised or lowered.
- Keep away and keep others away when folding or unfolding drill.

The hitch-to-hitch length of the 3S-4010HD/HDF decreases by 12 feet (3.7m) during unfolding.

Keep all persons away from all drill wheels during unfolding.

Tractor can move backward during folding, if tractor is in neutral with brakes released.

Center section of drill can move forward during folding if tractor is in Park, has brakes set, or otherwise cannot move.
Lock-Out Hubs

To reduce wear on drive system components during transport, the rockshaft gauge wheels can be locked-out (disconnected) from the drive system.

**Hub Lock-Out**

*Refer to Figure 22 (which depicts the right rockshaft wheel with the drive system engaged)*

1. At each rockshaft wheel, locate the lock-out pin receiver ①. Note that it has both shallow and deeper detents.
2. Pull the cross-pin ② away from the sprocket, rotate the pin ¼ turn, and release into the shallow detents.

**Hub Engagement**

1. At each rockshaft wheel, pull the cross-pin ② away from the sprocket, rotate the pin ¼ turn, and release into the deep detents.

& The pin usually does not fully seat immediately, but does so during the next full rotation of the wheel.

**Transport**

*Electrocution Hazard:*

To prevent serious injury or death from electric shock, keep clear of overhead power lines when transporting, folding, unfolding or operating all drill components. Machine is not grounded. At higher voltages, electrocution can occur without direct contact.

Great Plains recommends transporting the drill empty. Although designed for highway movement when loaded, the additional weight of seed may cause the drill to exceed the rated ability of the tractor, makes the drill more difficult to control and stop, and increases wear on tires and wheel bearings.

*Loss of Control Hazard:*

Towing the drill at high speeds or with a vehicle that is not heavy enough can lead to loss of vehicle control. Loss of vehicle control can lead to serious road accidents, injury and death. To reduce the hazard:

s Do not exceed 20 mph (32 kph).

s Do not tow a drill that weighs more than 1.5 times the weight of the towing vehicle. (The tractor must weigh at least 2/3 or 67% of the drill weight - see table below.)

**Transport Weights**

In the table, the “Large Configuration” includes: 3 weight kits, coulters, markers and Small Seeds (empty). If your tractor is rated for more than the “Large Configuration”, you may not need to determine the weight of your drill.

These weights are approximate. They can vary by hundreds of pounds depending on coulter type, press wheel type, material density and aftermarket modifications.
Approximate Transport Weights

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<tr>
<th></th>
<th>3S4010HD-4810</th>
<th>3S4010HD-6475</th>
<th>3S4010HDF-4810</th>
<th>3S4010HDF-6475</th>
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<td>Large Configuration</td>
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<td>51700 lbs</td>
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<td>0 kg</td>
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<td>4200 lbs</td>
<td>1900 kg</td>
<td>4200 lbs</td>
<td>1900 kg</td>
</tr>
</tbody>
</table>

Pre-Transport Checklist

Before transporting the drill, check and observe the following items:

- Make sure the weight of the tractor equals or exceeds 67% the drill.
- **Marker Checklist Complete**
  - Markers must be folded in transport carriers.
- **Drill Folded and Locked**
- **Tires**
  - Check that all tires are properly inflated as listed on **"Tire Inflation Chart"** on page 87.
- **Lock-Out Hubs**
  - Disengage rockshaft wheels from drive system. See **"Lock-Out Hubs"** on page 24.
- **Bystanders**
  - Check that no one is in the way before moving. Do not allow any one to ride on the drill.
- **Warning Lights**
  - Always use tractor and drill warning lights when transporting the drill.
- **Clearance**
  - Know the maximum dimensions of the drill in transport position and follow a route that provides adequate clearance from all obstructions, including overhead lines. See **"Specifications and Capacities"** on page 87.
- **Stopping Distance**
  - Allow sufficient stopping distance and reduce speed prior to any turns or maneuvers. If transported full, allow extra stopping distance.
- **Road Rules**
  - Comply with all national, regional and local laws when transporting on public roads.
- **Watch Traffic**
  - The seed boxes obstruct a portion of your rear view. Be prepared for sudden maneuvers from following vehicles.
Loading Materials

Fully loaded with dense seed, the drill weighs an additional 8294 lbs (3762 kg). Include this weight when checking tractor capability.

Load slightly more material than needed, because consumption rates can vary between compartments even though the furrow rates are identical.

Main Seed Box Loading

1. Check that all meter doors are positioned for the seed size, and not set for clean-out. See “Position Seed Cup Doors” in seed Rate Manual. If loading prior to transport, set them to position 1 (smallest seed).

2. Install or remove optional seed plugs as desired for the row spacing planned. See “Seed Tube Plug (Main Seeds)” on page 83.

3. If loading prior to transport, and calibration has not yet been done, set Seed Rate Handle to 0. At 0, and with the doors at 1, no seed can leak during transport.

Refer to Figure 24

4. The main seed box lid handle is also a latch. It needs to pivot up to release the lid.

5. On HDF (fertilizer-capable) drill models:
   - Check that any offset box dividers are set to the desired compartment ratio. See “Offset Box Divider” on page 84.
   - Check that the divider flap is set as desired (separate compartments, or all-seed). See “HDF Seeding with Both Compartments” on page 27.
   - If seeding only from the forward (seed) compartment, flip the top spill flap back to prevent seed from entering the fertilizer compartment.

6. Take all necessary materials safety precautions if the seed is treated.

7. Load seed evenly into compartments.

To reduce wear on unused boxes that may also be present, remove final drive chain for Small Seeds box.
HDF Seeding with Both Compartments

A 3S-4010HDF drill can use the fertilizer compartment for seed (which is still metered by the main seed box meters).

1. Clean out both boxes. See “Main Seed Box Clean-Out” on page 61 and “Fertilizer Box Clean-Out” on page 61.

Refer to Figure 25

2. Open the divider door between seed and fertilizer compartments. To open door, loosen knobs ①. Loosen knobs until bent clips can be turned away from door ②.

3. When all bent clips have been turned, lift vinyl dew shield (shown in Figure 26) and flip the flap door ② backward over fertilizer-tray openings ③.

Refer to Figure 26

4. With seed/fertilizer flap ② covering fertilizer openings, lower vinyl dew shield ④ to hold flap over fertilizer meter cup openings and away from divider.

5. To avoid unnecessary wear, remove all three fertilizer transmission chains. See Seed Rate Manual for details of Fertilizer drive.
Loading Fertilizer

The 3S-4010HDF models are equipped with a fertilizer compartment capable of planting seed only, or seeding and applying fertilizer in the same field pass.

Use only dry, granular fertilizer in the fertilizer box.

Fully loaded with dense fertilizer, the drill can weigh an additional 4700 lbs (2132kg) or more. Include this weight when checking tractor capability. Load fertilizer after transport if possible.

Seeding and applying fertilizer

1. Clean any seed or debris from fertilizer compartment. See “Fertilizer Box Clean-Out” on page 61.

Refer to Figure 27
2. Adjust dividers between seed and fertilizer compartments to desired capacity. See page 29 for details.

The standard fertilizer dividers partition the drill boxes into: 100% seed or 60 percent seed : 40 percent fertilizer.

The optional offset dividers (page 84) partition the drill boxes into: 100% seed, 68% seed : 32% fertilizer, or 55% seed : 45% fertilizer.

3. Check that fertilizer clean-out door (page 61) is closed and all latches are secure.

Refer to Figure 28
4. The fertilizer compartment is accessed via the main box lid ①. The main seed box lid handle is also a latch. Pivot the handle up and open the lid.

5. Flip the spill flap ③ forward to prevent fertilizer from being loaded into the forward seed compartment.

6. Load fertilizer evenly into fertilizer compartment ④.

To reduce wear, remove drive chains for seed boxes not used.
Fertilizer Divided Capacities

<table>
<thead>
<tr>
<th></th>
<th>Capacity Ratio</th>
<th>Total Capacity</th>
</tr>
</thead>
<tbody>
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<td></td>
<td>Seed</td>
<td>Fertilizer</td>
</tr>
<tr>
<td>None</td>
<td>100%</td>
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<tr>
<td>Standard</td>
<td>60%</td>
<td>40%</td>
</tr>
<tr>
<td></td>
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<td></td>
</tr>
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<td>32%</td>
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<tr>
<td></td>
<td></td>
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<td>55%</td>
<td>45%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Divider Removal

Refer to Figure 29
A. Remove $\frac{5}{16}$in bolts (1) and flange nuts (2) from tabs (3) at each end of drill box (2 locations).
B. Remove $\frac{5}{16}$in bolts (4) and nuts (5) from lid-hinge brackets (6) (3 locations).
C. Loosen but do not remove $\frac{1}{4}$in bolts (7) and nuts that clamp the lid assembly (8) angle irons to the plastic dividers (9).
D. Lift lid assembly (8) out of drill box. Lift dividers (9) out of drill box. Reinstall standard or offset dividers.
E. Reinstall lid assembly by reversing step D through step A.

Refer to Figure 30
7. Check that the seed/fertilizer flap at the bottom of the compartment is closed so seed and fertilizer cannot pass between compartments.

Flap flips forward to block passage. The flap top edge is secured to the dividers. Rotate the bent clips to engage the edge of the flap, and tighten the knobs.
Loading Small Seeds Box

1. If loading prior to transport, and calibration has not yet been done, set Seed Rate Handle to 0. At 0, no seed can leak during transport.

2. Take all necessary materials safety precautions if the seed is treated.

3. The Small Seeds lid is held closed by two external rubber latches. Pull them up and to the rear to release the lid.

4. Load seed evenly into compartments.

5. To reduce wear, remove transmission (driver-driven) chains for main seed boxes.

If you experience excessive seed shifting in your planting, consider installing additional optional partitions (page 85).
Marker Operation

Single (left side) or dual markers are optional on the 3S-4010HD/HDF. See “Flat Fold Markers” on page 82 for ordering information.

Single Marker Operation

The single marker is extended and retracted directly by the tractor lever, and has a needle valve adjustment for speed.

At the start of each pass, Extend the circuit to fully unfold the marker, and return the lever to neutral. At the end of each pass, Retract the circuit to fold the marker for the turn, and return the lever to neutral.

Dual Marker Operation

Dual markers are on circuit which contains an adjustable automatic sequence valve.

At first use, observe the markers carefully, in case the side that unfolds is not the intended side.

When the circuit is first Extended, normally the right marker unfolds, and the left remains in the cradle. When the circuit is reversed (Retracted), the right marker folds, and the left remains cradled.

When the circuit is next Extended and Retracted, the marker on the opposite side unfolds/folds, and the previous marker remains cradled.

At the start of the first pass (assuming right marker desired), Extend the marker circuit until the right marker is fully unfolded. Set lever to neutral.

At the end of the pass, Retract the circuit until the right marker is fully folded.

At the start of the next pass, Extend the circuit to deploy the opposing marker.

Special Dual-Marker Operations

Passes with same marker side:

• Retract (raise) the marker and make the turn.

• Begin to extend the opposite marker.

• Retract it, and extend the original marker.

Both markers unfolded:

• Fully extend one side.

• Momentarily Retract, then Extend to deploy opposite side.
Acremeter Operation

The acremeter counts shaft rotations whenever the shaft is rotating - this is with the drill lowered and in motion or during crank operation. The meter is programmed to display rotations as acres or hectares, when using all rows, factory-specified tires and tire inflations.

& Unusual conditions and/or non-standard row spacings can cause the acremeter tally to vary from actual acres planted.

Normal Operating Sequence

& The acremeter counts rotations during drill calibration (and if so, can be useful for calibration, although the meter must be on, or moved to, the shaft being cranked).

1. Record the acremeter reading at the start of planting (and after calibration). The large “12345.6” format display is the grand total area planted since meter installation. If the display is blank, see “Dormant Display” below.

2. Lower drill and plant. Acremeter counts shaft rotations, calculates acres or hectares, and adds to the running grand total.

3. During planting (drill lowered and moving forward), the display blanks (goes dormant), but area tally continues.

4. When raised for turns, obstructions and transport, the drive wheel stops, and the meter counts no additional (non-planting) rotations.

5. Whenever shaft rotation stops, the LCD display activates after 30 to 60 seconds, and remains visible for 30 to 45 minutes.

6. At the completion of planting, record the final reading or the grand total. If the display goes dormant before you can read it, see “Dormant Display”.

7. Subtract the reading at Step 1 from the reading at Step 6 for the total planted in the present session.

Dormant Display

Refer to Figure 33

To conserve power, the LCD display blanks itself most of the time. If you need to read the display after it has “timed out” and gone dormant:

• use the calibration crank to turn the jackshaft once, or

• gently tap or wave a magnet at either of the Great Plains logo spots ① on the lower region of the display. Be careful not to scratch the window.

When active the lower left corner displays the revolutions per acre for which the meter is factory-programmed.
Clutch/Point Row Operation

Prior to first use, the controller module must be installed in the tractor cab. See “Install Clutch Switch Module in Cab” on page 103.

During normal full-swath planting, the console requires no attention; all switches except Pump are On.

Common tasks requiring switch changes are:

- Calibration
- Point Row planting.

Refer to Figure 34

Normal Full Pass

1. Set Master switch (M) ON (up), and Pump (P) OFF. Set all sections (L, C, R) ON (up).
   Check that corresponding lamps are on.
2. Height switch automatically energizes clutches when row units are lowered.

Point Row

3. Turn desired sections off as non-planting regions are reached.
4. Turn them back on before commencing next full-width pass.

See also see “Clutch Troubleshooting” on page 59.

Calibration

In order to work at a comfortable height, the drill is normally lowered for calibration. If power is on, the clutches will be engaged, preventing manual operation of the metering system with the calibration crank.

For calibration of a drill section, set the Master switch (M) down to center-OFF. This disengages all clutches.

Refer to the Seed Rate Manual for details on calibration.

<table>
<thead>
<tr>
<th>Switch or Indicator</th>
<th>Function</th>
</tr>
</thead>
</table>
| M MASTER Switch     | Up: System enabled  
                      | Center: System OFF  
                      | Down: Height Switch Bypassed ON |
| m MASTER Lamp       | On: System enabled  
                      | Off: System OFF |
| S Section Lamps     | On: Clutch energized for that section.  
                      | Off: Clutch not energized\textsuperscript{a} |
| L LEFT CENTER RIGHT | Up: section enabled  
                      | Down: section disabled |
| P PUMP              | No function on standard 3S40 drills. |
| F Fuse\textsuperscript{b} | Protects switch box, clutches and battery. |
| CAL CAL Switch and Lamp | Height switch overridden to ON |

\textsuperscript{a} However, the section’s meters may still be coupled to the drive system, if lock-up bolts are installed in the clutch.

\textsuperscript{b} If (M) lamp fails to illuminate with (M) set ON, check the fuse (F). If open, check for damaged cable / failed clutch.
Electric Clutch Lock-Up
In case of electric clutch failure, an electric clutch can be mechanically engaged.

Refer to Figure 35 and Figure 36
1. Remove the three M8-1.25×14mm metric bolts ① from their storage locations near the clutch. Save the nuts.
2. At the clutch, align the cutouts ② with the holes ③.
3. Insert the M8-1.25×14mm metric bolts ④.
If you observe half the hole obstructed by a metal disc ④, you are not at a cutout.
If the entire hole is obstructed by a metal disc ④, you are not at a cutout.
When at a cutout, the bolt will screw in with minimal resistance until the bolt head reaches the clutch face.

& Use only the provided 14mm length bolts. Longer bolts will damage the clutch. Shorter bolts may not effect a lock-up. Replacement bolts are Great Plains part number 802-782C.

Shaft Monitor Operation (Option)
The optional shaft monitor generates an alarm if any one or more of the three meter shafts on the drill stop turning for more than 30 seconds.

Refer to Figure 37
To operate shaft monitor, turn system on by activating on-off switch ① on monitor head. If seed-cup shafts are turning, all three indicator lights ② are illuminated and no alarm sounds.
If any seed-cup shaft stops for 30 seconds, an alarm sounds and the indicator for that section flashes on the monitor, designating the failed shaft.
& The 30-second delay is to prevent nuisance alarms when turning at the end of the field.
& If a failure does occur and an alarm sounds, remember you have traveled for 30 seconds without planting with that drill section. If due to wheel lift or low tire pressure, you may have been planting at progressively lower populations before that.
Field Operations

This section presumes that all pre-operation check have been made on the drill, and the drill is loaded with seed and (optionally) fertilizer.

Final Field Checklist

- Drill unfolded (page 23).
- Lock-Out hubs: drive system engaged (page 24).
- Seed and fertilizer loaded (page 26).
- Set material rates per chart or calibration (page 44).
- Check all seed hoses secure.

Planting Sequence

1. Set Master and all section clutch switches ON.
2. Lower drill at initial seeding point.
3. Extend marker for next pass centerline.
4. Pull forward and begin planting.
5. Raise drill for turns (seed flow stops automatically).
6. Retract marker and make turn.

NOTICE

Machine Damage Risk:

Do not make short radius turns with the drill in the ground.
Parking
Following these steps when parking the drill for periods of less than 36 hours. For longer periods, see Storage, the next topic.

1. Position the drill on firm, level ground.

Roll-Away Hazard:
Do not unhitch on a slope.

2. Raise the drill.
3. Install lift locks.
4. Fold as necessary for the parking space available.
5. Securely block drill tires to prevent rolling.
6. Dismount jack from storage stob and pin to mount on side of hitch. If ground is soft, place a board or masonry block under jack.
7. Extend jack until tongue weight is off tractor drawbar.
8. Disconnect hydraulic lines, and arrange them so they cannot contact the ground.
10. Remove hitch pin.
11. Remove safety chain.

Storage
Store the drill where children do not play. If possible, store it inside for longer life.

1. Perform the drill Parking checklist.
2. Lubricate the drill at all points listed under "Lubrication" on page 73.
3. Check all bolts, pins, fittings and hoses. Tighten, repair or replace parts as needed.
4. Check all moving parts for wear or damage. Make notes of any parts needing repair before the next season.
5. Plug or cap seed delivery tubes to prevent pest entry.
6. Grease exposed cylinder rods to inhibit rust.
7. Use touch-up paint to cover scratches, chips and worn areas to prevent rust.
To get full performance from your drill, you need an understanding of all component operations, and many provide adjustments for optimal field results.

The 3S-4010HD and 3S-4010HDF have frame-mounted or unit-mounted coulters, and double-disk parallel-arm openers with depth-controlling press wheels. This system provides accurate depth control and seed placement over uneven terrain.

Each opener is mounted on a floating opener frame, held parallel to the ground. Opener bodies are staggered for easy soil flow. A spring provides the down pressure necessary for opener double disks to open a seed furrow. The spring allows openers to float down into depressions and up over obstructions. Individual openers can be adjusted to account for tire tracks.

Even if your planting conditions rarely change, some of these adjustment items need periodic attention due to normal wear.

**Planting Depth**

Setting nominal planting depth, and achieving it consistently, is affected by multiple adjustable drill functions, from greatest to least effect they are:

- Opener Depth (Press Wheel Height)
- Row Unit Down Pressure,
- Opener Frame Height,
- Frame-Mounted Coulter Force,
- Unit-Mounted Coulter Depth Adjustment,
- Frame Weights (at higher pressures), and;
- Disk Blade Adjustments (as row unit blades wear).

<table>
<thead>
<tr>
<th>Adjustment</th>
<th>Page</th>
<th>The Adjustment Affects</th>
</tr>
</thead>
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<td></td>
</tr>
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<td>Frame-Mounted Coulters (FMC)</td>
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<td></td>
</tr>
<tr>
<td>Frame Height - FMC</td>
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<td>Coulter depth and planting depth</td>
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<td>Individual FMC Depth</td>
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<td>SRa Seed population and fertilizer application rates</td>
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<td>Marker Adjustments</td>
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<td>Marker Extension Adjustment</td>
<td>18</td>
<td>Pass alignments with no overlap or excessive gap</td>
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<td>Marker Disk Adjustment</td>
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</tr>
<tr>
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<td>10HD Series Row Unit Adjustments</td>
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<td>Unit-Mounted Coulter Adjustments</td>
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<td>Row Unit Down Pressure</td>
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<td>70</td>
<td>Avoiding wasted and unplanted seed</td>
</tr>
</tbody>
</table>

a. Refer to separate Seed Rate manual (196-522B) for details, normally in manual pak enclosure on drill.
Opener Frame Height

Frame height adjustment methods depend on coulter configuration:

Refer to Figure 40
1. Frame-Mounted Coulters
   frame height information begins on this page.
2. Unit-Mounted Coulters
   frame height information begins on page 41.
3. No Coulters
   use the same frame height setup as #2, page 41.

Frame-Mounted Coulters

Frame-mounted coulters are an optional alternative to unit-mounted coulters. Only one type of coulter may be installed. See page 83 for ordering information.

Frame-mounted coulters are used “in row” and not “zone”. They are intended to prepare the soil directly ahead of the seed furrow.

With frame-mounted coulters, the coulter depth controls opener depth and performance. Set the frame height to achieve the desired coulter depth.

There are three adjustments for frame-mounted coulters:

Refer to Figure 41
1. Frame height - the running depth of all coulters as a group. This is set by a hydraulic stop, the next topic.
2. Individual coulter depth - a mechanical adjustment for a few rows in tire tracks. See page 40.
3. Individual coulter down-force - this is a spring adjustment for rows in tracks, or all rows - in unusually light or heavy no-till conditions. See page 41.

Frame Height - Frame Mounted Coulters

Refer to Figure 42
In regular or heavy no-till conditions, set
⑦ the coulter depth to about 1in (2.5cm) deeper than ⑧ seeding depth.

For example, if
⑧ the desired seeding depth is 1in (2.5cm), set
⑦ the coulters to run at 2in (5.1cm) deep.

Setting coulters too deep for conditions can cause opener plugging and uneven or too-deep seed depth. In light no-till or conventional till conditions, it may be necessary to set coulter depth ⑦ to less than 1in (2.5cm) below seeding depth ⑧, or even ¼ in (6mm) above seeding depth.

In addition to checking depths at setup, be sure to check actual seeding results while planting.
**Crushing Hazard:**
Make all down-stop adjustments with circuit in neutral and drill raised (actuator plunger not in contact with down-stop). Loosening the down-stop with circuit active and drill lowered results in rapid lowering of the frame.

**NOTICE**

**Field Result Inconsistency Risk:**
Make sure the drill is level and the lift system is re-phased before adjusting the tool bar height. If the center section does not consistently stop at the set height, or the wings do not run at the same height as the center, the lift system may be out of phase (above), or the wings may not be level. See “**Leveling Drill**” on page 65.

**Refer to Figure 43**
& The change in coulter height is greater than the change in down-stop adjustment. Make adjustments in small amounts.

The lift system includes an adjustable stop valve (1) to fix the height of the opener frame when the drill is lowered.

To adjust the stop height (assuming a desired 1 1/4 in / 3.2cm coulter depth):
1. Move to smooth level ground with soil as similar as possible to field conditions.
2. Lower the drill until the coulter blades just touch the ground. Hold that height by setting the lift circuit to neutral.
3. Loosen the knob (2) on the stop (3).
4. Adjust the stop (3) position on the tube (4) until it just touches the actuator (5).
5. Raise and then fully lower the drill.
6. Pull forward 10 feet (3m) and stop.
7. Measure the depth at which the coulters are running. Measure only in non-tire-track rows where the coulter springs are not in compression (arm is at full extension). If the coulters are at the desired depth, no further adjustment is necessary. Skip to step 11.
8. Raise the drill and set the lift circuit to neutral.
9. Adjust the stop up (to raise depth) or down (to lower depth). Adjust in small increments. Secure the stop with the knob on the bolt (2).
10. Check the new setting starting at step 5.
11. Raise and lower several times and confirm that the drill stops consistently at the new height.

& It is important that all of the tires remain in contact with the ground to maintain levelness of machine from front to rear. Setting the depth control too deep combined with high opener spring force can cause the drill to tip forward when planting, which may cause plugging.

Running with the front tires floating or skimming on the ground will cause uneven coulter depth and may cause uneven seed depth.
Before making any adjustments to individual frame-mounted coulters, setup the seeding depth on the row units, and verify that the coulter tool bar height is set for your conditions.

**Individual Frame-Mounted Coulter Depth**

The running depth of all coulters is adjusted simultaneously by changing the tool bar height. Adjusting the height of a small number of coulters may be useful for rows in tire tracks.

Adjust individual coulters as follows.

1. On level ground, lower the drill until coulters just touch the ground.
2. Raise the drill by the extra amount you need to lower the rows in tracks.
3. At each frame-mounted coulter to be adjusted, slightly loosen all six bolts (1, 2) at the mount.
4. Using a rubber mallet, tap the spring bar 3 up or down until the bottom edge of the coulter disk is at ground level.
5. Tighten the two clamp bolts 1 until both U-bolts are firmly against the edge of the spring bar 3. It is normal for there to be a small gap between the clamps.
6. Tighten the four U-bolts 2.
7. Lower the drill to planting height and pull forward 30 feet (10m).
8. Check coulter blade to opener blade (furrow centerline) alignment.
Frame-Mounted Coulter Force

In normal operation at target running depth, the spring is at full extension or only slightly compressed. It compresses briefly as obstructions and denser soil are encountered.

Coulter springs are set to 400 lbs (181 kg). In normal operation at target running depth, the spring is at full extension. It compresses briefly as obstructions are encountered.

- In heavy no-till conditions, you may observe the springs in compression most of the time. This means that the blades are not reaching the desired coulter depth. If adequate drill weight is available, you can increase the spring down-force to compensate.
- In light but rocky conditions, the factory spring setting may be higher than needed. You can extend blade life by reducing the force at which the blades ride up over obstructions.

To adjust the coulter spring:

Refer to Figure 45

1. Raise the drill and install transport locks. See “Raising” on page 21.
2. Determine the new spring length desired. See the table at right.
3. Measure the current length of the spring(s) to be changed. If already shorter than 9 3/4 in (24.8 cm), or longer than 10 1/4 in (26 cm), do not further adjust them.
4. Loosen the jam nut.
5. Rotate the adjuster nut until the spring is at the new length. Tighten the jam nut.
6. If all springs are continuously in compression, the coulters can lift the wing frames off the ground (at the gauge wheels), resulting in uneven coulter depth and/or uneven seed depth. If high forces are required, frame weights are probably required.

Frame Height without Frame-Mounted Coulters

Use these instructions with a drill having no coulters, or having unit-mounted coulters. Adjustments to individual unit-mounted coulters themselves are on page 46.

If the drill has frame-mounted coulters, use the height procedure on page 38.
Refer to Figure 46
Frame height is measured from the bottom of the opener tool bar (the largest of the tool bars), and is measured with the drill lowered.

The recommended height depends on your field conditions (see table below), and whether unit-mounted coulters are installed.

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Opener Tool Bar Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light no-till, or conventional tillage, with unit-mounted coulters or no coulters</td>
<td>Above 26in (above 66cm)</td>
</tr>
<tr>
<td>Moderate to challenging no-till with unit-mounted coulters</td>
<td>At 26in (66cm)</td>
</tr>
</tbody>
</table>

For no-till conditions, a 26in (66cm) height allows the opener parallel arms to run parallel to the ground giving the opener the maximum upward or downward flotation.

In loose or conventional planting conditions, a frame height above 26in (66cm) helps keep the no-till spring forces from burying the openers.

& Setting the frame above the 26in (66cm) limits the opener downward flotation.
& Running with the frame below 26in (66cm) limits opener upward flotation and could cause opener damage especially at center of the drill.

Crushing Hazard: Make all down-stop adjustments with circuit in neutral and drill raised (actuator plunger not in contact with down-stop). Loosening the down-stop with circuit active and drill lowered results in rapid lowering of the frame.

Field Result Inconsistency Risk:
Make sure the drill is level and the lift system is re-phased before adjusting the tool bar height. If the center section does not consistently stop at the set height, or the wings do not run at the same height as the center, the lift system may be out of phase (above), or the wings may not be level. See “Leveling Drill” on page 65.
Refer to Figure 47

The lift system includes an adjustable stop valve \( \textcircled{1} \) to fix the height of the opener frame when the drill is lowered.

To adjust the stop height:

1. Move to smooth level ground similar to field conditions.
2. Lower the drill and measure the present tool bar height. If the drill cannot be fully lowered due to row unit spring settings, temporarily move the cams to a lower setting, or out of notch entirely.
3. Raise the drill.
4. Loosen the knob \( \textcircled{2} \) on the stop \( \textcircled{3} \).
5. Adjust the stop \( \textcircled{3} \) position on the tube \( \textcircled{4} \). Adjust up (to raise) or down (to lower). Adjust by half the last difference. Secure the stop with the knob bolt \( \textcircled{2} \).
6. Lower the drill and measure the tool bar height. If the error is more than about \( \frac{1}{8} \)in (3mm), repeat the adjustment process from step 3.
7. Raise and lower several times and confirm that the drill stops consistently at the new height.

It is important that all of the tires remain in contact with the ground to maintain levelness of machine from front to rear. Setting the depth control too deep combined with high opener spring force can cause the drill to tip forward when planting, which may cause plugging.

Running with the front tires floating or skimming on the ground will cause uneven coulter depth and may cause uneven seed depth.

![Figure 47](image)

**NOTICE**

**Height Mis-adjustment Risk:**

Make sure the drill is level and the lift system is re-phased before adjusting the tool bar height.
Frame Weights

In challenging no-till conditions, a few row-unit down-pressure settings (across all rows), and some frame-mounted coulter settings, may be high enough to lift the wing gauge wheels off the ground. To avoid inconsistent results, add weight to the wings.

Up to three pair (six total) optional weight brackets may be added. See “Dual Weight Kit” on page 82. Each kit includes two brackets.

Each bracket accepts up to five standard weights, about 500 lbs (227 kg) per wing, or 1000 lbs (454 kg) per kit.

The weights required are common “suitcase” tractor weights, and are widely available, although not supplied by Great Plains.

Great Plains recommends loading no more than three sets of brackets, representing 3000 lbs (1361 kg) total.

Do not add weight to the center section. It is always heavier than even a fully weighted wing, and never requires additional weights.

Available Down Force

Material weight (e.g. seed) is not included in the table, as its effect dwindles toward zero during planting.

Each Weight set assumed to be fully populated with five 100 pound weights.

<table>
<thead>
<tr>
<th>Material</th>
<th>010HD-4810</th>
<th>3S4010HD-6475</th>
<th>3S4010HDF-4810</th>
<th>3S4010HDF-6475</th>
</tr>
</thead>
<tbody>
<tr>
<td>16 bs</td>
<td>299 kg</td>
<td>540 lbs</td>
<td>245 kg</td>
<td>680 lbs</td>
</tr>
<tr>
<td></td>
<td>27 kg</td>
<td>45 lbs</td>
<td>21 kg</td>
<td>59 lbs</td>
</tr>
<tr>
<td></td>
<td>6 kg</td>
<td>10 lbs</td>
<td>4 kg</td>
<td>13 lbs</td>
</tr>
<tr>
<td></td>
<td>16 kg</td>
<td>27 lbs</td>
<td>12 kg</td>
<td>35 lbs</td>
</tr>
</tbody>
</table>

Material Rate Setting

Details of seed and fertilizer rate setting are found in the Seed Rate Manual, and rely on data from that manual, normally located in the manual pak enclosure at front center of drill).

Rate setting controls are different for each box, but independent for each box. All chart rates, for all boxes, are approximate. Great Plains strongly recommends calibration of each box to the material to be applied.

<table>
<thead>
<tr>
<th>Coarse Rate</th>
<th>Main Box</th>
<th>Fertilizer</th>
<th>Small Seeds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drive Type Sprockets</td>
<td>Range Sprockets</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fine Rate</td>
<td>Rate Handle</td>
<td>Transmission Sprockets</td>
<td></td>
</tr>
<tr>
<td>Cup Adjustment</td>
<td>Door Handle</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
10HD Series Row Unit Adjustments

Refer to Figure 49
(de picting an opener populated with optional accessories)

From front to back, a Great Plains 10HD Series row unit can include the following capabilities (some optional):

1. Unit-Mounted Coulter (UMC): optional
   UMCs are used instead of frame-mounted coulters and are often preferred where soils are not rocky. See “Unit-Mounted Coulter Adjustments” on page 46.

2. Down Pressure Springs and Cam: standard
   Each row unit is mounted on the drill via parallel arms which allow the row unit to independently move up and down while remaining parallel to the ground. The cam-adjustable springs provides the force to get the row unit and attachments into the soil. See “Row Unit Down Pressure” on page 47.

3. Row Unit Lock-Up: optional
   If altering row spacing, unused rows can be raised to reduce wear. Seed flow is stopped at the boxes. See “Row Shut Off” on page 50.

4. Disc Blades: standard, 2 per row unit
   Double disc blades open a furrow, creating the seed bed. Spacers adjust the blades for a clean furrow. See “Disk Blade Adjustments” on page 52.

5. Scraper Separator: standard
   No adjustments are necessary.

6. Seed delivery tubes: standard
   No adjustments are necessary. There are one, two or three separate tubes for main seed, Fertilizer and Small Seeds.

7. Seed firmer: seed flap (not shown) standard:

   Keeton seed firmer (not shown)
   Improves seed-soil contact, and provides a stable arm for a low-rate liquid fertilizer delivery tube. See “Keeton Seed Firmer Adjustment” on page 53.

   Seed-Lok™ firming wheel (shown)
   Improves seed-soil contact. See “Seed-Lok™ Seed Firmer Lock-Up” on page 53.

8. Press wheels: standard (choice of types)
   Adjusted by a T-handle, these close the seed trench. The wheels also support the free end of the row unit, and provide the primary control over seeding depth. See “Opener Depth (Press Wheel Height)” on page 54.

---

**NOTICE**

Certain Machine Damage:
Do not back up with row units in the ground. To do so will cause severe damage and row unit plugging.
Unit-Mounted Coulter Adjustments

Unit-mounted coulters are an optional alternative to frame-mounted coulters. Only one type of coulter may be installed. See page 85 for ordering information.

- Unit-Mount Coulters are not factory-installed. Check alignment and depth prior to first use.
- For frame-mounted coulter adjustments, see page 38.

Coulter Depth Adjustment

The ideal operating depth for unit-mounted coulters is $\frac{1}{4}$in above opener depth. Although they may have originally been set to this depth, coulter (and opener) blades wear with time, and may need adjusting.

Adjusting the coulter depth is accomplished by remounting the coulter blade in one of the six mounting holes arranged in a staggered pattern in the coulter bracket.

Refer to Figure 50 and Figure 51

Raise drill and install cylinder locks before working on coulters. Row unit may be fully lowered or locked up. Do not attempt to move blade when the current or new position causes it to contact the ground during the adjustment. Be careful around the front end of row units. Coulter blades may be sharp.

To adjust coulter depth:

1. Determine the present opener and coulter depths.
2. Note which bracket hole the coulter is presently using.
3. Determine which new hole will position the coulter closer to the $\frac{1}{4}$in-above depth. See the table below.
4. Remove the $\frac{5}{8}$-11 x 4in bolt, lock washer and nut (7 in Figure 50).
5. Move the blade to the new position. Insert the bolt, and tighten on the lock washer and nut.

<table>
<thead>
<tr>
<th>Hole No.</th>
<th>Depth of (new) coulter blade relative to (new) opener blades</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>1in (25mm) above</td>
</tr>
<tr>
<td>3</td>
<td>5/8in (16mm) above</td>
</tr>
<tr>
<td>5</td>
<td>1/4in (6mm) above</td>
</tr>
<tr>
<td>1</td>
<td>0 (factory standard hole)</td>
</tr>
<tr>
<td>4</td>
<td>3/8in (10mm) below</td>
</tr>
<tr>
<td>6</td>
<td>3/4in (19mm) below</td>
</tr>
</tbody>
</table>

If a worn coulter cannot be adjusted to satisfactory operating depth, replace the coulter blade.
Coulter Row Alignment

Refer to Figure 52
For both frame- and unit-mounted coulters, the ideal alignment is for the blade to prepare a furrow directly ahead of the opener discs.

As a check on coarse alignment, sight along the coulter blade centerline ①, the gap between the opener blades ②, and the centerline between the press wheels ③. If they are clearly out of alignment, either the coulter or the press wheels (or both) may be in need of adjustment.

The exacting test of correct alignment is field results. Operate the drill on some test ground (no seed required), and verify that the opener blades are in the groove opened by the coulter.

Adjust UMC Alignment
To adjust unit-mounted coulter alignment, loosen the four bolts ④ that attach its bracket to the row unit. The holes on the row unit are slotted, side-to-side, and allow the coulter bracket sideways and rotational adjustment.

Keep the coulter blade vertical while adjusting.
If the blade cannot be brought into alignment, check that the blade spindle itself is using the same hole location on each side of the bracket.

Adjust FMC Alignment
To adjust frame-mounted coulters, loosen the same bolts used to make vertical adjustments. See page 38.

Row Unit Down Pressure

Refer to Figure 53
The ideal amount of down-force causes the press wheels to compress any loose surface soil, but not press a trench into subsoil.

To assess down-force, operate the drill for a short distance on typical ground (with or without seeding), and stop. Leave the drill lowered (row units in ground).
At several row units, inspect the furrow created by the opener discs and closed by the press wheels.
  & Be sure to inspect rows both in and out of tire tracks.
**Adjustments**

Refer to Figure 54
1. If the press wheels are leaving no tracks, or light tracks, increase down-force.
2. If the wheels are compressing trash and loose soil, and leaving clear tracks right at the top of the subsoil, down-force is probably correct and needs no adjustment.
3. If the wheels are creating a trench into the subsoil, down-force is too high and needs to be reduced.

**Adjusting Row Unit Down Force**
The springs allow the row units to float down into depressions and up over obstructions.

With Frame-Mounted Coulters
With frame-mounted coulters, the seed trench is primarily opened by the coulters. Row unit springs provide only additional assistance needed to make a furrow “V” shaped and ensure furrow closure by the press wheels.

Often, the rows may be run at the minimum spring setting, other than in tire tracks, which commonly need some adjustment.

If trench depth is not being achieved across all rows, adjust the force and/or depth of the coulters before making row unit spring adjustments.

With Unit-Mounted Coulters (or no coulters)
Without frame-mounted coulters, the row unit springs provide the primary down force for cutting through residue and opening the seed trench.

If you cannot achieve enough down force, adding a weight kit may help. See “Frame Weights” on page 44.
Adjusting 10HD-Series Down-Force

Refer to Figure 55

An adjuster cam sets row unit spring down pressure individually for each row unit. This is useful for penetrating hard soil and planting in tire tracks.

The notes in the left table below are based on a drill without coulters. About 120 lbs (54 kg) of the down-force is the weight of the row unit itself. The additional force is due to the springs lifting against the mass of the wing.

With factory-installed frame-mounted coulters, only 2 springs are installed, to provide finer down-force control at the opener disks (right table).

With frame-mounted coulers installed, they also lift against wing mass, effectively reducing the maximum cam settings without weights, but also reducing the workload of the openers, so down force settings may be lower. Test, without seeding, in your conditions, to determine optimal down-force settings, and whether additional weight is required.

Refer to Figure 55

To adjust down pressure, use an adjustable or open-end 1 1/8in (29mm) wrench.

1. Raise the drill. Although this adjustment can be made with the drill lowered, the springs will be in tension, and will require more effort. The extra force required may also damage tools.
2. Put tractor in Park and shut it off.
3. Position wrench on hex nut weldment.
4. Pull upper spring link back.
5. Move the adjustment cam to the new setting on the spring adjust bar.

Cam Down-Force Settings

<table>
<thead>
<tr>
<th>Cam Notch</th>
<th>Standard (4) Springs</th>
<th>Springs Reduced for FMC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pounds</td>
<td>7.5in</td>
</tr>
<tr>
<td>zero</td>
<td>(out of notch) Maintenance Only</td>
<td></td>
</tr>
<tr>
<td>one</td>
<td>250 lbs (113 kg)</td>
<td>✔</td>
</tr>
<tr>
<td>two</td>
<td>275 lbs (125 kg)</td>
<td>✔</td>
</tr>
<tr>
<td>three</td>
<td>310 lbs (141 kg)</td>
<td>✔</td>
</tr>
<tr>
<td>four</td>
<td>370 lbs (168 kg)</td>
<td>Note 1</td>
</tr>
<tr>
<td>five</td>
<td>430 lbs (195 kg)</td>
<td>Note 1</td>
</tr>
<tr>
<td>six</td>
<td>490 lbs (222 kg)</td>
<td>Note 1</td>
</tr>
<tr>
<td>(tip)</td>
<td>Do Not Use</td>
<td></td>
</tr>
</tbody>
</table>

Note 1: Setting to this down-force on all rows of a drill may require Markers and/or Weight sets

Note 2: Setting this down-force on all rows require Markers and/or Weight sets due to frame-mounted coulers
Row Shut Off

Using optional plugs, seed flow can be shut off for individual main box or Small Seeds box rows, but not for Fertilizer rows. Using optional pins, unused rows can be raised and locked up to reduce wear.

Main Seed Row Shutoff

If alternate row spacings are desired, the unused rows can be shut off with optional plugs (page 83).

1. Clean-out seed. The seed box must be empty prior to inserting plugs. See “Main Seed Box Clean-Out” on page 61.
2. Insert one plug at each row to shut off. Verify the seed hose path before inserting the plug, as some hoses do not make a strictly vertical drop to their row units.
3. Review seed rate settings prior to planting. Perform calibration calculations with the actual active row count.
4. Review marker extension setting. Drill centerline may have shifted, and correct extension values are likely to have changed and may differ on each side (and differ for opposing vs. concentric passes).

Small Seeds Row Shut-Off

If alternate row spacing is required for small seeds, optional plugs (page 84) are available to block flow inside the seed box tray.

1. Clean-out seed. The seed box must be empty prior to inserting plugs. See “Small Seeds Box Clean-Out” on page 62.
2. Before installing plugs, inspect the seed boxes for existing factory-installed plugs. These are blocking extra unused seed ports. You may want to identify these plugs with an indelible marker.
3. Insert one plug at each row to shut off. Verify the seed hose path before inserting the plug, as some hoses do not make a strictly vertical drop to their row units.
4. Review seed rate settings prior to planting. Perform calibration calculations with the actual active row count.
5. Review marker extension setting. Drill centerline may have shifted, and correct extension values are likely to have changed and may differ on each side (and differ for opposing vs. concentric passes).

When removing plugs to restore rows to operation, be sure to not disturb a factory-installed plug.
Row Unit Lock-Up

Wear of ground-contact components of unused rows can be minimized by locking up a row unit. Lock-up requires use of one optional pin (part number is 805-033C) for each row locked up.

Refer to Figure 58 (depicting similar 10HDP row)

When not in use, lock-up pins are normally stored in a hole 1 at the top of the opener mount.

1. Raise the drill. Although this adjustment can be made with the drill lowered, the row unit springs would be in tension, and require more effort. The extra force may also damage tools.
2. Set the down pressure springs to minimum force, per the instructions on page 49.

Refer to Figure 59 (depicting similar 10HDP row)

3. Raise the row unit high enough that the hole 2 for the pin is above the lower parallel arm 3:
   a. use a hoist at the rear of the opener,
   b. use a jack under the opener extension, or;
   c. place a block under the row, and lower drill.

Equipment Damage Risk:

Do not pin the row unit while it is in the lowered position. If the pin is inserted below the parallel arm, row unit damage will occur when planting begins.

4. Remove the pin from the storage hole and insert and secure it in the lock-up hole.
5. Lower row unit. Parallel arm rests on lock-up pin.
6. Repeat for all rows needing lock-up.

Loss of Control and Sharp Object Hazard:

Do not lift a row unit by hand. The weight of the unit, plus the spring force (even at minimum) is too great (plus, a free hand is needed for pinning). Even with multiple people lifting, hand lifting is unsafe - there are numerous sharp edges, and the row unit will snap down violently if a grip is lost.
**Disk Blade Adjustments**

Opener disc angle and stagger is not adjustable, but disc-to-disc spacing is, and may need attention as discs experience normal wear. Spacers will need to be reset when blades are replaced.

*Refer to Figure 60*

The ideal spacing causes the blades to be in contact for about one inch. If you insert two pieces of paper between the blades, the gap between them should be 0 to 1.75in (0-4.4cm).

If the contact region is significantly larger or smaller (or there is no contact at all), it needs to be adjusted by moving one or more spacer washers. If the contact region varies with blade rotation, one or both blades is likely bent and in need of replacement.

---

**Adjusting Disc Contact**

*Sharp Object Hazard:*

Row unit disk blades may be sharp. Use caution when making adjustments in this area.

*Refer to Figure 61*

1. Raise the drill and install the transport locks.
2. Remove the bolt retaining the opener disc on one side. Carefully remove the disc, noting how many spacers are outside the disk and inside the disk. Do not lose the hub components and spacer washers.
3. To reduce the spacing between the discs (the normal case), move one spacer washer from the inside to the outside of the disc.
4. Re-assemble and check disc contact.
Seed Firmer Adjustments

10HD Series row units include a seed flap, or one of two optional seed firmers.

The seed flap requires no adjustment, but may need to be replaced if worn, and may need to be shortened if an optional seed firmer is added after initial delivery.

**Sharp Object Hazard:**
Row unit disk blades may be sharp. Use caution when making adjustments in this area. To adjust the Keeton Seed Firmer, lower the drill until the disks of the row units are resting on the ground.

**Keeton Seed Firmer Adjustment**
The optional Keeton Seed Firmer is an engineered polymer shape that slides down the seed trench. It traps seeds as they exit the seed tube and firms them into the bottom of the “V”.

*Refer to Figure 62*
The Firmer is provided with a preset tension which is recommended for using the first year. The tension screw can be tightened in subsequent years according to your needs. Firmers should provide just enough tension to push seeds to the bottom of the trench.

**Seed-Lok™ Seed Firmer Lock-Up**
Optional Seed-Lok firming wheels provide additional seed-to-soil contact. The wheels are spring loaded and do not require adjusting. In some wet and sticky conditions the wheels may accumulate soil. To avoid problems associated with this, you can lock-up the firmers.

*Refer to Figure 63 (which depicts a row unit with the opener blades removed for clarity)*
To lock up Seed-Lock wheels:
1. Pull firming-wheel arm up as high as possible.
2. Flip the lock tip to hold the arm up.
Press Wheel Adjustments

Opener Depth (Press Wheel Height)

Seeding depth on 3S-4010HD and 3S-4010HDF is set by frame-mounted coulter depth (if installed) and row unit depth. Whether frame-mounted coulters are installed or not, set frame height (page 38 or page 41) before making row unit depth adjustments.

10HD Series press wheel height is a stop adjustment and not a spring adjustment. It establishes a fixed relationship between opener depth and the closed-furrow surface at the press wheel.

Refer to Figure 64

Set opener seeding depth by adjusting press-wheel height ①. To adjust, first raise openers slightly, then lift and slide T handles ② on top of openers. Initially adjust all press wheels to the same height. Individual rows running in tire tracks may need to be set deepera.

- For more shallow seeding, slide T handles forward ⑤ toward drill.
- For deeper seeding, slide T handles backward ⑥ away from drill.

If press wheels are lifting off ground, check front-to-back level, and increase row unit spring down force.

If press wheels are digging into ground, reduce spring down force at the row units.

Press Wheel Spacing

Double V Press Wheel Adjustment

Refer to Figure 65

The double-V closing wheels ① can be moved inward and outward to alter how they close the seed trench and press soil over the seed.

To move the wheels in toward the center of the trench, remove one of the 1/4in (6.4mm) spacer bushings ② next to the press wheel arm and position it under the head of the hex head cap screw ③.

On wider row spacings the closing wheels can be moved outward by relocating the spacers to the inside, next to the press wheel arm ④.

---

a. If frame-mounted coulters are installed, adjust them for tire tracks before adjust T-handles. The coulter depth adjustment may be all that’s required to compensate for tracks.
Marker Adjustments

This section covers marker items that may need adjustment for current conditions, and assumes that the markers are installed, set to the correct initial extension and in proper working order. See also:

- "Marker Setup" on page 18
- "Marker Maintenance" on page 71

Marker Disk Adjustment

*Sharp Object Hazard:*
Marker disks may be sharp. Use caution when making adjustments in this area.

**Adjusting Mark Width**

*Refer to Figure 66*

1 is the direction of travel.

To change angle of cut, and the width of the mark, loosen 1/2-inch bolts 2 holding the disk assembly.

For a wider mark 3, increase the angle of the marker with respect to the tube 1. For a narrower mark 4, reduce the angle.

Tighten bolts 2.

**Direction of Cut**

*Refer to Figure 67*

To have the marker throw dirt out, invert the disk on the spindle, and invert the disk assembly.

Marker Chain Length

*Refer to Figure 68*

With marker unfolded, adjust chain to a length 1 of 63 in (160 cm)

Slowly fold marker while observing disk. If marker disk slides across the ground more than a foot (0.3 m) before chain and linkage lifts it up, the chain is too long.

Remove bolt 2 and shorten chain one or two links. Check adjustment by repeating folding process.

If chain is too short when marker is unfolded, it will prevent the marker blade from dropping into field depressions, causing skips in the mark line. Correct this condition by lengthening chain one or two links.
## Troubleshooting

### General Troubleshooting

<table>
<thead>
<tr>
<th>Problem</th>
<th>Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Planting too much</strong></td>
<td>Excessive overlap</td>
<td>Adjust marker, page 18.</td>
</tr>
<tr>
<td></td>
<td>Incorrect Drive Type (Main Box)</td>
<td>Check sprocket set up (Seed Rate Manual).</td>
</tr>
<tr>
<td></td>
<td>Seed meter incorrectly set</td>
<td>Check handle against chart (Seed Rate Manual).</td>
</tr>
<tr>
<td></td>
<td>Seed cup door too open (Main Box)</td>
<td>Narrow door opening for seed size (Seed Rate Manual).</td>
</tr>
<tr>
<td></td>
<td>Seed size and/or density varies from charts</td>
<td>Calibrate for your seed (Seed Rate Manual).</td>
</tr>
<tr>
<td></td>
<td>Incorrect tire size or pressure.</td>
<td>Check tires per page 87. Adjust air pressure. For incorrect size, use calibration to compensate until correct tires are installed.</td>
</tr>
<tr>
<td></td>
<td>Meter flutes damaged</td>
<td>Inspect and service as necessary.</td>
</tr>
<tr>
<td></td>
<td>Actual field size is different</td>
<td>Verify field size.</td>
</tr>
<tr>
<td><strong>Planting too little</strong></td>
<td>Excessive field speed</td>
<td>Slow down.</td>
</tr>
<tr>
<td></td>
<td>Incorrect Drive Type (Main Box)</td>
<td>Check sprocket set up (Seed Rate Manual).</td>
</tr>
<tr>
<td></td>
<td>Seed meter incorrectly set</td>
<td>Check handle against chart (Seed Rate Manual).</td>
</tr>
<tr>
<td></td>
<td>Seed cup door too narrow (Main Box)</td>
<td>Widen door opening for seed size (Seed Rate Manual).</td>
</tr>
<tr>
<td></td>
<td>Seed size and/or density varies from charts</td>
<td>Calibrate for your seed (Seed Rate Manual).</td>
</tr>
<tr>
<td></td>
<td>Plugged opener seed tube</td>
<td>Lift drill, inspect and clear tube.</td>
</tr>
<tr>
<td></td>
<td>Contaminated seed or treatment build-up in</td>
<td>Use new clean seed. Clean out meters.</td>
</tr>
<tr>
<td></td>
<td>meters</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Skipping chain or severely worn sprockets</td>
<td>Adjust chain slack (page 63). Replace worn sprockets.</td>
</tr>
<tr>
<td><strong>Excessive seed cracking</strong></td>
<td>Excessive field speed</td>
<td>Slow down.</td>
</tr>
<tr>
<td></td>
<td>Seed cup door too narrow (Main Box)</td>
<td>Open as needed for seed size (see Seed Rate Manual).</td>
</tr>
<tr>
<td></td>
<td>Unclean seed.</td>
<td>Use clean seed.</td>
</tr>
<tr>
<td></td>
<td>Damaged, old or dry seed</td>
<td>Use clean, new seed.</td>
</tr>
<tr>
<td><strong>No Seed Flow</strong></td>
<td>Rockshaft hubs locked out</td>
<td>Engage hubs (page 24).</td>
</tr>
<tr>
<td></td>
<td>Seed cup door setting is smaller than seed</td>
<td>Open doors for even flow with minimal cracking. See Seed Rate Manual.</td>
</tr>
<tr>
<td></td>
<td>size (large seed, Main Box)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Height switch mis-adjusted or malfunctioning</td>
<td>Check that clutches cycle with height switch operation. Readjust switch engagement point (page 70).</td>
</tr>
<tr>
<td></td>
<td>Clutch failure</td>
<td>Lower drill to engage height switch and clutches. Shaft should be impossible to move at calibration crank if clutch is engaged.</td>
</tr>
<tr>
<td></td>
<td>Chain break</td>
<td>Check all stages of chains from ground drive wheels to meter boxes.</td>
</tr>
<tr>
<td></td>
<td>Seed run-out</td>
<td>Check seed box.</td>
</tr>
<tr>
<td></td>
<td>Obstruction in meter.</td>
<td>Clean-out meter.</td>
</tr>
<tr>
<td></td>
<td>Seed plugs installed</td>
<td>Remove any unintended seed tube plugs.</td>
</tr>
<tr>
<td>Problem</td>
<td>Cause</td>
<td>Solution</td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>--------------------------------------</td>
<td>----------------------------------------------------</td>
</tr>
<tr>
<td>Uneven seed spacing</td>
<td>Seed-Lok plugging</td>
<td>Lock up Seed-Lok, page 53.</td>
</tr>
<tr>
<td></td>
<td>Drive Type too low</td>
<td>Use higher Drive Type and lower handle rate.</td>
</tr>
<tr>
<td></td>
<td>Damaged or missing seed flap</td>
<td>Replace seed flap.</td>
</tr>
<tr>
<td></td>
<td>Openers not penetrating low spots</td>
<td>Check/adjust frame height, coulter settings, row</td>
</tr>
<tr>
<td></td>
<td></td>
<td>down-force and weight available per row.</td>
</tr>
<tr>
<td></td>
<td>Opener disks not turning.</td>
<td>See “Opener disks not turning freely” in this</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Troubleshooting chart.</td>
</tr>
<tr>
<td>Drill boxes do not empty evenly</td>
<td>Drive Type (Main Box) or rate adjusters not the same on all sections</td>
<td>Check and correct.</td>
</tr>
<tr>
<td></td>
<td>Opener seed tube plugged.</td>
<td>Raise drill and clean out seed tube with wire.</td>
</tr>
<tr>
<td></td>
<td>Chains broken or skipping.</td>
<td>Check chain condition and slack on all sections.</td>
</tr>
<tr>
<td></td>
<td>Concentric passes - if planting in turns, inside boxes plant less than outside.</td>
<td>Reverse pass direction periodically, add more seed to outside boxes, or use opposing passes.</td>
</tr>
<tr>
<td></td>
<td>On 7.5in/19cm spacing, center box empties first, as it has one more row than wing boxes.</td>
<td>Add extra seed to center box.</td>
</tr>
<tr>
<td></td>
<td>Rough or steep traverse field conditions moves seed in boxes.</td>
<td>Add extra seed. For Small Seeds, install dividers.</td>
</tr>
<tr>
<td>Openers drill too deep (bulldozing)</td>
<td>Too much opener spring force.</td>
<td>Reduce opener down force to match conditions (page 47).</td>
</tr>
<tr>
<td></td>
<td>Frame height too low</td>
<td>Check and adjust (page 18).</td>
</tr>
<tr>
<td></td>
<td>Incorrect press wheel adjustment</td>
<td>Check and adjust (page 54); however, do not use press wheels to compensate for incorrect down force.</td>
</tr>
<tr>
<td>Uneven seed depth</td>
<td>Excessive field speed</td>
<td>Slow down.</td>
</tr>
<tr>
<td></td>
<td>Coulter depth adjustment</td>
<td>Verify coulter-to-opener relationship.</td>
</tr>
<tr>
<td></td>
<td>Coulter down-force insufficient - coulters not achieving depth</td>
<td>Add weight or, if weight is sufficient, increase coulter spring settings.</td>
</tr>
<tr>
<td></td>
<td>Insufficient opener down force for conditions</td>
<td>Adjust row unit cam, page 49.</td>
</tr>
<tr>
<td></td>
<td>Conditions too wet</td>
<td>Wait for dryer weather.</td>
</tr>
<tr>
<td></td>
<td>Seed-Lok plugging</td>
<td>Lock up Seed-Lok, page 53.</td>
</tr>
<tr>
<td></td>
<td>Damaged or missing seed flap</td>
<td>Replace seed flap.</td>
</tr>
<tr>
<td></td>
<td>Damaged opener seed tube</td>
<td>Check for damage at tip of seed tube.</td>
</tr>
<tr>
<td></td>
<td>Partially plugged opener seed tube</td>
<td>Lift up drill, expose bottom of seed tube and clean out.</td>
</tr>
<tr>
<td></td>
<td>Incorrect choice of coulter</td>
<td>Change coulter blade.</td>
</tr>
<tr>
<td></td>
<td>Skimming (gauge wheels skipping, or off ground entirely)</td>
<td>Reduce coulter and/or row unit down forces, or add weights.</td>
</tr>
<tr>
<td>Opener disks not turning freely</td>
<td>Opener plugged with dirt</td>
<td>Clean opener. Adjust scraper.</td>
</tr>
<tr>
<td></td>
<td>Planting conditions too wet</td>
<td>Wait until drier weather.</td>
</tr>
<tr>
<td></td>
<td>Seed-Lok is plugging opener</td>
<td>Lock up Seed-Lok, page 53.</td>
</tr>
<tr>
<td></td>
<td>Too much blade-to-blade contact</td>
<td>Adjust disk contact. See page 52.</td>
</tr>
<tr>
<td></td>
<td>Failed disk bearings</td>
<td>Replace disk bearings.</td>
</tr>
<tr>
<td></td>
<td>Bent or twisted opener frame</td>
<td>Replace opener frame.</td>
</tr>
<tr>
<td>Meter flutes locked up or shaft twisted</td>
<td>Obstruction(s) in meter cups</td>
<td>Clean out cups.</td>
</tr>
<tr>
<td></td>
<td>Treatment build-up in cups</td>
<td>Disassemble and clean cups/flutes.</td>
</tr>
<tr>
<td>Problem</td>
<td>Cause</td>
<td>Solution</td>
</tr>
<tr>
<td>---------</td>
<td>-------</td>
<td>----------</td>
</tr>
<tr>
<td>Press wheels not compacting the soil as desired</td>
<td>Too wet or cloddy</td>
<td>Wait until drier weather or rework ground.</td>
</tr>
<tr>
<td></td>
<td>Coulter set too shallow</td>
<td>Adjust coulter depth. See page 38 or page 46.</td>
</tr>
<tr>
<td></td>
<td>Incorrect press wheel depth setting</td>
<td>Adjust T-handle. See page 54.</td>
</tr>
<tr>
<td></td>
<td>Opener spring pressure too low or too high</td>
<td>Reduce opener spring pressure.</td>
</tr>
<tr>
<td>Press wheel or openers plugging</td>
<td>Planting conditions too wet</td>
<td>Wait until drier weather.</td>
</tr>
<tr>
<td></td>
<td>Coulters not set deep enough to cut residue</td>
<td>Check coulter adjustment.</td>
</tr>
<tr>
<td></td>
<td>Coulters set too deep, bring up excess dirt and moisture</td>
<td>Check coulter adjustment.</td>
</tr>
<tr>
<td></td>
<td>Drill not set to run level from front to rear, carrying enough weight on gauge wheels to prevent “nosing over”, or set too low on rear caster eyebolts allowing it to run “nose high”</td>
<td>Check “Leveling Drill” on page 65.</td>
</tr>
<tr>
<td></td>
<td>Opener set too deep</td>
<td>Readjust, page 54.</td>
</tr>
<tr>
<td></td>
<td>Opener spring force too high</td>
<td>Readjust, page 47.</td>
</tr>
<tr>
<td></td>
<td>Backed up with drill in the ground</td>
<td>Clean out and check for damage.</td>
</tr>
<tr>
<td></td>
<td>Failed disk bearings</td>
<td>Replace disk bearings.</td>
</tr>
<tr>
<td></td>
<td>Disk blades worn</td>
<td>Adjust or replace disk blades, page 52.</td>
</tr>
<tr>
<td></td>
<td>Scraper worn or damaged</td>
<td>Replace scraper blade.</td>
</tr>
<tr>
<td>Marker Malfunction</td>
<td>Air or oil leaks in hose fittings or connections</td>
<td>Check all hose fittings and connections for air or oil leaks.</td>
</tr>
<tr>
<td></td>
<td>Market circuit not selected</td>
<td>Check Fold/Marker selector valve (if installed on drill)</td>
</tr>
<tr>
<td></td>
<td>Low tractor hydraulic oil level</td>
<td>Check tractor hydraulic oil level.</td>
</tr>
<tr>
<td></td>
<td>Loose or missing bolts or fasteners</td>
<td>Check all bolts and fasteners.</td>
</tr>
<tr>
<td></td>
<td>Needle valve plugged (single marker)</td>
<td>Open needle valve, cycle markers slowly and reset needle valve, refer to page 73.</td>
</tr>
<tr>
<td></td>
<td>Needle valve(s) in sequence valve plugged</td>
<td>Open needle valves, cycle markers slowly and reset needle valves, refer to page 73.</td>
</tr>
<tr>
<td>Marker disk does not mark</td>
<td>Marker folding linkage does not have enough slack to allow marker disk to drop into field depressions</td>
<td>Check chain length, page 55.</td>
</tr>
<tr>
<td></td>
<td>Disk angle or orientation not optimal</td>
<td>Angle marker disk blade, or reverse blade to pull or throw dirt.</td>
</tr>
<tr>
<td>Drill does not fold or unfold fully</td>
<td>Air in lines</td>
<td>Bleed fold system (page 64).</td>
</tr>
<tr>
<td></td>
<td>Cylinders out of phase</td>
<td>Re-phase cylinder (page 64).</td>
</tr>
<tr>
<td></td>
<td>Cylinder mounts misaligned</td>
<td>Check spacers, page 64.</td>
</tr>
<tr>
<td></td>
<td>Fluid run-out</td>
<td>Check tractor fluid level.</td>
</tr>
<tr>
<td></td>
<td>Uneven or soft ground</td>
<td>Pull ahead slightly while folding is completed.</td>
</tr>
<tr>
<td>Drill hunts in transport</td>
<td>Worn skid blocks</td>
<td>Replace blocks or add shims</td>
</tr>
<tr>
<td></td>
<td>Locks not engaged</td>
<td>Check lock operation</td>
</tr>
<tr>
<td></td>
<td>Caster detent pressure and caster pressure plate not set properly</td>
<td>Adjust casters (page 70).</td>
</tr>
</tbody>
</table>
## Clutch Troubleshooting

<table>
<thead>
<tr>
<th>Problem</th>
<th>Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>no seed metering, all rows</td>
<td>fuse blown</td>
<td>Check fuse. Correct underlying fault before replacing fuse.</td>
</tr>
<tr>
<td></td>
<td>height switch not tripping</td>
<td>Check adjustment of height switch (page 70).</td>
</tr>
<tr>
<td></td>
<td>height switch failed</td>
<td>Replace switch. Use CAL mode to operate until switch is replaced.</td>
</tr>
<tr>
<td>no metering, one section</td>
<td>clutch failure</td>
<td>Lock-up clutch until repaired or replaced (page 34).</td>
</tr>
<tr>
<td></td>
<td>section control switch Off or failed</td>
<td>Turn switch On. Replace if failed.</td>
</tr>
<tr>
<td></td>
<td>wing transfer shaft disengaged</td>
<td>Realign transfer shaft (page 68).</td>
</tr>
<tr>
<td>seed rate low or uneven</td>
<td>lubricant in clutch</td>
<td>Disassemble and de-grease clutches.</td>
</tr>
<tr>
<td>meters always on</td>
<td>CAL mode on</td>
<td>Move Master switch handle from CAL to ON.</td>
</tr>
<tr>
<td></td>
<td>height switch always on</td>
<td>Check adjustment of height switch (page 70).</td>
</tr>
</tbody>
</table>
Maintenance and Lubrication

Proper servicing and maintenance is the key to long drill life. With careful and systematic inspection, you can avoid costly maintenance, downtime and repair.

Always turn off and remove the tractor key before making any adjustments or performing any maintenance.

**Crushing and Overhead Hazards:**
You may be severely injured or killed by being crushed under a falling drill. Always have frame sufficiently blocked up when working on, and particularly under drill.

**High Pressure Fluid Hazard:**
Escaping fluid under pressure can have sufficient pressure to penetrate the skin. Check all hydraulic lines and fittings before applying pressure. Fluid escaping from a very small hole can be almost invisible. Use paper or cardboard, not body parts, and wear heavy gloves to check for suspected leaks. If an accident occurs, seek immediate medical attention from a physician familiar with this type of injury.

After using drill for several hours, check all bolts to be sure they are tight.

1. Securely block drill before working on it.
2. Lubricate areas listed under “Lubrication” on page 73.
3. Clean any fittings that do not take grease.
4. Inflate tires as specified on “Tire Inflation Chart” on page 87.
5. Inspect hydraulic hoses for cuts, cracks and aging. Check fittings for evidence of leaks.
6. Keep disk scrapers properly adjusted.
7. Replace any worn, damaged or illegible safety decals. Order new decals from your Great Plains dealer. See “Safety Reflectors and Decals” on page 6.
Materials Clean-Out

Main Seed Box Clean-Out
Refer to Figure 69, which depicts the seed cup door handle (1) in a normal operating position.

1. Set the Seed Rate Handle to zero (0) for the section of the drill to be cleaned out. This moves the seed cup sprockets out of the seed path.
2. Position a tarp or bucket under each row or set of rows to be cleaned out.
3. At the seed cup for that row, pull the door handle (1) out of the operating detent range, and swing it down to position (2).
4. Open the main seed box and use a small brush to sweep seed toward seed cups set to clean-out. If seed does not flow freely, inspect seed cup, hose and seed tubes for obstructions.
5. Wash out the seed box with high pressure water.

Seed meter drive shaft operation is unnecessary for clean-out. With the Seed Rate set to zero, nothing moves inside the seed cups; however, an inspection of the flutes for excess wear and damage does require shaft rotation.

Set the Seed Rate Handles to 100. With openers raised, the jackshafts can be slowly turned by one person with a 7/8 in (22mm) open-end wrench, while another inspects the flutes from the open seed boxes.

Fertilizer Box Clean-Out
After applying fertilizer, clean drill boxes as soon as possible. Fertilizers often contain chemicals corrosive to metal.

Refer to Figure 70
With a small scoop or can, remove as much fertilizer as possible from drill boxes.
Clean-out releases material across the entire length of a section box. Have collection equipment prepared.
Release all clean-out latches on a drill section, and open clean-out door. Leave door open until after washout.

Refer to Figure 71
Wash inside of drill boxes with water under high pressure. To aid clean out, lift vinyl cover shield and spray into fertilizer trays (with clean-out door open).
Let drill boxes dry before closing clean-out doors.
Small Seeds Box Clean-Out
1. Open lid of each box and scoop out as much seed as possible.
2. To recover remaining seed, place a collection tarp under the small seeds tubes at the openers.
3. Raise drill.
4. Set seed rate handles to 100.
5. Rotate clutch shaft until no seed flows.
6. If a vacuum cleaner is available, remove any residual seed from top of meters.

Seed Flap Replacement (s/n B1010B-)
Refer to Figure 72
To replace a seed flap ① use a needle nose pliers or similar tool and squeeze the tabs ② together. Pull plastic seed flap ① down out of metal bracket ③.
If replacing with 817-349C:
Push new seed flap ① up through metal bracket ③ until tabs ② on seed flap snap in place.
If replacing with 816-302C:
See seed flap replacement instructions below.

Seed Flap Replacement (s/n B1011B+)
Refer to Figure 73
To replace an 816-302C seed flap ④ use a needle nose pliers or similar tool to grasp “T” top of flap. Pull upward to pull flap up out of metal bracket ⑤.
Push new seed flap ④ down through metal bracket ⑤ until flap snaps into place with “T” top resting on top of bracket.
Chain Maintenance

Inspect and lubricate chains regularly. The slack of new chains tends to increase during the first few hours of operation due to seating.

Chain Slack

Check slack within the first 8 hours of operation and tighten idlers as necessary.

Refer to Figure 74, which, for clarity, greatly exaggerates slack, and omits the idlers.

1. Measure the span 1 for allowable slack:
   Locate the longest span of each chain (usually the span which does not run through the idlers).

2. Determine the ideal slack:
   - Long chains (over 36in/91cm): 1 in 4 in per foot
   - Vertical short chains: 1 in 4 in per foot (2.1cm/m)
   - Horizontal short chains: 1 in 2 in per foot (4.2cm/m).

3. Measure the current slack 2:
   Acting at a right angle to the chain span at the center of the span, deflect the chain in both directions. The slack is the distance of the movement.

4. Adjust the idlers for ideal slack.

Whenever mounting a chain, make sure the clip at the removable link is oriented to minimize snags.

Refer to Figure 75 (arrow shows chain direction)

Install clip with open end facing away from direction of chain travel (shown by gray or striped arrows in chain routing diagrams).
Adjusting Fold Cylinders

Refer to Figure 76
If the drill does not fold or unfold fully it may be necessary to add or remove shims from the base of the wing fold cylinder.

1. With the drill in the folded or unfolded position make sure drill is on level ground and all safety locks are in place.
2. Place tractor in park, turn off ignition and remove ignition key.
3. Remove bolts from cylinder base plate and add or remove shims as necessary.
4. Tighten fold cylinder base bolts and activate fold cylinders to make sure wings travel to full open and full closed position. If not repeat above steps until full open and full closed are achieved.

Figure 76
Fold Cylinder Shims
Leveling Drill

Make sure hydraulic system is re-phased before making any other adjustments to level.

Side-to-Side Level

All frame sections must be level to maintain even seeding depth. Before using the drill in the field, follow these steps to make sure the drill is level side-to-side. Also check that any frame-mounted coulters, and all row units, are set to matching depth and down-forcea (other than in tracks).

Periodic frame-leveling adjustments should not be necessary, but if you are having problems with uneven depth, check drill levelness and follow these procedures.

Refer to Figure 77

Adjustment Starting Point:

1. Locate the threaded eyebolts 1 at the base end of the gauge-wheel cylinders. The eye bolt is locked in place by a jam nut 2. Observe the amount of thread exposed above the upper nut and below the lower adjustment nut 3. If the exposed threads are roughly equal, no initial adjustment is needed. Go to step 3.

2. If the exposed threads above and below the nuts are not equal, loosen and adjust the jam nuts until the amount of exposed thread is about the same above and below. Repeat for other end of drill.

Adjustment Procedure:

3. Move the drill to a level area. With the drill unfolded, raise the drill to its highest position with the lift cylinders. With the tractor idling, re-phase the cylinders by holding the hydraulic lever on for an additional 30 seconds. Immediately lower the sections until the coulters and openers are just ready to touch the ground.

4. Move the gauge-wheel eyebolt adjustment nuts 3 until the openers on the outside end of the drill are the same height as the center openers.

&a. Eye-bolt adjustments are easier if the drill is first lowered to the ground to remove some of the force on the cylinders.

5. Repeat the steps above until the drill is level end-to-end when drilling in actual seeding conditions.

---

a. If row unit settings are not equal, they can cause section heights to be dissimilar. Balance rows before adjust frame level.
Front-to-Back Level
Level the drill front-to-rear using only the eyebolts located on the rear axle. Adjust only until level front-to-rear when drilling in actual seeding conditions.

Drill must be level front to rear in actual planting use or row plugging will occur. Adjusting gauge wheel depth too low or excess opener spring force can cause the front of drill to roll forward when planting. Conventional till ground can also cause drill to run low in the front if gauge wheel depth is set too low.

Refer to Figure 78
1. In representative field conditions, lower the drill and pull forward to place openers in ground. If openers a are operating at desired depth, and row units are parallel to the ground, check frame level front-to-back.

When drill is level, opener bodies will be level or slightly higher at rear.

Adjustment Starting Point:
2. Locate the threaded eyebolts at the base end of the rear axle cylinders. The eye bolt is locked in place by a jam nut. Observe the amount of thread exposed above the upper nut and below the lower adjustment nut. If the exposed threads are roughly equal, no initial adjustment is needed. Go to step 4.

3. If the exposed threads above and below the nuts are not equal, loosen and adjust the jam nuts until the amount of exposed thread is about the same above and below for both eyebolts.

Adjustment Procedure:
4. Lower the drill into actual seeding conditions.
5. Have an assistant check front to rear level while planting by observing the drill from a safe distance. Drill should run with frame level or slightly lower in the front. Adjust eyebolts as needed.

---

a. If openers are not level, or at correct depth, adjust depth and down-force settings before adjusting frame level.
Section Alignment

To check and adjust section alignment:

6. Unfold drill, see "Unfolding" on page 23, and place a block ahead of each wing gauge wheel. Pull drill forward against blocks to rock frames back. Pull forward until stop bolts are firmly against tool bars.

Refer to Figure 79

7. Check for proper alignment by running a string line across back of drill toward outer ends of wings. Measure to the back face of the tool bar supporting the row units.

For proper alignment, outside ends of wings (dimension 9) should be 0-to-\(\frac{1}{4}\)in (0-to-6.4mm) ahead of inside ends (dimension 8).

Refer to Figure 80

8. To adjust section alignment, shorten or lengthen stop bolts to change the contact point with the tool bars. Adjust stop bolts 7 in or out until dimension 8 is 0 to \(\frac{1}{4}\)in greater than dimension 9.

Lack of proper fold cylinder adjustment can cause difficulties with gauge wheels by not allowing full rotation of gauge wheel arm assemblies.

If you have trouble getting a section aligned, it may be necessary to adjust fold cylinders, see "Adjusting Fold Cylinders" on page 64. Do not over-adjust or you may cause fold latching problems.
Transfer Shaft Alignment

Refer to Figure 81
After the wings are properly aligned, the wing transfer drive shafts must be aligned so two pairs of break-away jaws ① are fully engaged and are concentric.

The 7/8 in hex drive shafts ② holding the clutch jaws should not contact each other (gap ③) when wing boxes are properly aligned and back against their stops.

1. Place a 4x4 in (10x10 cm) or similar sized block ahead of the wing gauge wheels and pull forward or push wing frames back until the tool bar is firmly against tool bar stop bolts on the center frame.

Refer to Figure 82
2. To align the clutch jaws vertically, loosen the two 1/2 inch bolts ④ on the front side of the adjustment plate. Slide the plate up or down in the desired direction. Tighten bolts.

3. To align the clutch jaws horizontally, and for full contact, loosen the two 1/2 inch bolts ⑤ on the top of the adjustment plate. Slide the breakaway mount weldment ⑦ left, right, forward or backward as needed to align and gap jaws. Tighten bolts.

& The two 7/8 in hex shafts ② should have a 1/8 in (3.2 mm) gap ⑤ between them when the jaws have full contact.
Tongue Spacer Block

If the folded drill does not pull straight, wanders back and forth while being towed, or fails to latch during folding, it may be necessary to replace or adjust one or more tongue spacer block assemblies.

Refer to Figure 83 (which depicts right tongue tube)
There are four of these block assemblies on the drill tongue. Two \( \text{①} \) are on the inside, and contact each other when folding. Two \( \text{②} \) are on the outside, and contact the wing main frames when folded.

The amount of contact should be just enough to prevent sway, but not so much that it prevents reliable transport latching during fold.

If the skid blocks (③, ④) are worn or deformed, replace them.

If the skid blocks are serviceable, and there is a gap when folded, add a shim ⑤. Consult the latest Parts manual for the current shim part number.

When re-installing:

- The inside blocks ① must be exactly opposite each other, and are located at:
  - ⑥ 122in (3.1m) from the forward end of the tongue tube wall.

- The outside blocks ② are located at:
  - ⑦ 155in (3.74m) from the forward end of the tongue tube wall.

& It is normal for the tongue assembly to rotate slightly when the wings move up and down independently. Adjusting tongue shims does not eliminate this.
Height Switch

The height switch turns the seed metering on and off as the drill is lowered and raised. The switch ① is mounted between the parallel arms on the left rear wheel assembly.

When the drill is lowered, the lower parallel arm contacts the flexible switch arm extension (whisker) ② and operates the switch.

If the switch is otherwise operating properly, but metering is not stopping when raised, or not resuming when lowered, the switch may need some adjustment.

The whisker should extend over the lower parallel arm enough so that the whisker cannot slip off the arm when the drill is lowered, but not so far that it bends severely.

To adjust, loosen the screws ③ attaching the switch to the bracket and slide the switch left or right as needed and re-tighten.

The whisker should operate (enable seeding) whenever the openers are just beginning to contact the ground.

To adjust:
1. Lower the implement until at a height where seeding should start (usually just above ground).
2. Turn off the tractor and remove the key.
3. Securely support implement frame at this height with jack stands or blocks.
4. Loosen switch bracket bolts ④.
5. Slide switch down until the flexible switch toggle is just past the point at which the switch clicks (the turn-on-seeding state).
6. Tighten the bolts.

Detent and Pressure Plate Adjust

Refer to Figure 85

The rear casters each have two independent adjustments, which may need some attention as their internal working surfaces wear over several seasons:

Caster Detent (on the outside, both sides):
① This feature snaps the caster into the full trailing position for straight-ahead movement. It helps keep the drill running true in the field and in transport.

Caster Pressure Plate (on the inside, both sides):
② This feature acts as a pivot brake, and helps prevent caster oscillation during transport.

If the casters do not detent during straight-ahead movement, first check the bolt ① adjustment, and replace caster detent pin and/or detent plate as needed.

If the caster is oscillating during transport turns, adjust the pressure plate bolt ②.
Refer to Figure 86
The factory setting for both adjustments is 1in (2.5cm) from the face of the bolt head to the top of the weldment. If pressure plate or detent components are ever replaced, return the bolts to the factory setting.

**NOTICE**

Never adjust the detent bolt 1 to less than 1in.

**Pressure Plate Adjustment**
1. Loosen the jam nut 3.
2. Turn the bolt 2 clockwise until the spring is fully compressed.
3. Back the bolt out 1/4 in (6mm).
4. Tighten the jam nut.

---

**Marker Maintenance**

If grease-seal cap for marker-disk-hub bearings is damaged or missing, disassemble and clean hub. Repack with grease and install a new seal or grease cap.

**NOTICE**

Bleed only at:
- JIC (Joint Industry Conference, 37° flare) or NPT (National Pipe Thread, tapered thread) fittings.
- Never bleed at:
  - ORB (O-Ring Boss) or QD (Quick Disconnect) fittings.

**NOTICE**

JIC fittings do not require high torque. JIC and O-ring fittings do not require sealant. Always use liquid pipe sealant when adding or replacing (NPT) pipe-thread fittings. To avoid cracking hydraulic fittings from over tightening, and to keep tape fragments from clogging filters, do not use plastic sealant tape.

**Overhead/Crushing Hazard:**
You may be injured if hit by a folding or unfolding marker. Markers may fall quickly and unexpectedly if the hydraulics fail. Never allow anyone near the drill when folding or unfolding the markers.
Marker Shear Bolt Replacement

Refer to Figure 87
The marker arm is attached to marker body with a pivot bolt ① and a shear bolt ②. A third clamp bolt ③ acts as a hold-down for the top of the marker shear base.

The shear bolt ② is designed to fail if the marker tip gets hung up on an obstacle. This prevents marker damage.

If the shear bolt fails, replace it with a bolt of identical size and grade, or one of similar strength.

The supplied bolt ② is Great Plains part: 802-589C HHCS 7/16-14X2 GR5

This is a 7/16-14 x 2in Grade 5 bolt. If an exact replacement is not immediately available, temporarily substitute a metric bolt, M10x0.75 Class 8.8.

NOTICE

Equipment Damage Risk:
Do not replace the shear bolt with a higher grade bolt, or the next obstruction may result in marker damage.

& Do not replace the shear bolt with a lower grade bolt, or smaller bolt, or you may experience nuisance shears.

If conditions are causing frequent shears, keep spare bolts in the storage holes of the marker shear base.

Before installing a new shear bolt, tighten the 5/8-11x5in pivot and clamp bolts (①, ③) just until marker shear arm moves with some resistance when pushed by hand.

& Repeat the above bolt adjustment step at the beginning of each season.

Marker Disk

Refer to Figure 88
If grease-seal cap ① for marker-disk-hub bearings is damaged or missing, disassemble and clean hub. Repack with grease and install a new seal or grease cap.
Lubrication

Rear Axle Beam Pivot

1 zerk
Type of Lubrication: Grease
Quantity: Until grease emerges

Rear Caster Wheel Pivot

1 zerk each of 2 casters; 2 total
Type of Lubrication: Grease
Quantity: Until grease emerges

Caster Detent

1 (left) zerk each of 4 casters; 4 total
Type of Lubrication: Grease
Quantity: Until grease emerges

& On rear casters, with wheels in trail, outside zerk is caster detent, and inside zerk is pressure plate pin (See page 70 for adjustments. See page 79 for pressure plate zerk.).
Wing Caster Wheel Pivot Lock

1 zerk each of 2 casters; 2 total
Type of Lubrication: Grease
Quantity: Until grease emerges

Wing Caster Wheel Pivot

1 zerk each of 2 casters; 2 total
Zerk is partially obscured behind lock cylinder mechanism.
Type of Lubrication: Grease
Quantity: Until grease emerges

Gauge Wheel Assembly Pivot

1 zerk each of 2 pivots; 2 total
Type of Lubrication: Grease
Quantity: Until grease emerges
**Wing Frame Vertical Pivots**

1 zerk each of 2 pivots; 2 total
Type of Lubrication: Grease
Quantity: Until grease emerges

**Parallel Arm Pivots**

4 zerks each of 4 arm sets; 16 total
Zerks are on inside faces of cross-tubes between arms.
Type of Lubrication: Grease
Quantity: Until grease emerges

**Wing Flex Pivots**

1 zerk each of 2 pivots; 2 total
Type of Lubrication: Grease
Quantity: Until grease emerges
Rockshaft

1 zerk each of 2 cylinder base end pins,
1 zerk each of 2 cylinder rod end pins,
1 zerk each of two outer rockshaft pivot tubes;
6 total
Type of Lubrication: Grease
Quantity: Until grease emerges

Parallel Arm Lift Cylinder Pins

1 zerk each rod-end cylinder pin;
4 total
Type of Lubrication: Grease
Quantity: Until grease emerges
Grease Bank

Up to 14 zerks each bank, 2 banks each of 3 sections; 6 banks total; 1 zerk per opener; 48 or 66 zerks total
Type of Lubrication: Grease
Quantity: 5 pumps

These zerks are only present if the drill has frame-mounted coulters. These zerks only serve the coulter arm pivots. Coulter hub zerks must be serviced at the hubs.

Marker(s) (Option)

3 zerks per marker; 3 or 6 total
Type of Lubrication: Grease
Quantity: Until grease emerges

Fertilizer Shaft Bearings (3S4010HDF only)

1 zerk each bearing, 2 per shaft; 6 total
Type of Lubrication: Grease
Quantity: Until resistance is felt
Small Seeds Shaft Bearing (Option)

1 zerk each box; 3 total
Type of Lubrication: Grease
Quantity: Until grease emerges

Felt Barrier Seals (3S-4010HDF only)

1 seal at each shaft end, 6 total
Type of Lubrication: Oil
Quantity: Soak seal

Seed Cup Drive Shaft Sprocket

1 sliding sprocket
Type of Lubrication: Oil
Quantity: Coat thoroughly

Move the Seed Rate adjustment handle back and forth to get oil into the square bore. Perform this with seed box empty, or handle may be difficult to set to 100.
Drive Chains

See “Chain Routing” on page 92.
Type of Lubrication: Chain Lube
Quantity: Coat thoroughly
Slack: per Chain Routing or general guidelines on page 63.

Rear Caster Pressure Plate Pin

1 (right) zerk per caster; 2 total
Type of Lubrication: Grease
Quantity: Until grease emerges
& With wheels in trail, inside zerk is pressure plate, and outside zerk is caster detent pin (See page 70 for pin adjustments. See page 73 for detent lubrication).

Frame-Mounted Coulter Hubs (Option)

1 zerk per coulter; 48 or 66 total
Type of Lubrication: Grease
Quantity: Until grease emerges
& These zerks are only present if the drill has frame-mounted coulters. These zerks only serve the coulter hubs. Coulter arm pivots are lubricated from the grease banks.
Marker Disk Bearings (Option)

- Seasona
- 2 races each marker; 2 or 4 total
- Type of Lubrication: Grease
- Quantity: Repack

Main Wheel Bearings

- 2-3
- 2 races each of 6 wheels; 12 total
- Type of Lubrication: Grease
- Quantity: Repack
Options

Shaft Monitor

This kit provides a cab alarm in the event that a main box seed meter shaft stops turning (which might result from excess down-pressure, low tire pressure/flat tire, chain break or clutch malfunction). Order one kit per drill.

<table>
<thead>
<tr>
<th>Description</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-Channel Shaft Monitor</td>
<td>116-121A</td>
</tr>
</tbody>
</table>

Hitches

One hitch is selected upon initial order of an 3S-4010HD and 3S-4010HDF Drill, and includes the spring wire loop, safety chain, and all fasteners. Additional hitches may be ordered for conversion in the field, and include extra hitch mounting bolts, lock washers and nuts.

<table>
<thead>
<tr>
<th>Hitch Description</th>
<th>Part Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>① Large Diameter Cast Hitch</td>
<td>170-004A</td>
</tr>
<tr>
<td>② Large Strap</td>
<td>170-038A</td>
</tr>
<tr>
<td>③ Clevis</td>
<td>170-039A</td>
</tr>
<tr>
<td>④ Small Strap</td>
<td>170-059A</td>
</tr>
</tbody>
</table>

Acremeter

One digital electronic acremeter is standard on the 3S-4010HD/HDF drill. If you require a replacement, or alternate units of measure, order one of the parts below.

<table>
<thead>
<tr>
<th>Units of Measure</th>
<th>Acremeter Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>45.1 revs/ac</td>
<td>891-105C</td>
</tr>
<tr>
<td>111.4 revs/ha</td>
<td>891-106C</td>
</tr>
</tbody>
</table>

See “Acremeter Operation” on page 32.
Flat Fold Markers

Hydraulically-operated markers leave a visible groove to use as centerline for the next pass.

The single marker mounts on the left side of the drill. The dual markers mount on both sides, and include an automatic sequence valve for operating alternate sides on each pass. Both markers include speed adjustments.

If ordered with a new drill, markers are factory-installed. Each kit equips one drill.

<table>
<thead>
<tr>
<th>Marker Kit</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single (Left Side)</td>
<td>113-770A</td>
</tr>
<tr>
<td>Dual</td>
<td>113-769A</td>
</tr>
</tbody>
</table>

Markers add weight to the drill, but only to the wing section(s). The dual kit adds 1860 lbs (844 kg). The single kit adds 930 lbs (422 kg). See page 44 for the contribution to available down-pressure.

To maintain equal available force when a single marker is installed, add one entire weight kit to the right wing, populated with eight 100 pound (45 kg) weights.

Dual Weight Kit

If unusual soil conditions require more weight for coulter penetration, weight bracket kits are available. Each kit includes two brackets. The brackets attach to the wing mainframe, and accept up to five standard “suitcase” tractor weights (not included), approximately 500 lbs (227 kg) per bracket or 1000 lbs (454 kg) per kit.

The empty weight of the kit itself is 121 lbs (55 kg), or 61 lbs (28 kg) per bracket.

The weight kit is field-installed. See “Frame Weights” on page 44 for use.

Great Plains suggests using no more than 3 kits (6 brackets, 3000 lbs (1361 kg) on the 3S-4010HD and 3S-4010HDF.

<table>
<thead>
<tr>
<th>Kit Description</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>40P DUAL WEIGHT BRACKET PKG</td>
<td>196-332A</td>
</tr>
</tbody>
</table>

Transport Hazard:
Adding more than the recommended weight to the drill frame could cause a tire to blow during transport, leading to a serious road accident and personal injury. Do not add more than 3000 pounds to the drill frame.
Coulters

The 3S-4010HD and 3S-4010HDF supports either frame-mounted or unit-mounted coulters (page 85). It is not possible to install both types on the same drill.

Frame-Mounted Coulters
Frame-mounted coulters are recommended for heavier no-till conditions and rocky soil. They are independent of row-unit down-force and may be set to different (usually higher) force levels.

Because the weight of the drill is used to deliver both frame-mounted coulter and row-unit opener/press-wheel down-force, extra weights are almost always required with frame-mounted coulters. Each coulter itself adds 61 lbs (28 kg) to the drill. See page 44 for information on calculating requirements.

When ordered with a new drill, frame-mounted coulters are factory-installed. They may also be ordered for field installation. Each kit equips an entire drill.

<table>
<thead>
<tr>
<th>Coulter Kit</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>For 3S-4010HD and 3S-4010HDF-4810</td>
<td>249-159A</td>
</tr>
<tr>
<td>-6675</td>
<td>249-169A</td>
</tr>
<tr>
<td>with 17x5/16in Fluted Blade</td>
<td>249-160A</td>
</tr>
<tr>
<td>with 17x3/4in Wavy Blade</td>
<td>249-161A</td>
</tr>
<tr>
<td>with 17x5/8in Turbo Blade</td>
<td>249-170A</td>
</tr>
</tbody>
</table>

See “Opener Frame Height” on page 38 for adjustments.

Seed Box Options

Seed Tube Plug (Main Seeds)
This plug stops seed flow from the main seed box above the meter. Order one per row to be set inactive.

<table>
<thead>
<tr>
<th>Description</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluted Feed Meter Plug</td>
<td>817-087C</td>
</tr>
</tbody>
</table>
Offset Box Divider
This reversible divider replaces the flat 60/40 partition standard on the 3S4010HDF. The Offset partition supports application at:
100% seed, 0% fertilizer,
68% seed, 32% fertilizer, or;
55% seed, 45% fertilizer.
Order 4 dividers per box, 12 per drill.

<table>
<thead>
<tr>
<th>Description</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Offset Divider</td>
<td>817-322C</td>
</tr>
</tbody>
</table>

See “Fertilizer Divided Capacities” on page 29.

Small Seeds Attachment
These kits deliver the smallest seeds evenly and gently.
A kit adds to each main seed box: a second seed box, small seed fluted feeder cups, seed drop tubes for each row, and all necessary hardware.
Small Seeds capability may be specified on the initial drill order or added later.

<table>
<thead>
<tr>
<th>Description</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>3S4010HD-4810 Small Seeds</td>
<td>133-353A</td>
</tr>
<tr>
<td>3S4010HD-6475 Small Seeds</td>
<td>133-352A</td>
</tr>
<tr>
<td>3S4010HDF-4810 Small Seeds</td>
<td>133-351A</td>
</tr>
<tr>
<td>3S4010HDF-6475 Small Seeds</td>
<td>133-350A</td>
</tr>
</tbody>
</table>

For operation, see “Loading Small Seeds Box” on page 30 and “Material Rate Setting” on page 44.

Seed Tube Plug (Small Seeds)
This plug stops seed flow from the small seeds box above the meter. Order one per row to set inactive.

<table>
<thead>
<tr>
<th>Description</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>SML SDS CUP PLUG</td>
<td>133-315H</td>
</tr>
</tbody>
</table>
Removable Partition
This partition reduces side-to-side seed flow in the small seeds box. This can prevent seed pile-up when drilling across slopes and in other situations where the seed is particularly fluid.

Order one per partition. The total order quantity varies with the seed type and planting terrain.

<table>
<thead>
<tr>
<th>Description</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>RMVBL SMALL SEED BOX PARTITION</td>
<td>123-409D</td>
</tr>
</tbody>
</table>

See “Small Seeds Partition Installation” on page 108 for installation.

Row Unit Options

Lock-Up Pins
If rows are shut off with seed tube plugs (page 83), you can reduce unnecessary wear on the unused row units by locking them up. Order one per row unit locked-up.

<table>
<thead>
<tr>
<th>Description</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>PIN HITCH 1 X 6 W/HAIRPIN</td>
<td>805-033C</td>
</tr>
</tbody>
</table>

See “Row Shut Off” on page 50.

Unit-Mounted Coulters
Unit-mount coulters (UMCs) attach directly to the 10HD row unit, and the coulter blade maintains a precise relationship to the opener disk (seeding) depth.

UMCs are suitable for lighter no-till and conventional tillage conditions. Their down-force is limited to what the 10HD row unit can provide. In challenging conditions, weight kits may be required.

UMCs are dealer-installed. Order one kit part number per row. Weight is 40 lbs (18kg) per row.

<table>
<thead>
<tr>
<th>Coulter Kit</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>GP25S UMC 15&quot; FLUTED BLD</td>
<td>204-616L</td>
</tr>
<tr>
<td>GP25S UMC 15&quot; TURBO BLD</td>
<td>204-617L</td>
</tr>
</tbody>
</table>

For operation, see “Unit-Mounted Coulters Adjustments” on page 46.

15in Coulters

<table>
<thead>
<tr>
<th>Blade</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>COULTER BLADE (FLUTED) 15&quot; OD</td>
<td>820-331C</td>
</tr>
<tr>
<td>COULTER BLADE (TURBO) 15&quot; OD</td>
<td>820-327C</td>
</tr>
</tbody>
</table>
Inside Scrapers
When planting in moist or sticky soils, these scrapers are useful in preventing build-up that might otherwise impair opener disc performance.

<table>
<thead>
<tr>
<th>Description</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>10HD25 INSID AIR DESIGN SCRAPER</td>
<td>122-278S</td>
</tr>
</tbody>
</table>

This scraper cannot be used with Seed-Lok seed firmers installed. It is compatible with seed flaps and optional Keeton seed firmers.
See page 109 for scraper installation. The carbide scraper is spring-loaded and requires no adjustment.

Seed Firmers
The standard 3S-4010HD and 3S-4010HDF includes seed flaps. A choice of firmers is an option in the product bundles, or may be field-installed as kits. Only one type of seed firmer may be installed at the same time.

Seed-Lok® Seed Firmer

<table>
<thead>
<tr>
<th>Description</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEED LOK 98 ROW UNIT</td>
<td>404-093K</td>
</tr>
</tbody>
</table>

For operations, see “Seed Firmer Adjustments” on page 53.

Keeton Seed Firmer

<table>
<thead>
<tr>
<th>Description</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 SER SEED FIRMER W/FERT</td>
<td>890-840C</td>
</tr>
</tbody>
</table>

For operations, see “Seed Firmer Adjustments” on page 53.

Press Wheels
A variety of single and dual press wheels are available, as bundle options at the time of initial drill order. Kits are not presently available to convert these in the field. Parts may be ordered to do so.
## Appendix A - Reference Information

### Specifications and Capacities

<table>
<thead>
<tr>
<th></th>
<th>3S-4010HD</th>
<th>3S-4010HD</th>
<th>3S-4010HD</th>
<th>3S-4010HD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-4810</td>
<td>-6475</td>
<td>-4810</td>
<td>-6475</td>
</tr>
<tr>
<td><strong>Operating Width</strong></td>
<td>40 ft (12.2m)</td>
<td>40 ft (12.2m)</td>
<td>40 ft (12.2m)</td>
<td>40 ft (12.2m)</td>
</tr>
<tr>
<td><strong>Swath</strong></td>
<td>480 in (1.219m)</td>
<td>484 in (1.229m)</td>
<td>480 in (1.219m)</td>
<td>484 in (1.229m)</td>
</tr>
<tr>
<td><strong>Number of Rows</strong></td>
<td>48</td>
<td>64</td>
<td>48</td>
<td>64</td>
</tr>
<tr>
<td><strong>Nominal Row Spacing</strong></td>
<td>10 in (25.4cm)</td>
<td>7.5 in (19.1cm)</td>
<td>10 in (25.4cm)</td>
<td>7.5 in (19.1cm)</td>
</tr>
<tr>
<td><strong>Swath-Averaged Row Spacing</strong></td>
<td>10 in (25.4cm)</td>
<td>7.56 in (19.2cm)</td>
<td>10 in (25.4cm)</td>
<td>7.56 in (19.2cm)</td>
</tr>
<tr>
<td><strong>Tractor Requirements</strong></td>
<td>325 hp (242 kW)</td>
<td>325 hp (242 kW)</td>
<td>325 hp (242 kW)</td>
<td>325 hp (242 kW)</td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td>37440 lbs (16982 kg)</td>
<td>40400 lbs (18325 kg)</td>
<td>37910 lbs (17196 kg)</td>
<td>40870 lbs (18538 kg)</td>
</tr>
<tr>
<td><strong>Maximum Additional Weight</strong></td>
<td>3 fully populated weight bracket sets: 3121 lbs (1416 kg)</td>
<td>3 fully populated weight bracket sets: 3121 lbs (1416 kg)</td>
<td>3 fully populated weight bracket sets: 3121 lbs (1416 kg)</td>
<td>3 fully populated weight bracket sets: 3121 lbs (1416 kg)</td>
</tr>
<tr>
<td><strong>Capacities: Main Seed Box</strong></td>
<td>129.6 bu (4567 liters)</td>
<td>-</td>
<td>71.3 or 129.6 bu (2512 or 4567 liters)</td>
<td>0 or 51.8 bu (0 or 1827 liters)</td>
</tr>
<tr>
<td><strong>Fertilizer (standard divider)</strong></td>
<td>9.6 bu (338 liters)</td>
<td>-</td>
<td>41.5 or 58.3 bu (1461 or 2055 liters)</td>
<td>9.6 bu (338 liters)</td>
</tr>
<tr>
<td><strong>Fertilizer (offset divider kit)</strong></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Small Seeds</strong></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Hydraulic Circuits</strong></td>
<td>3 circuits required, open or closed center</td>
<td>4 circuits required with Markers</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Hitch</strong></td>
<td>strap or clevis hitch</td>
<td>strap or clevis hitch</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Transport Width</strong></td>
<td>14 ft 11.5 in (4.56 m)</td>
<td>14 ft 11.5 in (4.56 m)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Transport Heights</strong></td>
<td>without Markers: 8 ft 10 in (2.69 m)</td>
<td>with Markers: 13 ft 8 in (4.17 m)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Operating Height</strong></td>
<td>without Markers: 6 ft 10 in (2.08 m)</td>
<td>with Markers: 11 ft 8 in (3.56 m)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Length</strong></td>
<td>45 ft 0 in (13.72 m)</td>
<td>45 ft 0 in (13.72 m)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Wing Flexibility</strong></td>
<td>12 degrees down, 12 degrees up</td>
<td>12 degrees down, 12 degrees up</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Tire Size</strong></td>
<td>18-22.5 (445/65 D22.5) NHS 16-Ply</td>
<td>18-22.5 (445/65 D22.5) NHS 16-Ply</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

a. Minimum: power requirements vary with tractor size, soil type, terrain and tillage practices

b. Typical weight; includes markers, frame-mounted coulters, small seeds option, but no material load or extra weights. See “Transport” on page 24 for additional data.

### Tire Inflation Chart

<table>
<thead>
<tr>
<th>Tire Size</th>
<th>Inflation</th>
</tr>
</thead>
<tbody>
<tr>
<td>118-22.5 (445/65 D22.5) NHS 16-Ply</td>
<td>85 psi</td>
</tr>
<tr>
<td></td>
<td>586 kPa</td>
</tr>
</tbody>
</table>

### Tire Warranty Information

All tires are warranted by the original manufacturer of the tire. Tire warranty information is found online at the manufacturer’s web sites listed below. For assistance or information, contact your nearest Authorized Farm Tire Retailer.

**Manufacturer** | **Web site**
--- | ---
Firestone | www.firestoneag.com
Gleason | www.gleasonwheel.com
Titan | www.titan-intl.com
## Torque Values Chart

<table>
<thead>
<tr>
<th>Bolt Size</th>
<th>Bolt Head Identification</th>
<th>Grade 2</th>
<th>Grade 5</th>
<th>Grade 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/4-20</td>
<td>N-m</td>
<td>ft-lb</td>
<td>ft-lb</td>
<td>ft-lb</td>
</tr>
<tr>
<td>1/4-28</td>
<td>7.4</td>
<td>5.6</td>
<td>11</td>
<td>8</td>
</tr>
<tr>
<td>5/16-18</td>
<td>15</td>
<td>11</td>
<td>24</td>
<td>17</td>
</tr>
<tr>
<td>5/16-24</td>
<td>17</td>
<td>13</td>
<td>26</td>
<td>19</td>
</tr>
<tr>
<td>3/8-16</td>
<td>27</td>
<td>20</td>
<td>42</td>
<td>31</td>
</tr>
<tr>
<td>3/8-24</td>
<td>31</td>
<td>22</td>
<td>47</td>
<td>35</td>
</tr>
<tr>
<td>7/16-14</td>
<td>43</td>
<td>32</td>
<td>67</td>
<td>49</td>
</tr>
<tr>
<td>7/16-20</td>
<td>49</td>
<td>36</td>
<td>75</td>
<td>55</td>
</tr>
<tr>
<td>1/2-13</td>
<td>66</td>
<td>49</td>
<td>105</td>
<td>76</td>
</tr>
<tr>
<td>1/2-20</td>
<td>75</td>
<td>55</td>
<td>115</td>
<td>85</td>
</tr>
<tr>
<td>9/16-12</td>
<td>95</td>
<td>70</td>
<td>150</td>
<td>110</td>
</tr>
<tr>
<td>9/16-18</td>
<td>105</td>
<td>79</td>
<td>165</td>
<td>120</td>
</tr>
<tr>
<td>9/16-11</td>
<td>130</td>
<td>97</td>
<td>205</td>
<td>150</td>
</tr>
<tr>
<td>9/16-10</td>
<td>150</td>
<td>110</td>
<td>230</td>
<td>170</td>
</tr>
<tr>
<td>3/4-16</td>
<td>260</td>
<td>190</td>
<td>405</td>
<td>295</td>
</tr>
<tr>
<td>7/8-9</td>
<td>225</td>
<td>165</td>
<td>585</td>
<td>430</td>
</tr>
<tr>
<td>7/8-14</td>
<td>250</td>
<td>185</td>
<td>640</td>
<td>475</td>
</tr>
<tr>
<td>1-8</td>
<td>340</td>
<td>250</td>
<td>875</td>
<td>645</td>
</tr>
<tr>
<td>1-12</td>
<td>370</td>
<td>275</td>
<td>955</td>
<td>705</td>
</tr>
<tr>
<td>1-9/16</td>
<td>480</td>
<td>355</td>
<td>1080</td>
<td>795</td>
</tr>
<tr>
<td>1-11/16</td>
<td>540</td>
<td>395</td>
<td>1210</td>
<td>890</td>
</tr>
<tr>
<td>1-13/16</td>
<td>680</td>
<td>500</td>
<td>1520</td>
<td>1120</td>
</tr>
<tr>
<td>1-14/16</td>
<td>750</td>
<td>555</td>
<td>1680</td>
<td>1240</td>
</tr>
<tr>
<td>1-5/8</td>
<td>890</td>
<td>655</td>
<td>1990</td>
<td>1470</td>
</tr>
<tr>
<td>1-11/8</td>
<td>1010</td>
<td>745</td>
<td>2270</td>
<td>1670</td>
</tr>
<tr>
<td>1-5/2</td>
<td>1180</td>
<td>870</td>
<td>2640</td>
<td>1950</td>
</tr>
<tr>
<td>1-13/2</td>
<td>1330</td>
<td>980</td>
<td>2970</td>
<td>2190</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bolt Size</th>
<th>Bolt Head Identification</th>
<th>Grade 5.8</th>
<th>Grade 8.8</th>
<th>Grade 10.9</th>
</tr>
</thead>
<tbody>
<tr>
<td>5/8-18</td>
<td>mm x pitch</td>
<td>N-m</td>
<td>ft-lb</td>
<td>N-m</td>
</tr>
<tr>
<td>5/8-24</td>
<td>8.5</td>
<td>13</td>
<td>10</td>
<td>18</td>
</tr>
<tr>
<td>5/8-32</td>
<td>15</td>
<td>11</td>
<td>24</td>
<td>17</td>
</tr>
<tr>
<td>3/4-20</td>
<td>27</td>
<td>20</td>
<td>42</td>
<td>31</td>
</tr>
<tr>
<td>3/4-24</td>
<td>31</td>
<td>22</td>
<td>47</td>
<td>35</td>
</tr>
<tr>
<td>7/16-14</td>
<td>43</td>
<td>32</td>
<td>67</td>
<td>49</td>
</tr>
<tr>
<td>7/16-20</td>
<td>49</td>
<td>36</td>
<td>75</td>
<td>55</td>
</tr>
<tr>
<td>1/2-13</td>
<td>66</td>
<td>49</td>
<td>105</td>
<td>76</td>
</tr>
<tr>
<td>1/2-20</td>
<td>75</td>
<td>55</td>
<td>115</td>
<td>85</td>
</tr>
<tr>
<td>9/16-12</td>
<td>95</td>
<td>70</td>
<td>150</td>
<td>110</td>
</tr>
<tr>
<td>9/16-18</td>
<td>105</td>
<td>79</td>
<td>165</td>
<td>120</td>
</tr>
<tr>
<td>9/16-11</td>
<td>130</td>
<td>97</td>
<td>205</td>
<td>150</td>
</tr>
<tr>
<td>9/16-10</td>
<td>150</td>
<td>110</td>
<td>230</td>
<td>170</td>
</tr>
<tr>
<td>3/4-16</td>
<td>260</td>
<td>190</td>
<td>405</td>
<td>295</td>
</tr>
<tr>
<td>7/8-9</td>
<td>225</td>
<td>165</td>
<td>585</td>
<td>430</td>
</tr>
<tr>
<td>7/8-14</td>
<td>250</td>
<td>185</td>
<td>640</td>
<td>475</td>
</tr>
<tr>
<td>1-8</td>
<td>340</td>
<td>250</td>
<td>875</td>
<td>645</td>
</tr>
<tr>
<td>1-12</td>
<td>370</td>
<td>275</td>
<td>955</td>
<td>705</td>
</tr>
<tr>
<td>1-9/16</td>
<td>480</td>
<td>355</td>
<td>1080</td>
<td>795</td>
</tr>
<tr>
<td>1-11/16</td>
<td>540</td>
<td>395</td>
<td>1210</td>
<td>890</td>
</tr>
<tr>
<td>1-13/16</td>
<td>680</td>
<td>500</td>
<td>1520</td>
<td>1120</td>
</tr>
<tr>
<td>1-14/16</td>
<td>750</td>
<td>555</td>
<td>1680</td>
<td>1240</td>
</tr>
<tr>
<td>1-5/8</td>
<td>890</td>
<td>655</td>
<td>1990</td>
<td>1470</td>
</tr>
<tr>
<td>1-11/8</td>
<td>1010</td>
<td>745</td>
<td>2270</td>
<td>1670</td>
</tr>
<tr>
<td>1-5/2</td>
<td>1180</td>
<td>870</td>
<td>2640</td>
<td>1950</td>
</tr>
<tr>
<td>1-13/2</td>
<td>1330</td>
<td>980</td>
<td>2970</td>
<td>2190</td>
</tr>
</tbody>
</table>

- a. in-tpi = nominal thread diameter in inches-threads per inch
- b. N m = newton-meters
- c. mm x pitch = nominal thread diameter in mm x thread pitch
- d. ft-lb = foot pounds

Torque tolerance +0%, -15% of torquing values. Unless otherwise specified use torque values listed above.
Lock Cylinder Hydraulics
Left Marker Hydraulics

Right Marker Hydraulics
Chain Routing

Rockshaft

Figure 89
Rockshaft Ground Drive
Transfer Shaft Input

Figure 90
Transfer Shaft Input Chains
Main Seed Drive, Center Section

Drive Type Sprockets:
14T, 23T, 34T or 72T

Fertilizer (Option):
Range, Rear Sprocket:
16T, 47T, 60T

Figure 91
Main Seed Drive, Center Section
Main Seed Drive, Wing

Drive Type Sprockets:
14T, 23T, 34T or 72T

Fertilizer (Option):
Range, Rear Sprocket:
16T, 47T, 60T

Figure 92
Main Seed Drive, Wing (Left Shown)
Fertilizer Drive (Option), Center Section

![Diagram of Fertilizer Drive (Option), Center Section]

**Table: Driver/Driven Gear Ratios**

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**Figure 93**
Fertilizer Drive, Center Section
Fertilizer Drive (Option), Wing

Figure 94
Fertilizer Drive, Wing (Left Shown)
Small Seeds Drive (Option), Center Section

Figure 95
Small Seeds Drive, Center Section
Small Seeds Drive (Option), Wing

Figure 96
Small Seeds Drive, Wing (Left Shown)
Small Seeds Jackshaft (Option)

Figure 97
Small Seeds Jackshaft
Appendix B - Initial Setup

Pre-Delivery Setup

The 3S-4010HD/HDF drill is delivered on flatbed trailer and is intended for dock unload off the rear of the trailer.

Refer to Figure 98 (which does not include markers)

You will need a clearance distance behind the trailer of 45 feet (14m), plus the length of the tractor, plus turning space for the tractor. The illustration at right presumes a tractor 22.5ft (6.9m) long, 10ft(3m) wide, with a turning radius of 15ft (4.5m).

Use a tractor rated for the load (see page 24).

1. Tow the drill off the trailer.

Seat Gauge Wheel Spindles

Refer to Figure 99

If the drill was delivered on a narrow bed trailer, the mainframe gauge wheels may have been set to a narrow wheel spacing for transport. If the front rockshaft wheels and rear casters have exposed spindles held in place with external C-clamps ⊙, perform the steps of this topic, otherwise skip to “Remove Rear Caster Transport Bolts”.

There may be two (rear casters only), or four (front center and rear) spindles that require seating.

2. At the clamp ⊙, remove from the storage cylinder, one set of:
   (14) 802-205C HHCS 1-8X5 1/2 GR5
   (15) 803-316C NUT HEX SIDE LOCK 1-8 PLT
3. Use a jack, hoist or lift to elevate a wheel slightly above ground.
4. Loosen the clamp bolt ⊙. Remove the clamp ⊙.
5. Tap the wheel spindle into the caster or rockshaft tube. Make sure the bolt hole in the spindle is aligned with the tube holes.
6. Secure the spindle and tube with the bolt 13 and nut 15 removed from the clamp.
7. Lower the wheel. Repeat step 2 through step 7 for remaining wheels.
Remove Rear Caster Transport Bolts
To prevent caster rotation during unloading, casters are locked in their full reverse position with shipping bolts.

Refer to Figure 100
8. At each rear caster, remove one set:
   11  802-065C HHCS 3/4-10X2 1/4 GR5
   16  804-093C WASHER FLAT 3/4 HARD ASTMF436
The removed parts may be stored on the shipping clamps (if any).

Install Wing Press Wheels
To meet highway clearance requirements, the press wheel arms and wheels on wing rows are not factory-installed.

Refer to Figure 101
Start with the left end of the left wing.
9. Select one each:
   1  Arm and press wheel assembly (exact part number varies, depending on drill row option)
   17  198-137D PRESS WHEEL PIVOT TUBE
   and two:
   20  817-084C PARALLEL ARM PIVOT BUSHING

   Insert the bushings 20 in each side of the arm pivot.
   Insert the pivot tube 17 in the bushings.
10. Select one each:
    18  802-421C HFS 1/2-13X3 3/4 GR5 SPTHD
    19  803-169C NUT HEX FLG. LOCK 1/2-13 PLT.

    Align the press wheel assembly 1 with the pivot hole in the opener frame. Secure with bolt 18 and lock nut 19.
11. Repeat step 9 and step 10 for each wing row.
Marker Installation

If markers (page 82) were ordered with the drill, they are not factory-installed.

Locate the 113-777M marker installation manual.

Review all steps to determine which components are in place. Complete all necessary installation steps.

Install markers before installing optional weight brackets.

Initial Setup

These items need to be completed prior to first use, but are not necessarily done by the dealer.

Install Clutch Switch Module in Cab

Refer to Figure 103 (dimensions are inches)
1. Choose a tractor cab location where the module does not obstruct vision, and the switches can be safely operated during planting passes.

2. Route the power leads (P) to a source of +12 Vdc power capable of supplying 12.6A (3S) or 8.4A (2S). Color code is: red+, black-.

    Direct battery connection is acceptable; the controller module has its own master switch and fuse.

3. Use a cable tie to secure the power lead.

4. Route the controller harness (H) to the tractor hitch. Use 2 ties to secure the hitch lead.

Shaft Monitor
If a 3-channel shaft monitor (page 81) was ordered for the drill, it was not factory-installed.
Consult the manual supplied with the shaft monitor for installation.

Install Weight Brackets
One to three pairs of weight brackets (page 82) are optional, and are not factory-installed. A third pair is optional, and is not factory-installed. Install brackets after installing markers (if any). Weights are not included.

Install First (Outer) Bracket Pair
Start with the left wing.

Refer to Figure 104
1. Select two: 806-172C U-BOLT 3/4-10 X 10 1/32X11 1/2

    From the front of the wing, insert the U-Bolts through the holes in the outside lug (P).
2. Select one:
   21 196-291H 40P WEIGHT BRACKET WLDMENT
and four sets:
   28 804-023C WASHER LOCK SPRING 3/4 PLT
   25 803-027C HEX 3/4-10 PLT

   Mount the bracket weldment 21 on the U-Bolts 29, and secure with lock washers 28 and nuts 25.

3. Select one:
   22 197-062D WEIGHT BRACKET ADJ LEG
and two sets:
   23 802-057C HHCS 5/8-11X2 1/4 GR5
   26 804-019C WASHER FLAT 5/8 USS PLT
   27 804-022C WASHER LOCK SPRING 5/8 PLT
   24 803-021C NUT HEX 5/8-11 PLT

   Orient the adjustment leg 22 toward the outside (end of wing), and secure with bolts 23, flat washers 26, lock washers 27 and nuts 24.

4. Repeat step 1 through step 3 for the right wing.

Figure 104
Weight Bracket, Outer
Install Second (Inner) Brackets

Refer to Figure 105

5. Select two:
   28 806-172C U-BOLT 3/4-10 X 10 1/32X11 1/2

   From the centerline of the inside U-Bolt installed at step 1, measure toward drill center, approximately:
   2 35\(^{\frac{1}{2}}\)in (90cm)

   Insert a U-bolt (28) from drill front, under the hoses.

   Insert the second U-Bolt \(7\frac{1}{2}\)in (19cm) further in.

6. Select one:
   27 196-291H 40P WEIGHT BRACKET WLDMNТ
   and four sets:
   28 804-023C WASHER LOCK SPRING 3/4 PLT
   29 803-027C HEX 3/4-10 PLT

   Position the bracket weldment (23) on the U-Bolts (29), and adjust the placement as necessary to clear tube weldments, web plates, grease banks, marker parts and secure with lock washers (28) and nuts (29).

7. Select one:
   22 197-062D WEIGHT BRACKET ADJ LEG
   and two sets:
   23 802-057C HHCS 5/8-11X2 1/4 GR5
   26 804-019C WASHER FLAT 5/8 USS PLT
   27 804-022C WASHER LOCK SPRING 5/8 PLT
   24 803-021C NUT HEX 5/8-11 PLT

   Orient the adjustment leg (22) toward the inside (center of drill), and secure with bolts (23), flat washers (26), lock washers (27) and nuts (24).

8. Repeat step 5 through step 7 for the right wing.
Install Third (Mid-Wing) Brackets

Refer to Figure 106

9. Select two:
   28 806-172C U-BOLT 3/4-10 X 10 1/32X11 1/2

   Position the first U-Bolt 28 just inboard of the lug weldment 1 used for the outer bracket. Insert the second U-Bolt 7 1/2in (19cm) further inboard of the first.

10. Select one:
    21 196-291H 40P WEIGHT BRACKET WLDNT
    and four sets:
    28 804-023C WASHER LOCK SPRING 3/4 PLT
    29 803-027C HEX 3/4-10 PLT

   Position the bracket weldment 21 on the U-Bolts 28, and adjust the placement as necessary to clear tube weldments, web plates, grease banks, marker parts, and secure with lock washers 28 and nuts 29.

11. Select one:
    22 197-062D WEIGHT BRACKET ADJ LEG
    and two sets:
    23 802-057C HHCS 5/8-11X2 1/4 GR5
    25 804-019C WASHER FLAT 5/8 USS PLT
    26 804-022C WASHER LOCK SPRING 5/8 PLT
    24 803-021C NUT HEX 5/8-11 PLT

   Orient the adjustment leg 22 toward the inside (center of drill), and secure with bolts 23, flat washers 25, lock washers 26 and nuts 24.

12. Repeat step 9 through step 11 for the right wing.

Offset Box Dividers
If seed box offset dividers (page 84) were ordered, they were not factory-installed. Install seed box dividers per immediate planting requirements. See "HDF Seeding with Both Compartments" on page 27.
Small Seeds Partition Installation

If partitions (page 85) were ordered with the drill, they are not factory-installed. The order quantity varies with the seed type and planting terrain.

 Refer to Figure 107
Start at the left side of the left Small Seeds box.

1. Loosen, but do not remove, the:
   - 802-148C HFSS 1/4-20X1/2 GR5
   - 803-006C NUT HEX 1/4-20 PLT
   at a seed meter.

2. Select one:
   - 123-409D RMVBL SMALL SEED BOX PARTITION

3. Insert the partition under the bolt heads from the right. Slide it fully to the left. Re-tighten nuts and bolts (use Grade 2 torque).
122-278S Scraper Installation
Optional carbide disc scrapers are not factory installed. Start with row 1 (left-most row unit).

- If a Keeton seed firmer is also installed, see the Parts Manual for assembly details.
- This scraper is not compatible with Seed-Lok.

Refer to Figure 108 and Figure 109
1. Remove one or both opener disc blades to gain safe access to the mount (1). Note the position of bushings and spacers for correct re-assembly (page 52).
2. Select one each:
   - 802-024C HHCS 3/8-16X3 GR5
   - 129BXT824 BRACKET FOR 890-929C FIRMER
   - 122-177D 10HD25 INSIDE SCRAPER MNT TUBE
   Insert the bolt (5), from the rear, through the lowest hole of the bracket (50). Place the tube (49) over the bolt.
3. Select one scraper set:
   - 890-928C 25 SER AIR DESIGN IN SCRAPER
   Place the shoulder washer (3) on bolt (51) with the larger diameter to the rear (toward bolt head). Place the left scraper blade (3) on the washer, followed by the right scraper blade (4).
4. Select one each:
   - 804-011C WASHER FLAT 3/8 USS PLT
   - 804-013C WASHER LOCK SPRING 3/8 PLT
   - 803-014C NUT HEX 3/8-16 PLT
   Place the flat washer (55) on the bolt (51), followed by the lock washer (43) and nut (43). Tighten bolt and nut to 3/8-16GR5 torque spec. Make sure blades pivot freely.
5. Select the scraper spring (5). Connect the spring between the blades, using the small top holes.
6. Select two sets:
   - 802-172C HHCS 5/16-18X2 1/2 GR5
   - 803-043C NUT HEX WHIZ 5/16-18 PLT
   Insert the scraper assembly (6) between the middle four lower square holes (7) of the opener frame. Secure with bolts (52) and whiz nuts (54).
7. Re-mount the removed disc blade.
Great Plains (a division of Great Plains Manufacturing, Inc.) warrants to the original purchaser that this Great Plains machine will be free from defects in material and workmanship for a period of one year (Parts & Labor) from the first use date when used as intended for personal use; ninety days for custom/commercial or rental use.

Second year limited warranty covers Parts ONLY (personal usage only, excluding labor and wear items). This warranty is limited to the replacement of any defective part by Great Plains. Great Plains reserves the right to inspect any equipment or part which are claimed to have been defective in material or workmanship.

The following items and/or conditions are NOT COVERED UNDER WARRANTY:
Failures resulting from the abuse or misuse of the equipment, failures occurring as a result of accidental damage or Force Majeure, failures resulting from alterations or modifications, failures caused by lack of normal maintenance as outlined in the operator’s manual, repairs made by non-authorized personnel, items replaced or repaired due to normal wear (such as wear items and ground-engaging components including, but not limited to, disc blades, chisel points, tires, bushings, and scrapers), repeat repair due to improper diagnosis or improper repair by the dealer, temporary repairs, service call and/or mileage to and from customer location, overtime premium, or unit hauling expenses. The warranty may be voided if the unit is towed at speeds in excess of 20 miles per hour (32 kilometers per hour), or failures occurring from soils with rocks, stumps, or other obstructions.

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This warranty is not valid unless registered by a certified Great Plains dealer.

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