Spyder Double Disc Drill

Featuring the Gent Undercut opener system
40' - 74'

Owner's Manual

KHS02240001-0030

PN101000 **Revision C, 2024**

At K-Hart, we are committed to continuous improvement. As a result, product documentation may be updated in future versions to reflect these enhancements.

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K-Hart's objective is to ensure that all owners obtain maximum reliability and performance from all K-Hart products.

K-Hart Industries warrants your K-Hart products to be free of defects in material and workmanship, under normal use and service. Obligations under this warranty shall extend for a period of one year in general and three years for frame following the date of delivery to the original purchaser and shall be limited to, at the option of K-Hart Industries, replacement or repair of any parts found, upon inspection by K-Hart, to be defective.

K-Hart Industries reserves the right to make changes or add improvements at any time without notice or obligation.

Warranty claims

The purchaser claiming under this warranty shall report a warranty claim to his Authorized dealer.

Exclusions and/or Deviations from the Base Warranty

- K-Hart does not cover any warranty on the frame tires. Any warranty has to be dealt with by the Original Tire Manufacturer.
- K-Hart does not cover any nicks, cuts, or other marks on the frame tires that occur during delivery.
- Rubber packer wheels, when used in excessively rocky conditions will not be warranted against cuts, scrapes, and abrasions.

Limitation of Liability

In no event shall the owner be entitled to recover for incidental, special or consequential damages such as, but not limited to, loss of crops, loss of profits or revenue, other commercial losses, inconvenience or cost of rental or replacement.

Normal Wear, Repair and Maintenance not Related to Defects

The expressed warranty does not cover wear of components, and is conditional upon the product being properly assembled, adjusted, and operated under normal farming conditions.

This warranty does not cover conditions resulting from misuse, negligence, unauthorized alterations, accident, or lack of performance of required maintenance.

Owner's Obligation

Warranty Transportation Costs

It is the responsibility of the owner, at the owner's expense, to transport the equipment to the service shop of an authorized K-Hart dealer or alternately for any travel or transportation expense involved in fulfilling this warranty.

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Warranty Registration Form

Each machine is identified by a model and a serial number. Record these numbers in the spaces given. Give the model number and serial number to your dealer when parts or service are required.

Warranty Void if Not Registered.

Machine Manufacturing Information

Machine Model Number: _____

Machine Serial Number: _____

Machine Year of Manufacture: _____

Original Purchase Information

Owner/Operator: _____

Date of Delivery: _____

Dealer's Information

Dealer Name: _____

Dealer Address: _____

Dealer Phone Number: _____

Dealer E-mail Address: _____

Dealer/ Support Contacts Information

Dealer/Support Contact Name: _____

Dealer/Support Contact Phone Number: _____

Dealer/Support Contact Mobile Number: _____

Dealer/Support Contact E-mail Address: _____

As soon as you receive this machine, inspect it thoroughly to be certain that it is in good order and complete. Finish a Predelivery inspection (PDI) checklist, paying special attention to the steps listed, prior to delivery to the customer.

NOTE: Warranty Registration Form must be completed and submitted to K-Hart Industries Ltd. within 30 days of the delivery date.

Mailing Address: 16 S Landing Dr, Oak Bluff, MB R4G 0C4
Email: info@khartindustries.com

Pre Delivery Inspection Checklist

TO THE DEALER: This form must be completed and returned to K-Hart Industries Ltd. along with the Warranty Registration Form. Inspect the machine thoroughly to be certain that it is in good order and complete. Carefully follow the steps listed below and indicate with a tick mark in the left-hand column when correct/complete.

Model:		Serial #:	
Check Completed By:		Signature:	
Dealer Name:		Date:	

Complete upon delivery of Spyder Double Disc Drill:

____	10 min	Remove travel sleeves from A frame of machine (foam and wrap removal main frame).
____	1-2 hours	Wash road grime/salt off machine.
____	5 min	Clean hydraulic and electric fittings.
____	5 min	Hook up to tractor.
____	1 min	Hook up blue hydraulics to tractor (folding) (Hydraulics marked for extend/retraction).
____	1 min	Hook up green hydraulics to tractor (openers) (Hydraulics marked for extend/retraction).
____	2 min	Hook up ISO connection to tractor.
____	10-60 min	Run K-Hart controller screen harness into tractor (Controller draws power from ISO harness) (RAM mounts available if permanent)
____	1 min	Connect connector harness to T on ISO harness (T is near the ISO connection).
____	1 min	Connect controller harness in tractor to K-Hart screen (Block plugs into back of screen)
____	2 min	Remove wing pins.
____	1 min	Start tractor - K-Hart controller will power up.
____	2 min	When K-Hart controller powers up, check configuration on screen (Ensure configuration matches machine).
____	1 min	Ensure everyone is clear of machine and room to unfold.
____	1 min	Set the blue circuit to continuous flow 100% and engage (forward position).
____	10 min	Review the unfolding section of manual - then follow instructions.
____	3 min	Allow the unit to fully unfold. The screen will advise you when is done (1-2 minutes).
____	4 min	Change blue hydraulics to backward position, then go to fold in the K-Hart controller (1-2 min).
____	4 min	Fold the machine down again (hydraulics to forward position).
____	1 min	Put the blue hydraulics in neutral (not float) for the wings.
____	10 min	Remove the gang opener safety pins (Lift gang, if pins are tight).
____	10 min	Remove the rear opener safety pins.
____	1 min	Set the green hydraulic circuit for openers to continuous (40%), click the remote forward.
____	1 min	Use the controller to lower the openers.
____	1 min	Use the controller to raise the openers.
____	1 min	Use the controller to put the rear openers in field position (ahead).
____	1 min	Use the controller to put the rear opener in service mode (back).
____	10 min	Put all opener gang safety pins in.
____	10 min	Put all rear gang safety pins in.
____	75 min	Grease machine (1-2 shots on all zerks except wheels).
____	60 min	Jack up main frame wheels to check bearings, tighten as needed. Repack grease as necessary.
____	20 min	Check tire pressures - see manual for roading and field.
____	30 min	Retorque all tires to spec.
____	30 min	Check all air hose lines are connected.
____	10 min	Check machine hydraulics to ensure no leaks.
____	10 min	If hooking up to a cart, inspect all lines to ensure no leaks after operating.
____	20 min	Complete a bolt tightness audit.

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Carefully read all the material provided before attempting to use the machine.

This Operator's Manual has been carefully prepared to provide the necessary information regarding the operation and adjustments, so that you may obtain maximum service and satisfaction from your new K-Hart Spyder Drill.

To protect your investment, study your manual before starting or operating in the field. Learn how to operate and service your Spyder Drill correctly, failure to do so could result in personal injury or equipment damage.

Use this manual as your first source of information about the machine. If you should find that you require information not covered in this manual, contact your local K-Hart Dealer. The Dealer will be glad to answer any questions that may arise regarding the operation of your K-Hart Spyder Drill.

K-Hart Dealers are kept informed on the best methods of servicing and are equipped to provide prompt efficient service if needed.

When setting up your machine or making adjustments, review and follow the recommended machines settings in all relevant K-Hart publications. Failure to do so may compromise the machine function and machine life and may result in a hazardous situation.

Occasionally, your Spyder Drill may require replacement parts. Your Dealer will be able to supply you with the necessary replacement parts required. If the Dealer does not have the necessary part, the K-Hart Factory will supply the Dealer with it promptly.

Your K-Hart Drill is designed to give satisfaction even under difficult conditions. A small amount of time and effort spent in protecting it against rust, wear and replacing worn parts will increase the life and trade-in value.

Keep this manual handy for frequent reference and to pass on to new Operators or Owners.

It is the policy of K-Hart Industries Ltd. to improve its products whenever it is possible to do so. The Company reserves the right to make changes or add improvements at any time without incurring any obligation to make such changes on machines sold previously.

K-Hart provides warranty for Customers who operate and maintain their equipment as described in this manual. A copy of the K-Hart Industries Ltd. Warranty Policy, which explains this warranty, has been included as part of this manual, and a copy is available from your dealer. Damage resulting from any of the following will void the warranty:

- Accident
- Misuse
- Abuse
- Improper maintenance or neglect
- Abnormal or Extraordinary use of the machines
- Failure to use the machine, equipment, component, or part in accordance with the manufacturer's instructions

Call your K-Hart Dealer if you need assistance, information, or additional copies of this manual.

This document is available in English only.

This manual gives the operator the proper instructions needed for operation and maintenance. Read, understand, and follow these instructions for best machine performance and life. With proper maintenance and operation procedures, the machine will have better overall performance. Use normally available tools for maintenance on this machine.
All operators must read and understand this manual before operating this machine. Where possible, operators who have not operated the machine must receive instruction from an operator who has operated this machine. Your dealer can give instruction in machine operation. Keep this manual with the machine for future reference. If the original manual is damaged, order a replacement from your dealer.
See your dealer for any service problems and adjustments. The dealer is equipped for all service work and to help with specific applications of the seeder in local conditions.
Left-hand and right-hand are determined by facing the direction the machine will travel when in use.

INTENDED USE

This machine is designed solely for use in customary agricultural operations.
Do not use this machine for any application or purpose other than those described in this manual. The manufacturer accepts no liability for damage or injury resulting from misuse of this machine.
Compliance with the conditions of operation, service and repair as specified by the manufacturer constitute essential elements for the intended use of this machine.
This machine should be operated, serviced and repaired only by qualified persons familiar with its characteristics and familiar with the relevant safety rules and procedures.
All generally recognized safety regulations and road traffic regulations must be obeyed at all times.
Any unauthorized modifications performed on this machine will relieve the manufacturer of all liability for any resulting damage or injury and may void warranty.

PROPER DISPOSAL OF WASTE

Improper disposal of waste can pollute the environment and ecology. A few examples of potentially harmful equipment waste can include, but not limited to, items such as oil, hydraulic oil, tires, etc.
Use leak proof containers when draining fluids.
Do not use food or beverage containers to collect waste fluids, as food or beverage container(s) may mislead someone into drinking from them.
Do not pour or spill waste onto the ground, down a drain, or into any water source.
Inquire with local environmental or recycling center on the proper way to recycle or dispose waste.

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1.1 Safety Alert Symbols and Signal Words

Carefully read and follow the safety message accompanying this symbol.

Watch for this symbol. It Identifies potential hazards to health or personal safety. It points our safety precautions. It means:

ATTENTION—BE ALERT
Your Safety is Involved

Familiarize yourself with the location of all decals. Read them carefully to understand the safe operation of your machine.

Three signal words, **DANGER**, **WARNING**, and **CAUTION** are used in conjunction with the safety alert symbol to alert you to hazardous situations. Two signal words, **IMPORTANT** and **NOTE**, identify non-safety related information. Signal words are selected using the following guidelines:

DANGER

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

WARNING

Indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury. It may also be used to alert against unsafe practices.

CAUTION

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

IMPORTANT:
Indicates a situation that, if not avoided, could result in a malfunction or damage to the machine.

NOTE:
Provides additional information or advice.

1.2 General Farm Safety

CAUTION

The following general farm safety precautions should be part of your operating procedure for all types of machinery.

- Hard hat
- Protective footwear with slip-resistant soles
- Protective glasses or goggles
- Heavy gloves
- Wet weather gear
- Respirator or filter mask
- Be aware that exposure to loud noise can cause hearing impairment or loss. Wear suitable hearing protection devices such as earmuffs or earplugs to help protect against loud noises.
- First aid kit for treatment of minor cuts and scratches.
- One or more fire extinguishers. Make sure fire extinguishers are properly charged and in operating condition. Use a water type fire extinguisher for a fire in crop. For fires involving anything other than crop, such as oil or electrical components, use a dry chemical fire extinguisher with an ABC rating.

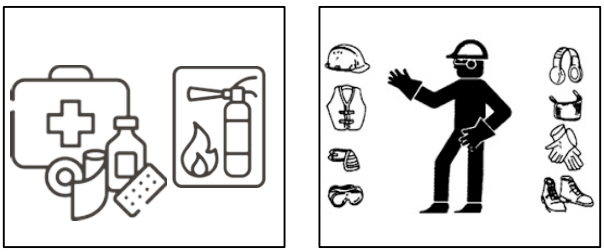


Figure 1.1 Safety Around Equipment

Take note of the following additional safety precautions:

- Keep young children away from machinery at all times.
- Be aware that accidents often happen when the Operator is tired or in a hurry. Take time to consider the safest way. **NEVER** ignore warning signs of fatigue.
- Wear close-fitting clothing and cover long hair. **NEVER** wear dangling items such as scarves or bracelets.
- Keep all shields in place. **NEVER** alter or remove safety equipment. Make sure driveline guards can rotate independently of shaft and can telescope freely.
- Use only service and repair parts made or approved by equipment manufacturer. Substituted parts may not meet strength, design, or safety requirements.
- Keep hands, feet, clothing, and hair away from moving parts. **NEVER** attempt to clear obstructions or objects from a machines while the engine is running.
- Do **NOT** modify the machine. Unauthorized modifications may impair machine function or safety.

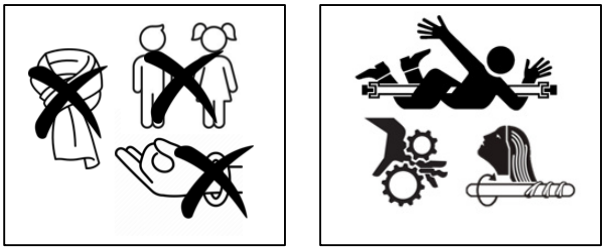


Figure 1.2 Safety Around Equipment

- To avoid injury or death from unexpected startup of the machine, **ALWAYS** stop the engine and remove the key from the ignition before leaving the operator's seat for any reason.
- Keep service area clean and dry. Wet and/or oily floors are slippery. Wet spots can be dangerous when working with electrical equipment. Be sure all electrical outlets and tools are properly grounded.
- Keep machinery clean. Do NOT allow oil or grease to accumulate on service platforms, ladders, or controls. Clean machines before storage.
- NEVER use gasoline, naphtha, or any volatile material for cleaning purposes. These materials may be toxic and/or flammable.
- When storing machinery, cover sharp or extending components to prevent injury from accidental contact.

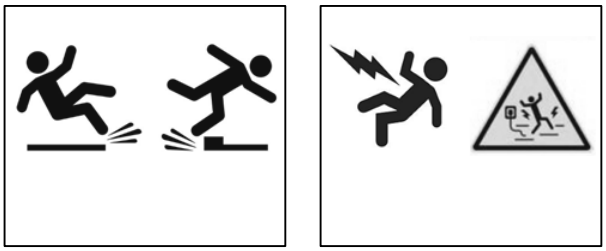


Figure 1.3 Safety Around Equipment

1.3 Operation

1.3.1 General Operation

DANGER

- Review the operator's manual and all safety items before operation and/or maintenance of the machine.
- **DO NOT RIDE!!** No one should be allowed to ride on the implement when in motion.

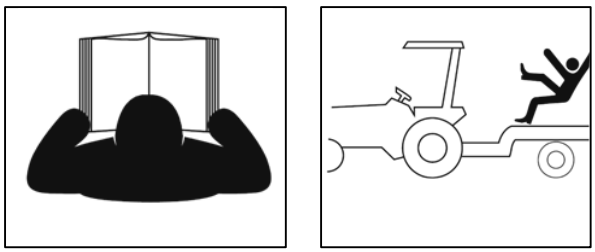


Figure 1.4 Safety Around Equipment

- **Reduce speed** and use additional caution when on hilly terrain, inclines, towing under adverse surface conditions, and turning.
- **Check behind** when backing up.
- **Stand clear** when raising or lowering wings.
- Never allow anyone within the immediate area when working.
- **Keep all shields in place**, replace them if removed for service work.

1.3.2 Tractor Operation

DANGER

- Review tractor manuals.
- Be aware of tractor safety procedure when working with implement.
- Secure hitch pin with a retainer and lock drawbar in center position.

Tires

- Proper ballast and tire pressure are required when pulling heavy implements.
- Consult your tractor's operators manual and follow all recommended procedures.

Hydraulics

- Wipe all hydraulic fittings and couplers with a clean cloth to avoid contaminating the system.
- The hydraulic system draws its oil supply from the tractor reservoir. Check that hydraulic reservoir is filled to the proper level.
- Check the oil level after the seeder system has been filled.

1.4 Transporting

DANGER

- Be aware of length, height, and width of implement. Make turns carefully and be aware of obstacles and overhead electrical lines. Watch for low slung overhead lines. Stay well away from power lines. Electrocution can occur without direct contact.
- Travel a safe speed. Do **NOT** exceed 32 km/h (20 mph).
- The slow moving vehicle (SMV) emblem and safety reflectors must be secured on the machine for safe transport (unless prohibited by law).

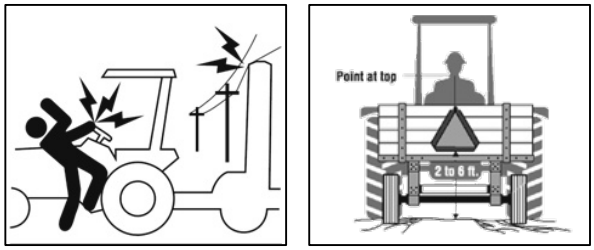


Figure 1.5 Safety Around Equipment

- Do not transport with a motor vehicle. The weight of the implement being towed ***must not*** *exceed* 1.5 times the weight of towing vehicle, unless proper implement braking is used.
- Do not transport in poor visibility.
- Avoid soft surfaces, the additional wing weight on the center wheels could cause the machine to sink.
- Ensure safety chain is attached correctly. Safety chains must be used at each pin connection.
- Check that wings are firmly seated in wing stops pins installed.
- Secure transport locks on depth control cylinders.
- Check that all safety lights, and reflective decals are in place and in good working order before transporting on public roads.

NOTE: K-Hart Industries Ltd. Will not be responsible for any damages or operator injury resulting from non-use or improper use of transport locks.

1.5 Hydraulics

DANGER

- Always place all hydraulic controls in Neutral before leaving the operator's seat.
- Do **NOT** search for high pressure hydraulic leaks without hand or face protection. Use a piece of cardboard as a backstop instead of hands to isolate and identify a leak. If injured by a concentrated high-pressure stream of hydraulic fluid, seek medical attention immediately. Serious infection or toxic reaction can develop from hydraulic fluid piercing the skin.

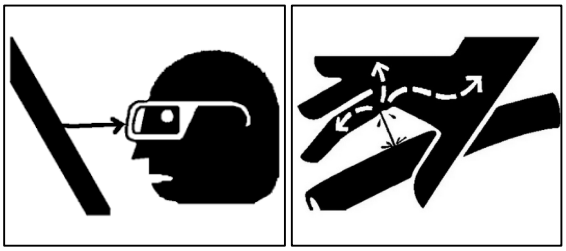


Figure 1.6 Safety Around Equipment

- Double check the area around the implement and tractor is clear before operating hydraulics.
- Make sure all components are tight and steel lines, hoses, and couplings are in good condition before applying pressure to a hydraulic system**.**
- Never remove hoses or hose ends with machine elevated. Relieve hydraulic pressure before disconnecting hydraulic hoses or ends.
- Ensure cylinders are completely filled with hydraulic fluid. Keep all connectors clean for positive connections.

- Hydraulic failure can allow wings or openers to fall rapidly, causing serious injury or death.
- Ensure all fittings and hoses in the hydraulic system are kept clean and in good condition.
- Replace any worn, cut, abraded, flattened, or crimped hoses and steel lines. Do **NOT** attempt any makeshift repairs to hydraulic lines, fittings, or hoses by using tapes, clamps, cements, or welding. The hydraulic system operates under extremely high-pressure. Makeshift repairs will fail suddenly and create hazardous and unsafe conditions.

Figure 1.7 Safety Around Equipment

- Always use caution when working on a hydraulic system. Even when the system is shut down, hydraulic oil can still be under very high pressure.
- Before servicing:
  1. Lower hydraulic-powered equipment to the ground or block mechanically.
  2. Shut off the engine which powers the hydraulic pump.
  3. Move the hydraulic lever back and forth a few times to release pressure.
  4. Let hydraulic system cool down.

Always follow tractor manufacturer's hydraulic system instructions. Servicing procedures may vary.

1.6 Maintenance

DANGER

- Ensure linkage lock pins are engaged on all linkages before servicing or entering machine (Section 3.14).
- Shut tractor off before making any adjustments or lubricating the machine.
- Block machine securely when making repairs.
- Do NOT stand or walk within radius of wings. Mechanical or hydraulic failure can allow wings to fall rapidly.
- Clear the area of bystanders, especially children, when carrying out any maintenance, repairs, or adjustments.
- Wear close-fitted clothing and appropriate safety equipment for the job. Keep hands, feet, clothing, and hair away from all moving and/or rotating parts.
- Wear proper hand and eye protection when searching for high-pressure hydraulic leaks. A tiny, almost invisible leak can penetrate skin, thereby requiring immediate medical attention.
- Do not modify the machine in any way that interferes with safety equipment or affects the intended function of the machine..

1.7 Chemicals

DANGER

- Always wear safety goggles, breathing apparatus and gloves when working on seeder filled with granular chemical or treated seed.
- Do not leave chemicals on your skin. Wash exposed skin immediately.
- Always have ample water available in case of exposure to ammonia liquid or gases.

- Always read granular chemical or treated seed labels carefully and always keep label warnings in mind.
- Properly store chemicals in original containers with labels intact.
- Do NOT feed any treated seed to livestock. Treated seed is poisonous and may cause harm to livestock.

1.8 Tires

WARNING

- Service tires safely.
- A tire can explode during inflation, which could cause serious injury or death.
- Follow proper procedures when mounting a tire on a wheel or rim. Failure to do so can produce an explosion that may result in serious injury or death.
- Do NOT stand over tire when inflating. Use a clip-on chuck and extension hose.
- Do NOT exceed maximum inflation pressure indicated on tire label.
- Never use force on an inflated or partially inflated tire.
- Make sure all air is removed from the tire before removing the tire from the rim.
- Never weld a wheel rim.
- Replace tires that have defects and replace wheel rims that are cracked, worn, or severely rusted.
- Regularly inspect wheel mounting hardware and wheel bearings for damage. Replace immediately if damage is suspected.

Figure 1.8 Safety of Tires

1.9 Welding Precaution

IMPORTANT:
It is very important that correct procedures be followed whenever welding, plasma cutting, or any other high current electrical operation is performed on the machine.

If procedures are not followed, it could result in severe damage to sensitive, expensive electronics. Even if complete failure of a module doesn't happen immediately, it is impossible to know what effect high current could have with regard to future malfunctions or shorter lifespan.

- Wear all protective clothing and appropriate safety equipment for the job at hand.
  - Welding helmet, hand shield or goggles
  - Respirators
  - Fire/Flame resistant clothing and apron
  - Hearing protection (earmuffs or earplugs)
  - Rubber-soled safety boots/shoes
  - Insulated gloves
- If any flame cutting, welding, or arc welding is to be done on the machine or attachments, make sure to clear any crop material or debris from around the area. Falling molten metal or sparks can ignite the material.
- Components to be welded should be removed from the machine whenever possible, rather than welded in place. When work needs to be completed on the Spyder, disconnect the implement completely from the tractor before welding and always have a fire extinguisher handy.

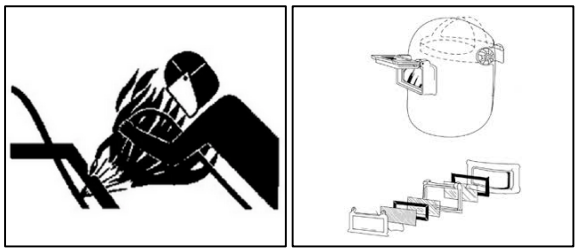


Figure 1.9 Safety during Welding

If unable to remove the component to be welded, you MUST disconnect the center harness, tractor and cart connectors, all electronic modules connectors, and wing harnesses.

IMPORTANT: When reconnecting these connectors, double-check that the connectors are fully seated into the master controller, and that the two locking tabs on each end of all four connectors have popped outward. If the tabs are not popped outward, the connector is not fully seated.

IMPORTANT: Do **NOT** power up or operate the Spyder drill until these connectors are locked into place.

1.10 Reflectors

WARNING

Motor vehicle drivers need to be able to identify slow moving vehicles in time to react safely. Protect yourself and others by ensuring the Slow Moving Vehicle (S.M.V.) Emblem and Safety Reflectors are secured on the machine.

Replace missing, damaged or faded reflectors as soon as possible.

SMV Emblem and Reflector Locations

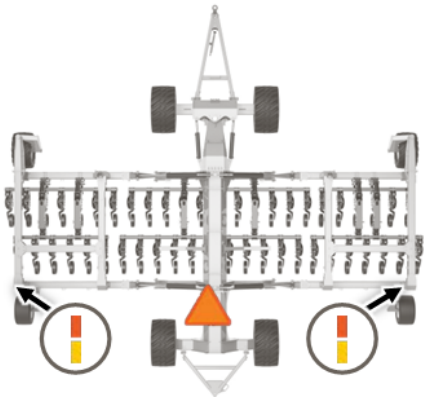


Figure 1.10 Three-Section Frame Reflectors

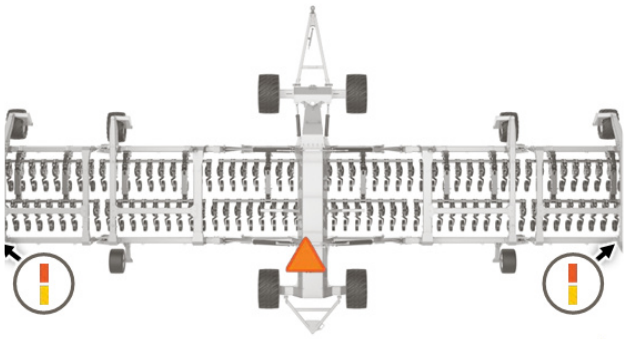


Figure 1.11 Five-Section Frame Reflectors

WARNING

Use SMV Emblem when transporting, to warn vehicles approaching from the rear. Comply with all provincial, federal and local laws when traveling on the highway. Comply with the requirements outlined in ASABE Standard S279.18 when placing lights and SMVs.

1.11 Warning Flags and Lights

Be familiar with and adhere to all highway traffic regulations in your area.
K-Hart recommends the use of safety flags or lights to meet the S279.18 when placing lights and SMVs for highway travel.

- For daytime travel, use flags to mark the extremities of the implement. Flags should be made of a fluorescent material and be displayed so that they are visible to the driver of another vehicle approaching from the front or rear.

Figure 1.12 Daytime Transport Flags

- For nighttime travel[1], use flashing warning lights to mark the extremities of the implement and at least two red tail lamps to mark the rear of the implement. Warning lights must show amber to the front and red to rear.

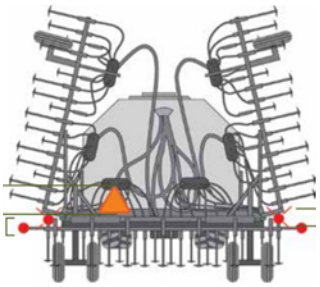


Figure 1.13 Nighttime Transport Flags

1* Refer to local regulation for definition of nighttime travel.

1.12 Safety Signs

NOTE: Familiarize yourself with the location of all decals. Read them carefully to understand the safe operation of your machine.
NOTE: Keep safety signs clean and legible at all times. Replace safety signs that are missing or illegible.
NOTE: Replacement of safety signs are available from your K-Hart Dealer Parts Department.

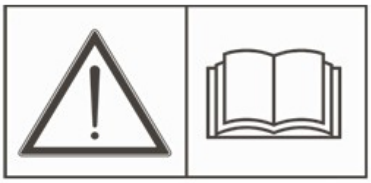


Figure 1.14 Read Operator's Manual to Understand the Safe Operation of your Machine

1.12.1 Installing Safety Signs

Follow this procedure to install safety decals.

1. Clean and dry the installation area.
2. Confirm decal placement. See 1.12.2 for locations.
3. Remove the smaller portion of the split backing paper.
4. Place the decal in position and slowly peel back the remaining paper, smoothing the decal as it is applied.
5. Prick small air pockets with a pin and smooth out.

1.12.2 Safety Sign Locations

The following safety signs will be installed on the frame of the drill.

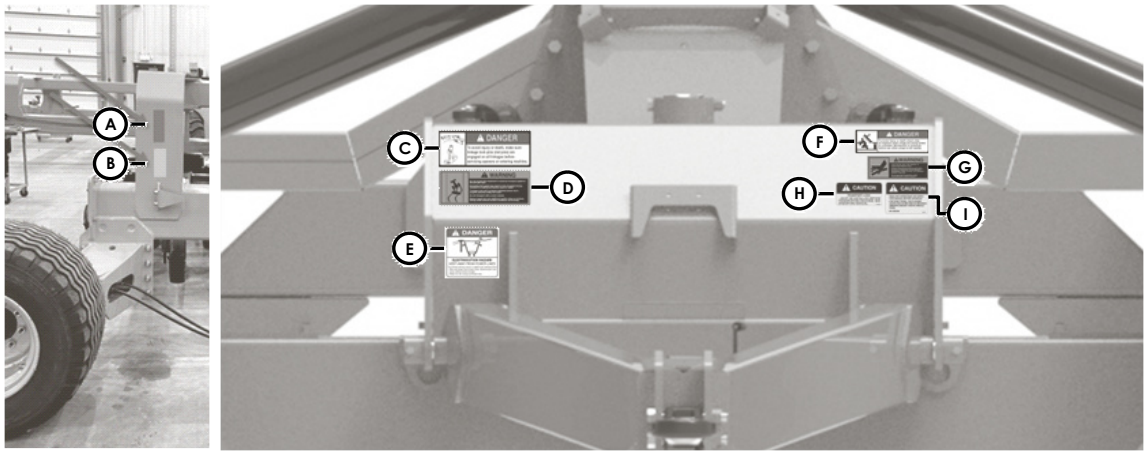


Figure 1.15 Read Operator's Manual to Understand the Safe Operation of your Machine (Left: Backside of the Outermost Wing Crossover, Right: Front Side of the Knuckle).

Table 1.1 Safety Signs locations and descriptions.

Item	KHI Part Number	Safety Sign Description
A	401336	Reflector - Red (2×6)
B	401335	Reflector - Amber (2×6)
C	402683	Decal - Danger, Opener Linkage Locks
D	402674	Decal - Warning, Transport Guidelines
E	400896	Decal - Danger, Electrocution
F	400897	Decal - Danger, Folding/Unfolding
G	402675	Decal - Warning, High Pressure Fluid
H	402676	Decal - Caution, Transport Locks (F-4044)
I	400898	Decal - Caution, Read Manual (N24301)

***NOTE: Spyder Safety Decals Kit KHI Part # 402684**

1.12.3 Understanding Safety Signs

Opener Linkage Locks (C)

- Hazard: Crushing hazard from lowing or falling wings.
- Avoidance: Stay clear of this area while engine and machine are operating. For service work, install the opener linkage and service mode linkage lock pins before getting under wing.

Transport Guidelines (D)

- Hazard: Single-vehicle traffic accidents such as lose of machine control and/or rollover.
- Avoidance: Install the safety chains when attaching the implement to the tractor. Maintain safe transport speed. Refer to the Operator Manual for proper transport procedures.

Electrocution (E)

- Hazard: Electrical shock hazard - risk of personal injury and component damage
- Avoidance: Keep the machine clear of overhead electrical power lines.

Folding/Unfolding (F)

- Hazard: Crushing hazard from lowing or falling wings.
- Avoidance: Stay clear of this area while engine and machine are operating. For service work, install the wing lock pins before working in fall zone of the wings.

Figure 1.16 Opener Linkage Locks

Figure 1.17 Transport Guidelines

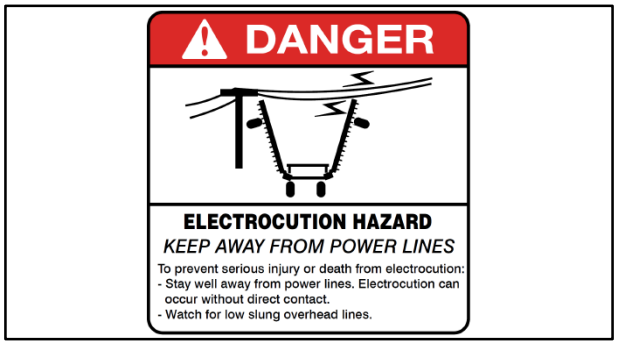


Figure 1.18 Electrocution

Figure 1.19 Folding/Unfolding

High Pressure Fluid (G)

- Hazard: Injection hazard into skin escaping fluid under high pressure.
- Avoidance: Shut off engine, remove key, and relieve pressure before performing maintenance or repair work. Do NOT search for high pressure hydraulic leaks without hand or face protection. Refer to the Operator Manual for proper service procedures.

Figure 1.20 High Pressure Fluid

Transport Locks (H)

- Hazard: Crushing hazard from lowing or falling wings
- Avoidance: Stay clear of this area while engine and machine are operating. For service work, install the wing lock pins before working in the fall zone of the wing.

Figure 1.21 Transport Locks

Read Manual (I)

- Hazard: General Safety Alert
- Avoidance: Read and understand the Operator Manual before operating the machine.

Figure 1.22 Read Manual

Table of Contents

2.1 Double Disc Drill Product Features

The drill is equipped with the patented K-Hart opener linkage. The linkage provides ample access for setting/adjusting down pressure and machine maintenance, while also keeping ranks close together for accurate row spacing during operation.

The drill's unique Spyder Fold technology provides narrower and safer transport dimensions. The drill is outfitted with exclusive 8600 Series Gent Undercut Disc Openers (Figure 2.1). The benefits of Gent Openers include low soil disturbance, reduced fuel consumption, limited hair pinning, precise drill settings, reduced paralink wear and user-friendly adjustments.

Figure 2.1 Undercut Technology

- The pivoting disc mount (Figure 2.2) allows the disc to find the path of least resistance, ensuring minimal soil disturbance and reducing fuel consumption.
- The angled discs lift a flap of soil, place the seed evenly, and allow the flap to fall on top of the seed, before being gently packed. This undercut technology provides optimal conditions for effective seeding by minimizing hair pinning and sidewall compaction.
- Down pressure setting is adjusted at the top of the opener with a user-friendly spring. The down pressure setting is complimented by an adjustable hydraulic down pressure by the opener linkage.
- A gauge on the packer adjustment allows precise and repeatable depth setting in 1/4" increments.
- Opener springs continuously adapt to ground contours and manage minor down-pressure adjustments. If the ground profile changes substantially while seeding, operators can make real-time opener down-pressure adjustments from the cab. Additionally, the operator can independently adjust opener down pressure for the outer wings, inner wings, and center section as needed.

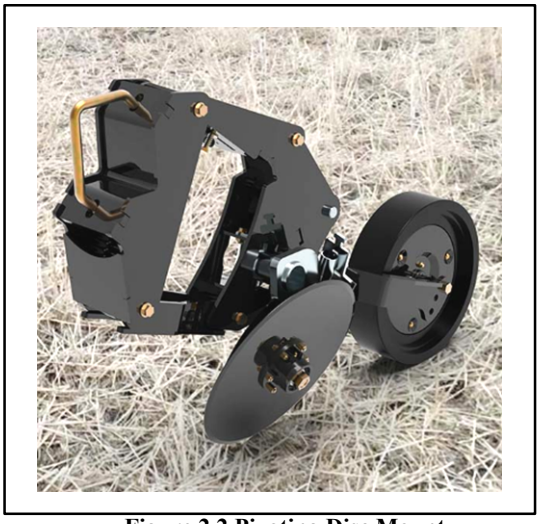


Figure 2.2 Pivoting Disc Mount

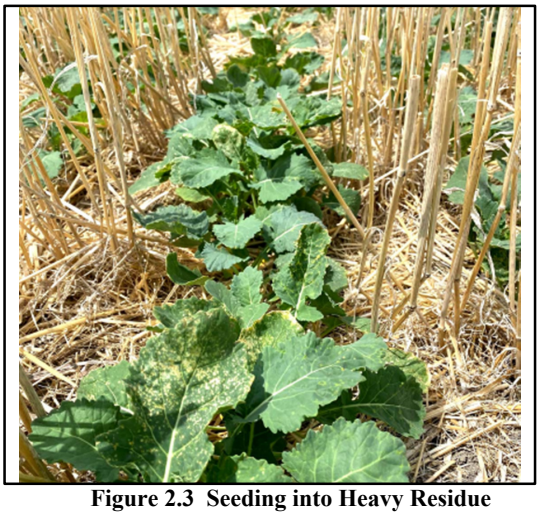


Figure 2.3 Seeding into Heavy Residue

2.1.1 Optional Product Features

NOTE: Optional features depend on drill configuration.

1704 Inter-Row Fertilizer Coulters (IRCs) (Figure 2.4):

The1704 Fertilizer Coulter allows for inter-row granular fertilizer placement, with adjustable depth control and the ability to raise when not in use. IRCs are not included in standard double disc drill configuration. If you require IRCs on your drill, contact your K-Hart Dealer.

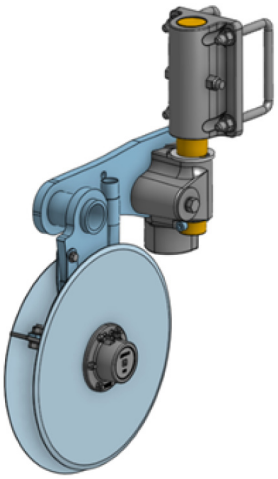


Figure 2.4 1704 Inter-Row Fertilizer Coulters

Liquid Fertilizer option for IRC's (Figure 2.5 & 2.6):

For farmers wanting to use liquid fertilizer with their IRC's, they will need to order a liquid kit which includes a boot and stainless steel pipe to direct the fertilizer into the furrow.

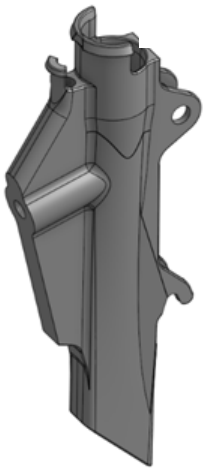


Figure 2.5 Liquid Boot

Liquid Fertilizer option for seed openers (Figure 2.5 & 2.6):

For farmers wanting to use liquid in their seed rows. The kit includes a stainless steel pipe and clamp, allowing 1/4" flexible liquid hose to be threaded through for accurate placement and minimizing plugging potential.

Blockage systems:

K-Hart offers both Agtron and Intelligent Ag systems in all run or single per tower or a combination for seed and granular fertilizer. Agtron supplies a tablet for control. Intelligent Ag users will need to supply their own Ipad to operate the system.

Figure2.6 Stainless Steel Pipe

2.2 Double Disc Drill Configuration

The double disc drill is designed for precise and efficient seeding while minimizing soil disruption. The double disc drill operates with precision through dense stubble, heavy stripped stubble, or cover crops. It utilizes angled discs to lift soil flaps, place seeds, and gently cover them, preserving the integrity of the seedbed.

An air distribution system is used to distribute the seed to each of the openers, from a cart attached to the drill. Air distribution and hitch systems are available for either Tow Between (TBT) aircarts or Tow Behind (TBH) aircarts for each size of Spyder drill.The drill is monitored using a display in the cab of the tractor.

The double disc drill is available in two different frame configurations.

Three-section double disc drill

The three-section double disc drill (Figure 2.7) has a center frame (1) with two folding wings (2). The three-section drill is only available in 12.19 m (40 ft) width.

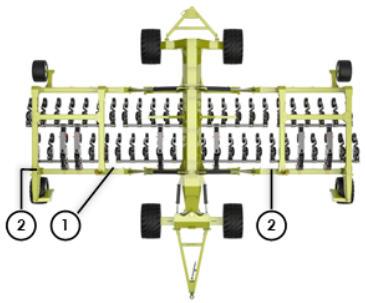


Figure 2.7 Three-Section Double Disc Drill

Five-section double disc drill

The five-section double disc drill (Figure 2.8) has a center frame (1), two folding wings (2), and a folding extension (3) on each folding wing. The five-section drill is available in three sizes: 18.28 m (60 ft), 20.12 m (66 ft) and 22.56 m (74 ft) widths.

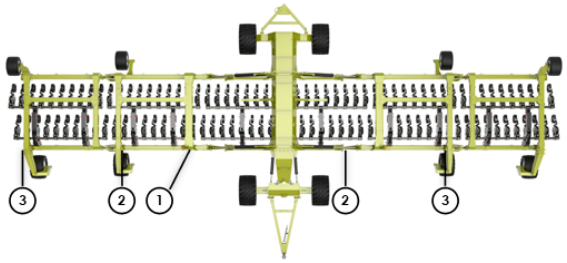


Figure 2.8 Five-Section Double Disc Drill

Tow behind & tow between

The Spyder drill will work with most air carts in a tow-between or two behind configuration. They are not interchangeable without some additional components. Please review a potential cart configuration with your dealer and K-Hart to ensure the cart will properly interface, proper hitch configurations and hydraulic line configurations. K-Hart uses 2 1/2” primary lines as a standard configuration with the ability to connect to aircarts with 3" seed delivery hoses.

2.3 Specifications

2.3.1 Transport Height and Weight

Table 2.1 MY2024 Spyder Specifications.

Size	Spacing	Height	Width	Weight	
				NON-IRC	IRC
40 ft (12.19 m)	7.5 in. (190.50 mm)	16 ft. 0 in. (4.88 m)	19 ft. 2 in. (5.84 m)	43500 lbs	51800 lbs
40 ft (12.19 m)	8 in. (203.20 mm)	16 ft. 0 in. (4.88 m)	19 ft. 2 in. (5.84 m)	42604 lbs	50551 lbs
40 ft (12.19 m)	10 in. (254.00 mm)	16 ft. 0 in. (4.88 m)	18 ft. 8 in. (5.69 m)	40100 lbs	47100 lbs
60 ft (18.29 m)	7.5 in. (190.50 mm)	15 ft. 11 in. (4.85 m)	19 ft. 8 in. (5.99 m)	63100 lbs	75300 lbs
60 ft (18.29 m)	10 in. (254.00 mm)	15 ft. 11 in. (4.85 m)	19 ft. 8 in. (5.99 m)	58000 lbs	68500 lbs
60 ft (18.29 m)	12 in. (304.80 mm)	15 ft. 11 in. (4.85 m)	19 ft. 8 in. (5.99 m)	55500 lbs	64900 lbs
66 ft (20.12 m)	7.6 in. (193.04 mm)	17 ft. 9 in. (5.41 m)	19 ft. 7 in. (5.97 m)	66100 lbs	79200 lbs
66 ft (20.12 m)	9 in. (228.60 mm)	17 ft. 9 in. (5.41 m)	19 ft. 7 in. (5.97 m)	62660 lbs	74500 lbs
66 ft (20.12 m)	9.9 in. (251.46 mm)	17 ft. 9 in. (5.41 m)	19 ft. 7 in. (5.97 m)	60958 lbs	72183 lbs
66 ft (20.12 m)	12 in. (304.80 mm)	17 ft. 9 in. (5.41 m)	19 ft. 7 in. (5.97 m)	58000 lbs	68200 lbs
74 ft (22.56 m)	7.9 in. (200.66 mm)	18 ft. 6 in. (5.64 m)	24 ft. 2 in. (7.37 m)	70000 lbs	83900 lbs
74 ft (22.56 m)	10.09 in. (256.29 mm)	18 ft. 6 in. (5.64 m)	24 ft. 2 in. (7.37 m)	64900 lbs	77000 lbs
74 ft (22.56 m)	12.33 in. (313.18 mm)	18 ft. 6 in. (5.64 m)	24 ft. 2 in. (7.37 m)	61480 lbs	75350 lbs

2.3.2 Tire Sizes

Table 2.2 Tire Sizes

Tire Location	Tire Size
Main Frame Center High Capacity Tires	850/50R30.5
Main Frame Standard Capacity Tires	710/50R26.5
Front Wing Castor Tires	560/45R22.5
Rear Wing Tires	480/45R17

2.3.3 Toolbar Specifications

Table 2.3 Toolbar Specifications

Component	Configurations
Seed Double Disc Sizes	17" Large Disc 15" Small Disc
IRC Double Disc Sizes	17" Both Sides
Seed Opener Depth	1/2" to 3" Deep
IRC Depth	2" to 4" Deep
Seed Row Spacing	7.5" to 12" Row Spacing Configurations
IRC Row Spacing	15" to 24" Row Spacing Configurations

2.3.4 Tire Pressure Guide

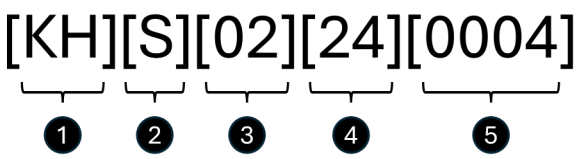
Table 2.4 Tire Pressure

Wheel	Field PSI	Transport PSI
Front Castor	25	25
Inner Rear Wheels	25 (Dual Option Available)	25
Outer Rear Wheels	70 (Required for Folding/Unfolding)	70
Center High Capacity	35 (Max Transport Seed 15 MPH)	52 (Max Transport Speed 30 MPH)
Center STD Capacity	35 (Max Transport Seed 15 MPH)	52 (Max Transport Speed 30 MPH)

2.4 Machine Identification

The serial number plate (A) is located on the left-hand side of the front fame.

Serial Number Nomenclature



1. Company Name (K-Hart)
2. Product Name (S for SPYDER, R for RAPTOR, etc.)
3. Model Series (01, 02, 03, etc.)
4. Model Year (23, 24, 25, etc.)
5. Machine Number (0001, 0002, 0003, etc.)

Figure 2.9 Serial Number Plate Location

Table of Contents

3.1 Introduction

3.1.1 Controller Functions and Display Navigation

The K-Hart Spyder display (Included) comes with a variety of RAM mounts to allow the farmer to locate the display in the best and most efficient location in the cab. The display is touch screen (The soft touch buttons at the bottom are not functioning).

NOTE: The operator will use the screen for most programming changes and can use the additional keypad (3"x 5") for most in-field functions (raising/lowering, hitch lock, quick gang pressure adjustment).

It is recommended to locate the display in an easy to reach location to the right of the operator and the key pad as close as possible to the operators right hand tractor console.

3.1.2 Display Harness

The display harness has four connectors on the display end. The large square one plugs into the back of the display. The triangular connector with the cap is the interface for software updates. The small rectangular male plug connects to the keypad. The fourth, capped connector is a capped resistor. The other end of the harness has a large round male plug that connectors to a T off the ISO harness that comes from the drill to the tractor. The "T" on the ISO harness is approximately 3 feet back from the ISO connection that goes on the tractor. This connection provides power to the display, and is the communication link to the Spyder's control ECU.

3.2 Connecting the Drill to the Tractor

Before starting the procedure

WARNING

The drill must be connected to a tractor that is the correct size to operate the drill. Failing to do so can cause significant damage to the tractor or the drill during field operation.

Procedure

1. Ensure tractor's swinging drawbar is locked in the center position and hitch pin is in a good condition and correctly sized for the drawbar and implement.
2. Use the hitch jack (A) on the front hitch of the drill to adjust the height of the hitch. Adjust the height of the hitch on the drill until the hitch on the drill is at the same height as the hitch on the tractor.

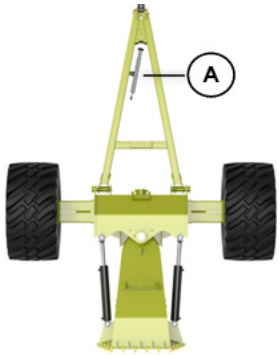


Figure 3.1 Front Hitch

DANGER

Make sure there are no people, pets or obstructions between the tractor and the drill.

3. Slowly reverse the tractor toward the hitch of the drill. Align the hitch on the tractor with the hitch on the drill when backing.
4. Stop the tractor when the hole of the tractor hitch aligns with the hole in the drill hitch. Stop the engine, set the park brake.

5. Install the hitch pin (B) through the holes in the tractor draw bar (C) and drill hitch (D). Install the keeper pin (E) in the hitch pin.

NOTE: Ensure the pin matches the tractor and the articulating implement hitch**.**

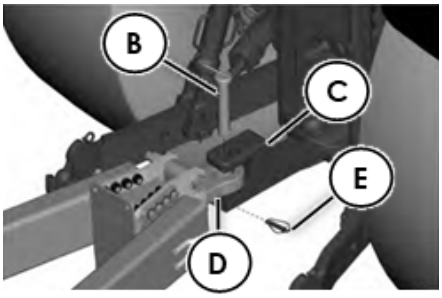


Figure 3.2: Hitch Pin and Keeper Pin

6. Connect the safety chains from the front hitch of the drill to the tractor.

NOTE: Provide only enough slack in chain to permit turning**.**

7. Retract the hitch jack and return to storage position (A).

NOTE: In some instances, especially in a Tow-Between Cart Configuration, the drill's safety chain may not be heavy enough for the entire weight of the implement train behind the hitch point. In this case, obtain a properly sized safety chain for the weight being towed by the tractor.

8. Remove the wheel chocks or blocks from tires.

Hydraulic and electrical connections

1. Inspect all fittings and hoses for leaks and kinks.
2. Clean the ends of the hydraulic connections on the drill and the tractor to ensure they are dirt free.

IMPORTANT! Dirt in the hydraulic system could damage O-rings, causing leakage, pressure loss and total system failure.

3. Make the following connections between the tractor and the drill.

   Opener down pressure hydraulic hoses (Green) (F)

   Wing fold/unfold hydraulic hoses (Blue) (G)

   ISO Harness to the tractor.

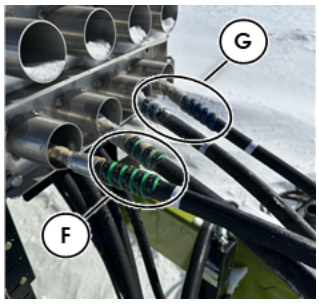


Figure 3.3: Hydraulic Connections

NOTE: Hydraulic lines are marked for which circuit is for extension or retraction.

There are 3 T-extension harnesses near the front of the drills ISO harness. One is for the display harness. Another is for aux power for Agtron. Also, there is the work switch connection.

For tow behind

- There will be two or four 3/4" hydraulic lines for the cart. They are color coordinated to match the hoses on the rear hitch manifold to connect to the cart.
- There will be a low pressure case drain. Depending on your tractor, you may need to change this fitting.

NOTE: Whatever case drain you choose, please ensure they are low pressure, otherwise you risk damaging the seal on your fan motors.

- John Deere configuration includes additional lines for the meters (power beyond).
- Vaderstad configuration includes two additional 1/2" lines for the cart's on-board generator.
- Auxiliary lines for other customer requested options.

NOTE: Bourgault carts are not compatible with the ISO cross tillage harness. Customers will need to supply and install their own cross tillage harness and potentially their brake and camera harnesses.

- 7 Pin connector—the 7 pin connector transmits signals for flasher, brakes, signal lights and lights to drill and cart, plus auxiliary power to the cart.
- Blockage—For Agtron systems, the ECU/ Router gets its power from one of the T-extension harnesses found near the front of the drills ISO harness.

NOTE: The router continually transmits, so it is recommended to unplug this connection if you are shutting down the tractor for more than one day to avoid draw down of the tractors batteries.

- Intelligent Ag—The ECU and gateway require 12v and switched key power from the tractor. The Tractor Harness (353050-000100) will need to be connected to the tractor. This connector does not need to be unplugged once connected correctly.

3.3 Unhitching from Tractor

NOTE: Lower the wings for storage when possible.

Procedure

1. Turn off tractor ignition and engage parking brake before exiting the cab.
2. Pin hitch jack in vertical position.
3. Ensure all transport locks are properly secured.
4. Extend hitch jack taking the weight off the hitch clevis.
5. Disconnect the hydraulic hoses.
6. Remove the safety chain.
7. Remove the draw bar pin.
8. Slowly move tractor away from Spyder.

3.4 Prepare the Drill for Transport

Procedure

1. With the tractor engine on, lift openers to full up position (Refer to 3.7 Fold Operations). **Do not walk under raised wings.**
2. Extend the service mode cylinders completely to put the rear of openers in service position.
3. Raise the wings fully until they are resting against the wing stops on the center spine.
4. Turn off tractor engine, put in park.
5. Install wing lift pins.
6. Ensure safety chain is properly installed (Refer to Figure 3.4).
7. Return to the tractor cab and start the engine.
8. Navigate to the Hitch control page and activate Unlock Mode Operation (Refer to 3.11).
9. Remove the tractor park break.

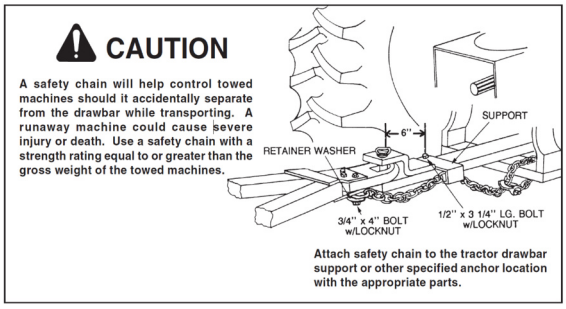


Figure 3.4 Proper Safety Chain Attachment

3.4.1 Transport

Refer to 2.3 for weight, transport height and width. Be familiar with and adhere to local laws.

Observe all applicable safety precautions in 1.4.

Procedure

- Always use safety lock pins on wings and center section opener lift linkage when transporting.
- Always connect the proper sized safety chain to the towing vehicle and the hitch of the seed cart. Safety chains must be used at each pin connection.
- Always connect a proper sized safety chain between the drill and any other implements being towed by the rear seeder hitch.
- Inspect tires for any serious cuts or abrasions. If such has occurred, tire should be replaced.
- Ensure proper reflectors are in place and that all safety lights are working properly, refer to 1.10.
- Transport with tractor only. The weight of the implement being towed must not exceed 1.5 times the weight of towing vehicle. Unless implements are equipped with properly sized brakes for the weight of the implement.
- Only tow at safe speeds. Do Not Exceed 32 km/h (20 mph).
- During the first few hours of transporting or use, make sure that the wheel bolts on the main center frame and the wings are tightened after the first 5 km and then after the next 10 km and the next 20 km. After the initial use, check wheel bolts every 40 hours of operation.

3.5 Machine Settings and Configurations

IMPORTANT: Before the first use of the Spyder, you will need to complete an initial configuration setup of the Implement Controller using the in-cab monitor that include the specifications of the unit. Accurate configuration settings are required to ensure the proper functionality of all systems.

Setting unit configurations - General

A: Brand of Air Cart drop-down list

B: Width of implement frame drop-down list

C: Opener spacing configuration

D: Implement IRC enable/disable button

E: Work switch settings (available with software and hardware upgrade)

F: Status Bar Area

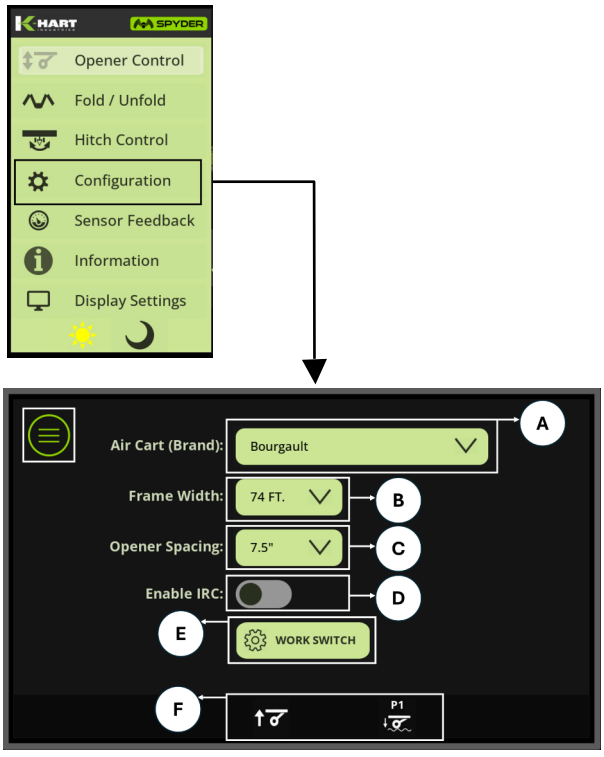


Figure 3.5 Configuration Set-up Page

Procedure

1. Ensure the connection is set up correctly (This warning appears if connection between cab and the implement controller is lost Figure 3.6).

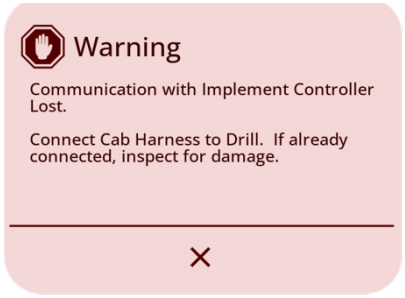


Figure 3.6 Implement Controller Communication Lost Warning.

2. Turn tractor key power on.
3. Press Main menu button.
4. Press Configuration button (Figure 3.5).
5. Select Air Cart (Brand) from the drop-down list (A), if your brand is not on the list choose any.
6. Select Frame Width from drop-down list (B).
7. Select Opener Spacing configuration from the drop-down list (C).
8. If your drill is equipped with IRC, selecting Enable IRC (D) will cause the IRCs to raise and lower along with the openers. De-selecting Enable IRC will keep the IRCs in the air no matter the position of the openers.

3.6 Fertilizer Bander Attachment

The optional fertilizer bander attachment (Section 2.1.1) referred to as "Inter Row Coulters, or IRCs" applies granular or liquid fertilizer between the two furrows that are made by the opening disc assemblies. The fertilizer bander attachment is installed forward of the opening disc assemblies across the front of the machine.

NOTE: The liquid boot and liquid kit are two optional upgrades that need to be ordered separately and installed in order to use liquid fertilizer on the IRC.

3.6.1 Enabling IRC's

1. Navigate to the configuration screen (Figure 3.5).
2. Select IRC Enable (D) and click the toggle to enable it.
3. This will allow IRC's to lift and lower along with Opener Control.

3.6.2 Disable IRC's

1. Navigate to the configuration screen (Figure 3.5).
2. Select IRC Enable and click the toggle to disable it.
3. This will keep the IRCs in the air no matter the position of the openers.

IMPORTANT: Remember to disable your IRC's in the raised position otherwise they will remain lowered position when you lift your openers.

3.7 Fold Operations

DANGER

The Fold Operations are a critical aspect of setting up and transitioning the Spyder Disc Drill between storage, transport and field positions.

Before initiating the fold or unfold operation of your Spyder Disc Drill, it is crucial to conduct a series of essential steps and checks to ensure a safe and smooth transition. Failing to do so may result in accidents, damage to the equipment, or operational disruptions.

- Raise and lower wings on **level ground.**
- Never raise or lower wings when moving.
- **Do not** walk under wings when raised.

3.7.1 Fold/Unfold Navigation Page

All fold operations are controlled from Fold / Unfold page the implement controller. The Spyder drill can fold and unfold either automatically or manually (in case of a sensor failure). This section includes a detailed explanation of the procedure involved in four types of fold operations.

Fold/Unfold control page navigation

A: Fold button

B: Unfold button

C: Cancel fold

D: User instructions area

E: System Notifications

F: Status Bar Area

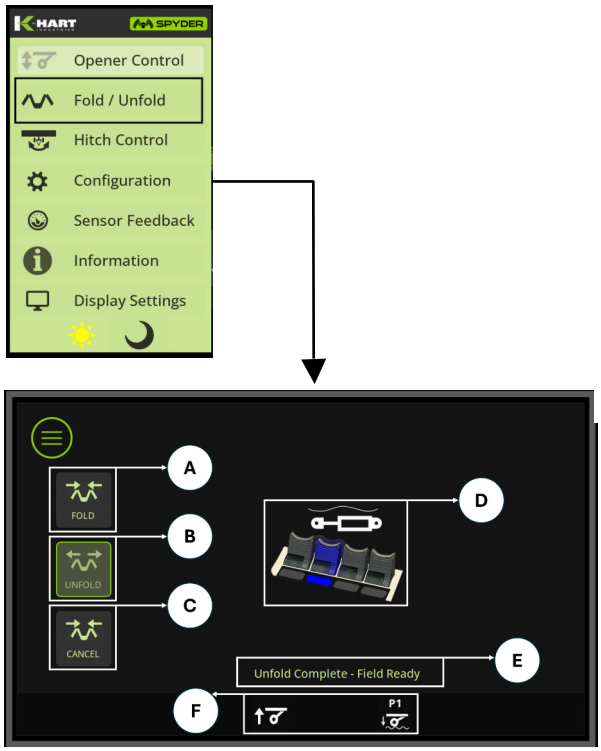


Figure 3.7 Fold/Unfold Control Navigation Page

3.7.1.1 Automatic Unfold

Procedure

1. Navigate to Fold / Unfold control page (Figure 3.7).
2. Set Hydraulic Circuit to Extend.

NOTE: Fold and unfold requires opposite hydraulic flow.

NOTE: In case of an Incorrect Hydraulic Activation Direction, you'll receive a Warning in Figure 3.8.

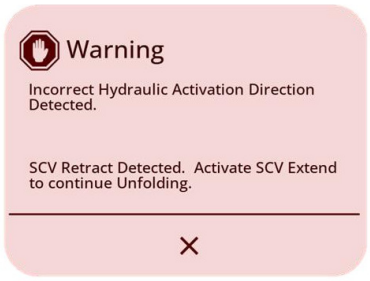


Figure 3.8 Incorrect Hydraulic Activation Warning

3. Select UNFOLD (B) button.
4. Caution will appear to remind you if the Wing Lock pins are removed (Figure 3.9)

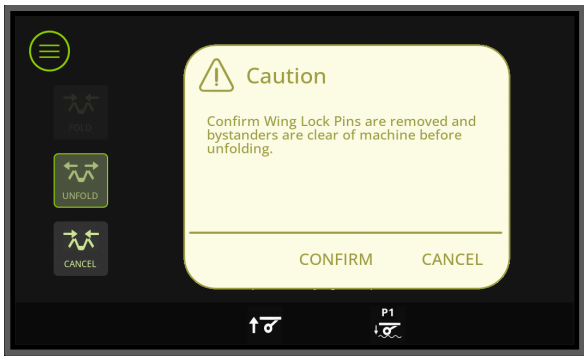


Figure 3.9 Wing Lock Pins Removal Caution

5. Wait until the unfolding sequence is complete.

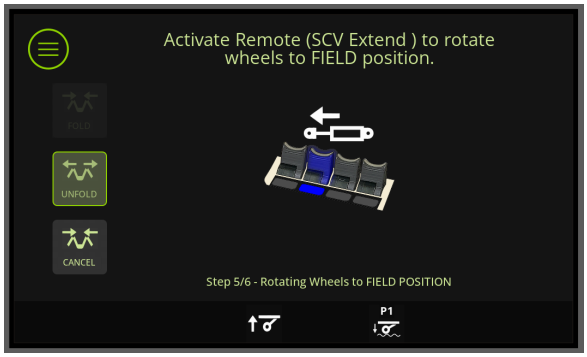


Figure 3.10 Step 5 of Unfolding Page

6. Upon completion you'll receive a pop up to put folding remote into float.

Figure 3.11 Unfolding Completion Warning Message

7. After Confirmation you'll see the "Unfold Complete – Filed Ready" in the system notifications area (A).

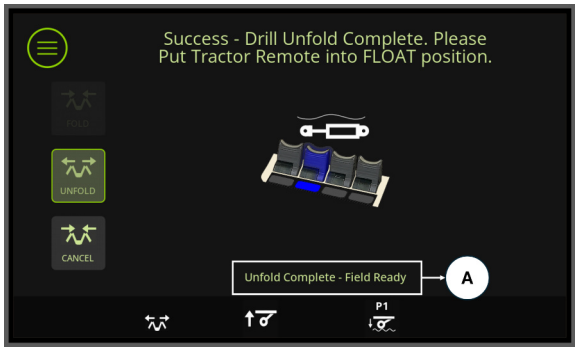


Figure 3.12 Drill Unfold Complete Notification

IMPORTANT: The wing fold circuit is to be set in float for field use. Failure to put in float can cause damage to wing cylinders.

8. Place the rear rank according to the desired operating mode of Service or field (More info on rear rank operation in Section 3.9).

Manual Unfold Procedure

If a sensor issue is detected, the operation will be stopped and a prompt on the monitor will instruct the user on how to perform a manual unfold. If replacement sensors are required, contact your K-Hart dealer.

If a sensor is inoperative, the system allows the operator to manually unfold the drill.

The process is similar to automatic unfolding but includes additional confirmation steps after pressing the UNFOLD button.

1. Follow the on-screen prompts to safely unfold the SPYDER drill by pressing OK.

Figure 3.13 Manual Unfolding Page

2. In the event of a sensor failure, the operator must ensure the front wheels are in contact with the ground before proceeding with unfolding. After checking confirm or cancel the caution.

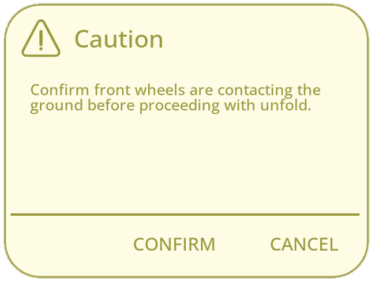


Figure 3.14 Front Wheel Contact Confirmation Warning

Then, follow the instructions for automatic unfolding as described before, since the process will be similar.

IMPORTANT: Ensure the folding cylinders are fully extended so the rod end is ½ way in the slot. This allows full travel of wing members in uneven terrain. Not fully extending cylinders will cause stress on frames and cylinders and may damage your equipment.

3.7.1.2 Automatic Fold

Procedure

1. Navigate to the Opener Control page and lift openers to the full up position. (Follow instructions on 3.8 for more details on opener control).
2. Place the rear bank into Service position (Follow instructions on 3.9 for more details on rear opener rank control).

IMPORTANT: Failing to put the openers into Service Mode will cause damage to your fold-away seed towers on some sizes of drill.

3. Navigate to Fold / Unfold control page (Figure 3.16).
4. Set Hydraulic Circuit to Retract.

NOTE: In case of an Incorrect Hydraulic Activation Direction, you'll receive a Warning on Figure 3.15.

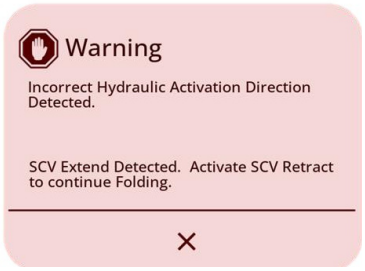


Figure 3.15 Incorrect Hydraulic Activation Warning

NOTE: Fold and unfold require opposite hydraulic flow.

5. Select FOLD (A) button.

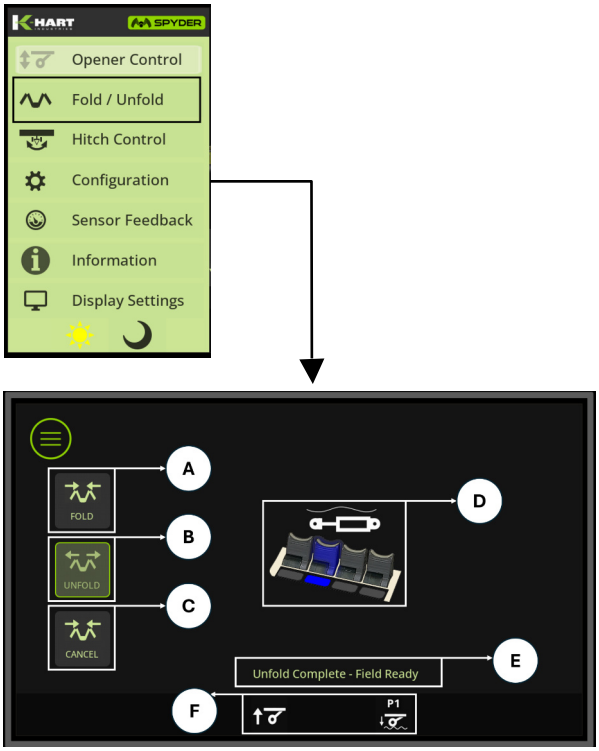


Figure 3.16 Fold/Unfold Control Navigation Page

NOTE: A popup warning will appear if the openers are not lifted and/or in service mode before folding (Figure 3.17).

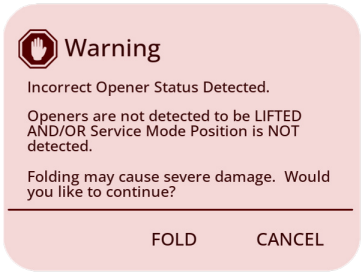


Figure 3.17 Warning on Openers Status

6. Confirm all openers are fully in the UP position.

NOTE: A warning will appear if it is not put in the service mode (Figure 3.18).

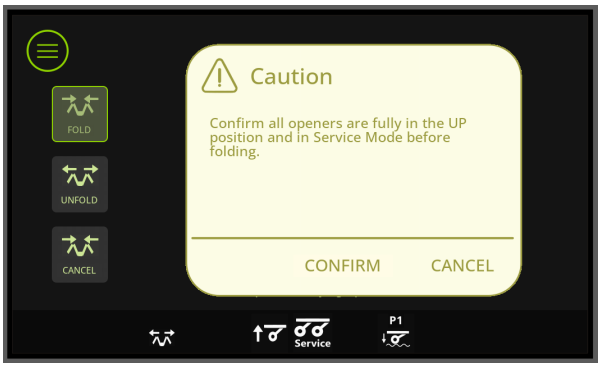


Figure 3.18 Openers Status Confirmation

NOTE: If your drill is equipped with IRCs, you will receive this popup instead.

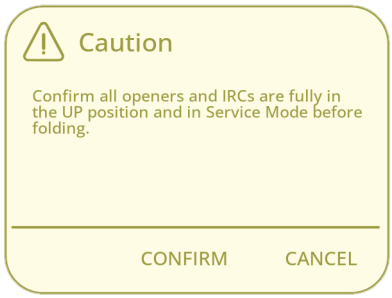


Figure 3.19 Openers and IRCs Status Confirmation

7. Wait until the folding sequence is complete.

Figure 3.20 Step 5 of Folding Page

8. Upon Completion you'll receive a pop up to confirm Wing Lock Pins are engaged.

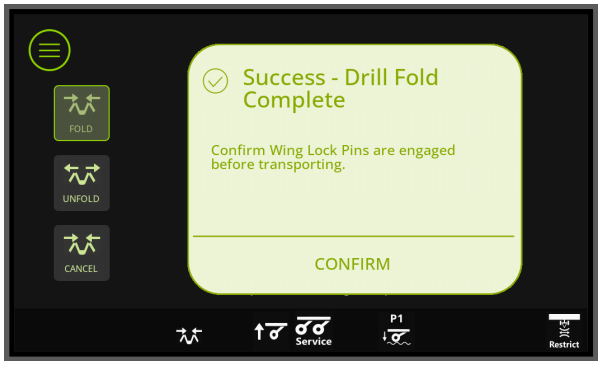


Figure 3.21 Drill Fold Complete Pop Up

9. Set Hydraulic Circuit to Neutral.
10. Install Wing Lock Pins (Follow instructions in section 3.14 on how to install Lock Pins).
11. Install Service mode and Opener Lift Linkage Locks for transport for more details on gang locks (Follow instructions in section 3.14 on how to install Lock Pins).

Manual Fold Procedure

If a sensor issue is detected, the operation will be stopped and a prompt on the monitor will instruct the user on how to perform a manual fold. If replacement sensors are required, contact your K-Hart dealer.

If a sensor is inoperative, the system allows the operator to manually fold the drill.

The process is similar to automatic folding but includes additional confirmation steps after pressing the FOLD button.

- Follow the on-screen prompts to safely fold the SPYDER drill by pressing OK.

Figure 3.22 Manual Folding Page

Then, follow the instructions for automatic folding as described before, since the process will be similar.

NOTE: Any folding operation can be canceled at any time by clicking the CANCEL (C) folding operation (Figure 3.23). If a fold operation is canceled, a complete fold operation must be completed safely to ensure that the drill is in an acceptable operation or transport state.

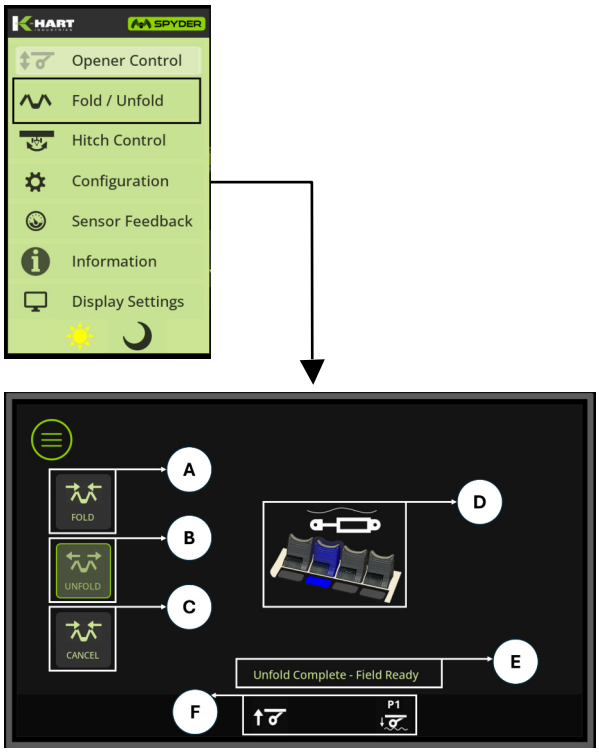


Figure 3.23 Fold/Unfold Control Navigation Page

3.8 Opener Control Page

Console opener control display

A: Display side menu button

B: Lift openers button

C: Lower openers button

D: Service mode activate toggle

E: Field mode activate toggle

F: Opener Down Pressure Preset

G: Status bar area

H: Current Down Pressure

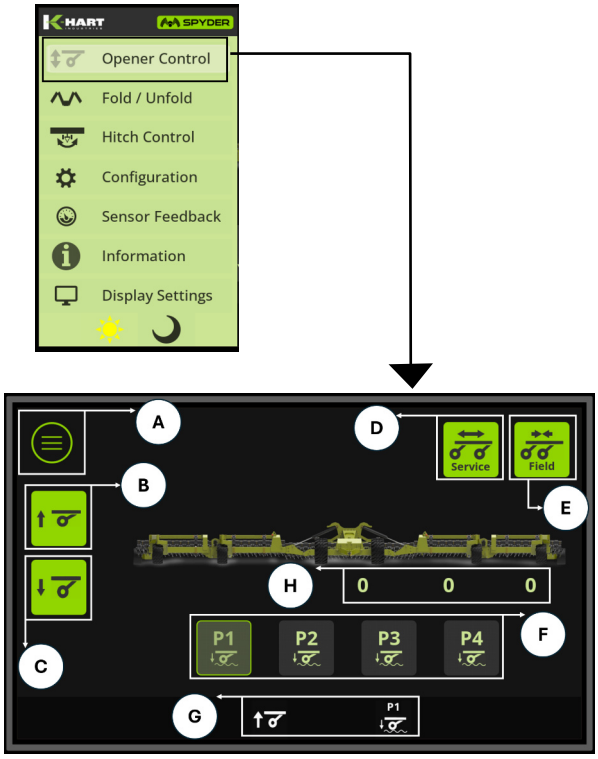


Figure 3.24 Opener Control Display

Opener control keypad

J: Toggle hitch control mode

K: Toggle lock/unlock hitch

L: Down pressure preset select buttons

M: Lift openers button

N: Lower openers button

Figure 3.25 Opener Control Keypad

3.8.1 Lowering Openers

Follow this procedure to run lower opener operation from the console display.

NOTE: Remove Opener Lift Linkage Pins before lowering openers (Instructions in section 3.14).

1. Set Opener Lift/Lower Hydraulic Circuit to Retract (continuous flow).
2. Navigate to the Opener Control page (Figure 3.26).
3. Put the mode of operation to Field (E).

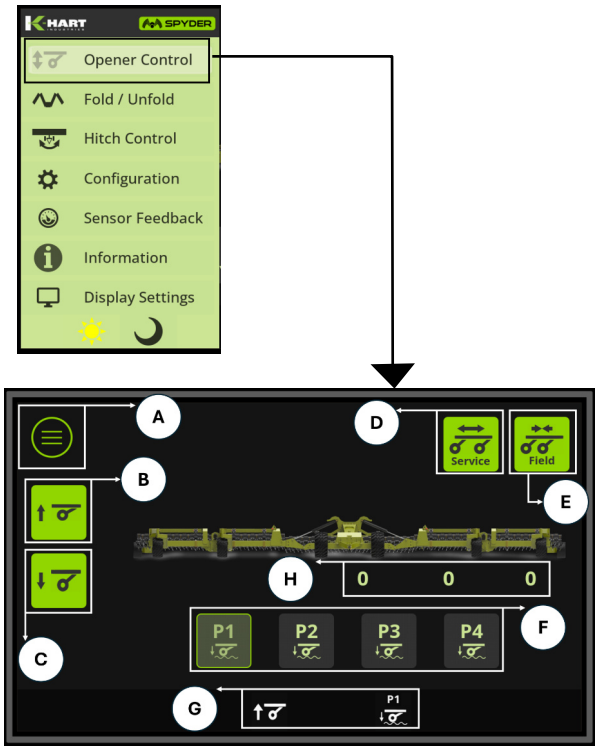


Figure 3.26 Opener Control Display

NOTE: In case you attempt to lower openers while in Service mode a warning would appear (Figure 3.27). In order to avoid that make sure to put the operation mode in the Field.

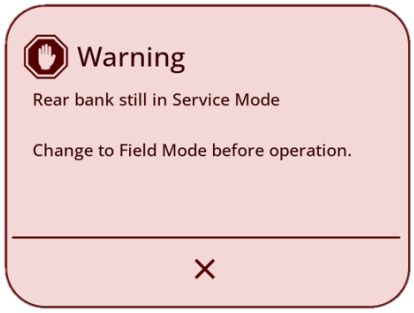


Figure 3.27 Rear Rank Status Warning

4. Press Lower openers button (C) to Lower Openers to full down position (Figure 3.26) or N on the Keypad.
5. For cancellation you can press Lower openers button again to pause the lower operation at any time.
6. The hydraulics are left in continuous flow while in field operation. They provide gang pressure adjustability and allow the operator to lift and lower in the field.

3.8.2 Lifting Openers

Follow this procedure to run the lift opener operation from the console display.

1. Set Opener Lift/Lower Hydraulic Circuit to Retract.
2. Navigate to the Opener Control page (Figure 3.26).
3. Press B to Lift Openers to full up position (Fig 3.26) or M on the keypad.
4. For cancellation you can press B (Figure 3.26) again to cancel lifting operation at any time.
5. Set Opener Lift/Lower Hydraulic Circuit to Neutral if servicing the machine.
6. Install Service Mode and Opener Lift Linkage Lock Pins if servicing the machine.

3.9 Service Mode

3.9.1 Alter Rear Rank Position

The rear Rank of the SPYDER can be moved into a **Service** and **Field Mode** position. The rear rank should be placed in **Service Mode** for two primary reasons:

1. When folding and unfolding the openers must be in **Service Mode** (The display will remind you each time you fold or unfold).
2. Allow for more room to service the openers.

3.9.2 Entering Rear Rank into Service Position

1. Set Opener Lift/Lower Hydraulic Circuit to Retract.
2. Navigate to the Opener Control page (Figure 3.26).
3. Press Lift openers (B) to the full up position
4. Select Service button (D).

NOTE: In case the openers are not in a full up position before moving into the service mode a warning will appear to lift openers (Figure 3.28).

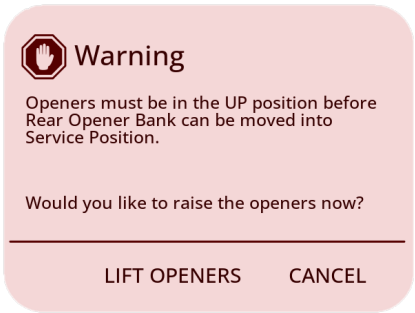


Figure 3.28 Rear Opener Bank Service Position Warning

5. Wait until the rear rank is fully transitioned into a Service Mode position (Appears on the status bar Section 3.13).
6. Ensure Opener Lift/Lower Hydraulic Circuit is neutral.
7. Install pins in the rear rank (Section 3.14 on how to install Lock Pins).

3.9.3 Exiting Rear Rank out of Service Position

1. Ensure the Opener Lift/Lower Hydraulic Circuit is neutral.
2. Uninstall pins in the rear rank.
3. Put the hydraulic in retract
4. Navigate to the Opener Control page (Figure 3.26).
5. Select Field Mode to move out of Service mode.

NOTE: Exiting service mode is not possible if the openers are sagging. The openers must be raised, and the warning addressed before leaving service mode (Figure 3.29).

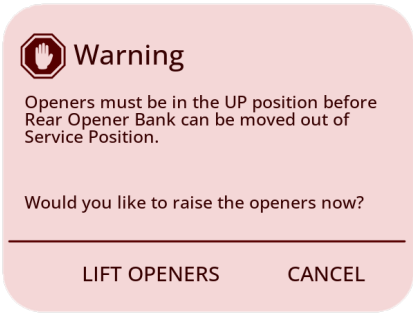


Figure 3.29 Rear Opener Bank E Service Position Warning

6. Wait until the rear rank is fully transitioning out of Service Mode position it will appear in the status bar (Appears on the status bar Section 3.13).
7. Ensure Opener Lift/Lower Hydraulic Circuit is neutral.

3.10 Selecting a Down Pressure Preset

Presets P1, P2, P3, and P4 are all selectable through the display and the K-Hart Keypad.

3.10.1 Activating a Down Pressure Preset

1. Navigate to the Opener Control page (Figure 3.30).

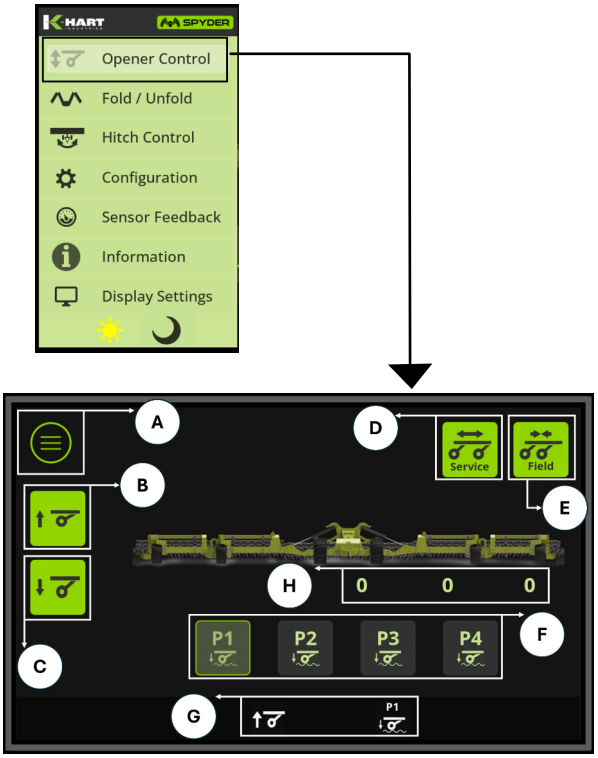


Figure 3.30 Opener Control Display

2. Select the Preset to apply (Preset P1, P2, P3, or P4) by pressing the corresponding toggle.
3. Change applied Preset by selecting another preset option toggle.
4. Active Preset will be displayed by means of a highlighted green button in both display and keypad.

3.10.2 Adjust Down Pressure Page

NOTE: Access the screen to adjust any of the presets, P1 through P4, by pressing and holding that specific preset selection button on the opener control page for 5 seconds.

Console preset adjustments settings

A: Reset button

B: Center section down pressure

C: Inner wings down pressure adjustment

D: Outer wings down pressure adjustment

E: Adjustment indicator graphics

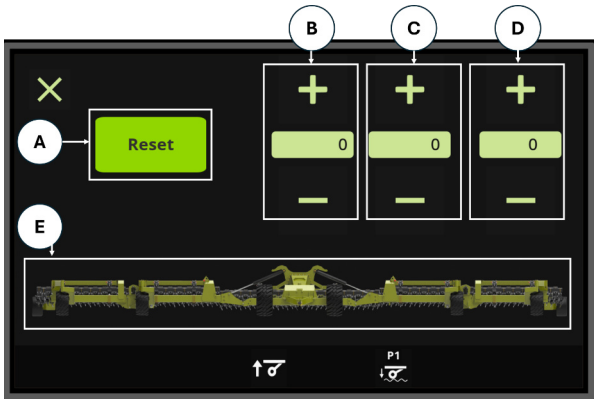


Figure 3.31 Down Pressure Preset Setting

3.10.3 Down Pressure Adjustment

Each SPYDER Drill is divided into three control sections (Center, Inner and Outer). Each control section can have their down pressure setting altered independently. There are three types of down pressure adjustments that can be made by the user:

1. Increase Down Pressure Setting
2. Decrease Down Pressure Setting
3. Value Select Down Pressure Setting

Drills less than 60’ wide are divided into two control sections Center and Outer (Figure 3.32).

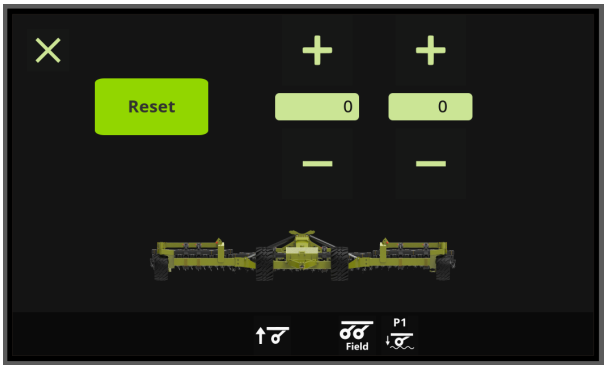


Figure 3.32 Down Pressure Preset Setting for Drills less 60’

The total range of adjustments for the down pressure setting is 0-100%.

Increasing the Down Pressure Setting can be achieved by activating the plus buttons.

Decreasing the Down Pressure Setting can be achieved by activating the minus buttons.

The Down Pressure can be adjusted by manually entering the values through the green value bar (Figure 3.33).

Figure 3.33 Manual Adjustment of the Down Pressure

NOTE: On each adjustment page, the SPYDER graphic will highlight to which control section the adjustment is being applied to.

3.10.4 Resetting a Down Pressure Setting

On each Preset Adjustment Page and Manual Adjustment Page, the Reset button will change each control section’s settings back to factory default (50%).

3.11 Hitch Control Page

Console hitch control display and keypad

A: Lock hitch hydraulic cylinders

B: Unlocked hitch hydraulics control mode

C: Skew hitch control mode

D: Restriction hitch control mode

E: Unlock mode button

F: Lock hitch button

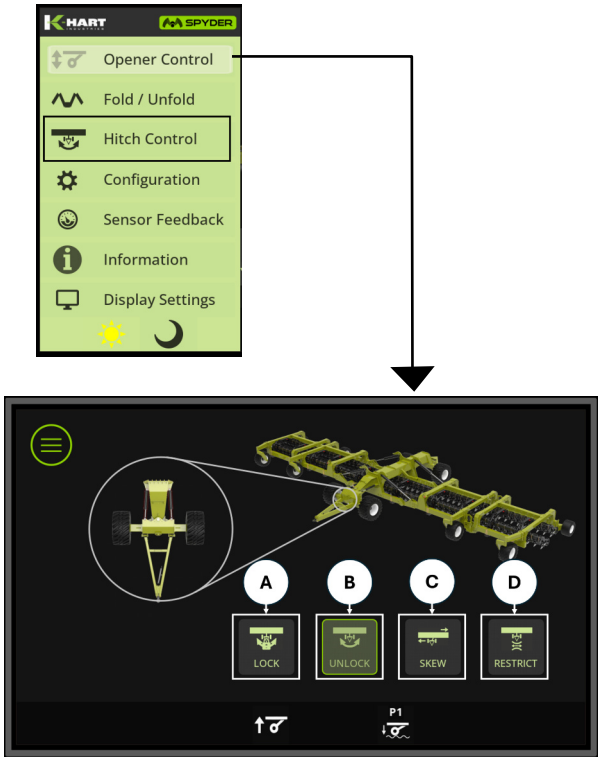


Figure 3.34 Hitch Control Display

Figure 3.35 Hitch Control Keypad

3.11.1 LOCK Hitch Mode Operation

- LOCK Hitch Mode increases the restriction of the hitch cylinders to 100%, essentially preventing the hitch from rotating.
- Locked Hitch Mode is most useful in instances of extreme pitch / downhill trajectory of the drill and when backing the drill into tight locations.

3.11.2 UNLOCK Hitch Mode Operation

- UNLOCK Mode decreases the restriction of the hitch cylinders to 0% essentially allowing the hitch to rotate freely.
- UNLOCK Mode is most useful while transporting the drill to and from the field as well as when operating the drill on flat ground where the other modes of operation are not required.

3.11.3 SKEW Mode Operation

- Skew mode is utilized to proportionally offset your hitch angle based off the detected side hill angle of the SPYDER drill. Skew Mode is most useful in instances while operating the drill on consistent side hills with very minimal pitch variation.
- The examples in Table 3.1 outline how the Skew Aggression Setting and the Detected Sidehill Angle change the position of the hitch.

3.11.4 RESTRICT Mode Operation

- RESTRICT Mode partially limits the rotation of the hitch by applying a controlled restriction to the hitch cylinders.
- This mode is useful when some degree of hitch movement is needed, but excessive rotation must be prevented, such as in moderate slopes or uneven terrain where full LOCK or full UNLOCK is not ideal.

3.11.5 Switching between Hitch Control Mode (Display)

1. Navigate to the Hitch Control page (Figure 3.34).
2. Select the desired control mode by pressing the desired mode's toggle button on the display.
3. Change applied active mode by selecting another mode's toggle.
4. The active button will be highlighted green.
5. The default mode is UNLOCK.

3.11.6 Lock/Unlock Hitch Mode (Keypad)

1. Utilize the Locked Hitch Mode button on the keypad to switch between the Lock and Unlock Hitch Mode.
2. The active button will be highlighted green.

Table 3.1 Effect of Skew Aggression and Sidehill Angle on Hitch Position.

Skew Mode\Examples	Example 1	Example 2	Example 3
Skew aggression setting	0.5	1.0	0.5
Detected Side hill Angle	6°(Direction #1) -6° (Direction #2)	6°(Direction #1) -6° (Direction #2)	12°(Direction #1) -12° (Direction #2)
Target hitch position (Direction #1)	25% (Left)	50% (Left)	50% (Left)
Target hitch position (Direction #2)	-25% (Right)	-50% (Right)	-50% (Right)

3.11.7 Altering Skew/Restriction Setting

1. Navigate to Hitch Control page (Figure 3.36).

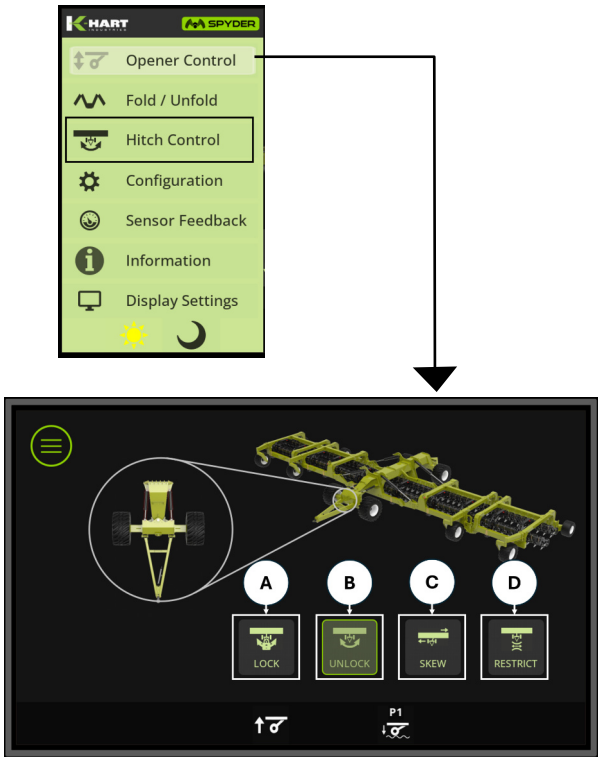


Figure 3.36 Hitch Control Display

1. To adjust the Skew Mode Agressiveness press and hold "C" for 5 seconds to enter the adjustment page. Select a skew agressiveness using the slider (from 0 to 1) (Figure 3.37 & 3.38).

Figure 3.37 Skew Adjustment Page

Figure 3.38 Restrict Adjustment Page

3. Adjust the Setting using the Slider Bar from 0 to 1 (most aggressive Skew/Restrict).

4. To adjust the amount of resistance to turning in the hitch, press and hold "D" to get to the resistance settings screen. Use the top slider to adjust the resistance to hitch turning on sidhills from 0-1 (0-100%). Use the bottom slider to adjust the resistance to hitch jackknifing on downhill slopes from 0-1 (0-100%).

5. Exit the Skew/Restrict Mode Adjustment Page by pressing the close button.

NOTE: The Reset button will change the setting back to factory default (0) and automatically save the default into memory.

3.12 Sensor Feedback Page

The Sensor Feedback page can be used for basic troubleshooting and knowledge about the performance of the SPYDER drill. The following information is provided on the Sensor Feedback page.

- millivolt (mV) for each corresponding hydraulic circuit control Figure 3.39 (1).
- Hydraulic pressure (PSI) detected for each corresponding hydraulic circuit Figure 3.39 (2).
- Active opener and service sensor numbers Figure 3.39 (3).
- Percent difference your hitch is currently off center from perfectly straight Figure 3.39 (4).
- Angled Degree detected by each inclinometer Figure 3.39 (5).
- Inclinometer connected or disconnected (Green = Connected, Red = Disconnected).

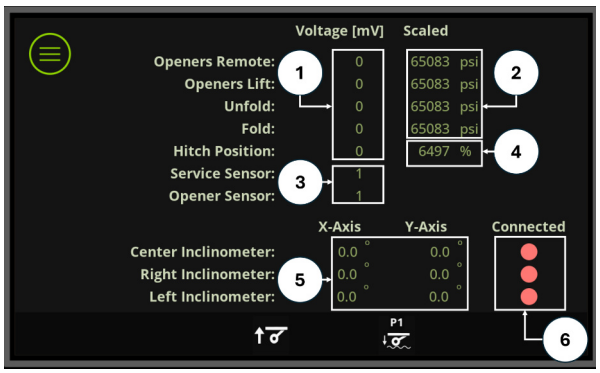


Figure 3.39 Sensor Feedback Page

3.13 Status Bar Area

Status Bar (A) displays icons that provide real-time updates and information about the drill's operation.

Figure 3.40 Status Bar Area

This icon is displayed when the drill is in Restrict Hitch Mode and after the folding process is complete.

This icon is displayed when the drill is in Skew Hitch Mode.

This icon is displayed when the drill is in Unlocked Hitch Mode.

This icon is displayed when the drill is in Locked Hitch Mode.

This icon is displayed when the Down Pressure Preset Adjustment is set at P1. Similar icons will be shown when presets P2-P4 are active.

This icon is displayed when the rear opener bank is in Field Mode.

This icon is displayed when the rear opener rank in Service Mode.

This icon is displayed when the openers are in the up position.

This icon is displayed when the openers are in the lower position.

This icon is displayed when the drill is folded.

This icon is displayed when the drill is unfolded.

3.14 Location of Lock Pins

1. Two pins located just off the center spine to lock both inner and outer wings to be used during transport (1).

Figure 3.41 Location of Wing Lock Pins

2. The Opener Lift Linkage Lock Pins are located on every opener linkage arm near the lower front of the linkage and only lock the front row of seed openers from coming down (2).

NOTE: Locked position is bottom and unlocked on top.

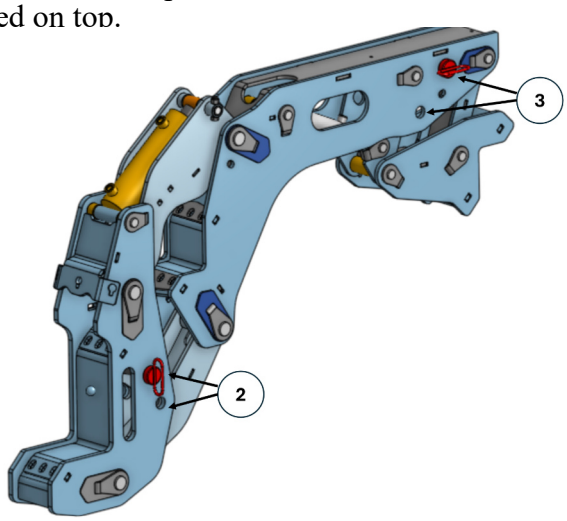


Figure 3.42 Opener Lift Linkage and Service Mode Lock Pins

3. The Service Mode Lock Pins are located on every linkage arm as well located above in between the front and rear gangs.

3.15 Opener Operation

3.15.1 Opener Depth Setting

Set the depth on the spring loaded cam lock (Figure 3.43). Simply push in and twist. Each notch is a ¼" depth adjustment. Shallowest setting is 1 and gets deeper.

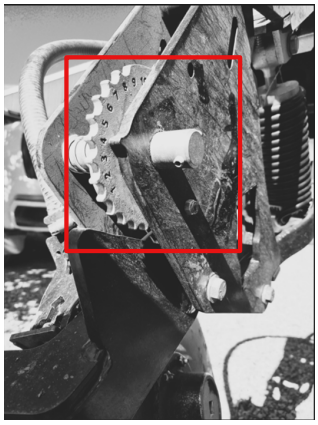


Figure 3.43 Cam Lock

3.15.2 IRC Depth Setting

The depth at which the fertilizer bander applies the fertilizer is set using depth stops on the IRC gang cylinders. The stops are on the rack above the cylinders (Figure 3.44). Adding stops reduces the depth of the IRC.

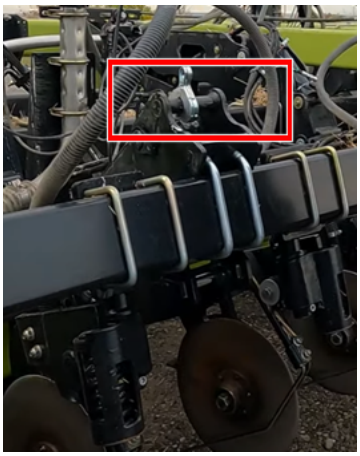


Figure 3.44 IRC Depth Stop Adjustment

NOTE: The center section gang requires an extra 2 1/2" stop to level this section with the wings.

IMPORTANT: When operating in rocky soil conditions, do not operate at a high rate of speed. High speeds in rocky conditions can damage the fertilizer bander attachment.

3.15.3 Packer Force

Set the mechanical spring packer pressure on each para-link opener (Figure 3.45).

Ground force pressure (split between disc and packer)

- 230 lb top position
- 330 lb second
- 430 lb third
- 530 lb bottom position

Figure 3.45 Mechanical Spring Packer

3.15.4 Opener Spring Setting Explained

The spring on the paralink provides down force that first pulls the discs into the ground, and any remaining force goes into packing pressure. Because the Spyder's undercut slits open the trench and the packer pushes the flap back down and does not mix a lot of dry and wet soil, very good seed to soil contact is achieved without having to overpack.

The objective is to provide enough hydraulic pressure to the opener gangs (through the opener linkage cylinders) while not over-packing the seed. We recommend starting in position two (second from the top) and openers behind tires, one position heavier, In this example, at spring pressure 3 (430lbs).

If, during operation, the openers are observed to "bounce", or the packer arm is not constantly in contact with the depth stop, it is recommended to select the next highest spring setting, and re-check opener packing and ground following.

3.15.5 Opener Spring/Down Pressure Calibration

Once you have set your depth and spring pressure, set your gang force pressure in the K-Hart controller to the appropriate pressure to have your paralink arms level (Neutral position) When the paralink arms are level with the ground, it gives them the full 5 1/2 inches of paralink travel each direction, giving the opener the best opportunity to maintain even seeding depth and still giving range and trip relief for obstacles in the ground.

When these settings are made, start driving and lower the openers into the ground while going a slower speed (3-4 mph). Fine tune the gang pressures to get the parallel arms level with the ground. Once they are level, speed up to your expected seeding speed and watch the parallel arms. If they are staying quiet and not bobbling up and down, your spring setting will be good. If they are bobbling, the spring pressure is not adequate to properly keep the discs in the ground and you will need to adjust to the next highest spring pressure and put the springs behind the wheels one position farther down (Fourth position). You'll need to recheck your gang pressure after adjusting the spring, as they will likely be out of parallel after this adjustment.

- You will rarely need the first and fourth spring setting. Please contact your dealer and territory manager if you are looking for advice on how to seed into adverse conditions (wet or dry).
- We recommend setting P1 down pressure as your neutral position (Which may need to be reset from field to field and crop to crop as conditions will be different).
- We recommend setting P2 down pressure slightly higher for the gangs, to use on headlands or more compacted area, in the field. P3 should have a lower down pressure for softer parts of the field and P4 as a very low pressure setting for wet parts of the field.

NOTE: Because there can still be spring down pressure even in the zero gang pressure setting, you may need to lift your openers in wet spots to avoid plugging.

NOTE: Operators need to monitor seed depth and packing pressure for their specific conditions and requirements. Our recommendations are for initial setting only. Please contact your dealer and K-Hart territory representative, If you have adjustment questions.

3.16 Packing Wheels

Packing wheels should be set in the top position with the spacers provided. This should give you approximately 3/4" starting position for depth with new blades. If you are unable to set the drill shallow enough can put the packer wheel in the middle hole (Refer to "1" Figure 3.46) and you will gain a 1/4" to 3/8" lower setting.

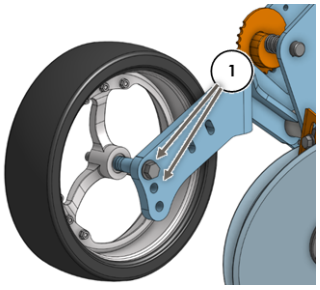


Figure 3.46 Packing Wheels

3.16.1 Checking the Seed Depth

Check the seed depth in the field before seeding with the machine. Following these steps will help ensure proper seed placement and optimize crop establishment with your double disc drill.

Tools and materials needed

- Tape measure or seed depth gauge
- Marking flags (optional)
- Pen or marker

Procedure

1. Choose a typical area of your field for testing.

2. Select a specific row to check and mark with a flag or other visible marker.

3. Fill the seed hopper or seed container with seed.

4. Put all the components of the machine in the field position.

5. Ensure the drill is set up correctly and in good condition. This includes checking that the disc openers are properly adjusted, the seed rate is calibrated, and all components are functioning as intended.

6. Lower the machine and plant a straight section at the needed speed for approximately 150 ft.

7. Stop the tractor. Stop the engine, apply the tractor park brake, and take the ignition key with you. Find one of the furrows behind the machine.

8. Carefully remove the soil covering four of the planted seeds.

9. Measure the distance from the surface of the soil directly above each seed to the bottom of each seed. Use one of the following two methods.

a. Using a ruler and a straight edge: Place the straight edge flat against the surface of the ground and press it down until it touches the top of the packed soil above the seed. Hold a ruler vertically in the seed furrow next to the seed. Measure the distance from the bottom of the seed to the bottom of the straight edge.

b. Using the seed finding tool (3.48): Place the long flat section (1) of the seed finding tool against the ground with the short flat section (2) inside the seed furrow (3). Press the short flat section in the ground until the long flat section is flush with the level of the packed soil directly above the seed. Measure the depth of the furrow using the marks on the short flat section.

Figure 3.47 Remove the Soil.

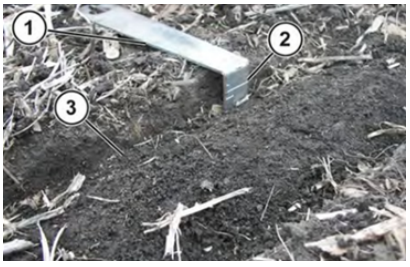


Figure 3.48 Use Seed Finding Tool.

10. Measure multiple seeds at different points along the row to get a representative sample. Note and record the depths of the seeds, then calculate the average seed depth1.

11. Compare the average depth to your target depth for the crop.

12. To ensure the consistency of seed depth across the field, you may need to repeat this procedure in multiple rows or sections of the field.

13. Regularly check seed depth during seeding and make adjustments to maintain the desired depth for uniform germination.

While checking seed depth, examine the compactness of the seed bed, increasing or decreasing the spring pressure accordingly to ensure optimum germination and emergence.

3.17 Turning at the Edge of a Field

The K-Hart openers swivel to allow for proper seed placement during shallow turns along sloughs or other obstacles) of less than 15 per cent angle change.

For steeper turns at headlands, operators need to lift the openers to reduce the risk of excessive side load on the discs, parallel arms, packer arms, packer wheel and attaching hardware.

Table of Contents

4.1 Openers and IRC Disc Gap Adjustment

The discs are shimmed using washers on the spindles with the blades as close together without touching. As the blades wear, the gap will start to widen. To ensure maximum residue shearing and keeping dirt from coming in between the discs, the gap needs to be adjusted once it grows to between 1/8" to 1/4". Generally, operators will be able to do this between seasons.

Procedure

Take one disc off, (Either 17" or 15") and remove one spacer shim. Re-install the blade and check the gap.

NOTE: Blades should be either very lightly touching or 1/8" apart.

If this spacing is not achieved by the single shim, take off the opposite blade and remove a shim, put the blade back on and check the spacing. Repeat until the gasp is resolved. After gap is set, reset your scraper.

Scraper adjustment

Opener : Adjust the scraper to the 17" blade. Move it to approx. 1/16" gap, loosely tighten it, then spin the disc (Disc's are irregular) to ensure the disc will clear all the way around. If its clear, tighten in position. Move the scraper up and down to space it approximately 1/16" from the 15" blade and then tighten into position.

IRC : Adjust the scraper to the lead blade. Move it to approx. 1/16" gap, loosely tighten it, then spin the disc (Discs are irregular) to ensure the disc will clear all the way around. If its clear, tighten in position.

NOTE: The lead blade is the key to keeping clear for optimal performance.

Disc wear

Discs should be replaced after approximately 2" of wear (Example: 17" when they get to 15"; 15" when they get to 13") or if their cutting edge has been rounded enough to negatively affect residue performance. We recommend installing new hardware when replacing discs. Bearings can last for multiple blade replacements if greased and maintained properly.

4.2 Greasing

IMPORTANT!

Disc openers, especially in wet or muddy conditions, require a large amount of grease during each service. In order to ensure optimal disc bearing life, always follow the following greasing instructions:

- Provide grease to the bearing until clean grease is seen at the inner and outer seals "grease to purge"
- This will often require 10+ pumps of grease from a normal grease gun.

4.2.1 50 Hour Greasing

These are all the locations we recommend to be greased every 50 hours max. Detailed figures can be seen below.

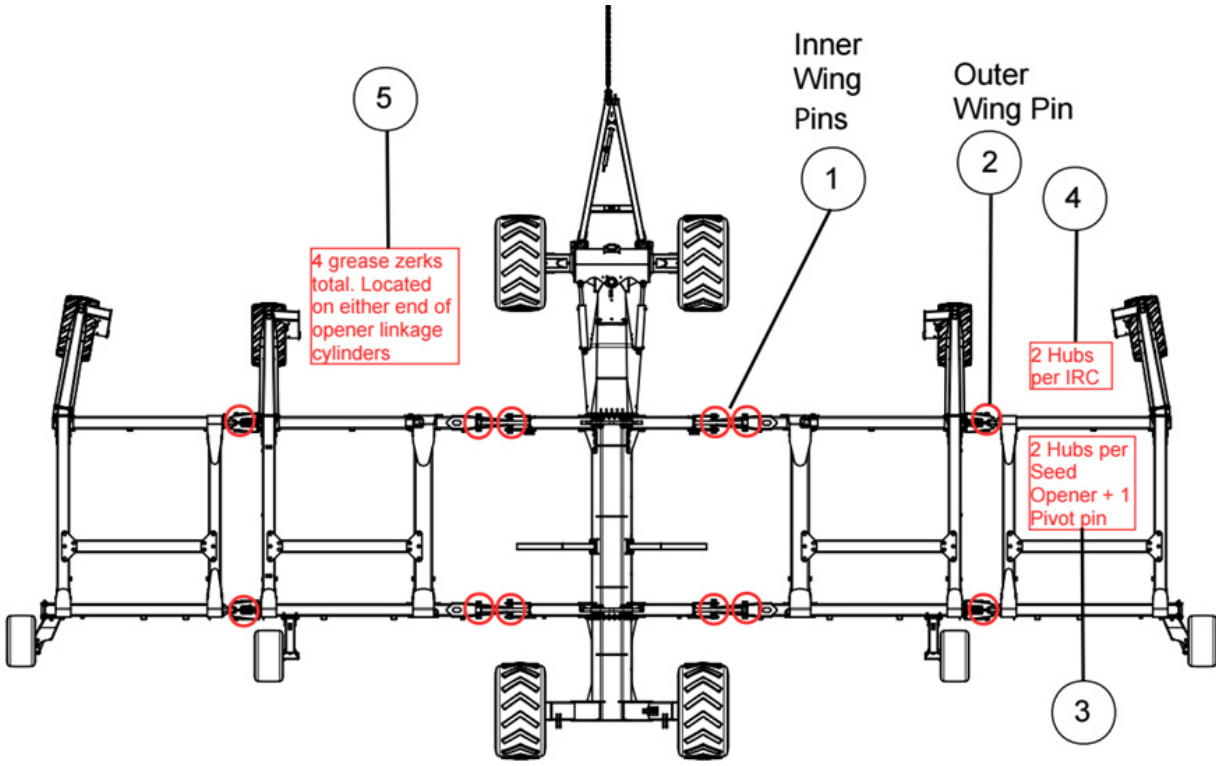


Figure 4.1 Recommended Locations of Greasing.

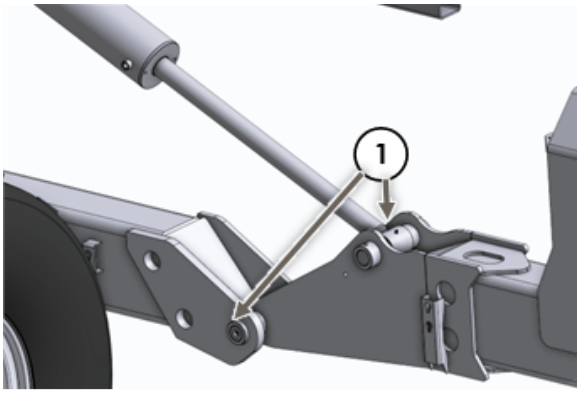


Figure 4.2 Greasing Inner Wing Pins.

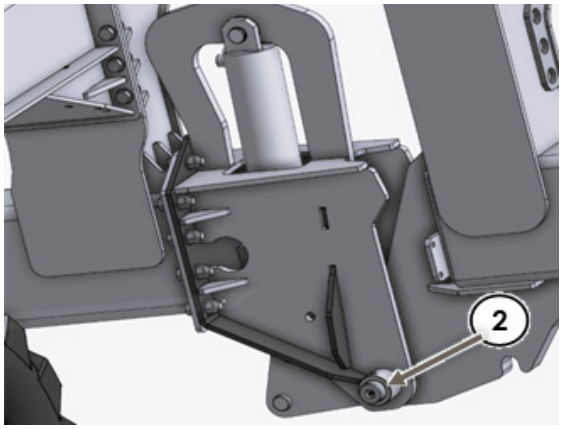


Figure 4.3 Greasing Outter Wing Pins.

These are all the locations we recommend to be greased every 50 hours max. Detailed figures can be seen below.

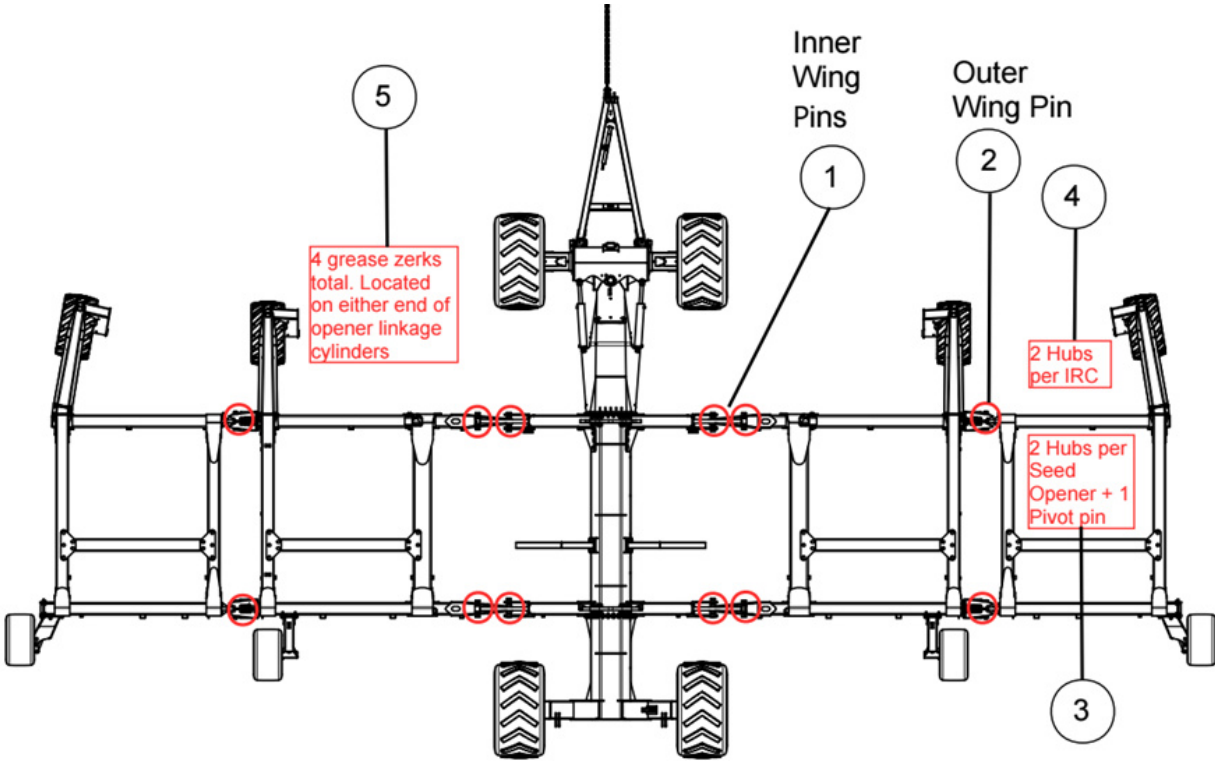


Figure 4.4 Recommended Locations of Greasing.

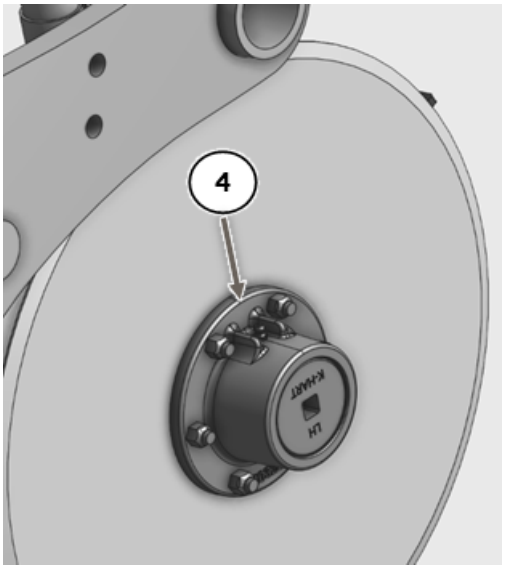


Figure 4.5

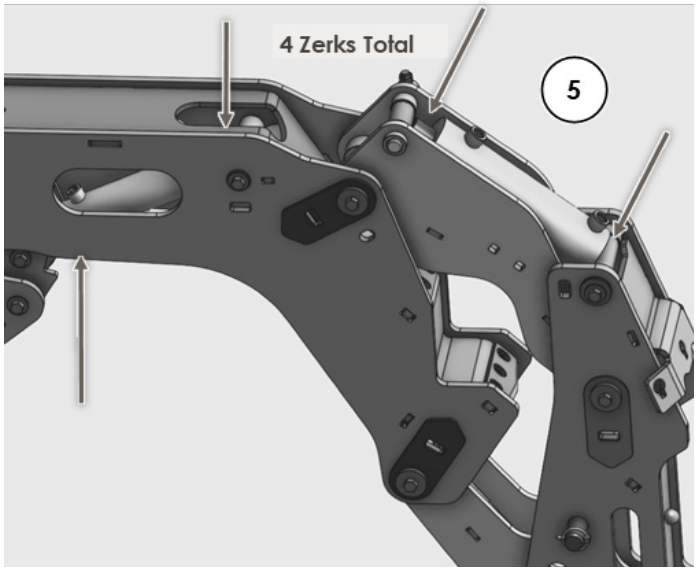


Figure 4.6

4.2.2 100 Hour Greasing

These are all the locations we recommend to be greased every 100 hours max. Detailed figures can be seen below.

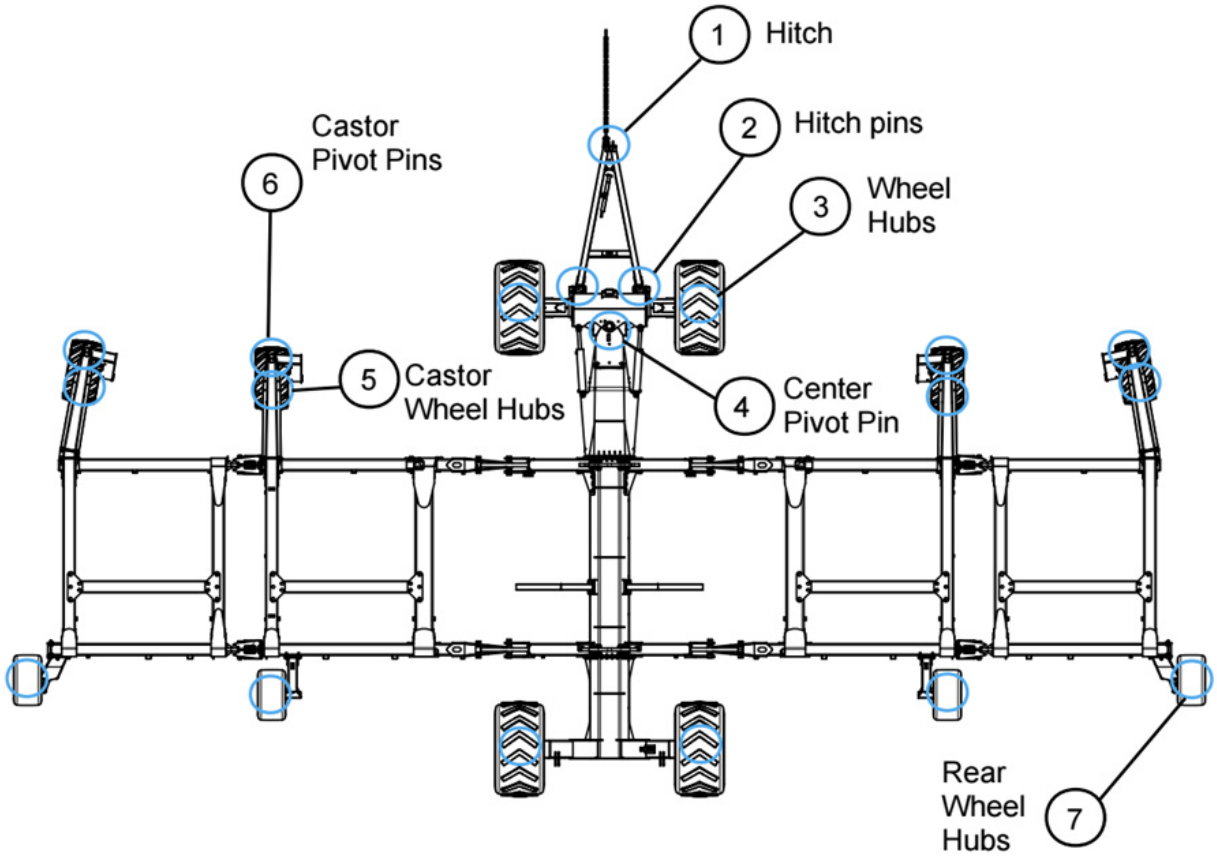


Figure 4.7 Recommended Locations of Greasing.

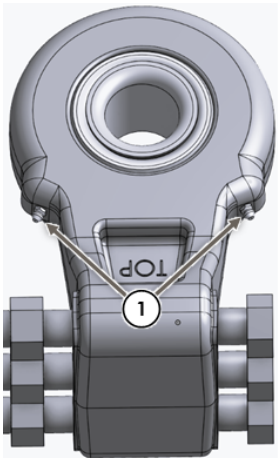


Figure 4.8

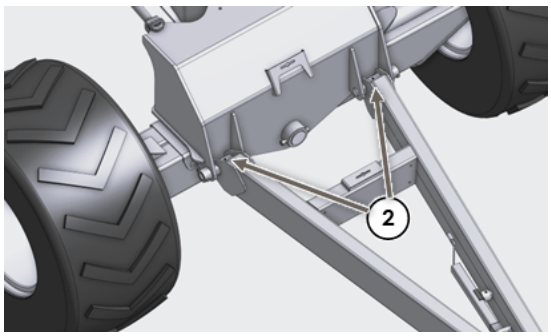


Figure 4.9

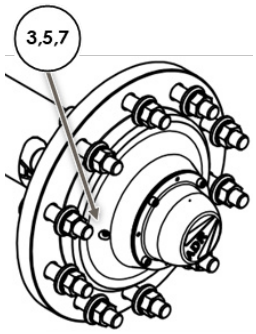


Figure 4.10

These are all the locations we recommend to be greased every 100 hours max. Detailed figures can be seen below.

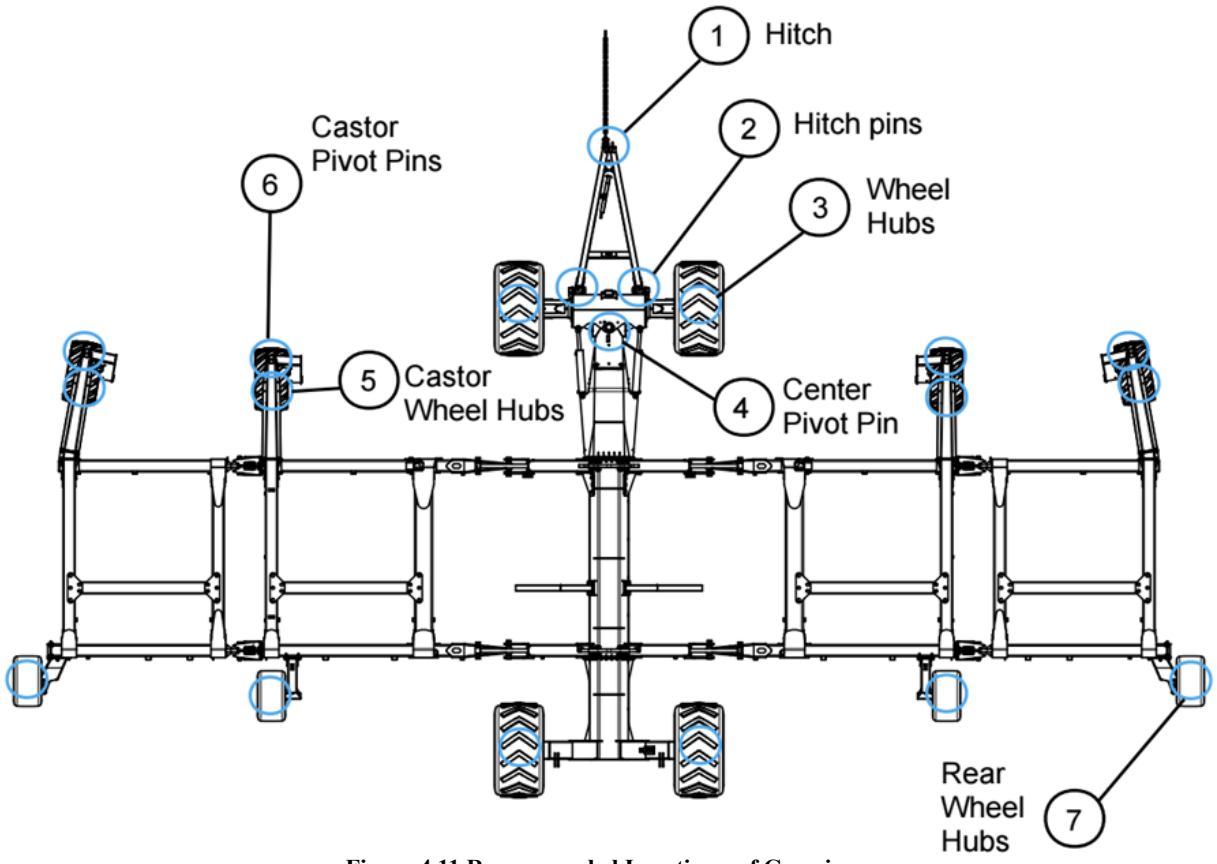


Figure 4.11 Recommended Locations of Greasing.

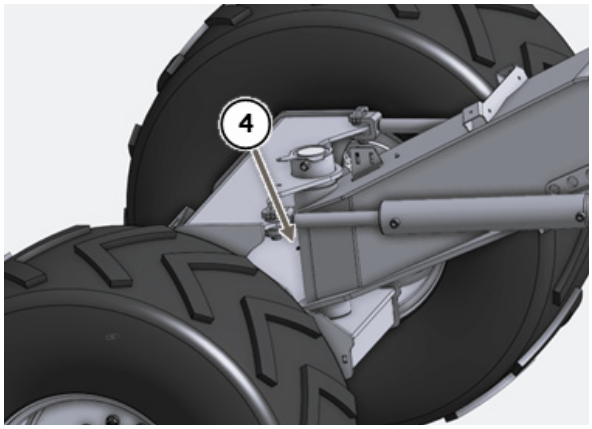


Figure 4.12

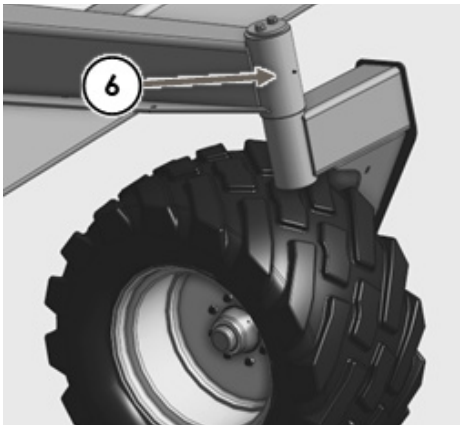


Figure 4.13

4.3 Software Uploading

Your dealer or K-Hart territory representative will perform these updates to your machine as necessary.

4.4 Assembly and Parts

- Assembly procedure is shown in the following pages. Assembly and parts are shown for all options. Your system may not have all the illustrated parts.
- Tighten all bolts to the torques shown in the following table unless otherwise instructed. All u-bolts should be torqued to the Grade 5 specification.
- Lubricate all bearings and moving parts as assembled.

Table 4.1 Coarse Threaded Bolts Torque Chart.

Nominal Size	SAE Grade 5	SAE Grade 8
	Torque (ft*lbf)	Torque (ft*lbf)
1/4 -20	8	12
5/16 -18	17	25
3/8 -16	35	45
7/16 -14	50	70
1/2 -13	75	105
9/16 -12	110	155
5/8 -11	150	210
3/4 -10	270	380
7/8 -9	400	610
1-8	600	910

4.4.1 Hydraulic Connection Specifications

O-ring Boss Hydraulic Fittings - Adjustable

The standard torque values are provided for adjustable hydraulic fittings. If a procedure specifies a different torque value for the same type and size of fitting found in this topic, refer to the value specified in the procedure instead.

1. Inspect O-ring (A) and seat (B) for dirt or defects.
2. Back off lock nut (C) as far as possible. Ensure that washer (D) is loose and that it is pushed toward lock nut (C) as far as possible.
3. Ensure that O-ring (A) is NOT on the threads. Adjust O-ring (A) if necessary.
4. Apply hydraulic system oil to O-ring (A).

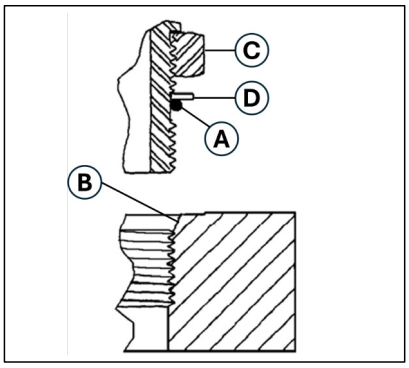


Figure 4.14 Hydraulic Fitting

5. Install fitting (B) into the port until backup washer (D) and O-ring (A) contact part face (E).
6. Position the angle fittings by unscrewing no more than one turn.
7. Turn lock nut (C) down to washer (D) and tighten it to the torque value indicated in the table. Use two wrenches, one on fitting (B) and the other on lock nut (C).
8. Verify the final condition of the fitting.

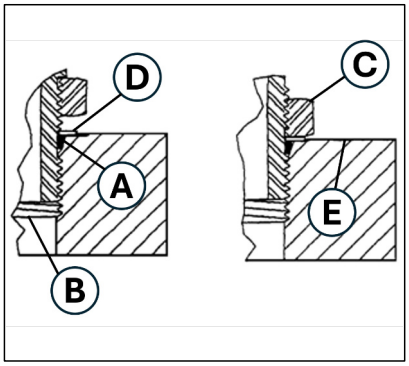


Figure 4.15 Hydraulic Fitting

Table 4.2 O-Ring Boss (ORB) Hydraulic Fittings - Adjustable and Non-Adjustable.

SAE Dash Size	Thread Size (in.)	Torque Value [1]	
		Nm	ft.lbf (*lbf.in)
-2	5/16 - 24	10 - 11	*89 - 97
-3	3/8 - 24	18 - 20	*159 - 177
-4	7/16 - 20	29 - 32	21 - 24
-5	1/2 - 20	32 - 35	24 - 26
-6	9/16 - 18	40 - 44	30 - 32
-8	3/4 - 16	70 - 77	52 - 57
-10	7/8 - 14	115 - 127	85 - 94
-12	1 1/16 - 12	183 - 201	135 - 148
-14	1 3/16 - 12	237 - 261	175 - 193
-16	1 5/16 - 12	271 - 298	200 - 220
-20	1 5/8 - 12	339 - 373	250 - 275
-24	1 7/8 - 12	414 - 455	305 - 336
-32	2 1/2 - 12	509 - 560	375 - 413

1. Torque values shown are based on lubricated connections as in reassembly.

O-Ring Boss Hydraulic Fittings – Non-Adjustable

The standard torque values for non-adjustable hydraulic fittings are provided. If a procedure specifies a different torque value for the same type and size of fitting found in this topic, use the value specified in the procedure instead.

1. Inspect O-ring (A) and seat (B) for dirt or defects.
2. Ensure that O-ring (A) is NOT on the threads. Adjust O-ring (A) if necessary.
3. Apply hydraulic system oil to the O-ring.
4. Install fitting (C) into the port until the fitting is hand-tight.
5. Torque fitting (C) according to values in Table 4.2.
6. Verify the final condition of the fitting.

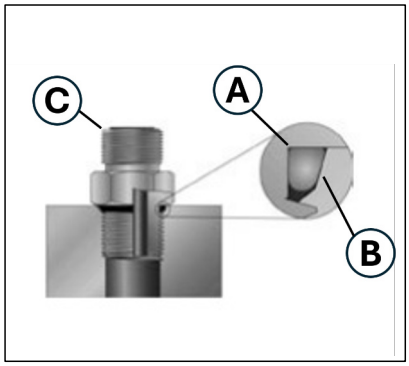


Figure 4.16 Hydraulic Fitting

O-Ring Face Seal Hydraulic Fittings

The standard torque values are provided for O-ring face seal hydraulic fittings. If a procedure specifies a different torque value for the same type and size of fitting found in this topic, refer to the value specified in the procedure instead.
Torque values are shown in the Table 4.3.

1. Ensure that the sealing surfaces and the fitting threads are free of burrs, nicks, scratches, and any foreign material.
2. Apply hydraulic system oil to O-ring (B).
3. Align the tube or hose assembly so that the flat face of sleeve (A) or (C) comes into full contact with O-ring (B).
4. Thread tube or hose nut (D) until it is hand-tight. The nut should turn freely until it bottoms out.
5. Torque the fittings according to values in Table 4.3.

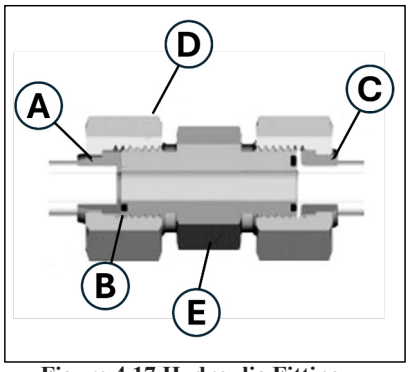


Figure 4.17 Hydraulic Fitting

Table 4.3 O-Ring Face Seal (ORFS) Hydraulic Fittings.

SAE Dash Size	Thread Size (in.)	Tube O.D. (in.)	Torque Value [1]	
			Nm	ft.lbf
-3	Note[2]	3/16	-	-
-4	9/16	1/4	25 - 28	18 - 21
-5	Note[2]	5/16	-	-
-6	11/16	3/8	40 - 44	30 - 32
-8	13/16	1/2	55 - 61	41 - 45
-10	1	5/8	80 - 88	59 - 65
-12	1 3/16	3/4	115 - 127	85 - 94
-14	Note[2]	7/8	-	-
-16	1 7/16	1	150 - 165	111 - 122
-20	1 11/16	1 1/4	205 - 226	151 - 167
-24	2	1 1/2	315 - 347	232 - 256
-32	2 1/2	2	510 - 561	376 - 414

1. Torque values and angles shown are based on lubricated connection as in reassembly.
2.. O-ring face seal type end not defined for this tube size.

NOTE: If applicable, hold the hex flange on fitting body (E) to prevent the rotation of the fitting body and the hose when tightening fitting nut (D).
6. Use three wrenches when assembling unions or joining two hoses together.
7. Verify the final condition of the fitting.

37° Flared and Straight Thread O-Ring Fittings

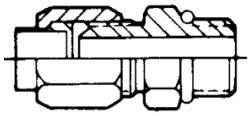


Figure 4.18 37° Flared

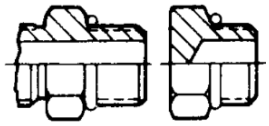


Figure 4.19 O-Ring Fitting-Plug

Figure 4.20 Swivel Nuts

Table 4.4 37° Flared and Straight Thread O-Ring Fittings (Except O-Ring Face Seal Fittings).

Nominal Tube O.D. (in)	Thread Size (in.)	Standard Torque	
		Nm	lb.ft
.125	5/16	5.0 ± 1.5	4 ± 1
.188	3/8	11.0 ± 1.5	8 ± 1
.250	7/16	16 ± 2	12 ± 1
.312	1/2	20 ± 5	15 ± 4
.375	9/16	25 ± 5	18 ± 4
.375	5/8	35 ± 5	26 ± 4
.500	3/4	50 ± 7	37 ± 5
.625	7/8	65 ± 7	48 ± 5
.750	1 1/16	100 ± 10	75 ± 7
.875	1 3/16	120 ± 10	90 ± 7
1.000	1 5/16	135 ± 15	100 ± 11
1.250	1 5/8	180 ± 15	135 ± 11
1.500	1 7/8	225 ± 15	165 ± 11
2.000	2 1/2	320 ± 30	240 ± 22

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16 S Landing Dr, Oak Bluff, MB R4G 0C4
Phone: 204-500-1698
Toll-free: 1-888-565-6570
info@khartindustries.com

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