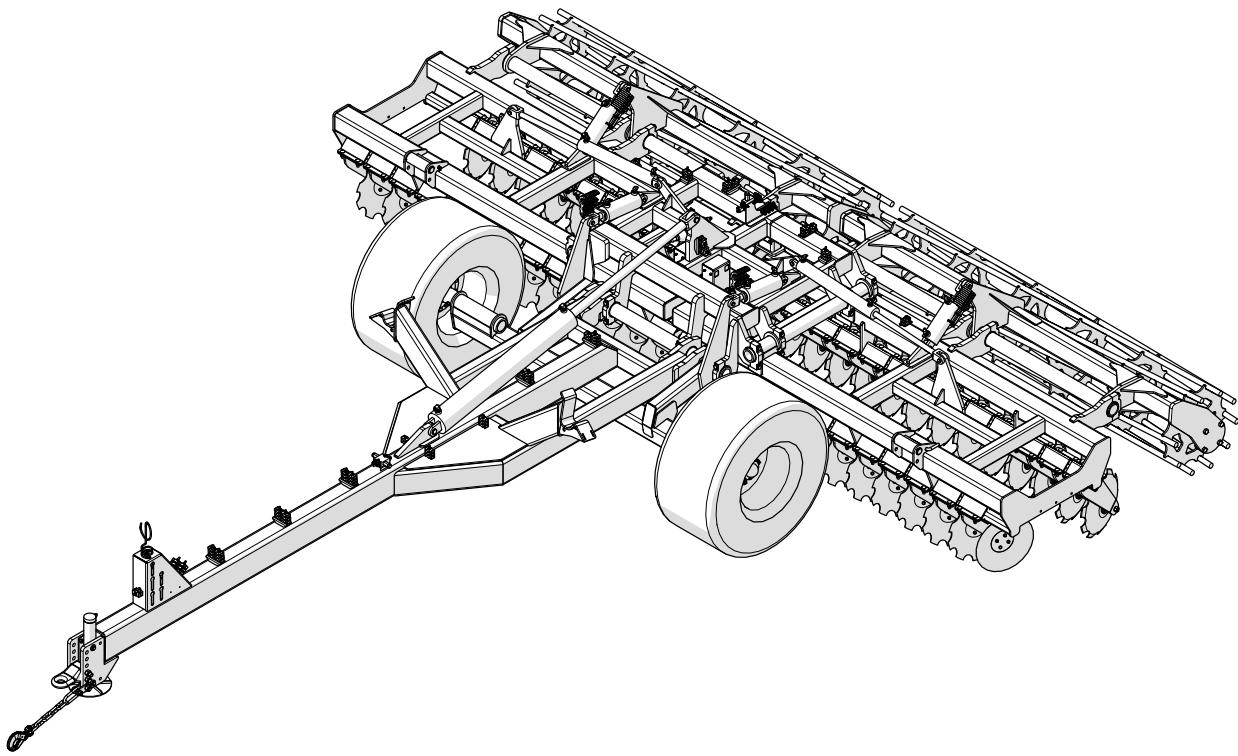


Kwik-Till



HSD1600 - HSD2450 Operating Instructions

Read this manual before operating your Norwood equipment. The information presented will prepare you to do a better and safer job. Keep this manual handy for ready reference. Require all operators to read this manual carefully and become acquainted with all the adjustment and operating procedures before attempting to operate. Replacement manuals can be obtained from your dealer.

The equipment you have purchased has been carefully engineered and manufactured to provide dependable and satisfactory use. Like all mechanical products, it will require cleaning and upkeep. Lubricate the unit as specified. Observe all safety information in this manual and safety decals on the equipment.

Use only genuine Norwood service parts. Substitute parts will void the warranty and may not meet standards required for safe and satisfactory operation. Record the model number and serial number of your equipment in the spaces provided:

Model: _____ Date of Purchase: _____

Serial Number: _____

Provide this information to your dealer to obtain correct repair parts.

Throughout this manual, the term **IMPORTANT** is used to indicate that failure to observe can cause damage to equipment. The terms **CAUTION**, **WARNING** and **DANGER** are used in conjunction with the Safety-Alert Symbol, (a triangle with an exclamation mark), to indicate the degree of hazard for items of personal safety.



This Safety-Alert Symbol indicates a hazard and means **ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED!**



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



Indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury, and includes hazards that are exposed when guards are removed



Indicates a potentially hazardous situation that, if not avoided, may result in minor or moderate injury.



Indicates that failure to observe can cause damage to equipment.



Indicates helpful information.

Quick Reference Guide

1. Connect Hydraulics

- I. Insert the males ends into the couplers on the tractor, Be sure to match pressure and return lines to one valve bank and make sure they are locked in place. Tractor flow settings should be 15 GPM or less to avoid damaging crossover reliefs. **See Below for Color Code Chart**

2. Transporting

- I. Use clevis style hitch on the tractor. Use hardened draw bar pin with a mechanical retainer.
- II. Attach safety chain around draw bar or cage to prevent unexpected separation.

25 MPH 40 KPH

⚠ WARNING

MAXIMUM SPEED

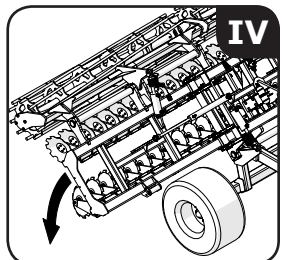
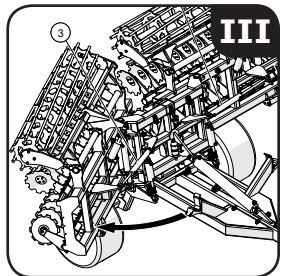
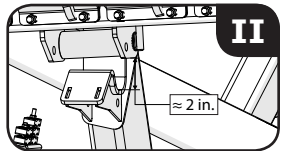
Can cause machine damage.

- Transportation speed must not exceed 25MPH (40KPH). Loss of machine control can result in serious injury or death.

90-44-0191

3. Unfold Machine into Field Position

- I. Remove wing transport pins from wings and place into holder holes.
- II. Slightly raise the transport cylinders (#4) to remove pressure from wings from transport rest. **DO NOT** fully extend cylinders at this point.
- III. Extend wing cylinders (#3) to unfold wings. When last wheel touches ground place wing cylinders in float.
- IV. With wings fully opened and wing cylinders in float, extend transport cylinders (#4) to lower machine fully to the ground. When machine is completely on the ground place transport cylinders into float position.



PLACE IN
FLOAT

90-44-0192

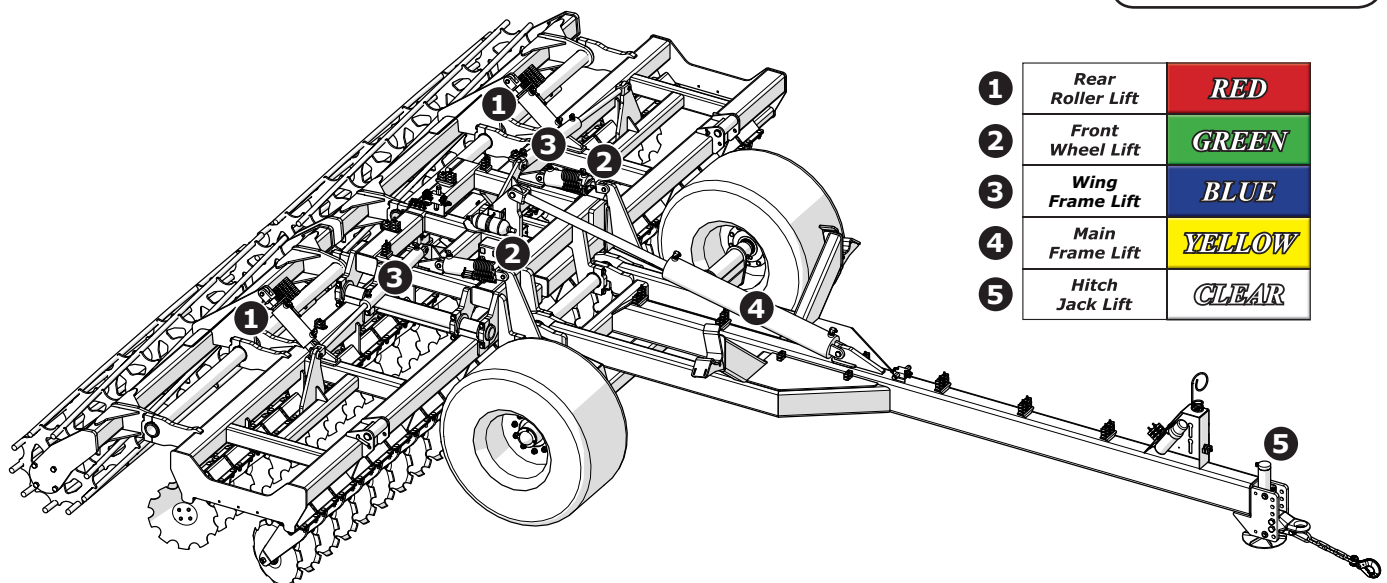
⚠ CAUTION

HYDRAULIC
CONTROL HAZARD

Can cause machine damage.

- Ensure transport & wing cylinders are placed in float during field operation.

Before operating machine **MAKE SURE** both wing cylinders (#3) and transport cylinders (#4) are in **FLOAT** position or damage to cylinders or machine may occur.



1	Rear Roller Lift	RED
2	Front Wheel Lift	GREEN
3	Wing Frame Lift	BLUE
4	Main Frame Lift	YELLOW
5	Hitch Jack Lift	CLEAR

4. Field Operation

- I. After placing machine in field position retract wheel cylinders (**#1**) and packer cylinders (**#2**) to the cylinder stops.
- II. It may be necessary to adjust digging depth, this is done by extending wheel cylinders (**#1**) and packer cylinders (**#2**) and adding cylinder stops for shallower, or removing stops for deeper depth.
- III. Be sure transport cylinders and wing cylinders are in **FLOAT** position before operating the machine, This ensures machine follows contour of ground. Otherwise damage may occur to hydraulic cylinders or other components.
- IV. For best performance the recommended operating speed is **between 9 and 14 MPH** and a depth of **2 1/2"**, depending on field conditions.
- V. When making headland turns that are sharp, the operator may need to raise discs slightly using the wheel cylinders (**#1**).

Depth	Number of Stops
2.0"	9
2.5"	8
3.0"	7
3.5"	6
4.0"	5
4.5"	4
5.0"	3
5.5"	2
6.0"	1

5. Maintenance

L = Lubricate C = Check

NOTE:

Recommendations are based on normal operating conditions. Severe or unusual conditions may require more frequent lubrication or oil changes.

Daily				Weekly		Monthly		Annually			
C	C	C	C	C	C	C	L	C	C	C	C
Hydraulic Leaks	Damaged Hoses, Fittings, and Valves	Check Tire Pressure	Scraper Alignment	Loose Hardware	Pivot Bushings	Rubber Cord Alignment	Wheel Hub	Damage or Excessive Wear to Discs	Wheel Bearings	Disc Hubs	Accumulator Pressure

6. Trouble Shooting

Problem	Cause	Solution
Machine doesn't track straight	Machine not level from front to back	Add or Remove cylinder stops as needed to level machine
Entire machine plugs	Ground speed too slow	Increase speed as specified in operations
	Working depth too deep	Add cylinder stops as needed
Wings plug	Wings not level	Verify same number of cylinders stop on main frame and wings
		Reduce digging depth
		Add weights to wings
Machine moves slowly	Low hydraulic pressure/flow from tractor	Increase flow/pressure to SCV in tractor
Machine doesn't move	Hydraulic hoses from equipment not connected	Verify all hoses are securely connect to tractor
	Hydraulic hoses from equipment not connected in correct pairs	Refer to color code diagram and connect hoses of the same color to the same SCV on tractor

Table of Contents

Introduction	Inside Front Cover
General Information	5
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Safety & Instructional Decals	8
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General Information

The purpose of this manual is to assist you in operating and maintaining your Kwik-Till. Read it carefully. It furnishes information and instructions that will help you achieve years of dependable performance. These instructions have been compiled from extensive field experience and engineering data. Some information may be general in nature due to unknown and varying operating conditions. However, through experience and these instructions, you should be able to develop procedures suitable to your particular situation.

The illustrations and data used in this manual were current at the time of printing, but due to possible in-line production changes, your machine may vary slightly in detail. We reserve the right to redesign and change the machines as may be necessary without notification.

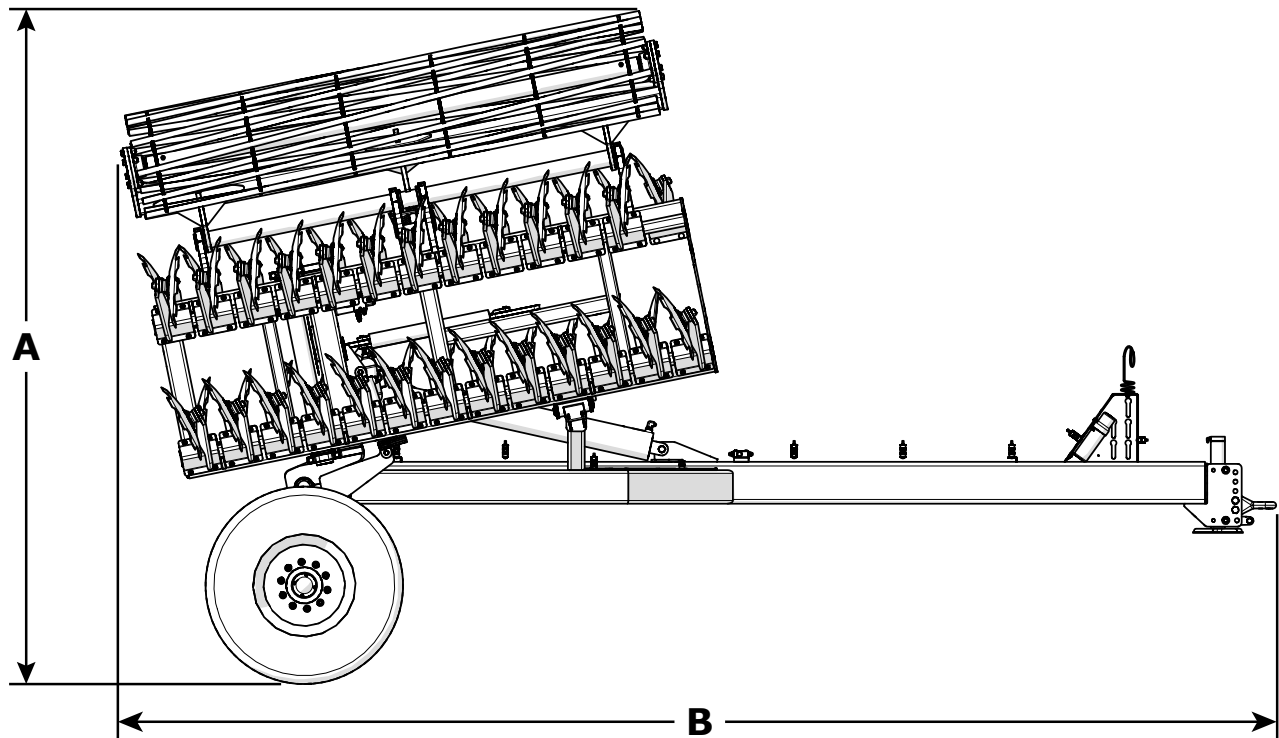


Some illustrations in this manual show the Kwik-Till with items removed to provide a better view. The Kwik-Till should never be operated with any items removed.

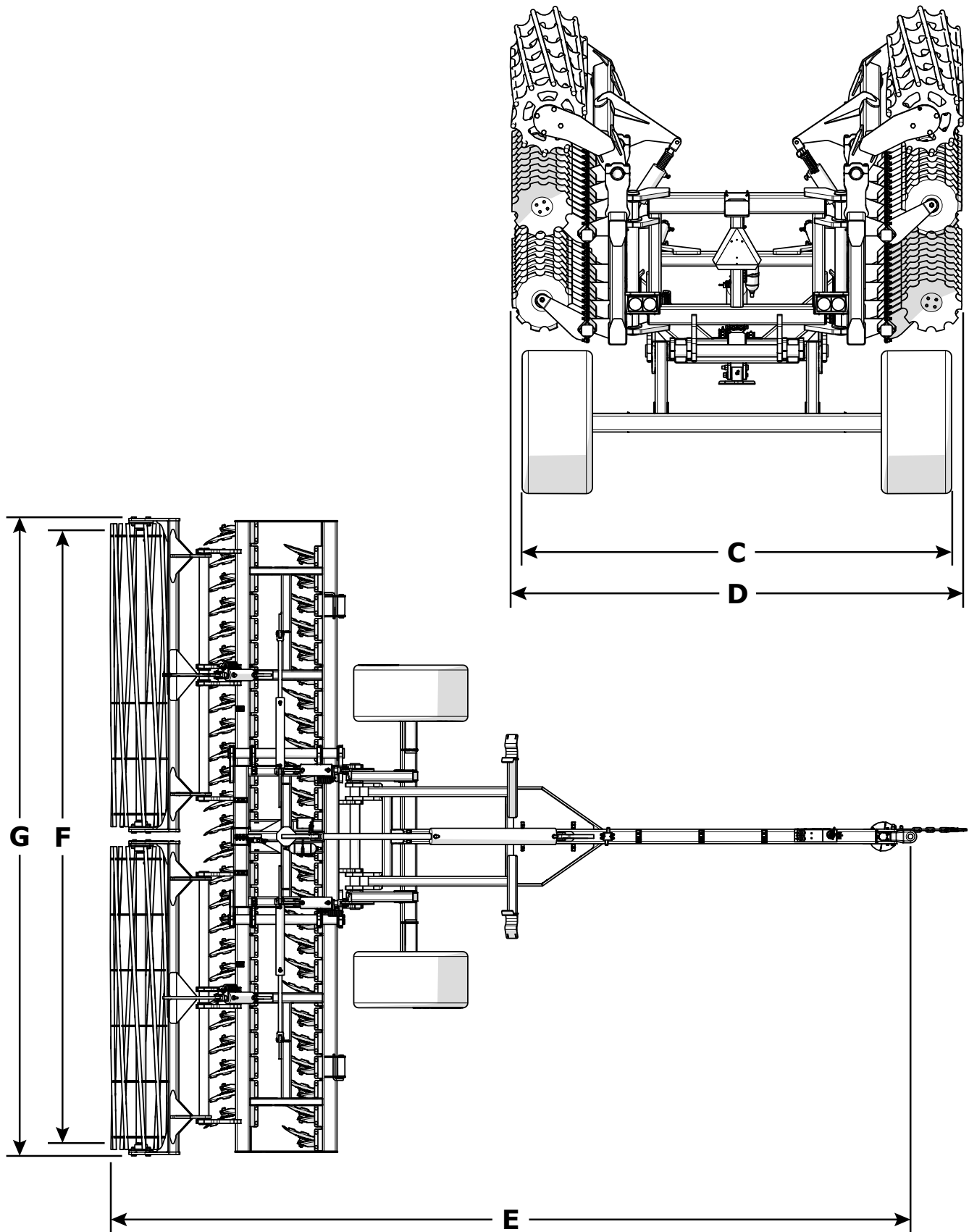
Throughout this manual, references are made to right and left direction. These are determined by standing behind the equipment facing the direction of forward travel.

Dimensions & Specifications

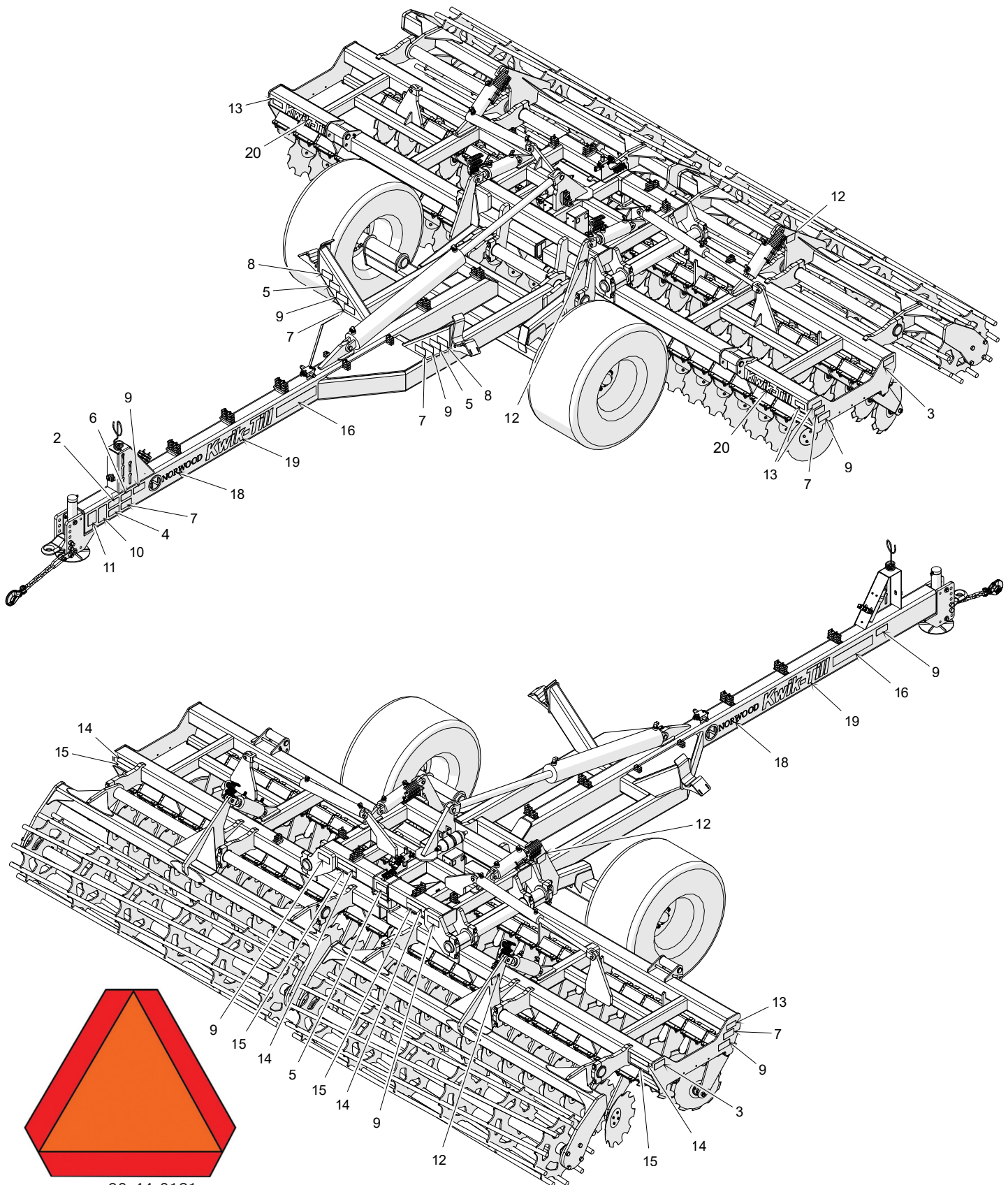
	HSD1600	HSD1775	HSD2100	HSD2450
Transport Height (A)	12'-5"	12'-6"	12'-8"	12'-11"
Transport Length (B)	22'-1"			
Transport Tire Width (C)	11'-10"			
Transport Width (D)	12'-5"			
Unfolded Length (E)	27'-6"			
Working Width (F)	15'-11"	17'-7"	20'-11"	24'-4"
Unfolded Width (G)	17'-0"	18'-8"	22'-0"	25'-4"
Weight	15,020 lbs	15,600 lbs	16,800 lbs	17,800 lbs
Number of Discs	38	42	50	58
Tongue Weight	1,800 lbs	2,000 lbs	2,600 lbs	3,200 lbs
Tire Size (Center)	600/50R22.5			
Lift Cylinder Size	6" Bore x 48" Stroke			
Wing Cylinder Size	3" Bore x 24" Stroke			
Wheel/Basket Cylinder Size	4" Bore x 8" Stroke			
Hitch Type	Cat IV (Standard) - Bull Pull Cat IV (Optional)			
Jack Type	Hydraulic (Standard)			



Dimensions & Specifications



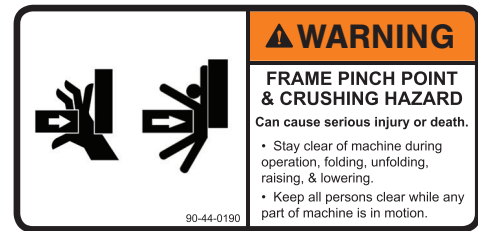
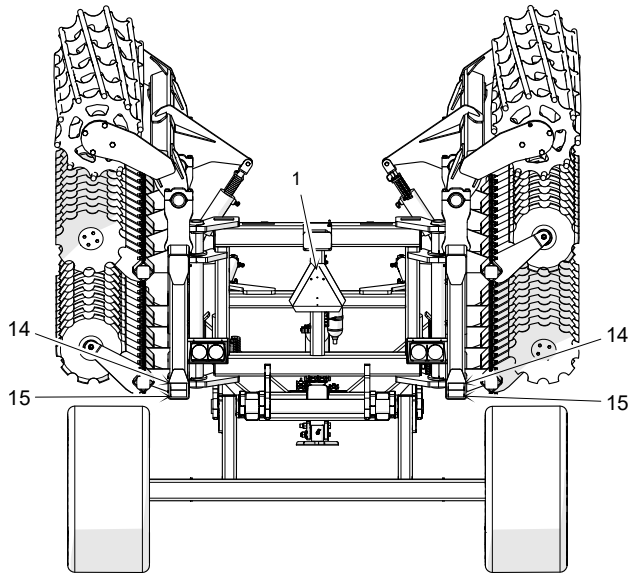
Safety & Instructional Decals



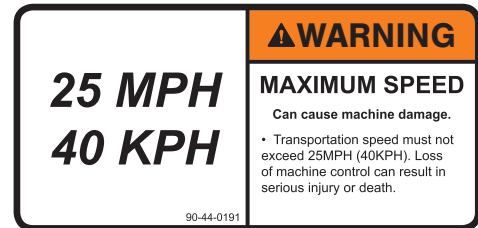
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90-44-0181
Sign, SMV

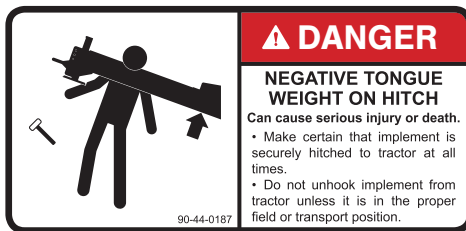
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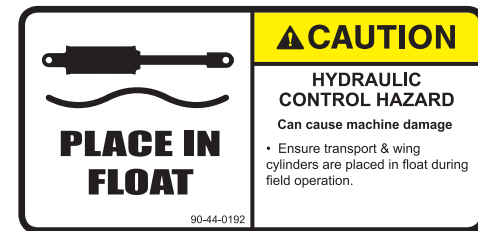
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Decal, Danger Pinch & Crushing Hazard



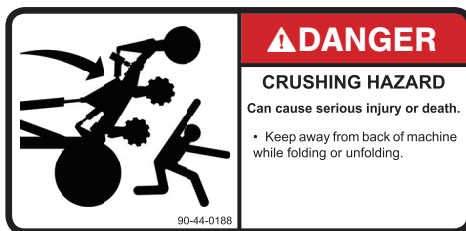
6. 90-44-0191
Decal, Warning Maximum Speed



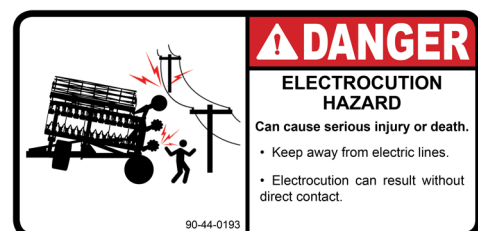
2. 90-44-0187
Decal, Danger Negative Hitch Weight



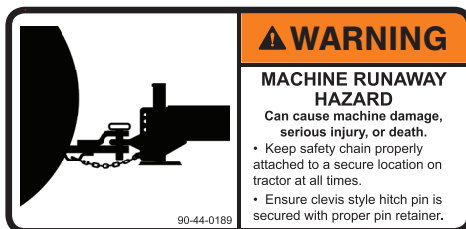
7. 90-44-0192
Decal, Caution Hyd Control Hazard



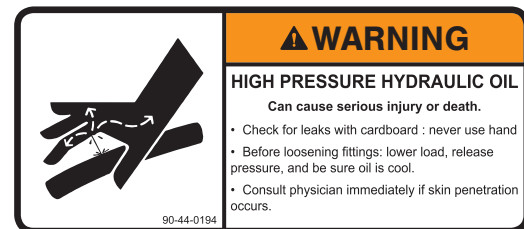
3. 90-44-0188
Decal, Danger Crushing Hazard



8. 90-44-0193
Decal, Warning Electrocution Hazard

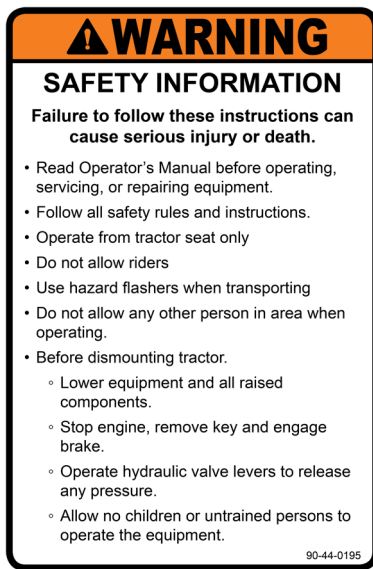


4. 90-44-0189
Decal, Warning Runaway Hazard

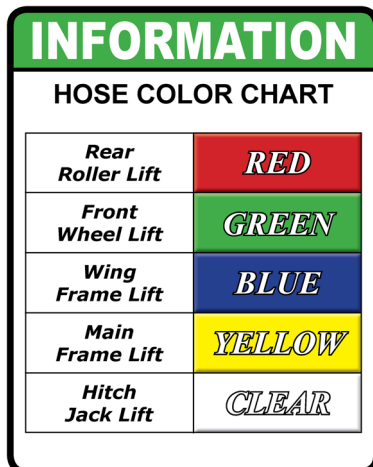


9. 90-44-0194
Decal, Warning High Pressure Hyd Oil

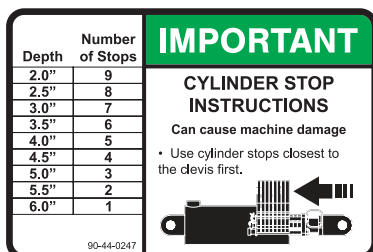
Safety & Instructional Decals



10. 90-44-0195
Decal, Warning Safety Information



11. 90-44-0196
Decal, Information Hose Color Chart



12. 90-44-0198
Decal, Cylinder Stop Instructions



13. 90-44-0207
Decal, Yellow Reflector (9x2)



14. 90-44-0208
Decal, Orange Fluorescent (9x2)



15. 90-44-0206
Decal, Red Reflector (9x2)



Large Model Number	Small Model Number
90-44-0236	90-44-0235
Decal, HSD2500 (4")	Decal, HSD2500 (3")
90-44-0238	90-44-0237
Decal, HSD3000 (4")	Decal, HSD3000 (3")
16. 90-44-0240	17. 90-44-0239
Decal, HSD3500 (4")	Decal, HSD3500 (3")
90-44-0242	90-44-0241
Decal, HSD4000 (4")	Decal, HSD4000 (3")
90-44-0244	90-44-0243
Decal, HSD4500 (4")	Decal, HSD4500 (3")



18. 90-44-0209
Decal, Norwood Logo (6")



19. 90-44-0199
Decal, Kwik-Till (6")
20. 90-44-0211
Decal, Kwik-Till (4")

Safety

Safety is a primary concern in the design and manufacturing of our products. Unfortunately, our efforts to provide safe equipment can be wiped out by a single careless act of an operator.

In addition to the design and configuration of equipment, hazard control and accident prevention are dependent upon the awareness, concern, prudence and proper training of personnel involved in the operation, transport, maintenance and storage of equipment.

It has been said "The best safety device is an informed, careful operator." We ask you to be that kind of an operator.

General Safety

- Read and understand the Operator's Manual before operating, maintaining, adjusting or unplugging the Kwik-Till.
- Only trained competent persons shall operate the Kwik-Till. An untrained operator is not qualified to operate the machine.
- Have a first-aid kit available for use should the need arise and know how to use it.
- Provide a fire extinguisher for use in case of an accident. Store in a highly visible place.
- Wear appropriate protective equipment. This list includes but is not limited to:
 - ✓ Hard Hat
 - ✓ Protective Shoes
 - ✓ Protective Goggles
 - ✓ Heavy Gloves
 - ✓ Hearing Protection
 - ✓ Respirator or Filter Mask
- Stop engine, remove ignition key and wait for all moving parts to stop before servicing, adjusting, repairing, or unplugging.
- Review safety related items annually with all personnel who will be operating or maintaining the Kwik-Till.
- Be familiar with machine hazard area. If anyone enters hazard areas, shut down machine immediately. Clear the area before continuing.

- Keep hands, feet and clothing away from all moving parts.
- Clear the area of bystanders when carrying out any maintenance and repairs or making any adjustments.

Storage Safety

- Store the unit in an area away from human activity.
- Store in a level dry area.
- Do not permit children to play on or around the stored machine.
- Be sure wheels are blocked and all hoses are in proper storage positions.

Transportation Safety

- Before transporting verify the following:
 - ✓ Tires are in good condition and have proper air pressure.
 - ✓ Wings are sitting on wing rests with transport pin secured.
 - ✓ Jack is in the up position.
 - ✓ Hitch pin is secured properly to tractor.
 - ✓ Safety chains are attached and in good condition.
 - ✓ Lights are visible and in working condition.
 - ✓ Remove any loose objects from machine prior to transporting.

Check Lists

Pre-Delivery Check List

(Dealer's Responsibility's)

Inspect the equipment thoroughly after assembly to ensure it is set up properly before delivering it to the customer.

The following check list are a reminder of points to inspect. Check off each item as it is found satisfactory or after proper adjustment is made.

- ✓ Check that all guards are installed and in good working, replace if damaged.
- ✓ Check all bolts to be sure they are tight.
- ✓ Check wheel bolts for proper torque.
- ✓ Check that all cotter pins and safety pins are properly installed. Replace if damaged.
- ✓ Check the tractor hydraulic reservoir has been serviced and that hydraulic system and all functions have been operated through full cylinder stroke to purge air from system.
- ✓ After pressurizing and operating all Kwik-Till functions, stop tractor and make sure there are no leaks in the hydraulic system. Follow all safety rules when checking for leaks.

Delivery Check List

(Dealer's Responsibility's)

- ✓ Show customer how to make adjustments.
- ✓ Point out the safety decals. Explain their meaning and the need to keep them in place and in good condition. Emphasize the increased safety hazards when instructions are not followed.
- ✓ Present operator's manual and request that customer and all operators read it before operating equipment. Point out the manual safety rules, explain their meanings and Emphasize the increased safety hazards that exist when safety rules are not followed.
- ✓ Show customer the safe, proper procedures to be used when mounting, dismounting and storing the equipment.
- ✓ Explain to customer that when equipment is transported on a road or highway, safety devices should be used to give adequate warning to operators of other vehicles.
- ✓ Explain to customer that when equipment is transported on a road or highway, a slow moving vehicle (SMV) sign should be used to provide adequate warning to operators of other vehicles.
- ✓ Explain to customer that when towing on a public road to comply with all state and local lighting/ marking laws and to use a safety chain.
- ✓ Make customers aware of optional equipment available so that customer can make proper choices as required.

Operator Sign-Off Record

Safety is a primary concern in the design and manufacture of our products. Unfortunately, our efforts to provide safe equipment can be wiped out by a single careless act of an operator.

In addition to the design and configuration of equipment, hazard control and accident prevention are dependent upon the awareness, concern, prudence and proper training of personnel involved in the operation, transport, maintenance and storage of equipment.

It has been said “The best safety device is an informed, careful operator.” We ask you to be that kind of an operator.

American Society of Agricultural & biological Engineers (ASAE) and the Occupational Safety and Health Administration (OSHA).

Anyone who will be operating and/or maintaining the Kwik-Till must read and clearly understand all Safety, Operating, and Service & Maintenance information presented in this manual.

Do not operate or allow anyone else to operate this equipment until this information has been reviewed. Review this information annually, before the season start-up. Make periodic reviews of the Safety and Operation sections a standard practice for those using any of your equipment.

Use the following Operator Sign-off Record to verify that each operator has read and understood the information in this manual and has been instructed in the safe operation of the Kwik-Till.

[illegible]

Operation

Safety is a primary concern in the design and manufacture of our products. Unfortunately, our efforts to provide safe equipment can be wiped out by a single careless act of an operator.

In addition to the design and configuration of equipment, hazard control and accident prevention are dependent upon the awareness, concern, prudence and proper training of personnel involved in the operation, transport, maintenance and storage of equipment.

It has been said "The best safety device is an informed, careful operator." We ask you to be that kind of an operator.



- Safety instructions are important! Read all attachment and power unit manuals; follow all safety rules and safety decal information. (Replacement manuals are available from your Norwood dealer.) Failure to follow instructions or safety rules can result in serious injury or death. Never allow children or untrained persons to operate equipment.
- Keep hands, feet, hair, and clothing away from equipment while engine is running. Stay clear of all moving parts.
- Before dismounting power unit or performing any service or maintenance, follow these steps: disengage power to equipment, lower the 3-point hitch and all raised components to the ground, operate valve levers to release any hydraulic pressure, set parking brake, stop engine, remove key, and unfasten seat belt.
- Never allow riders on power unit or attachment.
- Do not allow bystanders in the area when operating, attaching, removing, assembling, or servicing equipment.

- Keep hands, feet, hair, and clothing away from equipment while engine is running. Stay clear of all moving parts.
- Be familiar with the Kwik-Till before operating.
- The owner is responsible for training operators in the safe operation of the Kwik-Till.



- Always sit in power unit seat when operating controls or starting engine. Securely fasten seat belt, place transmission in neutral, engage brake, and ensure all other controls are disengaged before starting power unit engine. Never allow riders on power unit or attachment.
- Keep bystanders away from equipment.
- Always comply with all state and local lighting and marking requirements.
- Always wear relatively tight and belted clothing to avoid entanglement in moving parts. Wear sturdy, rough-soled work shoes and protective equipment for eyes, hair, hands, hearing, and head; and respirator or filter mask where appropriate.

Operation

Principle Components

The Norwood Kwik-Till consists of rear folding frames, individual disc assemblies, and rolling baskets. The Kwik-Till combines the right disc angle with the perfect roller basket to do a complete job every time you work your field.

The disc-angles are for high speed and medium to shallow penetration, they chop and mix trash and soil for a superior mixing action. The roller basket sections level, mix, and crumble to form a seed horizon and keep wind erosion down.

The Kwik-Till is designed to be used as a pull-type mounted machine.

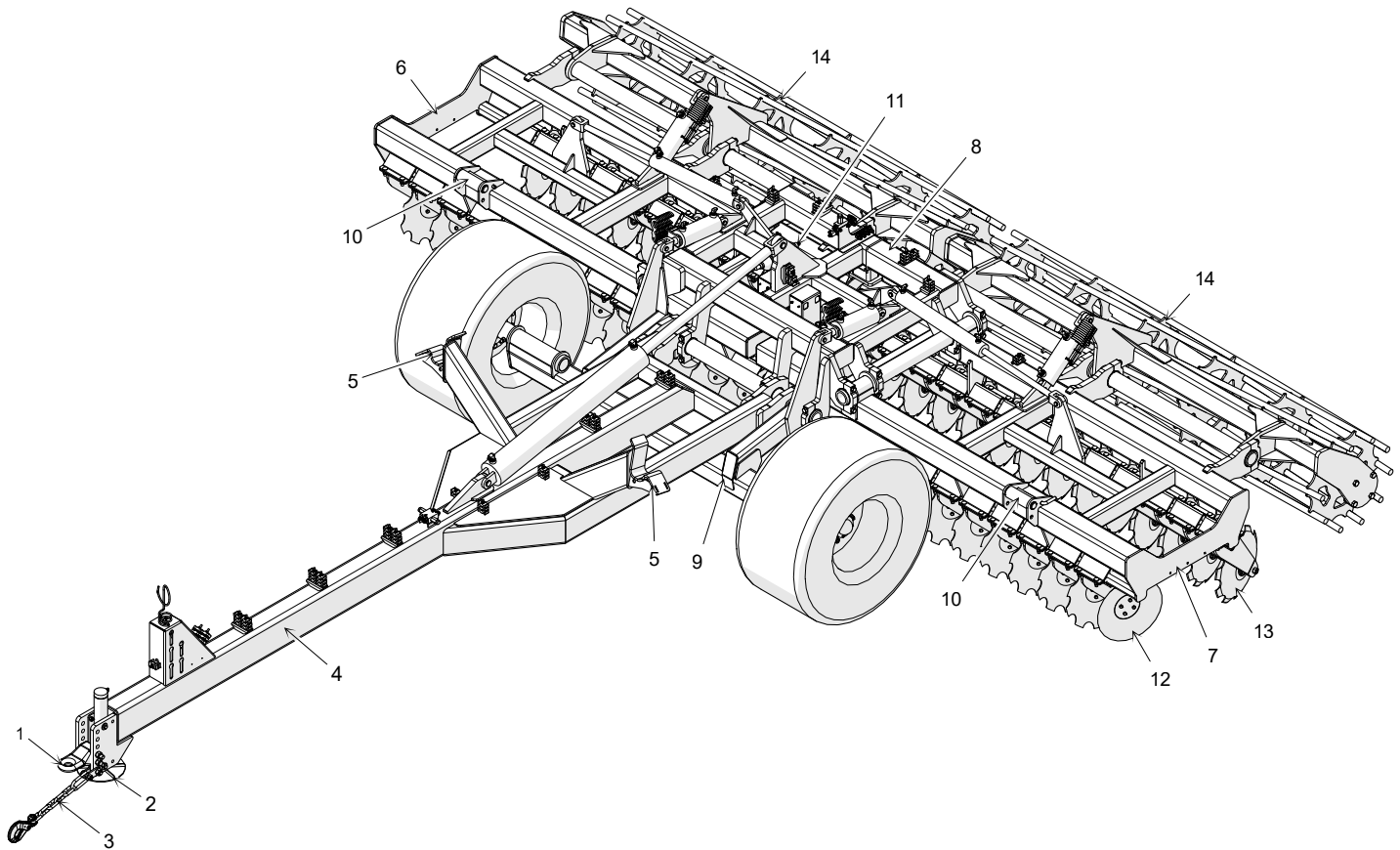


Figure 1. *Kwik-Till in Field Ready Position*

- | | |
|------------------------|---------------------------|
| 1. Tongue | 8. Center Section |
| 2. Hydraulic Jack | 9. Center Strut |
| 3. Safety Tow Chain | 10. Wing Transport Roller |
| 4. Hitch | 11. Accumulator |
| 5. Wing Transport Rest | 12. Front Disc Shank |
| 6. Wing (RH) | 13. Rear Disc Shank |
| 7. Wing (LH) | 14. Rolling Packer |

Operation

Pre-Operation Check List

(OWNER'S RESPONSIBILITY)

IMPORTANT

This Pre-Operation Check List is provided for the operator. It is important to follow for both personal safety and maintenance of the Kwik-till.

- ✓ Check all lubrication points and grease as instructed in Lubrication Schedule.
- ✓ Use only a tractor of adequate power and weight to pull the unit.
- ✓ Check all lubrication points and grease as required.
- ✓ Check that the unit is properly attached to the tractor. On pull-type unit, be sure there is a mechanical retainer through the draw-bar pin and the safety chain is installed.
- ✓ Check tire pressure. Bring to specified level.
- ✓ Inspect all hydraulic lines, hoses, couplers, and fittings. Tighten, repair, or replace any leaking or damaged components.

Choosing the Correct Equipment

To ensure safe and reliable operation of the Kwik-Till. Use a tractor with the correct specifications. Use the following guidelines to select the correct tractor.

1. HORSEPOWER

Use **Table 1.** for selecting the tractor horsepower class appropriate for your unit's width.

Increase the horsepower level by 25% when operating in hilly, soft, or wet conditions.

2. TRACTOR WEIGHT

By following recommendations for tractor horsepower, the tractor will have sufficient weight to provide stability for unit during field operation or when transporting.

It is recommended that each tractor be equipped with a full complement of suitcase weights on the tractor front (see Figure 2 for example). This will provide the required front weight for turning and extra traction if equipped with front wheel assist.

Model	Minimum Horsepower Requirements*
HSD1600	175 - 225
HSD1775	195 - 250
HSD2100	230 - 295
HSD2450	270 - 345

* May vary depending on soil conditions and digging depth

Table 1. Horsepower Requirements



Figure 2. Front Suitcase Weights

Operation

Attaching to Tractor

- **Do not allow anyone to stand between tractor and unit when backing up to the unit.**



- **Keep bystanders away from equipment.**

1. Place unit on a level, dry area free of debris and other foreign object.
2. Use clevis style hitch on the tractor. Lock the tractor draw-bar in the center position.
3. Provide enough clearance to back the tractor safely into the unit.
4. Use the implement jack, found on the front hitch to level hitch height to tractor draw-bar. (See connecting the Hydraulics)
5. Back slowly and align the draw-bar with the hitch.
6. Shut off the tractor, place all controls in neutral, set the parking brake, remove the key, and wait for all moving parts to stop.

7. Use the hardened draw-bar pin with provisions for a mechanical retainer, install a retainer, such as a klik pin.
8. Attach the safety chain around the draw-bar or cage to prevent unexpected separation. Provide sufficient slack for turning.
9. Raise implement jack to transport position.
10. Connect lights to tractor.

Connecting the Hydraulics

1. Use a clean cloth or paper towel to clean the couplers on the end of the hoses and the area around the couplers on the tractor.
2. Insert the male ends into the couplers on the tractor. Be sure to match pressure and return lines to one valve bank and make sure they are locked in place.
3. Hoses have been labeled in color. See **Figure 3**.
4. Adjust tractor hydraulic to 15 GPM or less to avoid damaging cross over reliefs.

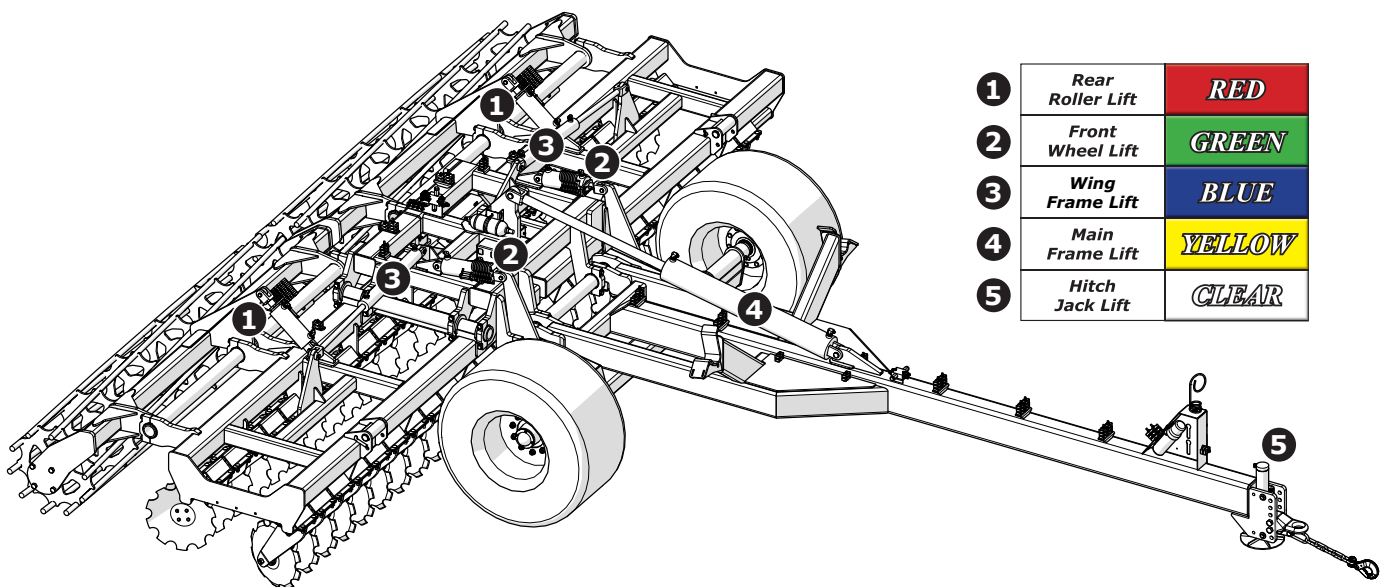


Figure 4. Hydraulic Cylinder Locations

Operation

Unfolding Machine into Field Position

1. Move machine onto level ground so it is straight behind the tractor.
2. Remove wing transport pins from wings and place in holder holes. See **Figure 5**.
3. Slightly raise the transport cylinders (**#4**) (**Figure 4**) to remove the pressure from the wings from the transport rest (**Figure 6**). Do not fully extend the cylinders at this point.
4. Extend the wing cylinders (**#3**) to unfold wings. When the last wheel touches ground place wing cylinders in float. See **Figure 7**.
5. With wings fully opened and wing cylinders in float, extend transport cylinders (**#4**) to lower machine fully to the ground. When machine is completely to the ground place transport cylinders (**#4**) into float position. See **Figure 8**.

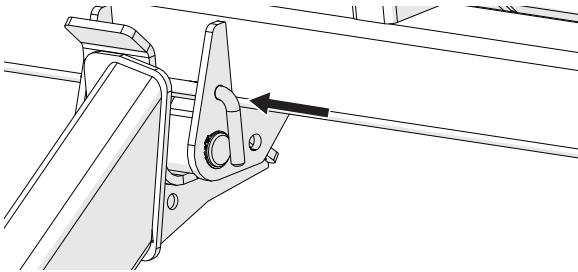


Figure 5. Removing Wing Transport Pin

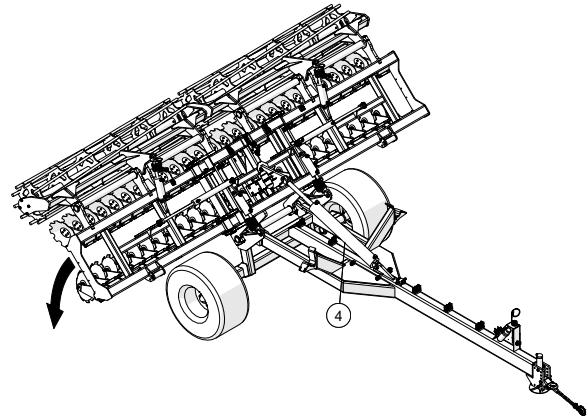


Figure 8. Lowering Machine

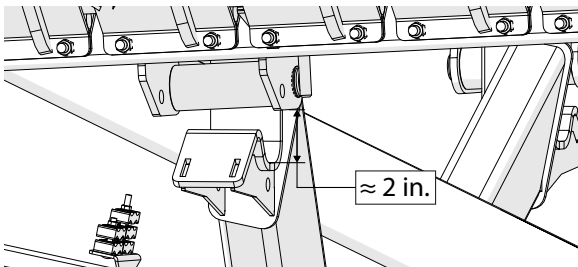


Figure 6. Wing Transport Pin Location

4. Extend the wing cylinders (**#3**) to unfold wings. When the last wheel touches ground place wing cylinders in float. See **Figure 7**.

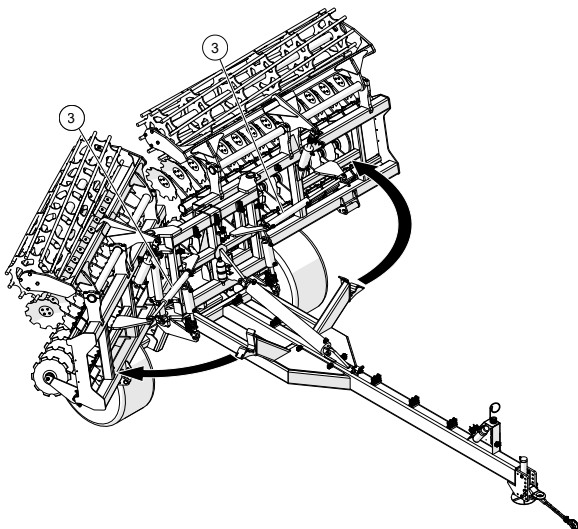



Figure 7. Unfolding Wings

IMPORTANT

Before operating machine **MAKE SURE** both wing cylinders (**#3**) and transport cylinders (**#4**) are in **FLOAT** position or damage to cylinders or machine may occur.

 <p style="font-weight: bold; font-size: 1.2em;">PLACE IN FLOAT</p>	<div style="background-color: yellow; text-align: center; padding: 5px; font-weight: bold;">CAUTION</div> <p style="text-align: center; font-weight: bold;">HYDRAULIC CONTROL HAZARD</p> <p style="text-align: center;">Can cause machine damage.</p> <ul style="list-style-type: none"> Ensure transport & wing cylinders are placed in float during field operation.
---	---

90-44-0192

Figure 9. Place in Float Caution

Operation

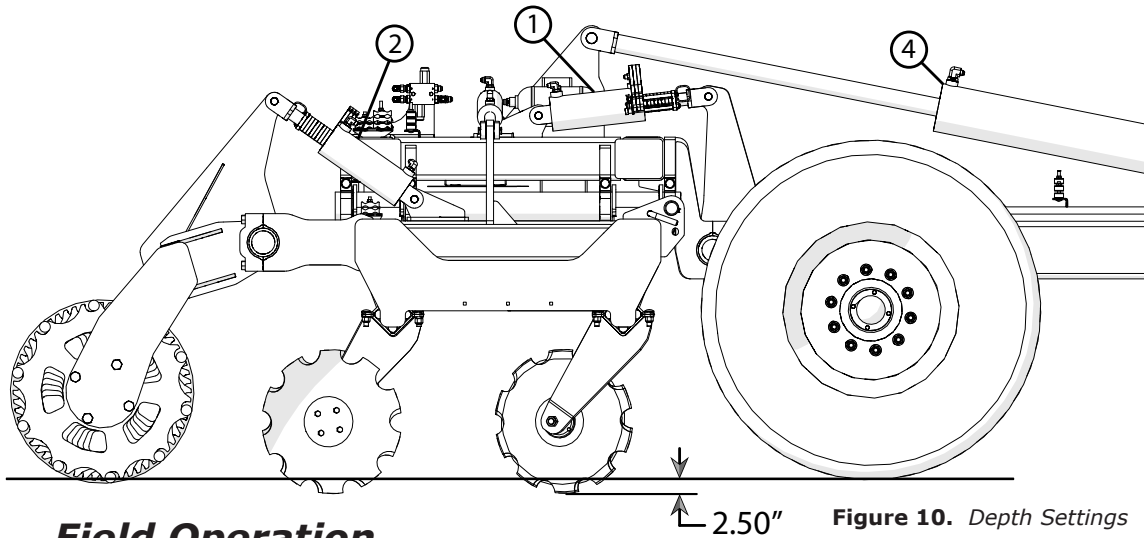


Figure 10. Depth Settings

Field Operation

1. After placing machine in field position retract wheel cylinders (**#1**) and basket cylinders (**#2**) to the cylinder stops.
2. It may be necessary to adjust digging depth, this is done by raising wheel cylinders (**#1**) and basket cylinders (**#2**) and adding cylinder stops for shallower, or removing stops for deeper depth.
3. Be sure transport cylinders and wing cylinders are in **FLOAT** position before operating the machine. This ensures machine follows contour of ground. Otherwise damage may occur to hydraulic cylinders or other Kwik-Till components.
4. The good average starting depth is 2 1/2" requiring (8) stops.
5. For best performance the recommended operating speed is between 9 and 14 MPH depending on field conditions.
6. When making headland turns that are sharp operator may raise discs slightly using wheel cylinders (**#1**) or transport cylinders (**#4**). Remember to put transport cylinders (**#4**) back into float position before continuing down the field.

Digging Depth	Number of Stops
2.0"	9
2.5"	8
3.0"	7
3.5"	6
4.0"	5
4.5"	4
5.0"	3
5.5"	2
6.0"	1

Table 2. Digging Depth vs Number of Stops

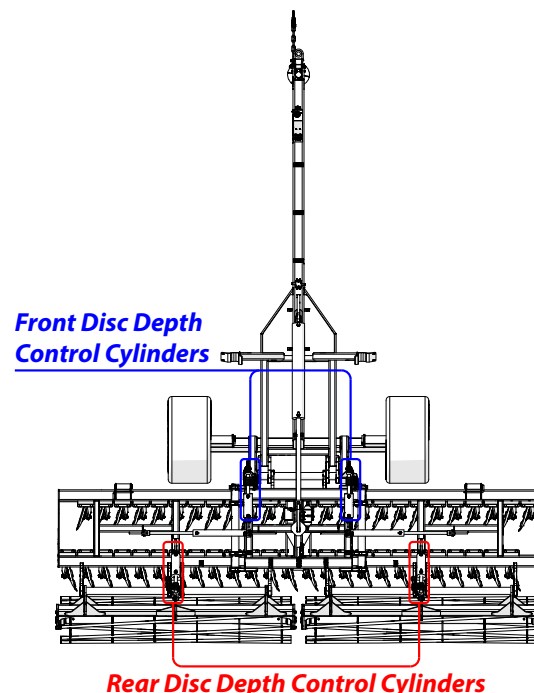
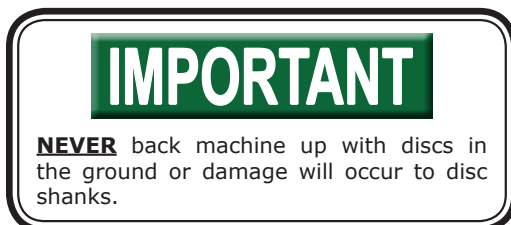


Figure 11. Depth Control Cylinders

Operation

Folding Machine into Transport Position

1. Move machine onto level ground so it is straight behind the tractor.
2. Extend the wheel cylinders (**#1**) and the basket cylinders (**#2**) to lift machine off the ground. This places machine into lowest transport position. See **Figure 12**.
3. Retract the transport cylinders (**#4**) to fully raise the frame (center and wings) completely off the ground into the raised position. See **Figure 13**.
4. Retract the wing cylinders (**#3**) to fold wings, When wing nears wing rest adjust transport cylinder (**#4**) so wing roller is just above wing rest, then completely retract wing cylinders (**#3**). When both wings are over wing rest retract transport cylinders (**#4**) until wings sit in wing rest. See **Figure 14**.
5. Replace wing pins to hold wings into wing rest. See **Figure 15**.

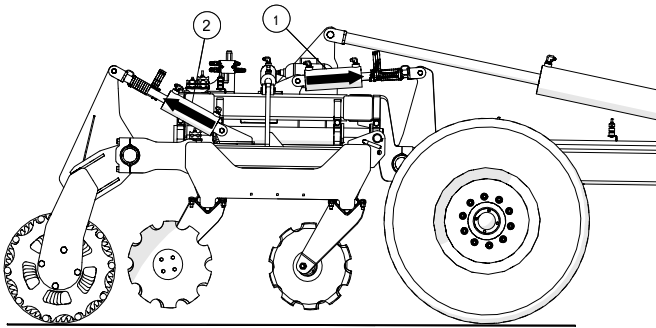


Figure 12. Raising Machine

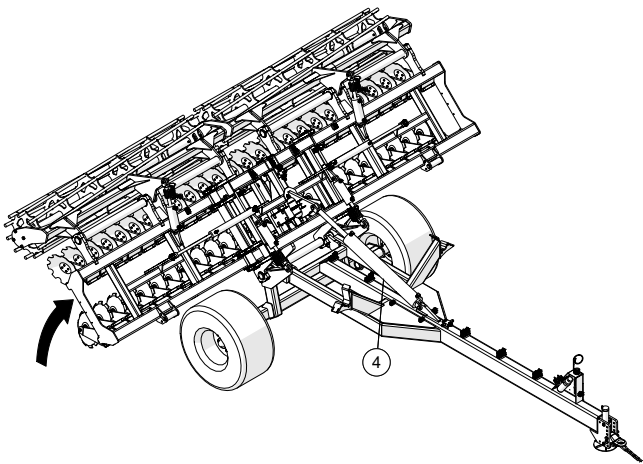


Figure 13. Lifting Machine

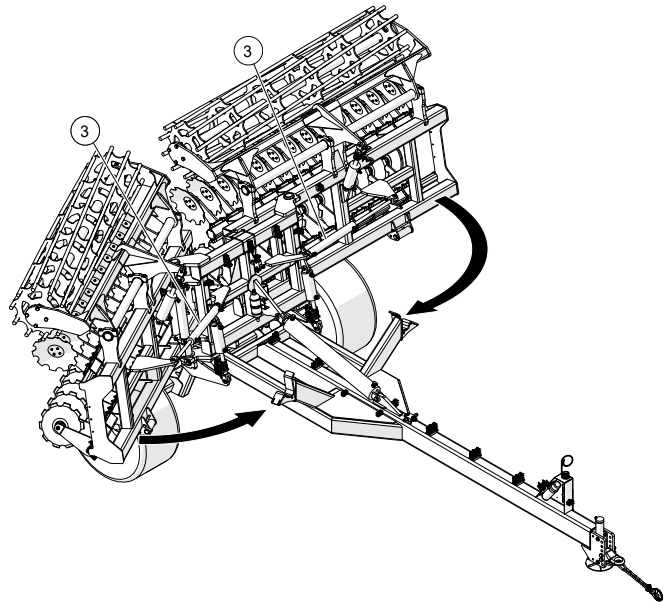


Figure 14. Folding Wings

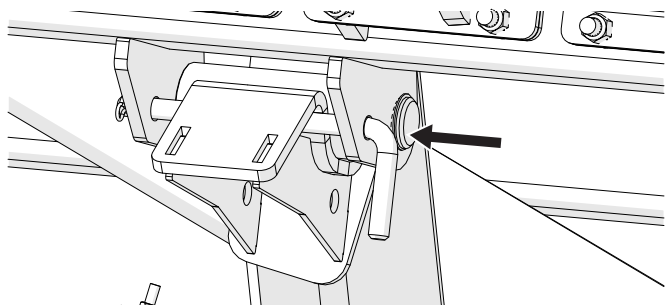


Figure 15. Installing Wing Transport Pin

Operation

Transporting the Unit



- **Never allow riders on power unit or attachment.**



- **Always comply with all state and local lighting and marking requirements.**

1. Be sure all bystanders are clear of the unit.
2. Be sure the unit is securely attached to the tractor and all retainer pins are installed.
3. Be sure safety chain is installed.
4. Clean the SMV emblem, lights, and reflectors and be sure they are working.
5. Be sure you are in compliance with all applicable lighting and marking regulations when transporting.
6. Check with your local authorities.
7. Never transport the unit faster than 20 mph (32 km/h). The ratio of the tractor weight to the Kwik-Till
8. Weight plays an important role in defining acceptable travel speed. **Table 3** summarizes the recommended travel to speed-to-weight ratio.
9. Be sure jack is in transport position.

Road Speed	Implement(s) weight relative to Towing Machine weight
Up to 20mph	1 to 1 or less
Up to 10 mph	2 to 1 or less
Do Not Tow	More than 2 to 1

Table 3. *Speed vs Weight Ratio*

Storage



- **Block equipment securely for storage.**
- **Keep children and bystanders away from storage area.**

At the end of the season, the Kwik-Till should be thoroughly inspected and prepared for storage. Repair or replace any worn or damage components to prevent unnecessary down time at the beginning of the next season.

To ensure a long, trouble-free life, prepare the unit for storage by carrying out the following procedure:

1. Clear the area of bystanders, especially children.
2. Thoroughly wash the unit, using a pressure washer to remove all dirt, mud, debris, and residue.
3. Inspect for damage or entangled material. Remove entangled material. Repair or replace damaged parts.
4. Inspect all hydraulic hoses, lines, couplers, and fittings. Tighten all loose fittings. Replace any hose that is cut, nicked, abraded, or separating from the crimped end of a fitting.
5. Lubricate all grease fittings. Make sure all grease cavities have been filled with grease to remove any water residue from pressure washing.
6. Touch up all paint nicks and scratches to prevent rust.
7. Move to storage area. Select a dry area free of debris. Store in an area away from human activity.
8. Unhook from tractor.
9. If the unit cannot be placed indoors, cover with a waterproof tarpaulin and tie securely. Store away from human activity
10. Do not allow children to play on or around the stored unit.

Service & Maintenance



- Before dismounting power unit or performing any service or maintenance, follow these steps:
 - ✓ Disengage power to equipment.
 - ✓ Lower all raised components to the ground.
 - ✓ Operate valve levers to release any hydraulic pressure.
 - ✓ Set parking brake.
 - ✓ Stop engine.
 - ✓ Remove key.
 - ✓ Unfasten seat belt.
- Before working underneath, read manual instructions, securely block up, and check stability. Secure blocking prevents equipment from dropping due to hydraulic leak down, hydraulic system failure, or mechanical component failure.
- Keep all persons away from operator control area while performing adjustments, service or maintenance.



- Always wear relatively tight and belted clothing to avoid entanglement in moving parts. Wear sturdy, rough-soled work shoes and protective equipment for eyes, hair, hands, hearing, and head, and respirator or filter mask where appropriate.
- Make certain all movement of equipment components has stopped before approaching for service.

LUBRICANTS

Use the Service Record (Page 24), to keep a record of all scheduled maintenance.

- **Grease**

Use and SAE multi-purpose high temperature grease with extreme pressure (EP) performance. A SAE multi-purpose lithium-based grease is also acceptable.

- **Storing Lubricants**

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

GREASING

1. Use a hand-held grease gun for all greasing.
2. Wipe grease fitting with a clean cloth before greasing to avoid injecting dirt and grit.
3. Replace and repair broken fittings immediately.
4. If fittings will not take grease, remove and clean thoroughly. Also clean lubricant passageway. Replace fitting if necessary.

Service & Maintenance

Service Record

Note: See prior pages for details.

Copy this page to continue service records.

L = Lubricate

C = Check

		Annually			Monthly	Weekly	Daily
		C					
	Accumulator Pressure						
	Disc Hubs						
	Wheel Bearings						
	Damage or Excessive Wear to Discs						
	Wheel Hub						
	Rubber Cord Alignment						
	Pivot Bushings						
	Loose Hardware						
	Scraper Alignment						
	Check Tire Pressure						
	Damaged Hoses, Fittings, and Valves						
	Hydraulic Leaks						
Serviced By:							
Date:							

Service & Maintenance

Daily

A.1 Check for Hydraulic Leaks

A.3 Check Tire Pressures **46 Psi (317 kPa)**

A.2 Check for Damage Hoses, Fittings, and Valves

A.4 Check Scraper alignment if equipped with Rubber Roller Basket

Weekly

B.1 Check for Loose Hardware

B.2 Check Pivot Bushings for damage and wear

- Bushings with 1/16" per side (1/8" total) gap should be replaced. Excess gap can cause excessive wear and/or damage to the pivot shaft.



Figure 16. Pivot Bushing

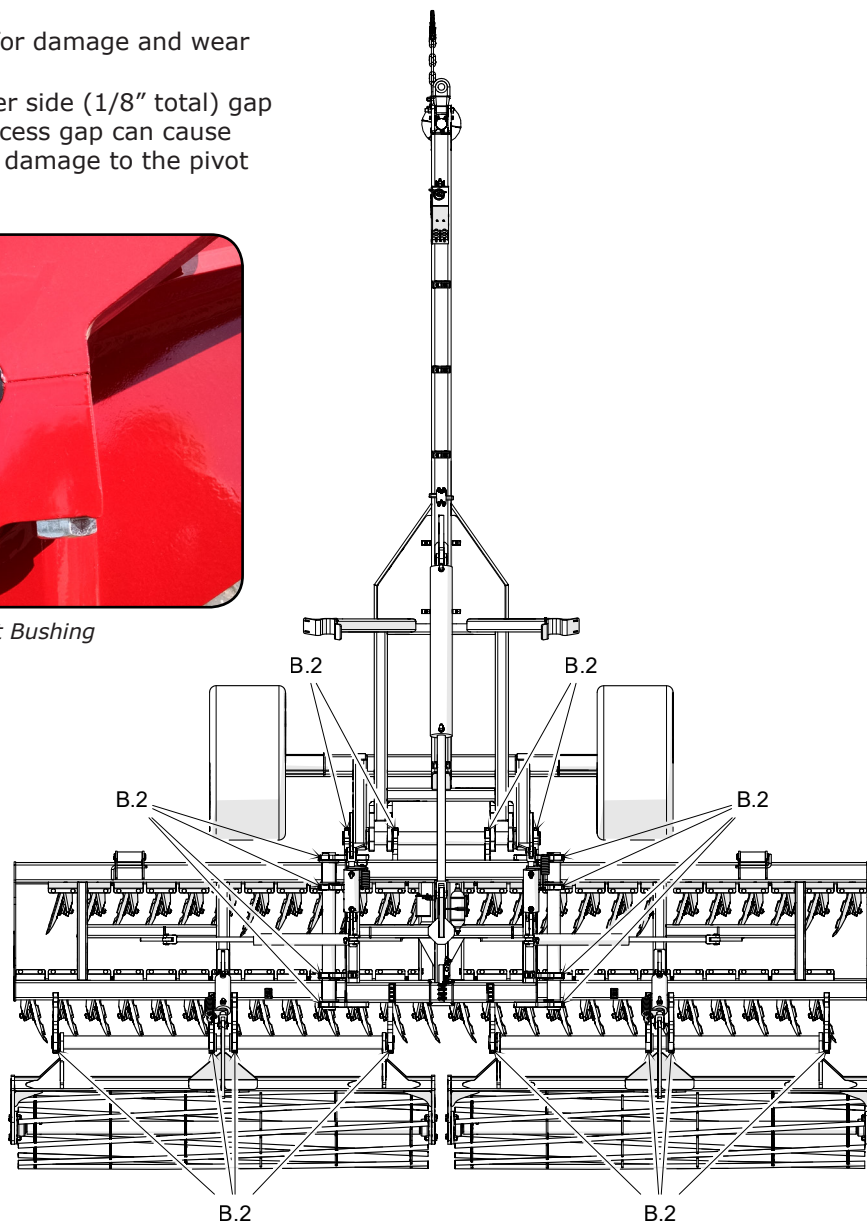


Figure 17. Pivot Bushing Locations

Service & Maintenance

Monthly

C.1 Check rubber cord alignment

- The cords should not extend more than 3/4" from the caps.
- If cords are greater than 3/4" from the cap, the cords should be readjusted. See # for cord readjustment instructions.



Figure 18. Rubber Cord Alignment

C.2 Lubricate wheel hubs

- Apply 3-4 pumps of grease to hub.
- If grease is visible on the back side of the hub, reduce the amount of grease added by 50%.

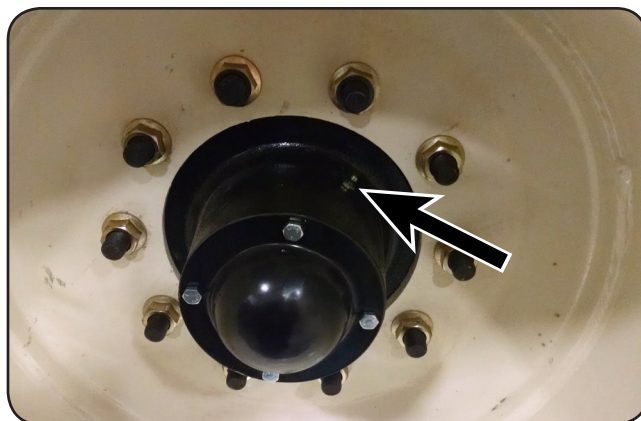


Figure 19. Wheel Hub Grease Point

Annually

D.1 Check for damage and/or excessive wear to discs

- Replace if disc is damaged. Disks should be replaced with 1" or more of wear.

D.2 Check Wheel Bearings

- Replace or tighten on owner's discretion

D.3 Check Disc Hubs for damage and/or excessive wear

- Check disc hubs for excess play. If excessive play is found replace disc hub, the disc hubs are sealed bearings

D.4 Check Accumulator

- Operational nitrogen pressure levels are between 700 - 800 psi. If levels are below this range, the accumulator would need to be recharged with nitrogen.
- If pressure is 0 psi, the accumulator would need to be replaced, due to a internal bladder rupture.

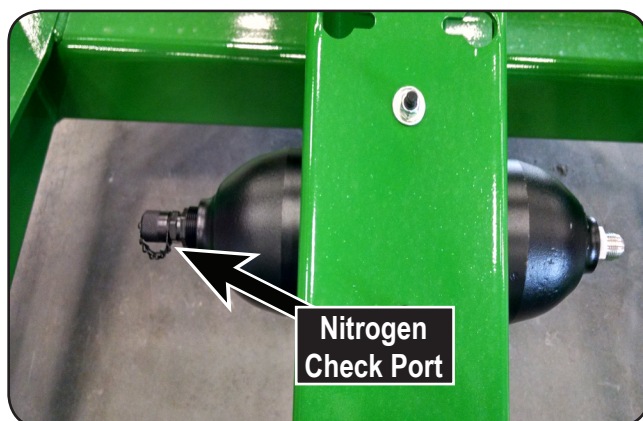


Figure 20. Accumulator

Service & Maintenance

Disc & Hub Removal/Installation

The machine must be in **transport position** with **wings pinned** before performing the following steps.

Removal

1. While supporting the disc, remove the 22M nut from the backside of the shank.
2. Remove disc and hub assembly.
3. With the disc on a sturdy surface, remove the (4) M12 bolts.

Installation

1. Apply Red thread locker to the M12 bolts.
2. Use the M12 bolts to assemble the disc to the hub. Torque the M12 bolts to 50 ft/lbs (68 Nm).
3. Apply red thread locker to the hub stud.
4. Use the M22 nut to assembly the hub to the shank. Torque the M22 nut to 365 ft/lbs (495 Nm).

Shank Removal/Installation

The machine must be in **transport position** with **wings pinned** before performing the following steps.

Removal

1. Remove disc and hub assembly. See above for instructions.
2. Remove (4) 5/8" x 2 bolts.
3. Remove shank, cap, and cords.

Installation

1. Place shank and cap on tube, start the nuts on the bolts.
2. Slide cords into place.
3. Tighten bolts in a cross pattern. Torque bolts to 170 ft/lbs (230 Nm).

Roller & Cradle Removal/Installation

The machine must be in **field position** with **disks resting on the ground** before performing the following steps.

Removal

1. Relieve hydraulic pressure against the roller lift cylinders.
2. Remove (8) 7/8" x 3 bolts.
3. Remove roller with bearings.
4. Support the roller cradle with 6" spacers under each side.

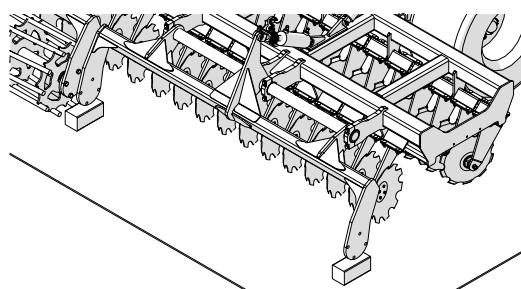


Figure 21. Roller Cradle Support

5. Relieve any remaining pressure against the roller lift cylinder.
6. Remove upper roller lift cylinder pin.
7. Remove (8) 3/4" x 3-3/4 bolts.
8. Remove cap, bushing, then the roller cradle.

Installation

1. Apply Red thread locker to the 3/4" x 3-3/4" bolts.
2. Position the roller cradle in the pivot cradles.
3. Use the 3/4" bolts to assemble the cap and outer bushing to the pivot cradle. Torque the 3/4" bolts to 297 ft/lbs (403 Nm).
4. Connect roller lift cylinder to roller cradle.
5. Remove spacers and position roller between cradle ends.
6. Use the 7/8" x 3" bolts and **new** 7/8" nylock nuts to assemble the roller bearings to the roller cradle. Torque the 7/8" bolts to 474 ft/lbs (642 Nm).

Note: Never reuse nylock nuts, these nuts are designed to only be used once and should be replaced whenever they are removed.

***The only exception to this rule is when thread locker is applied.**

Service & Maintenance

Wheel Removal/Installation

The machine must be in **field position** with **disks resting on the ground** before performing the following steps.

Removal

1. Relieve hydraulic pressure against the wheel lift cylinders.
2. Remove (10) 3/4" flange nuts.
3. Remove wheel.

Installation

1. Position wheel on hub.
2. Tighten flange nuts to 50 ft/lbs (68 Nm) using sequence below.
3. Check for proper seating against flange.
4. Tighten flange nuts to 350 ft/lbs (474 Nm) using sequence below.

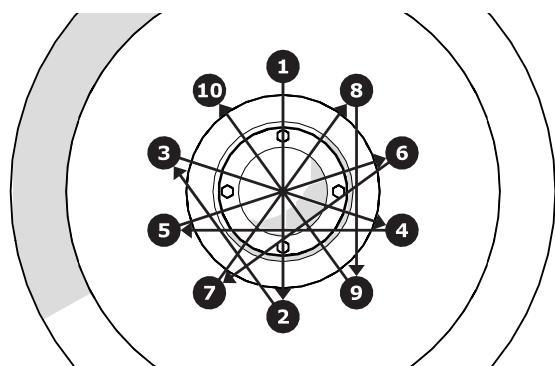


Figure 22. 10-Bolt wheel tightening sequence

Hydraulic Repairs

The machine must be in **field position** with **disks resting on the ground** before performing the following steps.

Removal

1. Relieve hydraulic pressure from system before starting any hydraulic repairs.
2. Use container to collect hydraulic oil.

Installation

1. Cycle hydraulics multiple times to purge air from the system.
2. Check system for leaks.

Hydraulic Jack Removal/Installation

The machine must be in **field position** with **disks resting on the ground** before performing the following steps.

Removal

1. Raise machine till the hitch is level.
2. Support the hitch under the hydraulic hose holder.
3. Fully retract hydraulic jack.
4. Remove pintel hitch by removing (2) 1" x 8" bolts.
5. Disconnect hydraulic hoses from jack. Use a container to collect the hydraulic oil.
6. Remove (4) 5/8" x 3" bolts holding the jack.
7. Remove hydraulic jack.

Installation

1. Install the hydraulic jack with the (4) 5/8" x 3 bolts. Torque bolts to 170 ft/lbs (230 Nm).
2. Install the pintle hitch with (2) 1" x 8" bolts. Torque bolts to 680 ft/lbs (925 Nm).
3. Connect hydraulic hose to jack.
4. Cycle cylinder multiple times to remove air from the system.
5. Raise hitch with jack, and remove hitch support.

Pivot Bushing Replacement

The machine must be in **field position** with **disks resting on the ground** before performing the following steps.

Removal

1. Remove (4) 3/4" x 3-3/4" bolts.
2. Remove bearing cap.
3. Remove pivot bushings, may have to lift rock shaft to relieve pressure on the inner bushing to remove the inner bushing.

Installation

1. Apply Red thread locker to the 3/4" x 3-3/4" bolts.
2. Install inner bushing before placing rock shaft back into place.
3. Install outer bushing with bearing cap. Use 3/4" bolts to install. Torque bolts to 297 ft/lbs (403 Nm).

Trouble Shooting

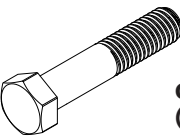
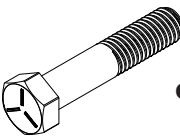
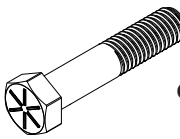
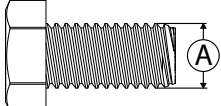
<i>Problem</i>	<i>Cause</i>	<i>Solution</i>
Machine doesn't track straight	Machine not level from front to back	Add or Remove cylinder stops as needed to level machine
Entire machine plugs	Ground speed too slow	Increase speed as specified in operations
	Working depth too deep	Add cylinder stops as needed
Wings plug	Wings not level	Verify same number of cylinders stop on main frame and wings
		Reduce digging depth
		Add weights to wings
Machine moves slowly	Low hydraulic pressure/flow from tractor	Increase flow/pressure to SCV in tractor
Machine does move	Hydraulic hoses from equipment not connected	Verify all hoses are securely connect to tractor
	Hydraulic hoses from equipment not connected in correct pairs	Refer to color code diagram and connect hoses of the same color to the same SCV on tractor

Bolt Torque Chart

Standard Torque Chart

Always tighten hardware to these values unless a different torque value or tightening procedure is listed for a specific application. Fasteners must always be replaced with the same grade as specified in the manual parts list.

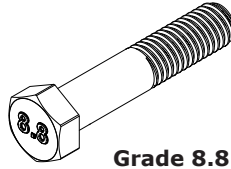
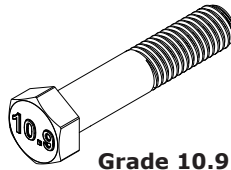
Make sure fastener threads are clean and you properly start thread engagement.

Bolt Head Identification							
Ⓐ Diameter (In)	Wrench Size (In)	Grade 2 Bolt (No Dashes)		Grade 5 Bolt (3 Dashes)		Grade 8 Bolt (6 Dashes)	
		<i>Ft./Lbs.</i>	<i>Nm</i>	<i>Ft./Lbs.</i>	<i>Nm</i>	<i>Ft./Lbs.</i>	<i>Nm</i>
1/4"	7/16"	6	8	10	13	14	18
5/16"	1/2"	12	17	19	26	27	37
3/8"	9/16"	23	31	35	47	49	67
7/16"	5/8"	36	48	55	75	78	106
1/2"	3/4"	55	75	85	115	120	163
9/16"	13/16"	78	106	121	164	171	163
5/8"	15/16"	110	149	170	230	240	325
3/4"	1-1/8"	192	261	297	403	420	569
7/8"	1-5/16"	306	416	474	642	669	907
1"	1-1/2"	350	475	680	925	1020	1383
1-1/8"	1-11/16"	450	610	885	1200		
1-1/4"	1-7/8"	600	815	1255	1700		
1-3/8"	2-1/16"	675	915	1620	2200		
1-1/2"	2-1/4"	920	1250	2200	2900		

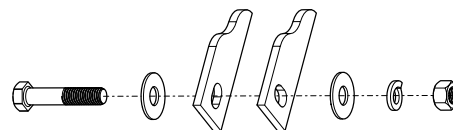
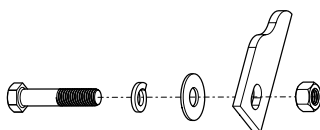
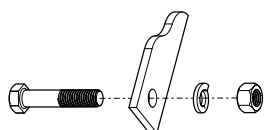
Metric Torque Chart

Use only metric tools on metric hardware. Always tighten hardware to these values unless a different torque value or tightening procedure is listed for a specific application. Fasteners must always be replaced with the same grade.

Make sure fastener threads are clean and you properly start thread engagement.

Ⓐ Diameter & Thread Pitch (Mm)	Wrench Size (Mm)	Coarse Thread				Fine Thread				Ⓐ Diameter & Thread Pitch (Mm)	Bolt Head Identification
		Grade 8.8		Grade 10.9		Grade 8.8		Grade 10.9			
		Ft./Lbs.	Nm	Ft./Lbs.	Nm	Ft./Lbs.	Nm	Ft./Lbs.	Nm		
6-M1.0	10	6	8	8	11						 Grade 8.8
8-M1.25	13	15	20	20	27	16	21	22	29	8-M1.0	
10-M1.5	16	29	39	40	54	30	41	42	57	10-M1.25	
12-M1.75	18	50	68	70	94	55	75	76	103	12-M1.25	
14-M2.0	21	80	109	111	151	87	118	120	163	14-M1.5	 Grade 10.9
16-M2.0	24	125	169	173	234	133	181	184	250	16-M1.5	
18-M2.5	27	172	234	239	323	194	263	268	363	18-M1.5	
20-M2.5	30	244	330	337	457	270	367	374	507	20-M1.5	
22-M2.5	34	332	451	460	623	365	495	505	684	22-M1.5	
24-M3.0	36	421	571	583	790	459	623	635	861	24-M2.0	
30-M3.0	46	867	1175	1199	1626	928	1258	1283	1740	30-M2.0	

Typical Installations



Abbreviations

AG	Agriculture	MO	Male O-Ring Boss
ASAE	American Society of Agricultural Engineers	MJ	Male JIC
ATF	Automatic Transmission Fluid	MJX	Male Swivel JIC
BSPP	British Standard Pipe Parallel	MP	Male Pipe
BSPTM	British Standard Pipe Taper Male	MPa	Mega Pascal
CV	Constant Velocity	MPH	Miles Per Hour
CCW	Counter-Clockwise	N	Newton
CW	Clockwise	NC	National Course
DIA	Diameter	NF	National Fine
EP	Extreme Pressure	NPSM	National Pipe Straight Mechanical
F	Female	NPT	National Pipe Tapered
FO	Female O-Ring Boss	NPTX	National Pipe Tapered Swivel
FJ	Female JIC	Nm	Newton Meter
FJX	Female Swivel JIC	OSHA ...	Occupational Safety & Health Administration
FP	Female Pipe	P	Pitch
Ft./Lbs.	Foot Pounds	PBY	Power Beyond
GA	Gauge	Psi	Pounds per Square Inch
GR (5, etc.)	Grade (5, etc.)	PTO	Power Take Off
HHCS	Hex Head Cap Screw	QD	Quick Disconnect
HT	Heat Treated	RH	Right Hand
In	Inch	ROPS	Roll Over Protection Structure
JIC	Joint Industry Council 37° Flare	RPM	Revolutions Per Minute
Kg	Kilogram	RT	Right
Km/h	Kilometers Per Hour	SAE	Society of Automotive Engineers
Lb	Pound	SMV	Slow Moving Vehicle
LH	Left Hand	UNC	Unified Coarse
LT	Left	UNF	Unified Fine
M	Meter	UNS	Unified Special
Mm	Millimeter	ZP	Zinc Plate
M	Male		

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Warranty

Warranty Registration

Customer's Name

Dealer's Name

Address

Address

City

State

Area Code

City

State

Area Code

Phone Number

Phone Number

Model

Serial Number

Delivery Date

Check One Below:

Commercial Use

Farm Use

Dealer Inspection Report

_____ Wheel Nuts Tight

_____ Tire Pressure

_____ Fasteners Tight

_____ All Decals Installed

_____ Signal Lights Work Properly

_____ Safety Chain Installed

_____ Review Operating & Safety Instructions

_____ Operator Manual Supplied

I have thoroughly instructed the buyer on the above described equipment including a review of the Operator's Manual content, equipment care, adjustments, safe operation and applicable warranty policy.

Date

Dealer's Signature

I have received the above equipment and Operator's Manual and I have been thoroughly instructed on its care, adjustments, safe operation and applicable warranty policy.

Date

Owner's Signature

Warranty

Limited Warranty Policy

Norwood Sales Inc. warrants to the buyer that the new machinery is free from defects in material and workmanship.

This warrant is only effective on new machinery, which has not been altered, changed or repaired since its delivery to the buyer.

Norwood Sales Inc. shall only be liable for defects in materials or workmanship and specifically excludes liability for repairs arising as a result of normal wear and tear of the new machinery and without limiting the generality of the foregoing, excludes application or installation of parts not completed in accordance with **Norwood Sales Inc.** operator's manual, specifications, or printed instructions.

Written notice shall be given by registered mail, to **Norwood Sales Inc.** within seven (7) days after the defect shall have become apparent or the repairs shall have become necessary, addressed as follows: **Norwood Sales Inc., 11202 38th Street South, Horace, ND 58047.**

This warranty shall expire one (1) year after the date of delivery of the new machinery.

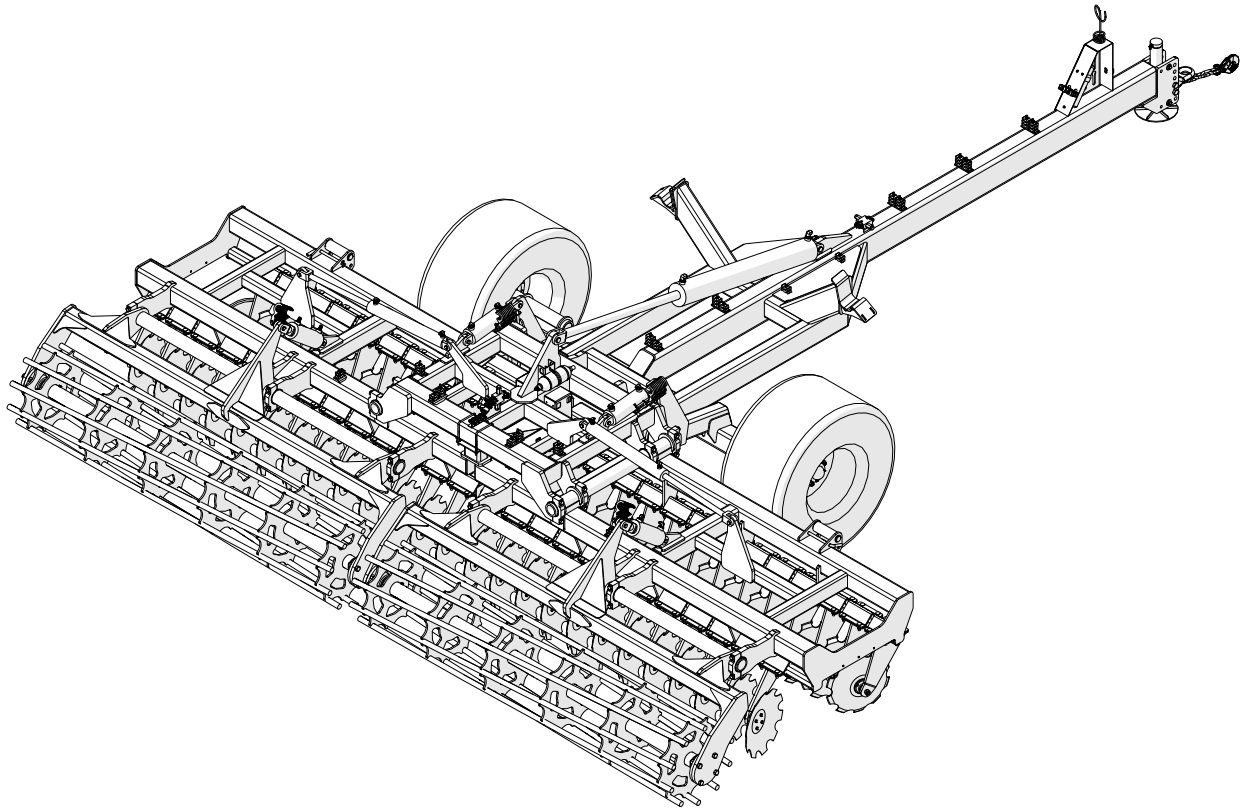
If these conditions are fulfilled, **Norwood Sales Inc.** at its option will either repair or replace any defect. The buyer shall be responsible for all expenses incurred as a result of repairs, labor, parts, transportation or any other work, unless **Norwood Sales Inc.** authorizes such expenses in advance.

The warranty shall not extend to any repairs, changes, alterations, or replacements made to the new equipment other than by **Norwood Sales Inc.** or its authorized dealers.

This warranty extends only to the original owner of the new equipment.

This warranty is limited to the terms stated herein and is in lieu of any other warranties whether expressed or implied, and without limiting the generality of the foregoing, excluded all warranties, expressed or implied or conditions whether statutory or otherwise as to quality and fitness for any purpose of the new equipment. **Norwood Sales Inc.** disclaims all liability for incidental or consequential damages.

This machine is subject to design changes and **Norwood Sales Inc.** shall not be required to retro-fit or exchange items on previously sold units except at its own option.



NORWOOD
Sales Inc.

Norwood Sales Inc.

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