



FIELD SERGEANT
HEAVY HARROW
OPERATOR/PARTS
MANUAL

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Heavy Harrow Operator's Manual

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Heavy Harrow Operator's Manual

Introduction

The Pillar Heavy Harrow is a well-built implement with some very good standard features, created by a team with nearly 100 years of collective design experience. The Pillar Heavy Harrow features hydraulic tine angle adjustment, hydraulic down pressure, hydraulic wheel transitioning between transport and field positions, harrow frame gauges visible from the tractor, structural steel draw tubes, and best of all, positive hitch weight in transport. With “on the go” hydraulic down pressure and hydraulic tine angle adjustment available from in the cab, it’s easy to adjust just how aggressive you want to harrow your field to achieve the desired field finish.



Heavy Harrow Operator's Manual

Features

1. With the patented design providing positive hitch weight in transport, you will never see a Pillar Heavy Harrow with the hitch sticking up in the air when parked. The Pillar Heavy Harrow is much safer to transport as it has over 1200 pounds of positive weight on the hitch in transport.
2. Structural steel draw tubes
3. Automatic draw tube unlocking
4. Hydraulic wheel transitioning between transport and field positions
5. Hydraulic tine angle adjustment with gauge visible from cab
6. Section level gauge
7. 10" x 10" x 1/4" main beams
8. 16.5L-16.1 SL Softrac center section tires
9. 26" x 9/16" harrow tines
10. 12.5L-15FI highway service wing tires
11. Hydraulically adjustable down pressure
12. Consistent down pressure and contouring though hilly terrain

Safety

SAFETY-ALERT SYMBOL



This symbol is used to denote possible danger and care should be taken to prevent bodily injury. This symbol means **ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED!**

THIS SYMBOL APPEARS WITH TEXT READING “DANGER!”, “CAUTION!”, OR “WARNING!” THESE WORDS INDICATE THREE LEVELS OF POSSIBLE HAZARDS THAT ARE DESCRIBED BELOW.



DANGER! Indicates an immediate hazardous situation which if not avoided, will result in death or serious injury. The color associated with Danger is RED.



WARNING! Indicates a potentially hazardous situation that if not avoided, could result in death or serious injury. The color associated with Warning is ORANGE.



CAUTION! Indicates a potentially hazardous situation which if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices. The color associated with Caution is YELLOW.

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General Safety Practices

REVIEW this manual before each season of use.

NEVER allow anyone unfamiliar, untrained, or complacent to operate the Heavy Harrow.

ALWAYS USE the jack supplied when unhooking the Heavy Harrow.

NEVER transport the Heavy Harrow at speeds higher than 32 km/hr (20 mph).

BE SURE the Heavy Harrow is securely fastened to a large farm tractor before operating hydraulics.

USE EXTREME CARE when making adjustments.

KEEP CHILDREN AWAY from all farm equipment.

Safety During Operation

DO NOT ALLOW ANYONE ON THE HEAVY HARROW while operating the Heavy Harrow hydraulics.

KEEP CHILDREN AWAY from the Heavy Harrow during operation.

NEVER STAND within the radius of the raised harrow sections. Hydraulic or mechanical failure may result in rapid or uncontrolled falling of the harrow sections.

Safety During Transport

CHECK with local authorities regarding transport on public roads. Obey all applicable laws and regulations.

ONLY TOW at a safe speed, to a maximum of 32 km/hr (20 mph). Use caution when turning or meeting traffic.

BE SURE safety lighting is plugged in and that the red tail light(s), amber flashers, and amber signal lights are all working properly.

ALWAYS be certain that no one is behind or around the Heavy Harrow before moving.

BE SURE all safety transport locks are in place before transporting the Heavy Harrow.

BE SURE the reflector decals are clearly visible from all sides of the Heavy Harrow and the Slow-Moving Vehicle sign is at the rear of the Heavy Harrow in clear view of overtaking traffic.

BE SURE all the wheel bolts are tight before transporting the Heavy Harrow.

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WATCH for power poles and overhead power lines. Transport height is 139-1/2" (3.54 m) and width is 178" (4.52 m).

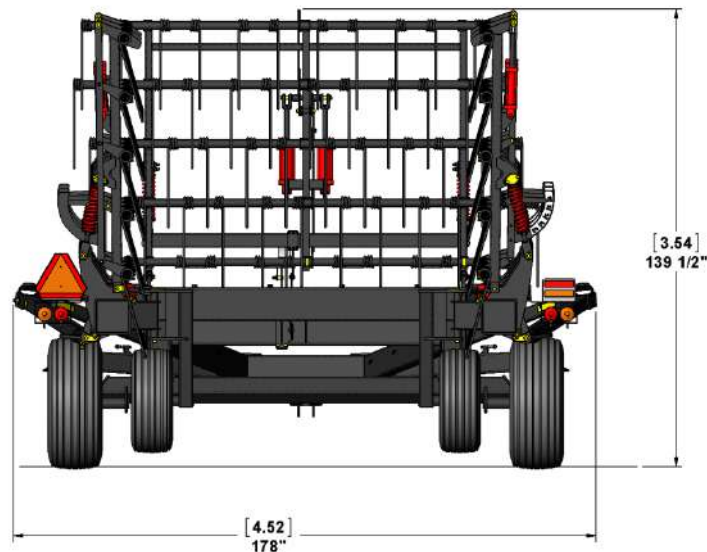


Figure 1. Transport Height and Width

ALWAYS lock the tractor drawbar when transporting the Heavy Harrow.

ALWAYS park the Heavy Harrow on level ground in transport position and block the wheels before unhooking from the towing vehicle.

NEVER subject the Heavy Harrow to steep side grades while in transport position.

ALWAYS use the hitch jack supplied with the Heavy Harrow when unhooking from the tractor.

NEVER brake or decelerate during cornering.

ALWAYS enter corners slowly.

REFER to the section, "Calculating the Minimum Towing Vehicle Weight for Safe Transport" to determine how to safely transport the Heavy Harrow.

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Safety During Servicing

SHUT DOWN TRACTOR ENGINE, remove key from tractor ignition, and be certain all moving parts have stopped before servicing implement.

ESCAPING HYDRAULIC FLUID HAZARD - escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury. Relieve pressure before disconnecting hydraulic lines. Check/tighten all connections **BEFORE** applying pressure. Use a piece of cardboard or paper to search for leaks. **NEVER** use your hand.

IF ANY fluid is injected into the skin, seek immediate medical attention. If not treated within a few hours, **GANGRENE MAY RESULT**.

ONLY service implement when it is in full field position.

DO NOT OVERINFLATE tires. **NEVER** lean over a tire while inflating it.

ALWAYS USE proper mounting procedures when mounting a tire to a rim. A tire not seated properly may explode when being inflated, causing serious injury or death.

BLOCK wheels to prevent movement when servicing.

BE SURE all safety transport locks are in place before servicing or working on the implement.

Safety Decals

KEEP SAFETY DECALS CLEAN. Wipe clean when necessary.

CHECK that the safety decals are not obstructed. If the decals are covered up, place in a location that is clear to view.

REPLACE missing or unreadable decals. New decals are available from your dealer or the manufacturer.

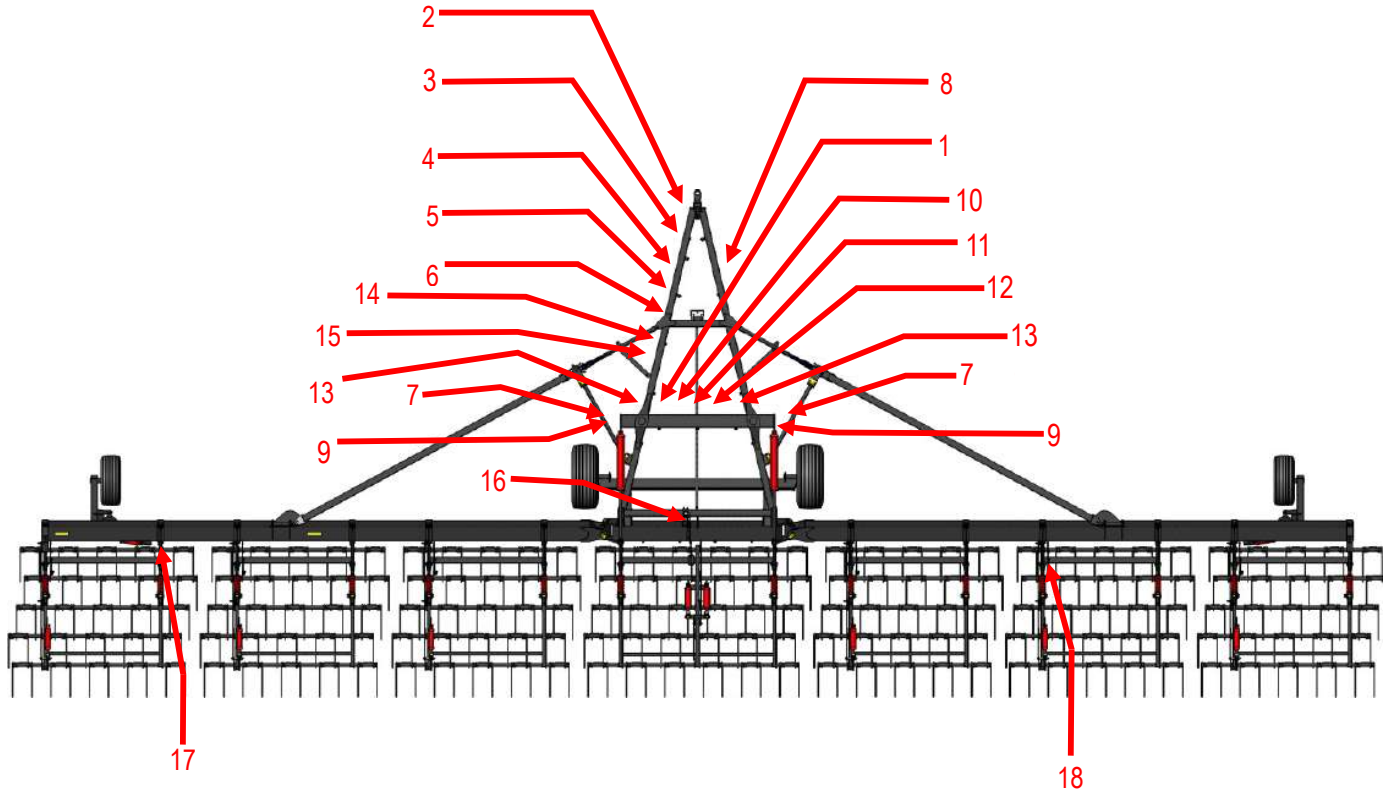
To replace decals:

1. Remove the old decal. Clean the area where the new decal will be affixed.
2. Remove the decal backing. Carefully affix the decal to the Heavy Harrow.
3. Work the air bubbles out from under the decal. Use a clean piece of paper or the decal backing itself.

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Decal Locations

Refer to the graphic below for locations of safety decals.



1



2



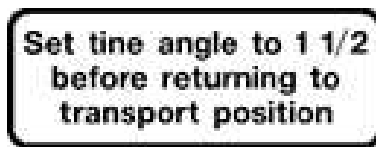
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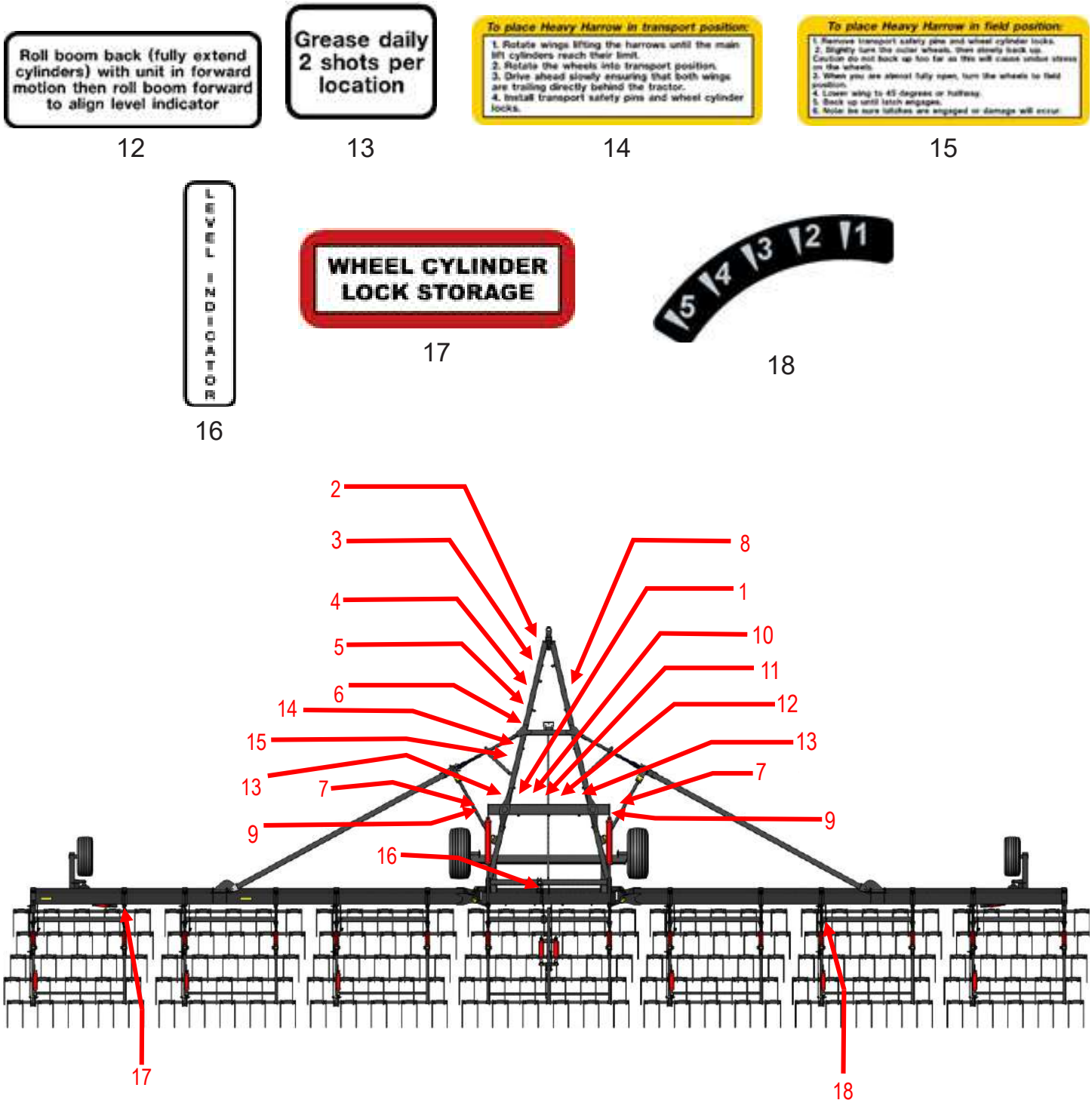
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11

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Refer to the graphic below for additional locations of safety decals.



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Safety Lights, Reflectors, Slow Moving Vehicle Sign

Keep the lenses of the safety lights clean. Keep the surfaces of the reflectors and the slow-moving vehicle sign clean.

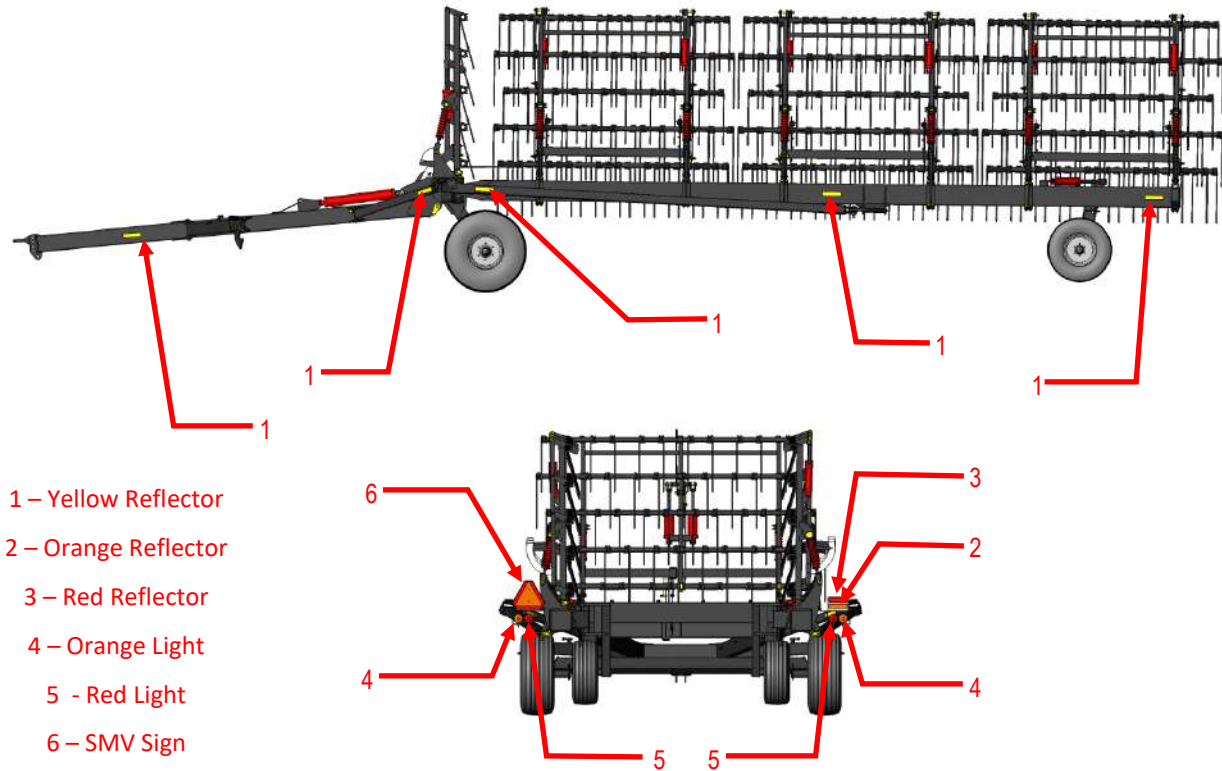


Figure 3. Safety Lights, Reflectors, and Slow-moving Vehicle Sign Locations

Operation

Connecting



WARNING! Lock tractor draw bar in its center position when transporting machine. Be sure safety transport locks are installed before transporting.

Always connect a safety chain between the Heavy Harrow and the tractor.

1. Always use a clevis hitch on the tractor when towing the Heavy Harrow.
2. Secure the Heavy Harrow to the tractor drawbar using an adequate draw pin, locked in place with a hairpin or other proper locking device.
3. Retract and rotate jack, pinning jack in horizontal position for storage. Using the pin connector chain, secure the jack handle in the horizontal position to prevent the handle from accidentally swinging down.
4. Connect the safety chain as shown in Figure 4 below. Be sure the safety chain has enough slack to allow the implement to turn.
5. Connect hydraulics to tractor. To avoid getting dirt in the hydraulic system, wipe off tips before connecting.

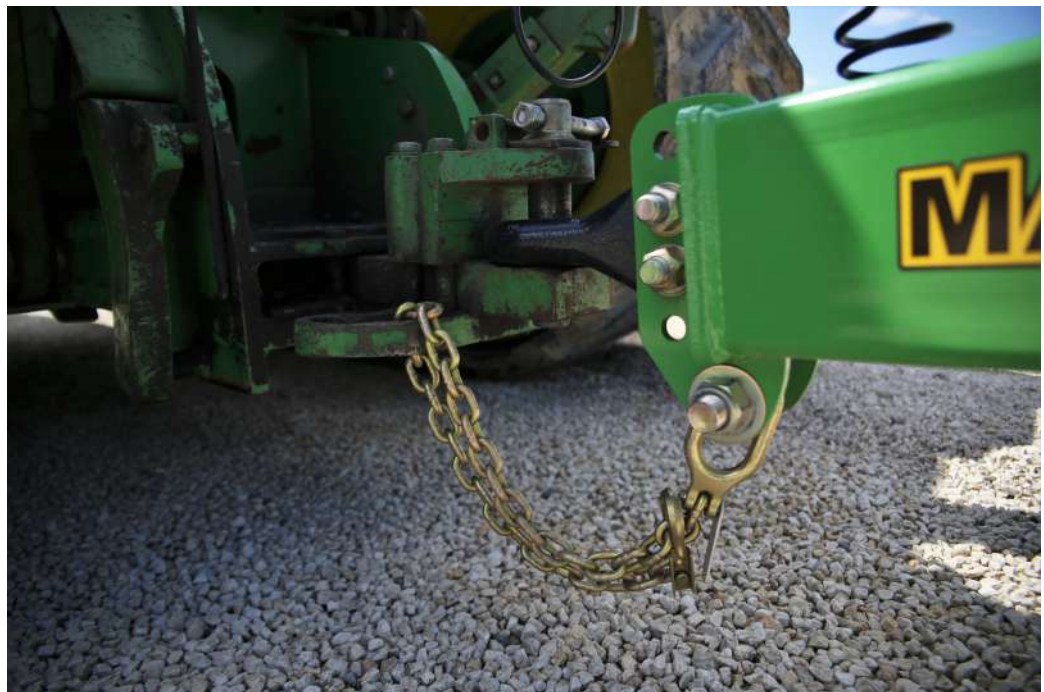


Figure 4. Connecting Heavy Harrow to Tractor

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Folding and Unfolding



WARNING! Keep everyone clear of the machine when folding or unfolding wings.

Be sure hydraulic system is fully charged with oil before operating. Failure to do so will allow wings to fall rapidly.

To avoid injury or death, do not contact electric lines.

To avoid injury or death, do not adjust the machine while in motion.

To avoid injury or death, ensure safety transport locks are installed before transporting or servicing machine.

To place Heavy Harrow in transport position:

1. Move tine angle to 1-1/2 before returning to transport position
2. Rotate wings, lifting the harrows until the main lift cylinders reach their limit.
3. Rotate the wheels into transport position.
4. Drive ahead slowly, ensuring that both wings are trailing directly behind the tractor.
5. Insert transport safety pin.

To place Heavy Harrow in field position:

1. Remove transport safety pin.
2. Slightly turn the outer wheels, then slowly back up. **Caution** - do not back up too far, as this will place undue stress on the wheels.
3. When wings are almost fully open, turn the outer wheels to field position.
4. Lower wings to 45 degrees or half way.
5. Back up until both draw tube latches engage. Note: Be sure latches are engaged or damage will occur.
6. Once latches are engaged, with tractor moving forward, continue to rotate the sections down past the notch on the level indicator to pressurize the cylinders, then reverse the rotation to bring level indicator back to the notch in order to level the harrow sections. Keeping the tractor moving forward while lowering the wings prevents the tine ends from leading instead of trailing.

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Safety Transport Locks

The Heavy Harrow has transport lock pins which must be put in place prior to transporting the implement. Refer to figures below (left side shown – right side is the same).

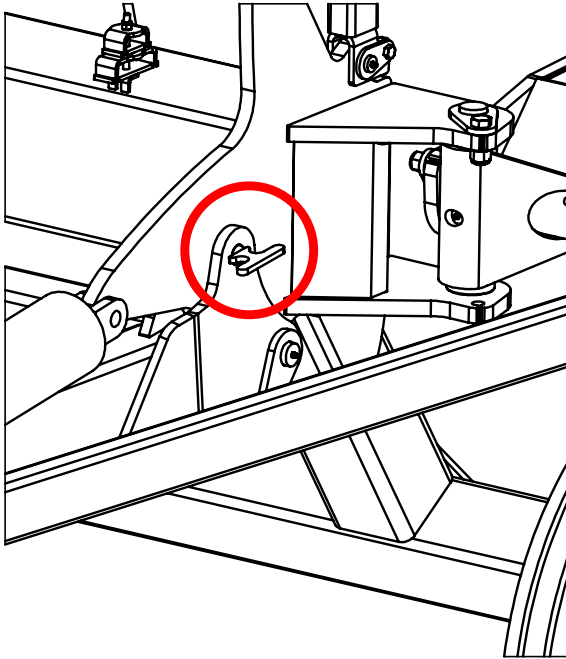


Figure 5. Transport Pin in Place

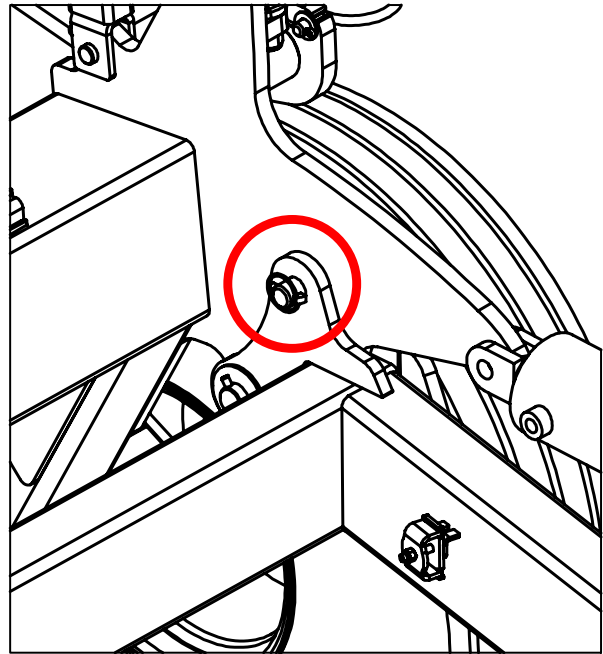


Figure 6. Lynch Pin in Place

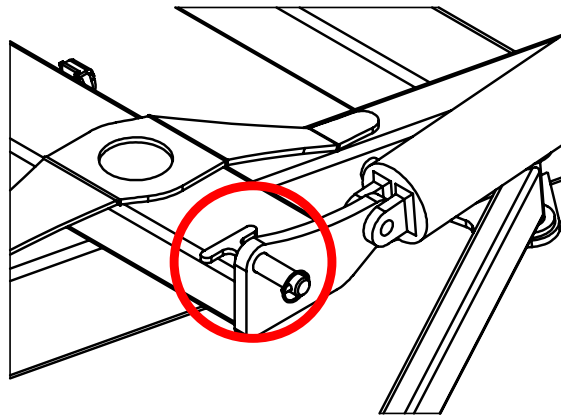


Figure 7. Transport Pin Storage Location

General Field Operation

Level Indicator

An indicator is provided to show when the harrow sections are level with the ground (indicating arrow pointing at notch). In most cases the sections should be level with the ground for best results. When the tine angle is changed, the harrow frames may become unlevel. The main lift cylinders will then need to be used to rotate the booms slightly until the level indicator is again pointing at the notch. Adjusting the spring down pressure may also cause the harrow frames to become unlevel. Use the main lift cylinders to rotate the booms until the indicator is pointing at the notch.

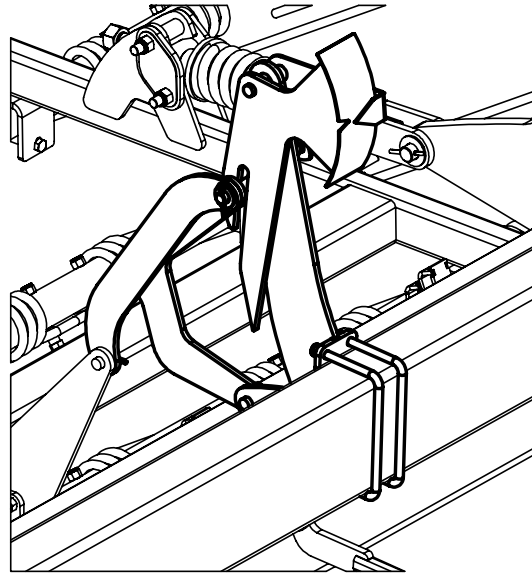


Figure 8. Level Indicator

Tine Angle Indicator

The Heavy Harrow is equipped with series rephasing hydraulic cylinders controlling the tine angle, enabling on-the-go repositioning. The tine angle indicator shows the current working angle of the tines, with 1 indicating the most aggressive setting and 5 the least aggressive. It is recommended that the cylinders be rephased periodically. In order to do this, extend the tine angle cylinders fully and hold the hydraulic lever in that position for several seconds. The tine angle indicator will be at position 1. Return the tine angle to the desired position.

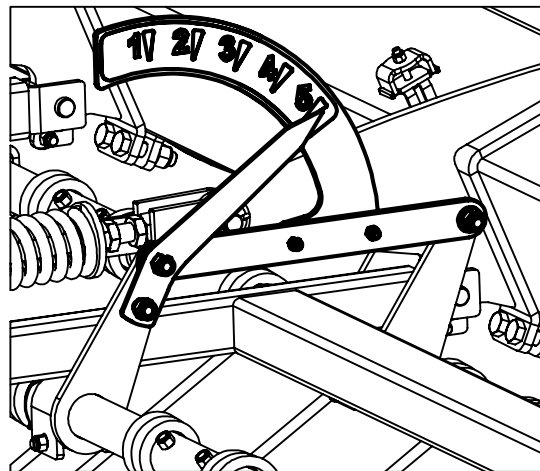


Figure 9. Tine Angle Indicator

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Down Pressure Spring

Two springs per harrow section are provided to apply down pressure to the harrow tines. Dimension 'A' is normally set to 3-1/4" on 10' sections and 4-1/4" on 12' sections. This setting is best for most conditions. Down pressure can be increased or decreased by turning the adjustment nut. Clockwise nut rotation (spring compressed more) increases down pressure. Dimension 'A' should match across all 10' sections on the machine. Likewise, dimension 'A' should match across all 12' sections. If the wing frames cannot be leveled relative to the center frame, dimension 'A' may need to be set slightly differently for the center frame compared to the wing frames.

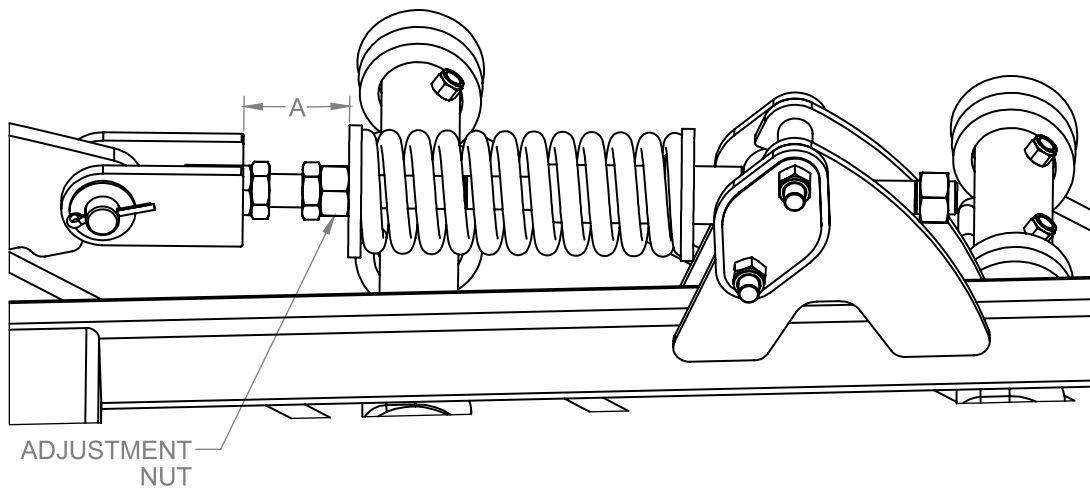


Figure 10. Down Pressure Spring

Transport

Transporting



WARNING! Transporting the towed equipment with an underweight towing vehicle could cause a loss of control during transport or braking, resulting in serious injury or death.

Transporting the towed equipment at speeds greater than 32 km/hr (20 mph) could result in a loss of control and serious injury or death. Be sure safety transport locks are installed before transporting. To prevent accidental disconnection, use a safety chain between tow vehicle and Heavy Harrow hitch when transporting on public roads.

IMPORTANT INFORMATION ABOUT TRANSPORTING

1. As a general rule, the weight of the towed equipment should be less than or equal to the weight of the towing vehicle.
2. Under no circumstances should the weight of the towed equipment be more than 1.5 times the weight of the towing vehicle.
3. Some guidelines to follow when transporting:
 - The towing vehicle **MUST** be able to control the moving mass.
 - The towing vehicle **MUST** be able to brake (stop) when required.
 - **AVOID** sudden stops.
 - Enter turns at **SLOW SPEED**.
 - **DO NOT** brake or decelerate during cornering.
 - **AVOID** sharp turns to reduce side loading on the rear wheels of the Heavy Harrow.
 - **AVOID** steep slopes.
 - **DO NOT** cut through ditches or ravines.

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Transporting Behind a Towing Vehicle Other Than a Tractor

- Determine if the towing vehicle is heavy enough to transport the towed equipment.
- The towing vehicle must have a clevis hitch.
- Secure the hitch with a 1-1/4" diameter or greater draw pin with a safety catch.
- A safety chain with a strength rating equal to or greater than the gross weight of the Heavy Harrow must be used.
- Be sure a slow moving vehicle (SMV) sign is properly installed and is clearly visible at the rear of the Heavy Harrow.
- Use the Heavy Harrow safety lights unless it is prohibited by law.
- Observe local restrictions.
- Secure hitching.

Transporting Behind a Tractor

- Determine if the tractor is heavy enough to transport the towed equipment.
- Tractor must have a clevis hitch.
- Lock the tractor drawbar in its centered position.
- Secure the hitch with a 1-1/4" diameter or greater draw pin with a safety catch.
- A safety chain with a strength rating equal to or greater than the gross weight of the Heavy Harrow must be used.
- Be sure a slow moving vehicle (SMV) sign is properly installed and is clearly visible at the rear of the Heavy Harrow.
- Use the Heavy Harrow safety lights unless it is prohibited by law.
- Observe local restrictions.
- Secure hitching.

Heavy Harrow Operator's Manual

Calculating the Minimum Towing Vehicle Weight for Safe Transport

1. Add the weights of all towed equipment.

Estimated Heavy Harrow weights:

52' Heavy Harrow = 10,424 lb (4,728 kg)

60' Heavy Harrow = 11,331 lb (5,140 kg)

72' Heavy Harrow = 12,832 lb (5,820 kg)

84' Heavy Harrow = 14,341 lb (6,505 kg)

2. Divide the total combined weight of the towed equipment by **1.5** to determine the minimum towing vehicle weight required for safe transport.

EXAMPLE: $\frac{14,341 \text{ lb (6,505 kg)}}{1.5} = 9,561 \text{ lb (4,337 kg)}$

= minimum towing vehicle weight required for safe transport

3. Refer to the towing vehicle Operator's Manual to determine if its weight is greater than the minimum vehicle weight required.

Disconnecting in Field Position



CAUTION! Always park implement on level ground and block wheels before attempting to unhook.

Escaping fluid hazard - Escaping hydraulic fluid under pressure can penetrate the skin causing serious injury. Relieve pressure before disconnecting hydraulic lines. Check/tighten all connections before applying pressure. Use a piece of cardboard or paper to search for leaks. Never use your hand. If any fluid is injected into the skin, seek immediate medical attention. If not treated within a few hours, gangrene may result.

Disconnecting in Field Position - Implement Lowered

1. The harrow sections must be down in field position.
2. Rotate the jack down from its storage position and pin it in a vertical position.
3. Extend the jack to remove the weight from the tractor.
4. Disconnect the hydraulic hoses.
5. Unhook the safety chain and unplug the lighting cable harness (if equipped).
6. Remove the draw pin and carefully drive away.

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Disconnection in Transport Position

1. If in transport position, harrow sections should already be raised. Block the wheels to prevent movement.
2. Rotate the jack down from its storage position and pin it in a vertical position.
3. Extend the jack to remove the weight from the tractor.
4. Disconnect the hydraulic hoses.
5. Unhook the safety chain and unplug the lighting cable harness (if equipped).
6. Remove the draw pin and carefully drive away.



Maintenance

Servicing Safety Precautions



SHUT DOWN TRACTOR ENGINE, remove key from tractor ignition and be certain all moving parts have stopped before servicing implement.

ESCAPING HYDRAULIC FLUID HAZARD - escaping hydraulic fluid under pressure can penetrate the skin causing serious injury. Relieve pressure before disconnecting hydraulic lines. Check/tighten all connections **BEFORE** applying pressure. Use a piece of cardboard or paper to search for leaks. **NEVER** use your

hand. **IF ANY** fluid is injected into the skin, seek immediate medical attention, if not treated within a few hours **GANGRENE MAY RESULT**.

ONLY service the implement when it is in full field position.

DO NOT OVERINFLATE tires. **NEVER** lean over a tire while inflating it.

ALWAYS USE proper mounting procedures when mounting a tire to a rim. A tire not seated properly may explode when being inflated causing serious injury or death.

BLOCK wheels to prevent movement when servicing.

BE SURE all safety transport locks are in place before servicing or working on the implement.

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Daily Maintenance (Every 10 hours)

Grease the following locations:

- Harrow frame pivots – 10 or 14 places depending on width – 10 hours
- Draw tube lugs – 2 places – 10 hours
- Knuckle pins – 4 places – 10 hours

Weekly Maintenance (Every 50 hours)

- Wheel arm pivots – 2 places – 50 hours
- Hitch pivot pins – 2 places – 50 hours
- Draft link carrier – 2 places – 50 hours

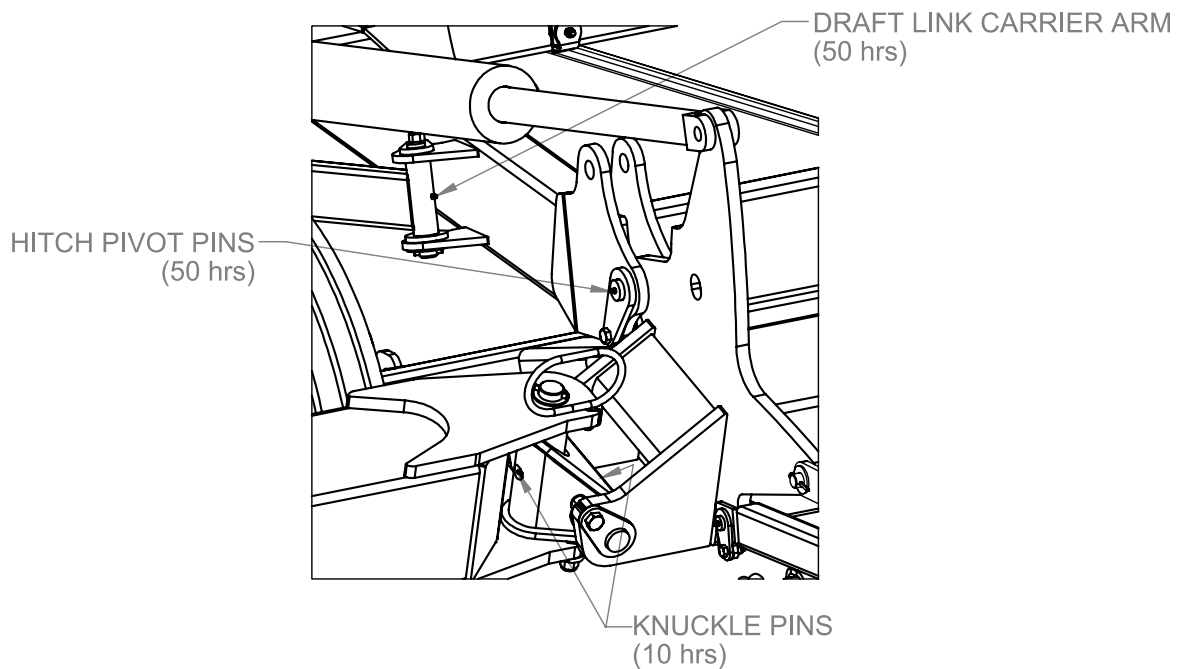


Figure 11. Grease Locations - Center

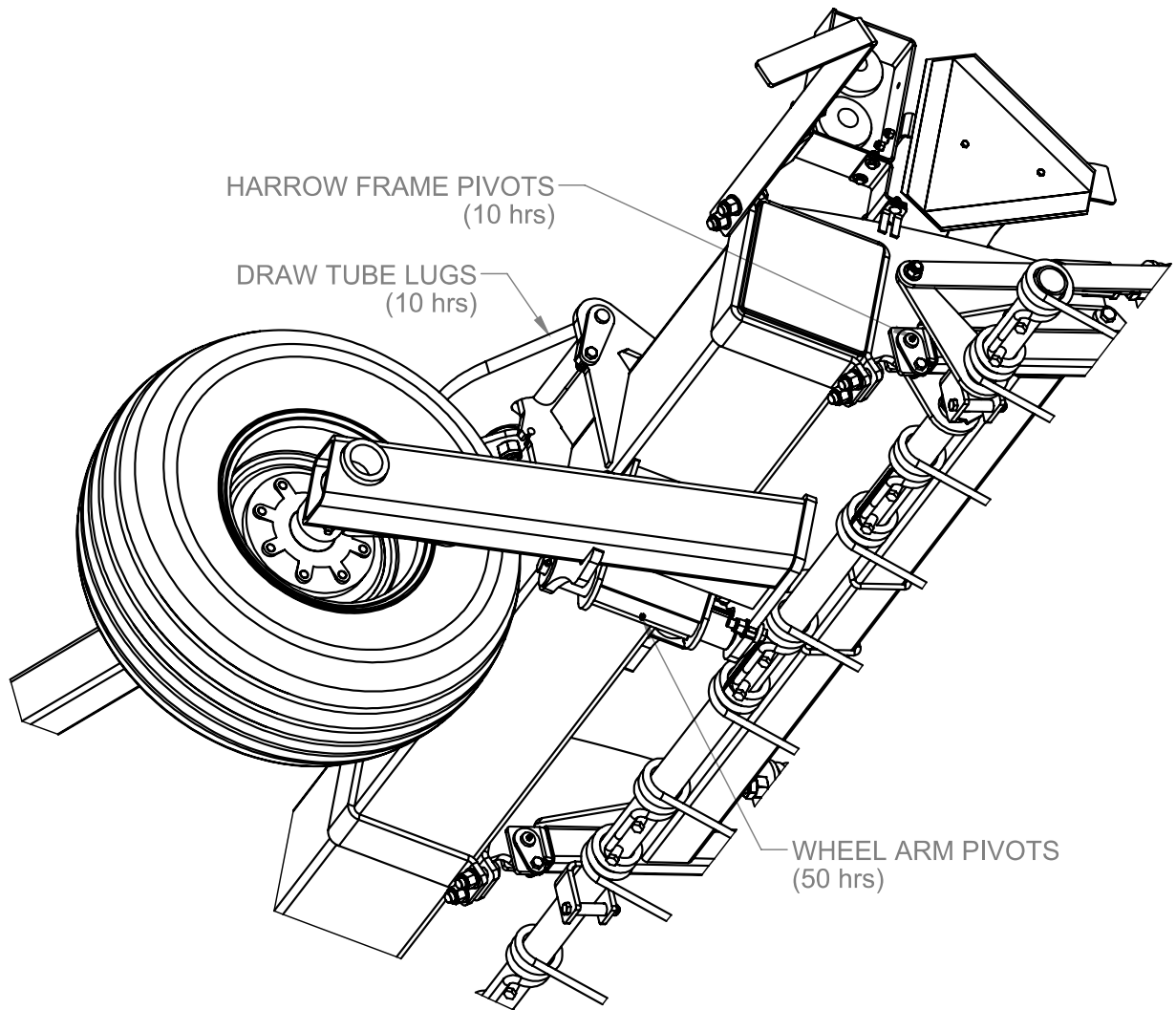


Figure 12. Grease Locations - Wing

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Semi-Annual Maintenance

1. Perform all daily and weekly maintenance items.
2. Grease all wheel hubs and inspect for looseness. Do not over-grease!

Before Seasonal Operation or Before Storage

1. Perform all daily and weekly maintenance items.
2. Inspect the implement. Be sure all components are ready for the field. Check the frame for any signs of structural cracks.
3. When placing the implement in storage for more than one month, coat all exposed hydraulic ram surfaces with a thick oil to protect them from the elements.
4. Check the implement, including tines, for loose bolts and tighten.

Changing Tires

To prevent injury when changing tires on the implement, always block raised section. Be sure section is stable before proceeding. Never rely on a jack or hydraulic device to support raised implement.

1. Use a wrench or impact to loosen the lug nuts.
2. Using a minimum of a 10 ton hydraulic jack and the necessary blocking, jack the implement until the weight is relieved from the tire.
3. Remove the lug nuts and pull the tire off the machine.
4. Place the spare on the machine, reinstall lug nuts, and hand-tighten.
5. Lower the machine back down to the ground and use a wrench or impact to fully tighten the nuts.

Note: Re-torque wheel bolts after first 10 hours of operation and frequently thereafter. Recommended torque is 150 ft·lb (200 N·m).

Changing Tines

To change tines:

1. Raise and block each harrow section to remove weight from the tines.
2. Remove the harrow tube (1) by removing bolt (2), spacer (3), and nut (4).
3. Remove shoulder bolts (5) and nuts (6) holding each tine (7). Some tines will also have a rotation-limiting tine clip (8) to remove.
4. Slide old tines off the end of the harrow tube.
5. Replace all removed components, ensuring that tine clips are replaced in their original locations.
6. Remove blocking and return harrow section to normal position.

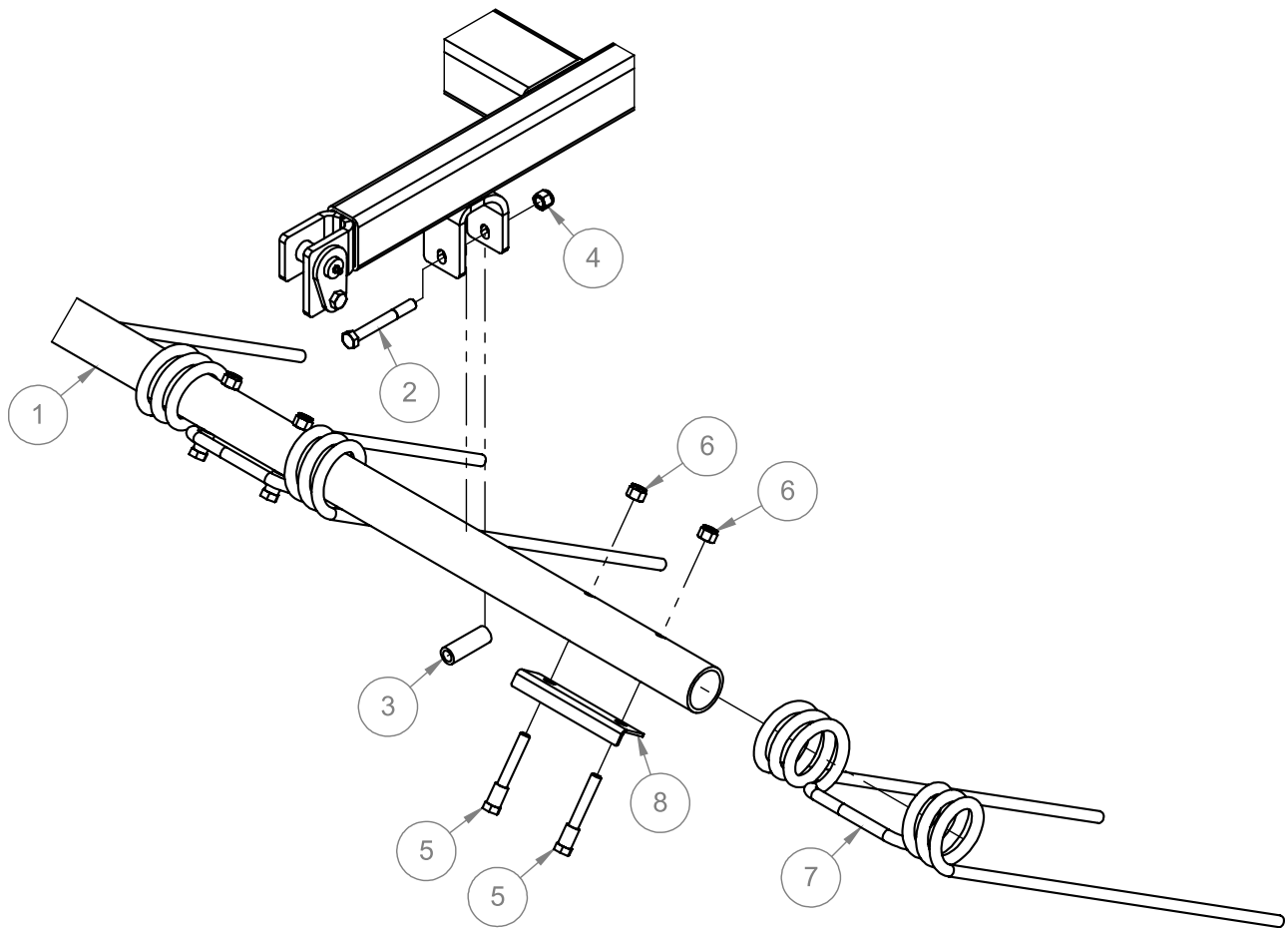


Figure 13. Tine Detail

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Maintenance Table

Refer to the table below for routine maintenance and lubrication intervals. Service items below either daily, weekly, semi-annually or annually or at the hours indicated in the table. Copy this maintenance table to continue your records.

DATE											
Serviced by											
10 Hours (Daily)											
Grease Harrow frame pivots – 10 or 14 places depending on width											
Grease Draw tube lugs – 2 places											
Grease Knuckle pins – 4 places											
DATE											
Serviced by											
50 Hours (Weekly)											
Grease Wheel arm pivots – 2 places											
Grease Hitch pivot pins – 2 places											
Grease Draft link carrier – 2 places											
DATE											
Serviced by											
Semi-Annual Maintenance											
Perform all daily and weekly maintenance items											
Grease all wheel hubs (3) and inspect for looseness											

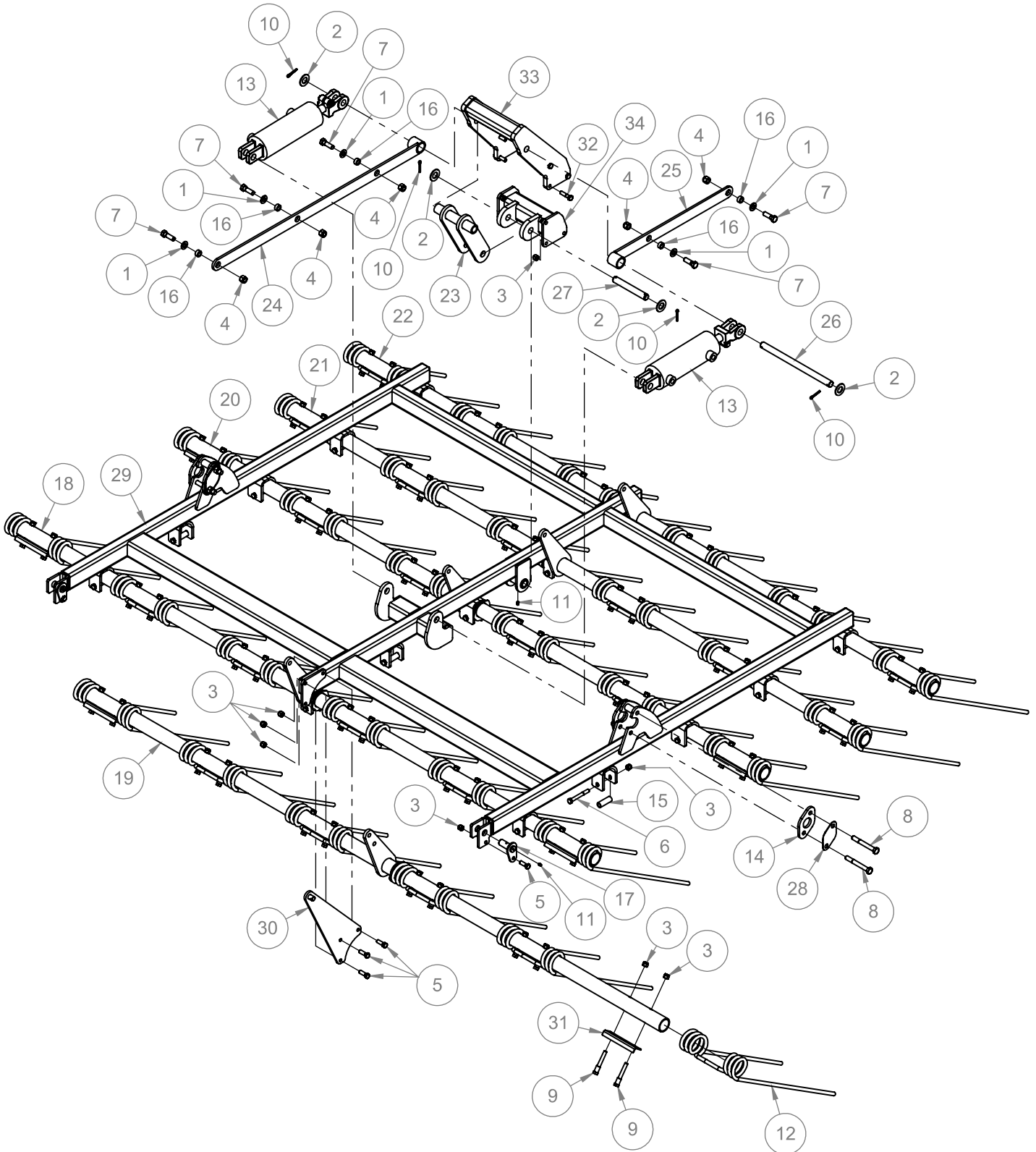
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DATE											
Serviced by											
Before Seasonal Operation or before storage											
Perform or check items listed under daily and weekly maintenance											
Inspect the implement. Be sure all components are ready for the field. Check the frame for any signs of structural cracks.											
When placing the implement in storage for more than one month, coat all exposed hydraulic ram surfaces with a thick oil to protect them from the elements.											
Check the implement, including tines, for loose bolts and tighten.											

Heavy Harrow Operator's Manual

Parts Information

Harrow Frame Assembly, 12' Center

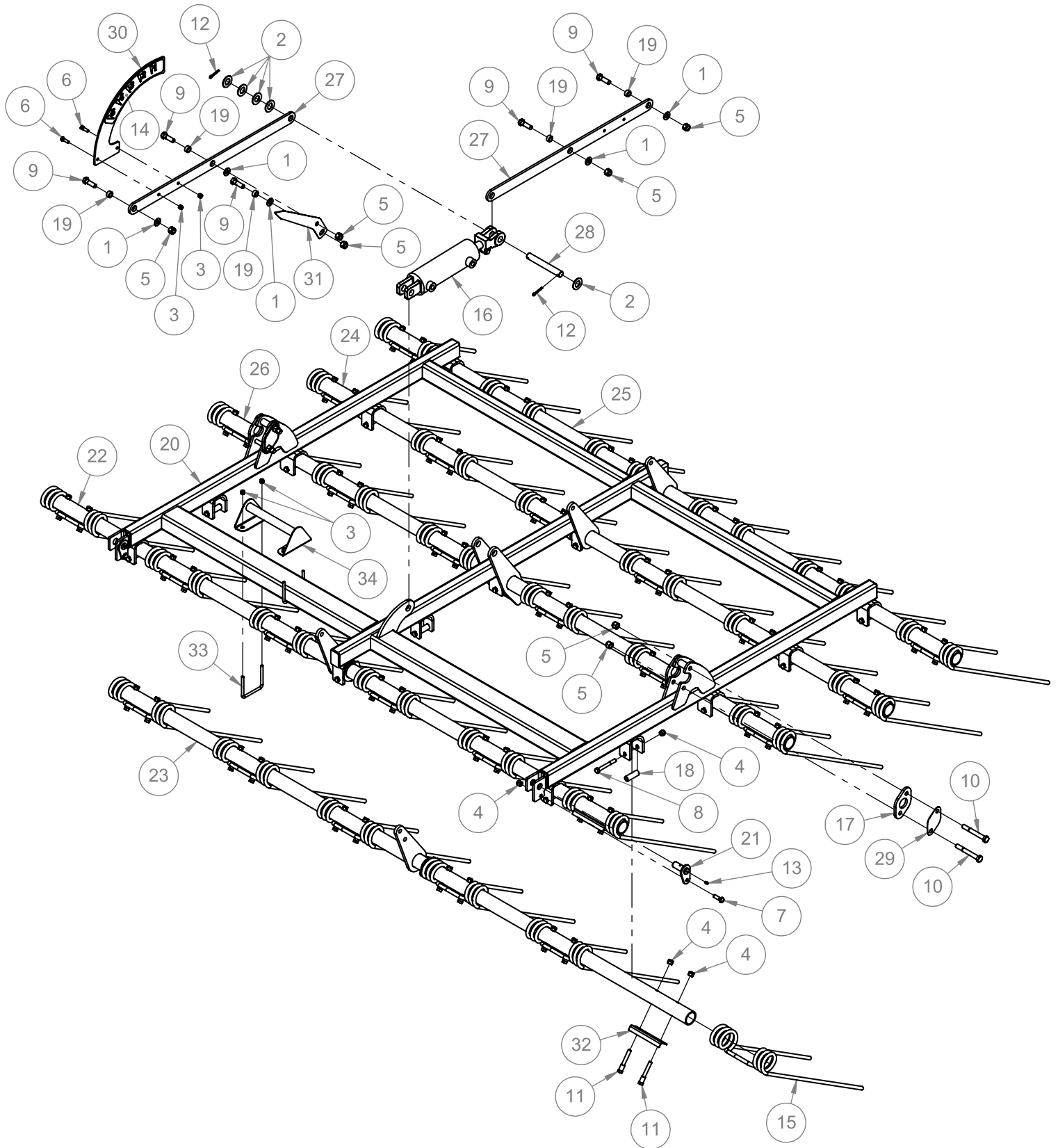


Heavy Harrow Operator's Manual

<i>Harrow Frame Assembly, 12' Center</i>			
ITEM NO.	PART NUMBER	DESCRIPTION	QTY
1	102-007	WASHER 5/8 PLATED SAE	5
2	102-010	WASHER 1 PLATED SAE	4
3	114-005	LOCKNUT, 1/2" UNC NYL INS GR 2 YZ	86
4	114-007	LOCKNUT, 5/8" UNC NYL INS GR 2 YZ	9
5	125-103	BOLT, 1/2 X 1-1/2 UNC GR5 PLATED	5
6	125-113	BOLT, 1/2 X 4 UNC GR5 PLATED	15
7	125-155	BOLT, 5/8 X 2 UNC GR5 PLATED	5
8	125-167	BOLT, 5/8 X 5 UNC GR5 PLATED	4
9	165-005	SHOULDER BOLT, 1/2 X 3-3/4 UNC GR5 PLATED	60
10	170-079	COTTER PIN, 1/4 X 2 PLATED	4
11	180-005	GREASE ZERK, 1/4-28 UNF STRAIGHT	3
12	212-033 212-145	HARROW TINE, 9/16" WIRE, 26" LG, REM 562 CARBIDE HARROW TINE, 9/16" WIRE, 26" LG	30
13	212-175 212-174	CYL, 3.5 x 8 SAE RPHG, WELDED, Ram P/N R4508886 CYL, 3.75 x 8 SAE RPHG, WELDED, Ram P/N R4508885	2
14	500-1026	CARTRIDGE PIVOT BEARING	4
15	500-1033	SPACER PIPE, HARROW TUBES	15
16	500-1079	SPACER, HARROW LINKAGE	5
17	500-1117	PIN, 1" DIA	2
18	500-1126	HARROW TUBE, 12' (1)	1
19	500-1129	HARROW TUBE, 12' (2)	1
20	500-1131	HARROW TUBE, 12' (3)	1
21	500-1133	HARROW TUBE, 12' (4)	1
22	500-1135	HARROW TUBE, 12' (5)	1
23	500-1140	MASTER CYLINDER PITMAN	1
24	500-1143	PITCH LINK, 12' LONG	1
25	500-1147	PITCH LINK, 12' SHORT	1
26	500-1176	CYLINDER PIN, CENTER FRAME	1
27	500-1273 500-1178	PIN, LONG, PITMAN LOWER PIVOT PREV. STYLE - PIN, PITMAN LOWER PIVOT	1
28	500-1200	PIVOT PIN KEEPER	4
29	500-1207	HARROW FRAME, 12' CENTER, 6" SETBACK	1
30	500-1247	INDICATOR MOUNT, HARROW FRAME	1
31	500-1261	TINE CLIP	6
32	125-105	BOLT, 1/2 X 2 UNC GR5 PLATED	6
33	500-1271	CENTER CYL. BRACE, UPPER	1
34	500-1272	CENTER CYL. BRACE, LOWER	1

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Harrow Frame Assembly, 12' Wing

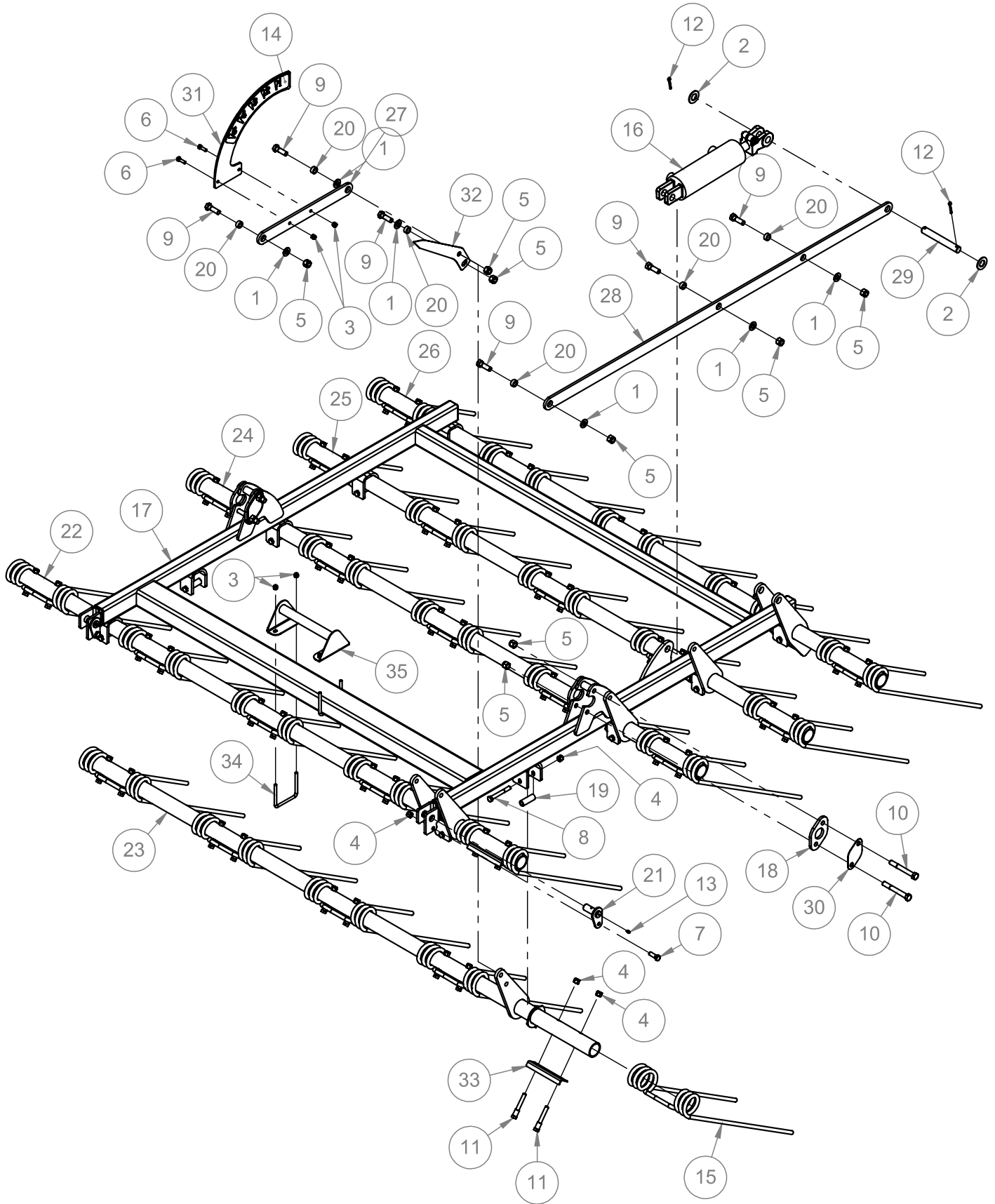


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<i>Harrow Frame Assembly, 12' Wing</i>			
ITEM NO.	PART NUMBER	DESCRIPTION	QTY
1	102-007	WASHER 5/8 PLATED SAE	5
2	102-010	WASHER 1 PLATED SAE	5
3	114-003	LOCKNUT, 3/8" UNC NYL INS GR 2 YZ	6
4	114-005	LOCKNUT, 1/2" UNC NYL INS GR 2 YZ	77
5	114-007	LOCKNUT, 5/8" UNC NYL INS GR 2 YZ	9
6	125-053	BOLT, 3/8 X 1-1/4 UNC GR5 PLATED	2
7	125-103	BOLT, 1/2 X 1-1/2 UNC GR5 PLATED	2
8	125-113	BOLT, 1/2 X 4 UNC GR5 PLATED	15
9	125-155	BOLT, 5/8 X 2 UNC GR5 PLATED	5
10	125-167	BOLT, 5/8 X 5 UNC GR5 PLATED	4
11	165-005	SHOULDER BOLT, 1/2 X 3-3/4 UNC GR5 PLATED	60
12	170-079	COTTER PIN, 1/4 X 2 PLATED	2
13	180-005	GREASE ZERK, 1/4-28 UNF STRAIGHT	2
14	210-020 210-021	DECAL, TINE ANGLE, RH DECAL, TINE ANGLE, LH	1
15	212-033 212-145	HARROW TINE, 9/16" WIRE, 26" LG, REM 562 CARBIDE HARROW TINE, 9/16" WIRE, 26" LG	30
16	212-175 212-176 212-177	CYL, 3.5 x 8 SAE RPHG, WELDED, Ram P/N R4508886 CYL, 3.25 x 8 SAE RPHG, WELDED, Ram P/N R4508887 CYL, 3 x 8 SAE RPHG, WELDED, Ram P/N R4508888	1
17	500-1026	CARTRIDGE PIVOT BEARING	4
18	500-1033	SPACER PIPE, HARROW TUBES	15
19	500-1079	SPACER, HARROW LINKAGE	5
20	500-1082	HARROW FRAME, 12' WING	1
21	500-1117	PIN, 1" DIA	2
22	500-1126	HARROW TUBE, 12' (1)	1
23	500-1129	HARROW TUBE, 12' (2)	1
24	500-1133	HARROW TUBE, 12' (4)	1
25	500-1135	HARROW TUBE, 12' (5)	1
26	500-1137	HARROW TUBE, 12' (3)	1
27	500-1168	PITCH LINK, 12' WING	2
28	500-1174	CYLINDER PIN, WING FRAMES	1
29	500-1200	PIVOT PIN KEEPER	4
30	500-1257	TINE ANGLE GAUGE	1
31	500-1259	POINTER, TINE ANGLE	1
32	500-1261	TINE CLIP	2
33	185-003	U-BOLT, 3/8 X 4-1/16 W X 4 H, UNC GR5 PLATED	2
34	500-1269	SAFETY LOCK STORAGE, REAR WHEEL	1

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Harrow Frame Assembly, 10' Wing

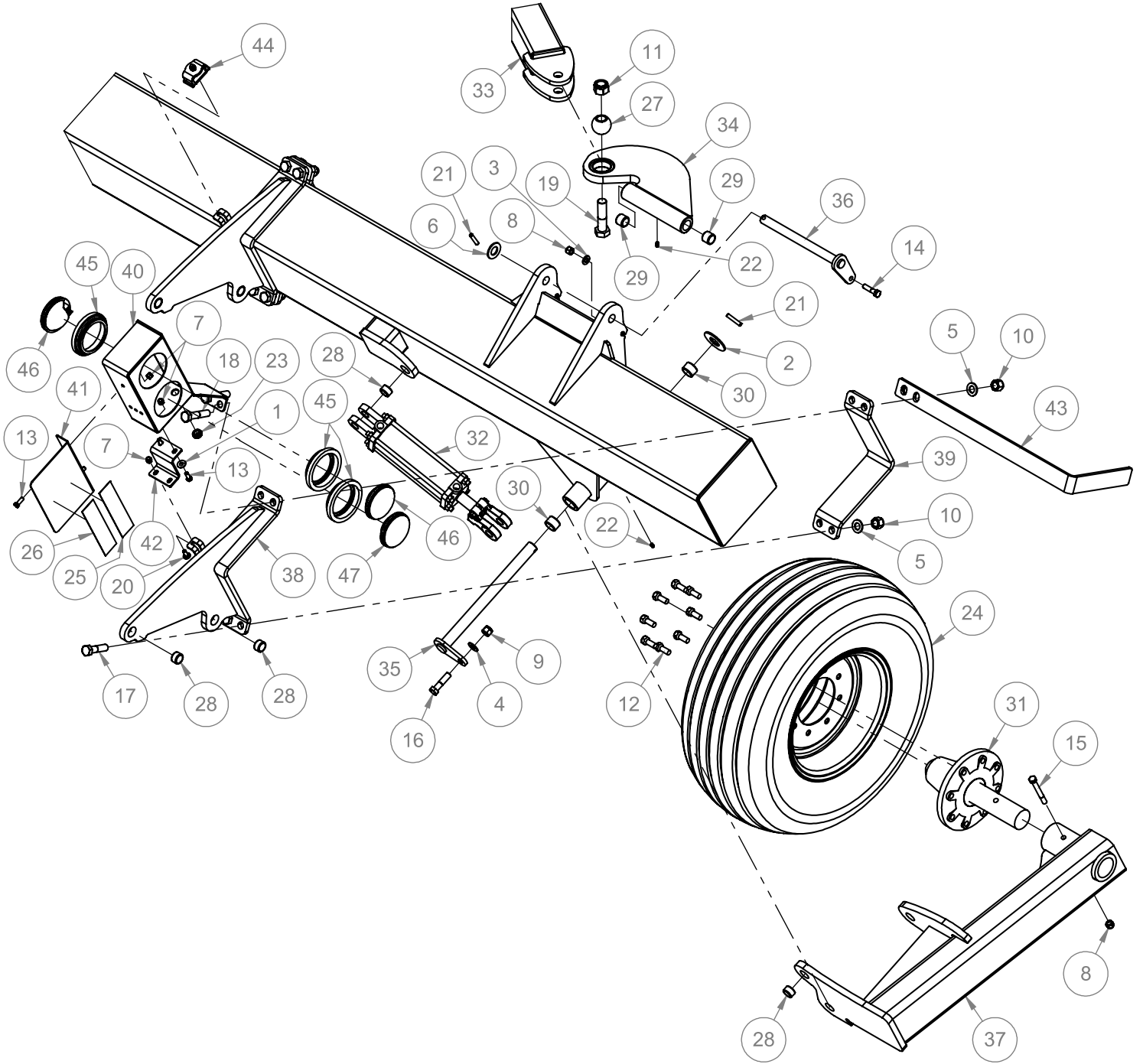


Heavy Harrow Operator's Manual

<i>Harrow Frame Assembly, 10' Wing</i>			
ITEM NO.	PART NUMBER	DESCRIPTION	QTY
1	102-007	WASHER 5/8 PLATED SAE	6
2	102-010	WASHER 1 PLATED SAE	2
3	114-003	LOCKNUT, 3/8" UNC NYL INS GR 2 YZ	6
4	114-005	LOCKNUT, 1/2" UNC NYL INS GR 2 YZ	62
5	114-007	LOCKNUT, 5/8" UNC NYL INS GR 2 YZ	10
6	125-053	BOLT, 3/8 X 1-1/4 UNC GR5 PLATED	2
7	125-103	BOLT, 1/2 X 1-1/2 UNC GR5 PLATED	2
8	125-113	BOLT, 1/2 X 4 UNC GR5 PLATED	10
9	125-155	BOLT, 5/8 X 2 UNC GR5 PLATED	6
10	125-167	BOLT, 5/8 X 5 UNC GR5 PLATED	4
11	165-005	SHOULDER BOLT, 1/2 X 3-3/4 UNC GR5 PLATED	50
12	170-079	COTTER PIN, 1/4 X 2 PLATED	2
13	180-005	GREASE ZERK, 1/4-28 UNF STRAIGHT	2
14	210-020 210-021	DECAL, TINE ANGLE, RH DECAL, TINE ANGLE, LH	1
15	212-033 212-145	HARROW TINE, 9/16" WIRE, 26" LG, REM 562 CARBIDE HARROW TINE, 9/16" WIRE, 26" LG	25
16	212-175 212-176 212-177	CYL, 3.5 x 8 SAE RPHG, WELDED, Ram P/N R4508886 CYL, 3.25 x 8 SAE RPHG, WELDED, Ram P/N R4508887 CYL, 3 x 8 SAE RPHG, WELDED, Ram P/N R4508888	1
17	500-1016	HARROW FRAME, 10' WING	1
18	500-1026	CARTRIDGE PIVOT BEARING	4
19	500-1033	SPACER PIPE, HARROW TUBES	10
20	500-1079	SPACER, HARROW LINKAGE	6
21	500-1117	PIN, 1" DIA	2
22	500-1150	HARROW TUBE, 10' (1)	1
23	500-1152	HARROW TUBE, 10' (2)	1
24	500-1154	HARROW TUBE, 10' (3)	1
25	500-1156	HARROW TUBE, 10' (4)	1
26	500-1160	HARROW TUBE, 10' (5)	1
27	500-1162	PITCH LINK, 10', SHORT	1
28	500-1166	PITCH LINK, 10'	1
29	500-1174	CYLINDER PIN, WING FRAMES	1
30	500-1200	PIVOT PIN KEEPER	4
31	500-1257	TINE ANGLE GAUGE	1
32	500-1259	POINTER, TINE ANGLE	1
33	500-1261	TINE CLIP	2
34	185-003	U-BOLT, 3/8 X 4-1/16 W X 4 H, UNC GR5 PLATED	2
35	500-1269	SAFETY LOCK STORAGE, REAR WHEEL	1

Heavy Harrow Operator's Manual

Wing Ends

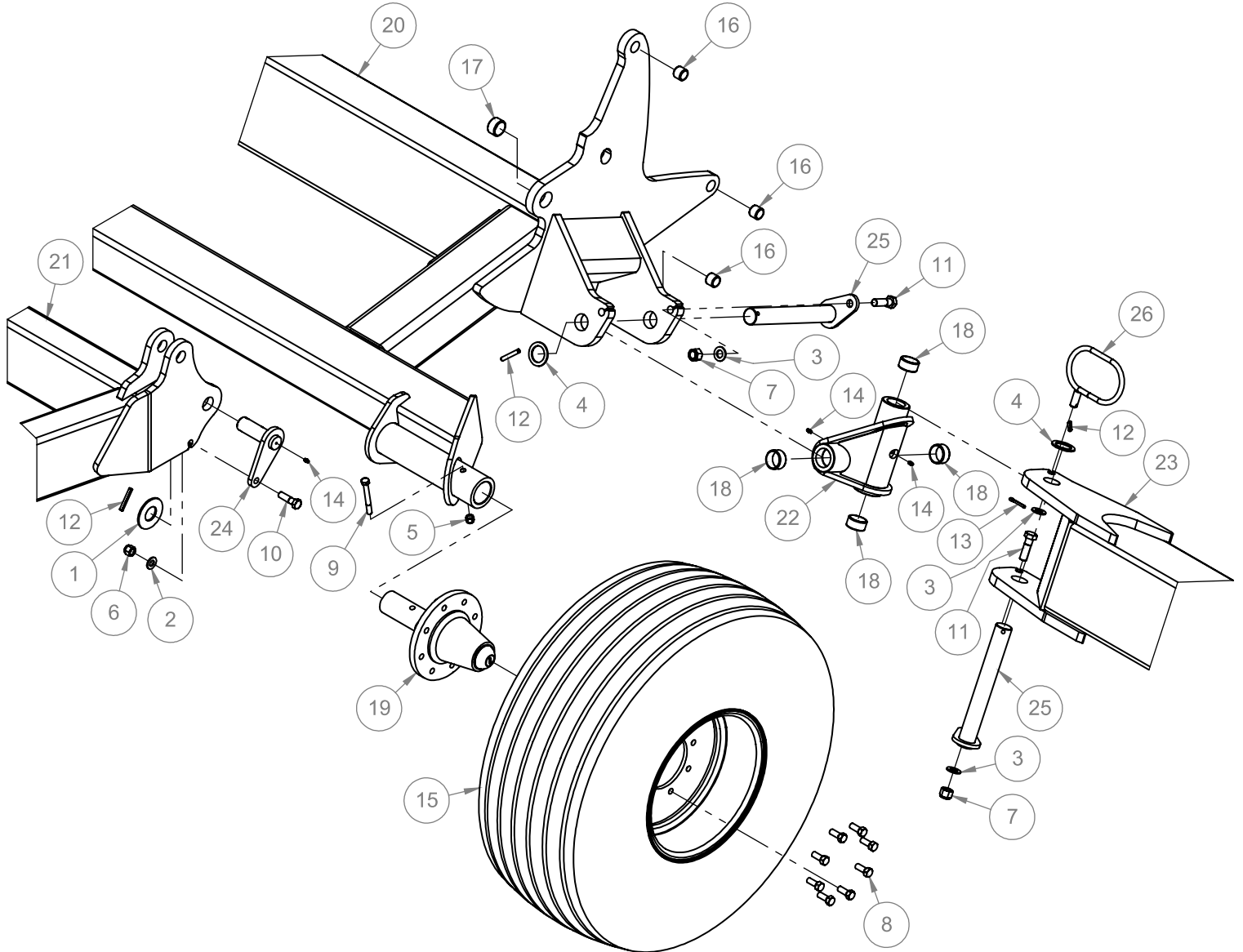


Heavy Harrow Operator's Manual

<i>Wing Ends</i>			
ITEM NO.	PART NUMBER	DESCRIPTION	QTY (SHOWN)
1	101-003	WASHER, 3/8 PLATED ASME WIDE	2
2	101-012	WASHER, 1-1/4 PLATED USS	1
3	102-005	WASHER, 1/2 PLATED SAE	1
4	102-007	WASHER, 5/8 PLATED SAE	1
5	102-008	WASHER, 3/4 PLATED SAE	8
6	102-010	WASHER, 1 PLATED SAE	1
7	114-003	LOCKNUT, 3/8" UNC NYL INS GR 2 YZ	5
8	114-005	LOCKNUT, 1/2" UNC NYL INS GR 2 YZ	2
9	114-007	LOCKNUT, 5/8" UNC NYL INS GR 2 YZ	1
10	114-008	LOCKNUT, 3/4" UNC NYL INS GR 2 YZ	8
11	114-010	LOCKNUT, 1" UNC NYL INS GR 2 YZ	1
12	123-003	WHEEL BOLT, 1/2" UNF (ADR #573Z121)	8
13	125-052	BOLT, 3/8 X 1 UNC GR5 PLATED	4
14	125-105	BOLT, 1/2 X 2 UNC GR5 PLATED	1
15	125-115	BOLT, 1/2 X 4-1/2 UNC GR5 PLATED	1
16	125-157	BOLT, 5/8 X 2-1/2 UNC GR5 PLATED	1
17	125-184	BOLT, 3/4 X 3 UNC GR5 PLATED	6
18	125-186	BOLT, 3/4 X 3-1/2 UNC GR5 PLATED	2
19	125-246	BOLT, 1 X 4 UNC GR5 PLATED	1
20	145-052	CARR. BOLT, 3/8 X 1 UNC GR5 PLATED	1
21	170-027	ROLL PIN, 3/8 X 2 PLATED	2
22	180-005	GREASE ZERK, 1/4-28 UNF STRAIGHT	2
23	206-522	RUBBER GROMMET, 9/16" ID, 3/16" PANEL	1
24	208-001	WHEEL & TIRE, TITAN STUBBLE GUARD 12.5 x 15	1
25	210-038	DECAL, ORANGE RETROFLECTIVE 2" X 9"	1
26	210-039	DECAL, RED RETROFLECTIVE 2" X 9"	1
27	212-058-02	SPEECO TOP LINK BALL JOINT BALL, P/N: CB5 B2219	1
28	212-059	TENSION BUSHING, 1" ID X 1-1/4" OD X 3/4" LG	6
29	212-060	TENSION BUSHING, 1" ID X 1-1/4" OD X 1" LG	2
30	212-064	TENSION BUSHING, 1-1/4" ID X 1-1/2" OD X 1" LG	2
31	212-106	6000# 8 BOLT, HUB/STD SPDL ASSM	1
32	212-178	CYL, 3 x 8 SAE, TIEROD, Ram P/N R4508889	1
33	500-1029 500-1061	DRAW TUBE, 52' / 60' / 72' DRAW TUBE, 84' (NOT SHOWN)	1
34	500-1039	DRAW TUBE LUG	1
35	500-1104	PIN, WING WHEEL, 1-1/4" DIA	1
36	500-1106	PIN, DRAW TUBE LUG, 1" DIA	1
37	500-1215 500-1217	WING WHEEL FRAME, LEFT, 8 BOLT (NOT SHOWN) WING WHEEL FRAME, RIGHT, 8 BOLT	1
38	500-1221	HARROW FRAME MOUNT	2
39	500-1223	TUBE CLAMP	2
40	500-1225 500-1226	LIGHT HOUSING, LH (NOT SHOWN) LIGHT HOUSING, RH	1
41	500-1229	PANEL, REFLECTIVE DECALS	1
42	500-1231	BRACKET, TO HOSE CLIP	1
43	500-1265	BOOM, END MARKER	1
44	600-1061	HOSE CLAMP KIT, 7/8" X 2-1/8"	1
45	212-267	GROMMET, 4" ROUND LIGHT	3
46	212-268	4" ROUND LIGHT, AMBER	2
47	212-269	4" ROUND LIGHT, RED	1

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Center Frame and Knuckles

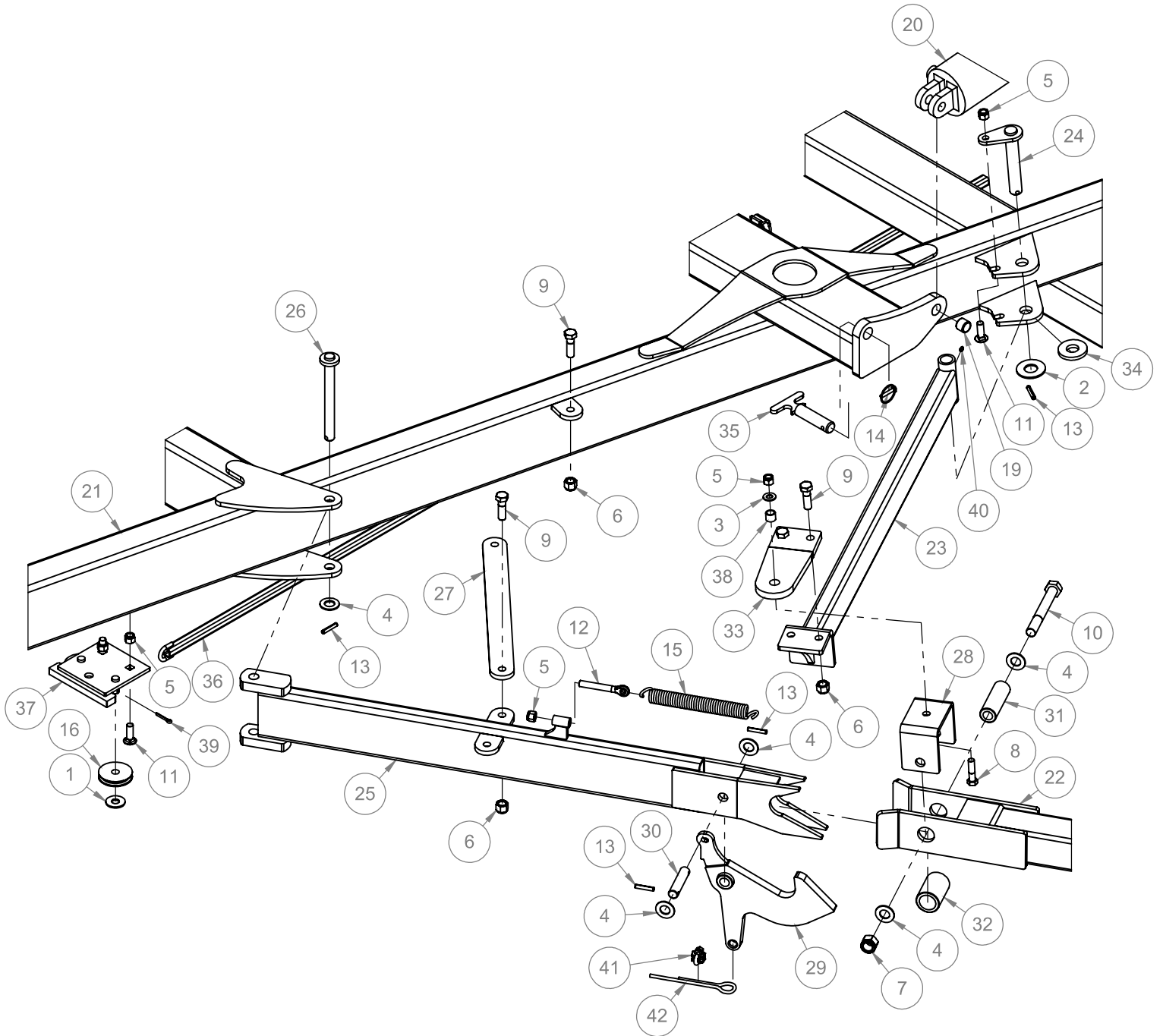


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<i>Center Frame and Knuckles</i>			
ITEM NO.	PART NUMBER	DESCRIPTION	QTY (SHOWN)
1	101-014	WASHER, 1-1/2 PLATED USS	1
2	102-007	WASHER, 5/8 PLATED SAE	1
3	102-008	WASHER, 3/4 PLATED SAE	3
4	104-003	WASHER, 1-3/4" ID x 2-1/2" OD x 10GA	2
5	114-005	LOCKNUT, 1/2" UNC NYL INS GR 2 YZ	1
6	114-007	LOCKNUT, 5/8" UNC NYL INS GR 2 YZ	1
7	114-008	LOCKNUT, 3/4" UNC NYL INS GR 2 YZ	2
8	123-003	WHEEL BOLT, 1/2" UNF (ADR #573Z121)	8
9	125-114	BOLT, 1/2 X 4-1/4 UNC GR5 PLATED	1
10	125-156	BOLT, 5/8 X 2-1/4 UNC GR5 PLATED	1
11	125-182	BOLT, 3/4 X 2-1/2 UNC GR5 PLATED	2
12	170-028	ROLL PIN, 3/8 X 2-1/2 PLATED	3
13	170-079	COTTER PIN, 1/4 X 2 PLATED	1
14	180-005	GREASE ZERK, 1/4-28 UNF STRAIGHT	3
15	208-005	WHEEL & TIRE, 16.5 X 16.1 GOODYEAR SOFT TRAC II	1
16	212-060	TENSION BUSHING, 1" ID X 1-1/4" OD X 1" LG	3
17	212-066	TENSION BUSHING, 1-1/2" ID X 1-3/4" OD X 1" LG	1
18	212-069	TENSION BUSHING, 1-3/4" ID X 2" OD X 1" LG	4
19	212-106	6000# 8 BOLT, HUB/STD SPDL ASSM	1
20	500-1002	CENTER BOOM	1
21	500-1005	HITCH	1
22	500-1036	KNUCKLE	1
23	500-1019 500-1023 500-1067 500-1070 500-1119 500-1122 500-1209 500-1211 500-1213	BOOM, RIGHT 72' (NOT SHOWN) BOOM, LEFT 72' (NOT SHOWN) BOOM, RIGHT 52' (NOT SHOWN) BOOM, LEFT 52' BOOM, RIGHT 60' (NOT SHOWN) BOOM, LEFT 60' (NOT SHOWN) STUB, 84' BOOM (NOT SHOWN) BOOM, RIGHT 84', SPLICED (NOT SHOWN) BOOM, LEFT 84', SPLICED (NOT SHOWN)	1
24	500-1111	PIN, CENTER PIVOT, 1-1/2" DIA	1
25	500-1114	PIN, KNUCKLE, 1-3/4" DIA	2
26	500-1204	HOSE ORGANIZER LOOP	1

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Draw Tube Latch

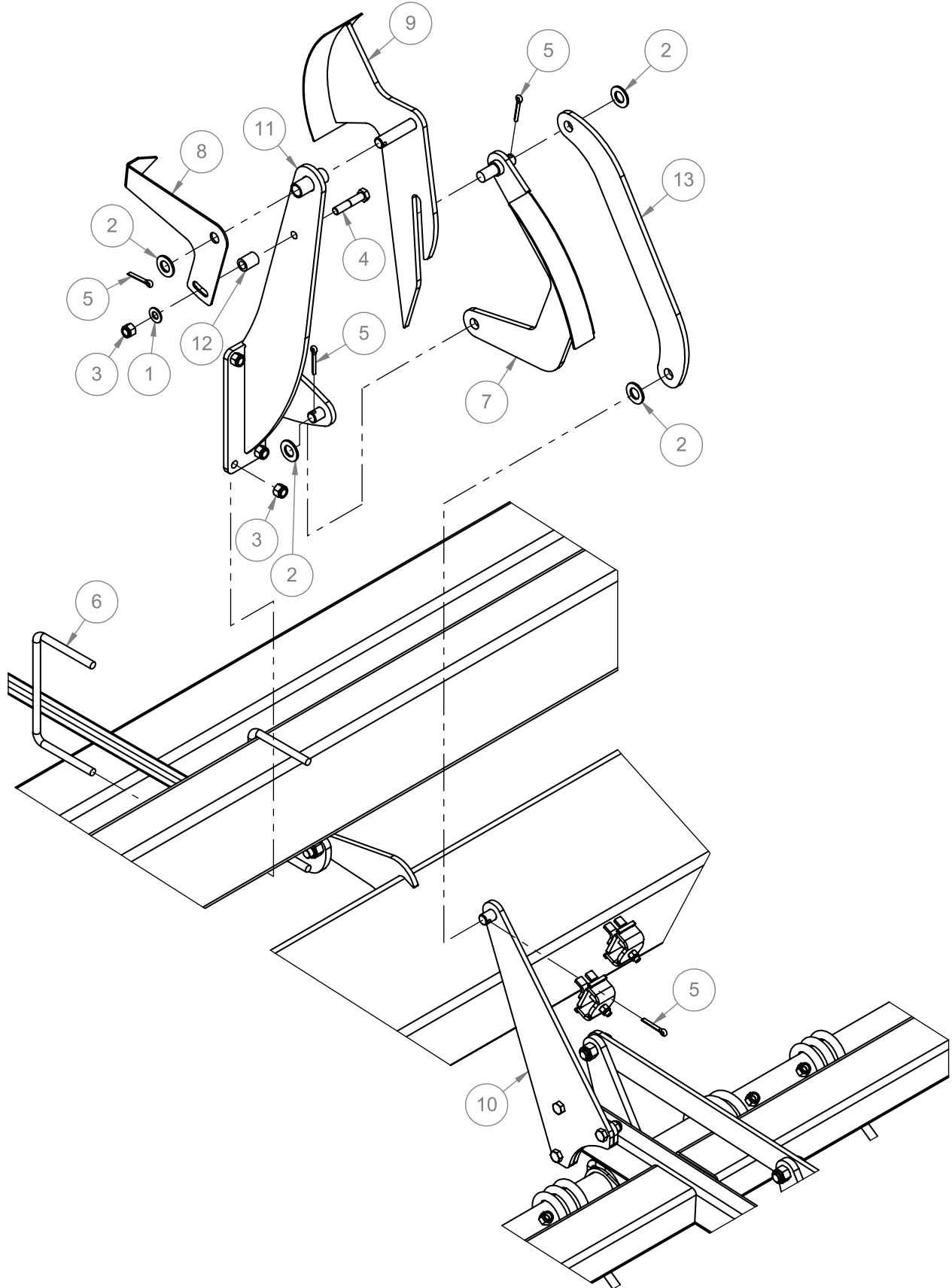


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<i>Draw Tube Latch</i>			
ITEM NO.	PART NUMBER	DESCRIPTION	QTY (SHOWN)
1	101-008	WASHER, 3/4 PLATED ASME WIDE	1
2	101-012	WASHER, 1-1/4 PLATED USS	1
3	102-007	WASHER, 5/8 PLATED SAE	1
4	102-010	WASHER, 1 PLATED SAE	5
5	114-007	LOCKNUT, 5/8" UNC NYL INS GR 2 YZ	5
6	114-008	LOCKNUT, 3/4" UNC NYL INS GR 2 YZ	4
7	114-010	LOCKNUT, 1" UNC NYL INS GR 2 YZ	1
8	125-157	BOLT, 5/8 X 2-1/2 UNC GR5 PLATED	1
9	125-182	BOLT, 3/4 X 2-1/2 UNC GR5 PLATED	4
10	125-262	BOLT, 1 X 8 UNC GR5 PLATED	1
11	145-156	CARR. BOLT, 5/8 X 2 UNC GR5 PLATED	3
12	165-007	EYEBOLT, 5/8", GR5, PLATED	1
13	170-027	ROLL PIN, 3/8 X 2 PLATED	4
14	170-052	LYNCH PIN, 5/16 X 1	1
15	212-031	EXTENSION SPRING, 5/16" WIRE, 20.5 COILS, 8.8 FL	1
16	212-054	SHEAVE, 5/16" WIRE, 3-1/2" OD, 5/8" THICK	2
17	212-056	CABLE, 5/16" (NOT SHOWN)	-
18	212-057	CABLE CLAMP, 5/16" (NOT SHOWN)	3
19	212-060	TENSION BUSHING, 1" ID X 1-1/4" OD X 1" LG	1
20	212-180	5" x 30", Ram Part No. R4508884	1
21	500-1005	HITCH	1
22	500-1029 500-1061	DRAW TUBE, 52' / 60' / 72' DRAW TUBE, 84' (NOT SHOWN)	1
23	500-1041 500-1194	DRAFT LINK CARRIER ARM DRAFT LINK CARRIER ARM, 84' (NOT SHOWN)	1
24	500-1044	PIN, DRAFT LINK CARRIER	1
25	500-1047 500-1202	DRAW TUBE LATCH DRAW TUBE LATCH, 84' (NOT SHOWN)	1
26	500-1051	PIN, DRAW TUBE LATCH - CENTER FRAME	1
27	500-1056 500-1186	DRAFT LINK STABILIZER DRAFT LINK STABILIZER, 84' (NOT SHOWN)	1
28	500-1058	DRAFT BOOM CARRIER CLEVIS	1
29	500-1064	DRAFT HOOK	1
30	500-1170	DRAW LATCH PIN	1
31	500-1180	LATCH SPACER TUBE	1
32	500-1182	LATCH ROLLER	1
33	500-1188	DRAFT LINK CARRIER LUG	1
34	500-1192	WASHER, 1-1/4" ID, 3/8" THICK	1
35	500-1196	TRANSPORT PIN, 1-1/4" DIA.	1
36	500-1235	CABLE PULL TUBE	1
37	500-1237	CABLE PULLEY MOUNT	1
38	500-1263	SPACER, DRAFT LINK ARM	1
39	170-079	COTTER PIN, 1/4 X 2 PLATED	2
40	180-005	GREASE ZERK, 1/4-28 UNF STRAIGHT	1
41	212-056	5/16" WIRE ROPE	194"
42	212-057	5/16" WIRE ROPE CLIP	3

Heavy Harrow Operator's Manual

Level Indicator

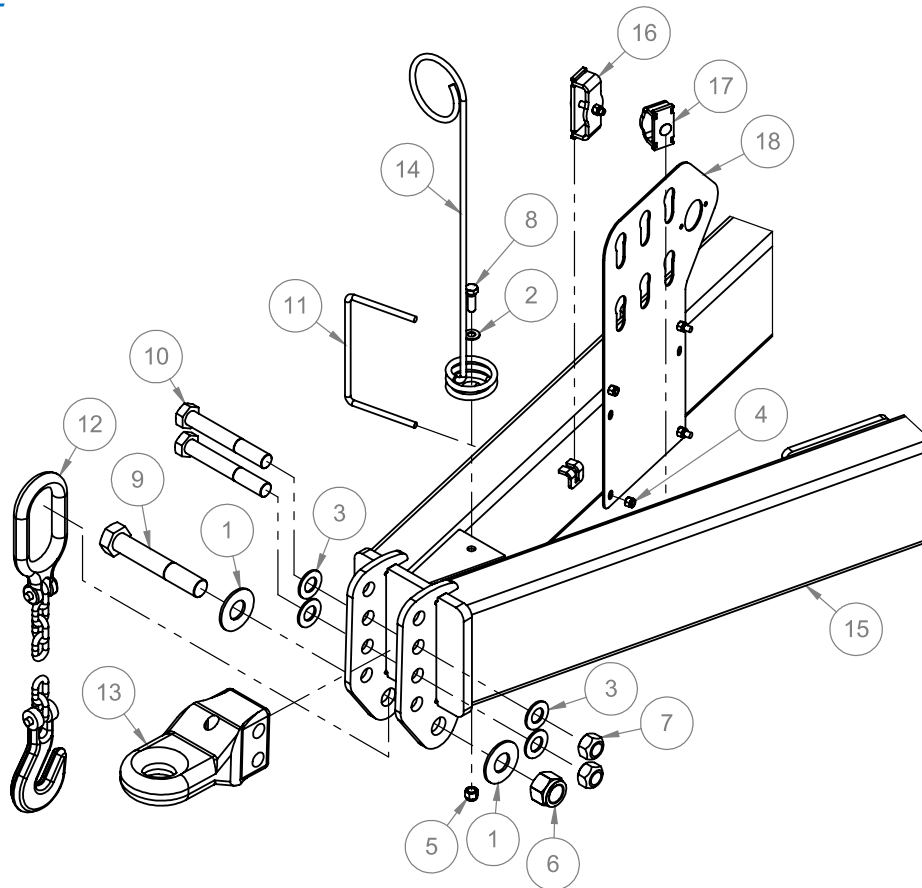


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<i>Level Indicator</i>			
ITEM NO.	PART NUMBER	DESCRIPTION	QTY (SHOWN)
1	102-005	WASHER, 1/2 PLATED SAE	1
2	102-008	WASHER, 3/4 PLATED SAE	4
3	114-005	LOCKNUT, 1/2" UNC NYL INS GR 2 YZ	5
4	125-107	BOLT, 1/2 X 2-1/2 UNC GR5 PLATED	1
5	170-079	COTTER PIN, 1/4 X 2 PLATED	4
6	185-001	U-BOLT, 1/2 X 8-1/8 W X 5 H, UNC GR5 PLATED	2
7	500-1239	LINK WITH GUIDE	1
8	500-1243	POINTER	1
9	500-1245	LEVEL INDICATOR	1
10	500-1247	INDICATOR MOUNT, HARROW FRAME	1
11	500-1249	INDICATOR MOUNT, MAIN FRAME	1
12	500-1253	SPACER	1
13	500-1255	LINK, LEVEL INDICATOR	1

Heavy Harrow Operator's Manual

Hitch, Front

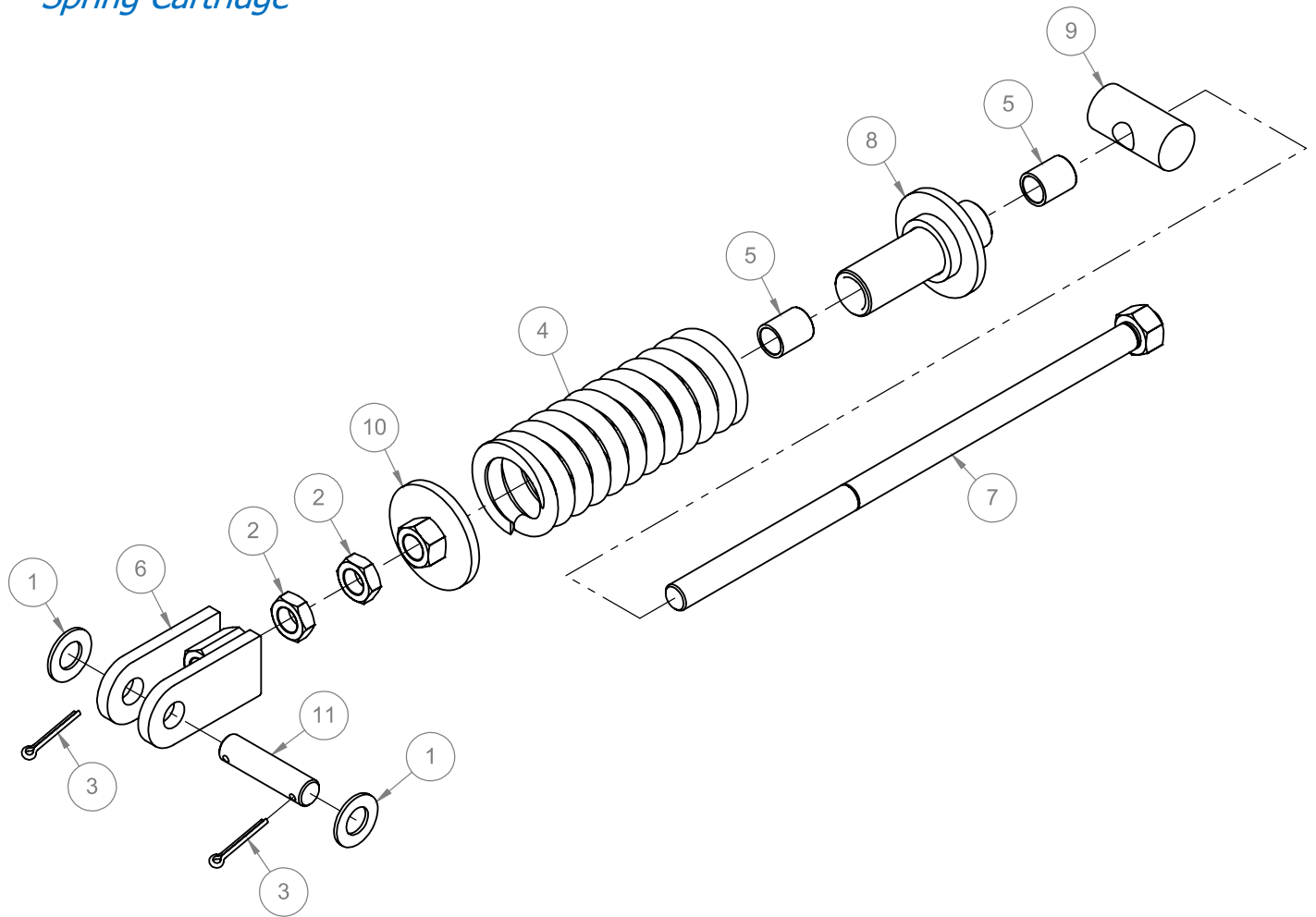


Hitch, Front

ITEM NO.	PART NUMBER	DESCRIPTION	QTY (SHOWN)
1	101-012	WASHER, 1-1/4 PLATED USS	2
2	102-005	WASHER, 1/2 PLATED SAE	1
3	102-010	WASHER, 1 PLATED SAE	4
4	114-003	LOCKNUT, 3/8" UNC NYL INS GR 2 YZ	4
5	114-005	LOCKNUT, 1/2" UNC NYL INS GR 2 YZ	1
6	114-012	LOCKNUT, 1-1/4" UNC NYL INS GR 2 YZ	1
7	119-010	STOVER NUT, 1 UNF GR 2 PLATED	2
8	125-103	BOLT, 1/2 X 1-1/2 UNC GR5 PLATED	1
9	130-328	BOLT, 1-1/4 X 7-1/2 UNC GR8 PLATED	1
10	140-258	BOLT, 1 X 7 UNF GR8 PLATED	2
11	185-025	U-BOLT, 3/8 X 8-1/16 W X 5 H, UNC GR5 PLATED	2
12	212-027	CHAIN, SAFETY, 21,000 lb, 3/8" x 50" lg	1
13	212-028	HITCH, CAT 4, CTD PP42XL	1
14	212-030	PIGTAIL HOSE HOLDER	1
15	500-1005	HITCH	1
16	600-1057	HOSE CLAMP ASSY, 13/16" X 3-7/8"	1
17	600-1061	HOSE CLAMP KIT, 7/8" X 2-1/8"	1
18	600-1180-01	HYDRAULIC HOSE HOLDER	1

Heavy Harrow Operator's Manual

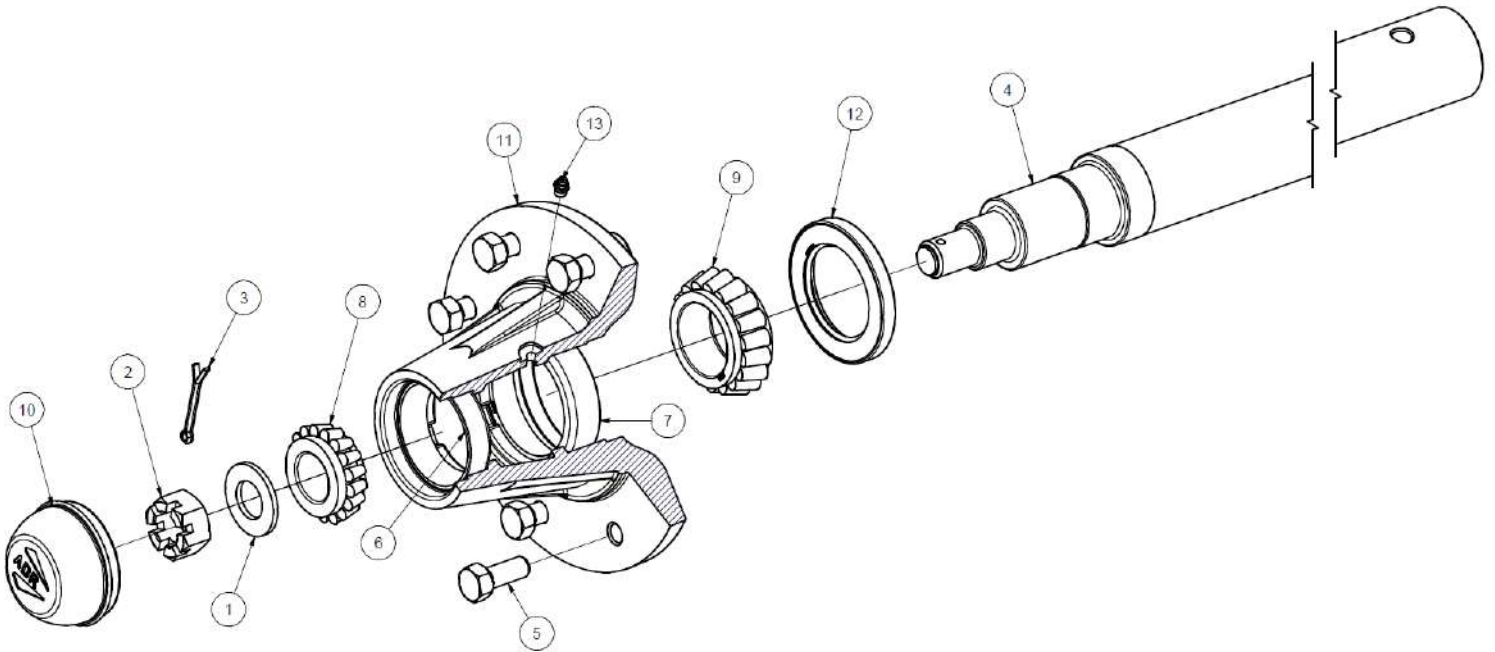
Spring Cartridge



<i>Spring Cartridge</i>			
ITEM NO.	PART NUMBER	DESCRIPTION	QTY
-	500-1086	SPRING CARTRIDGE ASSEMBLY (COMPLETE)	-
1	102-010	WASHER, 1 PLATED SAE	2
2	112-010	JAM NUT, 1 UNC GR 2 PLATED	2
3	170-080	COTTER PIN, 1/4 X 2 PLATED	2
4	212-032	COMPRESSION SPRING, 5/8 WIRE, 3-1/8" PD, 14.75" FL	1
5	212-055	JSI-1620-24 IGLIDE J SLEEVE BEARING	2
6	500-1088	SPRING CLEVIS	1
7	500-1090	SPRING BOLT	1
8	500-1092	SPRING BASE	1
9	500-1094	TRUNNION	1
10	500-1096	SPRING ADJUSTER	1
11	500-1172	SPRING CARTRIDGE PIN	1

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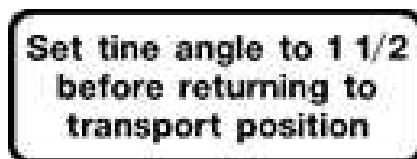
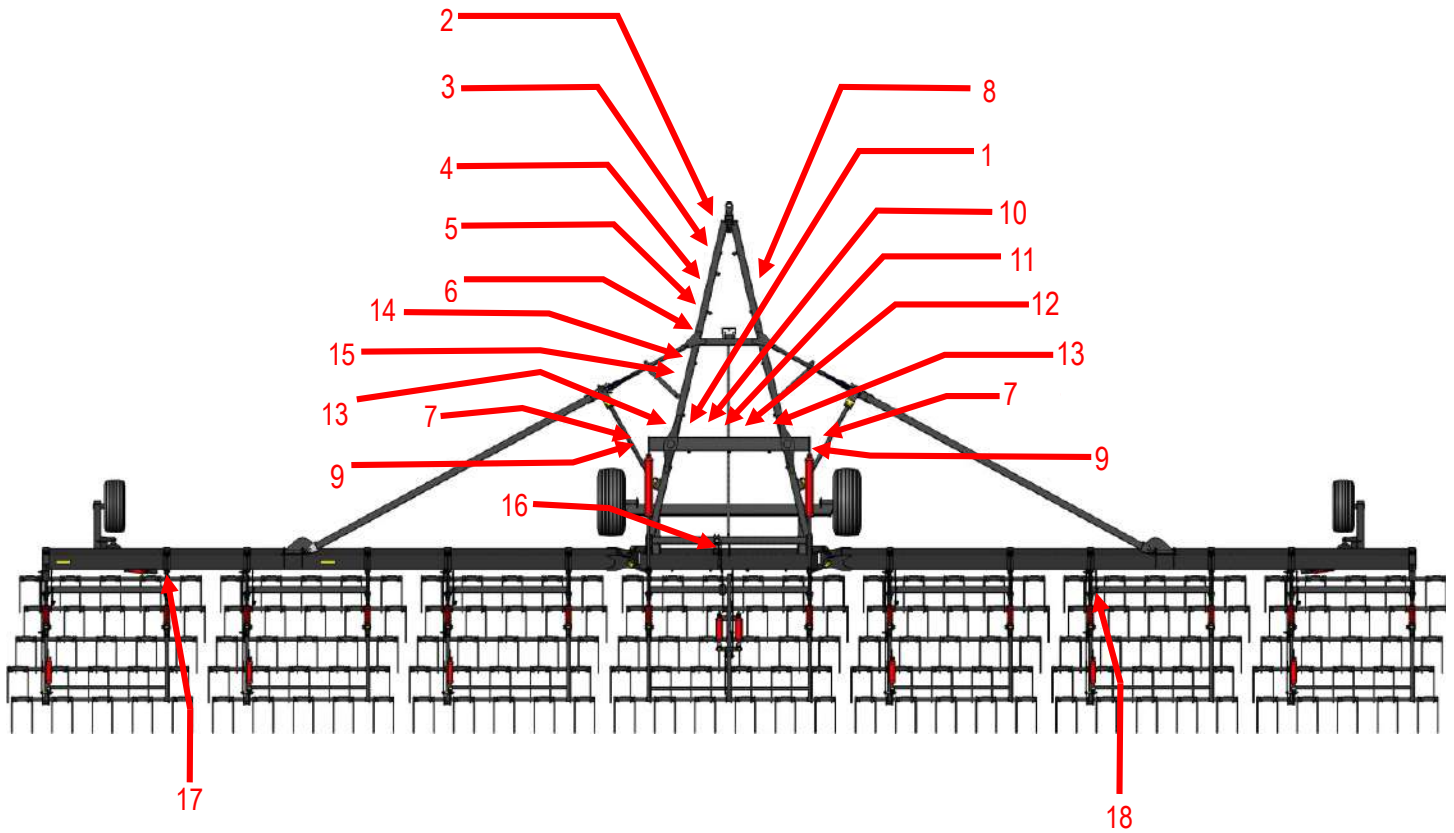
6,000 lb Wheel Hub w/ Standard Spindle



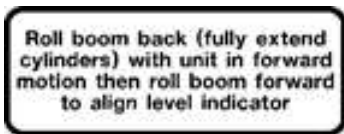
6,000 lb Wheel Hub w/ Standard Spindle

ITEM NO.	PART NUMBER	DESCRIPTION	QTY
-	212-106	COMPLETE ADR 8-BOLT 6,000 lb HUB ASSY, STANDARD SPINDLE	1
1	101-010	WASHER, M26	1
2	-	1" – 14 UNS CASTLE NUT	1
3	170-078	COTTER PIN, 5mm x 50mm	1
4	212-107	SPINDLE, STANDARD (HUB FLANGE FACE TO SHAFT END = 8-7/8")	1
5	165-002	WHEEL BOLT, 9/16" - 18 UNF	8
6	212-112	OUTER BEARING CUP, 2720	1
7	212-110	INNER BEARING CUP, 3720	1
8	212-113	OUTER BEARING CONE, 2790	1
9	212-111	INNER BEARING CONE, 3780	1
10	212-114	ADR DUST CAP	1
11	212-115	ADR 8-BOLT 6,000 lb HUB, 61LZKY002	1
12	212-116	GREASE SEAL	1
13	180-002	GREASE FITTING, M08 x 1.25	1

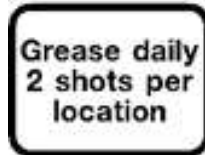
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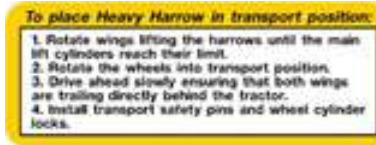
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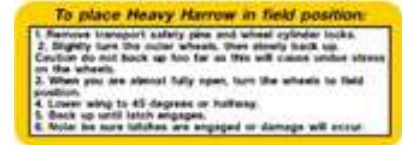
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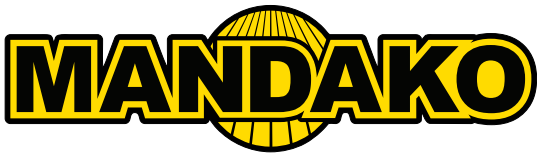
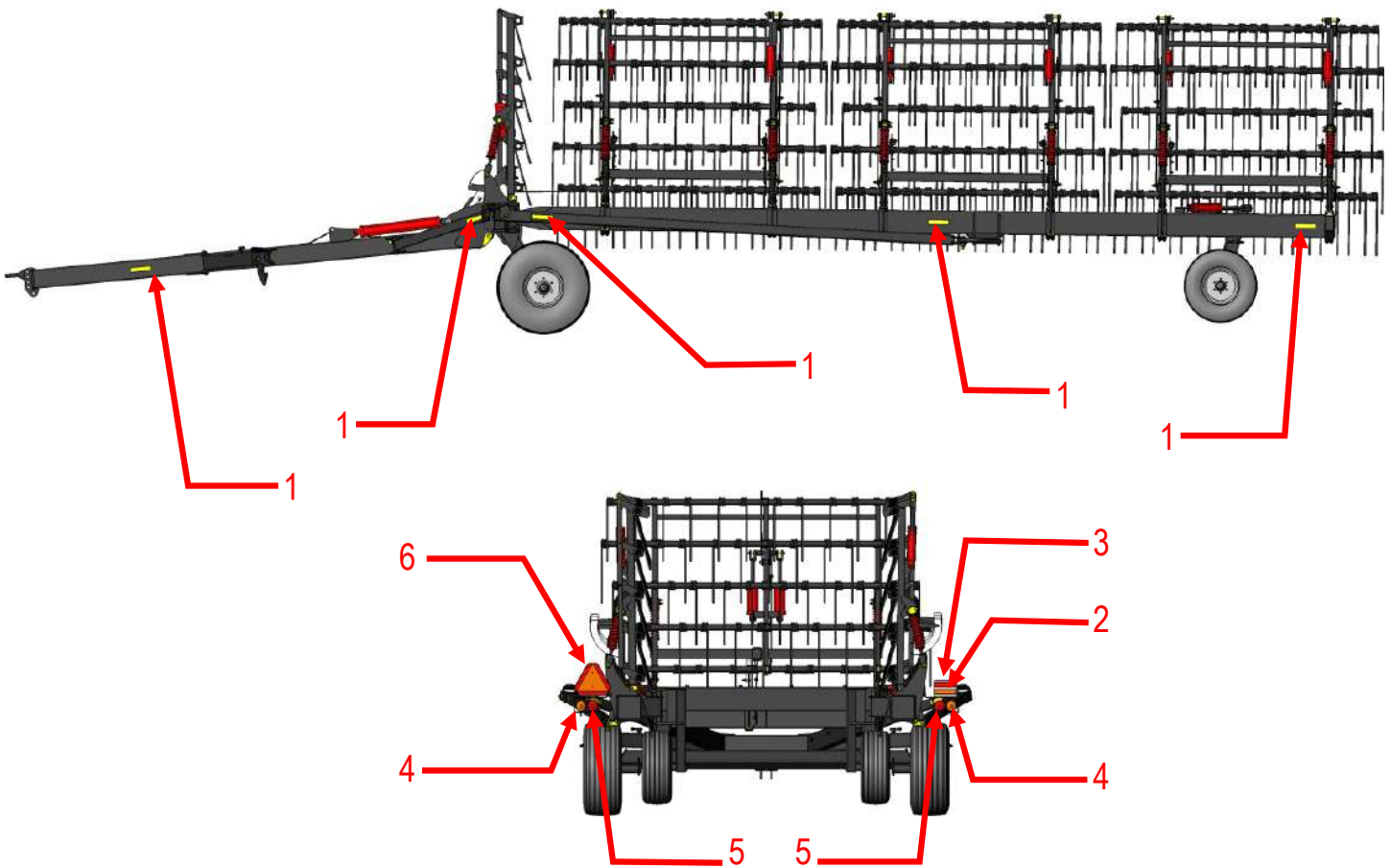
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ITEM NO.	PART NUMBER	DESCRIPTION	QTY
1	210-001	TRANSPORT LOCK PIN DECAL	1
2	210-034	MULTI-WARNING DECAL (Includes fig. items 2-6)	1
7	210-007	SAFETY LOCKS WARNING DECAL	1
8	210-008	MADE IN CANADA DECAL	1
9	210-023	TRANSPORT SAFETY PIN STORAGE DECAL	2
10	210-025	TINE ANGLE DECAL	1
11	210-026	REMOVE PINS/LOCKS DECAL	1
12	210-027	ROLL BOOM BACK/FORWARD TO ALIGN DECAL	1
13	210-028	GREASE DAILY DECAL	2
14	210-029	TRANSPORT POSITION DECAL	1
15	210-030	FIELD POSITION DECAL	1
16	210-024	LEVEL INDICATOR DECAL	1
17	210-022	WHEEL CYLINDER LOCK STORAGE DECAL	1
18	210-020	LEVEL INDICATOR (LEFT) DECAL	1
	210-021	LEVEL INDICATOR (RIGHT) DECAL	1

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ITEM NO.	PART NUMBER	DESCRIPTION	QTY
1	INQUIRE	YELLOW REFLECTOR	10
2		ORANGE REFLECTOR	1
3		RED REFLECTOR	1
4		ORANGE LIGHT	1
5		RED LIGHT	1
6		SMV SIGN	1
7	R9913200	Decal, Mandako Logo, 23.75" x 6.5"	1
8	R9913141	Decal, Field Sergeant	1
9	R9913142	Decal, Field Sergeant 52', HH520	1
	R9913143	Decal, Field Sergeant 60', HH600	
	R9913144	Decal, Field Sergeant 72', HH720	
	R9913145	Decal, Field Sergeant 84', HH840	



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PART #: R9912031

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Box 379 | 12159B Hwy 306

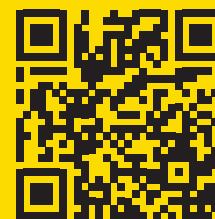
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