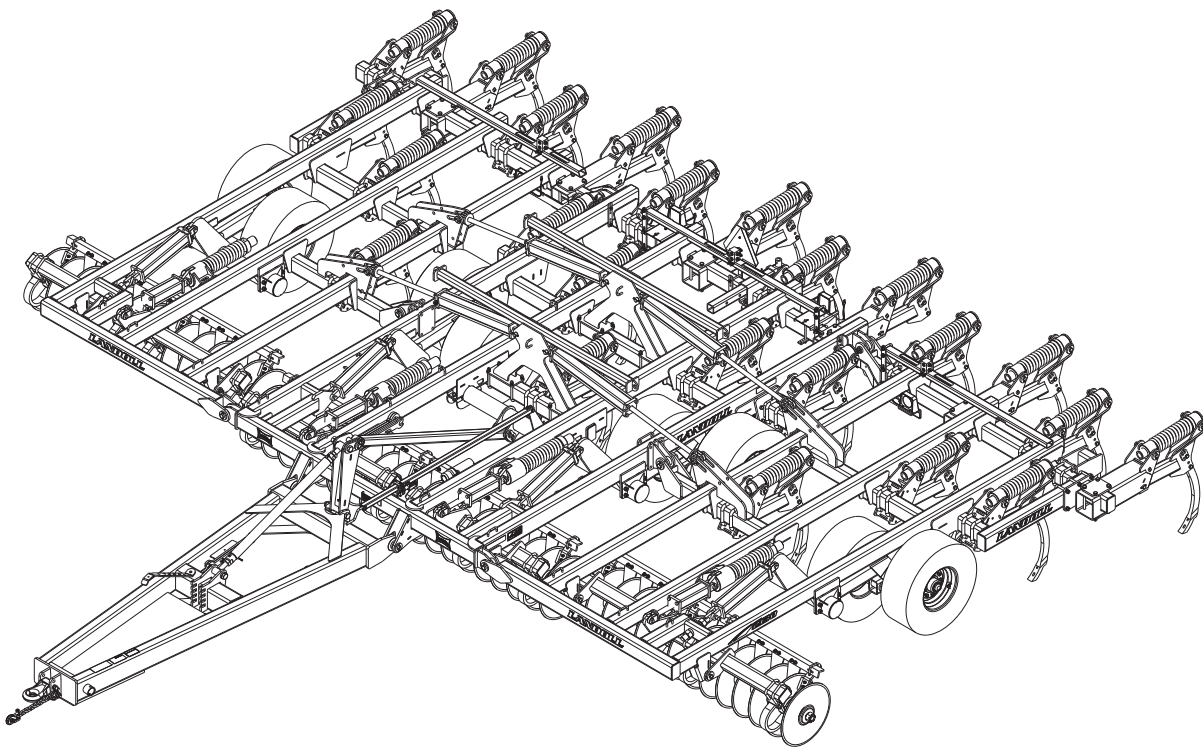




Model 2131

Wing Coulter Chisel

Operator's Manual



LANDOLL CORPORATION

1900 North Street
Marysville, Kansas 66508
(785) 562-5381

800-428-5655 ~ **WWW.LANDOLL.COM**

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Chapter 1

Introduction

The Landoll Model 2131 Wing Coulter Chisel is a quality product designed to give years of trouble free performance. By following each section of this manual, your system will perform as designed for you and your operation

- CHAPTER 1** gives basic instructions on the use of this manual.
- CHAPTER 2** gives product specifications. These specifications supply lengths and measures for your equipment. A Standard Bolt Torque Table is provided to give guidelines for bolt torques to be used when servicing this product.
- CHAPTER 3** contains assembly instructions for your Model 2131 Wing Coulter Chisel. When these procedures are correctly followed, your equipment should provide you years of trouble-free operation and service.
- CHAPTER 4** instructs how to operate your equipment before using it, and describes adjustments needed. It also gives practical advice for the care and maintenance of your Landoll equipment. Drawings in this section locate adjustment points on the equipment.

NOTE: IF THE EQUIPMENT IS IMPROPERLY ASSEMBLED OR MAINTAINED, THE WARRANTY IS VOID. IF YOU HAVE ANY QUESTIONS CONTACT:

**LANDOLL CORPORATION
1900 NORTH STREET
MARYSVILLE, KANSAS 66508
or phone:
(785) 562-5381 or
(800) 428-5655
or FAX:
(888) 527-3909**

- CHAPTER 5** is a troubleshooting guide to aid in diagnosing and solving problems with the equipment.
- PARTS LIST** is a separate manual showing the various assemblies, subassemblies, and systems. Refer to that manual when ordering Landoll replacement parts. Order parts from your Landoll dealer.

- WARRANTY** The Warranty Registration form is included with the product documents. Fill it out and mail it within 15 days of purchase.

NOTE: IMPROPER ASSEMBLY, MODIFICATION, OR MAINTENANCE OF YOUR LANDOLL MACHINE CAN VOID YOUR WARRANTY.

- COMMENTS** Address comments or questions regarding this publication to:

**LANDOLL CORPORATION
1900 NORTH STREET
MARYSVILLE, KANSAS 66508
ATTENTION: PUBLICATIONS -DEPT. 55**

Understanding Safety Statements

You will find various types of safety information on the following pages and on the machine signs (decals) attached to the vehicle. This section explains their meaning.

The Safety Alert Symbol means ATTENTION! YOUR SAFETY IS INVOLVED!



DANGER

Danger means a life-threatening situation exists. Death can occur if safety measures or instructions on this label are not properly followed.



WARNING

Warning means serious injury or death can occur if safety measures or instructions on this label are not properly followed.



CAUTION

Caution means serious equipment or other property damage can occur if instructions on this label are not properly followed.

NOTE

Means that failure to follow these instructions could cause damage to the equipment or cause it to operate improperly.

NOTE

Make sure you read and understand the information contained in this manual and on the machine signs (decals) before you attempt to operate or maintain this vehicle.

The safety statements contained in this manual relate to the operation of the Model 2131 Wing Coulter Chisel.

Chapter 2

Standard Specifications

Model Specifications

2131 Series Wing Coulter W/Auto Reset Shanks					
Model Number	2131-17	2131-19	2131-21	2131-23	2131-25
Working Width	21'-3"	23'-9"	26'-3"	28'-9"	31'-3"
Transport Width	16'-1"	16'-1"	15'-6"	15'-6"	15'-6"
Transport Height	11'-1"	11'-7"	13'-5"	13'-11"	15'-2"
Number of Blades	35	39	43	47	51
Number of Bearings	8	10	12	12	12
Estimated Weight	19,888 lbs.	20,830 lbs.	22,950 lbs.	23,892 lbs.	24,934 lbs.
NOTE: Specifications Are Subject To Change Without Prior Notification					

2131 Series Wing Coulter W/Rigid Shearbolt Shanks					
Model Number	2131-17	2131-19	2131-21	2131-23	2131-25
Working Width	21'-3"	23'-9"	26'-3"	28'-9"	31'-3"
Transport Width	16'-1"	16'-1"	15'-6"	15'-6"	15'-6"
Transport Height	11'-1"	11'-7"	13'-5"	13'-11"	15'-2"
Number of Blades	35	39	43	47	51
Number of Bearings	8	10	12	12	12
Estimated Weight	17,024 lbs.	17,629 lbs.	19,412 lbs.	20,017 lbs.	20,597 lbs.
NOTE: Specifications Are Subject To Change Without Prior Notification					

Tire Inflation

Tire Size	Tire Manufacturer	Ply/Load Rating	Inflation Pressure (Psi) (Max.)
12.5L x 15	Firestone	12 Ply/3860 lbs.	52 psi.
32/1550 x 16.5	Galaxy	G Load 8000 lbs. @ 20 mph	115 psi.
380/55R-16.5	Goodyear	Load Index 150A8/B7400 lbs. @ 30 mph	73 psi.
32/1550 x 16.5	Carlisle	G Load 8000 lbs. @ 20 mph	115 psi.
320/70R15	Firestone	Load Index 144/6150 lbs. @ 40 mph	70 psi.
VF 410/50 R16.5	BKT	Load Index 153A8/B - 8,050 lbs. @ 30 mph	73 psi

Specific Bolt Torques

Lug Bolts & Nuts	Torque (FT. LBS.)
Disc Gang Shafts	1,200 Ft./Lbs.
9/16-18 Lug Bolts & Nuts (Heavy Duty Disc)	80-90 Ft./Lbs.
5/8-18 Lug Bolts & Nuts (Heavy Duty Disc)	85-100 Ft./Lbs.

General Torque Specifications (rev. 4/97)

TORQUE SPECIFIED IN FOOT POUNDS - This chart provides tightening torques for general purpose applications when special torques are not specified on process or drawing. Assembly torques apply to plated nuts and capscrews assembled without supplemental lubrication (as received condition). They do not apply if special graphite moly-disulfide or other extreme pressure lubricants are used. When fasteners are dry (solvent cleaned) add 33% to as received condition torque. Bolt head identification marks indicate grade and may vary from manufacturer to manufacturer. Thick nuts must be used on grade 8 capscrews. Use value in [] if using prevailing torque nuts.

UNC SIZE	SAE Grade 2	SAE Grade 5	SAE Grade 8	UNF SIZE	SAE Grade 2	SAE Grade 5	SAE Grade 8
1/4-20	4 [5]	6 [7]	9 [11]	1/4-28	5 [6]	7 [9]	10 [12]
5/16-18	8 [10]	13 [13]	18 [22]	5/16-24	9 [11]	14 [17]	20 [25]
3/8-16	15 [19]	23 [29]	35 [42]	3/8-24	17 [21]	25 [31]	35 [44]
7/16-14	24 [30]	35 [43]	55 [62]	7/16-20	27 [34]	40 [50]	60 [75]
1/2-13	35 [43]	55 [62]	80 [100]	1/2-20	40 [50]	65 [81]	90 [112]
9/16-12	55 [62]	80 [100]	110 [137]	9/16-18	60 [75]	90 [112]	130 [162]
5/8-11	75 [94]	110 [137]	170 [212]	5/8-18	85 [106]	130 [162]	180 [225]
3/4-10	130 [162]	200 [250]	280 [350]	3/4-16	150 [188]	220 [275]	320 [400]
7/8-9	125 [156]	320 [400]	460 [575]	7/8-14	140 [175]	360 [450]	500 [625]
1-8	190 [237]	408 [506]	680 [850]	1-14	210 [263]	540 [675]	760 [950]
1-1/8-7	270 [337]	600 [750]	960 [1200]	1-1/8-12	300 [375]	660 [825]	1080 [1350]
1-1/4-7	380 [475]	840 [1050]	1426 [1782]	1-1/4-12	420 [525]	920 [1150]	1500 [1875]
1-3/8-6	490 [612]	1010 [1375]	1780 [2225]	1-3/8-12	560 [700]	1260 [1575]	2010 [2512]
1-1/2-6	650 [812]	1460 [1825]	2360 [2950]	1-1/2-12	730 [912]	1640 [2050]	2660 [3325]
1-3/4-5	736 [920]	1651 [2063]	2678 [3347]	1-3/4-12	920 [1150]	2063 [2579]	3347 [4183]

METRIC:

Coarse thread metric class 10.9 fasteners and class 10.0 nuts and through hardened flat washers, phosphate coated, Rockwell "C" 38-45. Use value in [] if using prevailing torque nuts.

Nominal thread diameter (mm)	Newton Meters (Standard Torque)	Foot Pounds (Standard Torque)	Nominal Thread Diameter (mm)	Newton Meters (Standard Torque)	Foot Pounds (Standard Torque)
6	10 [14]	7 [10]	20	385 [450]	290 [335]
7	16 [22]	12 [16]	24	670 [775]	500 [625]
8	23 [32]	17 [24]	27	980 [1105]	730 [825]
10	46 [60]	34 [47]	30	1330 [1470]	990 [1090]
12	80 [125]	60 [75]	33	1790 [1950]	1340 [1450]
14	125 [155]	90 [115]	36	2325 [2515]	1730 [1870]
16	200 [240]	150 [180]	39	3010 [3210]	2240 [2380]
18	275 [330]	205 [245]			

Table 2-1: General Torque Specifications

STANDARD SPECIFICATIONS**Hydraulic Fitting Torque Specifications****TORQUE IS SPECIFIED IN FOOT POUNDS- 37° JIC, ORS, & ORB (REV. 10/97)**

This chart provides tightening torques for general purpose applications when special torques are not specified on process or drawing. Assembly torques apply to plated nuts and capscrews assembled without supplemental lubrication (as received condition). They do not apply if special graphite moly-disulfide or other extreme pressure lubricants are used. When fasteners are dry (solvent cleaned) add 33% to as received condition torque. Bolt head identification marks indicate grade and may vary from manufacturer to manufacturer. Thick nuts must be used on grade 8 capscrews. Use value in [] if using prevailing torque nuts.

Parker Brand Fittings

Dash Size	37 Degree JIC	O-Ring (ORS)	O-Ring Boss (ORB)
-4	11-13	15-17	13-15
-5	14-16	-----	21-23
-6	20-22	34-36	25-29
-8	43-47	58-62	40-44
-10	55-65	100-110	58-62
-12	80-90	134-146	75-85
-16	115-125	202-218	109-121
-20	160-180	248-272	213-237
-24	185-215	303-327	238-262
-32	250-290	-----	310-340

Gates Brand Fittings

Dash Size	37 Degree JIC	O-Ring (ORS)	O-Ring Boss (ORB)
-4	10-11	10-12	14-16
-5	13-15	-----	-----
-6	17-19	18-20	24-26
-8	34-38	32-40	37-44
-10	50-56	46-56	50-60
-12	70-78	65-80	75-83
-14	-----	65-80	-----
-16	94-104	92-105	111-125
-20	124-138	125-140	133-152
-24	156-173	150-180	156-184
-32	219-243	-----	-----

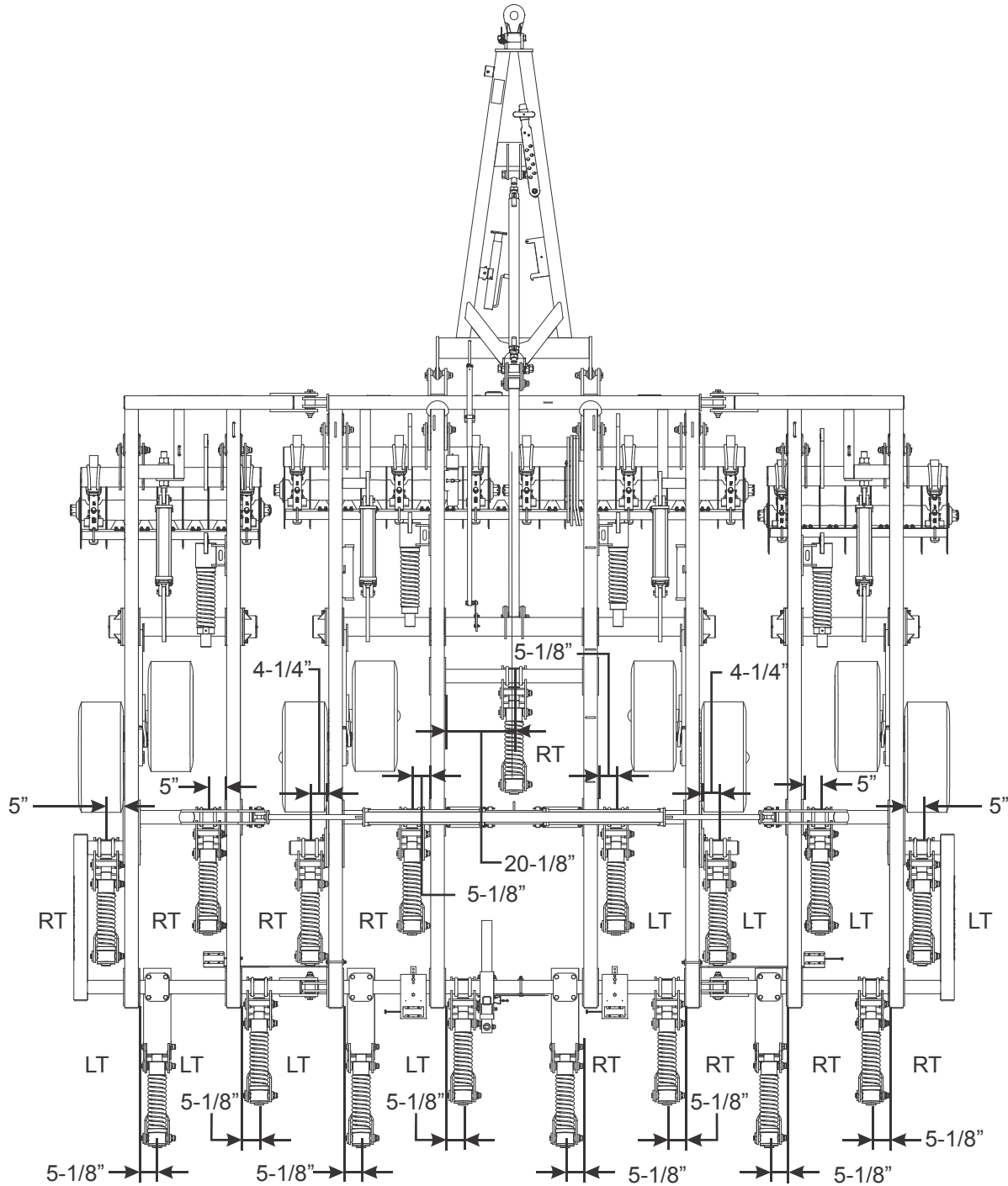
Aeroquip Brand Fittings

Dash Size	37 Degree JIC	O-Ring (ORS)	O-Ring Boss (ORB)
-4	11-12	10-12	14-16
-5	15-16	-----	16-20
-6	18-20	18-20	24-26
-8	38-42	32-35	50-60
-10	57-62	46-50	75-80
-12	79-87	65-70	125-135
-14	-----	-----	160-180
-16	108-113	92-100	200-220
-20	127-133	125-140	210-280
-24	158-167	150-165	270-360
-32	245-258	-----	-----

Table 2-2: Hydraulic Fitting Torque Specifications

[illegible]

NOTE: LT AND RT INDICATES
THE RECOMMENDED PLACEMENT
FOR TWISTED SHOVELS.

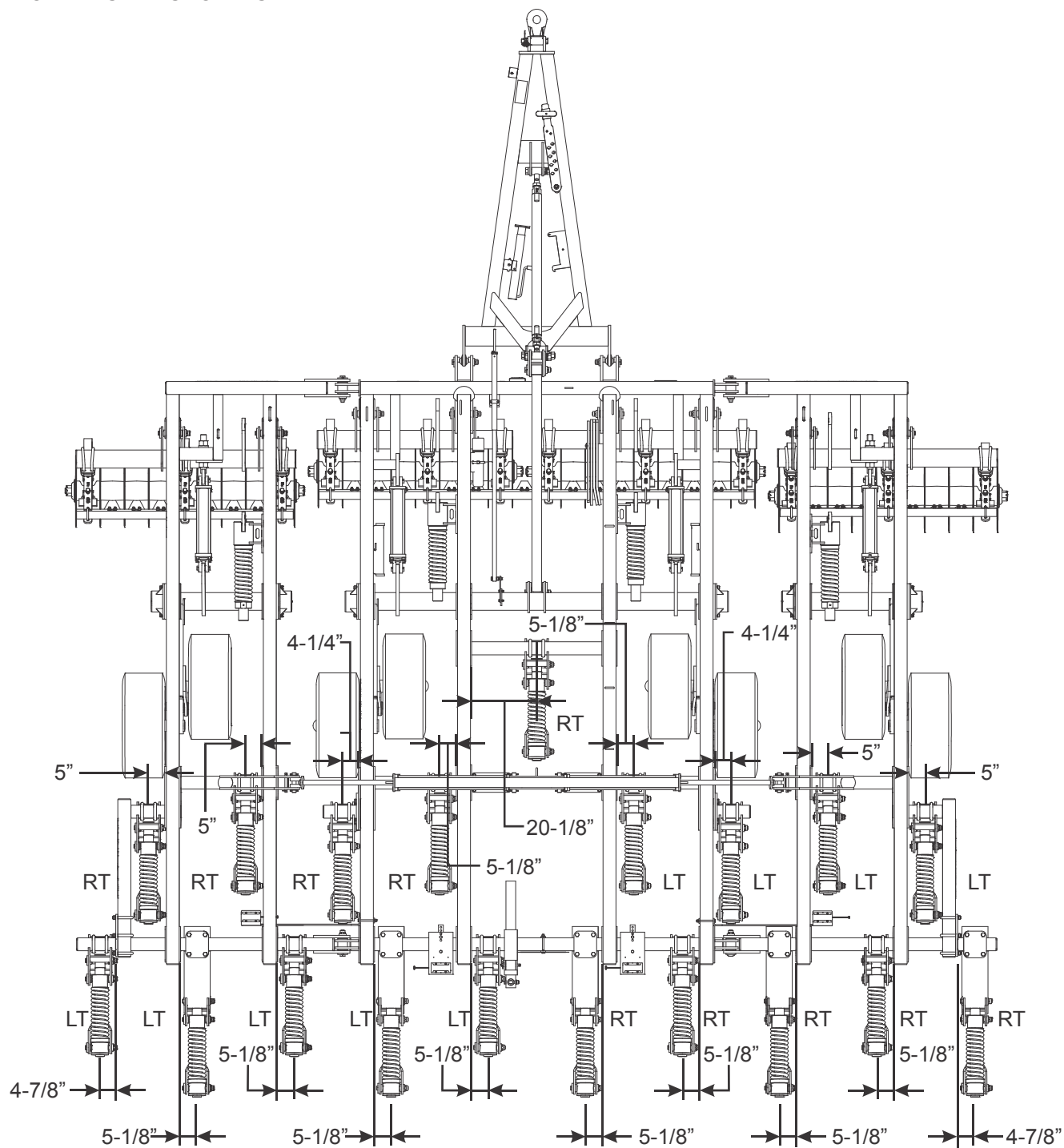


2130-17 shank-light placement

Figure 2-1: Auto Reset Shank and Light Bracket Placement (2131-17)

Figure 2-2: Rigid Shear Shank and Light Bracket Placement (2131-17)

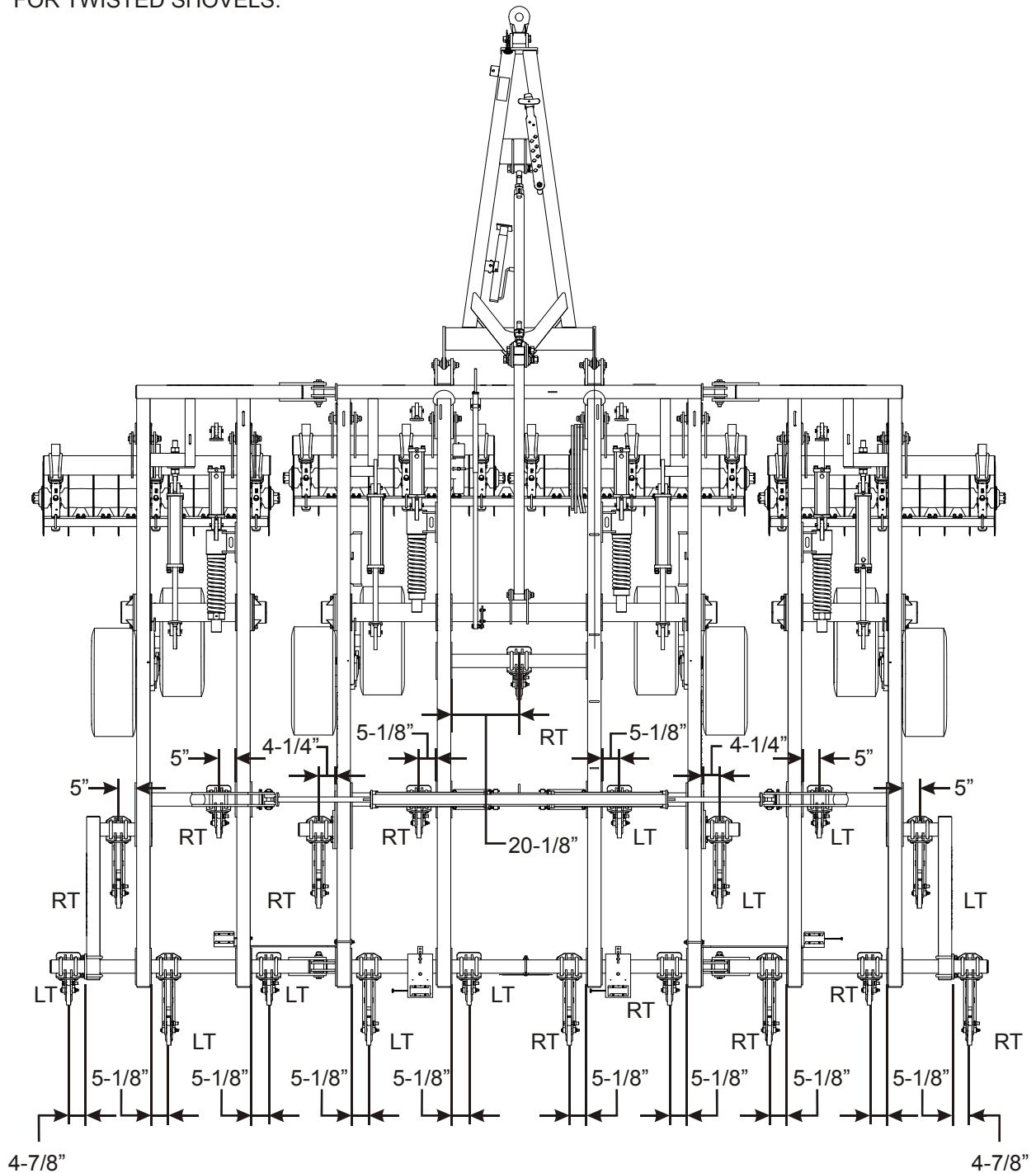
NOTE: LT AND RT INDICATES
THE RECOMMENDED PLACEMENT
FOR TWISTED SHOVELS.



2130-19 shank-light placement

Figure 2-3: Auto Reset Shank and Light Bracket Placement (2131-19)

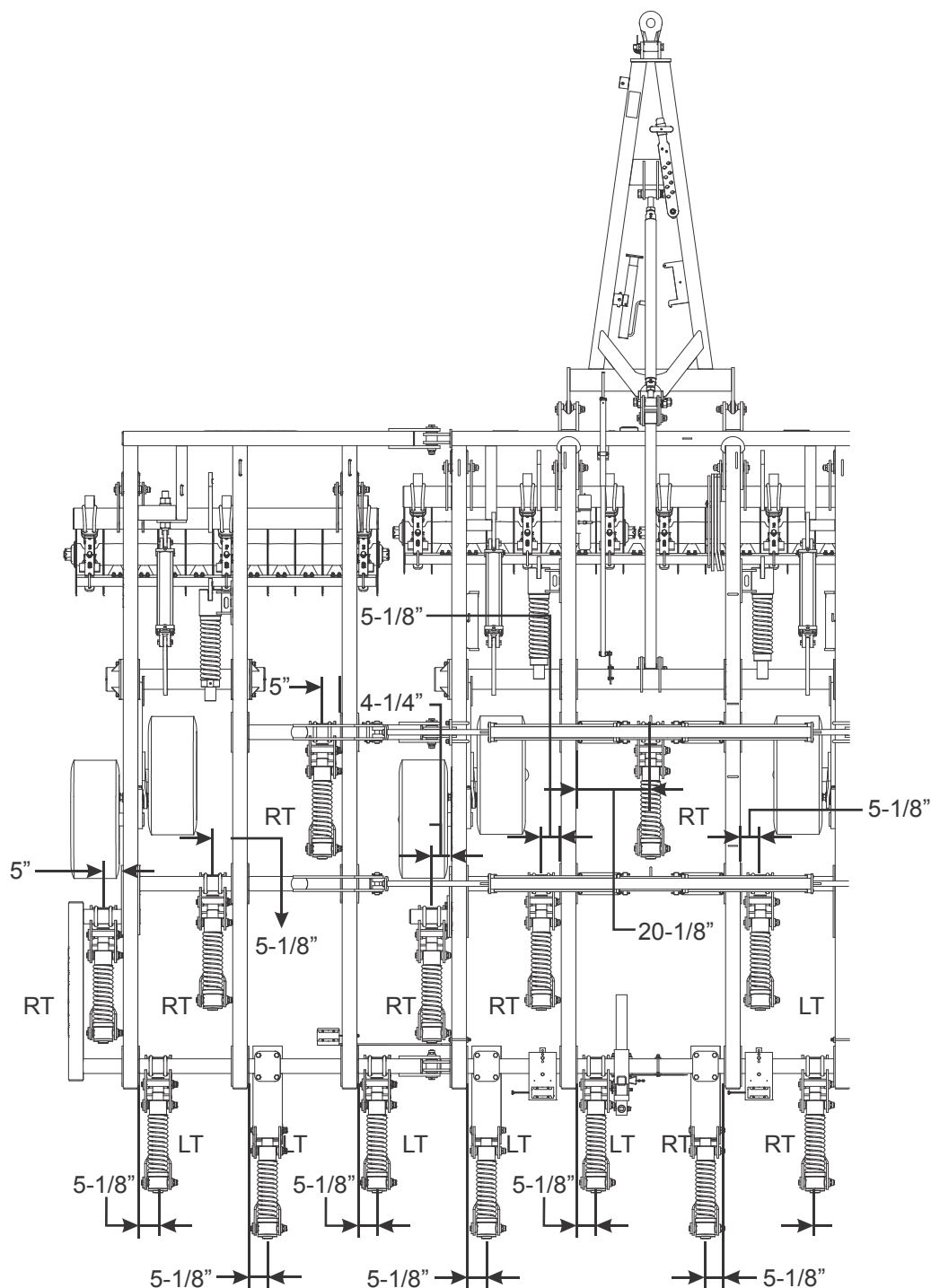
NOTE: LT AND RT INDICATES
THE RECOMMENDED PLACEMENT
FOR TWISTED SHOVELS.



2130-19_rsb shank-light placement

Figure 2-4: Rigid Shear Shank and Light Bracket Placement (2131-19)

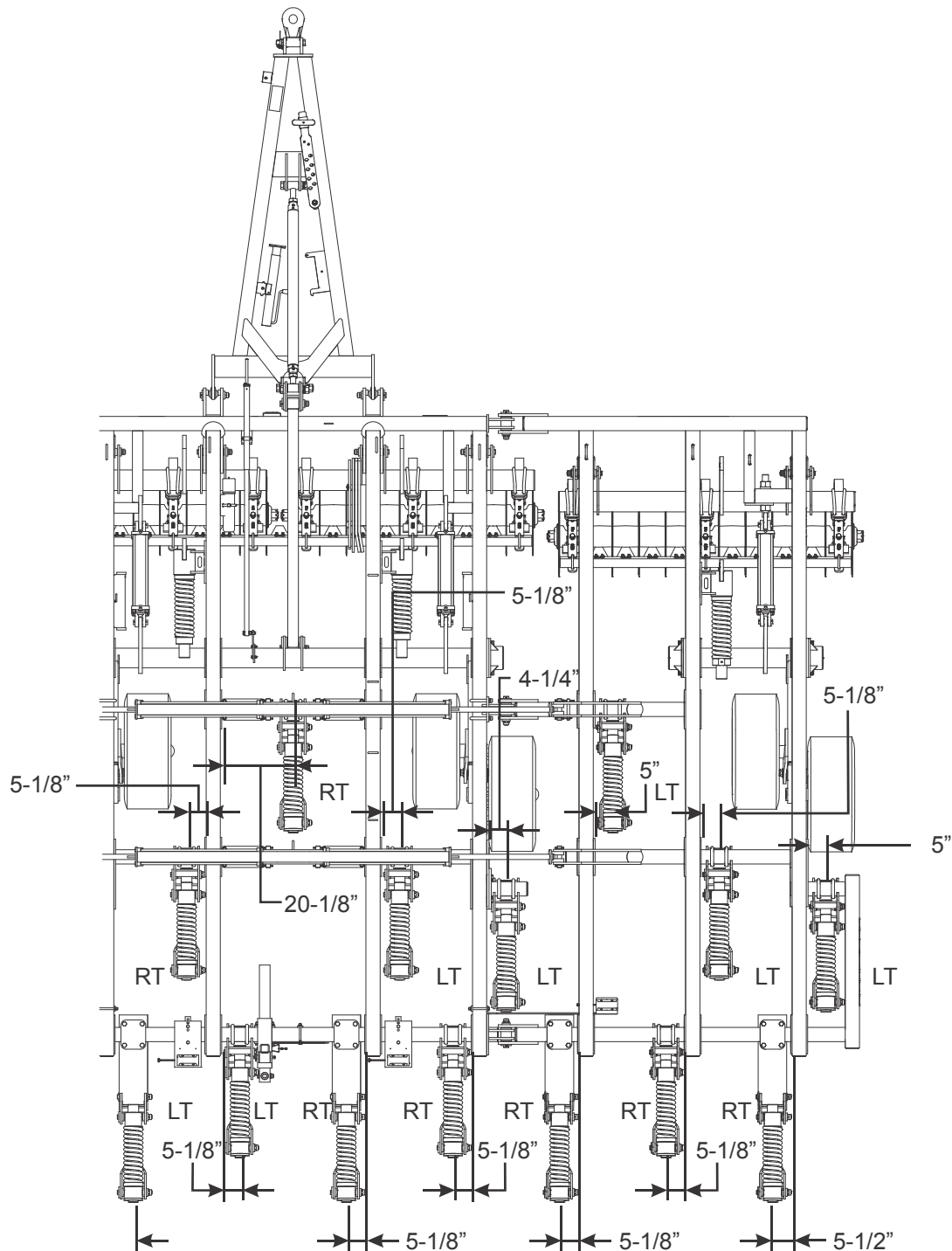
NOTE: LT AND RT INDICATES
THE RECOMMENDED PLACEMENT
FOR TWISTED SHOVELS.



2130-21 shank-light placement p1

Figure 2-5: Auto Reset Shank and Light Bracket Placement (2131-21)

NOTE: LT AND RT INDICATES
THE RECOMMENDED PLACEMENT
FOR TWISTED SHOVELS.



2130-21 shank-light placement p2

Figure 2-6: Auto Reset Shank and Light Bracket Placement (2131-21)

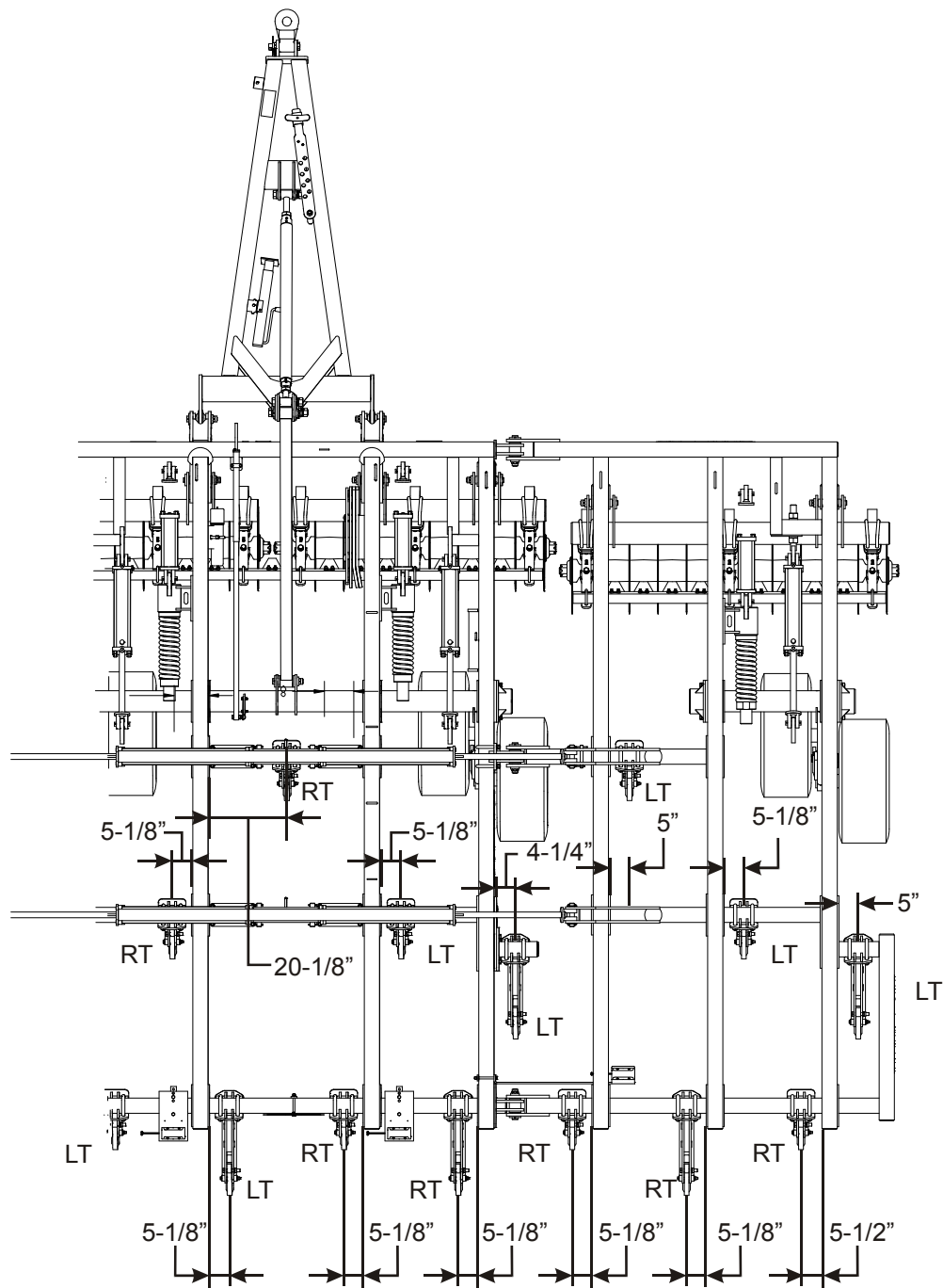
Technical drawing of a mechanical assembly, likely a printing press, showing a side view of the mechanism. The drawing includes various components such as levers, springs, and rods, with dimensions and labels (RT, LT) indicating specific parts and measurements.

Key dimensions and labels visible in the drawing:

- Dimensions: 5", 5-1/8", 4-1/4", 5-1/8", 20-1/8", 5-1/8", 5-1/8", 5-1/8", 5-1/8", 5-1/8", 5-1/8".
- Labels: RT (Right Top), LT (Left Top), RT (Right Bottom), LT (Left Bottom).

Figure 2-7: Rigid Shear Shank and Light Bracket Placement (2131-21)

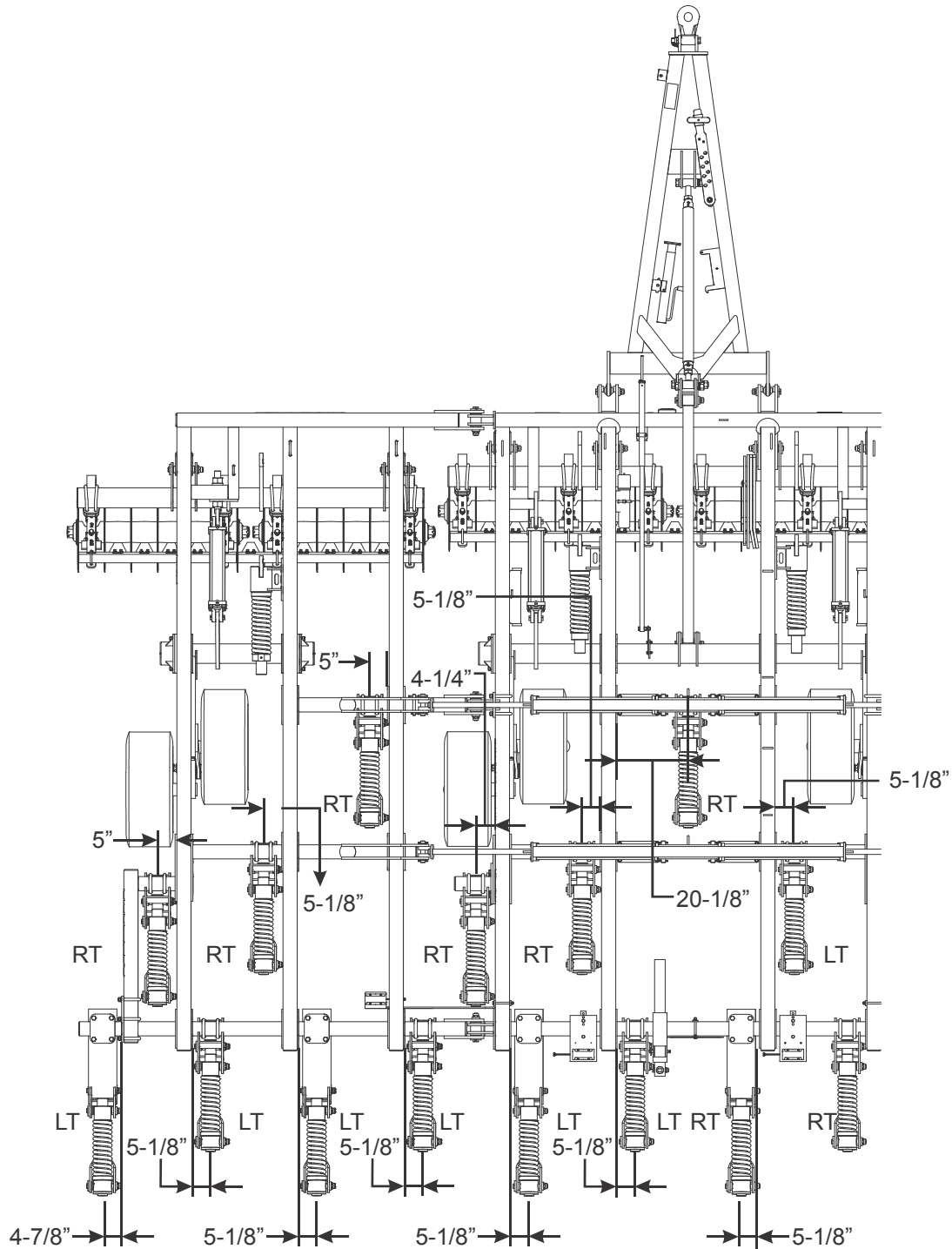
NOTE: LT AND RT INDICATES
THE RECOMMENDED PLACEMENT
FOR TWISTED SHOVELS.



2130-21 shank-light placement p2

Figure 2-8: Rigid Shear Shank and Light Bracket Placement (2131-21)

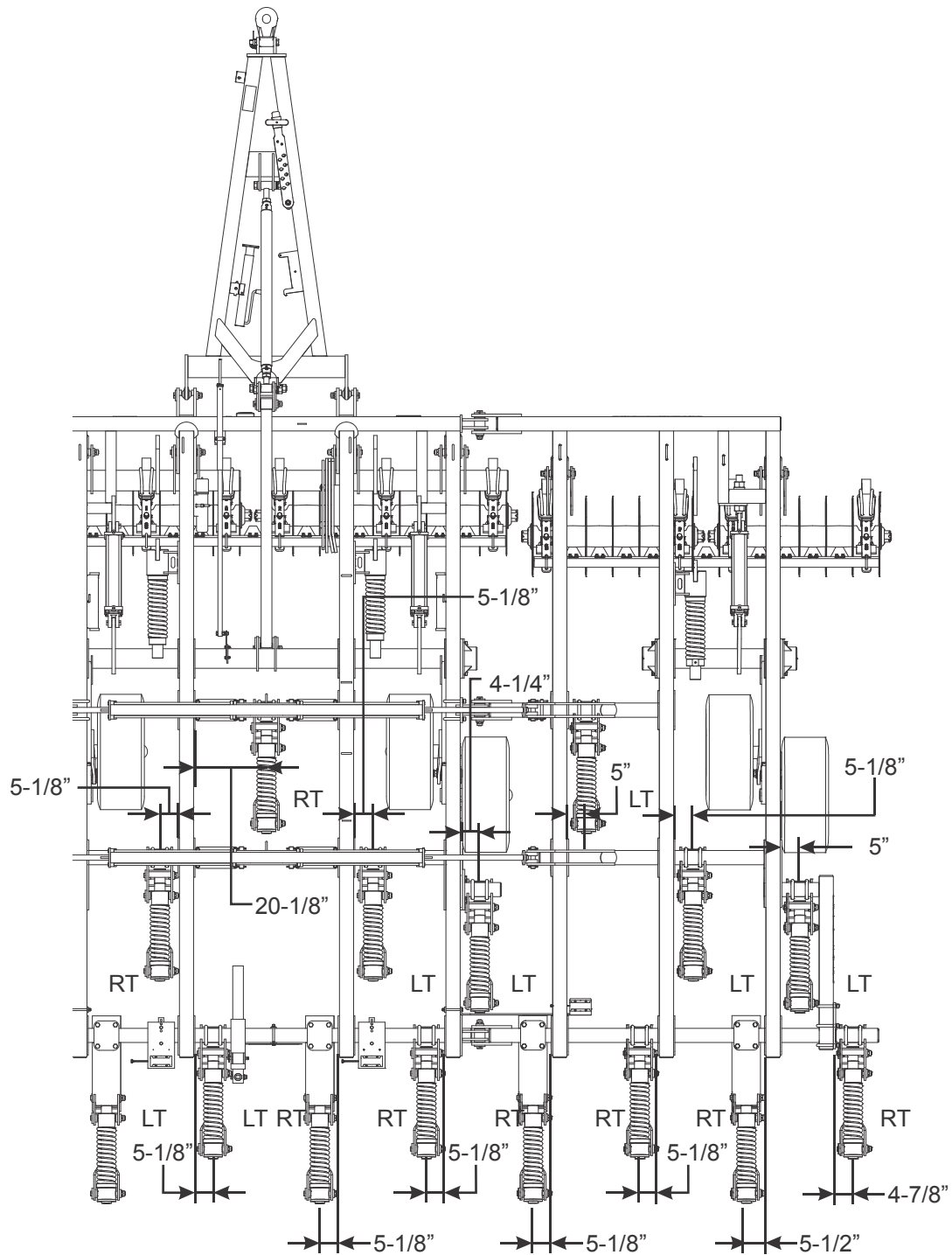
NOTE: LT AND RT INDICATES
THE RECOMMENDED PLACEMENT
FOR TWISTED SHOVELS.



2130-23 shank-light placement p1

Figure 2-9: Auto Reset Shank and Light Bracket Placement (2131-23)

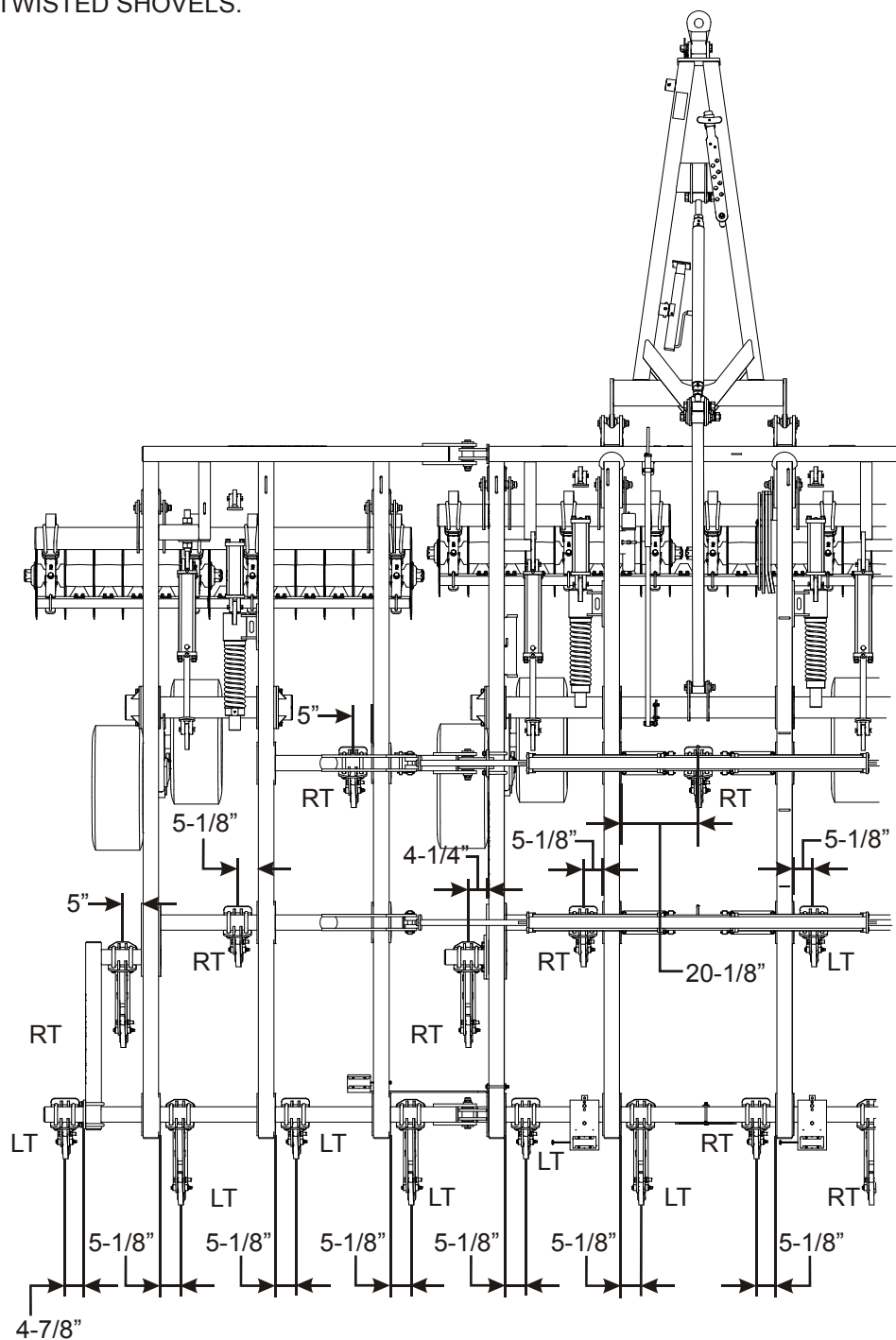
NOTE: LT AND RT INDICATES
THE RECOMMENDED PLACEMENT
FOR TWISTED SHOVELS.



2130-23 shank-light placement p2

Figure 2-10: Auto Reset Shank and Light Bracket Placement (2131-23)

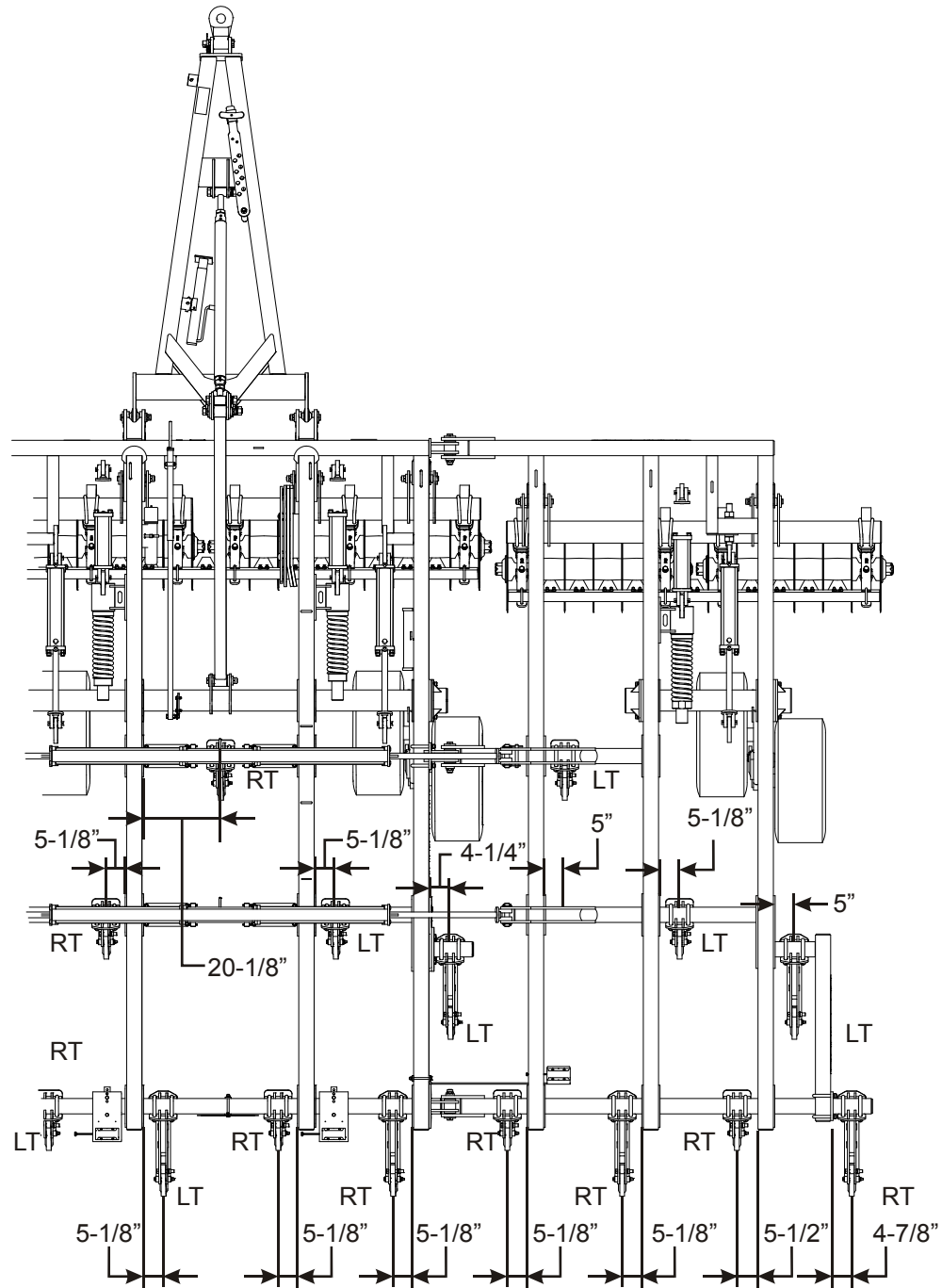
NOTE: LT AND RT INDICATES
THE RECOMMENDED PLACEMENT
FOR TWISTED SHOVELS.



2130-23_rsb shank-light placement p1

Figure 2-11: Rigid Shear Shank and Light Bracket Placement (2131-23)

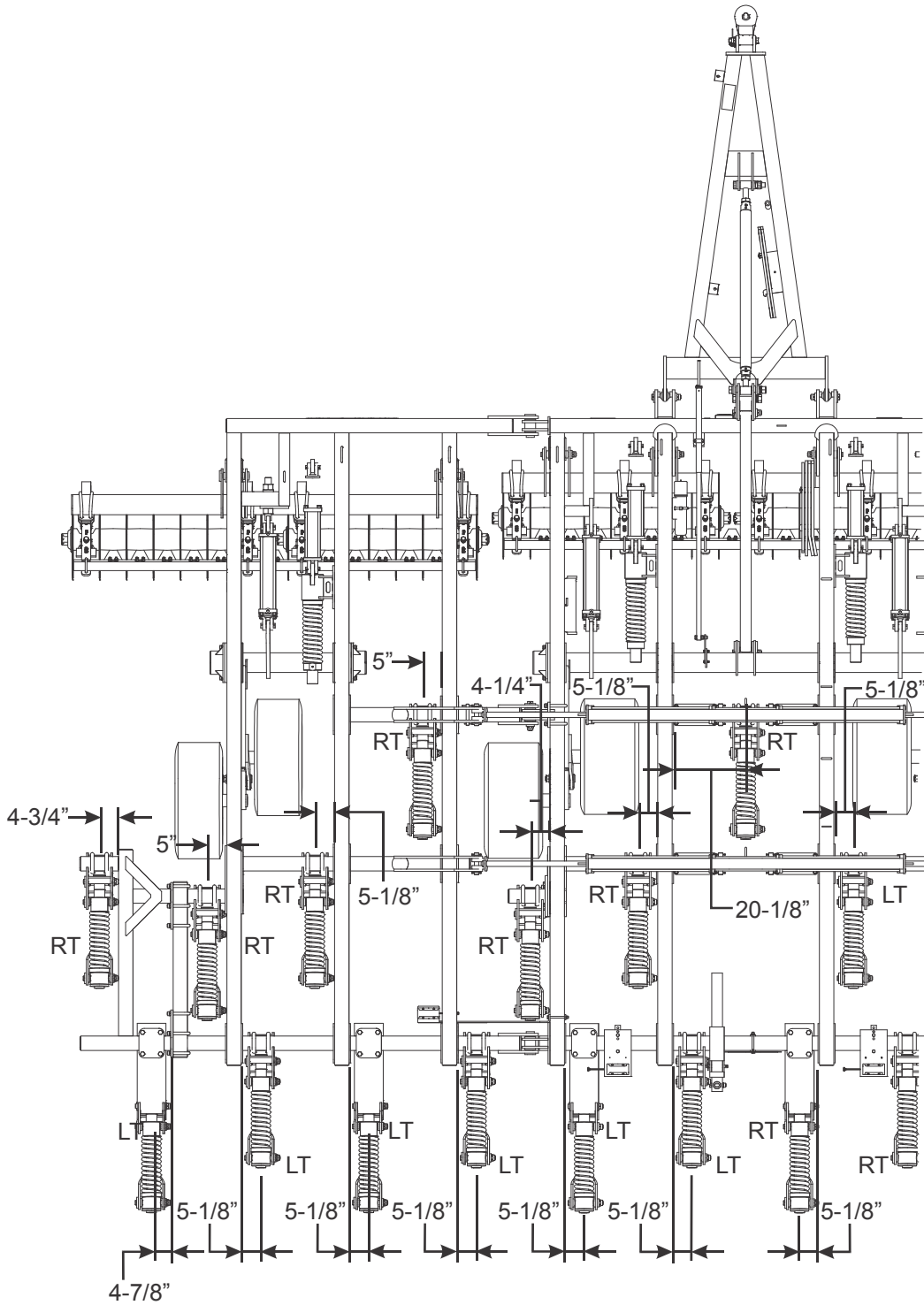
NOTE: LT AND RT INDICATES
THE RECOMMENDED PLACEMENT
FOR TWISTED SHOVELS.



2130-23 shank-light placement p2

Figure 2-12: Rigid Shear Shank and Light Bracket Placement (2131-23)

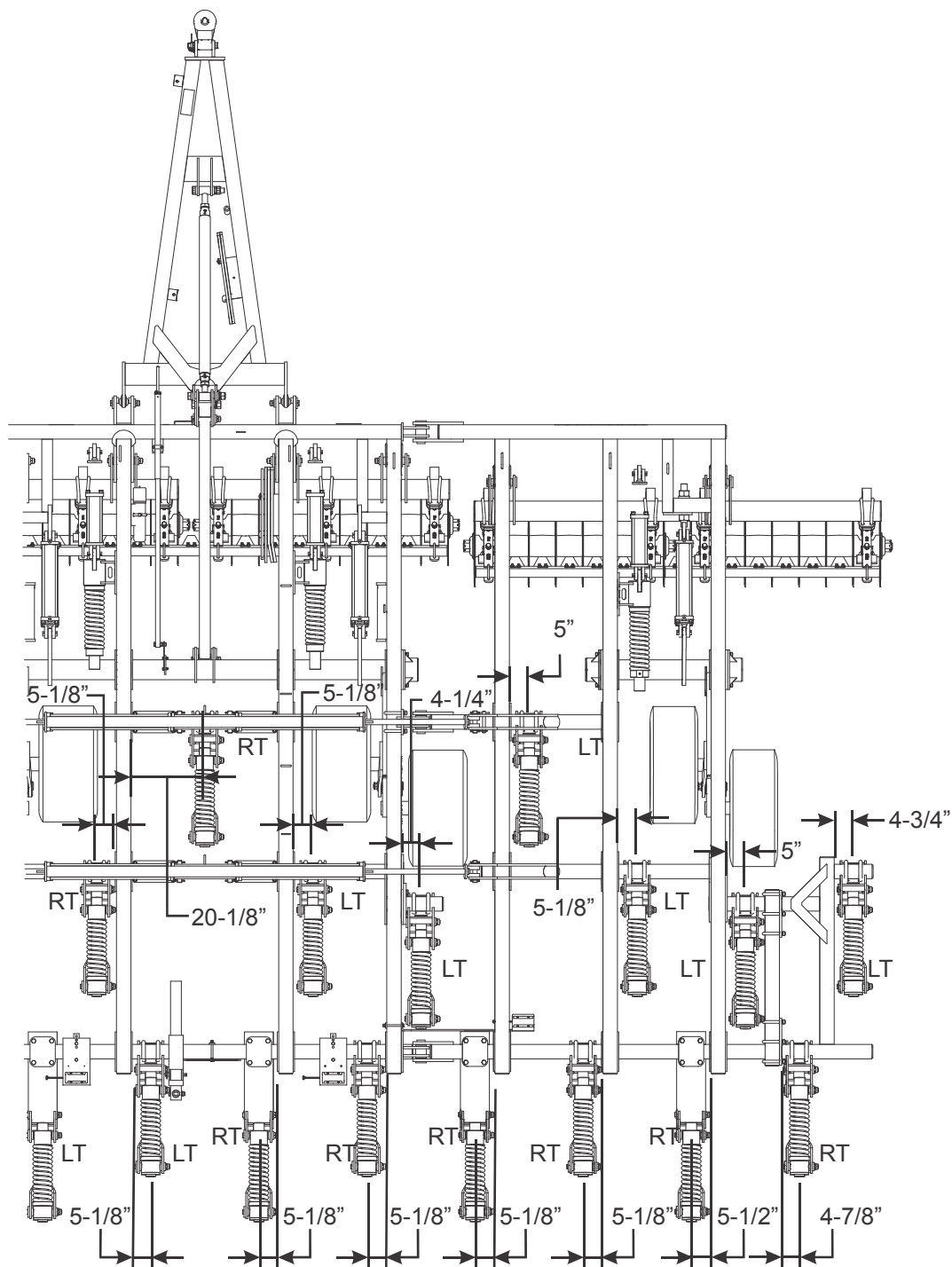
NOTE: LT AND RT INDICATES
THE RECOMMENDED PLACEMENT
FOR TWISTED SHOVELS.



2130-25 shank light placement p1

Figure 2-13: Auto Reset Shank and Light Bracket Placement (2131-25)

NOTE: LT AND RT INDICATES
THE RECOMMENDED PLACEMENT
FOR TWISTED SHOVELS.

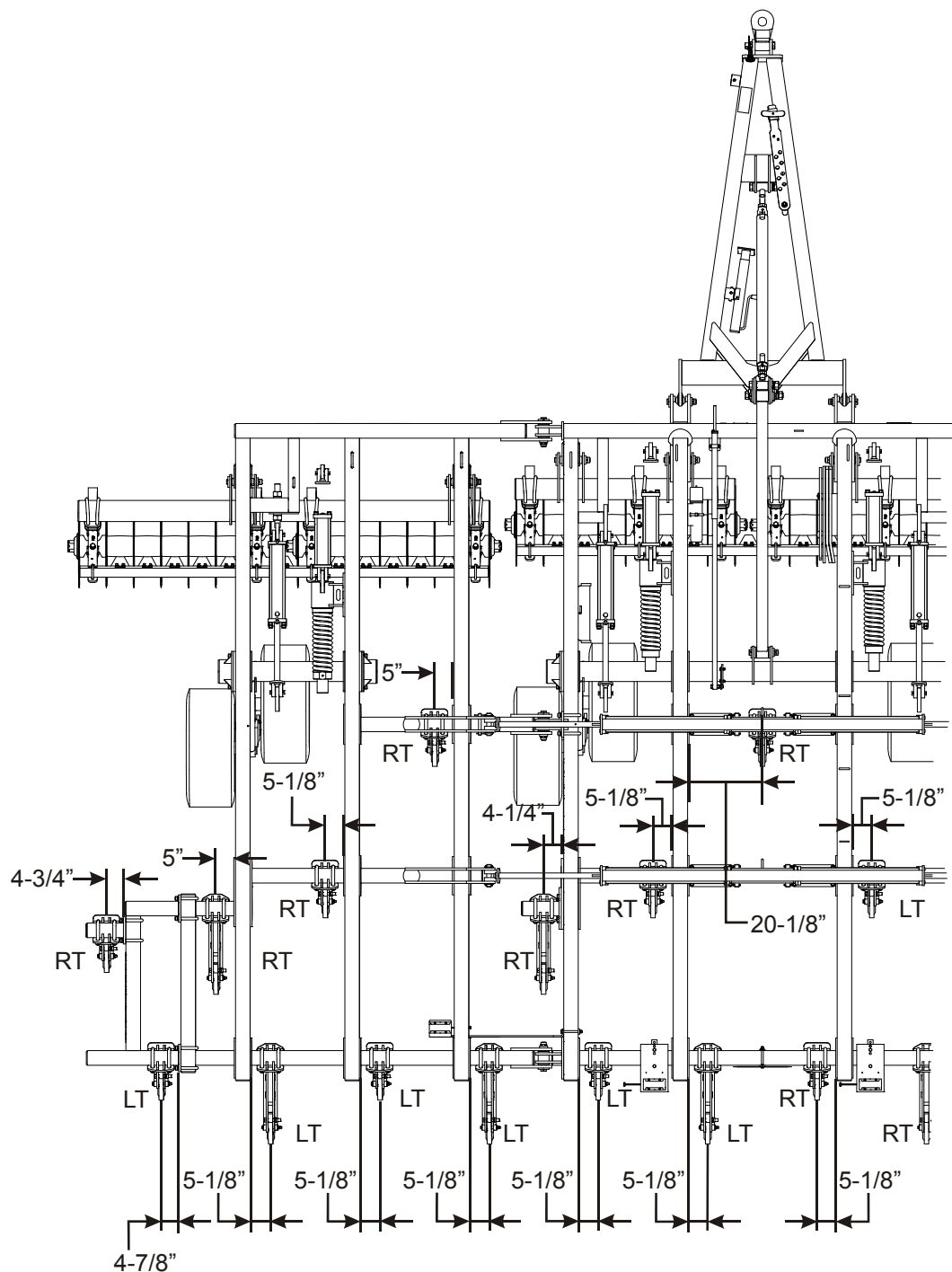


2130-25 shank light placement p2

Figure 2-14: Auto Reset Shank and Light Bracket Placement (2131-25)

STANDARD SPECIFICATIONS

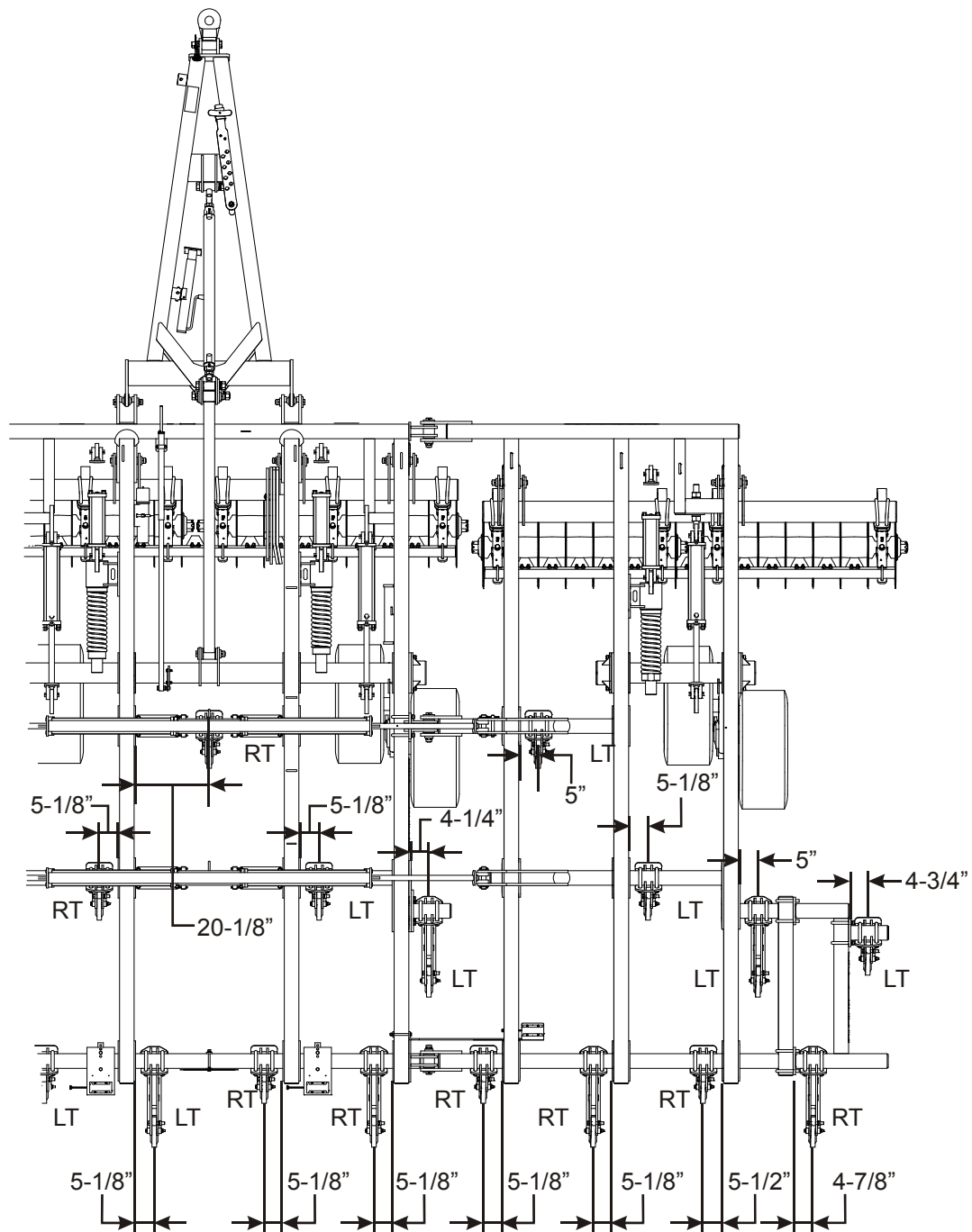
NOTE: LT AND RT INDICATES
THE RECOMMENDED PLACEMENT
FOR TWISTED SHOVELS.



2130-25_rsb shank-light placement p1

Figure 2-15: Rigid Shear Shank and Light Bracket Placement (2131-25)

NOTE: LT AND RT INDICATES
THE RECOMMENDED PLACEMENT
FOR TWISTED SHOVELS.

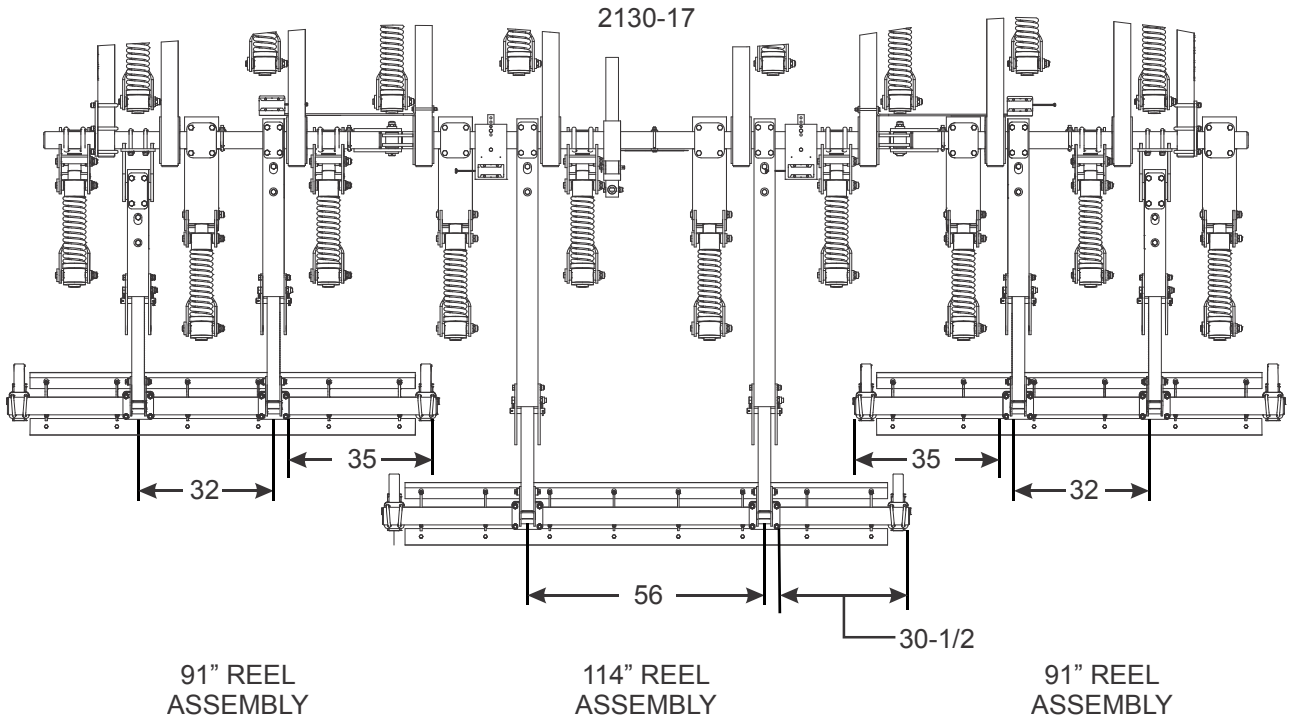
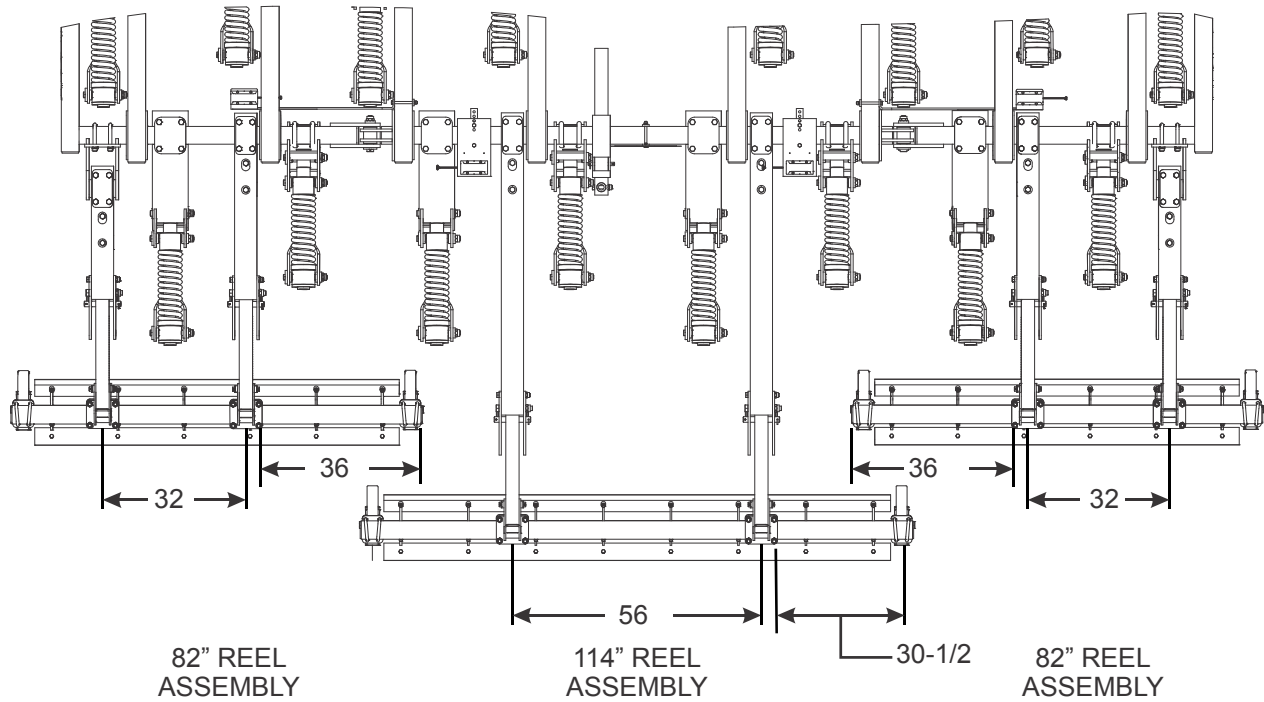


2130-25 _rsb shank light placement p2

Figure 2-16: Rigid Shear Shank and Light Bracket Placement (2131-25)

STANDARD SPECIFICATIONS

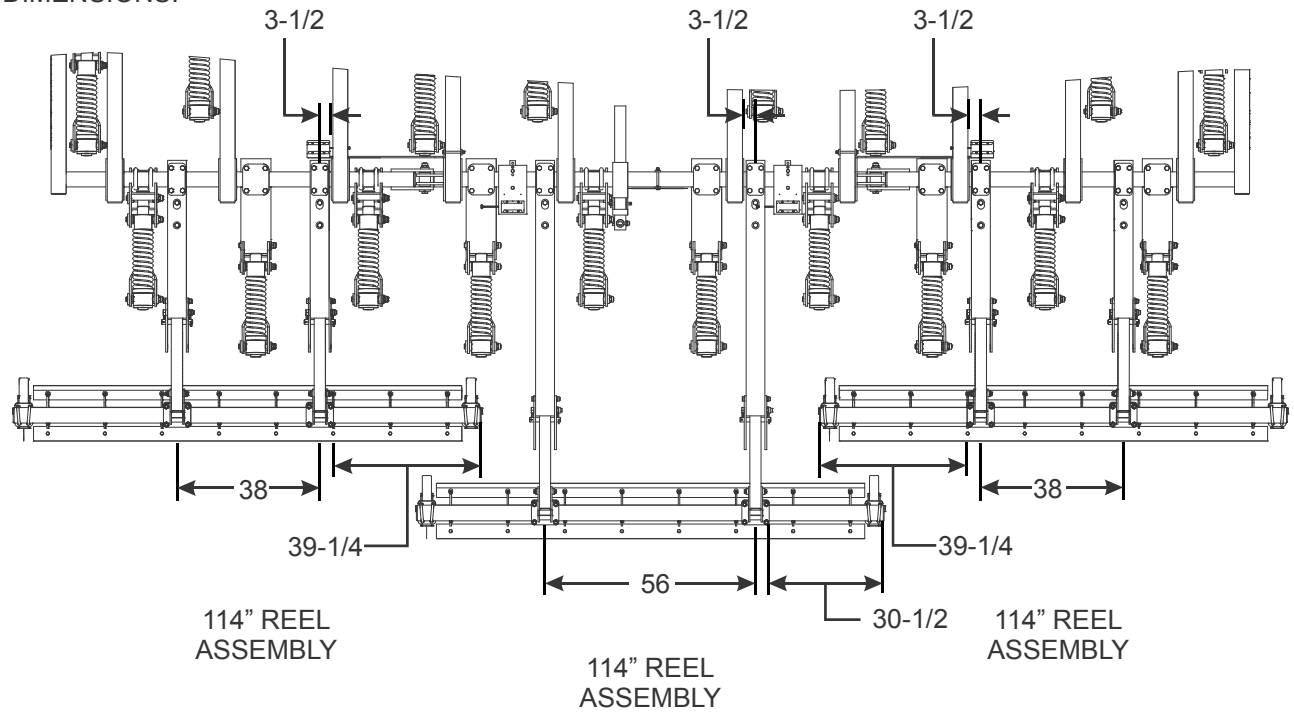
NOTE: AUTO RESET SHANK SHOWN. CHOPPER REELS ATTACH TO RIGID SHEAR SHANK MODELS USING SAME DIMENSIONS.



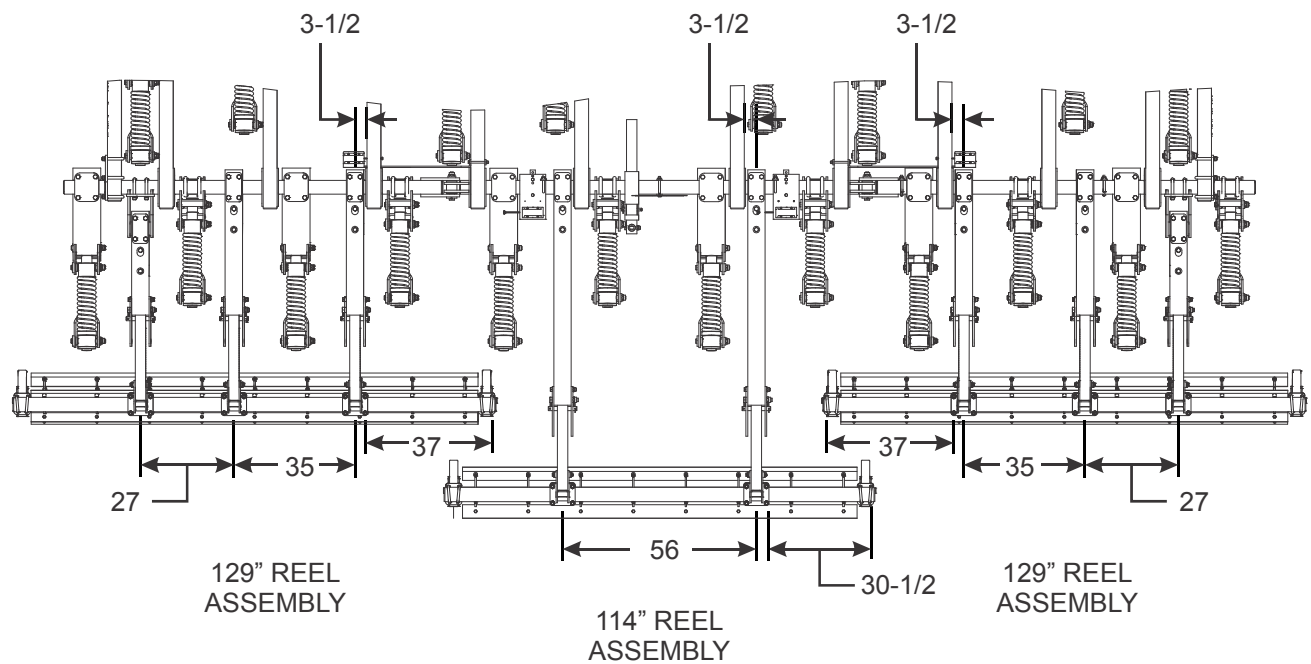
2130-17 & 19 chopper reel placement

Figure 2-17: Standard and Hydraulic Tubular Mount Chopper Reel Placement (2131-17 & 2131-19)

NOTE: AUTO RESET SHANK SHOWN. CHOPPER REELS ATTACH TO RIGID SHEAR SHANK MODELS USING SAME DIMENSIONS.



2130-21

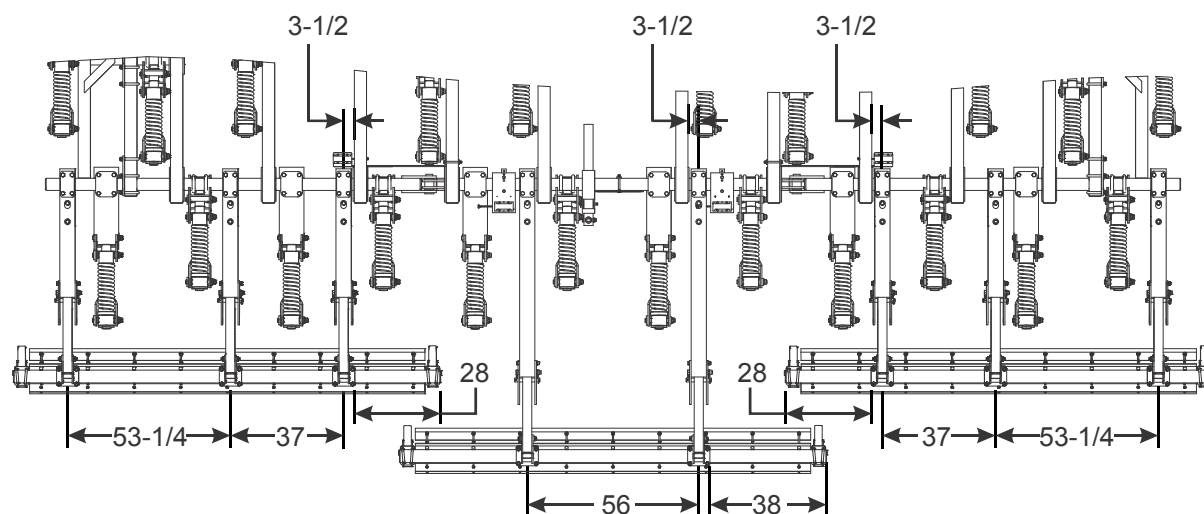


2130-23

2130-21& 23 chopper reel placement

Figure 2-18: Standard and Hydraulic Tubular Mount Chopper Reel Placement (2131-21 & 2131-23)

NOTE: AUTO RESET SHANK MODEL SHOWN. CHOPPER REELS ATTACH TO RIGID SHEAR SHANK MODELS USING SAME DIMENSIONS.



129" REEL
ASSEMBLY

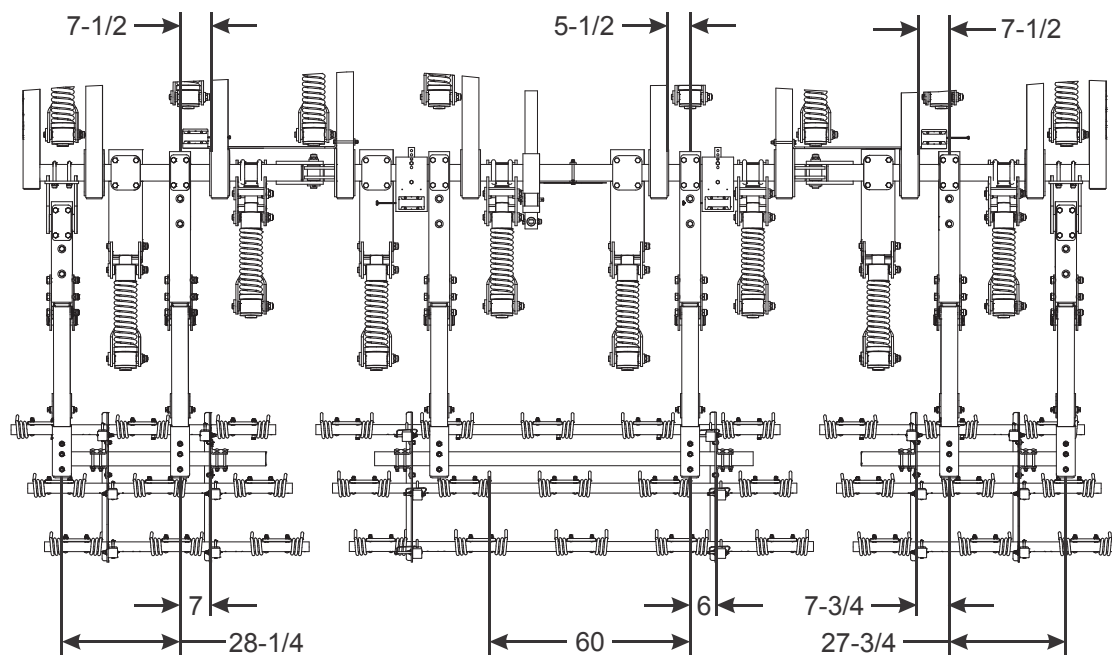
129" REEL
ASSEMBLY

129" REEL
ASSEMBLY

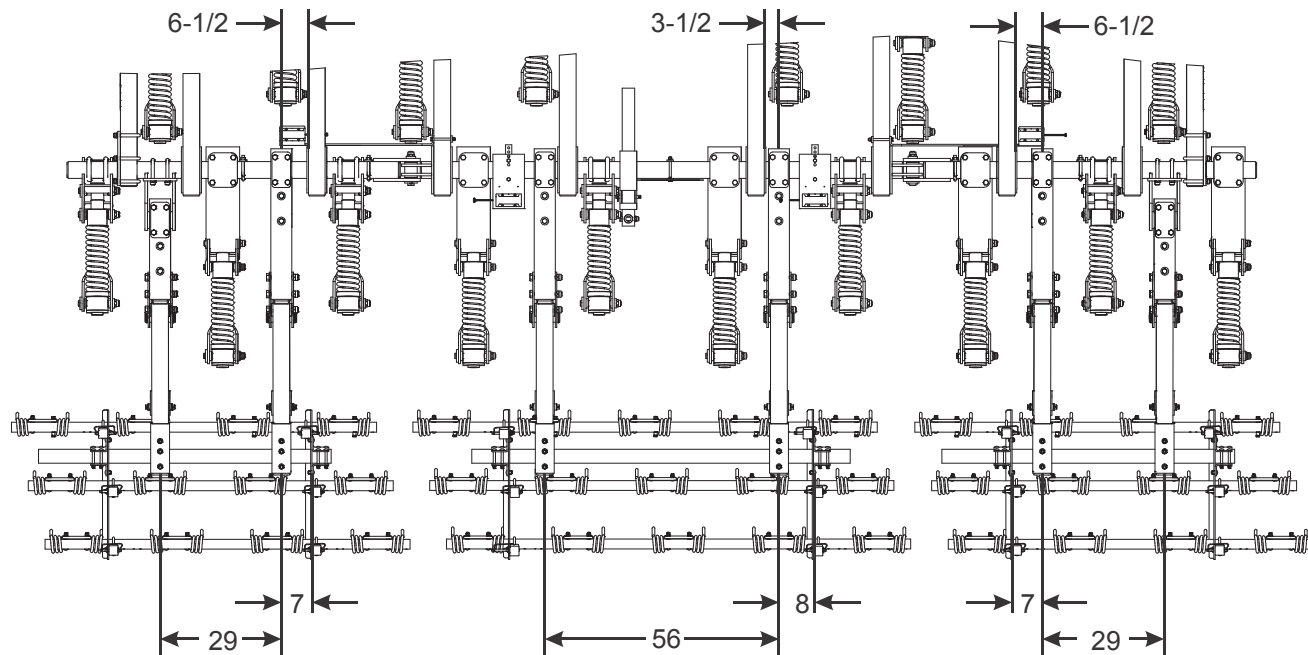
2130-25

2130-25 chopper reel placement

Figure 2-19: Standard and Hydraulic Tubular Mount Chopper Reel Placement (2131-25)



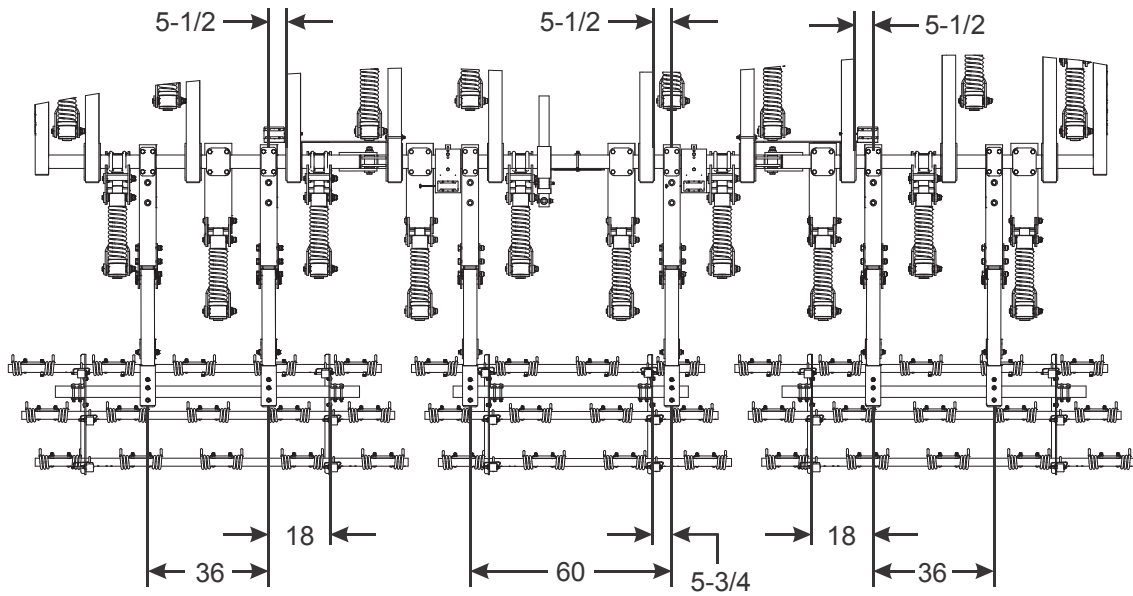
2130-17



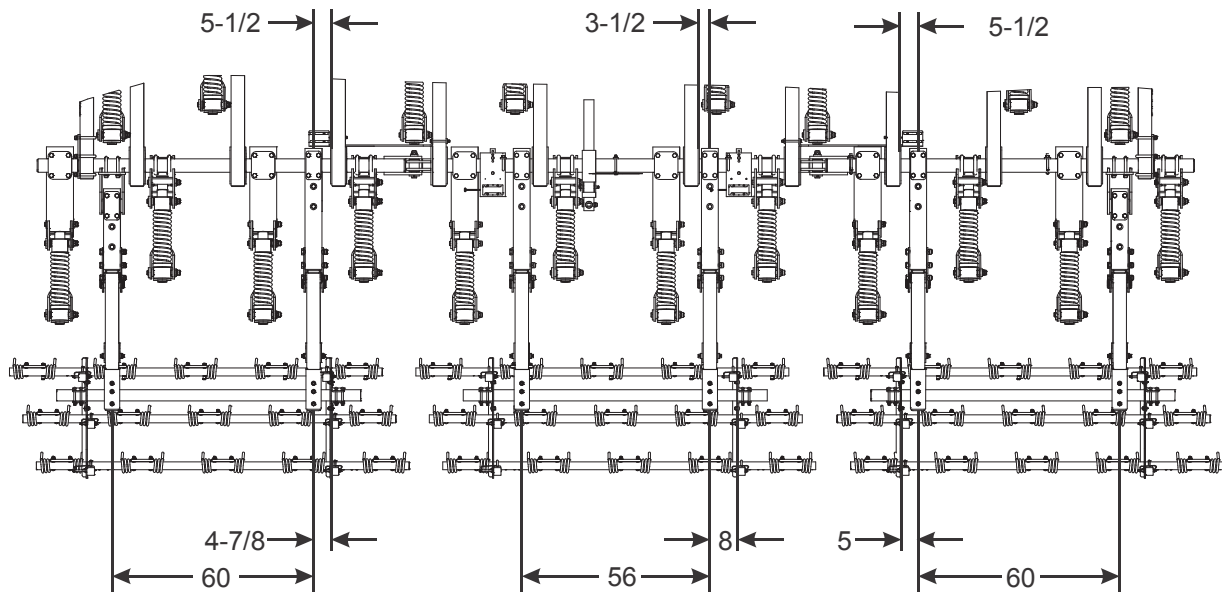
2130-19

Figure 2-20: Coil Tine Harrow Placement (2131-17 & 2131-19)

STANDARD SPECIFICATIONS

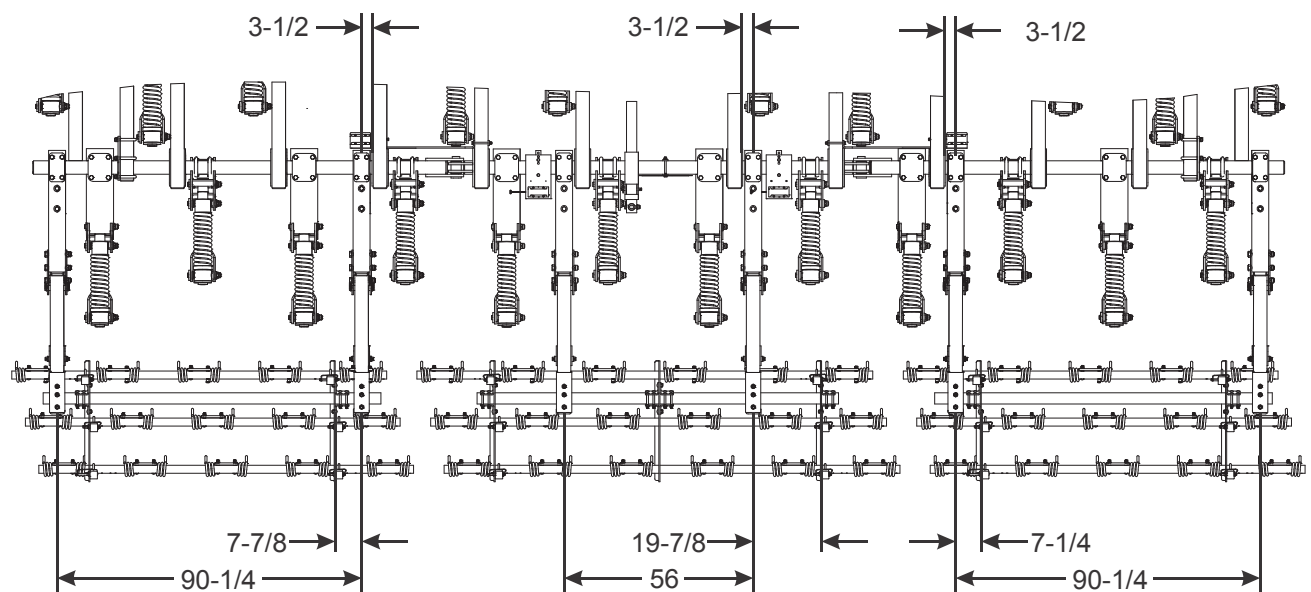


2130-21



2130-23

Figure 2-21: Coil Tine Harrow Placement (2131-21 & 2131-23)



2130-25

Figure 2-22: Coil Tine Harrow Placement (2131-25)

Chapter 3

Assembly Instructions

It is very important that your new 2131 Wing Coulter Chisel be properly assembled, adjusted and lubricated before use. Illustrations to assist with the assembly process are provided in “**Standard Specifications**” on **page 2-1**. They show proper shank and light mounting bracket spacing. Illustrations in this section show proper assembly procedures. Remove paint from grease fittings. Replace any grease fittings that are damaged or missing. Be sure to return screws, clips, etc., to their original locations.

To insure alignment of assemblies, **leave the nuts loose until completion** of final assembly. Use lock washers or flat washers as specified. Spread all cotter pins.

After completion of final assembly, tighten all nuts evenly to prevent misalignment, distortion or binding. Tighten all screws and nuts to the recommended torques (See Table 2-1 and .See Table 2-2)



DANGER

Coulter blades are extremely sharp. Exercise extreme care when working on or near coulter blades. Do not allow coulters to roll over or fall onto any body part. Do not allow wrenches to slip when working near coulter blades. Never push wrenches toward coulter blades. Do not climb over machine above coulter blades. Failure to stay clear of coulter blade edges can cause serious personal injury or death.



WARNING

Do not attempt to lift heavy parts (such as the frame, coulter gangs, wheel lift, and pull hitch) manually. Use a hoist or a forklift to move these parts into position.



DANGER

To prevent accidental lowering:

1. All hydraulically elevated equipment must be locked out using the cylinder lockouts.
2. Lower equipment to the ground while servicing or when it is idle.

Failure to take measures to prevent accidental lowering may result in serious personal injury or death.



CAUTION

Be sure to bleed the hydraulic system of all air in lines after installation. Failure to bleed the system of all air can result in improper machine operation.



CAUTION

Incorrect adjustment of disc adjust rods will cause permanent equipment damage.

ASSEMBLY INSTRUCTIONS

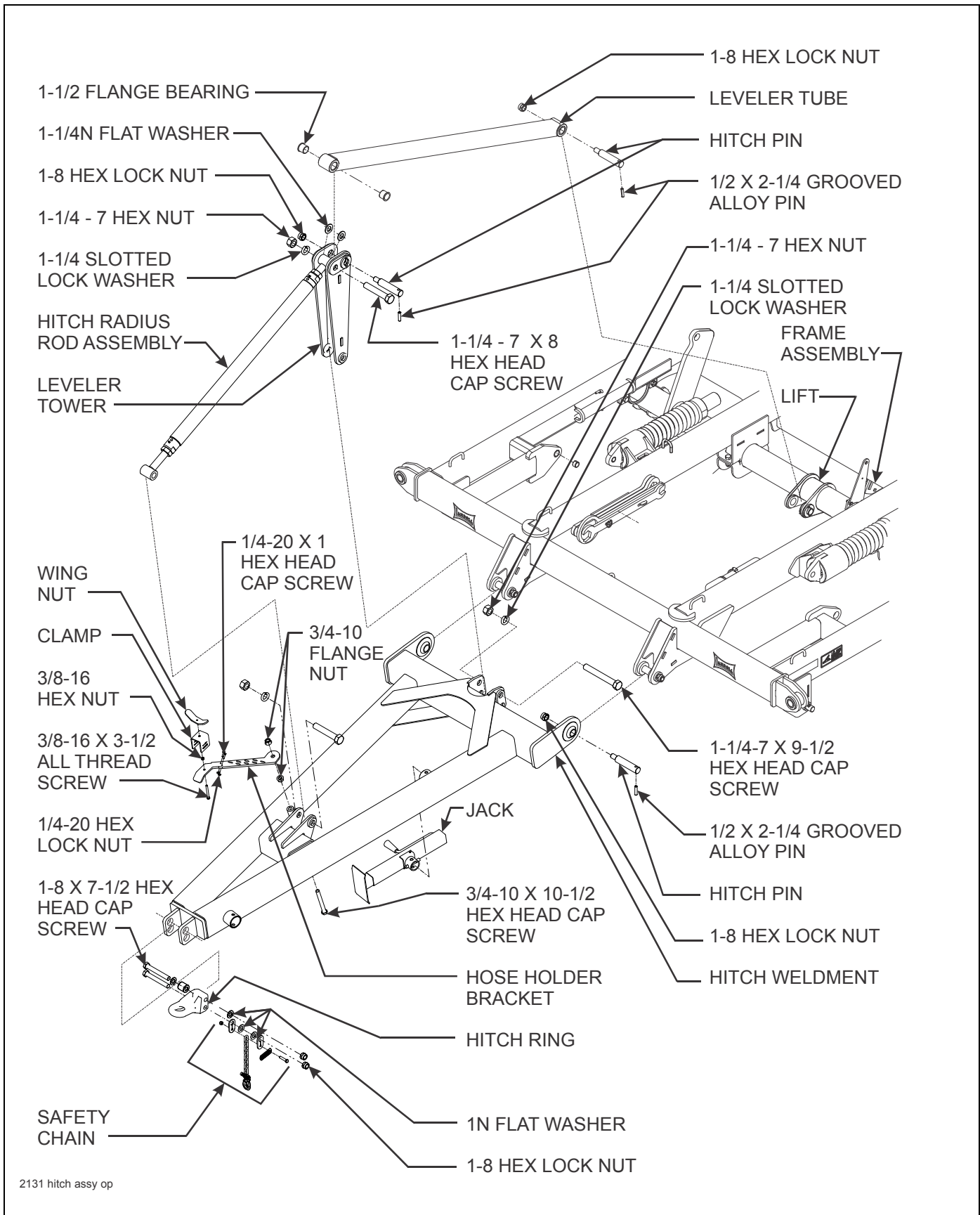


Figure 3-1: Hitch Installation (w/o Weights)

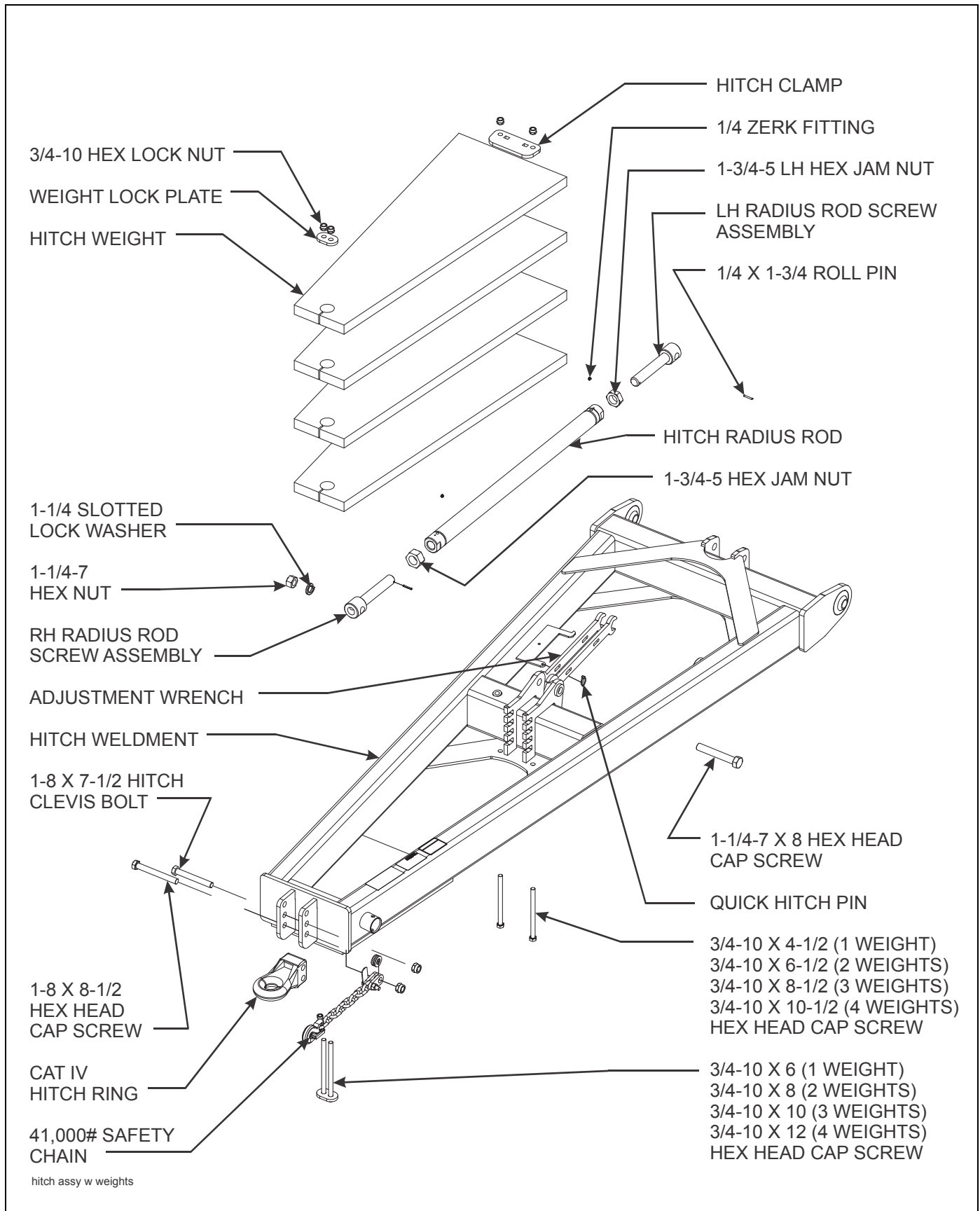


Figure 3-2: Hitch Installation (w/ Weights)

ASSEMBLY INSTRUCTIONS

Wing Coulter Chisel Center Frame Assembly



WARNING

Do not attempt to lift heavy parts (such as the frame, coulter gangs, wheel lift, and pull hitch) manually. Use a hoist or a forklift to move these parts into position.

IMPORTANT

Read all safety precautions at the front of the section before attempting any of the following procedures.

1. Place center frame assembly on stands approximately 36" high. The assembly area should be a large level area of sufficient size to accommodate the Wing Coulter Chisel when fully assembled.

Hitch Installation

1. Attach the hitch weldment to the front of the frame using hitch pins, 1-8 hex lock nuts, and 1/2 x 2-1/4 slotted spring pins (**See Figure 3-1.**)
2. Move the jack to the forward mounting tube and rotate to parking position to support the front of the hitch.
3. Insert a 3/4-10 x 10-1/2 hex head cap screw into the hose holder tube on the right side of the hitch from the bottom side so the threads point upward. Hold in place with a 3/4 prevailing torque flange nut with the flange pointing upward as well. Do not tighten this cap screw, so the hose holder bracket may pivot freely in this joint.
4. Slide the hose holder bracket over the screw and secure with another 3/4 prevailing torque flange nut.

5. Install a 3/8-16 x 3-1/2 all-thread screw in the front of the hose holder bracket and secure with a 3/8-16 hex nut.
6. Slide the hose holder clamp over the 3/8" screw and loosely start the wing nut on top of the clamp. Hydraulic hoses will be routed through the clamp after assembly.

IMPORTANT

The clamp has two sides, so that extend hoses can be located on one side and retract hoses can be located on the other side for reference.

IMPORTANT

The leveler tower must be installed so that the narrow end of the tower is down and the reinforced holes are to the rear of the machine.

7. Connect narrow end of the leveler tower to the top hole of the hitch weldment using 1-1/4-7 x 9-1/2 hex head cap screw, slotted lock washer, and hex nut.
8. Attach the leveler tube to leveler mount plates on the lift using hitch pin, 1-8 hex lock nut, and 1/2 x 2-1/4 grooved alloy pin.
9. Insert 1-1/2 flange bearings in loose end of the leveler tube.
10. Connect loose end of leveler tube to the rear top hole of the leveler tower using hitch pin, 1-8 hex lock nut, and 1/2 x 2-1/4 grooved alloy pin.
11. Attach the hitch rod radius assembly to the top front hole of the leveler tower using 1-1/4-7 x 8 hex head cap screw, slotted lock washer, and hex nut.
12. Connect the remaining end of the hitch rod radius assembly to the hitch weldment using 1-1/4-7 x 8 hex head cap screw, slotted lock washer, and hex nut.
13. Assemble hitch ring to the hitch weldment using 1-8 x 7-1/2 hex head cap screws, hitch bushings, flat washer, and hex lock nuts through the top hole. Use same hardware, safety chain assembly, and flat washers in the lower hole.
14. Install optional hitch weights to hitch weldment using 3/4-10 hex head cap screws, height clamps, and hex lock nuts. Use proper length screws in accordance with number of hitch weights being used (**See Figure 3-2.**)

NOTE

Hitch weights are required when equipment has chopper reel or harrow assemblies attached to the rear. This will help balance the machine and prevent it from tipping over.

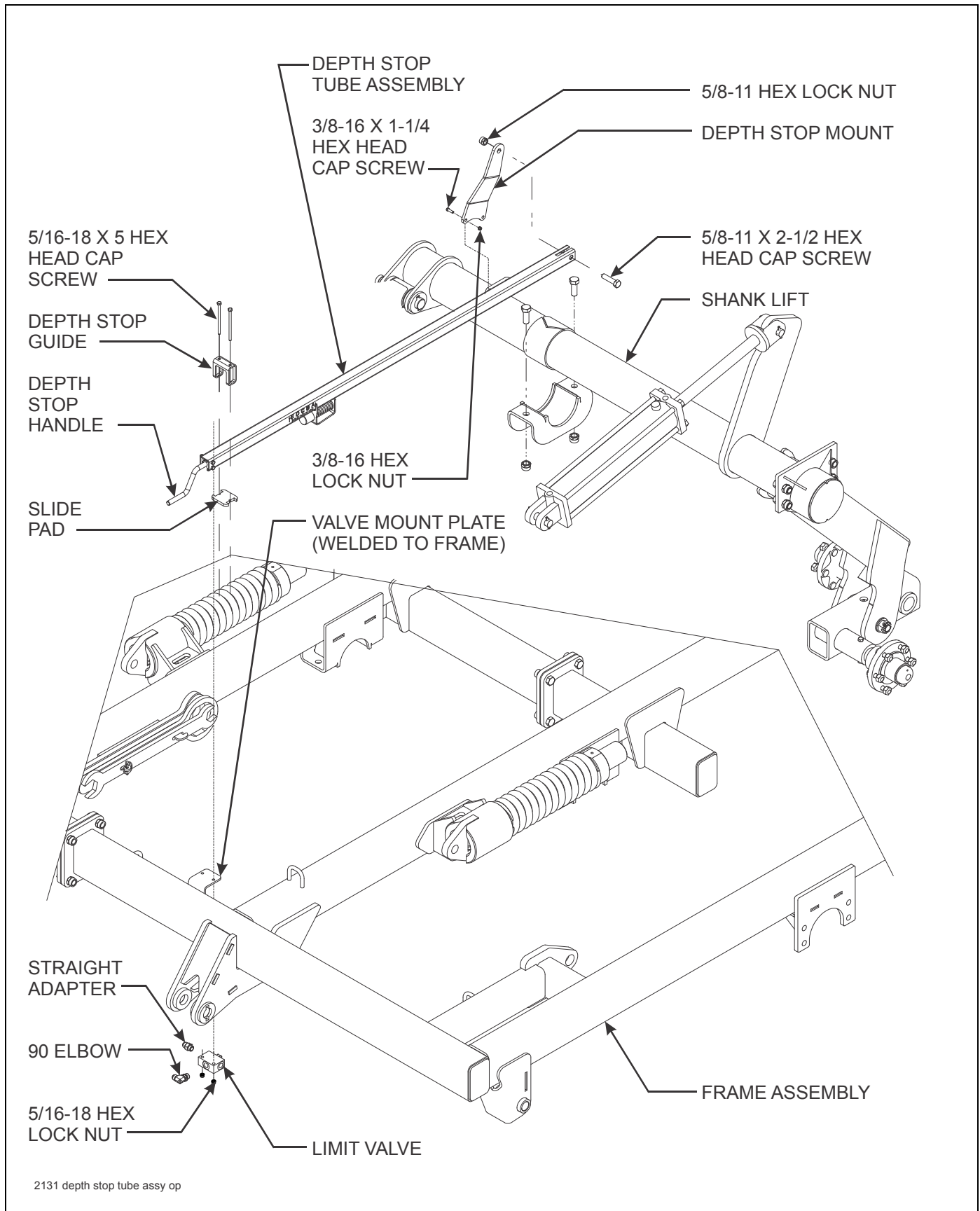


Figure 3-3: Depth Stop Assembly Installation

ASSEMBLY INSTRUCTIONS

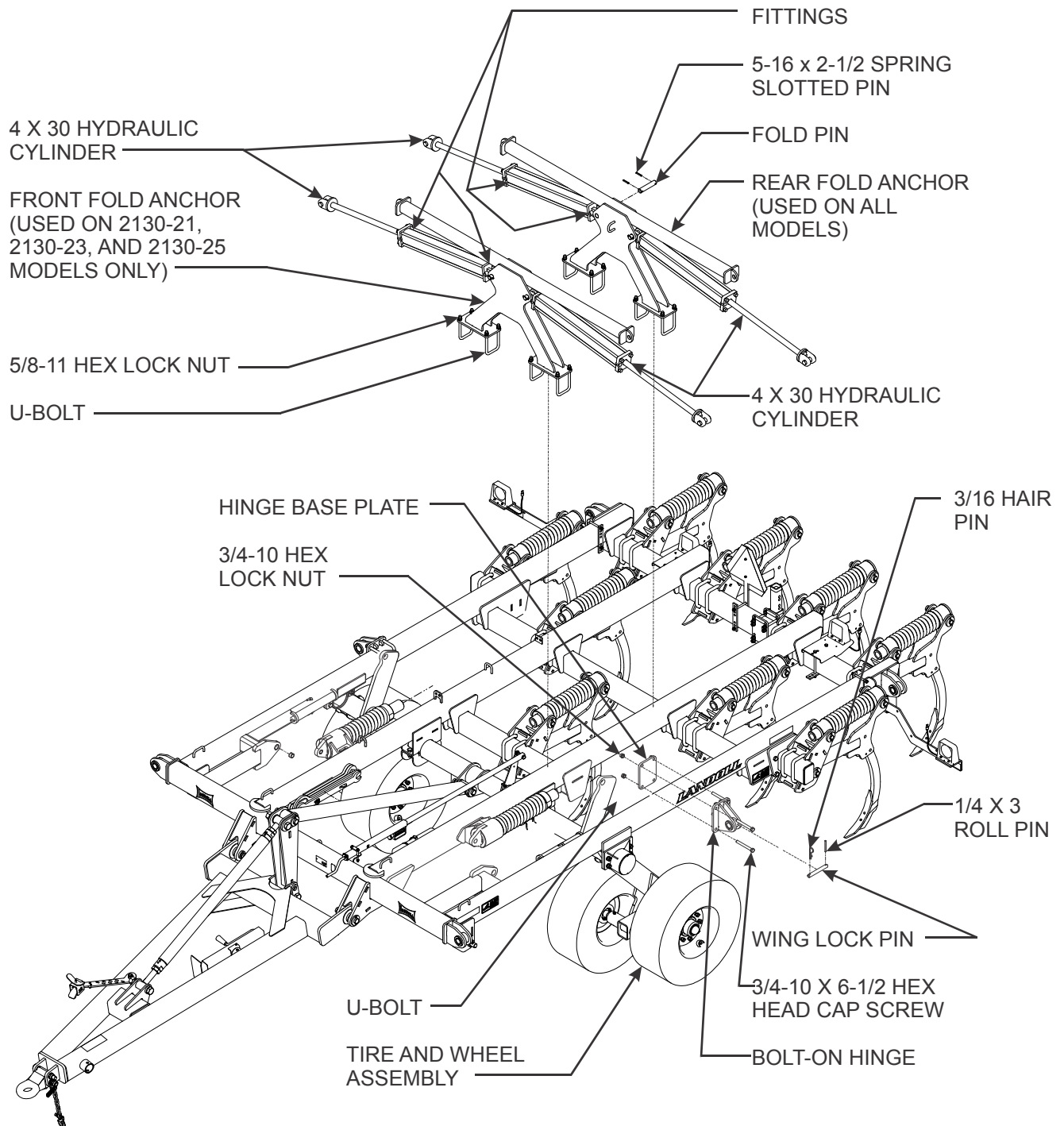
Depth Stop Tube Assembly

1. Attach the depth stop mount plate to the shank lift using 3/8-16 x 1-1/4 hex head cap screws and hex lock nuts.
2. Lay the depth stop tube assembly on top of the center frame. Insert a 5/8-11 x 2-1/2 hex head cap screw in the rear hole of the tube assembly from the left side (**See Figure 3-3.**) Install a 5/8-11 hex lock nut on the screw. Do not over tighten, as the depth stop must pivot on this screw.
3. Insert 90° elbow fittings in the back of the limit valve and a straight adapter in the side nearest the center of the machine.
4. Using 5/16-18 x 5 hex head cap screws secure the front end of the depth stop tube assembly to the top of the frame mount with the depth stop guide, slide pad, and 5/16-18 hex lock nuts. Attach the limit valve to the bottom side of the center frame mount using these same screws.

IMPORTANT

It may be necessary to leave these screws loose to attach the valve hoses later.

NOTE: FRONT FOLD CYLINDER FITTINGS SHOULD FACE THE REAR OF THE MACHINE. REAR FOLD CYLINDER FITTINGS SHOULD FACE THE FRONT OF THE MACHINE.



fold_2130-23

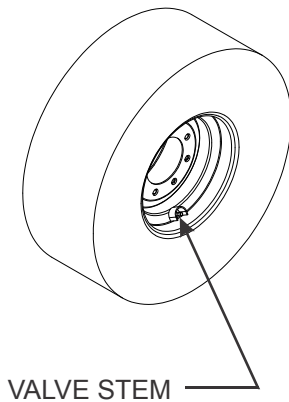
Figure 3-4: Fold Anchor and Bolt-on Mount Installation

ASSEMBLY INSTRUCTIONS

Center Frame Tires

1. Install the tire and wheel assemblies on the center section (**See Figure 3-4.**)
2. All models use tire and wheel assembly (p/n 157000 - Galaxy or p/n 165235 - Goodyear or p/n 175830 - Carlisle). (**See Figure 3-5.**)

NOTE: ALL TIRE/WHEEL ASSEMBLIES ARE MOUNTED WITH THE VALVE STEM FACING OUTWARD.



2130 tire placement

Figure 3-5: Tire Placement

Fold Anchor And Bolt-on Mount Installation

1. For 17 and 19 shank models, assemble the fold anchor to the rear cross bar using u-bolts and 5/8-11 hex lock nuts (**See Figure 3-4.**) Position fold anchor so that the hose loops point toward the front of the machine.
2. For 21 - 25 shank models, assemble two fold anchors to the center frame cross bars using u-bolts and 5/8-11 hex lock nuts (**See Figure 3-4.**) Position fold anchors so that the hose loops point in toward each other. The hose loop on the front fold anchor should face to the rear and the hose loop on the rear fold anchor should face to the front.
3. Attach base end of 4 x 30 hydraulic cylinders to both sides of fold anchor(s) using fold pin and 5/16 x 2-1/2 spring slotted pins. The front fold cylinder fittings should face the rear of the machine. The rear fold cylinder fittings should face the front of the machine.
4. On the 2131-21, 2131-23, and 2131-25 models, attach the bolt-on hinges to the right and left sides of the center frame using 3/4-10 x 6-1/2 hex head cap screws, hinge base plate, and 3/4-10 hex lock nuts (**See Figure 3-4.**)

IMPORTANT

Do not tighten bolt-on hinges until wings are installed.

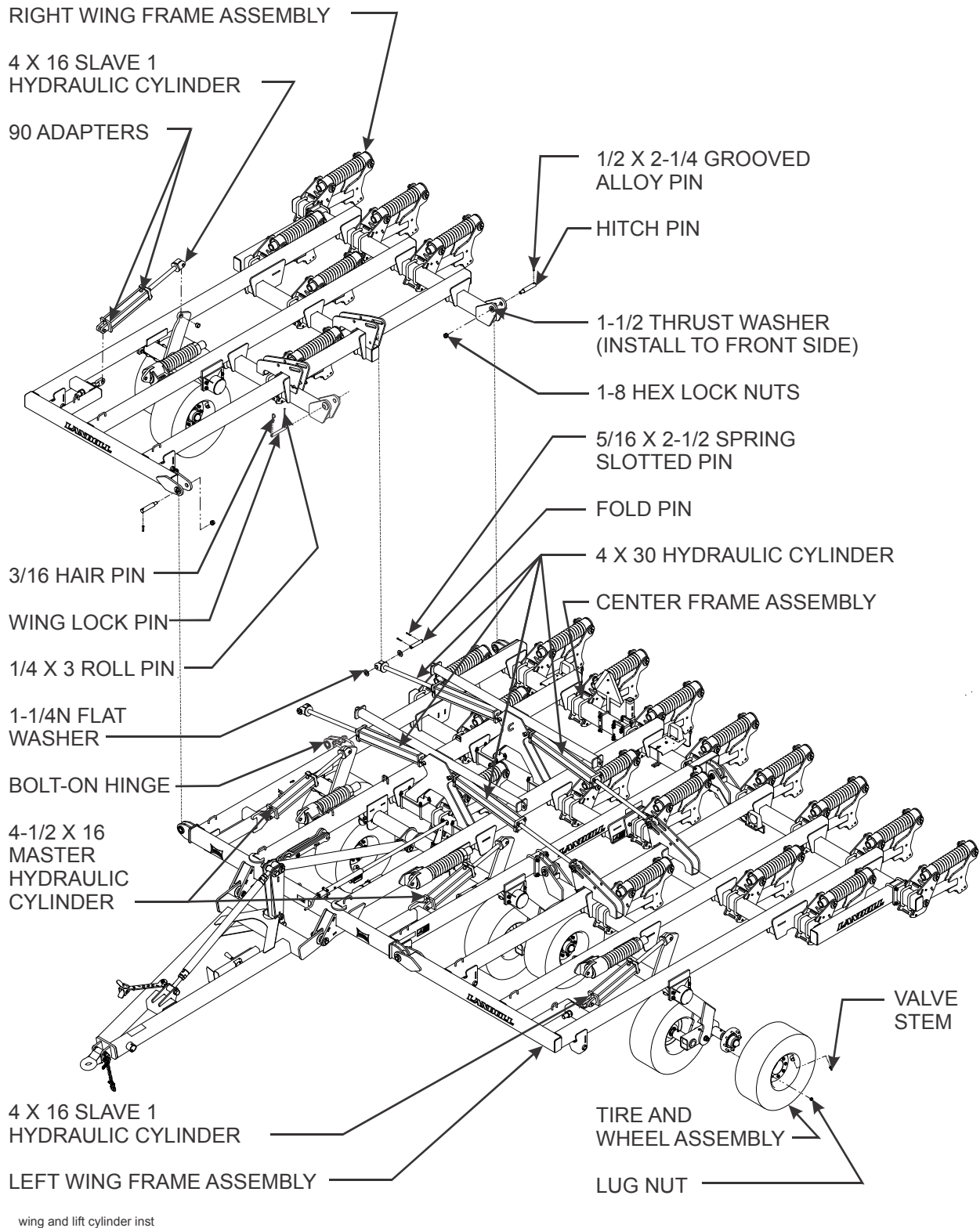


Figure 3-6: Wing Frame Installation

ASSEMBLY INSTRUCTIONS

Wing Frame Installation

IMPORTANT

Read all safety precautions at the front of the section before attempting any of the following procedures.



WARNING

Do not attempt to lift heavy parts, such as the wing frame, manually. Use a hoist or a forklift to move these parts into position.

1. On 2131-17 and 2131-19 models, attach right and left wing frame assemblies to the center frame assembly at the front and rear using hitch pins, 1/2 x 2-1/4 spring slotted pins, 1-1/2 thrust washers, and 1-8 hex lock nuts (See Figure 3-6.)

IMPORTANT

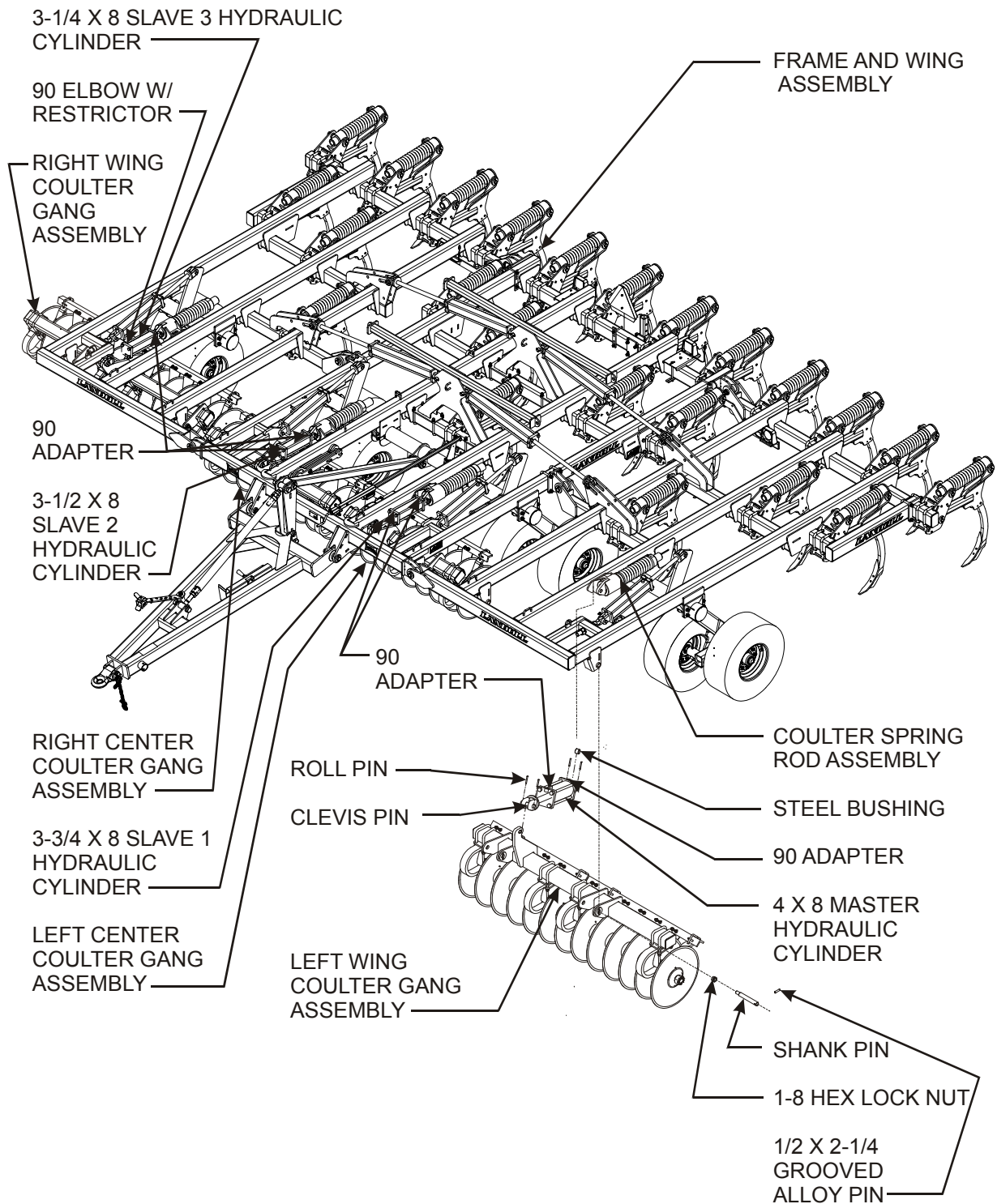
On all models, thrust washers must be installed to the front side of all hinge tubes.

2. On 2131-21, 2131-23, and 2131-25 models, attach right and left wing frame assemblies to the center frame assembly at front and rear using hitch pins, 1/2 x 2-1/4 grooved alloy pins, 1-1/2 thrust washers, and 1-8 hex lock nuts. Also attach right and left wing frame assemblies to the bolt-on hinges already assembled to the center frame assembly using wing lock pins, 1/4 x 3 roll pins, and 3/16 hair pins (See Figure 3-6.)
3. Connect rod end of each 4 x 30 hydraulic cylinder to the left and right wing frame assemblies using 1-1/4 flat washers, fold pins, and 5/16 x 2-1/2 spring slotted pins.
4. Install 4-1/2 x 16 hydraulic cylinders to the cylinder anchor plates of the center frame assembly using roll pins and clevis pins supplied with the cylinder.
5. Install 4 x 16 hydraulic cylinders to the cylinder anchor plate of the left and right wing frame assemblies using roll pins and clevis pins supplied with the cylinder.
6. Attach the rod end of each hydraulic cylinder to the lifts using roll pins and clevis pins supplied with the cylinders.
7. Install 90° adapters in each port of the 4-1/2 x 16 and 4 x 16 hydraulic cylinders.

IMPORTANT

Do not use 90° adapters with restrictors in ports of the 4-1/2 x 16 and 4 x 16 hydraulic cylinders.

8. Install the tire and wheel assemblies on left and right wing frame assemblies. Tighten wheel bolts evenly to assure proper wheel alignment. Wheel bolts should be tightened to 90 ft.-lbs. of torque. The hoist can then be removed.
9. Inflate the tires as recommended by the manufacturer.



2130 coultter gang assembly op

Figure 3-7: Coultter Gang Installation

Coulter Gang Installation



DANGER

Coulter blades are extremely sharp. Exercise extreme care when working on or near coulter blades. Do not allow coulters to roll over or fall onto any body part. Do not allow wrenches to slip when working near coulter blades. Never push wrenches toward coulter blades. Do not climb over machine above coulter blades. Failure to stay clear of coulter blade edges can cause serious personal injury or death.

1. Attach the coulter gang assemblies to the center and wing frames using shank pin, 1-8 hex lock nut, and 1/2 x 2-1/4 grooved alloy pin (**See Figure 3-7.**)
2. Attach the base end of the 4 x 8 master cylinder to the coulter spring rod assembly attached to the left wing frame weldment using the clevis pins and roll pins which come with the cylinder and a steel bushing.
3. Attach the base end of the 3-3/4 x 8 slave 1 cylinder to the coulter spring rod assembly attached to the left center frame weldment using the clevis pins and roll pins which come with the cylinder and a steel bushing.
4. Attach the base end of the 3-1/2 x 8 slave 2 cylinder to the coulter spring rod assembly attached to the right center frame weldment using the clevis pins and roll pins which come with the cylinder and a steel bushing.
5. Attach the base end of the 3-1/4 x 8 slave 3 cylinder to the coulter spring rod assembly attached to the right wing frame weldment using the clevis pins and roll pins which come with the cylinder and a steel bushing.
6. Connect the rod ends of each cylinder to the gang bar cylinder anchor plate using the clevis pins and roll pins which come with each cylinder.
7. Install 90° adapters into both ports of the 4 x 8 master cylinder, 3-3/4 x 8 slave 1 cylinder, 3-1/2 x 8 slave 2 cylinder, and the base end port of the 3-1/4 x 8 slave 3 cylinder.
8. Install 90° elbow w/ restrictor into the rod end of the 3-1/4 x 8 slave 3 cylinder.

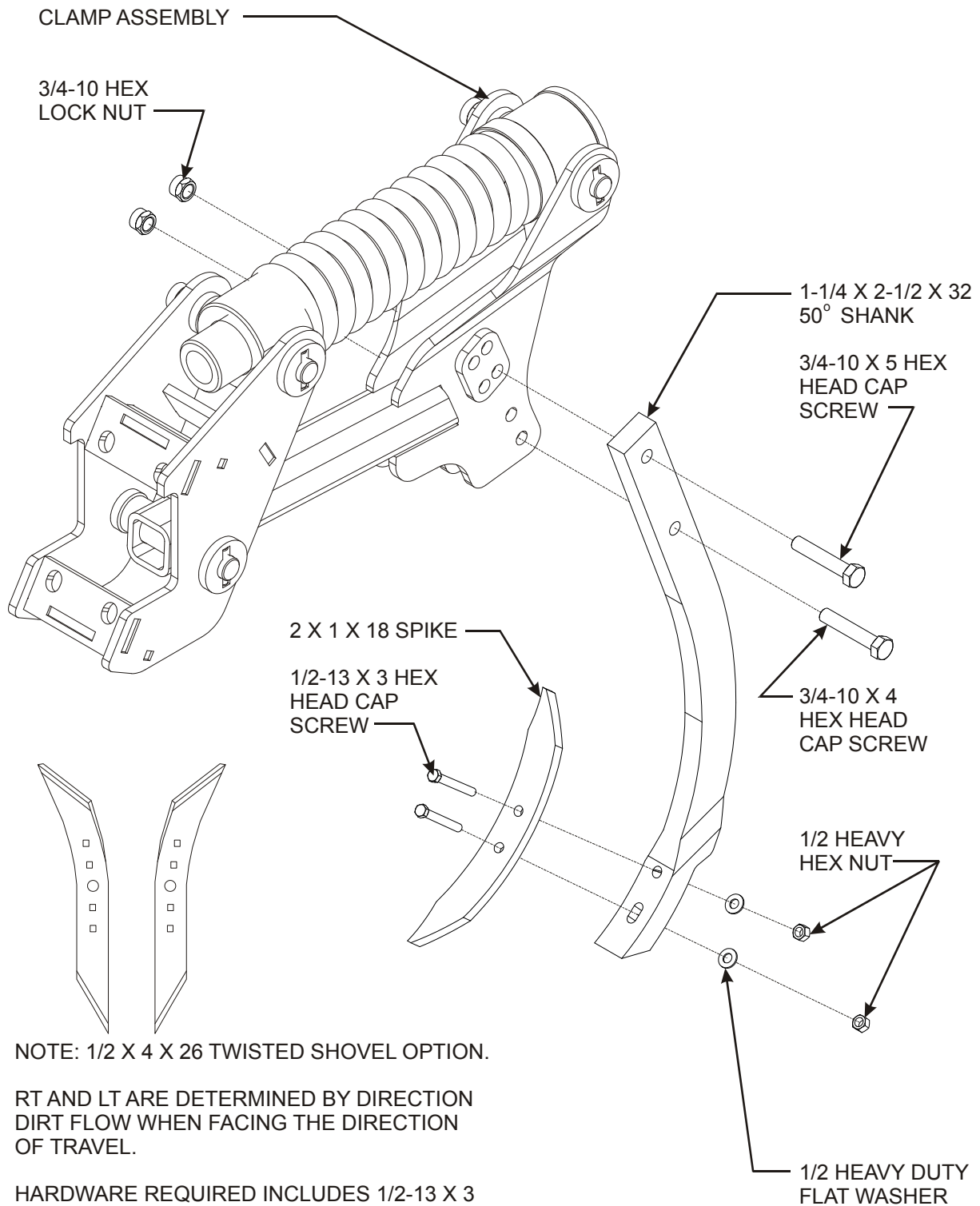


Figure 3-8: Auto Reset Shank and Shovel Installation

ASSEMBLY INSTRUCTIONS

Auto Reset Shank and Shovel Installation

1. Attach each shank assembly to each clamp assembly using 3/4-10 x 5 hex head cap screw in the top hole, 3/4-10 x 4 hex head cap screw in the bottom hole, and hex lock nuts. Be sure that twisted shovels are placed correctly (**See Figures 2-1 thru 2-16.**)

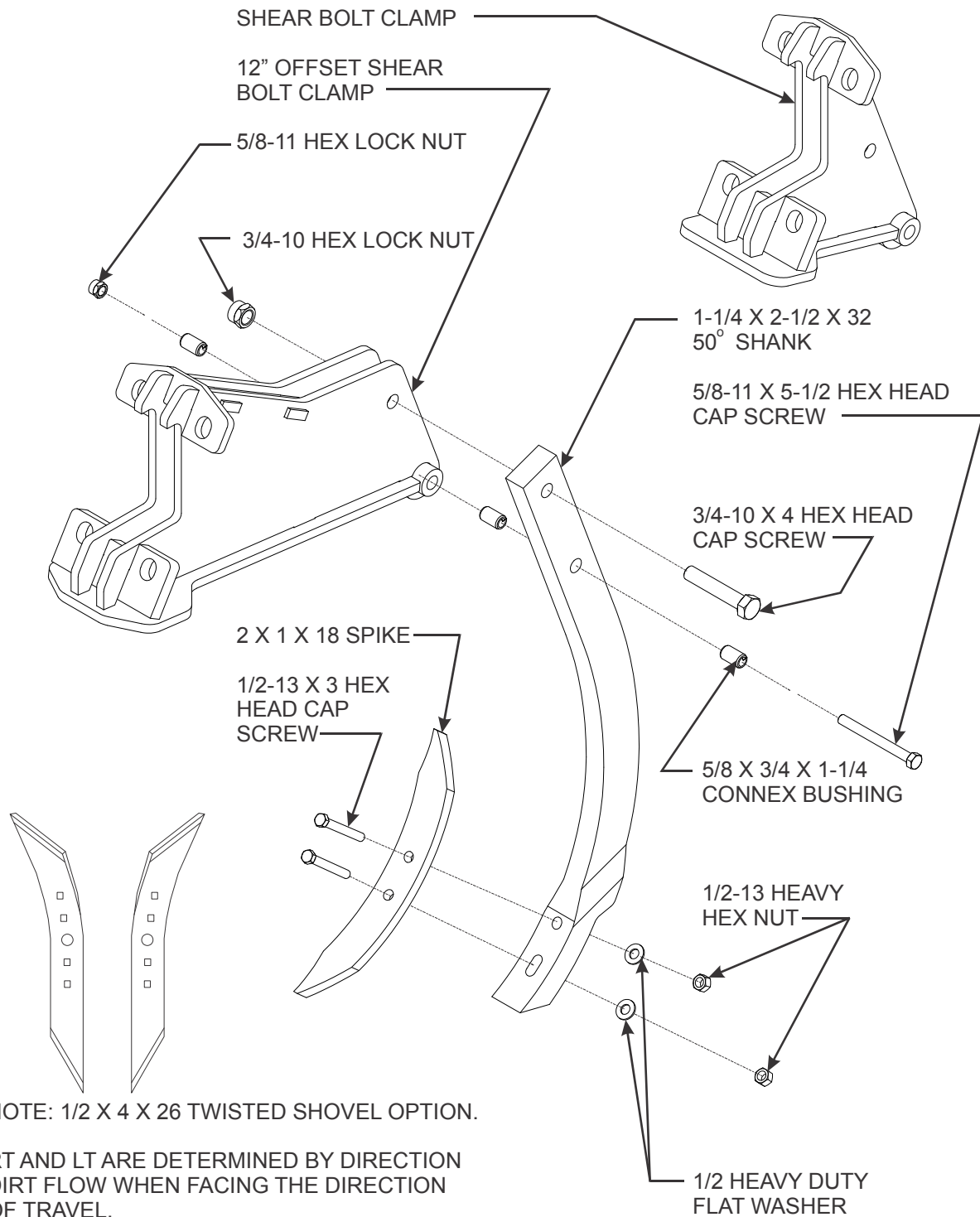
NOTE

For shallower depths, it may be necessary to move shank into upper mounting holes. For certain conditions shank may also be rotated forward when using twisted shovels.

2. Install 2 x 1 x 18 spikes or 1/2 x 4 x 26 twisted shovels onto shanks as follows:
 - a. Connect 2 x 1 x 18 spike to each shank using 1/2-13 x 3 hex head cap screws, flat washers, and heavy hex nuts (**See Figure 3-8.**).
 - b. Connect 1/2 x 4 x 26 twisted shovels to each shank using 1/2-13 x 3 plow bolts, flat washers, and heavy hex nuts. **See Figures 2-1 thru 2-16 for proper locations of right hand and left hand shovels.**

IMPORTANT

Right and left twisted shovels are determined by direction of dirt flow when facing the direction of travel.



rigid shear assy op after 07-08

Figure 3-9: Rigid Shear Shank and Shovel Installation

Rigid Shear Shank and Shovel Installation

1. Attach each shank assembly to each clamp assembly using 3/4-10 x 4 hex head cap screws and hex lock nuts in the top hole and 5/8-11 x 5-1/2 hex head cap screw and hex lock nut in the lower hole (See Figure 3-9.)

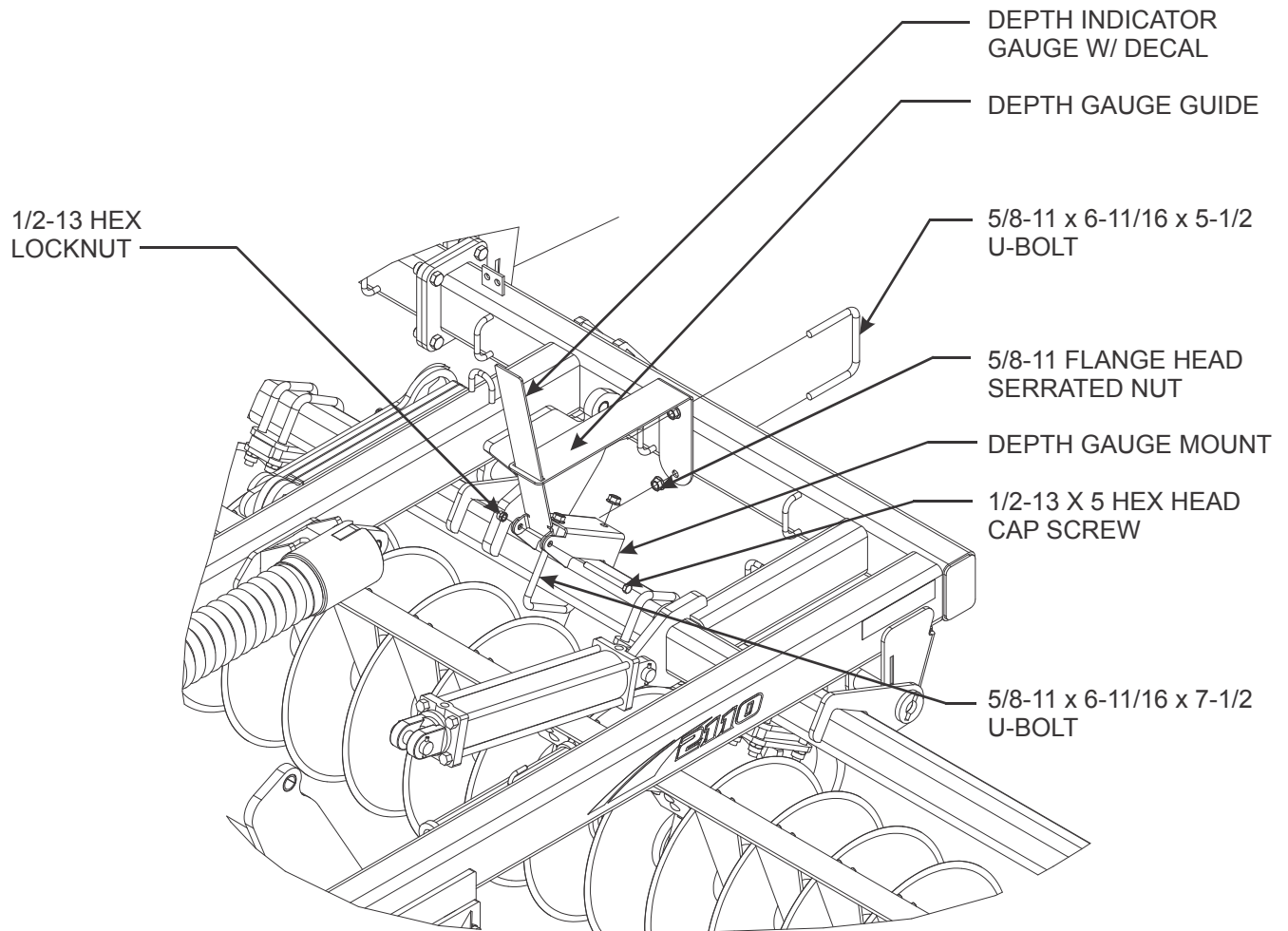
IMPORTANT

5/8 x 3/4 x 1-1/4 connex bushings shown in the drawing are installed at the landoll corporation.

2. Install 2 x 1 x 18 spikes or 1/2 x 4 x 26 twisted shovels onto shanks as follows:
 - a. Connect 2 x 1 x 18 spike to each shank using 1/2-13 x 3 hex head cap screws, flat washer (in bottom hole only), split lock washers, and hex nuts (See Figure 3-9.)
 - b. Connect 1/2 x 4 x 26 twisted shovels to each shank using 1/2-13 x 3 plow bolts, flat washer (in bottom hole only), split lock washers, and hex nuts. See Figures 2-1 thru 2-16 for recommended locations of right hand and left hand shovels.

IMPORTANT

Right and left twisted shovels are determined by direction of dirt flow when facing the direction of travel.



2130 depth gauge inst

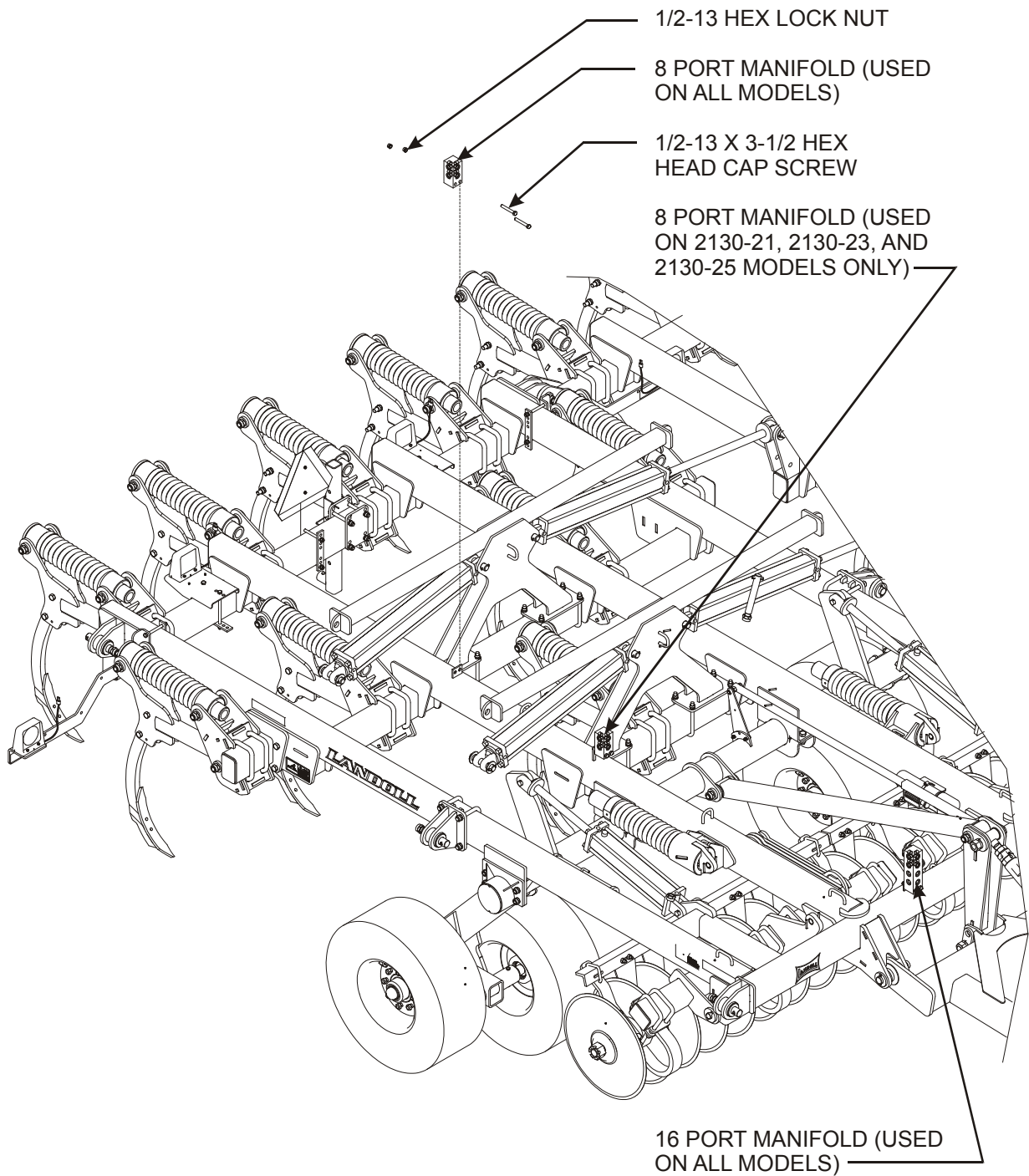
Figure 3-10: Depth Gauge Installation

Depth Gauge Installation

NOTE

The depth gauge assembly is attached to the coulter gang tube and front frame tube and may be placed at the discretion of the operator.

1. Attach depth gauge guide to the front frame tube using 5/8-11 x 6-11/16 x 5-1/2 u-bolt and flange head serrated nuts (**See Figure 3-10.**)
2. Attach depth gauge mount to the coulter gang tube using 5/8-11 x 6-11/16 x 7-1/2 u-bolt and flange head serrated nuts.
3. Slide depth indicator gauge w/ decal through slot in depth gauge guide. Attach depth indicator gauge to depth gauge mount using 1/2-13 x 5 hex head cap screw and hex lock nut.



hydraulic manifold placement

Figure 3-11: Shank and Shovel Installation

ASSEMBLY INSTRUCTIONS

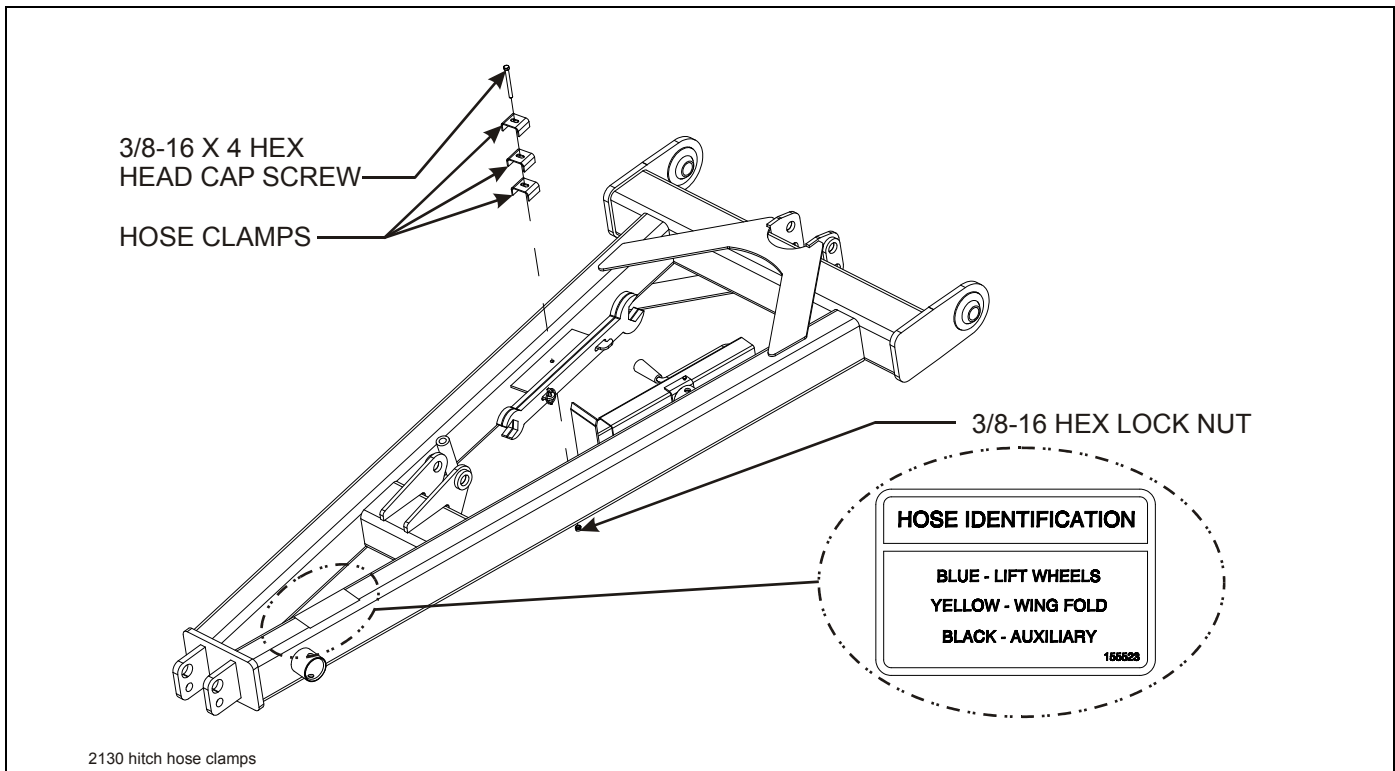


Figure 3-12: Hitch Hose Clamps and Color Designation

Hydraulic Installation

NOTE

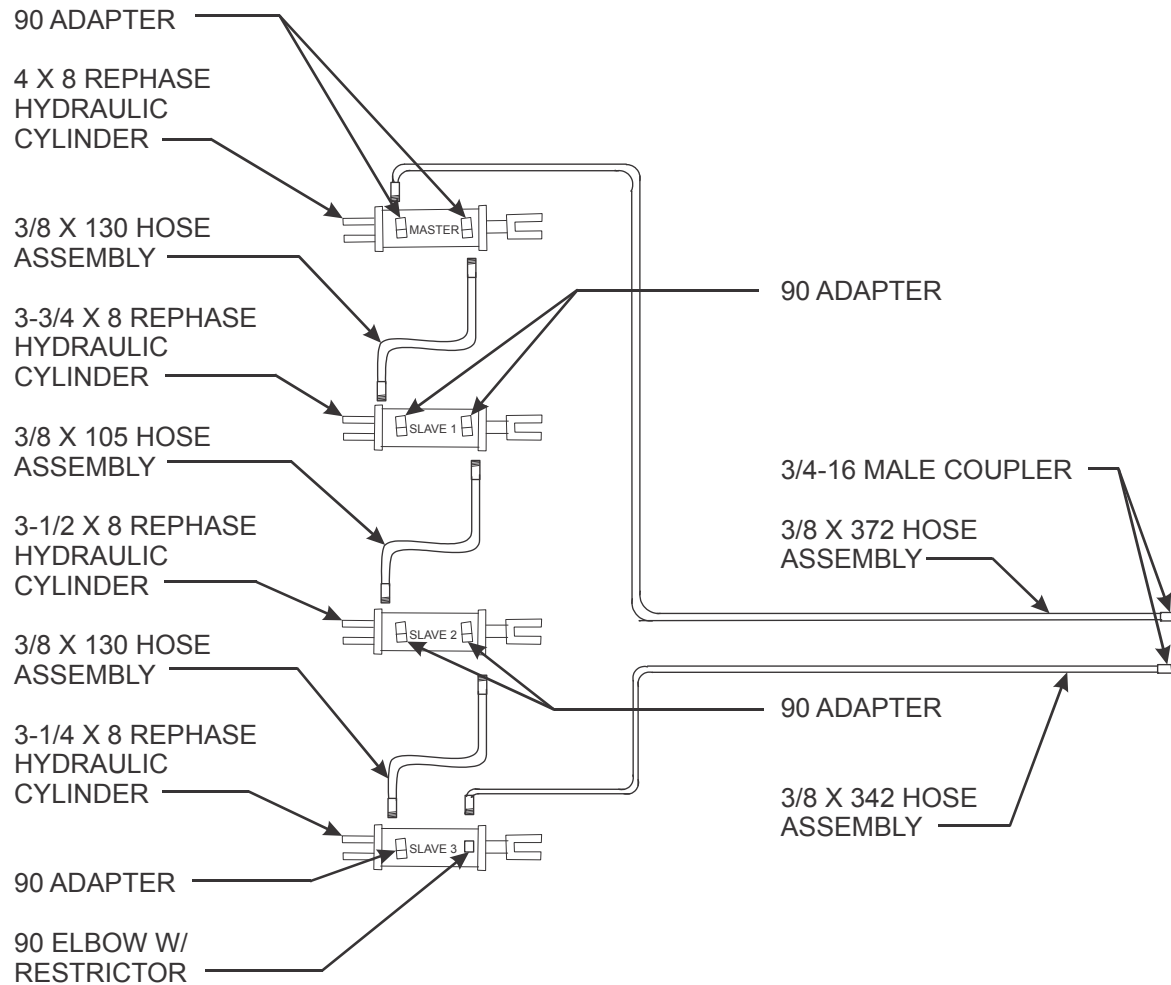
See Figures 3-13 thru 3-18 for coultter lift, wheel lift, and fold hydraulic diagrams.

1. On all models, install the 16 port manifold to the manifold bracket on the front center frame tube using 1/2-13 x 3-1/2 hex head cap screws and hex lock nuts (**See Figure 3-11.**)
2. On all models, install 8 port manifold to the manifold bracket on the center frame weldment near the right side of the rear fold anchor using 1/2-13 x 3-1/2 hex head cap screws and hex lock nuts (**See Figure 3-11.**)
3. On 2131-21, 2131-23, and 2131-25 models, install second 8 port manifold to the manifold bracket on the center frame weldment near the right side of the front fold anchor using 1/2-13 x 3-1/2 hex head cap screws and hex lock nuts (**See Figure 3-11.**)
4. Install 90° adapter in port N in the rear of the manifold.
5. Install straight adapters in any manifold port that has a hose connection.
6. Verify that limit valve is installed below the depth stop bracket welded to the frame. If not, refer to **“Depth Stop Tube Assembly” on page 3-6.**
7. Install coultter lift, wheel lift, and fold system hoses (**See Figures 3-13 thru 3-18.**)
8. Hold each system of hoses in place using 3/8-16 x 4 hex head cap screw, hose clamps, and hex lock nut (**See Figure 3-12.**)
9. Install plugs in any remaining open manifold or valve ports.
10. Install hose wraps around system hoses per hose identification decal near hose couplers, putting both hoses inside wrap(**See Figure 3-12.**)



Figure 3-13: Coulter Lift Hydraulic Installation (2131-17 & 2131-19)

ASSEMBLY INSTRUCTIONS



2131 21-25 coulters op

Figure 3-14: Coulter Lift Hydraulic Installation (2131-21, 2131-23, & 2131-25)

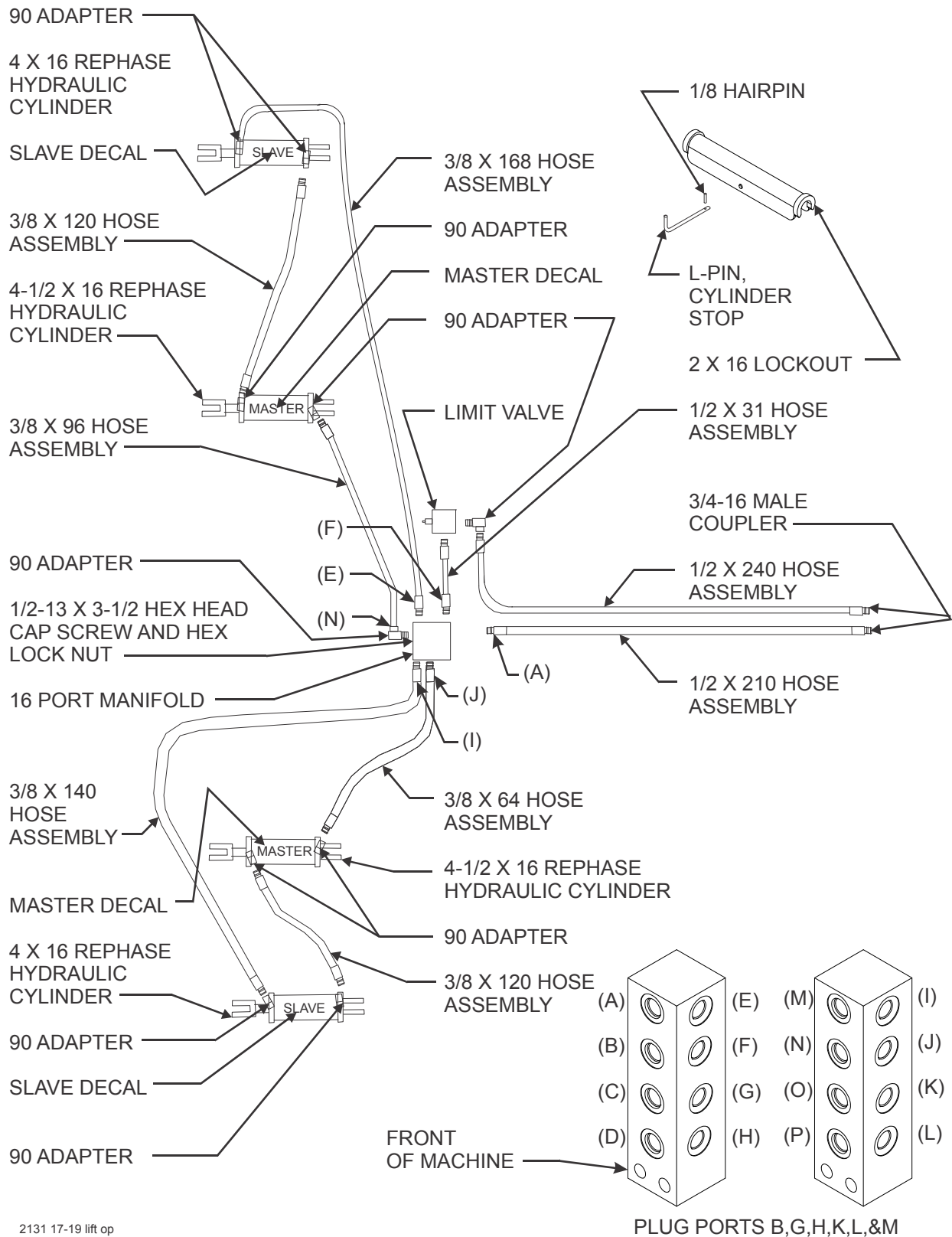


Figure 3-15: Wheel Lift Hydraulic Installation (2131-17 & 2131-19)

ASSEMBLY INSTRUCTIONS

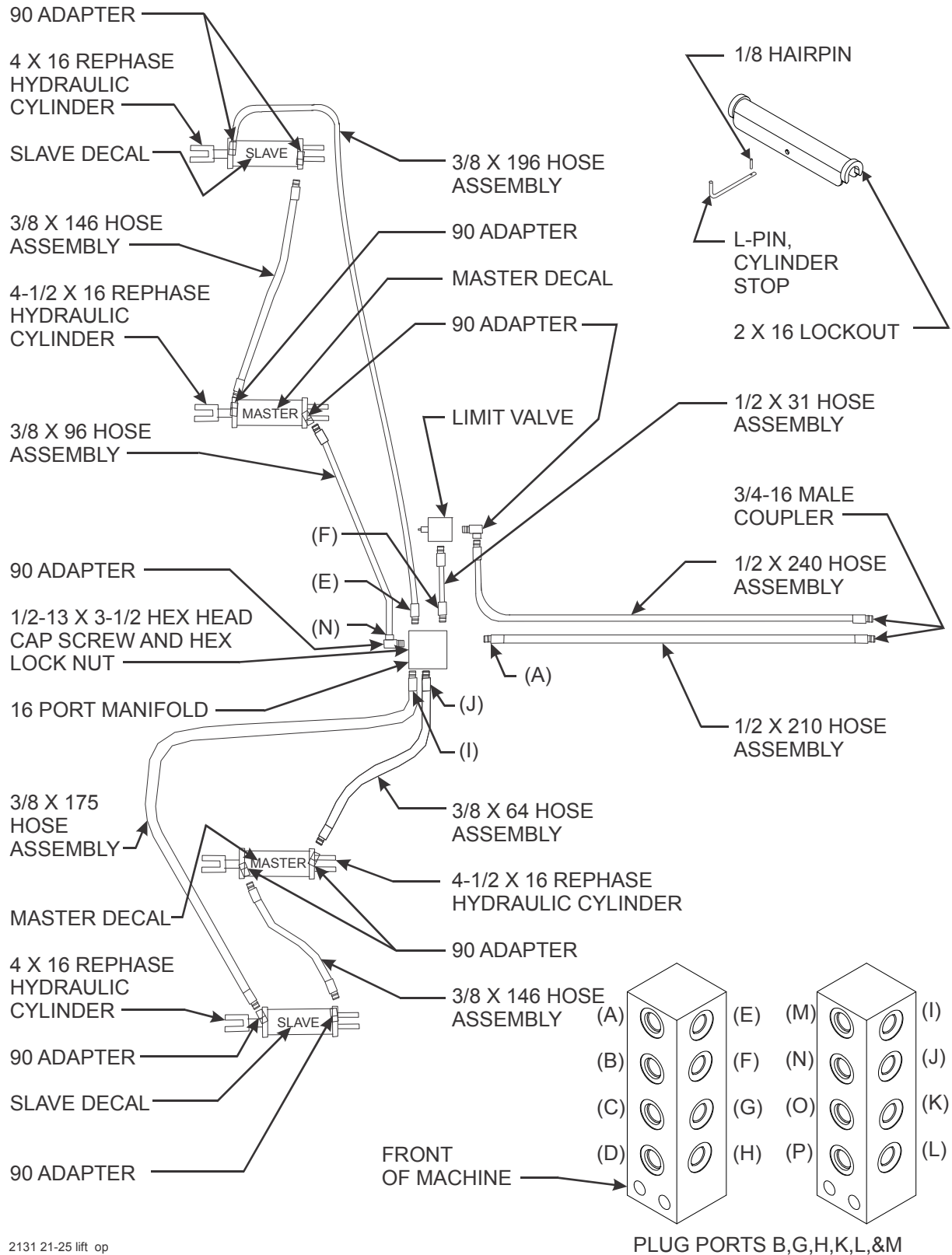
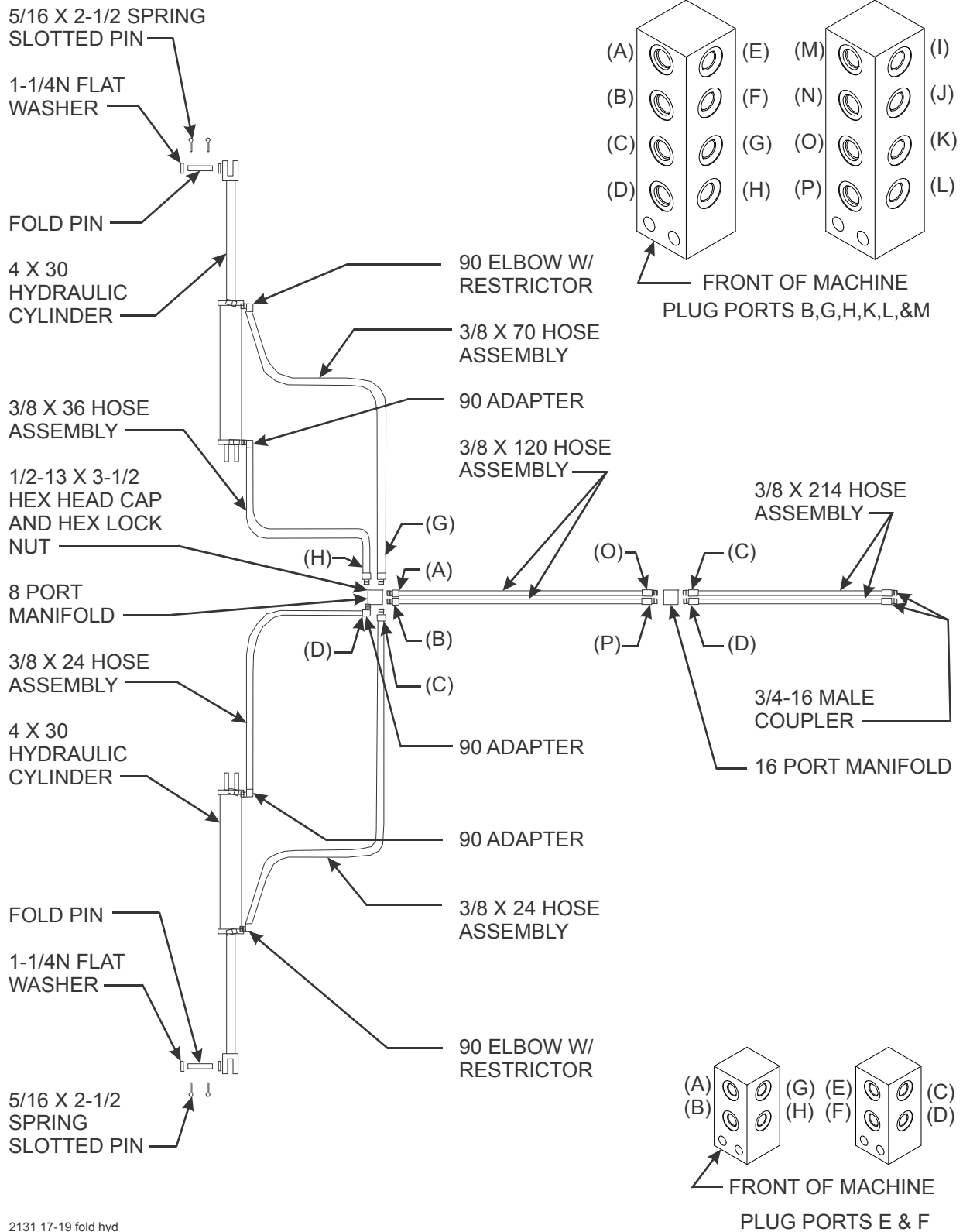


Figure 3-16: Wheel Lift Hydraulic Installation (2131-21, 2131-23, & 2131-25)



2131 17-19 fold hyd

Figure 3-17: Fold Hydraulic Installation (2131-17 & 2131-19)

ASSEMBLY INSTRUCTIONS

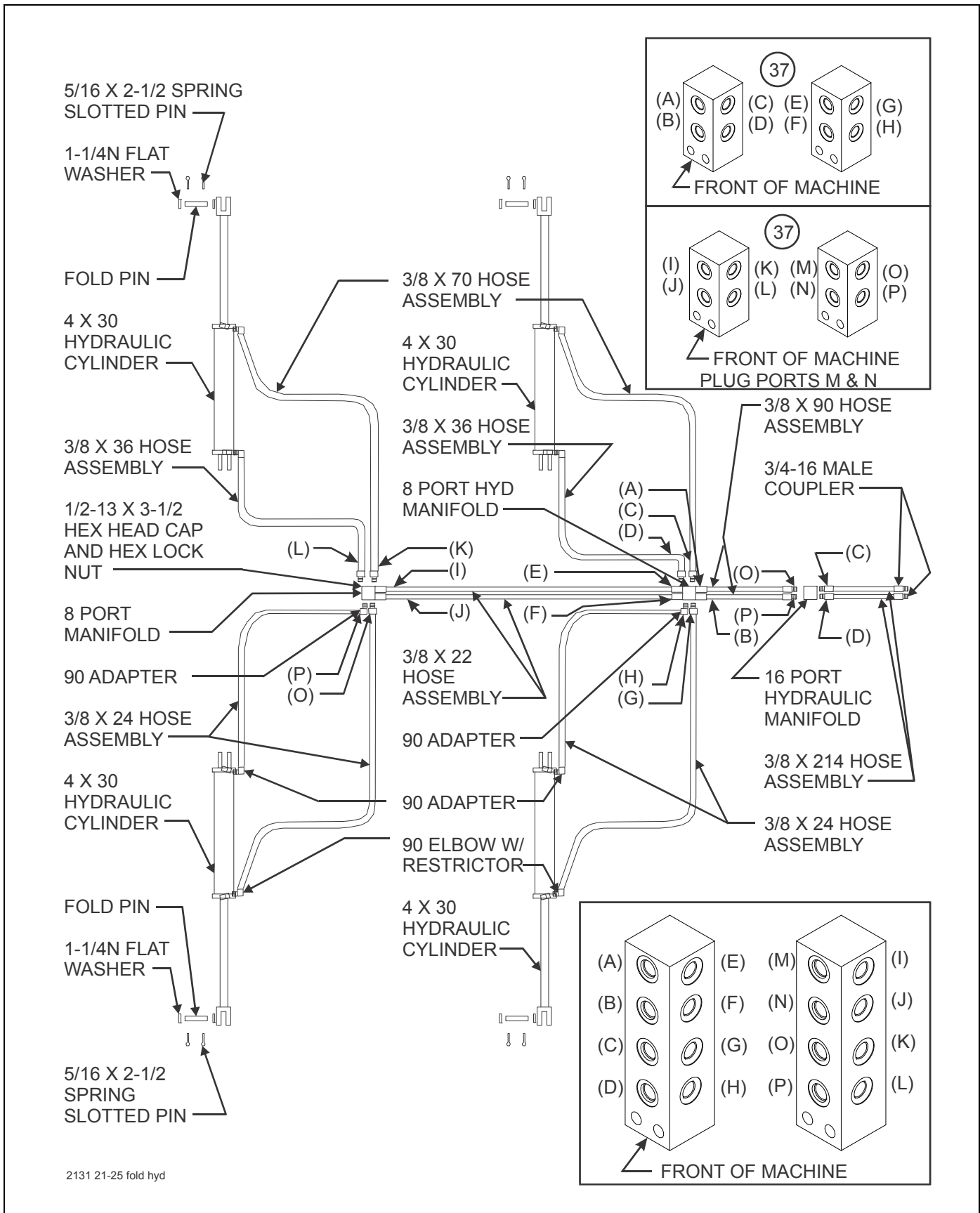
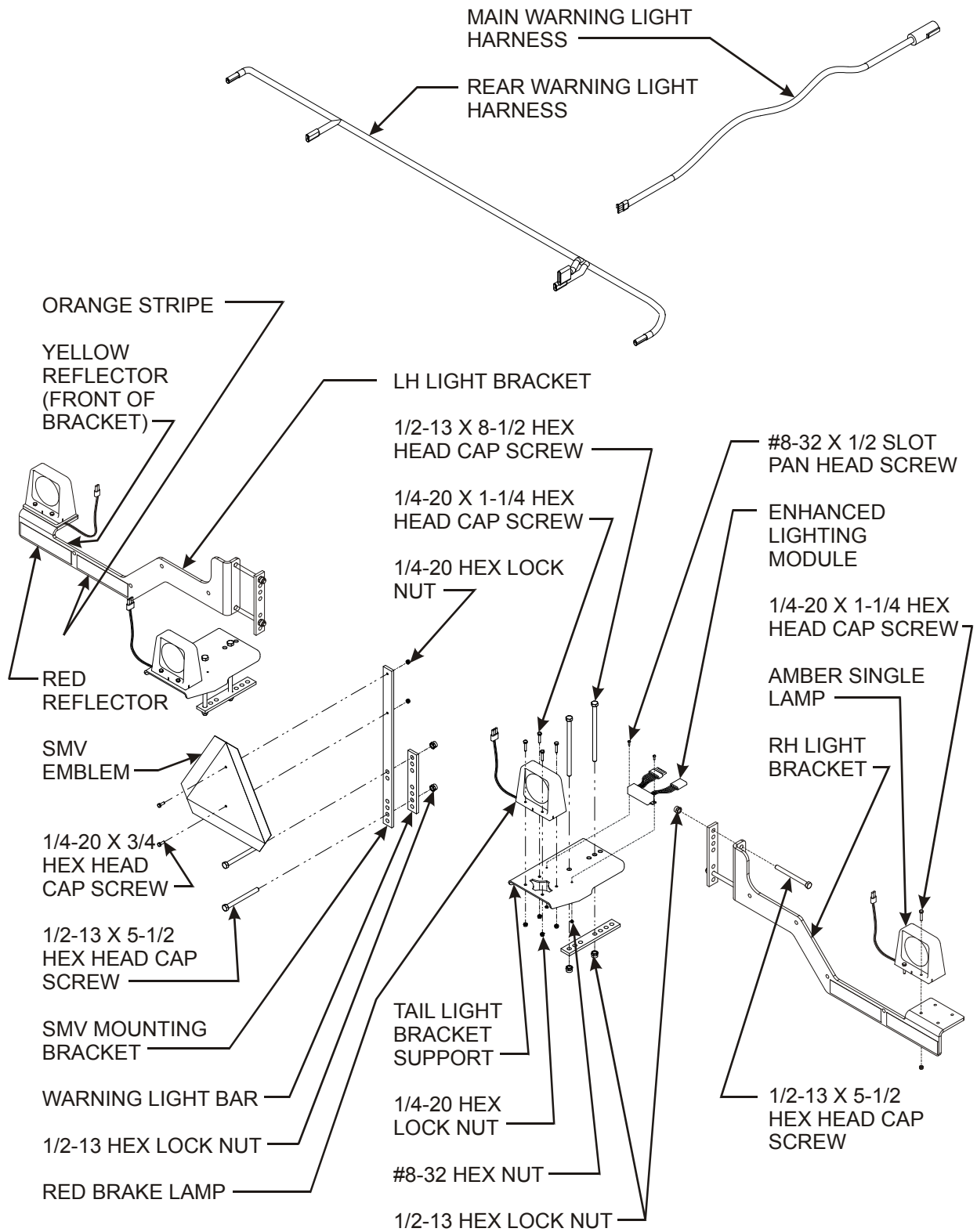


Figure 3-18: Fold Hydraulic Installation (2131-21, 2131-23, & 2131-25)

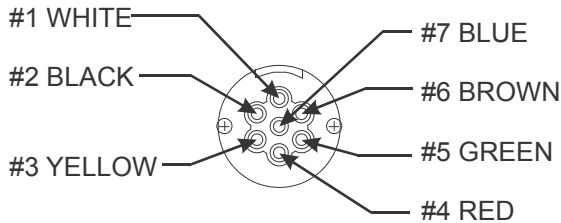


m147587 elect op

Figure 3-19: Light and SMV Bracket Installation (Prior to August, 2013)

ASSEMBLY INSTRUCTIONS

NOTE: IF REPAIRING OR REPLACING THE 7 PIN CONNECTOR, MATCH THE LETTERS AT THE BACK OF THE HARNESS TO THE 7 PIN CONNECTOR AS SHOWN. THE COLOR OF THE WIRE JACKET DOES NOT NECESSARILY MATCH THE COLOR MARKING OF THE 7 PIN CONNECTOR.



WIRING CHART	
7-PIN CONNECTION	4-PIN CONNECTION
GRND. 1	D
YEL. 3	B
GRN. 5	A
BRN. 6	C

Figure 3-20: Light and SMV Bracket Installation (Prior to August, 2013)

Light Installation (Prior to August, 2013)

NOTE

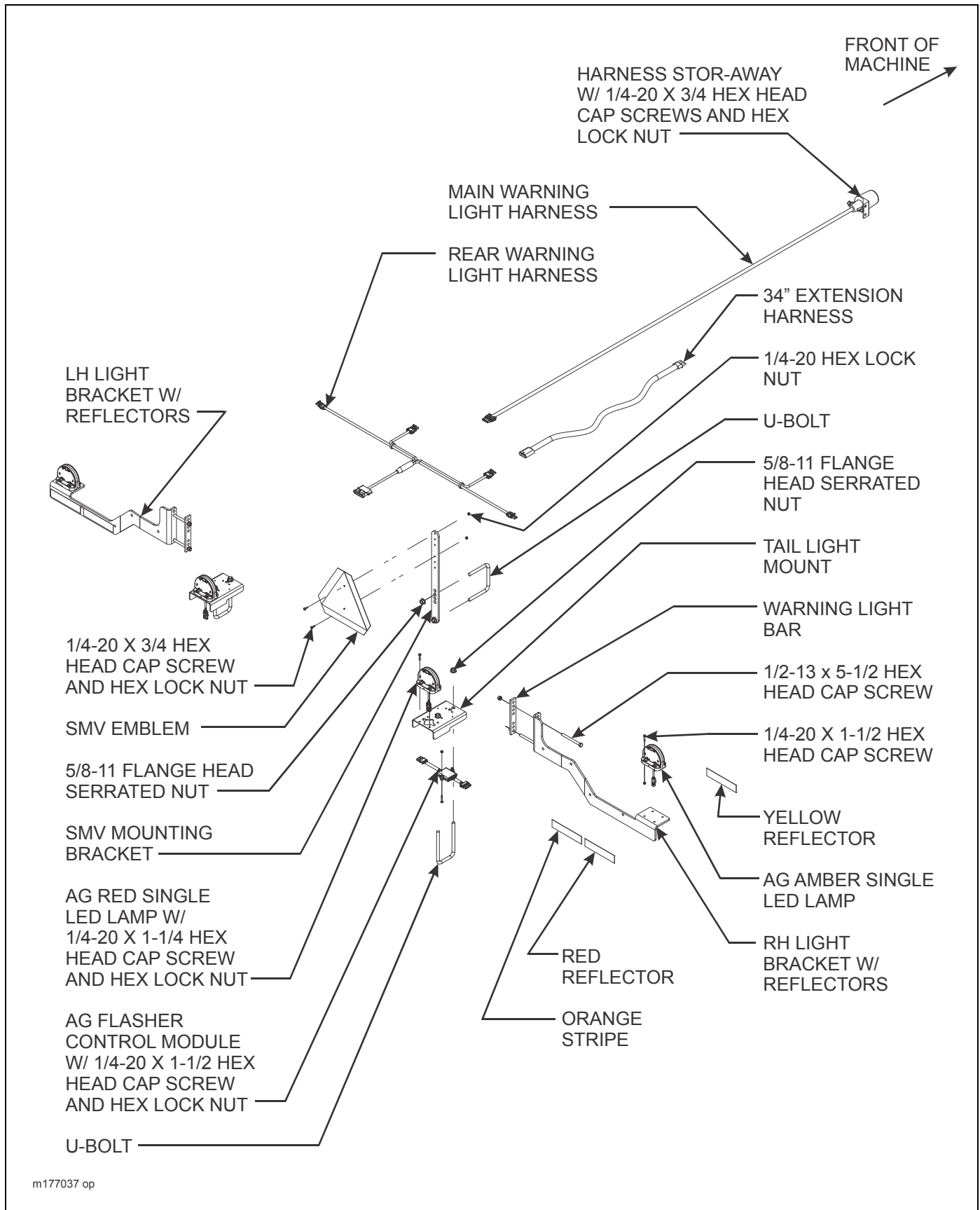
See Figures 2-1 thru 2-16 for light bracket placement. If no dimension is given for a bracket, it should be located against frame member as shown in drawing.

1. Attach inner tail light mounting bracket supports to the center frames using 1/2-13 x 8-1/2 hex head cap screws, warning light bars, and hex lock nuts (**See Figure 3-19.**)
2. Connect enhanced lighting module to the right inner tail light bracket using #8-32 x 1/2 slotted pan head screws and hex nut.
3. Attach outer lh and rh light brackets to frame weldment using 1/2-13 x 5-1/2 hex head cap screws, warning light bars, and hex lock nuts.

IMPORTANT

Outer light brackets need to be slid rearward as far as possible. See Figures 2-1 thru 2-16 for light bracket placement.

4. Attach red brake lamps to inner tail light mounting bracket supports and amber lamps to outer light brackets using 1/4-20 x 1-1/4 and 1/4-20 x 1-1/2 hex head cap screws and hex lock nuts.
5. Connect warning light harnesses to lights.
6. Attach SMV emblem and mounting bracket to rear center frame bar using warning light bar, 1/2-13 x 5-1/2 hex head cap screws, 1/4-20 x 3/4 hex head cap screws, and hex lock nuts. The SMV sign should be centered on the rear bar of the frame.
7. Attach red, orange, and yellow reflectors to outer rh and lh tail light mounting brackets.



m177037 op

Figure 3-21: LED Light and SMV Bracket Installation (After August, 2013)

ASSEMBLY INSTRUCTIONS

WIRE DESIGNATIONS FOR MAIN HARNESS				WIRE DESIGNATIONS FOR REAR HARNESS					
7-PIN CONN	4-PIN TOWER	CIRCUIT	WIRE COLOR		1	2	3	4	5
1	D	GROUND	GROUND		2-PIN TOWER	3-PIN TOWER	6-PIN SHROUD	3-PIN TOWER	2-PIN TOWER
2		WORK LAMPS	BLACK	BLK LEFT TURN			A	C	
3	B	LEFT FLASHING & TURN	YELLOW	WHT GROUND	A	A	B	A	A
4		STOP LAMPS	RED	BRN TAIL LIGHT		B	C	B	
5	A	RIGHT FLASHING & TURN	GREEN	YEL LEFT TURN			D		B
6	C	TAIL LAMPS	BROWN	GRN RIGHT TURN	B		E		
7		SWITCHED POWER (12V)	BLUE	RED RIGHT TURN		C	F		

m177037 wire designations op

Figure 3-22: LED Light and SMV Harness Wire Designations (After August, 2013)

LED Light and SMV Bracket Installation (After August, 2013)

NOTE

See Figures 2-1 thru 2-16 for light bracket placements.

1. Attach left and right light brackets with reflectors to center frame using u-bolts and hex lock nuts (**See Figure 3-21.**)
2. Attach ag amber single LED lamps to light brackets using 1/4-20 x 1-1/4 hex head cap screws and hex lock nuts.
3. Attach left tail light mount to frame assembly using u-bolt and 5/8-11 flange head serrated nuts.
4. Attach right tail light mount and ag flasher control module to frame assembly using u-bolt and 5/8-11 flange head serrated nuts. Be sure that the control module is set so that the 6 pin connector faces the right side of the machine.
5. Attach the ag red single LED lamps to tail light mounts using 1/4-20 x 1-1/4 hex head cap screws and hex lock nuts.

IMPORTANT

Make sure lights are positioned for maximum visibility from the rear.

6. Install the rear warning light harness to the frame. Connect 2 pin and 3 pin ends to each of the warning lights. Connect 6 pin to the ag flasher control module. **See Figure 3-22 for LED harness wire designations.**
7. Attach front warning harness to frame. Connect 4 pin end to the ag flasher control module.
8. Insure that the harnesses are clear of any moving parts and secure the harnesses with tie wraps provided.
9. Install the stor-away holder to hose holder on hitch with 1/4-20 x 3/4 hex head cap screws and hex lock nuts.
10. Attach SMV emblem and mounting bracket to rear center frame bar using u-bolt, 1/4-20 x 3/4 hex head cap screws, and hex lock nuts. The SMV sign should be centered on the back bar of the frame.

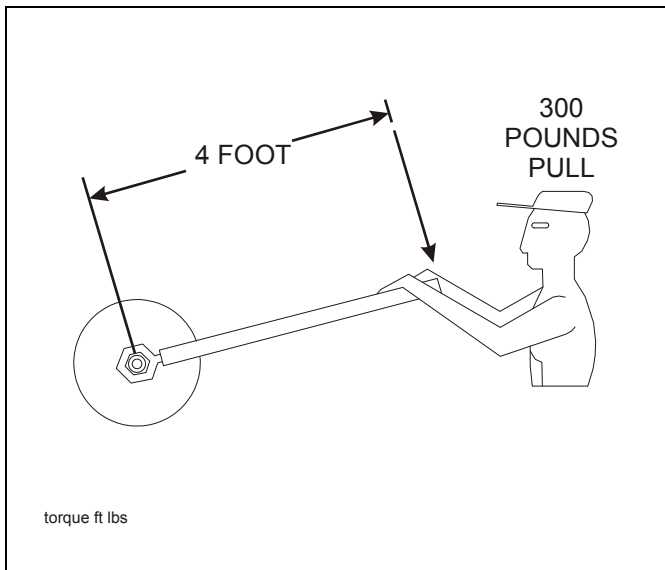


Figure 3-23: 1,200 Foot-Pounds of Torque

10. Touch up with paint any areas that may have been scratched during moving, handling, or assembly.
11. Thoroughly read and understand the operating section before using the Coulter Chisel.

Final Assembly

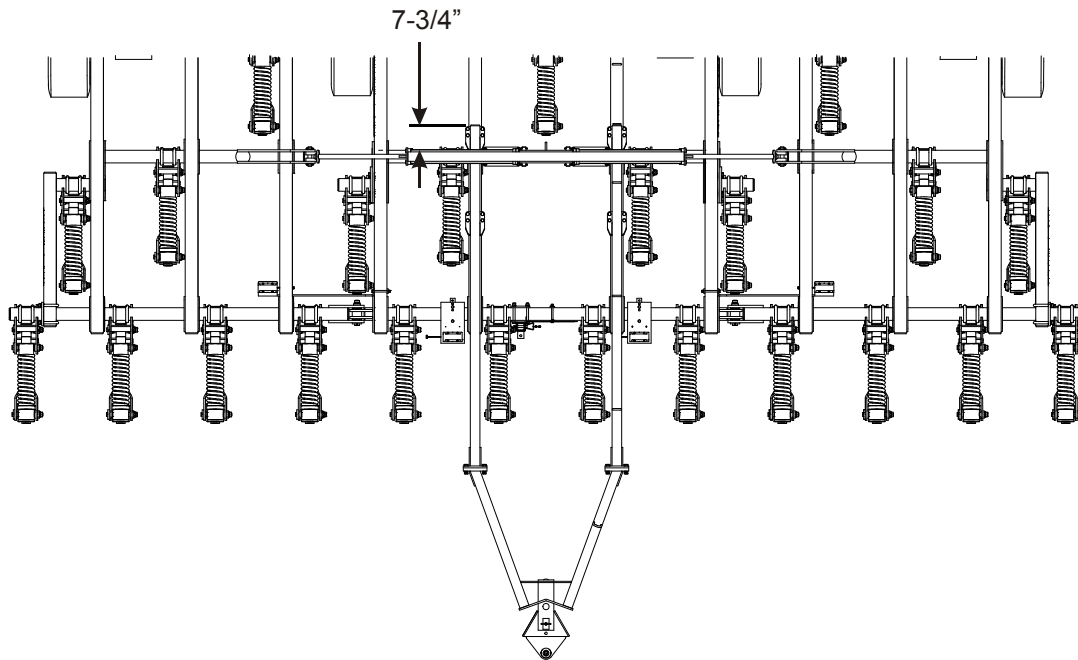
1. Attach a tractor to the implement and charge the lift system hydraulics as described in **“Hydraulic Lift System” on page 4-2.**
2. Install the 2 x 16 transport lockouts on both 4-1/2 x 16 master cylinders on the center frame.
3. The fold systems must be purged of air and filled with oil **BEFORE** attempting to fold the implement. Air in the system will allow the wings to fall uncontrollably and may result in implement damage. Follow instructions for charging the hydraulic fold system as described in **“Hydraulic Fold System” on page 4-4.**
4. Connect lights to the tractor and verify operation.
5. Check tires for proper inflation
6. Level the Wing Coulter Chisel from front to rear as described in **“Leveling (Front-to-Rear)” on page 4-7.**
7. Inspect the final implement assembly, and verify that all bolts have been tightened, cotter pins spread, and that there are no leaking hydraulic connections.



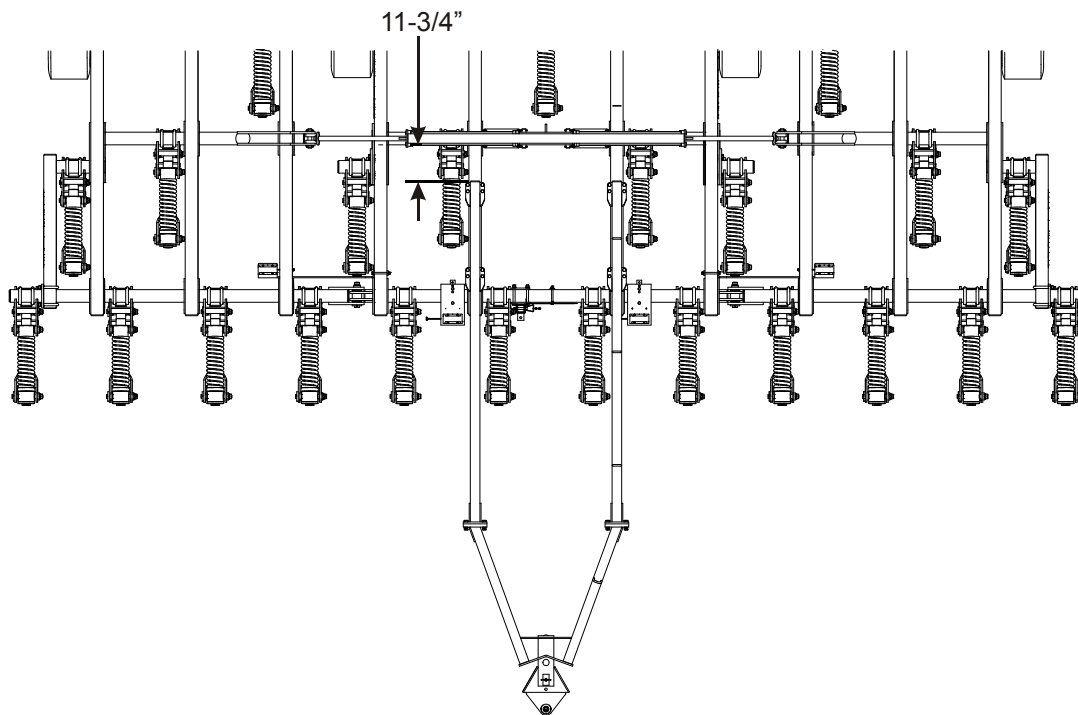
CAUTION

Tighten all 1-3/4” nuts to 1,250 foot-pounds of torque (See Figure 3-23.)

8. Rotate each coulter gang to verify that each gang rotates freely. Adjust any scrapers that may have shifted during shipment or assembly.
9. Lubricate the Wing Coulter Chisel at all locations as described in **“Lubrication Maintenance” on page 4-16.**



REAR TOW HITCH - SHORT ARM



REAR TOW HITCH - LONG ARM

2130 rear tow hitch placement

Figure 3-24: Rear Tow Hitch Placement (Option)

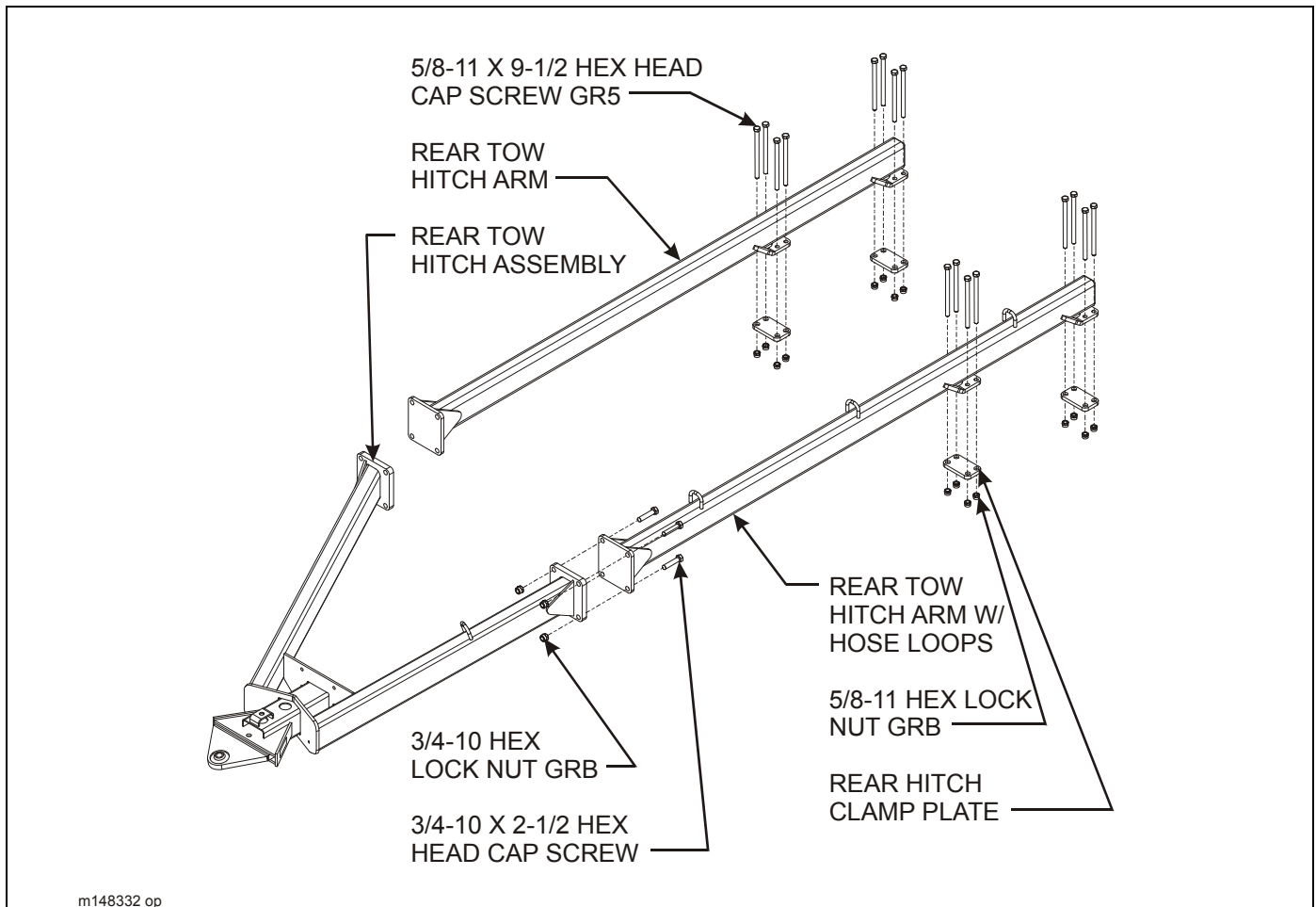
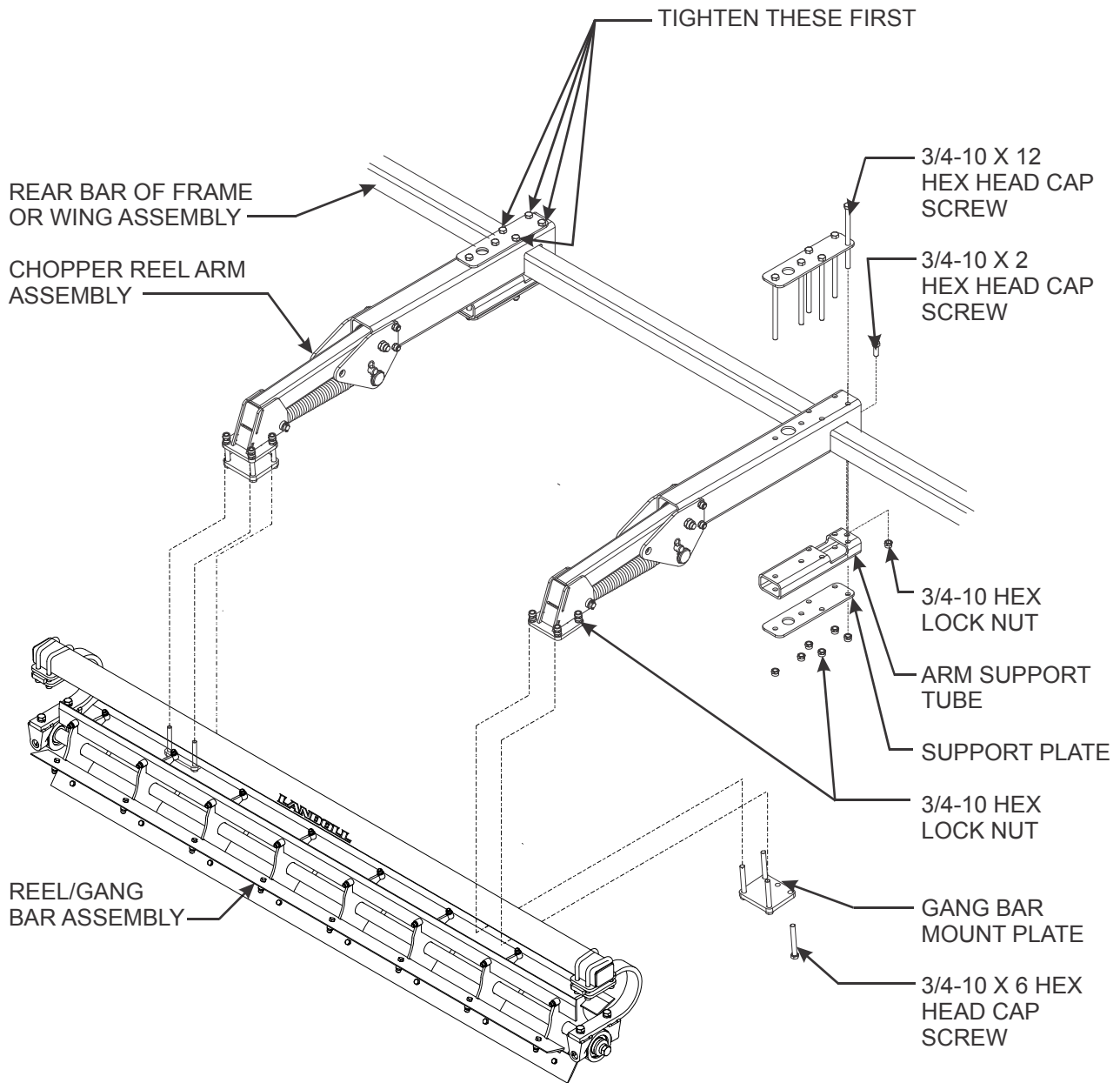


Figure 3-25: Rear Tow Hitch Installation (Option)

Rear Tow Hitch Installation (Option)

1. Attach rear tow hitch to the rear tow hitch arms using 3/4-10 x 2-1/2 hex head cap screws and hex lock nuts.
2. Attach the rear tow hitch assembly to the rear bars of the center frame using rear tow hitch clamp plates, 5/8-11 x 9-1/2 hex head cap screws, and hex lock nuts (**See Figure 3-25.**) The rear tow hitch assembly should be centered on the back bars of the center frame (**See Figure 3-24.**)



2131 bolt over frame chopper reel assy op

Figure 3-26: Standard or Hydraulic Tubular Mount Chopper Reel Installation (Option)

Standard Tubular Mount Chopper Reel Installation (Option)

1. Slide chopper reel arm assemblies over rear frame bar using chopper reel placement drawings (See **Figures 2-17, 2-18, 2-19, and 3-26.**)
2. Attach top plate to top of chopper reel arm assembly using (6) 3/4-10 x 12 hex head cap screws. Slide arm support tube and bottom plate onto 12" hex head cap screws on underside of chopper reel arm assembly and rear frame.
3. Evenly tighten the (4) 3/4-10 x 12 hex head cap screws marked in **Figure 3-26** first. Then tighten the front 3/4-10 x 2 hex head cap screw. Lastly, tighten the two remaining 3/4-10 x 12 hex head cap screws last, but be sure to **NOT** overtighten. These screws need to be snug.
4. Adjust spring to 20-1/2" (See **Figure 3-28.**)
5. Attach reel/gang bar assemblies to chopper reel arm assemblies using placement drawings (See **Figures 2-17, 2-18, 2-19, and 3-26.**)
6. Bolt in place using gang bar mount plate, 3/4-10 x 6 hex head cap screws, and hex lock nuts.
7. If unfavorable conditions exist or the chopper reel is not needed, the arm can be raised and pinned into a higher position creating little or no disturbance of the soil with the chopper reel (See **Figure 3-27.**)

NOTE

Hydraulic chopper reels do not have pins. They are held up by hydraulic cylinders.

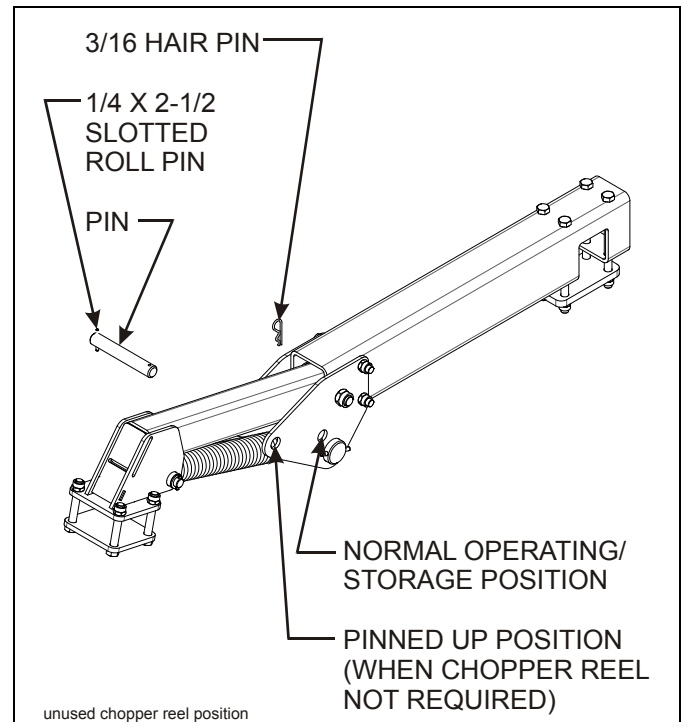


Figure 3-27: Unused Chopper Reel Position

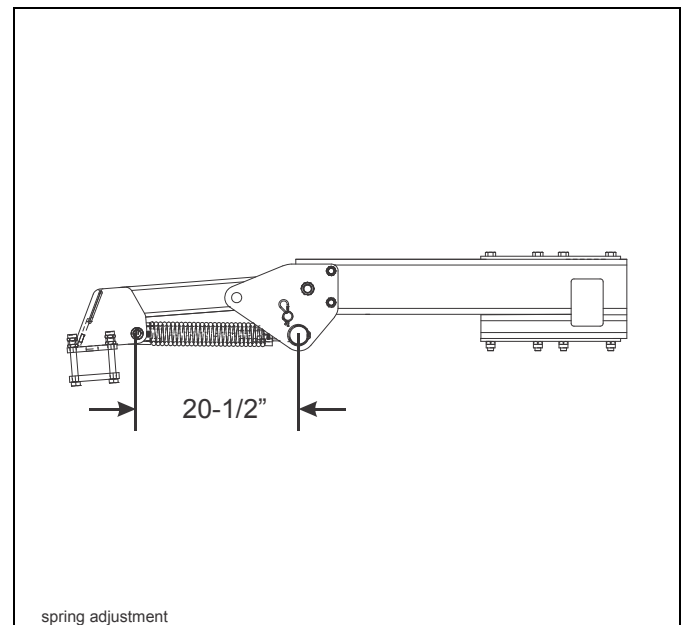


Figure 3-28: Spring Adjustment

ASSEMBLY INSTRUCTIONS

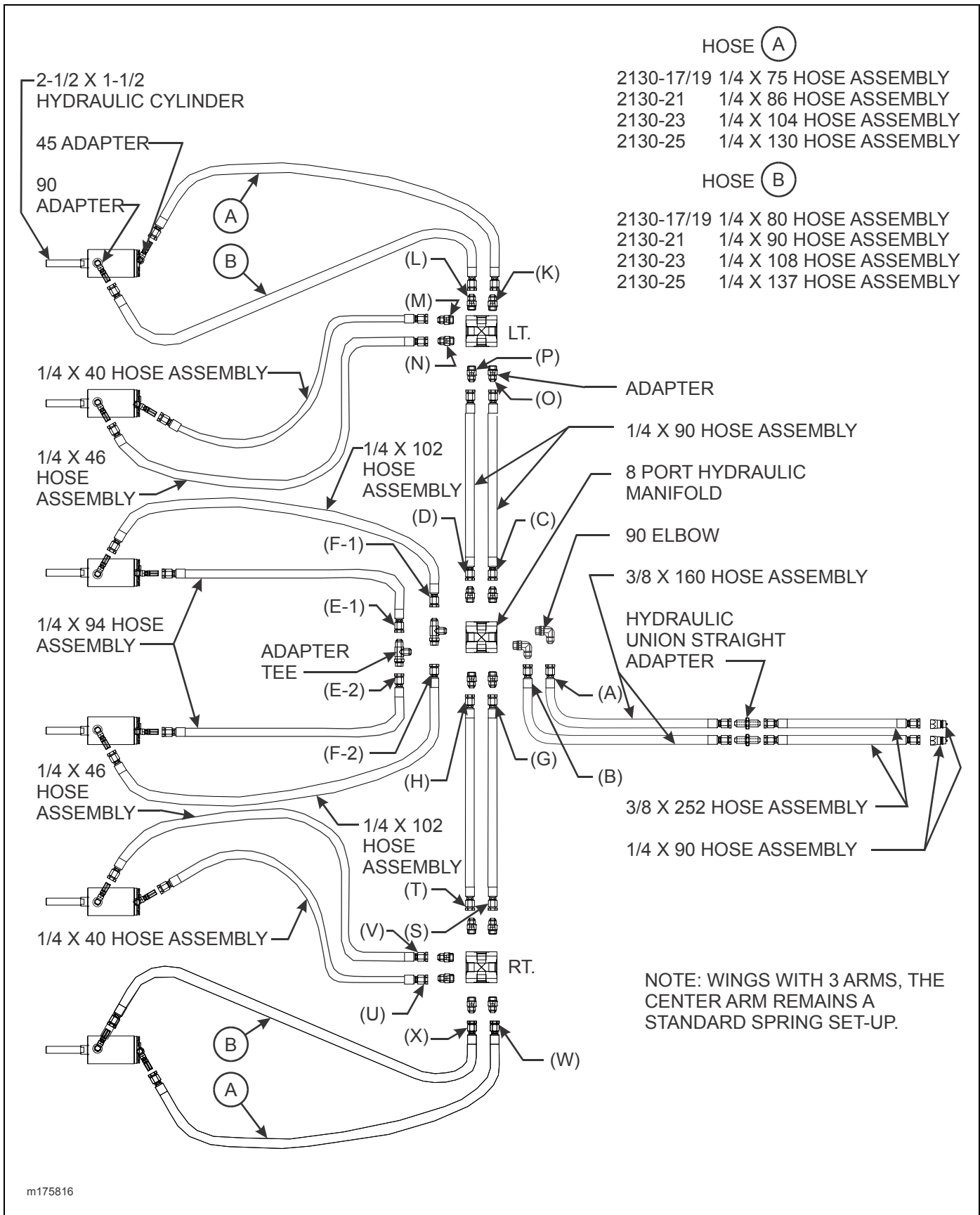


Figure 3-29: Chopper Reel Hydraulic Installation (Option)

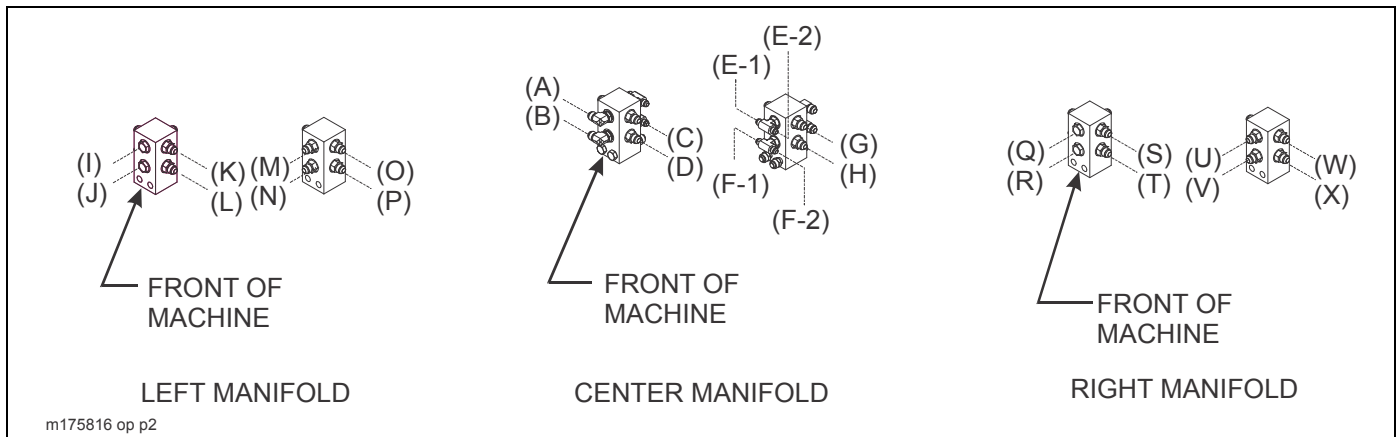


Figure 3-30: Chopper Reel Hydraulic Manifold Installation (Option)

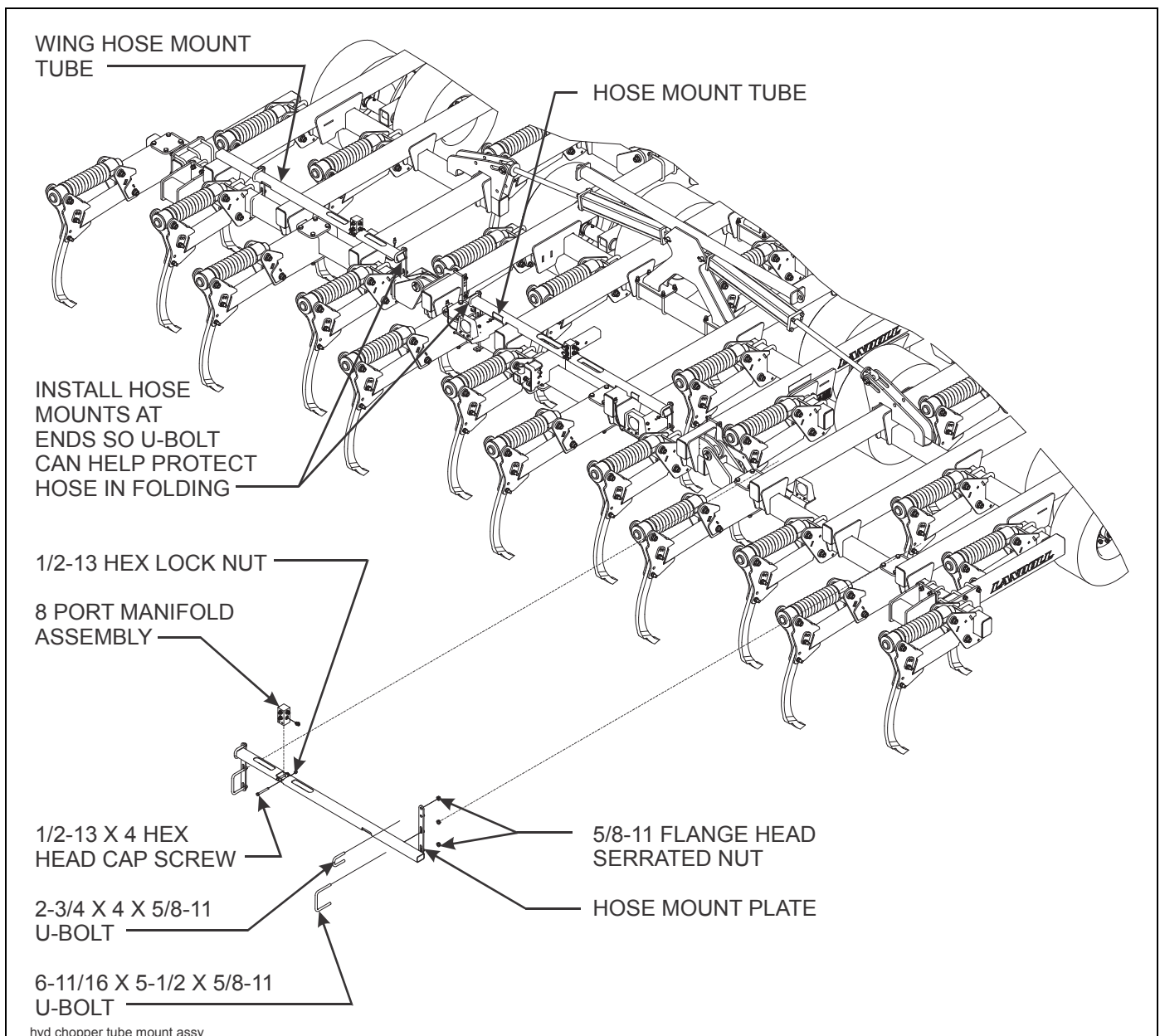


Figure 3-31: Hose Mount Tube Installation

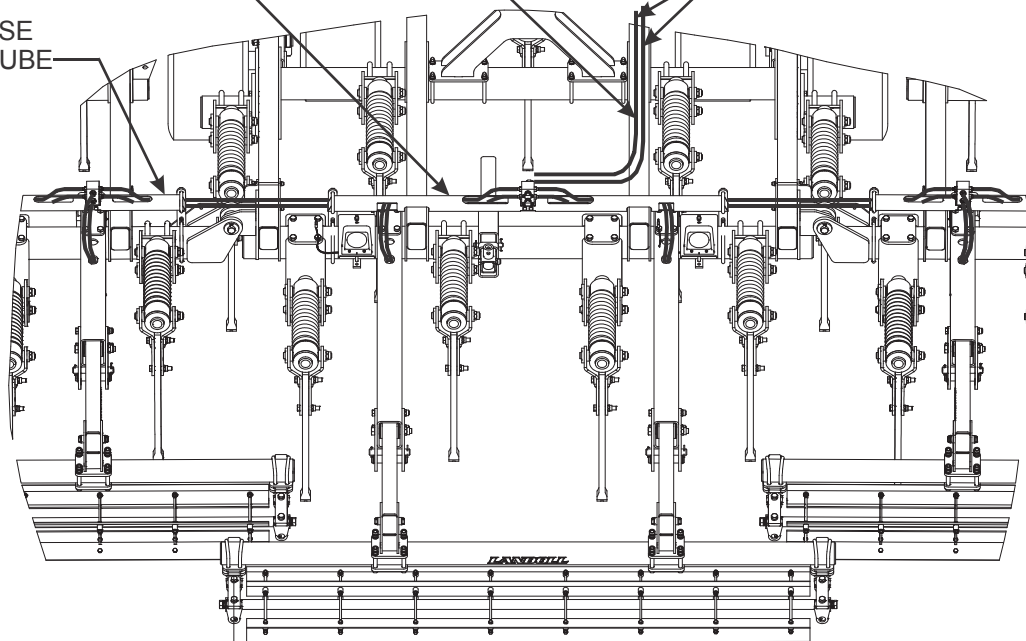
ASSEMBLY INSTRUCTIONS

ATTACH HOSE TO TOP OF
FRAME USING HOSE CLAMPS
(P/N'S 172977 AND 174784)

HOSE MOUNT TUBE

WING HOSE
MOUNT TUBE

ROUTE HOSES TO TRACTOR



chopper reel hose routing2

Figure 3-32: Hose Mount Tube Installation

Hydraulic Tubular Mount Chopper Reel Installation

1. Install hydraulic chopper reels in the same manner described for standard tubular mount chopper reels **(See “Standard Tubular Mount Chopper Reel Installation (Option)” on page 3-35.)**
2. Install hose mount plates onto rear tube of frame and wing frame using 6-11/16 x 5-1/2 x 5/8-11 u-bolts and flange head serrated nuts **(See Figure 3-31.)**
3. Install hose mount tubes to top of hose mount plates using 2-3/4 x 4 x 5/8-11 u-bolts and flange head serrated nuts.
4. Install 8 port manifold assembly to hose mount and wing hose mount tubes using 1/2-13 x 4 hex head cap screws and hex lock nuts. Orient manifold as shown in **Figures 3-29 and 3-30.**
5. Install fittings and route hoses as shown in **Figures 3-29, 3-31, 3-32, and 3-33.**

NOTE

On wings with three arms, the center arm will be a standard spring setup.

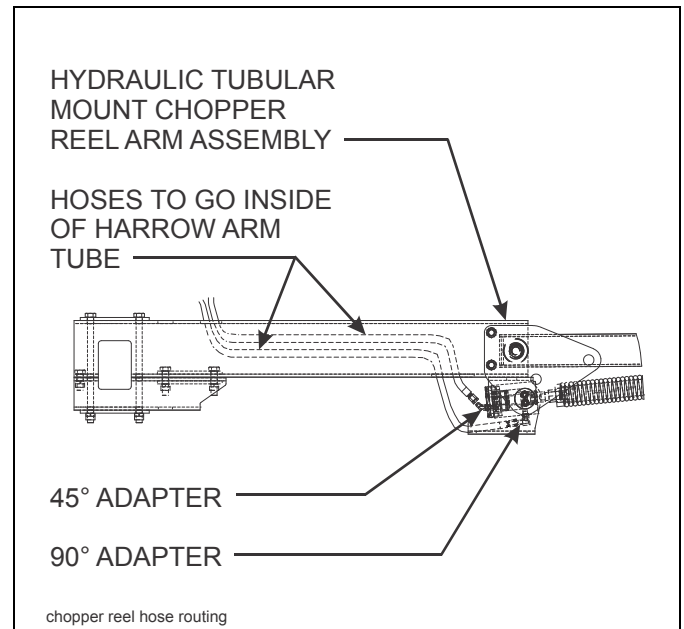
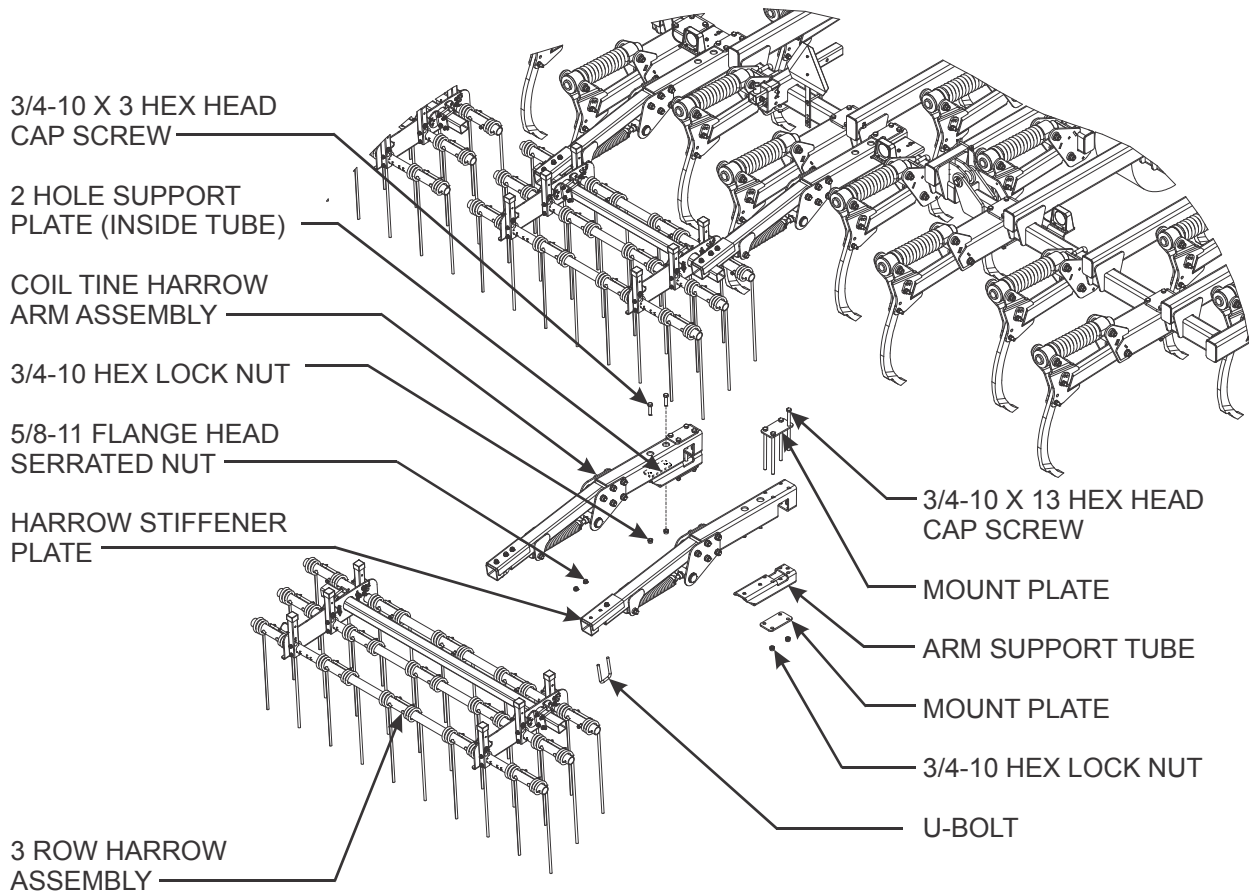


Figure 3-33: Hose Routing Inside Chopper Reel Arm



2130-21-tine-1

Figure 3-34: Coil Tine Harrow Installation

Coil Tine Harrow Installation

See Figures 2-20 thru 2-22 for 3 Row Coil Tine Harrow placement dimensions.

1. Install 2 hole support plate into coil tine harrow arm assembly. Use (2) 3/4-10 x 3 hex head cap screws to hold plate in place.
2. Slide coil tine harrow arm assemblies over rear frame bar using chopper reel placement drawings (See Figures 2-20 thru 2-22 and 3-34.)
3. Attach top plate to top of chopper reel arm assembly using (4) 3/4-10 x 13 hex head cap screws. Slide arm support tube and bottom plate onto 13" hex head cap screws on underside of chopper reel arm assembly and rear frame (See Figure 3-34.)
4. Evenly tighten the 3/4-10 x 13 hex head cap screws first. Then tighten the front 3/4-10 x 2 hex head cap screw. Tighten 3/4-10 x 3 hex head cap screws last, but be sure to not overtighten. These screws need to be snug.
5. Adjust spring to 21-1/2" (See Figure 3-35.)
6. Attach harrow arms to 3 row coil tine harrow assembly using u-bolts, and 5/8-11 flange head serrated nuts. The u-bolt will go through both the harrow arm and harrow stiffener plate.

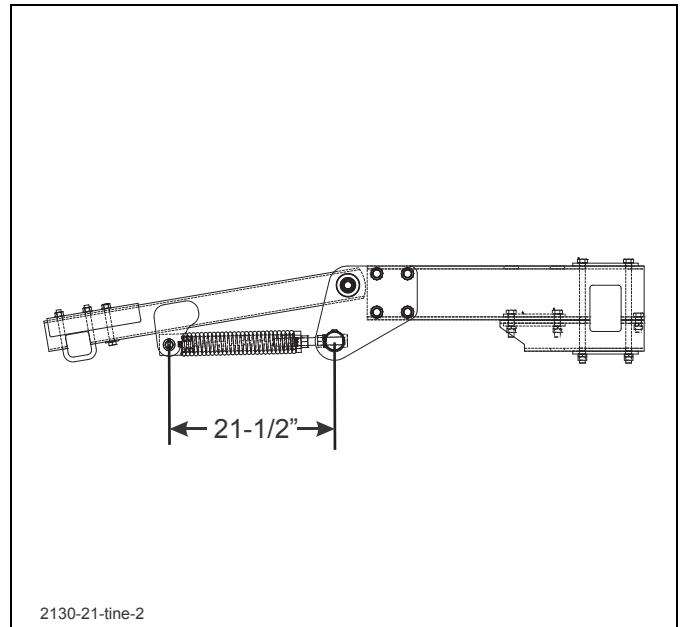


Figure 3-35: Coil Tine Arm Spring Adjustment

NOTES:

[illegible]

Chapter 4

Operation and Maintenance



DANGER

Never allow anyone to ride on the 2131 wing coultter chisel at any time. Allowing a person to ride on the machine can inflict serious personal injury or death to that person.



DANGER

Always lock the tractor drawbar in the center position when transporting the unit. Failure to do so can result in serious injury or death and cause damage to the equipment.



DANGER

Coulter blades are extremely sharp. Exercise extreme care when working on or near coulter blades. Do not allow coulters to roll over or fall onto any body part. Do not allow wrenches to slip when working near coulter blades. Never push wrenches toward coulter blades. Do not climb over machine above coulter blades. Failure to stay clear of coulter blade edges can cause serious personal injury or death.



DANGER

When transporting the unit, place cylinder lockouts in the transport lock position after fully extending the cylinders. Insert the lockout pins to secure the cylinder lockouts. Failure to lockout the cylinders can cause the unit to settle during transport, which can result in serious injury or death and cause damage to the equipment.



WARNING

All hydraulically elevated equipment must have cylinder lockouts installed or be lowered to the ground when servicing or when equipment is idle. Failure to take preventive measures against accidental lowering can result in serious personal injury.



CAUTION

When transporting farm implements on public roads, it is the responsibility of the operator to abide by state and local laws concerning wide loads, speed, safety emblems and safety lighting equipment. Drive at safe speeds, particularly when rounding corners, crossing rough ground or driving on hillsides, to prevent tipping the tractor.

Tractor Preparation

The Landoll 2131 Wing Coulter Chisel is designed to be pulled by tractor equipped with a double lip or clevis type hitch. If your tractor is not equipped as such, you need to purchase the hitch from your local tractor dealer.

Before attaching the Wing Coulter Chisel, prepare the tractor as follows:

1. Inflate the rear tractor tires equally and add ballast according to the tractor operator's manual.
2. Lock the tractor drawbar in the center position.

Coulter Chisel Preparation

1. Prior to operating the 2131 Wing Coulter Chisel, inspect it thoroughly for good operating condition.
2. Replace worn or missing parts.
3. When the machine is new, check the bolt tightness after a few hours of operation. Tighten any loose nuts or bolts. Check the lift wheel lug bolts daily.
4. Check the lift wheel tire inflation. Inflate all tires equally to avoid side draft. Follow the tire manufacturer's recommended pressures listed on the sidewall of the tires.
5. Lubricate the machine as shown in "Lubrication Maintenance" on page 4-16 (See Figure 4-14.)

Attaching to the Tractor

1. Align the tractor drawbar with the machine. Raise or lower the Wing Coulter Chisel ring hitch, as needed, using the swivel jack. Attach the unit with proper size hitch pin.
2. Always place the swivel jack on the interior mount before setting the machine in motion.
3. Clean all hydraulic couplings and attach to the tractor.
4. Fully extend the hydraulic lift wheel cylinders, and place the cylinder lockouts in the transport lock position over the cylinder rods. Secure the lockouts with the lockout pins.

Hydraulic Lift System

The Wing Coulter Chisel is equipped with a rephasing hydraulic lift system to raise and lower the unit in the field.

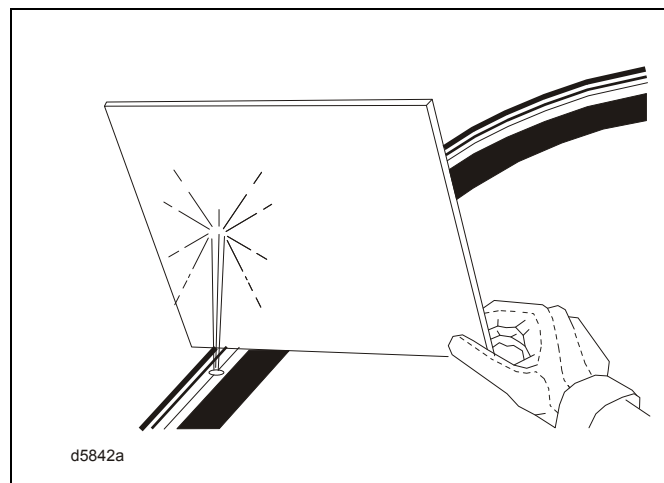


Figure 4-1: Hydraulic Leak Detection



WARNING

Escaping hydraulic fluid can cause serious personnel injury. Relieve system pressure before repairing, adjusting, or disconnecting. wear proper hand and eye protection when searching for leaks. Use cardboard instead of hands (See Figure 4-1.) Keep all components (cylinders, hoses, fittings, etc.) in good repair.

1. The rephasing hydraulic lift system contains smaller wing frame cylinders plumbed in series with larger center frame cylinders. It is important that the cylinders be connected in the proper series for the lift system to operate correctly. When the cylinders are fully extended and held in this position, oil is able to flow through the cylinders (or rephase) and allow the cylinders to operate in sync. This also allows the system to purge any air that may enter the system without having to loosen or crack hydraulic lines.
2. The hydraulic system is not filled with oil and should be purged of air before transporting and field operations. Carefully hitch the Wing Coulter Chisel to the tractor and connect the hydraulic lift hoses. Check to make sure the tractor hydraulic reservoir is full of the manufacturer's recommended oil. Slowly raise the machine, and continue to hold the hydraulic lever until all lift cylinders are fully extended. With all cylinders fully extended remove the 2 X 16 transport lockouts (**See Figure 4-2.**) Store transport lockouts as shown (**See Figure 4-3.**) Lower and raise the unit to verify that all cylinders are working simultaneously throughout the stroke. If the cylinders are not working evenly or together, fully extend the lift cylinders and continue to hold the lever to purge any remaining air. Do not loosen any hoses or fittings. Recheck tractor reservoir to make sure it is within operating limits.
3. Always fully extend the cylinders and hold the lever to ensure the cylinders are rephased before starting any field operation. This will keep all cylinders in time and frame sections level when operating.

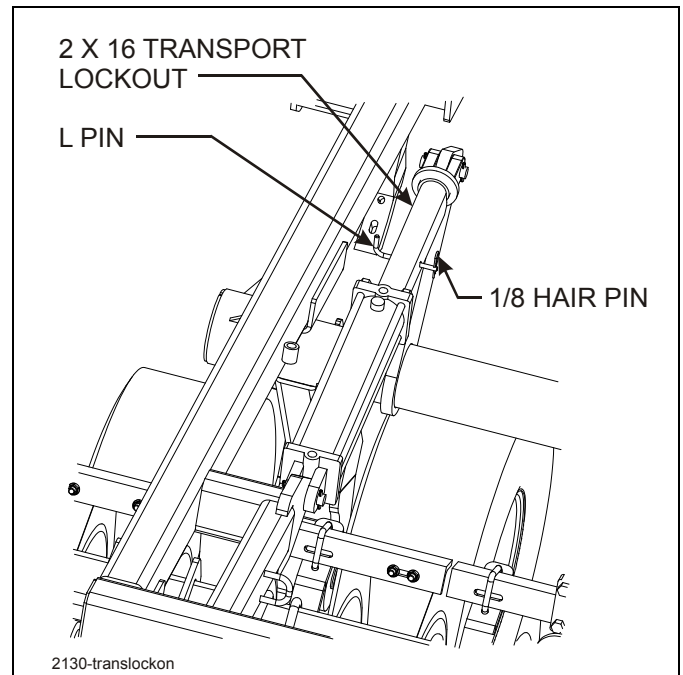


Figure 4-2: Installed Transport Locks

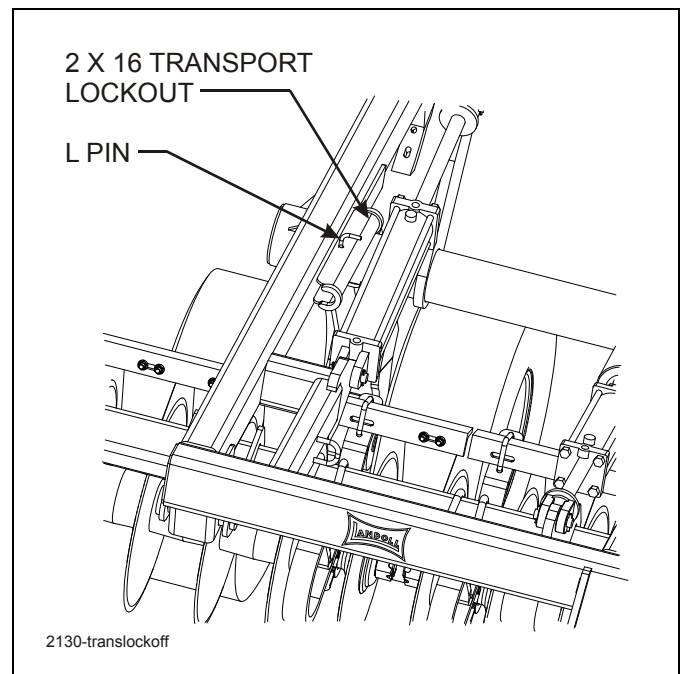


Figure 4-3: Stored Transport Locks

Hydraulic Fold System

1. The 2131 Wing Coulter Chisel is equipped with a hydraulic fold system to raise and lower the wing frames for narrow transport.
2. Be sure the system is fully charged with hydraulic oil before attempting to fold/unfold the unit. Air in the system can allow uncontrolled dropping of the wing frames causing serious personal injury or machine damage. The system needs to be charged with oil initially and any time the system has been opened for repair such as cylinder, hose, or fitting replacement/repair.
3. To charge the system, carefully hitch the coulter chisel to the tractor. Unpin the end(s) of the fold cylinders, and position them so they can extend and retract without contacting any frames or other parts. Check the tractor hydraulic fluid level to make sure it is full of the manufacturer's recommended hydraulic fluid. Connect the cylinder hoses to the tractor and fully extend and retract the cylinders several times. The cylinder rod travel should be smooth and positive when all air has been purged from the system. Due to large amounts of hydraulic oil required, recheck the tractor fluid level to make sure it is within proper operating limits.
4. The hydraulic fold system is equipped with restrictors in the rod end of cylinders to prevent uncontrolled falling of wing frames when unfolding. Removal or improper assembly of these restrictors can cause the machine to fold improperly and result in serious machine damage.



WARNING

Escaping hydraulic fluid can cause serious personnel injury. relieve system pressure before repairing, adjusting, or disconnecting. Wear proper hand and eye protection when searching for leaks. Use cardboard instead of hands (See Figure 4-4.) Keep all components (cylinders, hoses, fittings, etc.) in good repair.

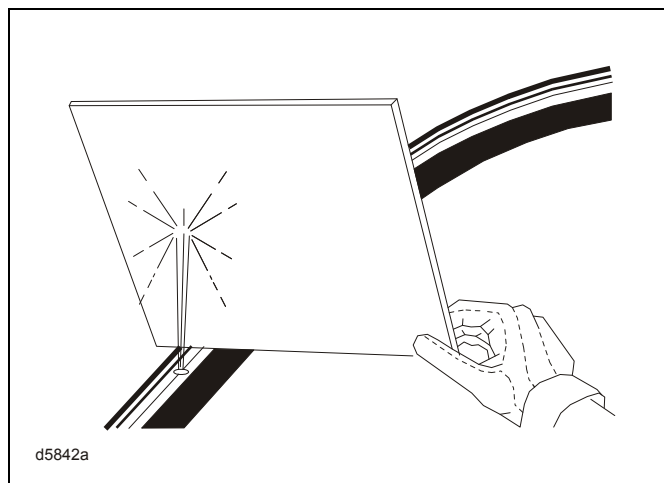


Figure 4-4: Hydraulic Leak Detection

5. To fold/unfold the 2131 Wing Coulter Chisel, find a level area large enough to accommodate the implement when it is fully unfolded. The tractor should be stopped and not moving with the unit fully raised. Remove the transport lock pins from the mounts and install them in the storage locations (See Figures 4-5 and 4-6.)

IMPORTANT

Failure to remove the lock pins when unfolding will result in serious damage to the implement. Be sure other people and pets are a safe distance away.

6. Slowly engage the tractor lever and fold/unfold the wing frames. When the wings are unfolded, continue holding the tractor lever to fully extend all fold cylinders. This will allow the wings to fully flex in the field.
7. When the unit is fully folded, remove the transport lock pins from the storage location and install in the mounts provided on each side of the machine.

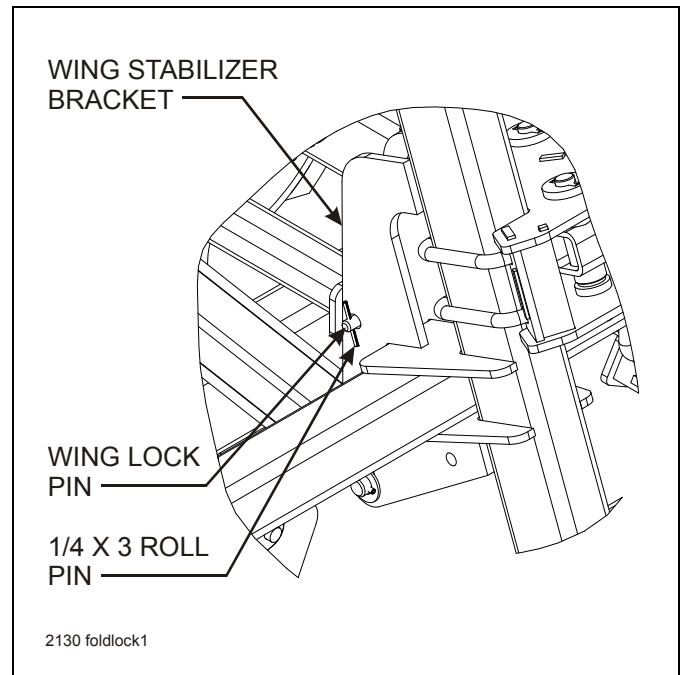


Figure 4-5: Installed Position of Transport Locks

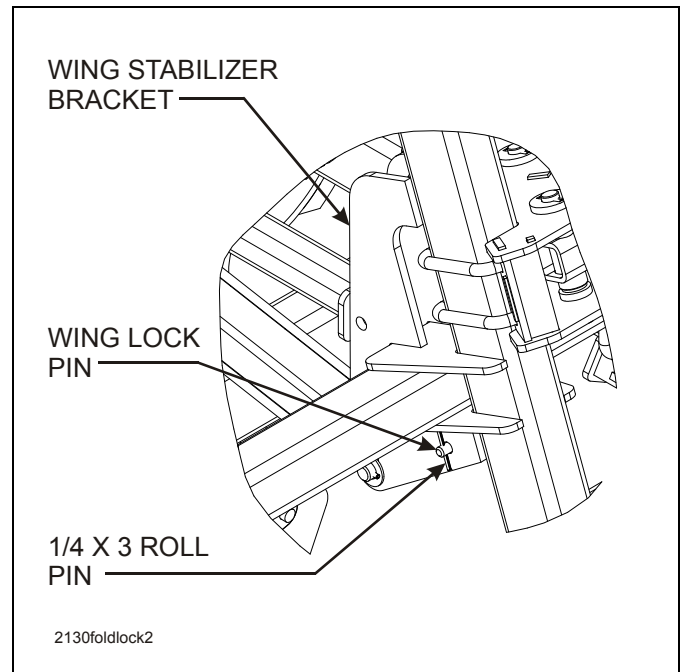


Figure 4-6: Stored Position of Transport Locks

Hydraulic Coulter Gang Lift System

The rephasing coulters gang lift system must be purged of air before beginning field operation. To insure that all air is purged from the system, the gang cylinders are mounted in a vertical position with the base end of each cylinder mounted on the gang bar.

1. Make sure the tractor's hydraulic reservoir is full of the manufacturer's recommended oil.
2. Extend the lift cylinder and raise the machine.
3. Fully extend the coulters gang cylinders and hold the tractor lever to allow oil to bypass and fill each coulters gang cylinder.

IMPORTANT

When initially filling the cylinders with oil or after extended periods of storage, hold the tractor valve approximately 1 minute. If the coulters chisel has recently been used, hold the tractor valve approximately 10 seconds.

4. Raise and lower the coulters gangs making sure the cylinders actuate simultaneously throughout the stroke.
5. If the coulters gang cylinders are not in unison, continue holding and cycling the cylinders to purge any remaining air.
6. This rephasing process may need to be repeated periodically during operation to assure even penetration of coulters gangs. DO NOT loosen any hydraulic fittings.

IMPORTANT

Retracting the cylinders during periods of storage will prevent rusting of shafts and subsequent damage to seals.

NOTE

Some tractor models have a bypass built into the hydraulic outlets. It may be necessary to reverse the coulters gang lift hoses if the rephasing cylinders extend during field operation.

General Operation

1. The horsepower requirements are typically 20-25 horsepower per shank. This will vary widely due to speed, depth, moisture, residue and types of soils. Local dealers can help in making recommendations for your areas.
2. Operating speed is typically 4.5-6 mph. Excessive speed can cause the unit to bounce, uneven depth, and create undesirable ridges.
3. Lift wheels must always be in contact with the ground and carrying some implement weight. Lift wheels are used to gauge the depth and to control the leveling feature.
4. Do not turn with the Wing Coulters Chisel in the ground. This can put excessive side load on the gangs and hitch. Raise the unit fully when making turns to prevent gouging and pushing a ridge.

Field Operation

1. Raise the unit to take the weight off of the transport locks. Remove the transport locks from the lift cylinders (on the main frame only). Store the transport locks on the retainers above the main lift (See Figure 4-3.)
2. Remove the wing lock pins and store in the extra hole in the hinge bracket. Unfold the wings and extend the fold cylinders completely (See Figure 4-6.)



CAUTION

Failure to remove wing lock pins before unfolding wings will cause permanent equipment damage.

Leveling (Front-to-Rear)

1. The leveling feature on the 2131 Wing Coulter Chisel is used to keep the machine level when raising the unit from a working position to a transport position. The leveling feature is also used to level the unit from front-to-rear to perform a level operation in the field.
2. The unit should be level from front to rear. This will reduce horsepower requirements, allow a more uniform tillage operation, and reduce unnecessary point wear.
3. To adjust the leveling feature, loosen jam nuts at each end of the radius rod using the adjustment wrenches (See Figure 4-7.) To raise the front of the Wing Coulter Chisel, lengthen the radius rod assembly. To lower the front of the Wing Coulter Chisel, shorten the radius rod assembly. After adjusting, retighten jam nuts at each end. Adjustments should be made in small increments.

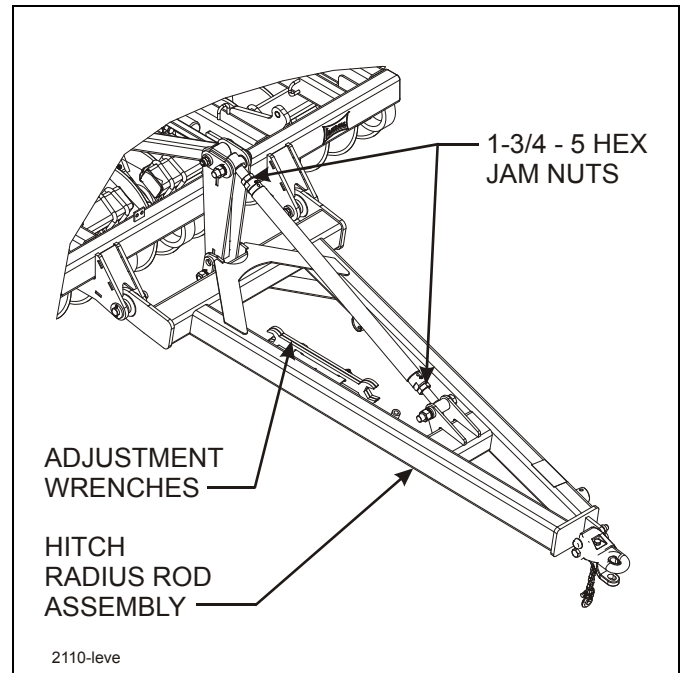


Figure 4-7: Radius Rod Leveling Adjustment

Leveling (Side to Side)

1. Leveling the 2131 Wing Coulter Chisel side-to-side involves leveling the wing frame to the center frame. The unit should be level side-to-side when operating in the field.
2. To level the unit, verify that all tires are properly inflated. With the implement unfolded, raise the unit to fully extend the lift cylinders. Continue to hold the tractor lever 30-60 seconds to insure that the cylinders are fully extended and the rephasing lift system has been purged of air. Lower the unit until the coulter points are approximately 1" off the ground. On the center frame, measure the distance from the walking beam spindle to the bottom side of the frame (**See Figure 4-8.**) Set wing frames 5/8" higher than the center frame. Adjusting the anchor at the base end of each wing lift cylinder sets wing frame height (**See Figure 4-9.**)

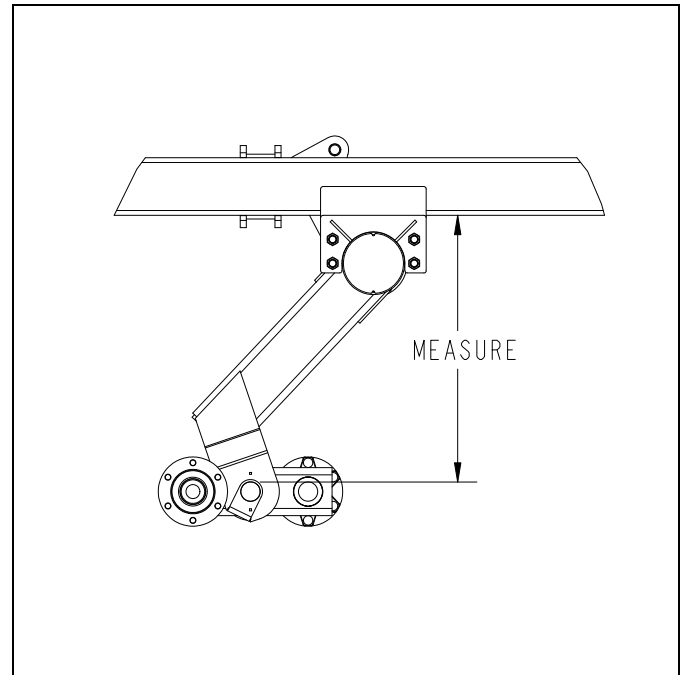


Figure 4-8: Leveling from Side to Side

3. An adjusting wrench is provided to make this adjustment. It may be necessary to lower the wing to the ground and relieve weight on the cylinder anchor to make this adjustment. If required, fully raise the implement, lower to just above the ground, and re-verify measurements. Repeat as necessary and securely tighten the cylinder anchor when complete.

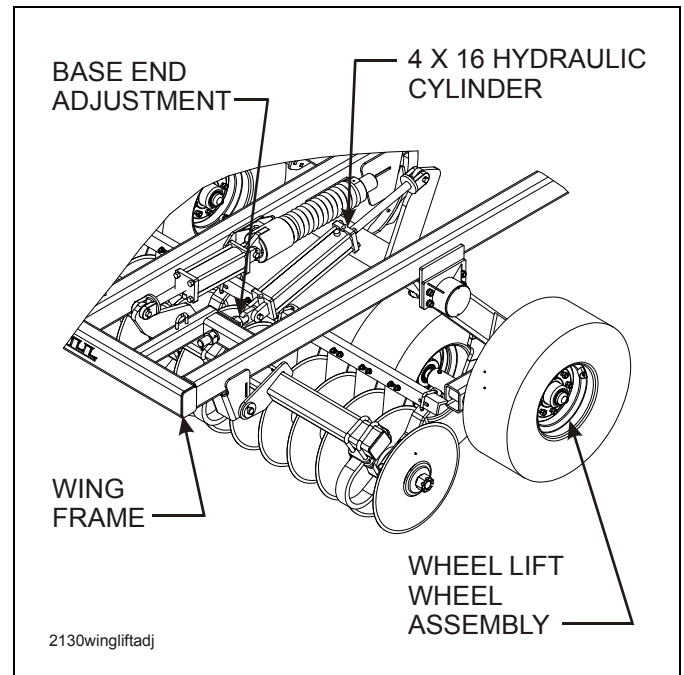


Figure 4-9: Wing Lift Adjustment

OPERATION AND MAINTENANCE

Variable Ratio Adjustment

The leveler is equipped with a variable ratio adjustment. This is located at the rear of the hitch and at the center of the wheel lift where the leveler tube attaches. Connect the leveler tube to the top hole in the center lift and the bottom hole in the tongue for normal operation. This will cause the rear of the machine to raise higher than the front increasing transport height. The lower hole on the center lift provides an increased leveler ratio, which will cause the Coulter Chisel to become more level in transport. The lower hole should be used when a rear tow hitch is needed to reduce the height of the rear tow hitch during transport.

The adjustments can be set as follows:

- Top hole in center lift, top hole in tongue - this will raise the rear of the machine the highest.
- Top hole in center lift, bottom hole in tongue - normal operation.
- Bottom hole in center lift, top hole in tongue - normal operation with a tow hitch
- Bottom hole in center lift, bottom hole in tongue - to lower rear tow hitch if needed.

1. To change the variable ratio adjustment, lower the implement to the ground and relieve the load on the lift system.
2. Extend or retract the radius rod, until the load is removed from the leveler tower.
3. Remove the 1-1/4 x 7 x 9-1/2 hex head cap screw, slotted lock washer, and hex nut through the leveler tower and hitch (**See Figure 4-10.**)
4. Reinstall the 1-1/4 x 7 x 9-1/2 hex head cap screw, slotted lock washer, hex nut, and leveler tower in the desired position. The radius rod will require some adjustment to connect to the new position.
5. To adjust the leveler tube at the center lift, remove the hitch pin, 1/2 x 2-1/4 slotted spring pin, and 1-8 hex lock nut.
6. Reinstall the hitch pin, 1/2 x 2-1/4 slotted spring pin, 1-8 hex lock nut in the leveler tube at the center lift in the desired position.

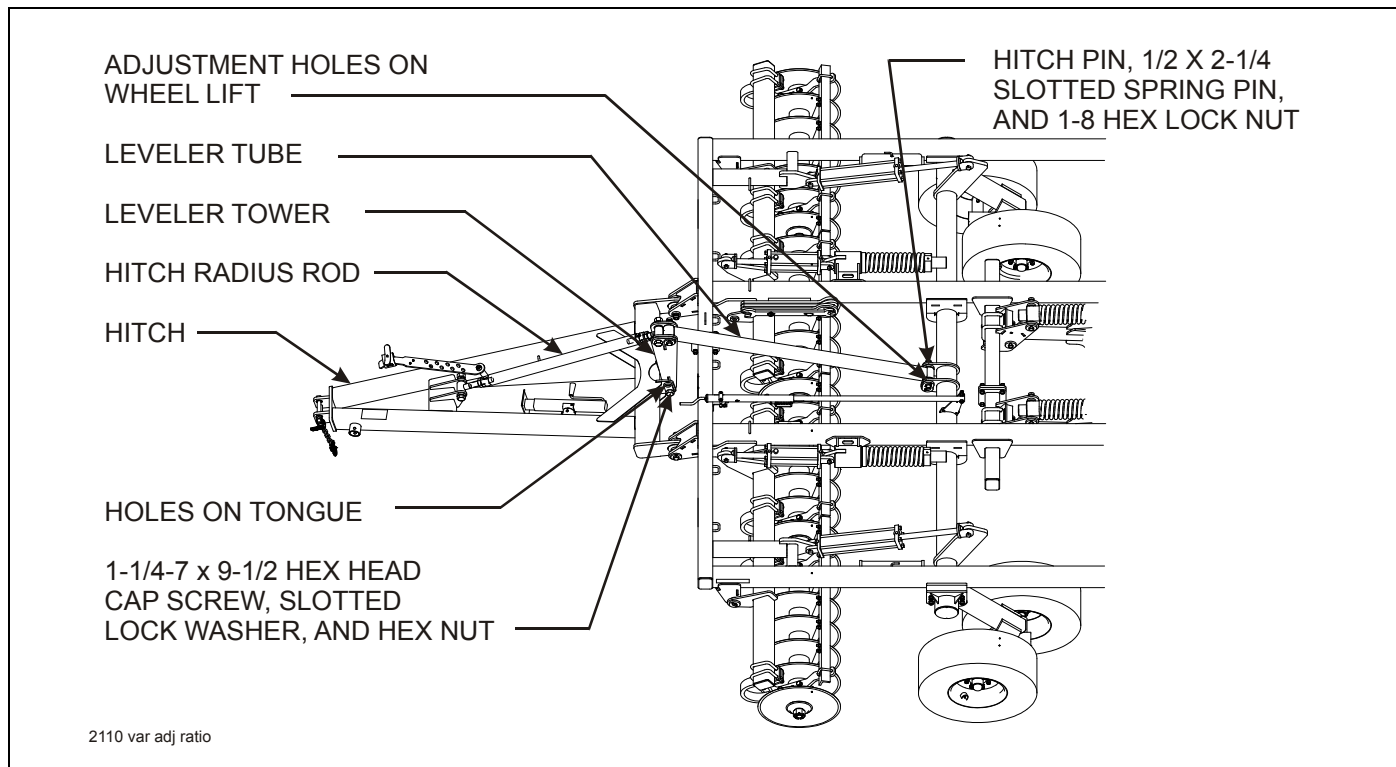


Figure 4-10: Variable Ratio Leveler Adjustment

Coulter Blades

1. The 2131 Wing Coulter Chisel is equipped with 22" coulters blades.
2. The 22" diameter blades are flat with a thickness of 4 ga (.256") and are standard for the 2131 Wing Coulter Chisel.
3. Sharpening – In some cases there is a desire to sharpen coulters blades for improved cutting. There are several people who roll-sharpen coulters blades. Most coulters blades used today are made of chrome-boron steel. The chrome-boron steel has a higher hardness than traditional carbon-steel blades for increased wear. Higher hardness makes roll sharpening more difficult often with mixed results, and is not covered by warranty. Coulter blade manufacturers will not cover any alterations to blades other than the place of manufacture. Results from roll-sharpening damage may not be immediate, and may take more than a season to be noticeable. If you choose to sharpen coulters blades, check with local dealers for reputable experienced sharpeners that will stand behind their work.



DANGER

Coulter blades are extremely sharp. Exercise extreme care when working on or near coulters blades. Do not allow coulters to roll over or fall onto any body part. Do not allow wrenches to slip when working near coulters blades. Never push wrenches toward coulters blades. Do not climb over machine above coulters blades. Failure to stay clear of coulters blade edges can cause serious personal injury or death.

Depth Stop Adjustment (Manual)

The operating depth of the 2131 Wing Coulter Chisel is controlled by a single-point depth stop. The stop is located at the center front of the machine.

1. Adjust the depth stop by turning the handle out (counter-clockwise) to increase operating depth (**See Figure 4-11.**) Turn the handle out (counter-clockwise) to decrease operating depth. One turn will equal approximately 3/16" adjustment in depth. Arrows on the front will also show this.
2. The gauge on the side of the depth stop tube gives a reference for depth setting. The "A" setting refers to maximum operating depth.

IMPORTANT

For maximum operating depth, the lift wheels must be in contact with the ground and carry some of the machine weight. Raising the lift wheels off the ground permits uncontrolled depth and does not allow the leveler to function properly.

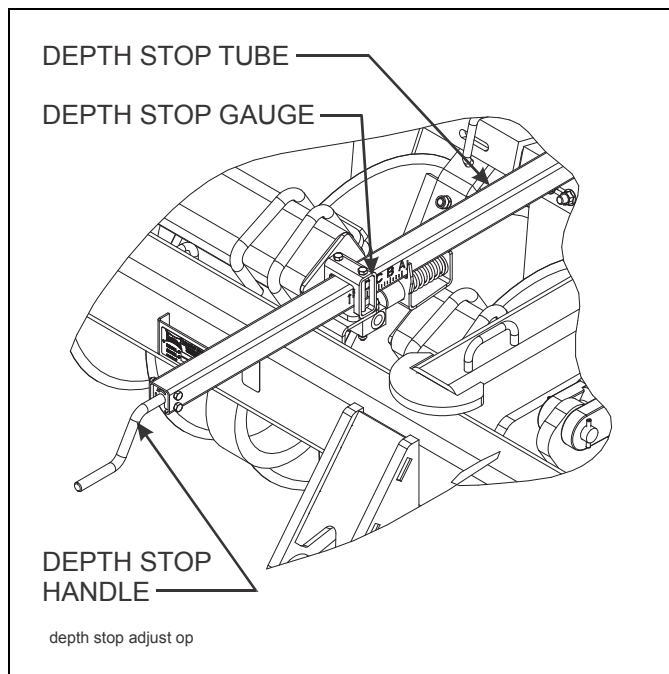


Figure 4-11: Depth Stop Adjustment (Manual)

Wheel Bearing Maintenance

Wheel bearing maintenance should be performed at the beginning of every season of use. Check the wheel bearings periodically for excessive end play. If needed, adjust or replace them using the following procedure:

1. Place the frame on blocks or stands sufficient to lift the tire clear of the ground.
2. Remove the tire.
3. Remove the hub cap, cotter pin, slotted nut and washer.
4. Remove the hub. Clean and inspect the bearings and hub cavity. Replace any worn or defective parts.
5. Repack the bearings using a high-quality wheel bearing grease.
6. Slide the triple-lip seal onto the spindle. Do not install the seal into the hub.

NOTE

It is recommended to install new seals any time the hub is removed.

7. Slide the inner bearing cone and hub onto the spindle.
8. Install the outer bearing cone, washer and slotted nut.
9. Tighten the slotted nut while rotating the hub until there is a slight resistance to wheel rotation. Then, back the slotted nut off one notch, until the wheel rotates freely without end play.
10. Slide the triple-lip seal to the hub and install the seal in the hub.

NOTE

The triple-lip seals should point away from the hub to keep contaminants out and allow grease to pass.

11. Install a new cotter pin and replace the hub cap.

Hydraulic Maintenance

1. Check the tractor hydraulic fluid level per tractor owners manual and after any leakage. Check fluid level with the cylinders in the retracted position.
2. If a cylinder or valve leaks, disassemble the parts to determine the cause of the leak. Any time a cylinder is opened up, or whenever any seal replacement is necessary, it is advisable to clean all parts and replace all seals. Seal kits are available from your Landoll dealer.
3. Check all hydraulic hoses weekly. Look for binding or cracking. Replace all worn or defective parts immediately.

IMPORTANT

Lower the unit to the ground, and relieve hydraulic pressure before attempting to service any hydraulic component.

4. Transport locks are provided to hold the implement in a raised position. Do not attempt to perform any service work under the implement without first installing the transport locks. Before servicing any hydraulic component, lower the implement to the ground and relieve all system pressure. If a hydraulic component is disconnected, repaired, or replaced, it will be necessary to purge the system of air before operation. **See “Hydraulic Lift System” on page 4-2 and “Hydraulic Fold System” on page 4-4** on how to purge the hydraulic systems.

Transport

1. Check and follow all federal, state, and local requirements before transporting the Coulter Chisel.
2. The 2131 Wing Coulter Chisel should be transported only by tractor required for field operation. The implement weight should not exceed more than 1.5 times the tractor weight. Unless noted on the implement, maximum transport speed is 20 mph for the implement. Slow down when driving on rough roads. Reduce speed when turning, or on curves and slopes to avoid tipping.

3. A safety chain is provided with the implement to insure safe transport.
 - a. The safety chain should have a tensile strength equal to or greater than the gross weight of the implement. The chain is attached to the lower hitch clevis hole with two flat washers between the clamp plates to assure a tight connection. Always use a 1” diameter Grade 8 bolt for this connection.
 - b. Attach the safety chain to the tractor drawbar **(See Figure 4-12.)** Provide only enough slack in the chain for turning. Do not use an intermediate chain support as the attaching point for the chain on the tractor. Do not pull the implement by the safety chain.
 - c. When unhitching from the tractor attach the hook end of the chain to a free link close to the hitch clevis for storage. This will keep the hook off the ground, reducing corrosion and keep the hook functioning properly.
 - d. Regularly inspect the safety chain for worn, stretched, or broken links and ends. Replace the safety chain if it is damaged or deformed in any way.

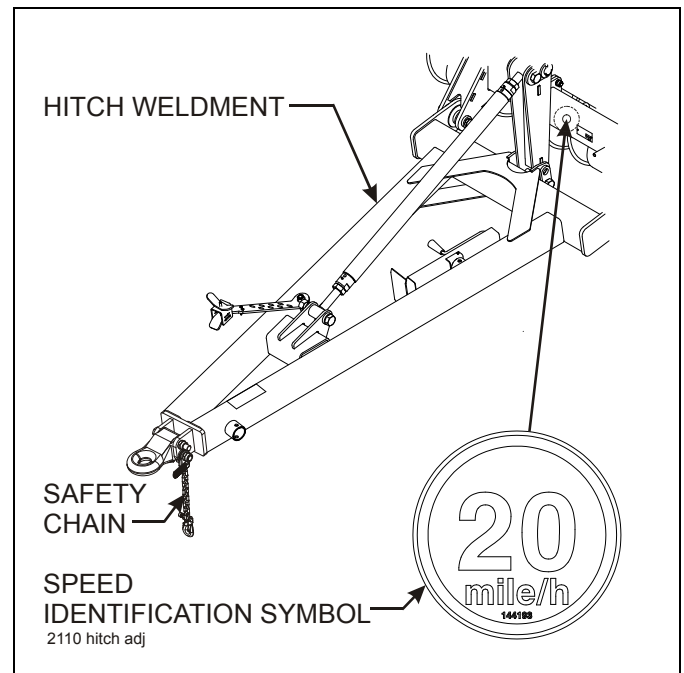


Figure 4-12: Hitch, Speed Identification Symbol, and Safety Chain

OPERATION AND MAINTENANCE

4. Check that tires are of proper size, load rating, and inflated to manufacture specifications before transporting. Check wheel lug bolts to insure tightness.
5. Know the transport heights and widths of the unit before transporting. Attachments such as leveling harrows can increase the transport dimensions of the implement. Use caution when transporting near bridges and power lines.



WARNING

Electrocution can occur without direct contact.

6. Raise the unit to full transport height.
7. Install transport locks on both lift cylinders. Do not depend solely on implement hydraulics for transport. (See Figure 4-13.)



WARNING

Failure to use transport lock pins during transport may result in permanent equipment damage, serious injury, or death.

8. Transport during daylight hours whenever possible. Always use flashing warning lights, except where such use is prohibited by law. Make sure lights, reflectors and SMV emblem are clearly visible and operating. Remove any obstructions such as dirt, mud, stalks or residue that restricts view before transporting.

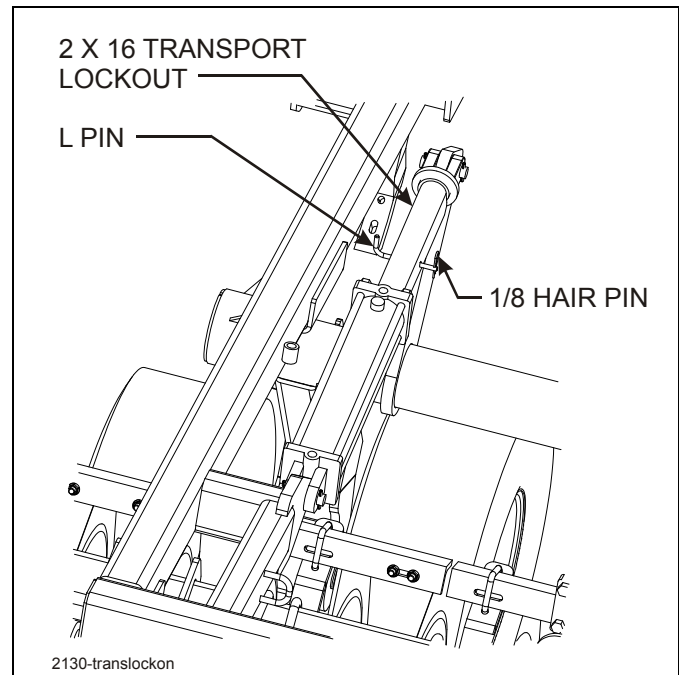
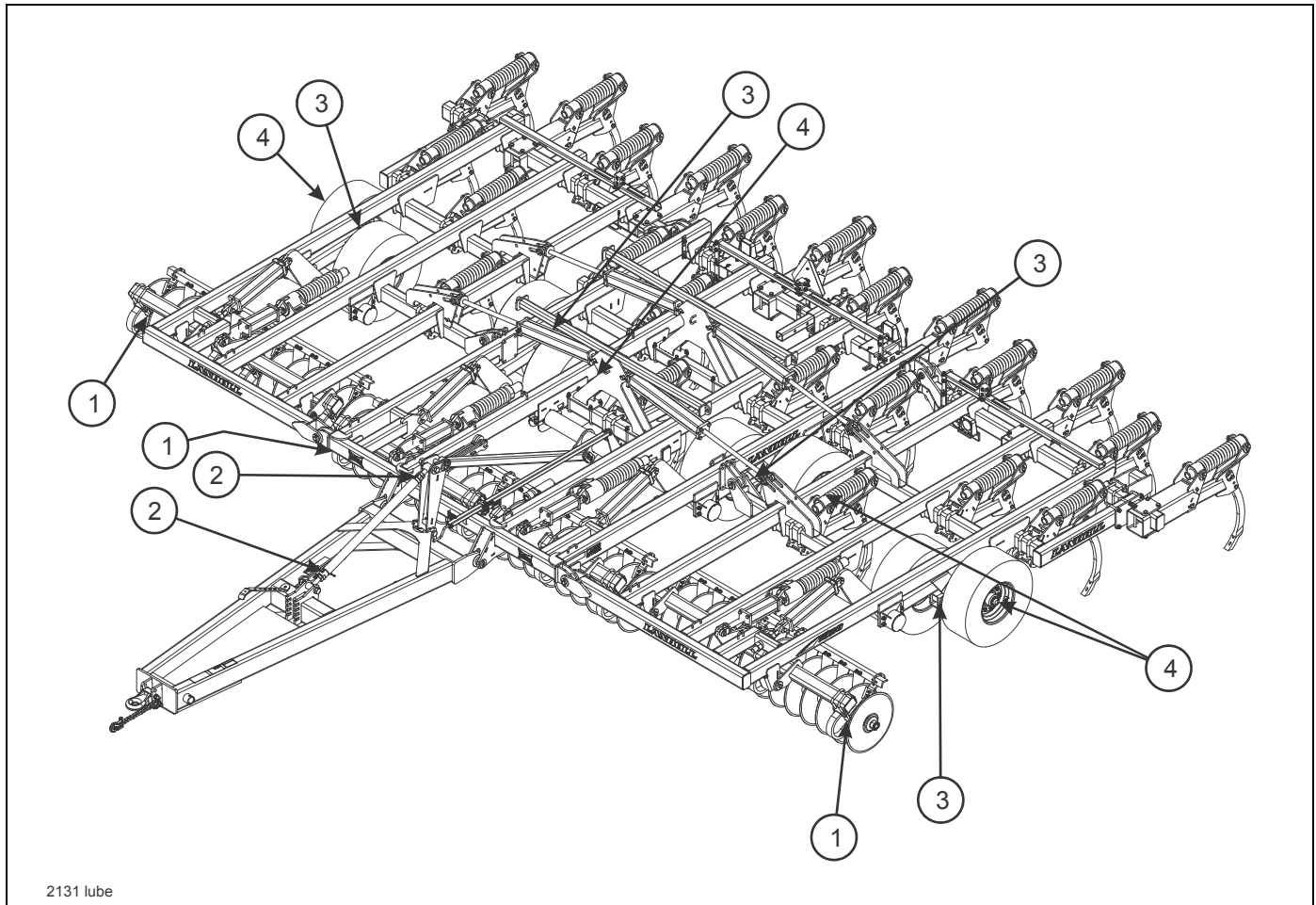


Figure 4-13: Installed Transport Locks


Figure 4-14: Lubrication Schedule

LUBRICATION TABLE			
ITEM	DESCRIPTION	NO. OF LUBE POINTS	INTERVAL (Hours Unless Stated)
1	Disc Gang Bearings	1 each	10
2	Radius Rod	2	50
3	Walking Tandem Hubs	1 each	50
4	Wheel Hubs	1 each	50

Table 4-1: Lubrication Table

Lubrication Maintenance

1. **Table 4-1** specifies the lubrication points and intervals on the 2131 Wing Coulter Chisel. Proper maintenance of your machine will, under normal operating conditions, help to keep it operating at or near its peak performance for an extended period of time. Proper maintenance is also a condition of keeping your warranty in good status (**See Figure 4-14.**)
2. When lubricating the Coulter Chisel, SAE multi-purpose EP grease, or EP grease with 3-5% molybdenum sulfide is recommended. Wipe soil from fittings before greasing. Replace any lost or broken fittings immediately.
3. Coulter gang bearings are equipped with triple-lip seals that will let grease pass and not harm the seal. Regular lubrication will maintain a full grease cavity and help purge any contaminants. Grease the bearings before long periods of storage to prevent moisture buildup within the bearing cavity.
4. Wheel seals and walking tandem seals, when properly installed, will allow grease to pass without harm to seals. Regular lubrication will extend service life, particularly in severe operating conditions.
5. The Wing Coulter Chisel is equipped with maintenance-free bearings in the lifts and leveler. These areas require no lubrication.

Storage

1. The service life of the 2131 Wing Coulter Chisel will be extended by proper off-season storage practices. Prior to storing the unit, complete the following procedures:
 - a. Completely clean the unit.
 - b. Inspect the machine for worn or defective parts. Replace as needed.
 - c. Repaint all areas where the original paint is worn off.
 - d. Grease all exposed metal surfaces of shanks, points and coulters.
 - e. Apply a light coating of oil or grease to exposed cylinder rods to prevent them from rusting.
 - f. Lubricate each point of the machine as stated in **“Lubrication Maintenance” on page 4-16.**
2. Store the unit in a shed or under a tarpaulin to protect it from the weather. The ground tools and tires should rest on boards, or some other object, to keep them out of the soil.

Chapter 5

Troubleshooting Guide

PROBLEM	PROBABLE CAUSE	SOLUTION
UNIT NOT PULLING EVEN	Coulter gangs uneven depth	Adjust depth/rephase coulter gang cylinders (See “Hydraulic Coulter Gang Lift System” on page 4-6.)
UNEVEN DEPTH	Unit not level when under power in the field	Level unit front to rear (See “Leveling (Front-to-Rear)” on page 4-7.)
	Excessive coulter gang depth or down pressure	Reduce coulter depth.
	Tire pressure too low	Check inflation.
	Unit not level front to rear	Adjust unit to be level (See “Leveling (Front-to-Rear)” on page 4-7.)
	Wing frame and center frame not level	Level wing frames to center frame (See “Leveling (Side to Side)” on page 4-8.)
	Lift cylinders not in phase	Fully extend lift cylinders and hold hydraulic lever until all cylinders are fully extended.
	Fold cylinders not fully extended to allow wings to flex	Extend fold cylinders fully.
UNIT SIDE DRAFTS OR MOVES SIDE TO SIDE	Lift wheels not carrying enough weight	Adjust depth stop and raise implement.
	Unit not level front to rear	Adjust unit to be level.
FRAMES NOT EVEN	Lift wheels not carrying enough weight	Adjust depth stop and raise implement
	Wing frames and center frame not level to each other	Level wing frames to center frame (See “Leveling (Side to Side)” on page 4-8.)
	Gauge wheels not set correctly or uneven	Set gauge wheels properly.
SHANKS PLUGGING WITH RESIDUE	Unit not level	Level machine (See “Leveling (Front-to-Rear)” on page 4-7.)
	Coulters not cutting residue	Adjust coulter depth
	Twisted shovels throwing soil wrong direction	Install shovels (See Figures 2-1 thru 2-16.)
BACK ROW OF SHANKS PLUGGING WITH RESIDUE	Heavy residue	Install optional offset shank mounts to stagger back row of shanks
SHANKS NOT PENETRATING	Unit not level	Level unit front to rear (See “Leveling (Front-to-Rear)” on page 4-7.)
	Excessive coulter depth	Reduce depth
	Points worn	Install new points
WHEEL BEARING FAILURE	Triple-lip seals not installed correctly	Install seals with the lips pointing outward away from the hub.

TROUBLESHOOTING GUIDE

PROBLEM	PROBABLE CAUSE	SOLUTION
HYDRAULIC - COULTER LIFT CYLINDERS NOT FULLY EXTENDING	Lift cylinders not in phase	Fully extend cylinders and hold hydraulic lever until all cylinders are fully extended.
	Cylinders not installed in proper series	Wing cylinders are smaller diameter than center cylinders. Reinstall cylinders properly.
	Hoses not properly connected	Check hose routing
HYDRAULIC - ENTIRE UNIT SETTLING	Depth stop valve not working	Repair valve
HYDRAULIC - UNIT SETTLING, ONE WING RAISING	Center frame cylinder leaking internally on side of unit that wing is raising	Repair center master cylinder.
HYDRAULIC - WING SETTLING	Wing cylinder leaking	Repair cylinder.
COULTER GANG PLUGGING	Operating depth too deep	Raise unit.
	Conditions too wet	Wait until conditions more favorable.
COULTER GANG WILL NOT TURN OR PUSHES SOIL	Depth set too deep for loose or wet conditions	Raise implement or wait until conditions are more favorable
	Gang bearing failure	Replace bearing
COULTER BLADES LOOSE AND/OR SHEARING ROLL PIN	Gang not tightened properly	Retighten gang shafts to 1200-1500 ft.-lbs. If gangs have ran loose, gangs may require disassembly to remove soil to properly torque gang shafts. Replace any worn components, shafts/spools, etc.



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Equipment from Landoll Corporation is built to exacting standards ensured by ISO 9001 registration at all Landoll manufacturing facilities.

Model 2131
Wing Coulter Chisel
Operator's Manual

Re-Order Part Number F-721-0513

LANDOLL CORPORATION

1900 North Street
Marysville, Kansas 66508
(785) 562-5381
800-428-5655 ~ WWW.LANDOLL.COM



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