

# Diamond Chain Harrow Assembly and Parts Manual

Model 40
Revision J March 2019

### **Australia**

Kelly Engineering PO Box 100 Booleroo Centre SA 5482

Phone: + 61 8 8667 2253 Fax: + 61 8 8667 2250

Email: sales@kellyengineering.com.au

Website (Australia):

www.kellyengineering.com.au

# **United States**

Email: sales@kellyharrows.com

Website (US): www.kellyharrows.com



# Thank you for choosing a Kelly Engineering product

We trust that you find the following manual clear and easy to follow. If you should require additional customer support or assistance, please do not hesitate to contact us.

Spare parts can be purchased, as required, through your local dealer or by contacting Kelly Engineering Australia or in the United States, Hood & Company.

Kelly Engineering welcomes feedback. Should you have any difficulties that you wish to raise, suggestions for improvement or modifications that you feel would enhance our products we look forward to hearing from you.

# Australia Kelly Engineering

PO Box 100

**Booleroo Centre SA 5482** 

**Phone:** + 61 8 8667 2253 **Fax:** + 61 8 8667 2250

**Email:** sales@kellyengineering.com.au **Spare Parts:** parts@kellyengineering.com.au **Website:** www.kellyengineering.com.au

# United States Kelly Engineering

Website: www.kellyharrows.com

Spare Parts Hood & Company Inc Springfield MO

**Phone:** 417 865 2100 **Fax:** 417 865 2105

Email: hoodco@hoodco.com

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# Section 1 Unpacking

# We recommend that a crane and forklift truck be available for unloading and assembly

# Unpacking



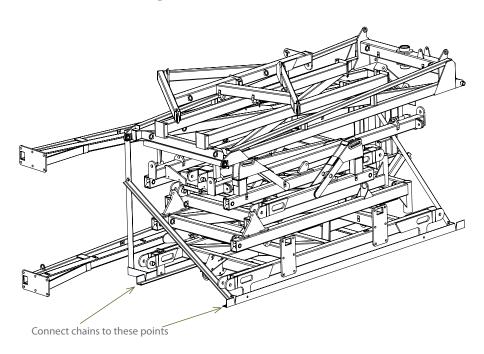
 Before opening shipping container inspect exterior for any damage. Remove seal and open container doors.

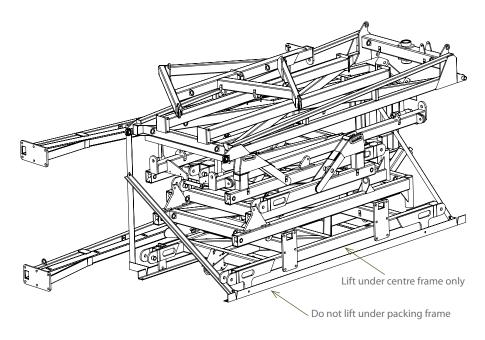


## **CAUTION**

Take care when opening doors as load may have shifted or restraints may have broken.

- Remove boxes from doorway of container one at a time using a forklift truck. Each box weighs approximately 2600 lbs (1200kg)
- Check strapping on each bundle before attempting to remove
- Attach chains to the packing frame using shackles and using suitable equipment (eg. fork-lift or tractor) drag framework bundles out of container. To move bundles away from front of container lift from side with forklift. Do not lift under angle iron frame, lift only under centre frame. Each bundle weighs approximately 7000 lb (3200 kg).











## **CAUTION**

Before cutting straps attach slings or chains and take the weight of the frames to avoid them slipping or falling and causing injury.

## **CAUTION**

Wear eye and hand protection when cutting straps. Sharp edges are exposed as straps separate and may cause injury.

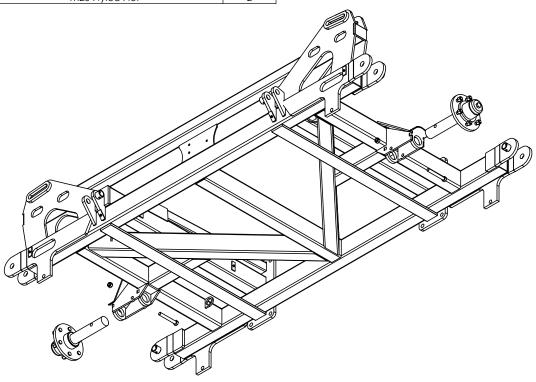
### CAUTION

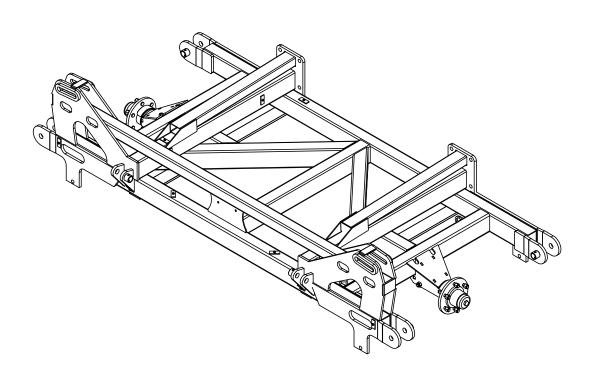
To avoid falling or moving components, before cutting straps attach slings or chains to individual pieces and only cut the straps holding the piece to be lifted.

- Remove boxes from rear of container one at a time using a forklift truck. Each box weighs approximately 2600 lbs (1200 kg)
- Cut straps holding bundles and separate parts and place in assembly area
- Identify parts for each machine by serial no. or description and separate. Open parts box and check that all parts are accounted for against checklist
- Once all parts have been identified machines are ready for assembly
- Read assembly instructions before proceeding.

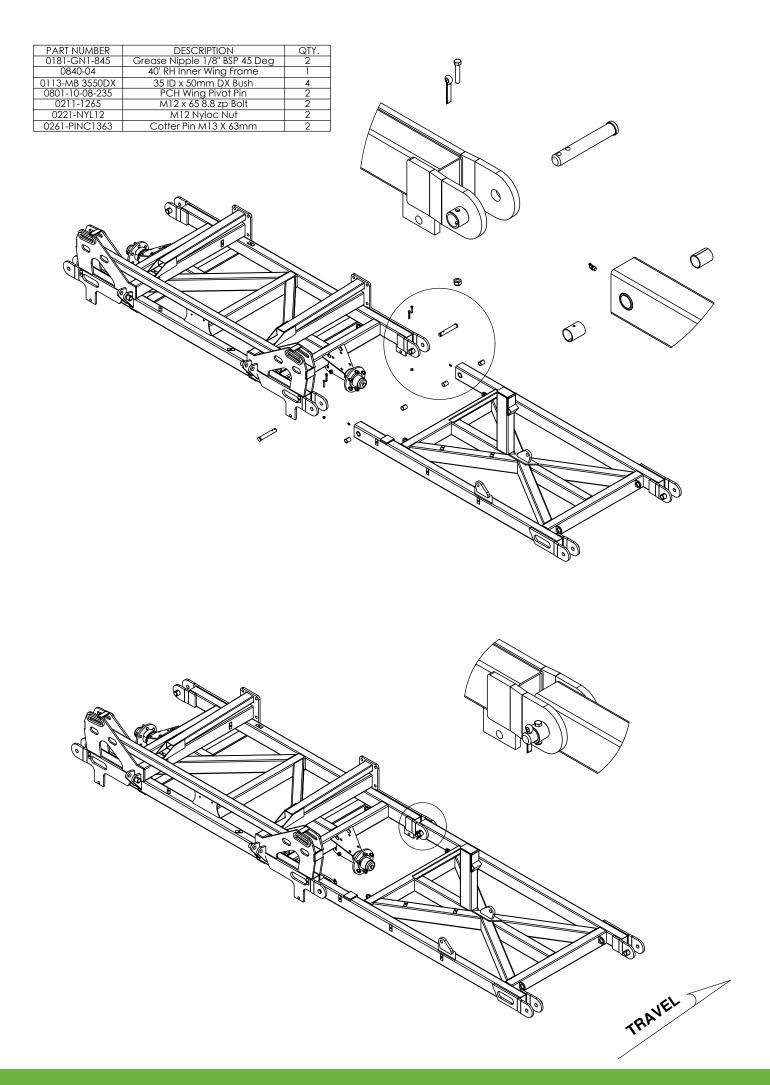
# Section 2 Parts

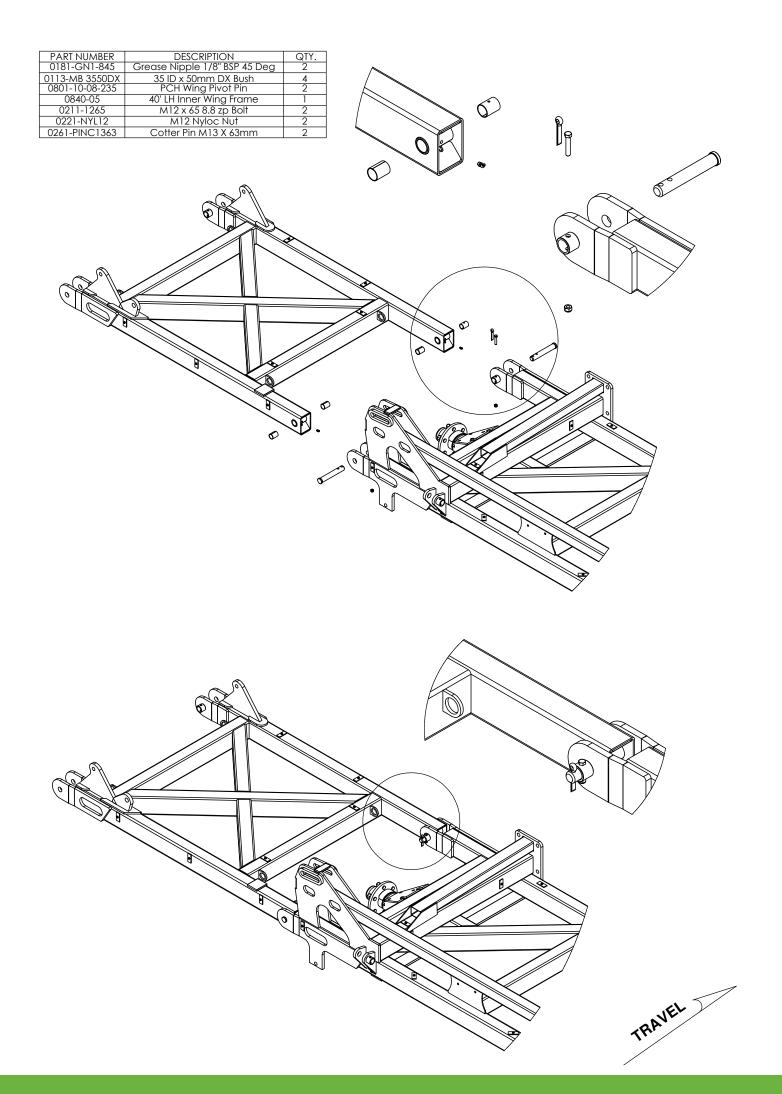
PART NUMBER	DESCRIPTION	QTY.
0840-01	40' Centre Frame	1
0733-SH275966205	2.75"R 6 Tonne on 205mm PCD Hub Complete	2
0211-20150	M20 x 150 8.8 zp Bolt	2
0221-NYI 20	M20 Nyloc Nut	2

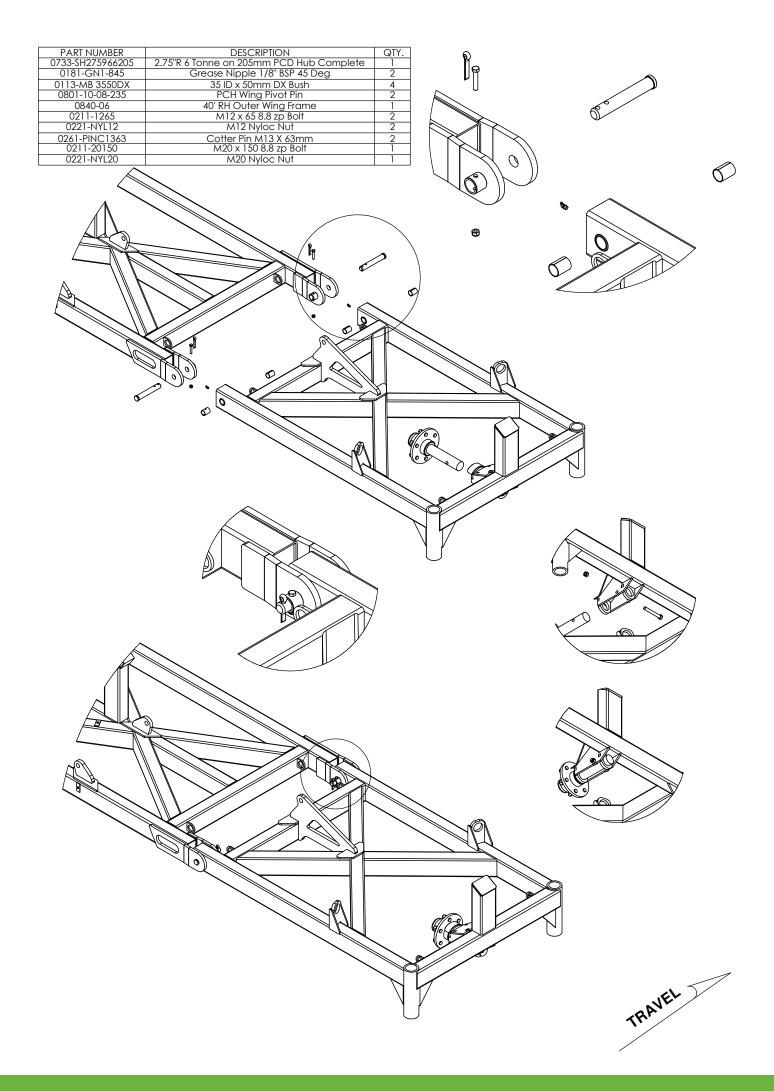


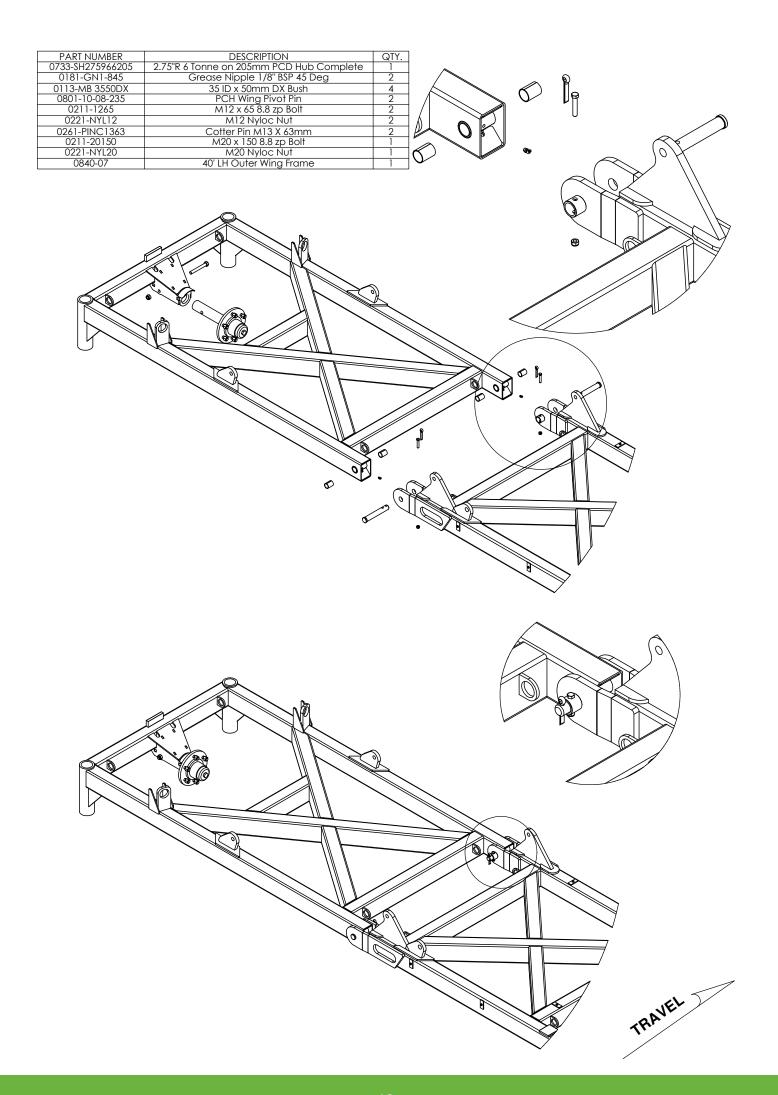


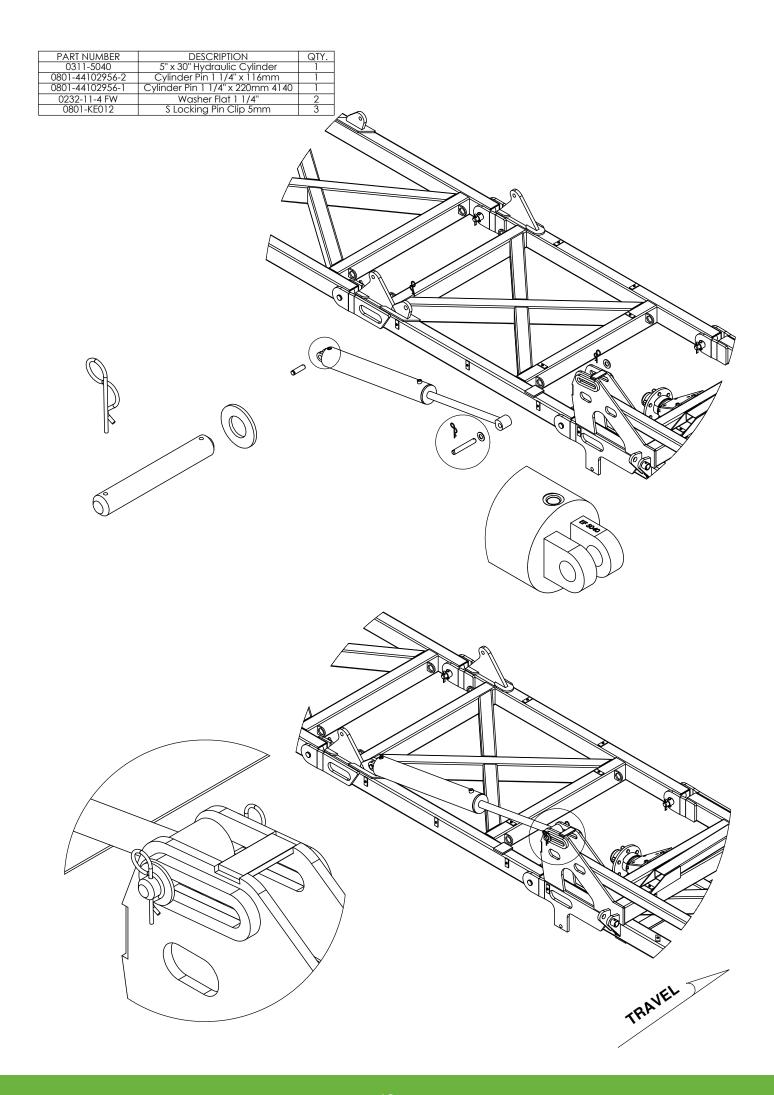


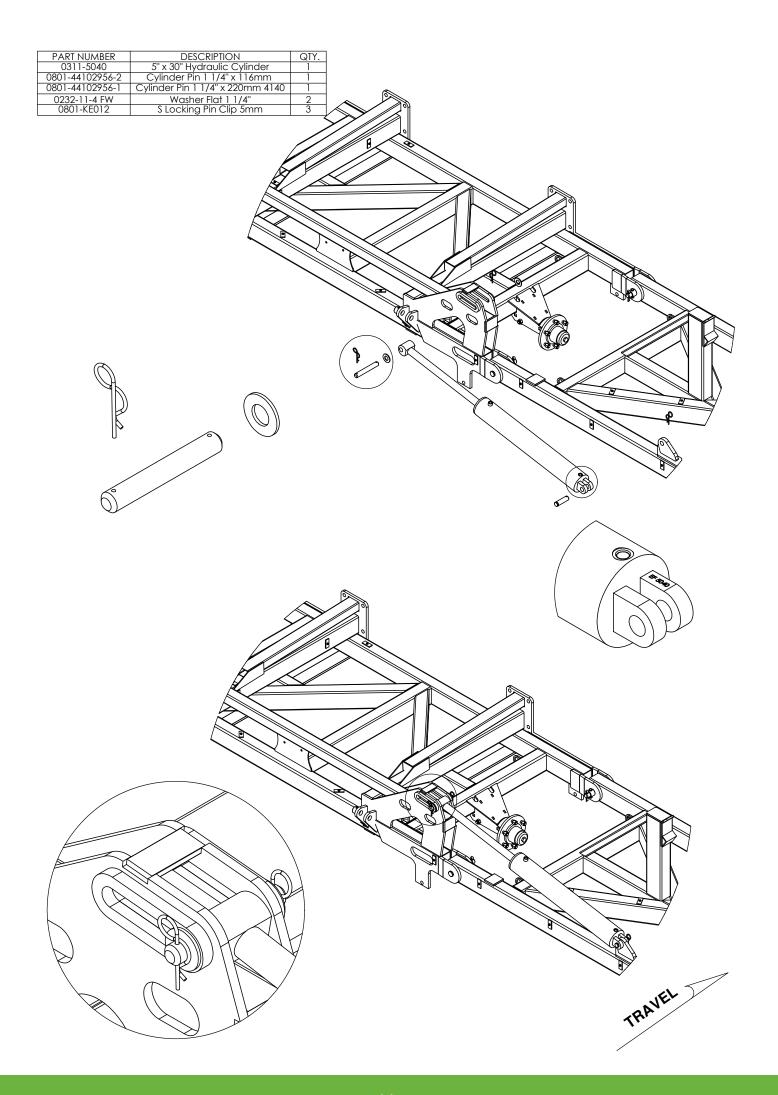




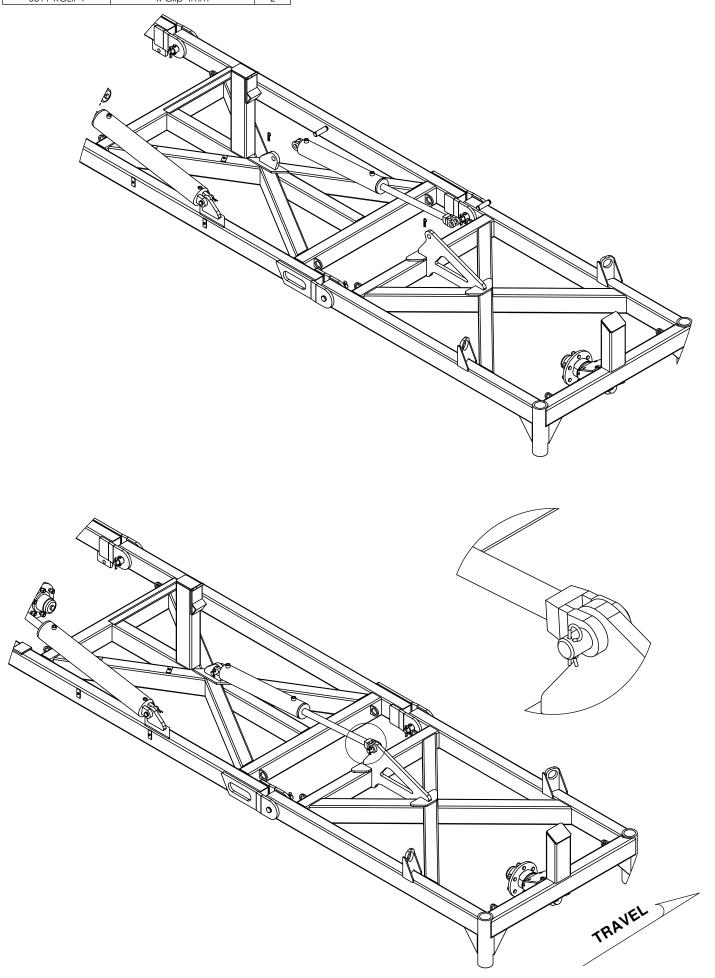


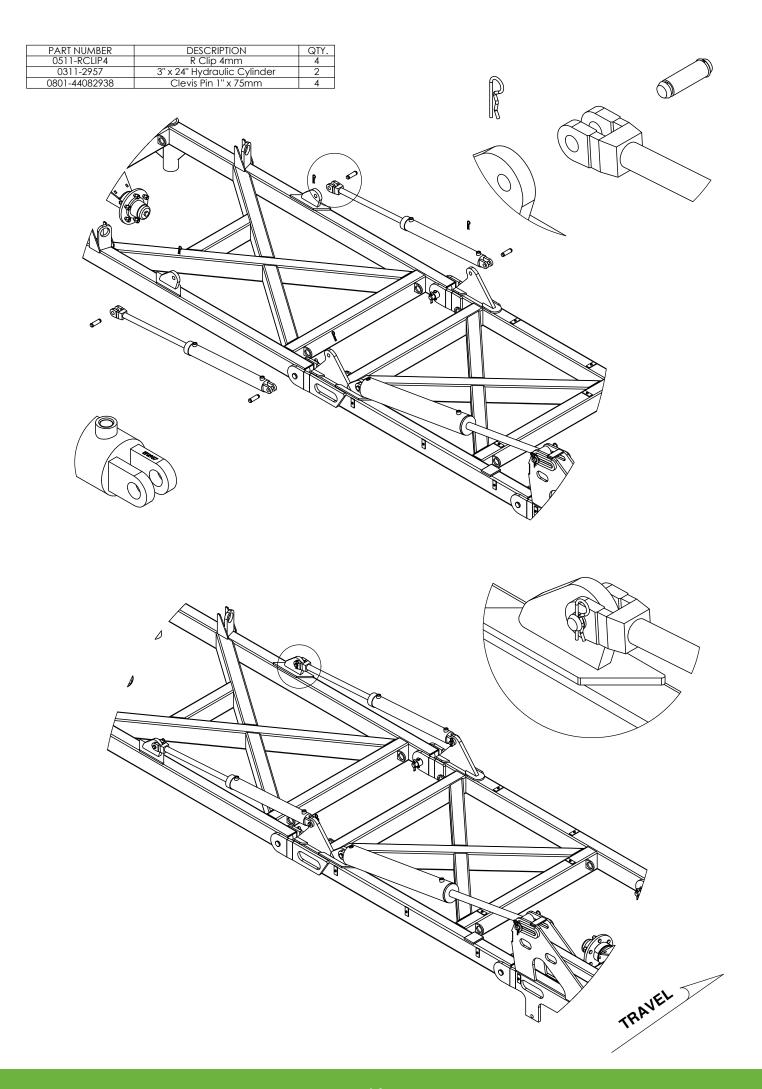




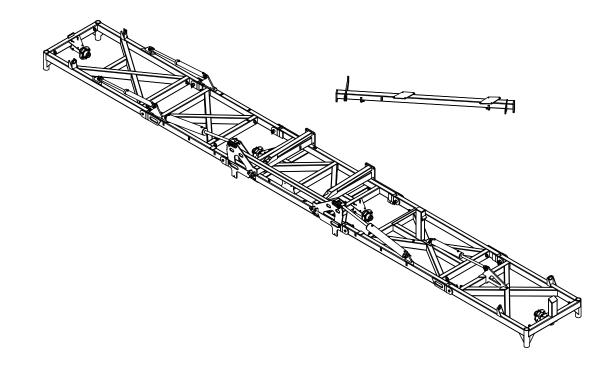


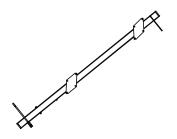
PART NUMBER	DESCRIPTION	QTY.
0801-44102956-2	Cylinder Pin 1 1/4" x 116mm	2
0311-3786	4" x 24" Hydraulic Cylinder	1
0511-RCHP4	R Clip 4mm	2

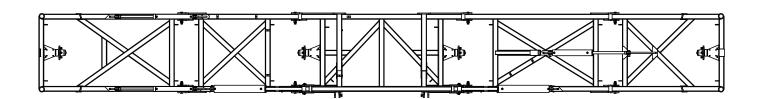




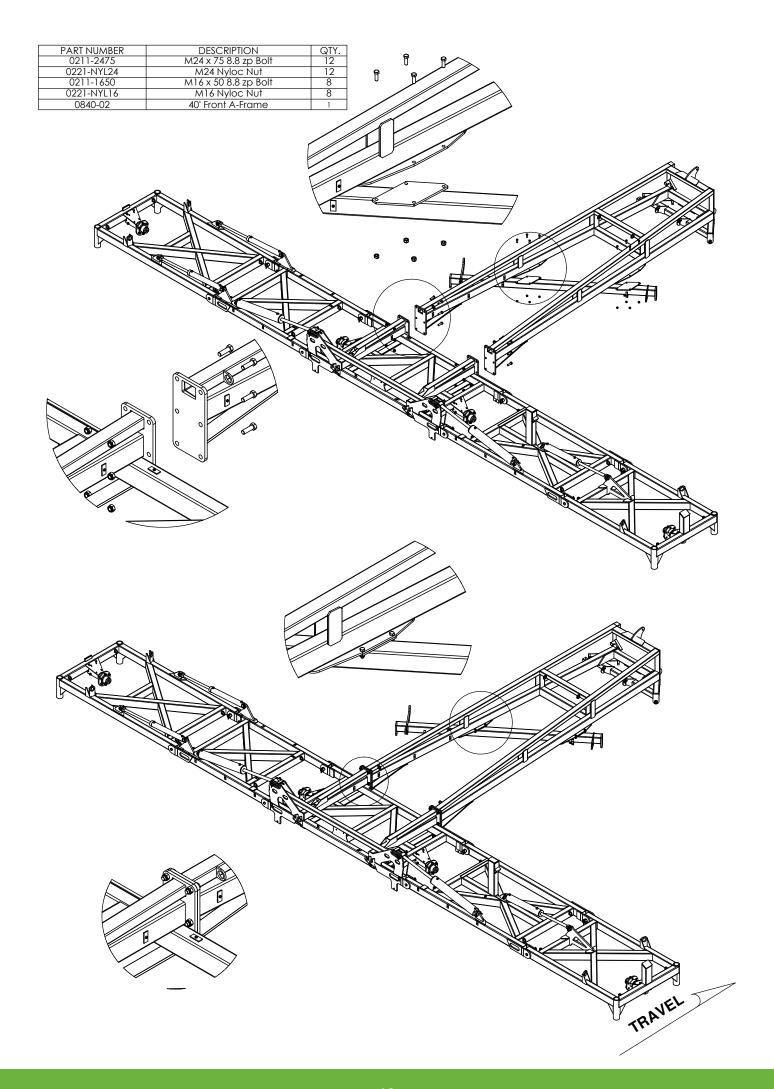
PART NUMBER	DESCRIPTION	QTY.
0810-28-40&45	40 & 45' Front Module	1



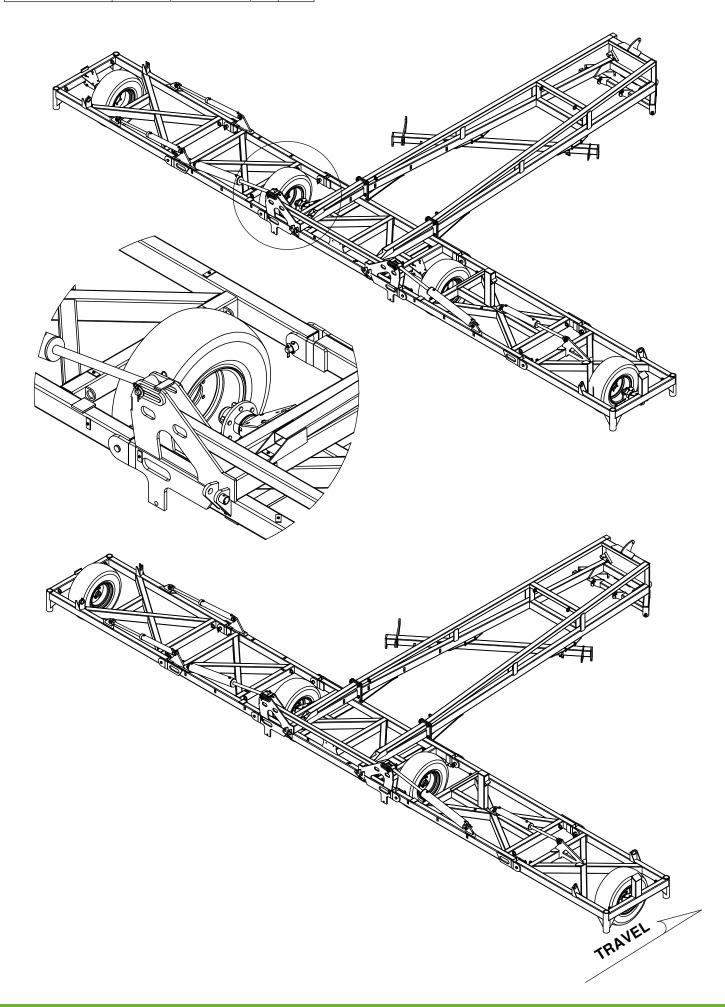


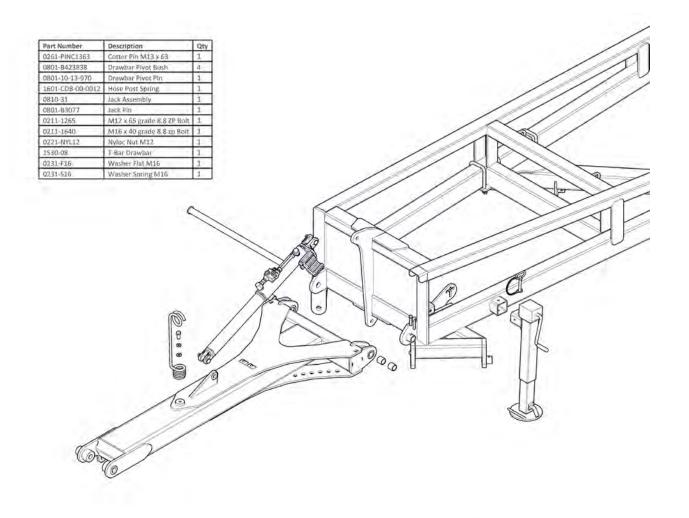


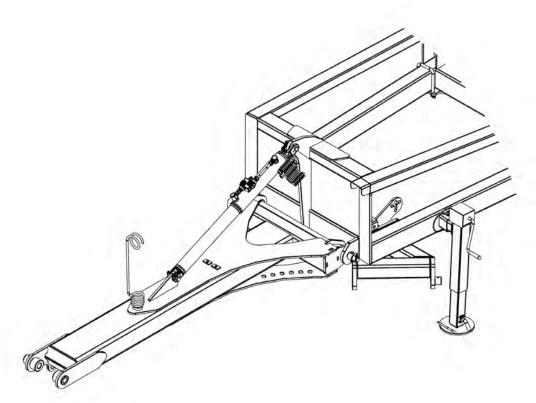
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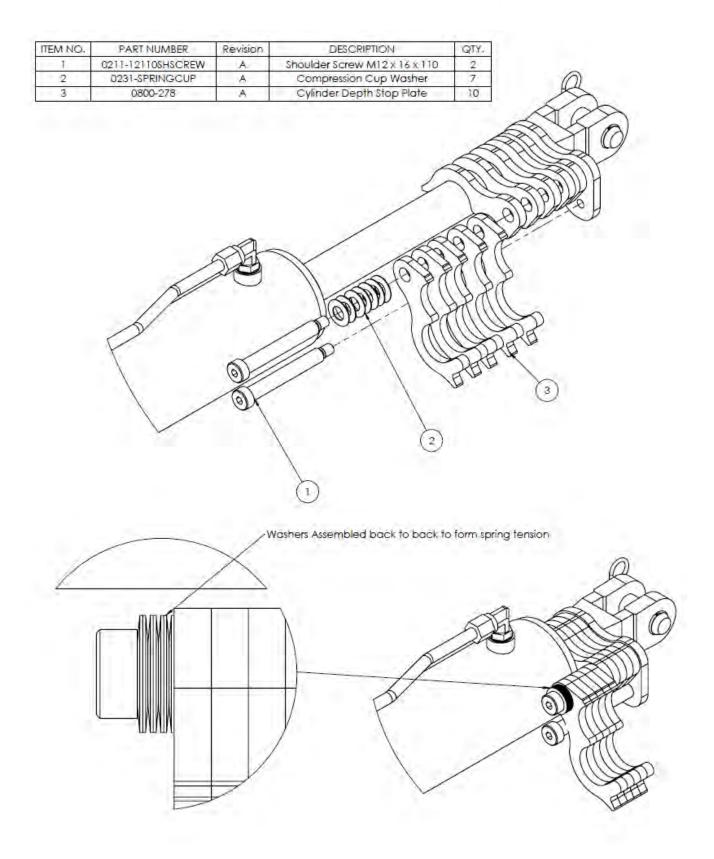
PART NUMBER	DESCRIPTION	QTY.
0751-15.0-70-18TR	15.0/70/18 Tyre and Rim Complete	4



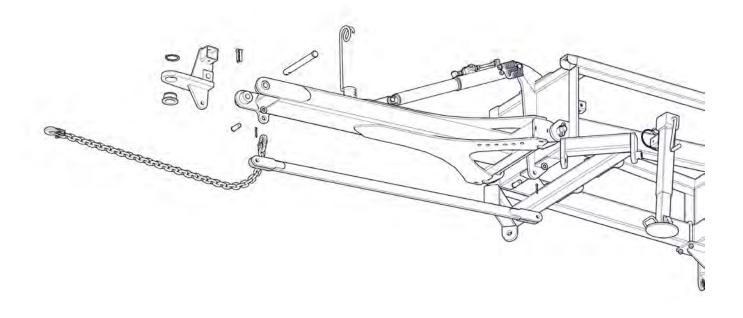


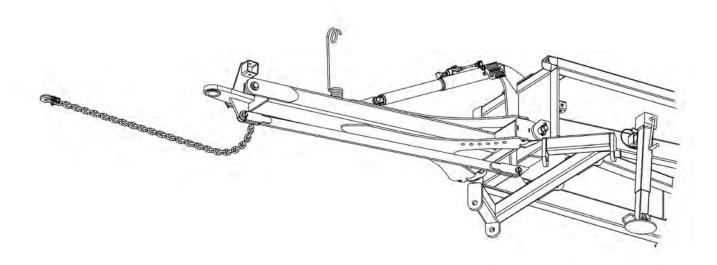


# **Front Cylinder Depth Stop**

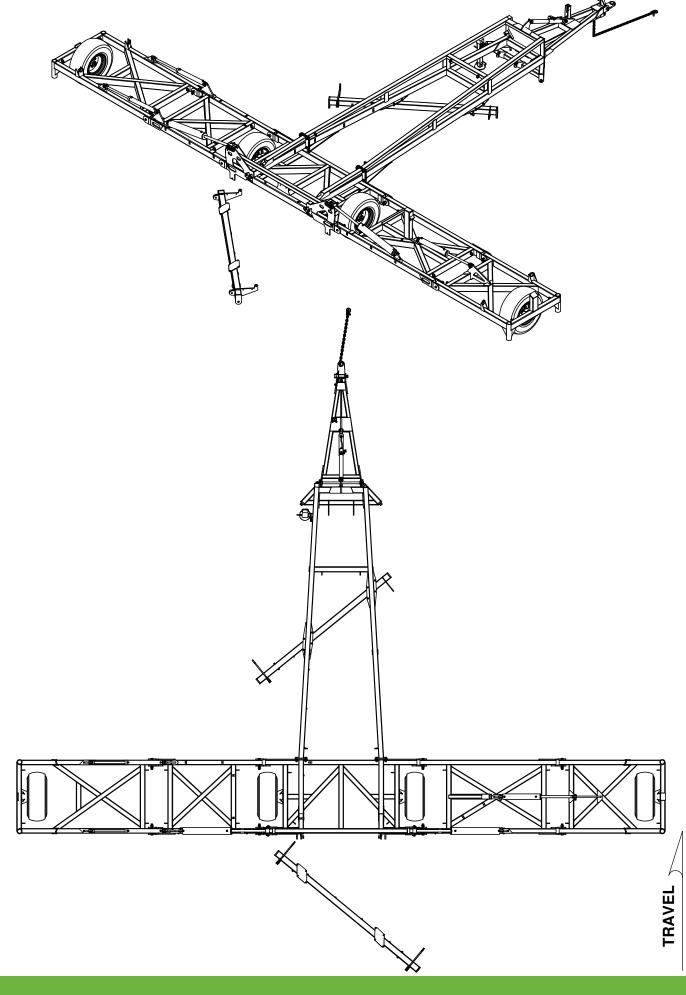


Part Number	Description	Qty
0172-D1400-0820	Criclip External 82mm	1
0211-1275	M12 x 75 grade 8.8 ZP Bolt	1
0221-NYL12	Nyloc Nut M12	1
0231-F24	Washer Flat M24	2
0261-PINC1363	Cotter Pin M13 x 63	1
0261-PINC650	Cotter Pin M6 x 50mm	2
0801-KE-0905-1-B	Hardened Tow Hitch Bush 2 1/4"	1
0801-KE0307-1	Clevis Pin 25mm x 75mm	2
0810-09	Tow Hitch	1
0810-16	Safety Chain Assembly	1
0810-22	Parallel Arm	1
1601-P35-370	Drawbar Tow Hitch Pin	1

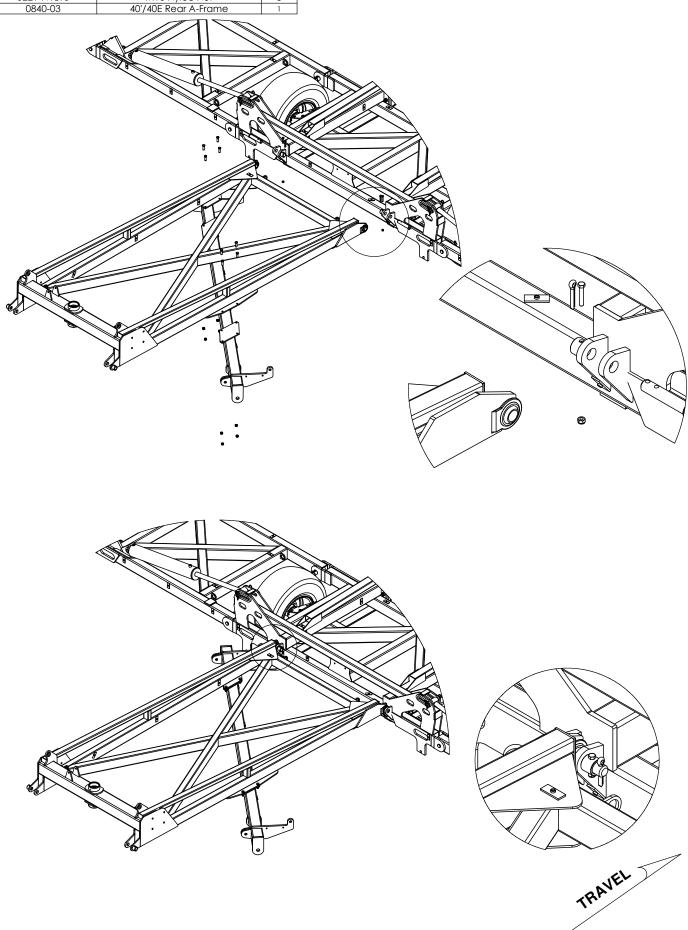




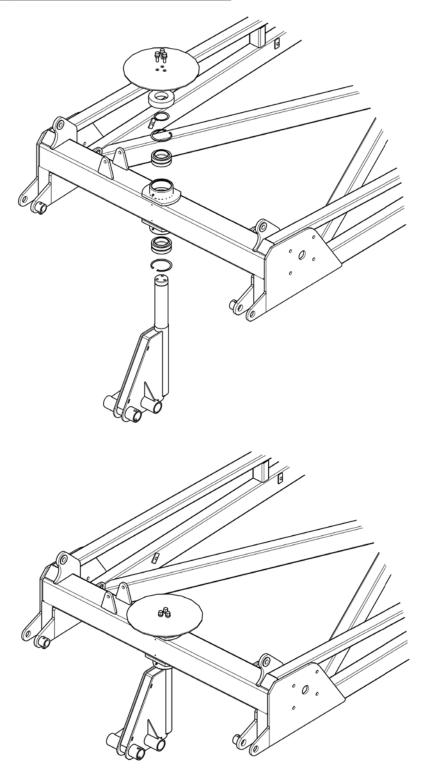
PART NUMBER	DESCRIPTION	QTY.
0810-29-40&45	40 & 45' Rear Module	1



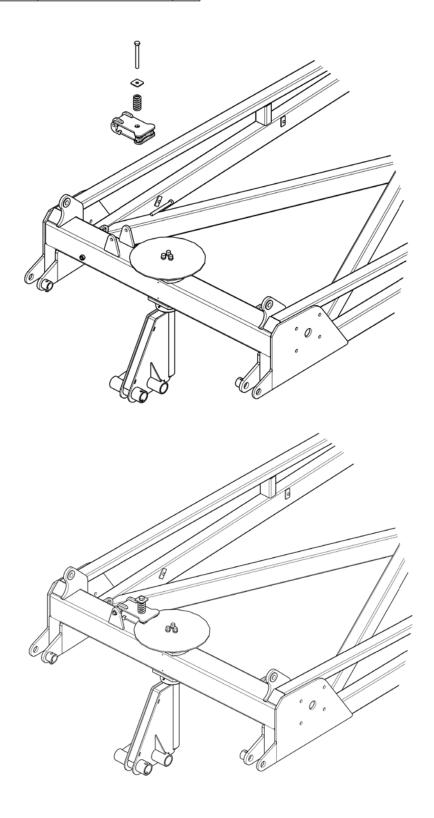
PART NUMBER	DESCRIPTION	QTY.
0801-10-08-175	Tail Frame Pivot pin	2
0211-1265	M12 x 65 8.8 zp Bolt	2
0221-NYL12	M12 Nyloc Nut	2
0261-PINC1363	Cotter Pin M13 X 63mm	2
0211-1650	M16 x 50 8.8 zp Bolt	8
0221-NYL16	M16 Nyloc Nut	8
0840-03	40'/40E Rear A-Frame	1



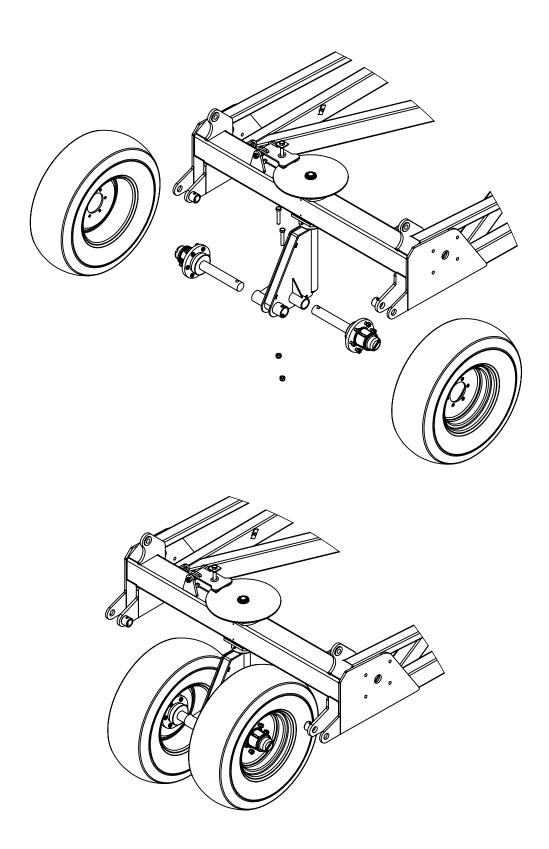
Item No.	Part Number	Description	Qty
1	0810-11-70	70mm Jockey Wheel	1
2	0216-WB1224	M12 x 24 Wheel Bolt	3
3	1600-405	Brake Disc	1
4	1601-DC7013535	Bolt on Brake Disc Dust Cap 70 ID x 135 OD x 35	1
5	0113-GE70DO-2RS	Plain Spherical Bearing 70mm	2
6	0172-D1400-70	Circlip External 70mm	1
7	0171-J105	Circlip Internal 105mm	2



Item No.	Part Number	Description	Qty
1	0810-12CAL	Jockey Wheel Brake Caliper	1
2	0801-KE009	Brake Compression Spring	1
3	0231-SQ16505	Washer Square M16 x 50 x 5	1
4	0211-16150	M16 x 150 grade 8.8 zp Bolt	2
5	0221-NYL16	Nyloc Nut M16	1



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	0211-1690	M16 x 90 grade 8.8 zp Bolt	2
2	0221-NYL16	Nyloc Nut M16	2
3	0733-K5083T66S	Axle 2"R 3T 6 on 6" PCD 330 OHF	2
4	0751-11L15	11L15 F3 Tyre on 6 on 6" Stud Rim	2

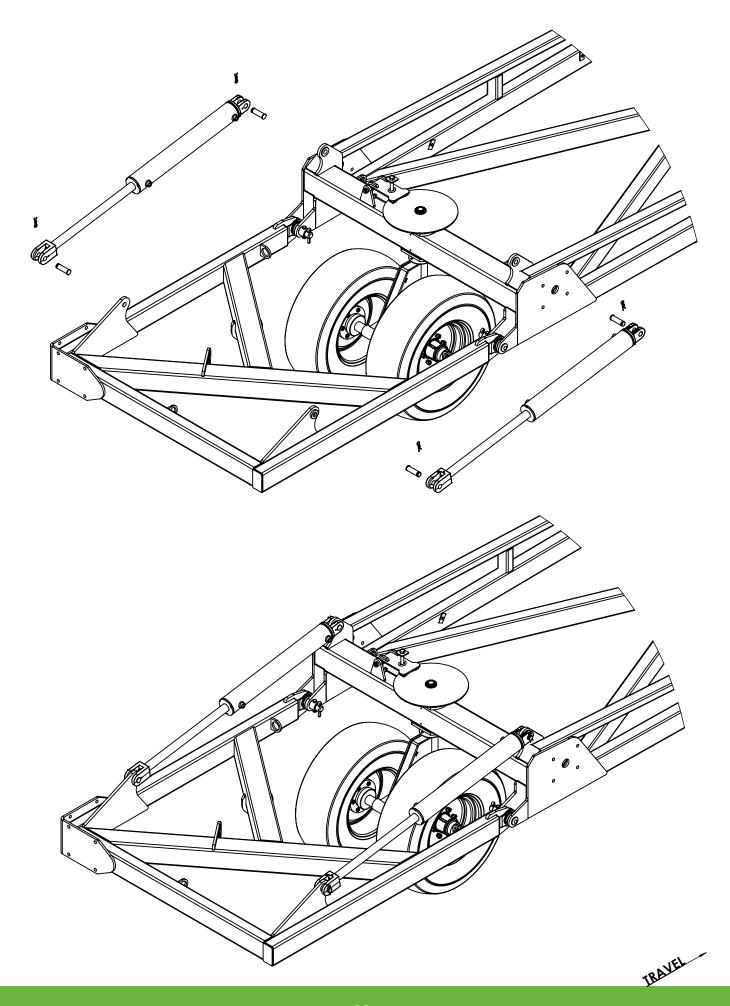




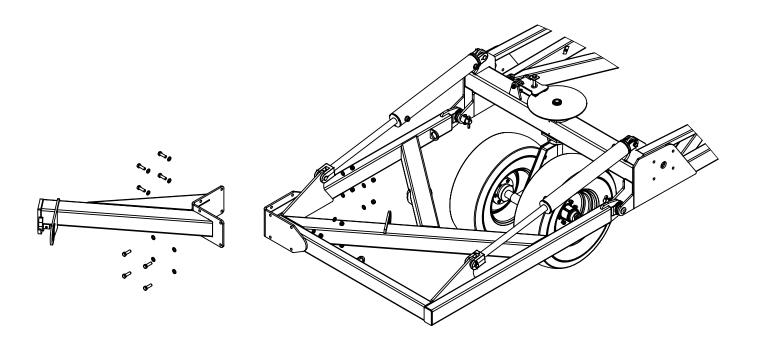
ITEM NO.   PART NUMBER   1   0211-1265   2   0221-NYL12   3   0261-PINC1363   4   0801-10-08-175   5   0810-10E	DESCRIPTION M12 x 65 grade 8.8 ZP Bolt Nyloc Nut M12 Cotter Pin M13 x 63 Tail Frame Pivot pin Extended Tip Rear Tail	QTY. 2 2 2 2 2	<b>*</b>

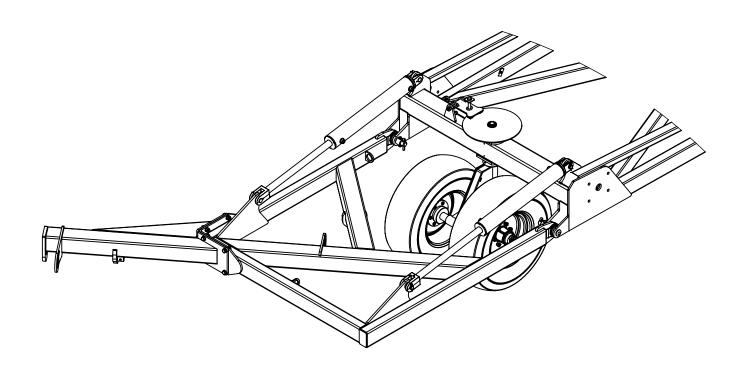


ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	0311-3524SP	3.5" Bore 24" Stroke 1.75" Rod Hydraulic Cylinder	2



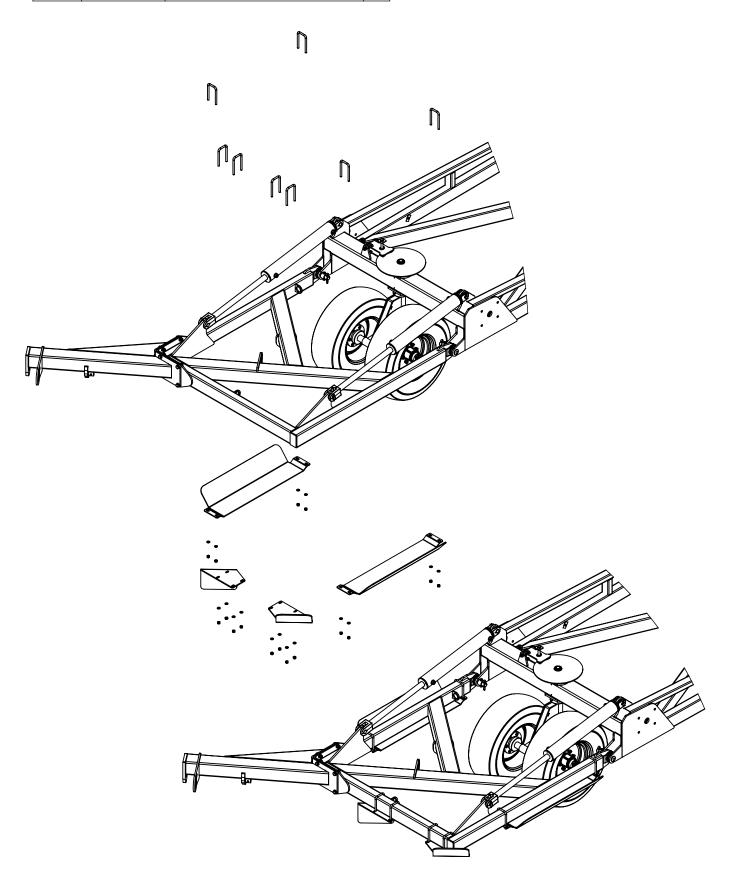
ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	0211-1650	M16 x 50 grade 8.8 zp Bolt	8
2	0221-NYL16	Nyloc Nut M16	8
3	0231-F16	Washer Flat M16	16
4	0810-10ET	Extended Tip Tail Bolt On Tip	1

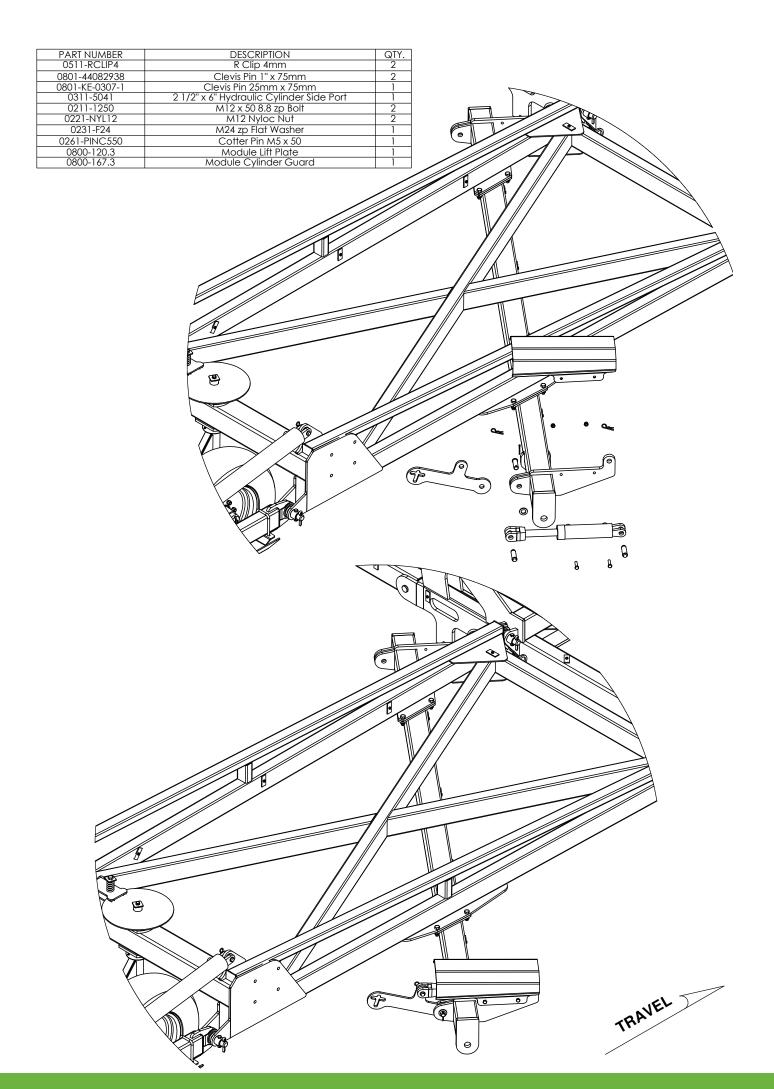






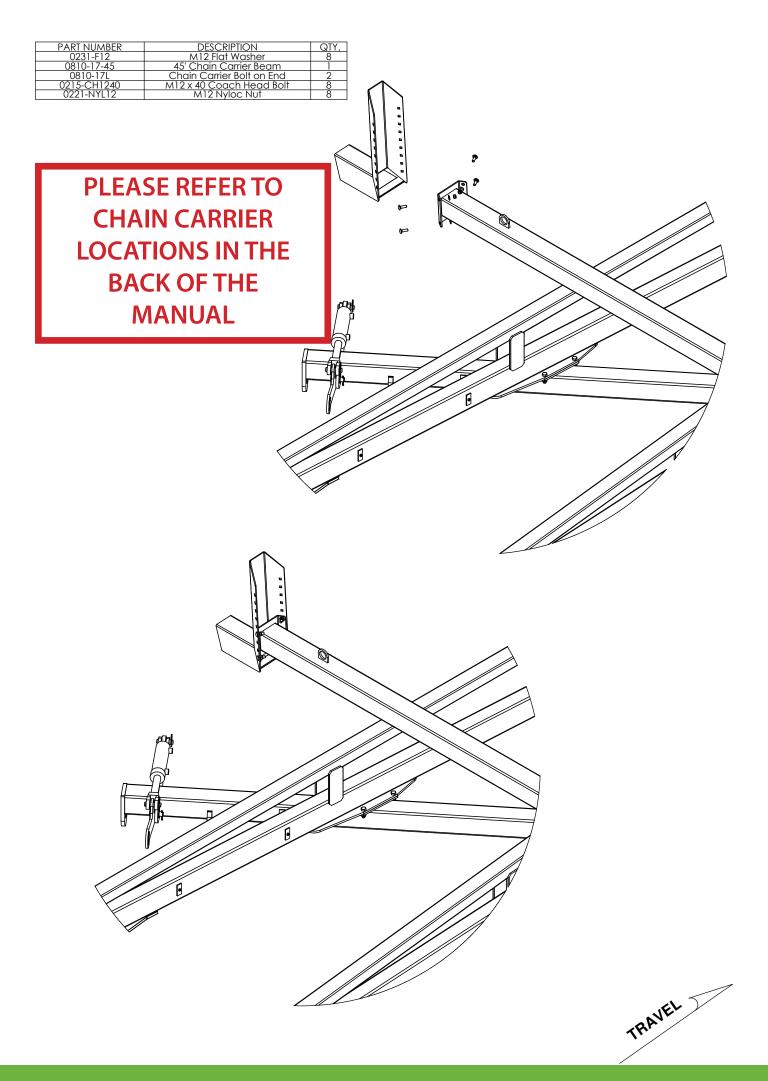
ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	0221-NYL12	Nyloc Nut M12	16
2	0231-F12	Washer Flat M12	16
3	0271-1215577	U-Bolt M12 x 155 Deep x 77 Wide	8
4	0800-220.1	Tail Chain Stop Guard	1
5	0800-235	Rear Tail Guard	2
6	0800-498	Angled Chain Gaurd	1

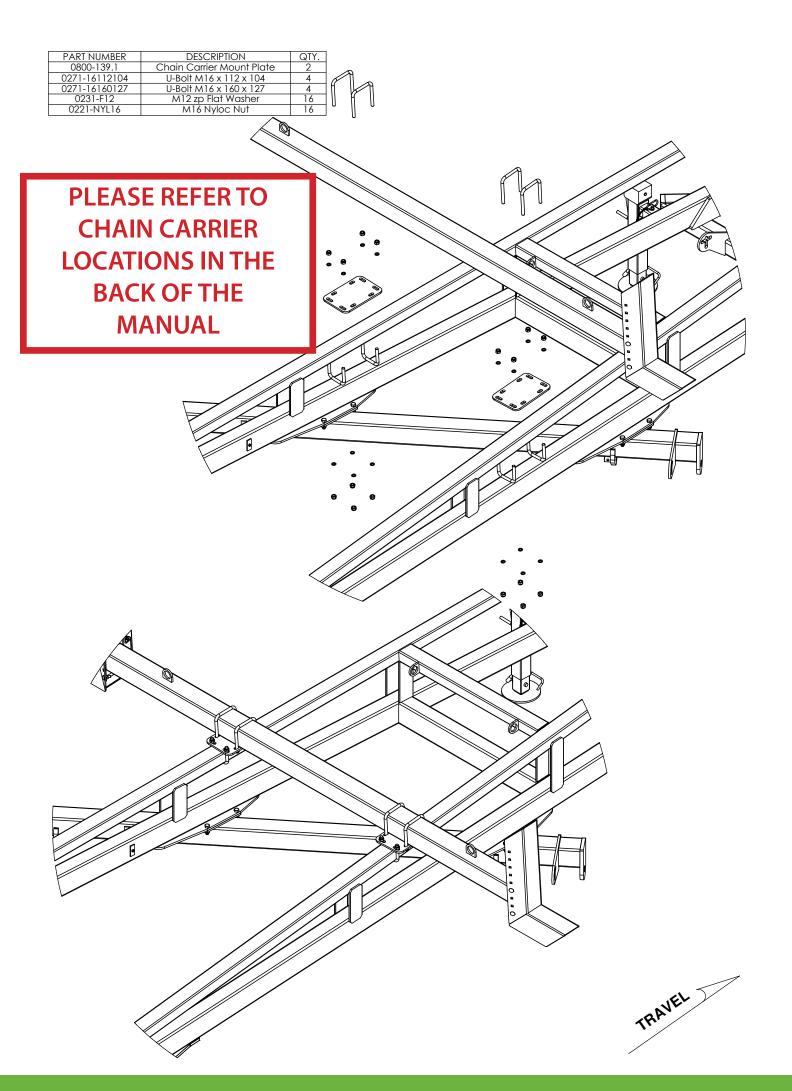


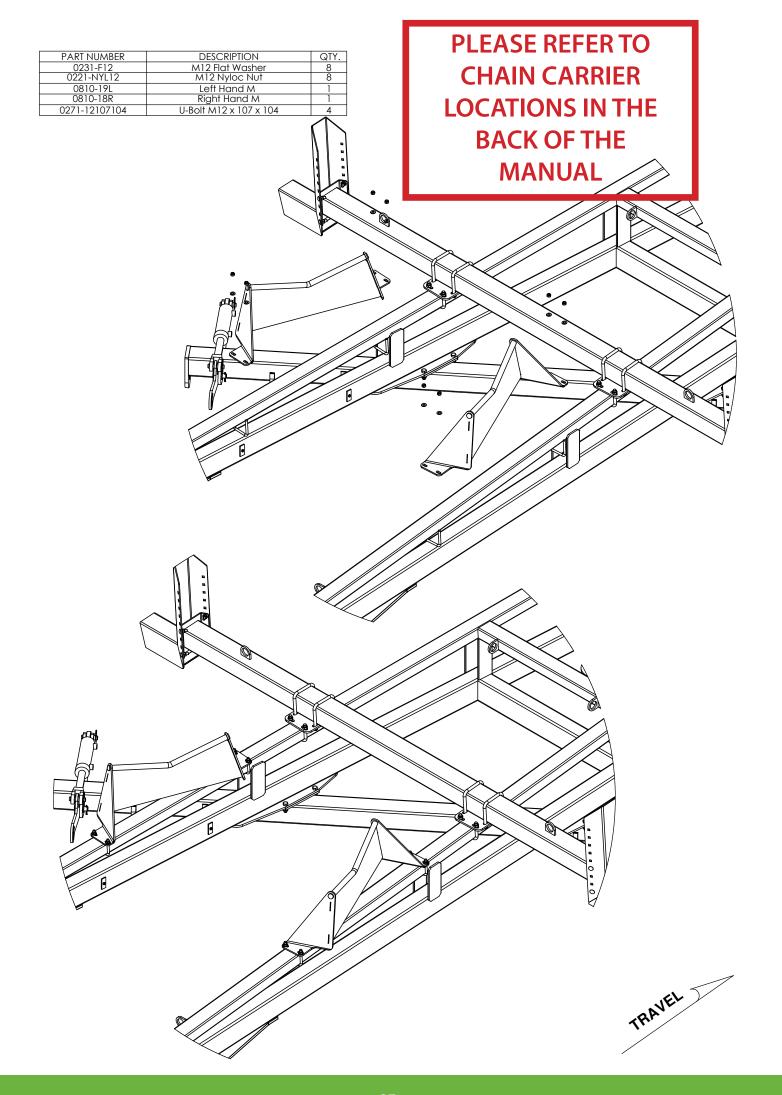


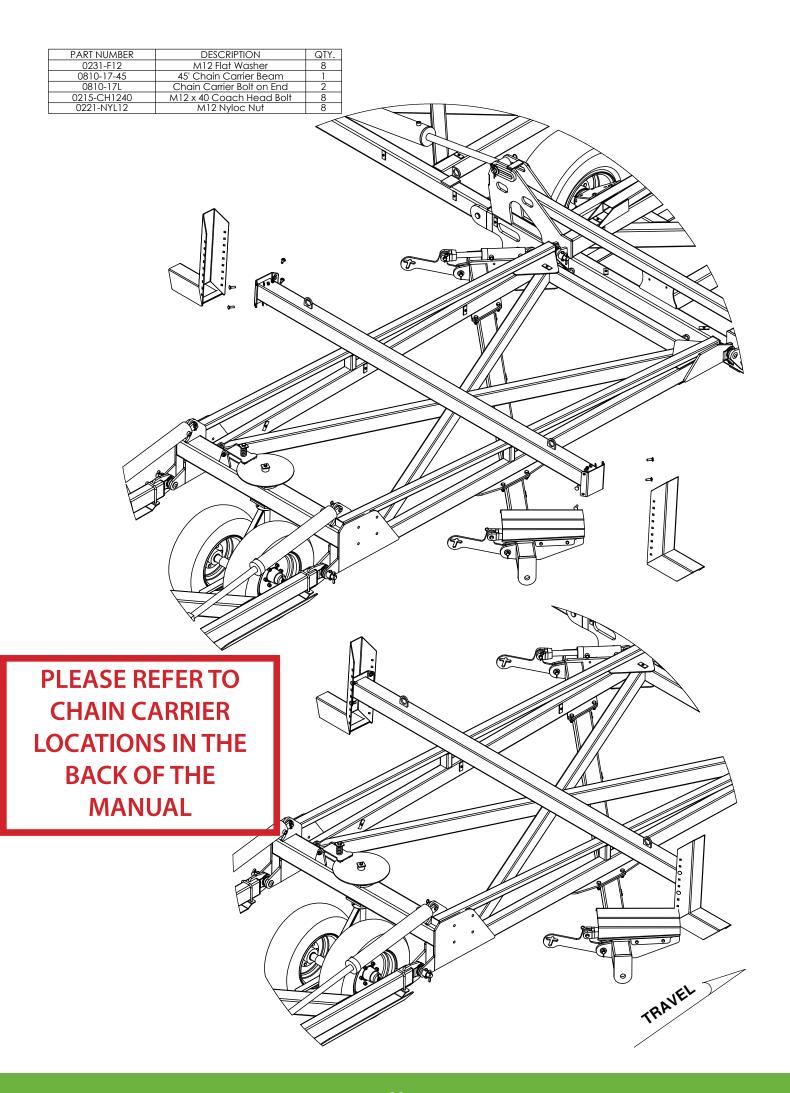
PART NUMBER 0511-RCLIP4	DESCRIPTION R Clip 4mm	QTY.
0801-44082938 0801-KE-0307-1 0311-5041 0231-F24	Clevis Pin 1" x 75mm Clevis Pin 25mm x 75mm 2 1/2" x 6" Hydraulic Cylinder Side Po M24 zp Flat Washer	
0801-KE-030/-1 0311-5041	2 1/2" x 6" Hydraulic Cylinder Side Po	
0231-F24	M24 zp Flat Washer	
0261-PINC550 0800-120.3	Cotter Pin M5 x 50 Module Lift Plate	
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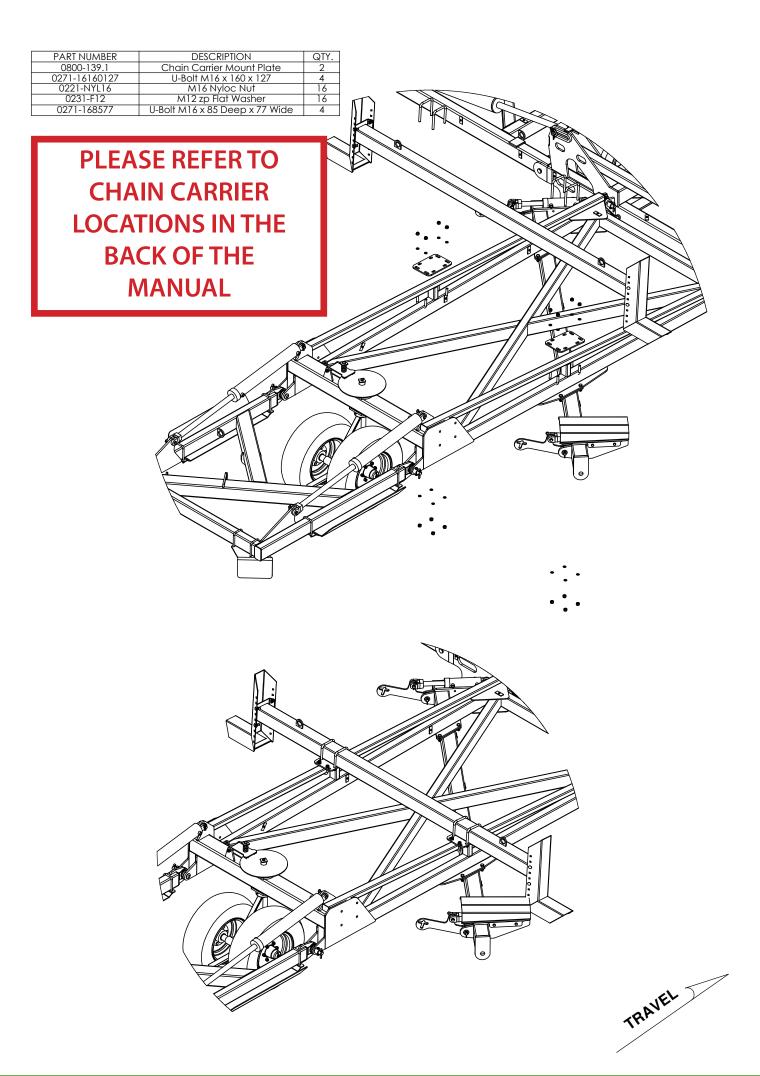
PART NUMBER         DESCRIPTION         QTY.           0511-RCLIP4         R Clip 4mm         2           0801-44082938         Clevis Pin 1" x 75mm         2	
0801-44082938         Clevis Pin 1" x 75mm         2           0801-KE-0307-1         Clevis Pin 25mm x 75mm         1           0311-5041         2 1/2" x 6" Hydraulic Cylinder Side Port         1           0231-F24         M24 zp Flat Washer         1	
0231-F24	
0261-PINC550         Cotter Pin M5 x 50         1           0800-120.3         Module Lift Plate         1	
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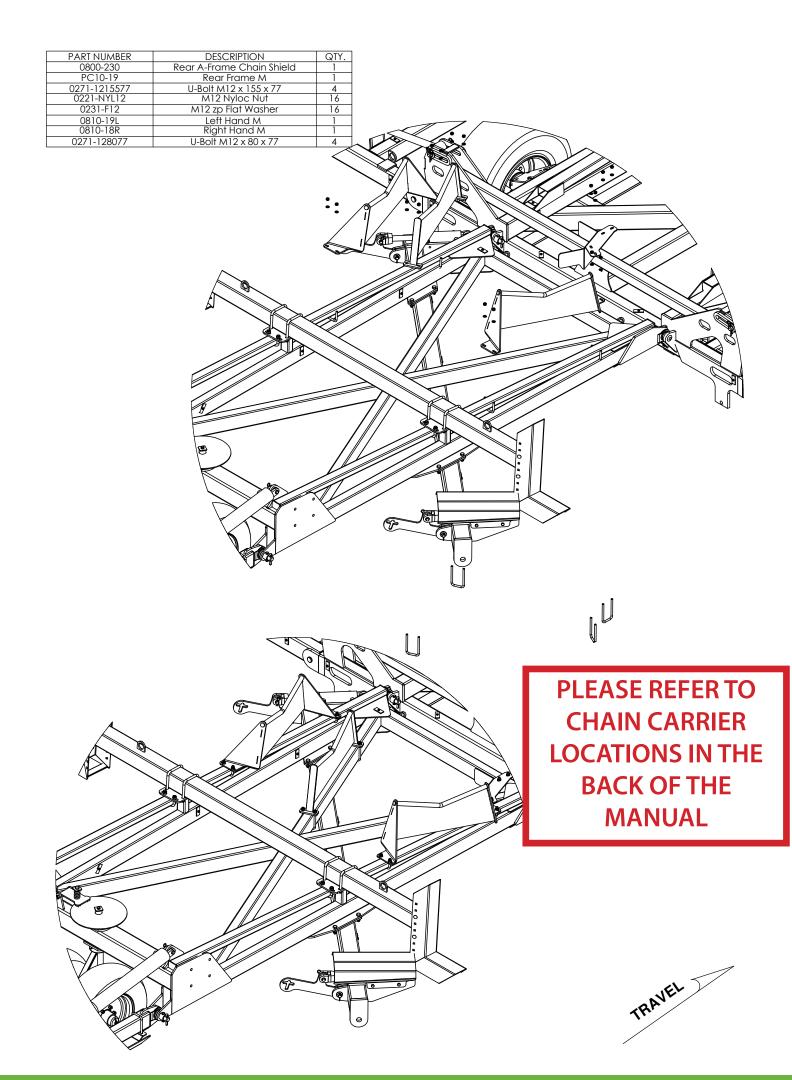






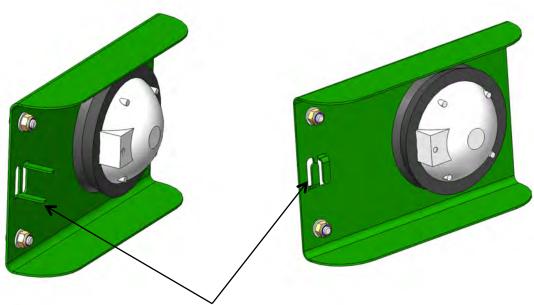




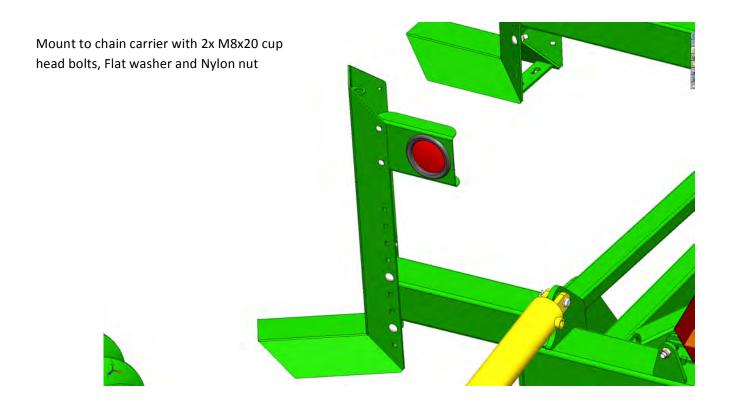


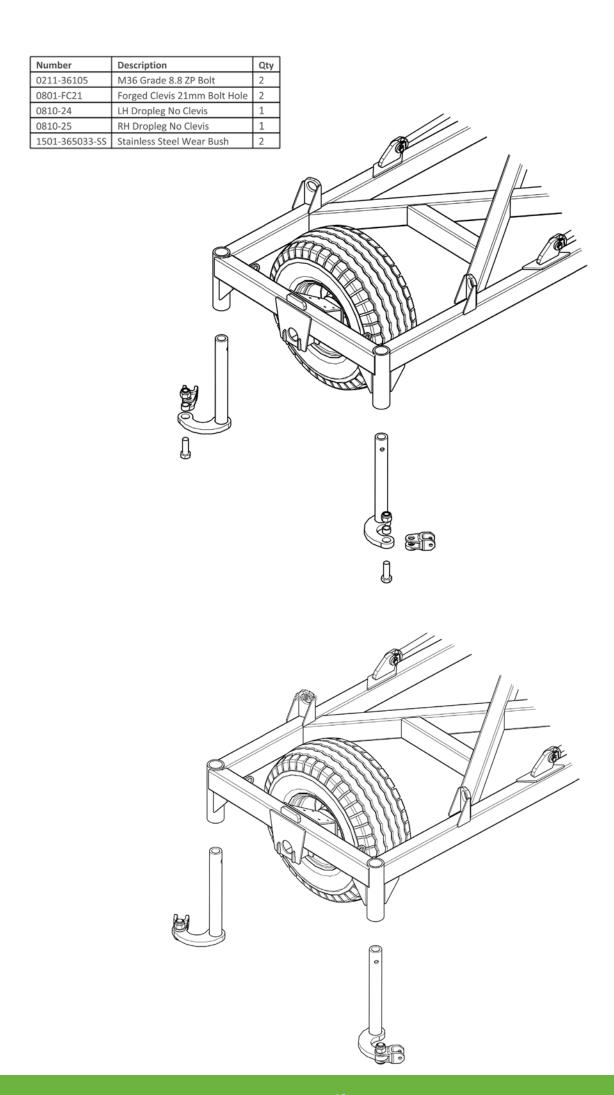
PART NUMBER         DESCRIPTION         QTY.           0810-109R         RH Outrigger With OS Sign Frame         1           0810-109L         LH Outrigger With OS Sign Frame         1           0231-F12         M12 Flat Washer         8           0810-17L         Chain Carrier Bolt on End         2           0211-1650         M16 x 50 8.8 zp Bolt         8           0221-NYL16         M16 Nyloc Nut         8           0215-CH1240         M12 x 40 Coach Head Bolt         8           0221-NYL12         M12 Nyloc Nut         8	<b>A</b>
	TRAVEL

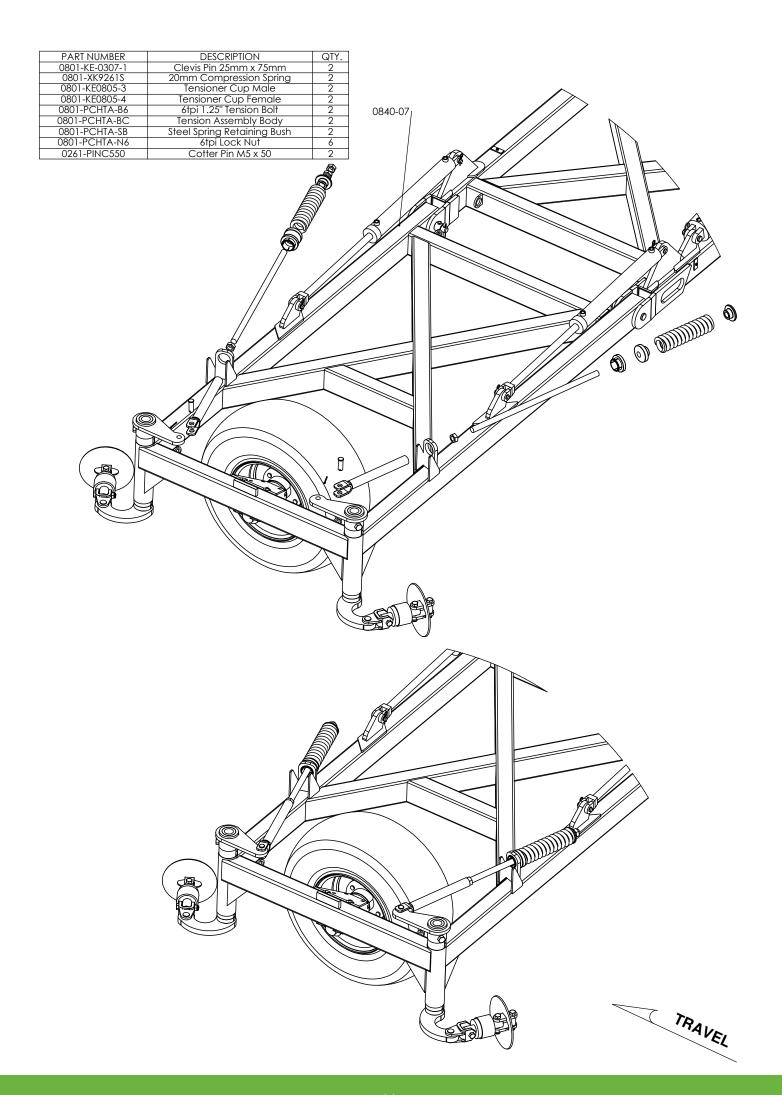
# **Rear Light Bracket**



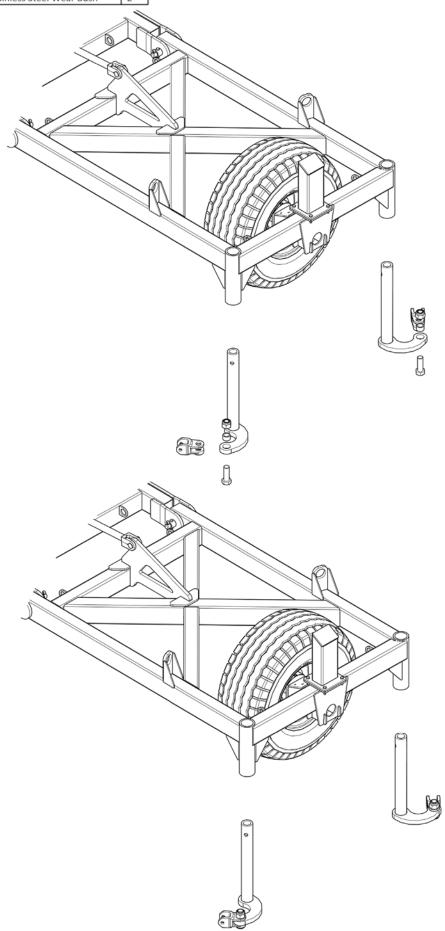
Please ensure to bend tabs up and feed wire through, so the light cable is secure



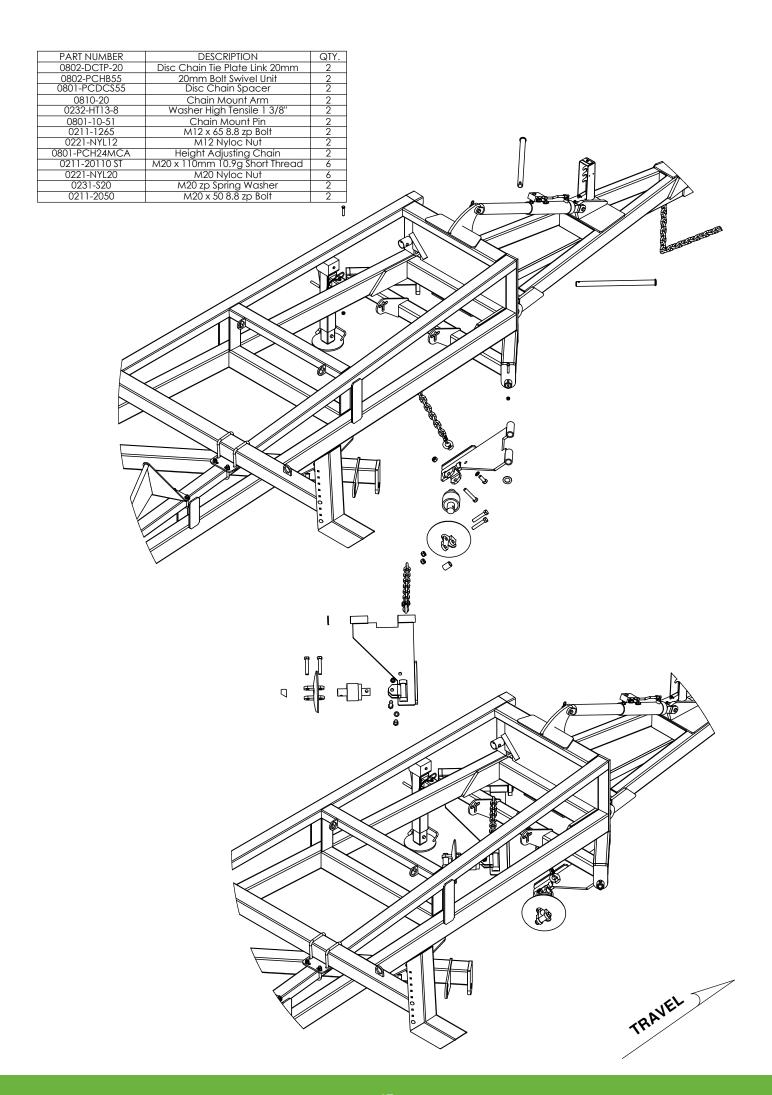


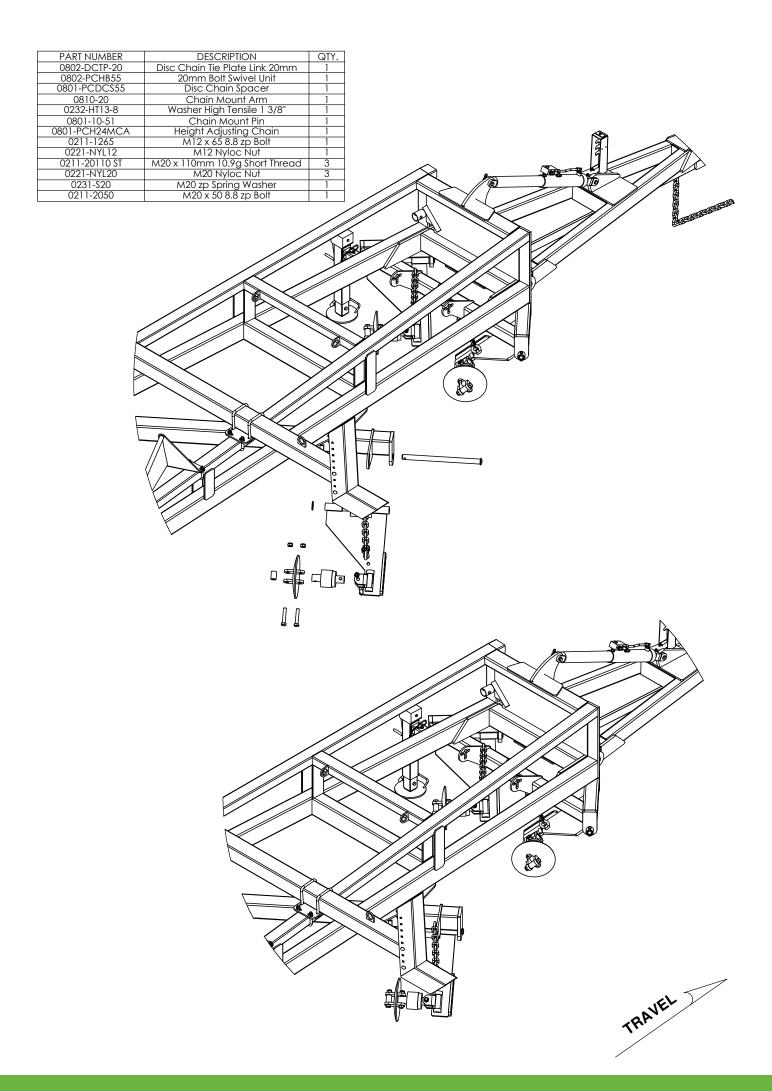


Number	Description	Qty
0211-36105	M36 Grade 8.8 ZP Bolt	2
0801-FC21	Forged Clevis 21mm Bolt Hole	2
0810-24	LH Dropleg No Clevis	1
0810-25	RH Dropleg No Clevis	1
1501-365033-SS	Stainless Steel Wear Bush	2



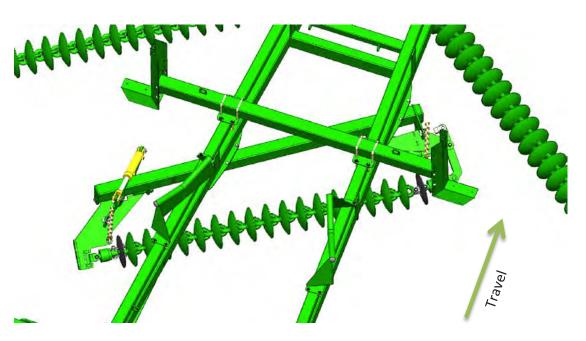
PART NUMBER	
	DESCRIPTION QTY.
0801-KE-0307-1	Clevis Pin 25mm x 75mm 2
0801-XK9261S 0801-KE0805-3	20mm Compression Spring 2 Tensioner Cup Male 2
0801-KE0805-4	Tensioner Cup Female 2
0801-PCHTA-B6 0801-PCHTA-BC	6tpi 1.25" Tension Bolt 2
0801-PCHTA-SB	Tension Assembly Body 2 Steel Spring Retaining Bush 2
0801-PCHTA-N6	6tpi Lock Nut 6
0261-PINC550	Cotter Pin M5 x 50 2
A	Steel Spring Retaining Bush 2 6tpi Lock Nut 6 Cotter Pin M5 x 50 2
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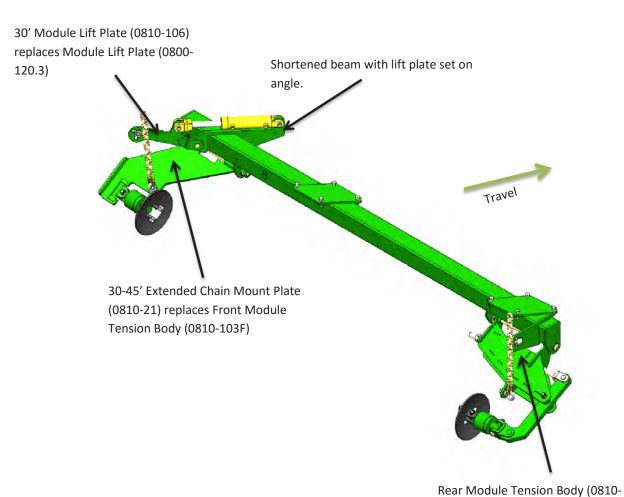


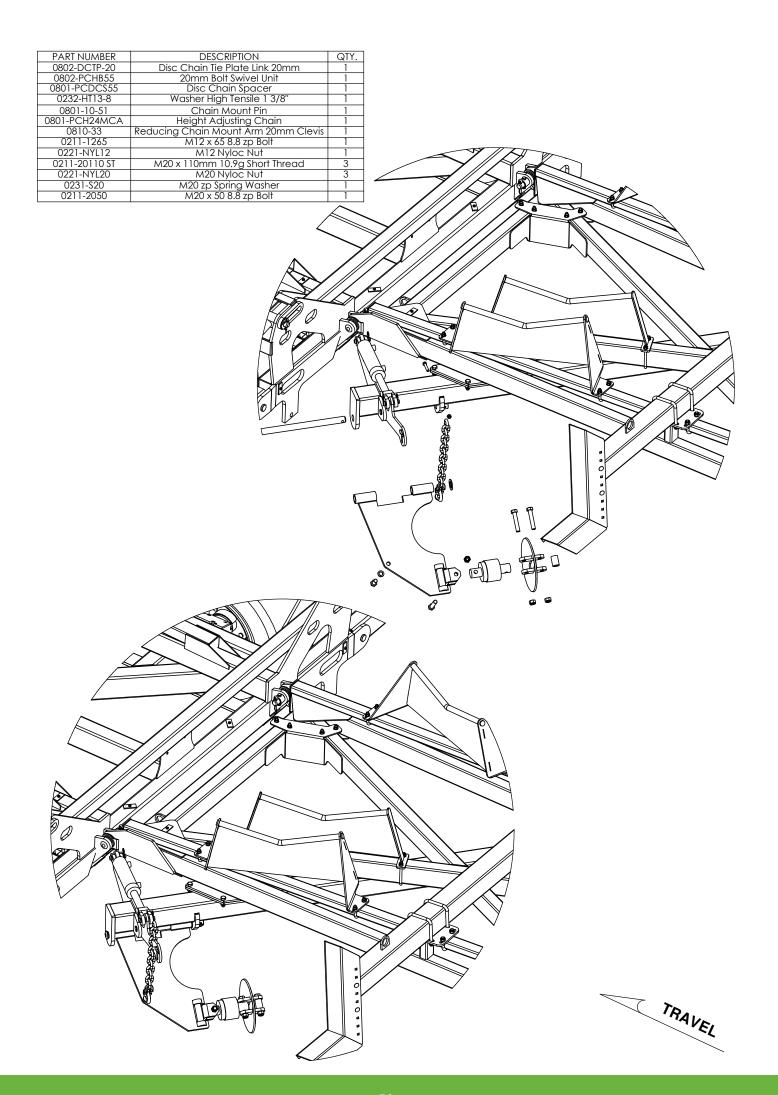


## **Front Module Change**

#### **Front Module**

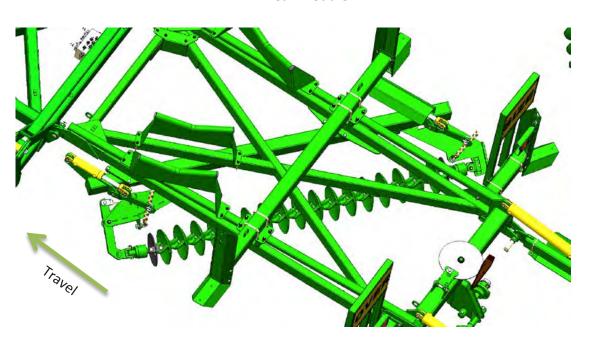


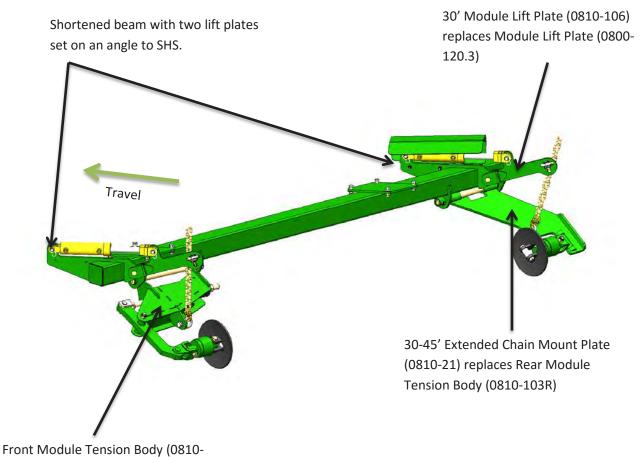




## **Rear Module Change**

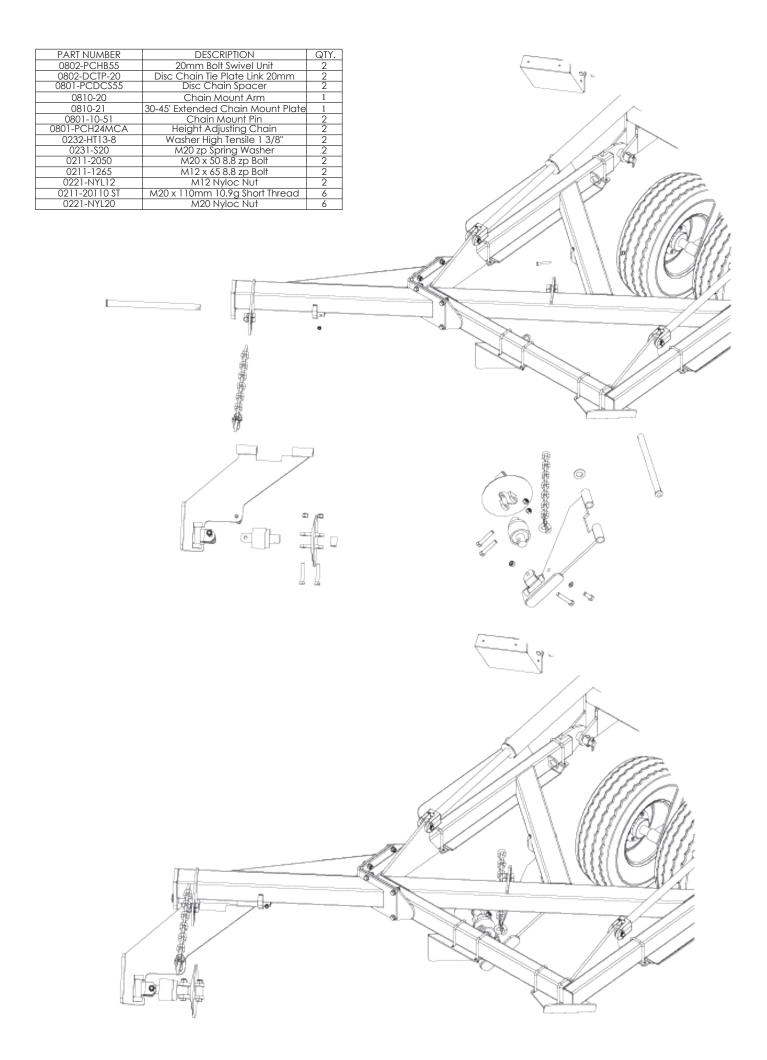
#### **Rear Module**

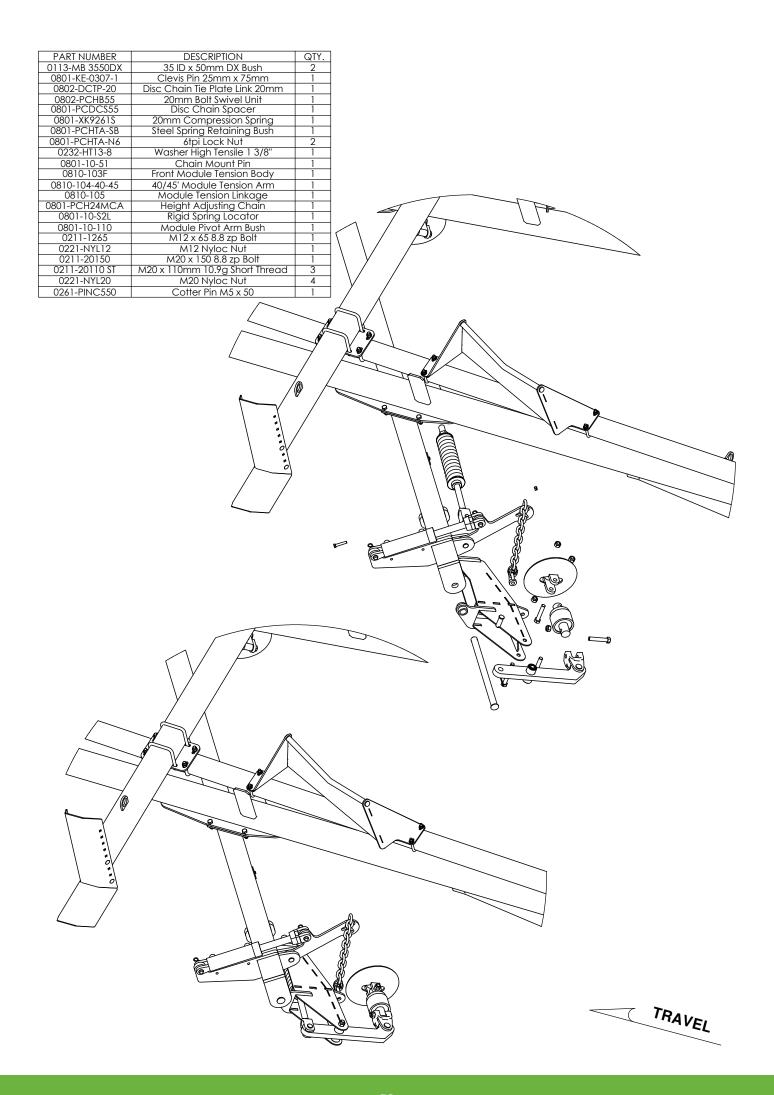


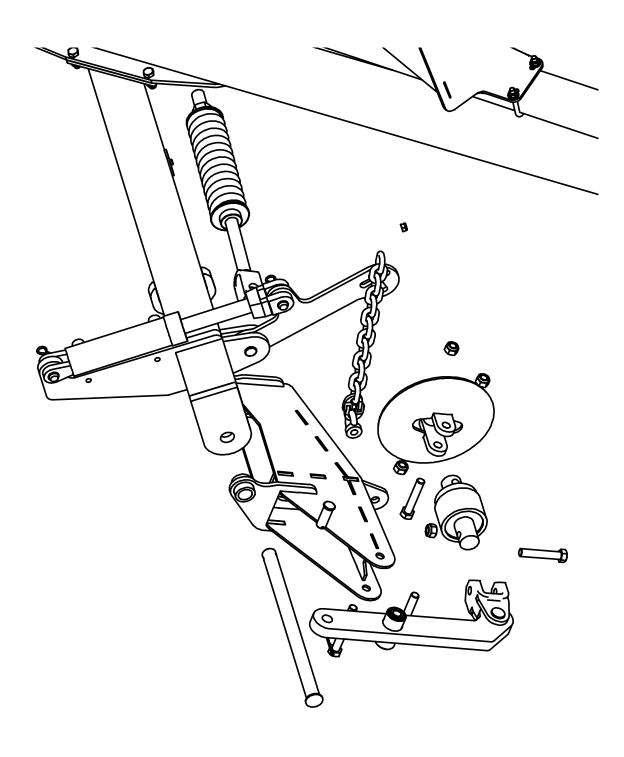


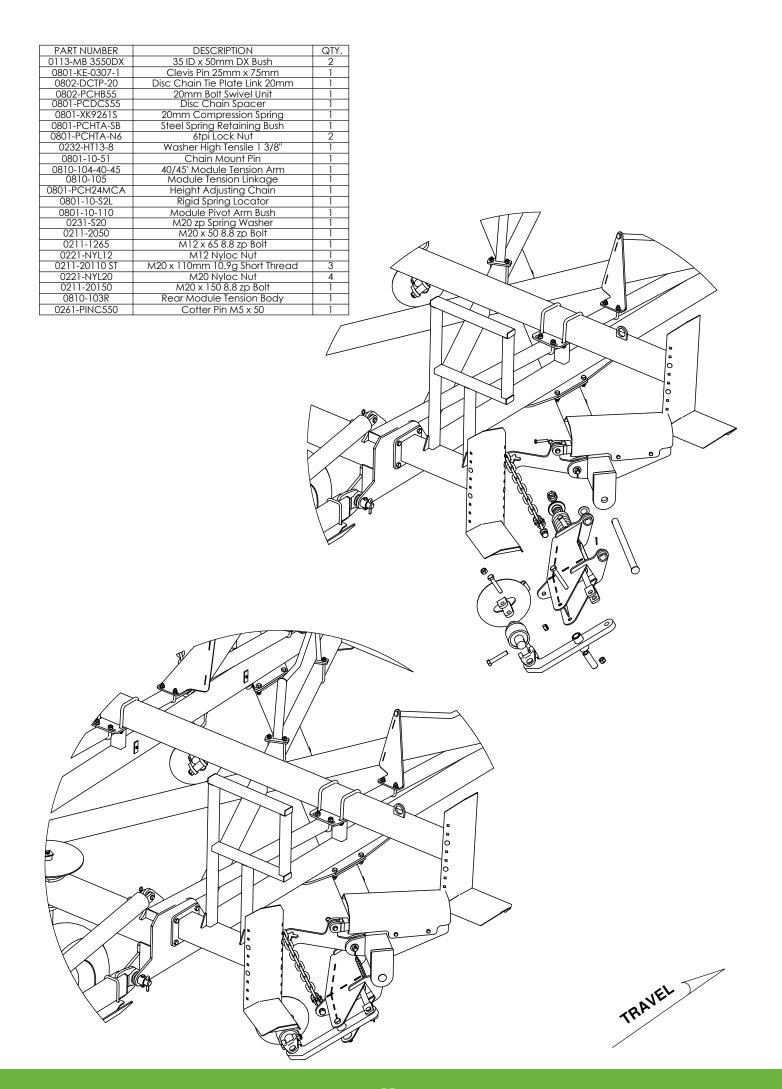
103F) replaces Reducing Chain Mount

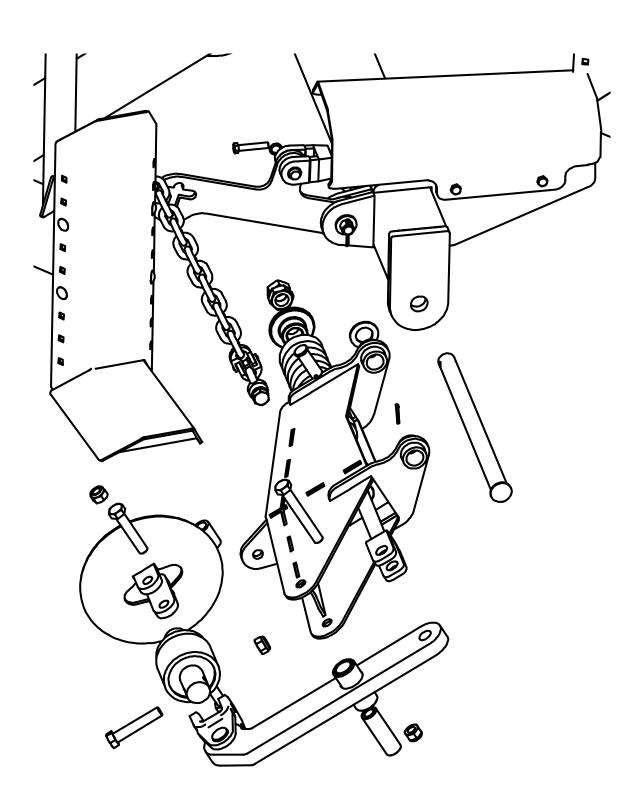
Arm 20mm clevis (0810-33)



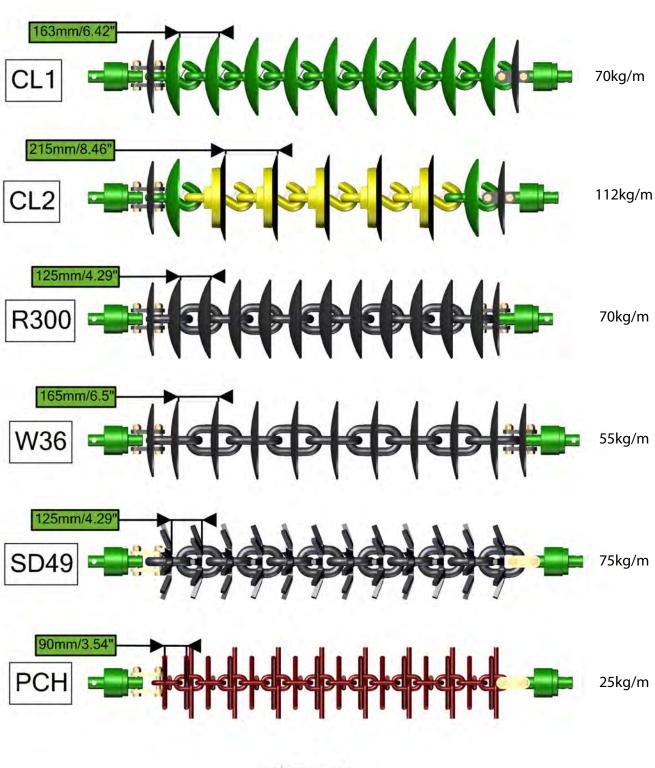


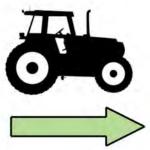




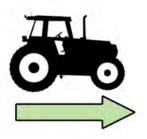


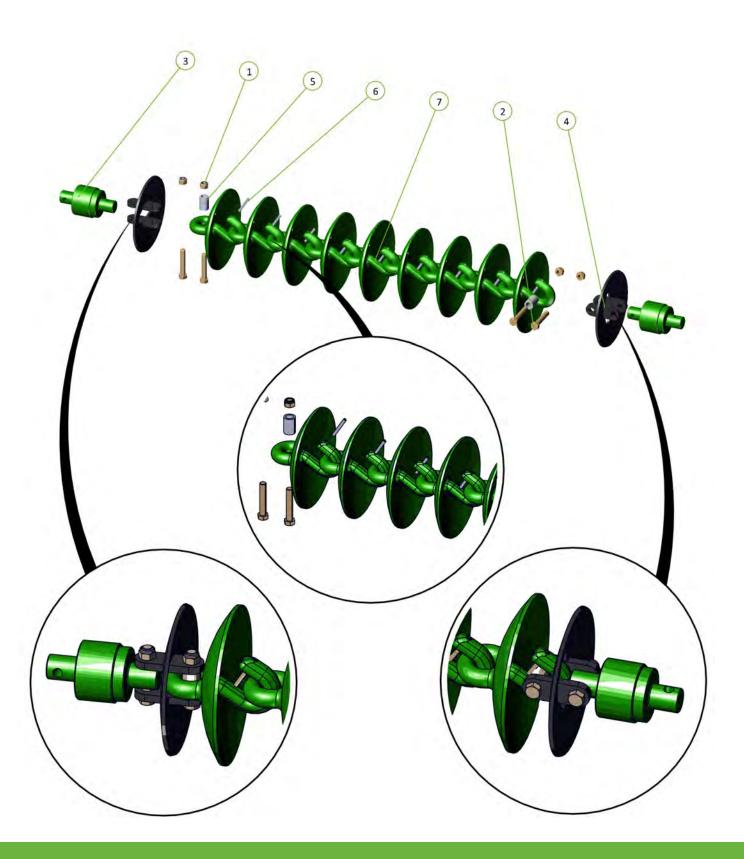
# **Section 3**Chain Assembly



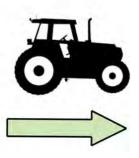


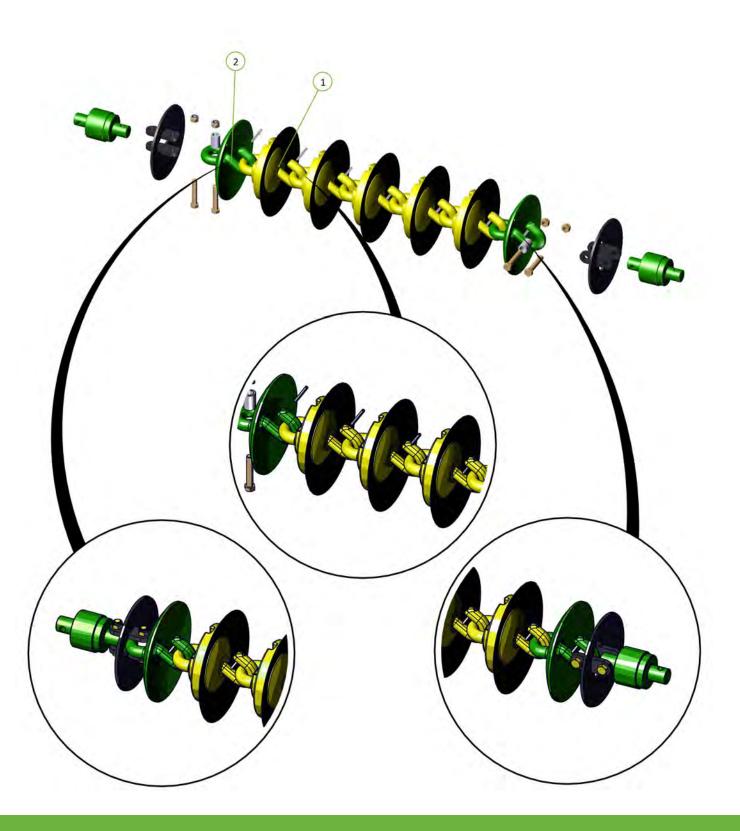
Item No.	Description	Number	Qty
1	Nyloc Nut M20/24	0221-NYL20/24	4
2	M20 x 110 / M24 x 120 grade 10.9 ZP Short Thread Bolt	0211-20110ST/0211-24120ST	4
3	20/24mm Bolt Swivel Unit	0802-PCHB55 / 0802-PCHB553	2
4	Disc Chain Tie Plate Link 20mm / 24mm	0802-DCTP-20 / 0802-DCTP-24	2
5	Tie Plate Bush	0801-PCDCS55	2
6	Roll Pin Zinc Plated 3/8" x 3"	0262-3-8X3	1
7	CL1-B Chain Disc Link	0803-CL1	1

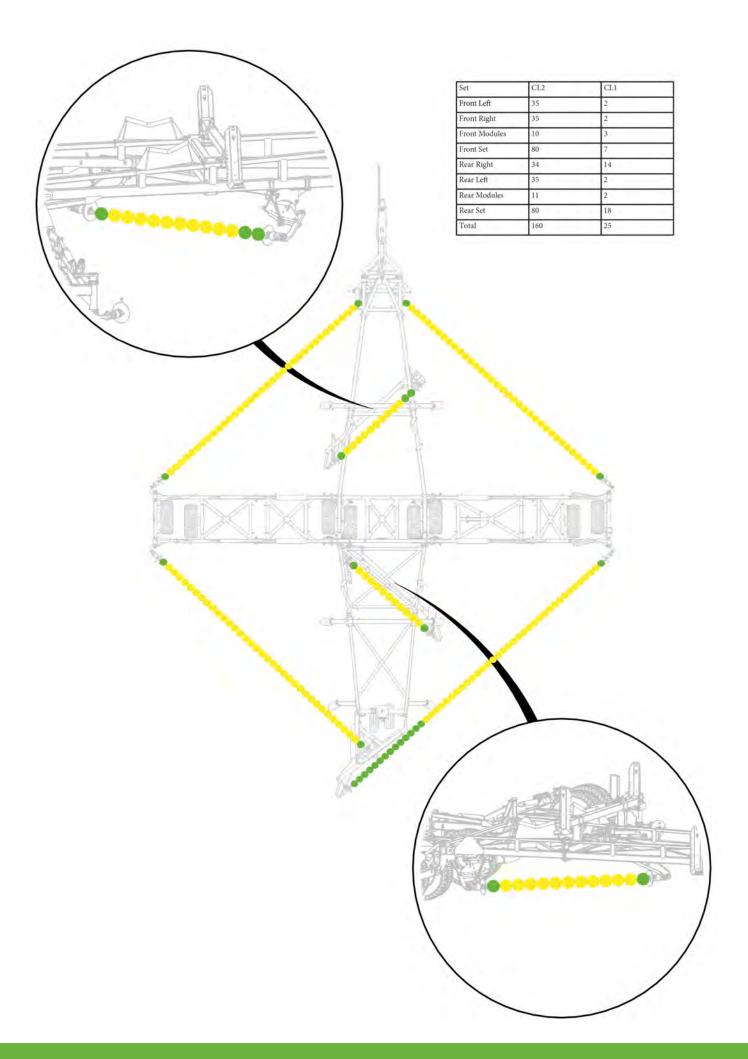




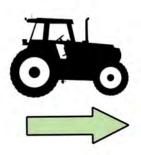
Item No.	Description	Number	Qty
1	0803-CL2-Link Assembly	0803-CL2	1
2	CL1-B Chain Disc Link	0803-CL1	1

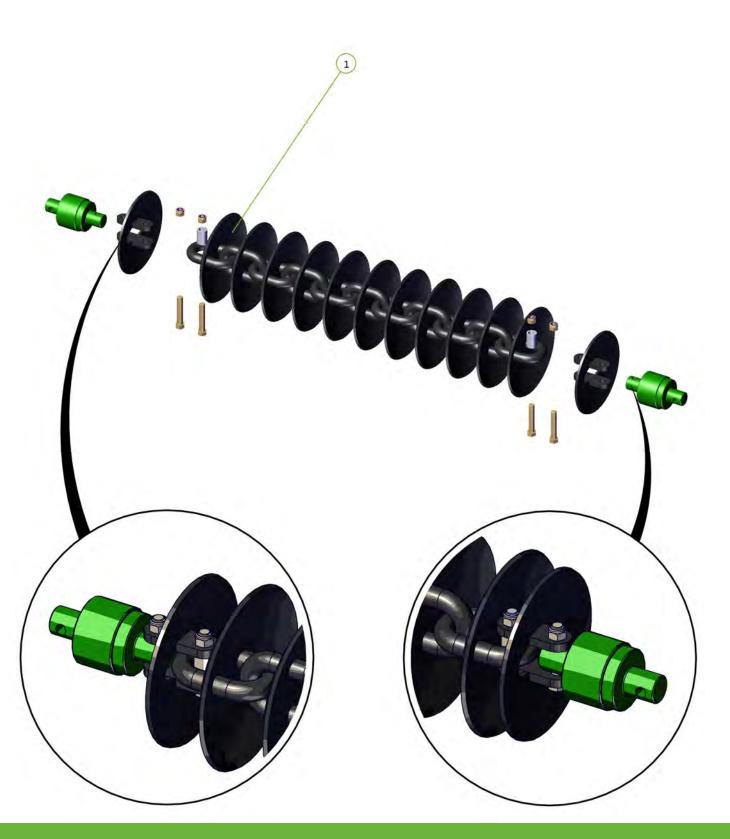




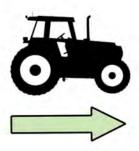


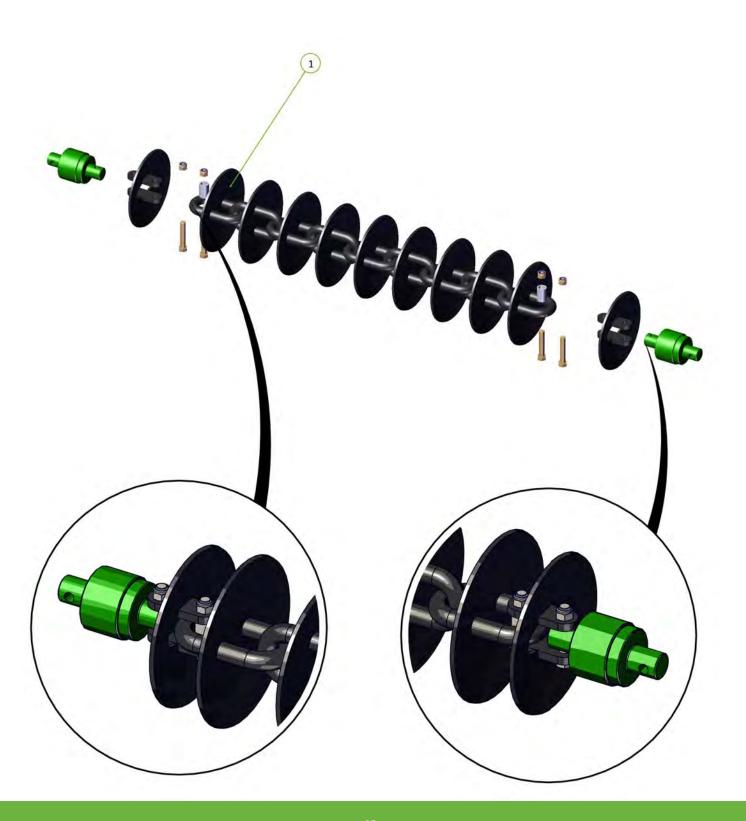
Item No.	Description	Number	Qty
1	R300 Chain Link	0803-R300	1



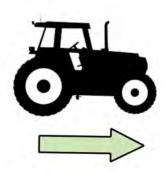


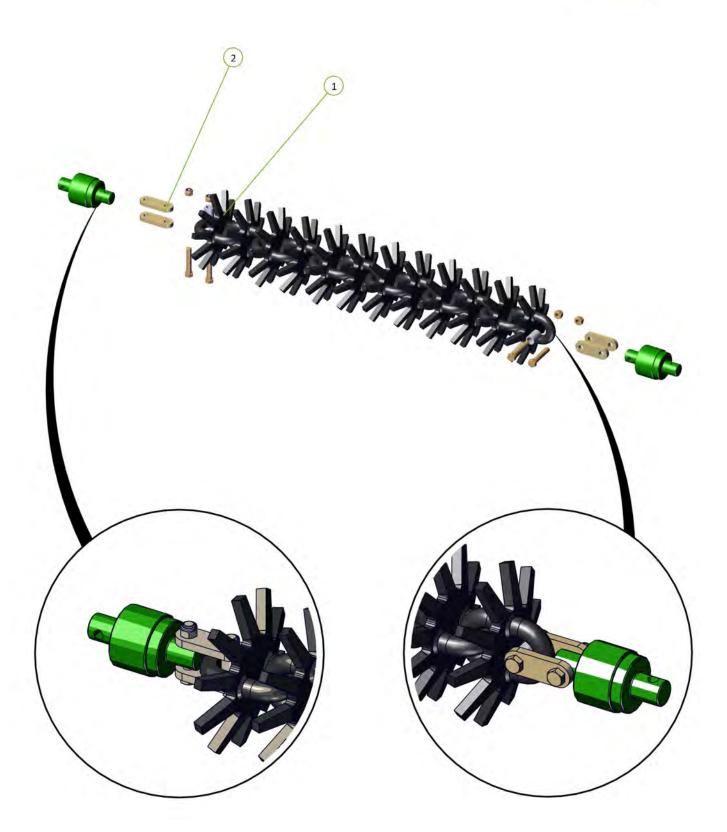
Item No.	Description	Number	Qty
1	W36/25 Chain Link	0803-W36	1



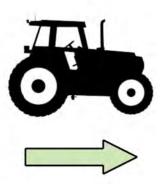


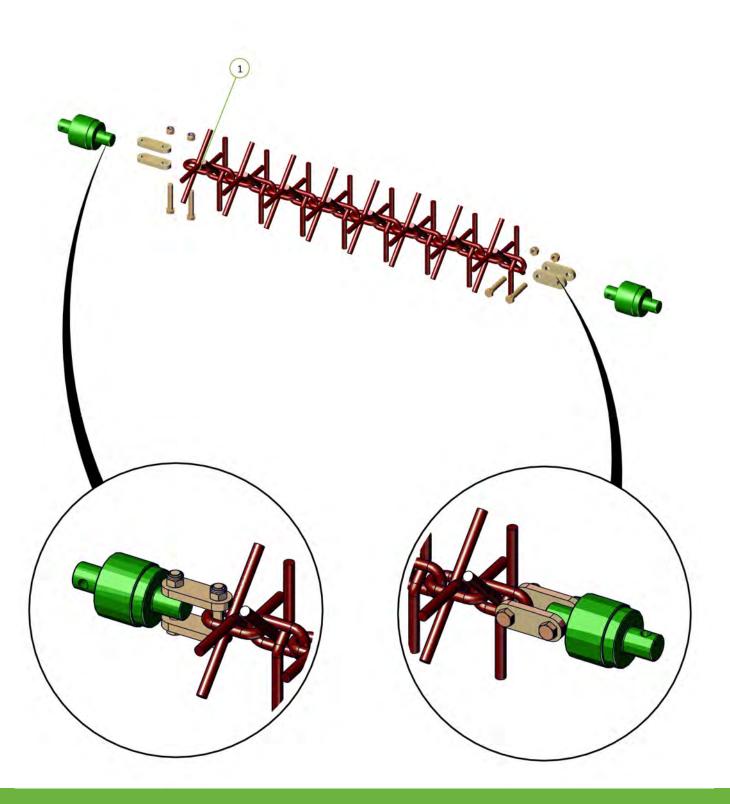
Item No.	Description	Number	Qty
1	10 Spike Disc Chain 49/27/5	0803-SD49	1
2	Tie Plate For 20mm Bolt/ Tie Plate For 24mm Bolt	0800-83.2 / 0800-83.3	4





Item No.	Description	Number	Qty
1	Prickle Chain Link	0803-PCH	1





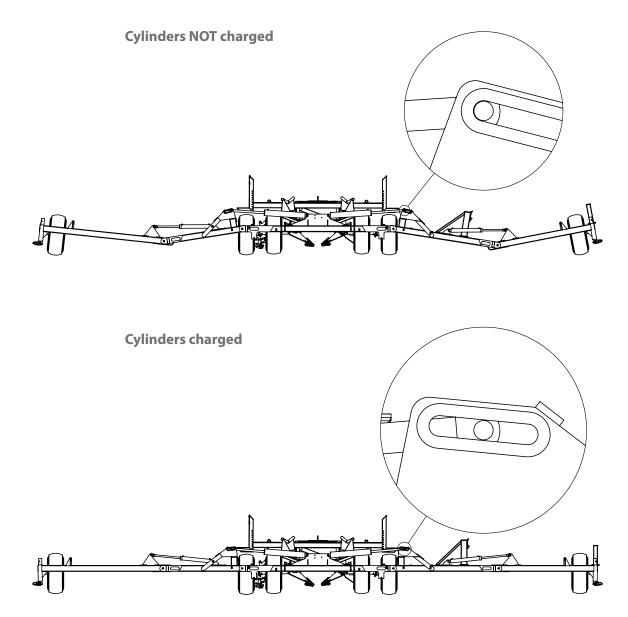
# Section 4 Diagrams and charts

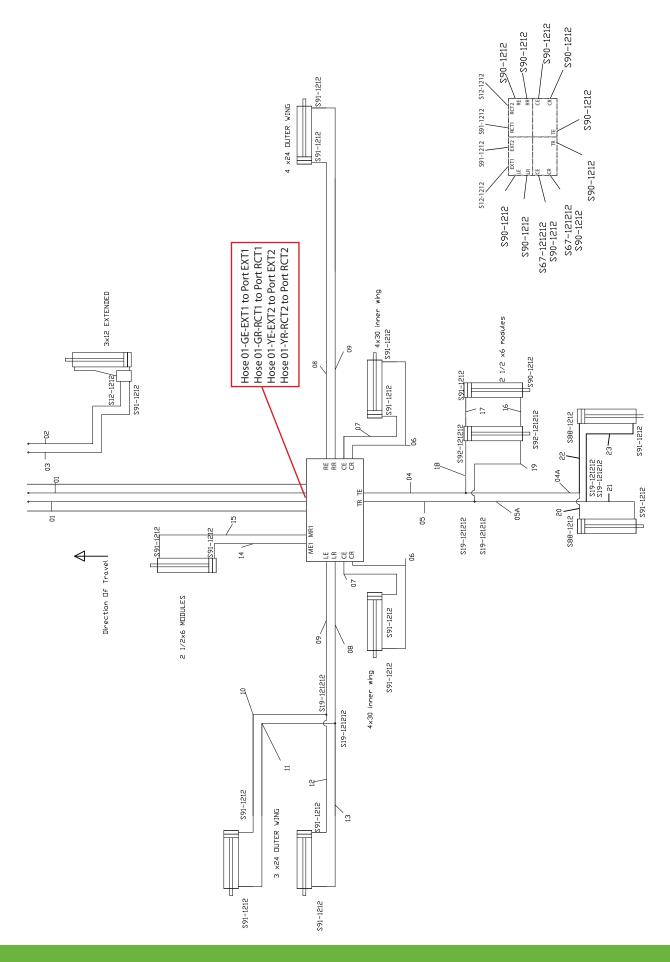


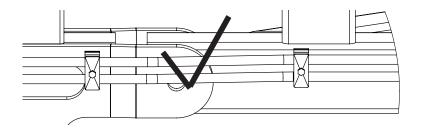
Before folding the machine for the first time, ensure all hydraulic cylinders are charged with oil.

To do this, run the hydraulics through the unfold sequence until the outer wings are straight and the centre cylinders are centred in the slots. (It may take a few minutes for the cylinders to charge completely).

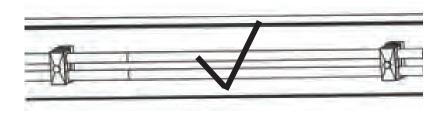
Failure to do this could result in severe personal injury and/or damage to the machine.

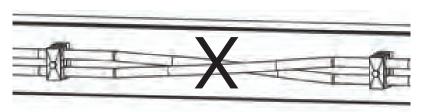




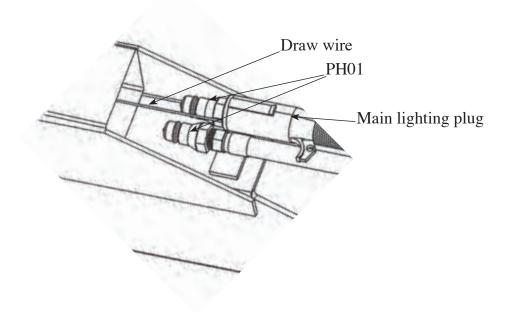


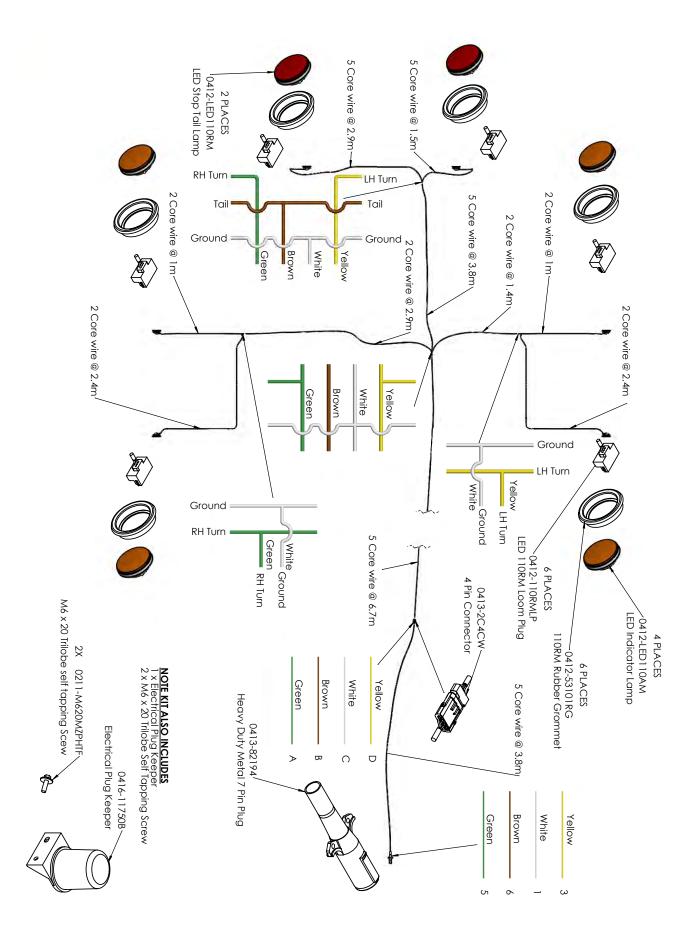
Correct layout of hoses



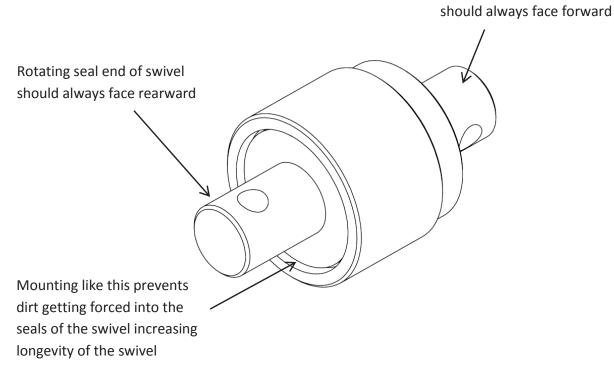


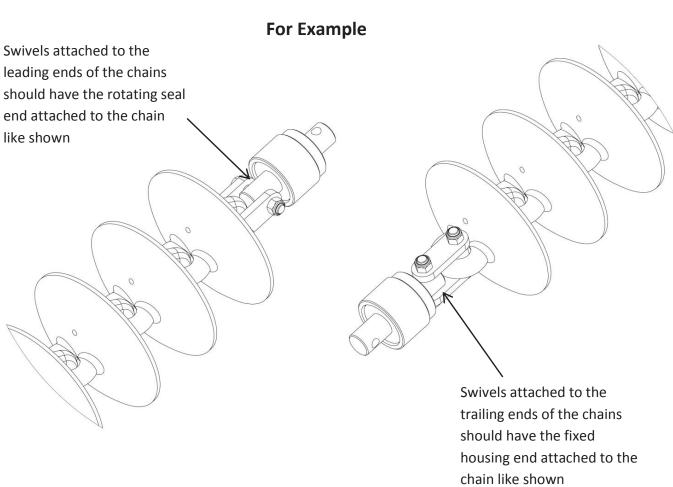
Avoid crossovers.





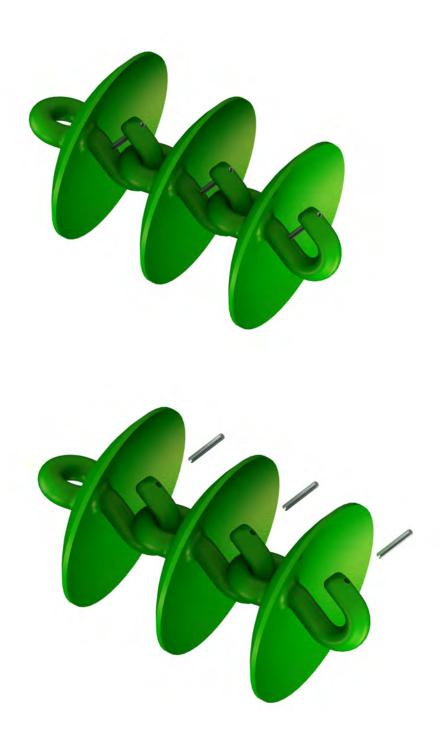
Fixed housing end of swivel





# **Fitting Cast Link Retaining Pins**

Please install cast link retaining Pins (3/8" x 3" Roll Pin, part number 0262-3-8X3) on all cast disc links. Failure to do this could lead to the discs becoming dislodged during transport causing severe damage or injury



# **Operating speeds**

Operating speeds for normal conditions					
Chain type Speed					
Prickle Chain	6-10 Mph / 10-16 kmph				
Disc Mulch Chain	6-8 Mph / 10-12 kmph				
Transport / towing on roads	15 Mph / 25 kmph				

## Tire pressure

Tire size	Ply	PSI	KPA
16.5L x 16.1	14	36	250
H40 x 14.5-19	26	60	410
11L - 15	10	44	300
15.5/80/24	16	58	400
16.5/85/24	16	55	380
550/60/22.5	16	40	280
400/60/22.5	16	50	350
12.5/80/18	14	85	590
15.0/70/18	14	71	490

# **Chain Harrow specifications**

Model	40'/12m			
Working width	43'4"/13.2m			
Transport width	11′6″/3.5m			
Transport height	12′2″/3.7m			
Transport length	52'6"/14.3m			

# **Bolt Torque Settings**

Bolt Type	Wheel nut			U Bolt			Grade 8.8 Bolt				Grade 10.9 Bolt			
<b>Bolt Size</b>	M18	M20	1/2"	9/16"	M10	M12	M16	M10	M12	M16	M20	M24	M20	M24
Ft lb	255	265	90	100	22	36	55	32	48	140	190	270	300	350
Nm	345	360	125	140	30	50	75	44	65	190	260	370	406	475

[1] When fitting a wheel & tire to a hub, do the wheel nuts up in rotation to the correct tension. To achieve this choose a wheel nut & tighten, then go clockwise to the next wheel nut & tighten & so on until all wheel nuts are tight. Then repeat the procedure to check that all nuts are tight. Do not use impact tools to tighten wheel nuts. For a guide to the correct tension of the wheel nuts please use the appropriate tension for your size wheel nuts from the Bolt Torque Settings table.

Torque values are for dry threads and surfaces however it is permissible to apply a small amount of anti corrosive oil to the threads.

# Specifications

# **Disc Chain lengths**

Model 40ft		Length	CL2	CL1	W36	R300	SD49	Prickle chain	
			CL2 disc chain also requires CL1 disc chain						
40′	Front right	25′/7.6m	CL2 - 32 CL1 - 2	46	46	60	60	84	
	Front left	25′/7.6m	CL2 -32 CL1 - 2	46	46	60	60	84	
	Rear right	29.8′/9.1m	CL2 - 32 CL1 - 14	57	60	79	79	109	
	Rear left	25′/7.6m	CL2 - 33 CL1 - 2	45	47	62	62	87	
	Modules front	8.9′/2.7m	CL2 - 10 CL1 - 2	17	17	22	22	31	
	Modules rear	8.9′/2.7m	CL2 - 11 CL1 - 2	16	17	22	22	31	

# Section 5 Operation

### **Basic Operation**

#### **Unfolding:**

- 1. Walk around and inspect the machine.
  - a. Check that chains are not hooked on framework
  - b. Check swivel bolts are in place and not broken
  - c. Check that height adjusting chains have not fallen out of their slotted plates during transport.
- 2. Lower front A frame to working height.
- 3. Unfold wings holding the hydraulic lever until the tail is in working position and the main center cylinder pins have centerd in their slots.
- 4. Walk around and check that all chain links are straight and that working height of all swivels is correct for field conditions. Adjust if neccessary.
- 5. Move off with all chains in working position. If neccessary it is acceptabe to raise front A pull to transport height. This will lift the front chains off the ground and reduce the load on the tractor. Lower the front A pull once moving satisfactorily.

#### **Folding:**

- 1. Lower the front A frame to working height. (This is important to ensure that all chains locate correctly in their transport rests).
- 2. Fold the wings. They should move as follows; modules will raise, tail will raise, main center cylinders will retract, one or both, until the wings stand vertically. The left outer wing then the right outer wing will fold down.
- 3. Raise front A frame to transport height.
- 4. Walk around and check that chains have located correctly in transport rests. (30' only, install wing transport lock pins).

## Setting for correct chain tension

## Wings

Use the spanner supplied. Loosen the lock nut adjacent to the tensioner assembly body. Turn the tension bolt clockwise to compress the coil spring. Correct tension is acheived when spring retains its set length when operator rolls the chain fore and aft on the ground. Retighten the lock nut.

See table below

#### **Spring Compression Length**

Model	Model inches	
40	12.4	315

When less than 4" (100mm) of thread remains visible on the adjustor bolt then a link must be removed from the chain









#### **Modules**

Loosen the lock nut on the draw bolt.

Tighten the adjusting nut clockwise until the outer face of the spring retaining washer is flush with the body of the module tensioning unit.

Retighten the lock nut.

If more than 8" (200mm) of thread is exposed then a link should be removed to maintain correct adjustment.





### Importance of chain tension

#### **Operational**

It is imperative that the correct adjustment be maintained. Only through correct adjustment can a smooth and level finish be achieved in field working.

Loose chains lead to:

- Uneven performance across the width of the machine
- Uneven weed control
- Unsatisfactory incorporation
- Ineffective levelling
- Accelerated or premature chain wear
- Chains failing to engage with transport locators when folded
- Machine damage when folding or unfolding
- Uneven field surface with ridges and furrows being created. The leading 1/3rd of a loose chain is much more aggressive than the trailing 1/3rd and the center. This will mean that middle of the machine's front pair of chains will aggressively move soil outwards. The machine's rear pair of chains, if loose, have their aggressive 1/3rd near the wing extremity. It follows then that as the front discs push soil outwards, the least aggressive portion of the rear chain follows them and does not balance the soil movement. This is exacerbated at the wings, effectively creating a broad ridge about halfway out each wing. It won't be evident in one pass, but is possible if care is not taken over time.

A correctly adjusted machine will not cause this phenomenon.

# Settings for correct working height

To adjust the swivel height at the wings, relocate one of the polyurethane spacers either above or below the fixed mounting tube.

# **Adjustment**

1	Loosen chain tension completely
2	Undo self tapping screw from corresponding spacer then prise open the spacer and spring it off of the drop leg tube
3	Replace it in the selected position after raising or lowering the drop leg
4	Reinstall the self tapping screw and re-tension the chain

It is possible to install all spacers either above or below the mounting tube giving a maximum of 4" (100mm) of adjustment.







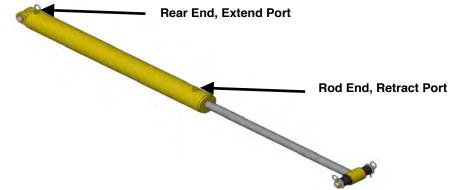
## **Correct Hose Attachment**

Please note that when attaching hoses to sequence valve block to check that hoses are connected to the correct port.

Ports with CE, LE or RE are extend ports (the E denotes Extend) and hoses connected to these must go to the rear end of the cylinder.

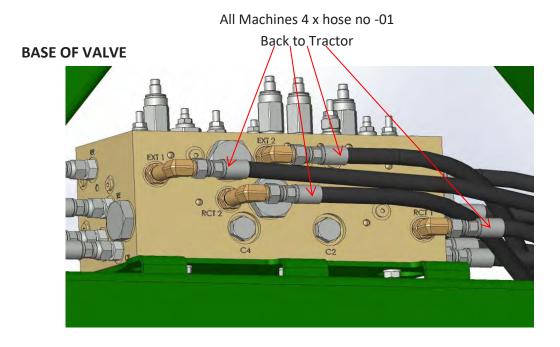
Ports with CR, LR or RR are retract ports (the R denotes Retract) and hoses connected to these must go to the rod end of the cylinder.

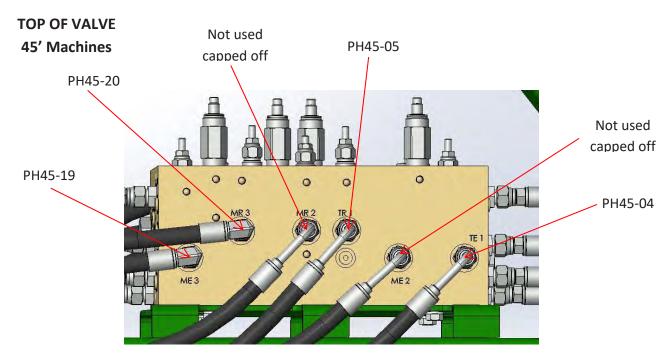




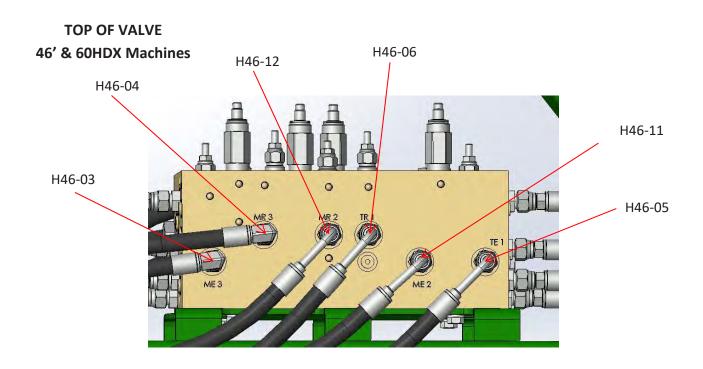
# **V12 Hydraulic Valve Fitting**

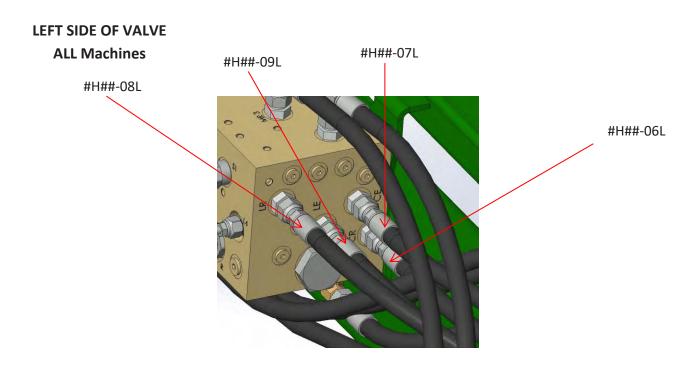
This assembly update shows the correct connection of the hydraulic hoses to the new Version 12 Hydraulic sequence valve manifold.



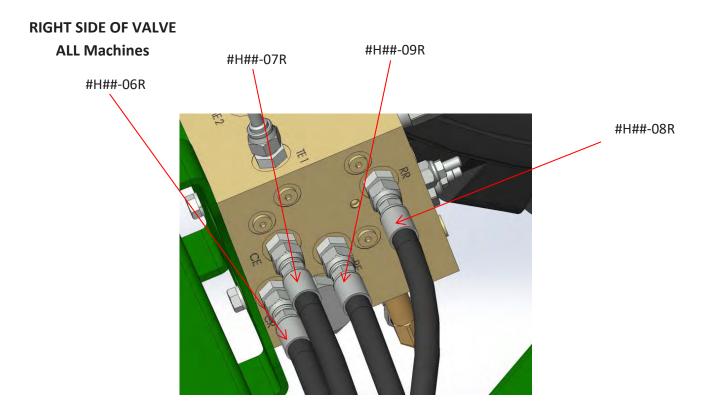


# **V12 Hydraulic Valve Fitting**

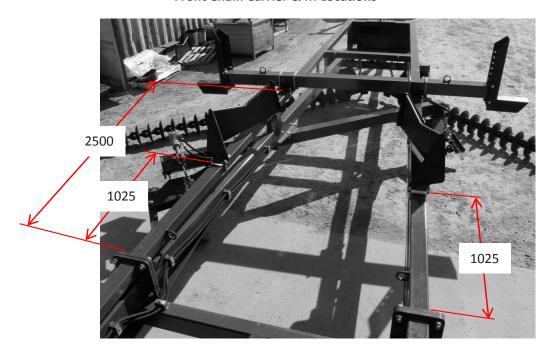




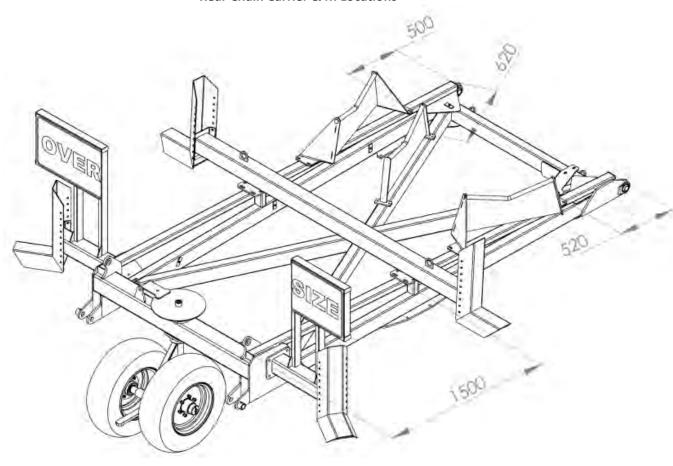
# **V12 Hydraulic Valve Fitting**



**Front Chain Carrier & M Locations** 



**Rear Chain Carrier & M Locations** 



# **Section 6**Pre-Delivery Check List

Pre-delivery check list	Checked
Check tyre pressure (As per manual)	
Check wheel nuts are tight	
Hydraulic rams & hoses are sound	
Grease caster wheel kingpin bearing	
All bolts and nuts are tightened to the correct torque values	
All safety decals are on the machine in the correct locations as per the operator's manual	
Check the chain tension as per the operator's manual	
Assembly and operating manuals are in the manual canister	
Brake disc tension spring is tensioned for road transport (50-63mm)	
Roll pins are installed in the CL Discs (CL2 & CL1)	
Chains are resting correctly in their transport supports (chain carries)	
Machine is registered	
Accumulator charged to 70bar with Argon (6m Only)	
Europe Only	
Check air brake hoses are sound with no leaks	
Check air brake relay valve is correctly set for the load	

# Notes

