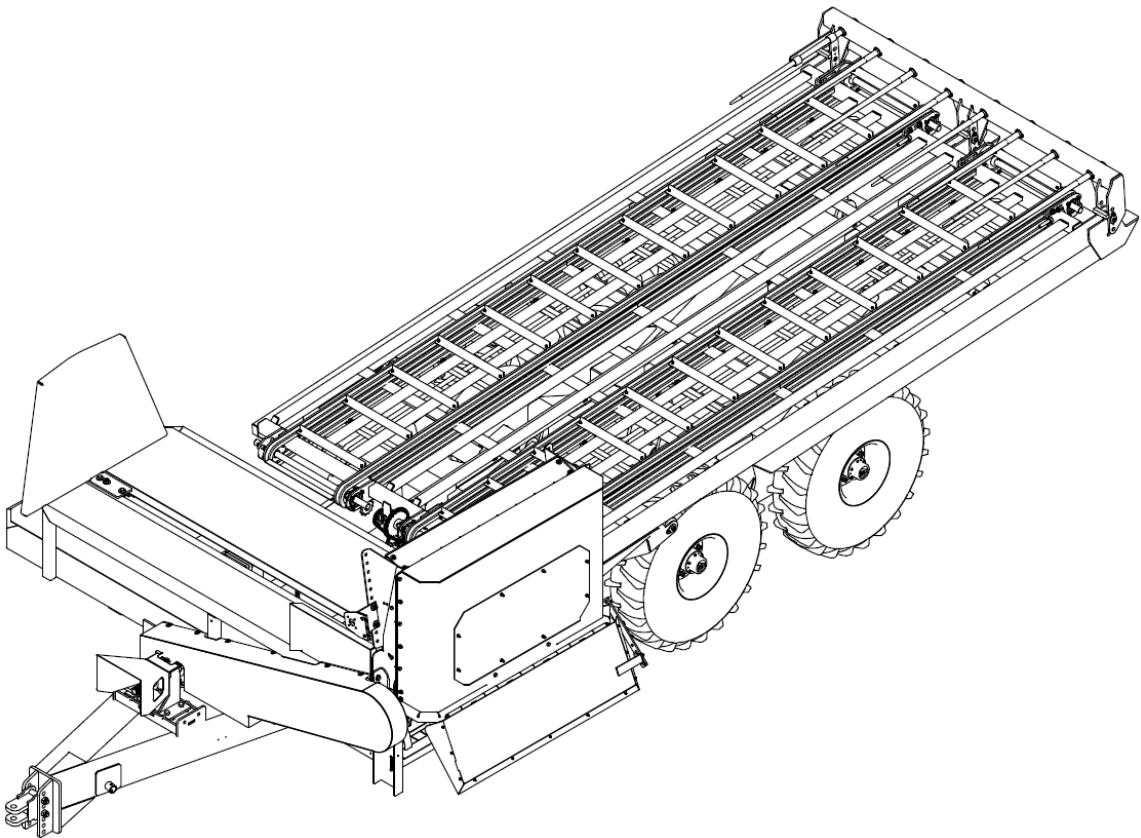


Tube-Line Boss IV

Operator's Manual



Operator's Manual

Thank you for choosing the Tube-line Boss IV Bale Processor. Our hope is that it will give you many years of productive service. This machine is designed to carry and spread large square bales .

Please read and understand this manual and the machine before operation.

Warranty and Limitation of Liability

All Equipment is sold subject to mutual agreement that it is warranted by the company to be free from defects of materials and workmanship. But the company shall not be liable for special, indirect or consequential, damages of any kind under this contract or otherwise. The company's liability shall be limited exclusively to replacing or repairing without charge, at its factory or elsewhere, at its discretion. Any material, or workmanship defects which become apparent within one year from the date on which the equipment was purchased, and the company shall have no liability for damages of any kind. The buyer by the acceptance of the equipment will assume all liability for any damages, which may result from the use or misuse by his employees or others.

Warranty coverage is null and void unless Warranty Registration form has been completely filled in and is on file at Tube-Line Manufacturing Ltd.

Safety

Learn Machine Safety

Carefully read this manual. Learn how to operate this machine and learn how to use the controls properly.

Do not let anyone operate this machine without proper instruction.

Unauthorized modifications to the machine may impair the function and/ or safety and affect machine life.

Understand Signal Words

A signal word – DANGER, WARNING or CAUTION is used with the safety alert symbol. Danger identifies the most serious hazards.

Safety signs with signal word DANGER or WARNING are typically near specific hazards.

General precautions are listed on CAUTION safety signs. CAUTION also calls attention to safety messages in this operator's manual.



Danger



Warning



Caution

Transport Safely

- Disengage PTO
- Do not tow loads that weigh more than twice the weight of the tractor
- Reduce the tractors speed when ground is rough
- Always keep the tractor in gear when traveling down steep grades
- To assure adequate braking performance and control, tow only with an agricultural tractor. Safe towing speed depends on the weight of the tractor and the towed load. Speed should never exceed 32kmh (20mph)

Safety

Check Before Operating :

- Become familiar with the controls
- Check all hardware
- Check all hydraulic hoses and connections
- Check the condition of drive belts
- Remove foreign objects from the machine
- Inspect drive-line shield for free rotation
- Be sure all guards are in place

Operate Safely :

- Keep all shields in place
- Avoid operating processor when making sharp turns or in steep banked gullies
- Under no circumstances should a processor equipped with a 1000 rpm PTO processor be operated by a tractor with 540 rpm PTO
- DO NOT allow riders on processor
- Drive slowly through doors and gates
- Reduce tractor ground speed when turning or traveling on rough terrain. Avoid traveling over loose fill, rocks, ditches, or holes

Park Safely :

Always park the processor on level ground and block the wheels when not in use

Using On Inclines :

When working on inclines or slopes, travel uphill or downhill. Be sure to keep tractor transmission in gear when traveling downhill.

Safety

Service Machine Safely

- Always engage tractor parking brake or place transmission in “PARK”, lower fork to the ground, shut off the engine and remove key before servicing.
- Do not work under raised machine parts unless it is securely blocked or safety props are in position
- Before disconnecting hydraulic hoses, relieve all hydraulic pressure.

Practice Safe Maintenance

- Understand service procedures before doing any work.
- Never lubricate or service machine while it is moving.
- Keep hands, feet, and clothing from power-driven parts.
- Disengage all power and operate controls to relieve pressure.
- Lower fork to the ground
- Securely support any machine elements that must be raised for service work
- Keep all parts in good condition and properly installed.
- Fix damage immediately.
- Replace worn or broken parts.
- Remove any buildup of grease, oil, or debris.

Protect Bystanders

- Never operate the machine near people.
- Do not stand near machine when running
- Keep all shields in place
- DO NOT allow children to operate the tractor
- Operate the machine from the tractor seat only

Safety

Service Machine Safely :

- Always engage tractor parking brake or place transmission in “PARK”, lower fork to the ground, shut off the engine and remove key before servicing.
- Do not work under raised machine parts unless it is securely blocked or safety props are in position
- Before disconnecting hydraulic hoses, relieve all hydraulic pressure.

Operate Safely :

- Keep all shields in place
- Avoid operating processor when making sharp turns or in steep banked gullies
- Under no circumstances should a processor equipped for 540 rpm PTO be operated with 1000 rpm PTO. Nor should a 1000 rpm PTO processor be operated by a tractor with 540 rpm PTO
- DO NOT allow riders on processor
- Drive slowly through doors and gates
- Reduce tractor ground speed when turning or traveling on rough terrain. Avoid traveling over loose fill, rocks, ditches, or holes

Park Safely :

Always park the processor on level ground and block the wheels when not in use

Using On Inclines :

When working on inclines or slopes, travel uphill or downhill. Be sure to keep tractor transmission in gear when traveling downhill.

Before Operating

Keep chains and belts at proper tension

- Machine is assembled complete from the factory less hitch mountings
- Adjust the height of the machine so it is parallel to the ground
- Improper hitch adjustments may cause separation from the PTO drive-line when operating on uneven terrain.
- This machines hydraulic system requires 6 outlets on the tractor

PTO Drive-line

PTO drive-line maintenance instructions must be read before attaching and operating. The maintenance instructions are attached to the chain supplied on the drive-line.

Failure to do so may result in damage to the drive-line and machine may void warranty.

When lubricating drive-line telescoping shafts, it is imperative that yokes remain phased. In order to maintain phasing, the flat profile of the inner tube must be engaged with the flat profile of the outer tube. Failure to do so will result in damage across and bearings and premature shearing of the shear bolt.

Shear bolt replacement must be done only with shear bolts of the same grade and diameter supplied on the drive-line.

Proper and adequate length of the drive-line must be maintained in order to have maximum one third engagement of telescoping tubing.

Too short of a drive-line will result in premature failing of the drive-line.

Too long of a drive-line will result in damage to drive-line, tractor PTO and implement.

PTO shaft drive-line must not be opened without all safety shields in place. PTO shaft drive-line must be attached securely before operating.

At no time should any persons be in the immediate area of the PTO shaft drive-line and machine while the PTO shaft drive-line is being operated.

Caution :

Tractor PTO must be disengaged and tractor shut off before approaching or contacting the PTO shaft drive-line.

Maintenance and Adjustments



Caution

The flail tube in this machine is a fully balanced assembly. If for any reason the flails must be removed, they MUST BE RETURNED to the SAME POSITION they were taken from. If this is not done a balance problem will result causing machine vibration. Number flails and inserts and their positions before you do any work.

Before performing any maintenance or adjustments make sure machine is not running. If for any reason arc welding is to be done, always ground the cylinder to the frame of the machine prevent arcing in the bearings.

1. Check for loose and badly worn parts.
2. Conveyor chain should be adjusted to allow chain slack 1" (2.54 cm) to 1 1/2" (3.8 cm).
3. Follow the Lubrication Chart.
4. Inspect rotor and all rotating parts for twine or wire build-up.
5. Inspect and tighten Allen screws on bearings after the first 10 hours of operation.
6. Check air pressure in tires – 35lb. (15.9 kg)?
7. Discharge deflector has adjustments to allow forage to be spread to any desired width.
8. Check for broken flails. Replace with new BOSS flails to keep the machine in balance.

Starting Machine



Warning

- Make sure that bales are free from foreign objects. Foreign objects in bale may cause damage to the machine or cause injury or death to livestock, bystanders, or operator.
- Make sure any bystanders are away from the machine and discharge before engaging PTO flying objects can cause serious injury or even death.

This machine is set-up to operate on a 1000 rpm PTO (540 rpm is optional).

The machine's hydraulic system performs two functions ? One function tilts the deck for loading bales on top of the machine. The second function powers the bale pusher by means of a hydraulic motor. Desired speed of the pusher is controlled by a flow control valve located on the front of the machine. Decrease the speed of the pusher allows flail knives to chop forage finer, increasing the speed leaves forage coarser when the knives are in the upward position.

Operating the tractor at maximum PTO rpm allows the machine to do a better job of chopping forage.

Twine build-up should be kept to a minimum to reduce fire hazard and keep the machine in balance.

Center the bales on the tines before loading on to the deck. Slide the tines lightly on ground when loading bales with the deck up. Store bales on level ground so that the bales can be loaded with ease. Bales should be stored on a clean surface free from rocks and other foreign objects.

Check for cylinder wear and broken flails and flail bracket wear.

Operating Instructions

Setup

Connect all six hoses (four on right side, two on left) to the tractor ports. Be sure to match up the paired hoses to the right ports to ensure proper operation. Also connect the PTO to the front shaft located at the front of the machine.

Prior to running the machine with bales, adjust the shredder's chute to the position likely to be used while operating.

Note : A good idea is to run the machine through the operating steps without bales to familiarize yourself with your new machine.

Operation

Use the tractors controls to raise the deck until it is upright. Gravity will bring the tines down 90 degrees to the deck.

Reverse into a stack of bales to a maximum of four bales high. Your bales should be no bigger than 4' x 4' x 9'.

Return the deck to its original position and drive to the area or row that you want to spread on, against etc. *Note : Make sure the spreaders chute is in the correct position for where you want your crop to go.*

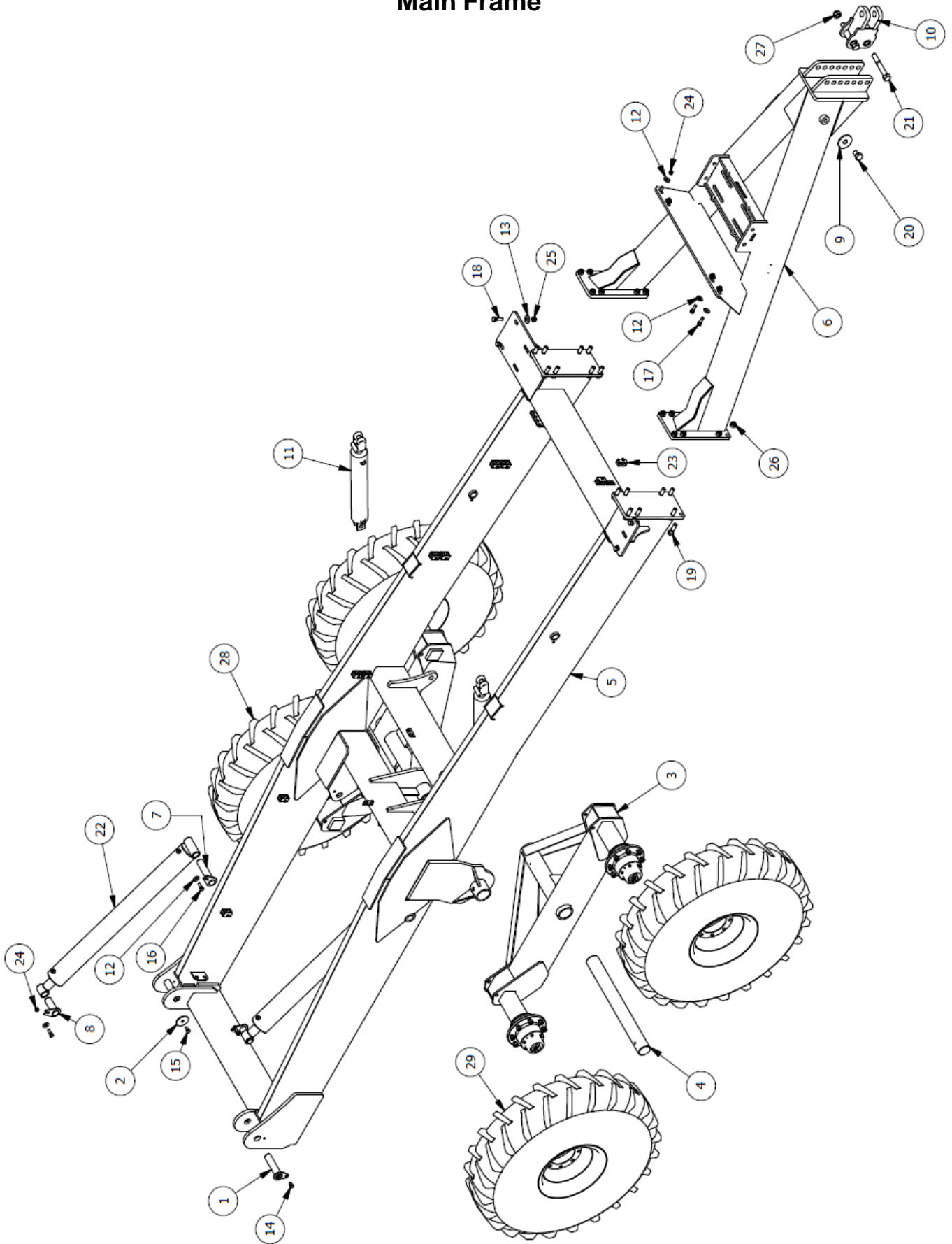
Use the tractors controls to run the apron (deck) chain towards the tractor, this will move the bales. Continue bringing them forward until one is securely positioned on the shredder table.

Next, move the installed joystick to push the bale through the rotating flail drum to shred and throw the bale evenly over the desired location. *The flail drum is rotated by the PTO drive.*

Remember to run the bale shredder ram back to its original position to allow the next bale onto the table.

Finish spreading the bales in like manner and repeat for next bale stacks.

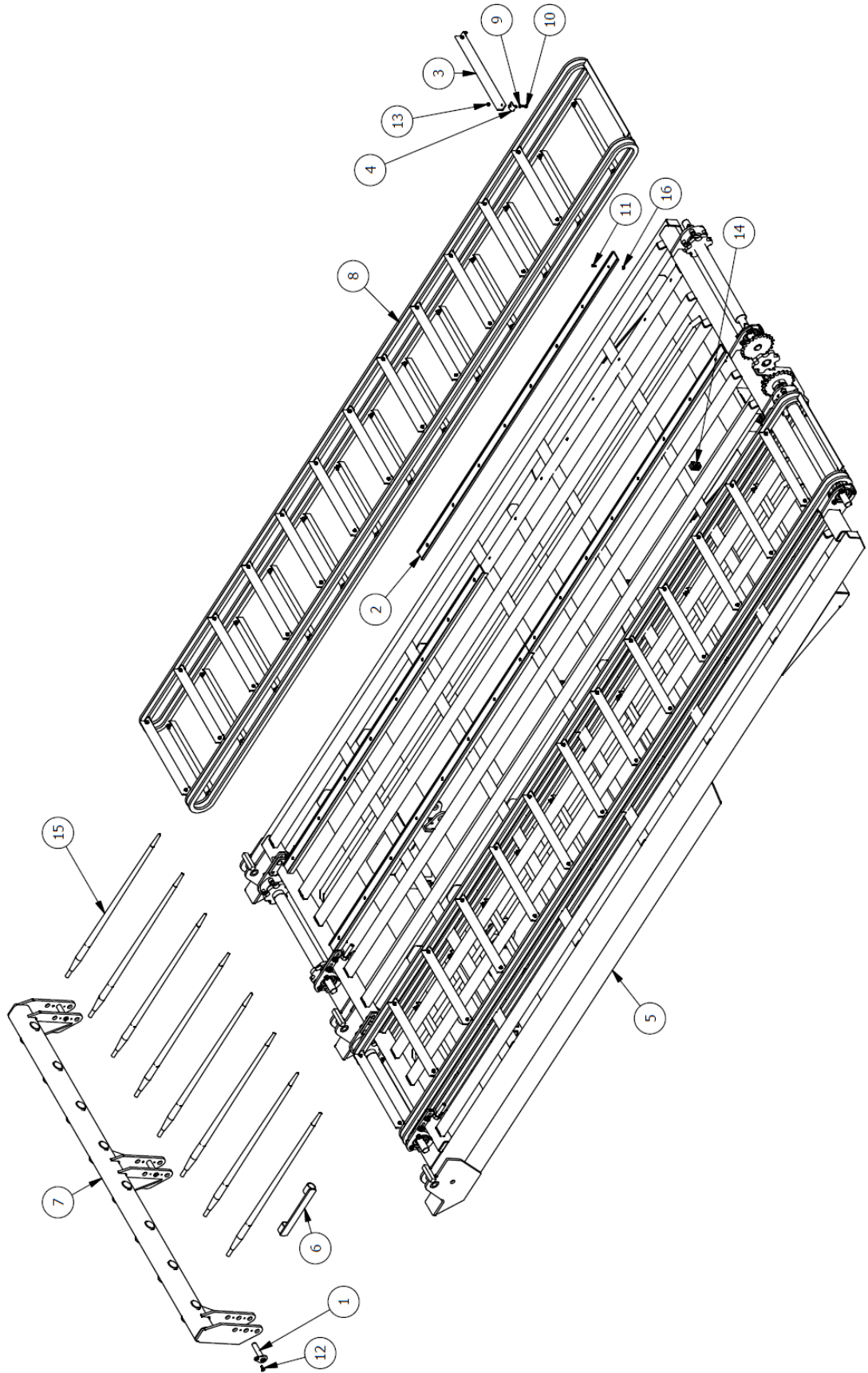
Main Frame



Main Frame

Item	Qty	Part #	Description
1	2	23478	6.25" Pin
2	2	23677	Pin Cap
3	2	27583	Walking Beam
4	2	27854	Walking Beam Pin
5	1	28750W	Main Frame
6	1	27852W	Front Tongue
7	2	27857W	Cylinder Pin
8	2	27859W	Cylinder Pin
9	1	28037	Retaining Washer
10	1	28053	Hitch
11	2	CYL BS 199899	Hydraulic Cylinder
12	12	Obtain Locally	FW .5 Flat Washer
13	4	Obtain Locally	FW .625 Flat Washer
14	2	Obtain Locally	HB .5 X .75 Hex Bolt
15	2	Obtain Locally	HB .5 X 1 Hex Bolt
16	4	Obtain Locally	HB .5 X 1.5 Hex Bolt
17	4	Obtain Locally	HB .5 X 1.75 Hex Bolt
18	4	Obtain Locally	HB .625 X 2 Hex Bolt
19	16	Obtain Locally	HB .75 X 2.5 Hex Bolt
20	1	Obtain Locally	HB 1 X 1.5 Hex Bolt
21	2	Obtain Locally	HB 1 X 7 Hex Bolt
22	2	CYL 27558	Hydraulic Cylinder
23	15	LA-HOSE CLAMP	Hose Clamp
24	8	Obtain Locally	LN .5 Lock Nut
25	4	Obtain Locally	LN .625 Lock Nut
26	16	Obtain Locally	LN .75 Lock Nut
27	2	Obtain Locally	LN 1 Lock Nut
28	2	WHE 12.4 X 24 X 8 L	Complete Left Wheel
29	2	WHE 12.4 X 24 X 8 R	Complete Right Wheel

Deck Frame

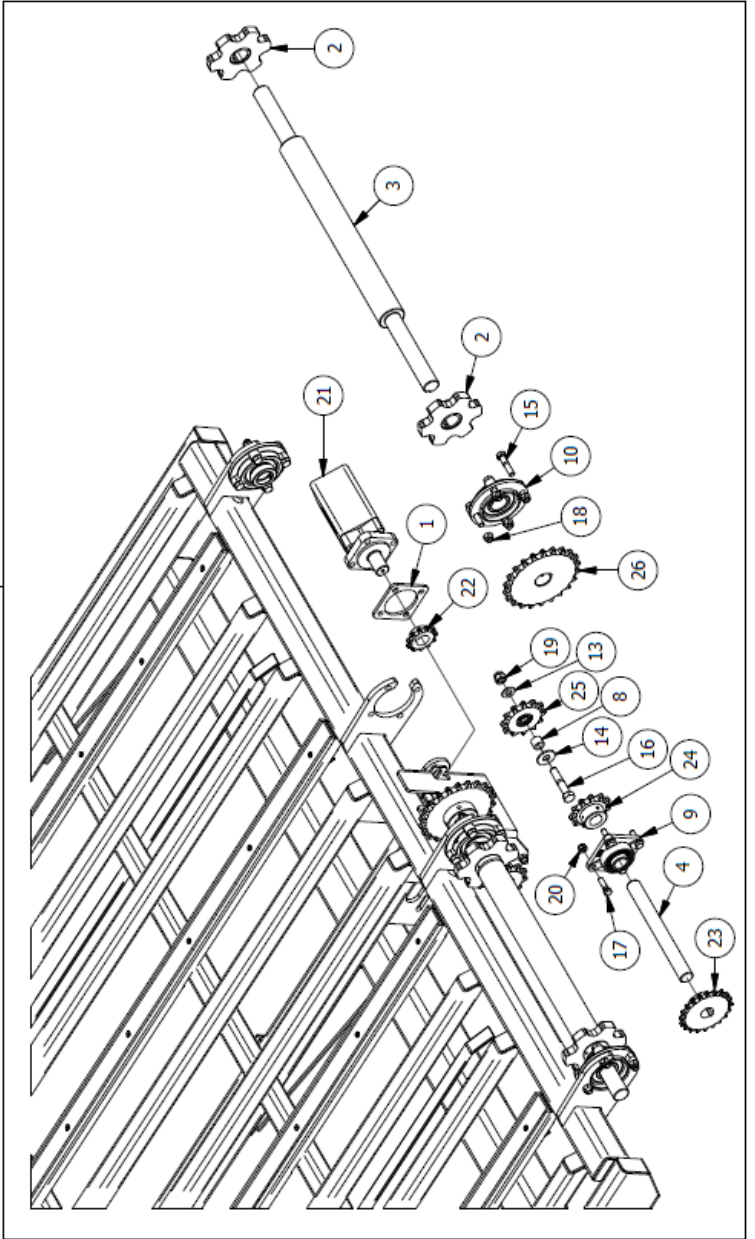
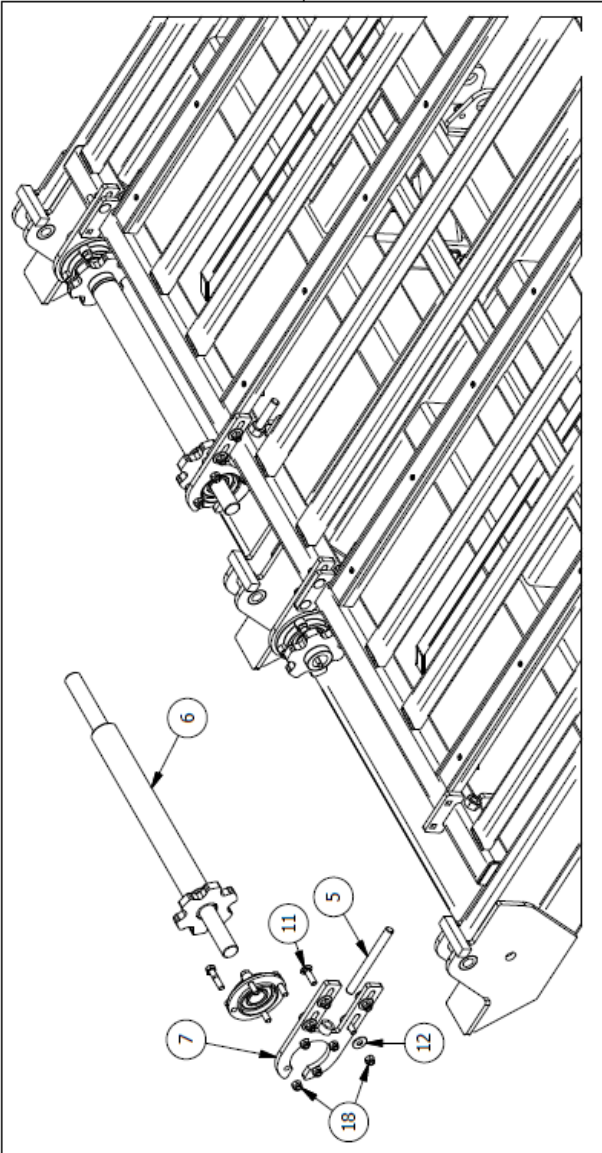


Deck Frame

Item	Qty	Part #	Description
1	3	23355	Linkage Retaining Pin
2	8	27625	Chain Slide
3	1	27640	Slat
4	1	27761	Chain Tab
5	1	27853W	Deck
6	1	28084	Tine Knife
7	1	28770	Tine Hinge
8	2	CHAIN 81X	Bed Chain
9		Obtain Locally	FW .313 Flat Washer
10		Obtain Locally	HB .313 X 1 Hex Bolt
11		Obtain Locally	HB .25 X 1 Flat Head Cap Screw
12		Obtain Locally	HB .375 X .75 Hex Bolt
13		Obtain Locally	HN .313 Hex Nut
14	5	LA-HOSE CLAMP	Hose Clamp
15	8	LA-MFE43	43" Tine
16		Obtain Locally	LN .25 Lock Nut

Deck Drive

Rear View

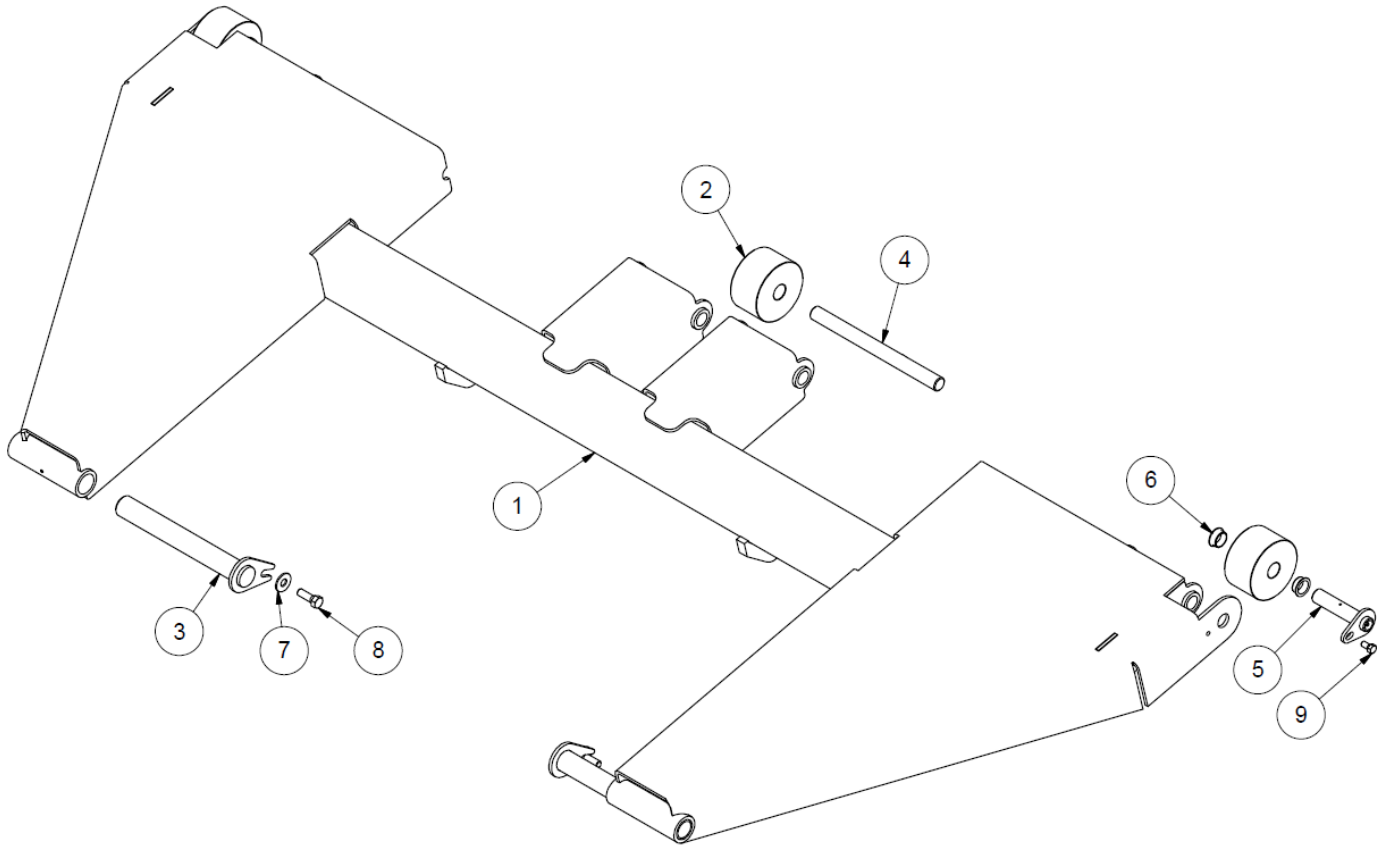


Front View

Deck Drive

Item	Qty	Part #	Description
1	1	27759	Motor Spacer
2	8	27856W	Chain 81X Sprocket
3	2	28098	Front Deck Shaft
4	1	28109	Jack Shaft
5	4	28144	Tensioner Rod
6	2	28147	Rear Deck Shaft
7	4	28796	Chain Adjuster
8	2	29679	Idler Sprocket Spacer
9	2	BEA UCF206-104	Flange Bearing
10	8	BEA UCF208-24	Cartridge Bearing
11		Obtain Locally	CB .5 X 1.75 Carriage Bolt
12		Obtain Locally	FW .5 Flat Washer
13		Obtain Locally	FW .625 Flat Washer (Narrow)
14		Obtain Locally	FW .625 Flat Washer (Wide)
15		Obtain Locally	HB .5 X 2.25 Hex Bolt
16		Obtain Locally	HB .625 X 3.25 Hex Bolt
17		Obtain Locally	HB .438 X 1.5 Hex Bolt
18		Obtain Locally	LN .5 Lock Nut
19		Obtain Locally	LN .625 Lock Nut
20		Obtain Locally	LN .438 Lock Nut
21	1	ML HYS 400 C4UD	Hydraulic Motor
22	1	SPR60B111.25	#60 11 Tooth Sprocket
23	1	SPR60B201.25	#60 20 Tooth Sprocket
24	2	SPR80B111.25	#80 11 Tooth Sprocket
25	2	SPR80B12	#80 12 Tooth Sprocket
26	2	SPR80B221.5	#80 22 Tooth Sprocket

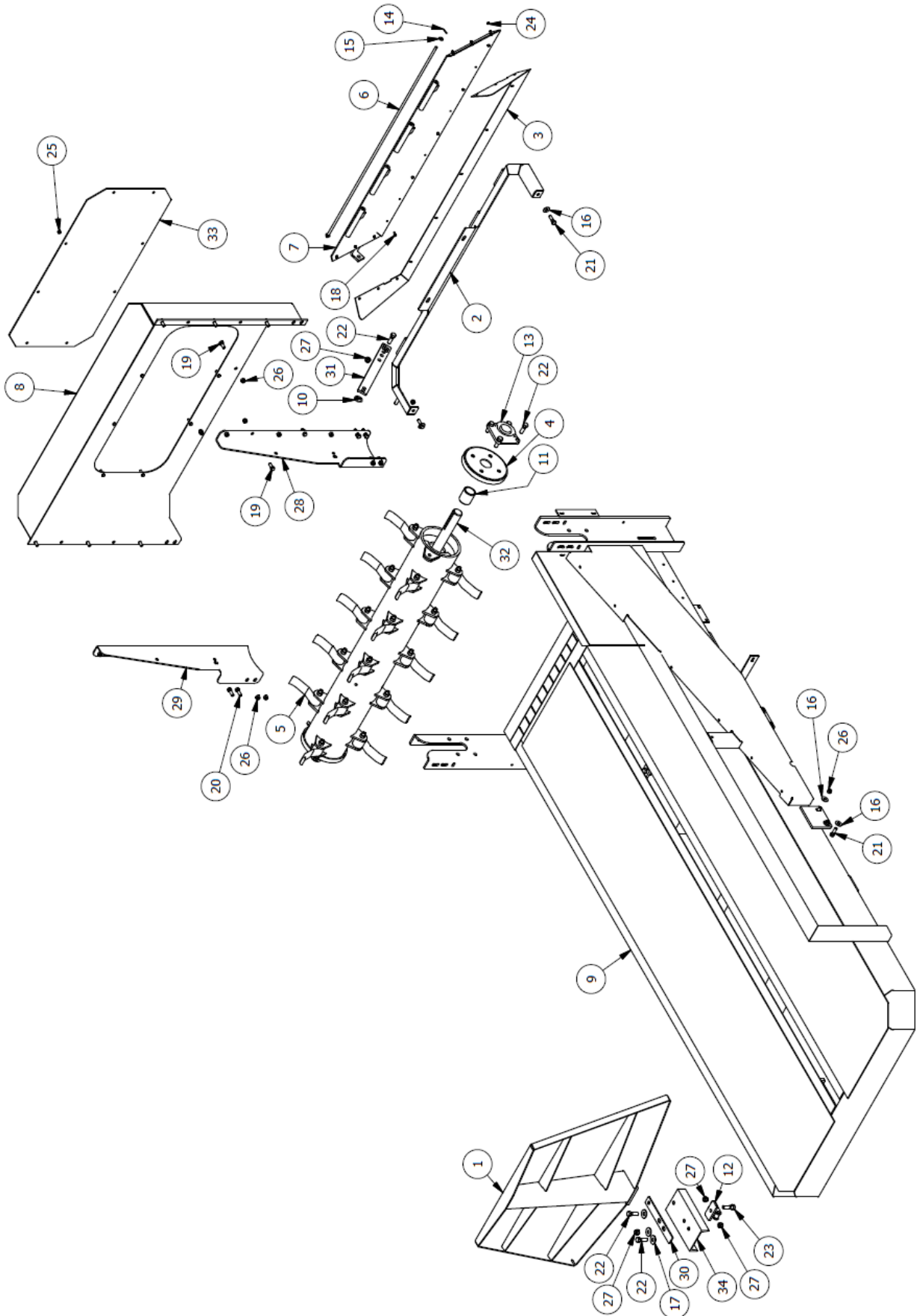
Lift Assist



Lift Assist

Item	Qty	Part #	Description
1	1	27854W	Lift Assist Frame
2	3	28010	Roller
3	2	27858W	Hinge Pin
4	1	27630	Middle Roller Pin
5	2	23355	Linkage Retaining Pin
6	2	GFI-1618-08	Plastic Bushing
7	2	Obtain Locally	FW .5 Flat Washer
8	2	Obtain Locally	HB .5 X 1.5 Hex Bolt
9	2	Obtain Locally	HB .375 X .75 Hex Bolt

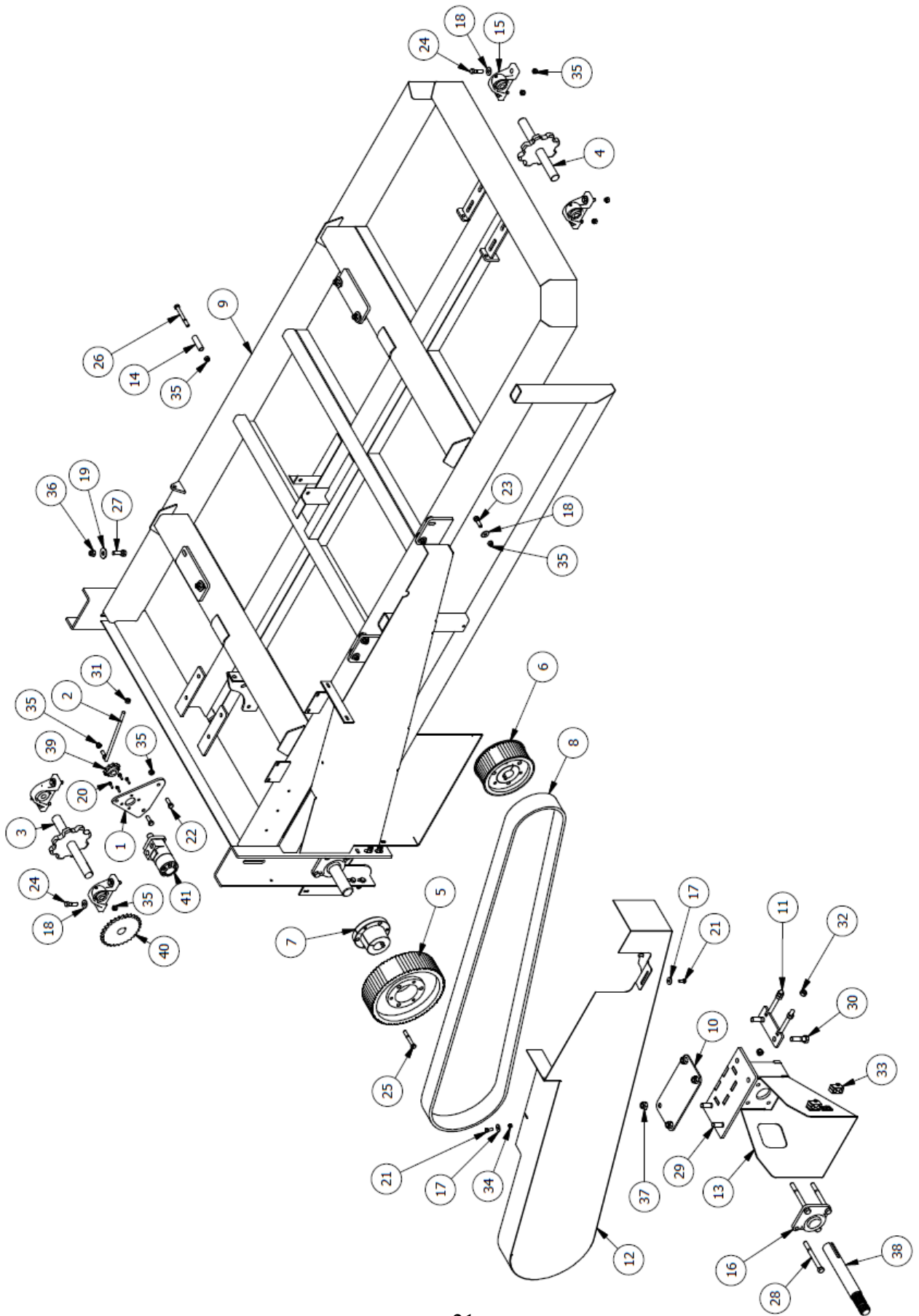
Shredder



Shredder

Item	Qty	Part #	Description
1	1	200003	Bale Pusher
2	1	200177	Outer Lid Support
3	1	208106	Side Discharge Deflector
4	2	208141	Bearing Protector
5	1	208142	Bottom Beater
6	1	25735	Hinge Shaft
7	1	25754	Hinge Tab
8	1	27233	Upper Hood
9	1	28020	Deck
10	1	Obtain Locally	.188 Snap Ring
11	2	30264	Flail Drum Spacer
12	1	B1 089	Bale Pusher Link
13	2	CMP200120	Bearing
14	1	Obtain Locally	CP .125 Cotter Pin
15		Obtain Locally	FW .438 Flat Washer
16		Obtain Locally	FW .5 Flat Washer
17		Obtain Locally	FW .625 Flat Washer
18		Obtain Locally	HB .25 X .75 Hex Bolt
19		Obtain Locally	HB .5 X 1.25 Hex Bolt
20		Obtain Locally	HB .5 X 1.5 Hex Bolt
21		Obtain Locally	HB .5 X 1.75 Hex Bolt
22		Obtain Locally	HB .625 X 2 Hex Bolt
23		Obtain Locally	HB .625 X 2.25 Hex Bolt
24		Obtain Locally	LN .25 Lock Nut
25		Obtain Locally	LN .375 Lock Nut
26		Obtain Locally	LN .5 Lock Nut
27		Obtain Locally	LN .625 Lock Nut
28	1	PCT 200172L	Left Side Adjustable Plate
29	1	PCT 200172R	Right Side Adjustable Plate
30	1	PCT200001	Bale Pusher Guide
31	1	PCT200002	Deflector Adjuster
32	1	PCT200057	Main Beater Shaft
33	1	PCT200174	Upper Hood Cover
34	1	SAW200013	Bale Pusher Mount

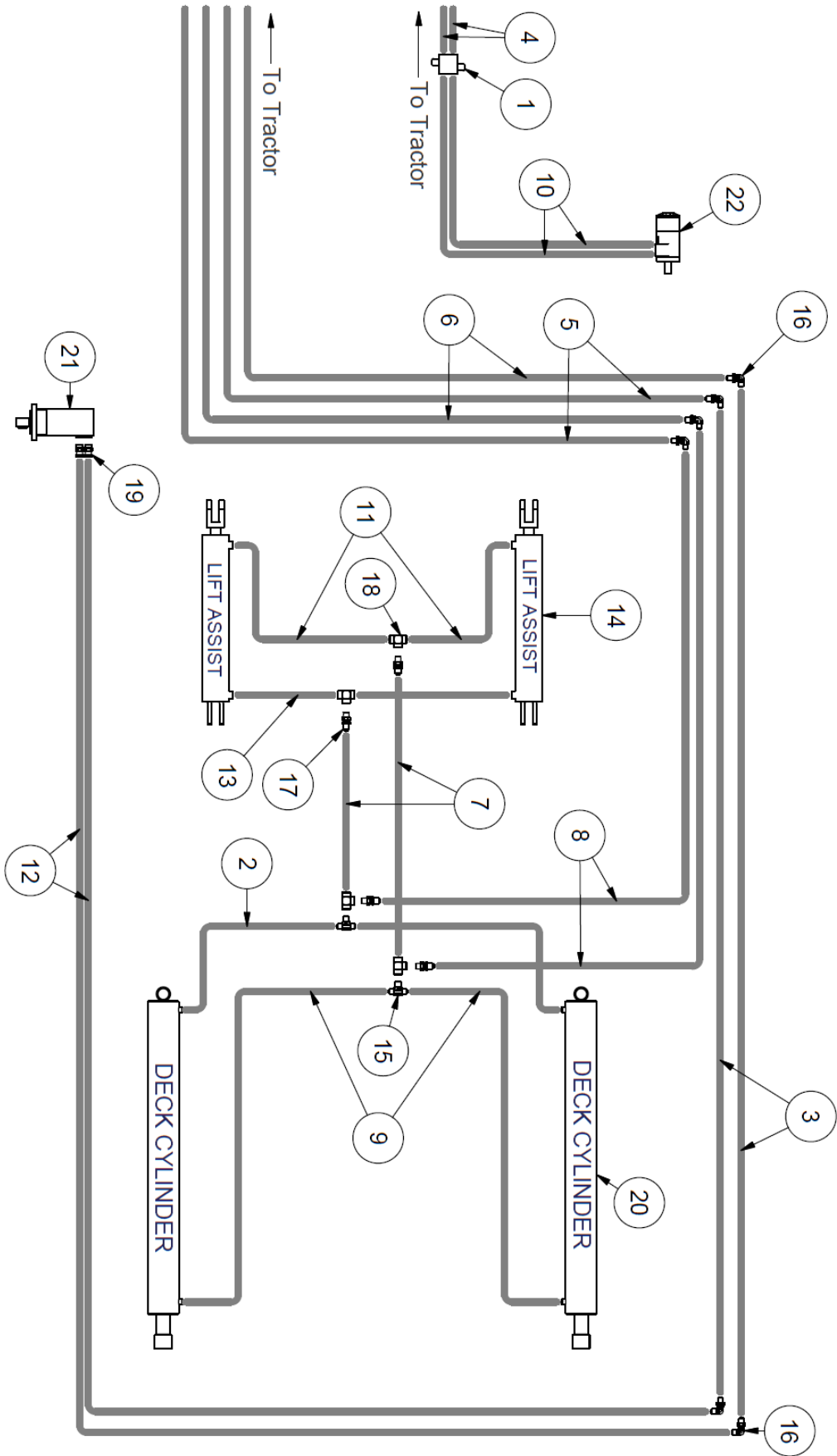
Shredder



Shredder

Item	Qty	Part #	Description
1	1	208119A	Ram Motor Mount
2	1	27232	Chain Tightener
3	1	27263	Ram Sprocket
4	1	27264	Ram Idler
5	1	28005	Top Pulley
6	1	28006	Bottom Pulley
7	1	28007	Taper Lock
8	1	28008	Drive Belt
9	1	28020	Deck
10	1	28232	Belt Guard
11	1	28785	PTO Box Adjuster
12	1	28930	PTO Guard
13	1	29017	PTO Shield
14	1	30268	Chain Roller
15	4	BEA P208-108DI	2 Bolt Bearing
16	4	CMP200120	4 Bolt Bearing
17		Obtain Locally	FW .375 Flat Washer
18		Obtain Locally	FW .5 Flat Washer
19		Obtain Locally	FW .625 Flat Washer
20		Obtain Locally	HB .25 X 1 Hex Bolt
21		Obtain Locally	HB .375 X 1 Hex Bolt
22		Obtain Locally	HB .5 X 1.5 Hex Bolt
23		Obtain Locally	HB .5 X 1.75 Hex Bolt
24		Obtain Locally	HB .5 X 2 Hex Bolt
25		Obtain Locally	HB .5 X 3.5 Hex Bolt
26		Obtain Locally	HB .5 X 4.5 Hex Bolt
27		Obtain Locally	HB .625 X 2 Hex Bolt
28		Obtain Locally	HB .625 X 6.5 Hex Bolt
29		Obtain Locally	HB .75 X 2.5 Hex Bolt
30		Obtain Locally	HB .75 X 2.75 Hex Bolt
31		Obtain Locally	HN .5 Hex Nut
32		Obtain Locally	HN .625 Hex Nut
33	3	LA-HOSE CLAMP	Hose Clamp
34		Obtain Locally	LN .375 Lock Nut
35		Obtain Locally	LN .5 Lock Nut
36		Obtain Locally	LN .625 Lock Nut
37		Obtain Locally	LN .75 Lock Nut
38	1	PCT200163	PTO Drive Shaft
39	1	SPR60B11	Sprocket
40	1	SPR60B30F-IH	Sprocket
41	1	VAL 1008	Hydraulic Motor












Boss IV Hydraulic Schematic



Boss IV Hydraulic Schematic

Item	Qty	Part #	Description
1	1	26215	Cross Over Relief Valve
2	2	26913	60" Hydraulic Hose
3	2	28029	192" Hydraulic Hose
4	2	28233	86" Hydraulic Hose
5	2	28234	180" (Short Fittings) Hydraulic Hose
6	2	28235	180" (Long Fittings) Hydraulic Hose
7	2	28236	18" Hydraulic Hose
8	2	28237	139" Hydraulic Hose
9	2	28238	67" Hydraulic Hose
10	2	28239	87" Hydraulic Hose
11	2	28240	39" Hydraulic Hose
12	2	28241	188" Hydraulic Hose
13	2	30262	37" Hydraulic Hose
14	2	CYL BS 199899	Hydraulic Cylinder (Lift Assist)
15	2	HF 2601-8-8-8	Hydraulic Fitting
16	6	HF 2701LN-8-8	Hydraulic Fitting
17	4	HF 2706LN-8-8	Hydraulic Fitting
18	4	HF 5605-8	Hydraulic Fitting
19	2	HF 6402-10-8	Hydraulic Fitting
20	2	CYL 27558	Hydraulic Cylinder (Deck)
21	1	VAL MHYS 400	Hydraulic Motor (Deck Motor)
22	1	VAL 1008	Hydraulic Motor (Shredder Motor)

UNIFIED INCH BOLT AND CAP SCREW TORQUE VALUES

SAE Grade and Head Markings	1 or 2 ^b	5	5.1	5.2	8	8.2
	NO MARK 					
SAE Grade and Nut Markings	2	5		8		
	NO MARK 					

TST162 -19-04MAR09

Size	Grade 1				Grade 2 ^b				Grade 5, 5.1, or 5.2				Grade 8 or 8.2			
	Lubricated ^a		Dry ^a		Lubricated ^a		Dry ^a		Lubricated ^a		Dry ^a		Lubricated ^a		Dry ^a	
	N-m	lb-ft	N-m	lb-ft	N-m	lb-ft	N-m	lb-ft	N-m	lb-ft	N-m	lb-ft	N-m	lb-ft	N-m	lb-ft
1/4	3.7	2.8	4.7	3.5	6	4.5	7.5	5.5	9.5	7	12	9	13.5	10	17	12.5
5/16	7.7	5.5	10	7	12	9	15	11	20	15	25	18	28	21	35	26
3/8	14	10	17	13	22	16	27	20	35	26	44	33	50	36	63	46
7/16	22	16	28	20	35	26	44	32	55	41	70	52	80	58	100	75
1/2	33	25	42	31	53	39	67	50	85	63	110	80	120	90	150	115
9/16	48	36	60	45	75	56	95	70	125	90	155	115	175	130	225	160
5/8	67	50	85	62	105	78	135	100	170	125	215	160	240	175	300	225
3/4	120	87	150	110	190	140	240	175	300	225	375	280	425	310	550	400
7/8	190	140	240	175	190	140	240	175	490	360	625	450	700	500	875	650
1	290	210	360	270	290	210	360	270	725	540	925	675	1050	750	1300	975
1-1/8	400	300	510	375	400	300	510	375	900	675	1150	850	1450	1075	1850	1350
1-1/4	570	425	725	530	570	425	725	530	1300	950	1650	1200	2050	1500	2600	1950
1-3/8	750	550	950	700	750	550	950	700	1700	1250	2150	1550	2700	2000	3400	2550
1-1/2	1000	725	1250	925	990	725	1250	930	2250	1650	2850	2100	3600	2650	4550	3350

DO NOT use these values if a different torque value or tightening procedure is given for a specific application. Torque values listed are for general use only. Check tightness of fasteners periodically.

Shear bolts are designed to fail under predetermined loads. Always replace shear bolts with identical grade.

Fasteners should be replaced with the same or higher grade. If higher grade fasteners are used, these should only be tightened to the strength of the original.

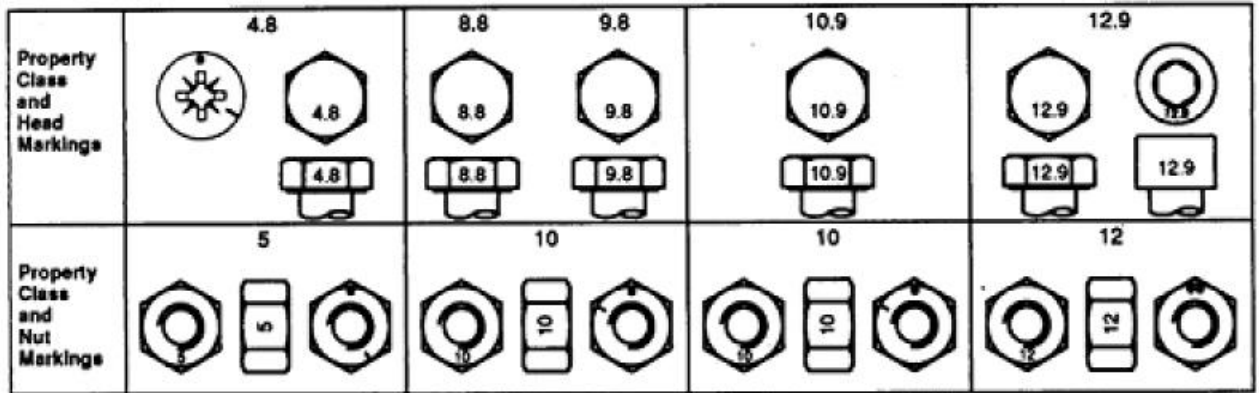
Make sure fasteners threads are clean and that you properly start thread engagement. This will prevent them from failing when tightening.

Tighten plastic insert or crimped steel-type lock nuts to approximately 50 percent of the dry torque shown in the chart, applied to the nut, not to the bolt head. Tighten toothed or serrated-type lock nuts to the full torque value.

^a "Lubricated" means coated with a lubricant such as engine oil, or fasteners with phosphate and oil coatings. "Dry" means plain or zinc plated without any lubrication.

^b Grade 2 applies for hex cap screws (not hex bolts) up to 152 mm (6-in.) long. Grade 1 applies for hex cap screws over 152 mm (6-in.) long, and for all other types of bolts and screws of any length.

METRIC BOLT AND CAP SCREW TORQUE VALUES



Size	Class 4.8				Class 8.8 or 9.8				Class 10.9				Class 12.9			
	Lubricated ^a		Dry ^a		Lubricated ^a		Dry ^a		Lubricated ^a		Dry ^a		Lubricated ^a		Dry ^a	
	N-m	lb-ft	N-m	lb-ft	N-m	lb-ft	N-m	lb-ft	N-m	lb-ft	N-m	lb-ft	N-m	lb-ft	N-m	lb-ft
M6	4.8	3.5	6	4.5	9	6.5	11	8.5	13	9.5	17	12	15	11.5	19	14.5
M8	12	8.5	15	11	22	16	28	20	32	24	40	30	37	28	47	35
M10	23	17	29	21	43	32	55	40	63	47	80	60	75	55	95	70
M12	40	29	50	37	75	55	95	70	110	80	140	105	130	95	165	120
M14	63	47	80	60	120	88	150	110	175	130	225	165	205	150	260	190
M16	100	73	125	92	190	140	240	175	275	200	350	255	320	240	400	300
M18	135	100	175	125	260	195	330	250	375	275	475	350	440	325	560	410
M20	190	140	240	180	375	275	475	350	530	400	675	500	625	460	800	580
M22	260	190	330	250	510	375	650	475	725	540	925	675	850	625	1075	800
M24	330	250	425	310	650	475	825	600	925	675	1150	850	1075	800	1350	1000
M27	490	360	625	450	950	700	1200	875	1350	1000	1700	1250	1600	1150	2000	1500
M30	675	490	850	625	1300	950	1650	1200	1850	1350	2300	1700	2150	1600	2700	2000
M33	900	675	1150	850	1750	1300	2200	1650	2500	1850	3150	2350	2900	2150	3700	2750
M36	1150	850	1450	1075	2250	1650	2850	2100	3200	2350	4050	3000	3750	2750	4750	3500

DO NOT use these values if a different torque value or tightening procedure is given for a specific application. Torque values listed are for general use only. Check tightness of fasteners periodically.

Shear bolts are designed to fail under predetermined loads. Always replace shear bolts with identical property class.

Fasteners should be replaced with the same or higher property class. If higher property class fasteners are used, these should only be tightened to the strength of the original.

^a "Lubricated" means coated with a lubricant such as engine oil, or fasteners with phosphate and oil coatings. "Dry" means plain or zinc plated without any lubrication.

Make sure fasteners threads are clean and that you properly start thread engagement. This will prevent them from falling when tightening.

Tighten plastic insert or crimped steel-type lock nuts to approximately 50 percent of the dry torque shown in the chart, applied to the nut, not to the bolt head. Tighten toothed or serrated-type lock nuts to the full torque value.

