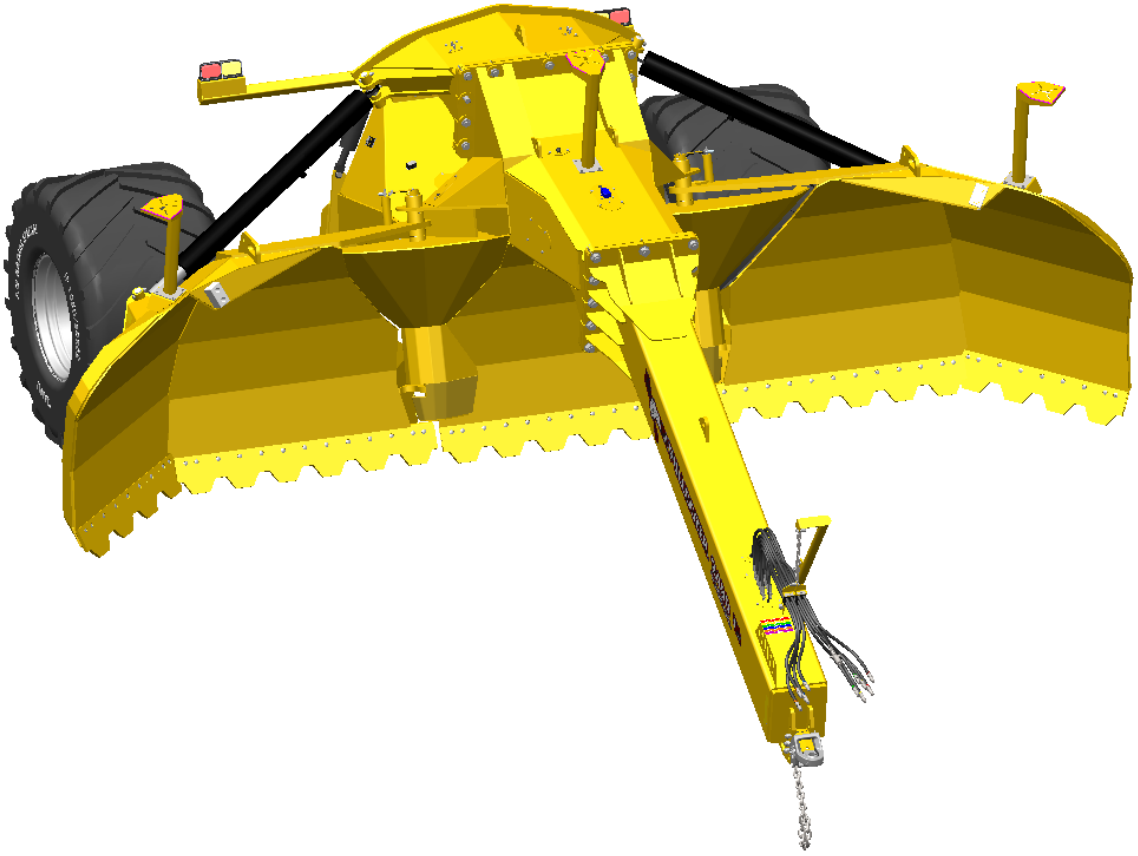
BRIDGEVIEW MFG. INC.



PULLDOZER TRANSFORMER

2490

Operator, Assembly & Parts Manual

Last Updated July 29, 2025

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Your Authorized Dealer
Your Serial Number

The serial number is located on the front of the middle blade on the left side of the machine.

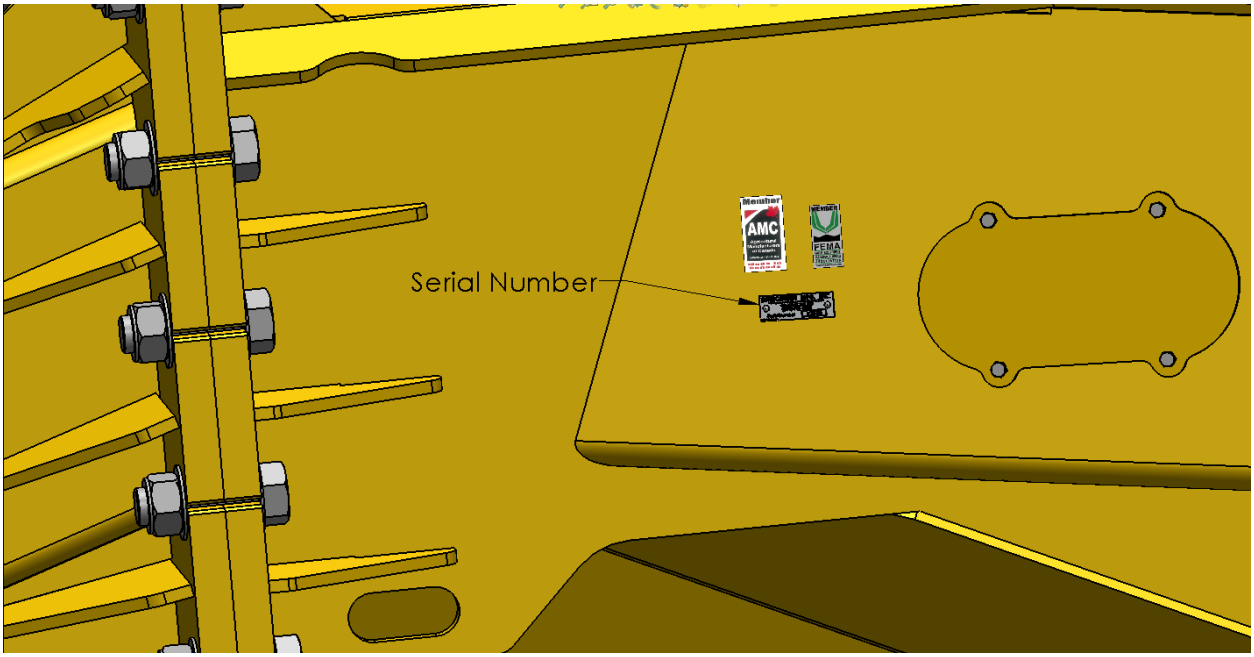


Figure 1.01

Table of Contents

1. Introduction

Thank you for purchasing a Pulldozer Transformer from Bridgeview Manufacturing. With the proper operation and service as outlined in this manual, the Pulldozer Transformer will provide you with years of trouble-free operation.

This is a complete safety, operation, and parts manual for the Pulldozer Transformer. The manual covers in detail how to use your new machine safely and effectively. The procedures outlined in this manual should be followed to ensure safe operation and longevity of your machine. The parts and assembly manual covers all parts you may need to order in case of accident or breakdown and how to install them. Please read completely through this manual before beginning operation of your new machine.

Left and right as used in the parts book is as viewed from the rear of the Pulldozer Transformer while looking in the direction of travel.

1.1 Safety Precautions

The following safety precautions MUST be followed to ensure the safe operation of the Pulldozer Transformer.

- **Tow at speeds not exceeding 31 miles/hour** (50 km/h) **when unloaded**. Slow down for hills, curves, rough area, and in advance of braking to prevent loss of control and possible injury or death.
- Read and follow the **Highway Transport** section before towing on public roads.
- **Always** turn off tractor, ensure parking brake is applied before leaving the operating platform, and remove key when working on machine
- **Always** leave cutting edge on the ground when not operating.
- **Always** leave hydraulic cylinders, when not operating, in the de-stroked position.
- **Stand clear** of the Pulldozer Transformer while in operation.
- **Beware** of pinch points at all articulating joints.
- **Support Raised Equipment** when working on machine
- **Do Not** over load Pulldozer Transformer and tractor design limits

1.2 Power Requirements

The Pulldozer Transformer is designed to utilize the pulling power of a large four-wheel-drive tractor. The following table shows the recommended drawbar horsepower required to pull a Pulldozer Transformer. Pulling with too large a tractor risks damaging the machine, while too small a tractor risks overloading and damaging the tractor.

	Horsepower	Maximum Tractor Weight
24 Foot	400 - 600 HP	67,000 lbs.

Call Before You Dig:

Every time you dig in the ground, wherever it may be, **THERE IS DANGER BELOW!** You run the risk of loss of life or damage to property if you hit any of the many buried cables, conduits, gas or oil pipelines and/or other underground facilities that serve our cities, towns, and rural areas.

Contact the nearest **ONECALL (Call Before You Dig)** services for optimal diligence towards preventing damage to underground infrastructure.

Canada		
Province	**Number**	**Website**
British Columbia	1.800.474.6886	http://www.bconecall.bc.ca/
Alberta	1.800.242.3447	http://www.alberta1call.com/
Saskatchewan	1.866.828.4888	http://www.sask1stcall.com/
Manitoba	1.800.827.5094	www.callb4udig.mb.ca/
Ontario	1.800.400.2255	http://www.on1call.com/
Quebec	1.800.663.9228	http://www.info-ex.com/
United States		
All states	811	http://www.call811.com/
TransCanada Pipelines		
Canada	1.888.982.7222	
United States	1.800.447.8066	

1.3 Transportation

Check with local authorities regarding transport on public roads. Follow all applicable laws and regulations.

Note the transportation dimensions shown below:

	2490
Total Weight	31,000 lb.
Hitch Weight	10,000 lb.
Axle Weight	21,000 lb.
Transport Height	12'-3"
Flat Height Blade to Top	10'-7"
Transport Blade Clearance	33"
Transport Width (Blade)	11'-7"
Transport Width (Tires)	11'-10"
Transport Length	28'-10"

When transporting the Pulldozer Transformer on public roads, the following precautions should be taken:

- Avoid transporting at night whenever possible
- ALWAYS ensure that the flashers and tail lights are clean and operational
- ALWAYS ensure that the Slow-Moving Vehicle (SMV) sign is visible
- NEVER exceed speeds of 25 mph (40 km/h)
- ALWAYS ensure that the safety chain is properly installed
- DO NOT tow with a vehicle that cannot handle the massive weight of the Pulldozer Transformer
- Check for the oversize or overload permit with the authorities for transportation on public highways.
- Ensure that blade is fully lifted, level, and not in contact with the road (maintain a safe level from the ground).
- Ensure that all safety locks are in place
- Ensure that the hydraulic hoses are properly secured (not dragging on the ground)

1.4 Field to Transport Position

1. Position machine on level ground. Stop tractor, and engage parking brake. Make sure wings are in the flat position as shown below

2. Engage lift cylinder remote and lower machine onto ground. Ensure the lift cylinders are fully retracted, telescopic tubes are free to retract, and tires are off the ground.

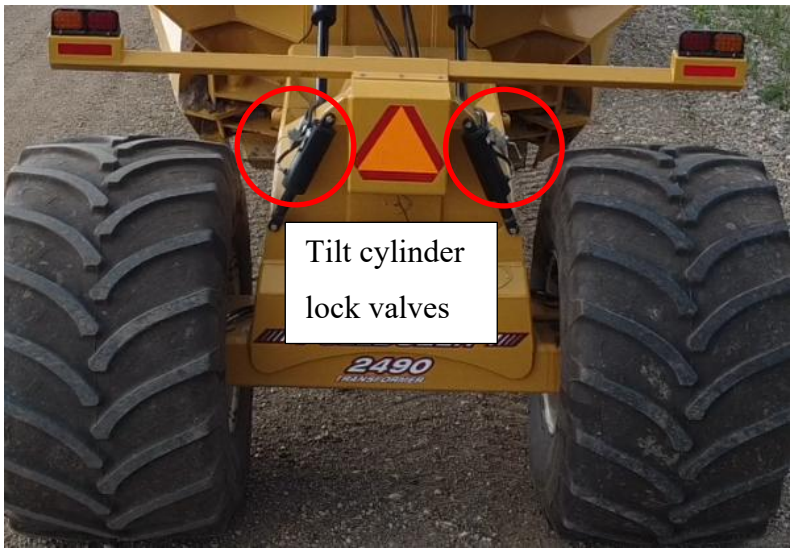
3. Retract tires to transport position

4. Raise the machine extending lifting cylinders

5. Operate the wing lift hydraulics to raise the wings fully into transport position.

Use a safety chain to lock the wings in transport position. Apply transportation locks on the tilt cylinders


PULLDOZER
2490


Tilt cylinder
lock valves
2490

Transportation Locks:

The lifting cylinders of the Pulldozer are held in position by self-locking valves. This prevents the machine from creeping downwards when raised.

1. Blade lift cylinder locking valves

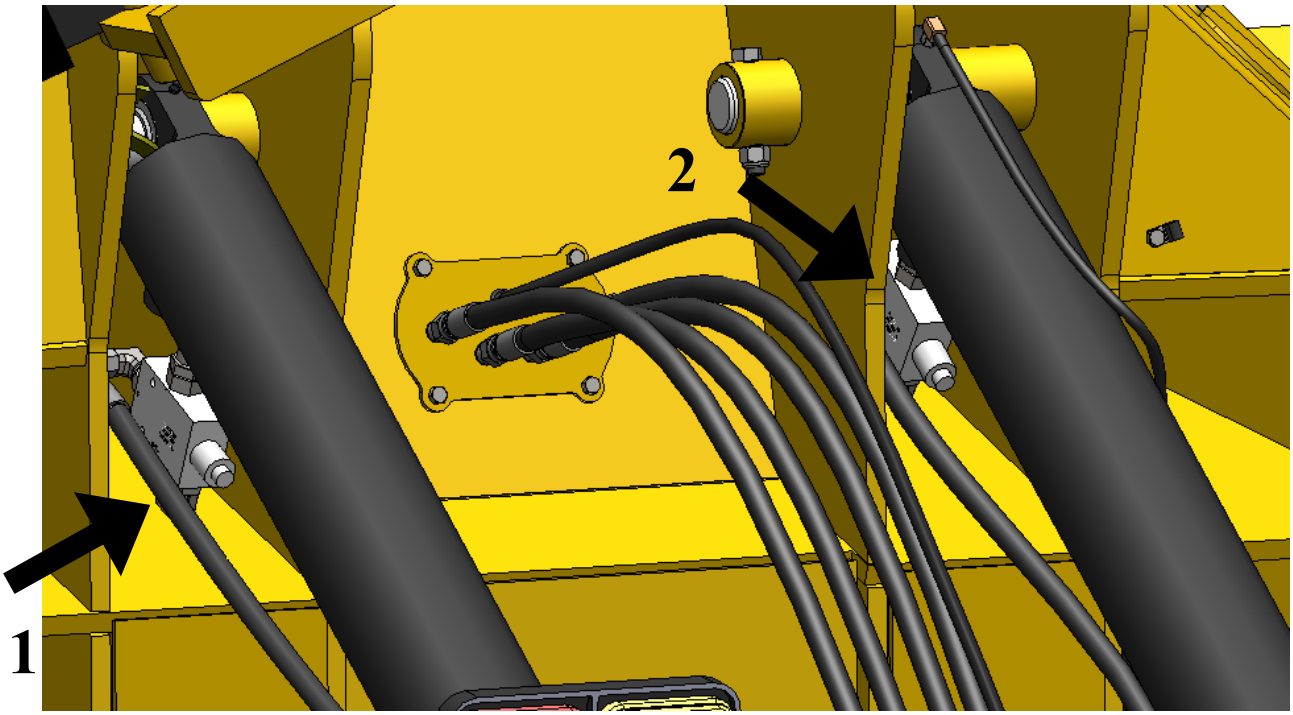


Figure 1.1 Lift Cylinder Check Valve Safety Locks

2. Tilt cylinder hydraulic on/off valve (One on each side)

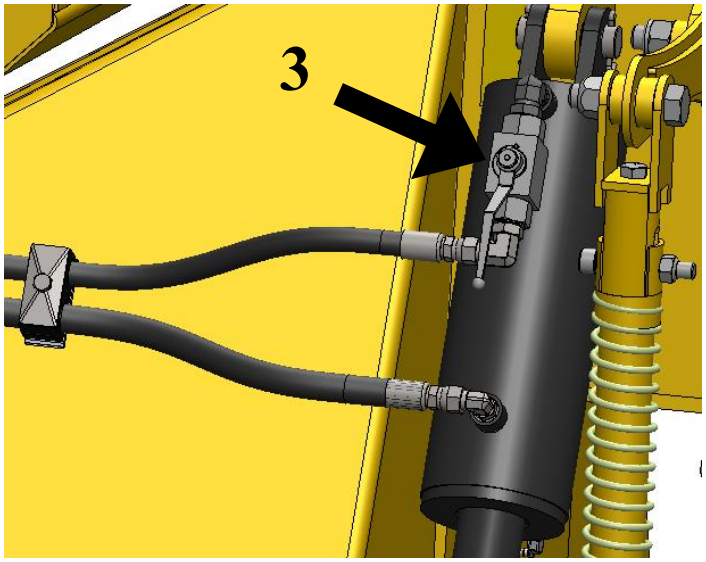


Figure 1.2 Tilt Cylinder Hydraulic on/off valve

1.5 Storage

When storing the 2490 Pulldozer Transformer set the blades with wooden blocks underneath so they do not sit in the ground. Apply grease to all exposed hydraulic cylinder shafts.

1.6 Lights and Marking

The Pulldozer Transformer comes standard with light kit for better visibility. The lights can be plugged into the standard 7-pin round trailer plug on a tractor. The lights function as flashing lights, with solid red tail lights. Ensure that they are functioning properly before towing.

Ensure that the SMV (Slow Moving Sign) sign is in place and visible.

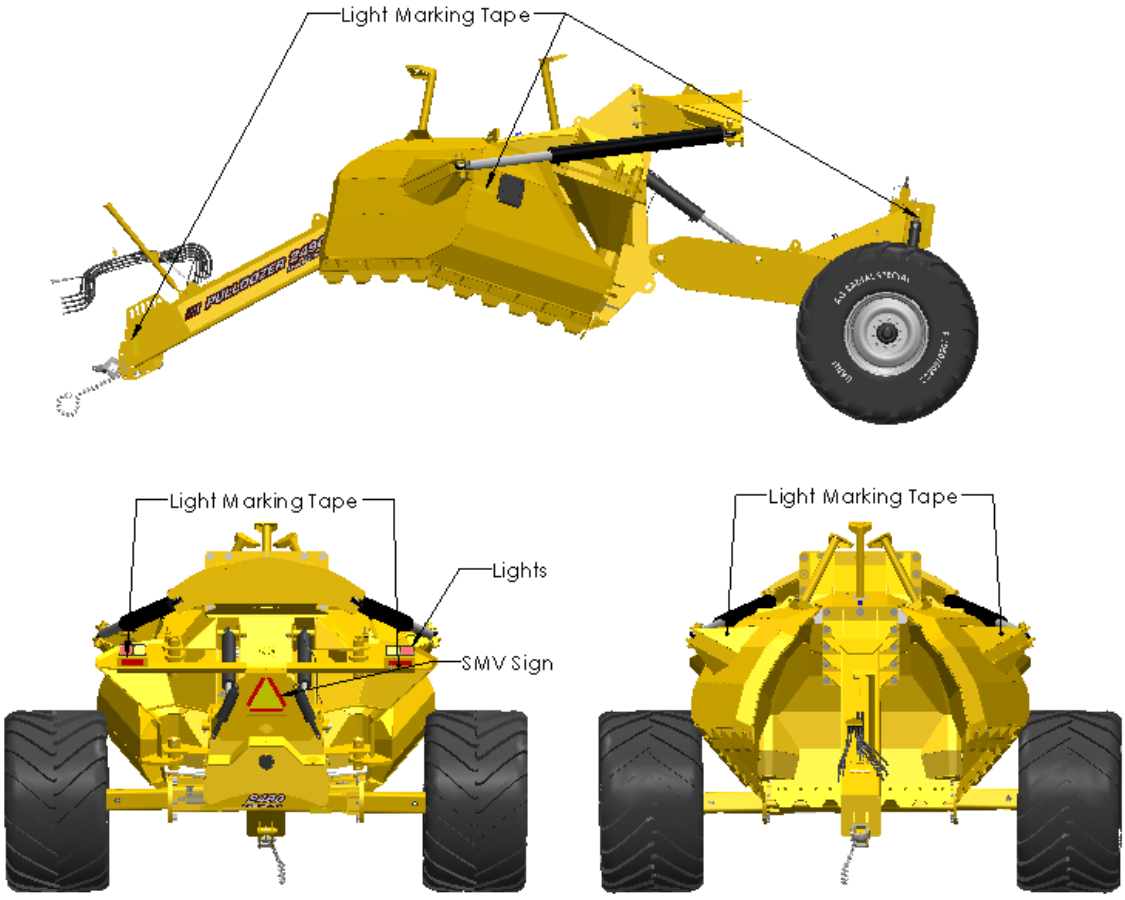


Figure 1.3 – Light Marking Locations

2. Features and Operation

The Pulldozer Transformer land shaper operates as a dozer, scraper, and grader, all in one complete, efficient, and virtually indestructible package.

The Pulldozer Transformer is capable of reclaiming unproductive land to allow for more seeded acreage. It can also drag dirt to elevate sloughs and potholes, level land, back-slope, clean and contour existing ditches and drains to improve draining and allow for earlier access by seeding equipment.

When mated with a GPS leveling system, the Pulldozer Transformer is excellent at making perfectly contoured fields for maximum drainage, or water retention.

Operators have reported 1 acre per hour of land reclamation, leaving it seed bed ready.

The Pulldozer Transformer allows for up to 25 cubic yards of dirt movement over short distances for the 24-foot unit.

This Unit comes equipped with an electronic system to accurately show the Pulldozer's wing and blade positions. This will be shown on the in-cab display.

Enjoy operating your new Pulldozer Transformer.

2.1 Hydraulic Systems

Hydraulic systems store considerable energy. They are used to:

- lift and change the position of attachments
- operate hydraulic motors
- assist in steering and braking

Leaks from hydraulic systems are a serious hazard because of the high pressure and temperature of the fluid contained in the system. Even fine jets of hydraulic fluid can burn or pierce skin and tissue. Workers should:

- Never inspect hydraulic hoses with bare hands;
- Wear long sleeves, heavy gloves and safety glasses when checking for leaks;
- Follow the instructions (blade to be on the ground and no pressure in hydraulic lines during maintenance) because the specific procedures for servicing these systems are very important for one's safety.

Where appropriate, a properly qualified and certified mechanic should perform repairs and maintenance.

Work should not be performed under raised hydraulic equipment.

There are five sets (2490) of hydraulic hoses to connect to the tractor. Each hose has a colored marker to identify its function. They should be connected for the best convenience at the tractor’s controls.

Note: the hoses are paired by color and the following table show the operation when pushing oil into the corresponding hoses.

Table 2.1.1 Pulldozer Transformer Hose Marking

Machine	Marker	Function
Pulldozer Transformer 2490	Long Red	Lift cylinder (lowers machine)
	Short Red	Lift cylinder (raises machine)
	Long Yellow	Left wing cylinder (opens wing-field)
	Short Yellow	Left wing cylinder (closes wing-transport)
	Long Green	Right cylinder (opens wing-field)
	Short Green	Right hand cylinder (closes wing-transport)
	Long Blue	Tilt cylinder
	Short Blue	Tilt cylinder
	Long Orange	Telescope cylinder (extends wheel width)
	Short Orange	Telescope cylinder (retracts wheel width)

2.2 Hitch Options

Your Pulldozer Transformer comes with a choice of two different articulating implement hitches. Category 4 has draw pin sizes of 1-1/2 (optional) and 2" (interchangeable) and Category 5 has a standard draw pin size of 2-3/4".

Draw Pin Size (inches)	Hitch Required	Part NO
1.50	Flanged Bushing	27373
2.00	Category 4 * with 2" bushing installed, 3 Hole Pattern	27372
2.75	Category 5, 3 Hole Pattern	30128

The articulating joint reduces drawbar and draw pin wear, thereby increasing the life of drawbar. This hitch allows for more control, especially with GPS navigation.

Also important is the hitch height. For maximum articulation, the hitch must be set to the correct height based on your tractor's drawbar height as follows.

Holes Used	Drawbar Height (inches)
1,2,3	21.25”
2,3,4*	19.00”
3,4,5*	16.75”

**** Factory setting***

For maximum articulation, a 3-5/8" clearance between the drawbar and hammer strap is also recommended. This will allow for 35 degrees front to back and 40 degrees side to side. This translates into a 10% grade (or 17-degree slope).

- NOTE: Exceeding this articulation range may damage or break the hitch – Breakage due to exceeding articulation range will no be covered by warranty!

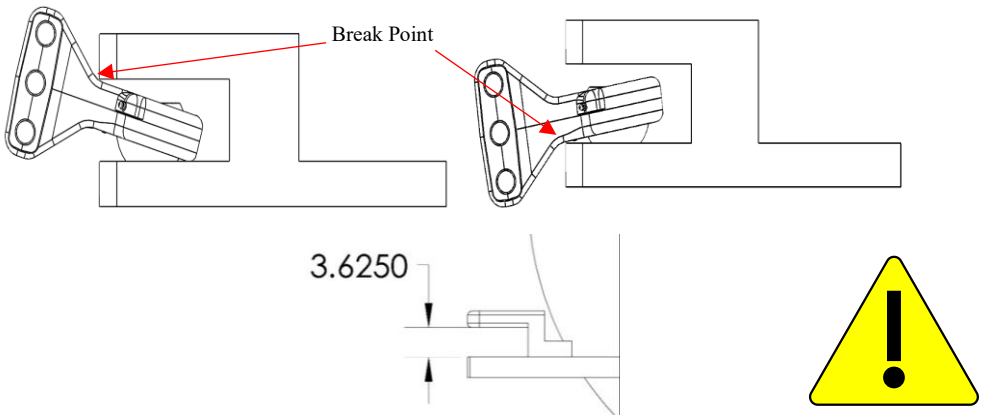


Figure 2.1 – Articulation clearance

2.3 Tires

Agricultural tread tires provide excellent flotation characteristics and minimal soil disturbance for packing and hauling applications. The speed and pressure on these tires should not exceed 30 mph (50 km/h) and 35 psi (241 kPa).

Check tire pressure and wheel torque on a regular basis.

Specifications	**2490**
Tire Size	1050/50R32
Tire Type	Tianli AG Radial Special
Rim Size	32
Tire Pressure	**35 psi**
Wheel Nut Torque	**280 ft-lb**

2.4 Lubrication

There are several pivot points on your Pulldozer that require lubrication for continuing performance. Lubrication is to be done on a regular basis. The grease points are in the following areas:

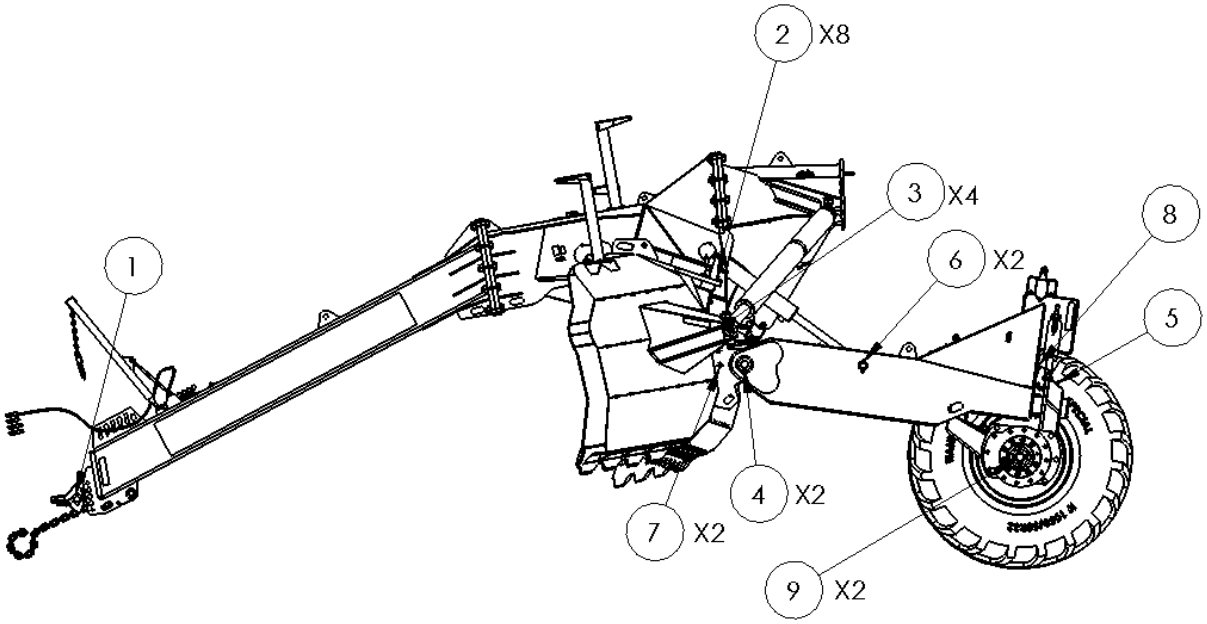


Figure 2.2 – Grease points locations

		Location	Interval
1	Hitch	Each side of casting	20 hours
2	Wing Pivot	Top and Bottom	10 hours
3	Wing Cylinder	Ball Joint Ends of Cylinders	10 hours
4	Blade Pivot	Front of Main Frame	10 hours
5	Rear Tilt Ring	Top of Axle	10 hours
6	Lift Cylinder Bottom	Facing towards top	20 hours
7	Lift Cylinder Top	Near Blade Pivot	20 hours
8	Front Tilt Ring	Back side of Main Frame	10 hours
9	Wheel Hub	Remove dust cap and pack with grease	100 hours or seasonally

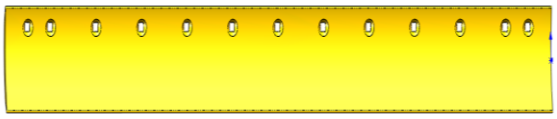
Grease using Mobil UNIREX EP2 GC-LB or equivalent.

2.5 Blade Options

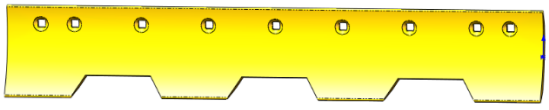
Efficient machine applications require the proper dozer attachments for the job at hand. Dozers are used in a wide variety of construction and maintenance applications for which several blade types have been developed. Soil characteristics, moisture content, compaction, ambient temperatures, and terrain are just some of the variables that will influence proper blade selection for optimal dozing productivity.

Using the right blade for the job will result in fuel savings, higher productivity, less wear on the tractor and a better finished product. Some dozer blades are designed for a specific application, while others have a broader range of uses and are more often employed. The Pulldozer Transformer comes with a choice of two blades. See section **3.1 Component Information (2490)** for part numbers for desired blade.

1. **Regular Blade:** General purpose operation. It has a penetration force of 1000 lb./ft. This is the factory standard. (6ft: 34153, 4ft: 34152)



2. **Notched Blade:** More suitable for higher penetration requirements. It can withstand penetration force up to 2000 lb./ft. Operators have noted that this blade leaves the field in better condition for immediate seeding. (6ft: 33053, 4ft: 33052)



NOTE: These blades wear over time. Contact your nearest Pulldozer representative to order any additional blades.

2.6 GPS Option

This GPS mounting tower kit **(24763)** is designed to be installed on any Pulldozer where GPS functionality is desired. On new machines three mounting locations are provided: in the center of the blade on top of the machine, and one on each wing. Before starting, ensure that all required components are present:

ID#	Description	QTY
24761	GPS Mounting Tower	1
13806	3/8" x 1-1/4" Bolt	4
11667	3/8" Flat washer	4
10271	3/8" Serrated flange nut	4

The following tools are required to install this kit:

Lifting device
Impact socket, 9/16"
Hand wrench, 9/16"

Before installing the mounting bracket, install the GPS antenna to the top (hardware is not supplied). Use the nuts and bolts to hold the tower in place.

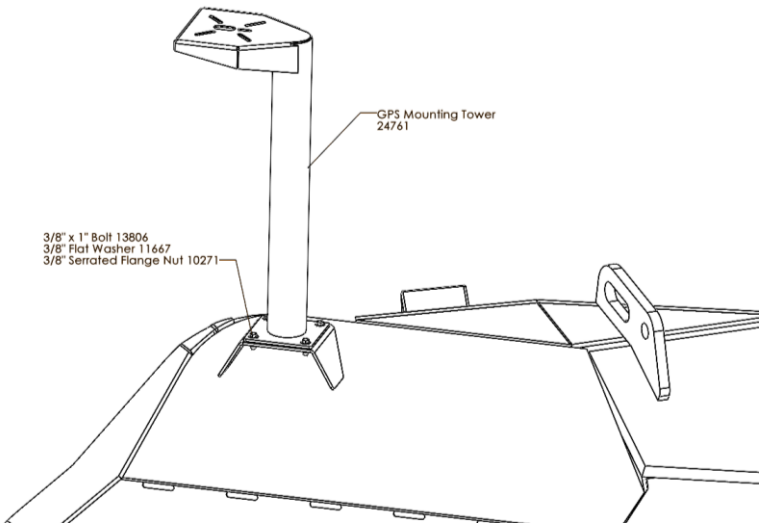
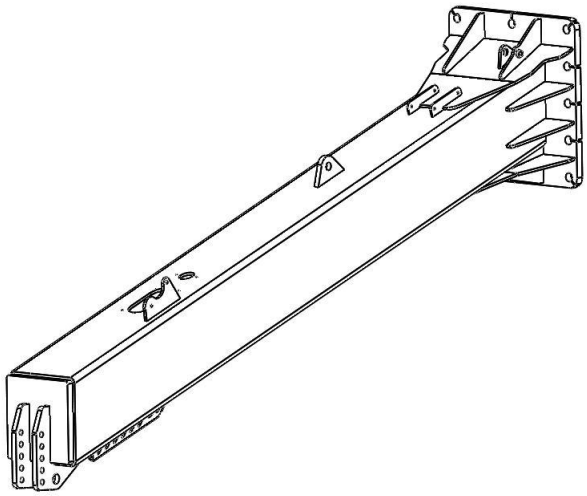
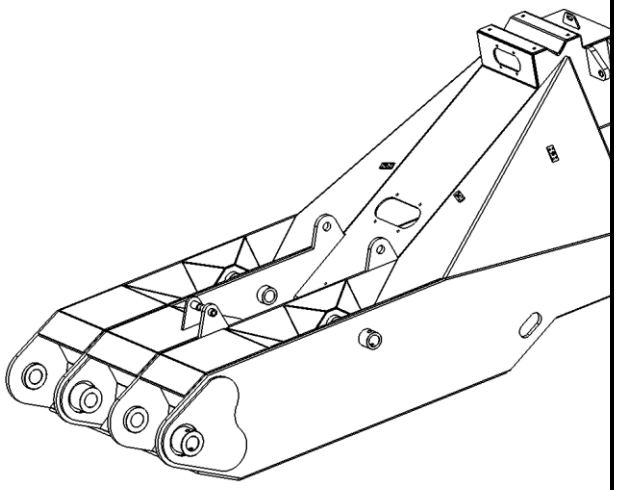
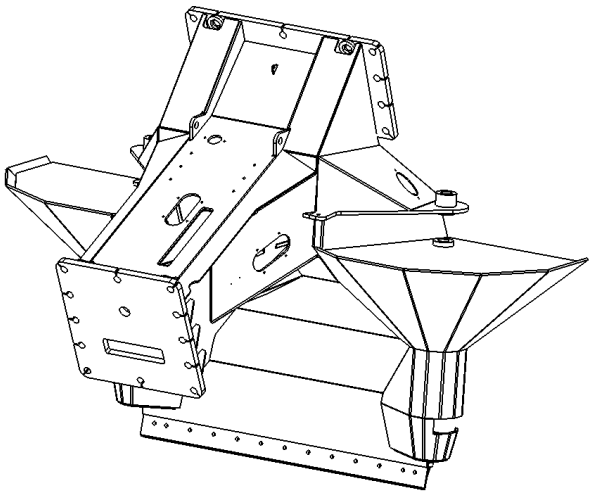
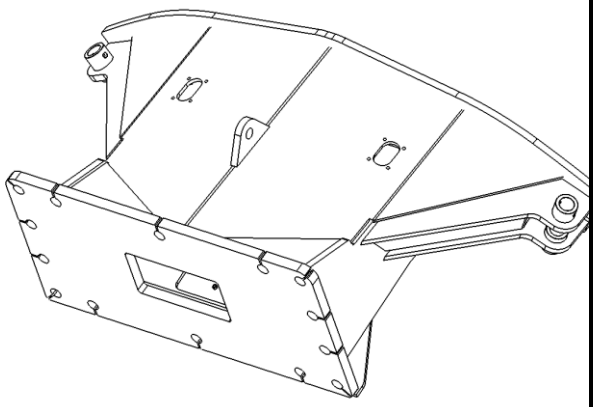


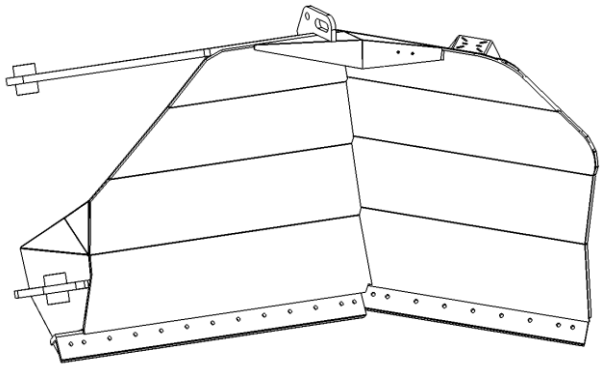
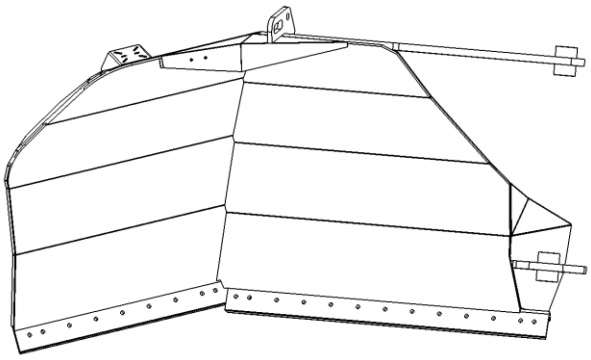
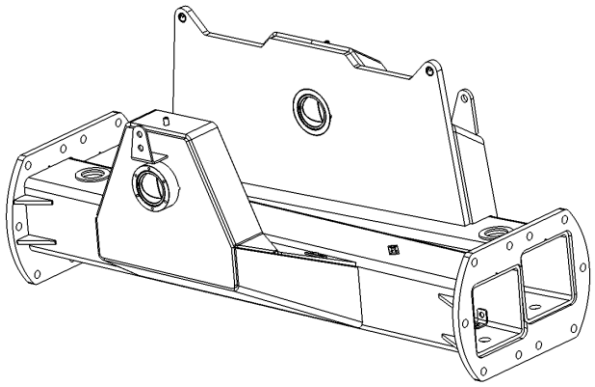
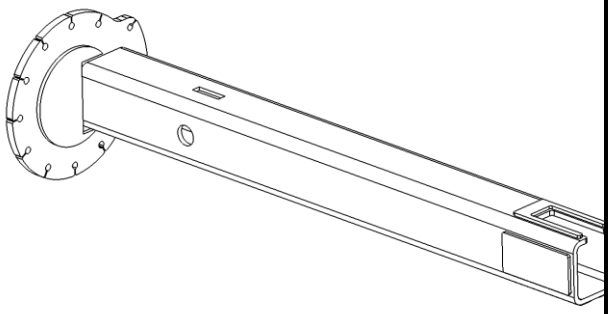
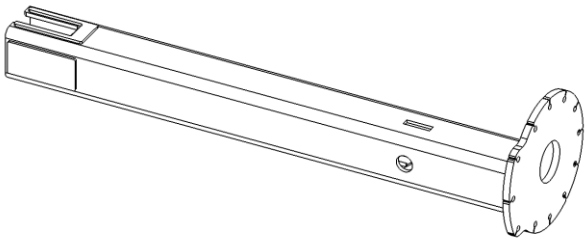
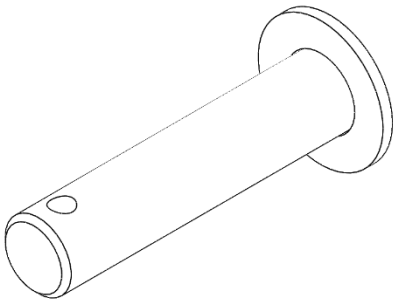
Figure 2.3 – Installing GPS tower

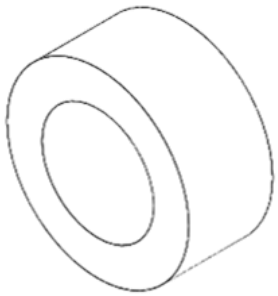
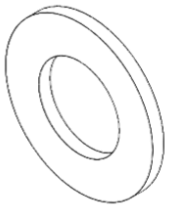
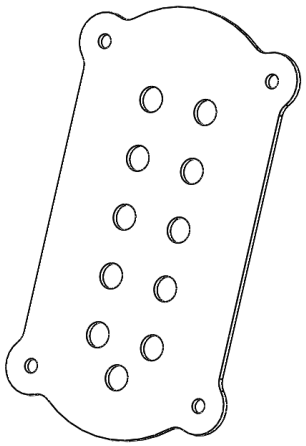
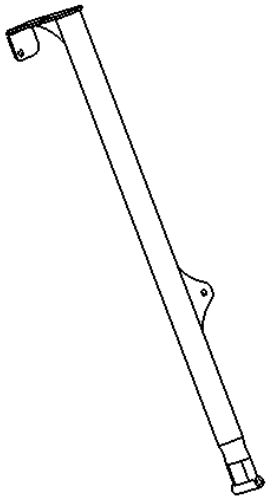
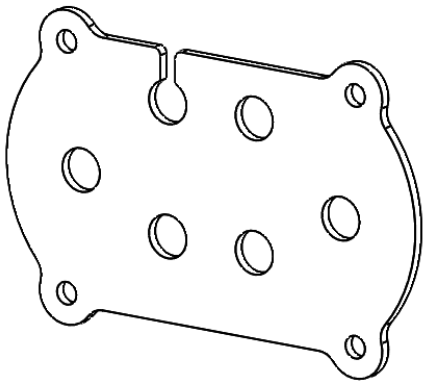
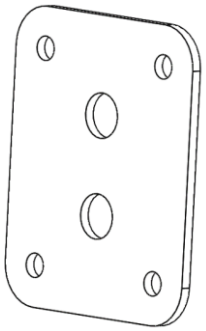
Route the electrical wires to the tractor cab through the Pulldozer hitch.

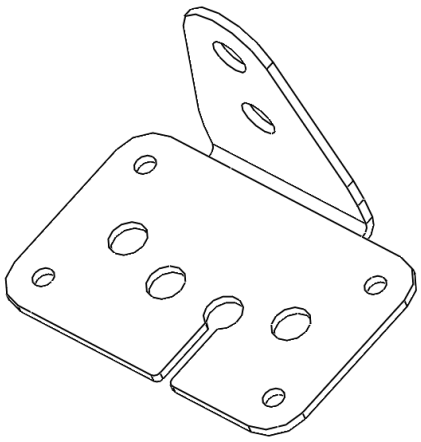
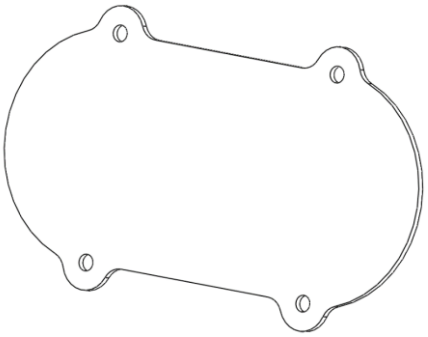
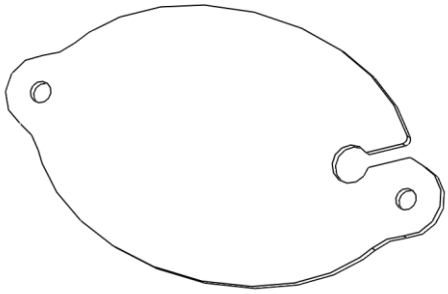
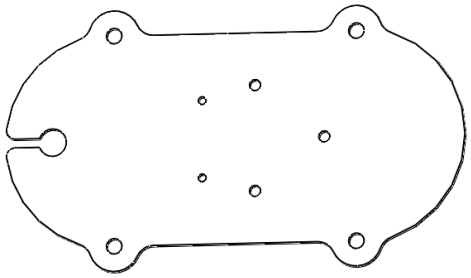
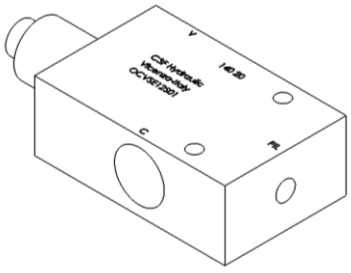
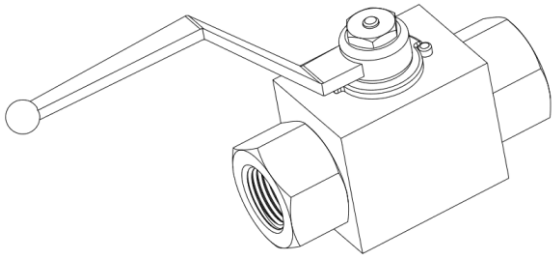
3. Assembly & Parts Manual

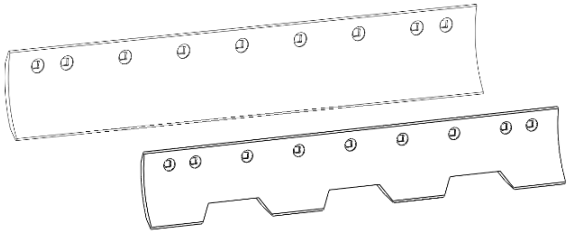
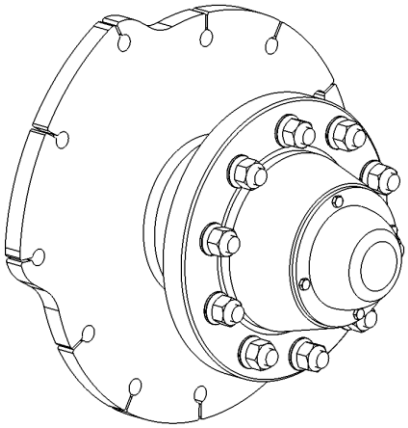
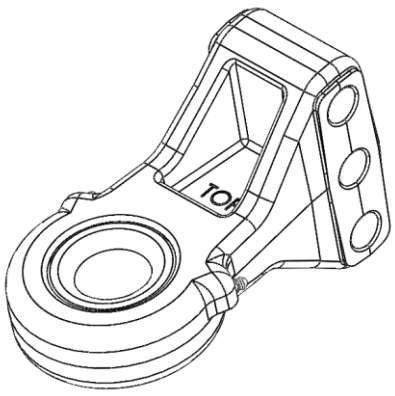
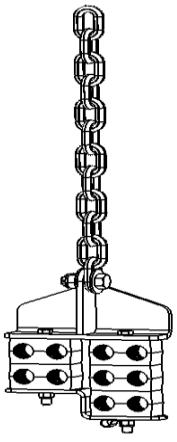
3.1 Component Information

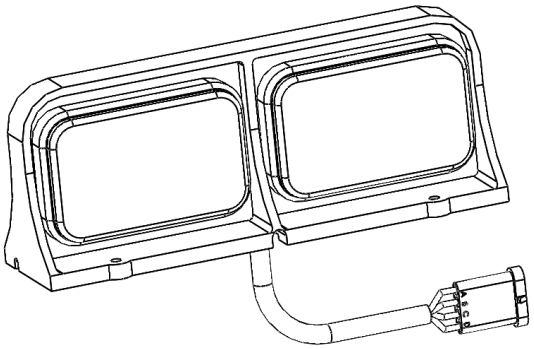
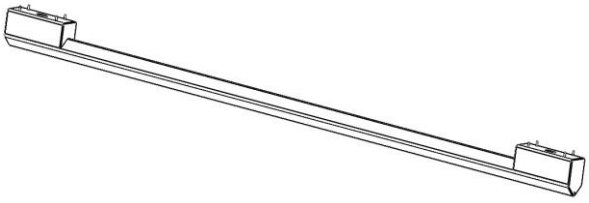
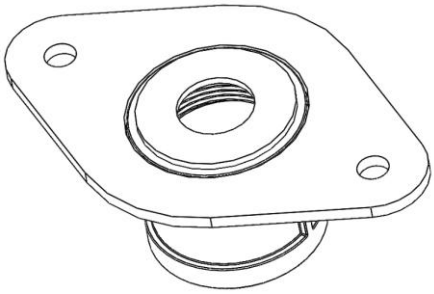
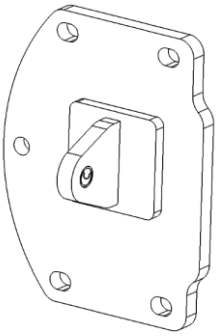
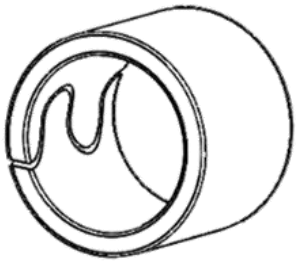
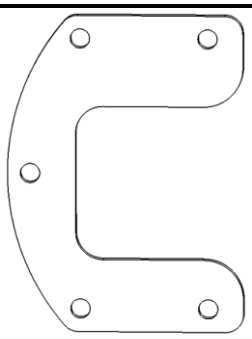
Hitch **35651** Weight = 1987 lb.	**Main Frame Weldment** **35655** Weight = 3563 lb.
	
Middle Blade **35653** Weight = 7411 lb.	***Back Wing Support*** **35666** Weight = 2044 lb.
	

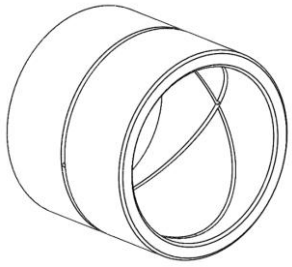
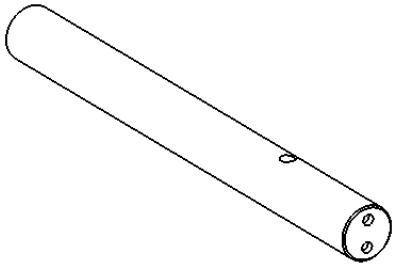
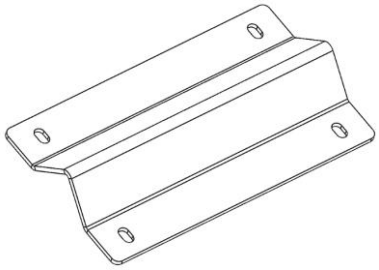
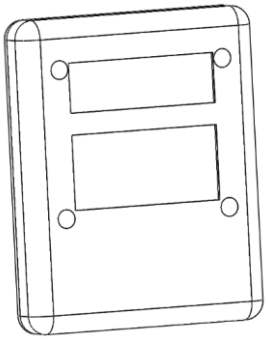
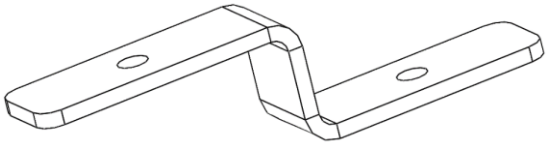
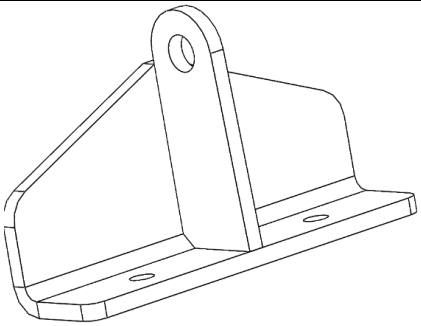
Left Hand Wing **35668** Weight = 3525 lb.	***Right Hand Wing*** **35670** Weight = 3523 lb.
	
Back Axle ***35657*** Weight = 2032 lb.	***Left Hand Telescoping Tube*** ***35661*** Weight = 482 lb.
	
Right Hand Telescoping Tube ***35659*** Weight = 482 lb.	***Safety Chain Pin*** ***27224***
	

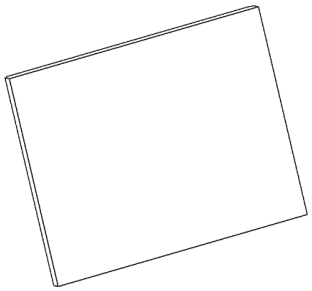
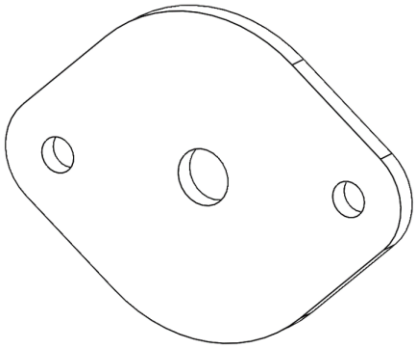
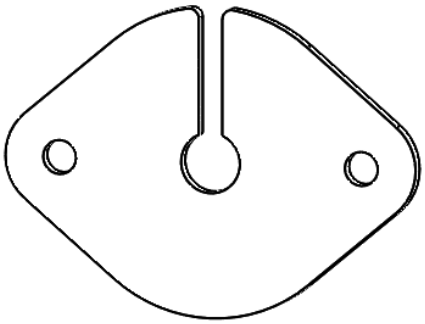
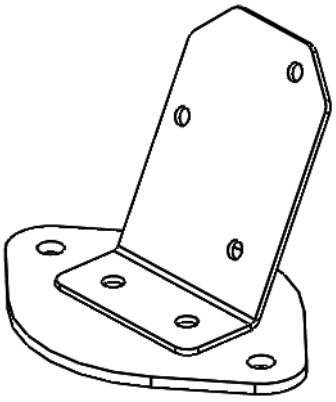
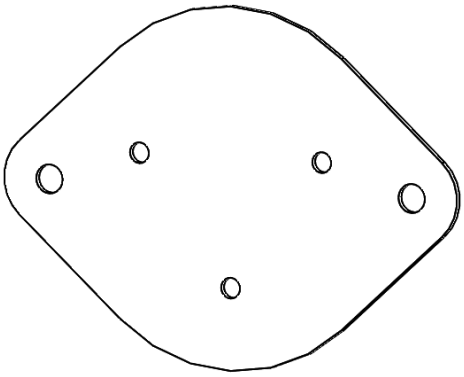
Safety Chain Pin Bushing ***27245***	***Safety Chain Washer*** ***27244***
	
Hitch Hose Plate ***35436***	***Hydraulic Hose Holder*** ***34493***
	
Rear Bulkhead ***35499***	***Wing Cylinder Hose Bulkhead*** ***35445***
	

Main Frame Bulkhead ***35501***	***Hydraulic Hose Access Plate*** ***27246***
	
Middle Blade Side Bulkhead ***35502***	Middle Blade Sensor Plate 35503
	
Lift Cylinder Counterbalance Valve ***33074***	***Tilt Cylinder Hydraulic Valve*** ***33041***
	

Wing Cylinder Pin 35437 x 4 ***Wing Pivot Pin 35438 x 2*** ***Lift Hydraulic Cylinder Base Pin 35439 x 2*** ***Lift Hydraulic Cylinder Shaft Pin 35440 x 2*** ***Main Frame Pivot Pin 35441 x 2***	***Blade Cutting Edge*** ***Straight:(34153) (Main Blade x 3)/ (34152)*** ***(Wing Blade x 2)*** ***Serrated: (33053) (Main Blade x 3) / (33052)*** ***(Wing Blade x 2)***
	
Tires & Rim (33276) ***See Section 3.2 e***	***Hub & Spindles (33239)*** ***See Section 3.2 e***
	
Articulating Hitch ***27372 (Cat. 4) / 30128 (Cat. 5)*** **(30128)**	***Chain Hose Holder***
	

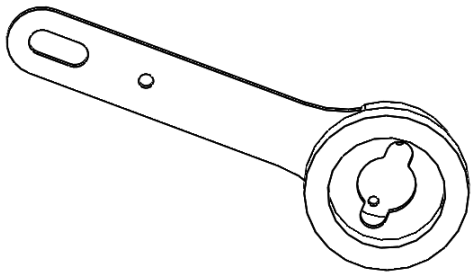
Lights **Right Light (31088) / Left Light (31087)**	***Light Bar*** ***35673***
	
GPS Cable Bracket ***35671***	***Telescoping Cylinder Flange*** ***35663***
	
Press in Bushing ***23708***	***Telescoping Cylinder Plate*** ***35378***
	

Hardened Bushing ***4" ID 33035***	**Main Frame/ Axle Pivot Pin** **35442**
	
Light Bar Bracket ***35435***	***Operators Manual Box*** ***22409***
	
Hose Holder Bottom Clamp ***34520***	***Hose Holder Top Clamp*** ***34507***
	

Hose Holder Chain (5/16") ***32168***	***Metal Slider*** ***35478***
	
Back Axle Grease Zerk Plate ***35457***	**Sensor Wiring Bulkhead** **35500**
	
Back Axle Sensor Bracket ***35678***	***Main Frame Sensor plate*** ***35506***
	

Rotary Sensor Mount

35676



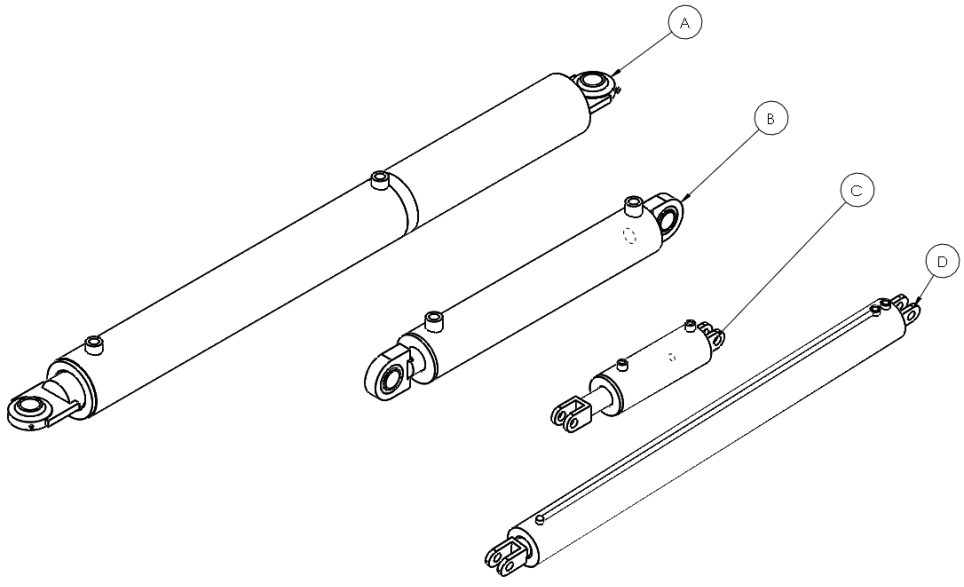
Hydraulic Cylinders:

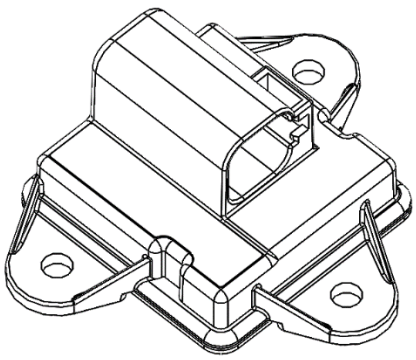
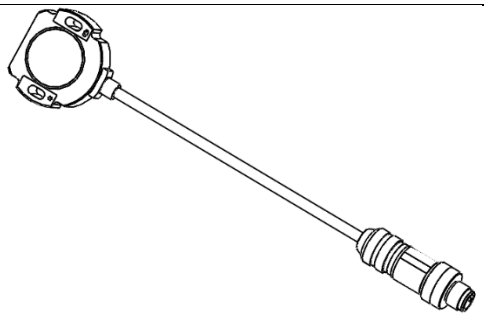
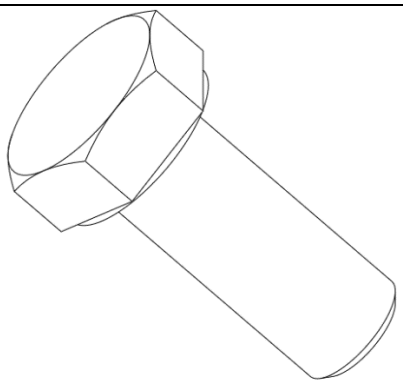
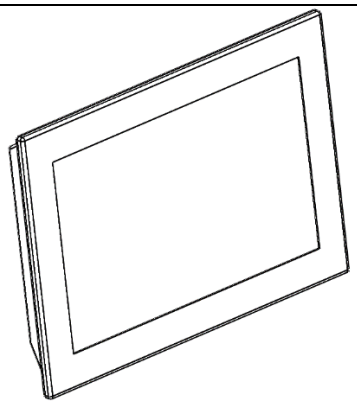
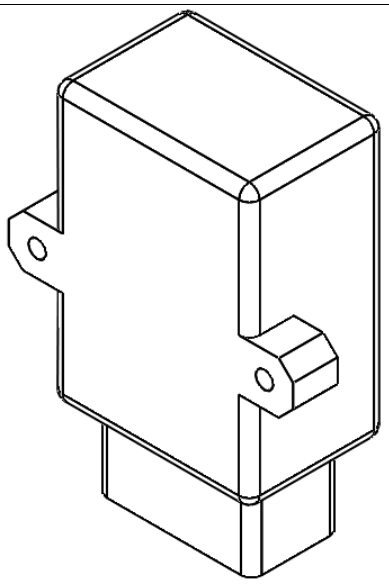
A: 33104 (6" x 32" Wing), 31188 (Seal Kit)

B: 23310 (5" x 24" Lift), 20808 (Seal Kit)

C: 33083 (4" x 8" Tilt), 20807 (Seal Kit)

D: 33084 (4" x 48" Telescope with Oil Line), 32574 (Seal Kit)



Inclination Sensors (34853) Middle Blade x1 Main Frame x1 Back Axle x1	Rotary Sensor (34852) x2
	
Rotary Marker (34854) x2	Display and Cab Mounting Kit (34851)
	
Wifi Transmitter (34856) x2	Wire Harnesses
	Cab wiring Harness (34850) Middle Blade Harness (34848) Mainframe wiring harness (34849)

3.2 Body Assembly

Note: Parts may not be exactly as shown.

a) Install Spindle (33239) and 4”x48” hydraulic cylinder with oil line into left (35660) and right (35658) hand telescoping tube. Secure spindle in place with twelve ¾” x 3.00” Gr.8 bolts, and twelve ¾” Gr. 8 fine thread stover lock nuts. **Ensure nuts are facing towards the spindle**. Secure hydraulic cylinder with one 1” x 4” UNF Gr.8 bolt with a 1” Gr. 8 fine thread stover lock nut.

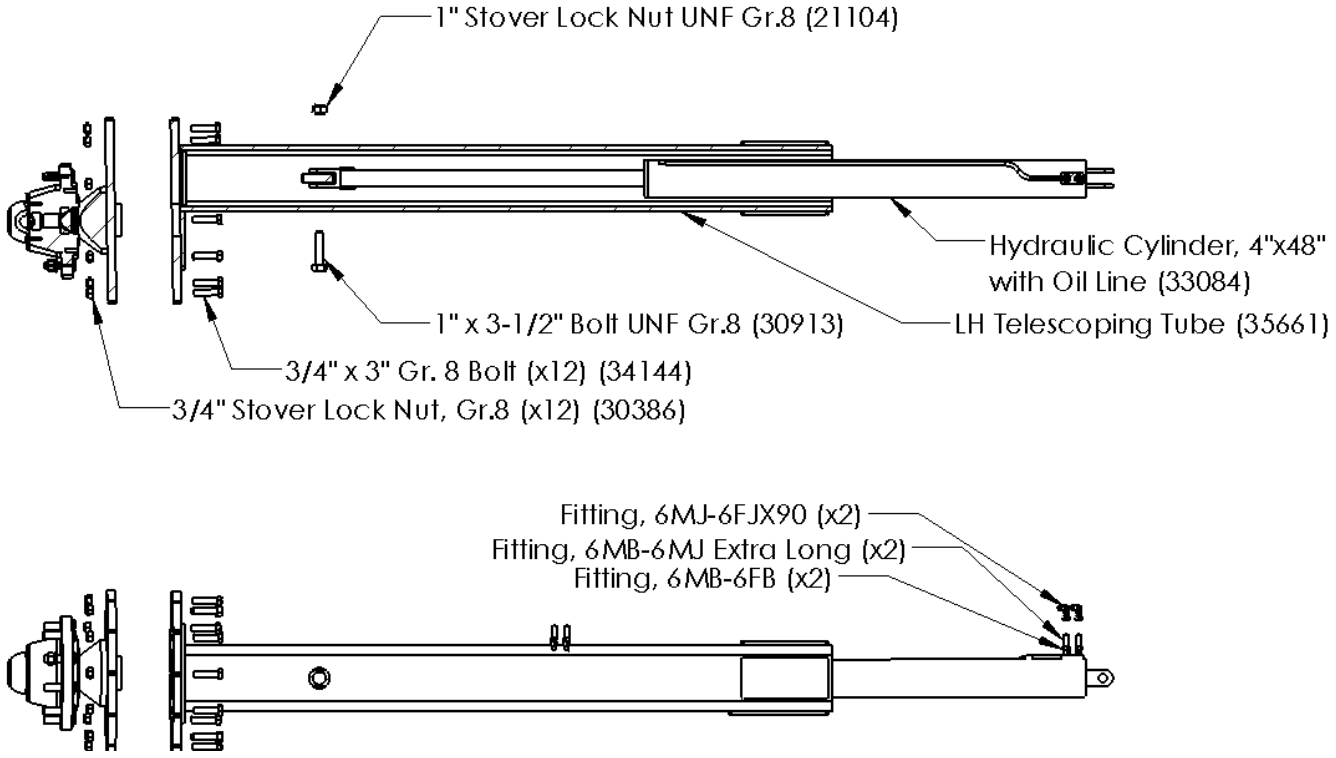


Figure 3.1 Telescoping Tube Assembly

-REPEAT FOR RIGHT HAND TUBE-

b) Install telescoping cylinder flange (35664), telescoping cylinder plate (35378), metal sliders (35478) (8 total), left (35661, and right (35659) hand telescoping tube into back axle weldment (35657). Install 1/8” Grease zerk on rear of axle weldment. Install axle pivot cover (x 2) with 3/8” x 1” Gr.8 bolts (x 12) after attaching axle to main frame. Install telescoping cylinder flanges using five 1” x 3.5” Gr.8 bolts per flange, and telescoping cylinder plates using five 1” x 3” bolts per plate. **Ensure nuts are facing towards the center of the machine.**

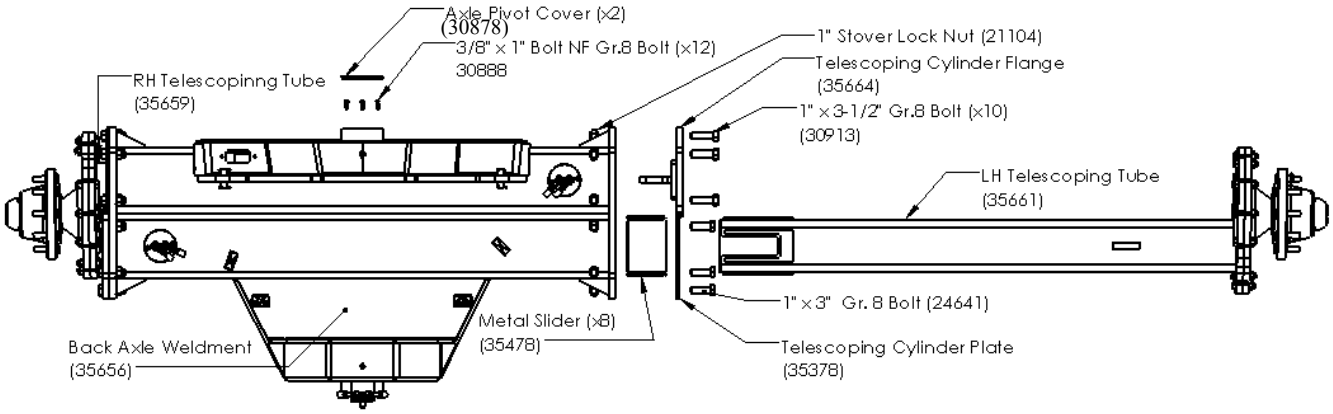


Figure 3.2 Axle Assembly

c) Install main frame weldment (35655) to the back axle assembly. Install the main frame to the back axle by fitting the end of main frame on top of the back axle and use the 4" x 40" axle pin (35442) with one 1"x7" Gr.8 bolt (33039) and 1" nylon lock (15436) nut to secure the pin. Ensure the pin hole is vertically aligned with bolt and ensure the holes to allow for the pin to be manually rotated are at the back end. Add plastic pin spacer (35520), and two end caps (20878) with six 3/8" x 1" fine thread Gr.8 bolts (30888) to secure pin.

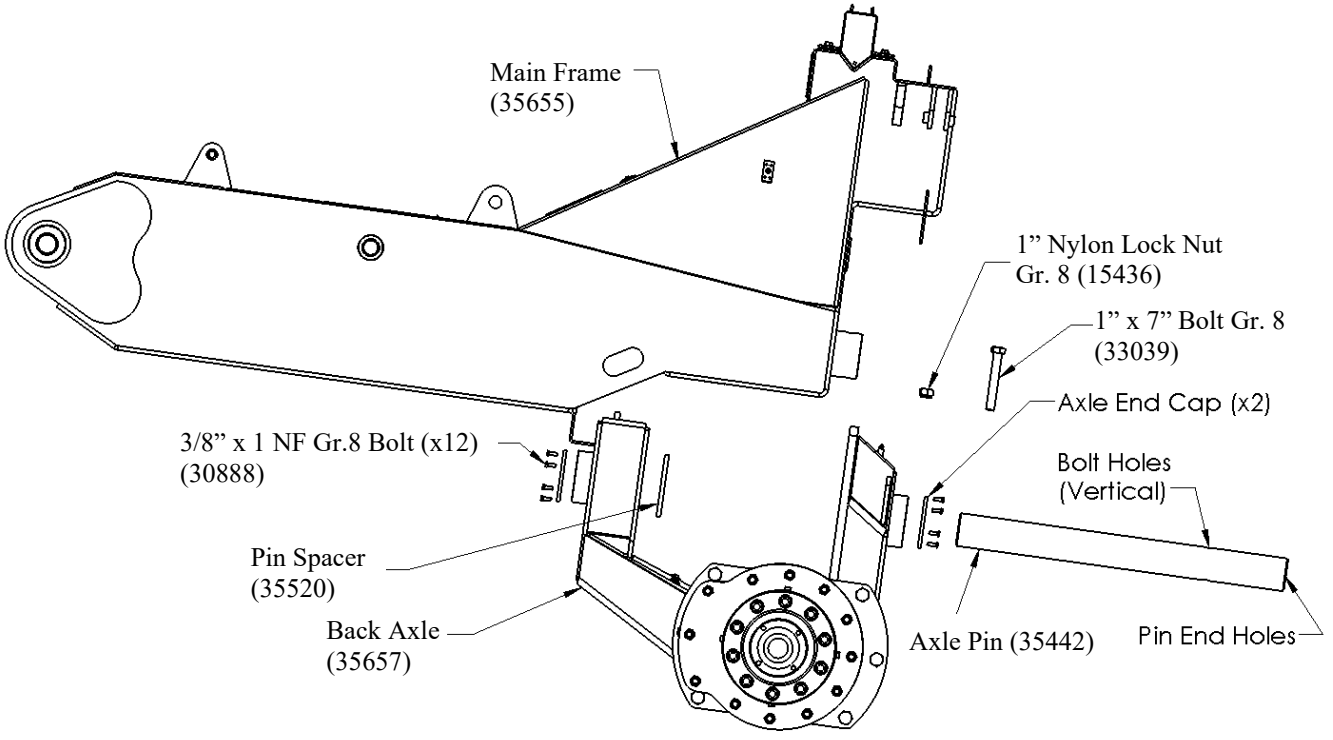


Figure 3.3 Main Frame Attachment side view

d) Install light bar with light bar bracket, six 1/2”x 4” bolts, and six ½” Flat Washers onto the main frame. Install 1/8” grease zerk and 1/8” bulkhead fitting on back of main frame. Install grease zerk plate onto mainframe using two 3/8” flat washers and two 3/8” x 1-1/4” bolts.

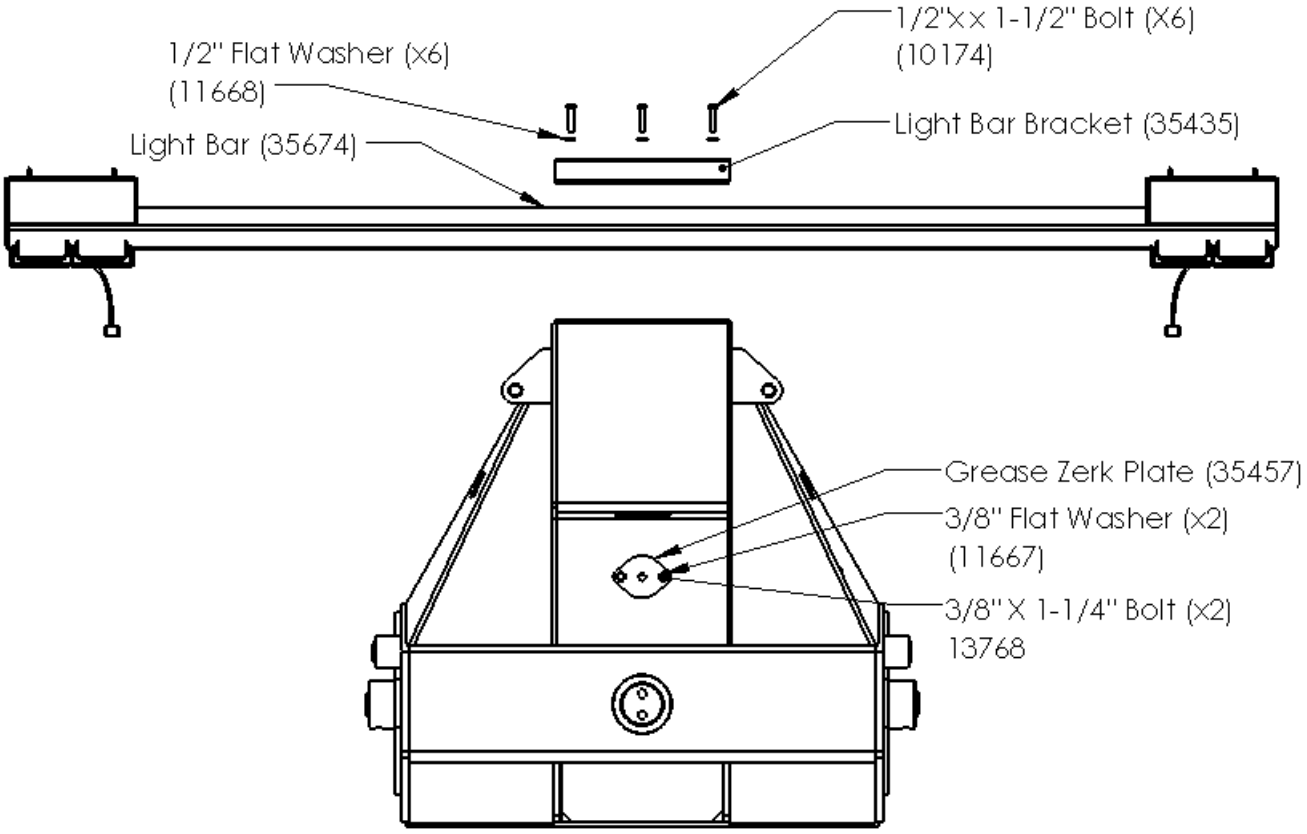
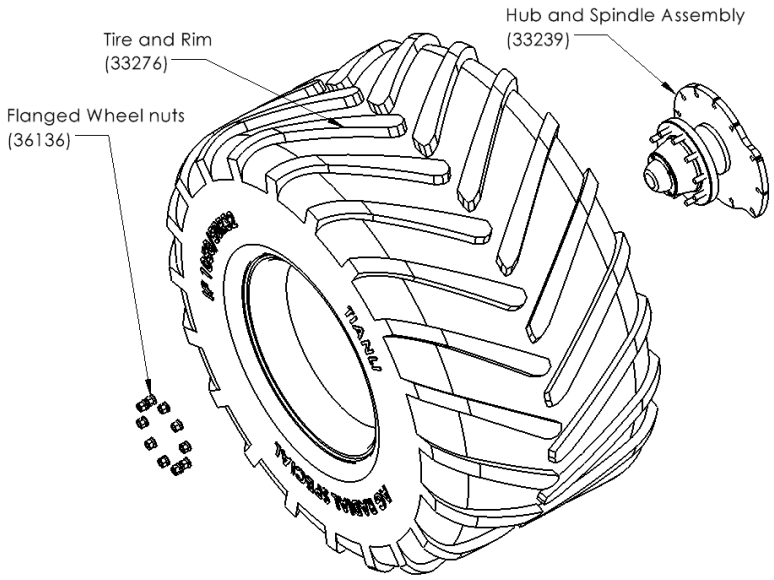


Figure 3.4 Main Frame Attachment back view

e) Fasten the hub to the bushing using the spherical washers and wheel nuts (20783). The flat side of the spherical washers should contact the surface of the rim with the spherical side against the wheel nuts.

Notes: Valve stem towards outside.

Tread pattern is reverse of standard on machine



Item No.	ID Number	Description	QTY
1	20903	5/16"x3/4" Bolt	4
2	20777	Dust Cap (D16000)	1
3	20779	Dust Cap Gasket	1
4	20780	Spindle Castle Nut (SF17512)	1
5	20781	Spindle Washer	1
6	20776	Wheel Bearing Outer (39585)	1
7	20782	5/16"x3-1/2" Cotter Pin	1
8	21481	Outer Bearing Race (39520)	1
9	22408	Stud Bolts (3/4" PIB)	10
10	20739	16000lb Wheel Hub	1
11	21480	Inner Bearing Race (47620)	1
12	20775	Wheel Bearing Inner (47687)	1
13	20778	Hub Seal (38730)	1
14	35662	Spindle Weldment	1
15	33239	Complete Hub	1

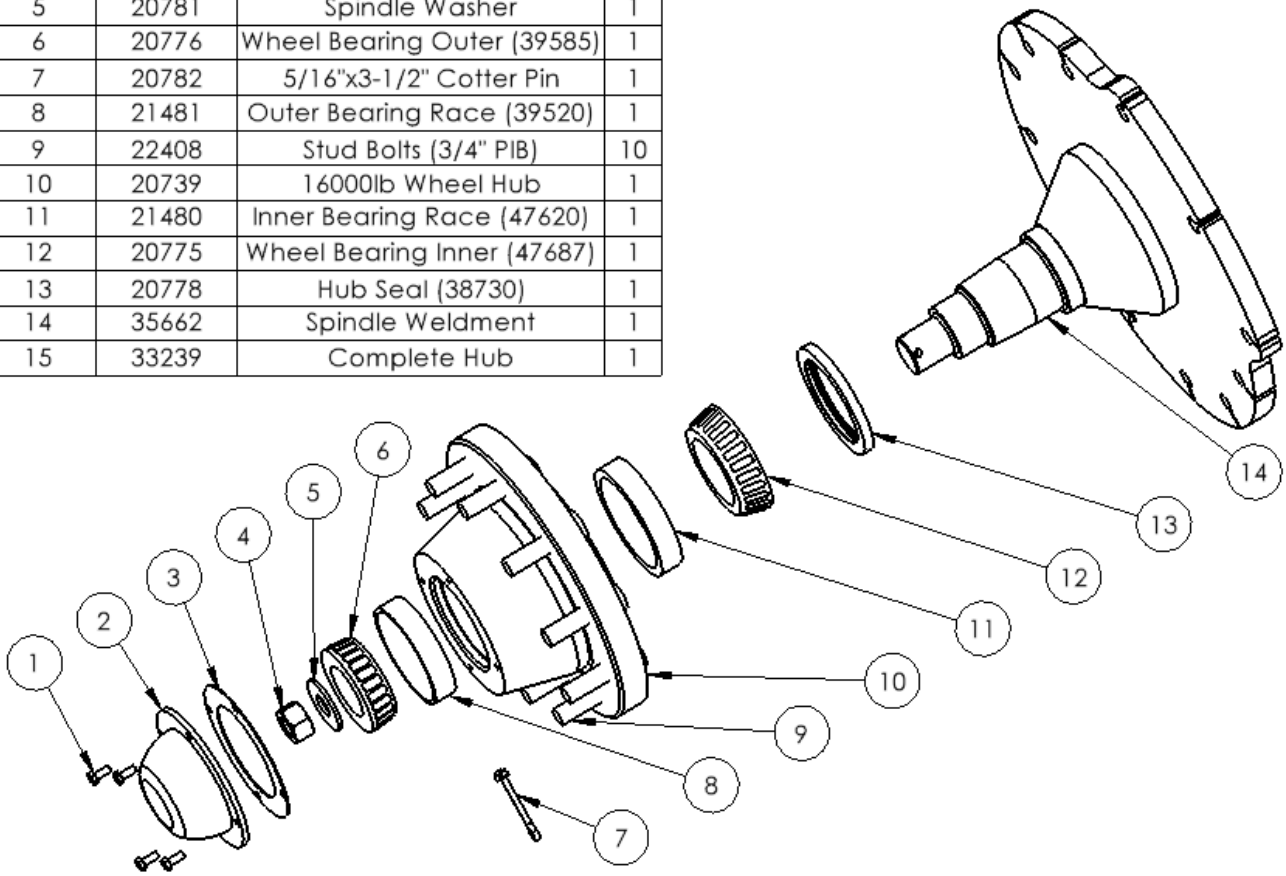


Figure 3.5 Hub and Wheel Assembly

Make sure that the tires are inflated to their correct pressure and the wheel nuts are torqued properly (see chart below).

Specifications	**2490**
Tire Size	1050/50R32
Tire Type	Tianli AG Radial Special
Rim Size	32
Part# (Tire and Rim)	33276
Tire Pressure	35 psi
Wheel Nut Torque	280 ft-lb

f) Install hitch weldment 35651 to middle blade (35653). Use twelve 1-1/2” x 5” bolts (20653), 1-1/2” flat washers (20434) (12 total), and 1-1/2” (20654) nuts to install hitch to middle blade.

Note: These bolts must be lubricated and torqued to 1800 ft-lb.

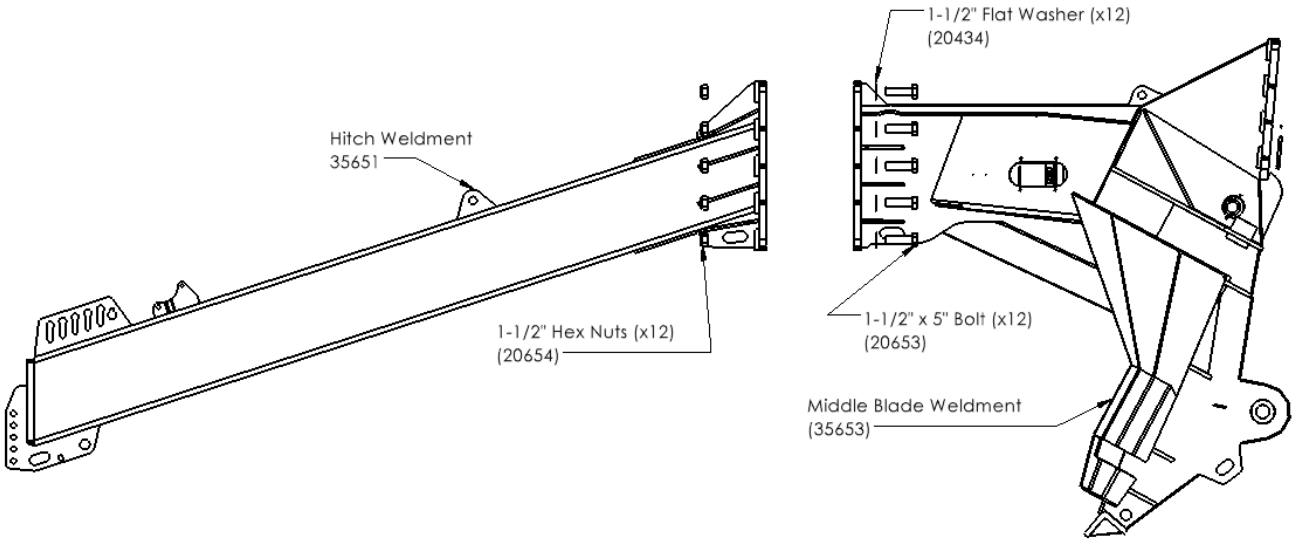


Figure 3.6 Hitch and Middle Blade assembly

g) Install middle blade assembly and back wing support (35666) using fourteen 1-1/2” bolts (20654), 1-1/2” flat washers on the bolt head side (20434) (14 total), and fourteen 1-1/2” nuts (20654). **Lubricate and torque to 1800lbs.**

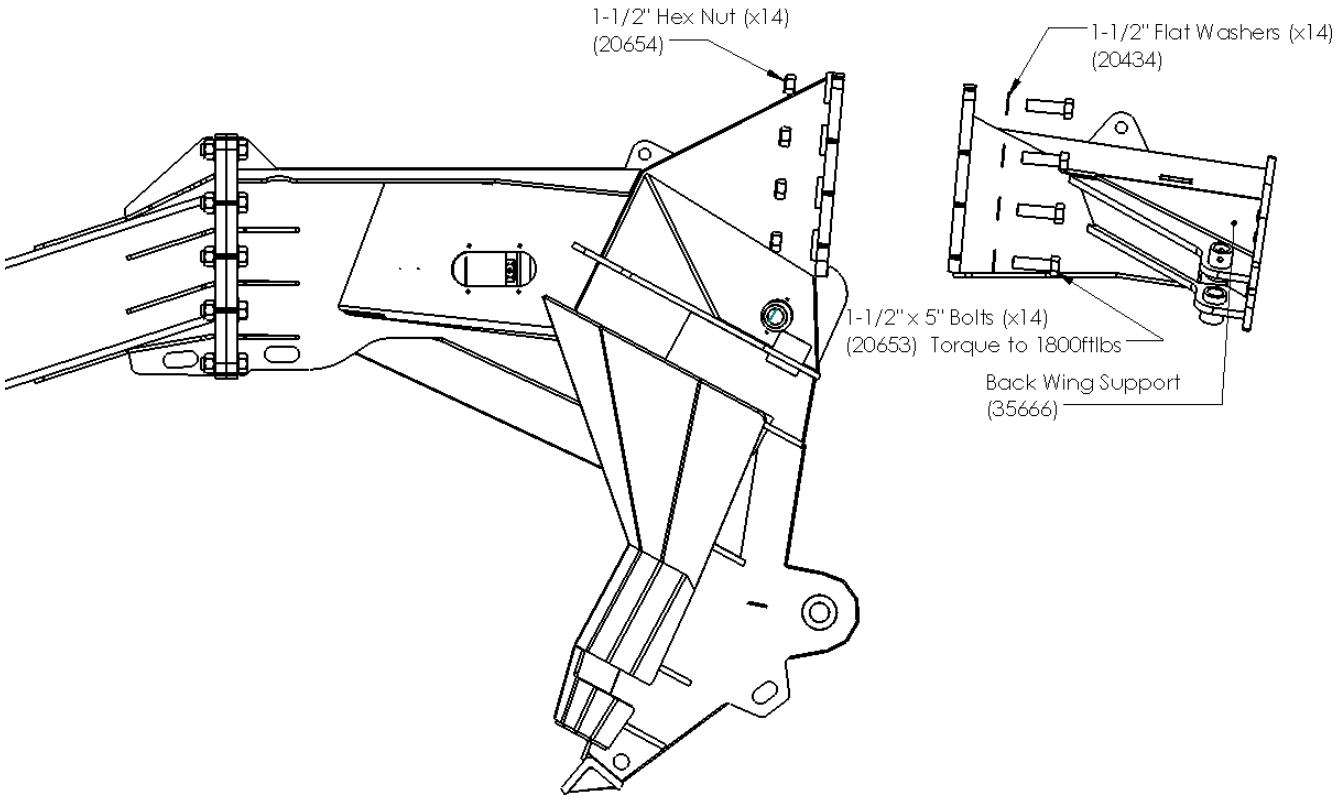


Figure 3.7 Middle Blade and Back Wing Support assembly

h) Connect the previously assembled main frame assembly to the middle blade weldment (35653) by rolling it into the middle blade. Install two 2-7/16” x 21-9/16” lift pivot pins (35441) along with two 5/8” x 5-1/2” Gr.8 bolts (33036), 5/8” nylon locking nuts (10364), and long pivot grease zerks (23356). See section 3.3 for installation of lift hydraulic cylinder.

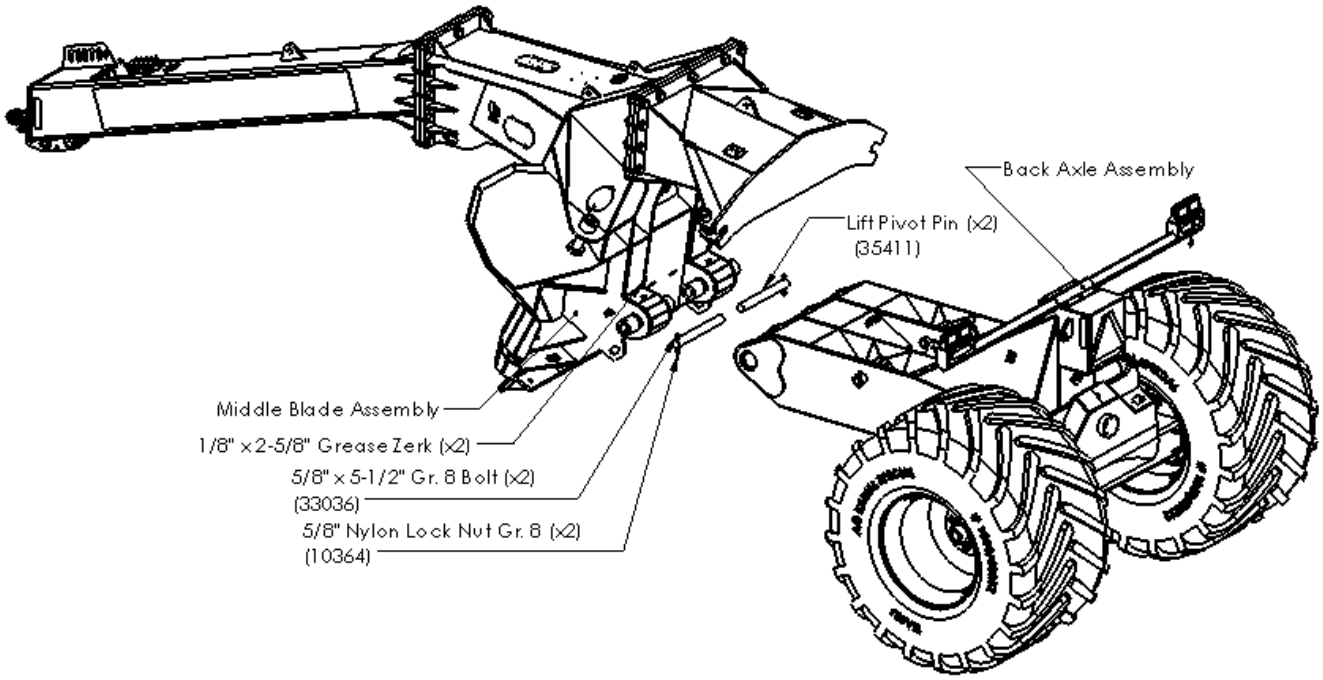


Figure 3.8 Middle Blade and Main Frame assembly

i) Install right hand wing weldment (35670) to middle blade assembly. Install using wing pivot pin (35438) and wing pivot sensor pin (35491). The sensor pivot pin requires one ¾”x5-1/2” Gr.8 bolt (26406) and one ¾” Gr.8 Nylon Lock Nut (10007) for a keeper bolt. One 5/8” x 5-1/2” Gr.8 Bolt (33036) and one 5/8” Gr.8 Nylon lock nut (10364) are required for the Wing Pivot Pin. Install Bushing Bolt Support (36425) on upper pin using ¾” x 1” bolt (36312). Use another ¾” x 1” bolt to cover threaded hole of lower pin as well. Four grease zerks (10270) are required for the wing bushings.

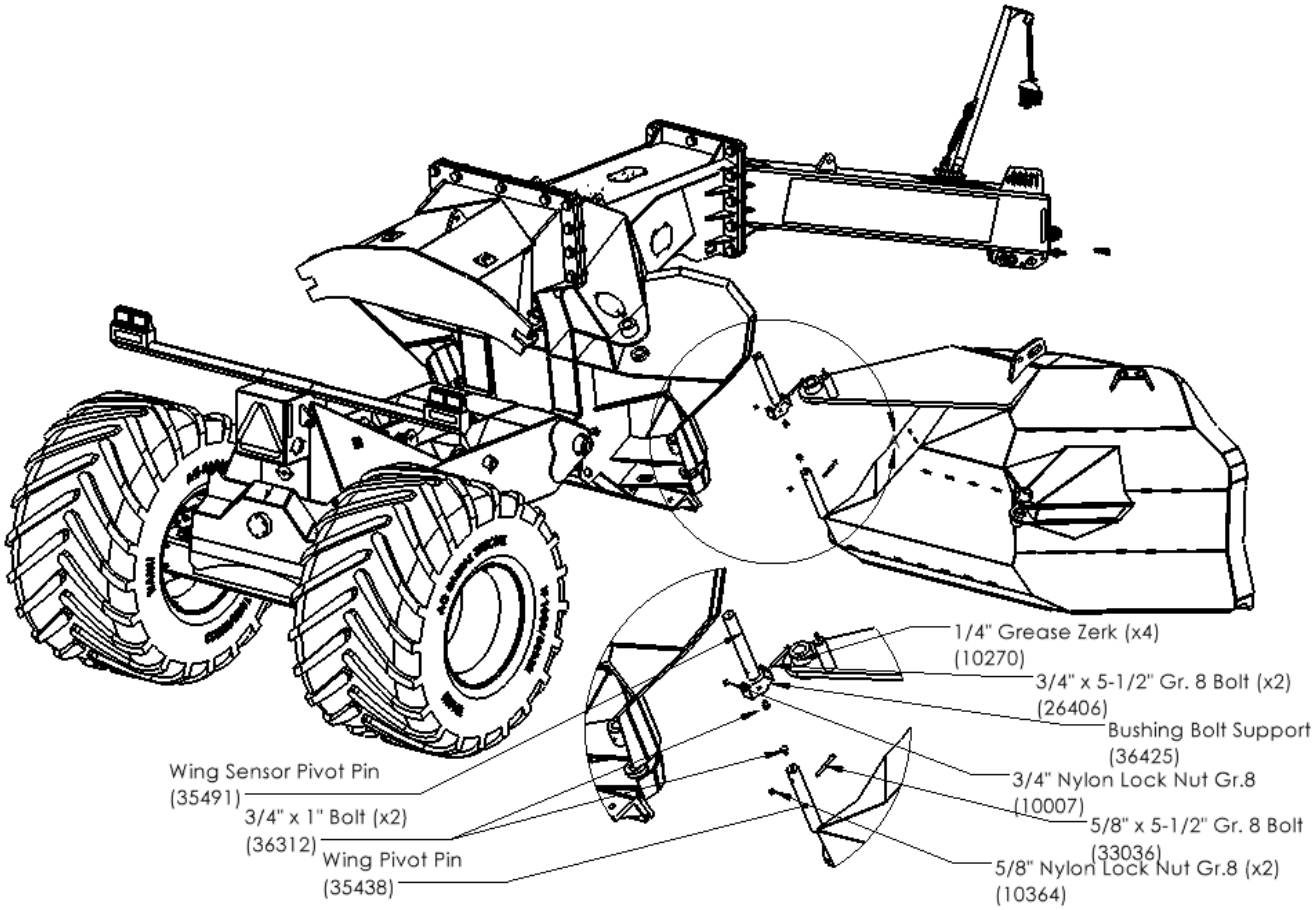


Figure 3.9 – Right hand wing assembly

-REPEAT FOR LEFT HAND WING-

j) Bolt the articulating hitch to the front of the hitch subassembly using three 1” x 7-1/2” NF Gr.8 Bolt (21103), and stover lock nuts (21104). Install safety chain pin (26880), two safety chain bushings (26714), safety chain washer (26712), one bolt (10804), stover lock nut (14393), and safety chain (26609). In order to ensure a tight fit for the hitch, shims may need to be installed. (See Chart)

Part Number	Description	Thickness
33891	Bullpull Hitch Shim A	10 gauge
33892	Bullpull Hitch Shim B	12 gauge
33893	Bullpull Hitch Shim C	14 gauge
33894	Bullpull Hitch Shim D	16 gauge

Set to the desired height (use closest setting):

Holes Used	Drawbar Height (inches)
1,2,3	21.25”
2,3,4*	19.00”
3,4,5*	16.75”

**** Factory setting***

Make sure that the ***lettering is on the top side.*** The Category 4 hitch has two available pin sizes, 1-1/2" and 2". Install the desired size by dropping in the bushing adapter from the top. Make sure that the bushing sticks out on the bottom.

Draw Pin Size (inches)	Hitch Required	Part NO
1.50	Flanged Bushing	27373
2.00	Category 4 * with 2" bushing installed, 3 Hole Pattern	27372
2.75	Category 5, 3 Hole Pattern	30128

** Comes supplied with both 1-1/2" and 2" bushings*

Note: (21103) bolts must be torqued to <u>900 ft-lb</u>.

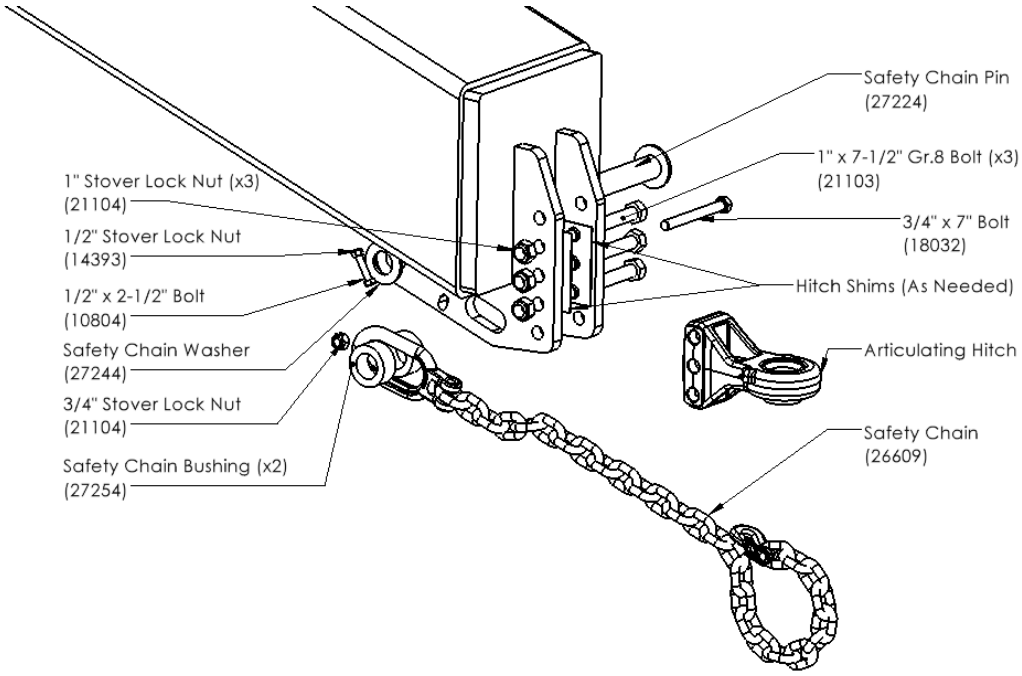


Figure 3.11 – Bull Pull & Safety Chain Attachment

k) Assemble chain hose holder by bolting the hose clamps with the hose holder top clamp (34507), hose holder bottom clamp (34502), and using a 5/16” x 4” bolt (31837), 5/16” x 5-1/2” (31109) bolt, and two 5/16 nylon lock nuts (11815). Attach the grote (13629) to the hose holder bottom clamp with the 5/16” x 4” bolt. Attach the hose holder chain (32168) with a ½” x 1-1/2” bolt (10174), two ½” flat washers (11668), and a ½” nylon lock nut (11815).

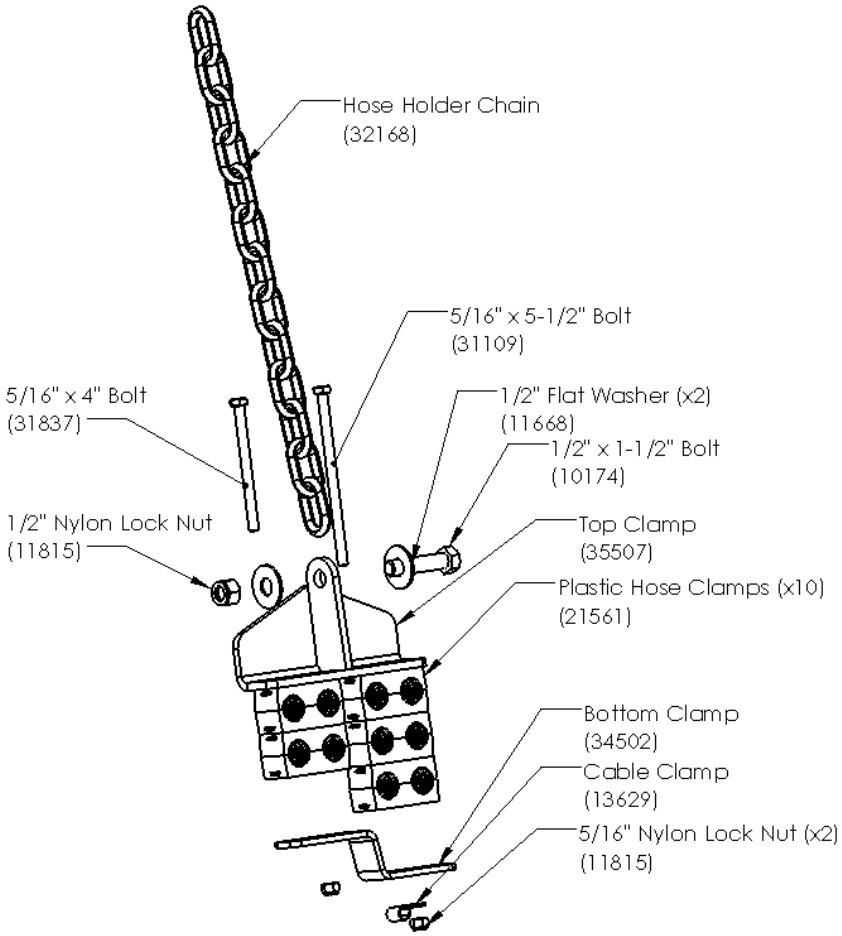


Figure 3.12 Chain Hose Holder Assembly

l) Bolt the hydraulic hose holder (34493) to the front hitch as shown, using a 3/4”x 5” bolt (10803) and a 3/4” nylon lock nut (10007). Bolt the Turnbuckle (14276) to the hydraulic hose holder. Bolt the chain hose holder to the hydraulic hose holder, using a ½” x 1-1/2” bolt (10174), two ½” washers (11668), and a ½” nylon lock nut (10007). Bolt the hydraulic hose holder bracket to the hitch using four 3/8” x 1” bolts (13806).

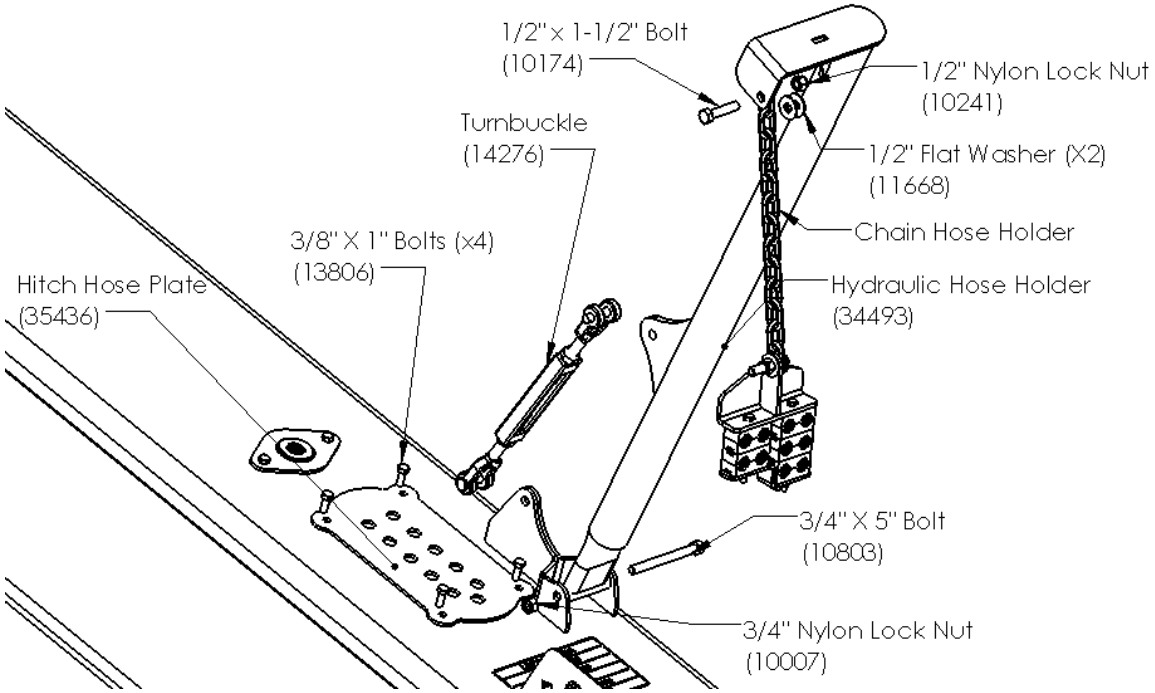


Figure 3.13 Hydraulic Hose Holder Assembly

m) Install GPS cable brackets (35672) onto hitch and middle blade assembly using two 3/8” x 1” bolts (13806) and 3/8” nylon lock nuts (10806). Install stepped grommet (30036) and GPS hose fitting (33027). Repeat for GPS cable bracket located on middle blade indicator. Connect both GPS fittings using the rubber GPS route hose.

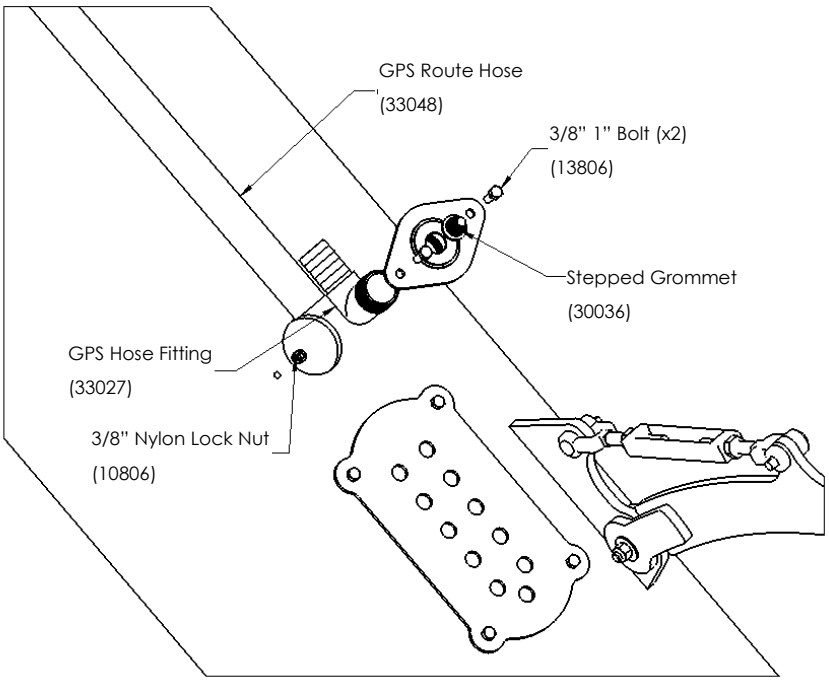


Figure 3.21 GPS Cable Bracket Assembly

3.3 Hydraulics Assembly

NOTE: Hydraulic cylinders must be attached to the top first then pulled down into position. A hydraulic schematic is attached at the back of the Hydraulic Assembly section. There are five remotes needed for the 2490 Pulldozer Transformer.

a) Install two 6” x 32” wing hydraulic cylinders (33104) on both the right & left side, with the 2” x 11-1/16” wing cylinder pin (35437), 5/8” x 4” bolt (33037), and 5/8” nylon lock nut (10364). Make sure ports are facing upwards as shown. The left-wing cylinder will need a 90 ° grease zerk at the base end.

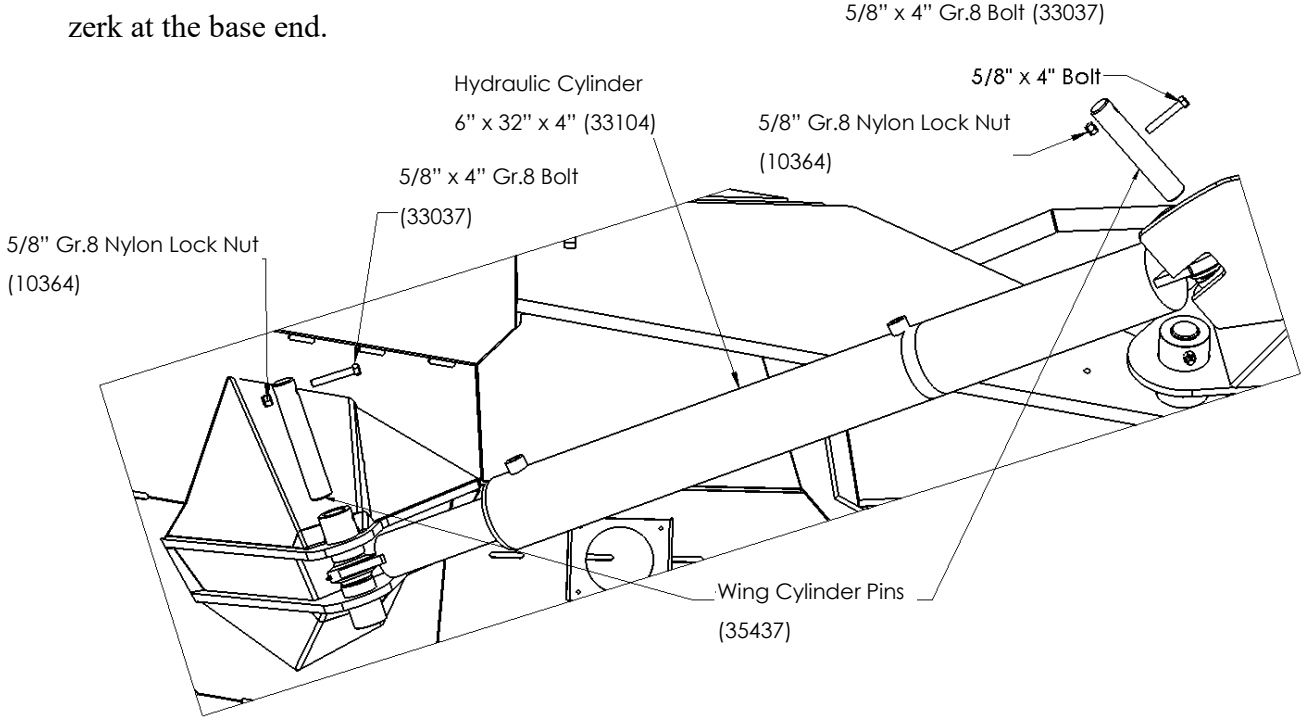


Figure 3.22 Wing Hydraulic Cylinder assembly

b) Install two 5” x 24” lift hydraulic cylinders (23310) on both sides, with the 2” x 19-7/16” main frame lift cylinder pins (35440), the 2” x 14-11/16” middle blade lift cylinder pins (35439), four 5/8” x 4” bolts (33037), four 5/8” nylon lock nuts (10364), and eight 2” flat washers (23304). Ports to be facing downwards as shown.

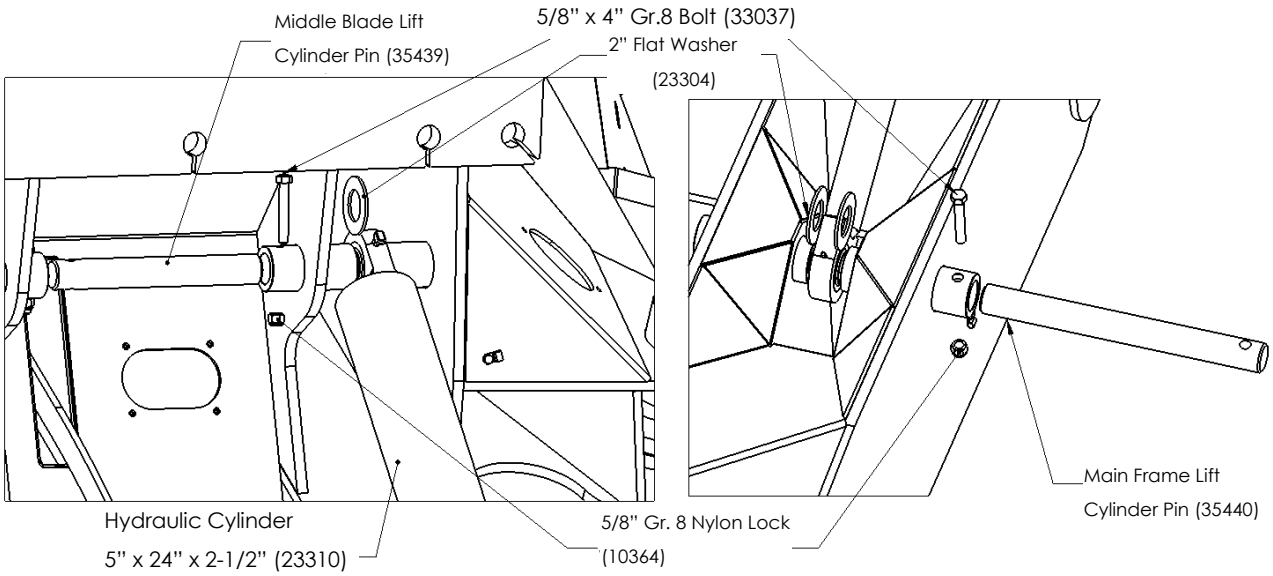


Figure 3.23 Lift Hydraulic Cylinder assembly

c) Install two 4” x 8” tilt hydraulic cylinders (33083) onto each side of main frame, make sure ports are facing outwards as shown. Install four 1” x 2-7/8” tilt cylinder pins (10339) and eight 3/16” x 2” cotter pins (11670).

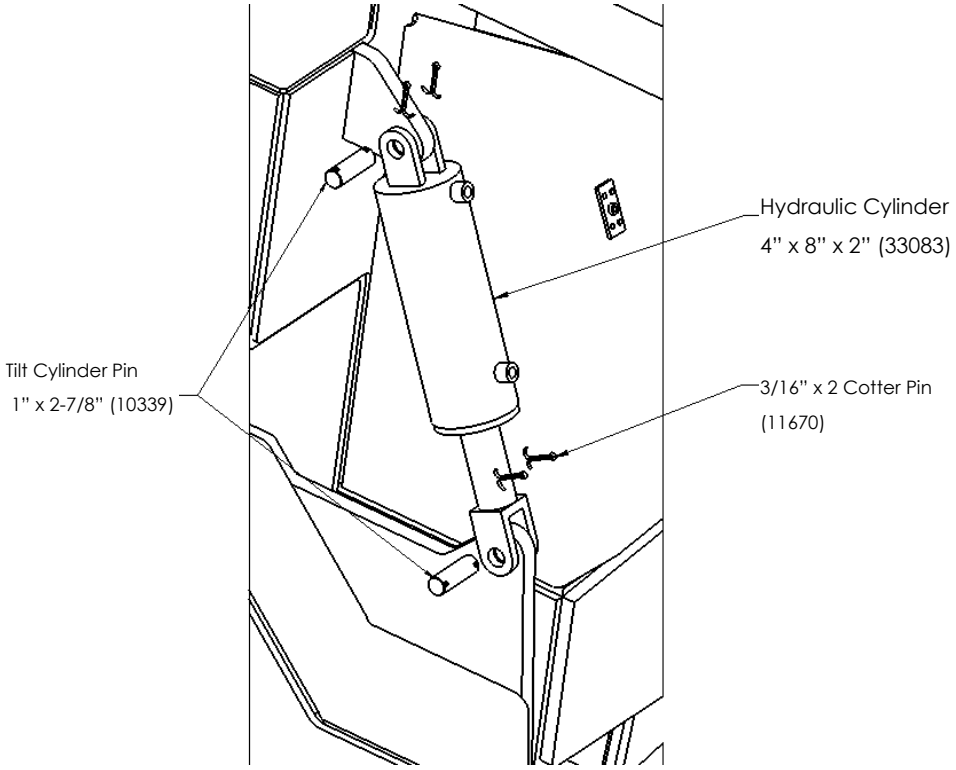


Figure 3.24 Tilt Hydraulic Cylinder assembly

d) Install two 4” x 48” hydraulic cylinders (33084) on both sides into axle. Ensure ports are facing upwards at hole location. Use four 1” x 4-1/2” UNF Gr.8 bolts (28555) and four 1” UNF Gr.8

stover lock nuts (21104). Install two grommets (34145) into axle for hydraulic hose adapters. Ensure the base of the hydraulic cylinder is connected to the telescoping cylinder flange.

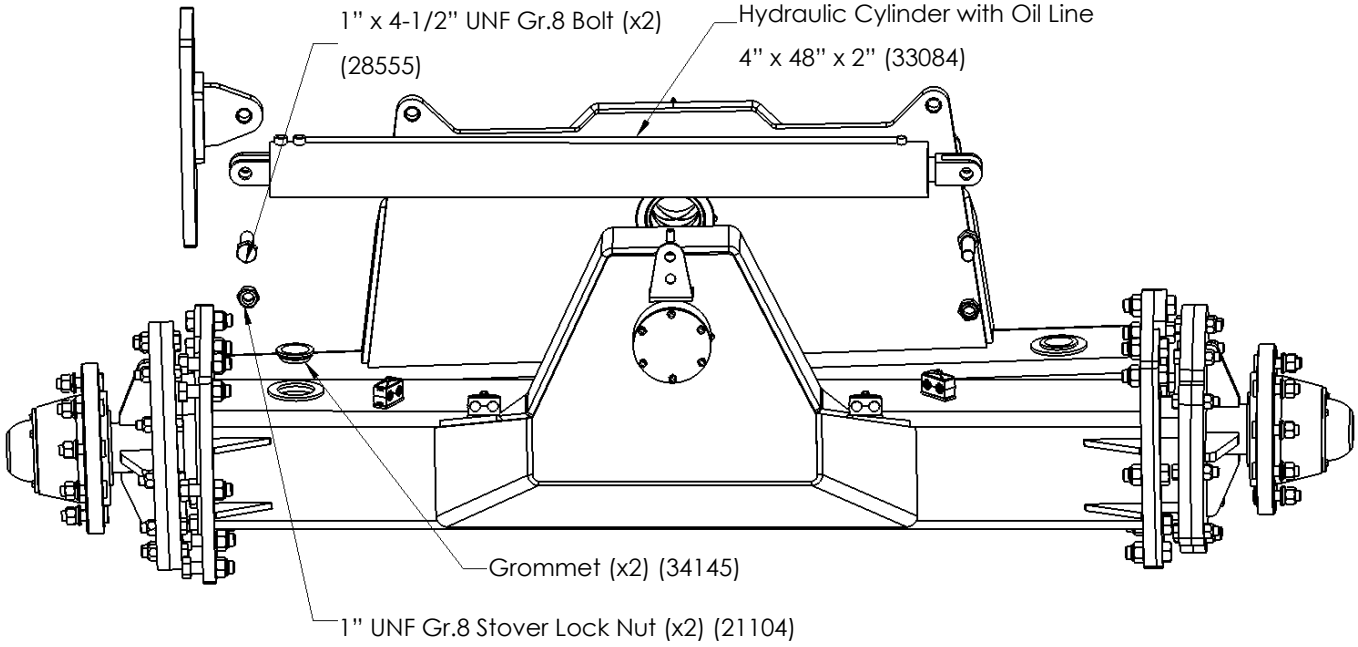


Figure 3.25 Telescoping Hydraulic Cylinder assembly

e) Install ten 8MJBH – 8MJ45 hydraulic fittings into hitch hose plate (35436). Hook up the hitch hydraulic hoses to 8MJBH – 8MJ45 then install four 3/8" x 1" bolts (13806). Install Grommet (21428) into hitch hose plate.

- Install pioneer fittings (17379) to the end of each hose and mark with heat shrink See **Table 2.1.1 Pulldozer Transformer Hose Marking** for marking of heat shrink per hydraulic hose.

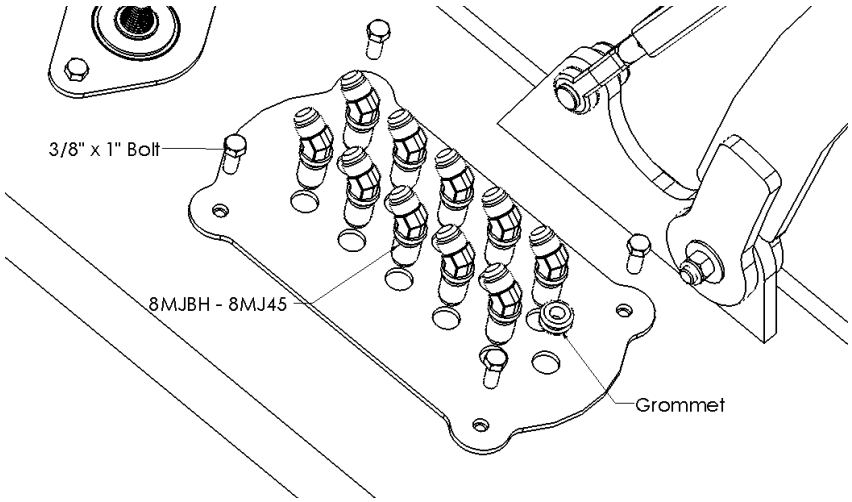


Figure 3.26 - Front bulkhead attachment

f) Install both wing support bulkhead plates (35445) with four 3/8” x 1” bolts (13806) and two 8MJBH – 8MJ45 hydraulic fittings.

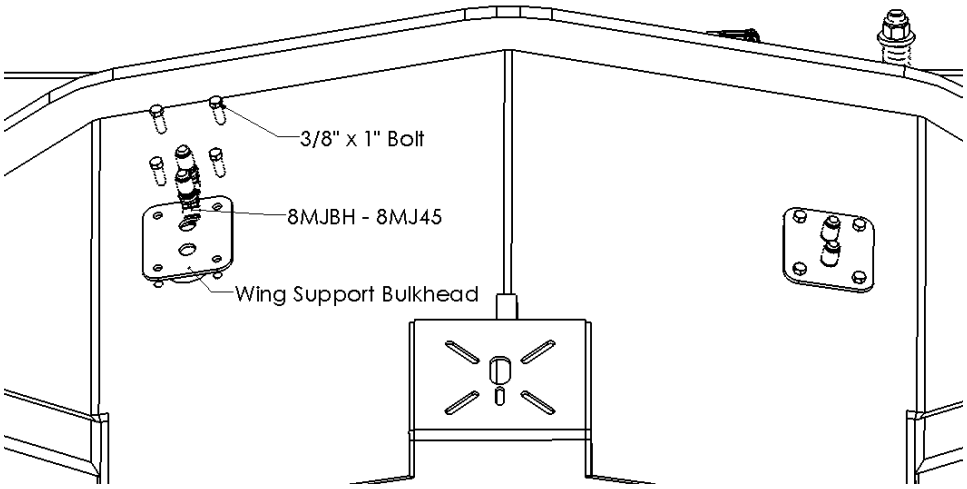


Figure 3.27 – Back Wing Support Bulkhead

g) Install back bulkhead plate with four 3/8” x 1” bolts (13806), four 8MJBH – 8MJ45 hydraulic fittings, and 2 grommets. 5/16” ID grommet (13179) to be split for installing wire for position monitoring system. 7/16” ID Grommet (21428) to be installed normally for light wiring

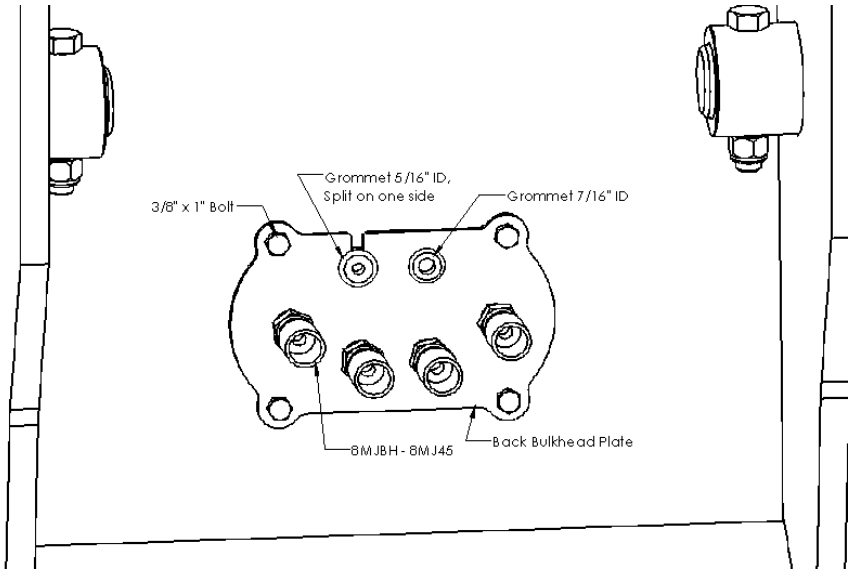


Figure 3.28 – Back Bulkhead Assembly

h) Install main frame bulkhead plate with four 3/8” x 1” (13806) bolts, two 8MJBH – 8MJT hydraulic fittings, two 8MJBH – 8MJ45 hydraulic fittings, and two grommets. 5/16” ID

grommet (13179) must be split for wire installation. 7/16” ID Grommet (21428) to be installed normally for light wiring.

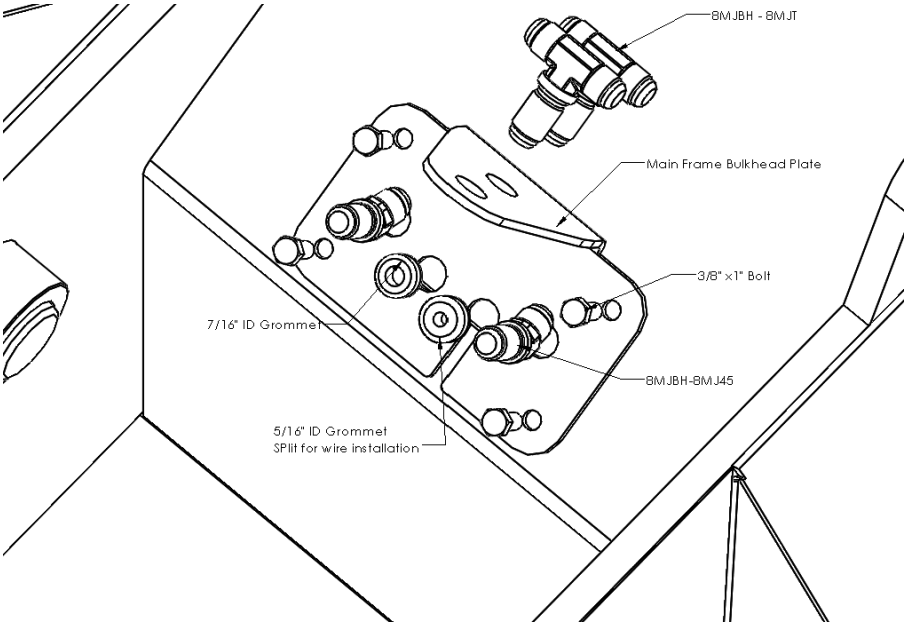


Figure 3.29 – Main Frame Bulkhead Assembly

i) Install two 8MJBH – 8MJT hydraulic fittings onto back axle L plate.

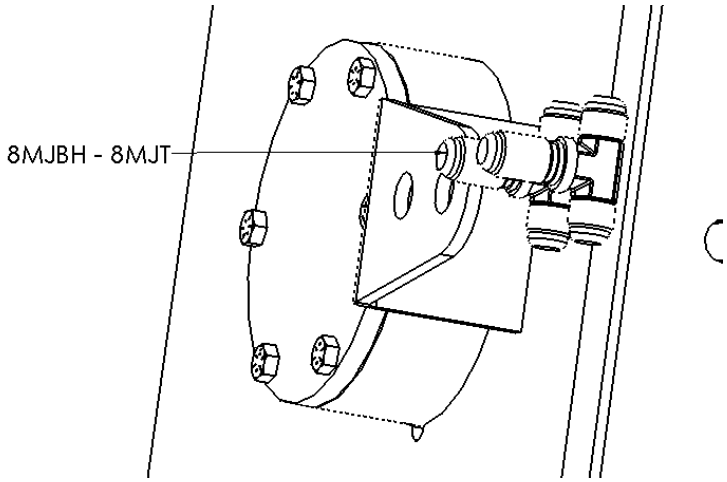


Figure 3.30 – Back Axle Bulkhead Assembly

- Tie any loose hoses together using zip ties or hose straps to complete the rear hose routing.
- When tightening the hose fittings make sure the corresponding cylinder is mid-stroke then make sure hoses are in natural position then tighten.

Hydraulic Hose Decal Legend

Hose #	Length (Inches)	Ends	QTY
1	115	8MB-8FJX	10

Legend

R - Long Red Shrink Wrap
r - Short Red Shrink Wrap
Y - Long Yellow Shrink Wrap
y - Short Yellow Shrink Wrap
G - Long Green Shrink Wrap
g - Short Green Shrink Wrap
B - Long Blue Shrink Wrap
b - Short Blue Shrink Wrap
O - Long Orange Shrink Wrap
o - Short Orange Shrink Wrap

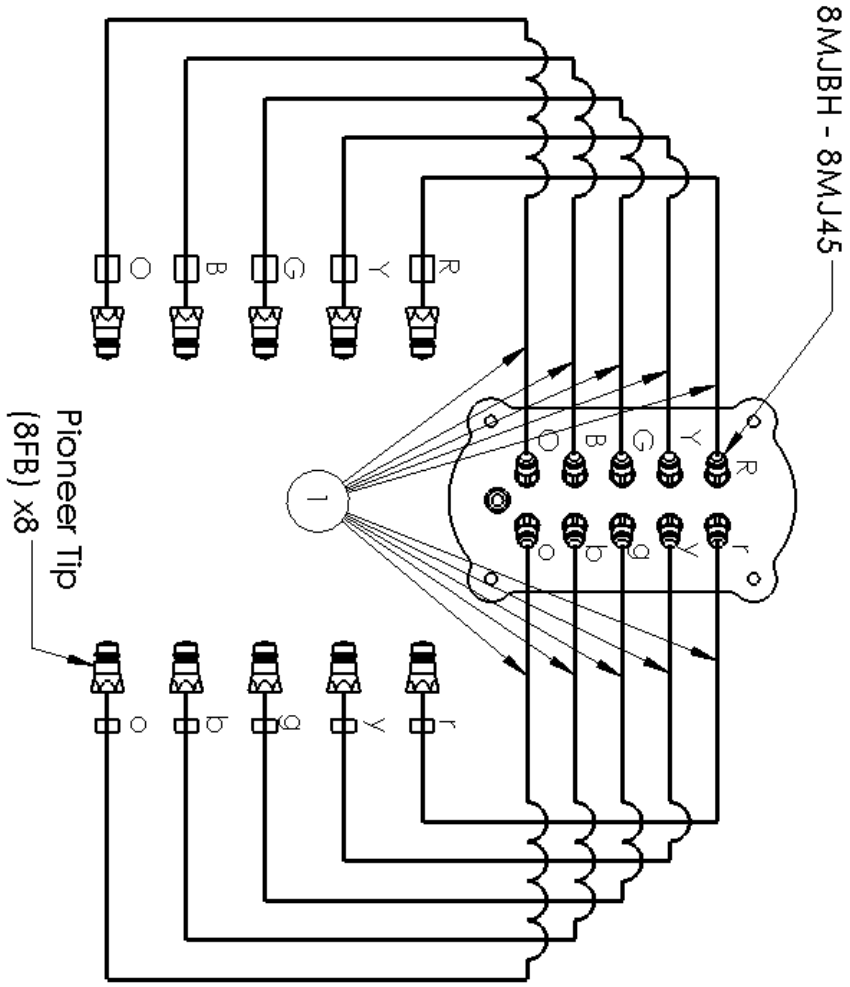
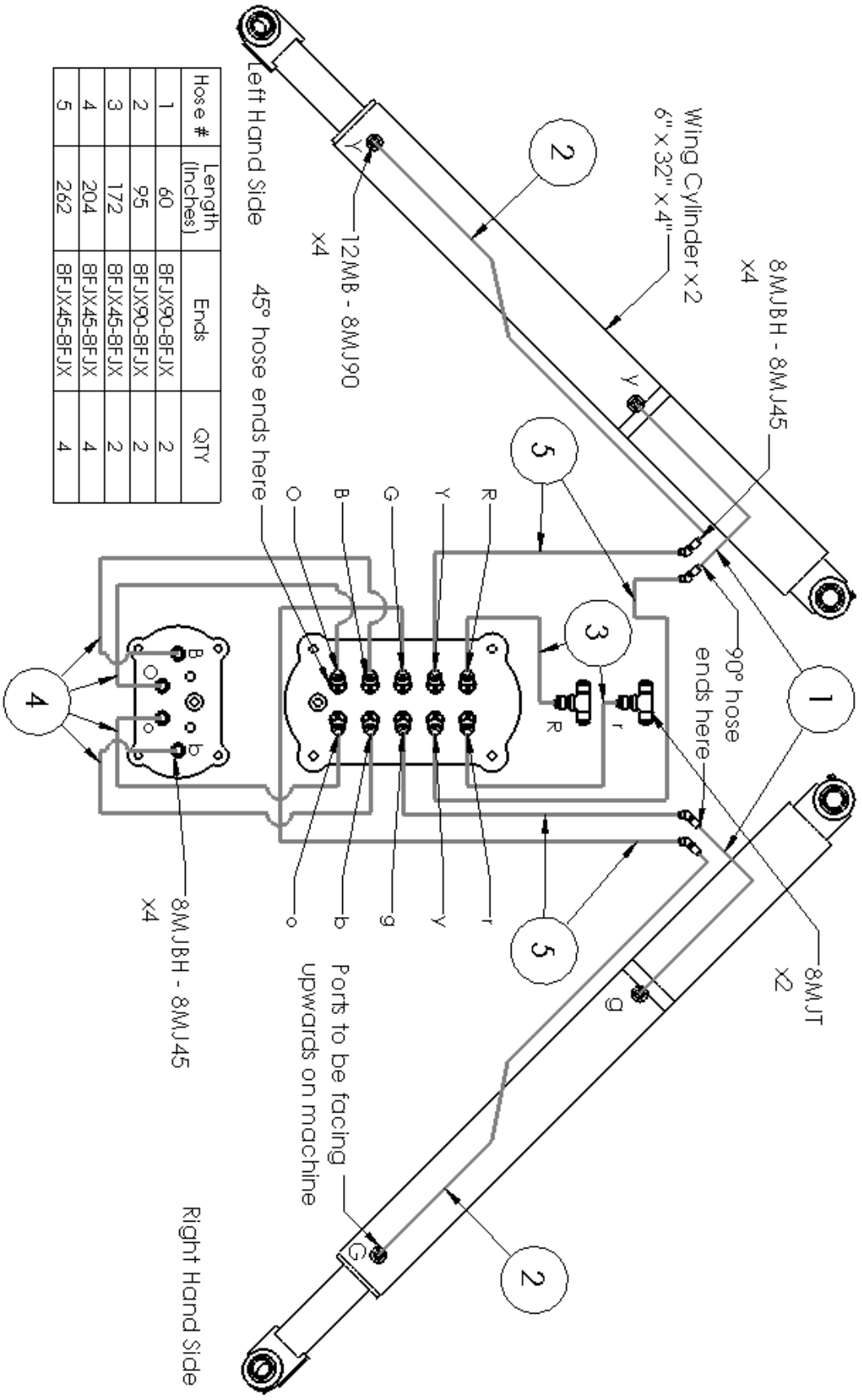
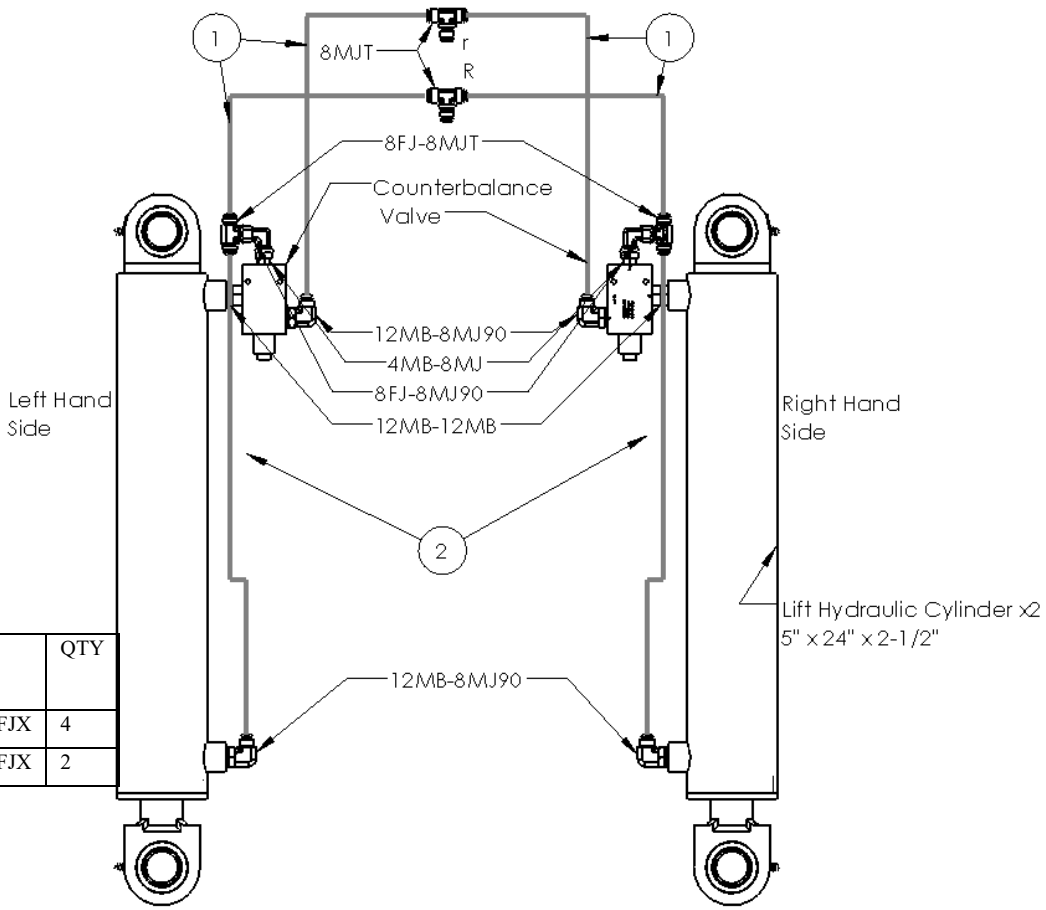


Figure 3.31 – Pulldozer Front Bulkhead



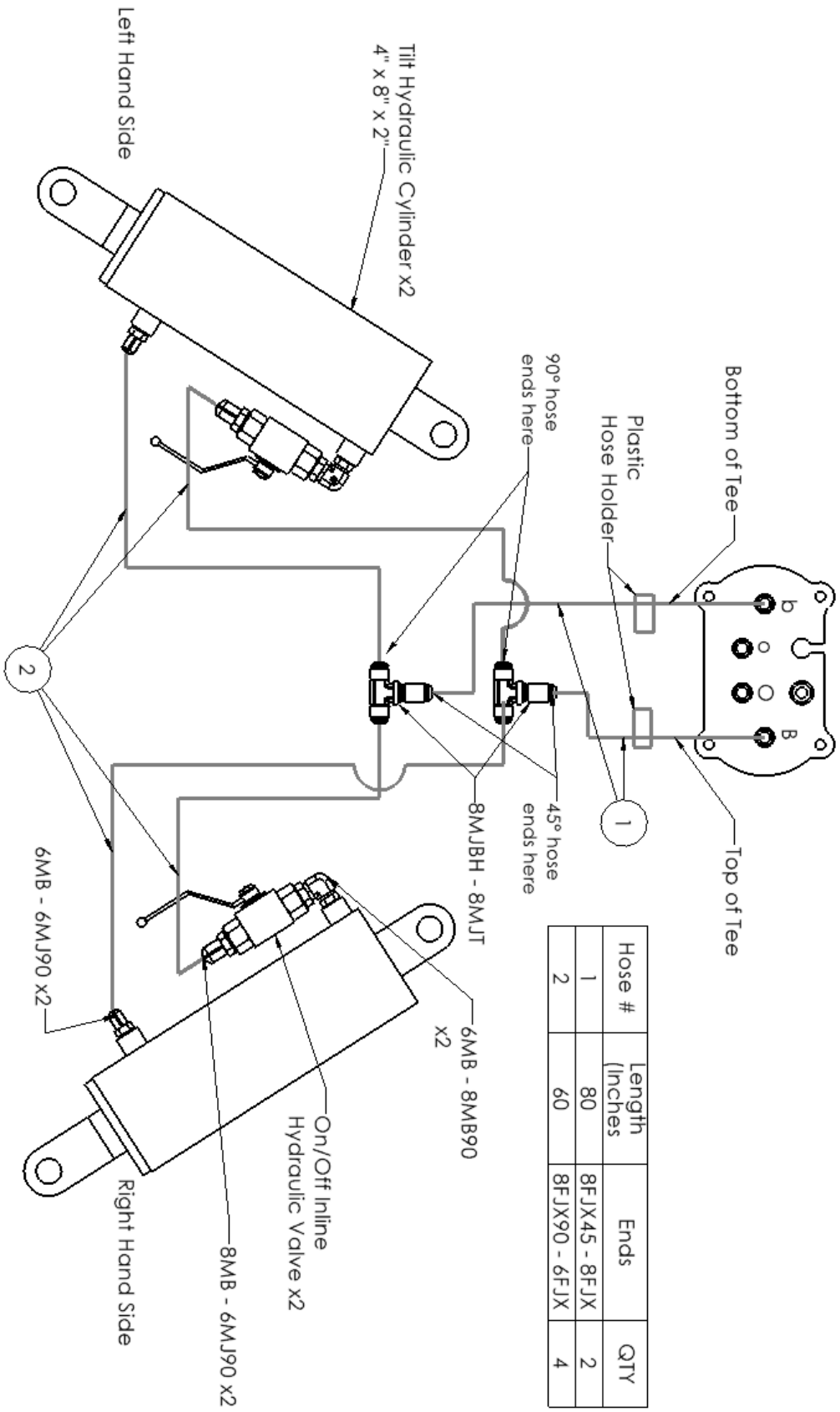
Hose #	Length (Inches)	Ends	QTY
1	60	8FJX90-8FJX	2
2	95	8FJX90-8FJX	2
3	172	8FJX45-8FJX	2
4	204	8FJX45-8FJX	4
5	262	8FJX45-8FJX	4

Figure 3.32 – Wing Cylinder Routing



Hose #	Length (inches)	Ends	QTY
1	62	8FJX-8FJX	4
2	31.5	8FJX-8FJX	2

Figure 3.33 – Lift Cylinder Routing



Hose #	Length (Inches	Ends	QTY
1	80	8FJX45 - 8FJX	2
2	60	8FJX90 - 6FJX	4

Figure 3.34 – Tilt Cylinder Routing

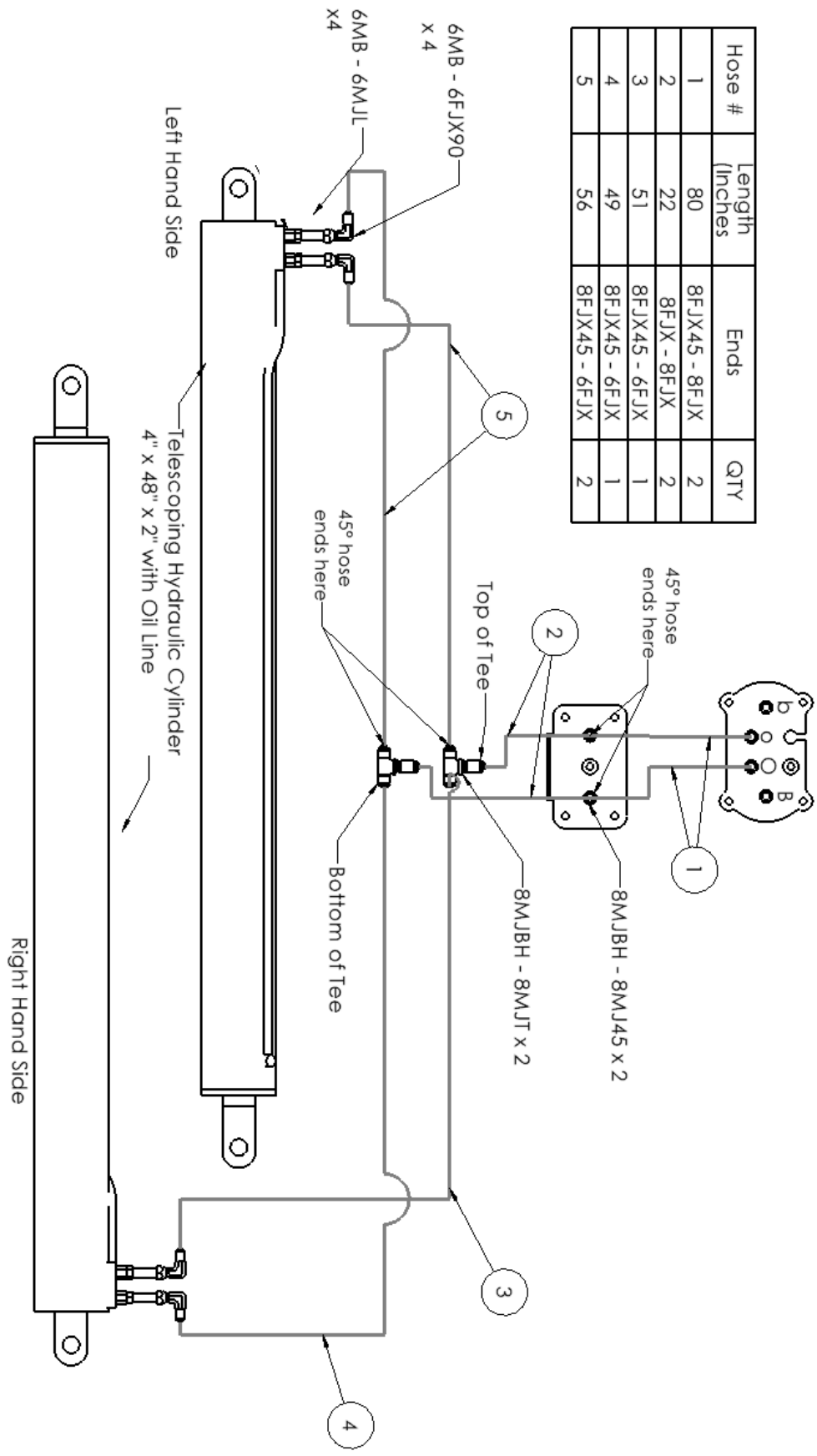


Figure 3.35 – Telescoping Cylinder Routing

Hose #	Length (Inches)	Ends	QTY
1	100	8MB-8FJX	6
2	25	8FJX - 8FJX45	2
3	34	8FJX - 8FJX90	2
4	90	8FJX - 8FJX	2

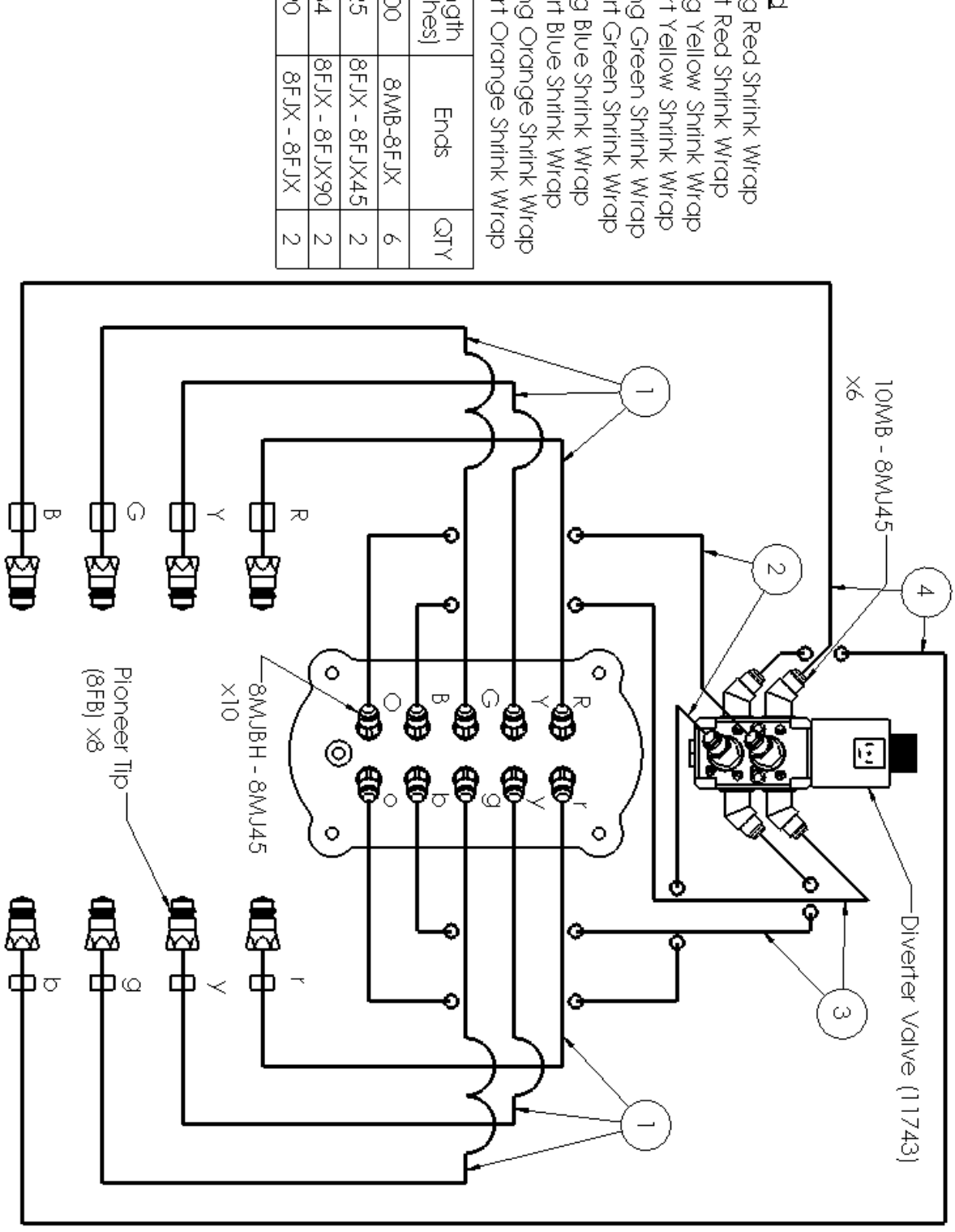


Figure 3.36 – Pulldozer Transformer 2490 4-Remote Kit

Install all 6 hydraulic hose access plates using twenty-four 3/8” x 1” bolts (13806). See figure 3.37 for example.

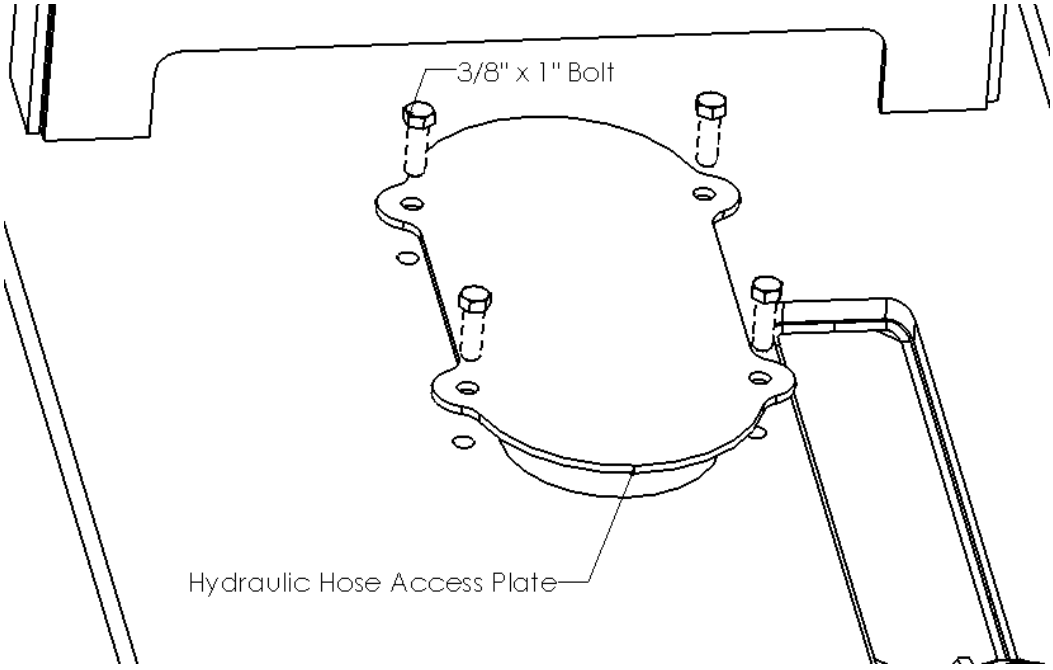


Figure 3.37 – Hydraulic Hose Access Plate Attachment

Install two hydraulic pin access plates on each side of blade using four 3/8” x 1” bolts (13806). 5/16” ID grommet (13179) should be split for sensor wire installation

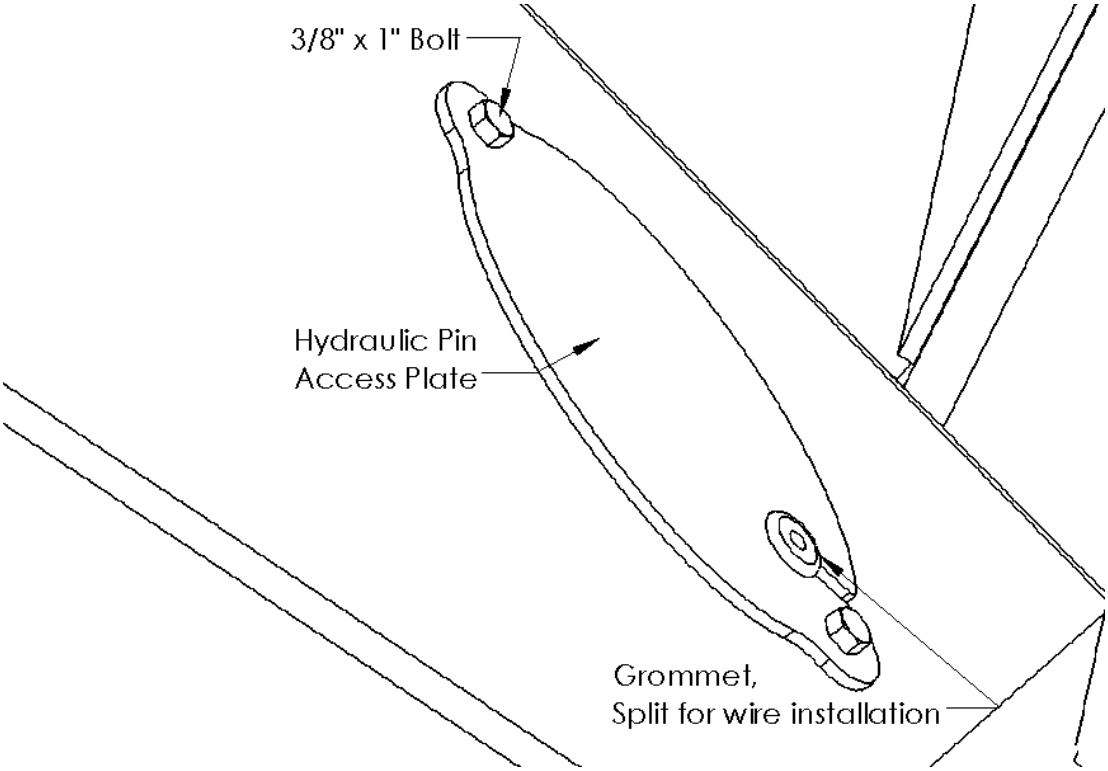


Figure 3.38 Hydraulic Pin Access Plate Attachment

3.4 Electrical Assembly

3.4.1 Light Wiring

a) Run front end electrical cable through the hitch (see wiring diagram at end of section). It will run alongside the hydraulic lines, through the front bulkhead cover (using a grommet – 21428). Run main frame electrical cable from front bulkhead cover into main frame to light bar. Leave enough wire at the back for ease of making connections. Both bulkhead covers can then be installed.

b) Connect the 7-pin round trailer plug following figure 3.40.

c) Route the light wishbone harness (35057 through the base of the light bar (35674) to each end. Connect each split end of the wishbone harness to the left light assembly (31087) and right light assembly (31088). Install the left light assembly and right light assembly to the light bar using eight ¼" nylon lock nuts (11664).

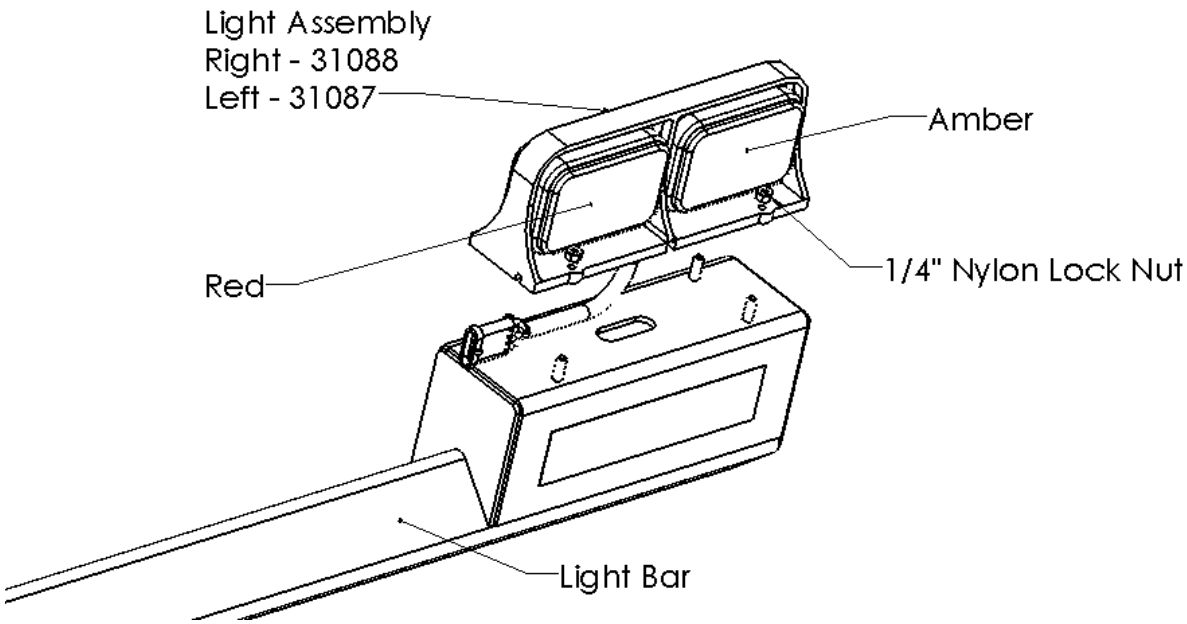


Figure 3.39 – Right light assembly attachment

Repeat for left side

d) Connect main harness (33056) to wishbone harness (33057) as shown in figure 3.40

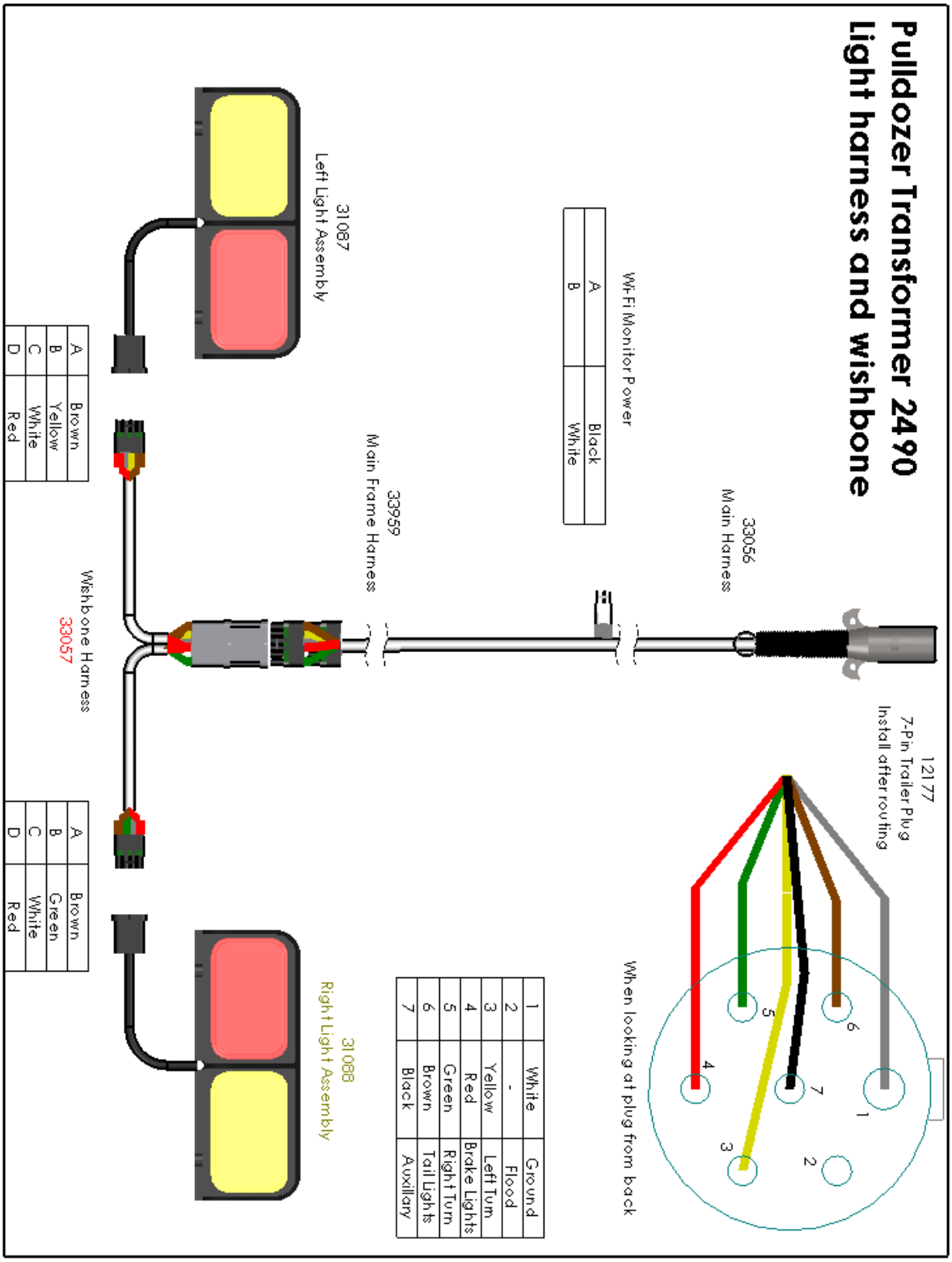


Figure 3.40 Pulldozer Transformer 2490 Light Wiring Schematic

3.4.2 Wi-Fi Indicator Installation

a) The machine harness for the Wi-Fi system comes in two pieces. The middle blade harness (34848) will route along the hydraulic hoses of the middle blade. The two round connectors will follow the lift hoses and come out of the machine at the pin access plates on each side. Place the split grommet around the cord and slide the grommet into the slot of the access plate. The two-pin power connector end will follow the hoses out through the middle blade's back bulkhead. Insert the wire through the split grommet and insert into the slot of the bulkhead plate. The Remaining end for the middle blade sensor and the Wi-Fi transmitter will be located at the access plate at the top of the machine

b) The main frame harness (34849) will be routed from the middle blade bulkhead to the main frame and back axle. At back axle tilt pivot, leave enough slack for the machine to tilt without straining the wires. Install in slotted grommets at the bulkhead plates. Connect to the middle blade harness with the 6-pin connector.

c) To install the middle blade sensor plate, bolt Wi-Fi transmitter (34856) and middle blade inclination sensor (34856) onto the sensor mounting plate (35503) as shown in figure 3.41. Connect to sensor wire harness before bolting down plate. **Note: <u>Maximum</u> torque of 30 in-lbs on ¼" bolts that mount sensors to the mounting plate.**

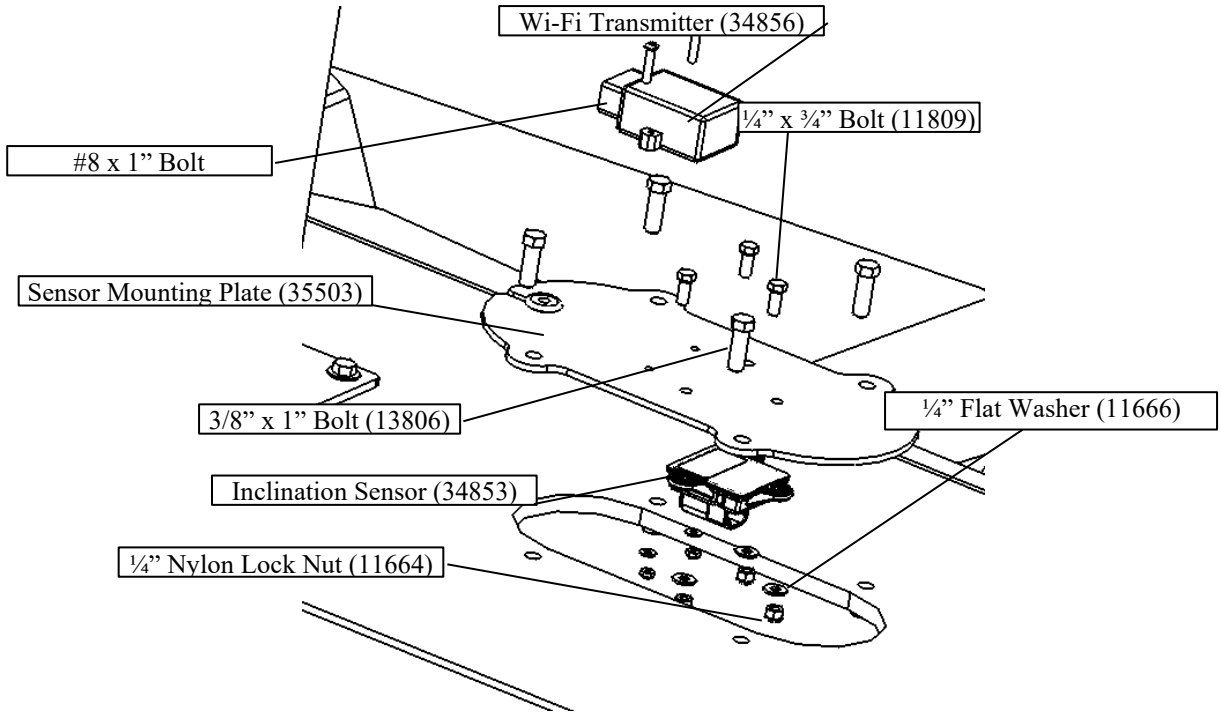


Figure 3.41 Middle Blade Sensor plate

d) To install the back axle inclination sensor (34853), bolt the sensor to mounting plate (35678) as shown in figure 3.42 and connect to sensor wiring. **Note: <u>Maximum</u> torque of 30 in-lbs on ¼" bolts that mount sensors to the mounting plate.**

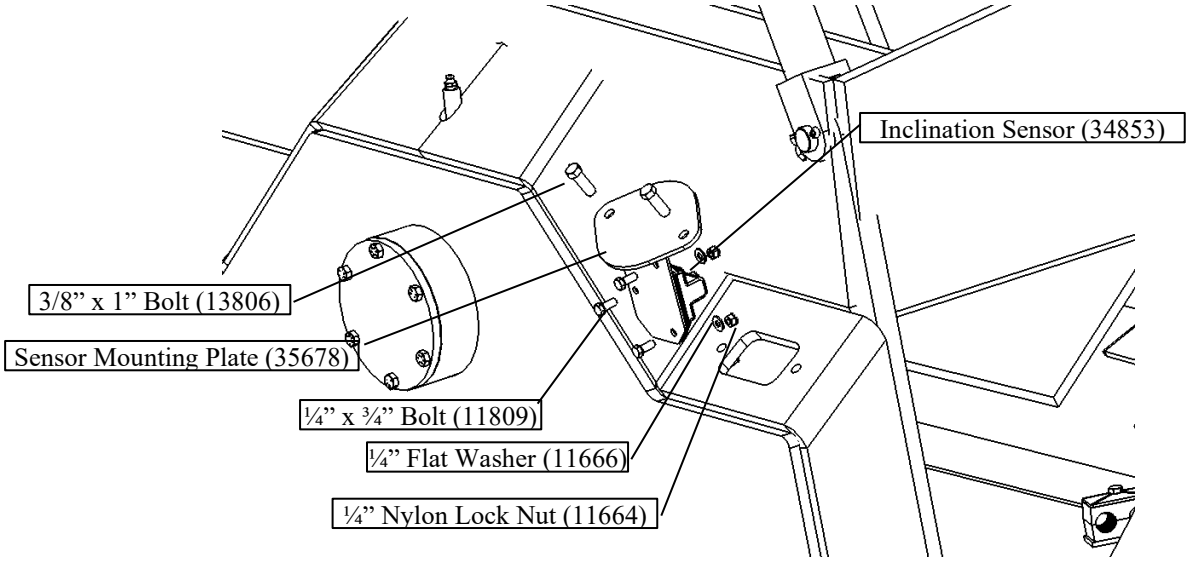


Figure 3.42 Back Axle Sensor plate

e) To install the Main Frame inclination sensor (34853), bolt the sensor to mounting plate (34853) as shown in figure 3.43 and connect to sensor wiring. **Note: <u>Maximum</u> torque of 30 in-lbs on ¼" bolts that mount sensors to the mounting plate.**

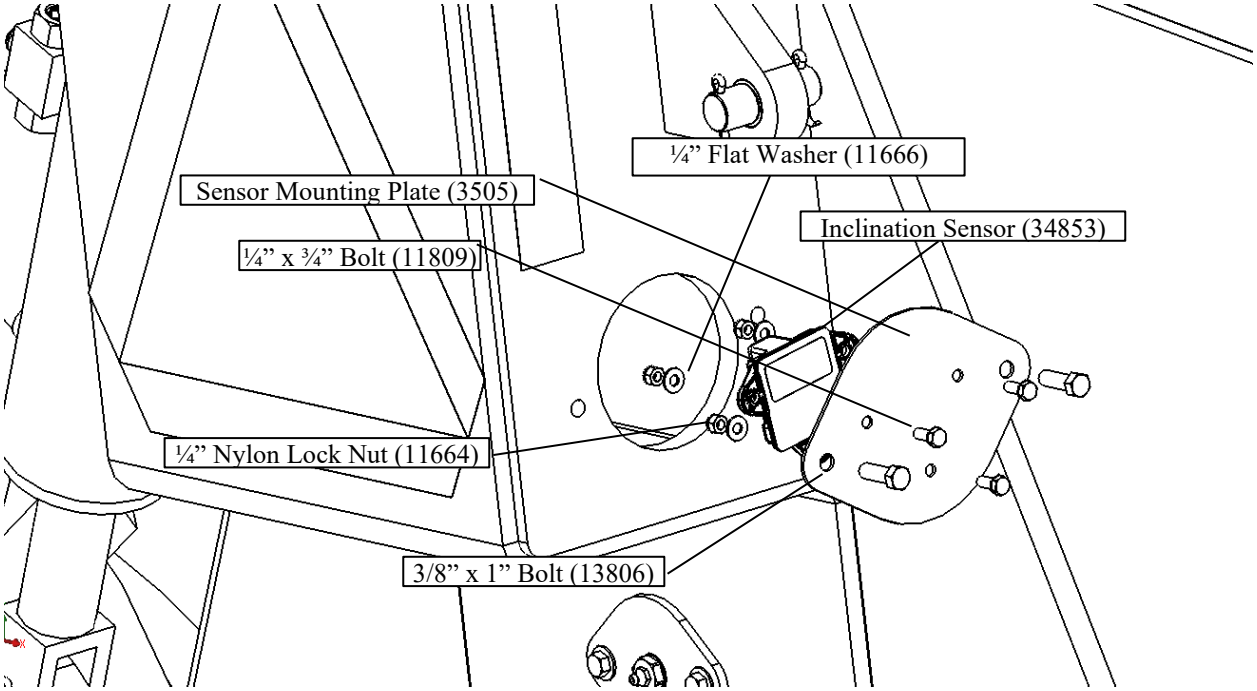


Figure 3.43 Back Axle Sensor plate

f) To install the wing rotary sensors. First install rotary sensor (34852) into rotary holder weldment (35676) with #8 bolts and nuts. Take care to install left-wing and right-wing rotary sensors in their correct positions. Install magnetic position marker bolt (34854) into the top of the wing sensor pin. **Do not torque more than 12ft-lbs**. Place weldment with sensor over the wing pivot pin and marker. Use ½" Nuts (20148) and washers (11668) to bolt Rotary holder (35676) onto wing. Adjust position of nuts so that the push the rotary holder downwards over the pin while keeping it square over the pin.

g) Connect the two-pin connector of the middle blade sensor harness to the connector on the light and electrical harness.

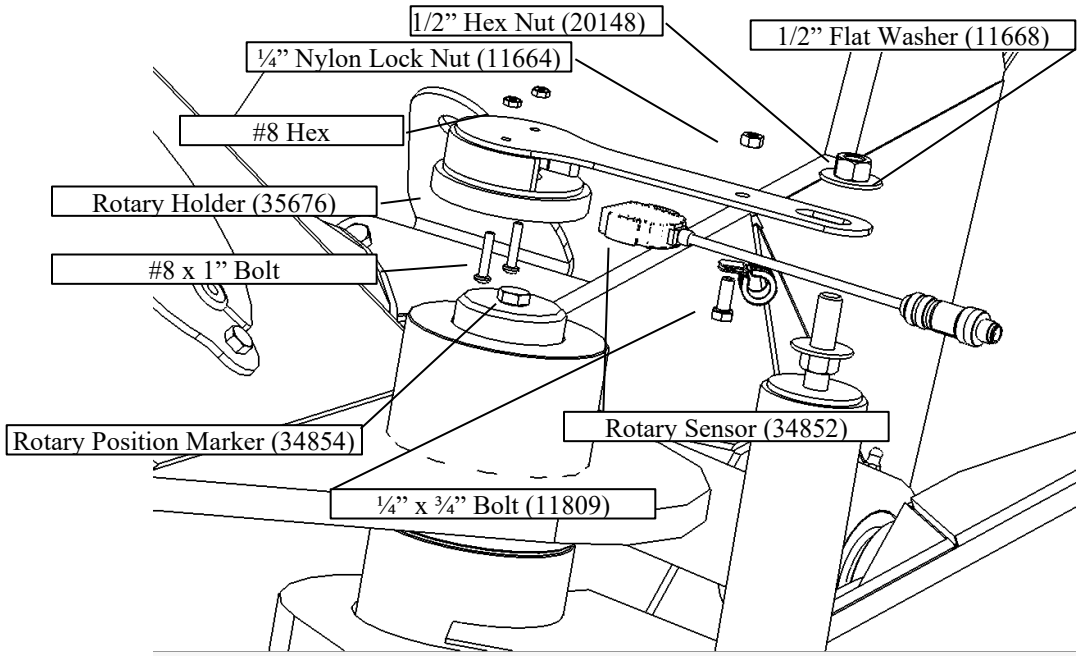


Figure 3.44 Wing Rotary Assembly

3.5 Parts Assembly

3.5.1 Scraper Blades

After hooking up the Pulldozer Transformer to the tractor. Lift the blade off the ground and lock it in place. Then attach three 6’ scraper blades to the middle blade and wings, and attach two 4’ scraper blades (See blade options) to the wings using fifty-seven 3”x 3/4” scraper blade bolts and ¾” nuts.

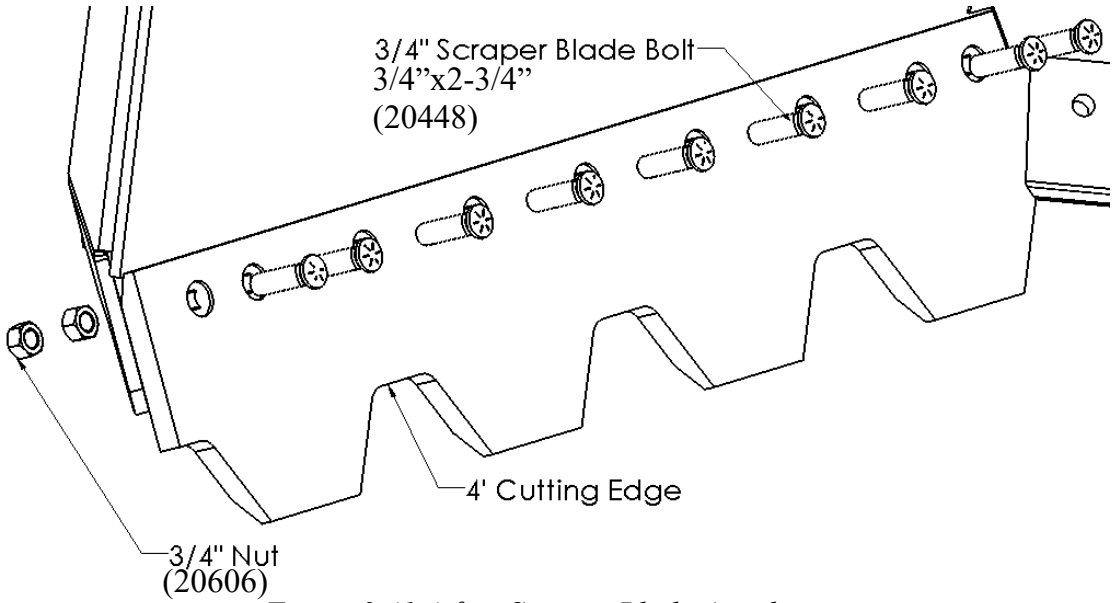


Figure 3.41 4-foot Scraper Blade Attachment

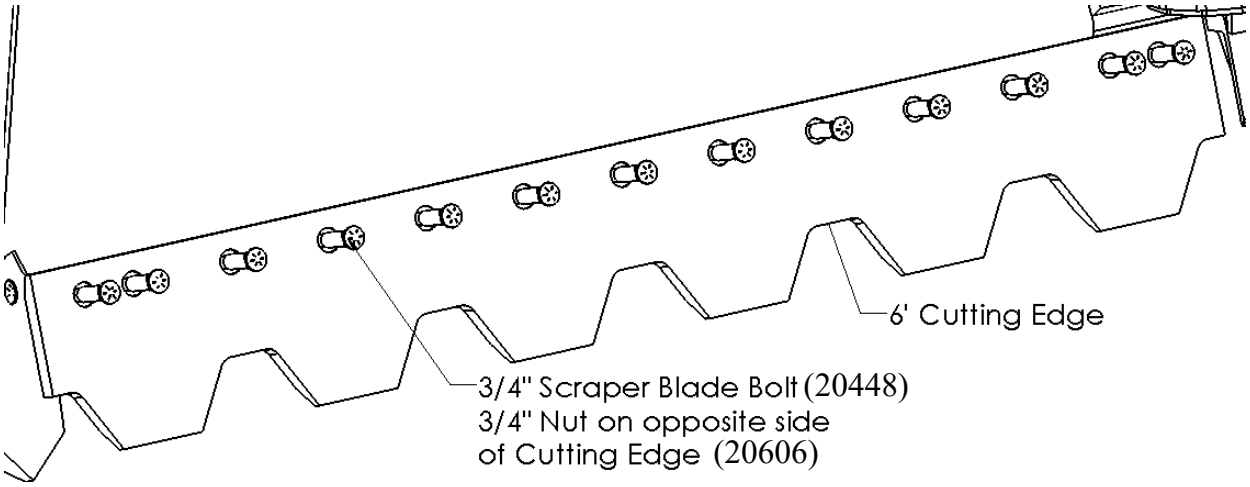


Figure 3.42 6-foot Scraper Blade Attachment

3.5.2 Operator Manual & Serial Number

a) Bolt the operator's manual box (22094) to the left-wing blade assembly, using four ¼" x ¾" bolts (11809), four ¼" flat washers (11666), and four ¼" serrated flange nuts (11812).

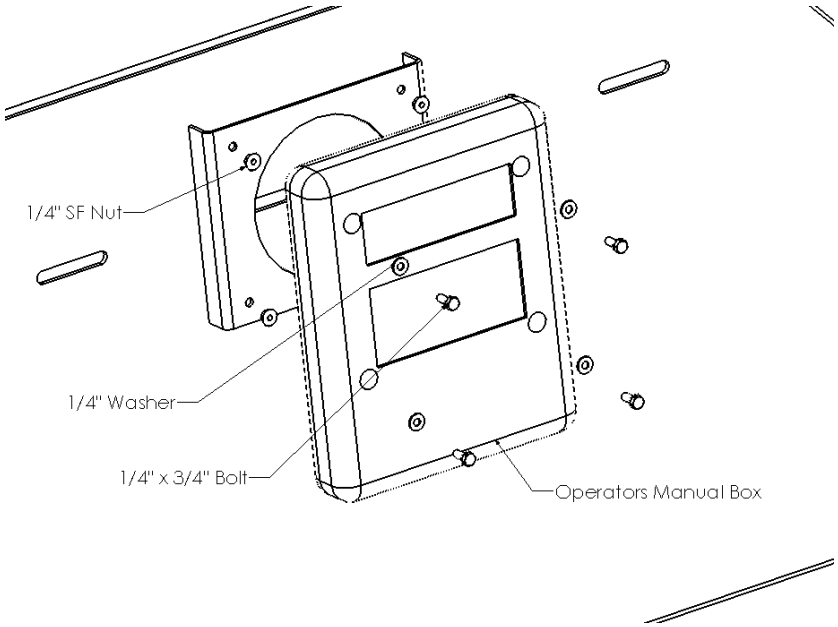


Figure 3.43 Operators Manual Box attachment

b) Install the serial number plate on the middle blade near the hitch connection using two 1/8" (13852) pop rivets.

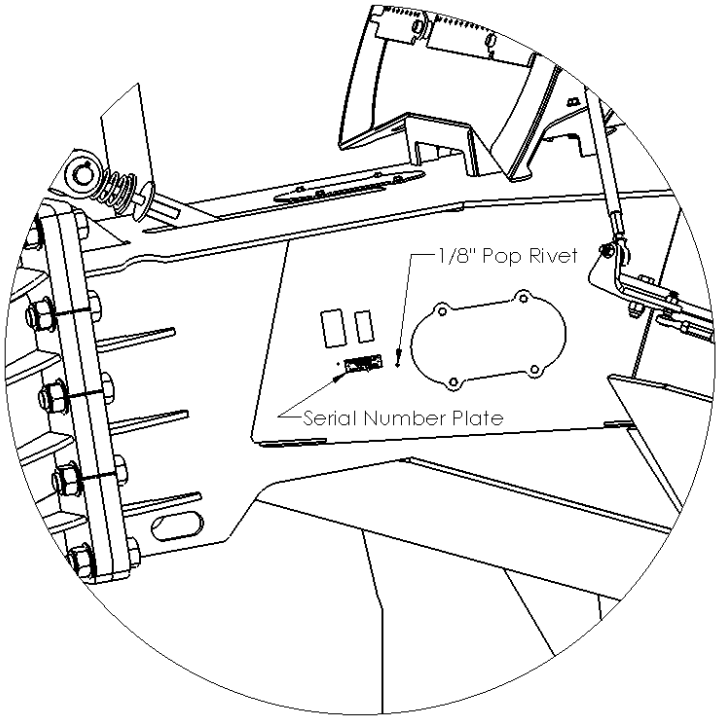


Figure 3.44 Serial Number Plate

3.5.3 Grease Tube

The Pulldozer Transformer is equipped with grease hoses to make greasing simpler. Two are two located near the lift pivot point as shown below.

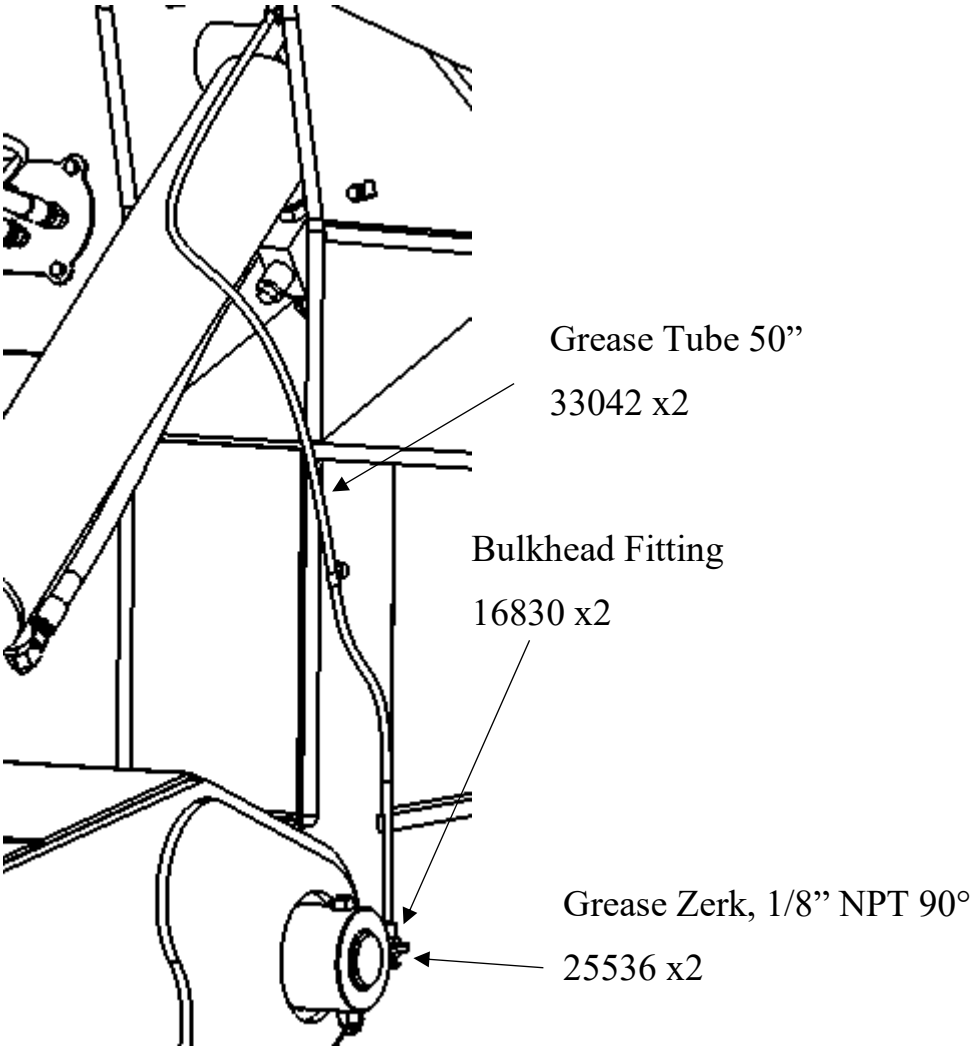


Figure 3.45 – Lift Grease Tube Installation

The other grease tube is in the connection from the main frame to the axle. Connect the grease tube bulkhead (16830) to the grease zerk plate (35457) then insert tube into main frame and feed through pipe to connect to the axle pipe. The grease zerk plate is then attached to the main frame with two 3/8” x 1-1/4” (10253) bolts. Screw in 1/8” NPT grease zerk (10270) into end of bulkhead,

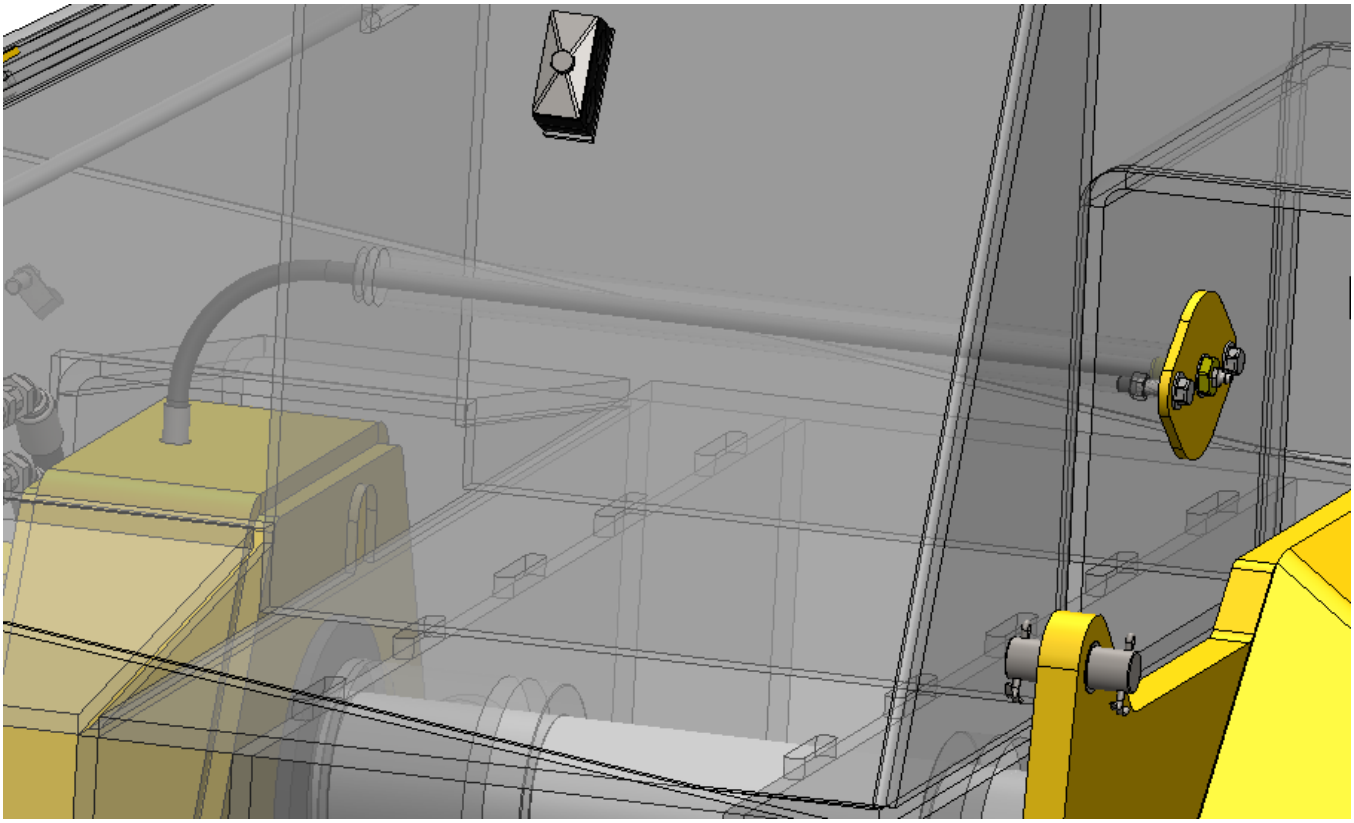


Figure 3.46 – Axle Grease Tube Installation

3.5.4 Grommets

Several rubber grommets are used on the Transformer to help prevent dirt from getting inside the machine

a) Install two 4" push in grommets (34145) into axle assembly to protect hydraulic hoses. Place four axle hose grommets (33094) around the four cylinder hoses, then install two axle hose plates (35479) per hose hole (4 total) and bolt together using four ¼" x ½" bolts (24415) and ¼" nuts (20891).

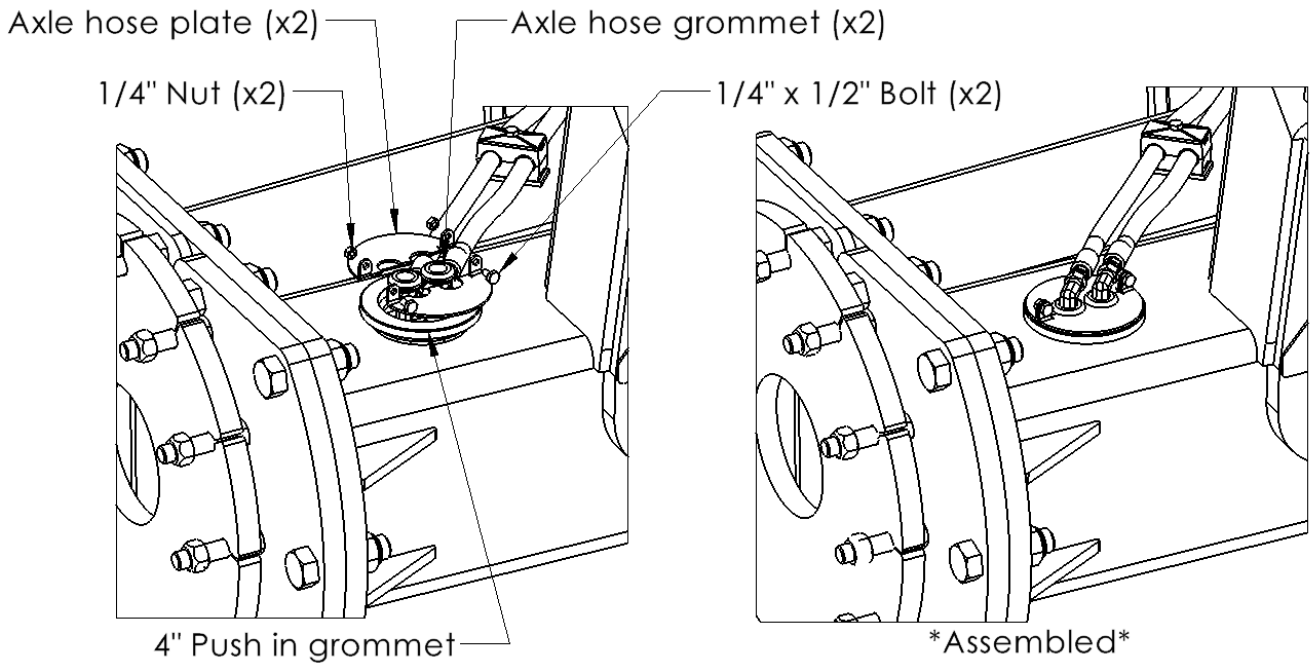


Figure 3.47 - Axle Hose Grommet Assembly

****REPEAT FOR RIGHT SIDE****

3.5.5 Axle Disassembly

Th following steps are to remove one of the telescoping tubes from the Axle without needing to disconnect the other telescoping tubes hydraulic cylinder from the end plate. (For diagram see next page)

1) Remove key bolt from telescoping cylinder flange
2) Loosen the 4 other bolts from telescoping cylinder flange, they do not need to be removed
3) Slide telescoping cylinder flange over using the slotted holes
4) Remove telescoping cylinder plate bolts
5) Remove telescoping cylinder plate
6) Remove the 4 metal sliders
7) Disconnect hydraulic cylinder shaft end from the inside of the telescoping tube
8) Now the telescoping tube can be safely removed without interference.

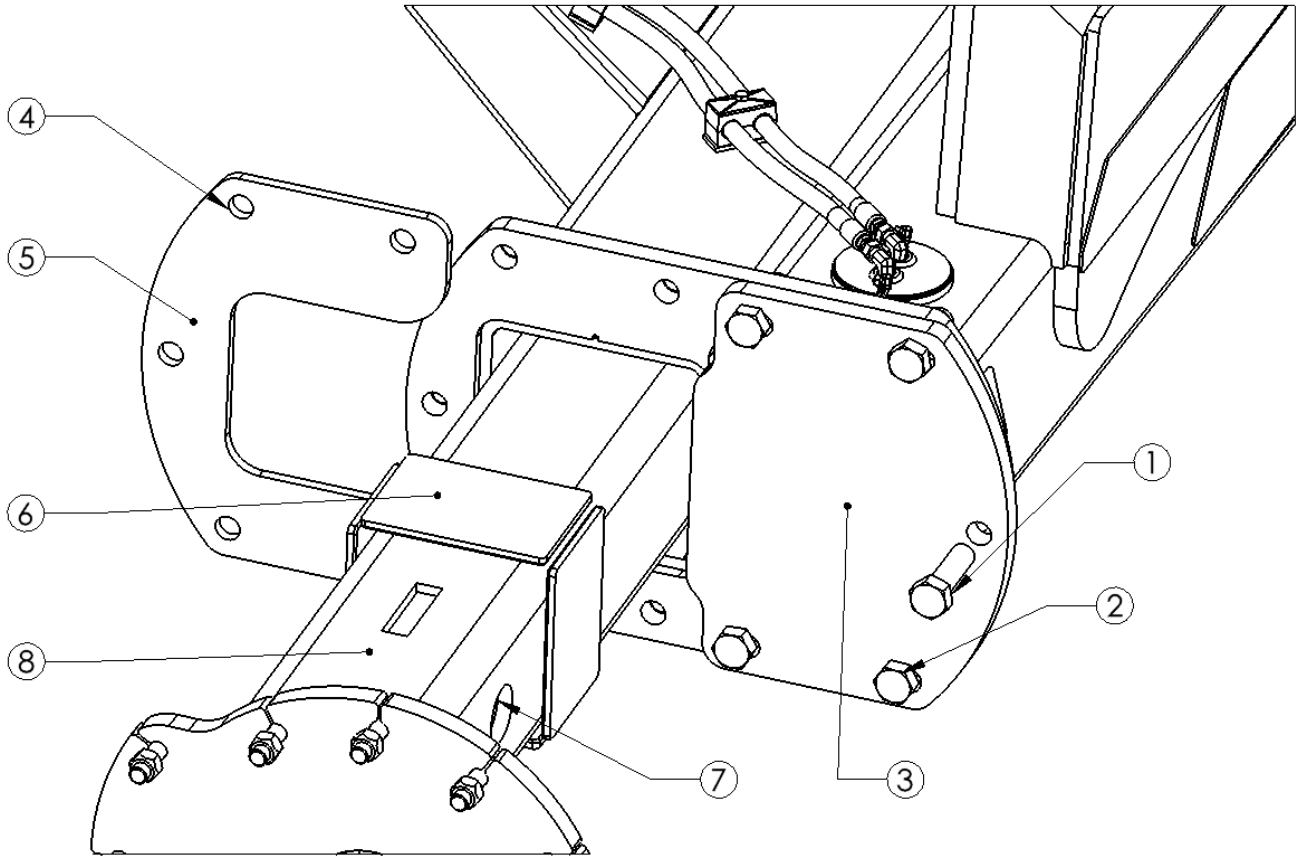


Figure 3.48 – Axle Telescoping Tube Disassembly

3.6 Decals

Decal List:

Pulldozer Transformer:

12228	Slow Moving Vehicle Sign	1
28383	Red Reflective Decal (2" x 9")	2
28384	Yellow Reflective Decal (2" x 9")	8
12239	Decal, AMC	1
25347	Decal, FEMA	1
33149	Transformer Hydraulic Hose Decal	1

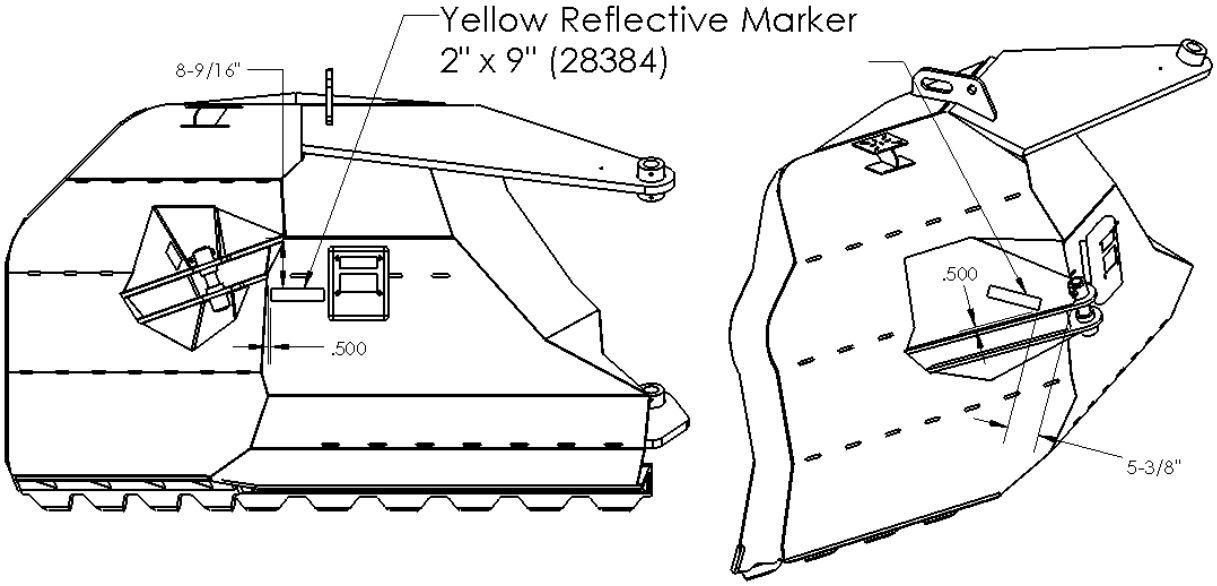
"2490"

33078	REAR AXLE 2490	"//// PULLDOZER 2490 ////"	RED
33076	RIGHT HITCH, 2490	"FIST PULLDOZER 2490 \\\\"	RED
33077	LEFT HITCH, 2490	"//// PULLDOZER 2490 FIST"	RED

Installation:

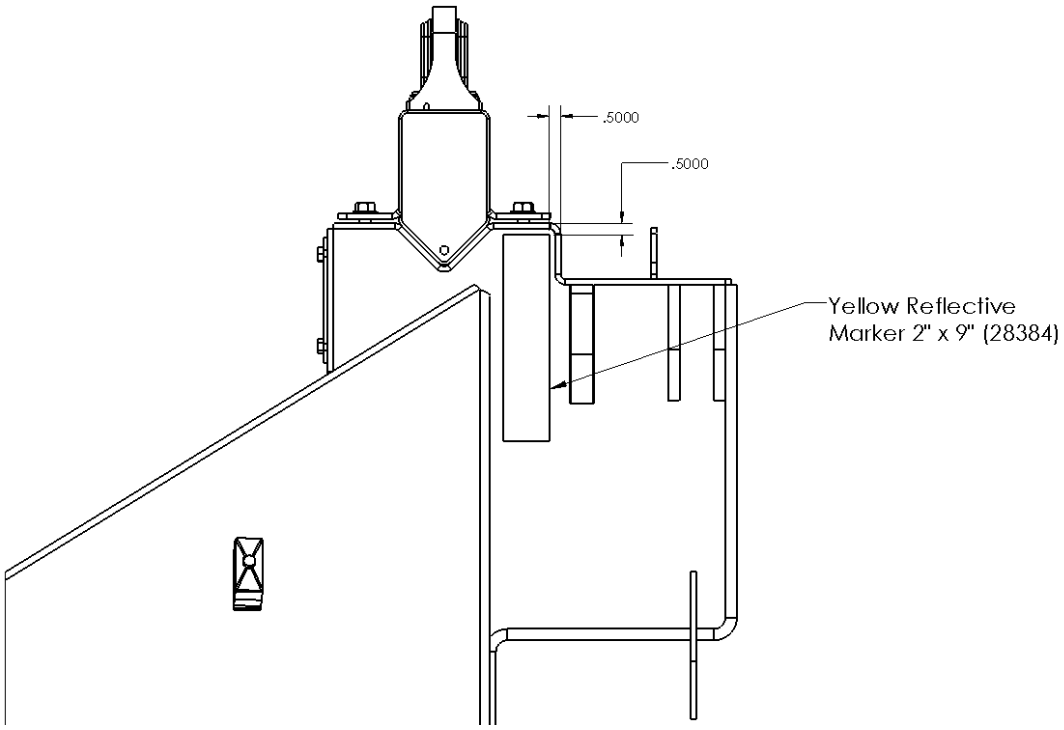
24 Foot Pulldozer Transformer Wing

Repeat for Right Side



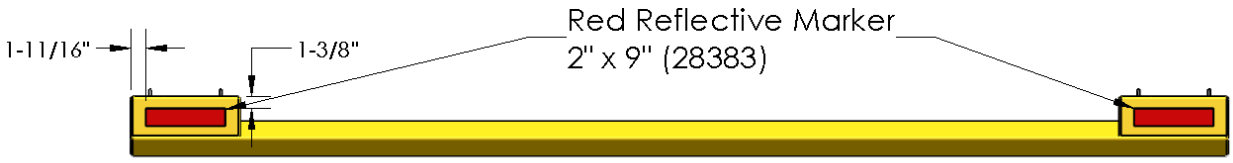
Pulldozer Transformer Main Frame

Repeat for Right Side

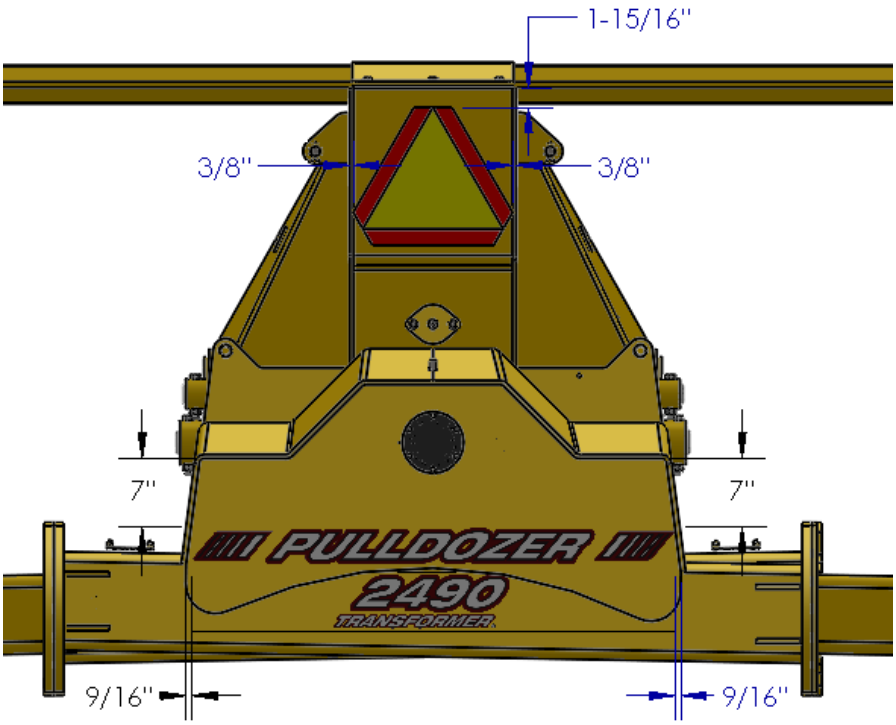


Pulldozer Transformer Light Bar

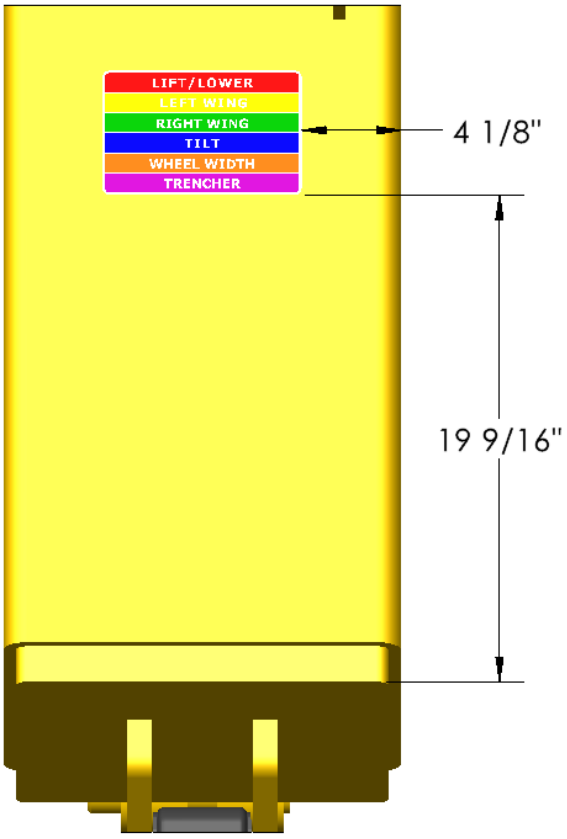
Rear View



Pulldozer Transformer SMV Sign and Rear 2490 Decal

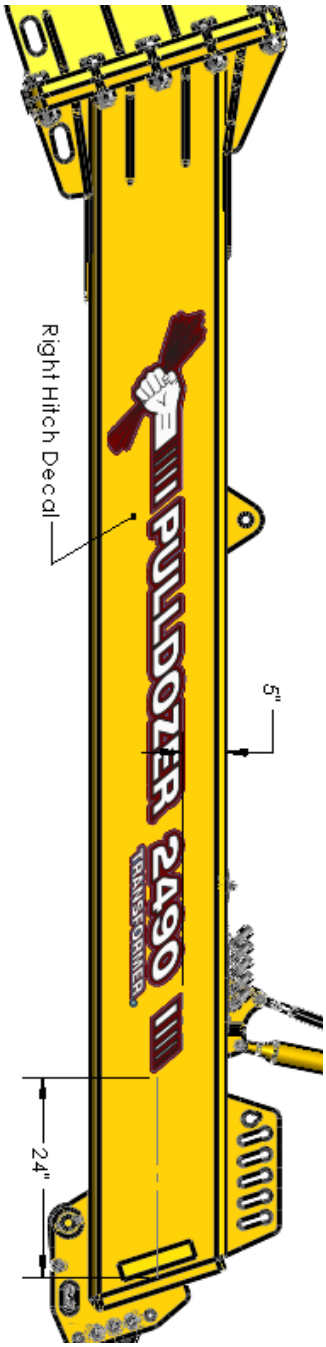


Pulldozer Transformer Hydraulic Hose Decal 5-6 Remotes (33149)



Pulldozer Transformer Hitch

Repeat for Left Side



4. Bolt Torque Values

FASTENER TORQUE CHARTS

BOLT CLAMP LOADS

Suggested Assembly Torque Values

	USS/SAE GRADE 5					USS/SAE GRADE 8				
DIAMETER & THREADS PER INCH	TENSILE STRENGTH MIN. PSI	PROOF LOAD LB	CLAMP LOAD LB	TORQUE DRY FT LB	LUBRICATED FT LB	TENSILE STRENGTH MIN. PSI	PROOF LOAD LB	CLAMP LOAD LB	TORQUE DRY FT LB	LUBRICATED FT LB
1/4-20 28	120,000 120,000	2,700 3,100	2,020 2,320	8 10	6.3 7.2	150,000 150,000	3,800 4,350	2,850 3,250	12 14	9 10
5/16-18 24	120,000 120,000	4,450 4,900	3,340 3,700	17 19	13 14	150,000 150,000	6,300 6,950	4,700 5,200	24 27	18 20
3/8-16 24	120,000 120,000	6,600 7,450	4,950 5,600	30 35	23 25	150,000 150,000	9,300 10,500	6,980 7,900	45 50	35 35
7/16-14 20	120,000 120,000	9,050 10,100	6,780 7,570	50 55	35 40	150,000 150,000	12,800 14,200	9,550 10,650	70 80	50 60
1/2-13 20	120,000 120,000	12,100 13,600	9,050 10,200	75 85	55 65	150,000 150,000	17,000 19,200	12,750 14,400	110 120	80 90
9/16-12 18	120,000 120,000	15,500 17,300	11,600 12,950	110 120	80 90	150,000 150,000	21,800 24,400	16,350 18,250	150 170	110 130
5/8-11 18	120,000 120,000	19,200 21,800	14,400 16,350	150 170	110 130	150,000 150,000	27,100 30,700	20,350 23,000	210 240	160 180
3/4-10 16	120,000 120,000	28,400 31,700	21,300 23,780	260 300	200 220	150,000 150,000	40,100 44,800	30,100 33,500	380 420	280 310
7/8-9 14	120,000 120,000	39,300 43,300	29,450 32,450	430 470	320 350	150,000 150,000	55,400 61,100	41,600 45,800	600 670	450 500
1-8 14	120,000 120,000	51,500 57,700	38,600 43,300	640 720	480 540	150,000 150,000	72,700 81,500	54,500 61,100	910 1,020	680 760

When using anti-seize, reduce the lubed chart reading by 20% to properly torque. Always lubricate and use lubed torque values.

NOTES:

The above recommended assembly torques are offered as a guide only. Torque specifications, especially for critical joints, should be determined under actual assembly conditions due to the many variables involved which are difficult to predict and do affect the torque-tension relationship.

The above recommended clamp loads are based on 75% of the minimum specified proof loads for each grade and size.

Torques for Grades 5 and 8 were calculated based on the following relationship:

T = R D P

Where: T = Torque (ft lb)

D = Nominal Diameter (in)

P = Clamp Load (lb)

R = Tightening Coefficient

The value of R is assumed to be equal to .20 for dry, unplated conditions and equal to .15 for lubricated, including plated, conditions. Actual values of R can vary between .05 and .35 for commonly encountered conditions.

STRENGTH GRADE	APPLICABLE SIZES	PROOF LOAD STRESS (PSI)	YIELD STRENGTH MIN. STRESS (PSI)	TENSILE STRESS MIN. (PSI)
SAE Gr. 5	1/4 to 1" diameter over 1" diameter to 1-1/2 diameter	85,000 74,000	92,000 81,000	120,000 105,000
SAE Gr. 8	1/4 to 1" diameter	120,000	130,000	150,000

Pounds to Inch Pound Conversion

lb x 12 = inch lb

Example: 9 lb x 12 = 108 inch lb

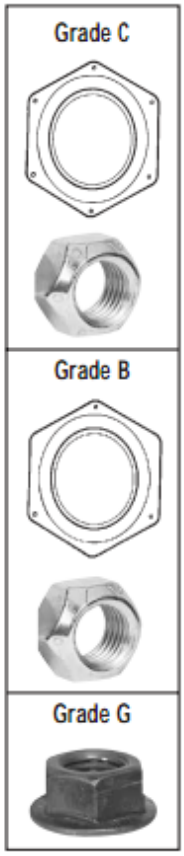
FRACTIONAL MEASUREMENT		
BOLT DIAMETER	CAP SCREW WRENCH SIZE	NUT WRENCH SIZE
1/4	7/16	7/16
5/16	1/2	1/2
3/8	9/16	9/16
7/16	5/8	11/16
1/2	3/4	3/4
9/16	13/16	7/8
5/8	15/16	15/16
3/4	1-1/8	1-1/8
7/8	1-5/16	1-5/16
1"	1-1/2	1-1/2
1-1/8	1-11/16	1-11/16
1-1/4	1-7/8	1-7/8
1-3/8	2-1/16	2-1/16
1-1/2	2-1/4	2-1/4
1-3/4	2-5/8	2-5/8
2"	3"	3"
2-1/4	3-3/8	3-3/8
2-1/2	3-3/4	3-3/4
2-3/4	4-1/8	4-1/8
3"	4-1/2	4-1/2

FASTENER TORQUE CHARTS

GUIDE FOR PREVAILING-TORQUE LOCK NUT ASSEMBLY TORQUES (CAD AND WAX, GRADE B, C, AND GRADE G FLANGE NUTS) LOCK NUT STANDARDS FROM IFI-100 REQUIREMENTS

Torque-Tension Requirements

Size Threads Per Inch	Grade B Clamp Load (lb)	Grade B Assembly Torque Max.	Grade B Assembly Torque Min.	Grade C Clamp Load (lb)	Grade C Assembly Torque Max.	Grade C Assembly Torque Min.	Grade G Clamp Load (lb)	Grade G Assembly Torque Max.	Grade G Assembly Torque Min.
1/4–20	2,000	85**	60**	2,850	125**	85**	2,850	150**	100**
1/4–28	2,300	90**	65**	3,250	125**	85**	3,250	160**	105**
5/16–18	3,350	150**	110**	4,700	190**	130**	4,700	240**	155**
5/16–24	3,700	160**	120**	5,200	200**	140**	5,200	230**	155**
3/8–16	4,950	20	14.5	6,950	28	20	6,950	32	21
3/8–24	5,600	22	16	7,900	29	21	7,900	33	22
7/16–14	6,800	32	23	9,600	43	31	9,600	51	34
7/16–20	7,550	34	24	10,700	43	31	10,700	60	40
1/2–13	9,050	50	37	12,800	62.5	45	12,800	85	55
1/2–20	10,200	52.5	37.5	14,440	70	50	14,440	89	59
9/16–12	11,600	70	50	16,400	95	70	16,400	120	80
9/16–18	13,000	77.5	57.5	18,300	95	70	18,300	132	88
5/8–11	14,500	95	70	20,300	122.5	90	20,300	143	95
5/8–18	16,300	97.5	72.5	23,000	125	90	23,000	175	115
3/4–10	21,300	165	125	30,100	210	155	30,100	240	160
3/4–16	23,800	165	120	33,600	210	155	33,600	270	170
7/8–9	29,500	250	185	41,600	312.5	225	41,600	360	260
7/8–14	32,400	270	200	45,800	312.5	225	45,800	402	247
1–8	38,700	375	275	54,600	462.5	360	54,600	530	410
1–12	42,300	395	290	59,750	490	360	59,750	—	—
1–14	43,000	400	300	61,100	500	362.5	61,100	645	398
1-1/8–7	42,100	404	294	69,000	585	454	69,000	—	—
1-1/8–12	47,500	437	327	76,800	622	453	76,800	—	—
1-1/4–7	53,500	513	375	87,000	736	573	87,000	—	—
1-1/4–12	59,700	549	412	96,600	782	570	96,600	—	—
1-3/8–6	63,800	612	445	104,000	880	685	104,000	—	—
1-3/8–12	72,900	670	503	118,000	955	696	118,000	—	—
1-1/2–6	77,600	745	545	127,000	1,075	837	127,000	—	—
1-1/2–12	87,700	807	605	142,000	1,150	837	142,000	—	—

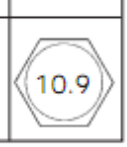


- Clamp loads for the Grade B lock nuts equal 75% of the bolt proof loads specified for SAE J-429 Grade 5, and ASTM A-449 bolts.
  Clamp loads for Grade C lock nuts equal 75% of the bolt proof loads specified for SAE J-429 Grade 8, and ASTM A-354 Grade BD bolts.
- IFI-100 does not govern lock nuts above 1". The values shown in the chart are to be used as a mid-range guideline.

** Torque values for 1/4" and 5/16" sizes are in inch lb. All other torque values are in foot lb.

METRIC TORQUE CHART FOR HEX HEAD CAP SCREWS

Size	Class	Newton Meters Zinc Plated	Newton Meters Unplated	Foot Pounds (approx.) Zinc Plated	Foot Pounds (approx.) Unplated	Class
M4 x .70 Pitch	8.8	3.1	2.2	2.30	1.65	
M5 x .80 Pitch	8.8	6.1	5.5	4.58	4.13	
M6 x 1.00 Pitch	8.8	10.4	9.5	7.80	7.13	
M7 x 1.00 Pitch	8.8	17.0	15.5	12.75	11.63	
M8 x 1.25 Pitch	8.8	25.0	23.0	18.75	17.25	
M8 x 1.00 Pitch	8.8	27.0	24.5	20.25	18.38	
M10 x 1.50 Pitch	8.8	51.0	46.0	38.25	34.50	
M10 x 1.00 Pitch	8.8	57.0	52.0	42.75	39.00	
M10 x 1.25 Pitch	8.8	54.0	49.0	40.50	36.75	
M12 x 1.75 Pitch	8.8	87.0	79.0	65.25	59.25	
M12 x 1.25 Pitch	8.8	96.0	87.0	72.00	65.25	
M12 x 1.50 Pitch	8.8	92.0	83.0	69.00	62.25	
M14 x 2.00 Pitch	8.8	140.0	125.0	105.00	93.75	
M14 x 1.50 Pitch	8.8	150.0	135.0	112.50	101.25	
M16 x 2.00 Pitch	8.8	215.0	195.0	161.25	146.25	
M18 x 2.50 Pitch	8.8	300.0	280.0	225.00	210.00	
M20 x 2.50 Pitch	8.8	430.0	390.0	322.50	292.50	
M22 x 2.50 Pitch	8.8	580.0	530.0	435.00	397.50	
M24 x 3.00 Pitch	8.8	740.0	670.0	555.00	502.50	
M6 x 1.00 Pitch	10.9	15.5	14.0	11.63	10.50	
M8 x 1.25 Pitch	10.9	37.0	34.0	27.75	25.50	
M10 x 1.50 Pitch	10.9	75.0	68.0	56.25	51.00	
M12 x 1.75 Pitch	10.9	160.0	117.0	97.50	87.75	
M14 x 2.00 Pitch	10.9	205.0	185.0	153.75	138.75	
M16 x 2.00 Pitch	10.9	310.0	280.0	232.50	210.00	



TORQUE CHART FOR STAINLESS STEEL CAP SCREWS

Size	316 inch-lb	18/8 inch-lb
6-32	10.1	9.6
6-40	12.7	12.1
8-32	20.7	19.8
8-36	23.0	22.0
10-24	23.8	22.8
10-32	33.1	31.7
1/4-20	78.8	75.2
1/4-28	99.0	94.0
5/16-18	138.0	132.0
5/16-24	147.0	142.0
3/8-16	247.0	236.0
3/8-24	271.0	259.0
7/16-14	393.0	376.0
7/16-20	418.0	400.0
1/2-13	542.0	517.0
1/2-20	565.0	541.0
9/16-12	713.0	682.0
9/16-18	787.0	752.0
5/8-11	1,160.0	1,110.0
5/8-18	1,301.0	1,244.0
3/4-10	1,582.0	1,530.0
3/4-16	1,558.0	1,490.0
7/8-9	2,430.0	2,328.0
7/8-14	2,420.0	2,318.0
1"-8	3,595.0	3,440.0
1"-14	3,250.0	3,110.0

NOTES