US Tarp Powered Arm

INSTALLATION INSTRUCTION MANUAL

&

OPERATIONAL GUIDE

SAFETY

Read this section carefully before proceeding. The following symbols may appear prior to certain safety related assembly and installation steps described in this manual.

FAILURE TO OPERATE AND INSTALL THIS UNIT AS INSTRUCTED MAY RESULT IN SERIOUS INJURY OR DEATH.

DANGER

Indicates an immediately hazardous situation which, if not avoided, will result in serious injury or death.

WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in serious injury or death.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or property damage.

NOTICE

Indicates information about a subject that is not safety related.

Contents

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INSTALLING THE GANTRY & ARM SYSTEM

STEP 1: INSTALLING THE GANTRY

US Tarp gantry frames are designed to be mounted to a variety of chassis and frame types. Mounting methods include U-bolts, chassis bolts, and welding.

⚠ CAUTION	⚠ CAUTION
Follow chassis manufacturers recommendations for mounting to frame rails. Failure to comply may result in damage or injury.	Do not drill into chassis top or bottom flange. Do not drill through sidewall of chassis closer to top or bottom flange than holes drilled by manufacturer.

Chassis Bolt (Included/Integrated)

Gantry frames come with integrated thru-bolt brackets which are designed to bolt through the sides of the chassis or trailer frame rails. To install, lower the gantry frame onto the frame rails. A minimum of 6” is required between cab and gantry frame legs (*Figure 1.1*).

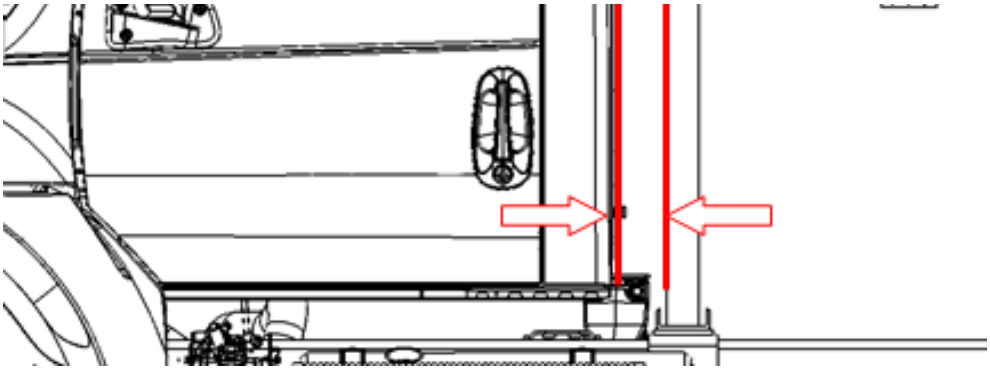


Figure 1.1: Cab to Gantry Frame Spacing

Center the frame horizontally (spacers may be required if frame rails are narrower than gantry legs). Align for level and squareness and double check cab to frame clearance. Transfer mounting holes from gantry to frame rails.

NOTICE
In applications with C-Channel frame rails (1) it is not advisable to use the top two bolt holes in the gantry frame mounting bracket (2) due to their proximity to the top flange of the frame.

Remove gantry frame and drill marked frame rails for 5/8” bolts. A minimum of 2 bolts per side are required. Replace gantry frame. Using the provided 5/8” bolts, nuts and washers, fix the gantry frame into place. See *Figure 1.2*. Do not use below grade 8 hardware if longer bolts are required. Ensure measurements taken earlier remain consistent.

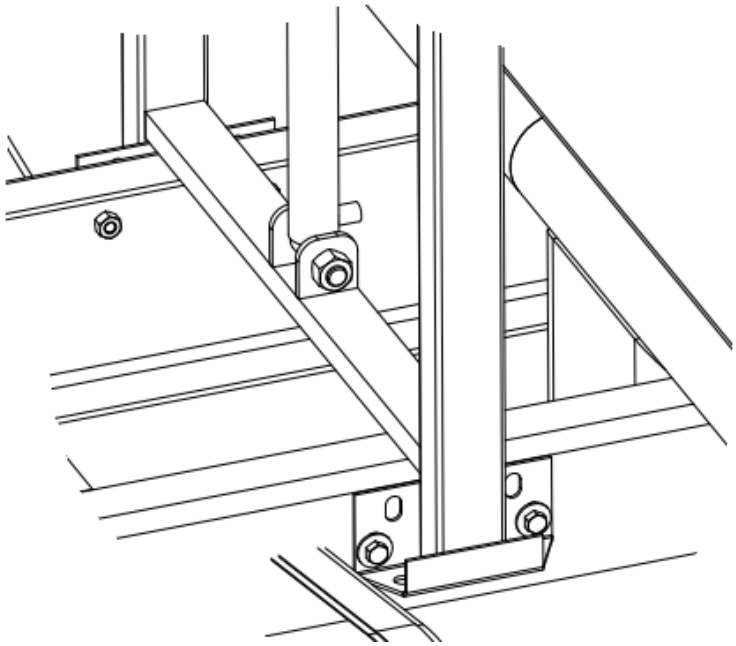


Figure 1.2: Chassis Bolt

Optional U-Bolt Kit

Prior to setting gantry on chassis, complete the following:

Holding U-Bolt plate up to gantry foot, insert 5/8”-11 x 2” grade 8bolts (1) with washers (2) through the bottom set of holes of the gantry feet. See *Figure 1.3* for orientation.

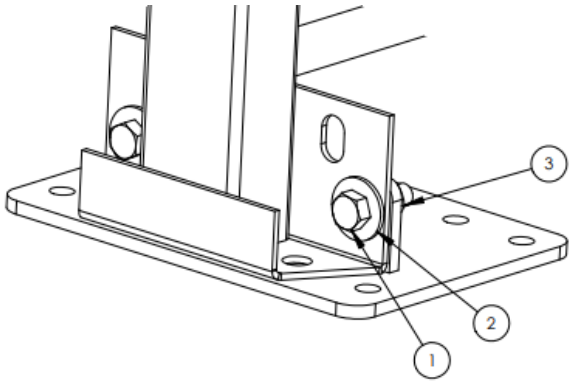


Figure 1.3: Attaching U-Bolt Mounting Plate

Turn on the 5/8” grade 8 nylock nut (3). Turn nut on until almost tight leaving a little room for play with the plate.

Place frame and attached u-bolt plates onto frame rails between cab and hoist system. U-bolt plates are oversized to allow for multiple mounting options.

NOTICE	⚠ CAUTION
Wires, air lines, hydraulic lines, and cables should be avoided. Do not pinch between u-bolt and frame rail.	Follow chassis manufacturers recommendations for mounting to frame rails. Failure to comply may result in damage or injury.

Start by routing one of the u-bolts (4) under the frame rail. There are four sets of holes on the mounting plate. The two primary sets run through the gantry feet. The primary holes should be used unless the u-bolt cannot be routed through them, see *Figure 1.4*. Hand tighten provided washers (2) and hex nuts (5) on to the u-bolts (4) to keep in position. Do not tighten yet.

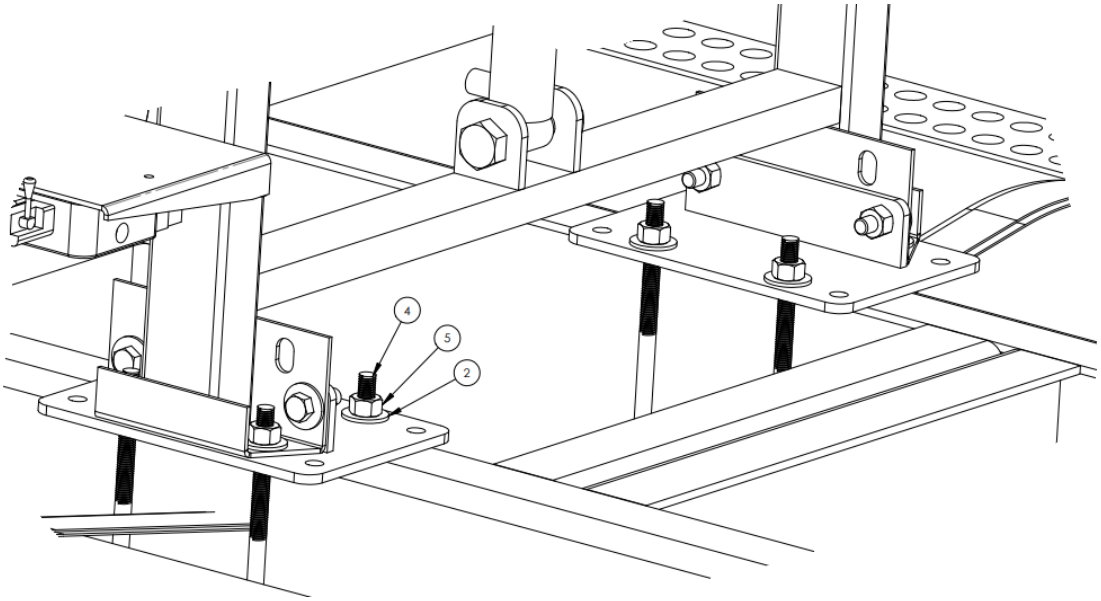


Figure 1.4: Mounting U-Bolt Plates to Chassis

If there is equipment in the way and the gantry frame cannot be adjusted forward or backward use the primary holes, use one or both alternate hole sets. See *Figure 1.5* with the red highlighted holes.

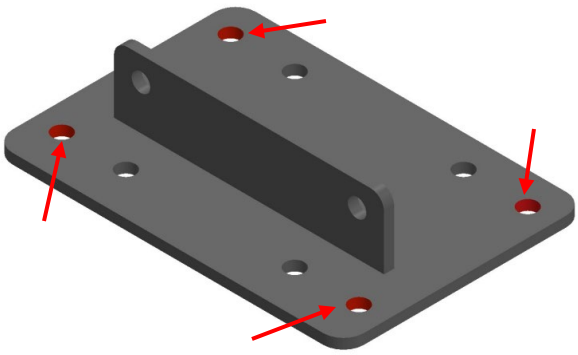


Figure 1.5: Alternate Mounting Holes

In the case that a u-bolt cannot be routed to any of the hole sets you can flip the u-bolt and route through alternate hole set. A custom bracket will need to be fabricated by the installer in order to use the u-bolt in this orientation, see *Figure 1.6*.

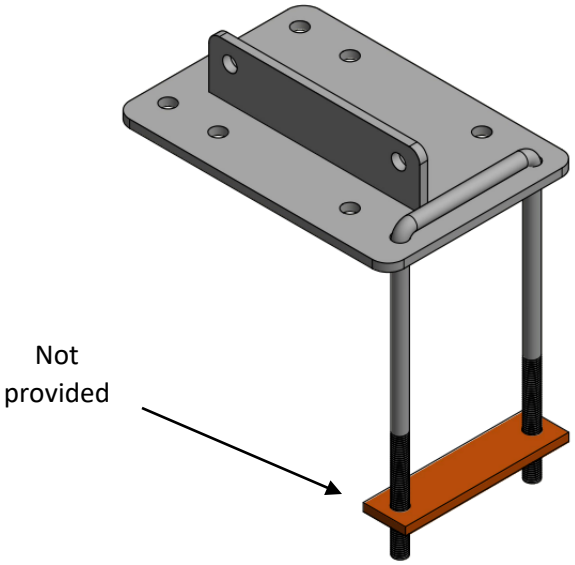


Figure 1.6: Alternate U-Bolt Mounting Orientation

Once all u-bolts are in position, double check gantry frame location. Tighten down hex nuts (5) on u-bolt in a circular pattern until tight to ensure the u-bolts are clamped evenly. Use a ratchet and socket until tight, then torque each bolt to 150 ft-lbs. To prevent backoff, turn on one extra hex nut (6) to each u-bolt leg and tighten against hex nut (5) already in place, see *Figure 1.7*. It is recommended that after 3-months of use these bolts are re-torqued to account for any stretching.

NOTICE

It is recommended that the u-bolts are re-torqued after 3-months of use at 150 ft-lbs.

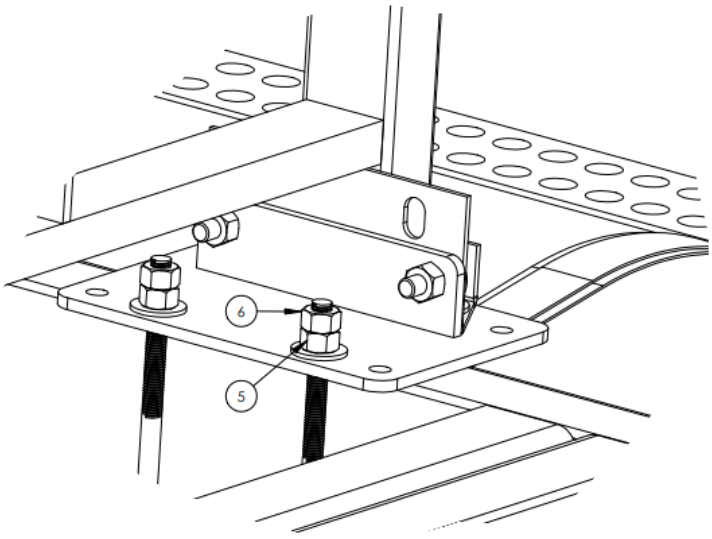


Figure 1.7: Installing Lock Nut

STEP 2: INSTALLING ARM SYSTEM

⚠ CAUTION	⚠ CAUTION
Do not drill into chassis top or bottom flange. Do not drill through sidewall of chassis closer to top or bottom flange than holes drilled by manufacturer.	Federal DOT allows a maximum outside width of 108". Check local DOT laws to determine if they vary. These instructions show the install for maximum allowable width according to federal DOT.

Note:

Offset Mounting Brackets must be:

1. *Level and square both horizontally and vertically.*
2. *Parallel to frame rails*
3. *Spaced to allow removal of all tires*
4. *Equal on both sides of chassis (from front, frame rail side, and height-wise)*

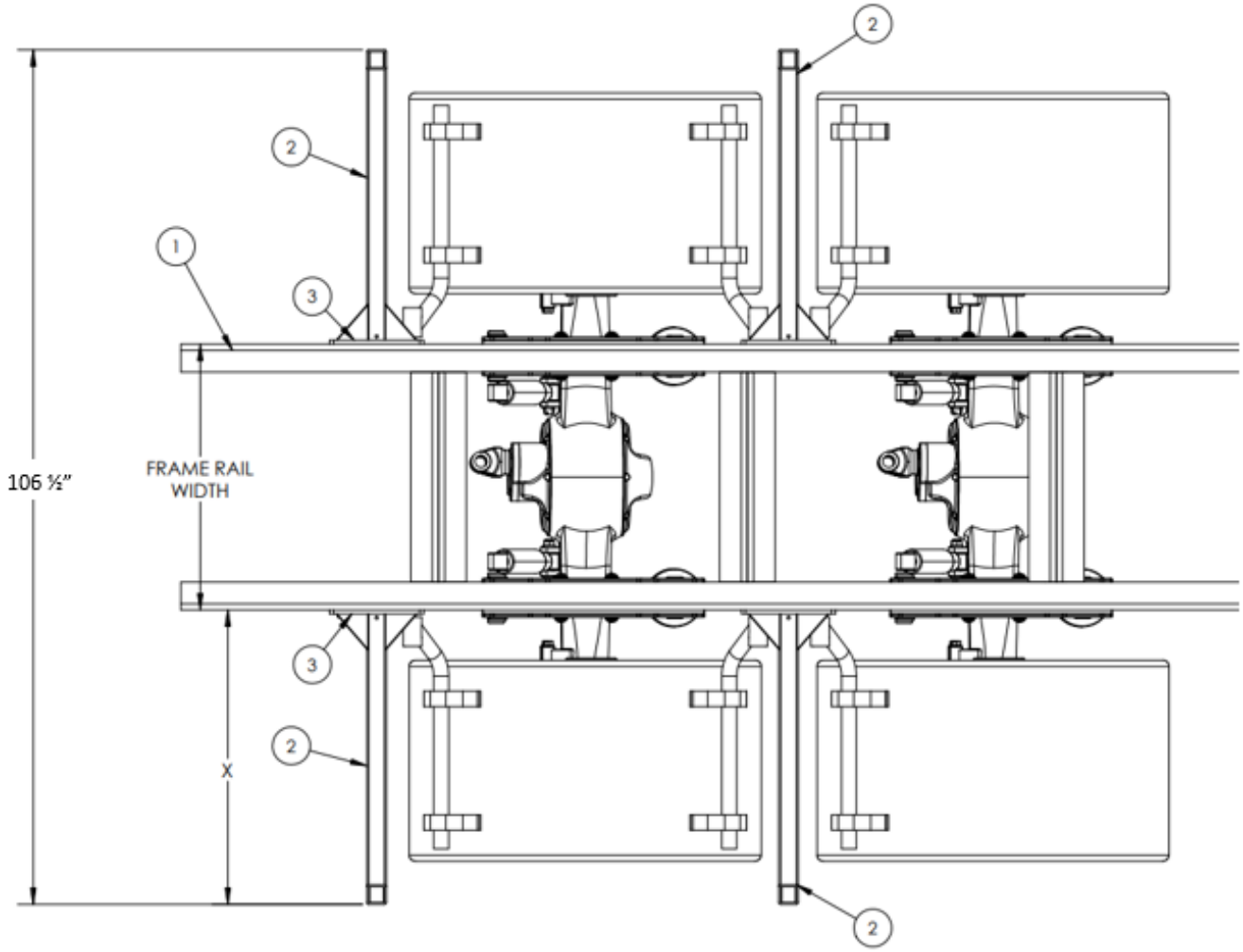


Figure 2.1: System Width Dimensions

Determining Arm Offset and Pivot Placement

NOTICE

Provided offset mounting tubes are longer than necessary to allow for varying width chassis. These will likely need to get cut down.

Start by taking the frame rail (1) outside width measurement. Take 106.5” and subtract the measurement from it. Take the remainder of that and divide by 2. This will give you the “X”: the distance needed to offset the pivots from the frame rails. (Ex. 34.5” frame rail width; 106.5” - 34.5” = 72”; 72”/2 = **36**”). In the example, 36” is the necessary offset distance, “X”. See *Figure 2.1* on previous page for dimensioning callouts.

The installation of the offset mounts (2) requires extra gusseting such as fish plates (3) (not included). Be sure to subtract the thickness of the fish plates (3) to determine the final length of the offset mounting tube (2) (ex. 3/8” fish plate thickness; 36” – 3/8” = 35-5/8” Offset Mounting Tube length).

NOTICE

If fish plate thicknesses vary, tube lengths will also vary. If fish plate thicknesses are equal, all four tubes all be the same length.

Now that the offset tube length has been determined, the four tubes can be cut to size. Offset tubes typically need to straddle the lead axle on a tandem axle set up. On a tri axle chassis, they will typically straddle the middle axle.

Height of pivot pin/mounting bracket is typically based off the fenders. Generally, the mounting bracket assembly base tube should sit even with or above the bottom lip of the fender. This allows for room to remove and replace wheels, see *Figure 2.2* on next page.

Depending on where the offset tubes will be located on the frame rails heightwise, the leg of the offset tube may need to be cut down. This is best done with a straight edge and level. Clamp offset tubes in mounting location. Span the straight edge between both offset tubes and make level with the bottom lip of fender. Mark the tubes where the straight edge crosses. Cut tops of tubes off if necessary and continue to opposite side. See *Figure 2.2* on next page.

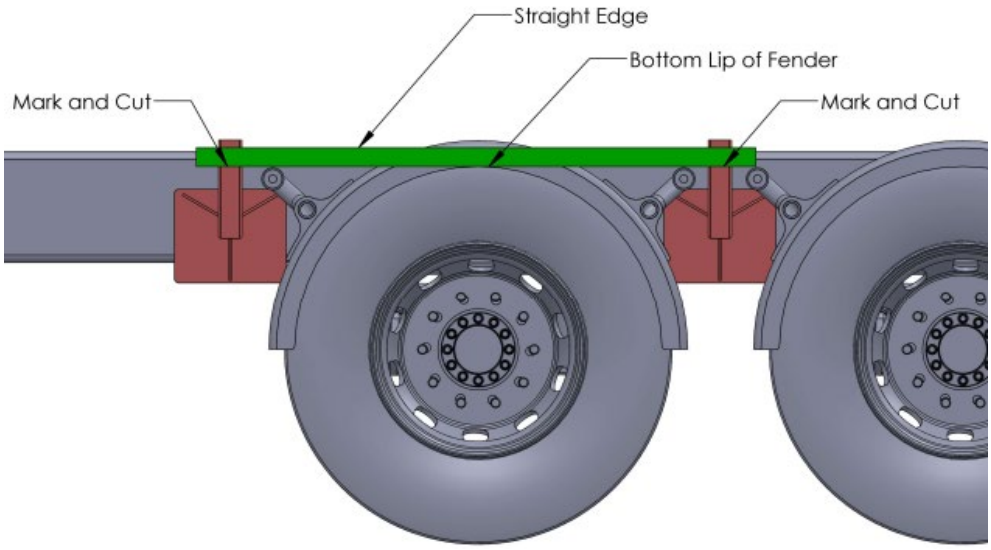


Figure 2.2: Determining Offset Height

Make sure that mounting tube heights are consistent from driver side to passenger side.

Weld and Bolt offset mounting tubes (2) to the frame rails (1) and add gusseting to fish plates (3); example shown in *Figure 2.3*. Do not use fasteners under Grade 8. 2 x 6 inch gussets are provided in the kit for use on offsets.

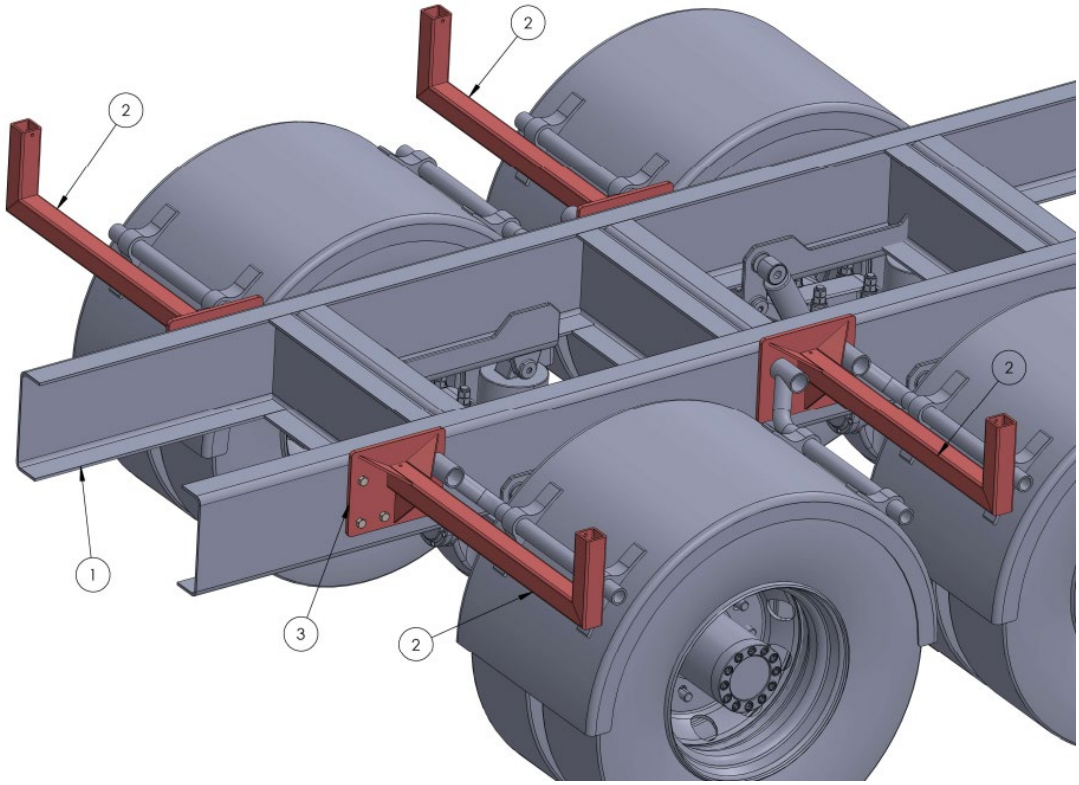


Figure 2.3: Offset Tube Fish Plates and Gusseting Requirements

Once offset tubes are mounted, the pivot location needs to be determined. If accessible, load the longest and tallest container on the hoist system (22' to 24' typically). Measure distance "A" shown in *Figure 2.4*. This is the distance from the rear of the gantry leg to the rear of the container. Divide that measurement by 2 to find the distance from rear of gantry leg to center of pivot pin.

If a container is not available, the dimension will be determined by the theoretical longest container. For most systems the longest container length will be 22'. The pivot pin center will be located roughly 132"(+/-) behind the container stop (or Hook) at the front of the hoist system. For max container lengths of 24' the pivot pin center will be located at roughly 144"(+/-) behind the container stop (or Hook) at the front of the hoist system.

Keep in mind the minimum distance from gantry leg to pivot point cannot be less than 132" or more than 168" in order for the arms to rest properly.

NOTICE

The reach of the adjustable arm is 132-168". 168" being the maximum reach from the center of the pivot pin. Keep this in mind when mounting.

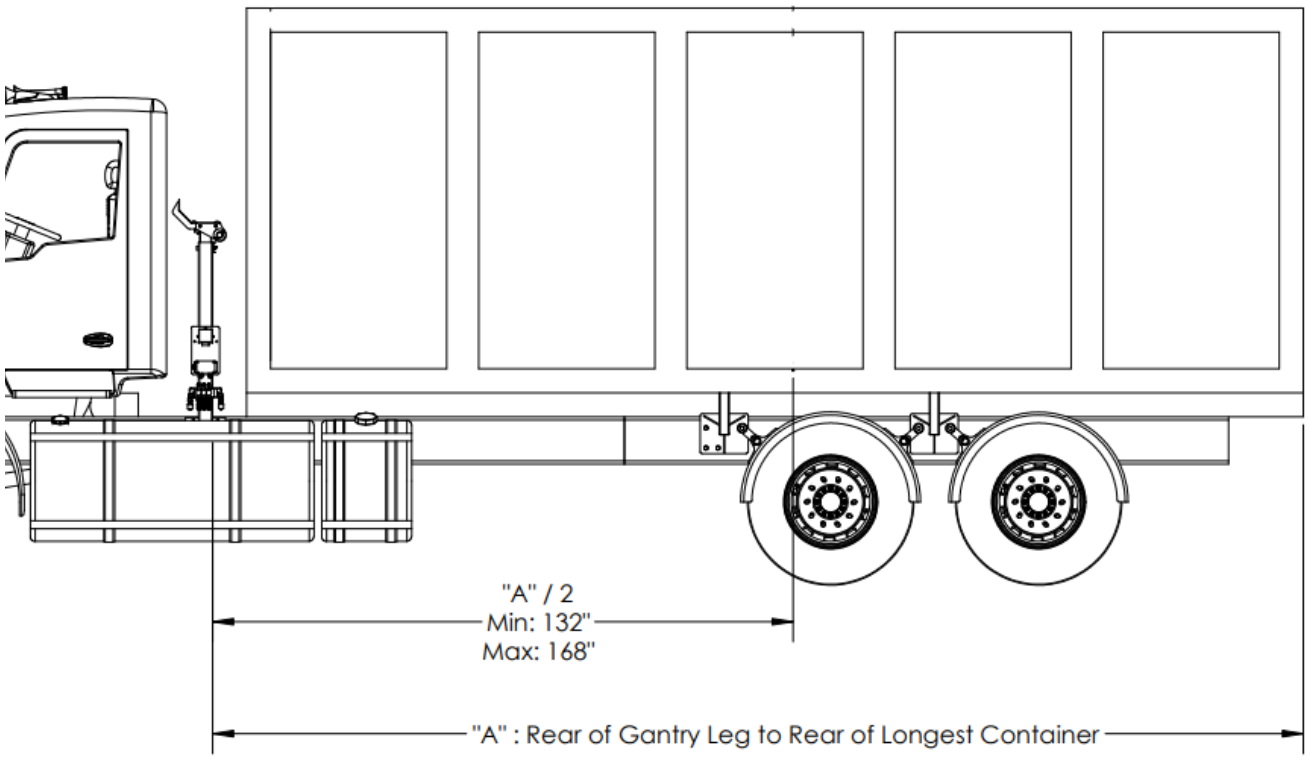


Figure 2.4: Finding Arm Pivot Location

With the center of the pivot pin location known, set pivot assemblies on top of tubes. With the grease zerk on the pivot pin facing outward, align the center of the pivot pin with the calculated measurement from above.

Check to make sure the mounting bracket sits plumb, runs parallel to frame rails and is aligned with our measurement from above. Tack weld into place.

With brackets tack welded into place, check spacing from frame rails at front and rear of brackets on each side. If these are not equal they need to be adjusted. See *Figure 2.5*. A good double check is to measure diagonally from gantry leg to opposing pivot pin. Do the same on the opposite side; these measurements should match.

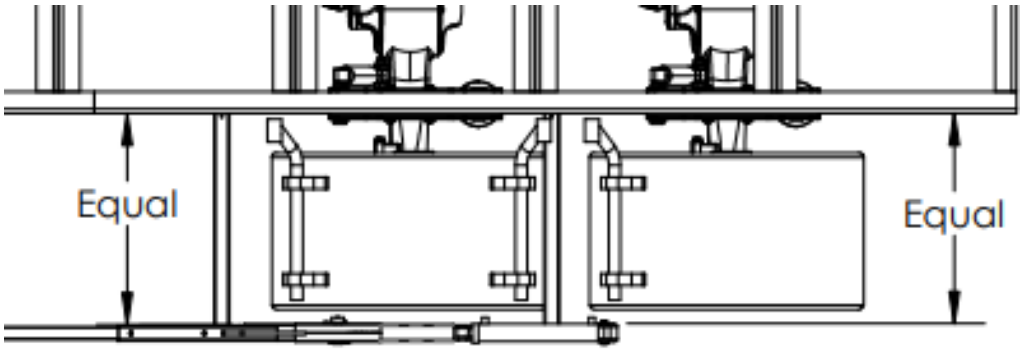


Figure 2.5: Verifying Pivot Assembly Squareness

Once dimensions are checked and corrected, finish weld mounting brackets to offset tubes.

Mounting brackets and offset tubes should be fully welded and secured at this point, see *Figure 2.6*.

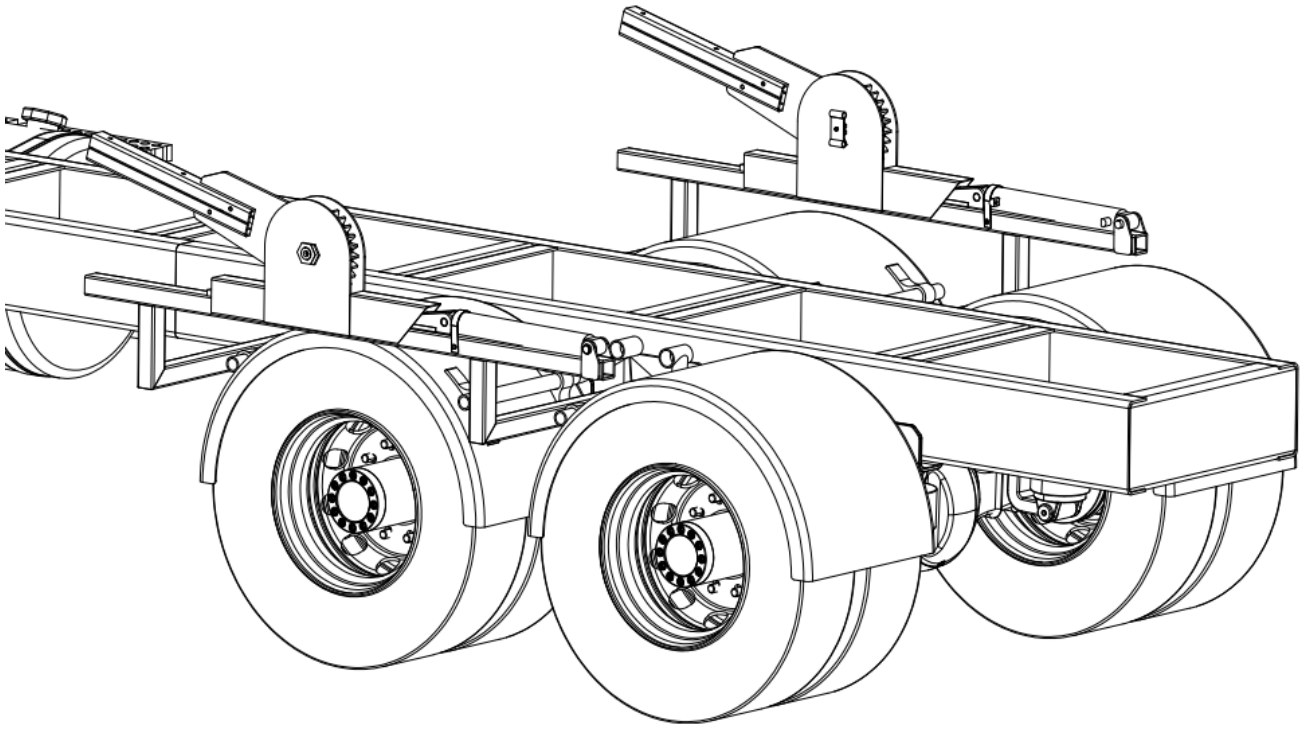


Figure 2.6: Pivot Assembly Mounted

Assembling Tarp onto Roller Tube

NOTICE
The tarp will come pre-installed on the roller assembly for new systems/installs. If replacing the tarp or roll tube, follow these next instructions.

Lay out tarp with vinyl reinforcement facing down. Set roll-tube on top of tarp at the rear (side opposite of tarp pocket). There will be grommets on the back edge of the tarp. Ensure that the labeled driver side of the roll tube is laying on the left-hand side of the tarp, see *Figure 2.7*.

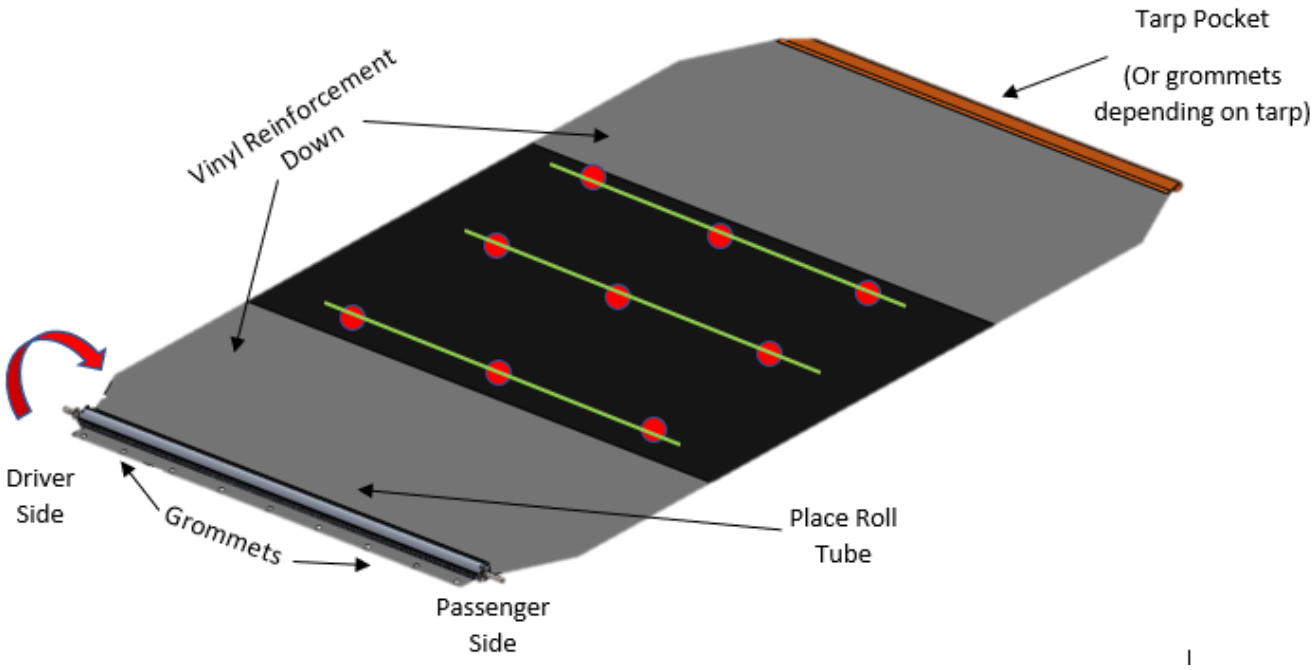


Figure 2.7: Assembling Replacement Tarp onto Roller Tube

Using the provided 3/8” bolts and washers, secure the tarp to the roll tube making sure it is centered and tight across the tube.

Standard tarps will include shock chord strips to string the tarp and allow it to retract when uncovering. The red dots (●) located the attached loops on the tarp. Run one strand of chord through each horizontal row according to the green lines (—) on *Figure 2.7*. Secure one side of each strand to the flap. Pull 18-24” of shock chord through the opposing grommet and triple knot. This will pull the center of the tarp in. Tension may need to be adjusted once installed.

Roll the tarp onto tube according to (the red arrow) *Figure 2.7* above. Leave 6-8” of tarp unraveled to access the tarp pocket.

Assembling Upper Arms and Tarp Assembly

Take the base arm assemblies that have the cylinders pre-installed. Pull loose end of hydraulic hosing out of tube and carefully route through the pivot arm channels exiting toward the inside of the mounting brackets. Route the hose through the swivel clamp mounted on the pivot pin, see *Figure 2.8*.

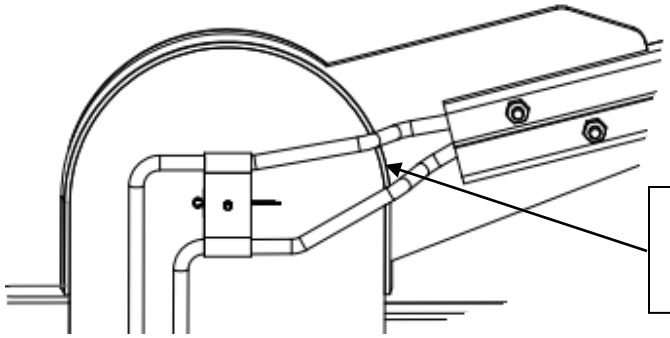


Figure 2.8: Routing Arm Cylinder Hosing Through Swivel Clamp

Slide the Base Arm into the Pivot Arm until holes align. Using the provided ½" hardware, secure the base arm to the pivot arm. Two ½" x 4-1/2" bolts (1) through each top channel and two ½" x 3-1/2" bolts (2) through each side channel using ½" lock nuts (3) to secure, see *Figure 2.9*.

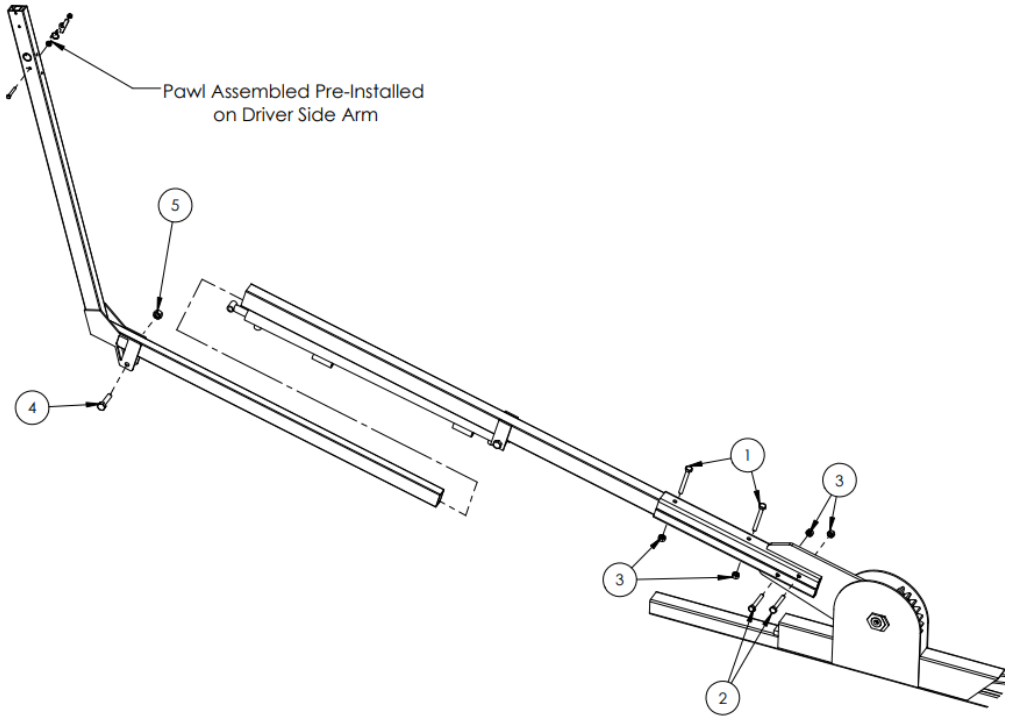


Figure 2.9: Assembling Base Arm and Extension Arm

Slide the upper extension arm into the base arm. The driver side arm has the pawl and spring assembly attached. Carefully, take the temporary arm cylinder restraint loose and bolt extension arm to cylinder rod end using the provided 5/8" hardware (4 & 5), see *Figure 2.9* above. At this point, both arm assemblies should be installed and secured.

The tarp will come pre-installed on the roller tube and attached to the roll rest on the gantry frame. *Figure 2.10* below shows how to attach the tarp & roller tube assembly in case of replacement. Remove one of the mounting pins (1) and slide the tarp tube onto the fixed mounting pin on the opposite side. Replace the mounting pin (1) that was removed by sliding it into the tarp tube when doing so. Reattach hardware (2 & 3) to secure the mounting pin. The tarp and tube should be anchored to the roll rest now.

⚠ CAUTION

Do NOT remove plastic banding that is holding tarp roller tube to roll rest until roller tube is secured to arms.

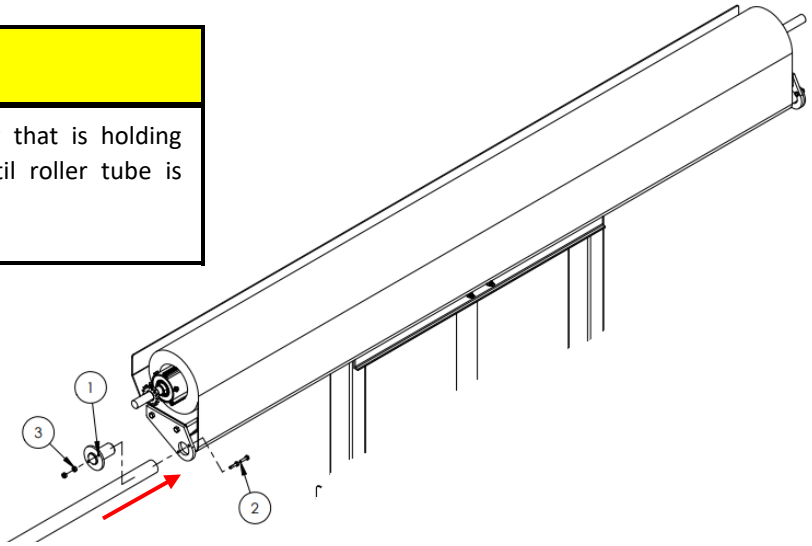


Figure 2.10: Attaching Tarp to Tarp Tube on Roll Rest Base

Slide one shaft collar (2) onto the passenger's side roller tube shaft. Lift and extend arms to slide over the tarp roller assembly shaft on either end. Temporarily slide the provided 3/8" x 3" grade 8 bolt (3) through the driver side arm and shaft to hold in place, hand tighten nut (4) onto bolt. Ratchet gear should be engaging the pawl at this point. If the arm cylinders are locked into place, complete the hydraulic install prior to doing this step. See *Figure 2.11*.

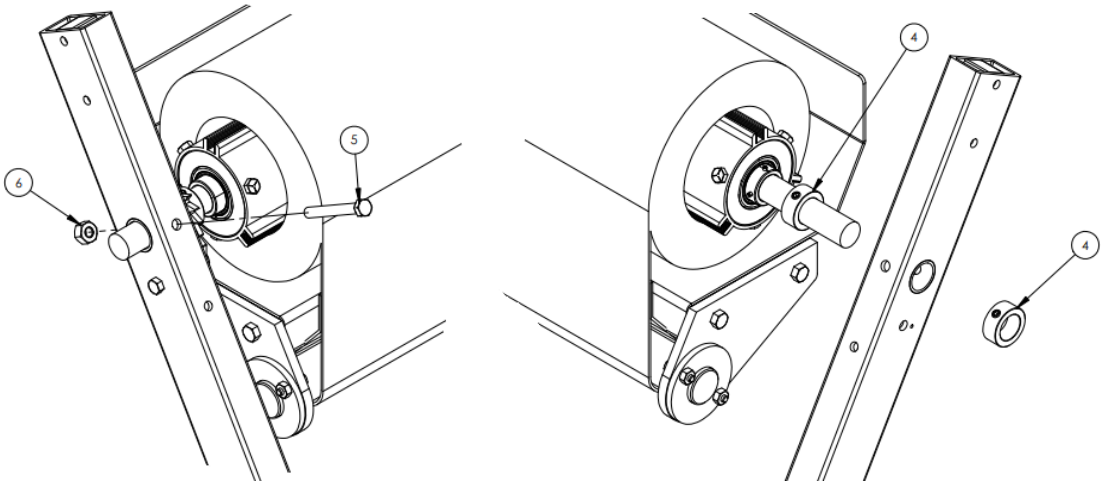


Figure 2.11: Installing Roller Tube onto Extension Arms

Slide the second shaft collar onto the passenger's side shaft securing the arm onto the shaft end. It is a good idea to mark where one of the set screws is located on the shaft end and create a 3/16" dimple. Use a small amount of thread lock on the set screw before tightening shaft collar down.

Install the stabilizer bar (7) to the tops of the extension arms with the provided 5/16” x 2-1/4” bolts (8) and nuts (9), see *Figure 2.12*.

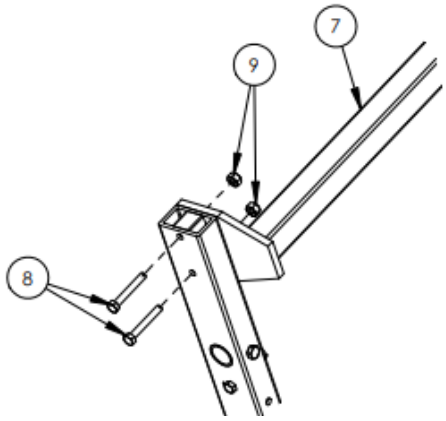


Figure 2.12: Installing Stabilizer Bar to Extension Arms

Using the provided handle, tighten set screw onto milled section of shaft. Remove the temporarily placed 3/8” shaft bolt (5) and nut (6) and rotate the shaft 7 counterclockwise turns. Replace and tighten the 3/8” shaft bolt (5) and nut (6). See *Figure 2.13*.

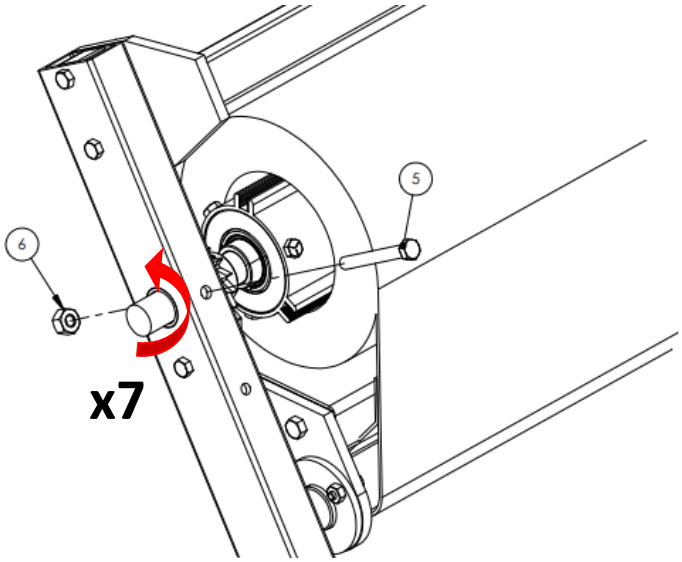


Figure 2.13: Pre-Loading Roller Tube

⚠ CAUTION

Always maintain a firm grip on the handle.

The arm system and tarp roller should now be fully installed and pre-tensioned.

STEP 3: INSTALLING THE HYDRAULICS

⚠ CAUTION

Only use pipe dope on fittings and do NOT use Teflon tarp. Follow Instructions closely regarding max pressures and max flow ratings. Failure to comply will void all warranties.

Mounting Valving and Plumbing Hose Kit

Follow the hydraulic schematic located in *Appendix A* to install the flow diverter. The USTarp standard flow diverter is offered in a 60gpm, 5000psi max rating. See *Appendix C* for port designations in a standard flow diverter set up.

NOTICE

For systems with pressures exceeding 5000psi the flow diverter must be mounted downstream from the hoist controls.

In the case of a high pressure system, the flow diverter must be mounted downstream of the hoist control using a Power Beyond set up. Extra valving required is not supplied by USTarp and is the responsibility of the installer.

USTarp standard systems come with a pre-installed directional control spool valve mounted to the frame of the gantry leg. Gantry cylinder hoses come pre-installed to the control valve. If the installer opts to move the control valve, USTarp is not responsible for supplying new hosing or brackets to move and remount the valve. See *Appendix D* for Manual Control Valve port designations. *Appendix E* shows port designations for Solenoid Operated Control Valve. *Appendix H* shows remote electrical diagram if included. Wiring comes pre-installed.

Follow diagram in *Appendix A* to install proper fittings/adapters into each valve manifold. Fitting types are based on suggested mounting orientations. Alternative fittings are the responsibility of the installer to supply.

Install the (4) 3/8” x 14’ hoses on the control valve according to the color coded map in Appendix B. Route them down the frame rails toward the rear of the chassis.

Route the pre-installed arm cylinder ¼” hoses to the divider-combiner manifold. Ensure to route lines through the hose swivel on the inner face of each pivot assembly. Label hoses if necessary. Hoses should be run under or through the frame rail toward the center of the chassis.

Install (4) 3/8” x 14’ Hoses to the 16” cylinders on the mounting bracket assembly according to the color coded map in *Appendix B*. Label hoses if necessary and route toward the center of the chassis.

NOTICE	NOTICE
Hose lengths are critical as they can affect synchronization between cylinders. Hoses run to the same function (i.e. Cover Rods) should to be the same length to ensure accurate synchronization.	Hoses may need to be cut for a proper and clean installation. If hoses are cut, used compressed air to blow out the hose to clear of shavings and debris as they could contaminate the wet system.

⚠ CAUTION

Failing to follow proper hose routing will result in the system not operating properly and could cause injury or damage.

Mount the flow divider-combiner manifold in a suitable location on the chassis where all hoses routed will reach. The manfold should be mounted to a stationary cross-member away from moving objects. A mounting bracket blank is supplied by USTarp for mounting divider combiner manifold, see *Figure 3.1*. This bracket can be cut, formed or drilled by the installer to use for many mounting positions. It is recommended to follow the manifold orientation shown in *Appendix F*. Custom bracketry may be required in certain applications. 5/16”-18 mounting bolts are required to mount the manifold and are not supplied by USTarp.

Figure 3.1: Divider-Combiner Mounting Bracket Blank

Using the (8) #6 Field Attachable hose ends, attach to the hoses run from the control valve and 16” pivot cylinders. Install (4) #4 field attachable hose ends to the arm cylinder hoses. Following the port designations in *Appendix F & G* and the stamped ports on the manifold, connect the hoses to the divider-combiner assembly. Do not cross hoses.

The USTarp Divider/Combiner Manifold has the flow controls for the Cover/Uncover function integrated into it. These flow controls will need to be set by the installer once the system is functional.

Verify connections at each port and that hoses are routed properly. Secure hoses to framework using cable ties. Avoid moving objects and hot surfaces. Install hose sleeve at any chafe points to increase the life of the hosing.

In a standard set up, the tarp wet system relief on the spool valve is pre-set to 2500psi. Tarp system pressure can be taken by installing a gage on one of the gantry work ports and deadheading the gantry. Tarp system working pressure should be set between 1800 and 2500psi.

⚠ CAUTION

Failing to set the system relief valve properly could cause damage to the hydraulic system or components.

The system relief valve setting on the manifold connected to the diverter needs to be set 100psi higher than hoist setting, see *Appendix* C. If the hoist system pressure is unknown, install a temporary pressure gauge and deadhead hoist tilt frame in the DOWN position. Remove the ¼" NPT plug and install a pressure gauge on the relief manifold to do so. Replace plug once pressure has been set.

Bleeding the Tarp System

Start the truck and engage the PTO. Operate the Cover function on the control valve and run the arms up 3-4ft. DO NOT operate arms over center.

⚠ CAUTION

Do NOT move arms over center until cylinders are filled with oil. Arms may move uncontrollably and could result in damage or injury.

The tarp system should operate correctly between 1800-2500psi. If arms are not moving, back both flow control set screws out on the divider-combiner manifold to allow for full flow. Move the cover/uncover cylinders a few times up and down to fill them with oil.

To bleed the cover/uncover cylinders, operate the arms to the front of the system so the tarp and roll tube rest on the roll rest. Operate the handle for a few seconds until pressure builds and blows over the relief. Crack open fittings on the cap ends of the cylinders to release air built up. Re-tighten fittings.

Run arm system to the covered position, resting on the rear of the container. If a container is not available, raise forktruck forks up to the position a container would be at the rear of the hoist. With the stabilizer bar resting on the container or forks, hold cover lever open until pressure builds and blows over the relief. Crack rod end fittings on the 16" cylinders to release built up air. Re-tighten fittings. Repeat this process until all air is bled from the 16" cylinders and their respective hoses.

To bleed the gantry cylinder, use the same process done when bleeding the 16" cover cylinders. Make sure the arms are not resting on the gantry while completing this step. Run the gantry completely up or down until fluid blows over the relief. Bleed cylinder as done above.

To bleed the arm extend/retract cylinders, use the same process as the prior steps. Run the arms completely in or out until fluid blows over the relief. Bleed cylinders as done above.

If any functions do not operate correctly (i.e. function runs reverse of intended action), make necessary changes to correct the function (i.e. correct crossed hosing).

The USTarp Powered Arm System has flow controls for the Cover/Uncover function integrated into the divider-combiner manifold. These meter out flow controls may need to be adjusted to better control the cover/uncover action. Flow meter location is shown in *Figure 3.2*. Each has a lock nut and set screw. Loosen the lock nut and adjust the set screw with a 5/32" alan key acording to Table 1 below:

Action Needed:	**Set Screw Adjustment:**	**Flow Meter Label on Manifold:**
Slower **Cover** Speed	Tighten	FDBA-ROD
Faster **Cover** Speed	Loosen	FDBA-ROD
Slower **Uncover** Speed	Tighten	FDBA-CAP
Faster **Uncover** Speed	Loosen	FDBA-CAP

Table 1: Flow Meter Adjustment

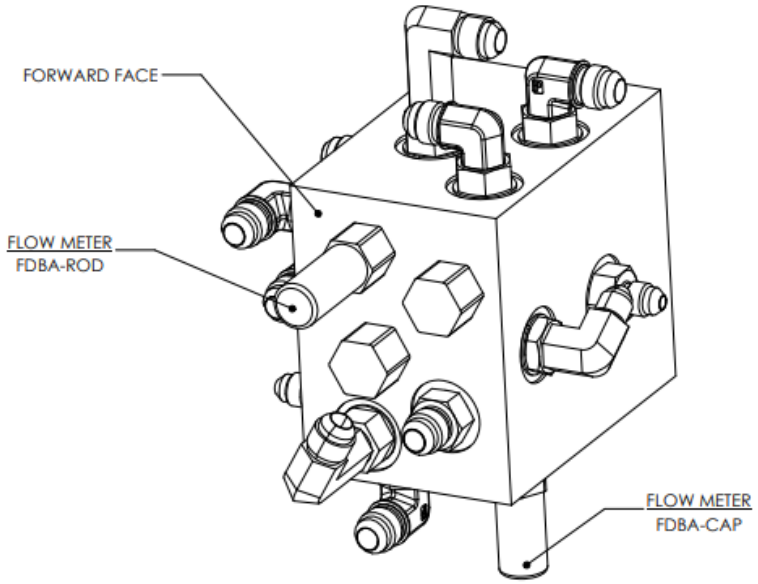


Figure 3.2: Flow Meter Location

Adjust each control so the time to cover and the time to uncover is 15-20 seconds each. Once flow controls are set, they should not need to be adjusted again and the lock nut should be tightened. For systems using the wireless remote, a cycle time of 20-25 seconds is recommended for optimal control.

If arms become out of sync during operation, fully cover or uncover them and dead-head the cylinders to re-sync arms.

⚠ CAUTION

Failure to re-synchronize arms could result in damage to arms, system, and containers.

⚠ CAUTION

Failure to properly adjust flow control and speed of Cover/Uncover function could result in damage or injury.

STEP 4: ADDING WARNING LABELS AND DECALS

WARNING

Failure to install warning labels could result in injury or death.

See Figure 4.1 for sticker locations. It is the responsibility of the upfitter to install all warning labels in their proper positions. See Replacement Parts for instruction and warning label part numbers.

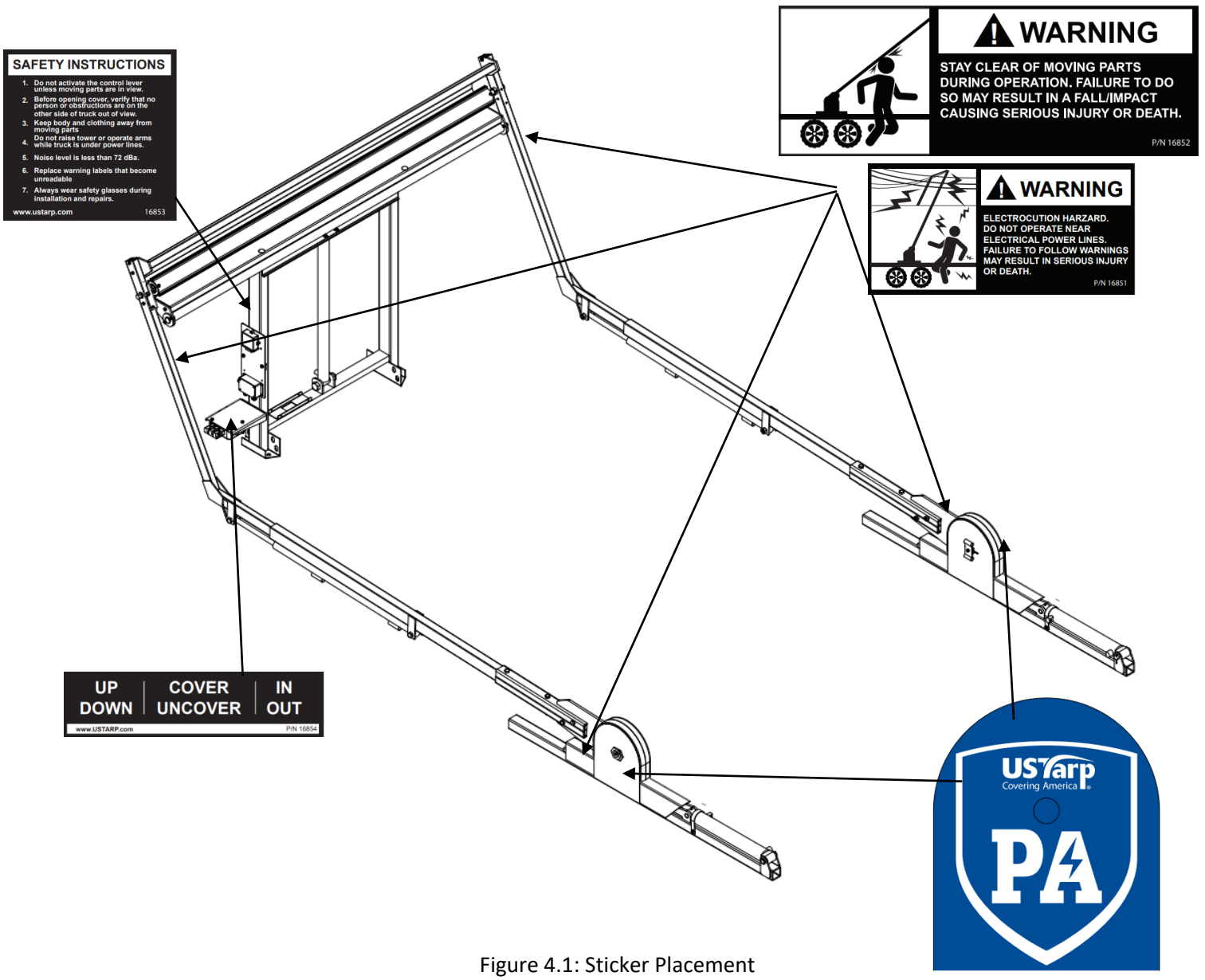


Figure 4.1: Sticker Placement

FINAL INSTALLATION STEPS

_____Add all warning, decal and instruction stickers.

_____ Grease arm pivots. Operate arms in and out to spread grease. Add grease if necessary once arms have been cycled a few times.

_____It is recommended that the extension arms and gantry legs get fully extended and lubricated with general purpose grease on the section of arm that gets indexed into the base arm.

_____Make sure all welds are finished, cleaned and re-sprayed to prevent unnecessary oxidation.

_____Check that all hoses are secured and away from hot or moving parts.

_____Check all bolts are tightened properly.

_____Make sure all hosing has chafe guards where necessary to prevent hose wear.

_____Check that all fittings and hose ends are tight.

_____Check for leaks on the hydraulic system.

_____Check that system functions as intended and matches function labels.

MAINTENANCE CHECKS

Daily Checks

- Visually Inspect tarping system for broken or flawed parts. Replace immediately if noted

Weekly Checks/Maintenance

- Check fittings and wet system for leaks.
- Grease arm pivots.

As Needed

- Re-Lubricate Gantry Legs
- Re-Lubricate Extension Arms
- Adjust Relief Valve
- Replace damaged warning labels

OPERATIONAL GUIDE

Covering the Load

1. Make sure surrouding area is clear of people and overhead objects such as power lines or trees.
2. Operate arms up about 25% of the way.
3. Extend arms if necessary to clear the front egde of the container.
4. Operate gantry to the fully raised position.
5. Operate arms out to hang just above the rear of the container.
6. Extend or Retract arms so that the stabilizer bar will rest on the rear wall of the container.
7. Operate arms out to rest on container.
8. Lower gantry to the resting position below the top of the container.

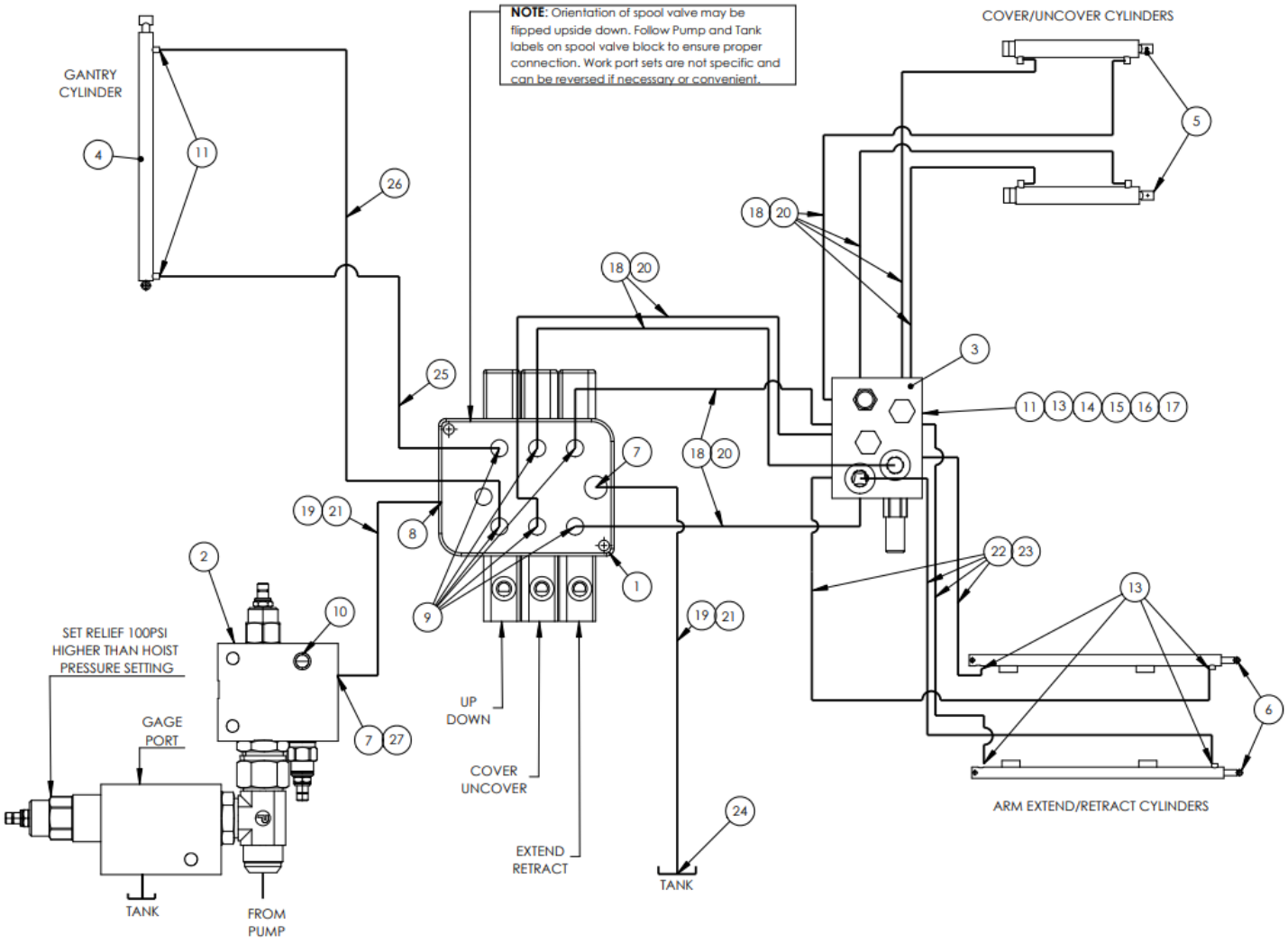
Uncovering the Load

1. Make sure surrouding area is clear of people and overhead objects such as power lines or trees.
2. Operate gantry to the fully raised position.
3. Operate arms to the front of the truck about 75% of the way.
4. Extend arms if necessary to clear the front edge of the container.
5. Lower gantry fully to the resting position.
6. Operate arms to below the front edge of the container.
7. Extend or Retract arms so the roll and tarp rest in the center of the roll rest on the gantry.
8. Operate arms to fully rest on the roll rest.

Important Tips and Notes

- Do NOT operate tarping system or hoist under overhead wires.
- Do NOT operate tarping system while others are in close proximity to moving parts
- Keep clear of the moving parts while operating.
- Do NOT hang arms behind containers as this could cause unnecessary stress to the arms and pivot components.
- If arms do not move, move slow or there is excessive flow over the relief valve, there could be an obstruction. Return arms to a safe position, clear obstruction if present and inspect arms and wet system for damage or failure.
- **To resynchronize the arms, fully extend or fully retract and allow fluid to blow over the relief valve. Failure to resynchronize the arms when they are not aligned could cause damage to the system.**

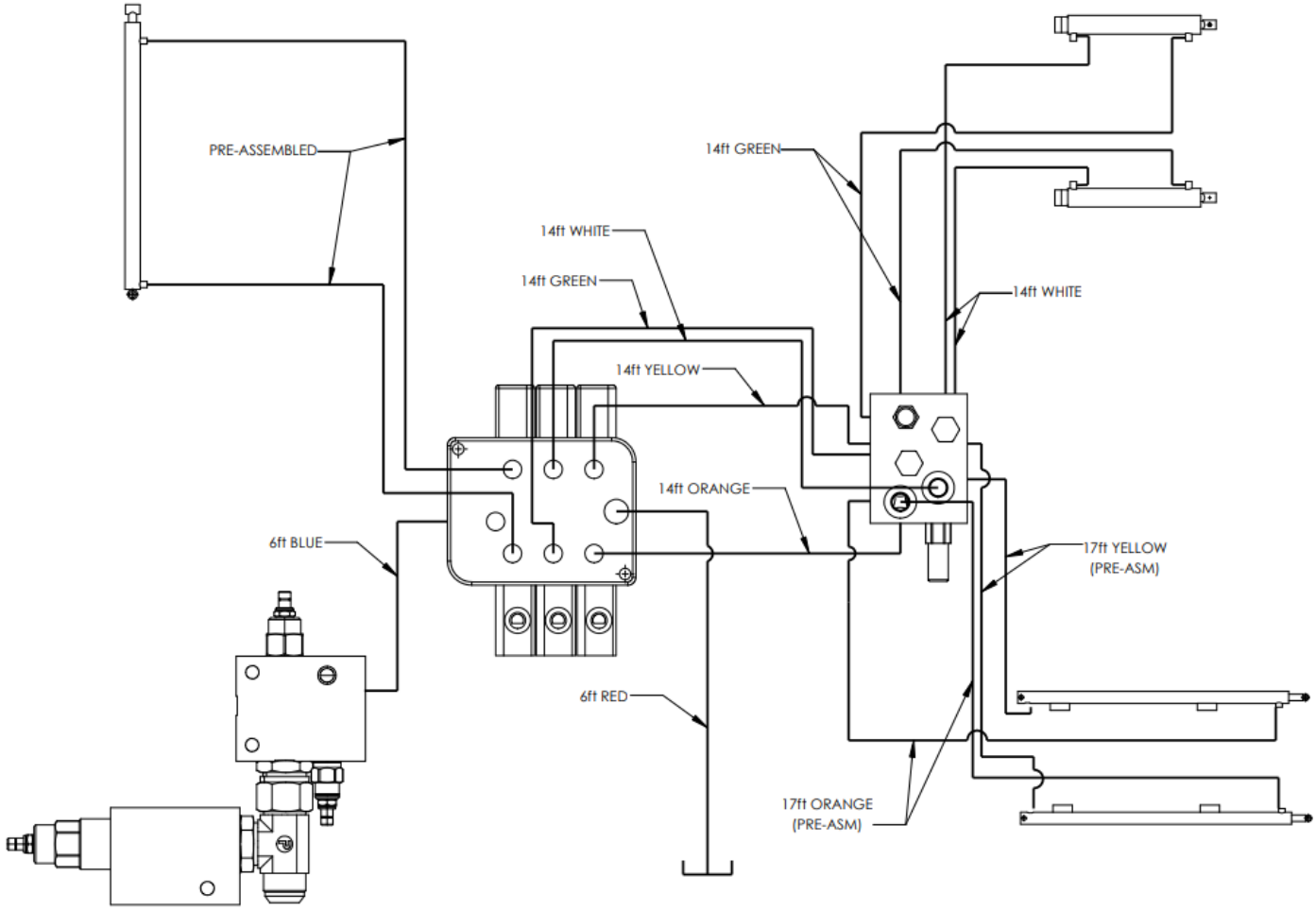
Appendix A
Wet System Schematic



REF #	PART #	DESCRIPTION	QTY
1	16753	Manual Lever Spool Valve	1
1	16754	Solenoid Operated Spool Valve with Manual Levers	1
2	16791	3gpm Diverter Valve with PRV; Rated to 60gpm	1
3	16792	Divider/Combiner Valve with Flow Controls	1
4	14838	Gantry Cylinder	1
5	HR4719	Cover Uncover Cylinders	2
6	HR4752	Arm Extend Retract Cylinders	2
7	16736-7	#10 SAE M x #8 JIC M Straight Adapter	2
8	16736-8	#8 SAE M x #8 JIC M Straight Adapter	1
9	16736-15	#8 SAE M x #6 JIC M 45° Adapter	6
10	16799	1/4" NPT Plug	1
11	15878	#6 SAE M x #6 JIC M 90° Adapter	7
12	16736-6	1/4" NPT M x #6 JIC M Straight Adapter	4
13	16736-13	#6 SAE M x #4 JIC M 90° Adapter	6
14	16736-10	#6 SAE M x # 6 JIC M Straight Adapter	2
15	16736-12	#6 SAE M x #6 JIC M Long 90° Adapter	2
16	16736-14	#6 SAE M x #4 JIC M Long 90° Adapter	2
17	16736-11	#6 SAE M x # 4 JIC M Straight Adapter	2
18	16736-1	#6 Hose x 14ft - #6 JIC F Straight One End	8
19	16736-2	#8 Hose x 6ft - #8 JIC F Straight One End	2
20	16736-3	#6 JIC F Field Attachable Fitting	8
21	16736-4	#8 JIC F Field Attachable Fitting	2
22	16737-1	#4 Hose x 17ft - #4 JIC F Straight One End	4
23	16736-5	#4 JIC F Field Attachable Fitting	4
24	16736-9	1/2" NPT x #8 JIC M Straight Adapter	1
25	16800	#4 Hose x 2-1/2ft - #6 JIC F Straight Both Ends	1
26	16801	#4 Hose x 5-1/2ft - #6 JIC F Straight Both Ends	1
27	16736-16	#12 SAE M x #8 JIC M Straight Adapter; 60GPM Diverter Only	1

NOTE: *Schematic shown with standard set up for integration into hoist systems with pressures less than 5000psi.*

Appendix B
Wet System Color Code Map



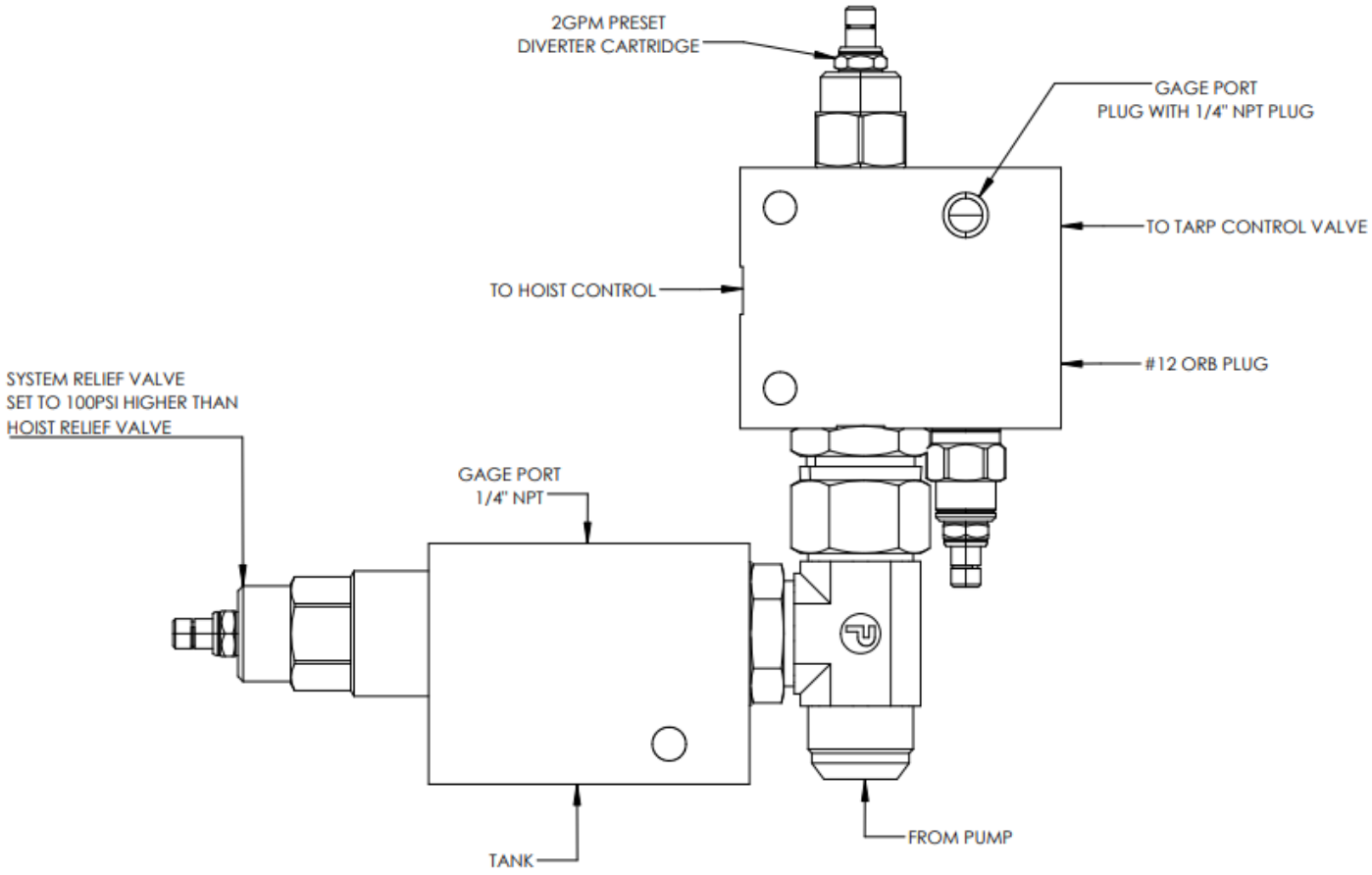
LEGEND	
COLOR	**FUNCTION**
BLUE	CV SUPPLY
RED	CV TANK
WHITE	COVER
GREEN	UNCOVER
ORANGE	ARM EXTEND
YELLOW	ARM RETRACT

NOTE: *Hoses come color coded from the factory with colored cable ties to aid in routing to the proper location and function.*

Appendix C

Standard Diverter Valve Set Up

16791: 60GPM, 5000PSI Diverter Assembly



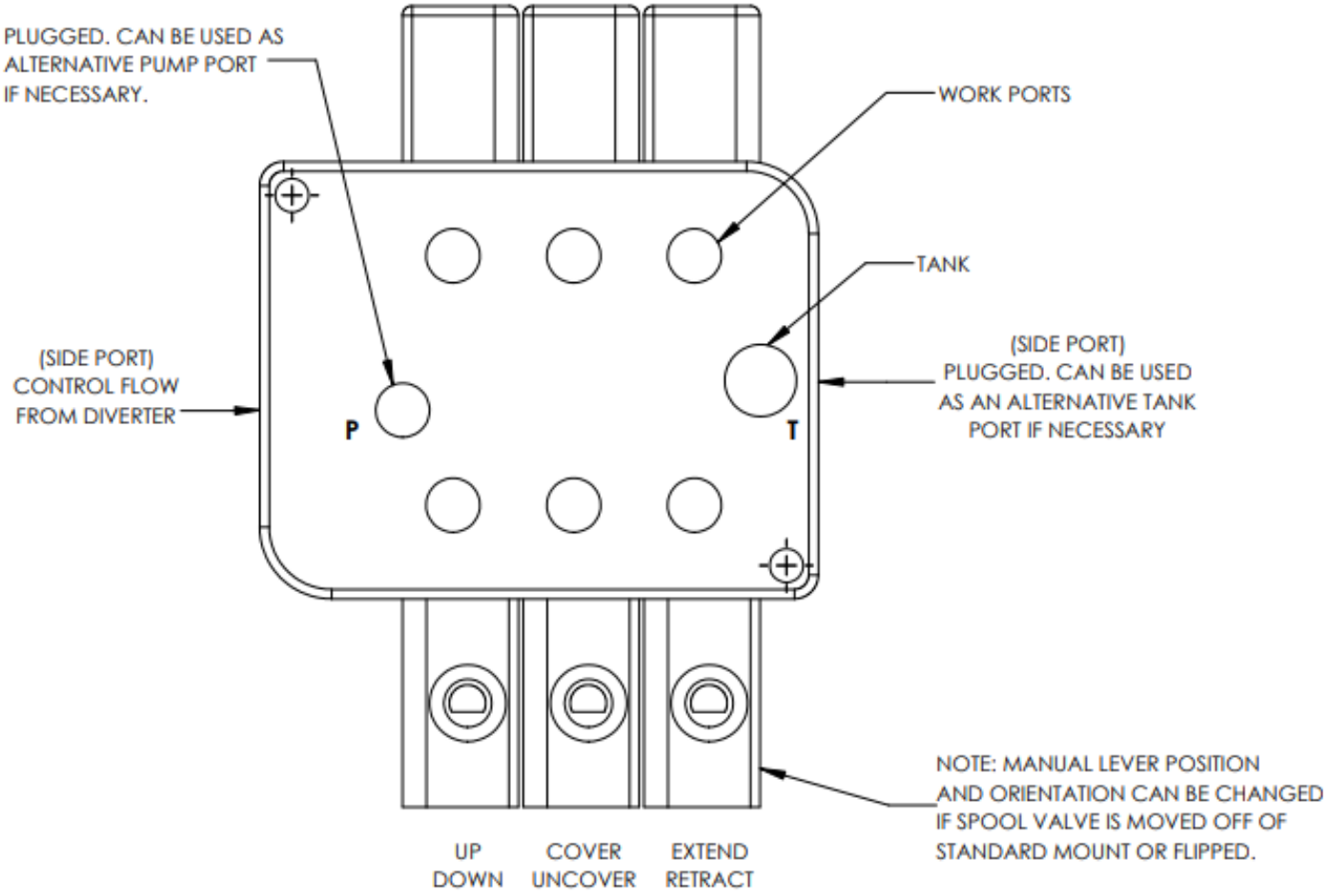
IMPORTANT NOTES:

To properly protects the hydraulic system, the tank line on the relief valve manifold must be connected to tank.

The relief valve must be adjusted to 100psi higher than the setting on the hoist system. Use the gage port on the relief manifold to take this reading.

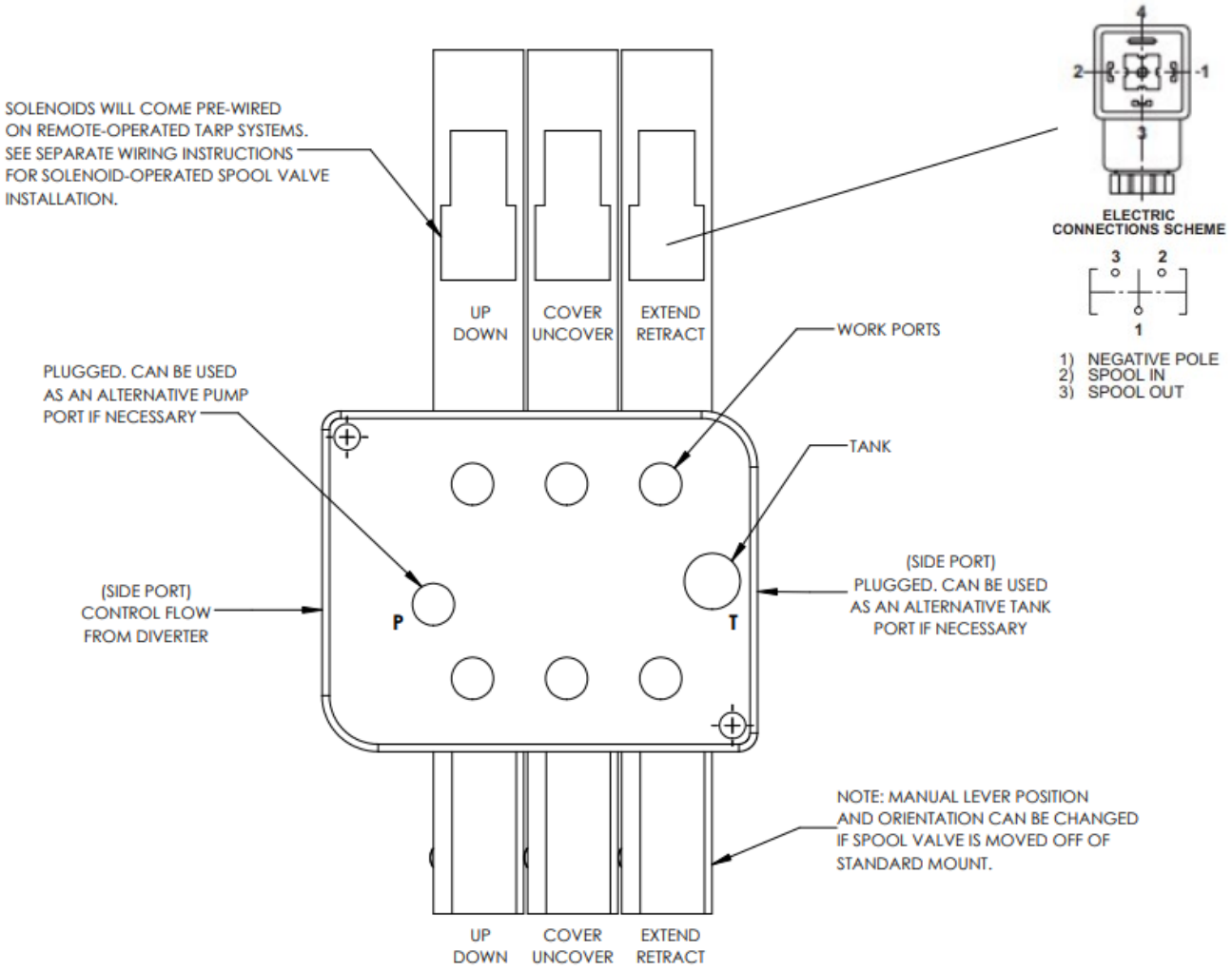
Tarp kits are offered with a 60GPM, 5000PSI max rated diverter. Diverter manifolds can be mounted between the pump and hoist controls only if the PTO system is within these parameters.

Appendix D
Manual 3-Spool Control Valve (#16753)



NOTE: *Orientation of spool valve may be flipped upside down. Follow Pump and Tank labels on spool valve block to ensure proper connection. Work port sets are not specific and can be reversed if necessary or convenient.*

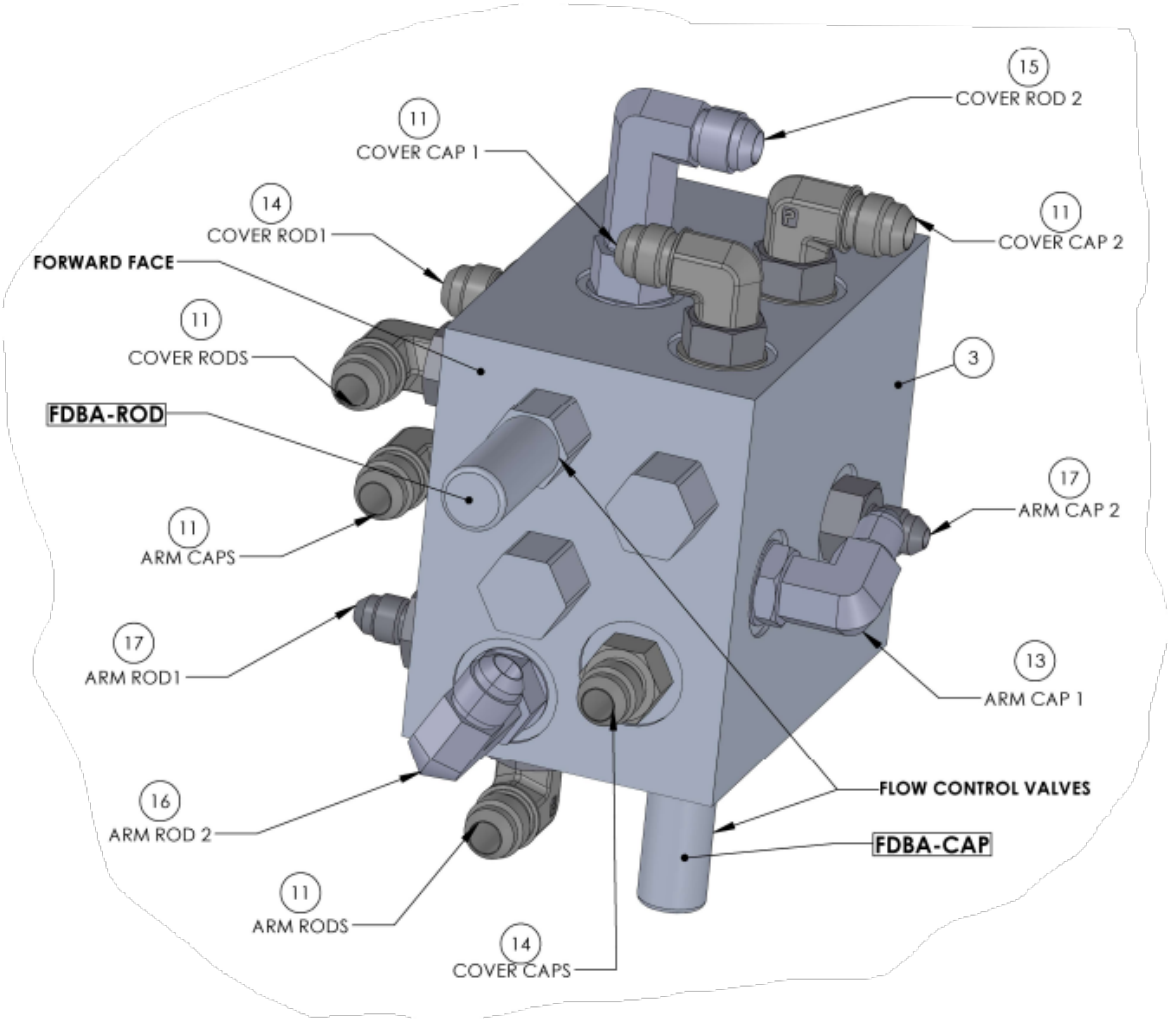
Appendix E
Solenoid Operated 3-Spool Control Valve
With Manual Levers (#16754)



NOTE: *Orientation of spool valve may be flipped upside down. Follow Pump and Tank labels on spool valve block to ensure proper connection. Work port sets are not specific and can be reversed if necessary or convenient.*

Appendix F

Divider-Combiner Assembly with Flow Controls (#16792)



Ref #	Part #	Description	QTY.
3	16792	Divider-Combiner Manifold Assembly	1
11	15878	#6 ORB M x #6 JIC M 90° Adapter	5
13	16736-13	#6 ORB M x #4 JIC M 90° Adapter	1
14	16736-10	#6 ORB M x #6 JIC M Straight Adapter	2
15	16736-12	#6 ORB M x #6 JIC M 90° Long (LL) Adapter	1
16	16736-14	#6 ORB M x #4 JIC M 90° Long (LL) Adapter	1
17	16736-11	#6 ORB M x #4 JIC M Straight Adapter	2

NOTES:

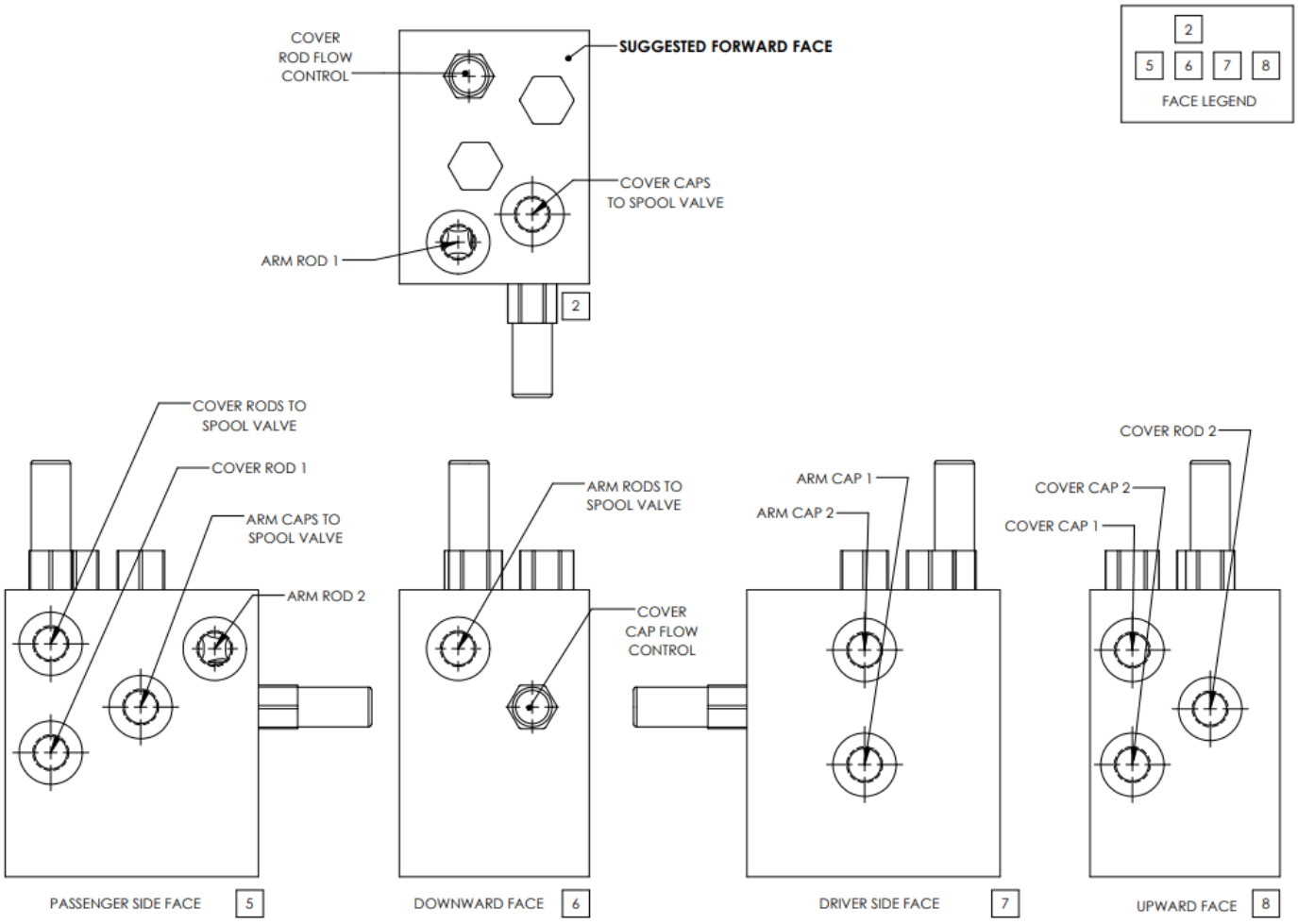
Diagram shows suggested orientation and adapter types for Divider-Combiner Manifold. The adapters provided in the kit match their suggested orientation shown. Installers are responsible for providing adapters that vary from the suggested orientation.

Use the (4) ¼"-20 tapped mounting holes that are located on the backside of the Divider-Combiner Manifold to mount the block. Hardware not provided.

The Divider-Combiner Manifold is built with tamperproof flow control valves for the Cover/Uncover functions integrated in. These are intended to be set by the installer and not field adjusted.

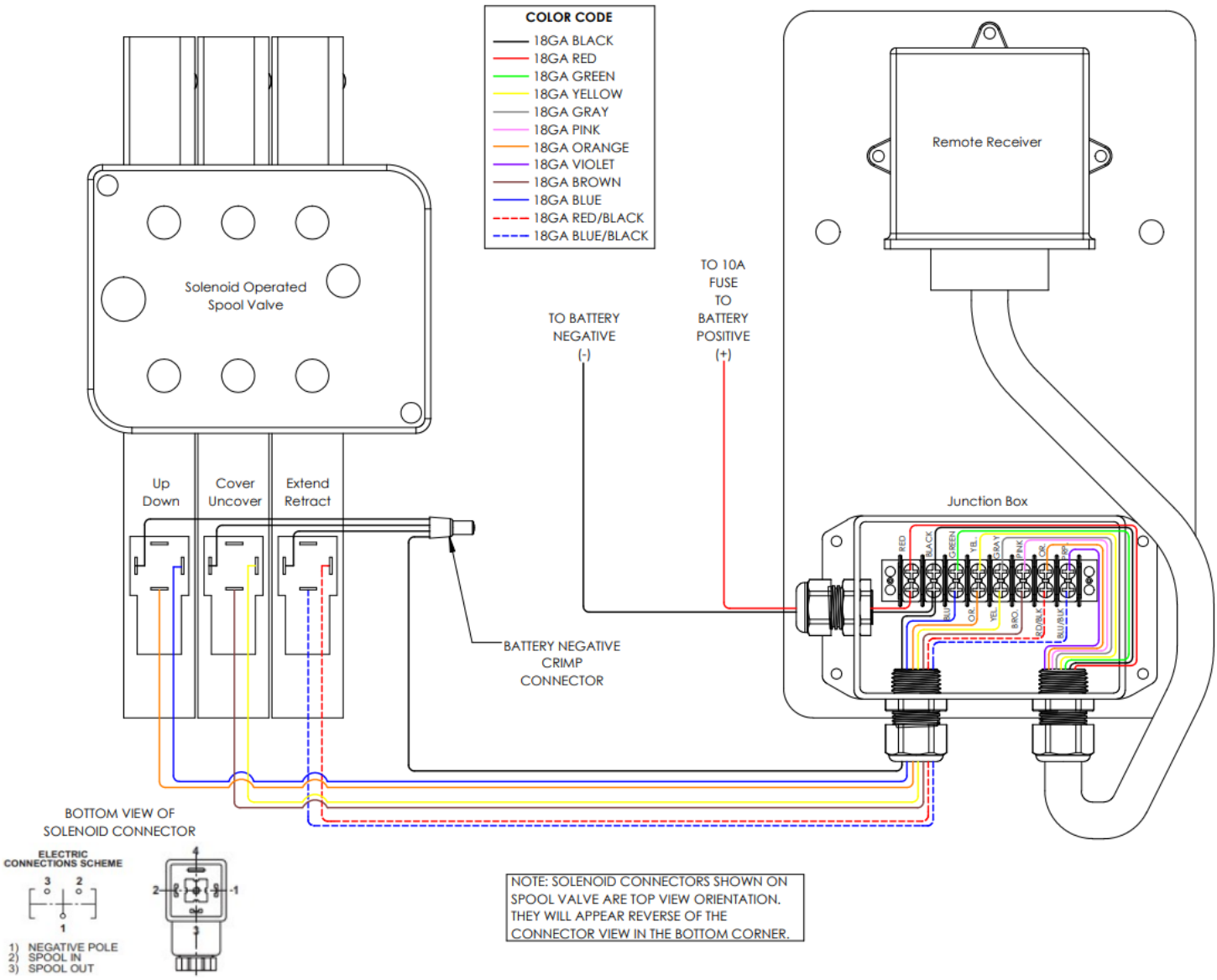
Appendix G

Divider-Combiner Port Designations (#16792)



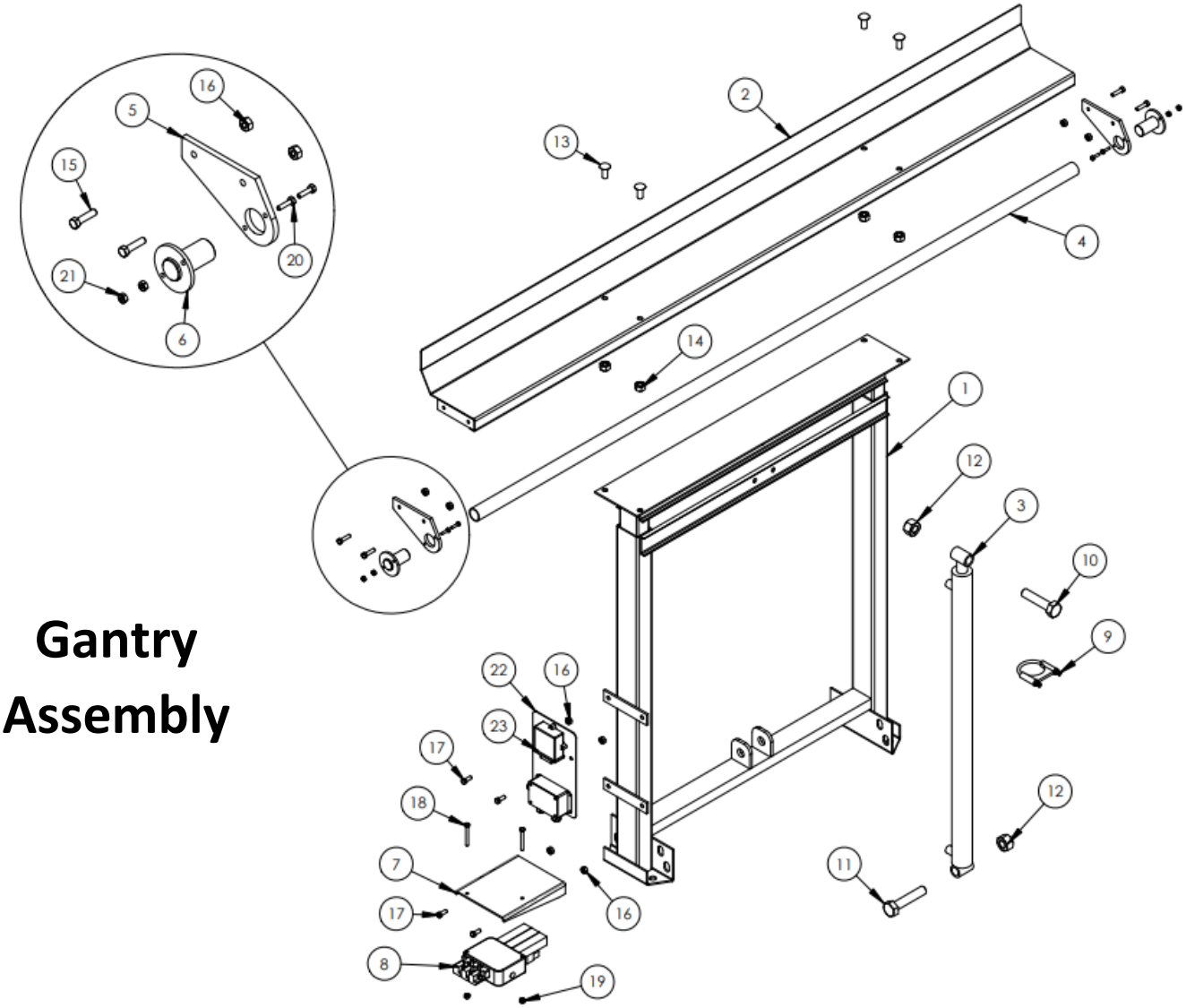
Appendix H

Electrical Diagram for Wireless Remote System



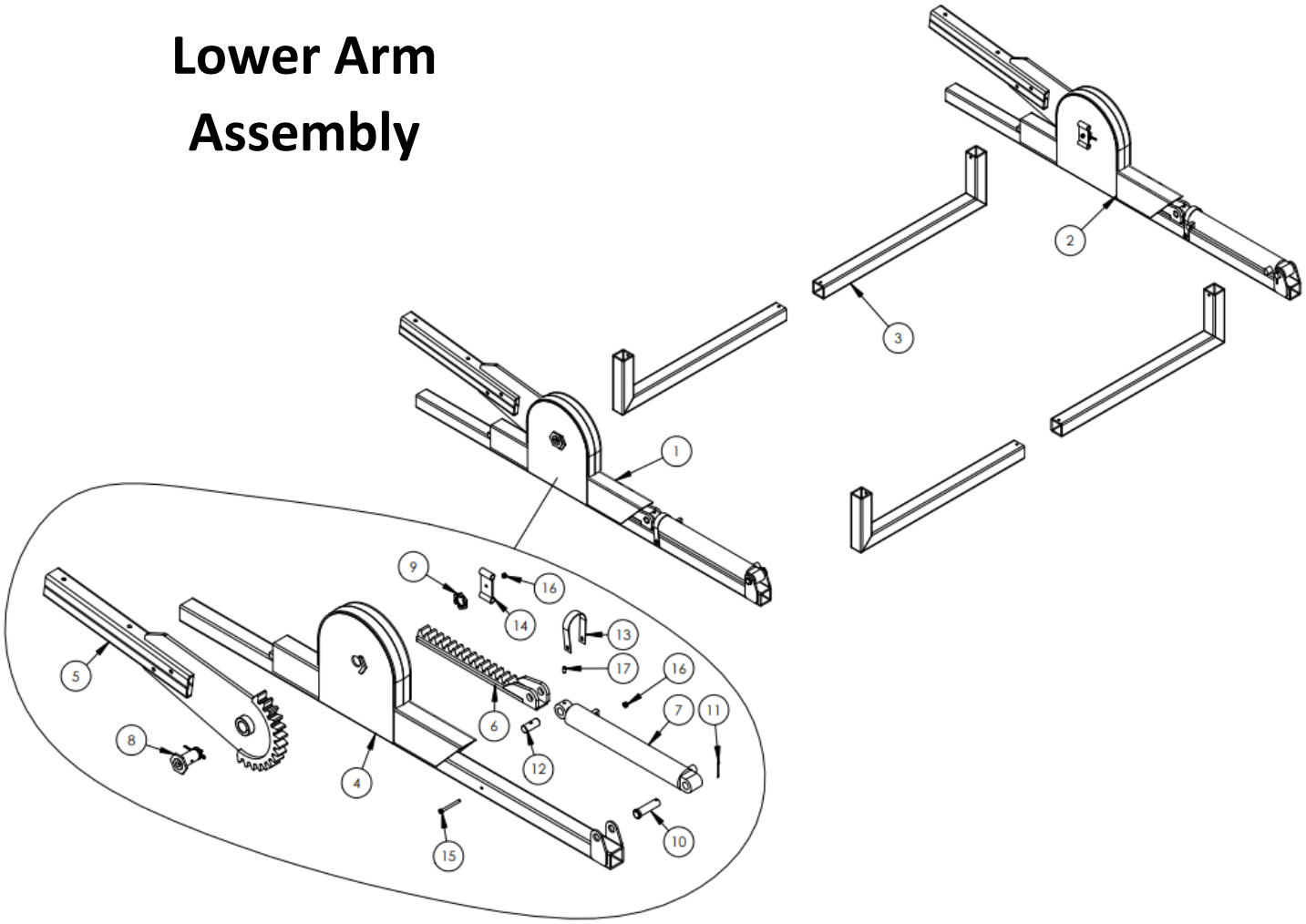
REPLACEMENT PARTS

Gantry Assembly



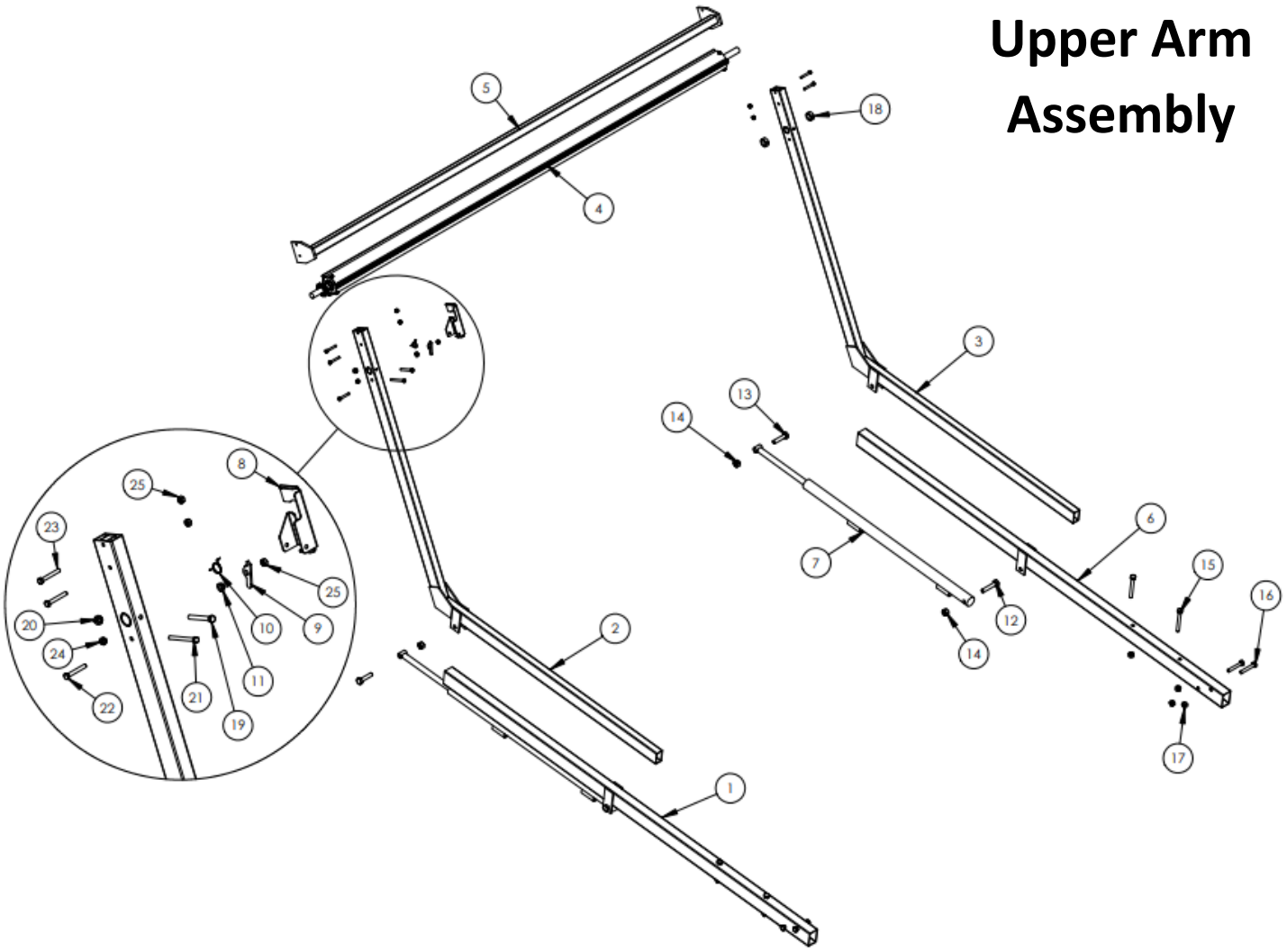
REF #	PART #	DESCRIPTION	QTY
1	15080	Single Stage Gantry Frame	1
2	16776	98" Roll Rest	1
3	14838	Gantry Cylinder; 36" Stroke	1
4	13602	98" Aluminum Tarp Tube	1
5	16780	Tarp Tube Extension Plate	2
6	16781	Tarp Tube Mounting Pin Weldment	2
7	16778	Control Valve Mounting Plate	1
8	16753	Manual 3-Spool Control Valve	1
9	16272	2-1/2" Cylinder Clamp	1
10	15748	1"-8 x 4-1/2" Hex Bolt	1
11	15759	1"-8 x 5" Hex Bolt	1
12	15760	1"-8 Hex Bolt	2
13	15297	1/2"-13 x 1" Button Head Bolt	4
14	11271	1/2"-13 Nylock Nut	4
15	16783	3/8"-16 x 1-1/2" Grade 8 Hex Bolt	4
16	16785	3/8"-16 x 1" Grade 8 Hex Bolt	2 or 4
17	16784	3/8"-16 Grade 8 Nylock Nut	6 or 8
18	16786	5/16"-18 x 2-1/2" Grade 8 Hex Bolt	2
19	16787	5/16"-18 Grade 8 Nylock Nut	2
20	14478	1/4"-20 x 1" Grade 8 Hex Bolt	4
21	16789	1/4"-20 Grade 8 Nylock Nut	4
8	16754	Solenoid Operated 3-Spool Control Valve; Wireless Kit Only	1
22	16779	Receiver Mount; Wireless Kit Only	1
23	16732	6-Button Waste Warrior Remote with Receiver; Wireless Kit Only	1

Lower Arm Assembly



REF #	PART #	DESCRIPTION	QTY
1	16773	Pivot Assembly; Driver Side	1
2	16774	Pivot Assembly; Passenger Side	1
3	HR4723	Offset Mounting Tubes	4
4	A4005A-1	Mounting Bracket Weldment; Driver Side	1
4	A4006A-1	Moutning Bracket Weldment; Passenger Side	1
5	HR4760	Base Arm Gear Weldment	2
6	A3868B	Rack Gear Weldment	2
7	HR4719	Pivot Cylinder; 16" Stroke	2
8	A3881	Pivot Pin	2
9	HR4785	Castle Nut	2
10	A3883-1	Long Cylinder Pin	2
11	A3883-2	Hammerlock Cotter Pin	2
12	D18836	Short Cylinder Pin	2
13	HR4731	Cylinder Strap	2
14	HR4728	Swivel Clamp	2
15	16489	5/16"-18 x 3" Hex Bolt	2
16	11229	5/16"-18 Nylock Nut	4
17	14416	3/8"-16 x 3/4" Socket Set Screw	2
8, 9	A3881-KIT	Pivot Pin with Castle Nut	1
*	16835	Plastic End Caps for Square Tube	4

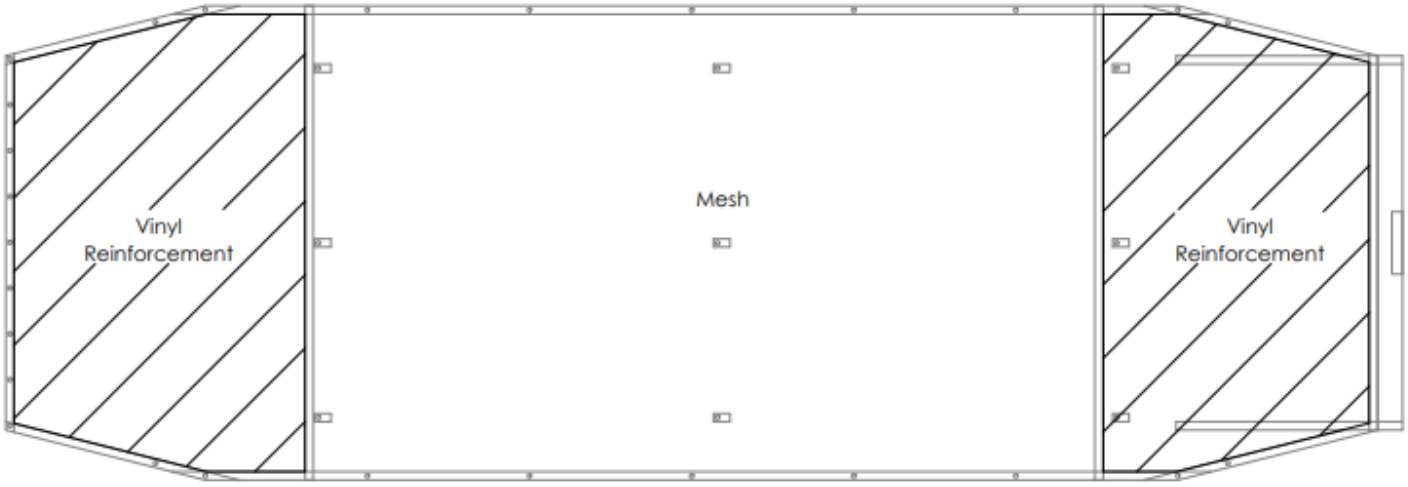
Upper Arm Assembly



REF #	PART #	DESCRIPTION	QTY
1	16775	Base Arm Assembly with Cylinder and Hosing	2
2	16808	Upper Extension Arm; Driver Side with Ratchet Assembled	1
3	HR4751	Upper Extension Arm	1
4	H7002A	Aluminum Roller Tube Assembly	1
4	16796-BM-I	Aluminum Roller Tube with 28' Black Mesh Tarp Assembled	1
5	HR4753	Stabilizer Bar	1
6	HR4750	Base Arm	2
7	HR4752	Arm Cylinder; 36" Stroke	2
8	16788	Ratchet Guard	1
9	HR4788	Pawl	1
10	HR4786	Pawl Spring	1
11	HR4787	Pawl Spacer	1
12	16734	5/8"-11 x 3-1/4" Grade 8 Hex Bolt	2
13	16733-1	5/8"-11 x 2-3/4" Grade 8 Hex Bolt	2
14	16735	5/8"-11 Lock Nut	4
15	16733-3	1/2"-13 x 4-1/2" Grade 8 Hex Bolt	4
16	16733-2	1/2"-13 x 3-1/4" Grade 8 Hex Bolt	4
17	16733-6	1/2"-13 Lock Nut	8
18	16195	1" Shaft Collar	2
19	16733-4	3/8"-16 x 3" Grade 8 Hex Bolt	1
20	16785	3/8"-16 Grade 8 Nylock Nut	1
21	14417	5/16"-18 x 3-1/2" Hex Bolt	1
22	16786	5/16"-18 x 2-1/2" Grade 8 Hex Bolt	1
23	16733-5	5/16"-18 x 2-1/4" Grade 8 Hex Bolt	4
24	11229	5/16"-18 Nylock Nut	1
25	16787	5/16"-18 Grade 8 Nylock Nut	5

Tarp Replacement Part Numbers

Tarp Design

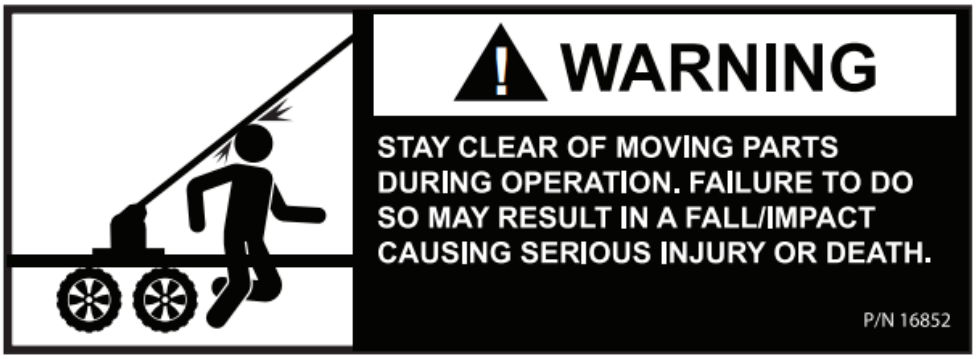


Tarp Part #	Description
40400 (Standard)	28’ Black Mesh Tarp with Vinyl Reinforcements and Shock Cord; Import
40420	28’ Black Monster Mesh Tarp with Vinyl Reinforcements and Shock Cord; Import
40410	28’ Armor Mesh Tarp with Vinyl Reinforcements and Shock Cord; Import
114-28-MC-R	28’ Multi-Color Mesh Tarp with Vinyl Reinforcements and Shock Cord; Domestic
114-28-BM-R	28’ Black Mesh Tarp with Vinyl Reinforcements and Shock Cord; Domestic
114-28-MM-R	28’ Multi-Color Monster Mesh Tarp with Vinyl Reinforcements and Shock Cord; Domestic
114-28-AM-R	28’ Armor Mesh Tarp with Vinyl Reinforcements and Shock Cord; Domestic
94-28-BM-HOOKLIFT*	28’ Black Mesh Tarp with Hook Cutout; Domestic
94-28-MM-HOOKLIFT*	28’ Multi-Color Monster Mesh Tarp with Hook Cutout; Domestic
94-28-AM-HOOKLIFT*	28’ Armor Mesh Tarp with Hook Cutout; Domestic

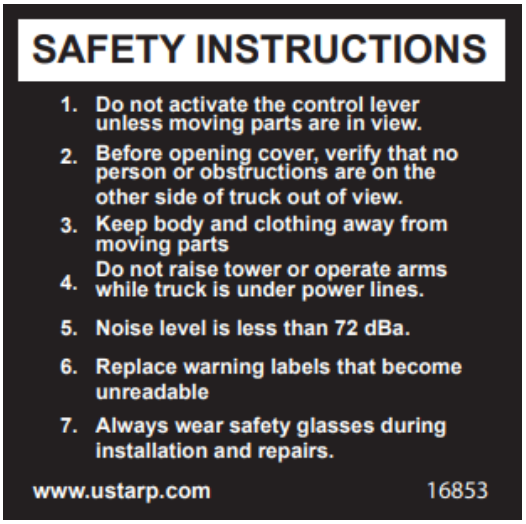
*Standard rectangular tarp, no vinyl reinforcement or shock cord as shown in above picture

Instruction and Warning Labels

#16851
Electrocution Hazard



#16852
Moving Parts Warning



#16853
Safety Instructions

#16854
Spool Valve Label

NOTES

System Part Number: _____

Purchase Date: _____

Installation Date: _____

Other Notes: _____

_____

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