

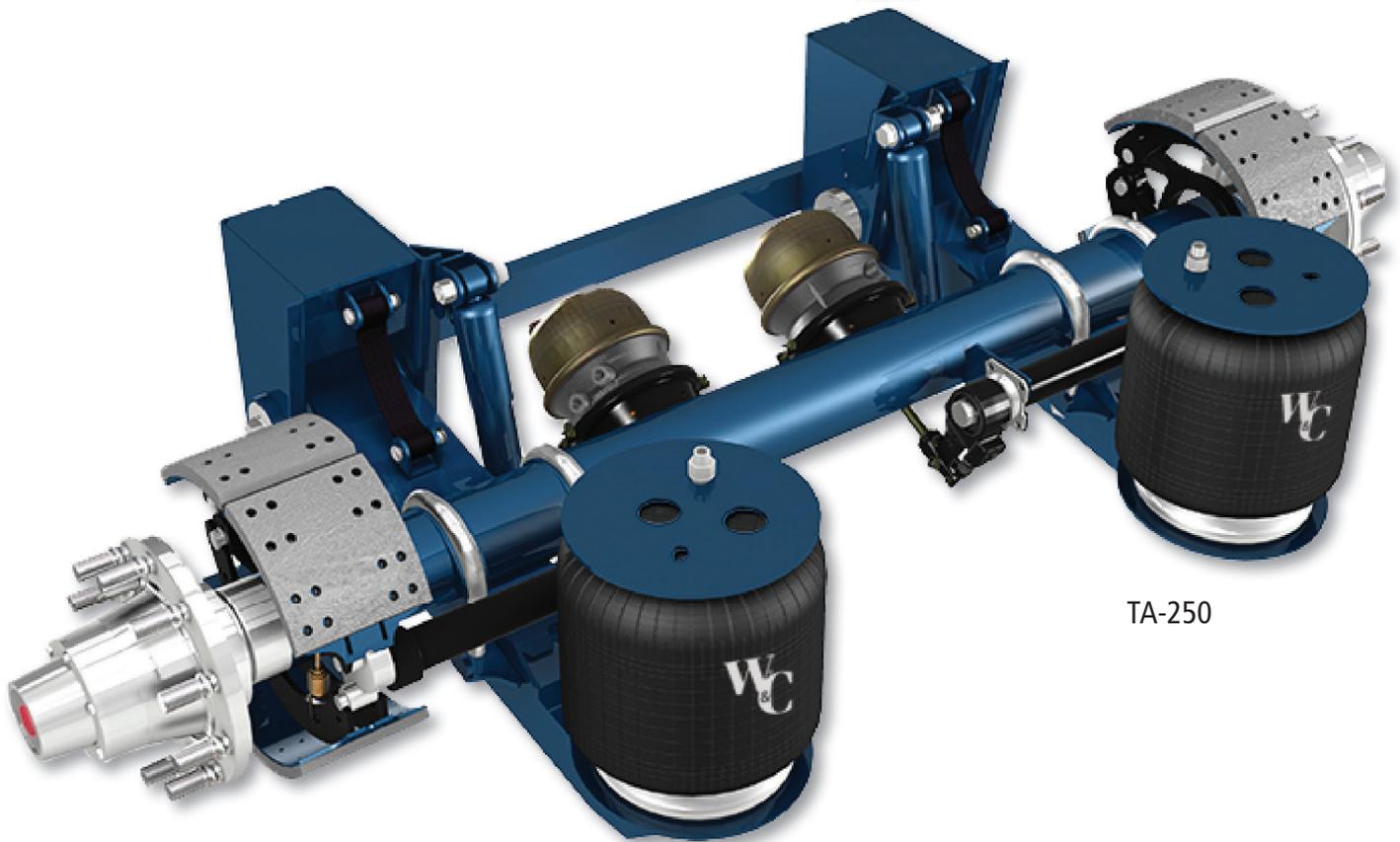
INSTALLATION AND OPERATION MANUAL

TRAILER AIR SUSPENSION SYSTEMS

TA SERIES

TA-250

TA-300



TA-250

Delivering Suspension Solutions



LIT-TA
REV 2

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Introduction

Considerations

Things needed to insure proper installation:

- Assembly drawing from Watson & Chalin that matches the suspension being installed.
- Location of axle center.
- Ride Height of the suspension.
- Suspension / Hanger Centers (usually determined by axle track and or tire size).
- Brake Chamber / Cam Orientation (camshaft location recommendations are usually shown on the assembly drawing). Brake chamber orientation should be planned out before welding axle to suspension.

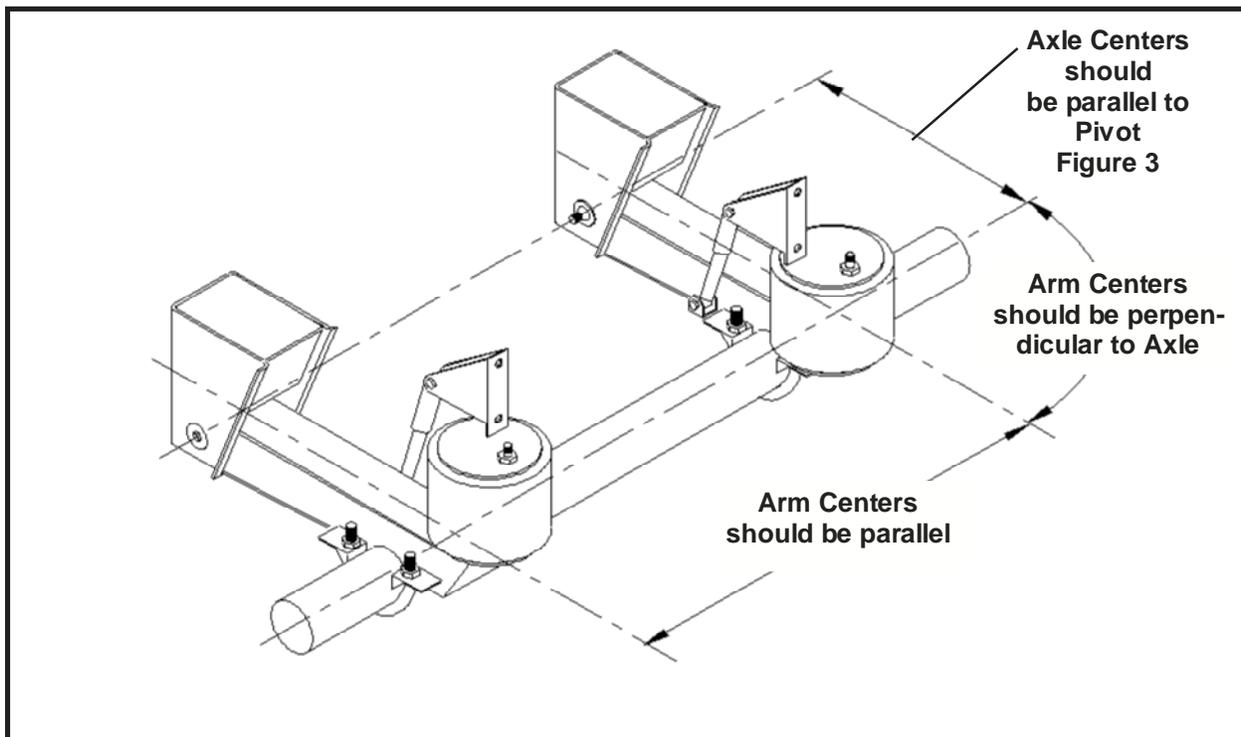


Figure 1

Important Notes:

These are the primary goals of a good installation (Refer to **Figure 1**):

1. The Axle to Arm Pivot Centers are Parallel (See **Figure 3**).
2. The Suspension Arms are Parallel to one another. The arm centers should not vary more than 1/8 inch from front to rear.
3. The Axle is perpendicular to the Suspension Arms and Suspension Arms are square.

Welding Axle to Suspension

Weld Specifications

Caution !

The welding procedures must be followed carefully to avoid damage to the axle and suspension which could cause an accident and or serious personal injury.

Standard Electrode: E-7018 (Oven Dried)
Determine diameter by fillet size needed.

Standard Wire: ER-70S-X
Determine diameter by fillet size needed.

Preparation

1. The surface must be free of paint, water, and other contaminants where welding is to occur.
2. Suspension parts must be at least 60°. *

* **Note:** Some axle manufacturers recommend preheating the axle before it is welded. Consult the axle manufacturer for recommended guidelines on welding to the axle.

3. Welding needs to be done in a flat horizontal position.

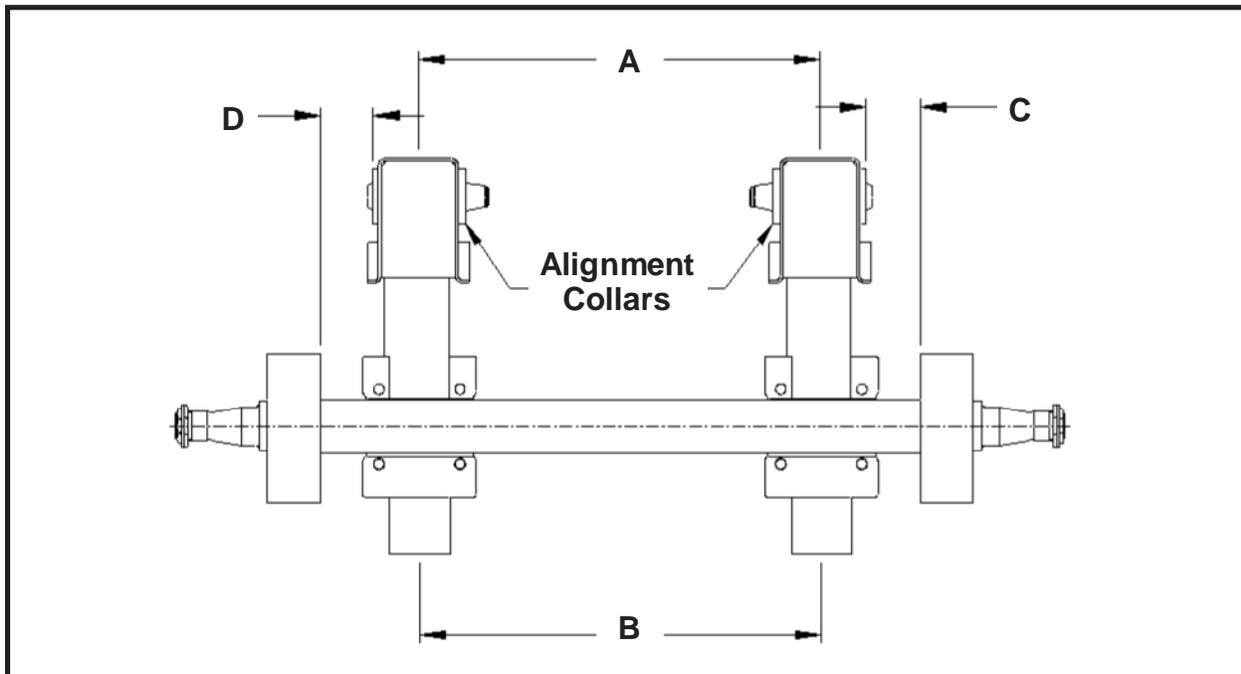


Figure 2

Setup for welding

1. Lay out suspension arms and axle on a level surface.
2. Make sure axle camshafts are indexed (rotated) properly.
3. Mark or locate center mark on axle.
4. Mark arm centers from center of axle and move arms to their proper location.
5. Make sure arms are centered on axle properly.
6. Check to make sure arms are parallel within 1/8" front to rear. (**Figure 2**)
Dimension **A = B**, and dimension **C = D**.
7. Make sure arms are perpendicular to axle.
8. Verify that Pivots of arms are concentric to prevent the trailer from leaning. (**Figure 3**)
9. Clamp arms to axle to hold in the correct position and verify measurements before tacking.

Note: Arms do not need be clamped so tight to the axle that the arms appear to be twisting the pivots out of parallel. At least one side of the arm in the axle seat area must be touching the axle firmly, but the other side may have up to a 1/16" gap to allow the pivots to remain parallel. (**Figure 4**)

Tacking for preliminary placement

1. Tack arms to axle with (4) 1/2" tacks near the center (2 Front, 2 Rear) of the axle seat connection. (**Figure 5**)

Make sure tacks are within the weld area and not at the ends of the welds.

Checking setup

Check measurements before proceeding to welding.

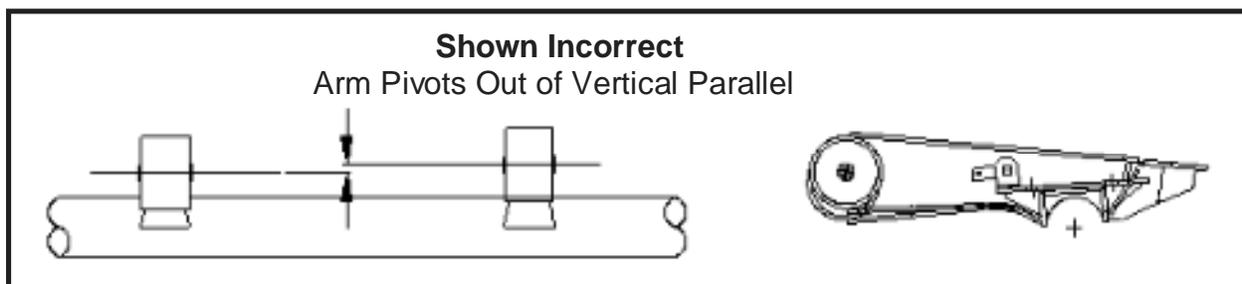


Figure 3

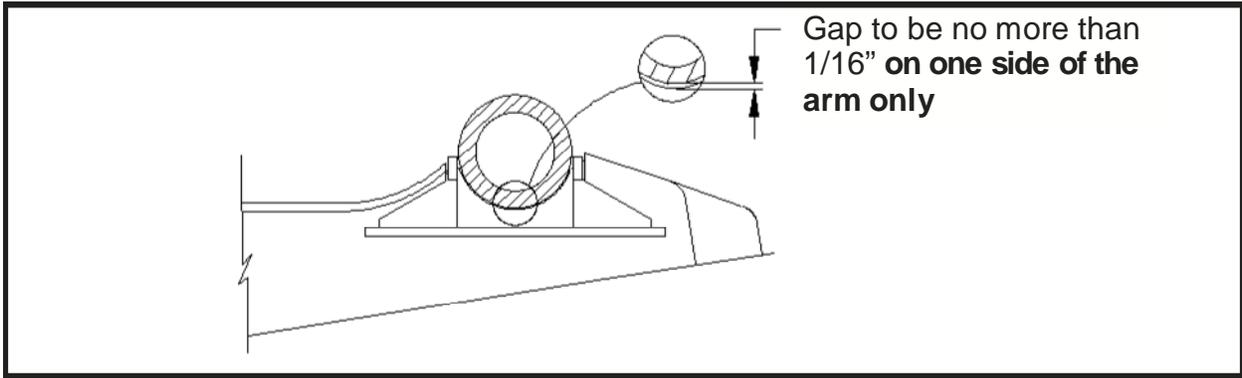


Figure 4

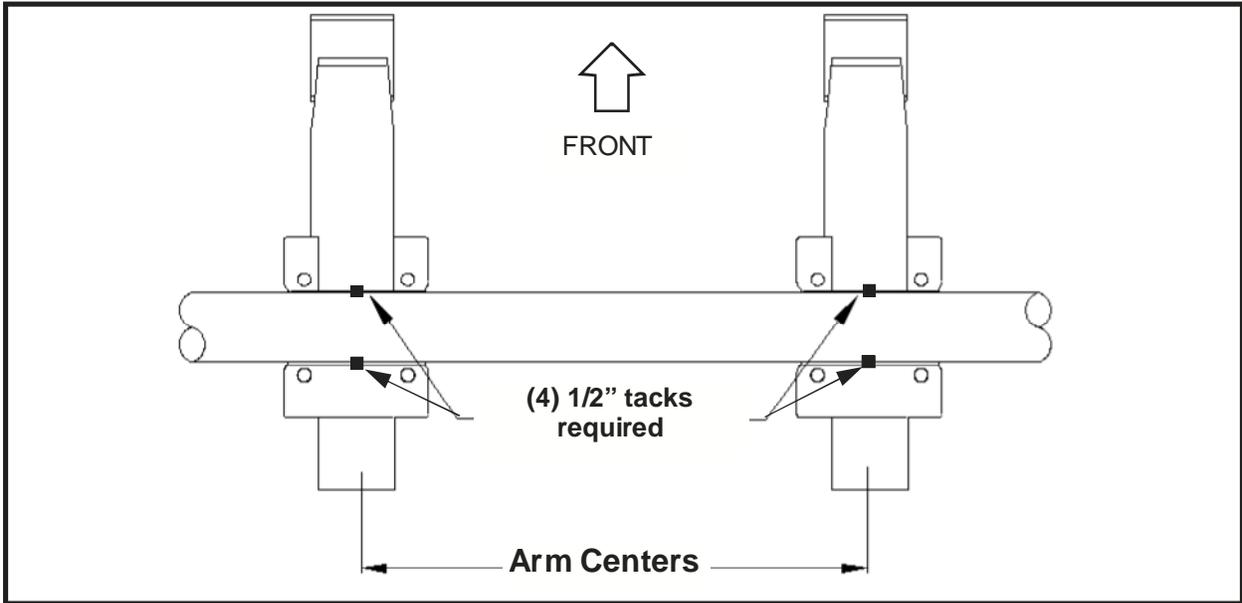


Figure 5

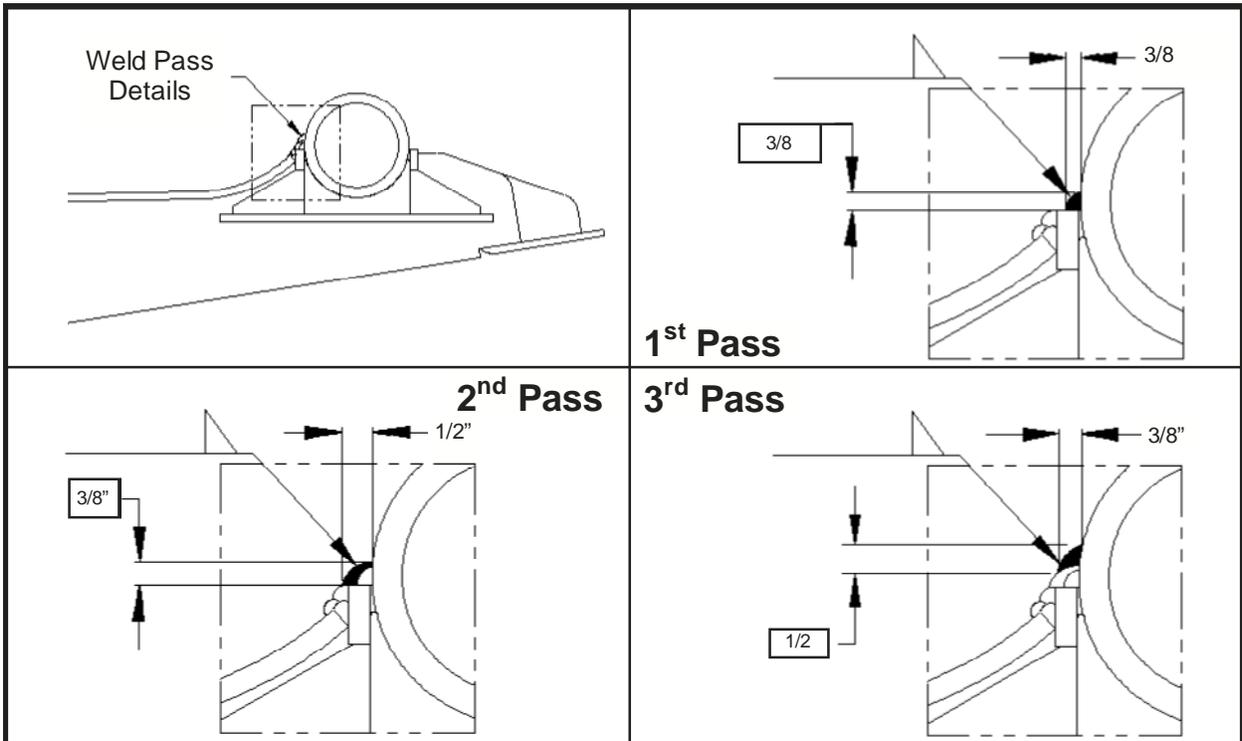


Figure 6

Welding Procedures

Warning ! Clean welds between passes and incorporate tacks into the first pass on the tacked side. Fill weld craters and avoid undercuts and cold laps over welds.

1. Three passes are required on each area where the axle is welded to the arms.
Figure 6 shows the size of the weld of each pass.
2. Start welding in the sequence shown in **Figure 7** at the rear side where the axle and seat meet. Make all first pass welds at all areas before proceeding to the second pass. **Welds should not be started or stopped at the end of the weld pass. They should stopped and started away from the ends as shown in Figure 7.**
3. **Figure 7** also shows the length of weld for both overslung and underslung models. **Do not wrap the corners of the axle seat while welding.**

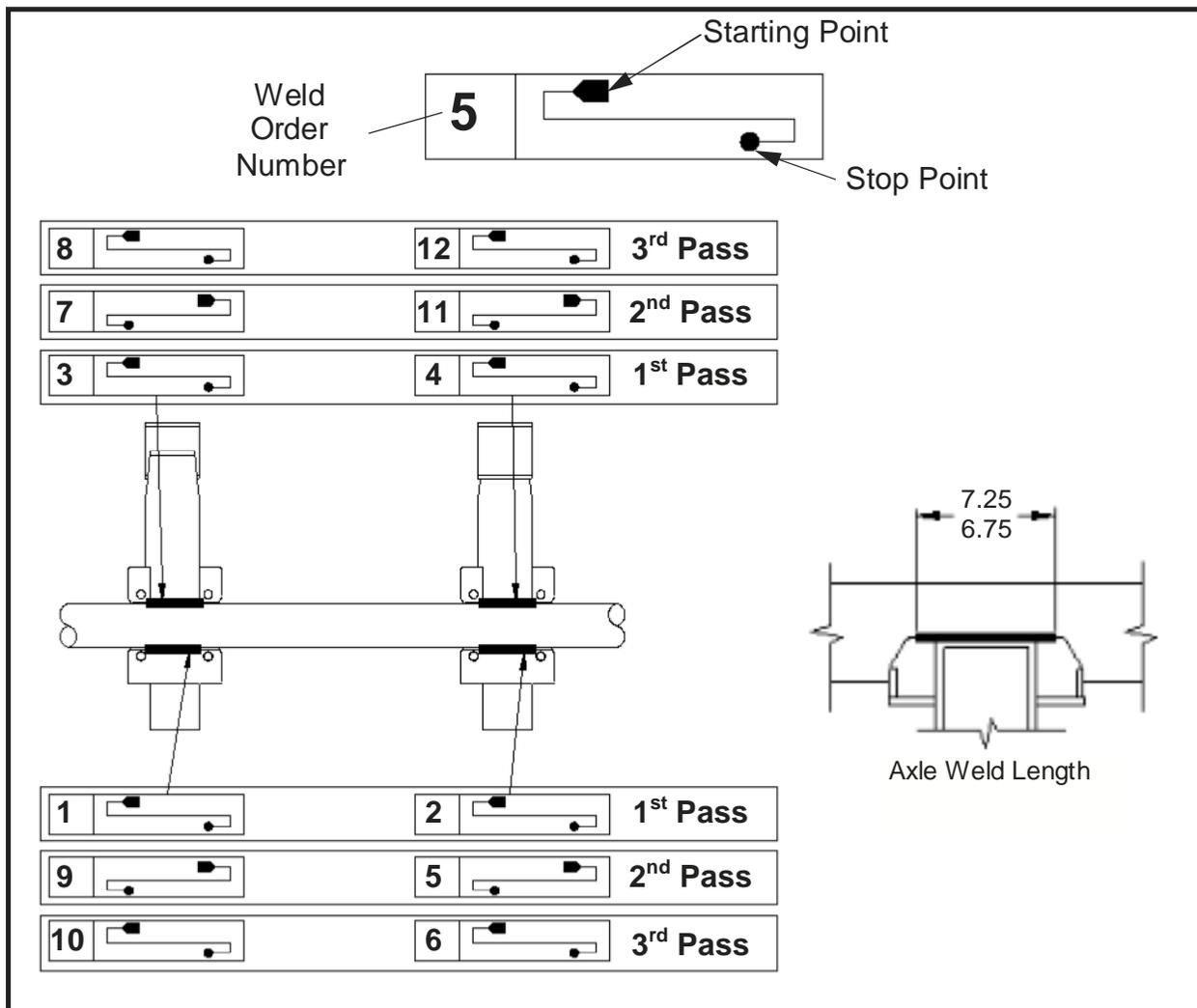


Figure 7

U-Bolt Installation

Note: Allow Welds to cool before installing U-bolts

1. Install U-bolt spacers, washers, and nuts on the U-bolts and snug up the nuts with a wrench. *Special welds may not use spacers.
2. Make sure U-bolt spacers are evenly spaced from the axle seats on both sides of the axle. See **Figure 8**.
3. Tighten the U-bolts by alternately tightening opposing corners of the clamp assembly. Torque U-bolts in a "X" pattern to **400 - 450 ft-lbs.** See **Figure 19**
4. The U-bolts should have an equal amount of thread showing above the nuts.

Figure 8

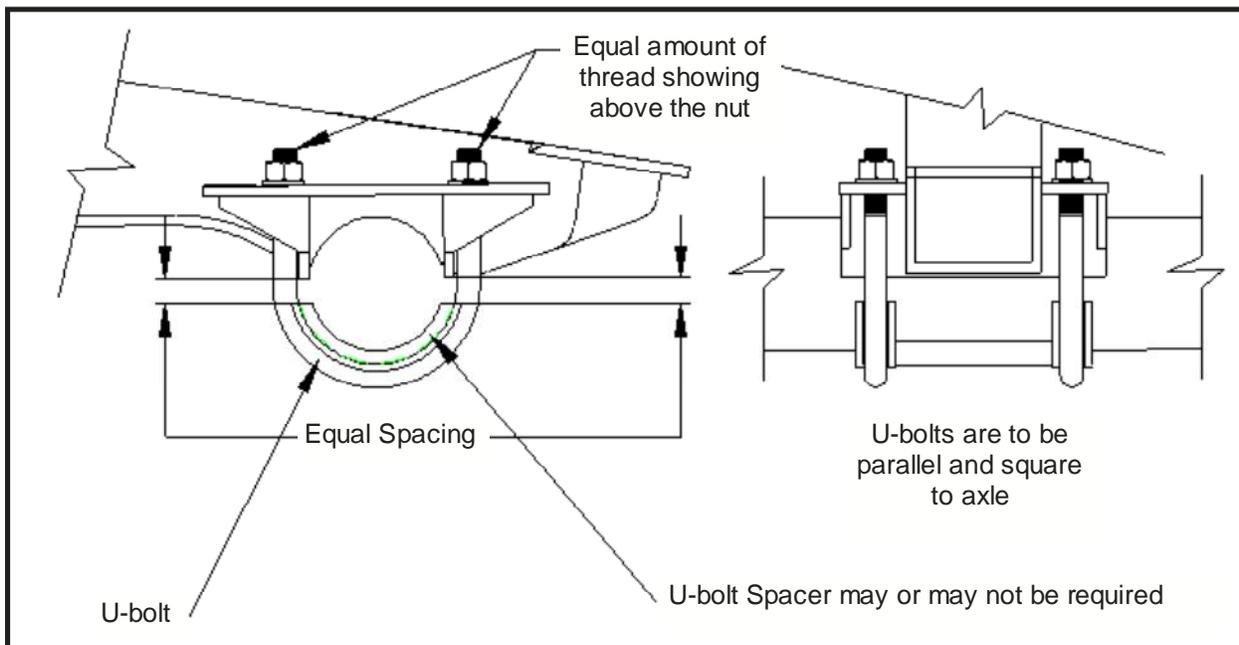


Figure 8

U-bolt Torque Instructions

To torque or re-torque u-bolts:

1. Partially tighten bolts #1 and #2 according to figure 1.

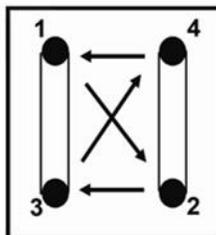


Figure 19: U-Bolt Torque Pattern

2. Partially tighten bolts #3 and #4.
3. Using the same sequence, torque to the proper torque as specified below.

Figure 19

Attaching suspension to frame

Note ! The suspension installer is responsible for ensuring the beams, crossmembers, and suspension attachment are adequate for the suspension. The following methods are common practices, but individual installations may vary.

Weld Note: It is important not to weld within .50 inch of any intersection of flange to flange between the Hangers and the frame components .

Preferred hanger to frame location

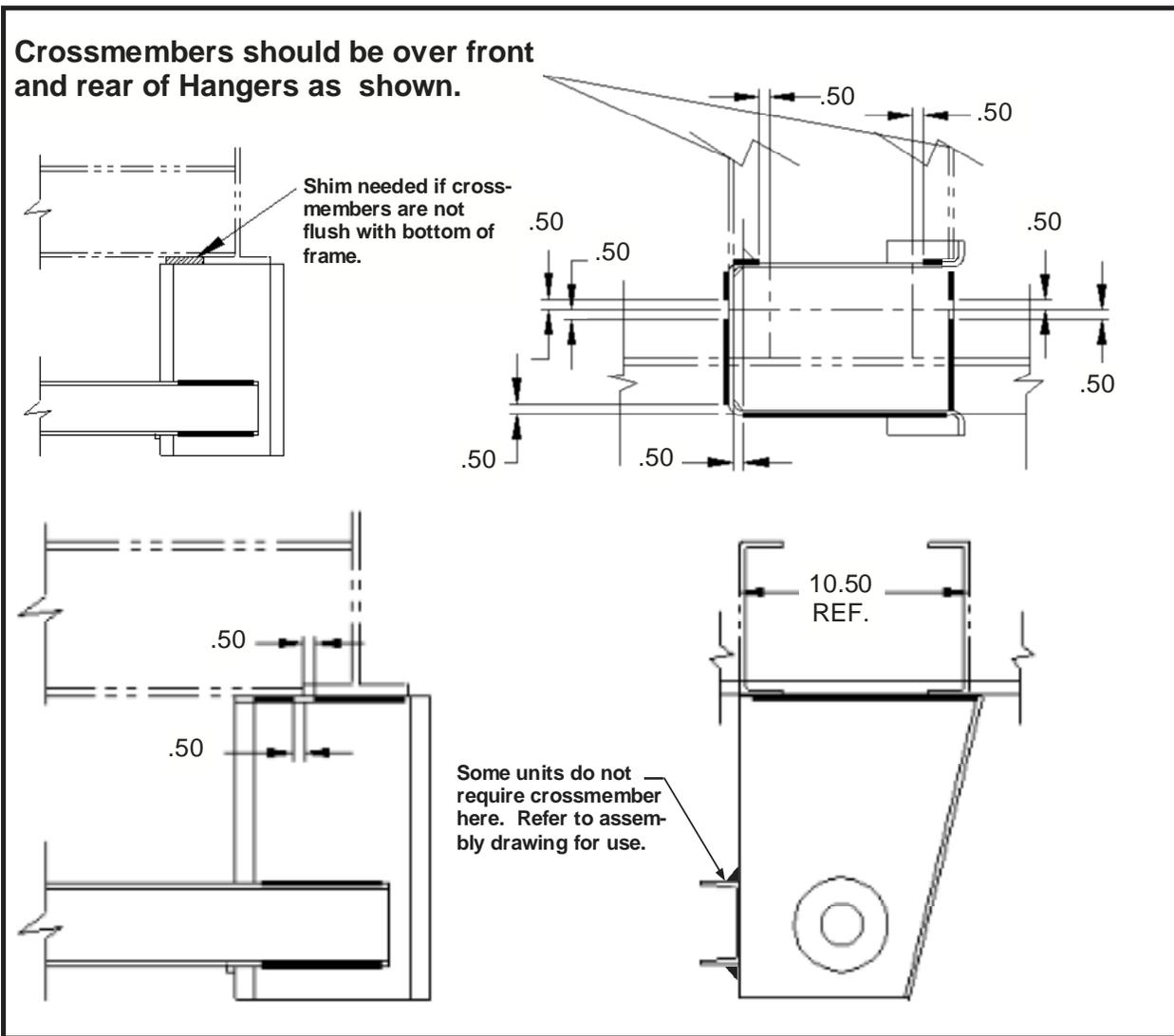


Figure 9

Optional outset orientation

Note: Figure 10 shows a common method, other methods may be necessary.

Gussets may be required if hanger extends past the center of the main beam of the trailer.
Gussets are furnished by the installer.

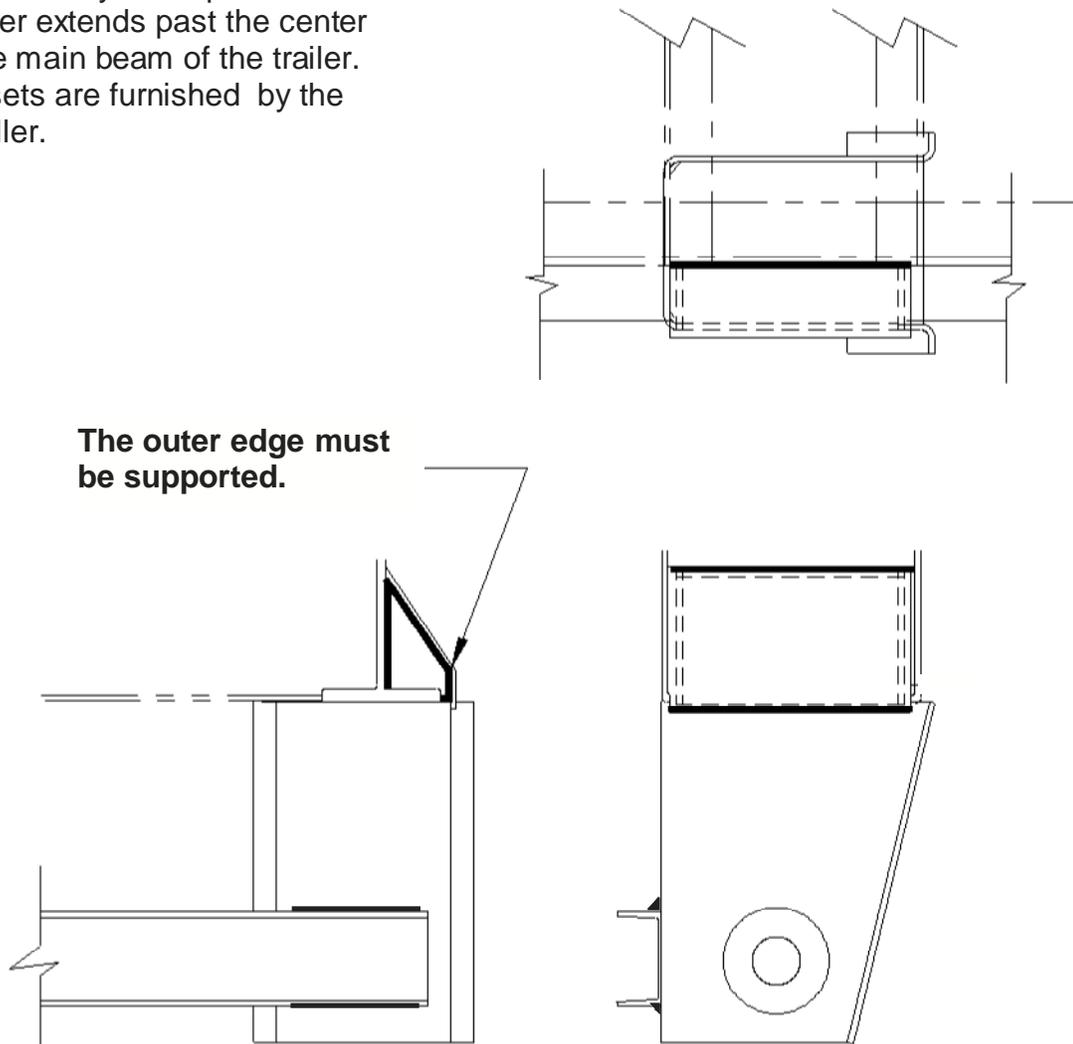
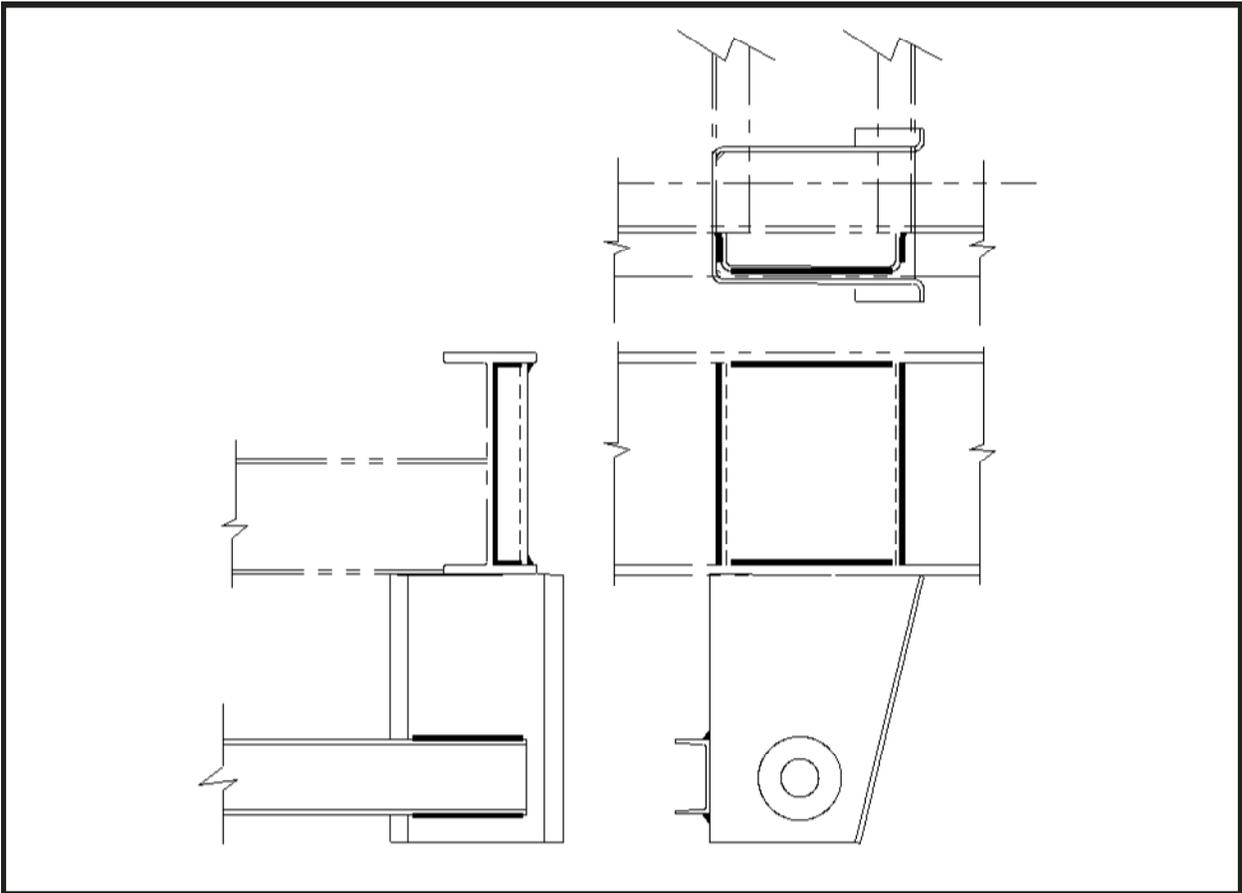
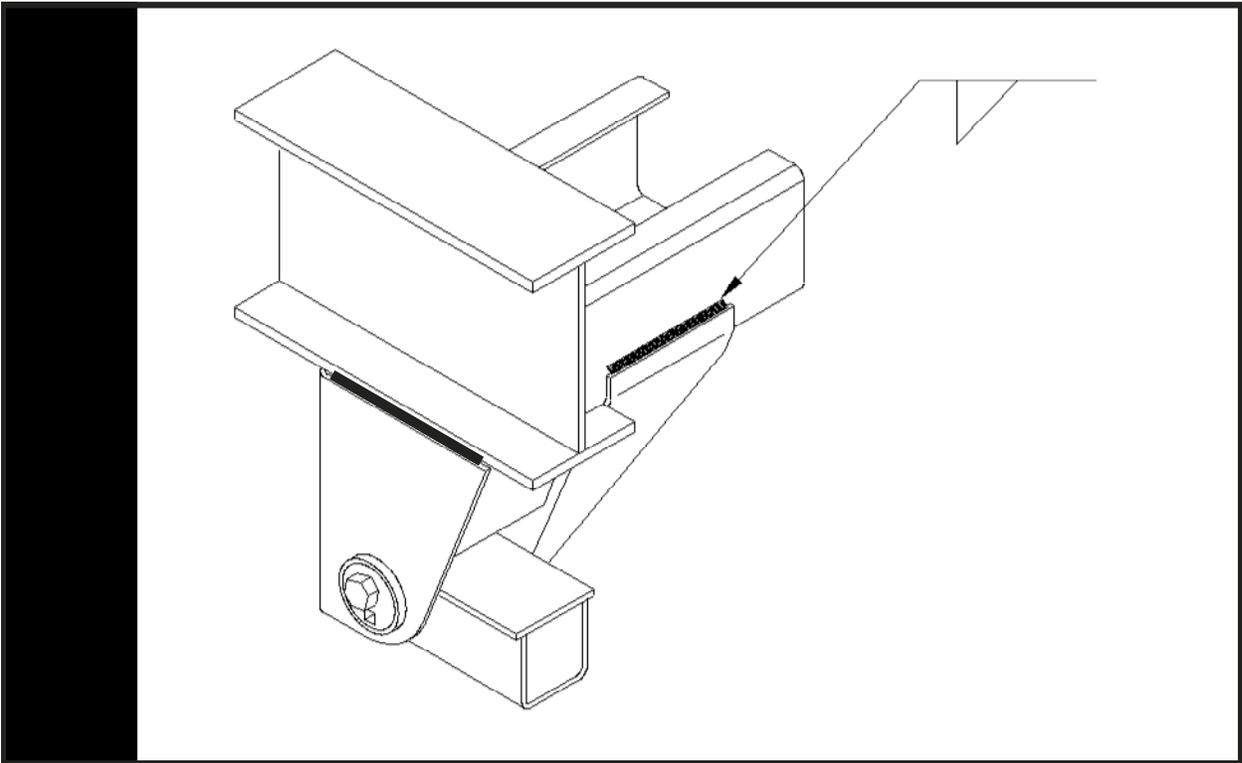


Figure 10



Optional Stiffener Mount
Figure 11



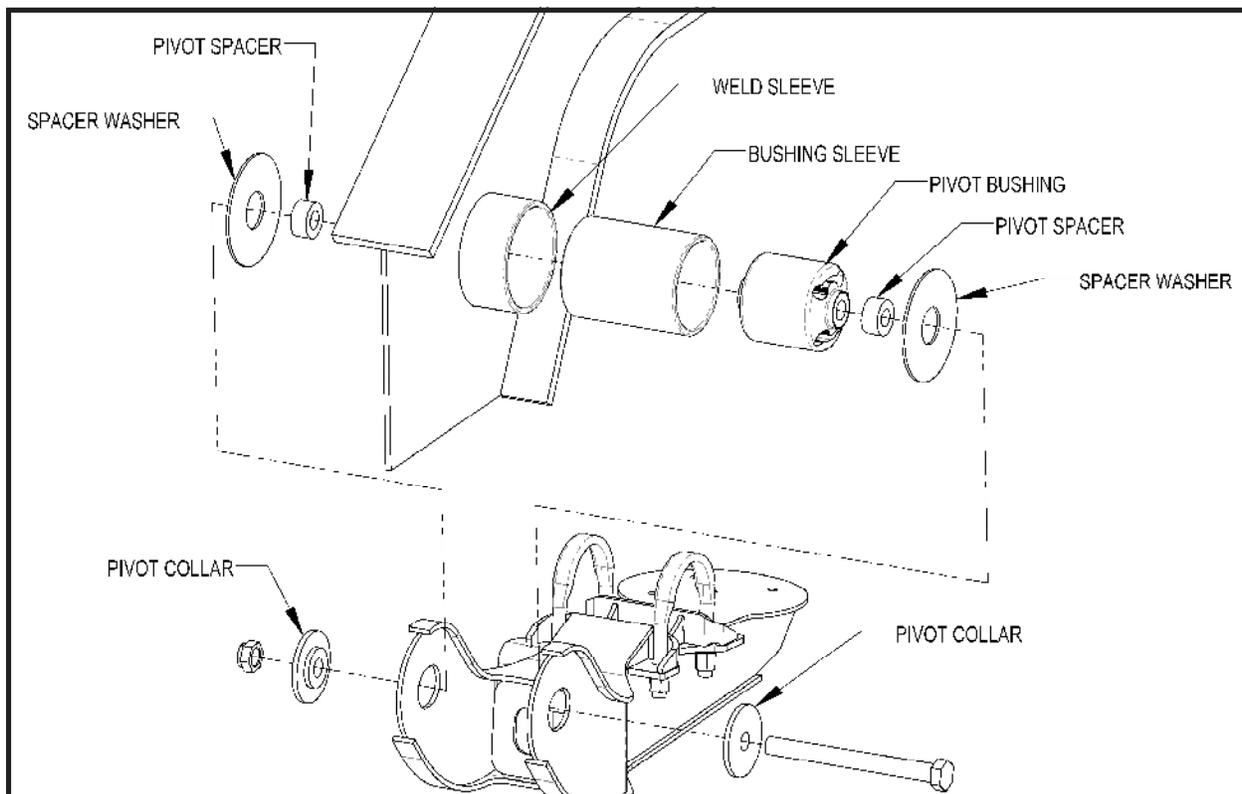
TA-250 Hanger with Gusset
Figure 12

TY Series Pivot Connection Frame Attachment

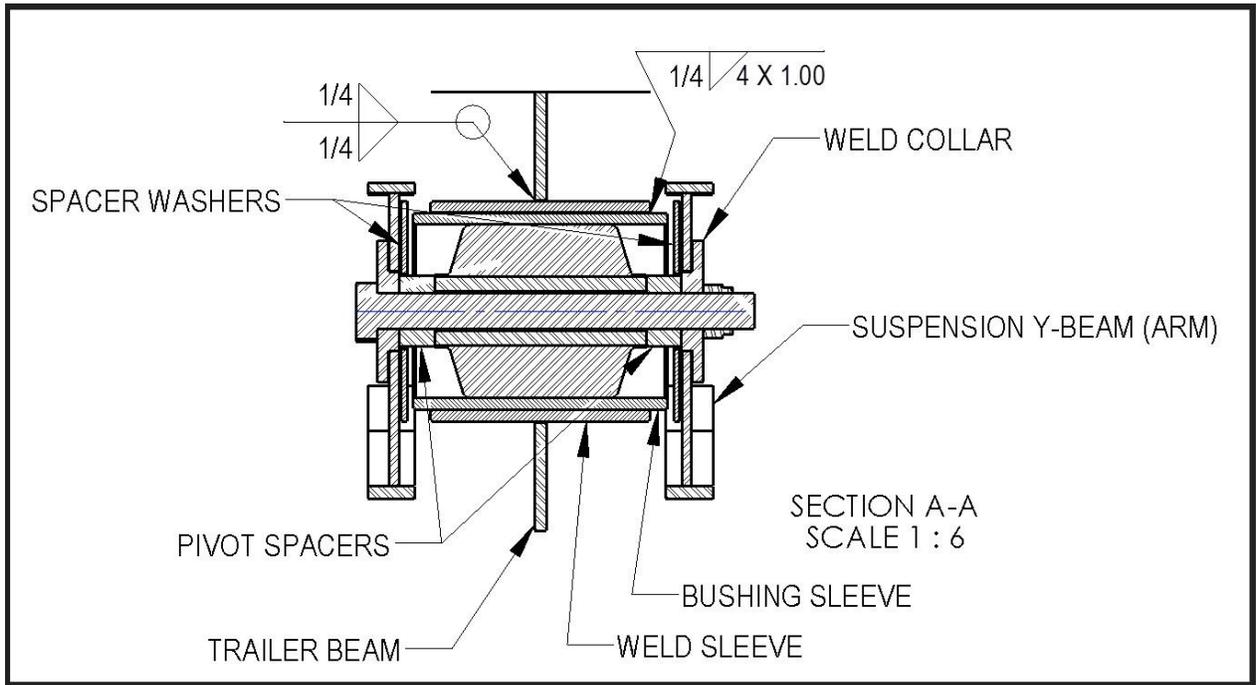
The TY Series suspensions require weld sleeves that are welded directly to the existing trailer frame as part of the installation. The installer must cut a 7" diameter hole for each sleeve through the trailer frame for the weld sleeves. Refer to suspension assembly drawing for location.

Note: It is the responsibility of the installer to provide adequate frame design and sleeve support in the area of the suspension attachment.

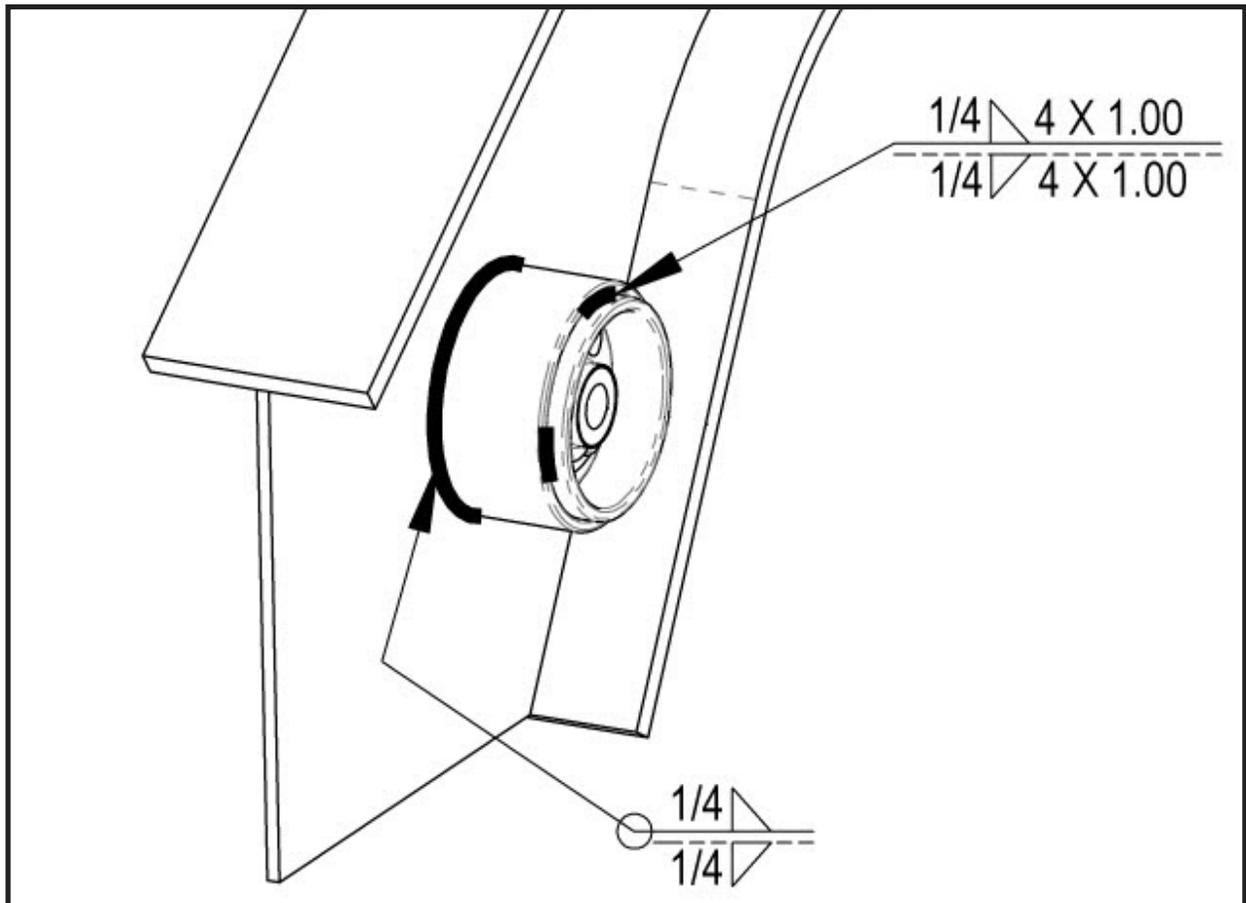
1. Center the weld sleeves in the trailer frame and verify that they are perpendicular to the web of the trailer frame.
2. Tack weld in place.
3. Verify that the sleeves are centered in the frame and are perpendicular to the trailer frame web.
4. Completely weld the sleeves to the web. (see Figures 14 and 15)
5. Install customer supplied support braces to the weld sleeves. (see Figure 16)
6. The bushing sleeve will already have the bushing installed into the sleeve.
7. Install and center the bushing sleeve with already installed bushing into the weld sleeve. Ensure the bushing locator mark is in the horizontal position. (see Figure 16).
8. Weld bushing sleeve in place. (see Figure 15). Alternate ends to allow cooling between welds.



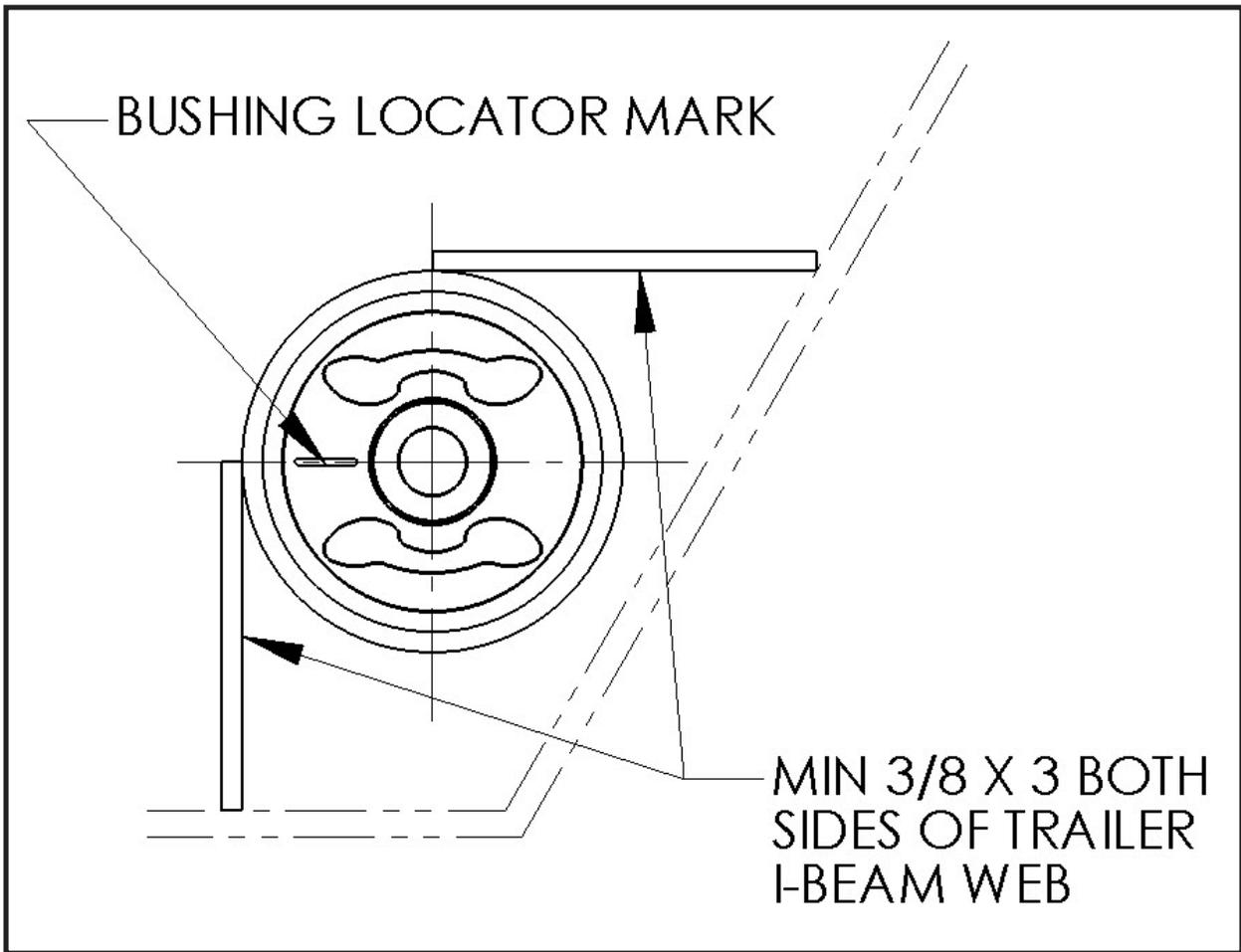
TY Series Pivot Connection Exploded View
Figure 13



TY Series Pivot Connection Section View
Figure 14



TY Series Pivot Connection Sleeve Welding
Figure 15



TY Series Pivot Connection Section View
Figure 16

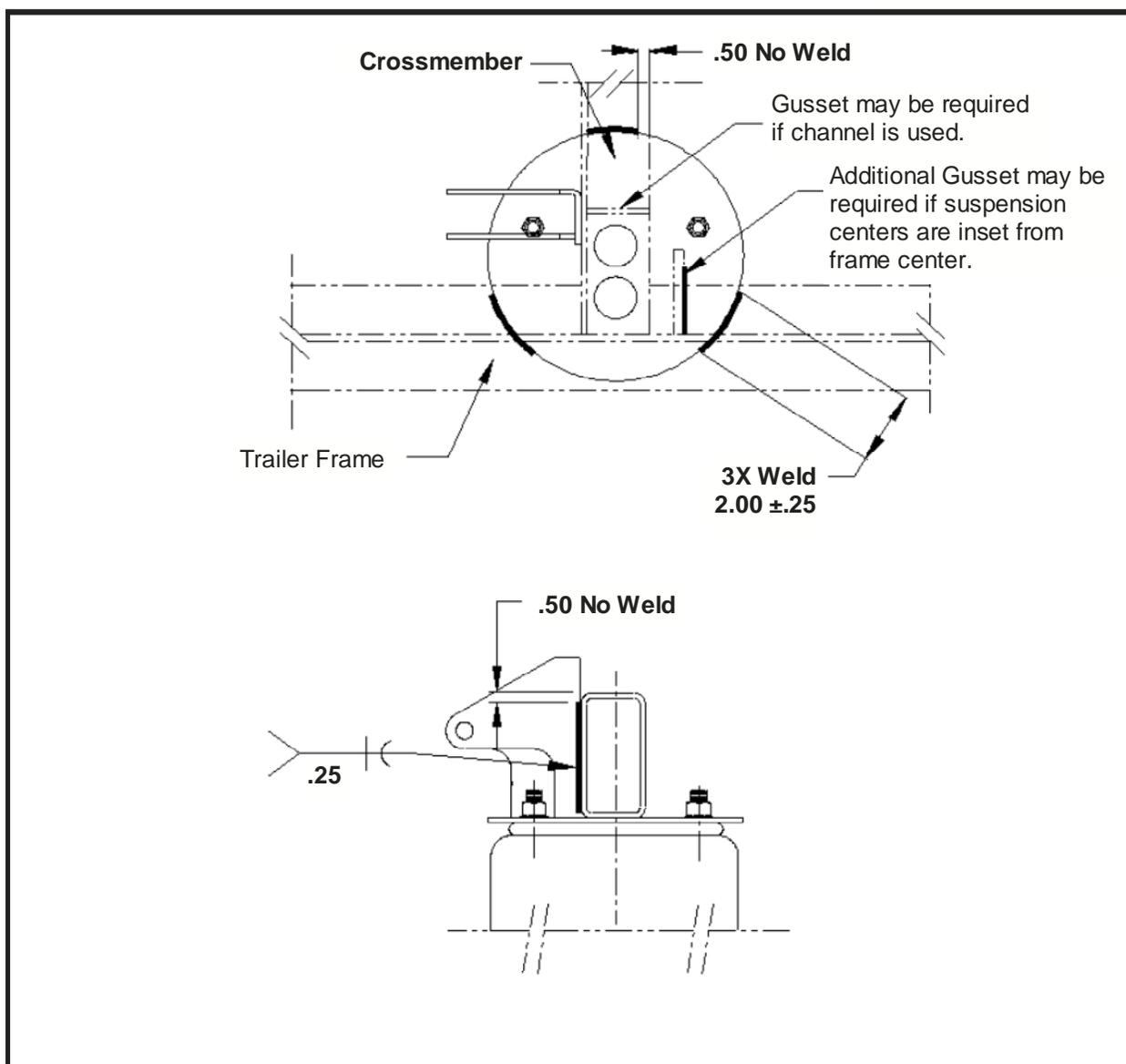
Attaching upper bag plate / spacer to frame

Note ! The suspension installer is responsible for ensuring the beams, crossmembers, and suspension attachment are adequate for the suspension. The following methods are common practices, but individual installations may vary.

Weld Note: It is important not to weld within .50 inch of any intersection of flange to flange between the Upper bag plates and the frame components as shown below.

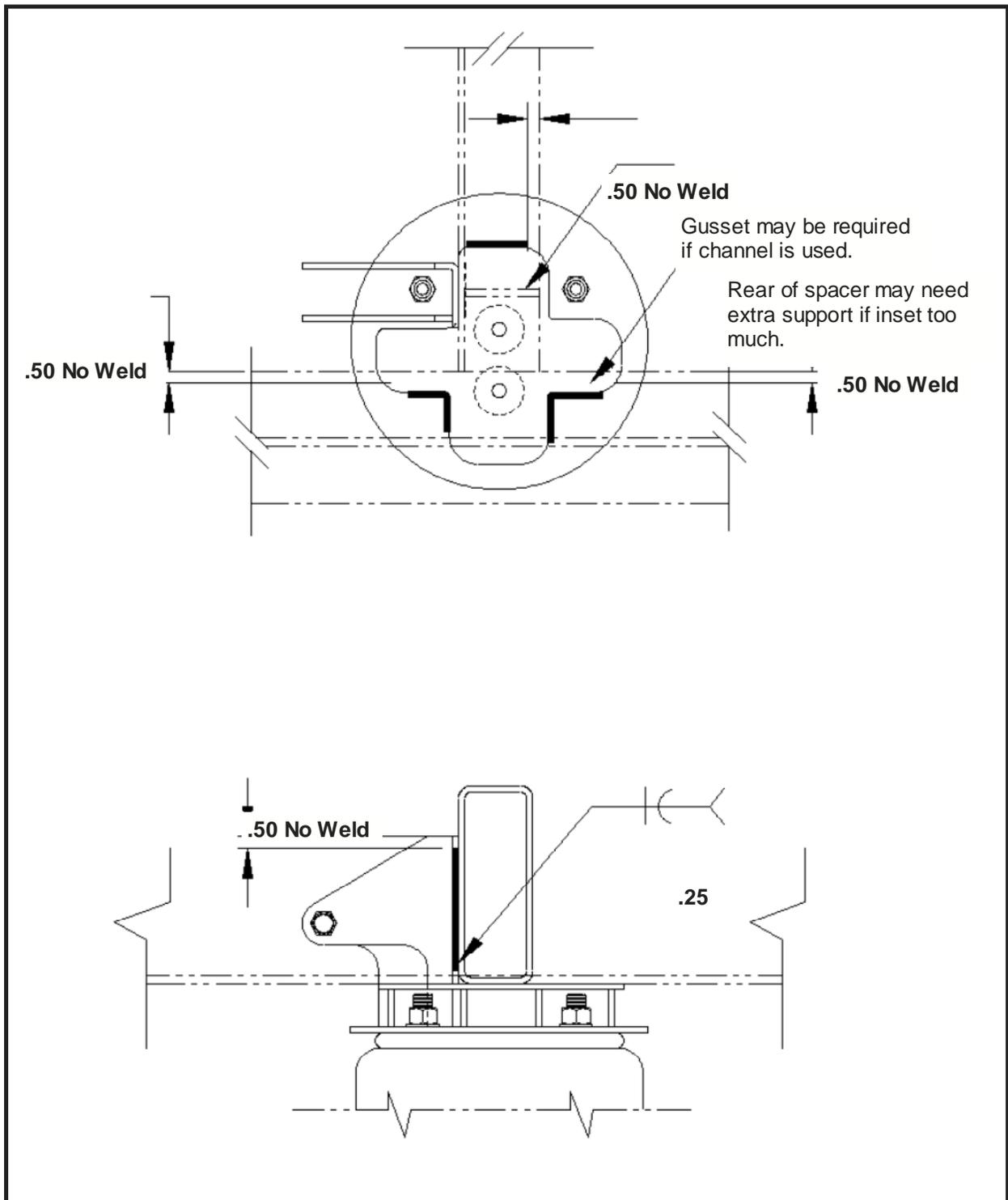
The bag plates need to be supported properly to ensure proper operation. The illustrations in **Figure 17** and **Figure 18** show the most common methods. Some installations may require additional bracing that is not shown due to the many different

Cont...



Bag plate without spacer
Figure 17

trailer styles and frame types. **Figure 17** shows a typical upper bag plate with no spacer. **Figure 18** shows a typical bag plate with spacer.



Spacer style bag plate
Figure 18

Final alignment for Weld Collar Type

Note ! The suspension installer is responsible for ensuring correct alignment and that all (4) collars on each suspension are welded completely.

Caution! **Failure to weld the collars voids the warranty and can cause severe suspension damage or failure and erratic trailer operation !**

Final Alignment of the axle, if done properly, will provide a maintenance free connection at the pivot of the suspension until bushing replacement. After several years of wear, it is normal to replace the bushing. If the original installation of the suspension is correct, the bushings can be replaced without the need to realign the suspension. **However, if the alignment is not correct, the bushing can wear prematurely and/or make the trailer track out causing tire wear.**

Sequence for alignment:

1. Tires must be the same size, diameter, and inflation pressure.
2. The suspension must be at the correct ride height to align properly. This can be done by adjust landing gear or using jacks to support the trailer. If trailer is upside down to mount suspension, the axles may be blocked to the proper ride height. Trailer and axles must be level. Refer to **Figure 20** and make sure ride height is the same on **both** sides of trailer frame.
3. Move one of the suspension arms to the middle of the adjustment slot and tack weld where shown in **Figure 21**.
4. Move the other arm on the suspension forward or backward to allow the distance from center of spindle to kingpin (**Figure 23** Dimension **A & B**) to be equal distance within 1/8".
5. Tack weld the other arm collars into place before welding.
6. Re-Check alignment before welding.
7. Make sure axles protrude evenly on both sides from frame. **Figure 23** dimensions **E** and **F** must be within 1/4" of each other
8. Weld all (4) collars with a .25 fillet completely around collars per **Figure 22**.
9. Additional suspensions should be aligned per **Figure 23** using the **C & D** dimensions with only 1/16" maximum variations.

Final alignment for Eccentric Collar Type

Final Alignment of the axle is very important. If done properly, will provide a low maintenance connection at the pivot of the suspension. After several years of wear, it is normal to replace the bushing. **If the alignment is not correct, the bushing can wear prematurely and/or make the trailer track out causing tire wear.**

Caution! **Adjusting or rotating the two collars independently of each other can cause the pivot joint to loosen after being put into service. Both collars on a single hanger must be rotated and adjusted at the same time and in the same direction. Failure to adjust them together can lead to misalignment, tire wear, and bushing failure.**

Sequence for alignment for Eccentric Collars:

1. Tires must be the same size, diameter, and inflation pressure.
2. The suspension must be at the correct ride height to align properly. This can be done by adjust landing gear or using jacks to support the trailer. If trailer is upside down to mount suspension, the axles may be blocked to the proper ride height. Trailer and axles must be level. Refer to **Figure 20** and make sure ride height is true on **both** sides of trailer frame.
3. Start out with the Adjustment-Square vertically aligned with pivot as shown in **Figure 24**.
4. Snug up one side so that the collars cannot rotate.
5. Using a 1/2" break over or ratchet, rotate the other two collars on the other hanger so the suspension moves forward or backward to allow the distance from center of spindle to kingpin (**Figure 23** Dimension **A & B**) to be equal distance within 1/8". Rotate inside and outside Eccentric Collar together and the same.
6. Snug up pivot bolt so the collar cannot move.
7. Re-Check alignment before proceeding. **If more suspension movement is needed to align, loosen the centered collar (unadjusted hanger) and rotate it to allow for more movement.** Again, move inside and outside Eccentric Collars together.
8. Make sure axles protrude evenly on both sides from frame. **Figure 23** dimensions **E** and **F** must be within 1/4" of each other.
9. Tighten fasteners to 800 - 900 ft-lbs. Weldment not required.
10. Additional suspensions should be aligned per **Figure 23** using the **C & D** dimensions with only 1/16" maximum variations.

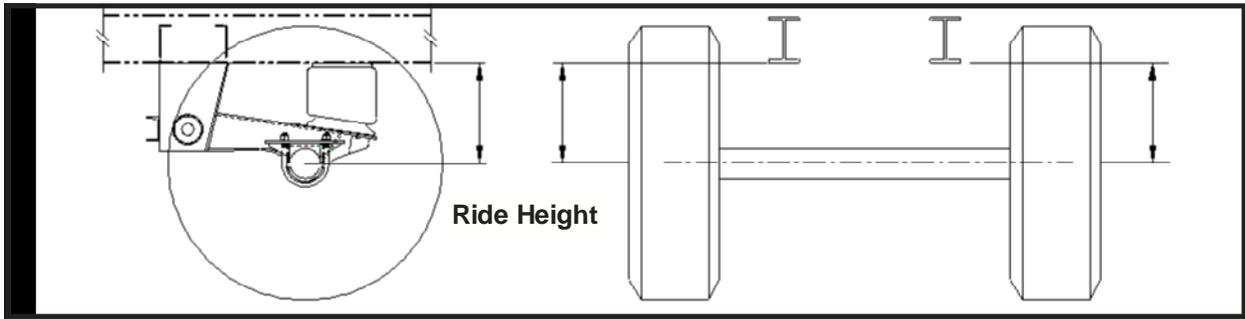


Figure 20

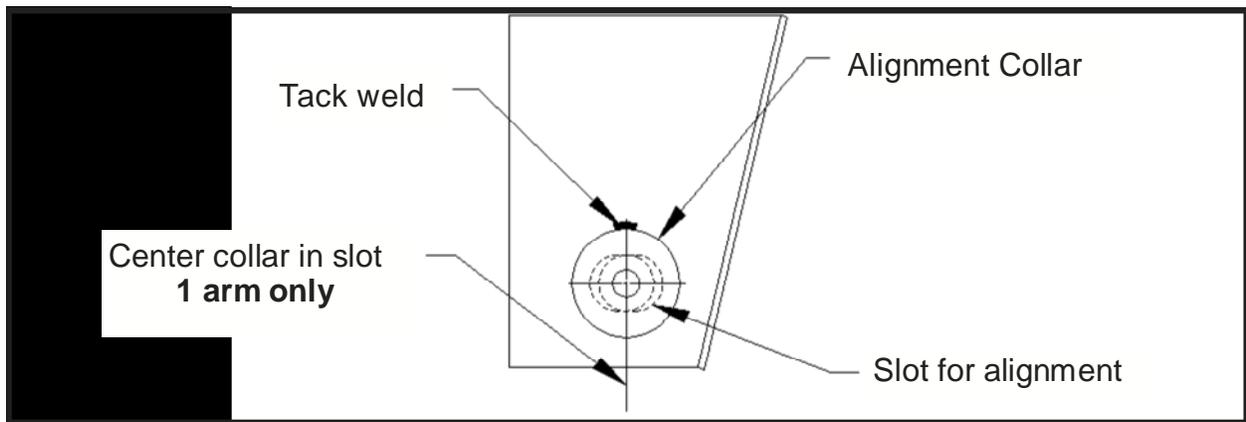


Figure 21

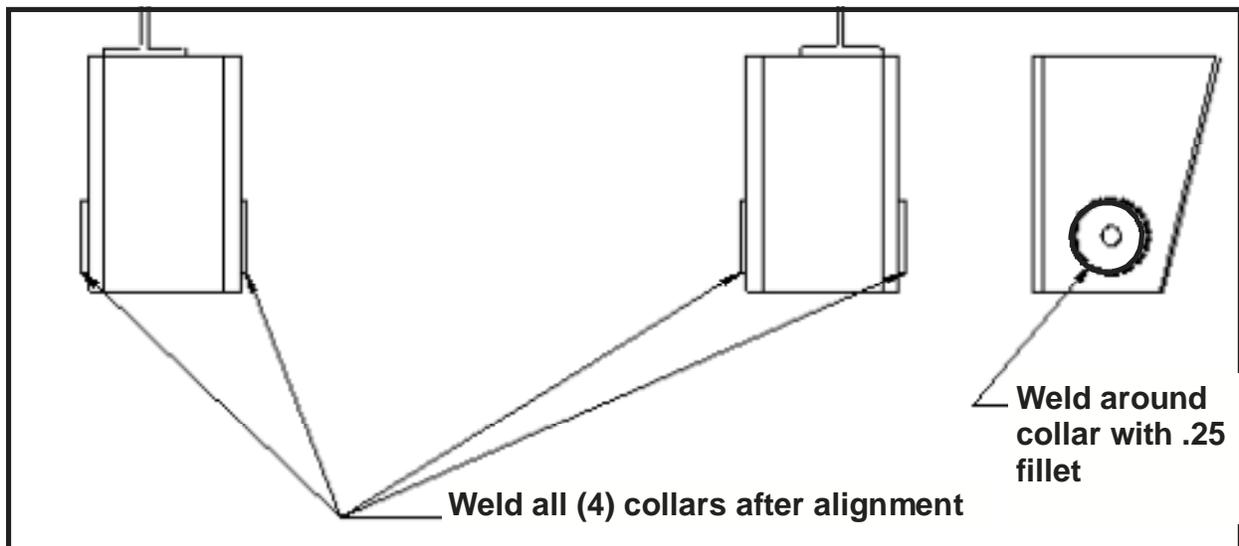


Figure 22

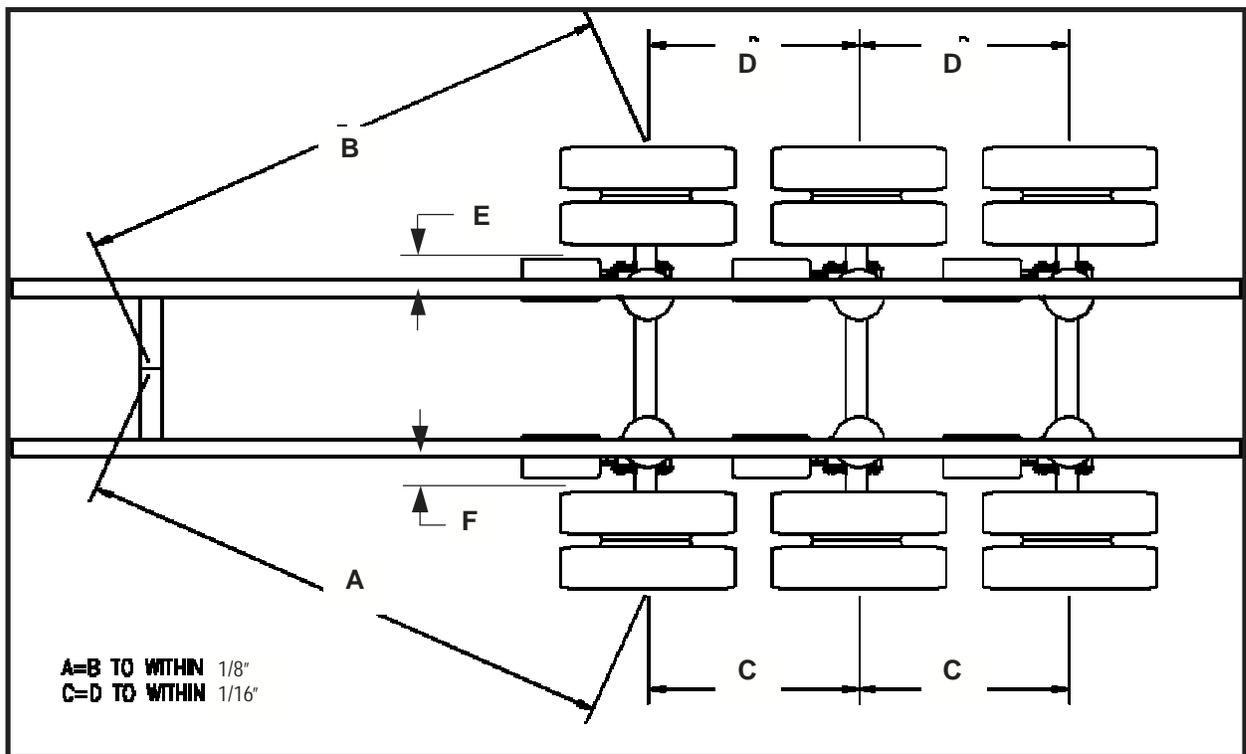


Figure 23

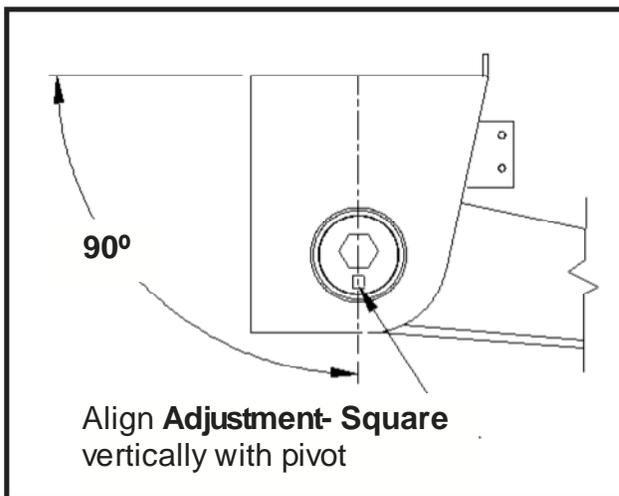


Figure 24

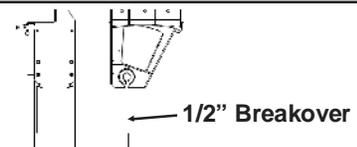
CAUTION

Adjusting or rotating the two collars independently of each other can cause the pivot joint to loosen after being put into service. Both collars on a single hanger must be rotated and adjusted at the same time and in the same direction. Failure to adjust them together can lead to misalignment, tire wear, and bushing failure.

IMPORTANT

Alignment Adjustment Requirements – When adjusting collars during the alignment of the axle, BOTH collars must be rotated at the same time.

- Use (2) 1/2" square-drive breakover bars to make the adjustments
- The square Adjustment Hole must line up from side to side.



Leveling Valve requirements

Caution ! Air lines are pressurized and may blow debris, **USE EYE PROTECTION.**

Major functions of the leveling valve:

The leveling valve (**Figure 25**) in conjunction with the air control kit is responsible for maintaining the proper ride height of the suspension. When the trailer is loaded, the leveling valve fills the airsprings with more air to bring the trailer back to proper ride height. When the trailer is emptied, the leveling valve releases air through the exhaust tube and lowers the suspension back to proper run height.

Watson and Chalin Mfg offers a variety of Air Control Kits to suit the most popular needs. The ACK203, -2 (**Figure 26**) is the most popular Air Control Kit. It provides the basic features that are needed to run an air suspension properly. Other Air Control Kits are available, such as the ACK201, (**Figure 27**) that provides a popular feature: dual leveling valves. Call Watson and Chalin Mfg for other specific needs.

Where to install the leveling valve:

Typically the leveling valve is located on the rear axle on a tandem or on the middle axle on a tridem.

Special considerations for spread tandems:

A spread tandem (over 50") may require special consideration about ride height adjustment. Aluminum or lightweight trailers that have a lot of camber (arc, rise) in the main deck need special consideration when determining proper ride height. The leveling valve (if placed on the rear axle) may have to be intentionally set to run at a slightly lower run height when the trailer is empty to keep the front suspension from running taller than it's intended run range. **It is recommended that ride height adjustments be checked in fully loaded and unloaded conditions to find an average run height that does not force a suspension to run past its maximum run range.**

Suspensions that run outside their intended run range can cause excessive wear on the shock absorbers and airsprings, plus cause increased stress at the axle connection.

Note: Consult separate Leveling Valve instructions that come in leveling valve box for specifics on installation.

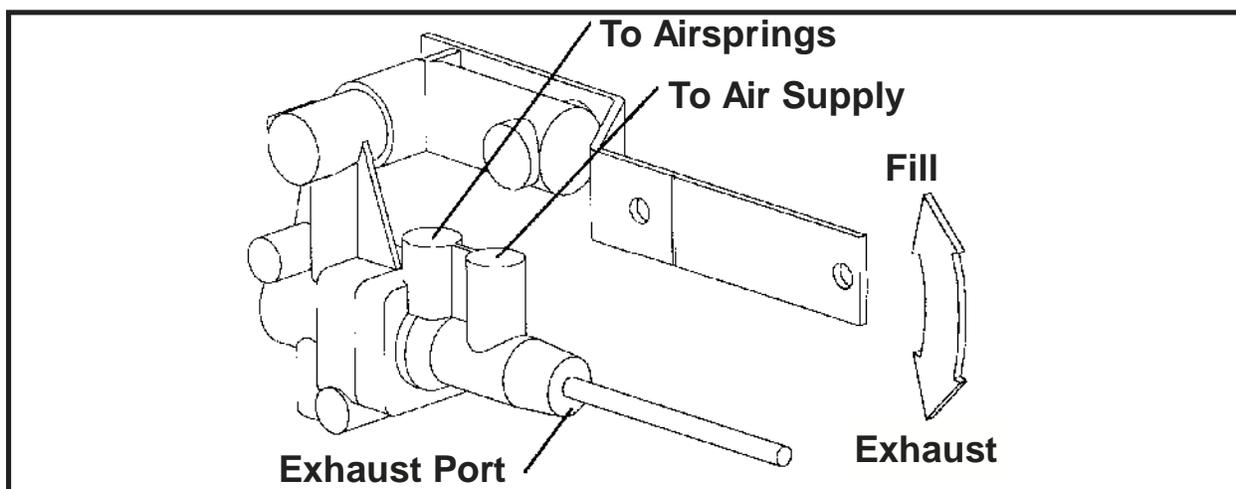
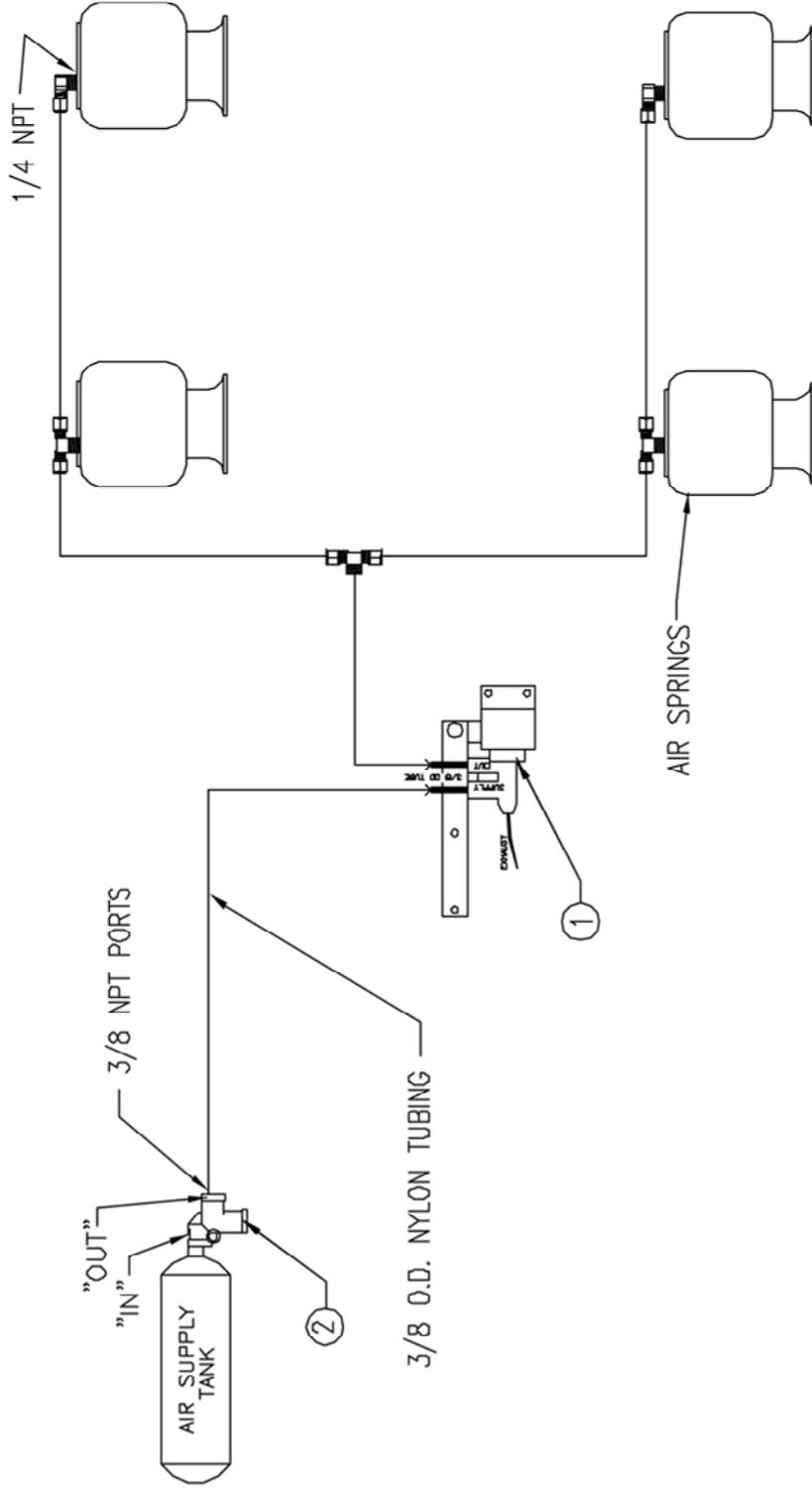


Figure 25

LEVEL	REVISION DESCRIPTION	EGN	DATE	BY
A	NEW DRAWING		27/03/04/03	JFF
B	ITEM #1 WAS 17760		5/20/06/08/08/11	K
C				

B

ITEM	PART NO.	QTY.	DESCRIPTION
1	17760-04	1	LEVELING VALVE (HADLEY)
2	10100	1	BRAKE PROTECTION VALVE



NOTES:

1. DIAGRAM IS SHOWN FOR TANDEM SUSPENSION. FOR SINGLE SUSPENSION, OMIT FRONT AIR SPRINGS.
2. NYLON TUBING AND FITTINGS FURNISHED BY CUSTOMER.
3. ALL EXTERNAL EXHAUST PORTS MUST USE MINIMUM 6.00 LONG DRAIN TUBE FACING DOWN

SINGLE LEVELING VALVE SYSTEM

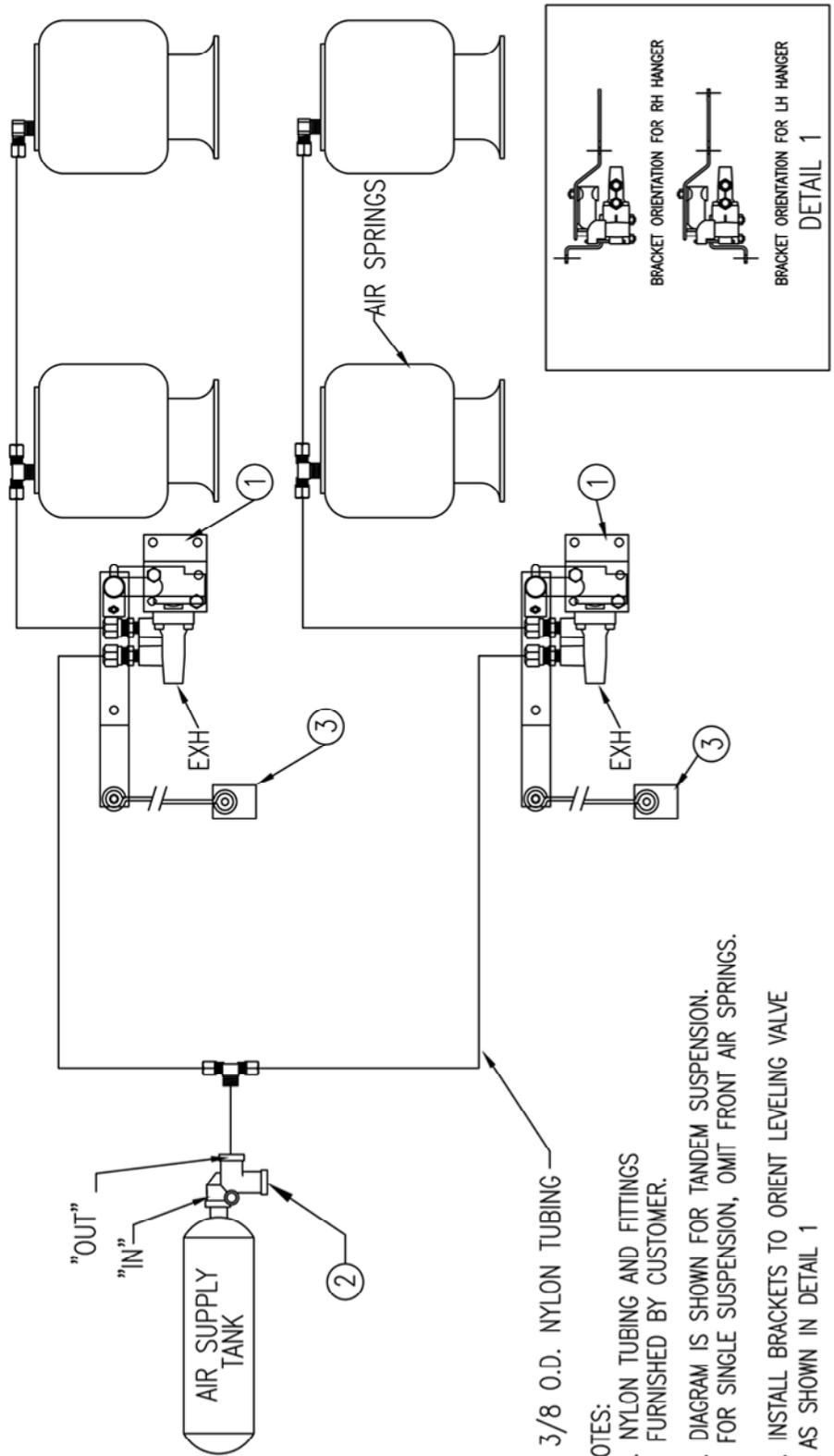
PART PROPERTIES	TOLERANCES (EXCEPT AS NOTED)		DESCRIPTION	MATERIAL
	DECIMAL	FRACTIONAL		
AREA	±	±	SEE ABOVE	—
OUT LENGTH	±	±	SUSPENSION MODEL	PREVIOUS ASSEMBLY
WEIGHT	±	±	DATE	DRAWING NO.
			3/04/03	ACK203
			CHKD BY/DRAWN BY	SCALE
			JFF	NTS

WATSON & CHALIN MFG., INC.

Figure 26

LEVEL	REVISION DESCRIPTION	ECN	DATE	BY
A	NEW DRAWING		27/62/14/03	LFE
B	ITEM # WAS 17760		5/20/06/09/08	MLZ
C	ADDED -30 CONTIG		2/28/07/30/09	GMF

ITEM	PART NO.	QTY.	DESCRIPTION
1	CHART	2	HEIGHT CONTROL VALVE
2	10100	1	BRAKE PROTECTION VALVE
3	30259*	1	LEVEL VALVE BRACKET (LOWER)



3/8 O.D. NYLON TUBING

- NOTES:
1. NYLON TUBING AND FITTINGS FURNISHED BY CUSTOMER.
 2. DIAGRAM IS SHOWN FOR TANDEM SUSPENSION. FOR SINGLE SUSPENSION, OMIT FRONT AIR SPRINGS.
 3. INSTALL BRACKETS TO ORIENT LEVELING VALVE AS SHOWN IN DETAIL 1
 4. ALL EXTERNAL EXHAUST PORTS MUST USE MINIMUM 6.00 LONG DRAIN TUBE FACING DOWN

* ONE 30259 IS INCLUDED IN SUSPENSION KIT

DEPARTMENTS AFFECTED		TOLERANCES (EXCEPT AS NOTED)	DESCRIPTION	MATERIAL
20	DECIMAL ± 06	SEE ABOVE		
-	FRACTIONAL ± 1/16	SUSPENSION MODEL TA	SCALE NTS	PREVIOUS ASSEMBLY -
-	ANGULAR ± 1°	DATE 2/14/03	CHKD BY/DRAWN BY SIZE JFF A	DRAWING NO. ACK201

PART NO.	ITEM #1
ACK201	17760-04
ACK201-01	17760

DESCRIPTION: DUAL LEVELING VALVE SYSTEM

WATSON & CHALIN MFG., INC.

Figure 27

Torque Requirement Procedures

All fasteners should be re-torqued according to the following schedule.

- after 30 days
- every 6 months thereafter

Capscrew/Bolt (Grade 8 UNF) Torque Requirements

Capscrew/Bolt Size	3/8"	1/2"	5/8"	3/4"	3/4" (Stabilizer Shock Stud)	7/8"	1"	1 1/8"
Torque minimum feet/lbs.	25	50	150	300	150	500	700	900
Torque maximum feet/lbs.	35	75	200	350	175	550	800	1000

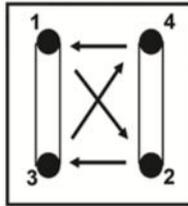
NOTE: Torque Values do not apply to air springs or lower grade fasteners.

U-bolt Torque Instructions

To torque or re-torque u-bolts:

1. Partially tighten bolts #1 and #2 according to figure 1.

Figure 1: U-Bolt Torque Pattern



2. Partially tighten bolts #3 and #4.
3. Using the same sequence, torque to the proper torque as specified below.

U-Bolt (Non-Plated Clean Lubricated Thread) Torque Requirements

UNF Grade 8 Size	3/8"	1/2"	5/8"	3/4"	7/8"	1"	1 1/8"
U-bolt minimum feet/lbs.	15	40	120	200	400	650	800
U-bolt maximum feet/lbs.	20	60	150	250	450	750	900

Airspring Torque Requirements

Size	Description	Max Torque Requirement (ft./lbs.)
3/8"	UNC Blind Nuts	50
1/2"	UNC Bolt or Stud	25
3/4"	UNC Stud	55
3/4"	UNF Combo Stud	50

Air Fitting Torque Requirements

Size	Max Torque Requirement (ft./lbs.)
1/4" NPTF	20
1/2" NPTF	20
3/4" NPTF	20

Final Inspection

Caution ! Be careful when inspecting trailer, especially if manually adjusting or cycling leveling valve, because the trailer will go up and down and this could cause serious injury.

1. Check welds to determine if they are placed correctly and make sure they are the right size for the following:
 - Axle seats to Axles to make sure the correct procedures on pages 5-8 were followed.
 - Check to make sure all (4) alignment collars were welded completely.
 - Check hangers and upper bag plates to make sure they are welded and positioned properly, and sufficient frame supports are in place.
2. Make sure the suspension can go through it's full range of motion without interfering with frame components, brake devices, valves, airtanks, or other such components.
3. Make sure the airspring has at least a 1" clearance all the way around it while it is fully inflated. This should be checked through the full range of motion to determine if possible contact may occur.
4. Through turns the suspensions may track out before returning to its proper position in a straight path, so make sure no interference will exist with tires and other suspension components.
5. Be sure the Ride-height of the suspension is in accordance with the assembly drawing from Watson and Chalin Mfg. Refer to page 18 for notes on ride height variations on spread tandems.
6. Check leveling valve to verify that the lever does not exceed 45° of movement in full up or down positions. Exceeding 45° can break the leveling valve.
7. Check U-bolt torque with specifications on page 9.
8. Make sure tire has at least 1" of clearance when suspension is dumped or in it's full up position.
9. Recheck alignment per pages 14 or 15. It is recommended that the trailer be pulled down the highway for a couple of miles to ensure proper tracking after inspection is finished.

General Troubleshooting

PROBLEM	POSSIBLE CAUSE	REMEDY
Trailer not tracking properly	Front alignment collars not welded	Align unit and weld alignment collars (refer to page 14)
	Axle misalignment	Cut loose front alignment collars & reweld collars (refer to page 14 for welded or 15 for eccentric non-weld type)
	Axle seats not properly installed to axle	Check axle seat location refer to page 5. If improperly installed cut loose and install properly as shown and realign.
Not getting the desired load on axle	Leveling valve incorrectly adjusted	Adjust the leveling valve per leveling valve instructions
	Air Control Kit not properly installed	Check piping of air system Check for kinks in hoses
	Suspension out of recommended travel range	Leveling valve needs adjustment (page 18) to proper run height
Insufficient air pressure to system	Defective brake protection valve	Replace brake protection valve and check air compressor
Not getting the correct axle travel	Interference with Trailer frame components	Inspect for interference And correct if needed
	Not installed properly	Check installation with factory installation drawing
	Leveling valve incorrectly adjusted	Adjust the leveling valve per leveling valve instructions or refer to leveling valve troubleshooting on page 22

Leveling Valve Troubleshooting and Testing

PROBLEM	POSSIBLE CAUSE
Airsprings flat	Obstruction in air line Defective Pressure Protection Valve Defective leveling valve-see test procedure Air leak in system
Air springs raise to full height but do not exhaust	Leveling valve linkage slipping (if clamped boot type) Obstructed air line Defective leveling valve-see test procedure Make sure any valves between leveling valve and airsprings are not one way valves
Air springs deflate when parked	Leak in air system-check with soapy water Defective leveling valve-see test procedure
Suspension will not maintain proper height	Leveling valve linkage slipping (if clamped boot type) Obstructed air line Defective leveling valve-see test procedure

Leveling valve test procedure

1. With a minimum of 90 psi at the supply port, rotate the lever up (as indicated on the side of the valve) 30° to 45° . Air should begin to flow into the air springs within seconds.
2. Rotate the lever to the neutral position. Air flow should stop.
3. Rotate the lever down 30° to 45° . Air should begin to exhaust from the air springs within seconds.
4. Rotate the lever to the neutral position. Air flow should stop.
5. If the valve fails to flow air or shut off as specified, replace leveling valve.

Reasons to replace leveling valve

- Did not pass the test procedure.
- Air leaks from the leveling valve.
- Leveling valve is damaged.