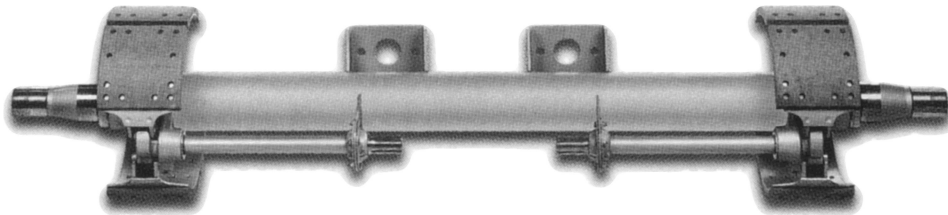
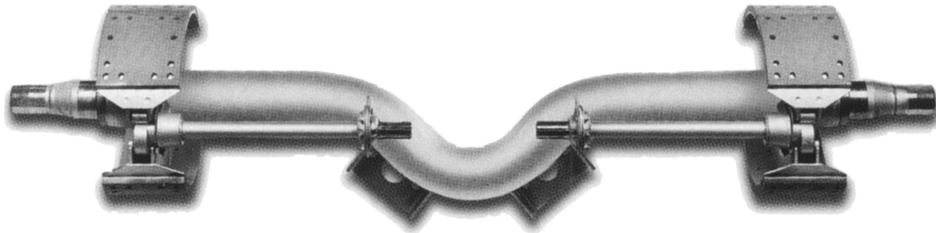


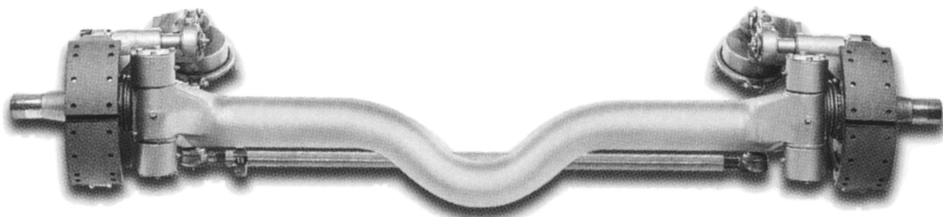
INSTALLATION AND MAINTENANCE MANUAL



Standard Trailer Axle



Drop Centre Axle



Self Steering Axle

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INTRODUCTION

The purpose of this manual is to familiarize yourself with an IMT axle.

Topics included will cover:

- Installation
- Adjustments
- Maintenance
- Inspections

This manual also contains information in chronological order to get your axle working as soon as possible. Tables, diagrams, and charts for a common sense approach are included to make this package as complete as possible.

Your IMT nameplate on any axle is located on the center of the beam. It contains the model and serial number. Your invoice number will also help to identify your axle. (Fig. 1)

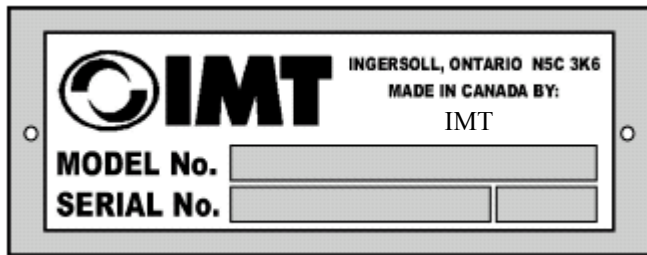


Fig. 1

Safety Warnings

This manual is intended to retain the safety, dependability, and performance engineered into IMT Axle Products. Study this manual carefully before you perform any installation or maintenance procedures.

CAUTIONS and WARNINGS will be used to point out any circumstances that can cause personal injury or damage components.



Before any repair or maintenance work that requires raising a vehicle, secure it with lift stands that are properly rated. Also make sure wheel chocks are accurately inserted. Do not depend on wheel jacks alone for support of vehicle.

Without proper training, safety equipment, and tools, serious if not fatal accidents can occur. Read and understand procedures in this manual before attempting any work.

Do not sand, chisel, hammer, or alter linings in any way. Do not blow brake assemblies with high pressure air lines. Dust from linings should not be inhaled. Do not weld on wheel or heat wheel nuts with tire on. A potentially explosive tire failure called "Pyrolysis" can occur.

Do not use a chisel to remove/install spindle nuts. Always use the right socket size and torque wrench, following torque procedures.

If you have any further questions, please contact:

IMT

347 King Street West

Box 250

Ingersoll, Ontario

Phone: 1-800-663-AXLE

519-485-2210

Fax: 519-485-2163

PART NUMBER DESCRIPTION SYSTEM

Fig. 2

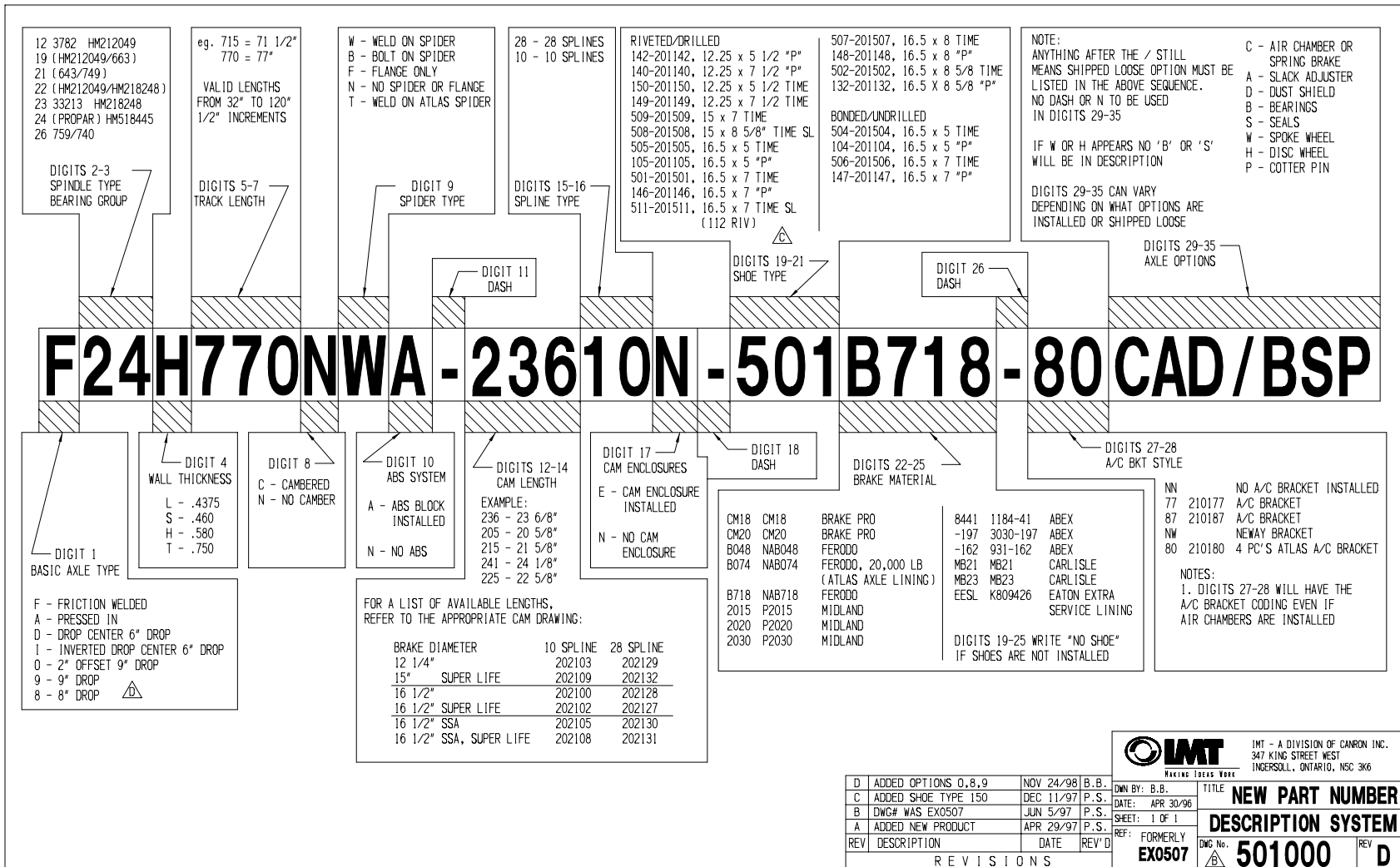
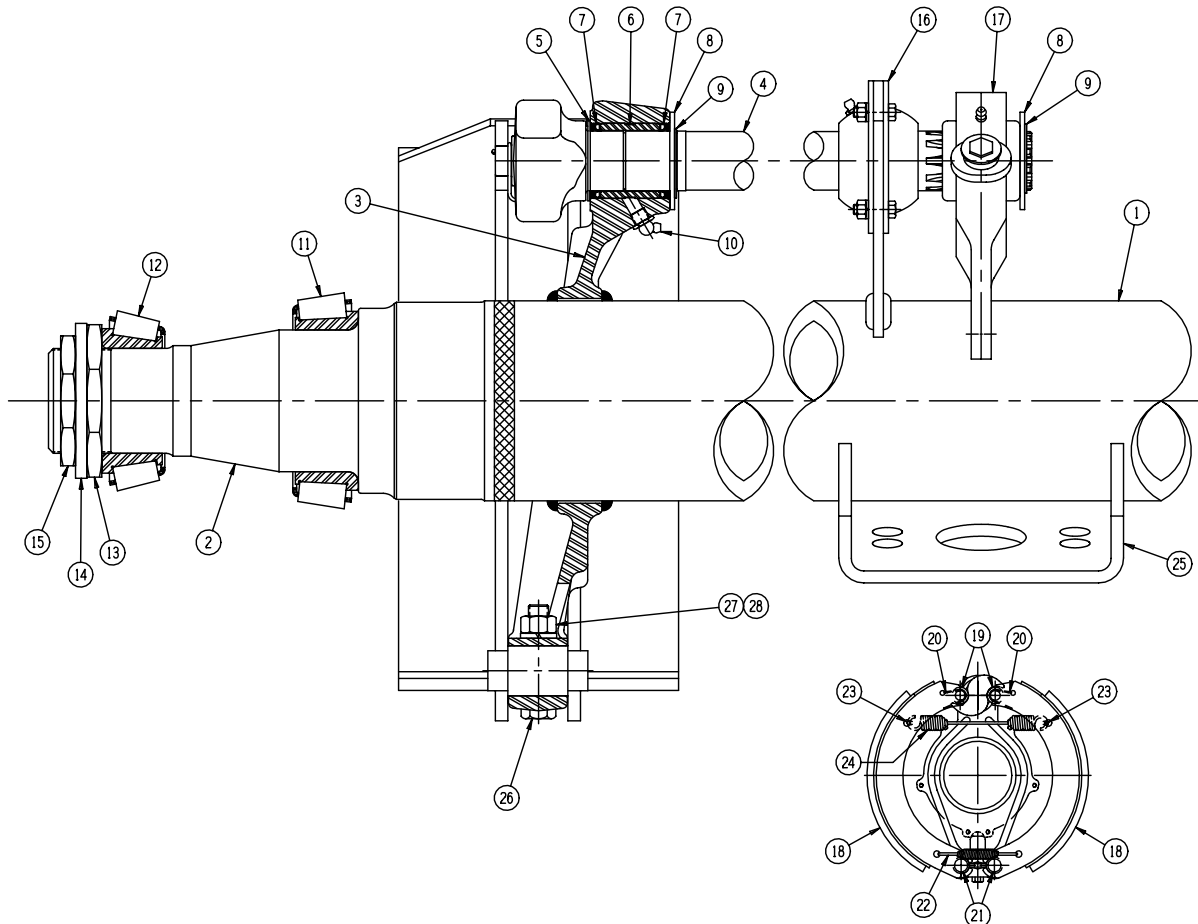



Fig. 3



DETAIL "A"
END VIEW OF BRAKE SHOE ASSEMBLY
SCALE = 1/8" * F.S.

PARTS LIST ASSEMBLY

28	2	402106	SPIDER CLAMP NUT
27	2	403117	SPIDER CLAMP WASHER
26	2	401101	SPIDER CLAMP BOLT
25	2	210177	AIR CHAMBER BRACKET
24	2	208104	RETRACT SPRING
23	4	207100	RETURN SPRING RETAINER
22	4	208502	RETAINER SPRING
21	4	203501	ANCHOR PIN
20	4	214103	ROLLER RETAINER
19	4	204101-001	ROLLER
18	4	601501-NAB718	BRAKE SHOE c/w LINING - 16.50 * 7.0
17	2	212116	SLACK ADJUSTER
16	2	209999-018	BRACKET ASS'Y
15	2	103102-001	OUTER JAM NUT
14	2	105107	INNER JAM NUT WASHER
13	2	103103-002	AXLE JAM NUT
12	2	104108	OUTER BEARING CONE (HM212049)
11	2	104115	INNER BEARING CONE (HM218248)
10	2	407102	GREASE FITTING
9	4	214104	RETAINING RING
8	4	403105	CAMSHAFT RETAINER WASHER
7	4	408101	SPIDER SEAL
6	2	405129	SPIDER BUSHING
5	2	403107	CAMSHAFT SPACER WASHER
4	1	202100-205-RH	R.H. CAMSHAFT (20 5/8 U.H.)
4	1	202100-205-LH	L.H. CAMSHAFT (20 5/8 U.H.)
3	2	200114-001	BRAKE SPIDER (WELD ON)
2	2	101132-S	F22 SPINDLE
1	1	F22S715	AXLE TUBE
ITEM	QTY.	PART NAME	DESCRIPTION
 OMT CORPORATION 347 KING STREET WEST INDERSOLL, ONTARIO, M5C 3K6 TEL: (519) 485-2210 FAX: (519) 485-2163			
REF.	71	1/2"	TRACK
DWN BY	E.H.	TITLE	F22S FRICTION WELD AXLE
DATE	JUNE 22/94	ASSEMBLY PARTS LIST	
SCALE	3/8" * FS	REF DWG NO	DWG NO
SHEET			500658
			REV NO
			-

GENERAL INFORMATION

Before installation can begin, now is the time to inspect your IMT axle for any flaws or damage that has occurred at the factory or during shipping.

WELDING HARDWARE TO AXLES

Methods

Four methods may be used to weld hardware to trailer axles:

- Shielded metal arc (stick electrodes)
- Gas metal arc (MIG, solid wire)
- Gas tungsten arc (TIG)
- Flux cored arc (tubular wire)

American Welding Society (AWS) classifications and specifications for these four methods are shown in **Table 1**.

Method for Welding Carbon & Low Alloy Steels	AWS Electrode Classification	AWS Specifications
Shielded Metal Arc	E70XX	A5.1 / A5.5
Gas Metal Arc	ER70S-X	A5.18
Gas Tungsten Arc	ER70S-X	A5.18
Flux Cored Arc	E70T-X	A5.20

Table 1.
AWS WELDING SPECIFICATIONS

The weld tensile strength must be 70,000 psi as per AWS specifications. Weld tensile strengths which are either higher or lower than this rating are not acceptable.

The best fusion and strength will be obtained using the voltage, current and shielding medium recommended by the electrode manufacturer. If the shielded metal arc method is used, electrodes must be clean, dry and have been stored per AWS specifications (AWS Section 4.5.2).

AXLE PREPARATION

The area to be welded must be free of grease, dirt, paint, slag and other contaminants. These contaminants may affect weld quality.

Never weld when the axle is cold. The axle and brackets to be welded should be stored overnight in a heated room and be at a temperature of at least 60°F prior to welding. This will reduce the chance of forming an area of brittle material adjacent to the weld.

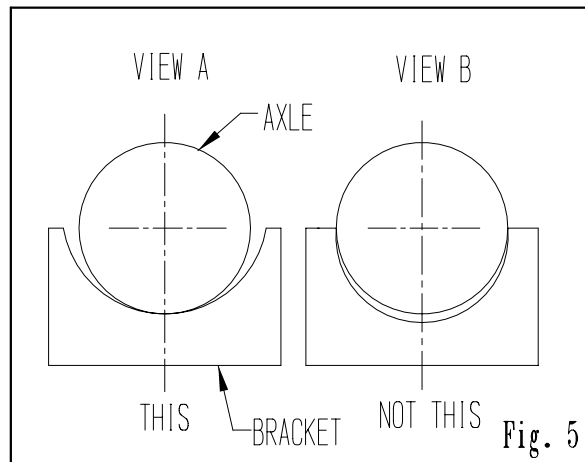
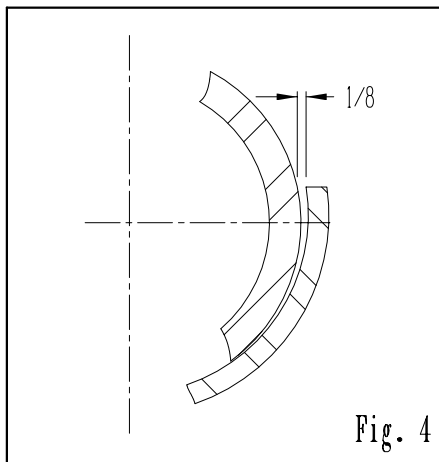
If temperature requirements are not met, moderately pre-heat the weld area to a maximum temperature of 200°F using a “Rosebud”. Do not concentrate heat in one area. Rather, slowly heat a wide area around the joint to be welded. Verify axle temperature using a temperature sensitive crayon or other appropriate means.

HARDWARE FIT

Hardware at the weld site should fit as close as possible to the axle. A maximum gap of 1/8-inch (3.18mm) should exist between the bracket and the axle tube. This will avoid the necessity for excessive welding. (See **Fig. 4**)

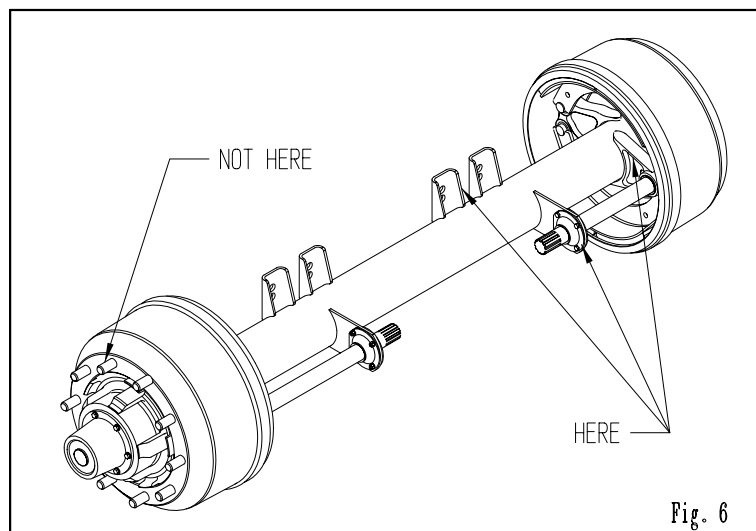
Hardware such as suspension spring seats and trailing arms must be accurately positioned parallel to each other. Use the top-center mark-when available-for reference in locating this hardware, then C-clamp in position prior to welding.

Brackets on axles should fit the axle such that the point of contact is at the base of the bracket as shown in “**Fig. 5, VIEW A**”. Here the fit is such that loads imposed on the bracket are transferred directly to the axle. A fit as shown in “**Fig. 5, VIEW B**” is such that loads imposed on the bracket are transferred to the axle through the weld. This may cause the weld to crack.



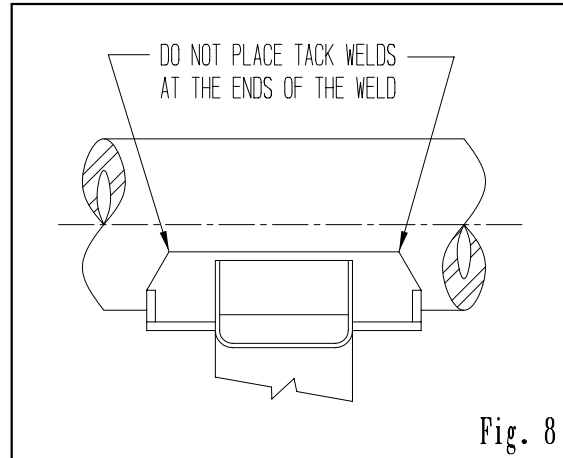
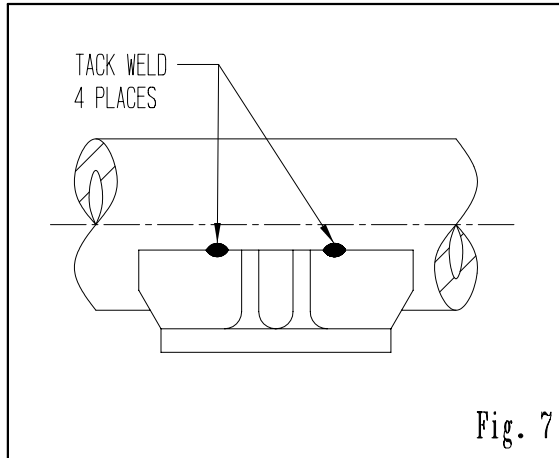
WELDING PREPARATION

The welding equipment should be grounded to the axle through a cable connection that is both clean and tight. The connection should be located at one of the parts welded to the axle, such as the camshaft bracket, air chamber bracket, or brake spider. The connection should not be located at a suspension spring, U-bolt, or at a point that will place a wheel bearing between the ground cable connection and the weld area, since the wheel bearing can be damaged by electric arcing. (See **Fig. 6**)



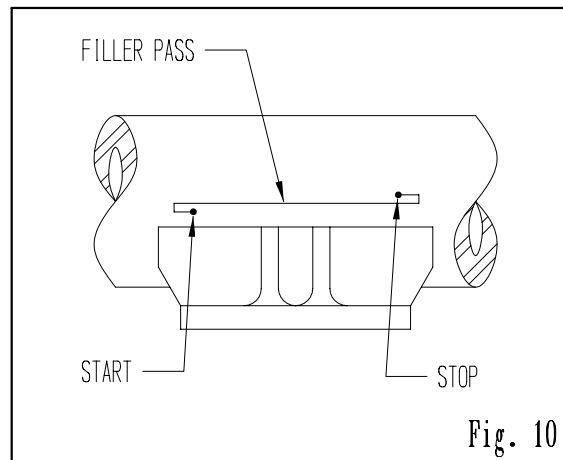
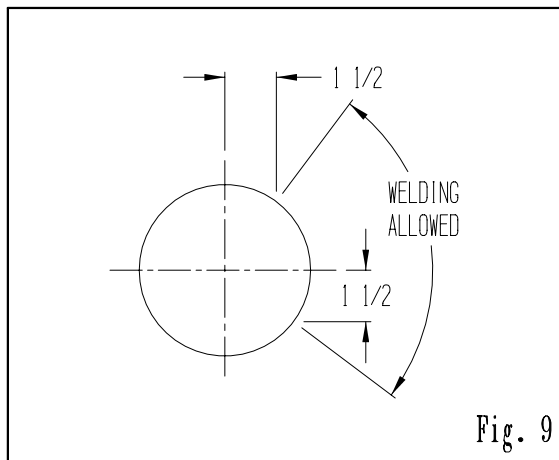
Prior to applying the final welds, hardware should be tack-welded to the axle as per recommendations provided by the component supplier. This will help minimize axle distortion and residual stresses caused by the final welds. After tack-welding, clean up the weld slag and then fuse the tack-welds into the final welds. (See **Fig. 7**)

Tack welds should never be located at the ends of the weld pass. (See **Fig. 8**)



LOCATION

Axles are more likely to crack at a weld location since welds reduce the strength of the axle material adjacent to the weld location. It is, therefore, essential that welding be confined to areas of relatively low stress near the center of the beam. These welding locations apply to all welds including both full attachment welds and tack welds. Additionally, the arc weld should not be tested on the axle-especially on the bottom half. This, too, can cause a material change that can reduce axle service life. (See **Fig. 9**)



WELDING PROCEDURE

Welds should not be started or stopped at the end of the weld pass. Rather, they should be started and stopped away from the ends as shown in **Fig. 10**. This will ensure that the stress risers-which occur when either starting or stopping a weld-are located away from the ends of the weld.

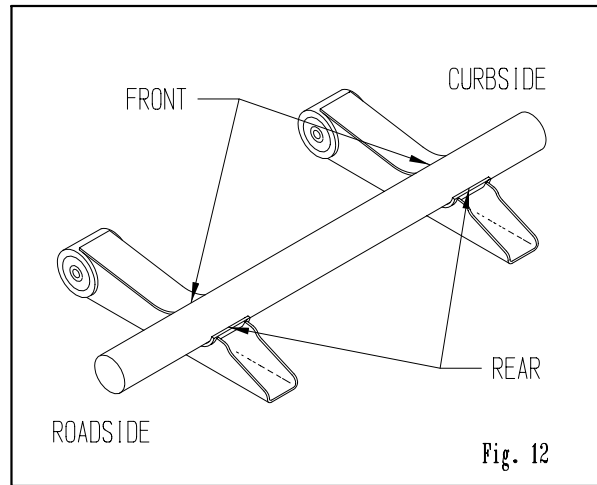
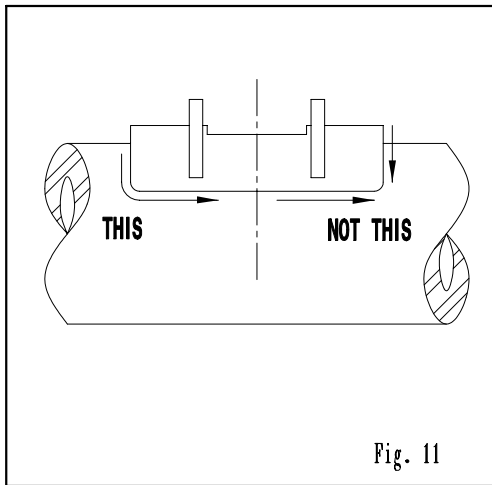
All welds should be made in one continuous pass rather than stopping and starting the weld passes as shown in **Fig. 11**.

When attaching a bracket using multiple welds, axle distortion can be minimized by sequencing the welds. This involves alternating weld passes between the front and rear of an individual bracket and between the brackets located on the axle roadside and curbside. (See **Fig. 12**). This is in contrast to applying all the welds at one bracket location.

Note further that the first weld pass should be made on the front side of the bracket. This will help ensure that any warping will result in the more desirable “toe-in” condition, rather than the less desirable “toe-out” condition.

WELD BEAD SIZE

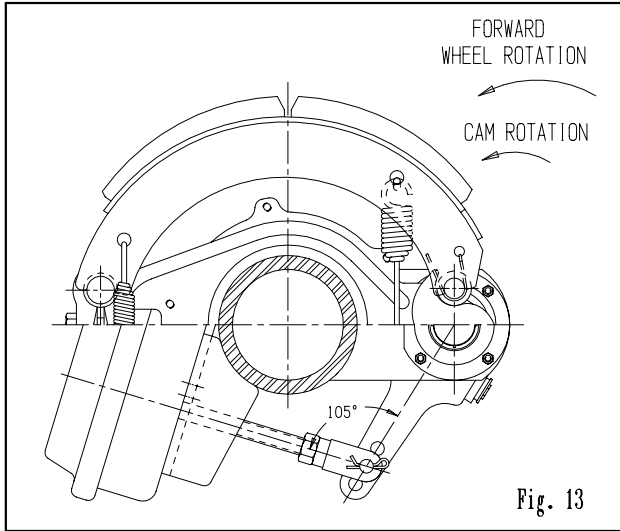
The maximum weld bead size allowed-regardless of whether the weld is achieved with a single or multiple pass-is 1/2 inch (12.7mm) on round axles.



INSTALLATION

ORIENTATION

Because of the many variations of IMT axles, orientation is important. A good rule of thumb is to align cam rotation with wheel rotation in the forward direction. (See **Fig. 13**). If cam/wheel rotation is opposite, natural frequencies can cause brake squealing and vibrations.



Consult IMT for further information.



INSTALLING AXLES AND ASSOCIATED EQUIPMENT

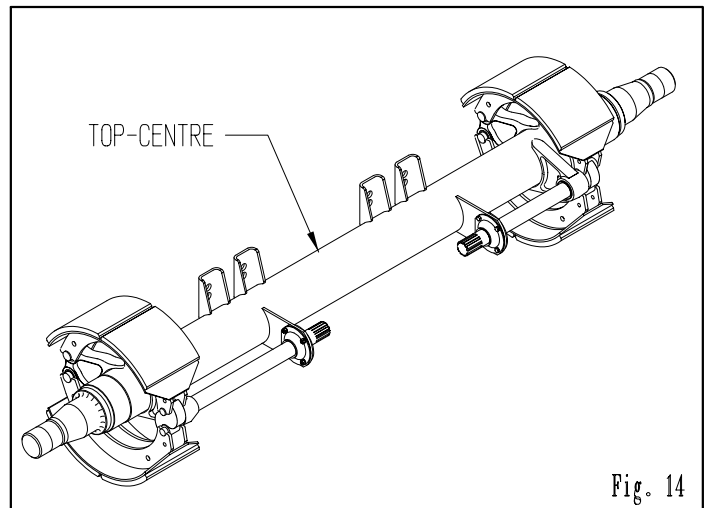
Axle Top-Center Location

Some trailer axle models are built with some type of mark, such as a drilled hole or a punch mark, which locates the top center of the beam. These markers can be used to orient the axle assembly on the suspension and identify the center of the beam so the suspension brackets can be located from a central reference point. (See **Fig. 14**)

ALLOWABLE AXLE ROTATION

WARNING: This section provides information on the allowable rotation of trailer axles. It does not, however, attempt to evaluate any possible interference between the axle assembly and other trailer components resulting from this rotation. Responsibility for maintaining adequate clearance between various components lies with the vehicle manufacturer.

WARNING: Installation of axles with the top-center other than as specified will void the warranty and could result in premature fatigue damage to the axle.

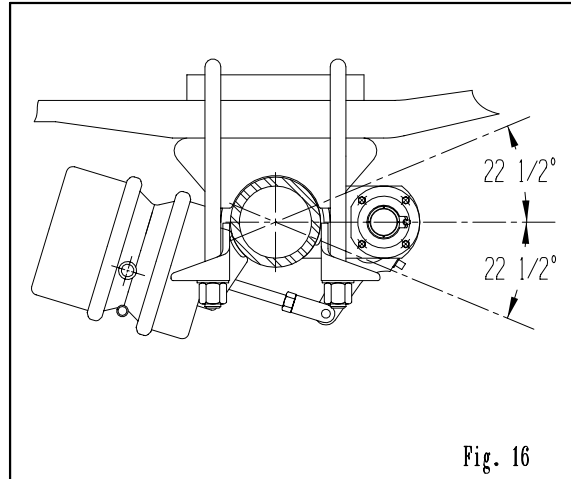
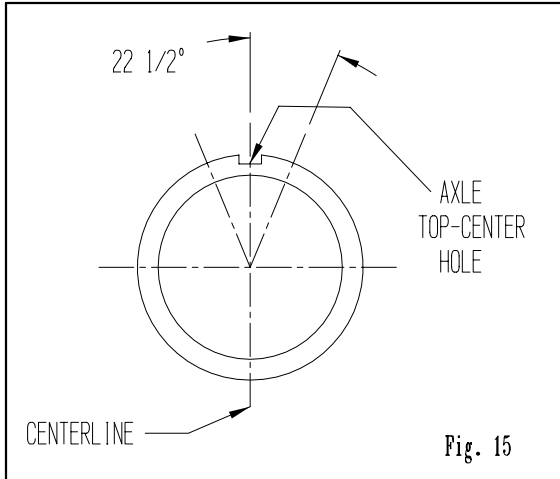


Cambered trailer axles must be installed so that the top-center mark is located at the exact top of the axle.

Non-cambered trailer axles can be installed so that the top-center mark is not located at the exact top of the axle. If rotation of the axle is allowed, the top-center mark can be rotated $22\frac{1}{2}$ degrees away from the exact top position. (See **Fig. 15**)

NOTE:

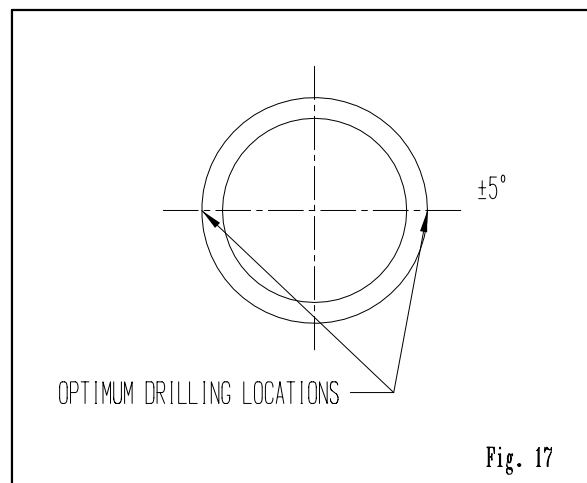
If top-center rotation is allowed, the hardware for the specific brake model must remain within the rotational limitation shown in **Fig. 16**.



DRILLING INTO THE AXLE

NOTE: This document makes recommendations as to the most logical location in which to drill a hole into an axle tube. Any components altered on an axle are the responsibility of the manufacturers who modify them.

Auxiliary trailer equipment such as central tire inflation systems may require drilling of a hole into the axle tube. In order to minimize the effect of hole drilling on axle strength, the hole should be located in an area of the tube that experiences the least stress. Therefore, good design practice dictates that the hole be located as close to the neutral axis of the axle tube as possible. (See **Fig. 17**)



AXLE INSTALLATION PROCEDURE

NOTE: Due to the many variations in suspension design, proper suspension installation is the responsibility of the trailer or suspension manufacturer.

1. Position the suspension components on the axle. Check to ensure that they fit the axle properly. Refer to the guidelines on welding contained within this Recommended Practice.
2. Locate the axle top-center and follow guidelines regarding allowable axle rotation as previously stated in this Recommended Practice.
3. Weld the suspension components to the axle according to suspension manufacturer's guidelines and this Recommended Practice.
4. Position the axle in place under the suspension while ensuring that the proper spacing and alignment requirements are met.
5. Snug the U-bolts with an impact tool. Torque the U-bolts to manufacturer's published requirements using a calibrated torque wrench. Tighten the U-bolts in a crisscross pattern. Be careful not to overtighten the U-bolts since this may damage the axle at the point which the U-bolts contact the axle.
6. Following axle installation and alignment, inspect the assembly to ensure the following:
 - All suspension springs are properly located on the wear pad.
 - Adequate clearance exists between the axle and the trailer frame and suspension components, both when the axle is loaded and unloaded.
 - All bolts have been tightened to proper torque values.

SLACK ADJUSTER INSTALLATION

There are two types of slack adjusters: the manual type and the automatic type. First, we will look at manual slack adjusters.

Manual Slack Adjusters: Installation

1. With the proper spider/cam hardware installed, completely push the cam against the spider face.
2. Install the slack on the cam spline so that the adjusting hex is accessible for servicing.
3. Adjust the clevis pin on the air chamber rod to the required length (ref. 12 ¼" and 16 ½" brake geometry **Fig. 20 - 21**).
4. Align the slack adjuster arm to the clevis and insert the provided pin through the aligned holes. Secure the clevis pin with a cotter pin.
5. Check that the angle between the air chamber rod and the slack adjuster center lines are 105° +0°/-2° when the brakes are in their released position.
6. Install the camshaft retaining washer and retaining ring on the end of the cam shaft. Be sure to shim clearance to slack adjuster manufacturer's specified tolerance.
7. Tighten the jam nut on the air chamber rod to lock the clevis into position (1/2-20 300-400 in.lbs. 5/8-18 400 in.lbs.).
8. After installation, make sure there is enough clearance for both applied and released brake positions. Also check that the slack adjuster rotates freely without binding.

Manual Slack Adjusters: Brake Adjustment Procedure

Safely raise the vehicle so that the tires spin freely. Clean the locking sleeve area so that the sleeve can return to its locked position without any obstructions. Place a socket or wrench on the adjusting hex and sink the locking sleeve to disengage it. While rotating the tires, adjust the set screw until the shoes contact the drum. Then, back off the adjusting hex until the tires rotate freely. Make sure the locking sleeve raises to its locked position. Note that the actuator stroke should be as short as possible without the brakes dragging.

Roadside Adjustment

If the vehicle cannot be raised up, again clean the locking sleeve area thoroughly. Place a socket or wrench on the adjusting hex sinking the locking sleeve. Turn the adjusting hex until it stops, indicating that the shoes have made contact with the drum. Pull on the slack adjuster to see if there is any movement. If it will not move, the adjusting hex was turned in the proper direction. If there is movement, then the adjusting hex was turned in the wrong direction and will have to be turned in the opposite direction until it stops, locking the shoes against the drums. After determining solid shoe contact, back off the adjusting hex 1/2 turn for new linings, or 1/4 turn for worn linings. The actuator stroke should be as short as possible without the brakes engaging. Make sure the locking sleeve moves up to its locked position. If it does not, the slack adjuster can back itself off.

Automatic Slack Adjusters: Installation (A-arm link type, B-anchor bracket type)

1. With the proper spider/cam hardware installed, completely push the cam against the spider face.
- 2A. Adjust the clevis on the air chamber rod to the required length and install air chamber (ref. 12 1/4" and 16 1/2" brake geometry - see **Fig. 20 - 21**).
- 2B. Place clevis pin on air chamber rod. Repeat (2A).
- 3A. Place swing tool or template onto the cam spline and rest against clevis.
- 3B. Rotate the control arm away from the adjusting hex until it comes to a complete stop. Note the indicator between the slots.
- 4A. Reposition clevis until 1/4" link pin holes are aligned. This will ensure a proper slack adjuster angle and fit.
- 4B. Tighten all anchor bracket fasteners while ensuring that the control arm does not move.
- 5A. Install slack adjuster on the camshaft so that the adjusting hex is accessible for servicing. Be sure to shim the slack adjuster to the manufacturer's specifications.
- 5B. Install auto slack adjuster onto camshaft with adjusting hex away from the air chamber. Be sure to shim the slack adjuster to the manufacturer's specifications.
- 6A. Rotate the adjusting mechanism if needed to insert the clevis and link pins. Install cotter pins.
- 6B. Rotate the adjusting hex to align the clevis hole with the slack adjuster hole and insert clevis pin. Note: Do not install cotter pin, see adjustment procedure to check for proper installation.
Then install cotter pin.
- 7A. Tighten jam nut on the air chamber rod.

Note: See Automatic Slack Adjuster Manufacturer's instructions for detailed illustrations and procedures.

Automatic Slack Adjusters: Brake Verification Procedure

Air Chamber Power Stroke: A power stroke at 80-90 psi brake application pressure will check both the adjustment and foundation brake condition. Apply the following procedure.

1. Measure the distance from the bottom of the air chamber to the center of the clevis pin on all wheels. **See Fig. 18.**
2. Apply brakes repetitively until the air reservoir indicator reads 90 - 100 psi. Then have someone apply full brakes and hold.
3. Again, measure the distance from the bottom of the air chamber to the center of the clevis on all wheels. **See Fig. 19.**
4. The difference between applied and released brakes is called the power stroke. If the measured distance is no more than the legal maximum stroke shown in **Table 2**, the procedure is complete.

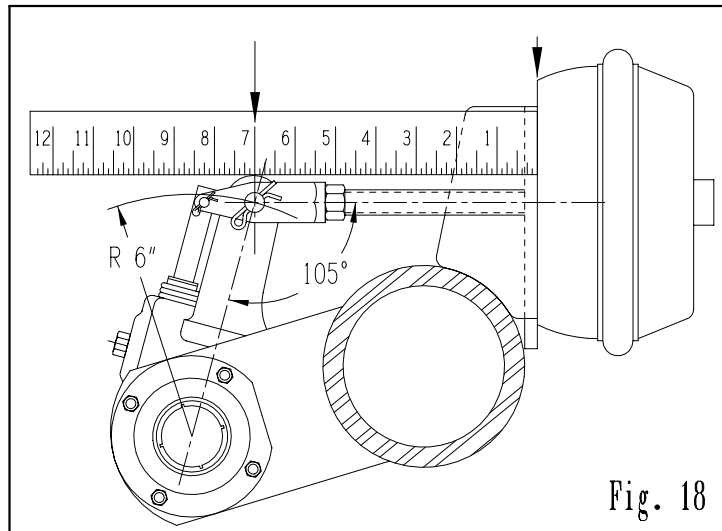


Fig. 18

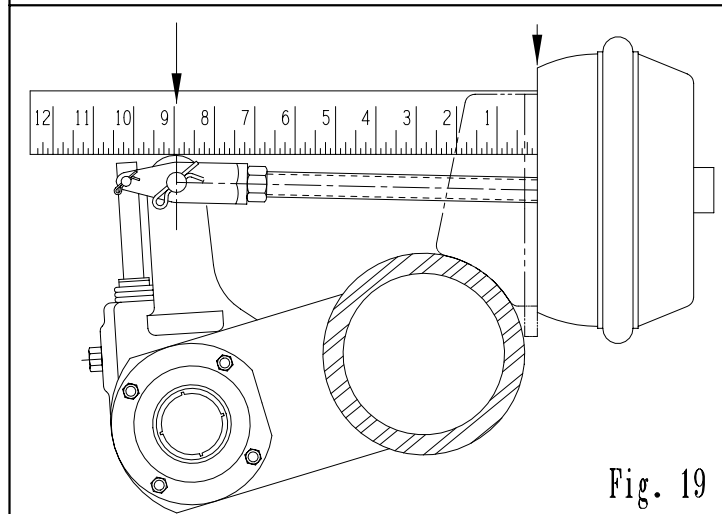


Fig. 19

Automatic Slack Adjusters: Adjustment

Place a socket or wrench over the adjusting mechanism. Turn it so the shoes contact the drum. Pull the slack adjuster by hand to make sure it does not move. If it does move, adjustment was made in the wrong direction. Turn the adjusting mechanism in the opposite direction until the shoes are contacting the drum and the adjusting mechanism stops.

Air Chamber Type	Maximum Legal Stroke
12	1 3/8"
16	1 3/4"
20	1 3/4"
24	1 3/4"
24 Long Stroke	2"
30 Long Stroke	2 1/2"
30	2"
36	2 1/4"

Table 2

Reverse the rotation 1/2 turn backing off the slack adjuster. Measure the air chamber power stroke at 80-90 psi as mentioned in the Brake Verification Procedure. Make a free stroke measurement (distance from rest to drum contact using a pry bar). You should be measuring a distance between 3/8" - 5/8".

If you cannot maintain the maximum legal stroke and the free stroke is less than 3/8", contact the brake manufacturer for foundation or brake geometry problems.

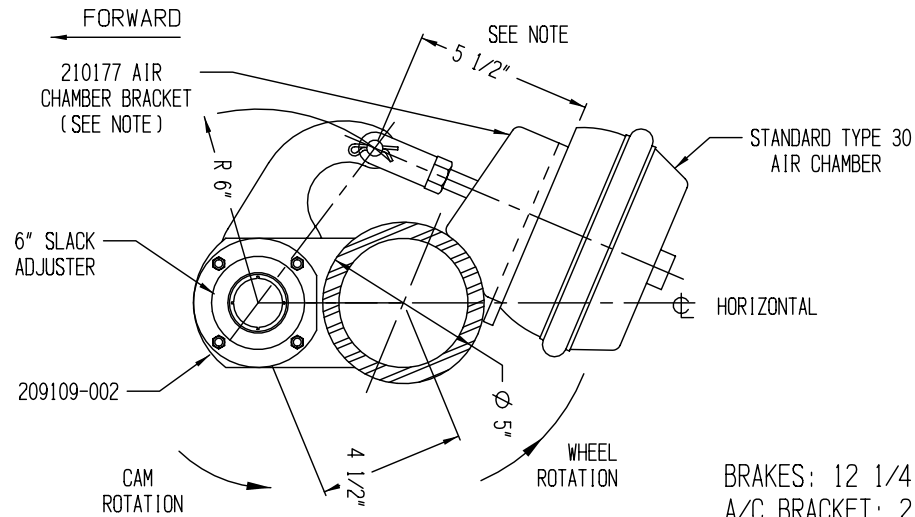
Roadside Adjustment

If the vehicle cannot be raised, use a pry bar to pull back on the slack adjuster. If there is more than 5/8" movement, an adjustment is required. Block the wheels or secure the vehicle. On the brakes to be adjusted, the spring brakes have to be caged or released with air.

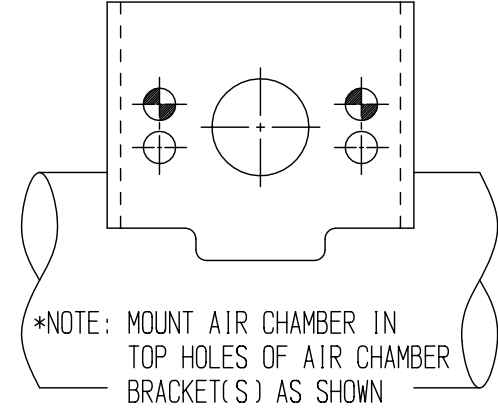
Rotate the adjusting mechanism on the slack adjuster until the shoes contact the drum. Use a pry bar to see if there is any movement. If there is any, the adjustment was made in the wrong direction. Adjust in the opposite direction until the shoes contact the drum. Note: You should hear a muffled knock when hitting the locked drum with a wrench. Back off the slack adjuster by small increments tapping the drum until an unobstructed chime is heard.

Using a pry bar, recheck the slack adjuster by pulling it back, measuring no more than 5/8" of movement. If it is more, then the adjustment was done improperly or there is a problem with the brake foundation.

Fig. 20

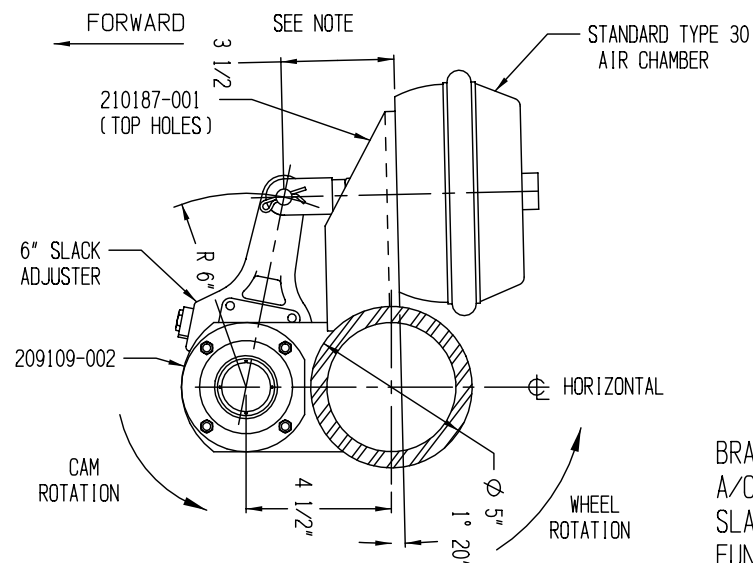


BRAKES: 12 1/4"
A/C BRACKET: 210177
SLACK ADJUSTER: 6" CURVED
FUNCTIONAL ROD LENGTH: 5 1/2"

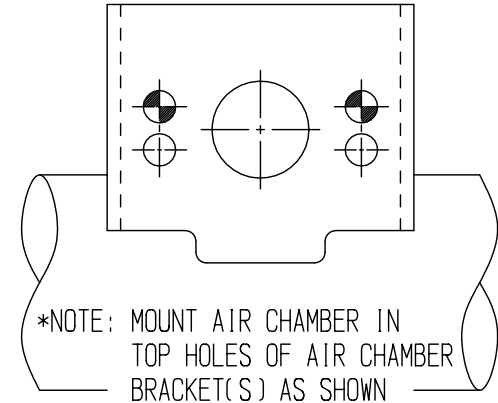


- NOTE:
1. BLOCK THE WHEELS OR MECHANICALLY SECURE THE VEHICLE
 2. FULLY CAGE SPRING BRAKES
 3. RELEASE SERVICE BRAKES
 4. MEASURE THE ROD LENGTH AS SHOWN

12 1/4" BRAKES

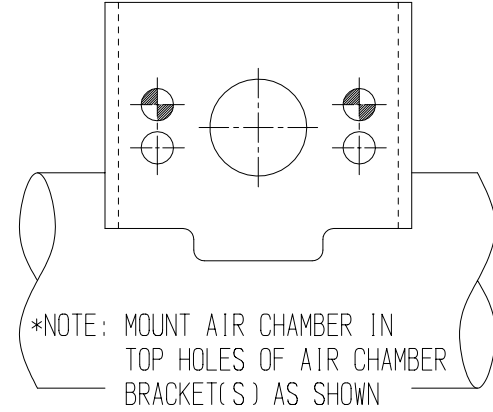
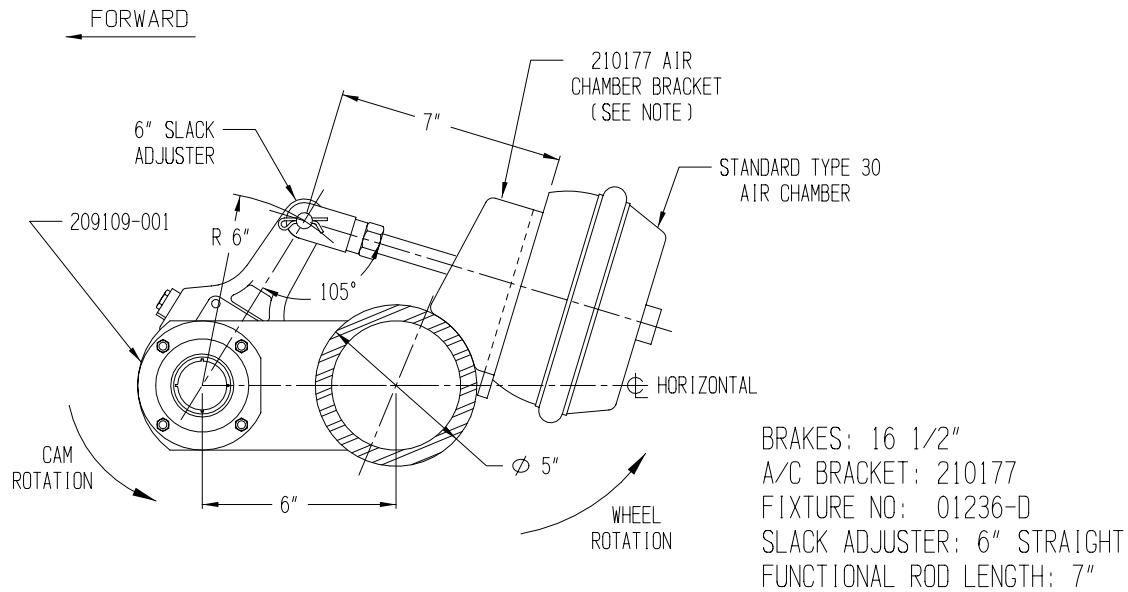


BRAKES: 12 1/4"
A/C BRACKET: 210187-001
SLACK ADJUSTER: 6" STRAIGHT
FUNCTIONAL ROD LENGTH: 3 1/2"



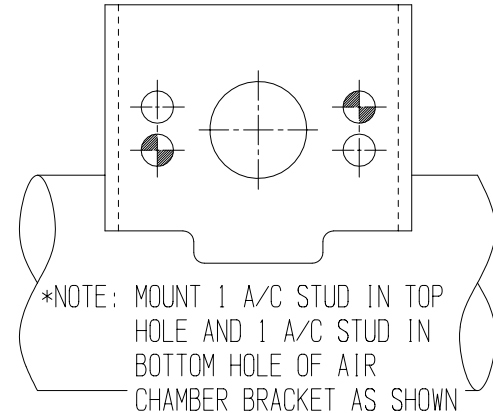
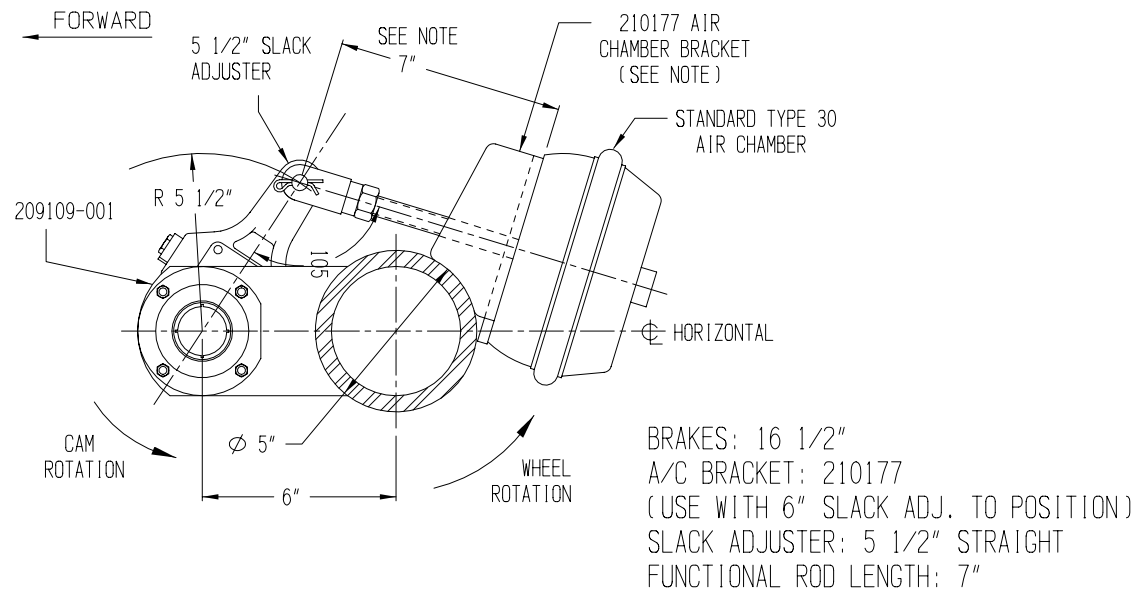
16 1/2" BRAKE GEOMETRY

Fig. 21



- NOTE:
1. BLOCK THE WHEELS OR MECHANICALLY SECURE THE VEHICLE
 2. FULLY CAGE SPRING BRAKES
 3. RELEASE SERVICE BRAKES
 4. MEASURE THE ROD LENGTH AS SHOWN

16 1/2" BRAKES



MAINTENANCE

Oil and Grease Change Suggested Intervals:

Due to varying load and driving conditions, service intervals will vary. Below is a generally accepted guideline on which maintenance scheduling can be observed. Always clean parts thoroughly with proper solvents and equipment. Do not use gasoline or steel brushes. Never refill the hub with old oil.

Extra attention should be given to seals. Contaminated lubricants can quickly destroy the entire wheel assembly.

DISTANCE OR TIME	OIL	GREASE	BRAKE COMPONENTS
1000mi 1600km	Inspect oil level in hub replace if contaminated. Check for leaks. Replace if hub removed for servicing. See indicated "ADD and FULL rings on the hub cap.	----- -----	----- -----
12,000mi 19,200km	----- -----	----- -----	Check brakes for adjustment.
30,000mi 48,000km or 6 month interval	Heavy-Duty (On/Off road) Change oil lubricant	Heavy Duty (On/Off Road) Regrease bearings. See DWG 500950	Check lining wear. Check cam and spider bushings for wear. Grease brake actuating parts.
100,000mi 160,000km or 1 yr interval	Standard-Duty Change oil lubricant	Standard Duty Regrease bearings. See DWG 500950	-----
750,000mi 1,200,000km	Replace synthetic "Semi-Fluid" Long Life Greases: Also replace if hub is removed for servicing.		

Table 3

Lubricant Properties:

IMT suggests the following grease properties:

Soap Type - Lithium Complex or Equivalent

Dropping Point - 446°F (230°C) Minimum

Consistency - NLGI No. 2 or No.1

Additives - Corrosion & Oxidation Inhibitors, EP Optional

Base Oil - Solvent Refined Petroleum Oil

DO NOT MIX LUBRICANTS

Oils generally recommended are:

Gear Oil API GL-5 Performance Level

SAE 90

Normally Preferred

SAE 75W, SAE 80W

Extreme Cold Environment

SAE 140

Extreme Hot Environment

AXLE COMPONENT LUBRICATION

This section offers recommendations for periodic lubrication of trailer brake components installed on trailer axles. Many fleets use their trailer inspection interval as their trailer lubricant interval. For information on brake lubrication intervals, refer to TMC RP 607 and 609.

Refer to TMC RP 624, *Lubricant Fundamentals* for more information.

Lubricant Leakage

Inspect the axle for lubricant leakage. Wear or damage to seals can result in either leaks or component contamination and could ultimately lead to wheel-end loss. Any signs of lubricant leakage should be investigated, and the seals or rings replaced if any damage or improperly installed components are found. Seal leakage can lead to loss of wheel-end lubricant and ultimately cause the wheel end to overheat.

Lubrication Preparation

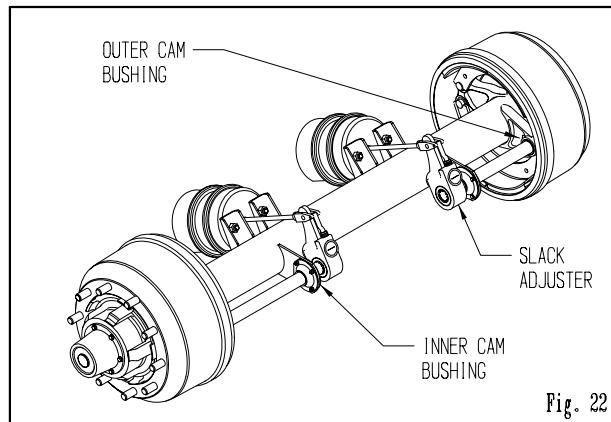
If possible, clean the trailer prior to lubrication. This will help the mechanic locate the grease fittings and spot any problems with the trailer.

Park the trailer on level ground and set the parking brakes. Be sure the landing gear is in place and free of defects. Chock the wheels to prevent the trailer from rolling, and block accessibility to the trailer so that no one attempts to hook it up and drive it off.

Locate all fittings to be lubricated and wipe off any excess grease or road film with a clean rag or paper towel.

Grease Fitting Location

A trailer axle fitted with S-cam brakes has grease fittings located at the inner cam bushings, outer cam bushings and slack adjusters. (See **Fig. 22**)



Lubrication Procedure

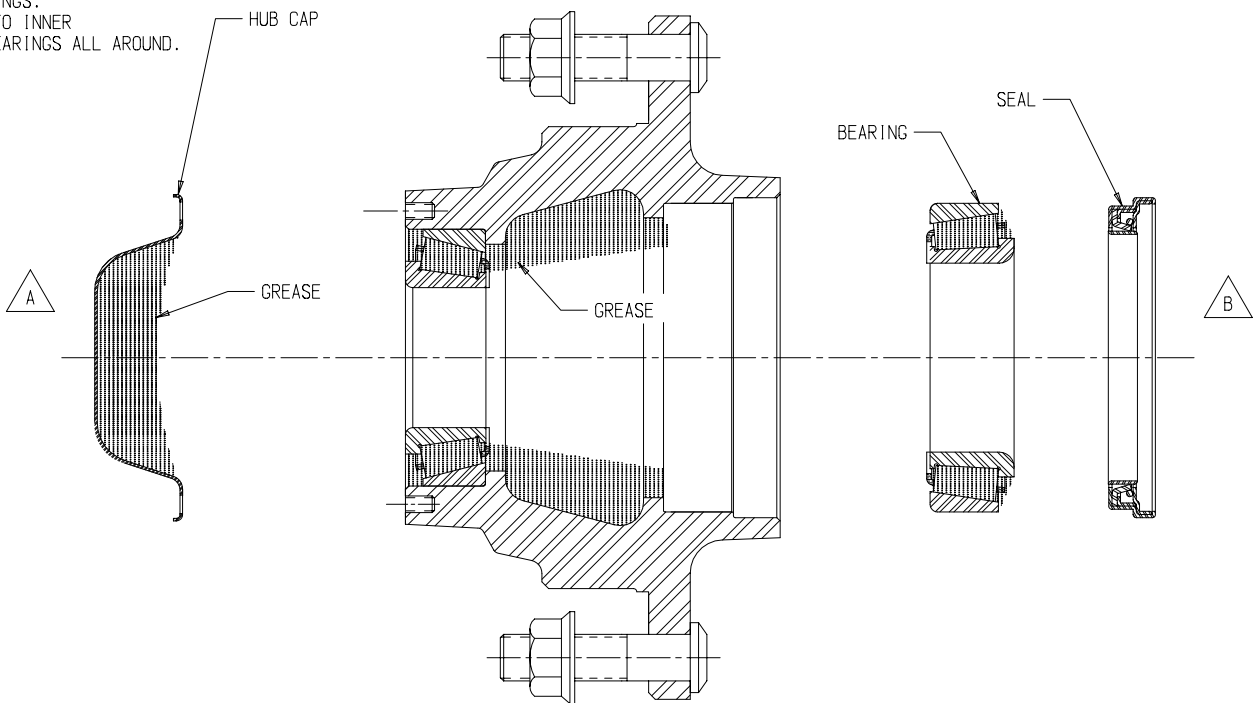
Using a hand-held grease gun - free of grit - add grease to each component through the appropriate grease fitting. Grease should be added until a small quantity of fresh grease appears at the purge point or at any opening of the component. This ensures that the contaminants have been flushed from the component without over greasing.

The excess grease should be wiped after it purges from the joint. This helps ensure that contaminants are not attracted to the lubrication point during regular road operations, that grease does not contaminate the brake linings, and that grease does not drop onto the road surface.

GREASE PACKING PROCEDURE

NOTES:

1. PACK BEARINGS.
2. FILL HUB TO INNER RACE OF BEARINGS ALL AROUND.
3. FILL CAP.



IMT Ingersoll Division 347 KING ST. WEST. @ANRON INC. INGERSOLL, ONTARIO	
REF.	TITLE
DWN BY B.B.	GREASE PACKING
DATE JAN 10/97	PROCEDURE
SCALE 1/4" = FS	DWG. NO. 500950
SHEET	REV. B

REV.	DESCRIPTION	DATE	REVISED BY
B	REVERSED GREASE SEAL TO PROPER VIEW	FEB 13/97	B.B.
A	CHG GREASE DEPTH FROM 1/4" TO FILL HUB CAP	FEB 6/97	B.B.
REVISIONS			

Fig. 23

WHEEL BEARING ADJUSTMENT PROCEDURE

IMT endorses TMC's Recommended Wheel Bearing Adjustment Procedure RP 618. The objective of these procedures is to obtain 0.001" to 0.005" end play.

PROCEDURE IN018 (See Fig. 24)

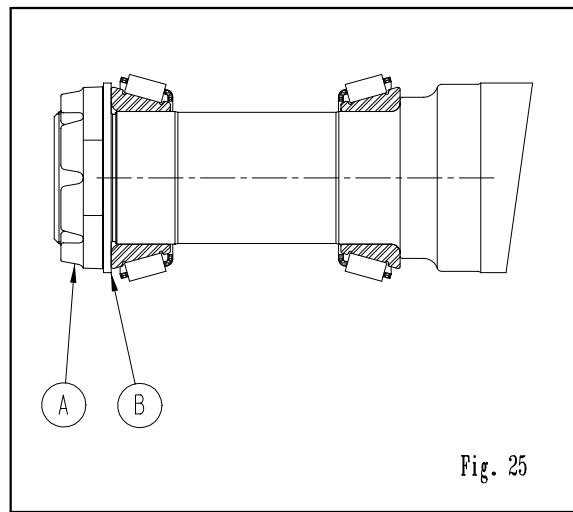
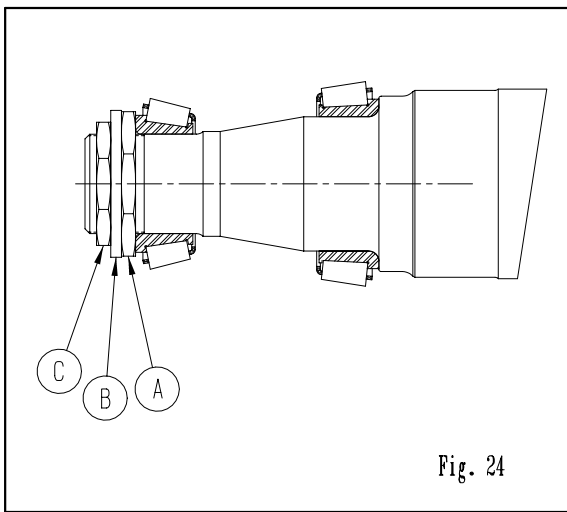
Double Adjusting Nut System: F19, A21, F22, F23, A26

1. Tighten the adjusting nut (A) to a torque of 200 ft-lbs. (271 N·m) while rotating the wheel.
2. Back off the adjusting nut (A) one full turn.
3. Tighten the adjusting nut (A) to a final torque of 50 ft-lbs. (68 N·m) while rotating the wheel.
4. Back off adjusting nut (A) 1/4 to 1/3 turn and install lock washer (B) to nearest hole.
5. Install outer jam nut (C) and torque to 300-400 ft-lbs. (407-542 N·m).
6. Acceptable end play is 0.001" (.025mm) to 0.005" (.013mm) measured with a dial indicator.
7. Verify that the wheel rotates freely when adjustment is complete.

PROCEDURE IN019 (See Fig. 25)

Single Adjusting Nut System: F23, A24, F24

1. Install lock washer (B).
2. Tighten adjusting nut (A) to a torque of 200 ft-lbs. (271 N·m) while rotating wheel.
3. Back off adjusting nut (A) 1 full turn.
4. Tighten the adjusting nut to a final torque of 50 ft-lbs. (68 N·m) while rotating the wheel.
5. Back off adjusting nut (A) 1/6 to 1/4 turn to the nearest locking hole.
6. Install cotter pin.
7. Acceptable end play is 0.001" (.025mm) to 0.005" (.013mm) measured with a dial indicator.
8. Verify that the wheel rotates freely when adjustment is complete.



IMT PROCEDURE IN033

WHEEL BEARING ADJUSTMENT PROCEDURE

CONMET PreSet HUB

**THIS TYPE OF HUB IS PRE-ASSEMBLED WITH A SEAL AND A SPACER
BETWEEN THE BEARING CONES**

For Double Nut System: F22, F23

**THE OBJECTIVE OF THIS PROCEDURE IS TO OBTAIN A PRELOAD ON
THE CONES AND SPACER.**

1. FOR OPERATION WITH SYNTHETIC GREASE: Completely coat the spindle with a film of grease, including the seal journal. Always use the same grease that will be used in the hub.
2. Lubricate the inside diameter of the seal.
3. Install the hub onto the spindle.
4. Remove the plastic bearing retainer and install the inner nut.
5. Torque the inner nut to 300 ft-lbs: **no back off.**
6. Install the locking washer and torque the outer nut to 200 ft-lbs.
7. Apply a ring of grease around the nuts.
8. Install the hub cap. Use Conmet, Stemco Sentinel, or equivalent "filtered vent" hub cap.
9. Fill the hub with 1.0 lbs. to 1.25 lbs. of grease through the fill hole in the hub.
10. FOR OPERATION WITH OIL: Pre-lubricate inside of seal only. Use "oil" hub cap and fill to level on sight glass.
11. There should be 0.000" to 0.004" end play.
12. Verify that the wheel turns freely when adjustment and locking procedures are complete.

IMT PROCEDURE IN034

WHEEL BEARING ADJUSTMENT PROCEDURE

CONMET PreSet HUB

**THIS TYPE OF HUB IS PRE-ASSEMBLED WITH A SEAL AND A SPACER
BETWEEN THE BEARING CONES**

For Single Nut System: F23, F24

**THE OBJECTIVE OF THIS PROCEDURE IS TO OBTAIN A PRELOAD ON
THE CONES AND SPACER.**

1. FOR OPERATION WITH SYNTHETIC GREASE: Completely coat the spindle with a film of grease, including the seal journal. Always use the same grease that will be used in the hub.
2. Lubricate the inside diameter of the seal.
3. Install the hub onto the spindle.
4. Remove the plastic bearing retainer and install the locking washer and the spindle nut.
5. Torque the spindle nut to 300 ft-lbs.: **no back off**. Lock the spindle nut. If required, advance the nut to the next locking position.
6. Apply a ring of grease around the nut.
7. Install the hub cap. Use Conmet, Stemco Sentinel, or equivalent “filtered vent” hub cap.
8. Fill the hub with 2.2 lbs. to 2.5 lbs. of grease through the fill hole in the hub.
9. FOR OPERATION WITH OIL: Pre-lubricate inside of seal only. Use “oil” hub cap and fill to level on sight glass.
10. There should be 0.000” to 0.004” end play.
11. Verify that the wheel turns freely when adjustment and locking procedures are complete.

PROCEDURE IN023

SEPT 20,2001

IMT STRAIGHT AXLE TOE-IN, TOE-OUT VERIFICATION

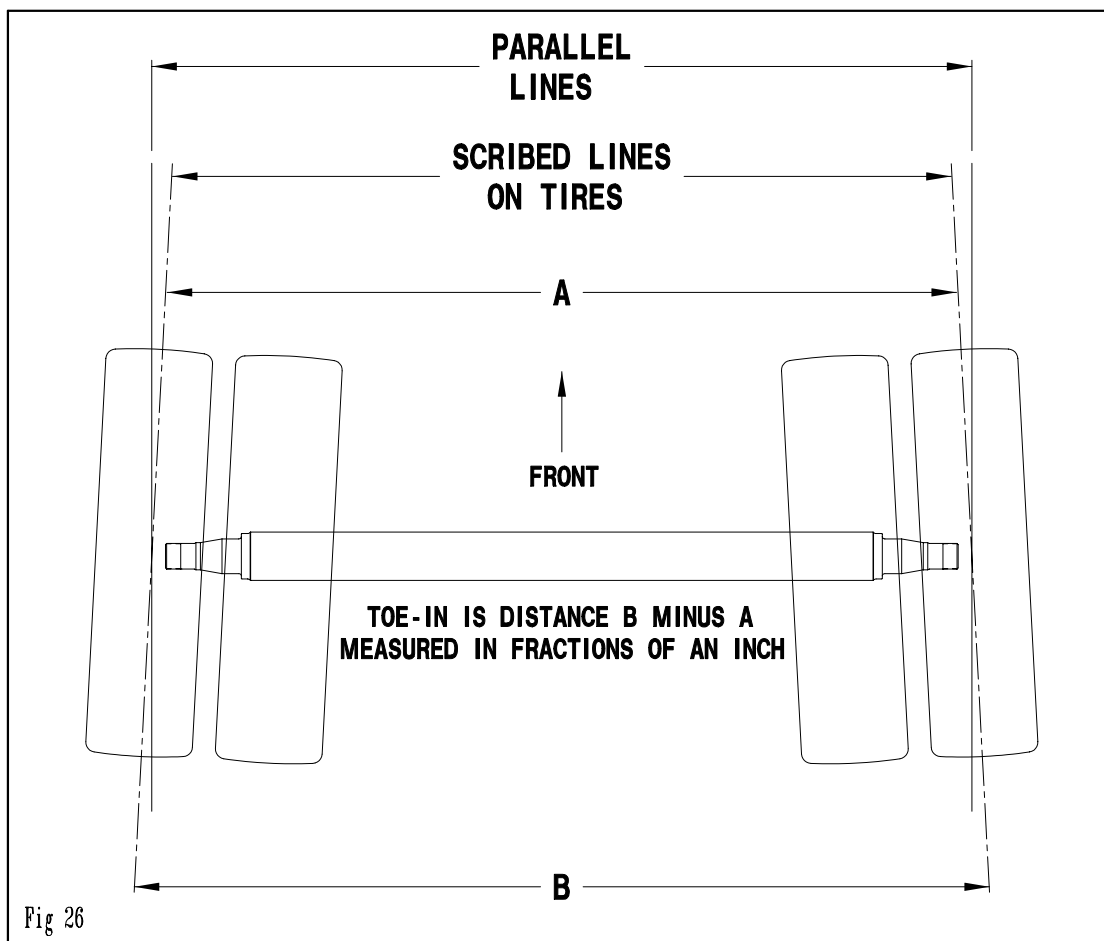


Figure A
WHEEL TOE-IN
(TOP VIEW OF AXLE WITH DUALS)

Note: With wheels off the ground, scribe a fine line on the tire tread all around the tire to aid in the measurement of "A" and "B".

Toe-in: "A" is smaller than "B".

Toe-out: "A" is larger than "B".

(See **Figure A**)

To be correctly aligned, wheel toe-in or toe-out must be within the limits of .25", 6.35 mm, 0.358 degree, or 21 minutes toe-in, and .063", 1.59 mm, 0.09 degree, or 5 minutes toe-out. Toe-in or toe-out which exceeds these limits will cause increased tire wear.

INSPECTING AXLES AND ASSOCIATED EQUIPMENT

Proper Inspection Intervals

Trailer axles should be inspected for cracks, wear and leaks every six months or 50,000 miles.

Cracks

The entire axle tube should be visually inspected for cracks. Any cracks found in the tubing indicate immediate axle replacement is necessary. Repair welding of the axle tube is prohibited.

Welds attaching brake spiders, camshaft brackets, air-chamber brackets and suspension components should be inspected for cracks. If a crack is detected, determine if it penetrates into the tubing. If a crack penetrates into the axle tubing, repair welding is not permitted and the axle must be replaced.

Axle Straightness

The axle should meet the trailer manufacturer's specifications for straightness. Refer to RP 708 regarding this inspection. Obvious signs of improper axle straightness include premature and excessive tire wear. Trailer axle manufacturers do not approve of straightening axles in the shop. Overloaded or bent axles should be replaced.

Spindle Wear, Scratches, Rust and Pitting

Any cracks found in the spindle require immediate axle replacement. Repair is not allowed.

Surface rust, scratches, or slight pitting on the wheel spindle bearing or seal journals may be polished or sanded out with emery or crocus cloth. Do not reduce the diameters of the journals beyond the axle manufacturer's specifications. Excessive pitting, scratches or fretting on the spindle bearing or seal journals-covering more than 50 percent of the surface-require immediate axle replacement.

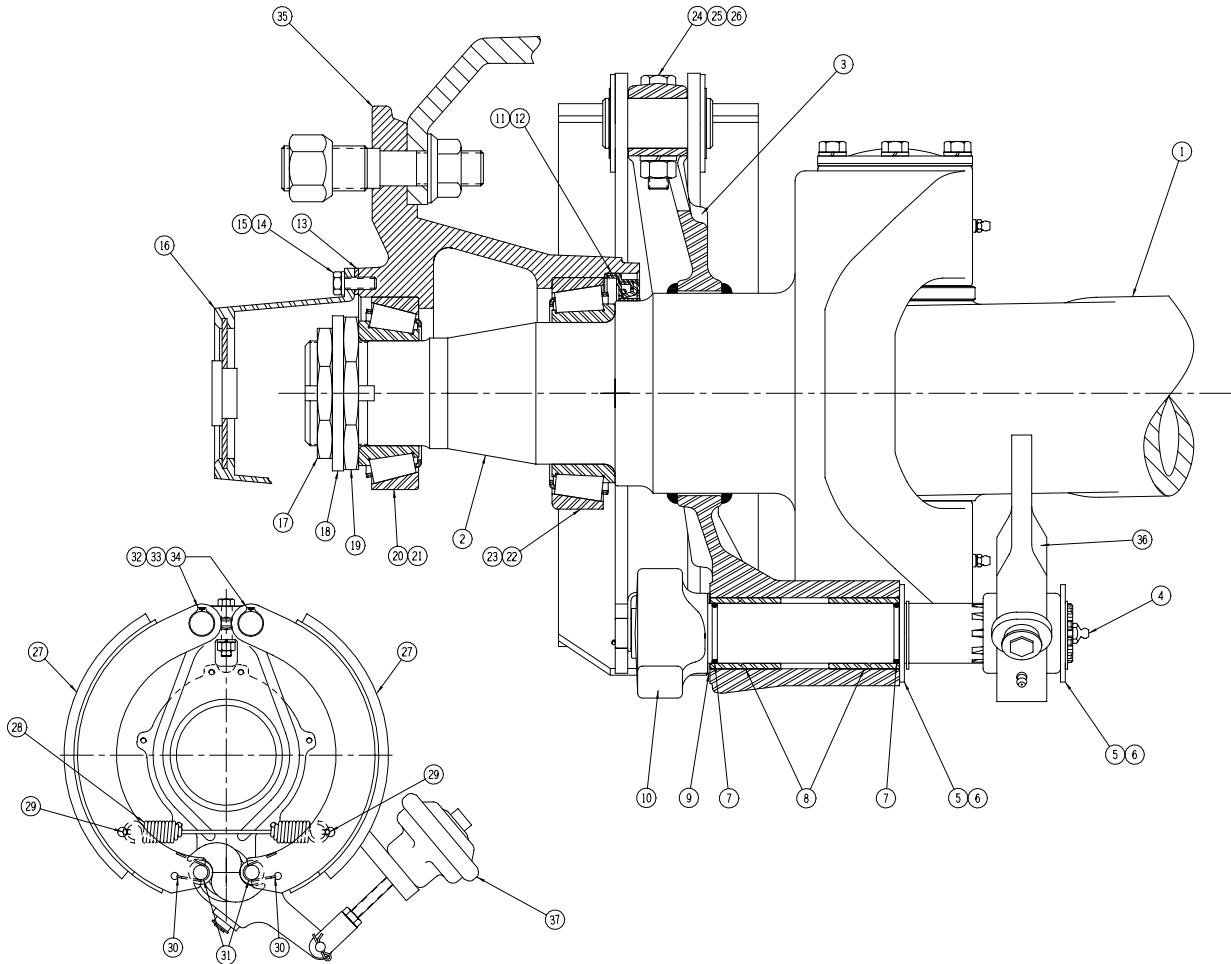
Spindle threads may be cleaned with a wire brush or chased with a die.

Repair welding of spindle threads are not permitted. Consult **IMT** if any wear is questionable.




SELF STEER ASSEMBLY

Fig. 27



DETAIL "A"
END VIEW OF BRAKE SHOE ASSEMBLY
SCALE = 3/16" * F.S.

37	2	217009-045	TYPE 9 AIR CHAMBER
36	2	212116	SLACK ADJUSTER
35	1	10059BEKR	R.H. HUB AND DRUM
35	1	10059BEKL	L.H. HUB AND DRUM
34	4	403145	ANCHOR PIN WASHER
33	4	214108	SNAP RING - ANCHOR PIN
32	4	203109-001	ANCHOR PIN
31	2	204101-001	ROLLER
30	4	214103	ROLLER RETAINER
29	4	207100	RETURN SPRING RETAINER
28	2	208104	RETRACT SPRING
27	4	601105-CM18	BRAKE SHOE c/w LINING - 16.50 * 5.0
26	2	402106	SPIDER CLAMP NUT
25	2	403117	SPIDER CLAMP WASHER
24	2	401101	SPIDER CLAMP BOLT
23	2	104115	INNER BEARING CONE (HM218248)
22	2		INNER BEARING CUP (HM218210)
21	2	104108	OUTER BEARING CONE (HM212049)
20	2		OUTER BEARING CUP (HM212010)
19	2	103103-002	AXLE JAM NUT
18	2	105107	INNER JAM NUT WASHER
17	2	103102-001	OUTER JAM NUT
16	1	343-4009	HUB CAP
15	12	400128	BOLT 5/16-NC x 5/8
14	12	403115	WASHER 5/16
13	1	330-3009	GASKET
12	1	320-2110	SEAL
11	1	310-1048	RING
10	1	202105-074-RH	R.H. CAMSHAFT (7 1/2 U.H.)
10	1	202105-074-LH	L.H. CAMSHAFT (7 1/2 U.H.)
9	2	403107	CAMSHAFT SPACER WASHER
8	4	50470	SPIDER BUSHING
7	2	20109	O-RING
6	4	403105	CAMSHAFT RETAINER WASHER
5	4	214104	SNAP RING - CAMSHAFT
4	2	407100	GREASE FITTING - STRAIGHT
3	2	51005	16 1/2" WELDON SPIDER
2	2	700046	STEERING KNUCKLE ASSEMBLY
1	1	700052	STRAIGHT AXLE TUBE
ITEM QTY.		PART NAME DESCRIPTION	



IMT

Ingersoll Division

@ANRON INC

347 KING ST. WEST,
INGERSOLL, ONTARIO

REF. 71.25" TRACK

DWN BY
H.S.

TITLE

700258 SSA AXLE

DATE
AUG 26/93

SCALE
3/8" * FS

SHEET

ASSEMBLY PARTS LIST

REF DWG NO

DWG NO

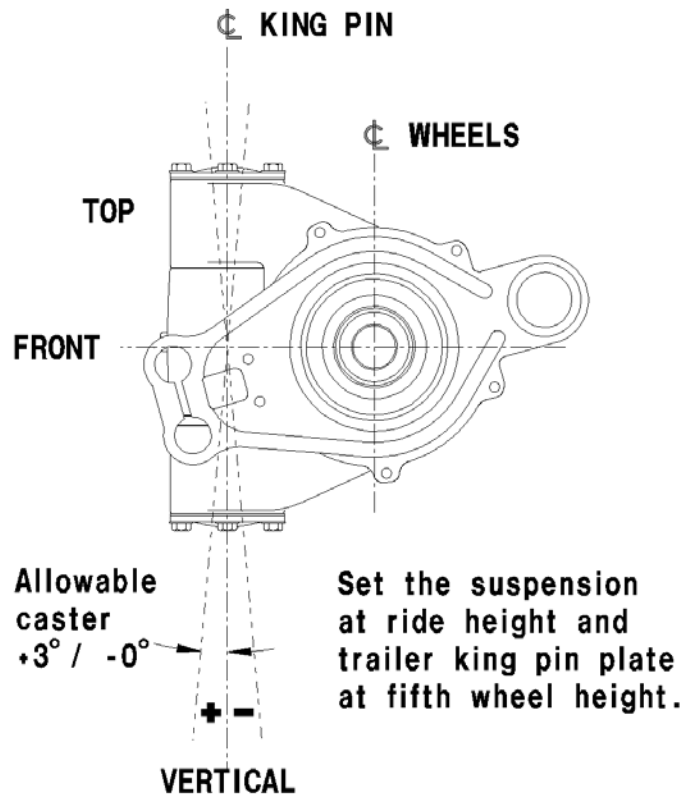
700259

500711

PROCEDURE IN015

March 02, 2005

IMT Self Steer Axle (700000 SERIES) CASTER SPECIFICATIONS FOR AXLE AT RIDE HEIGHT - LOADED



CAUTION

1. Changing tire diameters on the SSA or the primary suspensions will affect the SSA caster position.
 - Increasing the SSA tire diameter will cause the SSA caster to go negative which is undesirable.
 - Decreasing the primary suspensions' tire diameter will cause the SSA caster to go negative which is undesirable.
2. Changing the tractor fifth wheel height will affect the SSA caster position.
 - Decreasing the tractor fifth wheel height (new tractor) below the design height for the trailer, will cause the caster to go negative which is undesirable.
3. If the SSA caster measures more than 2 degrees negative, when tractor and trailer are properly coupled on level ground, consult IMT to develop a corrective action.

PROCEDURE IN016

FIELD CHECK AND ADJUSTMENT

SELF-STEERING AXLE ALIGNMENT

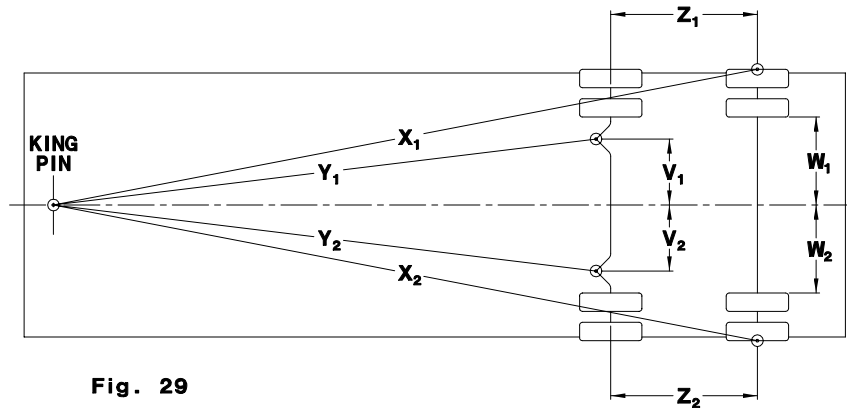
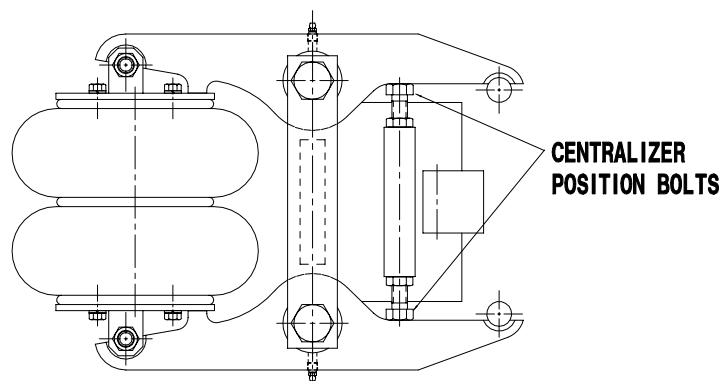


Fig. 29

NOTE: VERIFY AND ADJUST TOE-IN PER IMT PROCEDURE IN020 BEFORE STARTING THIS ADJUSTMENT.

1. Inspect suspension and axle for mechanical wear, damage, or missing parts. Repair or replace parts as required before starting toe-in and alignment.
2. Verify and adjust SSA king pin positions relative to trailer king pin, per **Fig. 29**: $Y_1=Y_2$. Use suspension adjustment mechanism to set this position.
3. Fixed Axle must be aligned first. Verify the SSA axle end alignment with the trailer king pin, and adjust with the centralizer air bag position bolts per **Dwg. 700196**. Centralizer bag must be at normal working pressure. Set $Z_1=Z_2$ per **Fig. 29**.
4. Lift SSA to release any adjustment tension still in the steering mechanism. Lower and apply normal equalized load on the axle, and verify toe-in and alignment again. Adjust as required. Repeat until the axle measures correct toe-in and alignment.



DWG 700196

PROCEDURE IN016

NEW INSTALLATION

SELF-STEERING AXLE ALIGNMENT

IMPORTANT: ALL SELF-STEERING AXLES MUST HAVE AN IMT ENGINEERING APPROVAL NUMBER.

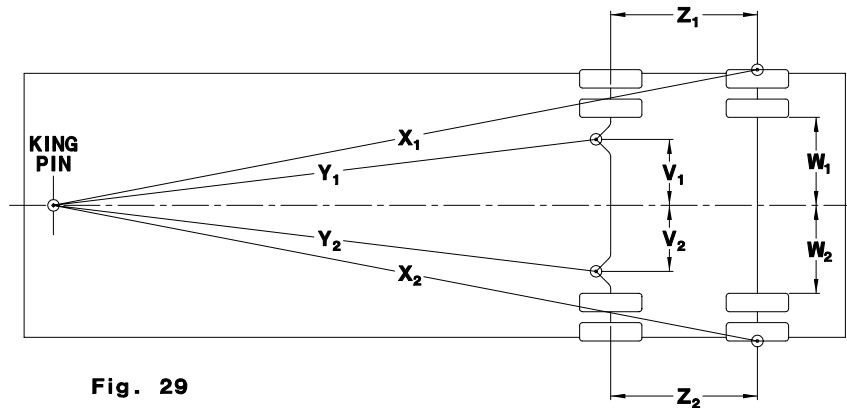
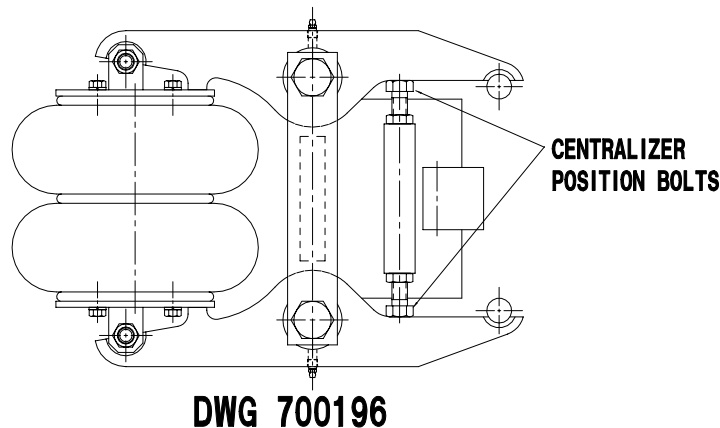


Fig. 29

1. Install and center the axle in the suspension and set the caster on the SSA per Procedure IN015. Secure by hard tack welding or clamping.
2. Center the axle and suspension assembly on the vehicle centerline using the king pin centers for reference: See Fig. 29. $Y_1=Y_2$, $V_1=V_2$
3. Set the fixed axle alignment: See Fig. 29. $X_1=X_2$, $W_1=W_2$
4. Safely hard tack weld suspension into place. Verify caster at working height again: (Procedure IN015). When axle and suspension are correctly aligned and caster is correct, complete all welding per recommendations.
5. Remove the shipping bar and verify Toe-in and alignment again.
6. If king pin location is correct, adjust alignment at spindle end using the Centralizer position bolts per Dwg. 700196. Centralizer bag must be at normal working pressure.



PROCEDURE IN017

SELF STEERING AXLE CHECK LIST

1. Suspension should be the right model and capacity. Install suspension shock kit if unusual axle hop or bounce is experienced. Compare the SSA to the tandem for reference.
2. Check for mechanical looseness/wear/damage on the suspension/axle/frame and all other components.
3. Verify toe-in: Procedure IN020.
4. Verify alignment: Procedure IN016.
5. Verify caster: Procedure IN015.
6. Tires (both sides) must be:
 - (a) Same size designation and tread.
 - (b) Same type: all radial -or- all bias ply.
 - (c) Balanced.
 - (d) Inflated to recommended pressure for actual load.
7. Rims (both sides) must be same P/N and mounted the same way.
8. Hubs and drums (both sides) must be:
 - (a) Same P/N.
 - (b) Balanced drum preferred.
9. Brakes (both sides) must be:
 - (a) Same size.
 - (b) Same friction (lining).
 - (c) Adjusted properly.
 - (d) Original length push rods.
10. Wheel bearings should be adjusted correctly.
11. Check for wear in King Pin and Bushings: Procedure IN035.
12. Steering damper and/or torpress should be installed and in working condition. Torpress adjusted per Procedure IN024.
13. Reverse lock should be installed and working.
14. Check for adequate clearance between frame, tie-rod, air chamber and tires at maximum turning angle.
15. Verify that the axle is installed with the thrust washer below the beam – see installation on IN022.

PROCEDURE IN020

TOE-IN ADJUSTMENT IMT Self Steer Axle

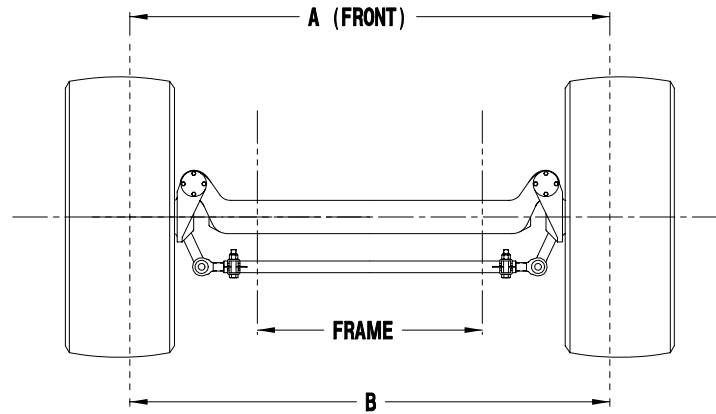


Fig. 30

1. Tires must be of the same size, pressure, and tread pattern. Hubs, drums and brakes must be identical. All suspension bushings and parts must be in good mechanical order and correctly adjusted.
2. Scribe a fine line on the tire tread all around the tire.
3. Measure between the scribed lines on tires in front and on the back, on axle center line. "A" must be shorter than "B" by 1/16" to 1/8", when axle/suspension is normally loaded.
4. Adjust by rotating the tie-rod with axle un-loaded. Tie-rod ends must be square with stud, and guide plate must be centered in u-bracket before tightening the clamps. Tighten all the clamp bolts and the tie-rod end nuts to 200 ft-lbs. of torque.
5. Check toe-in after each adjustment until the axle is within specification.

WHEN TO CHECK TOE-IN

1. Before releasing all new installations.
2. Whenever the vehicle experiences unusual vibration or when the axle "shimmies".
3. When tires experience unusual edge wear.
4. Each time new tires are installed.
5. Each time the tractor steering is aligned.
6. Each time repairs are done to the axle.

PROCEDURE IN021

REMOVAL / INSTALLATION OF STEERING LINK

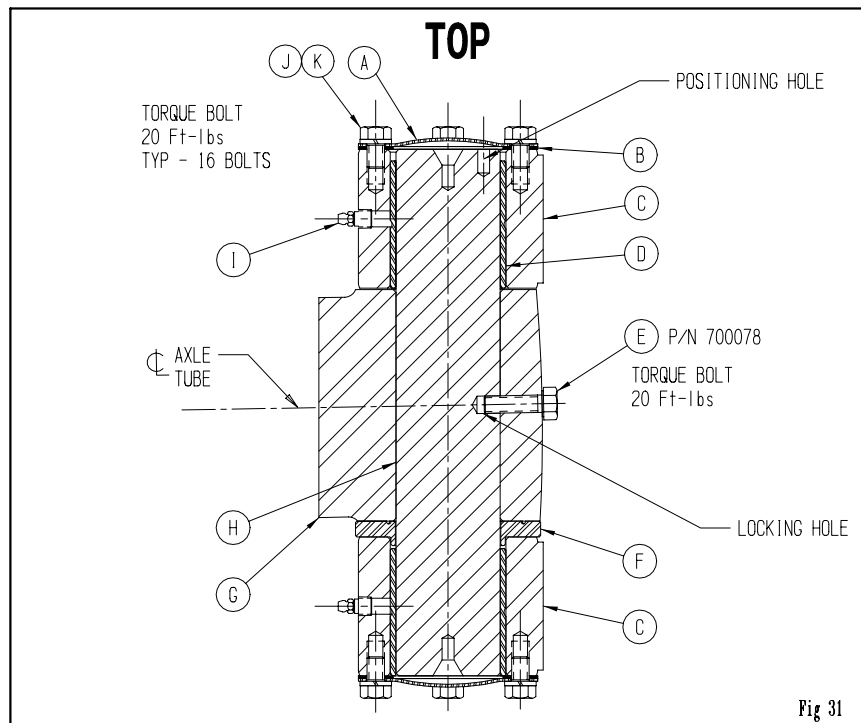
IMT Self Steer Axle - Pre 2003 Models

Disassembly (See Fig. 31)

1. Support steering link "C" to prevent from falling when king pin is removed.
2. Remove king pin caps "A" and gaskets "B".
3. Remove bolt "E".
4. Drive king pin "H" out of the steering link "C" and beam "G".
5. Remove steering link "C".
6. Remove thrust bearing "F".

Assembly (See Fig. 31)

1. Clean and inspect all parts. Insert thrust washer "F" in steering link as shown and mount steering link "C" on beam "G".
2. Slide king pin "H" into place with positioning hole in front to align locking hole with threaded hole in axle beam.
3. Screw-in locking bolt "E", P/N 700078 and torque to 20 ft-lbs. Bolt must engage and lock king pin in place. Only re-use once. Only substitute with Grade 8 bolt plus Locktite or equivalent. Reorder from IMT only.
4. Install top and bottom gaskets "B" and caps "A". Lubricate both grease nipples.



Recommendation

When significant wear is identified, you should replace both king pins, the four bushings, and both thrust washers. Genuine replacement kits are available from IMT and distributors.

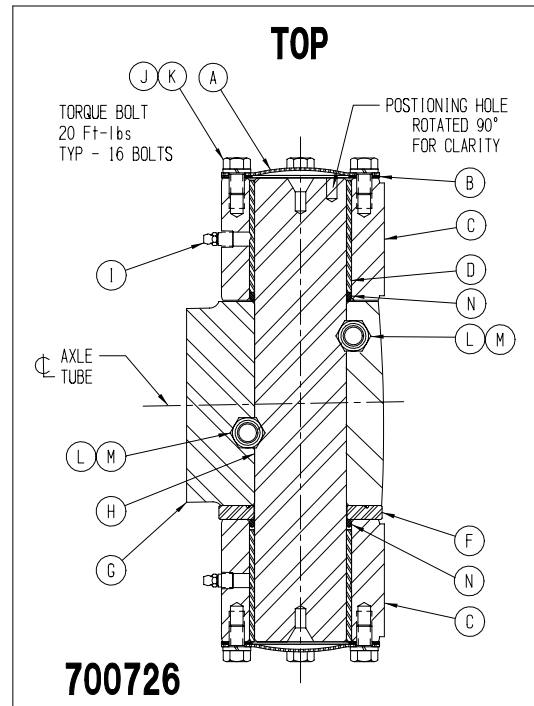
PROCEDURE IN043

January 2, 2003

KNUCKLE INSTALLATION – DRAW KEYS IMT Self Steer Axle - 2003 Models and Later REF DWG: 700726

Disassembly

1. Support knuckle "C" to prevent injury when king pin is removed.
2. Remove king pin caps "A" and gaskets "B".
3. Remove nuts "M" and draw keys "L".
4. Drive king pin "H" out of the knuckle "C" and beam "G".
5. Remove knuckle "C".
6. Remove thrust bearing "F".



Assembly

1. Clean and inspect all parts. Insert new o-rings "N" in knuckle "C". Mount knuckle "C" on beam "G". Slide thrust washer "F" into place, as shown.
2. Select left king pin "H" for left side. Verify slot positions on king pin to match holes in the beam "G". Slide king pin "H" into place with positioning hole in front to align draw key slots correctly.
3. Insert draw keys "L" with threads towards the front of axle, and torque flange nut "M" to 50 ft-lbs. Do opposite for right side.
4. Install top and bottom gaskets "B" and caps "A". Lubricate four grease nipples.
5. Re-torque two weeks after unit is put into service and at every major maintenance interval (50 ft-lbs.).

Recommendation

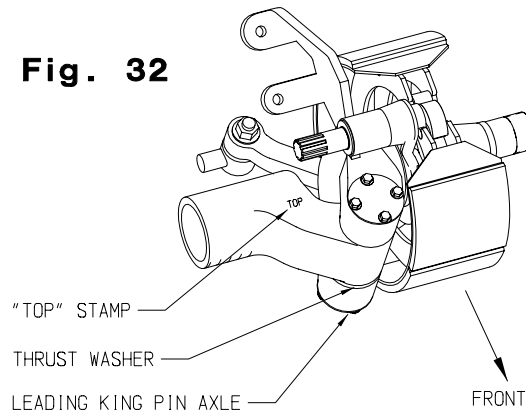
When significant wear is identified, you should replace both king pins, the four bushings, four draw keys and nuts, and both thrust washers. Genuine replacement kits are available from IMT and distributors (700040-KIT).

PROCEDURE IN022

INSTALLATION - INGERSOLL SELF-STEERING AXLES

April 8, 2003

Fig. 32



IMPORTANT: ALL SELF STEERING AXLES MUST HAVE AN IMT ENGINEERING APPROVAL NUMBER.

1. Confirm that the SSA has:
 - a. King Pins in front of axle.
 - b. Thrust washers on bottom of beam end.
 - c. Stamp letters "TOP" visible from top of axle.
2. Install the SSA axle in the suspension. Center the axle in the suspension and set the caster at working height (Procedure IN015).
3. Hard tack weld axle to suspension seat and assemble to vehicle. Install wheels & tires. Set alignment (Procedure IN016) using the suspension manufacturer's recommendation for adjusting the suspension. Safely hard tack weld suspension into place. Verify caster at working height again (Procedure IN015).
4. Remove shipping plate between the knuckle and beam end. With no pressure in torpress (when applicable), articulate suspension to both extremes and assure that there are no clearance problems with frame, suspension, or attachments (e.g., tire racks, dump, logging bunks, etc.).
Make allowances for suspension travel. When axle and suspension are correctly aligned and caster is correct, complete all welding per manufacturer's recommendations.
5. Verify toe-in - adjust as required (Procedure IN020).
6. When clearances are established, verify that the welding operations and torque values on the axle, suspension, and wheels are within specification.
7. Install air circuit as described on Dwg. No. 700006. The locking cylinder valve may be manual or solenoid operated, and location on truck/trailer may be governed by laws in your state or province.
8. Install electrical circuit as described on Dwg. No. 700007. The location on the vehicle for the operating switches for the lift axle(s) may be governed by laws in your state or province.

PROCEDURE IN024

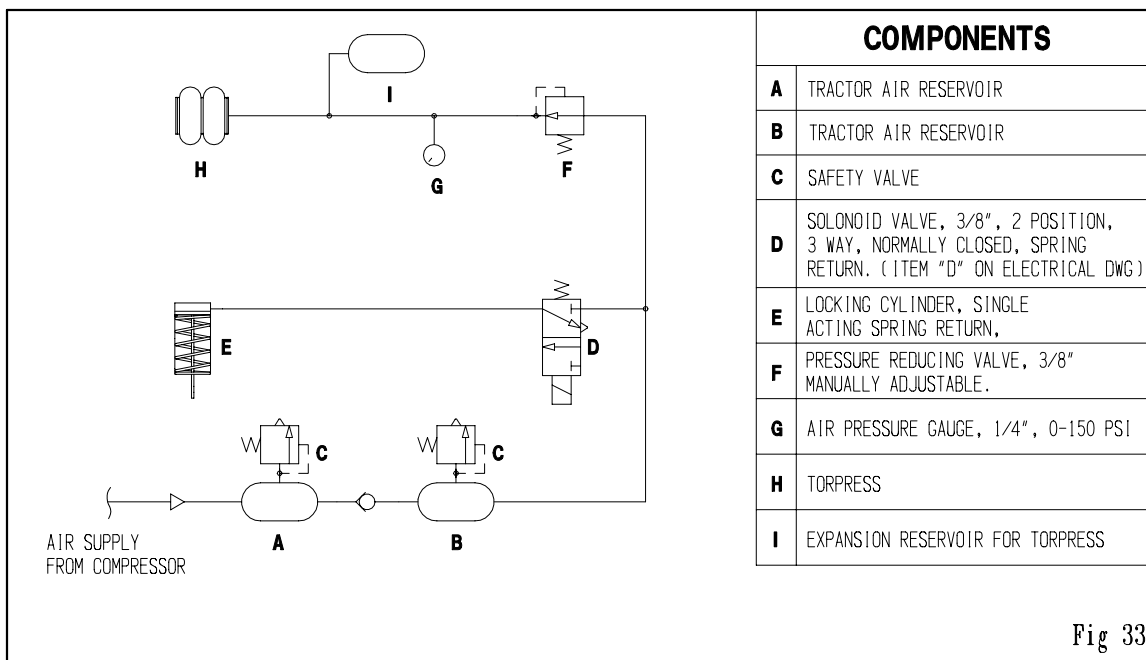
February 3, 2003

INGERSOLL SELF-STEERING AXLES

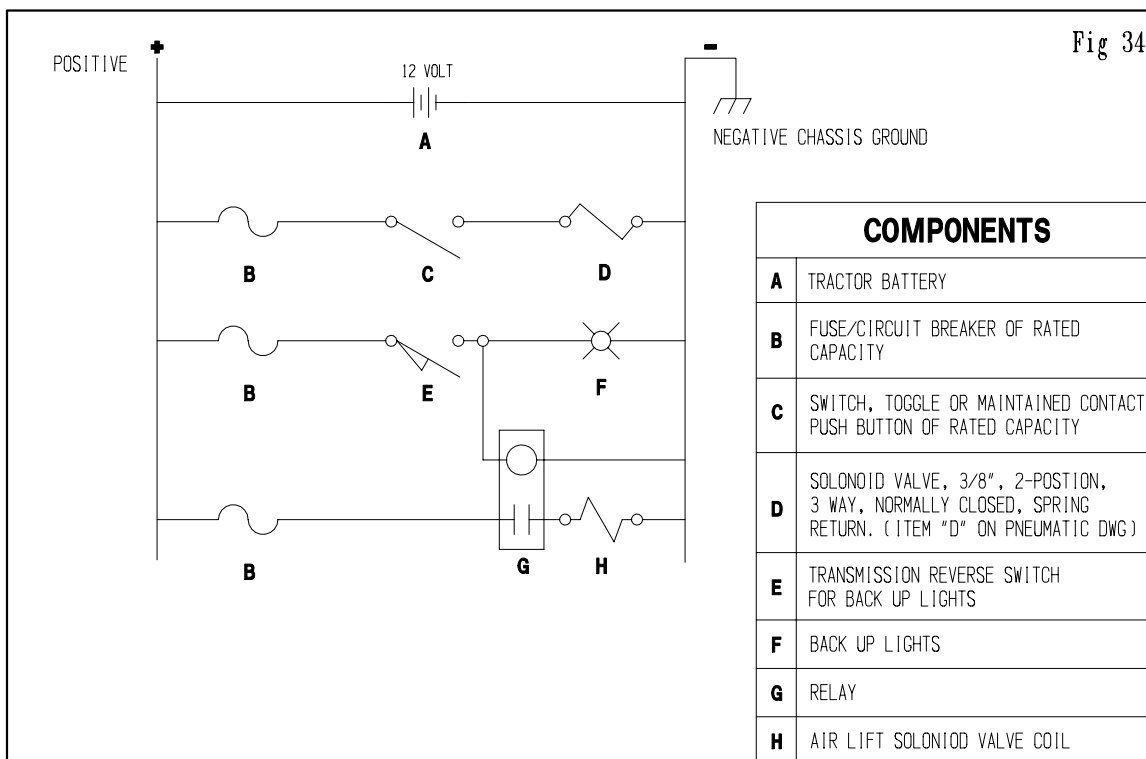
OPERATION WITH TORPRESS AND LOCKING CYLINDER

1. After installation is complete, set regulator to approximately half of the available pressure.
2. Observe operation of Self-Steering Axle and increase pressure until axle resists steering.
3. Reduce pressure slightly in order to regain steering function. The objective is to obtain maximum centering force while retaining self-steering function.
4. Adjust pressure to suit your load and road (traction) conditions.
5. Operators can quickly determine pressure settings for their particular operation and conditions.
6. For reverse operation (backing up) the Self-Steering Axle can auto-reverse lifted or it can be locked in the centered position. Locking can be done manually using a bolt through the holes provided in the lock mechanism, or using the recommended air operated locking cylinder, which is supplied with the axle.
7. IMT can recommend some simple auto-reverse lift systems that will lift the axle as soon as the vehicle starts backing up, or as soon as the reverse gear is selected.

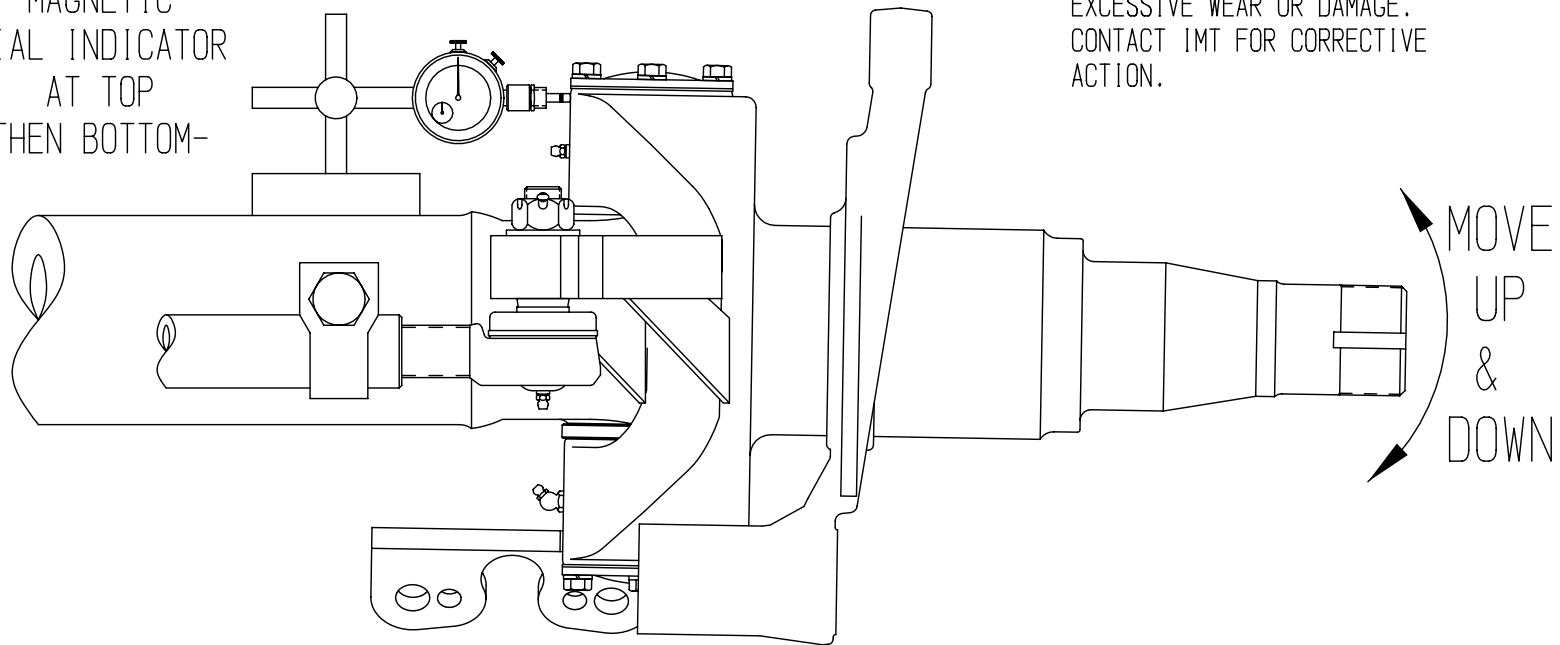
AIR CIRCUIT DIAGRAM FOR SSA WITH TORPRESS AND LOCKING CYLINDER



ELECTRICAL CIRCUIT DIAGRAM FOR LOCKING CYLINDER AND AUTO REVERSE LIFT COMMAND



MAGNETIC
DIAL INDICATOR
AT TOP
-THEN BOTTOM-



TOTAL INDICATED MOVEMENT OF 0.110"
OR MORE, TOP OR BOTTOM, INDICATES
EXCESSIVE WEAR OR DAMAGE.
CONTACT IMT FOR CORRECTIVE
ACTION.

SSA KING PIN BUSHING WEAR CHECK

IMT KING PIN O.D. = 2.249/2.248



347 KING STREET WEST
INGERSOLL, ONTARIO
N5C 3K6

TEL: (519) 485-2210
FAX: (519) 485-2163

REF. SELF STEERING AXLES

TITLE
IN035

SSA KING PIN BUSHING WEAR CHECK

DWG. NO. **700554**

REV. **C**

Fig. 35

TORQUE SPECIFICATIONS

Part Description	Thread Size	Grade	Torque
Spindle Nuts	See IN018, IN019		
Spider Anchor Bolts			
12 1/4"	1/2-20 UNF	8	100 ft.lbs.
16 1/2"	1/2-20 UNF	5	75 ft.lbs.
Bolt On Spider	1/2-20 UNF	5	75 ft.lbs.
Cam Brackets	1/4-20 UNC	5	8 ft.lbs.
Hub Cap	5/16-18 UNC	5	15 ft.lbs.
Air Chamber			
TYPE 9-16	7/16-14 UNC	Ask Supplier	30-40 ft.lbs.
TYPE 20-30	5/8-11 UNC	Ask Supplier	100-115 ft.lbs.

SSA

Steering Arms	7/8-14 UNF	5	150 ft.lbs.
Tie Rod Clamp Bolts	3/4-10 UNC	5	150 ft.lbs.
King Pin Cap	3/8-16 UNC	5	20 ft.lbs.
King Pin Lock	3/8-16 UNC	L9 Scotch Grip	20 ft.lbs.
Shock Mounts	3/4-10 UNC	5	150 ft.lbs.
Draw key	7/16-20 UNF	8	50 ft.lbs

[illegible]

IMT
347 King Street West, P.O. Box 250
Ingersoll, Ontario, Canada N5C 3K6
Toll Free: 1-800 663-axle
Phone: (519) 485-2210
Fax: (519) 485 2163
Web Site: www.imtcorporation.com

