KOMATSU

P&H

Structural Components

Section 03–01 Gen2

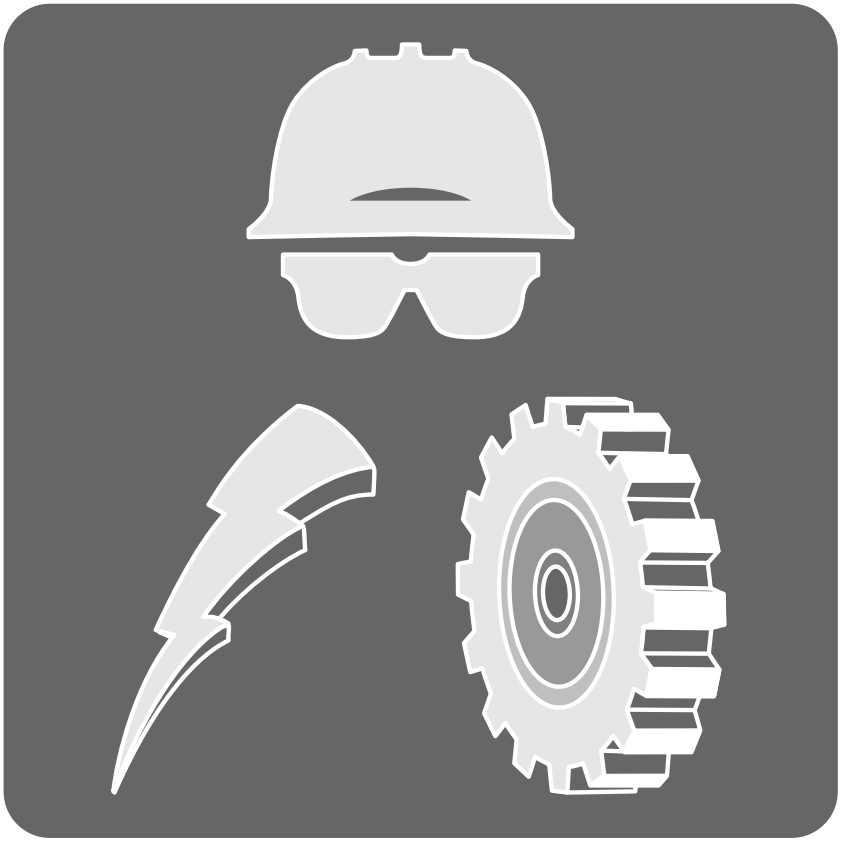

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Table of Contents

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List of Figures

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Preface

This Manual is provided as a guide to personnel involved with the operation, maintenance and repair of Komatsu Mining Corp. equipment. We recommend that such personnel review and become familiar with the general procedures and information contained within this manual. In addition, we recommend that this manual be kept readily available for reference when repairs or maintenance are necessary.

Read and become familiar with this Manual and any other general safety practices before attempting any procedures.

Due to the complexities of mining equipment and the environment in which it operates, situations may arise which are not directly discussed in detail in this Manual. When such a situation arises, past experience, availability of equipment and common sense play a large part in what steps are to be taken. In addition, a Komatsu Mining Corp. service center representative is available to answer your questions and assist you upon request.

Komatsu Mining Corp. reserves the right to continually improve its products and associated documentation. Therefore, physical alterations to Komatsu equipment may not be identified in this Manual. Revisions may be frequently made to this Manual in an effort to ensure that information contained within is current as alterations occur to the equipment. If you find an error or have other feedback regarding this Manual, please contact Product Training and Publications at *Pro.Train.Pub@mining.komatsu*.

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General Introduction

Scope of This Publication, 03–01

STRUCTURAL COMPONENTS is provided to assist maintenance personnel and operators in the location, inspection, adjustment and repair or replacement of the various structural components of the machine.

Customer Responsibilities and Warranty Advisories

P&H wheel loaders are warranted in accordance with the warranty policy provided with the machine. The recommended operating and maintenance procedures set forth shall be followed to ensure warranty coverage is not jeopardized. Failure to comply with recommended operating and maintenance procedures may void machine warranty.

Any questions or problems relating to warranty policy or administration should be directed to Komatsu Service Center. Include the model and serial number, in-service date of the machine, and hour meter reading. We especially draw your attention to the following safety advisories.

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Safety

This publication contains special instructions that pertain to safety, operation, maintenance, and repair of the machine. Listed below are the signal words and symbols that precede these instructions and their meanings:

DANGER

The danger label indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

The warning label indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

The caution label, used with the safety alert symbol indicates a hazardous situation which, if not avoided, could result in minor or moderate injury (includes the safety alert symbol).

CAUTION

The caution label (without safety alert symbol) is used to address practices not related to personal injury – only equipment damage.

NOTICE

The notice label indicates areas of importance to the reader that are not related to personal injury or machine damage.

Safety, Warnings, and Cautions

⚠ WARNING

CRUSH HAZARD

- **Crush hazards exist under rear of machine. Counter weight mounted under the rear frame. Do not enter this area unless the counterweights have been externally supported to prevent falling. Do not loosen the bolts for the counterweight structure unless the counter weights are externally supported. Entering the area under the counterweights or loosening the counterweight bolts without externally supporting the counterweights could cause a crush hazard resulting in serious injury or death.**
- **Crush hazards exist when installing counter weights, if the machined mating surfaces are not clean and free of foreign debris such as rust, dirt, or paint. Check the machined surfaces before installing the counterweights. Clean the surfaces of any foreign debris before installing the counterweights. Failure to check (and clean) the machined surfaces for dirt, paint, rust or other foreign debris before installing the counterweights could cause crush hazard resulting in serious injury or death.**
- **Crush hazards exist if loosening counterweight bolts. Before loosening counter weight bolts, check the machine Parts Manual for counter weight part number; to ensure the weight of the counter weight listed in this document is accurate. Some machines might have counter weights not listed in this document. Failure to determine accurate counterweight weight can cause crush hazards resulting in serious injury or death.**
- **Crush hazards exist if the machine is started or moved while work processes are being performed on the machine. Place bucket flat and level on the ground. Place frame lock in the locked position and lock out the machine's starting capability before performing any work process. Follow all applicable lockout procedures and local rules and regulations for performing work processes. ANYONE performing inspections or service procedures to the machine should be familiar with ALL instructions and procedures contained in the machine's SERVICE MANUAL. Crush hazard could occur if the machine is started or moves while any type of work process is being conducted on the machine, resulting in serious injury or death.**
- **Crush hazards exist in machine pivot area and area between the tires. Do not enter these areas unless it is verified that the operator has control over the steering and that personnel locking the frame lock have good communication with the operator. Entering the pivot area and area between the tires while the machine is moving or pivoting (articulating) could cause crush hazards resulting in serious injury or death.**
- **Crush hazards exist if all personnel are not cleared from the bucket and lift arm area before using the hydraulic hoist and bucket hydraulic pressure bleed down valves to relieve pressure from the hoist and bucket circuit. Clear all personnel from the area around the bucket and lift arms before operating hydraulic hoist and bucket hydraulic pressure bleed down valves. Using the hydraulic bleed down valves could result in some movement of the lift arms and bucket which could cause a crush hazard resulting serious injury or death.**
- **Crush hazards exist when preparing to remove the front frame from the rear frame. The frames must be supported so as to prevent them from tipping to either side as well as forward and backward. Refer to "Lifting (Jacking)", located in this section of the manual. Failure to properly support the frames can cause crush hazards resulting in serious injury or death.**
- **Crush hazard exists if the machine is not positioned straight or turned to either side and the frame lock is not installed prior to any testing. Always steer the machine straight and install the frame lock before performing any testing. Be sure all personnel are secure and in safe positions prior to performing any testing. Place signs to alert other personnel to keep a safe distance from the machine. Failure to place the frame lock in the locked position and to alert personnel to keep a safe distance could cause a crush hazard resulting in serious injury or death.**
- **Crush hazard exists when obtaining measurements. Do not get under or allow other personnel to get under raised lift arms or bucket. During the following steps, several measurements will have to be obtained. Follow all local safety rules and procedures while obtaining these measurements. Use a**

remote camera if necessary to avoid being under a suspended load. Failure to use proper procedures or a remote camera can result in serious injury or death.

- **Crush hazard exists when lifting the rear axle off the ground. Caution should be exercised when using jacks to lift the machine. If both wheels of the oscillating axle are off the ground at the same time, the axle may swivel vertically. This is a potentially hazardous situation. Both sides of the axle should be blocked to prevent swiveling. Failure to block both sides of the rear axle can cause a crush hazard resulting in serious injury or death.**
- **Crush hazards exist if standing under, or placing any body part under hoisted/suspended components. Never stand under hoisted/suspended components. Ensure appropriate lifting devices are used, and blocking is adequate to prevent the component from unexpectedly moving during transportation. Refer to SAFETY, WARNINGS, AND CAUTIONS before attempting to remove the operator's cab. Failure to stay out from under hoisted/suspended components can cause crush hazard resulting in serious injury or death.**
- **Crush hazard exists if the Roll Over Protective Structure (ROPS) is modified or repaired. Never modify or repair the ROPS structure without written approval from the Komatsu Engineering department. The ROPS structure is certified per government regulations. Any modifications to the ROPS, such as welding on or drilling holes in the structural members will affect the capability of the ROPS to provide adequate protection. Any modification or repair to the ROPS without the specific approval of Komatsu engineering department shall void its certification. Contact your authorized Komatsu service center before making any modifications or repairs to ensure that such will not void the certification or effectiveness of the structure. Failure to properly modify or repair the structure can cause a crush hazard resulting in serious injury or death.**
- **Crush hazards exist when inspecting, repairing, or replacing counter weights. When inspecting, repairing, or replacing counterweights, appropriate procedures and instructions shall be followed. Failure to follow appropriate procedures and instructions could cause crushing hazards resulting in serious injury or death.**
- **Crush hazards exist if contents and component weights are not considered when removing reservoir. Always consider the weight of the contents and any components connected to the reservoir before removing the reservoir. **The weights listed in the table above are for EMPTY fuel reservoirs without any fittings, pipes, manifolds, or hoses connected. The diesel fuel alone could add up to 7507 pounds (3405 kg) to the empty weight of the L-1850 reservoir and 9331 pounds (4232 kg) to the empty weight of the L-2350 reservoir. A reservoir that is full of fuel and with various pieces connected could weigh as much as 3 times as much as the values in the table – up to 15,000 pounds (6804 kg) for the L-1850 reservoir and up to 18,000 pounds (8165 kg) for the L-2350 reservoir. Failure to consider the content and component weight can cause a crush hazard resulting in serious injury or death.**
- **Crush hazard exists if personnel are positioned underneath a fuel reservoir or counterweight that is only supported by a crane or forklift. Appropriate stands or cribbing must be used to support the reservoir prior to entering this area. Failure to properly support the counterweights or fuel reservoir can cause a crush hazard resulting in serious injury or death.**
- **Crush hazards exist when raising the machine by using jacks or crane. Always ensure the machine is on flat, level ground that is firm enough to support the jacks holding the weight of the machine, for the time necessary to complete the procedures being performed. Machine tipping over or sinking into the ground is possible. Crush hazards exist under and around the machine if tipping or sinking occurs. Failure to ensure the jacks and cranes are of sufficient capacity, and the ground is firm enough to support the jacks or cribbing can cause crush hazards resulting in serious injury or death.**
- **Crush hazards exist if standing under, or placing any body part under hoisted/suspended components. Never stand under hoisted/suspended components. Ensure appropriate lifting devices are used, and blocking is adequate to prevent the component from unexpectedly moving during transportation. Failure to stay out from under hoisted/suspended components can cause crush hazard resulting in serious injury or death.**
- **Crush hazards exist if the correct equipment that is properly rated for lifting components and securing them to the transport vehicle is not used. Always use correct lifting equipment that is properly rated for the load. Failure to use correct equipment that is properly load rated can cause**

crush hazards resulting in serious injury or death.

- Crush hazards exist when moving components. Ensure all personnel stay clear of suspended or moving components. Failure to prevent uncontrolled component movement and to keep personnel clear of suspended or moving parts can cause crush hazards resulting in serious injury or death.
- Crush hazards exist when moving components without tag lines. When lifting, always use tag lines to control component movement. Failure to use tag lines when moving components can cause crush hazards resulting in serious injury or death.
- Crush hazards exist when hoisting and moving components. Ensure that any hoisting equipment is manned by a qualified operator. Failure to ensure the equipment is manned by a qualified operator can cause crush hazards resulting in serious injury or death.
- Crush hazard exists. Do not allow anyone to get under the fuel reservoir or counterweights unless the supports are on firm ground, externally supported with supports that have the capacity to hold their weight, are stable, and are positively locked. The following procedures for component installation and removal are generic. The specific method used to support and lower/raise the fuel reservoir or counterweight will vary depending on the equipment available. It is the responsibility of the onsite personnel to ensure that the method and equipment used have sufficient capability and capacity for the weights and component design. Failure to use proper supports can cause crush hazard resulting in serious injury or death.

CRUSH HAZARD AND PINCH POINT HAZARD

- Crush hazard and pinch points exist when removing the bucket and links. To prevent unexpected movement of the bell crank assembly, secure it to the lift arm structure prior to removing the bucket and links. Failure to secure the bell crank can cause a crush hazard and pinch point resulting in serious injury or death.

CRUSH, SHOCK, OR OTHER HAZARDS

- Crush, shock, or other hazards exist if stored energy is not removed or isolated prior to working on the machine. Stored energy (hydraulic, electrical, pneumatic, mechanical, etc.) may be present if not isolated or released prior to working on the machine. Do not work on the machine without removing this stored energy (suspended loads, electrical power, air pressure, etc.). Risk of crushing, shock, or other physical injury exists if stored energy is not removed or isolated prior to working on the machine which could result in serious injury or death.

FALL HAZARD OR STRUCK-BY HAZARD

- Fall hazard or struck-by hazard exists when opening the sound abatement panels. If the loader is on a slight incline or in high wind, the panel could quickly swing wide open. The panels are heavy. Do not stand in front of the panel when releasing the handle or internal latches. Stand on the opposite side of the door hinge when opening the door. Standing in front of the panel when opening it can cause a fall or a struck-by injury that results in serious injury or death.

⚠ CAUTION

CRUSH HAZARD

- Crush hazards exist when hoisting and moving components. Ensure that any hoisting equipment is manned by a qualified operator. Failure to ensure the equipment is manned by a qualified operator can cause crush hazards resulting in serious injury or death.

STRUCK-BY OR STRUCK AGAINST HAZARDS

- Struck-by or struck against hazard exist if it is necessary to disconnect air conditioning lines. Use extreme care as all air conditioning lines contain compressed gas under high pressure. Use proper procedures, wear all necessary Personal Protective Equipment (PPE), and follow all local rules or regulations for disconnecting air conditioning lines. Failure to follow local rules and regulations and to wear proper PPE can cause a struck-by or struck against hazard resulting in personal injury.

PINCH POINT HAZARDS

- **Pinch point hazards exist when handling chains, straps, or cables used for tying down components. Before tightening anything, make sure hands are clear of the securing devices and all other personnel are clear of the area. Failure to ensure hands and personnel are clear of securing devices can cause pinch points resulting in serious injury.**

Additional Warnings and Cautions

Table 1: Table 1. Counterweight locations and approximate weights

Counterweights				
Machine	**Location**	**P/N**	**Weight (Approximate)**	
			Pounds	**Kilograms**
L-1350	Under radiator	R4182851	5,000	2,268
L-1850	Under radiator	R4273984	7,200	3,266
L-2350	Under radiator	R4246005	9,500	4,310
	Outside of bumper	R4242461	13,000	5,897
	Under steps (Left and Right)	R4246037	1,800	817
		R4246241	2,400	1,089

Table 2: Table 2. Fuel reservoir locations and approximate weights

Fuel Reservoirs				
Machine	**Location**	**P/N**	**Weight (Approximate)**	
			Pounds	**Kilograms**
L-1850	Under Engine	421-1306	5000	2268
L-2350	Under Engine	424-7955	*6000	2722

WARNING

Crush hazard exists when attempting to disassemble any of the major components of the machine. BEFORE attempting to disassemble any of the major components of the machine, BE SURE to provide hoists or cranes and lifting devices of adequate capacity and height. Refer to “Lifting (Jacking)” (located in this section). Refer to GENERAL INFORMATION for approximate weights of the structural components. Component weights are located in Section 1 of the Service Manual. Failure to provide adequate cranes and lifting devices can cause crush hazards resulting in serious injury or death.

⚠ WARNING

Crush hazards exist if attempting to transport personnel on the machine. There are no provisions on the machine to accommodate the transportation of any persons other than the operator alone, unless a training seat in the cab is optionally provided. Ladders and catwalks attached to the machine are designed for servicing of the machine while the machine is stopped only. They are NOT designed for transporting riders at any time. Do not transport personnel or allow riders on the machine. A crush hazard is present while riding on any location of the machine other than the cab Operator's seat or training seat (if so equipped), which could result in serious injury or death.

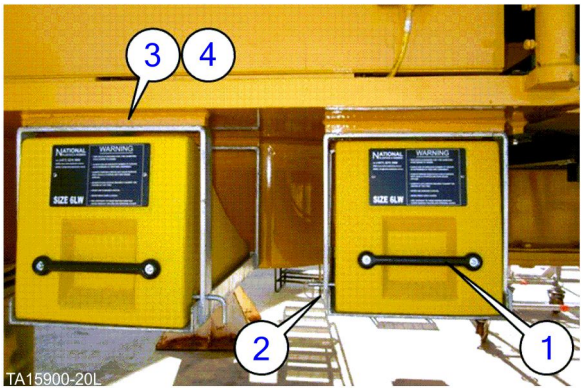
⚠ WARNING

Crush hazard exists when moving components without using a tag line to control unplanned component movement. When lifting, always use tag lines to control component movement. Failure to use a tag line can cause a crush hazard resulting in serious injury or death.

⚠ WARNING

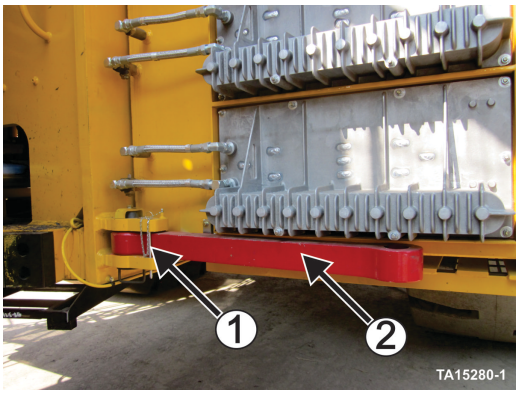
Crush hazard exists if wheel chocks are not used to deter machine movement while performing work procedures. Wheel chocks and mounting brackets are optionally provided on some models. Wheel chocks are used to block the tire to deter equipment movement during work procedures. Place a chock in front of and behind each tire. When chocks are not provided as an option, chocks shall still be used according to local rules and regulations. Local rules and regulations shall be used to determine appropriate chock size to prevent equipment movement. Failure to prevent equipment movement could cause crush hazards resulting in serious injury or death.

Figure 1: Wheel chocks and mount brackets (optional)



1) Wheel chock, **2)** Wheel chock holder bracket, **3)** Screws, **4)** Wheel chock mount bar

Figure 2: Frame Lock



NOTICE

Some models have a holding pin (#1), on the frame lock pivot bracket that holds the frame lock (#2) in position when the frame is not locked.

NOTICE

To ensure future safety, if a safety or instructional label or placard is on a part that is replaced, make sure a new label/placard is installed on the replaced part. Replace immediately any safety or instructional label that is not legible. Refer to the PARTS MANUAL to order replacement labels or placards.

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Theory of Operation

- The Bucket is attached to the lift arms.
- The Lift Arms are attached to the front frame.
- The Front Frame is attached to the rear frame.
- The Front Axle is a structural part of the front frame.
- The High Voltage cabinet, which contains the major electrical and electronic components, is mounted on the rear frame.
- The Operator's Cab is mounted on the rear frame.
- The Fuel Reservoir and Power Unit (engine and generator) are mounted in the rear frame.
- The fuel tank on some models is an integral part of the rear frame.
- The engine air cleaner system, cooling air system, battery compartment, hood and oscillating axle structure are mounted on the rear frame.
- The Rear Oscillating Axle is attached to the rear frame.
- Ladders for mounting and dismounting the machine are mounted on the rear frame.
- Platforms for moving around in certain areas on the machine are mounted on the front and rear frames.
- The front and rear frames are steel welded structures and are the two main structural components of the machine's articulating frame.

Ball Joints

- Six ball joints are attached to the front frame.
- Two ball joints are used to anchor the bucket lift arms.
- Two ball joints are used to anchor the hoist cylinders.
- Two ball joints are used to connect the front and rear frames at the pivot area.
- Two ball joints are attached to the rear oscillating axle and rear frame.

Pins

- Fourteen pins connect various structures on the machine.
- Two pins hold the bucket to the lift arms.
- Two pins connect the level link and the bucket.
- Two pins connect the level link and the bellcrank.
- Two pins connect the bell crank and the lift arm tube.
- Two pins connect the bell crank and the bucket cylinders.
- Two pins connect the bucket cylinders and the front frame.
- Two pins connect the lift arms and the hoist cylinders.

CAUTION

BEFORE welding on any structural members of the machine, refer to FIELD WELDING PROCEDURES, located in Section 03 of the Service Manual. Serious damage to electrical, electronic, and engine controls is possible unless precautions described in the publication are adhered to.

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Component Description

The major structural components of the loaders are:

- Bucket, Lift Arms, Bellcrank
- Front Frame
- Operator's Cab and Falling Object Protection Structure (FOPS)
- Rear Frame and Roll Over Protection Structure (ROPS)
- Oscillating Axle
- High Voltage Cabinet (Converter cabinet)
- Low Voltage Cabinet
- Ladders and Platforms
- KLENZ Cooling Air System

NOTICE

These weights are only approximate as a guide for determining proper lifting procedures and equipment.

Table 3: Approximate component weights

Item/Equipment	L1350		L1850/L2350	
	LBS.	KGS.	LBS.	KGS.
Bucket, with Teeth and Pins	34,000	15,422	55,000*	24,954*
Lift Arm Structure (without bellcrank or level link)	30,500	13,835	46,000	20,866
Bellcrank	3,900	1,769	7,525	3,413
Level Link	1,000	454	1,225	556
Front Frame W/Hoist Cylinder	65,000	29,484	74,000	33,566
Rear Frame W/Engine/Generator/Rear Axle	102,200	45,449	144,500	65,545
Tire And Rim Assembly 50/80 - 57 (each)	16,100	7,303	17,000	7,711
Motor, Driver, Brake	13,600	6,169	18,800	8,527
Hood Structure	1,800	817	1,800	817
Rear Axle (without motor or driver)	9,000	4,083	11,000	4,990
Roll Bar Structure	8,000	3,629	8,000	3,629

Cab	2,000	907	2,000	907
*28 Yard Bucket				

Ball Base/Cap Specifications and Location

Ball Size and Location

Machine	Lift Arm	Hoist Cylinder	Middle Pivot	Rear Axle Pivot
L-1350	12	12	9	9
L-1850	14	12	12	9
L-2350	14	14	12	9

Ball Base Specifications

Nominal Diameter	**7.5"**	**9”**	**12”**	**14”**
Machined ball diameter	7.500” ± .003”	8.997” ± .003”	12.000” ± .003”	14.000” ± .003”
Machined neck diameter	6.250” ± .010”	7.500” ±.005”	10.000” ± .005”	11.750” ± .003”
Ball Socket Specifications				
Machined diameter	8.003” ± .002”	9.503” ± .002”	12.503” ± .002”	14.503” ± .002”

Ball Base/Socket/Cap Assembly Specifications

New Liner (or new ball/socket) Setup					
	7.5"	**9”**	**12”**	**14” Lift arm**	**14” Hoist**
Suggested shim pack with new liners (adjust as needed to get correct endplay)	1 ea. 3/16" spacer plate 4 ea. .030" shim 1 ea. .018" shim 4 ea. .007" shim	1 ea. 3/16” spacer plate 4 ea. .030” shim 2 ea. .018” shim 2 ea. .007” shim	1 ea. 3/16” spacer plate 4 ea. .030” shim 2 ea. .018” shim 2 ea. .007” shim	1 ea. 1/4” spacer plate 2 ea. .030” shim 2 ea. .018” shim	1 ea. 3/16” spacer plate 2 ea. .030” shim 2 ea. .018” shim
New setup endplay reading	0.011-0.015"	0.014-0.018”	0.018-0.024”	0.021-0.028”	0.021-0.028”

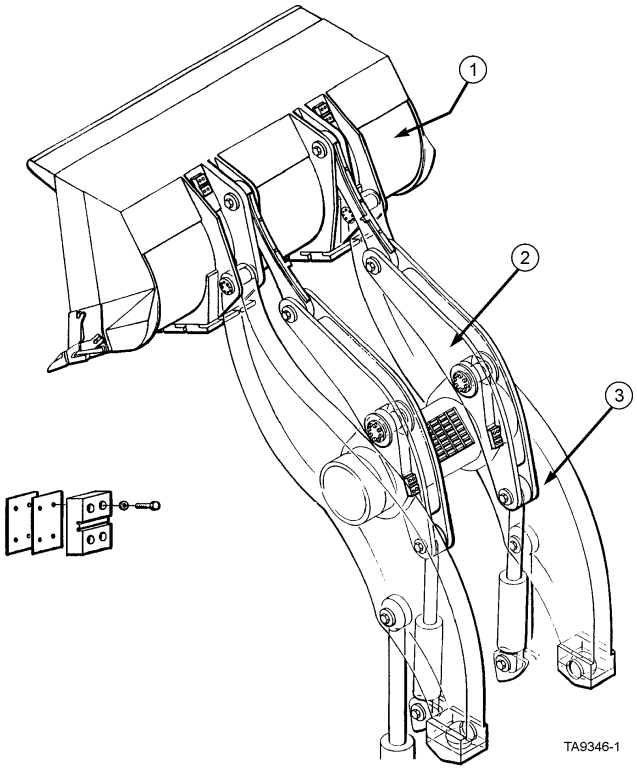
PM Checks and Setup

Table 4: Figure 2. Ball base socket cap specifications

				14” Lift arm	**14” Hoist**
Min. reading at PM	0.008"	0.009”	0.012”	0.014” Lift arm	0.014” Lift arm
Max. reading at PM check (if higher, then shims must be removed.)	0.023"	0.027”	0.036”	0.042”	0.042”
Reading range after PM shim removal.	.015” ± .002	.018” ± .002	.024” ± .003	.028” ± .003	.028” ± .003
Minimum shim pack before replacing liners	3/16" spacer plate	3/16” spacer plate	3/16” spacer plate	1/4” spacer plate	3/16” spacer plate
If the ball or socket is out of round (TIR) by more than this amount, rapid wear of the brass liners may be noted. This of course depends on the severity of the application. Ball wear is typically an indication of either a lubrication problem or running the ball socket assembly at high endplay limits. **Special shimming procedures are required when shimming a ball cap assembly when the ball is worn. This will only be temporary, as rapid liner wear will be common until the ball is replaced.**					

Bucket, Bellcrank, and Lift Arms

Figure 3: Bucket, bellcrank, and lift arms (typical)

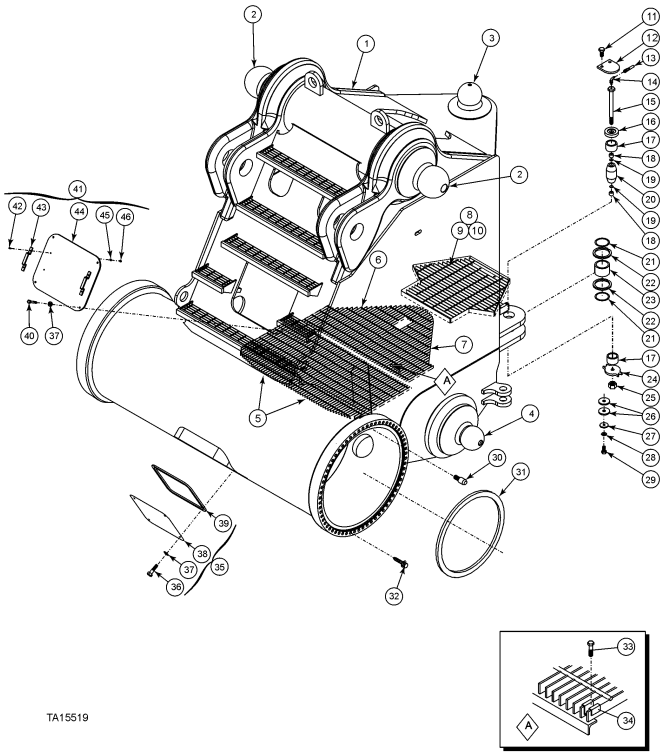


1) Bucket, **2)** Bellcrank, **3)** Lift Arms

Frames

Front Frame

Figure 4: L-1350 front frame and axle group-



1. Frame Structure, Front

2. Grating Structure, Front

3. Grating Structure, R.H. Rear

4. Grating Structure, L.H. Rear

5. Grating Structure, Center - Front Frame

6. Bolt

7. Lockwasher

8. Bolt

9. Cap, Pin Lug

10. Hose Assembly

11. Elbow

12. Bolt

13. Flatwasher

14. Bushing, Saw Cut

15. Sleeve, Retainer - O-Ring

16. O-Ring

17. Pin

18. Ring, Retaining - Internal

19. O-Ring

20. Bushing, Self-Aligning

21. Plate, Capture

22. Locknut

23. Flatwasher

24. Flatwasher

25. Lockwasher

26. Bolt

27. Dowel Pin, Threaded - Driver to Axle Housing

28. Seal, Axle/Motor

29. Capscrew

30. Bolt

31. Fastener, Grating

32. Cover Assembly

33. Bolt

34. Flatwasher

35. Cover Structure, Axle Access

36. Seal, Rubber

37. Bolt

38. Cover Assembly

39. Bolt

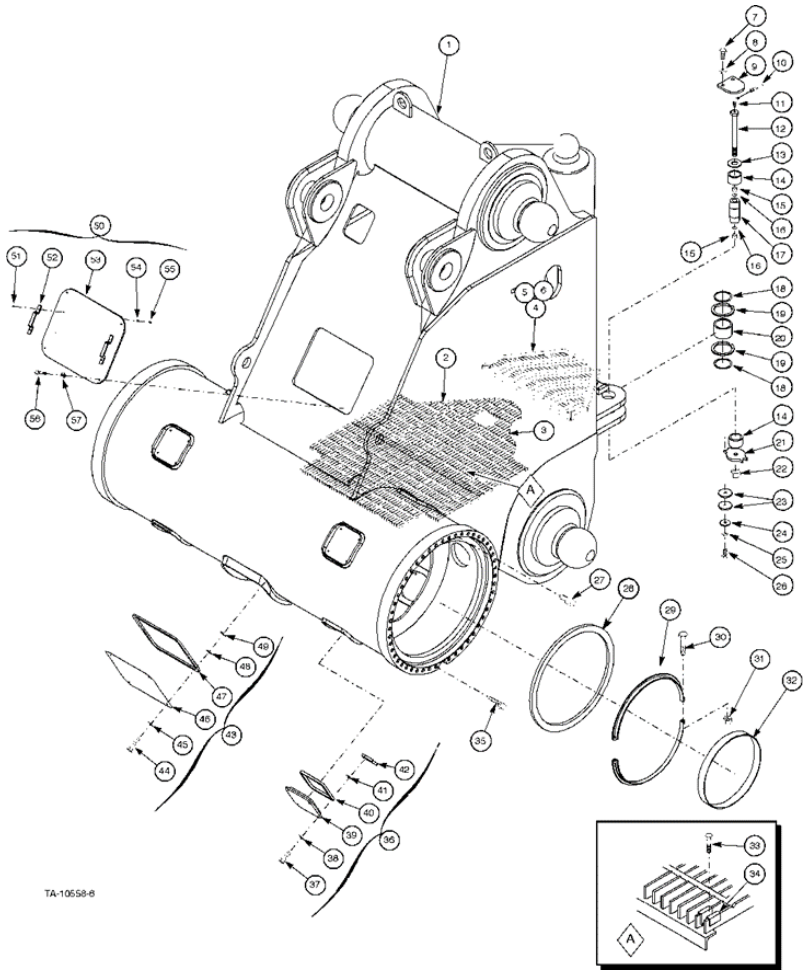
40. Handle

41. Cover Structure

42. Lockwasher

43. Nut,

Figure 5: L-1850/L-2350 front frame and axle group



1. Frame Structure, Front

2. Grating Structure, R. H. - Front

3. Grating Structure, L.H. - Front

4. Grating Structure, Center - Front Frame

5. Bolt

6. Lockwasher

7. Bolt

8. Lockwasher

9. Cap, Pin Lug

10. Hose Assembly

11. Elbow

12. Bolt

13. Flatwasher

14. Bushing, Saw Cut

15. Sleeve, Retainer - O-Ring

16. O-Ring

17. Pin

18. O-Ring

19. Ring, Retaining - Internal

20. Bushing, Self-Aligning

21. Plate, Capture

22. Locknut

23. Flatwasher

24. Flatwasher

25. Lockwasher

26. Bolt

27. Dowel Pin

28. Seal, Axle/Motor

29. Support Structure, Axle/Motor Seal - Half

30. Bolt

31. Locknut

32. Seal Strip

33. Screw

34. Fastener, Grating

35. Capscrew

36. Cover Assembly, Axle - Small

37. Bolt

38. Flatwasher

39. Cover Structure

40. Seal, Rubber

41. Flatwasher

42. Pin, Cotter

43. Cover Assembly, Axle - Large

44. Bolt

45. Flatwasher

46. Cover Structure, Axle Access

47. Seal, Rubber

48. Flatwasher

49. Pin, Cotter

50. Cover Assembly, Access - Main Valve

51. Bolt

52. Handle

53. Cover Structure

54. Lockwasher

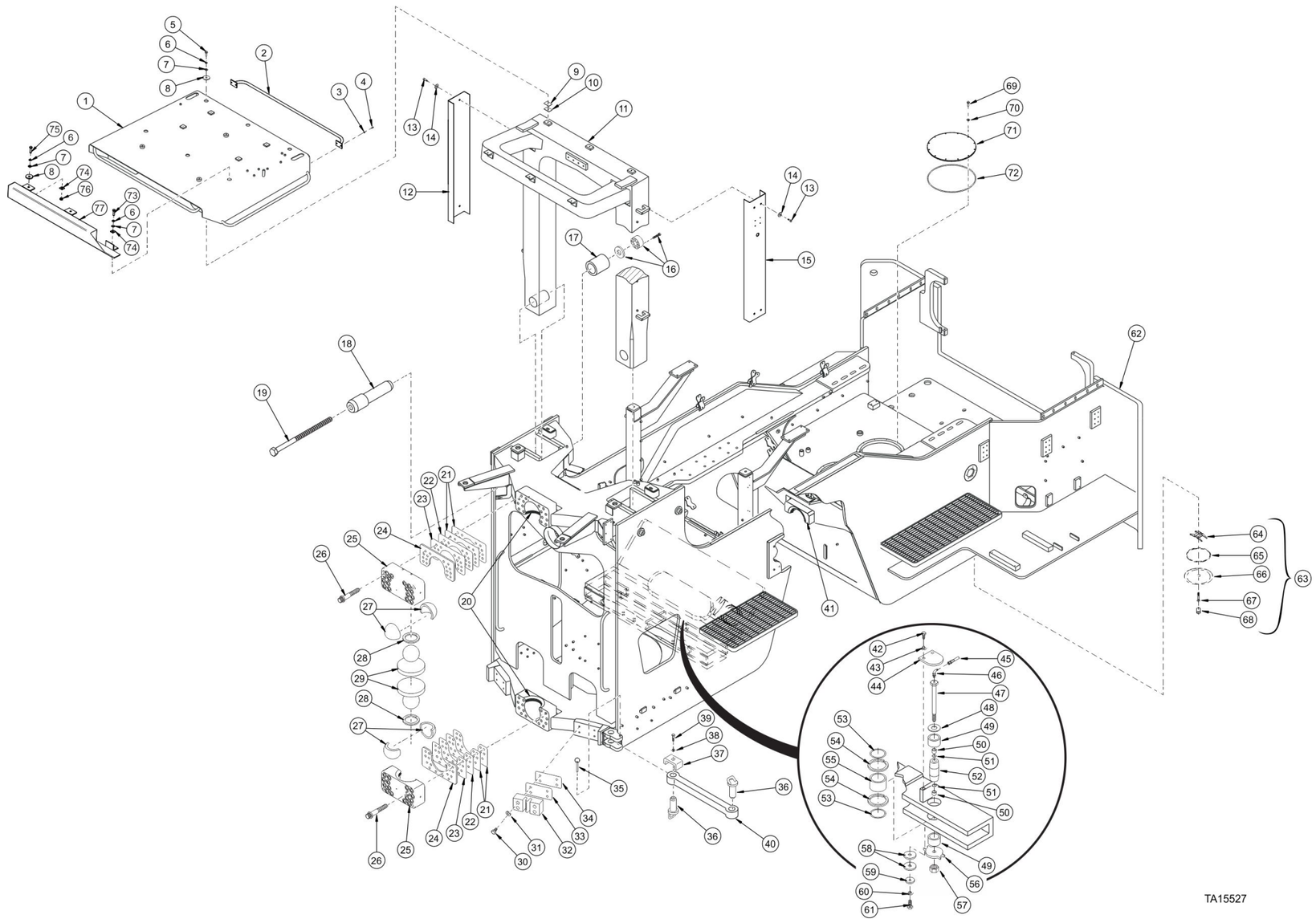
55. Nut

56. Bolt

57. Flatwasher

Rear Frame

Figure 6: L-1350 rear frame group (typical)



1. FOPS Assembly
2. Handrail Structure, FOPS
3. Lockwasher
4. Bolt
5. Bolt
6. Lockwasher
7. Flatwasher
8. Flatwasher
9. Shim
10. Shim
11. Roll Bar Structure
12. Cover Structure, ROPS - R.H.
13. Bolt
14. Lockwasher
15. Cover Structure, ROPS - L.H.
16. Nut, Torque
17. Plate Structure, Capture
18. Pin, Roll Bar
19. Bolt
20. Socket, Ball
21. Shim, .007"
22. Shim, .018"
23. Shim, .030"
24. Spacer, 1/4"
25. Cap, Ball
26. Capscrew
27. Liner, Ball - Half
28. Seal, Ball
29. Ball And Base, Steering Pivot
30. Bolt
31. Lockwasher
32. Stop Block
33. Spacer
34. Shim
35. Pin, Self-Locking
36. Pin Structure, Safety Link
37. Retainer, Pin
38. Lockwasher
39. Bolt
40. Safety Link
41. Socket, Ball
42. Bolt
43. Lockwasher
44. Cap, Pin Lug
45. Hose Assembly
46. Elbow
47. Bolt
48. Flatwasher
49. Bushing, Sawcut
50. Sleeve, Retainer - O-Ring
51. O-Ring
52. Pin
53. Ring, Retaining - Internal
54. O-Ring
55. Bushing, Self-Aligning
56. Plate, Capture
57. Locknut
58. Flatwasher
59. Flatwasher
60. Lockwasher
61. Bolt
62. Frame Structure, Rear
63. Cover Assembly, Access - Fuel Tank
64. Clamp Structure
65. O-Ring
66. Cover Structure
67. Capscrew
68. Plug, Pipe
69. Bolt
70. Lockwasher
71. Cover, Fuel Tank
72. O-Ring

NOTICE

Fuel reservoir is an integral part of the frame

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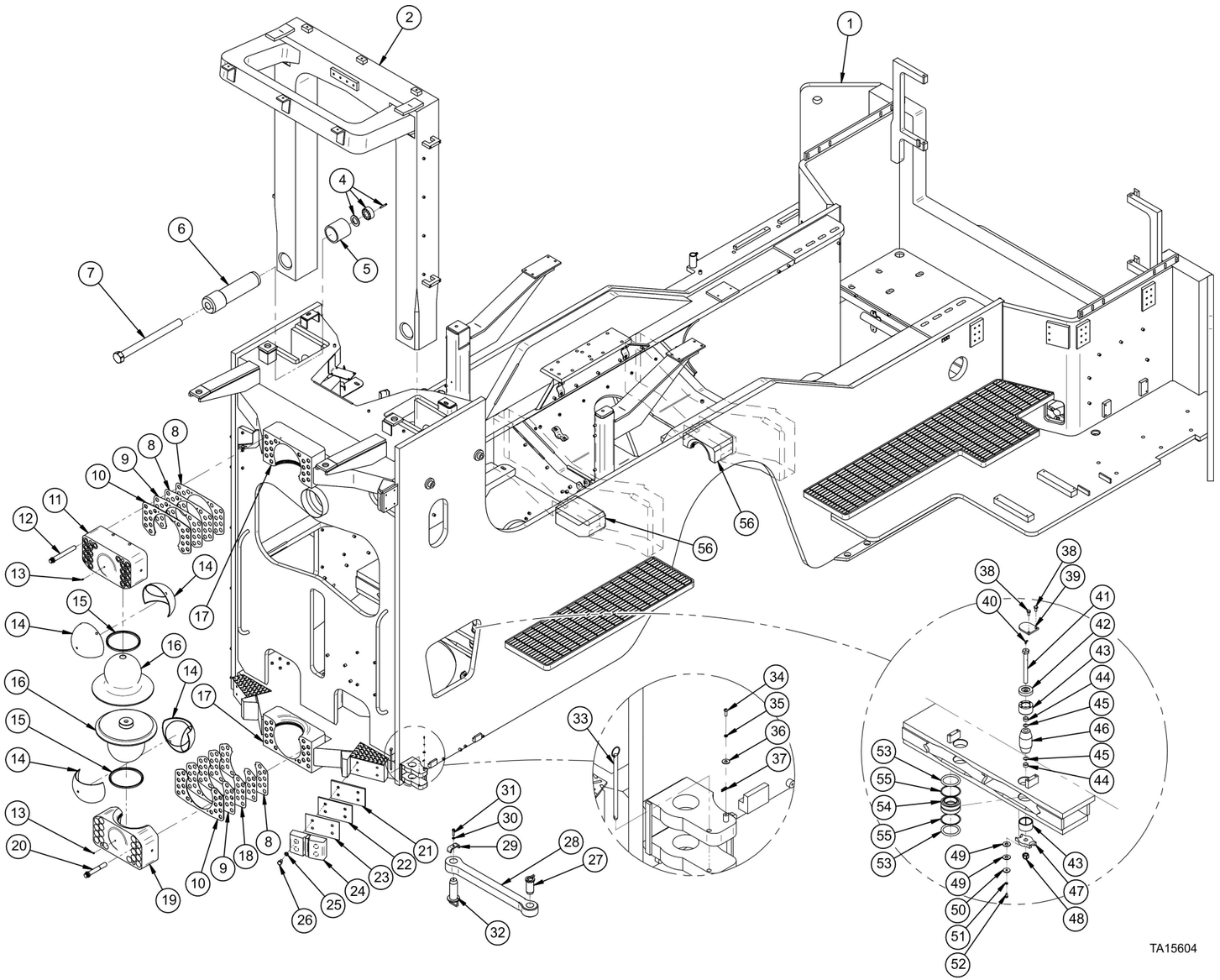
Figure 7: L-1850/L-2350 rear frame group (typical)



1 Frame Structure, Rear
2 Roll Bar Structure
3 Pin Group, Rollbar
4 Nut, Torque
5 Plate Structure, Capture
6 Pin, Roll Bar
7 Bolt
8 Shim, .007"
9 Shim, .018"
10 Shim, .030"
11 Cap, Ball
12 Capscrew
13 Plug, Pipe - Hex CSK.
14 Liner, Ball - Half
15 Seal, Ball
16 Ball And Base
17 Socket, Ball
18 Spacer, 3/16"
19 Cap, Ball
20 Capscrew
21 Shim
22 Spacer
23 Spacer
24 Stop Block
25 Lockwasher
26 Bolt
27 Pin Structure, Safety Link
28 Safety Link

29 Retainer, Pin
30 Lockwasher
31 Bolt
32 Pin Structure, Safety Link
33 Pin, Self-Locking
34 Screw
35 Lockwasher
36 Flatwasher
37 Chain
38 Bolt
39 Cap, Pin Lug
40 Elbow
41 Bolt
42 Flatwasher
43 Bushing, Sawcut
44 Sleeve, Retainer - O-Ring
45 O-Ring
46 Pin
47 Plate, Capture
48 Locknut
49 Flatwasher
50 Flatwasher
51 Lockwasher
52 Bolt
53 O-Ring
54 Bushing, Self-Aligning
55 Ring, Retaining - Internal
56 Socket, Ball

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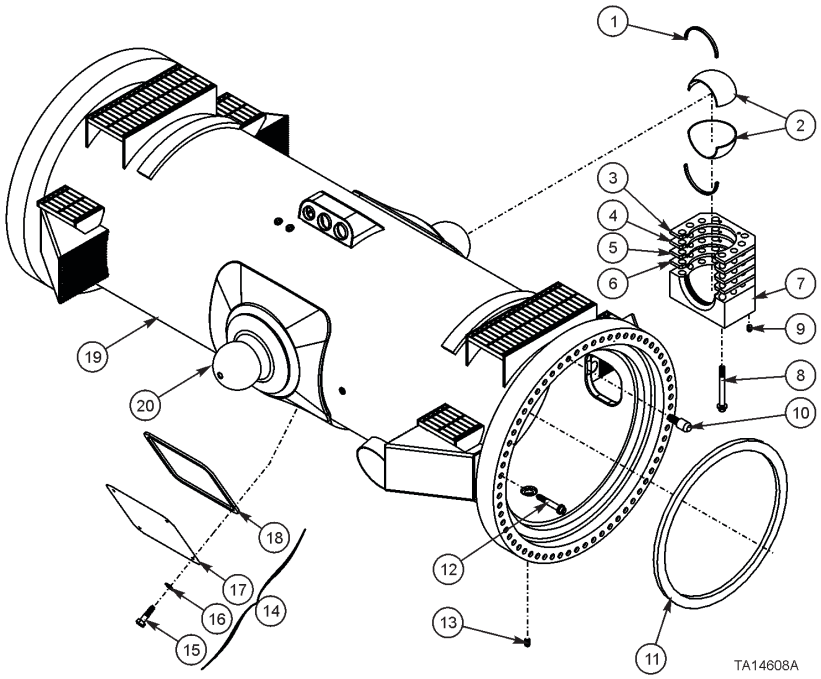
Oscillating Axle Assembly

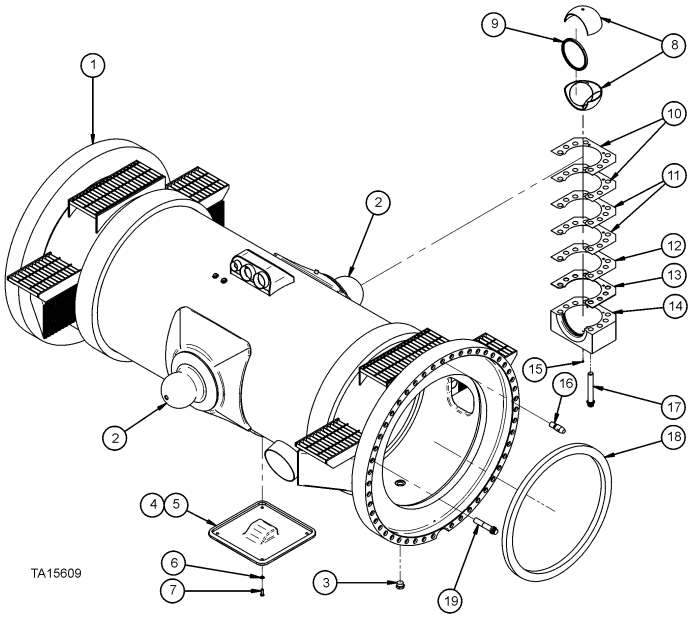
The oscillating axle is connected to the rear frame structure by use of two ball socket assemblies. Both ball base assemblies are welded to the axle structure. Ball liners are mounted within each ball socket and ball cap. This design allows the oscillating axle to adjust to ground irregularities, ensuring equal traction on each wheel. The rear frame is connected to the front frame by two ball pivots. This design provides an articulating frame with easier maneuverability and a shorter turning radius. Refer to illustrations “L-1350 rear axle group, L-1850 rear axle group or L-2350 rear axle group” (below) for the applicable Oscillating Axle Assembly.

Figure 8: L-1350 rear axle group



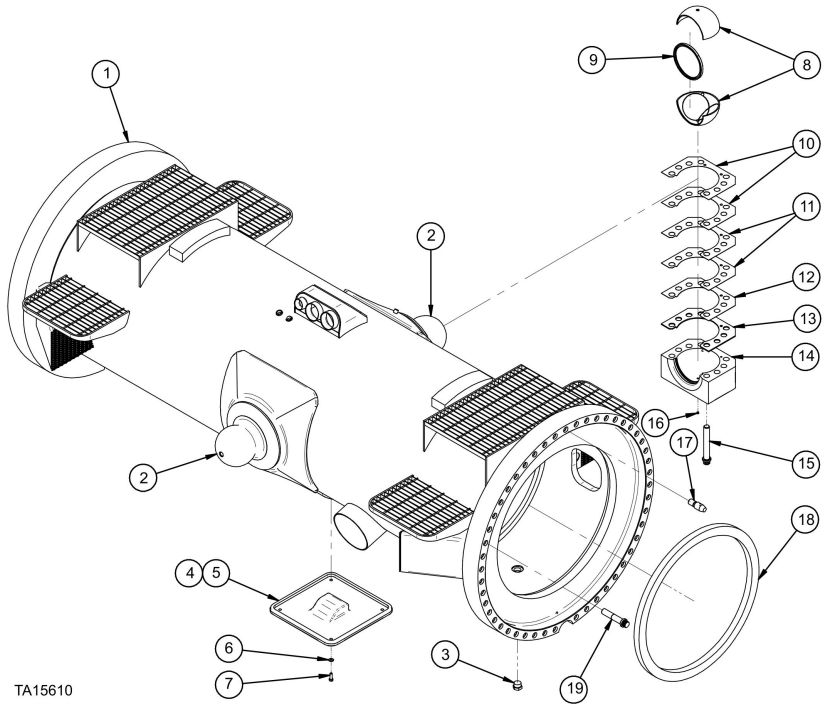
1. Seal, ball	**11.** Seal, axle/motor
2. Liner, ball	**12.** Capscrew
3. Spacer	**13.** Plug, pipe
4. Shim	**14.** Cover assembly, axle
5. Shim	**15.** Bolt
6. Shim	**16.** Flatwasher
7. Cap, ball	**17.** Cover assembly
8. Capscrew	**18.** Seal, rubber
9. Plug, pipe	**19.** Axle structure, rear
10. Dowel pin, threaded - driver to axle housing	**20.** Ball base

Figure 9: L-1850 rear axle group



1. Axle structure, rear	**11.** Shim, .018"
2. Ball and base, rear axle pivot	**12.** Shim, .030"
3. Plug, pipe	**13.** Spacer, 3/16"
4. Cover group, axle access	**14.** Cap, ball
5. Cover assembly, axle access	**15.** Capscrew
6. Flatwasher - conical	**16.** Plug, pipe
7. Bolt	**17.** Dowel pin
8. Liner, ball - half	**18.** Seal, axle/motor
9. Seal, ball	**19.** Capscrew
10. Shim, .007"	

Figure 10: L-2350 rear axle group

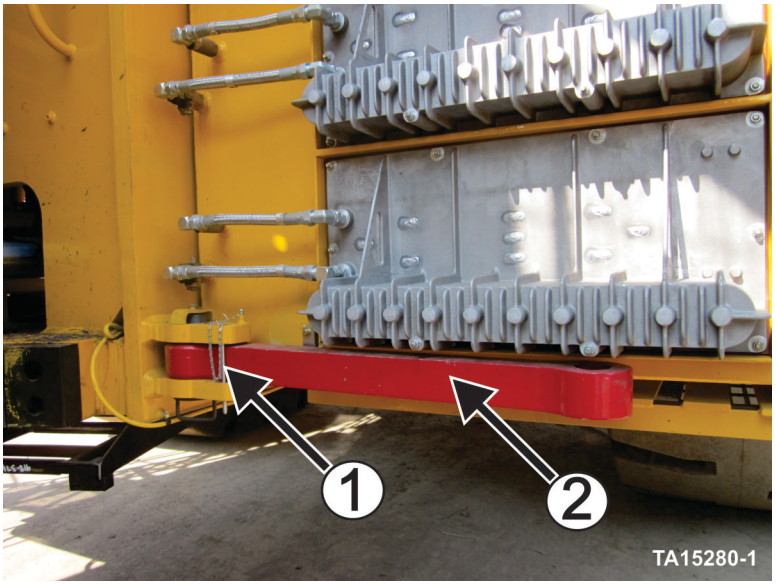


1. Axle structure, rear
2. Ball and base, rear axle pivot
3. Plug, pipe
4. Cover group, axle access
5. Cover assembly, axle access
6. Flatwasher - conical
7. Bolt
8. Liner, ball - half
9. Seal, ball
10. Shim, .007"
11. Shim, .018"
12. Shim, .030"
13. Spacer, 3/16"
14. Cap, ball
15. Capscrew
16. Plug, pipe
17. Dowel pin
18. Seal, axle/motor
19. Capscrew

Protective Structures

RollOver and Falling Object Protective Structure (ROPS and FOPS)

Figure 11: Rollover protective structure (ROPS) and falling object protective structure (FOPS) assembly (typical)



1. Falling object protection structure (FOPS) structure

2. Handrail structure

3. Lockwasher

4. Bolt

5. Bolt

6. Lockwasher

7. Flatwasher

8. Flatwasher

9. Shim

10. Shim

11. Roll over protection structure (ROPS)

12. Cover structure

13. Bolt

14. Lockwasher

15. Cover structure

16.L-1850-L-2350 (Super nut)

16.L-1350 (Single nut)

17. Plate structure

18. Pin

19. Bolt

20. Bolt

21. Square washer

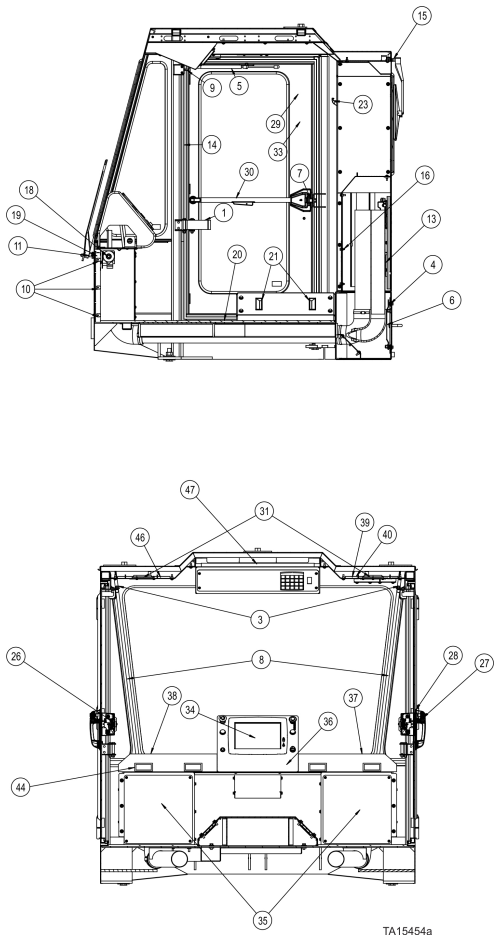
22. Bolt

23. Locknut

24. Mount structure

Cab Structure

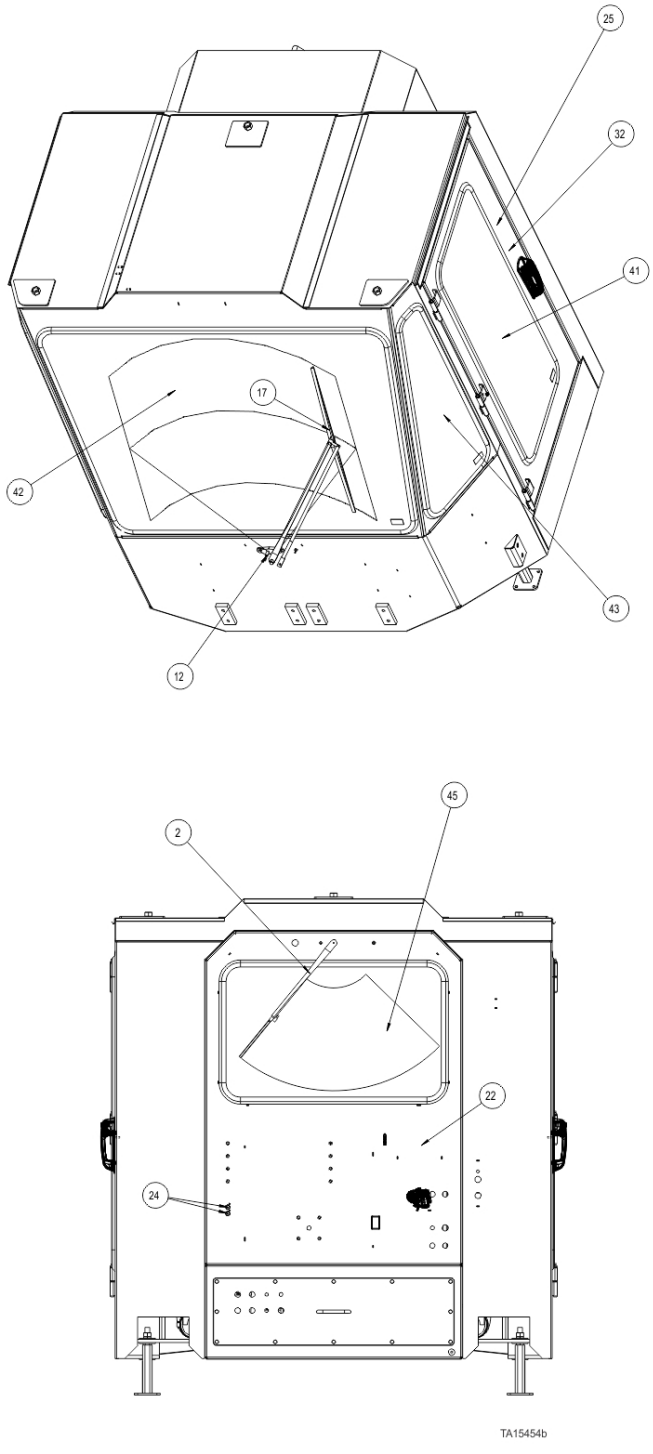
Figure 12: Cab assembly (1 of 2) (typical)



1. Strap, Door Holder
3. Gas Spring Cylinder Ball Stud
4. Rubber Seal Strip
5. Gas Spring Cylinder
6. Strap Tether
7. Striker Stud and Washer
8. PVC Trim Edge
9. Switch, Dome light
10. U-Clip Nut
11. Front Wiper Shaft Assembly
13. Seal Strip
14. Seal door
15. Wiper Motor
16. Fastener
18. Front Wiper Motor
19. Front Wiper Motor Arm
20. Floor Mat
21. Handle Pull Pocket

23. Coat Hook Plastic
26. Left Hand Interior Handle
27. Pull Handle
28. Pull Handle Gasket
29. R.H. Door Assembly
30. R.H. Interior Handle
31. Dome Light LED Assembly
33. R.H. Door Structure
34. Control Panel Assembly
35. Control Panel Structure
36. Center Dash Panel
37. Right Dash Panel
38. Left Dash Panel
39. R.H. Ceiling Panel; Assembly
40. R.H. Ceiling Panel Structure
46. L.H. Ceiling Panel Structure
47. Center Ceiling Panel Structure

Figure 13: Cab assembly (2 of 2) (typical)



2. Rear Wiper Arm

12. Pantograph Adapter

17. Front Wiper Blade

22. A/C and Heater Assembly

24. Wiper Cowl Fitting

25. L.H. Door Assembly

32. L.H. Door Structure

41. Door Glass

42. Front Glass

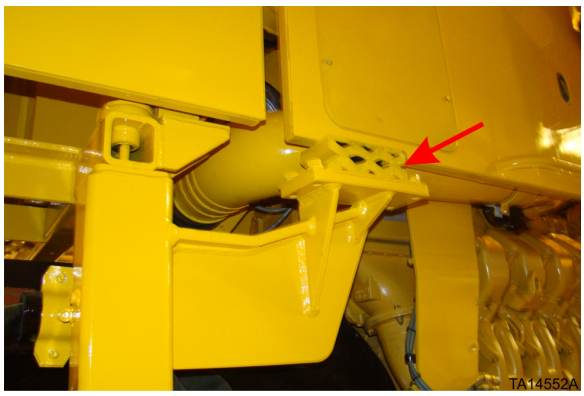
43. Side Glass

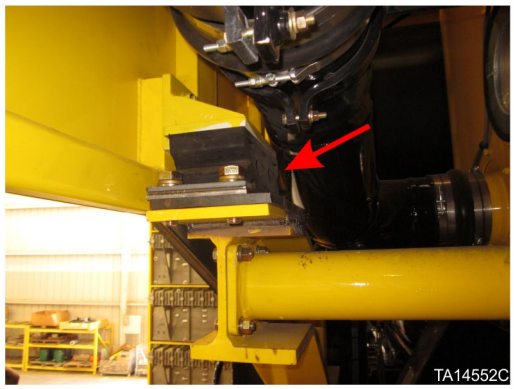
45. Door Glass

Rear Frame Hood

Some hood structures are secured with a “lattice mount block”. The bolts in this type of mount should be tight at all times. These mount blocks, on some machines, may be inside the hood.

Figure 14: Typical hood mount





Sound Abatement Panels

Machines can be fitted with sound abatement panels (optional) designed to lower the sound emitted by the power unit components. One panel is opened by using a locking handle latch on the outside of the panel. The companion panel can be opened by releasing the latch inside the panel by simultaneously pulling up on the bottom latch and pulling down on the top latch and pulling it open.

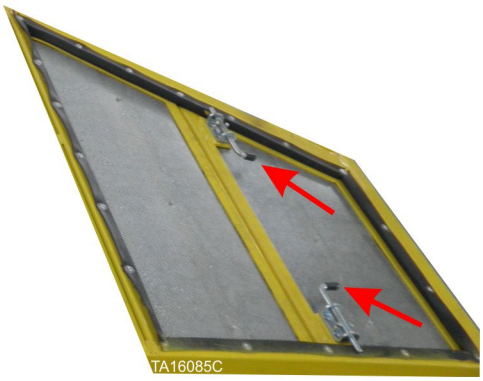
The panels should be lubricated with grease as needed to ensure free operation.

⚠ WARNING

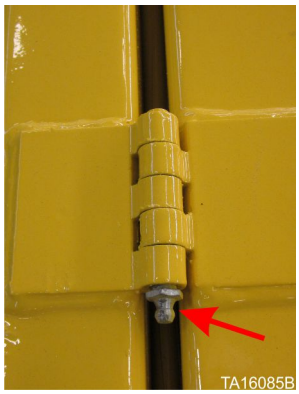
Fall hazard or struck-by hazard exists when opening the sound abatement panels. If the loader is on a slight incline or in windy conditions, the panel could quickly swing wide open. The panels are heavy. Do not stand in front of the panel when releasing the handle or internal latches. Stand on the opposite side of the door hinge when opening the door. Standing in front of the panel when opening it can cause a fall or a struck-by injury that results in serious injury or death.

Figure 15: Typical sound abatement panel

Panel handle latch



Latches inside panels (top and bottom)

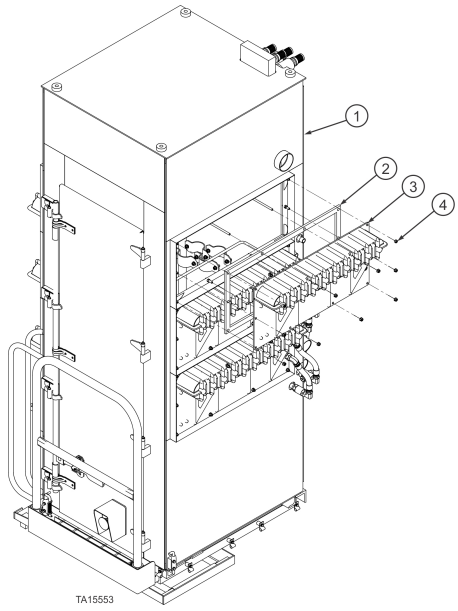


Grease zerk for panel hinge

High Voltage Cabinet

The high voltage cabinet is sometimes referred to as “electrical converter cabinet”.

Figure 16: Electrical converter cabinet (typical)



1. Electrical Converter Cabinet

2. Converter Panel Seal

3. Converter Panel

4. Converter Panel Retaining Nut

Machine Model	# of Converter Panels
1350	7
1850	12
2350	12

Counter Weights

Current production machines have counter weights attached by bolts to the rear of the machine. The weights may be in various locations:

- On either side of rear frame, near access ladders/battery boxes (L-2350).
- On the rear bumper (L-2350).
- Under rear of rear frame, in middle, under radiator (L-1350/1850/2350)

The weights and bolts must be checked for damage and checked to ensure they are secure. The bolts that secure the weights should be checked for damage and proper torque at the 2,000 hour interval, per the PM schedules.

Before checking torque, the weights must be properly supported by external supports such as jacks designed to support the weights.

⚠ WARNING

Crush hazards exist under rear of machine. Counter weight mounted under the rear frame. Do not enter this area unless the counterweights have been externally supported to prevent falling. Do not loosen the bolts for the counterweight structure unless the counter weights are externally supported. Entering the area under the counterweights or loosening the counterweight bolts without externally supporting the counterweights could cause a crush hazard resulting in serious injury or death.

⚠ WARNING

Crush hazards exist when installing counter weights, if the machined mating surfaces are not clean and free of foreign debris such as rust, dirt, or paint. Check the machined surfaces before installing the counterweights. Clean the surfaces of any foreign debris before installing the counterweights. Failure to check (and clean) the machined surfaces for dirt, paint, rust or other foreign debris before installing the counterweights could cause crush hazard resulting in serious injury or death.

⚠ WARNING

Crush hazards exist under rear of machine. Counter weight mounted under the rear frame. Do not enter this area unless the counterweights have been externally supported to prevent falling. Do not loosen the bolts for the counterweight structure unless the counter weights are externally supported. Entering the area under the counterweights or loosening the counterweight bolts without externally supporting the counterweights could cause a crush hazard resulting in serious injury or death.

The counterweight bolts must be inspected at no longer interval than the 2000 hour PM.

- Inspect for external damage such as rocks scraping the counterweight and bolt head
- When performing an inspection, check the torque to ensure that the bolts are tight

Counterweight bolts that are found to be loose or damaged during the PM inspection (or any other inspection, procedure, or process) shall be removed and inspected to ensure they are not defective.

- Counterweight bolts with damage to the head shall be replaced.
- Counterweight bolts with damage to the shoulder shall be replaced.
- Counterweight bolts that are found to be bent, shall be replaced.
- Counterweight bolts with thread damage shall be replaced.

- Counterweight bolts with corrosion of any type shall be replaced.
- Counterweight bolts that appear to be good should be crack inspected – if it cannot be inspected – it shall be replaced.

Counterweight bolts that are found defective shall be replaced with only original OEM bolts that are grade 8 or better.

- Counterweight bolts part numbers are located in the Parts Manual.

When installing counterweight bolts, there should be sufficient exposed threads for the lock nut to work properly.

Correct washers should be used between the bolt/nut and the counterweight. Reference Parts Manual.

⚠ WARNING

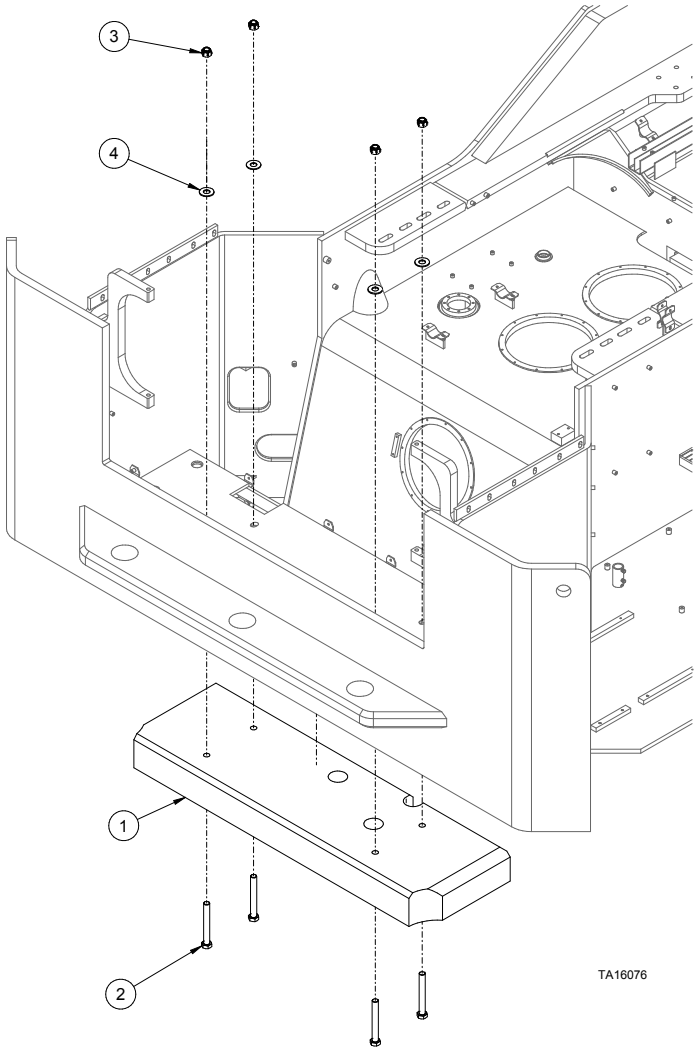
Crush hazards exist if loosening counterweight bolts. Before loosening counter weight bolts, check the machine Parts Manual for counter weight part number; to ensure the weight of the counter weight listed in this document is accurate. Some machines might have counter weights not listed in this document. Failure to determine accurate counterweight weight can cause crush hazards resulting in serious injury or death.

NOTICE

In the following illustrations, the counter weight pictured may appear slightly different from actual counter weights.

Figure 17: Typical counter weight location for L-1350

Machine Model	Location	CW PN	Weight
L-1350	Under rear of rear frame, in middle, under radiator.	R4182851	5,000 lbs. (2,268 kgs)



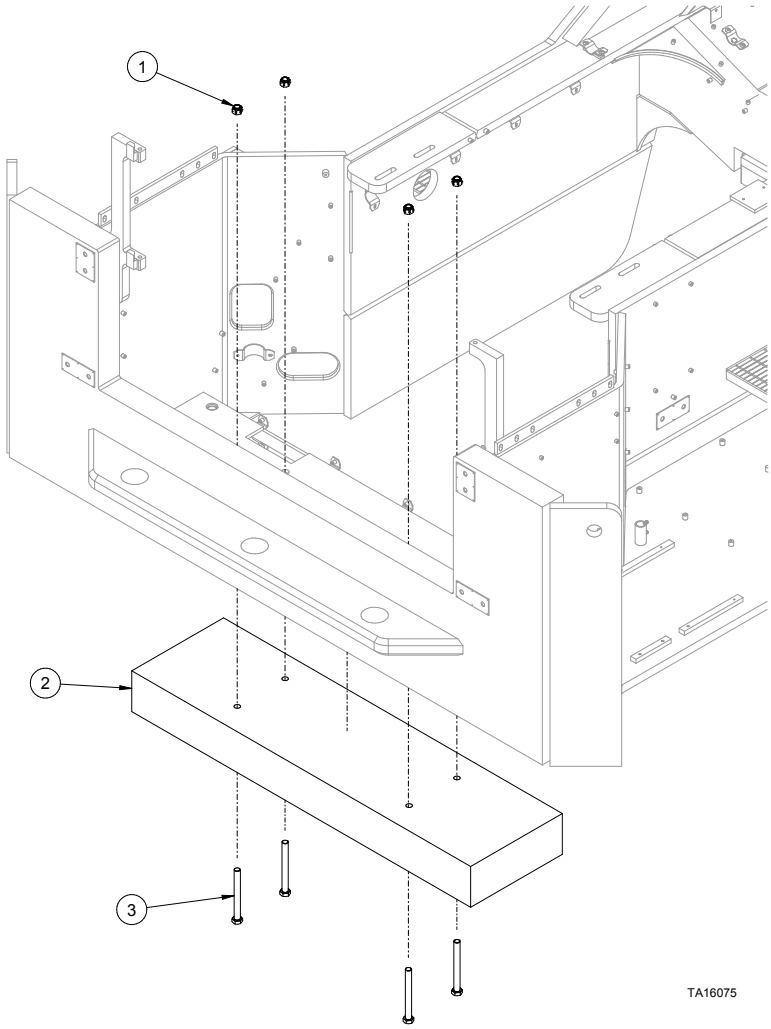
1. Counterweight	3. Locknut
2. Bolt	4. Flatwasher

WARNING

Crush hazards exist if loosening counterweight bolts. Before loosening counter weight bolts, check the machine Parts Manual for counter weight part number; to ensure the weight of the counter weight listed in this document is accurate. Some machines might have counter weights not listed in this document. Failure to determine accurate counterweight weight can cause crush hazards resulting in serious injury or death.

Figure 18: Typical counter weight location for L-1850

Machine Model	Location	CW PN	Weight
L-1850	Under rear of rear frame, in middle, under radiator.	R4273984	7,200 lbs. (3,266 kgs)



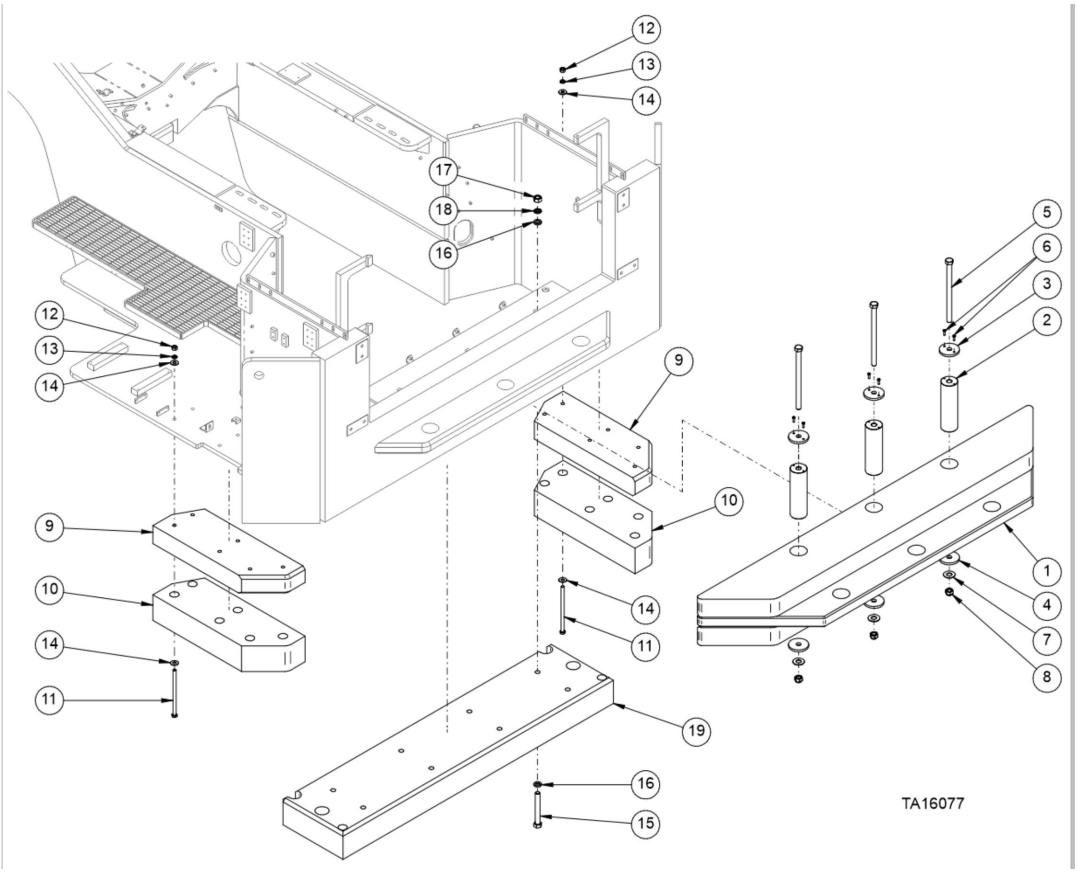
1. Locknut **2.** Counterweight	**3.** Bolt

WARNING

Crush hazards exist if loosening counterweight bolts. Before loosening counter weight bolts, check the machine Parts Manual for counter weight part number; to ensure the weight of the counter weight listed in this document is accurate. Some machines might have counter weights not listed in this document. Failure to determine accurate counterweight weight can cause crush hazards resulting in serious injury or death.

Figure 19: Typical counter weight location for L-2350

Machine Model	Location	CW PN	Weight
L-2350	Under rear of rear frame, in middle, under radiator.	R4246005	9,500 lbs (4,310 kgs)
	Under steps, left and right side of machine	R4246037	1,800 lbs (817 kgs)
		R4246241	2,400 lbs (1,089 kgs)
	On rear bumper	R4272461	13,000 lbs (5,897 kgs)



1. counterweight	**8.** locknut	**15.** bolt
2. pin	**9.** counterweight	**16.** flatwasher
3. plate	**10.** counterweight	**17.** nut
4. plate	**11.** bolt	**18.** lockwasher
5. bolt	**12.** nut	**19.** counterweight
6. bolt	**13.** lockwasher	
7. flatwasher	**14.** flatwasher	

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Settings and Adjustments

Securing the Converter Panels in the High Voltage Cabinet

Safety Preparations — Mechanical

Use the following procedure to isolate energy sources before performing any removal, replacement, or installation procedures described in this document.

⚠ WARNING

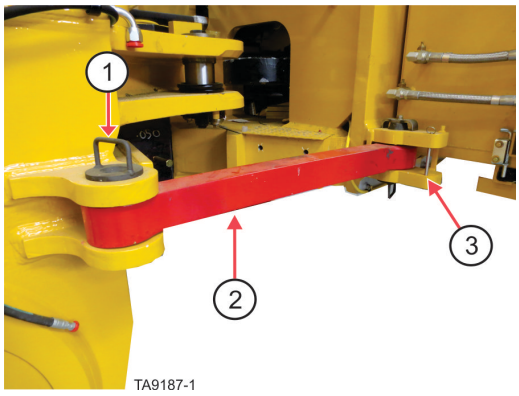
Crush hazards exist if the machine is started or moved while work processes are being performed on the machine. Place bucket flat and level on the ground. Place frame lock in the locked position and lock out the machine's starting capability before performing any work process. Follow all applicable lockout procedures and local rules and regulations for performing work processes. ANYONE performing inspections or service procedures to the machine should be familiar with ALL instructions and procedures contained in the machine's SERVICE MANUAL. Crush hazard could occur if the machine is started or moves while any type of work process is being conducted on the machine, resulting in serious injury or death.

Step 1: Stop the wheel loader on flat level ground.

Step 2: Move the frame lock to the locked position so that the frame cannot be steered.

⚠ WARNING

Crush hazards exist in machine pivot area and area between the tires. Do not enter these areas unless it is verified that the operator has control over the steering and that personnel locking the frame lock have good communication with the operator. Entering the pivot area and area between the tires while the machine is moving or pivoting (articulating) could cause crush hazards resulting in serious injury or death.



1) Retaining pin for locked position, **2)** Frame lock - shown in locked position, **3)** Retaining pin bracket for un-locked position

Frame lock in locked position

Step 3: Place wheel chocks in front and behind each wheel.

Step 4: Set bucket flat and level on the ground.

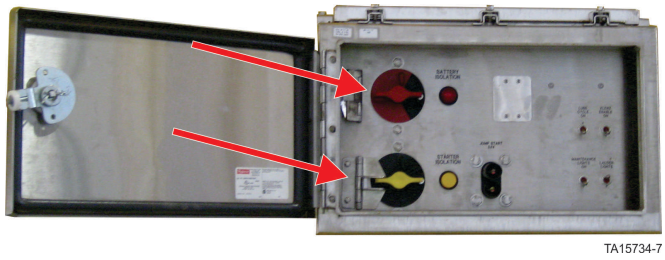
Step 5: Set the parking brakes.

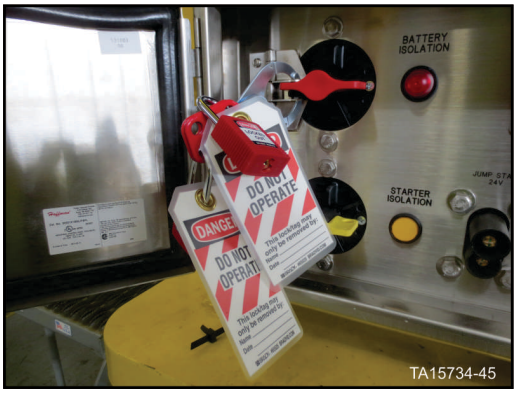
Step 6: Shut off the engine.

WARNING

Crush, shock, or other hazards exist if stored energy is not removed or isolated prior to working on the machine. Stored energy (hydraulic, electrical, pneumatic, mechanical, etc.) may be present if not isolated or released prior to working on the machine. Do not work on the machine without removing this stored energy (suspended loads, electrical power, air pressure, etc.). Risk of crushing, shock, or other physical injury exists if stored energy is not removed or isolated prior to working on the machine which could result in serious injury or death.

Step 7: Turn the battery and engine isolation switches to the off position and install locks on the battery isolation switch.

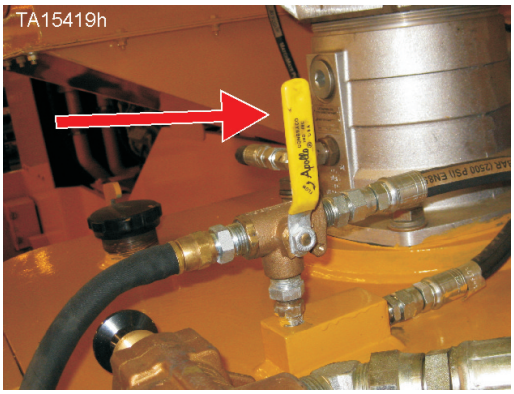




Battery Isolation Box – Battery isolation switch in OFF position with locks in place

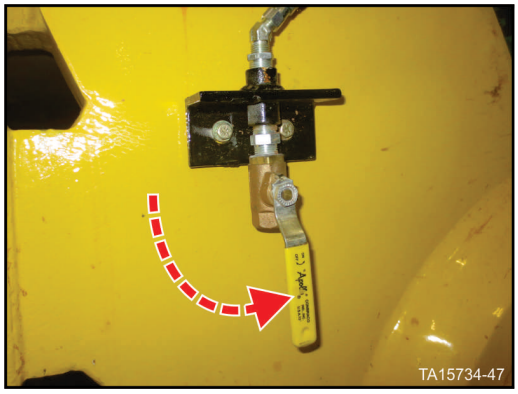
Step 8: Release the air from the hydraulic reservoir by using the hydraulic reservoir air valve (ball valve) on top of the reservoir.

- Turn the handle to the up position as shown below.
- The air supply line from main air system will be blocked.
- The reservoir air will vent out the hose that runs down the outside of the hydraulic reservoir.

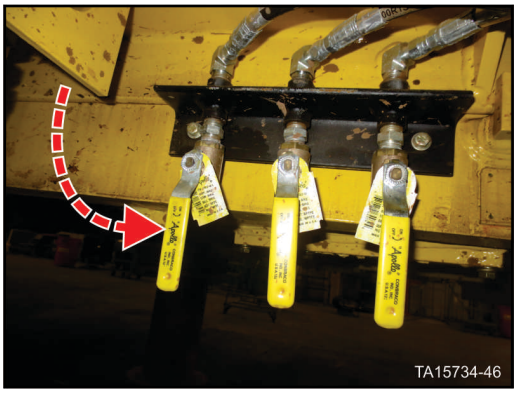


Hydraulic reservoir air valve handle UP

Step 9: Release the air from the various air storage reservoirs by opening all of the air bleed valves.



One valve on right side of front frame near hoist cylinder ball cap



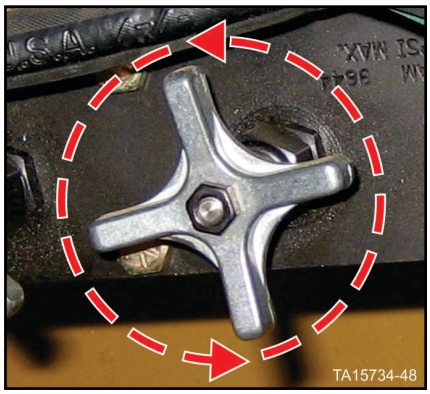
Three valves on right side of rear frame under hydraulic reservoir

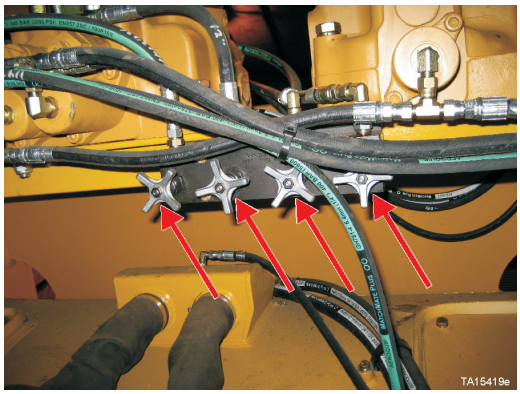
Open air reservoir bleed valves

Step 10: Use the hydraulic pressure bleed down valves located in the front frame underneath the Husco valves to bleed any stored pressure in the hoist and bucket cylinders.

Step 11: Turn each valve slowly counterclockwise as shown below and allow the pressure to bleed down.

Step 12: Open the valve completely and leave it open during this procedure.





Hoist and bucket circuit hydraulic pressure bleed down valves

Additional Safety Preparations with Draining Converter System Coolant

Use the following additional procedure to isolate energy sources before performing any removal, replacement, or installation procedures described in this document.

Step 1: Following all local environmental rules and regulations, drain the converter cooling reservoir and any residual fluid from reservoir, converters, and lines.

NOTICE

Environmental hazard exists when draining, filling, or disposing of component fluids. Spills are possible. Follow all appropriate environmental regulations for containing and disposing of fluids during any procedure that involves component fluids. Failure to follow all appropriate regulations for containing and disposing of fluids can cause an environmental hazard resulting in an environmental chemical spill.

Securing the Converter Panels

Step 1: Before torquing the nuts, check the seal around the panel.

- The seal should be spaced smoothly and evenly, horizontally and vertically, on the sealing surface.

Step 2: Check inside the cabinet for light around the panel sealing surface.

- There should not be any significant gaps.
- DO NOT tighten the retaining nuts until the panel fits properly into the opening.

Step 3: Install and hand tighten all the nuts.

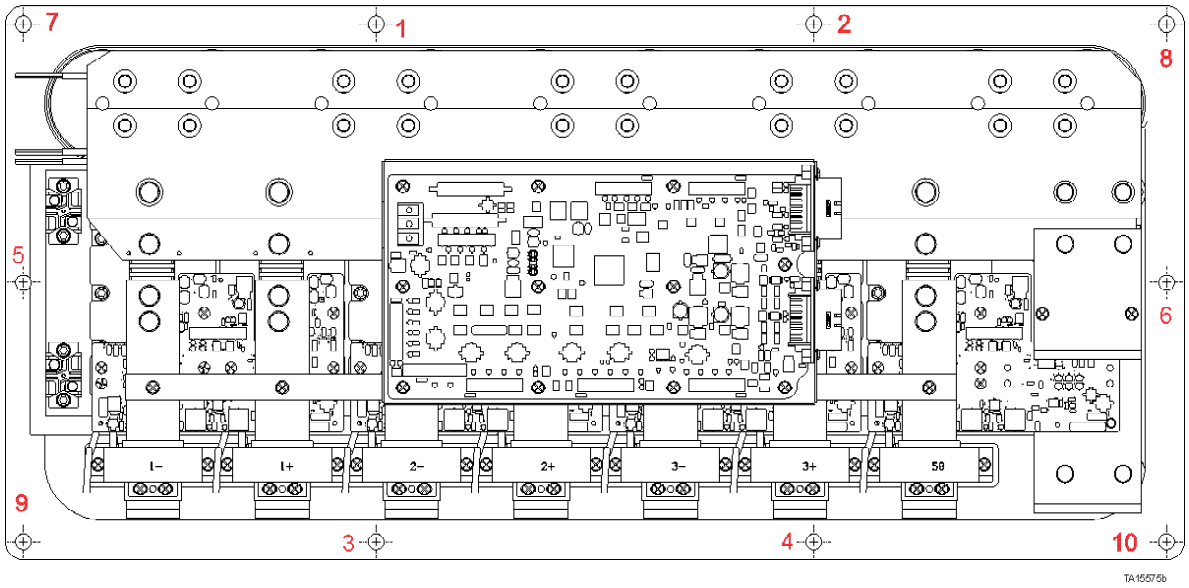
CAUTION

When a converter panel is installed, DO NOT torque the panel retaining nuts more than 8 lbf. (10.8 N•m) (This number has been reduced from the original 16 lbf (21.7 N•m) that may appear in other publications). Over torquing the nuts may damage the converter panel beyond repair. If this occurs, the panel will have to be replaced.

Step 4: Torque the nuts to 8 lbf ft. (10.8 N•m).

- Follow the torque pattern below.
- Multiple passes through the torque pattern may have to be completed before reaching the torque specification.

Figure 20: Converter panel tightening sequence



Servicing the RollOver Protection Structure (ROPS) Torque Nut

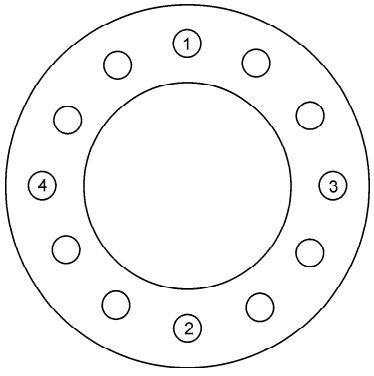
Check the torque on the ROPS torque nut capscrews after the initial 250 hours of operation and every 500 hours thereafter. The proper torque is 114 ft. lbs. (154.6 N•m) lubed, per bolt. Refer to illustration Torque nut and torque sequence as used on ROPS (typical) for bolt torque sequence.

NOTICE

The service intervals for the ROPS torque nut capscrews are listed on the SERVICE UPON RECEIPT CHECKLIST and the MODULAR PREVENTIVE MAINTENANCE SCHEDULES - POST BREAK-IN PERIOD, located in Section 02 of the Service Manual.

Figure 21: Torque nut and torque sequence as used on ROPS (typical)


TA15358F



TA15377A

Tighten (4) jackbolts at 90º apart.

NOTICE

Tensioners with 4 or 6 jackbolts – use a star pattern for all steps.

Step 1: Spin the tensioner onto the main thread until it seats against the washer. You may want to back off the tensioner 1/16” to 1/8” gap before tightening.

Step 2: Tighten (4) jackbolts at 90º apart (at the 12:00, 6:00, 9:00, and 3:00 o’clock position) on all studs with a partial torque (30 – 70%). This serves to seat the flange. If using an air impact wrench, use a reduced setting or lightly pulse the trigger at the full setting.

Step 3: At 100% target torque, tighten the same (4) jackbolts on all studs.

Step 4: At 100% target torque, tighten all jackbolts in a circular pattern. Do this for all studs (1 round only).

Step 5: Repeat “STEP 4” until all jackbolts are stabilized (less than 10º rotation). This usually requires 2 – 4 additional passes. If using air tools, switch to a torque wrench when socket rotation is small. Use the torque wrench to stabilize at the target torque.

Helpful Tips for Supernuts®

Prior to Tightening:
1)Check threads of main stud: If possible, verify that the tensioners spin on prior to the installation date. If a tensioner is tight or will not thread on, try using lapping compound on the main thread and work the tensioner in a back and forth motion making small advances when the thread loosens up. If necessary, chase the studs with a die.
2) Use of spacers: Tensioners should be positioned at the ends of the studs to minimize exposed threads and facilitate easy access to the jackbolts. A spacer (or stacked washers) can be used beneath the special hardened washer to accomplish this. A spacer will also “step over” a damaged area on a stud where years of bolting have deformed the first few threads.
3) Back the tensioner off before tightening to provide 1/16” (1.59mm) to 1/8” (3.175 mm) gap: The additional jackbolt extension provides easy access for oiling the jackbolt tips prior to removal. This is especially beneficial for oiling when the tensioners are inverted. Note: There may be insufficient jackbolt stroke to allow this step when tensioning exceptionally long bolts or tie rods, or when closing a gap between flanges.
4) For spinning the tensioner on and off the stud: Custom “sockets” which grip the tensioner are available. Also, two deep well sockets inserted over two jackbolt hex’s at 180º apart can serve as “handles” for spinning the tensioners on and off the studs.
For Tightening:
5) To improve efficiency when using impacts: Don’t wait for the socket to stall completely on a specific jackbolt before advancing to the next jackbolt. It is faster, overall, to move quickly between jackbolts.
6) Overshooting the target torque: You may want to use 110 - 120% of the target torque for Step 3, Step 4, and for 1-2 rounds of Step 5. This may eliminate a tightening round. Be careful not to stabilize all of the jackbolts at this torque however. For long bolts or tie rods, you may want to experiment using even higher torque values. Call Superbolt before using more than 120% target torque.
7) For gasketed joints: During gasket compression, the load is transferred to the jackbolts (i.e. stud) being tightened. Don’t be concerned if some jackbolts (or tensioners) become loose during the procedure. Continue following the procedure. Don’t spin down tensioners that become loose during gasket compression.
Helpful Tips For Removal
8) 1/4 turn or less!: Removing the jackbolts more than a 1/4 turn will increase the removal torque of the remaining jackbolts and you may get stuck. If this happens, you will have to retighten and start again.
9) Stuck jackbolt removal: If a jackbolt will not turn, remove, relube, and retighten a neighboring jackbolt and then try to turn it.

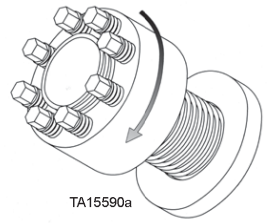
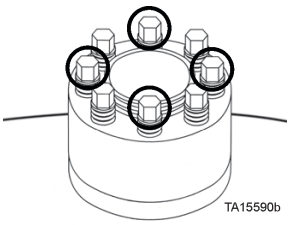
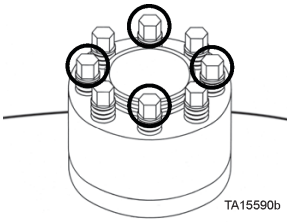
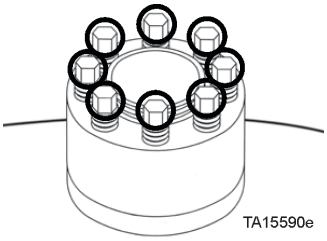
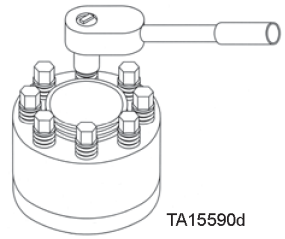
Air Impact Tool Selection (90 PSI (620 kPa) Air Pressure)

NOTICE

The jackbolt torque actually achieved by an air impact wrench is usually only 30 - 50% of its rated output. For minimum hand work, use an air impact with an output of 110% - 120% target torque. For maximum power, use the largest air line fitting.

Up to 70 lbs-ft (311 N•m): For 15-35 lbs-ft (67-155 N•m) use a right angle ratchet or light duty 3/8” impact. For 35-70 lbs-ft (155-311 N•m) use a heavy duty 3/8” impact.
70-100 lbs-ft (311-445 N•m): Use a light duty 1/2” impact at a reduced pressure or setting. (Be careful not to over tighten! Calibrate the impact before starting.)
100-170 lbs-ft (445-756 N•m): For 100-130 lbs-ft (445-578 N•m) use a light duty 1/2” impact. For 130–170 lbs-ft (578-756 N•m) use a heavy duty 1/2” impact.
170-200 lbs-ft (756-890 N•m): Use a light duty 3/4” impact on low setting. Some heavy duty 1/2” impacts will also reach this range.
Over 200 lbs-ft (890 N•m): For 200-300 lbs-ft (890-1334 N•m), use a light to medium duty 3/4” impact. Over 300 lbs-ft (1334 N•m), use a heavy duty 3/4” impact.
Calibrating an air impact wrench: Tighten one jackbolt until the socket rotation stops and check the jackbolt with a torque wrench. The torque required to move the jackbolt further is the output of the impact as measured on Superbolt® tensioners.

Installation Procedure for Supernuts

 TA15590a	**Step 1:** Spin the tensioner onto the main thread until it seats against the washer. You may want to back off the tensioner slightly as mentioned in Helpful Tip #3.
 TA15590b	**Step 2:** Tighten (4) jackbolts at 90º apart (12:00, 6:00, 9:00, and 3:00) on all studs with a partial torque (30-70%). This serves to seat the flange. If using an air impact, use a reduced setting or lightly pulse and trigger at the full setting.
 TA15590b	**Step 3:** At 100% target torque, tighten the same (4) jackbolts on all studs.
 TA15590e	**Step 4:** At 100% target torque, tighten all jackbolts in a circular pattern. Do this for all studs (1 round only). See Helpful Tip #7 about using up to 120% torque.
 TA15590d	**Step 5:** Repeat ‘STEP 4’ until all jackbolts are stabilized (less than 10º rotation). This usually requires 2-4 additional passes. If using air tools, switch to a torque wrench when socket rotation is small. Use the torque wrench to stabilize at the target torque.

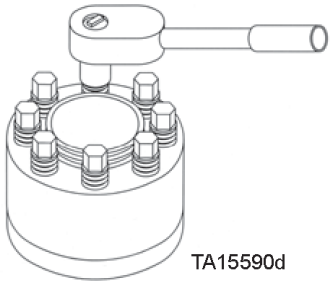
NOTICE

Product with 4 or 6 jackbolts – use a star pattern for all steps.Capscrew and Bolt-Nut Torque Specifications

Removal Procedure for Supernuts

CAUTION

Jackbolts must be unloaded gradually. If some jackbolts are fully unloaded prematurely, the remaining jackbolts will carry the entire load and may be hard to turn. With extreme abuse, a jackbolt tip can deform, making removal difficult.

<table>
<tr><th colspan="2">Service Under 250ºF (121ºC)</th></tr>
<tr><td colspan="2">Preparation: Spray jackbolts with penetrating oil or hydraulic oil prior to start (especially if product is in corrosive environment)</td></tr>
<tr><td rowspan="4"> 
TA15590d</td><td>Step 1: Loosen each jackbolt 1/8 turn following a circular pattern around the tensioner (1 round only). As you move around and get back to the first jackbolt, it will be tight again. Do this for all studs on the joint prior to the next step.

Step 2: Repeat a 2nd round as above for all studs, now loosening each jackbolt ¼ turn in a circular pattern.

Step 3: Continue loosening ¼ turn for 3rd and successive rounds until all jackbolts are loose.</td></tr>
<tr><td>NOTICE

NOTICE

Usually after the 3rd or 4th rounds, an impact can be used to completely extract the jackbolts, one by one. For long bolts or tie roads, additional rounds may be required before removing the jackbolts with an impact tool.</td></tr>
<tr><td>Step 4: Remove, clean and relubricate the jackbolts prior to next use with correct Superbolt lubricant (JL-G) Komatsu P/N 427-3753 (do not use any substitute).</td></tr>
</table>

Inspecting the Ball Cap and Liner

It is essential to perform periodic inspections of the ball cap and liner assemblies. Refer to “BALLS, CAPS AND PINS”, located in Section 03 of the Service Manual.

Inspecting the Cab

Weather protection is provided for the operator in an all-welded steel cab. A full 360° range of vision is provided from the operator’s station in the cab structure.

- The glass-enclosed cab is equipped with two full-length doors and a fixed windshield.

An electric windshield wiper may be installed on the windshield for use in inclement weather. Year-round comfort is insured with the thermostatically controlled heater and air conditioner (optional) mounted in the cab.

The operator's cab and console/seat assemblies should be inspected periodically for the following items:

- The glass and weather stripping must be intact and clean.

NOTICE

Glasses and weather stripping are replaceable items. Window frames may be purchased for replacement as a complete assembly only. Refer to the PARTS MANUAL for ordering information.

- The mounts must not be cracked or loose.
- Wiper blades are in good condition and wipers operating properly. The wiper blades should be replaced annually or more often if required.
- The operator's seat/console and seat belt are all in good condition and functioning properly. Service parts kits are available to repair the air suspension seat. Refer to the PARTS MANUAL when ordering parts.
- The heater and air conditioning (optional) are functioning properly.

Repairing the Operator's Seat

Use the following procedure to isolate energy sources before performing any removal, replacement, or installation procedures described in this document.

Safety Preparations Without Hydraulic Pressure Release

Use the following procedure to isolate energy sources before performing any removal, replacement, or installation procedures described in this document.

⚠ WARNING

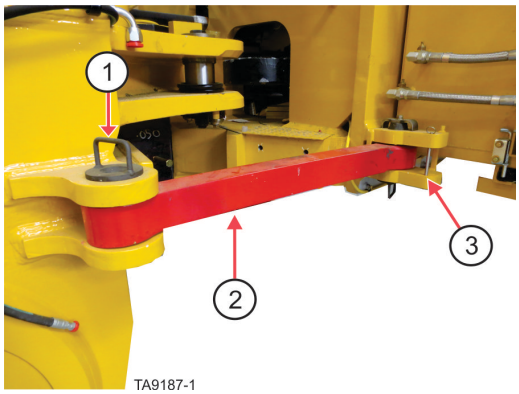
Crush hazards exist if the machine is started or moved while work processes are being performed on the machine. Place bucket flat and level on the ground. Place frame lock in the locked position and lock out the machine's starting capability before performing any work process. Follow all applicable lockout procedures and local rules and regulations for performing work processes. ANYONE performing inspections or service procedures to the machine should be familiar with ALL instructions and procedures contained in the machine's SERVICE MANUAL. Crush hazard could occur if the machine is started or moves while any type of work process is being conducted on the machine, resulting in serious injury or death.

Step 1: Stop the wheel loader on flat level ground.

Step 2: Move the frame lock to the locked position so that the frame cannot be steered.

⚠ WARNING

Crush hazards exist in machine pivot area and area between the tires. Do not enter these areas unless it is verified that the operator has control over the steering and that personnel locking the frame lock have good communication with the operator. Entering the pivot area and area between the tires while the machine is moving or pivoting (articulating) could cause crush hazards resulting in serious injury or death.



1) Retaining pin for locked position, **2)** Frame lock - shown in locked position, **3)** Retaining pin bracket for un-locked position

Frame lock in locked position

Step 3: Place wheel chocks in front and behind each wheel.

Step 4: Set bucket flat and level on the ground.

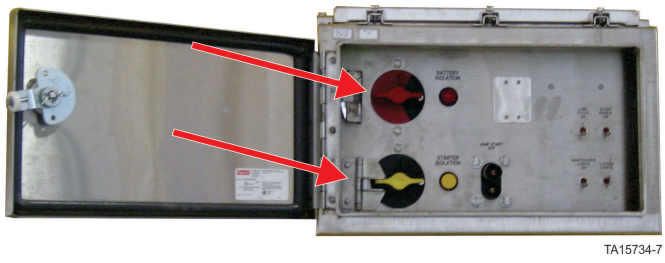
Step 5: Set the parking brakes.

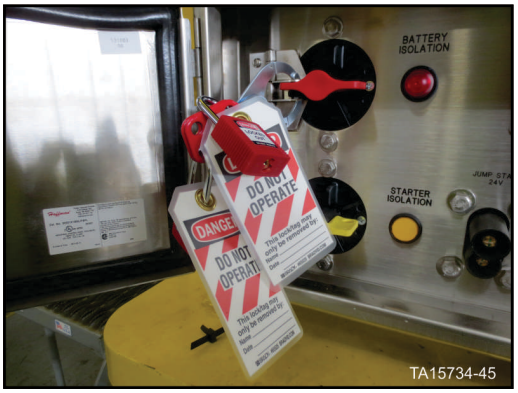
Step 6: Shut off the engine.

⚠ WARNING

Crush, shock, or other hazards exist if stored energy is not removed or isolated prior to working on the machine. Stored energy (hydraulic, electrical, pneumatic, mechanical, etc.) may be present if not isolated or released prior to working on the machine. Do not work on the machine without removing this stored energy (suspended loads, electrical power, air pressure, etc.). Risk of crushing, shock, or other physical injury exists if stored energy is not removed or isolated prior to working on the machine which could result in serious injury or death.

Step 7: Turn the battery and engine isolation switches to the off position and install locks on the battery isolation switch.

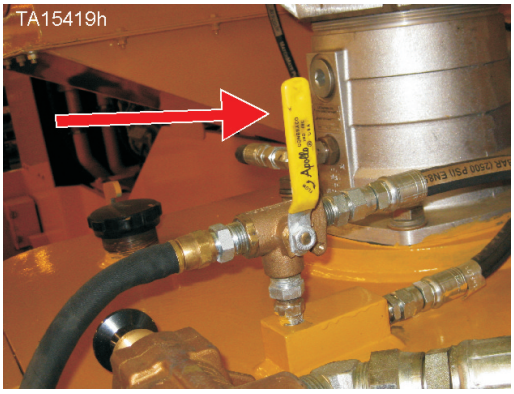




Battery Isolation Box – Battery isolation switch in OFF position with locks in place

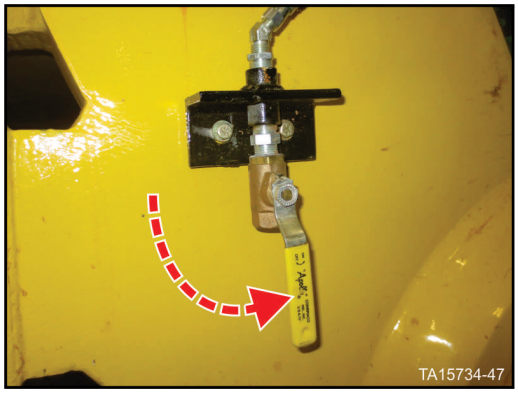
Step 8: Release the air from the hydraulic reservoir by using the hydraulic reservoir air valve (ball valve) on top of the reservoir.

- Turn the handle to the up position as shown below.
- The air supply line from main air system will be blocked.
- The reservoir air will vent out the hose that runs down the outside of the hydraulic reservoir.



Hydraulic reservoir air valve handle UP

Step 9: Release the air from the various air storage reservoirs by opening all of the air bleed valves.



One valve on right side of front frame near hoist cylinder ball cap

Three valves on right side of rear frame under hydraulic reservoir

Open air reservoir bleed valves

Removing and Installing the Operator Seat

To remove the seat assembly, seat slide, and pod from the operator's seat perform the following procedure:

NOTICE

Arm rests and joystick pods may differ in appearance on various machine models.

Step 1: Remove the four Phillips-head screws from the underside of the seat cushion and remove the seat cushion.

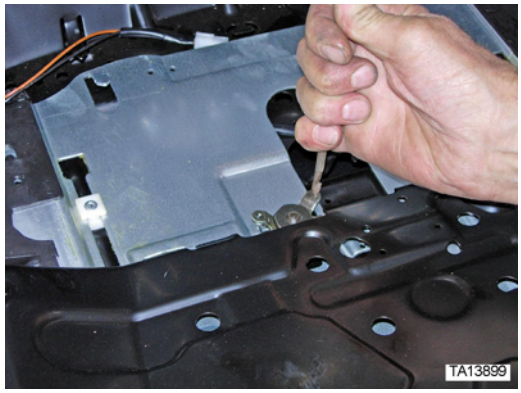
Figure 22: Removal of four Phillips-head screws securing seat cushion

Step 2: Squeeze the release lever on the seat cushion slide mechanism and move the seat cushion slide mechanism forward until it reaches the stop.

Figure 23: Seat cushion slide mechanism release lever (Compress and move seat cushion slide mechanism forward to stop)

Step 3: Insert a small screwdriver or punch into the tab on the release mechanism and pull the tab forward. This will bypass the stop and allow additional forward movement of the seat cushion slide mechanism.

Figure 24: Screwdriver inserted into tab on release mechanism



Step 4: Squeeze the release lever while pulling the tab forward and align the square tabs on each side of the seat base with the square slots on each side of the seat cushion slide mechanism. Lift the seat cushion slide mechanism from the seat frame.

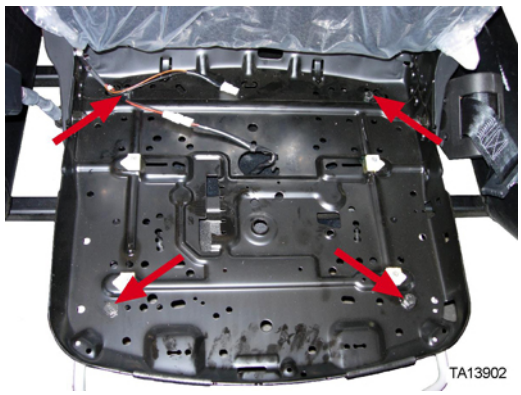
Figure 25: Seat cushion slide mechanism moved past stop to align plastic tabs with square slots in seat cushion slide mechanism

Step 5: Unplug electrical connection.

Figure 26: Electrical connection unplugged

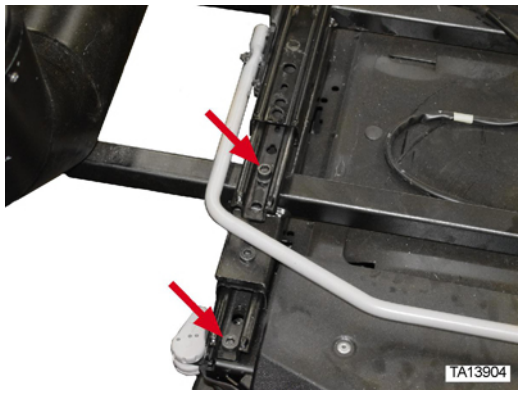
Step 6: Use a 13mm socket and ratchet and 13 mm end wrench to remove the four hex-head bolts and nuts securing the seat frame and remove the frame.

Figure 27: Seat frame with seat cushion slide mechanism removed



(Arrows indicate four (4) hex-head bolts and nuts securing seat frame to spindle)

Figure 28: Allen-head screw at each corner of assembly securing spindle & pod



Step 7: Use a 6 mm Allen-head wrench to remove the four screws securing the spindle mechanism to the pod. Remove the spindle. Refer to illustration “Operator’s seat – 50-Series machines”, below.

Step 8: Use a 6 mm Allen-head socket to remove the four screws securing the pod to the base. Remove the pod.

Step 9: To reassemble the seat, reverse the disassembly procedure.

Tool Requirements

- Small screwdriver or punch
- #2 Phillips screwdriver
- 13 mm socket and ratchet
- 13 mm end wrench
- 6 mm Allen-head wrench

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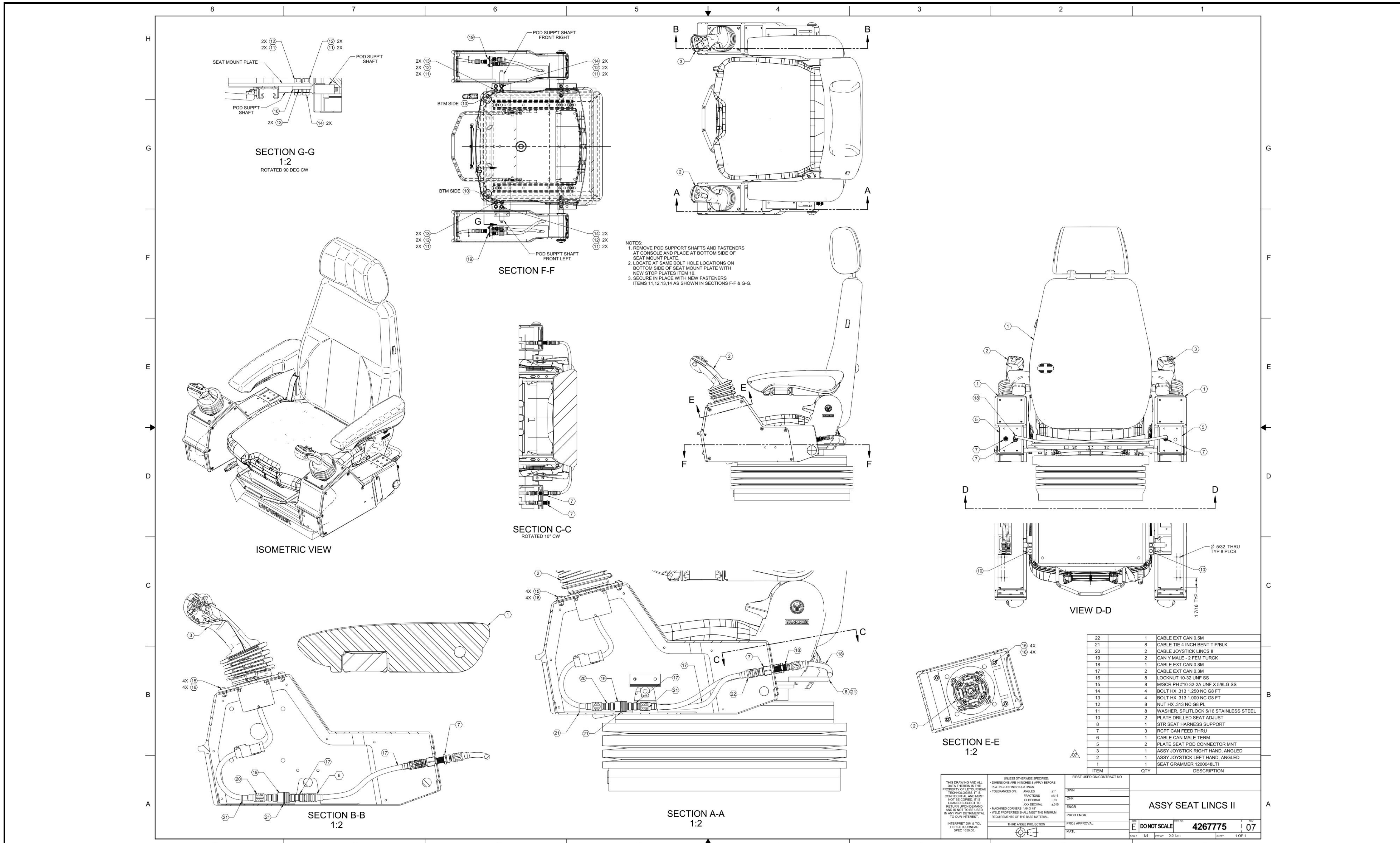
Figure 29: Operator’s seat – 50-Series machines



1. SEAT, AIR SUSPENSION
2. JOYSTICK ASSEMBLY, ANGLED
3. JOYSTICK ASSEMBLY, ANGLED
4. NOT USED
5. MOUNT PLATE, SEAT POD CONNECTOR
6. CABLE, CAN
7. RECEPTACLE, CAN FEED THRU
8. SUPPORT STRUCTURE, SEAT HARNESS
9. NOT USED
10. SEAT ADJUSTMENT PLATE, DRILLED
11. LOCKWASHER
12. NUT
13. BOLT
14. BOLT
15. SCREW
16. LOCKNUT
17. CABLE EXTENSION, CAN .3M
18. CABLE EXTENSION, CAN .8M
19. CABLE Y, CAN
20. CABLE, JOYSTICK
21. CABLE TIE
22. CABLE EXTENSION, CAN .5M

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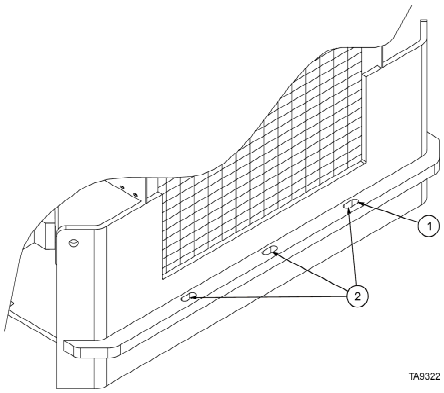
Troubleshooting

Retrieving and Towing the Machine

In the event the machine is disabled in the workplace, the rear bumper of the machine is equipped with three points for attachment of towing devices. It is essential to not exceed 131,000 lbs. of pull per attachment point. Refer to illustration below for towing points.

Figure 30: Towing points – rear of machine without bumper counterweight

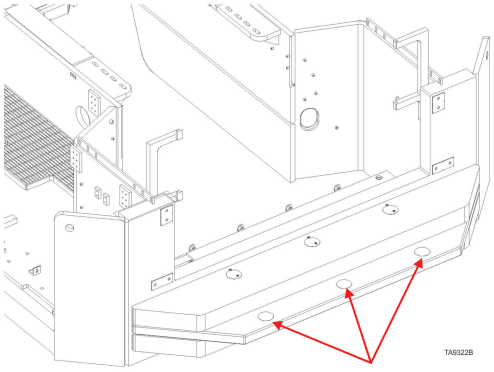


1. Attachment point (3 places)
2. Retrieving (towing points)- do not exceed 131,000 lbs total pull per attachment point

NOTICE

The rear bumper shall not be used to lift the rear frame. Lifting points are provided on the rear of the rear frame.

Figure 31: Towing points – rear of machine with bumper counterweight



1. Attachment point (3 places)
2. Retrieving (towing points)- do not exceed 131,000 lbs, total pull per attachment point

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Removal/Installation

Disassembling and Assembling the Front Frame Structure and Lift Arm and Linkage Group

Safety Preparations, Lifting (With Jacks) the Machine

Use the following procedure to isolate energy sources before performing any removal, replacement, or installation procedures described in this document.

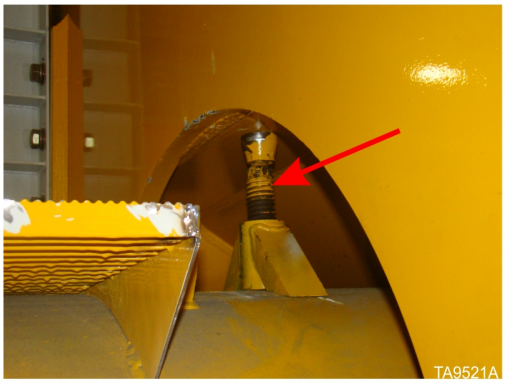
CAUTION

Following completion of service or repair, BE SURE to place the frame lock in the unlocked position or machine damage will result.

⚠ WARNING

Crush hazard exists when lifting the rear axle off the ground. Caution should be exercised when using jacks to lift the machine. If both wheels of the oscillating axle are off the ground at the same time, the axle may swivel vertically. This is a potentially hazardous situation. Both sides of the axle should be blocked to prevent swiveling. Failure to block both sides of the rear axle can cause a crush hazard resulting in serious injury or death.

Figure 32: Blocking axle to prevent swiveling



⚠ WARNING

Crush hazards exist when raising the machine by using jacks or crane. Always ensure the machine is on flat, level ground that is firm enough to support the jacks while holding the weight of the machine, for the time necessary to complete the procedures being performed. Machine tipping over or sinking into the ground is possible. Crush hazards exist under and around the machine if tipping or sinking occurs. Failure to ensure the jacks and cranes are of sufficient capacity, and the ground is firm enough to support the jacks or cribbing, while holding the weight of the machine, can cause crush hazards resulting in serious injury or death.

Safety Preparations — Mechanical

Use the following procedure to isolate energy sources before performing any removal, replacement, or installation procedures described in this document.

WARNING

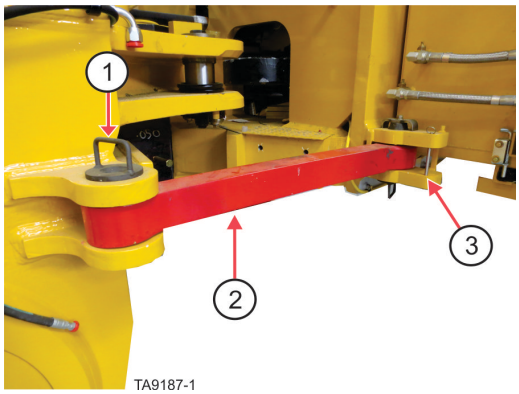
Crush hazards exist if the machine is started or moved while work processes are being performed on the machine. Place bucket flat and level on the ground. Place frame lock in the locked position and lock out the machine's starting capability before performing any work process. Follow all applicable lockout procedures and local rules and regulations for performing work processes. ANYONE performing inspections or service procedures to the machine should be familiar with ALL instructions and procedures contained in the machine's SERVICE MANUAL. Crush hazard could occur if the machine is started or moves while any type of work process is being conducted on the machine, resulting in serious injury or death.

Step 1: Stop the wheel loader on flat level ground.

Step 2: Move the frame lock to the locked position so that the frame cannot be steered.

WARNING

Crush hazards exist in machine pivot area and area between the tires. Do not enter these areas unless it is verified that the operator has control over the steering and that personnel locking the frame lock have good communication with the operator. Entering the pivot area and area between the tires while the machine is moving or pivoting (articulating) could cause crush hazards resulting in serious injury or death.



1) Retaining pin for locked position, **2)** Frame lock - shown in locked position, **3)** Retaining pin bracket for un-locked position

Frame lock in locked position

Step 3: Place wheel chocks in front and behind each wheel.

Step 4: Set bucket flat and level on the ground.

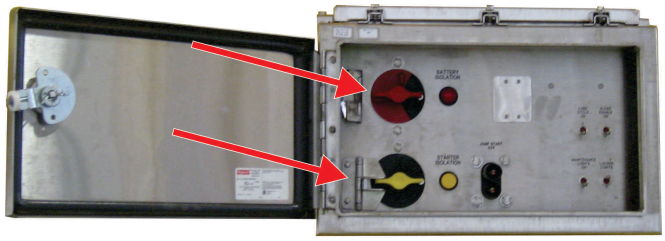
Step 5: Set the parking brakes.

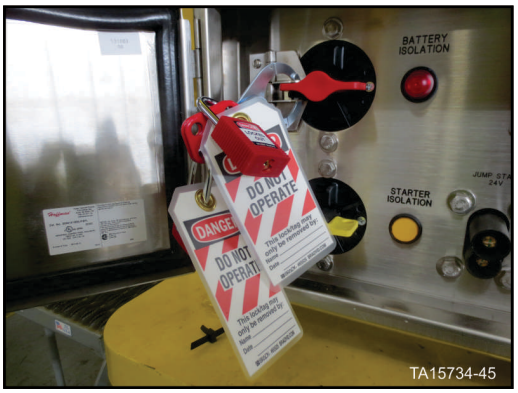
Step 6: Shut off the engine.

⚠ WARNING

Crush, shock, or other hazards exist if stored energy is not removed or isolated prior to working on the machine. Stored energy (hydraulic, electrical, pneumatic, mechanical, etc.) may be present if not isolated or released prior to working on the machine. Do not work on the machine without removing this stored energy (suspended loads, electrical power, air pressure, etc.). Risk of crushing, shock, or other physical injury exists if stored energy is not removed or isolated prior to working on the machine which could result in serious injury or death.

Step 7: Turn the battery and engine isolation switches to the off position and install locks on the battery isolation switch.

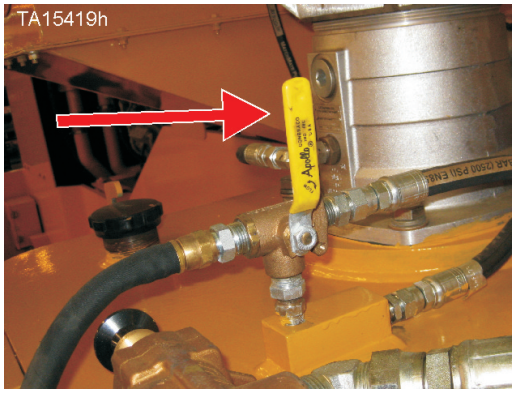




Battery Isolation Box – Battery isolation switch in OFF position with locks in place

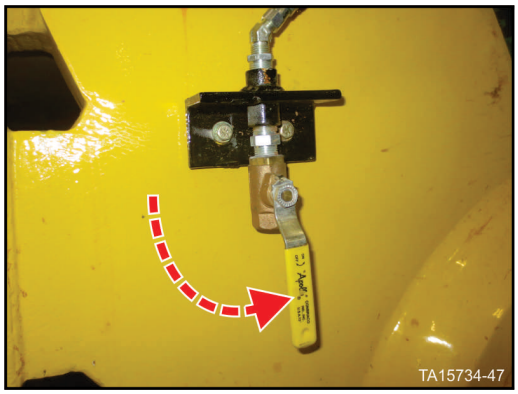
Step 8: Release the air from the hydraulic reservoir by using the hydraulic reservoir air valve (ball valve) on top of the reservoir.

- Turn the handle to the up position as shown below.
- The air supply line from main air system will be blocked.
- The reservoir air will vent out the hose that runs down the outside of the hydraulic reservoir.

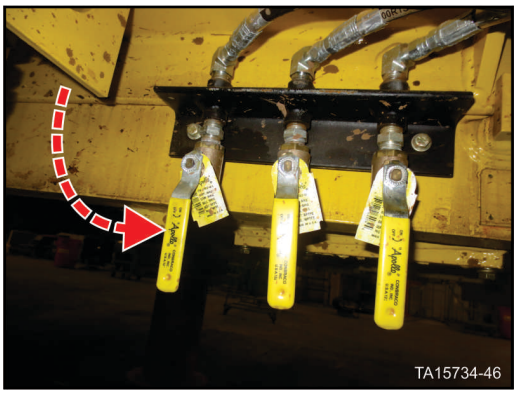


Hydraulic reservoir air valve handle UP

Step 9: Release the air from the various air storage reservoirs by opening all of the air bleed valves.



One valve on right side of front frame near hoist cylinder ball cap



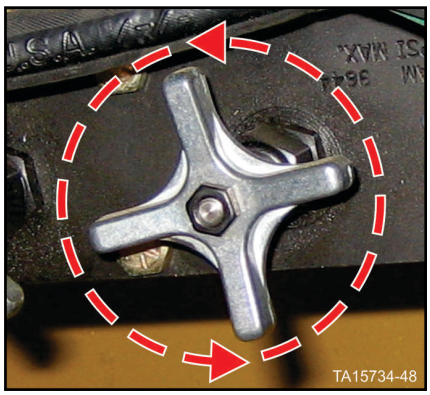
Three valves on right side of rear frame under hydraulic reservoir

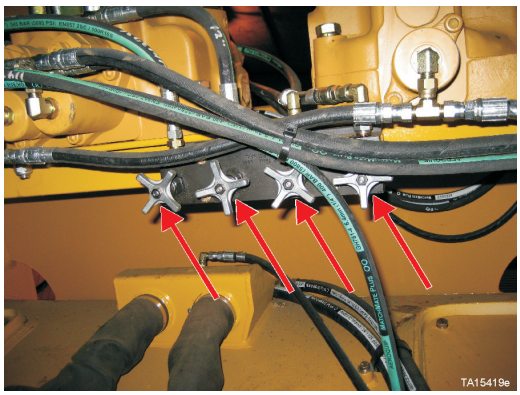
Open air reservoir bleed valves

Step 10: Use the hydraulic pressure bleed down valves located in the front frame underneath the Husco valves to bleed any stored pressure in the hoist and bucket cylinders.

Step 11: Turn each valve slowly counterclockwise as shown below and allow the pressure to bleed down.

Step 12: Open the valve completely and leave it open during this procedure.





Hoist and bucket circuit hydraulic pressure bleed down valves

Disassembling Components Preceding Removal from the Rear Frame

NOTICE

Refer to WARNINGS AND CAUTIONS (close to the beginning of this document) before beginning disassembly and removal procedures.

The front frame may be removed from the rear frame; however, some preliminary disassembly will be necessary.

The extent of disassembly or removal of components such as tires, drivers, motors, etc. will be determined by maintenance and repairs to be accomplished.

Step 1: Block each bellcrank so that it will not move, and remove the bucket cylinder rod-eye pins.

NOTICE

A suitable hoisting device should be attached to the bucket cylinders to prevent them from falling when the pins are removed.

⚠ WARNING

Crush hazard and pinch points exist when removing the bucket and links. To prevent unexpected movement of the bell crank assembly, secure it to the lift arm structure prior to removing the bucket and links. Failure to secure the bell crank can cause a crush hazard and pinch point resulting in serious injury or death.

Step 2: Attach a suitable hoisting device to the hoist cylinders and remove the hoist rod-eye pins.

NOTICE

If the bucket and hoist cylinders are to be removed, cap all cylinder ports and lines with plastic caps or plugs to protect components from contamination.

Step 3: Tag and disconnect all grease hose(s) from the bucket level links. Protect all grease lines and fittings from damage and contamination. Remove the bucket level link pins from both the bellcrank assembly and the bucket. Hoist the level links to a safe area.

Step 4: Remove the bucket pins from the lift arms and store in a safe area. Attach a suitable hoist to the bucket and move the bucket to a safe area.

Step 5: Tag and disconnect all grease hoses from the front frame to the lift arm. Protect from damage and contamination. Attach suitable hoist to lift arm structure and bellcrank assembly.

Step 6: Remove the lift arm ball cap capscrews, ball cap structures, ball cap spacers, and ball liner bushings and place in safe area. Protect from damage.

Step 7: Ensure all attachments are disconnected and hoist the lift arm and bellcrank structures to a safe area and place on blocking. Protect the ball socket structures from contamination and damage.

Step 8: Disconnect steering cylinders from the front frame.

Separating the Front Frame from the Rear Frame

⚠ WARNING

Crush hazards exist when preparing to remove the front frame from the rear frame. The frames must be supported so as to prevent them from tipping to either side as well as forward and backward. Refer to "Lifting (Jacking)", located in this section of the manual. Failure to properly support the frames can cause crush hazards resulting in serious injury or death.

Step 1: Disconnect and remove batteries or disconnect and tape the (-) negative battery cables.

Step 2: Tag and disconnect all electrical leads interconnected between the front and rear frames.

Step 3: Tag and disconnect all fluid power hoses or tubes interconnected between the front and rear frames.

Step 4: Disconnect all hydraulic and air lines that are interconnected between the front and rear mainframe structures.

Step 5: Disconnect steering cylinders from the front frame connection.

Step 6: Block up under the rear frame and the oscillating axle to support them during and after removal of the front frame.

Step 7: Attach a hoisting device with sufficient capacity to support the structure, to the lifting eyes near the top ball joints, and operate the hoisting device only enough to remove slack from the hoisting chains or cables.

NOTICE

Make a final check to see that no connections between the front and rear frames have been overlooked and that no lines are in a position to become entangled during removal of the front frame.

Step 8: Remove the capscrews securing the cap of the lower ball pivot. Remove the shims, liner, and cap.

Step 9: Remove the ball upper pivot cap capscrews, shims, liner, and cap.

NOTICE

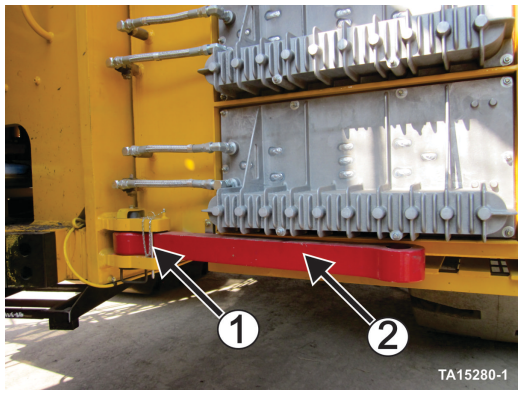
Refer to appropriate Rear Frame Illustrations for location of ball pivots and mounting hardware.

⚠ CAUTION

Crush hazards exist when hoisting and moving components. Ensure that any hoisting equipment is manned by a qualified operator. Failure to ensure the equipment is manned by a qualified operator can cause crush hazards resulting in serious injury or death.

Step 10: Move the frame lock to the unlocked position.

Figure 33: Move frame lock into unlocked position and secure with retaining pin (crush hazard areas)



NOTICE

Some models have a holding pin (#1), on the frame lock pivot bracket, that holds the frame lock (#2) in position when the frame is not locked.

(Left side of machine at pivot area)

CAUTION

Following completion of service or repair operations, it is critically important that the frame lock be removed from the locked position and properly secured in the unlocked position or machine damage will result.

Step 11: Move the front frame slowly, forward enough to clear the upper and lower pivot connecting points.

Assembling the Front Frame to the Rear Frame

Step 1: The procedures for removal and disassembly should be reversed for reassembly. Refer to CAPSCREW TORQUE CHART for torque values. Refer to “BALLS, CAPS, AND PINS”, located in Section 03 of the Service Manual, for installation of hoist cylinder ball cap and liner.

Step 2: Service all systems and lubricate the machine. Refer to LUBRICATION AND SERVICE, located in Section 04 in the Service Manual, for type and grade of lubricant to be used.

Step 3: When installation, lubrication, and pre-operational checks are complete, remove the safety link, and check all components for correct function and travel limits.

Disassembling Components Preceding Separation from the Front Frame

The extent of disassembly or removal of components mounted on the front and rear frames will be determined by maintenance and repairs to be accomplished.

Step 1: Prepare an area with sufficient blocking to support the rear frame and ascertain that the route to the receiving area is unobstructed and clear of personnel.

Step 2: Block up under the front frame to support it during and after removal of the rear frame.

Step 3: Disconnect the battery leads.

⚠ CAUTION

Struck-by or struck against hazard exist if it is necessary to disconnect air conditioning lines. Use extreme care as all air conditioning lines contain compressed gas under high pressure. Use proper procedures, wear all necessary Personal Protective Equipment (PPE), and follow all local rules or regulations for disconnecting air conditioning lines. Failure to follow local rules and regulations and to wear proper PPE can cause a struck-by or struck against hazard resulting in personal injury.

Step 4: Remove Roll Over Protective Structure (ROPS) and Falling Object Protective Structure (FOPS). Refer to previous illustration “ROLLOVER PROTECTIVE STRUCTURE AND FALLING OBJECT PROTECTIVE STRUCTURE ASSEMBLY”, in “COMPONENT DESCRIPTION”.

Step 5: Remove the cab. (see previous illustration “CAB ASSEMBLY” in “COMPONENT DESCRIPTION”.)

Step 6: Disconnect all electrical connections to the front frame.

Step 7: Release air pressure from hydraulic tank with the manual air release valve, located on top of the hydraulic tank.

Step 8: Disconnect all hydraulic or air lines that are interconnected between the front and rear mainframe structures.

NOTICE

Some residual hydraulic fluid will drain from the hydraulic lines when disconnected, particularly those lines that are not equipped with a quick disconnected valve. A container should be provided to catch this fluid.

Step 9: Protect all exposed hydraulic ports or lines with plastic caps, plugs, or tape.

Step 10: Disconnect any required air conditioning lines. The necessity for disconnecting air conditioning lines will be determined by the type of air conditioning installed.

Step 11: Disconnect the steering cylinders from the front frame connection point.

Step 12: Disconnect all lubrication lines interconnected between the automatic and manual lubrication manifold and the rear frame.

Separating the Rear Frame from the Front Frame

Step 1: Attach a hoisting device with sufficient capacity to the rear frame and operate the hoisting device only enough to remove the slack from the hoisting chains or cables.

Step 2: Block the oscillating axle between the axle housing and the rear frame to ensure rigidity during hoisting and transport.

Step 3: Remove the capscrews, cap, shim and liner from the upper ball pivot.

Step 4: Remove the capscrews, cap, shim and liner from the lower ball pivot.

⚠ CAUTION

Crush hazards exist when hoisting and moving components. Ensure that any hoisting equipment is manned by a qualified operator. Failure to ensure the equipment is manned by a qualified operator can cause crush hazards resulting in serious injury or death.

NOTICE

Make a final check to see that no connections between the front and rear frames have been overlooked and that no lines are entangled between the two frames or their components.

Step 5: Move frame lock to the unlocked position.

Step 6: Move the rear frame slowly backward enough to clear the upper and lower pivot connecting points.

Step 7: Move the rear frame to the receiving area and ensure that it is securely supported.

Joining the Rear Frame with the Front Frame

Step 1: Support the rear frame on the ground in upright position.

NOTICE

Inspect the ball bases and sockets to make sure they are free of debris or damage that might impair accurate assembly.

Step 2: Refer to Section 03- BALLS, CAPS, AND PINS, in the Service Manual, before beginning assembly procedures of the ball caps.

Step 3: Lightly coat the spherical surfaces of the ball cap and sockets with multi-purpose grease. Place a ball liner (half) into each ball cap and socket positioned to receive the balls. Check that the grease holes in the liner align with the grease holes in the ball cap and the socket.

Step 4: Place the 1/4” (6.35 mm) spacer, one .018” (.4572 mm) shim, at least two .007” (.1778 mm) shims and one .030” (.762 mm) shim onto the clamping face of the ball caps and hold them in place by inserting two capscrews through the cap. Install the grease seals (halves) in the ball caps and the sockets.

Step 5: Hoist the front frame and insert the balls on the front frame into the sockets on the rear frame, being careful not to damage the balls, liners or sockets.

Step 6: Hoist the ball caps to the ball bases, being careful not to damage the liners or seals. Install the capscrews and torque to appropriate ft. lbs., lubricated.

Step 7: Use the torquing sequence provided in “BALLS, CAPS, AND PINS”, in Section 03 of the Service Manual, as a guide. Repeat the torque sequence to ensure the torque remains constant.

WARNING

Crush hazard exists if the machine is not positioned straight or turned to either side and the frame lock is not installed prior to any testing. Always steer the machine straight and install the frame lock before performing any testing. Be sure all personnel are secure and in safe positions prior to performing any testing. Place signs to alert other personnel to keep a safe distance from the machine. Failure to place the frame lock in the locked position and to alert personnel to keep a safe distance could cause a crush hazard resulting in serious injury or death.

Step 8: Set the bottom plane of the bucket flat on the ground.

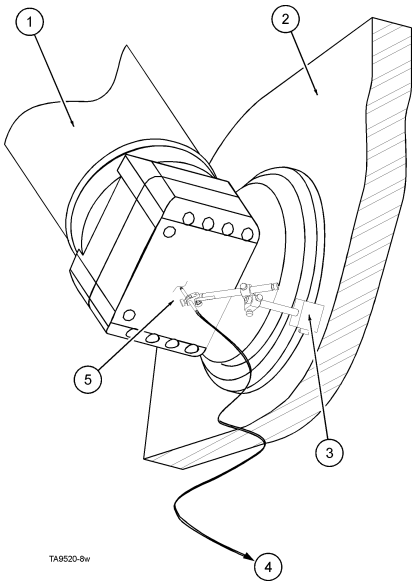
Step 9: Mount the magnetic base of a remote readout dial indicator on the front frame structure next to the middle pivot ball cap so the indicator transducer or remote gauge head contacts the ball cap as near to center as possible. The centerline of the indicator transducer or remote gauge head needs to be aligned with the centerline of the ball cap. In this situation, it will be horizontal. It may be necessary to scrape off some paint in order to have the magnetic base securely mounted.

- The remote indicating unit or gauge amplifier should be placed either outside of the pivot area or facing the outside of the pivot area where it can be seen from a safe position (refer to illustration “Typical indicator setup for measuring endplay in ball and cap assembly", below).

NOTICE

Remote readout electronic dial indicators are available from many manufacturers such as Starrett, Brown and Sharp, Federal, Mitutoyo and others.

Figure 34: Typical indicator setup for measuring endplay in ball and cap assembly



1. Hoist Cylinder
2. Frame
3. Magnetic Base Securely Attached to Frame
4. To the Remote Meter Outside the Vehicle
5. Dial Indicator Probe in Contact With Cap

Step 10: Slowly power down with the hoist until the weight comes off of the tires (it is not necessary to lift the front end of the machine). Zero the dial indicator.

Step 11: Slowly hoist the lift arms.

Step 12: As the arms begin to move up, the dial indicator needle should “snap” from the zero setting to some value. After that, the needle will typically continue to move slowly in the same direction.

NOTICE

The “snap” value is the endplay reading for the middle pivot ball cap. Take care to read the “snap” reading. All other needle movement is due to deflection and cap movement. Failure to do this can lead to very tight ball socket assemblies, heat, and rapid wear.

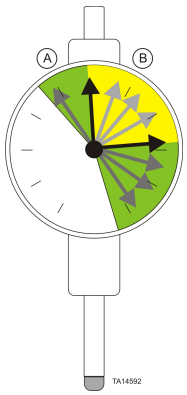
Step 13: Repeat the test powering down.

Step 14: Repeat the test several times while hoisting up and down unit consistent numbers are obtained.

Step 15: Repeat the test for top and bottom pivot ball caps.

Step 16: Compare the reading obtained to those in table “Ball base socket cap specifications". If above the maximum reading (or below the minimum new setup reading), the shim pack will have to be adjusted. Adjust the shim pack to bring the endplay into the “New setup range”. Refer to illustration “Snap value (deflection and clearance),” below).

Figure 35: Snap value (deflection and clearance)



(A) Green area – needle moves slowly in proportion to how much machine is moved, steered, hoisted. etc. This is **DEFLECTION**	**(B)** Yellow area – Needle snaps quickly between low and high when the machine is moved, steered, hoisted, etc. This is the **CLEARANCE**

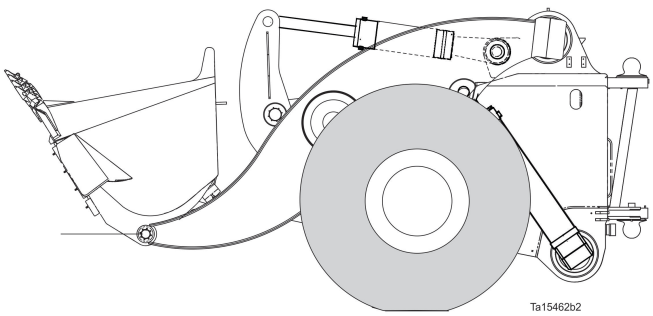
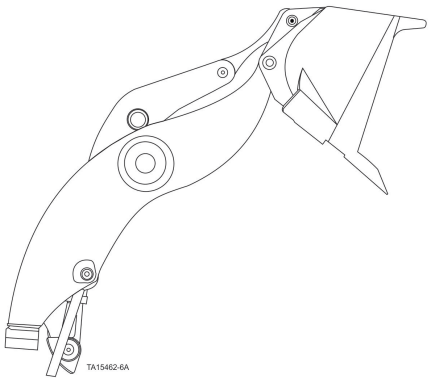
Step 17: Make a visual inspection of the ball and sockets for visually detectable movement every 500 hours. Use a dial indicator to check for worn ball liners every 2000 hours or six months of operation. Follow Steps “g”, “h” and “i” to obtain a dial indicator reading. If the reading is past tolerance limits, the liners should be replaced.

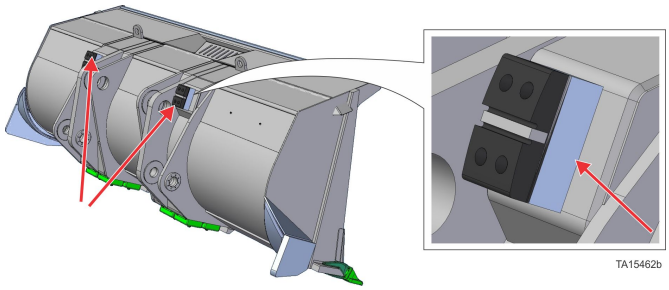
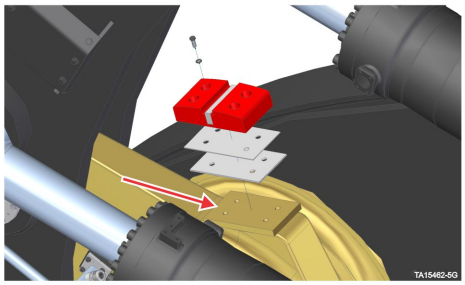
Replacing and Shimming Stop Blocks

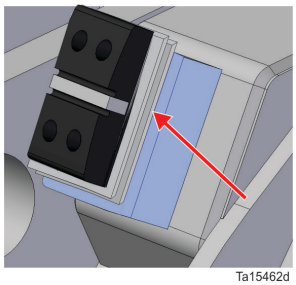
NOTICE

This procedure only references the bucket dump and bucket rollback stop blocks. It does not include steering stop blocks.

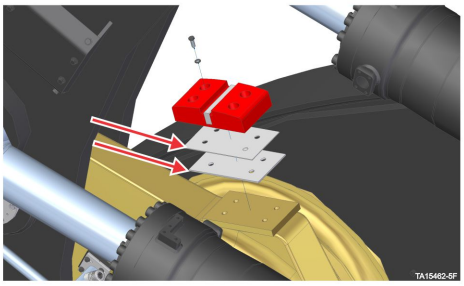
Terminology Used In Shimming Procedures

	
Bucket rollback The bucket is rolled back to carry a load.	**Bucket dump** The bucket is rolled forward to expel the load

	
Bucket Rollback Stop Plate The plate that is either welded or bolted to the bucket. The stop block is bolted to it.	**Bucket Dump Stop Plate** The plate that is either welded to the lift arm torque tube or is a part of the casting. The stop block is bolted to it.

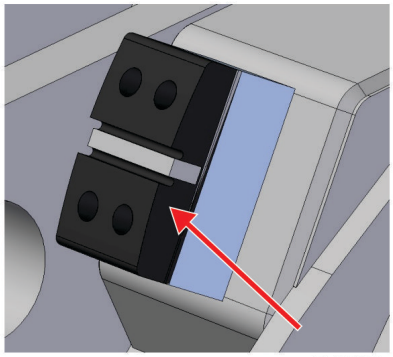


Bucket Rollback Shims

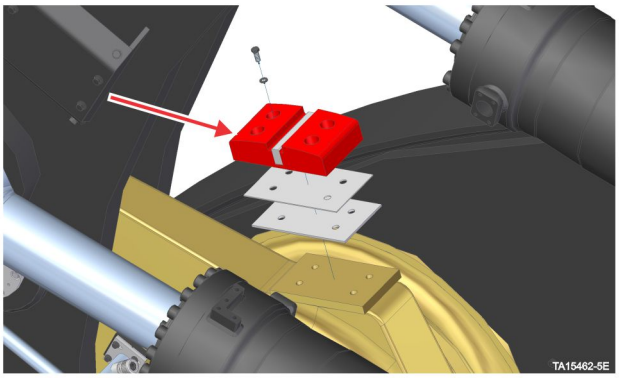


Bucket Dump Shims

Plates, of different thicknesses, that fit between the Stop Plate and the Stop Block. The number will vary depending on spacing requirements.

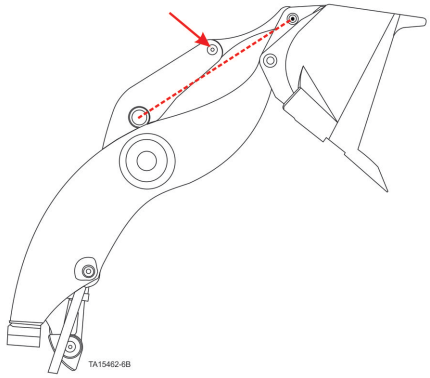


Bucket Rollback Stop Block



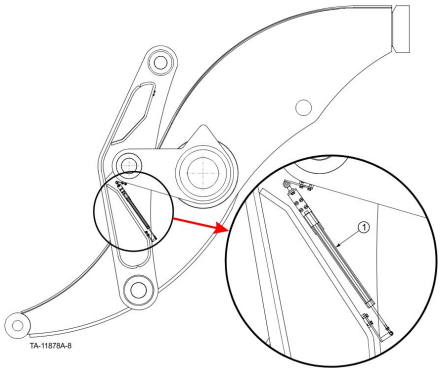
Bucket Dump Stop Block

Stop Block: the block of pliable material, such as polyurethane, used to limit structure movement.



Over-center Condition

The connection point of the level link and bellcrank rises above the centerline between the bucket to level link connection point and the bellcrank to torque tube ear connection point



1) Linear Transducer

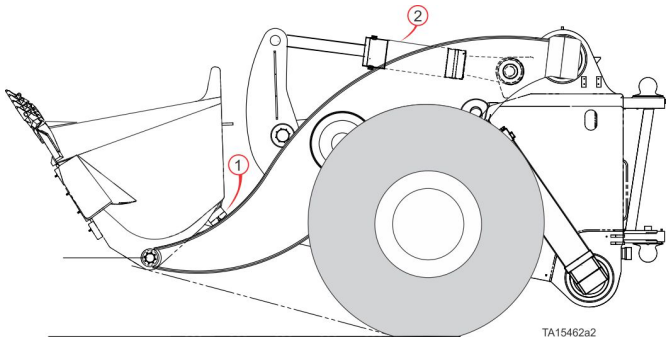
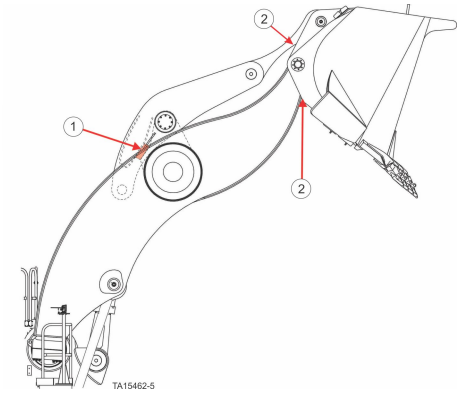
A transducer about 3 feet in length, positioned under the right bellcrank.

Identifying Reasons for Shimming

Proper shimming is necessary to avoid excessive bucket rollback and bucket dump stop block wear on wheel loaders. Wear and improper shimming can lead to excessive mechanical loads on components such as level links, bucket pins, and bucket cylinders. Proper shimming of both the rollback and dump stop blocks is crucial and should be verified.

Once properly shimmed, stop block wear should be monitored and the stop blocks replaced if necessary. When a bucket is changed, the bucket rollback and bucket dump stop block set up and shimming must be checked and adjusted accordingly. Each combination of lift arm type and bucket might require a different bucket rollback stop plate. Tire size and wear can also affect shimming.

Figure 36: Areas affected and corrected

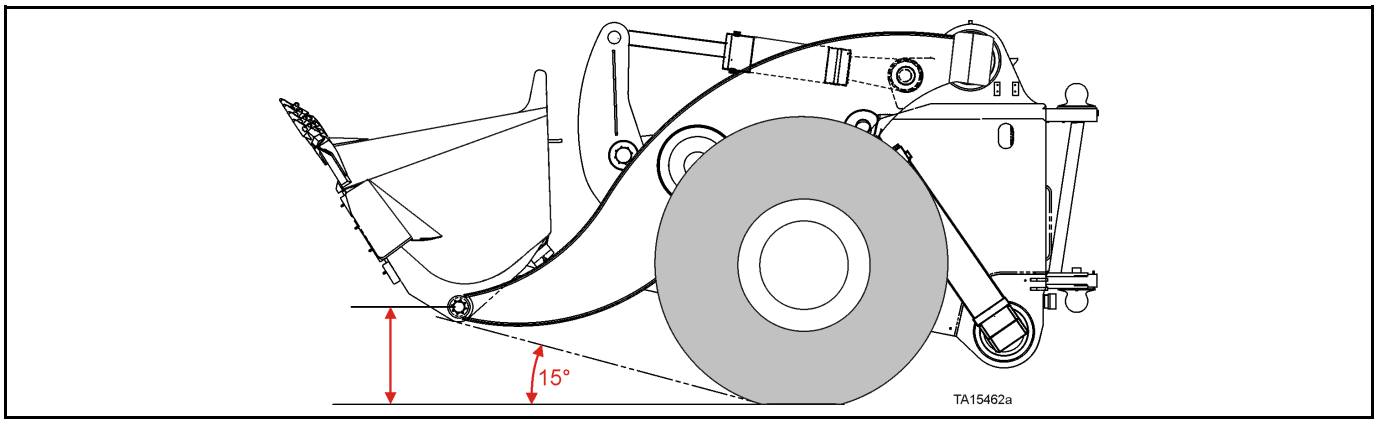
	
1. Rollback stop block adjustment here 2. Proper shimming prevents bucket cylinders from holding the load while pushing into the pile	1. Dump stop block adjustment here– Shimming here to limit bucket dump 2. Prevents contact here–Level link clearance on pin retainer cap 3. Prevents contact here—bucket hitting bottom of lift arm

Locating the Bucket Rollback Stop Blocks

The rollback stop blocks are positioned so that they contact the lift arms at the SAE standard carry position. The SAE standard carry position is defined where the bottom of the bucket pivot is at an angle that is 15° tangent to the tire. The rollback stop blocks should contact the lift arm prior to the bucket cylinder achieving full extension from this height down. This protects the bell cranks and bucket cylinders from loads when the bucket is rolled back while filling the bucket in the bank.

The following procedure provides the correct height at which the lift arms are positioned for bucket rollback stop block placement. The additional tables take into account setting stops when the loader has different tire sizes.

Figure 37: SAE bucket carry position



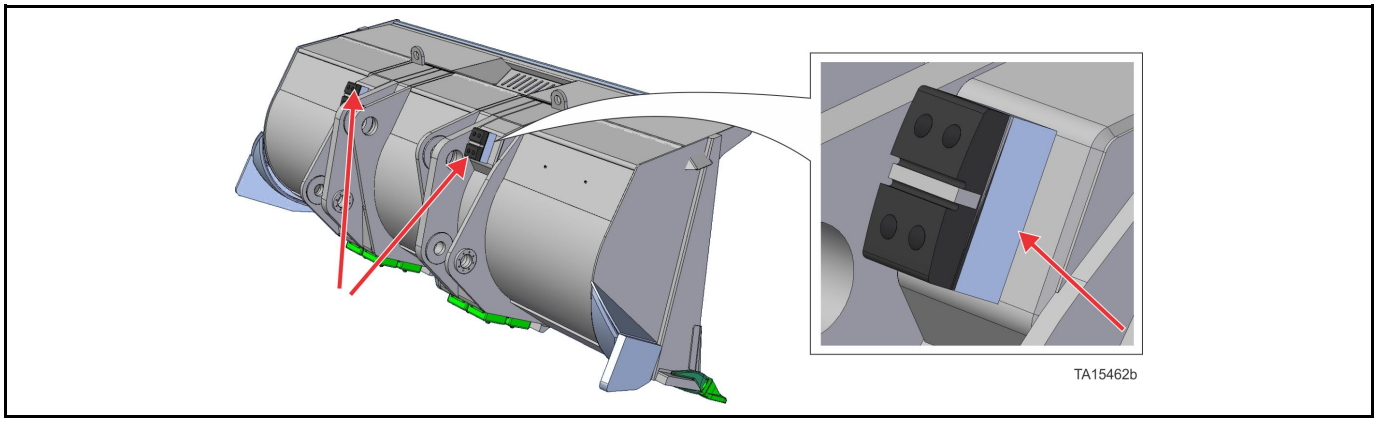
CAUTION

The size of the bucket rollback stop plates on the back of the bucket will vary depending on the machine type and whether the lift arm is high lift, standard lift, or super high lift. The orientation and standoff measurement of these plates must be considered when swapping buckets between machine and lift arm types. The rollback stop position should be checked any time a bucket is changed.

NOTICE

This is a one-time procedure that matches the stops on a bucket to the lift arms on a loader. As long as the same bucket is being used on the loader - the only maintenance required is to replace the stop blocks when they are worn or damaged.

Figure 38: Roll back stop plate



Incorrect orientation and standoff height of the bucket rollback stop plate could place excessive stress on the bucket cylinder rod structure, rod piston, and bucket cylinder head stuffing box, causing serious damage.

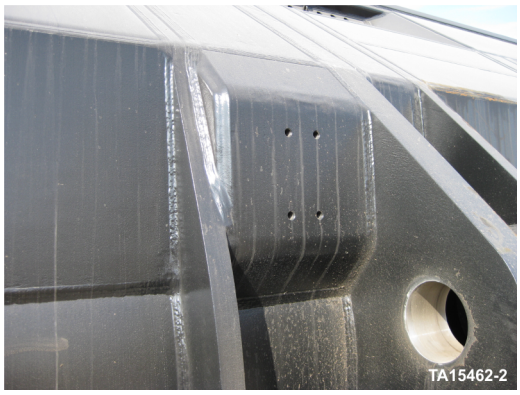
Both the left and right rollback stop blocks should contact the lift arms at the same time. If the bucket rollback stop blocks do not contact the lift arms simultaneously with full block contact, damage to the lift arms could occur.

NOTICE

The angle of contact between the rollback stop block and the lift arm is critical. The stop block must contact the arm squarely. The rollback stop plate must be properly positioned and angularity between the stop block and lift arm verified before trying to make adjustments. The stop plate angles and heights will be different depending on what type of bucket is used and whether the machine has high lift arms, standard lift arms, or super high lift arms.

If the angle of contact is not correct, the stop plate will have to be cut off and re-welded to the correct position. All cutting and welding on the bucket structure has to follow the Komatsu Field Welding Procedures (formerly known as Let-1), located within this manual.

Figure 39: Different examples of roll back stop plates



Bucket Rollback Stop Block Shimming Procedure

Safety Preparations for Running Machine

Use the following procedure to isolate energy sources before performing any removal, replacement, or installation procedures described in this document.

WARNING

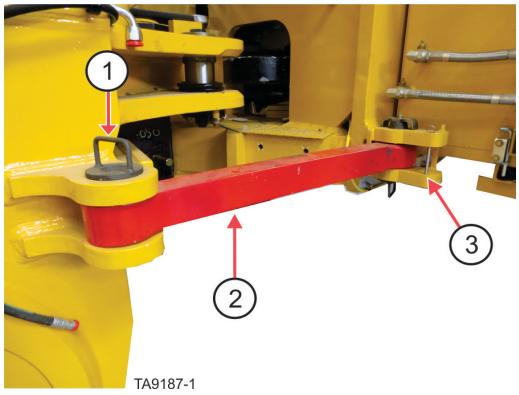
Crush hazards exist if the machine is started or moved while work processes are being performed on the machine. Place bucket flat and level on the ground. Place frame lock in the locked position before performing any work process. Follow all applicable local rules and regulations for performing work processes. ANYONE performing inspections or service procedures to the machine should be familiar with ALL instructions and procedures contained in the machine's SERVICE MANUAL. Crush hazard could occur if the machine is moved while any type of work process is being conducted on the machine, resulting in serious injury or death.

Step 1: Stop the wheel loader on flat level ground.

Step 2: Move the frame lock to the locked position so that the frame cannot be steered.

WARNING

Crush hazards exist in machine pivot area and area between the tires. Do not enter these areas unless it is verified that the operator has control over the steering and that personnel locking the frame lock have good communication with the operator. Entering the pivot area and area between the tires while the machine is moving or pivoting (articulating) could cause crush hazards resulting in serious injury or death.



1) Retaining pin for locked position, **2)** Frame lock - shown in locked position, **3)** Retaining pin bracket for un-locked position

Frame lock in locked position

Step 3: Place wheel chocks in front and behind each wheel.

Step 4: Set bucket flat and level on the ground.

Step 5: Set the parking brakes.

Shimming the Bucket Rollback Stop Blocks

Step 1: Remove the bucket rollback stop blocks and shims from both left and right sides of the bucket.

Step 2: Start the loader. Follow all local safety rules and procedures.

⚠ WARNING

Crush hazard exists when obtaining measurements. Do not get under or allow other personnel to get under raised lift arms or bucket. Do not get in, or allow others in, areas where machine movement can cause serious injury or death. During the following steps, several measurements will have to be obtained. Follow all local safety rules and procedures while obtaining these measurements. Use a remote camera if necessary to avoid being under a suspended load or in an area where machine movement could cause serious injury or death. Failure to use proper procedures or a remote camera can result cause crush hazards resulting in serious injury or death.

Step 3: Position the bucket at the height listed in the appropriate table. The correct table is determined based on some specific criteria.

Generation 1 machines: two tables are available.

- New Tires (Method 1) (Bucket pivot)
- New, Worn or Different Tires (Method 2) (Hoist cylinder extension)
  Generation 2 machines: Use Generation 2 Machine table (Method 3) (Hoist cylinder extension)

NOTICE

L1350 Generation 2 Standard Lift Only: The L-1350 standard lift requires that the bucket cylinder extension be set. When adjusting the bucket roll back stops on this machine, the following steps "f" through "j" will not be followed. The bucket cylinder extension must be per the graphic titled "L1350 Standard Lift Only". The dimension shown on that graphic is from the center of the cylinder base pin to the center of the cylinder rod eye pin. Also see table "All LINCS Generation 2 Machines" for dimension.

50 Series Generation 2 machines:

- Access the LINCS™ System Settings/Machine Settings screens and check the box to bypass the bucket and hoist limits. This requires maintenance level access.
- Access the LINCS™ Operator User Preference Inhibit Park Brake Release Mode: Enable (this allows the park brakes to remain set while the hydraulics are operable). Place the park brake switch in the released position. Park brake light will flash red because brakes are still set.

CAUTION

Special instructions for Generation 1 machines with linear position transducer under right hand bell crank:

Remove the linear position transducer prior to doing the following steps. Failure to remove can cause damage if the bellcrank is allowed to move full range.

Step 4: At low throttle, SLOWLY roll the bucket back until it stops. The bucket cylinders are fully extended at this time. DO NOT force the bucket back after contact is made. See the CAUTION above if machine is equipped with the linear position transducer under the bellcrank.

- **L-1350 Generation 2 standard lift ONLY:** Rollback the bucket until the bucket cylinder extension reaches dimension called out in illustration “L1350 Generation 2 standard lift ONLY”, at the end of this procedure.

Step 5: Use a permanent marker to place a mark, on one of the cylinder rods, that is 1” (25.4 mm) from the rod wiper.

Step 6: At low throttle, SLOWLY roll the bucket forward toward the dump position to retract the cylinder until the mark is flush with the rod wiper [1” (25.4 mm) retracted].

Step 7: Install the stop blocks on both sides, with necessary shims, to achieve full contact of both stop block pads with the lift arms on both sides. The bucket rollback stop blocks must make simultaneous, even, and full contact with the lift arms.

CAUTION

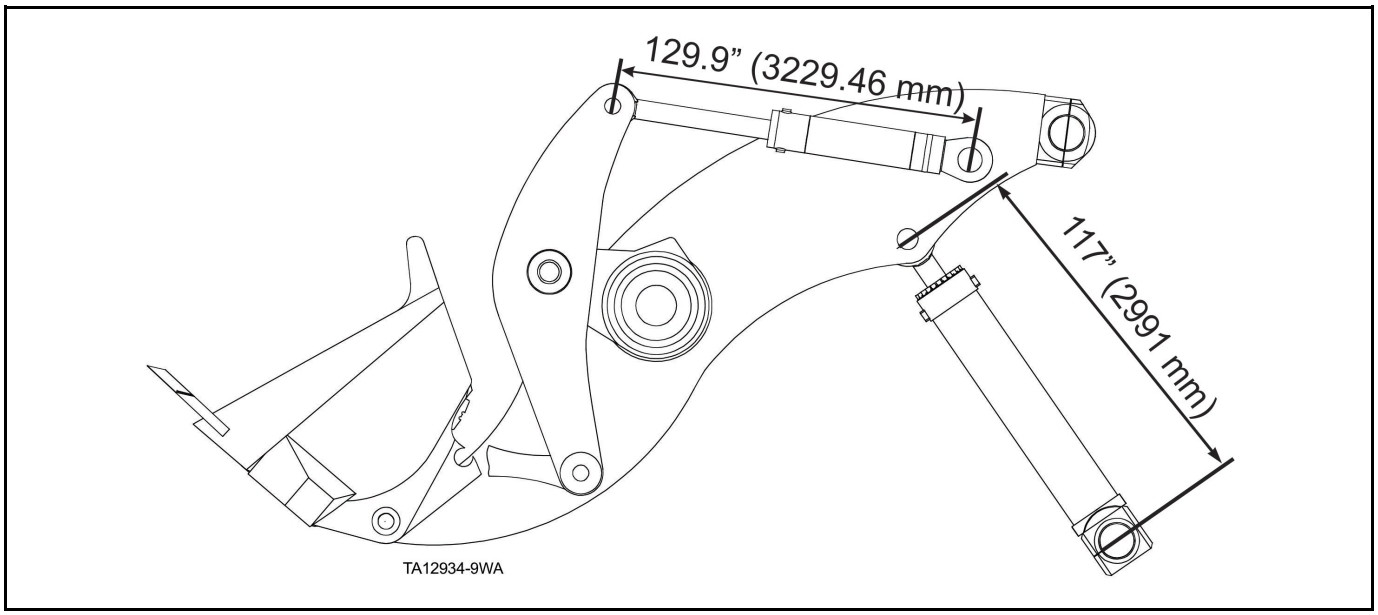
Special instructions for machines with linear position transducer under right hand bell crank: Install the linear position transducer under the bell crank.

Step 8: Reset LINCS™ motion limits.

Figure 40: All LINCS Generation 2 Machines

Hoist Cylinder Extension					
Machine		Hoist Cylinder Extension Position #1	Bucket Cylinder Extension	Bucket Pivot to Ground Reference Dimension only Position #2	Lift Arm Angle Reference only Position #3
L-1350	High Lift	119.75” (3042 mm)	NA	47.75” (1213 mm)	-28.0°
	Std. Lift	117.5” (2991 mm)	129.9” (3229.46 mm)	42.25” (1073 mm)	-31.0°
L-1850	High Lift	128.0” (3251 mm)	NA	48.5” (1232 mm)	-29.0°
	Std. Lift	127.25” (3232 mm)	NA	42.5” (1080 mm)	-33.0°
L-2350	High Lift	132.25” (3359 mm)	NA	52.5” (1334 mm)	-25.73°
	Std. Lift	131.07” (3329 mm)	NA	44.4” (1128 mm)	-30.09°
	Super High Lift	135.36” (3438 mm)	NA	72.31” (1837 mm)	-18.0°

Figure 41: L1350 standard lift ONLY

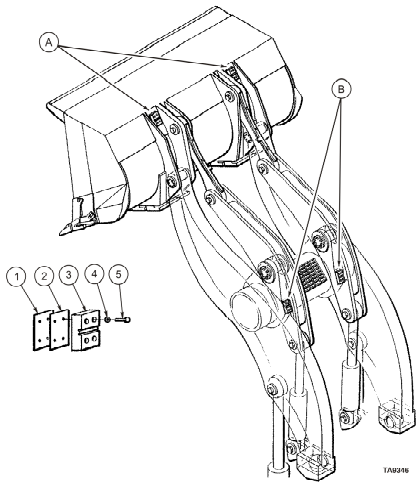
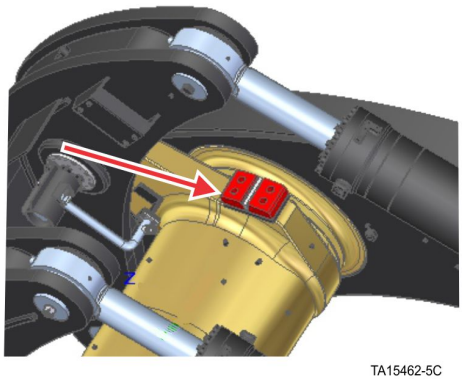


Bucket Dump Stop Block Shimming Procedure

Locating the Bucket Dump Stop Blocks

The graphics below show the shimming area for the bucket dump. Shimming here eliminates the contact with the bucket and the bottom of the lift arms. This has to be shimmed so that the level link and bucket cannot hit when the urethane stop pad is fully compressed.

Figure 42: Shimming area for bucket dump stop blocks

<table>
<tr>
<td colspan="2"> 
</td>
<td> 
</td>
</tr>
<tr>
<td>1. Shim
2. Shim
3. Stop Block
4. Lockwasher</td>
<td>Capscrew
A. Bucket rollback stop block
B. Bucket dump stop block</td>
<td>Bucket Dump Stop Block
(Other side is the same)</td>
</tr>
</table>

NOTICE

On the L-2350 High Lift ONLY, the bucket pivot pin retainer plate has one side cut off to give additional level link clearance. However, it has to be rotated and oriented correctly to give this clearance. Refer to “Pivot Retainer Plate Orientation”, following this procedure.

Safety Preparations for Running Machine

Use the following procedure to isolate energy sources before performing any removal, replacement, or installation procedures described in this document.

⚠ WARNING

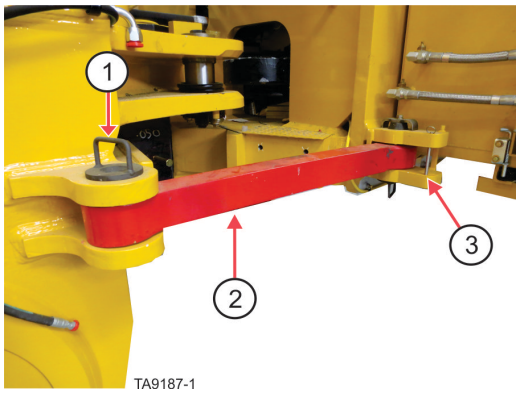
Crush hazards exist if the machine is started or moved while work processes are being performed on the machine. Place bucket flat and level on the ground. Place frame lock in the locked position before performing any work process. Follow all applicable local rules and regulations for performing work processes. ANYONE performing inspections or service procedures to the machine should be familiar with ALL instructions and procedures contained in the machine's SERVICE MANUAL. Crush hazard could occur if the machine is moved while any type of work process is being conducted on the machine, resulting in serious injury or death.

Step 1: Stop the wheel loader on flat level ground.

Step 2: Move the frame lock to the locked position so that the frame cannot be steered.

⚠ WARNING

Crush hazards exist in machine pivot area and area between the tires. Do not enter these areas unless it is verified that the operator has control over the steering and that personnel locking the frame lock have good communication with the operator. Entering the pivot area and area between the tires while the machine is moving or pivoting (articulating) could cause crush hazards resulting in serious injury or death.



1) Retaining pin for locked position, **2)** Frame lock - shown in locked position, **3)** Retaining pin bracket for un-locked position

Frame lock in locked position

Step 3: Place wheel chocks in front and behind each wheel.

Step 4: Set bucket flat and level on the ground.

Step 5: Set the parking brakes.

Shimming the Bucket Stop Blocks

Step 1: Remove the bucket dump stop blocks and shims from the left and right side of the bellcrank torque tube.

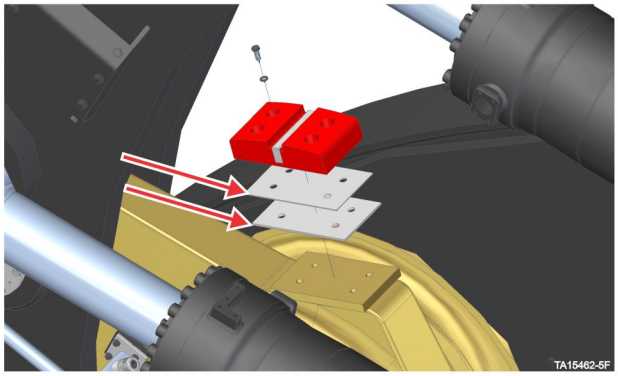
Step 2: Start the loader. Follow all local safety rules and procedures.

⚠ WARNING

Crush hazard exists when obtaining measurements. Do not get under or allow other personnel to get under raised lift arms or bucket. Do not get in, or allow others in, areas where machine movement can cause serious injury or death. During the following steps, several measurements will have to be obtained. Follow all local safety rules and procedures while obtaining these measurements. Use a remote camera if necessary to avoid being under a suspended load or in an area where machine movement could cause serious injury or death. Failure to use proper procedures or a remote camera can result cause crush hazards resulting in serious injury or death.

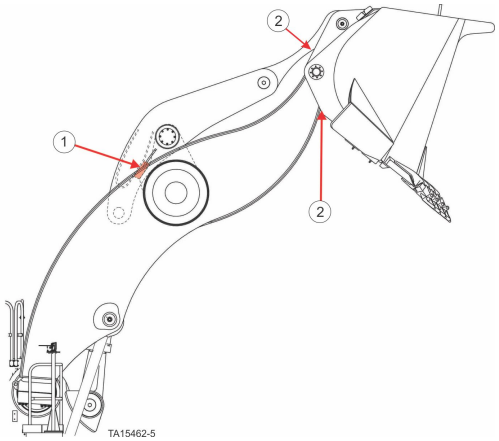
Step 3: Install stop blocks with a standard shim pack as indicated in the Parts Manual (typically 1/2”).

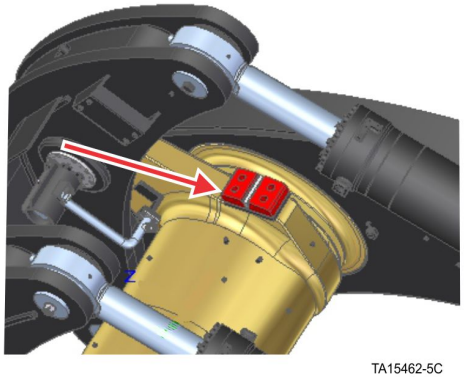
Figure 43: Stop block with standard shim pack



Step 4: Raise the lift arms to full height, without limits bypassed.

Figure 44: Stop block installed with shims





1) Stop block adjustment here **2)** prevents contact here

Step 5: Slowly dump the bucket while observing the stop blocks on both sides until contact is made on either side. Do not force the bucket down after contact is made.

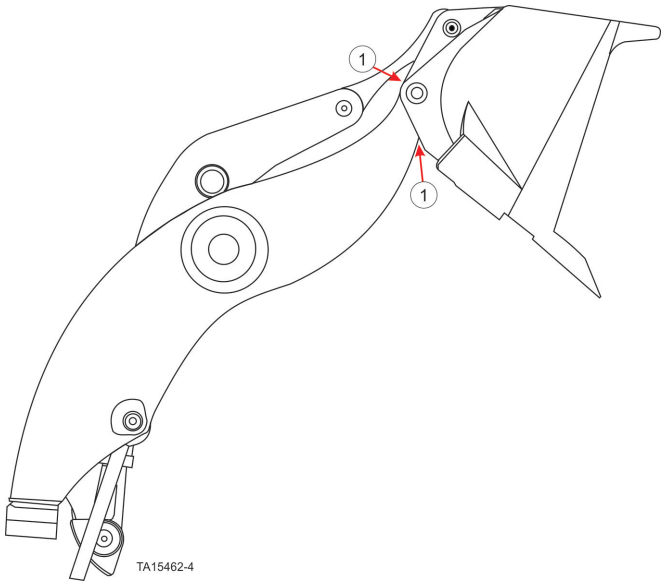
Step 6: Determine the amount of shims that will be needed on each side of the bell crank torque tube so that the bellcrank contacts the stop blocks simultaneously. It is preferred that shims be added to the lowest side as this prevents the bell crank from entering an over-center condition.

Step 7: Lower the bucket to the ground and install the shims determined necessary in the previous step.

Step 8: Repeat steps b thru f as needed, until contact is made simultaneously on the stop blocks.

Step 9: Ensure that there is no contact between the level link (dogbone) and the bucket pivot pin inner retainers.

Figure 45: Contact check points



1) Check here for contact

Step 10: Ensure that there is no contact between the bottom of the bucket and the lift arms. If contact is made, add equal shims to both sides until this condition no longer exists.

Step 11: Return the machine to service. Follow all local safety rules and procedures.

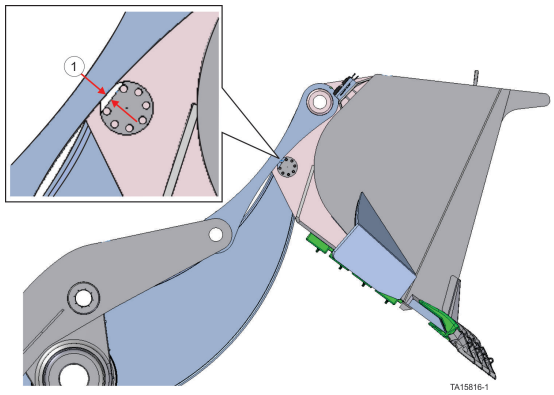
END

Pivot Retainer Plate Orientation (L-2350 High Lift Only)

The following illustration shows that there will be 1” clearance between the level link and the cut out on the pin retainer plate. (This was drawn with the dump pad fully compressed against the steel stop) - This illustration assumes that all components have been made exactly to engineering specifications. Each component has allowable tolerance so there can be some variance from the engineering drawing.

The shims under the dump stops allow for any manufacturing tolerances and variances. Additional shims under the dump stop pad will add additional clearance between the level link and bucket pin retainer cap and eliminate contact between the two.

Figure 46: Clearance area

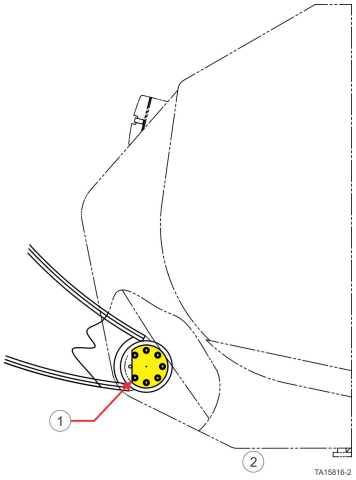


1) 1” Clearance

L-2350 High Lift Shown

On the L-2350 High Lift, the bucket pivot pin retainer plate has one side cut off to give additional level link clearance. However, it has to be rotated and oriented correctly to give this clearance

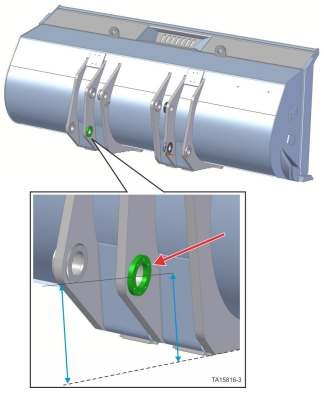
Figure 47: Cutout orientation



1) Orientation of cutout on the retainer cap **2)** Bucket level

The boss (circular ring with tapped and threaded holes) welded to the hinge ears must also be installed in the correct orientation.

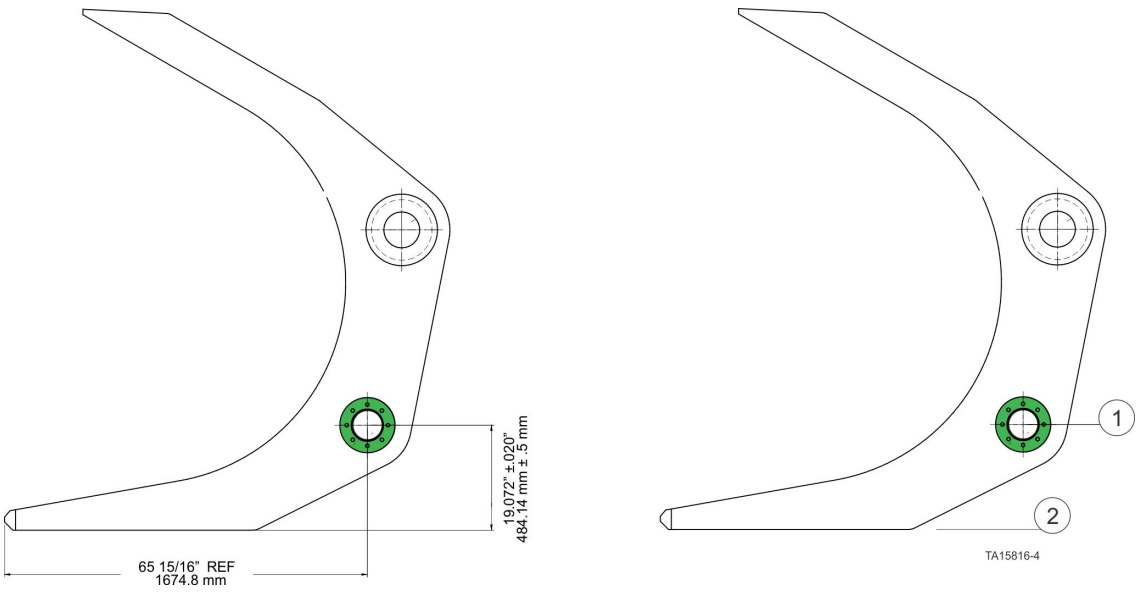
Figure 48: Correct orientation of the boss (circular ring)



If the boss is not properly installed – it is not possible to properly orient the cut out on the retainer plate.

The following shows the correct installation of the boss ring.

Figure 49: Correct installation of the boss ring



1) Holes level **2)** Bucket level

Installing and Removing the Rear Oscillating Axle

Safety Preparations, Lifting (With Jacks) the Machine

Use the following procedure to isolate energy sources before performing any removal, replacement, or installation procedures described in this document.

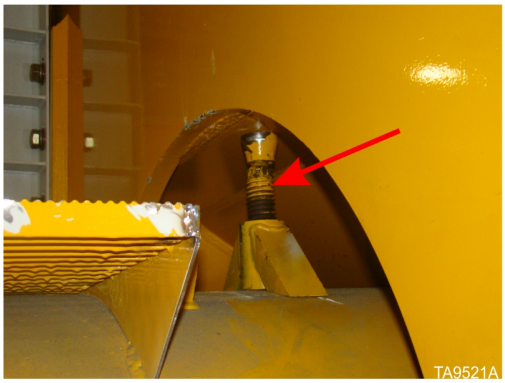
CAUTION

Following completion of service or repair, BE SURE to place the frame lock in the unlocked position or machine damage will result.

⚠ WARNING

Crush hazard exists when lifting the rear axle off the ground. Caution should be exercised when using jacks to lift the machine. If both wheels of the oscillating axle are off the ground at the same time, the axle may swivel vertically. This is a potentially hazardous situation. Both sides of the axle should be blocked to prevent swiveling. Failure to block both sides of the rear axle can cause a crush hazard resulting in serious injury or death.

Figure 50: Blocking axle to prevent swiveling



⚠ WARNING

Crush hazards exist when raising the machine by using jacks or crane. Always ensure the machine is on flat, level ground that is firm enough to support the jacks while holding the weight of the machine, for the time necessary to complete the procedures being performed. Machine tipping over or sinking into the ground is possible. Crush hazards exist under and around the machine if tipping or sinking occurs. Failure to ensure the jacks and cranes are of sufficient capacity, and the ground is firm enough to support the jacks or cribbing, while holding the weight of the machine, can cause crush hazards resulting in serious injury or death.

Safety Preparations — Mechanical

Use the following procedure to isolate energy sources before performing any removal, replacement, or installation procedures described in this document.

WARNING

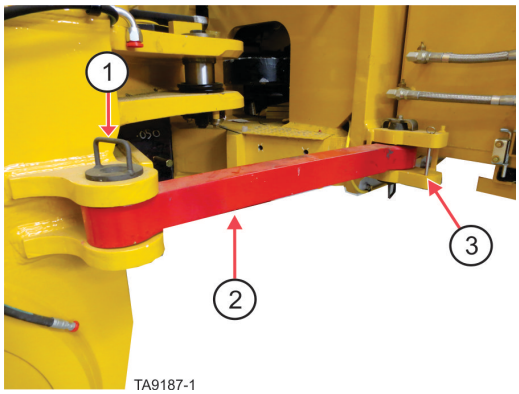
Crush hazards exist if the machine is started or moved while work processes are being performed on the machine. Place bucket flat and level on the ground. Place frame lock in the locked position and lock out the machine's starting capability before performing any work process. Follow all applicable lockout procedures and local rules and regulations for performing work processes. ANYONE performing inspections or service procedures to the machine should be familiar with ALL instructions and procedures contained in the machine's SERVICE MANUAL. Crush hazard could occur if the machine is started or moves while any type of work process is being conducted on the machine, resulting in serious injury or death.

Step 1: Stop the wheel loader on flat level ground.

Step 2: Move the frame lock to the locked position so that the frame cannot be steered.

WARNING

Crush hazards exist in machine pivot area and area between the tires. Do not enter these areas unless it is verified that the operator has control over the steering and that personnel locking the frame lock have good communication with the operator. Entering the pivot area and area between the tires while the machine is moving or pivoting (articulating) could cause crush hazards resulting in serious injury or death.



1) Retaining pin for locked position, **2)** Frame lock - shown in locked position, **3)** Retaining pin bracket for un-locked position

Frame lock in locked position

Step 3: Place wheel chocks in front and behind each wheel.

Step 4: Set bucket flat and level on the ground.

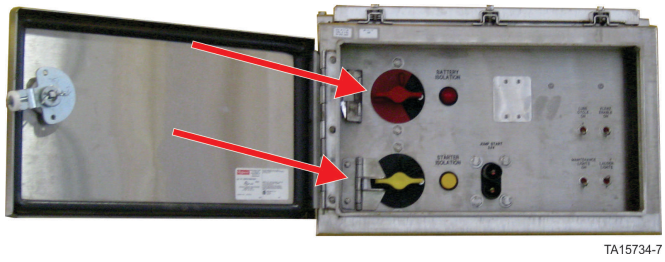
Step 5: Set the parking brakes.

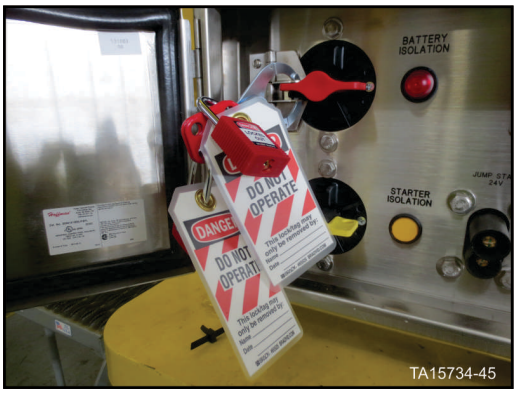
Step 6: Shut off the engine.

⚠ WARNING

Crush, shock, or other hazards exist if stored energy is not removed or isolated prior to working on the machine. Stored energy (hydraulic, electrical, pneumatic, mechanical, etc.) may be present if not isolated or released prior to working on the machine. Do not work on the machine without removing this stored energy (suspended loads, electrical power, air pressure, etc.). Risk of crushing, shock, or other physical injury exists if stored energy is not removed or isolated prior to working on the machine which could result in serious injury or death.

Step 7: Turn the battery and engine isolation switches to the off position and install locks on the battery isolation switch.

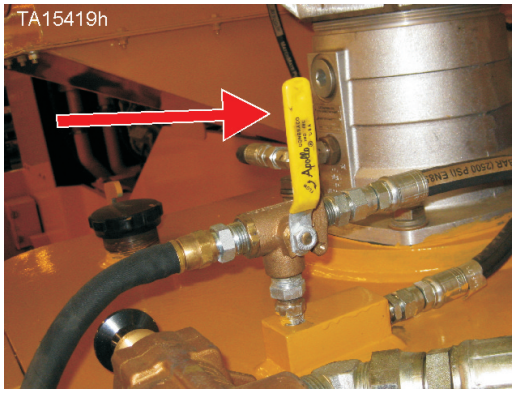




Battery Isolation Box – Battery isolation switch in OFF position with locks in place

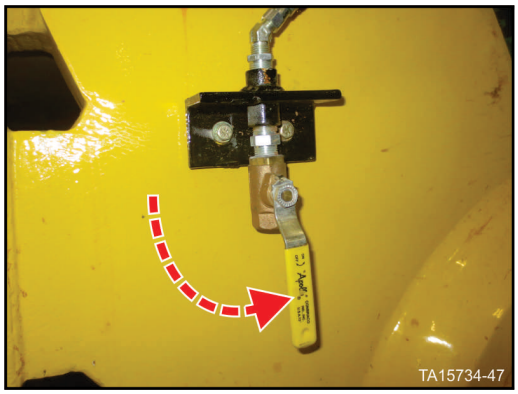
Step 8: Release the air from the hydraulic reservoir by using the hydraulic reservoir air valve (ball valve) on top of the reservoir.

- Turn the handle to the up position as shown below.
- The air supply line from main air system will be blocked.
- The reservoir air will vent out the hose that runs down the outside of the hydraulic reservoir.

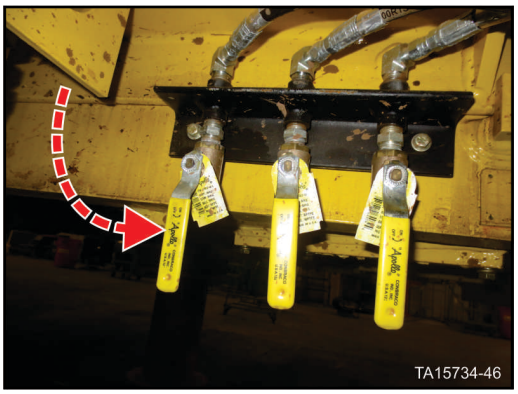


Hydraulic reservoir air valve handle UP

Step 9: Release the air from the various air storage reservoirs by opening all of the air bleed valves.



One valve on right side of front frame near hoist cylinder ball cap



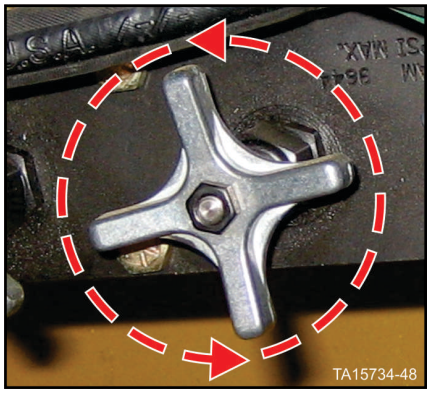
Three valves on right side of rear frame under hydraulic reservoir

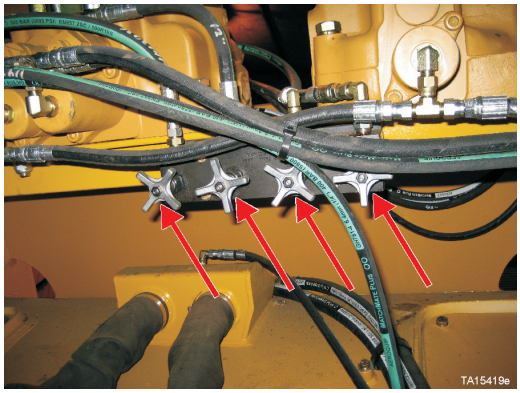
Open air reservoir bleed valves

Step 10: Use the hydraulic pressure bleed down valves located in the front frame underneath the Husco valves to bleed any stored pressure in the hoist and bucket cylinders.

Step 11: Turn each valve slowly counterclockwise as shown below and allow the pressure to bleed down.

Step 12: Open the valve completely and leave it open during this procedure.





Hoist and bucket circuit hydraulic pressure bleed down valves

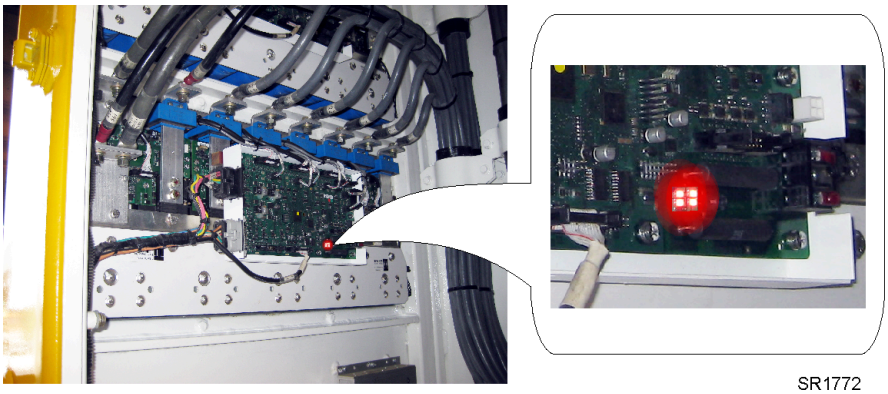
Bus Discharge Verification Procedure

Converter Bus Voltage

WARNING

Risk of fatal shock or injury by contact in the electrical cabinet is possible if the engine is running, the LINCS software indicates voltage on the bus, or the red bus LED's in the electrical cabinet are illuminated. All Generation 2 SR equipment has the ability to produce voltage at low throttle. Even with the engine off, there may be a residual of 12-15VDC on the bus. Do not enter the electrical cabinet or touch any components in the electrical cabinet without performing the Bus Discharge Verification Procedure. Failure to do so may result in fatal electrical shock or other injury.

Figure 51: Converter assembly bus LED's



There are three different methods that are combined to verify when it is safe to enter the electrical cabinet. All three methods are required in order to assure that the system is properly discharged.

1. LINCS II display in cab
2. visual indication in electrical cabinet
3. physical measurement

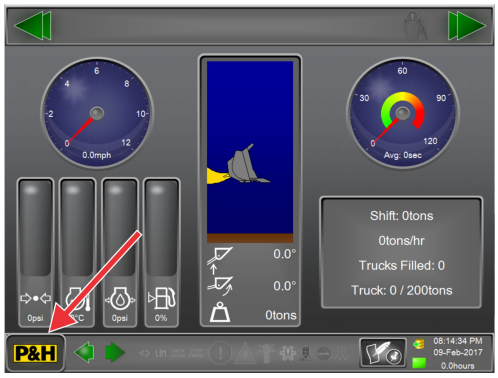
In Cab Verification Using LINCS II Display

Before You Begin

Make sure that the LINCS II system is booted (key switch ON) with the engine NOT running and the park brake SET.

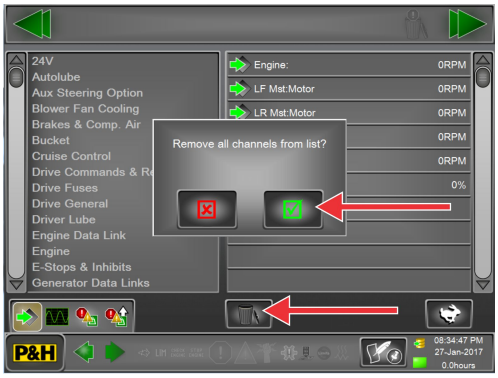
Step 1: As shown in the following figure, on the touch panel in the dash, press the Main Menu button in the lower left corner, then select Data Logging and Logging/Monitoring.

Figure 52: LINCS logging/monitoring menu access

 TA15638-PH	 TA15639-PH
Main Menu Button	Data Logging & Logging/Monitoring

Step 2: Select the Trash Can icon and select the Check Mark to clear any selection on the right hand side of the screen (if applicable).

Figure 53: Remove channels



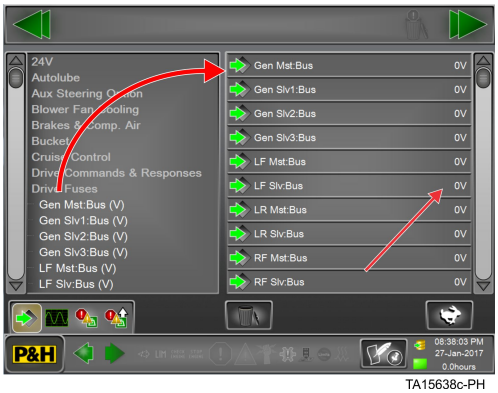
TA15638a-PH

Step 3: Scroll down the left hand list until Drive Fuses is displayed.

Figure 54: Left hand scroll

Step 4: Drag the Drive Fuses category to the right hand side of the screen, all of the bus voltage channels should now be visible.

Figure 55: Bus voltage indication



Step 5: Verify bus voltage is less than 24VDC.

NOTICE

Should any voltage (greater than 24VDC) be present on any of the DC busses, allow the system to discharge for a period of no less than 10 minutes. Re-test the bus voltages prior to continuing.

Step 6: Turn the key switch to the OFF position and proceed to the next step in the verification process.

Verification by Visual Indication

Following the verification by LINCS II software, the next step is to verify the existence of bus voltage by the array of four LED indicators located on the main SR control board on each converter assembly.

To conduct this test, ensure that:

- The 24V DC power is isolated at the battery disconnect (turned off and locked out) per site requirements.

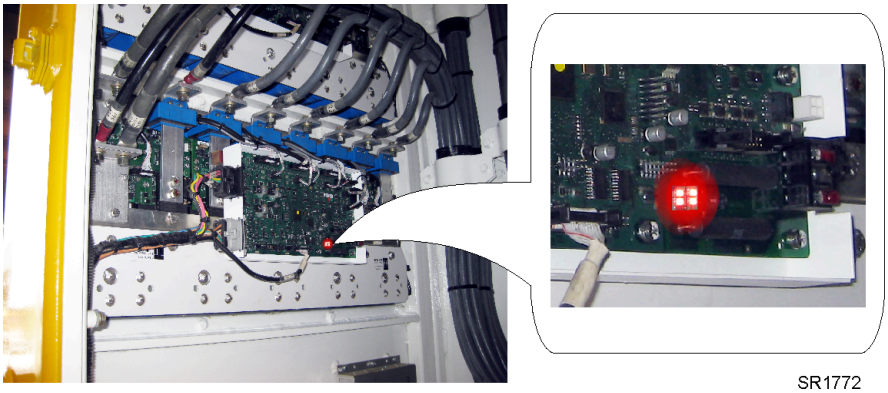
Figure 56: Isolation and control switch assembly

Isolate the battery and lockout the machine

- The SR electrical converter cabinet door can now be opened.
- DO NOT enter the cabinet at this time.

View the LED arrays on each of the converter assemblies and verify the LED's are not illuminated. The LED's will be illuminated when a potential of greater than approximately 35VDC is present on the DC bus connections on the converter assemblies. The light intensity varies with voltage and a greater intensity indicates a higher bus voltage.

Figure 57: Bus voltage LED array on SR control board



Once verified that the LED's are NOT illuminated, proceed with Verification by Physical Measurement of the main bus bars.

Verification by Physical Measurement Main Bus Bars

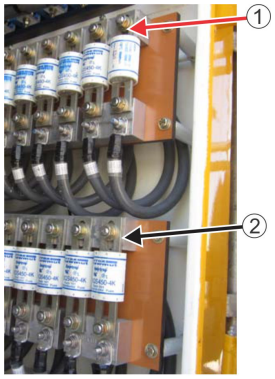
Once the visual indicators have been verified, the bus voltage should be physically measured. The bus voltage should be fully discharged based on the previous checks.

Step 1: Measure between the positive and negative bus bars using a voltmeter rated for 1000V. The potential voltage on a bus that has not discharged could be over 700VDC. A properly discharged bus should be less than 24VDC as verified by the completion of LINCS system verification.

WARNING

Risk of shock or equipment damage by use of an improperly rated meter is possible. Use a CAT III 1000V rated volt meter to take voltage readings. Shock or other injury may result from using improperly rated test equipment.

Figure 58: Main bus bars



1) Positive bus bar, **2)** Negative bus bar

Converter Assembly Bus Connections

The final point of verification is the bus connections to each individual converter assembly. The bus voltage can be measured at the two bus tabs located adjacent to the electrical converter cabinet door.

NOTICE

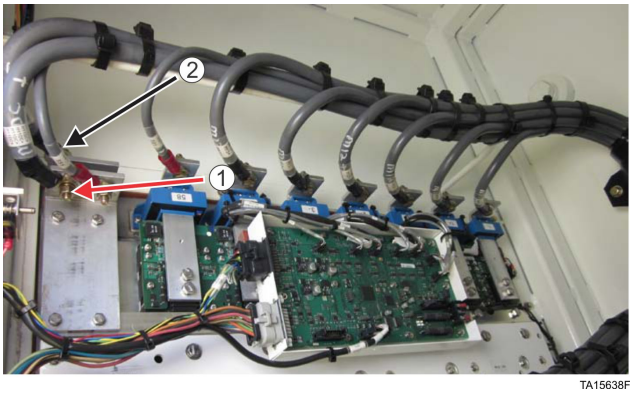
The converter assemblies on the rear of the cabinet are inverted in comparison to those mounted on the front. Similarly, the positive and negative bus connections will be inverted.

Connect a voltmeter across the two bus connection points. Bus voltage should be less than 24VDC following the completion of the previous checks. Once the check has been completed, the entire drive system has been verified as discharged.

Figure 59: Converter assembly bus connections (rear of cabinet)

1) Positive bus bar, **2)** Negative bus bar

Figure 60: Converter assembly bus connections (front of cabinet)



1) Positive bus bar, **2)** Negative bus bar

Once verified that bus voltage does not exist, entry into the electrical cabinet, axles, and grid area are permissible.

Removing the Rear Oscillating Axle from Vehicle

WARNING

Crush hazard exists when lifting the rear axle off the ground. Caution should be exercised when using jacks to lift the machine. If both wheels of the oscillating axle are off the ground at the same time, the axle may swivel vertically. This is a potentially hazardous situation. Both sides of the axle should be blocked to prevent swiveling. Failure to block both sides of the rear axle can cause a crush hazard resulting in serious injury or death.

NOTICE

Refer to “SAFETY, WARNINGS, AND CAUTIONS” and to “LOADER JACKING INSTRUCTIONS” before beginning axle removal procedures.

Step 1: Ensure the frame lock is in the locked position.

Step 2: Jack up the machine and remove the rear wheels. Refer to “Tire and Rim”, located in Section 03, for wheel and tire removal instructions.

Step 3: Disconnect and tape (-) negative battery cables.

Step 4: Disconnect and tag all electrical leads to the oscillating axle and remove the leads from the axle assembly.

Step 5: Disconnect all lubrication filter hose assemblies (if applicable) and air brake lines from the axle assembly. Protect all hose and brake line open ends from damage and contamination.

Step 6: Place heavy timbers beneath the axle structure onto which the axle may be lowered.

Step 7: Remove the traction motors and drivers. Refer to “Planetary Drive”, located in Section 03, for removal instructions.

Step 8: Lower the machine onto jack stands previously prepared under the axle.

Step 9: Remove the ball cap capscrews from each ball-socket assembly. Remove the ball cap and ball cap spacers from each ball base.

Step 10: Attach a suitable hoist with sling to the rear of the main frame. Raise the rear of the mainframe clear of the ball bases.

Step 11: Install heavy jack stands under the mainframe and lower the main frame onto it.

Step 12: Remove the axle from under the mainframe and place in a safe work area.

Step 13: Remove the ball liner from each of the balls and place in a safe, clean area. Protect the seals and O-rings.

Step 14: Remove the ball base liner from each ball base and place in a safe, clean area. Protect the O-rings and seals.

Installing the Rear Oscillating Axle

Step 1: Refer to Balls, Caps, And Pins, located in Section 03 of the Service Manual, for specific instructions and shim clearance that must be followed to mount the ball caps to the ball sockets that are welded to the mainframe.

Step 2: Reverse removal procedure above and complete the installation of the oscillating axle.

Installing and Removing the Operator Cab

Safety Preparations — Mechanical

Use the following procedure to isolate energy sources before performing any removal, replacement, or installation procedures described in this document.

⚠ WARNING

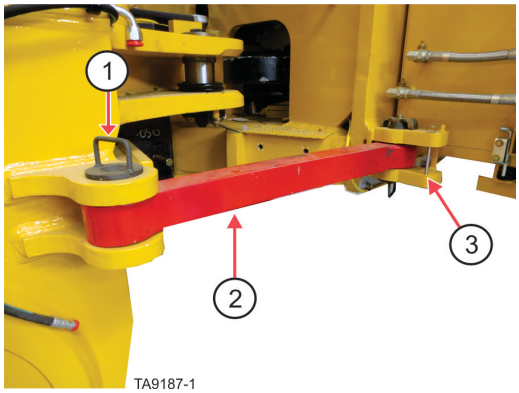
Crush hazards exist if the machine is started or moved while work processes are being performed on the machine. Place bucket flat and level on the ground. Place frame lock in the locked position and lock out the machine's starting capability before performing any work process. Follow all applicable lockout procedures and local rules and regulations for performing work processes. ANYONE performing inspections or service procedures to the machine should be familiar with ALL instructions and procedures contained in the machine's SERVICE MANUAL. Crush hazard could occur if the machine is started or moves while any type of work process is being conducted on the machine, resulting in serious injury or death.

Step 1: Stop the wheel loader on flat level ground.

Step 2: Move the frame lock to the locked position so that the frame cannot be steered.

⚠ WARNING

Crush hazards exist in machine pivot area and area between the tires. Do not enter these areas unless it is verified that the operator has control over the steering and that personnel locking the frame lock have good communication with the operator. Entering the pivot area and area between the tires while the machine is moving or pivoting (articulating) could cause crush hazards resulting in serious injury or death.



1) Retaining pin for locked position, **2)** Frame lock - shown in locked position, **3)** Retaining pin bracket for un-locked position

Frame lock in locked position

Step 3: Place wheel chocks in front and behind each wheel.

Step 4: Set bucket flat and level on the ground.

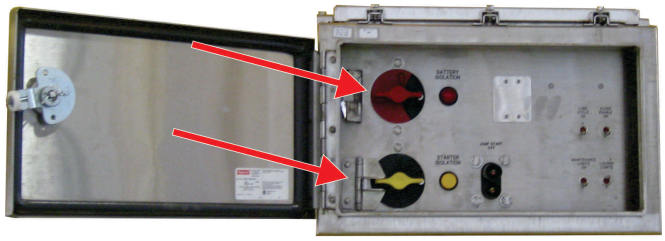
Step 5: Set the parking brakes.

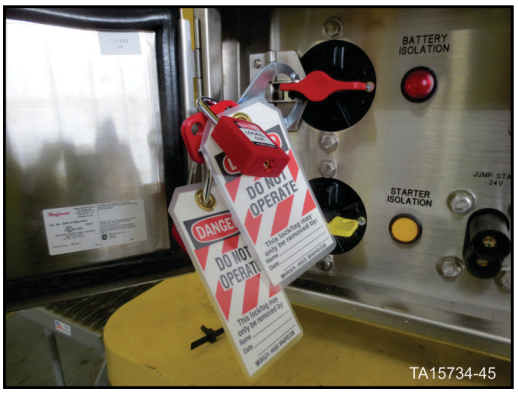
Step 6: Shut off the engine.

⚠ WARNING

Crush, shock, or other hazards exist if stored energy is not removed or isolated prior to working on the machine. Stored energy (hydraulic, electrical, pneumatic, mechanical, etc.) may be present if not isolated or released prior to working on the machine. Do not work on the machine without removing this stored energy (suspended loads, electrical power, air pressure, etc.). Risk of crushing, shock, or other physical injury exists if stored energy is not removed or isolated prior to working on the machine which could result in serious injury or death.

Step 7: Turn the battery and engine isolation switches to the off position and install locks on the battery isolation switch.

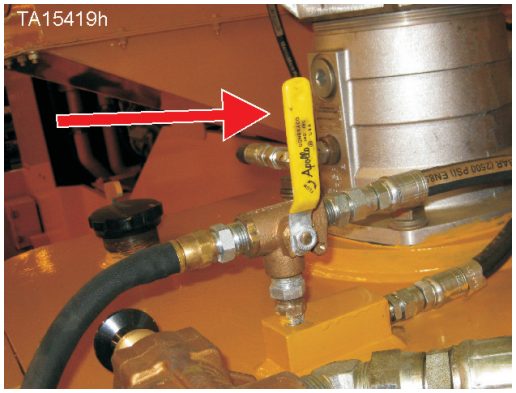




Battery Isolation Box – Battery isolation switch in OFF position with locks in place

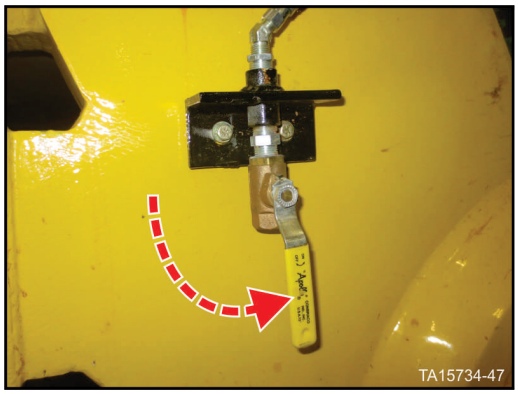
Step 8: Release the air from the hydraulic reservoir by using the hydraulic reservoir air valve (ball valve) on top of the reservoir.

- Turn the handle to the up position as shown below.
- The air supply line from main air system will be blocked.
- The reservoir air will vent out the hose that runs down the outside of the hydraulic reservoir.

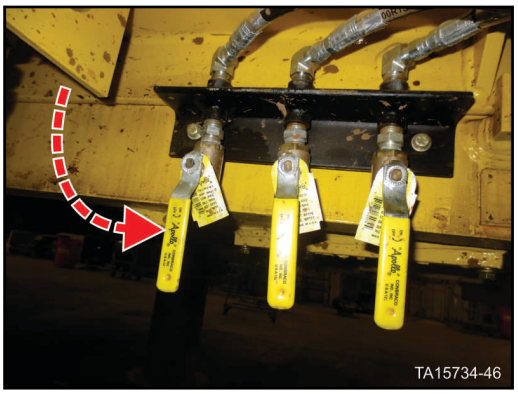


Hydraulic reservoir air valve handle UP

Step 9: Release the air from the various air storage reservoirs by opening all of the air bleed valves.



One valve on right side of front frame near hoist cylinder ball cap



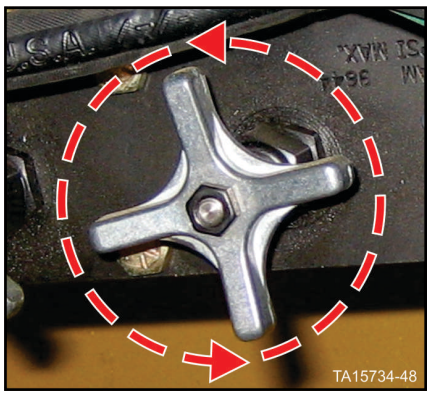
Three valves on right side of rear frame under hydraulic reservoir

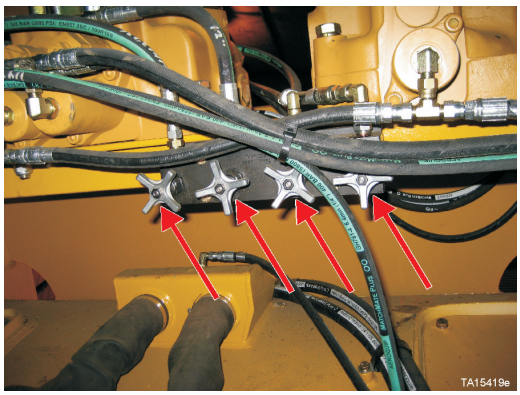
Open air reservoir bleed valves

Step 10: Use the hydraulic pressure bleed down valves located in the front frame underneath the Husco valves to bleed any stored pressure in the hoist and bucket cylinders.

Step 11: Turn each valve slowly counterclockwise as shown below and allow the pressure to bleed down.

Step 12: Open the valve completely and leave it open during this procedure.





Hoist and bucket circuit hydraulic pressure bleed down valves

Removing the Operator Cab

WARNING

Crush hazards exist if standing under, or placing any body part under hoisted/suspended components. Never stand under hoisted/suspended components. Ensure appropriate lifting devices are used, and blocking is adequate to prevent the component from unexpectedly moving during transportation. Refer to SAFETY, WARNINGS, and CAUTIONS before attempting to remove the operator's cab. Failure to stay out from under hoisted/suspended components can cause crush hazard resulting in serious injury or death.

NOTICE

If a safety or instructional label or placard is on a part that is replaced, make sure a new label is installed on the replaced part. Replace immediately any safety or instructional label or placard that is not legible. Refer to the PARTS MANUAL to order replacement labels/placards.

To remove the operator's cab from the cockpit of the machine does not require removal of the control station, deck or instrument panel.

⚠ CAUTION

Struck-by or struck against hazard exist if it is necessary to disconnect air conditioning lines. Use extreme care as all air conditioning lines contain compressed gas under high pressure. Use proper procedures, wear all necessary Personal Protective Equipment (PPE), and follow all local rules or regulations for disconnecting air conditioning lines. Failure to follow local rules and regulations and to wear proper PPE can cause a struck-by or struck against hazard resulting in personal injury.

Step 1: Remove light/mirror bar assembly.

Step 2: Remove the Roll Over Protective Structure (ROPS) and Falling Object Protective Structure (FOPS).

Step 3: Disconnect and tag all electrical leads or mechanical controls; i.e., windshield wiper, beacon, heater, air conditioner, etc.

Step 4: Remove the capscrews securing cab to base.

Step 5: Attach a suitable hoisting device and hoist the cab structure from the cockpit.

Installing the Cab

Step 1: Attach a suitable hoisting device to the cab and hoist the cab structure into the mounting position on the cockpit.

Step 2: Align mounting bolt holes and install mounting capscrews (refer to "Capscrew Torque Chart" located at the end of this document).

Step 3: Recharge air conditioner with appropriate Freon, if necessary.

Step 4: Connect electrical leads as tagged or indicated in the electrical schematics, located in the Schematics section of this manual.

Step 5: Install ROPS and FOPS. Refer to “Rollover protective structure (ROPS) and falling object protective structure (FOPS) assembly (typical)” in “Component Description”. Torque retaining nuts to 114 ft. lbs. (154.6 N.M. per bolt. Recheck torque after the initial 250 hours of operation and every 500 hours thereafter.

WARNING

Crush hazard exists if the Roll Over Protective Structure (ROPS) is modified or repaired. Never modify or repair the ROPS structure without written approval from the Komatsu Engineering department. The ROPS structure is certified per government regulations. Any modifications to the ROPS, such as welding on or drilling holes in the structural members will affect the capability of the ROPS to provide adequate protection. Any modification or repair to the ROPS without the specific approval of Komatsu engineering department shall void its certification. Contact your authorized Komatsu service center before making any modifications or repairs to ensure that such will not void the certification or effectiveness of the structure. Failure to properly modify or repair the structure can cause a crush hazard resulting in serious injury or death.

Removing or Installing the Counterweights or Fuel Reservoir

If the counterweights or fuel reservoir are to be removed, the following steps must be adhered to along with any mine site specific requirements.

Fuel Reservoir specific steps:

Safety Preparations — Mechanical

Use the following procedure to isolate energy sources before performing any removal, replacement, or installation procedures described in this document.

⚠ WARNING

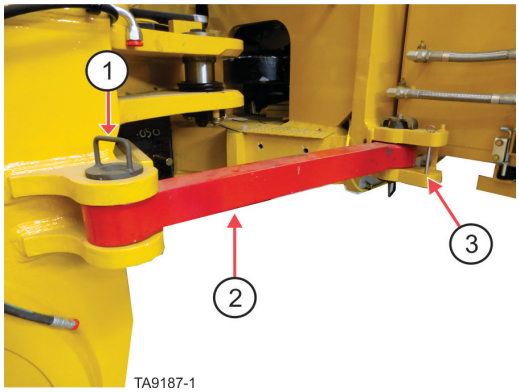
Crush hazards exist if the machine is started or moved while work processes are being performed on the machine. Place bucket flat and level on the ground. Place frame lock in the locked position and lock out the machine's starting capability before performing any work process. Follow all applicable lockout procedures and local rules and regulations for performing work processes. ANYONE performing inspections or service procedures to the machine should be familiar with ALL instructions and procedures contained in the machine's SERVICE MANUAL. Crush hazard could occur if the machine is started or moves while any type of work process is being conducted on the machine, resulting in serious injury or death.

Step 1: Stop the wheel loader on flat level ground.

Step 2: Move the frame lock to the locked position so that the frame cannot be steered.

⚠ WARNING

Crush hazards exist in machine pivot area and area between the tires. Do not enter these areas unless it is verified that the operator has control over the steering and that personnel locking the frame lock have good communication with the operator. Entering the pivot area and area between the tires while the machine is moving or pivoting (articulating) could cause crush hazards resulting in serious injury or death.



1) Retaining pin for locked position, **2)** Frame lock - shown in locked position, **3)** Retaining pin bracket for un-locked position

Frame lock in locked position

Step 3: Place wheel chocks in front and behind each wheel.

Step 4: Set bucket flat and level on the ground.

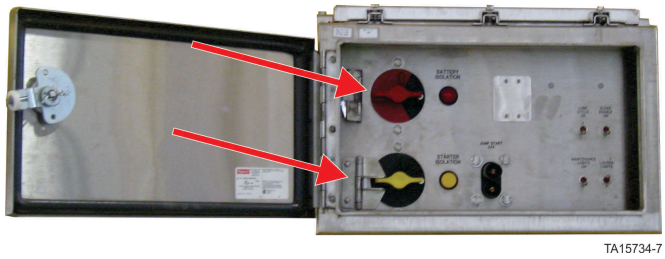
Step 5: Set the parking brakes.

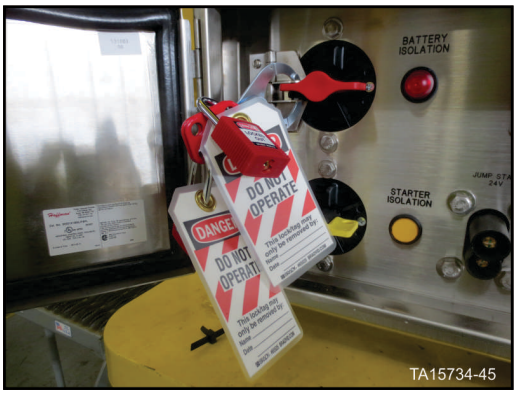
Step 6: Shut off the engine.

WARNING

Crush, shock, or other hazards exist if stored energy is not removed or isolated prior to working on the machine. Stored energy (hydraulic, electrical, pneumatic, mechanical, etc.) may be present if not isolated or released prior to working on the machine. Do not work on the machine without removing this stored energy (suspended loads, electrical power, air pressure, etc.). Risk of crushing, shock, or other physical injury exists if stored energy is not removed or isolated prior to working on the machine which could result in serious injury or death.

Step 7: Turn the battery and engine isolation switches to the off position and install locks on the battery isolation switch.

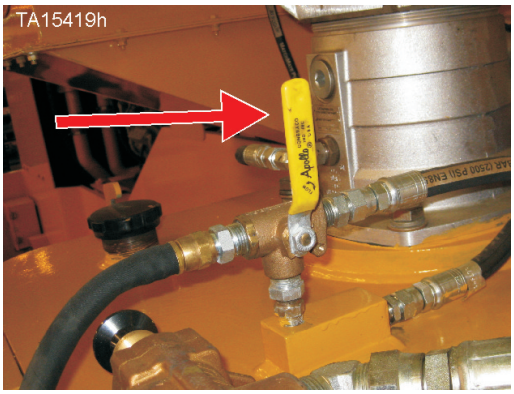




Battery Isolation Box – Battery isolation switch in OFF position with locks in place

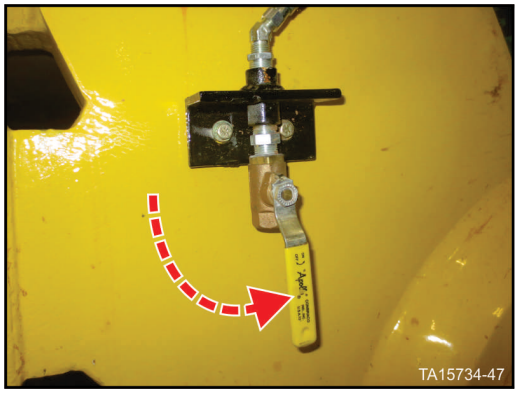
Step 8: Release the air from the hydraulic reservoir by using the hydraulic reservoir air valve (ball valve) on top of the reservoir.

- Turn the handle to the up position as shown below.
- The air supply line from main air system will be blocked.
- The reservoir air will vent out the hose that runs down the outside of the hydraulic reservoir.

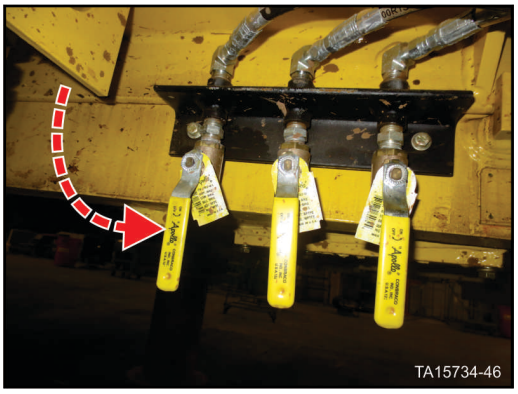


Hydraulic reservoir air valve handle UP

Step 9: Release the air from the various air storage reservoirs by opening all of the air bleed valves.



One valve on right side of front frame near hoist cylinder ball cap



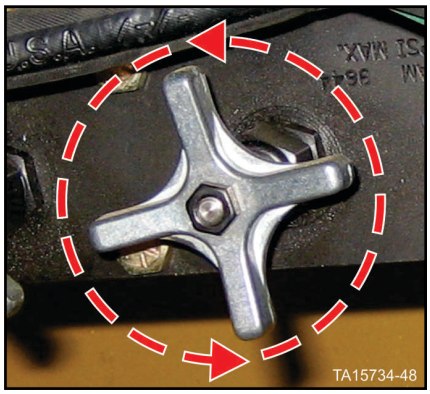
Three valves on right side of rear frame under hydraulic reservoir

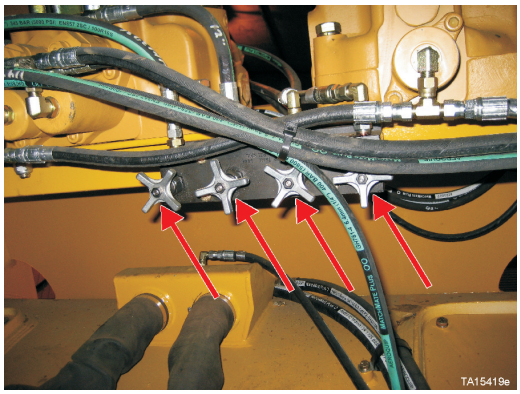
Open air reservoir bleed valves

Step 10: Use the hydraulic pressure bleed down valves located in the front frame underneath the Husco valves to bleed any stored pressure in the hoist and bucket cylinders.

Step 11: Turn each valve slowly counterclockwise as shown below and allow the pressure to bleed down.

Step 12: Open the valve completely and leave it open during this procedure.





Hoist and bucket circuit hydraulic pressure bleed down valves

Additional Safety Preparations with Draining Fuel Reservoir

Use the following additional procedure to isolate energy sources before performing any removal, replacement, or installation procedures described in this document.

Step 1: Following all local environmental rules and regulations, drain the fuel reservoir and any residual fluid from lines or filters as required to prevent a fuel spill.

NOTICE

Environmental hazard exists when draining, filling, or disposing of component fluids. Spills are possible. Follow all appropriate environmental regulations for containing and disposing of fluids during any procedure that involves component fluids. Failure to follow all appropriate regulations for containing and disposing of fluids can cause an environmental hazard resulting in an environmental chemical spill.

Removing the Counterweights and Fuel Reservoir

Step 1: Clean the fuel reservoir top and bottom to remove any dirt, mud or other buildup

Step 2: Remove the grease line going to the axle socket behind axle.

Step 3: Record the following measurements

- **a.** Measure the height of the fuel reservoir assembly and fittings (A)
- **b.** Add 10” (25 cm) to this dimension (A + 10”)
- **c.** Measure the distance from the bottom of the frame (B)
- **d.** Subtract this distance from step b. A + 10” – B = required gap under frame

Step 4: If the fuel reservoir is to be removed, remove all fuel.

Step 5: Disconnect all wiring or hoses that are either connected to the component or that would be in the way as the component is removed. The items to be disconnected will vary depending on the machine and the component being removed.

Step 6: Lift the rear frame and set on blocks or stands.
This will typically require about 24” of height
See step “h” to determine the height.

Step 7: If the frame has been placed onto stands, block the rear axle so that it cannot oscillate.

Step 8: Remove the tire on the side the reservoir will be lowered from.

Fuel Reservoir and Counterweight steps
Step 9: Support the fuel reservoir or counterweight with appropriate cribbing or stands of sufficient size and capacity for the reservoir or counterweight so that the component cannot fall.

⚠ WARNING

Crush hazard exists if personnel are positioned underneath a fuel reservoir or counterweight that is only supported by a crane or forklift. Appropriate stands or cribbing must be used to support the reservoir prior to entering this area. Failure to properly support the counterweights or fuel reservoir can cause a crush hazard resulting in serious injury or death.

Step 10: Remove the bolts or pins.

Step 11: Discard the bolts, nuts and washers and use new ones when the component is reinstalled.

NOTICE

The pins used for the newer bumper counterweights on 1850 and 2350 weigh about 120 lb. (54.43 kg.) each.

Step 12: Lower the fuel reservoir or counterweight to the ground using jacks, crane(s) or forklift.

CAUTION

Fuel reservoirs that have been in service for some time may be difficult to remove due to dirt or rust and will not come out without some assistance. A hydraulic cylinder or jack may be required from the top side to break the reservoir free of the dirt and rust. A spreader block of hard wood or steel must be placed between the reservoir and the hydraulic cylinder (port-a-power) so that the pushing force on the reservoir is spread over a wide area. The top surface of the reservoir is not thick enough to bear point loads.

Installing Fuel Reservoir and Counterweights

If the counterweights or fuel reservoir are to be installed, the following steps must be adhered to along with any mine site specific requirements.

Installing Fuel Reservoir specific steps

Step 1: Lift the rear frame high enough so that the fuel reservoir will fit underneath when on forklift.

Step 2: Place the rear frame on stands or blocks.

Step 3: Block the rear axle so it cannot oscillate.

Installing Fuel Reservoir and Counterweight Steps

Step 1: Place the fuel reservoir or counterweight underneath the machine.

Step 2: Lift the fuel reservoir or counterweight into position using jacks, crane(s) or forklift.

Step 3: Support the fuel reservoir or counterweight with appropriate cribbing or stands of sufficient size and capacity for the reservoir or counterweight so that the component cannot fall while it is being positioned.

⚠ WARNING

Crush hazard exists if personnel are positioned underneath a fuel reservoir or counterweight that is only supported by a crane or forklift. Appropriate stands or cribbing must be used to support the reservoir prior to entering this area. Failure to properly support the counterweights or fuel reservoir can cause a crush hazard resulting in serious injury or death.

NOTICE

Use new bolts, washers and nuts each time a counterweight or fuel reservoir is installed.

Step 4: Install the bolts or pins.

See the parts manual for the specific machine in order to determine the correct bolt, washer and nut to use.

NOTICE

The pins used for the newer bumper counterweights on 1850 and 2350 weigh about 120 lb. each.

Step 5: Torque bolts to the values indicated on the torque chart in the manuals or in SIL294.

Step 6: Reconnect all wiring or hoses.

Installing: Additional Fuel Reservoir specific steps

Step 1: Install the tire.

Step 2: Remove the blocks that prevented the rear axle from oscillating.

Step 3: Add fuel to the fuel reservoir if it was removed.

Step 4: Reinstall the grease line going to the axle socket behind axle.

Step 5: Verify that the socket is taking grease.

Installing Fuel Reservoir specific steps

Step 1: Lift the rear frame high enough so that the fuel reservoir will fit underneath when on forklift.

Step 2: Place the rear frame on stands or blocks.

Step 3: Block the rear axle so it cannot oscillate.

Installing: Additional Fuel Reservoir specific steps

Step 1: Install the tire.

Step 2: Remove the blocks that prevented the rear axle from oscillating.

Step 3: Add fuel to the fuel reservoir if it was removed.

Step 4: Reinstall the grease line going to the axle socket behind axle.

Step 5: Verify that the socket is taking grease.

Lifting (Jacking) the Machine

Safety Preparations, Lifting (With Jacks) the Machine

Use the following procedure to isolate energy sources before performing any removal, replacement, or installation procedures described in this document.

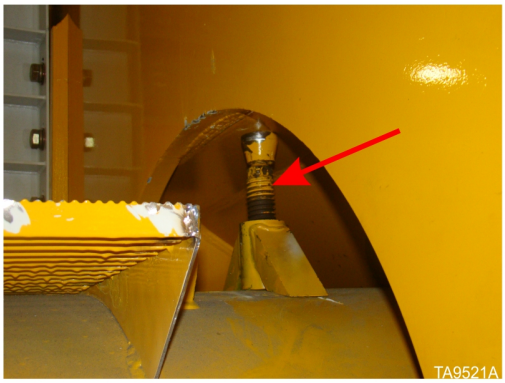
CAUTION

Following completion of service or repair, BE SURE to place the frame lock in the unlocked position or machine damage will result.

WARNING

Crush hazard exists when lifting the rear axle off the ground. Caution should be exercised when using jacks to lift the machine. If both wheels of the oscillating axle are off the ground at the same time, the axle may swivel vertically. This is a potentially hazardous situation. Both sides of the axle should be blocked to prevent swiveling. Failure to block both sides of the rear axle can cause a crush hazard resulting in serious injury or death.

Figure 61: Blocking axle to prevent swiveling



WARNING

Crush hazards exist when raising the machine by using jacks or crane. Always ensure the machine is on flat, level ground that is firm enough to support the jacks while holding the weight of the machine, for the time necessary to complete the procedures being performed. Machine tipping over or sinking into the ground is possible. Crush hazards exist under and around the machine if tipping or sinking occurs. Failure to ensure the jacks and cranes are of sufficient capacity, and the ground is firm enough to support the jacks or cribbing, while holding the weight of the machine, can cause crush hazards resulting in serious injury or death.

Safety Preparations — Mechanical

Use the following procedure to isolate energy sources before performing any removal, replacement, or installation procedures described in this document.

WARNING

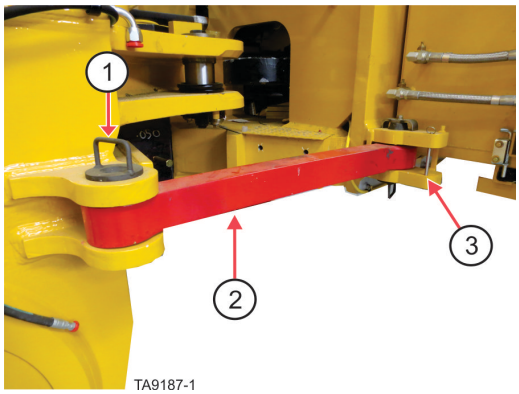
Crush hazards exist if the machine is started or moved while work processes are being performed on the machine. Place bucket flat and level on the ground. Place frame lock in the locked position and lock out the machine's starting capability before performing any work process. Follow all applicable lockout procedures and local rules and regulations for performing work processes. ANYONE performing inspections or service procedures to the machine should be familiar with ALL instructions and procedures contained in the machine's SERVICE MANUAL. Crush hazard could occur if the machine is started or moves while any type of work process is being conducted on the machine, resulting in serious injury or death.

Step 1: Stop the wheel loader on flat level ground.

Step 2: Move the frame lock to the locked position so that the frame cannot be steered.

WARNING

Crush hazards exist in machine pivot area and area between the tires. Do not enter these areas unless it is verified that the operator has control over the steering and that personnel locking the frame lock have good communication with the operator. Entering the pivot area and area between the tires while the machine is moving or pivoting (articulating) could cause crush hazards resulting in serious injury or death.



1) Retaining pin for locked position, **2)** Frame lock - shown in locked position, **3)** Retaining pin bracket for un-locked position

Frame lock in locked position

Step 3: Place wheel chocks in front and behind each wheel.

Step 4: Set bucket flat and level on the ground.

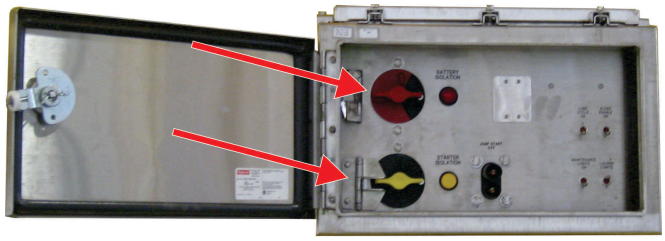
Step 5: Set the parking brakes.

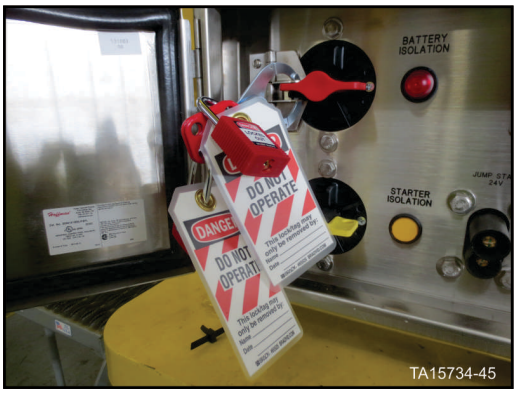
Step 6: Shut off the engine.

⚠ WARNING

Crush, shock, or other hazards exist if stored energy is not removed or isolated prior to working on the machine. Stored energy (hydraulic, electrical, pneumatic, mechanical, etc.) may be present if not isolated or released prior to working on the machine. Do not work on the machine without removing this stored energy (suspended loads, electrical power, air pressure, etc.). Risk of crushing, shock, or other physical injury exists if stored energy is not removed or isolated prior to working on the machine which could result in serious injury or death.

Step 7: Turn the battery and engine isolation switches to the off position and install locks on the battery isolation switch.

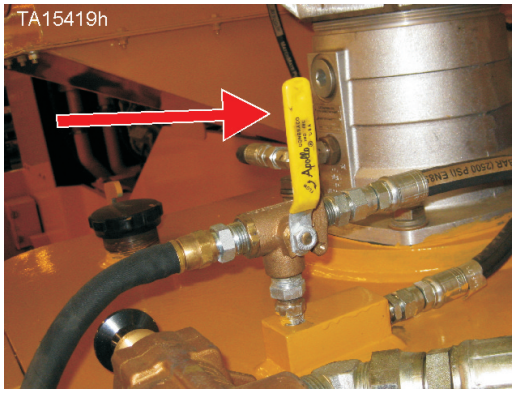




Battery Isolation Box – Battery isolation switch in OFF position with locks in place

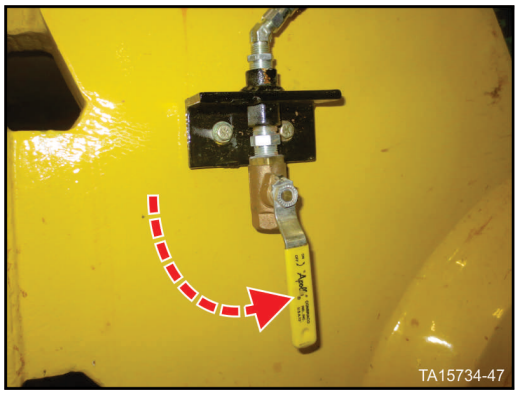
Step 8: Release the air from the hydraulic reservoir by using the hydraulic reservoir air valve (ball valve) on top of the reservoir.

- Turn the handle to the up position as shown below.
- The air supply line from main air system will be blocked.
- The reservoir air will vent out the hose that runs down the outside of the hydraulic reservoir.

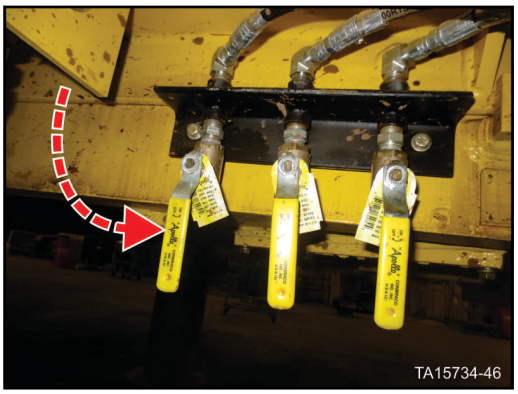


Hydraulic reservoir air valve handle UP

Step 9: Release the air from the various air storage reservoirs by opening all of the air bleed valves.



One valve on right side of front frame near hoist cylinder ball cap



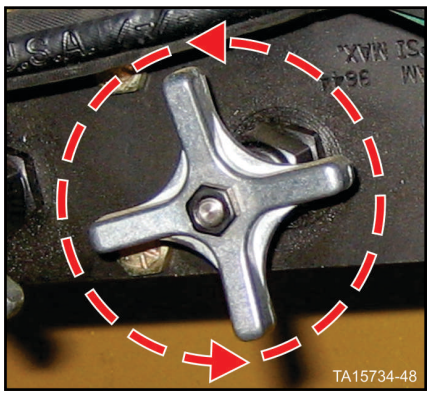
Three valves on right side of rear frame under hydraulic reservoir

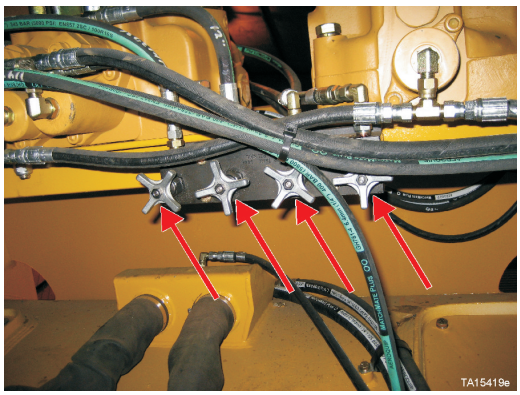
Open air reservoir bleed valves

Step 10: Use the hydraulic pressure bleed down valves located in the front frame underneath the Husco valves to bleed any stored pressure in the hoist and bucket cylinders.

Step 11: Turn each valve slowly counterclockwise as shown below and allow the pressure to bleed down.

Step 12: Open the valve completely and leave it open during this procedure.





Hoist and bucket circuit hydraulic pressure bleed down valves

Lifting the Machine (Jacking up the Machine)

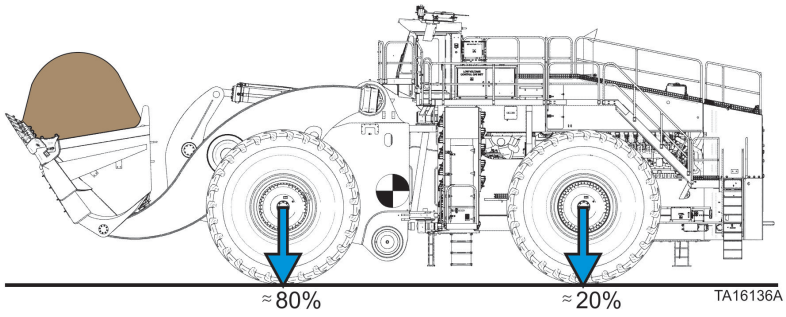
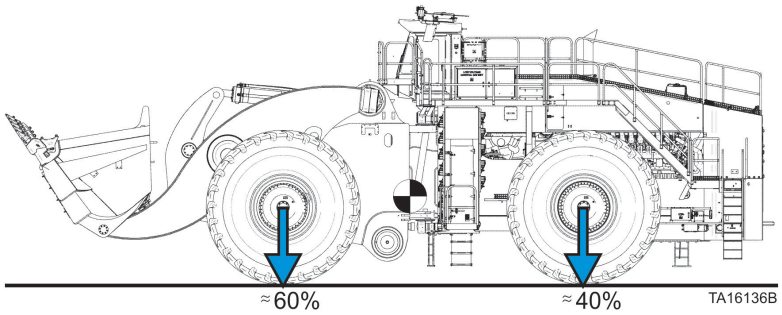
WARNING

Crush hazard exists when jacking the machine. The following table shows the approximate weights for new stock machines with the bucket rolled back in the carry position. Always consider the following factors/ variables. The table does not account for: 1) other positions of the lift arm and bucket, 2) components that may have been removed during repairs, 3) items added during machine build, 4) for chains, 5) all tire sizes, 6) tire wear, 7) empty/full fuel tank, 8) mud on the machine, 9) customer add-ons, 10) customers adding additional weight of wear plates in the bucket, 11) amount of material weight in the bucket, 12) other variables. Failure to consider all variables before jacking the machine can cause crush hazards resulting in serious injury or death.

Table 5: Loader operating weights (approximate)

Machine model/lift	Lbs.	Kgs.
1350 standard lift	405,000	183705
1350 high lift	410,000	185973
1850 standard lift	535,000	242672
1850 high lift	543,000	246,370
2350 standard lift	587,800	266622
2350 high lift	599,800	272065
2350 super high lift	608,576	276045

Figure 62: Approximate weight distribution of a wheel loader

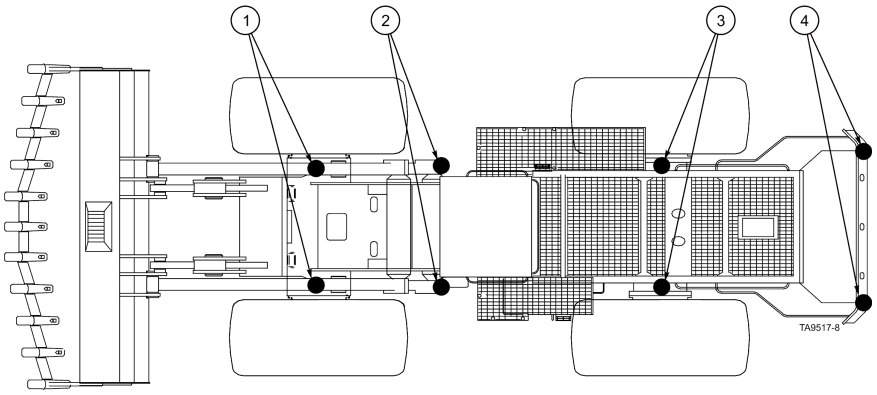
	Loaded, with bucket in carry position
	Not loaded, with bucket in carry position

The approximate weight distribution of a wheel loader is:		
Condition	**Front axle**	**Rear axle**
Empty	**60%	** 40%
Loaded (with rated load)	** 80%	** 20%
**The % weight distribution and center of gravity can vary widely depending on the factors listed above		

NOTICE

The only way to know the precise machine weight and weight distribution at a given time is to use scales to weigh the front and rear axles.

Figure 63: Loader jacking points – in operating mode (not loaded)

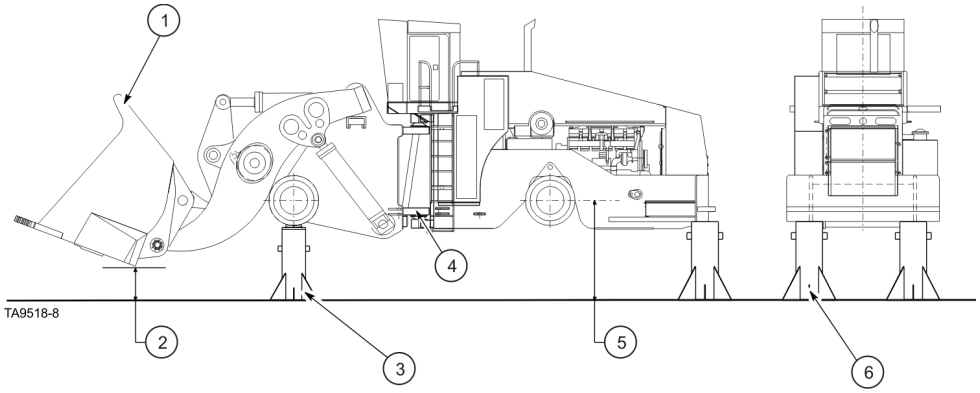


1) Jacking point if not using jack stands 2) Jacking point if placing jack stands under front axle 3) Jacking point 4) Alternate jacking point

NOTICE

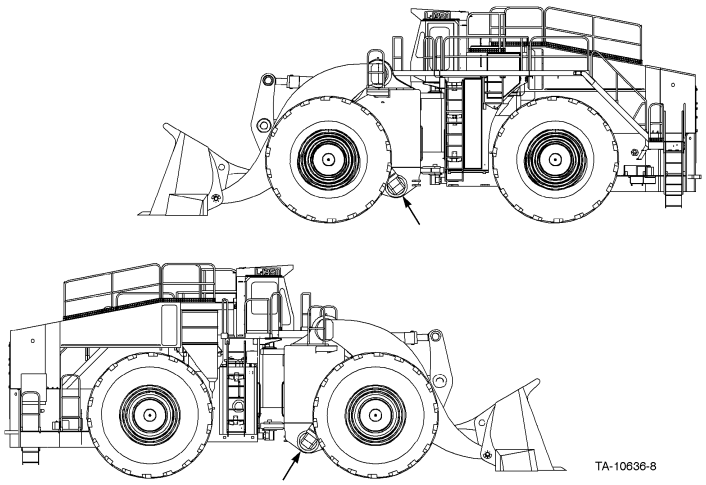
Weights at points of lifting on axle • Bucket empty and in "carry" position • Frame in locked position • All wheels chocked.

Figure 64: Recommended jack stand placement locations (typical all models)



1) bucket at carry height in rollback position 2) clear of ground 3) jack stands placed under front axle each side as close as possible to frame structural support member 4) frame lock in locked position 5) radius of tire +6" (150mm) 6) jack stands placed under rear bumper each side in line with frame.

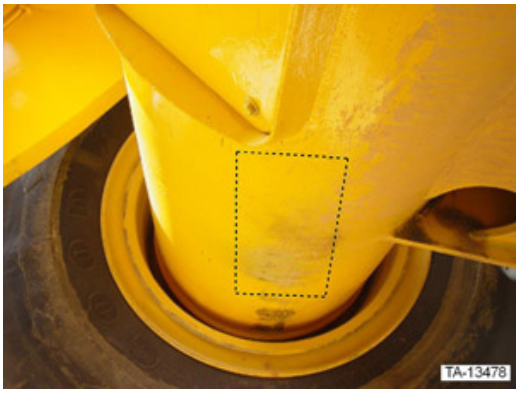
Figure 65: Jacking points for placing jack stands under front axle (typical all models)



NOTICE

Place jack under frame each side at location indicated. Place jack stands under axle as close as possible to frame structure support member as shown in illustration front axle jacking and jack stand placement locations, below.

Figure 66: Front axle jacking and jack stand placement location (typical)



Typical Location All Model

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Bucket Stand Design

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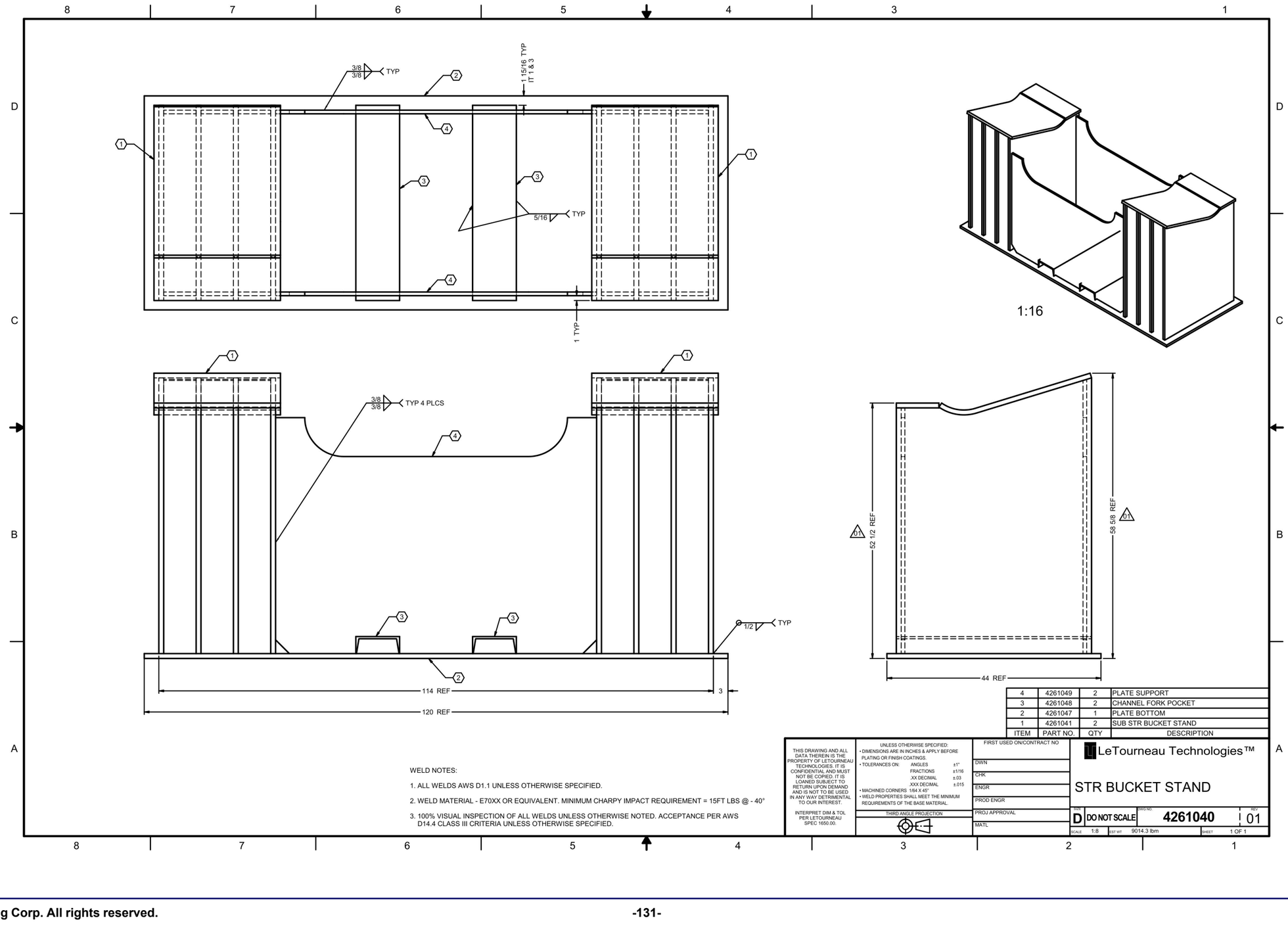
Figure 67: Bucket stand



ITEM	PART NO.	QTY	DESCRIPTION
4	4261049	2	PLATE SUPPORT
3	4261048	2	CHANNEL FORK POCKET
2	4261047	1	PLATE BOTTOM
1	4261041	2	SUB STR BUCKET STAND

WELD NOTES:

1. ALL WELDS AWS D1.1 UNLESS OTHERWISE SPECIFIED.
2. WELD MATERIAL - E70XX OR EQUIVALENT. MINIMUM CHARPY IMPACT REQUIREMENT = 15FT LBS @ - 40°
3. 100% VISUAL INSPECTION OF ALL WELDS UNLESS OTHERWISE NOTED. ACCEPTANCE PER AWS D14.4 CLASS III CRITERIA UNLESS OTHERWISE SPECIFIED.

UNLESS OTHERWISE SPECIFIED:
- DIMENSIONS ARE IN INCHES & APPLY BEFORE PLATING OR FINISH COATINGS.
- TOLERANCES ON: ANGLES ±1° FRACTIONS ±1/16 .XX DECIMAL ±.03 .XXX DECIMAL ±.015
- MACHINED CORNERS 1/64 X 45°
- WELD PROPERTIES SHALL MEET THE MINIMUM REQUIREMENTS OF THE BASE MATERIAL.

THIRD ANGLE PROJECTION

FIRST USED ON/CONTRACT NO

DWN
CHK
ENGR
PROD ENGR
PROJ APPROVAL
MATL

LeTourneau Technologies™

STR BUCKET STAND

SIZE D | DO NOT SCALE | DWG NO. 4261040 | REV 01

SCALE 1:8 | EST WT 9014.3 lbm | SHEET 1 OF 1

Figure 68: Support plate

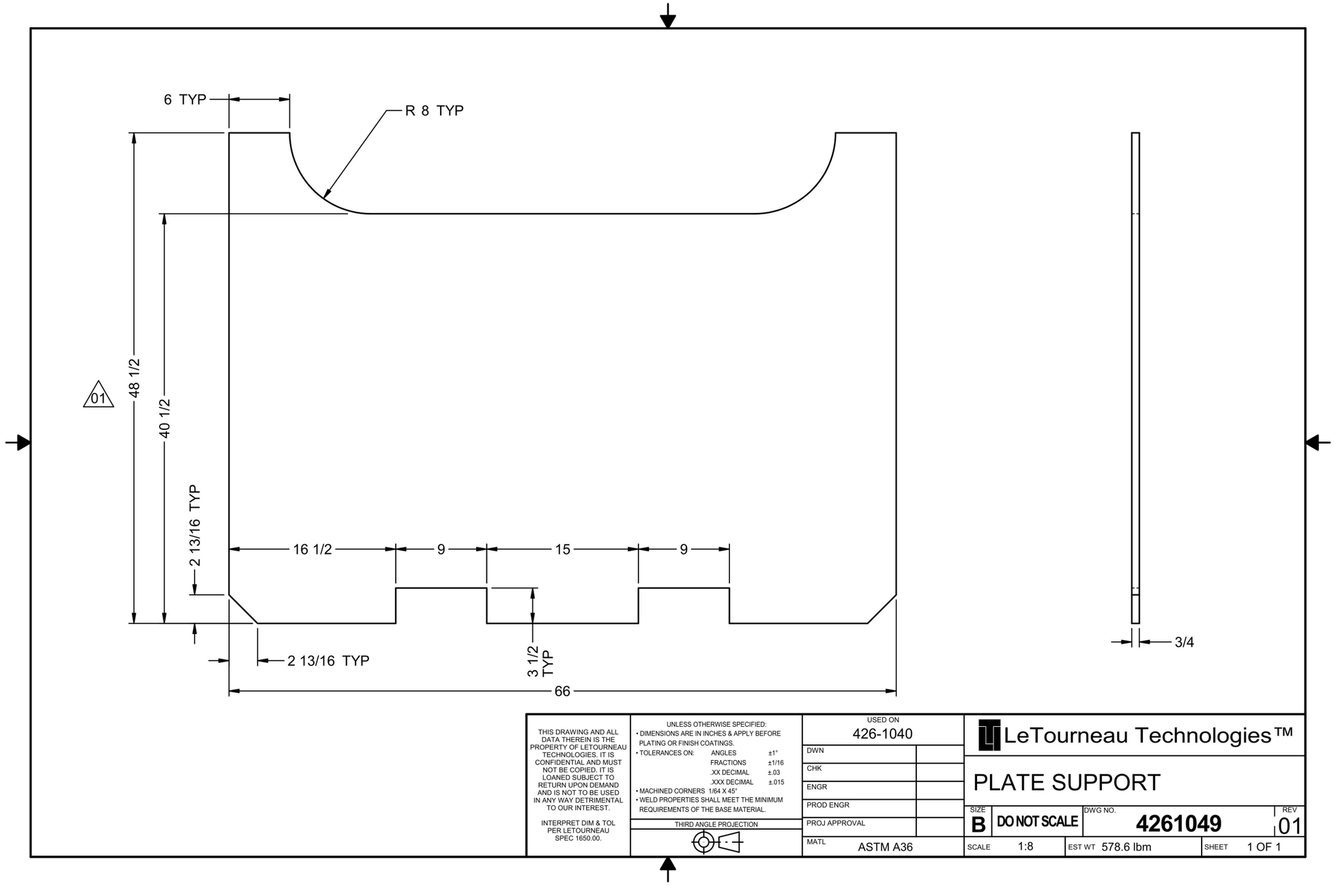


Figure 69: Fork pocket channel

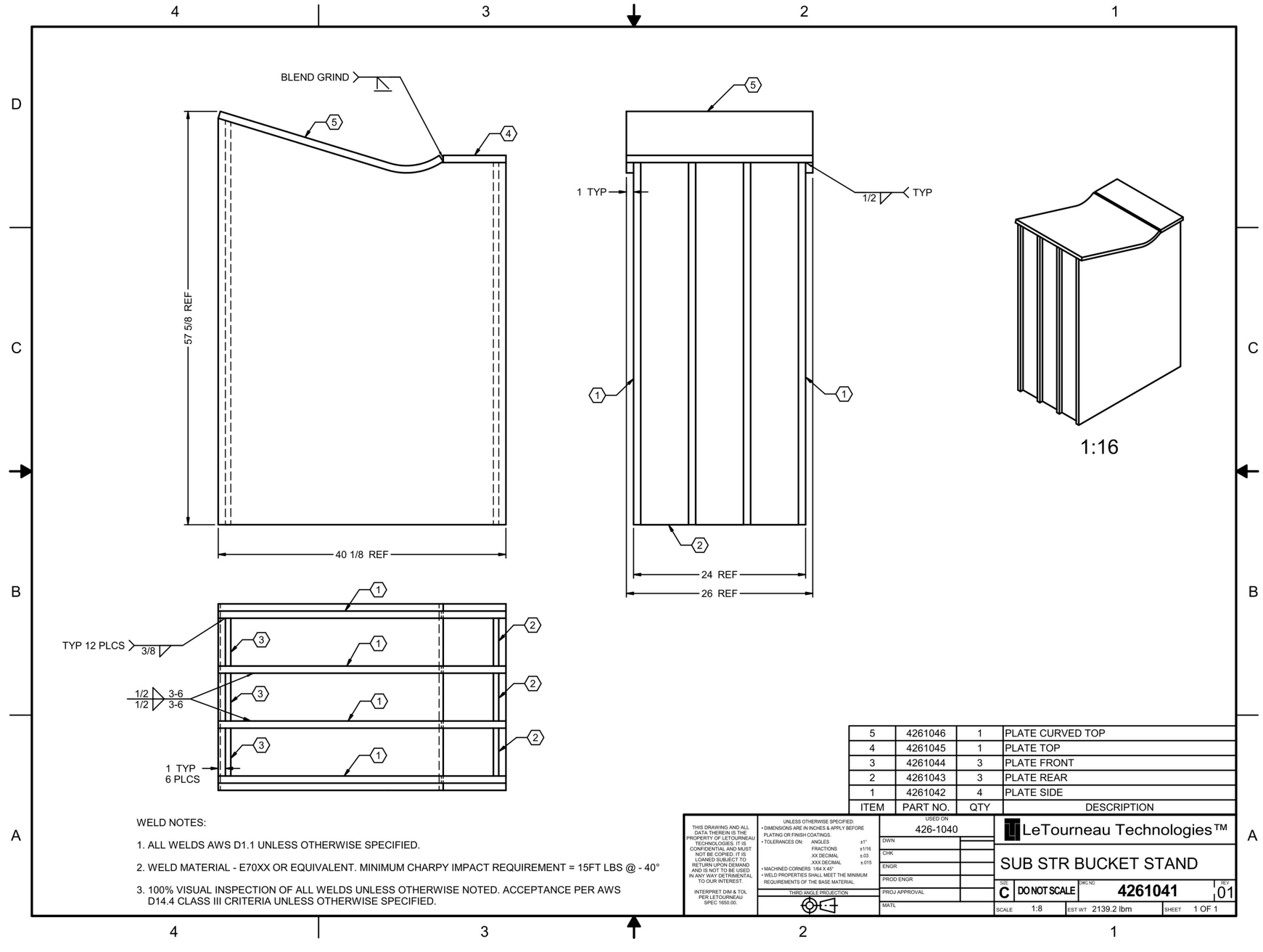


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Figure 70: Bottom plate

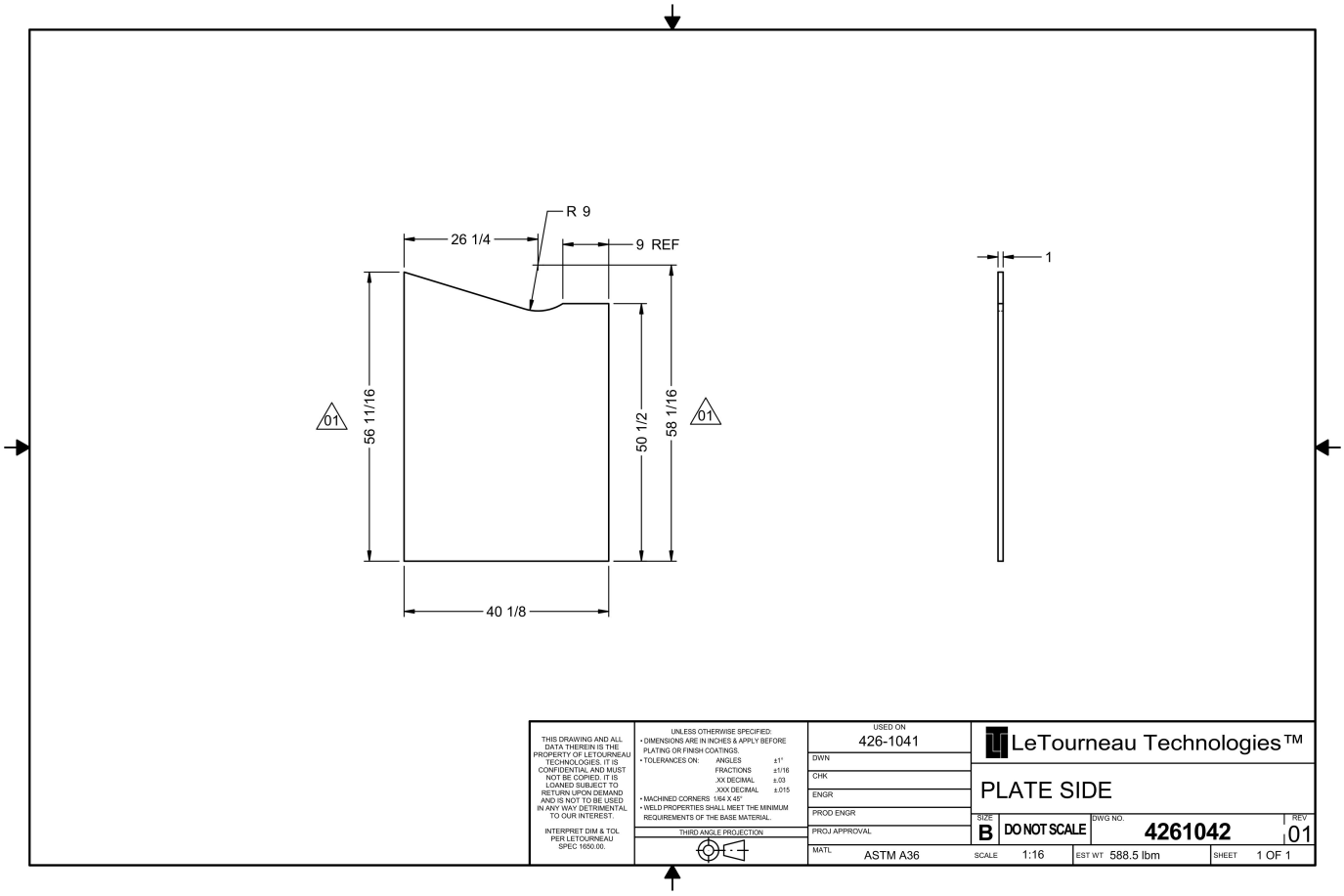


Figure 71: Bucket stand sub structure

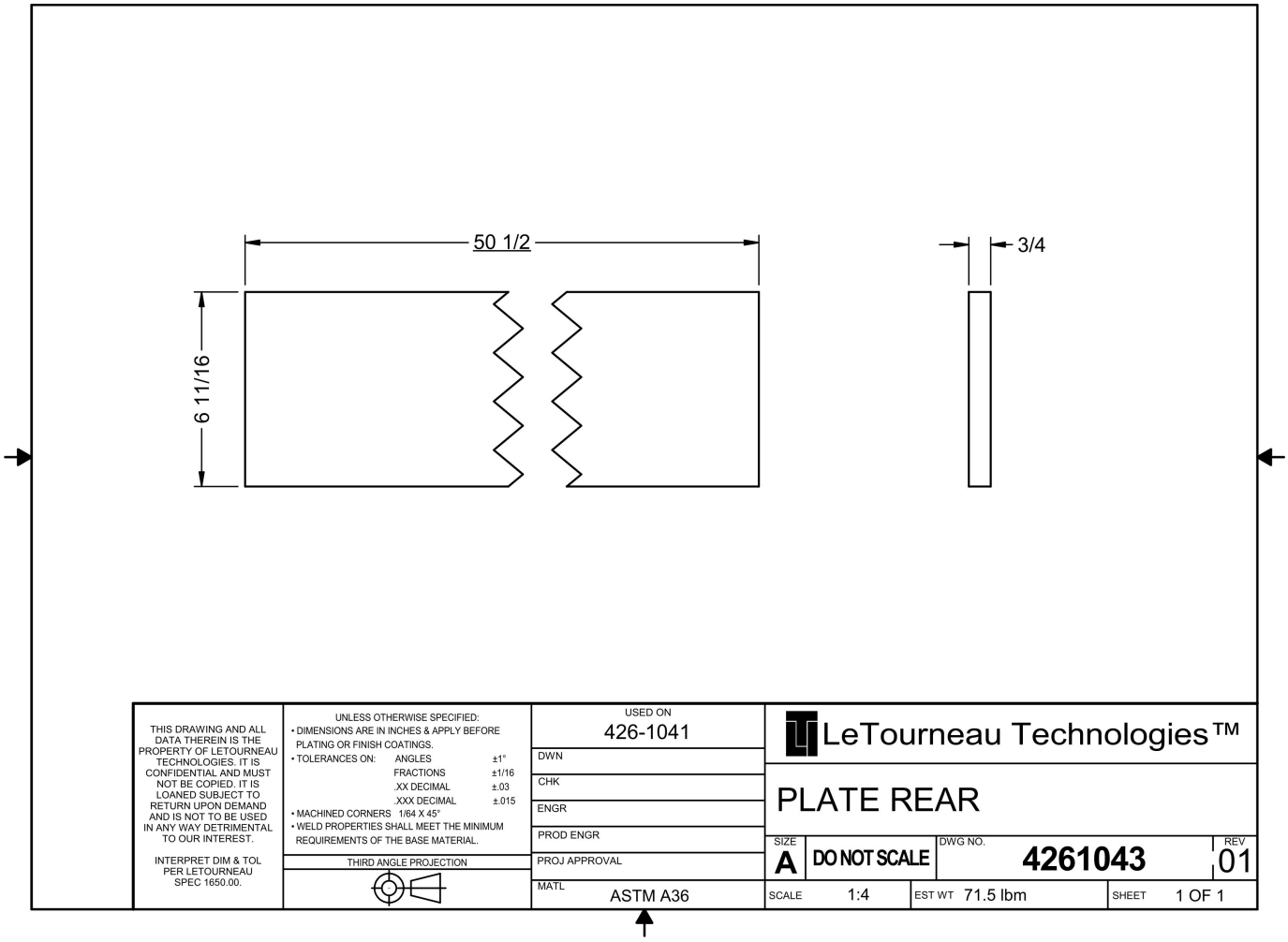


Figure 72: Curved top plate

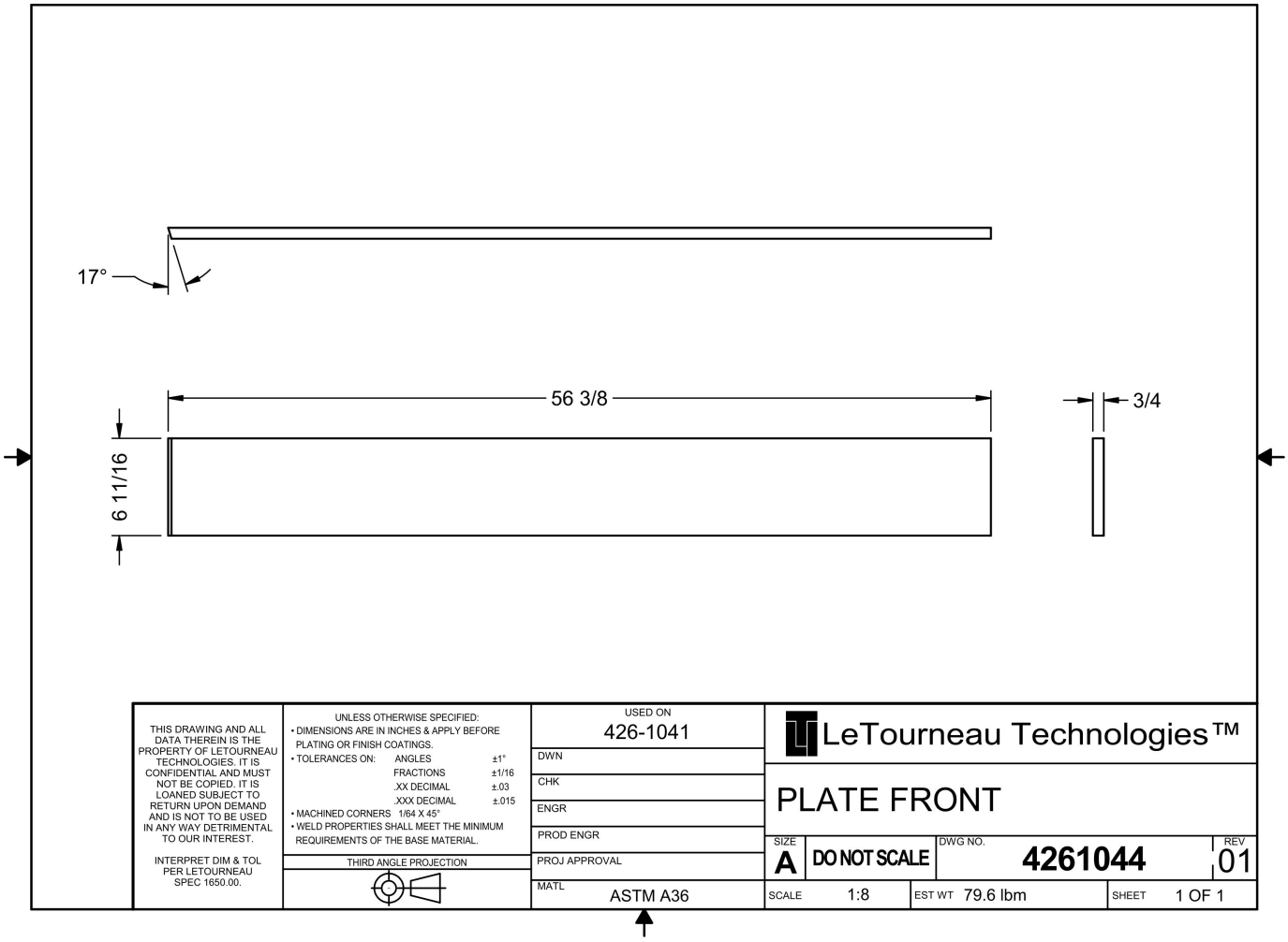


Figure 73: Top plate

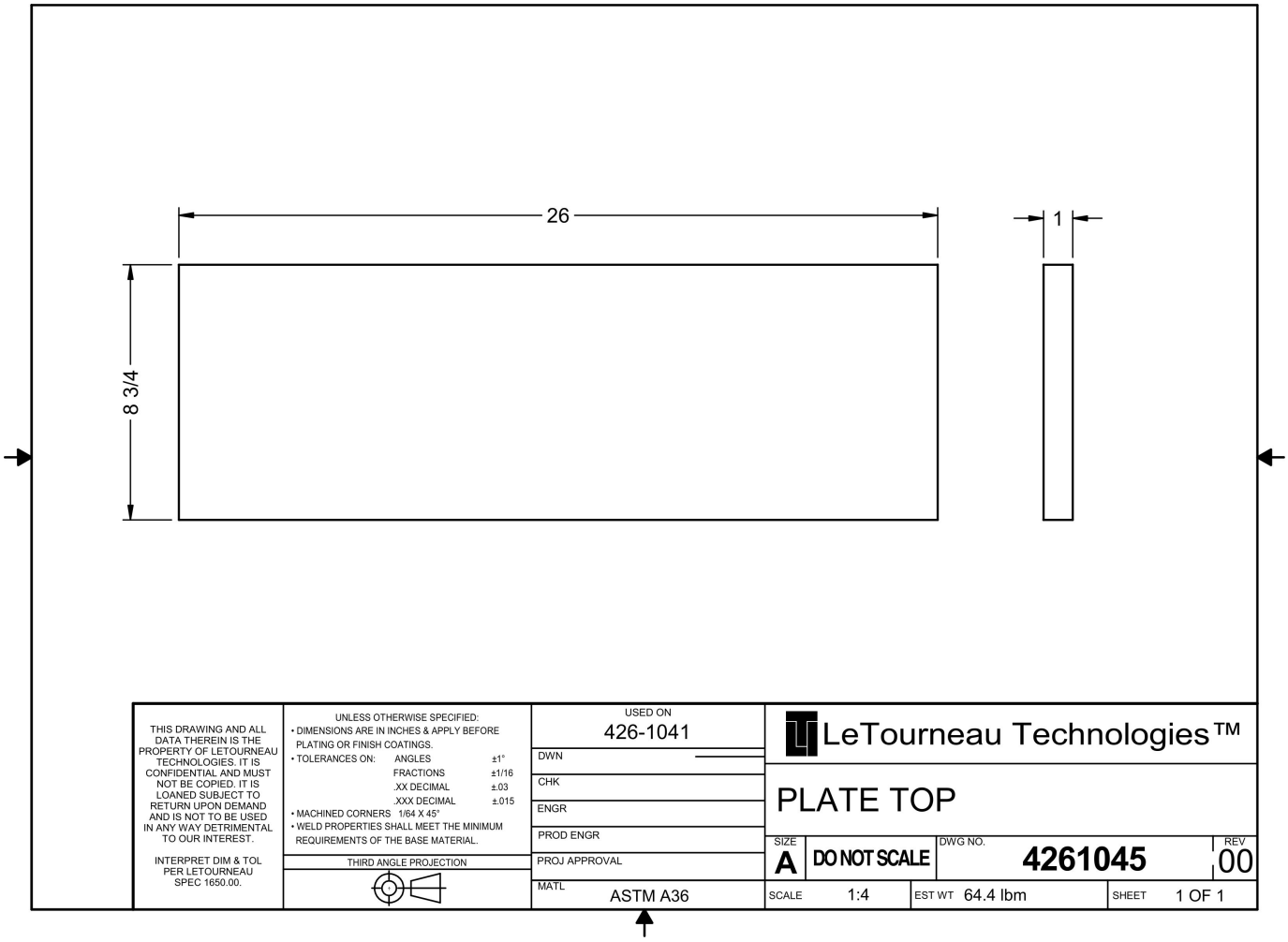


Figure 74: Front plate

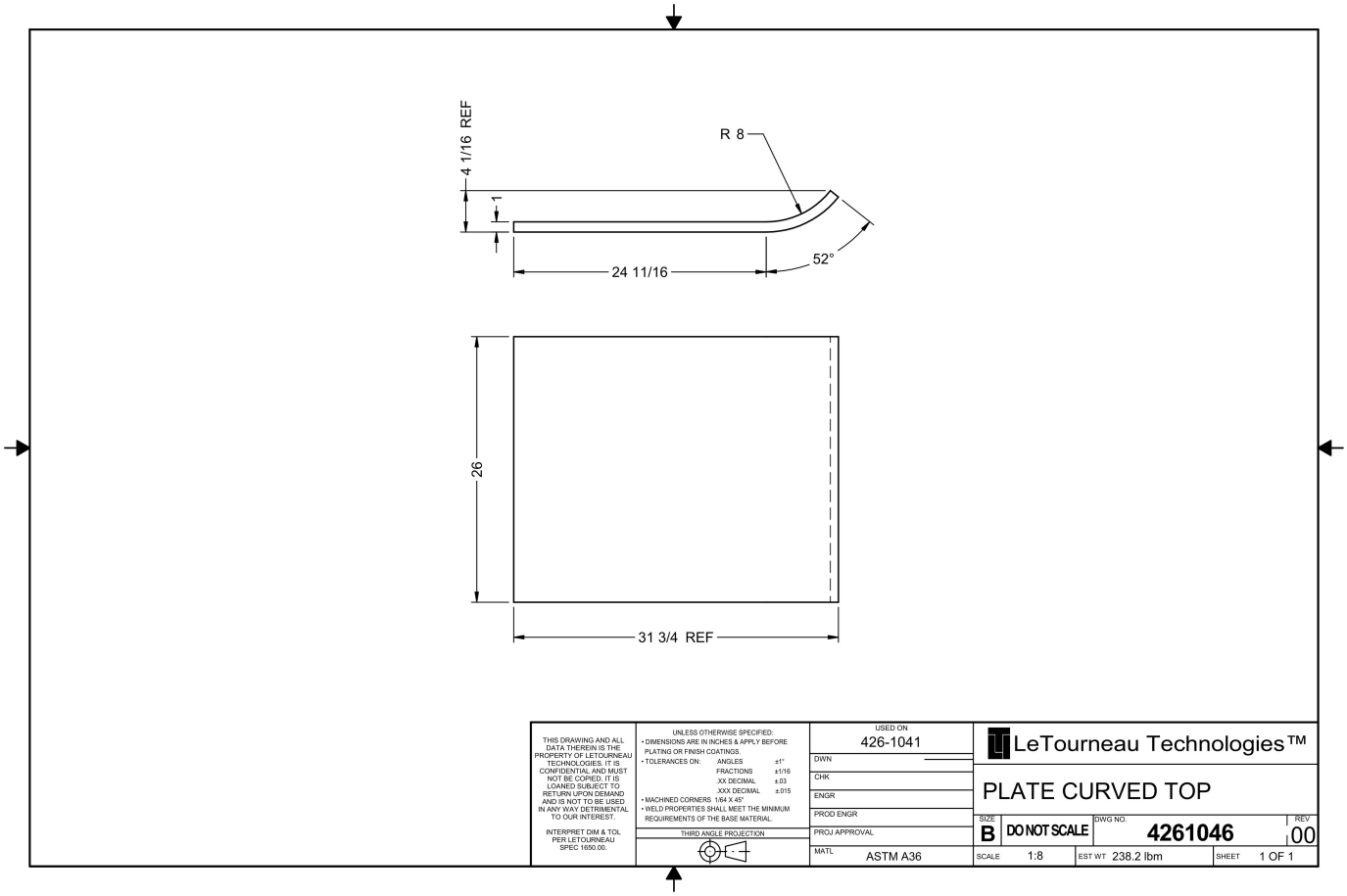


Figure 75: Rear plate

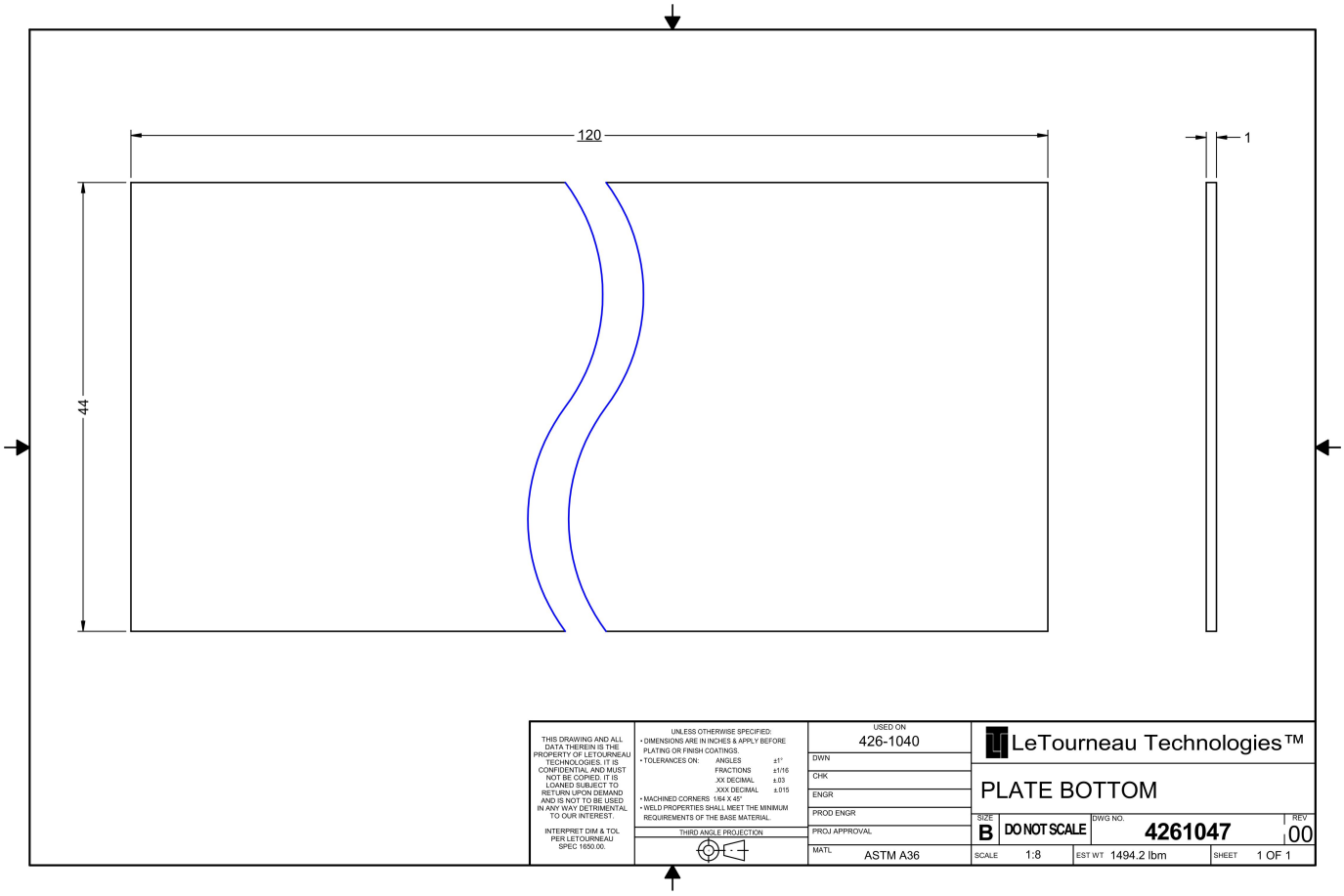
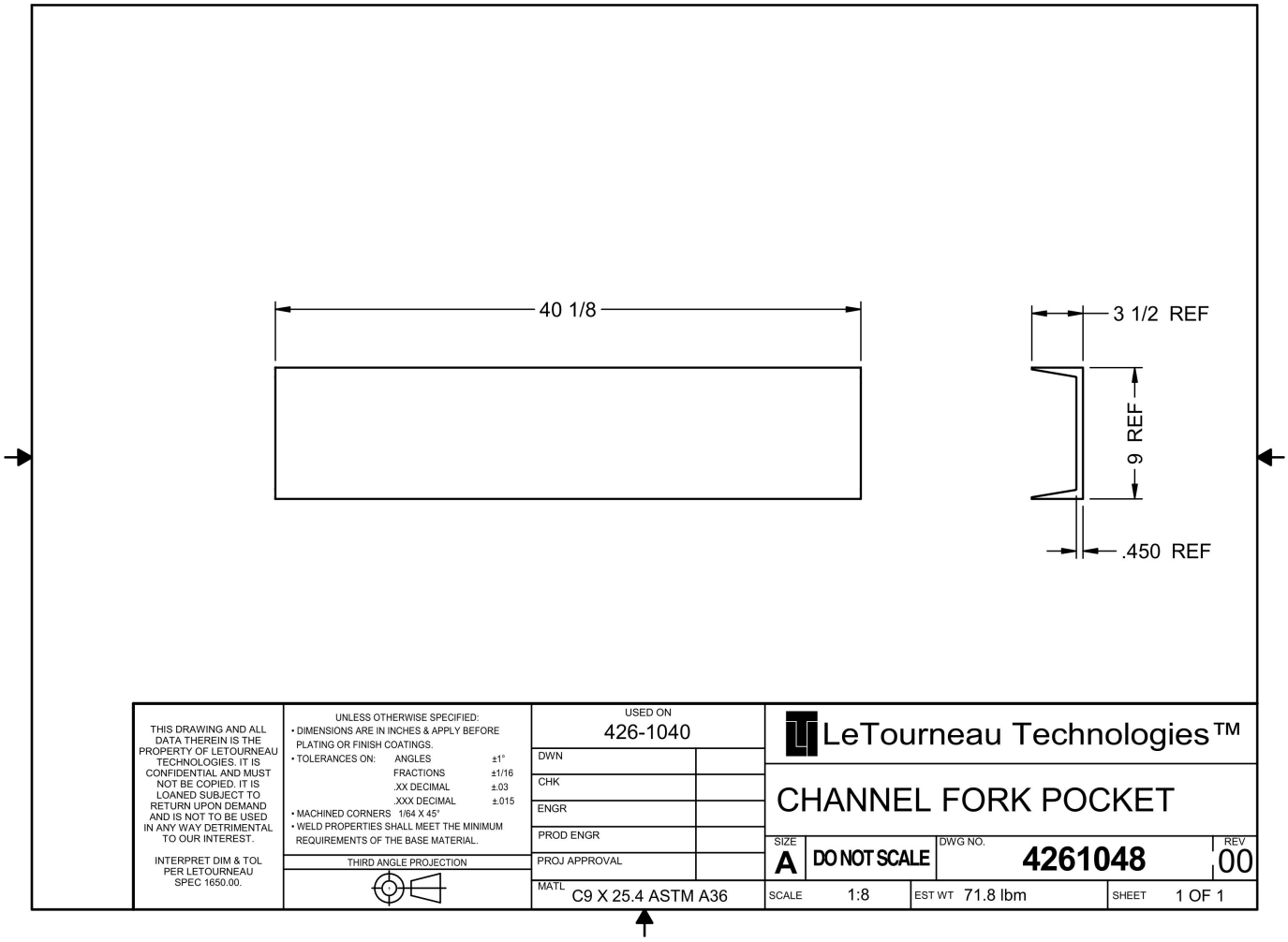


Figure 76: Side plate



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Jack Stand Design

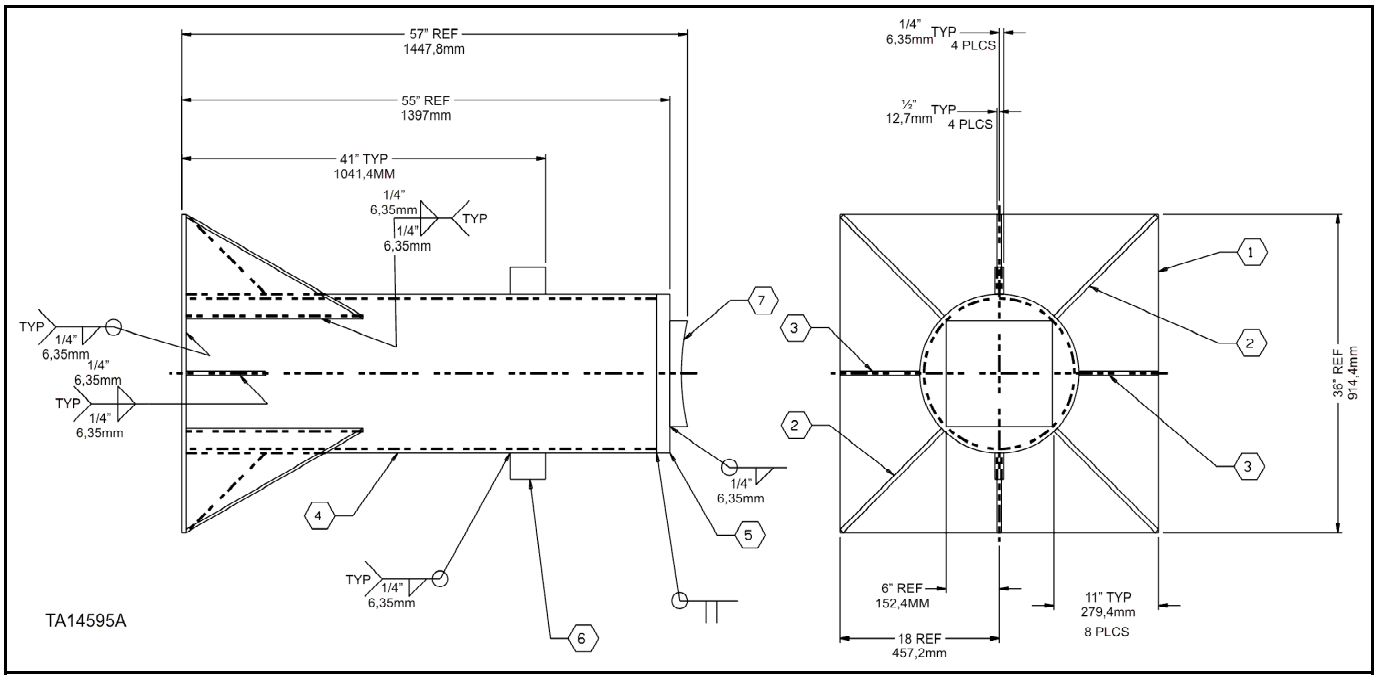
CAUTION

The stands shown on the following pages are for use only on Komatsu machines and should be used only in the locations provided by Komatsu. Before using, the stands should be certified locally to ensure compliance with local regulations.

CAUTION

A514 requires special welding processes such as preheat and post heat. Refer to section "03-02 Field Welding Procedures" located in the current Service Manual.

Figure 77: Front axle jack stands



NOTICE

Overall height of front frame jack stand varies with loader model and height of tires. Typically, 48" (1219 mm) to 50" (1270 mm) is suitable for L-1350 and 55" (1397 mm) to 57" (1448 mm) is typically suitable for L-1850/L-2350. Top of cradle is 2" (51 mm) above top of jack stand top plate. It is essential to measure the tires and calculate optimal height with wooden blocking in place to ensure tires clear the ground.

Placement of forklift plates is relative to the height of the jack stand. They are normally positioned 12" (305 mm) to 14" (356 mm) below the top of the jack stand.

Figure 78: Front axel base plate

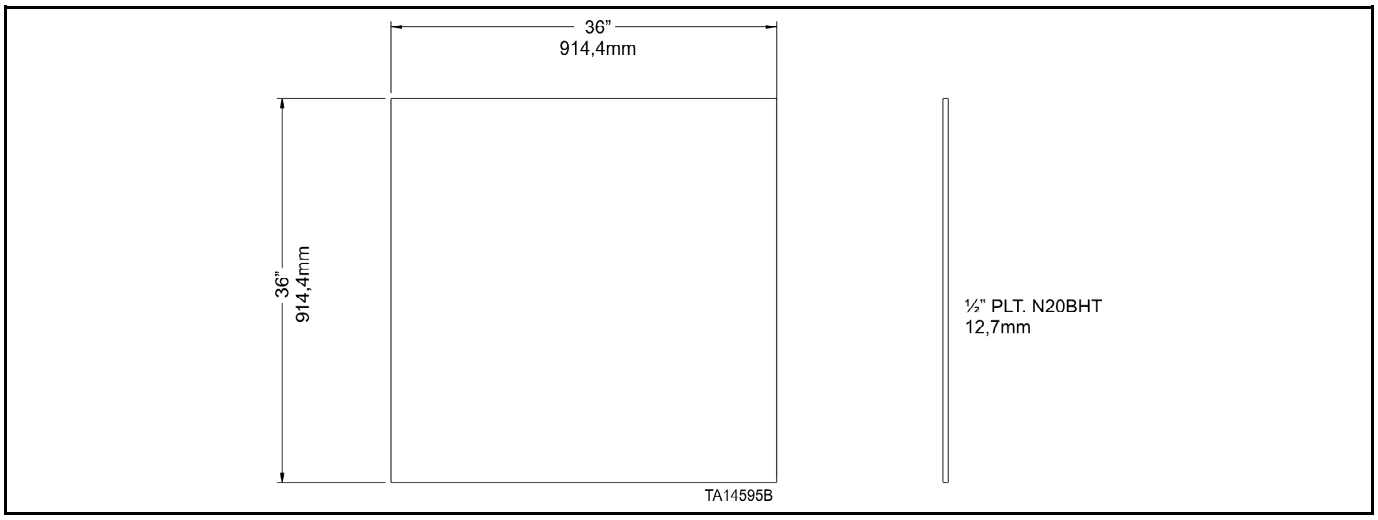
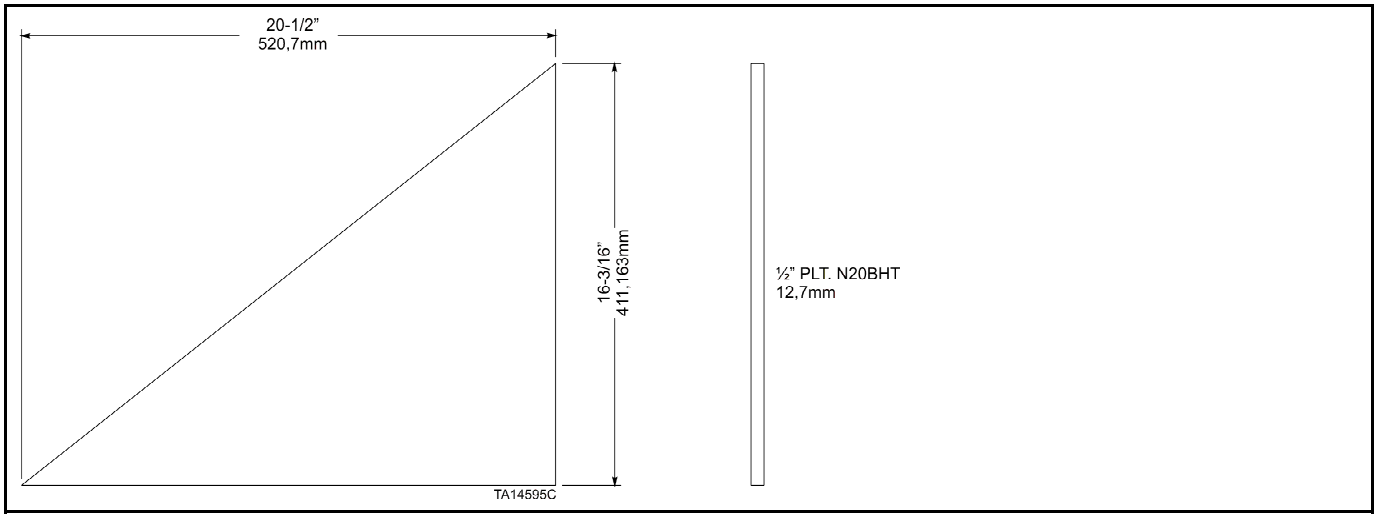


Figure 79: Front axel support plate (large)



NOTICE

Material N20BHT no longer used - use A514.

CAUTION

A514 requires special welding processes such as preheat and post heat. Refer to section “03-02 Field Welding Procedures” located in the current Service Manual.

Figure 80: Front axle support plate (small)

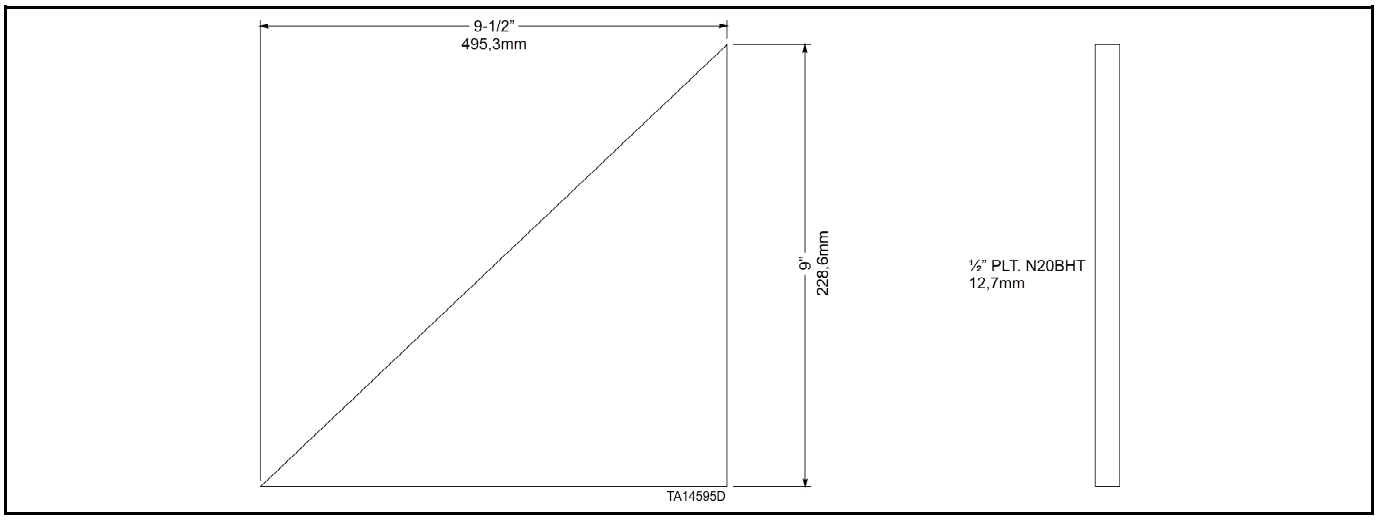
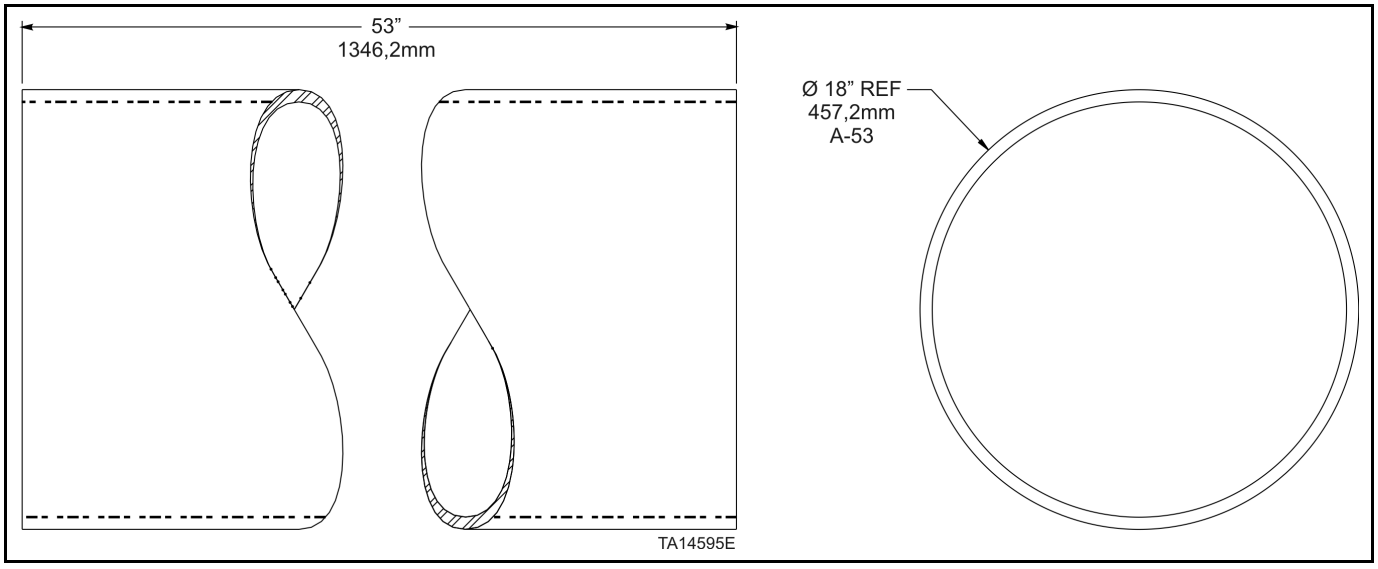


Figure 81: Front axel front tube



NOTICE

Material N20BHT no longer used - use A514.

CAUTION

A514 requires special welding processes such as preheat and post heat. Refer to section "03-02 Field Welding Procedures" located in the current Service Manual.

Figure 82: Front axel cap plate

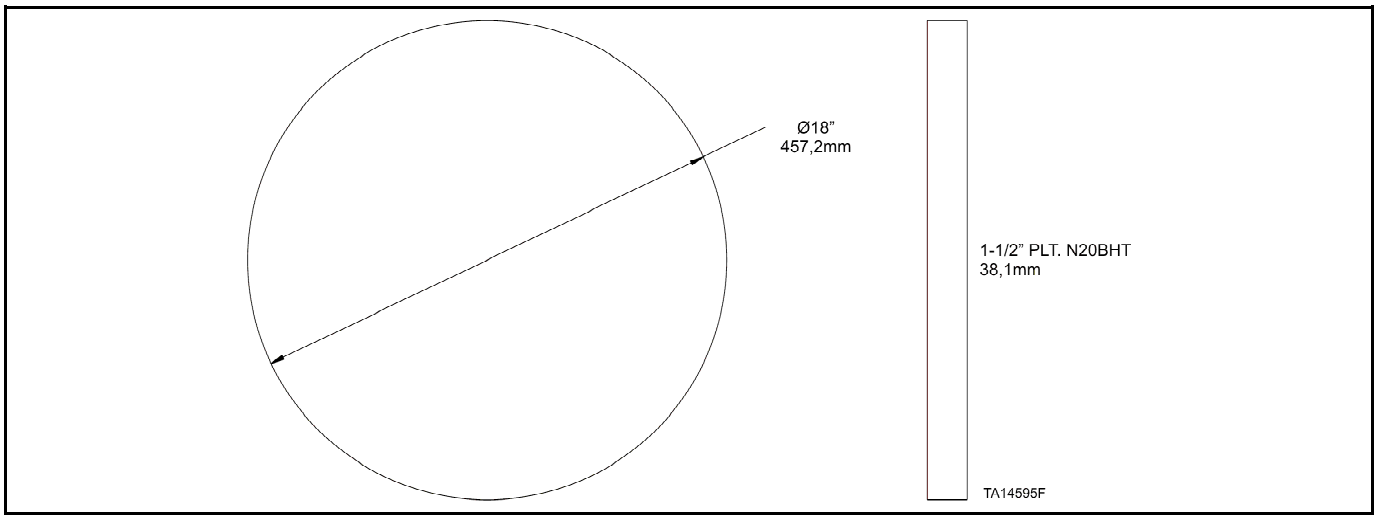


Figure 83: Front axle plate (lifting plate)

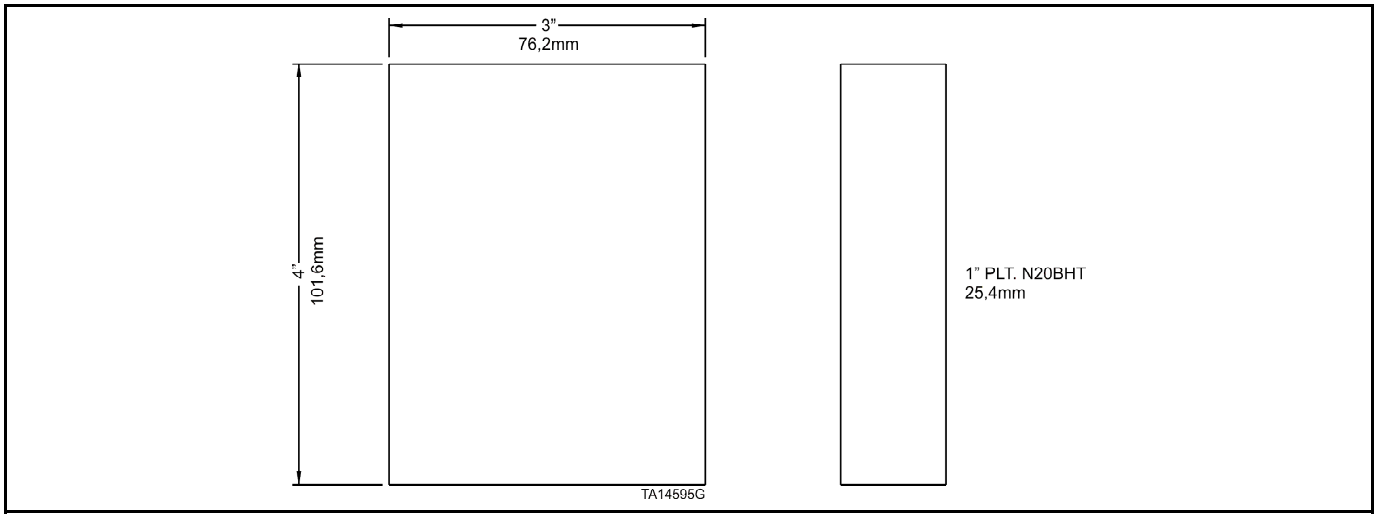
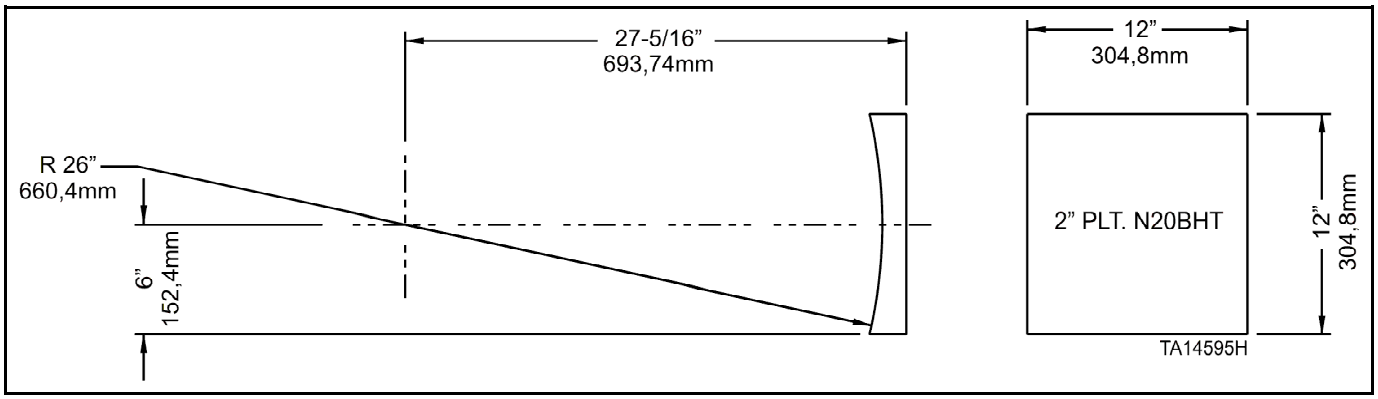


Figure 84: Front axle pad plate



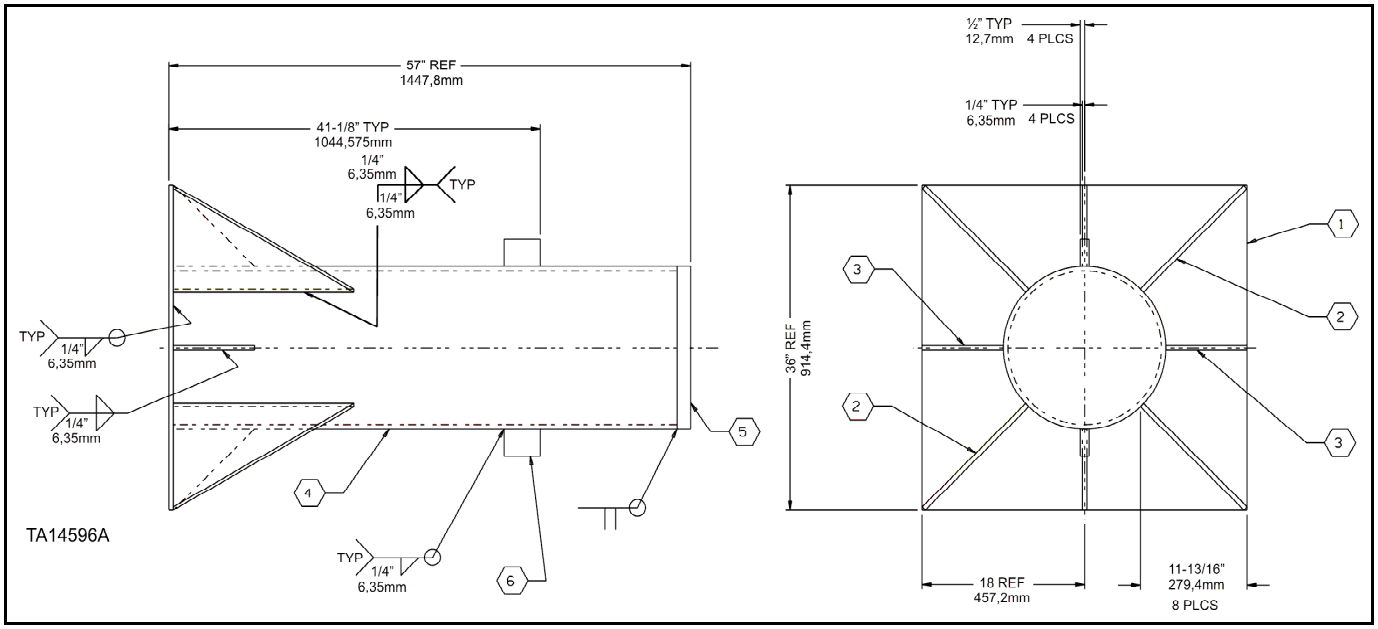
NOTICE

Material N20BHT no longer used - use A514.

CAUTION

A514 requires special welding processes such as preheat and post heat. Refer to section "03-02 Field Welding Procedures" located in the current Service Manual.

Figure 85: Rear frame jack stands - front end



NOTICE

Overall height of rear frame jack stand - front end varies with loader model and height of tires. Typically, 48" (1219 mm) to 50" (1270 mm) is suitable for L-1350 and 55" (1397 mm) to 57" (1448 mm) is typically suitable for L-1850/L-2350. It is essential to measure the tires and calculate optimal height with wooden blocking in place to ensure tires clear the ground.

Placement of forklift plates is relative to the height of the jack stand. They are normally positioned 12" (305 mm) to 14" (356 mm) below the top of the jack stand.

Figure 86: Rear frame base plate

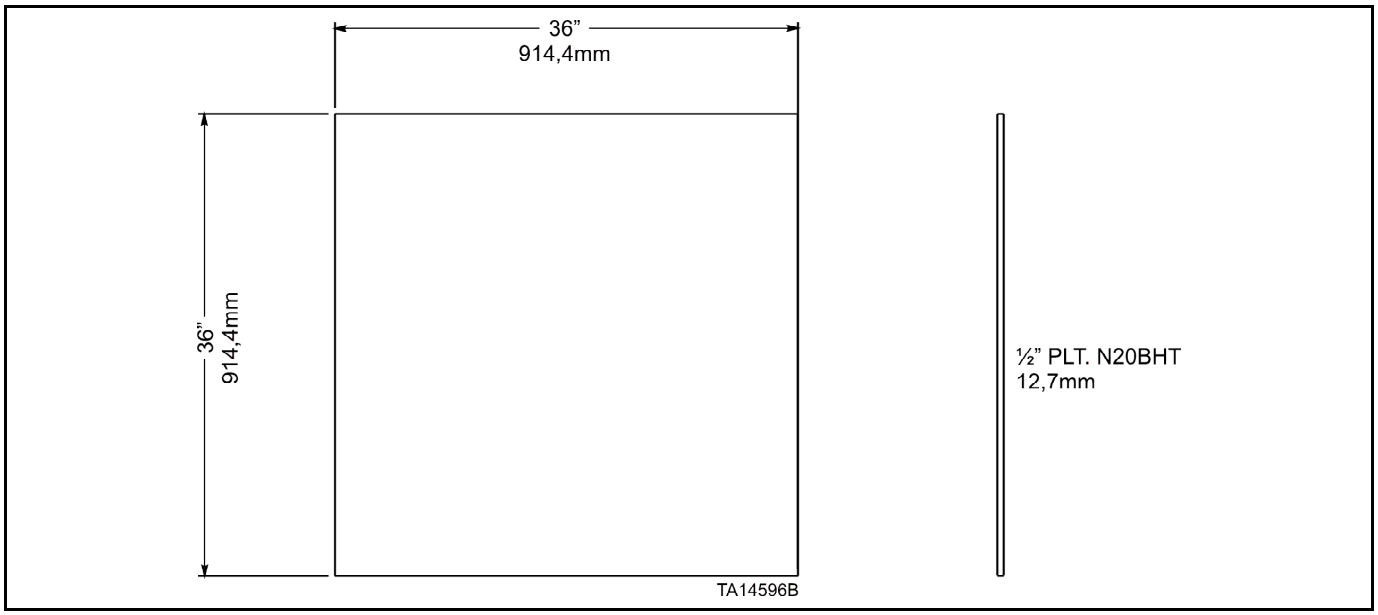
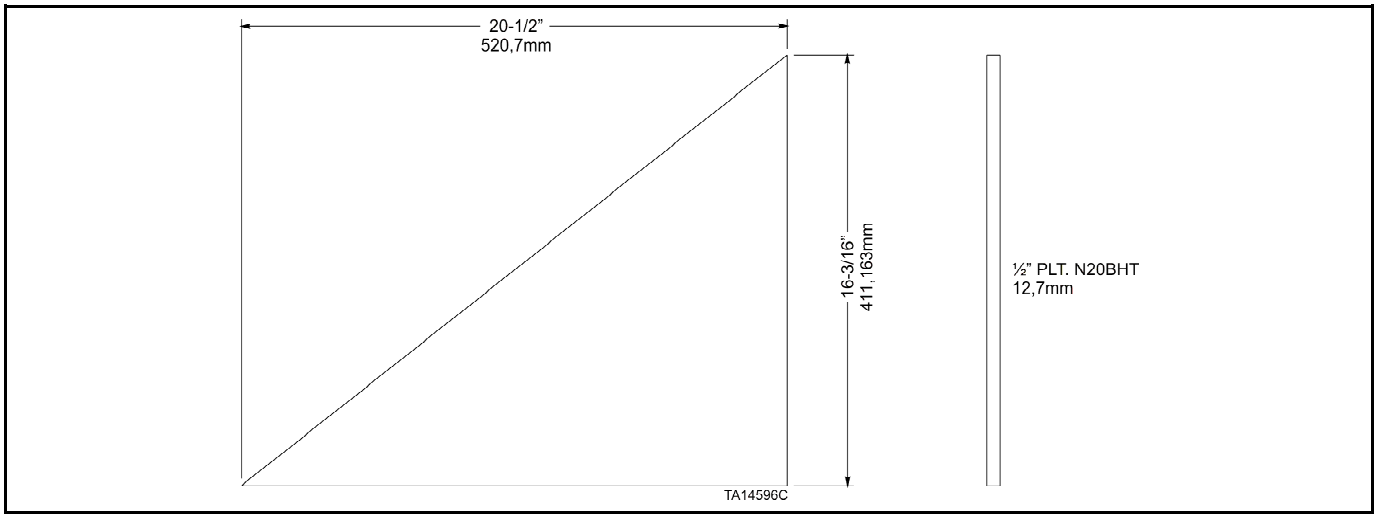


Figure 87: Rear frame support plate (large)



NOTICE

Material N20BHT no longer used - use A514.

CAUTION

A514 requires special welding processes such as preheat and post heat. Refer to section "03-02 Field Welding Procedures" located in the current Service Manual.

Figure 88: Rear frame support plate (small)

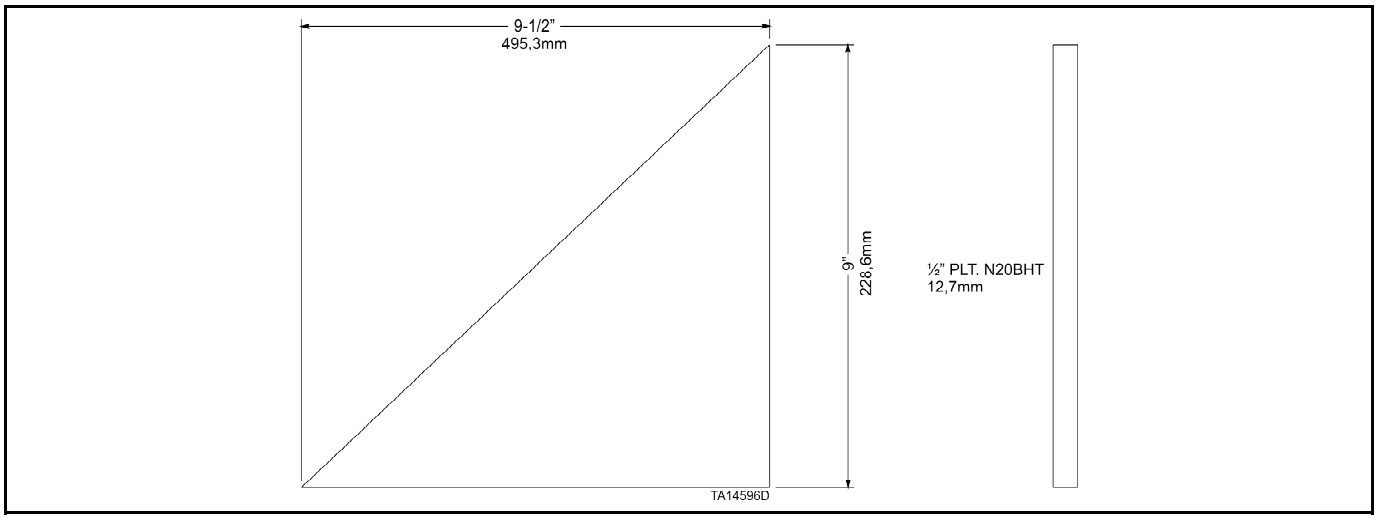
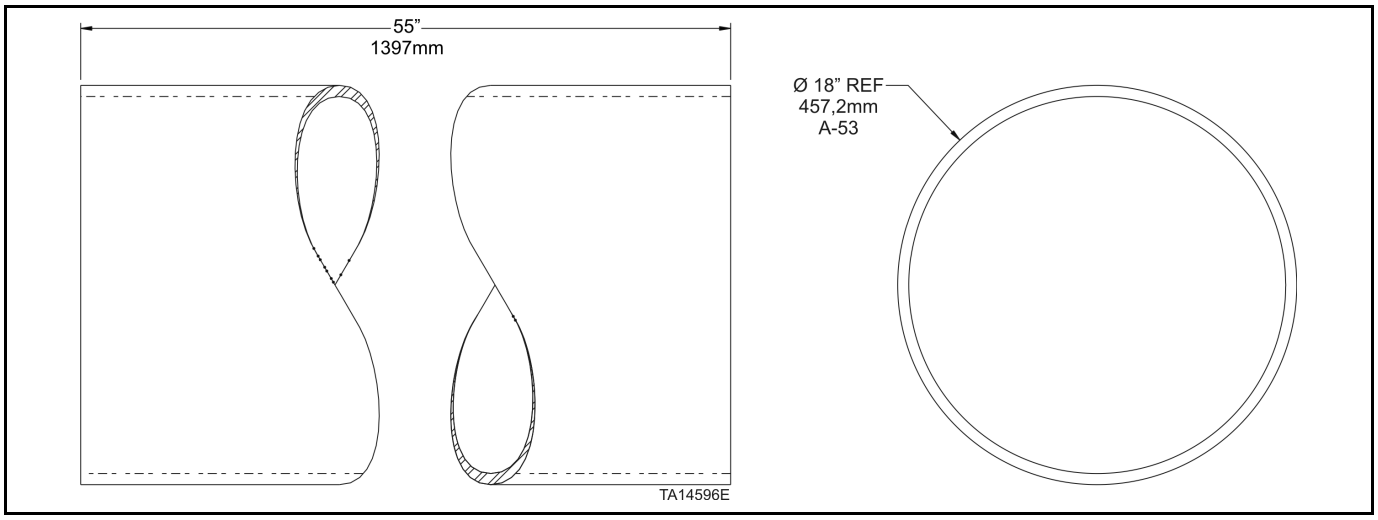


Figure 89: Rear frame front tube



NOTICE

Material N20BHT no longer used - use A514.

CAUTION

A514 requires special welding processes such as preheat and post heat. Refer to section “03-02 Field Welding Procedures” located in the current Service Manual.

Figure 90: Rear frame cap plate

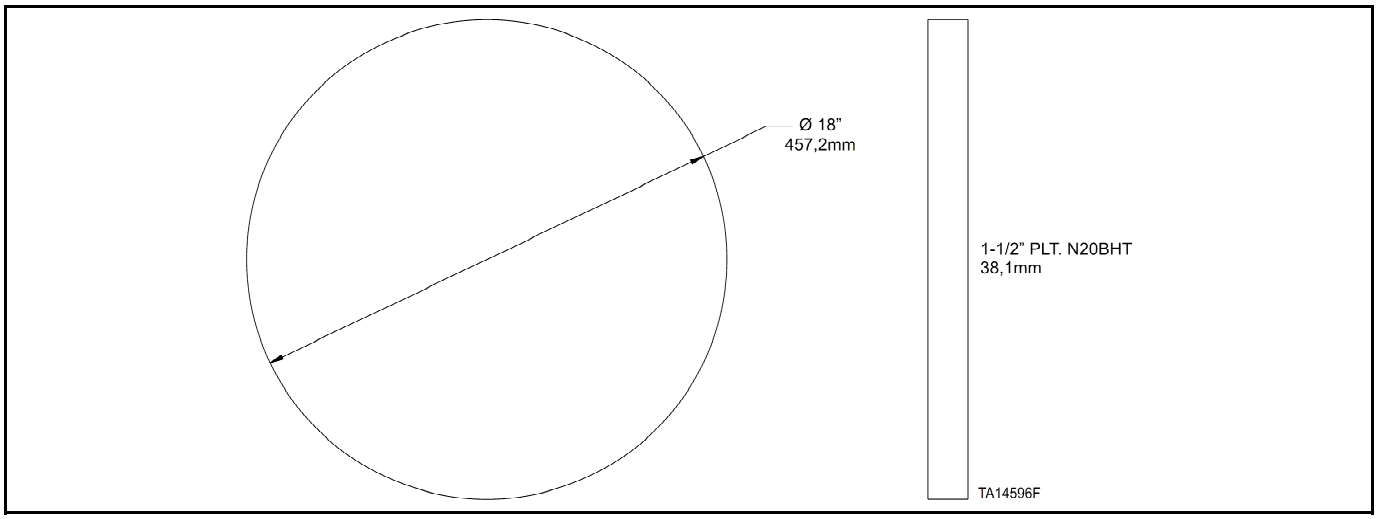
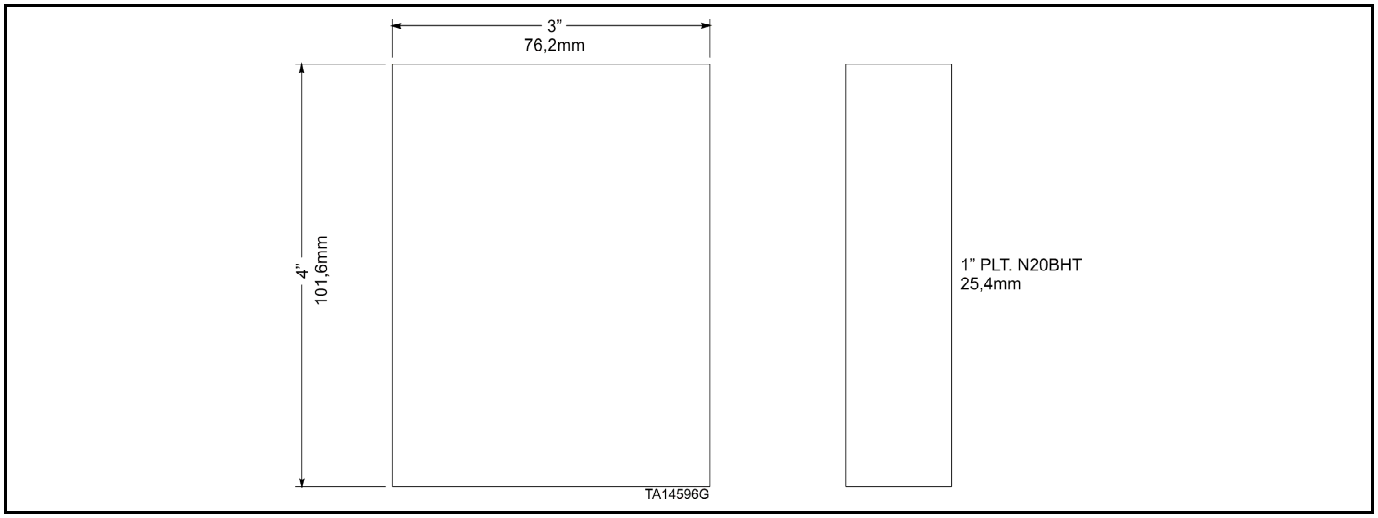


Figure 91: Rear frame plate (lifting plate)



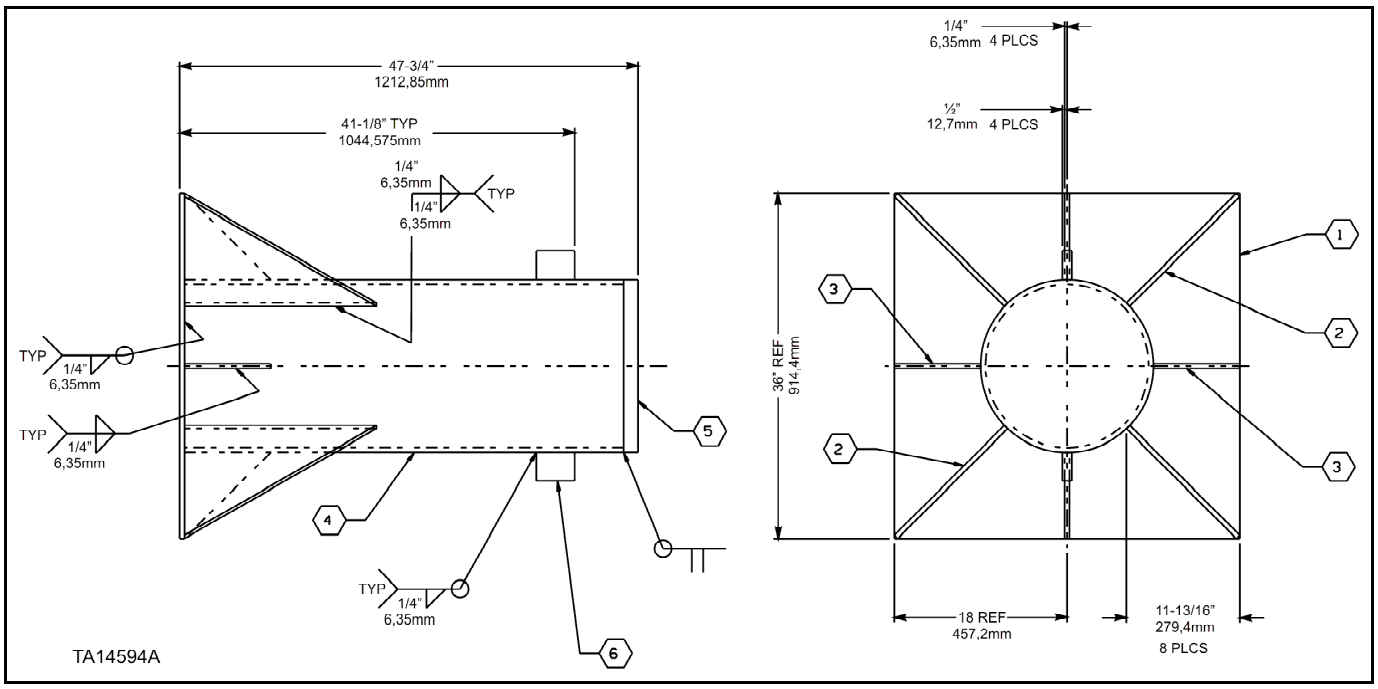
NOTICE

Material N20BHT no longer used - use A514.

CAUTION

A514 requires special welding processes such as preheat and post heat. Refer to section “03-02 Field Welding Procedures” located in the current Service Manual.

Figure 92: Rear bumper jack stands - rear end



NOTICE

Overall height of rear bumper jack stand varies with loader model and height of tires. Typically, 38" (965 mm) to 40" (1016 mm) is suitable for L-1350 and 47" (1194 mm) to 48" (1219 mm) is typically suitable for L-1850/L-2350. It is essential to measure the tires and calculate optimal height with wooden blocking in place to ensure tires clear the ground.

Placement of forklift plates is relative to the height of the jack stand. They are normally positioned 12" (305 mm) to 14" (356 mm) below the top of the jack stand.

Figure 93: Rear bumper base plate

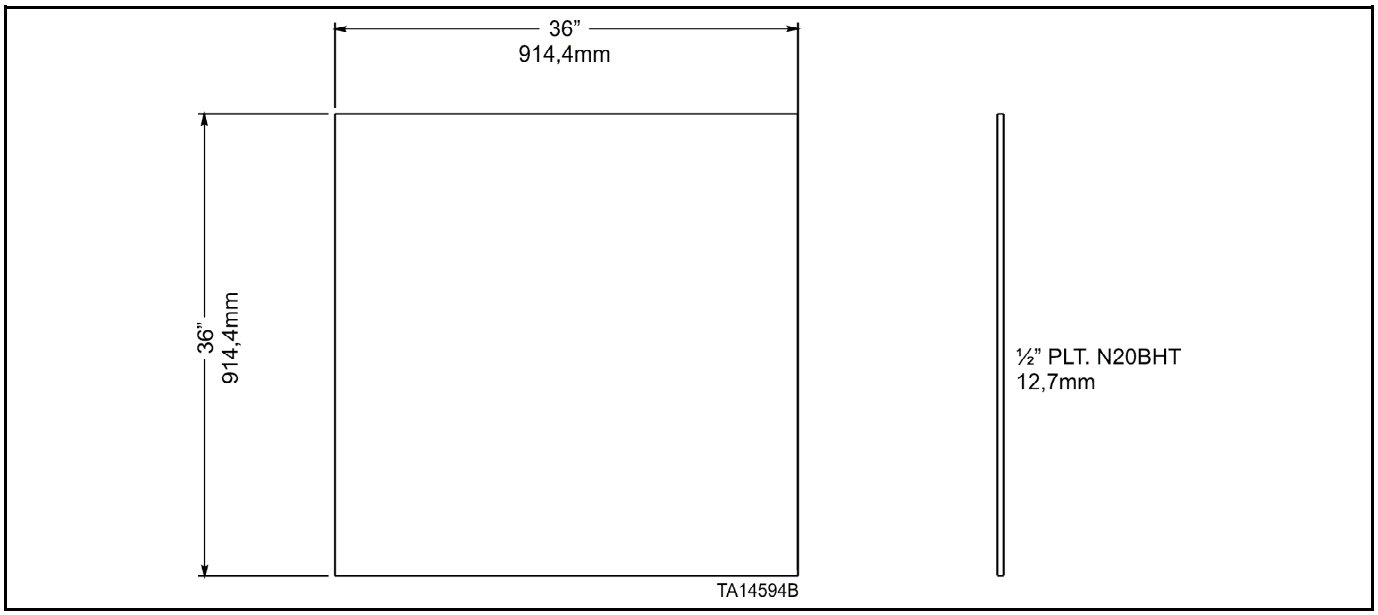
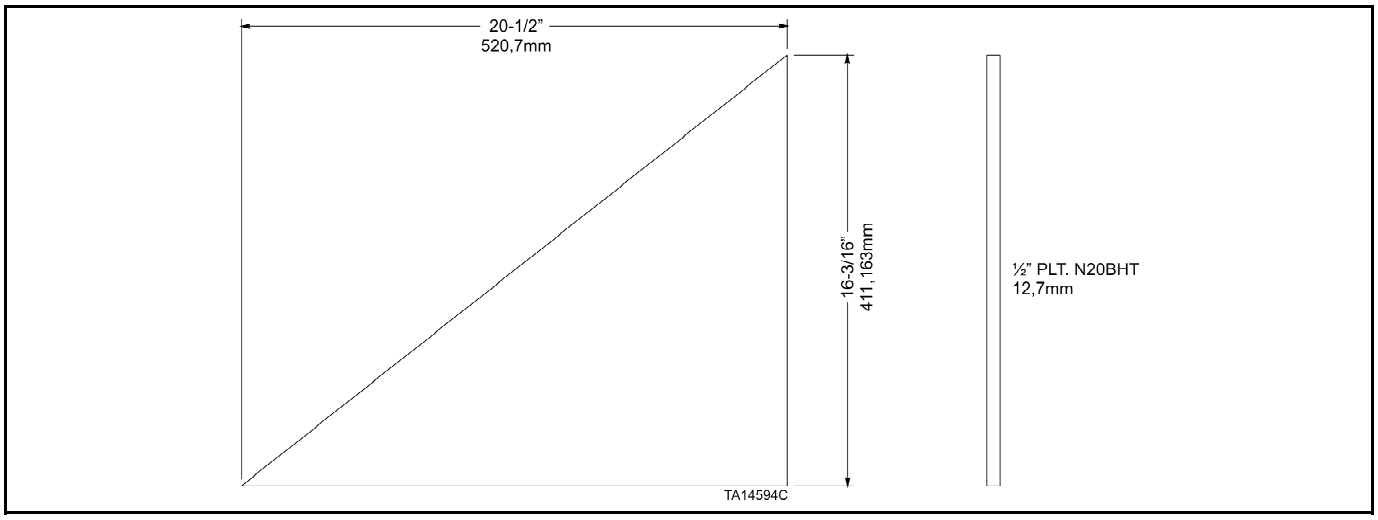


Figure 94: Rear bumper support plate (large)



NOTICE

Material N20BHT no longer used - use A514.

CAUTION

A514 requires special welding processes such as preheat and post heat. Refer to section “03-02 Field Welding Procedures” located in the current Service Manual.

Figure 95: Rear bumper support plate (small)

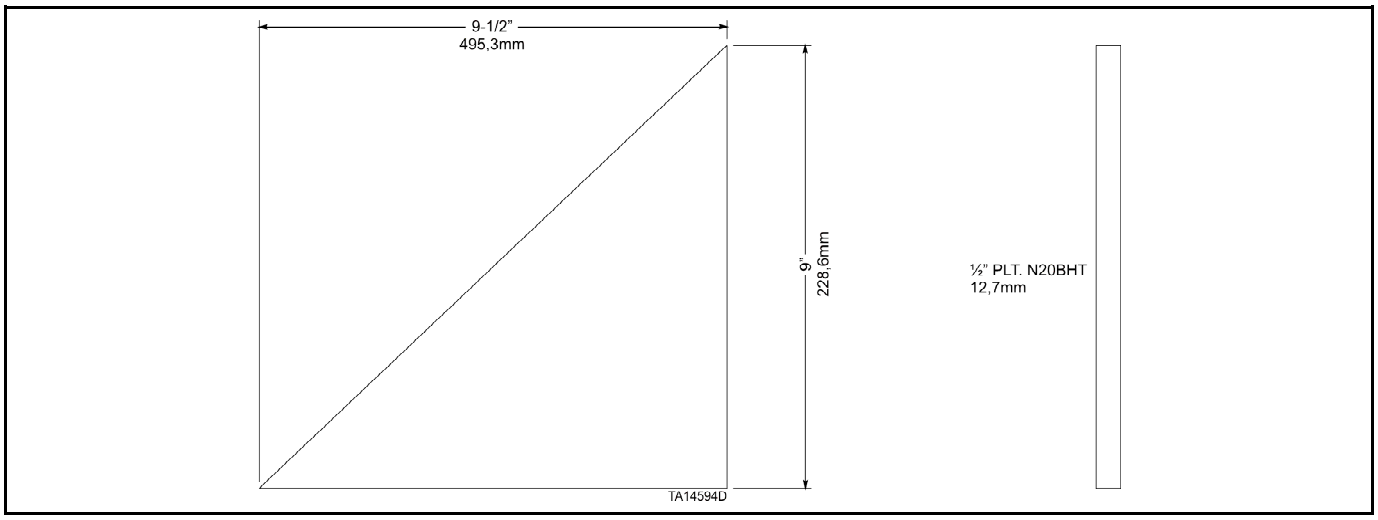
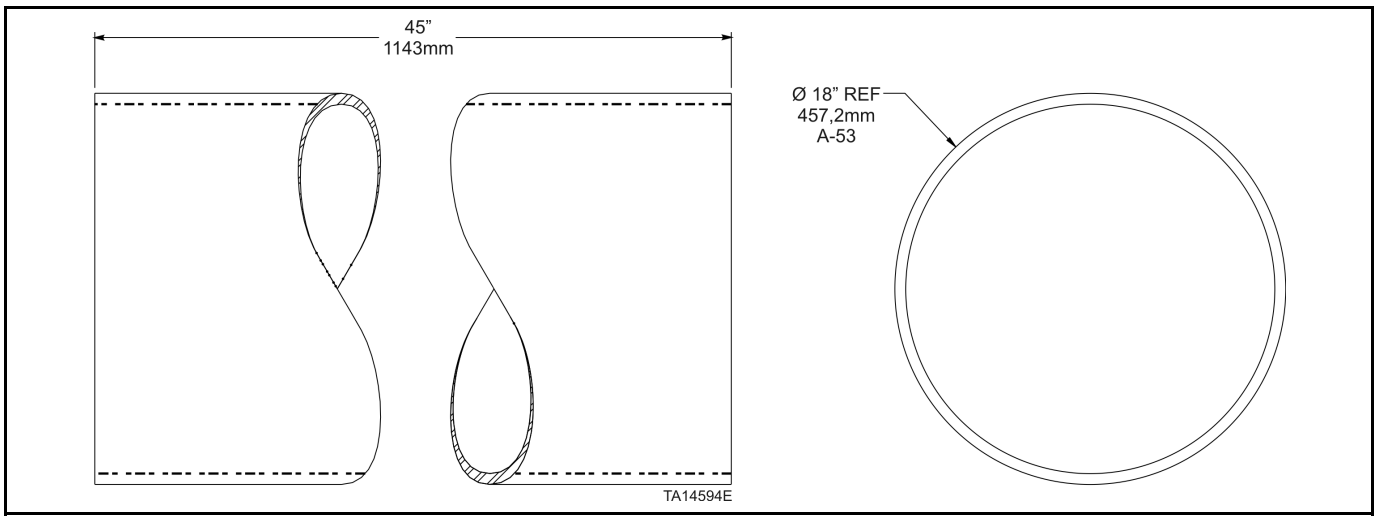


Figure 96: Rear bumper front tube



NOTICE

Material N20BHT no longer used - use A514.

CAUTION

A514 requires special welding processes such as preheat and post heat. Refer to section "03-02 Field Welding Procedures" located in the current Service Manual.

Figure 97: Rear bumper cap plate

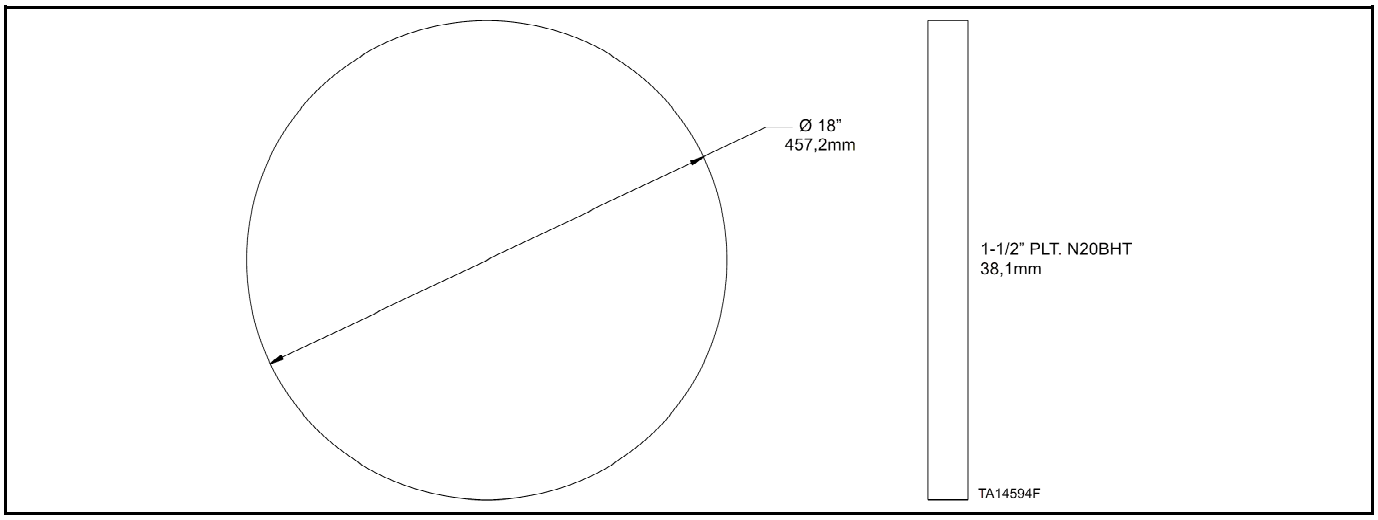
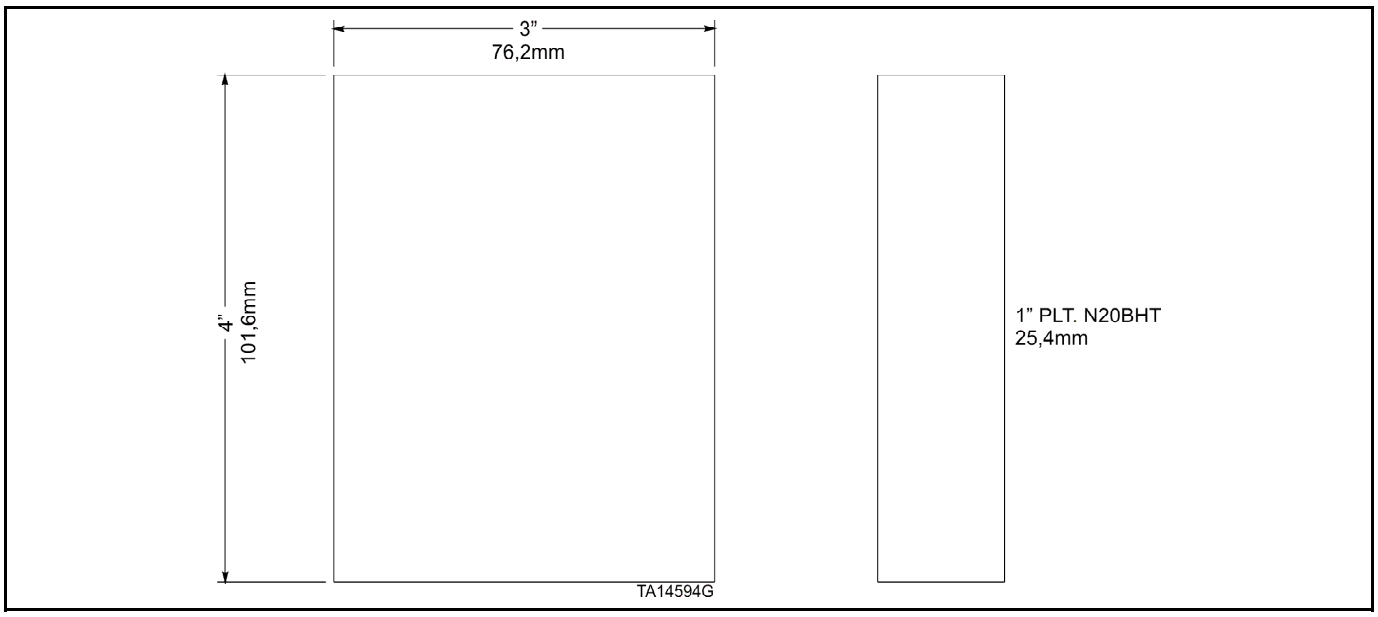


Figure 98: Rear bumper plate (lifting plate)



NOTICE

Material N20BHT no longer used - use A514.

CAUTION

A514 requires special welding processes such as preheat and post heat. Refer to section "03-02 Field Welding Procedures" located in the current Service Manual.

Alternative Jack Stand Design

The following are alternative dimensions and design drawings for jack stands.

NOTICE

The stands shown on the following pages are for use only on Komatsu machines and should be used only in the locations provided by Komatsu. Before using, the stands should be certified locally to ensure compliance with local regulations. Any local manufacturing would have to be evaluated by the local manufacturing engineering personnel to ensure the material used, dimensions, and design meet local standards and load requirements.

Item No	Part	Size*	Dimensions*	Grade		Qty
AS	ASTM*					
1	Base Plate	16mm (3/4”)	915 x 915 (36.1” X 36.1”)	250	A36	1
2	Gusset 1	12mm (1/2”)	402 x 402 (15.9” X 15.9”)	250	A36	4
3	Gusset 2	12mm (1/2”)	219 x 219 (18.63” X 18.63”)	250	A36	4
4	Gusset 3	12mm (1/2”)	150 x 150 (5.91” X 5.91”)	250	A36	8
5	Pipe	45ONb XS	1379 x 12.7 W/T (54.2” length x ½” wall thickness)	C350	A572GR50 A678GRA A709GR50	1
6	Cap Plate	60mm (2-3/8”)	457 O/D (18”)	250	A36	1
7	Lifting Ring	12mm (1/2”)	607 O/D, 460 I/D (23.9” X 18.2”)	250	A36	1
8	Pad Plate	50mm (2”)	305 x 305 (12.1” X 12.1”)	250	A36	1
9	Shackle Plate	5mm (1/4”)	75 x 100 (3” X 4”)	250	A36	8

***The chart was originally provided in millimeters, using Australian Standards. The equivalent conversions are approximate. Never use materials with less strength than the metric size provided on this chart. When Australian standards are not available, the equivalent US standards shall be enforced.**

1) ALL welds to be 6 mm (0.236”) C.F.W U.N.O. (Continuous Fillet Weld Unless Noted Otherwise).

2) ALL plates shall comply to A.S/N.Z.S (Australian Standard/New Zealand Standard) 3678 GRADE 250.

3) Pipe shall comply to A.S (Australian Standard) 1163 GRADE C350 LO.

4) Corrosion protection - abrasive blast. Primed & painted in 2 pack polyurethane. Minimum thickness 75 microns.

5) Stands to be used in pairs on a hard level surface not less than 15 kg/cm^2 bearing capacity.

6) Maximum certified height is 1455mm (57”); stands may be shorter than maximum, but no longer.

7) Working load limit -100 tons applied centrally on the pad plate.

Figure 99: Front support stand

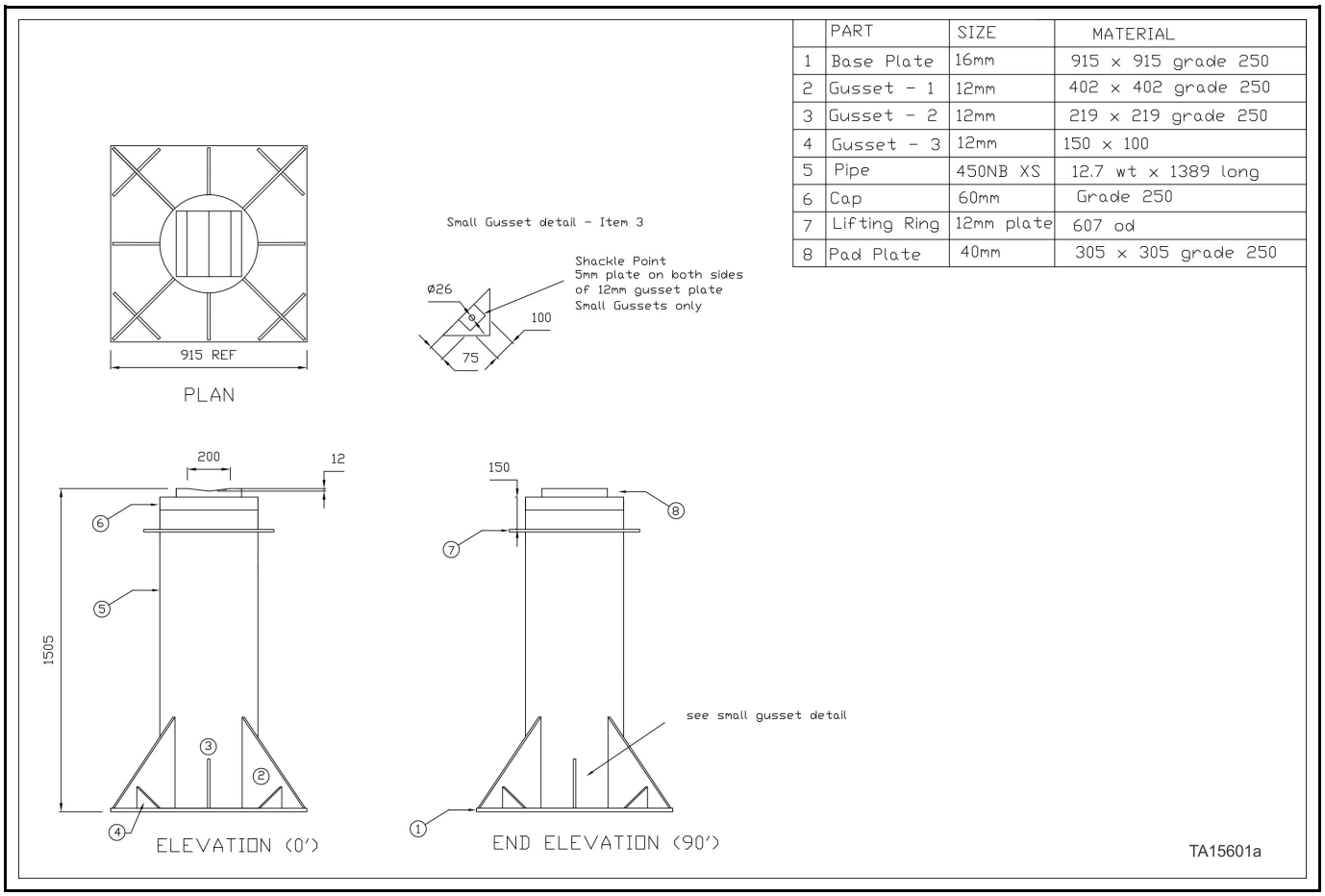
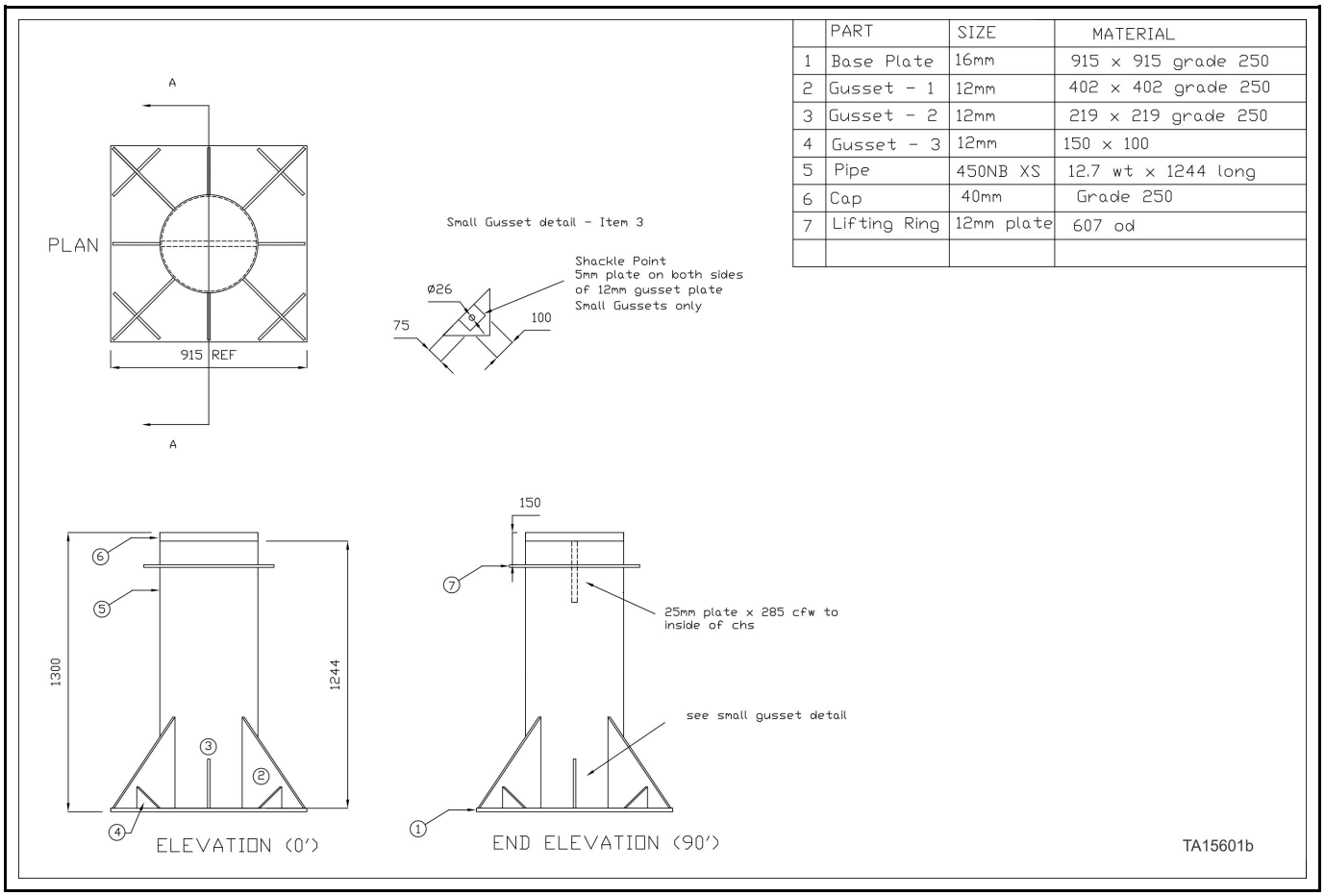


Figure 100: Rear support stand



	PART	SIZE	MATERIAL
1	Base Plate	16mm	915 x 915 grade 250
2	Gusset - 1	12mm	402 x 402 grade 250
3	Gusset - 2	12mm	219 x 219 grade 250
4	Gusset - 3	12mm	150 x 100
5	Pipe	450NB XS	12.7 wt x 1244 long
6	Cap	40mm	Grade 250
7	Lifting Ring	12mm plate	607 od

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Typical Tie Down Locations for Wheel Loader Components

The following photographs/illustrations shows some of the acceptable tie down locations for various components of wheel loaders. The shipping firm is responsible for tie down equipment, methodology used, stability of components, and location of tie down equipment to the transport vehicle.

NOTICE

Always wear locally required Personal Protective Equipment (PPE) and follow all locally required safety rules when working around equipment to be transported.

Do not use undue force, so as to cause deformation or component damage, when components are being secured or transported.

⚠ CAUTION

Pinch point hazards exist when handling chains, straps, or cables used for tying down components. Before tightening anything, make sure hands are clear of the securing devices and all other personnel are clear of the area. Failure to ensure hands and personnel are clear of securing devices can cause pinch points resulting in serious injury.

⚠ WARNING

Crush hazards exist if standing under, or placing any body part under hoisted/suspended components. Never stand under hoisted/suspended components. Ensure appropriate lifting devices are used, and blocking is adequate to prevent the component from unexpectedly moving during transportation. Failure to stay out from under hoisted/suspended components can cause crush hazard resulting in serious injury or death.

⚠ WARNING

Crush hazards exist if the correct equipment that is properly rated for lifting components and securing them to the transport vehicle is not used. Always use correct lifting equipment that is properly rated for the load. Failure to use correct equipment that is properly load rated can cause crush hazards resulting in serious injury or death.

⚠ WARNING

Crush hazards exist when moving components. Ensure all personnel stay clear of suspended or moving components. Failure to prevent uncontrolled component movement and to keep personnel clear of suspended or moving parts can cause crush hazards resulting in serious injury or death.

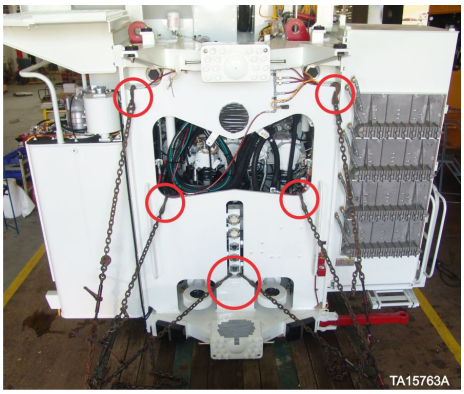
⚠ WARNING

Crush hazards exist when moving components without tag lines. When lifting, always use tag lines to control component movement. Failure to use tag lines when moving components can cause crush hazards resulting in serious injury or death.

⚠ WARNING

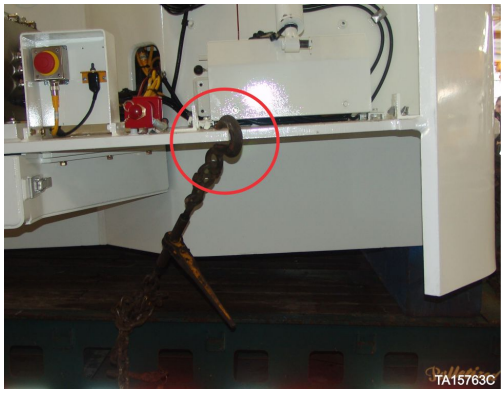
Crush hazards exist when hoisting and moving components. Ensure that any hoisting equipment is manned by a qualified operator. Failure to ensure the equipment is manned by a qualified operator can cause crush hazards resulting in serious injury or death.

Figure 101: Typical tie down points of rear frame



Front of rear frame

Rear of rear frame



Left rear side of rear frame

Right rear side of rear frame

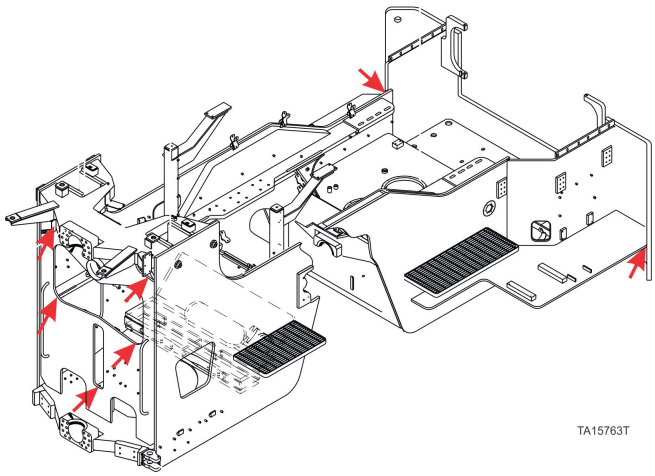
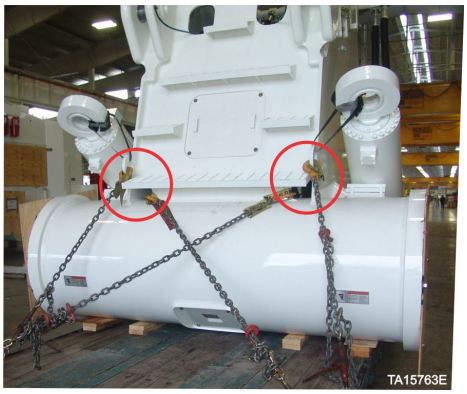


Figure 102: Typical tie down locations on front of front frame



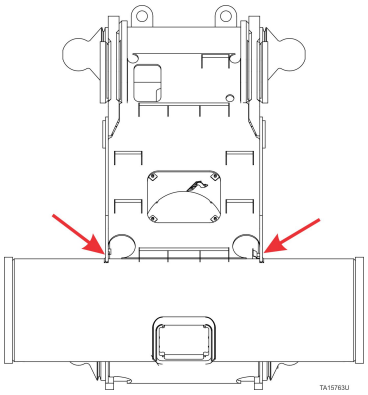
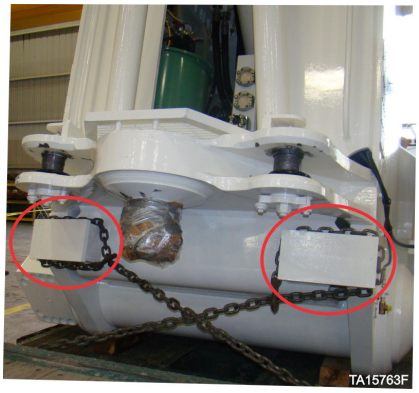


Figure 103: Typical tie down locations on rear of front frame



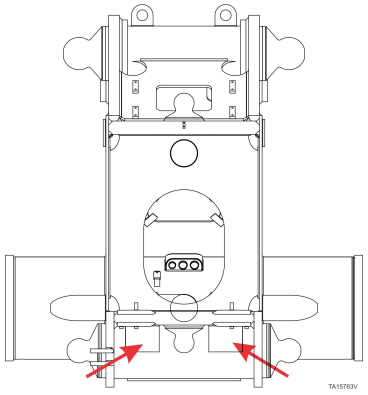
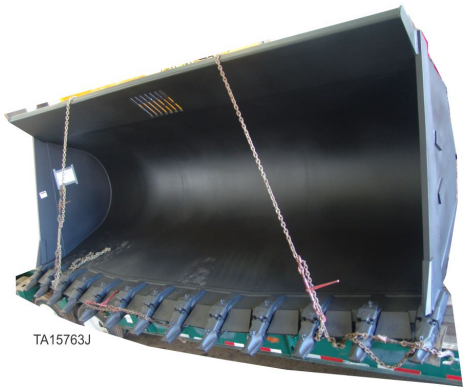


Figure 104: Typical tie down locations on bucket



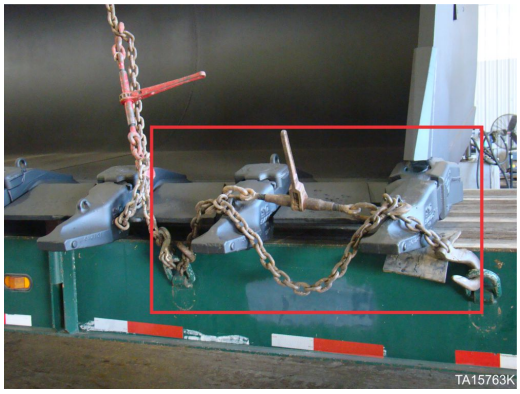


Figure 105: Typical tie down locations on lift arms

NOTICE

The following components do not have tie down attachments such as lifting eyes. Straps, cables, or chains shall be used to secure the load by passing across or over the entire component to secure it to the transport vehicle. Most components are secured to a pallet or shipping platform before being loaded. Do not secure only the pallet or shipping platform, always secure the component to the transport vehicle.

Figure 106: Typical tie down location on planetary drive/motor and wheel rim

Figure 107: Typical tie down locations on rollover protection structure (ROPS) and falling object protection structure (FOPS)

Figure 108: Typical tie down locations on miscellaneous steel structures

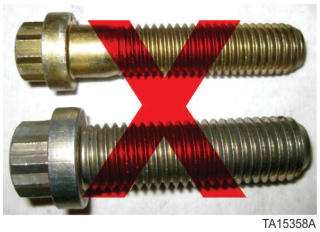
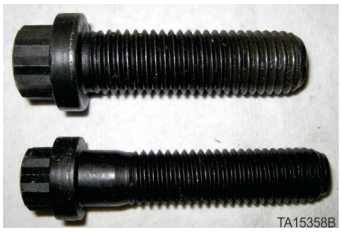
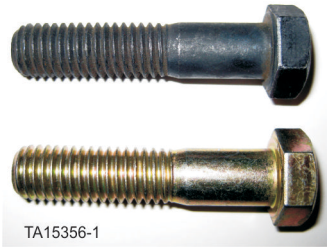
Figure 109: Typical tie down locations on crates containing miscellaneous parts such as cab and light bar

Capscrew and Bolt-Nut Torque Specifications

There are some exceptions to the torques provided on the following pages. Reduced torques are specified in the planetary drive rebuild manual, for the capscrews holding the planetary drive covers, due to a copper sealing washer under the head of the capscrew.

The torque specifications on this chart apply only to Grade 8 bolts, black or gold colored, and 12PT black-colored alloy steel capscrews. 12PT capscrews with gold-colored zinc chromate plating are excluded from these specifications and the zinc chromate 12PT capscrews should not be used on loaders or dozers. (except for planetary drive covers)

These torque values are for normal routine operations. If doing component rebuilds or any other abnormal machine component assembly/disassembly, please contact the factory for these values for specific instances.

 TA15358A	 TA15358B	 TA15356-1
Does not apply**X**	12PT Alloy Capscrew ✓	Grade 8 Bolt ✓

NOTICE

Please note the additional tables for exceptions to the torque values for items such as Lift Arm Ballcaps, Super Nuts and steering pin bolts with drilled grease passages.

Please direct any questions to Komatsu Product Support.

Capscrew and Bolt-Nut Torque Specifications Chart

Standard SAE G8 and Alloy Steel and Hex Socket Capscrews

Size	Thread	GRADE 8 Fasteners		Alloy Steel 12PT. and Hex Socket Capscrews	
		USA Units lb-ft **Lubed	Metric Units N-m **Lubed	USA Units lb-ft **Lubed	Metric Units N-m **Lubed
1/4 (0.25)	20 UNC	9	13	12	16
	28 UNF	10	14	14	19
5/16 (0.3125)	18 UNC	18	25	24	33
	24 UNF	20	27	27	37
3/8 (0.375)	16 UNC	33	45	45	61
	24 UNF	37	50	50	68
7/16 (0.4375) (* See Note below)	14 UNC	52	71	70	95
	20 UNF	58	79	79	107
1/2 (0.5) (* See Note below)	13 UNC	80	109	108	146
	20 UNF	90	122	122	165
5/8 (0.625)	11 UNC	159	216	203	275
	18 UNF	180	244	230	312
3/4 (0.75)	10 UNC	282	383	361	490
	16 UNF	315	427	403	546
1 (1.0) (*** See Note below)	8 UNC	682	925	872	1182
	14 UNS	764	1,036	977	1325
1-1/8 (1.125)	7 UNC	966	1310	1235	1674
	12 UNF	1083	1468	1385	1878
1-1/4 (1.25) (**** See Note below)	7 UNC	1,363	1,848	1744	2365
	12 UNF	1,509	2,046	1930	2617
1-1/2 (1.5)	6 UNC	2,371	3,215	3033	4113
	12 UNF	2,668	3,618	3413	4628

*** See Special Torque Specifications for ROPS super nut.**

**** See page 4 for specifications for "LUBED" – engine oil on threads and shoulder.**

***** See Special Torque Specifications for 950/1150 steering pins.**

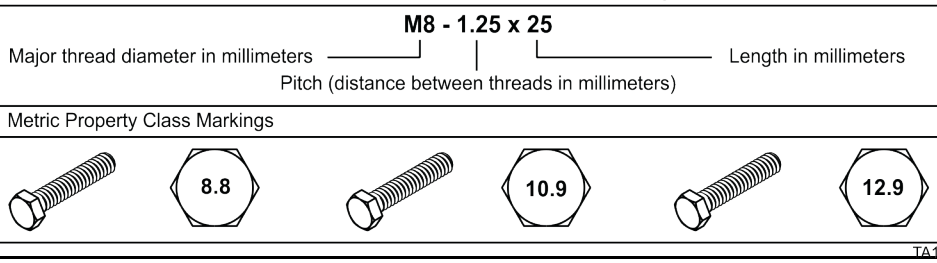
***** This bolt is UNS (with 14 threads per inch), it is NOT UNF. It is a unique thread count bolt.**

****** See Special Torque Specifications for loader lift arms and 1350/1850/2350 steering pins.**

Standard Metric Bolts and Grades (SAE J1701M)

Size (mm)	Pitch (mm)	Property Class 8.8		Property Class 10.9		Property Class 12.9	
		USA Units lb-ft	Metric Units N-m	USA Units lb-ft	Metric Units N-m	USA Units lb-ft	Metric Units N-m
		** Lubed	** Lubed	** Lubed	** Lubed	** Lubed	** Lubed
6	1.00	6	8	8	11	10	13
7	1.00	10	13	14	19	16	22
8	1.25	14	19	20	27	24	32
10	1.50	28	38	40	54	47	63
12	1.75	49	66	70	94	81	110
14	2.00	77	105	111	150	130	176
16	2.00	121	164	173	235	202	274
18	2.50	167	226	239	324	279	378
20	2.50	244	331	337	458	394	535
24	3.00	422	572	584	791	682	925

Standard Metric Bolt Dimensions and Property Classes



Capscrew and Bolt-Nut Torque Specifications

Special Torque Specifications

Alloy Steel 12PT. Capscrew for Wheel Loader Lift Arm Ballcaps

Size	Type	Thread	USA Units lb-ft **Lubed	Metric Units N-m **Lubed	Application
1-1/4 (1.250)	12PT. capscrew F-C on head	7 UNC	1900	2577	LHD, L-950, L-1150, L-1350, L-1850, and L-2350 (Lift arm ball caps only)
1-1/4 (1.250)	12PT. capscrew B-7 on head	12 UNF	1320	1790	L-1000-L-1100 (Lift arm ball caps only)

Steering Pins (Hex Head Bolt)

Size	Type	Thread	USA Units lb-ft ** Lubed	Metric Lubed N-m ** Lubed	Application
1 (1.0)	Bolt (drilled center)	8UNC	425	576	LHD, L-950, D-950, L-1150 (Steering Pins)
1-1/4 (1.250)	Bolt (drilled center)	7UNC	850	1152	L-1350, L-1850, L-2350 (Steering Pins)

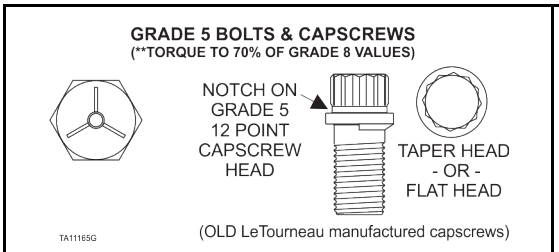
Aluminum 12pt. Capscrews used for Motor Pinion Balancing

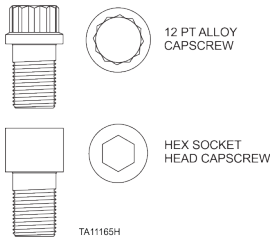
Size	Type	Thread	USA Units (lb-ft)		Metric Units (N-m)	
			Dry	**Lubed	Dry	**Lubed
¾ (0.75)	Aluminum	16 UNF	114	86	155	117
¾ (0.75)	Aluminum 2024-T4	16 UNF	150	113	203	153
15/16 (.9375)	Aluminum 6061 T6	12 NF	217	163	294	221
15/16 (.9375)	Aluminum 2024-T4	12 NF (2 START)	285	214	387	290

2-Thread (2-Start) Steel 12PT. Capscrews

Size	Type	Thread	USA Units lb-ft ** Lubed	Metric Units N-m ** Lubed
3/8 (.3750)	12PT.	24 NF	25	34
9/16 (.5625)	12PT.	18 NF	87	119
15/16 (.9375)	12PT.	14 NF	428	584
1-5/16 (1.325)	12PT.	12 NF	1216	1660

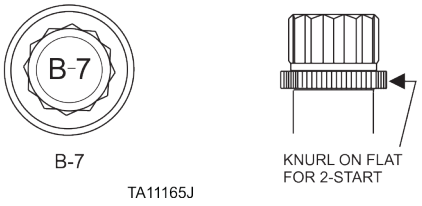
Bolt and Capscrew Markings on Head





Typical Markings on Alloy Capscrew Heads

Typical B-7, 2-Start



** See “Key Items” for specifications for “LUBED” – engine oil on threads and shoulder.

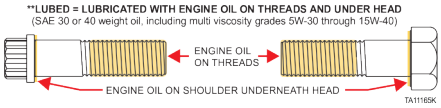
Capscrew and Bolt-Nut Torque Specifications

Key Items

- “LUBED” is defined as having the threads and under the head lubricated with engine oil. Engine oil is defined as SAE 30 or 40 weight oil, including multi viscosity grades 5W-30 through 15W-40. No other lubricant (such as anti-seize, MolyKote, copper coat, grease, etc.) is permitted unless specifically called out in a Komatsu procedure.

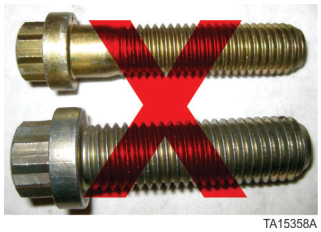
****LUBED = Lubricated with engine oil on threads and under head**

(SAE 30 or 40 weight oil, including multi viscosity grades 5W-30 through 15W-40)

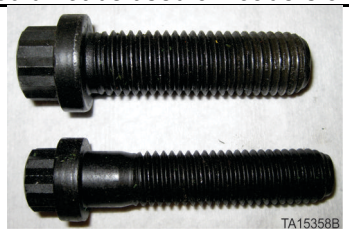


NOTE: No other lubricant (such as anti-seize, never seize, MolyKote, copper coat, grease, etc.) is permitted unless specifically called out in a Komatsu procedure.

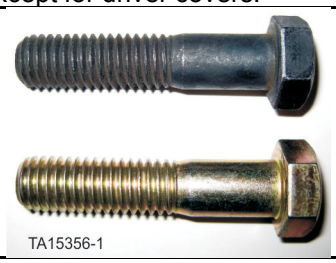
- All capscrews and bolts should be started by hand until a minimum of three (3) threads are engaged prior to any air impact equipment being used.
- If a procedure in a Rebuild Manual, Repair and Overhaul or Operating and Service Manual calls for the use of Loctite® threadlocker on the threads, the torque specification for “lubed” should be used. The threads on both the fastener and mating part should be thoroughly cleaned with a proper solvent prior to use of Loctite®. The Loctite® thread sealant should only be used on the threads - not the head.
- Certain applications in components such as drivers or lift arm ball caps may specify a FERRY brand of capscrew. Use only FERRY brand capscrews in these applications.
- Komatsu, recommends that any old 12PT. Komatsu-fabricated (fabrication was stopped many years ago) capscrew (refer to illustration under BOLT AND CAPSCREW MARKINGS ON HEAD) be replaced at the time of repair with alloy capscrews. If new capscrews are not available, then the Komatsu-fabricated capscrews should only be torqued to Grade 5 specifications (70% of Grade 8 value - lubed).
- The torque specifications on the charts on page 2 only apply to Grade 8 bolts, metric bolts and 12PT. black-colored alloy steel capscrews. Capscrews with gold-colored zinc chromate plating are excluded from these specifications and these capscrews should not be used on loaders or dozers except for driver covers.



Does not apply X



12PT Alloy Capscrew ✓



Grade 8 Bolt ✓

- CLEANING: It is mandatory to remove all paint, rust and debris from all mating surfaces, surfaces under the head of the bolt or capscrew and threads prior to installation and torquing of all bolts and capscrews.

Arrow indicates location to be cleaned

Cleaning paint and rust prior to torquing

Super Nut Specifications

Bolt size	Jack bolt size	Jack bolt thread	USA Units lb-ft	Metric Units N-m	Application
			*****Lubed	*****Lubed	
1 ¾" - 5	7/16 (0.4375)	20 UNF	68	92	Hoist Cylinder Rod Pin
2 ¼" – 4.25	½ (0.50)	20 UNF	114	155	ROPS Pin
2 ¾" - 8	**NOTICE** *Refer to Authorized Cylinder Rebuild Center*				Steering Cylinder Piston
*****NOTE:** Supernut jackbolts require P/N 427-3753 Lube JL-G from Superbolt (do not use any substitute)					

Helpful Tips for Supernuts®

Capscrew and Bolt-Nut Torque Specifications

Prior to Tightening:
1) Check threads of main stud: If possible, verify that the tensioners spin on prior to the installation date. If a tensioner is tight or will not thread on, try using lapping compound on the main thread and work the tensioner in a back and forth motion making small advances when the thread loosens up. If necessary, chase the studs with a die.
2) Use of spacers: Tensioners should be positioned at the ends of the studs to minimize exposed threads and facilitate easy access to the jackbolts. A spacer (or stacked washers) can be used beneath the special hardened washer to accomplish this. A spacer will also "step over" a damaged area on a stud where years of bolting have deformed the first few threads.
3) Back the tensioner off before tightening to provide 1/16" (1.59mm) to 1/8" (3.175 mm) gap: The additional jackbolt extension provides easy access for oiling the jackbolt tips prior to removal. This is especially beneficial for oiling when the tensioners are inverted. Note: There may be insufficient jackbolt stroke to allow this step when tensioning exceptionally long bolts or tie rods, or when closing a gap between flanges.
4) For spinning the tensioner on and off the stud: Custom "sockets" which grip the tensioner are available. Also, two deep well sockets inserted over two jackbolt hex's at 180° apart can serve as "handles" for spinning the tensioners on and off the studs.
For Tightening:
5) To improve efficiency when using impacts: Don't wait for the socket to stall completely on a specific jackbolt before advancing to the next jackbolt. It is faster, overall, to move quickly between jackbolts.

6) Overshooting the target torque: You may want to use 110 - 120% of the target torque for Step 3, Step 4, and for 1-2 rounds of Step 5. This may eliminate a tightening round. Be careful not to stabilize all of the jackbolts at this torque however. For long bolts or tie rods, you may want to experiment using even higher torque values. Call Superbolt before using more than 120% target torque.

7) For gasketed joints: During gasket compression, the load is transferred to the jackbolts (i.e. stud) being tightened. Don't be concerned if some jackbolts (or tensioners) become loose during the procedure. Continue following the procedure. Don't spin down tensioners that become loose during gasket compression.

Helpful Tips For Removal

8) 1/4 turn or less!: Removing the jackbolts more than a 1/4 turn will increase the removal torque of the remaining jackbolts and you may get stuck. If this happens, you will have to retighten and start again.

9) Stuck jackbolt removal: If a jackbolt will not turn, remove, relube, and retighten a neighboring jackbolt and then try to turn it.

Air Impact Tool Selection (90 PSI (620 kPa) Air Pressure)

NOTICE

NOTICE

The jackbolt torque actually achieved by an air impact wrench is usually only 30 - 50% of its rated output. For minimum hand work, use an air impact with an output of 110% - 120% target torque. For maximum power, use the largest air line fitting.

Up to 70 lbs-ft (311 N•m): For 15-35 lbs-ft (67-155 N•m) use a right angle ratchet or light duty 3/8" impact. For 35-70 lbs-ft (155-311 N•m) use a heavy duty 3/8" impact.

70-100 lbs-ft (311-445 N•m): Use a light duty 1/2" impact at a reduced pressure or setting. (Be careful not to over tighten! Calibrate the impact before starting.)

100-170 lbs-ft (445-756 N•m): For 100-130 lbs-ft (445-578 N•m) use a light duty 1/2" impact. For 130–170 lbs-ft (578-756 N•m) use a heavy duty 1/2" impact.

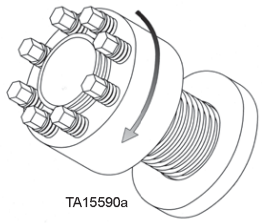
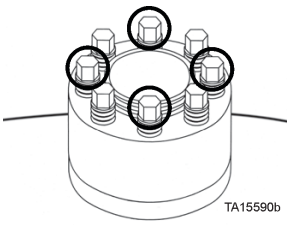
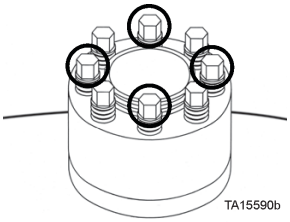
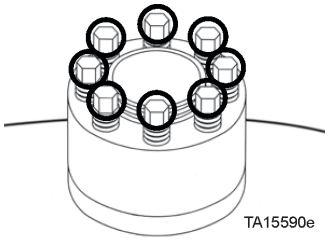
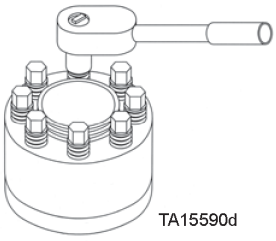
170-200 lbs-ft (756-890 N•m): Use a light duty 3/4" impact on low setting. Some heavy duty 1/2" impacts will also reach this range.

Over 200 lbs-ft (890 N•m): For 200-300 lbs-ft (890-1334 N•m), use a light to medium duty 3/4" impact. Over 300 lbs-ft (1334 N•m), use a heavy duty 3/4" impact.

Calibrating an air impact wrench: Tighten one jackbolt until the socket rotation stops and check the jackbolt with a torque wrench. The torque required to move the jackbolt further is the output of the impact as measured on Superbolt® tensioners.

Capscrew and Bolt-Nut Torque Specifications

Installation Procedure for Supernuts

 TA15590a	**Step 1:** Spin the tensioner onto the main thread until it seats against the washer. You may want to back off the tensioner slightly as mentioned in Helpful Tip #3.
 TA15590b	**Step 2:** Tighten (4) jackbolts at 90º apart (12:00, 6:00, 9:00, and 3:00) on all studs with a partial torque (30-70%). This serves to seat the flange. If using an air impact, use a reduced setting or lightly pulse and trigger at the full setting.
 TA15590b	**Step 3:** At 100% target torque, tighten the same (4) jackbolts on all studs.
 TA15590e	**Step 4:** At 100% target torque, tighten all jackbolts in a circular pattern. Do this for all studs (1 round only). See Helpful Tip #7 about using up to 120% torque.
 TA15590d	**Step 5:** Repeat 'STEP 4' until all jackbolts are stabilized (less than 10º rotation). This usually requires 2-4 additional passes. If using air tools, switch to a torque wrench when socket rotation is small. Use the torque wrench to stabilize at the target torque.

NOTICE

Product with 4 or 6 jackbolts – use a star pattern for all steps.Capscrew and Bolt-Nut Torque Specifications

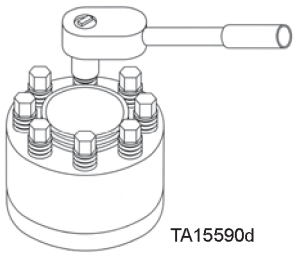
Removal Procedure for Supernuts

CAUTION

Jackbolts must be unloaded gradually. If some jackbolts are fully unloaded prematurely, the remaining jackbolts will carry the entire load and may be hard to turn. With extreme abuse, a jackbolt tip can deform, making removal difficult.

Service Under 250ºF (121ºC)

Preparation: Spray jackbolts with penetrating oil or hydraulic oil prior to start (especially if product is in corrosive environment)


TA15590d

Step 1: Loosen each jackbolt 1/8 turn following a circular pattern around the tensioner (1 round only). As you move around and get back to the first jackbolt, it will be tight again. Do this for all studs on the joint prior to the next step.

Step 2: Repeat a 2nd round as above for all studs, now loosening each jackbolt ¼ turn in a circular pattern.

Step 3. Continue loosening ¼ turn for 3rd and successive rounds until all jackbolts are loose.

NOTICE

Usually after the 3rd or 4th rounds, an impact can be used to completely extract the jackbolts, one by one. For long bolts or tie roads, additional rounds may be required before removing the jackbolts with an impact tool.

Step 4 Remove, clean and relubricate the jackbolts prior to next use with correct Superbolt lubricant (JL-G) Komatsu P/N 427-3753 (do not use any substitute).

Index

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