Structural Components

Section 03-01

Komatsu has made every effort to make this manual as accurate as possible based on the information available at the time of publication and printing. Continuous improvement and advancement of product design may cause changes to machines, which may not have been included in this publication. Komatsu reserves the right to make changes and improvements at any time. To ensure the most current information, please contact your service center.

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General Introduction

Scope of This Publication

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

Komatsu 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, P.O. Box 2307, Longview, Texas 75601, Attention: Warranty Manager. 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

Before any inspections or repairs are performed to the structural components on the machine it is critically important to read and comply with the following warnings and cautions:

⚠ 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 graphic is to indicate 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.**
- **The counterweight bolts must be inspected at no longer interval than the 2000 hour PM.**

- **Counterweight bolts that are found to be loose or damaged during the PM inspection shall be removed and inspected to ensure they are not defective.**
- **Counterweight bolts that are found defective shall be replaced with only original OEM bolts that are grade 8 or better.**
- **Correct washers should be used between the bolt/nut and the counterweight. Reference Parts Manual.**
- **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 or unlocking 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

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 1. Counterweight 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

Table 2. Fuel reservoir locations and approximate weights

⚠ 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

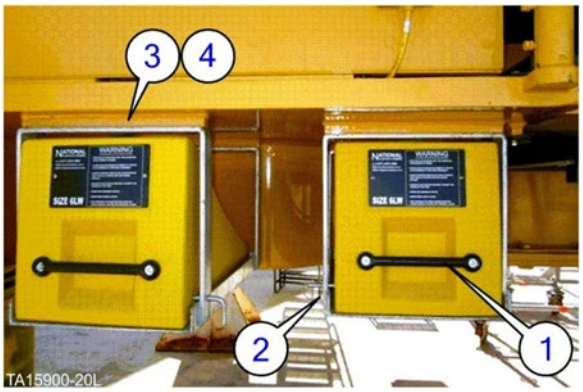
Crush hazards exist if attempting to transport personnel on the machine. There are no provisions on the machine to accommodate the transportation of any persons other than the operator alone, unless a training seat in the cab is optionally provided. Ladders and catwalks attached to the machine are designed 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.

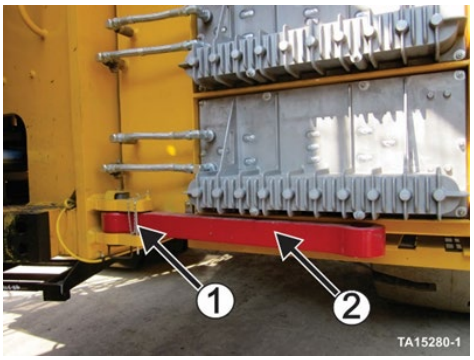
⚠ WARNING

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.



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

Figure 1. Wheel chocks and mount brackets (optional)



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.

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.

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)
- Ladders and Platforms
- KLENZ Cooling Air System

NOTICE

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

Item/Equipment	L1350		L1850/L2350	
	LBS.	KGS.	LBS.	KGS.
Bucket, with Teeth and Pins	35,000	15,876	55,000*	24,954*
Lift Arm Structure (without bellcrank or level link)	30,500	13,835	46,000	20,866
Bellcrank	4,100	1,860	7,525	3,413
Level Link	1,100	499	1,225	556
Front Frame W/Hoist Cylinder	65,000	29,484	74,000	33,566
Rear Frame W/Engine/Generator/Rear Axle	100,500	45,587	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	3,000	1,361	3,000	1,361
*28 Yard Bucket				

Table 3. Approximate component weights

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”

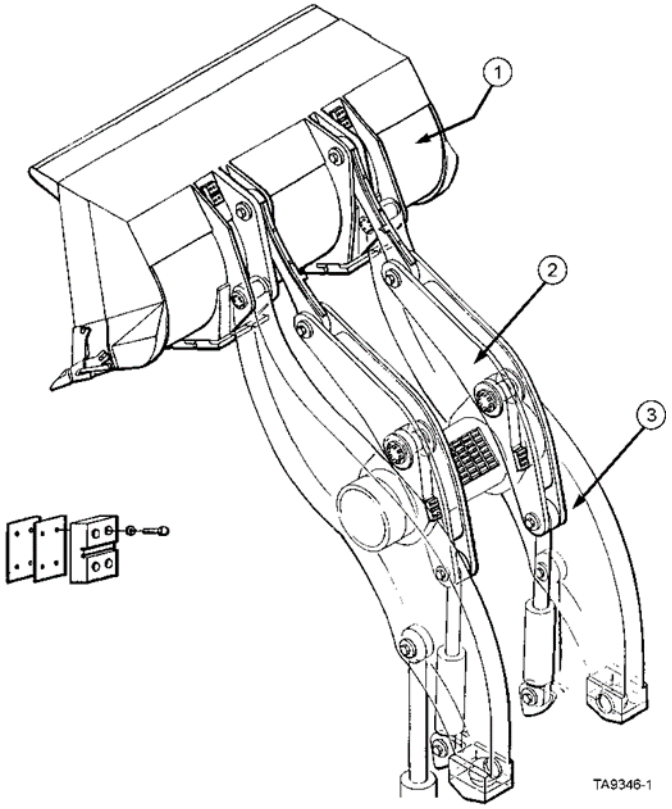
PM Checks and Setup				14” Lift arm	14” Hoist
Min. reading at PM	0.008"	0.009”	0.012”	0.014” Lift arm	0.014” Lift arm
Max. reading at PM check (if higher, then shims must be removed.)	0.023"	0.027”	0.036”	0.042”	0.042”
Reading range after PM shim removal.	.015” ± .002	.018” ± .002	.024” ± .003	.028” ± .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.

Figure 2. Ball base socket cap specifications

Bucket, Bellcrank, and Lift Arms



1) Bucket

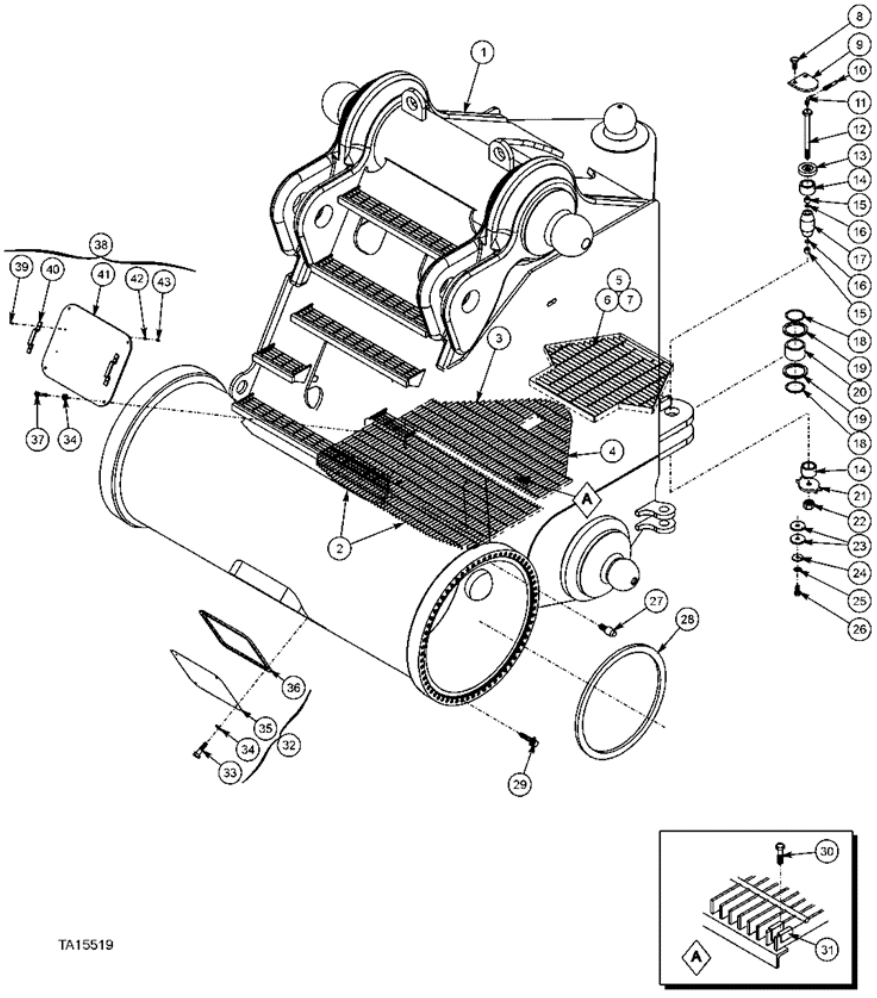
2) Bellcrank

3) Lift Arms

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

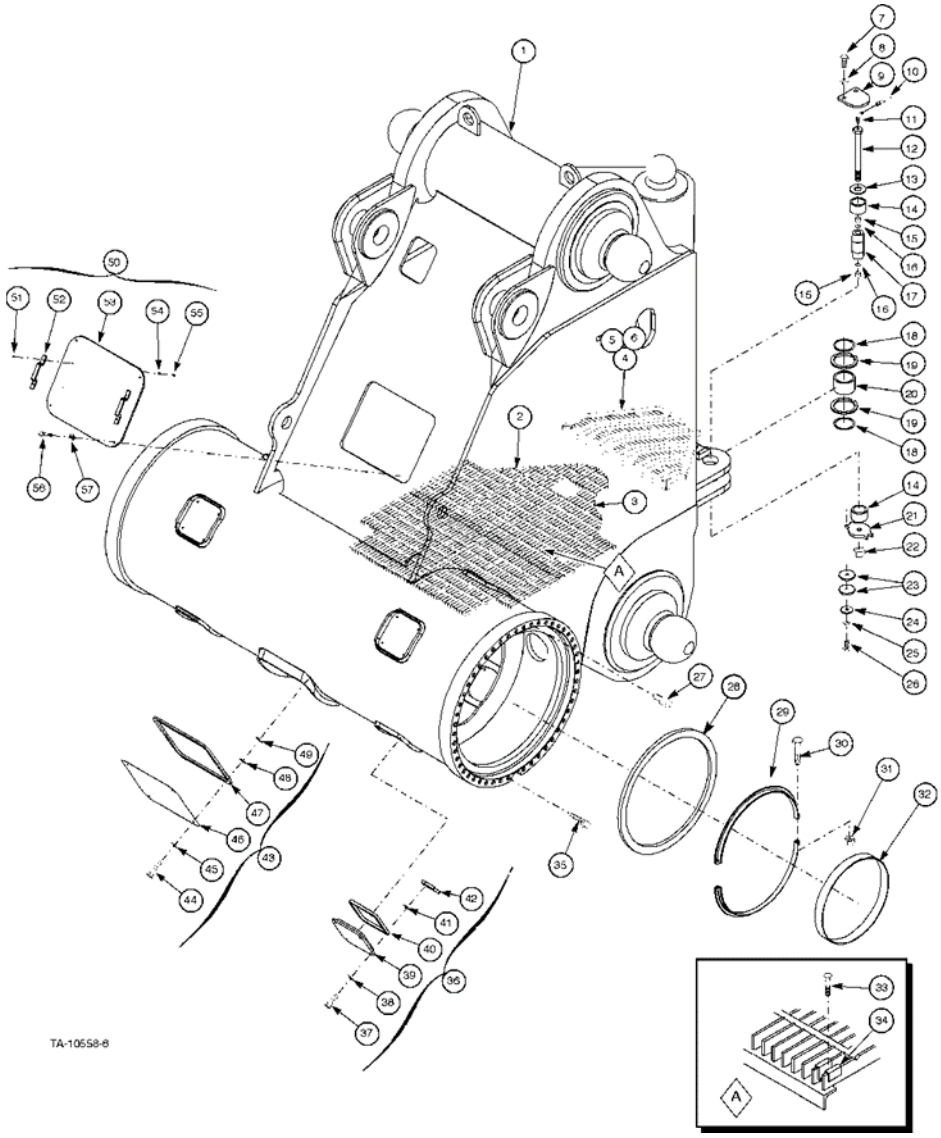
Frames

Front Frame



1. Frame Structure, Front	**17.** Pin	**33.** Bolt
2. Grating Structure, Front	**18.** Ring, Retaining - Internal	**34.** Flatwasher
3. Grating Structure, R.H. Rear	**19.** O-Ring	**35.** Cover Structure, Axle Access
4. Grating Structure, L.H. Rear	**20.** Bushing, Self-Aligning	**36.** Seal, Rubber
5. Grating Structure, Center - Front Frame	**21.** Plate, Capture	**37.** Bolt
6. Bolt	**22.** Locknut	**38.** Cover Assembly
7. Lockwasher	**23.** Flatwasher	**39.** Bolt
8. Bolt	**24.** Flatwasher	**40.** Handle
9. Cap, Pin Lug	**25.** Lockwasher	**41.** Cover Structure
10. Hose Assembly	**26.** Bolt	**42.** Lockwasher
11. Elbow	**27.** Dowel Pin, Threaded - Driver to Axle Housing	**43.** Nut,
12. Bolt	**28.** Seal, Axle/Motor	
13. Flatwasher	**29.** Capscrew	
14. Bushing, Saw Cut	**30.** Bolt	
15. Sleeve, Retainer - O-Ring	**31.** Fastener, Grating	
16. O-Ring	**32.** Cover Assembly	

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



1. Frame Structure, Front	**20.** Bushing, Self-Aligning	**39.** Cover Structure
2. Grating Structure, R.H. - Front	**21.** Plate, Capture	**40.** Seal, Rubber
3. Grating Structure, L.H. - Front	**22.** Locknut	**41.** Flatwasher
4. Grating Structure, Center - Front Frame	**23.** Flatwasher	**42.** Pin, Cotter
5. Bolt	**24.** Flatwasher	**43.** Cover Assembly, Axle - Large
6. Lockwasher	**25.** Lockwasher	**44.** Bolt
7. Bolt	**26.** Bolt	**45.** Flatwasher
8. Lockwasher	**27.** Dowel Pin	**46.** Cover Structure, Axle Access
9. Cap, Pin Lug	**28.** Seal, Axle/Motor	**47.** Seal, Rubber
10. Hose Assembly	**29.** Support Structure, Axle/Motor Seal - Half	**48.** Flatwasher
11. Elbow	**30.** Bolt	**49.** Pin, Cotter
12. Bolt	**31.** Locknut	**50.** Cover Assembly, Access - Main Valve
13. Flatwasher	**32.** Seal Strip	**51.** Bolt
14. Bushing, Saw Cut	**33.** Screw	**52.** Handle
15. Sleeve, Retainer - O-Ring	**34.** Fastener, Grating	**53.** Cover Structure
16. O-Ring	**35.** Capscrew	**54.** Lockwasher
17. Pin	**36.** Cover Assembly, Axle - Small	**55.** Nut
18. O-Ring	**37.** Bolt	**56.** Bolt
19. Ring, Retaining - Internal	**38.** Flatwasher	**57.** Flatwasher

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

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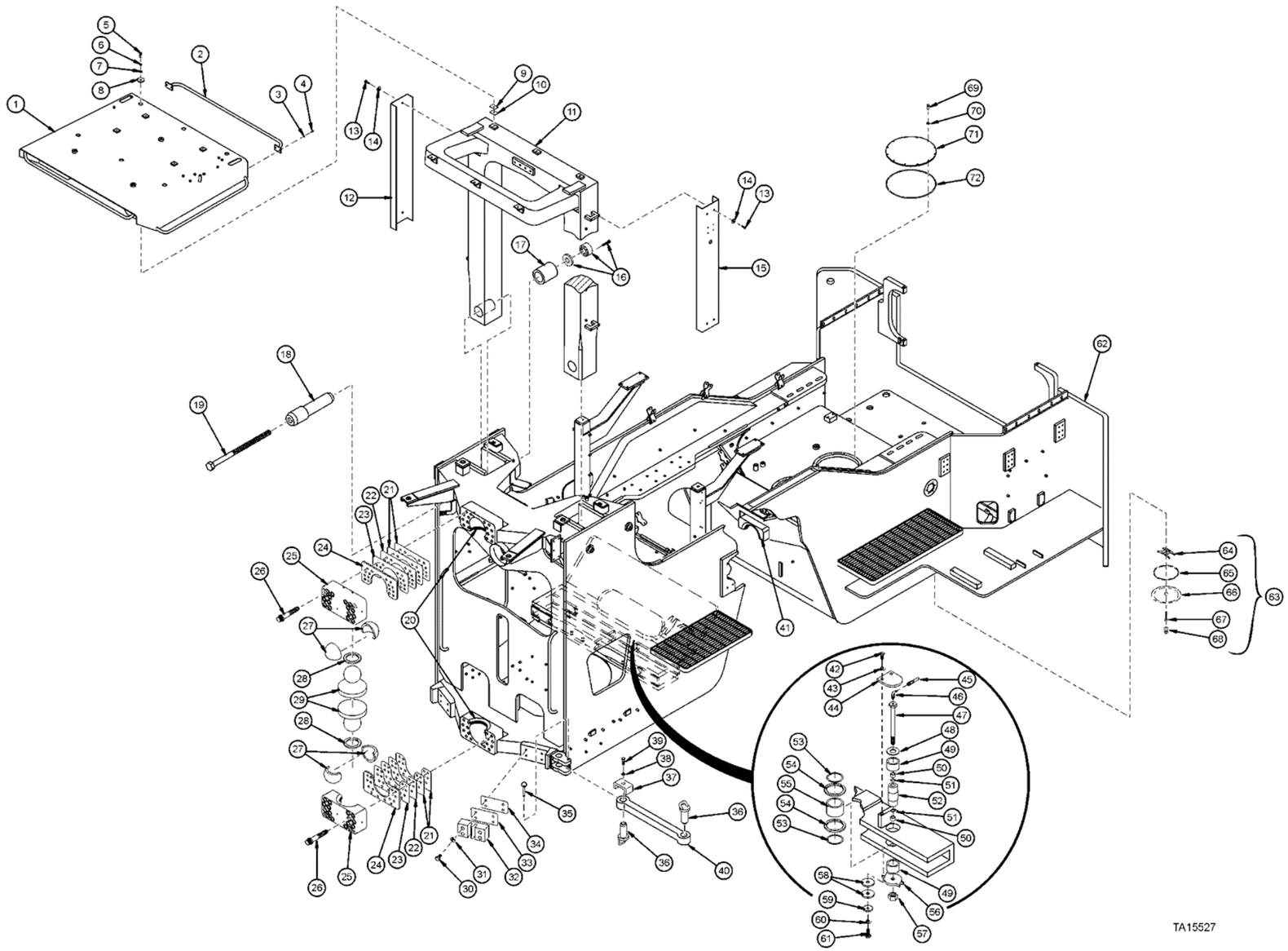
Rear Frame

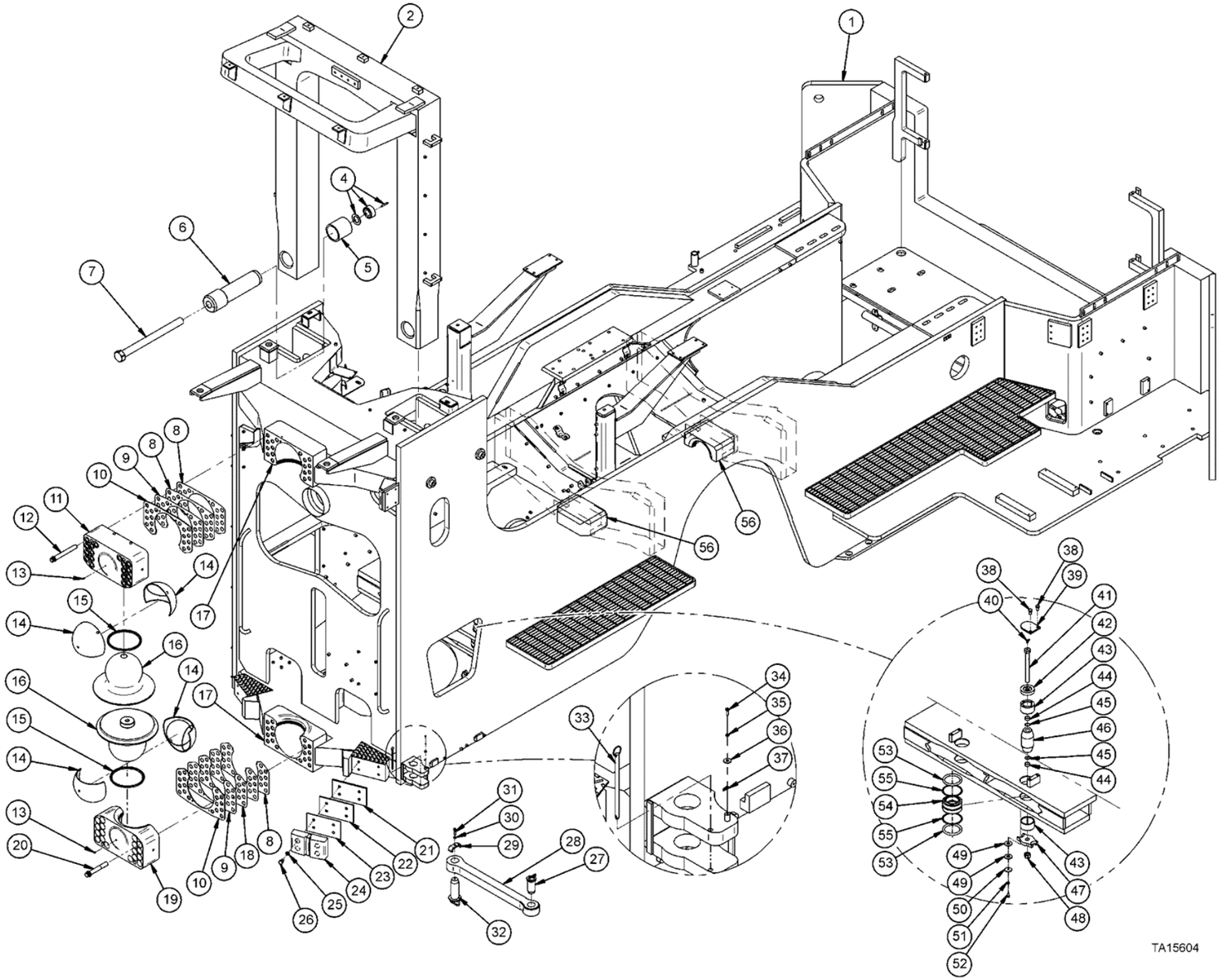


1. FOPS Assembly
2. Handrail Structure, FOPS
3. Lockwasher
4. Bolt
5. Bolt
6. Lockwasher
7. Flatwasher
8. Flatwasher
9. Shim
10. Shim
11. Roll Bar Structure
12. Cover Structure, ROPS - R.H.
13. Bolt
14. Lockwasher
15. Cover Structure, ROPS - L.H.
16. Nut, Torque
17. Plate Structure, Capture
18. Pin, 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

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

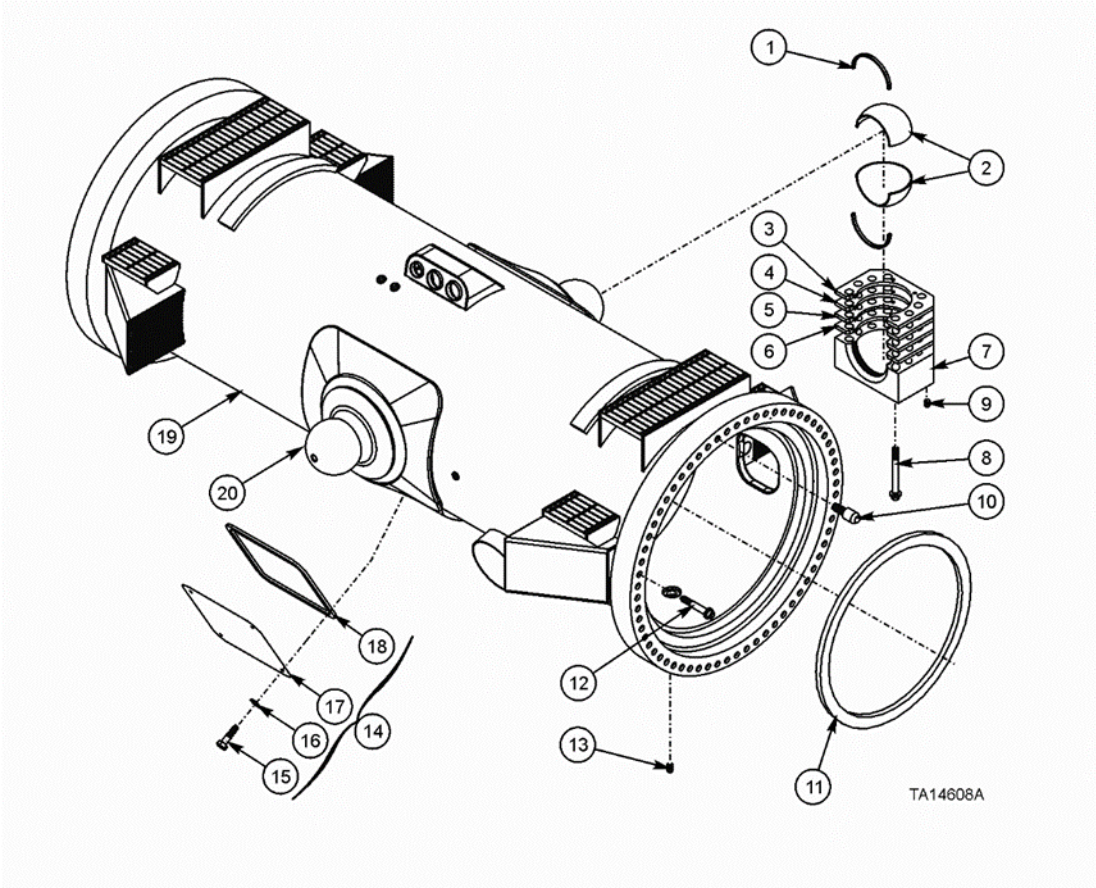


1 Frame Structure, Rear
2 Roll Bar Structure
3 Pin Group, Rollbar
4 Nut, Torque
5 Plate Structure, Capture
6 Pin, Roll Bar
7 Bolt
8 Shim, .007"
9 Shim, .018"
10 Shim, .030"
11 Cap, Ball
12 Capscrew
13 Plug, Pipe - Hex CSK.
14 Liner, Ball - Half
15 Seal, Ball
16 Ball And Base
17 Socket, Ball
18 Spacer, 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

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

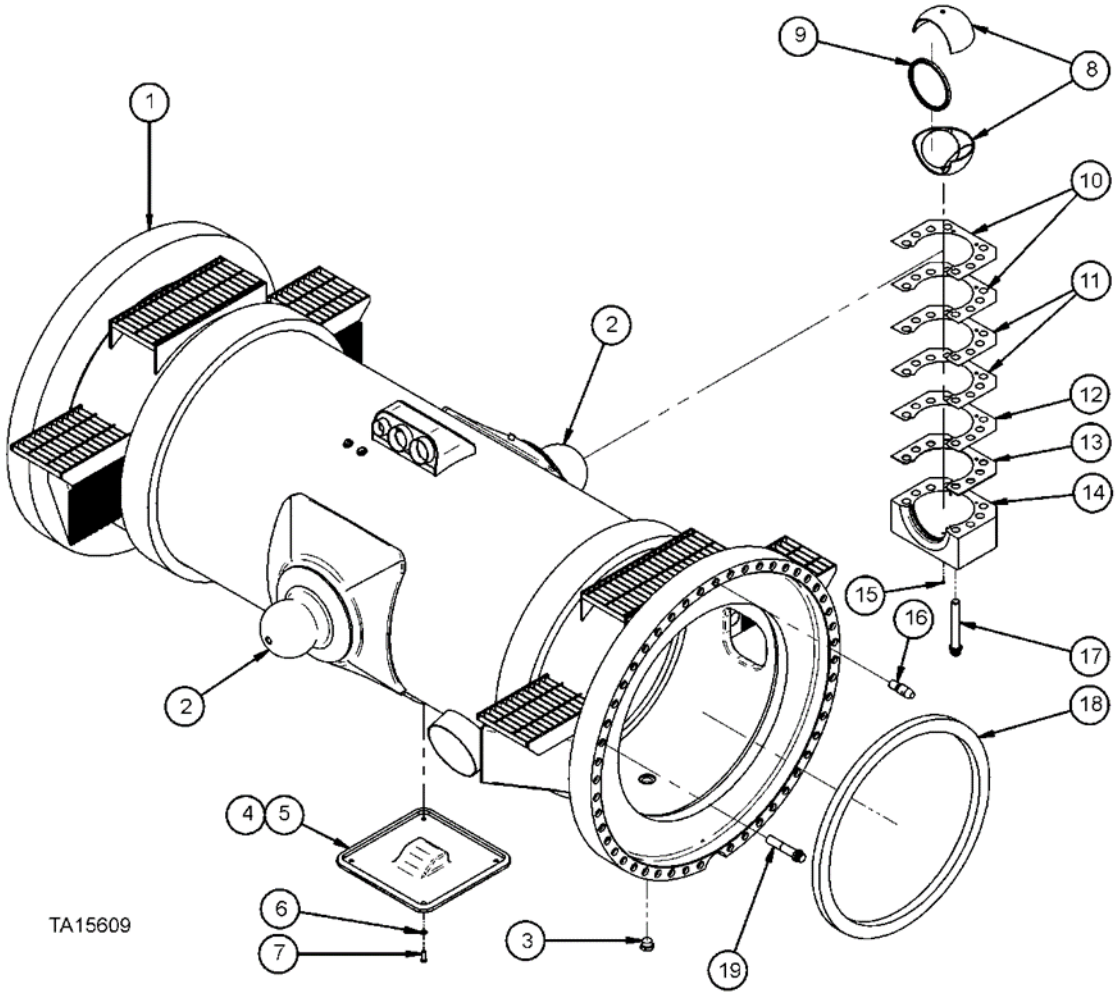
Oscillating Axle Assembly

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.



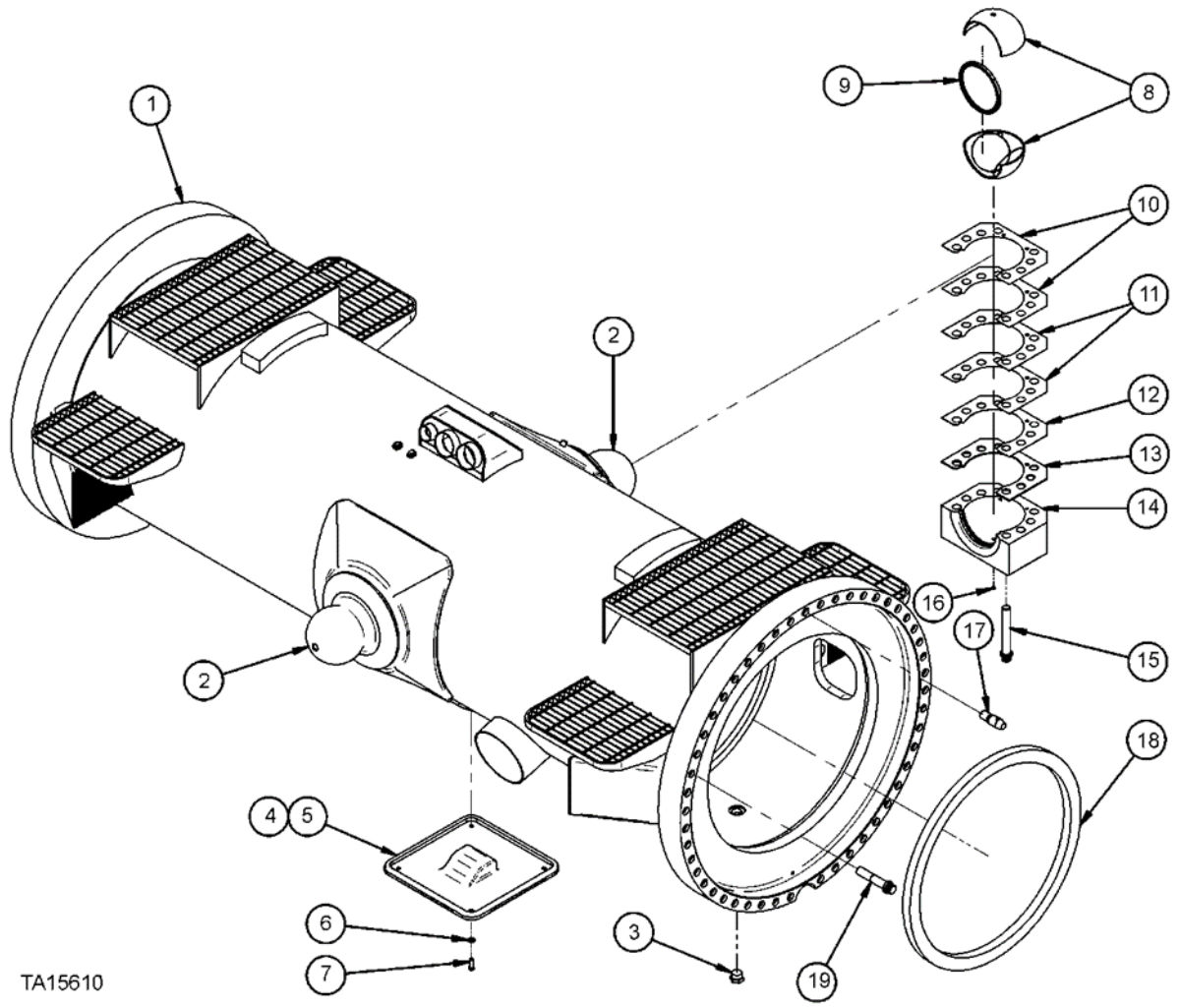
1. Seal, ball	**11.** Seal, axle/motor
2. Liner, ball	**12.** Capscrew
3. Spacer	**13.** Plug, pipe
4. Shim	**14.** Cover assembly, axle
5. Shim	**15.** Bolt
6. Shim	**16.** Flatwasher
7. Cap, ball	**17.** Cover assembly
8. Capscrew	**18.** Seal, rubber
9. Plug, pipe	**19.** Axle structure, rear
10.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

Figure 8. L-1350 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 9. L-1850 rear axle group



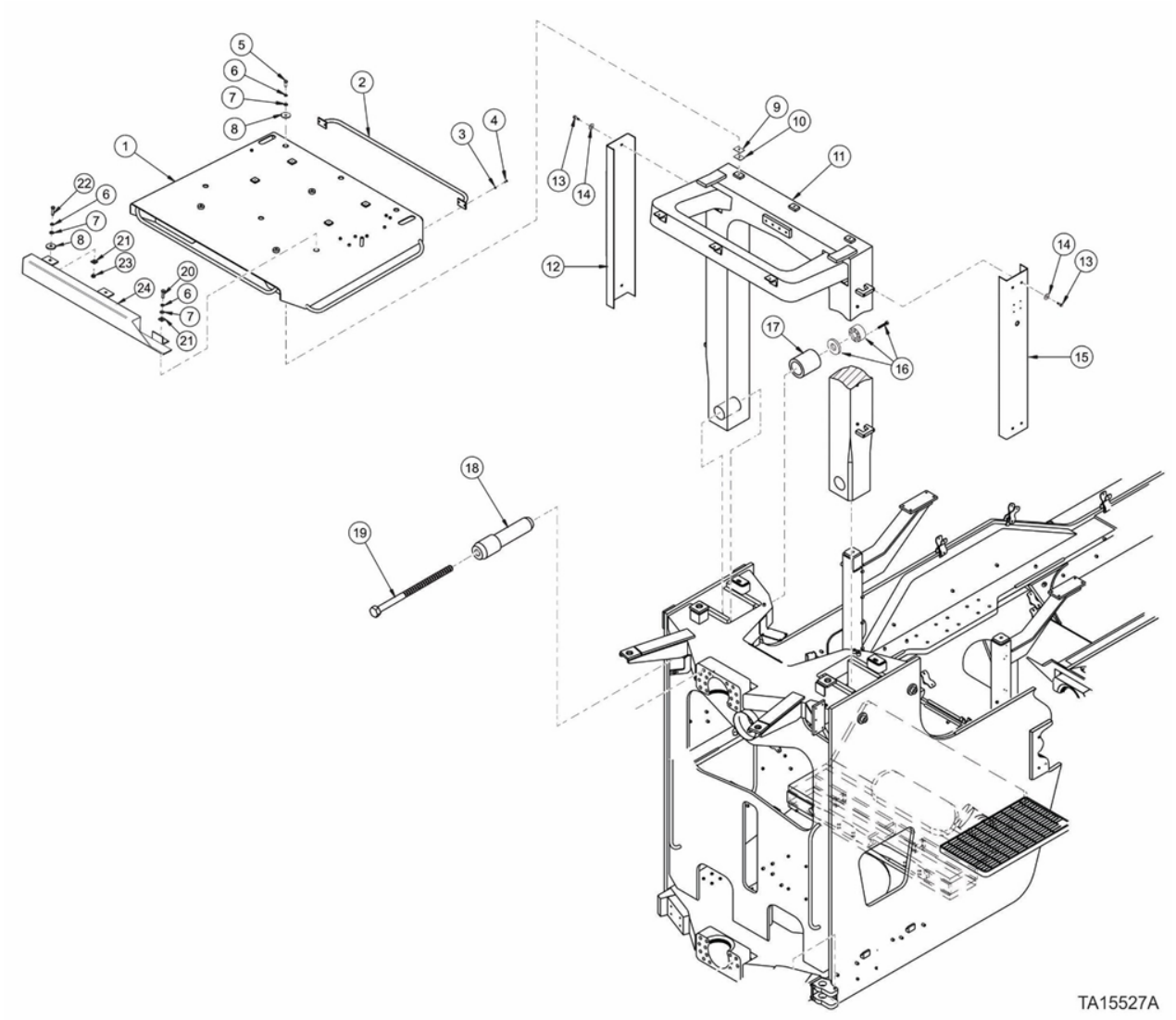
1.	Axle structure, rear	**11.**	Shim, .018"
2.	Ball and base, rear axle pivot	**12.**	Shim, .030"
3.	Plug, pipe	**13.**	Spacer, 3/16"
4.	Cover group, axle access	**14.**	Cap, ball
5.	Cover assembly, axle access	**15.**	Capscrew
6.	Flatwasher - conical	**16.**	Plug, pipe
7.	Bolt	**17.**	Dowel pin
8.	Liner,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

Figure 10. L-2350 rear axle group

Protective Structures

Rollover Protective Structure (ROPS)

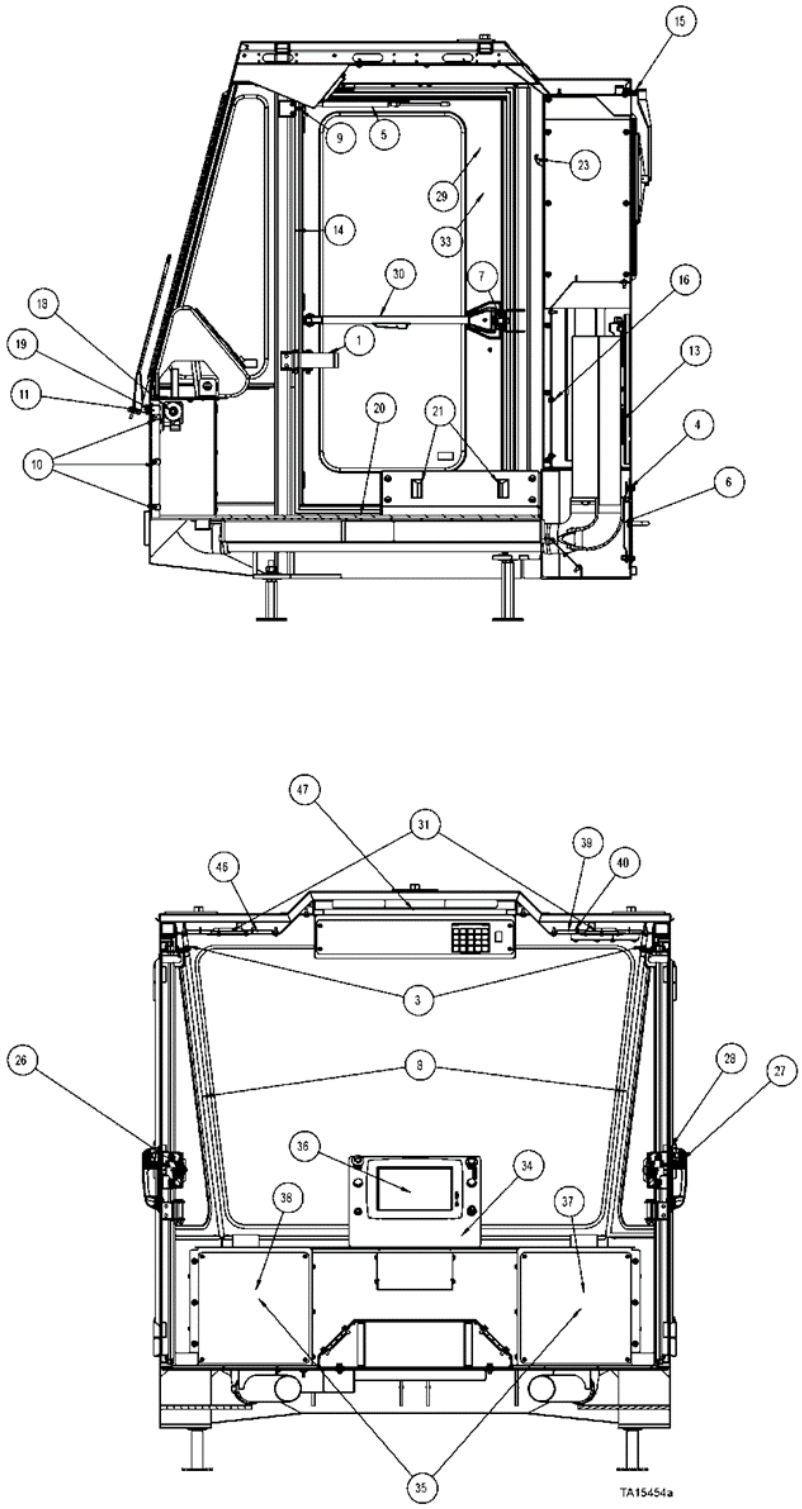
Falling Object Protective Structure (FOPS)



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

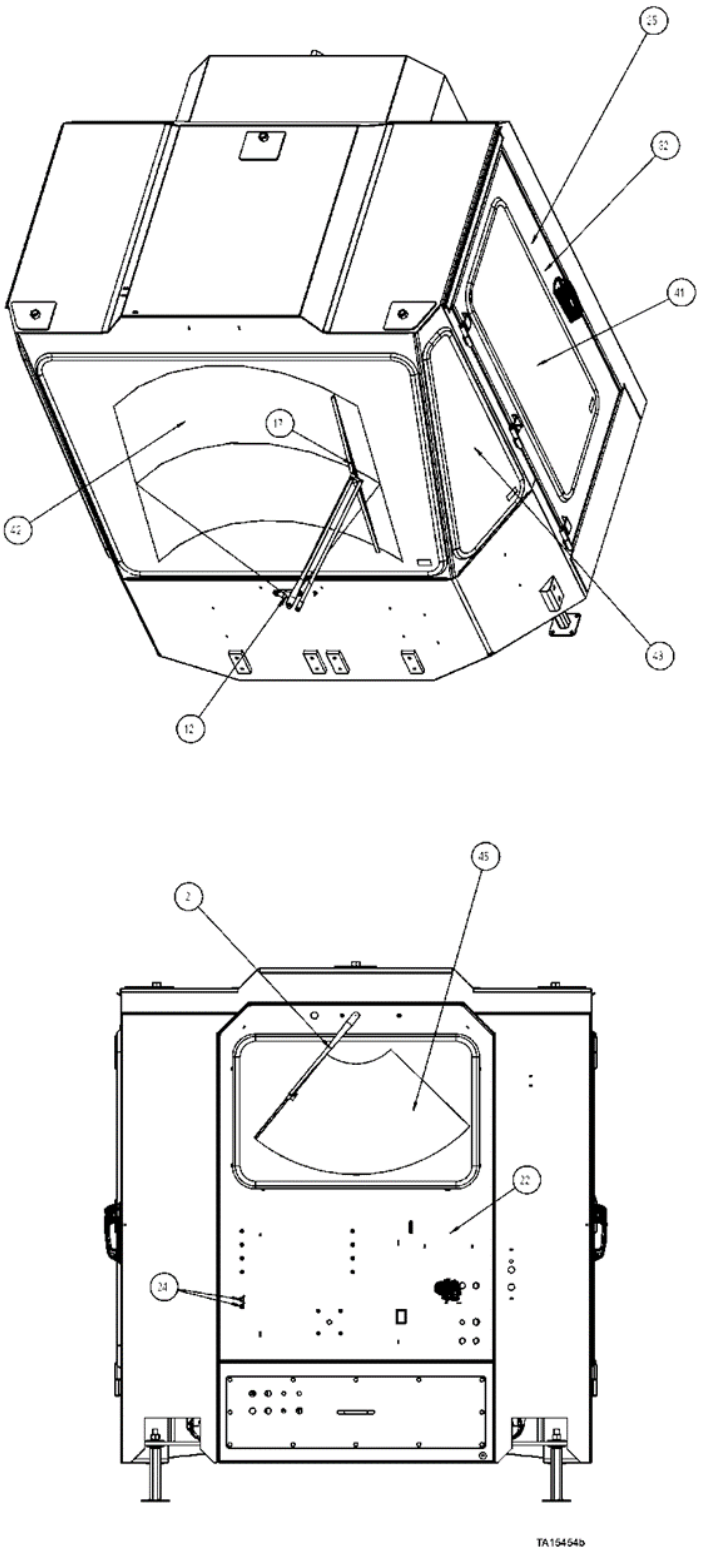
Figure 11. Rollover protective structure (ROPS) and falling object protective structure (FOPS) assembly (typical)

Cab Structure



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 12. Cab assembly (1 of 2) (typical)

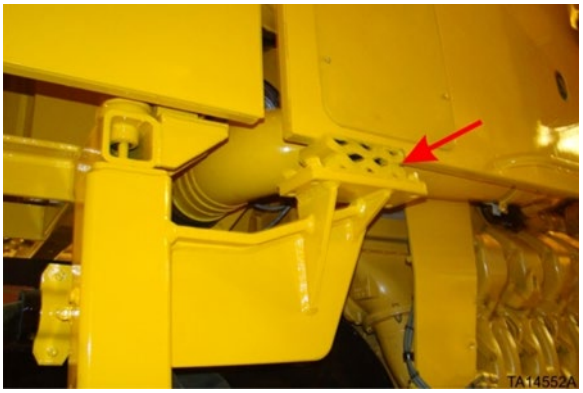


2. Rear Wiper Arm
12. Pantograph Adapter
17. Front Wiper Blade
22. A/C and Heater Assembly
24. Wiper Cowl Fitting
25. L.H. Door Assembly
32. L.H. Door Structure
41. Door Glass
42. Front Glass
43. Side Glass
45. Door Glass

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

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.



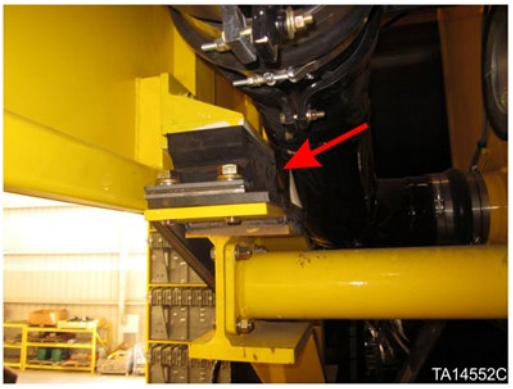


Figure 14. Typical hood mount

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.

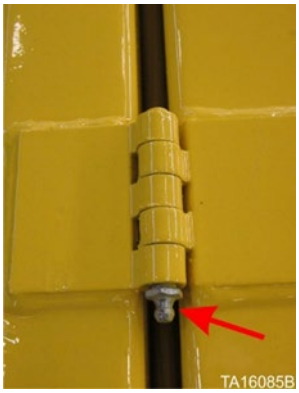
The panels should be lubricated with grease as needed to ensure free operation.

⚠ WARNING

Fall hazard or struck-by hazard exists when opening the sound abatement panels. If the loader is on a slight incline or in 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.

Panel handle latch

Latches inside panels (top and bottom)

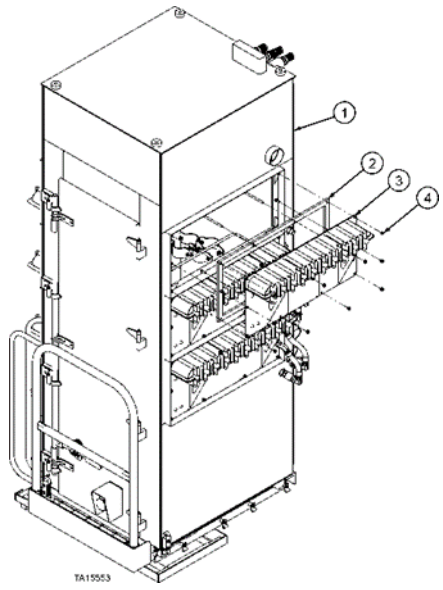


Grease zerk for panel hinge

Figure 15. Typical sound abatement panel

High Voltage Cabinet

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



1. Electrical Converter Cabinet
2. Converter Panel Seal
3. Converter Panel
4. Converter Panel Retaining Nut

Machine Model	# of Converter Panels
1350 GEN3	9
1850	12
2350	12

Figure 16. Electrical converter cabinet (typical)

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
- Check the torque to assure that the bolts are tight

Counterweight bolts that are found to be loose or damaged during the PM inspection 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.

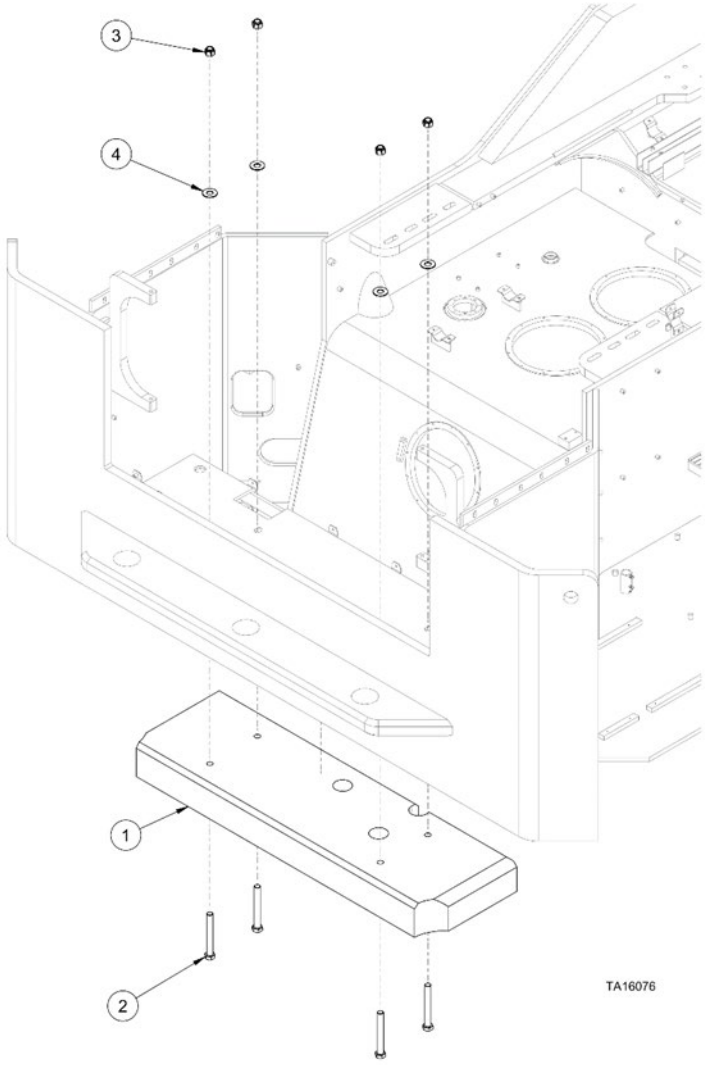
⚠ WARNING

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.

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



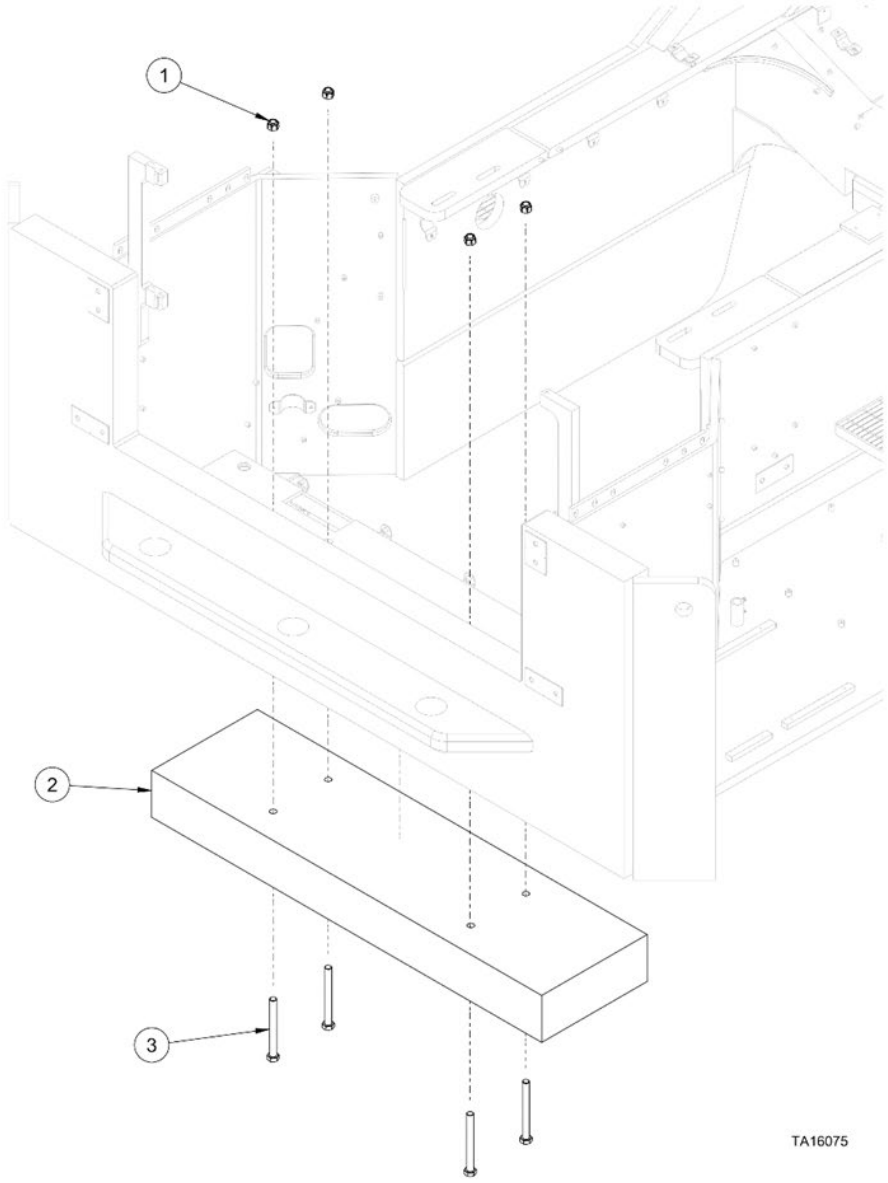
1.	Counterweight	**3.**	Locknut
2.	Bolt	**4.**	Flatwasher

Figure 17. Typical counter weight location for L-1350

⚠ 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.

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



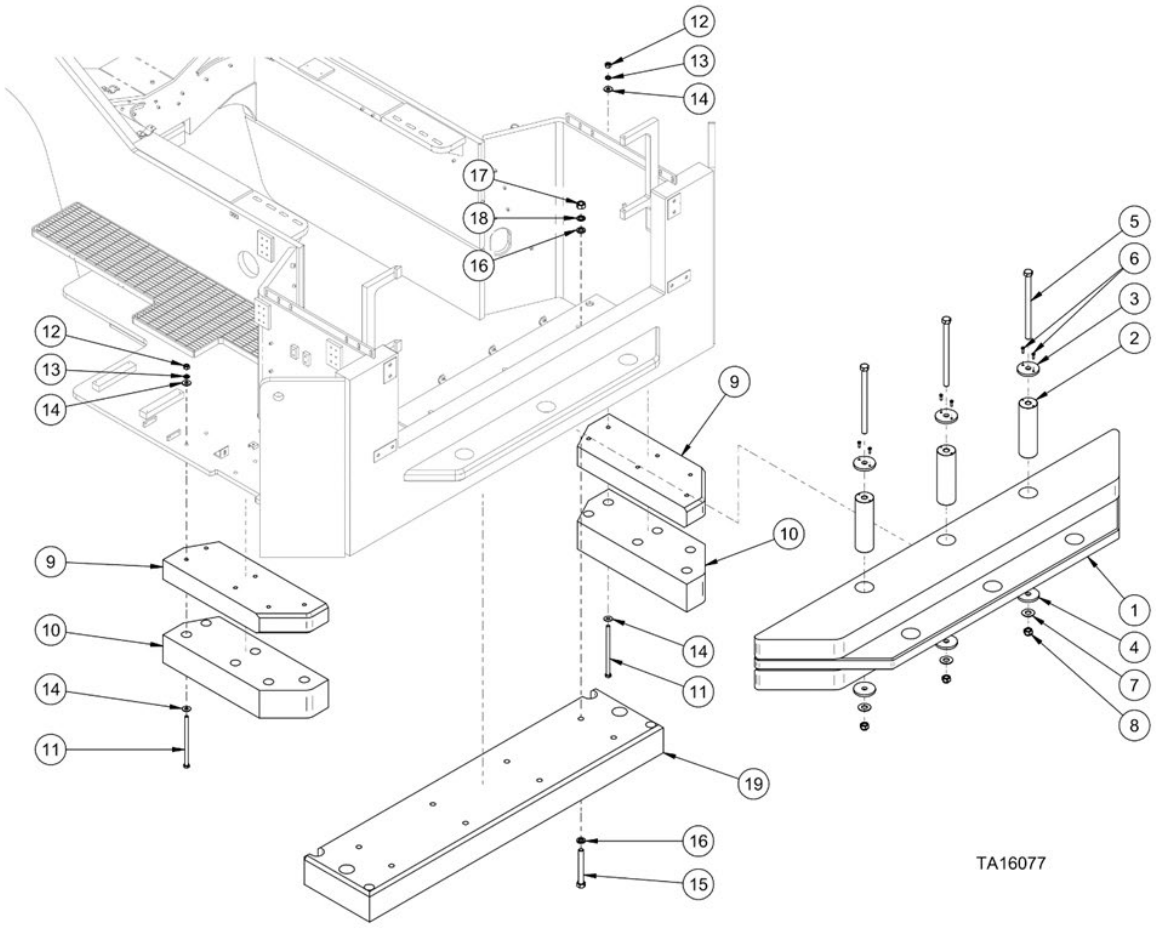
1. Locknut	**3.** Bolt
2. Counterweight	

Figure 18. Typical counter weight location for L-1850

⚠ 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.

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

Figure 19. Typical counter weight location for L-2350

Settings and Adjustments

Securing the Converter Panels in the High Voltage Cabinet

Safety Preparations

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

This procedure is used only to mechanically secure the converter panel to the high voltage converter cabinet. For removal and installation procedures, which include electrical connections and software requirements, refer to “Converter Assembly Replacement” in section 06-03 “SR Drive System Procedures”.

⚠ WARNING

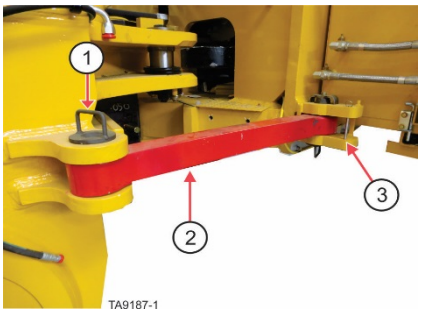
Crush hazards exist if the machine is started or moved while work processes are being performed on the machine. Place bucket flat and level on the ground. Place frame lock in the locked position and lock out the machine’s starting capability before performing any work process. Follow all applicable lockout 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.

a. Stop the wheel loader on flat level ground.

b. 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 or unlocking 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

Figure 20. Frame lock in locked position

c. Place wheel chocks in front and behind each wheel.

d. Set bucket flat and level on the ground.

e. Set the parking brakes.

f. 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.

g. Turn the battery and engine isolation switches to the off position and install locks on the battery isolation switch.

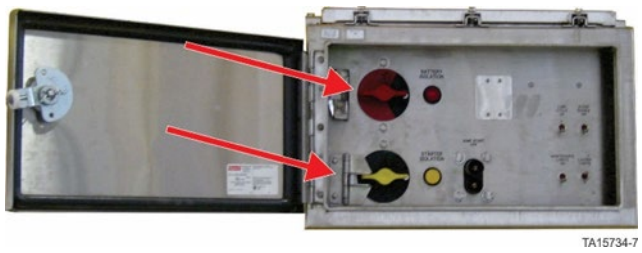


Figure 21. Battery Isolation Box – Battery isolation switch in OFF position with locks in place

h. Release the air from the hydraulic reservoir by using the hydraulic reservoir air valve (ball valve) on top of the reservoir. The supply line from main air system will be blocked and reservoir air will vent out the hose that runs down the outside of the hydraulic reservoir.

- Turn the handle to the up position as shown.

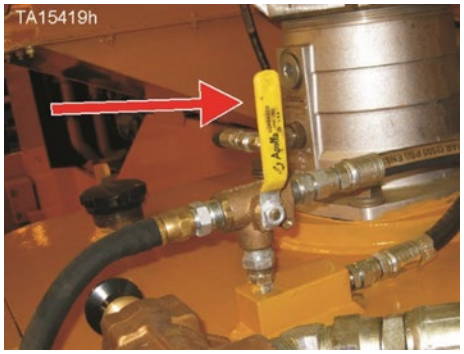
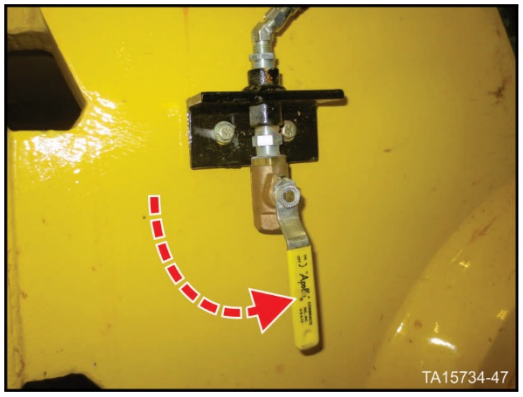


Figure 22. Hydraulic reservoir air valve handle UP

i. Release the air from the various air storage reservoirs by opening all of the air bleed valves.

Three valves on right side of rear frame under hydraulic reservoir
One valve on right side of front frame near hoist cylinder ball cap



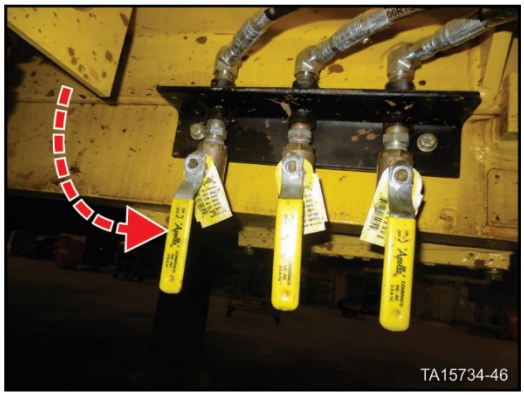


Figure 23. Open air reservoir bleed valves

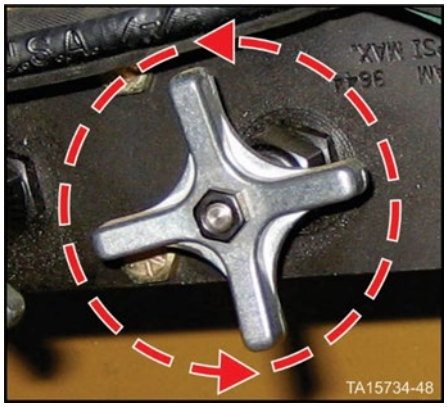
⚠ WARNING

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.

j. 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.

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

- Open the valve completely and leave it open during this procedure.



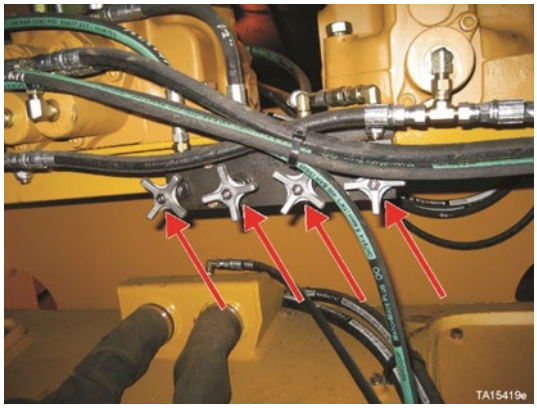


Figure 24. Pressure bleed down valves

l. Following all local environmental rules and regulations, drain the converter cooling reservoir and any residual fluid.

m. Following all local environmental rules and regulations, drain the hydraulic reservoir and any residual fluid in the hydraulic lines.

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.

n. 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.

o. 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.

p. Install and hand tighten all the nuts.

q. 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.

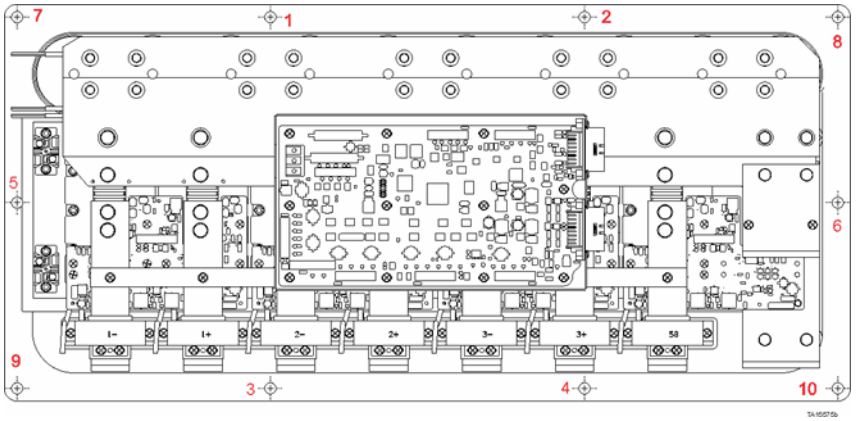


Figure 25. Converter panel tightening sequence

Servicing the ROPS Torque Nut

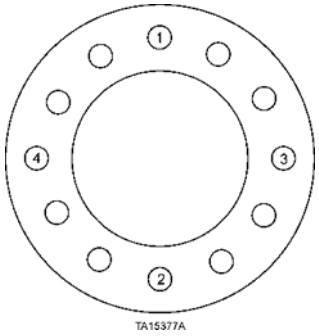
Check the torque on the ROPS torque nut capscrews after the initial 250 hours of operation and every 500 hours thereafter. The proper torque is 114 ft. lbs. (154.6 N•m) lubed, per bolt. Refer to illustration Torque nut and torque sequence as used on ROPS (typical) for bolt torque sequence.

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.

NOTICE

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



Tighten (4) jackbolts at 90º apart.

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.

Figure 26. Torque nut and torque sequence as used on ROPS (typical)

Capscrew and Bolt-Nut Torque Specifications

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)

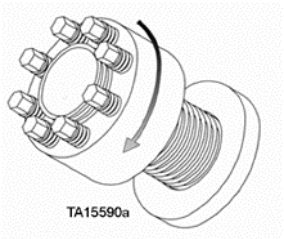
NOTICE

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.

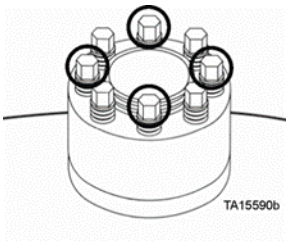
Up to 70 lbs-ft (311 N•m): For 15-35 lbs-ft (67-155 N•m) use a right angle ratchet or light duty 3/8" impact. For 35-70 lbs-ft (155-311 N•m) use a heavy duty 3/8" impact.
70-100 lbs-ft (311-445 N•m): Use a light duty 1/2" impact at a reduced pressure or setting. (Be careful not to over tighten! Calibrate 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.

Capscrew and Bolt-Nut Torque Specifications

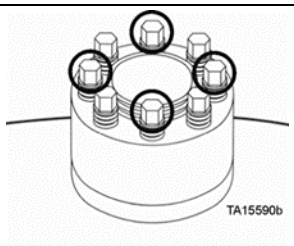
Installation Procedure for Supernuts



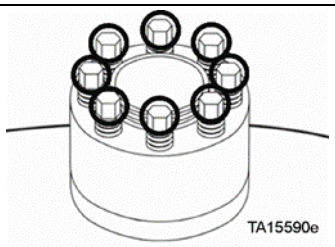
Step 1:
Spin the tensioner onto the main thread until it seats against the washer. You may want to back off the tensioner slightly as mentioned in Helpful Tip #3.



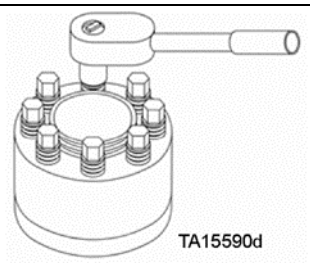
Step 2:
Tighten (4) jackbolts at 90º apart (12:00, 6:00, 9:00, and 3:00) on all studs with a partial torque (30-70%). This serves to seat the flange. If using an air impact, use a reduced setting or lightly pulse and trigger at the full setting.



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). See Helpful Tip #7 about using up to 120% torque.



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

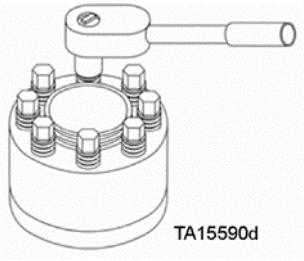
Removal Procedure for Supernuts

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)



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).

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.

GENERATION1: The glass-enclosed cab is equipped with a full-length door, fixed windshield, and a window that can be used for emergency exit.

GENERATION3: 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:

a. 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.

b. The mounts must not be cracked or loose.

c. Wiper blades are in good condition and wipers operating properly. The wiper blades should be replaced annually or more often if required.

d. 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.

e. The heater and air conditioning (optional) are functioning properly.

Repairing the Operator's Seat

Safety Preparations

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.

a. Stop the wheel loader on flat level ground.

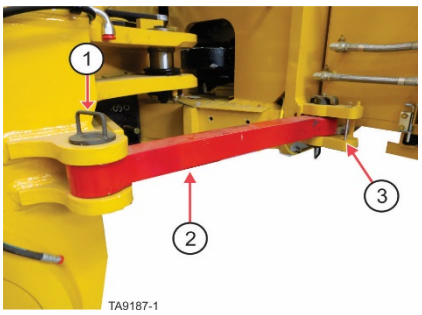
b. Move the frame lock to the locked position so that the frame cannot be steered.

c. Set bucket flat and level on the ground.

d. Place wheel chocks in front and behind each wheel.

⚠ 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 or unlocking 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

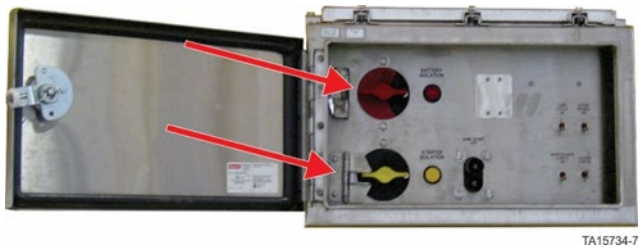
e. Set the parking brakes.

f. 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.

g. 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

h. Release the air from the hydraulic reservoir by using the hydraulic reservoir air valve (ball valve) on top of the reservoir. The supply line from main air system will be blocked and reservoir air will vent out the hose that runs down the outside of the hydraulic reservoir.

- Turn the handle to the up position as shown.

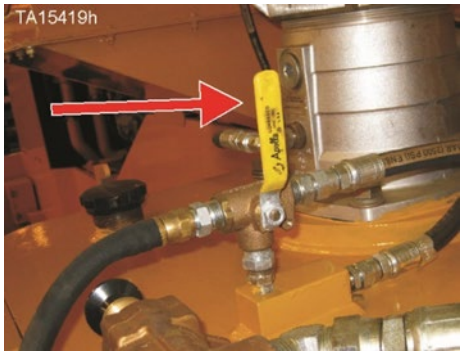
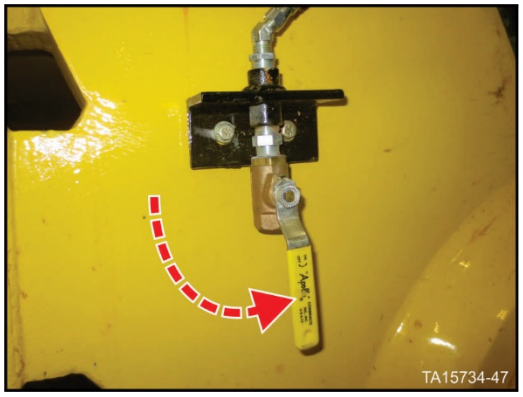
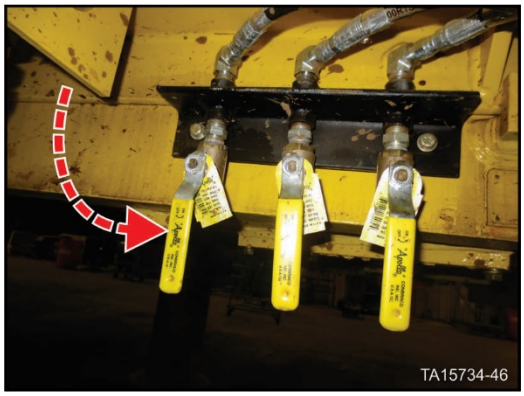


Figure 27. Hydraulic reservoir air valve handle UP

i. Release the air from the various air storage reservoirs by opening all of the air bleed valves.

Three valves on right side of rear frame under hydraulic reservoir
One valve on right side of front frame near hoist cylinder ball cap





Open air reservoir bleed valves

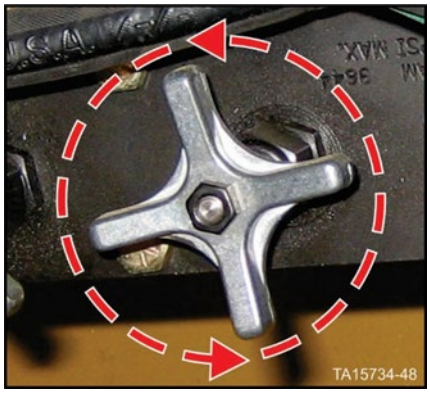
⚠ WARNING

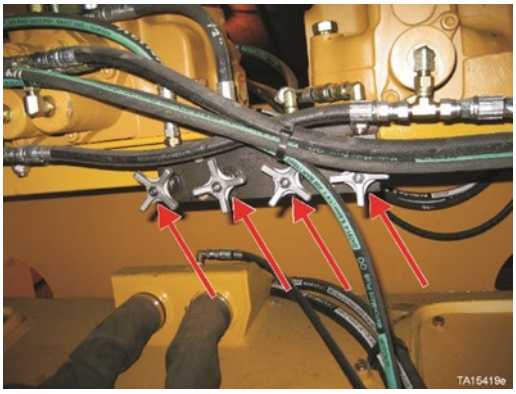
Crush hazards exist if all personnel are not cleared from the bucket and lift arm area before using the hydraulic hoist and bucket hydraulic pressure bleed down valves to relieve pressure from the hoist and bucket circuit. Clear all personnel from the area around the bucket and lift arms before operating 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.

j. 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.

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

- Open the valve completely and leave it open during this procedure.





Pressure bleed down valves

l. Following all local environmental rules and regulations, drain the converter cooling reservoir and any residual fluid.

m. Following all local environmental rules and regulations, drain the hydraulic reservoir and any residual fluid in the hydraulic lines.

NOTICE

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

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

n. Remove the four Phillips-head screws from the underside of the seat cushion and remove the seat cushion.

Figure 28. Removal of four Phillips-head screws securing seat cushion

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

Figure 29. Seat cushion slide mechanism release lever

(Compress and move seat cushion slide mechanism forward to stop)

p. 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 30. Screwdriver inserted into tab on release mechanism

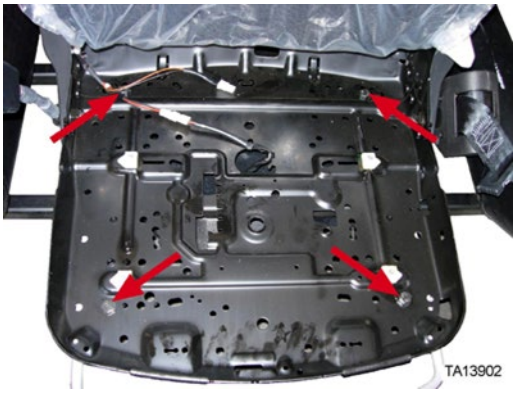
q. Squeeze the release lever while pulling the tab forward and align the square tabs on each side of the seat base with the square slots on each side of the seat cushion slide mechanism. Lift the seat cushion slide mechanism from the seat frame.

Figure 31. Seat cushion slide mechanism moved past stop to align plastic tabs with square slots in seat cushion slide mechanism

r. Unplug electrical connection.

Figure 32. Electrical connection unplugged

s. 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.



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

Figure 33. Seat frame with seat cushion slide mechanism removed

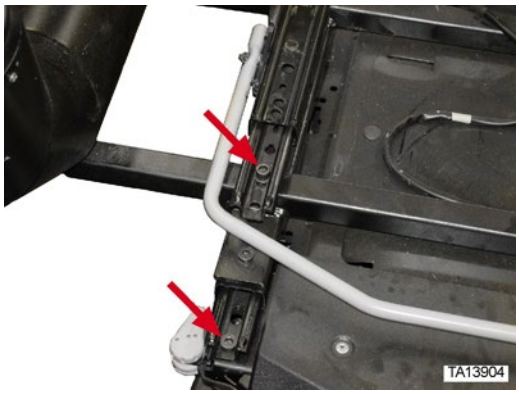


Figure 34. Allen-head screw at each corner of assembly securing spindle & pod

t. 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.

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

v. 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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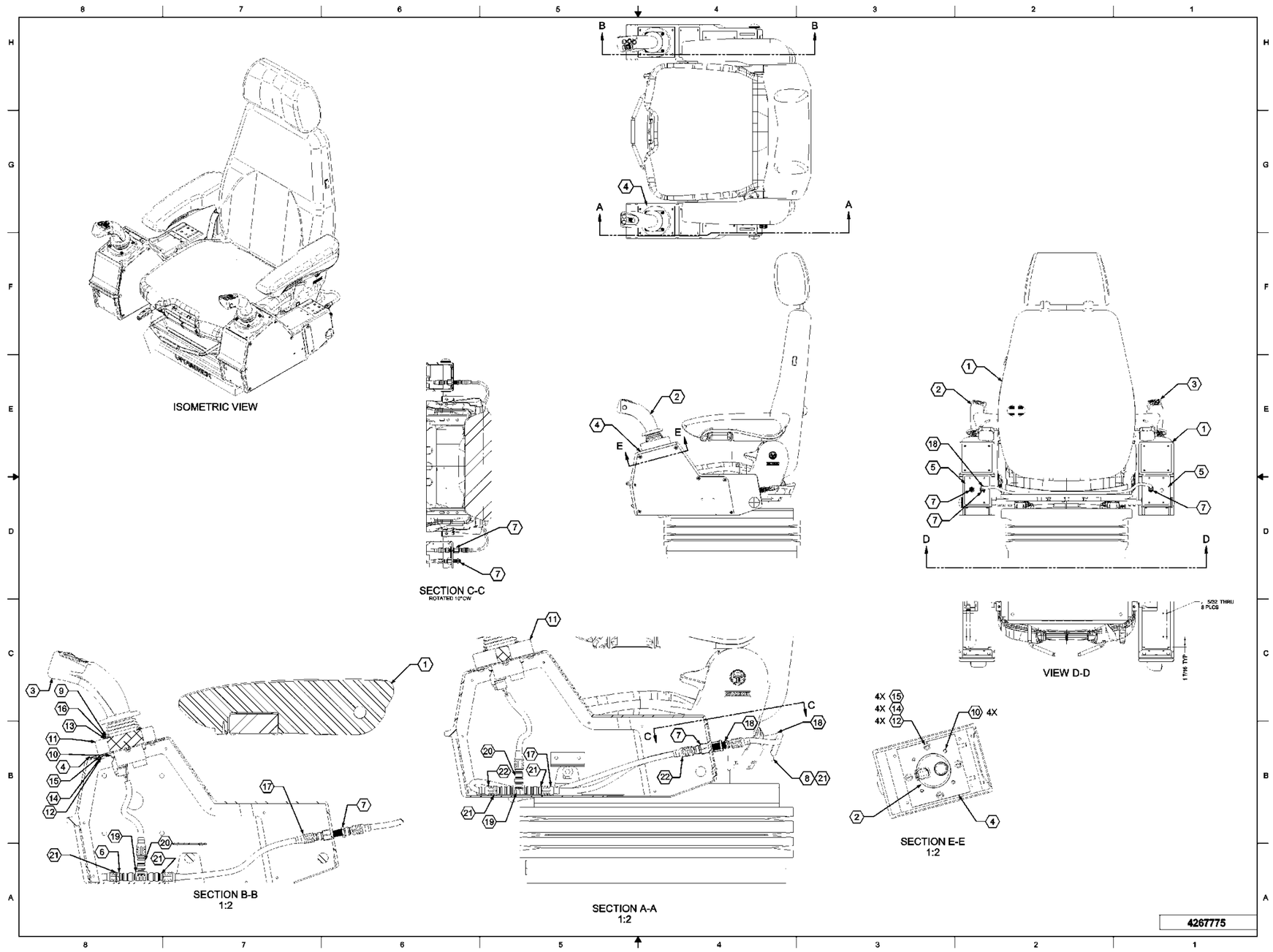

1. Seat, Air Suspension
2. Joystick Control, L.H.
3. Joystick Control, R.H.
4. Adapter Plate, Joystick
5. Mount Plate, Seat Pod Connector
6. Cable, CAN - Male
7. Receptacle, CAN Feed Thru
8. Support Structure, Seat Harness
9. Screw, #6-32 X 1-1/2"
10. Nutsert, #6-32
11. Mount Base, Joystick
12. Screw, #10-32 X 3/4"
13. Flatwasher, #6
14. Lockwasher, #10
15. Flatwasher, #10
16. Lockwasher, 1/8"
17. Cable Extension, CAN .3m
18. Cable Extension, CAN .8m
19. Cable Tee, CAN - 2 Male-Female
20. Cable, Joystick - LINCS II
21. Cable Tie
22. Cable Extension, CAN .5m

Figure 35. Operator's seat – 50-Series machines

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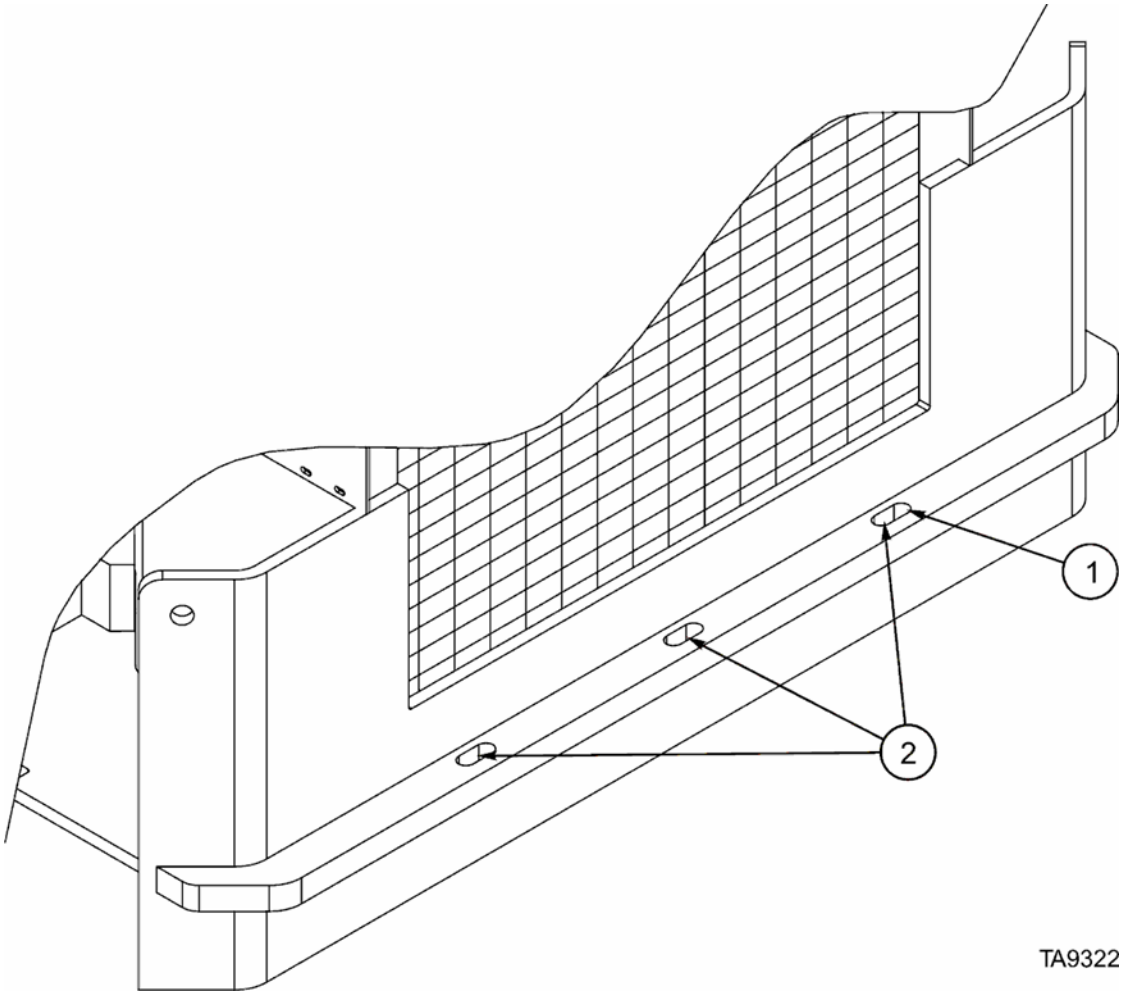
Troubleshooting

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.

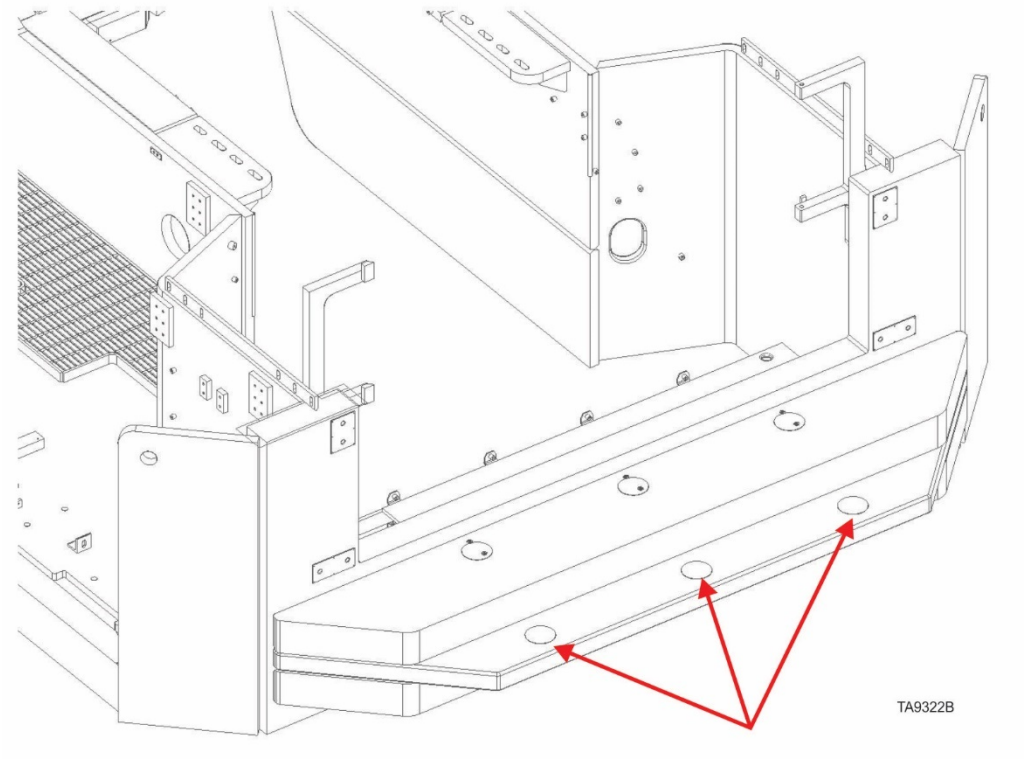


1. Attachment point (3 places)
2. Retrieving (towing points)- do not exceed 131,000 lbs, total pull per attachment point

Figure 36. Towing points – rear of machine without bumper counterweight

NOTICE

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



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

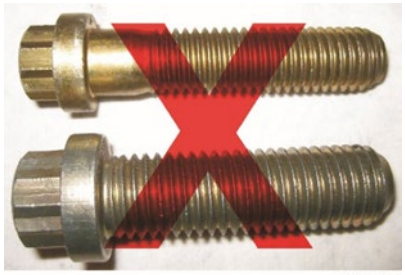
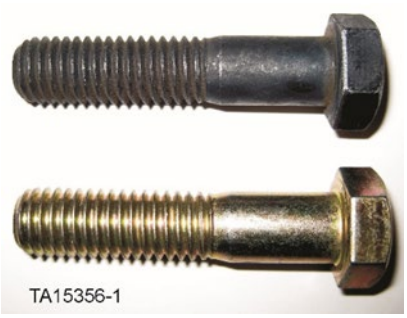
Figure 37. Towing points – rear of machine with bumper counterweight

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.

		
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	Metric Units N-m	USA Units lb-ft	Metric Units N-m
		**Lubed	**Lubed	**Lubed	**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.**

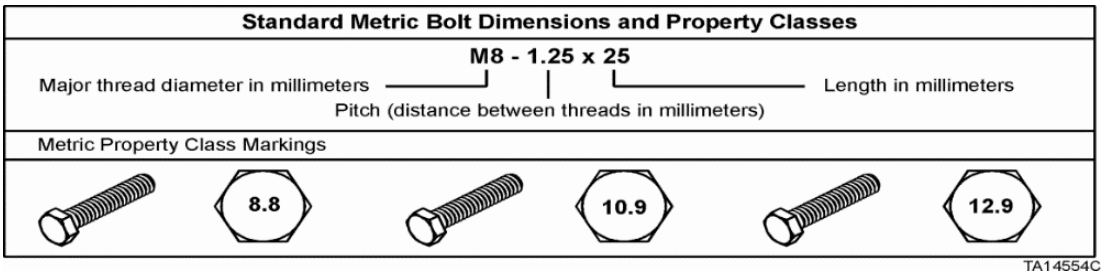
*** **See Special Torque Specifications for 950/1150 steering pins.**

*** **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



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	Metric Units N-m	Application
			**Lubed	**Lubed	
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	Metric Lubed N-m	Application
			** Lubed	** Lubed	
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)

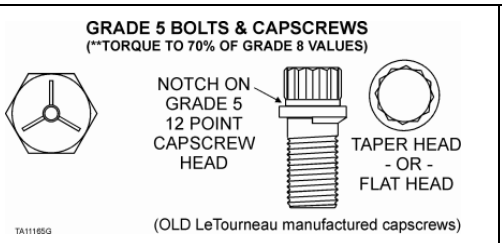
Aluminum 12pt. Capscrews used for Motor Pinion Balancing

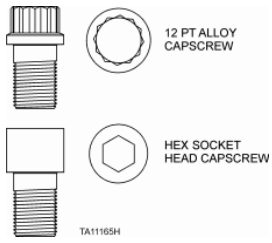
Size	Type	Thread	USA Units (lb-ft)		Metric Units (N-m)	
			Dry	**Lubed	Dry	**Lubed
¾ (0.75)	Aluminum	16 UNF	114	86	155	117
¾ (0.75)	Aluminum 2024-T4	16 UNF	150	113	203	153
15/16 (.9375)	Aluminum 6061 T6	12 NF	217	163	294	221
15/16 (.9375)	Aluminum 2024-T4	12 NF (2 START)	285	214	387	290

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

Size	Type	Thread	USA Units lb-ft	Metric Units N-m
			** Lubed	** 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

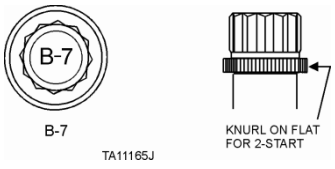
Bolt and Capscrew Markings on Head





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

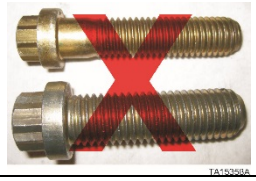
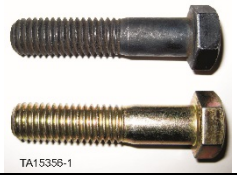
Key Items

- "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 *****Lubed	Metric Units N-m *****Lubed	Application
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)					

Capscrew and Bolt-Nut Torque Specifications

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.

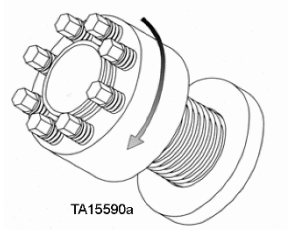
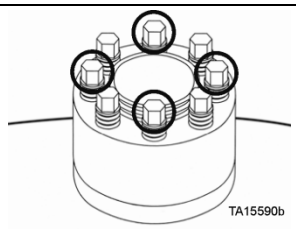
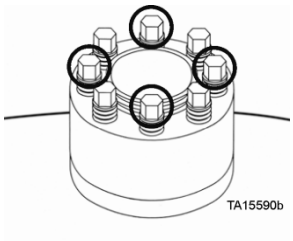
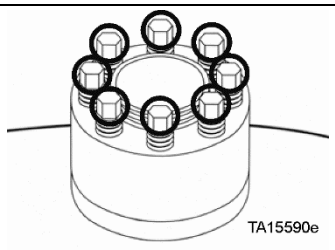
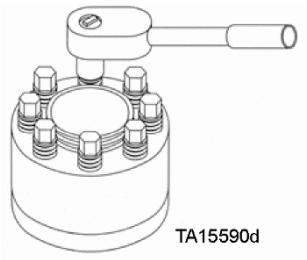
170-200 lbs-ft (756-890 N•m): Use a light duty 3/4" impact on low setting. Some heavy duty 1/2" impacts will also reach this range.

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.

Capscrew and Bolt-Nut Torque Specifications

Installation Procedure for Supernuts

	**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.
	**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.
	**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). See Helpful Tip #7 about using up to 120% torque.
	**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

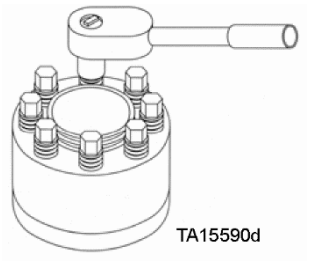
Removal Procedure for Supernuts

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)



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).

Removal/Installation

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

Safety Preparations

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

⚠ WARNING

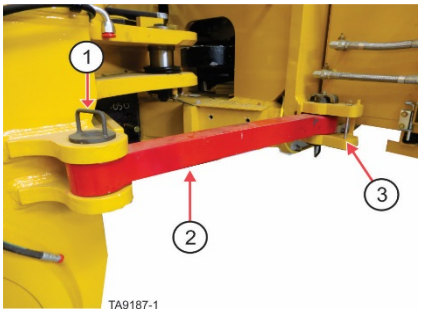
Crush hazards exist if the machine is started or moved while work processes are being performed on the machine. Place bucket flat and level on the ground. Place frame lock in the locked position and lock out the machine's starting capability before performing any work process. Follow all applicable lockout 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.

a. Stop the wheel loader on flat level ground.

b. 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 or unlocking 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

c. Place wheel chocks in front and behind each wheel.

d. Set bucket flat and level on the ground.

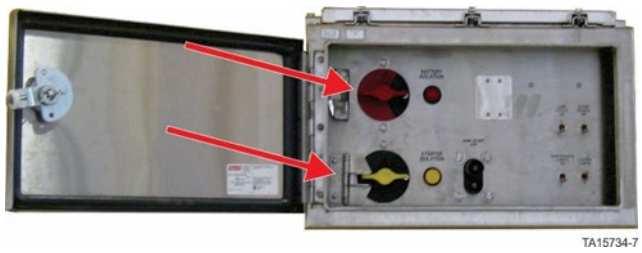
e. Set the parking brakes.

f. 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.

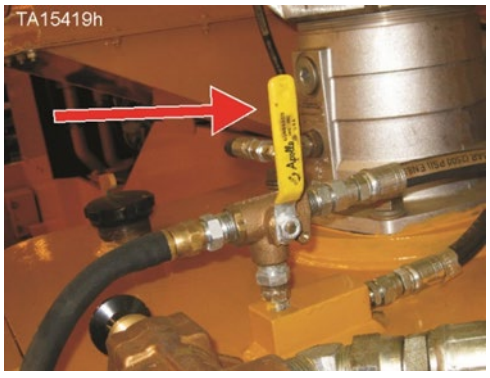
g. Turn the battery and engine isolation switches to the off position and install locks on the battery isolation switch.



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

h. Release the air from the hydraulic reservoir by using the hydraulic reservoir air valve (ball valve) on top of the reservoir. The supply line from main air system will be blocked and reservoir air will vent out the hose that runs down the outside of the hydraulic reservoir.

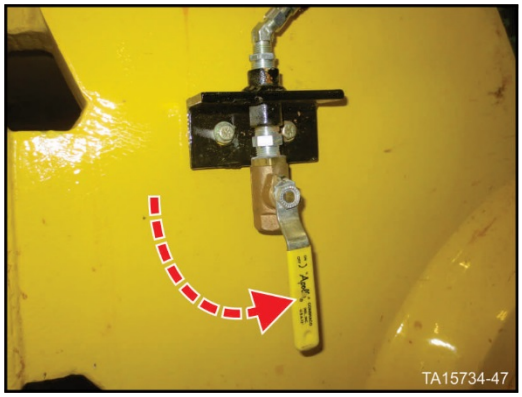
- Turn the handle to the up position as shown

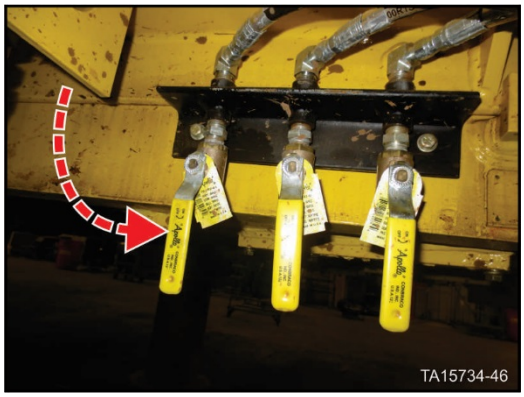


Hydraulic reservoir air valve handle UP

i. Release the air from the various air storage reservoirs by opening all of the air bleed valves.

Three valves on right side of rear frame under hydraulic reservoir
One valve on right side of front frame near hoist cylinder ball cap





Open air reservoir bleed valves

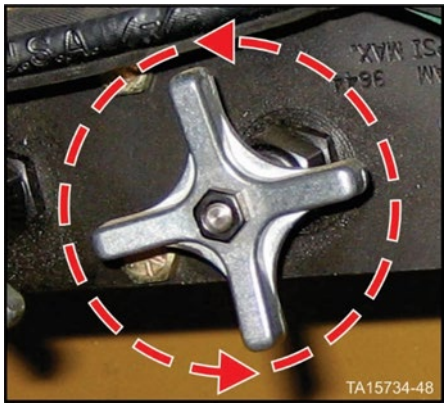
⚠ WARNING

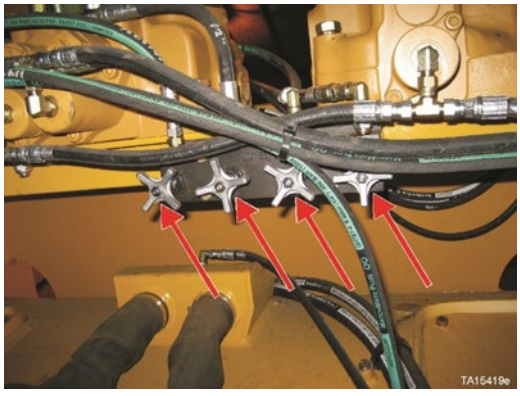
Crush hazards exist if all personnel are not cleared from the bucket and lift arm area before using the hydraulic hoist and bucket hydraulic pressure bleed down valves to relieve pressure from the hoist and bucket circuit. Clear all personnel from the area around the bucket and lift arms before operating 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.

j. 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.

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

- Open the valve completely and leave it open during this procedure.





Pressure bleed down valves

l. Following all local environmental rules and regulations, drain the hydraulic reservoir and any residual fluid in the hydraulic lines.

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.

a. 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.

b. 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.

c. 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.

d. 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.

e. 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.

f. 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.

g. 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.

h. 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.

a. Disconnect and remove batteries or disconnect and tape the (-) negative battery cables.

b. Tag and disconnect all electrical leads interconnected between the front and rear frames.

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

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

e. Disconnect steering cylinders from the front frame connection.

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

g. 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.

h. Remove the capscrews securing the cap of the lower ball pivot. Remove the shims, liner, and cap.

i. Remove the ball upper pivot cap capscrews, shims, liner, and cap.

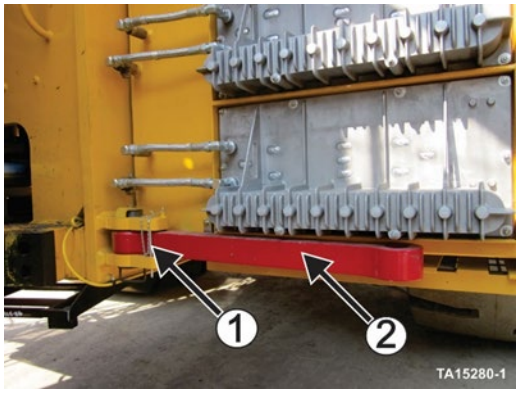
NOTICE

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.

j. Move the frame lock to the unlocked position.



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)

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

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.

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

Assembling the Front Frame to the Rear Frame

a. 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.

b. 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.

c. 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.

a. 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.

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

c. 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.

d. 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”.

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

f. Disconnect all electrical connections to the front frame.

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

h. 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.

i. Protect all exposed hydraulic ports or lines with plastic caps, plugs, or tape.

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

k. Disconnect the steering cylinders from the front frame connection point.

l. Disconnect all lubrication lines interconnected between the automatic and manual lubrication manifold and the rear frame.

Separating the Rear Frame from the Front Frame

a. 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.

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

c. Remove the capscrews, cap, shim and liner from the upper ball pivot.

d. 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.

e. Move frame lock to the unlocked position.

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

g. Move the rear frame to the receiving area and ensure that it is securely supported.

Joining the Rear Frame with the Front Frame

a. 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.

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

c. 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.

d. 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.

e. 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.

f. 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.

g. 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.

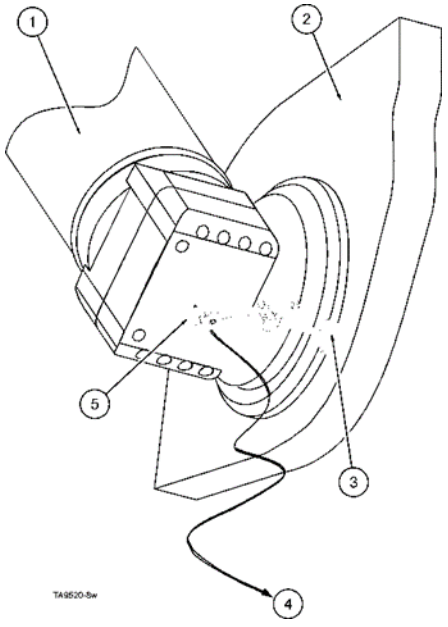
h. Set the bottom plane of the bucket flat on the ground.

i. 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.



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

Figure 38. Typical indicator setup for measuring endplay in ball and cap assembly

j. 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.

k. Slowly hoist the lift arms.

l. 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

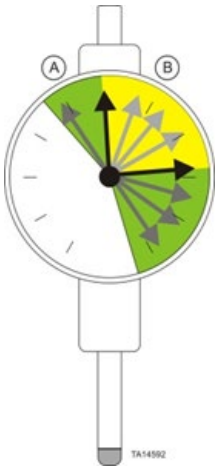
The “snap” value is the endplay reading for the middle pivot ball cap. Take care to read the “snap” reading. All other needle movement is due to deflection and cap movement. Failure to do this can lead to very tight ball socket assemblies, heat, and rapid wear.

m. Repeat the test powering down.

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

o. Repeat the test for top and bottom pivot ball caps.

p. 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).



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

Figure 39. Snap value (deflection and clearance)

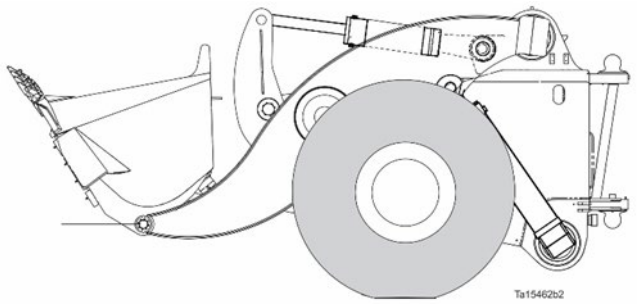
q. Make a visual inspection of the ball and sockets for visually detectable movement every 500 hours. Use a dial indicator to check for worn ball liners every 2000 hours or six months of operation. Follow Steps “g”, “h” and “i” to obtain a dial indicator reading. If the reading is past tolerance limits,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

Replacing and Shimming Stop Blocks

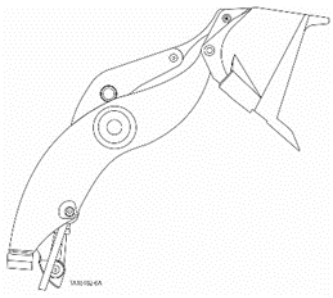
NOTICE

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

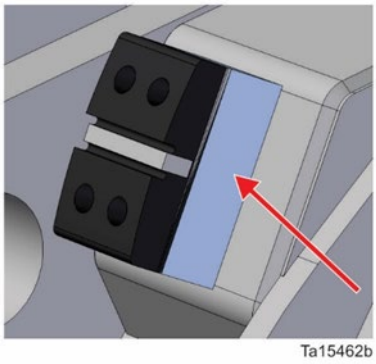
Terminology Used In Shimming Procedures



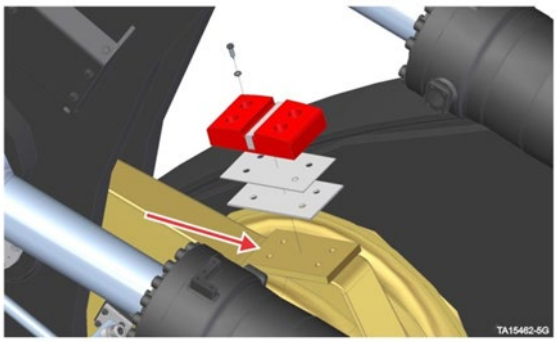
Bucket rollback
The bucket is rolled back to carry a load.



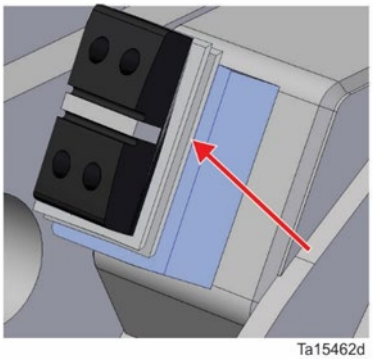
Bucket dump
The bucket is rolled forward to expel the load



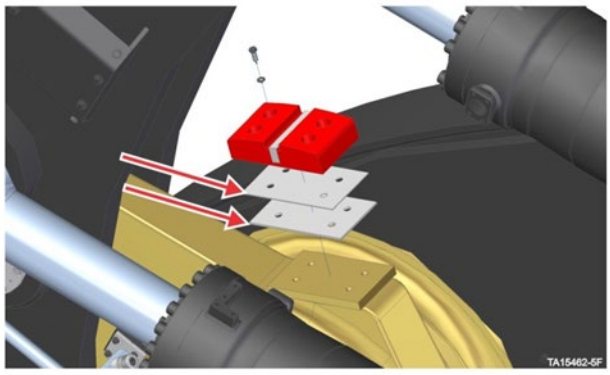
Bucket Rollback Stop Plate
The plate that is either welded or bolted to the bucket. The stop block is bolted to it.



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.

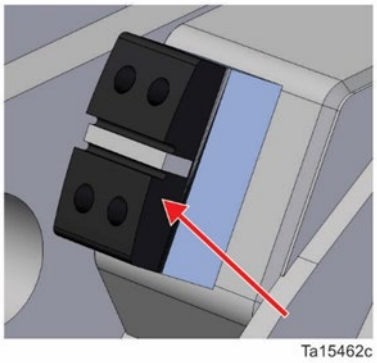


Bucket Rollback Shims

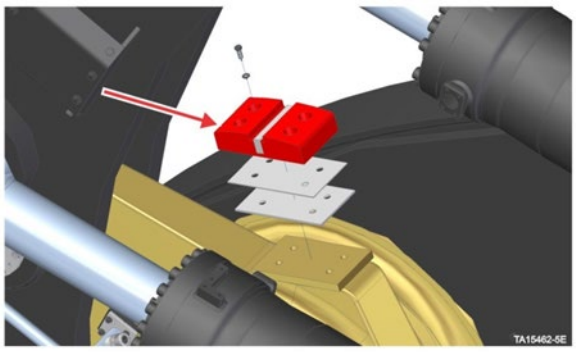


Bucket Dump Shims

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

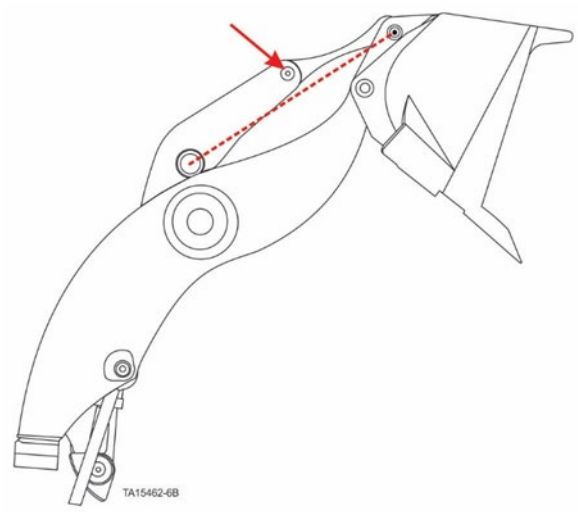


Bucket Rollback Stop Block



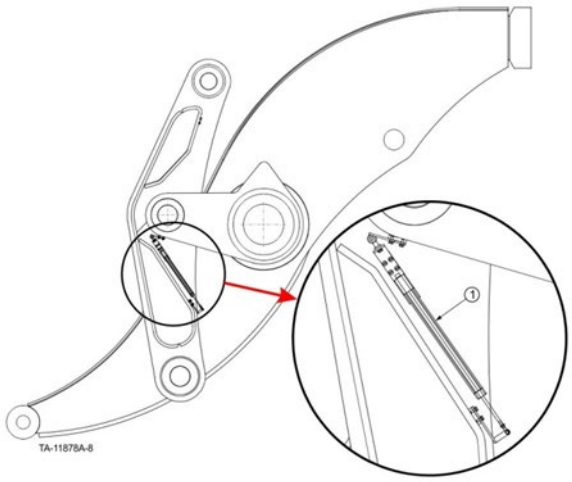
Bucket Dump Stop Block

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

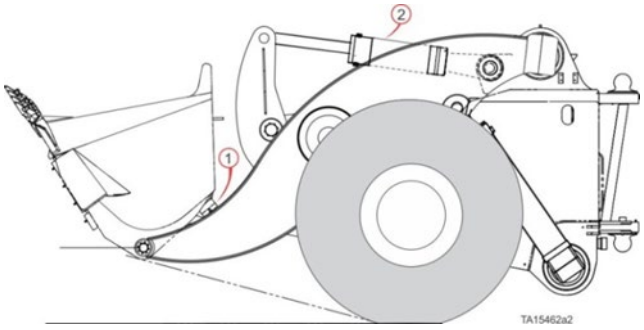
A transducer about 3 feet in length, positioned under the right bellcrank.

Figure 40. Terminology used in shimming procedure

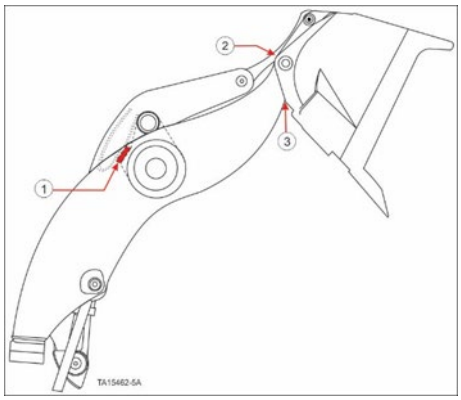
Reasons for Shimming

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.



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

Figure 41. Areas affected and corrected

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.

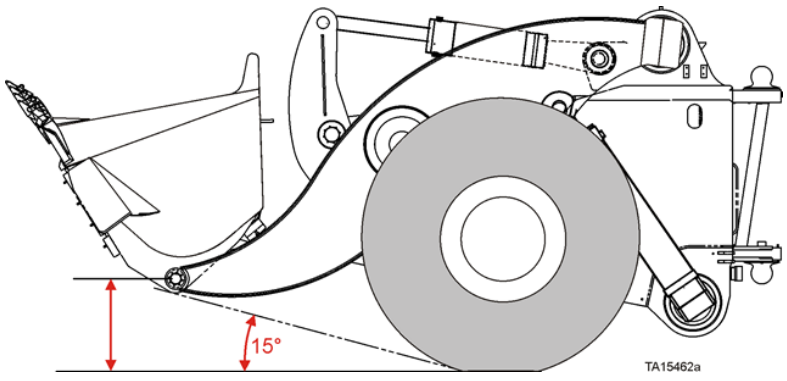


Figure 42. SAE bucket carry position

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.

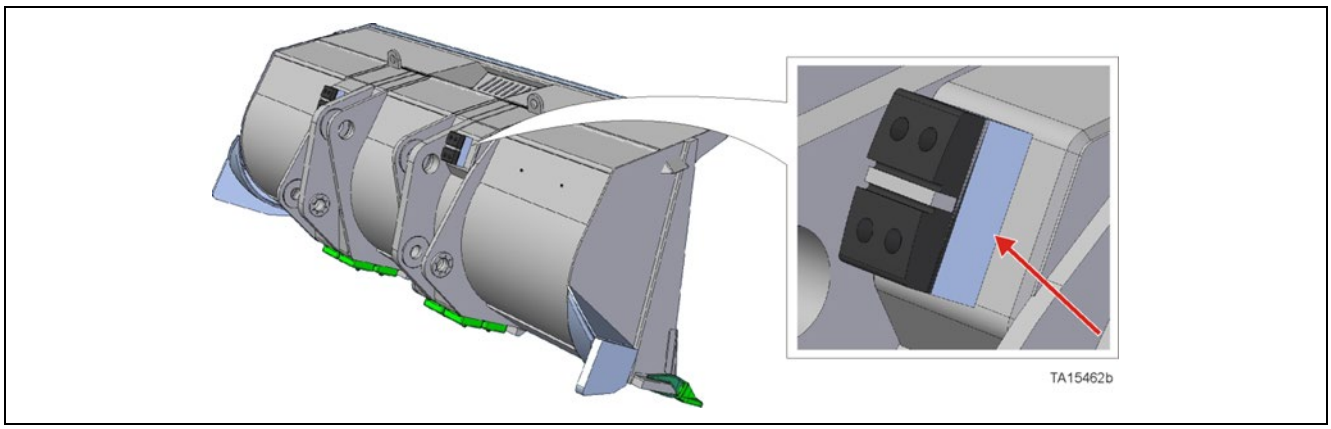


Figure 43. Roll back stop plate

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.

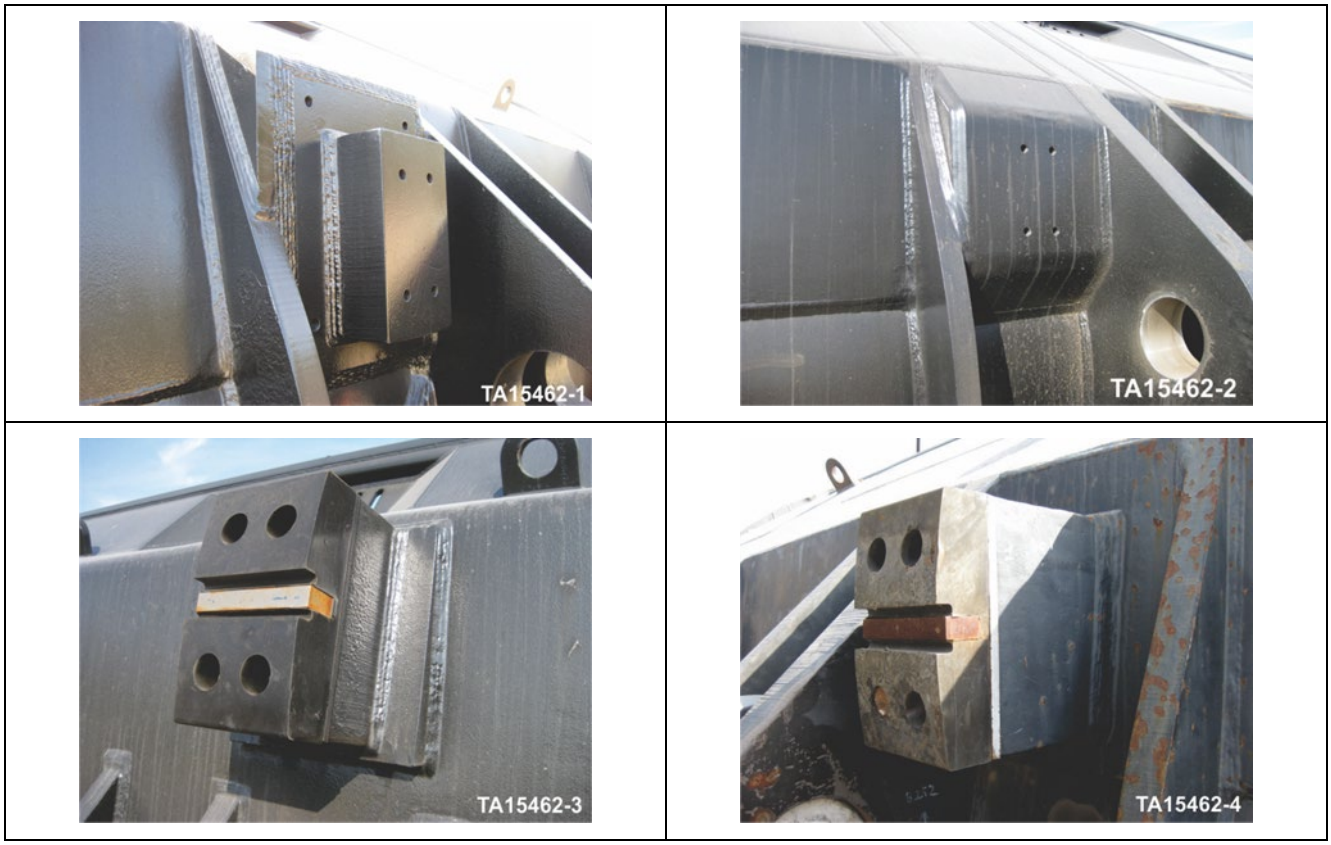


Figure 44. Different examples of roll back stop plates

Bucket Rollback Stop Block Shimming Procedure

Safety Preparations

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

⚠ WARNING

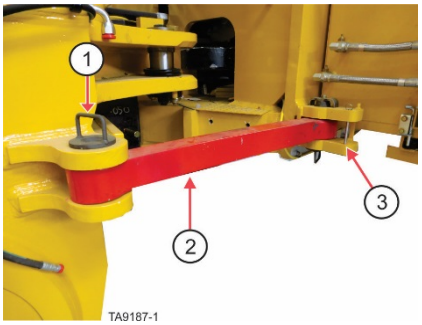
Crush hazards exist if the machine is started or moved while work processes are being performed on the machine. Place bucket flat and level on the ground. Place frame lock in the locked position and lock out the machine's starting capability before performing any work process. Follow all applicable lockout 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.

a. Stop the wheel loader on flat level ground.

b. 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 or unlocking 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

c. Place wheel chocks in front and behind each wheel.

d. Set bucket flat and level on the ground.

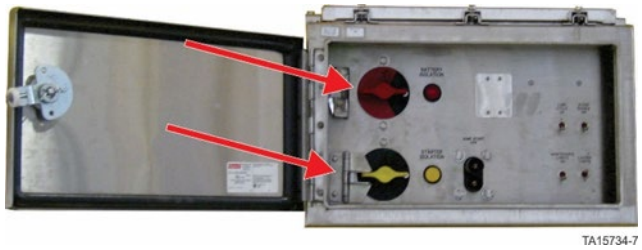
e. Set the parking brakes.

f. 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.

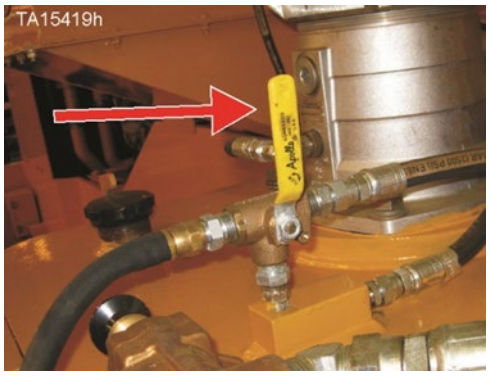
g. Turn the battery and engine isolation switches to the off position and install locks on the battery isolation switch.



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

h. Release the air from the hydraulic reservoir by using the hydraulic reservoir air valve (ball valve) on top of the reservoir. The supply line from main air system will be blocked and reservoir air will vent out the hose that runs down the outside of the hydraulic reservoir.

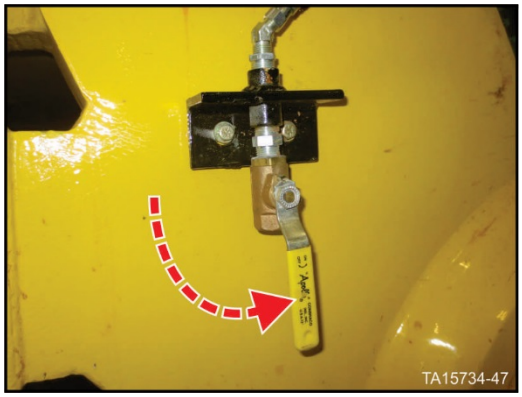
- Turn the handle to the up position as shown

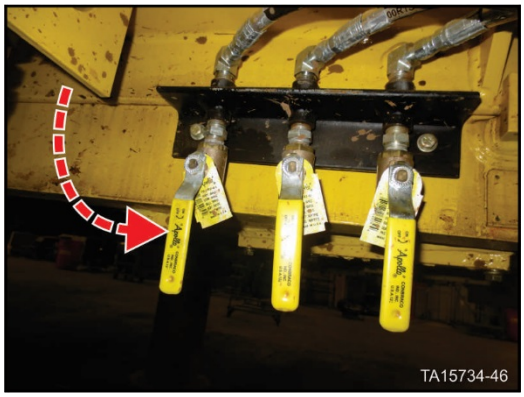


Hydraulic reservoir air valve handle UP

i. Release the air from the various air storage reservoirs by opening all of the air bleed valves.

Three valves on right side of rear frame under hydraulic reservoir
One valve on right side of front frame near hoist cylinder ball cap





Open air reservoir bleed valves

⚠ WARNING

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.

j. Remove the bucket rollback stop blocks and shims from both left and right sides of the bucket.

k. 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. 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.

l. 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.

m. Bypass limits

- **50 Series Generation 3 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.

n. 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 3 standard lift ONLY:** Rollback the bucket until the bucket cylinder extension reaches dimension called out in illustration "L1350 Generation 3 standard lift ONLY", at the end of this procedure.

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

p. 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].

q. 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.

r. Reset LINCS™ motion limits.

s. Return the machine to service following all local safety rules and procedures.

Hoist Cylinder Extension (Method 3)					
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°

Table 4. All LINCS Generation 3 Machines

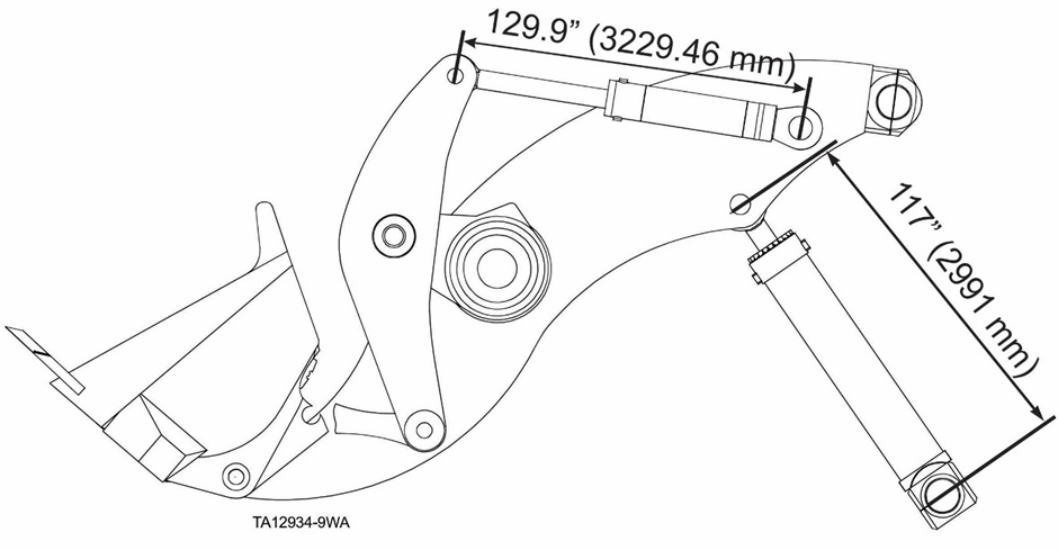
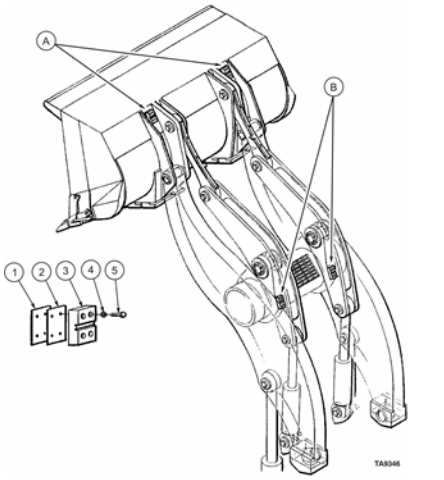


Figure 45. L1350 Generation 3 standard lift ONLY

Bucket Dump Stop Blocks

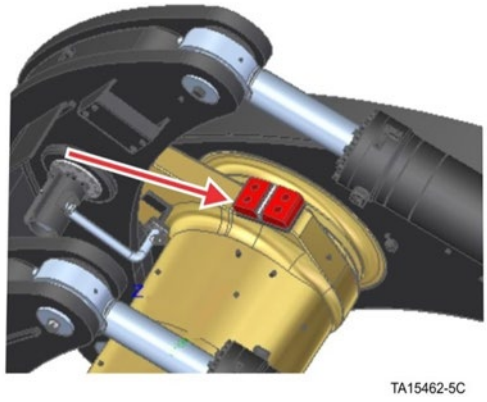
The graphics below show the shimming area for the bucket dump. Shimming here eliminates the contact with the bucket and the bottom of the lift arms. This has to be shimmed so that the level link and bucket cannot hit when the urethane stop pad is fully compressed.



1. Shim
2. Shim
3. Stop Block
4. Lockwasher
5. Capscrew

A. Bucket rollback stop block

B. Bucket dump stop block



Bucket Dump Stop Block
(Left side is the same)

Figure 46. Shimming area for bucket dump stop blocks

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.

Bucket Dump Stop Block Shimming Procedure

Safety Preparations

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

⚠ WARNING

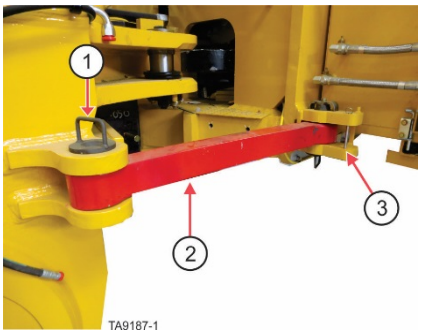
Crush hazards exist if the machine is started or moved while work processes are being performed on the machine. Place bucket flat and level on the ground. Place frame lock in the locked position and lock out the machine's starting capability before performing any work process. Follow all applicable lockout 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.

a. Stop the wheel loader on flat level ground.

b. 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 or unlocking 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

c. Place wheel chocks in front and behind each wheel.

d. Set bucket flat and level on the ground.

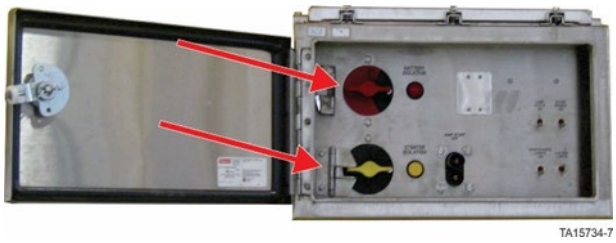
e. Set the parking brakes.

f. 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.

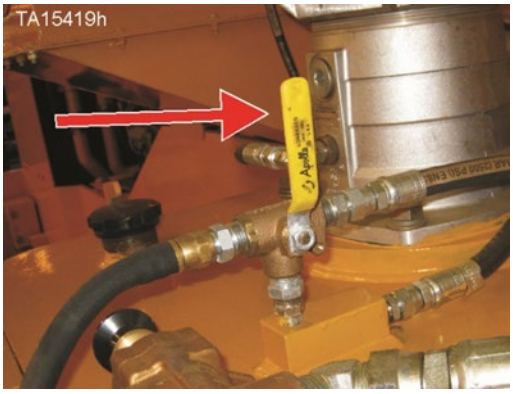
g. Turn the battery and engine isolation switches to the off position and install locks on the battery isolation switch.



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

h. Release the air from the hydraulic reservoir by using the hydraulic reservoir air valve (ball valve) on top of the reservoir. The supply line from main air system will be blocked and reservoir air will vent out the hose that runs down the outside of the hydraulic reservoir.

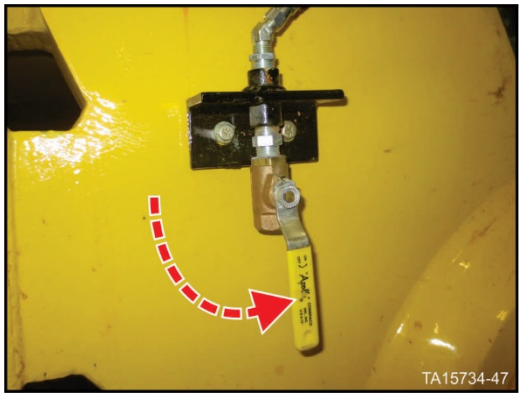
- Turn the handle to the up position as shown

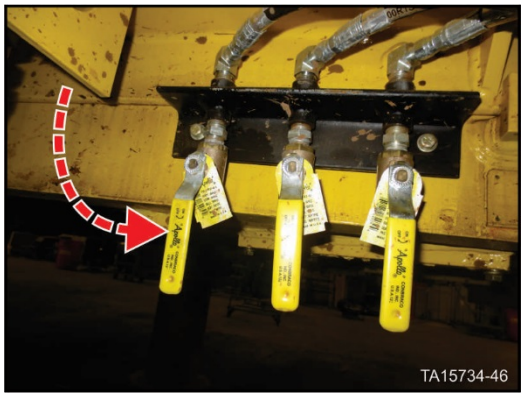


Hydraulic reservoir air valve handle UP

i. Release the air from the various air storage reservoirs by opening all of the air bleed valves.

Three valves on right side of rear frame under hydraulic reservoir
One valve on right side of front frame near hoist cylinder ball cap





Open air reservoir bleed valves

⚠ WARNING

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.

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

k. 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. 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.

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

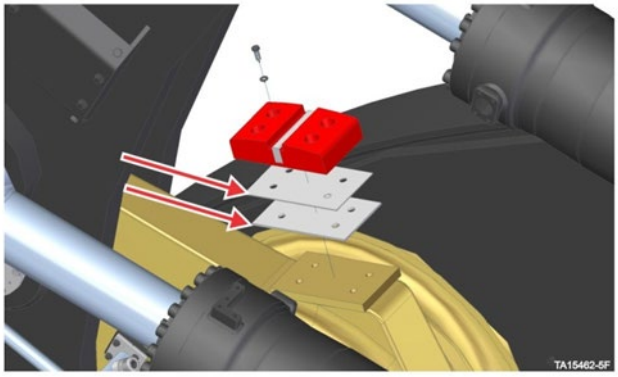
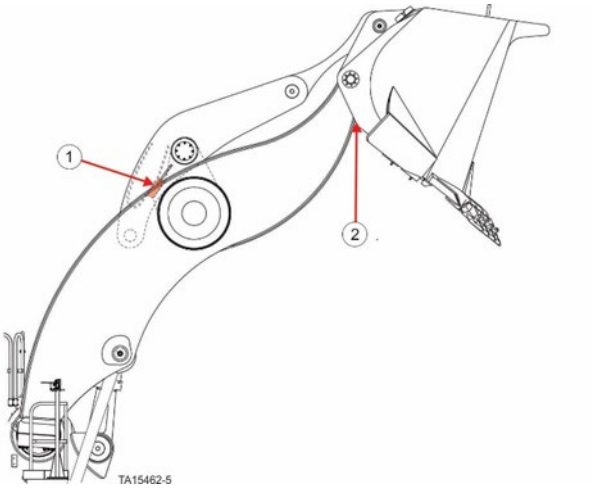


Figure 47. Stop block with standard shim pack

m. Raise the lift arms to full height, without limits bypassed.



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

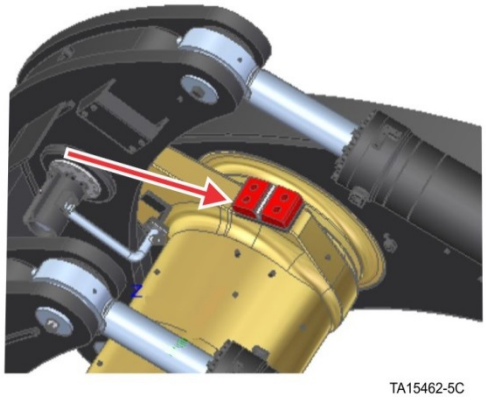


Figure 48. Stop block installed with shims

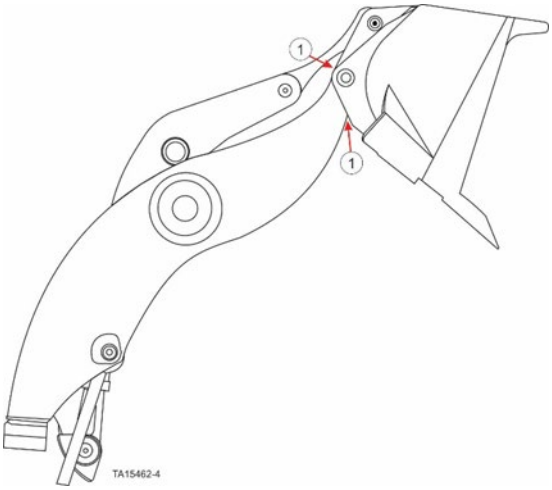
n. Slowly dump the bucket while observing the stop blocks on both sides until contact is made on either side. Do not force the bucket down after contact is made.

o. 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.

p. Lower the bucket to the ground and install the shims determined necessary in the previous step.

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

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



1) Check here for contact

Figure 49. Contact check points

s. 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.

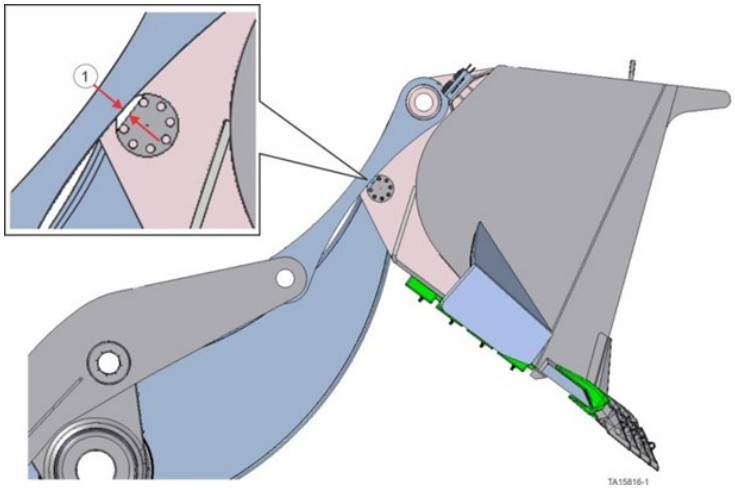
t. Return the machine to service. Follow all local safety rules and procedures.

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.

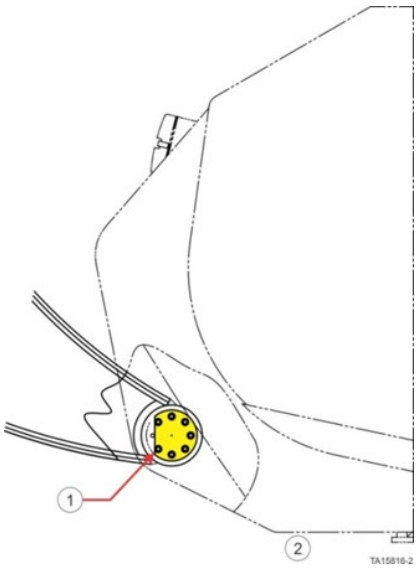


1) 1” Clearance

L-2350 High Lift Shown

Figure 50. Clearance area

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



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

Figure 51. Cutout orientation

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

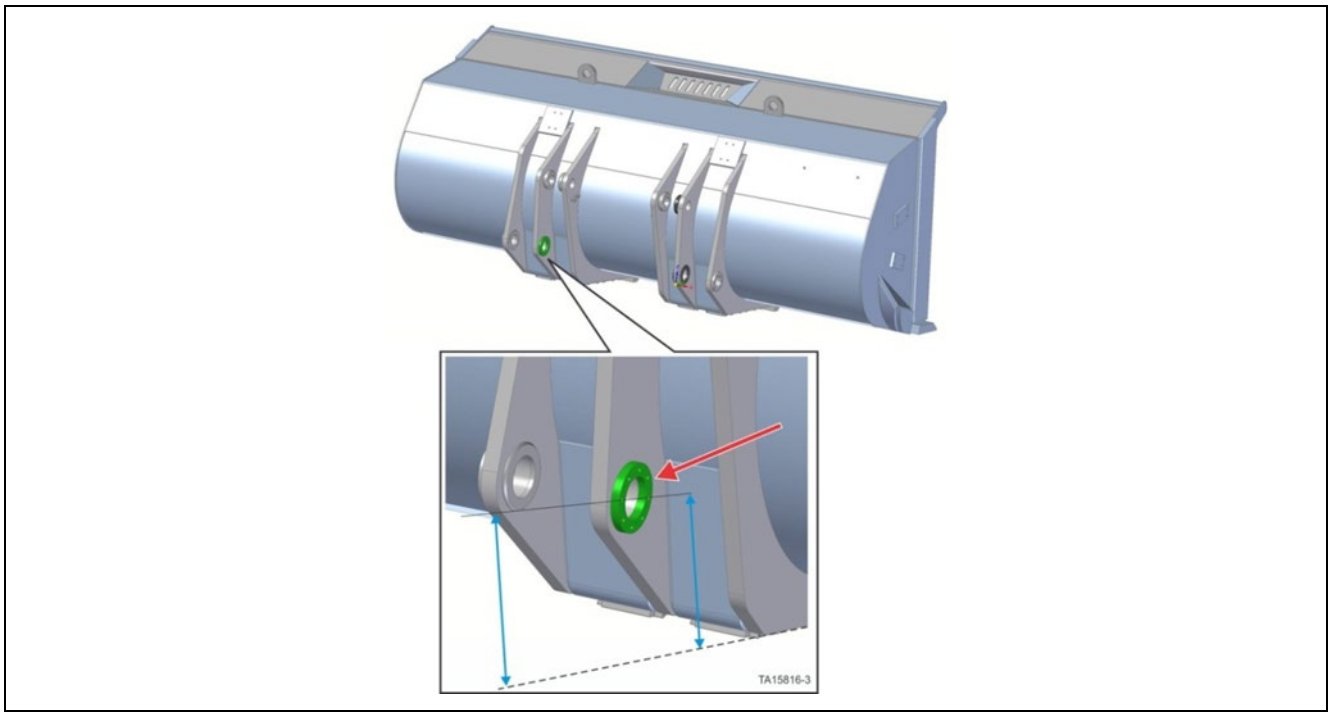
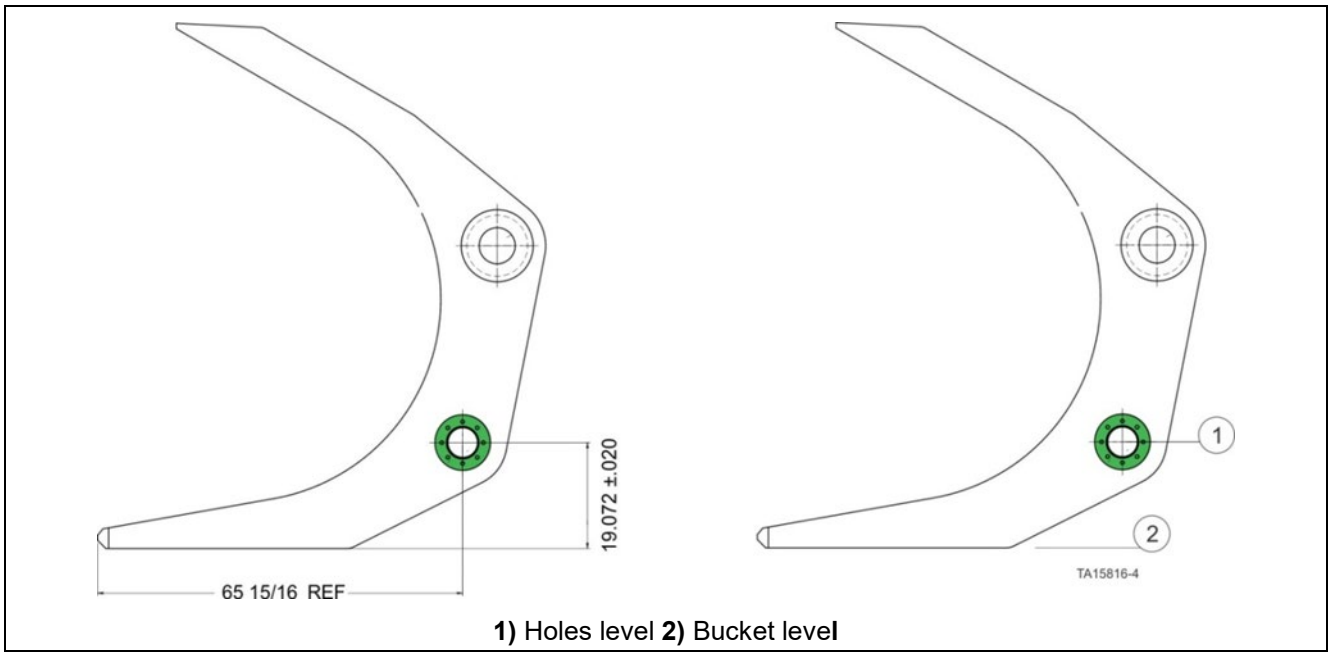


Figure 52. Correct orientation of the boss (circular ring)

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.



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

Figure 53. Correct installation of the boss ring

Installing and Removing the Rear Oscillating Axle

Safety Preparations

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

⚠ WARNING

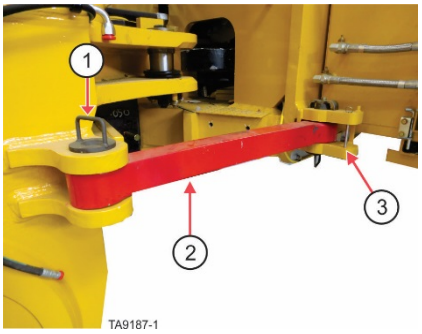
Crush hazards exist if the machine is started or moved while work processes are being performed on the machine. Place bucket flat and level on the ground. Place frame lock in the locked position and lock out the machine's starting capability before performing any work process. Follow all applicable lockout 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.

a. Stop the wheel loader on flat level ground.

b. 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 or unlocking 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

c. Place wheel chocks in front and behind each wheel.

d. Set bucket flat and level on the ground.

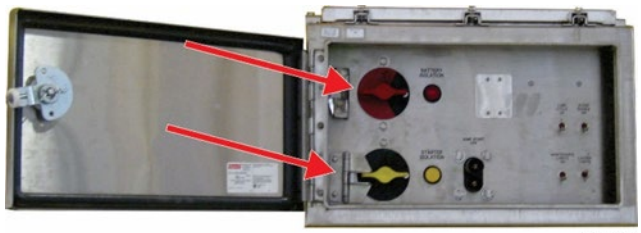
e. Set the parking brakes.

f. 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.

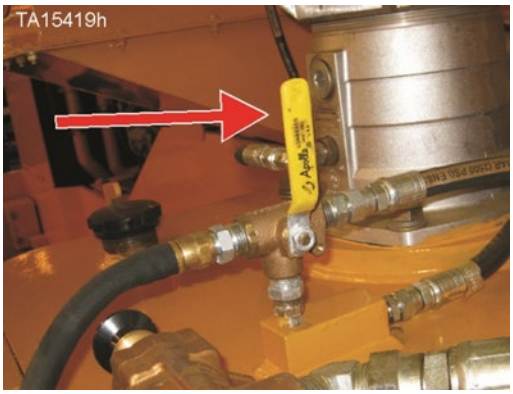
g. Turn the battery and engine isolation switches to the off position and install locks on the battery isolation switch.



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

h. Release the air from the hydraulic reservoir by using the hydraulic reservoir air valve (ball valve) on top of the reservoir. The supply line from main air system will be blocked and reservoir air will vent out the hose that runs down the outside of the hydraulic reservoir.

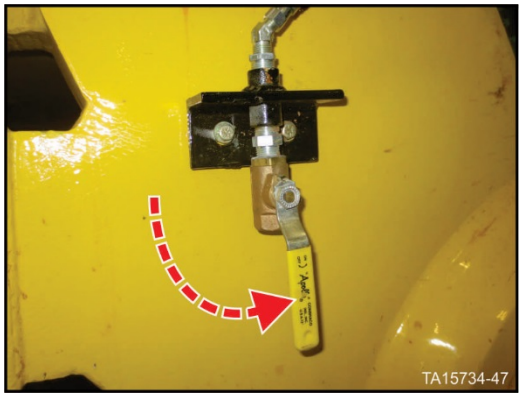
- Turn the handle to the up position as shown

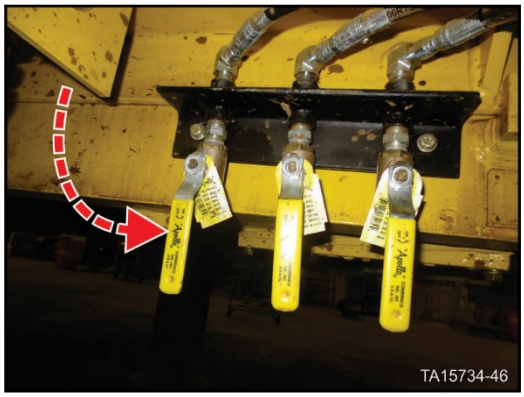


Hydraulic reservoir air valve handle UP

i. Release the air from the various air storage reservoirs by opening all of the air bleed valves.

Three valves on right side of rear frame under hydraulic reservoir
One valve on right side of front frame near hoist cylinder ball cap





Open air reservoir bleed valves

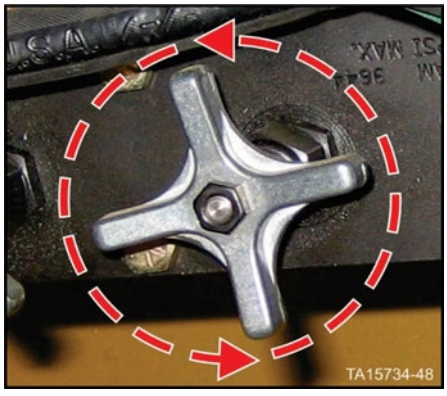
⚠ WARNING

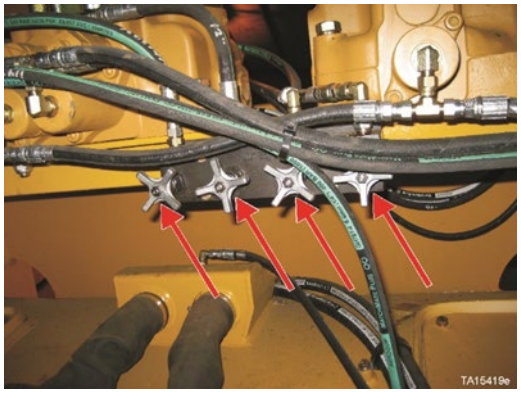
Crush hazards exist if all personnel are not cleared from the bucket and lift arm area before using the hydraulic hoist and bucket hydraulic pressure bleed down valves to relieve pressure from the hoist and bucket circuit. Clear all personnel from the area around the bucket and lift arms before operating 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.

j. 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.

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

- Open the valve completely and leave it open during this procedure.





Pressure bleed down valves

l. Following all local environmental rules and regulations, drain the hydraulic reservoir and any residual fluid in the hydraulic lines.

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.

a. Move frame lock to locked position.

b. Jack up the machine and remove the rear wheels. Refer to "Tire and Rim", located in Section 03, for wheel and tire removal instructions.

c. Disconnect and tape (-) negative battery cables.

d. Disconnect and tag all electrical leads to the oscillating axle and remove the leads from the axle assembly.

e. 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.

f. Place heavy timbers beneath the axle structure onto which the axle may be lowered.

g. Remove the traction motors and drivers. Refer to "Planetary Drive", located in Section 03, for removal instructions.

h. Lower the machine onto jack stands previously prepared under the axle.

i. Remove the ball cap capscrews from each ball-socket assembly. Remove the ball cap and ball cap spacers from each ball base.

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

k. Install heavy jack stands under the mainframe and lower the main frame onto it.

l. Remove the axle from under the mainframe and place in a safe work area.

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

n. 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

a. 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.

b. Reverse removal procedure above and complete the installation of the oscillating axle.

Installing and Removing the Operator Cab

Safety Preparations

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

⚠ WARNING

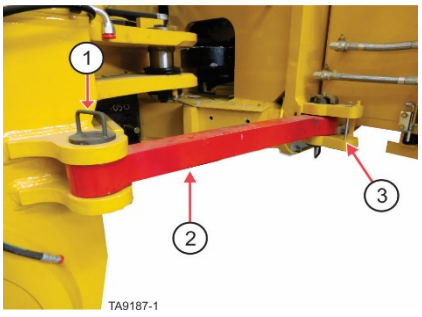
Crush hazards exist if the machine is started or moved while work processes are being performed on the machine. Place bucket flat and level on the ground. Place frame lock in the locked position and lock out the machine's starting capability before performing any work process. Follow all applicable lockout 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.

a. Stop the wheel loader on flat level ground.

b. 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 or unlocking 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

c. Place wheel chocks in front and behind each wheel.

d. Set bucket flat and level on the ground.

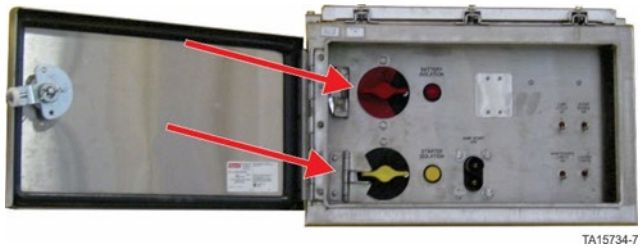
e. Set the parking brakes.

f. 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.

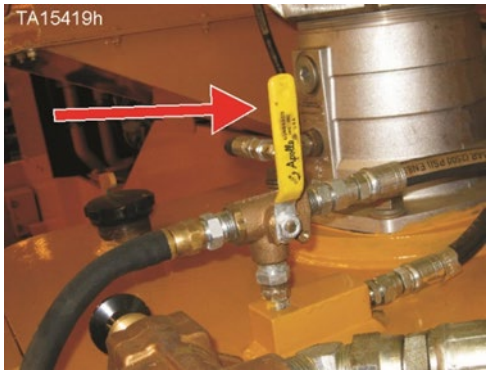
g. Turn the battery and engine isolation switches to the off position and install locks on the battery isolation switch.



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

h. Release the air from the hydraulic reservoir by using the hydraulic reservoir air valve (ball valve) on top of the reservoir. The supply line from main air system will be blocked and reservoir air will vent out the hose that runs down the outside of the hydraulic reservoir.

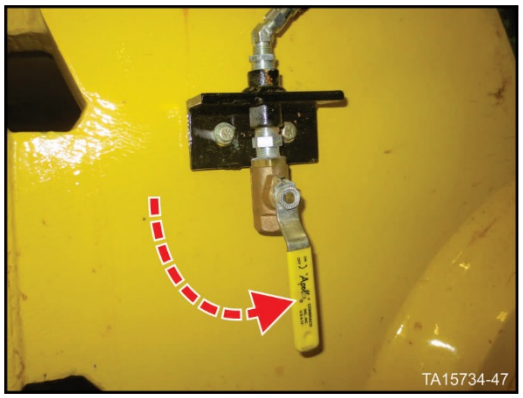
- Turn the handle to the up position as shown

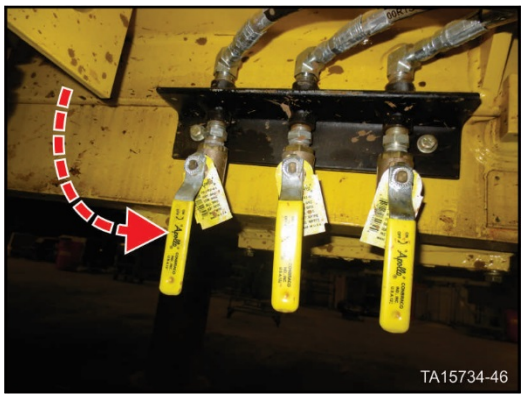


Hydraulic reservoir air valve handle UP

i. Release the air from the various air storage reservoirs by opening all of the air bleed valves.

Three valves on right side of rear frame under hydraulic reservoir
One valve on right side of front frame near hoist cylinder ball cap





Open air reservoir bleed valves

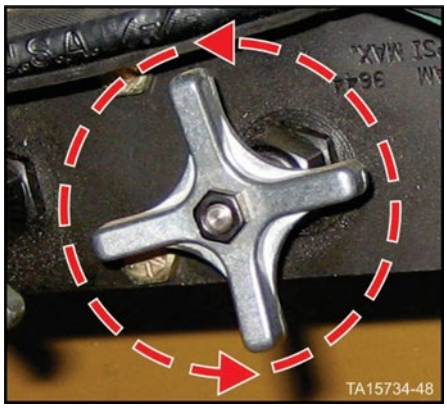
⚠ WARNING

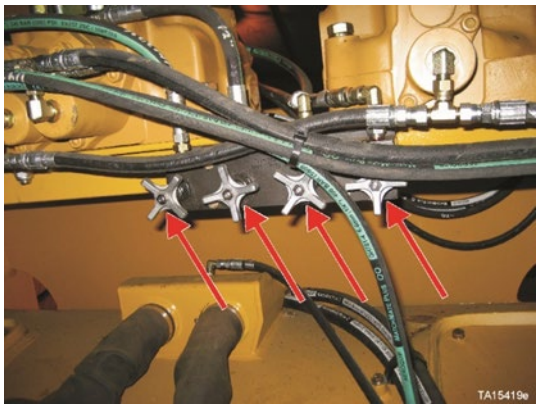
Crush hazards exist if all personnel are not cleared from the bucket and lift arm area before using the hydraulic hoist and bucket hydraulic pressure bleed down valves to relieve pressure from the hoist and bucket circuit. Clear all personnel from the area around the bucket and lift arms before operating 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.

j. 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.

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

- Open the valve completely and leave it open during this procedure.





Pressure bleed down valves

l. Following all local environmental rules and regulations, drain the hydraulic reservoir and any residual fluid in the hydraulic lines.

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.

a. Remove light/mirror bar assembly.

b. Remove the Roll Over Protective Structure (ROPS) and Falling Object Protective Structure (FOPS).

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

d. Remove the capscrews securing cab to base.

e. Attach a suitable hoisting device and hoist the cab structure from the cockpit.

Installing the Cab

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

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

c. Recharge air conditioner with appropriate Freon, if necessary.

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

e. 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.

Installing and Removing Counterweights and Fuel Reservoir

The L-1850 and L-2350 loaders have removable fuel reservoirs that are bolted underneath the rear frame in the area under the engine.

Some loaders may have been fitted with optional counterweights. The optional counterweights are mounted in various locations such as underneath the radiator or underneath the rear steps or on the rear bumper.

⚠ WARNING

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.

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**
- **Check the torque to assure that the bolts are tight**

Counterweight bolts that are found to be loose or damaged during the PM inspection 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.**

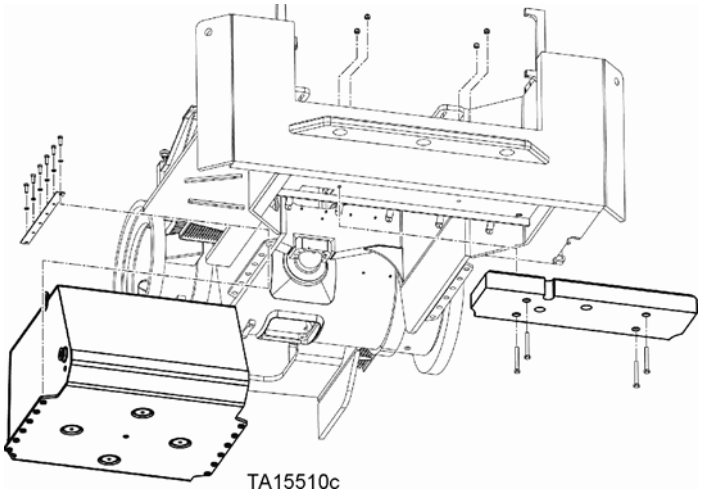
When installing counterweight bolts, there should be sufficient exposed threads for the lock nut to work properly.

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

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 take point loads.

Typical counterweight and fuel reservoir locations



Typical fuel reservoir location – L-1850, L-2350	Typical counterweight location – L-1350, L-1850

Figure 54. Typical fuel reservoir and counterweight locations

NOTICE

The following table lists the counterweight location for each type of machine and the approximate weight for each of the various optional counterweights.

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 5. Counterweight locations and approximate weights

⚠ WARNING

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.

Removable 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

Table 6. Fuel reservoir locations and approximate weights

NOTICE

The comments in the following procedures regarding removal of the fuel reservoir only apply to the L-1850 and L-2350 loaders. The fuel reservoir on the L-950, L-1150 and L-1350 loaders are an integral welded part the rear frame and are not removable.

⚠ WARNING

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.

Safety Preparations

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

⚠ WARNING

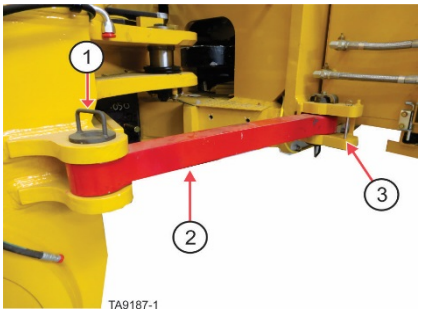
Crush hazards exist if the machine is started or moved while work processes are being performed on the machine. Place bucket flat and level on the ground. Place frame lock in the locked position and lock out the machine's starting capability before performing any work process. Follow all applicable lockout 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.

a. Stop the wheel loader on flat level ground.

b. 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 or unlocking 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

c. Place wheel chocks in front and behind each wheel.

d. Set bucket flat and level on the ground.

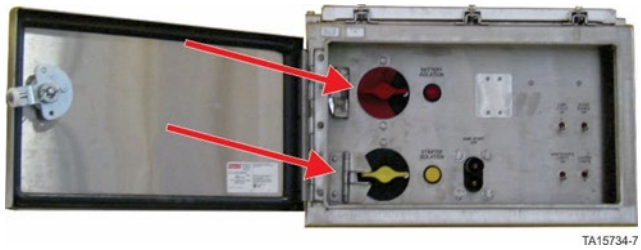
e. Set the parking brakes.

f. 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.

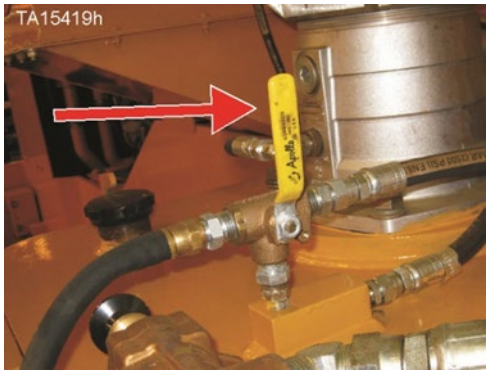
g. Turn the battery and engine isolation switches to the off position and install locks on the battery isolation switch.



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

h. Release the air from the hydraulic reservoir by using the hydraulic reservoir air valve (ball valve) on top of the reservoir. The supply line from main air system will be blocked and reservoir air will vent out the hose that runs down the outside of the hydraulic reservoir.

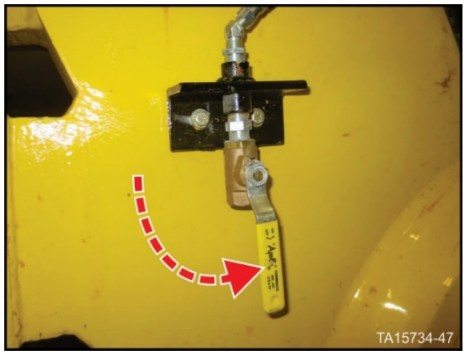
- Turn the handle to the up position as shown



Hydraulic reservoir air valve handle UP

i. Release the air from the various air storage reservoirs by opening all of the air bleed valves.

Three valves on right side of rear frame under hydraulic reservoir
One valve on right side of front frame near hoist cylinder ball cap



Open air reservoir bleed valves

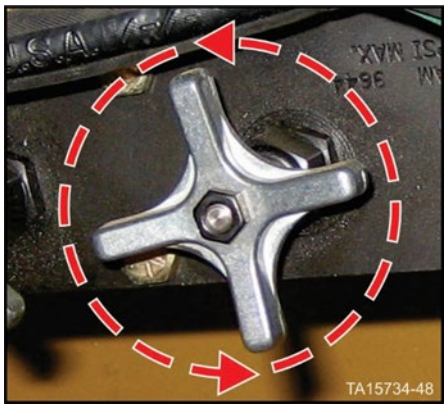
⚠ WARNING

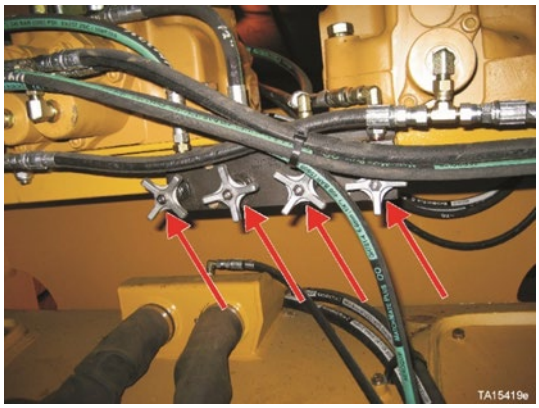
Crush hazards exist if all personnel are not cleared from the bucket and lift arm area before using the hydraulic hoist and bucket hydraulic pressure bleed down valves to relieve pressure from the hoist and bucket circuit. Clear all personnel from the area around the bucket and lift arms before operating 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.

j. 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.

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

- Open the valve completely and leave it open during this procedure.





Pressure bleed down valves

l. Following all local environmental rules and regulations, drain the hydraulic reservoir and any residual fluid in the hydraulic lines.

m. Following all local environmental rules and regulations, drain the fuel reservoir and any residual fuel in the fuel lines and filters.

Removing

If the 1350/1850/2350 counterweights or 1850/2350 fuel reservoir are to be removed, the following steps must be adhered to along with any mine site specific requirements.

Fuel Reservoir specific steps

a. Clean the fuel reservoir top and bottom to remove any dirt, mud or other buildup

b. Remove the grease line going to the axle socket behind axle.

c. Measurements

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

d. If the fuel reservoir is to be removed, remove all fuel.

e. 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.

f. 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.

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

h. Remove the tire on the side the reservoir will be lowered from.

Fuel Reservoir and Counterweight steps

a. 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.

b. Remove the bolts or pins.

c. 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.

d. 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

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

Fuel Reservoir specific steps

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

b. Place the rear frame on stands or blocks

c. Block the rear axle so it cannot oscillate.

Fuel Reservoir and Counterweight steps

a. Place the fuel reservoir or counterweight underneath the machine

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

c. 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.

d. Install the bolts or pins.

e. 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.

f. Torque bolts to the values indicated on the torque chart in the manuals or in SIL294 (latest revision for the torque chart is in LeTrak KB article #256).

g. Reconnect all wiring or hoses.

Additional Fuel Reservoir specific steps

a. Install the tire

b. Remove the blocks that prevented the rear axle from oscillating.

c. Add fuel to the fuel reservoir if it was removed.

d. Reinstall the grease line going to the axle socket behind axle.

e. Verify that the socket is taking grease.

Fuel Reservoir and Counterweight steps

a. Remove the lockout/tagout locks.

b. Remove the chocks.

c. Close air valves on hydraulic reservoir.

Additional Fuel Reservoir specific steps

a. Install the tire

b. Remove the blocks that prevented the rear axle from oscillating.

c. Add fuel to the fuel reservoir if it was removed.

d. Reinstall the grease line going to the axle socket behind axle.

e. Verify that the socket is taking grease.

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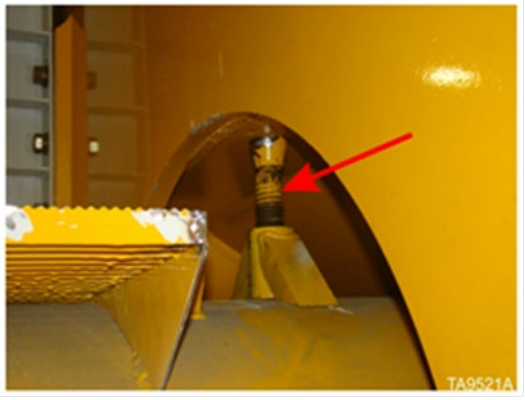
Lifting (Jacking) the Machine

The following precautions and instructions should be followed for safe jacking of the loader:

- Be sure the loader is on an adequate surface to support its weight when jacked up.
- Be sure the machine is on flat, level ground.
- NEVER jack up the machine by using the bucket and lift arms.
- The bucket should be lowered to three to four feet off the ground and placed in full rollback position.
- Be sure to provide adequate jacks or hoists when lifting the machine or any of its components. Refer to table below “Loader axle weights – in operating mode (not loaded)” for the proper jacking points and weights. If placing jack stands under the front axle, the machine is jacked from the side as shown in illustration below “Jacking points for placing jack stands under front axle (typical all models”.
- After hoisting the loader, it is recommended jack stands be used for support. Refer to illustrations “Front axle jack stands”, “Rear frame jack stands - front end” and “Rear bumper jack stands - rear end” for recommended construction methods and “Recommended jack stand placement locations” Referenced illustrations located below.

NOTICE

“Loader axle weights – in operating mode (not loaded)” and “Jacking points for placing jack stands under front axle (typical all models” show front jacking points when using and not using jack stands. When jacking under the front axle or placing jack stands under the front axle, it is essential to get as close as possible to the structural support member. Placing the jack or jack stand in any other area could cause damage to the axle.

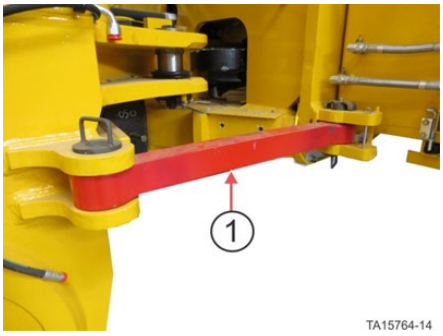
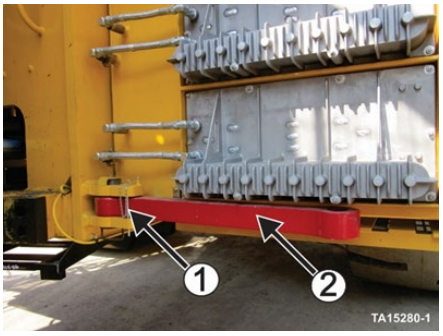


1) Special tool placed between rear axle and frame to prevent swiveling - both sides.

Figure 55. Blocking axle to prevent swiveling

⚠ 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.

	
Frame locked **(Left side of machine at pivot area)** **1)** Safety Link	**Frame unlocked** **(Left side of machine at pivot area)** **1)** Retaining Pin For Unlocked Position **2)** Safety Link

Typical frame locked/unlocked (L-1350/L-1850/L-2350)

Safety Preparations

a. 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.

b. Stop the wheel loader on flat, level ground.

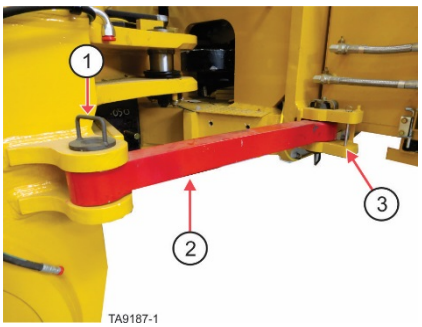
⚠ WARNING

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 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.

c. 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 or unlocking 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

d. Place wheel chocks in front and behind each wheel.

e. Set bucket flat and level on the ground.

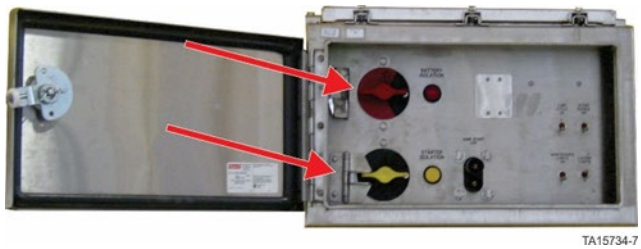
f. Set the parking brakes.

g. 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.

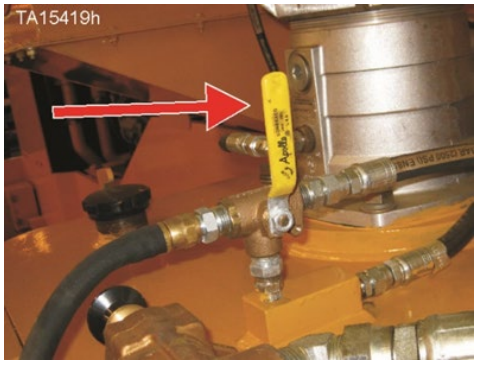
h. Turn the battery and engine isolation switches to the off position and install locks on the battery isolation switch.



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

i. Release the air from the hydraulic reservoir by using the hydraulic reservoir air valve (ball valve) on top of the reservoir. The supply line from main air system will be blocked and reservoir air will vent out the hose that runs down the outside of the hydraulic reservoir.

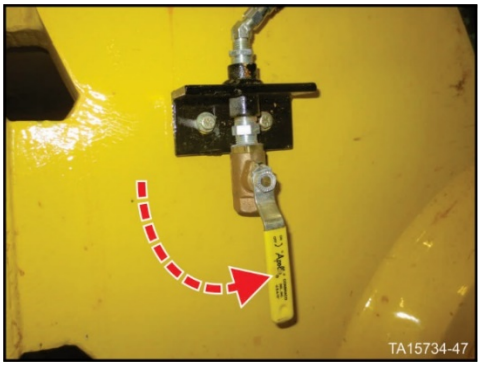
- Turn the handle to the up position as shown



Hydraulic reservoir air valve handle UP

j. Release the air from the various air storage reservoirs by opening all of the air bleed valves.

Three valves on right side of rear frame under hydraulic reservoir
One valve on right side of front frame near hoist cylinder ball cap



Open air reservoir bleed valves

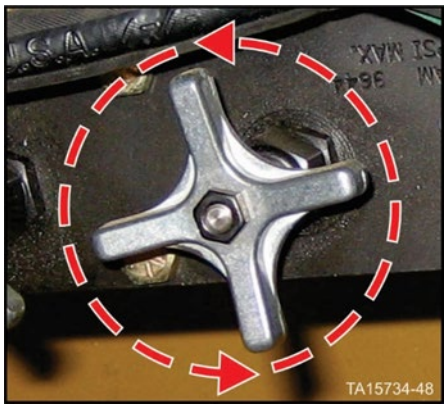
⚠ WARNING

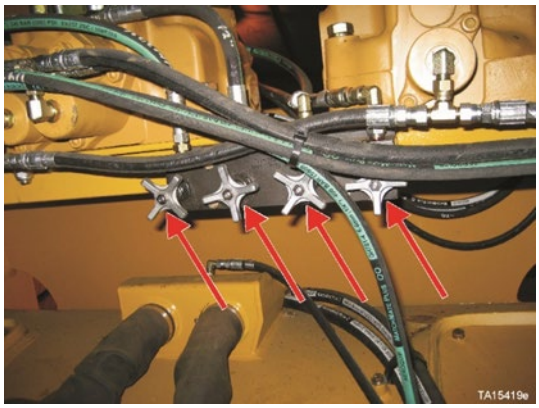
Crush hazards exist if all personnel are not cleared from the bucket and lift arm area before using the hydraulic hoist and bucket hydraulic pressure bleed down valves to relieve pressure from the hoist and bucket circuit. Clear all personnel from the area around the bucket and lift arms before operating 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.

k. 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.

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

- Open the valve completely and leave it open during this procedure.





Pressure bleed down valves

m. Following all local environmental rules and regulations, drain the hydraulic reservoir and any residual fluid in the hydraulic lines.

CAUTION

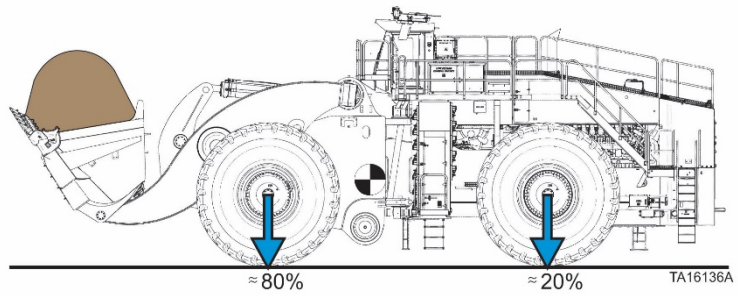
Following completion of service or repair, BE SURE to place the frame lock in the unlocked position or machine damage will result (refer to illustrations above).

⚠ WARNING

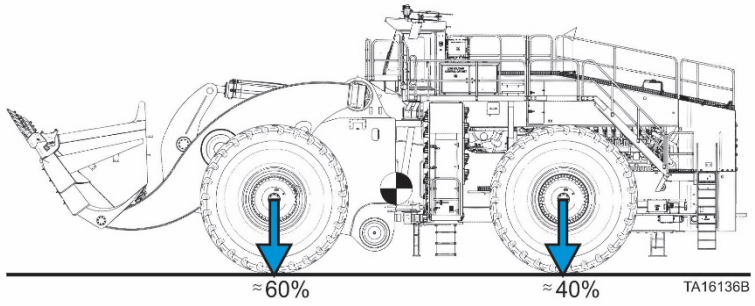
Crush hazard exists when jacking the machine. The following table shows the approximate weights for new stock machines with the bucket rolled back in the carry position. Always consider the following factors/variables. The table does not account for: 1) other positions of the lift arm and bucket, 2) 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.

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 56. Loader operating weights (approximate)



Loaded, with bucket in carry position



Not loaded, with bucket in carry position

The approximate weight distribution of a wheel loader is:

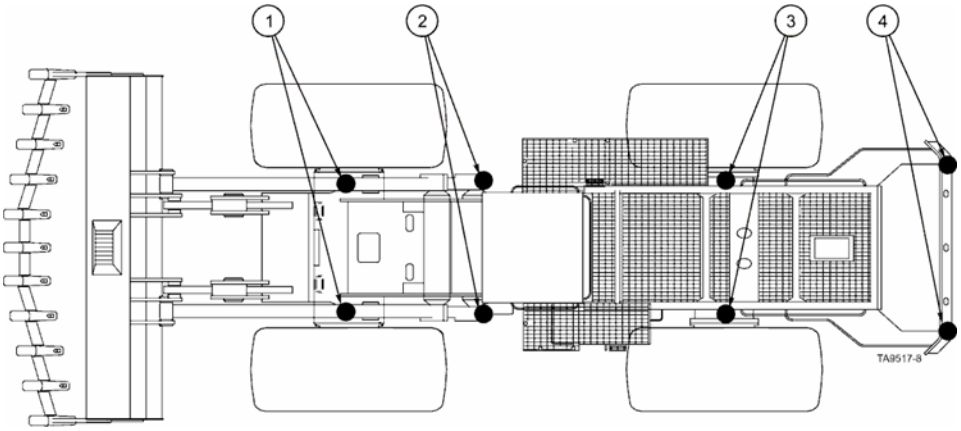
Condition	Front axle	Rear axle
Empty	**60%	** 40%
Loaded (with rated load)	** 80%	** 20%

**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 57. Approximate weight distribution of a wheel loader

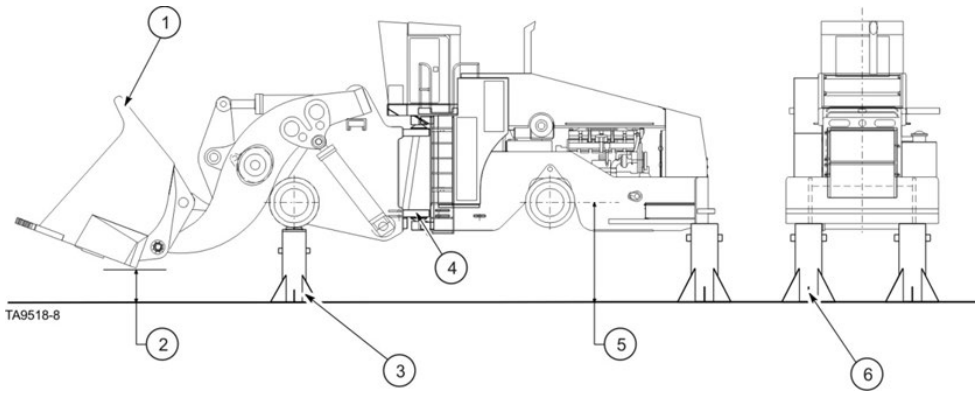


1) Jacking point if not using jack stands **2)** Jacking point if placing jack stands under front axle
3) Jacking point **4)** Alternate jacking point

NOTICE

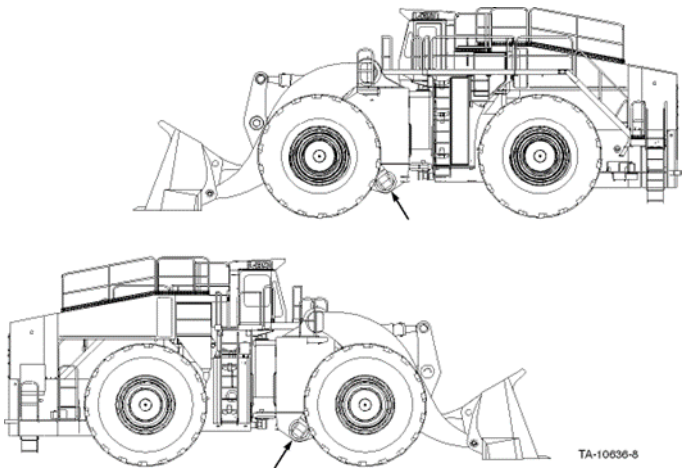
Weights at points of lifting on axle • Bucket empty and in "carry" position • Frame in locked position • All wheels chocked.

Figure 58. Loader jacking points – in operating mode (not loaded)



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.

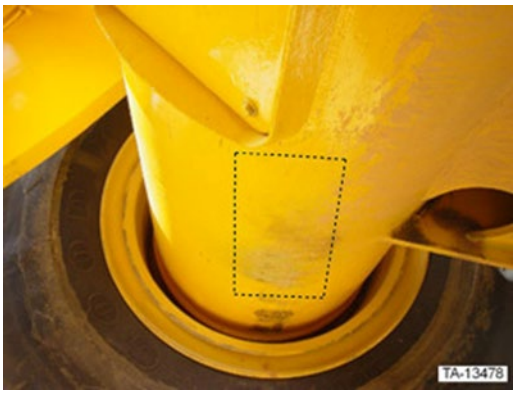
Figure 59. Recommended jack stand placement locations (typical all models)



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 60. Jacking points for placing jack stands under front axle (typical all models)



Typical Location All Model

Figure 61. Front axle jacking and jack stand placement location (typical)

Jack Stand Design

⚠ WARNING

Crush hazard exists when using stands while performing any type of work on or around the machine. Do not use stands that are not engineered for the specific purpose, weight, or design to support specific component(s). Stands shall be made of appropriate size and design to support the weight and shape being held. Failure to use appropriate stands when performing any type of work on, or around the machine can cause crush hazards resulting in serious injury or death.

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 the latest version of Field Welding Procedures in LeTrak. KB#436.

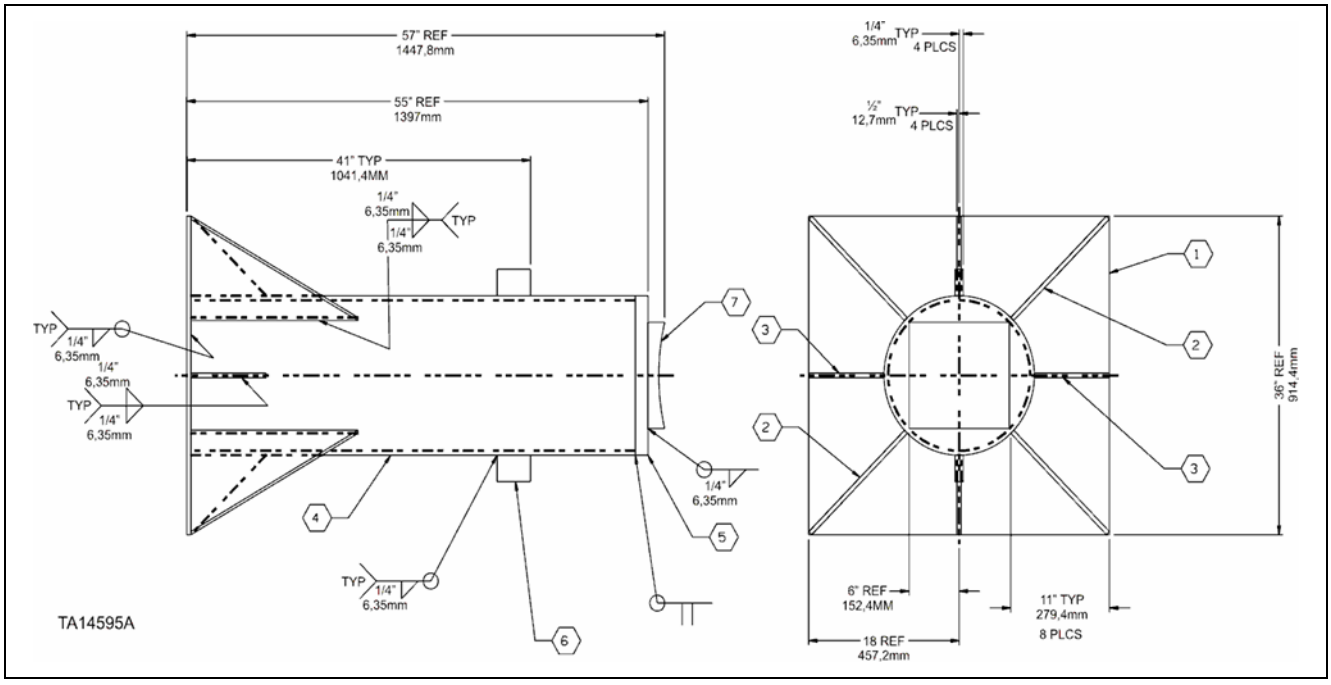


Figure 62. Front axle jack stands

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.

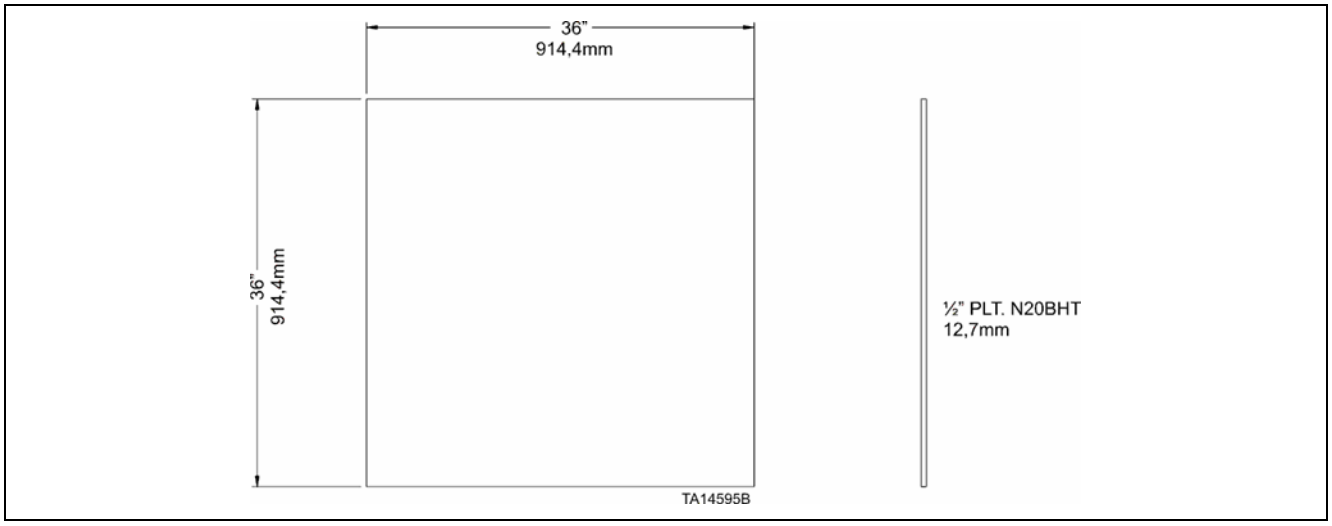


Figure 63. Front axel base plate

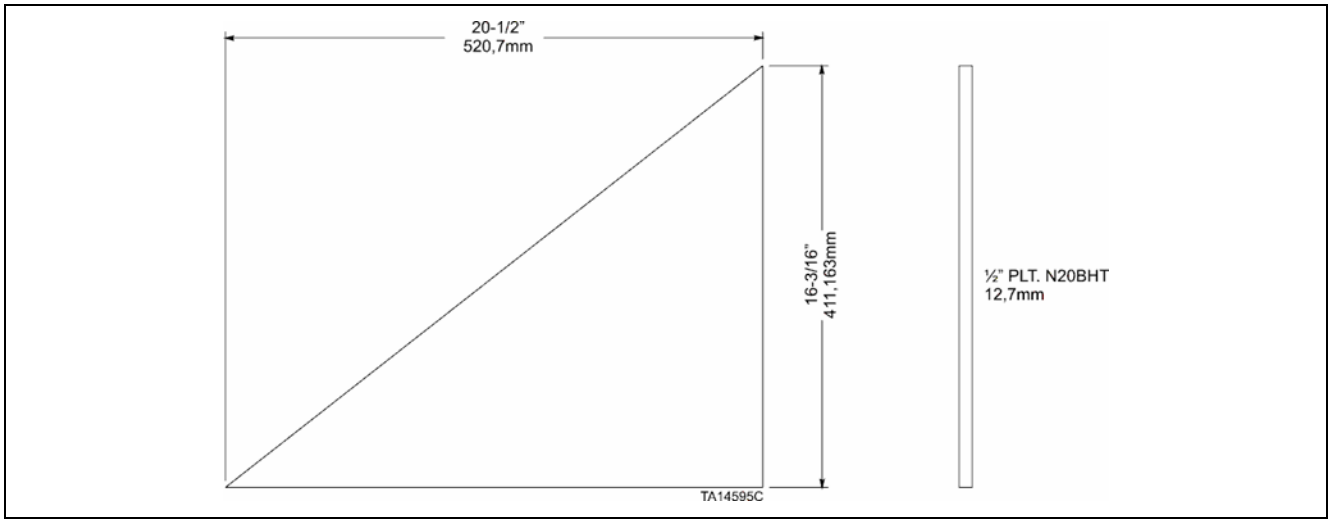


Figure 64. Front axel support plate (large)

NOTICE

Material N20BHT no longer used - use A514.

CAUTION

A514 requires special welding processes such as preheat and post heat. Refer to the latest version of Field Welding Procedures in LeTrak. KB#436.

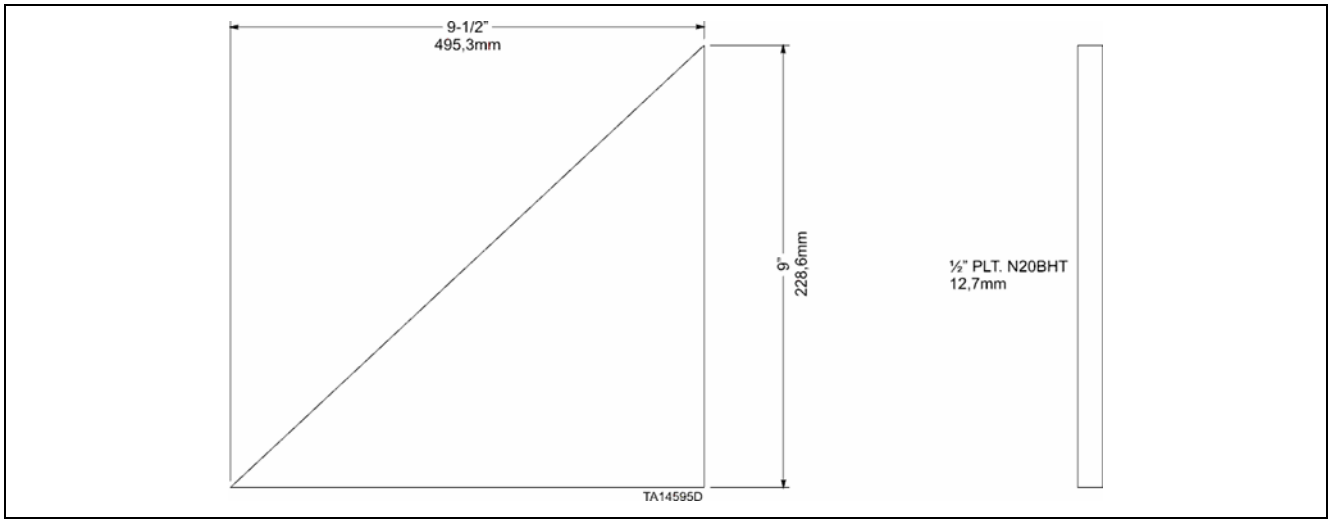


Figure 65. Front axle support plate (small)

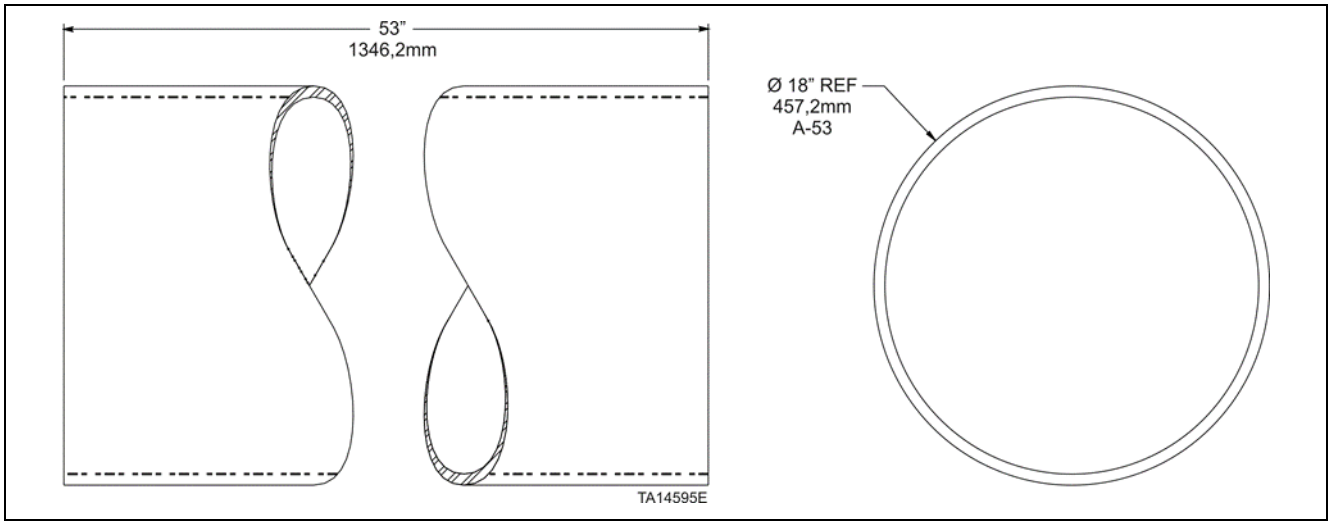


Figure 66. Front axel front tube

NOTICE

Material N20BHT no longer used - use A514.

CAUTION

A514 requires special welding processes such as preheat and post heat. Refer to the latest version of Field Welding Procedures in LeTrak. KB#436.

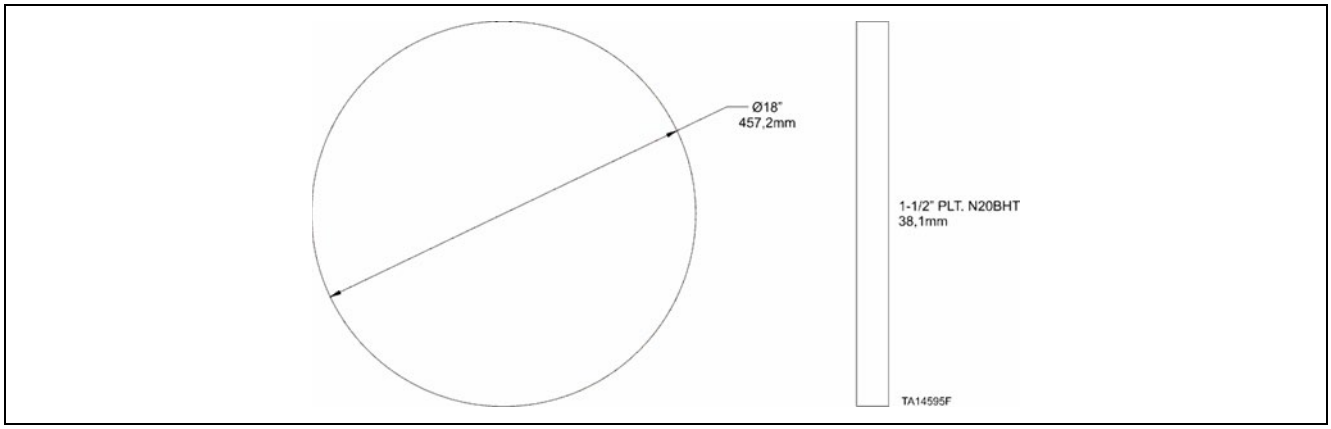


Figure 67. Front axel cap plate

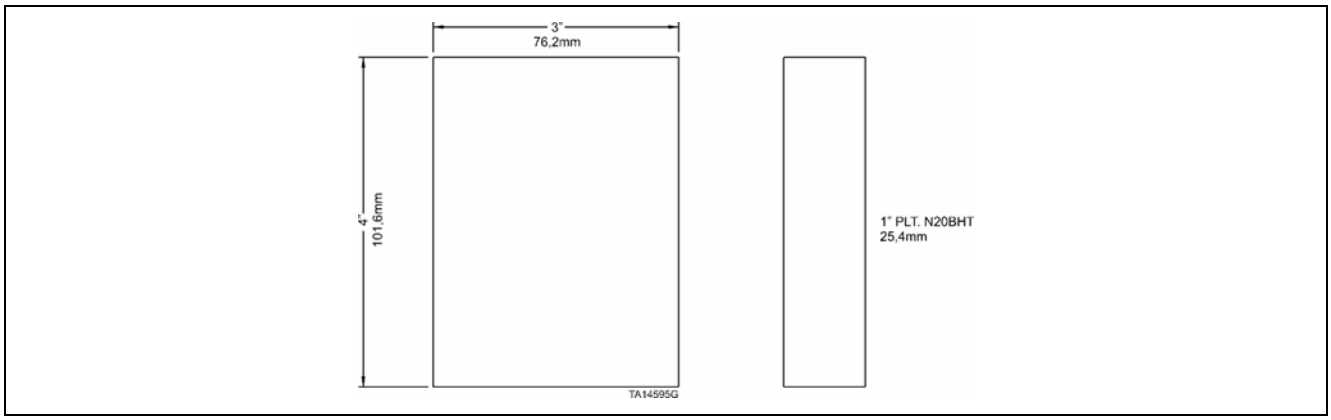


Figure 68. Front axle plate (lifting plate)

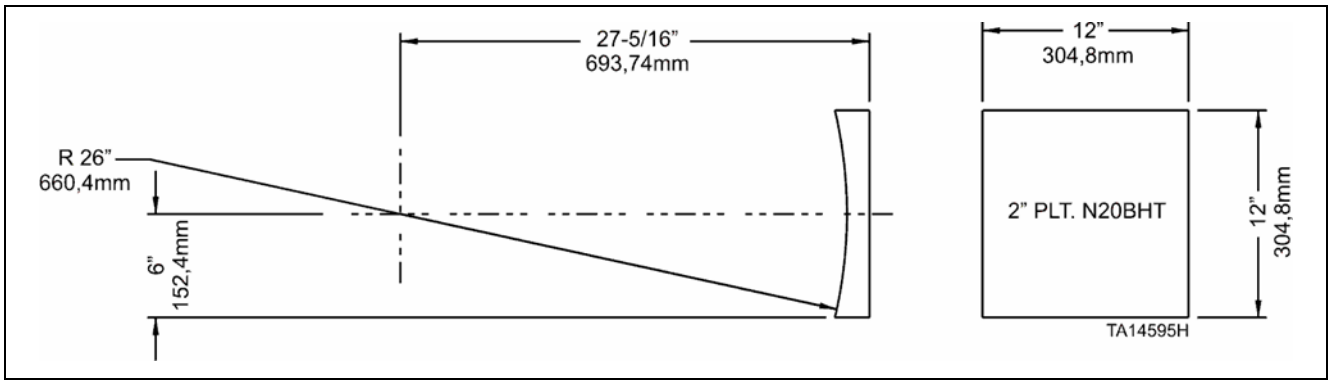


Figure 69. Front axle pad plate

NOTICE

Material N20BHT no longer used - use A514.

CAUTION

A514 requires special welding processes such as preheat and post heat. Refer to the latest version of Field Welding Procedures in LeTrak. KB#436.

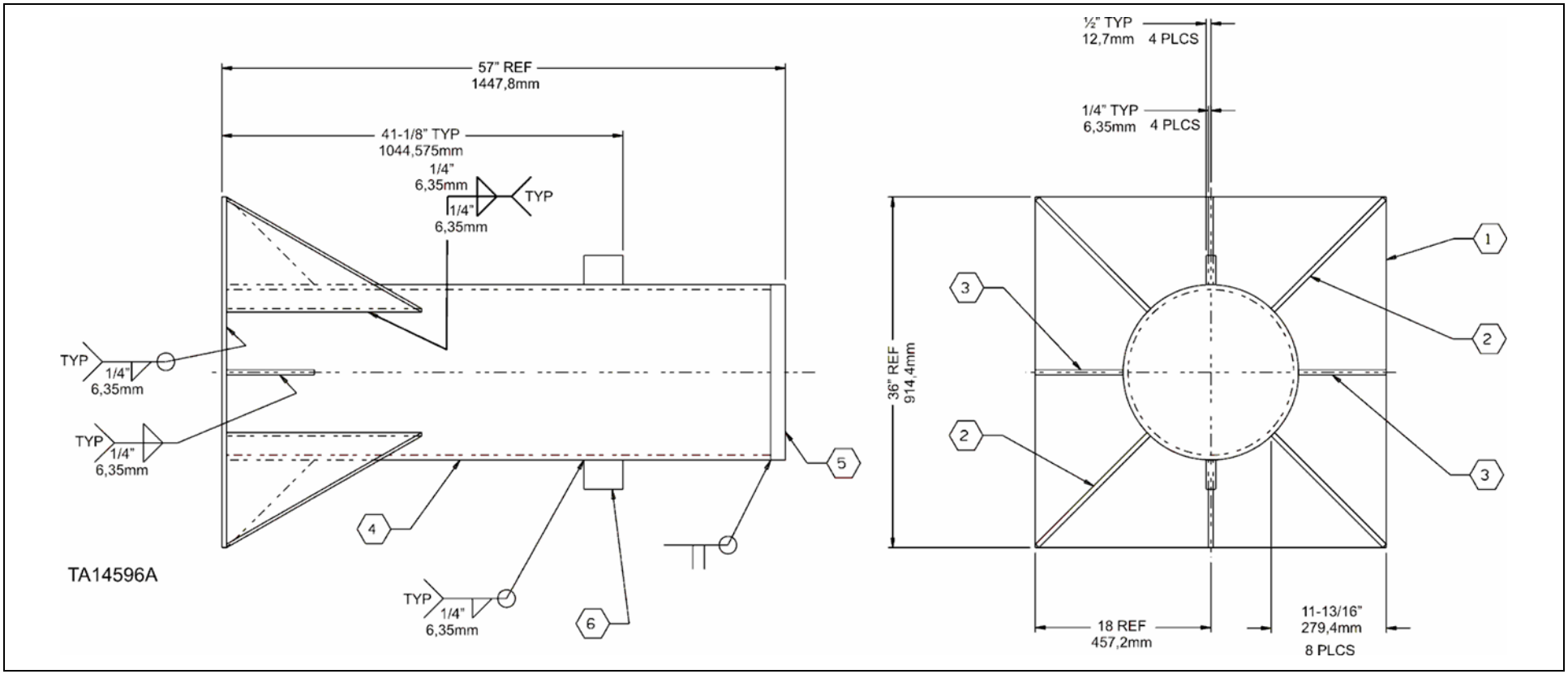


Figure 70. Rear frame jack stands - front end

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.

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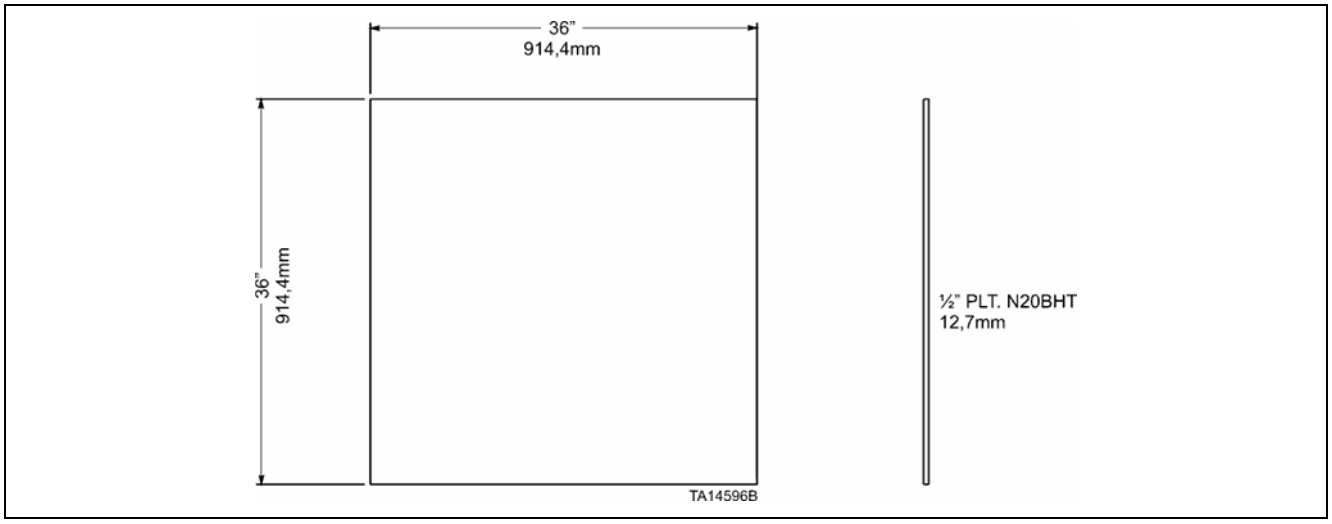

Figure 71. Rear frame base plate

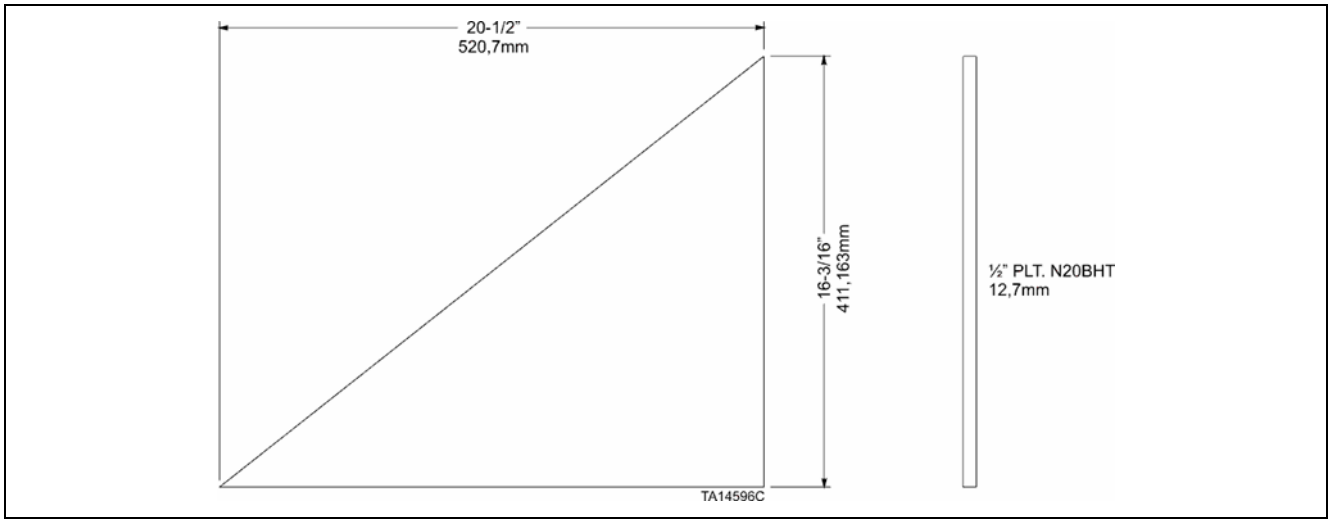

Figure 72. Rear frame support plate (large)

NOTICE

Material N20BHT no longer used - use A514.

CAUTION

A514 requires special welding processes such as preheat and post heat. Refer to the latest version of Field Welding Procedures in LeTrak. KB#436.

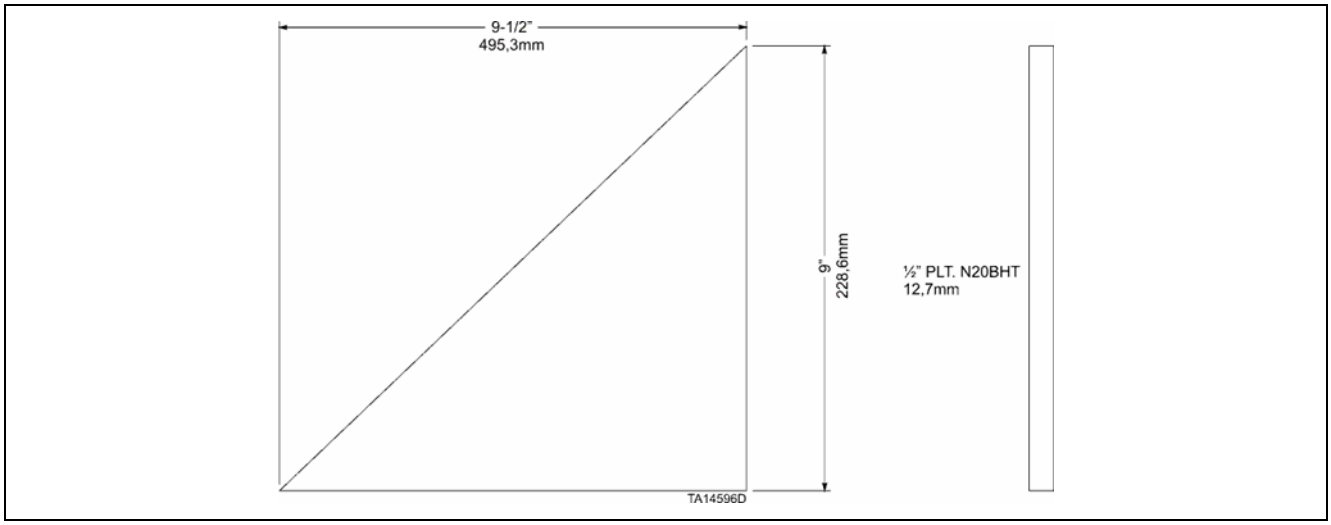

Figure 73. Rear frame support plate (small)

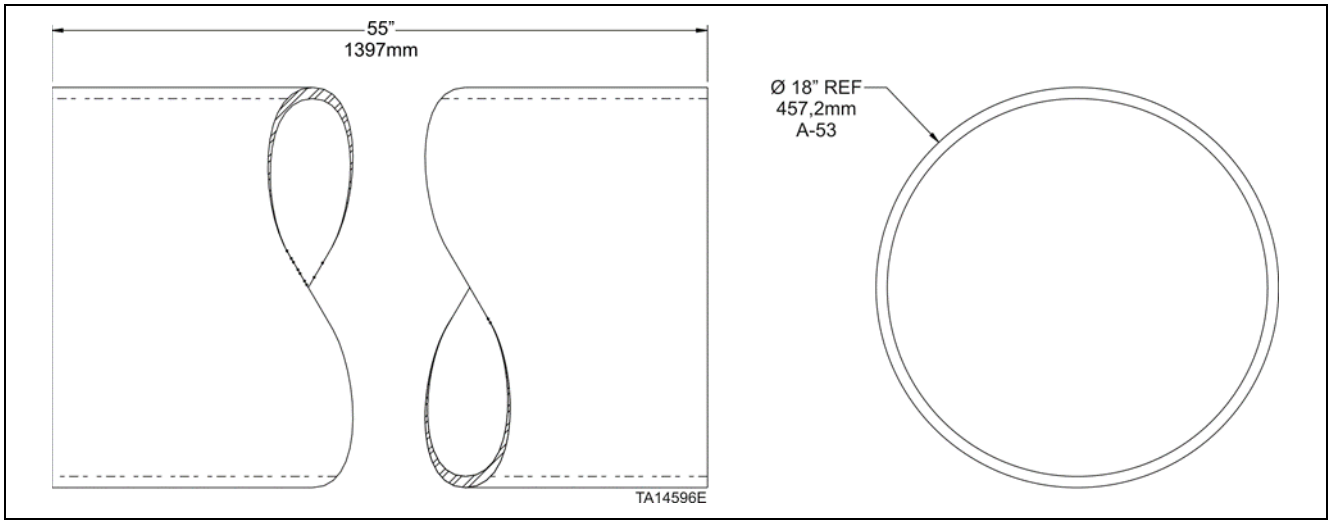

Figure 74. Rear frame front tube

NOTICE

Material N20BHT no longer used - use A514.

CAUTION

A514 requires special welding processes such as preheat and post heat. Refer to the latest version of Field Welding Procedures in LeTrak. KB#436.

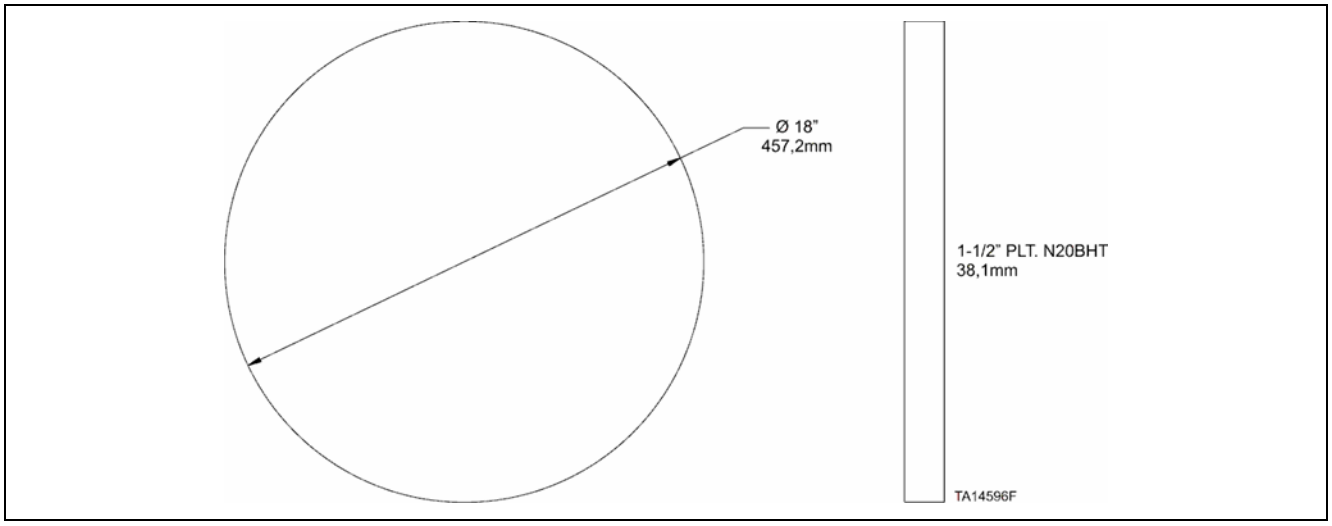

Figure 75. Rear frame cap plate

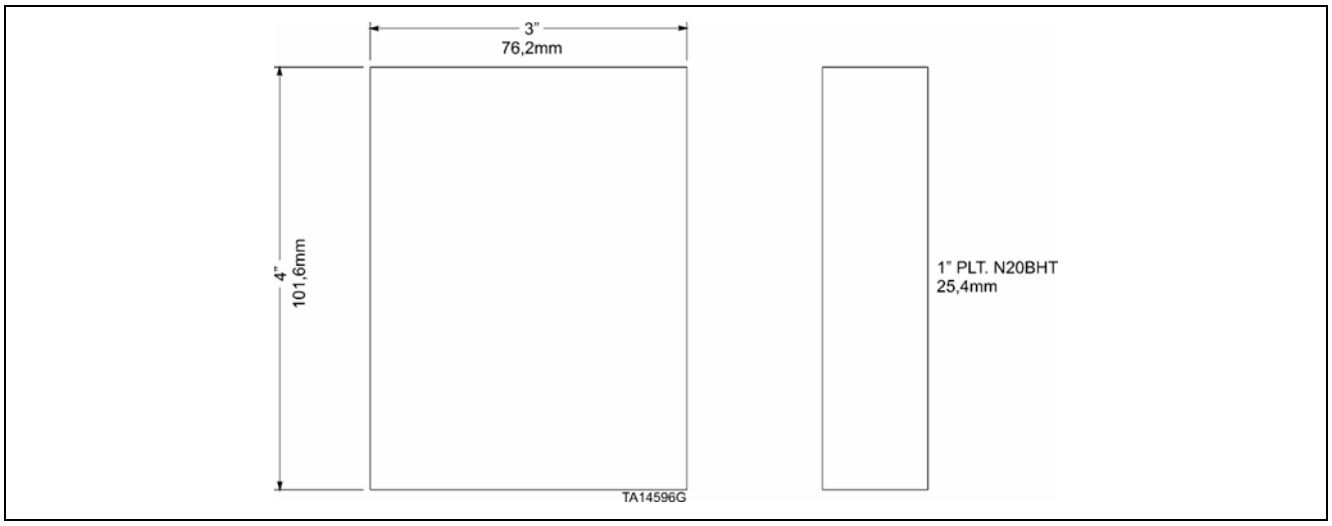

Figure 76. Rear frame plate (lifting plate)

NOTICE

Material N20BHT no longer used - use A514.

CAUTION

A514 requires special welding processes such as preheat and post heat. Refer to the latest version of Field Welding Procedures in LeTrak. KB#436.

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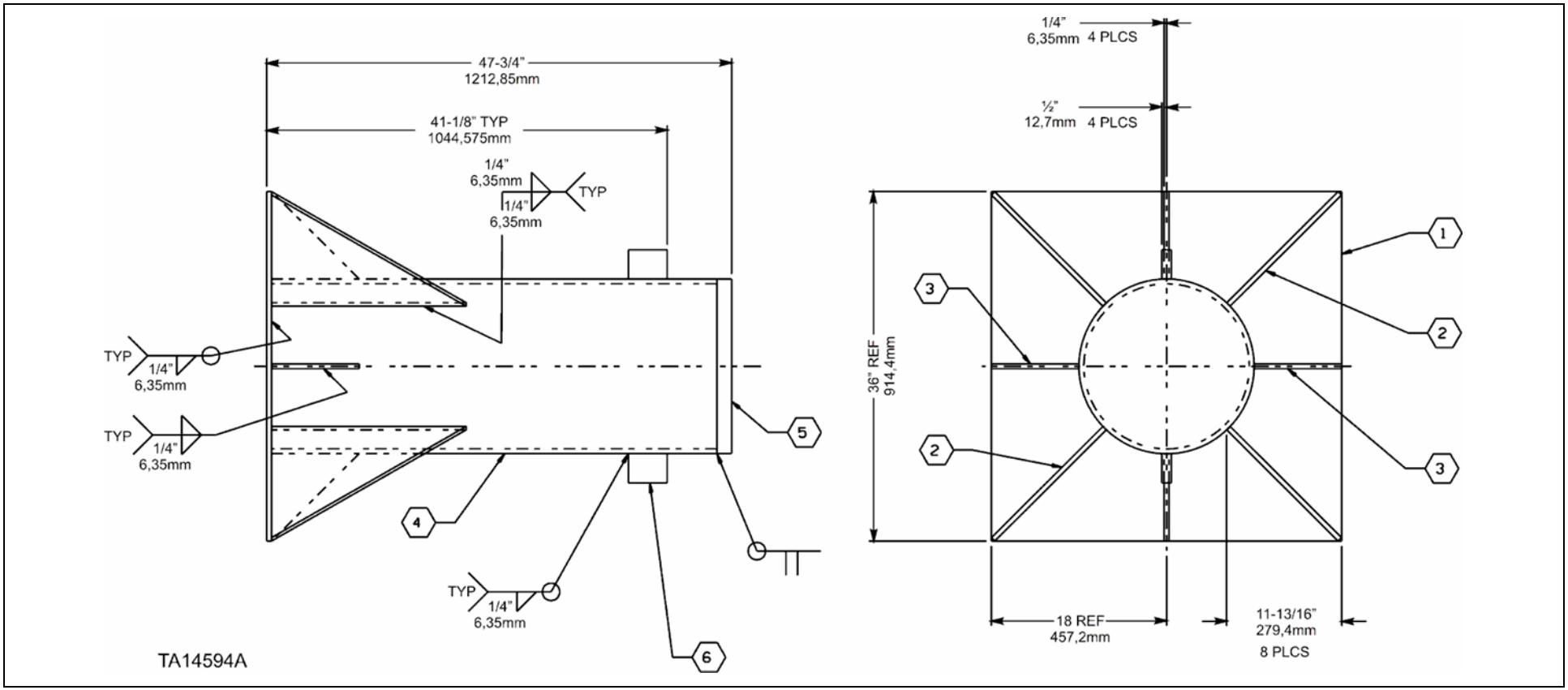

Figure 77. Rear bumper jack stands - rear end

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.

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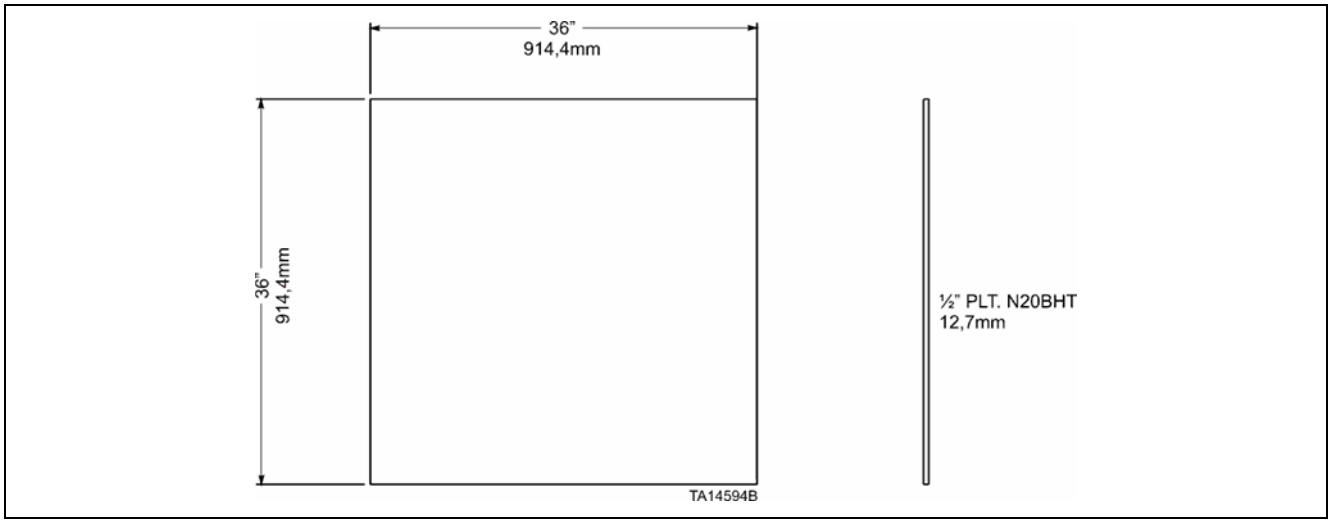


Figure 78. Rear bumper base plate

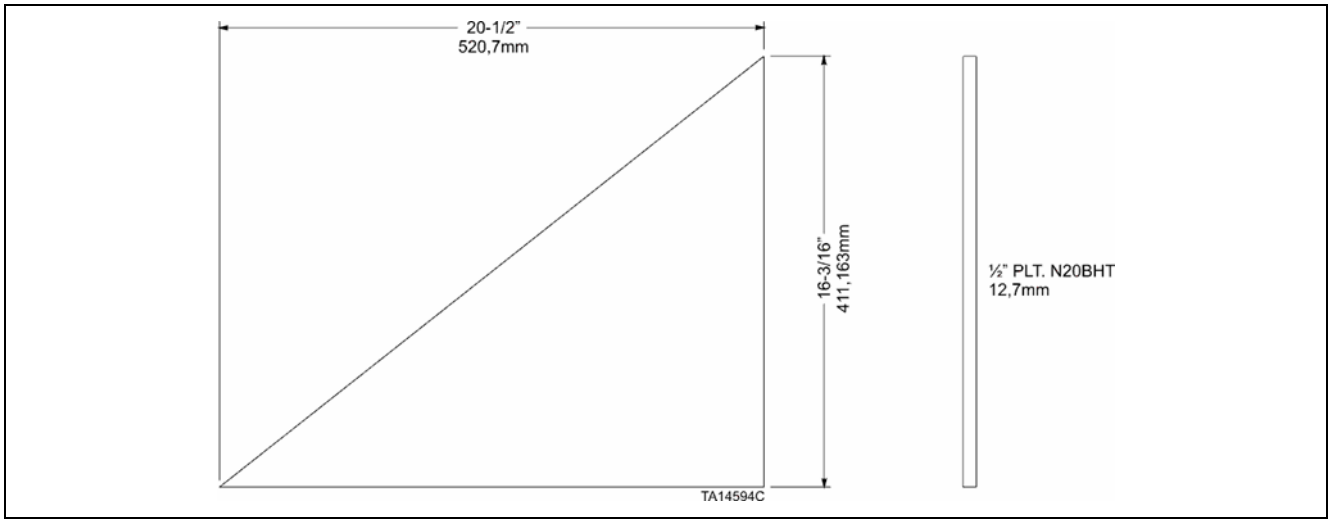


Figure 79. Rear bumper support plate (large)

NOTICE

Material N20BHT no longer used - use A514.

CAUTION

A514 requires special welding processes such as preheat and post heat. Refer to the latest version of Field Welding Procedures in LeTrak. KB#436.

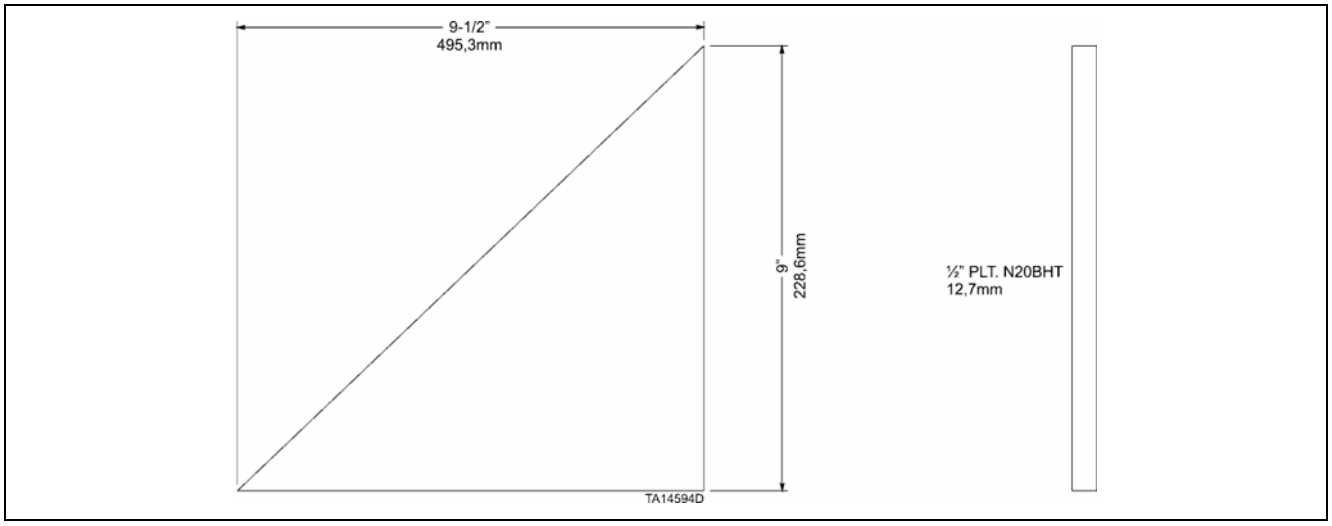


Figure 80. Rear bumper support plate (small)

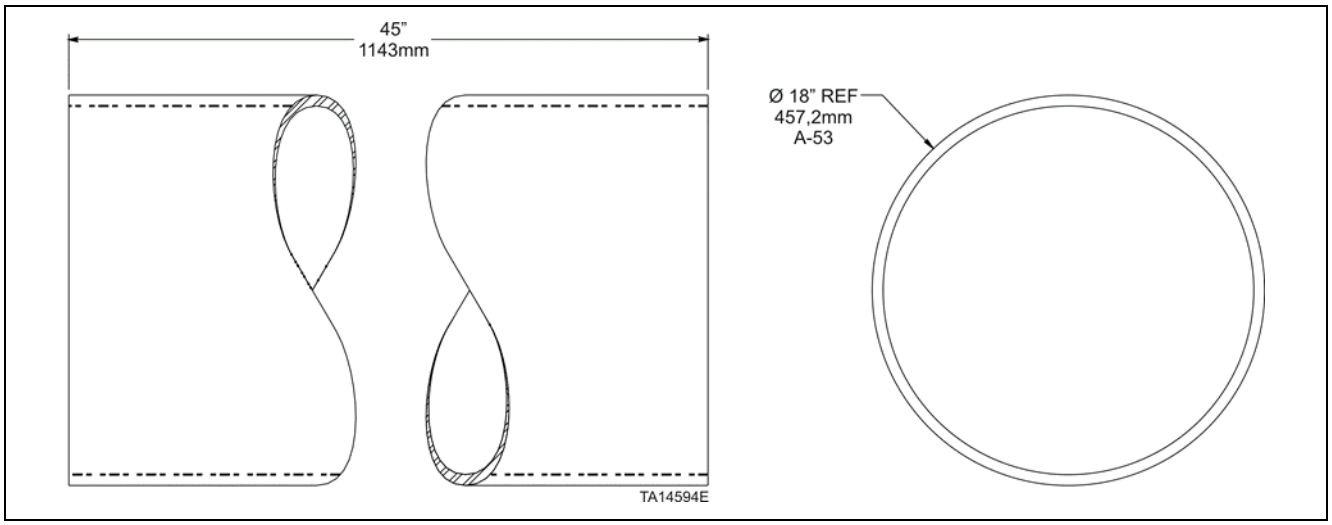


Figure 81. Rear bumper front tube

NOTICE

Material N20BHT no longer used - use A514.

CAUTION

A514 requires special welding processes such as preheat and post heat. Refer to the latest version of Field Welding Procedures in LeTrak. KB#436.

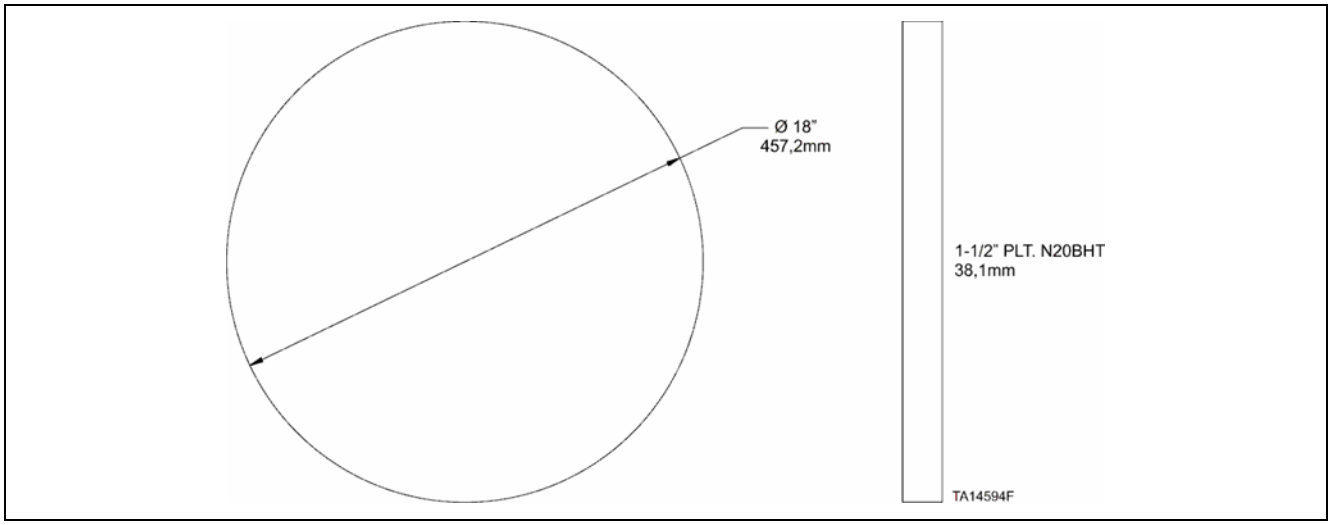


Figure 82. Rear bumper cap plate

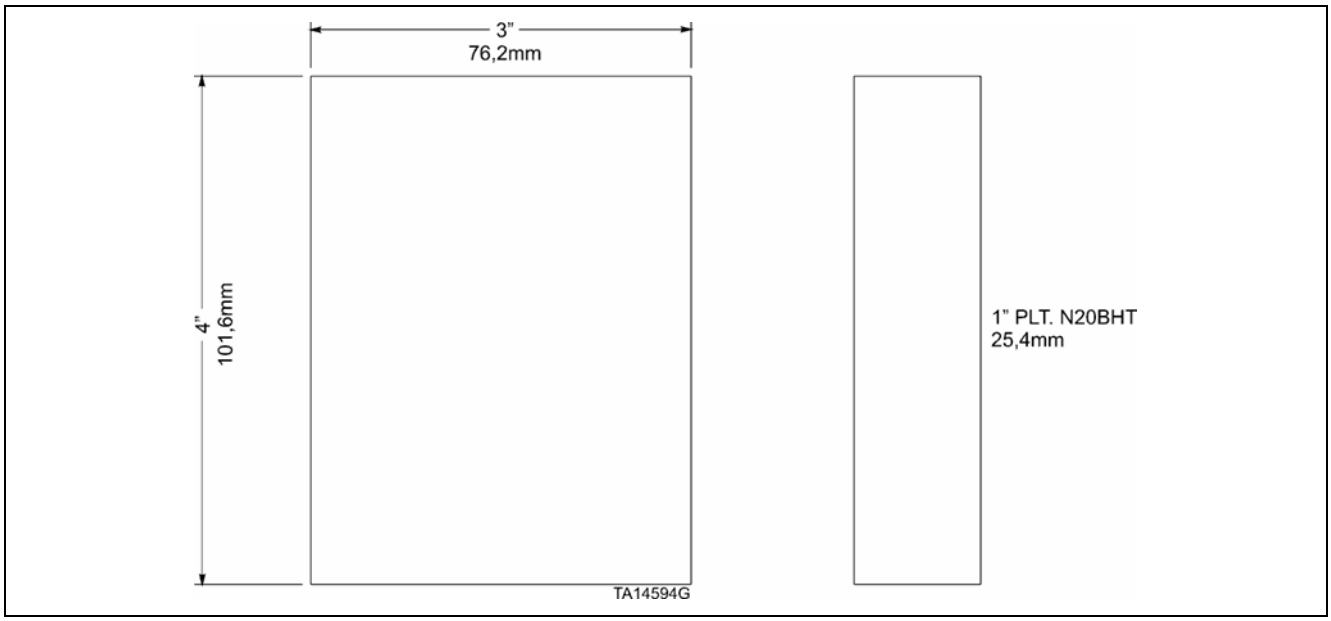


Figure 83. Rear bumper plate (lifting plate)

NOTICE

Material N20BHT no longer used - use A514.

CAUTION

A514 requires special welding processes such as preheat and post heat. Refer to the latest version of Field Welding Procedures in LeTrak. KB#436

Alternative Jack Stand Design

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

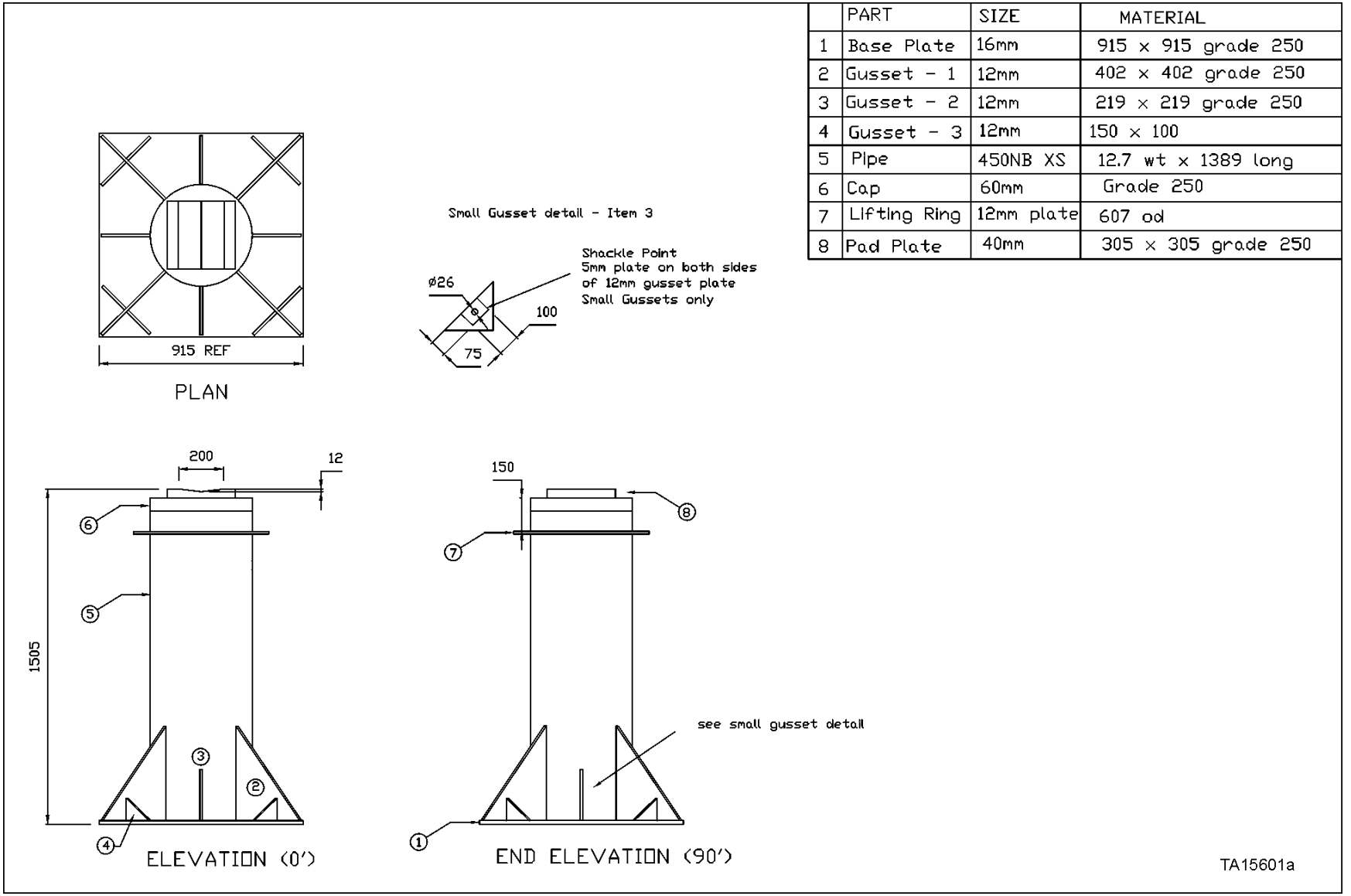
NOTICE

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

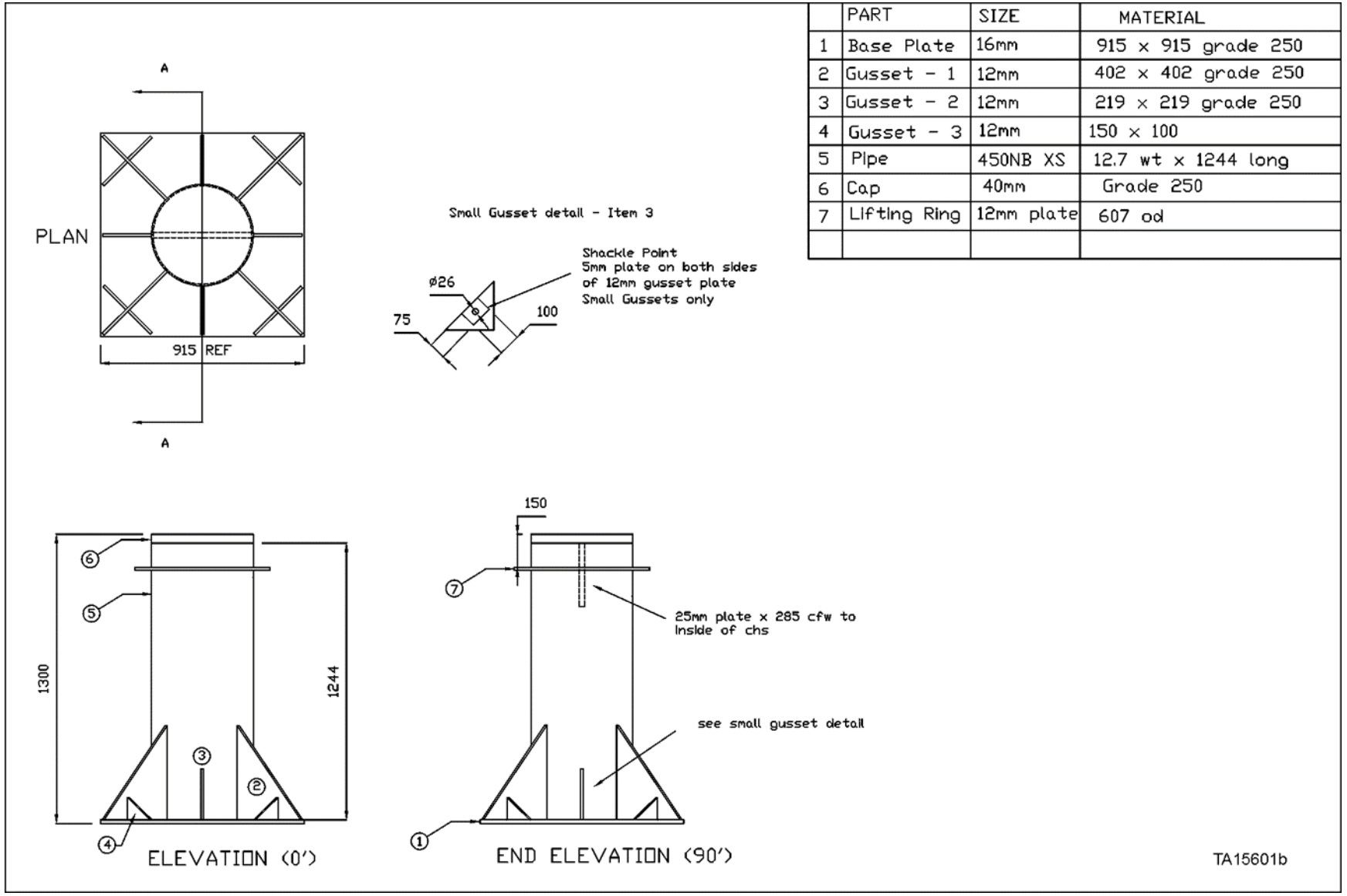
***The chart was originally provided in millimeters, using Australian Standards. The equivalent conversions are approximate. Never use materials with less strength than the metric size provided on this chart. When Australian standards are not available, the equivalent US standards shall be enforced.**

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.



	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 1389 long
6	Cap	60mm	Grade 250
7	Lifting Ring	12mm plate	607 od
8	Pad Plate	40mm	305 x 305 grade 250

Figure 84. Front 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

Figure 85. Rear support stand

Bucket Stand Design

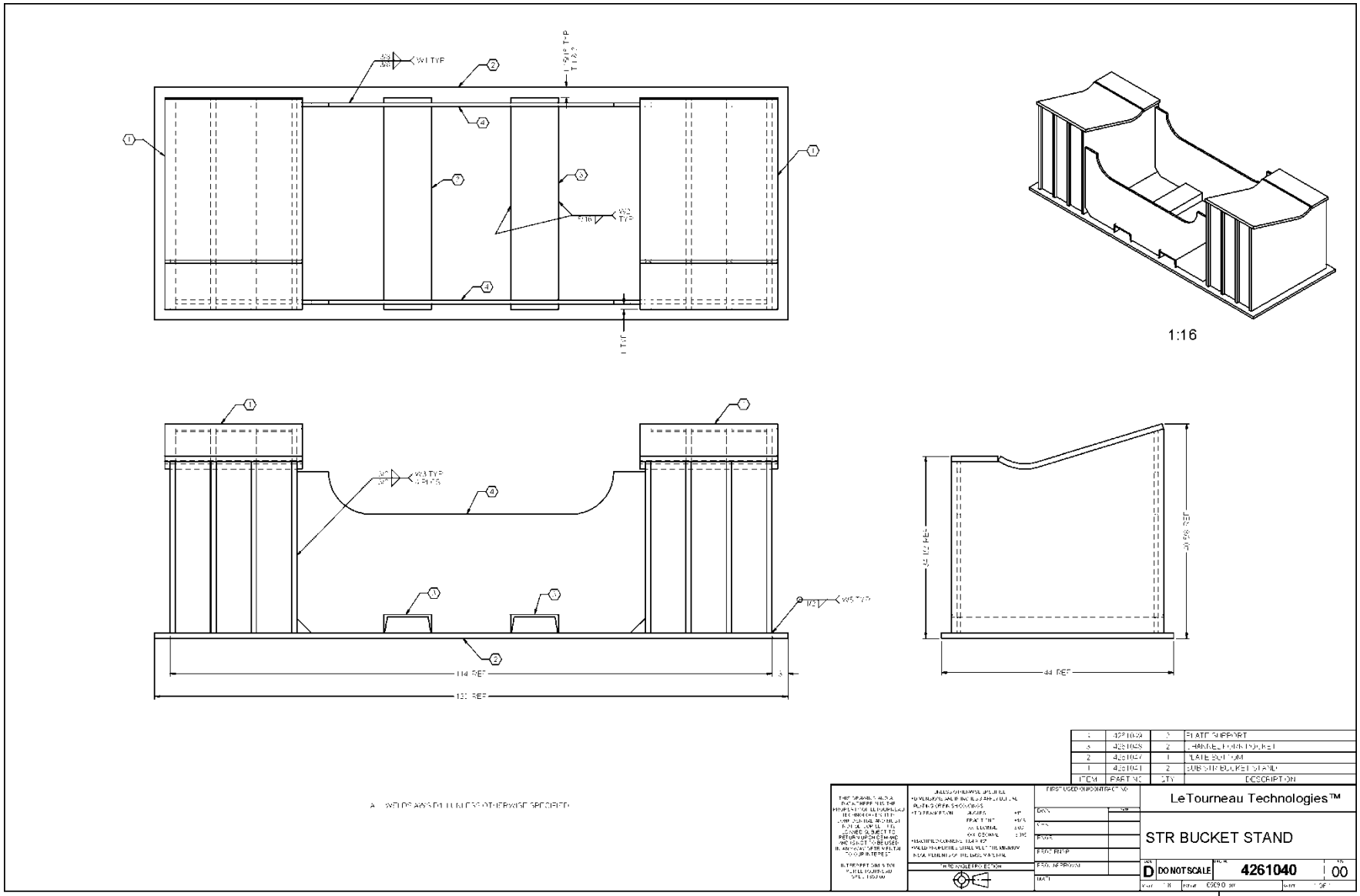


Figure 86. Bucket stand

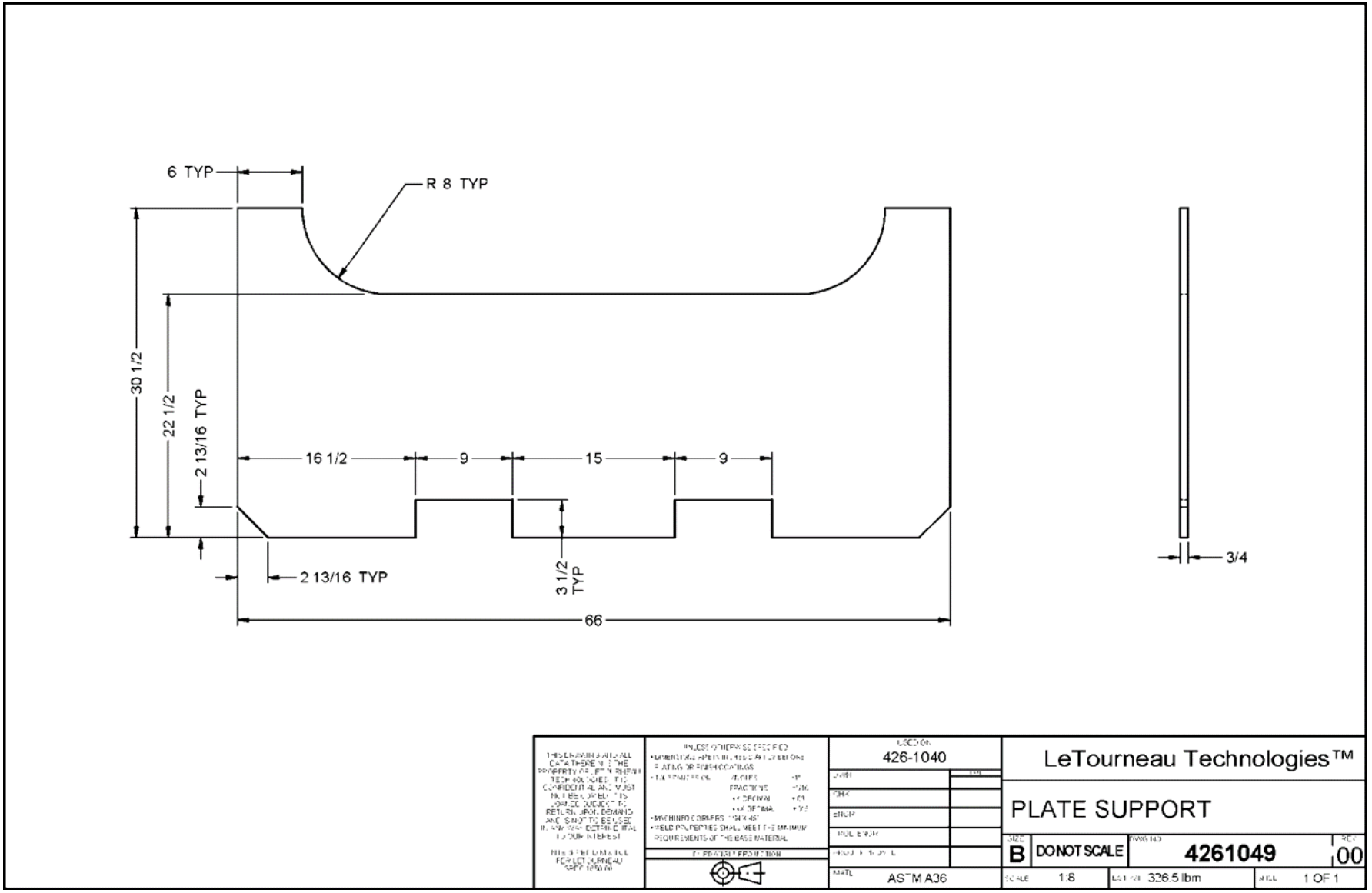


Figure 87. Support plate

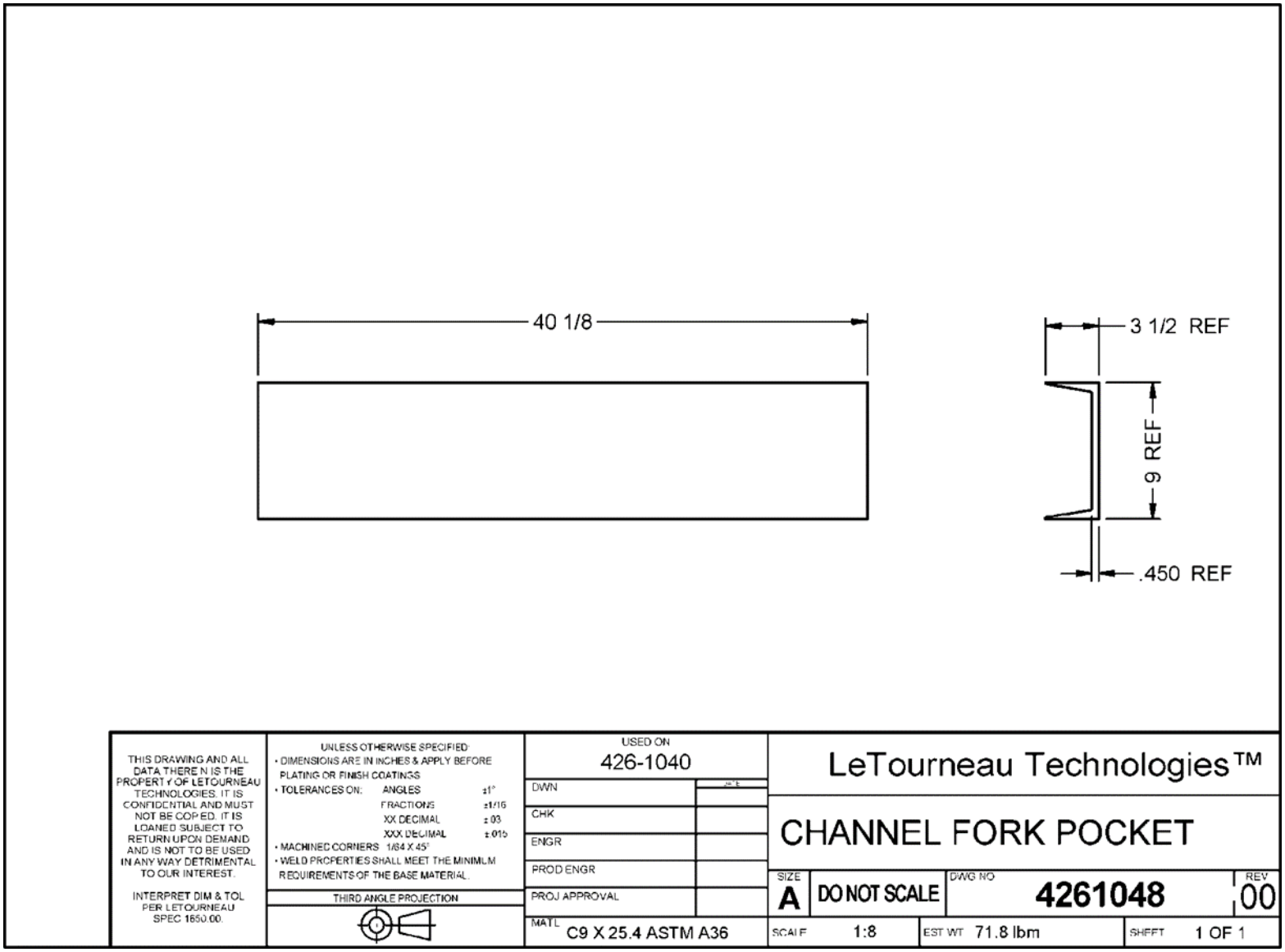


Figure 88. Fork pocket channel

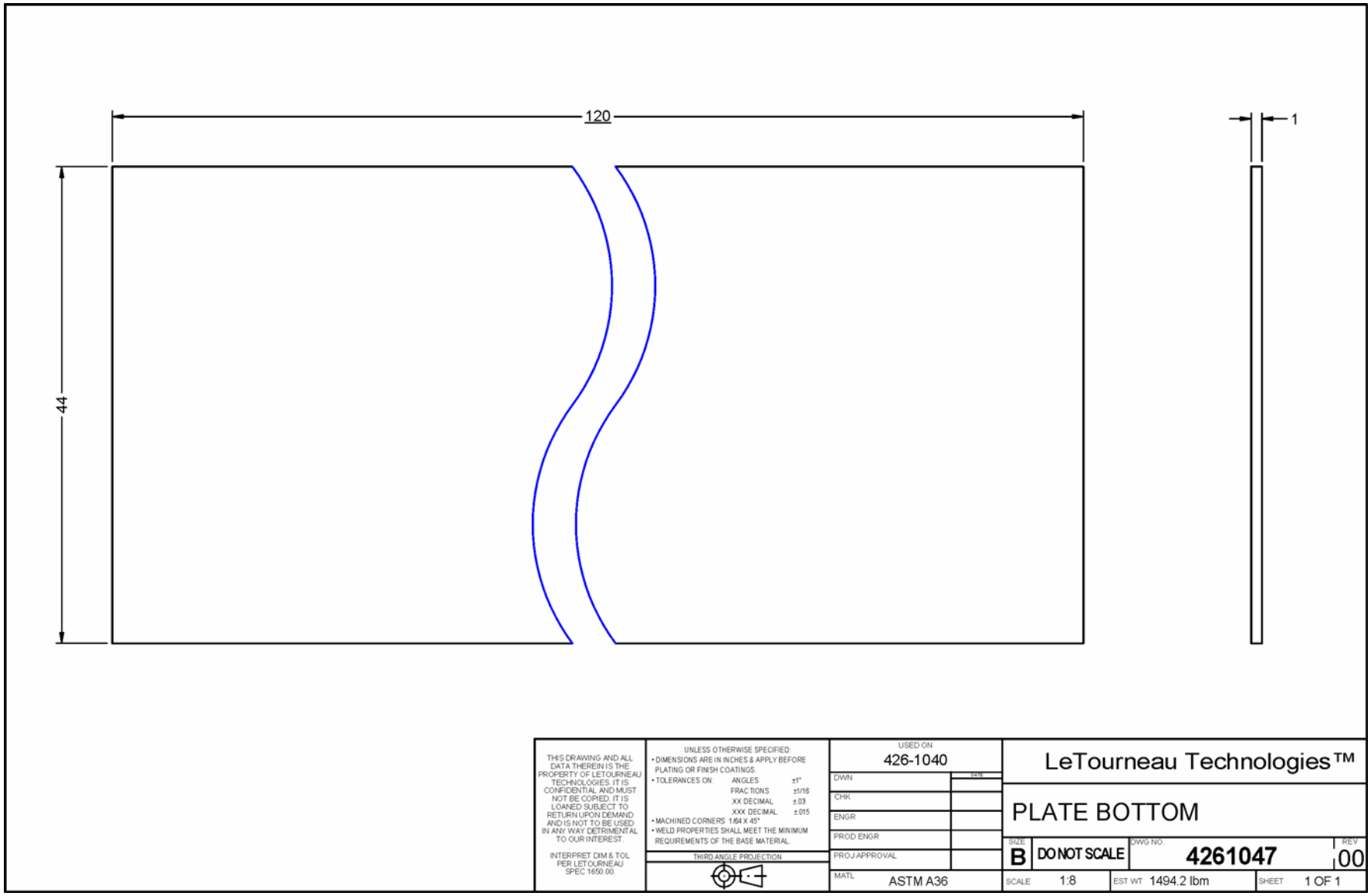


Figure 89. Bottom plate

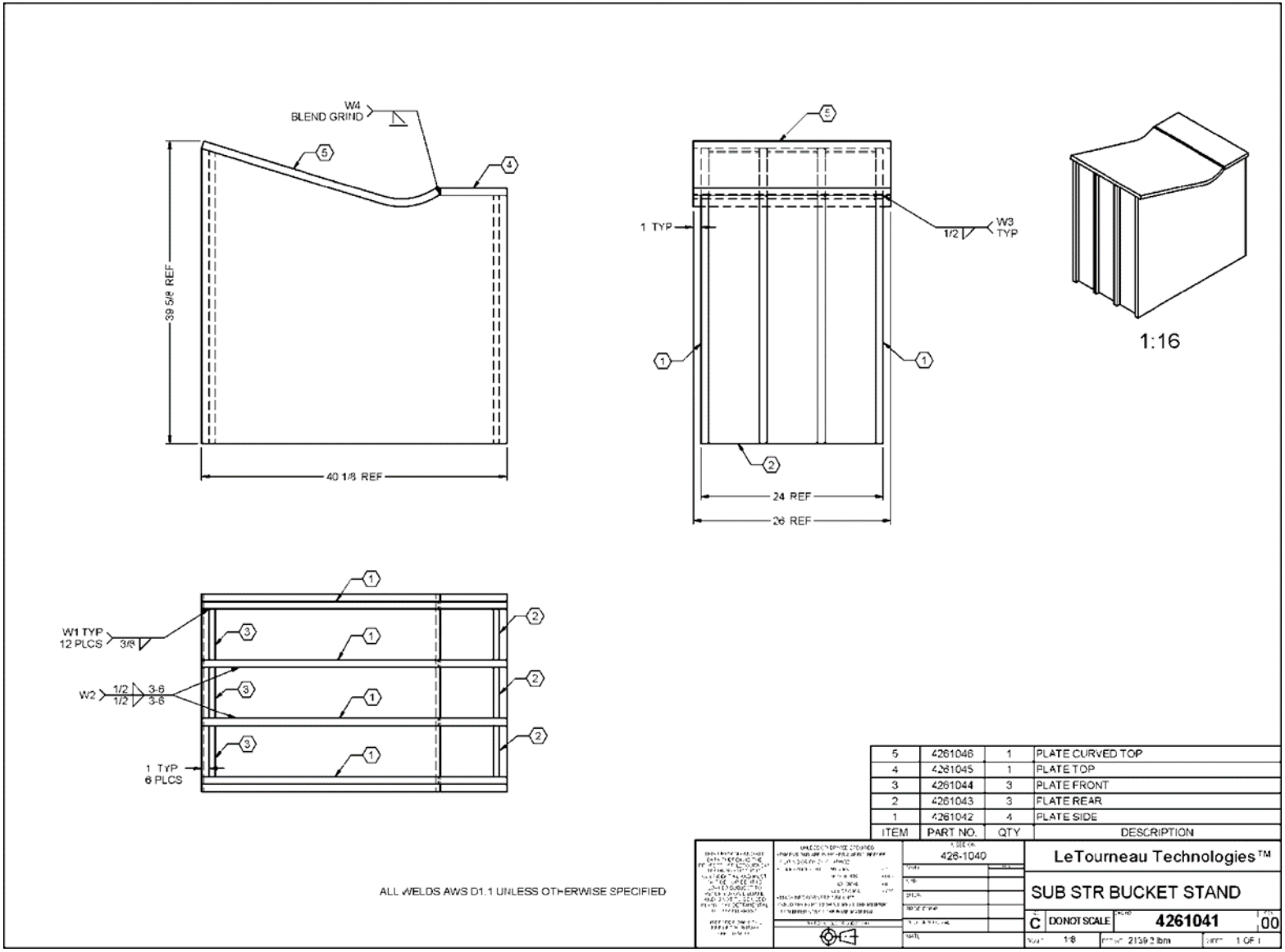


Figure 90. Bucket stand sub structure

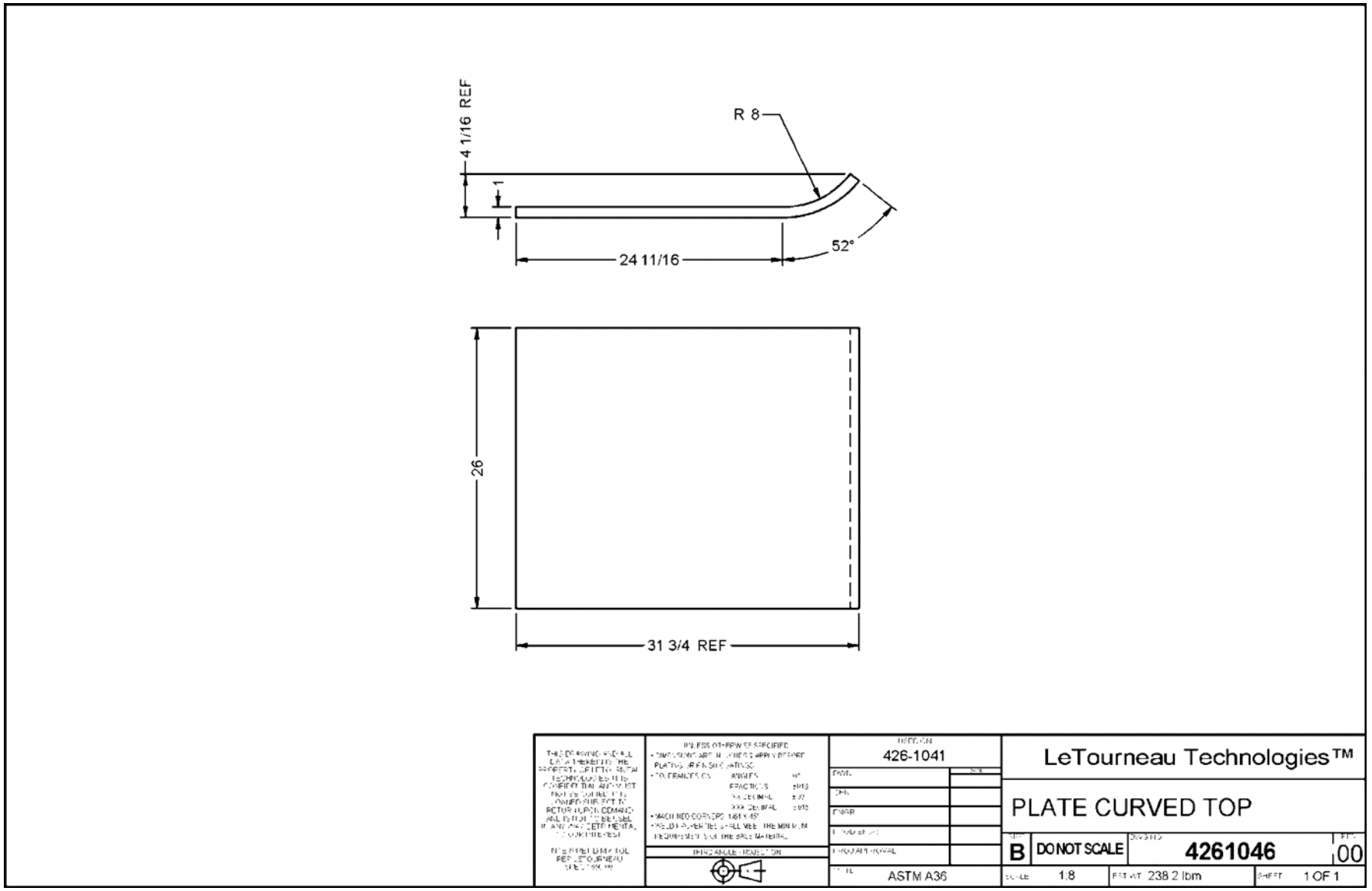


Figure 91. Curved top plate

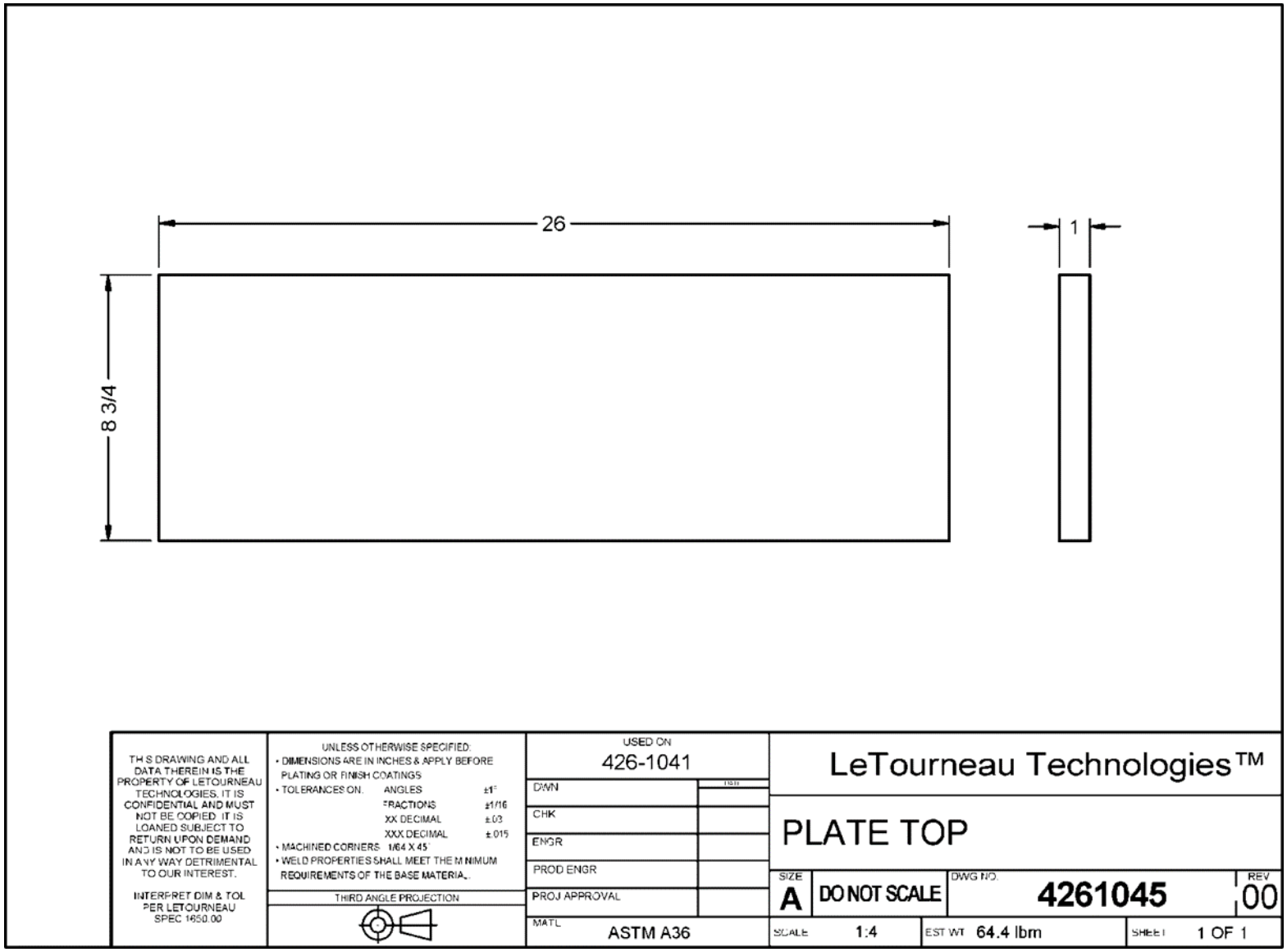


Figure 92. Top plate

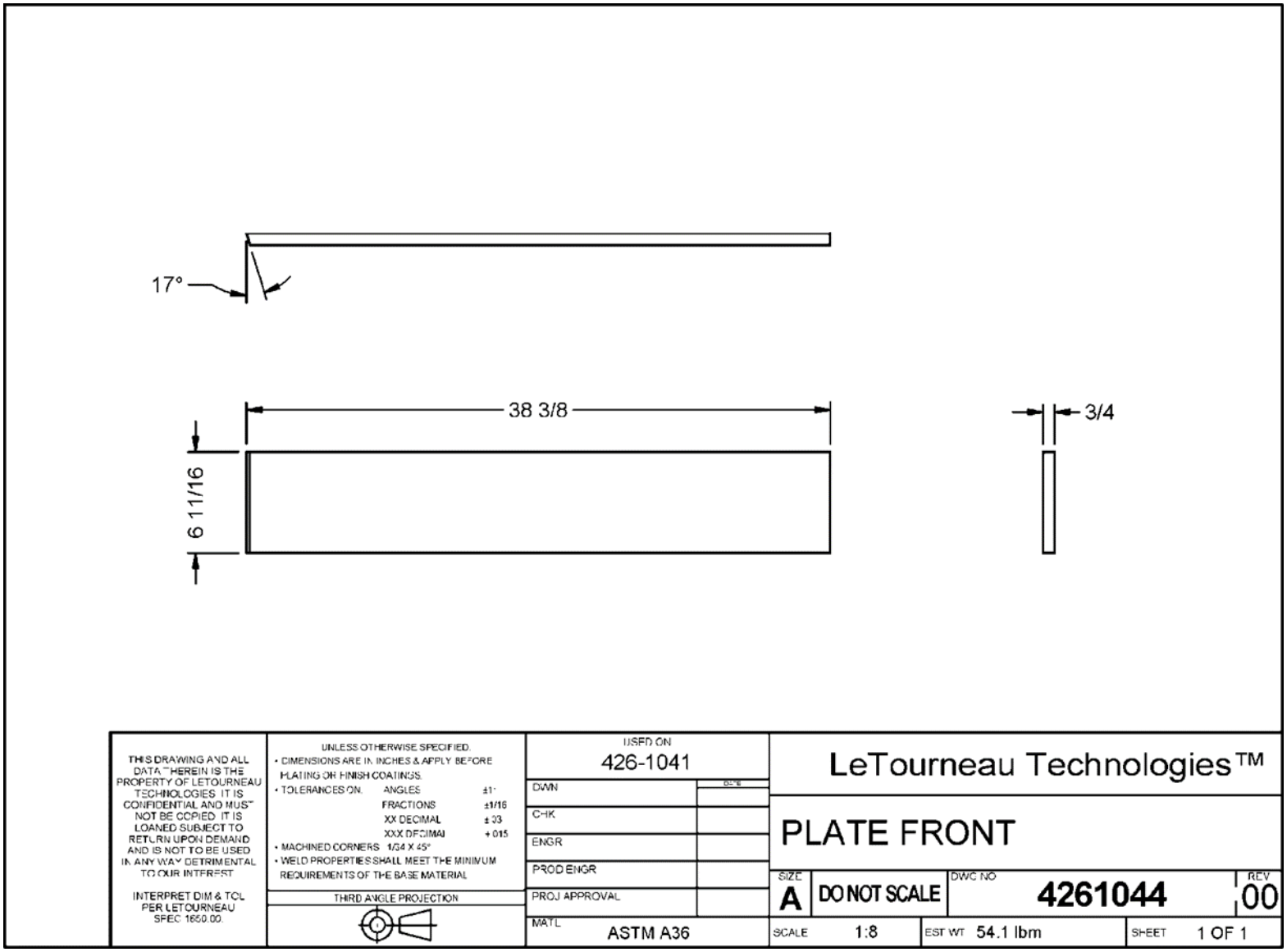


Figure 93. Front plate

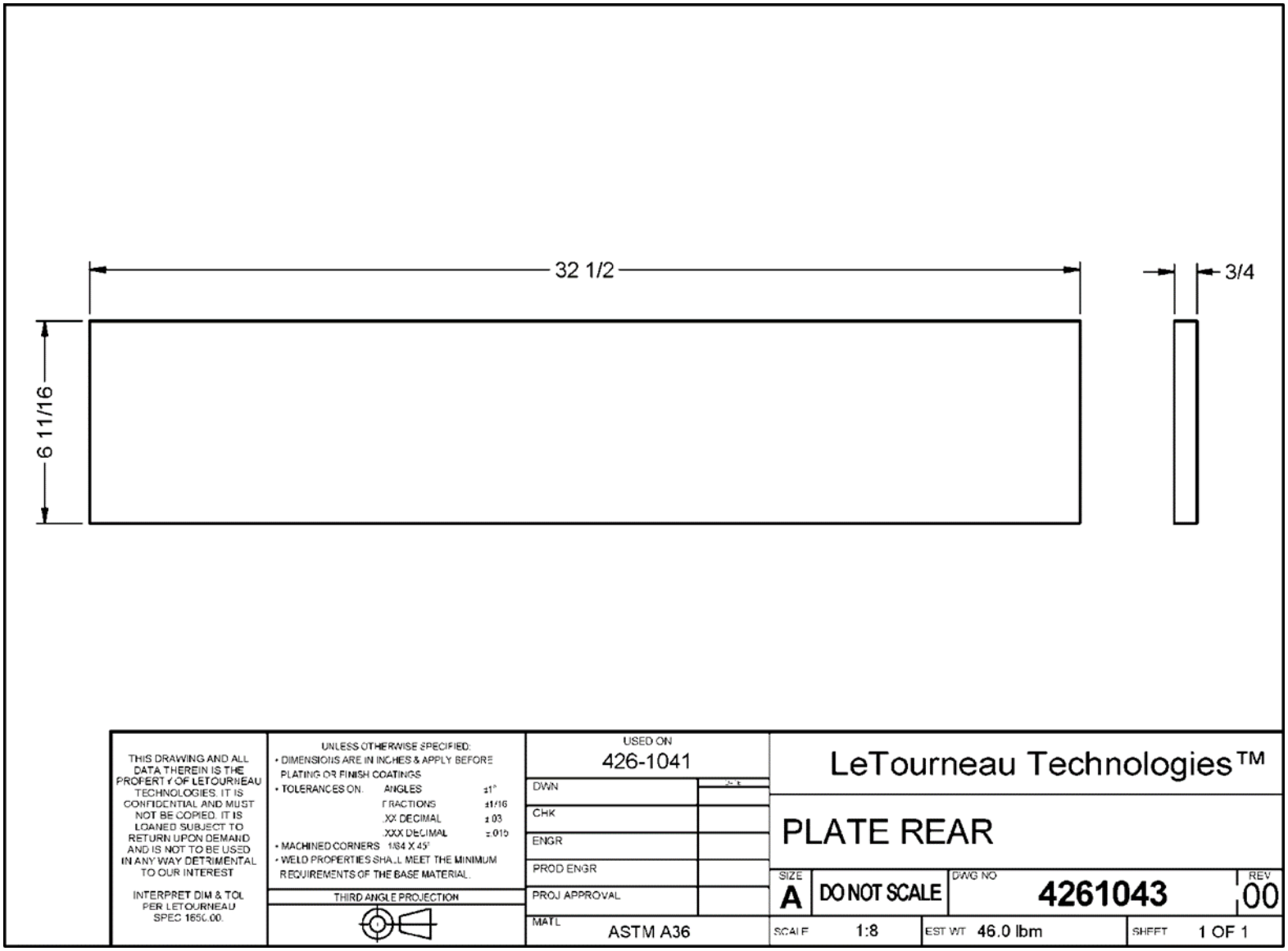


Figure 94. Rear plate

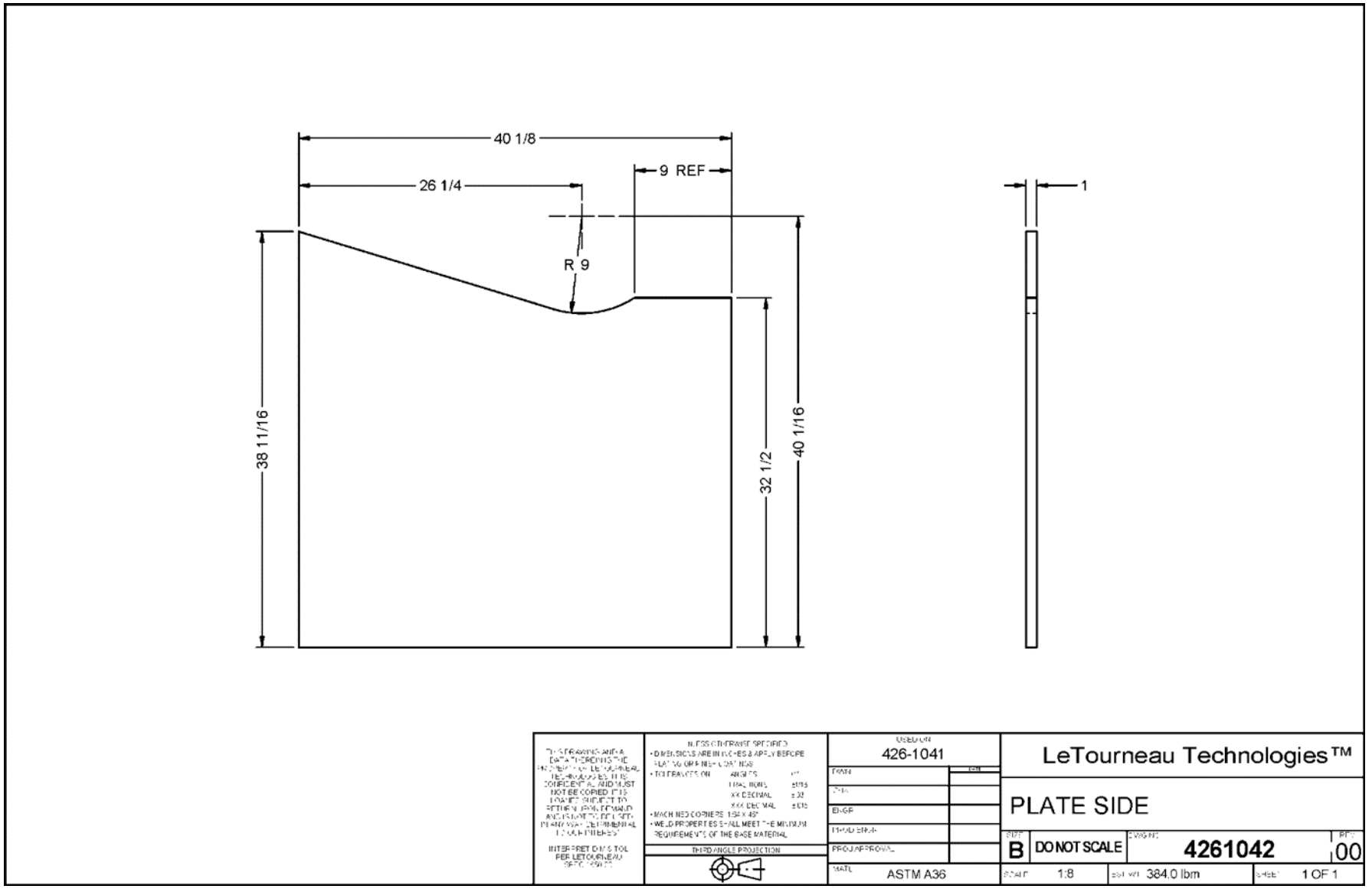


Figure 95. Side plate

Typical Tie Down Locations for Wheel Loader Components (When Transporting Separate 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

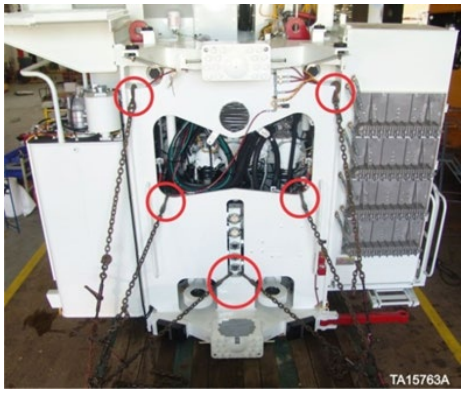
Crush hazards exist when moving components. Ensure all personnel stay clear of suspended or moving components. Failure to prevent uncontrolled component movement and to keep personnel clear of suspended or moving parts can cause crush hazards resulting in serious injury or death.

⚠ 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.

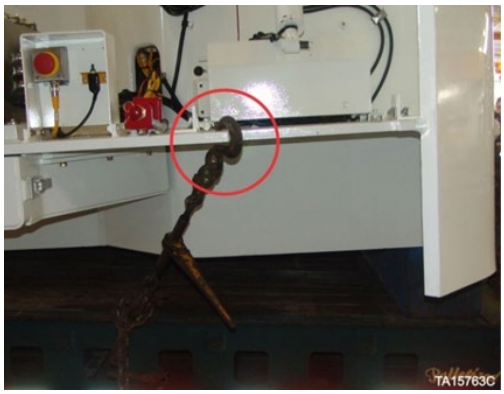
⚠ WARNING

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.



Front of rear frame

Rear of rear frame



Left rear side of rear frame

Right rear side of rear frame

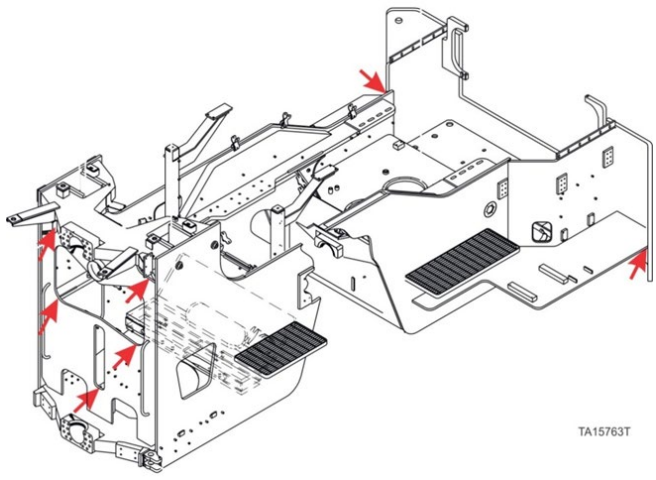


Figure 96. Typical tie down points of rear frame

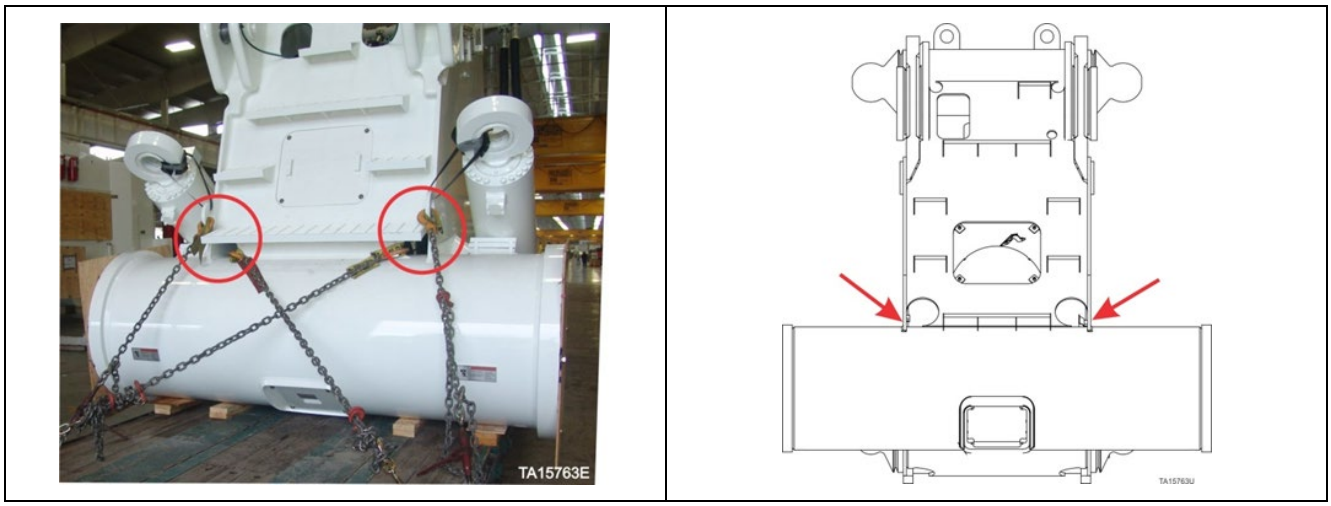


Figure 97. Typical tie down locations on front of front frame

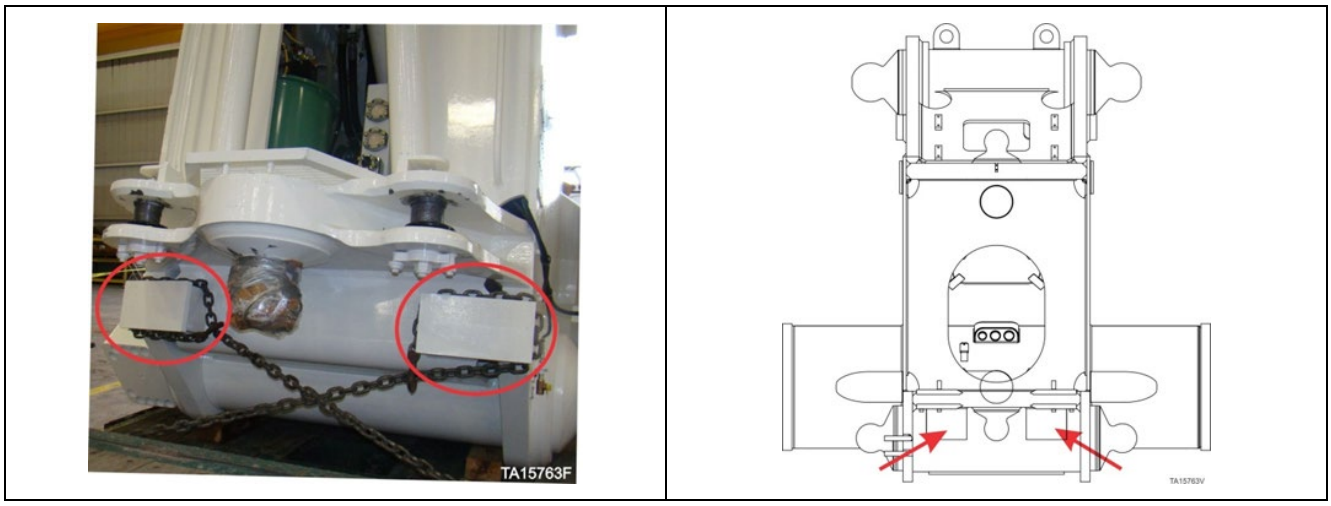
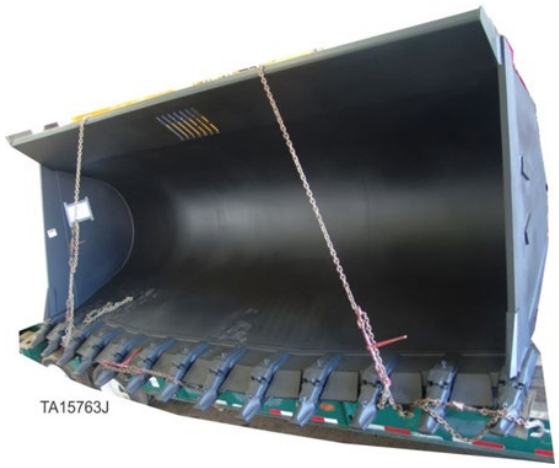


Figure 98. Typical tie down locations on rear of front frame



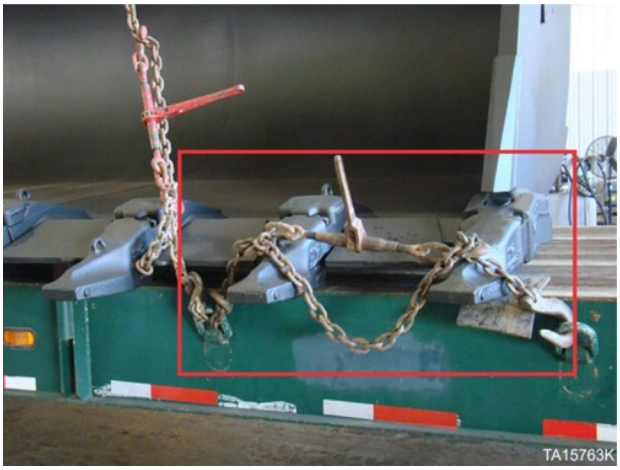


Figure 99. Typical tie down locations on bucket

Figure 100. 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 101. Typical tie down location on planetary drive/motor

Figure 102. Typical tie down locations on wheel rim

Figure 103. Typical tie down locations on rollover protection structure (ROPS)

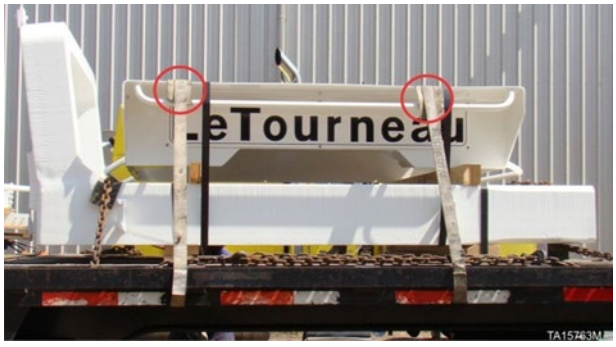


Figure 104. Typical tie down locations on falling object protection structure (FOPS)

Figure 105. Typical tie down locations on miscellaneous steel structures

Figure 106. Typical tie down locations on crates containing miscellaneous parts such as cab and light bar