CREATING VALUE

50 SERIES MECHANICAL – BALL & SOCKET

JOYGLOBAL

5O SERIES MECHANICAL

BALLS AND CAPS JOINTS

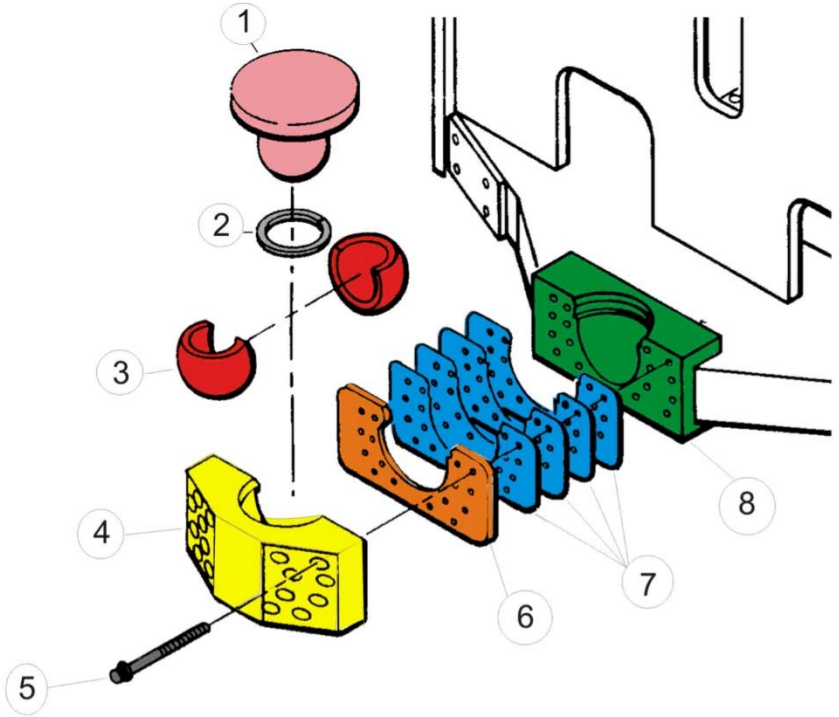
- Theory of Operation
- Component Descript
- Circuit Description
- Setting & Adjustmen
- Trouble Shooting

BALL & SOCKET JOINTS

Theory of operation

BALL AND SOCKET COMPONENTS

1. The Ball
2. The Lip Seal
3. The Liner
4. The Socket Cap
5. The Bolt
6. The Spacer Plate
7. The Shims
8. The Socket



Component Description

THE BALL

L950

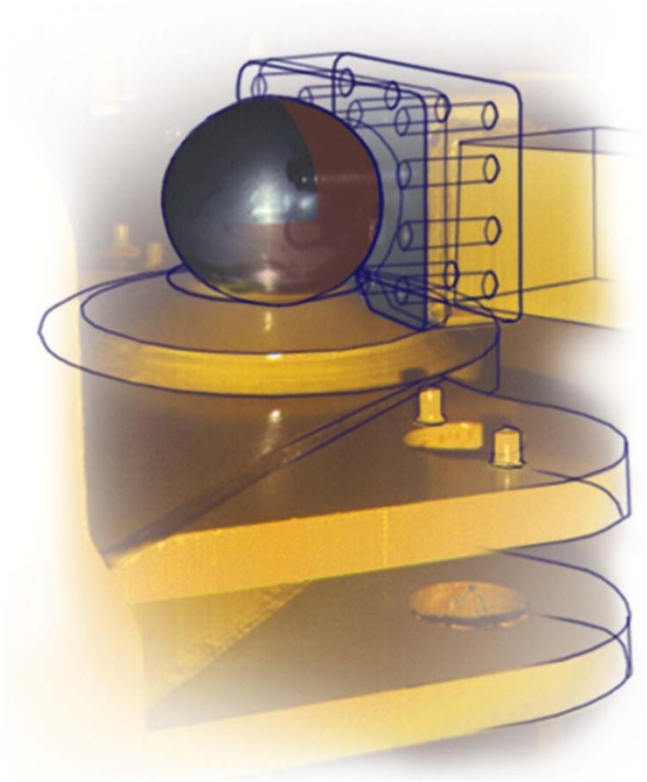
D950

L1150

L1350

L1850

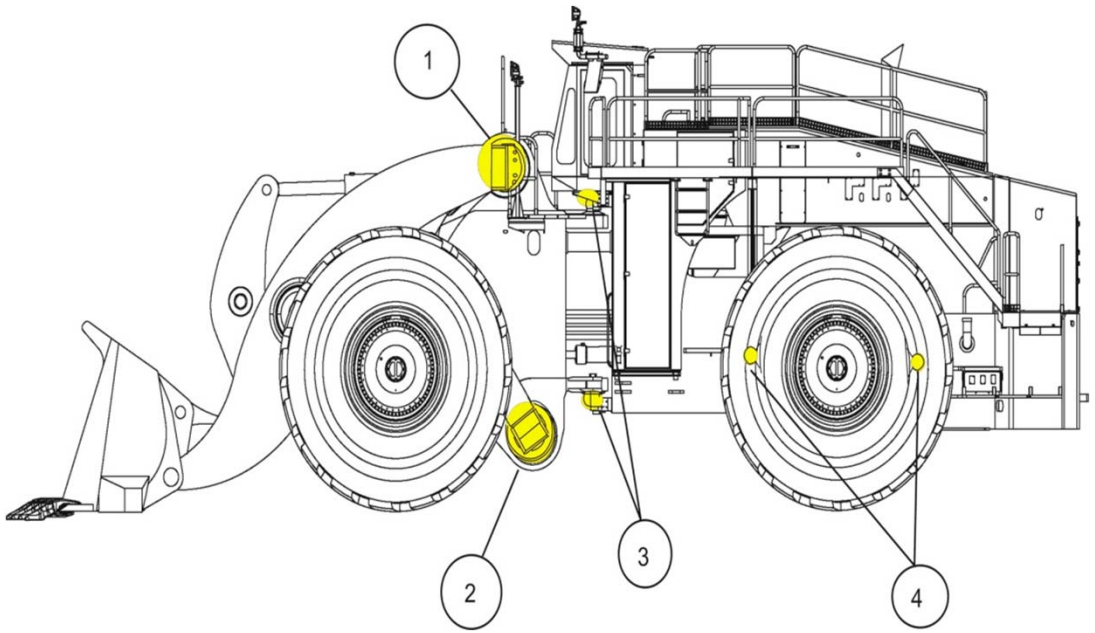
L2350



Component Description

BALL SIZE AND LOCATION
L-950

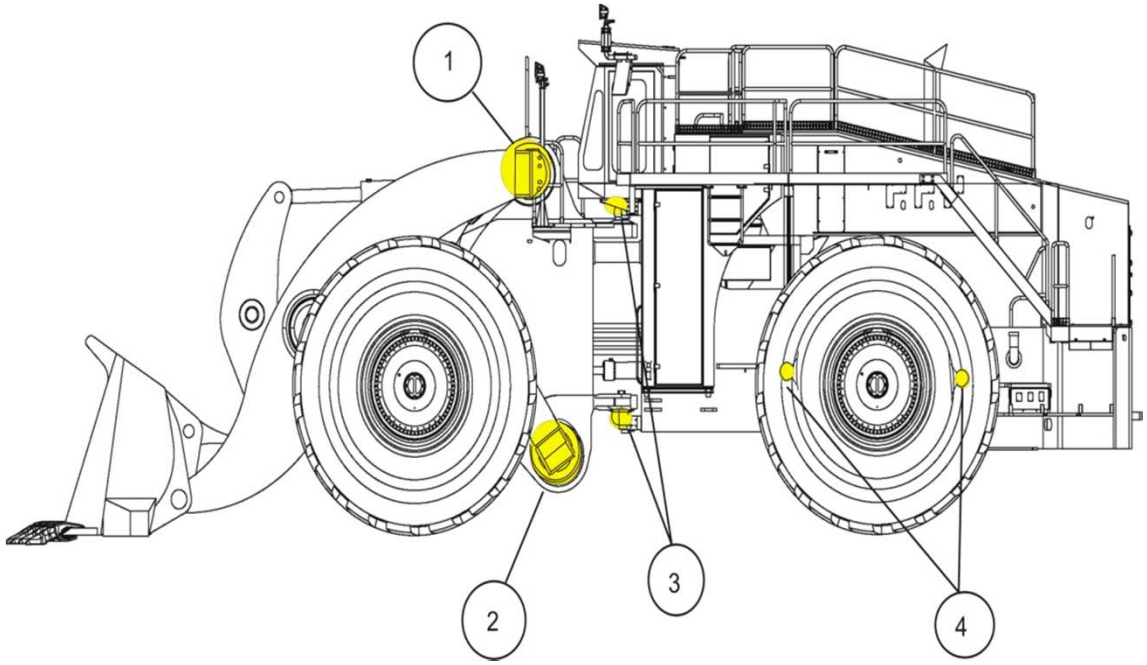
	1. Liftarms 12”	**2.** Hoist Cylinder 9”	**3.** Middle Pivot 7.5”	**4.** Rear Axle 7.5”
Cap =	425-4334	425-4630	425-2086	425-2089
Spacer =	413-3264	413-3660	413-3254	413-3257
Shim .007 =	412-3772	410-3654	413-3255	413-3258
Shim .018 =	413-3265	413-3261	413-3256	413-3259
Shim .030 =	412-3773	411-6771	413-3092	413-3294



Component Description

BALL SIZE AND LOCATION
D-950

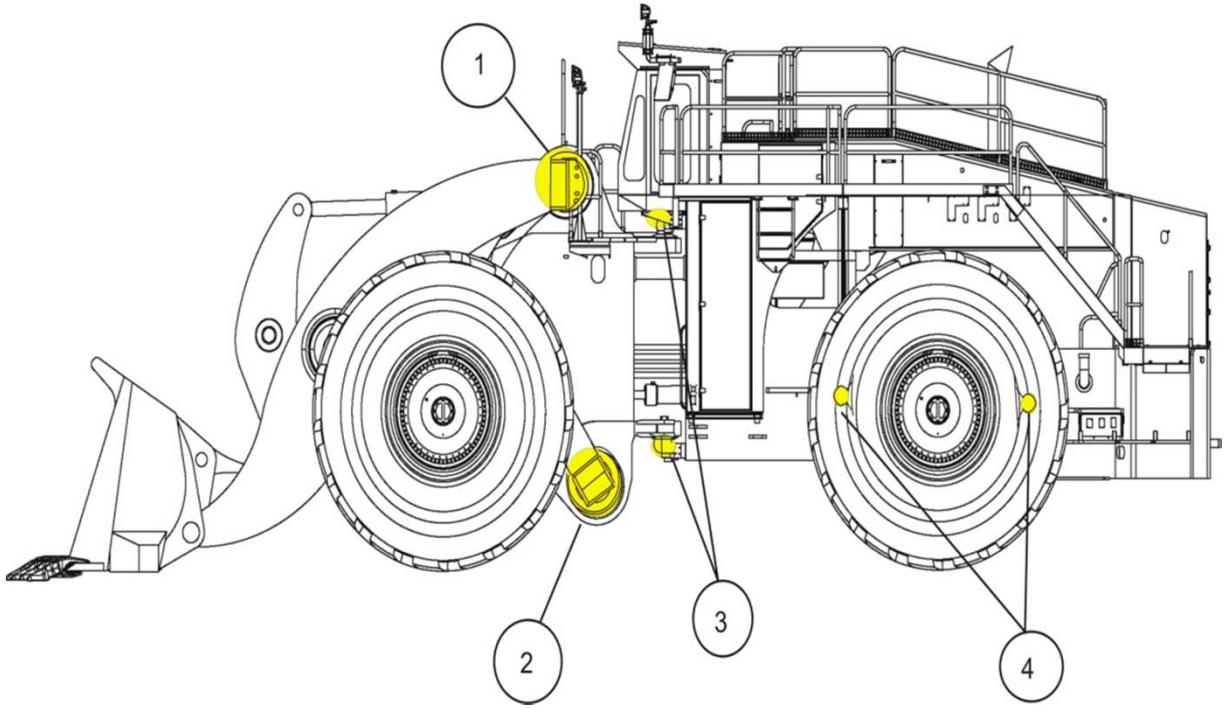
	1. Liftarms 12”	**2.** Hoist Cylinder 9”	**3.** Middle Pivot 7.5”	**4.** Rear Axle 7.5”
Cap =			425-2086	425-2089
Spacer =			413-3254	413-3257
Shim .007 =	**Not Used**	**Not Used**	413-3255	413-3258
Shim .018 =			413-3256	413-3259
Shim .030 =			413-3092	413-3294



Component Description

BALL SIZE AND LOCATION
L-1150

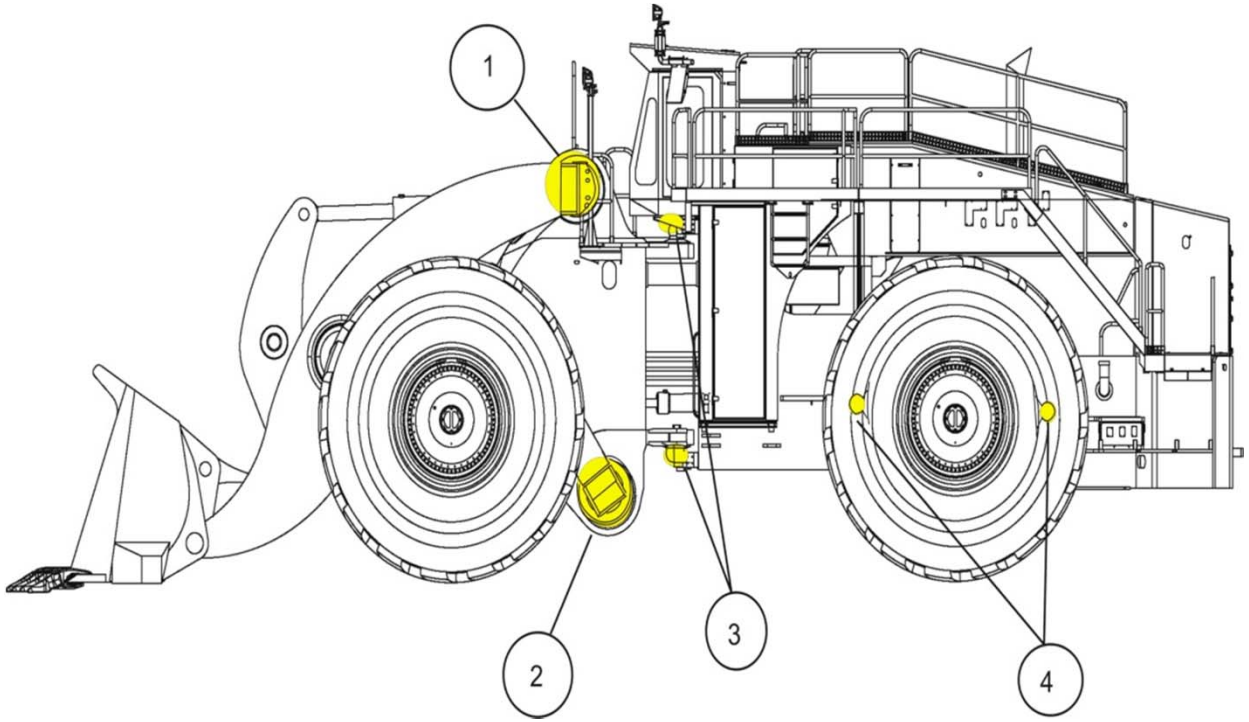
	1. Liftarms 12”	**2.** Hoist Cylinder 9”	**3.** Middle Pivot 7.5”	**4.** Rear Axle 7.5”
Cap =	425-4334	425-4630	425-2086	425-2089
Spacer =	413-3264	413-3660	413-3254	413-3257
Shim .007 =	412-3772	410-3654	413-3255	413-3258
Shim .018 =	413-3265	413-3261	413-3256	413-3259
Shim .030 =	412-3773	411-6771	413-3092	413-3294



Component Description

BALL SIZE AND LOCATION
L-1350

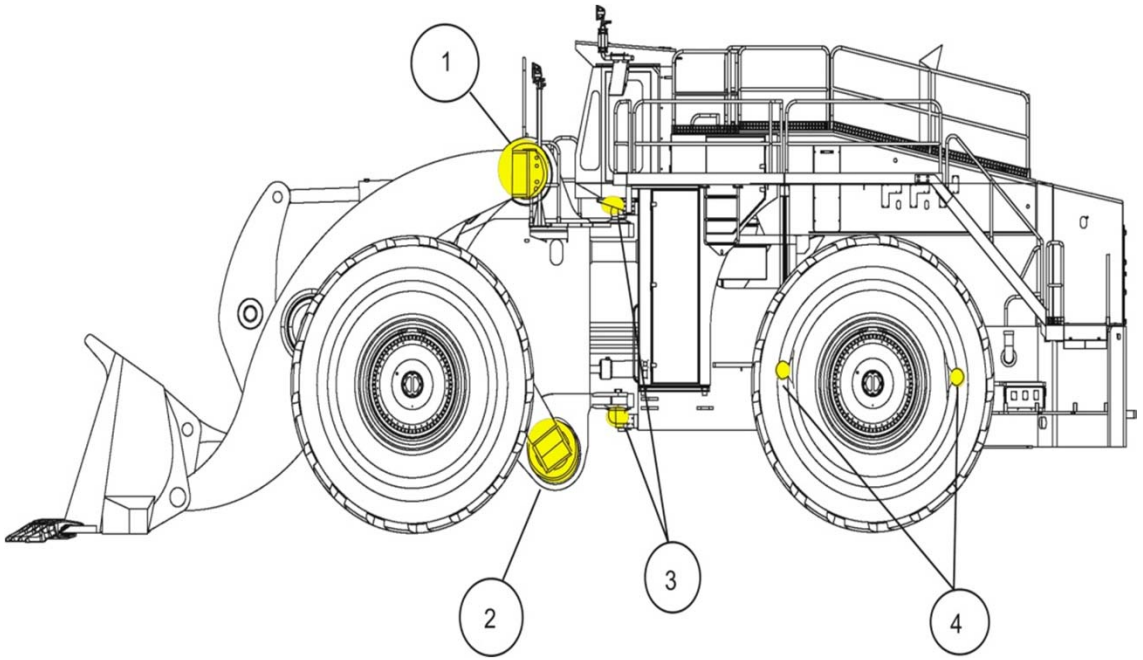
	1. Liftarms 12”	**2.** Hoist Cylinder 9”	**3.** Middle Pivot 9”	**4.** Rear Axle 9”
Cap =	425-4334	425-4630	411-9455	425-4630
Spacer =	413-3264	413-3660	413-3262	413-3660
Shim .007 =	412-3772	410-3654	410-4791	410-3654
Shim .018 =	413-3265	413-3261	413-3263	413-3261
Shim .030 =	412-3773	411-6771	411-6772	411-6771



Component Description

BALL SIZE AND LOCATION
L-1850

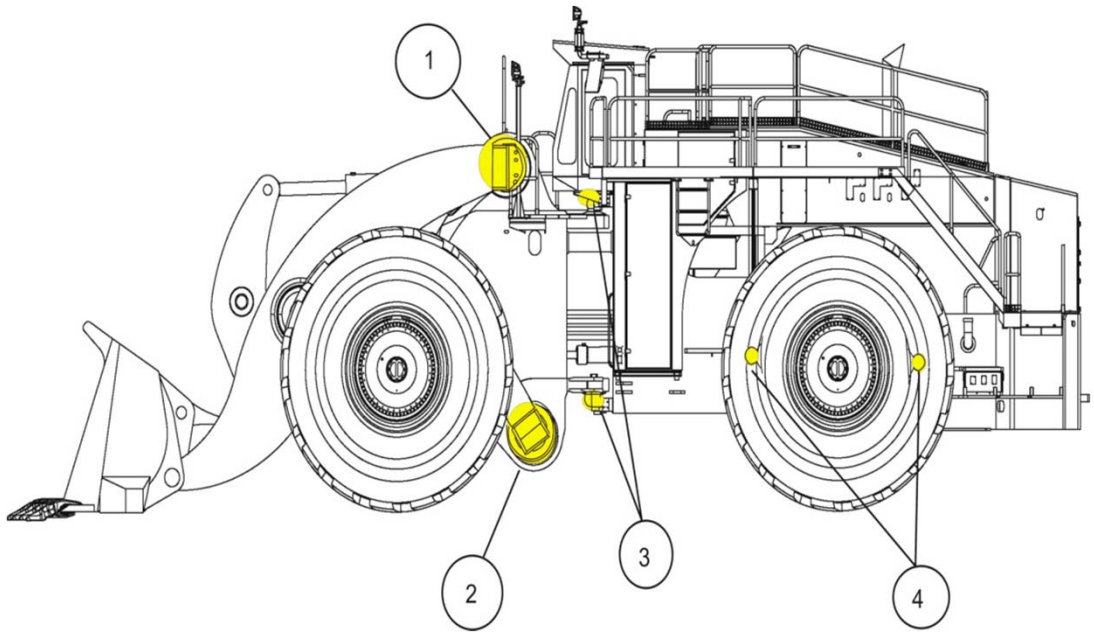
	1. Liftarms 14”	**2.** Hoist Cylinder 12”	**3.** Middle Pivot 9”	**4.** Rear Axle 9”
Cap =	423-9340	416-1182	411-9455	425-4630
Spacer =	421-1970	417-0754	413-3262	413-3660
Shim .007 =	425-4640	408-3039	410-4791	410-3654
Shim .018 =	421-1949	417-0755	413-3263	413-3261
Shim .030 =	421-1950	417-0756	411-6772	411-6771



Component Description

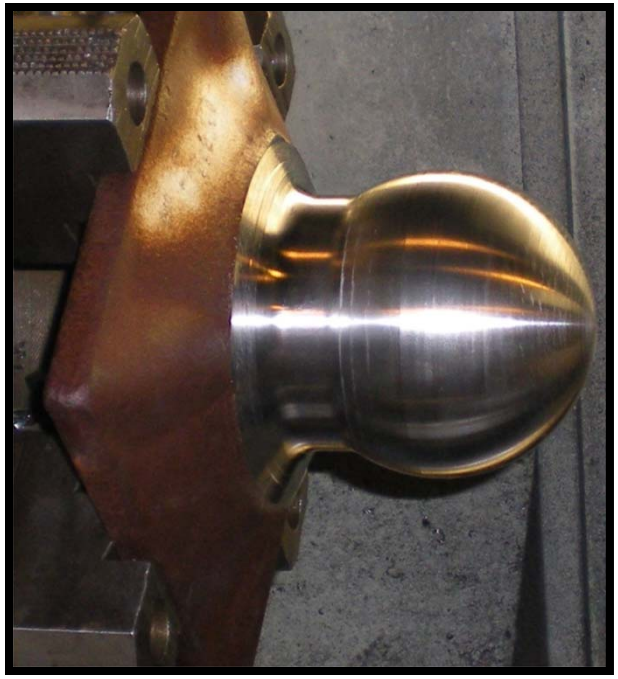
BALL SIZE AND LOCATION
L-2350

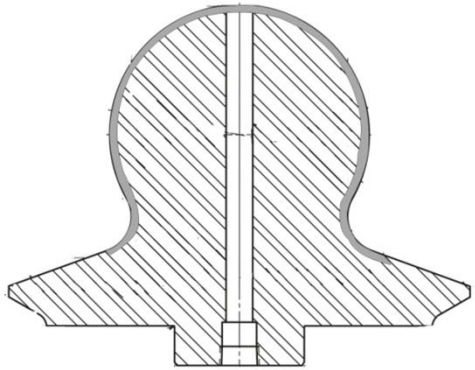
	1. Liftarms 14”	**2.** Hoist Cylinder 14”	**3.** Middle Pivot 9”	**4.** Rear Axle 9”
Cap =	423-9340	423-9417	411-9455	425-4630
Spacer =	421-1970	423-9421	413-3262	413-3660
Shim .007 =	425-4640	423-9418	410-4791	410-3654
Shim .018 =	421-1949	423-9419	413-3263	413-3261
Shim .030 =	421-1950	423-9420	411-6772	411-6771



Component Description

THE BALL





BALL IS MACHINED

THRU HOLE DRILLED FOR LUBRICATION

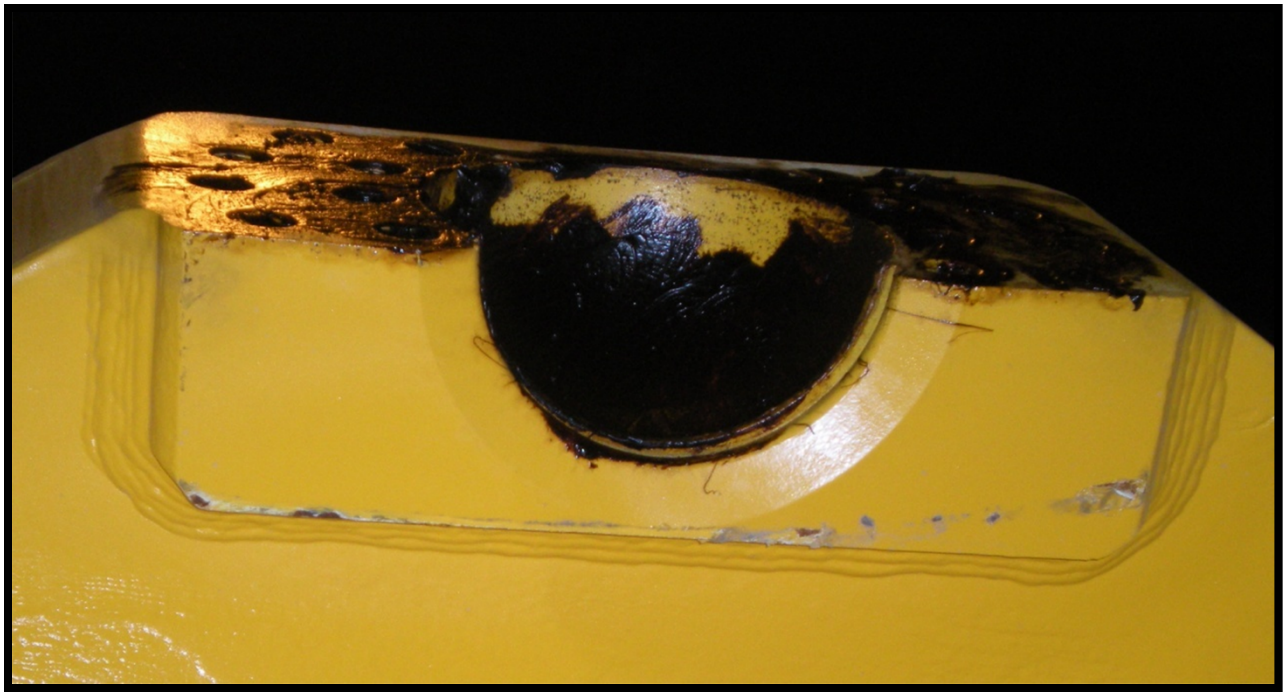
CASE HARDENED BALL FOR WEAR

HARDENED SURFACE ENDS AT NECK TO ALLOW WELD ABILITY OF BALL BASE

Component Description

THE SOCKET

The Socket is the stationary portion of the joint that is welded solid to the machine or structure.



Component Description

THE SOCKET CAP

The socket cap is the portion of the joint that bolts to the socket and captures the ball into the joint.

BALL CAP WEIGHT (*Approximate)				
LOADER	LIFT ARM	HOIST CYLINDER	MIDDLE PIVOT	REAR AXLE PIVOT
D-950	N/A	N/A	210 lbs.	202 lbs.
L-950	275 lbs	140 lbs	210 lbs.	202 lbs.
L-1150	275 lbs	140 lbs	210 lbs.	202 lbs.
L-1350	275 lbs.	202 lbs.	309 lbs.	202 lbs.
L-1850	610 lbs.	250 lbs.	309 lbs.	202 lbs.
L-2350	610 lbs.	389 lbs.	309 lbs.	202 lbs.

These weights are only approximate and provided as a guide for determining proper lifting procedures and equipment. In all cases, adequate equipment should be used to provide a good safety margin.

Component Description

THE LINER

- Consists of two semi-spherical halves that fit in the socket and cap.
- Made of nickel-aluminum-bronze.
- Provides a low friction, high output load carrying capacity.
- Grooved to allow grease to flow between liner surface and ball.

Component Description

THE SPACER

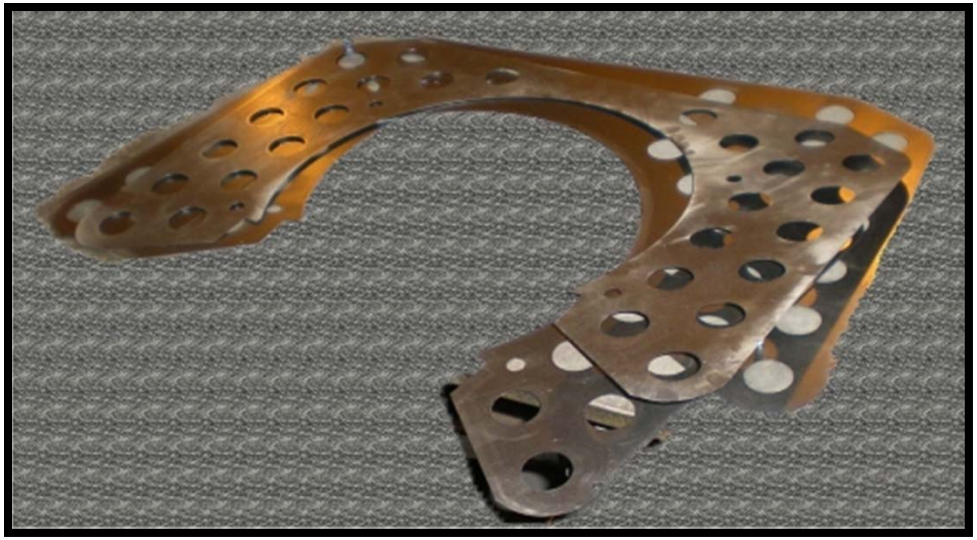
The spacer serves two purposes:

- One -- is to complete the sphere of the cap and socket.
- Two -- locks the liner halves into the socket and cap and prevents them from rotating in the joint.

Component Description

THE SHIMS

The purpose of the shims are to provide adjustment of the clearance in the joint that allows for movement and lubrication.



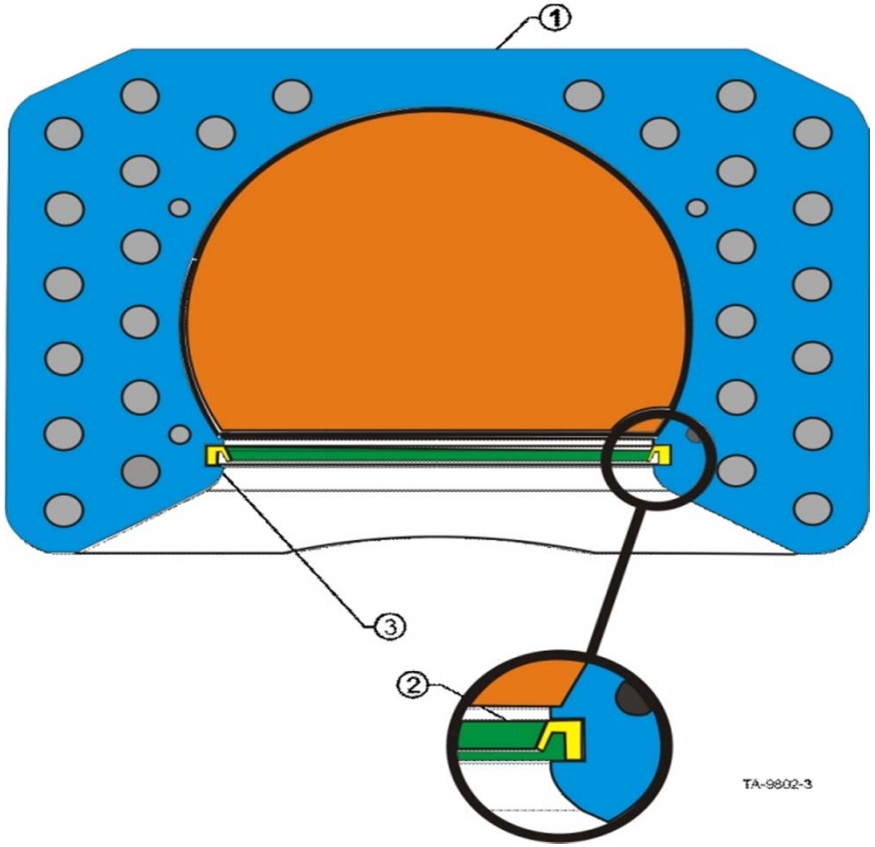
7.5"	9"	12"	14"
1 ea. 3/16" spacer plate 4 ea. .030" shim 1 ea. .018" shim 4 ea. .007" shim	1 ea. 3/16" spacer plate 4 ea. .030" shim 2 ea. .018" shim 2 ea. .007" shim	1 ea. 3/16" spacer plate 4 ea. .030" shim 2 ea. .018" shim 2 ea. .007" shim	1 ea. 1/4" spacer plate 2 ea. .030" shim 2 ea. .018" shim

Component Description

THE LIP SEAL

The purpose of the lip seal is to:

- prevent contamination from entering the socket joint.
- It also prevents water from entering the joint during washing of the machine.



1. Socket or Cap
2. Seal
3. Seal Groove

Component Description

BOLTS

Ball Cap Location	Machine	Capscrew	LeT P/N	Torque Value	
				Ft.-Lb.	N•M
Lift Arms*	L-950	1-1/4"			
	L-1150	1-1/4"			
	L-1350	1-1/4"-7 x 6" UNRC	423-3222	1900	2584
	L-1850/ L-2350	1-1/4"-7 x 10" UNRC	424-1671		
Hoist Cylinders* Middle Pivot Rear Axle *NOT APPLICABLE ON DOZER	D-950 L-950 L-1150 L-1350 L-1850/ L-2350	1-1/4"-7 X 6" (Ball caps with countersunk holes)	423-3222	1744	2365
		1-1/4"-7 X 8-1/2" (Ball caps with non-countersunk holes)	424-3968		

Use only capscrews available under LeTourneau Technologies P/N shown for these applications. Inspect the thread count, size of bolt and type of bolt removed from the original application before installing new bolts. Always make sure the bolt thread count, size and type matches the old or new application before installing bolts. Lube with engine oil only.

Component Description

THE COMPLETE BALL JOINT

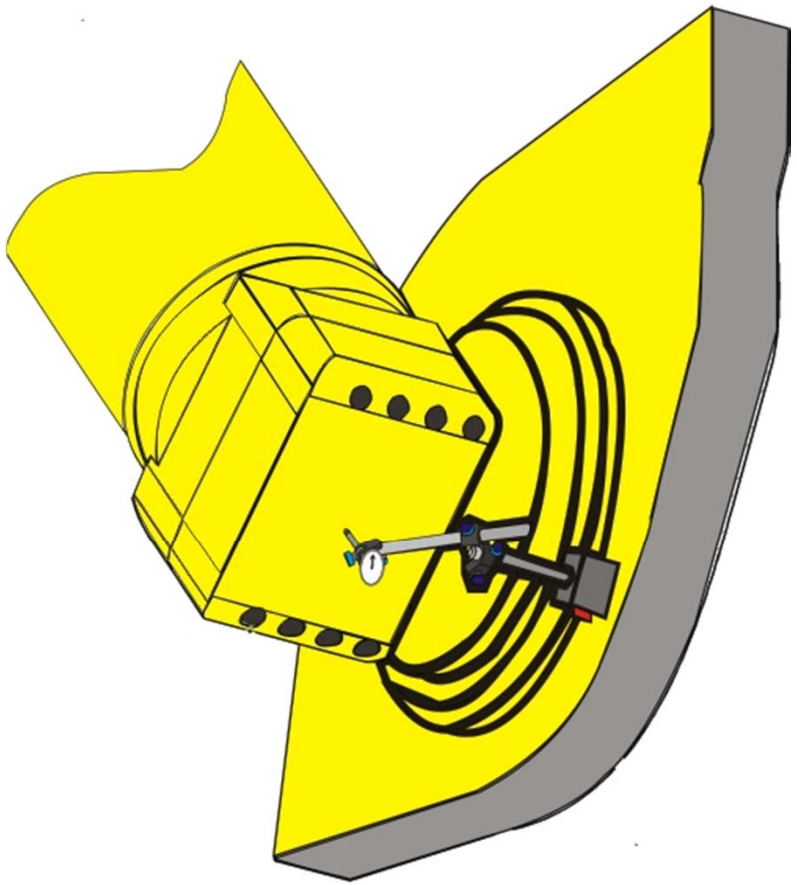
Circuit Description

BALL SOCKET JOINT CLEARANCES

BALL BASE SPECIFICATIONS				
Nominal diameter	**7.5"**	**9”**	**12”**	**14”**
Machined diameter	7.500" ± .003”	8.997” ± .003”	12.000” ± .003”	14.000” ± .003”
*Max ball wear before liner may be affected	0.060"	0.065”	0.070”	0.080”
BALL SOCKET SPECIFICATIONS				
Machined diameter	8.003" ± .002”	9.503” ± .002”	12.503” ± .002”	14.503” ± .002”
*Maximum socket wear before liner may be affected.	0.030"	0.030”	0.030”	0.030”
BALL BASE/SOCKET/CAP ASSEMBLY SPECIFICATIONS				
NEW LINER (OR NEW BALL/SOCKET) SETUP				
	7.5"	**9”**	**12”**	**14”**
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
New setup endplay reading	0.011-0.015"	0.014-0.018”	0.018-0.024”	0.021-0.028”
PM CHECKS AND SETUP				
Min. reading at PM	0.011"	0.014”	0.018”	0.021”
Max. reading at PM check (if higher, then shims must be removed.)	0.030"	0.036”	0.048”	0.056”
range after PM shim removal.	0.011-0.015"	0.014-0.018”	0.018-0.024”	0.021-0.028”
Minimum shim pack before replacing liners	3/16" spacer plate	3/16” spacer plate	3/16” spacer plate	1/4” spacer plate

Settings & Adjustments

PLACEMENT OF INDICATOR

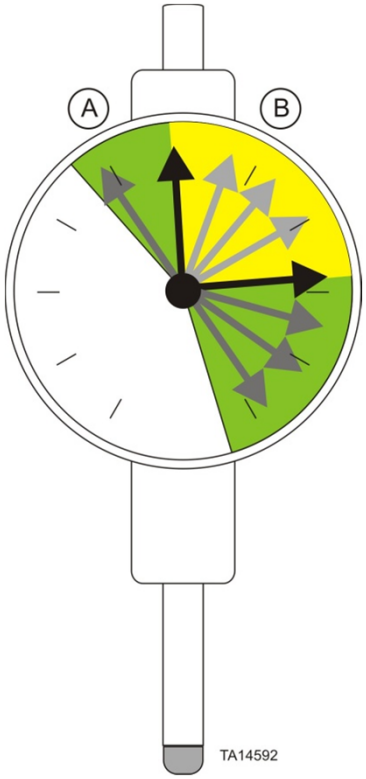


TA9520-8w

Settings & Adjustments

READING JOINT CLEARANCE

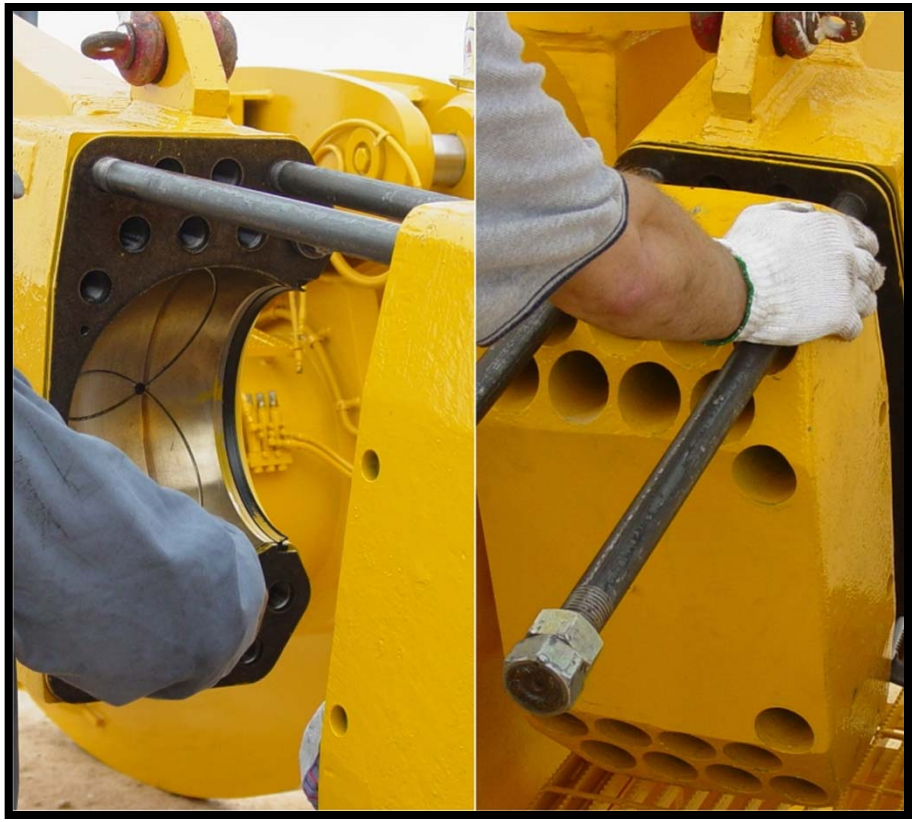
The joint clearance is referred to as the “Snap Value”



(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**.

ADJUSTING THE CLEARANCE

To adjust the clearance in the joint, you add or take away shim plates.



EXCESSIVE HEAT IN JOINT

Causes:

- Clearance too tight.
  - a. Check adjust of clearance.

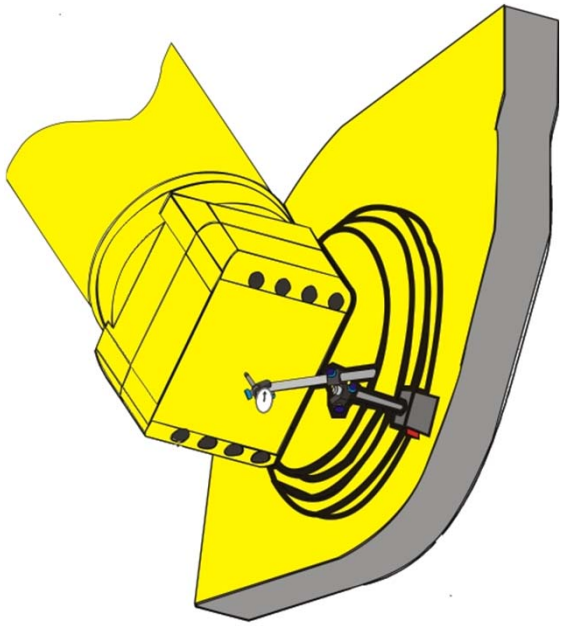
- Lack of lubrication .
  - Check lubrication supply.
  - Check lubrication lines.

- Liners out of specification

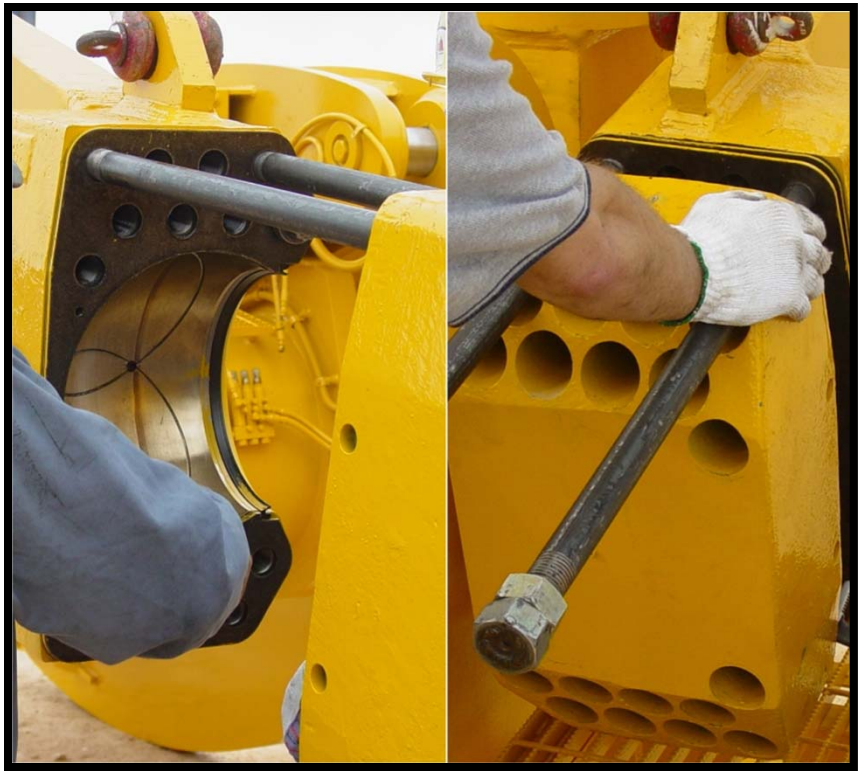
- Warped socket or cap.

JOINT IS TOO TIGHT

Check clearance of Joint.



TA9520-8w



Add shim to adjust.

LUBRICATION

Make sure that there is fresh grease present at the joint.

Make sure there is grease in the grease reservoir

Check injector settings.

Check for broken or loose grease lines.

LUBRICATION

The joints are lubricated by two methods:

- From the outside of the ball socket and cap.
- From the center of the ball.

Troubleshooting

LUBRICATION

Lubrication from the outside of the joint is done at the:

- Liftarm Hoist Cylinder
- Rear Axle

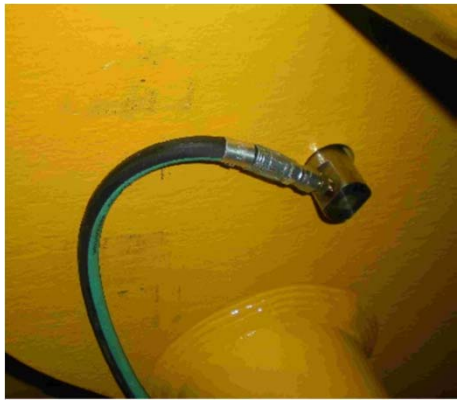
Troubleshooting

LUBRICATION

Lubrication from the center of the ball done at the:

Liftarm Ball and the Middle Pivot

The Liftarm ball uses a drilled and taped plug with a lube line attached.



The middle pivot uses a thru hole tapped at the bottom and nipple extension.

LUBRICATION

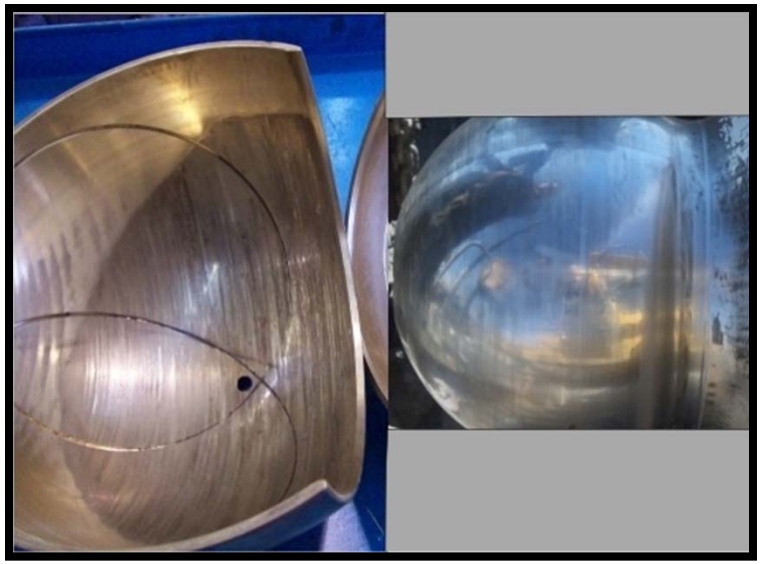
Center plug not installed in hoist cylinder balls could cause:

Troubleshooting

INSPECTION

Worn Socket and Cap.

Worn Ball



Cracked or broken Ball or Slab.

Troubleshooting

WORN SOCKET OR BALL

BALL SOCKET SPECIFICATIONS				
Nominal diameter	**7.5"**	**9”**	**12”**	**14”**
Machined diameter	8.003" ± .002”	9.503” ± .002”	12.503” ± .002”	14.503” ± .002”
*Maximum socket wear before liner may be affected.	0.030"	0.030”	0.030”	0.030”

If any of these measurements are out of specification replace the socket and cap.

BALL BASE SPECIFICATIONS				
Nominal diameter	**7.5"**	**9”**	**12”**	**14”**
Machined diameter	7.500" ± .003”	8.997” ± .003”	12.000” ± .003”	14.000” ± .003”
*Max ball wear before liner may be affected	0.060"	0.065”	0.070”	0.080”

Replace Balls using Let 1 welding procedures.

REPAIR OF SOCKET OR BALL

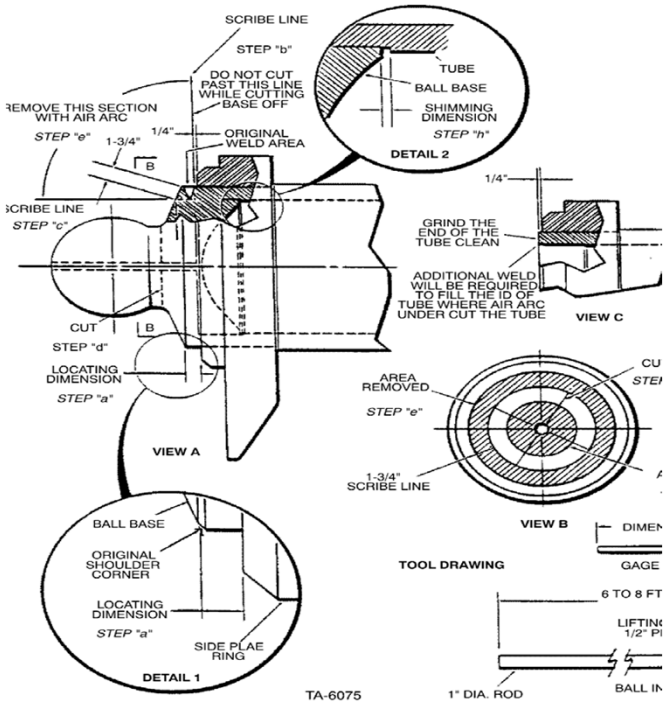
Follow Let 1 procedure for removal and installation repairs of balls and sockets.

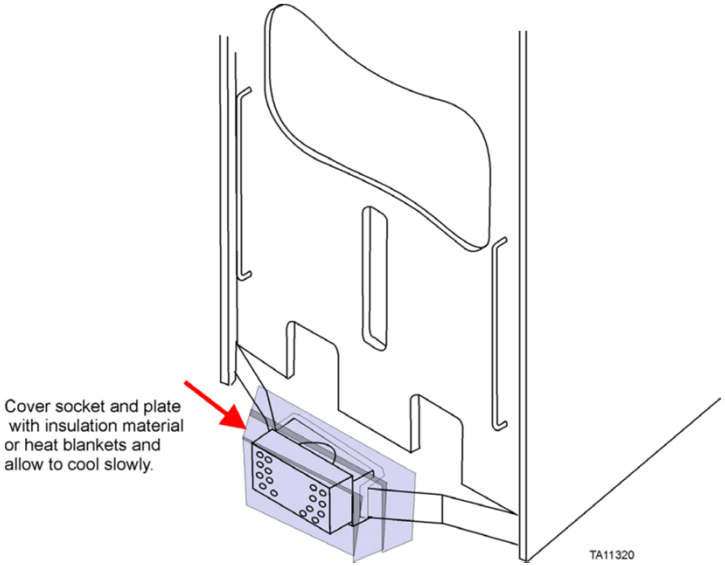
Do not do this.

Pre-heat before gouging and welding.
Maintain heat during welding.

CRACKED AND BROKEN BALLS

When welding use Let 1 Field Welding Procedure found on Knowledge Base Article 436.





Make sure preheat is used and post heat is used.

Removal and installation

JOYGLOBAL

P&H

P&H Brand LeTourneau-Series wheel loader