250D and 300D
(Serial No. 200537 - 609165)
Articulated Dump Truck Repair

TECHNICAL MANUAL

250D and 300D (S.N. 200537 — 609165) Articulated Dump Truck Repair

TM2116 16SEP13 (ENGLISH)

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For complete service information also see:

250D and 300D (S.N. 200537—609165) Articulated Dump Truck Operation and Test	TM2115
250D and 300D (S.N. 200537—609165) Articulated Dump Truck Operator's Manual	OMT201340
8.1L Base Engine.....	CTM86
Level 9 Electronic Fuel Systems with Denso High Pressure Common Rail.....	CTM255
Alternators and Starter Motors	CTM77
OEM Engine Accessories	CTM67
120 Series Hydraulic Cylinders.....	CTM114319
Specifications Manual.....	SP458VOL2

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Original Instructions. All information, illustrations and specifications in this manual are based on the latest information available at the time of publication. The right is reserved to make changes at any time without notice.

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General Information

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14. Remove cap screws (2).
15. Remove carrier cover (1) at carrier cover notches (3) with pry bar.

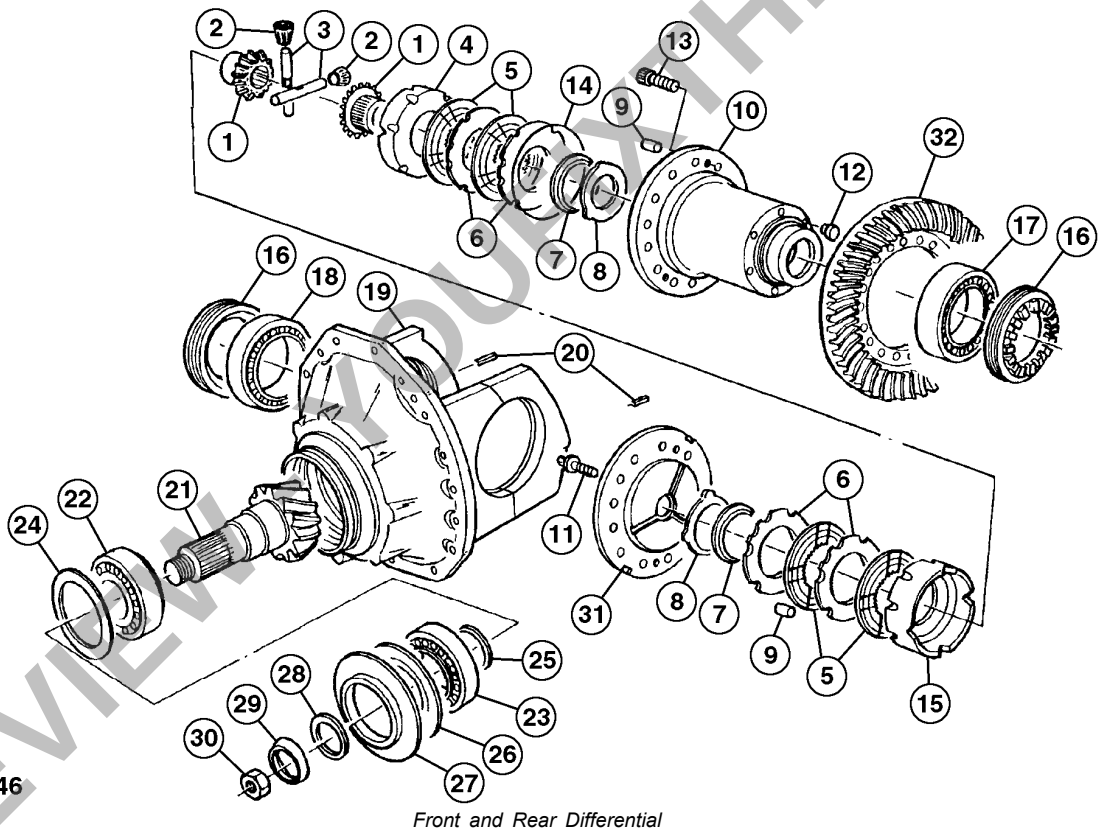
1— Carrier Cover
2— Cap Screw (2 used)
3— Carrier Cover Notch (2 used)



T128106B —UN—17FEB00

Differential Case Cover

SW03989,000094B -19-08AUG11-8/12



TX1007846 —UN—17MAY06

Front and Rear Differential

1— Axle Bevel Gear (2 used)
2— Bevel Gear (4 used)
3— Cross Shaft (2 used)
4— Ring Housing
5— Friction Clutch Disk with Inner Spline (4 used)
6— Steel Clutch Disk (4 used)
7— Thrust Washer (2 used)
8— Thrust Washer (2 used)
9— Dowel Pin (12 used)
10— Carrier Housing
11— Cap Screw (12 used)
12— Sealing Cap (6 used)
13— Cap Screw (2 used)
14— Lock Ring
15— Housing
16— Carrier Bearing Adjusting Nut (2 used)
17— Roller Bearing and Cup
18— Roller Bearing and Cup
19— Housing
20— Lock Pin (2 used)
21— Pinion Shaft
22— Roller Bearing and Cup
23— Roller Bearing and Cup
24— Selective Shim
25— Selective Spacer
26— Seal
27— Dust Shield
28— Bushing
29— Washer
30— Pinion Nut
31— Carrier Cover
32— Ring Gear

16. Remove thrust washers (7 and 8).
17. Remove dowel pins (9).
18. Remove clutch disks (5 and 6).

Continued on next page

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Wheel Repair

Remove and Install Wheel

1. Park the machine on firm, level ground.

CAUTION: When servicing a machine and one of the wheels is raised off the ground using a jack, install wheel chocks under one or more of the other wheels. There is a possibility machine can roll off the jack, even with the park brake is engaged.

2. Install wheel chocks under one or more of the wheels not being removed.
3. Loosen flange nuts (1) one turn before lifting wheel off ground.

CAUTION: Heavy component; use a hoist.

Wheel—Specification

250D Articulated Dump Truck—Weight..... 17 700 kg (39,000 lb) approximate
300D Articulated Dump Truck—Weight..... 18 200 kg (41,000 lb) approximate

4. Raise wheel being removed off the floor using a 18-t (20-ton) service jack under axle housing.
5. Place a 18-t (20-ton) floor stand under axle housing.

CAUTION: Heavy component; use a hoist.

Wheel—Specification

Tire and Rim—Weight.....520 kg (1144 lb) approximate

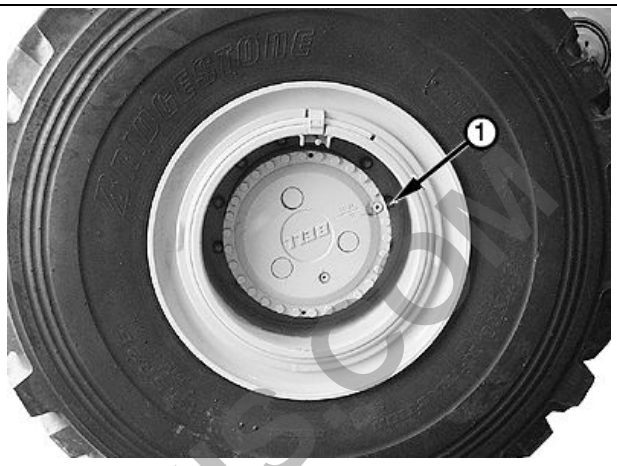
6. Place a wheel lift (2) under raised wheel. Fasten chain around upper portion of tire.
7. Remove flange nuts and washers.
8. Remove wheel.

IMPORTANT: Paint, rust, and dirt must be removed from threads of wheel bolts and flange nuts, mating surfaces of flange nuts, washers, rim, and hub to ensure good contact between all surfaces. Paint, rust, and dirt prevents good contact between the surfaces and can result in the wheels coming loose.

9. Clean threads of wheel bolts and flange nuts, mating surfaces of flange nuts, washers, rim, and hub.

IMPORTANT: Check tire diameter before installing wheel. Difference in tire diameter must be within 2% across axles and between axles. Excessive differences in tire rollout will cause drivetrain malfunctions.

10. Install wheel on hub.
11. Install washers and flange nuts.



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1— Flange Nut and Washer

2— JT05726 Wheel and Axle Lift

12. Tighten flange nuts to specification in increments using a crisscross pattern.

Wheel—Specification

Rim-to-Hub Flange Nut—Torque.....650 N·m (480 lb-ft) (check after five hours of operation and then every 50 hours)

13. Lower machine to ground.
14. Check and tighten flange nuts as needed after machine has been driven for five hours and then every 50 hours of operation.

Continued on next page

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Front and Rear Axle Differential Repair

NOTE: Front axle shown. Procedure is same for rear axle.

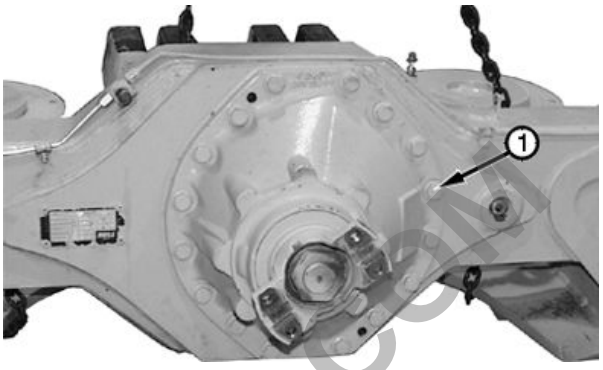
1. Remove axle. See Front Axle Remove and Install. (Group 0200.)

CAUTION: Heavy component; use a hoist.

Differential—Specification

Front Axle—Weight	1111 kg (2450 lb.) approximate
Rear Axle—250D—Weight	907 kg (2000 lb.) approximate
Rear Axle—300D—Weight	1043 kg (2300 lb.) approximate

2. Drain axle housing. The approximate axle oil capacity is 39.7 L (10.5 gal.). See Change Axle Oil. (Operator's Manual.)
3. Drain final drive planetaries. The approximate final drive planetary oil capacity is 2.0 L (2.1 qt.) each. See Change Final Drive Oil. (Operator's Manual.)



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Differential Mounting Cap Screws

1— Cap Screw (16 used)

4. Remove axle shafts. See Axle Shaft Repair. (Group 0250.)
5. Remove cap screws (1).

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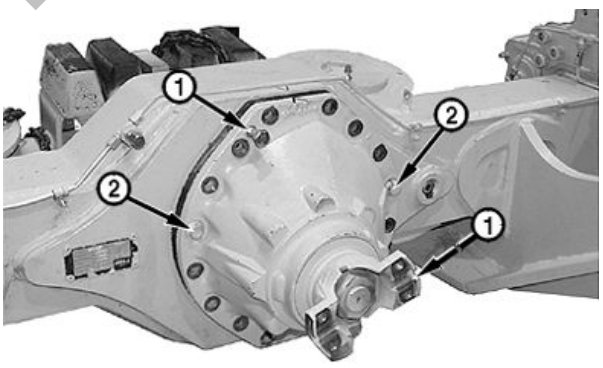
CAUTION: Heavy component; use a hoist.

Differential—Specification

Front or Rear Axle Differential—Weight	96 kg (212 lb.) approximate

6. Install cap screws (2) to guide and position differential during removal.
7. Install longer cap screws (1) in threaded holes. Tighten evenly to separate differential from axle housing.

1— Cap Screw (2 used) **2— Guide Cap Screw (2 used)**



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Differential Removal

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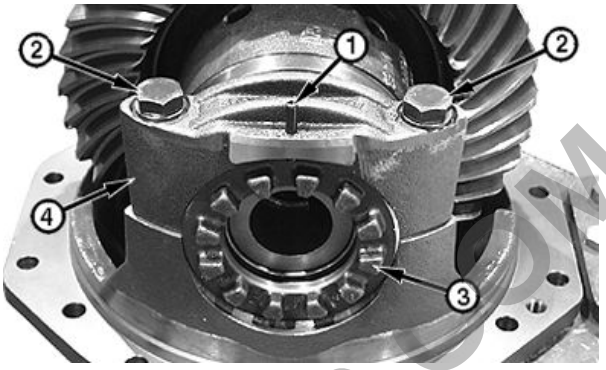
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93. Drive spring pins (1) down to hold adjusting nuts (3).

1— Spring Pin (2 used)
2— Cap Screw and Washer (2 used)
3— Adjusting Nut (2 used)
4— Bearing Cap



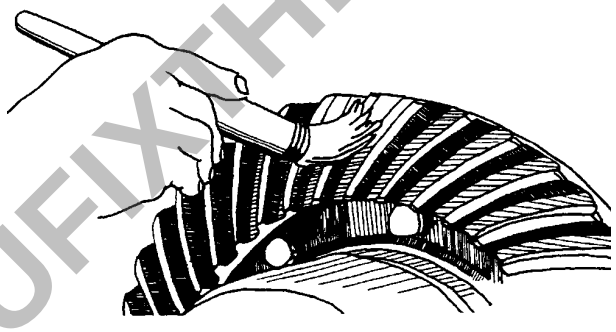
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Carrier Bearing Caps and Adjusting Nuts

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Check Gear Tooth Contact Pattern

1. Coat several ring gear teeth with marking compound.
2. Turn ring gear so pinion gear leaves a wear pattern through marking compound.



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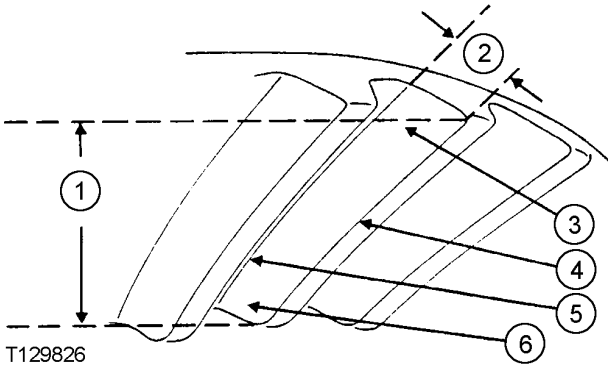
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3. Inspect wear pattern.

   The length and shape of contact pattern varies, especially for used gears.

   The position of contact pattern is important for all gears. Wear pattern must not be too much toward tooth heel (3), and must not run off of toe (6). Pattern should be centered between top land (4) and root (5).

1— Face Width
2— Tooth Depth
3— Heel
4— Top Land
5— Root
6— Toe



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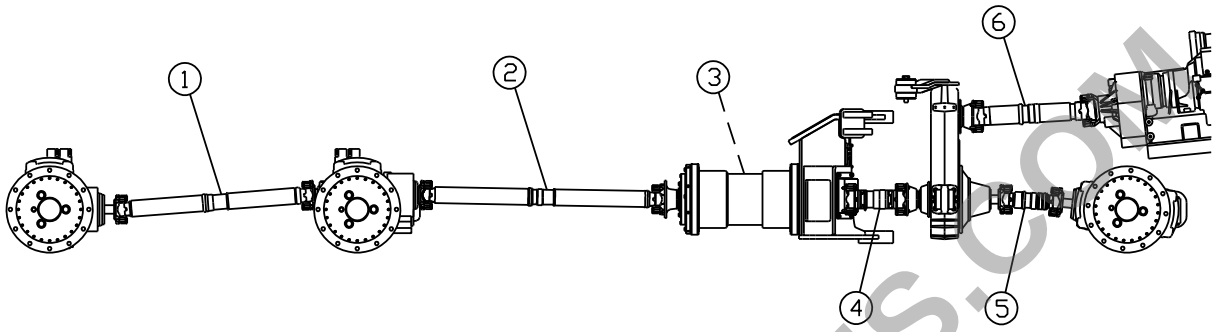
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Drive Shaft Repair



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T148689 —UN—04JAN02

1— Middle Axle-to-Rear Axle Drive Shaft
2— Oscillation Tube-to-Middle Axle Drive Shaft
3— Oscillation Tube Through-Drive Shaft
4— Transfer Case-to-Oscillation Tube Drive Shaft
5— Transfer Case-to-Front Axle Drive Shaft
6— Transmission-to-Transfer Case Drive Shaft

For removal and installation of transmission-to-transfer case drive shaft (6), See Transmission-to-Transfer Case Drive Shaft Remove and Install. (Group 0325.)

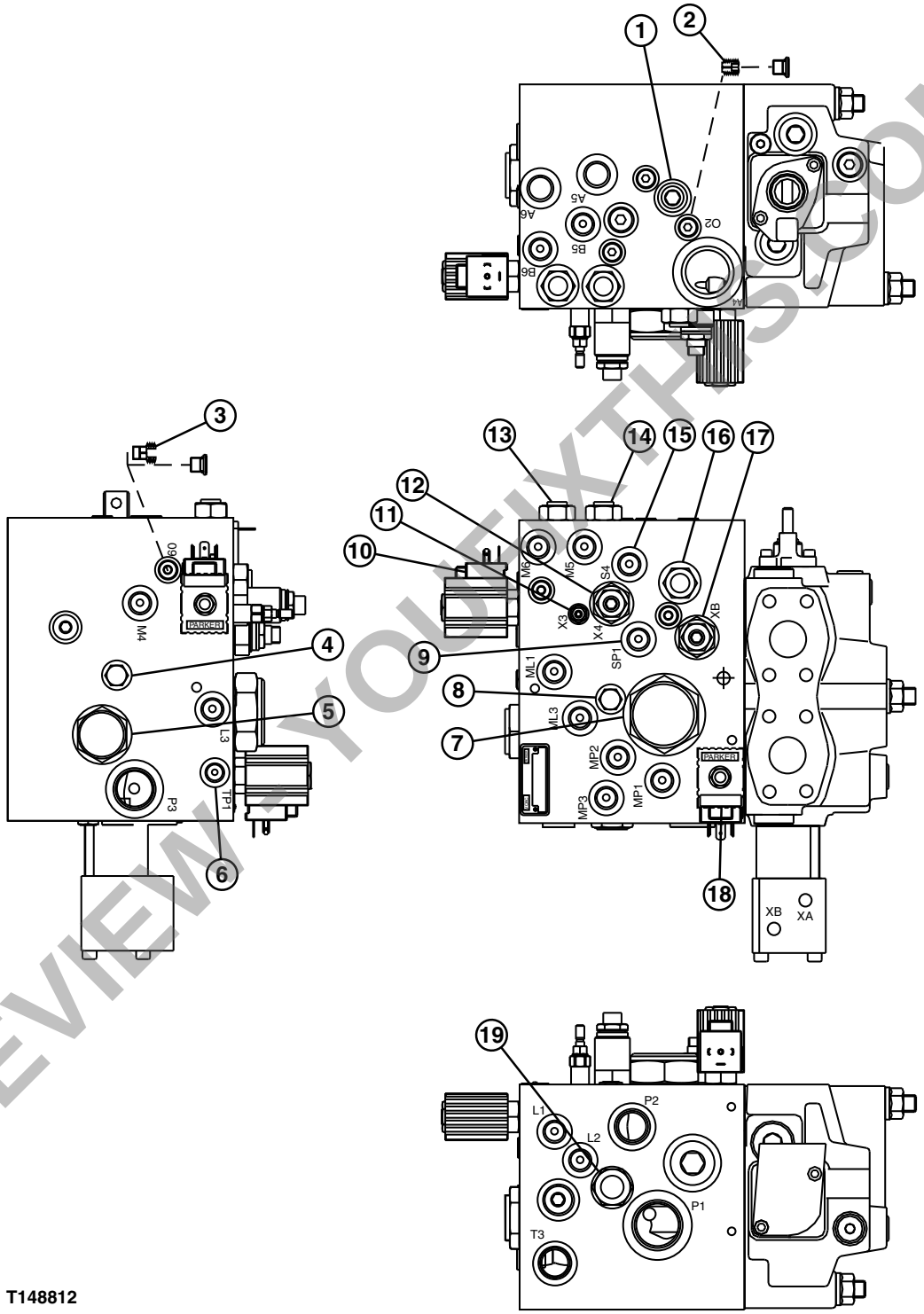
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Disassemble and Assemble Hydraulic System Manifold



T148812

T148812 —UN—10DEC01

Hydraulic System Manifold Valve Locations

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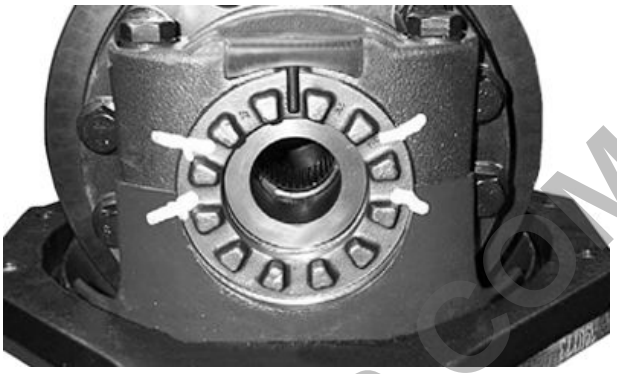
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5. With a white marking pen, mark the lock nut on the setting side as shown. Likewise, mark the lock nut on the other side of the differential.



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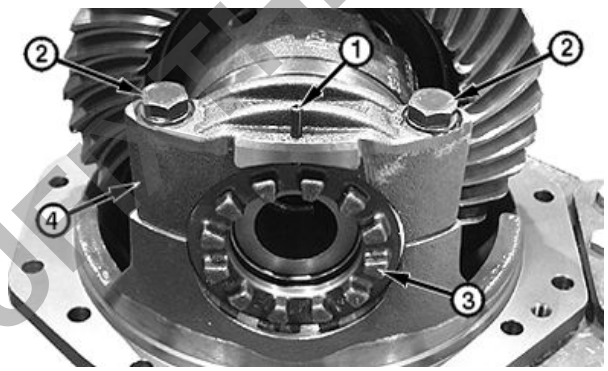
Marking Lock Nut

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6. Mark bearing caps (4). Bearing caps are similar and must be returned to their original location.
7. Remove lock pin (1).
8. Loosen cap screws (2).
9. Loosen adjusting nuts (3) with JDG1278 Axle Spanner Nut Wrench at least one full turn.
10. Remove parts (2—4).

⚠ CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

11. Remove carrier with lifting strap.



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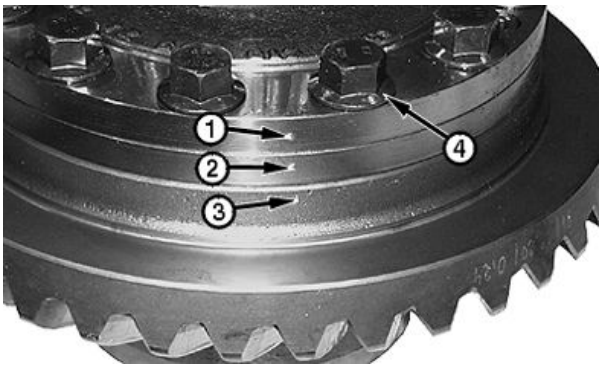
Unlocked Position (shown)

1— Lock Pin
2— Cap Screw and Washer (4 used)
3— Adjusting Nut (2 used)
4— Bearing Cap (2 used)

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12. Use hammer and punch to mark carrier case (2), carrier cover (1), and ring gear (3).
13. Remove cap screws (4) and ring gear.

1— Carrier Cover
2— Carrier Case
3— Ring Gear
4— Cap Screw (12 used)



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Case and Ring Gear

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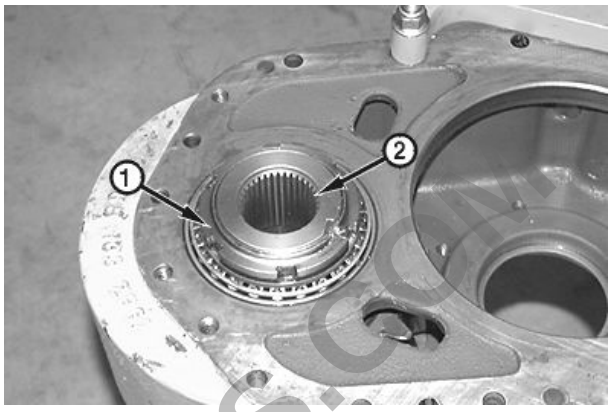
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14. Using a hammer and chisel, remove staking from spanner nut (1).
15. Hold yoke on drive shaft (2) and remove spanner nut with JDG1348 Axle Pinion Lock-Nut Socket if it is a hex nut, or JDG1848 Spanner Nut Socket if it is a notched castle nut.

1— Spanner Nut **2— Drive Shaft**



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Spanner Nut

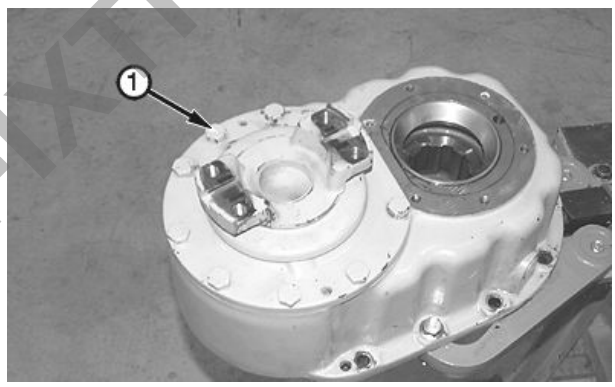
TX19495,0000039 -19-09SEP13-10/70

16. Remove input drive shaft yoke spanner nut using JDG1348 Axle Pinion Lock-Nut Socket if it is a hex nut, or JDG1848 Spanner Nut Socket if it is a notched castle nut.
17. Remove input drive shaft yoke from shaft.
18. Remove cap screws (1) from bearing housing (3).

NOTE: Support bearing on bottom of case. Bearing will fall to floor as bearing housing is separated from case.

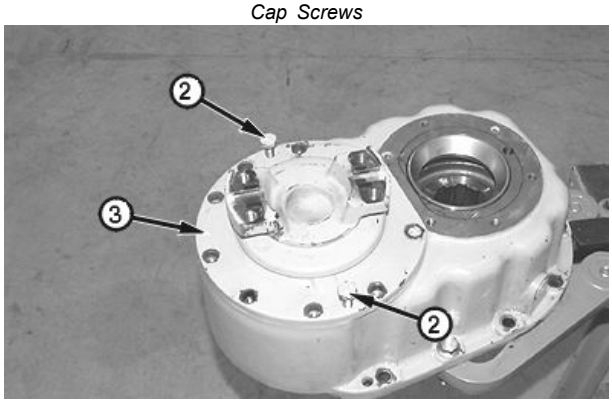
19. Install two longer cap screws (2) in threaded holes.
20. Support bearing and evenly tighten cap screws (2) to separate bearing housing from case.

1— Cap Screw (10 used) **3— Bearing Housing**
2— Cap Screw (2 used)



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Cap Screws



T129417B —UN—23MAR00

Bearing Housing

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Transmission-to-Transfer Case Drive Shaft Remove and Install

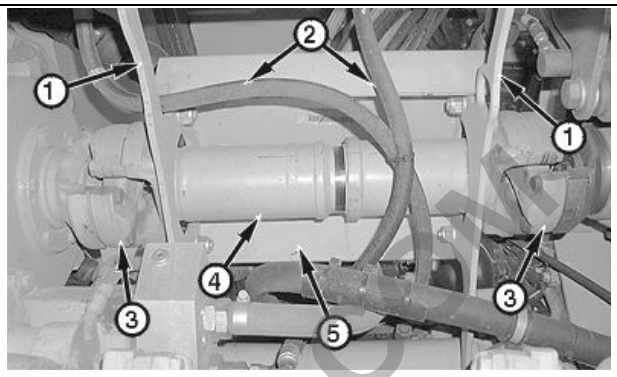
1. Turn steering wheel from side-to-side three times to relieve hydraulic pressure.
2. Raise cab. See Tilt Cab. (See Operator's Manual.)
3. Disconnect shield (5) from brackets (1).
4. Support shield from underside of cab, using a hand-operated ratcheting cable winch.
5. Remove brackets.
6. Disconnect steering cylinder hydraulic lines (2). Close all openings with caps and plugs.

CAUTION: Heavy component; use a hoist.

7. Attach hoist to drive shaft.
8. Disconnect cross and bearing assemblies (3) from transmission and transfer case yokes.
9. Remove drive shaft assembly.
10. Inspect and replace parts as necessary.

IMPORTANT: Assemble drive shaft so yokes on ends of the shaft are aligned. If yokes are not aligned, severe vibration and machine damage may result.

11. Assemble drive shaft so yokes are aligned.
12. Apply rigid form-in-place gasket to cap screws.



T149385B —UN—03JAN02

1— Bracket (2 used)
2— Steering Cylinder Hydraulic Line (2 used)
3— Cross and Bearing Assembly (2 used)
4— Drive Shaft
5— Shield

13. Install drive shaft assembly and tighten cap screws to specification.

Transmission-to-Transfer Case Drive Shaft—Specification

Cap Screw—Torque..... 120 N·m (89 lb-ft)

14. Connect steering cylinder hydraulic lines.
15. Install brackets.
16. Attach shield to brackets.
17. Lower cab. See Tilt Cab. (See Operator's Manual.)

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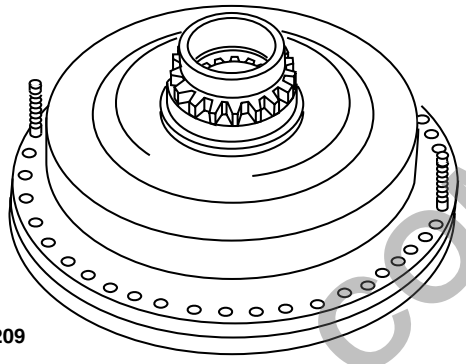
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62. Install two guide pins to assemble converter cover and pump drive cover. Tighten cap screws.

Torque Converter—Specification

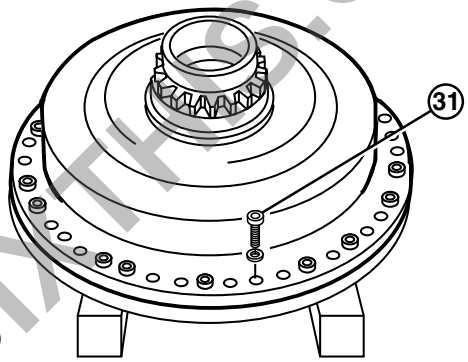
Torque Converter Cap Screws—Torque ..... 35 N·m (26 lb-ft)

31— Cap Screw (36 used)



T150209

T150209 —UN—18JAN02



T150210

T150210 —UN—18JAN02

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OUO1065,000055A -19-22MAY09-15/16

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1— Cap Screw (18 used)
2— Rotor
3— Seal
4— Rectangular Ring
5— Seal Plate
6— Needle Bearing
7— Dowel Pin
8— Hub
9— Pin
10— Snap Ring
11— Retainer Pins (3 used)
12— Snap Ring
13— Lip Seal
14— Clutch C Piston
15— Lip Seal
16— Clutch Carrier
17— Seal
18— Clutch B Piston
19— Seal
20— Clutch B End Plate
21— Clutch B Inner Plate
22— Pin (9 used)
23— Spring (9 used)
24— Retaining Pin (2 used)
25— Pin (9 used)
26— Clutch B Outer Plate
27— Clutch B End Plate
28— Clutch C Inner Plate
29— Clutch C Outer Plate
30— Clutch C End Plate
31— O-Ring
32— Reverse Gear Housing
33— Lip Seal
34— Lip Seal
35— Clutch A Piston
36— Spring Plate
37— Retainer Plate
38— Snap Ring
39— Spring Plate
40— Retainer Plate
41— Clutch A Inner Plate
42— Clutch A Outer Plate
43— Clutch A End Plate
44— Split Ring

CAUTION: The Approximate weight of clutch carrier is 25 kg (55 lb).

1. Remove cap screw (1) and rotor (2).
2. Remove rectangular ring (4) and seal plate (5).
3. Compress clutch C piston springs with JDG1618 Clutch Spring Compressor and remove snap ring (12).
4. Remove clutch C piston (14).

Continued on next page

OUO1048,0000AF7 -19-26MAY09-2/33

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1. Use measuring bar and measuring blocks to measure sun gear height with needle bearing (2) and thrust washer (3) in place. Record as dimension (A).
2. With same measuring blocks measure intermediate housing without gasket at several locations.
3. Calculate average sun gear height. Record as dimension (B).
4. To calculate sun gear height, subtract dimension (A) from dimension (B). Record as dimension (C). B-A = C
5. Position gasket on output housing.
6. Measure output planetary carrier height at several locations.
7. Calculate average output planetary carrier height and record as dimension (F).
8. Measure planetary carrier thrust washer surface height with measuring blocks and record as dimension (G).
9. To calculate correct shim size (H). Subtract dimension (F) from (G) and record as dimension (D). G-F = F

   Subtract dimension (C) from dimension (D). Record as dimension (E). D-C = E

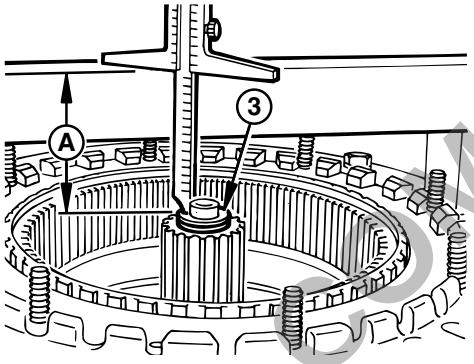
   Subtract sun gear end play specification average 0.5 mm (0.020 in.) from dimension (E). Record as shim size (H). (0.5 mm (0.002 in.) - E) = H shim size.

Output Planetary—Specification

Sun Gear—End Play.....0.4—0.6 mm (0.016—0.024 in.)

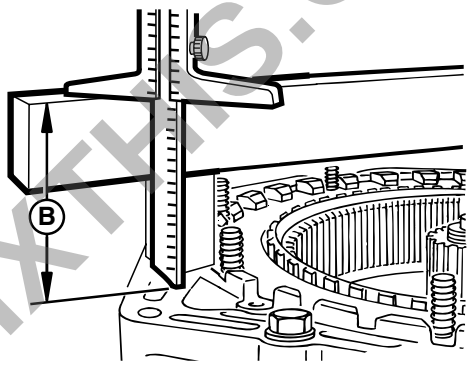
10. Use combination of two shim sizes for end play adjustment.
11. Install needle bearing and shims on sun gear.
12. Remove three cap screws holding intermediate housing and install gasket.
13. Attach DFT1231 Output Assembly Lifting Bracket to output shaft.
14. Install guide pins.
15. Using hoist lower output planetary cover and guide speed sensor harness through housing.

    Planetary gears must align and mesh with sun gear.
16. Tighten cap screws alternating side to side in a cross pattern.



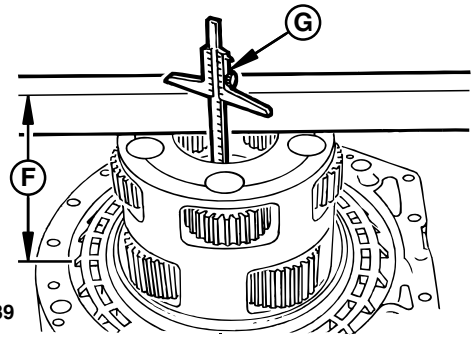
T151238

T151238 —UN—20FEB02



T151231

T151231 —UN—20FEB02



T151239

T151239 —UN—20FEB02

A—Sun Gear Height
B—Intermediate Housing Height
F—Output Carrier Height
G—Output Carrier Thrust Washer Height
3—Thrust Washer

Output Planetary—Specification

Output Planetary Cover
Cap Screw—Torque..... 46 N·m (34 lb-ft)

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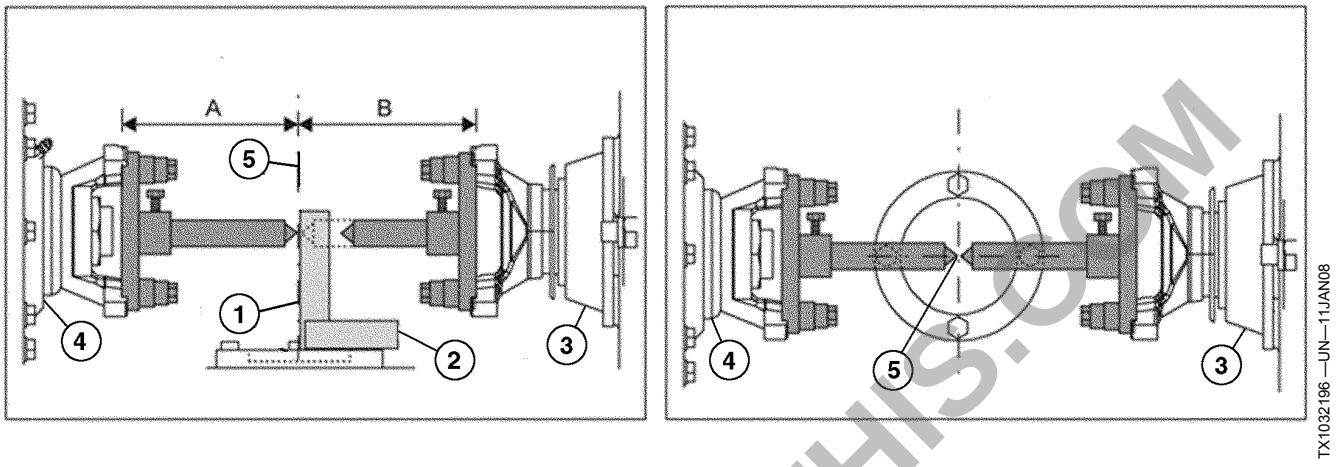
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Oscillation Through Drive

1— Straight Edge
2— Right Angle Square
3— Transfer Case
4— Oscillation Joint
5— Articulation Pivot Point

26. Use a right angle square (2) to determine articulation pivot point (5).
27. Keep the right angle square horizontally flat on the upper surface of the articulation pin, after establishing center point of pin.
28. Adjust pointer to articulation pivot point and tighten cap screw to hold adjustable pointer in place.
29. Measure the distance A and record.
30. Measure the distance B and record.
31. Compare measurements, the difference must be within specification.

Specification

Articulation Pivot Point—Distance	2 mm 0.08 in.

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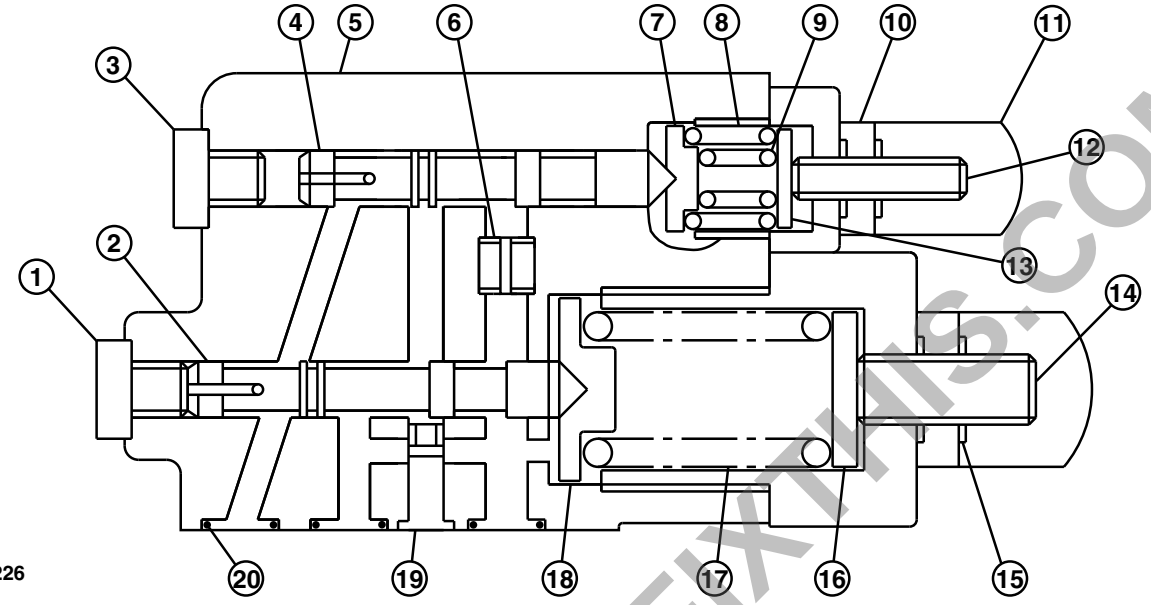
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Disassemble and Assemble Secondary Steering Pump

1. Clean and drain pump.
2. Remove anti-cavitation valve.



1— Plug
2— Compensator Valve Spool
3— Plug
4— Residual Valve Spool
5— Pump Regulator Valve
6— Orifice
7— Spring Guide
8— Outer Spring
9— Inner Spring
10— Nut (2 used)
11— Cap (2 used)
12— Adjusting Screw
13— Plate
14— Adjusting Screw
15— Sealing Washer (4 used)
16— Plate
17— Spring
18— Spring Guide
19— Orifice
20— O-Ring (3 used)

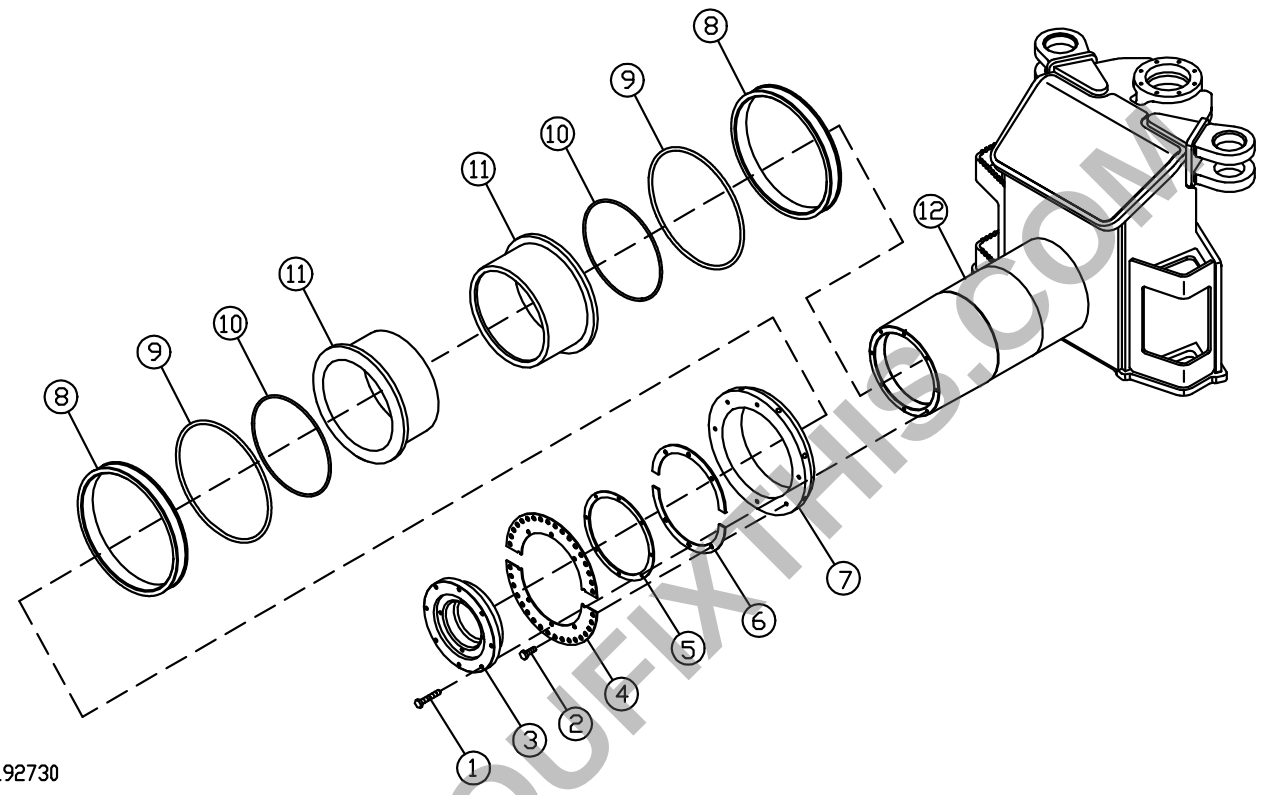
3. Remove regulator valve.
4. Disassemble as necessary.

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T192730

T192730 —UN—14AUG03

1— Bearing Housing-to-Oscillation Tube Cap Screw (8 used)
2— Lock Plate-to-Spanner Nut Cap Screw (6 used)
3— Bearing Housing
4— Lock Plate (2 used)
5— Outer Shim
6— Inner Shim
7— Spanner Nut
8— Seal (2 used)
9— Outer O-Ring (2 used)
10— Inner O-Ring (2 used)
11— Oscillation Bushing (2 used)
12— Oscillation Tube

11. Remove cap screws (1 and 2).
12. Remove locking plates (4) and shims.
13. Install cap screws (1).

CAUTION: Heavy component; use a hoist.

Separate Front and Rear Frames—Specification

Spanner Nut—Weight..... 29 kg (63 lb) approximate

14. Remove spanner nut (7) using a spanner wrench.
15. Remove seal (8) and O-rings (9 and 10) from rear bushing (11).
16. Attach a forklift or other machine to rear towing point of equipment frame.
17. Slowly pull equipment frame rearward to separate oscillation joint. Adjust overhead hoist to keep tube and bushings aligned during separation.
18. Support front of equipment frame with 18-t (20-ton) shop stands.
19. Remove seal (8) and O-rings (9 and 10) from front bushing (11). Discard seal and O-rings.
20. Clean, inspect, repair, and replace parts as necessary.
21. Apply a layer of all-purpose grease inside bushings.
22. Pack space between bushings with grease.
23. Install new O-rings on front bushing.
24. Apply a layer of all-purpose grease to O-rings and to lip of bushing.
25. Install new seal over lip of bushing.

IMPORTANT: Make sure that front bushing O-rings (9 and 10) and seal (8) are not damaged during assembly of oscillation joint.

26. Slowly push equipment frame forward. Adjust overhead hoist to maintain alignment of tube and bushings.
27. Make sure that front bushing O-rings and seal are properly seated.
28. Install new O-rings on rear bushing.
29. Apply a layer of all-purpose grease to O-rings and to lip of bushing.
30. Install seal over lip of bushing.

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TX19495,0000054 -19-26MAY09-5/6

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10. Apply flex activator to edge of the windowpane (4) using a lint free cloth. Allow flex activator to dry.
11. Install the rubber seal (3) on windowpane (4).

IMPORTANT: Avoid windowpane damage. Follow manufacturer's instructions for using adhesive. Allow adhesive to cure before operating machine.

12. Apply a bead of adhesive on the windowpane edge.

Specification	
Adhesive Bead—Size	6 mm 0.25 in.

13. Position windowpane in cab frame. Use hand pressure to force windowpane down until edges are even with frame.

IMPORTANT: Avoid windowpane damage. Allow adhesive to cure for 8 hours before operating machine.

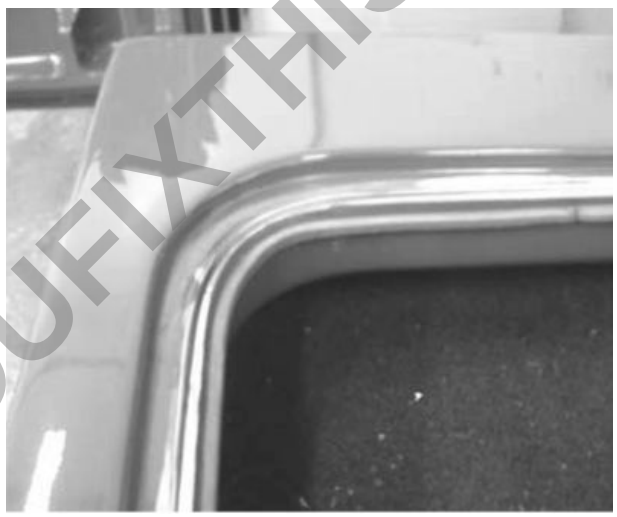
14. Secure windowpane with duct tape or tie straps and wood blocks around cab to hold and maintain windowpane position until adhesive cures. Allow adhesive to cure for 8 hours before operating machine.

JW40272,000005F -19-28JUN10-2/2

Cab Door Window Installation

1. Wipe window flange with ethanol (ethyl alcohol) or isopropyl alcohol (isopropanol) using a clean dry cloth. Allow to dry for 5 minutes.
2. Apply Terostat® 8519P All-in-One Primer to frame flange with wipe-on wipe-off method and allow to dry for a minimum of 10 minutes or a maximum of 2 hours.
3. Wipe door flange with ethanol (ethyl alcohol) or isopropyl alcohol (isopropanol). Allow to dry for 5 minutes.
4. Apply Terostat® 8519P All-in-One Primer to frame flange with wipe-on wipe-off method and allow to dry for a minimum of 10 minutes or a maximum of 2 hours.
5. Using a clean dry cloth, apply Terostat® 8519P All-in-One Primer to F/Glass Flange. Allow to dry for a minimum of 20 minutes or a maximum of 24 hours.
6. Fit gasket roll stock around entire door opening as shown.

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Fitting Gasket Roll Stock

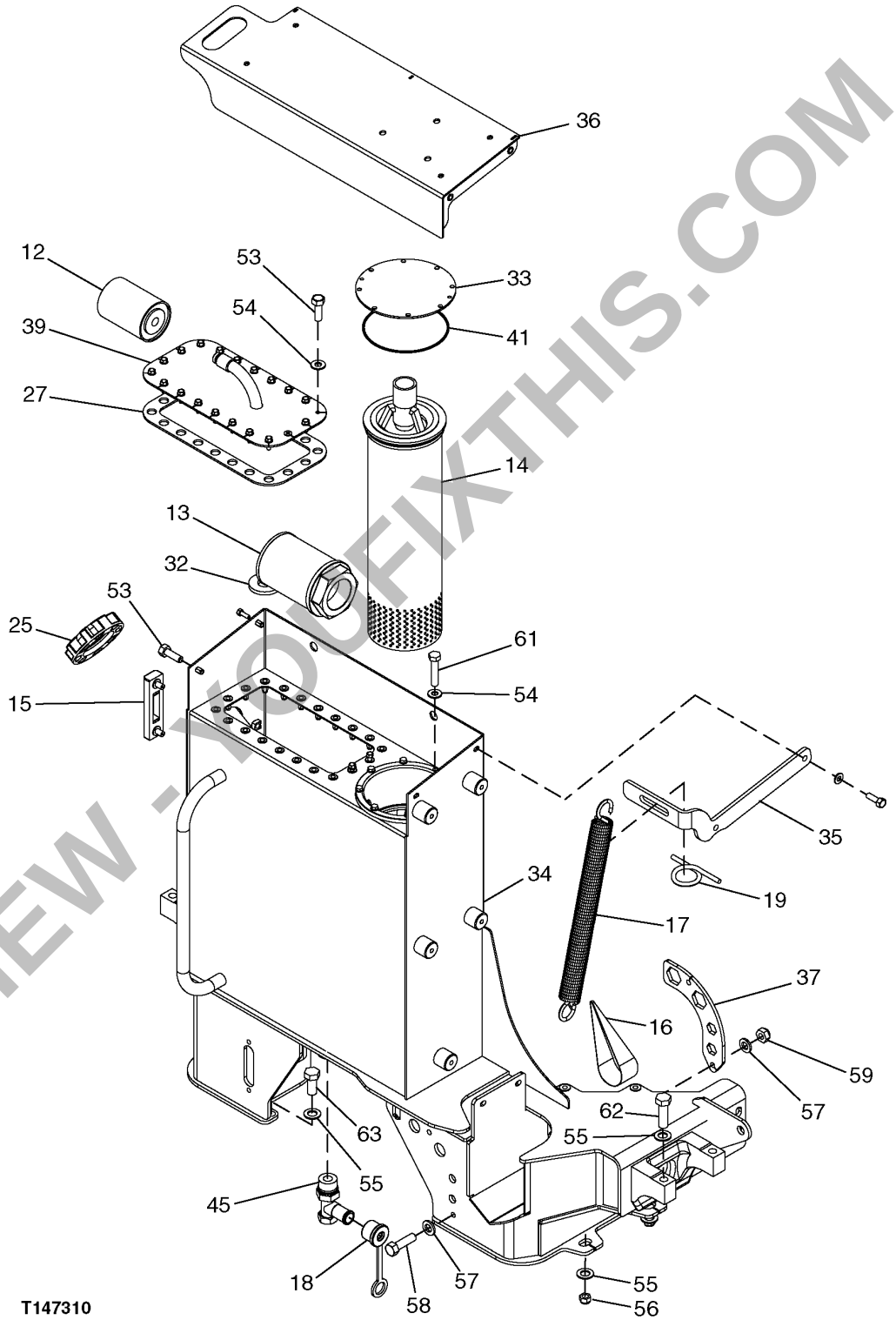
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Hydraulic Reservoir Repair

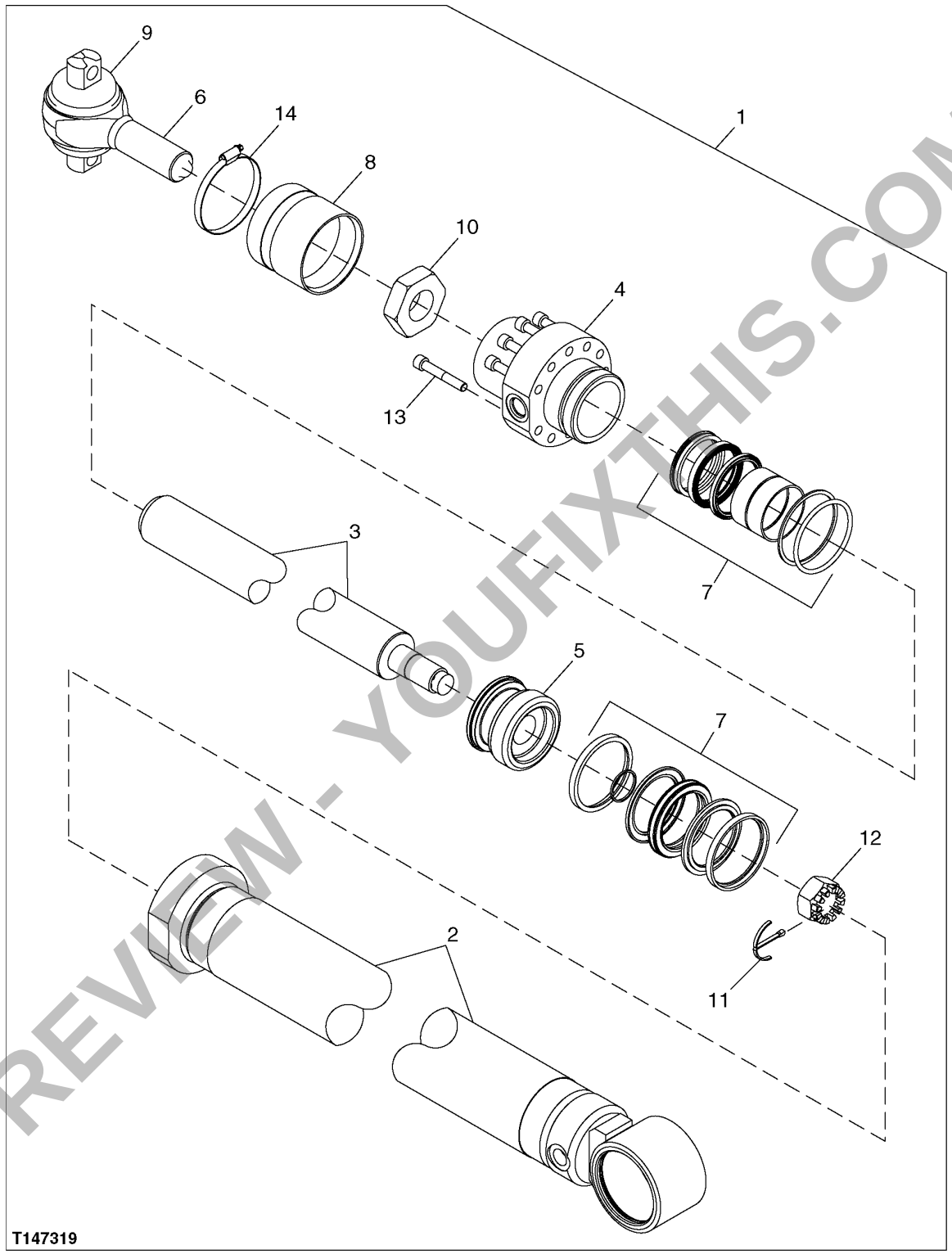


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