450DLC Excavator Repair

TECHNICAL MANUAL
450DLC Excavator Repair

TM2362 25JUN08 (ENGLISH)

For complete service information also see:

Worldwide Construction And Forestry Division

LITHO IN U.S.A.

Recognize Safety Information

This is the safety alert symbol. When this symbol is noticed on the machine or in this manual, be alert for the potential of personal injury.

Follow the precautions and safe operating practices highlighted by this symbol.

A signal word — DANGER, WARNING, or CAUTION — is used with the safety alert symbol. DANGER identifies the most serious hazards.

On the machine, DANGER signs are red in color, WARNING signs are orange, and CAUTION signs are yellow. DANGER and WARNING signs are located near specific hazards. General precautions are on CAUTION labels.

T133555 –UN–28AUG00

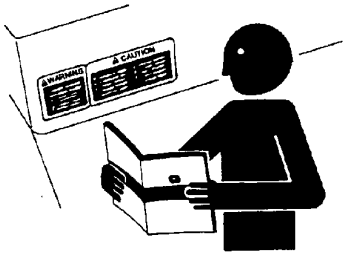
T133588 –19–28AUG00

TX03679,00016CC –19–03JAN07–1/1

Follow Safety Instructions

Read the safety messages in this manual and on the machine. Follow these warnings and instructions carefully. Review them frequently.

Be sure all operators of this machine understand every safety message. Replace operator's manual and safety labels immediately if missing or damaged.



T133556 –UN–24AUG00

TX03679,00016F9 –19–03JAN07–1/1

Operate Only If Qualified

Do not operate this machine unless the operator's manual has been read carefully, and you have been qualified by supervised training and instruction.

Operator should be familiar with the job site and surroundings before operating. Try all controls and machine functions with the machine in an open area before starting to work.

Know and observe all safety rules that may apply to every work situation and work site.

TX03679,00016FA –19–03JAN07–1/1

Park and Prepare for Service Safely

Warn others of service work. Always park and prepare your machine for service or repair properly.

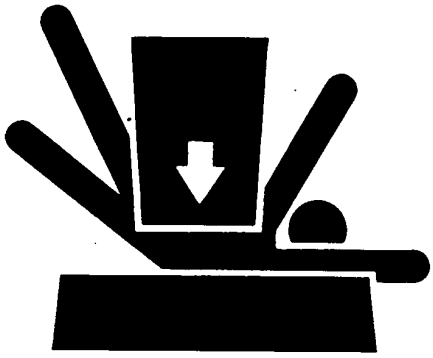
- Park machine on a level surface and lower equipment to the ground.
- Place pilot control shutoff lever in “lock” position. Stop engine and remove key.
- Attach a “Do Not Operate” tag in an obvious place in the operator’s station.

Securely support machine or equipment before working under it.

- Do not support machine with boom, arm, or other hydraulically actuated attachments.
- Do not support machine with cinder blocks or wooden pieces that may crumble or crush.
- Do not support machine with a single jack or other devices that may slip out of place.

Understand service procedures before beginning repairs. Keep service area clean and dry. Use two people whenever the engine must be running for service work.

T133332 –19–14DEC01



TS229 –UN–23AUG88

TX03679,00016E9 –19–24JAN07–1/1

Service Cooling System Safely

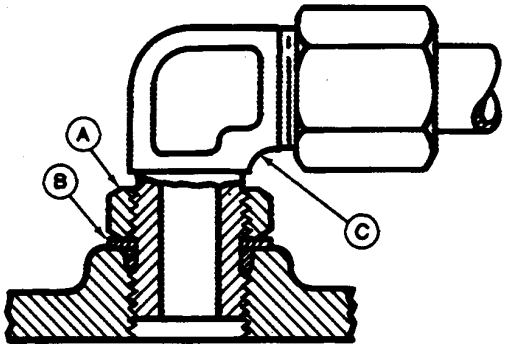
Explosive release of fluids from pressurized cooling system can cause serious burns.

Shut off engine. Only remove filler cap when cool enough to touch with bare hands. Slowly loosen cap to first stop to relieve pressure before removing completely.

TS281 –UN–23AUG88

DX,RCAP –19–04JUN90–1/1

Angle Fitting



T6520AB –UN–18OCT88

1. Back-off lock nut (A) and back-up washer (B) completely to head-end (C) of fitting.
2. Turn fitting into threaded boss until back-up washer contacts face of boss.
3. Turn fitting head-end counterclockwise to proper index (maximum of one turn).

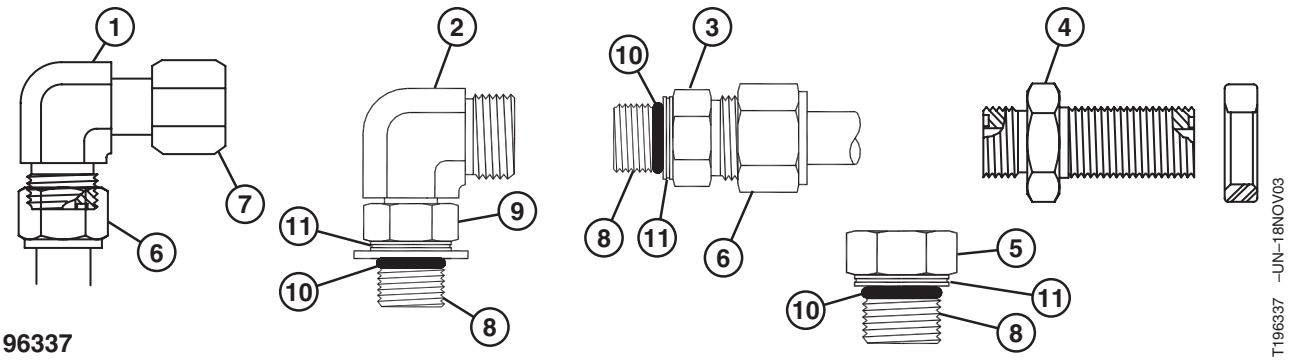
NOTE: Do not allow hoses to twist when tightening fittings.

4. Hold fitting head-end with a wrench and tighten locknut and back-up washer to proper torque value.

STRAIGHT FITTING OR SPECIAL NUT TORQUE CHART		
Thread Size	**N•m**	**lb-ft**
3/8-24 UNF	8	6
7/16-20 UNF	12	9
1/2-20 UNF	16	12
9/16-18 UNF	24	18
3/4-16 UNF	46	34
7/8-14 UNF	62	46
1-1/16-12 UN	102	75
1-3/16-12 UN	122	90
1-5/16-12 UN	142	105
1-5/8-12 UN	190	140
1-7/8-12 UN	217	160
NOTE: Torque tolerance is ± 10%.		

04T,90,K66 –19–29SEP99–2/2

O-Ring Face Seal Fittings With Metric Hex Nut And Stud End For High Pressure Service Recommendations



T196337

T196337 –UN–18NOV03

1—90° Swivel Elbow
2—90° Adjustable Stud Elbow
3—Stud Straight
4—Bulkhead Union and Nut
5—External Hex Stud End Plug
6—Tube Nut
7—Swivel Nut
8—Stud End
9—Hex Nut
10—O-Ring
11—Identification Groove

O-RING FACE SEAL FITTINGS WITH METRIC HEX NUT AND STUD END FOR HIGH PRESSURE, ABOVE 27 600 kPa (275.8 bar) (4,000 psi), TORQUE VALUES—Tolerance is +15 -20% unless otherwise specified

Nominal Tube OD or Hose ID			O-Ring Face Seal Hose or Tube Swivel Nut			Bulkhead Nut	
Metric Tube OD	Inch Tube OD or Hose ID		Thread Size	Hex Size	Torque	Hex Size	Torque
mm	Dash Size	mm (in.)	in.	mm	Nm (lb-ft)	mm	Nm (lb-ft)
4	-2	3.18 (0.125)	—	—	—	—	—
5	-3	4.78 (0.188)	—	—	—	—	—
6	-4	6.35 (0.250)	9/16-18	17	24 (18)	22	32 (24)
8	-5	7.92 (0.312)	—	—	—	—	—
10	-6	9.53 (0.375)	11/16-16	22	37 (27)	27	42 (31)
12	-8	12.70 (0.500)	13/16-16	24	75 (55)	30	93 (69)
16	-10	15.88 (0.625)	1-14	30	103 (76)	36	118 (87)
20	-12	19.05 (0.750)	1-3/16-12	36	152 (112)	41	175 (129)
22	-14	22.23 (0.875)	1-3/16-12	36	152 (112)	41	175 (129)
25	-16	25.40 (1.000)	1-7/16-12	41	214 (158)	46	247 (182)
28	—	—	—	—	—	—	—
32	-20	31.75 (1.250)	1-11/16-12	—	286 (211)	50	328 (242)
38	-24	38.10 (1.500)	2-12	—	326 (240)	60	374 (276)

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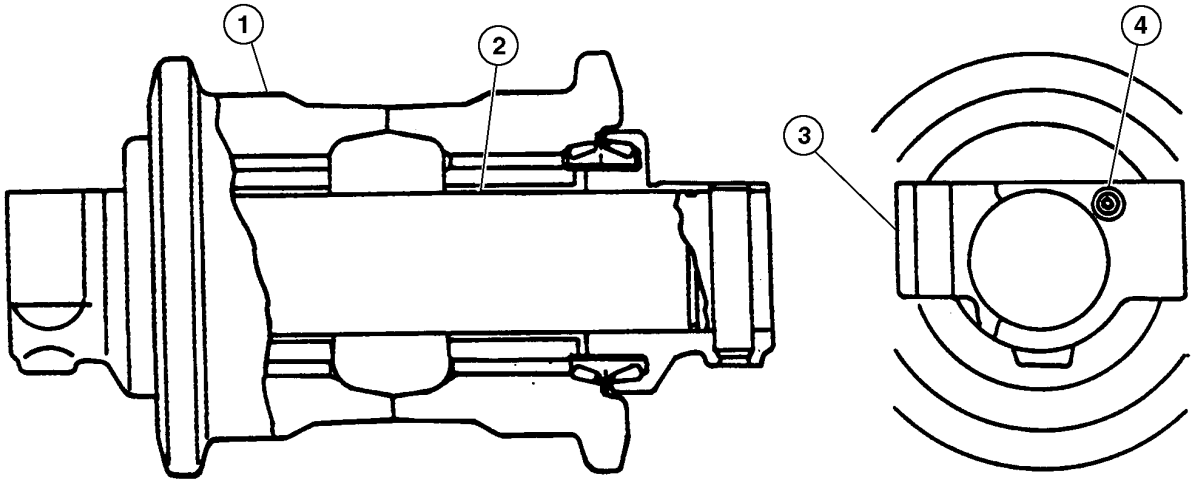
Track Roller Disassemble and Assemble



TX1008198 –UN–24MAY06

TX1008198

1—Roller **2—Axle** **3—Bracket** **4—Plug**

Continued on next page

MD46667,00000AE –19–03AUG06–1/7

Apply equal pressure with the fingers at four equally spaced points on seal ring face. Seal must “pop”

into place so O-ring and seal ring is seated squarely in bore.

NOTE: A volatile, non-petroleum base solvent or talcum power may be used as a lubricant.

10. Clean seal ring face using clean oil and lint-free tissues. Apply a thin film of oil to each seal ring face.

11. Install roller (8) and thrust washer (5). Tighten cap screws (9).

Track Carrier Roller—Specification

Thrust Washer-to-Axle Cap Screw—Torque	64 N•m 47 lb-ft

12. Install O-ring (4) and cover (3). Tighten cap screws (1).

Track Carrier Roller—Specification

Cover-to-Roller Cap Screw—Torque	64 N•m 47 lb-ft

13. Fill roller with 120 mL (4 fl oz) of clean oil. See Track Roller, Front Idler, and Carrier Roller Oil. (See Operator’s Manual.)

14. Apply cure primer and pipe sealant to threads of plug (2). Install plug.

MD46667,00000B0 –19–02AUG06–2/2

Metal Face Seal Inspection

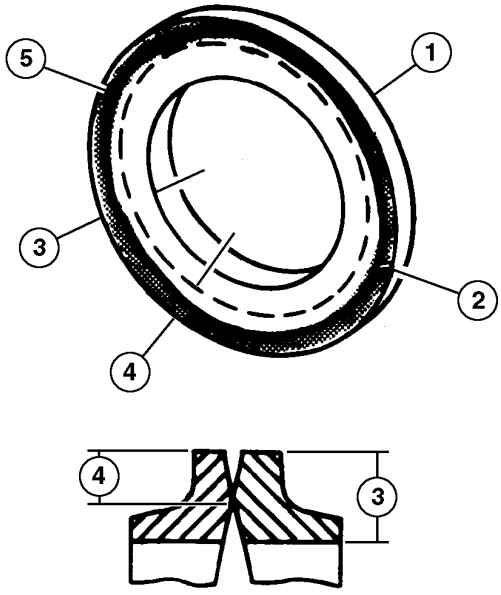
1. Inspect for the following conditions to determine if seals can be reused:

   a. The narrow, highly polished sealing area (5) must be in the outer half of seal ring face (4).

   b. Sealing area must be uniform and concentric with the ID and OD of seal ring (1).

   c. Sealing area must not be chipped, nicked, or scratched.

1—Seal Ring
2—Worn Area (shaded area)
3—Seal Ring Face
4—Outer Half of Seal Ring Face
5—Sealing Area (dark line)



TX1008208 –UN–24MAY06

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MD46667,00000D2 –19–02AUG06–1/3

12. Install end of chain on sprocket and slowly turn sprocket in forward direction to pull chain across top of frame to front idler.

13. Pull ends of chain together. Install spacers and master pin using master pin pusher installer.

14. Install track shoe. See Track Shoe Remove and Install. (Group 0130.)

15. Perform Check and Adjust Track Sag. (Operator's Manual.)

TX17984,0000009 –19–02AUG06–4/4

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

3. Attach track to hoist, remove from frame, and repair or replace.

Track Adjuster and Recoil Spring—Specification

Track Adjuster and Recoil Spring—Weight	240 kg approximate 530 lb approximate

4. See Track Adjuster and Recoil Spring Disassemble and Assemble and see Track Adjuster Cylinder Disassemble and Assemble. (Group 0130.)

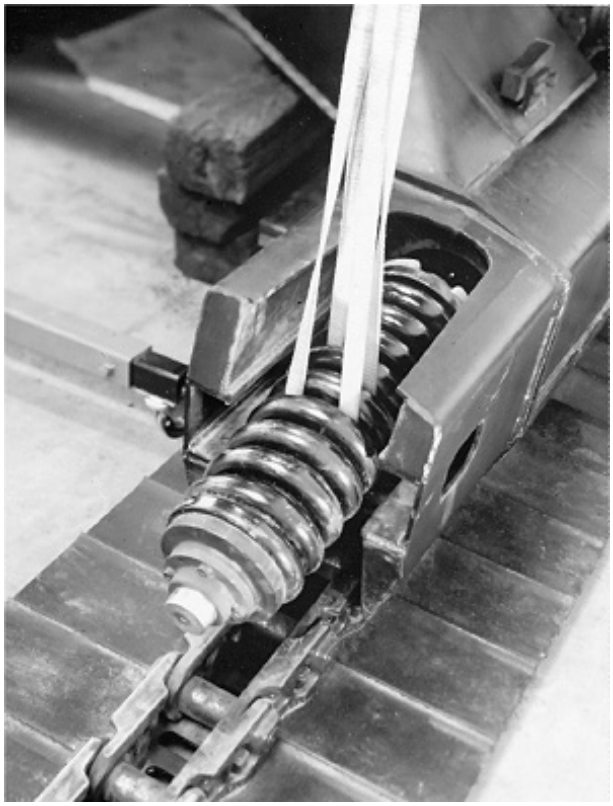
5. Install track adjuster and recoil spring in track using hoist.

Track Adjuster and Recoil Spring—Specification

Adjusting Nut Out of Hole In Frame—Distance	15 mm 0.6 in

6. Install front idler and track chain.

   See Front Idler Remove and Install and see Track Chain Remove and Install. (Group 0130.)



T6557CY –UN–25OCT88

MD46667,00000B9 –19–02AUG06–3/3

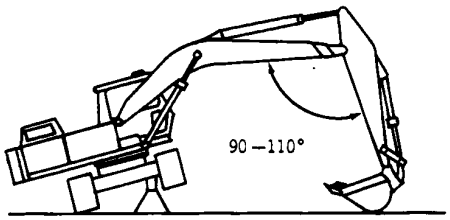
Travel Gearbox Remove and Install

1. Remove travel gearbox.

MD46667,00000C5 –19–02AUG06–1/5

Swing upperstructure 90° and lower bucket to raise track off the ground. Keep angle between boom and arm 90—110° and position round side of bucket on ground. Put a support stand under the undercarriage.

2. Disconnect track chain. See Track Chain Remove and Install. (Group 0130.)

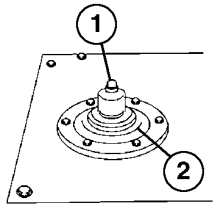


T6876FG –UN–06DEC88

MD46667,00000C5 –19–02AUG06–2/5

CAUTION: The hydraulic oil tank is pressurized. High pressure release of oil can cause serious burns or penetrating injury.

3. Push hydraulic oil tank pressure release button to release pressure in the hydraulic oil tank.



TX1000859 –UN–01DEC05

1—Hydraulic Oil Tank Pressure Release Button
2—Hydraulic Oil Tank Cover

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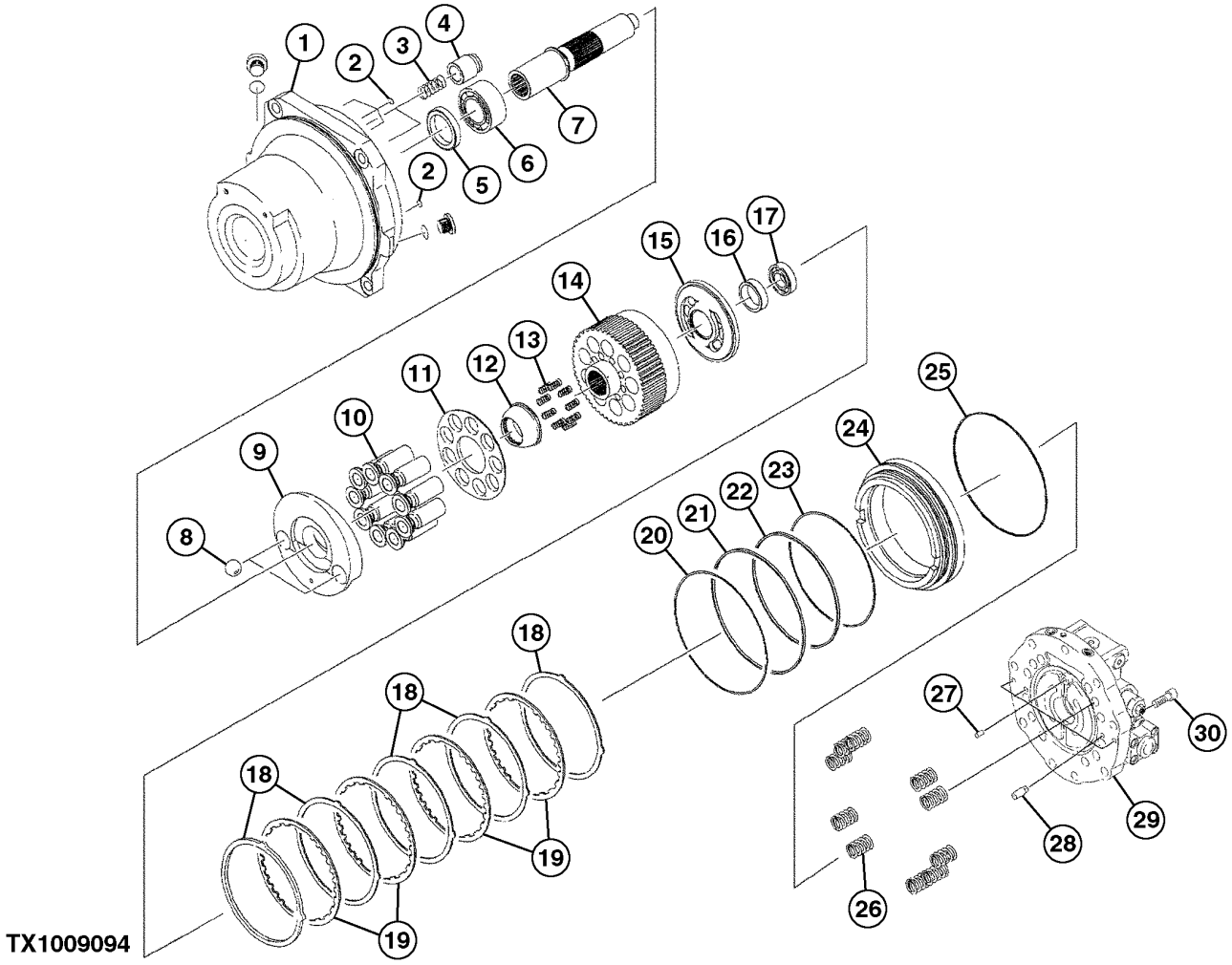
MD46667,00000C5 –19–02AUG06–3/5



TX1009094

TX1009094 –UN–27JUN06

1—Housing
2—O-Ring (4 Used)
3—Spring (2 Used)
4—Piston (2 Used)
5—Oil Seal
6—Roller Bearing
7—Shaft
8—Steel Ball (2 Used)
9—Swash Plate
10—Piston (9 Used)
11—Retainer
12—Holder
13—Spring (9 Used)
14—Cylinder Block
15—Valve Plate
16—Collar
17—Roller Bearing
18—Plate (5 Used)
19—Friction Plate (4 used)
20—Backup Ring
21—O-Ring
22—O-Ring
23—Backup Ring
24—Brake Piston
25—O-Ring
26—Spring (10 Used)
27—Pin
28—Pin (4 Used)
29—Valve Housing
30—Socket Cap Screw (9 Used)

8. Remove cap screws (30) and remove valve (29) and remove O-ring (25).

9. Replace parts as necessary.

10. Install O-ring (25).

11. Install valve (29).

12. Install and tighten cap screws (30).

Specification

Valve-to-Travel Gearbox Cap Screw—Torque ..... 400 N•m (295 lb-ft)

Continued on next page

Section 04
Engine

Contents

1—Turbine Housing
2—Compressor Impeller
3—Bearing Housing
5—Turbine Back Cover
6—Shaft and Turbine Impeller
7—Compressor Housing
12—Lock Nut
14—Bearing (2 used)
15—Bearing
17—Snap Ring
18—Snap Ring (2 used)
22—Piston Ring
23—Piston Ring
35—Clamp
63—Insert
72—O-Ring
73—O-Ring
80—Oil Deflector
82—Thrust Sleeve
83—Thrust Bearing
84—Thrust Ring
85—Turbocharger
86—Snap Ring
87—Turbocharger (complete)

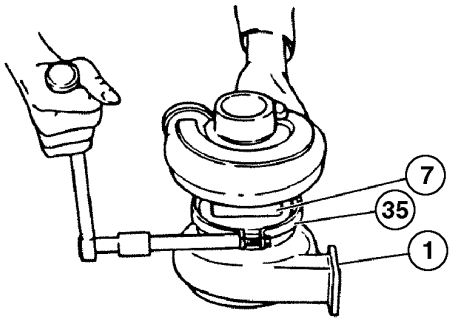
GD61784,0000003 –19–02AUG06–2/16

IMPORTANT: When assembling the relationships between compressor cover, bearing housing, and turbine housing is very important.

1. Remove clamp (35).

2. Make reference marks on the turbine housing (1), compressor housing (7) and bearing housing to ensure proper assembly.

1—Turbine Housing
7—Compressor Housing
35—Clamp



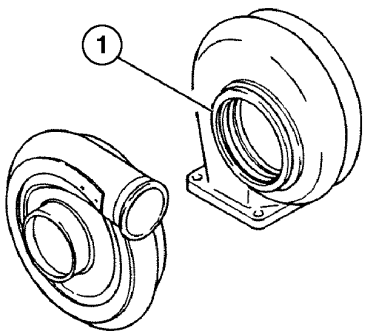
TX1008230 –UN–06JUN06

Turbocharger

GD61784,0000003 –19–02AUG06–3/16

3. Remove turbine housing (1).

1—Turbine Housing



TX1008256 –UN–06JUN06

Turbocharger Housing

Continued on next page

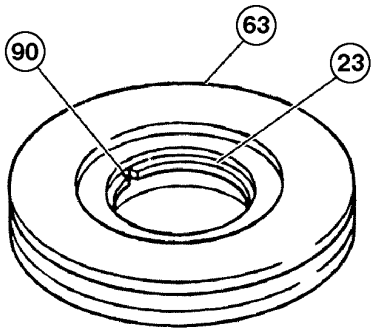
GD61784,0000003 –19–02AUG06–4/16

7. Install a new piston ring into insert and measure piston ring joining section clearance.

Specification

Piston Ring Joining Section—
Clearance ..... 0.05—0.25 mm
0.002—0.010 in.

23—Piston ring
63—Insert
90—Joining section



Insert

TX1008281 –UN–06JUN06

04
0400
19

TX17984,000001D –19–31JUL06–7/7

1—Gasket
2—Plug
3—Spring
4—Nut
5—Intake Pipe
6—Intake Air Temperature Sensor
7—Cap Screw
8—Gasket
9—Intake Manifold

1. Remove lead valves. See Lead Valve Remove and Install. (Group 0400.)
2. Disconnect wiring harness.
3. Remove air inlet pipe and install plug in turbocharger outlet.
4. Remove final fuel filter. See Final Fuel Filter Remove and Install. (Group 0560.)
5. Remove fuel injector pressure lines.
6. Remove intake pipe (5) and discard gasket (8). Close openings using caps and plugs.
7. Remove intake manifold (9) and discard gaskets (1).
8. Inspect and repair as needed.
9. Install intake manifold. Tighten nuts to specification.

Specification

Intake Manifold Nut—Torque..... 20 N•m
32 lb-ft

10. Install intake pipe. Tighten cap screws to specification.

Specification

Intake Pipe Cap Screw—
Torque..... 39 N•m
29 lb-ft

11. Install fuel injector lines. Tighten to specification.

Specification

Fuel Injector Line Fittings—
Torque..... 39 N•m
29 lb-ft

12. Install Final Fuel Filter. See Final Fuel Filter Remove and Install. (Group 0560.)
13. Connect wiring harness.
14. Install lead valves. See Lead Valve Remove and Install. (Group 0400.)

GD61784,000000E –19–02AUG06–2/2

4. Measure clearances of the idle gear C.

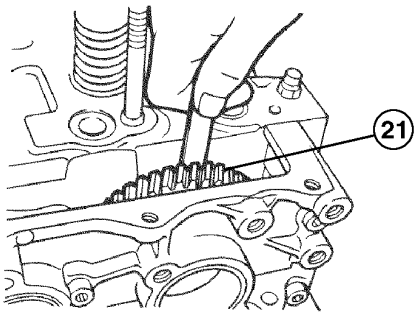
Specification

Idle Gear C—Clearance	0.05-0.14 mm new
	0.25 mm limit of use
	0.002-0.006 in. new
	0.01 in. limit of use

5. Remove the O-ring for the gear case.

6. Remove idle gear shaft C.

21—Idle Gear C



TX1009926 –UN–20JUL06

TX17984,0000027 –19–03AUG06–2/23

7. Remove idle gear C.

8. Remove gear case.

9. Remove split collar using 1-8523-5013-0 Compressor.

10. Remove upper spring sheet.

11. Remove valve spring and valve.

12. Number each valve cylinder.

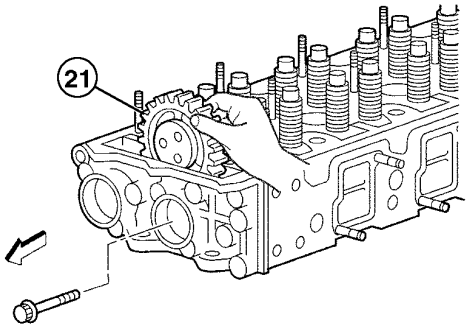
13. Remove valve spring.

14. Remove lower spring sheet.

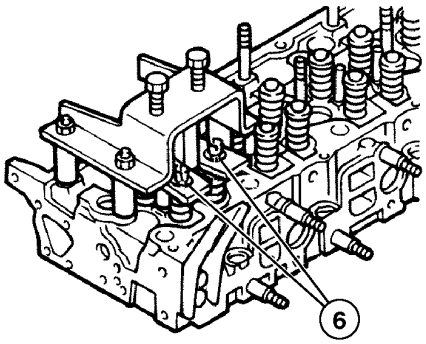
15. Remove valve.

16. Remove valve stem oil seal.

6—Split Collar
21—Idle Gear C



TX1009927 –UN–20JUL06



TX1009930 –UN–20JUL06

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TX17984,0000027 –19–03AUG06–3/23

6. Inspect the valve stem end for wear. Repair slight abrasions using an oil stone.

TX1009940 –UN–20JUL06

TX17984,0000028 –19–03AUG06–3/9

7. Measure the amount of wear of valve stem at the three points shown.

Specification

Intake Valve Stem—OD ..... 10 mm new
9.92 mm limit of use
0.394 in. new
0.391 in. limit of use

Specification

Exhaust Valve Stem—OD ..... 10 mm new
9.90 mm. limit of use
0.394 in. new
0.390 in. limit of use

TX1009941 –UN–20JUL06

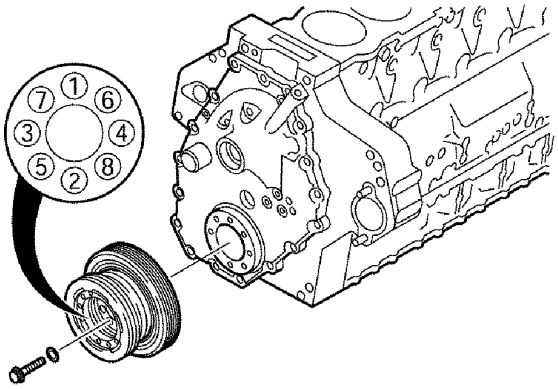
Continued on next page

TX17984,0000028 –19–03AUG06–4/9

31. Install crankshaft pulley cap screws and tighten in sequence to specification.

Specification

Crankshaft Pulley-to-Crankshaft
Cap Screws—Torque ..... 267 N•m
197 lb-ft



TX1010148 –UN–18JUL06

32. Install oil pan. See Oil Pan Remove and Install. (Group 0400.)

33. Install cylinder head. See Cylinder Head Remove and Install. (Group 0400.)

34. Install alternator. See Alternator Remove and Install. (Group 0400.)

TX17984,0000029 –19–03AUG06–10/10

Cylinder Block Disassemble and Assemble

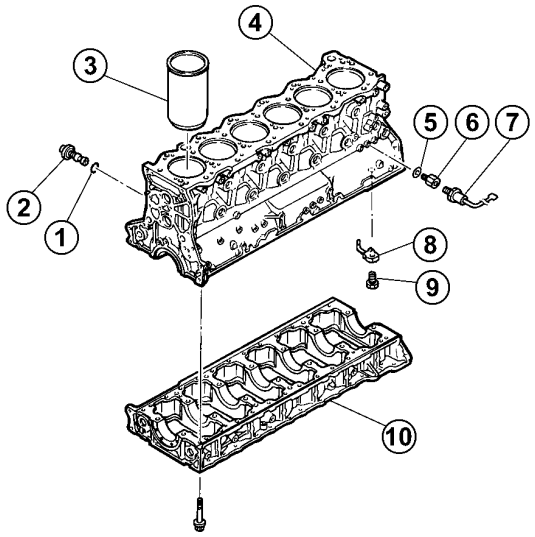
1. Remove oil pressure relief valve (2) and gasket (1).

2. Remove oil pressure switch (7), adapter (6) and gasket (5).

3. Remove oil jets (8).

4. Remove cylinder liners (3).

5. Perform Cylinder Block Inspection. (Group 0400.)



T145045 –UN–08FEB02

T145045

1—Gasket
2—Oil Pressure Relief Valve
3—Cylinder Liner (6 used)
4—Cylinder Block
5—Gasket
6—Adapter
7—Oil Pressure Switch
8—Oil Jet (6 used)
9—Banjo Fitting (6 used)
10—Lower Crankcase

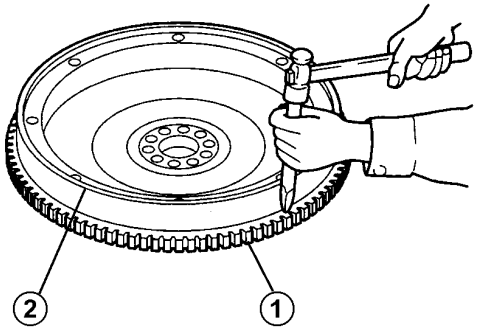
Continued on next page

TX17984,000002A –19–31JUL06–1/3

2. Remove ring gear (1) a hammer and drift or brass punch.

3. Inspect and repair as necessary.

1—Ring Gear
2—Flywheel



T144417

T144417 –UN–08FEB02

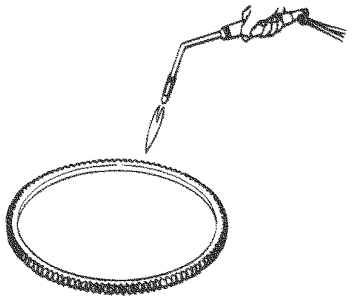
TX17984,0000031 –19–31JUL06–2/3

CAUTION: Prevent possible burn injury. Hot equipment and fluids can cause burns to unprotected skin. Wear gloves and protective cloths when working with hot equipment and fluids.

4. Heat ring gear uniformly with torch.

Specification	
Ring Gear—Temperature	200°C or less 390°F or less

5. Install ring gear on flywheel with largest chamfer side to flywheel. Push ring gear on until bottomed out on flywheel.



TX1008851 –UN–16JUN06

TX17984,0000031 –19–31JUL06–3/3

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

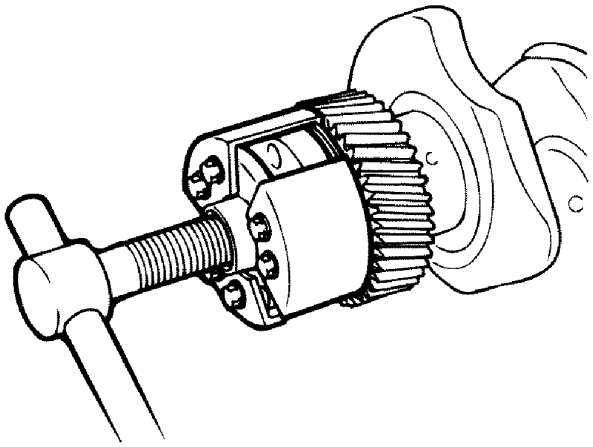
IMPORTANT: Crankshaft must not be ground as it has been treated by soft nitriding to enhance crankshaft strength.

1. When slinger remains on crankshaft, use 1-8521-0027-0 Slinger Remover to remove it.

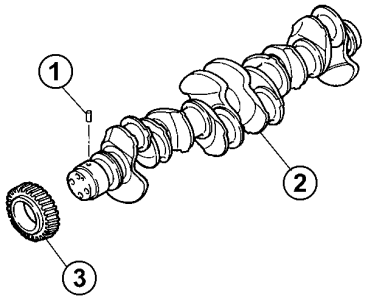
Specification	
Crankshaft—Weight	155 kg approximate 340 lb approximate

2. Use 1-8521-0064-0 Crankshaft Gear Remover and remove crankshaft gear (3).

1—Dowel Pin
2—Crankshaft
3—Crankshaft Gear



TX1010143 –UN–18JUL06



T144471 –UN–08FEB02

T144471

Continued on next page

GD61784,0000011 –19–03AUG06–2/9

15. Verify that piston rings rotate smoothly in piston ring grooves.

GD61784,0000015 –19–24JUL06–2/2

Piston and Connecting Rod Inspection

1. Insert piston ring horizontally (in position it would be in if it were installed in piston) into cylinder liner bore.
2. Push ring into cylinder liner bore until it reaches point where bore is smallest. Do not allow ring to slant, it must remain perfectly horizontal.
3. Measure piston ring gap using a feeler gauge.

Specification	
1st Compression Ring, 3rd Compression Ring, Oil Ring—Gap	0.35—0.50 mm new
	1.0 mm limit of use
	0.014—0.02 in. new
	0.039 in. limit of use
2nd Compression Ring—Gap	0.80—0.95 mm new
	1.5 mm limit of use
	0.031—0.037 in. new
	0.059 in. limit of use

Piston ring must be replaced when ring gap exceeds specification.

Continued on next page

GD61784,0000016 –19–02AUG06–1/6

13. Install pilot gear in oil pump housing.

14. Install driven gears in oil pump housing.

15. Install oil pump housing cover.

16. Tighten cap screws (9 and 11) to specification.

Specification	
Oil Pump Cover-to-Oil Pump Housing Cap Screw—Torque	18 N•m 159 lb-in.

Specification	
Oil Pump Cover-to-Oil Pump Housing Cap Screw M10—Torque	39 N•m 29 lb-ft

17. Install relief valve.

18. Install spring.

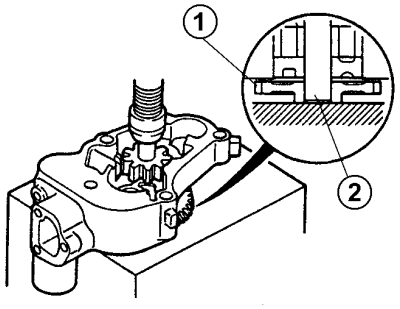
19. Install spring seat.

20. Install cotter pin. Bend long leg of cotter pin 90°.

21. Install ball.

22. Install cover. Tighten cap screws (1) to specification.

Specification	
Oil Pump Relief Valve Cover-to-Oil Pump Housing—Torque	18 N•m 159 lb-in.



T144817

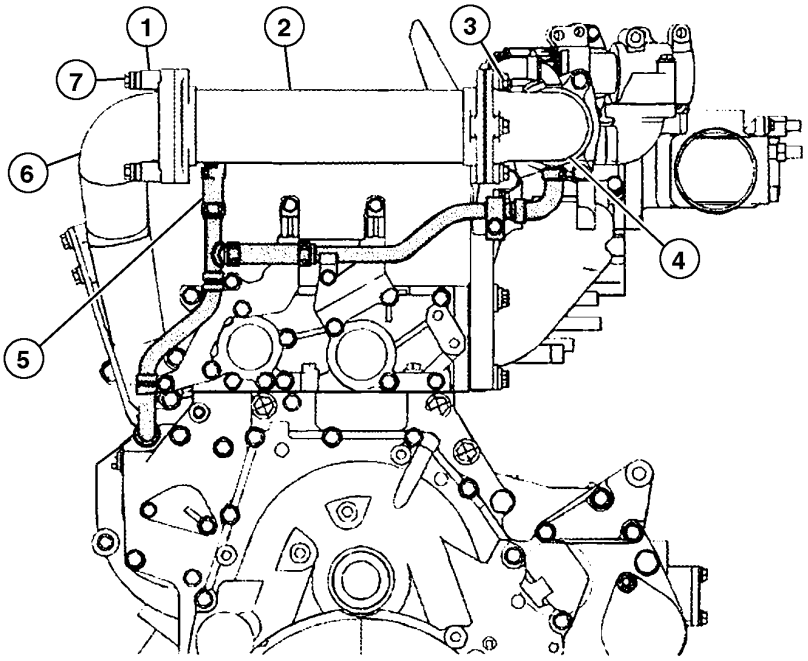
T144817 –UN–08FEB02

1—Oil Pump Drive Gear
2—Pilot Gear Shaft

04
0400
99

TX17984,000003B –19–01AUG06–2/2

Primary Exhaust Gas Recirculation (EGR) Cooler Remove and Install



TX1010294

1—Spacer (3 used)
2—Primary Exhaust Gas Recirculation (EGR) Cooler
3—Cap Screw (3 used)
4—Secondary Exhaust Gas Recirculation (EGR) Cooler
5—Water Inlet Pipe
6—Air Duct
7—Nut (3 used)

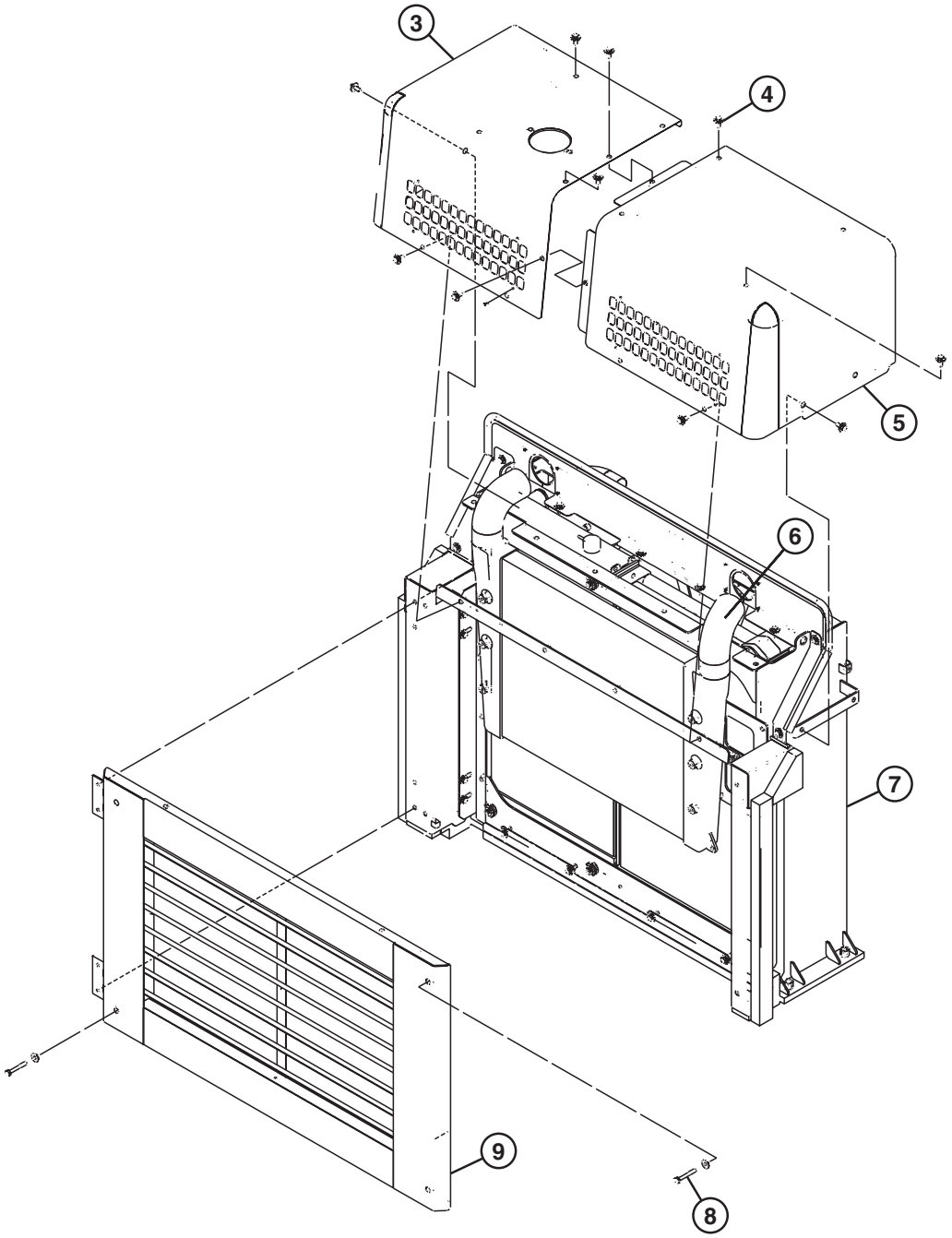
1. Drain engine coolant. See Drain Cooling System. (Operator's Manual.)
2. Remove water inlet pipe (5).
3. Remove water return pipe.
4. Remove primary exhaust gas recirculation (EGR) cooler (6) and discard gaskets.
5. Repair and replace as necessary.
6. Install primary exhaust gas recirculation (EGR) cooler with new gaskets.
7. Install water return pipe.
8. Install water inlet pipe.
9. Perform Cooling System Fill and Deaeration Procedure. (Operator's Manual.)

GD61784,0000020 –19–01AUG06–1/1

TX1010294 –UN–20JUL06

Section 05
Engine Auxiliary System

Contents



TX1010436

3—Rear Cover
4—Cap Screw (20 used)
5—Front Cover
6—Intercooler
7—Cooling Package
8—Cap Screw (4 used)
9—Cooling Package Door

Continued on next page

GD61784,0000026 –19–01AUG06–3/19

TX1010436 –UN–24JUL06

05
0510
9

39. Close cooling package door (9).

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

40. Install rear engine hood.

Specification	
Rear Engine Hood—Weight	23 kg approximate 50 lb approximate

41. Install front engine hood.

Specification	
Front Engine Hood—Weight	32 kg approximate 71 lb approximate

42. Perform Cooling System Fill and Deaeration Procedure. (Group 1830.) Approximate capacity is 46 L (12 gal).

43. Fill hydraulic oil. See Hydraulic Oil. Approximate capacity is 322 L (85 gal).

GD61784,0000026 –19–01AUG06–19/19

Fan, Fan Guard, and Fan Shroud Remove and Install

See Fan Drive Motor Remove and Install. (Group 3360.)

TX17984,000004A –19–18JUL06–1/1

Section 07
Dampener Drive (Flex Coupling)

Contents

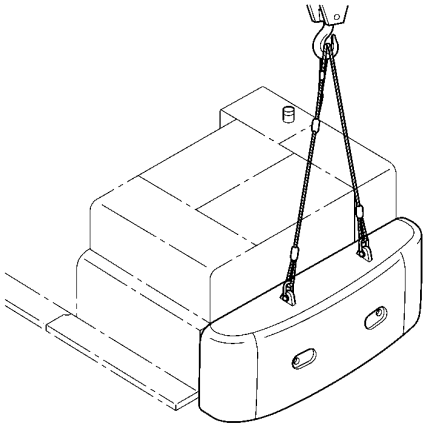
Counterweight Remove and Install

CAUTION: Avoid crushing injury from heavy component. Use appropriate lifting device.

1. Attach appropriate lifting device to lifting bracket on counterweight.

Specification

Counterweight—Weight	9150 kg 20,200 lb



TX1009184 –UN–05JUL06

Counterweight

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TX17984,0000055 –19–16JUN06–1/3

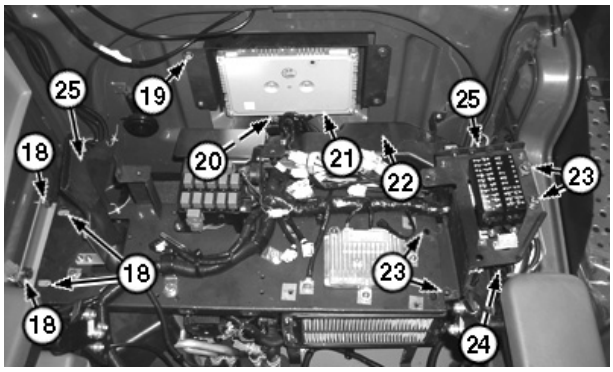
17
1749
1

0—Cover
1—Tray
3—Cap (5 used)
4—Air Duct
7—Electrical Connector Terminal
11—Screw (6 used)
12—Cap Screw with Washer
13—Mechanical Lighter
14—Isolator (3 used)

13. Remove trim cover (0) and rear tray (1) behind seat.

TX17984,0000056 –19–07JUL06–6/11

14. Remove cap screws (18, and 23) that attach bracket to cab.
15. Remove fresh air duct (24) and filter on left side of cab.
16. Remove fresh air duct (22) behind A/C unit.
17. Remove cap screws (19) that hold MCF (21) to back of cab and lay MCF to the side.
18. Feed electrical connectors through hole (20) in back of cab.
19. Disconnect electrical connectors (25) from the rear corners of the cab.



Panel Behind Seat

18—Cap Screw
19—Cap Screw
20—Hole in Rear of Cab
21—MCF (main controller)
22—Fresh Air Duct
23—Cap Screw
24—Fresh Air Duct
25—Electrical Connectors

18
1800
5

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TX17984,0000056 –19–07JUL06–7/11

Operator Enclosure

1—Black Ceramic Coating Range

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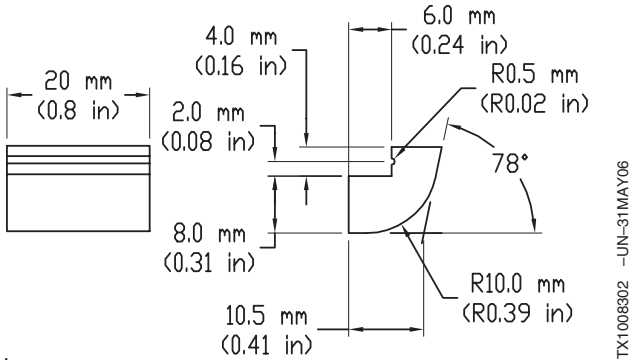
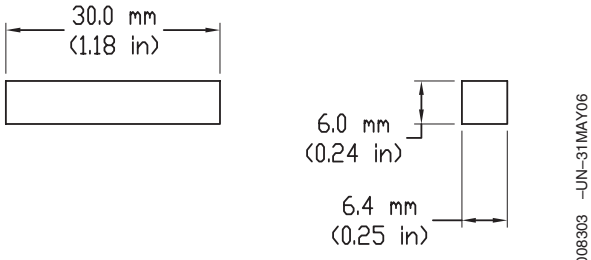


Spacer C

AH91621,00002B2 –19–26JUL06–17/22



Dam Rubber

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AH91621,00002B2 –19–26JUL06–18/22

Seat and Seat Belt

0—Seat Assembly
2—Cushion Cover
3—Pad
4—Cushion
5—Pad
6—Frame
7—Cable
8—Handle
9—Stand
10—Spring
11—Seat Slide Track Kit
14—Lever Kit
15—Bearing Kit
16—Compressor
17—Lever
18—Torsional Damper
19—Air Spring Seat Kit
20—Valve
21—Hose Kit
22—Seat Suspension
23—Seat Suspension Boot Kit
24—Seat Adjustment Cable Kit
25—Wiring Lead
26—Head Rest
27—Heater

TX17984,000005E –19–05JUN06–2/2

Evacuate R134a System

CAUTION: Liquid refrigerant will freeze eyes or skin on contact. Wear goggles, gloves and protective clothing.

Do not remove high pressure relief valve. Air conditioning system will discharge rapidly causing possible injury.

1. See Refrigerant Cautions and Proper Handling. (Group 1830.)
2. Connect refrigerant recovery system. See R134a Refrigerant Recovery/Recycling and Charging Station Installation Procedure. (Group 1830.)
3. Open low-side and high-side valves on refrigerant recovery/recycling and charging station.
4. Follow charging station manufacturers' instructions to evacuate system.
5. Evacuate system until low-side gauge vacuum reading is to specification.

   Vacuum specification listed is for sea level conditions. Subtract the specified value for elevation above sea level.

Specification	
Evacuate System—Vacuum	98 kPa 980 mbar 29 in. Hg
Value to Subtract for Elevation Above Sea Level—Vacuum	3.4 kPa from 98 kPa for each 300 m elevation above sea level 34 mbar from 980 mbar for each 300 m elevation above seal level 1 in. Hg from 29 in. Hg for each 1000 ft elevation above sea level

If the specified vacuum reading cannot be obtained in 15 minutes, check the system for leaks. See Refrigerant Leak Test. (Group 9031-25.)

6. Close low-side and high-side valves when specified vacuum reading is obtained.
7. Turn vacuum pump off.
8. Observe the gauge for 5 minutes to see if the vacuum decreases. A vacuum decrease more than the specification indicates a leak in the system.

Specification	
Allowable System Decrease—Vacuum	3.4 kPa 34 mbar 1 in. Hg

Repair the leak. See Refrigerant Leak Test. (Group 9031-25.)

9. Start the vacuum pump.

   Open low-side and high-side valves.

   Continue to evacuate the system for 30 minutes.

Specification	
Evacuation Procedure—Time	30 minutes

10. Close low-side and high-side valves. Turn vacuum pump off.
11. Perform Charge R134a System. (Group 1830.)

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1830
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MT89988,000000D –19–01AUG06–1/1

Section 33
Excavator

Contents

Continued on next page

1—Pin Fastener
2—Cap Screw (4 used)
3—Nut (8 used)
4—Bucket
5—O-Ring (4 used)
6—Seal (2 used)
7—Link
8—Washer
9—Washer
10—Washer
11—Washer
12—Link
13—Link
14—Pin Fastener
15—Pin Fastener
16—Cylinder
17—Arm
18—Pin

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

1. Lower bucket (4) to the ground with flat surface resting on the ground to prevent roll over.

Specification	
Bucket—Weight	1633 kg approximate 3600 lb approximate

Specification	
Bucket Link—Weight	185 kg approximate 408 lb approximate

Specification	
Arm Link—Weight	53 kg approximate 118 lb approximate

2. Slide O-ring (5) onto boss on bucket.
3. Remove parts (1—3) and (18). Remove bucket.

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

Specification	
Bucket Cylinder—Weight	390 kg approximate 840 lb approximate

4. Support bucket cylinder using wood blocks.
5. Remove parts (2 and 3).
6. Remove O-ring (5) and seal (6).
7. Remove washers (8—11).
8. Remove pin fasteners (14 and 15).
9. Remove links (7 and 13).
10. Remove bucket link (12) and links.
11. Replace parts as needed.
12. Inspect seals and bushings in links (12). See Bushings and Seal Remove and Install. (Group 3340.)

IMPORTANT: To prevent the seizure and galling of new or cleaned pins and bushings, apply grease to pins and bushings before assembly. Grease may not flow to all points of pin and bushing at the initial lubrication causing metal-to-metal contact. After assembly, lubricate pivot joint until grease escapes from joint. Then lubricate every 4 hours for the next 20 hours, then daily for the next 30 to 100 hours, and then at the regular maintenance interval.

13. Apply grease to pin fasteners and link pin bores.
14. Install links, bucket, and pins.

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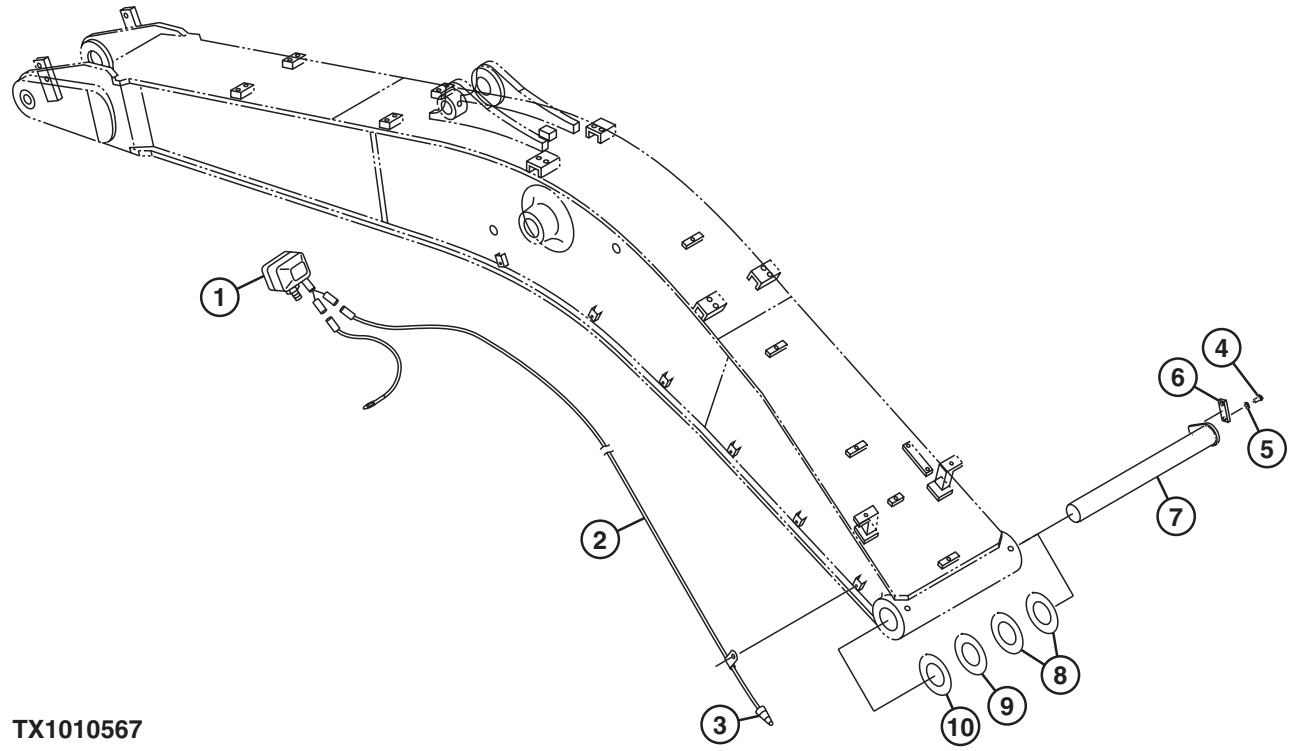
3340
3

CP94658,0000010 –19–02AUG06–2/2



TX1010567

TX1010567 –UN–28JUL06

1—Light
2—Wiring Harness
3—Wiring Connector
4—Cap Screw (2 used)
5—Washer (2 used)
6—Retaining Plate
7—Boom Pin
8—Shim (2 used)
9—Thrust Plate
10—Thrust Plate

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

NOTE: Maintain clearance between boom and thrust plate at 1.5 mm (0.06 in.) or less with the use of shims.

18. Support boom with hoist and install boom pin (7), thrust plates (9 and 10) equally to each side. Add shims (8) to attain boom thrust clearance.

Specification	
Boom with Arm Cylinder—Weight	3370 kg approximate 7430 lb approximate

Specification	
Boom Pin—Weight	116 kg approximate 257 lb approximate

Specification	
Boom Thrust Plate—Clearance	0—1.5 mm 0—0.06 in.

19. Install retaining plate (6).

Specification	
Boom Pin Cap Screw—Torque	400 N•m 295 lb-ft

20. Connect wiring connector (3).

33
3340
13

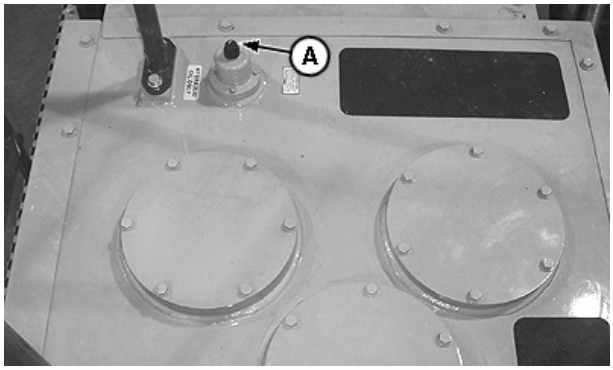
Continued on next page

Apply Vacuum to Hydraulic Oil Tank

CAUTION: High pressure release of oil from pressurized system can cause serious burns or penetrating injury.

1. Release pressure from hydraulic oil tank by pushing pressure release button (A).
2. Assemble fittings and hydraulic oil line adapter from D15032NU Vacuum Pump Kit, and JT07085A Vacuum Pump Set.

A—Pressure Release Button

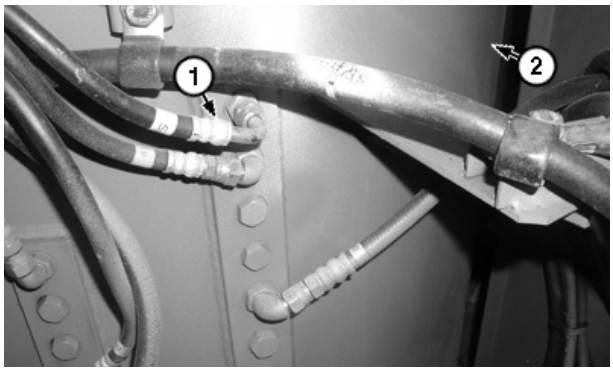


TX1010475A –UN–20JUL06

JH38101,0000038 –19–27JUL06–1/2

3. Install JT03001 Tee, 7/16-20 M 37° x 7/16-20 F 37° Sw x 7/16-20 M 37° to line (1).
4. Install hydraulic oil line adapter from D15032NU Vacuum Pump Kit, and JT07085A Vacuum Pump Set to JT03001 Tee, on line (1). Refer to pump instructions for operating information.

1—Line
2—Hydraulic Oil Tank



TX1010424A –UN–24JUL06

JH38101,0000038 –19–27JUL06–2/2

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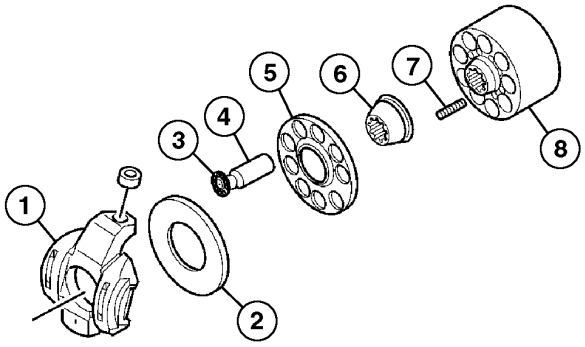
3360
1

Pump 1 and 2 Inspection

1. See Pump 1 and Pump 2 Disassemble and Assemble. (Group 3360.)

1—Swash Plate
2—Plate
3—Slipper (9 used)
4—Piston (9 used)
5—Retainer
6—Spherical Bushing
7—Spring (9 used)
8—Cylinder



TX1010289 –UN–21JUL06

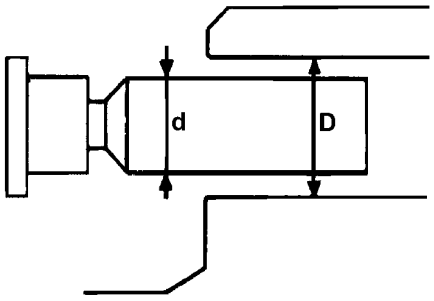
JH38101,000002C –19–26JUL06–1/5

2. Clearance between piston (4) outer diameter (d) and cylinder (8) bore diameter (D).

Specification

Bore Diameter and Piston Diameter—Clearance ..... 0.038 mm (0.001 in) new
0.078 mm (0.003 in) maximum wear

d—Outer Diameter
D—Bore Diameter



T144080 –UN–16JUL01

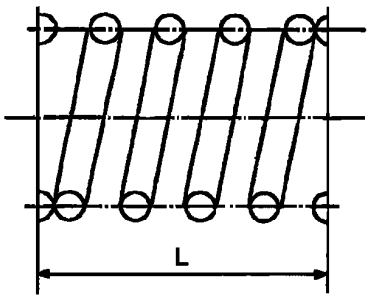
JH38101,000002C –19–26JUL06–2/5

3. Check free length (L) of spring (7).

Specification

Spring Length—Free Length..... 40.9 mm (1.61 in) new length
40.1 mm (1.58 in) minimum length

L—Free Length



T144081 –UN–16JUL01

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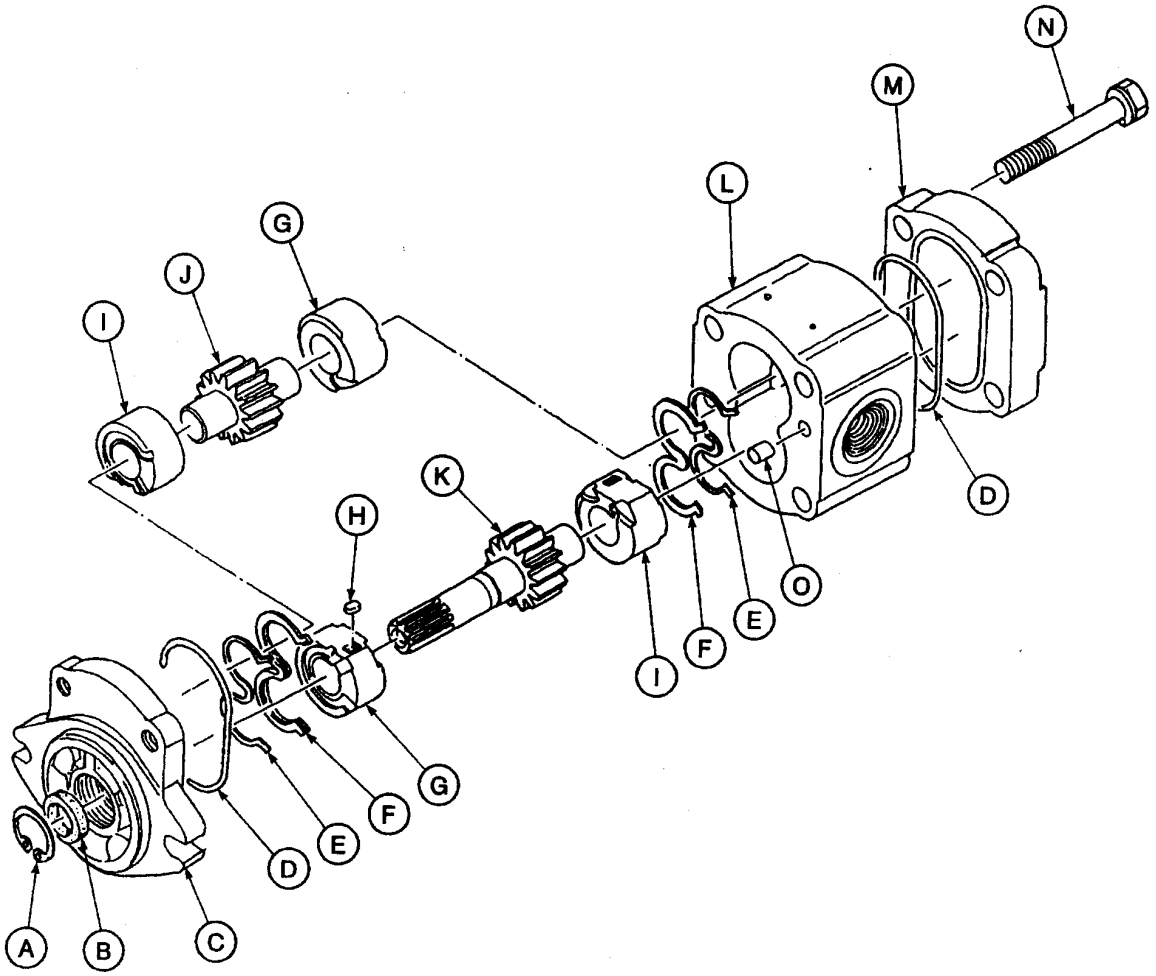
JH38101,000002C –19–26JUL06–3/5

Pilot Pump Disassemble and Assemble



T7966CN –UN–04MAY93

A—Snap Ring
B—Seal
C—Mounting Flange
D—O-Ring (2 used)
E—Back-Up Ring (2 used)
F—Seal (2 used)
G—Bushing (2 used)
H—Key (2 used)
I—Bushing (2 used)
J—Driven Gear
K—Drive Gear
L—Housing
M—Cover
N—Cap Screw (4 used)
O—Dowel Pin (2 used)

1. Remove snap ring (A).
2. Remove cap screws (N).
3. Remove mounting flange (C).
4. Check bushings (G). If inside diameter and surface toward gear are rough or worn, replace pump.
5. Check gears (J and K) and housing (L). If gear teeth, shaft and inside of housing are rough or worn, replace pump.

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3360
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Continued on next page

TX17984,000007E –19–01AUG06–1/2

11. Clean mounting surface and install new O-ring (1) on pump mounting face.

12. With hoist install pump with four socket head screws. Tighten to specifications.

Specification

Fan Pump Mounting Socket Head Screw—Torque..... 230 N•m (170 lb-ft)

13. Connect wire harness connector to solenoid on fan pump control valve.

14. Install case drain hose to pump.

15. Install pilot hose to pump control valve.

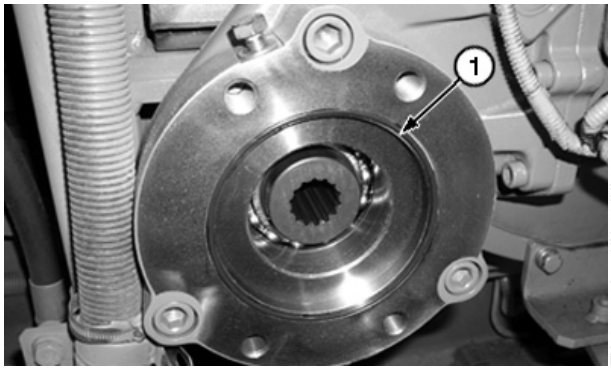
16. Install inlet tube and outlet hose to pump with four bolt flange and socket head screws.

Specification

Fan Pump Hydraulic Four Bolt Flange Mounting Socket Head Screw—Torque..... 50 N•m (37 lb-ft)

17. Remove vacuum pump.

18. Fill fan pump case with hydraulic oil.See Pump 1 and 2 Start-Up Procedure. (Group 3360.)



TX1010764A –UN–28JUL06

1—O-Ring

TX04577,0000113 –19–01AUG06–5/5

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3360
41

1—Pin
2—Sleeve
3—O-Ring (2 used)
4—O-Ring
5—Sleeve
6—Compensating Piston
7—Compensating Rod
8—Spring Set
9—Spring
10—Spring
11—Adjusting Disc
13—Retaining Ring
14—Spring Seat
15—Spring
16—Spring
17—Retaining Ring
18—Sleeve
19—Spool
20—Pin (2 used)
21—Lever
22—Feedback Lever
23—Pin
24—Pin
25—Lever
27—Pilot Piston
28—Spring Seat
29—Spring
30—Adjusting Disc
31—O-Ring
32—Cap Screw (8 used)
33—Cover
34—O-Ring
35—O-Ring (3 used)
36—Cap Screw (2 used)
37—Cap Screw (2 used)
38—O-Ring
39—Adjusting Screw
40—Adjusting Screw
41—Nut (2 used)
42—O-Ring
43—Cover
44—Nut
46—Adjusting Screw
48—Housing
49—Pin (2 used)
51—Adjusting Plug
52—O-Ring (3 used)
53—Retaining Ring (2 used)
54—Adjusting Plug
57—Pin
58—O-Ring
59—O-Ring
60—O-Ring
61—O-Ring
62—Cover
63—Cap Screw (4 used)
64—Plug (11 used)
65—Solenoid Valve
66—Cap Screw (2 used)
67—O-Ring (9 used)
69—Plug

13. Insert compensating rod (7) and lever (21) into housing (48).

14. Align pin (49) hole on lever (21) with the pin hole on housing (48). Align pin (20) in lever (21) with stepped part on compensating rod (7). Install lever (21) to housing (48).

15. Install retaining ring (17) to sleeve (18). Install sleeve (18) and spool (19) to housing (48).

IMPORTANT: Check that spool (19) moves smoothly before installing feedback lever (22).

16. Align the pin hole on spool (19) with hole on feedback lever (22). Install pin (23) through mounting hole of support plug (51).

17. Insert pilot piston (27) and lever (25) into housing (48).

IMPORTANT: Check that piston (27) moves smoothly before installing lever (25).

18. Align pin (26) in lever (25) with stepped part on pilot piston (27) and install lever (25).

19. Install O-ring (52) and pin (49) to adjusting plug (51).

20. Align pin (49) in adjusting plug (51) with pin hole on lever (25) and install adjusting plug (51). Install retaining ring (53) to housing (48).

21. Install O-ring (55) to adjusting plug (54). Install adjusting plug (54) to housing (48). Install retaining ring (56) to housing (48).

22. Install O-ring (31) to stopper (30).

23. Install spring seat (28), spring (29), and stopper (30) to housing (48).

24. Install O-ring (3) to stopper (11).

25. Install O-ring (42) to housing (48). Install spring seat (8), springs (9 and 10), and stopper (11) to housing (48). Install cover (43) to housing (48) with cap screws (32).

Specification	
Fan Drive Pump Regulator Adjusting Screw Cover Cap Screw—Torque	12 N•m 106 lb-in.

26. Install spring (15), spring seat (14) and retaining ring (13) to spool (19).

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3360
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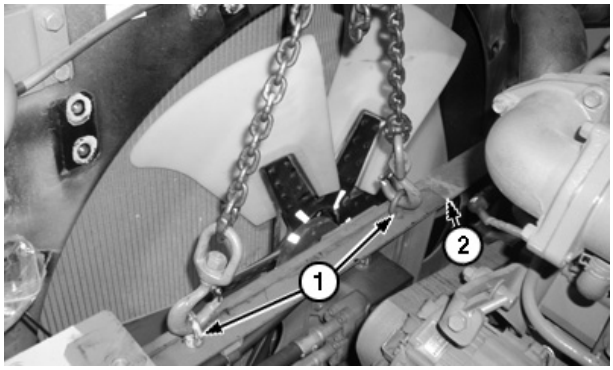
Continued on next page

17. Install eye bolts in fan motor support. Attach hoist and chain to eye bolts as shown.

1—Eye Bolts
2—Fan Motor Support



Fan Motor Assembly

TX04577,000010A –19–02AUG06–15/33

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

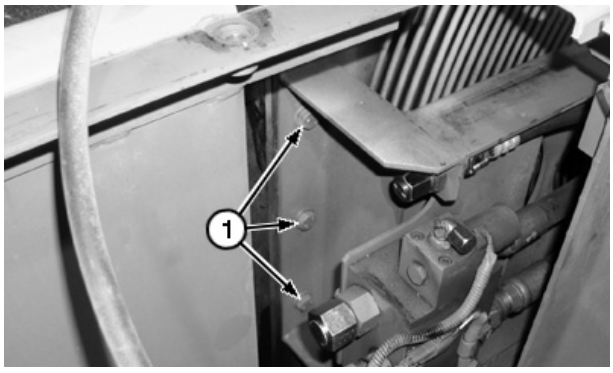
NOTE: For photo purpose only fan guard shows attached to motor hub but is not when this step is performed.

18. Remove six cap screws (1) from fan motor support with hoist attached. Slowly lift up and remove assembly from machine.

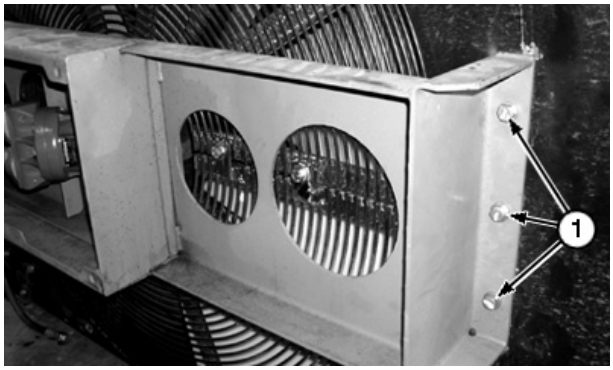
Specification

Fan Motor Support Assembly—	
Weight	95 kg approximate
	210 lb approximate

1—Cap Screws (6 used)



Fan Motor Assembly Mounting Hardware—Front



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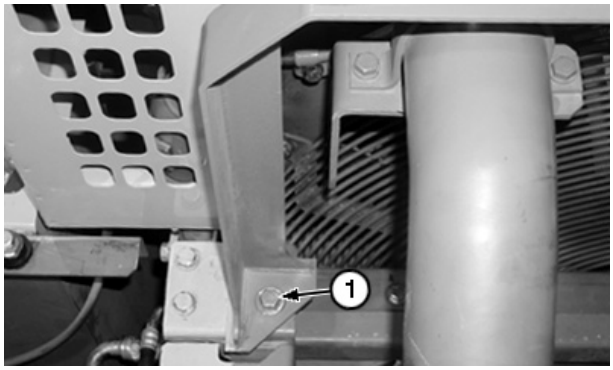
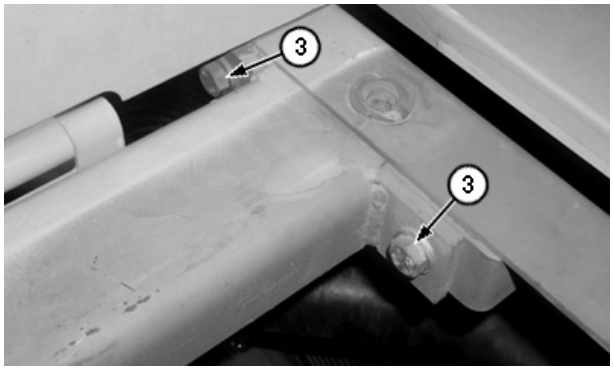
TX04577,000010A –19–02AUG06–16/33

16. With hoist install engine hood assembly with cap screws (1, 2 and 3).

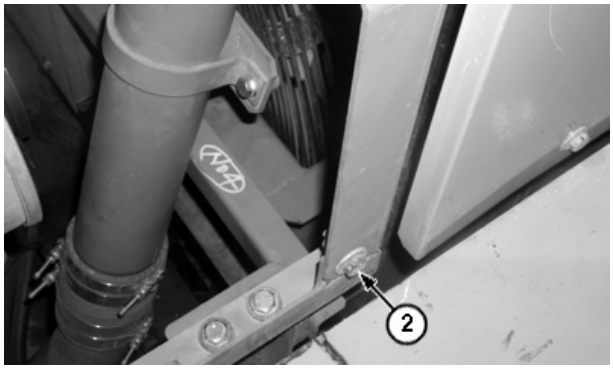
1—Cap Screw—Left Side
2—Cap Screw—Right Side
3—Cap Screws—Center Support (4 used)



Engine Hood Support Assembly—Right Side



Engine Hood Support Assembly—Left Side



Engine Hood Support Assembly—Center

Continued on next page TX04577,000010A –19–02AUG06–30/33

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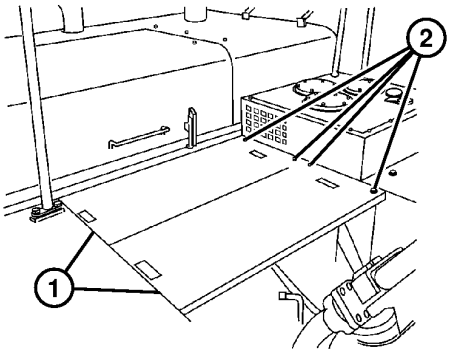
13. Install two covers (1) removed. Tighten to specification.

Specification

Covers—Over Main Control Valve—Torque	90 N•m 66 lb-ft

1—Cap Screws (4 used)
2—Covers (2 used)



TX1009141 –UN–01AUG06

Cover—Center Over Main Control Valve

TX04577,000010D –19–01AUG06–11/11

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2—Left Hand Upper Cover
3—Screw (8 used)
4—Cap Screw, Washer and Lock Washer (14 used)
5—Left Hand Outside Cover
6—Cap Screw
7—Left Hand Inside Cover
8—Right Hand Upper Cover
9—Right Hand Outside Cover
10—Right Hand Inside Cover
11—Right Hand Upper Rear Cover
12—Cap (2 used)
13—Label
14—Label
15—Case
16—Cap (4 used)
17—Screw (4 used)

3. Remove caps (12).
4. Remove screws (3 and 17).
5. Remove cap screws (4 and 6).
6. Remove right and left hand covers (2, 5, 7, 8, 9, 10 and 11)

Continued on next page

29. Secure cam by using a spanner wrench. Tighten screw joint by using a spanner wrench.

Specification	
Screw Joint—Torque	68 N•m 50 lb-ft

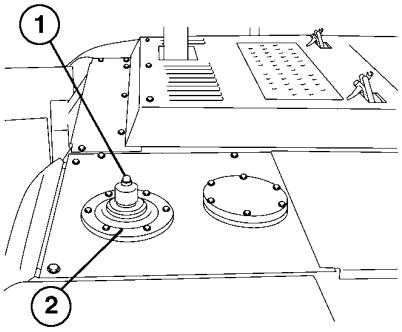
TX17984,000008E –19–03AUG06–8/8

Boom Up Shockless Valve Remove and Install

CAUTION: High pressure release of oil from pressurized system can cause serious burns or penetrating injury. Relieve pressure by pushing pressure release button.

1. Push pressure release button (1).

1—Pressure Release Button
2—Hydraulic Oil Tank Cover



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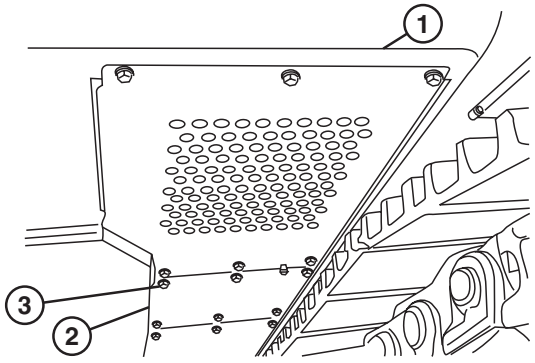
TX17984,00000D9 –19–02AUG06–1/3

2. Remove cap screws (3) and cover (2) from main frame (1) under cab.

1—Main Frame
2—Cover
3—Cap Screw (6 used)



Cap Screws and Cover

TX1010156 –UN–18JUL06

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TX17984,00000D9 –19–02AUG06–2/3

IMPORTANT: The quantity of shims has been determined during the performance testing at the factory. Install the shims together with the spools they came out of.

20. Install spacers, shims and balance springs into spools.
21. Push balance springs by hand. Install spring guides to spools with the stepped end facing toward balance springs.
22. Apply hydraulic oil onto internal parts.
23. Insert the return springs into case.
24. While turning, install spools into the same port in case as they were before disassembly.
25. Install oil seals to bushings.
26. Apply grease to the inner surface of oil seals.
27. Install O-rings to bushings.
28. Install pushers into bushings.
29. Apply grease to the head of pushers.
30. Install the pushers into the case.
31. Install bushings by driving inner bushings from both ends with a bushing driver until the inside end of bushings are flush with the inside wall of holder.
32. Drive the outer bushings with a bushing driver so that the outside ends are flush with the outside of holder.
33. Install O-rings to pin. Apply grease to O-rings. Assemble pins and cams to holder.
34. Install spring pins to cams so that the pins are displaced with their slits at 90° from each other. Drive pins until they make contact with the stepped part of hole.
35. Crimp the hole edge of cams in two places where spring pins are inserted using a punch.
36. Install holder to case. Install cap screws and spring washers. Tighten cap screws to specification.

Specification	
Holder-to-Case Cap Screws—Torque	49 N•m (36 lb-ft)

37. Install rubber seats to pin.
38. Install dampers to pin with the lever facing top of travel pilot control valve.
39. Install cap screws and spring washers to secure damper and rubber seat to holder. Tighten cap screws to specification.

Specification	
Damper-to-Holder Cap Screws—Torque	7 N•m (65 lb-in.)

40. Apply grease to O-rings. Push O-rings to the end of pin.
41. Install brackets to pins aligning the inserting holes for spring pins.
42. Place a block of wood under bracket. Install spring pins into brackets so that the slits are displaced at 90° from each other. Drive spring pins until they contact the stepped end.
43. Crimp the hole edge of brackets where spring pins are inserted using a punch.
44. Install cover to holder. Tighten cap screws to specification.

Specification	
Holder-to-Cover Cap Screws—Torque	5 N•m (44 lb-in.)

45. Apply grease to the spring pin contact part of dampers.

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Continued on next page

TX17984,00000DC –19–02AUG06–4/5

0—Bracket
1—Cap Screw (4 used)
2—Digging Sensor Manifold
3—Cap Screw (2 used)
4—Adapter Fitting (12 used)
6 —Bracket
7—Cap Screw (2 used)
8—Travel Sensor Manifold
9—Cap Screw (2 used)
10—Adapter Fitting (4 used)
11—Elbow Fitting (4 used)
12—Boom Down Sensor
13—Boom Up Sensor
14—Bucket Dump Sensor
15—Bucket Curl Sensor
16—Arm In Sensor
17—Arm Out Sensor
18—Right Travel Sensor
19—Left Travel Sensor

2. Attach identification tags to lines and fittings. Disconnect hydraulic lines from digging sensor manifold (2). Close all openings using caps and plugs.
3. Remove cap screws (3) to remove digging sensor manifold (2) from bracket (0).
4. Repair or replace parts as necessary.
5. Install digging sensor manifold to bracket using cap screws.
6. Connect hydraulic lines.See Pilot Control Valve-to-Pilot Signal Manifold Component Location—Excavator Pattern. (Group 9025-15.)

   See Pilot Control Valve-to-Pilot Signal Manifold Component Location—Backhoe Pattern. (Group 9025-15.)

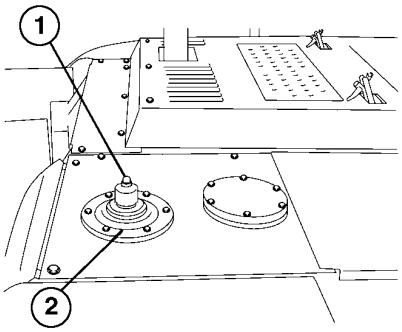
TX17984,00000DF –19–02AUG06–3/3

Travel Sensor Manifold Remove and Install

CAUTION: High pressure release of oil from pressurized system can cause serious burns or penetrating injury. Relieve pressure by pushing pressure release button.

1. Release pressure by pushing hydraulic oil tank pressure release button (1).

1—Pressure Release Button
2—Hydraulic Oil Tank Cover



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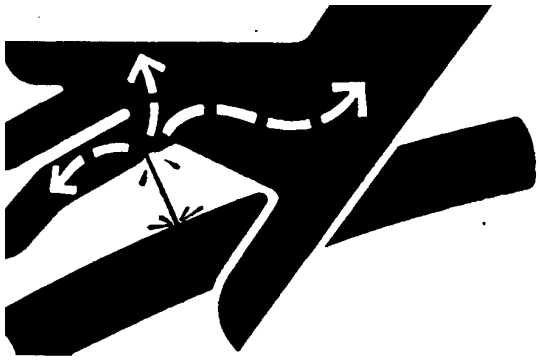
1—Lever
2—Grip
3—Cap Screw and Washer (2 used)
4—Counterweight Pilot Control Valve
5—Cap Screw (2 used)
6—Lock Washer (2 used)
8—Cap Screw and Washer (2 used)
9—Plate
10—Cap Screw and Washer (4 used)
11—Cover
12—Cover
13—Catch
14—Cap Screw (2 used)
15—Lock Washer (2 used)

4. Remove cover (12).

MM16633,0000030 –19–02AUG06–3/4

CAUTION: To avoid injury from escaping fluid under pressure, stop engine and relieve the pressure in the system before disconnecting or connecting hydraulic or other line. Tighten all connections before applying pressure.



X9811 –UN–23AUG88

5. Disconnect hoses from counterweight pilot control valve (4). Close all openings using caps and plugs. See Counterweight Removal Hydraulic System Line Connections. (Group 9025-15.)
6. Remove cover (11).
7. Remove counterweight pilot control valve.
8. Repair or replace parts as necessary.
9. Install counterweight pilot control valve (4).
10. Install cover (11).
11. Connect hoses to counterweight pilot control valve. See Counterweight Removal Hydraulic System Line Connections. (Group 9025-15.)
12. Install cover (12).
13. Check hydraulic oil level. See Check Hydraulic Oil Level. (Operator's Manual.)

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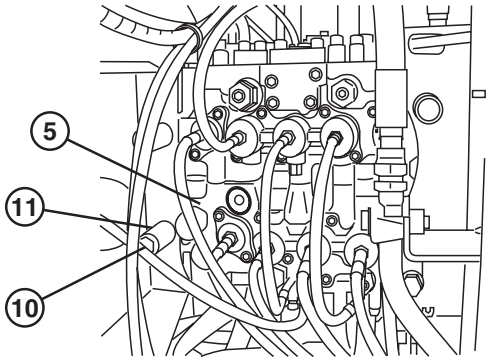
MM16633,0000030 –19–02AUG06–4/4

12. Remove cap screws (10) and spacers (11).
13. Remove control valve.
14. Repair or replace parts as necessary.

5—Control Valve
10—Cap Screw (4 used)
11—Spacer (4 used)



TX1010518 –UN–24JUL06

TX17984,0000093 –19–02AUG06–5/9

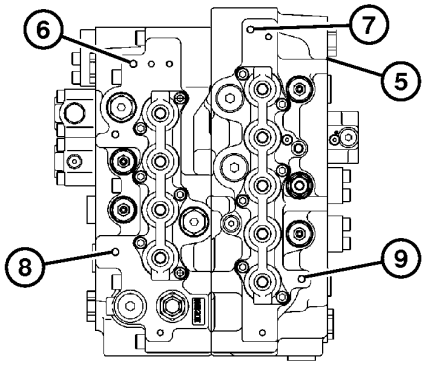
15. Install M12-1.75 metric lifting eyebolts such as JT05550 Metric Lifting Eyebolts to tapped holes (6—9).

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

16. Attach lifting device to control valve (5).

Specification	
Control Valve—Weight	400 kg approximate 880 lb approximate

17. Lift and align control valve (5) to frame.



TX1010439 –UN–24JUL06

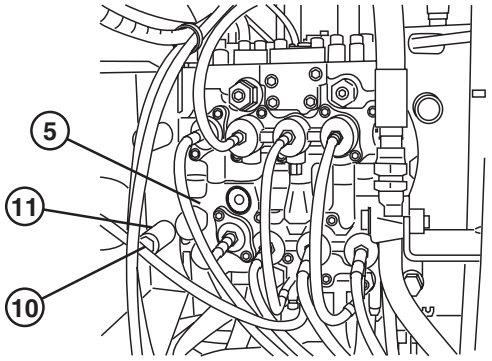
5—Control Valve
6—Tapped Hole
7—Tapped Hole
8—Tapped Hole
9—Tapped Hole

TX17984,0000093 –19–02AUG06–6/9

18. Apply PM38654 Thread Lock (high strength) to threads of cap screws (10).
19. Install cap screws (10) and spacers (11).

Specification	
Cap Screw—Torque	400 N•m 295 lb-ft

5—Control Valve
10—Cap Screw (4 used)
11—Spacer (4 used)



TX1010518 –UN–24JUL06

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TX17984,0000093 –19–02AUG06–7/9

2—Right Control Valve (4-spool)
60—Circuit Relief Valve (4 used)
61—O-Ring (4 used)
62—Backup Ring (4 used)
63—O-Ring (4 used)
64—Sleeve (4 used)
65—Poppet (4 used)
66—Piston (4 used)
67—Spring (4 used)
68—Spring (4 used)
69—O-Ring (4 used)
70—Backup Ring (8 used)
71—O-Ring (4 used)
72—Valve Seat (4 used)
73—Pilot Poppet (4 used)
74—Spring (4 used)
75—O-Ring (4 used)
76—Adjusting Screw (4 used)
77—Nut (4 used)
78—Arm Regenerative Valve—Switch Valve
79—Sleeve
80—O-Ring (2 used)
81—Backup Ring (2 used)
82—Piston (2 used)
83—Spool (2 used)
84—O-Ring (2 used)
85—Sleeve
86—Spring
87—Guide (2 used)
88—O-Ring (2 used)
89—14 mm Fitting Plug (2 used)
90—Bucket Regenerative Switch Valve
91—Check Valve (3 used)
92—Spring (3 used)
93—Backup Ring (3 used)
94—O-Ring (2 used)
95—Sleeve
96—Sleeve
97—Spring
98—Main Relief and Power Digging Valve
99—Sleeve
100—Poppet
101—Spring
102—O-Ring
103—Backup Ring
104—Valve Seat
105—Poppet
106—Spring
107—O-Ring (4 used)
108—Cap (relief valve housing)
109—41 mm Nut
110—O-Ring
111—O-Ring
112—Sleeve (second adjusting plug)
113—Orifice
114—30 mm Nut
115—O-Ring
116—Screw (first adjusting plug)
117—14 mm Plug—Main Relief Valve Isolation Check Valve
118—Backup Ring
119—14 mm Plug—Travel Flow Combiner Circuit Check Valve
120—46 mm Plug—Travel Flow Combiner Valve
121—Spring
122—Spacer
123—Spool
124—Plug
125—O-Ring
126—Plug
127—O-Ring

9. See Control Valve Operation for locations of control valve components.

IMPORTANT: The circuit relief and main relief and power digging valves must be checked and adjusted after assemble to ensure that the pressure settings are correct.

10. Before disassembling the circuit relief or main relief and power digging valves (60 and 98), make a mark on the adjusting plugs or adjusting screw and then record the number of turns to remove.

CAUTION: The arm regenerative valve—switch valve and bucket regenerative switch valve contains a spring under load. Prevent injury from sudden release of spring by holding the 14 mm fitting plug as it is removed.

11. Hold 14 mm fitting plug (89) as it is removed to release the force of spring (86 or 97).

12. Assemble circuit relief valves (60—77).

    Tighten the valve seat (72) to sleeve (64) to specification.

Specification	
Circuit Relief Valve—Valve Seat to Sleeve—Torque	100 N•m 74 lb-ft

Tighten the circuit relief valves (60) to right control valve housing (2) to specification. Apply tighten force to the hexagonal part of sleeve.

Specification	
Circuit Relief Valve to Right Control Valve Housing—Torque	100 N•m 74 lb-ft

Perform Circuit Relief Valve Test and Adjustment to check and adjust pressure setting after assembly.

13. Assemble arm regenerative valve—switch valve (78—89)

    Tighten 14 mm fitting plug (89) to specification.

Specification	
Arm Regenerative Valve—Switch Valve—14 mm Fitting Plug to Sleeve—Torque	180 N•m 133 lb-ft
Arm Regenerative Valve—Switch Valve to Right Control Valve Housing—Torque	180 N•m 133 lb-ft

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Continued on next page

4. Loosen coupling (1).
5. Remove hydraulic line (2).
6. Remove restriction valve (5).
7. Replace parts as necessary.
8. Install restriction valve (5).
9. Install hydraulic line (2).
10. Tighten coupling (1).

Specification	
Coupling—Torque	10 N•m 90 lb-in.

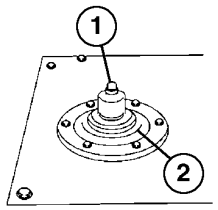
11. Fill hydraulic system. See Change Hydraulic Tank Oil, Clean Suction Screen. (Operator's Manual.)
12. Bleed air from hydraulic system. See Bleed Air From Hydraulic System. (Operator's Manual.)

TX17984,000009E –19–02AUG06–3/3

Hydraulic Oil Cooler Bypass Valve Remove and Install

CAUTION: The hydraulic oil tank is pressurized. High pressure release of oil from pressurized system can cause serious burns or penetrating injury.

1. Release hydraulic oil tank pressure by pushing release button on top of hydraulic oil tank.
2. Drain hydraulic tank. Hydraulic tank capacity is 331 L (85 gal) approximate. See Change Hydraulic Tank Oil, Clean Suction Screen. (Operator's Manual.)
3. Apply vacuum to hydraulic oil tank. See Apply Vacuum to Hydraulic Oil Tank. (Group 3360.)



TX1000859 –UN–01DEC05

1—Hydraulic Oil Tank Pressure Release Button
2—Hydraulic Oil Tank Cover

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TX17984,00000EC –19–02AUG06–1/3

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NOTE: The following cylinder service tools are recommended to disassemble and assemble cylinders on this machine:

Recommended Cylinder Service Tools—Specification

HCS-40—Maximum Torque	54 232 N•m 40,000 lb-ft
HCS-60—Maximum Torque	81 349 N•m 60,000 lb-ft
HCS-60-L—Maximum Torque	81 349 N•m 60,000 lb-ft

Contact **Tricorp USA,** Palm Beach, Florida (www.tricorpusa.com) for more information.

3. Attach cylinder to service tool.

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

IMPORTANT: Avoid damage to cylinder barrel and cylinder rod. Pull cylinder rod straight out to protect sealing surfaces.

4. Pull cylinder rod (1) straight out of cylinder barrel (18).
5. Completely extend cylinder rod (1).
6. Remove cap screw (8) from cylinder rod guide (9).
7. Remove cylinder rod guide (9) and cylinder rod (1) from cylinder barrel (18).
8. Attach cylinder rod (1) to service tool.
9. Mark cylinder rod (1) and nut (17) to aid in assembly.
10. Remove set screw (16).
11. Loosen nut (17) and remove piston (14) using ST3268 (125 mm) Special Wrench for Cylinder Piston Nut.
12. Inspect piston (14) for any damage.
13. Remove and discard seal ring (15), ring (12) and wear ring (13), from piston (14).
14. Remove packing ring (11) and cylinder rod guide (9) from cylinder rod (1).
15. Remove O-ring (10) and snap rings (2) and (7) from cylinder rod guide (9).
16. Remove dust seal (3), ring (5), seal (4), and bushing (6) using ST2671 (115 mm) Installing Bushing.
17. Inspect cylinder rod (1) and cylinder barrel (18) outside and inside for wear, scratches, and nicks that may cut or damage a seal or wear ring during assembly.

Specification

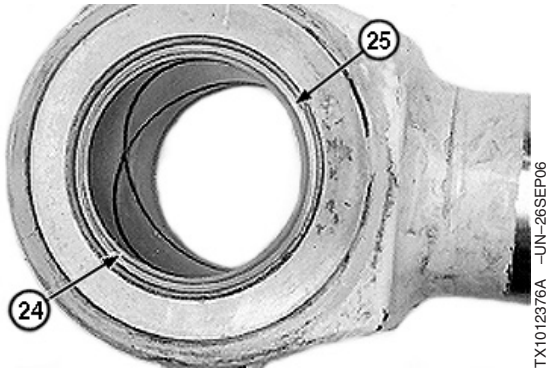
Cylinder Barrel—ID	170—170.063 mm 6.69—6.70 in.

Continued on next page

21. Inspect seals and bushings on both rod end and head end of cylinder for wear and damage Perform Inspect Pins, Bushings and Bosses-Front Attachment. (Group 3340.)

Specification

Arm Cylinder Head End Bushing—ID	110.05—110.25 mm 4.333—4.341 in.
Arm Cylinder Rod End Bushing—ID	110.05—110.25 mm 4.333—4.341 in.



24—Bushing
25—Dust Seal

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TF44157,0000008 –19–07NOV06–3/6

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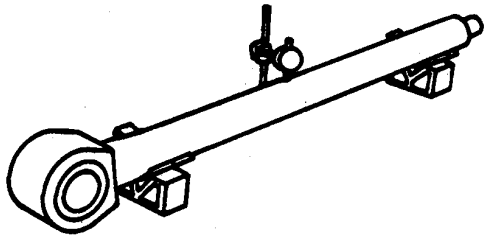
18. Check cylinder rod (1) for curvature using V-blocks and dial indicator.

Specification

Bucket Cylinder Rod—Curvature ..... 0.125 mm /1000 mm
0.005 in. /39.37 in.

Specification

Bucket Cylinder Rod—OD After Re-plating ..... 119.943—120.027 mm



T6585XG –UN–27OCT88

19. Install bushing (9) and snap ring (10) to cylinder rod guide (3) using ST8036 (120 mm) Cylinder Head Maintenance Tool / Rod Outside Dimension 120 mm.

20. Install buffer ring (8) to the cylinder rod guide (3) with the lip toward the cylinder head end.

21. Install U-ring (7) with the lip toward the cylinder head end.

22. Install backup ring (6) and U-ring (7) to the cylinder rod guide (3).

23. Install new slide ring (5) to the cylinder rod guide (3).

24. Install wiper ring (2) with the lip toward the rod end of cylinder. Install to the cylinder rod guide (3) using ST8036 (120 mm) Cylinder Head Maintenance Tool / Rod Outside Dimension 120 mm.

25. Install O-ring (12) and backup ring (11) to cylinder rod guide (3).

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TF44157,000001A –19–08NOV06–4/6

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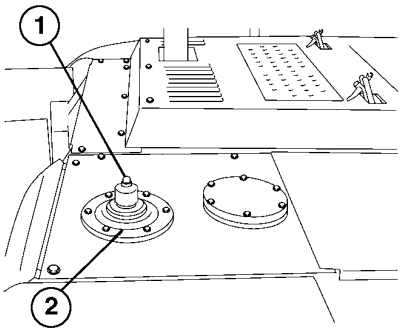
Swing Gearbox Remove and Install

CAUTION: High pressure release of oil from pressurized system can cause serious burns or penetrating injury. The hydraulic tank is pressurized. Relieve pressure by pushing pressure release button.

1. Release hydraulic oil tank pressure by pushing pressure release button (1) on top of hydraulic tank.
2. Drain hydraulic oil tank. Approximate capacity is 322 L (85 gal).



T214924 –UN–17NOV05

1—Pressure Release Button
2—Hydraulic Oil Tank Cover

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TX17984,00000AA –19–02AUG06–1/3

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1

39. Install spring pin (17) so the slit (39) in spring pin is to the end of the pin (18).

40. Install spring pin (17) into the hole of planetary pinion carrier (9).

41. Install thrust plate (5) to planetary pinion carrier (6) with the oil groove to sun gear (4).

42. Install needle bearings (21) to planetary gears (20).

43. Install planetary gears (20), thrust plates (19), pins (23) and spring pins (22) to first stage carrier (6).

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

44. Install the planetary pinion carrier (9) to the shaft (34).

Specification	
Planetary Pinion Carrier—Weight	23 kg approximate 51 lb approximate

45. Install the sun gear (7) to the planetary pinion carrier (9) with the thinner side facing up towards the motor side.

46. Apply PM38654 Threadlocker to mating surfaces of ring gear (3) and housing (27).

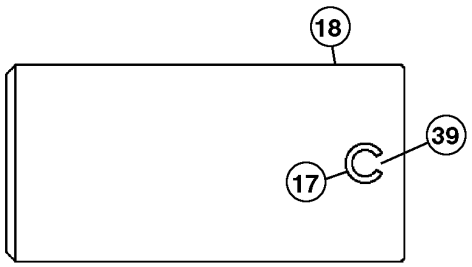
CAUTION: Prevent possible crushing injury from heavy component. Use appropriate lifting device.

47. Install ring gear to housing. Tighten cap screws (24).

Specification	
Ring Gear—Weight	23 kg approximate 50 lb approximate

Specification	
Ring Gear-to-Housing Cap Screws—Torque	205 N•m 150 lb-ft

48. Install the planetary pinion carrier (6) to the sun gear (7).



TX1009831 –UN–17JUL06

Spring Pin

17—Spring Pin
18—Pin
39—Slit

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Continued on next page

TX17984,00000AB –19–02AUG06–8/9

0—Outer Bearing Race
1—Inner Bearing Race
2—Swing Bearing
7—Lower Seal
8—Upper Seal
9—Ball Bearing (86 used)
10—Support (86 used)

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

1. Place swing bearing (2) on clean, flat surface.

Specification	
Swing Bearing—Weight	642 kg approximate 1420 lb approximate

Keep hoist attached to outer bearing race (0) to aid in disassembly.

2. See Swing Bearing Upper Seal Install for replacement of damaged or torn upper seal (8). (Group 4350.)

   See Swing Bearing Lower Seal Install for replacement of damaged or torn lower seal (7). (Group 4350.)

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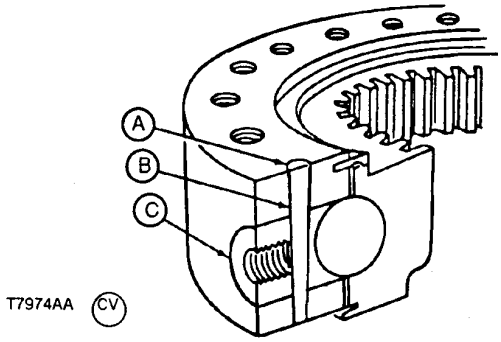
NOTE: Taper pin may be tack welded or crimped.

3. Grind tack weld (A) or crimp off of top of taper pin (B)
4. Drive taper pin out from the bottom side of swing bearing.
5. Remove loading plug (C) using a M10 x 1.5 pitch cap screw.

A—Tack Weld
B—Taper Pin
C—Loading Plug



T7974AA –UN–30MAR93

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TX17984,00000AF –19–02AUG06–3/4

1—Plug
2—Spindle
3—Dust Seal
4—O-Ring
5—Bushing
6—Oil Seal (6 used)
7—Body
8—Ring
9—Snap Ring
10—O-Ring
11—Cover
12—Cap Screw (4 used)

12. Clean body and new bushing. Apply grease to body and new bushing.

13. Install bushing into body using the ST 2670 Pushing Tool or disks from JT01800 Bushing, Bearing, and Seal Driver Set and a press.

14. Install dust seal and O-ring (4).

    Apply grease to lip of dust seal and O-ring in body.

15. Install oil seals to body.

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

16. Place spindle with its upside down.

    Install two M12 x 1.75 mm eyebolts into the body.

    Lift and place body.

Specification

Spindle—Weight ..... 22 kg approximate
50 lb approximate

Body—Weight ..... 29 kg approximate
60 lb approximate

17. Install the body onto spindle by tapping the circumference of body evenly.

18. Install snap ring to spindle.

19. Install O-ring (10) to body.

20. Install cover to body.

21. Tighten cap screws (12) to specification.

Specification

Cover to Body Cap Screws—
Torque ..... 88 N•m
65 lb-ft

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3. Remove crossover relief valve (1).

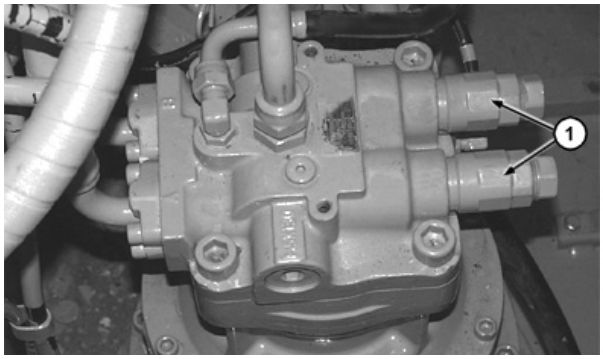
NOTE: Crossover relief valves are not repairable. Replace only.

4. Install crossover relief valve (1).

Specification

Crossover Relief Valve—Torque ..... 175 N•m
130 lb-ft

5. Perform Swing Motor Crossover Relief Valve Test and Adjustment. (Group 9025-25.)



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1—Crossover Relief Valve (4 used)

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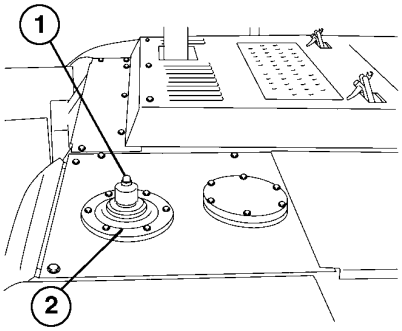
Swing Motor Make-Up Check Valve Remove and Install

CAUTION: High pressure release of oil from pressurized system can cause serious burns or penetrating injury. The hydraulic tank is pressurized. Relieve pressure by pushing pressure release button.

1. Release hydraulic oil tank pressure by pushing pressure release button (1) on top of hydraulic tank.

2. Pull a vacuum in hydraulic oil tank using a vacuum pump or drain hydraulic oil tank. See Apply Vacuum to Hydraulic Oil Tank. (Group 3360.)



T214924 –UN–17NOV05

1—Pressure Release Button
2—Hydraulic Oil Tank Cover

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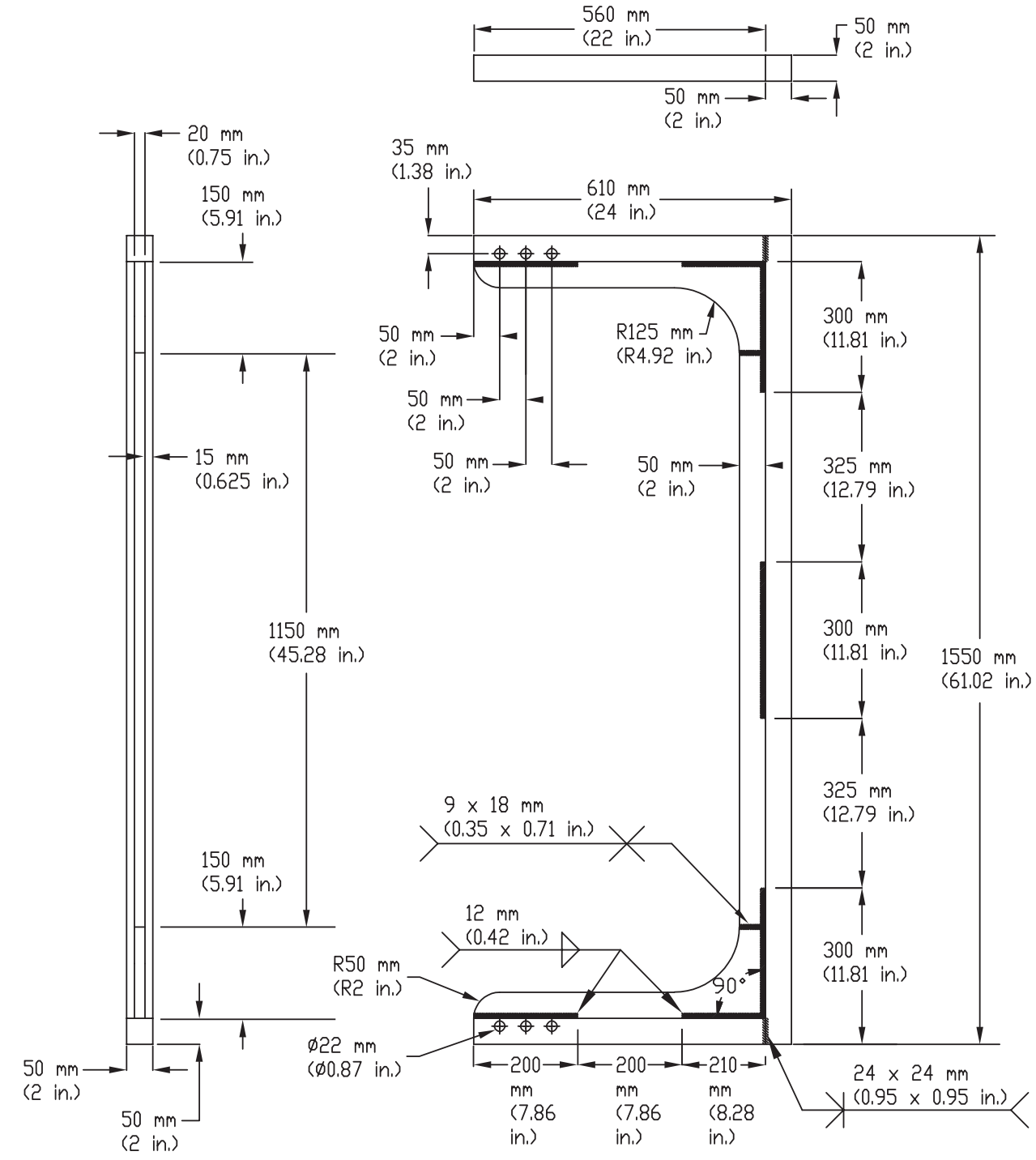
DFT1250 Lifting Bracket



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