



Caterpillar

Service Manual

D8 Crawler

S/n 14A1 & 15A1 & up

Service Manual

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SERVICE MANUAL

for

CATERPILLAR

D8 TRACTOR

SERIAL NUMBERS 14A1-UP AND 15A1-UP

	Section
Engine.....	10
Starting Engine.....	20
Power Transmission Units.....	30
Track Roller Frame.....	40
Seat, Fuel Tank and Miscellaneous.....	200

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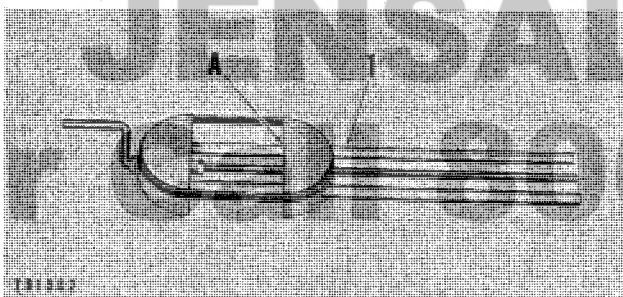
CATERPILLAR

1. For ease of seal installation, remove the wear ring.
2. Install the inner expansion rings on the piston.
3. Measure the diameter of the piston to determine the diameter to which the seal must be expanded. The outer seals of the seal assemblies must be expanded to a diameter slightly larger than the diameter of piston to allow the seal to be placed over the piston. Be careful not to over-expand the seals or they can be ruined.

NOTE

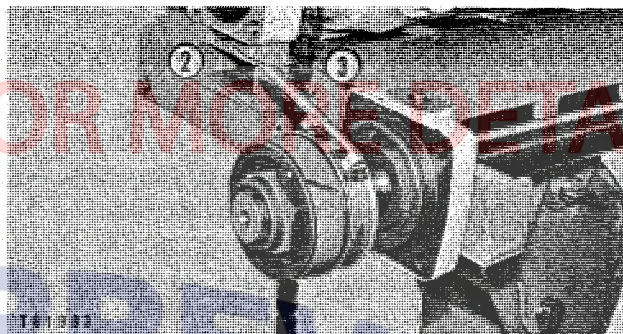
The bars of the expander are graduated, representing piston diameters. If the seal can be slipped off the expander when the inside face of the movable block is at point (A) (indicated piston diameter) the seal is expanded sufficiently.

4. Place a seal on the expander. Turn the crank on the expander until the inside face of the movable block is slightly past point (A). Then return to point (A). Rotate the seal 90° on the expander and expand again. Check to see if the seal will slip off the expander. If not, repeat the procedure, expanding the seal farther each time, until seal will slip off the expander when block is returned to point (A).
5. Lubricate the outer seals and place them on the piston. Install and lubricate the wear ring.
6. Select the applicable compressor from the COMPRESSOR SELECTION CHART. Install the clamp on the compressor. Place the compressor loosely over the outer seals. Place the compressor on the piston so the rolled side of the compressor will be facing the cylinder when the piston is installed in the cylinder.

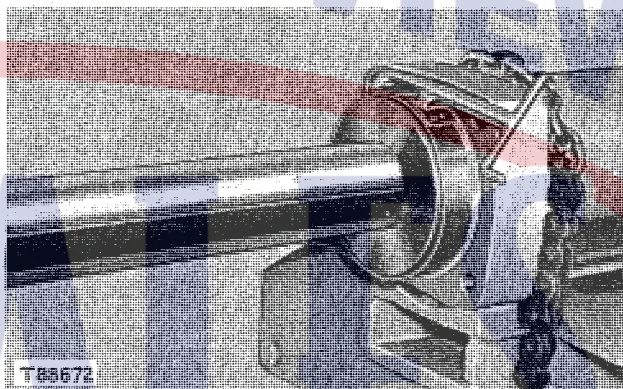


This shows the seal on the expander. Illustrated are: 1-4S9181 Expander Assembly. A-Indicated piston diameter.

7. Slowly turn the handle on the clamp and force the seals into their grooves. Be certain the seals are being seated in their grooves as they are being compressed.



The tools illustrated compressing seals are: 2-Seal compressor. 3-4S9446 Clamp Assembly.



This shows the installation of the piston into the cylinder.

8. Place the piston assembly into the cylinder bore as illustrated; be certain the piston is square in the bore.
9. Drive on the piston rod until the entire piston assembly is in the cylinder bore. Remove the clamp and the compressor.
10. Install the bolts securing the cylinder head to the cylinder with the piston rod fully extended. Tighten the bolts to the torque value in the SPECIFICATIONS.

Pumps

The direction of pump rotation, clockwise (CW) or counterclockwise (CCW), is the direction the pump turns when viewed from the drive shaft end. Refer to the SPECIFICATIONS for the rotation of a particular pump.

After assembling any pump, lubricate it thoroughly. After assembly, the pump must rotate freely by hand.

Assembly of Insert Vane-type Pumps

The insert vane-type pump capacity and direction of rotation will vary with different applications. The assembly procedure however will be the same.

Before disassembling a pump, mark the pump body and cover to insure correct assembly with respect to port relationship.

ENGINE**TABLE OF CONTENTS**

	Section	Group
Index	1A - 10	30
Specifications	1A - 10	40
Cooling System	1A - 10	70
Cooling System	1A - 10	70.1
Water Temperature Regulator	1A - 10	100
Fan Group	1A - 10	130
Fan Group	1A - 10	130.2
Water Pump	1A - 10	140
Radiator	1A - 10	160
Lubricating System	1A - 10	170
Oil Pan	1A - 10	180
Oil Pump	1A - 10	190
Oil Cooler	1A - 10	200
Oil Filter and Manifolds	1A - 10	210
Fuel System	1A - 10	230
Fuel System	1A - 10	230.3
Fuel Supply Equipment	1A - 10	240
Fuel Supply Equipment	1A - 10	240.2
Fuel Injection Equipment	1A - 10	250
Accessory Drive and Governor	1A - 10	260
Manifolds	1A - 10	270
Cylinder Heads	1A - 10	280
Valves and Valve Mechanism	1A - 10	290
Vibration Damper	1A - 10	300
Vibration Damper	1A - 10	300.2
Front Support	1A - 10	310
Timing Gears	1A - 10	320
Pistons, Rings and Connecting Rods	1A - 10	340
Cylinder Liners	1A - 10	350
Main Bearings	1A - 10	360
Crankshaft	1A - 10	370
Flywheel and Flywheel Housing	1A - 10	390
Diesel Engine Removal and Installation	1A - 10	400

ENGINE**INDEX**

A		F	
Accessory Drive Housing	260 - 1	Fan Group	130 - 1
Accessory Shaft	260 - 7		130.2- 1
Adjustments:		Filters:	
Fuel Injection Pump Lifter	250 - 4	Fuel	240 - 2
Full Load Speed	260 - 4	Oil	210 - 1
Governor	260 - 4	Flow of Coolant	70 - 1
Valve Clearance	40 - 2		70.1- 1
Air Inlet Manifold	270 - 1	Flow of Fuel	230 - 1
			230.3- 1
B		Flow of Lubricating Oil	170 - 1
Bearings:		Flywheel	390 - 1
Connecting Rod	340 - 3	Front Support, Engine	310 - 1
Main	360 - 1	Fuel:	
Bell, Suction	190 - 1	By-pass	240 - 2
By-pass:			240.2- 2
Fuel	240 - 2	Filter Housing	240 - 2
	240.2- 2		240.2- 2
Oil Filter	210 - 1	Injection:	
C		Equipment	250 - 1
Camshaft Gear	320 - 2	Pumps	250 - 2
Chambers, Precombustion	280 - 2	Pump Housing	250 - 3
Cleaning:		Pump Lifters	250 - 4
Engine Valves	290 - 3	Valves	250 - 1
		System	230 - 1
Pistons	340 - 2	Transfer Pump	240 - 1
Temperature Regulators	100 - 2		240.2- 1
Clearances and Tolerances	40 - 1	G	
Compression Release Mechanism	290 - 5	Gauge:	
Connecting Rods and Bearings	340 - 1	Fuel	230 - 1
Controlled Inlet Valve, Oil	190 - 4		230.3- 2
Cooler, Oil	200 - 1	Oil	170 - 1
Cooling System	70 - 1	Gear:	
	70.1- 1	Accessory Drive	260 - 1
Core, Radiator	160 - 1	Camshaft	320 - 2
Crankshaft	370 - 1	Crankshaft	370 - 1
Crankshaft Pulley	300 - 1	Idler	320 - 1
	300.2- 1	Ring, Flywheel	390 - 1
Cylinder Head	280 - 1	Timing	320 - 1
Cylinder Liners	350 - 1	Timing Marks	320 - 1
D		Governor:	
Data, Engine	40 - 1	Adjustments	260 - 4
Damper, Vibration	300 - 1	Control Shaft	260 - 5
	300.2- 1	Operation	260 - 2
Directors, Water	280 - 2	H	
Drive:		Head, Cylinder	280 - 1
Accessory	260 - 6	Heat Tube	270 - 1
Oil Pump	190 - 1	Housing:	
Service Meter	260 - 7	Accessory Drive and Governor	260 - 1
E		Flywheel	390 - 1
Engine Data	40 - 1	Fuel Injection Pump	250 - 2
Engine Removal	400 - 1	Fuel Filter	240 - 2
Exhaust Manifold	270 - 1		240.2- 1
		Timing Gear	320 - 1

ENGINE INDEX

I

Idler Gears	320	- 1
Injection, Fuel	250	- 1
Inlet:		
Manifold	270	- 1
Valve	250	- 1

L

Lifters:		
Fuel Injection Pumps	250	- 4
Valve	290	- 4
Liners, Cylinder	350	- 1
Lubricating System	170	- 1
Lubrication:		
Piston and Ring	340	- 1
Service Meter	260	- 7
Timing Gear	170	- 1

M

Main Bearings	360	- 1
Manifolds:		
Exhaust	270	- 1
Fuel	230	- 1
	230.3	- 1
Inlet	270	- 1
Oil Filter	210	- 2
Oil	210	- 2
Meter, Service	260	- 7

O

Oil:		
By-pass Valves	210	- 1
Cooler	200	- 1
Filter Manifold	210	- 1
Filters	210	- 1
Manifold	210	- 2
Pan	180	- 1
Pump	190	- 1
Pump Drive	190	- 1
Pump Suction Bells	190	- 1
Operating Difficulties:		
Engine Coolant Overheating	70	- 1
	70.1	- 1
Engine Fuel System	230	- 1
	230.3	- 1
Engine Lubricating System	170	- 2
Overheating, Coolant	70	- 1
	70.1	- 1

P

Pan, Oil	180	- 1
Pistons	340	- 1
Piston Pin Bushings	340	- 3
Piston Rings	340	- 2
Precombustion Chambers	280	- 2
Pump:		
Fuel:		
Injection	250	- 2
Transfer	240	- 1
	240.2	- 1
Oil	190	- 1
Water	140	- 1
Pressure, Oil	170	- 2
Gauge	170	- 1
Relief Valve	190	- 3

R

Radiator	160	- 1
Raising Ring Ridge in Cylinder Liners	350	- 2
Regulators, Water Temperature	100	- 1
Release, Compression	290	- 5
Ring Gear, Flywheel	390	- 1
Rings, Piston	340	- 1
Rocker Arms, Valve	290	- 1
Rod, Connecting	340	- 2

S

Sealed Pressure Overflow	160	- 2
Seals, Liner	350	- 1
Service Meter	260	- 7
Setting Fuel Pump Lifter	250	- 4
Shaft, Accessory Drive	260	- 6
Specifications	40	- 1
Springs:		
Governor	260	- 2
Valve	290	- 3
Suction Bells	190	- 1
Support, Engine Front	310	- 1

T

Testing Temperature Regulators	100	- 1
Thrust Bearing:		
Camshaft	320	- 3
Crankshaft	360	- 1
Timing:		
Engine Gears	320	- 1
Engine Valves	290	- 4
Fuel Injection	250	- 4
Timing Gears	320	- 1
Timing Marks	320	- 1
Tolerances	40	- 1
Transfer Pump, Fuel	240	- 1
	240.2	- 1

V

Valve:		
By-pass, Fuel	240	- 2
	240.2	- 2
By-pass, Oil	210	- 1
Controlled Inlet, Oil	190	- 4
Inlet and Exhaust	290	- 1
Fuel Injection	250	- 1
Inspection and Reconditioning	290	- 3
Lifters	290	- 4
Operation	290	- 1
Pressure Relief	190	- 4
Rocker Arm	290	- 2
Rotators	290	- 1
Seat Specifications	290	- 3
Stem Bushings	290	- 4
Timing	290	- 4
Valves and Valve Mechanism	290	- 1

W

Water:		
Directors, Seals and Ferrules	280	- 2
Pump:		
Seal Replacement	140	- 1
Temperature Regulator	100	- 1

ENGINE SPECIFICATIONS

Injection pump lifter setting (off engine—see text)	1.781 ± .001 in.
Fuel pump plunger length	2.6575 - 2.6577 in.
Permissible wear (decrease in length of plunger)	.005 in.
Injection nozzle orifice	.028 in.
Fuel injection camshaft bearing bore	1.436 - 1.437 in.
Clearance between fuel injection camshaft and bearings	.002 - .004 in.
Permissible clearance	.010 in.
Nozzle retaining nut torque	105 lb. ft.

Fuel Transfer Pump

Clearance between gears and covers, total	.001 - .003 in.
Bearing bore	.4950 - .4955 in.
Bearing clearance	.001 - .002 in.
Permissible bearing clearance	.005 in.

Flywheel

Bolt torque	265 lb. ft.
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Flywheel Housing

Bolt and nut torque	265 lb. ft.
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Governor

Drive gear backlash	.002 - .006 in.
Permissible upper retainer bearing clearance	.005 in.

Oil Pump

Clearance between gears and end covers	.002 - .004 in.
Drive gear shaft diameter	.7405 - .7410 in.
Bearing bore	.743 - .744 in.
Bearing clearance	.0020 - .0035 in.
Permissible bearing clearance	.006 in.

Piston Pins

Clearance in piston pin bearing	.001 - .002 in.
Permissible clearance in piston pin bearing	.006 in.
Clearance in piston	.0004 - .0010 in.
Permissible clearance in piston	.006 in.

Piston Rings (new rings and liner)

Piston Ring	EARLIER	LATER
Side Clearance		
Top ring	.0050 - .0060 in.	.0050 - .0060 in.
2nd ring	.0030 - .0046 in.	.0030 - .0045 in.
3rd ring	.0030 - .0046 in.	
Oil ring	.0015 - .0035 in.	.0020 - .0030 in.
Permissible clearance (top compression ring)	.012 in.	.012 in.
Ring gap, top	.017 - .025 in.	.023 - .028 in.
Ring gap, 2nd	.017 - .028 in.	.021 - .031 in.
Ring gap, oil	.017 - .028 in.	
Ring gap, oil	.015 - .028 in.	.015 - .025 in.

Precombustion Chamber

Torque	200 lb. ft.
--------	-------------

Rear Power Take-off Drive Shaft

Bearing clearance	.003 - .006 in.
Permissible bearing clearance	.010 in.

End clearance	.010 - .020 in.
Permissible end clearance	.035 in.

Rocker Arm Bearings

Clearance between shaft and bearings	.0020 - .0035 in.
Permissible clearance	.010 in.

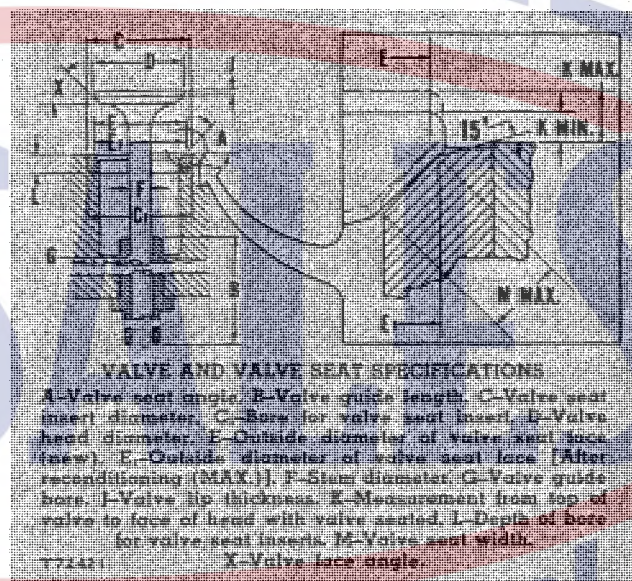
Service Meter

Permissible bearing clearance	.012 in.
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Timing Gear Housing

Bolt torque	80 lb. ft.
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Valve and Valve Seat Specifications



	INLET	EXHAUST
A	45°	45°
B	5.252"	5.252"
C	2.5025" - 2.5035"	2.5025" - 2.5035"
C ₁	2.4995" - 2.5005"	2.4995" - 2.5005"
D	2.338" - 2.348"	2.277" - 2.287"
E	2.296"	2.244"
E ₁	2.318" MAX.	2.257" MAX.
F	.4950" - .4960"	.4950" - .4960"
*G	.499" - .501"	.500" - .502"
H	.141" MIN.	.094" MIN.
K	.134" MIN. - .185" MAX.	.076" MIN. - .130" MAX.
L	.508" - .510"	.508" - .510"
†M	.145" MAX.	.185" MAX.
X	44¼°	44¼°

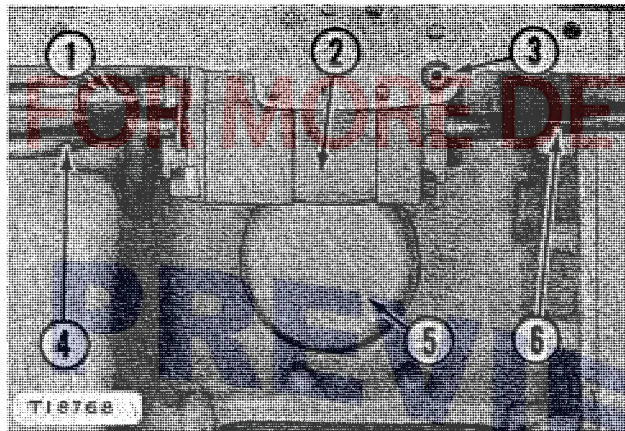
*Measure valve guide bore in portion of guide which is pressed into cylinder head closest to valve head.

†If valve seat face exceeds the maximum width after grinding, narrow the seat face by using a 15° stone or fly cutter.

Maximum permissible valve stem clearance in valve stem bushing	Inlet .009 Exhaust .009
--	----------------------------



MAIN SUCTION BELL DISASSEMBLED
1-Cover. 2-Screen assembly. 3-Suction bell.



PREPARING TO REMOVE OIL PUMP
1-Splined coupling. 2-Oil pump. 3-Seal. 4-Tube.
5-Suction bell. 6-Tube.

4. Install new gaskets between the cover, screen assembly and suction bell when reassembling.
5. Use a new gasket between the suction bell and oil pump body.

NOTE

Any air leaks on the suction side of the pump can result in the loss of the output of the oil pump and in low oil pressure.

OIL PUMP REMOVAL

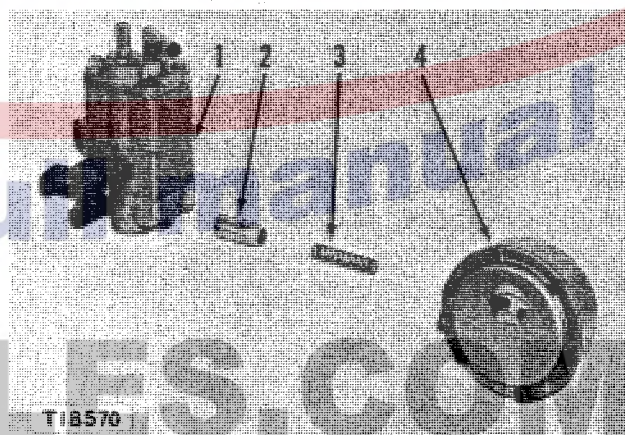
The oil pump (2) can be removed from the oil pan without removing the oil pan from the engine. If the oil pan is to be removed from the engine for any reason, it is easier to remove the oil pump at that time. In either case, the removal is similar.

1. Drain the oil from the oil pan.
2. If the oil pan is attached to the engine block, remove the covers from both sides of the oil pan.
3. Remove the main suction bell (5). See the covering topic.
4. Disconnect the rear suction bell tube (6) from the oil pump and move the tube toward the rear of the oil pan as far as possible.
5. Remove the bolt from the splined coupling (1) connecting the drive shaft and the oil pump shaft in the oil pump.
6. Move the splined coupling (1) forward along the drive shaft until the oil pump shaft is free of the coupling.
7. Disconnect the front suction bell tube (4) from the oil pump.
8. Remove the capscrews securing the oil pump (2) to the oil pan, and remove the pump through one of the openings in the side of the oil pan.

9. If the oil pan has been removed, install a new seal (3) when installing the oil pan.

OIL PUMP DISASSEMBLY

1. Remove the two capscrews securing the main suction bell (4) to the main pump body (1).
2. Remove the controlled inlet valve plunger (2) and spring (3) from the main pump body.

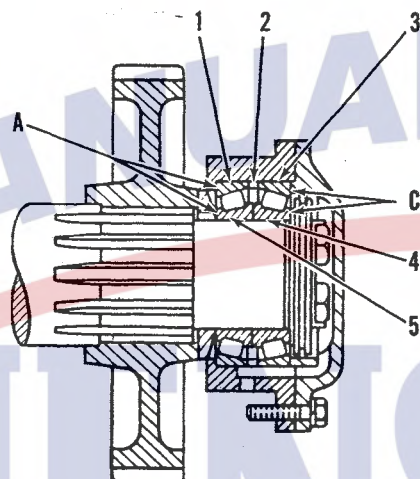


REMOVING MAIN SUCTION BELL
1-Main pump body. 2-Controlled inlet valve plunger.
3-Spring. 4-Main suction bell.

3. Remove the retainer (9), retainer (8), spring (7), washer (6) and ball (5) from the main pump body. These parts make up the pressure relief valve.
4. Remove the capscrews holding the three sections of the pump and the discharge tube together.
5. Remove the rear scavenger pump body (10) from the main pump body.

Assembly of Pinion Shaft and Countershaft Bearings and Cages

The bearing assembly on the front end of the pinion shaft is composed of two bearings (4) and (5), spacer (2) and two bearing cups (1) and (3).



INSTALLING PINION SHAFT FRONT BEARINGS
1-Bearing cup. 2-Spacer. 3-Bearing cup. 4-Bearing.
5-Bearing. A and C-Identification marks on bearing cups and bearing.

This bearing also has a serial number similar to the transmission upper shaft bearing.

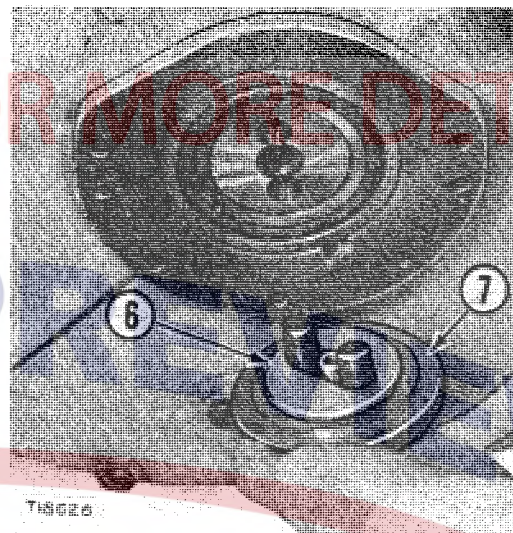
Bearing cups marked with a letter following the serial number must be assembled to the bearing that is marked with the same letter. Although the bearings (4) and (5) are interchangeable from side to side, they must be matched with the correct bearing cups.

This bearing has .0034"-.0091" end clearance after assembly.

NOTE

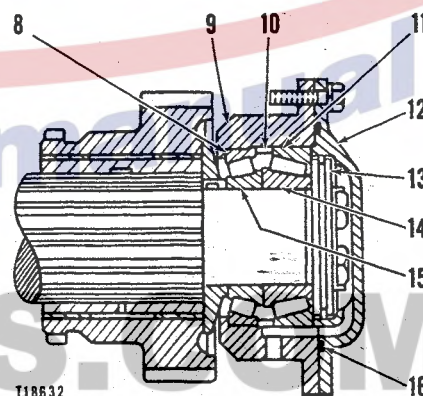
Install bearings so the taper is in the position as illustrated.

1. Place the seal around the bearing cage before it is installed.
2. Use suitable size and length capscrews through the bearing cage flange and retainer to pull the cage and bearing into place.
3. Install the predetermined amount of shims (6), and retainer (7).
4. Inspect the piston-type ring in the retainer before installing the cover.



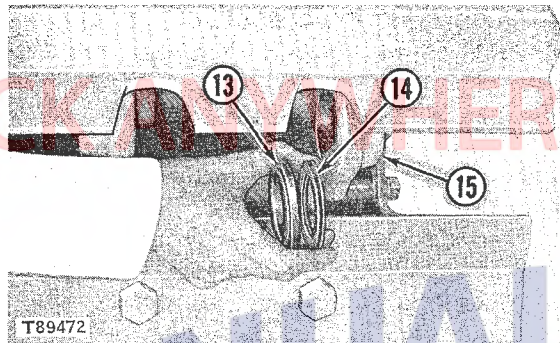
INSTALLING PINION SHAFT FRONT BEARING
6-Shims. 7-Retainer.

5. Place shims under the bearing cage as described in the topic, PINION SHAFT AND BEVEL GEAR ADJUSTMENT.
6. Inspect the seal on the cover and install the cover on the bearing cage.



INSTALLING COUNTERSHAFT FRONT BEARINGS
8-Small bearing cup. 9-Bearing cage. 10-Spacer. 11-Large bearing cup. 12-Cover. 13-Retainer. 14-Large bearing. 15-Small bearing. 16-Seal.

7. Install the small bearing cup (8) and spacer (10) into the bearing cage (9).
8. Install the bearing cage (9) with a gasket under the flange of the cage, into the transmission front cover.
9. Install the small bearing (15), as illustrated, on the shaft and tap the bearing onto the shaft as far as possible.



REPLACEMENT TRACK SEAL WASHERS AND SPACERS

13-Spacers (two). 14-Coned disc seal washers (four).
15-Master links (two).

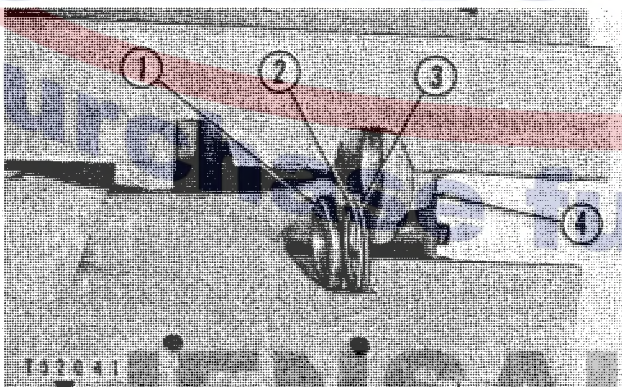
INSTALLING TRACK

1. Back the machine until the sprocket is just ahead of the rear end of the track.
2. Attach a suitable hoist to the outside link and raise the track as the machine is driven forward.

NOTE

If a traveling hoist is not available, it may be necessary to block the track and reposition the hoist to complete installation.

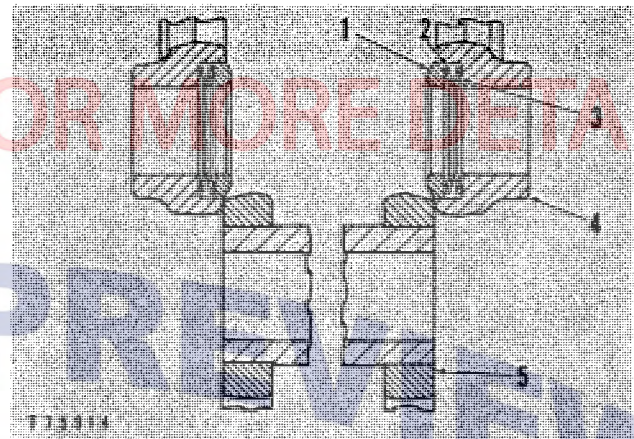
3. Carry the track high enough to clear the rollers.



**INSTALLING SEAL WASHERS AND SPACERS
(Replacement Track)**

1-Spacers (two). 2 and 3-Coned disc seal washers (four).
4-Master link.

4. When installing replacement tracks, place a block under the first shoe, drive forward until links (4) and (5) are approximately 1" apart and install the coned disc seal washers (2) and (3) and spacer (1) in each side of links (4).
5. Install each set of coned disc seal washers with one outside diameter facing the counterbore in link (4) and one outside diameter facing spacer (1), with inside diameters against each other. Install spacer (1) with beveled edge toward the centerline of the track.



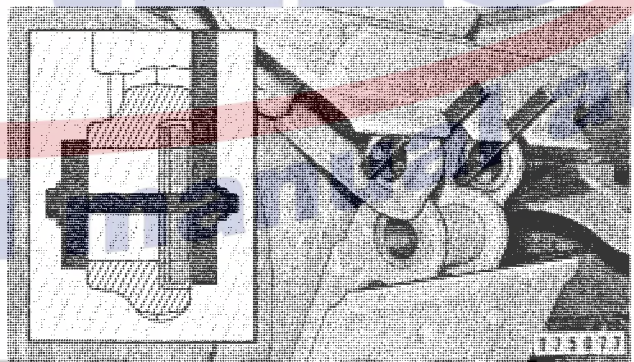
INSTALLING SEAL WASHERS AND SPACERS

1-Spacers (two). 2 and 3-Coned disc seal washers (four).
4-Master link. 5-Track link.

NOTE

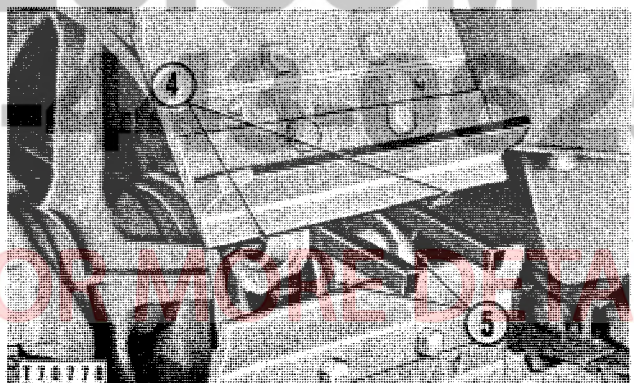
The coned disc seal washers (2) and (3) and spacers (1) can be held in place in the counterbores of master links (4) with the use of two fabricated tools.

6. Assemble the tools on links (4), tightening the bolt on each tool to compress seal washers (2) and (3). Spacers (1) will be flush with inner face of links when seal washers are properly compressed.



COMPRESSING SEAL WASHERS

Tool required: FT573 Holding Tool (Fabricated Tool)



**TRACK POSITIONED TO REMOVE HOLDING TOOLS
(Typical Example)**

4-Master links. 5-Track links.