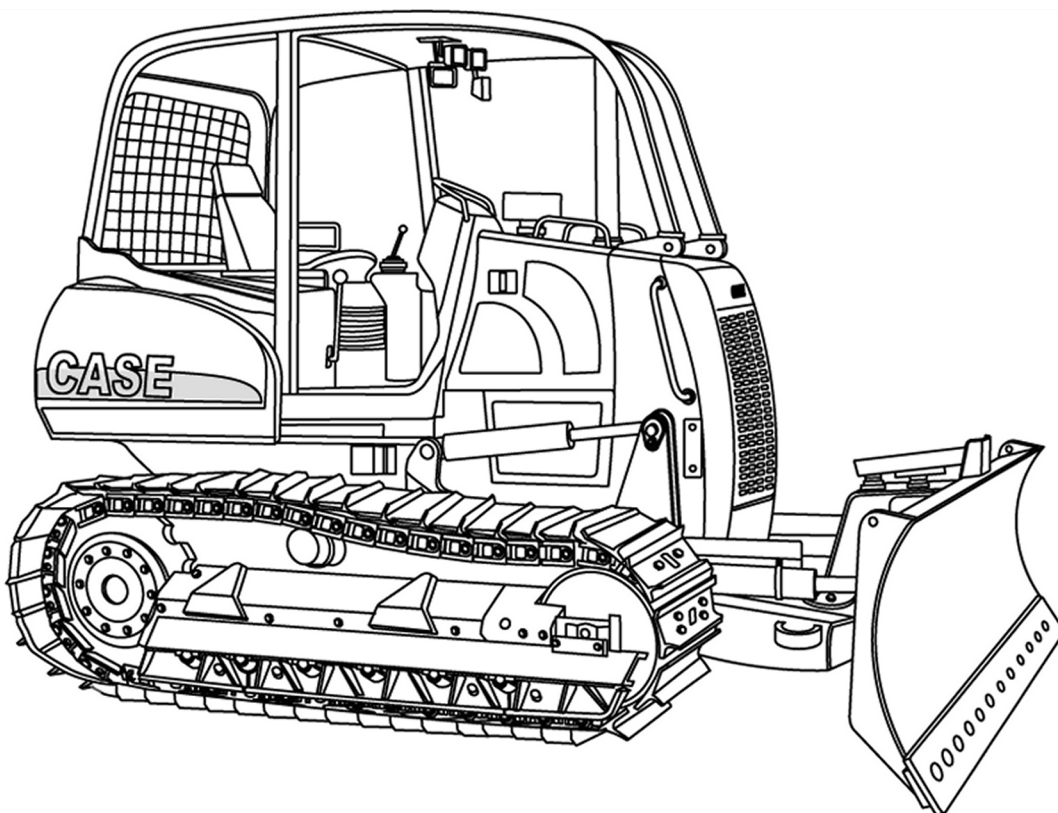




SERVICE MANUAL

CRAWLER DOZER 650L TIER3



84276960

Replaces 84260831

Issued October 2009

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INTRODUCTION

Basic instructions

Technical Information

This manual has been produced by a new technical information system. This new system is designed to deliver technical information electronically through CDROM and in paper manuals. A coding system called ICE has been developed to link the technical information to other Product Support functions e.g. Warranty.

Technical information is written to support the maintenance and service of the functions or systems on a customers machine. When a customer has a concern on his machine it is usually because a function or system on his machine is not working at all, is not working efficiently, or is not responding correctly to his commands. When you refer to the technical information in this manual to resolve that customers concern, you will find all the information classified using the new ICE coding, according to the functions or systems on that machine. Once you have located the technical information for that function or system then you will find all the mechanical, electrical or hydraulic devices, components, assemblies and sub-assemblies for that function or system. You will also find all the types of information that have been written for that function or system, the technical data (specifications), the functional data (how it works), the diagnostic data (fault codes and troubleshooting) and the service data (remove, install adjust, etc.).

By integrating this new ICE coding into technical information , you will be able to search and retrieve just the right piece of technical information you need to resolve that customers concern on his machine. This is made possible by attaching 3 categories to each piece of technical information during the authoring process.

The first category is the Location, the second category is the Information Type and the third category is the Product:

- **LOCATION** - is the component or function on the machine, that the piece of technical information is going to describe e.g. Fuel tank.
- **INFORMATION TYPE** - is the piece of technical information that has been written for a particular component or function on the machine e.g. Capacity would be a type of Technical Data that would describe the amount of fuel held by the Fuel tank.
- **PRODUCT** - is the model that the piece of technical information is written for.

Every piece of technical information will have those 3 categories attached to it. You will be able to use any combination of those categories to find the right piece of technical information you need to resolve that customers concern on his machine.

That information could be:

- the description of how to remove the cylinder head
- a table of specifications for a hydraulic pump
- a fault code
- a troubleshooting table
- a special tool

How to Use this Manual

This manual is divided into Sections. Each Section is then divided into Chapters. Contents pages are included at the beginning of the manual, then inside every Section and inside every Chapter. An alphabetical Index is included at the end of a Chapter. Page number references are included for every piece of technical information listed in the Chapter Contents or Chapter Index.

Each Chapter is divided into four Information types:

- **(D)** Technical Data (specifications) for all the mechanical, electrical or hydraulic devices, components and assemblies.
- **(C)** Functional Data (how it works) for all the mechanical, electrical or hydraulic devices, components and assemblies.
- **(G)** Diagnostic Data (fault codes, electrical and hydraulic troubleshooting) for all the mechanical, electrical or hydraulic devices, components and assemblies.
- **(F)** Service data (remove disassembly, assemble, install) for all the mechanical, electrical or hydraulic devices, components and assemblies.

Sections

Sections are grouped according to the main functions or a systems on the machine. Each Section is identified by a letter A, B, C etc. The amount of Sections included in the manual will depend on the type and function of the machine that the manual is written for. Each Section has a Contents page listed in alphabetic/numeric order. This table illustrates which Sections could be included in a manual for a particular product.

PRODUCT	SECTION										
	A - Distribution Systems										
	B - Power Production										
	C - Power Train										
	D - Travelling										
	E - Body and Structure										
	F - Frame Positioning										
	G - Tool Positioning										
	H - Working Arm										
	J - Tools and Couplers										
	K - Crop Processing										
	L - Field Processing										
Tractors	X	X	X	X	X	X		X	X		
Vehicles with working arms: backhoes, excavators, skid steers,	X	X	X	X	X	X	X	X	X		
Combines, forage harvesters, balers,	X	X	X	X	X	X	X	X	X	X	
Seeding, planting, floating, spraying equipment,	X	X	X	X	X	X	X		X		X
Mounted equipment and tools,					X	X	X		X		

Chapters

Each Chapter is identified by a letter and number combination e.g. Engine B.10.A The first letter is identical to the Section letter i.e. Chapter B.10 is inside Section B, Power Production.

CONTENTS

The Chapter Contents lists all the **(D)** technical data (specifications), **(C)** functional data (how it works), **(F)** service data (remove, install adjust, etc.) and **(G)** diagnostic data (fault codes and troubleshooting) that have been written in that Chapter for that function or system on the machine.

Contents

POWER PRODUCTION ENGINE _ 10.A

TECHNICAL DATA

ENGINE - General specification (B.10.A - D.40.A.10) 3

FUNCTIONAL DATA

ENGINE - Dynamic description (B.10.A - C.30.A.10) 4

SERVICE

ENGINE - Remove (B.10.A - F.10.A.10) 5

DIAGNOSTIC

ENGINE - Troubleshooting (B.10.A - G.40.A.10) 6

INDEX

The Chapter Index lists in alphabetical order all the types of information (called Information Units) that have been written in that Chapter for that function or system on the machine.

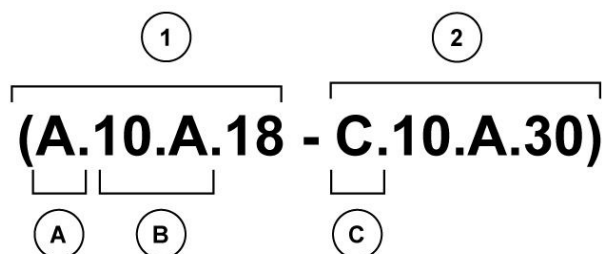
Index

POWER PRODUCTION - B ENGINE	
ENGINE - Dynamic description (B.10.A - C.30.A.10)	4
ENGINE - General specification (B.10.A - D.40.A.10)	3
ENGINE - Remove (B.10.A - F.10.A.10)	5
ENGINE - Troubleshooting (B.10.A - G.40.A.10)	6

Information Units and Information Search

Each chapter is composed of information units. Each information unit has the ICE code shown in parentheses which indicates the function and the type of information written in that information unit. Each information unit has a page reference within that Chapter. The information units provide a quick and easy way to find just the right piece of technical information you are looking for.

example information unit	Stack valve - Sectional View (A.10.A.18 - C.10.A.30)				
Information Unit ICE code	A	10.A	18	C	10.A.30
ICE code classification	Distribution systems	Primary hydraulic power	Stack valve	Functional data	Sectional view



CRIL03J033E01 1

Navigate to the correct information unit you are searching for by identifying the function and information type from the ICE code.

- **(1)** Function and **(2)** Information type.
- **(A)** corresponds to the sections of the repair manual.
(B) corresponds to the chapters of the repair manual.
(C) corresponds to the type of information listed in the chapter contents, **(D)**, Technical data, **(C)**, Functional Data, **(G)**, Diagnostic, and **(F)**, Service.
(A) and **(B)** are also shown in the page numbering on the page footer.
THE REST OF THE CODING IS NOT LISTED IN ALPHA-NUMERIC ORDER IN THIS MANUAL.
- You will find a table of contents at the beginning and end of each section and chapter.
You will find an alphabetical index at the end of each chapter.
- By referring to **(A)**, **(B)** and **(C)** of the coding, you can follow the contents or index (page numbers) and quickly find the information you are looking for.

Page Header and Footer

The page header will contain the following references:

- Section and Chapter description

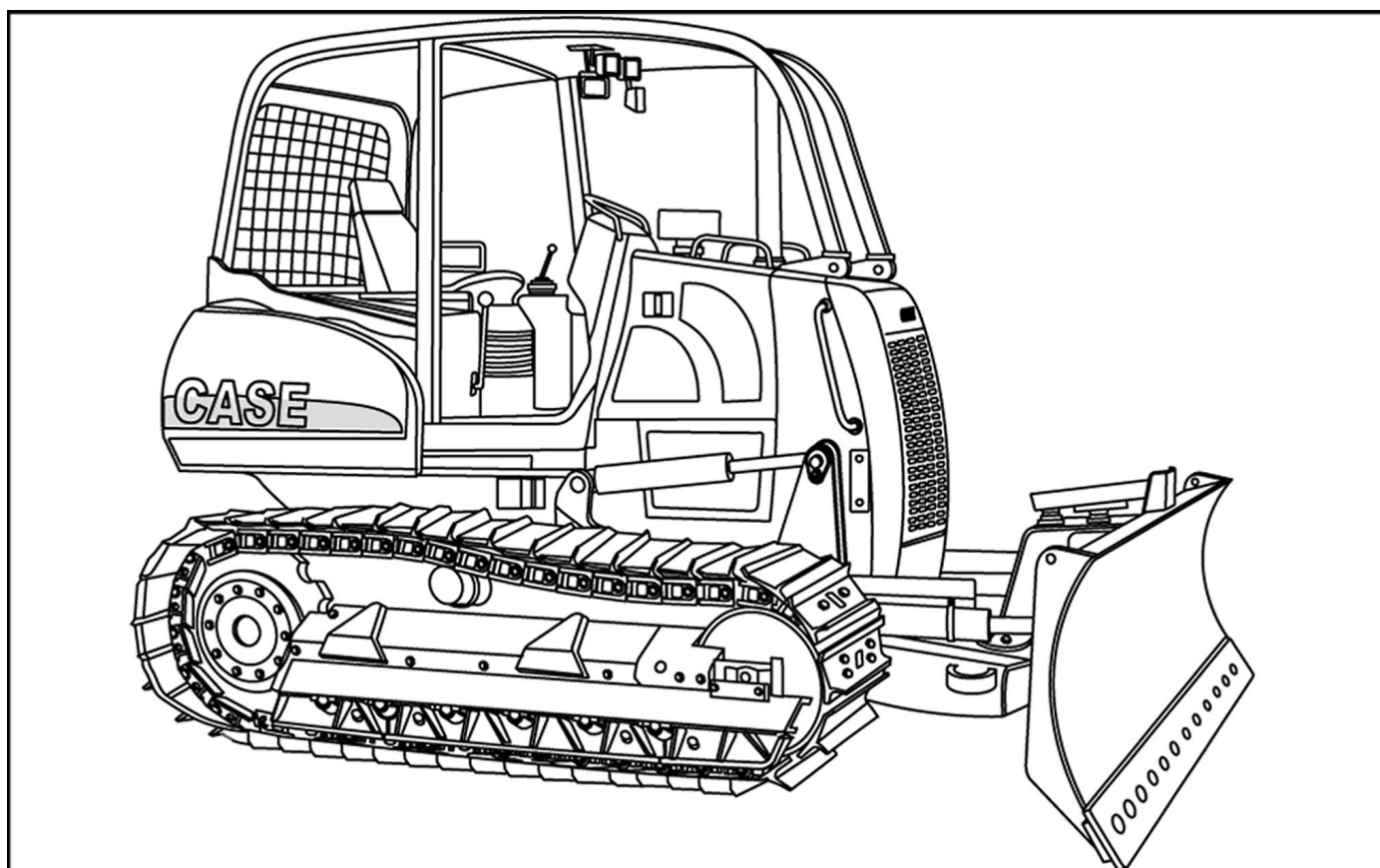
The page footer will contain the following references:

- Publication number for that Manual, Section or Chapter.
- Version reference for that publication.
- Publication date
- Section, chapter and page reference e.g. A.10.A / 9



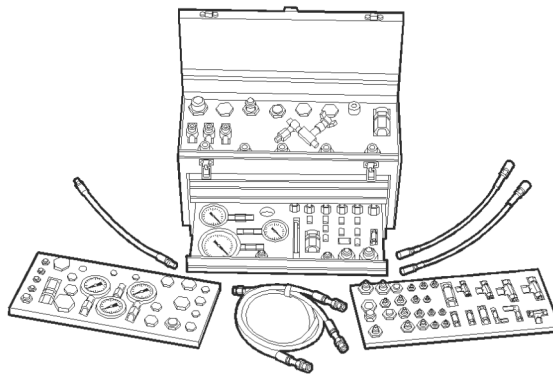
SERVICE MANUAL

DISTRIBUTION SYSTEMS



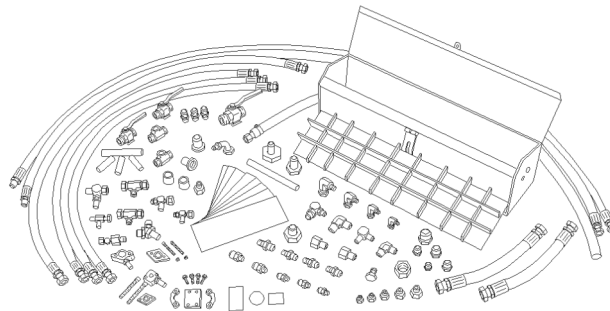
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PRIMARY HYDRAULIC POWER SYSTEM - Special tools



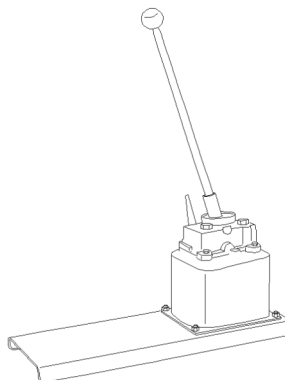
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CAS1804 Hydraulic pressure fitting kit



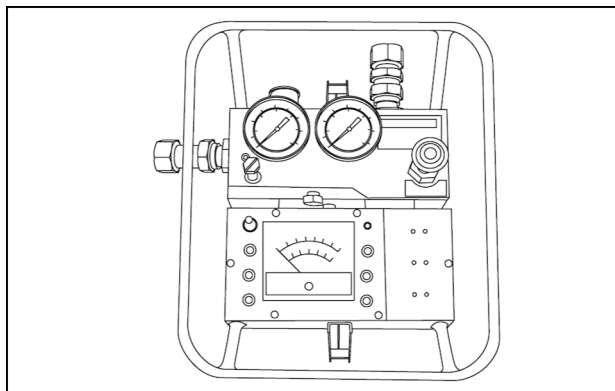
RCPH09CWL006AAD 2

CAS1808 Flowmeter fitting kit



RCPH09CWL004AAD 3

CAS10090 Hand pump



RCPH09CWL339AAD 4

CAS10280 Flowmeter

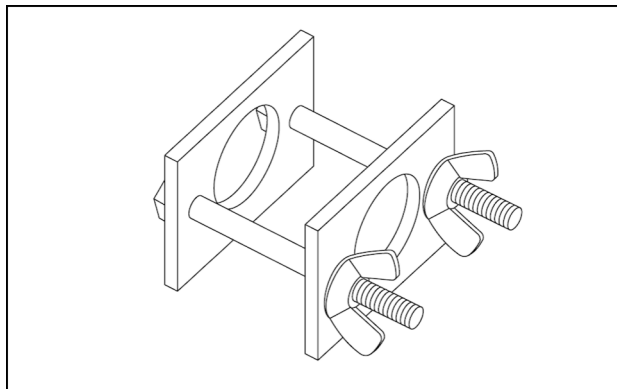
PRIMARY HYDRAULIC POWER SYSTEM - General specification

Type of oil	CASE AKCELA AW68 HYD FLUID MAT 3508
Temperature of hydraulic oil when testing	52 - 79 °C (125 - 175 °F)
Neutral system pressure	12 - 15 bar (180 - 220 psi) at 2000 RPM
Main relief valve pressure All models at 2000 RPM	203 - 214 bar (2950 - 3100 psi)
Circuit relief valves A and B ports ripper/auxiliary section	214 - 227 bar (3100 - 3300 psi) with hand pump
Dozer blade lift speed	457 mm second (18 in second)
Dozer blade lift time (measure from ground level to full height)	2 seconds

Stack valve - Torque

Special torques	Nm	lb
Bolts and nuts that fasten the sections together	39 - 47 Nm	28.7 - 34.6 lb ft
Relief valves and load check valves	24 - 30 Nm	17.7 - 22 lb ft
Allen head screws	12 - 15 Nm	106 - 133 lb in
Centering spring screw	13 - 16 Nm	115 - 142 lb in

Stack valve - Special tools



RCPH09CWL075AAD 1

Centering spring compression tool

Stack valve - Calibration

Relief Valves	bar	psi
Main relief valve	203 - 214 bar	2950 - 3100 psi
Circuit relief valves tested with hand pump	214 - 227 bar	3100 - 3300 psi

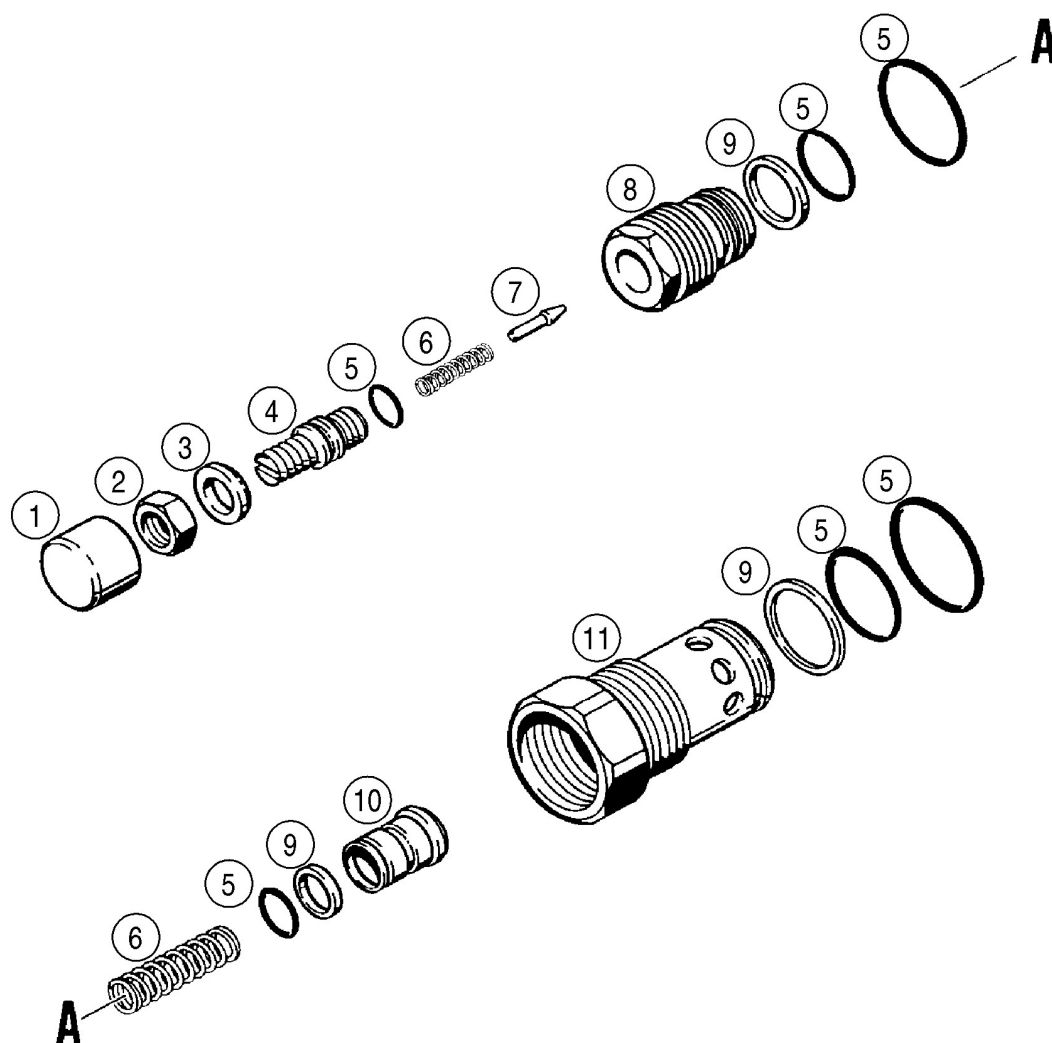
Stack valve - General specification

Spool travel	MM	Inch
Neutral to pressure - lift, tilt and auxiliary	7.9 mm	0.31 in
Neutral to pressure - angle section	6.6 mm	0.26 in
Neutral to float - lift	13.5 mm	0.53 in

Hydraulic pump - General specification

Rotation	Clockwise as seen from end of shaft
Hydraulic pump output	72 l at 207 bar at 2000 RPM 19 US gpm at 3000 psi at 2000 RPM

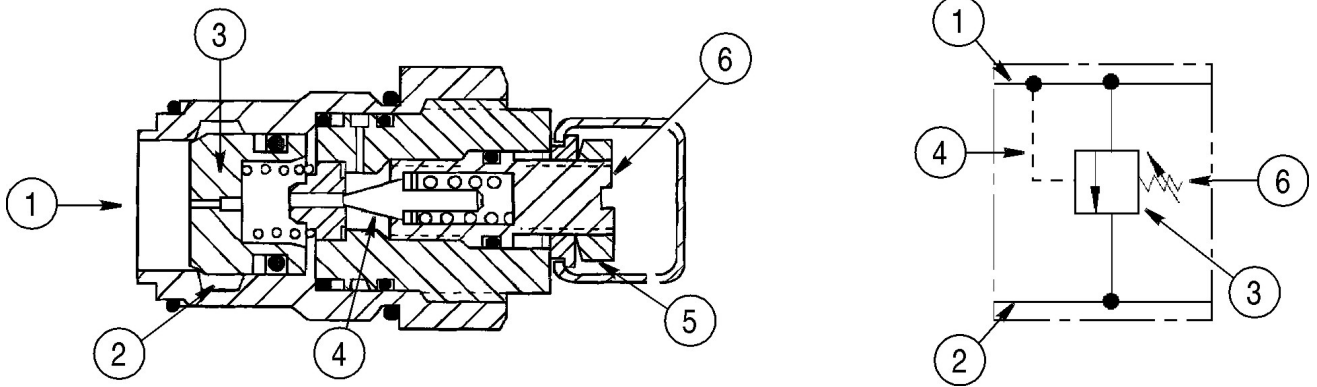
Relief valve - Exploded view



BS99M034 1

(1) Cap	(5) O-ring	(9) Backup ring
(2) Lock nut	(6) Spring	(10) Poppet
(3) Spacer	(7) Plunger	(11) Housing
(4) Adjusting screw	(8) Body	

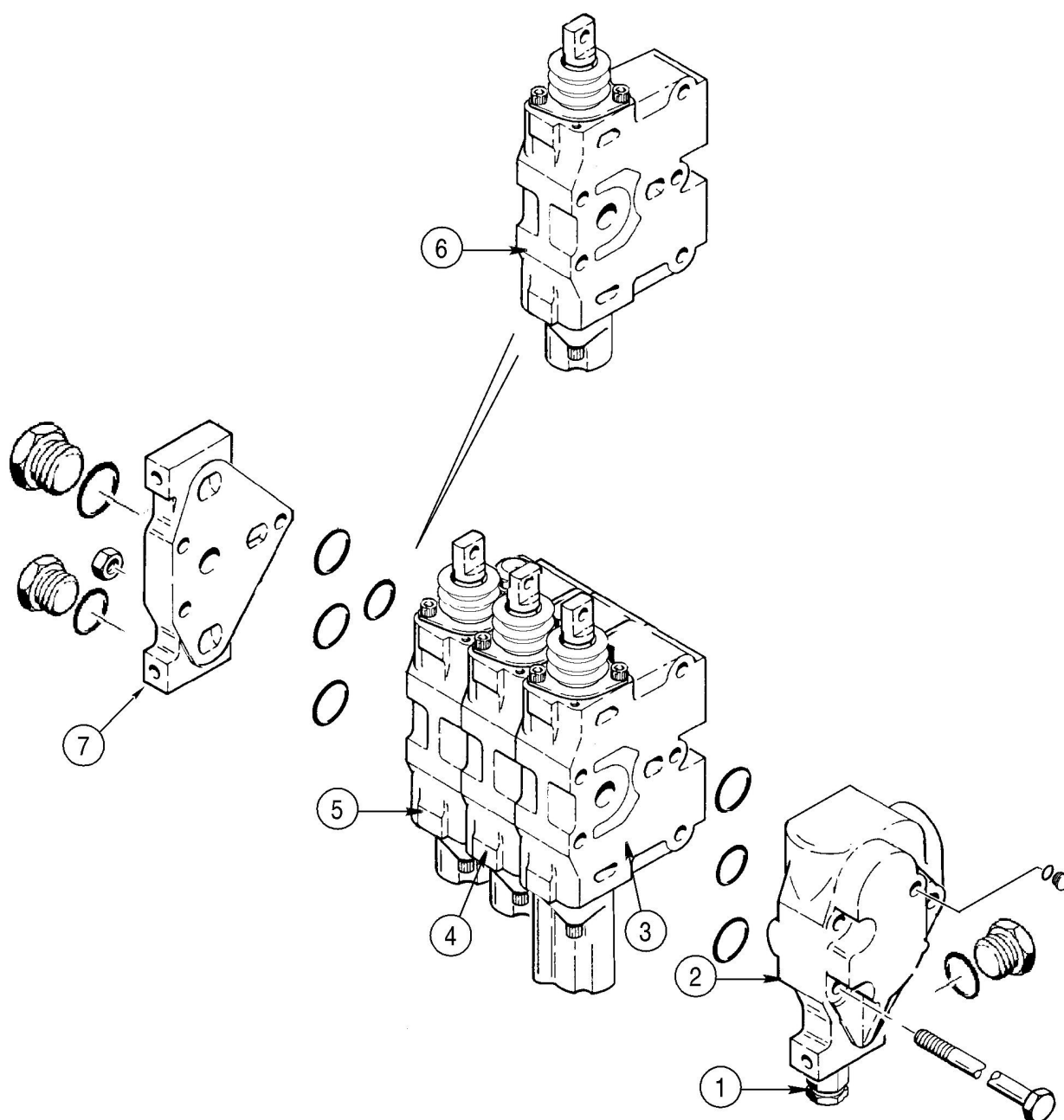
Relief valve - Sectional view



BS00A057 1

(1) Inlet port passage	(4) Pilot passage poppet
(2) Return port passage	(5) Jam nut
(3) Main relief poppet	(6) Pressure adjusting screw

Stack valve - Exploded view



BC02J007 1

(1) Main relief valve	(5) Dozer angle section
(2) Inlet section	(6) Ripper/auxiliary section
(3) Dozer lift section	(7) Outlet section
(4) Dozer tilt section	

PRIMARY HYDRAULIC POWER SYSTEM - Cleaning

1. Contamination in the hydraulic system is a major cause of the malfunction of hydraulic components. Contamination is any foreign material in the hydraulic oil. Contamination can enter the hydraulic system in several ways.
 - (A) When you drain the oil or disconnect any line.
 - (B) When you disassemble a component.
 - (C) From normal wear of the hydraulic components.
 - (D) From damaged or worn seals.
 - (E) From a damaged component in the hydraulic system.
2. All hydraulic systems operate with some contamination. The design of the components in this hydraulic system permits efficient operation with a small amount of contamination. An increase in this amount of contamination can cause problems in the hydraulic system. The following list includes some of these problems.
 - (A) Cylinder rod seals leak.
 - (B) Control valve spools do not return to neutral.
 - (C) Movement of control valve spools is difficult.
 - (D) Hydraulic oil becomes too hot.
 - (E) Pump gears, housing, and other parts wear rapidly.
 - (F) Relief valves or check valves held open by dirt.
 - (G) Quick failure of components that have been repaired.
 - (H) Cycle times are slow; machine does not have enough power.
3. If your machine has any of these problems, check the hydraulic oil for contamination. See types of contamination below. If you find contamination, use the Portable Filter to clean the hydraulic system.

NOTE: *There are two types of contamination, microscopic and visible.*

4. Microscopic contamination occurs when very fine particles of foreign material are in suspension in the hydraulic oil.
5. These particles are too small to see or feel. Microscopic contamination can be found by identification of the following problems or by testing in a laboratory. Examples of the problems:
 - (A) Cylinder rod seal leak.
 - (B) Control valve spools do not return to NEUTRAL.
 - (C) The hydraulic system has a high operating temperature.

6. Visible contamination is foreign material that can be found by sight, touch, or odor. Visible contamination can cause a sudden failure of components. Examples of visible contamination:
- (A) Particles of metal or dirt in the oil.
 - (B) Air in the oil.
 - (C) The oil is dark and thick.
 - (D) The oil has an odor of burned oil.
 - (E) Water in the oil.

NOTE: *The hydrostatic system uses a third port bypass filter system. If the filter becomes plugged it bypasses back to the reservoir to stop contamination from entering the hydrostatic system. Upon completion of cleaning the hydraulic system replace the hydrostatic system filter.*

PRIMARY HYDRAULIC POWER SYSTEM - Decontaminating

CAS10162A CAS10508 CAS10192

1. Prepare the portable filter **CAS10162A** by doing the following steps:
(A) Remove all the hydraulic oil from the inlet and outlet hoses for the portable filter.
(B) Remove the filter element from the portable filter.
(C) Remove all hydraulic oil from the portable filter.
(D) Clean the inside of the housing for the filter element.
2. You must know whether the contamination is microscopic or visible. Refer to **PRIMARY HYDRAULIC POWER SYSTEM - Cleaning (A.10.A)**.
3. If the contamination is microscopic:
(A) Check the maintenance schedule for the machine to learn if the hydraulic oil must be changed. If needed, change the hydraulic oil. Change the hydraulic filter.
(B) Do steps 6 through 35.
4. If the contamination is visible:
(A) Change the hydraulic oil and hydraulic filter.
(B) Do steps 5 through 35.
5. Check the amount of contamination in the hydraulic system by doing the following steps:
(A) Disassemble one cylinder in two different circuits. Check for damage to seals, scoring of the cylinder wall, etc. Repair the cylinders as necessary.
(B) If, in your judgment, the damage to the cylinders was caused by severe contamination and is not the result of normal wear, it is necessary to remove, clean and repair valves, pump, lines, cylinders, hydraulic reservoir, etc. in the hydraulic system.
6. Remove the breather from the reservoir and connect the vacuum pump to the opening. Start the vacuum pump.
7. Loosen and remove the drain plug from the reservoir.
8. Using the fitting kit **CAS10508**, install the valve in the hole for the drain plug. Make sure that the valve is closed.
9. Stop the vacuum pump.
10. Connect the inlet hose for the portable filter to the valve that is installed in the hole for the drain plug.
11. Disconnect the vacuum pump from the hydraulic reservoir air breather hose. Remove the filler cap.
12. Install the outlet hose for the portable filter in the hydraulic reservoir filler neck.
13. Open the valve that is installed in the hole for the drain plug.
14. Move the switch for the portable filter to the ON position. Start and run the engine at 1500 rpm (r/min).
15. Run the portable filter for 10 minutes.

16. Continue to run the portable filter. Increase the engine speed to full throttle. Heat the oil to operating temperature by doing the following steps:
(A) Hold the blade control lever in the TILT position for five seconds.
(B) Return the blade control lever in the NEUTRAL position for five seconds.
(C) Repeat steps A and B until the oil in the hydraulic system is at operating temperature.
17. Continue to run the engine at full throttle. Continue to run the portable filter.
18. Operate each hydraulic circuit to completely extend and retract the cylinders. Continue to operate each hydraulic circuit two times, one after the other for 45 minutes.
19. Decrease the engine speed to low idle.
20. Continue to run the portable filter for 10 minutes.
21. Stop the portable filter
22. Stop the engine.
23. Remove the hose from the hydraulic reservoir.
24. Close the valve that is installed in the hole for the drain plug.
25. Disconnect the inlet hose for the portable filter from the valve. Remove the outlet hose from the reservoir filter neck and replace filler cap.
26. Connect a vacuum pump to the breather hose of the hydraulic reservoir.
27. Start the vacuum pump.
28. Remove the valve from the hole for the drain plug.
29. Install the drain plug.
30. Stop the vacuum pump. Disconnect the vacuum pump from the opening in the reservoir and install the breather.
31. Remove the hydraulic and hydrostatic filter elements from the machine.
32. Install new hydraulic and hydrostatic filter elements on the machine.
33. Start the engine. Check for oil leakage around the new hydraulic and hydrostatic filters.
34. Stop the engine.
35. Check the oil level in the hydraulic reservoir. Add oil as required.

**NOTE: THE FOLLOWING PROCEDURES ARE FOR
FLUSHING WATER FROM THE HYDRAULIC SYSTEM**

36. Start and run the engine at 1500 rpm (r/min).

-
37. Completely retract the cylinders of all attachments on the machine. Angle the blade to the right, the right cylinder will be fully retracted and the left will be fully extended. Stop the engine.

**WARNING**

If retracting the cylinder rods causes the attachment to be raised, block the attachment in place before proceeding to the next step.

39-4

38. Move each control lever in both directions to release pressure in the hydraulic circuits.
39. Loosen and remove the filler cap from the reservoir.
40. Drain the hydraulic oil from the reservoir.
(A) The reservoir holds approximately **75.5 l (20 US gal)** of hydraulic oil.
(B) Have available acceptable equipment to drain the hydraulic oil.
(C) Remove the drain plug from the bottom of the reservoir.
41. Remove the hydraulic and hydrostatic filter elements from the machine.
42. Install new hydraulic and hydrostatic filter elements on the machine.
43. Install the drain plug in the bottom of the reservoir.
44. Fill the hydraulic reservoir with lubricant, refer to **Capacities** for proper quantities and type.
45. Disconnect the line from the OPEN end and CLOSED end of each cylinder.
46. Be sure all control levers are in the NEUTRAL position.
47. Start and run the engine at low idle.

IMPORTANT: Check the oil level in the hydraulic reservoir frequently while doing step 48. Have another person hold a container under the hydraulic lines while you do step 48.

48. Slowly move each control lever in both directions until oil begins to flow from the open line. Hold the control lever in place until clean oil flows from the open line.
49. Stop the engine.
50. Connect the system line to the CLOSED end of each cylinder.
51. Connect a suitable drain line to the OPEN end of each cylinder and place the other end in an acceptable container for contaminated oil.
52. Start the engine and run the engine at low idle.
53. Slowly and completely extend all cylinders. As the piston rod comes in/out of the cylinder, oil will be pushed out of the OPEN end of the cylinders.

IMPORTANT: Any attachment or part of an attachment that is raised must be supported with acceptable equipment to prevent the attachment from falling.

54. Support any attachments that will be in the RAISED position.
55. Stop the engine.
56. Disconnect the drain lines and connect the system lines to the cylinders.
57. Check the oil level in the hydraulic reservoir. Add oil as required.
58. Install the filler cap on the reservoir.
59. Remove the hydraulic and hydrostatic filter elements from the machine.
60. Install new hydraulic and hydrostatic filter elements on the machine.
61. Start and run the engine at 1500 rpm (r/min), operate each hydraulic circuit to completely extend and retract the cylinders.
62. Stop the engine and check for leaks. Check the oil level in the hydraulic reservoir. Add oil as required.

Relief valve - Pressure setting

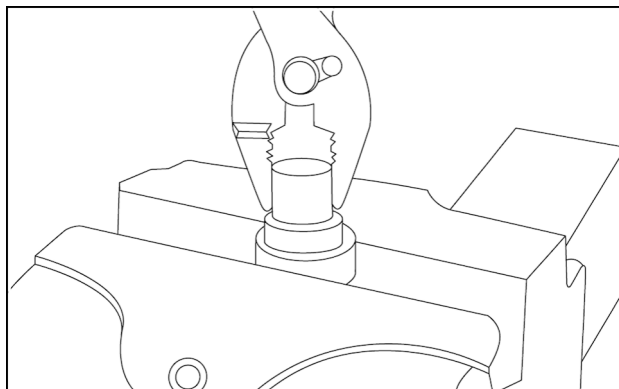
1. Remove the cover from the main relief valve and loosen the lock nut on the adjusting screw.
2. Turn the adjusting screw into the main relief valve to increase the pressure or out of the main relief valve to decrease the pressure.
3. Refer to **Relief valve - Pressure test (A.10.A)** and check the pressure setting. Adjust the main relief valve again as necessary.
4. When the pressure setting is correct, prevent the adjusting screw from turning while the lock nut is tightened. Install the cover on the main relief valve.

Relief valve - Disassemble

Prior operation:

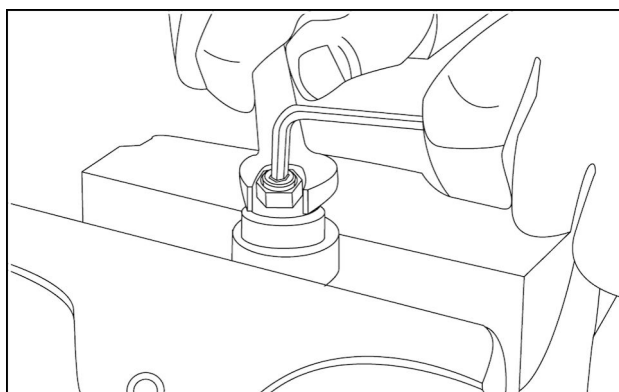
Stack valve Inlet section - Disassemble (A.10.A)

1. Fasten the main relief valve in a vise with soft jaws. Remove the cap.



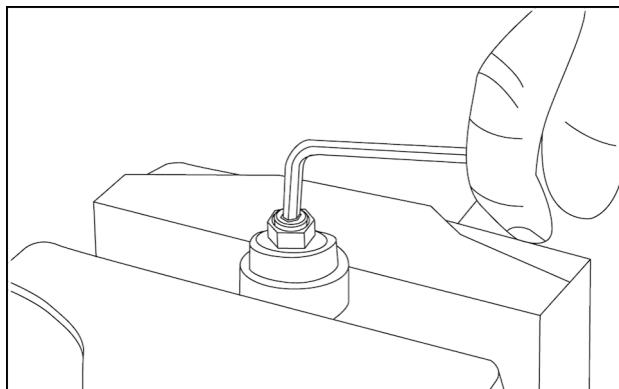
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2. Hold the adjusting screw in position while you loosen the lock nut.



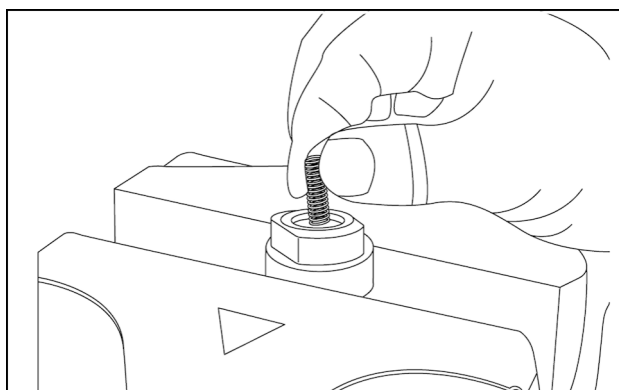
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3. Remove the adjusting screw. Make sure that you count the number of turns required to remove the adjusting screw so that you can install the adjusting screw correctly during Assembly.



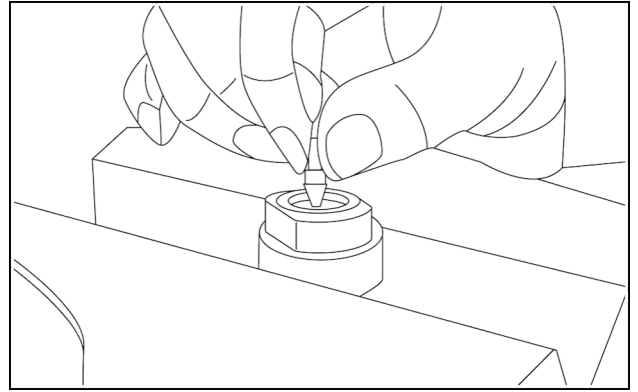
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4. Remove the spring.



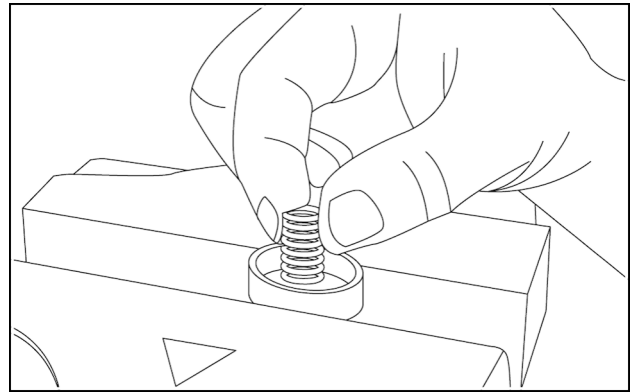
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5. Remove the plunger.



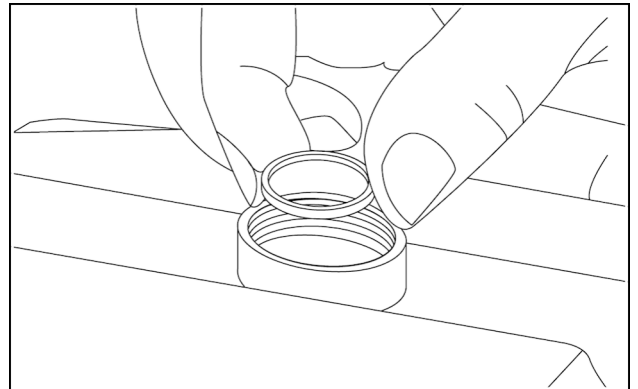
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6. Remove the body from the housing.
7. Remove the spring.



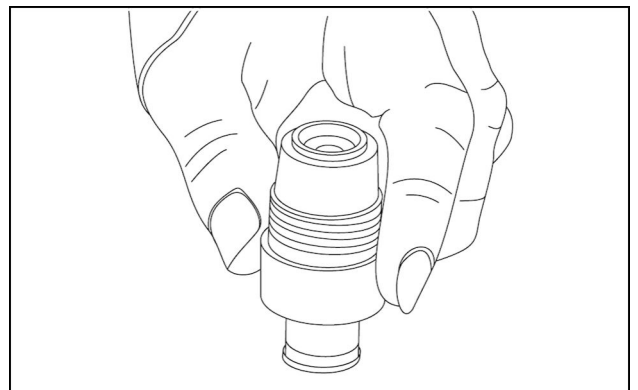
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8. Replace the O-ring and the backup ring in the housing.



RCPH09CWL188AAD 7

9. Tap the main relief valve lightly against a solid surface so that the poppet can be removed from the housing.



RCPH09CWL187AAD 8



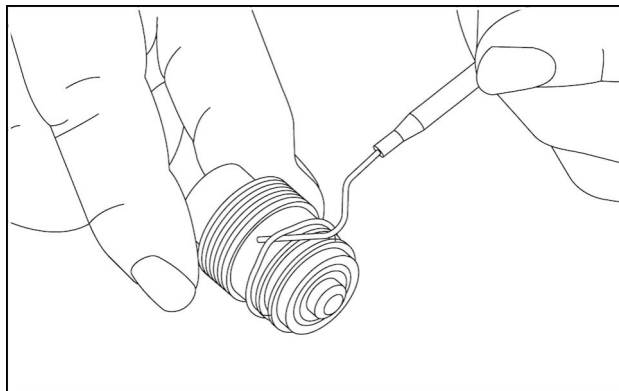
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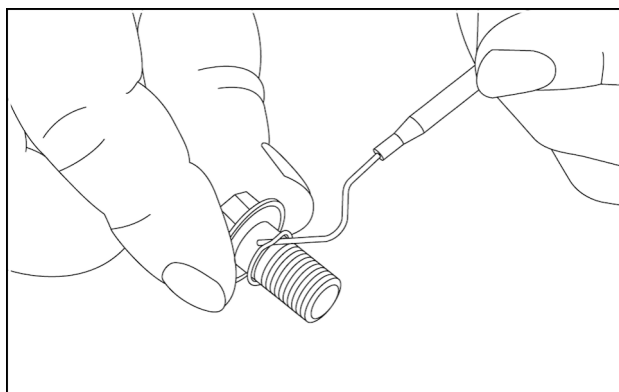
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10. Replace the O-ring on the body.



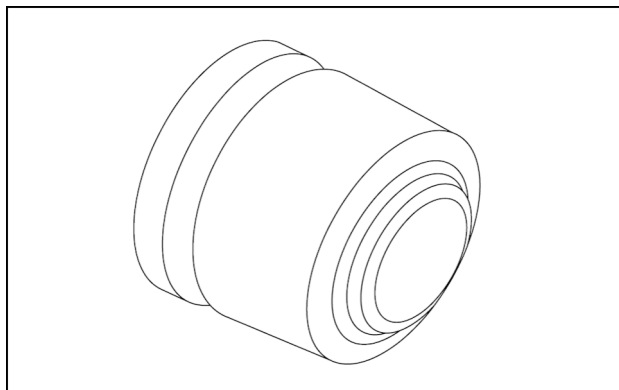
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11. Replace the O-ring on the adjusting screw.



RCPH09CWL116AAD 10

12. Replace the O-ring and the backup ring on the poppet.



RCPH09CWL083AAD 11

Next operation:
Relief valve - Visual inspection (A.10.A)

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