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C22 Series and C23 Series Transmission

Operation and Maintenance



Waterous Company • 125 Hardman Avenue South • South Saint Paul, MN 55075 • (651) 450-5000 www.waterousco.com

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PRODUCT OVERVIEW

Operation

TROUBLESHOOTING

Safety Precautions

- Read and understand all the associated documentation before you begin operating the product.
- Contact Waterous when you have questions about operating or maintaining the equipment.
- Read and understand all the notices and safety precautions.
- Do not operate the equipment when safety guards are removed.
- Do not modify the equipment.

WARNING

Sudden Unexpected Movement

Unexpected movement can cause injury or death.

Make sure the shift unit is in the proper mode before operation.



NOTICE

Before Operation

- Read and understand all the instructions provided.
- Check all fluid levels and replenish if necessary.
 Remove all shipping plugs
- Remove all snipping plugs and install the operation plugs or caps.



NOTICE

Modification Modifying the equipment can damage components and void your warranty.

• Do not modify the system or any of its components.



NOTICE

Freeze Damage

•Do not allow fluid in the lines to freeze.

Remove all freezable fluid from the lines before storing the apparatus.



SAFETY

PRODUCT OVERVIEW

- The instructions may refer to options or equipment that you may not have purchased with your system.
- The illustrations in this document are intended to convey concepts. Do not use the illustrations to determine physical attributes, placement, or proportion.
- Understand that your application may require additional steps, that are not described in the illustrations or instructions, to perform the installation.
- The equipment described in this document is intended to be installed by a person or persons with the necessary skills and knowledge to perform the installation.
- The equipment described in this document is intended to be operated by a
 person or persons with the basic knowledge of operating similar equipment.
- 1. The information in this document is subject to change without notice.
- This document is divided into the following sections:

SAFETY

This section describes general precautions and alert symbols in the document.

INTRODUCTION

This section is an overview of the document.

PRODUCT OVERVIEW

This section describes the components that make up the system.

OPERATION

This section describes the equipment operation.

MAINTENANCE

This section describes maintenance procedures.

TROUBLESHOOTING

This section describes how to troubleshoot any issues with the equipment.

Using this Document

Use the guidelines below when viewing this document.

Viewing the Document Electronically

- View this document in landscape orientation.
- Use the table of contents to navigate directly to that section.

MAINTENANCE

• Text with this appearance is linked to a reference.

Printing the Document

- The document is best viewed when printed on both sides and in color.
- Use a 3-ring binder to store the document.

Additional Documentation

• Additional documentation is available through the MyWaterous login at <u>Waterousco.com</u>. Use your serial number to gain access to the service parts list associated with your system. Dimensional drawings are available through the Waterous Service department.

Symbols

Symbols are use to illustrate additional tools or operations that are required to complete the instruction.



Discard—This symbol tells you to discard or recycle the part in accordance with local regulations.



Torque to specification—This symbol tells you to torque the hardware to the specified value.





SAFETY	
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C22 Transmission Overview

	Feature	Description
1	Drive shaft—input	This connects to the apparatus drive line.
2	Coupling shaft—output	This connects the apparatus drive line to the wheels when in drive mode.
3	Shift unit	This switches the transmission between drive mode and pump mode.
4	Сар	This accommodates the different requirements between the pump/transmission mounting location and drive line.
5	Transmission case	This houses the internal components.
6	Transmission pan	This allows access to the internal components.
7	Breather	This prevents internal pressure buildup during operation.
8	Manual shift integration	This allows the installer to use the threads on the shift rod to integrate a manual shift mechanism to the apparatus.
9	Shift indicator switch	This indicates the position of the pneumatic shift unit.
10	Magnetic plug—drain	This is where the fluid drains from the transmission.
11	Sight glass plug	This allows you to visually determine the transmission fluid level.
12	Magnetic plug—lubricant	This allows you to add transmission fluid to the transmission.



SAFETY	
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SAFETY	INTRODUCTION	PRODUCT OVERVIEW	OPERATION	MAINTENANCE	TROUBLESHOOTING

In-Cab Panel

	Feature	Description
1	Shift knob	This shifts the pneumatic shift unit.
2	Shift knob lock	This locks the shift knob into position.
3	Pump engaged LED	This illuminates when the shift unit is in the pump position.
4	OK to pump LED	This illuminates when the OK to pump interlock conditions are satisfied.
5	Road position	This position transfers power from the chassis transmission to the drivetrain.
6	Pump position	This position transfers power from the chassis transmission to operate the pump.



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WATER!

SAFETY	INTRODUCTION	PRODUCT OVERVIEW	OPERATION	MAINTENANCE	TROUBLESHOOTING
Throttle Read	dy Panel				

	Feature	Description
1	Throttle ready LED	This illuminates when the throttle ready interlock is made.
2	OK to pump LED	This illuminates when the OK to pump interlock is made.

Shifting from Road to Pump Mode

Understand that the following instructions are for apparatus with an Allison transmission. Refer to OEM instructions for non-Allison transmission shift instructions.



Shifting from Road to Pump Mode



Continue to use the illustrations and instructions to shift the pump transmission into pump mode. Understand that each application operates with its own characteristics and that it is common to hear the pneumatic shift unit during the procedure. Complete each step in the procedure and verify that the shift was achieved before you leave the cab.



- 7 If all the appropriate interlock conditions are satisfied, the pump engaged LED and the OK to pump LED on the in-cab shift panel will illuminate.
- 8 For apparatus with speedometers driven by the apparatus transmission, after obtaining the pump engaged and OK to pump lights, observe the speedometer for some value as another means of confirming the shift is complete.
- 9 You may now leave the cab and chock the wheels.
- 10 The final indicator that you shifted the apparatus from road mode to pump mode is that the throttle ready/OK to pump LEDs are illuminated on the throttle ready panel and that discharge pressure builds in the pump.

Shifting from Pump to Road Mode



Use the illustrations and instructions to shift the pump transmission into road mode. Understand that each application operates with its own characteristics and that it is common to hear the pneumatic shift unit during the procedure. Complete each step in the procedure and verify that the shift was achieved before you leave the cab.

WARNING			
Sudden Unexpected Movement •Unexpected movement can cause injury or death. • Make sure the shift unit is in the proper mode before operation.			
1 Reduce the engine speed to idle.			
2 Shift the transmission into NEUTRAL.			

- 3 Allow the speedometer to return to 0.
- 4 Move the shift unit on the in-cab panel up to road position.
- 5 With the engine speed at idle and the foot-brake applied, shift the chassis transmission into *DRIVE* or *REVERSE*.
- 6 Release the PARKING BRAKE.

Shifting from Pump to Road Mode



Use the illustrations and instructions to shift the pump transmission into road mode. Understand that each application operates with its own characteristics and that it is common to hear the pneumatic shift unit during the procedure. Complete each step in the procedure and verify that the shift was achieved before you leave the cab.



- 3 Allow the speedometer to return to 0.
- 4 Move the shift unit on the in-cab panel up to road position.
- 5 With the engine speed at idle and the foot-brake applied, shift the chassis transmission into *DRIVE* or *REVERSE*.
- 6 Release the PARKING BRAKE.



SAFETY	INTRODUCTION	PRODUCT OVERVIEW	OPERATION	MAINTENANCE	TROUBLESHOOTING
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Maintenance Schedule

Perform the following procedures at the recommended intervals at a minimum. Environmental conditions determine the maintenance intervals. Inspect the components frequently, and create a maintenance schedule suitable to your application and environmental conditions. Replace wear components with equivalent components.

Operation	Weekly	Monthly	12 Months	Comment
Check the fluid level	X			
Change transmission fluid			Х	Change every 100 hours of pump operation or annually, whichever comes first.
Inspect the breather			X	Inspect every 100 hours of pump operation or annually, whichever comes first. Clean or replace as required.

Towing

To prevent damage to the pump transmission when towing is required, disconnect the driveshaft connecting the output shaft on the pump transmission to the rear wheel differential on the chassis.

Checking the Transmission Fluid Level



Use the illustration and instructions to check transmission fluid level. Refer to the **"Maintenance Schedule" on page 19** for a suggested interval.

- **Note:** Make sure that you park the apparatus so that the transmission is level before you check the fluid level.
- 1 Locate the sight glass on the transmission.
- 2 Make sure that the fluid is at the midpoint of the sight glass, if not perform the following:
 - If the fluid level is too low, add fluid to the transmission. Refer to: "Adding the Transmission Fluid" on page 22.
 - **Note:** In cases where the fluid level is too low, it is important to determine the cause. Look for and repair any leaks found in the transmission.
 - If the fluid level is too high, drain the contaminated fluid and refill with fresh fluid. Refer to: "Draining the Transmission Fluid" on page 21.
 - **Note:** In cases where the fluid is too high, it is important to determine the cause. Look to see if water from the pump is entering the transmission—repair or replace any seals or components that allow water to enter the transmission.

Draining the Transmission Fluid



Adding the Transmission Fluid



SAFETY	INTRODUCTION	PRODUCT OVERVIEW	OPERATION	MAINTENANCE	TROUBLESHOOTING
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Understand that the following troubleshooting information is for apparatus with an Allison transmission. Refer to the OEM instructions for troubleshooting information for apparatus with a non-Allison transmission.

Problem	Possible Cause	Solution		
The pump does not engage.The in-cab shift panel is in the pump position	A butt-tooth condition exists.	For Allison transmissions, place the apparatus transmission into <i>DRIVE</i> for an automatic transmission, or the pumping gear for a manual transmission.		
 The pump engaged LED on the in-cab panel does not illuminate when expected. 		For non Allison transmissions, refer to the OEM shift instructions.		
	The indicator switch on the pneumatic shift unit is malfunctioning.	Replace the indicator switch on the pneumatic shift unit.		
	Insufficient air pressure is available to the pneumatic shift unit—80 psi minimum.	Allow air pressure to build in the system, repair any leaks in the system.		
	Leaking pneumatic shift unit.	Replace the pneumatic shift unit.		
	Malfunctioning air control valve on the in-cab shift unit.	Repair or replace the air control valve.		
	Improper shifting sequence	Attempt shifting using the proper sequence.		
	Pump transmission shifting components are damaged.	Inspect the pump transmission shifting components for leaks or damage.		
Pump engaged LED is illuminated but the OK to pump LED is not.	The parking brake is not applied.	Apply the parking brake.		
	Chassis transmission is not in pumping gear.	Shift chassis transmission into pumping gear.		
	Malfunction with the high range lockup or safety interlock systems.	Contact the apparatus manufacturer.		
	Malfunction with the chassis transmission or transmission electronic control unit.	Contact the chassis transmission manufacturer.		
The in-cab shift panel is in the road position, but the pump engaged LED and/or OK to pump LED remains illuminated.	Shift indicator switch on the pneumatic shift unit may be stuck in the closed position.	Replace the shift indicating switch.		
	Insufficient air pressure is available to the pneumatic shift unit—80 psi minimum.	Allow air pressure to build in the system, repair any leaks in the system.		
Note: The engine may stall when	Leaking pneumatic shift unit.	Replace the pneumatic shift unit.		
the chassis transmission is placed into a drive gear.	Malfunctioning air control valve on the in-cab shift unit.	Repair or replace the air control valve.		
	Improper shifting sequence	Attempt shifting using the proper sequence.		
	Pump transmission shifting components are damaged.	Inspect the pump transmission shifting components for leaks or damage.		

SAFETY INTRODUCTIO		ON PRODUCT OVERVIEW OF		ERATION	MAINTENANCE	TROUBLESHOOTING	
Problem		Possible Cause		Solution			
The in-cab shift panel is in the road position and you hear a grinding		Pump transmission shifting components are	Inspection pump transmission shifting components for leaks or damage.				
sound emanating from the pump	Improper shifting sequence	Attempt shifting using the proper sequence.					
transmission.		Malfunction with the chassis transmission or transmission electronic control unit.		Contact the chassis transmission manufacturer.			
The engine stalls when the chassis transmission is placed in <i>DRIVE</i> after moving the pump transmission to road mode.	Shift indicating switch malfunctioning.		Replace the shift indicating switch.				
	Malfunctioning chassis transmission or transmission electronic control unit.		Contact chassis transmission manufacturer.				
The interlock allows shifting to road mode when the chassis transmission is in pump gear.		The shift unit solenoid is stuck in the de-energized (open) position.		Check that the interlock is operating properly.			
				Verify that the solenoid is operating properly. Replace if needed.			
The in-cab shift pan position, but the veh move.	el is in the road iicle will not	Improper shifting sequence.		Repeat shifting p	rocedure.		

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