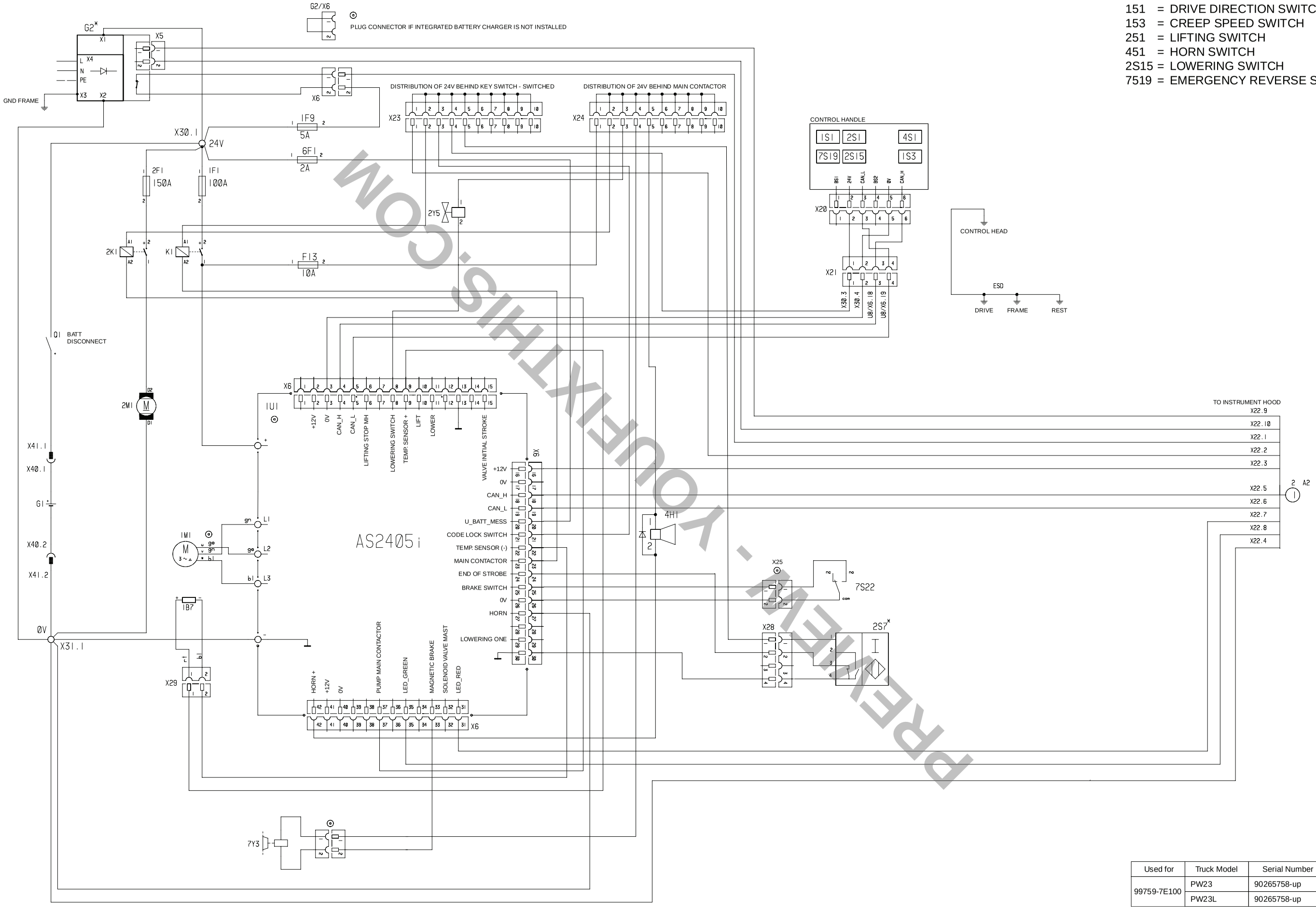
151 = DRIVE DIRECTION SWITCH
153 = CREEP SPEED SWITCH
251 = LIFTING SWITCH
451 = HORN SWITCH
2S15 = LOWERING SWITCH
7519 = EMERGENCY REVERSE SWITCH



Used for	Truck Model	Serial Number
99759-7E100	PW23	90265758-up
	PW23L	90265758-up

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Hydraulic Troubleshooting Guidelines

When you check voltages at solenoids, make sure hydraulic lines and components are fully installed.

Use an ohmmeter to check for wiring continuity to solenoids. Use an ammeter to check for proper current to solenoids and contactor coils.

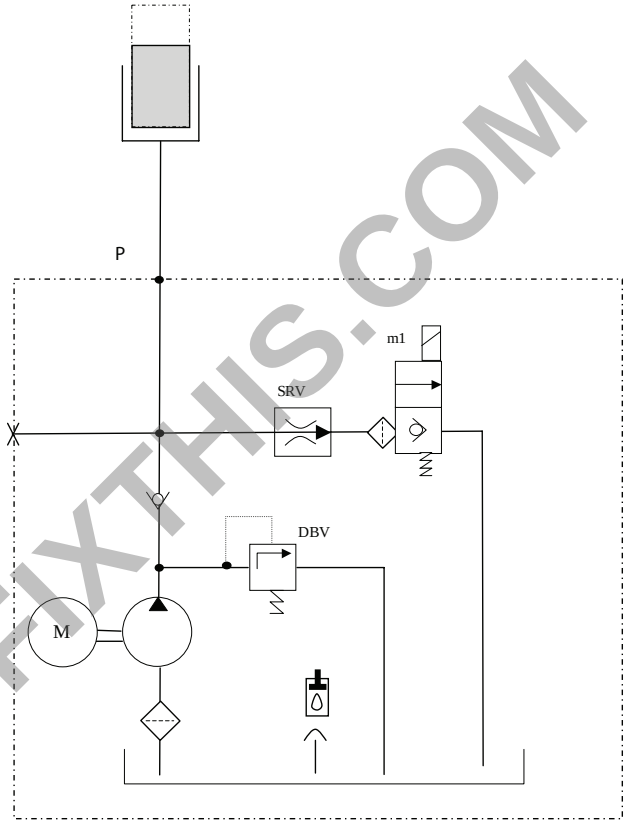
CAUTION

Unless otherwise directed, disconnect the battery connector when you check electrical circuits or components with an ohmmeter. Electrical current can damage the ohmmeter.

Visually inspect all hydraulic lines and components for:

- Leaking connections or connectors
- Loose or damaged fittings
- Damaged tubing, vents, or seals.

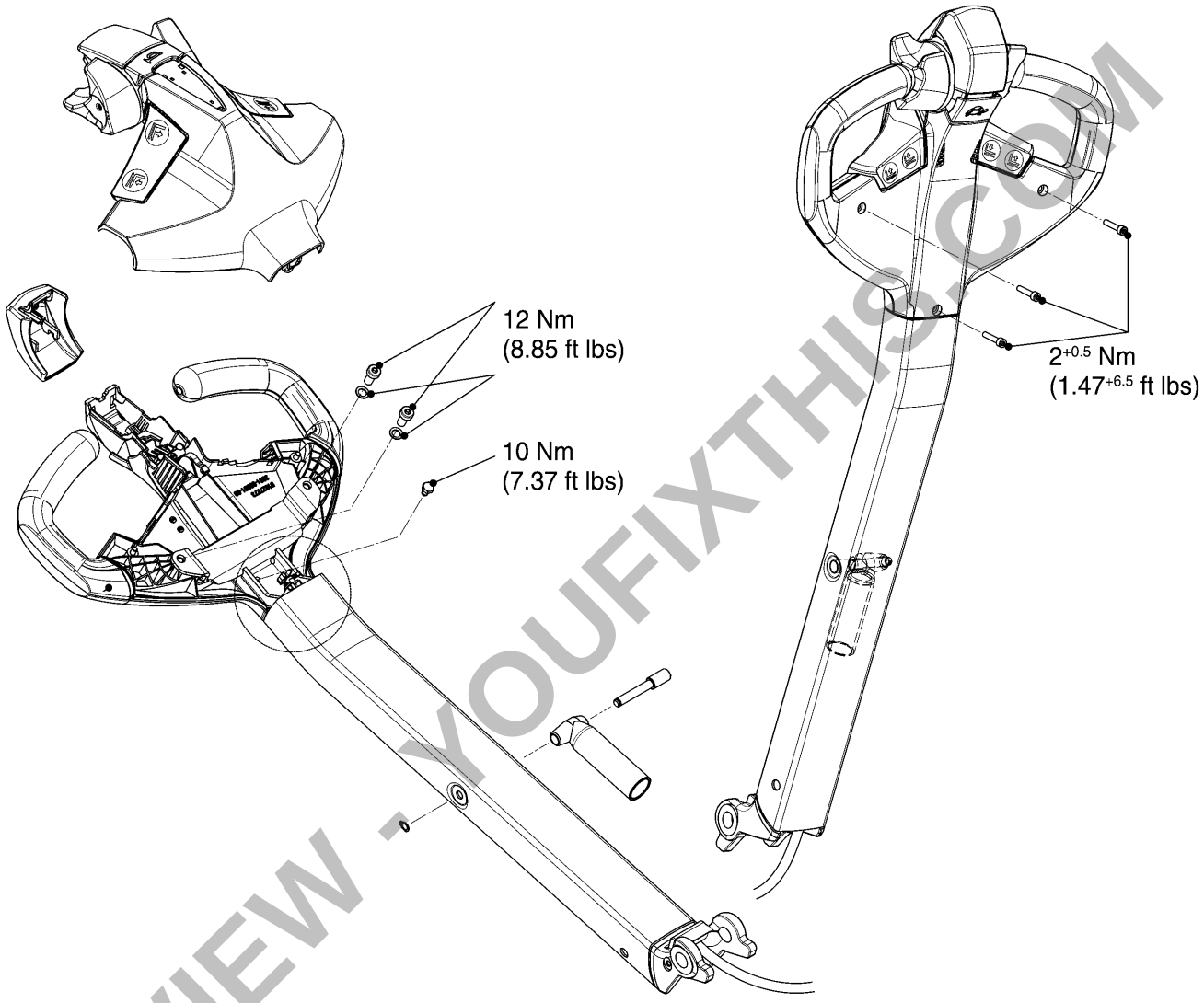
Hydraulic Schematic



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Additional Torque Specifications



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Event Messages

F	E	XX	S	Operating Status	Description	Possible Cause	Recommended Action
_	1	02	1	Self Test	Contact closed instead of open.		- Test the main contactor output of the controller. - Check the wire connection. - Replace the controller.
_	1	02	2	Self Test	Contact open instead of closed.		- Test the main contactor output of the controller. - Check the wire connection. - Replace the controller.
_	1	03	1	Self Test	Output transformer faulty (phase V)	The semi-jumpers 1, 2, and 3 are controlled in turn for 50 msecs at 25% PWM (pulse width modulation) when the output transformer is closed. ("Output transformer deactivated" signal). The message is issued at the end of the 50 msec period of the respective phase if the following applies: $V_{Phase_x} < (V_{capacitor}/2) - 25\%$	- Replace controller.
			2	Self Test	Output transformer faulty (phase V)		
			3	Self Test	Output transformer faulty (phase W)		
_	1	04	1	Self Test	Output transformer faulty (phase V)	Semi-jumpers 1, 2, and 3 are controlled in turn for 50 msecs at 25% PWM (pulse width modulation). The message is issued at the end of the 50 msec period of the respective phase if the following applies: $V_{Phase_x} < (V_{capacitor}/4) + 25\%$ or $V_{Phase_x} < (V_{capacitor}/4) - 25\%$	Replace controller.
			2	Self Test	Output transformer faulty (phase V)		
			3	Self Test	Output transformer faulty (phase W)		
_	1	05	1	Self Test	Motor cutout	Semi-jumpers 1, 2, and 3 are controlled in turn for 50 msecs at 25% PWM (pulse width modulation). The message is issued at the end of the 50 msec period of the respective phase if the following applies: $V_{Phase_x} < (V_{capacitor}/4) + 25\%$ or $V_{Phase_x} < (V_{capacitor}/4) - 25\%$	- Check motor connection wire (possible wire breakage). - Replace motor.
_	1	06	1	Operation	Safety switch inputs are out of sequence	The safety switch consist of an NC and a NO contact. When the switch is applied both contacts connect simultaneously. As a result, only the 0/1 and the 1/0 combinations should occur. During operation the combinations 0/0 and 1/0 (500 MSECs) trigger the message. For a valid combination (0/1 or 1/0, 500 msecs) the event and the truck response are reset.	- Check wire connection to safety switch (deadman switch, seat switch, tiller switch). - Check safety switch. - Replace safety switch.

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Disassembly Sequence

1. Turn the key switch OFF or press the (O)-key on the keypad (keyless entry option) to turn power off.
2. Press down on battery disconnect.
3. Disconnect the brake electrical connector.
4. Screw the air screws (emergency operation) into the brake so that the armature plate (5) rests against the magnetic body (7).
5. Loosen and unscrew mounting screws (2), but do not pull them from magnetic body (7).
6. Remove magnetic body (7) together with the mounting screws (2).
7. Remove the brake disk (4) from the hub (3) and replace it.
8. Check friction plate (1) and replace if necessary.

Assembly Sequence

1. Place friction plate (1) on bearing plate.
2. Slide the brake disk (4) onto the hub (3). It should be possible to move the brake disk manually.
3. Mount the magnetic body complete with mounting screws (2) and spacer sleeves onto the bearing shield and slightly tighten screws.
4. Tighten mounting screws (2) uniformly with a torque of 5.5 Nm (4.05 ft. lbs.)
5. Remove Allen head screws from brake so that the armature plate can move freely in an axial direction.
6. Plug the brake cable (8) into the wire harness.
7. Plug the battery in and turn the truck on.
8. Check braking function.

Magnetic Brake Adjustment Instructions

Adjusting Braking Deceleration

Depending on the design and total weight of the truck, the spring load must be adjusted in order to achieve the required braking deceleration.

WARNING

When replacing the brakes, the number and thickness of the inserted springs in the removed brake must be checked and the new brake adapted accordingly.

Replacing Compression Spring

1. Remove magnetic brake.
2. Back out screws and remove friction surface.
3. Insert compression springs in accordance with removed brakes.
4. Place friction surface on brake and fasten with screws.
5. Install magnetic brake.

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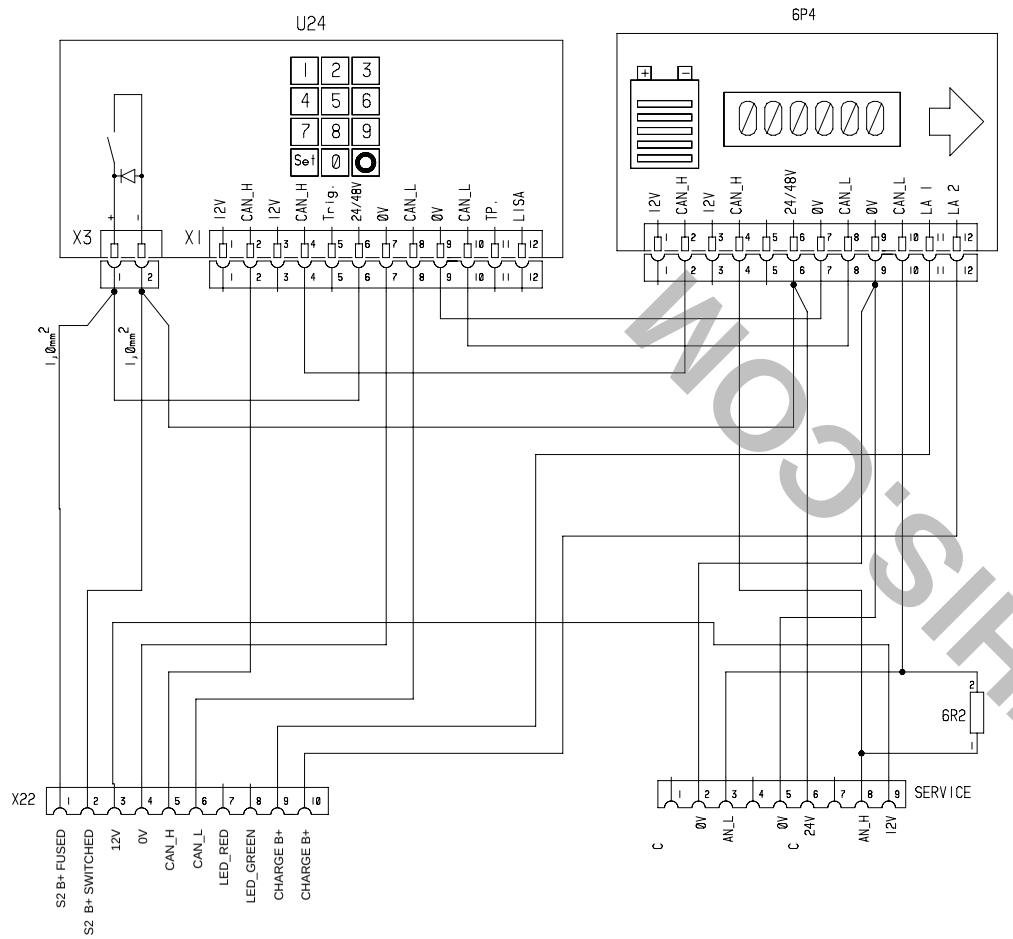
Inspection and Maintenance Schedule

Item	Component	Check	Time Interval is Meter Hours				
			Daily	Weekly	3 Months	6 Months	12 Months
			8 Hrs.	40 Hrs.	500 Hrs.	1000 Hrs.	2000 Hrs.
1	Battery	Check charge.	X				
		Check water level after charging (standard wet battery).	X				
		Check cleanliness and exterior condition.		X			
		Check weight.	X				
		Ensure battery is properly installed.	X				
		Clean battery and truck.		X			
2	Battery Disconnect (Emergency Stop)	Ensures that all powered functions are shut down when activated.	X				
3	Brake	Verify the drive motor does not run while the brake is applied.	X				
		Check that the control handle returns to the vertical position when released.	X				
		Check the brake shoes for wear. Replace if necessary.			X	X	X
4	Caster Wheels	Badly worn, excessive breaks. Remove steel chips and foreign material to prevent damage.	X				
5	Inching Switch (Snail Button)	Truck reduces travel speed.	X				
6	Contactors	Clean and inspect contactors. Replace worn or burnt tips.			X	X	X
7	Directional Controls	Check the speed and directional controls.	X				X
8	Drive Unit*	Check for noises and oil leaks. If leaks are found, check the oil level. If the level is low, determine the cause.	X				
9	Drive Housing	Change the oil in the drive housing.			X	X	X
10	Drive Wheel	Check the tightness of the retaining nut on the drive wheel mounting. Tighten.		X			
11	Electrical System	Visually inspect all cables for damage. Replace if necessary.	X				
		Check truck's electrical to ground.					X
12	Emergency Reverse Button	Check the operation of the emergency reverse button.	X				
13	Forks	Check the lift limit switch for lift motor cut-out. Adjust if necessary.		X			
14	General	Check for loose hardware. Tighten if necessary.	X				

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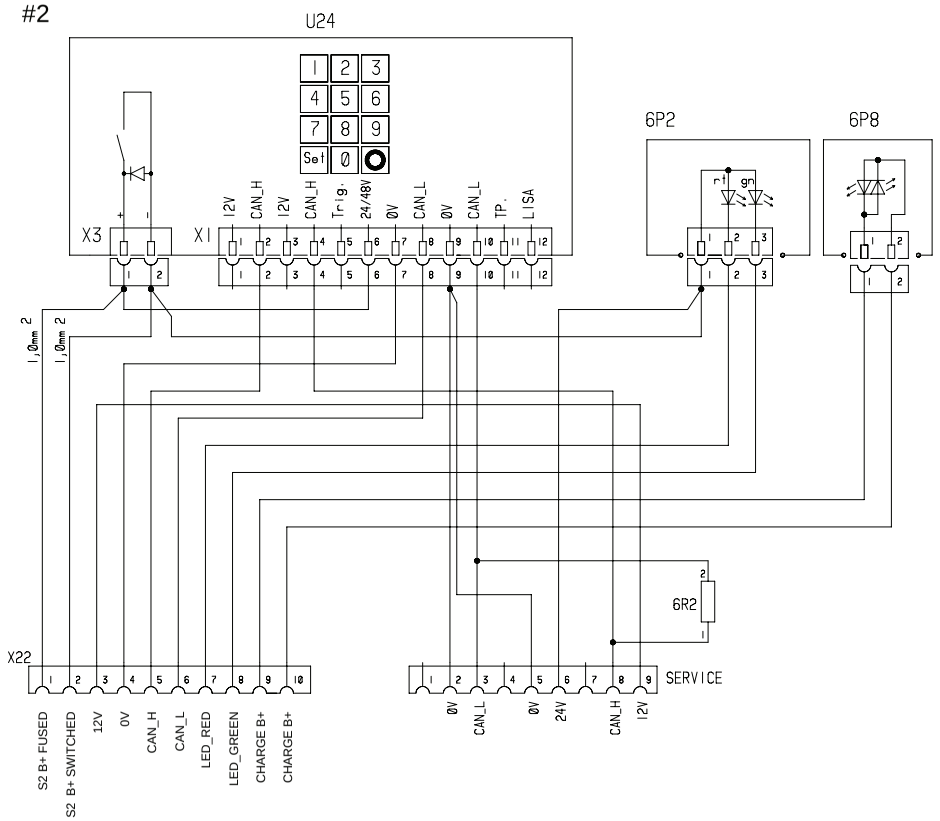
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#1

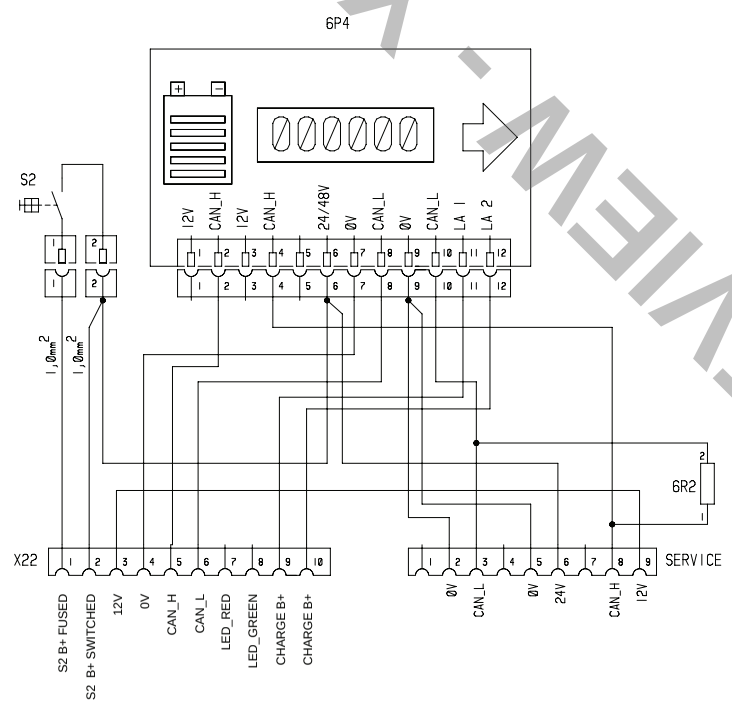


1B7	Temperature Sensor, Drive Motor
1F13	Drive/Brake Control Fuse
1F9	Travel/Lifting Control fuse
1F1	Drive Motor Fuse
2F1	Pump Motor Fuse
6F1	Discharge Indicator Control Fuse
G1	Battery
G2	Battery Charger
4H1	Horn
K1	Traction Main Contactor
2K1	Pump Main Contactor
1M1	Drive Motor
2M1	Pump Motor
6P2	Discharge Indicator
6P4	Operating Hourmeter & Discharge Indicator
6P8	Charge Display
Q1	Master Switch
6R2	CAN-Bus Termination
S2	Key Switch
1S2	Controller
1S3	Inching Speed Switch
2S1	Lifting Switch
2S15	Lowering Switch
4S1	Horn Switch
7S22	Brake Switch
U24	Code Lock
1U1	Drive Current Control System
X40	Battery SB Connector
X41	Truck Battery SB Connector
2Y5	Solenoid Valve - Lower
2Y96	Solenoid Valve - Mast Stroke
2Y97	Solenoid Valve - Initial Stroke
7Y3	Magnetic Brake Coil
*1	Keyless Entry (Keypad) - BDI/HM with Fault Display
*2	Keyless Entry (Keypad) - BDI LED
*3	Keyswitch - BDI/HM with Fault Display
Standard	KeySwitch with BDI LED

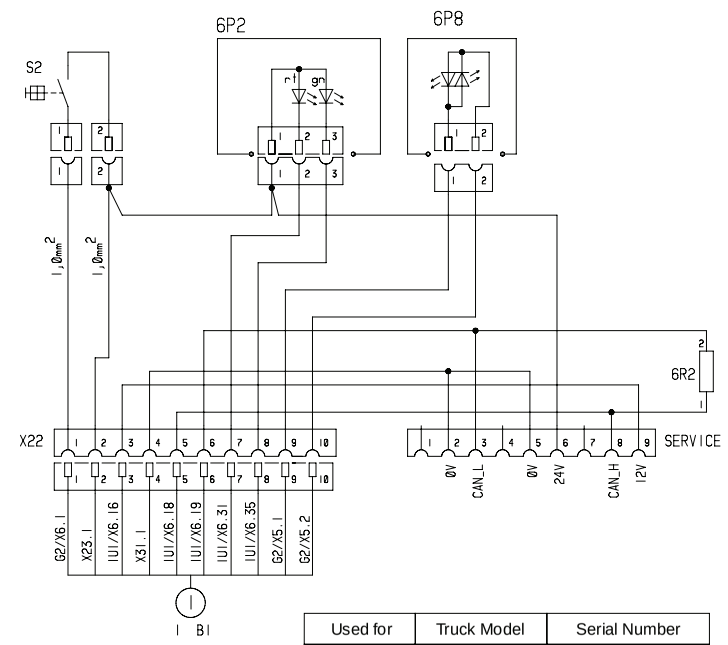
#2



#3



STANDARD



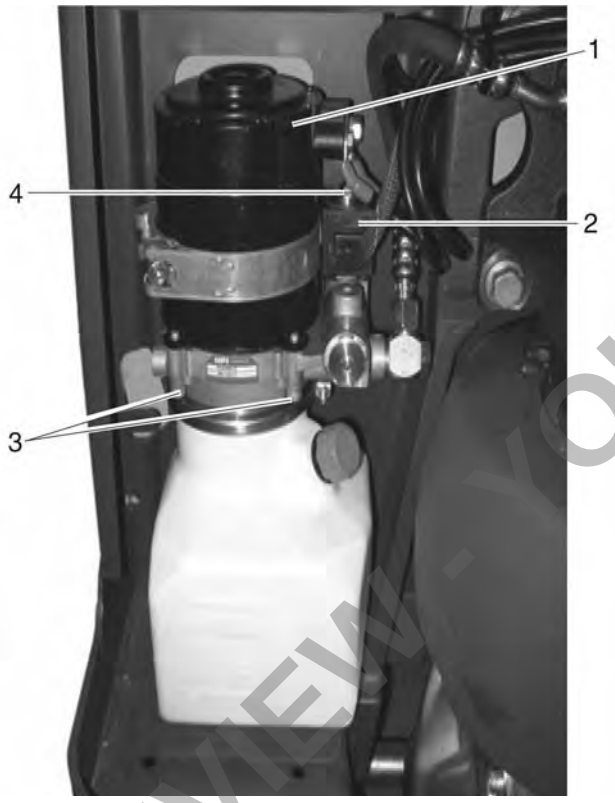
Used for	Truck Model	Serial Number
99759-7E100	PW23	90265758-up
	PW23L	90265758-up

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Hydraulic Unit

Removing the Hydraulic Unit

- Lower forks.
- Loosen bolt on clamp connection.
- Pull clamp off in upward direction. Loosen container cable if necessary.
- Remove oil reservoir.



Replacing the Pump Motor

- Remove screws (4).
- Remove solenoid coil (2).

Installation

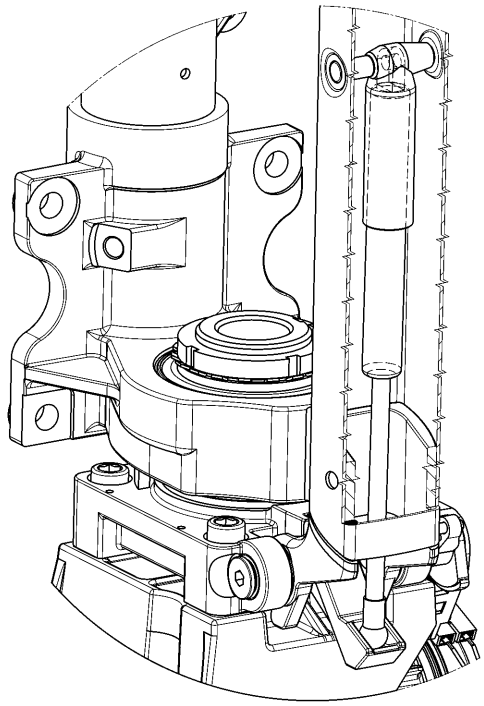
- Installation is in the reverse order of above.

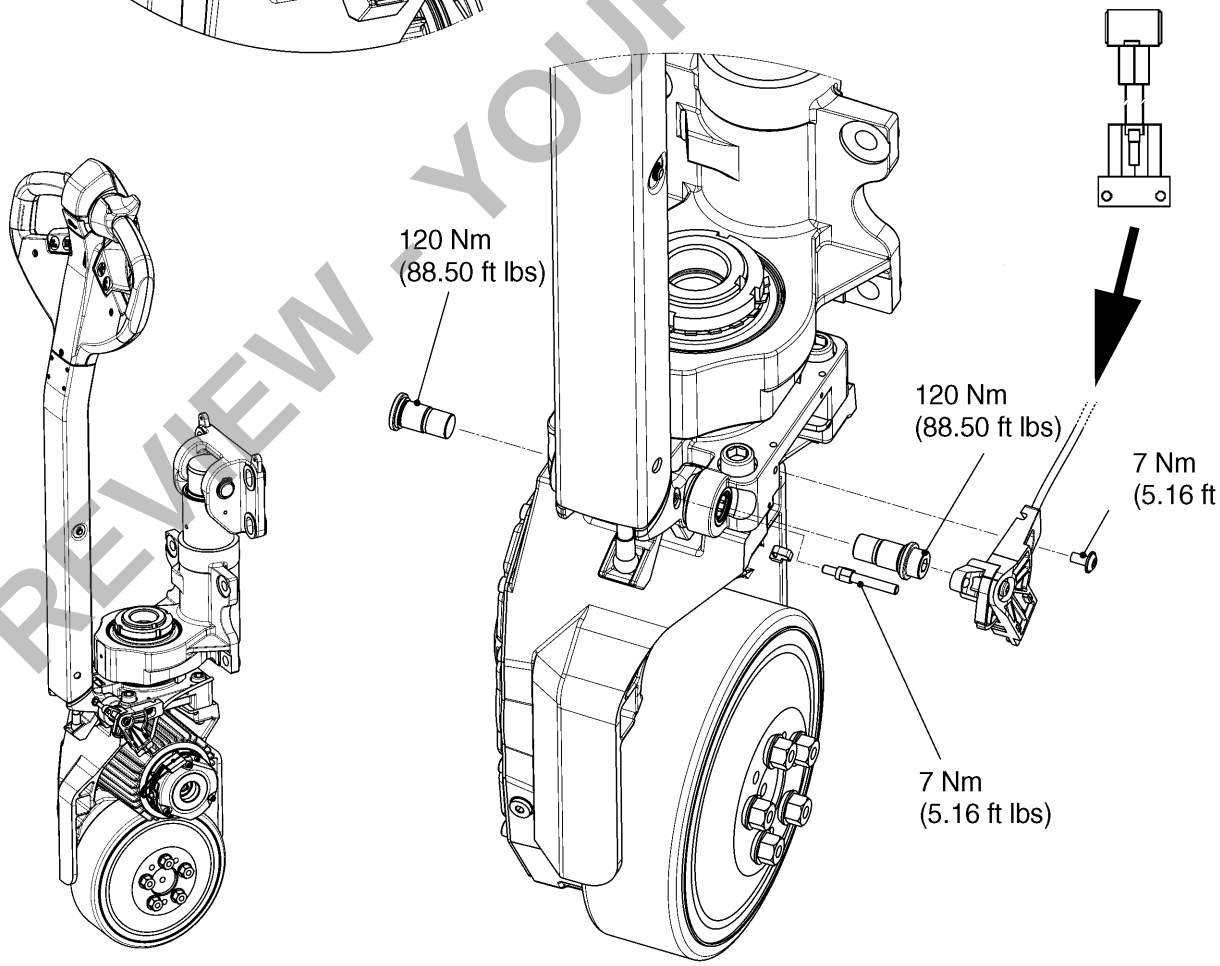
Adapter L10XG1/4A-E-St	Torque 50 Nm (36.88 ft. lbs.)
Angle Swivel Screw Connection	Torque 35 Nm (25.81 ft. lbs.)

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Additional Torque Specifications (continued)





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F	E	XX	S	Operating Status	Description	Possible Cause	Recommended Action
_	1	07	1	Operation	Operator protection switch out of sequence	The operator protection switch consist of an NC and a NO contact. When the switch is applied both contacts connect simultaneously. As a result, only the 0/1 and the 1/0 combinations should occur. During operation the combinations 0/0 and 1/0 (500 MSECs) trigger the message. For a valid combination (0/1 or 1/0, 500 msecs) the event and the truck response are reset.	- Check wire connections. - Check operator protection switch. - Replace operator protection switch.
_	1	08	1	Operation	Touch mode button inputs are out of sequence	The touch mode button consist of an NC and a NO contact. When the switch is applied both contacts connect simultaneously. As a result, only the 0/1 and the 1/0 combinations should occur. During operation the combinations 0/0 and 1/0 (500 MSECs) trigger the message. For a valid combination (0/1 or 1/0, 500 msecs) the event and the truck response are reset.	- Check wire connections. - Check touch mode button. - Replace touch mode button.
_	1	09	1	Operation	Weight button inputs are out of sequence	The weight button consist of an NC and a NO contact. When the switch is applied both contacts connect simultaneously. As a result, only the 0/1 and the 1/0 combinations should occur. During operation the combinations 0/0 and 1/0 (500 MSECs) trigger the message. For a valid combination (0/1 or 1/0, 500 msecs) the event and the truck response are reset.	- Check wire connection. - Check weight button. - Replace weight button.
_	1	10	1	Operation	Lift/lower digital setpoints are invalid	During operation the combination 1/1 for both buttons pressed simultaneously for 500 msecs triggers the following message. For a valid combination (0/0, 0/1 or 1/0 [button not pressed/only one button pressed]; 500 msecs) the event and the truck are reset.	- Check wire connection. - Check weight button. - Replace weight button.
_	1	10	2	Operation	Lift/lower analog setpoints are invalid	During operation the limits 1/1 [both buttons pressed simultaneously] for 500 msecs have been exceeded. For a valid combination (0/0, 0/1 or 1/0 [button not pressed/only one button pressed]; 500 msecs) the event and the truck are reset.	- Check wire connection. - Check weight button. - Replace weight button.

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Parameter Change Examples

Changing the Master Code from Four Digits to Six Digits (Function 000 and 004)

1. The keypad is switched off Operating Status LED-BZ is solid red.
2. Master code entry: 7-2-9-5.
3. Operating Status LED-BZ is flashing green.
4. All user codes must initially be deleted as the length of the master code determines the length of the user code. Enter parameter number 004 “delete code memory”.
5. Press the SET key.
6. Operating Status LED-BZ and LED 3 flash green.
7. Enter digits “3265”.
8. Press the SET key.
9. Operating Status LED-BZ is flashing green. **All User Codes are now deleted**.
10. Enter the parameter number 000 “Change master code”.
11. Press the SET key. (LED 1 and operating Status LED-BZ flash green).
12. Enter the old master code (7295).
13. Press the SET key. (LED 2 and Operating Status LED-BZ flash green).
14. Enter the new master code (e.g., 1-2-3-4-5-6).
15. Press the SET key. (LED 3 and Operating Status LED-BZ flash green).
16. Repeat the new master code and finish by pressing the SET key.
17. (Operating Status LED-BZ is flashing green).
18. Push the (O)-key to turn off unit. Operating Status LED-BZ is solid red.
19. Enter new Master code “1-2-3-4-5-6” to validate master code change.

User Mode

When the battery is plugged in, the operating status LED-BZ located on the lower left corner of the (O)-key (reset key) is lit (permanently red).

When the correct user code has been entered (factory setting **2-5-8-0**), the relay switches in the control circuit. Operating status LED-BZ is now lit (permanently green).

If an incorrect user code is entered, Operating Status LED-BZ will flash red for two seconds. The operator must reenter the code.

Adding a User Code (Function 001)

NOTE

Master Code is set to factory default.

1. **Enter** the current master code **7-2-9-5** (operating Status LED-BZ Flashes green).
2. **Enter** the parameter code **001**.
3. **Confirm** by pressing the SET Key (LED 2 and Operating Status LED-BZ flash green).
4. **Enter** the new user code **1-4-9-5**.
5. **Confirm** by pressing Set Key (LED 3 and Operating Status LED-BZ flash green).
6. **Enter** the new user code **1-4-9-5**.
7. **Confirm** by pressing Set Key (Operating Status LED-BZ flash green).
8. After all the settings have been made, you can leave the master mode by pressing the (O)-key (Operating Status LED-BZ flashes red).
9. Now you have User Code 2580 and new user code 1-4-9-5. Both start the control unit.

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Item	Component	Check	Time Interval is Meter Hours				
			Daily	Weekly	3 Months	6 Months	12 Months
			8 Hrs.	40 Hrs.	500 Hrs.	1000 Hrs.	2000 Hrs.
		Check the tightness of the drive unit mounting bolts. Tighten if necessary.	X				
15	Grease Fittings	Lubricate all grease fittings.			X	X	X
16	Horn	Check that the horn operates when you press the horn button. (Battery must be connected.)	X				
17	Hydraulic System	Check for oil leaks.	X				
		Check for proper fluid level—within 1 in. (25 mm) of filler plug. Add fluid if necessary.	X				
		Check hydraulic connections and mountings.		X			
		Check the tightness of the pump and motor hardware.		X			
		Check hoses, tubes, and fittings for leaks. Replace defective hoses or seals.		X			
		Change Filter.					X
		Change Fluid.					X
18	Lift Cylinder	Check the lift cylinder for leaks. Replace components if necessary.	X				
19	Lifting and Lowering	Check the lifting and lowering functions.	X				X
20	Load Wheel	Check and lubricate the load wheel bearings and linkage.			X	X	X
21	Lubrication Points	Lubricate all levers, shafts, and leakage points.		X			
22	Steering	Check the steering operation.	X				
23	Wheels/Tires	Check the condition of the drive wheel and load wheels. Remove any steel chips and foreign material to prevent damage to the wheels.	X				
		Check for gouging and chunking of the surface. If damaged, report the damage to your supervisor or maintenance personnel.	X				

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