MANITOU

HANDLING YOUR WORLD

REPAIR MANUAL
MANUEL DE RÉPARATION
REPARATURANLEITUNG
MANUAL DE REPARACIÓN
MANUALE RIPARAZIONE

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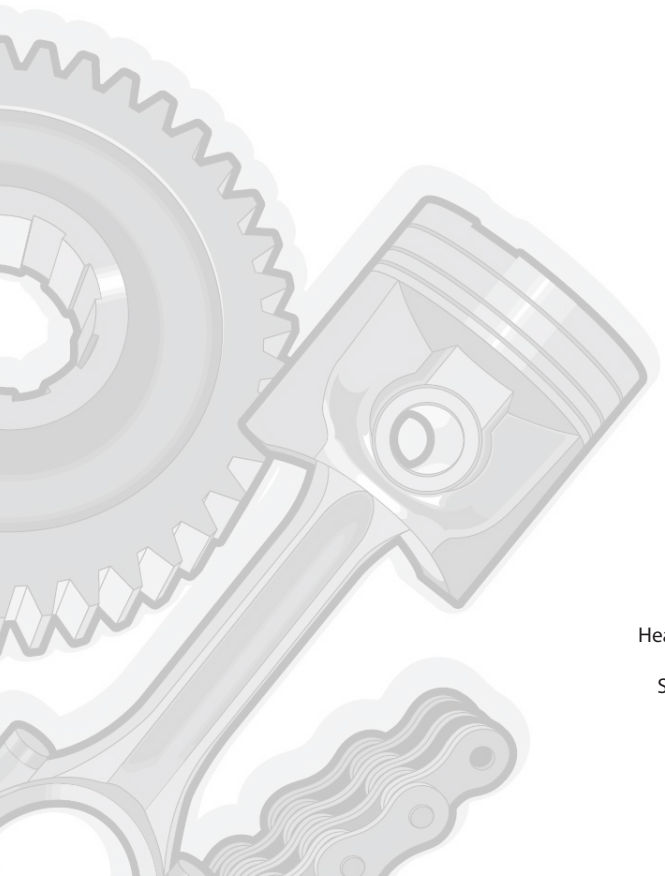

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HYDRAULIC COMPONENTS

- Some hydraulic lines are under VERY HIGH PRESSURE, even when the lifting platform is not running. To prevent an accident:

– Follow the hydraulic lines' pressure relieving procedure before performing any work on one of their components.

- Some cylinders are fitted with valves used to put the lifting platform in Safe mode as soon as the movements cease by retaining hydraulic pressure in the cylinder's chambers. Consequently, a removed cylinder may still have VERY HIGH PRESSURE in its chambers (over 100 bars, especially in the tilt compensation circuit). It is therefore advisable:

– To follow the procedures for releasing the pressure in the cylinder to be removed.
– To eliminate the pressure in its chambers before removing a cylinder.

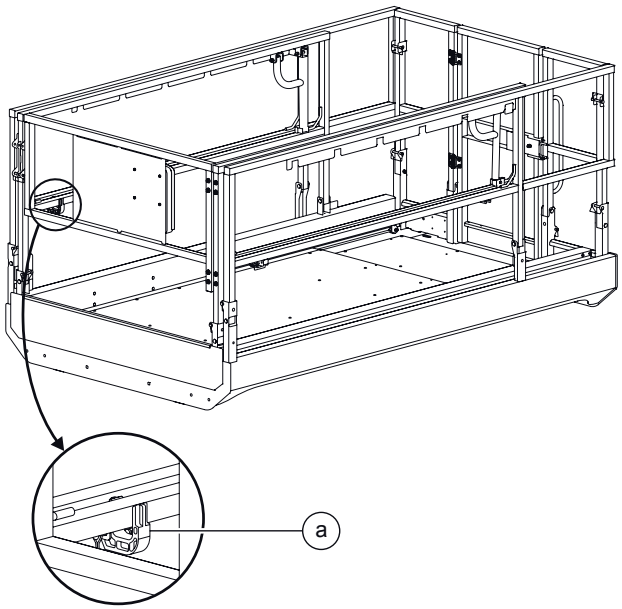
- Before working on a hydraulic component, clean the immediate surrounding area, provide receptacles or cloths for catching any oil that may escape during removal operations; also provide stoppers and covers to plug the apertures and prevent any foreign bodies from getting into the circuit.
- The cowls, hatches, seals and filters are designed to keep the hydraulic oil clean and prevent any foreign bodies from getting into the circuit. On these components, therefore, you must periodically:

– Check that there is no damage or deterioration.
– Keep them properly clean.

- Cloudy oil is the sign of the presence of a significant amount of humidity causing oxidisation / corrosion of the circuit's metal components: bleed and empty the whole circuit and then refill the circuit with fresh oil.
- If it should transpire that the circuit is polluted with foreign bodies (metal, rubber, etc.), bleed the complete circuit, clean it thoroughly and refill it with fresh oil.
- It is not recommended to mix oils of different types or brands if it is not guaranteed that they are equivalent in composition and viscosity.
- Please refer to Section 3 - *MAINTENANCE in the INSTRUCTIONS MANUAL* to select the appropriate oil to use in the lifting platform.

4 Remove the platform controls from the platform and lay it off to the side.

5 Release the four rail spacers by pulling the retaining pin and turn them in a downward position.



a rail spacer

6 Position a forklift at the steer end of the machine with the forks even with the bottom of the platform extension.

7 Carefully slide the platform extension out until the platform extension makes contact with the carriage on the forklift.

8 Secure the platform extension deck railings to the carriage of the forklift to support the platform extension deck.

9 Carefully slide the platform extension out and away from the platform and place it on a structure capable of supporting it.

Scissor Assembly, 140 SC

How to Disassemble the Scissor Assembly

Note: When removing a hose assembly or fitting, the O-ring on the fitting and/or hose must be replaced and then torqued to specification during installation.

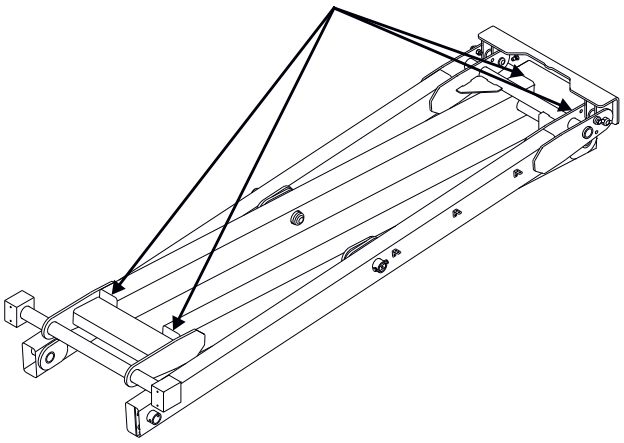
Note: This procedure will require an overhead lifting device and sling chains capable of supporting 1000 lbs / 454 kgs.

1 Remove the platform. See , *How to Remove the Platform.*

2 Remove the retaining fasteners that attach the ladder to the drive chassis. Remove the ladder and set aside.

3 Remove the cables from the platform through the linkage assembly.

4 Using an overhead lifting device attach a 4 hook sling chain to the ends of the number 5 inner arm (index #17). Make the chains tight but do not apply lifting pressure.

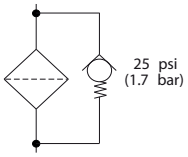


5 Remove the retaining fasteners from the number 5 pivot pins (index #3 and #19).

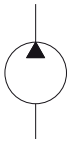
Note: Do not remove the external snap ring.

6 Using a soft metal drift, remove the pivot pins and set aside.

7 Carefully lift the linkage assembly off of the machine and place it on a structure capable of supporting it.

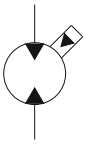


Filter with bypass check valve



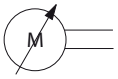
Pump fixed displacement

Motor bidirectional



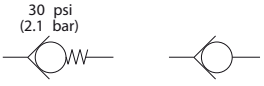
Motor 2 speed, bidirectional

Hydraulically released brake

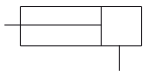


Pump prime mover (engine or motor)

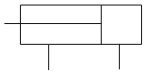
Orifice with size



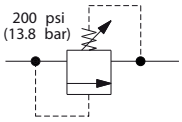
Check valve



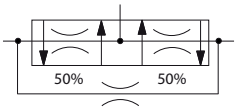
Single acting cylinder



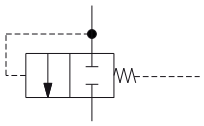
Double acting cylinder



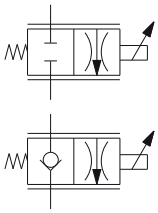
Relief valve with pressure setting



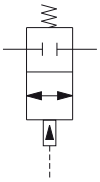
Flow divider/combiner valve with pressure balancing orifice and flow percentages



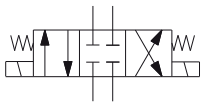
Differential sensing valve



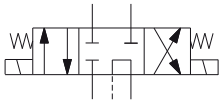
Solenoid operated proportional valve



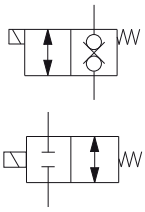
Pilot operated directional valve 2 position, 2 way



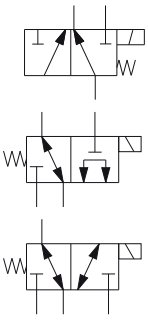
Solenoid operated 3 position, 4 way, directional valve, closed center



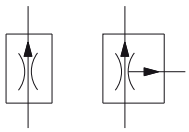
Solenoid operated 3 position, 5 way, directional valve, closed center



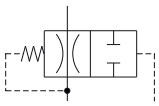
Solenoid operated 2 position, 2 way, directional valve, normally closed



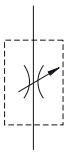
Solenoid operated 2 position, 3 way, directional valve, normally open



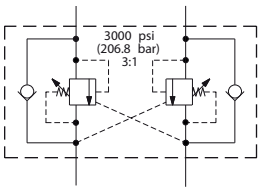
Priority flow regulator valve



Pilot operated flow regulator valve



Needle valve



Counterbalance valves with pressure and pilot ratio

Hydraulic tank strainer

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Traction Manifold Components - View 1

The traction manifold is located inside the ground control box.

Index No.	Description	Schematic Item	Function	Torque
1	Solenoid valve, 2 position 3 way	TA	Brake release	15-20 ft-lbs / 20-27 Nm
2	Solenoid valve, 2 position 4 way	TB	Steer end drive motor circuit	20-25 ft-lbs / 27-34 Nm
3	Relief valve, 2500 psi / 172.4 bar	TC	Drive pressure circuit	15-20 ft-lbs / 20-27 Nm
4	Needle valve N.C.	TD	Enables towing ability	20-25 ft-lbs / 27-34 Nm
5	Solenoid valve, 3 position 4 way	TE	Drive forward / reverse	20-25 ft-lbs / 27-34 Nm
6	Orifice, 0.060 inch / 1.5 mm	TF	Equalizes pressure on both sides of flow divider/combiner valve 17	
7	Flow divider/combiner valve	TG	Controls flow to flow divider/combiner valves 8 and 17	73-77 ft-lbs / 99-104 Nm
8	Flow divider/combiner valve	TH	Controls flow to steer end drive motors in forward and reverse	48-52 ft-lbs / 65-71 Nm
9	Orifice, 0.060 inch / 1.5 mm	TI	Equalizes pressure on both sides of flow divider/combiner valve 8	
10	Solenoid valve, 2 position 2 way	TJ	Allows flow to bypass divider/combiner valve 7 in high drive	20-25 ft-lbs / 27-34 Nm
11	Solenoid valve, 2 position 2 way	TK	Allows flow to loop the steer end motors in high drive	20-25 ft-lbs / 27-34 Nm
12	Solenoid valve, 2 position 3 way	TL	Two speed circuit	15-20 ft-lbs / 20-27 Nm

This list continues. Please turn the page.

Hydraulic Tank

The primary functions of the hydraulic tank are to cool, clean and deaerate the hydraulic fluid during operation. It utilizes internal suction strainer for the pump supply line and has an external return line filter.

How to Remove the Hydraulic Tank

Note: When removing a hose assembly or fitting, the O-ring on the fitting and/or hose must be replaced and then torqued to specification during installation.

1 Open the hydraulic tank side cover.

2 Remove the drain plug from the hydraulic tank and completely drain the tank into a container of suitable capacity.

3 Tag and disconnect the harnesses from the ground control box.

4 Remove the ground control box from the machine and set aside.

5 Tag disconnect and plug the hydraulic hoses from the hydraulic tank. Cap the fittings on the tank and return filter.

6 Remove the return filter. Protect the filter head from dirt and debris with a plastic bag.

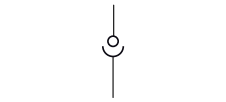
7 Loosen the hydraulic tank mounting strap fastener. Pull the tank strap to the side.

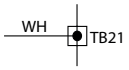
Note: Do not remove the tank strap.

8 Remove the hydraulic tank from the machine.

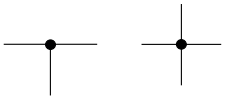
Note: Clean the hydraulic tank and inspect for cracks or other damage before installing.

Electrical symbol legend


Quick disconnect terminal / connector

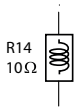


T-circuit connects at terminal


Circuit connections


Circuits crossing no connection


Diode

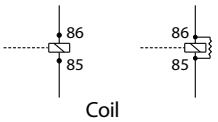


Resistor with ohm value

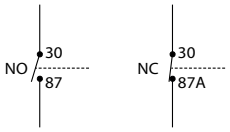
Capacitor


LED

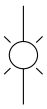
Fuse with amperage



Coil solenoid or relay



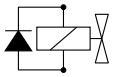
Contact solenoid or relay


Flashing beacon

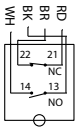
Hour meter / Gauge


Work light (option)

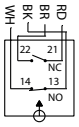

Horn


Valve coil with suppression diode


Valve coil without suppression diode

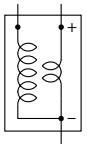


Limit switch not held

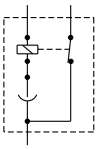


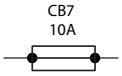
Limit switch - held


Spark plug



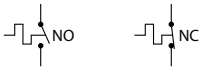
Ignition coil


Level sensor (without outriggers)



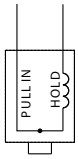
Circuit breaker with amperage


Button normally open

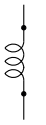


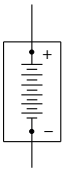
Temperature switch

Pressure switch normally closed



Fuel solenoid

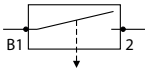

Starting aid: glow plug

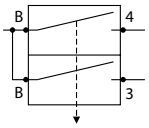


Battery

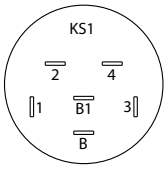

Negative ground

Red Emergency Stop button normally closed

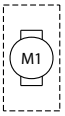




Key switch



Key switch



Electric motor

How to Determine the Revision Level

1 Turn the key switch to ground controls and pull out the red Emergency Stop buttons to the on position at both platform and ground controls.

⊙ Result: The revision level of the ECM will appear in the LED display window.

How to Adjust the Stowed Drive Speed

1 Pull out the red Emergency Stop button to the on position at the platform controls.

2 Push in the red Emergency Stop button to the off position at the ground controls.

3 Turn the key switch to ground control.

4 Press and hold both the black platform up and red platform down buttons. Pull out the red Emergency Stop button to the on position at the ground controls.

⊙ Result: TUNE SPEEDS is showing in the diagnostic display window. The ECM is now in programming mode.

5 Press the lift function enable button.

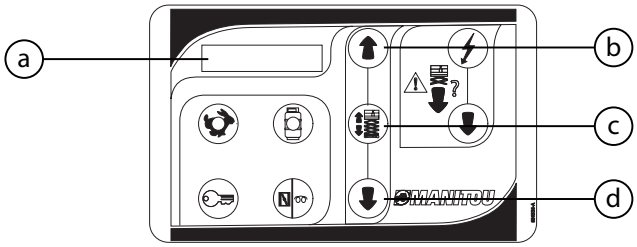
6 Use the red platform down arrow to scroll to max fwd high speed drive.

⊙ Result: MAX FWD HIGH SPEED DRIVE is showing in the diagnostic display window.

7 Press the lift function enable button.

8 Press the red platform down button to decrease the drive speed or press the black platform up button to increase the drive speed.

.



a diagnostic display
b black platform up button
c lift function enable button
d red platform down button

9 Press the lift function enable button.

⊙ Result: MAX FWD HIGH SPEED DRIVE is showing in the diagnostic display window.

10 Use the red platform down arrow to scroll to max rev high speed drive.

⊙ Result: MAX REV HIGH SPEED DRIVE is showing in the diagnostic display window.

11 Press the lift function enable button.

12 Press the red platform down button to decrease the drive speed or press the black platform up button to increase the drive speed.

13 Press the lift function enable button.

14 Push in the red Emergency Stop button to the off position at the ground controls.

15 Check the stowed drive speed of the machine. Refer to Service MANUAL.

Valve Coils

How to Test a Coil

A properly functioning coil provides an electromagnetic force which operates the solenoid valve. Critical to normal operation is continuity within the coil. Zero resistance or infinite resistance indicates the coil has failed.

Since coil resistance is sensitive to temperature, resistance values outside specification can produce erratic operation. When coil resistance decreases below specification, amperage increases. As resistance rises above specification, voltage increases.

While valves may operate when coil resistance is outside specification, maintaining coils within specification will help ensure proper valve function over a wide range of operating temperatures.

Note: If the machine has been in operation, allow the coil to cool at least 3 hours before performing this test.

1 Tag and disconnect the wiring from the coil to be tested.

2 Test the coil resistance using a multimeter set to resistance (Ω) . Refer to the Valve Coil Resistance Specification table.

☒ Result: If the resistance is not within the adjusted specification, plus or minus 10%, replace the coil.

Valve Coil Resistance Specification

Note: The following coil resistance specifications are at an ambient temperature of 68°F / 20°C. As valve coil resistance is sensitive to changes in air temperature, the coil resistance will typically increase or decrease by 4% for each 18°F / 20°C that your air temperature increases or decreases from 68°F / 20°C.

Description	Specification
Proportional valve, 12V DC with diode (schematic item FL)	7.1 Ω
Solenoid valve, 2 position 2 way 12V DC with diode (schematic item FB)	8.8 Ω
Solenoid valve, 2 position 2 way 12V DC with diode (schematic item TJ, TK)	7.1 Ω
Solenoid valve, 2 position 3 way 12V DC with diode (schematic item FO, FP, TL, TT)	8.8 Ω
Solenoid valve, 2 position 3 way 12V DC with diode (schematic item FD)	7.1 Ω
Solenoid valve, 2 position 4 way 12V DC with diode (schematic items TB)	7.1 Ω
Solenoid valve, 3 position 4 way 12V DC with diode (schematic items BA)	7.1 Ω
Solenoid valve, 3 position 4 way 12V DC with diode (schematic items TE)	5.1 Ω
Solenoid valve, 3 position 5 way 12V DC with diode (schematic item FK)	8.8 Ω

Observe and Obey:

- ☑ Troubleshooting and repair procedures shall be completed by a person trained and qualified on the repair of this machine.
- ☑ Immediately tag and remove from service a damaged or malfunctioning machine.
- ☑ Repair any machine damage or malfunction before operating the machine.
- ☑ Unless otherwise specified, perform each repair procedure with the machine in the following configuration:
  - Machine parked on a firm, level surface
  - Platform in the stowed position
  - Key switch in the off position with the key removed
  - The red Emergency Stop button in the off position at both ground and platform controls
  - Wheels chocked
  - All external AC power supply disconnected from the machine

Before Troubleshooting:

- ☑ Read, understand and obey the safety rules and operating instructions in the appropriate operator's manual on your machine.
- ☑ Be sure that all necessary tools and test equipment are available and ready for use.
- ☑ Be aware of the following hazards and follow generally accepted safe workshop practices.

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