An Oshkosh Corporation Company

Service and Maintenance Manual

Models
20MVL
20MSP

PVC 2002

31215825

January 23, 2019 - Rev A

ANSI

MidWestTech | JLG 20MSP, 20MVL Vertical Mast Service Manual | Publication 31215825

Order the manual at mid-west-tech.com >

SECTION NO.	TITLE	PAGE NO.
SECTION A - INTRODUCTION - MAINTENANCE SAFETY PRECAUTIONS		
a	General	1-A
b	Hydraulic System Safety	1-A
c	Maintenance	1-A
SECTION 1 - GENERAL SPECIFICATIONS		
1.1	Machine Specifications	1-1
	Machine Wheel Loads and PSI - Per Wheel	1-2
	Electrical Specifications	1-2
	Platform Data	1-2
	Machine Component Weights	1-3
	Serial Number Locations	1-3
1.2	Lubrication	1-3
	Hydraulic Oil	1-3
	Lubrication Specifications	1-3
1.3	Cylinder Specifications	1-3
1.4	Torque Requirements	1-3
1.5	ThreadLocking Compound	1-5
1.6	Torque Charts	1-6
	SAE Fastener Torque Chart	1-6
	Metric Fastener Torque Chart	1-12
SECTION 2 - GENERAL		
2.1	Machine Preparation, Inspection, And Maintenance	2-1
	General	2-1
	Preparation, Inspection, and Maintenance	2-1
	Pre-Start Inspection	2-1
	Pre-Delivery Inspection and Frequent Inspection	2-1
	Annual Machine Inspection	2-1
	Preventative Maintenance	2-1
2.2	Preventive Maintenance and Inspection Schedule	2-2
	Inspection and Maintenance Codes:	2-4
	Footnotes:	2-4
2.3	Servicing and Maintenance Guidelines	2-5
	General	2-5
	Safety and Workmanship	2-5
	Cleanliness	2-5
	Components Removal and Installation	2-5
	Component Disassembly and Reassembly	2-5
	Pressure-Fit Parts	2-5
	Bearings	2-5
	Gaskets	2-5
	Bolt Usage and Torque Application	2-5
	Hydraulic Lines and Electrical Wiring	2-6
	Hydraulic System	2-6
	Lubrication and Servicing	2-6
	Batteries	2-6
	Mast Chain Inspection Procedure	2-6
2.4	Lubrication Information	2-8
	Hydraulic System	2-8
	Hydraulic Oil	2-8
	Changing Hydraulic Oil	2-8
	Lubrication Specifications	2-8

MidWestTech | JLG 20MSP, 20MVL Vertical Mast Service Manual | Publication 31215825 Order the manual at mid-west-tech.com >

SECTION NO.	TITLE	PAGE NO.
SECTION 3 - BASE COMPONENTS		
3.1	Base Assembly Components	3-1
3.2	Base Frame Covers	3-2
	Drive Motor Cover - Installation	3-2
	Battery Charger Cover - Installation	3-2
3.3	Drive/Elevation Cut-out switch Installation	3-3
3.4	Drive And Caster Wheels	3-3
	Tire Wear and Damage	3-3
	Wheel and Tire Replacement	3-3
	Wheel Installation	3-3
	Caster Wheels - Installation	3-4
3.5	Wheel Drive Assembly - Servicing	3-4
	Roll And Leak Testing	3-4
	Oil Type & Capacity	3-5
	Drive Motor Brush Wear - Warning Indication	3-5
	Wheel Drive Assembly - Removal From Machine	3-6
	Wheel Drive Disassembly - Main Components	3-7
	Replacing Drive Motor Brushes	3-8
	Gear Box Main Disassembly	3-10
	Input Carrier Disassembly	3-11
	Hub Disassembly	3-12
	Spindle Disassembly	3-13
	Spindle Sub-Assembly	3-14
	Hub Sub-Assembly	3-15
	Input Carrier Sub-Assembly	3-16
	Main Gear Box Sub-Assembly	3-17
	Motor, Brake and Gear Box Assembly	3-18
3.6	Pot Hole Protection System	3-19
3.7	Battery Charger - Service Procedures	3-21
	Battery Charger General Information	3-21
	Battery Charger Maintenance Information	3-21
	Battery Charge LED Indicator on Platform Control Console	3-21
	Battery Low Voltage Warning Indicators	3-21
	Battery Charging Status Indicators	3-22
	Battery Charger Check/Change Charging Algorithm	3-23
	Battery Charger Removal/Installation	3-23
SECTION 4 - CONTROL COMPONENTS		
4.1	Control Components Overview	4-1
4.2	Controls Cover Installation	4-2
	Battery Cover Doors	4-2
	Center, Left and Right Lower Covers	4-2
4.3	Control Components - Installation	4-3
	Ground Control Module	4-3
	Traction Control Module	4-3
	Platform Control Console Installation	4-4
	Horn Installation	4-4
	Alarm Installation	4-4
4.4	Batteries - Service Procedures	4-5
	Battery Replacement	4-5
	Battery Condition Testing	4-5
	Battery Disconnect (Option)	4-5
	Battery - Installation - (2-12V Batteries)	4-6
	Battery Installation - (4-6V Batteries) (OPTION)	4-8
4.5	Ground Control Module - Service Procedure	4-9
	Cover Removal/Installation	4-10
	Power Selector/EStop Switch Installation	4-11

MidWestTech | JLG 20MSP, 20MVL Vertical Mast Service Manual | Publication 31215825 Order the manual at mid-west-tech.com >

SECTION NO.	TITLE	PAGE NO.
4.6	Ground Control Station - Programming	4-12
	General	4-12
	Activating Programming Mode	4-12
	Entering Password	4-13
	Programming Mode Selection	4-13
	Selecting Programmable Item to Adjust	4-13
	Adjusting Programmable Setting	4-13
	Service Programming Mode - (Level-2)	4-14
	Operator Programming Mode - (Level-3)	4-15
4.7	Platform Control Console - Service Procedures	4-17
	General	4-17
	Remove Platform Control Console	4-17
	Display/Controller Module Electrical Connections	4-18
	Mounting Bracket - Install/Remove	4-18
	Rear Cover - Install/Remove	4-18
	Display/Controller Module - Install/Remove	4-19
	Drive/Lift Mode Switch - Install/Remove	4-19
	Horn Button Switch - Install/Remove	4-19
	Key Switch - Install/Remove	4-19
	E-Stop/ShutDown Switch - Install/Remove	4-20
	Joystick Assembly - Install/Remove	4-20
4.8	Pump-Motor Assembly - Service Procedure	4-21
	Hydraulic Pressure settings and Adjustment	4-21
	Hydraulic Pressure Gauge Connection	4-21
	After Filter Pressure Check	4-22
	Pump/Motor/Tank Installation	4-22
	General Installation and Disassembly	4-23
	Inline Hydraulic Filter Installation	4-23
	FENNER BRAND PUMP - Brush Replacement	4-23
	Motor Cap/Motor Installation	4-23
	Motor Brush Installation	4-24
	Brush Housing Final Assembly Tips	4-25
	MONARCH BRAND PUMP - Brush Replacement	4-26
	Motor Assembly - Remove/Install - Reference Marks	4-26
	Motor/Brush Cover - Remove/Install	4-26
	Brush Carrier Assembly - Remove/Install	4-27
	Brush Assembly - Remove/Install	4-27
	Tank Installation	4-28
	Filter Screen Installation	4-28
	Pump Installation	4-28
	Pressure Adjust Valve Installation	4-29
	Pressure Check Valve Installation	4-29
SECTION 5 - MAST COMPONENTS		
5.1	Mast Components Overview	5-1
5.2	Mast Chains And Sequencing Cables Adjustment	5-2
	Mast Chain/Cable Adjustment	5-2
	Sequencing Cable Adjustment	5-2
5.3	Sequence Cable Replacement Kit	5-4
	Remove Old Cable	5-4
	Replacement Cable Installation	5-4
	Clamp Installation (Drum/Socket Type)	5-4
5.4	Hydraulic Line - Disconnect - Special Tool	5-7
	Tool Use - In-Line Style Fittings	5-7
	Tool Use - Angled Style Fittings	5-8

MidWestTech | JLG 20MSP, 20MVL Vertical Mast Service Manual | Publication 31215825 Order the manual at mid-west-tech.com >

Machine Wheel Loads and PSI - Per Wheel

Table 1-1. 20MVL/MSP - Machine Maximum Wheel Loads (lb) and (PSI) - Per Wheel

Platform Type (Loaded to Max. Capacity)	20MVL				20MSP			
	Average Maximum				Average Maximum			
	Wheel Load Per Wheel (lb)		(PSI) Per Wheel		Wheel Load Per Wheel (lb)		(PSI) Per Wheel	
	Rear	Front	Rear	Front	Rear	Front	Rear	Front
22 x 25 SB	855 lb (388 kg)	450 lb (206 kg)	132 psi (9.3 kg/cm^2)	250 psi (17.6 kg/cm^2)				
28 x 26 GW	835 lb (379 kg)	460 lb (209 kg)	121 psi (8.6 kg/cm^2)	261 psi (18.4 kg/cm^2)				
26 x 50 GW	850 lb (386 kg)	480 lb (218 kg)	131 psi (9.3 kg/cm^2)	277 psi (19.5 kg/cm^2)	850 lb (386 kg)	480 lb (218 kg)	131 psi (9.3 kg/cm^2)	259 psi (18.3 kg/cm^2)
28 x 48 SP					815 lb (370 kg)	560 lb (255 kg)	120 psi (8.5 kg/cm^2)	320 psi (22.5 kg/cm^2)
w/Folding Tray					810 lb (368 kg)	565 lb (257 kg)	125 psi (8.8 kg/cm^2)	313 psi (22 kg/cm^2)

NOTE: *Platform Types: SB - with Sliding Bar Gate, GW - with Gull Wing Gate, SP - Stock Picker Platform*

Electrical Specifications

SPECIFICATION	20MVL/20MSP
System Voltage	24 volts DC
Battery Specifications Battery Type	AGM (VRLA) (Sealed)
Voltage (DC)	12 volts DC - 2 Battery System 6 volts DC - 4 Battery System
Amp Hour (AH) Rating	100 amp hr. @ 20 hr. Rate - 12V - 2 Battery System 220 amp hr. @ 20 hr. Rate - 6V - 4 Battery System
Battery Charger (DC Models) Input (AC)	120/230 VAC RMS - 45/65 Hz - Voltage Selectable 12 AMPS RMS @ 108 VAC
Output (DC)	24 volts DC Nominal - 33.6 VDC Maximum 25 amp - Max. DC Output Current

Platform Data

SPECIFICATION	20MVL	20MSP
Maximum Occupants (Persons allowed in Platform)	1	1
Maximum Work Load (Capacity) Gull Wing or Front Slide Bar Entry	350 lb (160 kg)	-
Stockpicker	-	400 lb (180 kg)
Extendible	350 lb (160 kg)	350 lb (160 kg)
Platform Height - Mast Fully Extended - (Ground to Platform Floor)	19 ft. 1 in. (5.80 m)	19 ft. 6 in. (5.96 m)
Platform Cycle Performance (in seconds) (w/max. rated load) Lift Up Lift Down	 22.5 sec. 21 - 26 sec.	 22.5 sec. 21 - 26 sec.

Table 1-2. Max. Capacity with Side Entry Platform w/Folding Material Tray Installed

SPEC	Model(1)	Platform Capacity	Tray Capacity	Combined Capacity
ANSI/ CSA	20MSP	300 lb (136 kg)	150 lb (70 kg)	450 lb (206 kg)
CE	20MVL	250 lb (115 kg)	100 lb (45 kg)	350 lb (160 kg)
AUS	20MVL	250 lb (115 kg)	100 lb (45 kg)	350 lb (160 kg)

(1) This platform is only available on models shown for the applicable specification.

NOTE: *Australian Specification Machines ONLY - The SIDE ENTRY PLATFORM w/FOLDING MATERIAL TRAY includes a gate release/latch mechanism which is released by pressing down on the handles mounted to the top rail of both entry gates. Releasing the handles will latch the gates when closed.*

MidWestTech | JLG 20MSP, 20MVL Vertical Mast Service Manual | Publication 31215825 Order the manual at mid-west-tech.com >

6.11 FAULT CODE TROUBLESHOOTING TABLES

Machine in Drive Speed Cut-Back (Turtle) Mode All The Time

Overview of Procedure

Under normal machine operation once the platform is elevated the machine's maximum drive speed is reduced to 1/4 the normal drive speed of when the platform is fully lowered. This is detected with a drive speed cut-back *(proximity)* switch mounted at the base of the mast assembly and a target mounted on the mast assembly. When the mast is elevated and the target raised the proximity switch then cuts back the machine drive speed. When machine is in the drive speed cut-back mode a turtle is displayed on the Ground Control Module LCD display.

Check For These Obvious Conditions First:

- Mast drive speed cut-back (proximity) switch and target plate secure and undamaged.
- Both Pot Hole Protection Bar Limit switches secure and undamaged.

Table 6-5. Machine In Drive Speed Cut-Back (Turtle) Mode All The Time

STEP	ACTION	SPEC	YES	NO
1.	The Pot-Hole-Protection system bars should be raised when the platform is fully lowered. Check if the Pot-Hole-Protection bars are down when the platform is fully lowered.	—	Check the mechanical operation of the PHP System	Go to Step 2
2.	With the platform fully lowered, check for continuity on the Cutback Proximity Switch wires between pins-8 and 18 on the P2 connector at the Ground Control Module.	—	Go to Step 3	Repair or Replace Speed Cutback (Proximity) Switch
3.	With the platform fully lowered, bars raised, check for continuity on the Right Side PHP bar limit switch, between pins-9 and 19 on the P2 connector at the Ground Control Module.	—	Repair or Replace Right Side PHP Limit Switch Go to Step 4	
4.	With the platform fully lowered, bars raised, check for continuity on the Left Side PHP bar limit switch, between pins-10 and 20 on the P2 connector at the Ground Control Module.	—	Repair or Replace Left Side PHP Limit Switch	

Battery Voltage Low - Warning Level 3 - Three (3) LED/LCDs lit

- 3 LEDs/BARS Flashing with an audible beep.
- Machine will Operate - No Control Functions are Locked Out.

When batteries are drained to Warning Level 3, charge batteries until a level of four (4) LEDs-(Platform) or BARS (Ground Control Module), or more before operating. Failure to do so, will eventually result in a fault Code 38 - Battery Voltage Low - Warning Level 2.

NOTE: *If battery is not charging properly, see Battery/Battery Charger Servicing - Section 3 of this Manual.*

Overload Alarm and Overload Indicator

Overload Alarm: The output of the alarm will be software controlled and sound a continuous alarm while LSS is active.

Overload Indicator: The overload indicator will be mounted on the platform box and connected internally to the platform box panel connector. The anode side of the LED will be routed to the ground station and driven by the aux 2 Output (ground module P1-8). P1-8 output should mimic the current Aux 1 output (P1-9) when LSS is enabled. This will drive the LED at 5 seconds on and 2 seconds off.

NOTE: *The LSS system activation will remain the same and will only be active when an open circuit is detected at ground module pins P2-13 and P2-4. Machine drive and lift functions will be deactivated while LSS is activated.*

MidWestTech | JLG 20MSP, 20MVL Vertical Mast Service Manual | Publication 31215825 Order the manual at mid-west-tech.com >

Code 19 - Alarm - Disconnected

Check For These Obvious Conditions First:

- Damaged wiring in the alarm wiring harness or a damaged alarm.
- Activate a function to check if alarm beeps.

Table 6-22. Code 19 - Alarm - Disconnected

STEP	ACTION	SPEC	YES	NO
1.	Check voltage at the P1 connector on the Ground Control Module between pin-13 and pin-6. Is reading within specification?	2 - 4VDC	Replace Ground Control Module	Go to Step 2
2.	Remove the wire terminals at the alarm, check continuity of each of the wires from pins 13 and 6 on the P1 connector to the alarm end.	—	Replace the Alarm	Repair or Replace Wiring

Code 20 - Beacon - Short Circuit

Check For These Obvious Conditions First:

- Damaged wiring in the beacon wiring harness or a damaged beacon unit.

Table 6-23. Code 20 - Beacon - Short Circuit

STEP	ACTION	SPEC	YES	NO
1.	At the Ground Control Module, P1 connector, check the voltage across pins-12 and 5 to the beacon. Is reading within specification?	0 - 2VDC	Go to Step 2	Replace Ground Control Module
2.	Remove the wire terminals at the beacon, check continuity of each of the wires from pins 12 and 5 on the P1 connector to the beacon end.	—	Replace the Beacon	Repair or Replace Wiring

MidWestTech | JLG 20MSP, 20MVL Vertical Mast Service Manual | Publication 31215825 Order the manual at mid-west-tech.com >

Voltage Measurement

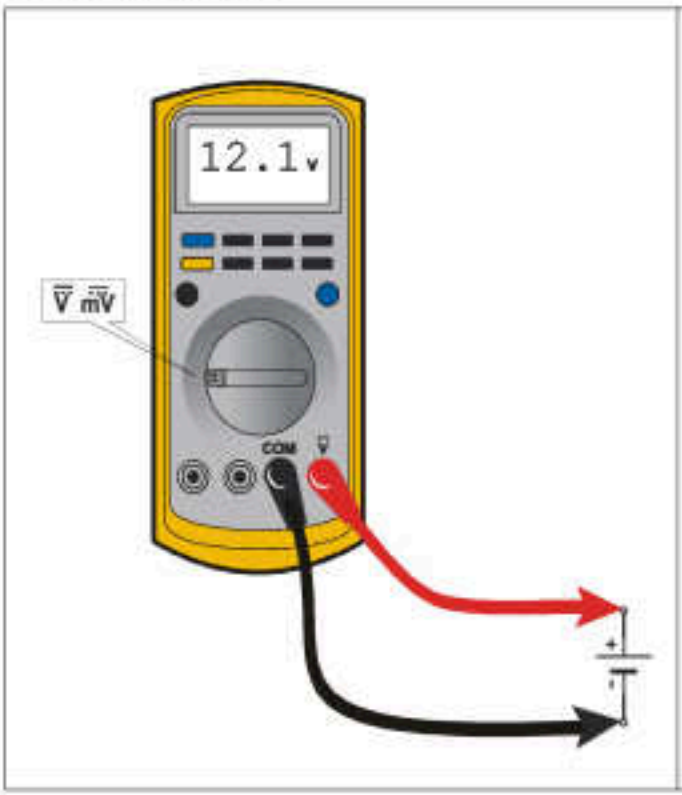


Figure 6-1. Voltage Measurement (DC)

- If meter is not auto ranging, set it to the correct range (See multimeter's operation manual)
- Use firm contact with meter leads

Resistance Measurement

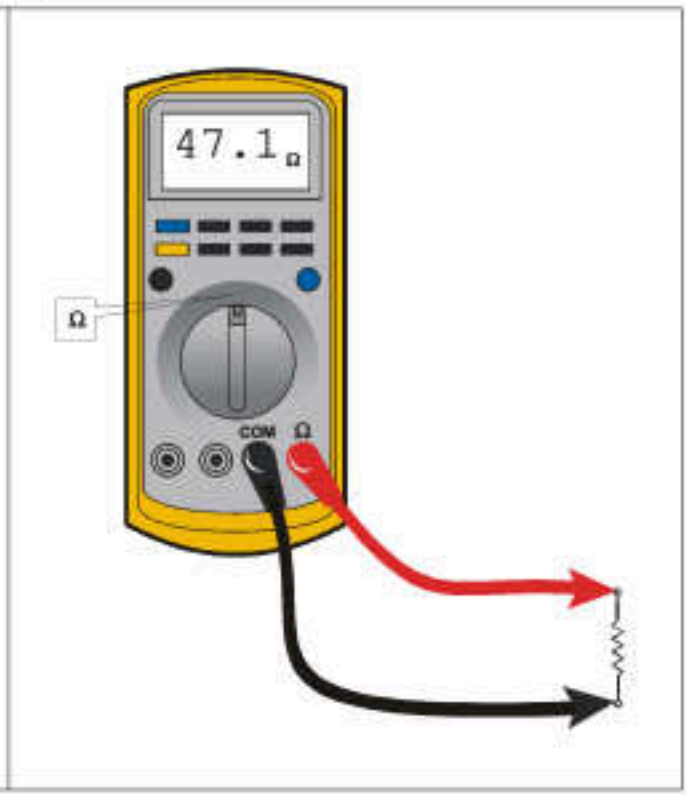


Figure 6-2. Resistance Measurement

- First test meter and leads by touching leads together. Resistance should read a short circuit (very low resistance)
- Circuit power must be turned OFF before testing resistance
- Disconnect component from circuit before testing
- If meter is not auto ranging, set it to the correct range (See multimeter's operation manual)
- Use firm contact with meter leads

MidWestTech | JLG 20MSP, 20MVL Vertical Mast Service Manual | Publication 31215825 Order the manual at mid-west-tech.com >