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Quick Reference User Guide

**HOW TO START**
- Sit in seat, fasten seatbelt and insert key.
- Turn key to ON. Wait for screen to display STARTUP (10 seconds).
- Place foot on brake and turn key to START position.
- Hold key in START position for a couple of seconds to start the engine.

If key is turned to START too soon, the tractor will not start.
The key must then be reset by turning it to OFF - leave off for 5 seconds and then back to ON.

**SHUTDOWN**
- Turn off PTO.
- Turn off hydraulics.
- Turn key to OFF and release seatbelt to exit tractor.

**PARKING BRAKE**
- Engages/Disengages automatically when pressing and releasing accelerator pedal.

**FORWARD/REVERSE**
- Using the joystick, push the 3rd toggle switch from the left UP for forward or DOWN for reverse.

**THROTTLE (Work Mode)**
- Use the 2nd toggle switch from the left joystick to throttle UP (push upward) or to throttle DOWN (pull downward).

**RAISE/LOWER FRONT ATTACHMENT**
- While tractor is running, pull back on joystick to raise front attachment.
- Lower attachment by pushing forward on joystick.

**ON/OFF REAR ELECTRICAL/HYDRAULIC ATTACHMENTS**
- Turn rear electrical attachment (IE Sprayer) ON and OFF with 1st toggle switch on left.
- Turn rear hydraulic ON and OFF with 1st toggle switch on right.
Quick Reference User Guide
This page can be removed and kept in the operator’s cab.

HOW TO START
- Sit in seat, fasten seatbelt and insert key.
- Turn key to ON. Wait for screen to display STARTUP (10 seconds).
- Place foot on brake and turn key to START position.
- Hold key in START position for a couple of seconds to start the engine.

If key is turned to START too soon, the tractor will not start.
The key must then be reset by turning it to OFF - leave off for 5 seconds and then back to ON.

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- Engages/Disengages automatically when pressing and releasing accelerator pedal.

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THROTTLE (Work Mode)
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ON/OFF REAR ELECTRICAL/HYDRAULIC ATTACHMENTS
- Turn rear electrical attachment (IE Sprayer) ON and OFF with 1st toggle switch on left.
- Turn rear hydraulic ON and OFF with 1st toggle switch on right.
WARNING:
Read this manual and any attachment owner’s manuals before using this equipment. Failure to do so can result in serious injury or death. Call your dealer if you have any questions.

HAZARD DEFINITIONS
For your safety, and to assure the long life of your equipment, be sure you understand the following signal words which will be seen throughout this manual:

• DANGER: Alerts you to an immediate hazard, which will always result in severe personal injury and possible death if it is not avoided.
• WARNING: Alerts you to a hazard which will result in a serious personal injury or possible death in some cases, if not avoided.
• CAUTION: Alerts you to a potential hazard which may result in a serious personal injury if not avoided. It also alerts against an unsafe practice that will permanently damage equipment or property.
• IMPORTANT: Points out a proper use that will avoid damage to the machine, and/or will extend the life of its parts.
• NOTE: Suggests how to use or adjust the equipment for best product results.

IDENTIFICATION OF SAFETY LABELS
Safety labels are strategically located around the vehicle to prevent potential hazards. The labels are a permanent part of the equipment. If they become separated from the product or illegible, contact M-B Companies Inc. for replacements. Understand the information the labels are communicating before operating or maintaining the equipment.

WARNING: HIGHER ROLLOVER RISK
Avoid Abrupt Maneuvers and Excessive Speed
Travel at Low Speed When Turning
Always Wear Safety Belt

DANGER
HOT FLUID UNDER PRESSURE

DANGER
CUTTING/SEVERING OF FINGERS OR HAND - FAN

DANGER
ROTATING DRIVELINE HAZARD
To prevent serious injury or death from rotating driveline:
• Keep all guards in place when operating.
• Keep hands, feet, hair and clothing away from moving parts.

WARNING: UNLEVEL TERRAIN AT HIGHER SPEEDS MAY CAUSE VEHICLE TO BECOME UNSTABLE

DANGER
DO NOT GO NEAR HYDRAULIC OIL LEAKS
When checking for hydraulic system leaks, observe only.
Try never use your hands to check for leaks.
Hydraulic oil from a pin hole leak can puncture your skin and cause serious injury, gangrene, or death.
If injured by hydraulic oil under pressure, seek medical attention immediately.
Oil can be hot and can cause severe burns.

WARNING
Uneven terrain at higher speeds may cause vehicle to become unstable

WARNING
HOT SURFACE

WARNING
NO RIDERS OR HANGERS ON
GENERAL SAFETY

• This manual should be available during operation.
• Extra copies of this manual are available for purchase through M-B Customer Service.
• To avoid serious injury or death, do not modify equipment. Any modifications made to equipment can be dangerous and can void equipment warranty.
• Never defeat a safety device to make a task easier.
• Never deface or remove factory-installed safety labels. If a label ever becomes lost, damaged, or illegible, report this condition to a supervisor and obtain a replacement label from the Customer Service department of M-B Companies, Inc.
• Always wear proper apparel when operating equipment; safety glasses, face shield or goggles, ear protection, and dust mask. Tie hair back. Never wear loose clothing or jewelry that could get caught in moving parts.
• Never operate equipment with covers or guards removed. Rotating parts can cause severe injury. Keep hands, feet, hair, jewelry and clothing away from all moving parts.
• Understand the operation of hydraulic and pneumatic controls.
• Understand which adjustments are operator and which are maintenance adjustments.
• Always shut OFF equipment when left unattended.
• Never operate or work around equipment if under the influence of alcohol, drugs or medications.

![Figure 1](image)

- Always use the safety link whenever transporting or performing work on the vehicle. Closing the safety link will prevent unexpected movement of the articulation joint.

WARNING:

- Batteries give off flammable fumes that can explode resulting in personal injury.
- Electrolyte is an acid and can cause personal injury if it contacts skin or eyes.

PRE-START-UP SAFETY

• Install any covers or guards which may have been removed for shipping purposes or maintenance.
• Before starting equipment, walk around equipment, making a visual inspection that all safety devices are properly installed and secured.
• Check that all hardware, fasteners, hydraulic fittings, etc. are in good condition and properly fastened. Replace any fatigued or damaged items with proper replacements.
• Personnel who are not required to be in the work area should be kept away. Never start the equipment unless you are absolutely certain that everyone in the area is clear of the machine and aware it is being started.
• Follow the manufacturer’s recommended start-up procedure.

PRESSURIZED SYSTEMS SAFETY

• Do not disassemble a pressurized system unless properly trained and equipped with adequate tooling.
• Familiarize yourself with the proper method of relieving pressure from pneumatic or hydraulic systems. Never perform maintenance on, or disassemble, pressurized systems without first locking out power to these systems and then relieving pressure to them.
• Oils and fluids can be very hot under pressure. Use caution and allow the system to cool before beginning maintenance work.
• Never operate or pressurize one of these systems with worn or damaged components. Replace hoses, fittings, valves or other components which appear defective.
• Never adjust pressurized systems beyond recommended levels to achieve higher operating pressures.
THE MANUAL

It is the purpose of this manual to provide complete instructions for the operation of the M-B Multi-Service Vehicle.

Directional Reference
All reference to left, right, front, or rear are given from the operator in the operator position and facing the direction of your unit.

REQUIRED OPERATOR TRAINING

Original purchaser of this unit was instructed by the seller on safe and proper operation. If unit is to be used by someone other than original purchaser; loaned, rented or sold, ALWAYS provide this manual and any needed safety training before operation.

The Operator Must Understand:
• How to operate all controls
• The functions of all controls
• How to STOP in an Emergency
• Speed Ranges

WORK AREA

• ALWAYS check overhead and side clearances carefully before operation. ALWAYS be aware of traffic when operating along streets and curbs.
• Keep area of operation clear. Stay alert for hidden hazards.
• DO NOT run engine in an enclosed area. Always provide good ventilation.
• Abnormal Vibrations are a warning of trouble. Striking a foreign object can damage unit. Stop unit and engine. Wait for all moving parts to stop. Inspect unit and make any necessary repairs before restart.
• Protect eyes, face, and head from objects that may be thrown from unit. Wear appropriate hearing protection.
• Avoid Sharp Edges. Sharp edges can cause serious injury. Wear gloves to service unit when handling sharp edges.
• ALWAYS keep hands and feet away from all moving parts during operation. Moving parts can cause serious injury or death.
• Be aware of the surroundings. Look for blind spots from which pedestrians or vehicles may suddenly appear.
• Locate the emergency stop on the vehicle.
• Do not operate in crowded pedestrian areas. This equipment may cause serious injury or death if safety rules are not followed.

• The M-B Multiple Service Vehicle (M-B MSV) uses a level gauge. The gauge helps the operator determine the angle or slope of the surface being driven on. The gauge shows percent of grade.

<table>
<thead>
<tr>
<th>WARNING:</th>
</tr>
</thead>
<tbody>
<tr>
<td>During normal operation the M-B MSV must not exceed 30% grade to either side. Adding any attachment to the M-B MSV will affect the safe maximum grade.</td>
</tr>
</tbody>
</table>

![Figure 2](image)

MAINTENANCE SAFETY

• Do not remove guards while operating. After maintenance work, be sure all guards and other safety devices are installed and in proper working order.
• Never clean, lubricate, or adjust equipment while it is moving, has the potential to move or when engine is running.
• Always release pressure from pressurized systems before disassembling.
• Allow ample time for heated components to cool before working on or working close to them. Use temperature sticks or other appropriate devices to test temperatures.
• ALWAYS maintain unit in safe operation condition.
• Check the conditions of the unit at the end of each day and repair any damage or defects.
• Keep all fasteners properly torqued and in safe operating condition.
• Before maintenance, adjustments, or service (except where specifically recommended), shut off engine, and secure from moving.

Storage
ALWAYS clean and lubricate equipment before extended storage. Disconnect the battery cables. Clean and lubricate equipment every 6 months during prolonged storage.
INTRODUCTION
Thank you for choosing M-B Companies, Inc. as your equipment manufacturer and supplier. As part of our commitment to total customer satisfaction, we have strived to ensure that the information contained within this manual is complete and representative of the equipment you have purchased. The manual cannot, however, anticipate every possible contingency to be met in the installation, operation and maintenance for your equipment. If you require additional information not included in this manual, please contact our Service Department at:

Customer Service Department
c/o M-B Companies, Inc.
1615 Wisconsin Ave.
PO Box 200
New Holstein, WI  53061
Phone: 1-888-558-5801 or 1-800-558-5800
Fax: 920-898-4588

MACHINE IDENTIFICATION
Each machine manufactured by M-B Companies, Inc. has an identification plate mounted to it as shown in Figure 3. This plate contains the serial number of your M-B equipment. Copy the information from the plate on your equipment into the appropriate space in Figure 3. This information is important to have available when communicating with M-B.

CUSTOMER SERVICE
The serial number on your equipment is essential for proper service support. When contacting M-B Companies regarding service support, always provide the product serial number. This number is located on the identification plate mounted on your equipment, and should also have been recorded in the Machine Identification section.

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Ballast Calculations

Adding Attachments will affect the stability, performance, characteristics, and reduces safe operating grades.

- Never exceed the max rating of the weakest component: GVWR, max axle ratings, or tire capacity.
- Never operate with less than 25% of the total load on the front axle.
- All calculations should be verified by weighing the MSV with the attachments on a certified scale.
- Attachments such as sanders and sprayers should be checked when filled with desired particulate.
- A scale must be used to determine axle weights when using a dump body.
- Ballast Types include: Fluid filled tires, wheel weights, or another attachment.

NOTE: All weights in pounds; all dimensions in inches.

CW = Curb Weight for MSV-100501; 6620 lbs, Front-2140 lbs, Rear-4480 lbs
TW = FA + RA including attachments and or ballast.
WB = Wheel Base; 81in for MSV
TFA = Total Front Axle Weight
TRA = Total Rear Axle Weight
CgF = Weight at the center of gravity of front attachment or ballast
CgR = Weight at the center of gravity of rear attachment or ballast
FA = Front Axle
RA = Rear Axle
dF = dimension from center of front axle to Center of gravity on front attachment or ballast
dR = dimension from center of rear axle to Center of gravity on rear attachment or ballast

\[
TFA = \frac{[CgF \times (dF + WB) + (2140 \times WB) - (CgR \times dR)]}{WB}
\]

\[
TW = FA + RA
\]

\[
TRA = TW - TFA
\]

If unsure of calculations, contact M-B Customer Support 1-800-558-5800
INTRODUCTION
This section provides information that is specific to the M-B MSV. Each sub-section describes a component or system to give the reader a reasonable understanding of the topic. If a more in-depth knowledge is needed, contact M-B Companies Customer Support.
INTRODUCTION
This section of the manual describes the function of the controls typically provided with the MSV. Because of the unique and complex nature of this equipment, this document may not be an exact representation of the controls on your equipment.

Controls which are not part of the standard or optional M-B controls package, but which are unique to an individual attachment may not be listed. Separate manuals are created for attachments.

M-B Companies Inc. reserves the right to modify the function or location of the operator controls. Please call our Customer Service Department before operating the machinery if you have any questions regarding the controls on your MSV.

OPERATOR CAB CONTROLS
The operator cab has several controls that are used to operate the M-B MSV. This section details the controls that the operator uses to provide comfort and safety. The joystick and the Plus+1® interface are described in another section.

Operator Seat
The seat is cushioned by an airbag that absorbs bumps and vibration. The firmness of the cushion is adjusted using a knob located at the front of the seat and below the operators legs (Figure 4).

With the engine running, the firmness is adjusted by rotating the knob up for firmer or down for less firm. When the engine is off rotating the knob down releases air.

Two levers on the side of the seat control forward/back and seat back position.

Move the front lever to release the seat and move the seat to the new position. Release the lever to lock.

Lift the rear lever to release the seat back. Reposition the seat back and release the lever to lock.

The cab also has a cup holder, document storage compartments and a flip down armrest (Figure 5).

Air Vents
There are several air vents throughout the cab. The vents can be rotated and the blades move to direct airflow (Figure 6).
Sunroof
The sunroof can be opened by flipping the rear latch and pushing up on the back half of the window (Figure 7).

Figure 7
The window can be removed completely. The two front latches are opened by pulling down on the center piece (Figure 8).

Figure 8
Open the rear latch. Pull down sharply on the end attached to the roof. The latch will pull free from the connection leaving the post (Figure 9).

Figure 9
Remove the window and store in a safe place.

To replace the window, position it on top of the opening seal.

CAUTION:
The seal must be in proper location or it will leak.

Move the latches into position. Secure the front two by snapping the levers into the hinge point. The rear latch should be positioned so the open clip is over the post. Then push that end onto the post.

Open the window and inspect the seal. The front edge of the window must lay flat on the seal (Figure 10).

Figure 10
With the window open the seal can be pulled into position.
STEERING COLUMN
Several controls are located on the steering column. The left side has controls for; windshield squirter, horn, wiper, headlight high beams and the steering wheel tilt (Figure 11). The right side and the top end of the column have controls for; fan, keyswitch, lights, hazard lights and air conditioning (Figure 11).

Key Switch
Very similar to an automotive key switch, there are three positions; OFF, ON, and START. When the key switch is OFF, all vehicle functions except the horn are off. After the engine is started the keyswitch releases to ON (run).

**IMPORTANT:** The engine will not start unless Plus+1® is ready. Turn the key to ON and wait for Plus+1® to start up (approximately 15 seconds). If the key is turned to START before Plus+1® is ready, the key must be reset. Turn the key to OFF, wait 5 seconds, then back to ON. When Plus+1® is ready the engine preheater will be ready. The engine can then be started.

To start the engine the operator must be in the seat and the seat belt must be fastened. The Plus+1® must be showing the main operating screen.

Windshield Squirter
The ring at the end of the lever activates the windshield squirter. Press in on the ring. Washer fluid will be pumped as long as the ring is pressed. The wipers will start moving then stop when the ring is pressed. See Figure 11.

Horn
The horn will work regardless of the key switch position. Press in on the button at the end of the lever. See Figure 11.

Wiper
Rotating the barrel of the lever will activate the wipers. From the off position rotate the barrel up (clockwise) one notch for low speed. Rotate two notches for high speed wipers. Rotate the barrel down (counterclockwise) for intermittent wipers. See Figure 11.

Headlight High Beams
When the headlights are on, push down on the lever to change between low and high beam settings. See Figure 11.

Fan
The fan pulls air through the filter cartridge and into the cab. Rotating vents distribute the air. The switch has four positions; OFF, LOW, MEDIUM, and HIGH. See Figure 11.
Steering Column Tilt/Telescope
The steering column can be tilted and telescoped toward or away from the operator. Hold the steering wheel with one hand. Move the lever to unlock. Tilt or telescope the steering column to a comfortable position. Release the lever to lock the column in the new position. See Figure 11.

Switches
There are switches for the exterior lights, hazard flashers and air conditioning. These rocker switches are located at the top of the steering column. See Figure 11.

- Air Conditioning - On/Off
- Hazard Flashers - On/Off
  When the lights are flashing, the turn signal arrows on the Plus+1® display will flash.
- Exterior Lights - Off/Running/Headlights
  When the switch is moved to a position it will stay until it is pushed again.

RADIO CONSOLE
The radio is on the right side of the steering column. Another feature is a 12 volt 10 amp power point socket. It is similar to an automotive outlet where accessories can be plugged in. See Figure 12.

CIRCUIT BREAKERS
Located under the right armrest are push-to-reset circuit breakers (Figure 13).
If a circuit breaker trips or trips repeatedly, maintenance personnel should be notified. A circuit breaker that needs to be reset more than once is an indication of an electrical problem that requires repair.

HEATER BYPASS
In front of the joystick is an adjustment for bypassing the heater. When this knob is rotated the temperature of incoming air is raised or lowered. Opening the valve increases heat.

IMPORTANT: This adjustment should be closed when the air conditioning is on.

Figure 13
Figure 14
Open Screen

Quality You Can See. People You Can Trust

Disp VERS: 0  MC24 VERS: 0
MC50 VERS: 0  SC50 VERS: 0  MC30 VERS: 0
### Main Menu Screen

<table>
<thead>
<tr>
<th>Button</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Access Transport Mode (Refer to Page 19)</td>
</tr>
<tr>
<td>2</td>
<td>Access Work Mode (Refer to Page 21)</td>
</tr>
<tr>
<td>3</td>
<td>Access Joystick Setup (Refer to Page 23)</td>
</tr>
<tr>
<td>4</td>
<td>Access Front Inputs, Outputs, and MVEC Status Screens - Use Up and Down arrows to access each section (Refer to Pages 24-26)</td>
</tr>
<tr>
<td>5</td>
<td>Access Calibration Screen (Refer to Page 27)</td>
</tr>
<tr>
<td>6</td>
<td>Access Attachment Selection Screen (Refer to Pages 28-29)</td>
</tr>
<tr>
<td>7</td>
<td>Access Password Screen - If showing “PW OK” Password access has be granted (Refer to Page 30)</td>
</tr>
<tr>
<td>8</td>
<td>Access Rear Inputs, Outputs, and MVEC Status Screens - Use Up and Down arrows to access each section (Refer to Page 31-33)</td>
</tr>
<tr>
<td></td>
<td>Up and Down arrow keys will cycle through the screen functions as well.</td>
</tr>
<tr>
<td>Button</td>
<td>Function</td>
</tr>
<tr>
<td>--------</td>
<td>----------</td>
</tr>
<tr>
<td>2</td>
<td>Turns on cruise control function of MSV. To engage cruise control press “OK”. To disengage press brake pedal or “OK” button again. To return to foot pedal throttle (FP Throttle) arrow down. Pressing okay will activate joystick throttle control.</td>
</tr>
<tr>
<td>3</td>
<td>Actives low speed, pressing again will return to high speed mode</td>
</tr>
<tr>
<td>4</td>
<td>Access to faults screens (Refer to page #)</td>
</tr>
<tr>
<td>5</td>
<td>Brings MSV to idle. Pressing again brings MSV back to last RPM level</td>
</tr>
<tr>
<td>6</td>
<td>Access to work screen mode – may have to reduce speed</td>
</tr>
<tr>
<td>7</td>
<td>NOT USED</td>
</tr>
<tr>
<td>8</td>
<td>Returns to Main Menu</td>
</tr>
<tr>
<td></td>
<td>Activates beacon light controls. Pressing “OK” turn on/off beacon light. Arrow down again to access rear work light controls. Pressing “OK” will turn on/off the rear work lights, if equipped.</td>
</tr>
</tbody>
</table>

Icons in uppers left corner of screen will light up red when a warning has occurred. A beep will occur every minute when a warning light is illuminated.
Transport Screen Icons

- Left Signal Indicator
- Right Signal Indicator
- Vehicle Drive Status
- Headlight High Beam Indicator
- Hour Meter
- Alarms Display
- Coolant Low
- Engine RPM
- Vehicle Speed
- Glow Plugs
- Main Menu
- Cruise
- Foot Pedal Throttle
- Hi/Low Range Selection
- Lights - select to turn on
- Indicates when in High Speed
- Quick Stop - Quick Idle
- Vehicle Ground Drive
- Operator is present
- Low Fuel Warning
- High Engine Temperature
- Service Hydraulic Filter
- Oil Pressure Warning
- Low Battery Voltage
- High Hydraulic Oil Temperature
- Parking Break Engaged
- Seat Belt
- Engine Fault
- System Faults
- System receiving signal from engine ECM
- Fuel Gauge
- Engine Coolant Guage
- Engine Oil Gauge
- Low Battery Gauge
- Hydraulic Oil
- Current horsepower load being used by engine
### Work Mode Screen

<table>
<thead>
<tr>
<th>Button</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Press to select creep mode, press “OK” to engage creep mode. Utilize creep mode to connect attachments. Press again to select diff lock mode, press “OK” to engage. Diff lock is used to reduce wheel slippage, use only under 7 MPH.</td>
<td></td>
</tr>
<tr>
<td>Turns on cruise control function of MSV. To engage cruise control press “OK”. To disengage press brake pedal or “OK” button again. Press again to activate foot pedal throttle, press “OK” to engage</td>
<td></td>
</tr>
<tr>
<td>Energizes PTO icon. Press “OK” to activate PTO icon. MSV must be under 1200 RPM to activate</td>
<td></td>
</tr>
<tr>
<td>Access to faults screens (Refer to pages 35-36)</td>
<td></td>
</tr>
<tr>
<td>Brings MSV to idle. Turns off any attachment. Pressing again will return MSV to previous RPM and turn back on the attachments that were previously on.</td>
<td></td>
</tr>
<tr>
<td>Access to transportation screen mode</td>
<td></td>
</tr>
<tr>
<td>Access to weight transfer setup screen. Must have weight transfer function selected. (Refer to page 34)</td>
<td></td>
</tr>
<tr>
<td>Returns to Main Menu</td>
<td></td>
</tr>
<tr>
<td>Activates beacon light controls. Pressing “OK” turn on/off beacon light. Arrow down against to access rear work light controls. Pressing “OK” will turn on/off the rear work lights, if equipped. Arrow down again to active weight transfer function (Refer to page 34)</td>
<td></td>
</tr>
</tbody>
</table>
# Work Screen Icons

<table>
<thead>
<tr>
<th>Icon</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="images/run.png" alt="Run" /></td>
<td>Quick Stop - Quick Idle</td>
</tr>
<tr>
<td><img src="images/trans_mode.png" alt="Trans Mode" /></td>
<td>Vehicle Ground Drive</td>
</tr>
<tr>
<td><img src="images/reduce_speed.png" alt="Reduce Speed" /></td>
<td>Speed too high. Switch to Work Mode. Must stop to switch modes.</td>
</tr>
<tr>
<td><img src="images/coolant_low.png" alt="Coolant Low" /></td>
<td>Spray/Spreader on (green) Speader Speed 0-6</td>
</tr>
<tr>
<td><img src="images/seat_belt.png" alt="Seat Belt" /></td>
<td>Setup Weight Transfer</td>
</tr>
<tr>
<td><img src="images/weight_transfer_setup.png" alt="Weight Transfer Setup" /></td>
<td>Aux 3A on (green)</td>
</tr>
<tr>
<td><img src="images/float.png" alt="Float" /></td>
<td>Hitch in Float Mode (green)</td>
</tr>
<tr>
<td><img src="images/load.png" alt="Load" /></td>
<td>Voltage</td>
</tr>
<tr>
<td><img src="images/engine_rpm.png" alt="Engine RPM" /></td>
<td>Fuel Level</td>
</tr>
<tr>
<td><img src="images/vehicle_speed.png" alt="Vehicle Speed" /></td>
<td>Main Menu</td>
</tr>
<tr>
<td><img src="images/creep.png" alt="Creep" /></td>
<td>Pressure level to ground drive</td>
</tr>
<tr>
<td><img src="images/diff_lock.png" alt="Diff Lock" /></td>
<td>Lights - select to turn on (green)</td>
</tr>
<tr>
<td><img src="images/cruise.png" alt="Cruise" /></td>
<td>Weight Transfer engaged (green)</td>
</tr>
<tr>
<td><img src="images/foot_pedal_throttle.png" alt="Foot Pedal Throttle" /></td>
<td>Function being operated by joystick</td>
</tr>
<tr>
<td><img src="images/pto_rpm.png" alt="PTO RPM" /></td>
<td>Current front and rear attachment selection</td>
</tr>
</tbody>
</table>
Joystick Setup Screen

<table>
<thead>
<tr>
<th>Button</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Returns to Main Menu</td>
</tr>
<tr>
<td>☀️</td>
<td>Cycle through each function. Press “OK” to select function. Press up/down again to place the position of the function. Function must not be active on other selections. Place NA on the functions you do not want to use. Functions 3, 4, 5 and 6 cannot be moved.</td>
</tr>
</tbody>
</table>

The numbers on the left side of each function are the default numbers. Place the number in the right to set back factory default. Functions 19, 20, and 21 are bonus functions that must be assigned an unused number.
Front Input Screen

<table>
<thead>
<tr>
<th>Button</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Returns to Main Menu</td>
</tr>
<tr>
<td>4</td>
<td>Press to highlight Front Inputs</td>
</tr>
<tr>
<td></td>
<td>Cycle through Front Inputs, Outputs and MVEC</td>
</tr>
<tr>
<td></td>
<td>Press to access highlighted option</td>
</tr>
</tbody>
</table>

Displays the status of the front inputs.
Front Output Screen

Displays the status of the front outputs and what voltage or current it is modulating.

<table>
<thead>
<tr>
<th>Button</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Returns to Main Menu</td>
</tr>
<tr>
<td>4</td>
<td>Press to highlight Front Inputs</td>
</tr>
<tr>
<td></td>
<td>Cycle through Front Inputs, Outputs and MVEC</td>
</tr>
<tr>
<td>OK</td>
<td>Press to access highlighted option</td>
</tr>
</tbody>
</table>

Displays the status of the front outputs and what voltage or current it is modulating.
### Front MVEC Screen

![Front MVEC Screen](image)

<table>
<thead>
<tr>
<th>Button</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Returns to Main Menu</td>
</tr>
<tr>
<td>4</td>
<td>Press to highlight Front Inputs</td>
</tr>
<tr>
<td>📅📅</td>
<td>Cycle through Front Inputs, Outputs and MVEC</td>
</tr>
<tr>
<td>OK</td>
<td>Press to access highlighted option</td>
</tr>
</tbody>
</table>

Displays the status of the front MVEC.
## Button Function

<table>
<thead>
<tr>
<th>Button</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Resets foot pedal settings. Allows you to recalibrate foot pedal</td>
</tr>
<tr>
<td>2</td>
<td>Resets hydraulic filter notice</td>
</tr>
<tr>
<td>3</td>
<td>Cycles between slow, medium and high ground drive ramping</td>
</tr>
<tr>
<td>4</td>
<td>Cycles between slow, medium and high ground drive ramping</td>
</tr>
<tr>
<td>5</td>
<td>Resets steering cylinders</td>
</tr>
<tr>
<td>8</td>
<td>Returns to Main Menu</td>
</tr>
<tr>
<td>🏆</td>
<td>Change screen brightness</td>
</tr>
<tr>
<td>🚧</td>
<td>Change tire size</td>
</tr>
</tbody>
</table>
### Attachment Selection Screen

**Button Function**

<table>
<thead>
<tr>
<th>Button</th>
<th>Function</th>
</tr>
</thead>
</table>
| 1      | Front attachment selection  
Arrow up/down to cycle through attachments. Press and hold “OK” for three seconds to select attachment |
| 2      | Press and hold to reset front attachment |
| 3      | Rear attachments selection  
Arrow up/down to cycle through attachments. Press and hold “OK” for three seconds to select attachment |
| 4      | Press and hold to reset rear attachment |
| 5      | Access attachment setup screen. This function is only accessible with password clearance from the main menu screen. |
| 6      | Returns to Main Menu |

Each selection illuminate in red when a fault is registered.
Once you have your attachment selected on the attachment selection screen you can access the attachment setup screen only with password clearance from the main menu screen.
Password Screen

<table>
<thead>
<tr>
<th>Button</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>#1</td>
</tr>
<tr>
<td>2</td>
<td>#2</td>
</tr>
<tr>
<td>3</td>
<td>#3</td>
</tr>
<tr>
<td>4</td>
<td>#4</td>
</tr>
<tr>
<td>5</td>
<td>#5</td>
</tr>
<tr>
<td>6</td>
<td>#6</td>
</tr>
<tr>
<td>7</td>
<td>#7</td>
</tr>
<tr>
<td>8</td>
<td>#8</td>
</tr>
<tr>
<td>9</td>
<td>#9</td>
</tr>
<tr>
<td>0</td>
<td>#0</td>
</tr>
<tr>
<td>OK</td>
<td>Submit Password</td>
</tr>
<tr>
<td>esc</td>
<td>Returns to Main Menu</td>
</tr>
</tbody>
</table>

Only accessible when password has been provided by M-B
### Rear Input Screen

The Rear Input Screen displays the status of the rear input and frequency.

<table>
<thead>
<tr>
<th>Button</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Returns to Main Menu</td>
</tr>
<tr>
<td>4</td>
<td>Press to highlight Rear Inputs</td>
</tr>
<tr>
<td></td>
<td>Cycle through Rear Inputs, Outputs and MVEC</td>
</tr>
<tr>
<td>OK</td>
<td>Press to access highlighted option</td>
</tr>
</tbody>
</table>

Displays the status of the rear input and frequency.
Rear Output Screen

<table>
<thead>
<tr>
<th>Button</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Returns to Main Menu</td>
</tr>
<tr>
<td>4</td>
<td>Press to highlight Rear Inputs</td>
</tr>
<tr>
<td>7</td>
<td>Cycle through Rear Inputs, Outputs and MVEC</td>
</tr>
<tr>
<td>OK</td>
<td>Press to access highlighted option</td>
</tr>
</tbody>
</table>

Displays the status of the rear output and frequency.
### Rear MVEC Screen

#### Rear MVEC Status

1. R1 AC Clutch Relay: On
2. R2 OEM Conn 3: On
3. R3 OEM Conn 4: On
4. R4 Backup Alarm Relay: On
5. R5 Optional Relay: On
6. R6 Rear Conn 2: On
7. R7 Rear Conn 3: On
8. R8 Engine Start Relay: On

#### Button Functions

<table>
<thead>
<tr>
<th>Button</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Returns to Main Menu</td>
</tr>
<tr>
<td>4</td>
<td>Press to highlight Rear Inputs</td>
</tr>
<tr>
<td>☐</td>
<td>Cycle through Rear Inputs, Outputs and MVEC</td>
</tr>
<tr>
<td>☐</td>
<td>Press to access highlighted option</td>
</tr>
</tbody>
</table>

Displays the status of the rear MVEC.
Weight Transfer Screen

<table>
<thead>
<tr>
<th>Button</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Reset weight transfer configuration by holding for two seconds</td>
</tr>
<tr>
<td>2</td>
<td>Save settings</td>
</tr>
<tr>
<td>3</td>
<td>Return to work mode screen</td>
</tr>
<tr>
<td>4</td>
<td>Decrease weight transfer</td>
</tr>
<tr>
<td>5</td>
<td>Increase weight transfer</td>
</tr>
</tbody>
</table>
## Faults Screen

### Button Function

<table>
<thead>
<tr>
<th>Button</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Access to Engine Faults</td>
</tr>
<tr>
<td>2</td>
<td>Access to Front MVEC Faults</td>
</tr>
<tr>
<td>3</td>
<td>Access to Front Control Faults</td>
</tr>
<tr>
<td>6</td>
<td>Access to Rear MVEC Faults</td>
</tr>
<tr>
<td>7</td>
<td>Access to Rear Control Faults</td>
</tr>
<tr>
<td>8</td>
<td>Access to Return to Main Menu</td>
</tr>
</tbody>
</table>
Faults Screens

Front MVEC Faults Screen
When highlighted in RED shows an active fault

Rear MVEC Faults Screen
When highlighted in RED shows an active fault

Front Control Faults Screen
When highlighted in RED shows an active fault

Rear Control Faults Screen
When highlighted in RED shows an active fault
The following examples apply once the initial attachment setup has been performed by M-B or a factory trained MSV dealer. This setup includes adjusting outputs to the optimum levels.

Selecting the Ribbon Snow Blower Attachment

Connect the Ribbon Snow Blower and the hydraulic hoses to the desired auxiliary hydraulics.

<table>
<thead>
<tr>
<th>Button</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Attachment Selection screen</td>
</tr>
</tbody>
</table>

Press and hold for two seconds to reset front attachment

Front attachment selection

Press two times to highlight MSV PTO Ribbon Blower

Press and hold for three seconds to set attachment

Return to Main Menu
Selecting the Ribbon Snow Blower attachment (continued)

<table>
<thead>
<tr>
<th>Button</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Enter Work Mode</td>
</tr>
</tbody>
</table>

Select PTO, Engine RPM must be below 1200 RPM to activate PTO.

Press “OK” to use PTO (engages Impeller), PTO RPM shows above PTO icon. Increase PTO RPM’s by increasing engine RPM’s.

User Defined

Press user defined button on joystick to turn on Aux 3A function to engage ribbon.

Increase engine RPM to desired speeds and begin using attachments.
The following examples apply once the initial attachment setup has been performed by M-B or a factory trained MSV dealer. This setup includes adjusting outputs to the optimum levels.

Selecting the Rear Spreader Attachment

Connect the Rear Spreader and the hydraulic hoses.

<table>
<thead>
<tr>
<th>Button</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Attachment Selection screen</td>
</tr>
<tr>
<td>6</td>
<td>Press and hold for two seconds to reset rear attachment</td>
</tr>
<tr>
<td>5</td>
<td>Rear attachment selection</td>
</tr>
<tr>
<td>5</td>
<td>Press three times to highlight MSV Spreader</td>
</tr>
<tr>
<td>8</td>
<td>Return to Main Menu</td>
</tr>
<tr>
<td>OK</td>
<td>Press and hold for three seconds to set attachment</td>
</tr>
</tbody>
</table>
Selecting the Rear Spreader Attachment (continued)

<table>
<thead>
<tr>
<th>Button</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Enter Work Mode</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Button</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>User Defined</td>
<td>Press user defined button to engage Aux 4A to turn on rear spreader.</td>
</tr>
</tbody>
</table>

Increase engine RPM to desired speeds and begin using attachments.
**Operation - Weight Transfer Example**

The following examples apply once the initial attachment setup has been performed by M-B or a factory trained MSV dealer. This setup includes adjusting outputs to the optimum levels.

### Initial set up of the Weight Transfer feature

After your attachments are connected and set up follow these steps. Steps need to be done when switching between attachments.

**Operation - Weight Transfer Example**

<table>
<thead>
<tr>
<th>Button</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Work mode screen</td>
</tr>
<tr>
<td></td>
<td>Arrow down three times</td>
</tr>
<tr>
<td>OK</td>
<td>Press “OK” to turn on Weight Transfer</td>
</tr>
<tr>
<td>7</td>
<td>Access Weight Transfer setup screen</td>
</tr>
</tbody>
</table>
Initial set up of the Weight Transfer feature (continued)

### Button Functions

<table>
<thead>
<tr>
<th>Button</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hold for two seconds to reset weight transfer</td>
</tr>
<tr>
<td>Joystick Forward</td>
<td>Push joystick forward to activate weight transfer</td>
</tr>
<tr>
<td>2</td>
<td>Press multiple times until attachment begins to raise</td>
</tr>
<tr>
<td>3</td>
<td>Press until attachment stops rising. This sets 100% of the attachment weight on the hitch.</td>
</tr>
<tr>
<td>2</td>
<td>Press to save settings</td>
</tr>
<tr>
<td>3</td>
<td>Return to Work Mode screen</td>
</tr>
</tbody>
</table>

**Decrease weight transfer (decreases weight on front wheels)**

**Increase weight transfer (increases weight on front wheels)**

Increase engine RPM to desired speeds and begin using attachments.
ADVANCED ENGINE DIAGNOSTICS

The engine has diagnostic information that can be viewed using the Plus+1® displays. The engine manufacturer provides a second level of diagnostic information. Refer to the engine documentation for hardware requirements and access to that level. The communication port is located below the right side arm rest (Figure 35).

JOYSTICK LAYOUT

The Joystick Layout screen is used to display all current joystick functions. Some functions will change depending on the Attachments selected. The layout shown results when None is selected in the Attachment Selection screen.

![Joystick Layout Diagram]

Figure 36
## PRE-START UP

**WARNING:**
Before performing any of the following inspections, make sure that the vehicle engine is shut down, the ignition key is removed, and all personnel in the work area are aware that the equipment is being inspected and must not be started.

Never check for hydraulic leaks by hand. Hydraulic fluid under pressure can penetrate skin.

- Inspect all hydraulic lines for evidence of leaking, loose fittings, and frayed or damaged hoses.
- Check hydraulic cylinders for broken or loose parts, especially cotter pins on the hydraulic cylinders.
- Check the hydraulic oil level. A sight gauge is located on the side of the reservoir for this purpose. Add fluid as necessary.
- All access doors are secured in place.
- Visually inspect for fluid leaks under the vehicle.
- Check engine fluids.
- Check for faults on screen.
- Inspect attachments for damage and proper connection.

## START-UP PROCEDURE

**Key Switch**
The key switch on the steering column is used to initialize Plus+1® controller and start the engine. The engine will not start until Plus+1® has booted up and the intake manifold heater has properly warmed.

To start the MSV the operator must be seated. Turn the key switch to the on position. Watch the screen of Plus+1®. After an M-B splash screen the start up screen will appear. Turn the key to start the engine.

**IMPORTANT:** The engine will not start unless Plus+1® is ready. Turn the key to ON and wait for Plus+1® to start up (approximately 15 seconds). If the key is turned to START before Plus+1® is ready, the key must be reset. Turn the key to OFF and back to ON. When Plus+1® is ready the engine preheater will be ready. The engine can then be started.

Trying to start the engine prior to the Startup screen appearing may cause delays. Engine will not crank until manifold heater is at starting temperature. Colder temps will cause delays.

1. Start the engine.
2. Use Plus+1® to determine if the correct attachments are configured in the controls.
3. With the engine idling, operate the attachments until the system warms up.
4. Return to the main screen for operation.

## COLD WEATHER STARTING

**Before Starting the Engine**

**NOTE:** Do not use a torch to heat a compartment. This causes fires, burns wiring, gaskets and seals, or melts protective plastic. When using canvas covers, do not install them near exhaust systems. This helps to prevent fires.

**Manually Sprayed Ether Starting Aids**

**DANGER:**
Do not use manually sprayed Ether starting aids. Using a spray type starting aid may cause the air intake to explode and cause personal injury.

**Intake Air Heater**
The engine has a grid heater in the air intake tube just before the intake manifold. This heater is controlled as needed by the engine electronics. Do not bypass or force the heater on.
AFTER STARTING ENGINE

Whenever a machine has been parked for a long period of time, some of the systems will cool to below normal operating temperatures. Always warm the machine systems before operating the machine at full operation. Damage to engine valve control components can result from engine operation for short intervals during operation in very cold weather conditions. If the engine is not allowed to warm completely, the engine can be damaged by repeated starting and stopping.

To avoid damage, always run the engine until the coolant temperature is at least 180°F (82°C).

After the engine is warm, warm up the other systems. Start with the hydraulics. Run the engine at less than one-third throttle, and slowly move the control lever to lift the attachment. Initially, lift the control lever for a few inches (centimeters). Lower the attachment slowly. Continue the sequence: raising, lowering, extending, and retracting. Extend the travel during each cycle. Perform this operation for all hydraulic circuits. Alternate between all of the attachments.

Exercise the transmission and the power train. If you cannot move the control for the transmission, perform the following steps:

• Engage the parking brake or apply the brake pedal.
• Run the engine slightly above LOW IDLE.
• Shift the transmission several times from FORWARD to REVERSE.

Release the brake. Move the equipment forward and backward for several feet (meters). Exercise the machine for several minutes.

To reduce the total warm up time, start exercising the entire machine before you complete the hydraulic warm up time.

Operate under light load until the systems reach normal operating temperatures.

If the engine temperature is not high enough enclose the engine and block the radiator. A thermostat that opens at a higher temperature will not increase the engine temperature if the engine is not under load.

To prevent seal damage and gasket damage, keep the engine crankcase breather pipe clear of blockage.

In extreme conditions, use a canvas over the engine compartment. Heat the engine area with a space heater. This will aid in starting the engine. Extending the canvas over the hydraulic components will provide initial warming of the components.

Multigrade lubricants (10W30) may be used successfully at ambient temperatures below the pour point of the oil. However, in order to use this oil, you must leave the engine running at low idle. This helps keep lubricants and compartments warm for the engine and for the transmission. Running the engine at low idle will not keep the hydraulic systems warm.

SAFETY LINK

The chassis for the MSV articulates or pivots in the middle. This is used to help maneuver the MSV and provides a smaller turning radius.

During maintenance it is advisable to lock-out the articulation of the chassis.

To lock the Chassis:
1. Pull straight ahead to align the chassis.
2. Locate the safety link on the frame behind the cab (Figure 37 Safety Link Open).
3. Pull out the removable pin (Figure 38).
4. Swing the link to meet the back half and insert the pin.

When the safety link is not in use, it should be stored against the front frame.
FRONT ATTACHMENT CONNECTIONS

Front Hitch Connections

IMPORTANT: For best performance each attachment must be setup by M-B or your authorized MSV dealer prior to use.

The attachment hitch has two hooks with hitch clamps. Up and down movement is supplied by two hydraulic cylinders. The hitch hooks will slide side-to-side to align with various attachments.

**CAUTION:**
If the attachment is not centered on the vehicle damage may occur. Keep the hitch hooks tightened in place. The hydraulic hoses must be kept clear from all interference points.

To connect an attachment:
1. Pull the MSV close to the attachment.
2. Adjust the hooks side-to-side as needed using the locking bolt on the back side. Pull the handle forward to open the clamp locks.
3. Drive the MSV forward with the hooks lowered. Putting the MSV in Creep Mode will assist in this.
4. The hooks should fit into the arms of the attachment. Lift the hitch in position so the hooks engage and lift the attachment.
5. Push the clamp locks back completely.
6. Insert the safety pins. Most attachments will have a top link as a third connecting point. This link is normally used to level the attachment.

Some attachments may be different. Review the instructions with each attachment. Hydraulic, PTO, and electrical connections may also be needed for proper attachment use.

Front Power Take Off (PTO)

The front attachment PTO is accessed thru a panel under the operators feet (Figure 40).

**WARNING:**
Turn the engine off before opening the access panel.

Remove the panel.

The drive spline is visible

**NOTE:** The spline (Figure 41) should have a coating of grease before attaching the PTO shaft.

The PTO shaft is inserted from the front of the MSV (Figure 42).

Line the universal joint up with the spline and push together. Make sure the locking device or universal joint has compressed in groove of PTO shaft (Figure 43).

---

M-B Multi-Service Vehicle
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Replace the access panel before starting the engine.

**Hydraulic Connections**

At the front of the MSV there are three pair of connections. Each pair has a line out and a line in. The connections are matched for each pair. Attachments are connected and Plus+1® controls are set to control the proper auxiliary ports. See Attachment Manual for proper connections. Also refer to Plus+1® Controls section in this manual.

- **Aux 1B** Quick Disconnect
- **Aux 1A** Quick Disconnect
- **Aux 2A** Quick Disconnect
- **Aux 3A** Quick Disconnect
- **Case Drain** Quick Disconnect
- **Electrical Plug**
- **Aux 2B** Quick Disconnect
- **Aux 3B** Quick Disconnect

**Rear Hydraulic Connections (Optional)**

The rear of the MSV may have two pair of optional hydraulic connections (Figure 45). Each pair has a line out and a line in. Attachments are connected and Plus+1® controls are set to control the proper auxiliary ports (See Plus+1®).

**NOTE:** Some attachments will require these connections to make them operational.

- **Aux 4A**
- **Aux 4B**
- **Aux 5A**
- **Aux 5B**

Figure 43

Figure 44

Figure 45
Preventative maintenance is a daily responsibility. The following charts provide a checklist of areas that should be inspected on a regular schedule.

## PREVENTATIVE MAINTENANCE

<table>
<thead>
<tr>
<th>Area</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>As Required</td>
</tr>
<tr>
<td>Inspect all hydraulic lines for evidence of leaking, loose fittings, and frayed or damaged hoses.</td>
<td>X</td>
</tr>
<tr>
<td>Check hydraulic cylinders for broken or loose parts, especially cotter pins on the hydraulic cylinders.</td>
<td>X</td>
</tr>
<tr>
<td>Check the hydraulic oil level. The Plus+1® will display an alarm if the level becomes low. A sight gauge is located on the side of the reservoir for this purpose. Add fluid as necessary.</td>
<td>X</td>
</tr>
<tr>
<td>Visually inspect that all access doors and panels are secured in place.</td>
<td>X</td>
</tr>
<tr>
<td>Visually inspect for leaks under the vehicle.</td>
<td>X</td>
</tr>
<tr>
<td>Check Plus+1® for any active alarms before operating vehicle. Service or repair as needed.</td>
<td>X</td>
</tr>
</tbody>
</table>

### Engine

<table>
<thead>
<tr>
<th>Task</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clean cooler intake.</td>
<td>X</td>
</tr>
<tr>
<td>Inspect fuel filters; replace as necessary.</td>
<td>X</td>
</tr>
<tr>
<td>Drain moisture from fuel/water separator.</td>
<td>X</td>
</tr>
<tr>
<td>Check engine oil.</td>
<td>X</td>
</tr>
<tr>
<td>Inspect air filter</td>
<td>X</td>
</tr>
</tbody>
</table>

### Hydraulic System

<table>
<thead>
<tr>
<th>Task</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check hydraulic fluid level; add fluid as required.</td>
<td>X</td>
</tr>
</tbody>
</table>

### Ground Drive

<table>
<thead>
<tr>
<th>Task</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check tire pressure.</td>
<td>X</td>
</tr>
<tr>
<td>Check connections for fluid leaks</td>
<td>X</td>
</tr>
</tbody>
</table>

### Electrical

<table>
<thead>
<tr>
<th>Task</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check battery terminals for corrosion.</td>
<td>X</td>
</tr>
<tr>
<td>Electrical guards in place.</td>
<td>X</td>
</tr>
<tr>
<td>Inspect vehicle for loose or damaged wires</td>
<td>X</td>
</tr>
</tbody>
</table>
Replacement Parts / Warranty

For a complete listing of replacement parts, refer to the Parts Manual 904-183260.

Manufacturer’s Limited Warranty

The M-B Companies, Inc. warrants all its M-B MSV products to be free from defects in materials and workmanship for 12 months, to begin with the delivery of said product to its original owner. This warranty is not transferable without the written consent of M-B.

M-B will, at its own expense and without expense to the owner, replace all failed parts for and make all repairs that may be required by reason of workmanship or material in any part of the assembly of the product and associated components.

Upon notice in writing, M-B will promptly repair or replace all defective or damaged items delivered under the contract. The batteries, tires, rubber materials, brushes and material normally consumed in operation, and major components such as engines, air compressors, and hydraulic pumps and motors are excluded from this warranty but shall, in any event, be guaranteed by M-B to the extent of any warranty received from its supplier.

Any components replaced under warranty will be warrantied for the remainder of the original warranty. Replaced components do not restart the warranty period.

If requested by M-B, products or parts for which a warranty claim is made are to be returned, transportation prepaid, to M-B’s factory. Any improper use, operation beyond capacity, or substitution of parts not approved by M-B, or alteration or repair by others in such a manner as in M-B’s judgement materially and/or adversely affects the product shall void this warranty.

This warranty does not apply to defects caused by damage or unreasonable use while in the possession of the owner, including but not limited to: failure to provide reasonable and necessary maintenance, normal wear, routine tune-ups or adjustments, improper handling or accidents, operation at speed or load conditions contrary to published specifications, improper or insufficient lubrication, or improper storage.

The M-B Companies, Inc. shall not be liable for consequential damages of any kind, including, but not limited to, consequential labor costs or transportation charges in connection with the replacement or repair of defective parts, or lost time or expense which may have accrued because of said defect.

THE M-B COMPANIES DO NOT MAKE ANY WARRANTY OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE. THE ONLY WARRANTY MADE BY M-B COMPANIES IS AS SET FORTH HEREIN. THIS WARRANTY CANNOT BE EXTENDED, BROADENED OR CHANGED EXCEPT IN WRITING BY AN AUTHORIZED OFFICER OF M-B COMPANIES, INC.

(M-B’s total liability hereunder in no event shall exceed the purchase price of the product.)
Machine upgrade Version 159
08/01/16
MACHINE CALIBRATION SCREEN 1

ADDED ODOMETER AND TRIP METER

TAKES YOU TO SECOND CALIBRATION SCREEN
ADJUST THE PERCENTAGE OF SPEED IN WORK MODE.
WE ADDED TWO LEVELS OF PROTECTION TO THE SCREENS
To get into the normal screens password is “501”
This will allow you to move through the screens to verify different settings and calibrations.
To make changes to the hydraulic flows the password “500” will have to be typed in after “501” was entered.
We also added a scrape function and ride control. Currently are working on these option and will be available in the fall as an option. The software has been installed for these upgrades.