

RISK & HAZARD MANAGEMENT

JLG Machine	20MVL	Safe Working	160	Max.	5.94	Max. Height	5.94
Type	10MSP	Load (kg)	160	Drive	3.05	(m)	3.05
	15MSP		230	Height (m)	4.65		4.65
	20MSP		160		5.92		5.92

INTRODUCTION/SCOPE

The aim of this report is to conduct an investigation into the hazards¹ and risks involved with the operation, maintenance, servicing, inspection, transportation and storage of the above plants². Our aim is to ensure people at work (and any other personnel) are protected against health and safety risks associated with the use of the plant detailed within this report. Possible hazards and risks are to be assessed with respect to use of the plant and control measures incorporated to maximise safety. For each identified risk the probability and consequences of occurrence are assessed and the control measures implemented to reduce this risk as far as practicable³. Additional measures taken to control risk are also listed. The following procedure will be used:

- 1. Identifying Hazards** - associated with the plant or 'systems of work'⁴
- 2. Risk and Hazard Likelihood** - The probability of a hazard occurring, and the probable consequence associated with that hazard occurring.
- 3. Controls implemented to reduce Hazards & Risks** - these include design and any other measures, which are put in place to reduce risks and hazards as far as practicable.

TABLE 1: RISK & HAZARD LIKELYHOOD

HAZARD	(A) Likelihood of Occurring	(B) Consequence of Occurring	RISK SCORE*
As listed in Table 2	(1) Rare (2) Very Low (3) Low (4) Moderate (5) High (6) Very High	(1) First Aid (2) Casualty (3) Hospitalisation (4) Disabled (5) Fatality (6) Numerous Fatalities	Risk Scores* are found by adding likelihood (A) & consequence (B) of occurrence together. Risk Scores range from 2-12

* The higher the risk score the larger the requirement for the hazard to be addressed and guarded against. Please see Table 1 for identification of hazard types checklist.

¹ A hazard is anything with potential to cause injury, illness or harm when the plant is operated, maintained, serviced, repaired, inspected, transported and stored.

² Plant in this case is defined as an MVL or MSP Series elevating work platform.

³ JLG considers that "reducing the risk as far as practicable" to be an undertaking of out duty of care in that we have addressed the potential to exposure to a risk during design and manufacture and have adhered to the required standards during this time. Any identified additional risks raised during this assessment have been addressed and eliminated for normal machine operation by trained personnel.

⁴ Systems of work describe all operating/maintenance procedures and in general systems used by workers in servicing, inspecting, transportation and storage

TABLE 2* - HAZARD TYPE CHECKLIST

A. CRUSHING ENTANGLEMENT CUTTING STABBING PUNCTURING SHEARING FRICTION STRIKING	-can anyone's hair, clothing, gloves, cleaning apparatus or any other materials become entangled in moving parts, or objects in motion. -crushing due to material falling from plant. -uncontrolled motion or unexpected movement of plant. -inadequate stopping devices of plant to control movement. -support structure collapse. -being thrown from or within plant. -cutting, stabbing & puncturing due to contact with sharp or flying objects. -parts of plant or worksite material disintegrating or falling. -movement of plant. -can anyone's body parts be sheared between moving parts or surfaces of the plant. -can anyone be burnt due to contact with moving parts or surfaces of the plant. -can anyone be struck by moving objects due to uncontrolled or unexpected movement of plant or workpieces.
B. ERGONOMIC SLIPPING TRIPPING FALLING	-can anyone be injured due to poorly designed seating or repetitive body movements. -constrained body posture or the need for excessive effort. -design inefficiency causing mental or psychological stress. -inadequate or poorly placed lighting of plant or workers. -lack of failsafe measures against human error. -mismatch of plant with natural human limitations.
C. HIGH PRESSURE FLUIDS. HIGH TEMPERATURES. FIRE/EXPLOSION.	-can anyone come into contact with fluids under high pressure, due to plant failure or misuse. -can anyone come into contact with objects at high temperatures, or objects which can cause fire or burning. -can anyone suffer illness due to exposure to high or low temperatures. -can anyone be injured by explosion of gases, vapours, liquids, dusts or other substances triggered by the operation of the plant or workpieces.
D. SUFFOCATION DROWNING	-can anyone be suffocated or drowned due to lack of oxygen, or atmospheric contamination.
E. ELECTRICAL	-can anyone be injured by electric shock due to the plant coming into contact with live conductors. -plant being too close to high tension power lines. -overload of electrical circuits. -electrical wiring or switch shorting. -lack of insulation against water contact shorting. -magnetic interference from workplace corrupting electrical components.
F. STABILITY	-can machine tip or roll over due to outriggers not extending. -outriggers failing mechanically, or retract unintentionally. -control valve or interlock failure. -set up on soft ground, unlevel or uneven ground, excessive slope. -driving on rough surfaces, over potholes, hitting fixed objects, excessive side loads e.g. wind.
G. HYDRAULIC FAILURE	-hydraulic system failure. -hose or cylinder failure.
H. STRUCTURAL FAILURE	-support structure failure due to fatigue, corrosion, or overloading. -pin, cable or linkage failure. -general overload: lifting excessive load, loading platform/ basket in an unintended way.
I. MAINTENANCE	-can anyone be injured while carrying out routine, preventative or corrective maintenance. -explosion due to welding spark etc. near charging battery -adjusting equipment for essential components faulty or seized. -guard removal.
J. TRANSPORT	-can anyone be injured due to machine instability while transporting. -plant or objects falling from transport truck.
K. OCCUPATIONAL HAZARDS	-plant obstructing other plants at site. -unauthorised use by untrained personnel. -unintended use of duplicate controls while working. -hearing loss or communication interference due to excessive noise. -safety signs or decals removed. -energy supply failure (chemical, electrical or mechanical).

* Table 2 is based upon N.Z Chamber of Manufacture hazard identification guide, & specifications from the Elevating Work Platform purchasing Specification and Operating Guide by the Electricity Association NSW - 1996, and pr EN280.

HAZARD TYPE	LOCATION/SCENARIO	RISK SCORE	CONTROL MEASURES TO REDUCE RISK
Crushing, collision, striking	Operating unit in an area where obstacles, other people and plant may be present.	3+3	Beacons and motion alarm are fitted to the plant to warn personnel in the vicinity of the plant. Section 1.3 of operator's manual contains instructions and guidelines for operating in these circumstances, under the heading "Crushing and Collision Hazards".
Crushing, striking	Underneath basket when basket is being lowered.	1+3	Beacons and motion alarm are fitted to the plant to warn personnel in the vicinity of the plant. Obstruction Sensing System (15MSP and 20MSP option) will stop the descent and give an audible and visual alarm if there is an obstruction under the platform when the platform is being lowered using the platform controls. Section 1.3 of operator's manual (under the heading "Crushing and Collision Hazards") says to warn personnel to keep clear of raised platform and to erect barricades if necessary.
Crushing, striking	Objects falling from platform	2+4	Raised periphery around bottom of platform. Section 1.3 of operator's manual (under the heading "Crushing and Collisions") says to warn personnel to keep clear of area beneath platform and to erect barricades if necessary. Section 1.3 also says that ground personnel must wear personnel protection equipment.
Crushing, shearing	In mast when retracting	1+4	Beacons and motion alarm are fitted to the plant to warn personnel in the vicinity of the plant. Lifting mechanism is of the mast type and retract along themselves which reduces the chance of crushing. Warning decals are placed on the plant.
Entanglement	In mast chain	1+4	Guards placed over sheaves. Tools are required in order to remove guards. Correct inspection and maintenance procedures are placed in manuals.
Entanglement	In drive system	2+3	Beacons and motion alarm are fitted to the plant to warn personnel in the vicinity of the plant. Drive motors covered.
Cutting, stabbing, puncturing.	General Operation	1+2	Controls and other contact surfaces such as handles have rounded edges. Guards used to cover moving parts.
Striking, crushing, collision	Sudden or unintended movements.	3+3	Emergency stop buttons are in place to halt movement in the case of an emergency. Controls return to neutral when released. Only one set of controls may be used at a time. Ground controls recessed. Enable switches only allow controls to activate when pressed. The power selector will only remain active for a preset number of minutes five minutes if a function is not operated. Braking is spring applied (electric release).
Falling	General operation	2+5	Guard rail provided around platform, lanyard attachment points provided, marked by decals. Platform gate self-closing. Safe operating procedures outlines in Section 1.3 of operator's manual, under the heading "Trip and Fall Hazards".
Slipping, tripping	Slipping or tripping when in platform	1+2	Non-slip platform floors. Section 1.2 of operator's manual says to keep platform floor free of debris, mud, oil, grease and other slippery substances. Control measures in place to prevent inadvertent movements (e.g. enable switches, recessed ground controls, only one set of controls may be used at a time).
Excessive effort	General operation	1+1	Controls are designed to operate with one hand and are either of joystick, toggle or button type. Non-assisted controls are minimised using electrical actuation. Where manual operation is required, operating effort is reduced as far as practical.

HAZARD TYPE	LOCATION/SCENARIO	RISK SCORE	CONTROL MEASURES TO REDUCE RISK
Operating stress	General operation	1+1	Control panels use pictures for functions and switches, which control direction and operate in that direction. Machines are field tested as part of the internal product development process. Handrails are provided around platforms for support during motion.
Lighting	General operation	1+1	This risk is job-site specific and should be evaluated by the end-user.
High Temperatures	Burns from contact with high temperature components	1+3	Hot surfaces are covered using guards or shrouds. Correct inspection and maintenance procedures are placed in the manuals. Regular maintenance in accordance with AS 2550.10 is required.
High Pressure	High pressure fluid jets	1+3	There are only two short hydraulic hoses and they are placed under cover. They have a bursting pressure which is several times the working pressure. Correct inspection and maintenance procedures are placed in the manuals. Regular maintenance in accordance with AS 2550.10 is required.
Electrical	Accidental electric shock from the electrical system	1+2	This EWP is not fitted with high voltage. System voltage is 24V DC. Those units fitted with 240V AC outlets have an earth leakage circuit breaker and wiring is in accordance to AS3000 as applicable. Correct inspection and maintenance procedures are placed in the manuals. Regular maintenance in accordance with AS 2550.10 is required.
Electrical	Loose wire shorts	1+2	Connectors used are either insulated crimp lugs or permanent type clamps. Wiring is protected against rubbing in exposed areas with flexible plastic sheathing.
Electrical	Working too close to power lines	4+6	Warning decals are placed on the machine. Safe operating procedures and allowable distance to power lines are placed in the manual.
Electrical	Electromagnetic interference	1+1	Design is sufficient for normal use.
Electrical	Water bridging	2+1	Wiring looms of control boxes are covered with water resistant covers. Looms are clamped together with ties to prevent vibration damage. Correct inspection and maintenance procedures are placed in the manuals. Regular maintenance in accordance with AS 2550.10 is required.
Electrical	Servo controller, motor failure	3+1	'Fail-safe' systems are used. In the advent of electrical failure a manual lowering system is installed on the machine.
Electrical	Battery charging	1+4	The plant incorporates a battery charger automatically stops charging when the battery has reached full charge. This reduces the risk of gas (hydrogen) build up. Warning decals are placed on machine. Safe charging procedures placed in the manual.
Stability	General operation	3+5	The plant is designed to meet EN 280 and AS 1418.10 for stability. In and out of service braking is spring applied (electrical release). A permanent type specification plate is permanently attached to the plant which shows S.W.L., maximum slope, maximum side force and wind speed etc.
Stability	Overloading the platform	3+5	Maximum safe working load and number of people is clearly marked on the machine and in the manual. Designed to meet EN280 and AS1418.10.
Stability	Excessive manual side force	3+5	Maximum allowable manual side force marked on machine. Designed to meet EN 280 and AS 1814.10.
Stability	Uneven, soft or sloping ground	3+5	15MSP, 20MVL/MSP Interlocks prevent drive and lift up without pothole protection system being deployed. 10MSP: Ground clearance < 48mm. All models: Tilt switches prevent drive and lift up when set-up on excessive slope. Maximum allowable slope marked on machine. Warning decals are placed on the machine.

HAZARD TYPE	LOCATION/SCENARIO	RISK SCORE	CONTROL MEASURES TO REDUCE RISK
Stability	Control valve or interlock failure	2+5	Interlocks are self-monitoring i.e. they are normally off/open so that in the event of malfunction, motion is prevented. Inspection and maintenance procedures are placed in the manuals and are to be done in accordance with AS2550.10-10.
Stability	Dynamic loading, travelling over rough surfaces	4+5	Drive and lift is cut when driven onto excessive slope. Travel speed is also limited when elevated. Braking is designed to hold the unit on it's maximum rated gradeability. 10MSP ground clearance < 48mm. A pothole protection system is fitted on other MSP's and MVL's to reduce the risk of overturning on uneven ground. Machine is designed to meet dynamic stability requirements of EN 280 and AS 1418.10. Warning decals are placed on the machine.
Hydraulic failure	General failure	3+2	Relief valve are used to prevent over pressurising the hydraulic system. The lift cylinder is automatically arrested and sustains the load when there is loss of power or failure of hydraulic lines. Inspection and maintenance procedures are placed in the manuals and are to be done in accordance with AS2550.10-10.
Structural failure	Failure due to fatigue	2+5	The plant has been cyclically tested against fatigue. Design calculations have been reviewed by a local independent engineer. Also rigorous stress analysis plus field-testing as part of product development process is used to ensure structural soundness. Regular inspection in accordance with AS2550.10.
Structural failure	Failure due to corrosion or wear	1+5	Corrosive surfaces are painted or plated, components subject to wear have provisions to minimise wear by using sacrificial components or lubrication. E.g. mast sections have wear pads, and chains are lubricated. Inspection and maintenance procedures are placed in the manuals and are to be done in accordance with AS2550.10.
Structural failure	Failure due to general overload (eg. from misuse)	3+5	A relief valves help limit the amount of overload placed on the system. Warning decals are placed on the machine to show safe working loads. Safe operating procedures are placed in the manual. Designed to meet EN280 and AS 1418.10 which require the machine to be structurally capable of taking 125% of the rated capacity.
Maintenance	Routine inspection or maintenance	2+3	Components that require regular maintenance, such as filters are placed in an easily accessible area. Inspection and maintenance procedures are placed in the manuals and are to be done in accordance with AS2550.10.
Maintenance	Adjusting equipment	2+2	Test pressure locations are provided for checking hydraulic system pressures. Adjusting points require tools to alter pressure settings.
Maintenance	Guard removal	3+3	Guarding is of a fixed permanent nature that can only be removed with tools. Maintenance only to be carried out by qualified personnel.
Transport	Objects falling from plant	4+2	Components are designed to withstand vibration. The platform floor has a raised periphery to prevent objects falling. Safe transportation procedures are placed in the manual. Decals are placed on the machine at lifting and tie down points.
Excessive noise	General operation	1+1	Motors have a shroud around them and are not considered to pose noise problems.
Various	Decal removal	4+5	Decals have permanent marking & fastening. Safety warnings are placed in manual.
Various	Use by unintended personnel	2+3	Control boxes have a removable key switch.

OTHER SAFETY RELATED INITIATIVES

Please Note: That the risk assessment compiled and attached is prepared in ADDITION to many other activities which have been undertaken by JLG to ensure the safety of the product. These include:

- JLG Industries (USA) perform computer simulation/modelling of product and internal design calculations.
- Independent design review by an independent engineer to local design requirements is completed in Australia.
- Field testing of prototype units to ensure faults and hazards are identified during product development.
- JLG Industries (Australia) offer training and maintenance courses to any interested companies. World class Operation & Safety, Service and Maintenance, and Illustrated Parts Manuals are available for all JLG machines.
- JLG Industries (Australia) support industry safety for operations and maintenance (being an EWPA member and an AS1418 & AS2550 Standards Association of Australia committee member).