RISK & HAZARD MANAGEMENT

JLG Machine Type	1230ES	Safe Working Load (kg)	230	Max. Drive Height (m)	3.66	Max. Height (m)	3.66

INTRODUCTION/SCOPE

The aim of this report is to conduct an investigation into the hazards[1] and risks involved with the operation, maintenance, servicing, inspection, transportation and storage of the above plant[2]. 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 maximize 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 practicable[3]. 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 2 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 a JLG model 1230ES 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 the design of seating or due to 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. -check valve or relief valve failure. -hose or cylinder failure - mechanical or fatigue.
H. STRUCTURAL FAILURE.	-boom or scissor arm 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 Chanber of Manufacture hazard identification guide, & specifications from the Elevating Work Platform purchasing Specification and Operating Guide by the Electiricity Association NSW - 1996, and pr EN280.

TABLE 3: 1230ES RISK ASSESSMENT AND CONTROL MEASURES

HAZARD NUMBER	HAZARD TYPE	LOCATION/SCENARIO	RISK SCORE	CONTROL MEASURES TO REDUCE RISK	NEW RISK SCORE
1	Crushing, collision/striking.	Operating unit in an area where obstacles, other people and plant may be present.	5+3	Beacon and motion alarm alert others in the area that the unit is in use. Horn also fitted. Section 1.3 of operator's manual contains instructions and guidelines for operating in these circumstances, under the heading "Crushing and Collisions".	3+3
2	Crushing, collision/striking.	Underneath platform when platform is being lowered.	3+3	Beacon alerts others in the area that the unit is in use. Motion alarm sounds when lift down is being operated. Decal warning of this hazard. Section 1.3 of operator's manual (under the heading "Crushing and Collisions") says to warn personnel to keep clear of raised platform and to erect barricades if necessary. Clearance maintained between platform and chassis when machine is stowed. The speed of the lift down function becomes slower as the platform gets lower.	1+3
3	Crushing, striking.	Objects falling from platform.	5+3	Kickboard around bottom of platform. Beacon alerts others in the area that the unit is in use. 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 head gear is to worn by ground personnel.	3+3
4	Entanglement.	Between wheels and frame.	3+3	Beacon and motion alarm alert others in the area that the unit is in use. Operator's manual says to keep non-operating personnel at least 1.8m away while driving.	1+3
5	Entanglement.	Between mast section when platform is being lowered.	2+3	This scenario will only occur when there are ground personnel near the machine while elevated and section 1.3 of the 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. Motion alarm to alert others in the area that the unit is in use. Lower mast sections do not move until the upper mast sections are fully retracted. The speed of the lift down function becomes slower as the platform gets lower.	1+3
6	Entanglement, friction, cutting.	High-speed components.	3+3	All high-speed components are enclosed. Maintenance to be carried out by qualified personnel.	1+3
7	Crushing, striking.	Sudden or unintended movements.	4+4	Enable switch provided on joystick to prevent inadvertent movement. Emergency stop buttons are in place to halt movement in the case of an emergency. Controls return to neutral when released. Brakes are spring applied electric release. Only one set of controls may be used at a time and they must be selected using a keyswitch. Ground controls recessed. Load holding valves fitted to cylinders. Decals indicate which way drive will function if control box is moved. Horn fitted.	1+4
8	Cutting, stabbing, puncturing.	General operation.	2+2	Controls and other contact surfaces have no sharp edges.	1+1
9	Falling.	Falling from platform.	2+5	Lanyard attachment points provided which are marked by decals. Top platform rail more than 950mm above the floor and a midrail is provided as per AS 1418.10. Gate is self-closing. Anti-skid tape fitted to platform floor.	2+3
10	Slipping, tripping.	Slipping or tripping within platform.	4+1	Anti-skid tape fitted to platform floor. Section 1.2 of operator's manual says to keep platform floor free of debris, mud, oil, grease and other slippery substances. Enable switch on joystick prevents inadvertent movements. Solid handrail to hold on to while operating the platform controls. Holes in floor facilitate drainage.	3+1

HAZARD NUMBER	HAZARD TYPE	LOCATION/SCENARIO	RISK SCORE	CONTROL MEASURES TO REDUCE RISK	NEW RISK SCORE
11	Excessive effort.	General operation.	2+1	Controls are designed to operate with one hand and are either of joystick, toggle or button type. Non-assisted controls are minimized using electrical actuation. Where controls are mechanical in nature operating effort is reduced as far as practicable.	1+1
12	Operating stress.	General operation.	2+1	Control panels use pictures for functions, and switches, which control direction operate in that direction. Plants are field tested for controllability and ease of use. Handrails are provided near control station for support during motion.	1+1
13	Lighting.	General operation.	3+1	Lighting requirements vary depending on the application and hence need to be accesses on a job-by job-basis. Manual says that visibility needs to be taken into account when determining travel speed.	1+1
14	High Temp Components.	Burns from coming in to contact with components.	3+3	High temperature components are positioned within covers. Lubrication schedule placed in service manual. Maintenance to be carried out by qualified personnel.	1+1
15	High Pressure Components.	High pressure fluid jets resulting puncturing the skin or eyes.	3+4	All hydraulic components are within the covers or inside the mast. The hydraulic hoses have bursting pressures well in excess of the working pressure. Maintenance to be carried out by qualified personnel. Relief valves are used to prevent over pressurizing the hydraulic system. Correct pressures listed in the service manual.	1+3
16	Suffocation.	Inhalation of gases.	-	No exhaust gases given off as machine is electric.	-
17	Electrical.	Electric shock from machines electrical system.	2+5	System voltage is 24 V DC. Those units fitted with 240 V AC outlets have an earth leakage circuit breaker and wiring is in accordance to AS3000 as applicable. Cables insulated & secured to plant. Cables are labelled. Major current carrying cables have protective rubber boots over connection points to prevent contact shorting during maintenance.	1+3
18	Electrical.	Loose wire shorts.	3+1	Connectors used are either insulated crimp lugs, locking plastic plugs, or permanent type clamps. Wiring is protected against rubbing in exposed areas with flexible sheathing.	2+1
19	Electrical.	Working too close to power lines.	4+6	Warning decals are placed on the machine. Operator's manual states that the machine is not insulated. Safe operating procedures and minimum approach distances are placed in the manual.	2+6
20	Electrical.	Electromagnetic interference.	1+1	Design is sufficient for normal use.	1+1
21	Electrical.	Water bridging.	3+1	Wiring looms of control boxes are covered with water resistant covers. Control cards for functions and flow control are encased in epoxy resin to prevent water damage. Machines are tested for water damage in the internal product development process. Service manual states conditions under which pressure washing may be carried out.	1+1
22	Stability.	Overloading the platform.	4+5	Maximum safe working load and number of people is clearly marked on the machine and in the manual. Designed to meet AS 1418.10 requirements.	2+5
23	Stability.	Unit is exposed to high-wind levels.	4+5	Machine is designed for non-wind use only and is marked accordingly. Manual also states the rated wind speed is 0 m/s.	1+5
24	Stability.	Excessive manual side forces.	4+5	Maximum allowable manual side force marked on machine. Designed to meet AS 1418.10.	2+5

HAZARD NUMBER	HAZARD TYPE	LOCATION/SCENARIO	RISK SCORE	CONTROL MEASURES TO REDUCE RISK	NEW RISK SCORE
25	Stability.	Uneven, soft or sloping ground.	4+5	Tilt switch provides an audible and visual alarm when above elevation on a slope exceeding the rated incline and lift-up and drive are disabled. Tested in excess of rated side slope (as required by AS 1418.10). Pothole protection system cuts drive when anything holds up the pothole protection bars. Manual says not to elevate the platform or drive with the platform elevated while on or near a sloping, uneven or soft ground. Decals instruct not to use the machine on sloping or uneven ground. Decals state the maximum load imposed by the tyres on the ground and the manual says to ensure that the ground conditions are adequate to support that load. Brakes designed to hold machine on maximum gradeability.	2+5
26	Stability.	Tyre puncture.	4+5	The 1230ES is fitted with solid tyres.	0
27	Stability.	Driving too fast when elevated.	4+5	Control system limits the travel speed when elevated.	1+5
28	Stability.	Machine driven into obstacle.	4+5	Machine designed to meet AS 1418.10 kerb test requirements.	1+5
29	Stability.	Other dynamic effects.	3+5	Dynamic load factors included in calculations and test loads as per AS 1418.10. Manual says machine must not be used as a crane (which could produce swinging loads). AS 2550.10 prohibits the use of this type of plant for lifting and supporting loads in any manner for which they are not specifically rated. AS 2550.10 prohibits travelling with freely suspended loads.	1+5
30	Stability.	Control valve or interlock failure.	3+5	Interlocks are self-monitoring i.e. they are normally off/open so that in the event of malfunction motion is prevented. Holding valves are installed to prevent decent due to hydraulic failure. Cut-outs are to be checked as part of the pre-start function check.	1+5
31	Hydraulic failure.	Excessive pressure build-up.	3+5	Relief valves are used to prevent over pressurizing the hydraulic system. Correct pressures listed in the service manual. Hydraulic hoses used have bursting pressures well in excess of the working pressure. Maintenance schedule provided in the manuals.	1+5
32	Hydraulic failure.	Pump or engine failure.	3+5	Holding valve on lift cylinder so mast will not collapse. Manual descent valve fitted to allow retrieval of platform personnel. Maintenance schedule provided in the manuals.	2+1
33	Structural failure.	Platform overload.	4+5	Design calculations independently reviewed to verify compliance to AS 1418.10. Overload tested at 1.25 x SWL as per AS 1418.10. Maximum safe working load is clearly marked on the machine and in the manual.	2+5
34	Structural failure.	Fatigue.	4+5	Testing and analysis carried out to ensure minimum design life is met. Maintenance schedule provided in the manuals. Maintenance to be carried out by qualified personnel.	1+5
35	Structural failure.	Wear and corrosion.	4+5	Corrosive surfaces are painted, components subject to wear have provisions to minimize wear by using sacrificial components or lubrication e.g. mast sections use wear pads along telescoping sections. Components which are not self-lubricating have grease nipples provided. Maintenance schedule provided in the manuals. Maintenance to be carried out by qualified personnel.	2+5
36	Structural failure.	General overload.	4+5	Relief valves prevent excessive loads being lifted by the platform. Tools are required to alter pressure settings. Test points are provided for checking of pressures.	2+5
37	Excessive effort.	Maintenance.	4+2	Batteries mounted on swing out trays for easy access. Removable cover allows easier access to other components. Correct maintenance procedures placed in the service manual.	3+2
38	Entanglement, friction, cutting.	Maintenance.	4+4	Guarding provided is a fixed permanent nature and can only be removed with tools. Correct maintenance procedures placed in the service manual.	2+4

HAZARD NUMBER	HAZARD TYPE	LOCATION/SCENARIO	RISK SCORE	CONTROL MEASURES TO REDUCE RISK	NEW RISK SCORE
39	Crushing, collision.	Machine falling of truck during transport.	3+6	Designated tie-down points are indicated by decals. Correct transport procedures in manual.	1+6
40	Crushing.	Lifting machine incorrectly.	4+5	Designated lifting points are indicated by decals. Correct lifting procedures in manual.	2+5
41	Noise.	General operation.	4+4	Machine is electrically powered and very quiet. Where noise is considered excessive, level testing may be carried out to AS1055.2/AS1269.	3+4
42	Various	Decal removal.	4+6	Decals have permanent type marking & weatherproof backing. Specification plate is stamped for longevity. Recommended inspections require that decals be checked for readability and are in place. Safety warnings are in manual.	1+6
43	Various	Manual lost or illegible.	4+6	Weatherproof storage container to keep manual protected and with the machine. Replacement copies available on request.	1+6
44	Various	Lack of maintenance.	4+5	Schedule placed in manual. Logbook in pouch fitted to the machine. Maintenance is to be carried out in accordance with AS 2550.10.	1+5
45	Various	Use by unintended personnel.	4+4	Unit is fitted with key switch.	1+4
46	Various	Machine malfunction due to static charge.	3+1	Static strap fitted to chassis.	1+1
47	Explosion/Fire	Battery charging	3+5	Decal warning of possible explosion/fire. Manual says that charging is only to be carried out in a well-ventilated area and that there is to be no sparks, flames, lit cigarettes, etc. in the vicinity.	1+5