

# RISK & HAZARD MANAGEMENT

|                         |        |                               |     |                              |          |                        |     |
|-------------------------|--------|-------------------------------|-----|------------------------------|----------|------------------------|-----|
| <b>JLG Machine Type</b> | 4108AN | <b>Safe Working Load (kg)</b> | N/A | <b>Max. Drive Height (m)</b> | No Drive | <b>Max. Height (m)</b> | 8.0 |
|-------------------------|--------|-------------------------------|-----|------------------------------|----------|------------------------|-----|

## INTRODUCTION/SCOPE

The aim of this report is to conduct an investigation into the hazards<sup>1</sup> and risks involved with the operation, maintenance, servicing, inspection, transportation and storage of the above plant<sup>2</sup>. 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<sup>3</sup>. The following procedure will be used:

- 1. Identifying Hazards** - associated with the plant or 'systems of work'<sup>4</sup>
- 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 LIKELIHOOD

| HAZARD               | (A) Likelihood of Occurring  | (B) Consequence of Occurring  | RISK SCORE*   |
|----------------------|--|---|---|
| As listed in Table 2 | (1) Rare<br>(2) Very Low<br>(3) Low<br>(4) Moderate<br>(5) High<br>(6) Very High | (1) First Aid<br>(2) Casualty<br>(3) Hospitalisation<br>(4) Disabled<br>(5) Fatality<br>(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.

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

<sup>2</sup> Plant in this case is defined as a JLG model 4108AN Lighting Tower.

<sup>3</sup> 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.

<sup>4</sup> 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**

|  |   |
|--|---|
| <b>A. CRUSHING.<br/>ENTANGLEMENT.<br/>CUTTING.<br/>STABBING.<br/>PUNCTURING.<br/>SHEARING.<br/>FRICTION.<br/>STRIKING.</b> | <ul style="list-style-type: none"> <li>-can anyone's hair, clothing, gloves, cleaning apparatus or any other materials become entangled in moving parts, or objects in motion.</li> <li>-crushing due to material falling from plant.</li> <li>-uncontrolled motion or unexpected movement of plant.</li> <li>-inadequate stopping devices of plant to control movement.</li> <li>-support structure collapse.</li> <li>-being thrown from or within plant.</li> <li>-cutting, stabbing &amp; puncturing due to contact with sharp or flying objects.</li> <li>-parts of plant or worksite material disintegrating or falling.</li> <li>-movement of plant.</li> <li>-can anyone's body parts be sheared between moving parts or surfaces of the plant.</li> <li>-can anyone be burnt due to contact with moving parts or surfaces of the plant.</li> <li>-can anyone be struck by moving objects due to uncontrolled or unexpected movement of plant or workpieces.</li> </ul> |
| <b>B. ERGONOMIC.<br/>SLIPPING.<br/>TRIPPING.<br/>FALLING.</b>  | <ul style="list-style-type: none"> <li>-can anyone be injured due to the design of seating or due to repetitive body movements.</li> <li>-constrained body posture or the need for excessive effort.</li> <li>-design inefficiency causing mental or psychological stress.</li> <li>-inadequate or poorly placed lighting of plant or workers.</li> <li>-lack of failsafe measures against human error.</li> <li>-mismatch of plant with natural human limitations.</li> </ul>  |
| <b>C. HIGH PRESSURE<br/>FLUIDS.<br/>HIGH<br/>TEMPERATURES.<br/>FIRE/EXPLOSION.</b>   | <ul style="list-style-type: none"> <li>-can anyone come into contact with fluids under high pressure, due to plant failure or misuse.</li> <li>-can anyone come into contact with objects at high temperatures, or objects which can cause fire or burning.</li> <li>-can anyone suffer illness due to exposure to high or low temperatures.</li> <li>-can anyone be injured by explosion of gases, vapours, liquids, dusts or other substances triggered by the operation of the plant or workpieces.</li> </ul>   |
| <b>D. SUFFOCATION.<br/>DROWNING.</b>   | <ul style="list-style-type: none"> <li>-can anyone be suffocated or drowned due to lack of oxygen, or atmospheric contamination.</li> </ul>   |
| <b>E. ELECTRICAL.</b>  | <ul style="list-style-type: none"> <li>-can anyone be injured by electric shock due to the plant coming into contact with live conductors.</li> <li>-plant being too close to high tension power lines.</li> <li>-overload of electrical circuits.</li> <li>-electrical wiring or switch shorting.</li> <li>-lack of insulation against water contact shorting.</li> <li>-magnetic interference from workplace corrupting electrical components.</li> </ul>   |
| <b>F. STABILITY.</b>   | <ul style="list-style-type: none"> <li>-can machine tip or roll over due to outriggers not extending.</li> <li>-outriggers failing mechanically, or retract unintentionally.</li> <li>-control valve or interlock failure.</li> <li>-set up on soft ground, unlevel or uneven ground, excessive slope.</li> <li>-driving on rough surfaces, over potholes, hitting fixed objects, excessive side loads e.g. wind.</li> </ul>  |
| <b>G. HYDRAULIC<br/>FAILURE.</b>   | <ul style="list-style-type: none"> <li>-hydraulic system failure.</li> <li>-check valve or relief valve failure.</li> <li>-hose or cylinder failure - mechanical or fatigue.</li> </ul>   |
| <b>H. STRUCTURAL<br/>FAILURE.</b>  | <ul style="list-style-type: none"> <li>-boom or scissor arm failure due to fatigue, corrosion, or overloading.</li> <li>-pin, cable or linkage failure.</li> <li>-general overload- lifting excessive load, loading platform/basket in an unintended way.</li> </ul>  |
| <b>I. MAINTENANCE.</b>   | <ul style="list-style-type: none"> <li>-can anyone be injured while carrying out routine, preventative or corrective maintenance.</li> <li>-explosion due to welding spark etc. near charging battery</li> <li>-adjusting equipment for essential components faulty or seized.</li> <li>-guard removal.</li> </ul>  |
| <b>J. TRANSPORT.</b>   | <ul style="list-style-type: none"> <li>-can anyone be injured due to machine instability while transporting.</li> <li>-plant or objects falling from transport truck.</li> </ul>  |
| <b>K. OCCUPATIONAL<br/>HAZARDS</b>   | <ul style="list-style-type: none"> <li>-plant obstructing other plants at site.</li> <li>-unauthorised use by untrained personnel.</li> <li>-unintended use of duplicate controls while working.</li> <li>-hearing loss or communication interference due to excessive noise.</li> <li>-safety signs or decals removed.</li> <li>-energy supply failure (chemical, electrical or mechanical).</li> </ul>  |

\* 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.

**TABLE 3: 4108AN 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. | 3+3        | Warning decals are placed on the plant, and safe operating procedures are placed in the operator's manual.  | 1+3            |
| 2             | Crushing, collision.            | Machine falling of forklift during transport.                                     | 3+6        | Designated forklift pockets located at the rear of the machine should be used. Correct forklifting procedures in manual.  | 1+6            |
| 3             | Crushing.                       | Lifting machine incorrectly.  | 4+5        | Designated lifting points are indicated by decals. Correct lifting procedures in manual.  | 2+5            |
| 4             | Crushing, shearing              | Moving parts of mast  | 3+3        | Crushing hazards have been marked with warning decals. Correct maintenance and operating procedures and safety instructions are placed in the service manual.   | 1+3            |
| 5             | Entanglement, friction, cutting | Maintenance   | 2+4        | Guarding provided is a fixed permanent nature and can only be removed with tools. Correct maintenance procedures placed in the service manual.  | 1+2            |
| 6             | Entanglement, friction, cutting | High-speed components   | 3+3        | All high-speed components are enclosed. Maintenance to be carried out by qualified personnel.   | 1+1            |
| 7             | Crushing, striking              | Sudden or unintended mast movements   | 3+4        | Mast rotation is not powered. An enable button is in place to prevent inadvertent movements of the mast. Correct inspection and maintenance procedures are placed in the service manual.  | 1+3            |
| 8             | Crushing, striking              | Sudden or unintended movements  | 3+4        | Machine does not have its own drive. Decal & manual instructs operator to apply brake. Manual states that the jockey wheel is not to be used as an outrigger and details correct mast usage procedure.  | 1+3            |
| 9             | Shearing, entanglement          | Between masts and frame   | 2+4        | Appropriate clearances maintained between members. Crushing hazard decals are clearly displayed on the machine. Warnings are placed in manual to prevent entanglement.  | 1+2            |
| 10            | Friction                        | Mechanical failure  | 2+1        | Operators are not subject to friction as there are no high-speed exposed components. Mechanical failure due to friction is reduced with self-lubricating bushes and rollers. Engine lubrication points are easily accessed via the lift-up side panel. Also, a lubrication schedule is provided along with oil/grease types to be used. | 1+1            |
| 11            | Cutting, stabbing, puncturing   | General operation   | 2+2        | Contact surfaces such as handles and doors have no sharp edges.   | 1+1            |
| 12            | Falling                         | General operation   | 2+5        | Operations are performed from the ground and so falling is not a problem. An emergency stop button is positioned at the ground controls. Correct inspection and maintenance procedures are placed in the service manual.  | 1+1            |
| 13            | Excessive effort                | General operation   | 2+1        | Controls are design to operate with one hand and are either of lever, toggle or button type. Non-assisted controls are minimised using electrical actuation. Where controls are mechanical in nature operating effort is reduced as far as practicable.   | 1+1            |
| 14            | Excessive effort                | General operation   | 2+2        | Jockey wheel fitted to reduce physical effort required should the plant need to be repositioned manually.   | 1+1            |
| 15            | Operating stress                | General operation   | 2+1        | Controls are simple levers, buttons and toggle switches. Functions of controls are clearly marked. Warning decals are used to warn of in correct operating procedures.  | 1+1            |

| HAZARD NUMBER | HAZARD TYPE               | LOCATION/SCENARIO   | RISK SCORE | CONTROL MEASURES TO REDUCE RISK   | NEW RISK SCORE |
|---------------|---------------------------|---|------------|---|----------------|
| 16            | High Temp Components.     | Burns from coming in to contact with components.                | 3+3        | High temperature components are positioned away from operator, on the opposite side of the machine from the controls. Exhaust outlet through roof of trailer. High-pressure hydraulic hoses are secured together with fasteners and in potential failure areas (tight radius bends) are covered in spiral wrap. Lubrication schedule placed in service manual. Maintenance to be carried out by qualified personnel. A fire extinguisher is provided inside trailer in case of emergency.   | 1+2            |
| 17            | High Pressure Components. | High pressure fluid jets resulting puncturing the skin or eyes. | 3+4        | 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            |
| 18            | Suffocation.              | Inhalation of gases.  | 2+1        | Exhaust gas is directed away from the operator. The size of machine prevents operation in confined spaces, therefore exhaust gas inhalation is not considered to pose a problem.  | 1+1            |
| 19            | Electrical.               | Electric shock from machines electrical system.                 | 2+5        | 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. Major current carrying cables are marked with standard colours and have protective rubber boots over connection points to prevent contact shorting during maintenance. Decal stating maximum voltage within the trailer. Correct inspection and maintenance procedures are placed in the manual including procedures for testing for AS3760. Manuals state that service and testing should only be carried out by trained personnel. | 1+3            |
| 20            | 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. Correct inspection and maintenance procedures are placed in the manual.   | 2+1            |
| 21            | Electrical.               | Working too close to power lines.                               | 4+6        | Electrical warning decals are placed on the machine. Warnings in manual and on decal, instructing operators' to contact relevant local authorities. Recommended safe operating procedures and minimum approach distances are placed in the manual.  | 3+3            |
| 22            | Electrical.               | Electromagnetic interference.                                   | 1+1        | Design is sufficient for normal use.  | 1+1            |
| 23            | Electrical.               | Water bridging.   | 3+1        | Looms tied together to prevent vibration damage. Enclosures have an ingress protection rating of IP65. Correct operating, inspection and maintenance procedures are placed in the manuals.  | 2+1            |
| 24            | Electrical                | Pump and motor failure  | 3+1        | Ground controls are in trailer to prevent damage from being hit inadvertently. Correct operating, inspection and maintenance are placed in the manuals.   | 1+1            |
| 25            | Stability.                | Unit is exposed to high-wind levels.                            | 4+5        | Designed to remain stable when subject to the nominated AS1170.2 wind loading. Correct set up procedures and wind rating stated in the operator's manual. Manual states that jockey wheel is not to be used as an outrigger.  | 1+5            |
| 26            | Stability.                | Outrigger failure   | 4+5        | Standard units are fitted with manually operated outriggers and as such are not subject to problems such as hydraulic failure. The jacks are rated to take the required load. Units with optional hydraulic outriggers have holding valves in case of hydraulic failure. Manual states that jockey wheel is not to be used as an outrigger. Decal instructs not to operate functions until the outriggers are down.   | 1+5            |
| 27            | Stability.                | Uneven, soft or sloping ground.                                 | 4+5        | Outriggers jacks and a bubble level gauge are provided to set the machine up level. Safe operating procedures are placed in the manuals.  | 2+5            |
| 28            | Stability.                | Travelling hazards  | 3+5        | Machine is towed to the required site then is stationary while in use. A permanent type specification plate is stamped with trailer weight, tyre specifications, maximum towing speed, etc.   | 2+4            |

| HAZARD NUMBER | HAZARD TYPE                      | LOCATION/SCENARIO                   | RISK SCORE | CONTROL MEASURES TO REDUCE RISK  | NEW RISK SCORE |
|---------------|----------------------------------|-------------------------------------|------------|--|----------------|
| 29            | Stability.                       | Control valve or interlock failure. | 3+5        | Holding valves are installed to prevent decent due to hydraulic failure. Correct operating, inspection and maintenance procedures are placed in the manuals.   | 1+5            |
| 30            | Hydraulic failure.               | Excessive pressure build-up.        | 3+5        | Relief valves are used to prevent over pressurizing the hydraulic system. Holding valves prevent unsafe descent in the advent of failure. Correct pressures listed in the service manual. Hydraulic components are tested at pressures well in excess of the system operating pressure. Maintenance procedures are placed in the manuals.  | 1+5            |
| 31            | Hydraulic failure.               | Pump or engine failure.             | 3+5        | Hydraulic components are tested at pressures well in excess of the system operating pressure. Maintenance schedule provided in the manuals.  | 2+1            |
| 32            | Structural failure.              | Failure due to wind                 | 4+5        | Designed to withstand the nominated AS1170.2 wind loading. Rigorous testing is used to ensure structural soundness before introduction to the workplace. (A certificate of structural integrity has been issued by an independent engineer, having carried out analysis to AS1170.2 and AS3990.)   | 2+5            |
| 33            | Structural failure.              | Fatigue.                            | 4+5        | Structural integrity verified by independent engineer. Correct operating, inspection and maintenance procedures (including a maintenance schedule) are placed in the manuals. Maintenance to be carried out by qualified personnel.  | 1+5            |
| 34            | 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. Components which are not self-lubricating have grease nipples provided. Correct operating, inspection and maintenance procedures (including a maintenance schedule) are placed in the manuals. Maintenance to be carried out by qualified personnel. | 2+4            |
| 35            | Structural failure.              | General overload.                   | 4+5        | Relief valves prevent excessive loads being lifted. Tools are required to alter pressure settings. Test points are provided for checking of pressures. Correct pressure settings are placed in the manual. Safe operating procedures are placed in manual. Manual explicitly states not to lift objects using the mast.  | 1+4            |
| 36            | Excessive effort                 | Maintenance.                        | 2+1        | Historical records are used in design to reduce maintenance (and thus risk) as far as practicable. Components which require regular maintenance such as filters are placed in an easily accessed area. Correct inspection and maintenance procedures (including a maintenance schedule) are placed in the service manual. Illustrated parts manual is available for ordering replacement parts.  | 1+1            |
| 37            | Excessive effort.                | Maintenance.                        | 4+2        | Battery is automatically charged while engine is running and, as it is only being trickle charged, gas (hydrogen) build-up is not considered a problem. Service instructions are placed in the manual.   | 1+1            |
| 38            | Excessive effort                 | Maintenance                         | 2+1        | Test points are provided for checking of pressure settings, eg. Drive and lift relief. Adjustment points require tools to change. Correct inspection and maintenance procedures are placed in the service manual. Hydraulic (and other) specifications are listed to enable adjustment.  | 1+1            |
| 39            | Entanglement, friction, cutting. | Maintenance.                        | 4+4        | Guards are provided in accordance with plant code requirements for guarding. Guarding provided is a fixed permanent nature and can only be removed with tools. Correct maintenance procedures placed in the service manual.  | 2+4            |
| 40            | Crushing, collision              | General operation                   | 3+6        | Trailer is road registrable and can be towed by another vehicle. Decals are placed on the plant to clearly label any lifting/tie down points. Safe transportation procedures are placed in the manual.   | 2+6            |
| 41            | Crushing, collision              | Objects falling from plant          | 2+4        | Components are designed to withstand vibration, and are tested in harsh conditions. Correct inspection and maintenance procedures (including a maintenance schedule) are placed in the manuals.  | 1+2            |

| HAZARD NUMBER | HAZARD TYPE    | LOCATION/SCENARIO            | RISK SCORE | CONTROL MEASURES TO REDUCE RISK   | NEW RISK SCORE |
|---------------|----------------|------------------------------|------------|---|----------------|
| 42            | Noise.         | General operation.           | 4+4        | Motors use baffled mufflers and are within acceptable sound limits. Noise testing carried out to AS2790.  | 3+4            |
| 43            | 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            |
| 44            | 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            |
| 45            | 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            |
| 46            | Various        | Use by unintended personnel. | 4+4        | There is only one set of controls plants have a removable key switch which prevents operation by unintended personnel. A clearly visible emergency stop button must be depressed in order to operate the hydraulic controls. Correct operating procedures are placed in the manual. Safety warnings are also placed in the manual. An operational shutdown timer available. | 1+4            |
| 47            | Various        | Controls failure             | 1+2        | There is only one set of controls so there can be no conflict between two sets of controls requiring one set to be overridden. Correct operating are placed in the operator's manual.   | 1+1            |
| 48            | 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            |

**TABLE 4: 4108AN WITH AUTO START OPTION - RISK ASSESSMENT AND CONTROL MEASURES**

| HAZARD NUMBER | HAZARD TYPE                     | LOCATION/SCENARIO   | RISK SCORE | CONTROL MEASURES TO REDUCE RISK  | NEW RISK SCORE |
|---------------|---------------------------------|---|------------|--|----------------|
| 1             | Entanglement, friction, cutting | Working on mechanical component when machine starts automatically | 2+5        | Auto Start controls active only when one both cabin doors are closed (normally open / held closed limit switch), emergency stop button is pulled, battery isolator is on and Auto start is set to ON. Safe operating procedures are placed in the manuals. Correct inspection and maintenance procedures are placed in the service manual. Maintenance to be carried out by qualified personnel. | 1+3            |
| 2             | Electrical                      | Electric shock from machines electrical system due to auto start. | 4+5        | Auto Start controls active only when one both cabin doors are closed (normally open / held closed limit switch), emergency stop button is pulled, battery isolator is on and Auto start is set to ON. Safe operating procedures are placed in the manuals.   | 1+3            |