

RISK & HAZARD MANAGEMENT

Model	3507	Capacity @	1100	Max. Capacity	3500	Max.	7.0
	4008	Max. Forward Reach (kg)	1250	(kg)	4000	Height	7.6
	3010		450		3000	(m)	9.8

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 Likelihood

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 one of the telescopic material handler models referenced in the table at the top of the page.

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.
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 burns. -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 failure due to fatigue, corrosion, or overloading. -pin, cable or linkage failure. -general overload - lifting excessive load, loading attachment 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.

TABLE 3: TELEHANDLERS FIXED LOAD - 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	2+6	Crushing hazard decals are clearly displayed on the machine. A backup alarm and a horn are fitted to warn of movement. A revolving beacon option is fitted to Australian units. Safe operating procedures are placed in the operator's manual.	1+6
2	Crushing	Between boom and frame	2+4	A back-up alarm and a horn are fitted to warn of movement. A revolving beacon option is fitted to Australian units. Safe operating procedures are placed in the operator's manual.	1+4
3	Crushing.	Lifting machine incorrectly	3+6	Designated lifting points are indicated by decals. Correct lifting procedures in manual.	1+6
4	Crushing, shearing	Moving parts	3+5	Crushing and shearing hazards have been marked with warning decals. Correct maintenance and operating procedures and safety instructions are placed in the operation and safety manual.	1+5
5	Crushing, collision/striking.	Underneath attachment when boom is being lowered	2+5	A horn is fitted to warn of movement. A revolving beacon option is fitted to Australian units. Section 1.3 of operator's manual says to warn personnel to keep others away while operating.	1+5
6	Crushing, striking.	Objects falling from plant	2+5	Cab is FOPS compliant. Components designed to withstand vibration, and are tested in harsh conditions in excess of normal use. Locking type hardware is used to reduce the risk of components working loose. Section 1.3 of operator's manual says to warn personnel to keep others away while operating.	1+5
7	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+4
8	Entanglement, friction, cutting	High-speed components	2+4	All high-speed components are enclosed. Engine is enclosed under covers. Maintenance to be carried out by qualified personnel.	1+4
9	Crushing, striking	Sudden or unintended boom movement	3+5	Decals inside cab show correct operating instructions. Holding valves on cylinders to prevent movement in the event of power failure or hose failure. Correct inspection and maintenance procedures are placed in the service manual. Section 1.3 of operator's manual says to keep clear from under boom.	1+5
10	Crushing, striking	Sudden or unintended movements while driving	2+6	Back-up alarm, horn and beacon are fitted to warn of movement. Striking due to sudden machine movements when driving is restricted with smooth and accurate control of steering and braking systems. Braking is achieved through the use of closed loop hydraulics and a manual park brake lever. Operator location provides good visual access to extremities of plant. Headlights are provided to illuminate the work area. Tail light assembly provides a visual indication of stopping and turning. Turn indicators are also provided at the front of the machine. All cabin controls are illuminated. A seat belt is provided to protect the operator. Inspection and maintenance procedures are placed in the manual. Warning decals are placed on the plant, and safe operating procedures are placed in the manual. Section 1.3 of operator's manual says to keep others away while operating.	1+6
11	Collision	Driving	2+6	Headlights are provided to illuminate the work area. Tail light assembly provides a visual indication of stopping and turning. Turn indicators are also provided at the front of the machine. All cabin controls are illuminated.	1+6

HAZARD NUMBER	HAZARD TYPE	LOCATION/SCENARIO	RISK SCORE	CONTROL MEASURES TO REDUCE RISK	NEW RISK SCORE
12	Shearing, entanglement	Between boom and frame	2+4	Appropriate clearances maintained between members. Warning decals are clearly displayed on the machine. Warnings are placed in manual to prevent entanglement/shearing.	1+4
13	Friction	Mechanical failure	2+2	Mechanical failure due to friction is reduced with self-lubricating bushes and wear pads. Drive motors are self lubricating as they are hydraulic, other friction points have a grease nipple. Lubrication instructions are in the manual. A lubrication schedule is provided along with oil/grease types to be used.	1+1
14	Cutting, stabbing, puncturing	General operation	2+2	Contact surfaces such as cabin grab rails and latches at entry points have no sharp edges. Operator controls and seating are ergonomically designed.	1+2
15	Falling	General operation	2+5	Holding valves on cylinders to prevent inadvertent movement in the event of power or hydraulic failure. Cabin door is self latching upon closure. Sprung seating and seat belt ensures operator remains at controls during operation. Grab rails and non slip step provide safe entry and exit to control station.	1+5
16	Excessive effort	General operation	2+1	Controls are multi-funtional in operation, which reduces hand movements for the operator and aids in reducing fatigue. Boom/attachment controls are designed to operate with one hand and are either of joystick, toggle or button type. Steering is power assisted. Non-assisted controls are minimised using electrical actuation. Where controls are mechanical in nature operating effort is reduced as far as practicable. Boom/attachment controls return to neutral upon release and movement will only occur when physically actuated.	1+1
17	Ergonomic	Seating	2+1	Fully adjustable seating provides a comfortable environment for the operator. Safe operating procedures and limitations are provided at the control station and in the operators manual.	1+1
18	Operating stress	General operation	2+1	Control panels use illustrations for functions, and switches, which control operation in that direction. Machines are field tested for controllability and ease of use. A seat belt is provided for additional support during motion. Warning decals in conjunction with visual and audible indicators are used to warn of incorrect operating procedures.	1+1
19	Lighting.	General operation	2+6	Headlights are provided to illuminate the work area. Warning decals and operators manuals provide cautions for unusual operating conditions. Optional front and rear worklights may be fitted.	1+6
20	High Temp Components	Burns from coming in to contact with components	2+4	High temperature components are positioned within frame and are protected by covers. Exhaust system is positioned in such a way to minimised the probability of accidental contact by personnel, exhaust outlet through rear top. High-pressure hydraulic hoses are secured together with fasteners and in potential failure areas (tight radius bends) are covered in spiral wrap. These hazards are related to incorrect and or lack of maintenance. Lubrication schedule placed in service manual. Maintenance to be carried out by qualified personnel.	1+4
21	Fire/Explosion	Battery Charging	2+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+2
22	High Pressure Components	High pressure fluid jets resulting puncturing the skin or eyes	2+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+4
23	Suffocation.	Inhalation of gases	2+3	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+3

HAZARD NUMBER	HAZARD TYPE	LOCATION/SCENARIO	RISK SCORE	CONTROL MEASURES TO REDUCE RISK	NEW RISK SCORE
24	Electrical.	Electric shock from machines electrical system	2+5	This TMH is not fitted with high voltage (i.e. above 32V AC). 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. Correct inspection and maintenance procedures are placed in the manual. Maintenance to be carried out by trained personnel.	1+5
25	Electrical.	Loose wire shorts	2+4	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. Machines use a diagnostic type control system which warns of any abnormalities within the control system (which include high temperature, low oil, safety alerts etc).	1+4
26	Electrical.	Working too close to power lines.	2+5	Plant is clearly marked with electrical warning decals to reduce the risk. Warning decals are placed on the machine and the manuals state that the machine non-insulating. Safe operating procedures are placed in the manual.	1+5
27	Electrical.	Electromagnetic interference	2+1	Design is sufficient for normal use.	1+1
28	Electrical.	Water bridging	3+3	Wiring looms of control boxes are covered with water resistant covers. Looms are clamped together with ties to prevent vibration damage. Control cards are encased in epoxy resin to prevent water damage process. Electrical connections are treated with anti-corrosion compounds. Sensitive control systems are located within operators cab for additional protection. Inspection and maintenance procedures are placed in the manual.	1+3
29	Stability.	General operation	2+6	The plant is designed to meet AS 10896.1 as applicable for stability. Level gauges inside cabin to show machine's tilt angle. Boom angle indicator is installed on boom to show boom angle. Load Stability Indicator (LSI) advises operator when limits of longitudinal stability are being reached and activates cut-outs. Upon commissioning of a new machine the customer is provided with a short operator training session which reduces the chance of the machine being put in an unstable position. Load charts are provided and safe operating procedures are placed in the manual.	1+6
30	Stability	Outrigger failure	N/A	N/A	N/A
31	Stability	Uneven, soft or sloping ground	2+6	LSI provides an audible and visual alarm as well as function cutout as the limit of longitudinal stability is approached. Level gauges inside cabin to show machine's tilt angle. A permanent type specification plate is permanently attached to the plant which shows the machine ratings. Warning decals are placed on machine, and safe operating procedures are placed in the manual. Load charts are provided.	1+6
32	Stability	Travelling hazards	2+6	Indicators fitted to advise operator of excessive slope. Design includes frame levelling cylinders. Warning decals are placed on plant, and safe operating procedures are placed in the manual. A permanent type specification plate is stamped with machine design limits. Pick and Carry (P&C) positions illustrated in load charts.	1+6
33	Stability	Control valve or interlock failure	2+6	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 descent due to hydraulic failure. Correct operating, inspection and maintenance procedures are placed in the manuals.	1+6

HAZARD NUMBER	HAZARD TYPE	LOCATION/SCENARIO	RISK SCORE	CONTROL MEASURES TO REDUCE RISK	NEW RISK SCORE
34	Hydraulic failure	Excessive pressure build-up	2+6	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. Maintenance procedures are placed in the manuals.	1+6
35	Hydraulic failure	Pump and engine failure	2+6	Hydraulic cylinders are equipped with load holding valves and will remain locked in the event of electrical or mechanical failure. Valves may be manually operated to enable lowering and retraction of the boom in the event of a control unit failure. These plants have indicators to assist in identifying problems. Manuals contain a troubleshooting section. Hydraulic components are tested at pressures well in excess of the system operating pressure. Maintenance schedule provided in the manuals.	1+6
36	Structural failure	Fatigue	2+6	The plant has been cyclic tested and fatigue analysis carried out as part of the design process. Regular inspection and maintenance procedures are in manuals.	1+6
37	Structural failure	Wear and corrosion	2+6	Corrosive surfaces are painted, components subject to wear have provisions to minimize wear by using sacrificial components or lubrication e.g boom sections use wear pads along telescoping sections, pins use self lubricating bushes. Components which are not self-lubricating have grease nipples provided. Correct operating, inspection and maintenance procedures (including lubrication points) are placed in the manuals. Maintenance to be carried out by qualified personnel.	1+6
38	Structural failure	General overload	3+6	Special access to system is required to alter settings. Load charts provided indicate the allowable capacities, boom angle and length. Plate on attachment indicate the maximum capacities. Relief valve are used to prevent excessive hydraulic pressures. Safe operating procedures are placed in manual. Correct pressure settings are placed in the manual.	1+6
39	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. Illustrated parts manual is available for ordering replacement parts. JLG conducts operator and service training courses to all customers. Daily walk around inspection procedure is in the manual.	1+1
40	Excessive effort	Adjusting equipment	2+1	Test points are provided for checking of all hydraulic pressure settings. 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
41	Entanglement, friction, cutting.	Maintenance	3+4	Guarding provided is a fixed permanent nature and can only be removed with tools. Correct maintenance procedures placed in the service manual.	1+4
42	Crushing, collision	Transport	2+5	Provision is provided for both lifting and tie down points on chassis section. Decals are placed on the plant to clearly label any lifting/tie down points. Hand brake to be applied during transportation. Safe transportation procedures are placed in the manual.	1+5
43	Crushing, collision	Objects falling from plant	2+6	Components are designed to withstand vibration, and are tested in harsh conditions. Correct operation, inspection and maintenance procedures (including a maintenance schedule) are placed in the manuals.	1+6
44	Noise.	General operation	3+4	Motors use baffled mufflers and are within acceptable sound limits. Noise testing carried out to EN12053.	1+4

HAZARD NUMBER	HAZARD TYPE	LOCATION/SCENARIO	RISK SCORE	CONTROL MEASURES TO REDUCE RISK	NEW RISK SCORE
45	Occupational hazards	Decal removal	2+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 as per parts manual. Replacement decals are available. Safety warnings are in manual.	1+6
46	Various	Controls failure	1+2	A single control station ensures the operator has full control at all times. Safe operating procedures are placed in the manuals.	1+1
47	Various	Manual lost or illegible	2+6	Storage container to keep manuals and load charts inside cabin. Replacement copies available on request.	1+6
48	Various	Lack of maintenance	2+5	Schedule placed in manual. Logbook in pouch fitted to the machine. Maintenance to be carried out by qualified personnel.	1+5
49	Various	Use by unintended personnel	3+4	Plants have a removable key switch which prevents operation by unintended personnel. The control cabin is lockable to prevent unintended access. Correct operating procedures are placed in the manual. Safety warnings are also placed in the manual. JLG conducts operator and service training courses to all customers.	1+4

**TABLE 4: TELEHANDLERS WITH JIB ATTACHMENT (OR FREELY SUSPENDED LOAD) OPTION - RISK ASSESSMENT AND CONTROL MEASURES
(IN ADDITION TO TABLE 3)**

HAZARD NUMBER	HAZARD TYPE	LOCATION/SCENARIO	RISK SCORE	CONTROL MEASURES TO REDUCE RISK	NEW RISK SCORE
1	Stability	General operation with jib	3+6	Load Management Indicator System (LMIS) is supplied or maybe retrofitted for machines which use jib as one of the attachments. The LMIS provides visual indication and cut function when loads programmed into LMIS are exceeded. Correct operating procedures are placed in the manual. Level gauges inside cabin to show machine's tilt angle. Pendulum is installed on boom to show boom angle. Load charts inside cabin show maximum ground slope, boom angle and boom length. Stability testing is done to AS 10896.1 as applicable. JLG conducts operator and service training courses to all customers.	1+6
2	Stability	Uneven, soft or sloping ground	2+6	LMIS provides an audible and visual alarm as well as function cutout as the limit of longitudinal stability is approached. Level gauges inside cabin to show machine's tilt angle. A permanent type specification plate is permanently attached to the machine which shows the machine ratings. Warning decals are placed on machine, and safe operating procedures are placed in the manual. Load charts provided state allowable ground conditions.	1+6
3	Structural failure	General overload with jib	2+6	LMIS is used to prevent excessive loads being lifted by the machine with jib. Special access to system is required to alter settings. Load charts provided and LMIS control panel indicate the allowable capacities, boom angle and length. Plate on jib indicate the maximum capacities. Relief valve are used to prevent excessive loads being lifted by the machine. Safe operating procedures are placed in manual. Correct pressure settings are placed in the manual.	1+6

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) performs computer simulation/modelling of product and internal design calculations.
- Independent design review by an independent engineer to local design requirements is completed in Australia.
- Cycle testing of components to ensure fatigue life is adequate is completed.
- Extensive field testing of prototype units to ensure faults and hazards are identified before manufacture is completed.
- JLG conduct an intensive Product Development Process to fully specify, design, risk assessment and safety test and field prove the design. This process is outlined in our proprietary GPD process - which can be viewed on request.
- JLG Industries (Australia) offer training and maintenance courses to any interested companies. World class Operation, Safety, Illustrated Parts, Service and Maintenance manuals are available from JLG Industries (Australia) for each model.
- JLG Industries (Australia) support industry safety for operations and maintenance (being an TSHA member and an AS10896.1 Standards Association of Australia committee member).