

RISK & HAZARD MANAGEMENT

JLG Machine Type	Toucan 10E	Safe Working Load (kg)	200	Max. Drive Height (m)	8.1	Max. Height (m)	8.1
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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 plant². 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 practicable³. 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 scores 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 Toucan 10E model 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.	<ul style="list-style-type: none"> -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.	<ul style="list-style-type: none"> -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.	<ul style="list-style-type: none"> -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.	<ul style="list-style-type: none"> -can anyone be suffocated or drowned due to lack of oxygen, or atmospheric contamination.
E. ELECTRICAL.	<ul style="list-style-type: none"> -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.	<ul style="list-style-type: none"> -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.	<ul style="list-style-type: none"> -hydraulic system failure. -check valve or relief valve failure. -hose or cylinder failure - mechanical or fatigue.
H. STRUCTURAL FAILURE.	<ul style="list-style-type: none"> -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.	<ul style="list-style-type: none"> -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.	<ul style="list-style-type: none"> -can anyone be injured due to machine instability while transporting. -plant or objects falling from transport truck.
K. OCCUPATIONAL HAZARDS	<ul style="list-style-type: none"> -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.

TABLE 3: TOUCAN 10E 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+6	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".	1+6
2	Crushing, striking	Underneath basket when basket is being lowered.	2+5	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 (under the heading "Crushing and Collision Hazards") says to warn personnel to clear all personnel from the work platform area before lowering the mast and/or the jib, and to erect barricades if necessary.	1+5
3	Crushing, striking	Objects falling from platform	2+5	The platform has a kick rail to avoid objects falling. Section 1.3 of operator's manual (under the heading "Crushing and Collision Hazards") says to warn personnel to clear all personnel from the work platform area before lowering the mast and/or the jib, and to erect barricades if necessary. Section 1.3 also says that head gear is to be worn by ground personnel.	1+5
4	Crushing, shearing	In mast when retracting	2+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 retracts along themselves which reduces the chance of crushing. Warning decals are placed on the plant.	1+4
5	Entanglement	In mast chain	2+4	Guards placed over sheaves. Tools are required in order to remove guards. Correct inspection and maintenance procedures are placed in manuals.	1+4
6	Entanglement	In drive system	2+4	Beacons and motion alarm are fitted to the plant to warn personnel in the vicinity of the plant. Drive motors are enclosed.	1+4
7	Cutting, stabbing, puncturing.	General Operation	2+4	Controls and other contact surfaces such as handles have rounded edges. Guards used to cover moving parts.	1+1
8	Striking, crushing, collision	Sudden or unintended movements.	3+6	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. Braking is spring applied (hydraulic release). Safe operating procedures are in the manual.	1+6
9	Falling	General operation	2+5	Guard rail provided around platform, lanyard attachment points provided, marked by decals. Platform gate self-closing. Safe operating procedures outline in Section 1.3 of operator's manual.	1+5
10	Slipping, tripping	Slipping or tripping when in platform	2+5	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).	1+5
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 minimised using electrical actuation. Where manual operation is required, operating effort is reduced as far as practical.	1+1
12	Operating stress	General operation	2+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.	1+1
13	Lighting	General operation	2+1	This risk is job-site specific and should be evaluated by the end-user. Where additional lighting is requested, work lights may be fitted to the basket by JLG.	1+1

HAZARD NUMBER	HAZARD TYPE	LOCATION/SCENARIO	RISK SCORE	CONTROL MEASURES TO REDUCE RISK	NEW RISK SCORE
14	High Temperatures	Burns from contact with high temperature components	2+3	Hot surfaces are covered using guards or shrouds. Counterbalance valves act as a thermal fuse. Correct inspection and maintenance procedures are placed in the manuals. Regular maintenance in accordance with AS2550.10 is required.	1+3
15	High Pressure	High pressure fluid jets	2+3	Most hydraulic hoses are under guards or covers. They have a bursting pressure in excess of the working pressure. Correct inspection and maintenance procedures are placed in the manuals. Regular maintenance in accordance with AS2550.10 is required.	1+3
16	Electrical	Accidental electric shock from the electrical system	2+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. Cables are insulated and secured to plant. Correct inspection and maintenance procedures are placed in the manuals. Regular maintenance in accordance with AS2550.10 is required.	1+2
17	Electrical	Loose wire shorts	2+1	Durable connectors and terminals are used. Stain-resistant cables are used. Fuses are on main cables. Inspection procedures are placed in the manual.	1+1
18	Electrical	Working too close to power lines	3+6	Plant is not insulated and has not been designed to work close to powerlines. Warning decals are placed on the machine. Safe operating procedures and allowable distance to power lines are placed in the operator's manual Section 1.3 under the heading "Electrocution Hazards".	1+6
19	Electrical	Electromagnetic interference	2+1	Design is sufficient for normal use.	1+1
20	Electrical	Water bridging	2+1	Control boxes sealed. Sealed connectors and stain-resistant cables used. 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 AS2550.10 is required. Manual says do not clean electrical components with high pressure cleaner.	1+1
21	Electrical	Servo controller, motor failure	2+3	'Fail-safe' systems are used. In the advent of electrical failure a manual lowering system (manual descent valve) is installed on the machine.	1+3
22	Electrical	Battery charging	2+2	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.	1+2
23	Stability	General operation	2+6	The plant is designed to meet EN280 and AS1418.10 for stability. In and out of service braking is spring applied (hydraulic 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.	1+6
24	Stability	Overloading the platform	3+6	Maximum safe working load and number of person on platform is clearly marked on the machine and in the manual. Designed to meet EN280 and AS1418.10.	1+6
25	Stability	Excessive manual side force	2+6	Maximum allowable manual side force marked on machine. Designed to meet EN280 and AS1418.10.	1+6
26	Stability	Uneven, soft or sloping ground	2+6	Tilt sensor prevents further aggravating motion when elevated on an excessive slope. Maximum allowable slope marked on machine. Warning decals are placed on the machine.	1+6
27	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 unsafe descent in advent of failure. Inspection and maintenance procedures are placed in the manuals and are to be done in accordance with AS2550.10-10.	1+6

HAZARD NUMBER	HAZARD TYPE	LOCATION/SCENARIO	RISK SCORE	CONTROL MEASURES TO REDUCE RISK	NEW RISK SCORE
28	Stability	Dynamic loading, travelling over rough surfaces	2+6	Drive is disabled and function speeds slowed down when machine is driven onto an excessive slope. Travel speed is also limited when elevated. Braking is designed to hold the unit on its maximum rated gradeability. Machine is designed to meet dynamic stability requirements of EN280 and AS1418.10. Warning decals are placed on the machine.	1+6
29	Hydraulic failure	General failure	2+5	Relief valve are used to prevent over pressurising the hydraulic system. Holding valves prevent unsafe descent in the advent of failure. Manual lowering system (manual descent valves) allows emergency retrieval in the advent of check or relief valve failure. Inspection and maintenance procedures are placed in the manuals and are to be done in accordance with AS2550.10-10.	1+5
30	Structural failure	Failure due to fatigue	2+6	Rigorous stress analysis carried out as part of the design process. Fatigue testing has been carried out to validate calculations. Design calculations have been reviewed by a local independent engineer. Regular inspection in accordance with AS2550.10.	1+6
31	Structural failure	Failure due to corrosion or wear	2+6	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). Mast sections extend and retract on rollers. Inspection and maintenance procedures are placed in the manuals and are to be done in accordance with AS2550.10.	1+6
32	Structural failure	Failure due to general overload (e.g. from misuse)	2+6	Relief valves are used to prevent excessive loads being lifted by the platform. Warning decals are placed on the machine to show safe working loads. Safe operating procedures are placed in the manual. Manual states that the plant should not be used as a crane. Designed to meet EN280 and AS1418.10 which require the machine to be structurally capable of taking 125% of the rated capacity.	1+6
33	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.	1+3
34	Maintenance	Adjusting equipment	2+2	Test pressure locations are provided for checking hydraulic system pressures. Adjusting points require tools to alter pressure settings. Correct adjusting procedures are placed in the manual. Hydraulic (and other) specifications are listed to enable adjustment.	1+2
35	Maintenance	Guard removal	2+3	Guarding is of a fixed permanent nature that can only be removed with tools. Maintenance to be carried out by qualified personnel.	1+3
36	Transport	Objects falling from plant	2+6	Designated tie-down and lifting points are indicated by decals. Correct transport procedures are in manual.	1+6
37	Excessive noise	General operation	2+1	Electric motors are used and they are not considered to pose noise problems except for alarms and buzzers. Where noise is considered excessive, level testing is done to AS1055.2/AS1269.	1+1
38	Various	Decal removal	2+6	Decals have permanent marking & fastening. Safety warnings are placed in manual.	1+6
39	Various	Use by unintended personnel	2+6	Only one set of controls is operable at any given time. Ground controls are recessed to prevent inadvertent engagement by hitting an object. Enable switches are incorporated into the control system. Control boxes have a removable key switch which prevents operation by unintended personnel. Emergency stop button is provided to stop unintended movement. Correct operating procedures are placed in the manual. JLG conducts operator service training courses to all customers.	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.
- European CE design reviews are completed and independently verified for this model machine.
- 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.
- 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 IPD 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 EWPA member and an AS1418 & AS2550 Standards Association of Australia committee member).