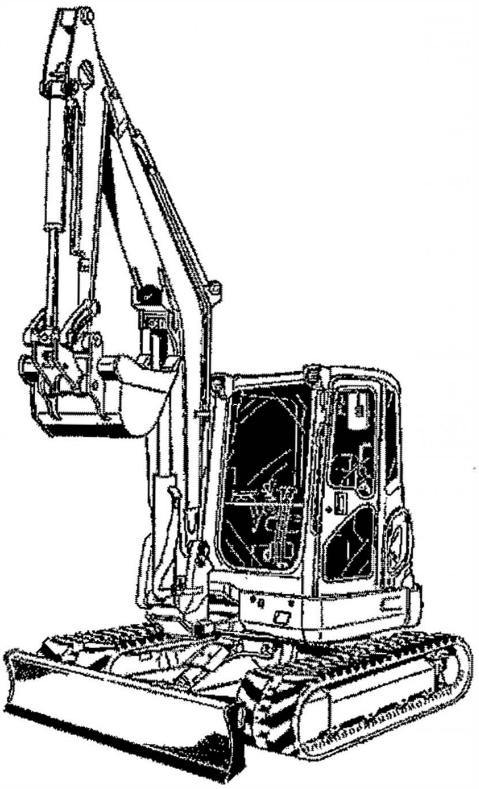
TASWIDE

EQUIPMENT HIRE

RISK ASSESSMENT

U35-4



Assessment Date	25/10/2013
Revision	B
Assessment Location	Truganina, Victoria
Assessor	Chris Borbidge
Position	Technical Engineer (R&D)
Model	U35-4
Serial Number	10456

	Sample	Production
Type of Unit		✓

Kubota Tractor Australia have performed this risk assessment on a standard unit for flat ground application. A thorough risk assessment, specific to their application, must be carried out by the end user before the operation of this machine. All operating processes and environments must be carefully considered.

ASSESSED BY: Chris Borbidge Technical Engineer Date: 25/10/2013	**RELEASED BY:** Benjamin Binns R&D Manager Date: 25/10/2013

1.0 Excavator Specifications

Noise level testing - Tested to AS2012

	High Idle - A/C ON	High Idle - A/C OFF	Reference Standard
Average at operators ear	82.9 dBA	82.0dBA	AS2012.2
Average at 7m	73.1 dBA	73.1 dBA	AS2012.1

2 TECHNICAL DATA

TECHNICAL DATA

				KUBOTA EXCAVATOR		
Model name				U35-4		
Type				RUBBER TRACK		
				Canopy	CAB	
Operating weight (including operator's)			kg (lbs.)	3685 (8124)	3835 (8455)	
Engine	Type			Water cooled 4 cycle diesel engine with 3 cylinder		
	Model name			D1703-M-DI-E4-US1		
	Total displacement		cc (cu.in)	1647 (100.5)		
	Engine power SAE gross		kW (HP)	18.5 (25)		
	Rated speed		rpm	2200		
	Low idle speed		rpm	1300 ~ 1350		
Performance	Unit swing speed		rpm	8.9		
	Travel speed	Fast	km/h (mph)	4.6 (2.9)		
		Slow	km/h (mph)	3.0 (1.9)		
	Ground pressure (With operator)		kPa (kgf/cm^2) [psi]	33.7 (0.34) [4.8]	35.1 (0.36) [5.0]	
	Climbing angle		% (deg)	*58 (30)		
	Angle in case of crossing slope		% (deg)	*27 (15)		
Dozer	Width x Height		mm (in.)	1700 x 343 (66.9 x 13.5)		
	Max swing angle	Left	deg	---		
		Right	deg	---		
Boom swing angle		Left	rad (deg)	1.22 (70)		
		Right	rad (deg)	0.87 (50)		
Pressure connection for attachments	Max.displacement (Theoretical)		L (US gal)/ min	60.5 (15.9)		
	Max. pressure		MPa (kgf/cm^2) [psi]	17.2 (175) [2494]		
Fuel tank capacity			L (US gal)	45.1 (11.9)		

				KUBOTA EXCAVATOR		
Model name				U35-4		
Type				STEEL TRACK		
				Canopy	CAB	
Operating weight (including operator's)			kg (lbs.)	3685 (8124)	3835 (8455)	
Engine	Type			Water cooled 4 cycle diesel engine with 3 cylinder		
	Model name			D1703-M-DI-E4-US1		D1703-M-DI-E4-US2
	Total displacement		cc (cu.in)	1647 (100.5)		
	Engine power SAE gross		kW (HP)	18.5 (25)		
	Rated speed		rpm	2200		
	Low idle speed		rpm	1300 ~ 1350		
Performance	Unit swing speed		rpm	8.9		
	Travel speed	Fast	km/h (mph)	4.6 (2.9)		
		Slow	km/h (mph)	3.0 (1.9)		
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	Max swing angle	Left	deg	---		
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		Right	rad (deg)	0.87 (50)		
Pressure connection for attachments	Max.displacement (Theoretical)		L (US gal)/ min	60.5 (15.9)		
	Max. pressure		MPa (kgf/cm²) [psi]	17.2 (175) [2494]		
Fuel tank capacity			L (US gal)	45.1 (11.9)		

NOTE :

- Above dimensions are based on the machine with rubber trucks.
- Specifications subject to change without notice.

* With unloaded digging bucket. (Q/C BUCKET)
* Firm compacted soil.
* Operators must exercise extra caution and follow instructions in the operator's manual.
* Worse condition or heavier attachment to the above will decrease climbing angle.

2.0 Risk Assessment Tables

Likelihood Table

Category	Description
Almost Certain	Incident will occur at some time (0 - 1 month)
Likely	Incident could occur at some time (1 month - 1 year)
Slight	Incident is possible to occur (1 year - 2 years)
Unlikely	Incident is possible, but unlikely to occur (2 years - 5 years)
Rare	Cannot imagine that this could occur (over 5 years)

Consequences Table

Category	Description
Negligible	Effects unlikely to last until the next day.
Minor	Likely to affect employee the next day.
Moderate	Injury needs formal medical treatment.
Major	Injury requiring extensive medical treatment and/or hospitalisation.
Severe	Injury resulting in death or permanent incapacity.

Risk Score Calculator

		Consequences				
		Negligible	**Minor**	**Moderate**	**Major**	**Severe**
Likelihood	**Almost Certain**	Medium	High	Very High	Very High	Very High
	Likely	Medium	Medium	High	Very High	Very High
	Slight	Low	Medium	High	High	Very High
	Unlikely	Low	Low	Medium	Medium	High
	Rare	Low	Low	Low	Medium	Medium

Risk Priority Table

	Priority	Action
Very High	1	Immediate action required
High	2	Implement short term safety controls immediately
Medium	3	Short term safety controls implemented to minimise risk of injury
Low	4	Monitor activity

3.0 Operational Risk (Risks associated with operating the unit within fair and resonable circumstances)

		Uncontrolled Risk					Residual Risk			
Hazard Identified	**Source**	**LH**	**Con**	**Risk**	**Current Controls**	**Hierarchy of Control**	**LH**	**Con**	**Risk**	**Action Required**
Slip, Trip, Fall	Risk of anyone slipping, tripping or falling due to uneven or slippery work surfaces?	Slight	Minor	Medium	Non slip rubber is used on the operators platform and rubber materials used on user controls (hand and foot levers). **(Engineering)** Handrails fitted to the machine **(Engineering)** "Mount and dismount safely when entering or leaving the operator's compartment" decal fitted. **(Administration)** No-step decal fitted on the right hand side engine cover. **(Administration)**	Elimination Substitution Engineering Isolation Administration (PPE)	Slight	Negligable	Low	None
Entanglement (Rotating components)	Risk of anyone's clothing or body parts becoming entangled with rotating parts of the machine.	Slight	Moderate	High	Belts, pulleys and gears are adequately guarded to **AS4024.1**. These guards are to be kept in serviceable condition at all times. **(Isolation)** Safety decals have been fitted in appropriate areas to ensure the operator is aware of potential entanglement, pinching or shearing. **(Administration)** Safety decal stating "To avoid personal injury, never open before stopping the engine". **(Administration)**	Elimination Substitution Engineering Isolation Administration (PPE)	Unlikely	Negligable	Low	None
Pinching (shearing)	Risk of anyone's body parts being pinched or sheared between two or more moving parts of the units?	Slight	Minor	Medium	No shearing hazards exist in the operator zone. **(Elimintation)** Unit fitted with an exlusion zone decal around the main knuckle of the machine. **(Administration)** Unit fitted with a "boom pinch point: keep out of this area to avoid serious personal injury or death" decal. **(Administration)**	Elimination Substitution Engineering Isolation Administration (PPE)	Unlikely	Minor	Low	None
Striking	Risk of anyone being struck by moving objects due to uncontrolled or unexpected movement of the unit?	Slight	Negligable	Low	Engine hood is fitted with a gas strut to prevent striking during it's release. **(Engineering)** Arm rest / operators controls on the LHS of operator must be in locked position (down) before hydraulic controls can be used. **(Engineering)**	Elimination Substitution Engineering Isolation Administration (PPE)	Unlikely	Negligable	Low	None
Striking	Risk of anyone being struck by moving objects due to the unit, parts of the unit, or attachments disintegrating?	Unlikely	Minor	Low	Operator zone is adequately guarded to **AS4024.1. (Isolation)**	Elimination Substitution Engineering Isolation Administration (PPE)	Unlikely	Minor	Low	None
Striking	Risk of anyone being struck by moving objects due to material being dropped / thrown from the unit?	Slight	Moderate	High	Safety decal included on the unit (on window lift chart decal) stating that it must not be used for lifting of freely suspended loads (unless fitted with appropriate safety devices). **(Administration)**	Elimination Substitution Engineering Isolation Administration (PPE)	Unlikely	Minor	Low	None

		Uncontrolled Risk					Residual Risk			
Hazard Identified	**Source**	**LH**	**Con**	**Risk**	**Current Controls**	Hierarchy of Control	**LH**	**Con**	**Risk**	**Action Required**
High Pressure Fluid	Risk of anyone coming in contact with High Pressure Fluid escaping during normal operation, or due to component failure.	Unlikely	Moderate	Medium	Hydraulic system is protected by relief valve to prevent system overload. **(Engineering)** High pressure hydraulic hoses are sufficiently guarded / enclosed in the excavators boom. **(Isolation)** Operator's manual includes safe working procedures hydraulic leak checking. **(Administration)**	Elimination Substitution Engineering Isolation Administration (PPE)	Unlikely	Minor	Low	None
Burns / Friction	Risk of burns due to contact with hot fluids or surfaces.	Slight	Minor	Medium	The engine exhaust is guarded by the engine cover (hood) as well as individual covers in the engine bay labelled "HOT". **(Engineering)**	Elimination Substitution Engineering Isolation Administration (PPE)	Unlikely	Minor	Low	None
Burns / Friction	Risk of burns or abrasion due to contact with moving surfaces of the unit.	Unlikely	Minor	Low	Operator Zone is free of moving parts. **(Engineering)**	Elimination Substitution Engineering Isolation Administration (PPE)	Unlikely	Minor	Low	None
Burns / Friction	Risk of burn due to fires caused by operating the unit.	Unlikely	Moderate	Medium	None	Elimination Substitution Engineering Isolation Administration (PPE)	Unlikely	Moderate	Medium	Spark arrestor (complying to **AS1019**) is to be fitted to the unit if local regulation specifies. Fire extinguisher (complying to **AS1841**) is to be fitted if required by local regulation / work site requirements.
Collision	Risk of collision with a bystander due to being hidden by blind spots in the unit, attachments obstructing the operators view, buildings or obstacles in the area of operation or other factors.	Unlikely	Severe	High	Unit has a work light on the boom and on the top of the cabin. **(Engineering)** Unit is fitted with a horn. **(Engineering)** Unit is fitted with a travel alarm. **(Engineering)** Unit is fitted with reflective stickers for greater visability at the rear of the unit. **(Administration)** Unit is fitted with safety decal stating "do not allow any persons within the working range". **(Administration)** Unit is fitted with an "Attachments can slew into ROPS" caution	Elimination Substitution Engineering Isolation Administration (PPE)	Unlikely	Moderate	Medium	Mirrors (rear convex mirror and side mirrors (left and right hand sides)) are to be fitted to the machine. The unit is to be fitted with a rotating beacon, if required by local regulation / work site requirements.

		Uncontrolled Risk					Residual Risk			
Hazard Identified	**Source**	**LH**	**Con**	**Risk**	**Current Controls**	Hierarchy of Control	**LH**	**Con**	**Risk**	**Action Required**
Crushing	Risk of anyone being crushed by material falling off the unit, the unit tipping or rolling over, parts of the unit collapsing,	Unlikely	Severe	High	ROPS fitted compliant with **ISO 12117-2 2008 (Engineering)** TOPS fitted compliant with **ISO 12117 1997 (Engineering)** FOPS fitted compliant with **ISO 10262-1998** (FOPS Level 1) **(Engineering)** Safety decal stating "Damaged ROPS must be replaced, not repaired or revised". **(Administration)** Seatbelt fitted compliant with J386 **(Engineering)** Exit is clearly defined inside the unit and a hammer is supplied for quick exit if required **(Engineering)**	Elimination Substitution Engineering Isolation Administration (PPE)	Unlikely	Negligable	Low	None
Electrocution / Shock	Risk of anyone being electrocuted, or sustaining shock or burns due to the unit contacting live electrical conductors, over head and underground.	Unlikely	Major	Medium	Viewing window included in roof to allow good visability at height. **(Engineering)** "Check over head clearance with electric wires" safety decal fitted to the unit. **(Administration)**	Elimination Substitution Engineering Isolation Administration (PPE)	Rare	Minor	Low	Dial before you dig sticker is to be added to the unit before used.
Electrocution / Shock	Risk of anyone being electrocuted, or sustaining shock or burns due to damaged or poorly maintained electrical leads or cables, damaged electrical switches or water near electrical equipment?	Rare	Negligable	Low	12V system. **(Substitution)**	Elimination Substitution Engineering Isolation Administration (PPE)	Rare	Negligable	Low	None
Poisoning	Risk of anyone suffering ill-health due to exposure to chemicals, toxic gases or vapours, fumes, dust, radiation or other factors.	Unlikely	Moderate	Medium	Exhaust system points away from operator platform. **(Engineering)** Cabin is well ventilated. **(Engineering)** Operator Manual and safety decal warn of affixiation due to exhaust when operated in enclosed space. **(Administration)** Fuel cap is lockable. **(Engineering)**	Elimination Substitution Engineering Isolation Administration (PPE)	Unlikely	Minor	Low	None
Hearing Loss	Risk of hearing loss/damage due to excessive noise level. (Exceed 85dBA)	Likely	Moderate	High	Cabin model noise level does not exceed 85dBA limitation. **(Engineering)**	Elimination Substitution Engineering Isolation Administration (PPE)	Rare	Negligible	Low	None
Strain	Risk of anyone being injured due to poor seating or constrained body posture, or due to repetitive body movements or excessive effort.	Slight	Minor	Medium	Ergonmic full suspension seat with arm rests is fitted standard to the unit. **(Engineering)** All controls are ergonomically positioned in reach of operator during normatl operation duties. **(Engineering)**	Elimination Substitution Engineering Isolation Administration (PPE)	Unlikely	Minor	Low	None

		Uncontrolled Risk					Residual Risk			
Hazard Identified	Source	LH	Con	Risk	Current Controls	Hierarchy of Control	LH	Con	Risk	Action Required
Incorrect Operation	Risk of anyone being injured due to unexpected operation of the unit, overloading the unit or its attachments, excessive speed, sudden shutdown of the unit, use by unauthorised operators or incorrect application.	Slight	Minor	Medium	Arm rest / operators controls on the LHS of operator must be in locked position (down) before hydraulic controls can be used. **(Engineering)** An operators manual is provided with the machine which includes safe operating procedures. The operators manual has a safe holding location on the unit. **(Administration)** Machine controls are clearly described on information label, informing operator of their function and proper use. **(Administration)** Unit is fitted with emergency stop button. **(Administration)** Variable lift chart included in the unit's operator's manual. Safety decal is also include on operator's cabin. **(Administration)** No lifting hooks have been fitted to the unit. **(Engineering)**	Elimination Substitution Engineering Isolation Administration (PPE)	Unlikely	Minor	Low	None

3.1 Maintenance Risk (Risks associated with maintaining the unit)

		Uncontrolled Risk					Residual Risk			
Hazard Identified	Source	LH	Con	Risk	Current Controls	Hierarchy of Control	LH	Con	Risk	Action Required
Slip, Trip, Fall	Risk of anyone slipping, tripping or falling due to uneven or slippery work surfaces while conducting maintenance.	Likely	Moderate	High	Operator's manual states that the machine should be placed on a firm, flat, level surface and that attachments should be lowered to the ground. **(Administration)**	Elimination Substitution Engineering Isolation Administration (PPE)	Unlikely	Minor	Low	None
Entanglement (Rotating components)	Risk of anyone's clothing or body parts becoming entangled with rotating parts of the machine while conducting maintenance.	Slight	Moderate	High	Warning decal provided on the radiator housing, warning against placing hand in radiator fan. **(Administration)**	Elimination Substitution Engineering Isolation Administration (PPE)	Unlikely	Minor	Low	None
Pinching (shearing)	Risk of anyone's body parts being pinched or sheared between two or more moving parts of the units.	Slight	Moderate	High	Operator's manual states that the controls should be locked and that the key should be removed. **(Elimination)**	Elimination Substitution Engineering Isolation Administration (PPE)	Rare	Negligible	Low	None
Striking	Risk of anyone being struck by moving objects due to uncontrolled or unexpected movement of the unit while conducting maintenance?	Slight	Moderate	High	Operator's manual states that the controls should be locked and that the key should be removed. **(Elimination)**	Elimination Substitution Engineering Isolation Administration (PPE)	Rare	Negligible	Low	None
High Pressure Fluid	Risk of anyone coming in contact with High Pressure Fluid escaping while conducting maintenance and/or removing components.	Slight	Minor	Medium	Operator's manual includes safe working procedures hydraulic leak checking, **(Administration)** Hydraulic hoses are suitably rated for working pressure. **(Engineering)**	Elimination Substitution Engineering Isolation Administration (PPE)	Rare	Negligible	Low	None
Burns / Friction	Risk of burns due to contact with hot fluids or surfaces while conducting maintenance.	Slight	Minor	Medium	Operator's manual states that the exhaust system, the radiator and the hydraulics need to be allowed to cool before work starts. **(Administration)** Individual covers in the engine bay labelled "HOT". **(Administration)** Operator's manual warns against opening the radiator cap before the radiator has cooled down sufficiently. **(Administration)**	Elimination Substitution Engineering Isolation Administration (PPE)	Rare	Negligible	Low	None
Burns / Friction	Risk of burns or abrasion due to contact with moving surfaces of the unit.	Unlikely	Minor	Low	Operator's manual states that the controls should be locked and that the key should be removed. **(Elimination)**	Elimination Substitution Engineering Isolation Administration (PPE)	Rare	Negligible	Low	None

		Uncontrolled Risk					Residual Risk			
Hazard Identified	**Source**	**LH**	**Con**	**Risk**	**Current Controls**	Hierarchy of Control		**Con**	**Risk**	**Action Required**
Crushing	Risk of anyone being crushed by material falling off the unit, the unit tipping or rolling over, and/or parts of the unit collapsing while conducting maintenance.	Slight	Severe	Very High	Operator's manual states that the machine should be securely supported with stands or suiable blocking before working underneath. **(Administration)** Operator's manual warns against working under any hydraulically supported devices. **(Administration)** Gas strut used to support engine hood whilst in open position. **(Engineering)**	Elimination Substitution Engineering Isolation Administration (PPE)	Unlikely	Minor	Low	None
Electrocution / Shock	Risk of anyone being electrocuted, or sustaining shock or burns due to damaged or poorly maintained electrical leads or cables, damaged electrical switches or water near electrical equipment while conducting maintenance.	Rare	Negligible	Low	12V system **(Substitution)**	Elimination Substitution Engineering Isolation Administration (PPE)	Rare	Negligible	Low	None
Poisoning	Risk of anyone suffering ill-health due to exposure to chemicals, toxic gases or vapours, fumes, dust, radiation or other factors while conducting maintenance.	Slight	Moderate	High	Operator's manual states that a face mask must be used to protect the respiratory system against dust and other foreign particles. **(Administration)** Hazardous materials are kept in suitable enclosures. **(Isolation)** The machine is supplied with a sturdy, permanent cover attached to all batteries. **(Isolation)**	Elimination Substitution Engineering Isolation Administration (PPE)	Unlikely	Minor	Low	None
Hearing Loss	Risk of hearing loss/damage due to excessive noise level (Exceed 85dBA) while conducting maintenance.	Slight	Moderate	High	Operator's manual states that the controls should be locked and that the key should be removed. **(Elimination)**	Elimination Substitution Engineering Isolation Administration (PPE)	Rare	Negligible	Low	None
Strain	Risk of anyone being injured due to repetitive body movements or excessive effort while conducting maintenance.	Likely	Moderate	High	All regularly servicable items are located within easy reach from the rear of the unit. **(Engineering)**	Elimination Substitution Engineering Isolation Administration (PPE)	Unlikely	Minor	Low	None
Incorrect Operation	Risk of anyone being injured due to inexperienced or unauthorised persons conducting maintenance.	Likely	Minor	Medium	Maintenance section of operator's manual gives safety releated warnings, and safe work proceedures / instructions for each servicable item. **(Administration)**	Elimination Substitution Engineering Isolation Administration (PPE)	Unlikely	Minor	Low	None

4.0 Required Controls

Type	Hazard Identified	Action Required	Responsibility	Due
Operational	Burns / Friction	Spark arrestor (complying to **AS1019**) is to be fitted to the unit if local regulation specifies. Fire extinguisher (complying to **AS1841**) is to be fitted if required by local regulation / work site requirements.	DEALER	As required.
Operational	Collision	Mirrors (rear convex mirror and side mirrors (left and right hand sides)) are to be fitted to the machine. The unit is to be fitted with a rotating beacon, if required by local regulation / work site requirements.	DEALER DEALER	Before delivery. As required.
Operational	Electrocution / Shock	Dial before you dig sticker is to be added to the unit before delivery to customer.	DEALER	Before delivery.