



## Maintenance Programme



## Permaquip Kubota RRV

Permaquip Ltd  
Brierley Industrial Park,  
Stanton Hill, Sutton in Ashfield  
Nottinghamshire, NG17 3JZ, UK  
Tel: +44 (0) 1623 513349  
Fax: +44 (0) 1623 517742  
E-mail: [sales@permaquip.co.uk](mailto:sales@permaquip.co.uk)  
[www.permaquip.co.uk](http://www.permaquip.co.uk)

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**Please note**

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All information, illustrations and specifications in this User Guide are based on the latest information available at the time of publication. The right is reserved to make changes at any time without notice.

Equipment operators and installers shall be responsible for ensuring that a safe working environment and safe systems of work are in place and in certain circumstances advice and permission from the controlling authority must be sought before any operation, installation or surveying work is carried out.

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Authorised by:	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; padding: 5px;">Martin Sheppard</td> <td style="width: 50%;"></td> </tr> <tr> <td style="width: 50%; padding: 5px;">Engineering Manager</td> <td style="width: 50%;"></td> </tr> </table>	Martin Sheppard		Engineering Manager		
Martin Sheppard						
Engineering Manager						

## 1. ISSUE AND REVISION RECORD

This document will be updated when necessary by the re-issue of the complete document.

Issue	Description	Date	Revised Page No.	Revised By.
01	Loaded brake test removed	31/07/2008	12	C.H.
02	Updated section 5.1	26/01/2009	9	C.H.
03	Rail wheel torques altered	21/04/2009	12/13	C.H.
04	Road wheel torques clarified and shift check added to road wheel bolts	06/07/2009	8, 11, 13, 14, 15, 20	C.H.
05	Rear drive axle nut torque check added	30/11/2009	11, 12, 13, 14, 15	C.H.
	Battery check added		12	
	Steering stop check added		12	
06	Updated for RIS-1530-PLT issue 2	31/01/2010	All	C.H.
07	Updated for RIS-1530-PLT issue 4	07/11/2013	All	M.S.
08	Updated for RIS-1530-PLT issue 5 to include air braking additions	09/10/2014	All	M.S.

## 2. INTRODUCTION

The Permaquip Kubota is an Off-Road Rail Vehicle (RRV) that has been designed to facilitate the transportation of goods and personnel. These benefits can be enhanced further when used in conjunction with the Permaquip™ Rail Mover, Type B Towing Trolley, Gas Bottle Trolley, Personnel Carrier, Drum Trolley and Railman.

The Permaquip Kubota RRV is a 4 x 4 vehicle fitted with a diesel engine, which has the ability to carry two persons in addition to the payload located in the rear. This payload area can also accommodate an additional four passengers when on rail. The Kubota base vehicle has been equipped by Permaquip with the following features:

- Front and rear rail gear.
- Ramps for on / off tracking across track.
- Control Module.
- Front and rear work lights.
- Rear load / seating arrangement.
- Towing / propelling Couplings for use with the range of accessories.
- Hydraulic Brake Couplings for use with the range of accessories.
- Air Brake C Couplings for use with the range of accessories.

The fail-safe hydraulic or air brake system causes the brakes to be applied when one of the following occurs:

- The Trolleys or Personnel Carrier brakes away from the consist and causes the hydraulic or air hose to rupture.
- A break in the break-away warning circuit, which is part of the Marker Light Board.
- The Emergency Stops are operated.
- Operation of the handbrake at the driving position.
- Full application of the footbrake.
- Turning the brake system to the 'Off' position.

### 3. DEFINED WORDS

The following outlines the defined words used within this Maintenance Programme.

<b>Term</b>	<b>Action required</b>
<b>Adjust</b>	Correct to defined limits
<b>Change</b>	Remove the original and fit a new or overhauled part or assembly in its place.
<b>Check</b>	Determine a particular nominated condition before, during or after repair, for example completeness, security, position
<b>Clean</b>	Remove all dirt and deposits
<b>Defective</b>	Any fault or faults in a component or assembly, for example structural fractures or weld fractures, which may prevent the component or assembly from fulfilling its designed purpose
<b>Dismantle</b>	Take to pieces
<b>Examine</b>	Determine general condition before repair, for example wear, cracks, splits, leaks, scoring, erosion, breaks, distortion, looseness
<b>Gauge</b>	Determine a nominated dimension by using suitable measuring equipment, for example ruler, micrometer, callipers, feeler gauges or Go / No-Go gauge
<b>Inspect</b>	Determine general condition after repair and attention, that is, conformity to required standards
<b>Lubricate</b>	Apply lubricant
<b>Overhaul</b>	Do what is necessary to make an assembly or sub-assembly re-usable, that is dismantle, strip, clean, examine, fit new parts, repair, re-assemble, test and inspect as required
<b>Paint</b>	To impart colour to a surface
<b>Re-assemble</b>	Put together
<b>Record</b>	Put down in writing a finding from examination, test, inspection or special checks.
<b>Rectify</b>	To set right
<b>Refit</b>	Put back and re-connect
<b>Remove</b>	Disconnect and take off
<b>Renew</b>	Remove, scrap the original part and put a new part in its place
<b>Repair</b>	Restore an original part to the required condition by hand tooling, machining, build-up, welding, patching, bending, setting, heat-treating, re-securing etc.
<b>Strip</b>	Remove covering, that is, paint, polish, fabric
<b>Test</b>	Prove correct operation by trial

## 4. DOCUMENT REVIEW

The following Maintenance Programme specified on the appropriate VAB certification for each product is reviewed as follows:

1. The Maintenance Programme is reviewed on an annual basis to investigate:
  - The potential for improvement.
  - The maintenance activities.
  - The vehicle performance and associated components.
  - National Incident Reports (NIR's).
  - Changes in use and/or operating environment.
  - Manufacturer's advice.
  - Directives from Network Rail.
  - The vehicle's seven-year review.
2. A record of any decisions taken at this review are retained.
3. The process of review follows the Permaquip Engineering Change Control procedure.

## 5. MAINTENANCE AND OVERHAUL PROGRAMME

The following Maintenance Programme specified on the appropriate VAB certification for each product is as follows:



In order to carry out this Maintenance Programme in a manner that achieves the required safety and quality, the following minimum level of competence is required:

- a) For all activities the person leading the task must be able to follow and carry out the instruction detailed in this document.
- b) All safety-critical work must be carried out by persons competent in accordance with Railway (Safety Critical Work) Regulations 1994.
- c) All work relating to the maintenance and overhaul of axle bearings should be carried out by competent persons. Requirements for axle bearings are set out in GM/RT2030; these do not apply to possession-only rail vehicles but may be used as a source of information.
- d) Staff undertaking this work must have been trained and hold certificates of competency such as: SCW ID; apprentice-Trained Craftsman/NVQ level 3 in Plant Maintenance; Certificate issued by a CITB/CTA approved body – operation for maintenance purposes only; Re-assessment of competency in accordance with RPA Standards etc.
- e) All staff to have undergone the training course for the appropriate Permaquip equipment, to the extent of the responsibilities and the tasks they are asked to be perform by the machine and equipment owners and their agents.



Always follow local regulations.



All tools and equipment used for testing of speeds, lighting, noise levels, electrical circuits and all M.O.T. requirements must be calibrated to National Standards, and only operated by fully trained persons.



Observe Manual Handling Regulations.



Information shown is based upon normal rail mileage and service conditions. If used in unusual or arduous conditions then the frequency of the maintenance must be increased accordingly.



Brake tests must be performed following any repair or replacement of the brake system or components.



Prior to working on the air braking system drain the air reservoir via the drain valve sited at the bottom of the tank.



Full track tests must be performed following damage or derailment.



Wheel flange back-to-back measurements must be performed following replacement or removal and reassembly of any wheels.



The road wheel bolt position markers (either paint applied across the bolt onto the wheel, or a physical indicator on the bolt head) must be applied / fitted after the bolts are tightened to the correct torque.



## 5.1. General



During the course of maintenance and testing, all missing items must be replaced; defective items must be repaired or renewed; all faults rectified and equipment correctly adjusted. Replacement parts shall be identical to the original parts in fit, function and performance.



In order to carry out this Maintenance Programme, the following minimum level of facilities is required, appropriate to the jobs being undertaken:

- a) Clean, dry, covered accommodation for dealing with rail gear, bearings, mechanical, hydraulic and electrical components, etc.
- b) Adequate illumination for inspection of components, rail gear and underframes.
- c) Cleaning facilities which will not cause damage to the components.
- d) Handling facilities for removal and refitting of components such as engines.
- e) Protection from the weather of vulnerable areas of the vehicles and its components.
- f) Any specific requirements additional to those listed are identified on the applicable job description.
- g) A suitable length of straight level track for carrying out brake tests.

Maintenance action is intended to ensure the continued safe operation of the Permaquip Kubota RTV900 towing / propelling vehicle and associated trolleys. The maintenance programme has been derived from reliability and safety apportionment's and failure by the owner to follow these activities would invalidate both warranty and safety systems given for the product.

The maintenance location defines the recommended position of the RRV for completion of maintenance actions. Subject to component access, maintenance actions can be completed in the five following locations:-

### 5.1.1. On Site

Here all maintenance action of examination and repair / replacement of the component(s) can be completed with the unit on site.

### 5.1.2. Examination on Site, Replacement in Workshop

Here the visual examination of the component can be completed with the vehicle on site, but it is recommended that the maintenance actions take place in workshop conditions.

### **5.1.3. Workshop**

Here the component is not readily visible / accessible when fitted to the vehicle. It is recommended that the maintenance and examination of these components is carried out in a suitable workshop.

### **5.1.4. Examine at time of Overhaul**

Here the component is assessed not to require general maintenance (i.e. sealed bearings) and the item is planned for repair or replacement within the overhaul schedule.

### **5.1.5. On Equipment, replaced through LRU**

Here the component cannot be inspected on vehicle and can only be assessed using specialist equipment. The component is therefore assessed as a line replaceable unit (LRU) which will be offered on an exchange basis only.

### **Note**

All maintenance tasks recommended for completion on site can also be performed with the equipment located within a workshop. The maintenance schedules contained within this document should be copied prior to completion and the completed sheet stored at the rear of the Product folder. Do not record information directly onto this document.

For spare parts please see the Spare Parts List. It is recommended that parts are purchased from Permaquip to ensure machine reliability and safety.

Upon completion of any maintenance, a Safety Exam must be performed. Follow the Shift Maintenance Programme to do this.

## 5.2. Maintenance Schedule – Base Vehicle

Ref:	Maintenance Task	Instruction	Specific Instructions / Comments	After First Month	Shift and Safety Exam	Weekly	3 Monthly	6 Monthly	9 Monthly	Yearly	Every 2 Years	Every 4 Years
1	Engine start system	Check	See Kubota operations manual	x	x	x	x	x	x	x	x	x
2	Greasing	Apply	See Kubota operations manual			x	x	x	x	x	x	x
3	Engine oil	Check	See Kubota operations manual			x						
		Change	See Kubota operations manual	x			x	x	x	x	x	x
4	Muffler	Clean	See Kubota operations manual	x			x	x	x	x	x	x
5	Spark arrester	Clean	See Kubota operations manual				x	x	x	x	x	x
6	Road wheel bolts	Check	Visual only: present, secure and position marker not disturbed	x	x	x	x	x	x	x	x	x
		Check	Torque 90Nm	x			x	x	x	x	x	x
7	Rear drive axle nuts	Check	Torque 150Nm. Check bearings for play/noise	x			x			x	x	x
8	Battery condition	Check	See Kubota operations manual				x	x	x	x	x	x
9	Fan belt	Check/adjust	See Kubota operations manual				x	x	x	x	x	x
10	VHT neutral spring	Check	See Kubota operations manual				x	x	x	x	x	x
11	Tow-in (road mode only)	Check/adjust	See user guide	x			x	x	x	x	x	x
12	Fuel filter element	Check	See Kubota operations manual				x	x	x			
		Replace	See Kubota operations manual							x	x	x
13	Air cleaner element	Clean	See Kubota operations manual				x	x	x			
		Replace	See Kubota operations manual							x	x	x
14	Fuel line	Check	See Kubota operations manual				x	x	x	x		If required
		Replace	See Kubota operations manual									
15	Engine oil filter	Replace	See Kubota operations manual	x			x	x	x	x	x	x
16	Transmission oil filter (HST - yellow)	Replace	See Kubota operations manual	x				x		x	x	x
17	Transmission oil filter (suction - orange)	Replace	See Kubota operations manual	x				x		x	x	x
18	Transmission fluid	Change	See Kubota operations manual	x				x		x	x	x
19	Brake pedal	Check/adjust	See Kubota operations manual	x				x		x	x	x
20	Parking brake lever	Check/adjust	See Kubota operations manual	x				x		x	x	x
21	Brake light switch	Check	See Kubota operations manual	x				x		x	x	x
22	Front brake case	Check	See Kubota operations manual	x				x		x	x	x
23	Power steering oil	Change	See Kubota operations manual					x		x	x	x
24	Hydraulic lift oil	Change	See Kubota operations manual					x		x	x	x
25	Radiator hose and clamp	Check	See Kubota operations manual					x		x		
		Replace	See Kubota operations manual								If required	If required
26	Power steering oil line	Check	See Kubota operations manual					x		x		
		Replace	See Kubota operations manual								If required	If required
27	Intake air line	Check	See Kubota operations manual					x		x		
		Replace	See Kubota operations manual								If required	If required
28	Brake hose and pipe	Check	See Kubota operations manual	x				x		x	x	
		Replace	See Kubota operations manual									If required
29	Tyre wear	Check	See Kubota operations manual	x	x	x	x	x	x	x	x	x
30	Tyre Pressure	Check	20 PSI	x		x	x	x	x	x	x	x
31	Front axle case oil	Check	See Kubota operations manual							x	x	x
32	Knuckle case oil	Check	See Kubota operations manual							x	x	x
33	Engine valve clearance	Check/adjust	See Kubota operations manual								x	x
34	Fuel injection nozzle injection pressure	Check	See Kubota operations manual									x
35	Injection pump	Check	See Kubota operations manual									x
36	Brake master cylinder (inner parts)	Replace	See Kubota operations manual								If required	If required
37	Brake fluid	Change	See Kubota operations manual								x	x
38	Remote hydraulic hose	Replace	See Kubota operations manual								If required	If required
39	Rear brake cylinder seal	Replace	See Kubota operations manual								If required	If required
40	Front brake seal	Replace	See Kubota operations manual								If required	If required
41	Cooling system	Flush	See Kubota operations manual								x	x
42	Coolant	Check	See Kubota operations manual	x		x	x	x	x	x		
		Change	See Kubota operations manual									
43	Fuel system	Bleed	See Kubota operations manual									
44	Horn	Check	See Kubota operations manual	x	x	x	x	x	x	x	x	x
45	Vehicle lights	Check/replace	See Kubota operations manual	x	x	x	x	x	x	x	x	x

### 5.3. Maintenance Schedule – RRV Conversion

Ref:	Maintenance Task	Instruction	Specific Instructions/Comments	After First Month	Shift and Safety Exam	Weekly	3 Monthly	6 Monthly	9 Monthly	Yearly	Every 2 Years	Every 4 Years
46	EA Documentation	Check			x	x	x	x	x	x	x	x
47	Marker and work lights	Check	Correct operation and are clean	x	x	x	x	x	x	x	x	x
48	Rail wheels bolts	Check	Visual only		x	x	x	x	x			
			Torque 50 Nm	x							x	x
49	Rail wheels - running profile	Check	No flat exceeding 20mm long. No step in flange profile more than 1.5mm. Tread on outside of wheel not more than 2mm above running tread surface. Otherwise do not use until repaired			x						
		Record	No flat exceeding 20mm long. No step in flange profile more than 1.5mm. Tread on outside of wheel not more than 1.5mm above running tread surface. The tread profile shall follow the limits defined for a P1 tread. These are: flange thickness to be 28mm (new) to 24mm (worn) and flange height to be 30mm (new) to 36.5mm (worn). Otherwise do not use until repaired and report incident to infrastructure controller	x			x	x	x	x	x	x
		Record	Diameter greater than 246mm	x			x	x	x	x	x	x
50	Rail wheels back to back	Record	1360mm - 2mm, +3mm at top and bottom of wheel when loaded and unloaded	x			x	x	x	x	x	x
51	Fire extinguisher	Check	Present	x	x	x	x	x	x	x	x	x
		Check	In date and indicator in "OK / green" zone							x	x	x
52	Towing pins and tow bar	Check	Present and secure	x	x	x	x	x	x	x	x	x
53	Leaks under vehicle	Check	No leaks	x	x	x	x	x	x	x	x	x
54	Cab and rear bay	Check	Clean and tidy. Check driver/front passenger safety chains are present and in good condition	x	x	x	x	x	x	x	x	x
55	Bodywork	Check	No damage and yellow areas clean, not faded or discoloured	x	x	x	x	x	x	x	x	x
56	Brake test - static	Check	Vehicle does not move when hand or footbrake applied	x	x	x	x	x	x	x	x	x
57	Brake test	Check	10mph, driver only, unladen. Maximum stopping distance 16m	x	x	x	x	x	x			
		Record	5mph, driver only, laden. Maximum stopping distance, 6m							x	x	x
		Record	20mph, driver only, laden. Maximum stopping distance 60m							x	x	x
58	Track operation	Check	No vibration, noise or steering problems	x	x	x	x	x	x	x	x	
59	Labels	Check	Clean and Present. See user guide MAN-M-O-190	x	x	x	x	x	x	x	x	
60	Rail gear mechanical locks	Check	Pins fitted and secure	x	x	x	x	x	x	x	x	
61	On tracking equipment	Check	Present and damage free	x	x	x	x	x	x	x	x	
62	Break away warning	Check	Buzzer sounds when marker lights disconnected (both ends)	x	x	x	x	x	x	x	x	
63	Engine stops	Check	Can engine stop and rear bay engine stop cuts out engine	x	x	x	x	x	x	x	x	
64	Trailer failsafe brakes - operation	Check	Trailer brakes apply when handbrake or foot break applied, the trailer break switch is off and marker lights are disconnected	x	x	x	x	x	x	x	x	
65	Trailer failsafe brakes - pump/oil tank	Check	Oil level with top of tank body	x	x	x	x	x	x	x	x	
		Check	Pressure 110 ± 30 bar at front and rear connections							x	x	
66	Trailer failsafe brakes - working pressure / air tank	Check	Air brake reservoir pressure reaches 8 bar	x	x	x	x	x	x	x	x	
		Check	Pressure 5.5 - 6 bar at front and rear connections							x	x	
67	Brake hoses	Check	Secure and no damage	x			x	x	x	x	x	
68	Rail gear supports	Check	Secure with no loose fasteners	x				x		x	x	
69	Rail wheels - alignment	Check	See user guide MAN-M-O-190	x						x	x	
70	Rail wheel loading	Record	All between 90-110kg. See section 12 for guidance	x						x	x	
71	Rail gear wheel bearings	Check	See user guide MAN-M-O-190	x						x	x	
72	General inspection of all fasteners	Check	Present and secure	x			x	x	x	x	x	
73	Speedometer	Check	Speedometer functions	x	x	x	x	x	x			
		Record	Speedometer accurate ±10%							x	x	
74	Lifting beam (if supplied)	Record	Statutory checks					x		x	x	
75	Steering stops	Check	Secure	x			x	x	x	x	x	
76	Auxiliary and main battery charge	Check	If vehicle not being used, idle engine for 20 minutes per week	x		x	x	x	x	x	x	
77	Rail wheel life guard/rail head sweep	Record	Rubber height <30mm							x	x	



## 6. RECORD SHEETS

The following record sheets can be used to record the measurements taken as specified in the maintenance programme and are available upon request.

- Kubota Shift Maintenance Schedule
- Kubota Weekly Maintenance Schedule
- Kubota 3 Monthly Maintenance Schedule
- Kubota 6 Monthly Maintenance Schedule
- Kubota Annual Maintenance Schedule
- Kubota 2 Yearly Maintenance Schedule
- Kubota 4 Yearly Maintenance Schedule

Alternative formats to these maintenance records can be used, but they must be retained to show that the maintenance schedule has been followed.

The vehicle log book must be updated with the date and examination type of the last maintenance carried out.

## 7. EMERGENCY RECOVERY PROCEDURE

### 7.1. Stowing of Equipment



All equipment must be stowed prior to recovery. The vehicle must not be propelled or towed at more than 5 mph.

- The Permaquip Kubota should be towed / propelled to a suitable off-tracking point such as a level crossing. Otherwise use the Ramps.
- Move the vehicle off the track to a position of safety.

### 7.2. Rail Gear Failure



In the event of the Rail Gear being unable to be stowed it will be necessary to off-track with the Rail Gear in the lowered position. Therefore care must be taken not to damage the infrastructure.



Once off-tracked and in a position of safety it will be necessary to remove the Rail Gear or rectify the fault. Under no circumstances should the vehicle be driven off-road with any Rail Gear lowered.

- The functioning Rail Gear should be raised into the stowed position as described in the sections 'Raising the Rail Gear'.
- Use the Ramps as necessary to remove the vehicle to a position of safety.

## 8. VEHICLE WINTERISATION



Ensure that the appropriate fluids shown below are used for safe and correct operation at lower temperatures.



Refer to the Kubota Operator's Manual 'Operating the Engine' for cold weather starting and warming up.

### Engine oil

Oil that meets API Service Classification CD, CE or CF.

Use a SAE30, SAE10W-30 or 10W-40 above +25°C.

Use a SAE20, SAE10W-30 or 10W-40 between 0 and +25°C.

Use a SAE10W or SAE10W-30 below 0°C.

### Engine Coolant

Fresh clean water with anti-freeze that is suitable for aluminium engines. When the antifreeze is mixed with the water, the antifreeze mixing ratio must be no more than 50%.

- 40% volume antifreeze, freezing point -24°C
- 50% volume antifreeze, freezing point -37°C

### Fuel

Grade No.2 Diesel fuel above -10°C.

Grade No.1 Diesel fuel below -10°C.

## 9. TYRES AND WHEELS

Please refer to the relevant sections under 'Routine Maintenance and Tests' in the Permaquip Kubota User Guide MAN-M-O-190 for tyre size / types and toe-in requirements.

Actual tyre wear is important – as the tyre wears, the rail wheel loadings can be affected. Therefore ensure that the rail wheel loadings are within the specified limits. If the vehicle has been registered for road use, ensure that the tyre wear is even across the tread and within the depth limits specified by national legislation.

After a new or repaired tyre has been fitted, inflate to the correct pressure as stated in the Maintenance Schedule.

It is recommended that a functional brake test is carried out immediately before further use and a brake stopping distance test at the earliest opportunity.

## 10. WHEEL BOLT MARKERS



Ensure that the wheel bolts have a paint line applied.

The wheel bolts have a paint line applied to highlight any wheel bolt movement. This line is painted on once the wheel bolts have been torqued to 90Nm.

Should the wheel or wheel bolts be removed or re-torqued, the old paint markers should be removed and then reapplied, as shown below.



## 11. REAR DRIVE AXLE NUT

Once the rear drive nut torque has been checked to be 150Nm, check the wheel bearings for play and noise. This is carried out by jacking each wheel separately and rocking the wheel side to side, and top to bottom. Investigate / replace accordingly.

Ensure that a new split pin is fitted into the castle nut after the rear drive nut torque has been checked. Should the pin holes not align with the castle nut slot once the correct torque has been reached, continue to tighten until alignment occurs.

Ensure that the rear wheel spacers and wheel bolts are tightened to the correct torque as described in section 9 above.