

Operating & Maintenance Manual



Ironman (Standard and LUL)

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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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1 ISSUE AND REVISION RECORD

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

	Description	Data	Revised	Revised
issue	Description	Dale	Page No.	By.
15	Changes for new MD	31/12/2009	All	C.H.
16	Maximum length was 300', increased to 360'. Use of additional Ironmen added.	26/08/2011	19	M.J.K.
17	Transposing usage note now includes maximum level 150mm	19/09/2011	5	C.D.M.
18	General update to include more detailed maintenance information.	25/02/2016	All	M.S.
19	Unit of measurement error corrected.	23/06/2017	24	M.S.

Authorised By:	Martin Sheppard BEng	
Autionsed by.	Engineering Manager	

2 INTRODUCTION

The Permaquip[™] Ironman is proven design which can be used singularly or in multiples, for the lifting and transportation of rail lengths, or parts of points and crossings (P&C) from one location to another.

The Ironman can also be used to transpose rail from one side of the track to the other. Therefore by straddling the running rails, access to the four-foot, six-foot and cess is possible.

The Ironman has design variations approved to work on various infrastructures with features including; fail-safe braking system, dismantle-able frame to enable easier lifting and transportation, rail storage bracket, strong and durable steel construction. Optional features depending on model include insulated or non-insulated wheels, Yale Pull-Lift, Camlok Rail Clamp or Rail Lifting Clamp, Single or Double Rail Carriage & Sleeper Lifting System.

3 SAFE AND CORRECT USE

Please keep this User Guide for future reference.

To ensure safe and correct use of the Ironman the following should be noted:





Before placing on track ensure the Ironman has been maintained and perform a COP0018 pre-use check. Failure to do so may result in injury, damage to equipment or infrastructure, consist runaway or worse.



Always ensure there is enough trained personnel present to operate the Ironmen as detailed later in this manual. Under no circumstances should fewer staff be used.



Stopping distances will be greatly increased by icy or wet conditions; gradients; an increase in load; an increase in speed.

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For transposing operations ensure the Ironman is on stable and firm ground and level within the 150mm MAXIMUM on track operating cant, failure to do so may result in injury. Do not attempt to move the Ironman when under transposing conditions.

Do not move the Ironman during transporting operations without the Bottom Cross Beam in position.

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Do not hold off the Brake Handle using mechanical means.

Do not ride the Ironmen. Riding the Ironmen puts yourself and others at risk.

Do not use the Ironman for any other purpose than as described in the introduction. Please contact Permaquip Ltd for advice on use for other applications or purposes.

Increases in cant require extra operator effort to hold the load on the Traverse Hand Wheel once it is disengaged from the locking mechanism.

4 TECHNICAL SPECIFICATION

	Standard Assembly	LUL Assembly
Width	1935 mm	1935 mm
Depth	1085 mm	1065 mm
Height	1410 mm	1400 mm
Total Mass	153.5 kg	141.5 kg
Centre of mass	Central	Central

4.1 Physical Data for Ironman Assembled

4.2 Mass Data for Components

	Mass
Top Beam Assembly	31 kg
Braked End Frame Assembly	36 kg (standard) / 32 kg (LUL)
Un-braked End Frame Assembly	34 kg (standard) / 30 kg (LUL)
Bottom Cross Beam	11 kg
Rail Storage Bracket	7 kg
Adaptor Link Assembly	1 kg
Yale Pull-Lift	15 kg
Single Leg Chain Assembly	6 kg
Rail Lifting Clamp	8.5 kg
Camlok Rail Clamp	12.5 kg

4.3 Physical Data for Sleeper Lifting Attachments

	Beam	Frame
Width	240 mm	1417 mm
Depth	4000 mm	138 mm
Height	267 mm	850 mm
Total Mass	29 kg	17 kg
Centre of mass	Central	Central

4.4 Load Specifications

•	Maximum SWL of Ironman Frame assembly	1500 kg
•	Camlok Rail Clamp (see marking on clamp for details)	750 or 1000 kg
•	Rail Lifting Clamp	1500 kg
•	Yale Pull-Lift	1500 kg
•	Adaptor Link	1500 kg
•	Single Leg Chain Assembly	3150 kg
•	Maximum SWL of Sleeper Lifting Beam	300 kg
•	Maximum SWL of Sleeper Carrying Frame	1000 kg
•	Maximum rail overhang on outer Ironman	10' (3m)

Therefore the maximum operating loads for the various Ironman configurations are as follows;

1. Rail transportation

For standard rail, using a Yale Pull-Lift, Adaptor Link and Camlok Rail Clamp: **SWL 750 or 1000kg (see rating) when lifting, 1500 kg during transportation**

For LUL rail, using a Yale Pull-Lift, Adaptor Link, and Rail Lifting Clamp: **SWL 1500 kg when lifting and during transportation**

For all rail types, using the Rail Storage Bracket mounted on the Ironman (in addition to the appropriate Rail Clamp):

SWL 500 kg during storage only

2. Points and Crossings transportation

For points and crossings, using a Yale Pull-Lift, Adaptor Link and a suitable rated webbing strap:

SWL 1500 kg when lifting and during transportation

Note that the Single Leg Chain Assembly could be used instead of the webbing. However a webbing strap is preferable.

4.5 **Operational Limits**

•	Maximum gradient	1:27
•	Maximum cant (on track)	150mm
•	Maximum cross level (off track, stationary)	150mm
•	Maximum length of rail	360' 110m
•	Maximum length of rail (Network Rail Infrastructure)	300' 91.5m

4.6 Vibration

The Hand Arm Vibration at the operator's position has been measured as less than the action level of 2.5 m/s^2 and therefore no additional measures need to be taken into account.

The Whole Body Vibration is not applicable, therefore the action level is less than 0.5 m/s² so no additional measures need to be taken into account.

Uncertainty is 50% of the values stated.

4.7 **Product Compliance**

The standard Ironman complies with RIS-1701-PLT.

The Ironman also complies with the following:

- Directive 2006/42/EC Safety of Machinery.
- Directive 93/68/EEC CE Marking.

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EC CEF	RTIFICATE	OF CONFORM	IITY
Certificate number:	PMQ		
Customer name:			
Address:			E
Customer Order No:		Permaquip Order I	No:
Description of equipm	nent: Ironman LUL (c/w lifting	equipment)	
Part No:	28717	Date of manufatur	e:
Machine type:	Lifting Equipment	Pads / cat No:	PE007/1057
Safe Working Load:	1500 kg	Quantity:	
Manufacturing confor	mity examination: 150%	overload of safe working load per ea	ch unit & safe work
Serial numbers:			
Serial numbers: Responsible person:	M. Sargent - Director - Pern	naquip Ltd.	
Serial numbers: Responsible person: Person empowered	M. Sargent - Director - Pern M. Sheppard BEng - Engine	naquip Ltd. eering Manager	
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ustomer name:			
ddress:			E
Customer Order No:		Permaquip Order	No:
escription of equipm	nent: Ironman Standard (c/w	lifting equipment)	
art No:	28957	Date of manufatu	ire:
lachine type:	Lifting Equipment	Pads / cat No:	94/009001
afe Working Load:	1500 kg	Quantity:	
anufacturing confor	mity examination: 150%	overload of safe working load per e	ach unit & safe work
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art No:		35696	D	ate of manufature	
achine ty	pe:	Lifting Equipment	Pa	ads / cat No:	a)
afe Workin	g Load:	300 kg Beam, 1000 kg	g Frame Q	uantity:	
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5 STORAGE AND TRANSPORTATION

5.1 Storage

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The Ironman and any associated spare parts should be stored in a dry and secure environment. Safety critical spare parts must be stored in a dry, secure and controlled environment.

5.2 Transportation



During transit the Ironman should be secured, and kept away from all electrified lines. Ensure that any method used to secure the Ironman in/on a vehicle applies the load uniformly and does not exceed the SWL. Do not use excessive force when using a ratchet type loading strap.

6 GENERAL LAYOUT

The following shows the main components of the Ironman before assembly (lifting gear not shown).



The following outlines the main components once assembled.



7 OPERATING INSTRUCTIONS

The following procedure outlines the correct method for operation.



Observe Manual Handling Regulations.

7.1 Checks before use

Follow the appropriate Maintenance Programme outlined in the Maintenance section.

7.2 Assembly of the Ironman

The following procedure outlines the correct method for assembling the Ironman.

- 1. Ensure that all 4 main components are available.
- 2. It is recommended that the Ironman is assembled by a minimum of two persons. Once assembled it is recommended that it is lifted by four persons.
- 3. Check that all parts of the Ironman have the same serial number, the SWL is shown and the 'Next Brake Test Due' has not expired.
- 4. Check that the brakes are in good working order. To do this, access the braked wheels and rotate with one hand. Please refer to CoP0018, pre-use checks. The wheels should resist movement. If in doubt do not use until it has been checked by a competent person.
- 5. Check the brake handle when pushed out to one side is between 5° to 10° above the push handle. If in doubt do not use until it has been checked by a competent person. See picture below.



6. On firm level ground or on track, stand one of the End Frame Assemblies vertically and locate the Top Beam Assembly in position as shown below.



7. Insert the Clamping Screw and tighten, as shown below. This secures the End Frame and Top Beam Assembly together. Repeat the procedure for the remaining End Frame Assembly.



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8. Mount the Bottom Cross Beam onto both of the End Frame Assemblies, as shown below.



9. The Ironman is now assembled. The appropriate lifting equipment can now be hooked onto the Top Beam carriage, as shown below.



10. If required, mount the Rail Storage Bracket onto the un-braked End Frame Assembly as shown below. Secure in position with the Clamp Screw.



7.3 Fitting the red lights

- 1. The Red Lights are located in two positions on the Ironman Top Beam. There are no additional fixings required as they slot into the Light Brackets fitted within the apertures, as shown below. The two locking screws supplied can be fitted to prevent unauthorised removal.
- 2. The Red Lights can be switched from underneath using the on and off switch positioned between the support tabs. It will need to be actuated using your fingernail or a small thin flat object. Operation has purposely been made difficult to prevent false operation.



7.4 Moving the Assembled Ironman

The fully assembled Ironman is equipped with four rotating lifting handles. Once lifted, the handles will lock in position to prevent unexpected movement.

It is designed to be lifted by four persons, as shown below.



Once the Ironman is on the track ensure that all four wheels are in contact with the rail head.

To release the fail-safe brake, hold down the Brake Handle whilst facing the direction of travel and walking outside of the rail, as shown below.



When operated in pairs, ensure both of the Ironmen have the Brake Handles on the same safe side. The brake will automatically apply when the Brake Handle is released.

7.5 Operating the Ironman



Where possible, always ensure that the operator is on the higher side of canted track when operating the Carriage Traverse.



Ensure the operator's hands and fingers are on the outside of the handwheel at all times.

Before attempting to use the Ironman, the following checks must be made:

- 1. Check that the Carriage Traverse is working correctly;
 - Push in and rotate the handwheel.
 - Stop and pull the handwheel until the lock engages (lock off traverse).
 - Ensure that the traverse lock is engaged.
- 2. Check the operation of the failsafe brakes:-
 - Disengage the brake by pushing down on the Brake Handle.
 - Push the machine forward.
 - Apply the brake by releasing the Brake Handle.

- Ensure that the machine stops, remains stationary and that the Brake Cables are not taut.

7.5.1 Lifting Operations

3. Single Rail Lift

Lower the Camlok Rail Lifting Clamp by operating the Yale Pull-lift in accordance with the manufacturer's instructions. Attach the Rail Clamp to the rail in accordance with the manufacturer's instructions.

Before lifting ensure that the rail clamp is secure on the rail and that the carriage is positioned vertically above the point of lifting. Lift the load by operating the Yale Pull-lift in accordance with the manufacturer's instructions.

When only one rail is being transported it is essential that it is placed centrally on the Bottom Cross Beam and not into the Rail Storage Bracket (if fitted).

4. Double Rail Lift

When more than one rail needs to be lifted, the additional 2-Rail Carrier Assembly can be used.

Convert from a single lift to a double lift on the Top Beam as follows;

- 1. Remove the central Top Beam carriage lifting bolt.
- 2. Fit the 2-Rail Carrier Assembly and secure in position with the bolt and Nyloc nut supplied.
- 3. Connect a Yale Pull-Lift to each of the lifting points one each side of the 2-Rail Carrier Assembly.
- 4. The Ironman is now ready for lifting rail 2 rails at the same time.



2-Rail Carrier Assembly mounted onto Top Beam carriage



Yale Pull-Lift mounted onto each side

Alternatively, if the 2-Rail Carrier Assembly is not fitted, then a length of rail can be temporarily stored when the Rail Storage Bracket is mounted on the Un-braked Frame Leg of the Ironman. The removable pin locates in one of two positions. The outer position is used for flat-bottom rail, whereas the inner position is used for Bull-head rail.



Mounting for flat-bottom rail



Mounting for Bull-head rail

When using the Rail Storage Bracket, ensure that the other rail is located just off the centre on the Bottom Cross Beam. Then lift the second rail out of the Rail Storage Bracket and onto the Bottom Cross Beam. This ensures the loads are uniformly distributed, as shown below.



5. Points and Crossing Type

Lower the Single Leg Chain Assembly by operating the Yale Pull-lift in accordance with the manufacturer's instructions until there is enough slack to secure the chain around the points and crossing. Ensure that the protective chain covers are positioned so that they protect the chain. Secure the chain using the shortening clutch as required.

Before lifting ensure that the carriage is positioned vertically above the point of lifting. Lift the load by operating the Yale Pull-lift in accordance with the manufacturer's instructions.

Additional Ironmen may be required to prevent damage when lifting.

Note that a webbing strap can be used to replace the Single Leg Chain Assembly when preferred.

7.5.2 Traversing Operations

The following procedure outlines the correct method for operation.

- 1. Position each Ironman over the items to be lifted.
- 2. Manoeuvre the carriage. To do this grip the handwheel with both hands, push the handwheel to compress the spring and disengage the lock, turn the wheel approx. 90°, then pull to re-engage the lock.

Do not rely on the spring to lock the traverse as this is only designed to hold the lock once engaged. Repeat this push-turn-pull sequence to manoeuvre the carriage to the desired position. Ensure that the traversing mechanism lock is fully engaged before lifting and travelling under load.

7.5.3 Transposing Operations

Remove the Bottom Cross Beam if fitted.

With the push-turn-pull method outlined in 'Traversing Operations', use the handwheel to traverse the rail/points & crossings to the required position. Once positioned, ensure that the traversing mechanism lock is fully engaged before releasing the handwheel.

7.5.4 Transporting Operations

Using the Yale Pull-lift, lower the rail or points & crossings onto the centre of the Bottom Cross Beam. Ensure that some tension remains in the Lifting Tackle Assembly to retain the rail in position. The Ironman can now be pushed along the track and walking pace or slower to the required unloading site. The Ironman is manually propelled and must be attended by the correct amount of personnel to ensure full control is kept at all times. Do not pull the Ironman.

Once the unloading site is reached, the rail or points & crossings should be lifted clear of the Bottom Cross Beam, the Bottom Cross Beam removed, and the rail or points & crossings can then be lowered to the ground using the Yale Pull-lift.

7.5.5 Operations with lengths of rail

The Ironman can be used to traverse, transpose and transport longer lengths of rail up to 360' (110m) provided that:

- 1. A lifting plan is in place.
- 2. The lifting operation is controlled by one person, ensuring that all Pull-lifts are operated at the same time and the load is lifted off the ground.
- 3. The distance between each Ironman does not exceed 40' (13m).
- 4. Only one length of rail is handled at a time when over 60' and should not exceed the SWL of each Ironman.
- 5. With two lengths of rail the lengths should not exceed 60' and not exceed the SWL of each Ironman.
- 6. There are a minimum of two operators for each Ironman when transporting, located outside the 4-foot. Local regulations should be followed in regards to additional personnel required to push the Ironman with loads up or down gradients. Please refer to CoP0018 for guidance.

The number of Ironman required will depend upon the total length of rail and profile being moved. The following information provides guidance on these figures based on 50kg/m rail:

Rail length	Min. Number of	Max. Distance	Maximum rail
	Ironmen	between Ironmen	overhang
Up to 60'	2		
Over 60', less than 100'	3		
Over 100', less than 140'	4		
Over 140', less than 180'	5		
Over 180', less than 220'	6	40'	10'
Over 220', less than 260'	7		
Over 260', less than 300'	8		
Over 300', less than 340'	9		
Over 340', less than 360'	10		

Lengths over 360' should not be moved. This is due to practical limitations on safe communication – it is essential that all lifting and moving operations occur at the same time.

7.5.6 Operations with switches

The Ironman can be used to traverse, transpose and transport switches. However it is essential that the switch is not damaged or the Ironman overloaded. Therefore the following data gives guidance on the switch type for the lifting plan (fitted UIC54 rail).

Lift operations highlighted in red must not be used.

Lift operations using two Ironmen with various overhang are shown below.

Switch	Loading on Ironman with various lengths of overhang						
туре	1 ype 0' 2' 4' 6'	8'	10'				
AV							
AVT			OK	to use			
BV							
CV							
DV		Do not use Ironman as lifting capacity exceeded					
EV							
FV							
SGV							
GV							
ΗV							

Lift operations using **three** Ironmen with various overhang on the two outer units, are shown below. The third Ironman is placed centrally.

	Loading on li with 2.5' ove		ng on Ironman 2.5' overhang		Loading on Ironma with 5' overhang	
Switch Type	Light End	Central	Heavy End	Light End	Central	Heavy End
AV						
AVT						
BV						
CV						
DV						
EV						
FV		D	o not use	Ironman a	as	
SGV		lift	ing capac	ity exceed	ed	
GV						
HV						
	Loadi with	ing on Iro 7.5' over	nman hang	Loadi with	ng on Iro 10' overl	nman nang
Switch Type	Loadi with Light End	ing on Iro 7.5' over Central	nman hang Heavy End	Loadi with Light End	ng on Iro 10' overh Central	nman nang Heavy End
Switch Type AV	Loadi with Light End	ing on Iro 7.5' over Central	nman hang Heavy End	Loadi with Light End	ng on Iro 10' overh Central	nman nang Heavy End
Switch Type AV AVT	Loadi with Light End	ing on Iro 7.5' over Central	nman hang Heavy End	Loadi with Light End	ng on Iro 10' overh Central <i>N/R</i> *	nman nang Heavy End
Switch Type AV AVT BV	Loadi with Light End	ing on Iro 7.5' over Central	nman hang Heavy End	Loadi with Light End	ing on Iro 10' overh Central <i>N/R*</i>	nman nang Heavy End
Switch Type AV AVT BV CV	Loadi with Light End	ing on Iro 7.5' over Central	nman hang Heavy End	Loadi with Light End	ing on Iro 10' overh Central <i>N/R</i> *	nman nang Heavy End
Switch Type AV AVT BV CV DV	Loadi with Light End	ing on Iro 7.5' over Central	nman hang Heavy End	Loadi with Light End	ing on Iro 10' overh Central <i>N/R</i> *	nman nang Heavy End
Switch Type AV AVT BV CV DV EV	Loadi with Light End	ing on Iro 7.5' over Central	nman hang Heavy End	Loadi with Light End	ing on Iro 10' overh Central <i>N/R*</i>	nman hang Heavy End
Switch Type AV AVT BV CV DV EV EV	Loadi with Light End	ing on Iro 7.5' over Central	nman hang Heavy End	Loadi with Light End	ing on Iro 10' overh Central <i>N/R*</i>	nman nang Heavy End
Switch Type AV AVT BV CV DV EV EV FV SGV	Loadi with Light End	ing on Iro 7.5' over Central	nman hang Heavy End	Loadi with Light End	ing on Iro 10' overh Central <i>N/R</i> *	nman nang Heavy End
Switch Type AV AVT BV CV DV EV EV FV SGV GV	Loadi with Light End	ing on Iro 7.5' over Central	nman hang Heavy End	Loadi with Light End	ing on Iro 10' overh Central <i>N/R*</i>	nman hang Heavy End

N/R* - In this lift case, the central Ironman is not required.

7.5.7 Changing the Lifting Equipment

Standard Lifting Equipment

Convert from a Single Leg Chain Assembly to a Camlok Rail Clamp as follows;

- 1. Locate the Adaptor Link Assembly which connects the Yale Pull-Lift chain and the Single Leg Chain Assembly.
- 2. Remove the Lower Bolt which will release the whole chain assembly from the Yale Pull-Lift.
- 3. Remove the Single Leg Chain Assembly and replace it with the Camlok Rail Clamp.
- 4. Replace the Lower Bolt in the Adaptor Link Assembly.
- 5. The Ironman is now ready for lifting rail.

To convert between a Camlok Rail Clamp to a Single Leg Chain Assembly reverse the process outlined above.

LUL Lifting Equipment

Convert from a Single Leg Chain Assembly to an Rail Lifting Clamp as follows;

- 1. Locate the Adaptor Link Assembly which connects the Yale Pull-Lift chain and the Single Leg Chain Assembly.
- 2. Remove the Lower Bolt which will release the whole chain assembly from the Yale Pull-Lift.
- 3. Remove the Single Leg Chain Assembly and replace it with the Rail Lifting Clamp.
- 4. Replace the Lower Bolt in the Adaptor Link Assembly.
- 5. The LUL Ironman is now ready for lifting rail.

To convert between a Rail Lifting Clamp to a Single Leg Chain Assembly reverse the process outlined above.

7.6 Using the Sleeper Lifting System Attachments

- 1. Remove the M20 lifting bolt from the carriage of two Ironmen.
- 2. Stand the two Ironmen on track at a pitch of 3m.
- 3. Attach the beam to both carriages using the pins at each end and lock in place with the lynch pin (see below).
- 4. Place one frame into the base of each Ironman so that all four pins are locked in place (see below)



- 5. Attach a suitable pull-lift or winch to the lifting bolt on the underside of the main beam.
- 6. The sleeper can now be lifted using the suitable lifting equipment and stored on the frame at the base of the Ironman.



8 DEFINED WORDS

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

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

9 DOCUMENT REVIEW

The following Maintenance Programme specified for the Ironman is reviewed as follows:

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

10 MAINTENANCE

The following Maintenance Programme specified for the Ironman 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.
- 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.

0

U

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.

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

Note that:

- The Maintenance and Testing of the Brakes, Wheels and Axles are defined as Railway Safety Critical under CoP0010, Railway Safety Critical Maintenance Elements of Small Plant and Equipment.
- The Maintenance and Testing of the Brakes are covered under CoP0018, Rail Mounted Manually Propelled Equipment. The brakes must be maintained and tested at a periodicity of no greater than 3 months.

10.1 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 wheelsets, bearings, mechanical, hydraulic and electrical components, etc.
- b) Adequate illumination for inspection of components, bogies and underframes.
- c) Cleaning facilities which will not cause damage to the components.
- d) Handling facilities for removal and refitting of components such as rail bogies and 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 Trailers and towing / propelling vehicle. 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 Trailer for completion of maintenance actions. Subject to component access, maintenance actions can be completed in the five following locations:

10.1.1 On Site

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

10.1.2 Examination on site, replacement in workshop

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

10.1.3 Workshop

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

10.1.4 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.

10.1.5 On equipment, replaced through LRU

Here the component cannot be inspected on trailer 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 contact your nearest Permaquip service centre. 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 Daily or Pre-use maintenance schedule to do this.

10.2 Maintenance schedule

The following schedule outlines the maintenance required on the Ironman.

				Frequency		
Ref:	Maintenance Task	Instruction	Location	Daily or Pre-use	3 Monthly	6 Monthly
10.3.1	Check that the Top Beam, End Frames and the Bottom Cross Beam have no deformation or cracks.	Check	Workshop		x	x
10.3.2	Check both End Frames; the axle mount plates should be straight and in line. The Bottom Cross Beam locating lugs should not be damaged.	Check	Workshop		x	x
10.3.3	Ensure all four wheels are in contact with the rail head.	Check	Test Track		x	x
10.3.4	Check assembly for any missing components and replace if necessary.	Check / Replace	Workshop		x	x
10.3.5	Ensure that all four carrying handles are in good condition.	Check	On Site	x	x	x
10.3.6	End Frames - keep the top (unpainted portions) lubricated to facilitate ease of assembly with the Top Beam Assembly.	Lubricate	Workshop		x	x
10.3.7	Lubricate inside the Top Beam pockets to facilitate assembly.	Lubricate	Workshop		x	x
10.3.8	Lubricate all Clamping Screws.	Lubricate	Workshop		x	x
10.3.9	Ensure all labels are secure and can be easily read. Clean and replace as required.	Check / Clean	On Site		x	x
10.3.10	Check paint work condition. Re-condition paint work if necessary.	Check / Clean / Paint	On Site / Workshop			x
10.4.1	Check that the wheels rotate freely. Resistance to rotation or rocking of the wheel on the axle indicates either a worn axle or a cracked bearing. The wheel bearings are sealed for life and do not require lubrication. Replace damaged or worn bearings / axles.	Check / Replace	Workshop		x	x
10.4.2	Check the wheel profile for wear, cracks and damage. Replace damaged or worn wheels.	Check / Replace	Workshop		x	x
10.4.3	The conductivity between the aluminium wheels (where applicable) and frame needs to be checked using a calibrated resistance meter. Connect one lead to an unpainted section of the frame. Connect the other lead to one of the wheels. The measured resistance should be less than 0.5Ω .	Check / Record	Workshop		x	x
10.4.4	The insulation of nylon & hybrid wheels (where applicable) and frame needs to be checked using a calibrated resistance meter. Connect one lead to an unpainted section of the frame. Connect the other lead to one of the wheels. The measured resistance for each wheel should be more than $5M\Omega$.	Check / Record	Workshop		x	x
10.4.5	The aluminium wheels have a P1 profile. The maximum wear limits can be checked using the Wheel Profile Gauge (part number 34597). Note that an increase in wear will reduce brake performance.	Check	Workshop		x	x

10.5.1	Remove the brakes and check the brake linings. Remove any dirt or oil from the working surfaces. The recommended minimum thickness of the brake pad lining is 2.5mm. Replace if necessary then re-assemble.	Clean / Replace	Workshop		x	x
10.5.2	Check the operation of the brake to ensure that the brake cables, clevis and rigging screw adjuster are in good condition. See manual.	Check / Adjust	Workshop		x	x
10.5.3	Lubricate both of the brake pivot pins, clevis pins and the rigging screw adjuster.	Lubricate	Workshop		x	x
10.5.4	Check that the brakes are in good working order. To do this, access the braked wheels and rotate with one hand. Please refer to CoP0018, pre-use checks. The wheels should resist movement.	Check	On Site	x		
10.5.5	The brakes shoes should be clear of contact with the wheels when the Brake Handle is held fully down against the push handle, and in full contact with the wheels when the Brake Handle is released.	Check	On Site	x	x	x
10.5.6-8	With the Brake Handle released and the brakes engaged, both brake cables should be slack. Check the brake handle when pushed out to one side and no downward pressure exerted is	Check	On Site	x	x	x
10.0.0 0	positioned between 5° to 10° above the push handle. Adjust if necessary. See Manual.	Adjust	Workshop		x	x
10.5.9- 10	Test the brake efficiency using the appropriate Brake Test Tool. Ensure that the wheels and brake pads are dry. The brakes should be tested at all four quadrants of each braked wheel and in both directions. The average torque at which the wheel resists movement should be equal or greater than 40 Nm for aluminium wheels, hybrid wheels and 25Nm for Nylon wheels. As these are the lowest limits it is highly recommend to allow a minimum of 20Nm above these figures for setting the torque allowing for wear between service intervals. Adjust if necessary. See manual.	Check / Adjust	Workshop		x	x
10.5.11	Fix a 'Next Brake Test Due' label onto the Trolley. The date specified must be within 3 months. Complete the Maintenance Brake Test Record Sheet.	Renew / Record	Workshop		x	x
10.6.1	Ensure that the traverse hand wheel is free moving and will spring into the locked position.	Check	On Site	x	x	x
10.6.2	Check the condition of the Traverse Lock Pin and if damaged replace immediately.	Check / Replace	Workshop		x	x
10.6.3	Ensure that both traverse handwheel sprocket pivots and Carriage Top Rollers are lubricated.	Lubricate	Workshop		x	x
10.6.4	The Traverse Chain should be kept lubricated using chain lubricant spray.	Lubricate	Workshop		x	x
10.6.5	Ensure all labels are secure and can be easily read. Replace as required.	Check / Clean	On Site		x	x
10.6.6	Check that the rollers are free to rotate on the Double Rail Carriage and lubricate (if fitted).	Check / Lubricate	Workshop		x	x
10.7	Lifting Tackle Assemblies should be maintained and tested in accordance with statutory requirements. Complete a "Report of Thorough Examination".	Check / Report	Workshop			x
10.8	Check Red lights are present and operate correctly, replace batteries or unit if required. See manual.	Check	On Site	x	x	x

10.3 Mainframe Assembly

- 1. Check that the Top Beam, End Frames and the Bottom Cross Beam have no deformation or cracks.
- 2. Check both End Frames; the axle mount plates should be straight and in line. The Bottom Cross Beam locating lugs should not be damaged.
- 3. Ensure all four wheels are in contact with the rail head.
- 4. Check assembly for any missing components and replace if necessary.
- 5. Ensure that all four carrying handles are in good condition.
- 6. End Frames keep the top (unpainted portions) lubricated to facilitate ease of assembly with the Top Beam Assembly.
- 7. Lubricate inside the Top Beam pockets to facilitate assembly.
- 8. Lubricate all Clamping Screws.
- 9. Ensure all labels are secure and can be easily read. Replace as required.
- 10. Check paint work condition. Re-condition paint work if necessary.

10.4 Wheels

- 1. Check that the wheels rotate freely. Resistance to rotation or rocking of the wheel on the axle indicates either a worn axle or a cracked bearing. The wheel bearings are sealed for life and do not require lubrication. Replace damaged or worn bearings / axles.
- 2. Check the wheel profile for wear, cracks and damage. Replace damaged or worn wheels.
- 3. The conductivity between the aluminium wheels (where applicable) and frame needs to be checked using a calibrated resistance meter. Connect one lead to an unpainted section of the frame. Connect the other lead to one of the wheels. The measured resistance should be less than 0.15Ω .
- 4. The insulation of nylon & hybrid wheels (where applicable) and frame needs to be checked using a calibrated resistance meter. Connect one lead to an unpainted section of the frame. Connect the other lead to one of the wheels. The measured resistance for each wheel should be more than $5M\Omega$.
- 5. The aluminium wheels have a P1 profile. The maximum wear limits can be checked using the Wheel Profile Gauge (part number 34597). Note that an increase in wear will reduce brake performance.

10.5 Brakes

- 1. Remove the brakes and check the brake linings. Remove any dirt or oil from the working surfaces. The recommended minimum thickness of the brake pad lining is 2.5mm. Replace if necessary then re-assemble.
- 2. Check the operation of the brake to ensure that the brake cables, clevis and rigging screw adjuster are in good condition.

- 3. Lubricate both of the brake pivot pins, clevis pins and the rigging screw adjuster.
- 4. Check that the brakes are in good working order. To do this, access the braked wheels and rotate with one hand. Please refer to CoP0018, pre-use checks. The wheels should resist movement.
- 5. The brakes shoes should be clear of contact with the wheels when the Brake Handle is held fully down against the push handle, and in full contact with the wheels when the Brake Handle is released.
- 6. With the Brake Handle released and the brakes engaged, both brake cables should be slack. Check the brake handle when pushed out to one side and no downward pressure exerted is positioned between 5° to 10° above the push handle.
- 7. To adjust, slacken off the locknuts positioned at the top and bottom of the Rigging Screw Adjuster. Turning the Adjuster in one direction will introduce slack into the brake cable and turning in the opposite direction will reduce slack.
- 8. Once the above set-up is obtained re-tighten the locknuts. Remove any previous markings and remark using a paint marker pen.
- 9. Test the brake efficiency using the appropriate Brake Test Tool. Ensure that the wheels and brake pads are dry. The brakes should be tested at all four quadrants of each braked wheel and in both directions. The average torque at which the wheel resists movement should be equal or greater than 40 Nm for aluminium wheels, hybrid wheels and 25Nm for Nylon wheels. As these are the lowest limits it is highly recommend to allow a minimum of 20Nm above these figures for setting the torque allowing for wear between service intervals.
- 10. If the brake torque is not achieved, check and adjust the brakes as described previously and repeat the tests. To aid brake torque figures the spring can be shimmed using M16 Form A zinc washers up to a maximum of 2 washers. See picture below:



11. Fix a 'Next Brake Test Due' label onto the Trolley. The date specified must be within 3 months. Complete the Maintenance Brake Test Record Sheet.

10.6 Carriage and Traverse Mechanism

- 1. Ensure that the traverse hand wheel is free moving and will spring into the locked position.
- 2. Check the condition of the Traverse Lock Pin and if damaged replace immediately.
- 3. Ensure that both traverse handwheel sprocket pivots and Carriage Top Rollers are lubricated.
- 4. The Traverse Chain should be kept lubricated using chain lubricant spray.
- 5. Ensure all labels are secure and can be easily read. Replace as required.
- 6. Check that the rollers are free to rotate on the Double Rail Carriage and lubricate (if fitted).

10.7 Lifting Tackle Assemblies

1. Lifting Tackle Assemblies should be maintained and tested in accordance with statutory requirements. Complete a "Report of Thorough Examination".

10.8 Red Light

- 1. To replace the batteries within the Red Lights, remove the 4 off cross-headed screws from the rear of the light assembly and lift off the rear cover.
- 2. Replace the 2 off batteries to the correct specification, noting the polarity.
- 3. With the gasket in position replace the rear cover and secure using the 4 off screws.
- 4. Discard the old batteries according to local and national regulations.
- 5. Check the light operation using the slide switch on the bottom of the unit.
- 6. Replace into the Ironman.



11 RECORD SHEETS

The following Record Sheets can be used to record the measurements taken as specified in this Maintenance Programme and are available upon request.

- Ironman Daily or Pre-Use Maintenance Schedule
- Ironman 3 Monthly Maintenance Schedule
- Ironman 6 Monthly 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.

12 TEST SPECIFICATION



All parts including the lifting equipment should be inspected, maintained and tested by a competent person in accordance with statutory requirements.

The Ironman should be tested to the following specification after any structural repairs have been carried out, or when the Ironman has been damaged.

Note the testing of the Brakes is defined under the Maintenance section of this User Guide. This is important as the brakes must be checked and maintained before testing.

- 1. Visually check that there is no component damage or distortion.
- 2. Mount the assembled Ironman onto the test rig which simulates 150mm track cant.
- 3. Apply a downward load equivalent to 1.5 x SWL (2,250kg) on the Carriage Assembly mount.
- 4. Maintain this load for 2 minutes. Remove the load.
- 5. Check all components to ensure there is no weld damage or permanent deformation.
- 6. Check the diagonal corner-to-corner dimensions. There should be no more than 2mm between the two dimensions.
- 7. Ensure that all of the main components have identification showing the date tested.
- 8. Test all other lifting equipment in accordance with current legislation.

The Sleeper Lifting Beam should be annually tested to the following specification.

- 1. Visually check that there is no component damage or distortion.
- 2. Mount the lifting beam onto two assembled Ironman on flat level track.
- 3. Apply a downward load equivalent to 1.5 x SWL (450kg) on the Carriage Assembly mount.
- 4. Maintain this load for 10 minutes. Remove the load.
- 5. Check all components to ensure there is no weld damage or permanent deformation.

6. Ensure that all of the main components have identification showing the date tested.

Permaquip Ltd offer a testing and maintenance service – please contact us for further details.

13 TRAINING

Persons that will operate, maintain and test the Ironman should undertake a programme of training. This programme of training should include the following aspects:

- Product familiarisation.
- Component location and function.
- Product preparation.
- Safe and Correct Use.
- Maintenance.
- Testing.
- Practical experience.

Permaquip Ltd offer a training service – please contact us for further details.

14 ORDERING

DE	SCRIPTION	PADS Cat. No.	PART NO
Ironman (standard) Assembly complete with Yale Pul-Lift, Camlok Rail Clamp, Adaptor Link, Single Leg Lifting Chain and Rail Storage Bracket (lifting gear not shown)		PA05/03385	28957
Ironman (LUL) Assembly complete with Yale Pul-Lift, LUL Rail Clamp, Adaptor Link, Single Leg Lifting Chain and Rail Storage Bracket (lifting gear not shown)		LUL Certificate Number PE007/1057	28717

Ironman (standard) complete with Rail Carrying Bracket only		28397
Ironman (LUL) complete with Rail Carrying Bracket only		33273
Adaptor Link Assembly		27924
Yale Pull-Lift		040590025
Single Leg Lifting Chain		28640
Red Light		040820218

Brake Test Tool		34711
Camlok Rail Clamp		040590057
Rail Lifting Clamp		06275
Double Rail Carriage		35212
Rail Storage Bracket		28549

Wheel Profile Gauge	and a second sec	34597

For spare parts please see the Ironman Spare Parts List.

Please contact Permaquip Ltd for further information and support.

Our contact details are shown on the front of this manual.

In order to avoid delay and to have your orders fulfilled promptly,

Please telephone, e-mail, fax or write giving the following information:

- 1. Company name.
- 2. Contact details.
- 3. Invoicing and delivery details.
- 4. Purchase order number.
- 5. Method of delivery.
- 6. Part number, description and quantity for each item.