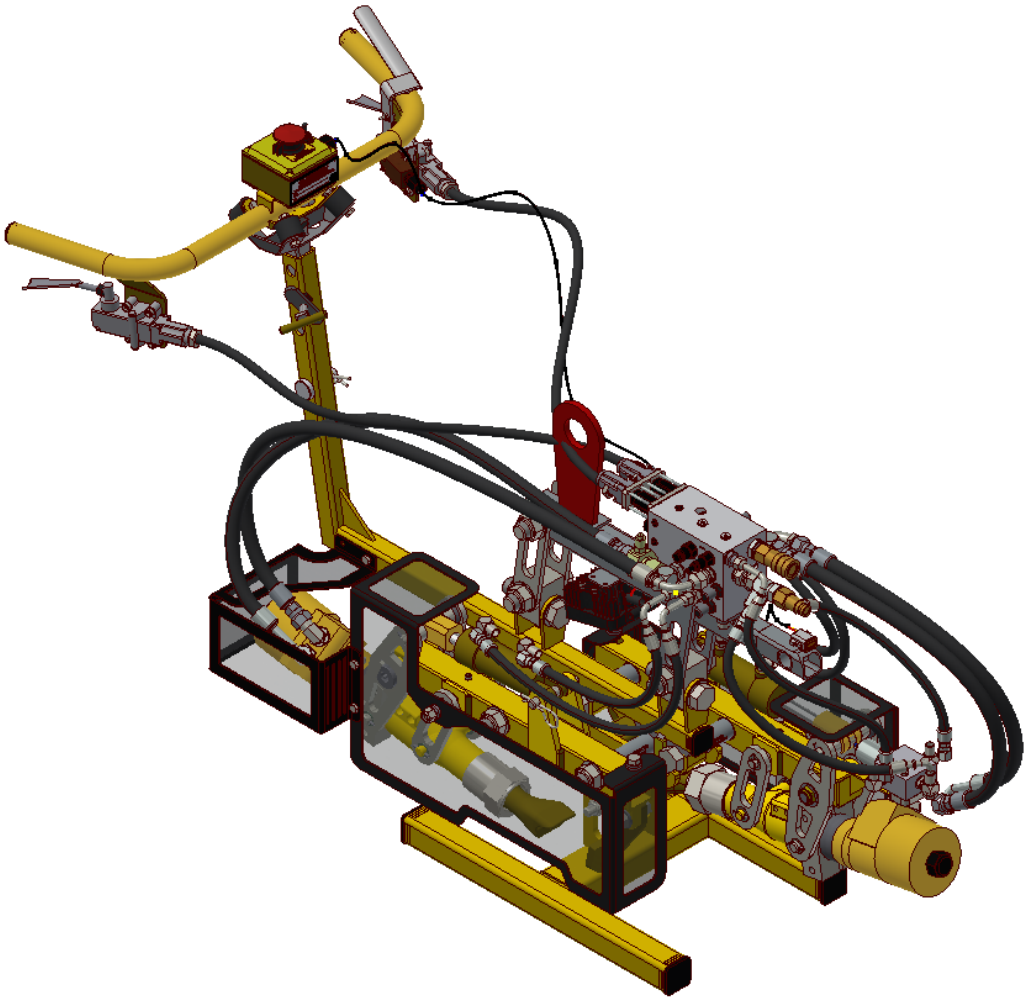
Melvelle Equipment Corp Pty Ltd

"Proud Australian Manufacturers"

186 E-Clip Remover

Operation, Training & Maintenance Manual



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1. Preface

Every attempt has been made to present accurate and current information within this manual. However, as product development on the E-Clip Remover and components used within is continuous, the information contained herein may be subject to change without notice, and without incurring obligation.

The information provided within this manual is the sole property of Melvelle Equipment Corporation Pty Ltd (MEC) and as such, reproduction or replication of any material contained within is not allowed without the written consent of MEC.

Information provided within this manual assumes:

- The person(s) operating the machinery have read and understand this manual and other manuals provided for specific components
- The person(s) operating are properly trained and equipped to safely and professionally operate this machinery
- The person(s) operating utilise the correct attachments and/or tools, and are trained and equipped to use them safely and professionally

SERVICING THE 186 E-CLIP REMOVER

This manual contains safety, operation and periodic maintenance instructions. MEC recommends that servicing of equipment, other than periodic maintenance, must be performed by MEC or certified and authorised dealer. Please read the following warning.

SERIOUS INJURY OR DEATH COULD RESULT FROM THE IMPROPER REPAIR OR SERVICE OF THIS EQUIPMENT.

REPAIRS AND / OR SERVICE OF THIS EQUIPMENT MUST ONLY BE PERFORMED BY MELVELLE EQUIPMENT CORP. PTY LTD. OR CERTIFIED AND AUTHORISED DEALER.

THE USER SHALL NOT MODIFY THE DESIGN OR CONFIGURATION OF EQUIPMENT WITHOUT CONSULTING MEC

2. Safety Information

This operation and training manual is intended to complement existing site procedures.

The following site documentation must be reviewed by the trainee before commencing training:

- Safe Work Procedures (SWP)
- Isolation Procedures

If the training package information conflicts with existing site documentation, then the authorised site and/or end user is to consult with MEC in regards to any possible amendments or modifications required.

The following practices and procedures must be adhered to:

- Always complete Pre-Operation Checks prior to use and report any defects if found
- Only connect equipment with compatible MEC equipment
- Only operate the equipment for its intended purpose
- Never operate with guards missing or damaged
- PPE Equipment as a minimum should be worn at all times according to this manual and as per site specifications
- Ensure Isolation Procedures are followed prior to carrying out any maintenance
- If any faults or damage to this machine are found during pre-operation checks or operation, tag the machine “Out-of-Service” and follow site procedures

Following the above mentioned and the information contained within this manual will ensure safe, efficient operation of the equipment.

3. Safety Symbols

The safety symbols and signal words, as shown below, are used to emphasise all operator, maintenance and repair actions which, if not strictly followed, could result in a life-threatening situation, bodily injury or damage to the equipment.

3.1. Safety Symbols & Signal Words

	**This safety alert and signal word indicates a hazardous situation which, if not avoided, will result in death or serious injury.**
	**This safety alert and signal word indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.**
	**This safety alert and signal word indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.**
	**This signal word indicates a potentially hazardous situation which, if not avoided, may result in property damage.**
	**This signal word indicates a situation which, if not avoided, will result in damage to the equipment.**
	**This signal word indicates a situation which, if not avoided, may result in damage to the equipment.**

3.2. Hazard Warning Signs

	**This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all instructions to avoid possible injury or death.**
	**This is the fire risk symbol. It is used to alert you to the potential of a fire starting if ignition sources are present.**
	**This is the explosive risk symbols. It is used to alert you to the potential of an explosion /explosive substances present.**
	**This is the toxic hazard symbol. It is used to alert you to the presence of toxic substances.**
	**This is the corrosive risk symbol. It is used to alert you to the presence of corrosive substances.**
	**This is the electric shock risk symbols. It is used to alert you to the presence of an electrical supply.**
	**This is the battery symbol. It is used to alert you to the potential hazard of electrical supply, battery acid and leaking batteries.**

	**This is the hot surface symbol. It is used to alert you that the surfaces may be hot.**
	**This is the dangerous gases symbol. It is used to alert you to the presence of dangerous gases.**
	**This is the fluid under pressure symbol. It is used to alert you that there are fluids under pressure in this machinery.**
	**This is the sharp edges symbol. It is used to alert you to the presence of sharp edges or cutting hazard.**
	**This is the keep hands clear symbol. It is used to warn you to keep hands clear as there are pinch points present.**
	**This is the rotating parts symbols. It is used to warn you of rotating parts on the machinery. Keep clear of rotating parts.**

3.3. Personal Protection Symbols

	**This is the eye protection symbol. It is used when eye protection must be worn.**
	**This is the hearing protection symbol. It is used when hearing protection must be worn.**
	**This is the head protection symbol. It is used when head protection must be worn.**
	**This is the hand protection symbol. It is used when hand protection must be worn.**
	**This is the foot protection symbol. It is used when feet protection must be worn.**
	**This is the protective body clothing symbol. It is used when protective clothing must be worn.**

	**This is the face protection symbol. It is used when face protection must be worn.**
	**This is the long hair protection symbol. It is used when long hair is required to be contained or restrained.**

3.4. Prohibition Symbols

	**This is the naked flame symbol. It is used when there is not to be a fire, naked flame, ignition sources and smoking nearby.**

4. Safety Precautions

To ensure safe operation, please read and understand the following statements and their meanings. Also refer to supporting manuals from the engine manufacturer on specific operation and maintenance of the engine. This manual contains safety precautions which are outlined below.

Ensure all personnel operating this equipment are properly trained to ensure safe operation

Wear personal protective equipment around this machinery.
For example: safety glasses, hearing protection, head protection, protective clothing and safety shoes at all times.

Accidental starts can cause severe injury or death.
Disable engine by disconnecting negative (-) battery cable. Ensure machinery is started in the neutral position.

Rotating parts can cause severe injury
Stay away whilst machine is in operation. Ensure ALL guarding is in place and secured before operation.

Hot parts can cause severe burns.
Beware of hot parts on the machinery – i.e. exhaust, engine, hoses, radiator, solenoids, exposed metal components, etc.

WARNING

Carbon monoxide can cause severe nausea, fainting or death.
Avoid inhaling exhaust fumes and never operate the engine in a closed or refined area.

WARNING

Fuel can cause fires and severe burns.
Do not fill the fuel tank while the engine is hot or running.

WARNING

Explosive gas can cause fires and severe acid burns.
Charge battery only in a well-ventilated area. Keep sources of ignition away.

WARNING

High Pressure fluids can puncture skin and cause severe injury or death.
Do not work on fuel or hydraulic system without proper training and safety equipment. Ensure all hose connections are tight.

WARNING

Clamping parts can cause severe injury.
Stay away whilst machine is in operation. Ensure ALL guarding is in place and secured before operation.

WARNING

Loose hair, clothing and jewellery can cause severe injury.
Ensure hair is restrained; loose clothing not to be worn and jewellery must be removed before operating the machinery.

Electrical shock can cause injury.
Do not touch wires whilst engine is running. Disconnect negative (-) battery cable before any work on wires.

Attachment hoses must have a minimum working pressure rating of 2500psi. Do not use hoses and fittings that are not pressure rated.

Ignition sources can cause fires and severe burns.
There is <u>not</u> to be a fire, naked flame, ignition sources or smoking around any MEC machinery.

Toxic and/or Hazardous substances utilised in this machinery.
Beware of toxic and/or hazardous substances used within this machinery. Do not inhale, swallow or touch toxic/hazardous substances.

WARNING

Injury can occur due to terrain and operating speeds.
To ensure safe work is achieved, do not exceed walking pace whilst operating this equipment. Also note the terrain conditions (underfoot and rail conditions). Do not walk on sleepers or the rail head.

WARNING

Electrification can occur if used on live third rail and/or fourth rail.
Do not use equipment on live third rail and/or fourth rail electrification.

WARNING

Injury can occur through incorrect operation of the equipment.
Only operate the equipment for its intended use. Failure to do so may result in injury. Do not ride on or tow the equipment.

WARNING

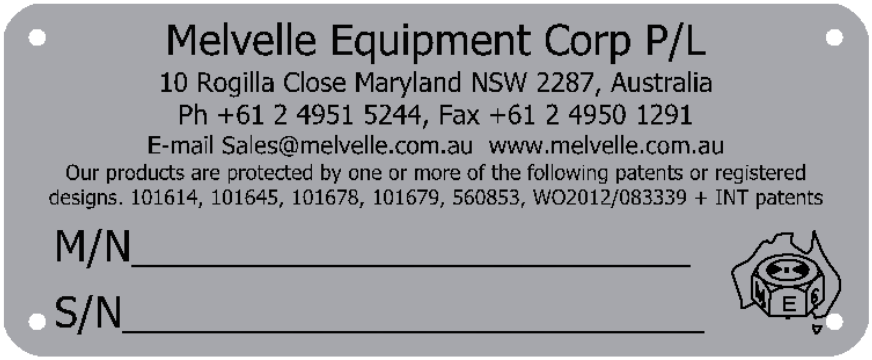
Accumulator Hazard.
This machine utilises hammers that have a pressure accumulator.
DO NOT disassemble hammers without consultation with MEC.

WARNING	WARNING
	
Vibration Hazard Normal and proper use of this equipment will expose the operator to vibration. Vibration exposure may cause and/or contribute to injury throughout the body. Ensure proper procedures are followed for vibration exposure levels to reduce the risk of injury. Refer to Specifications 9.1.2 for vibration level data.	**Noise Hazard.** Ensure adequate hearing protection is worn whilst using this machinery. High sound levels may cause permanent hearing loss. Refer to Specifications 9.1.1 for noise level data.

5. Equipment Stickers & Tags

Below are the stickers and tags utilised on this equipment.

IDTAG01 – Melvelle Identification Tag



IDTAG02 – Model & Serial No. Tag

IDTAG12 – Emergency Stop Warning Label

IDTAG08 – Lifting Point WLL 150kg

LAB0003 – Melvelle Newcastle Sticker

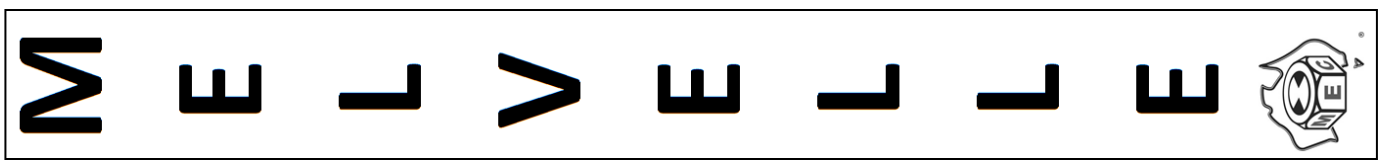
LAB0004 – Melvelle Achieving Excellence Sticker

LAB0006 – Danger – Keep Hands and Feet Clear Sticker

LAB0007 – Danger – Moving Parts Sticker

LAB0008 – Safety Label

LAB0013 – Do Not Manually Lift Sticker



LAB0030 - Large Melvelle Upright

5.1. Stickers & Tags Locations

Refer to Further Documents for sticker location drawing.

6. Emergency Stop

This machine has been fitted with an Emergency Stop to increase the operational safety of MEC machinery.

Important information about the Emergency Stop:

- The Emergency Stop is designed to stop the engine and hence the work head in Emergency situations

- Dedicated machines have a dedicated Emergency Stop to the power pack – they are wired into the machine

- Trackpacks fitted with a wiring harness will not operate unless a work head with an Emergency Stop is connected and the wiring harness connectors are joined

- The Emergency Stop **WILL NOT OPERATE** unless it is electrically connected to the power pack. For Trackpack heads, if the Trackpack is not fitted with a wiring harness and plug, the Emergency Stop will not work

- The Emergency Stop is not intended to be used for normal stopping of the machinery

7. Introduction

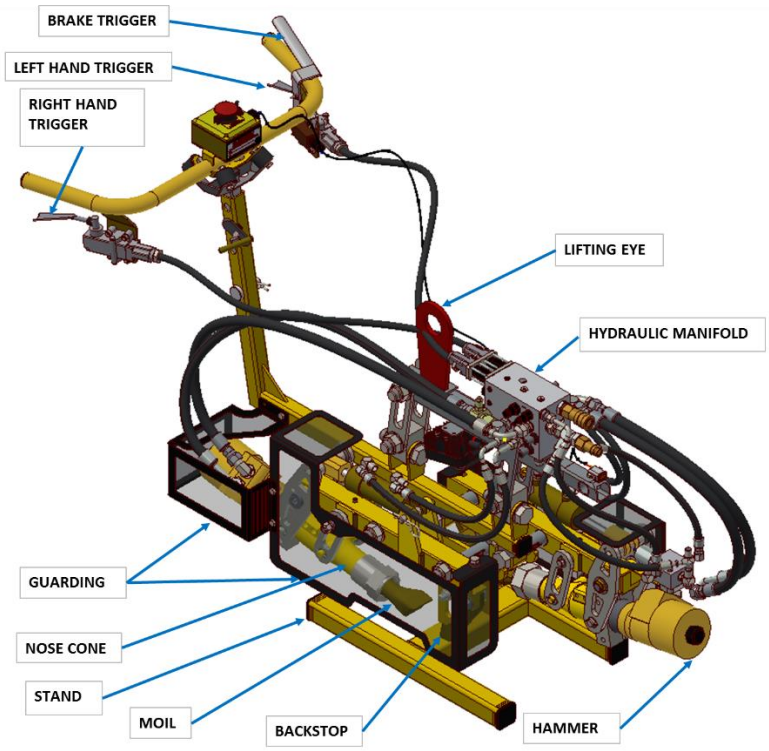
Melvelle Equipment Corp Pty Ltd (MEC) supply E-Clip Removers to the rail industry. The 186 E-Clip Remover is designed to remove E and PR Clips (elastic fasteners) that are used to fasten the rail to sleepers. The 186 has the ability to be used on rail sizes from 41kg/m to 68kg/m rail with steel, timber or concrete sleepers.

The 186 removes frozen/weathered clips that have become corroded in position. Under normal conditions, the 186 unclips either side of one rail in approximately 2-5 seconds. Under severe conditions (frozen), it unclips in approximately 6-60 seconds. Once the clips are removed, they are left in a parked position behind the sleeper shoulder, ready for reinsertion.

By using the 186 E-Clip Remover, injuries from traditional methods of removing these clips (swinging hammers) have been eliminated. These are (but not limited to):

- Back strain
- Repetitive strain injury
- Hammer strikes to legs
- Damage to feet through striking/or clips hitting ball of foot
- Struck by flying clips
- Infrastructure damage

The 186 has inherent safety features built into the design. This includes counterbalanced design (user to lift <5kg during operation), emergency stops, hose covers, dual handed operation, guarding and lifting points (mechanical lifts). By providing equipment with these features ensure safe and efficient operation of MEC machinery.



8. Specifications

8.1 FP-186-HE – Honda Electric Dedicated (Aus)

Engine	13HP Honda® Petrol Electric Start
Dimensions	2800mm long x 740mm wide x 1060mm high
Weight (wet)	250kg
Pressure (max)	103.5bar / 1500psi
Pump Flow	32.5L/min
Fuel Type	Petrol
Battery	12V
Hydraulic Oil[1]	ISO68
Hydraulic Hose Connection Size	½"
Pressure Settings:	
Hammer Pressure	103.5bar / 1500psi
Cylinder Pressure	34.5bar / 500psi
Vibration Level during operation (See section 0 for further info)	4.0 m/s^2
Noise Level MAX (See section 9.1.1 for further info)	108db(A)
Maximum Sound Pressure Level	125db(C)

8.2. FP-186-TP- Trackpack Workhead (Aus)

Engine	MEC Trackpack
Dimensions	1600mm long x 740mm wide x 1060mm high
Weight (wet)	120kg
Pressure (max)	103.5bar / 1500psi
Battery	12V
Hydraulic Oil[1]	ISO68
Hydraulic Hose Connection Size	½"
Pressure Settings:	
Hammer Pressure	103.5bar / 1500psi
Cylinder Pressure	34.5bar / 500psi
Vibration Level during operation (See section 0 for further info)	4.0 m/s^2
Noise Level MAX (See section 9.1.1 for further info)	108db(A)
Maximum Sound Pressure Level	125db(C)

8.3. FP-186-TPUK – Trackpack Workhead – Fixed Displacement (UK)

Engine	MEC Trackpack
Dimensions	1600mm long x 740mm wide x 1060mm high
Weight (wet)	120kg
Pressure (max)	103.5bar / 1500psi
Battery	12V
Hydraulic Oil[1]	ISO68
Hydraulic Hose Connection Size	½”
Pressure Settings:	
Hammer Pressure	103.5bar / 1500psi
Cylinder Pressure	34.5bar / 500psi
Vibration Level during operation (See section 0 for further info)	4.0 m/s^2
Noise Level MAX (See section 9.1.1 for further info)	108db(A)
Maximum Sound Pressure Level	125db(C)

8.3. FP-186-TPUK-V – Trackpack Workhead – Variable displacement (UK)

Engine	Variable displacement pump (MMT train)
Dimensions	1600mm long x 740mm wide x 1060mm high
Weight (wet)	118kg
Pressure (max)	103.5bar / 1500psi
Battery	N/A
Hydraulic Oil[1]	ISO68
Hydraulic Hose Connection Size	½”
Pressure Settings:	
Hammer Pressure	103.5bar / 1500psi
Cylinder Pressure	34.5bar / 500psi
Vibration Level during operation (See section 0 for further info)	4.0 m/s^2
Noise Level MAX (See section 9.1.1 for further info)	108db(A)
Maximum Sound Pressure Level	125db(C)

8.4. FP-186-YE – Yanmar Electric Dedicated (Aus)

Engine	7HP Yanmar® Diesel Electric Start
Dimensions	2800mm long x 740mm wide x 1060mm high
Weight (wet)	250kg
Pressure (max)	103.5bar / 1500psi
Pump Flow	26/min
Fuel Type	Diesel
Battery	12V
Hydraulic Oil[1]	ISO68
Hydraulic Hose Connection Size	½"
Pressure Settings:	
Hammer Pressure	103.5bar / 1500psi
Cylinder Pressure	34.5bar / 500psi
Vibration Level during operation (See section 0 for further info)	4.0 m/s^2
Noise Level MAX (See section 9.1.1 for further info)	108db(A)
Maximum Sound Pressure Level	125db(C)

[1] The type of hydraulic oil depends on ambient air temperatures. ISO68 is a good, general purpose oil for ambient conditions between 10-30°C. If the ambient temperature is between 0-10°C use the next lighter oil grade. If the ambient temperature is between 30-50°C, use the next heavier oil grade

9. Operation

Before use of the equipment, be aware of the operating environment and conditions for which the equipment is to be used. Ensure all users are trained to operate the machinery before operation.

9.1. Operating Conditions

The following outlines the duties and conditions for which the equipment is intended to be operated:

- Used on the intended rail line (gauge)
- Used within a possession
- Not to be used on third and/or fourth rail electrification
- Has the ability to be used in all environmental conditions providing the rail is clean and accessible (i.e. snow, extreme heat, etc may be considered hazardous to operation of the equipment)
- Equipment is designed to remove Pandrol ‘E’ Clip and ‘PR’ Clips (elastic fasteners) only
- Ensure operators are using hearing protection when using this machinery that is applicable to industry standards to reduce noise to acceptable levels
- Ensure operators adhere to industry accepted operating times for vibration exposure levels

9.1.1. Noise

In using the 186 E-Clip Remover, noise levels above the safe level are generated. Hearing protection must be worn by the operators and those in the vicinity of the machine operating. Class 5 rated hearing protection is recommended for anyone operating this machine or in the immediate area. See below specific data during operation.

Results

Sample	LA_{eq} (dB(A))	LC_{peak} (dB(C))	Sample Location
1	96	114	1M AWAY (RUBBER USED TO DAMPEN VIBRATIONS)
2	83	99	1M AWAY
3	87	103	5M AWAY (DIFFERENT RUBBER USED)
4	75	91	5M AWAY FROM MACHINE
5	81	97	5M AWAY FROM MACHINE
6	84	100	10M AWAY ON TRAIN STAIRS
7	68	91	10M END OF WORKSITE ON TRAIN STAIRS
8	67	88	25M AWAY INSIDE TRAIN

Raw data recorded will be retained by 4-RAIL Services for further reference.

As multiple measurements were taken at each distance, it would be considered prudent to base any control measures on a worst case scenario and take the highest readings from each distance. With that in mind, within 5m of the machinery the Exposure Limit Value (ELV) is exceeded and hearing protection would be considered mandatory for any persons working within this area. Up to 10m away measurements are above the Lower Action Exposure Value (LAEV), where hearing protection should be made freely available as well as providing information regarding the hazards involved with loud equipment.

Considering the above, a 10m Hearing Protection Zone (HPZ) would be recommended for this piece of equipment. Any hearing protection provided should be adequately assessed to ensure that it is capable of reducing sound pressure levels to acceptable levels. Members of staff required to wear the hearing protection will also require sufficient briefing in how to properly wear and maintain the condition of the hearing protection. A full octave band analysis to identify the prominent frequencies within the noise could also be considered to help when selecting potential hearing protection. Report Ref. 4RS-CD-170703-R619051 Page 4 of 4

It should also be noted that the testing was carried out within a depot environment which is not the natural working environment for this machinery. In reality the machine will be working on track in a variety of environments. Noise exposure is heavily dependent on the environment in which it is produced, such as reflective surfaces and ambient weather conditions. Whilst this assessment is an important first step in deciding on the likely required control measures further monitoring maybe required whilst the machine is working in ‘real’ working conditions would be considered good practice.

9.1.2. Vibration

The normal and proper use of the E-Clip Remover exposes the operator to levels of vibration (see Specifications). Below is a table from the Health and Safety Executive[1] (HSE – UK) displaying values of vibration (m/s^2) and the allowable Exposure Action Value (EAV – time take before action is required – 100 points) and also the Exposure Limit Value (ELV – maximum daily exposure – 400 points).

Vibration magnitude m/s^2	15 m	30 m	1 h	2 h	3 h	4 h	5 h	6 h	8 h	10 h
40	800									
30	450	900								
25	315	625	1250							
20	200	400	800							
19	180	360	720	1450						
18	160	325	650	1300						
17	145	290	580	1150						
16	130	255	510	1000						
15	115	225	450	900	1350					
14	98	195	390	785	1200					
13	85	170	340	675	1000	1350				
12	72	145	290	575	865	1150	1450			
11	61	120	240	485	725	970	1200	1450		
10	50	100	200	400	600	800	1000	1200		
9	41	81	160	325	485	650	810	970	1300	
8	32	64	130	255	385	510	640	770	1000	1200
7	25	49	98	195	295	390	490	590	785	865
6	18	36	72	145	215	290	360	430	575	720
5.5	15	30	61	120	180	240	305	365	485	605
5	13	25	50	100	150	200	250	300	400	500
4.5	10	20	41	81	120	160	205	245	325	405
4	8	16	32	64	96	130	160	190	255	320
3.5	6	12	25	49	74	98	125	145	195	245
3	5	9	18	36	54	72	90	110	145	180
2.5	3	6	13	25	38	50	63	75	100	125
2	2	4	8	16	24	32	40	48	64	80
1.5	1	2	5	9	14	18	23	27	36	45
1	1	1	2	4	6	8	10	12	16	20
	Daily exposure time									

Above limit value
Likely to be above limit value
Above action value
Likely to be above action value
Below action value

Given the current values of vibration for the E-Clip Remover as 4.0 m/s^2, the time to reach the EAV is 2hr, and greater than 10hr for the ELV. Below are the results from testing.

Test 6		"	3.8	Lowest reading	
2 Soft-2 Hard Dampners	SVAN ACC on Bar	"	4.3	highest reading	826
		"	4.0	Final reading after 1 min	
		Average	4.0		

Summary as supplied by REACTEC:

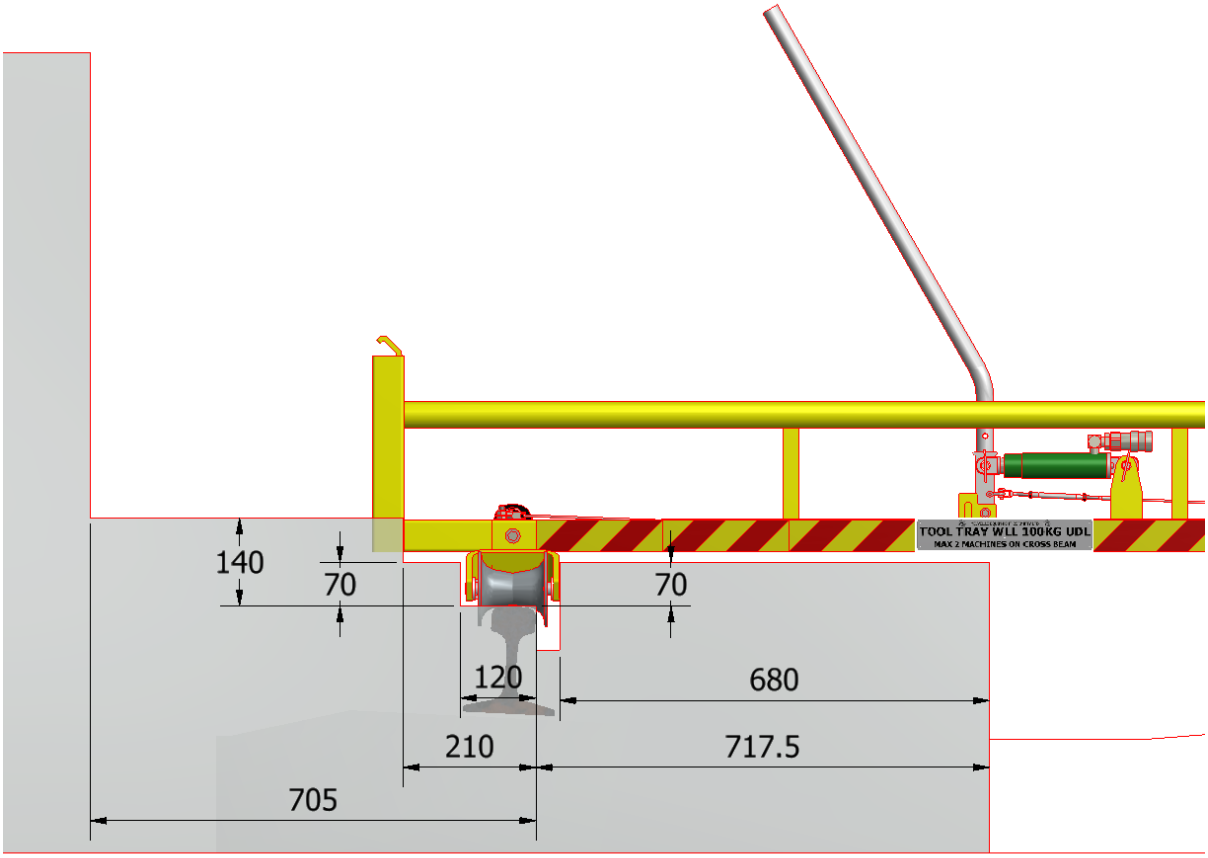
The measurements carried out during the visit to Darlington Network rail using the Melvelle E–Clip/PR Clip remover show a couple of things.

- Average measurements taken using Svantek Meter show a value <5 m/s2 when the Accelerometer was not in contact with the operators hand.
- The best dampening for reduced vibration is to use 4 soft or 2 soft + 2 hard dampeners. Results show similar vibration magnitude values for both set ups.
- Havwear points accrued throughout measurement of this piece of equipment show through calculation the Vib/mag equates to 4.9m/s2

[1] Retrieved from http://www.hse.gov.uk/vibration/hav/readyreckoner.htm on 10/04/2013

9.1.3. Conformance to Gauge

As according to the Rail Safety and Standards Board (RSSB – London), the exceedence allowed for railborne portable and transportable equipment is given in RIS-1701-PLT Issue 1, Part 4, Figure 1. Below is the superimposed image of this exceedence onto the standard gauge trolley (1435 gauge). It can be seen that there are some areas that exceed the allowance and therefore, may cause a conflict at switches and crossings.



9.2. Pre-Operation Checks

Overall Inspection

1. Check that the equipment is free from damage or defects
2. If damaged, DO NOT USE. Contact MEC for repairs

Engine Oil

1. Check the level and quality of the engine oil and add if required
2. If contaminated or old, engine oil will be dark (nearly black)
3. If contaminated with water, engine oil will be a milky colour
4. Refer to manufacturer's instructions for specific data
5. If engine oil contaminated, replace before use

Hydraulic Oil

1. Check the level and quality of the hydraulic oil and add if required
2. Oil level to be just above the centre cone, under the filter breather cover, by 2-20mm
3. If contaminated, hydraulic oil will be discoloured
4. If contaminated with water, hydraulic oil will be a milky colour
5. If hydraulic oil contaminated, replace before use

Fuel

1. Check the level of fuel and add if required

Battery (if applicable)

1. Visually inspect the condition of the battery
2. Ensure there is no damage, acid levels are OK and the battery leads are free from defects
3. If damaged, replace before use

Light (if applicable)

1. Visually inspect condition and leads of light
2. Ensure there is no damage and leads are free from defects
3. Before starting, ensure the light is off
4. If damaged, replace before use

Hydraulic Hoses & Filter

1. Visually inspect the hoses and filter
2. Ensure there is no damage
3. If damaged, replace before use

Guards & Stickers/Tags

1. Inspect all guards and stickers/tags are in place and secure – refer to further document drawings for locations
2. Ensure there is no damage
3. If damaged, DO NOT use machinery. Replace before use

Emergency Stop

1. Ensure Emergency Stop plug is electrically connected
2. Ensure the wires are free from damage and connections are clean and dry

Moil

1. Inspect Moil for damage and wear before use
2. Ensure the moil is lubricated before use
3. If damaged or excessive wear seen, replace moil

9.3. Assembly Procedures

WARNING

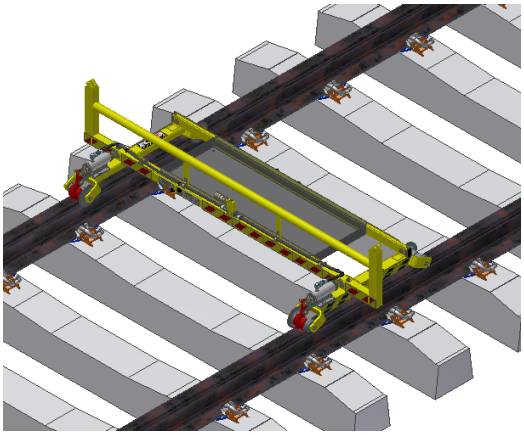
Before any assembly and/or maintenance are performed, ensure the work head and engine are off and in a neutral position

9.3.1. Braked Machine Trolley

1. Inspect the trolley and ensure it is not damaged and free from defects.

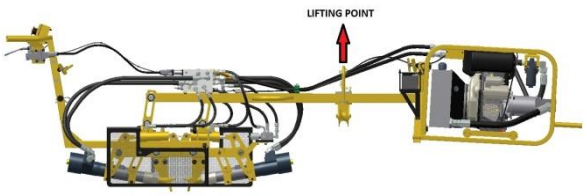
2. Assemble the trolley to the rail lines.

   Refer to Braked Machine Trolley Operation Manual for more information



9.3.2. Machine Assembly – Dedicated Machine

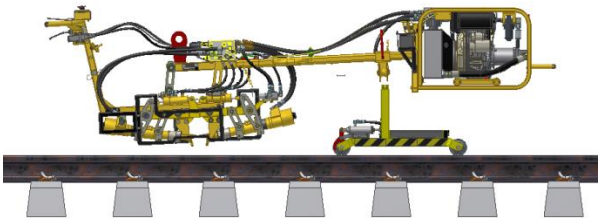
1. Observe all safety precautions. Ensure the operation is being performed on safe and steady ground (no excessive slopes or dangerous terrain).
2. Inspect the E-Clipper and ensure it is not damaged and is free from defects.
3. A dedicated E-Clip Remover Machine weighs approximately 250kg. Using a certified lifting device (min 250kg), attach slings or a lifting hook to the lifting point on the machine.



4. By following safe lifting procedures, lift the machine onto the trolley. The cross trolley rollers will sit onto the cross bar (tube).

⚠ CAUTION

When placing the machine onto the trolley, ensure hands are clear of the cross trolley rollers and cross bar (tube) as personal injury may occur.

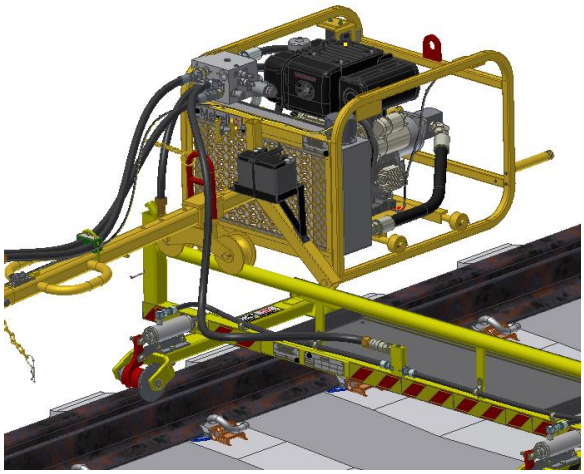


5. Remove the slings and/or hooks. The machine can now be moved to either rail for use. This is achieved by raising the head off the ground and sliding across the trolley. A second person may be required to assist and push the engine across the trolley.

6. Attach the chain to the trolley to ensure the machine will not roll during operation.

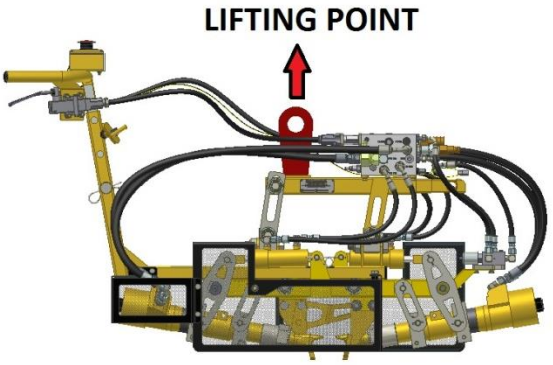
7. Connect the Brake hose to the Cylinder on the trolley.

8. The equipment is now ready for use.



9.3.3. Machine Assembly – Trackpack

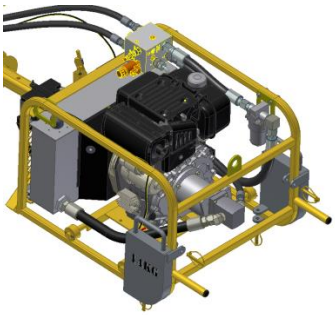
1. Observe all safety precautions. Ensure the operation is being performed on safe and steady ground (no excessive slopes or dangerous terrain).
2. Inspect the E-Clip Remover Head and Trackpack and ensure they are not damaged and are free from defects.
3. A Trackpack E-Clip Remover Head weighs approximately 120 kg and a Trackpack weighs approximately 120kg. The counterweights weigh 14kg each (total 28kg extra).



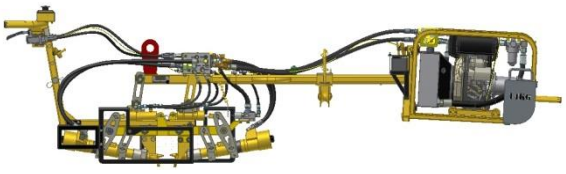
4. Place work head onto ground (Follow safe lifting procedures)
5. Adjust the pivot position (cross trolley rollers) to the correct position for the machine. For the E-Clip Remover this is the furthest hole from the engine (refer further document drawing for pin locations). Attach slings to the lifting lugs on the Trackpack.

6. By following safe lifting procedures, lift the Trackpack using slings ensuring it is kept level and easy to move (For more information refer to the Trackpack Manual).
7. Guide the Trackpack towards the work head and align the square attachment (hayman-reese style) and slide the items together. Insert the locking pin between the items and lock in position with the R -Clip. Lower the Trackpack to the ground and remove the slings.

8. Connect the hydraulic quick snaps together. Connect the electrical deutsch plugs together to ensure the Emergency stop and brake is connected to the trackpack. Attach the Counterweights for the E-Clip Remover to the Trackpack and place the Lynch pins to secure.



9. The Trackpack and work head are now attached and can be lifted onto the machine trolley (the same as a dedicated machine). Refer above for procedure on attaching to machine trolley.



9.3.4. Handle Adjustment

The adjustment of the handles is done to achieve a comfortable height for the operator whilst using the machine.

To adjust the handles:

1. Loosen the T-Bolt and locking nut.

2. Remove the R-Clip and adjustment bolt from the handles.

3. Stand in the operating position and lift/lower the handles to the required height.

4. Replace the adjustment bolt and R-clip.

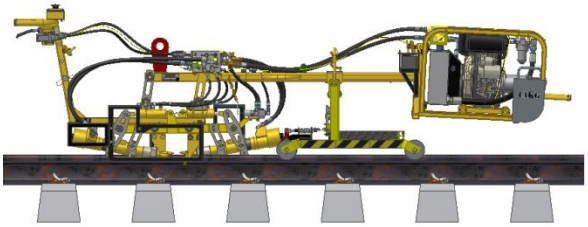
5. Tighten the T-Bolt and locking nut.

9.3.5. Machine Adjustment – Workhead Angle

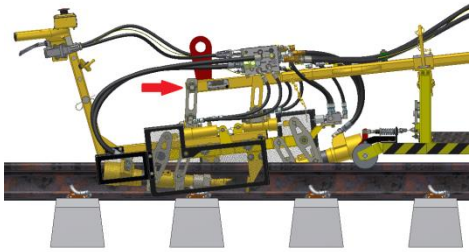
The head angle adjustment is required to ensure the E-Clip Remover is level with the rail and ensures correct alignment with the clips. This is required as the rail height changes between rail sizes and hence, the angle of the Workhead. By not having the adjustment correct hinders the operation of the machine and operators will find it difficult to use the machinery.

To adjust the Workhead angle:

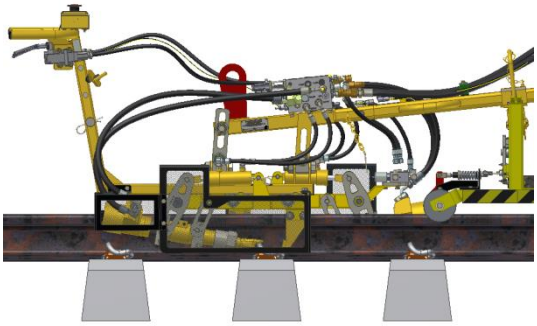
1. Ensure the Workhead is on the rail and connected to a Trackpack (if not a dedicated machine)



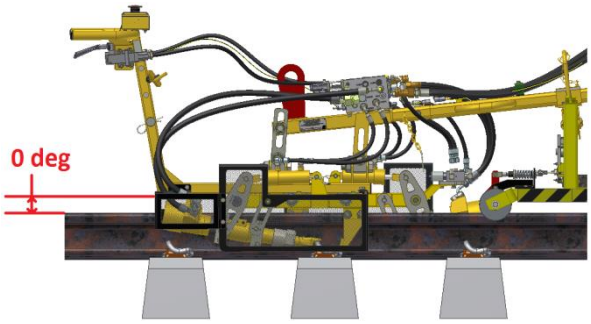
2. Loosen the 1” bolt that allows adjustment of the Workhead angle



3. Stand behind in the operating position and lift/lower the Workhead to adjust the angle.



4. When the rail level and centre frame angle are the same, tighten the 1” bolt and nut to lock into position. The Workhead angle adjustment is now complete.



9.3.6. Machine Adjustment – Rail Size

The E-Clip Remover has the ability to be utilised on 41-68kg rail and those in between. This is achieved through the use of predetermined spacers for each of the rail sizes. These are:

Shoulder Eye Spacing	Rail Used With	MEC Part Number
188	AUS Rail Plates (41, 47, 50 KG)	1860062
201	UK (F23, F27, EF28, 5EF28, W402)	1860117
204	AUS Standard Spacing (All sizing VIC & QLD)	1860183
208	AUS Rail Plates (53, 60, 68 KG) & UK (F40 & 5F40)	1860118
210	AUS Standard Spacing (All sizing NSW & WA)	1860063
222.2	AUS Standard Spacing (68 KG WA)	1860064

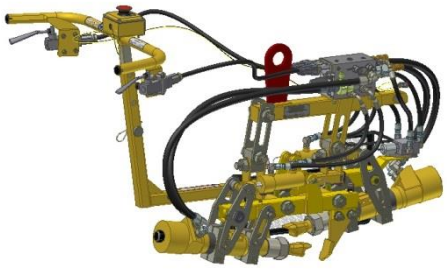
To adjust the E-Clip Remover:

1. Remove the guards and the attaching nuts.

2. Remove the large nuts and washers from the work head.

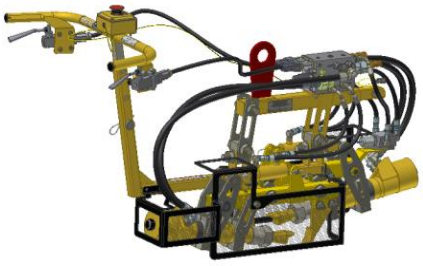
3. Slide the outer frame assembly off the bolts. The assembly will weigh approximately 40kg. Follow safe lifting procedures.

4. Remove the current spacers off the bolts and assemble the required spacer (from above table).



5. Slide the frame assembly back onto the bolts (follow safe lifting procedures).

6. Assemble the large nuts and washers back to the work head.



7. Assemble the guards and nuts back onto the work head

9.3.7. Machine Adjustment – Rail Type

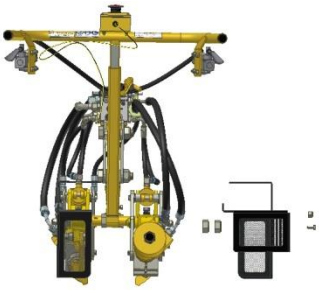
The E-Clip Remover has the ability to be used on Concrete, Steel and Timber Sleepers. Refer below for the setup of the E-Clip Remover sleeper setup instructions.

Concrete Sleepers Setup

The E-Clip Remover should look like the image below with the left hand (LH) head on the furthest two (2) bolt holes from the operator position on the centre frame. Likewise, the right hand (RH) head will bolt onto the centre frame utilising the two (2) holes closest to the operator.

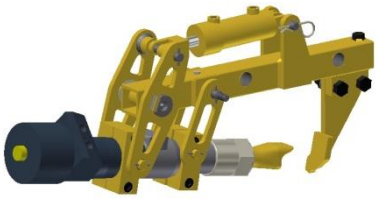
To set the E-Clip Remover for use on Concrete Sleepers:

1. Remove the guards and the attaching nuts.



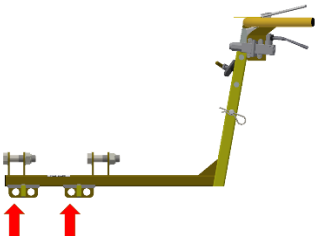
2. Remove the large nuts and washers from the work head.

3. Slide the outer frame assembly off the bolts. The assembly will weigh approximately 40kg. Follow safe lifting procedures.

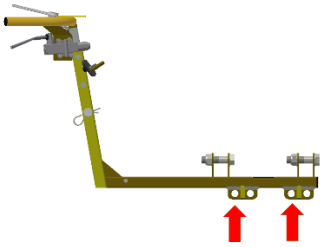


4. Remove the current spacers off the bolts and remove the bolts from the frame fabrication

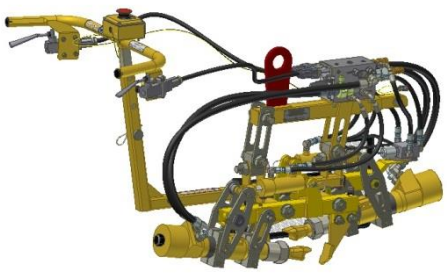
5. For the left hand head assembly, slide the bolts into the two furthest boltholes from the operator in the centre frame fabrication



6. Likewise, for the right hand head assembly, slide the bolts into the two closest boltholes from the operator in the centre frame fabrication



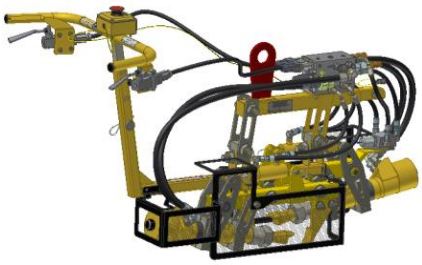
7. Assemble the spacers onto the bolts and slide the frame assembly back onto the bolts (follow safe lifting procedures).



8. Assemble the large nuts and washers back to the work head.

9. Assemble the guards and nuts back onto the work head

10. The E-Clip Remover has now been set up for Concrete Sleepers

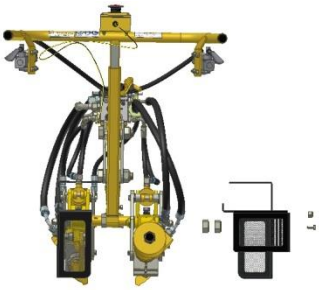


Timber Sleepers Setup

The E-Clip Remover should look like the image below with the left hand (LH) head on the closest two (2) bolt holes from the operator position on the centre frame. Likewise, the right hand (RH) head will bolt onto the centre frame utilising the two (2) holes furthest from the operator.

To set the E-Clip Remover for use on Concrete and/or Steel Sleepers:

1. Remove the guards and the attaching nuts.

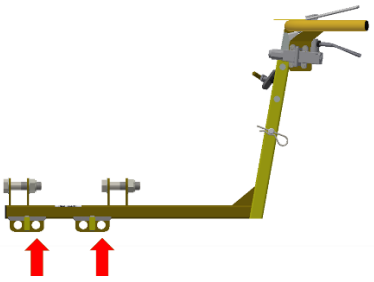


2. Remove the large nuts and washers from the work head.

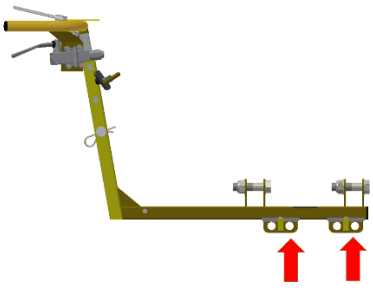
3. Slide the outer frame assembly off the bolts. The assembly will weigh approximately 40kg. Follow safe lifting procedures.

4. Remove the current spacers off the bolts and remove the bolts from the frame fabrication

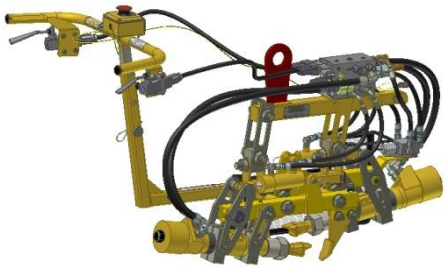
5. For the left hand head assembly, slide the bolts into the two closest boltholes from the operator in the centre frame fabrication



6. Likewise, for the right hand head assembly, slide the bolts into the two furthest boltholes from the operator in the centre frame fabrication

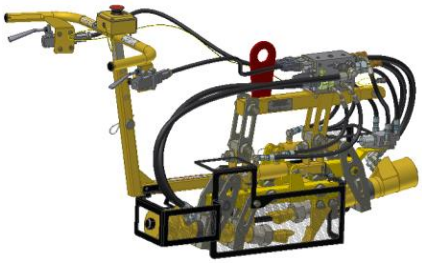


7. Assemble the spacers onto the bolts and slide the frame assembly back onto the bolts (follow safe lifting procedures).



8. Assemble the large nuts and washers back to the work head.

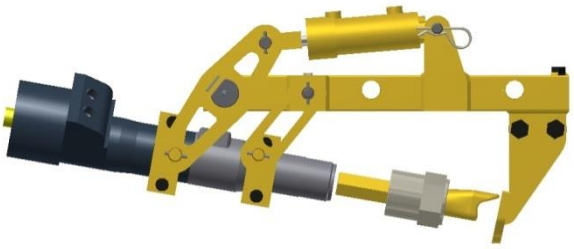
9. Assemble the guards and nuts back onto the work head

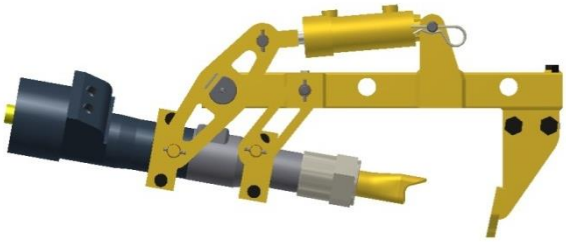


10. The E-Clip Remover has now been set up for Timber Sleepers

9.3.8. Moil Assembly

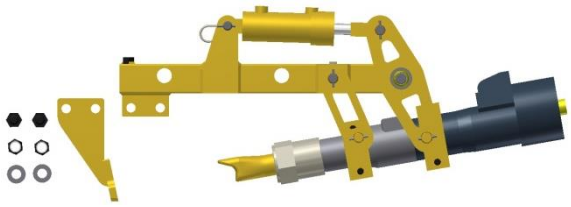
1. Retract the cylinders to move the moil as distant from the backstop as possible – Pull and release LH trigger.
2. Ensure the machine is off and then remove the guards and the attaching nuts.
3. Remove the top pin by removing the R-Clip as shown. This allows the moil to move back enough to clear the backstop.
4. Loosen and Remove the hammer end cap (retaining the moil). Slide the moil and end cap away from the hammer. If the cylinders don't retract enough for the moil to be removed, remove the R clip and axle pin to physically move the cylinder backwards.
5. Remove the moil from the end cap by sliding the hex through the cap. Slide the replacement moil through the end cap ready for assembly.
6. Ensure the hammer and moils are clean before assembly. Apply lubrication if required.
7. Slide the replacement moil through the end cap and into the hammer. Ensure the cup of the moil is facing down and the moil is sitting square within the hammer (as shown).
8. Slide the pin back through and insert the R-Clip
9. Assemble the end cap and tighten so that the moil is retained. Ensure the moil is free to move.
10. Assemble the guards and nuts back onto the work head
11. The moil has now been replaced



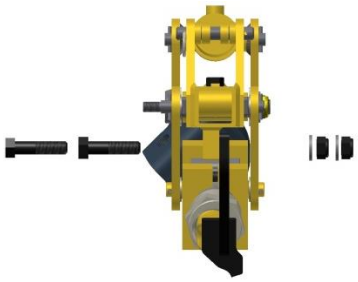


9.3.9. Backstop Assembly

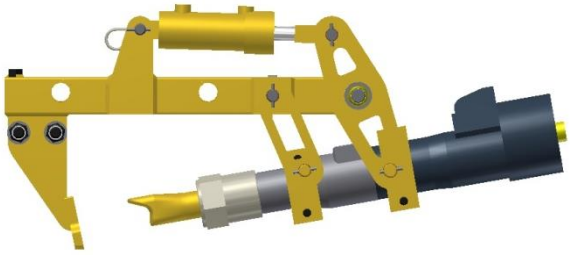
1. Ensure machinery is off and in neutral position before undertaking any work/adjustment
2. Remove Guards from the E-Clip Remover



3. Choose required backstop based on clips to be removed



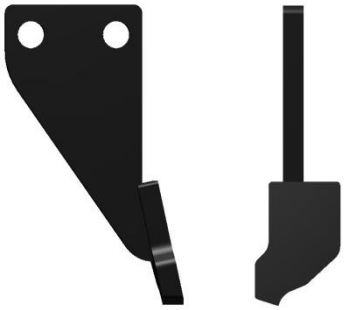
4. Place the backstop on the rail side of the mounting plate



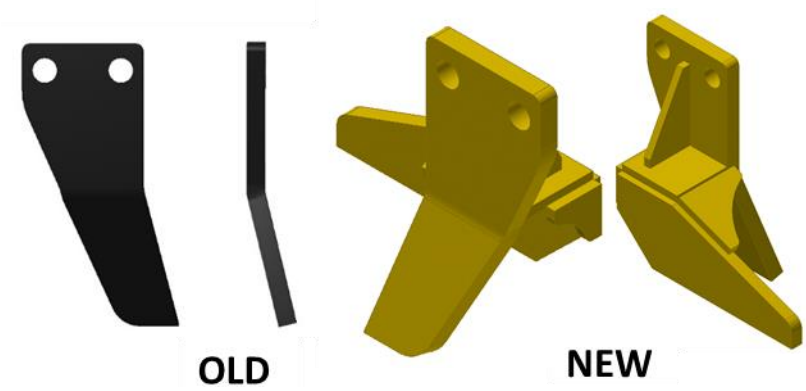
5. Insert two bolts and tighten to attach the backstop to the mounting plate
6. Once bolts are tightened, replace guarding
7. The backstop has now been assembled

9.3.10. E-Clip Remover Backstop Selection

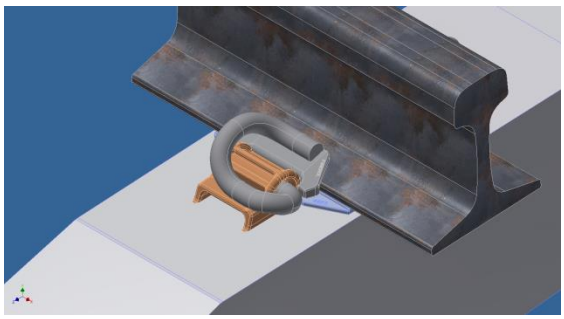
There are two backstops available for use on the E-Clip Remover. They are available for the removal of E-Clips and PR-Clips.



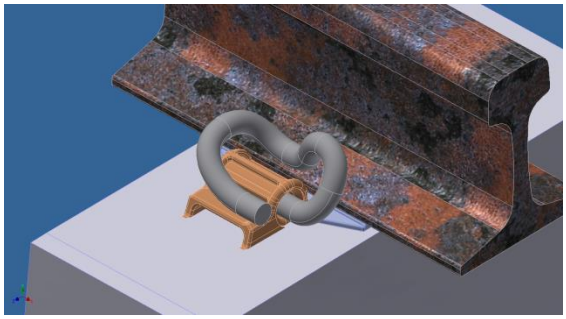
E-Clip Backstop
MEC Part No. 1860017



PR-Clip Backstop
MEC Part No. 1860072 (OLD) 1860072_B (NEW)



E-Clip



PR-Clip

9.3.11. Changing from Variable displacement to Fixed Displacement hydraulic function

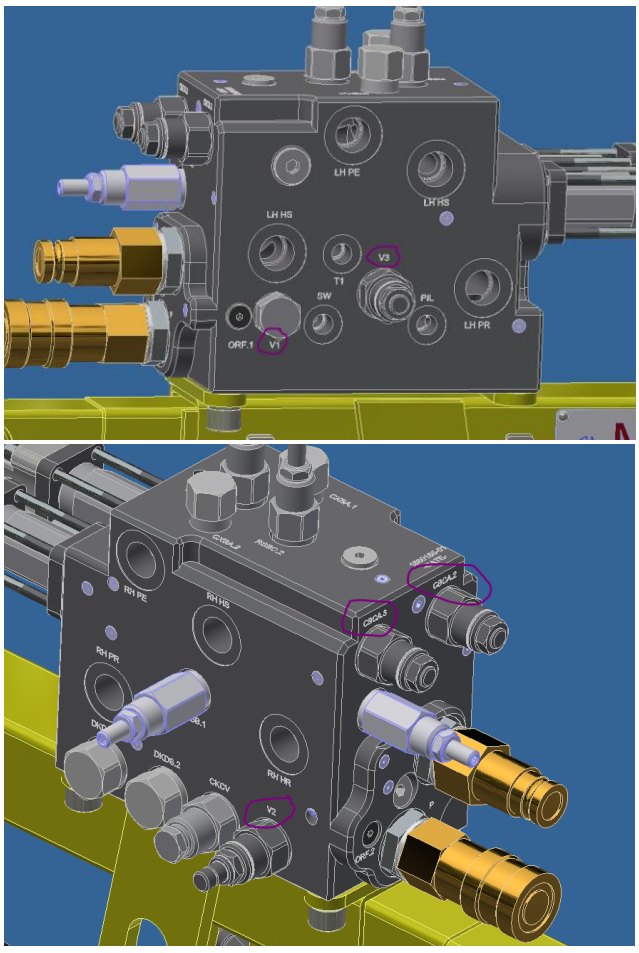
Depending on model supplied, the unit can run from a Variable displacement pump, and a fixed displacement pump. Below outlines changes that need to occur to the hydraulic manifold to handle the different inputs.

Setup for Fixed displacement
V1 – Relief valve Installed at 110 bar
V2 – Cavity Plug
V3 – Counterbalance valve Installed at 28 bar
CBCA.2 – 80 bar
CBCA.3 – 80 bar

Setup for Variable Displacement
V1 – Cavity plug
V2 – Reducing valve at 110 bar
V3 – Counterbalance valve installed at 115 bar
CBCA.2 – 210 bar
CBCA.3 – 210 bar

For further reference see circuit diagrams on page 71 and 72.

Valves located here



9.4. Operation Procedures

Only authorised personnel shall start, operate or interfere with the normal working of portable machines or trolleys. The user shall be careful to use the machine in the intended way, avoiding over-loading.

9.4.1. Starting the Engine – Electric Start[1]

1. Observe all safety precautions
2. Ensure all pre-operation checks have been conducted
3. Ensure the E-Clip Remover is on safe and steady grounding (no excessive slopes or dangerous terrain conditions)
4. Attach tooling hoses to power pack. Ensure the snap connectors are clean and tool is in 'NEUTRAL' position (both handles released)
5. Ensure Emergency Stop is electrically connected to power pack and not engaged
6. Place the throttle at 50% power
7. Turn the key to its first position (on position)
8. If diesel:
    a. Operate the decompression lever.
    b. Turn key to second position (starting position). The starter motor will engage and turn the engine over
    c. After 2-3 seconds there will be enough momentum in the fly wheel. Release the decompression lever and the engine will start.
    d. Allow the key to return to the on-position, disengaging the starter motor.
9. If Petrol:
    a. Engage choke if cold starting
    b. Turn key to second position (starting position). The starter motor will engage and turn the engine over.
    c. After the engine starts allow the key to return to the on-position, disengaging the starter motor.

[1] Refer to engine manual for detailed engine instructions and requirements

10. Place throttle in idle (min) position and allow engine to warm up – refer manufacturers manual for required times

11. Move throttle to required rpm position, normally full throttle[1]

12. Power pack and hydraulic circuit are now in operation and tooling is able to be used. Refer to Equipment Operation for instructions on using tooling

[1] During first 50hrs do not exceed 70% maximum rated power

9.4.2. Starting the Engine – Recoil Start[1]

1. Observe all safety precautions
2. Ensure all pre-operation checks have been conducted
3. Ensure the E-clip Remover is on safe and steady grounding (no excessive slopes or dangerous terrain conditions)
4. Attach tooling hoses to power pack. Ensure the snap connectors are clean and tool is in 'NEUTRAL' position (both handles released)
5. Ensure Emergency Stop is electrically connected to power pack and not engaged
6. Place the throttle at 50% power
7. Turn the key to its first position (on position)
8. Hold the grip and pull the cord until compression is found
9. Completely rewind the cord (allow to retract)
10. Operate the decompression lever (if Diesel)
11. Using two hands, firmly and quickly pull the cord to start
12. Place throttle in idle (min) position and allow engine to warm up – refer manufacturers manual for required times
13. Place throttle at required rpm position, normally full throttle[2]
14. Power pack and hydraulic circuit are now in operation and tooling is able to be used. Refer to Equipment Operation for instructions on using tooling

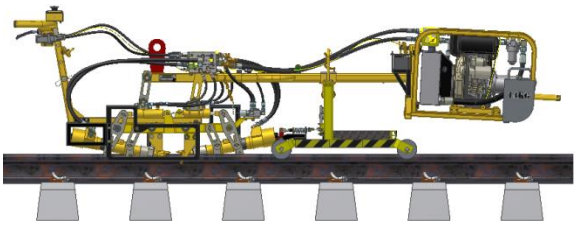
[1] Refer to engine manual for detailed engine instructions and requirements
[2] During first 50hrs do not exceed 70% maximum rated power

9.4.3. Equipment Operation – Releasing the Brake

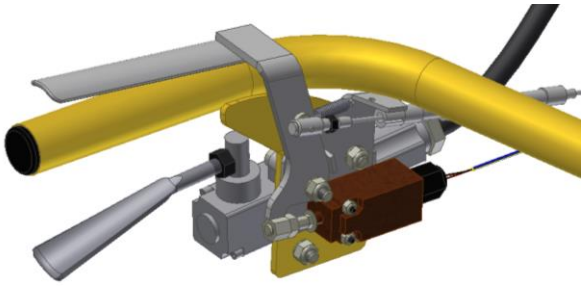
All new machine trolleys are fitted with fail-safe brakes. These brakes are released by hydraulic pressure, supplied by connecting the ¼" hydraulic hose line to the trolley as stated in assembly procedures.

To release the brake on the trolley:

1. Observe all safety precautions
2. Ensure all pre-operation checks have been conducted
3. Ensure the E-Clip Remover is on safe and steady grounding (no excessive slopes or dangerous terrain conditions)



4. Ensure all Assembly Procedures have been followed and the E-Clip Remover is set up correctly for the rail size.
5. Ensure all hydraulic and electrical connectors are connected – these control the operation of the brakes and also the machine.
6. If there is a manual pull cable for the brake manifold (small flexible cable), connect this to the trigger – as shown.

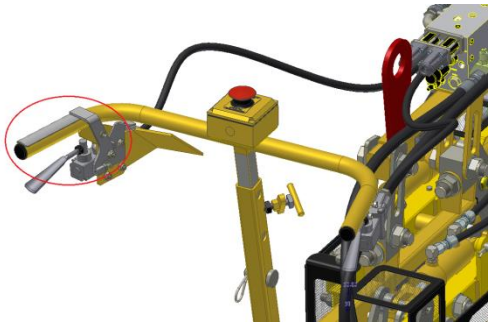


7. To assemble a manual pull cable to the brake trigger, slide the cable through the outer cable holder. Pull down on the cable connection at the end of the cable to open and slide over the ball located on the trigger. The outer cable should locate on the back of the outer cable holder. Adjustment of the cable may be required before and after assembly of the cable to the trigger.

8. Start the engine as per Starting the Engine instructions (listed above)

9. To release the brakes, push down the trigger on top of the handles

10. The brakes will release and allow movement of the machine. For further information, please see trolley manual or contact MEC.



9.4.4. Equipment Operation – Un-Clipping

11. Observe all safety precautions

12. Ensure all pre-operation checks have been conducted

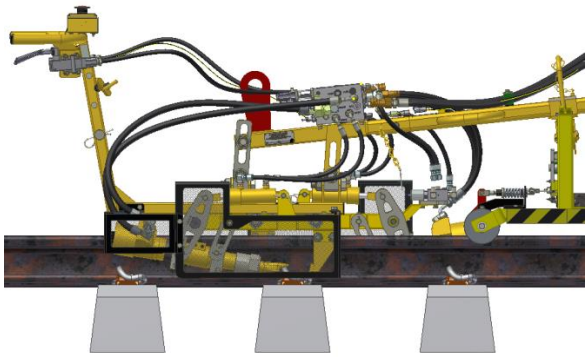
13. Ensure the E-Clip Remover is on safe and steady grounding (no excessive slopes or dangerous terrain conditions)

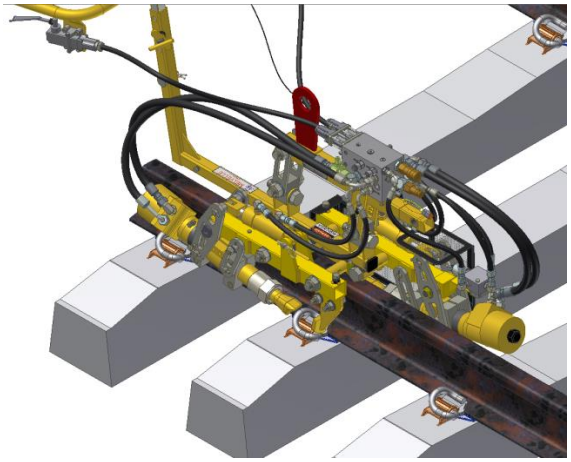
14. Ensure all Assembly Procedures have been followed and the E-Clip Remover is set up correctly for the rail size.

15. Start the engine as per Starting the Engine instructions (listed above)

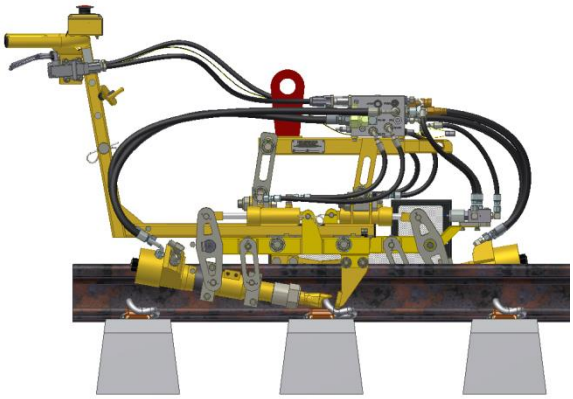
16. Squeeze and hold the left hand trigger. This will allow the cylinders to retract and the jaws to open.

17. Position the work head over the pair of clips to be removed. The backstops should sit behind the clips and rest against the clip supports



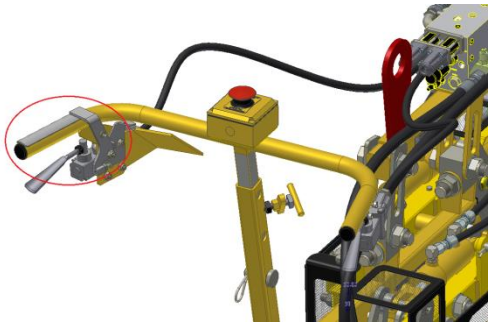


18. Whilst holding the left hand trigger, squeeze and hold the right hand trigger and ensure the hammer moils have picked up both clips. The hammers will begin removing the clips. The left hand side clip is removed first and then the right.



19. Once the clips are removed, release the right hand trigger to retract the cylinders and open the jaws. Release the left hand trigger to place the machine in neutral.
Note: If you continue holding both triggers after the clips are removed, the right hand side hammer will continue to operate.

20. To move to the next clips, activate the brake lift switch and push the machine to the required position



9.4.5. Stopping the Engine[1]

1. Place tooling and power pack to “NEUTRAL” position

2. Set the engine speed to idle (min) using accelerator

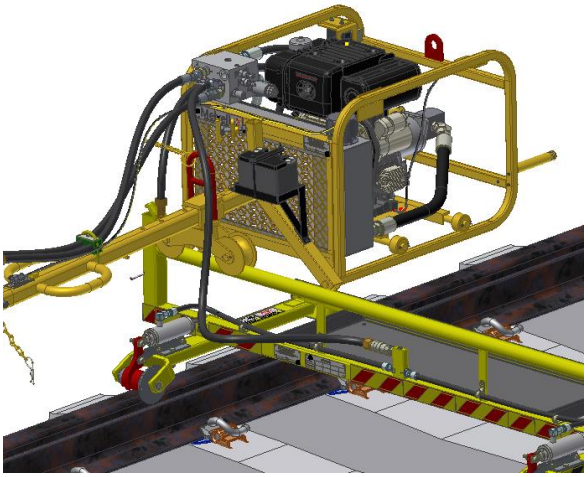
3. Turn the ignition key to OFF

[1] Refer to engine manual for detailed engine instructions and requirements

9.5. Disassembly Procedures

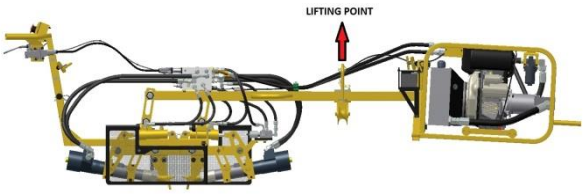
9.5.1. Removal of E-Clip Remover from Track

1. Observe all safety precautions
2. Ensure engine is off and no hydraulic flow is operating to cylinder
3. Disconnect the brake hose from the trolley cylinder



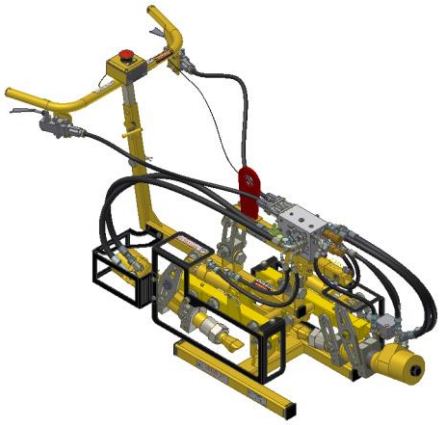
4. Disconnect the chain from the retaining profile to release the machine from the trolley

5. Lift and remove the workhead (and Trackpack) from the trolley using a certified lifting device (>250kg)



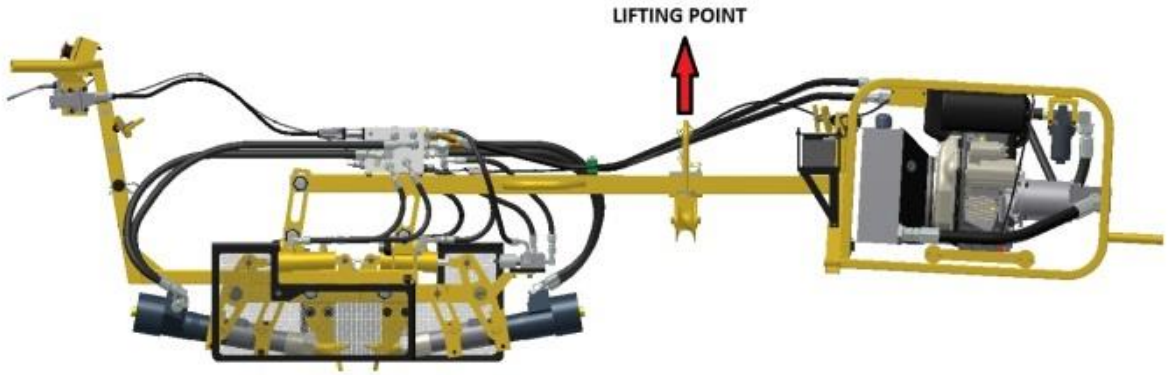
*Expected time for removal of trolley with workhead assembled is approximately five (5) minutes (using certified lifting devices). These times may increase or decrease depending on location, conditions, etc.

6. The E-Clip Remover is now able to be placed onto transport or in storage. For a Trackpack and Workhead, these can be stored and/or transported coupled together or separated.

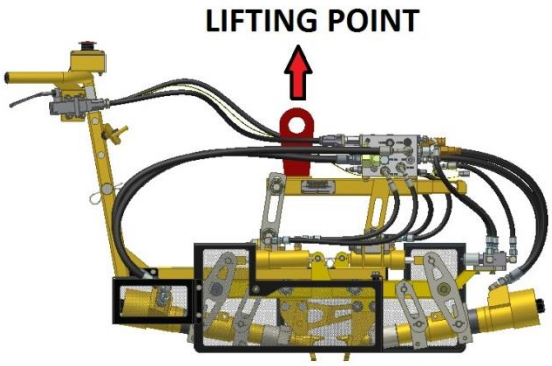


9.5.2. Lifting the Machinery

1. DO NOT manually lift machinery
2. Observe all safety precautions
3. Ensure all pre-operation checks have been conducted
4. Attach slings or hooks into lifting points on the machinery – see below
5. Using a certified lifting device to >250kg, lift the machinery to required position



186 Dedicated Machine Lifting Point



186 Trackpack Workhead Lifting Point

9.6. Storage & Transport

9.6.1. Storage of E-Clip Remover

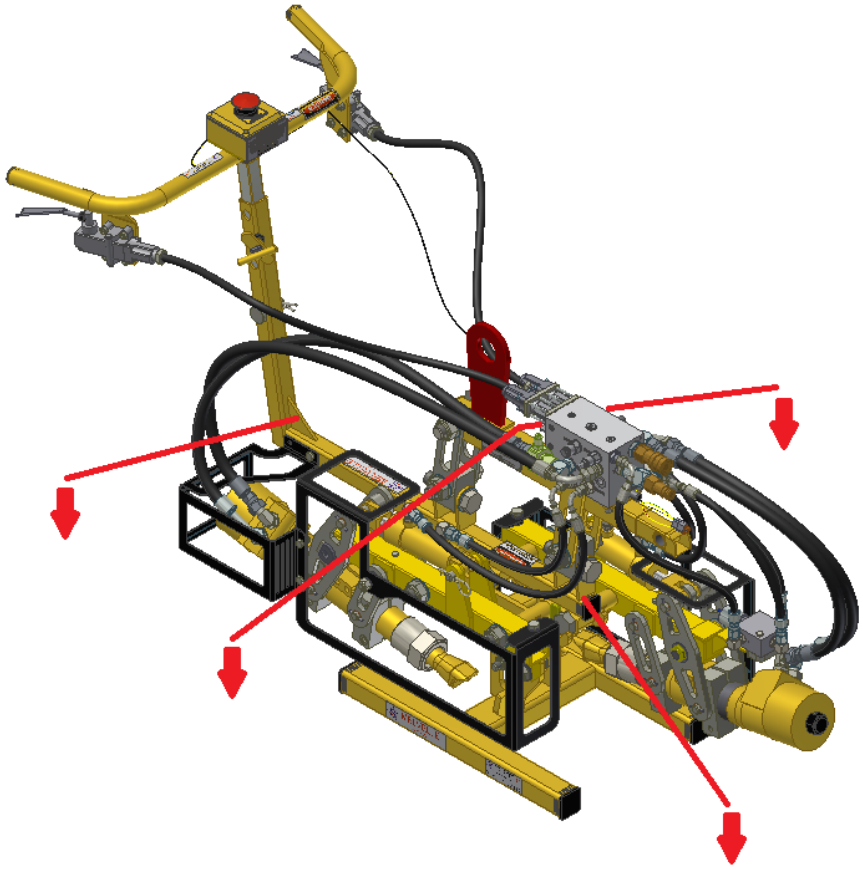
MEC equipment should be stored in a secure, safe, dry location to ensure the equipment is not damaged and maintained in good working order.

If possible, machines may be placed onto racks or placed on the ground for storage. Storing the machines in the storage/transport frames will also help to keep the equipment free from damage and allow it to sit level.

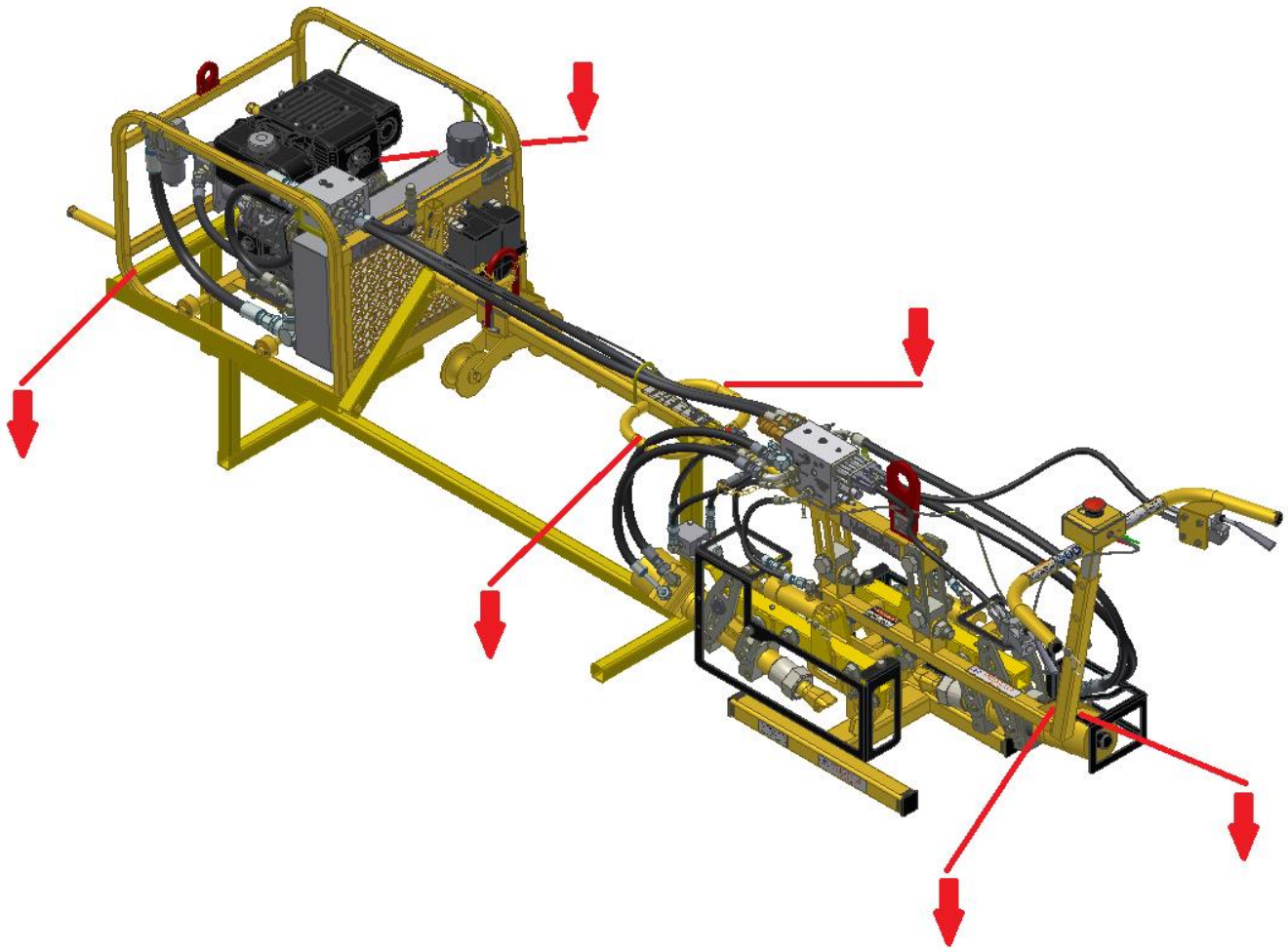
9.6.2. Transport of E-Clip Remover

Place the equipment (dedicated machine or Trackpack Head) onto a flat surface (truck or trailer) and strap down ensuring the equipment is unable to move. By utilising the storage/transport frames will help to reduce damage and make it easier to store/transport. See below for recommended lashing points.

When strapping the equipment down, ensure that the straps are used on the main frames of the equipment to avoid damage. Ensure hoses/cables and other lighter parts of the machinery are not used to secure the equipment during transport.



FP-186-TP Suggested Transport Lashing Points



FP-186-YE Suggested Transport Lashing Points

10. Equipment Protection & Care

NOTICE

In addition to the Safety Precautions found in this manual and the supporting tool and engine manuals, observe the following for equipment protection and care

- Make sure all couplers/connectors are wiped clean before connection
- The hydraulic circuit control valve in “NEUTRAL” position when coupling or uncoupling hydraulic tools. Failure to do so may result in damage to the couplers and cause overheating of the hydraulic system
- Always store hoses coupled together in a ‘loop’ to stop hydraulic lock due to the hoses and hydraulic oil heating
- Always store the E-Clip Remover in a clean dry space, safe from damage or pilferage
- Make sure the power pack hydraulic circuit PRESSURE hose (male quick disconnect) is connected the PRESSURE hose for the tool (female quick disconnect) and vice versa for the RETURN hoses. Do not reverse circuit flow. This can cause damage to the internal seals of the equipment
- Always replace hoses, couplings and other components with replacement parts recommended by MEC. Hydraulic hoses must have a minimum working pressure of 2500psi
- Always keep critical tool markings such as warning stickers and tags legible
- Power pack and tooling repairs and/or service work must only be performed by MEC or certified and authorised dealer
- Do not use the power pack and/or tooling for applications for which it is not intended
- Ensure all bolts are tight and all covers/guards are fitted

11. Maintenance

WARNING

Before any maintenance of the machine or trolley is performed, ensure the work head and engine are off and in a neutral position. Ensure all potential energy is released from the system (springs, cylinders, etc). Ensure maintenance is performed by a competent and authorised person.

11.1. Tools Required to Complete Maintenance

Below are initial tools required to complete general maintenance tasks. Additional tools may be required.

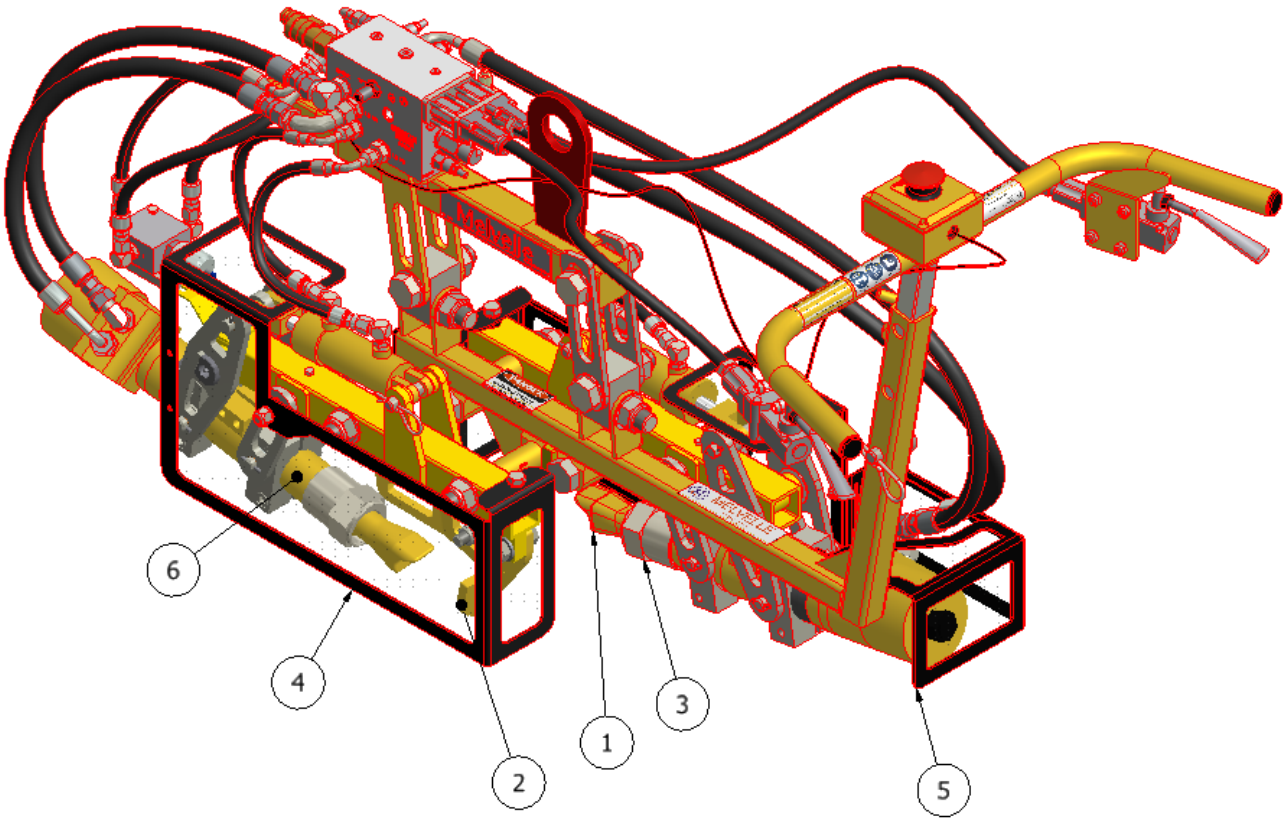
• Allen Keys (3/8”)	
• Hammer	
• Pin Punch (1/8” or 4mm)	
• Ruler and/or Vernier’s	
• Shifter or	
• Spanners (3/4”,15/16”, 1 ½”, 13mm)	
• Stilsons (>65mm opening)	

11.2. Maintenance Spares

11.2.1. 186 E-Clip Remover Trackpack Workhead (FP-186-TP) Spares

Below is a list of spares that may be required for general maintenance during the life of the 186 E-Clip Remover Trackpack Workhead.

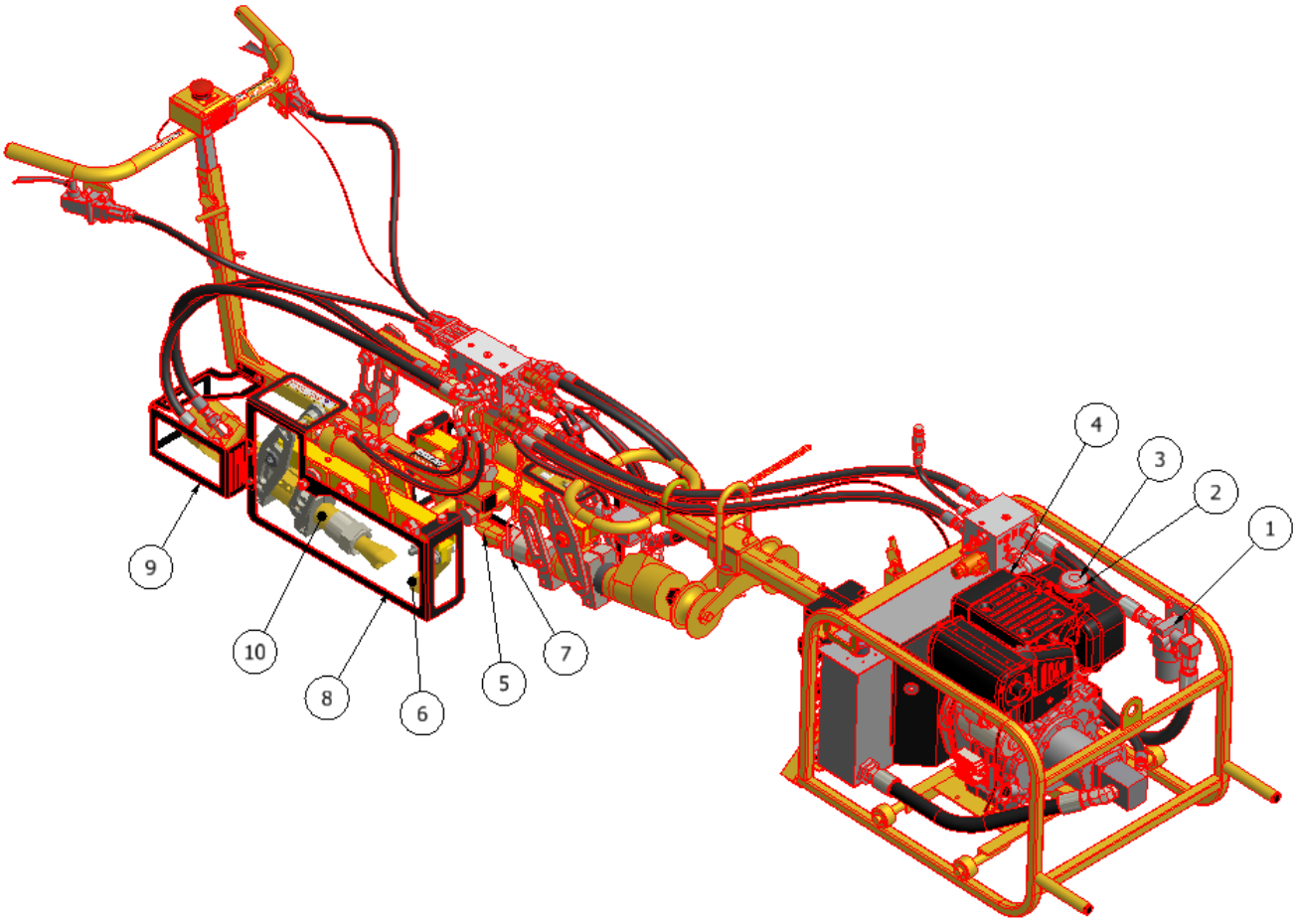
Item	MEC Part Number	Description
1	1860136	Hammer Moil
2	1860017	E-Clip Backstop Fabrication
3	1860057	Hammer Moil End Retainer
4	1860070	Outer Protective Guard
2	1860072	PR Clip Backstop Fabrication
5	1860097	Hammer End Guard Fabrication
6	1860102	Hammer Nose Cone Machined



11.2.2. 186 E-Clip Remover Dedicated Yanmar (FP-186-YE) Spares

Below is a list of spares that may be required for general maintenance during the life of the 186 E-Clip Remover Dedicated Machine.

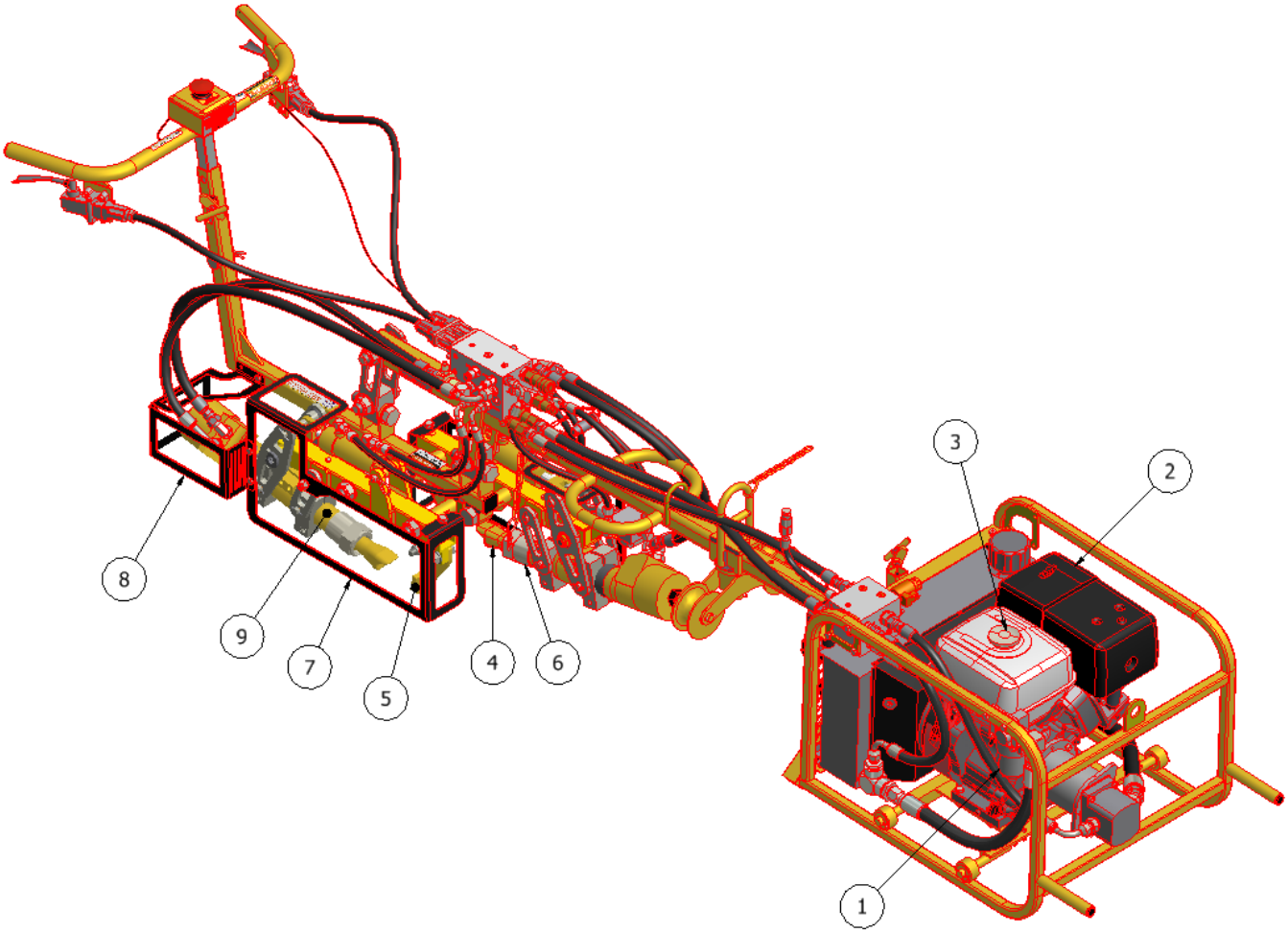
Item	MEC Part Number	Description
1	1081289-01	Hydraulic Oil Filter Element
2	1540004	Yanmar L70 Outlet Fuel Filter
3	1540662	Yanmar Fuel Tank Strainer
4	1540818	Yanmar L70N6 Air Filter
5	1860136	Hammer Moil
6	1860017	E-Clip Backstop Fabrication
7	1860057	Hammer Moil End Retainer
8	1860070	Outer Protective Guard
6	1860072	PR Clip Backstop Fabrication
9	1860097	Hammer End Guard Fabrication
10	1860102	Hammer Nose Cone Machined



11.2.3. 186 E-Clip Remover Dedicated Honda (FP-186-HE) Spares

Below is a list of spares that may be required for general maintenance during the life of the 186 E-Clip Remover Dedicated Machine.

Item	MEC Part Number	Description
1	1081289-01	Hydraulic Oil Filter Element
2	1540242	Honda Air Filter
3	1540243	Honda Fuel Filter
4	1860136	Hammer Moil
5	1860017	E-Clip Backstop Fabrication
6	1860057	Hammer Moil End Retainer
7	1860070	Outer Protective Guard
5	1860072	PR Clip Backstop Fabrication
8	1860097	Hammer End Guard Fabrication
9	1860102	Hammer Nose Cone Machined



11.3. Maintenance Period[1]

REGULAR SERVICE PERIOD* Perform at every indicated month or operating hour interval, whichever comes first.		Each use	Every 1 month or 10hrs	Every 3 months or 50hrs	Every 6 months or 250hrs	Every year or 500hrs
ITEM						
Engine oil	Check level	X				
	Change			X (1)	X	
Engine oil filter	Change			X (1)		X
Fuel Level	Check/Fill	X				
Fuel Lines	Check		X			
	Replace					X
Fuel Filter	Check/Clean			X		
	Change					X
Air Filter	Check			X		
	Replace				X	
Engine cooling fins	Clean					X
Rocker arms clearance	Check & set					X (2)
Injectors	Clean & set					X (2)
Spark Plug	Check				X	
	Replace					X
Hydraulic oil Filter	Change			X (1)	X	
Hydraulic oil	Check	X				
	Change				X	
Hydraulic hoses	Check	X				
	Check/Change					X (3)
Hydraulic pump	Check			X (1) (4)		X (4)
Battery	Check	X				
Grease Nipples	Fill			X		
Backstops	Check	X				
Brake Lift Switch	Check	X				
Emergency Stop	Check	X				
Guards	Check	X				
Hammer	Check		X			
Hammer Nose Cone	Check		X			
Hammer Moil Retainer	Check		X			
Hammer Accumulator Pressure	Check		X			
Moils	Check	X				
Nuts, Bolts, Screws, Fittings	Check					X

*If heavy machine use, the service period may be less.

(1) First 50 hrs of use
(2) Only to be performed by MEC or certified and authorised dealer.
(3) A thorough inspection is required. If hoses undamaged, may leave in service. However, replace hoses every 3 years of operation.
(4) Flow and Pressure Check

[1] Refer to engine manual for detailed engine instructions and requirements

12. Troubleshooting[1]

PROBLEM	POSSIBLE CAUSE	CORRECTION
Engine won't start	Refer to engine manual for details	
	Battery charge low	Charge battery
	Battery connections loose/not attached	Check battery connections
	Emergency Stop not connected	Check Emergency stop connection
	No engine oil	Check engine oil
	No fuel	Check fuel quantity
	Fuel filter blocked	Check fuel filter
	Fuel solenoid is off	Check fuel solenoid position
No hydraulic oil flow/little flow	No hydraulic oil	Check hydraulic oil level
	Pressure and Tank (return) hoses interchanged	Check connection.
	Operation lever in neutral	Check operation lever position
	Couplers or hoses blocked	Remove restriction
	Filter Blocked or Old	Replace filter
	Hoses leaking	Check hoses
	Contamination in relief valve	Clean relief valve
	Pump damaged	Check pump
Hydraulic oil overheating	Air obstruction	Remove obstruction to ensure sufficient air flow around heat exchanger
	Incorrect oil for operating temperature	Replace oil with correct grade for operating conditions
	Dirty/old oil	Replace oil
	Tool valve closed	Change tool or valve to 'open centre'
Unable to connect hoses	Oil temperature and pressure increase in hoses	Allow hoses to cool
	Operation lever in operation position	Place lever in neutral
Emergency Stop does not work	Emergency Stop not connected to the machine	Connect Emergency Stop to the power pack
	Wiring and/or connections damaged	Inspect wiring and replace damaged parts
	Switch Damaged	Check/Replace switch
Cylinders oscillating	Air in plunger valve	Remove air from plunger valve hoses
Hammer doesn't work. Pressure is not built up when trigger is activated	No or incorrect flow/pressure	Check flow/pressure by means of test equipment
	Seals defect in spool channel of valve housing	Dismount, check and replace seals

[1] Refer to engine manual for detailed engine instructions and requirements

Hammer doesn't work. Pressure is built up when trigger is activated	Back pressure too high	Make direct tank connection. (Max back pressure of 150psi) Alert MEC
	Quick-release coupling in return line defective	Locate and replace defective coupling
	Striking piston sticks, possibly due to thickening of cylinder	Check oil viscosity. Thin oil increases the risk of thickening
		Chamfer/polish the edge slightly at the cylinder dashpot (where the cylinder bore changes). Refer to hammer manual
	Spool/reversing spool or auxiliary spool sticking easily	Dismount and check that all parts move. Polish slightly if necessary. Refer to hammer manual
	Seals defective	Dismount, check and replace
Hammer runs weakly or irregularly	Insufficient flow	Check flow/pressure
	Seals defective	Replace seals
	Wear, internal leakage	Dismantle, check and replace defective or worn parts
		Check impurity or oil and oil viscosity at working temperature
		Thin oil = increased internal leakage
	Insufficient accumulator charge	Recharge accumulator
	Diaphragm defective	Replace diaphragm
Hoses pulsate	Accumulator defective	Replace accumulator diaphragm and charge with nitrogen
Oil leaking from hammer	Seals defective	Replace seals
Moil not restrained	End cap not tight/assembled correctly	Assemble/tighten end cap
	End cap damaged	Replace end cap

13. Further Documents

Please refer to the further documents within for drawing, risk assessment and other related information.

Further documents for the 186 Pandrol E-Clipper:

Document No.	Description	Type	Pg. #
186-OPRA	Operational Risk Assessment	Document	**Error! Bookmark not defined.**
108-215	Trolley to Power Pack Attachment	Drawing	66
143-48	Trackpack Boom Adjustment	Drawing	67
186-12	Left Hand Head Assembly	Drawing	68
186-43	E-Clip Remover Trackpack Head (FP-186-TP)	Drawing	69
186-147	E-Clip Remover Hydraulic Circuit – PRE 11/2018	Drawing	70
186-338	E Clip Remover Circuit diagram Fixed displacement – POST 11/2018	Drawing	71
186-339	E-Clip Remover Circuit diagram Variable displacement – POST 11/2018	Drawing	72
186-152	E-Clip Remover sticker location	Drawing	73
186-172	E-Clip Remover Trackpack Head (FP-186-TPUK)	Drawing	74

13.1. Operational Risk Assessment

	Machine: FP-186-AA E Clip Remover								Form No.: :	
	ABN								Issue Date	14/11/2011
	WORKPLACE GENERIC HIRARC FORM								Version:	0

Company	**MELVELLE EQUIPMENT CORP**	**Department / Workplace:**	**Melvelle Offices**	**Date of Assessment 14/11/2011**	**Commenced:**	9am	**Completed:**	12md

Scope of Assessment: Identify the risks and hazards associated with the operation of a rail maintenance machine to remove rusted pandrol e-clips from in situ tracks.

Names of Risk Assessment Team: Gary Morris, Adrian Gersbach	**Names of additional personnel consulted during Risk Assessment:**	**Identified limitations of risk assessment: Only applies to risks identified as part of the operation of the machine.**
		Information Sources / References: AS4024.1-2006 Safety of Machinery, AS4024-2601-Two Handed Control Device

RISK ASSESSMENT MATRIX

Potential Consequences			**Likelihood**				
			Almost Certain	**Likely**	**Possible**	**Unlikely**	**Rare**
Keyword	**Description Safety Health & Hygiene**	**Description Environmental**	*Expected to occur*	*Will occur occasionally*	*May Occur*	*Not expected to occur*	*Requires unusual chain of events*
Minor	First Aid Injury	On-site release immediately contained with business unit resources	**Medium 8**	**Medium 7**	**Low 3**	**Low 2**	**Low 1**
Significant	Medical Treated Injury or illness	On-site release or offsite release immediately contained with smelter resources	**High 14**	**Medium 10**	**Medium 9**	**Low 5**	**Low 4**
Serious	Lost Time Injury or illness	Off-site release causing nuisance or community complaint. Breach of license condition	**High 16**	**High 15**	**Medium 12**	**Medium 11**	**Low 6**
Severe	Fatality or Permanently disabling injury of illness	Off-site release with detrimental impact to environment or community. Repeated breach of license conditions	**Extreme 24**	**Extreme 22**	**High 20**	**High 18**	**Medium 13**
Disastrous	Multiple Fatalities or work-related fatal diseases	Toxic release off-site with detrimental impact to environment or community	**Extreme 25**	**Extreme 23**	**Extreme 21**	**High 19**	**High 17**

LEGEND	**ACTION REQUIRED**	**NOTIFY**
LOW 1-6	Tolerable - Manage by Routine Procedures	
MEDIUM 7-13	Risk reduction required to "As low as Reasonably Practicable" ALARP	Design Team/Engineer
HIGH 14-20	Immediate action required to reduce risk. Authorisation required before proceeding on task	CEO
EXTREME 21-25	Intolerable. Cease activity until controls in place to reduce risk. Immediate & urgent Senior Management Team action required	CEO

MANAGEMENT ACTIONS	
Comments	Refer to Action Plan
Risk Assessment Referred to:	Design Team
Risk Assessment Accepted by:	Andrew Melvelle
Risk Assessment findings recorded in the Project Design Folder	Design Team
Risk Assessment Findings communicated to:	Design Team, Melvelle Equipment Corp.

		Raw Risk Rating (no controls)				Residual Risk Rating (after controls)					
Ref no	Description / hazard / risk	Consequence (no controls)	Likelihood	Risk Level & Score	Controls	Consequence	Likelihood	Risk Level & Score	Is Risk Tolerable Y/N	Additional Controls Req	Action By / Name & date required
	Manual lifting of machine or segments of machine is dangerous to the operators back, and other areas	Serious	Likely	15	Use of lifting points for machines(crane) to lift the machine. No person to lift any machine at all	Serious	Rare	6	Y	Document lifting points	
	Weight at handles through incorrect trackpack setup causing strain on operator (trackpack only)	Significant	Likely	10	Correctly adjust trackpack pin location. Details shown in manual	Significant	Rare	4	Y	Documented in trackpack manual	
	Machine handles too low/high causing injury	Significant	Possible	9	Handles adjusted to the correct height. Procedure shown in manual	Significant	Rare	4	Y	Procedure shown in manual	
	Fluid levels too high causing overflow and low causing machine damage	Significant	Likely	10	Pre-start checklist requiring operator to check fluid levels before operating machine	Significant	Rare	4	Y	Pre start checklist	
	Exposure to hazardous materials such as fuel and oils	Significant	Likely	10	Hazardous material documentation in MSDS.	Significant	Rare	4	Y	MSDS	
	Fueling the fuel tank can lead to explosions, fires, and dangerous fumes being inhaled	Serious	Possible	12	Engine must only be re-filled when the power pack is stopped and in well ventilated area	Serious	Rare	6	Y		
	Injury can occur through connection of quick snap connections	Minor	Possible	3	Must be connected parellel to each other.	Minor	Rare	1	Y		
	Setting of height and backstops can lead to injury	Serious	Likely	15	Ensure machine is turned off and deadman employed. Use of manuals and procedures	Serious	Rare	6	Y	Procedure/manual	
	General machine operation	Significant	Likely	10	Procedures developed such as prestart checklist	Significant	Rare	4	Y	Pre start checklist	
	Injury through oil injection through hydraulic failure	Serious	Possible	12	Checking of all hydraulics eg Hose's for damage	Serious	Rare	6	Y	Procedure on hose checks	
	Loud noise from engine and machine causing permanent hearing damage	Serious	Likely	15	Motor fitted with muffler. Operator required to wear hearing protection.	Serious	Rare	6	Y	PPE during operation	

		Raw Risk Rating (no controls)				Residual Risk Rating (after controls)					
Ref no	Description / hazard / risk	Consequence (no controls)	Likelihood	Risk Level & Score	Controls	Consequence	Likelihood	Risk Level & Score	Is Risk Tolerable Y/N	Additional Controls Req	Action By / Name & date required
	Serious burns can occur through the touching of hot surfaces	Significant	Likely	10	Include warning signs. Include warnings in training and operating manuals.	Significant	Unlikely	5	Y	Warning sticker list	
	Battery contains corrosive material. Operator can be exposed to injury from battery acid spills	Serious	Possible	12	Batteries securely mounted.Wear protective clothing when handling battery.	Serious	Rare	6	Y		
	Trip hazard through ballast and loose items on rail way	Significant	Likely	10	Correct training in railway safety	Significant	rare	4	Y	Railway Safety	
	Crushing injury through falling machine if incorrectly supported	Serious	Likely	15	Correctly secured to rail trolley and powerpack (if applicabe)	Serious	Rare	6	Y		
	Pinch points exist through the connection of power pack to trolley and powerpack to work head	Significant	Possible	9	Procedure shown on connection of powerpack, trolley, and work head. Gloves to be worn	Significant	Unlikely	5	Y	procedure shown in connection of items	
	Injury through crushing during clip extraction	Serious	Possible	9	Guarding of moving parts and pinch points, Use of 2 handed controls meaning hands are at a safe area, Training of pinch areas in manual	Serious	Rare	6	Y		
	Injury Through clip projectile	Significant	Possible	9	Guarding of Clip extraction Area	Significant	Rare	4	Y		
	Injury through Kicking of machine under incorrect alignment	Minor	Likely	7	Correct training in machine use through manual	Minor	Unlikely	2	Y		
	Hitting of ballast by machine causing projectiles	Minor	Likely	7	Guarding of machine. Adequate cleaning of ballast through use of manual	Minor	Unlikely	2	Y		
	Pinch points on cylinder and pilot valve	Significant	Possible	9	Guarding of cylinder pich points. Gloves to be worn. Training in operation of machinery	Significant	Unlikely	5	Y		

13.1. Trolley to Power Pack Attachment

LOWERING POWERPACK AND WORK HEAD ONTO TROLLEY

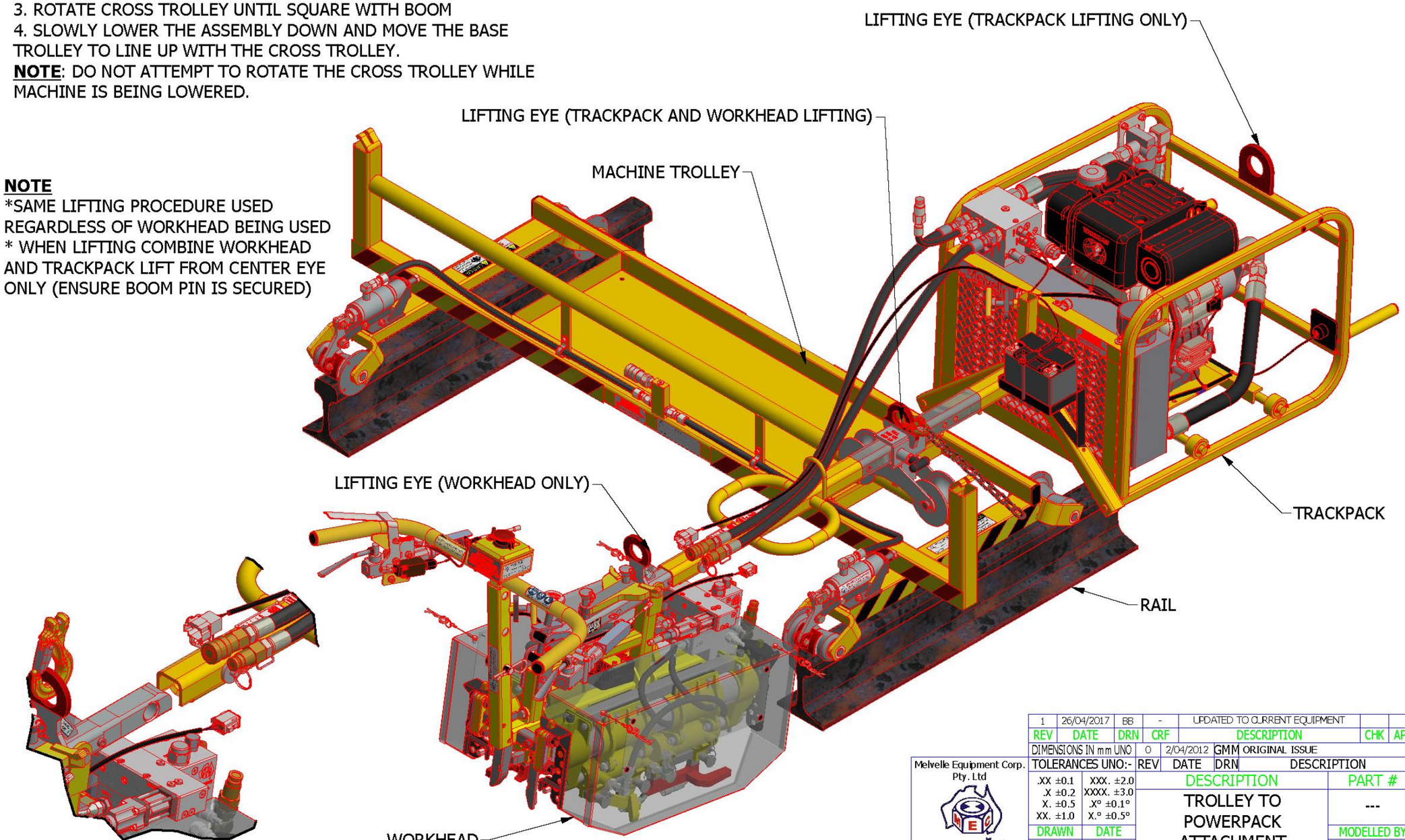
1. PLACE TROLLEY ONTO RAIL
2. LIFT POWERPACK AND WORKHEAD BY LIFTING EYE AS SHOWN
3. ROTATE CROSS TROLLEY UNTIL SQUARE WITH BOOM
4. SLOWLY LOWER THE ASSEMBLY DOWN AND MOVE THE BASE TROLLEY TO LINE UP WITH THE CROSS TROLLEY.

NOTE: DO NOT ATTEMPT TO ROTATE THE CROSS TROLLEY WHILE MACHINE IS BEING LOWERED.

NOTE

*SAME LIFTING PROCEDURE USED REGARDLESS OF WORKHEAD BEING USED

* WHEN LIFTING COMBINE WORKHEAD AND TRACKPACK LIFT FROM CENTER EYE ONLY (ENSURE BOOM PIN IS SECURED)



TRACKPACK TO WORK HEAD CONNECTION

REV	DATE	DRN	CRF	DESCRIPTION	CHK	APP
1	26/04/2017	BB	-	UPDATED TO CURRENT EQUIPMENT		
DIMENSIONS IN mm UNO			0	2/04/2012 GMM ORIGINAL ISSUE		

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Fax:+61 02 4950 1291

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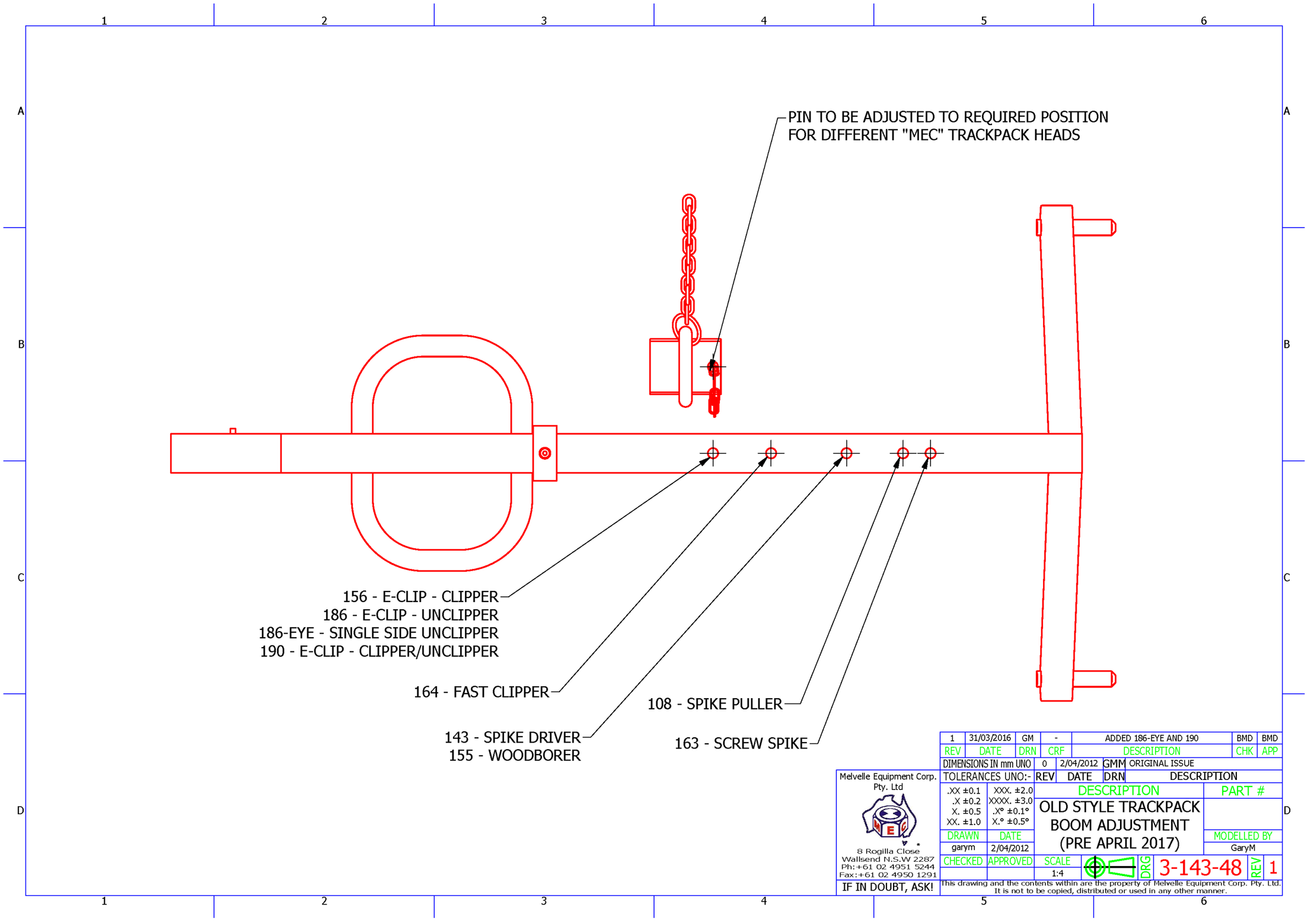
TOLERANCES UNO:-		REV	DATE	DRN	DESCRIPTION
.XX ±0.1	XXX. ±2.0				
.X ±0.2	XXX. ±3.0				
X. ±0.5	.X° ±0.1°				
XX. ±1.0	X.° ±0.5°				

DESCRIPTION	PART #
TROLLEY TO POWERPACK ATTACHMENT	---

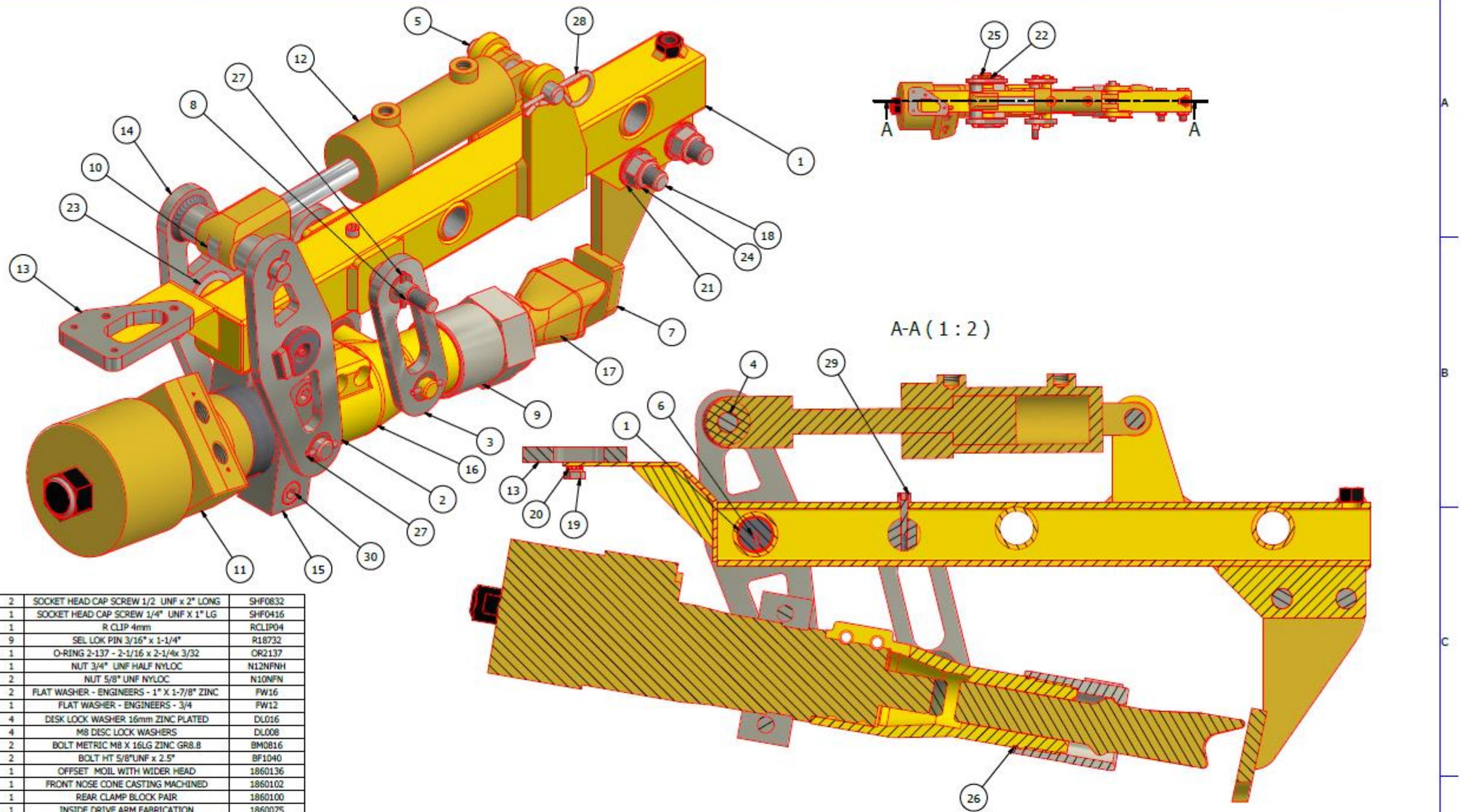
DRAWN	DATE	MODELLED BY
garym	2/04/2012	garym

CHECKED	APPROVED	SCALE	DRG	REV
		1:8	3-108-215	1

13.2. Trackpack Boom Adjustment



13.3. Left Hand Head Assembly



ITEM	QTY	DESCRIPTION	PART NUMBER
		MATERIAL/CUT LIST	
30	2	SOCKET HEAD CAP SCREW 1/2 UNF x 2" LONG	SHF0832
29	1	SOCKET HEAD CAP SCREW 1/4" UNF X 1" LG	SHF0416
28	1	R CLIP 4mm	RCLIP04
27	9	SEL LOK PIN 3/16" x 1-1/4"	R18732
26	1	O-RING 2-137 - 2-1/16 x 2-1/4x 3/32	OR2137
25	1	NUT 3/4" UNF HALF NYLOC	N12NFNH
24	2	NUT 5/8" UNF NYLOC	N10NFN
23	2	FLAT WASHER - ENGINEERS - 1" X 1-7/8" ZINC	FW16
22	1	FLAT WASHER - ENGINEERS - 3/4	FW12
21	4	DISK LOCK WASHER 16mm ZINC PLATED	DL016
20	4	M8 DISC LOCK WASHERS	DL008
19	2	BOLT METRIC M8 X 16LG ZINC GR8.8	BM0816
18	2	BOLT HT 5/8"UNF x 2.5"	BF1040
17	1	OFFSET MOIL WITH WIDER HEAD	1860136
16	1	FRONT NOSE CONE CASTING MACHINED	1860102
15	1	REAR CLAMP BLOCK PAIR	1860100
14	1	INSIDE DRIVE ARM FABRICATION	1860075
13	1	PLUNGER VALVE MOUNT PLATE	1860071
12	1	MODIFIED CYLINDER 1-1/2" DIA x2-1/4" STROKE	1860067
11	1	MODIFIED HAMMER	1860066
10	1	SD4 CAM PUSHER SPACER	1860058
9	1	HAMMER MOIL END RETAINER	1860057
8	1	PIN SWING ARM	1860019
7	1	WELDED BACKSTOP FABRICATION	1860017
6	1	PIN DRIVE ARM	1860016
5	1	PIN CYLINDER LUG	1860015
4	1	PIN CYLINDER CLEVIS	1860014
3	2	SWING ARM FABRICATION	1860013
2	1	OUTSIDE DRIVE ARM FABRICATION	1860012
1	1	LEFT HAND HEAD FRAME FABRICATION	1860009

REV	DATE	DRN	DESCRIPTION
5	9/05/2018	GM	CHANGED NOSE CONE AND MOIL
4	19/03/2014	GM	MOVED HAMMER CAP AND BUSHS AS CR9825,808
3	27/8/2013	GM	CHANGED TO BRONZE BUSHS
2	28/5/2013	AG	ADDED 2x GLACIER BUSH AS PER CRF 757
1	12/5/2011	GM	UPDATED TO NEW BUILD
0	12/05/2011		ORIGINAL ISSUE

DIMENSIONS IN mm UNO
TOLERANCES UNO:- .XX ±0.1 .X ±0.2 X. ±0.5 XX. ±1.0 XXX. ±2.0 XXXX. ±3.0 .X° ±0.1° X.° ±0.5°

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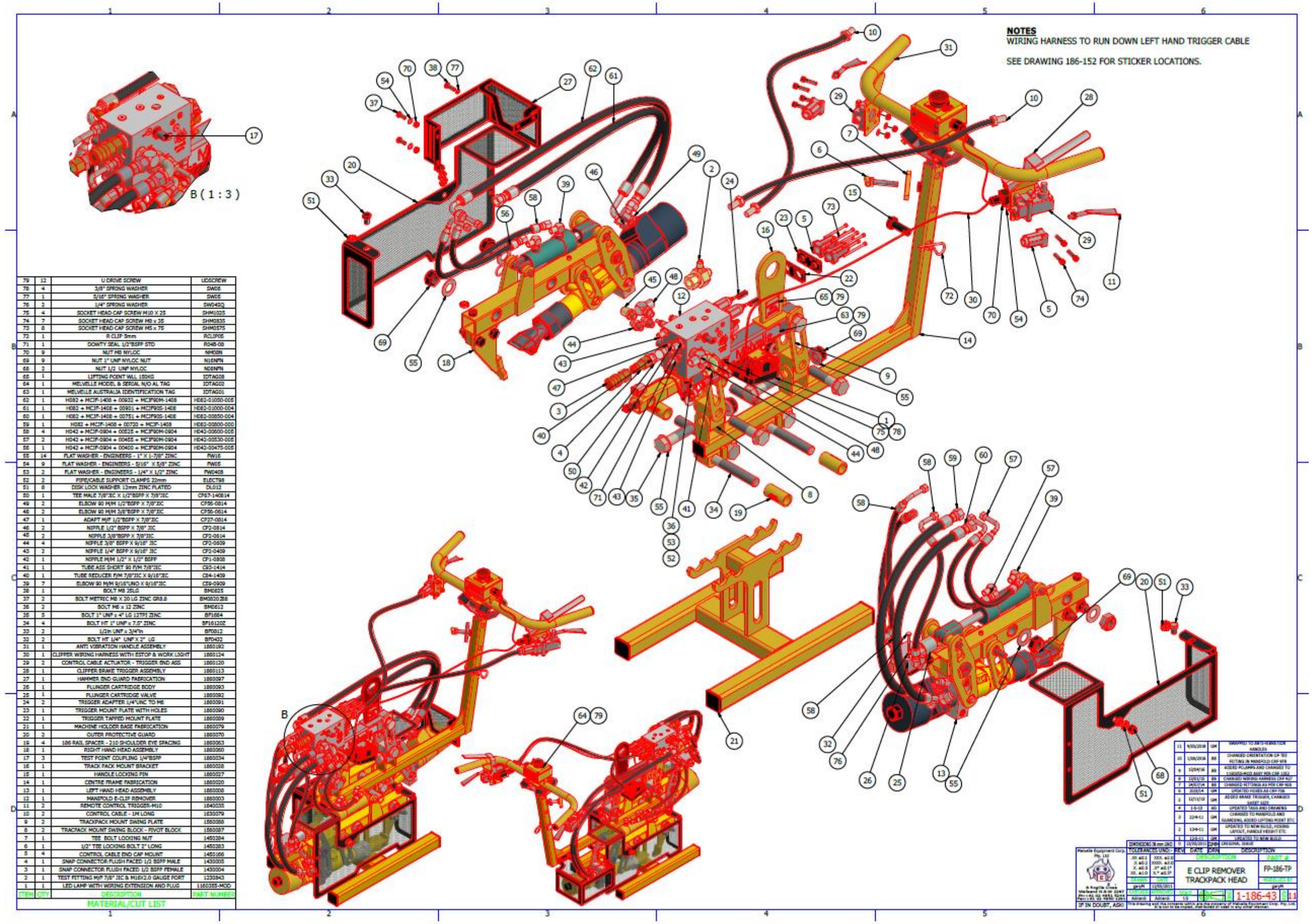
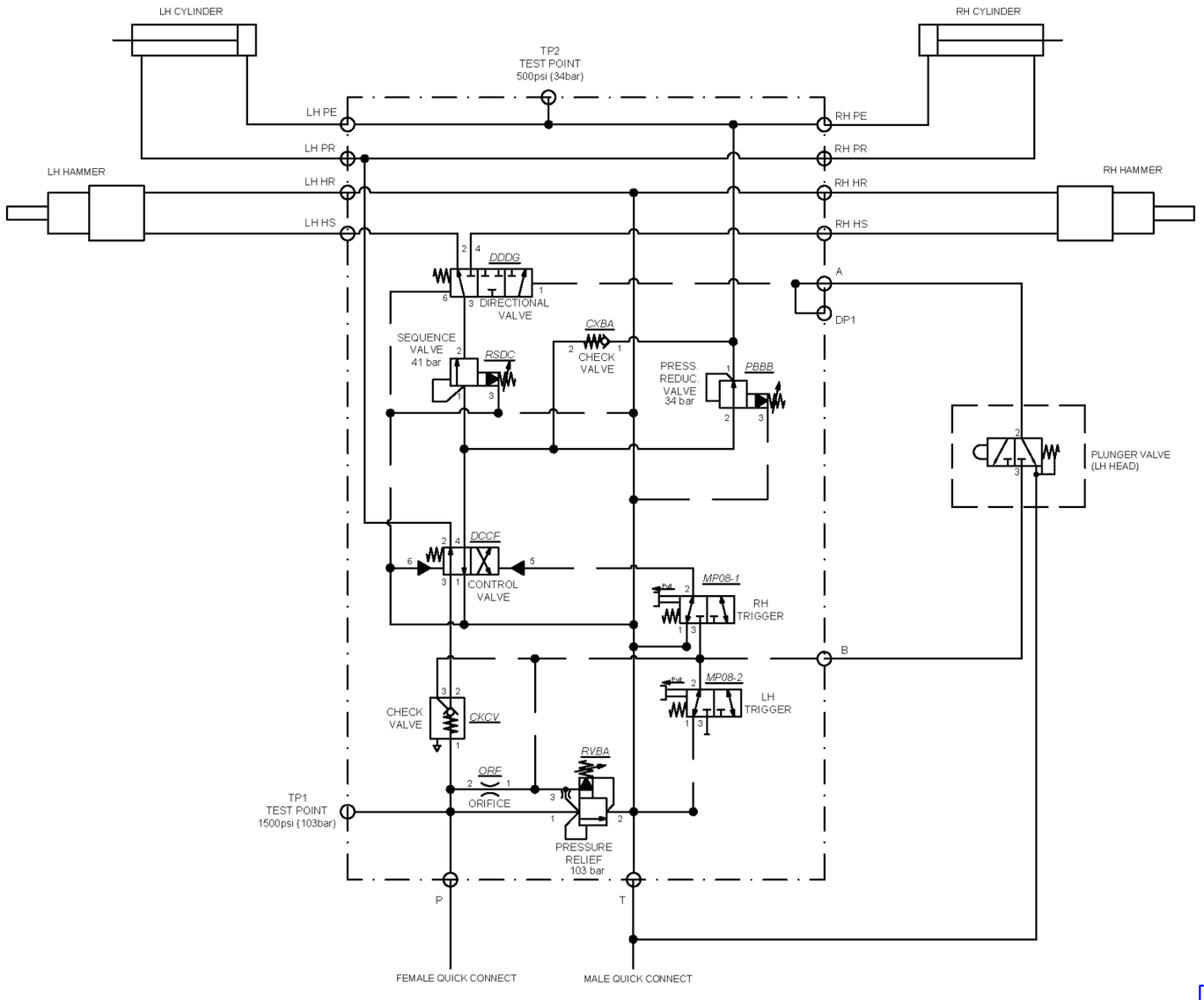
DESCRIPTION: LEFT HAND HEAD ASSEMBLY
PART #: 1860008
DRAWN: garyM 12/05/2011
MODELLED BY: Andrewd
CHECKED: AdrianG APPROVED: AdrianG
SCALE: 1:2.5
SIZE: A2
2-186-12
REV: 5

13.4. E-Clip Remover Trackpack Head (FP-186-TP



ITEM	QTY	DESCRIPTION	PART NUMBER
		MATERIAL/CUT LIST	
79	12	U DRIVE SCREW	UDSCREW
78	4	3/8" SPRING WASHER	SW06
77	1	5/16" SPRING WASHER	SW05
76	2	1/4" SPRING WASHER	SW040Q
75	4	SOCKET HEAD CAP SCREW M10 X 25	SHM0025
74	7	SOCKET HEAD CAP SCREW M6 x 35	SHM0035
73	8	SOCKET HEAD CAP SCREW M5 x 75	SHM0575
72	1	R CLIP 9mm	RCLIP09
71	1	DOWTY SEAL 1/2"BSPP STD	R04B-08
70	9	NUT M8 NYLOC	NM08N
69	9	NUT 1" UNF NYLOC NUT	N16NFN
68	2	NUT 1/2. UNF NYLOC	N08NFN
65	1	LIFTING POINT WLL 102KG	IDTAG08
64	1	MELVELLE MODEL & SERIAL N/O AL TAG	IDTAG03
63	1	MELVELLE AUSTRALIA IDENTIFICATION TAG	IDTAG01
62	1	H082 + MCIP-1408 + 00632 + MCIP90M-1408	H082-01000-006
61	1	H082 + MCIP-1408 + 00901 + MCIP90S-1408	H082-01000-004
60	1	H082 + MCIP-1408 + 00751 + MCIP90S-1408	H082-00850-004
59	1	H082 + MCIP-1408 + 00720 + MCIP-1408	H082-00800-000
58	4	H042 + MCIP-0904 + 00825 + MCIP90M-0904	H042-00600-006
57	2	H042 + MCIP-0904 + 00455 + MCIP90M-0904	H042-00530-006
56	1	H042 + MCIP-0904 + 00400 + MCIP90M-0904	H042-00475-006
55	14	FLAT WASHER - ENGINEERS - 1" X 1-7/8" ZINC	FW16
54	9	FLAT WASHER - ENGINEERS - 5/16" X 5/8" ZINC	FW05
53	2	FLAT WASHER - ENGINEERS - 1/4" X 1/2" ZINC	FW0408
52	2	PIPE/CABLE SUPPORT CLAMPS 22mm	ELEC798
51	8	DISK LOCK WASHER 12mm ZINC PLATED	DL012
50	1	TEE MALE 7/8"JIC X 1/2"BSPP X 7/8"JIC	CP67-140814
49	2	ELBOW 90 M/M 1/2"BSPP X 7/8"JIC	CP56-0814
48	2	ELBOW 90 M/M 3/8"BSPP X 7/8"JIC	CP56-0614
47	1	ADAPT M/F 1/2"BSPP X 7/8"JIC	CP27-0814
46	2	NIPPLE 1/2" BSPP X 7/8" JIC	CP2-0814
45	2	NIPPLE 3/8"BSPP X 7/8"JIC	CP2-0614
44	4	NIPPLE 3/8" BSPP X 9/16" JIC	CP2-0609
43	2	NIPPLE 1/4" BSPP X 9/16" JIC	CP2-0409
42	1	NIPPLE M/M 1/2" X 1/2" BSPP	CP1-0808
41	1	TUBE ASS SHORT 90 F/M 7/8"JIC	CR3-1414
40	1	TUBE REDUCER F/M 7/8"JIC X 9/16"JIC	CR4-1409
39	7	ELBOW 90 M/M 9/16"UNO X 9/16"JIC	CR9-0909
38	1	BOLT M8 25LG	BM0825
37	2	BOLT METREC M8 X 20 LG ZINC GR8.8	BM0820.ZR8
36	2	BOLT M6 x 12 ZINC	BM0612
35	5	BOLT 1" UNF x 4" LG 12TPI ZINC	BF1664
34	4	BOLT HT 1" UNF x 7.5" ZINC	BF161202
33	2	1/2in UNF x 3/4"in	BF0812
32	2	BOLT HT 1/4" UNF X 2" LG	BF0432
31	1	ANTI VIBRATION HANDLE ASSEMBLY	1860182
30	1	CLIPPER WIRING HARNESS WITH ESTOP & WORK LIGHT	1860124
29	2	CONTROL CABLE ACTUATOR - TRIGGER END ASS	1860120
28	1	CLIPPER BRAKE TRIGGER ASSEMBLY	1860113
27	1	HAMMER END GUARD FABRICATION	1860097
26	1	PLUNGER CARTRIDGE BODY	1860093
25	1	PLUNGER CARTRIDGE VALVE	1860092
24	2	TRIGGER ADAPTER 1/4"UNC TO M6	1860091
23	1	TRIGGER MOUNT PLATE WITH HOLES	1860090
22	1	TRIGGER TAPPED MOUNT PLATE	1860089
21	1	MACHINE HOLDER BASE FABRICATION	1860079
20	2	OUTER PROTECTIVE GUARD	1860070
19	4	186 RAIL SPACER - 210 SHOULDER EYE SPACING	1860063
18	1	RIGHT HAND HEAD ASSEMBLY	1860060
17	3	TEST POINT COUPLING 1/4"BSPP	1860034
16	1	TRACK PACK MOUNT BRACKET	1860028
15	1	HANDLE LOCKING PIN	1860027
14	1	CENTRE FRAME FABRICATION	1860020
13	1	LEFT HAND HEAD ASSEMBLY	1860006
12	1	MANIFOLD E-CLIP REMOVER	1860003
11	2	REMOTE CONTROL TRIGGER-M10	1640035
10	2	CONTROL CABLE - 1M LONG	1630079
9	2	TRACPACK MOUNT SWING PLATE	1860088
8	2	TRACPACK MOUNT SWING BLOCK - PIVOT BLOCK	1860087
7	1	TEE BOLT LOCKING NUT	1450284
6	1	1/2" TEE LOCKING BOLT 2" LONG	1450283
5	4	CONTROL CABLE END CAP MOUNT	1450166
4	1	SNAP CONNECTOR FLUSH FACED 1/2 BSPP MALE	1430005
3	1	SNAP CONNECTOR FLUSH FACED 1/2 BSPP FEMALE	1430004
2	1	TEST FITTING M/F 7/8" JIC & M16X2.0 GAUGE PORT	1230843
1	1	LED LAMP WITH WIRING EXTENSION AND PLUG	1160365-MOD

13.5. E-Clip Remover Hydraulic Circuit – Pre 11/2018



ITEM	QTY	DESCRIPTION	LENGTH	PART No.
MATERIAL/CUT LIST				

REV	DATE	DRN	DESCRIPTION
2	3/12/13	GM	LABELLED CARTRIDGES
1	22/10/13	GM	UPDATED TO SEQUENCE VALE
0	15/10/12	AFG	ORIGINAL ISSUE

DIMENSIONS IN mm UNO
TOLERENCES UNO:-
.XX ±0.1 XXX. ±2.0
.X ±0.2 XXXX. ±3.0
X. ±0.5 .X° ±0.1°
XX. ±1.0 X.° ±0.5°

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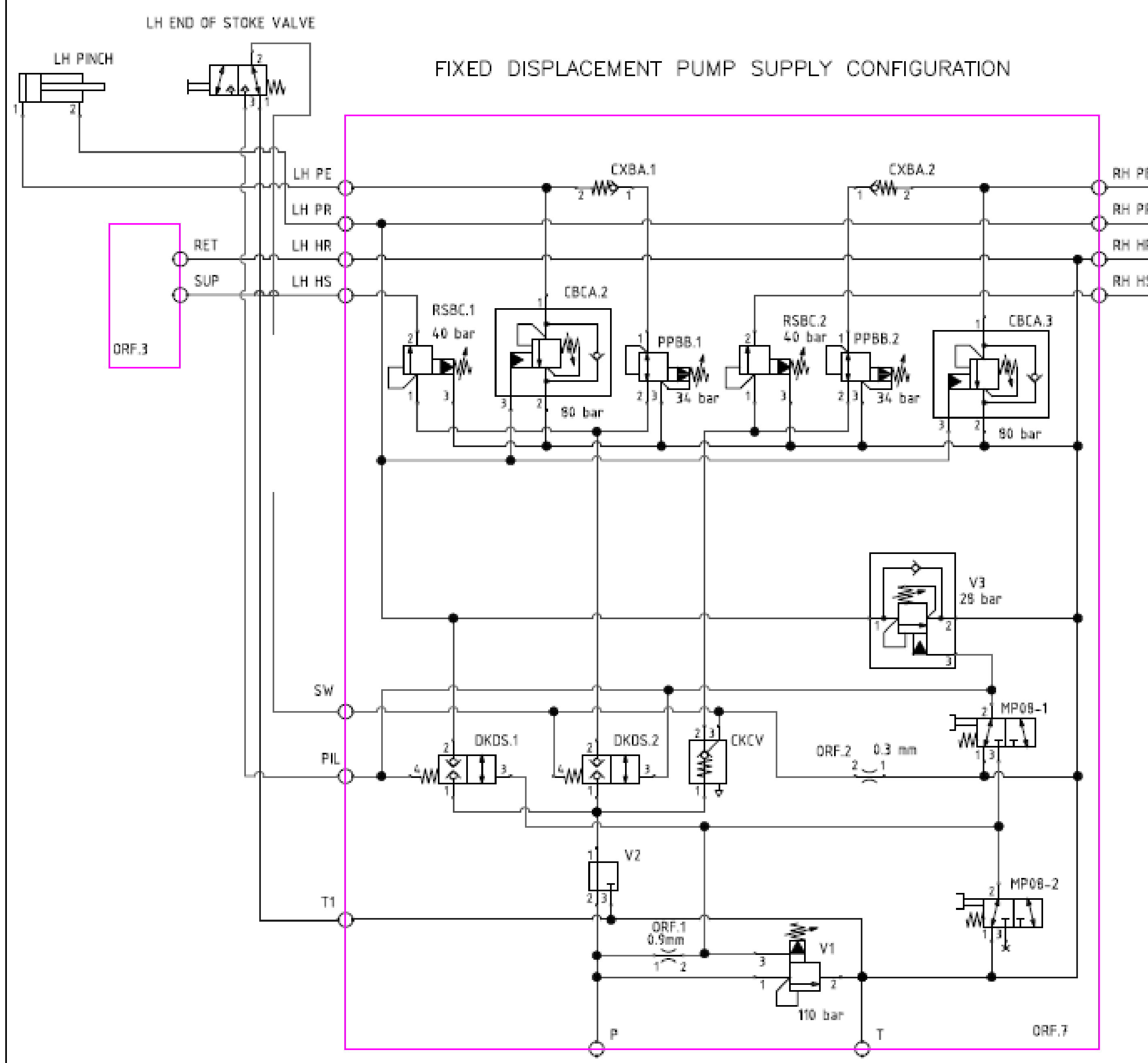
DESCRIPTION	PART#
186 E-CLIP REMOVER HYDRAULIC CIRCUIT DIAGRAM	FP-186

DRAWN	DATE	AUTOCAD DRAWING
AFG	15/10/12	
CHECKED	APPROVED	SCALE
GMM	GMM	NTS

DRG 3-186-147 REV 2

13.6. E-Clip Circuit diagram – Fixed Displacement – Post 11/2018



COMMON MANIFOLD COMPONENTS				
ITEM ID	QTY	MODEL CODE	DESCRIPTION	MANUFACTURER
CBCA	2	CBCA LHN	COUNTERBALANCE VALVE	SUN HYDRAULICS
CKCV	1	CKCV XAN	PILOT TO OPEN CHECK VALVE WITH ATMOSPHERIC VENT	SUN HYDRAULICS
CXBA	2	CXBA XAN	CHECK VALVE	SUN HYDRAULICS
DKDS	2	DKDS XHN	N.C. BALANCED POPPET TYPE LOGIC ELEMENT – PILOT TO OPEN	SUN HYDRAULICS
MP08-1	2	MP08-30T	2/2 WAY MANUAL PULL TO SHIFT DIRECTION CONTROL VALVE	HYDRAFORCE
ORF.2	1	ORF/M6X0.3SC	ORIFICE PLUG SELF CLEANING	CFP
PPBB	2	PPBB LNN	PILOT OPERATED PRESSURE REDUCING/RELIEVING VALVE	SUN HYDRAULICS
RSBC	2	RSBC LBN	PILOT OPERATED SEQUENCE VALVE	SUN HYDRAULICS

FIXED DISPLACEMENT PUMP SETUP PARTS				
ITEM ID	QTY	MODEL CODE	DESCRIPTION	MANUFACTURER
ORF.1	1	CFPN-1814	1/8 NPT GRUBSCREW ORIFICE 0.9MM	CAULTON FLUIDPOWER
V1	1	RVBA LAN-110-BAR	PILOT OP. VENTABLE RELIEF VALVE	SUN HYDRAULICS
V2	1	XEOA XXN	CAVITY PLUG T11A	SUN HYDRAULICS
V3	1	CBCA LBN	COUNTERBALANCE VALVE	SUN HYDRAULICS

ITEM ID	PORT TYPE	DESCRIPTION	PORT SIZE
LH HR, LH HS, LH PE, LH PR, RH PE	BSP	3/8 BSPP	G 3/8-19
PIL, SW, T1	BSP	1/8 BSP	G 1/8-28
P, T	BSP	1/2 BSPP	G 1/2-14

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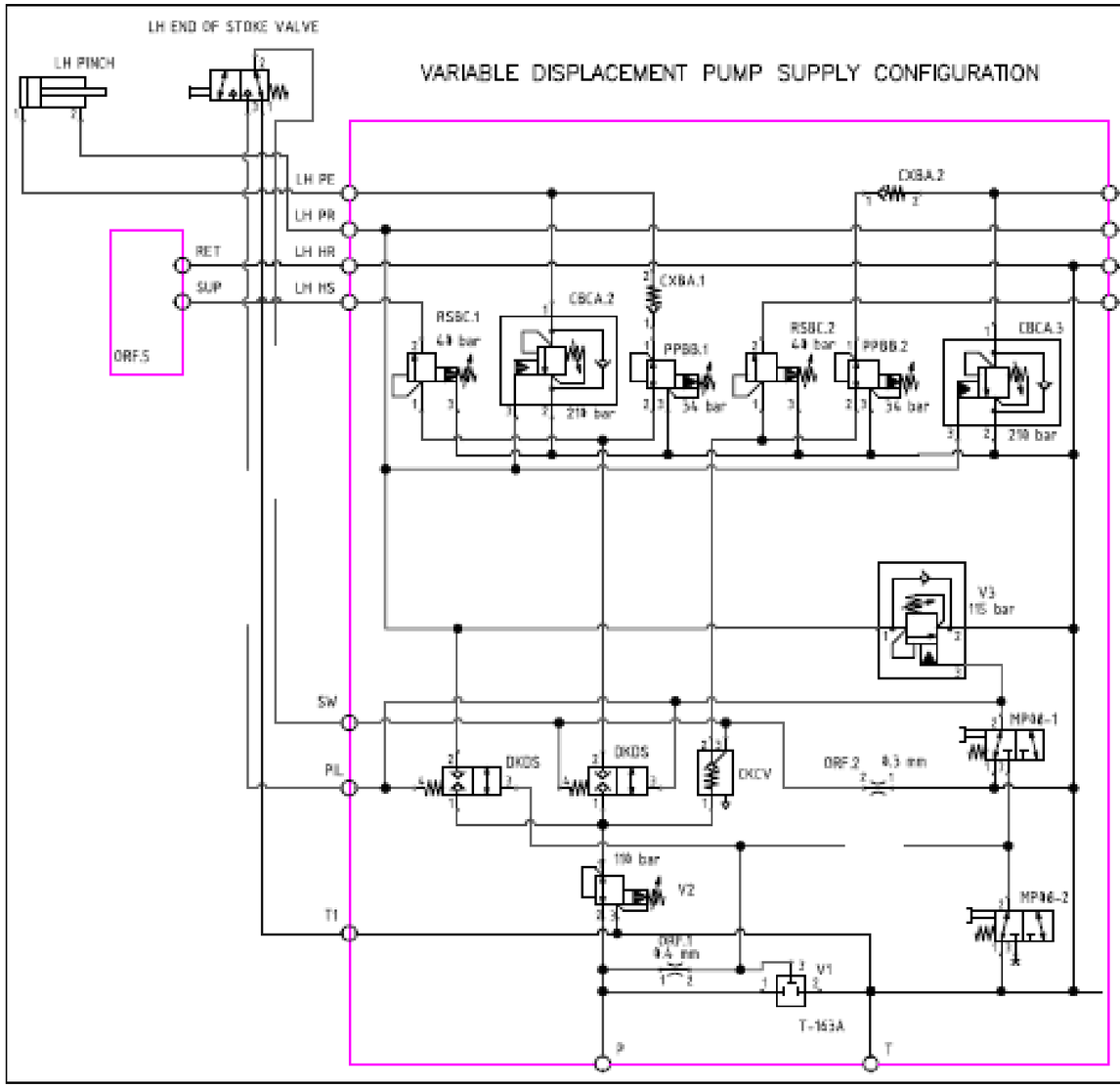
IF IN DOUBT, ASK!

TOLERENCES UNO		DIMENSIONS IN mm UNO	
.XX ±0.1	XXX. ±2.0	DESCRIPTION	PART#
.X ±0.2	XXXX. ±3.0	E CLIP REMOVER CIRCUIT DIAGRAM FIXED DISPLACEMENT	
X. ±0.5	.X° ±0.1°		
XX. ±1.0	X.° ±0.5°		AUTOCAD DRAWING
DRAWN	DATE		
GM	10/12/2018		
CHECKED	APPROVED	SCALE	DRG 3-186-338 REV 0
JC	JC	NTS	

13.7. E-Clip Circuit diagram – Variable Displacement – Post 11/2018



COMMON MANIFOLD COMPONENTS				
ITEM ID	QTY	MODEL CODE	DESCRIPTION	MANUFACTURER
CBCA	2	CBCA LHN	COUNTERBALANCE VALVE	SUN HYDRAULICS
CKCV	1	CKCV XAN	PILOT TO OPEN CHECK VALVE WITH ATMOSPHERIC VENT	SUN HYDRAULICS
CXBA	2	CXBA XAN	CHECK VALVE	SUN HYDRAULICS
DKDS	2	DKDS XHN	N.C. BALANCED POPPET TYPE LOGIC ELEMENT - PILOT TO OPEN	SUN HYDRAULICS
MP08-1	2	MP08-3DT	2/2 WAY MANUAL PULL TO SHIFT DIRECTION CONTROL VALVE	HYDRAFORCE
ORF.2	1	ORF/M6X0.3SC	ORIFICE PLUG SELF CLEANING	CFP
PPBB	2	PPBB LNN	PILOT OPERATED PRESSURE REDUCING/RELIEVING VALVE	SUN HYDRAULICS
RSBC	2	RSBC LBN	PILOT OPERATED SEQUENCE	SUN HYDRAULICS

VARIABLE PUMP SETUP PARTS				
ITEM ID	QTY	MODEL CODE	DESCRIPTION	MANUFACTURER
ORF.1	1	CFPN-1813	1/8" NPT GRUBSCREW ORIFICE 0.4MM	CFP
V1	1	XZCB XXN	CAVITY PLUG T163A	SUN HYDRAULICS
V2	1	PPDB LAN	PILOT OPERATED PRESSURE REDUCING/RELIEVING VALVE	SUN HYDRAULICS
V3	1	CBCA LBN	POPPET TYPE RELIEF VALVE	SUN HYDRAULICS

ITEM ID	PORT TYPE	PORT SIZE	
LH HR, LH HS, LH PE, LH PR, RH PE	BSP	3/8 BSPP	G 3/8-19
PIL, SW, T1	BSP	1/8 BSP	G 1/8-28
P, T	BSP	1/2 BSPP	G 1/2-14

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IF IN DOUBT, ASK!

TOLERENCES UNO!-
.XX ±0.1 XXX, ±2.0
.X ±0.2 XXXX, ±3.0
X, ±0.5 .X° ±0.1°
XX, ±1.0 X,° ±0.5°

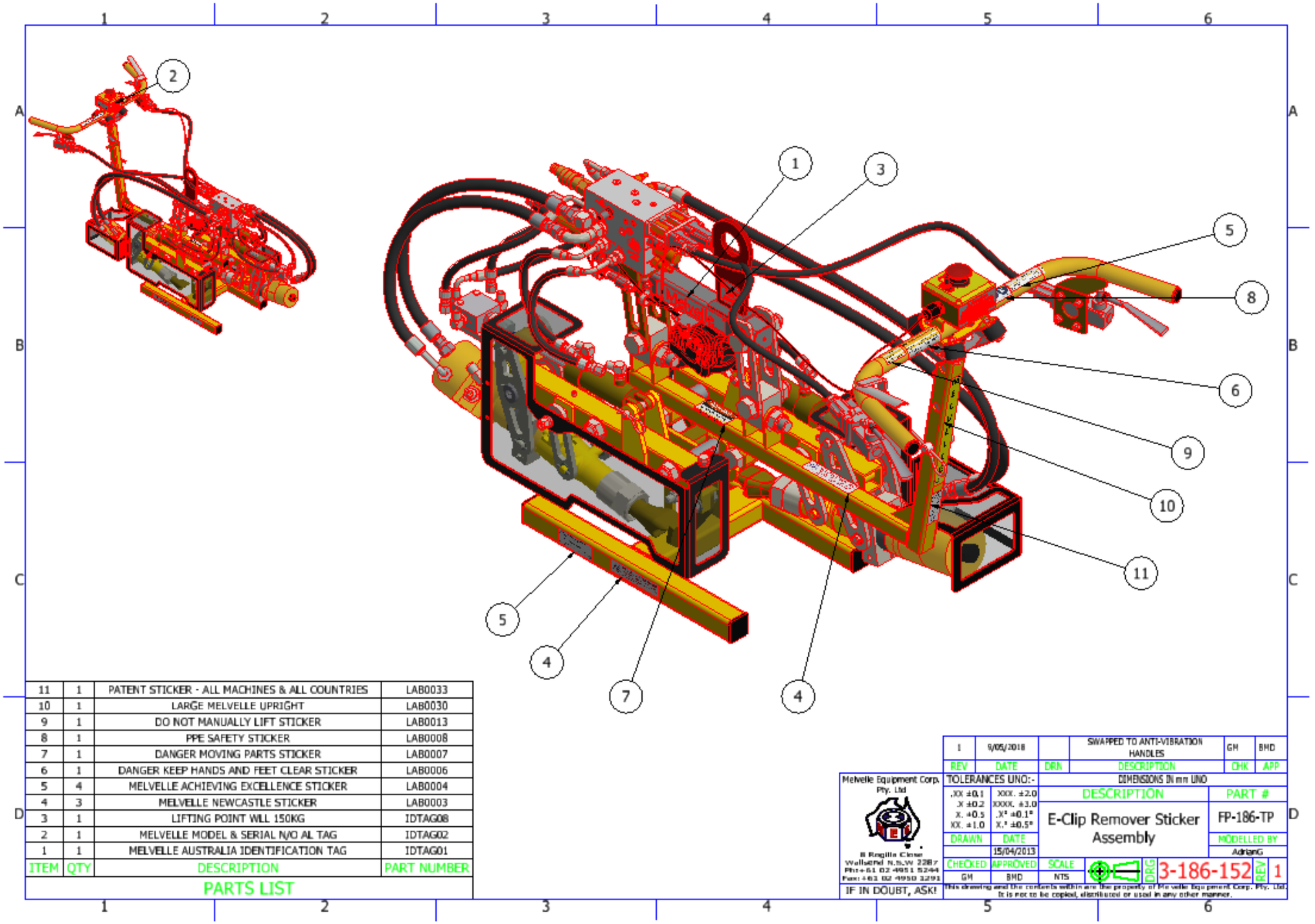
DIMENSIONS IN mm UNO

DESCRIPTION: E CLIP REMOVER CIRCUIT DIAGRAM VARIABLE DISPLACEMENT

PART#:

DRAWN: GN | DATE: 10/12/2018 | CHECKED: JC | APPROVED: JC | SCALE: NTS | AUTOCAD DRAWING: 3-186-339 | REV: 0

13.2. E-Clip Remover Sticker location



ITEM	QTY	DESCRIPTION	PART NUMBER
11	1	PATENT STICKER - ALL MACHINES & ALL COUNTRIES	LAB0033
10	1	LARGE MELVELLE UPRIGHT	LAB0030
9	1	DO NOT MANUALLY LIFT STICKER	LAB0013
8	1	PPE SAFETY STICKER	LAB0008
7	1	DANGER MOVING PARTS STICKER	LAB0007
6	1	DANGER KEEP HANDS AND FEET CLEAR STICKER	LAB0006
5	4	MELVELLE ACHIEVING EXCELLENCE STICKER	LAB0004
4	3	MELVELLE NEWCASTLE STICKER	LAB0003
3	1	LIFTING POINT WLL 150KG	IDTAG08
2	1	MELVELLE MODEL & SERIAL N/O AL TAG	IDTAG02
1	1	MELVELLE AUSTRALIA IDENTIFICATION TAG	IDTAG01

PARTS LIST

REV	DATE	DRN	DESCRIPTION	CHK	APP
1	9/05/2018		SWAPPED TO ANTI-VIBRATION HANDLES	GM	BMD

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TOLERANCES UNO:-
.XX ±0.1 XXX. ±2.0
.X ±0.2 XXXX. ±3.0
X. ±0.5 .X° ±0.1°
XX. ±1.0 X.° ±0.5°

DIMENSIONS IN mm UNO

DESCRIPTION	PART #
E-Clip Remover Sticker Assembly	FP-186-TP

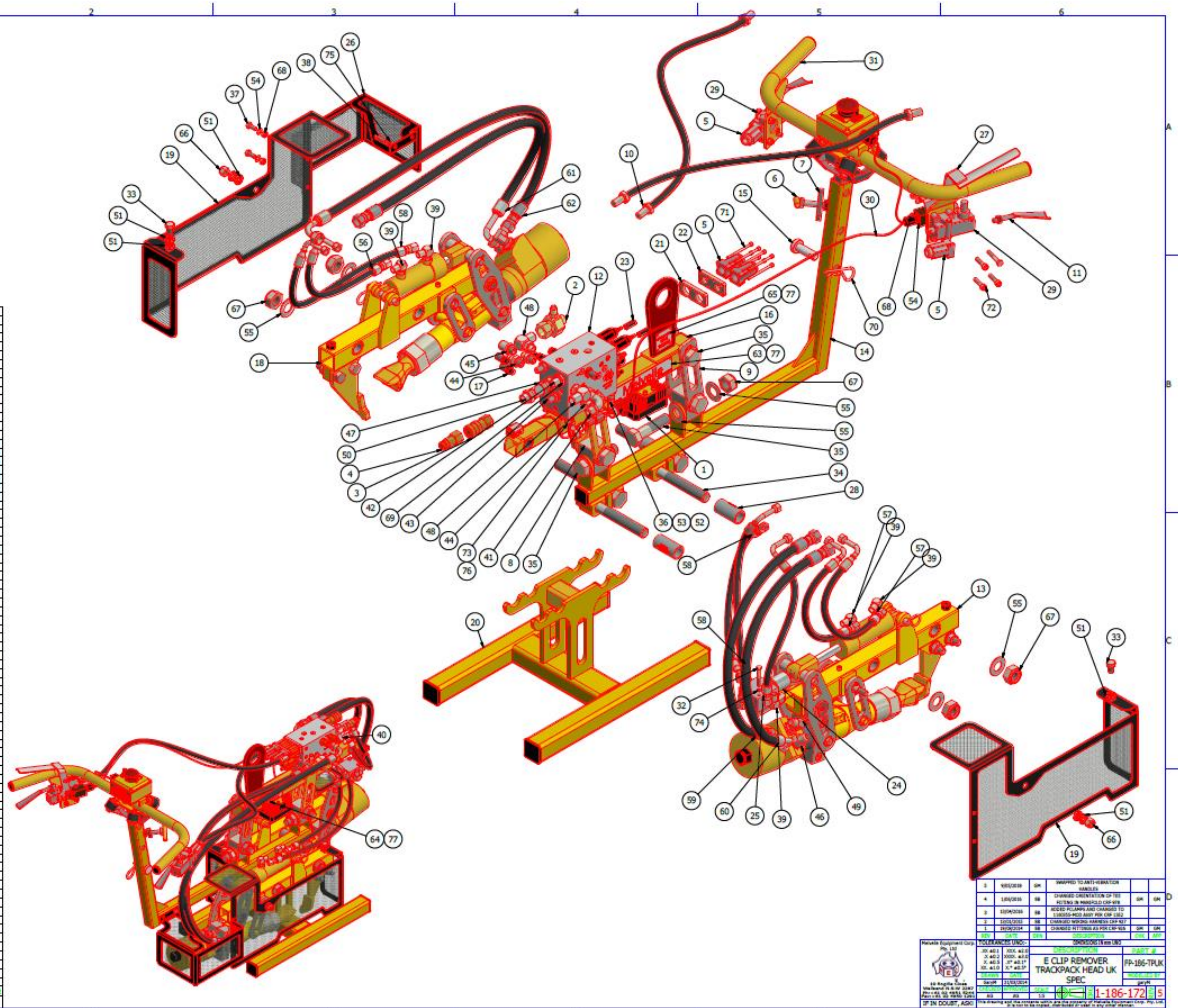
DRAWN	DATE	MODELLED BY
	15/04/2013	AdrianG
CHECKED	APPROVED	SCALE
GM	BMD	NTS

DRG 3-186-152 REV 1

13.3. E-Clip Remover Trackpack Head (FP-186-TPUK)

NOTES

SEE DRAWING 186-152 FOR STICKER LOCATIONS.



ITEM	QTY	DESCRIPTION	PART NUMBER
77	12	U DRIVE SCREW	UDSCREW
76	4	3/8" SPRING WASHER	SW06
75	1	5/16" SPRING WASHER	SW05
74	2	1/4" SPRING WASHER	SW04SQ
73	4	SOCKET HEAD CAP SCREW M10 X 25	SHM1025
72	7	SOCKET HEAD CAP SCREW M8 x 35	SHM0835
71	8	SOCKET HEAD CAP SCREW M5 x 75	SHM0575
70	1	R CLIP 5mm	RCLIP05
69	1	DOWTY SEAL 1/2"BSPP STD	R048-08
68	9	NUT M8 NYLOC	NM08N
67	9	NUT 1" UNF NYLOC NUT	N16NFN
66	2	NUT 1/2 UNF NYLOC	N08NFN
65	1	LIFTING POINT WLL 150KG	IDTAG08
64	1	MELVELLE MODEL & SERIAL N/O AL TAG	IDTAG02
63	1	MELVELLE AUSTRALIA IDENTIFICATION TAG	IDTAG01
62	1	H082 + MCJF-1408 + 00902 + MCJF90M-1408	H082-01050-005
61	1	H082 + MCJF-1408 + 00901 + MCJF90S-1408	H082-01000-004
60	1	H082 + MCJF-1408 + 00751 + MCJF90S-1408	H082-00850-004
59	1	H082 + MCJF-1408 + 00720 + MCJF-1408	H082-00800-000
58	4	H042 + MCJF-0904 + 00525 + MCJF90M-0904	H042-00600-005
57	2	H042 + MCJF-0904 + 00455 + MCJF90M-0904	H042-00530-005
56	1	H042 + MCJF-0904 + 00400 + MCJF90M-0904	H042-00475-005
55	14	FLAT WASHER - ENGINEERS - 1" X 1-7/8" ZINC	FW16
54	9	FLAT WASHER - ENGINEERS - 5/16" X 5/8" ZINC	FW05
53	2	FLAT WASHER - ENGINEERS - 1/4" X 1/2" ZINC	FW0408
52	2	PIPE/CABLE SUPPORT CLAMPS 22mm	E1ECT98
51	8	DISK LOCK WASHER 12mm ZINC PLATED	DL012
50	1	TEE MALE 7/8"JIC X 1/2"BSPP X 7/8"JIC	CP67-140814
49	2	ELBOW 90 M/M 1/2"BSPP X 7/8"JIC	CP58-0814
48	2	ELBOW 90 M/M 3/8"BSPP X 7/8"JIC	CP58-0614
47	1	ADAPT M/F 1/2"BSPP X 7/8"JIC	CP27-0814
46	2	NIPPLE 1/2" BSPP X 7/8" JIC	CP2-0814
45	2	NIPPLE 3/8"BSPP X 7/8"JIC	CP2-0614
44	4	NIPPLE 3/8" BSPP X 9/16" JIC	CP2-0609
43	2	NIPPLE 1/4" BSPP X 9/16" JIC	CP2-0409
42	1	NIPPLE M/M 1/2" X 1/2" BSPP	CP1-0808
41	1	TUBE ASS SHORT 90 F/M 7/8"JIC	C93-1414
40	1	TUBE REDUCER F/M 7/8"JIC X 9/16"JIC	C84-1409
39	7	ELBOW 90 M/M 9/16"UNO X 9/16"JIC	C59-0909
38	1	BOLT M8 25LG	BM0825
37	2	BOLT METRIC M8 X 20 LG ZINC GR8.8	BM0820Z88
36	2	BOLT M6 x 12 ZINC	BM0612
35	5	BOLT 1" UNF x 4" LG 12TPI ZINC	BF1664
34	4	BOLT HT 1" UNF x 7.5" ZINC	BF16120Z
33	2	1/2in UNF x 3/4"in	BF0812
32	2	BOLT HT 1/4" UNF X 2" LG	BF0432
31	1	ANTI VIBRATION HANDLE ASSEMBLY	1060192
30	1	CLIPPER WIRING HARNESS WITH ESTOP & WORK LIGHT	1060124
29	2	CONTROL CABLE ACTUATOR - TRIGGER END ASS	1060120
28	4	186 RAIL SPACER - 207 SHOULDER EYE SPACING (UK)	1060118
27	1	CLIPPER BRAKE TRIGGER ASSEMBLY	1060113
26	1	HAMMER END GUARD FABRICATION	1060097
25	1	PLUNGER CARTRIDGE BODY	1060093
24	1	PLUNGER CARTRIDGE VALVE	1060092
23	2	TRIGGER ADAPTER 1/4"UNC TO M6	1060091
22	1	TRIGGER MOUNT PLATE WITH HOLES	1060090
21	1	TRIGGER TAPPED MOUNT PLATE	1060089
20	1	MACHINE HOLDER BASE FABRICATION	1060079
19	2	OUTER PROTECTIVE GUARD	1060070
18	1	RIGHT HAND HEAD ASSEMBLY	1060060
17	3	TEST POINT COUPLING 1/4"BSPP	1060034
16	1	TRACKPACK MOUNT BRACKET	1060028
15	1	HANDLE LOCKING PIN	1060027
14	1	CENTRE FRAME FABRICATION	1060020
13	1	LEFT HAND HEAD ASSEMBLY	1060008
12	1	MANIFOLD E-CLIP REMOVER	1060003
11	2	REMOTE CONTROL TRIGGER-M10	1640035
10	2	CONTROL CABLE - 1M LONG	1630079
9	2	TRACKPACK MOUNT SWING PLATE	1560088
8	2	TRACPACK MOUNT SWING BLOCK - PIVOT BLOCK	1560087
7	1	TEE BOLT LOCKING NUT	1450284
6	1	1/2" TEE LOCKING BOLT 2" LONG	1450283
5	4	CONTROL CABLE END CAP	1450166
4	1	SNAP CONNECTOR FLUSH FACED 1/2 BSPP MALE	1430005
3	1	SNAP CONNECTOR FLUSH FACED 1/2 BSPP FEMALE	1430004
2	1	TEST FITTING M/F 7/8" JIC & M16X2.0 GAUGE PORT	1230843
1	1	LED LAMP WITH WIRING EXTENSION AND PLUG	1160285-MOD

MATERIAL/CUT LIST

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