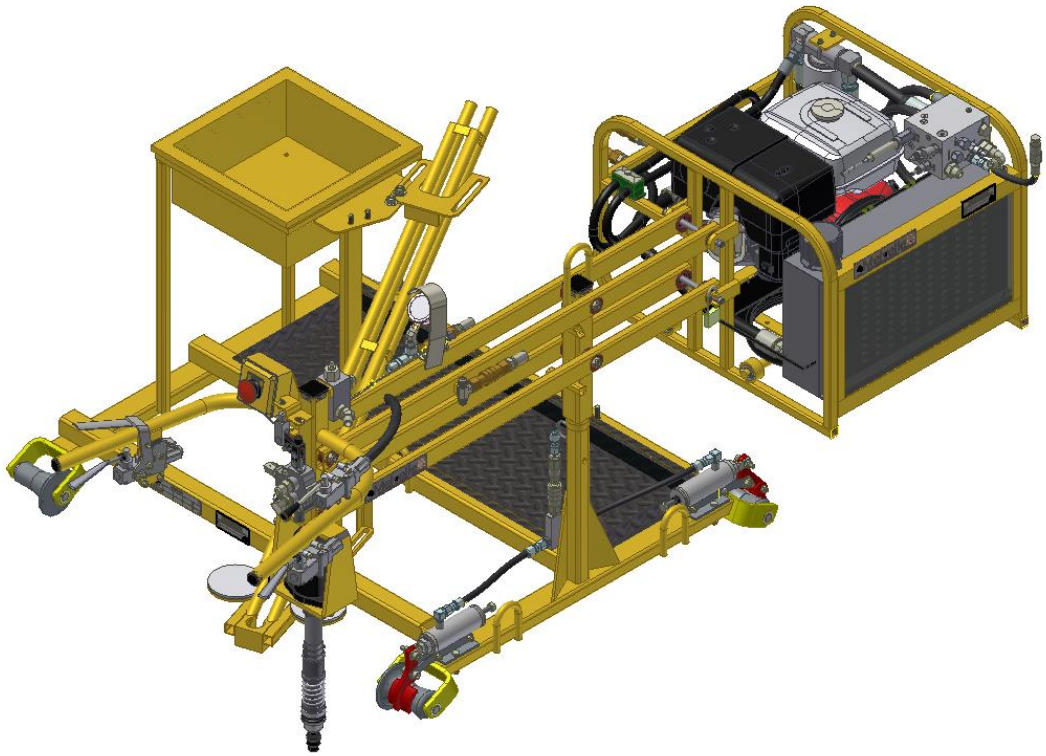
Melvelle Equipment Corp Pty Ltd

"Proud Australian Manufacturers"

163 Screw Spike Machine

Operation Manual



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Updated Date: 16th June 2015

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Preface

Every attempt has been made to present accurate and current information within this manual. However, as product development on the Screw Spike Machine 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 163 SCREW SPIKE MACHINE

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.

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.

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.**

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.**

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.**

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.**

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 death or injury.
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.
Do not touch machinery whilst in operation.

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.

CAUTION

Electrical shock can cause injury.
Do not touch wires whilst engine is running.

WARNING

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

WARNING

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.

WARNING

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.

Equipment Stickers & Tags

Below are the stickers and tags utilised on this equipment.

IDTAG01 – Melvelle Identification Tag

IDTAG02 – Model & Serial No. Tag

LAB0008 – Safety Label

LAB0009 – Hydraulic Oil Label

IDTAG04 – Emergency Stop Warning Label

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

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

- Trackpacks and removable power packs are fitted with a wiring harness and 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

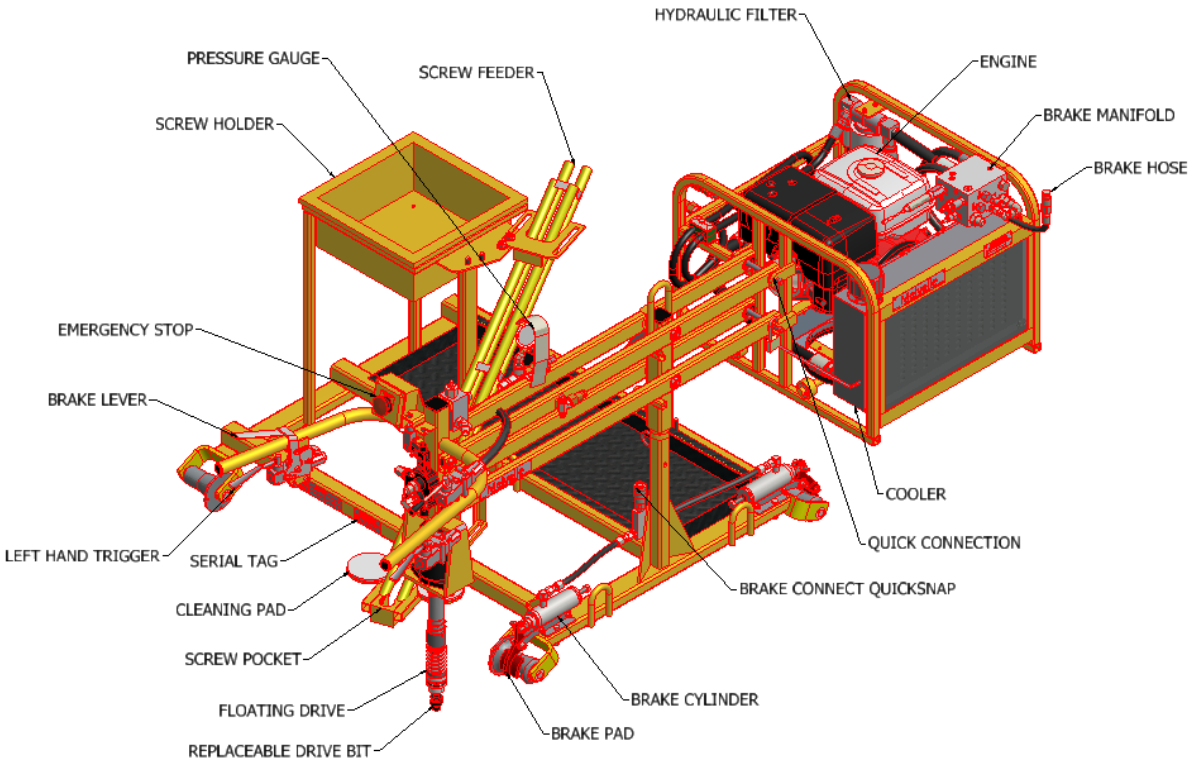
Introduction

Melvelle Equipment Corp Pty Ltd (MEC) supply Screw Spike Drivers to the rail industry. The 163 Screw Spike Driver is designed to drive in various styles of spikes. The machine has adjustable torque settings as well as the ability to change drive bits for various styles of screws.

By using the 163 Screw Driver, injuries from traditional methods of inserting these screws (Hand held equipment) have been eliminated. These are (but not limited to):

- Back strain
- Repetitive strain injury from bending over
- Hand injuries from handling screws
- Struck by flying screws
- Infrastructure damage

The 163 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.



Specifications

FP-163-1 – Braked Trackpack Head

Engine	MEC Trackpack
Dimensions	800mm long x 690mm wide x 970mm high
Weight (wet)	40kg
Pressure (max)	172.5bar / 2500psi
Pump Flow	30L/min
Hydraulic Oil*	ISO68
Hydraulic Hose Connection Size	½”
Pressure Relief	2200-2500psi
Rotation Speed	120rpm
Torque	350Nm

FP-163-AA – Un-braked Yanmar Dedicated Screw Spike Driver

Engine	7HP Yanmar® Diesel Electric Start
Dimensions	2500mm long x 690mm wide x 970mm high
Weight (wet)	140kg
Pressure (max)	172.5bar / 2500psi
Pump Flow	30L/min
Battery	12V
Fuel Type	Diesel
Hydraulic Oil*	ISO68
Hydraulic Hose Connection Size	½”
Pressure Relief	2200-2500psi
Rotation Speed	120rpm
Torque	350Nm

FP-163-AC –Un-braked Pantograph Screw Spike Machine

Engine	13HP Honda® or 7HP Yanmar Diesel.
Dimensions	2050mm long x 1600mm wide x 1050mm high
Weight (wet – incl trolley)	190kg
Pressure (max)	172.5bar / 2500psi
Pump Flow	30L/min
Fuel Type	Petrol or Diesel
Hydraulic Oil*	ISO68
Hydraulic Hose Connection Size	½”
Pressure Relief	2200-2500psi
Rotation Speed	120rpm
Torque	350Nm

FP-163-AC-B – Braked Pantograph Screw Spike Machine

Engine	13HP Honda® or 7HP Yanmar Diesel
Dimensions	2050mm long x 1600mm wide x 1050mm high
Weight (wet)	190kg
Pressure (max)	172.5bar / 2500psi
Pump Flow	30L/min
Fuel Type	Petrol or Diesel
Battery	12V
Hydraulic Oil*	ISO68
Hydraulic Hose Connection Size	½”
Pressure Relief	2200-2500psi
Rotation Speed	120rpm
Torque	350Nm

FP-163-AQ – Un-braked Honda Dedicated Screw Spike Driver

Engine	13HP Honda® Petrol Recoil Start
Dimensions	2500mm long x 690mm wide x 970mm high
Weight (wet)	140kg
Pressure (max)	172.5bar / 2500psi
Pump Flow	30L/min
Fuel Type	Petrol
Hydraulic Oil*	ISO68
Hydraulic Hose Connection Size	½”
Pressure Relief	2200-2500psi
Rotation Speed	120rpm
Torque	300Nm

FP-163-CN –Pantograph Dog Screw Spike – No Feeder

Engine	13HP Honda® Petrol or 7HP Yanmar Diesel
Dimensions	2050mm long x 1600mm wide x 1050mm high
Weight (wet)	190kg
Pressure (max)	172.5bar / 2500psi
Pump Flow	30L/min
Fuel Type	Petrol
Hydraulic Oil*	ISO68
Hydraulic Hose Connection Size	½”
Pressure Relief	2200-2500psi
Rotation Speed	120rpm
Torque	350Nm

*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.

Torque Specifications

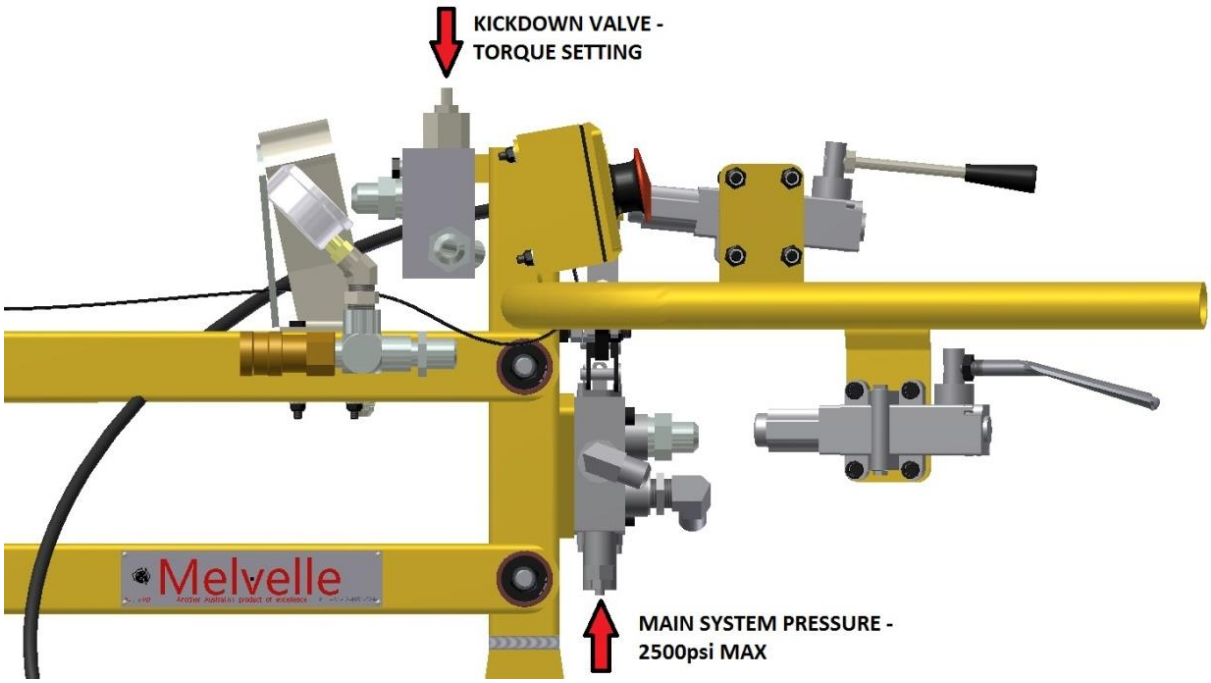
Approximate torque[1] for set pressure (at 95% motor efficiency):

Pressure (psi)	Torque (Nm)
600	125
700	150
800	170
900	190
1000	210
1100	230
1200	250
1300	275
1500	315
1700	360
1900	400
2100	440
2300	485
2500	525

Adjust Pressure Settings

The main system pressure relief is found on the handle side and the adjustment is at the base of the body (see image below). This is set at MEC and is **NOT** to be adjusted higher than **2500psi**.

The torque (pressure) setting is at the kickdown valve (engine side of head – see image below). To adjust the pressure, loosen the nut on the valve cartridge and use an allen key to adjust the valve. Tighten the nut to secure the cartridge and pressure required.



[1] Check with screw manufacturer for screw insertion torque settings

Operation

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. 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

Halogen 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

1. Inspect all guards 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. Contact MEC for repairs.

Emergency Stop

1. Ensure the wires are free from damage and connections are clean and dry

2. Connect the Powerpack and Work Head plugs together

Braking System

1. If an electric brake switch is being used ensure the wires are free from damage and connections are clean and dry.

2. If a manual pull style cable is being used ensure the cable is free from kinks and damage and the adjustment is correct

3. Ensure the brake lever operates smoothly and freely.

4. Ensure the brake hose is free from damage and connects to the trolley.

Assembly Procedures

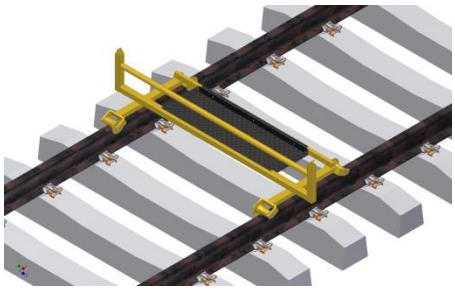
WARNING

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

Machine Trolley – Trackpack and Dedicated Machines

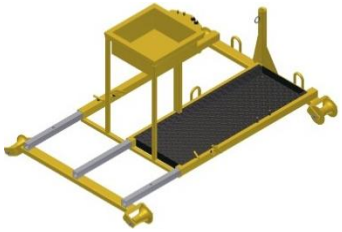
1. Inspect the trolley and ensure it is not damaged and free from defects.

2. The machine trolley weighs approximately 36-40kg. Using a minimum of 2 people or certified lifting device, lift the trolley onto the rail lines. This can be achieved by lifting from the cross bar (tube).
3. Ensure the trolley sits stationary until the Screw Spike Machine is assembled to it.

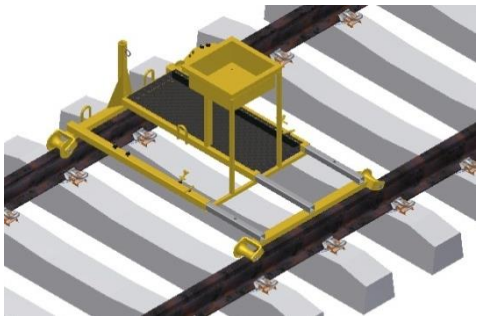


Machine Trolley – Pantograph Machines

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

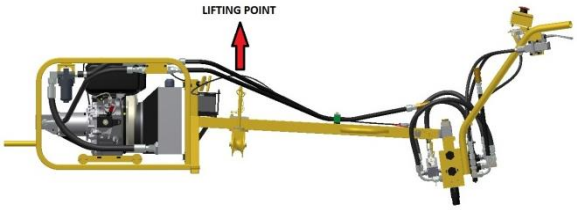


2. The machine trolley weighs approximately 50kg. Using a minimum of 2 people or certified lifting device, lift the trolley onto the rail lines. This can be achieved by lifting from the cross bar (tube).
3. Ensure the trolley sits stationary until the Screw Spike Machine is assembled to it.



Machine Assembly – Dedicated Machine

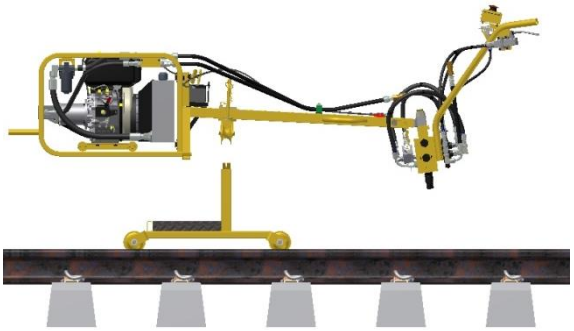
1. Observe all safety precautions. Ensure the operation is being performed on safe and steady ground (no excessive slopes or dangerous terrain).
2. Inspect the Screw Spike Machine and ensure it is not damaged and free from defects.
3. A dedicated Screw Spike Machine weighs approximately 140kg. Using a certified lifting device (min 250kg), attach slings or a lifting hook to the lifting point on the machine.



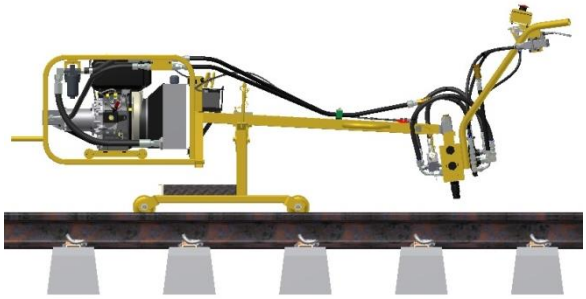
4. By following safe lifting procedures, lift the machine onto the trolley. The cross trolley rollers will sit onto the cross bar (tube).

⚠ 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. If no brakes are fitted, attaching the Screw Spike Machine to the trolley will allow the head to rest on the ground and stop the trolley from moving.
6. 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.

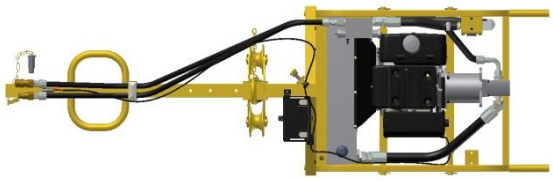


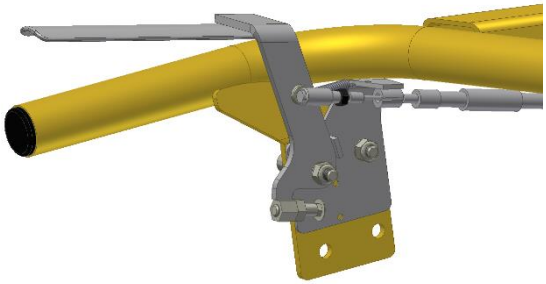
7. Attach the chain to the trolley to ensure the machine will not roll during operation.
8. If applicable connect the quick snap for the brake into the quick snap located on the trolley.

The machine is now ready for use.

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 Screw Spike Head and Trackpack and ensure they are not damaged and are free from defects.
3. A Trackpack Screw Spike Head weighs approximately 40 kg and a Trackpack weighs approximately 100kg.
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 Screw Spike Head this is the nearest hole to the engine (refer to further documents for pin locations). Attach slings to the Trackpack
6. By following safe lifting procedures, lift the Trackpack using slings ensuring it is kept level and easy to move.
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. Lower the Trackpack to the ground and remove the slings.
8. If the work and power pack are fitted with electrics connect the wiring plugs together. If the power pack is fitted with a manual pull brake cable attach the cable to the brake trigger, Ensure the cable is correctly adjusted. If not adjust by the screw adjustment located in the cable.
9. The Trackpack and work head are now attached and can be lifted onto the machine trolley. Refer above for procedure on attaching to machine trolley.





Machine Assembly – Pantograph power pack onto Machine Arms.

1. Ensure the power and pantograph arms are free from damage (Only perform this when the pantographic system is attached to a trolley).

2. Ensure the Pantograph arms have the pins in them and are secured. Also ensure the safety padlock is removed.

3. Lift the power pack using appropriate lifting techniques. MEC recommend the use of 3 slings.

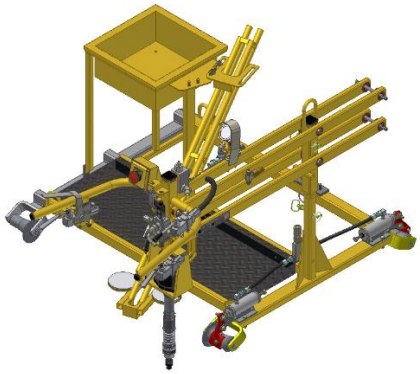
4. With the work head sitting on the ground and secure guide the power pack towards the arms. Tilt the power pack until the top hooks clip onto the top pin. Lower the power pack until the stops engage the lower pins. Continue to lower until the weight is balanced out. Ensure the machine cannot roll or move during assembly.

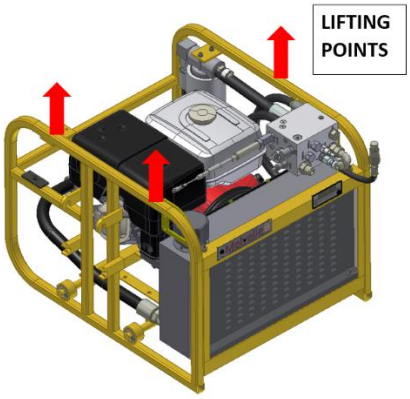
5. Lock the power pack on using the supplied pad lock.

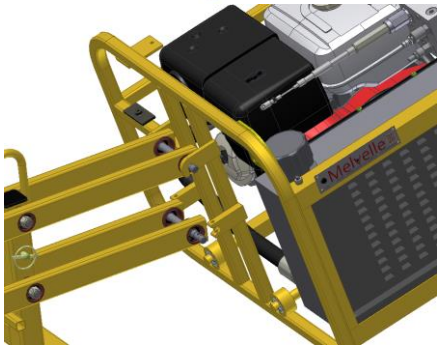
6. Remove the slings.

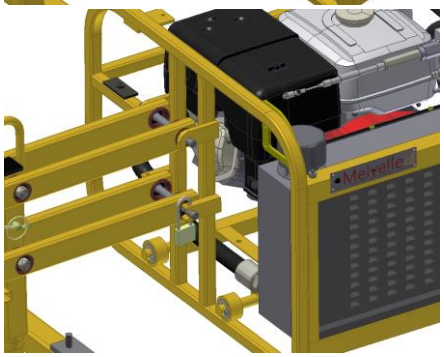
7. Connect the hydraulic quick snaps to the work head, connect the brake hose to the trolley and also connect the electrical plug. If applicable connect the brake cable from the power pack to the work head.

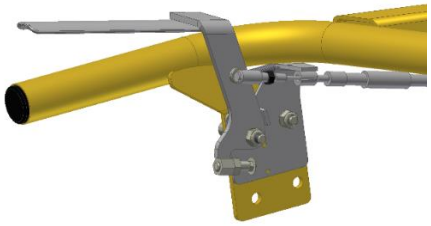
8. The machine is now ready to be used.











Machine Assembly – Pantograph Machine

1. Inspect the Screw Spike Machine and ensure it is not damaged and free from defects. The power pack should be connected to the arms.

2. Place the trolley onto the track

3. A Pantograph Screw Spike Machine weighs approximately 140kg. 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. Align and slide the post on the machine to the post on the trolley.

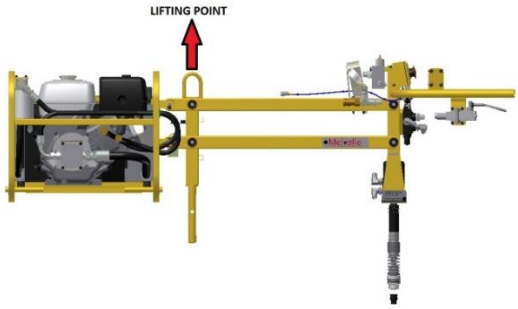
   ⚠ CAUTION

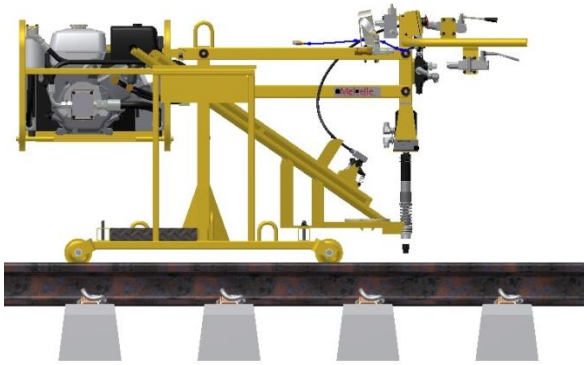
   When placing the machine onto the trolley, ensure hands are clear of the tube.

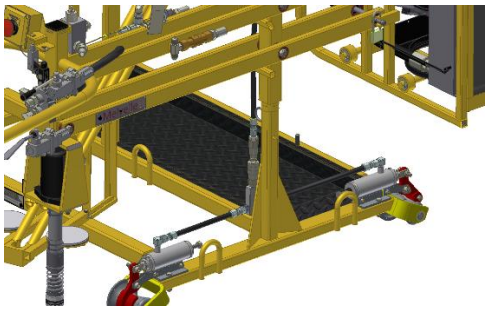
5. Remove the slings and/or hooks.

6. Connect the brake hose into the trolley using the hydraulic brake hose and quick snaps.

7. The work head and trolley are now connected and ready for use.







Machine Assembly – Assembled Pantograph Machine onto the Track

1. Inspect the Screw Spike Machine and ensure it is not damaged and free from defects.

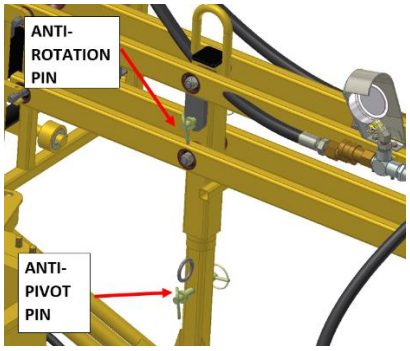
2. Ensure the machine is assembled correctly with the power pack attached to the arms and this assembly sitting in the trolley post.

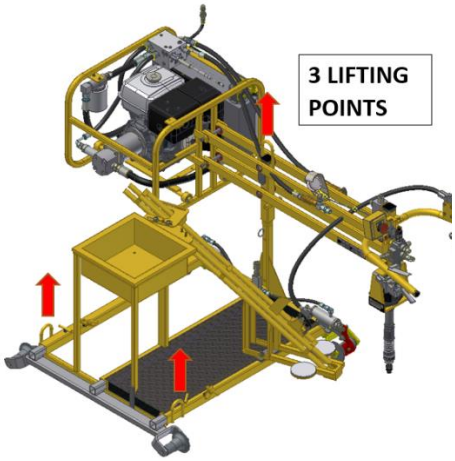
3. Insert and latch the pins to stop the machine rotating and to stop the machine from pivoting.

4. Attach the relevant slings to the 3 lifting points.

5. Lift slowly and then position the machine into the track or the required area.

6. Lower the machine, remove the slings and remove the anti-rotation and anti-pivoting pins.





Operation Procedures

Starting the Engine – Electric Start[1]

1. Observe all safety precautions
2. Ensure all pre-operation checks have been conducted
3. Ensure the screw spike machine 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. Ensure Fuel Solenoid switch is down (if applicable). Turn the Battery isolator on if fitted.
7. Place the throttle at 50% power
8. Turn the key to its first position (on position)
9. Turn key to second position (starting position). Hold until engine starts and the release, allowing the key to return to its first position
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[2]
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]Refer to engine manual for detailed engine instructions and requirements
[2]During first 50hrs do not exceed 70% maximum rated power

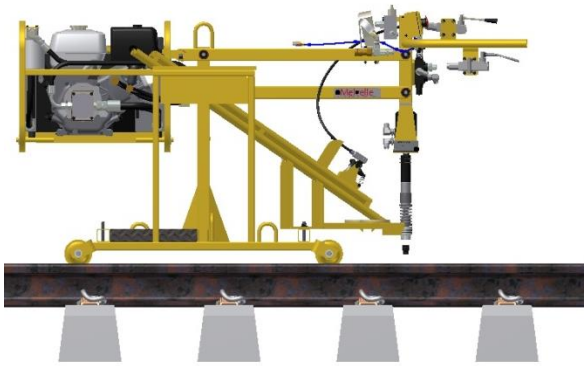
Starting the Engine – Recoil Start[1]

1. Observe all safety precautions
2. Ensure all pre-operation checks have been conducted
3. Ensure the screw spike machine 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. Ensure Fuel Solenoid switch is down (if applicable)
7. Place the throttle at 50% power
8. Turn the key to its first position (on position)
9. Hold the grip and pull the cord until compression is found
10. Completely rewind the cord (allow to retract)
11. Operate the decompression lever (push down)
12. Using two hands, firmly and quickly pull the cord to start
13. Place throttle in idle (min) position and allow engine to warm up – refer manufacturers manual for required times
14. Place throttle at required rpm position, normally full throttle[2]
15. 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

Equipment Operation – Screw Insertion

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



4. Fill the automatic feeder with the screws

5. Start the engine as per Starting the Engine instructions (listed above)
6. Position the work head over the sleeper for the screws to be inserted

7. Pick up a screw by placing the work head on top of the screw – the magnetic head allows the screw to be lifted
8. Depress the brake trigger on the left hand and move the head to the required position for the screw to be inserted.
9. Squeeze the right hand trigger to begin screw insertion (clockwise rotation).
10. When the screw is inserted, release the trigger and lift the head up off the screw
11. Lift the automatic feed control lever to release the next screw to be inserted and repeat process

Equipment Operation – Screw Removal

1. Observe all safety precautions
2. Ensure all pre-operation checks have been conducted
3. Ensure the screw spike machine is on safe and steady grounding (no excessive slopes or dangerous terrain conditions)
4. Start the engine as per Starting the Engine instructions (listed above)
5. Depress the brake handle and position the work head down and on top of the screw to be removed
6. Squeeze the left hand trigger to begin screw removal. Note torque settings may need to be adjusted to remove the screw.
7. Once the screw is removed, the magnetic head will allow the screw to be lifted
8. Remove the screw from the work head.
9. Move onto the next screw.

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.
4. Turn the Battery Isolator to off if applicable.

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

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 clipper 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

Maintenance[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 lines	Check		X			
Fuel Filter	Change					X
Air cleaner	Clean		X			
Engine cooling fins	Clean					X
Rocker arms clearance	Check & set					X (2)
Injectors	Clean & set					X (2)
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)		X (4)
Battery	Check	X				
Grease Nipples	Fill			X		
Magnetic Drive Head	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

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 pressure	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
Screws not lifting/being held	Incorrect alignment	Align correctly on screw
	Magnets damaged/old	Replace magnets
Screws not inserting	Tough/hard timber	Pre-drill hole
	Incorrect pressure setup	Check pressure setup and contact MEC
Screws not inserting but drill head turns	Incorrect socket	Fit correct socket
	Socket worn	Replace socket

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

Further Documents

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

Further documents for the 163 screw Spike Machine:

Document No.	Description	Type
108-215	Trolley to Powerpack Attachment	Drawing
111-26	FP-111-AA – Honda Recoil un-braked	Drawing
111-30	FP-111-BB – Yanmar Electric Un-braked	Drawing
111-35	FP-111-AA-B – Honda recoil Braked	Drawing
111-36	FP-111-BB-B – Yanmar Electric Braked	Drawing
111-37	FP-111-AJ – Honda Electric Un-braked	Drawing
111-38	FP-111-AJ-B – Honda Electric Braked	Drawing
143-48	Trackpack Boom Adjustment	Drawing
163-50	Hydraulic Circuit Diagram Un-braked	Drawing
163-119	FP-163-AC Honda Pantograph Screw Spike Machine	Drawing
163-122	FP-163-1 Trackpack Screw Spike Head	Drawing
163-123	FP-163-AQ Honda Dedicated Screw Spike Machine	Drawing
163-132	FP-163-AC-B Honda Pantograph Screw Spike Machine	Drawing
163-138	Hydraulic Circuit Diagram braked	Drawing
163-OPRA	Operation Risk Assessment	Document

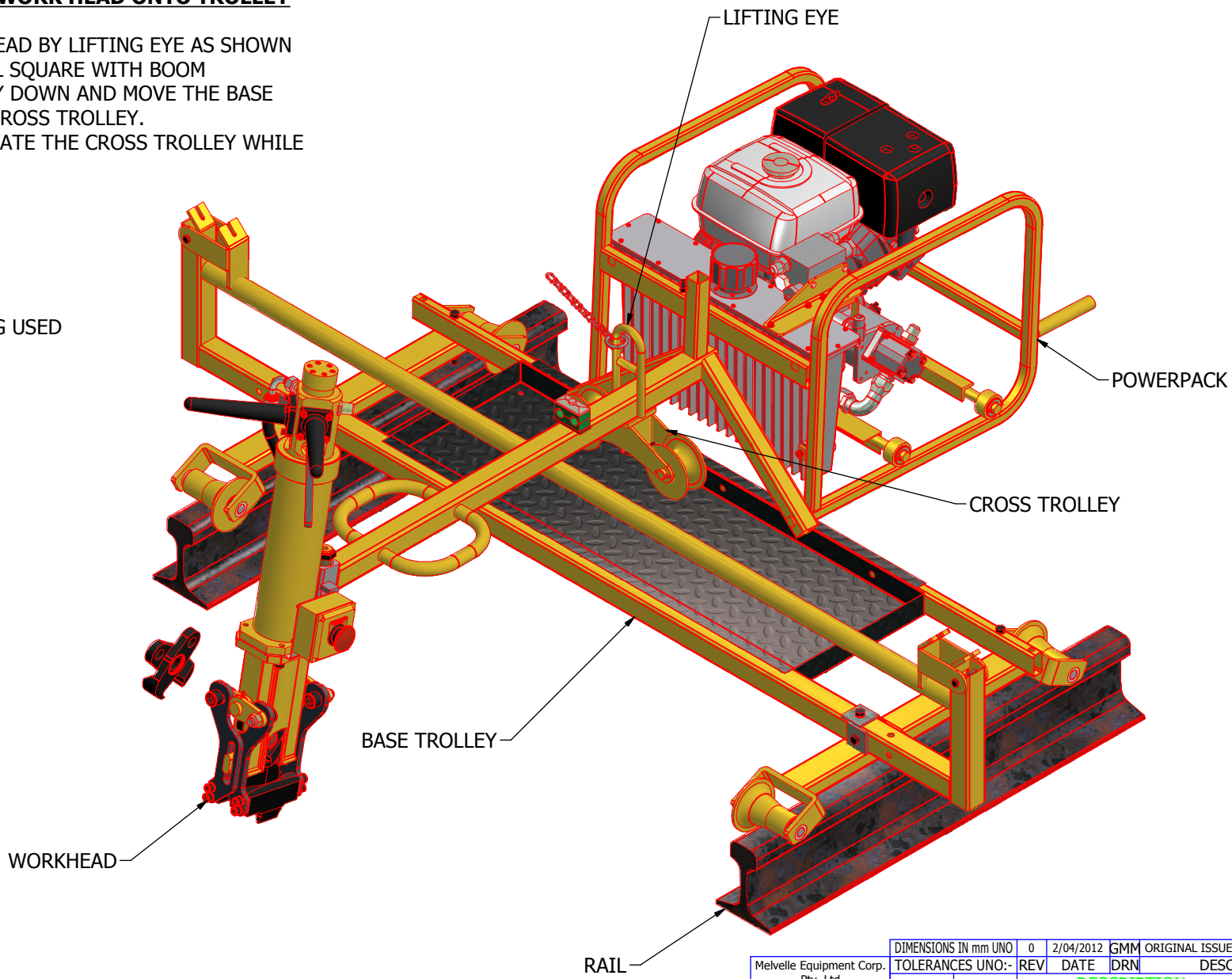
LOWERING POWERPACK AND WORK HEAD ONTO TROLLEY

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



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DIMENSIONS IN mm UNO	0	2/04/2012	GMM	ORIGINAL ISSUE
TOLERANCES UNO:-	REV	DATE	DRN	DESCRIPTION

.XX ±0.1	XXX. ±2.0	DESCRIPTION	PART #
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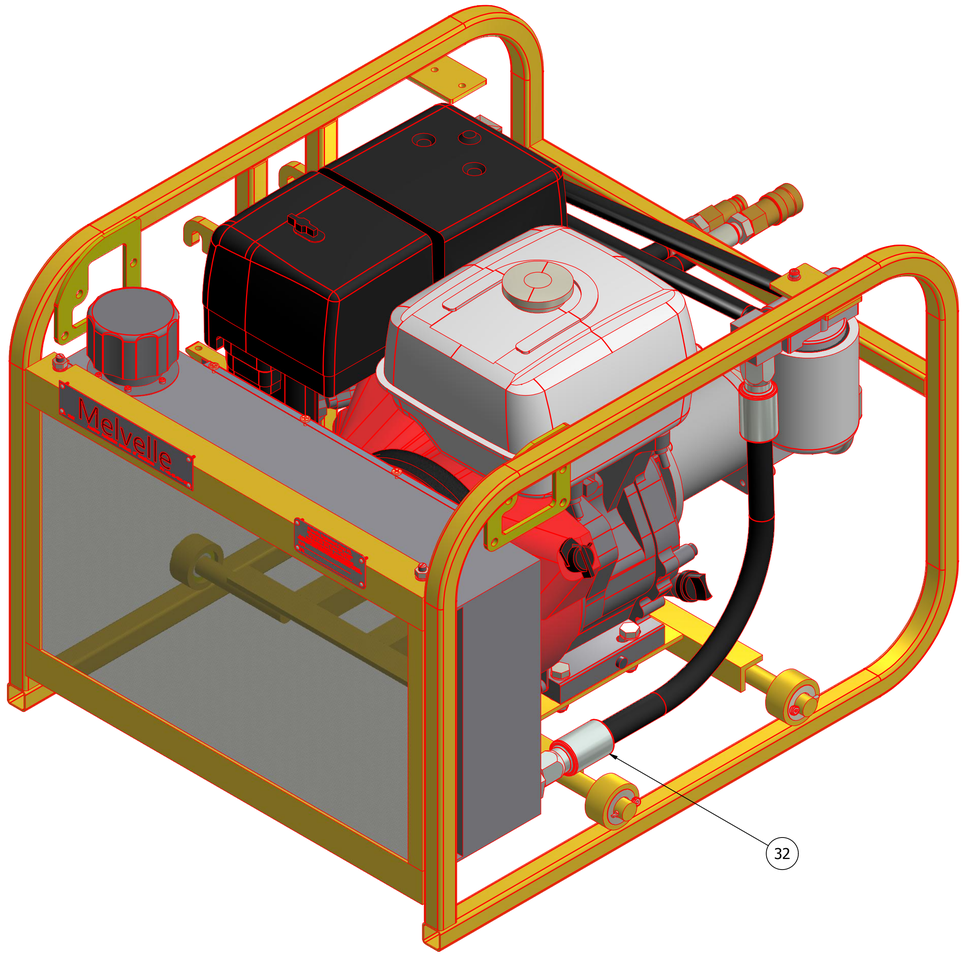
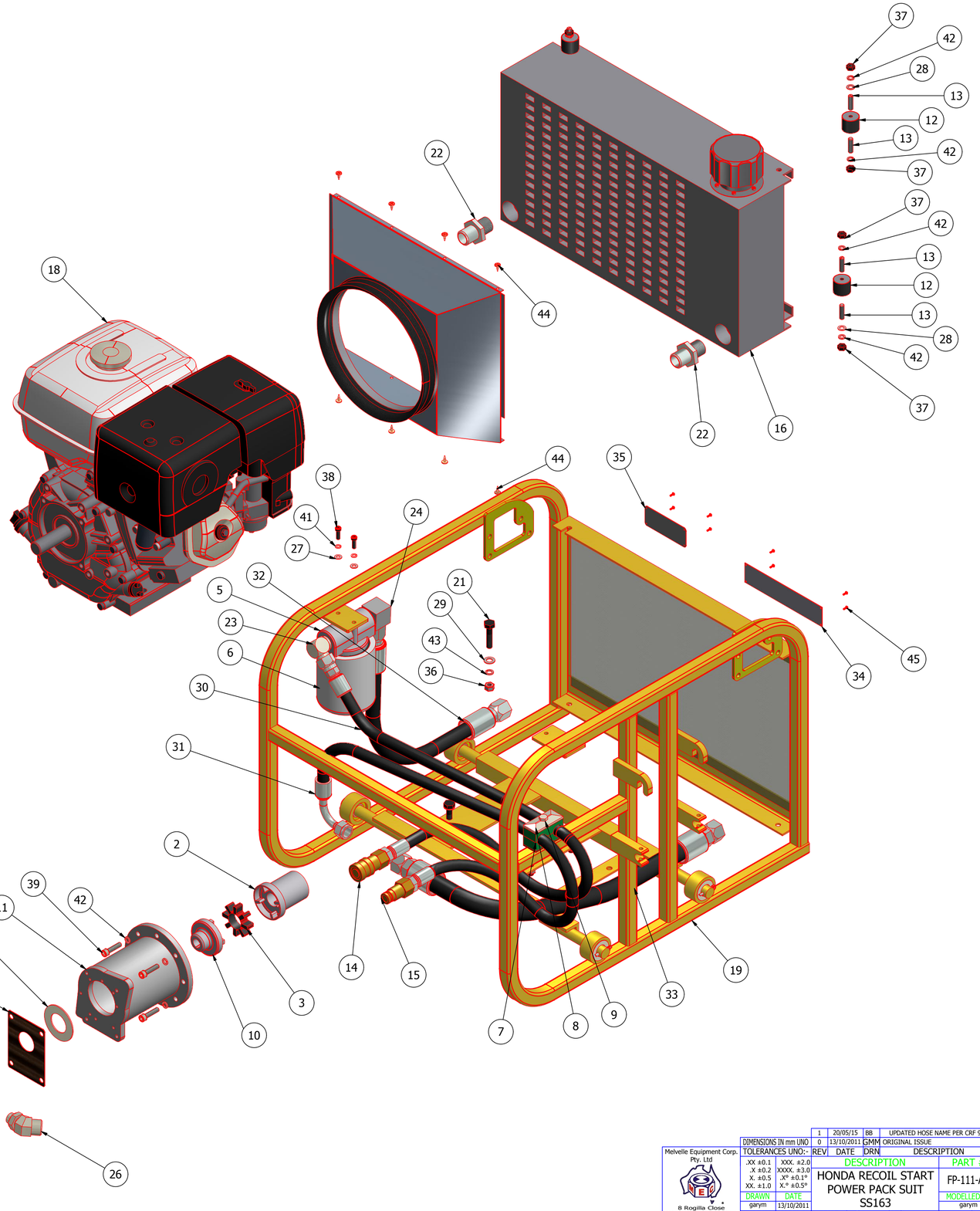
X. ±0.5	.X° ±0.1°		
XX. ±1.0	X.° ±0.5°		
DRAWN	DATE		MODELLED BY
garym	2/04/2012		garym
CHECKED	APPROVED	SCALE 1:8	DRG 3-108-215 REV 0





45	8	U DRIVE SCREW	UDSCREW
44	8	TEK SCREW TAPTITE - RESERVOIR BREATHER	TAPTIT1
43	4	3/8" SPRING WASHER	SW06
42	16	5/16" SPRING WASHER	SW05
41	2	1/4" SPRING WASHER	SW04SQ
40	4	SOCKET HEAD CAP SCREW M8 x 25	SHM0825
39	4	SOCKET HEAD CAP SCREW 5/16" UNF X 1-1/4"	SHF0520
38	2	SOCKET HEAD CAP SCREW 1/4" UNC X 3/4"	SHC0412
37	8	NUT M8 ZINC	NM08Z
36	4	NUT 3/8` UNC BLACK	N06NC
35	1	MELVELLE MODEL & SERIAL N/O AL TAG	IDTAG02
34	1	MELVELLE AUSTRALIA IDENTIFICATION TAG	IDTAG01
33	1	H160 + MCJF-1716 + 00480 + MCJF-1716	H160-00640-000
32	1	H121 + MCJF-1712 + 00480 + MCJF-1712	H121-00580-000
31	1	H082 + MCBM-0808 + 01380 + MCJF90M-1808	H082-01480-035
30	1	H082 + MCBM-0808 + 01320 + MCJF-1408	H082-01420-008
29	4	FLAT WASHER - ENGINEERS - 3/8" X 3/4" ZINC	FW06
28	4	FLAT WASHER - ENGINEERS - 5/16" X 5/8" ZINC	FW05
27	2	FLAT WASHER - ENGINEERS - 1/4" X 1/2" ZINC	FW0408
26	1	ELBOW 45 M/M 1/2" BSPP X 1-1/16"JIC	CP38-0817
25	1	NIPPLE 1/2" BSPP X 7/8" JIC	CP2-0814
24	1	ELBOW 90 M/M 3/4"BSPT X 1-1/16"JIC	CB56-1217
23	1	ELBOW 90 M/M 3/4"BSPT X 7/8"JIC	CB56-1214
22	2	NIPPLE 1"BSPT X 1-1/16"JIC	CB2-1617
21	4	BOLT HT 3/8" UNC X 1-3/4"	BC0628
20	1	PUMP 11cc GROUP 2	1630076
19	1	ROLL BAR SUIT PANTOGRAPH	1630034
18	1	HONDA ENGINE GX390 13HP RECOIL START	1540230
17	1	COOLER AIR COWLING HONDA & YANMAR	1430014
16	1	COOLER/RADIATOR - HONDA FITTED WITH FILLER BREATHER	1430008
15	1	SNAP CONNECTOR FLUSH FACED 1/2 BSPP MALE	1430005
14	1	SNAP CONNECTOR FLUSH FACED 1/2 BSPP FEMALE	1430004
13	8	CUSHION MOUNT STUDS	1150925
12	4	RADIATOR RUBBER MOUNT	1150400
11	1	BELL HOUSING - GROUP 1&2 7-18HP ENGINES FEMALE	1110023
10	1	PUMP COUPLING - GROUP 2 65 SERIES	1110021
9	1	HOSE CLAMP DOUBLE 22mm - BOLT GROUP 3 CLAMPS	1081101-04
8	1	HOSE CLAMP DOUBLE 22mm - TOP PLATE GROUP 3	1081101-03
7	2	HOSE CLAMP DOUBLE 22mm - JAWS	1081101-01
6	1	FILTER ELEMENT - HYDRAULIC OIL FILTER	1080813
5	1	FILTER HEAD	1080812
4	1	BELL HOUSING CENTERING RING GROUP 2	1080765
3	1	ENGINE COUPLING RUBBER SPIDER 65 SERIES	1080710
2	1	ENGINE HALF COUPLING - 1 SHAFT 65 SERIES	1080708
1	1	PUMP HEAT GASKET - GRP 2	1080059
ITEM	QTY	DESCRIPTION	PART NUMBER

MATERIAL/CUT LIST

		1	20/05/15	BB	UPDATED HOSE NAME PER CRF 945
	DIMENSIONS IN mm UNO	0	13/10/2011	GMM	ORIGINAL ISSUE
	TOLERANCES UNO:-	REV	DATE	DRN	DESCRIPTION

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Fax:+61 02 4950 1291
IF IN DOUBT, ASK!

.XX ±0.1	.XXX. ±2.0	DESCRIPTION	PART #
.X ±0.2	.XXX. ±3.0	HONDA RECOIL START POWER PACK SUIT SS163	FP-111-AA
.X. ±0.5	.X° ±0.1°		
.XX. ±1.0	.X.° ±0.5°		
DRAWN	DATE		MODELLED BY
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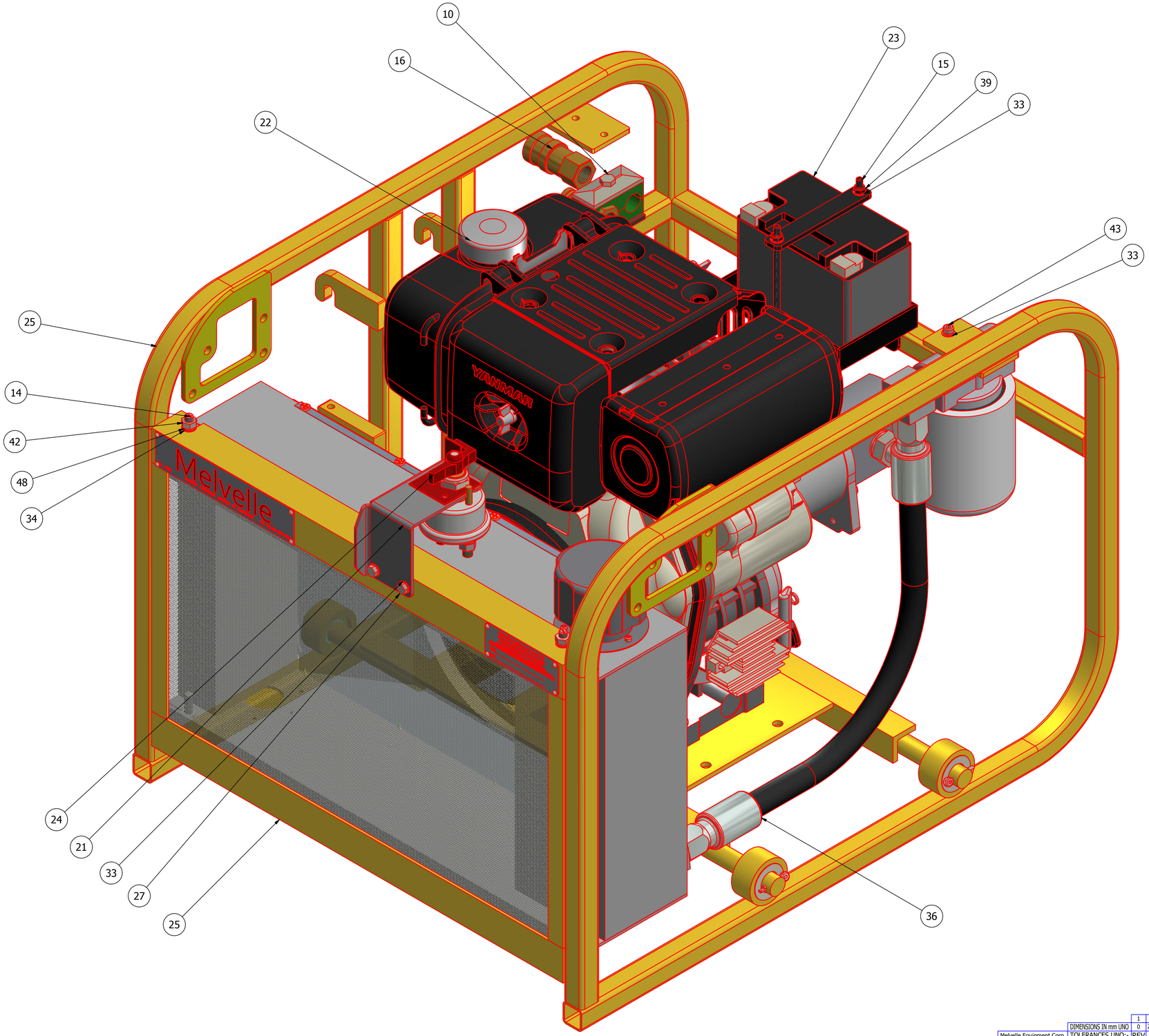
CHECKED	APPROVED	SCALE	DWG 1-111-26 REV 1
AdrianG	AdrianG	1:2.5	



ITEM	QTY	DESCRIPTION	PART NUMBER
51	8	U DRIVE SCREW	UDSCREW
50	8	TEK SCREW TAPTITE - RESERVOIR BREATHER	TAPTIT1
49	4	3/8" SPRING WASHER	SW06
48	16	5/16" SPRING WASHER	SW05
47	2	1/4" SPRING WASHER	SW04SQ
46	4	SOCKET HEAD CAP SCREW M8 x 35	SHM0835
45	4	SOCKET HEAD CAP SCREW M8 x 30	SHM0830
44	2	SOCKET HEAD CAP SCREW M6 x 40	SHM0640
43	2	SOCKET HEAD CAP SCREW 1/4" UNC X 3/4"	SHC0412
42	8	NUT M8 ZINC	NM08Z
41	4	NUT M6 NYLOC	NM06N
40	4	NUT 3/8` UNC BLACK	N06NC
39	2	NUT 1/4 UNC NYLOC	N04NCN
38	1	MELVELLE MODEL & SERIAL N/O AL TAG	IDTAG02
37	1	MELVELLE AUSTRALIA IDENTIFICATION TAG	IDTAG01
36	1	H121 + MCJF-1712 + 00480 + MCJF-1712	H121-00580-000
35	4	FLAT WASHER - ENGINEERS - 3/8" X 3/4" ZINC	FW06
34	4	FLAT WASHER - ENGINEERS - 5/16" X 5/8" ZINC	FW05
33	12	FLAT WASHER - ENGINEERS - 1/4" X 1/2" ZINC	FW0408
32	1	ELBOW 45 M/M 1/2" BSPP X 1-1/16"JIC	CP38-0817
31	1	NIPPLE 1/2" BSPP X 7/8" JIC	CP2-0814
30	1	ELBOW 90 M/M 3/4"BSPT X 1-1/16"JIC	CB56-1217
29	1	ELBOW 90 M/M 3/4"BSPT X 7/8"JIC	CB56-1214
28	2	NIPPLE 1"BSPT X 1-1/16"JIC	CB2-1617
27	2	BOLT M6 x 20 HT	BM0620
26	4	BOLT HT 3/8" UNC X 1-3/4"	BC0628
25	1	ROLL BAR SUIT PANTOGRAPH	1630034
24	1	BATTERY ISOLATOR SWITCH - INCLUDING RED LOCKOUT	1540813
23	1	BATTERY 12V SEALED 120AH DEKA	1540412
22	1	YANMAR ENGINE L70AEDE ELECTRICSTART ENGINE	1540210
21	1	BATTERY LOCKOUT MOUNT BRACKET	1430136
20	1	BATTERY BOX TOP CLAMP	1430113
19	1	PUMP 7.8-7.9cc GROUP 1	1430081
18	1	COOLER AIR COWLING HONDA & YANMAR	1430014
17	1	SNAP CONNECTOR FLUSH FACED 1/2 BSPP MALE	1430005
16	1	SNAP CONNECTOR FLUSH FACED 1/2 BSPP FEMALE	1430004
15	1	BATTERY BOX FOR 115-5 POWERPACK	1150929
14	8	CUSHION MOUNT STUDS	1150925
13	4	RADIATOR RUBBER MOUNT	1150400
12	1	BELL HOUSING - GROUP 1&2 7-18HP ENGINES FEMALE	1110023
11	1	PUMP COUPLING - GROUP 2 65 SERIES	1110021
10	1	HOSE CLAMP DOUBLE 22mm - BOLT GROUP 3 CLAMPS	1081101-04
9	1	HOSE CLAMP DOUBLE 22mm - TOP PLATE GROUP 3	1081101-03
8	2	HOSE CLAMP DOUBLE 22mm - JAWS	1081101-01
7	1	RADIATOR YANMAR	1081024
6	1	FILTER ELEMENT - HYDRAULIC OIL FILTER	1080813
5	1	FILTER HEAD	1080812
4	1	BELL HOUSING CENTRING RING GROUP 1	1080728
3	1	ENGINE COUPLING RUBBER SPIDER 65 SERIES	1080710
2	1	ENGINE HALF COUPLING - 1 SHAFT 65 SERIES	1080708
1	1	PUMP HEAT GASKET - GRP 1	1080058

MATERIAL/CUT LIST

REV	DATE	DRN	DESCRIPTION
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0	26/03/2012	GMM	ORIGINAL ISSUE

DIMENSIONS IN mm UNO
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°

DRAWN garym 26/03/2012
CHECKED APPROVED
SCALE 1:2

DESCRIPTION: YANMAR ELECTRIC START POWER PACK SUIT SS163
PART #: FP-111-BB
MODELLED BY: garym
DWG 1-111-30 REV 1

Melvelle Equipment Corp. Pty. Ltd
8 Rogilla Close
Wallsend N.S.W 2287
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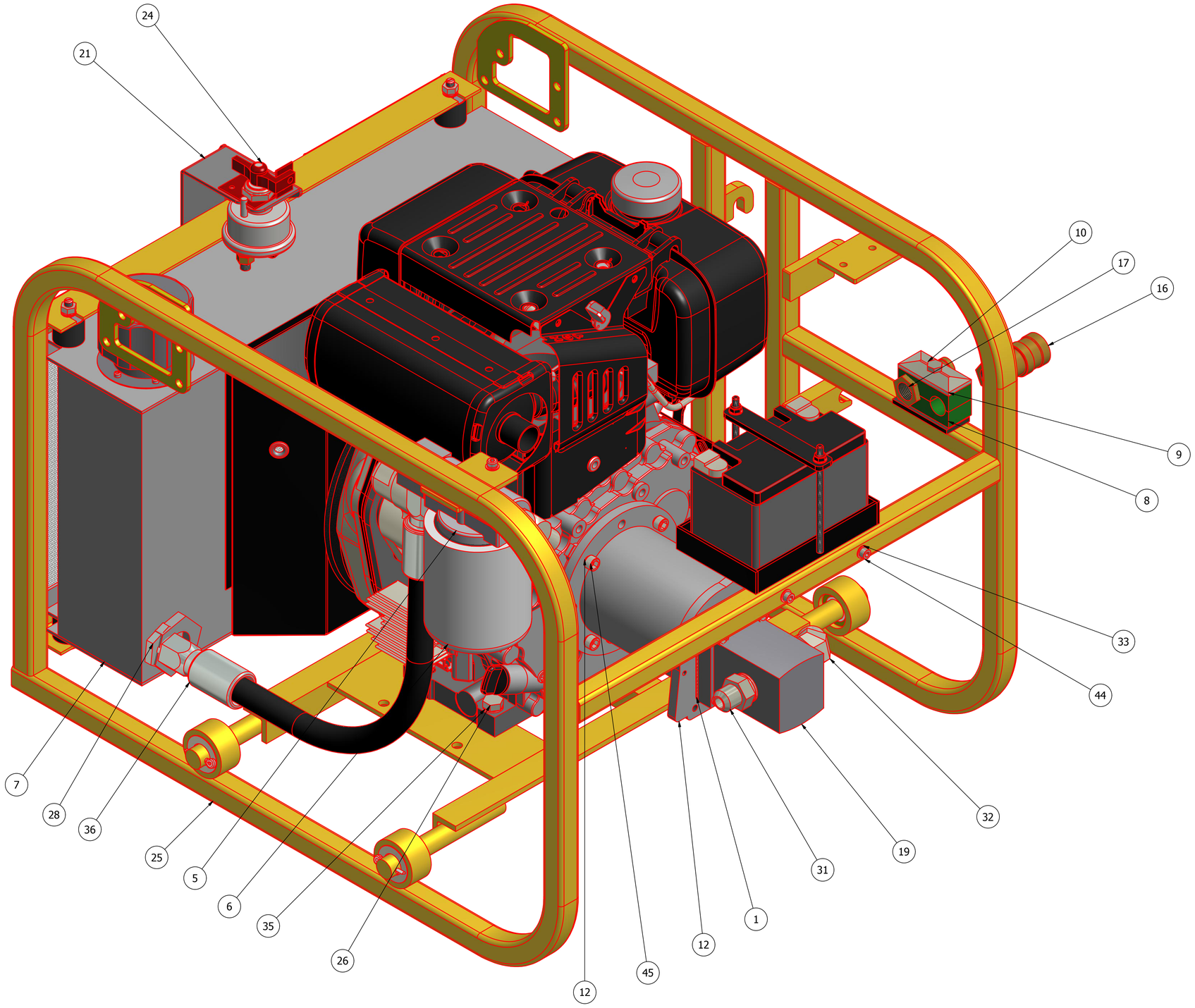
1 OF 2 SHEET #
ISO 1 SHEET DESCRIPTION
IF IN DOUBT, ASK!



DIMENSIONS IN mm UNO	0	26/03/2012	GM	ORIGINAL ISSUE	
TOLERANCES UNO:-	REV	DATE	DRN	DESCRIPTION	

Melvelle Equipment Corp. Pty. Ltd
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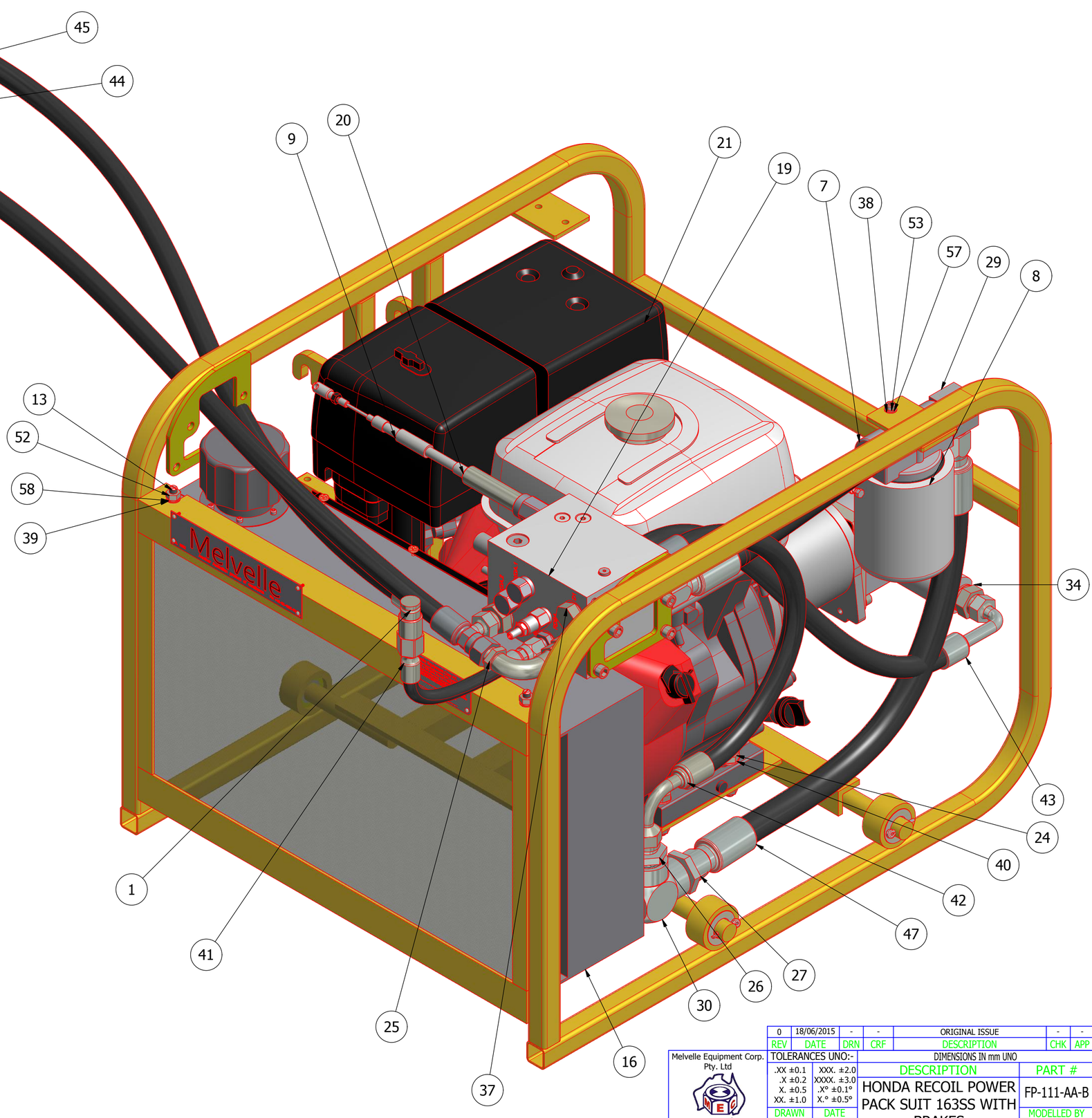
Fax:+61 02 4950 1291

.XX ±0.1	XXX. ±2.0	DESCRIPTION	PART #
.X ±0.2	XXXX. ±3.0	YANMAR ELECTRIC START POWER PACK SUIT SS163	FP-111-BB
X. ±0.5	.X° ±0.1°		
XX. ±1.0	X.° ±0.5°		MODELLED BY
DRAWN	DATE		garym
garym	26/03/2012		
CHECKED	APPROVED	SCALE	
		1:3	ISO

1-111-30 rev 1

2 OF 2	ISO 2
SHEET #	SHEET DESCRIPTION

IF IN DOUBT, ASK!



ITEM	QTY	DESCRIPTION	PART NUMBER
61	8	U DRIVE SCREW	UDSCREW
60	8	TEK SCREW TAPTITE - RESERVOIR BREATHER	TAPTIT1
59	4	3/8" SPRING WASHER	SW06
58	20	5/16" SPRING WASHER	SW05
57	2	1/4" SPRING WASHER	SW04SQ
56	4	SOCKET HEAD CAP SCREW M8 x 25	SHM0825
55	4	SOCKET HEAD CAP SCREW M8 x 20	SHM0820
54	4	SOCKET HEAD CAP SCREW 5/16" UNF X 1-1/4"	SHF0520
53	2	SOCKET HEAD CAP SCREW 1/4" UNC X 3/4"	SHC0412
52	8	NUT M8 ZINC	NM08Z
51	4	NUT 3/8` UNC BLACK	N06NC
50	1	MELVELLE MODEL & SERIAL N/O AL TAG	IDTAG02
49	1	MELVELLE AUSTRALIA IDENTIFICATION TAG	IDTAG01
48	1	H160 + MCJF-1716 + 00480 + MCJF-1716	H160-00640-000
47	1	H121 + MCJF-1712 + 00550 + MCJF-1712	H121-00650-000
46	1	H121 + MCJF-1712 + 00330 + NO FITTING	H121-00380-040
45	1	H082 + MCBM-0808 + 01380 + MCJF90M-1408	H082-01480-035
44	1	H082 + MCJF-1408 + 01320 + MCBM-0808	H082-01420-008
43	1	H082 + MCJF-1408 + 00671 + MCJF90S-1408	H082-00770-004
42	1	H082 + MCJF-1408 + 00501 + MCJF90S-1408	H082-00600-004
41	1	H042 + MCJF-0904 + 01941 + MCBM-0604	H042-02000-008
40	4	FLAT WASHER - ENGINEERS - 3/8" X 3/4" ZINC	FW06
39	4	FLAT WASHER - ENGINEERS - 5/16" X 5/8" ZINC	FW05
38	2	FLAT WASHER - ENGINEERS - 1/4" X 1/2" ZINC	FW0408
37	1	PLUG 3/8"BSPP	CP77-06
36	1	ELBOW 45 M/M 1/2" BSPP X 1-1/16"JIC	CP38-0817
35	1	NIPPLE 1/2"BSPP - 1-1/16"JIC	CP2-0817
34	4	NIPPLE 1/2" BSPP X 7/8" JIC	CP2-0814
33	1	NIPPLE 3/8"BSPP X 7/8"JIC	CP2-0614
32	1	NIPPLE 1/4" BSPP X 9/16" JIC	CP2-0409
31	1	NIPPLE M/M 1/2" X 1/2" BSPP	CP1-0808
30	1	TEE M/F/F 1"BSPT	CB64-161616
29	1	ELBOW 90 M/M 3/4"BSPT X 1-1/16"JIC	CB56-1217
28	1	HOSETAIL 3/4"BSPT X 3/4"HOSE	CB4-1212
27	2	NIPPLE 1"BSPT X 1-1/16"JIC	CB2-1617
26	1	NIPPLE 1"BSPT X 7/8"JIC	CB2-1614
25	1	TUBE ASS SHORT 90 F/M 7/8"JIC	C93-1414
24	4	BOLT HT 3/8" UNC X 1-3/4"	BC0628
23	1	PUMP 11cc GROUP 2	1630076
22	1	ROLL BAR SUIT PANTOGRAPH	1630034
21	1	HONDA ENGINE GX390 13HP RECOIL START	1540230
20	1	BRAKE MANIFOLD OUTER CABLE HOLDER	1430127
19	1	BRAKE MANIFOLD - MANUAL PULL - S13L80E	1430124
18	1	IN-LINE PRESSURE FILTER 1/2"BSPP	1430122
17	1	COOLER AIR COWLING HONDA & YANMAR	1430014
16	1	COOLER/RADIATOR - HONDA FITTED WITH FILLER BREATHER	1430008
15	1	SNAP CONNECTOR FLUSH FACED 1/2 BSPP MALE	1430005
14	1	SNAP CONNECTOR FLUSH FACED 1/2 BSPP FEMALE	1430004
13	8	CUSHION MOUNT STUDS	1150925
12	4	RADIATOR RUBBER MOUNT	1150400
11	1	BELL HOUSING - GROUP 1&2 7-18HP ENGINES FEMALE	1110023
10	1	PUMP COUPLING - GROUP 2 65 SERIES	1110021
9	1	BRAKE CABLE FOR DEDICATED SPIKE PULLER	1081356
8	1	FILTER ELEMENT - HYDRAULIC OIL FILTER	1080813
7	1	FILTER HEAD	1080812
6	1	BELL HOUSING CENTERING RING GROUP 2	1080765
5	1	HOSE CLAMP 14-32 SCREW TYPE	1080722
4	1	ENGINE COUPLING RUBBER SPIDER 65 SERIES	1080710
3	1	ENGINE HALF COUPLING - 1 SHAFT 65 SERIES	1080708
2	1	PUMP HEAT GASKET - GRP 2	1080059
1	1	MALE 3/8" FLUSH FACED SNAP CONNECTOR	1020342

PARTS LIST

REV	DATE	DRN	CRF	DESCRIPTION	CHK	APP
0	18/06/2015	-	-	ORIGINAL ISSUE	-	-

Melvelle Equipment Corp. Pty. Ltd
10 Rogilla Close
Wallsend N.S.W 2287
Ph:+61 02 4951 5244
Fax:+61 02 4950 1291

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: HONDA RECOIL POWER PACK SUIT 163SS WITH BRAKES

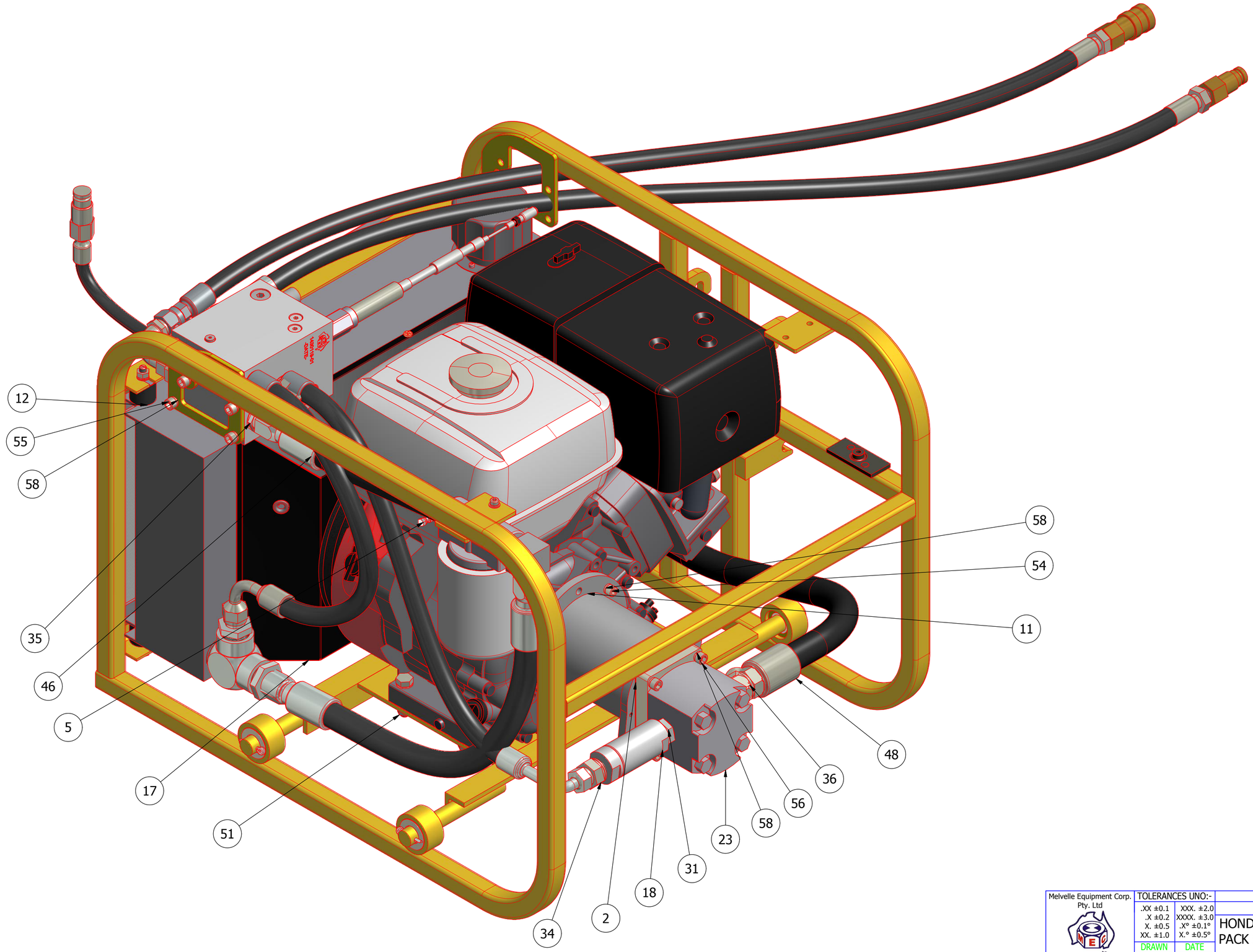
PART #: FP-111-AA-B

DRAWN: garym DATE: 18/06/2015

MODELLED BY: garym

CHECKED APPROVED SCALE: 1:3 DRG: 2-111-35 REV: 0

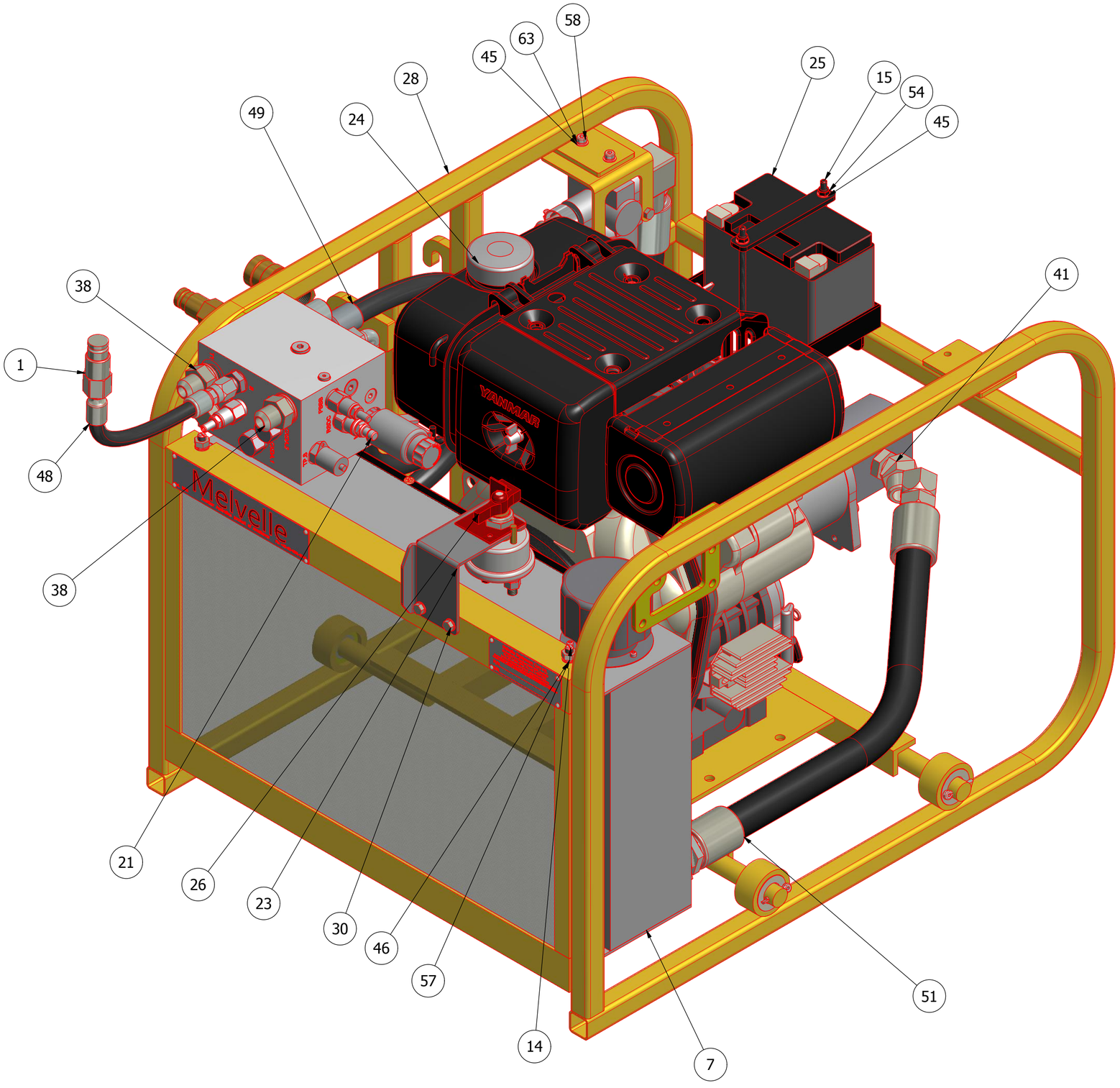
1 OF 2 SHEET # | ISO 1 SHEET DESCRIPTION | IF IN DOUBT, ASK!



Melvelle Equipment Corp. Pty. Ltd 10 Rogilla Close Wallsend N.S.W 2287 Ph:+61 02 4951 5244 Fax:+61 02 4950 1291	TOLERANCES UNO:-	DIMENSIONS IN mm 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°	DESCRIPTION: HONDA RECOIL POWER PACK SUIT 163SS WITH BRAKES	PART #: FP-111-AA-B
	DRAWN: garym 18/06/2015		MODELLED BY: garym
	CHECKED APPROVED	SCALE: 1:6	DRG: 2-111-35 REV: 0
2 OF 2 SHEET #	ISO 2 SHEET DESCRIPTION	IF IN DOUBT, ASK!	

ITEM	QTY	DESCRIPTION	PART NUMBER
67	8	U DRIVE SCREW	UDSCREW
66	8	TEK SCREW TAPTITE - RESERVOIR BREATHER	TAPTIT1
65	4	3/8" SPRING WASHER	SW06
64	20	5/16" SPRING WASHER	SW05
63	2	1/4" SPRING WASHER	SW04SQ
62	4	SOCKET HEAD CAP SCREW M8 x 35	SHM0835
61	4	SOCKET HEAD CAP SCREW M8 x 30	SHM0830
60	4	SOCKET HEAD CAP SCREW M8 x 20	SHM0820
59	2	SOCKET HEAD CAP SCREW M6 x 40	SHM0640
58	2	SOCKET HEAD CAP SCREW 1/4" UNC X 3/4"	SHC0412
57	8	NUT M8 ZINC	NM08Z
56	6	NUT M6 NYLOC	NM06N
55	4	NUT 3/8` UNC BLACK	N06NC
54	2	NUT 1/4 UNC NYLOC	N04NCN
53	1	MELVELLE MODEL & SERIAL N/O AL TAG	IDTAG02
52	1	MELVELLE AUSTRALIA IDENTIFICATION TAG	IDTAG01
51	1	H161 + MCJF-1716 + 00500 + MCJF-1716	H161-00620-000-S
50	1	H121 + MCJF-1712 + 00550 + MCJF-01712	H121-00650-000
49	2	H082 + MCJF-1408 + 00673 + MCJF90S-01408	H082-00770-004
48	1	H042 + MCJF-0904 + 01941 + MCBM-0604	H042-02000-008
47	4	FLAT WASHER - ENGINEERS - 3/8" X 3/4" ZINC	FW06
46	4	FLAT WASHER - ENGINEERS - 5/16" X 5/8" ZINC	FW05
45	14	FLAT WASHER - ENGINEERS - 1/4" X 1/2" ZINC	FW0408
44	1	PLUG 3/8"BSPP	CP77-06
43	1	ELBOW 90 M/M 1/2"BSPP X1-1/16"JIC	CP56-0817
42	1	HOSETAIL 1/2"BSP X 3/4"HOSE	CP4-0812
41	1	ELBOW 45 M/M 1/2" BSPP X 1-1/16"JIC	CP38-0817
40	1	ELBOW 45 M/M 1/2"BSPP X 7/8"JIC	CP38-0814
39	1	NIPPLE 1/2"BSPP - 1-1/16"JIC	CP2-0817
38	3	NIPPLE 1/2" BSPP X 7/8" JIC	CP2-0814
37	1	NIPPLE 3/8"BSPP X 7/8"JIC	CP2-0614
36	1	NIPPLE 1/4" BSPP X 9/16" JIC	CP2-0409
35	1	NIPPLE M/M 1/2" X 1/2" BSPP	CP1-0808
34	1	TEE M/F/F 1"BSPT	CB64-161616
33	2	NIPPLE 1"BSPT X 1-1/16"JIC	CB2-1617
32	1	NIPPLE 1"BSPT X 7/8"JIC	CB2-1614
31	2	BOLT METRIC M6 X 65LG ZINC GR8.8	BM0665Z
30	2	BOLT M6 x 20 HT	BM0620
29	4	BOLT HT 3/8" UNC X 1-3/4"	BC0628
28	1	ROLL BAR SUIT PANTOGRAPH	1630034
27	1	OIL PRESSURE SWITCH - 1/8TH BSP X 10 PSI	1540816
26	1	BATTERY ISOLATOR SWITCH - INCLUDING RED LOCKOUT	1540813
25	1	BATTERY 12V SEALED 120AH DEKA	1540412
24	1	YANMAR ENGINE L70AEDE ELECTRICSTART ENGINE	1540210
23	1	BATTERY LOCKOUT MOUNT BRACKET	1430136
22	1	IN-LINE PRESSURE FILTER 1/2"BSPP	1430122
21	1	BRAKE MANIFOLD - ELECTRIC SOLENOID	1430119
20	1	BATTERY BOX TOP CLAMP	1430113
19	1	PUMP 7.8-7.9cc GROUP 1	1430081
18	1	COOLER AIR COWLING HONDA & YANMAR	1430014
17	1	SNAP CONNECTOR FLUSH FACED 1/2 BSPP MALE	1430005
16	1	SNAP CONNECTOR FLUSH FACED 1/2 BSPP FEMALE	1430004
15	1	BATTERY BOX FOR 115-5 POWERPACK	1150929
14	8	CUSHION MOUNT STUDS	1150925
13	4	RADIATOR RUBBER MOUNT	1150400
12	1	BELL HOUSING - GROUP 1&2 7-18HP ENGINES FEMALE	1110023
11	1	PUMP COUPLING - GROUP 2 65 SERIES	1110021
10	1	MP FILTER	1081289
9	2	MP FILTER SPACER	1081288
8	1	MP FILTER MOUNTING BRACKET	1081285
7	1	RADIATOR YANMAR	1081024
6	1	BELL HOUSING CENTRING RING GROUP 1	1080728
5	1	HOSE CLAMP 14-32 SCREW TYPE	1080722
4	1	ENGINE COUPLING RUBBER SPIDER 65 SERIES	1080710
3	1	ENGINE HALF COUPLING - 1 SHAFT 65 SERIES	1080708
2	1	PUMP HEAT GASKET - GRP 1	1080058
1	1	MALE 3/8" FLUSH FACED SNAP CONNECTOR	1020342

PARTS LIST



Melvelle Equipment Corp. Pty. Ltd
10 Rogilla Close
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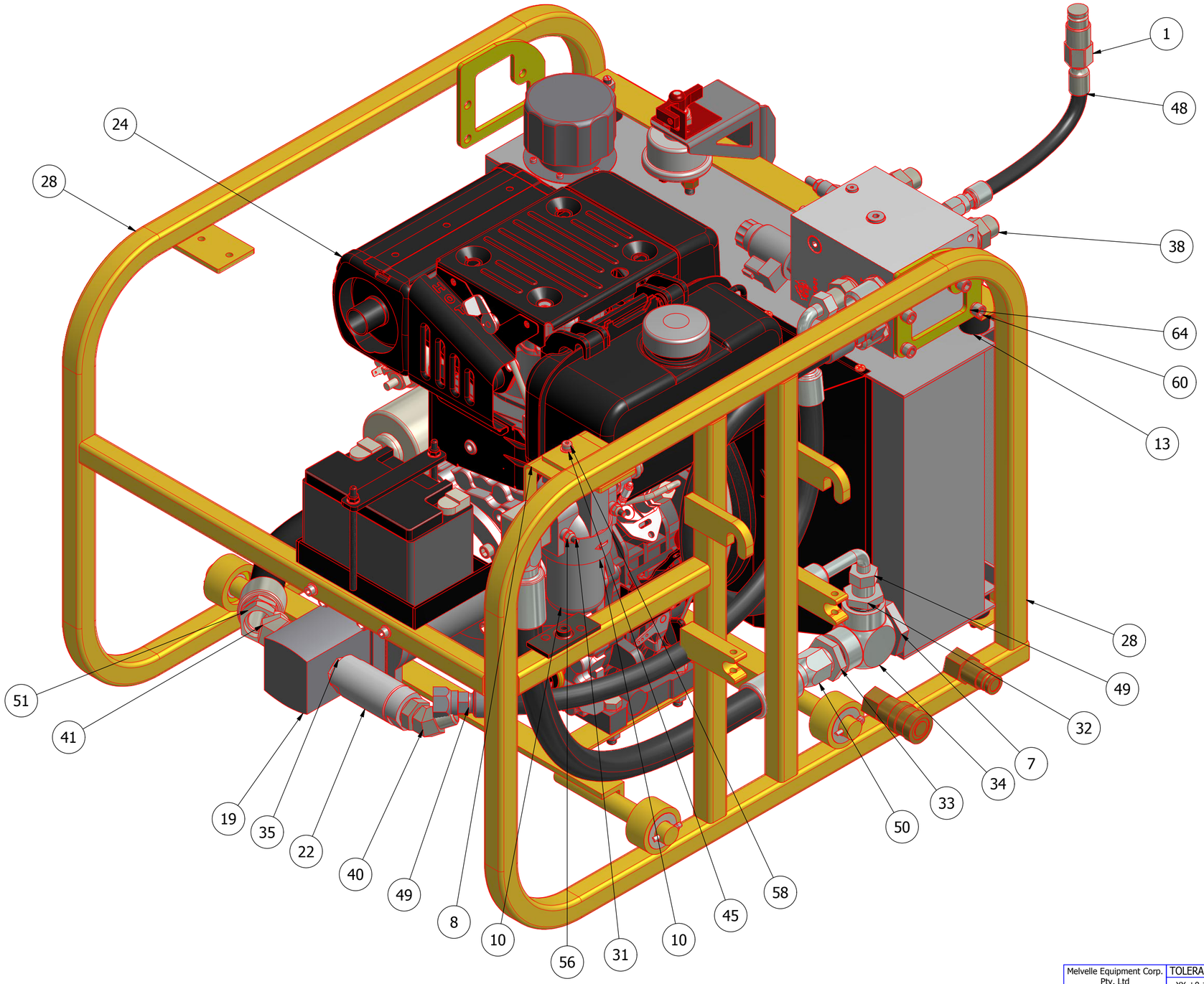
TOLERANCES UNO:-		DIMENSIONS IN mm UNO
.XX ±0.1	XXX. ±2.0	DESCRIPTION: YANMAR ELECTRIC START POWER PACK SUIT SS163 BRAKED
.X ±0.2	XXXX. ±3.0	PART #: FP-111-BB-B
X. ±0.5	.X° ±0.1°	
XX. ±1.0	X.° ±0.5°	
DRAWN: garym	DATE: 22/06/2015	MODELLED BY: garym
CHECKED	APPROVED	SCALE: 1:3

DRG 2-111-36 REV 0

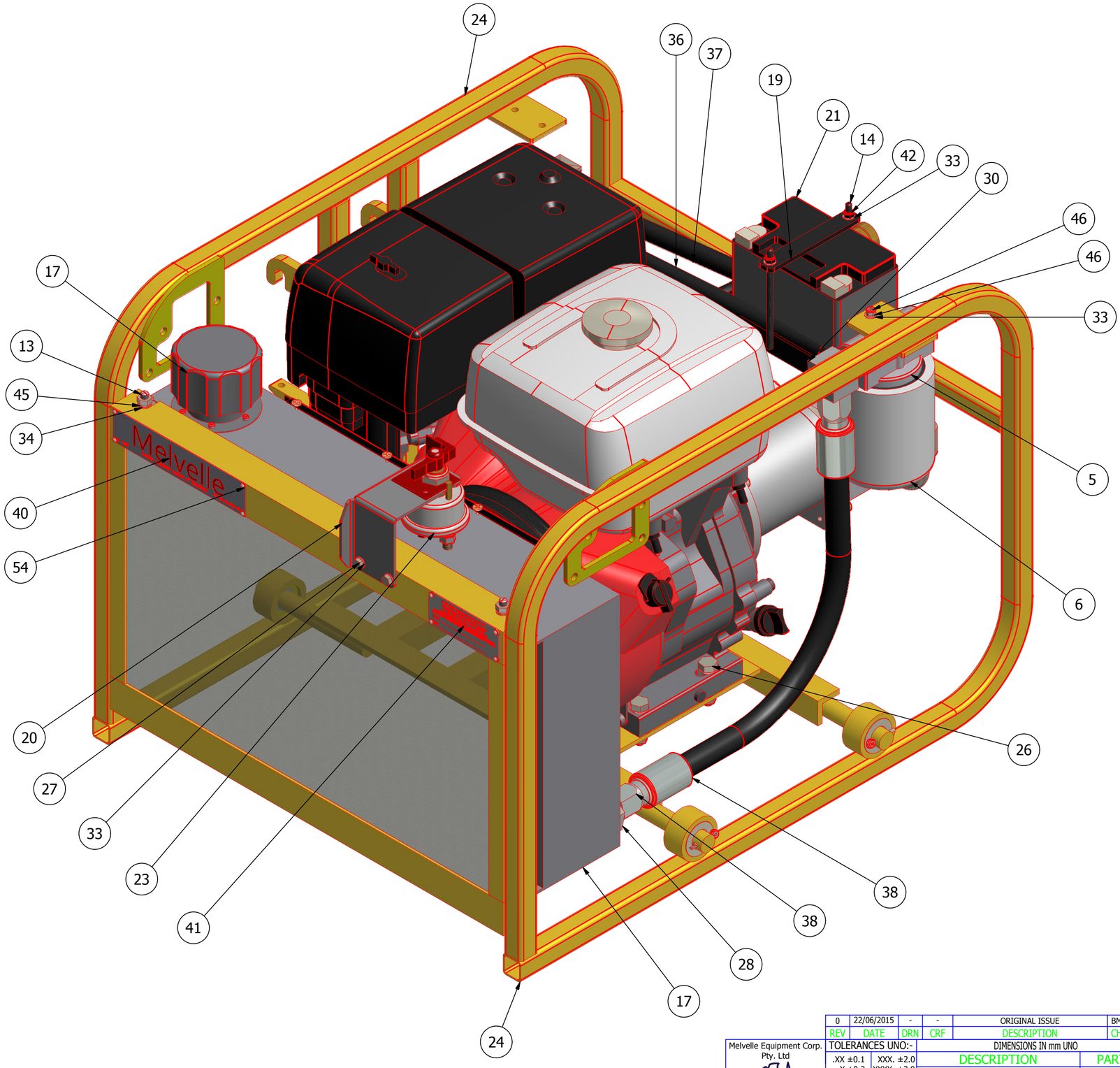
1 OF 2 — SHEET #
ISO 1 — SHEET DESCRIPTION
IF IN DOUBT, ASK!



Melvelle Equipment Corp. Pty. Ltd	TOLERANCES UNO:-
10 Rogilla Close Wallsend N.S.W 2287 Ph:+61 02 4951 5244 Fax:+61 02 4950 1291	.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	YANMAR ELECTRIC START POWER PACK SUIT SS163 BRAKED
PART #	FP-111-BB-B
DRAWN garym	DATE 22/06/2015
MODELLED BY	garym
CHECKED	APPROVED
SCALE	1:4
DRG	2-111-36
REV	0
2 OF 2 SHEET #	ISO 2 SHEET DESCRIPTION
IF IN DOUBT, ASK!	

ITEM	QTY	DESCRIPTION	PART NUMBER
54	8	U DRIVE SCREW	UDSCREW
53	8	TEK SCREW TAPTITE - RESERVOIR BREATHER	TAPTIT1
52	4	3/8" SPRING WASHER	SW06
51	16	5/16" SPRING WASHER	SW05
50	2	1/4" SPRING WASHER	SW04SQ
49	4	SOCKET HEAD CAP SCREW M8 x 25	SHM0825
48	2	SOCKET HEAD CAP SCREW M6 x 40	SHM0640
47	4	SOCKET HEAD CAP SCREW 5/16" UNF X 1-1/4"	SHF0520
46	2	SOCKET HEAD CAP SCREW 1/4" UNC X 3/4"	SHC0412
45	8	NUT M8 ZINC	NM08Z
44	4	NUT M6 NYLOC	NM06N
43	4	NUT 3/8` UNC BLACK	N06NC
42	2	NUT 1/4 UNC NYLOC	N04NCN
41	1	MELVELLE MODEL & SERIAL N/O AL TAG	IDTAG02
40	1	MELVELLE AUSTRALIA IDENTIFICATION TAG	IDTAG01
39	1	H160 + MCJF-1716 + 00480 + MCJF-1716	H160-00640-000
38	1	H121 + MCJF-1712 + 00480 + MCJF-1712	H121-00580-000
37	1	H082 + MCBM-0808 + 01380 + MCJF90M-1808	H082-01480-035
36	1	H082 + MCBM-0808 + 01320 + MCJF-1408	H082-01420-008
35	4	FLAT WASHER - ENGINEERS - 3/8" X 3/4" ZINC	FW06
34	4	FLAT WASHER - ENGINEERS - 5/16" X 5/8" ZINC	FW05
33	12	FLAT WASHER - ENGINEERS - 1/4" X 1/2" ZINC	FW0408
32	1	ELBOW 45 M/M 1/2" BSPP X 1-1/16"JIC	CP38-0817
31	1	NIPPLE 1/2" BSPP X 7/8" JIC	CP2-0814
30	1	ELBOW 90 M/M 3/4"BSPT X 1-1/16"JIC	CB56-1217
29	1	ELBOW 90 M/M 3/4"BSPT X 7/8"JIC	CB56-1214
28	2	NIPPLE 1"BSPT X 1-1/16"JIC	CB2-1617
27	2	BOLT M6 x 20 HT	BM0620
26	4	BOLT HT 3/8" UNC X 1-3/4"	BC0628
25	1	PUMP 11cc GROUP 2	1630076
24	1	ROLL BAR SUIT PANTOGRAPH	1630034
23	1	BATTERY ISOLATOR SWITCH - INCLUDING RED LOCKOUT	1540813
22	1	HONDA ENGINE GX390 13HP -18AMPELECTRIC START ENGINE 1" SHAFT	1540687
21	1	BATTERY 12V SEALED 120AH DEKA	1540412
20	1	BATTERY LOCKOUT MOUNT BRACKET	1430136
19	1	BATTERY BOX TOP CLAMP	1430113
18	1	COOLER AIR COWLING HONDA & YANMAR	1430014
17	1	COOLER/RADIATOR - HONDA FITTED WITH FILLER BREATHER	1430008
16	1	SNAP CONNECTOR FLUSH FACED 1/2 BSPP MALE	1430005
15	1	SNAP CONNECTOR FLUSH FACED 1/2 BSPP FEMALE	1430004
14	1	BATTERY BOX FOR 115-5 POWERPACK	1150929
13	8	CUSHION MOUNT STUDS	1150925
12	4	RADIATOR RUBBER MOUNT	1150400
11	1	BELL HOUSING - GROUP 1&2 7-18HP ENGINES FEMALE	1110023
10	1	PUMP COUPLING - GROUP 2 65 SERIES	1110021
9	1	HOSE CLAMP DOUBLE 22mm - BOLT GROUP 3 CLAMPS	1081101-04
8	1	HOSE CLAMP DOUBLE 22mm - TOP PLATE GROUP 3	1081101-03
7	2	HOSE CLAMP DOUBLE 22mm - JAWS	1081101-01
6	1	FILTER ELEMENT - HYDRAULIC OIL FILTER	1080813
5	1	FILTER HEAD	1080812
4	1	BELL HOUSING CENTERING RING GROUP 2	1080765
3	1	ENGINE COUPLING RUBBER SPIDER 65 SERIES	1080710
2	1	ENGINE HALF COUPLING - 1 SHAFT 65 SERIES	1080708
1	1	PUMP HEAT GASKET - GRP 2	1080059

PARTS LIST



REV	DATE	DRN	CRF	DESCRIPTION	CHK	APP
0	22/06/2015	-	-	ORIGINAL ISSUE	BMD	BMD

Melvelle Equipment Corp. Pty. Ltd
10 Rogilla Close
Wallsend N.S.W 2287
Ph:+61 02 4951 5244
Fax:+61 02 4950 1291

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: HONDA POWER PACK ELECT START SUIT SS163

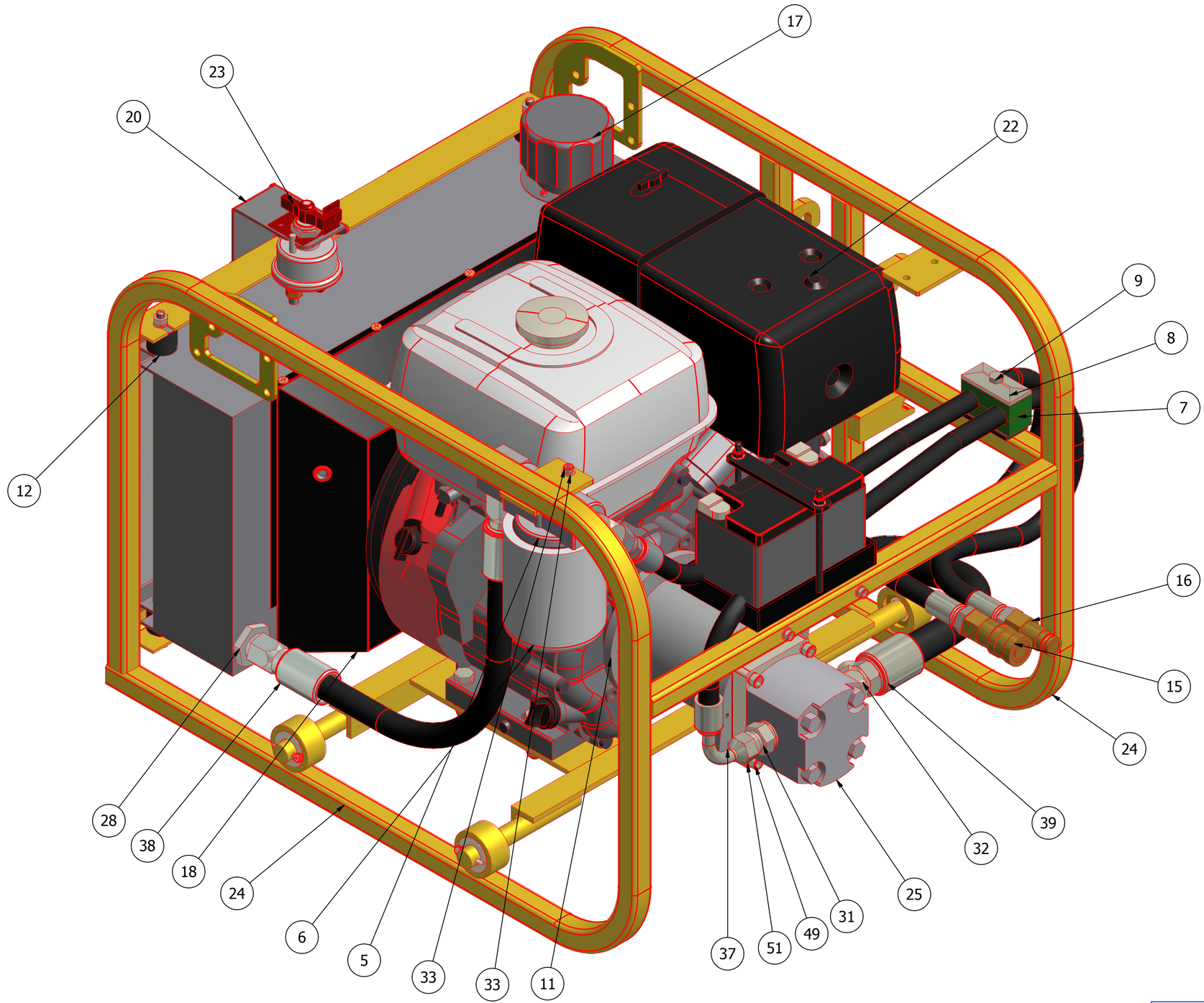
PART #: FP-111-AJ

DRAWN: garym | DATE: 22/06/2015

MODELLED BY: garym

CHECKED | APPROVED | SCALE: 1:3 | DRG: 2-111-37 | REV: 0

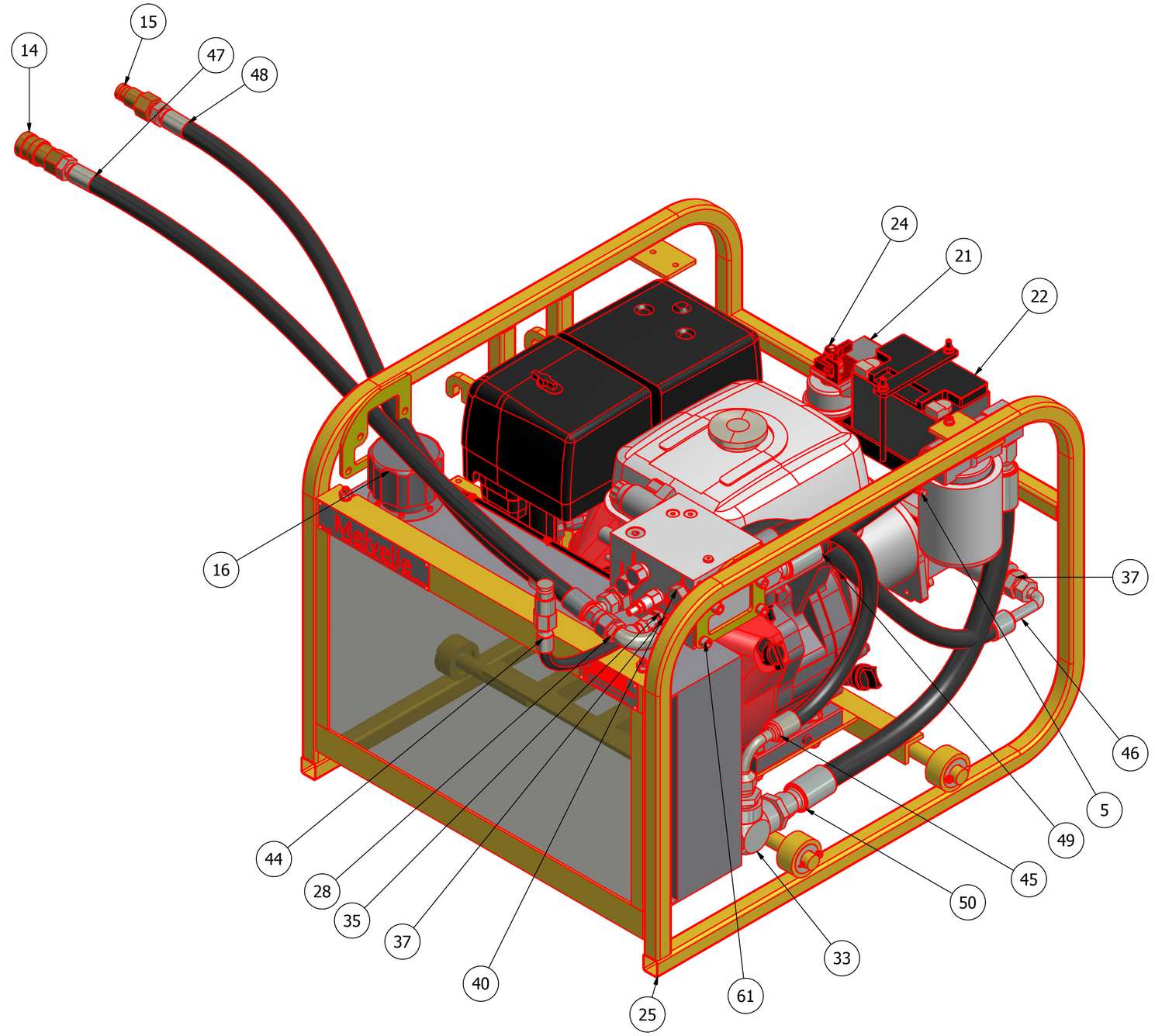
1 OF 2 SHEET # | ISO 1 SHEET DESCRIPTION | IF IN DOUBT, ASK!



Melvelle Equipment Corp. Pty. Ltd	TOLERANCES UNO:-		DIMENSIONS IN mm UNO		
	.XX ±0.1	XXX. ±2.0	DESCRIPTION	PART #	
	.X ±0.2	XXXX. ±3.0	HONDA POWER PACK ELECT START SUIT SS163	FP-111-AJ	
	X. ±0.5	.X° ±0.1°		MODELLED BY	
	XX. ±1.0	X.° ±0.5°		garym	
10 Rogilla Close Wallsend N.S.W 2287 Ph:+61 02 4951 5244 Fax:+61 02 4950 1291	DRAWN	DATE			
	garym	22/06/2015			
	CHECKED	APPROVED	SCALE	DRG	REV
			1:3	2-111-37	0
2 OF 2	ISO 2		This drawing and the contents within are the property of Melvelle Equipment Corp. Pty. Ltd. It is not to be copied, distributed or used in any other manner.		
SHEET #	SHEET DESCRIPTION	IF IN DOUBT, ASK!			

ITEM	QTY	DESCRIPTION	PART NUMBER
67	8	U DRIVE SCREW	UDSCREW
66	8	TEK SCREW TAPTITE - RESERVOIR BREATHER	TAPTIT1
65	4	3/8" SPRING WASHER	SW06
64	20	5/16" SPRING WASHER	SW05
63	2	1/4" SPRING WASHER	SW04SQ
62	4	SOCKET HEAD CAP SCREW M8 x 25	SHM0825
61	4	SOCKET HEAD CAP SCREW M8 x 20	SHM0820
60	4	SOCKET HEAD CAP SCREW M6 x 40	SHM0640
59	4	SOCKET HEAD CAP SCREW 5/16" UNF X 1-1/4"	SHF0520
58	2	SOCKET HEAD CAP SCREW 1/4" UNC X 3/4"	SHC0412
57	8	NUT M8 ZINC	NM08Z
56	4	NUT M6 NYLOC	NM06N
55	4	NUT 3/8` UNC BLACK	N06NC
54	2	NUT 1/4 UNC NYLOC	N04NCN
53	1	MELVELLE MODEL & SERIAL N/O AL TAG	IDTAG02
52	1	MELVELLE AUSTRALIA IDENTIFICATION TAG	IDTAG01
51	1	H160 + MCJF-1716 + 00480 + MCJF-1716	H160-00640-000
50	1	H121 + MCJF-1712 + 00550 + MCJF-1712	H121-00650-000
49	1	H121 + MCJF-1712 + 00330 + NO FITTING	H121-00380-040
48	1	H082 + MCBM-0808 + 01380 + MCJF90M-1408	H082-01480-035
47	1	H082 + MCJF-1408 + 01320 + MCBM-0808	H082-01420-008
46	1	H082 + MCJF-1408 + 00671 + MCJF90S-1408	H082-00770-004
45	1	H082 + MCJF-1408 + 00501 + MCJF90S-1408	H082-00600-004
44	1	H042 + MCJF-0904 + 01941 + MCBM-0604	H042-02000-008
43	4	FLAT WASHER - ENGINEERS - 3/8" X 3/4" ZINC	FW06
42	4	FLAT WASHER - ENGINEERS - 5/16" X 5/8" ZINC	FW05
41	12	FLAT WASHER - ENGINEERS - 1/4" X 1/2" ZINC	FW0408
40	1	PLUG 3/8"BSPP	CP77-06
39	1	ELBOW 45 M/M 1/2" BSPP X 1-1/16"JIC	CP38-0817
38	1	NIPPLE 1/2"BSPP - 1-1/16"JIC	CP2-0817
37	4	NIPPLE 1/2" BSPP X 7/8" JIC	CP2-0814
36	1	NIPPLE 3/8"BSPP X 7/8"JIC	CP2-0614
35	1	NIPPLE 1/4" BSPP X 9/16" JIC	CP2-0409
34	1	NIPPLE M/M 1/2" X 1/2" BSPP	CP1-0808
33	1	TEE M/F/F 1"BSPT	CB64-161616
32	1	ELBOW 90 M/M 3/4"BSPT X 1-1/16"JIC	CB56-1217
31	1	HOSETAIL 3/4"BSPT X 3/4"HOSE	CB4-1212
30	2	NIPPLE 1"BSPT X 1-1/16"JIC	CB2-1617
29	1	NIPPLE 1"BSPT X 7/8"JIC	CB2-1614
28	1	TUBE ASS SHORT 90 F/M 7/8"JIC	C93-1414
27	4	BOLT HT 3/8" UNC X 1-3/4"	BC0628
26	1	PUMP 11cc GROUP 2	1630076
25	1	ROLL BAR SUIT PANTOGRAPH	1630034
24	1	BATTERY ISOLATOR SWITCH - INCLUDING RED LOCKOUT	1540813
23	1	HONDA ENGINE GX390 13HP -18AMPELECTRIC START ENGINE 1" SHAFT	1540687
22	1	BATTERY 12V SEALED 120AH DEKA	1540412
21	1	BATTERY LOCKOUT MOUNT BRACKET	1430136
20	1	IN-LINE PRESSURE FILTER 1/2"BSPP	1430122
19	1	BRAKE MANIFOLD - ELECTRIC SOLENOID	1430119
18	1	BATTERY BOX TOP CLAMP	1430113
17	1	COOLER AIR COWLING HONDA & YANMAR	1430014
16	1	COOLER/RADIATOR - HONDA FITTED WITH FILLER BREATHER	1430008
15	1	SNAP CONNECTOR FLUSH FACED 1/2 BSPP MALE	1430005
14	1	SNAP CONNECTOR FLUSH FACED 1/2 BSPP FEMALE	1430004
13	1	BATTERY BOX FOR 115-5 POWERPACK	1150929
12	8	CUSHION MOUNT STUDS	1150925
11	4	RADIATOR RUBBER MOUNT	1150400
10	1	BELL HOUSING - GROUP 1&2 7-18HP ENGINES FEMALE	1110023
9	1	PUMP COUPLING - GROUP 2 65 SERIES	1110021
8	1	FILTER ELEMENT - HYDRAULIC OIL FILTER	1080813
7	1	FILTER HEAD	1080812
6	1	BELL HOUSING CENTERING RING GROUP 2	1080765
5	1	HOSE CLAMP 14-32 SCREW TYPE	1080722
4	1	ENGINE COUPLING RUBBER SPIDER 65 SERIES	1080710
3	1	ENGINE HALF COUPLING - 1 SHAFT 65 SERIES	1080708
2	1	PUMP HEAT GASKET - GRP 2	1080059
1	1	MALE 3/8" FLUSH FACED SNAP CONNECTOR	1020342

PARTS LIST



REV	DATE	DRN	CRF	DESCRIPTION	CHK	APP
0	22/06/2015	-	-	ORIGINAL ISSUE	-	-

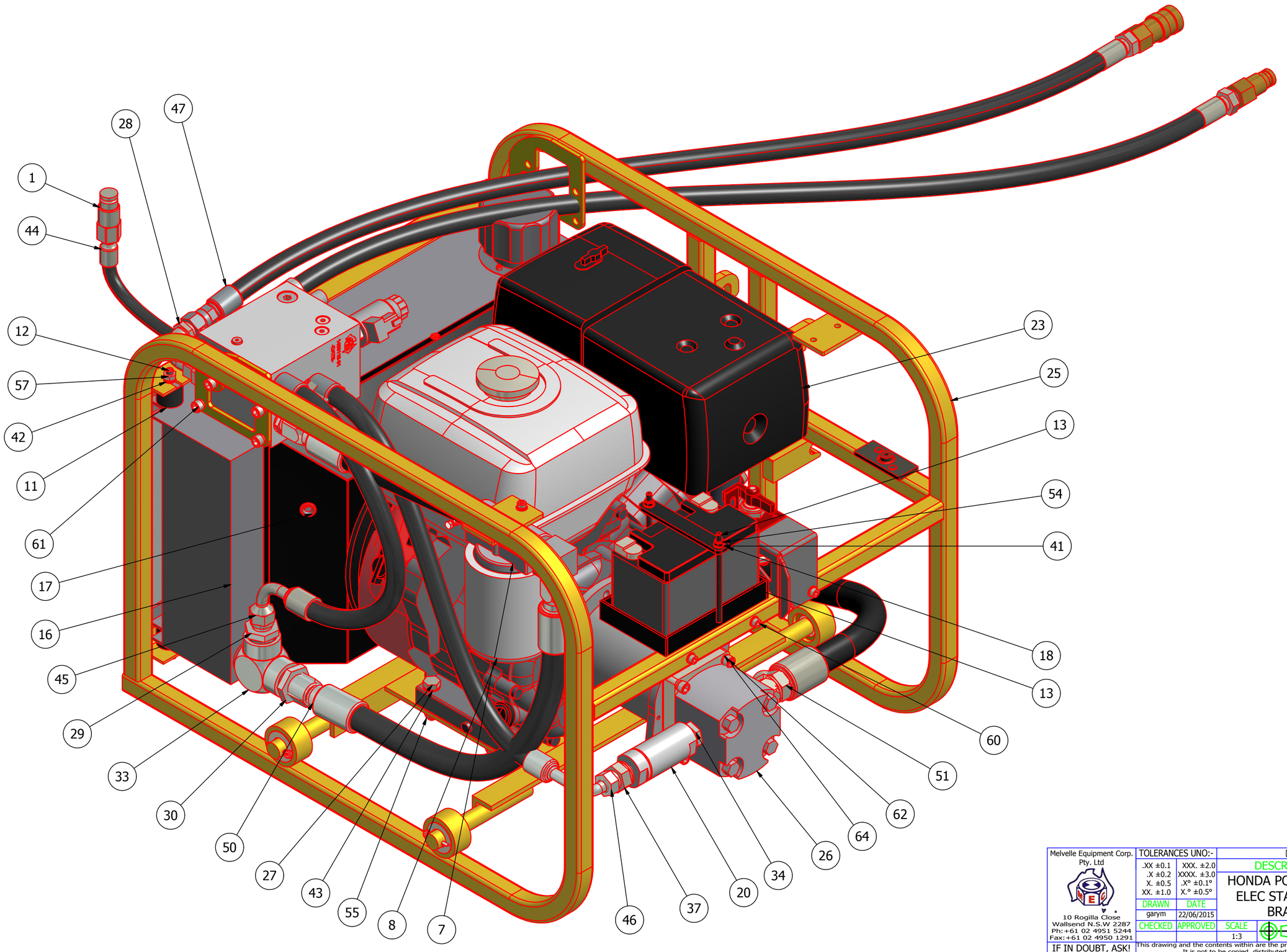
Melvelle Equipment Corp. Pty. Ltd
10 Rogilla Close
Wallsend N.S.W 2287
Ph:+61 02 4951 5244
Fax:+61 02 4950 1291

TOLERANCES UNO:-		DIMENSIONS IN mm UNO
.XX ±0.1	XXX. ±2.0	DESCRIPTION: HONDA POWER PACK ELEC START WITH BRAKES
.X ±0.2	XXXX. ±3.0	PART #: FP-111-AJ-B
X. ±0.5	.X° ±0.1°	
XX. ±1.0	X.° ±0.5°	
DRAWN: garym	DATE: 22/06/2015	MODELLED BY: garym
CHECKED	APPROVED	SCALE: 1:4

DRG 2-111-38 REV 0

SHEET #	SHEET DESCRIPTION
1 OF 2	ISO 1

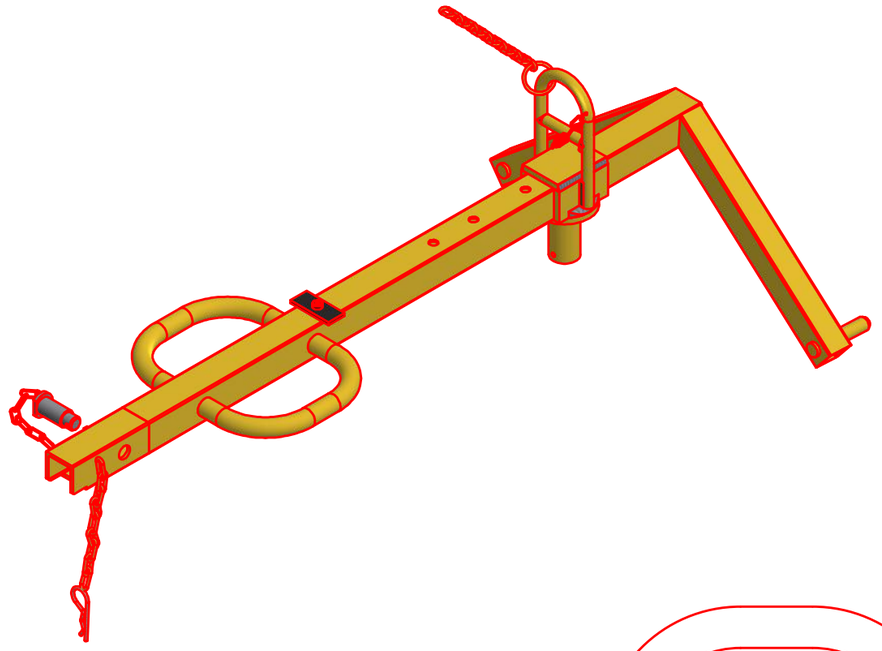
IF IN DOUBT, ASK!

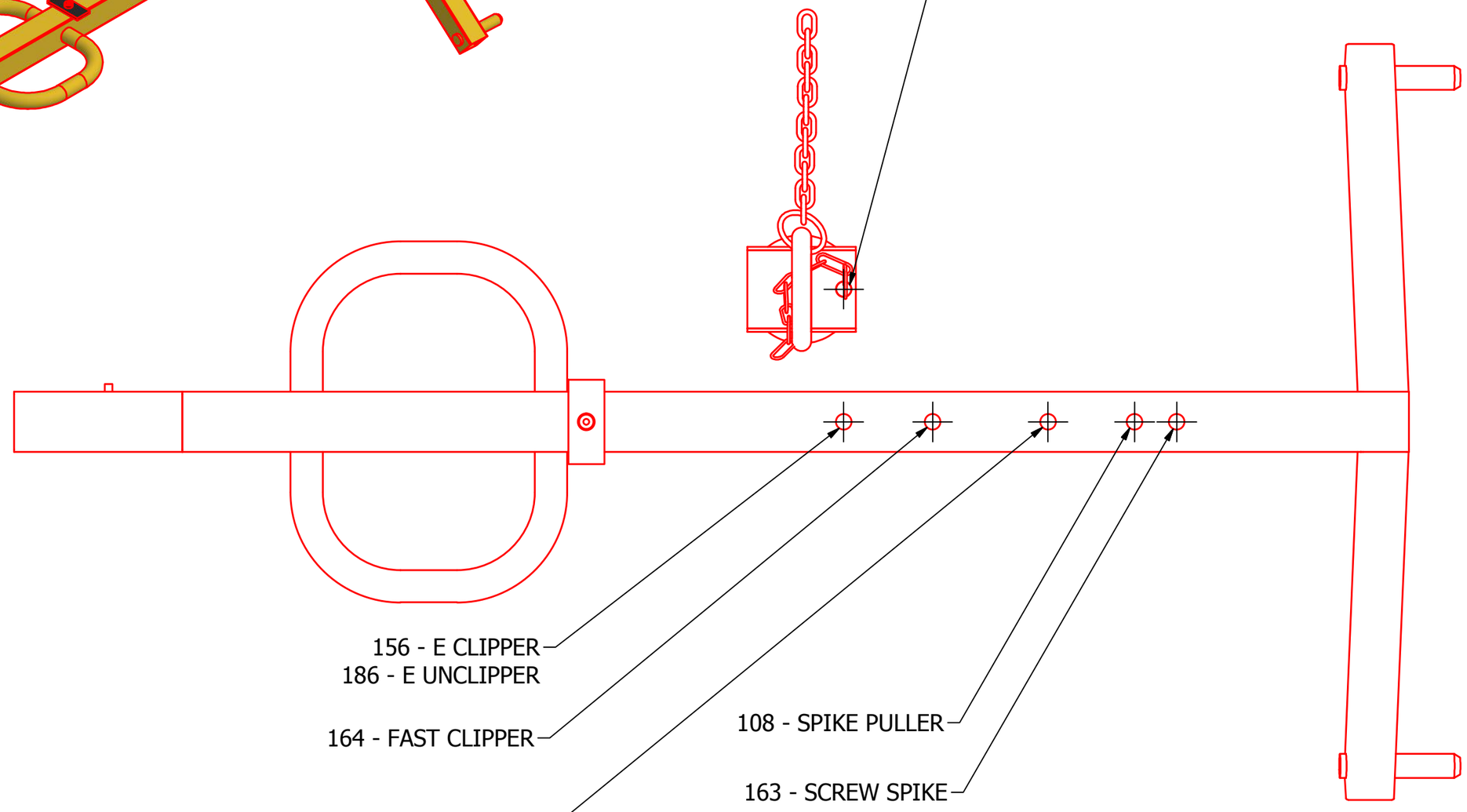


Melvelle Equipment Corp. Pty. Ltd	TOLERANCES UNO:-	DIMENSIONS IN mm UNO	
	.XX ±0.1 XXX. ±2.0 .X ±0.2 XXXX. ±3.0 X. ±0.5 .X° ±0.1° XX. ±1.0 X.° ±0.5°	DESCRIPTION	PART #
		HONDA POWER PACK ELEC START WITH BRAKES	FP-111-AJ-B
	DRAWN / DATE		MODELLED BY
	garym / 22/06/2015		garym
	CHECKED / APPROVED	SCALE	ORG 2-111-38 REV 0
		1:3	

10 Rogilla Close
Wallsend N.S.W 2287
Ph:+61 02 4951 5244
Fax:+61 02 4950 1291

IF IN DOUBT, ASK!





Melvelle Equipment Corp. Pty. Ltd
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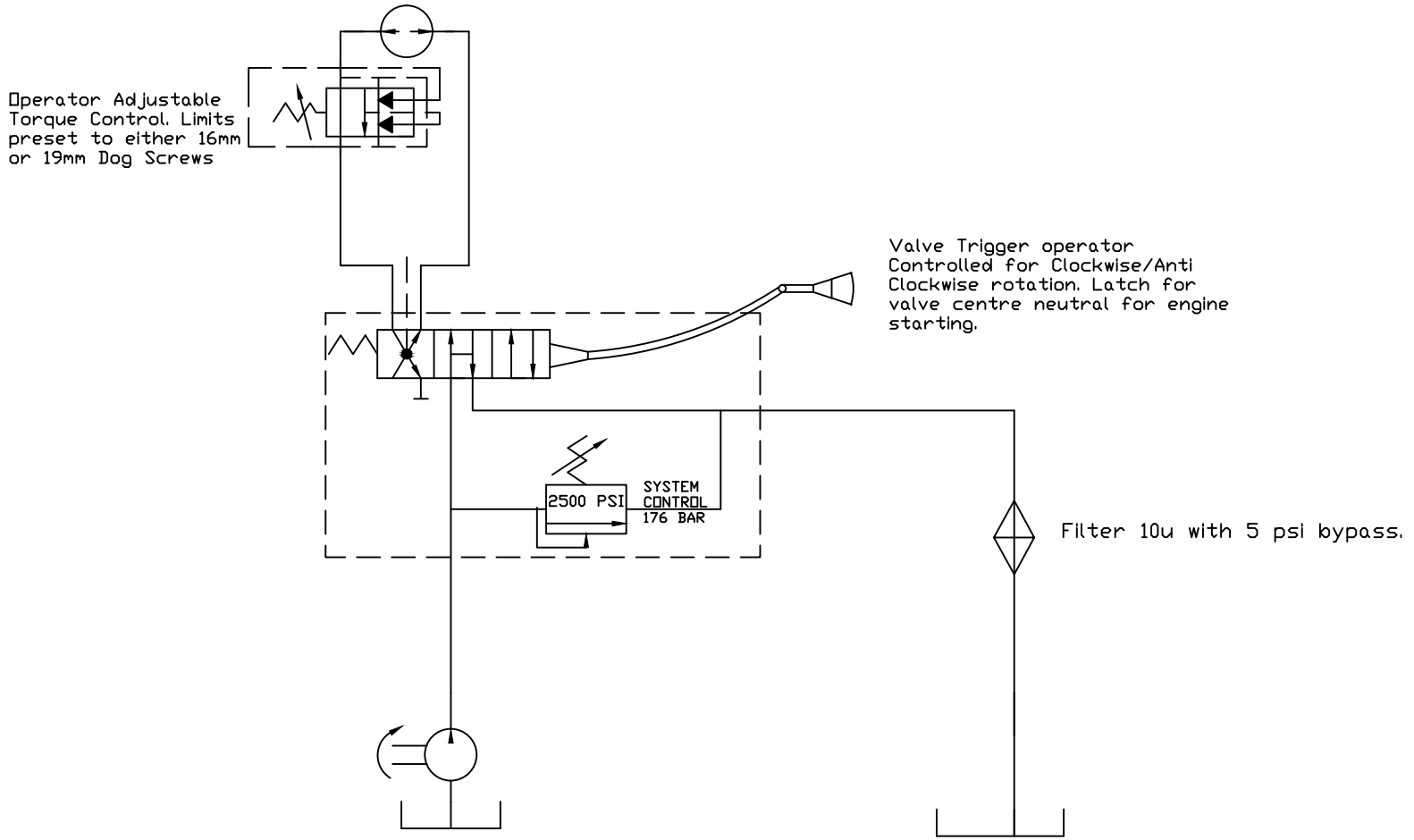
IF IN DOUBT, ASK!

DIMENSIONS IN mm UNO	0	2/04/2012	GMM	ORIGINAL ISSUE
TOLERANCES UNO:-	REV	DATE	DRN	DESCRIPTION

.XX ±0.1	XXX. ±2.0	DESCRIPTION	PART #
.X ±0.2	XXXX. ±3.0	TRACKPACK BOOM ADJUSTMENT	
X. ±0.5	.X° ±0.1°		
XX. ±1.0	X.° ±0.5°		
DRAWN	DATE		MODELLED BY
garym	2/04/2012		GaryM
CHECKED	APPROVED	SCALE	DRG 3-143-48 REV 0
		1:4	



K:\Drawings\163\163-50.dwg

MELVELLE ENGINEERING Co. P/L
STRIVING FOR GREATER EXCELLENCE A.C.N 033-553-044

SCALE	NTS
DATE	15/11/04
DRAWN	PHM
CHECKED	
APPROVED	

SS163 SCREW SPIKE M/C CIRCUIT DIAGRAM – UN-BRAKED

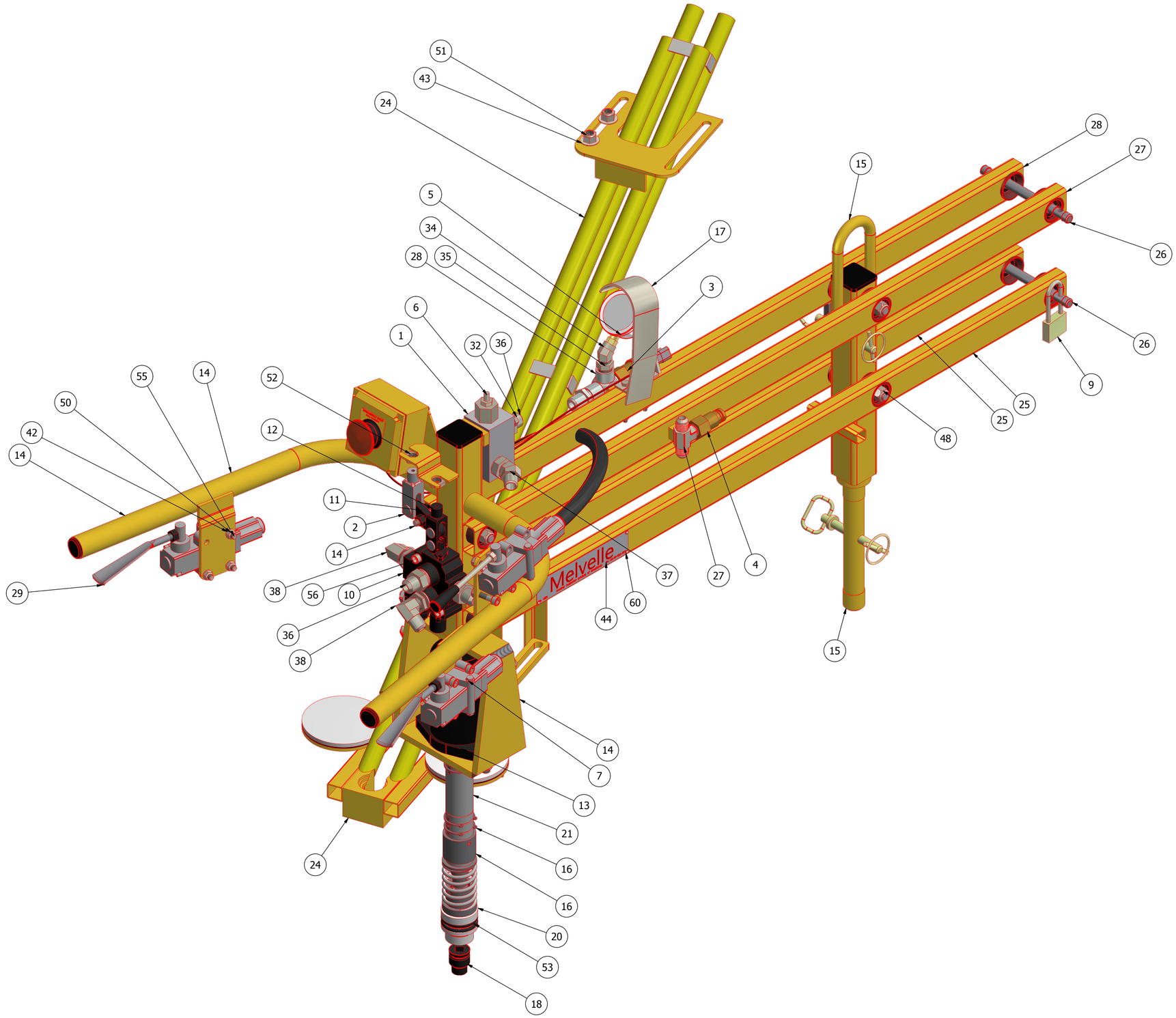
3-163-50

REVISION 1

ITEM	QTY	DESCRIPTION SOURCE	PART No.

ITEM	QTY	DESCRIPTION	PART NUMBER
89	2	DRAW BAR PIN 1/2" x 3.5"	1630165
60	12	U DRIVE SCREW	UDSCREW
59	2	1/2" SPRING WASHER x 7/64" SQ SECTION	SW08
58	2	5/16" SPRING WASHER	SW05
57	3	SPLIT PIN 1-16 x 3-4LG	SP0112
56	2	SOCKET HEAD CAP SCREW M8 x 45	SHM0845
55	11	SOCKET HEAD CAP SCREW M8 x 35	SHM0835
54	1	SEL LOK PIN 3/16" X 1-3/4" ZINC	R18745
53	2	ORING 1.75 ID x 2.125 OD x 0.21 CS	OR2327
52	2	NUT M16 FINE THIN NUT (ZINC)	NM16HF
51	4	NUT M12 NYLOC	NM12N
50	11	NUT M8 NYLOC	NM08N
49	2	NUT M6 NYLOC	NM06N
48	10	NUT 1/2 UNF NYLOC	N08NFN
47	1	NUT 3/8` UNC NYLOCK	N06NCN
46	2	NUT 3/8` UNC BLACK	N06NC
45	1	MELVELLE MODEL & SERIAL N/O AL TAG	IDTAG02
44	2	MELVELLE AUSTRALIA IDENTIFICATION TAG	IDTAG01
43	4	FLAT WASHER - ENGINEERS - 1/2" X 1" ZINC	FW08
42	11	FLAT WASHER - ENGINEERS - 5/16" X 5/8" ZINC	FW05
41	2	FLAT WASHER - ENGINEERS - 1/4" X 1/2" ZINC	FW0408
39	2	CIRCLIP EXTERNAL 40mm	CRCP040
38	4	ELBOW 90 M/M 1/2"BSPP X 7/8"JIC	CP56-0814
37	1	ELBOW 45 M/M 1/2"BSPP X 7/8"JIC	CP38-0814
36	4	NIPPLE 1/2" BSPP X 7/8" JIC	CP2-0814
35	1	REDUCING BUSH 1/2"BSPT X 1/4" BSPT	CB73-0804
34	1	ELBOW 45 M/F 1/4"BSPT	CB37-0404
33	1	NIPPLE 1/2"BSPT X 7/8"JIC	CB2-0814
32	2	BOLT M8 60LG	BM0860
31	2	BOLT METRIC M6 X 65LG ZINC GR8.8	BM0665Z
30	2	1/2in UNF x 2in	BF0832
29	2	REMOTE CONTROL TRIGGER-M10	1640035
28	1	PANTOGRAPH ARM TOP LEFT	1630170
27	1	PANTOGRAPH ARM TOP RIGHT	1630169
26	2	END PIN POWERPACK TO ARMS	1630168
25	2	PANTOGRAPH ARM BOTTOM	1630166
24	1	REVERSBLE STRAIGHT RAMP FEEDER ASSEMBLE	1630162
23	1	AJAX UNIVERSAL DRIVE KEY	1630095
22	3	CLEVIS PIN	1630086
21	1	MAGNETIC HEAD EXTENSION SHAFT	1630083
20	1	MAGNETIC NYLON SCREW SPIKE PICK UP	1630065
19	1	19-21mm E24 SPIKE SOCKET	1630062
18	1	16MM SCRW SPIKE SOCKET	1630061
17	1	PRESSURE GAUGE GUARD	1630058
16	1	SCREW SPIKE MACHINE AJAX DOG SCREW SPIKE UNIVERSAL DRIVE	1630045
15	1	PANTOGRAPH TROLLEY CENTRE POST	1630035
14	1	MOTOR FRAME AND HANDLES - PANTOGRAPH	1630011
13	1	MOTOR 200cc 1" KEYED SHAFT SIDE PORTED 1/2" BSPP	1630010
12	1	VALVE CLEVIS	1590028
11	1	CONTROL VALVE CLEVIS PIVOT LINK	1590027
10	1	VALVE-CONTROL VALVE	1590011
9	1	PAD LOCK	1450327
8	2	CONTROL CABLE END CAP MOUNTS TO 1450165	1450166
7	2	CONTROL CABLE ACTUATOR - TRIGGER END ASS	1450165
6	1	KICKDOWN VALVE CARTRIDGE	1450159
5	1	PRESSURE GAUGE 0-3500 PSI	1450144
4	1	SNAP CONNECTOR FLUSH FACED 1/2 BSPP MALE	1430005
3	1	SNAP CONNECTOR FLUSH FACED 1/2 BSPP FEMALE	1430004
2	1	REVERSE CLEVIS	1300140
1	1	KICKDOWN RELIEF BODY-HC - 1/2" PORTS	1080756

MATERIAL/CUT LIST



REV	DATE	DRN	DESCRIPTION
1	17/07/14	BB	ADDED X12 WASHERS AS PER CRF 584
0	22/03/2012	GMM	ORIGINAL ISSUE

DIMENSIONS IN mm UNO
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°

DESCRIPTION: PANTOGRAPH HEAD UNBRAKED
PART #: FP-163-AC
MODELLED BY: garym
DRAWN: garym 22/03/2012
CHECKED
APPROVED
SCALE: 1:4
DWG: 1-163-119 REV: 1

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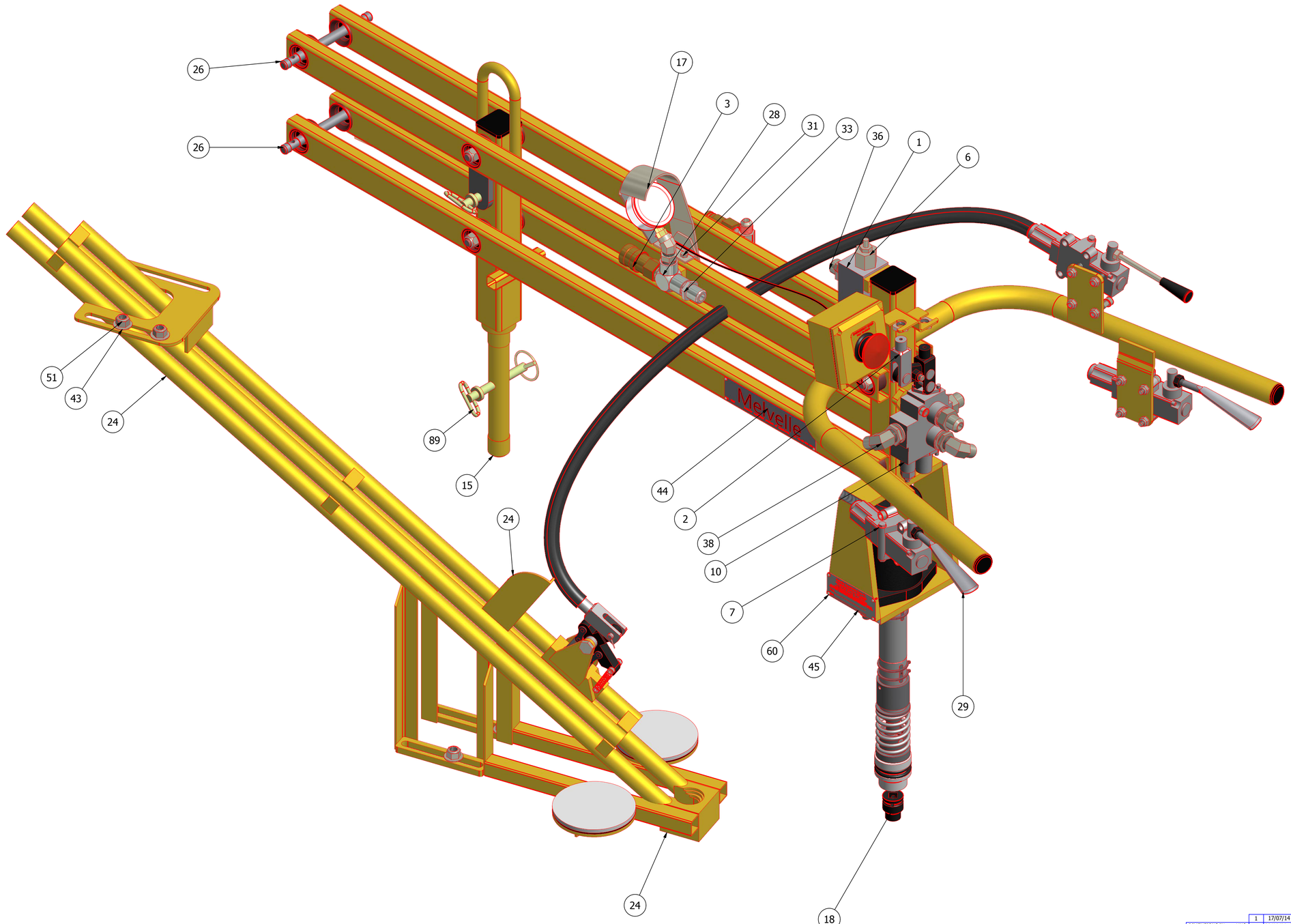
1 OF 3 ASSEMBLY
SHEET # SHEET DESCRIPTION
IF IN DOUBT, ASK!



		1	17/07/14	BB	ADDED X12 WASHERS AS PER CRF 584
DIMENSIONS IN mm UNO		P/V	22/03/2012	FNC	ORIGINAL ISSUE
TOLERANCES UNO:-		REV	DATE	DRN	DESCRIPTION
.XX ±0.1	XXX. ±2.0				
.X ±0.2	XXXX. ±3.0				
X. ±0.5	.X° ±0.1°				
XX. ±1.0	X.° ±0.5°				
DRAWN	DATE				
garym	22/03/2012				
CHECKED	APPROVED				

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DESCRIPTION: PANTOGRAPH HEAD UNBRAKED

PART #: FP-163-AC

MODELLED BY: garym

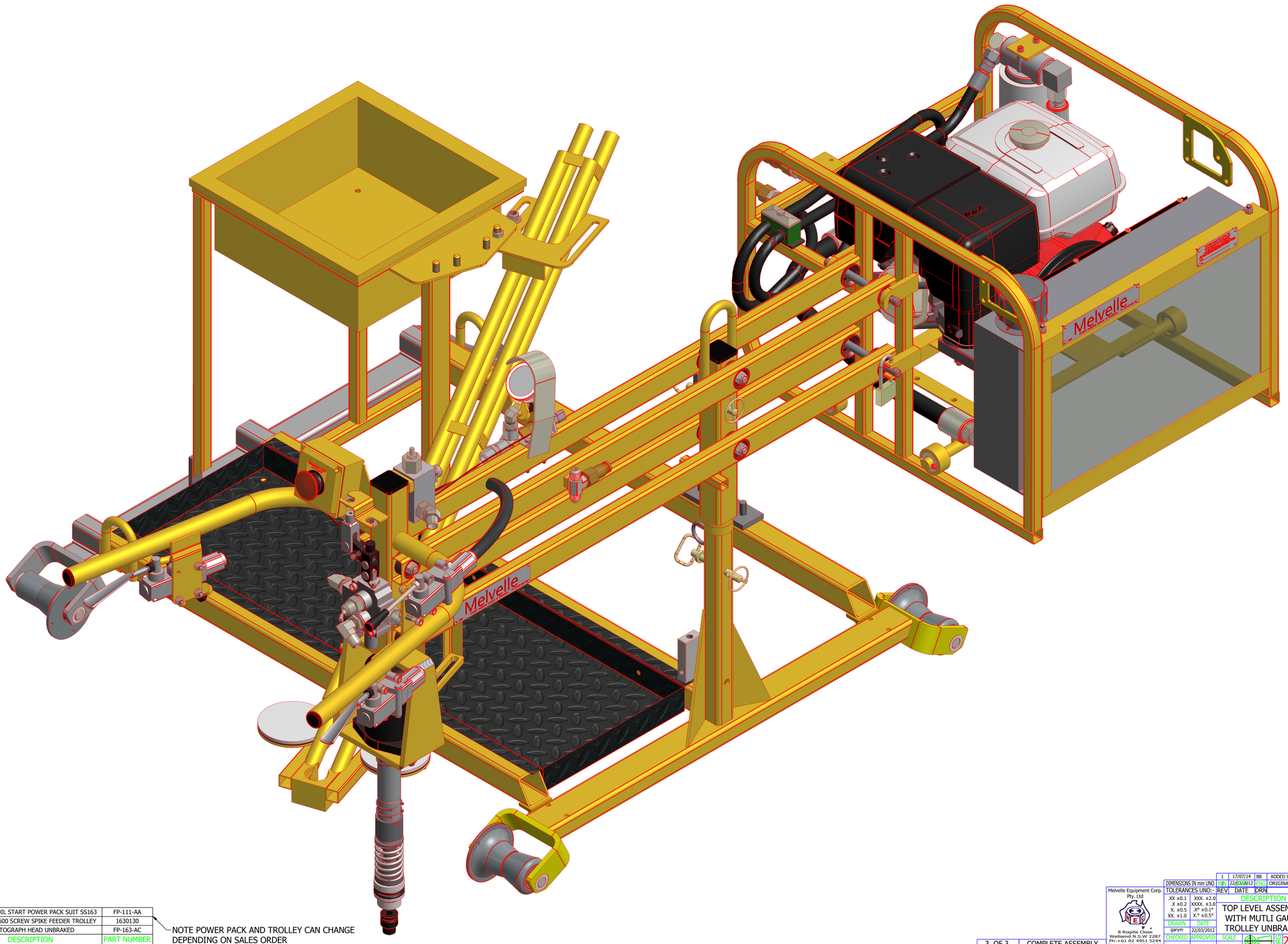
SCALE: 1:3

DRG: 1-163-119 REV: 1

2 OF 3 | MAIN ASSEMBLY

SHEET # | SHEET DESCRIPTION

IF IN DOUBT, ASK!



ITEM	QTY	DESCRIPTION	PART NUMBER
3	1	HONDA RECOIL START POWER PACK SUIT SS163	FP-111-AA
2	1	1067-1435-1600 SCREW SPIKE FEEDER TROLLEY	1630130
1	1	PANTOGRAPH HEAD UNBRAKED	FP-163-AC

PARTS LIST

NOTE POWER PACK AND TROLLEY CAN CHANGE DEPENDING ON SALES ORDER

REV	DATE	DRN	DESCRIPTION
1	17/07/14	BB	ADDED X12 WASHERS AS PER CRF 584
DIMENSIONS IN mm UNO			
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°		
DRAWN	DATE		
garym	22/03/2012		
CHECKED	APPROVED		

Melvelle Equipment Corp. Pty. Ltd
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DESCRIPTION: TOP LEVEL ASSEMBLY WITH MUTLI GAUGE TROLLEY UNBRAKED

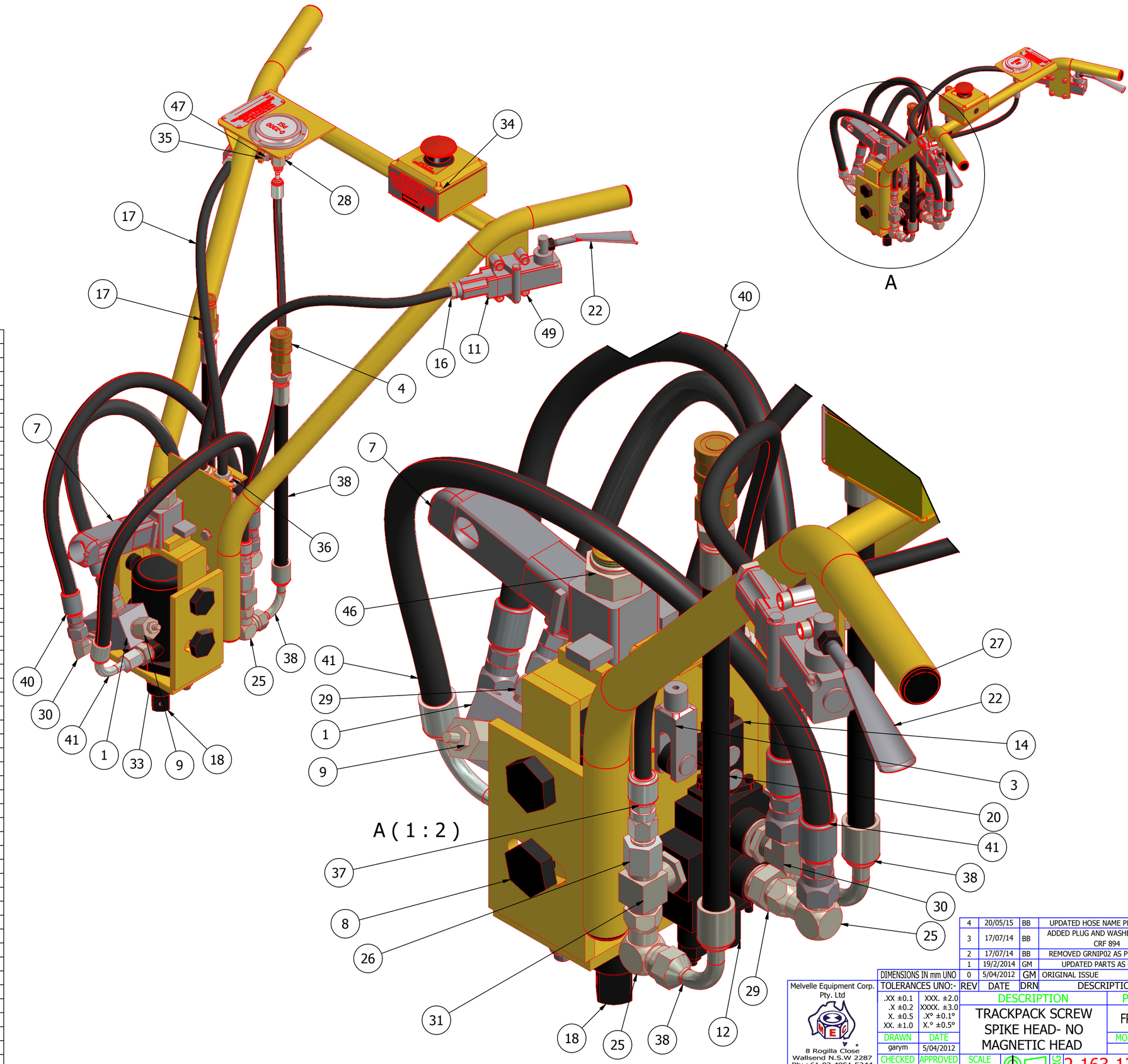
PART #: DWG 2-163-119 REV 1

MODELLED BY: garym

SCALE:

SHEET #	SHEET DESCRIPTION
3 OF 3	COMPLETE ASSEMBLY

IF IN DOUBT, ASK!



ITEM	QTY	DESCRIPTION	PART NUMBER
52	4	U DRIVE SCREW	UDSCREW
51	2	1/2" SPRING WASHER x 7/64" SQ SECTION	SW08
50	3	SPLIT PIN 1-16 x 3-4LG	SP0112
49	8	SOCKET HEAD CAP SCREW M8 x 35	SHM0835
48	2	NUT M16 FINE THIN NUT (ZINC)	NM16HF
47	8	NUT M8 NYLOC	NM08N
46	1	NUT 1-1/4` UNF HALF NYLOC	N20NFNH
45	2	NUT 1/2 UNF NYLOC	N08NFN
44	1	NUT 3/8` UNC NYLOCK	N06NCN
43	2	NUT 3/8` UNC BLACK	N06NC
42	1	MELVELLE MODEL & SERIAL N/O AL TAG	IDTAG02
41	1	H082 + MCJF-1408 + 00820 + MCJF90L-1408	H082-00920-006
40	1	H082 + MCJF-1408 + 00740 + MCJF-1408	H082-00830-000
39	1	H082 + MCJF-1408 + 00650 + MCJF-1408	H082-00750-000
38	2	H082 + MCBM-0808 + 00620 + MCJF90M-1408	H082-00700-035
37	1	H042 + MCJF-0904 + 00500 + MCJF45S-0904	H042-00600-002
36	4	FLAT WASHER - ENGINEERS - 5/8" X 1-1/4" ZINC	FW10
35	8	FLAT WASHER - ENGINEERS - 5/16" X 5/8" ZINC	FW05
34	1	TRACKPACK ESTOP WIRING HARNESS SCREW SPIKE	ESTOP10
33	2	CIRCLIP EXTERNAL 40mm	CRCP040
32	1	NIPPLE 1/2"BSPP X 1/2"BSPT	CPB1-0808
31	2	TEE - MALE 7/8"JIC X 7/8"JIC X 1/2"BSPP	CP65-141408
30	2	ELBOW 90 M/M 1/2"BSPP X 7/8"JIC	CP56-0814
29	3	NIPPLE 1/2" BSPP X 7/8" JIC	CP2-0814
28	1	ADAPTOR M/F 9/16"JIC X 1/4" BSPT	CB20-0409
27	4	PLASTIC CAP TO SUIT 25NB PIPE	CAPRND-1-1/4"
26	1	TUBE REDUCER F/M 7/8"JIC X 9/16"JIC	C84-1409
25	3	ADAPTOR 90 M/F 7/8"JIC X 7/8"JIC	C46-1414
24	2	BOLT M8 x 50LG ZINC	BM0850Z
23	2	1/2in UNF x 2in	BF0832
22	2	REMOTE CONTROL TRIGGER-M10	1640035
21	1	MOTOR FRAME AND HANDLES- TRACKPACK HEAD	1630098
20	3	CLEVIS PIN	1630086
19	1	MOTOR ADAPTER DRIVE SHAFT KEY	1630073
18	1	MOTOR ADAPTER SHAFT 1" SQ DRIVE	1630071
17	1	MOTOR FRAME BOOM CLEVIS	1630037
16	2	CONTROL CABLE 750MM LONG	1630012
15	1	MOTOR 200cc 1" KEYED SHAFT SIDE PORTED 1/2" BSPP	1630010
14	1	VALVE CLEVIS	1590028
13	1	CONTROL VALVE CLEVIS PIVOT LINK	1590027
12	1	VALVE-CONTROL VALVE	1590011
11	2	CONTROL CABLE END CAP MOUNTS TO 1450165	1450166
10	2	CONTROL CABLE ACTUATOR - TRIGGER END ASS	1450165
9	1	KICKDOWN VALVE CARTRIDGE	1450159
8	2	SD67 MOUNTING BRACKET LOCKING BOLT	1430080
7	1	TRACK PACK SD67/8T QUICK CHANGE END	1430076
6	2	SD67 MOUNTING BRACKET PIVOT AXLES	1430027
5	1	SNAP CONNECTOR FLUSH FACED 1/2 BSPP MALE	1430005
4	1	SNAP CONNECTOR FLUSH FACED 1/2 BSPP FEMALE	1430004
3	1	REVERSE CLEVIS	1300140
2	1	PRESSURE GAUGE 0-2300 PSI PANEL MOUNT	1230382
1	1	KICKDOWN RELIEF BODY-HC - 1/2" PORTS	1080756

MATERIAL/CUT LIST

REV	DATE	DRN	DESCRIPTION
4	20/05/15	BB	UPDATED HOSE NAME PER CRF 945
3	17/07/14	BB	ADDED PLUG AND WASHERS AS PER CRF 894
2	17/07/14	BB	REMOVED GRNIP02 AS PER CRF 887
1	19/2/2014	GM	UPDATED PARTS AS CRF474
0	5/04/2012	GM	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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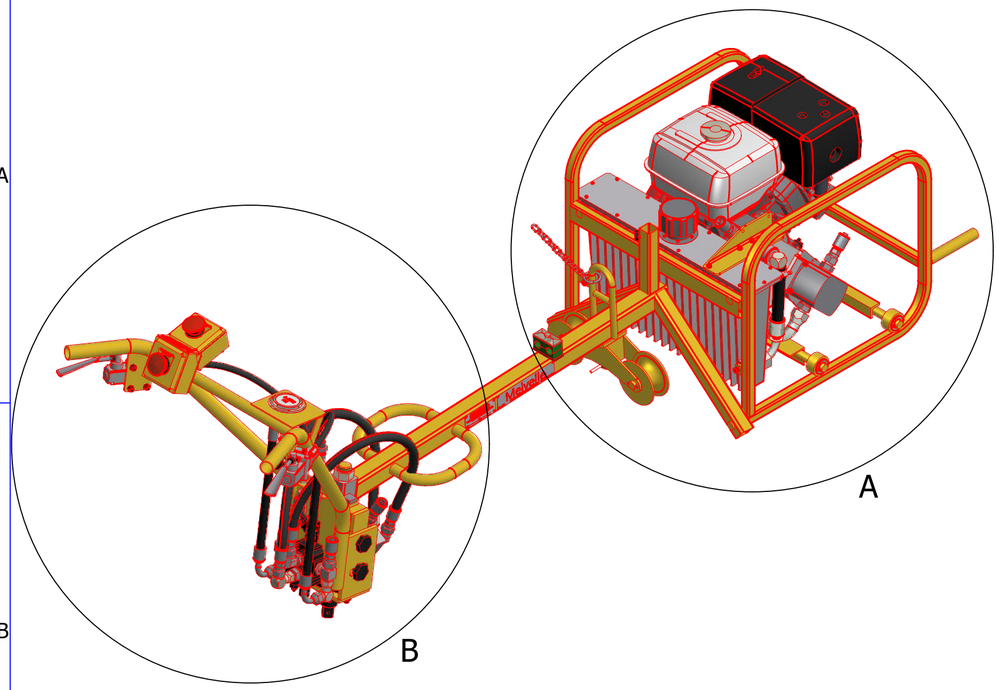
IF IN DOUBT, ASK!

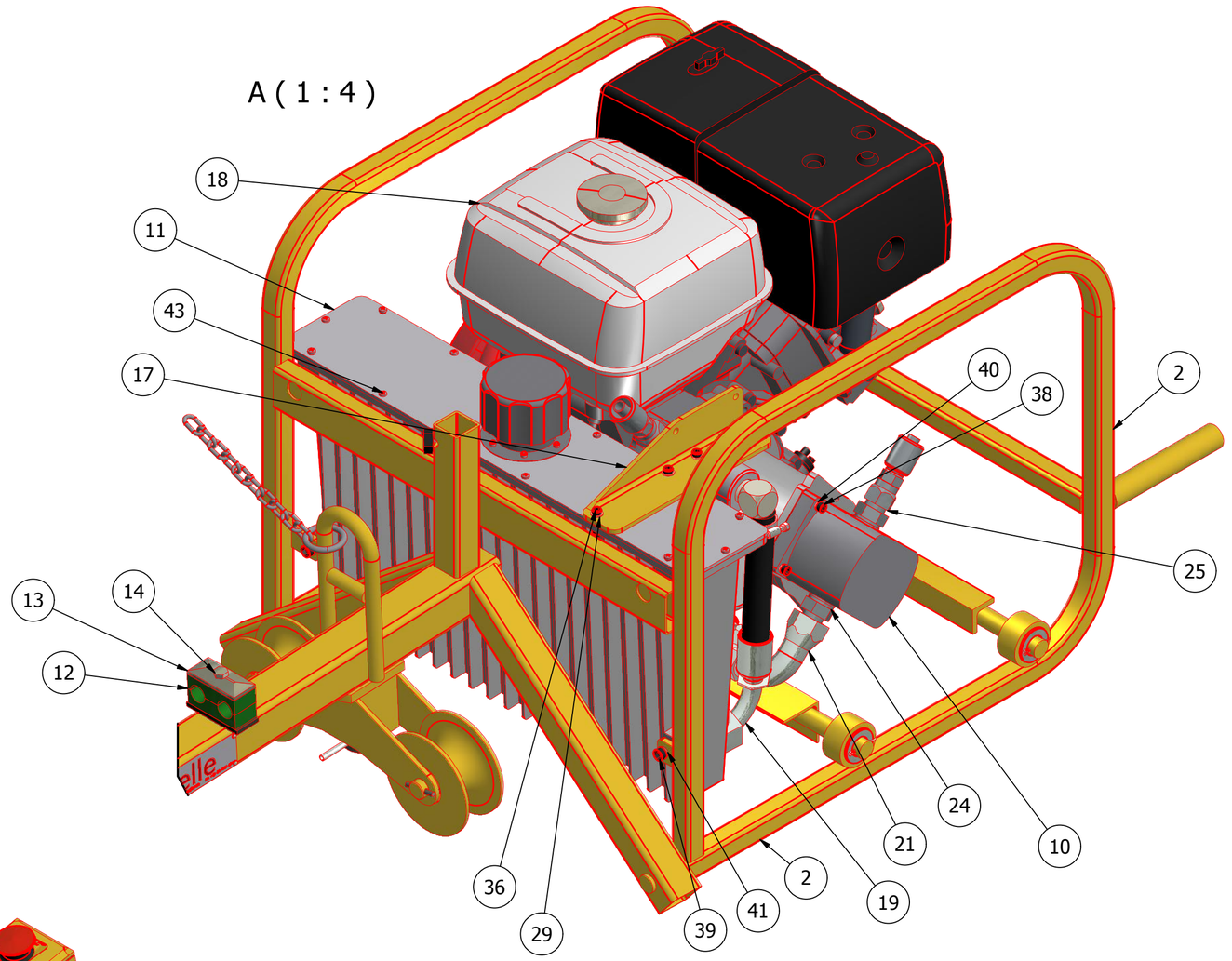
DESCRIPTION	PART #
TRACKPACK SCREW SPIKE HEAD- NO MAGNETIC HEAD	FP-163-1

DRAWN	DATE	MODELLED BY
garym	5/04/2012	garym

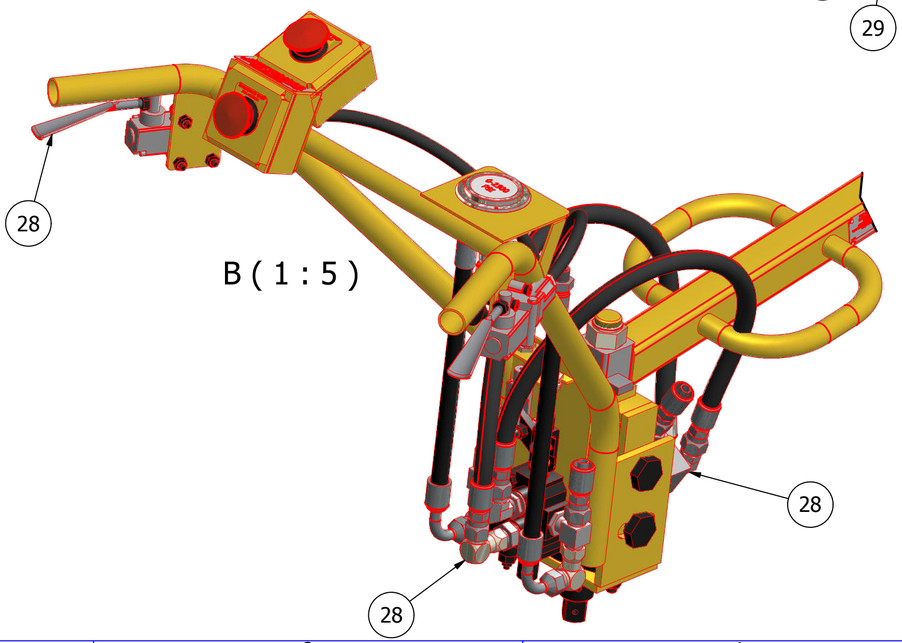
CHECKED	APPROVED	SCALE	DRG	REV
AG	AG	1:4	2-163-122	4



A (1 : 4)



B (1 : 5)



ITEM	QTY	DESCRIPTION	PART NUMBER
44	8	U DRIVE SCREW	UDSCREW
43	2	TEK SCREW TAPTITE - RESERVOIR SCREW	TAPTITE
42	4	3/8" SPRING WASHER	SW06
41	8	5/16" SPRING WASHERS	SW05
40	6	1/4" SPRING WASHER	SW04SQ
39	4	SOCKET HEAD CAP SCREW M8 x 20	SHM0820
38	4	SOCKET HEAD CAP SCREW M6 x 25	SHM0625
37	4	SOCKET HEAD CAP SCREW 5/16" UNF X 1 1/4"	SHF0520
36	2	SOCKET HEAD CAP SCREW 1/4" UNC X 1-1/4" LG	SHC0420
35	2	SOCKET HEAD CAP SCREW 1/4 UNC X 3/4	SHC0412
34	4	NUT 3/8` UNC BLACK	N06NC
33	2	NUT 1/4 UNC NYLOC	N04NCN
32	1	MELVELLE MODEL & SERIAL N/O AL TAG	IDTAG02
31	1	MELVELLE AUSTRALIA IDENTIFICATION TAG	IDTAG01
30	4	FLAT WASHER - ENGINEERS - 3/8	FW06
29	2	FLAT WASHER 1/4" x 1/2"	FW0408
28	1	TRACKPACK SCREW SPIKE HEAD- NO MAGNETIC HEAD	FP-163-1
27	1	DEDICATED SPIKE PULLER ESTOP WIRING HARNESS	ESTOP5
26	2	HOSE END MEGA CRIMP JIC FEMALE 90 - 7/8 X 1/2 HOSE	CH06074
25	2	HOSE END MEGA CRIMP JIC FEMALE - 7/8" JIC X 1/2" HOSE	CH06048
24	2	1/2" BSPP - 7/8" JIC NIPPLE	CH02010
23	1	ELBOW 90 M/M 3/4 NPT - 7/8 JIC	CH01773
22	1	HOSETAIL 90 3/4" BSP 3/4" HOSE	CH01193
21	1	F/SHORT 90 F/M 1-1/16 JIC	CH00715
20	4	BOLT HT 3/8" UNC X 1-3/4"	BC0628
19	1	HOSE ASSY FILTER TO TANK RETURN	1640157
18	1	HONDA ENGINE RECOIL GX390	1540230
17	1	FILTER AND KICKDOWN BRACKET FOR MOUNTING TO RESERVOIR	1450273
16	1	BELL HOUSING	1110023
15	1	PUMP COUPLING - GROUP 2 65 SERIES	1110021
14	1	HOSE CLAMP DOUBLE 22mm - BOLT	1081101-04
13	1	HOSE CLAMP DOUBLE 22mm - TOP PLATE	1081101-03
12	2	HOSE CLAMP DOUBLE 22mm - JAWS	1081101-01
11	1	8L RESIVOIR COMPLETE	1081000
10	1	PUMP 8.2cc GROUP 2-1 8 TAPERSHAFT 1/2" BSPP PORTS	1080845
9	1	OIL FILTER	1080813
8	1	FILTER HEAD	1080812
7	1	HOSE TANK TO PUMP SUCTION	1080768
6	1	BELL HOUSING CENTERING RING GROUP 2	1080765
5	1	HOSE CLAMP 14-32 SCREW TYPE	1080722
4	1	RUBBER SPIDER	1080710
3	1	ENGINE HALF COUPLING	1080708
2	1	ROLL BAR BOOM ASSY 7-11HP WITH ENGINE RAIL ELECTRIC START	1080702
1	1	PUMP HEAT GASKET - GRP 2	1080059

MATERIAL/CUT LIST

Melvelle Equipment Corp. Pty. Ltd
8 Rogilla Close
Wallsend N.S.W 2287
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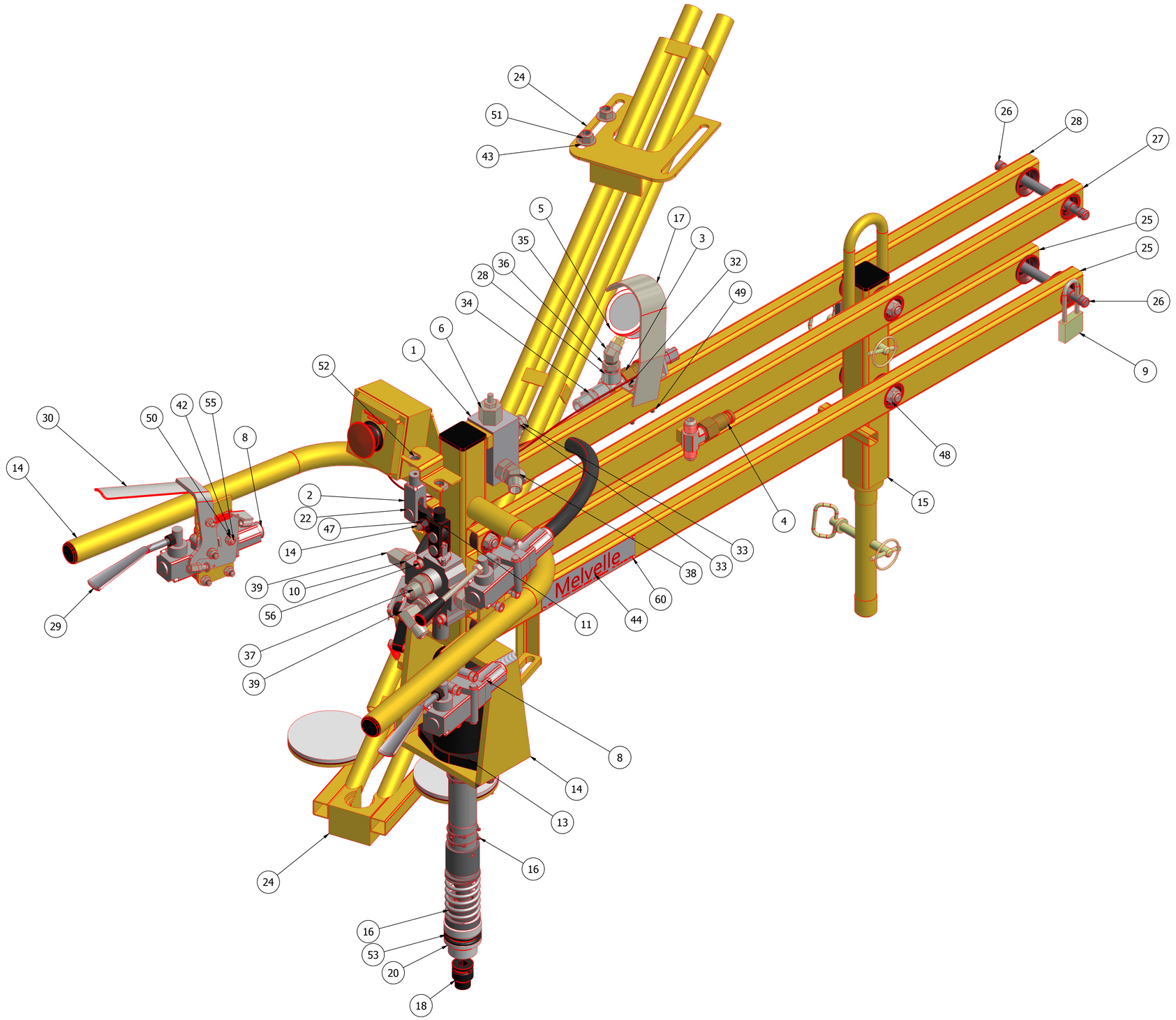
Fax:+61 02 4950 1291

IF IN DOUBT, ASK!

DIMENSIONS IN mm UNO	0	5/04/2012	GMM	ORIGINAL ISSUE
TOLERANCES UNO:-	REV	DATE	DRN	DESCRIPTION

.XX ±0.1	XXX. ±2.0	DESCRIPTION	PART #
.X ±0.2	XXXX. ±3.0	SCREW SPIKE DRIVER HONDA PETROL RECOIL START	FP-163-AQ
X. ±0.5	.X° ±0.1°		
XX. ±1.0	X.° ±0.5°		MODELLED BY
DRAWN	DATE		garym
garym	5/04/2012		
CHECKED	APPROVED	SCALE	DRG 2-163-123 REV 0
		1:6	



ITEM	QTY	DESCRIPTION	PART NUMBER
90	2	DRAW BAR PIN 1/2" x 3.5"	1630165
60	12	U DRIVE SCREW	UDSCREW
59	2	1/2" SPRING WASHER x 7/64" SQ SECTION	SW08
58	2	5/16" SPRING WASHER	SW05
57	3	SPLIT PIN 1-16 x 3-4LG	SP0112
56	2	SOCKET HEAD CAP SCREW M8 x 45	SHM0845
55	11	SOCKET HEAD CAP SCREW M8 x 35	SHM0835
54	1	SEL LOK PIN 3/16" X 1-3/4" ZINC	R18745
53	2	ORING 1.75 ID x 2.125 OD x 0.21 CS	OR2327
52	2	NUT M16 FINE THIN NUT (ZINC)	NM16HF
51	4	NUT M12 NYLOC	NM12N
50	11	NUT M8 NYLOC	NM08N
49	2	NUT M6 NYLOC	NM06N
48	10	NUT 1/2 UNF NYLOC	N08NFN
47	1	NUT 3/8` UNC NYLOCK	N06NCN
46	2	NUT 3/8` UNC BLACK	N06NC
45	1	MELVELLE MODEL & SERIAL N/O AL TAG	IDTAG02
44	2	MELVELLE AUSTRALIA IDENTIFICATION TAG	IDTAG01
43	4	FLAT WASHER - ENGINEERS - 1/2" X 1" ZINC	FW08
42	11	FLAT WASHER - ENGINEERS - 5/16" X 5/8" ZINC	FW05
41	2	FLAT WASHER - ENGINEERS - 1/4" X 1/2" ZINC	FW0408
40	2	CIRCLIP EXTERNAL 40mm	CRCP040
39	4	ELBOW 90 M/M 1/2"BSPP X 7/8"JIC	CP56-0814
38	1	ELBOW 45 M/M 1/2"BSPP X 7/8"JIC	CP38-0814
37	4	NIPPLE 1/2" BSPP X 7/8" JIC	CP2-0814
36	1	REDUCING BUSH 1/2"BSPT X 1/4" BSPT	CB73-0804
35	1	ELBOW 45 M/F 1/4"BSPT	CB37-0404
34	1	NIPPLE 1/2"BSPT X 7/8"JIC	CB2-0814
33	2	BOLT M8 60LG	BM0B60
32	2	BOLT METRIC M6 X 65LG ZINC GR8.8	BM0665Z
31	2	1/2in UNF x 2in	BF0832
30	1	CLIPPER BRAKE TRIGGER ASSEMBLY	1860113
29	2	REMOTE CONTROL TRIGGER-M10	1640035
28	1	PANTOGRAPH ARM TOP LEFT	1630170
27	1	PANTOGRAPH ARM TOP RIGHT	1630169
26	2	END PIN POWERPACK TO ARMS	1630168
25	2	PANTOGRAPH ARM BOTTOM	1630166
24	1	REVERSBLE STRAIGHT RAMP FEEDER ASSEMBLE	1630162
23	1	AJAX UNIVERSAL DRIVE KEY	1630095
22	3	CLEVIS PIN	1630086
21	1	MAGNETIC HEAD EXTENSION SHAFT	1630083
20	1	MAGNETIC NYLON SCREW SPIKE PICK UP	1630065
19	1	19-21mm E24 SPIKE SOCKET	1630062
18	1	16MM SCRW SPIKE SOCKET	1630061
17	1	PRESSURE GAUGE GUARD	1630058
16	1	SCREW SPIKE MACHINE AJAX DOG SCREW SPIKE UNIVERSAL DRIVE	1630045
15	1	PANTOGRAPH TROLLEY CENTRE POST	1630035
14	1	MOTOR FRAME AND HANDLES - PANTOGRAPH	1630011
13	1	MOTOR 200cc 1" KEYED SHAFT SIDE PORTED 1/2" BSPP	1630010
12	1	VALVE CLEVIS	1590028
11	1	CONTROL VALVE CLEVIS PIVOT LINK	1590027
10	1	VALVE-CONTROL VALVE	1590011
9	1	PAD LOCK	1450327
8	2	CONTROL CABLE END CAP MOUNTS TO 1450165	1450166
7	2	CONTROL CABLE ACTUATOR - TRIGGER END ASS	1450165
6	1	KICKDOWN VALVE CARTRIDGE	1450159
5	1	PRESSURE GAUGE 0-3500 PSI	1450144
4	1	SNAP CONNECTOR FLUSH FACED 1/2 BSPP MALE	1430005
3	1	SNAP CONNECTOR FLUSH FACED 1/2 BSPP FEMALE	1430004
2	1	REVERSE CLEVIS	1300140
1	1	KICKDOWN RELIEF BODY-HC - 1/2" PORTS	1080756

PARTS LIST

REV	DATE	DRN	CRF	DESCRIPTION	CHK	APP
0	19/06/2015	-	-	ORIGINAL ISSUE	BMD	BMD

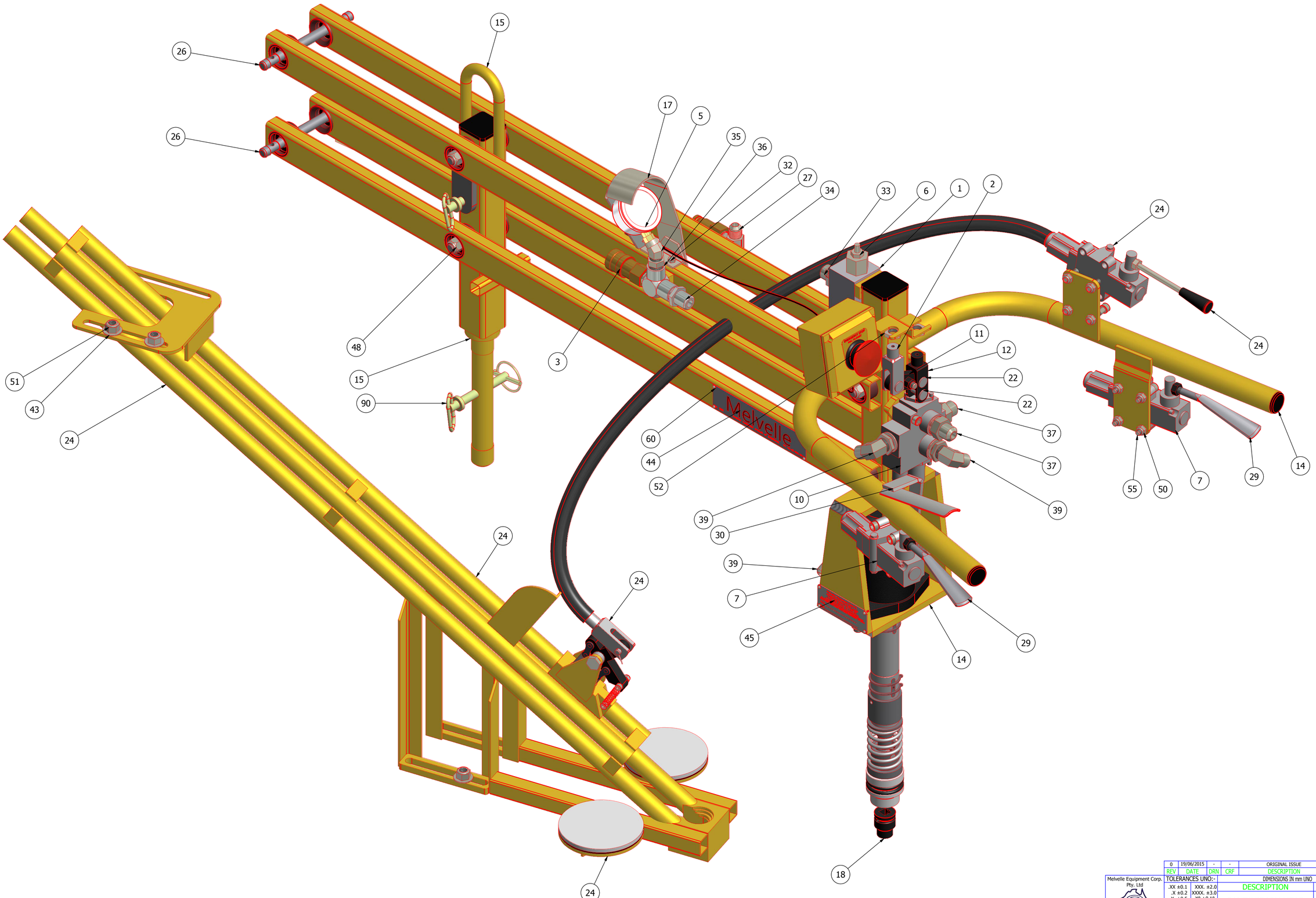
Melvelle Equipment Corp. Pty. Ltd
10 Rogilla Close
Wallsend N.S.W 2287
Ph:+61 02 4951 5244
Fax:+61 02 4950 1291

TOLERANCES UNO:- DIMENSIONS IN mm 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°

DESCRIPTION: PANTOGRAPH HEAD BRAKED
PART #: FP-163-AC-B
MODELLED BY: garym
DRAWN: garym 19/06/2015
CHECKED
APPROVED
SCALE: 1:3
DWG: 1-163-132 REV: 0

SHEET #	SHEET DESCRIPTION
1 OF 3	MAIN ASSEMBLY
IF IN DOUBT, ASK!	



REV	DATE	DRN	CRF	DESCRIPTION	CHK	APP
0	19/06/2015	-	-	ORIGINAL ISSUE	BMD	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

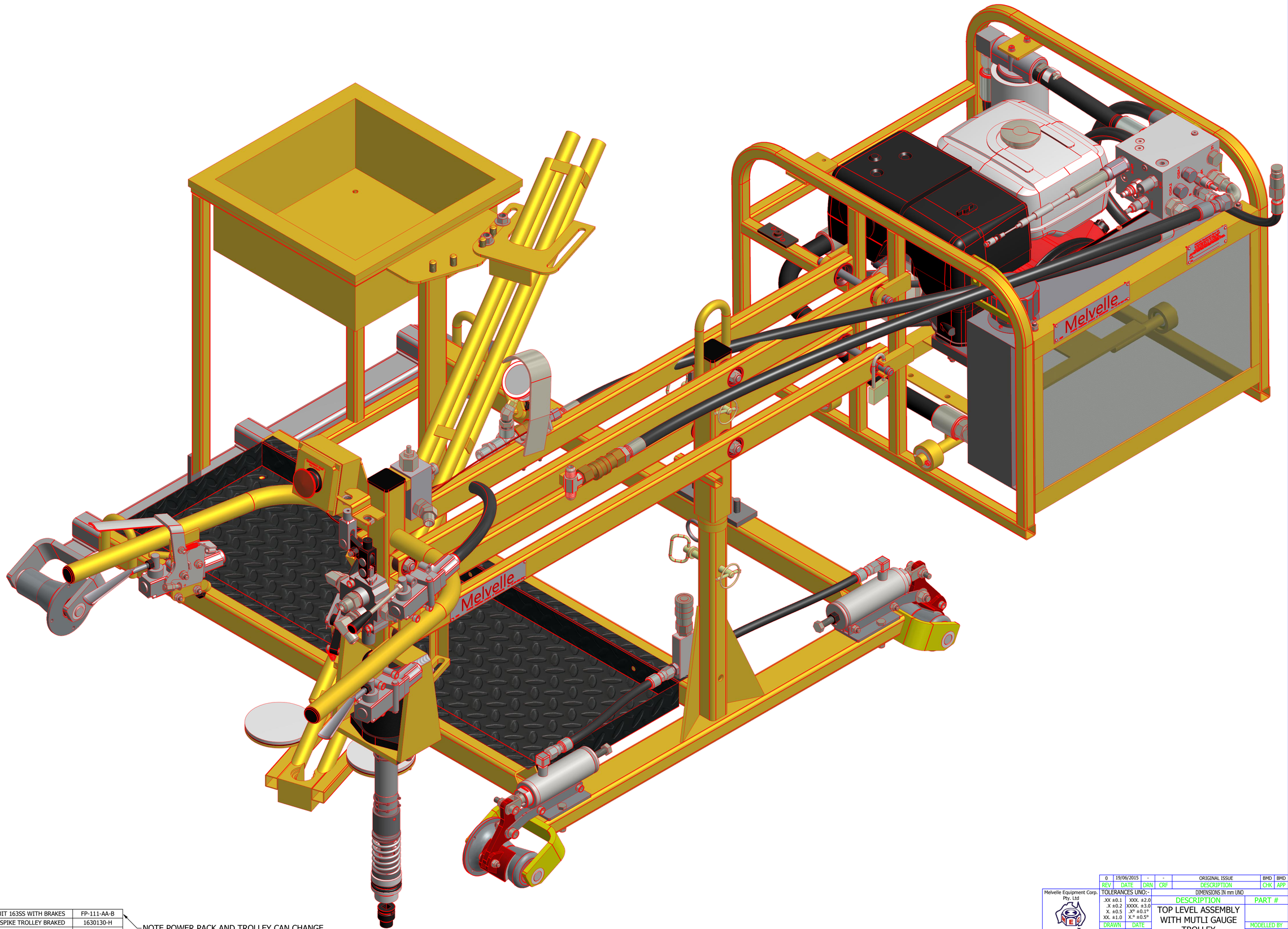
DESCRIPTION	PART #
PANTOGRAPH HEAD BRAKED	FP-163-AC-B

DRAWN	DATE	MODELLED BY
garym	19/06/2015	garym

CHECKED	APPROVED	SCALE	DWG	REV
		1:3	1-163-132	0

2 OF 3	MAIN ASSEMBLY
SHEET #	SHEET DESCRIPTION

IF IN DOUBT, ASK!



ITEM	QTY	DESCRIPTION	PART NUMBER
3	1	HONDA RECOIL POWER PACK SUIT 163SS WITH BRAKES	FP-111-AA-B
2	1	1067-1435-1600 GAUGE SCREW SPIKE TROLLEY BRAKED	1630130-H
1	1	PANTOGRAPH HEAD BRAKED	FP-163-AC-B

PARTS LIST

NOTE POWER PACK AND TROLLEY CAN CHANGE DEPENDING ON SALES ORDER

REV	DATE	DRN	CRF	DESCRIPTION	CHK	APP
0	19/06/2015	--	-	ORIGINAL ISSUE	BMD	BMD

Melvelle Equipment Corp. Pty. Ltd
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Wallsend N.S.W 2287
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TOLERANCES UNO:-
.XX ±0.1 XXX. ±2.0
.X ±0.2 XXX. ±3.0
X. ±0.5 .X° ±0.1°
XX. ±1.0 X.° ±0.5°
DIMENSIONS IN mm UNO

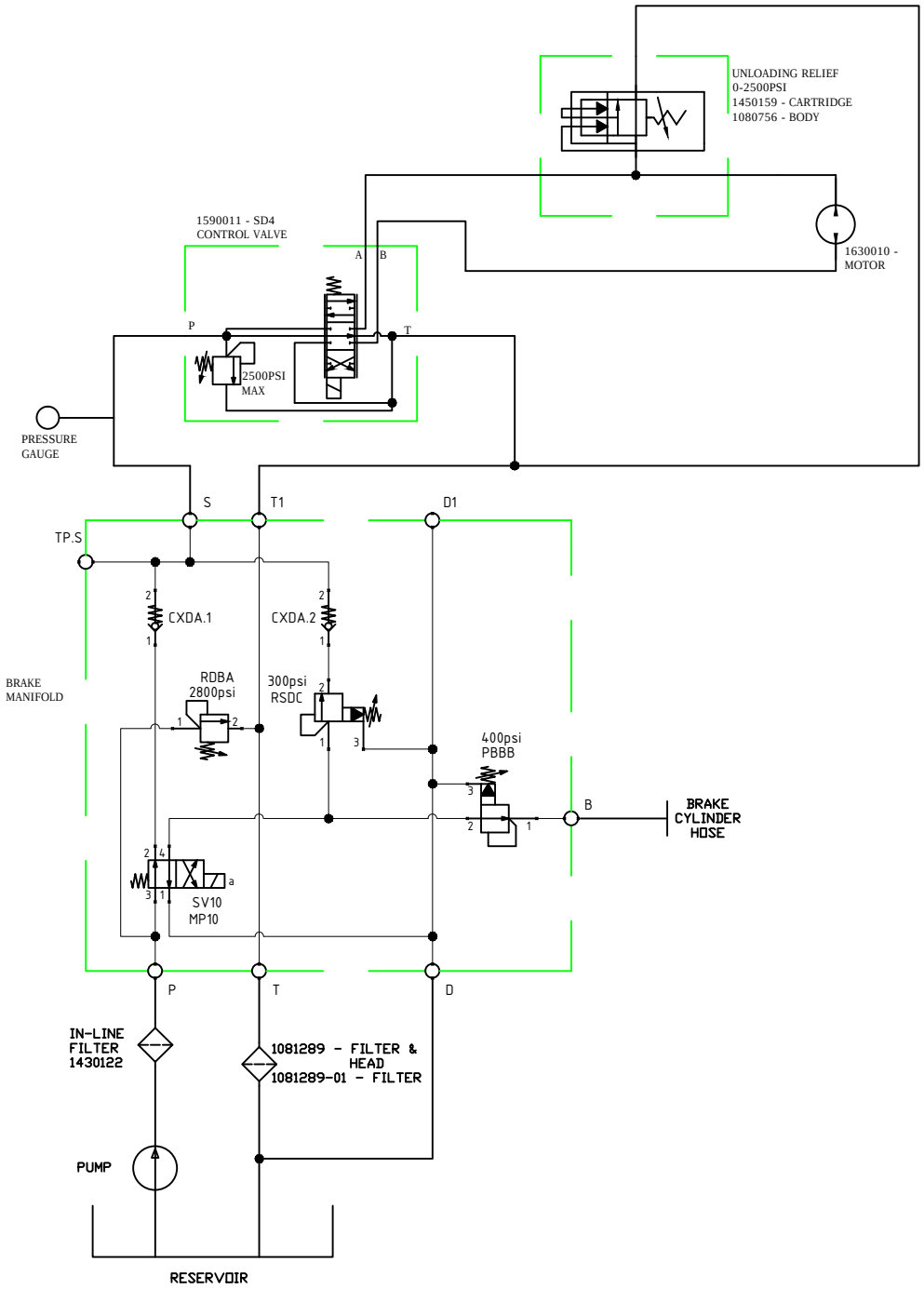
DESCRIPTION: TOP LEVEL ASSEMBLY WITH MUTLI GAUGE TROLLEY

PART #:

DRAWN: garym 19/06/2015
MODELLED BY: garym
CHECKED: APPROVED:
SCALE: 1:3

DWG 1-163-132 REV 0

3 OF 3 COMPLETE ASSEMBLY
SHEET # SHEET DESCRIPTION
IF IN DOUBT, ASK!



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Ph: +61 02 4951 5244
Fax: +61 02 4950 1291

IF IN DOUBT, ASK!

TOLERENCES UNO:-		DIMENSIONS IN mm UNO
.XX ±0.1	XXX. ±2.0	DESCRIPTION / PART#
.X ±0.2	XXXX. ±3.0	163 SCREW SPIKE HYDRAULIC CIRCUIT DIAGRAM
X. ±0.5	.X° ±0.1°	
XX. ±1.0	X.° ±0.5°	
DRAWN	DATE	AUTOCAD
GMM	30/06/2015	DRAWING
CHECKED	APPROVED	SCALE
BMD	BMD	NTS

DRG 3-163-138 REV 0

		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	
	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		
	General machine operation	Significant	Likely	10	Procedures developed such as prestart checklist, where one operator is needed	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	Manufacturer specifications rate the motor at 94dba at 1m.Motor fitted with muffler. Operator required to wear hearing protection.	Serious	Unlikely	11	Y		
	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	
	Pinch point in Panotgraph arms	Significant	Possible	9	use of two hands in opertaion to keep operator clear from moving parts	Significant	Unlikely	5	Y		
	Back injury through continous bending over to place screws into the holes.	Significant	Possible	9	Feeder ramp to be used to supply screws down to suitable area	Significant	Unlikely	5	Y		
	Rotation of workhead in trasit can injur people nearyby	Minor	Likely	7	use of locking pins to stop roation	Minor	Unlikely	2	Y		
	Entanglement in rotation of drill spindle	Significant	Likely	10	Use of self centering valve that stops roation when handles released. As well as correct operation training.	Significant	Unlikely	5	Y		
	Pinch point from sudden drop of workhead when power pack is removed. (pantograph machine only)	Significant	Possible	9	Training in manual as well as saftey stops on arm to limit motion of travel	Significant	Unlikely	5	Y		