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SOLUTIONS FOR THE REPAIR RENOVATION AND DECOMMISSIONING OF PIPELINES



HD Mini MACAW Pipe Cracker

Operating Instructions

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1. INTRODUCTION

Since its foundation in 1981, Steve Vick International has been at the leading edge of trenchless techniques for the repair and renovation of underground **gas** distribution pipes.

In the UK, we are a major supplier to the gas distribution networks and many of our techniques have become accepted practice in the industry. We constantly seek to provide our customers with renewal methods which will minimise their costs and maximise their production.

The company has been supplying pipe handler equipment to the **water** utilities and their contractors for over 20 years. More recently we have entered the market with pipe cutting equipment and our sealant technology has been successfully adapted for use in the waste water sector.

In 2014 the company relocated and can be found at:

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2. PRODUCT DESCRIPTION

The HD Mini MACAW Pipe Cracker is designed as a safe and efficient alternative to traditional methods of breaking out a cast iron main. It attaches to the quick-hitch or bucket pins of a mini excavator, and, using the excavator's hydraulic power, the operative in the cab manoeuvres the arms of the HD Mini MACAW around the pipe and then applies sufficient pressure to crack the cast iron.

The HD Mini MACAW is suitable for use on 3"-8" cast iron mains; it may also be used on mains inserted with PE. A choice of pin slots and a top load spike allows different sizes of pipe to be handled using the same equipment.

Weighing 48kg, the HD Mini MACAW is light enough for two operatives to manually locate it onto the main. However it is strongly recommended to use the chain supplied and link it to the mini excavator.



Diagram 1 - Varying views of the HD Mini MACAW

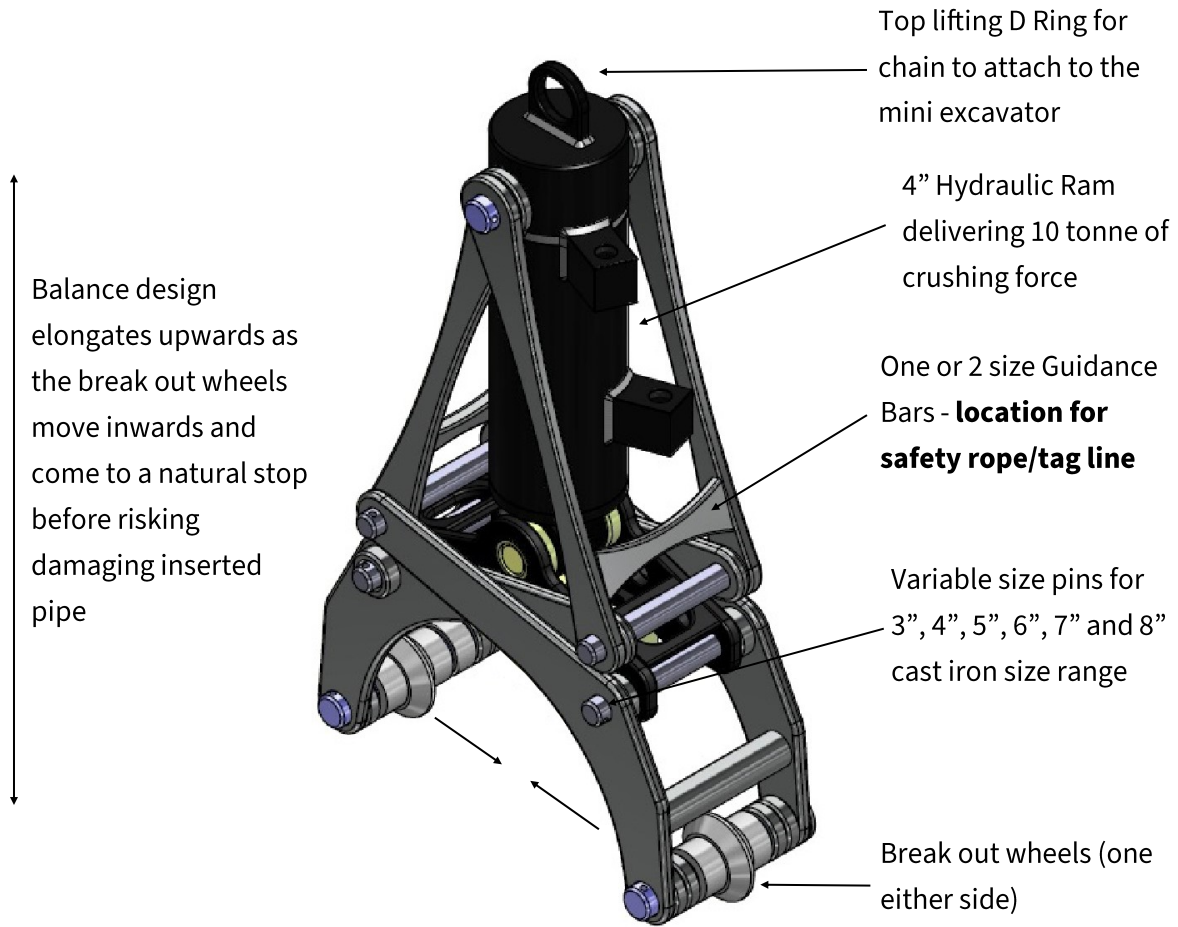
2.1 HD MINI MACAW Benefits

Safer than using a 'podger' or sledge hammer	No need for labour intensive smashing of cast iron mains by hand - any slithers left are easier to 'finish off'
One machine cracks pipes from 3" to 8" diameter, including the odd sizes in between	Break out speed controlled using flow control valve
Suitable for use on empty or inserted cast iron mains	Easy to operate; once located onto the main the hydraulics do the work
Mini excavator takes the weight, significantly reducing manual handling issues	Does not require access around the whole circumference of the pipe
Operates off excavator's third service or breaker hydraulics or hand pump (available from Steve Vick International upon request)	Convenient for cored-out trenches as very little space is required

Table 1: Key Dimensions

2.2 HD Mini MACAW FEATURES

Diagram 2: Key features of the HD Mini MACAW Pipe Cracker



3. PIN POSITION FOR SIZE OF MAIN

Diagram 3: Side view of the HD Mini MACAW

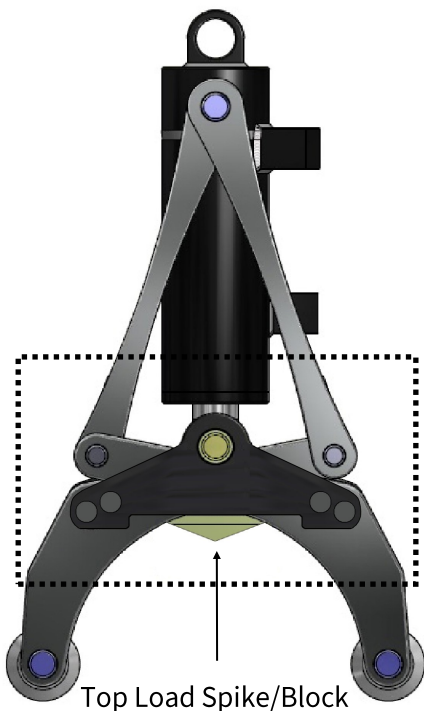
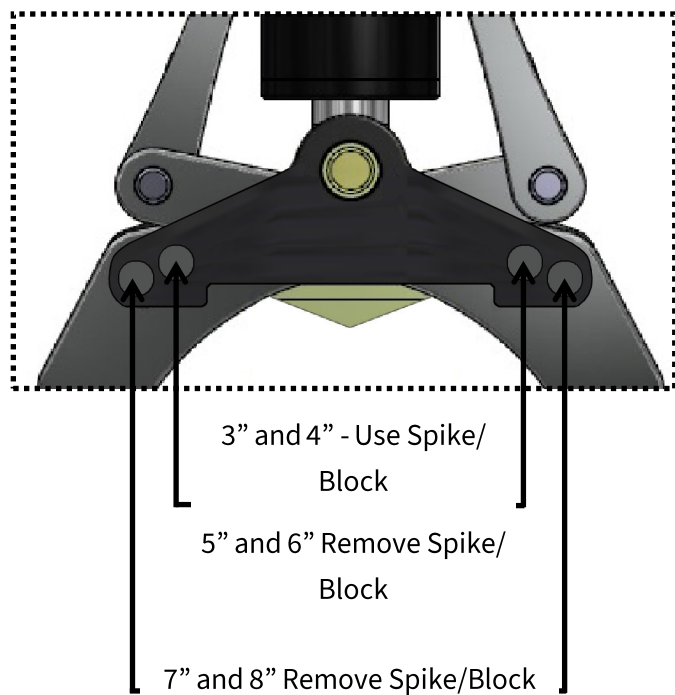


Diagram 4: Close up of Pin Selection area



It is strongly recommended to have the designated excavator driver be solely responsible for changing the pins/attaching to the excavator in order to leave the excavator empty with the power turned off.

4. SAFETY, PRECAUTIONS, BASIC DIMENSIONS AND WEIGHT

4.1 The following PPE must be worn at all times:

- A) Eye protection
- B) Hard hat
- C) High visibility jacket
- D) Gloves
- E) Steel toe cap footwear

4.2 Ensure there is a designated banksman to control all operations of the excavator and the HD Mini MACAW.

4.3 Ensure all operations, including pipe cracking and pipe manoeuvring with the excavator take place within an area contained by a barrier.

4.4 Ensure movement of the excavator arm is contained within the area contained by a barrier.

4.5 Ensure all fittings and attachments required are present to allow the HD Mini MACAW to be correctly attached to the excavator arm and that the hydraulic lines on the excavator are working.

4.6 Unload the HD Mini MACAW onto horizontal ground within the area contained by the barrier—**all manual lifting of the HD Mini MACAW must be carried out by two operatives.**

4.7 The section of the cast iron main being broken out should be cleaned of any rust that may inhibit the movement or destabilise the HD Mini MACAW.

4.8 Check the trench in which the HD Mini MACAW will operate and ensure it will not foul any 3rd party utility—be aware the HD Mini MACAW expands and contracts during operation.

4.9 The HD Mini MACAW is designed to attach to most excavators in the size range 1½ to 3 tonnes however there is a hand pump available from Steve Vick International if required.

4.10 The HD Mini MACAW comes fitted with two ¾” flat face couplings male and female. This size will fit most mini excavators, however the next common size is ¾” and the adaptors for these can be found in the storage tin. If required connect these back to back fittings directly to the ¾” fittings already on the HD Mini MACAW; there is no need to remove them off the hose line.

4. SAFETY, PRECAUTIONS, BASIC DIMENSIONS AND WEIGHT (CONTINUED)

TYPE OF EXCAVATOR REQUIRED	
'BEAK' SIZE/DIAMETER OF MAIN	SUITABLE EXCAVATOR
All sizes up to 8"	1.5 to 3 tonne
BASIC DIMENSIONS AND WEIGHT	
Height	61cm
Height when fully closed	71cm
Width	36cm
Width when fully closed	31cm
Depth	19cm
Weight including chain	40/48kg—model dependant

5. OPERATING INSTRUCTIONS

5.1 Connecting the HD Mini MACAW to the excavator:

Ensure that the excavator's third service/breaker lines are both operating and that the dual flow option is selected. If needed the excavator's hydraulics will need to be switched into the dual flow mode. This lever may be inside a panel on the outside of the excavator or underneath the rubber mat inside the cabin.



Figure 1

5.2 It is also vital that the operating pedal for the third service/breaker lines can be fully pressed downwards on both sides. Some may be set to allow only one side to be pressed down. In this instance the feed screw underneath the pedal will need to be adjusted to allow full movement.

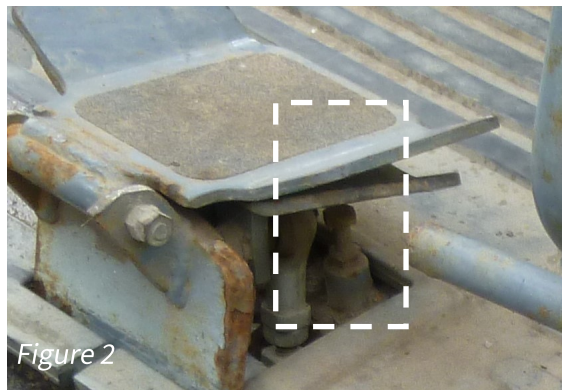


Figure 2

5.3 Unload the HD Mini MACAW onto horizontal ground within the barriered off area, this is a two-man operation as the weight is approx. 40/48kg or use approved lifting equipment.

With the aid of a banksman carefully drop the boom close to the HD Mini MACAW. It will be necessary to remove any buckets that may already be fitted.

It is strongly recommended that attaching the hoses and the chain is carried out by the designated excavator driver. At the same time the driver must turn the power off from the excavator. This will help to prevent unexpected movement from the excavator.



Figure 3

5. OPERATING INSTRUCTIONS (CONTINUED)

5.4 Offer the chain up to the boom to check the boom is low enough without pulling on the HD Mini MACAW. Slide the single pin into the bucket slot on the arm nearest the cabin as this arm is static which will give greater control. Secure with R-Pin. Choose which one of the two pins has the tightest fit.



Figure 4

5.5 Offer the hoses from the HD Mini MACAW up to the excavator's fittings on the boom and check the hoses do not pull on the HD Mini MACAW prior to connecting. It may be necessary to use extension hoses supplied if the boom fittings are set further back. The couplers are 3/8" fittings and will directly fit onto most boom hydraulics, if not it may be necessary to use the quick coupler adaptors in the storage tin.



Figure 5

5.6 Fit both male and female couplers to the boom fittings and ensure they are correctly in place by swivelling the knurled section away from the visible ball bearing.



Figure 6

5.7 Visually check the valves on the boom are in the ON position—the flat head bolt should be in line with the connectors. Alter if necessary.



Figure 7

5. OPERATING INSTRUCTIONS (CONTINUED)

5.8 With the HD Mini MACAW lying flat on the ground check the hydraulic hoses are working by operating the relevant pedal in the cabin. Ensure there are no limbs near the HD Mini MACAW when doing so.

It is in this position that the pins are changed depending on the size of host main being broken out.

See Figure 3 and 4 on Page six and seven for an overview of the pin locations for each of the host main sizes.



Figure 8

5.9 Image 9 shows the HD Mini MACAW set in the 8" position. In this instruction the HD Mini MACAW will be changed to the 6" position. Ensure the HD Mini MACAW will not topple over during the operation.

It will be necessary to slacken off and remove the nuts with a spanner, this is best achieved with the HD Mini MACAW on its side whilst securing the knurled bolt heads on the other side. BOTH nuts must be removed whilst the HD Mini MACAW is on its side however the bolts must not be removed yet.



Figure 9

5.10 Carefully lay the HD Mini MACAW on its side BEFORE removing each bolt—this will prevent sudden movement of the jaws when the bolt is removed. Fully lift out both bolts.



Figure 10

5.11 To choose the other position it may be necessary to manipulate the jaws from the excavator to allow the holes to line up. This is carried out by slowly opening and closing the ram from the excavator.

This must be done by the excavator driver only so that there are no operatives near the HD Mini MACAW.



Figure 11

5. OPERATING INSTRUCTIONS (CONTINUED)

5.12 To change from the 8” position to the 6” (or 4”) slide the outer arm so that the hole in the arm lines up with the INNER hole on the chassis underneath.

Figure 12 shows the chassis fully exposed and the two hole choices visible. The outer hole is for 8” and the inner hole next to the outer hole is for 4” and 6”. The hole on the arm needs to line up with one of these holes depending on size of host main.



Figure 12

5.13 Drop the bolts back through until they are clear of the HD Mini MACAW on the other side and the heads are flush with the arms. Tighten both nuts up with a spanner.

Figure 13 shows the HD Mini MACAW set in the 6” position.



Figure 13

5.14 The HD Mini MACAW is now ready for use and needs to be lifted up off the ground in a slow and controlled manner ensuring it does not swing around. This is done by raising the arm of the mini excavator and ensuring there is no one within close vicinity of the HD Mini MACAW.

The HD Mini MACAW may be used on empty cast iron pipe prior to a Dead Mains Insertion or on a Live Mains Insertion where the annulus has been made gas free using a foam-off flow stop operation. In both cases ensure the host main is completely gas free. The speed in which the jaws open and close can be altered depending on whether the host main is inserted or not. It is recommended to select a slower speed for Live Mains Insertion to allow greater control in protecting the PE pipe inside.



Figure 14

5.15 Firstly, loosen the locking nut to allow movement of the knurled valve. Locking nut unscrews away from the knurled valve.

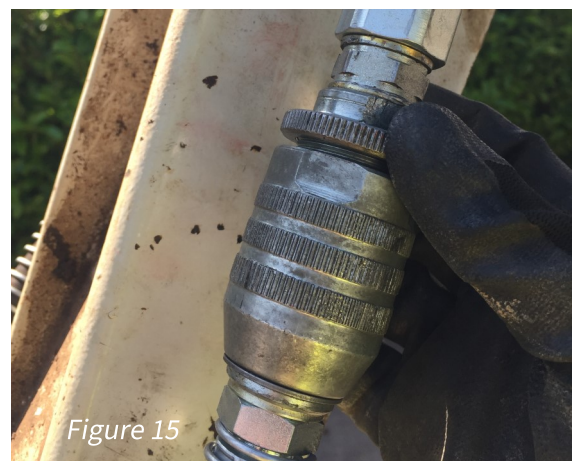


Figure 15

5. OPERATING INSTRUCTIONS (CONTINUED)

5.16 Rotate the knurled valve towards the locking nut to INCREASE the speed of the jaws. Stand away from the HD Mini MACAW and check to see if the speed is satisfactory. If wanting to slow down the speed of the jaws rotate the knurled valve away from the locking nut—this will DECREASE the speed of the jaws.

Note, if the knurled valve is fully rotated away from the locking nut to a complete stop this will close the valve and the jaws will not operate.

Once the speed of the jaws is set rotate the locking nut so that it is tight with the knurled valve.



Figure 16

5.17 Prior to using fully open the jaws by pressing the relevant peddle in the excavator. This locks the frame of the HD Mini MACAW preventing any unintentional movement of the frame.



Figure 17

5.18 If there is some extension of the piston rod the frame can rock from side to side.



Figure 18

5. OPERATING INSTRUCTIONS (CONTINUED)

5.19 With the frame of the HD Mini MACAW locked, monitor the ram for any extension of the piston rod. If this is witnessed there may be a fault with the hydraulics on the excavator. Stop all operations and instruct relevant line manager.

With the power of the excavator on, the HD Mini MACAW should appear as shown in figure 19 with no piston rod visible.



Figure 19

5.20 Locate the mini excavator next to the trench. It is strongly recommended to use a safety rope and banksman for guidance.

- Ensure there are no operatives in the trench at any time during the operation.
- If used on Live Mains Insertion ensure the section of annulus is confirmed as decommissioned and safe to work in
- If used on the Dead Mains Insertion the section of main has to be confirmed as decommissioned and safe to work in



Figure 20

The blue line in the following images represents a safety rope/tag line used for guiding the HD Mini MACAW.

5.21 Ensure the trench is correctly supported and it is recommended the mini excavator is approximately 0.5m away from the trench wall.

Line up the HD Mini MACAW in the correct orientation to the main to be broken out. Use the safety rope to help position the HD Mini MACAW. Lower the HD Mini MACAW down into the trench and allow it to sit on top of the main. If 3rd party plant is hindering this position use the mini excavator to slightly rotate the HD Mini MACAW using the safety rope to a satisfactory position whilst ensuring it is still fully slotted onto the main.

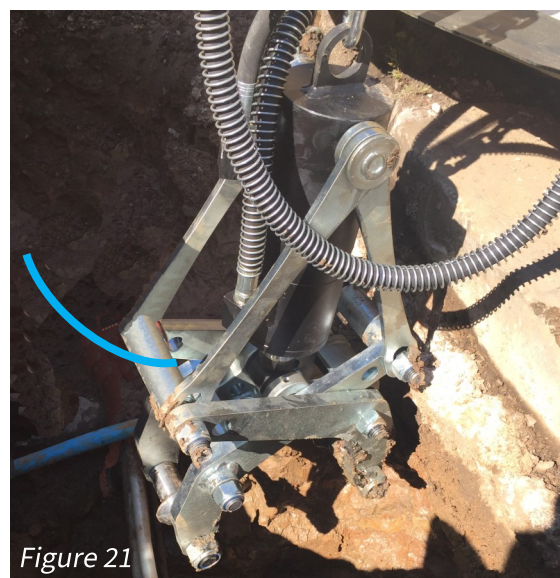


Figure 21

5. OPERATING INSTRUCTIONS (CONTINUED)

5.22 With the HD Mini MACAW sat securely onto the main activate the hydraulics in the mini digger. The pedals will open and close the HD Mini MACAW depending which side is pressed down.



Figure 22

5.23 Ensure the banksman is monitoring the breaking out at all times giving instructions to the operative in the mini excavator. Ensure the HD Mini MACAW does not foul 3rd party plant as it operates and note the shape change as it opens and closes. Pay special attention to the height increase as it closes onto the main. Ensure the HD Mini MACAW does not move off the main as it breaks out.



Figure 23

5.24 It may be necessary to rotate the HD Mini MACAW to complete the break out. To do this drop the arm of the Mini excavator and to slacken the chain on the HD Mini MACAW. Manipulate the arm to see if this can be done all from the Mini Excavator. If it is necessary to enter the trench to reposition the HD Mini MACAW **TURN OFF THE POWER FROM THE MINI EXCAVATOR BEFORE DOING SO**. This will ensure there is no accidental movement of the arm or the HD Mini MACAW. When repositioned **LEAVE THE TRENCH** and carry on with breaking out the main. For best results ensure there is wall of the main that both jaws of the HD Mini MACAW can work off.



Figure 24

5.25 During the operation remove loose pieces of broken main. **REMOVE THE HD MINI MACAW FROM THE TRENCH TO DO SO**. Complete the break out until all wall material is removed. On the rare occasion there is a slither left in place this must be removed manually using approved hand held tools.

Repeat the previous steps for other break out operations.



Figure 25

5. OPERATING INSTRUCTIONS (CONTINUED)

5.26 Track the HD Mini MACAW to a barriered off location for unloading using the excavator with the banksman guiding the HD Mini Macaw with the safety rope.

Lower the boom so that the HD Mini MACAW slides onto its wider side of the frame until the chain becomes slack. The power from the excavator must be turned off and the excavator driver is responsible for removing the pin connecting the HD Mini Macaw to the boom. The excavator driver must remove the hydraulic fittings from the boom.

Track the excavator safely away from the HD Mini MACAW.

Load/store the HD Mini MACAW as required, this is a two-man operation as the weight is approx. 40kg or use approved lifting equipment.

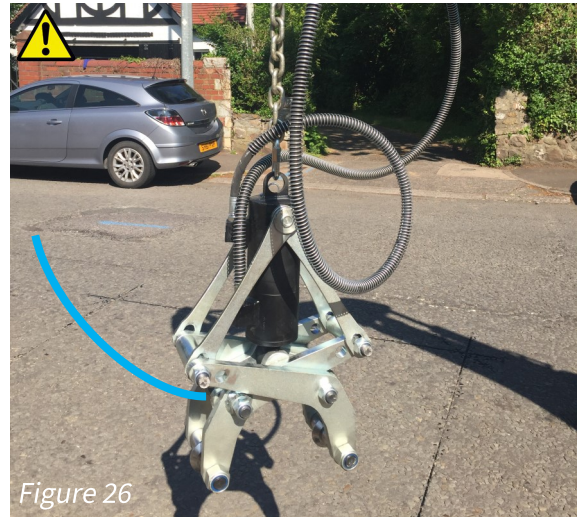


Figure 26

6. ROUTINE MAINTENANCE

The HD Mini MACAW has been designed to be relatively free of maintenance. Simple checks on the tightness of bolts and clips, any hydraulic leaks and general wear on parts being all that is required in normal day to day operation.

	ACTION	FREQUENCY
1.	Check paintwork and welding and that the machine is clean	WEEKLY
2.	Ensure that the break out wheel bolts are tightened	DAILY
3.	Ensure that the break out wheels are in good condition	DAILY
4.	Check that all hydraulic fittings are tightened	DAILY
5.	Ensure that all hydraulic hoses are undamaged	DAILY
6.	Check for general wear and tear	DAILY
7.	Confirm the Flow Control Valve is operational	DAILY
8.	Check for loose bolts and tighten accordingly	DAILY