CYLINDER REPLACEMENT # 20

a. Introduction

Replacement of the cylinder assembly requires:
(refer photograph 1)

a. Pre-start Check
b. Removal of guide and top jaw.
c. Removal of cylinder.
d. Replacement of cylinder.
e. Replacement of top jaw and guide.
f. Adjustment of guides.
g. Re-commissioning.

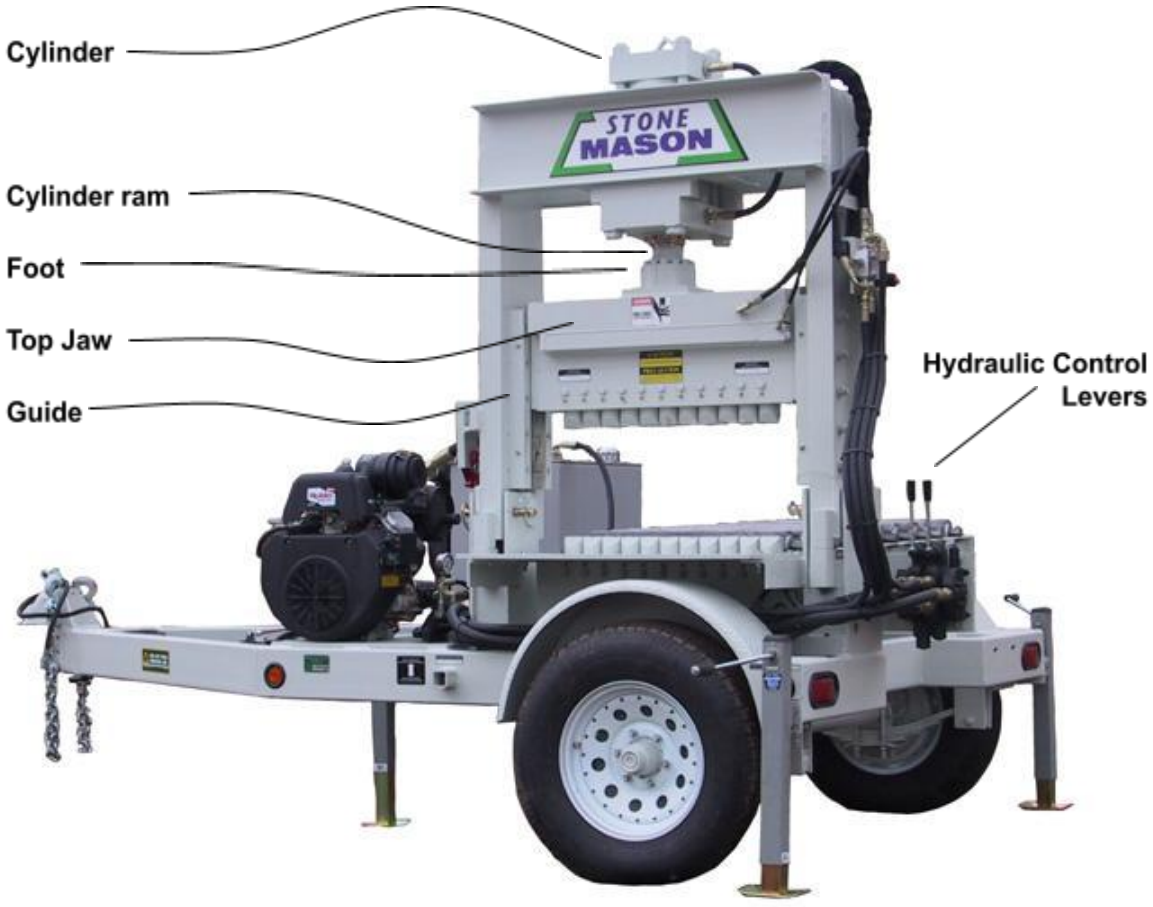

Photo 1 : General Arrangement of the M50 Stone Cutter

2 Pre-start Check

2.1 Check that the cylinder to be replaced has a Rexroth number plate (photo. 2)

2.2 Record engine hours, cylinder (photo. 3) and machine serial numbers.

2.3 Photograph machine including :
- overall condition
- hydraulic leaks – particularly between the cylinder end plates and barrel, around the ram seal and around the hydraulic fittings in general.
- condition of tooth bar
- condition of teeth

2.4 Check size of replacement cylinder and record serial number.

2.5 Check cylinder has a lifting lug or nut welded on the end to take a lifting eye (photo. 4).

3 Top Jaw Removal

3.1 Loosen foot bolts, using ½" allen drive socket and breaker bar. (photo. 4)

3.2 Loosen 4 cylinder bolts (photo. 4). This will require an impact driver or a torque multiplier and a 6' breaker bar and 1 7/8" socket. Use a bungee cord to support the multiplier (photo. 5)

3.3 Loosen left hand side guide (looking at machine from the outbound side, photo. 4) and remove center three bolts using a ½" allen drive socket, a 15/16" socket and extension bar. This will require the top jaw to be raised and lowered to gain access to the allen studs.

3.4 Support the top jaw so that the jaw can be lifted out between the guide adjusters. (photo.6)

3.5 Remove the foot bolts.

3.6 Retract the ram into the cylinder (left control lever - forward)

3.7 Disconnect and cap the two top jaw hoses (photo. 4)

3.8 Disconnect and cap the two cylinder hoses (photo.4)

3.9 Support the top jaw using two 3' slings, positioned at each end of the top jaw, and a forklift. (photo.6)

3.10 Lift the top jaw, using a forklift, ensuring the slings are positioned to lift the jaw vertically. It is worth spending some time repositioning the slings to ensure that the jaw is lifted vertically as this will facilitate replacement of the jaw.

3.11 Lower the top jaw onto two blocks positioned at either end of the top jaw and placed on a level surface. Ensure that the top jaw remains upright; this will facilitate replacement of the top jaw.

4 Cylinder Removal

4.1 Attach lifting eye and sling to the top of the cylinder, the sling needs to be long enough to lower the foot of the cylinder onto the outbound table.

4.2 Support the cylinder using a sling and forklift or hoist.

4.3 Remove the four cylinder support bolts.

4.4 Lower cylinder whilst ensuring the hydraulic fittings clear the frame spacer plates.

4.5 Continue to lower the cylinder whilst pulling the cylinder forward to clear the teeth and sit the cylinder, on its foot (i.e. vertically), on the outbound table.

4.6 Support the cylinder whilst removing the sling from the hoist and reconnecting the sling on the outside the frame of the machine.

4.7 Continue lowering the cylinder onto a pallet.

5 Cylinder Replacement

5.1 Attach lifting eye and sling to top of new cylinder and lift the cylinder onto the out bound table

5.2 Support the cylinder and reconnect the sling on the inside of the frame.

5.3 Continue lifting the cylinder and guide through the frame, ensuring that the hose connections are on the right side of the machine (looking from the front, photo. 4).

5.4 The cylinder should be drawn up to within $^{1}/_{4}$ “of the frame. Due to the limited clearance between the cylinder holes and bolts it is essential that the cylinder is drawn up parallel to the frame, otherwise it will be difficult to start the bolts, on no account force the bolt if there is any resistance, adjust the cylinder alignment using the hoist, so that the bolt turns freely.

5.5 Apply anti-seize to the cylinder bolt threads.

5.6 Start all four bolts and then tighten in sequence until the cylinder is drawn tight up to the frame.

5.7 Disconnect the sling and remove lifting eye, if fitted.

6 Top Jaw Replacement

6.1 Lift the top jaw and sit the jaw on a supporting block, placed and supported horizontally over the lower set of teeth (photo. 6)

6.2 Replace the guide and tighten guide bolts finger tight.

6.3 Remove the slings.

6.4 Reconnect the two top jaw and two cylinder hoses.

6.5 Bring the cylinder ram down into contact with the top jaw.

6.6 Apply a liberal coating of grease to the foot.

6.7 Apply anti-seize to the foot bolts.

6.8 Replace the two halves of the foot connector and finger tighten all the foot bolts.

6.9 Tighten opposing foot bolts until they are all tight.

7 Guide Adjustment

7.1 Raise the top jaw to a position midway up the guides.

7.2 Tighten the top and bottom guide bolts so they are friction tight.

7.3 Use a mallet, or length of wood, to hammer the guide tight up to the top jaw.

7.4 Tighten all the guide bolts.

7.5 Run the top jaw up to the top and grease the top guide grease nipples.

7.6 Lower the top jaw and grease the lower guide grease nipples.

7.7 Run the top jaw up and down to distribute the grease.

7.8 When the guides are adjusted correctly, there should be an even and thin film of grease on the each of the four guides and the top and bottom set of teeth should be in alignment. Lower the top jaw and use a set square to check that the teeth are in alignment.

8 Recommissioning

8.1 Raise the top jaw to the top of its travel and hold the left control lever forward, whilst checking that there are no leaks at the **lower** cylinder hose connection.

8.2 Lower the top jaw to the bottom of its travel and hold the left control lever back, whilst checking that there are no leaks at the **upper** cylinder connector.

8.3 Work the teeth using a length of 2 x 4” placed vertically between each set of teeth, by unlocking the teeth (right lever – forward and return to neutral position) then lower the top jaw (left lever – back) until the teeth are retracted.

8.4 Repeat for each set of teeth

8.5 Extend the teeth (right lever- back)

8.6 Repeat 8.3 to 8.5 three times.

8.7 Check that all the teeth are retracting and extending correctly and that there are no leaks from the top jaw hose connections.

8.8 Seal the cylinder ports and secure cylinder to be returned to a suitable pallet for shipment.

PHOTOGRAPHS

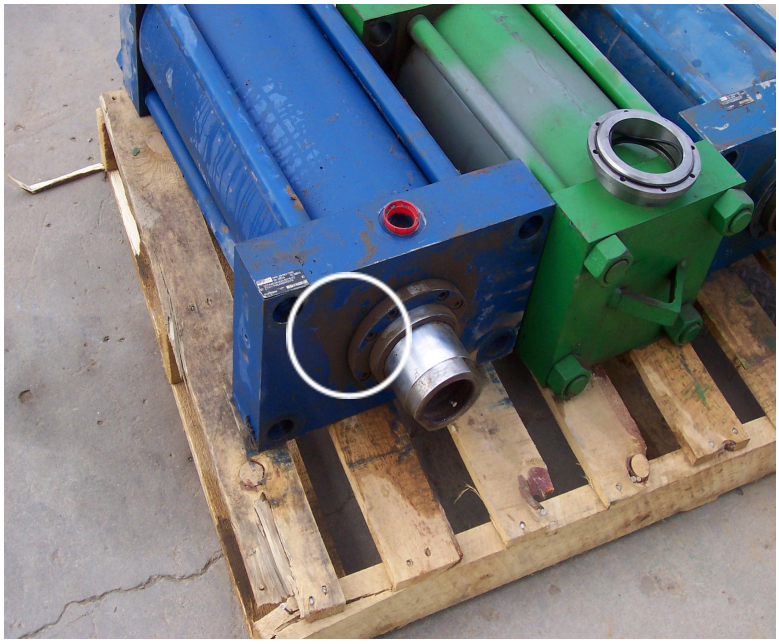

Photo 2 : Location of Rexroth Number Plate

Photo 3 : Location of Rexroth Serial Number

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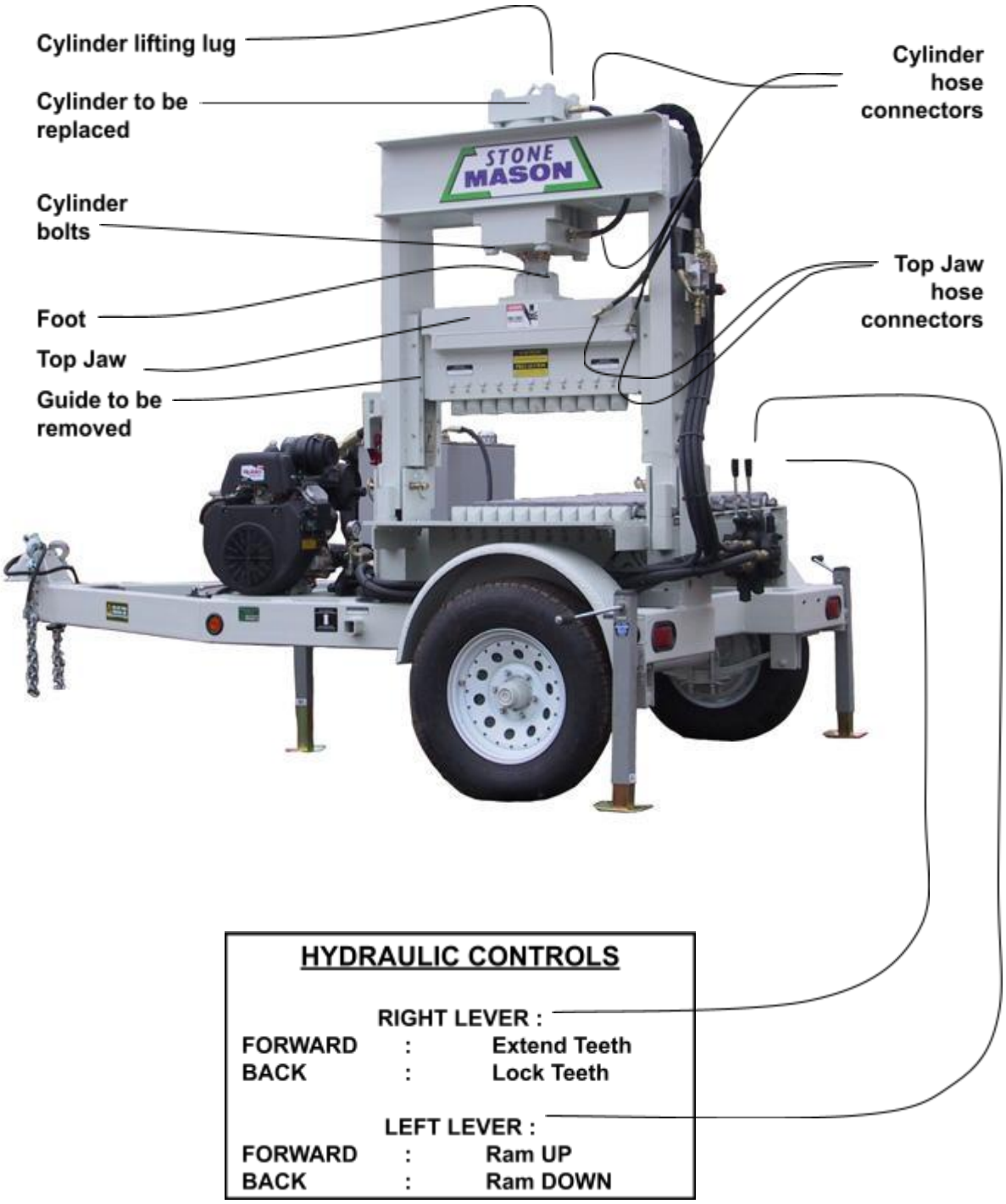

Photo 4 : Location of Lifting Lug, Hose Connectors, Cylinder, Foot and Guide bolts.

Photo 5 : Torque multiplier and socket held onto cylinder bolts, using a bungee cord, prior to un-tightening the bolts with a breaker bar.

Photo 6 : Top Jaw Supported, Left Guide removed and Slings positioned to lift out Top Jaw with a forklift