



En İyisi - The Best

HYDRO DRILL

Maintenance and Instruction Manual

WARNING

SET-A Makina

This manual contains important information on safety. Before carrying out any handling or use operation consult this use and maintenance manual.

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All data contained in this manual are indicative and not binding, given that SET-A Makina reserves the right to modify or vary its machines without any previous warning.

General Information

Manual content and use

Keep this manual in a dry and safe place for future reference, so that it is not ruined and is always available for consultation.

This manual cannot replace the user's experience but it does supply all the information for correct machine use.

If you need copies or up-dates, exclusively contact the SET-A Makina, which will supply indications on the matter and solve any problems.

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PRESENTATION

'HYDRO DRILL' is an hydraulic drill ideal for making large diameter holes (110 mm – 4.3 inch). It is mainly used for making holes for the passage of diamond wire.

Practicality in use, derived from its simple construction, and the lightness of the structure are its main characteristics.

'HYDRO DRILL' is equipped with a hydraulic rotation head which combined with the down the hole hammer permits drilling linearity to be maintained, reaching considerable depths at high penetration speeds.

Other construction characteristics permit the drill height from the ground to be kept to a minimum, in the case of horizontal drills.

The standard column is sized for the use of 1000 mm. extension rods; on request, extension rods 1500 mm. long can be supplied.

GENERAL NOTES ON DELIVERY

On receipt of the machine, open the package and check that:

- The equipment is not damaged.
- In the case of transport damage, inform the forwarder and / or the transport insurance company
In a detailed way, immediately on delivery.
- The supply corresponds to the order specifications

If any pieces are missing, immediately inform the SET-A Makina within 8 days of receipt.

Guarantee

The machine is supplied and guaranteed to be free from fabrication faults or defective material for a period of 1 year from the date on the transport document.

This guarantee, concerning faults and defects due to material, manufacturing and processing, is valid on condition of reporting them within 8 days time after the relative identification.

Parts proved to be defective will be repaired or replaced, at the discretion of the SET-A Makina, on condition that the said defect does not depend on failure to observe the use and maintenance instructions, bad or unsuitable use of the equipment or on normal wear.

The parts to be replaced or repaired will be made available ex-our workshop.

The user shall sustain the shipment and transport costs, plus those for the labour, travel and board, if the repair should necessitate the presence of one of our technicians.

Parts subject to wear are not covered by the guarantee.

Modifications To The Machine

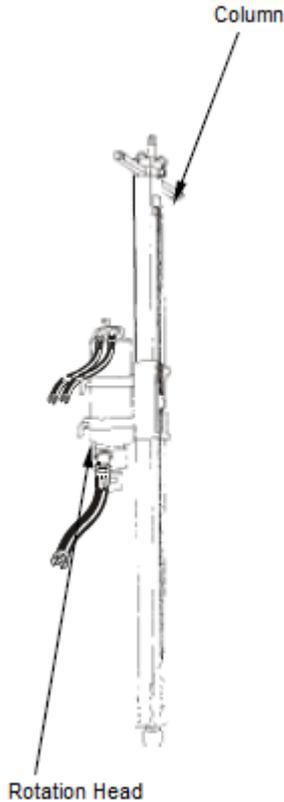
SET-A MAKİNA reserves the right to make all necessary modifications to the machines it manufactures without any prior notice.

Machine identification

The machine is identified by the number indicated on the card.

Identification Of Spare Parts

When requesting spare parts, always indicate the machine's serial number found on the test card and the no. of the required part taken from the enclosed lists of spares.



TECHNICAL DESCRIPTION

MOD. HYDRO DRILL SERIAL No. HYD _____

Hydraulic drill comprised of a column supporting the rotating head with an attachment for the down the hole hammer. The rotating head can be supplied with a thread for rods with a cylindrical, male fitting (RD 50) or a conical, female fitting (API 2" 3/8).

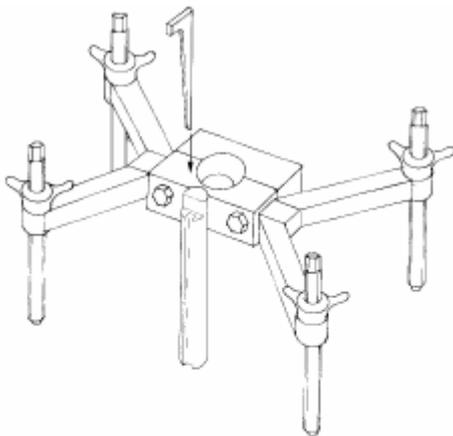
Rotating head advance via a chain driven by a hydraulic cylinder.

The machine is supplied as standard with:

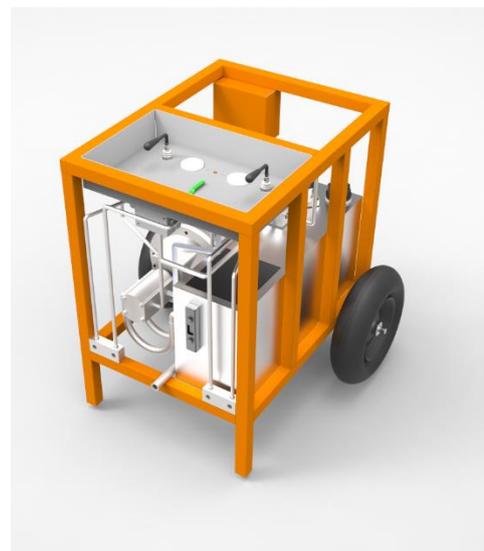
- Support column (Appendix I page 21).
- Anchoring down jack with spherical joint for column engagement (Appendix II page 22) and levelling screws 4 (Appendix II).
- Power unit
- Socket wrench for column spherical joint locking bolts.
- Socket wrench for levelling screws.
- 2 wrenches for unscrewing the rods.
- Drill steel 22x108 Ø40 400 mm L. for anchoring holes.

The following are available on request:

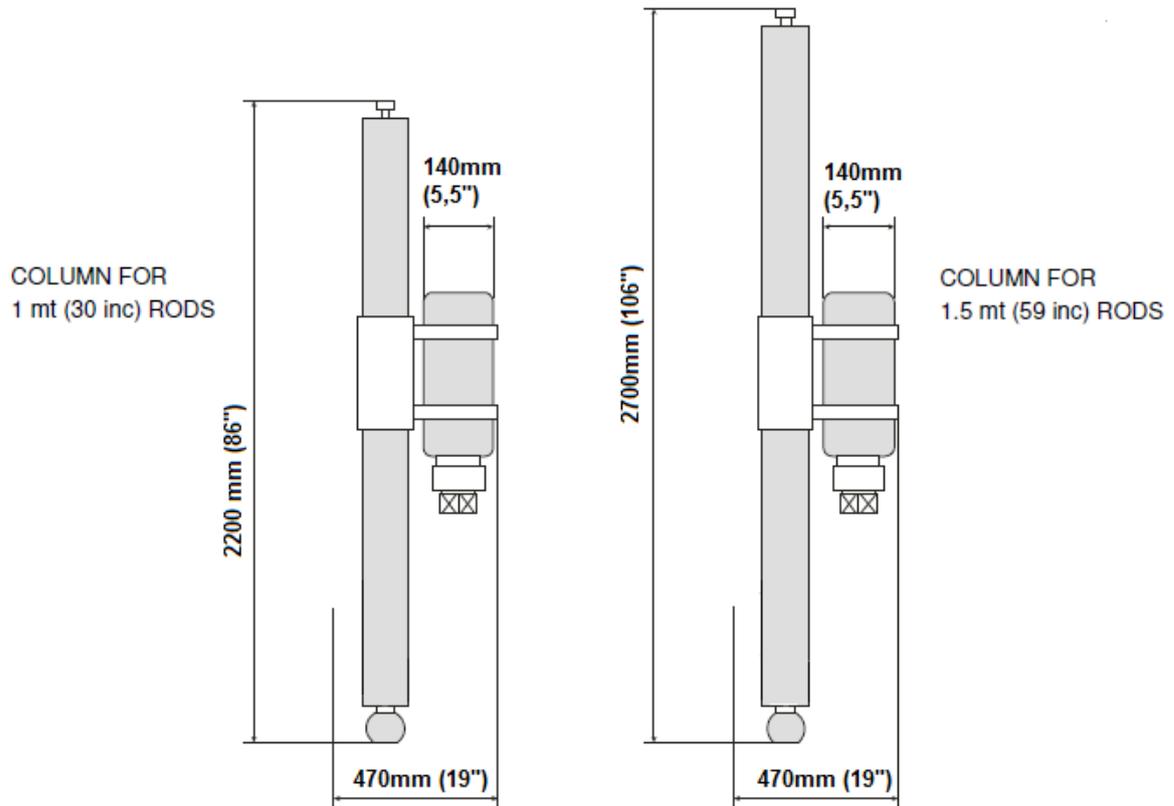
- 1000 mm. drilling rods (39 in.) or 1500 mm. (59 in.) depending on column length (see page 9).
- Down the hole hammer.
- 1 wrench for hammer disengagement.
- Bit for down the hole hammer.
- Sharpener for hole bottom bit.
- Adapter from RD 50 to API 2" 3/8.



Anchoring down jack



TECHNICAL CHARACTERISTICS



| | kg | lbs |
|--|--|-------------|
| 2200 mm (86") column | 210 | 462 |
| 2700 mm (106") column | 230 | 500 |
| Power unit weight | 200 | 440 |
| Rotation head weight | 36 | 80 |
| Down jack weight (complete) | 21 | 47 |
| Down the hole hammer weight (DTH) | 25 | 55 |
| Bit weight | 5 | 11 |
| 1 m (39") rod weight | 11 | 25 |
| 1.5 m (59") rod weight | 14 | 31 |
| Total weight - 2200mm column (excluding down the hole hammer, rods and bit) | 522 | 1151 |
| Total weight - 2700mm column (excluding down the hole hammer, rods and bit) | 542 | 1189 |
| Rotating head air consumption | 2000 Lt/min at 6 bar (73 cfm at 87 P.S.I.) | |
| 3" down the hole hammer air consumption | 4000 Lt/min at 6 bar (146 cfm at 87 P.S.I.) | |
| Total compressed air consumption | 6800 Lt/min at 6 bar (219 cfm at 87 P.S.I.) | |
| Lubricating oil consumption | 1.5 Lt every 8 hours of work | |

SAFETY

General Information Concerning Safety

The design and manufacturing of this machine in conformity with the Machinery Safety Directive 2006/42/AT, 2006/95/AT LVD Directive, 2004/108/AT EMC Directive (specify relevant provisions and other applicable directives, if any).

In particular, measures designed to prevent risks to operators were adopted during the design and construction phases.

The complete documentation of the safety measures adopted is contained in the technical dossier deposited at the offices of the SET-A Makina.

For some risks it was not possible to find solutions at the design level. In these cases, this manual indicates the safety prescriptions to adopt to operate in the safest way.

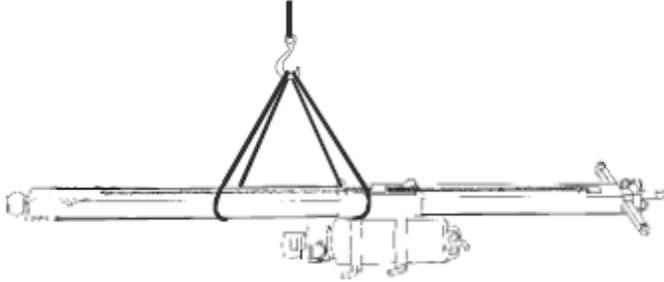
WARNING: SET-A Makina recommends complying with the instructions, procedures and recommendations of this manual, to adopt all precautions suggest by the technique and to comply with the accident prevention regulations in force.

Safety Prescriptions

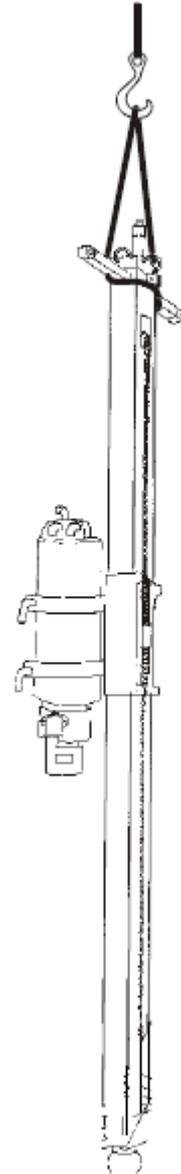
- The installation, maintenance, and use of the machine is reserved to specialised staff.
- Before performing any cleaning or maintenance intervention, check that the power supply is disconnected.
- Do not remove the fixed protections of the machine protecting the mobile elements.
- Do not put your hands in the pairs where there is a danger of being crushed or trapped.
- The operator should stay by the control group in the most distant and protected position.
- When working and performing control operations the operator must always position himself behind the control group.
- When the machine or its parts are handled it must idle and the power supply must be disconnected. This must be performed by specialized staff with the appropriate tools.
- If it is necessary to replace machine components, exclusively use original spare parts.

HANDLING AND TRANSPORTATION

WARNING: the handling and transportation of the machine should be carried out by specialised or adequately trained staff with the support of the adequate lifting equipment.



| | |
|-----------------------|-------------------------|
| Rotating head weight | 36 kg (80 lb) |
| Hammer and bit weight | 30 kg (66 lb) |
| Total weight | 66 kg (145.5 lb) |



POSITIONING

Positioning for vertical work (Anchoring down jack)

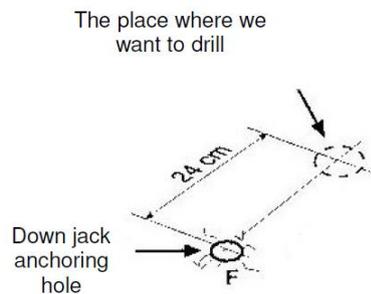


Figure 3/a

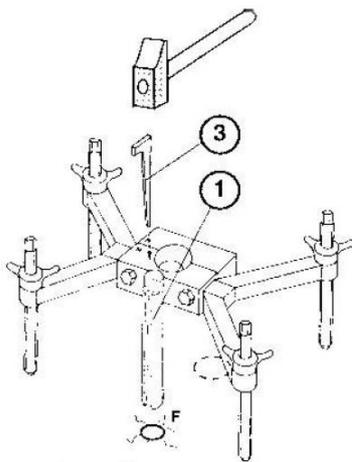


Figure 3/b

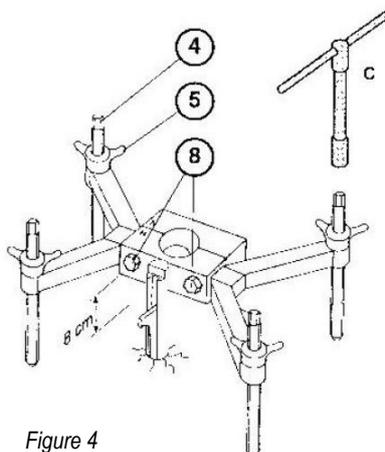


Figure 4

1. Using a small drill with a standard drill steel $\text{Ø } 40 \times 400$ make a hole at least 25 cm (10 inc) deep (F) 24 cm (9.5 inc) away from the point in which you want to drill (fig. 3a). The hole must be as perpendicular as possible to the rock face.
2. Insert the grooved pin 1 of the down jack into the hole made (fig.3b).

WARNING: Never insert the grooved pin 1 as far as to touch the bottom of the hole otherwise you will experience serious difficulty in extracting it later.

3. Direct the down jack so that the spherical coupling seat of the column to the down jack finds itself between the anchoring pin and the point where the drill will be made (fig. 3b).
4. Position the down jack so that there is a gap of around 8-10 cm (3-4 inc) (fig. 4) between the rock and the down jack. This space will facilitate the down jack removal operation.
5. Block the down jack by inserting the conical fixing pin 3 into the pin grooving 1 (fig.3b). Apply a few hammer blows to the head of the pin and check that the anchoring is effective (fig.3b e fig.4)
6. Stabilise the down jack by forcibly tightening the levelling screws 4 (fig.4) against the support surface using the special wrench (C) supplied. Block the screws by tightening the butterfly counter-nuts 5 (fig.4).

If you have correctly performed these operations, the anchoring of the column support down jack to the rock has now been performed.

Column positioning

1. Detach the spherical half-shell from the down jack by unscrewing the tightening bolts 8 (fig.4).
2. Lift the column with cables or a chain, paying attention that the delicate parts of the machine (joint, motor, ...) are not damaged by accidental impacts.
3. Position the spherical joint 11 (Appendix I) of the column into the halfshell (Appendix II) of the anchoring down jack.

4. Screw on the previously removed spherical half-shell, taking care that the positioning numbers 9 (Appendix II) of the two half-shells 2 (Appendix II) line up on the same side.

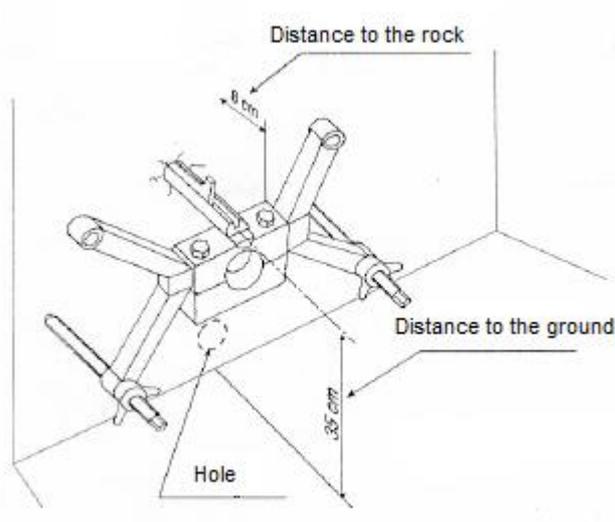


Figure 5

The anchoring of the down jack for horizontal drilling is similar to that for vertical drilling.

Keep well in mind that in order to drill as close as possible to the base of the wall, the anchoring hole for the down jack must be made at around 35 cm from the height of the ground.

1. After making the anchoring hole, remove the two upper stabilising screws of the anchoring down jack, (fig. 5) and screw them onto the screw support arms at the top of the column 13 (Appendix I).
2. Block the down jack as for the vertical position and stabilise it with the two remaining screws, as in the vertical position.
3. Install the support column following the same procedure as for the vertical positioning, remembering to check the column stability before freeing it from the sling.
4. Contrast the two screws previously fitted to the column arms against the ground or another type of support.

5. Direct the column in the same direction as the hole to make.

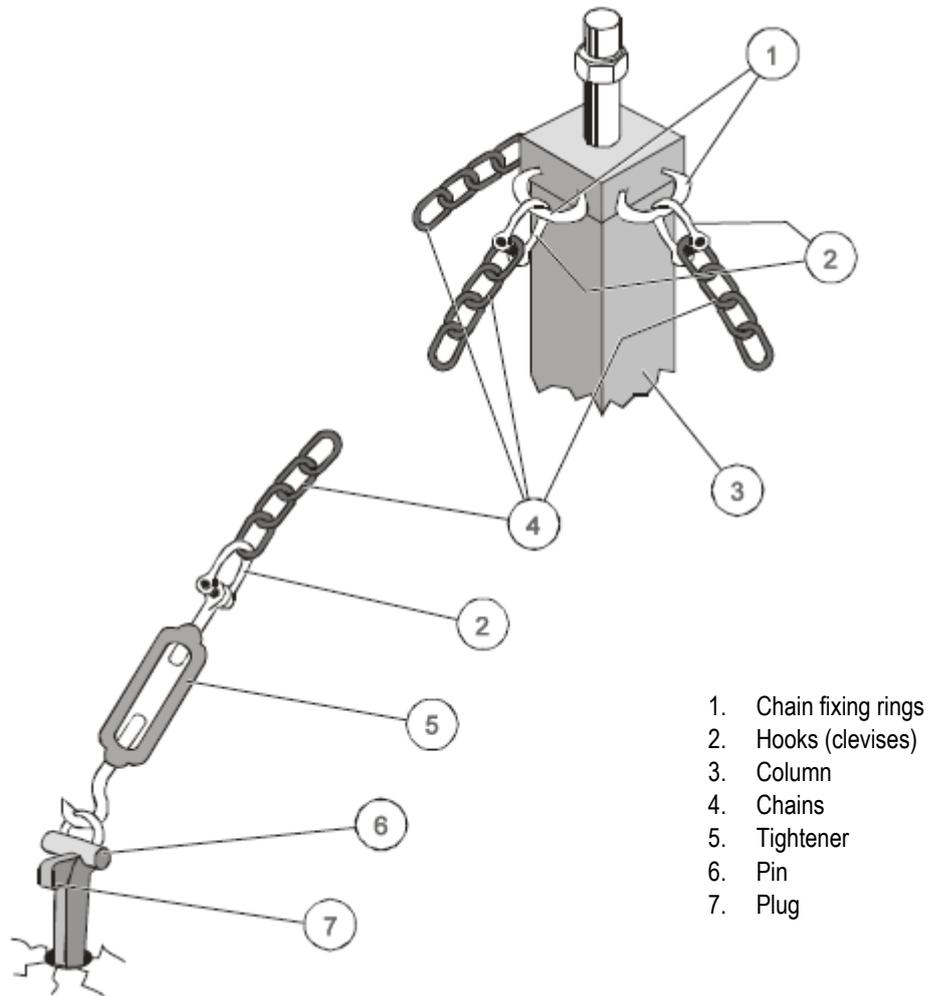
6. Block the column in the spherical seat of the down jack and firmly tighten the locking bolts 8 (Appendix II) with the correct wrench.

7. Manually check the column stability.

If these operations have been performed correctly, the column is now positioned and anchored to the rock to be drilled. At this point, we can free it from the cable or can we used to lift it with.

Positioning for horizontal drilling

COLUMN ANCHORING WITH CHAINS



1. Make 34 mm holes 20 cm (8 inc) deep
2. Fix the chains (4) to the rings (1) of the column (3) using the hooks (clevises) (2).
3. Slacken the tighteners (5).
4. Fix the chains (4) to the ground using the special anchoring pins (6-7) (see "Down jack anchoring" procedure).
5. Use the tighteners (5) to tighten the chains equally.

USING THE MACHINE

WARNING: before using the machine, check that it is well anchored to the ground and that all the bolts and air hoses are correctly tightened.

Fitting the down the hole hammer (DTH)

The machine is generally supplied with the down the hole hammer fitted to the rotating head.

The same hammer, has the drilling bit fitted to its bottom end. The type of bit is the one requested by the customer, or the most suitable one for the material to be drilled.

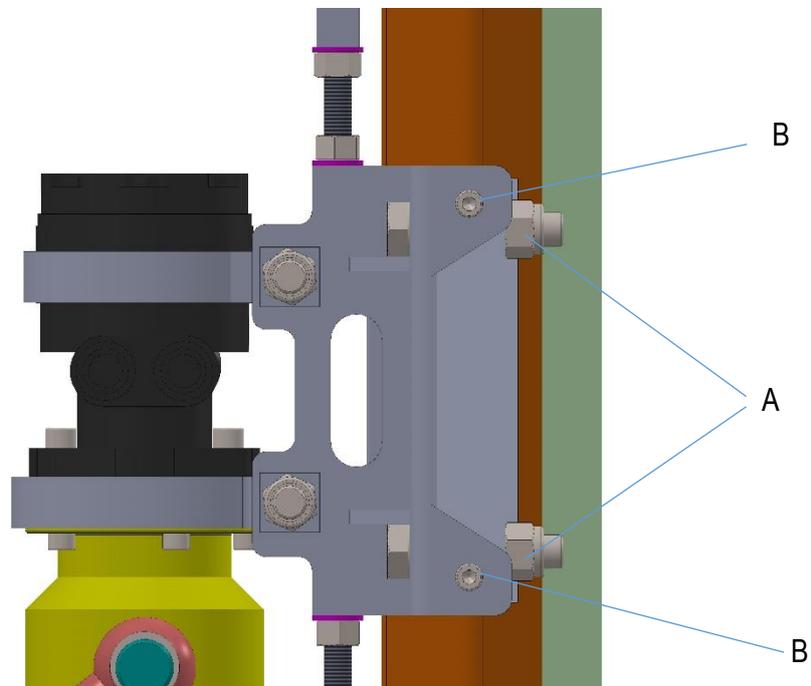
The down the hole hammer is screwed on in a clockwise direction to the output group of the rotating head. Before fitting, make sure that the threaded fitting is the same as the one on the rotating head: cylindrical RD50 or API Regular 2" 3/8 conical.

The down the hole hammer must be tightened with the special wrenches supplied (see "Extension rod joint" page 14).

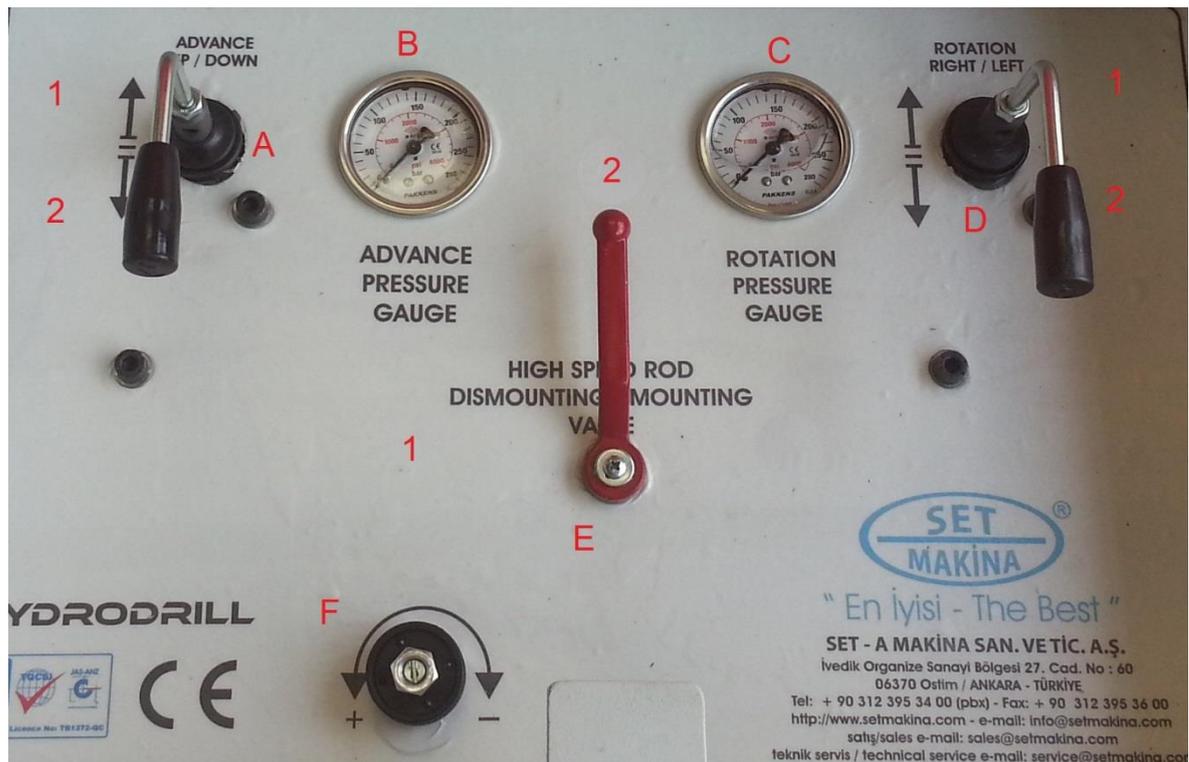
Adjusting the Slead

Due to the wear of the sleed, a gap may occur between the column and sleed. This gap prevent the machine to work efficiently. Therefore the sleed needs to be adjusted periodically related to the workload.

1. Loosen the bolts (A).
2. Use (B) bolts to adjust the sleed's alignment.
3. Tighten the bolts (A) 60Nm with a torque wrench. Do not exceed 60Nm, it can damage the column.



Using the machine



A - Advance Lever: This control lever cranks up chain, thus it provides that sled moves up and down.

POSITION 1: Slead move up

POSITION 2: Slead move down

B - Manometer: It shows exposure pressure during move up and down.

C - Manometer: It shows impact pressure during drilling.

D - Control Lever: It provides rotation.

POSITION 1: It makes counter-clockwise rotation. (Direction of Dismounting)

POSITION 2: It makes clockwise rotation (Direction of Mounting)

E - High-Speed Rod Dismounting/Mounting Valve: It sets speed of rotation during drilling and dismounting rod.

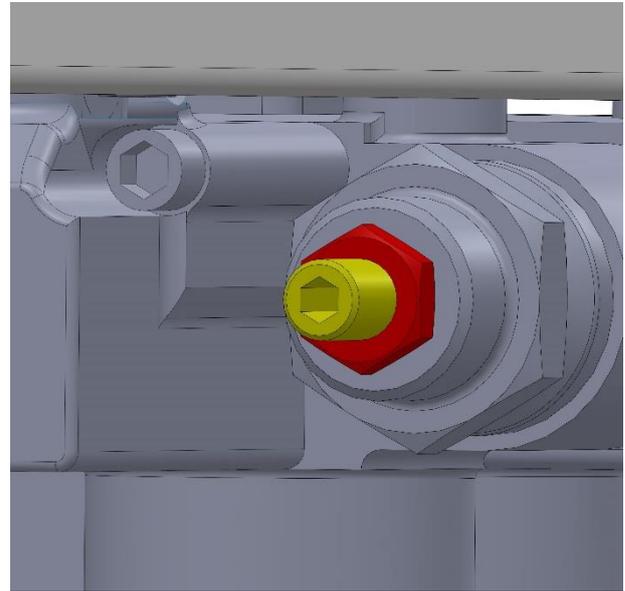
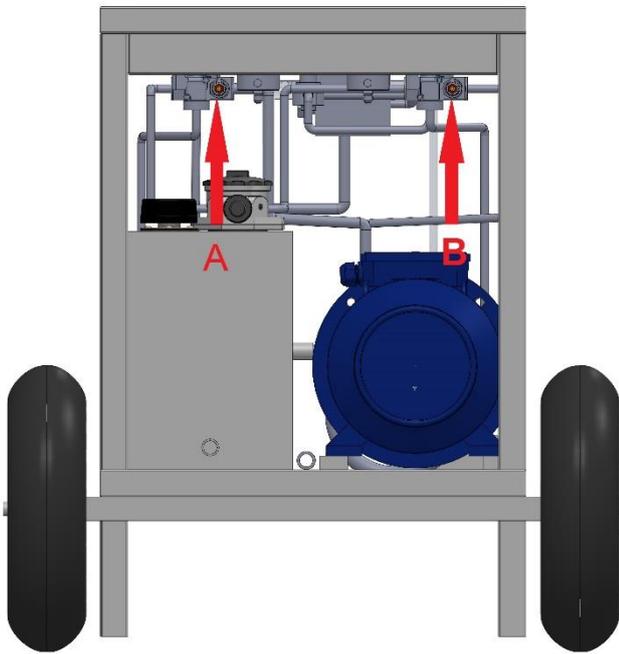
POSITION 1: It provides more slowly constant down speed.

POSITION 2: It provides more faster constant speed during dismounting rod.

F - Speed Regulation Valve: It determines speed of downward stroke of sled. **Use this valve only for initial speed setting. If you need to speed up the advance of the sled use E-High Speed Rod Dismounting/Mounting Valve.**

Adjusting The Operating Pressure

Back Side of The Power Unit



A: Rotation head operating pressure setting screw.

B: Advance operating pressure setting screw.

1. Loosen the lock nut (red).
2. Turn the setting screw (yellow) clockwise to increase the pressure, turn counter clockwise to decrease the pressure.
3. Check the pressure from the related pressure gauge (page 13, position C or B).
4. After the pressure is set, tighten the lock nut.

Warning: Maximum pressure for rotation head (A) is 120 bar. Maximum pressure for advance (B) is 80 bar.

EXTENSION ROD JOINTING

At the end of the drilling limit:

1. Block the advance, rotation and percussion by closing the respective distributors A and D (page 13).
2. Insert the wrench supplied into the seat (a) of the output group and turn it against the column. This prevents the reducer from advancing and the rotating head from becoming damaged by counter-blows while changing the rods. (fig.6).
3. Insert the wrench supplied into the seat (b) of the hammer or rod and keeping the wrench contrasted in (a) against the column, release the hammer or rod by applying a few hammer blows to the wrench in the seat (b) (fig.6).
4. Remove the wrenchs, rotate the rotating head in an anticlockwise direction (page 13, lever D, position 1) and unscrew the hammer or the rod. Position the rotating head high on the column, almost as far as it will go.
5. Manually screw the extension rod onto the hammer or possibly onto the other rod found in the hole (fig.7).
6. Advance the rotation head (page 13, lever A, position 2) and make it rotate clockwise (page 13, lever D, position 2) and screw it to the rod or the hammer.
7. After checking that the rod has been screwed both to the head and the hammer (or possibly to the other rod still found in the drill), start drilling again.
8. For more joints, repeat the operations described.

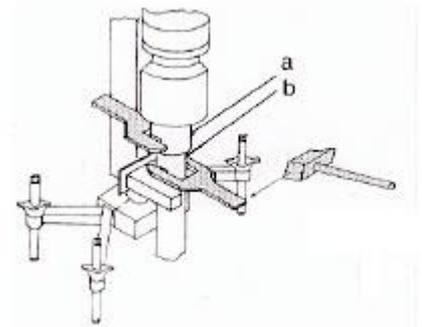


Figure 6

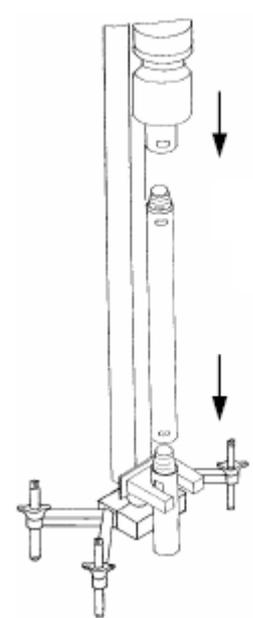


Figure 7

WARNING: Never unscrew the rods or the hammer with just the force of the rotation head. Keep the power unit as far away as possible from the column to prevent accidental manouvres.

ROD AND HAMMER RECOVERING

1. Position the rotating head high on the column almost as far as it will go.
2. Insert the wrench supplied into the seat (d) of the rod which finds itself in the hole and make it rest on the rod guide. In the case of vertical drilling, this wrench serves to prevent the rods from falling into the drill at the moment they are unscrewed from the rotating head.
3. Insert the wrench supplied into the seat (a) on the rotating head and wedge it against the column.
4. Insert the wrench supplied into the seat (b)
5. Hit the wrench inserted in seat
6. (b) with a hammer and release the rod, by making it rotate in a clockwise direction.
7. Remove the wrenches from seats (a) and (b), rotate the head and unscrew it from the rod.
8. Position the rotating head high up on the column to almost as far as it will go.
9. Insert the wrench into seat (c), wedge the wrench in seat (d) against the column; hit the wrench in seat (c) with a hammer to release the rod and then unscrew it.
10. We have now removed the 1st rod.
11. Approach the rotation head of the 2nd rod which is still found in the drill.
12. Screw the head to the rod to then make it rise up pulling the rod with it.
13. By repeating the procedure described, we recover the other rods and the hammer.

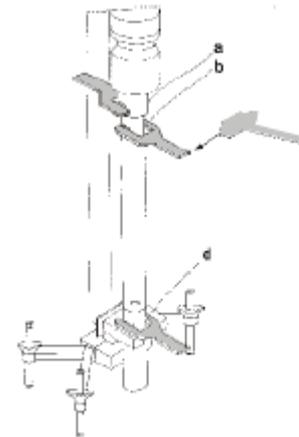


Figure 8

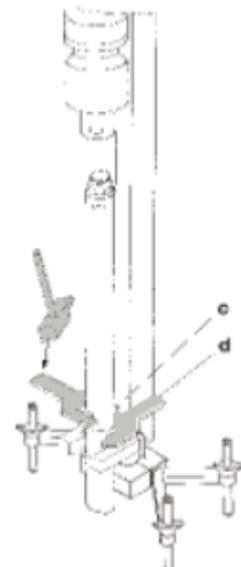


Figure 9

WARNING: Never try to unscrew the rods or the hammer with the force of the rotation head alone. Keep the power unit as far away from the column as possible with the purpose of avoiding any accidental manouvres.

MACHINE STOPPING AND REMOVAL

After detaching the main supply and discharging the air found in the power unit:

- Detach the feeding hoses from the rotating head, the hammer and advance gear motor;
- Remove the support column from the spherical seat of the anchoring down jack;
- Slacken the butterfly counter-nuts 5 (Fig. 10) on the levelling screws 4 and unscrew the screws by 4-5 cm;
- Apply a few hammer blows to the anchoring pin 1 which by entering the drill, frees the conical plug 3;
- Remove the conical plug and the down jack;

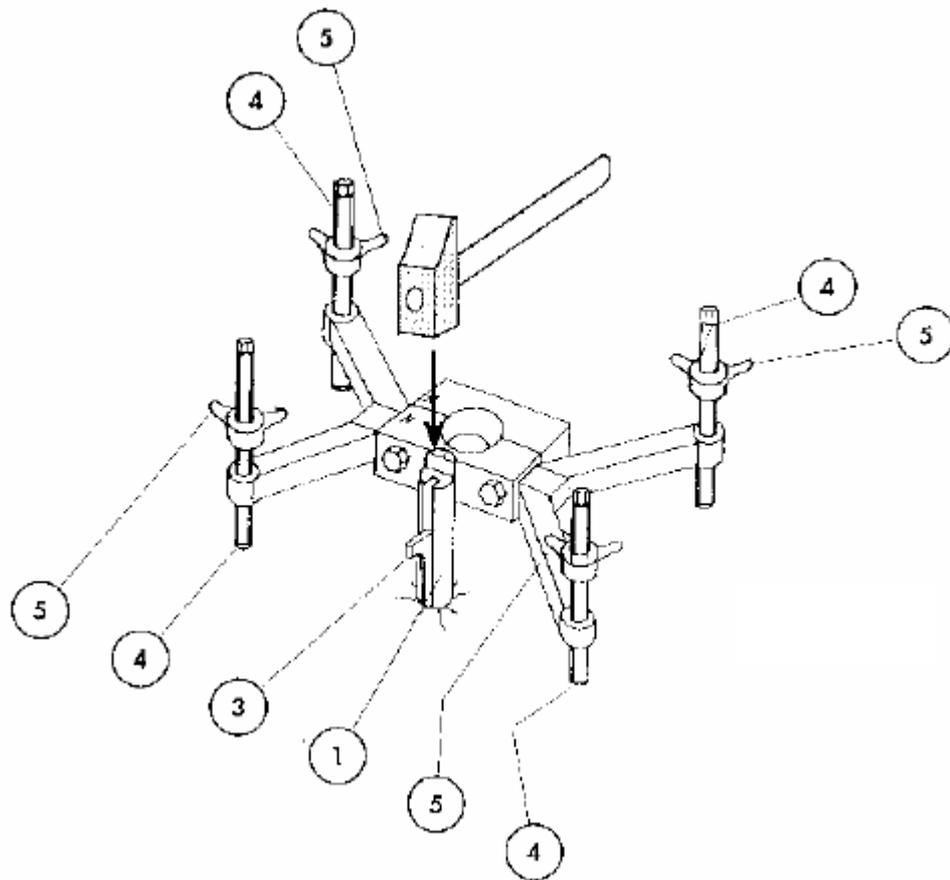
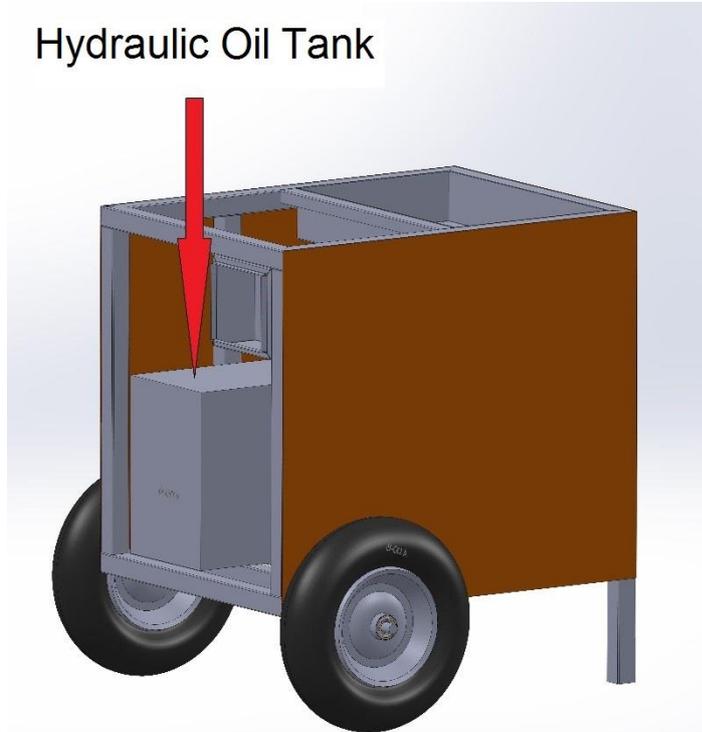


Figure 10

MAINTENANCE

Adding Oil

WARNING: The tank filler cap should not be removed if the power unit is pressurised.



Oil to use:

- TOTAL AZOLLA 68
- SHELL TELLUS 68
- MOBIL DTE 26
- BP ENERGOL 68

HAMMER BIT SHARPENING

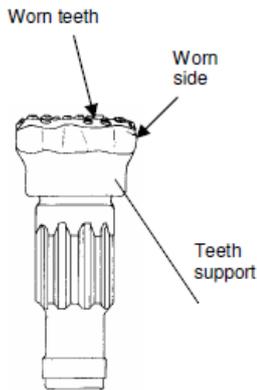


Figure 11/b

In use, the down the hole hammer bit wears changing the shape of the teeth (Fig.11/a) and that of the teeth support (Fig.11/b).

It is therefore necessary to regenerate both the tooth shape and that of the teeth support.



Figure 11/a

Using the special sharpening machine, (optional) with a suitable cylindrical tool of adequate dimensions, remove the right amount of material from the teeth support to return the teeth to a suitable height.

(Fig.12/a-b-c).

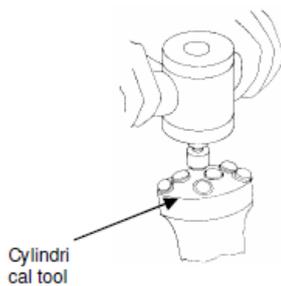


Figure 12/a

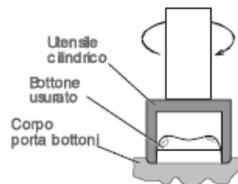


Figure 12/b



Tooth after being machined with the cylindrical tool

Figure 12/c

Change the tool on the sharpener with one with a semi-spherical profile and reconstruct the tooth's profile in (Fig.13/a-b-c).

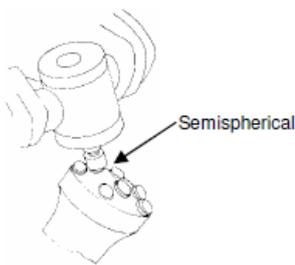


Figure 13/a

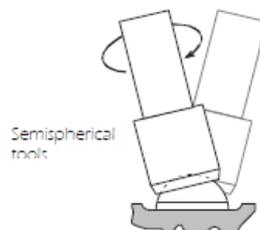


Figure 13/b



Tooth after machining With the spherical tool

Figure 13/c

Reconstructing the tooth support

Concerning the tooth support, it is also necessary to reconstruct the side because its original shape is lost through wear, tending to become straight, chamfered and rounded.

(Fig.14).

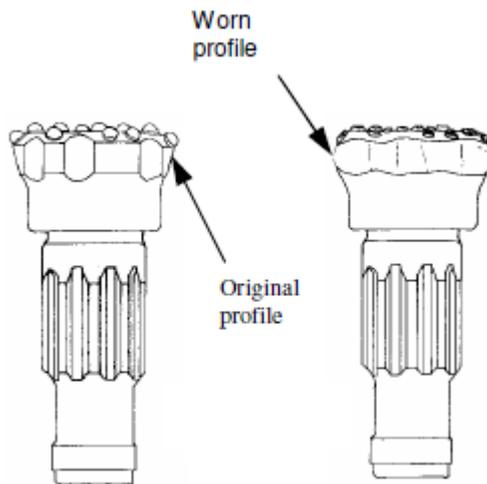


Figure 14

During drilling, the bit teeth wear leaving the tooth support exposed to a greater diameter.

Using a lathe or a lapping grinder, it is necessary to remove material from the sides of the teeth support to restore the initial inclination, without which it is not possible to work correctly. (Fig.15).

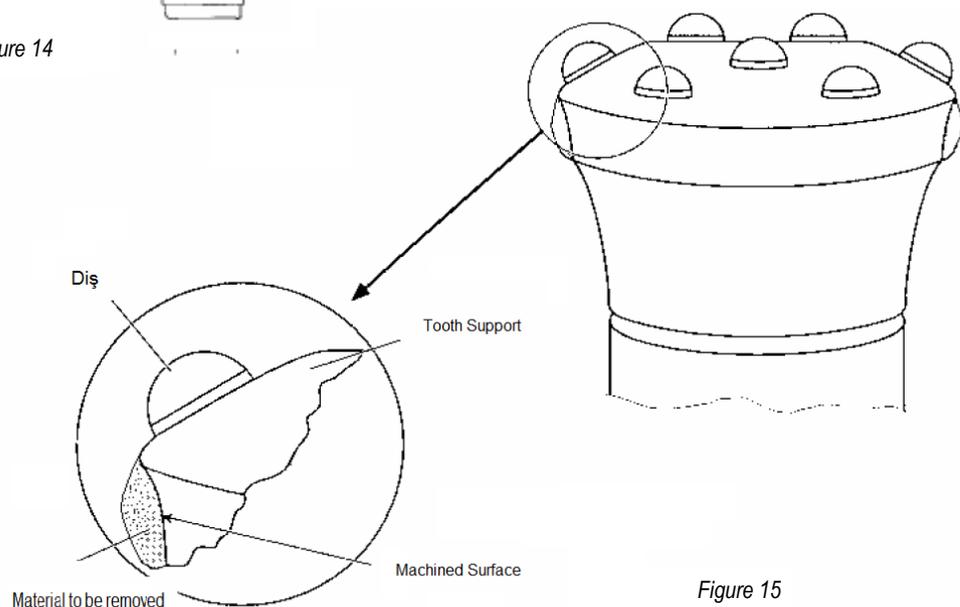


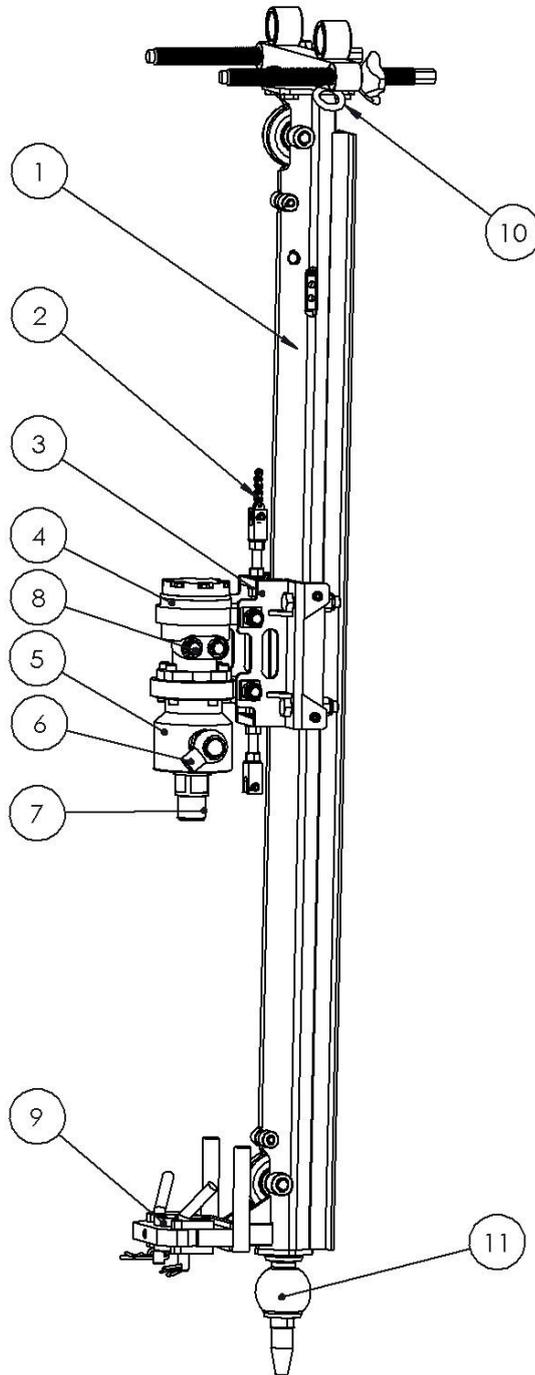
Figure 15

NOTES:

The indications given, mainly concern tools for working granite, which given the hardness of this material are subject to greater wear. It is therefore necessary to sharpen them more frequently.

Tools used for softer materials, such as marble for example, wear much less and require re-sharpening more rarely. The procedure is anyway the same.

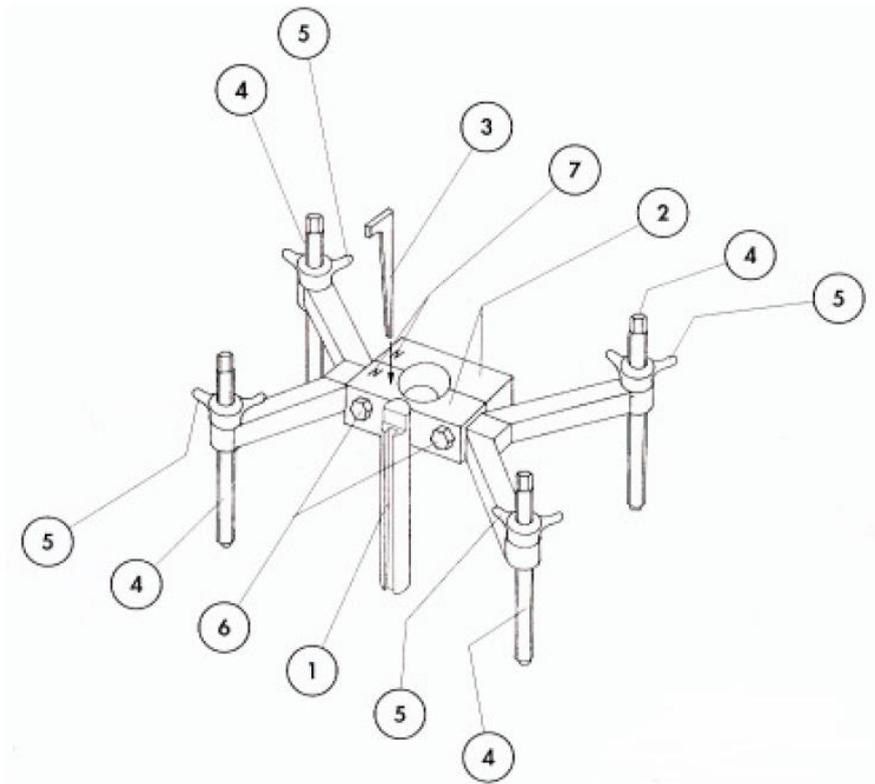
APPENDIX I



1. Support Column
2. Advance Chain
3. Carriage
4. Rotating Head
5. Rotating Head Output Group
6. Hammer Feeding Hose
7. Hammer or Rod Fitting Seat
8. Rotating Head Pressurised Oil Hoses
9. Rod Guides
10. Arms for Levelling Screws
11. Spherical Joint

APPENDIX II

ANCHORING DOWN JACK



1. Grooved pin
2. Spherical half-shell
3. Conical fixing pin
4. Levelling screws
5. Lock nuts (wing nuts)
6. Locking bolts