

# NS215M ROCK-DRILL

The OEM Manufacturer

MANUFACTURERS | DISTRIBUTORS | REPAIR WORKSHOPS

**NASA**  
ENGINEERING (PTY) LTD

BORE

68mm

STROKE

55mm

MASS

21.5 KG

AIR  
CONSUMPTION

55 l/sec 115 c.f.m.



## A lightweight high performance rock drill

The NS215M is a lightweight, high performance rock drill which is designed to meet the requirements of the South African mining industry specifically in stoping applications and raise and box hole drilling.

It is also suitable for development drilling in the coal mines. The NS215M Rock-Drill can be used in different applications such as hand held, airleg mounted or rig

7 Beryllium Street, Alrode Ext 7, Alberton  
Tel: 011 908-4534 | Tel: 011 908-4535  
Fax: 011 908-4537  
Email: sales@nasaeng.co.za | Email: joval@nasaeng.co.za

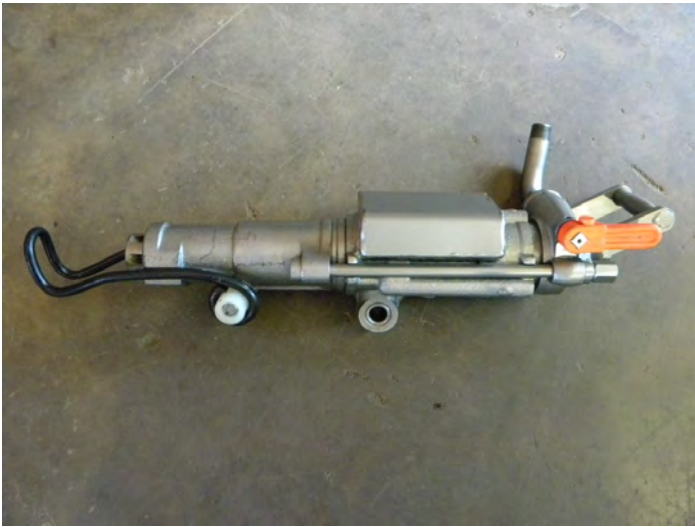
BUILT IN SOUTH AFRICA BY NASA ENGINEERING  
12 MONTH FACTORY WARRANTY  
ADDITIONAL CHARTS CAN BE DOWNLOADED  
FROM [www.nasaengineering.co.za](http://www.nasaengineering.co.za)



The NS215M Rock-Drill comprises of precision manufactured components which deserve the best care possible to realise the greatest possible service during life of the machine.

## NS215M ROCK-DRILL MAINTENANCE AND ASSEMBLY MANUAL

NASA Engineering Rockdrills are designed, manufactured and tested to meet exacting standards and they will operate under the most arduous conditions. By following adequate operating and maintenance procedures, a long and economical life can be assured.



### SCOPE

The main emphasis of this manual has been placed on preventative maintenance of the NS215M Rock-Drill.

Since preventative maintenance begins as soon as the machine is put into service, this manual is concerned with the role of the drill operator and his responsibility for the proper care and operation of his drill as well as the Rock Drill Shop maintenance

### OPERATING PROCEDURES

- a) Always ensure that all air and water hoses are flushed or blown clear before connecting them to the machine.
- b) When hoses are disconnected from the machine, always ensure that the water and air inlets are plugged to prevent dust or dirt to enter the machine.
- c) Ensure a lubricator is fitted to the air line no more than three metres from the drill. If possible, fit it to the air inlet stem. Also ensure that the lubricator is working correctly and that it is filled on a regular basis with the correct grade of rock drill oil.
- d) Make sure that the end of the shank of the drill steel to be used are not damaged and are of the correct length. The end of the drill steel should be flat and square to the axis of the drill steel. It must have a chamfer on the inside hole as well as the outside hexagon. Poorly maintained drill steels can cause damage to the drill.
- e) When collaring a hole, do not use excessive thrust.
- f) During the drilling operation, the thrust must be gradually increased until drilling operation is adequate. Note must be taken that under thrusting of the drill will cause damage to the drill and will reduce drilling speed.
- g) When the drill is not in use, refrain from running it at full throttle as it can cause the piston to seize in the cylinder.
- h) If a drill refuses to operate, do not use force to try and get it running. This can cause damage to the drill and subsequent complete failure of the drill. Remove the drill from the drill steel to ensure that it is not jammed in the hole. Ensure that the drill runs without the drill steel. If the drill won't run without the drill steel, send it for service.

## MAINTENANCE PROCEDURE

It is of paramount importance that a rock drill is periodically stripped and examined for proper operation to ensure optimum life for all the working components.

It is highly recommended that every rock drill is registered and called up for maintenance every 20 shifts, or at least once a month, depending which comes first.

Records of rock drill maintenance should be kept in order to record any irregular trends of failures.

For the ease of maintenance, the rock drill maintenance procedure is split into five sub assemblies as follows:

### 1) Back Head Sub Assembly



The Back Head sub assembly consist of the following components:

- ☒ Back Head (A1406)
- ☒ Back Head Spud (??)
- ☒ Water Stem Nut Copper Washer (S21-50)
- ☒ Water Tube (S19-39)
- ☒ Water Tube Rubber Small (S21-45)
- ☒ Water Tube Cap Screw (S21-42)
- ☒ Water Tube Thrust Washer (S24-46)
- ☒ Water Tube Rubber Large (S21-44)
- ☒ Air Stem (S21-37A)
- ☒ Air Stem Nut (S21-38)
- ☒ Air Stem Nut Copper Washer (S21-91)
- ☒ Throttle Valve (B2147)
- ☒ Throttle Valve Plunger (S21-29)
- ☒ Throttle Valve Plunger Spring (S21-30)
- ☒ Throttle Valve Handle (S21-24P)



#### a) Back Head

- I. Ensure that the thread for the Back Head Spud is not damaged and excessively worn.
- II. Ensure that no dirt or steel chunks are embedded inside the Air Stem Nut area.
- III. Ensure that the taper bore for the Throttle Valve is clean and not damaged.
- IV. Ensure that the Water Tube and Water Tube Seals are in good condition.

#### b) Throttle Valve

- I. Ensure that the square end of the Throttle Valve is not excessively worn or chipped.
- II. Ensure that the Throttle Valve Handle fits tight and are not c racked.
- III. Ensure that the Throttle Valve Plunger does not have a flat on its radius and that the Throttle Valve Spring still has adequate tension.

#### c) Air Stem, Nut and Copper Washer

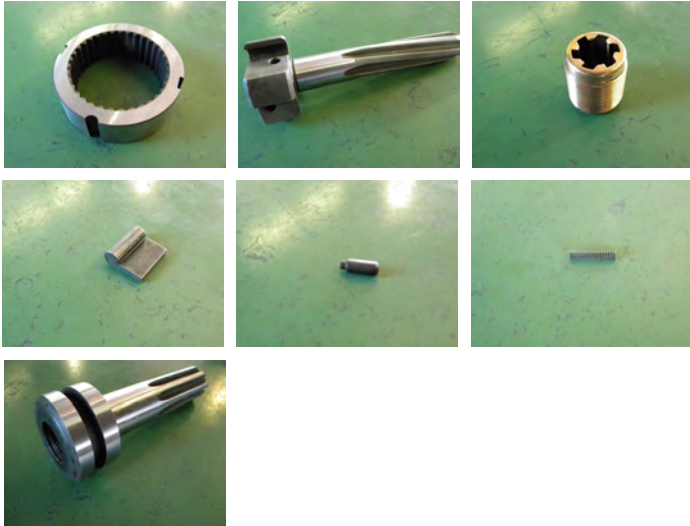
- I. Ensure that the Air Stem and Nut fits properly as a unit and is not r ocking on the taper. Once the tapered end protrudes the Nut by 5mm, both parts must be replaced.
- II. Ensure that the threads on both the Nut and the Air Stem are in good condition.
- III. Ensure that there is no dirt inside the Air Stem.
- IV. Ensure that the Air Stem Nut Copper Washer is flat and not damaged.

#### d) Back Head Spud and Water Tube

- I. Ensure that the Back Head Spud's threads are in good condition and the serrated are is not damaged.
- II. Ensure that the Back Head Spud hole is clear of any dirt.
- III. Ensure that the Water Stem Nut Copper Washer is flat and not

- IV. Ensure that the Water Tube is not bent and the small end is not damaged or blocked. If the Water Tube has shortened by more than 10mm from its original length, it needs to be replaced.
- V. Ensure that the Water Tube Rubbers are not damaged and has become soft in comparison to new Rubbers.

## 2) Ratchet Ring, Rifle Bar and Piston Sub Assembly



The Ratchet Ring and Rifle Bar Sub Assembly together with the Piston are the rotation components of the Rock Drill and consist of the following components:

- ☒ Ratchet Ring (C2698L)
- ☒ Rifle Bar (C2023L)
- ☒ Rifle Nut (D1623)
- ☒ Pawl (S21-33)
- ☒ Pawl Plunger (S21-34)
- ☒ Pawl Plunger Spring (D1611)
- ☒ Piston (B2107)

### a) Ratchet Ring

- I. Ensure that the teeth on the Ratchet Ring have not worn by more than 1mm.
- II. An easy way of checking the wear on the Ratchet Ring is to use a new Valve as a gauge and when it enters the teeth, it must be replaced.

### b) Rifle Bar and Rifle Nut

- I. Ensure that the splines on the Rifle Bar are in good working condition.
- II. An inspection of the splines can be done by using a new Rifle Nut as a gauge.
- III. Take a new Rifle Nut and place it over the splines of the Rifle Bar. If the Rifle Nut slides down the splines to the beginning of the machined splines, it will indicate that 50% of the Rifle Bar has worn away and it needs to be replaced.
- IV. Ensure that the splines in the Rifle Nut are still in good condition. Compare the worn splines to a new Rifle Nut and if it has worn by

approximately 50% of a new one, it must be replaced.

- V. Ensure that the splines on the Rifle Bar are in good working condition without any damage to the splines. Look for heat checking (small cracks) on the splines of the Rifle Bar and if excessive, replace it. Where Rifle Bars show a wear pattern on the splines of approximately 30%, both the Rifle Bar and the Rifle Nut must be replaced.

### c) Pawls, Pawl Plungers and Pawl Plunger Springs.

- I. Ensure that the Pawls do not show wear of more than 1mm on the working corners.
- II. Note must be taken that Pawls may be refaced by up to 1mm in order to restore the corner.
- III. It is highly recommended that all four Pawls, Pawl Plungers and Pawl Plunger Springs be replaced with every service.
- IV. This will enable ample time to repair these parts as and where possible.
- V. Ensure that Pawl Plungers do not have a flat on the domed area and if so, discard immediately.

### d) Piston

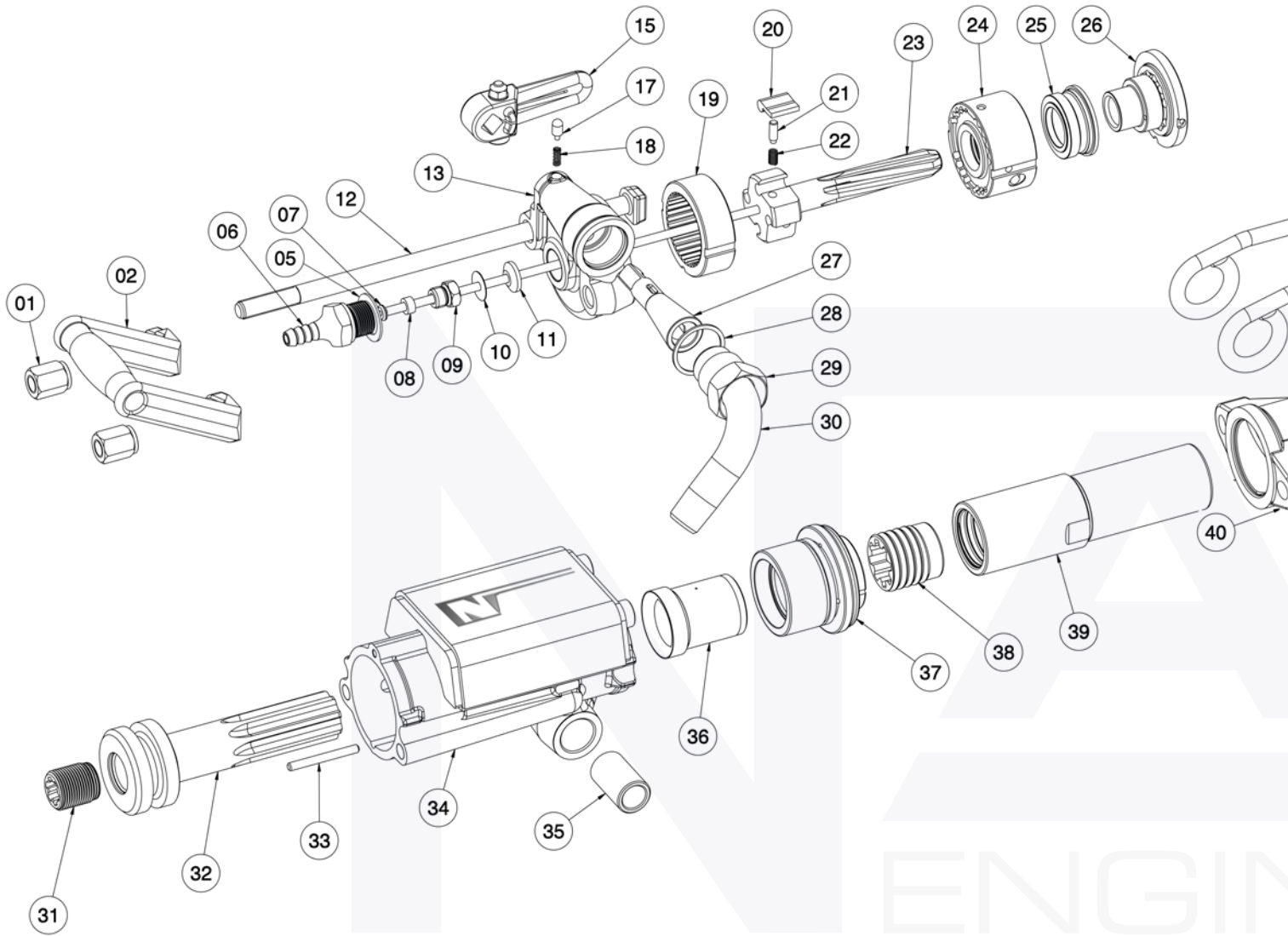
- I. Ensure that the Piston striking face is flat, square to the axis of the Piston shank and smooth.
- II. Should the Piston striking face be dished to a maximum of 1 mm, it may be refaced square by grinding to restore the flat surface. This grinding must preferably be done using a proper sanding machine with the correct tooling using ample cooling liquid.
- III. A maximum of 2 mm can be removed from the striking face surface during the life cycle of a Piston.
- IV. Care must be taken to ensure that the radius on the end of the Piston splines is restored to prevent damage to the Chuck Nut.
- V. Ensure that the Piston head is clear of nicks or high spots. These high spots may be honed clear before entering the Piston into the Cylinder.

## 3) Valve Box Sub Assembly



The Valve Box Sub Assembly consists of the following components:

- ☒ Valve Box (A1446A)
- ☒ Valve Plug (B2108A)
- ☒ Valve (C2697A)
- ☒ Valve Box Locating Pin (D2482)



**NS215M GENERAL ROCK DRILL DATA**

BORE	68mm
STROKE	55mm
MASS	21,5kg

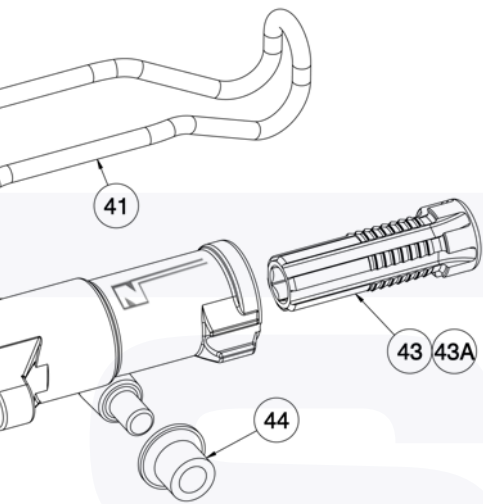
**Mr Joe Valentim**  
 Managing Director  
 Office: 011 908 4537  
 Cell: 082 554 2834

**Mr Vincent Fredericks**  
 Sales and Marketing  
 Office: 011 908 4537  
 Cell: 082 292 8246

**Mr Steven Ras**  
 Sales Manager  
 Office: 011 908 4537  
 Cell: 082 454 0534

## COMPARISON TABLE

No.	NASA No.	PART No.	DESCRIPTION	QTY
01	21501	D2130	Side Rod Nut	2
02	21502	B2154-2	Spade Handle	1
05	21504	S21-50	Copper Washer	1
06	21503	HF-7581-123	Backhead Spud	1
07	21505	S19-39	Water Tube	1
08	21506	S21-45	Water Tube Rubber Small	1
09	21507	S21-42	Water Tube Cap Screw	1
10	21508	S24-46	Thrust Washer	1
11	21509	S21-44	Water Tube Rubber Large	1
12	21538	C3102	Side Rod	2
13	21510	A1406	Backhead	1
15	21517	S21-24P	Throttle Valve Handle (Plastic)	1
17	21512	S21-29	Throttle Valve Plunger	1
18	21511	S21-30	Throttle Valve Spring	1
19	21523	C2698L	Ratchet Ring	1
20	21521	S21-33	Pawl	4
21	21520	S21-34P	Pawl Plunger (Plastic)	4
22	21519	D1611	Pawl Plunger Spring	4
23	21518	C2023L	Rifle Bar	1
24	21524	A1446A	Valve Box	1
25	21525	C2697A	Valve	1
26	21526	B2108A	Valve Plug	1
27	21513	B2147	Throttle Valve	1
28	21515	S21-91	Copper Washer	1
29	21516	S21-38	Air Stem Nut	1
30	21514	S21-37A	Air Bend	1
31	21527	D1623	Rifle Nut	1
32	21528	B2107	Piston	1
33	21522	D2482	Valve Box Locating Pin	1
34	21529	A1404M2	Muffled Cylinder	1
35	21530	C1101M	Cylinder Lug Bush	1
36	21531	C6521	Front Cylinder Washer Liner	1
37	21532	B5474	Front Cylinder Washer	1
38	21533	S19-7	Chuck Nut	1
39	21534	B2148	Chuck	1
40	21535	A4994	Economy Fronthead	1
41	21539	B2798L	Steel Retainer	1
43	21537	C2701 22mm	Chuck Bush	1
43A	21537A	C2846 25mm	Chuck Bush	1
44	21536	D2146A	Steel Retainer Bush	2



**a) Valve Box**

- I) Ensure the Valve Box has been cleaned properly.
- II) Check for burrs on the faces and bearing surfaces.
- III) Any burrs, nicks or bumps can be carefully removed with a honing stone.
- IV) Ensure all holes, top and side, are clear and clean.
- V) Check that the seat at the bottom of the Valve Box is not worn excessively and that there are no major sideways movement of the Valve when fitted to the Valve Box.

**b) Valve Plug**

- I) Ensure the Valve Plug has been cleaned properly.
- II) Ensure that all the holes at the base of the Valve Plug are clear and clean.
- III) Ensure that the kicker ports at the side of the Valve Plug are clear and clean.
- IV) The Valve Plug can be checked for wear by sliding a new Valve over the Valve Plug. Both parts must be clean and dry. Once the Valve are fully down on the Valve Plug, close off the kicker ports on the side of the Valve Plug with your fingers. Slowly pull the Valve backwards and forwards. There should be a reasonable amount of suction when doing this motion and if not, the Valve Plug needs replacement.

**c) Valve**

- I) Ensure the Valve has been cleaned properly.
- II) Ensure there are no nicks and bump marks on the Valve by rubbing your finger around the Valve surface. Nicks and bumps may be removed by using a honing stone.
- III) Wear in the Valve may be checked by blocking off the kicker ports on the side of a new Valve Plug with your fingers. The free movement of the Valve should be restricted by the air trapped beneath the Valve and should it not be the case, the Valve needs to be replaced.

**d) Valve Box Locating Pin**

- I) Ensure the Locating Pin is in good condition and are straight.
- II) Should the Locating Pin be damaged and bent, replace it with a new one.

**4) Cylinder Sub Assembly**



The Cylinder Sub Assembly consists of the following components:

- ☒ Cylinder (A1404M)
- ☒ Front Cylinder Washer (C2699)
- ☒ Front Cylinder Washer Liner (C6521)
- ☒ Cylinder Lug Bush (C1101M)

**a) Cylinder**

- I) Ensure the Cylinder has been cleaned properly.
- II) Ensure that the kicker ports and lubrication ports are clear and clean by blowing air through them.
- III) Ensure the wear between the Piston and the Front Cylinder Washer Liner is checked.
- IV) Insert the Piston in the Cylinder and pull on the Piston shank rapidly forward from the front end. The Piston should bounce on the air cushion. If it does not bounce, repeat this action again but using a new Piston this time. If still no cushion, insert a new Front Cylinder Washer Liner.
- V) Check the wear between the Cylinder and the Piston by inserting the Piston in the Cylinder and moving the Piston sideways. If there are excessive sideways play, repeat with a new Piston. Replace either the Piston or Cylinder as required. Note that the maximum wear between the Cylinder and the Piston should be less than 0.15mm.

**5) Front Head Sub Assembly**



The Front Head Sub Assembly consists of the following components:

- ☒ Front Head (A4994)
- ☒ Chuck (B2148)
- ☒ Chuck Nut (S19-7)
- ☒ Chuck Bush (C2701)
- ☒ Steel Retainer (B2798)
- ☒ Steel Retainer Bush (D2146A)
- ☒ Side Rod (C3102)
- ☒ Side Rod Nut (D2130)
- ☒ Spade Handle (B2154-2)

## a) Front Head

- I) The Front Head does not normally show excessive wear, but the clearance between the Chuck and the Front Head should not exceed 1.0mm.
- II) If more than 1.0mm, discard Front Head.
- III) Ensure that the general condition of the exterior of the Front Head is still in a workable state.

## b) Chuck

- I) Ensure that the Chuck is not badly corroded or cracked.
- II) Ensure that the clearance between the Chuck and a new Front Head is not more than 1.0mm. If so, replace the Chuck.
- III) Ensure that the internal reverse buttress thread is still in a good condition. If the thread has a flat at its major diameter and no sharp edge is visible, replace the Chuck.
- IV) Ensure the Chuck has no visible cracks.

## c) Chuck Nut

- I) Ensure that the Chuck Nut is replaced as soon as the splines have worn to 50% of its original width.
- II) Ensure that the external reverse buttress thread is still in a good condition. If the thread has a flat at its major diameter and no sharp edge is visible, replace the Chuck Nut.

## d) Chuck Bush

- I) The Chuck Bush must be discarded as soon as it has worn by 1.25 mm across the flats at the worst point.
- II) Ensure that the internal hex does not have a corner starting to form on the flats. If so, replace Chuck Bush.

## e) Steel Retainer

- I) Ensure that the Steel Retainer is still in good working condition.
- II) Ensure that the Steel Retainer is not worn at the front end "U" shape. If worn by more than 25% of original shape, replace.
- III) Ensure that the two eyes on the Steel Retainer are not worn by more than 1.5 mm. If so, replace.

## f) Steel Retainer Bush

- I) Ensure that that the outside diameter of the Bushes is not worn by more than 1.5 mm. If so, replace.

## g) Side Rods and Side Rod Nuts

- I) Ensure that Side Rods are not bent by rolling them across a flat surface. If badly bent, replace them.
- II) Ensure that the threads on the Side Rods are not damaged and worn.
- III) Ensure that the hex on the Side Rod Nuts is still in good shape and are not rounded in any way.
- IV) Ensure that the internal threads of the Side Rod Nuts are not damaged and worn.

## h) Spade Handle

- I) Ensure that the Spade Handle clamps are not bent.
- II) Ensure that there are no visible cracks on the Spade Handle.

## ASSEMBLY OF ROCK DRILL

Ensure that all the required tools are available prior to starting the assembly of Rock Drills.

Ensure that all the components are dipped into a cleaning solvent bath.

Ensure that all the components are covered with a thin layer of Rock Drill oil. (Except for the Valve Box assembly)

When tightening the Side Rods, ensure that they are evenly tightened and finally torqued to a value of 95 Nm. (70 lbs ft.)

Ensure that the Chuck Bush rotates by hand once the Rock Drill has been assembled.

The building sequence for the assembly of the Rock Drill is as follows:

- Slide Chuck into the Front Head. Ensure that the Chuck Nut and the Chuck Bush has been fitted to the Chuck first.



- Fit both Side Rods through the flange area of the Front Head.



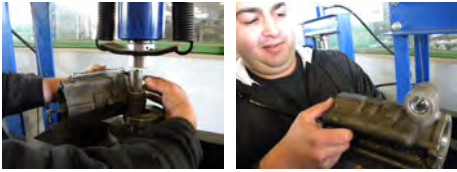
- Place the Front Head, Chuck and Side Rods over the spikes on the assembly work bench.



- Press Front Cylinder Liner into Front Cylinder Washer and press the assembly into the small diameter of the Cylinder.



- Press Cylinder Lug Bushes into the Cylinder.



- Slide Piston into the Cylinder. Ensure that the Rifle Nut has been fitted to the Piston.



- Now place the Cylinder assembly over the Front Head assembly on the assembly work bench. Ensure that the splines of the Piston enter the splines of the Chuck Nut.



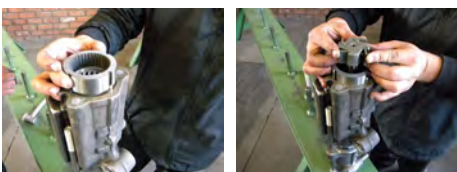
- Assemble the Valve Box, Valve Plug and Valve. Ensure that the Valve moves freely in the assembly by shaking it backwards and forward. The Valve should make a "clicking" sound.



- Fit the Valve Box assembly with the Locating Pin to the Cylinder.



- Assemble Ratchet Ring, Rifle Bar, Pawl Plunger Springs, Pawl Plungers and Pawls.



- Fit Ratchet Ring assembly to the Cylinder and ensure the Rifle Bar splines enters the splines on the Rifle Nut.



- Assemble the Back Head unit using the Throttle Valve, Throttle Valve Spring, Throttle Valve Plunger, Air Stem, Air Stem Copper Washer, Air Stem Nut, Throttle Valve Handle with bolt and nut, Water Tube, Small Water Tube Rubber, Water Tube Cap Screw, Water Tube Thrust Washer, Large Water Tube Rubber and the Back Head Spud.



- Fit the Back Head assembly to the Cylinder ensuring that the Water Tube enters the Piston freely and the Side Rods fits through the holes on the Back Head.



- Fit the Spade Handle over the Side Rods and tighten Side Rod Nuts by hand until hand tight. Ensure the position of the Side Rod heads sits properly on the Front Head.



- Tighten the Side Rod Nut with a torque wrench to the value of 95 Nm. Ensure that the Chuck Bush rotates freely.



- Fit the Steel Retainer Bushes to the Cylinder.

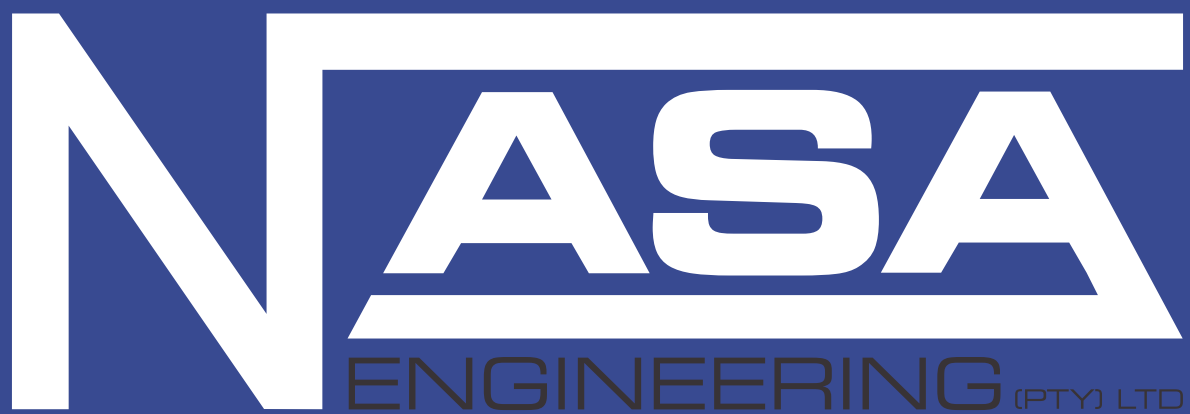


- Fit the Steel Retainer over the Steel Retainer Bushes.



- Test the assembled Rock Drill on the Test Bench.





# The OEM Manufacturer

**Mr Joe Valentim**  
Managing Director  
**Office:** 011 908 4537  
**Cell:** 082 554 2834

**Mr Vincent Fredericks**  
Sales and Marketing  
**Office:** 011 908 4537  
**Cell:** 082 292 8246

**Mr Steven Ras**  
Sales Manager  
**Office:** 011 908 4537  
**Cell:** 082 454 0534