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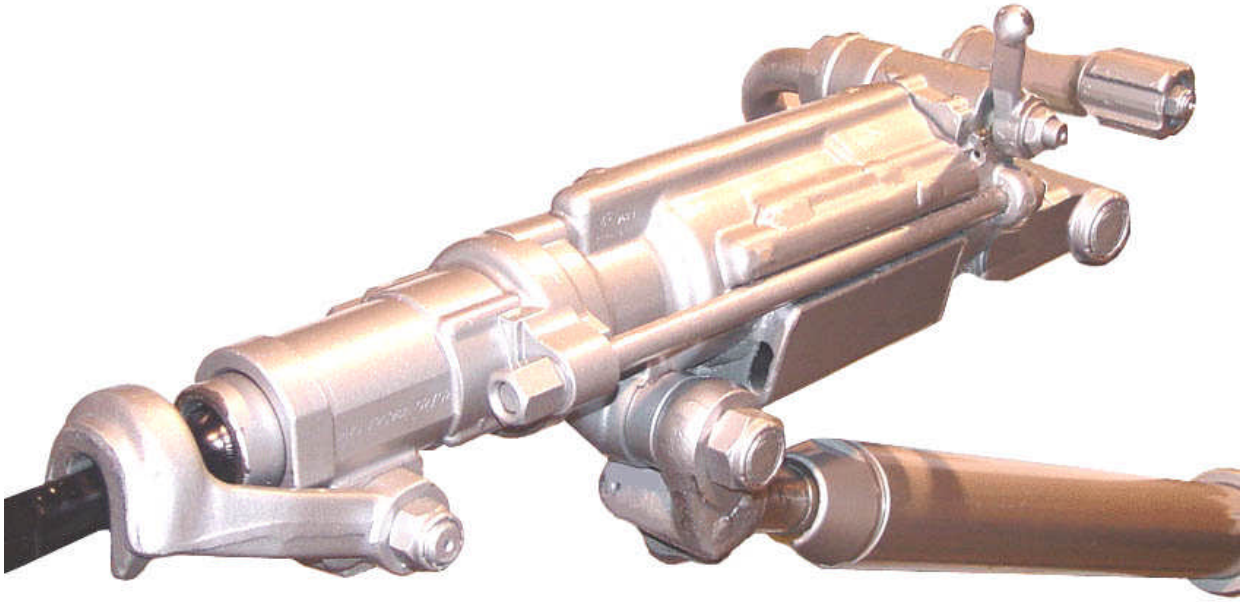
PHQ250 Jackleg



Parts and Service Manual

PHQ250JHMAVL
Anti-vibration Jackleg
c/w 51” Retractable Air Leg

5048912 JOY Football Style Lubricators

Version 200711

Safety Identification and Safeguards

WARNING Read and understand all safety instructions carefully before operating this machine. Failing to follow these instructions may result in serious personal injury.

Important Safeguards

- Keep clear of rotating equipment and never wear loose clothing to tangle in machinery
- Always maintain a clean and tidy work area. Pick up unnecessary items. Store tools.
- Avoid dangerous working environments and lack of ventilation.
- Do not operate equipment while under the influence of drugs, alcohol, or medication.
- Keep visitors at a safe distance and away from the work area where they may be injured.
- Wear protective equipment, hard hat, safety glasses, hearing protection, gloves and hard toed boots.
- Read and understand the operations manual and any and all labels affixed to the machine.
- Use only genuine PHQ replacement parts. Failure to do so could cause rapid and severe damage to the machine or ultimately the operator. Pirate replacement parts may void the warranty of mating parts.
- Employ qualified service technicians to repair rock drills. An un-trained mechanic could possibly make errors in installing parts and cause severe damage to mating parts in the machine.
- Ensure that the drill and accessories comply with applicable company safety and health regulations.
- Do not exceed the rated capacity of any piece of equipment.
- Do not change or alter the drill, its components or accessories without prior approval from PHQ.
- Unauthorized alteration voids the warranty, and could render the equipment unsafe.
- Before moving a control, be certain what function it operates and the ramifications of that function.
- Breathing protection must be worn when working with materials which produce airborne particles.
- Prolonged exposure to vibration causes serious arm/hand vibration syndrome disease (White Finger)
- For additional information on training or start up, contact your PHQ representative.

WARNING
Operating a Rockdrill without lubricant or with incorrect lubricant is the leading cause of failure of rock drill parts. Lack of lubrication can rapidly cause EXTENSIVE DAMAGE to the working parts of this machine. All Rockdrill repairs should be preformed by properly trained and equipped personnel.

NOTE: No claim for product warranty of premature failed parts will be considered when it is evident that the failures were caused by a prolonged lack of proper lubrication. No claim for product warranty of premature failed components will be considered by PHQ if parts other than those manufactured by PHQ are deemed to have caused the failure.

Certificate of Performance

This certificate supplied with each drill and is signed by the assembly mechanic assuring that 'the product has been tested and meets PHQ's quality standards. It lists the actual test results achieved by running the drill on a PHQ test bench at the time of assembly.

Parts HeadQuarters Inc

Form # PHQ-1901 Rev 1

Part or Assembly Number	Rockdrill Torque Test Report		Report Number
Part or Assembly Name	Serial Number	Lot Number N/A	Report Date
Customer & Destination :	Work Order Number	Tested and Inspected by	
Cylinder Part Number	Test Level ☐ Unit Test ☐ System Test ☐ Acceptance Test ☐ Field Test		

	Air Line Pressure P.S.I.	Operating Pressure Full Throttle	Operating Air Flow C.F.M.	Feed Pressure P.S.I.	Retract Leg Feed Pressure	Maximum Torque At Full Throttle Ft/lbs.		Break Off Torque		Water Pressure Test
Test					N/A	1	2	1	2	
						3	4	3	4	

Remarks : Lubricated with Vultrex EP000 Rockdrill grease during assembly,

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NOTE: PHQ continuously updates product literature to provide customers with the most current technical information available. Portions of this literature in time could contain information that may not be exactly representative of the current configuration of PHQ products. Contact your nearest PHQ representative for information on the latest product improvements and replacement literature available. The purpose of the manual is to provide service technicians with detailed information to achieve the maximum operating performance from PHQ products. Parts lists with corresponding exploded view schematic drawings are provided to aid in identifying parts needed for repairs and to facilitate ordering of proper parts for the assembly. Drawings are included at the appropriate area within the text. The drawings included are small through necessity. Large wall posters are available. PHQ personnel are proud to say they are backed up by over 50 years of experience in design, manufacture and operation of Percussive Drilling Equipment. Many of the accepted practices in use today were pioneered by some of the personnel working at PHQ.

To obtain the best performance and life of the equipment regular maintenance is required.

To obtain the best performance the machines should be operated in accordance with the instructions.

Ensure proper safety apparel is worn when transporting, servicing or using the equipment.

Ensure quality lubricant is used and the delivery system provides amounts sufficient to run the drill.

Inspect and replace worn front end and chuck parts promptly to improve the life of drill rods.

Ensure the drill is being operated correctly to avoid steel and drill rod misalignment.

Check air supply pipes and hoses and connections for flow restrictions or ingress of contaminants.

Listen to the drill for erratic running and insure the side rod bolts on the drill are properly torqued...

Provide new employees with time to read this manual before allowing them to operate the equipment.

Keep a master copy of this manual at hand at all times for reference should any questions arise.

Standard Warranty

For each new or used PHQ manufactured product and accessory, PHQ warrants that the product is free from defects in material and workmanship under normal; use and service for a 180 days from the date of first use (not to exceed one year from the date of shipment from a PHQ factory). The obligation under this warranty shall be limited to the replacement or repair of the failed product returned to PHQ. All warranty replacement is subject to inspection by a PHQ representative and the Quality Control Department at PHQ in Burlington, Ontario. PHQ will replace only parts that are judged to have been defective at the time of manufacture and assembly. This warranty does not apply to a product which has been altered, changed, or has been used and repaired then returned to a drill where the repaired part failed while in operation...

PHQ states that the product described in this manual shall not be merchantable or fit for any other purpose other than the operations described in the manual. No other warranties are expressed or implied.

Exclusive of Liability for Consequential Damages

In no event shall PHQ be liable for a customer's cost of lost production, increased cost, loss of profit, special indirect, incidental or consequential damages, and freight, brokerage, and shipping and storage charges.

Ordering Parts

PHQ requires the following procedures be followed and the proper information be supplied to expedite the filling of customer orders for parts and to eliminate delays and errors in shipping incorrect parts.

1. List the model of the assembly (EG: PHQ250JHMAVL Anti-vibration Jackleg Drill).
2. State the exact quantity of each item of parts required.
3. Identify items with the description and part number as shown in the parts section of this manual.
4. Specify the preferred method of shipment. (EG: Parcel Post. Courier, Truck Freight).
5. For overseas shipments specify the preferred method of shipment. (EG Air freight or sea freight).

Pricing is specified by PHQ in formal quotations and shipping terms can be included in quotations. All normal repeat part orders are priced according to INCOTerms2000 Ex-Works and FOB our factory in Burlington Ontario. Separate charges for transportation and export packing may apply.

Returning of New or Damaged Parts

If a customer wishes to return parts to PH due to overstocking or whether for repairs, replacement, or warranty, a letter of explanation should first be sent by e-mail, mailed or faxed to:

Parts HeadQuarters Inc.
C2-1175 Appleby Line
Burlington, Ontario
Canada L7L 5H9
ATTN: Sales Department
sales@partshq.com

Phn: 905-332-3271
Fax: 905-332-9497

This letter should specify the model number of the PHQ product (EG: PHQ250JHML Jackleg Drill) and list the parts by item that the customer wishes to return. The list should contain the Item part number, description and the quantity of each item. The letter should state the date of purchase (or order number) as well as a valid reason for requesting return. Parts returned by customers due to overstocking at the customers' location will be subject to a percentage restocking charge by PHQ.

DO NOT ship parts until authorized by PHQ Sales Department and shipping instructions are received.

All Parts returned to PHQ regardless of reasons must be shipped prepaid to PHQ.

Rockdrill Repair Shop

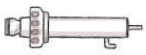
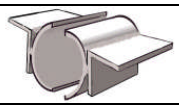
The rock drill repair shop should be a clean area equipped with all the usual filters' tools, work benches, component cleaning tanks and a hydraulic press. Your work shop should have the following items:

- PHQ Test Bench – custom designed and made to test torque generated by the drill and leg pressure. Every drill that is repaired in the drill shop should be "run-in" on the test bench using the spring loaded device that allows the drill to be run under load and leg pressure
- Work Bench – 91.4cm x 213.4 cm (36" x 84") c/w air bulkhead (optional)
- 15.2 cm (6") Vice (fixed type) mounted on the corner of the bench
- 10.2 cm to 20.3 cm (4" to 8") Chain Vice mounted on opposite corner of bench
- Steel block or press – two 7.6 cm x 7.6 cm x 45.7 cm (2" x 3" x18") with slider stop bars
- Electric pump driven solvent wash cleaning tank
- Bench Grinder 8" diameter one coarse and one fine stone (optional)
- Belt (Sand Paper) Grinder c/w back support for grinding piston faces.
- Acetylene Oxygen – Cutting torch set c/w twenty foot hoses.
- Welding machine (optional)
- Sliding eight to ten drawer metal cupboards for parts
- Pin Skids
- Electric cord with auto rewind fancily – wall mounted
- Four foot four bulb fluorescent lighting over work bench. Small pencil light.

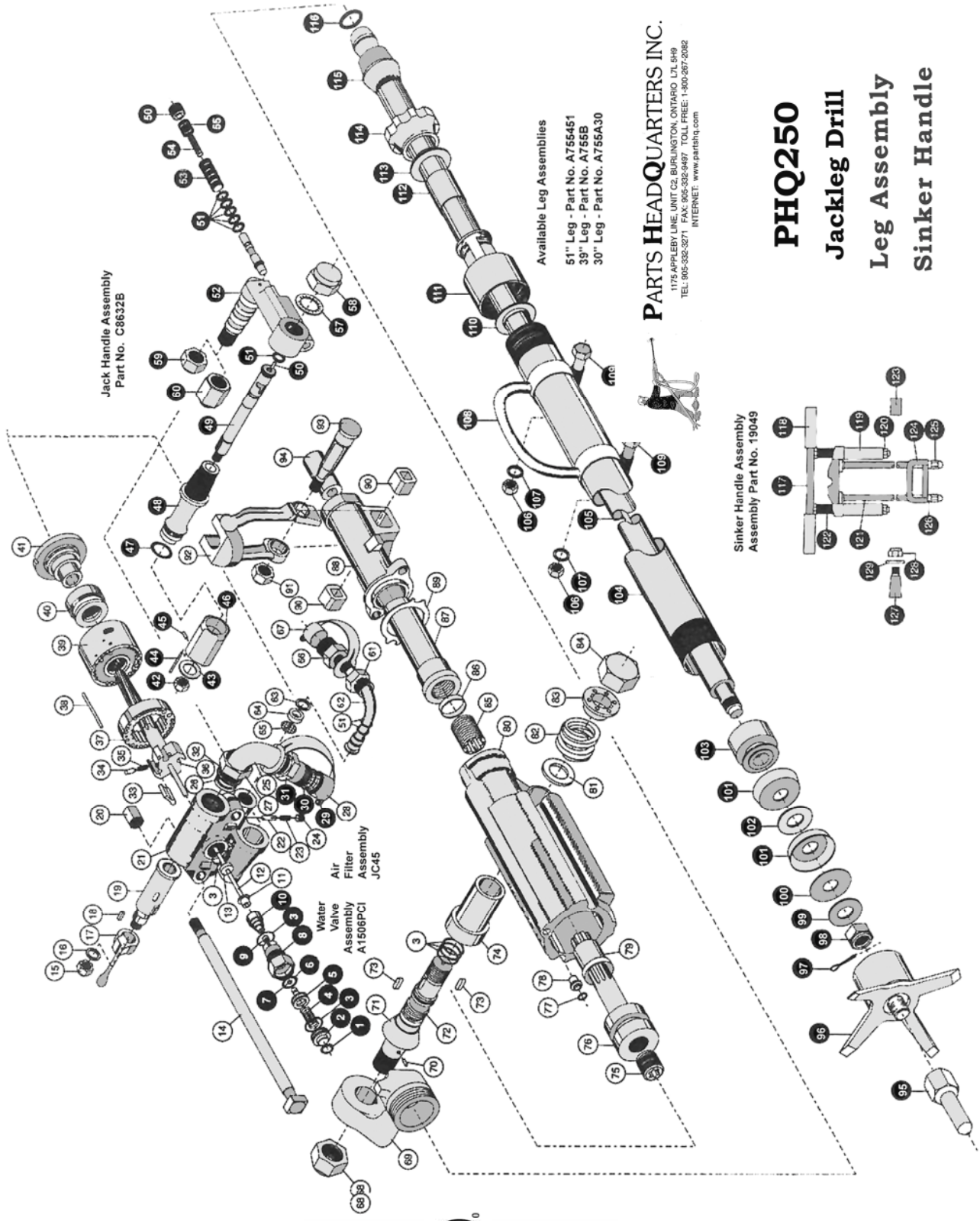
Your tools should include:

- PHQ S250 Tools Repair kit (Part Number PHQ250T
- Torque Wrench with 12.7 mm (1/2") drive (up to 250 ft/lbs)
- Pneumatic Impact Socket Wrench 12.7 mm (1/2") Drive
- Standard Pipe Wrench 61 cm (24")
- Standard Pipe Wrench 30.5 cm (12")
- Miner's Combination Crescent Wrench 38mm (1-1/2")
- Drive Socket 38mm x12.7mm (1-1/2" x 1/2")
- Drive Socket 36.5 mm x 12.7mm (1-7/16" x 1/2")
- Sockets 15/16", 1-1/16", 1-7/16", 1-1/2"; 15"
- Allen Key: 3/16", Allen Key 3/8"
- Pick Set and Miscellaneous carbide grinding heads for ½ electric drill
- Mechanic's Hammer
- 12.7 mm x 304mm (1/2" x12") plate c/w chuck nut removal tool, rifle nut, removal tool
- Rigid 3 ½; column bar, short arm with swing and dump and short guide shell (for S-36 repairs)
- Repair Tags and Report Sheets

PHQ250JHML Repair Tool Kit

1	C1811A*		**Air Inlet Cover** – Used to cover JC45 inlet adapter.
2	C1811W*		**Water Inlet Cover** – Used to cover 3/8"–1" adapter.
3	C3720		**Chuck Insert Wear Gauge** – Place in chuck insert across flats. If top of the insert is more than halfway up gauge, insert should be changed
4	SECP1		**Piston Removal Tool** – Remove Piston and Valve Assy from Cylinder. Remove fronthead and chuck insert punch into piston and hammer out.
5	SG001		**Air Gauge Adapter** – Measure Airleg pressure. Attach to jackleg clevis body.
6	SG002		**Air Gauge** – Measure Airleg pressure. Attach (qty 2) to SG001.
7	T201		**Cylinder Bushing Extractor** – Used to remove brass bushing from inside cylinder and remove bushing from the Stoper Leg.
8	T203		**Stoper Punch** – Remove Stoper handle bushing form cylinder.
9	T204		**Retract Valve Assembly Tool** – Place retract valve in handle. Insert retract valve in handle and gently hammer in with retract valve tool.
10	T205		**Valve Chest Assembly Tool** – For assembling valve chest and installing valve chest in cylinder.
11	T206		**Valve Chest Punch** – To disassemble valve chest. Insert punch into top of valve box, hammer out.
12	T214		**Retract Valve Hand Reamer** – Use to remove burrs from the retract valve bore
13	T217		**Chuck Insert Remover -** For collared steel chucks. Place chuck in chuck removal support ST218 and push insert out with hydraulic press.
14	T218		**Chuck Removal Support –** To remove chuck inserts place chuck Assy in support and use T555 or T217 punch to push out on hydraulic press.
15	T221		**Chuck Insert Punch** – To insert collared chuck insert place the insert in chuck T218 and push insert in hydraulic press until flush with chuck.
17	T224		**Jackleg Cylinder Mandrill** – Remove small dents from Airleg by forcing T224 through the inside diameter of the cylinder...
18	T225		**Lug Bushing Punch** – Used to install cylinder lug bushing on Jackleg
19	T555		**Chuck Insert Punch** – Insert and remove collarless steel chuck insert. Place the chuck in support T218. Push the insert in using the hydraulic press until the face of the insert is level with circumference of chuck.
20	T209		**Feed Cylinder Clamp** – Used to grip the Jackleg pusher leg cylinder in a shop vice

*Minimum order quantity 20


PHQ250
Jackleg Drill
Leg Assembly
Sinker Handle
PARTS HEADQUARTERS INC.
1175 APPLEBY LINE, UNIT C2, BURLINGTON, ONTARIO L7L 5H9
TEL: 905-332-3271 FAX: 905-332-9497 TOLL FREE: 1-800-267-2082
INTERNET: www.partshq.com
Available Leg Assemblies
51" Leg - Part No. A755451
39" Leg - Part No. A755B
30" Leg - Part No. A755A30
Jack Handle Assembly
Part No. C8632B
Sinker Handle Assembly
Assembly Part No. 19049
Air Filter Assembly JC45
Water Valve Assembly A1506PCI

PHQ250 Jackleg

1	20015	1	Circlip (20014)
2	C1521PC1	1	Water Valve Spring Cap
3	164231	6	O-Ring
4	D1406	1	Water Valve Spring
5	C1522PC1	1	Water Valve
6	164521	1	O-Ring
7	164301	1	O-Ring
8	B1181PC4	1	Water Control Valve Body
9	D1673	1	Water Valve Seat
10	C2144	1	Water Valve Seat Retainer
11	D1674	1	Water Tube Spacer
12	C1574A	1	Water Tube - Swaged
13	D1675	1	Water Tube Seal
14	C1572C	2	Side Rod
15	D1385	1	Throttle Valve Handle Nut
16	149163MT	1	Disc Spring
17	C1509	1	Throttle Valve Handle
18	D1384	1	Throttle Valve Key
19	B1176	1	Throttle Valve
20	D1388	2	Side Rod Nut
21	A660	1	Backhead
22	D1383	1	Throttle Valve Plunger
23	D1382	1	Throttle Valve Plunger Spring
24	2422P	1	Plug
25	C1525N	1	Air Bend
26	D1601	1	Air Bend Copper Washer
27	C1526	1	Air Bend Nut
28	C1811A	1	Air Line Cap
29	355538A	1	Air Inlet Screen
30	164999	1	O-Ring
31	1356588	1	Hose Spud
32	164731	1	O-Ring
33	D6177	4	Ratchet Pawl (Reversible)
34	S2134	4	Pawl Plunger
35	D1611C	4	Pawl Plunger Spring
36	B1173B	1	Rifle Bar (Reversible)
37	B1170	1	Ratchet Ring (35 Teeth, standard)
38	S2128	1	Valve Box Pin (SD1397)
39	A745	1	Valve Box
40	C1648	1	Valve
41	A744	1	Valve Plug
42	1218UF	1	Spindle Nut
43	149122MT	1	Disc Spring
44	300822	2	Sellok Pin (Long)
45	30088	2	Sellok Pin (Short)
46	C1518	1	Twist Grip
47	164631	1	Friction Ring
48	B1180B	1	Control Body (Taper Fit)
48A	B1180	1	Control Body (Straight Fit)
49	B1183B	1	Control Spindle (Taper Fit)
49A	B1183	1	Control Spindle (Straight Fit)
50	1125NF02	1	Spindle Plug
51	164811	8	O-Ring
52	A697B	1	Operating Handle (Taper Fit)
52A	A697	1	Operating Handle (Straight Fit)
53	C151415	1	Retract Valve Assembly
54	D1424	1	Plunger Spring
55	D1425	1	Sleeve Spring
56	D1427	1	Plunger Plug
57	145M30	1	Operating Handle Washer
58	D8247	1	Operating Handle Nut
59	D1454	1	Operating Handle Adapter Nut (Nylock)
60	D1454D	1	Operating Handle Adapter Nut
61	S2141	1	Water Stem Nut
62	C1809	1	Water Stem - Threaded Type
63	S2487	1	Water Stem Thrust Washer
64	D1402	1	Water Inlet Washer Rubber
65	C1272	1	Water Inlet Screen
66	D2441	1	Water Inlet Adapter Spud
67	C1811W	1	Water Stem Cap
68	D1982	1	Clevis Body Spindle Nut
69	A693A	1	Clevis Body
70	30066	1	Spindle Locating Pin (D2546)
71	D1398	1	Clevis Body Spindle Cone
72	B1182A	1	Clevis Body Spindle
73	D1426	2	Lock Washer Key
74	C1523	1	Cylinder Lug Bushing
75	C1508	1	Rifle Nut
76	B2334	1	Piston
77	164311	1	O-Ring
78	D1390	1	Cylinder Ferrule
79	C1517	1	Front Cylinder Washer Liner
80	E393M	1	Cylinder - Muffled
80A	E393	(1)	Cylinder - Standard
81	D1392	1	Spindle Thrust Washer
82	C1571	1	Spindle Spring
83	C1519	1	Spindle Lock Washer
84	C1527	1	Spindle Nut
85	C1512	1	Chuck Nut
86	C1516	1	Chuck Nut Spacer
87	B1178	1	Chuck
88	A2598A	1	Fronthead
89	NB500P	1	Fronthead Gasket (Plastic)
89A	NB500C	(1)	Fronthead Gasket (Copper)
90	D6205	2	Steel Retainer Pin Bushing
91	12812UF	1	Steel Retainer Pin Nut (D1932)
92	A2599	1	Steel Retainer
93	C6908	1	Steel Retainer Pin
94	C1418A	1	Chuck Insert (7/8" Hex.)

Leg Assembly 51"= A755451 39"= A755B 30"= A755A30

95	C1672	1	Bottom Cap Spike (Standard)
96	C1791	1	Bottom Cap - 4 Prong
97	225414	1	Split Pin
98	D1073A	1	Piston Rod Lock Nut
99	D2038	1	Piston Rod Lock Washer
100	D1439A	1	Bucket Spacer - Lower
101	1796740	2	Bucket
102	D1438A	1	Piston Rod Spacer
103	D1515A	1	Bucket Spacer - Upper
104	C1788A	1	Cylinder - 51" Stroke
104A	C1790A	(1)	Cylinder - 39" Stroke
104B	C3519	(1)	Cylinder - 30" Stroke
105	B1851RK	1	Nylon Tubing c/w Ferrules and O Rings (2)
106	1216W	2	Nut
107	143M10	2	Washer
108	B1308	1	Carrying Handle c/w Bolts and Nuts
109	1026W12	2	Bolt
110	1973854A	1	Hat Packing (Double Lip)
111	B1287	1	Top Cap
112	D1069	1	Top Cap Bushing
113	1973854	1	Hat Packing
114	C1520	1	Adapter Nut
115	B1851A	1	Piston Rod - 51" Stroke
115A	B1849	(1)	Piston Rod - 39" Stroke
115B	B3004	(1)	Piston Rod - 30" Stroke
116	164531	1	O-Ring

Sinker Handle Assembly Part No. 19049

117	B3352	1	Tee Handle c/w Nuts
118	S2120	2	Tee Handle Grip
119	C3844	1	Tee Handle Guide
120	B3263	2	Tee Handle Nylock Nuts (12812UF)
121	C1582C	2	Side Rod
122	D2584	2	Tee Handle Springs
123	C1940	1	Cylinder Lug Bushing
124	B1729	1	Stirrup Handle
125	D1388D	2	Side Rod Nuts
126	D2154	2	Side Rod Nut Wahser
127	C1939	1	Backhead Lug Bushing
128	D1454	1	Nut
129	D1453	1	Washer

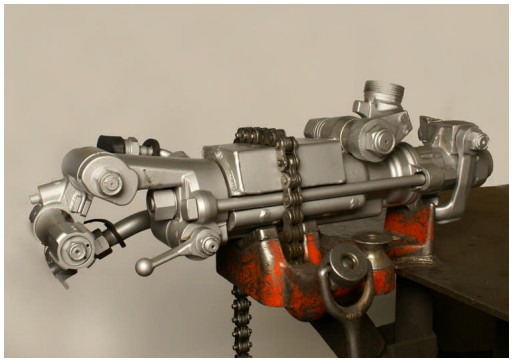
Maintenance Procedures

The maintenance of all rock drills follows the same routine. First clean the exterior of the drill then make a quick visible check to look for items requiring a minor repair that could have shut the drill down before disassembly of the drill. (EG worn chuck bushing, broken water tube, air connection missing or damaged, water valve loose, water connection damaged or missing, side rod nut missing or broken side rod). If no visible problem exists connect the air line with the leg still connected to the drill and start the drill up on low throttle if possible. Look into the front end to check the end of the piston for rotation and check the action of the leg using the control handle. Listen for leaking air. If the problem is still not evident shut the drill down disconnect the air line and disassemble the drill examining the parts as they are removed. Clean the parts, inspect each part in detail, replace damaged parts, rebuilt and test the drill. Most drill shops lack sophisticated measuring equipment to accurately gauge wear on components. An experienced drill doctor relies on his experience to visually check parts for wear and to test for "fit, feel, and function" to determine if the parts should be replaced or not. Parts can be assessed using simple, but effective work shop practices and knowledge gained over years of experience.

NOTE: After unit is completely disassembled and prior to full inspection all components must be thoroughly cleaned in a suitable pump driven solvent wash tank, and blown clean.

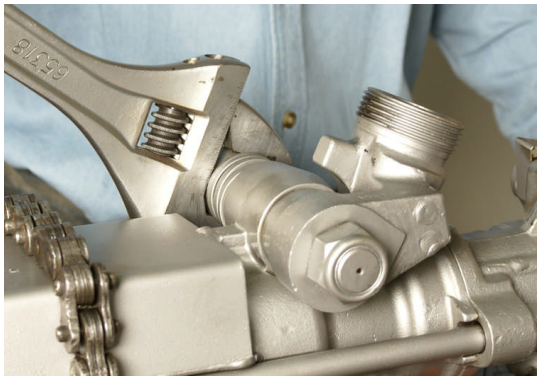
Disassembly Procedures

Clevis Body

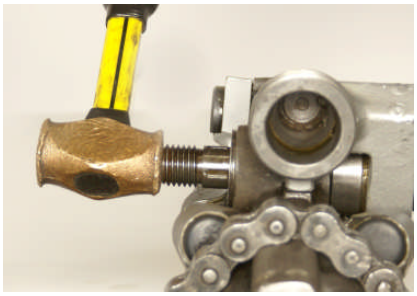


1. Once the drill is cleaned place it upside down in the chain vice on work bench gripping the cylinder.

2. Using an adjustable wrench, unscrew the clevis body spindle nut (D1982). If it is tight compress the spindle spring (C1571) by inserting a screw driver between lock washer (C1519) and spindle nut.



3. Remove the spindle nut, spring, lock washer and trust washer. Remove the keys from the stem end of the spindle

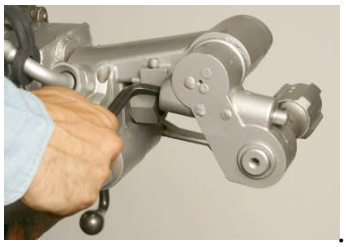


4. Strike the end of the spindle (B1182A) with a copper mallet and withdraw the spindle complete with the clevis body (A693A) from the cylinder lug. To remove the spindle from the clevis body unscrew the clevis body spindle nut (D1982) nut and hold the clevis body in a gloved hand. Strike the end of the spindle with a copper mallet to "break" the taper joint.

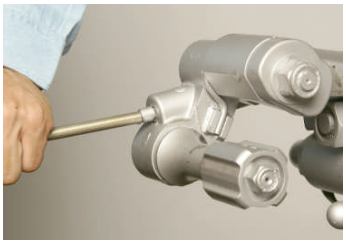
5. Inspect the various components for wear and damage and replace if necessary. Always replace the three O-rings (164231). It is not necessary to separate the spindle from the clevis body spindle cone (D1398). These two parts should be considered as a single component and when worn replace both parts.

Anti-vibration Control Handle

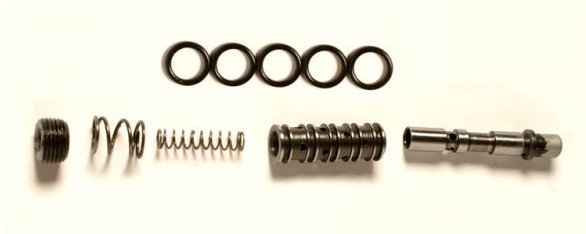
6. With the machine still upside down and the cylinder in a workbench chain vice. Start work on the back end of the machine. Unscrew the plug (1125NF02) in the back of the handle adaptor to access the parts that make up the retract valve assembly (AVH667).

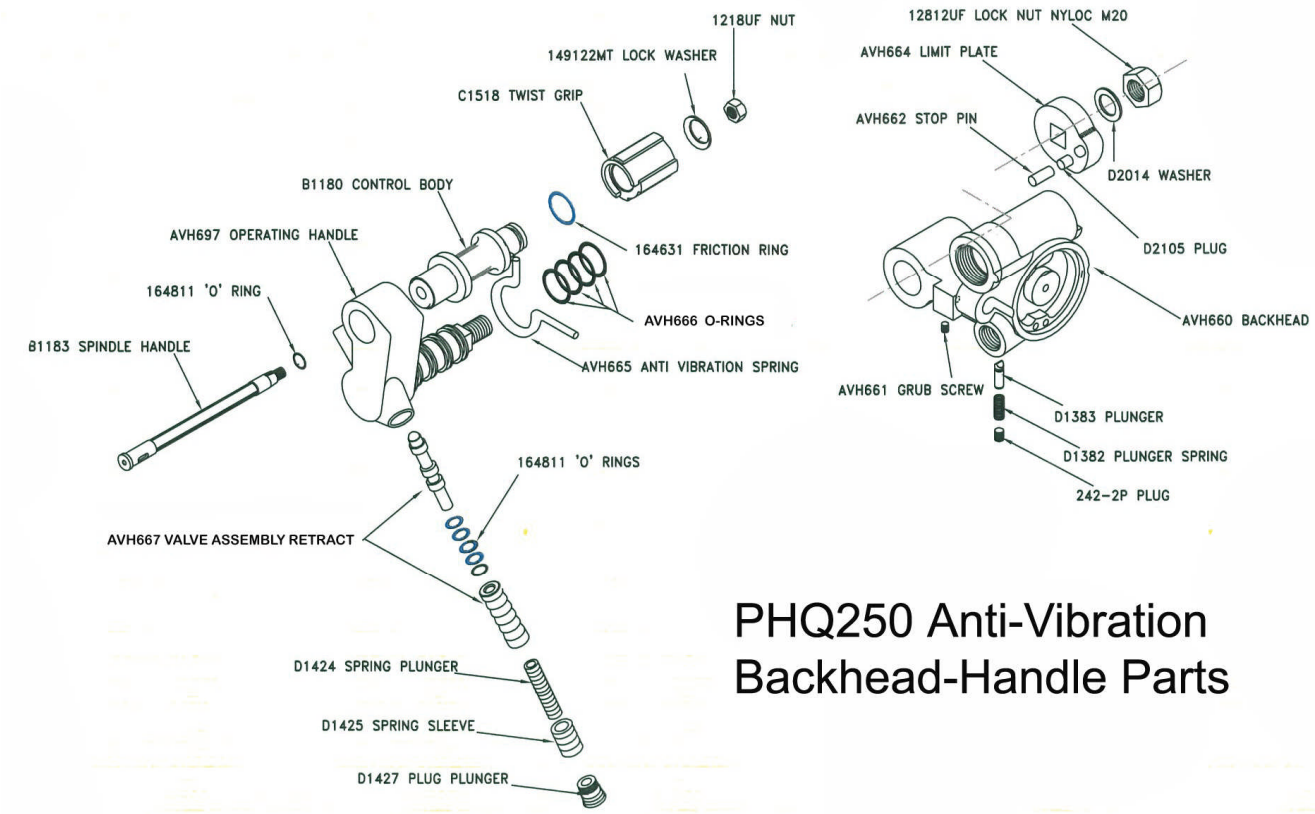


7. Remove the retract valve assembly (AVH667) the plunger spring (D1424) and sleeve spring (D1425) from the open end of the valve bore in the handle adaptor. Wash the assembly in Varsol and test. If the valve is moving freely do not disassemble. If the valve seems to be sticking separate the retract valve sleeve from the valve wash and clean all parts and inspect for wear, damage, or corrosion.

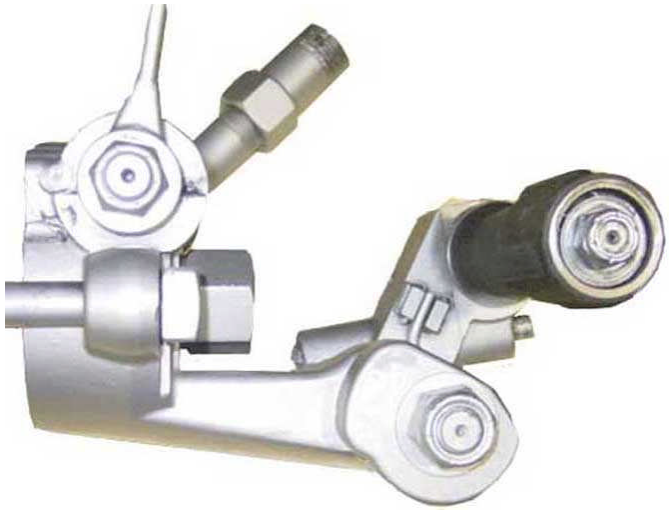


8. The fit between the valve and valve sleeve is critical. The two parts are a matched pair and both must be replaced together if either is worn. Always replace all five O-Rings (AVH666) whenever the valve is disassembled. Should the tension of the plunger spring seem weak replace that spring? The sleeve spring is less critical.



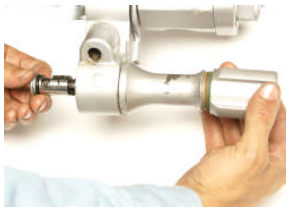


PHQ250 Anti-Vibration Backhead-Handle Parts



9. Unscrew the spindle nut (1218UF) on end of the control spindle (B1183 straight fit) to remove the twist grip (C1518) from the control handle.

10. If tight gently tap on the end of the control spindle with a ball peen hammer.



11. Turn the twist grip (C1518) several times to check the tension of the friction ring (164631) inside. If the grip turns too freely check the friction ring (164631) for wear when removing it later on.

12. Remove control spindle (B1183 straight fit) from the control handle

13. Remove twist grip (C1518) from control body (B1180 straight fit).

14. Carefully lift the friction ring (164631) from the end of the control body using a scriber or small screw driver. If the ring did not provide adequate tension when tested at step 6 check to see if it is worn or damage and if so the ring should be replaced. It is usually advisable to replace the friction ring (164631) if the drill has been in use for long.

15 Check the movement of the anti-vibration operating handle (AVH697) relative to the backhead (AVH660) before removing. It should move back and forth one half inch with minimal resistance.

16. Unscrew the operating handle adapter nut (Nyloc) (D1454) from the end of the stem of the operating handle AVH697).

17. Remove the operating handle adapter nut (12812UF) with the limit plate (AVH664). Check the limit stop dowel pin (AVH662) that protrudes from the control body for wear. Always replace the rubber bumper (D2105) in the limit plate regardless of appearance or wear. .

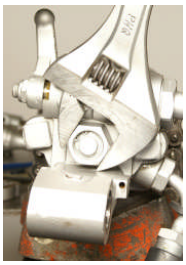
18. Remove the operating handle assembly with the control handle still intact. The anti-vibration backhead operating handle has a straight shaft and it should slip out easily. If it is tight rethread the nut and tap gently on the nut with a hammer.
19. Replace all four O-rings (AVH666) on the operating handle shaft regardless of the condition of the O-rings.

20. Remove the grub screw (AVH661) and the anti-vibration spring (AVH665). Compare the tension of the anti-vibration spring with that of a new AV spring and replace the AV spring it is not exactly the same. Check the grub screw to be sure it is ok for re-use.

21. If the limit stop dowel pin (AVH662) is worn remove it with a punch inserted in the hole behind the pin. Replace with a new pin.

Water Control Valve and Water Tube

22. Unscrew the water control valve assembly (A1506PC1) from the backhead using an expandable wrench or a large open end wrench. This valve automatically adjusts water flow through the water tube to flush drill cuttings from the hole. Air pressure from a port in the backhead competes with a spring loaded valve to regulate the flow of water.



23. Always remove the water control valve and the water tube with the water tube seal (D1675) and spacer (D1674) still in place from the bore of the backhead. Push the water tube from the front end of the machine if necessary using end of the wooden handle of a hammer...

24. Remove O-ring (164231) within the recess inside the backhead bore. This O-ring is always replaced regardless of condition

Water Control Valve (Automatic Valve)

25. Remove circlip (20015) from water control valve body (B1181PC4) with a pair of circlip pliers that are designed just to remove circlips. Remove the water valve spring cap (C1521PC1). Replace the circlip and cap if damaged or worn.

26 Remove the water valve seat retainer (C2144) and the spring (D1406). Check the tension on the spring and replace if too loose.

27. Remove water valve (C1522PC1) Check O-rings (164521) and (164301) Replace if damaged or worn.

28. Check all the valve parts to be sure they are in good condition. Reassemble the valve coating parts lightly with Vultrex triple zero grease and set aside to wait reassembly in the drill. The grease will make it easy to insert the valve without damage later on.

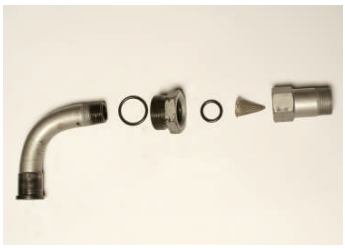
29. Whenever the water tube is inserted into the drill always place the raised washer end of the tube into the water control valve to re-insert into the backhead to be sure the end of the tube is well seated in the water control valve.

Air Connection Assembly Removal

30. Unscrew hose spud (1356588) from air bend (C1525N). Check the air inlet screen (355538A) for damage and replace along with O-ring (164999).

31. Unscrew the air bend nut (C1526) from the backhead. Always replace the copper washer (D1601). Replace any worn or damaged parts as the air connection nut and bend are safety critical.



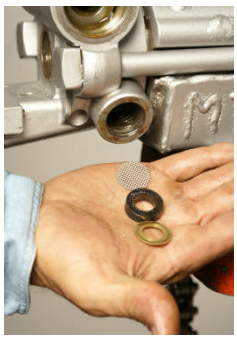


If the air connection releases from a drill during operation the hose will injure the driller!

Water Connection Assembly Removal

32. Unscrew the water inlet adapter stud (D2441) from the water stem (C1809) and unscrew water stem nut (S2141)from the backhead of the drill


33. Remove water stem thrust washer (S2487) inlet washer rubber (D1402) from the backhead of the drill. Remove the water inlet screen (C1272) with a small screw driver or a scriber.

34. Replace both O-rings (164811) as well as the stem thrust washer (S2487) and washer rubber (D1402) whenever the drill is in the shop for repair. Check the screen filter (C1272) and replace if damaged.

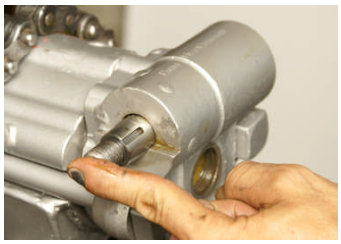

Throttle Valve Assembly Removal



35. Unscrew the throttle valve handle nut (D1385) on the end of the throttle valve (B1176). Remove the nut and disc spring (1491623MT) and slip off the throttle valve handle (C1509).

Remove the throttle valve key (D1384).


36. Unscrew the plug (2422P) that retains the throttle valve plunger assembly and throttle valve plunger (D1383) and spring (D1382). This should be done before removing the throttle valve to prevent scratching or damaging the surface of the throttle valve. Check the throttle valve plunger to be sure it is still properly shaped to engage the ratchet teeth on the throttle valve. Check the spring for tension. Replace any faulty parts.




37. The throttle valve (B1176) should push out easily. If it is tight tap gently on the end of the valve with a bronze hammer and remove from backhead.

Steel Retainer Removal



38. Remove the steel retainer pin nut (12812UF) (D1932) from the steel retainer pin (C6908).

Tap the end of the steel retainer pin with a bronze hammer to loosen.

Push the steel retainer pin through the front end lug bore using a screwdriver or punch.



39. Pull the steel retainer pin through the lug on the front end and remove the steel retainer (A2599).

40. Remove both of the square plastic steel retainer pin bushings (D6205) from the housing using a screw driver.

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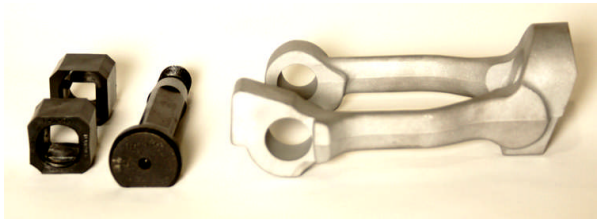
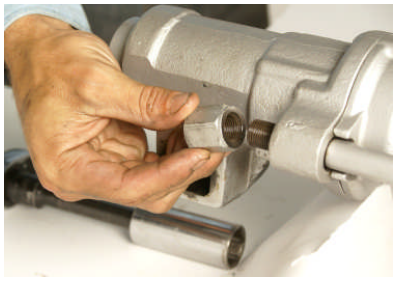
41. Examine all the parts for wear and replace any parts that are worn. Check the area of the steel retainer where the collar of the drill steel rides to be sure it is not worn out.



Side Rods and Front Head Removal

42. Loosen the side rod nuts (D1388) with an adjustable wrench and remove both nuts from the side rods. Check the thread on the side rods and the threads in the side rod nuts. Replace the side rod nuts if worn.



43. The fronthead (A2598A) should slip easily off of the cylinder (E393). If not tap the fronthead gently with brass hammer to loosen. Remove the front head and examine the mating surfaces between the fronthead and the drill cylinder for wear. If the surfaces are cracked, indented or irregular these major components may need to be replaced. .

44. Remove the chuck driver assembly from the fronthead.

Check the hexagon bore of the chuck bushing (C1418A) in the chuck (B1178) with the chuck gauge provided in the service kit. If the gauge drops 0.75” into the bushing indicating wear the bushing must be replaced. If the bushing is cracked or chipped it must be replaced before it does damage to drill steel. Set the driver assembly aside until later. If the chuck shows no sign of lubrication check the port that carries lubrication to the chuck in the front end to see if it is plugged.

45. Remove both side rods (C1572C) from the backhead end of the drill. Examine the threads for wear.

Tap the backhead (AVH660) with a brass hammer to loosen it from the cylinder.

46. Remove the backhead (AVH660) from the cylinder.

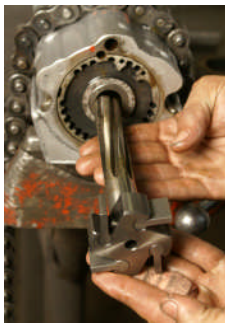
47. Remove the cylinder ferrule (D1390) complete with O-ring (164311) from the blower port in the back face of the drill cylinder.

Removal of Ratchet Ring, Rifle Bar and Valve Chest

48. Using piston removal tool (SECP1) push the piston (B233) back until it touches the valve chest (A745). Hammer gently on the tool pushing ratchet ring (B1170) until it protrudes about one inch out of the cylinder bore.

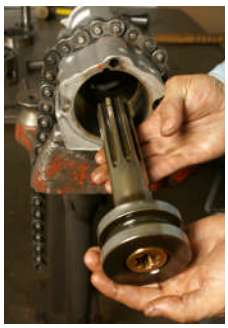
49. Remove the valve box locating pin (S2128) from the groove in the cylinder using needle nose pliers.

50. Remove the ratchet ring (B1170). Examine the teeth on the inner diameter of the ring for chipping or wear. The ratchet ring is reversible and it is advisable to reverse sides whenever removing the ratchet ring to maximize part life.



51. Remove the rifle bar (B1173B) and check the spiral flutes for wear. Set the rifle bar complete with ratchet pawls aside to examine in detail later. Reversible pawls can safely be turned to the un-used side to get more life.

52. Using the piston removal tool push or hammer gently on the face of the drill piston to push the valve chest assembly out of the cylinder until it drops in you hand.



Continue pushing on the piston (B2334) until it emerges from the drill cylinder and catch it in your hand. Examine the striking face of the piston and flutes for signs of wear. If the striking face is chipped the piston must be replaced.

Valve Chest Disassembly

53. Valve chest disassembly must be done using the proper valve punch T206. Hold the valve chest box in the palm of one hand. Place with the small end of the valve plug (A744) facing up. Fit the punch in the bore of the plug. Strike the punch with a brass hammer until the valve box (A745) separates from the valve plug (A744). Handle the precision ground parts of the valve with care.

54. Once the valve plug (A744) is loosened remove the valve plug from the valve box (A745). Next remove the valve (C1648) from the valve box (A745). Wash all the valve parts in Varsol and blow dry. Check that the parts are clean and free from debris. Check for sharp edges on the components caused by long use. Sharp edges cause the drill to run erratically and should be removed with emery cloth. Take care to just remove the sharp edge.

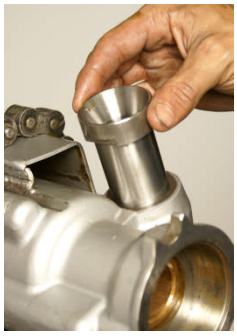
55. Align the valve properly on the stem of the valve plug. Push to mate with the face of the plug. Cover the two holes in the large diameter of the valve plug with your fingers. Pull the valve away from the mating surface. If it moves easily there is no suction created and the valve is worn.

56. Reassemble the valve and holding the assembly firmly in both hands shake back and forth. Listen for a clicking noise that signifies the automatic valve is moving inside the valve. If no distinct clicking is heard the valve is jamming. The valve must be disassembled to find the cause before returning it to the drill. The valve surfaces are precision ground to within thousands of an inch so never hand grind the faces of the automatic valve or the inner faces of the valve box.

Cylinder Lug Bushing Removal

57. Examine the cylinder lug bushings (C1523) for sign of wear. The three large O-rings (164231) often wear into the inside diameter of the bushing and can cause air crossover leaking.
To remove the cylinder lug bushing turn the cylinder on its side in the chain vice. Insert service tool T225 into the bore of the bushing and strike repeatedly with a hammer until the bushing drops through the cylinder boss.

58. To insert a new cylinder lug bushing (C1523) turn the cylinder over in the chain vice, align the locating flats on the new bushing with flats on the cylinder lug. Drive home the new bushing until it seats using the T225 lug bushing punch.



Inspection and repair of the striking face of the Piston

59. Inspect the striking face of the piston (B2334). If the striking face is not dished more than 1.0 mm (0.04 inch) you may reface the piston. Grinding of the face of pistons should be carried out in a proper machine shop where the piston is steadied in a turning jig to align the face to be ground square to the piston axis. The head must be quickly ground on a good belt grinder so that low heat is produced. Remove the raised portion and try to leave the original dished surface of the piston face. The piston should be replaced if the outer thickness of the splines at the front end are worn down to half the original size or if the piston striking face is chipped or cracked in any way.

60. The case hardening on the face of the piston is approximately1.3 mm (0.050 inch) deep so that removal of material must not exceed 0.7 mm (0.040 inch). An “egg-shell” affect is created grinding the piston face by seriously reducing the case hardened depth. The life of a reconditioned piston can be expected to be about one half of what is normally expected performance. It is often more economical to replace worn pistons.

Inspection of the fit of Piston (B2334) and the Cylinder (E393) (E393M) bore

61. To establish consistency in testing always test the cylinder with inner surfaces of the cylinder bore and outside surfaces of the drill piston free from oil. The test relies on the “feel” of the fit and function of movement of the piston within the bore and the sounds generated during testing

62 .The piston must be replaced when the head of the piston is worn down. Proper sophisticated measuring equipment to accurately gauge the wear on a piston head or in a cylinder bore is not available in most rockdrill service workshops. Cylinder and piston wear can be gauged by simple but effective established workshop practices. Place the cylinder so the font end is face down on a flat work bench. Align a new piston with the large head in the cylinder bore wrong way down. Always use a piston free of oil so that the comparison is always done under the same conditions. Grasp the splined end of the piston and slowly rock the piston back and forth in the cylinder to check the clearance. If the rocking motion of the striking end of the piston is greater than 3mm (0.12”) the cylinder is oversize. If the new piston is tight remove the new piston and replace with the used piston. If the same rocking motion is evident, it indicates that the piston is worn oversize and must be replaced.

Front Cylinder Assembly Inspection

63. The clearance between the outer diameter of a new piston stem and the inner diameter of the bronze front cylinder washer liner (C1517) is nominally 0.047mm (0.0015”). The clearance between a worn piston stem and a worn bronze cylinder liner bore is 0.160mm (0.0063”) or larger. If the cylinder liner does not visibly appear to be worn it still should be tested with the piston (B2334) installed in the normal operating position in the cylinder bore with the stem through the cylinder liner.

64. To measure the compression fit of the piston and cylinder liner place the drill cylinder body flat on the bench and advance the piston fully through the liner. With one hand gripping the spline end of the piston and the other the front part of the cylinder body push the piston back into the drill as far as it will go then pull it rapidly forward until it stops on the cushion of air above the liner.

Hold a thumb against the splines of the piston and slowly pull the piston out of the cylinder. One should be able to pull the piston face approximately three quarters of an inch further through the cylinder.

65. An alternate method to measure the compression fit of the piston and bronze cylinder washer liner is to hold the cylinder in a vertical position and push the piston up from underneath to let it free fall down into the cylinder. The piston should bounce and then move slowly to the bottom of the bore against the cushion of air.

66. A good air cushion prevents the piston from bottoming too hard on the cylinder liner during the down stroke and provides a bounce to start the piston on its backward stroke during operation. If the piston head has proper clearance with the cylinder bore and there is no bounce of the piston on a cushion of air during the test then the bronze front cylinder washer liner (C1517) must be changed to improve compression.

NOTE: It is very important that the distinct “pop pop” sound of a good air cushion is heard during this test, not the jarring “clank” sound of metal on metal impacting of the two parts.

67. To remove the bronze front cylinder washer liner (C1517) place the cylinder body under the piston of a hydraulic press. Use T201 to press the bronze liner out of the cylinder. If a press is not available the liner can be driven out by striking the T201 tool carefully with a hammer.



68. To install a new liner stand the cylinder body on the press bench with the front end down. Carefully place a new bronze liner (C1517) in the front cylinder washer using the lead on the liner to align the bushing in the bore. A good method is to place the liner on a piston and insert the liner with the piston to be sure of alignment. Insert a second piston (B2334) with the head into the bore resting on the bronze liner or head of the first piston. Push the bushing with the hydraulic press until it bottoms out inside the cylinder with an audible "click".


69. Often the inside diameter of the bronze front cylinder washer (C1517) will shrink inwards due to the pressure on the outside diameter as it is pressed into place. Check that the piston stem moves freely through the bronze washer and if required hone the inside diameter until the fit is correct. The front cylinder washer liner test should be repeated after installing a new bronze liner and if metal on metal contact occurs repeat the inspection of the cylinder bore and piston head.

Chuck Insert Removal

70. Inspect the hexagon bore of the chuck bushing (C1418A) with the gauge tool C3720. Replace the chuck bushing if it is cracked, chipped or worn oversize. If the gauge enters the bushing across the flats 19,19mm (0.7555") or more, the insert is worn oversize. Worn chuck bushings damage drill steel and can cause the water tube to break off when the drill steel is very sloppy in the chuck bushing. Chipped bushings damage drill steel.

71. To remove the chuck bushing (C1418A) place the chuck assembly in tool T218 under the piston of a hydraulic press. Place the service tool T555 for collared chuck inserts in the bore of the chuck and press out the chuck bushing, It is important that all parts are correctly aligned in this pressing operation to avoid damage to the chuck. It toll T218 is not available place the chuck assembly in a used fronthead (A2598A) inverted and supported between two steel blocks)

Check the top outer diameter of the chuck bushing and the top inner diameter of the chuck. If either is corroded there has been no contact between the bushing and the chuck and the chuck should be discarded as it no longer is supporting the front of the chuck bushing. Rule of thumb says that up to five chuck bushings can be replaced in one chuck before the chuck is worn out.

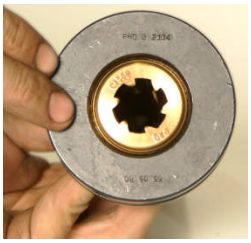
72. To replace the chuck bushing (C1418A) invert the chuck under the piston of a hydraulic press and insert the chuck bushing and tool T221 for collared insert and T555 for collarless insert in the open end. Align the chuck, chuck bushing and the pressing tool and press the chuck bushing home until fully sealed.



The interference fit between the chuck bushing and the chuck is nominally two thousanths of and inch and requires from six to fifteen tons of force to push into place. The bushing hits bottom with an audible "bang" when properly pushed into place in a hydraulic press.

Rifle Nut Removal

73. Inspect the (flutes) splines of the rifle nut (C1508) and replace when the splines are worn down past 50% of original thickness. Rule of thumb says that the rifle nut should be replaced whenever the mechanic knows the drill will be used in a remote, inaccessible or difficult to get to work place to prevent the premature return of the drill to the repair shop.



C1508 RIFLE NUT NEW

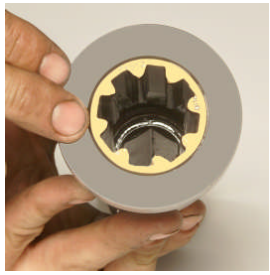
C1508 RIFLE NUT 50% WORN

C1508 RIFLE NUT 100% WORN

74. The mechanic can make a tool to remove a worn rifle nut (C1508) from a good piston (B2334) without damaging the piston by welding a steel handle across the bottom end of a used rifle bar to form a wrench. A good tool to hold the piston can be made by brazing a used (but fairly good) chuck nut (C1512) into a used chuck (B1178) and welding the chuck to the side of the work bench at working height in a convenient location. Insert the splines on the stem of the good piston into the spines of the chuck nut. Insert the wrench tool made from a used rifle bar into the rifle nut and unscrew the rifle nut from the piston head. Note: the rifle nut is left hand threaded so unscrew in a "clock wise" direction.

Chuck Nut Removal

75. Inspect the splines of the chuck nut (C1512) and replace when splines are worn to half their original thickness. The mechanic can make a tool to remove chuck nuts by welding a steel handle across the head of a piston (B2334) to create a wrench. A good tool to hold the chuck is the collar of a drill rod welded to the side of the shop bench at work height in a convenient location. Slide the chuck insert onto the drill rod collar and using the fabricated wrench unscrew the chuck nut out of the chuck. The nut is left hand threaded so unscrew in a clockwise direction.



C1512 CHUCK NUT NEW

C1512 CHUCK NUT 50% WORN

C1512 CHUCK NUT 100% WORN

76. Place the chuck insert onto the collar of a drill rod that has been cut and welded to a steel bench or other rigid support. Place the splines of the Chuck Nut Wrench tool into the splines of the chuck nut. Turn the handle clockwise to remove the left hand threaded chuck nut.

76. An alternate method of removing a chuck nut is to grip the chuck firmly in the jaws of a bench vice with copper jaw inserts across the flats provided for the purpose. Unscrew the chuck nut using a service tool made from an old piston stem welded onto a handle or with flats ground to take a large crescent wrench. The parts are left hand threaded.

These same tools are used to install rifle nuts in pistons and chuck nuts in chuck drivers.

Assembly Procedures

77. To install a piston with the cylinder horizontal in the jaws of a vice use a rifle bar for alignment. Oil the stem end of the piston and insert into the cylinder bore guiding it with care not to strike the step for the valve chest seat in the cylinder .

78. To replace the valve box assembly (Parts A745 C1648 A744) place the cylinder upright on a flat work bunch and carefully insert the valve box assembly into the bore of the cylinder. Align the valve locating pin (S2128) in the groove in the valve box and cylinder. Place tool T205 on top of valve box assembly and gently tap the valve box home with a brass mallet. The valve box should fit fairly tightly in the bore of the rock drill cylinder.

The valve chest assembly is the “heart of the drill”. The valve controls the working of the drill by directing air to the proper ports to activate all the moving parts in the drill. Great care must be taken when removing, cleaning, examining and replacing the valve chest assembly in the drill.

79. Insert the ratchet ring (B1170) into the cylinder, taking care to align the groove in the ratchet ring to fit the valve locating pin (already installed). Gently tap around the circumference of the ratchet ring home with a brass mallet until the ratchet ring seats down snugly on top of the valve chest assembly.

80. Assemble the rifle bar parts. Rifle bar – reversible (B1173B) four ratchet pawls - reversible (D6177) four pawl plungers (S2134) and four pawl plunger springs (D1611C). If the pawls appear “rounded” reversible pawls can be turned once to present the square (not worn) side of the pawl to the teeth of the ratchet ring. This provides for extended life for these fast wearing parts. PHQ does not recommend grinding the face of rounded pawls. It is often more economical to replace these in-expensive and fast wearing parts when a drill is in the shop for repair.

81. To insert the rifle bar assembly, lightly oil the splined end of the rifle bar. Holding all four ratchet pawls closed (with the fingers of both hands); guide the stem of the rifle bar into place in the rifle nut. Insert the head carefully into the ratchet ring slowly turning at the same time. Oil the pawls in the ratchet ring. Check the pawl sequence by slowly turning the piston and listening to the action, the pawls should click into place in a 1, 2, 3, 4 sequence

82. With the cylinder in the horizontal position in the bench vice, insert ferrule (D1390) and O-ring (164311). Slide the backhead (AVHA660) into position over the ratchet ring, taking care to fit the valve box locating pin (S2128) in the appropriate groove in the backhead

83. Insert the two side rods (C1572C) from the back end of the drill by sliding them alongside the cylinder body in the grooves provide. Seat the square heads of the side rods to match with the machined area on the backhead.

84. Lightly oil the splined end of the piston before proceeding. Install the fronthead end assembly, complete with the chuck driver assembly, into position on the front of the cylinder. Move the holes in the front end over the threaded ends of the side rods and at the same time sliding the chuck driver nut over the splines of the piston inside the cylinder.

85. Thread the side rod nuts (D1388) on the side rods (C1572C). Tighten progressively and evenly on both sides. Even tightening is critical to the life of the side rods in service. Working from side to side tighten the side rod nuts to a minimum torque of 1313NM (90ft lbs). Use a proper torque wrench if available.

86. To assemble the steel retainer mechanism, insert the two steel retainer pin bushings (D6205) into the fronthead lug. Hold steel retainer (A2599) in position over the fronthead. Insert steel retainer pin (C6908) from the side taking care to align the location flat on the retainer pin and retainer. Drive the retainer pin home with a copper mallet.
Tighten the steel retainer pin nut (12812UF).

87. Make sure the O-ring (164231) is in position inside the drill backhead before starting to install the tube. Lightly oil the water tube (C1574A) and slide the water tube spacer (D1674) and water tube seal (D1675) onto the tube making sure these parts face the right direction to properly seal. Place the end of the tube into the end of the water valve assembly (A1506PC1).

88. Check to insure the proper fit of the water valve on the tube. Apply anti-seize lubricant to the threads of the water control valve to prevent them from galling and insert the tube and water control valve assembly together into the backhead. Tighten the water valve assembly to torque of 1313Nm (90ft lbs).

89. Fit water bend assembly parts into the backhead in order. Water inlet screen (C1272) water inlet washer rubber (D1402) water stem thrust washer (S2487) water stem (C1809) with both O-Rings (164811) and water stem nut (S2141). Tighten the water stem nut. Fit water inlet cover (C1811W) to protect the water stem threads and prevent ingress of dirt.

90. Lightly oil the throttle valve (B1176) and insert it into position in the backhead. Check fit and function to be sure the valve slides easily into place in the backhead and turns freely inside the bore. Align the large opening in the side of the throttle valve with the opening in the backhead

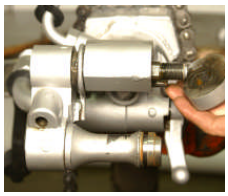
91. Invert the drill in the chain vice. Insert the throttle valve plunger (D1383) and throttle valve plunger spring (D1382) into the hole in the bottom of the backhead with a dab of grease. Look through the handle end of the hole to check the alignment of the detent with the ratchet grooves of the throttle. Tighten plug (2422P) into the backhead.

92. Fit the air bend nut (C1526) with the air bend (C1525N) into backhead (AVHA660) using a new air bend copper washer (D1601). Tighten the air bend nut in position and thread the hose spud (1356588) onto the air bend. Fit the air line cap (C1811A) to protect threads on the hose spud and prevent the ingress of dirt.

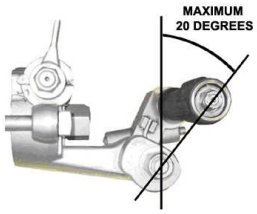
93. Fit the throttle valve handle key (D1384) into the slot in the throttle handle and slide the throttle handle (C1509) onto the shaft over the key. Note the key is designed as a tight fit in the handle for longer life. Install disc spring (149163MT). Tighten the throttle valve handle nut (D1385) and test ratchet action of the throttle valve.

94. Place the end of the anti-vibration spring (AVH665) in the stop on the backhead. Install four new O-rings (910660216) on the shaft of the anti-vibration handle adapter. Lightly grease the shaft and slide the anti-vibration handle adaptor (AVH697) into the backhead. Fit the coil of the anti-vibration spring (AVH665) into the groove machined around the shaft.

95. Place the short end of the spring between the two stops on the control handle shaft. Put the limit plate (AVH664) complete with a new rubber bumper (D2105) on the square end of the handle adapter. Tighten grub screw (AVH661) on the anti-vibration spring where it meets the backhead.



96. Set the anti-vibration operating handle adapter at the proper angle (maximum 20 degrees off vertical). Tighten the operating handle nut nyloc (12812UF) on the outside of limit plate (AV664). Test movement of the operating handle relative to the backhead. The handle should oscillate approximately one half inch.



97. Check the control handle friction ring (164631). Grease control spindle (B1183 straight fit) and push it into the control body. Fit the twist grip (C1518) disc washer (149122MT) and tighten nut (1218UF) in position.

98. Check rotation of the twist grip. The feel should be firm with the new O-ring but not rigid. Check that the anti-vibration handle assembly moves in relation to the backhead and is not rigid.

99. Lightly oil the retract valve assembly (C151415) with five new O-rings (164811). Insure the valve and valve sleeve are properly assembled. Insert the assembly into the bore of the adaptor. Fit the two springs (D1424) (D1425) into the bore of the handle adaptor. Screw plunger plug (112FN502)in position

100. Check the clevis body spindle and install three new O-rings (164231) If a new cone is required assemble with a new spindle. Ensure the pin in the spindle is aligned with the key way in the clevis body.

101. Fit the clevis body (A693A) onto the shaft of the clevis body spindle with the spindle locating pin (D2546) lined up properly. Thread on the clevis body spindle nut (D1982) and tighten.

102. Insert the clevis body spindle assembly into the cylinder lug bush. Fit the spindle thrust washer (D1392) two lock washer keys (D1426) spindle spring (C1571) spindle lock washer (C1519) and spindle nut (C1527).

103. Take care when slipping the lock washer over the spindle that the keys are in the proper place. Tighten the spindle nut to give the desired degree of friction between the clevis assembly and the cylinder lug bush.

Your PHQ250JHMAVL Anti-vibration drill is now complete and ready for testing.

Running in

104 Place the assembled drill on the PHQ test bench and run for approximately 15 minutes at low throttle to "run-in" the assemble parts and insure the parts in the drill are fully lubricated before testing the torque of the drill. The PHQ test bench supplied with compressed air at a minimum volume of 5.0 cu m/m (175 cfm) and minimum pressure of 620 kPa (6 Bar) (90 psi) is required to adequately test Jackleg and Stoper Pneumatic Rock Drills.

Remove the pusher leg from the jackleg drill and connect the drill to the adapter on the saddle.

Move the drill saddle forward with the pneumatic pusher cylinder built into the test bench.

Insert the spring loaded collared rod shank into the chuck bushing of the rock drill and close the steel retainer locking the drill into position so that it does not jump back if leg pressure releases.

Rotate the control handle forward so the piston in the built in cylinder pushes the drill forward

Run the drill under full leg pressure at partial throttle for no more than 15 minutes.

Running the drill under controlled conditions in the shop accomplishes several things:

- The rifle bar polishes the bronze of the rifle nut.
- The piston splines polish the bronze of the chuck driver nut.
- The drill doctor listens for irregular sounds and to be sure the drill runs smoothly.
- The drill doctor places his hand on the cylinder of the drill near where the front head joins the cylinder to check for heat that may be generated

If the drill sounds smooth during the running and the body remains fairly cool to the touch during and after the run in period the Rock Drill Doctor can be satisfied that the repairs were done properly and that the drill is running properly. This ensures smoother running later on when the drill is run at full throttle in actual drilling operations.

The drill is now ready for torque testing and already in the proper position on the test bench.

Testing the Jackleg

Remove spring loaded shank steel assembly from the bench and replace with the torque test head

Before engaging the drill to the head make sure the torque head is “loosened off” at least five rotations. This will allow the drill revolution to build up momentum going into the torque test.

Move the drill forward with the pneumatic pusher cylinder built into the torque test bench.

Insert the rod shank adapter on the torque tester into the chuck bushing and close the steel retainer

Release the feed pressure on the drill by shutting off the air to the pusher leg.

With the drill in position and no pusher leg pressure suddenly throw the throttle handle forward opening the valve fully to operate the drill for a short burst at full throttle ending in a stall.

Observe the reading on the air consumption gauge, which should read 5000 LPM (170 CFM).

When the drill stalled the reading on the torque gauge should be minimum 2000 Nm (140 ft lbs)

When testing a sinker drill, the same test procedure is used.

PICTURE SHOWS A STOPER DRILL DURING RUN-IN PROCEDURE

Water Testing Procedure.

Testing of water connections and the flow of water through the drill can be accomplished while the drill is “running in” on the test bench.

The air connection to the drill is already in place, leave the air valve turned on.

Shut the hammering of the drill down temporarily using the throttle handle.

Connect the water hose to the proper connection on the drill and turn on the water valve.

Connect the banjo fitting on the spring loaded shank assembly to a drain hose (into a bucket)

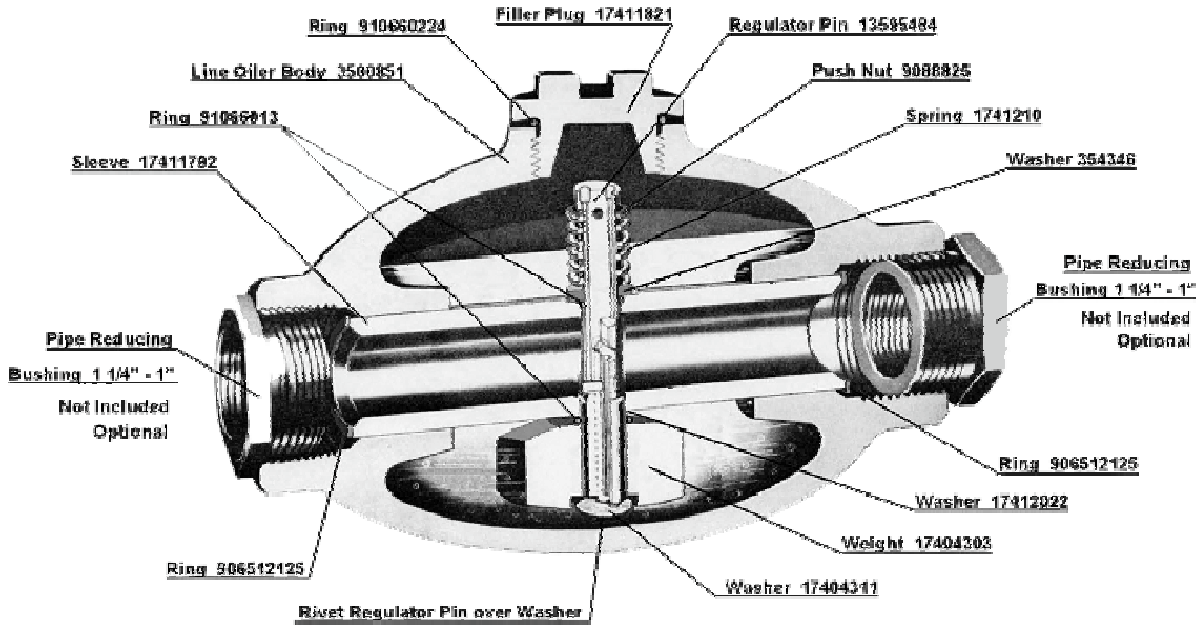
Advance the throttle handle forward to engage the valve to the second notch. Water should be exiting from the water tube at the front of the drill and coming out of the drain hose.

Return the throttle lever to the “off” position and the water should stop running in the drain.

With the water pressure still on check for leaks around the water inlet and automatic water valve.

NOTE: The water regulation control valve will not work if the water pressure supplied to the drill is equal to or greater than the air pressure supplied to the drill. The ideal air pressure for PHQ drills is 7 bar (100psi). The ideal water pressure is 3 bar (45 psi).

JOY Football Style Lubricator



The JOY football style lubricator (50481912) requires little or no servicing as the parts experience very minor wear in operation over long service intervals. When a used lubricator is returned to the drill shop it is usually sufficient to thoroughly wash out any accumulated dirt or debris in the reservoir of the lubricator with Varsol. Blow dry and rinse with oil before returning the lubricator to service. Relacement parts are avaliable though customers seldom buy any parts for lubricators. The threaded pipe bushings in the ports in the lubricator may need to be replaced after prolonged use. The safety filler plug (17411821) could be hammered on by drillers to the point where the shape has been damaged to the extent it can not be gripped by a wrench and needs to be replaced.

PHQ250 Anti-Vibration Jackleg Parts Performance		Feet Drilled		Meters Drilled	
Part Number	Description	Soft Ground	Hard Ground	Soft Ground	Hard Ground
	SHOP TRIP	4000	3000	1200	900
D1611C	PAWL PLUNGER SPRING	4000	3000	1200	900
C1418A	CHUCK INSERT (7/8" HEX)	4000	3000	1200	900
AVH665	ANTI-VIBRATION SPRING	4000	3000	1200	900
AVH666	ANTI-VIBRATION O-RINGS (4)	4000	3000	1200	900
D2105	ANTI-VIBRATION PLUG	4000	3000	1200	900
C1512	CHUCK NUT	4500	3500	1400	1000
D6177	RATCHET PAWL - REVERSIBLE	5000	3500	1500	1000
C1574A	WATER TUBE - SWAGED	5000	3500	1500	1000
S2134	PAWL PLUNGER	5000	3500	1500	1000
AVH697	OPERATING HANDLE	6000	4000	1800	1200
C1509	THROTTLE VALVE HANDLE	6000	5000	1800	1500
C1508	RIFLE NUT	7000	2500	2100	800
B2334	PISTON	8000	7000	2400	2100
JC45	SPUD ASSEMBLY C/W SCREEN	9000	9000	2700	2700
AVH662	LIMIT STOP	10000	10000	3000	3000
C2144	WATER VALVE SEAT RETAINER	10000	10000	3000	3000
D1675	WATER TUBE SEAL	10000	10000	3000	3000
B1178	CHUCK	12000	6000	3700	1800
D1388	SIDE ROD NUT	13000	11000	4000	3300
D6205M	BUFFER FOR RETAINER	13000	11000	4000	3300
C1572C	SIDE ROD (JACKLEG)	13000	12000	4000	3700
D1433	VALVE ASSEMBLY - FEED RELEASE	14000	13000	4300	4000
355538A	SCREEN	15000	15000	4600	4600
C1809	HOSE STEM - THREADED TYPE	15000	15000	4600	4600
D1601	AIR BEND NUT WASHER	15000	15000	4600	4600
D2441	WATER INLET ADAPTER SPUD	15000	15000	4600	4600

PHQ250 Anti-Vibration Jackleg Parts Performance		Feet Drilled		Meters Drilled	
Part		Soft	Hard	Soft	Hard
Number	Description	Ground	Ground	Ground	Ground
S2141	WATER STEM NUT	15000	15000	4600	4600
C1517	FRONT CYLINDER WASHER LINER	16000	12000	4900	3700
C1809	HOSE STEM - THREADED TYPE	18000	18000	5500	5500
B1173B	RIFLE BAR (REVESIBLE)	20000	12000	6100	3700
B1176	THROTTLE VALVE	20000	15000	6100	4600
C1272	WATER INLET SCREEN	20000	20000	6100	6100
C1648	VALVE	20000	20000	6100	6100
A1502	HANDLE ASSEMBLY	28000	20000	8500	6100
D1515A	BUCKET SPACER - UPPER	28000	26000	8500	7900
A639A	CLEVIS BODY	30000	20000	9100	6100
C1523	CYLINDER LUG BUSHING	30000	20000	9100	6100
C1526	AIR BEND NUT	30000	26000	9100	7900
D1406	WATER VALVE SPRING	35000	35000	10700	10700
S2128	VALVE BOX PIN	40000	30000	12200	9100
C1525N	AIR BEND	45000	45000	13700	13700
B1170	RATCHET RING (35 TEETH STANDARD)	50000	35000	15200	10700
A2598A	FRONTHEAD	50000	40000	15200	12200
A2599	STEEL RETAINER	60000	50000	18300	15200
A745	VALVE BOX	60000	50000	18300	15200
B1181PC4	WATER CONTROL VALVE BODY	90000	80000	27400	18300
B1308	CARRYING HANDLE C/W BOLTS AND NUTS	90000	80000	27400	18300
AVH660	BACKHEAD AVHB	90000	80000	27400	18300
C1791	BOTTOM CAP - 4 PRONG	100000	100000	30500	30500
D1383	PLUNGER FOR THROTTLE VALVE	100000	100000	30500	30500
E393M	JACKLEG CYLINDER - MUFFLED	200000	150000	61000	45700

Troubleshooting Guides

Problem	Probable Cause	Remedy
104. Rock drill will not start when throttle handle is advanced.	Air line supply blocked	Always blow the air hose. Check air connection screen.
	Piston sticks air hissing past	Cylinder may be dented or damaged. Replace cylinder at the rockdrill shop. (SM 61-66)
	Dirt in automatic valve assembly or valve gummed by thick oil	Return drill to rock drill shop to repair valve. (SM 53-56)
	Automatic valve flooded by lubricant or gummed by grease.	(SM 111)
	Ice in the muffler or exhaust ports	(SM 106)
	Damaged front cylinder washer	Hone or ream front cylinder washer or replace. (SM 63-66)
105. Rock drill runs erratically or lacks power during drilling operations.	Lubricant too heavy (thick) for the ambient operating temperature.	(SM 111).
	Improper amount of lubricant.	(SM 111).
Penetration is erratic or slower than normal.	Valve chest sticking	Check parts for sharp edges. Check operation (SM 53-56)
	Side rods tightened unevenly	Relax side rod nuts; re-tighten properly (SM 85).
	Parts broken inside the drill.	Replace broken parts at the rockdrill to shop
	Pawls and springs worn out	Replace broken parts at the rockdrill to shop (SM 80)
	Insufficient air supply to leg	(SM 112).
106. Water coming out of the exhaust ports on the drill. Rockdrill freezing up and the muffler or exhaust ports are blocked with ice. **Excess fogging in the work place area.**	Excess water in the air entering the rock drill	Install water trap in pipeline. Blow moisture out of hoses. Check water tube for breakage cracks or missing rubber seal. Check the O-Ring (164231) inside the Backhead (SM 87) Water pressure must be less than air pressure by 30 psi.

Troubleshooting Guides

Problem	Probable Cause	Remedy
107 Drill runs sluggish	Excess water in the air Too much lubricant in drill	(SM 106). (SM 111).
108. Drill sounds like it is running properly but it lacks drilling power.	Cuttings not being removed from the drill hole fast enough	Use direct blow to remove cuttings (throttle handle back)
	Plugged drill steel or water tube	Check and clean (SM 23)
Penetration into the rock face is too slow.	Drill not aligned with drill rod during drilling operation.	Driller must keep the machine ligned up with the drill rod.
	Loss of bit gauge causing binding of the bit in the drill hole	Gauge grind worn bits and color code by diameter size.
	Drill shank is too long or short	Check drill shanks regularly for damage or collar wear.
	Broken piston or worn piston face	Replace the drill piston at the rockdrill shop. (SM 61-66)
	Partially blocked air supply	Check air lines. Blow hose. Check air connection screen.
	Low air pressure	Minimum air pressure 80 psi Ideal air pressure 100-110 psi
	Lack of lubrication	(SM 111).
	Loss of cushion (compression) in the drill due to worn buffer ring, or worn piston.	Check front cylinder washer and piston in rockdrill shop Replace if worn (SM 64-65).
	Damage to the drill cylinder body. Drill cylinder body heating up.	Check the drill cylinder at the rockdrill shop. Look for wear to mating faces and check interior wear (SM 61-62) If worn replace the drill cylinder body in the rockdrill shop.
	Damaged chuck assembly	Check the chuck at the rock drill shop (SM 44) (SM70-76) Replace worn or damaged part
	Damaged front end	Check the front end at the drill shop (SM 42-44) Replace.
	Pusher leg not functioning	(SM 112).

Troubleshooting Guides

Problem	Probable Cause	Remedy
109. Bronze cuttings exhausting from rock drill ports.	Rifle Nut Failing Rifle nut burned by overheating	Rifle bar heat checked from lack of lubrication (SM 111). Rifle Bar failing or broken. Replace at rockdrill shop.
	Chuck Nut Failing Chuck nut burned by overheating	Piston heat checked from lack of lubrication (SM 111) Piston failing or broken. Replace at rock drill shop
110. Drill parts wearing faster than normal. **Service trips to rockdrill shop too frequent.**	Improper Lubrication. Dirt or debris entering the drill	(SM 111). Check front end blow Plug or cover all openings in the drill when in storage or moving between drill sites.
111. Faulty Lubrication **According to experts in the maintenance field:** ***"Lack of lubrication is the leading cause of failure of parts in machinery"!***	Lack of Lubrication	If using rock drill oil fill lubricator at beginning of shift and check level mid shift. If using rock drill grease fill the lubricator at the beginning of each shift. Check lubricator flow setting. Lubricant high viscosity (too thick) for ambient temperature Drill hose maximum 12 feet
	Wrong Lubrication	Use EP100 rockdrill oil or Triple zero Vultrex grease at temperatures -10 +40° Celsius
	Excessive Lubrication Lubricator flooded by oil Lubricator stuck with grease.	Check lubricator setting Oil at a viscosity too low for a warm ambient temperature Grease may be too thick for a cold ambient temperature. Lubricator may be damaged.
	Excessive water in the air supply	Excessive water will wash lubricant out of the drill. (SM 106).

Troubleshooting Guides

Problem	Probable Cause	Remedy
112. Pusher Leg not functioning properly. **Drill is jumping on the leg during drilling operations.**	Insufficient (lack of volume) or erratic pressure supply of air to the pusher leg.	Check the Clevis body for loose fitting or damage (SM 1) Leg control handle assembly O-Rings worn out (SM 18). Retract valve O-Rings worn out or damaged (SM 7) Replace parts in rockdrill shop
	Bucket seals in leg worn	Examine and replace bucket seals (See Leg Manual)
	Bent piston rod	Check piston rod. Return to rockdrill shop. Replace if bent.
	Dented pusher leg cylinder	Check the cylinder for dents and return to rockdrill shop for replacement if dented.
113. Drill steel failing at the collar or forming a coke bottle shape. **Drill steel showing chips or chunks out of striking face at the collar end.** **Pistons in drills have chips out of the striking face or are failing at the striking face.** **Experience has proven:** ***"One chipped piston can damage a lot of new drill rods. One chipped drill rod can damage a lot of new pistons"!*** **They need to be removed**	Drill steel was worn or chipped to begin with.	Remove damaged steel from the circuit. Check piston face.
	Piston in the drill has a chipped or broken front striking face.	Replace the piston. Check drill steel for chipped ends.
	Drill steel does not have a square face on the striking end.	Remove damaged steel from the circuit. Check piston face.
	Refaced piston in the drill was not machined properly.	Replace the piston in the rock drill shop. (SM 59-60)
	Worn chuck insert	Check the chuck insert with gauge. If worn replace in the rock drill shop. (SM 44)
	Worn chuck parts caused by poor alignment of steel with the hole	Replace the worn parts Check the drill steel ends are square.
	Collaring holes with drill steel longer than four feet.	Holes should be collared with two foot or four foot drill rods. Side pressure enlarges chuck inserts or breaks the insert.
	Running out the full length of the leg so that the lack of push makes the drill bounce on the drill rod	Always pull in the leg before reaching full extension and reposition to continue drilling.

Troubleshooting Guides

Problem	Probable Cause	Remedy
114. Drill steel does not rotate in the rock drill or has weak rotation.	Rifle bar or rifle nut worn out	Return drill to rock drill shop to replace rifle bar (SM 80) or rifle nut (SM 73-74).
	Worn chuck driver assembly	Return drill to rock drill shop to replace chuck driver nut (SM 70-72).
	Piston flutes badly worn or chuck nut worn out and stripped	Return drill to rock drill shop to replace piston (SM59-60) or chuck driver nut (SM75-76).
	Side rods tightened unevenly	Relax side rod nuts; re-tighten properly (SM 85)
	Lack of lubrication to front end.	(SM 111).
	Damaged front cylinder washer	Hone or ream front cylinder washer to proper fit or replace.
115. Stuck drill steel	Plugged drill steel or water tube	Remove and clear water tube.
	Broken water tube	Replace water tube (SM 23)
	Poor alignment of drill with hole	Always drill in line with hole.
	Low water pressure. Intermittent water supply	Check for water line blockage crimped water hose or plugged screen in water connection.
116. Drill overheating	.Over feeding rock drill can cause overheating of the drill body.	Maintain proper leg pressure so drill rod visibly rotates,
	Pulling drill steel with a machine run at high throttle and insufficient feed pressure allows the piston to freewheel in the drill and build up excessive heat.	When a drill hole is completed always pull the drill steel with the machine running at partial throttle. Use occasional bursts of full throttle to clear a hole.
	Following worn bits with oversize bits or using bits with gauge loss.	Gauge grind worn bits and color code by diameter size.
	Drilling with insufficient water to clear cutting drill rod stuck.	(SM 115).