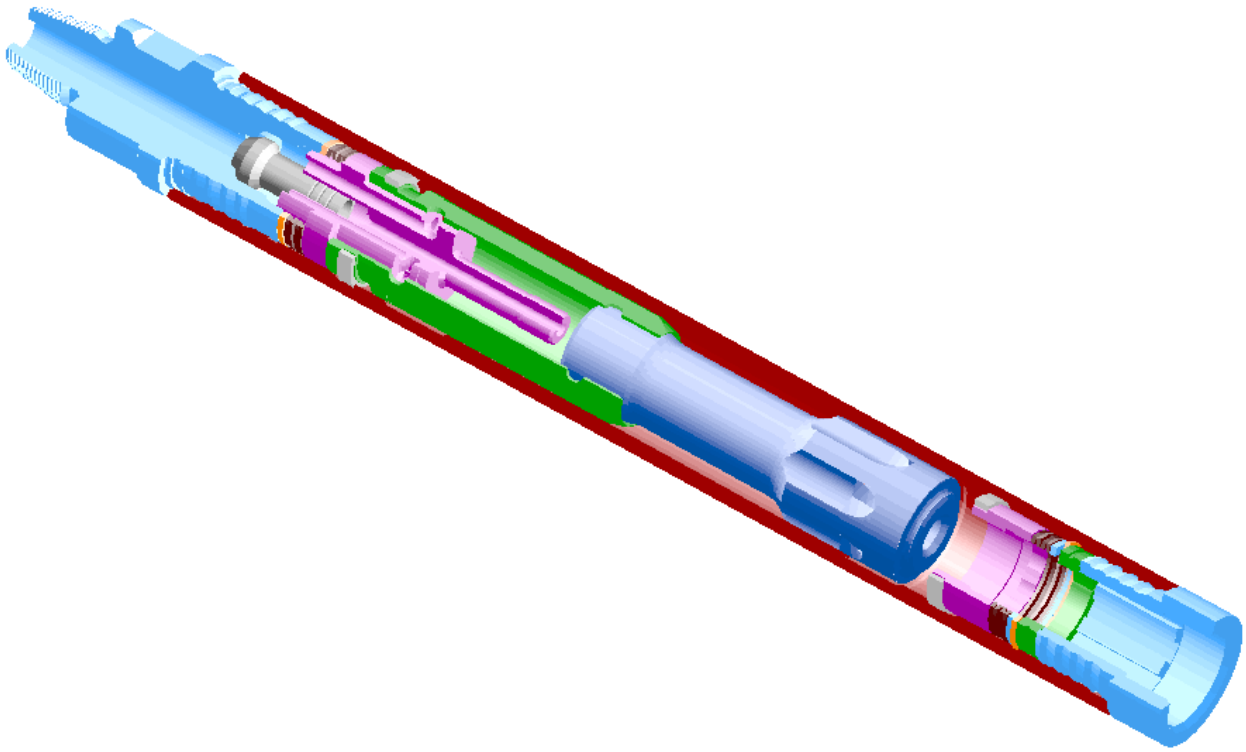
Rock Hog® Rock Drilling Products

RH6S & RH6SHD
DTH HAMMERS

OPERATION & MAINTENANCE MANUAL

MANUAL No HW-49011



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Section 1. General Information

1.1 Description

The RH6S hammer is a valveless pneumatic percussion hammer for drilling in all rock formations. It is designed for a wide range of applications including water wells, blast holes, and construction. This long proven design incorporates one moving part, the piston, making the hammer very reliable. All external parts are hardened to resist wear while all critical internal parts are also hardened for maximum service life. The simple design also makes the hammer easy to maintain and service. A variety of models are available. There is the standard model suitable for all applications. There is the heavy duty "HD" option; this hammer has a larger outside diameter for blasthole & quarry applications. And there is the low volume "LV" option; this hammer will build the same operating pressure as the standard model on a lower volume of air supply.

1.2 SPECIFICATIONS

	English	Metric
Outside Dia		
Standard Model	5.46 in	139 mm
Heavy Duty Model	5.75 in	146 mm
Overall Length Without Bit		
RH6Si Models	53.0 in	1346 mm
RH6Sm Models	53.6 in	1361 mm
Total Weight		
Standard Model	215 lbs	97.5 kg
Heavy Duty Model	248 lbs	112.5 kg
Bore Size	4.44 in	113 mm
Piston Weight	45 lbs	20.4 kg
Drillpipe Connect	3-1/2 Reg API Pin Up others available upon request	
Wrench Flats	4 in	102 mm
Hole Size Range		
Standard Model	6 in to 8-1/2 in	
Heavy Duty Model	6-1/4 in to 8-1/2 in	
Bit Shank Required		
RH6Si Models	360	
RH6Sm Models	5315/SD6	
Minimum Air Volume Required		
RH6S Models	750 cfm	21 cmm
RH6SLV Models	450 cfm	13 cmm
Maximum Operating Pressure All Models	350 psi	23.8 bar

1.3 Air Supply

Two models, standard & low-volume (LV), are available to accommodate different air supplies. For the standard RH6s models, a minimum of 750 cfm should be supplied to the hammer up to air supplies of 1250 cfm. For the LV models, a minimum of 300cfm should be supplied to the hammer. The LV model is well suited for air supplies up to 800 cfm. Both versions will function on lower supplies but the penetration rate will be very slow. For the fastest possible penetration, the hammer should be operated at the highest obtainable pressure for the given air supply. A maximum pressure of 350 psi is recommended. Operating at pressures over 350 psi will increase penetration rates but shorten the service life of internal hammer parts and the bits.

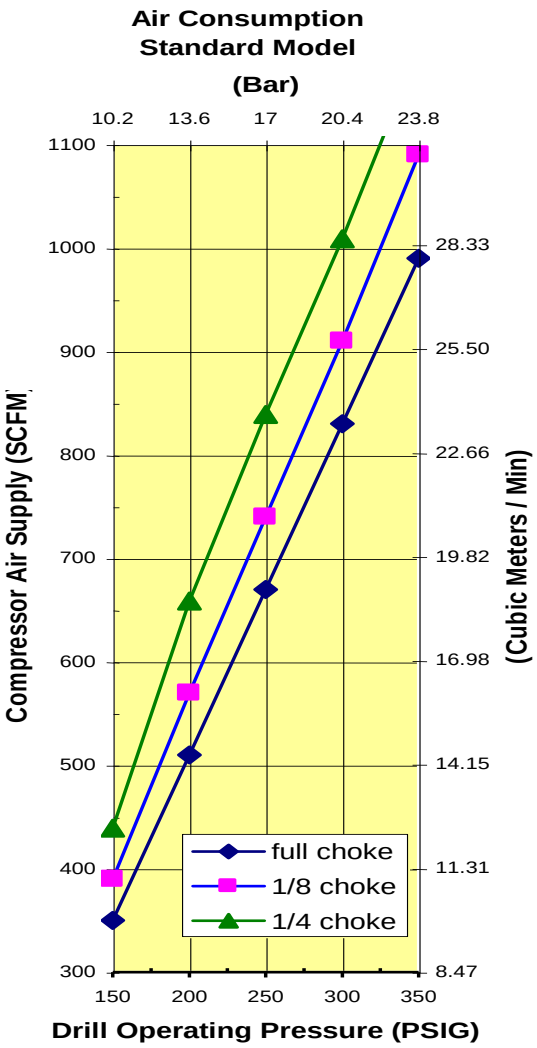
The charts on the next page show the hammers operating pressure for a given air volume supply based on operation at sea level. If a large air volume is supplied, the choke will need to be opened to maintain the 350 max psi. The choke adjustment is explained in section 2.4

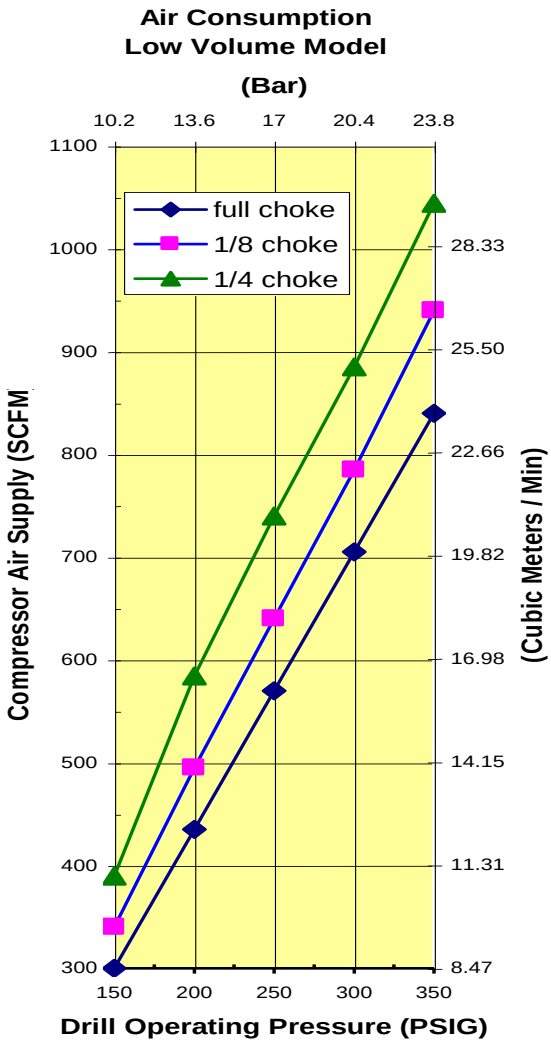
1.4 Unpacking a New Hammer

First make note of the hammer Part Number & Serial Number found on the ID label outside of the hammer shipping tube and also on the wearsleeve of the hammer. Your Rock Hog representative will need these numbers if you have questions on the hammer. The 12-digit hammer serial number is the backhead & air distributor numbers put together.

Once the hammer has been unpacked, locate and remove the plastic bag attached to the backhead. This bag contains 2 optional chokes. Keep these chokes for possible future use.

Air Supply Charts for section 1.3





Section 2. Hammer Operation

2.1 Lubrication of Internal Parts

The hammer must have a constant and adequate supply of oil to prevent part wear, corrosion, and failure. Rock Hog recommends Mobil ALMO series, Chevron VISTAC series, or an equivalent grade. Contact your local lubricant representative for the proper grade to use for your drilling environment and temperatures.

Make sure the oil injector is filled and working properly. Always verify that there is oil coming through the drill string, **DO NOT RUN THE HAMMER WITHOUT CONSTANT OIL INJECTION! THE HP HAMMERS REQUIRE MORE OIL THAN THEIR PREDECESSORS.**

Set the system to inject 1.0 pints per hour for every 300 cfm of air supply. Example, if the supply is 950 cfm, inject 950/300x1.0 = 3.2 pints per hour.

Oil Properties			
Mobil ALMO Grade	**525**	**529**	**532**
Chevron VISTAC Grade	**ISO46**	**ISO 150**	**ISO 320**
When to use	winter	summer	summer, production drilling
ISO viscosity grade	46	150	320
SAE viscosity grade	20W-20	30	50
Viscosity			
cSt @ 40°C, ASTM D 445	44	144	310
cSt @ 100°C	6	14	22
SUS @ 100°F, ASTM D 2161	228	755	1660
SUS @ 210°F	48	75	112
Flash Point			
°C	210	220	220
°F	410	450	450

2.2 Lubrication of Threaded Connections

All threaded connection must be coated with a no-gall grease. Both the backhead and chuck thread into the wear sleeve. The hammer is shipped with grease on both these connections. All drill pipe connections must also be coated. **When applying grease, be careful not to put grease where it will enter the air stream. The grease will not blow through the hammer but stick to the internal parts. Excessive grease in the hammer will close the airways and stop the hammer.**

Use a high performance copper based grease. Rock Hog recommends its own Rock Hog Thread Grease. Ask your Rock Hog representative for part number 350010.

2.3 Hole Cleaning

For proper hole cleaning, verify that an adequate up-hole air velocity can be obtained. An annular velocity of 3000 feet-per-minute or more is required. Use this formula to check what the velocity will be:

$$\text{Velocity (fpm)} = \frac{(183) \times (\text{supply CFM})}{(\text{bit size})^2 - (\text{drill pipe size})^2}$$

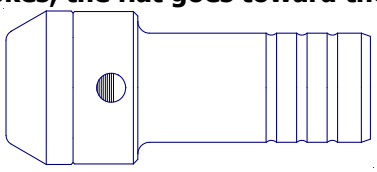
2.4 Setting the Choke

The choke is used to match the hammers operating pressure to the air supply. The hammer is shipped with a full choke installed. Two optional open chokes are shipped with the hammer.

For top performance, the operating pressure should be set at the compressor's rated output. The maximum recommended operating pressure should not exceed 350 psi even if the compressor is rated over 350 psi. Operating over 350 will increase penetration rates but reduce service life.

An open choke creates a controlled air leak in the hammer while the full choke allows no air leak. The larger the choke opening the greater the volume of lost air, the lower the hammer operating pressure.

To determine what choke should be in the hammer, plot your air supply, cfm & psi, on the chart in Section 1.3. From this point, move straight up the chart. The 1st choke line reached is the choke that should be used. The hammer is supplied with the full choke installed. To change the choke, remove the backhead, pull out the check valve and with a hammer and punch, drive out the current choke and drive in the needed choke**. On open chokes, the flat goes toward the bit.**



The actual operating pressure of your hammer may vary from the chart in Section 1.3 due to elevation from sea level (see section 2.5), leaks in the air supply line, and actual compressor output compared to its rating.

It is possible to fine-tune the choke opening if needed. If the full choke is in and the operating pressure is below the compressor's rated output, the

only way to increase the operating pressure is to increase the air volume supply. If a factory supplied open choke is being used and the operating pressure is below the compressor's rated output, it is possible to bring the operating pressure up to the rating by taking the full choke and making a flat on it that is smaller than the current open choke.

2.5 Effect of Elevation

Elevation above sea level affects the compressor output. As elevation increases, the compressor's volume output decreases. Use the table below to determine volume loss.

Elevation Correction Factor	
Actual Compressor Output = Rated Output x ECF	
Elevation in Feet	**ECF**
4000	0.86
5000	0.82
6000	0.79
7000	0.76
8000	0.73
9000	0.70
10000	0.68
11000	0.65
12000	0.63
13000	0.61
14000	0.59
15000	0.57

2.6 Water Injection

Injecting water into the air supply is a common practice to keep down dust and to improve hole cleaning in soft formations. **ALWAYS USE A CLEAN SUPPLY OF WATER.**

Water injection will increase the hammer operating pressure; reduce the service life of the internal parts, and cause of pitting at the base of the bit blow tube. Therefore, use just enough water for the drilling conditions present.

When drilling is complete, always shut off the water and blow air and oil through the drill string to remove the water and coat internal surfaces with oil. This will help prevent surface corrosion of the steel.

2.7 Drilling Under Water

The hammer is equipped with a check valve that closes when the air supply is shut off. This maintains air pressure inside the hammer and prevents water from coming up into the hammer.

Drilling under water increases the backpressure. The higher the head of water the greater the backpressure, the slower the hammer will penetrate. A point can be reached where the up-hole velocity is insufficient to over come the water head and the piston will stop. When needed. Performance can be improved by opening the choke. This diverts air from the piston to help blow the water out of the hole.

2.8 Drill Pipe

Drill pipe must be kept clean and straight. Dirt and rust blown out of the drill pipe and into the hammer will damage the hammer's internal parts. Always cover the hole in the drill pipe when doing a pipe change. Always blow out the pipe before connecting it to the drill string.

2.9 Installing the Bit

The bit can be installed into the hammer on or off the rig. Remove the chuck then the bit retainer ring. Apply a coating of no-gall grease to the bit splines. Set the chuck down over the bit shank. Pull the two halves of the ring apart and put the ring down over the shank. Put the halves together and set the ring on the chuck. Coat the threads with no-gall grease. Thread the chuck back into the wear sleeve.

2.10 Connect the Hammer

If the hammer is new, take a clean rod and push the check valve open and pour about a pint of rock drill oil down the center hole in the backhead.

Once on the rig, tighten both the chuck and backhead before starting the hammer. When tight, there will no longer be a gap between the chuck & sleeve shoulders and between the backhead & sleeve shoulders. ALWAYS USE A WRAP-AROUND WRENCH TO GRIP THE WEAR SLEEVE.

Once the hammer is connected, check the travel of the bit. In the drilling position, the bit should shoulder on the chuck and when the hammer is pulled up, the bit should drop out 2.2" (56mm).

2.11 Drilling

With the hammer/bit up off the bottom of the hole, supply air to the hammer. The air will blow through the hammer but the piston will not cycle. This allows for continuous blowing to clean out the hole when needed.

Start rotation of the drill string and lower the hammer/bit onto the bottom of the hole. As the bit pushes into the hammer, the piston will begin to cycle and the pressure will build to its normal operating level.

Once a consistent formation is being drilled, set the rotation speed and hold down pressure. As a starting

point, use a rotation speed in revolutions per minute (RPM) of:

RPM = 154 / bit size (in inches)

Set the hold down weight on the bit. As a starting point, the weight should be 2000 lb to 3000 lb. Keep in mind that as the hole goes deeper, the weight on the bit increases. Eventually hold back is needed to keep excessive weight off the bit.

Only driller experience will determine what RPM and bit weight combination work best in a given formation. In general, too slow a RPM results in slow penetration and shortened bit life but too fast a RPM will also shorten bit life. Excessive weight on the bit will cause bit button failure. Insufficient weight causes the piston blow energy to be dissipated into the bit and piston, which will lead to steel failure of these parts.

2.12 The Drill Bit

A quality Rock Hog hammer requires a quality bit. Rock Hog recommends using the proven Rock Hog line of DTH bits. A full range of sizes and face styles are available through your Rock Hog representative.

The bit is what carries the hammer piston energy to the rock therefore the condition the bit cutting face should be checked after the completion of each hole drilled.

As the bit accumulates drill time, the buttons and steel will start to show a wear pattern. The pattern and rate of wear will vary greatly depending on the formation being drilled.

In soft formations such as limestone where the bit wears slowly, watch the buttons for "snakeskin" on the surface. These surface cracks must be ground off to prevent button failure.

In hard formations where the bit wears quickly, watch the size of the flats on the buttons. The buttons should be sharpened when the width of the flat is no wider than ½ the diameter to help prevent bit failure.

Some formations wash the steel away quickly. In this case the buttons start to protrude excessively. The buttons need to be ground down to prevent them from breaking off.

Dull buttons are the single biggest contributor to slowed penetration and excessive stress to the bit and hammer.

If a bit must be changed before a hole is complete, make sure the gage diameter of the bit used to complete the hole is no larger than the bit just removed. Using a larger bit will result in probable lost of the gage buttons before the bit reaches the bottom of the hole. For this reason, always keep 1 or 2 worn bits that are in good condition on the drill rig.

2.13 Breaking Threads Loose

When breaking the chuck thread loose to change bits, or the backhead loose to do hammer maintenance, follow these guidelines:

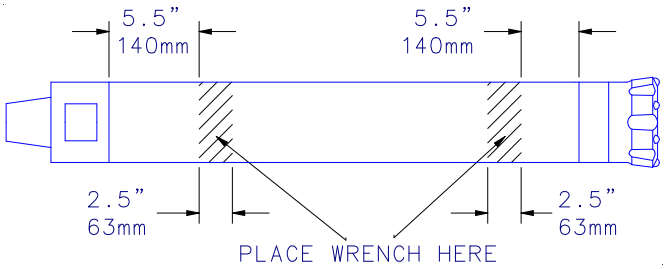
ALWAYS USE A WRAP-AROUND WRENCH this is to prevent pinching the sleeve out-of-round

KEEP SHARP JAWS IN THE WRENCH the wear sleeve is very hard to give a long service life so only quality hardened or diamond-tipped jaws in good condition will grip the sleeve

DO NOT POUND ON THE SLEEVE hammering on the sleeve with a ball peen or sledgehammer will crack the sleeve an void any warranty.

DO NOT WELD ON THE SLEEVE welding on the hardened sleeve will crack the sleeve and voids any warranty on the sleeve.

PLACE THE WRENCH AS SHOWN BELOW



2.14 Monitoring

As the hammer accumulates drill time, these areas need to me monitored to determine when to service the hammer.

External surfaces: Rock Hog hammer parts are made from the best materials and hardened for long life but eventually these surfaces will wear away. The rate of wear depends on the formation being drilled, drilling speed and airflow. Make periodic checks to know what condition the parts are in.

Normally the chuck wears out first. Check the wall thickness on the bit shoulder end. When it measures 5/16" (8mm) or less at any point, replace the chuck. The service life of the chuck also heavily depends on the condition of the drill bit.

The wear sleeve will normally wear more on the chuck end. When the regular outside diameter reaches 5-1/8" (130mm), flip the sleeve. When the heavy duty outside diameter reaches 5-1/4" (134mm), flip the sleeve. Once either end has worn down to a 5" (127mm) diameter, replace the sleeve. The service life

of the sleeve also heavily depends on the condition of the chuck.

Chuck splines: check the condition of the chuck splines each time the bit is removed. **Do not put a chuck with badly worn splines on a new bit.**

Shoulder Gap: the backhead on all models & chuck only on RH6Si models are designed to have a gap when hand tight. Periodically check the gap between the backhead and sleeve when the backhead is hand tight only. If the gap falls below .08" (2.0mm), refer to Section 3.4-step 16 & 9B.

Operating pressure: this is the best way to know what condition the internal parts are in. As internal parts wear, the operating pressure, and therefore the penetration rate, will drop. Only the operator can say when hammer performance has dropped below an acceptable level at which time the hammer must be serviced. If the pressure goes up after the hammer has been in service for some time, this would indicate the piston is sticking or the air passages inside the hammer are becoming restricted. Remember, if an open choke is in and the pressure is down, the easiest way to increace the pressure is to reduce the choke opening.

2.15 Storage

Overnight

When drilling is complete for the day, shut off water and any other injections except the oil and allow air and oil only to blow through the hammer for a minute or two. This will blow out most of the water and other injections and coat all the internal parts with oil. **If the hammer is in a wet hole, bring the hammer above the water level before blowing it out.**

Short term

If the hammer will be off the rig for no more than 3 weeks, blow air and oil only through the hammer for a minute or two before taking it off the rig. This will blow out most of the water and other injections and coat all the internal parts with oil. Store that hammer in a dry area with the ends covered. The storage area should have a steady temperature to prevent surface condensation during temperature swings.

Long term

A used hammer going into storage for a month or more should be torn down with all parts cleaned, dried, oiled and stored assembled or disassembled in a dry, steady temperature area. This is to prevent surface corrosion. ***Surface corrosion is a main cause of part failure in hammers.***

Section 3. Maintenance

3.1 Schedule

If the need for service defined in Monitoring, section 2.14, is not reached first, follow these guidelines for servicing the hammer:

When the hammer is operated to the parameters defined in section 2 in formations up to what is considered "hard", perform service every 25000 feet (7600 meters) of drilling.

When water injection & drilling foams are used extensively, perform service every 18000 feet (5500 meters).

When drilling in "very hard" formations or when drilling under heavy mud, perform service every 10000 feet (3000 meters)

When injecting agents that are corrosive to metal, like potash to coat the hole wall, disassemble & clean the hammer at completion of the job.

Use this as a starting point. Keep a log of service done-vs.-footage drilled. This will help refine the service schedule to fit your operation.

Note: The steps listed to disassemble, inspect, and assemble apply to both the RH6Si and RH6Sm models except for the steps noted "*Do this step only on the RH6Si model hammers*". The pictures shown are for the RH6Si.

3.2 Disassembly

All parts are a sliding fit except for the bit bearing in RH6Si models, which is a press fit. Parts that are a sliding or clearance fit inside the hammer may be tight inside the hammer depending on the condition of the parts and the time period since the hammer was last serviced.

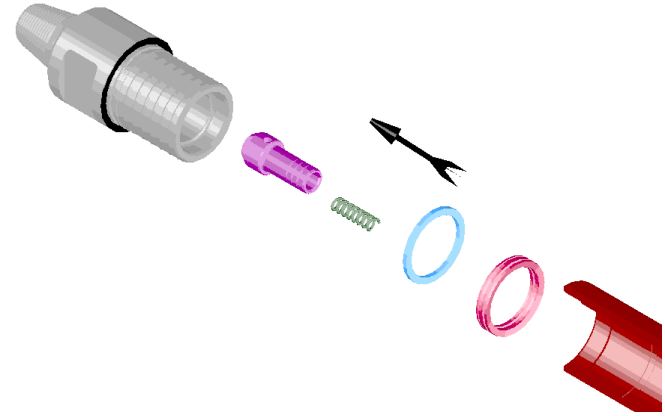
Caution, because many of the hammer parts are hardened, do not use hammers or driving rods made of hardened steel. Striking hardened steels together can result in major damage to the parts or the steel shattering into pieces and bodily injury. If hardened steel hammers are used, always use a piece of, wood, aluminum, brass, or unhardened steel between the part and the hammer.

1. Break both the backhead and chuck threads loose. See section 2.13

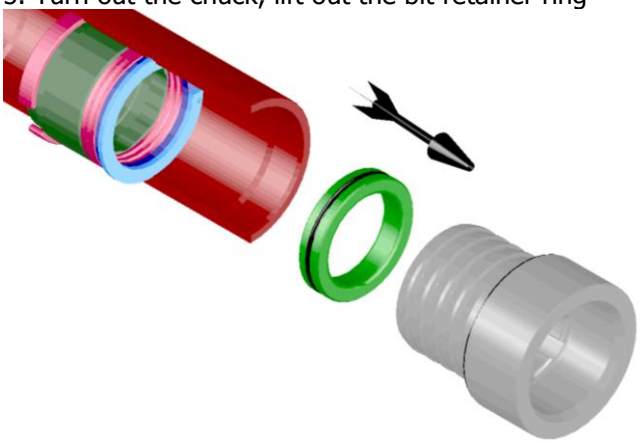
2. Lay hammer on a bench, mark the sleeve ends "backhead" and "chuck"

3. Turn out the backhead, lift out the check valve, check valve spring.

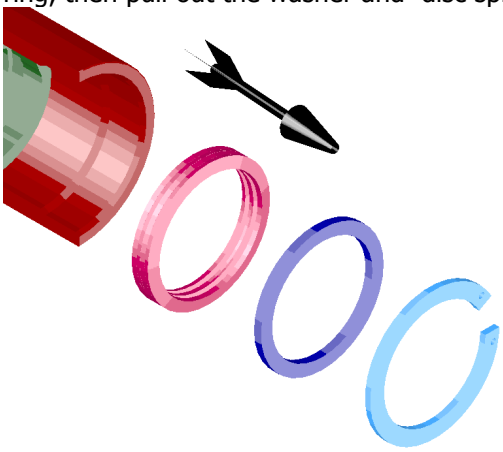
4. Lift up the chuck end to cause the washer and disc springs to drop out of the backhead end.



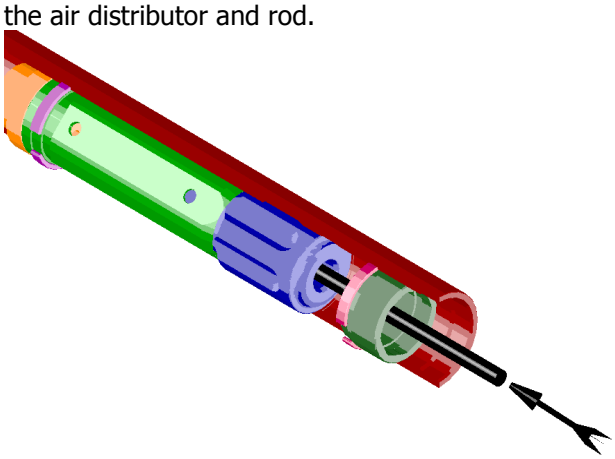
5. Turn out the chuck, lift out the bit retainer ring

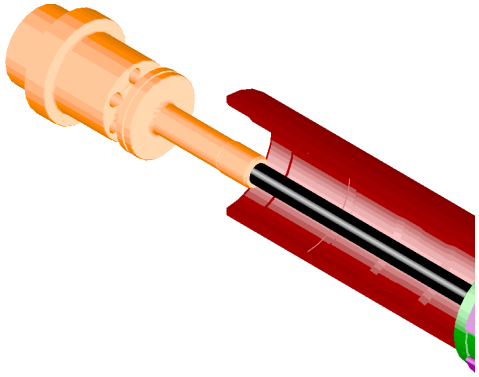


6. *Do this step only on the RH6Si model hammers*. Using a 24" pair of snap ring pliers, remove the snap ring, then pull out the washer and disc springs.



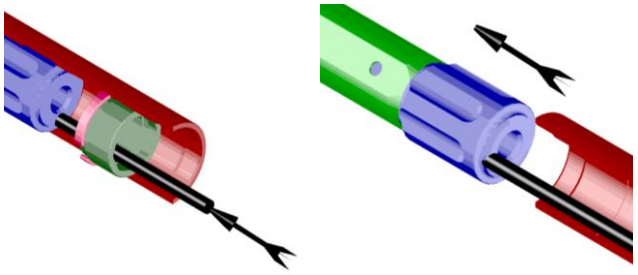
7. Remove the air distributor. Stand the sleeve on the backhead end on a solid surface. Put a rod (1-1/4" dia max X 30" long min) down through the center hole in the piston. Drive on the air distributor until it comes loose from the cylinder. Lay sleeve over and pull out the air distributor and rod.





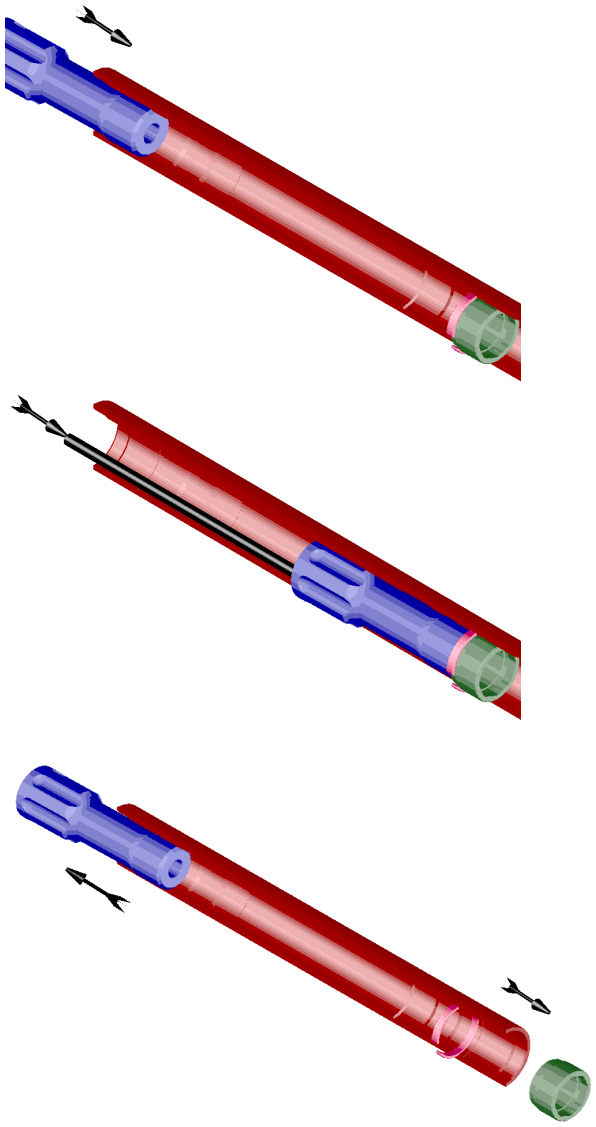
8. Remove the piston & cylinder. Stand the sleeve on the backhead end on a solid surface. With a heavy rod or timber on the piston face, drive on the piston (Rock Hog uses a 2-1/2"diameter X 60" long steel bar). The cylinder is held in by a retaining ring that will collapse out of its groove allowing the parts to come out. It will take moderate force to collapse the ring. Once collapsed, the parts will advance with less force. Drive the parts down until they hit bottom

Lay the sleeve over and drive the parts the rest of the way out. The ring on the cylinder does not come off.



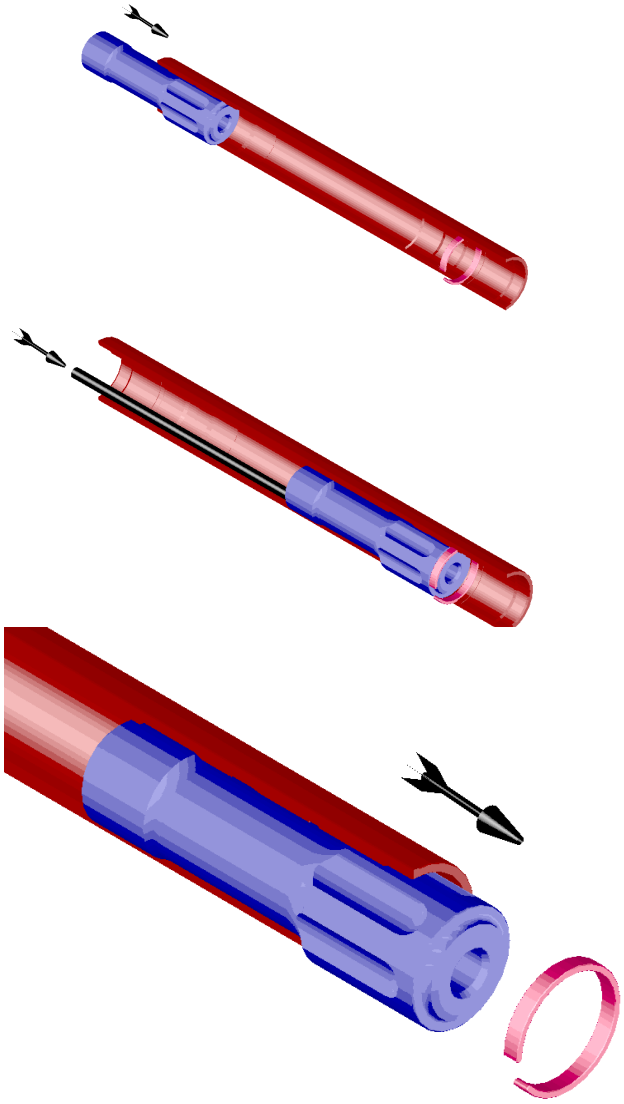
9. *Do this step only in the RH6Si model hammer*. Remove the bearing. Pull the cylinder off of the piston. Put the piston, small end first, back into the backhead

end of the sleeve. Stand the sleeve on the chuck end on a solid surface. With a heavy rod or timber on the piston face, drive on the piston. The bearing is a press fit. Moderate to heavy force is needed to drive the bearing out. Drive on the piston until the bearing has bottomed out.
Lay the sleeve horizontal and push the bearing out. Push the piston back out the backhead end.



10. If needed, remove the piston-retaining ring. If the wear sleeve is not being replaced or flipped, and the ring and sleeve shoulder look in good condition, the ring does not need removed. If the ring does need removed, put the piston, big end first, back into the backhead end of sleeve. Stand the sleeve on the chuck end on a solid surface. With a heavy rod or timber on the piston face, drive on the piston. The retaining ring will collapse out of its groove and push out. It will take moderate force to collapse the ring. Once collapsed, the parts will advance with less force. Drive on the piston until the ring has bottomed out.

Lay the sleeve horizontal and push the parts out.



Disassembly is complete.

3.3 Inspection

Before cleaning any parts, observe them for oil. If the hammer is being properly lubricated, the parts should have a substantial film of oil all over but not dripping.

None of the following should be found inside:
dirt and grit
metal shavings
grease (other than at the chuck & backhead)
rust and corrosion

Clean all parts. Carefully look over all parts for cracks, corrosion, and pitting. Any corrosion indicates the hammer is not being oiled properly. Corrosion greatly increases the chance of cracks starting. Removed any and all corrosion using fine emery paper.

Galling- is surface damage caused by metal-to-metal contact under high loads. Many of the parts listed will be checked for galling. Any sign of galling indicates lack of lubrication, use of the wrong type of lubricant, or parts have been damaged to the extent there is interference between parts.

The clearance checks given below are what Rock Hog considers as the limit of wear for those parts. Past this point, the hammer performance will no longer be satisfactory. The clearance may be checked using feeler gages or measuring both parts with micrometers. **These clearances may or may not be acceptable for your given application. With so many variables (air supply, rig settings, rock formation, etc) affecting hammer performance, only the operator can say when hammer performance has dropped below an acceptable level**. Again, keeping a log of when & what service was performed will help fine-tune the service schedule to fit your operation.

Backhead: be sure to remove all the old grease from the drill pipe connection threads. Moisture can get trapped under the grease and corrode the surface. This also allows for a visual check of wear on the threads. Compare the worn threads to a new thread. If 50% of the thread form is worn away, replace the backhead.

Check the condition of the o-ring. If it is cracked, cut, or brittle, replace it.

Check the large threads for galling. Polish out any damaged areas.

The outside of the backhead will wear away. This wear is not detrimental to the function of the hammer but will eventually allow the drill pipe to wear away. Replace the backhead if it is no longer protecting the drill pipe.

Check Valve: check the condition of the rubber top. If the surface is degraded, replace the check valve. If the clearance with the air distributor bore is greater than .015" (.4mm), replace the check valve.

Check Valve Spring: the outside of the spring will be worn on one side about mid-length. If the wire diameter has been reduced by more than 30%, replace the spring.

Air Distributor: make sure all the air holes are clear. Check the clearance of the stem end with the back bore in the piston. If it exceeds .015" (.4mm) replace the air distributor.

Check the condition of the o-ring. If it is cracked, cut, or brittle, replace it.

Cylinder: check the inside bore for galling with the piston. Polish out any surface damage.

Check the clearance of the bore with the top diameter of the piston. If it exceeds .012" (.30mm), replace the cylinder. Check the new cylinder to the used piston. If the clearance exceeds .009" (.23mm), replace the piston also.

The retaining ring should be replaced if the cylinder is replaced. If the cylinder is still usable, check the faces of the retaining ring. If there is step .04" (1mm) worn into either face, cut the ring off the cylinder and install a new ring at assembly.

Check the cylinder shoulder where the ring sits. If the shoulder is rounded off, replace the cylinder.

Piston: check the (2) outside guide diameters and top bore for galling and burning. Polish out any minor damage found on the surfaces.

Any black areas on the surface indicate the piston was rubbing and over heating. Surface heating is very detrimental to the piston. In most cases, if the surface is black, that surface will also be covered with cracks. Replace the piston if it has excessive surface cracks.

If the wear sleeve has not been previously flipped, check the clearance of the piston's big diameter with the sleeve bore where the cylinder sits. If it exceeds .010" (.25mm), replace the piston. Check the new piston to the sleeve bore on the chuck end. If the clearance exceeds .010" (.25mm), flip the wear sleeve at assembly (note: normally sleeve external wear determines when the sleeve gets flipped).

If the sleeve has been previously flipped, check the clearance of the big diameter with the sleeve bore where the piston runs. If it exceeds .012" (.30mm), replace the sleeve. Check the piston to the new sleeve bore. If the clearance exceeds .009" (.23mm), replace the piston.

Check the strike face for chipping and pitting. Replace a piston with a badly damaged strike face. **Note: the face can be reconditioned by removing up to .04" (1mm) of material. Only a qualified machinist should do this. Reconditioned pistons are not covered under warranty.**

Remove any nicks, dents, burrs with fine emery paper or a fine honing stone.

Again look over the piston for any rust, corrosion, pitting. All these will lead to cracks and failure of the piston.

Wear Sleeve: Check the outside diameter. The wear sleeve will normally wear more on the chuck end. When any location on the outside diameter has reached 5-1/8" (130mm), flip the sleeve. **Once any location**

has worn down to a 5" (127mm) diameter, replace the sleeve.

Check the bore where the piston runs and the threads for galling. Polish out any surface damage.

Check the shoulder where the retaining rings sit (8.25"[210mm] down in). If the shoulder is badly worn off, replace the sleeve.

Piston Retaining Ring: Check the faces of the retaining ring. If there is step .04" (1mm) worn into either face, install a new ring at assembly.

Bearing: *Note, the RH6Si model bearing is a separate piece while the RH6Sm model has a bearing that is built into the top part of the chuck.*

Check the inside bore for galling. Polish out any damage. Check the clearance of the bore with the guide diameter on a new bit. If it is over .016" (.41mm), replace the bearing.

Dics Springs and Washers: Replace any parts that are cracked or damaged. Look for wear on the faces. As the faces wear, there is less compression force created by the springs. This compression is set by the compression gap described in section 3.4.9B & 3.4.16

Bit Retainer Ring: Replace a cracked or damaged ring. Check the o-ring. This o-ring is not a seal but only a retainer to keep the 2-halves together.

Chuck: check the large threads for galling. Polish out any damaged areas.

Check the splines. The driving side will wear away. If the form of the driving side still matches the bit, the chuck is usable. If the form no longer matches the bit or more than ½ the spline thickness is worn away, replace the chuck.

Check the outside diameter for wear. If the wall thickness on the bit shoulder end measures 5/16" (8mm) or less at any point, replaced the chuck.

Breakout Washers: These copper washers are on the hammer when shipped. One between the backhead and sleeve, and one between the chuck and sleeve. The washers are optional but they do reduce the torque required to break the threads loose. These rings do disintegrate over time. During inspection there may be just a portion of the ring remaining or no ring at all.

3.4 Assembly

Any basic tools needed, will be described as needed.

Step 11 may require Rock Hog's assembly tool #45403 (sold separately) or a similar tool to expand the retainer ring onto the cylinder.

Step 12 will require at a minimum a simple bushing to help install the cylinder or Rock Hog's assembly tool #45401 (sold separately) is available.

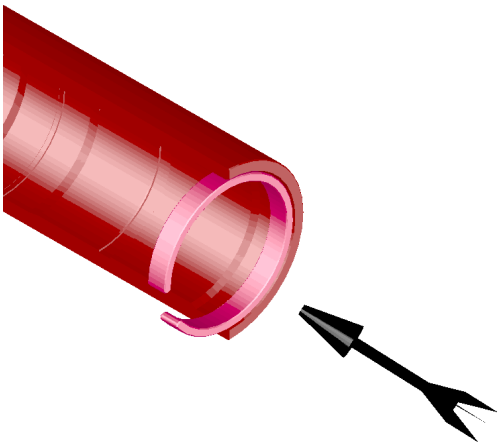
Caution, because many of the hammer parts are hardened, do not use hammers or driving rods made of hardened steel. Striking hardened steels together can result in major damage to the parts or the steel shattering into pieces and bodily injury. If hardened steel hammers are used, always use a piece of, wood, aluminum, brass, or unhardened steel between the part and the hammer.

Note: The steps listed to disassemble, inspect, and assemble apply to both the RH6Si and RH6Sm models except for the steps noted "*Do this step only on the RH6Si model hammers*". The pictures shown are for the RH6Si.

1. **Make sure all parts are clean. Wash and wipe off and/or blow out any dirt. Apply a light coat of oil to all internal parts.**

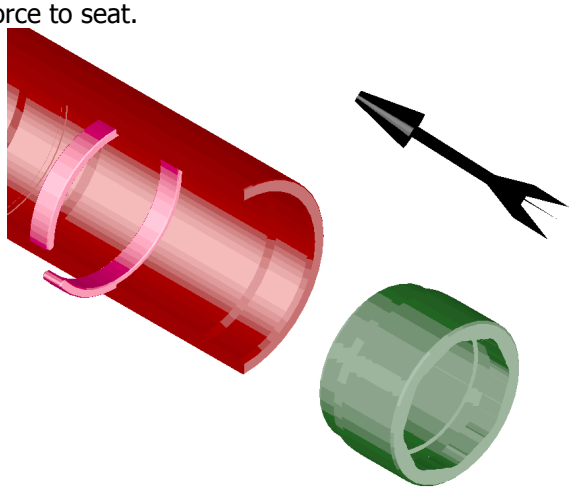
2. Apply a light coating of oil into the bore of the wear sleeve. Based on the inspection, determine which end of the sleeve will be the chuck end. If the sleeve has been replaced, start on either end since the sleeve is the same on both ends.

3. Install the piston retaining ring.
   a. Stand sleeve on the beakhead end on a solid surface.
   b. Push ring into top bore in sleeve.
   c. Using the piston, or a 4.4" dia rod, drive the ring into the sleeve. The ring will stop and seat into the groove that is 8" down in the sleeve. Pull driver out.

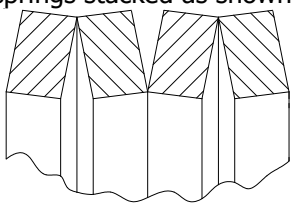


4. *Do this step only in the RH6Si model hammers*. Install the bearing. The bearing goes in with the 4-1/8" (104mm) dia x 5/8" (16mm) long step towards the sleeve. Set the bearing into the sleeve. Using the same driver as in step 3, drive the bearing into the sleeve

until it comes to a hard stop at about 5.6" down. The bearing is a press fit and will require moderate to heavy force to seat.



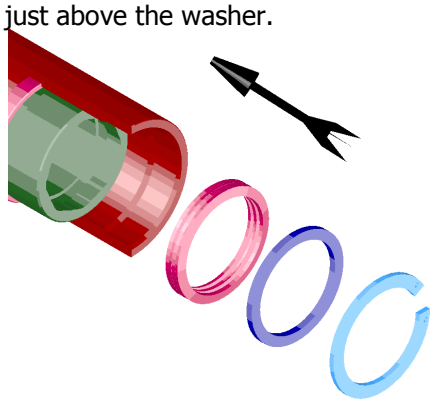
5. *Do this step only in the RH6Si model hammers*. Set in the disc springs stacked as shown here.



DISC SPRING STACK

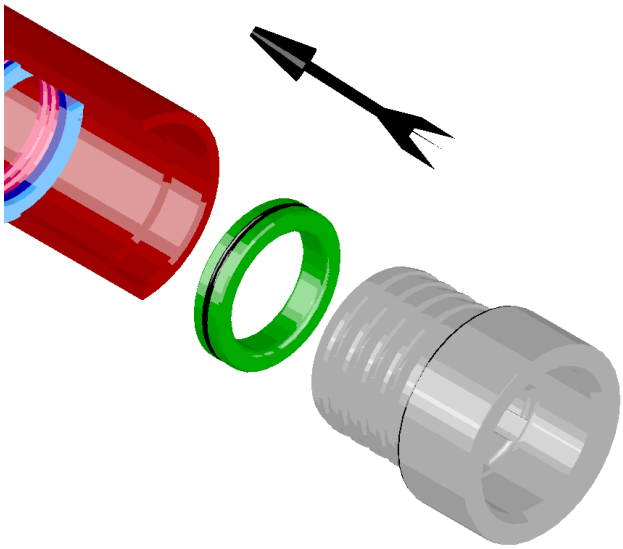
6. *Do this step only in the RH6Si model hammers*. Set in the washer.

7. *Do this step only in the RH6Si model hammers*. Using the 24" pliers, install the snap ring into the groove just above the washer.



8. Put the o-ring around the bit retainer ring and set the ring in.

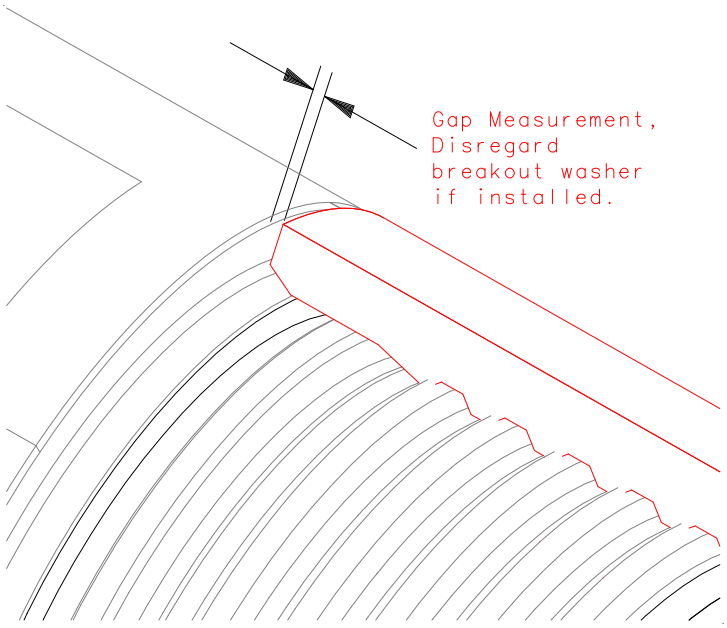
9A. If you use them, put the breakout washer on the chuck now. Apply a thick coating of copper coat grease to the chuck thread. Thread in the chuck until hand tight.



9B. *Do this step only in the RH6Si model hammers*. Check the gap between the chuck shoulder & sleeve face. If it is greater than .24" (6.0mm), a part is out of position. If it is less than .06" (1.5 mm), perform one of the following:

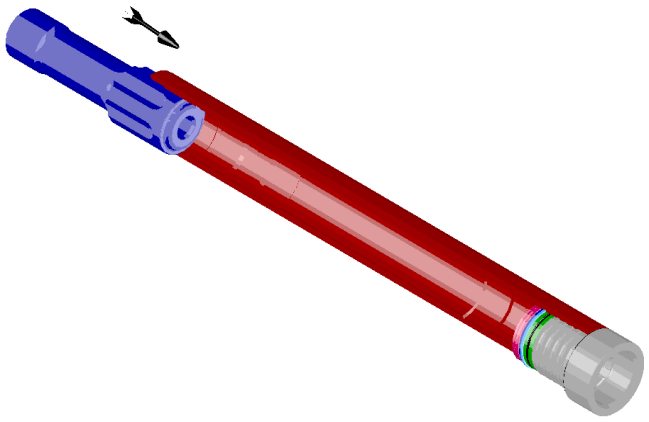
a. Purchase and install Rock Hog part #943012 between the bearing and bottom disc spring.
b. Obtain and install a steel washer (4.40 OD x 3.62 ID x .090 THK) between the bearing and bottom disc spring.

If the gap is less than .06 and a make-up washer is already in the hammer, then check the condition of the disc springs, piston retaining ring and the shoulders the ring sets on. Replace any worn parts. Assemble the hammer without the make-up washer, and check the gap. If the gap is still less than .06, put (1) new make-up washer back in.

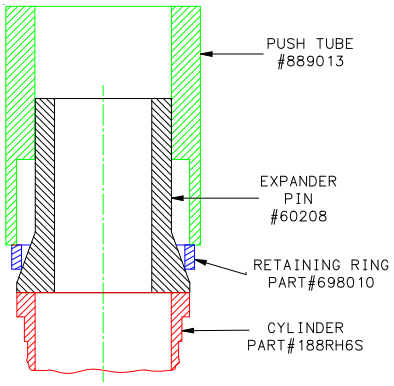


The bottom end is complete.

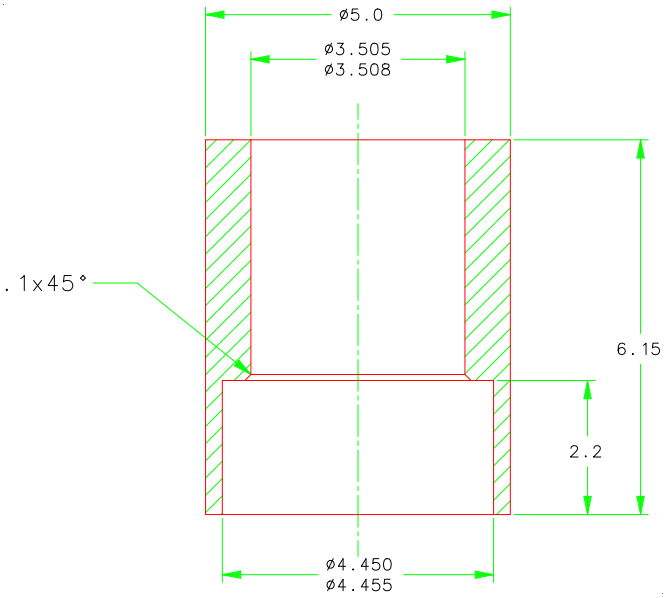
10. Apply film of oil to piston. Lay the sleeve horizontal and push piston, large end first, into the sleeve. The piston will hang up some as it passes the grooves but should slide free then to the piston retaining ring. If the piston does not slide free between the grooves, remove it and determine what is holding it up.



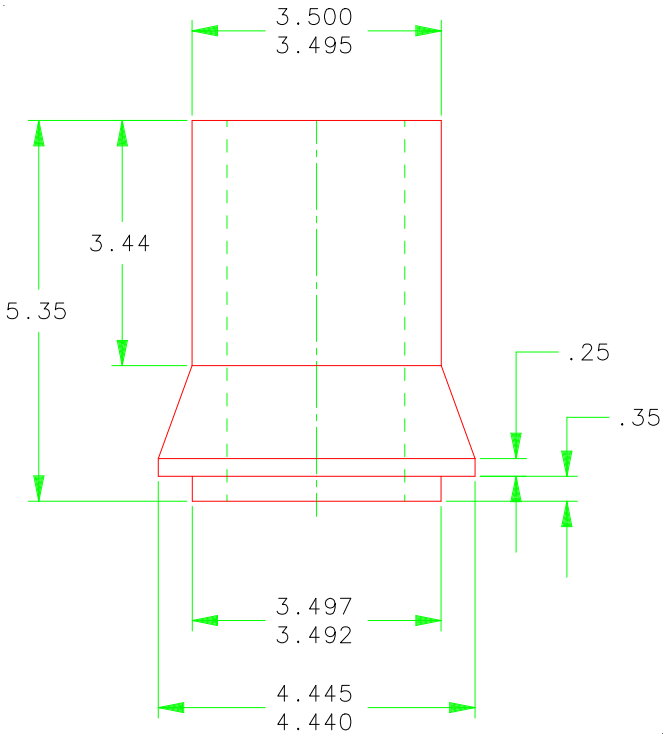
11. If needed, install new retaining ring on cylinder. A skillful mechanic can put this ring on with a rubber hammer by hooking one end of the ring over the cylinder and then work around from the hooked side, hammering on ring until it expands and snaps into the groove. If this method cannot be mastered, Rock Hog tool #45403 is available (sold separately) or make your own from the drawings below.
Tool #45403. This tool is designed for use on a hydraulic press.



Push tube #889013

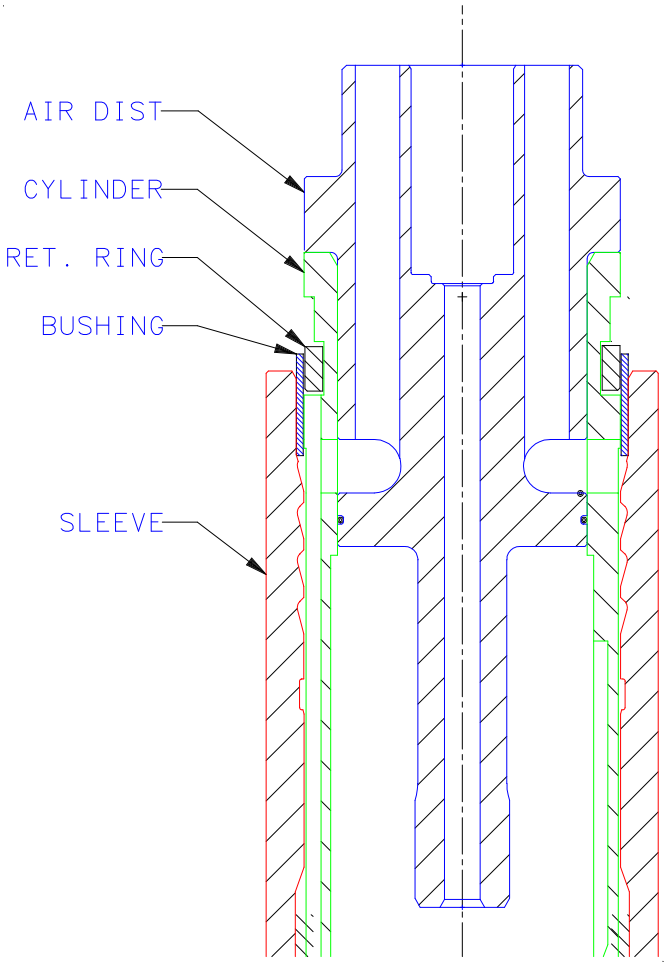


Expander pin #80208



12A. Installing the cylinder & air distributor without Rock Hog tool #45401. Wrap-around chain vise pliers and a simple metal bushing, 4.650/4.648 OD x 4.440/4.445 ID x 1.5 long, are needed for this procedure.

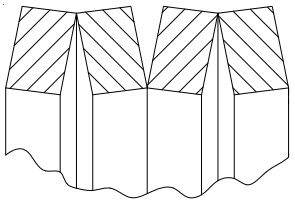
a. Apply a film of oil to the air distributor o-ring, set the air distributor on cylinder, tap the air distributor into the cylinder.
b. Use the chain pliers to collapse the retaining ring into the deepest groove in the cylinder.
c. Stand the sleeve on the chuck on a solid surface. Set the bushing into the front bore of the sleeve.
d. Set the cylinder into the sleeve. With the ring collapsed, it will start into the bushing. Tap the cylinder in until the bushing will keep the ring collapsed, remove the pliers.



e. Drive the air distributor/cylinder into the sleeve. The ring will only seat into the correct location so drive the cylinder in until it comes to a hard stop. The top of the air dist will be below the sleeve 4.38" (111mm).
f. Remove the bushing from the sleeve.

12B. Installing the cylinder can also be done using Rock Hog tool #45401. This kit is sold separately and comes complete with instructions. Contact your Rock Hog representative for availability.

13. Set in the disc springs, stacked as shown here, on the air distributor shoulder.

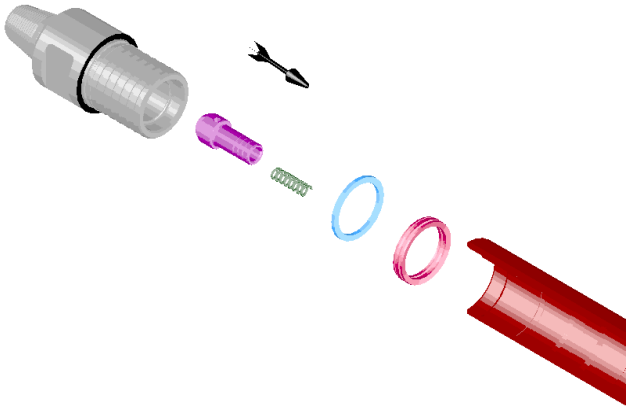


DISC SPRING STACK

14. Set in the washer on the disc springs.

15. Set the check valve spring, then the check valve into the air distributor center hole. Push check valve all the way down, the spring should push it back. **The valve must move freely**.

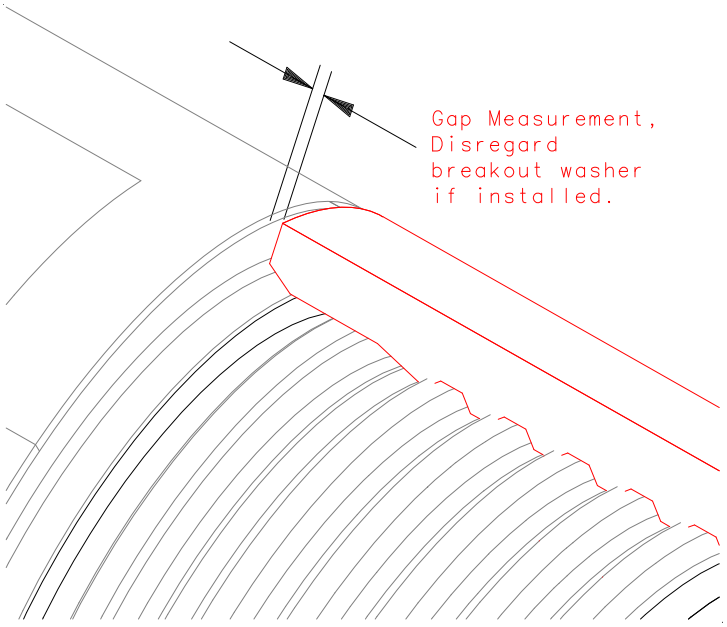
16. Put the o-ring and, if used, the breakout washer on the backhead. Apply a thick coating of no-gall grease on the backhead thread. Thread the backhead into the wear sleeve until hand tight. Note that when the o-ring contacts the sleeve, the backhead will become hard to turn by hand due to o-ring drag.



With the backhead hand tight there should be a gap between the backhead shoulder & sleeve face. Check the gap ignoring the breakout washer if installed. If the gap is greater than .24" (6.0mm), a part is out of position. If it is less than .08" (2.0 mm), perform one of the following:

a. Purchase and install Rock Hog part #943012 between the washer and backhead
b. Obtain and install a steel washer (4.40 OD x 3.62 ID x .090 THK) between the washer and backhead

If the gap is less than .08 and a make-up washer is already in the hammer, then check the condition of the disc springs, cylinder retaining ring and the shoulders the ring sets on. Replace any worn parts. Assemble the hammer without the make-up washer, and check the gap. If the gap is still less than .08, put (1) new make-up washer back in.



Assembly is complete.

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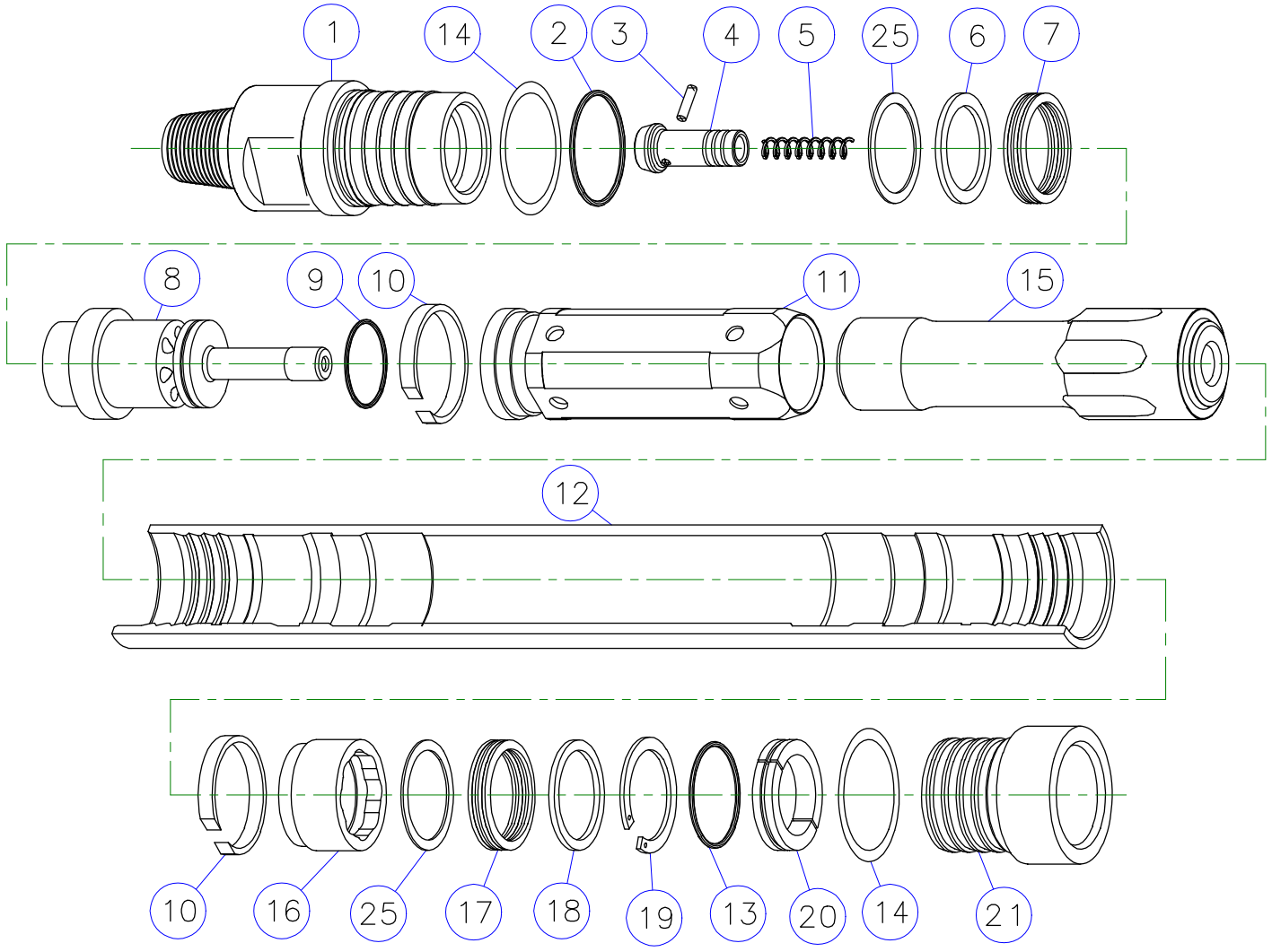
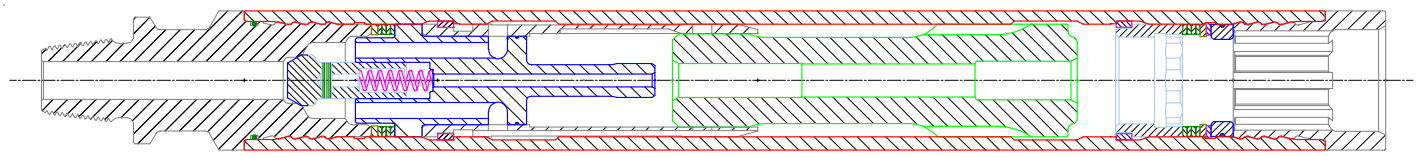
Section 4. Parts Breakdown

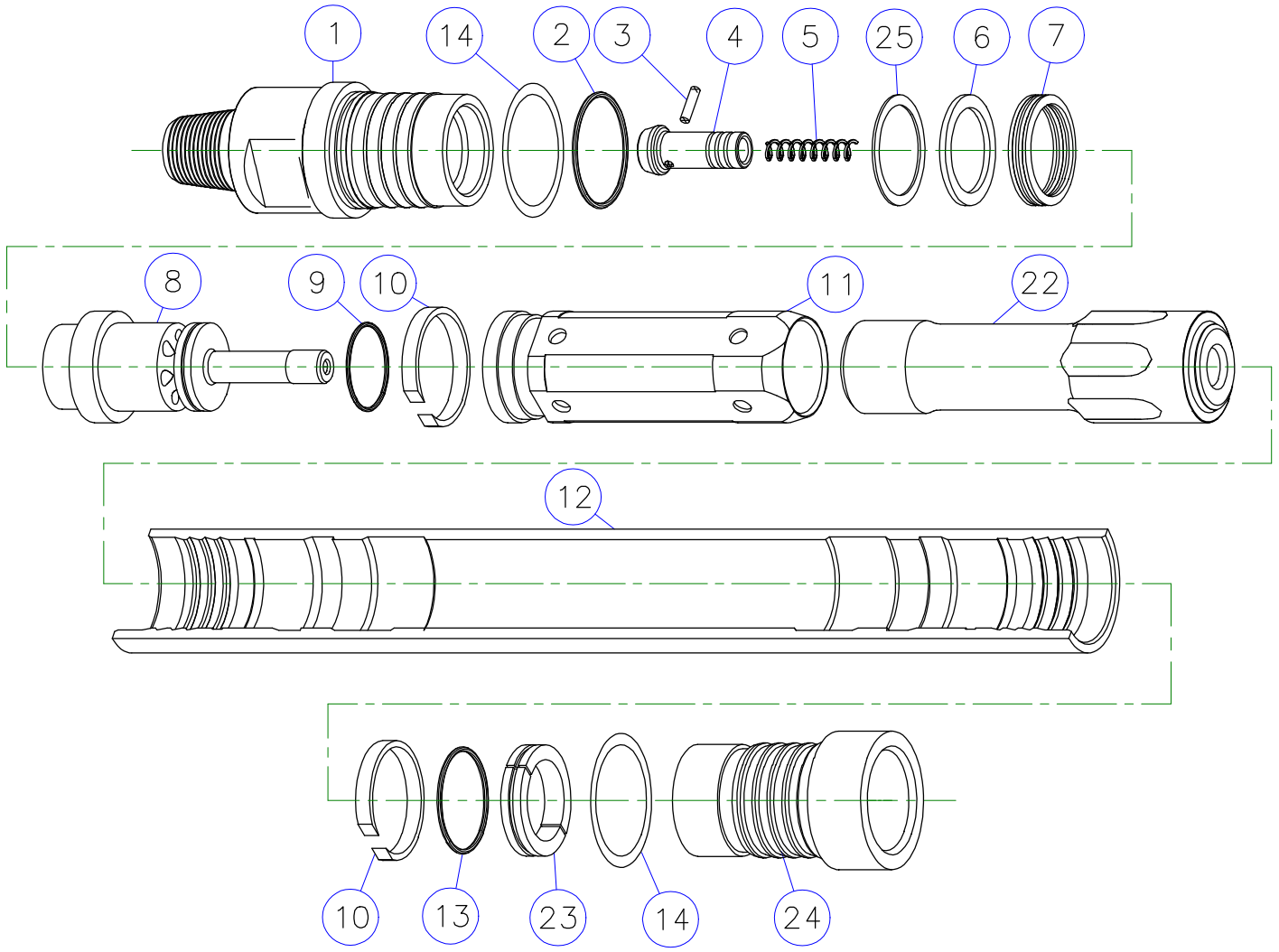
Exploded View, all RH6Si models



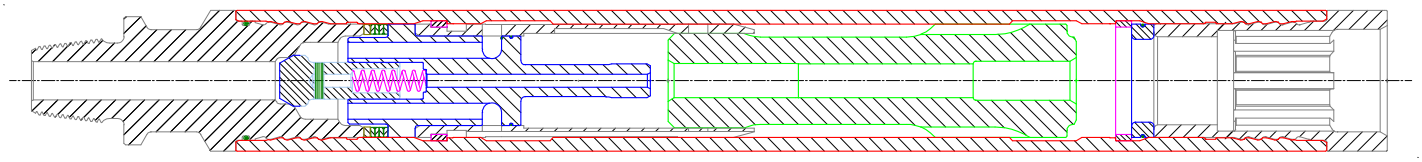
Assembled View, all RH6Si models



Exploded View, all RH6Sm models



Assembled View, all RH6Sm models



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Part List

Shown at the right side of the chart is the quantity of spare parts that should be kept on hand. Level 1 is for water well drilling, Level 3 is for high production drilling.

ITEM No	PART No	QTY REQD	PART NAME	WEIGHT LBS	WEIGHT KGS	SPARE PARTS ON HAND LEVEL 1	LEVEL 2	LEVEL 3
THE FOLLOWING PARTS ARE IN BOTH THE RH6Si & RH6Sm MODEL HAMMERS								
1		1	BACKHEAD			-	-	1
	062RH61		WITH 3-1/2 REG API PIN UP	41.5	18.8			
	062RH61HD		HEAVEY DUTY WITH 3-1/2 REG API PIN UP	43.5	19.7			
	062RH62		WITH 3-1/2 REG API BOX UP	42.5	19.3			
	062RH65HD		HEAVEY DUTY WITH 3-1/2 IF API PIN UP	44	20.0			
2	560347	1	O-RING, BACKHEAD			1	2	4
3	1103810	1	CHOKE SET			-	-	1
4	922RH6	1	CHECK VALVE	0.8	0.36	-	-	1
5	798010	1	SPRING, CHK VAL	0.05	0.02	-	1	2
6	943011	1	WASHER	0.36		-	-	1
7	799010	4	DISK SPRINGS	0.68	0.31	-	4	8
8	201RH6	1	AIR DISTRIBUTOR	15	6.80	-	-	1
9	560152	1	O-RING, AIR DISTRIBUTOR	0.01	0.00	-	1	2
10	698010	1	RET RING, CYLINDER/PISTON	0.56	0.25	-	-	2
11	188RH6S	1	CYLINDER	12.3	5.58	-	-	1
12		1	WEAR SLEEVE			1	2	3
	780RH6S		STANDARD 5-1/2 DIAMETER	90	40.8			
	780RH6SHD		HEAVY DUTY 5-3/4 DIAMETER	121	54.9			
13	560240	1	O-RING, BIT RET. RING	0.01		-	1	2
14	943018	2	BREAKOUT WASHER	0.03	0.014	1	2	4
RH6Si PARTS ONLY- THESE PARTS ARE IN ONLY THE RH6Si MODEL HAMMER								
15		1	PISTON			-	-	1
	605RH6S		STANDARD	45	20.4			
	605RH6S1		LOW VOLUME, USED IN "LV" MODELS	49	22.2			
16	065RH6S	1	BEARING	4.5	2.04	-	-	1
17	799010	4	DISK SPRINGS	0.68	0.31	-	4	8
18	943011	1	WASHER	0.36		-	-	1
19	689011	1	SNAP RING	0.32		-	-	1
20	698012	1	BIT RETAINING RING	1.65	0.75	-	-	1
21		1	CHUCK			2	4	6
	112RH6		STANDARD 5-1/2 DIAMETER	14	6.3			
	112RH6HD		HEAVY DUTY 5-3/4 DIAMETER	15.4	7.0			
RH6Sm PARTS ONLY- THESE PARTS ARE IN ONLY THE RH6Sm MODEL HAMMER								
22		1	PISTON			-	-	1
	605RH6SM		STANDARD	45	20.4			
	605RH6SM1		LOW VOLUME, USED IN "LV" MODELS	49	22.2			
23	698016	1	BIT RETAINING RING	0.9	0.41	-	-	1
24		1	CHUCK			2	4	6
	112RH6M		STANDARD 5-1/2 DIAMETER	14	6.3			
	112RH6MHD		HEAVY DUTY 5-3/4 DIAMETER	15.4	7.0			
THE FOLLOWING PARTS ARE SOLD SEPARATE								
25	943012		MAKE-UP WASHER	0.12	0.05	-	1	2
-	350010		ROCK HOG THREAD GREASE	10	4.54			
-	45403		CYL RET RING INSTALL KIT					

454045 SET OF CYLINDER INSTALL RINGS AVAILABLE AT NO CHARGE

Section 5. Trouble Shooting

These are typical problems that can develop after the hammer has been in service:

	Possible Causes
Piston will not cycle	1. Bit blow tube is broke 2. Piston stuck in sleeve due to a. Sleeve was pinched shut with wrench when threads were being loosened/tightened b. Foreign material entered through drill string and jammed piston c. Mud backed up into hammer (drilling under water), inspect the check valve 3. An internal part failed
Slow penetration, pressure ok	1. Dull or broken buttons on bit 2. Incorrect drill rotation or down pressure for the formation being drilled 3. Harder rock formation than the normal
Low pressure	1. Leak in the air line 2. Leak in the hammer (cracked or broken part) 3. Compressor output problem
High pressure	1. Air line is partially closed off 2. Foreign material clogging air passages in hammer 3. Bit blow holes are clogged