Rock & Concrete Splitter

Manual

(Concrete) **(Rock)**

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Appendix A: DATA of Power Rock Splitter: SP-80 Power Cylinder

1. TYPICAL APPLICATIONS FOR THE ROCK /CONCRETE SPLITTING SYSTEM.

1.1 What are some applications for the Power Rock Splitter series Rock/Concrete splitting system?

i) On sites where there is a restriction or ban on the use of hydraulic impact hammers or conventional blasting methods.
ii) In downtown core areas where there are by laws regarding noise and dust pollution.
iii) Job sites near to electrical supplies, gas mains, water mains, or other services that can be adversely affected by vibration and fly rock.
iv) Under, in, or beside historic buildings, that can be damaged by less controlled methods.
v) Excavating narrow trenches in rock, or concrete, dedicated to service lines such as gas, electricity, water and sewage.

Power Rock Splitter– Technical Specification

Chart 1.1

Model / Items	Unit	Sp-80
		Applications (concrete or hard rock)
Power Cylinder Weight	**lbs**	**66.1 (30Kgs)**
Power Cylinder Length	**in**	**29.5 (750mm)**
Power cylinder dia.	**in**	**3.15" (80mm)**
Piston max. stroke	**in**	**8.87" (225mm)**
Working Pressure	**psi**	**17,068 (1,200Kgs/cm2)**

Rock Splitter Force	**ton**	**259x4=1,036**
Productivity	**y^3 /shift**	**115 - 315** **(80 – 220m3/shift)**
Drill by		**Top Hammer** **DTH Hammer** **CORE DRILL**
Drilling Diameter	**in**	**3.504” (89mm)**

* **Technical specifications are subject to change without prior notice due to quality improvement.**
* **More detailed specifications are available in Appendix 1.**

There are many other sizes of power cylinder available depending on your application but the two units shown are the most often used and the most economical for general purposes.
In a basement digging jobsite where the excavation is in bedrock, we recommend use of a special drill of diamond drill coring type.

2. BASIC CONCEPT

The Power Rock Splitter is an advanced method of mechanically breaking rock or concrete using hydraulic power. Utilizing a state-of-the-art design the Power Rock Splitter uses hydraulic power and specially designed hydraulic rams to split the concrete or bedrock. This method is useful and efficient and is a more than acceptable alternative at urban job sites or near industrial plants, historical buildings and municipal facilities where blasting methods or impact breakers are severely regulated due to vibration, noise, dust or environmental concern.
The Power Rock Splitter is lightweight and the durable power cylinder (ram) makes it easy to operate.

Reduced Vibration ***Reduced Noise*** ***Reduced Dust***

The Power Rock Splitter uses hydraulic pressure in 9~12 small pistons to gradually expand across the diameter of the drilled hole until the material fractures. The breaking force can be in excess of 1,200 tons (144,000psi).

There are several mechanical methods available to split rock including the "Darda" system, "HRS", expansion methods using chemicals (Brista), gas gun method and Super Wedge insertion by excavator. The Power Rock Splitter has demonstrated time and time again that it is the safest, most efficient, cost effective, and productive method on the market today.

3. ADVANTAGES of Power Rock Splitter.

(1) Reduced Vibration –Reduced Noise

With the Power Rock Splitter, vibration and noise are virtually eliminated (Except for the noise generated by the Core Drill, Crawler Drill or DTH Hammer). Noise levels can be reduced to between 90-95 Dba utilizing the latest Hydraulic drilling technology. It can be further reduced to 85 Dba using electric core drilling technology. As there is little impact involved in the hydraulic drill, and none in the core drill method there is anything vibration generated.

(2) Precise Control

The equipment is simple and easy to use, shearing clean faces and break is limited to very exact specifications. No over break occurs and no micro fractures are created in the host rock that might later result in "loose sloughing off".
The power cylinder is lighter than other types of hydraulic jacks and the operator /worker can manage the power cylinder fairly easily. This contributes to increased productivity as the operator / worker is not as prone to physical fatigue.

- **High Efficiency**

Only two operators per rock splitter are required to achieve the daily production of 35-100 Cubic Yards per shift. No other competitive systems can offer this level of production efficiency. We recommend using two crawler drills, diamond core drills or DTH Hammer with one Power Rock splitter, as this will create the most efficient and productive workforce.

- **Low Breaking Costs and Maintenance Costs.**

The Power Rock Splitter is designed to operate with most electrical power supplies including generator, city electricity and industrial electricity. In most cases the step-up or step-down voltage requirements are managed by the power pack, but the best is to specify the voltage available to factory before ordering a unit of Power Rock splitter.

With other rock splitting equipment, a number of potential problems exist:

- With the DARDA System, wedges brake frequently and the system requires special grease to lubricate the leaves
- With the HRS System, expansion tubes burst easily and must be replaced on a regular basis.
- Chemical (BRISTA or other brands of expansion chemicals) is expensive and not usable in horizontal holes
- As a direct result of equipment failure or the introduction of chemicals, the potential for environmental damage is increased

All of these problems can lead to excessive maintenance costs and lower production rates. The Power Rock splitter requires little maintenance, uses environmentally friendly oils, and replacement parts costs are negligible.

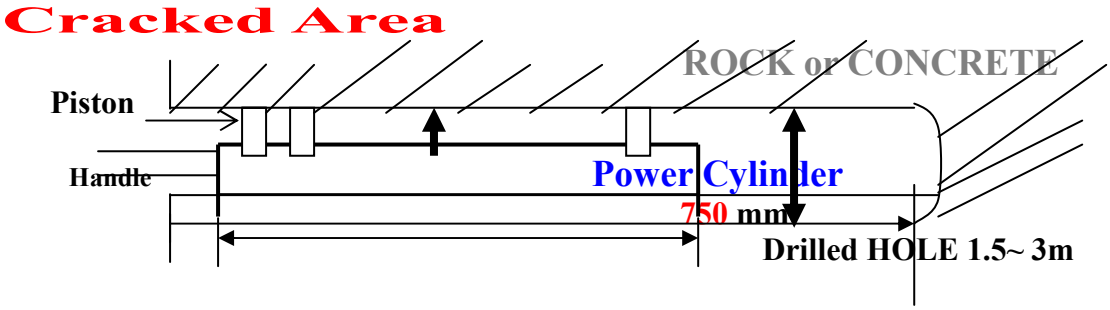
- **Versatility**

The Power Rock Splitter is lightweight for efficient mobilization, has few moving parts and is easily maintained. It can be moved into narrow site applications including tunnels and used in building demolition as well as for cement or rock breaking jobs.

4. OPERATION THEORY

As with blasting or impact breaking, force is required to split the rock. In the first two methods, excessive force is applied resulting in ancillary damage to the host rock in the form of micro-fractures that create weakness in the host rock and encourage splitting. With the Power Rock Splitter force is applied directionally and under tight control. With a 1” stroke on the cylinders, the force applied is adequate to cause splitting along the fracture plane in the rock or concrete without causing further damage to the host material.

<Fig. 1-1>



5. COMPARISION vs NON-EXPLOSIVE SYSTEMS

<Chart 1-2>

SYSTEM / COMPARISION	NON EXPLOSION METHOD			
ITEMS	ROCK SPLITTER	H.R.S. METHOD	DARDA	CHEMICAL
Productivity	115-315 Y^3/shift	10—50 Y^3/shift	15—30 Y^3/shift	30 –40 Y^3/shift
Advantage	Highly productive Low operating cost Low maintenance Controlled power Multi-purpose Light weight	Useful in trenching or in confined spaces	Useful in trenching or in confined spaces	Useful in trenching or confined space applications where movement is severely restricted
Disadvantage	Second breaking costs by hydraulic hammer.	Expansion Tube is expensive & easily broken. More down time. Increased risk of hydraulic spills	Wedges are weak and expensive and are easily broken. Lubrication is expensive. Increased risk of hydraulic spills	Chemical is expensive. Long wait times while chemical sets Increased risk of chemical spills
Applicable Job Site.	Medium or Large Site	Small or Medium site	Small and / or Narrow site	Narrow site
Type of Drill Rig and Secondary Breaking Equipment	Diamond Core Drill Crawler Drill DTH Hammer Hydraulic Breaker	Crawler Drill DTH Hammer Impact Breaker	Crawler Drill DTH Hammer Impact breaker	Crawler Drill Leg Drill

The PowerRock splitter compares favorably with other methods in all categories and it's high productivity, low operating cost and convenience, clearly show it to be the method having the greatest versatility.

2. OPERATIONAL SEQUENCE

1. Drilling

The first step is to drill holes of the proper diameter to accommodate the selected SP-series cylinder diameter. In a large excavation where noise levels under 95 dB are acceptable, and where there is adequate room for a crawler mounted top hammer this would be the drill of choice, although a crawler mounted DTH drill would also be acceptable. The other choice would be a Coring Diamond Drill on Excavator especially where noise, dust and vibration are restricted.

The PCD-200 series Diamond Core Drill can be attached to an excavator if there is no available crawler mounted drill or crawler mounted DTH drill

<Fig 3-1> PCD-200 & Core Drill Bits

• Diamond Core Drill with Excavator

• Core Drill Bits

An excavator can also be used to mount a small DTH drill if a crawler mounted unit is not available.

<Fig3-2> Low Noise PHD-30

The PHD-30 DTH Drill is very useful in small areas and where there are restrictions limiting noise pollution. The DTH hammer, and more rigid drill string, cuts a straighter hole than the crawler drill.

(*We have found that there is a strong correlation between straight holes and extended power cylinder life cycle*.)

When using a crawler top down drill, it is recommended to use a reaming bit or a retrac bit to ensure that the hole is straight. The diameter of hole should be 3/8" wider than power cylinder in order to ensure easy insertion of the power cylinder in the drilled holes.

<Chart 3-1>

PROPER DRILL BIT FOR SP-80 Splitter

Dia / Model	**Sp-80**
Bit Dia in "in"	3.504"
Remarks	Reaming or Retract Bit or DTH

Note: If you do not use the recommended bits and the holes are crooked, damage and premature failure of the power cylinder will occur. This may invalidate a warranty claim.

2) Cleaning the Drill Holes

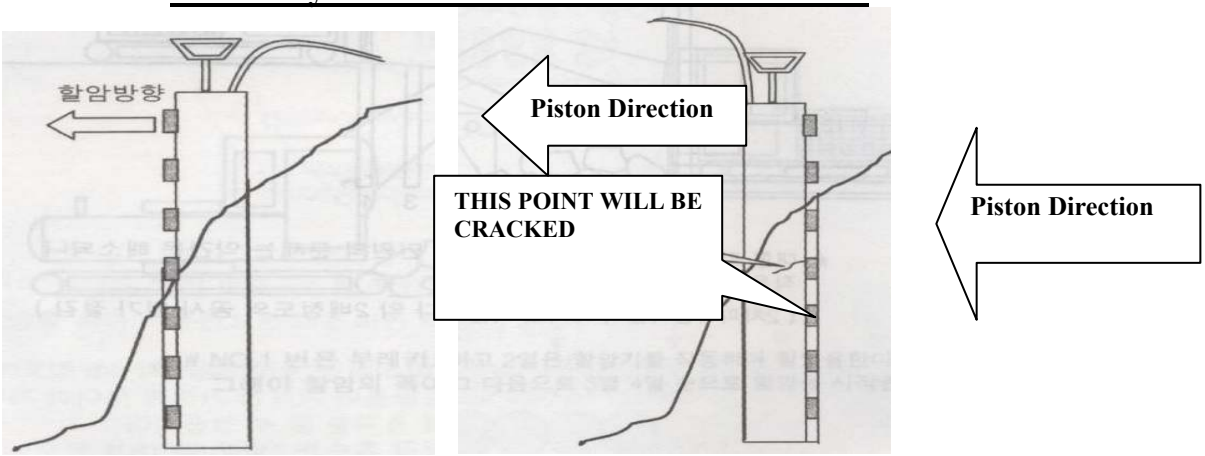
The drilled hole should be cleaned out prior to the insertion of the Power Rock splitter power cylinder. This can be done using a blowpipe and compressed air, or by using the "rake" supplied with each splitter. When cleaning multiple holes, plug the collar of the hole after it has been cleaned, to avoid recontamination from adjacent holes being cleaned.

3) Insert the Power Cylinder

Insert the power cylinders into the cleaned holes with the pistons facing toward the free face. Never use support plates at the back of the power cylinder, as our experience is that this may cause damage to the power cylinder. In case of using support plate, please use it at the front face of power cylinder.

<Fig No. 3-3>

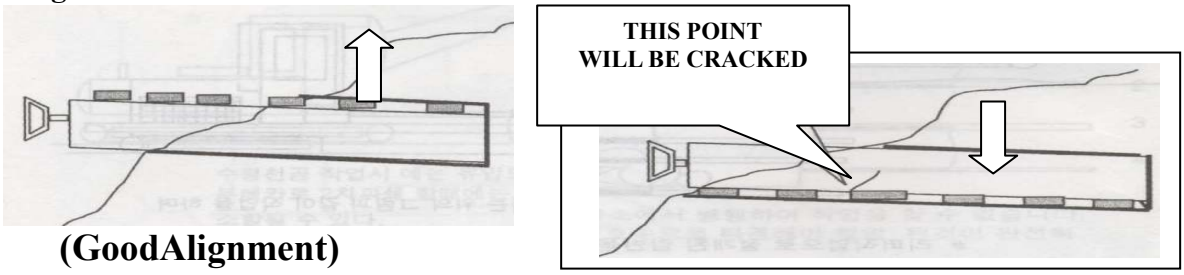
Power Cylinder Placement in Vertical Holes



(Correct Direction) **(Wrong Direction)**

Power Cylinder Placement in Horizontal Holes

<Fig No.3-4>



(GoodAlignment)

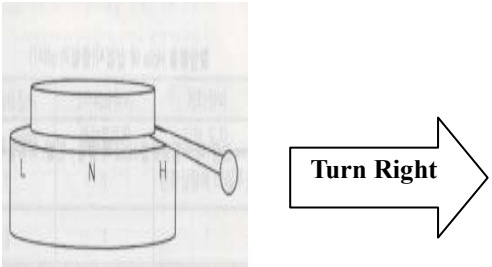
(
(Wrong Alignment)

4) Powering Up

Once the power cylinders are properly placed in the selected holes the Oil Directional Control Lever is set to the right hand side. The pump supplies oil to the power cylinders and ramps up the pressure in the pistons forcing them to stroke outwards until the rock or concrete is fractured.

Directional Control lever

<Fig. No.3-5>



5) Failure to Fracture the Concrete or Rock

If the rock or concrete fails to fracture then you will have to redrill the holes ensuring that they are the correct diameter for your Power Rock splitter. The Pistons in the Power Cylinder have a 1” stroke, which is more than adequate to break even the hardest rock encountered to date. Oversized holes increase the distance between the piston face and the hole wall, thereby increasing the amount of travel for the piston before it engages the hole wall and decreases the ability to create fractures. The temptation is to augment the travel by inserting a backing plate in order to shim the power cylinder. This has been done before with a high degree of likelihood that the power cylinder body will be cracked and made inoperable. Redrilling is the most prudent option.

Fractured Concrete and Hard Rock

<Fig. No.3-6>

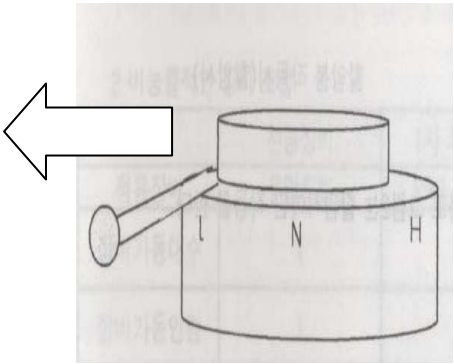
(Concrete) **(Rock)**

6) Power Down

After cracking the rock or concrete, turn the Directional Control Lever to the left hand position. Low pressure oil goes through the low pressure oil hose to the piston and retracts the pistons back into the power cylinder.

Note: ***The lever moves to three directions, High Pressure or Extend, Low Pressure or Retract and neutral.***

<Fig 3-7>



(Turn the Directional Control Lever to the left side for piston retraction)

7) Removing The Power Cylinder

As soon as the pistons are retracted into the power cylinder, the power cylinders may be pulled out from the cracked holes and move to the next set of holes to be broken. If portion of the broken rock or concrete obstruct you from pulling the power cylinder out of the hole **do not** pull it out by force. Clean out the broken material and then pull out the power cylinder smoothly.

8) Secondary Breaking

If the broken material is too large and bulky to be removed, either the material must be broken with an impact hammer or drilled and broken up using the splitter. If this is a continuing problem, then the drilling pattern should be reassessed and adjusted for fewer burdens.

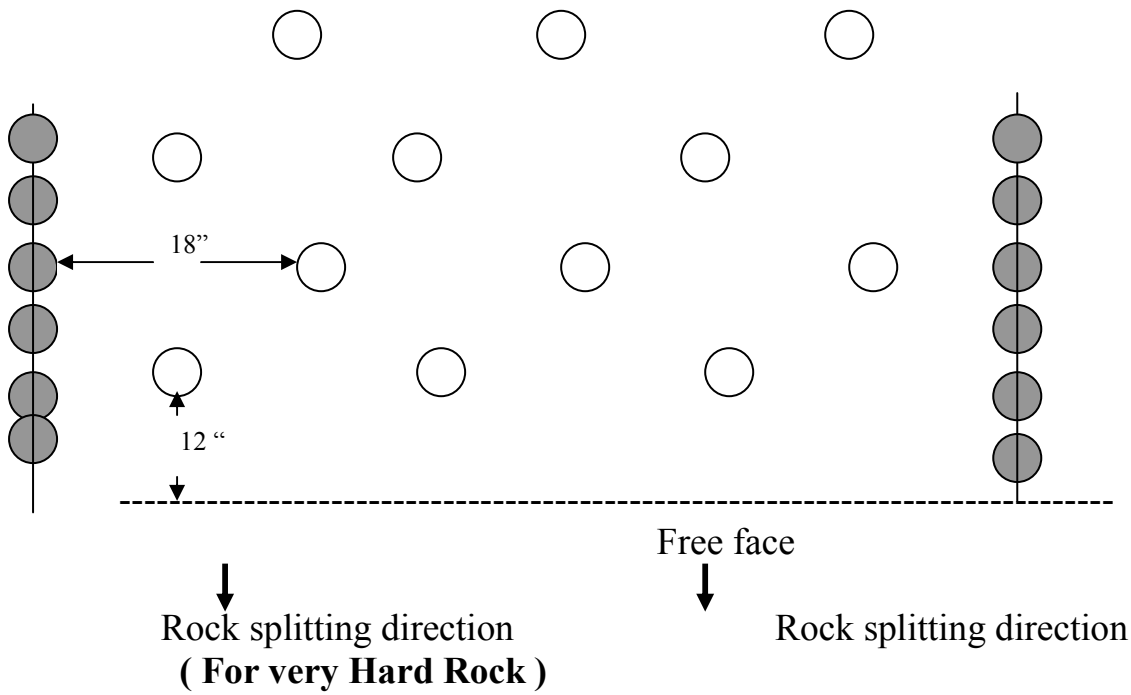
3. DRILLING PATTERNS

1) Distance between Holes

The spacing between the holes depends on the "breakability" of the rock or concrete. As a rule of thumb, in hard rock, all perimeter holes (holes defining the rock/excavation contact) should be at 6" centerline to centerline, to ensure clean shearing on the contact line. The next line of holes can have a spacing of 12" centerline of hole to centerline of hole. After that the pattern can be expanded to 18" center to center. This pattern will produce chunks that weigh about 50-125 lbs. with little or no secondary breaking required.

Preferable Hole Distance

<Fig 4-1>



(For very Hard Rock)

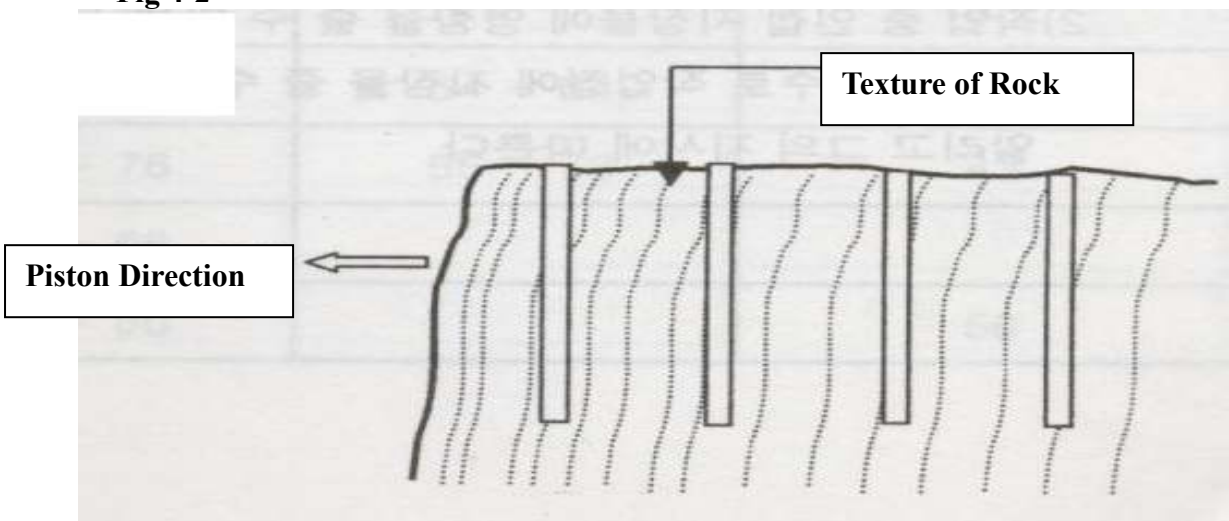
Caution

Generally you will drill the holes to a depth 5-6" longer than the Power Cylinder length. When the Power Cylinders are inserted into the holes, they must be suspended so that they do not drop too deeply into the hole. An 8" rebar or drill steel would be appropriate.

Another consideration when orienting the pistons of the power cylinder is to look for fractures, or small fault planes in the material to be split. These are indicators of weakness in the "in situ" rock. The splitting force should be applied along the fault or fracture, as this is the easiest and weakest plane.
If there is no definable plane of weakness, you may have to experiment with the placement of the power cylinder and pistons to establish the best plane for breaking the particular rock on your project.

Texture of Rock and Splitting Direction

Fig 4-2



(Rock Texture & Splitting Direction)

When breaking the reinforced concrete, the hole spacing should be fairly close (12”-15”) especially if there is a tight rebar pattern.

. It is important to ensure that any intersection with the rebar in the concrete is recognized as even the slightest deviation in the accuracy of the hole will have an adverse effect on your ability to insert the power cylinder. Although it is time consuming, it is far better to move over and redrill the hole, than it is to damage the power cylinder because the hole is not straight.

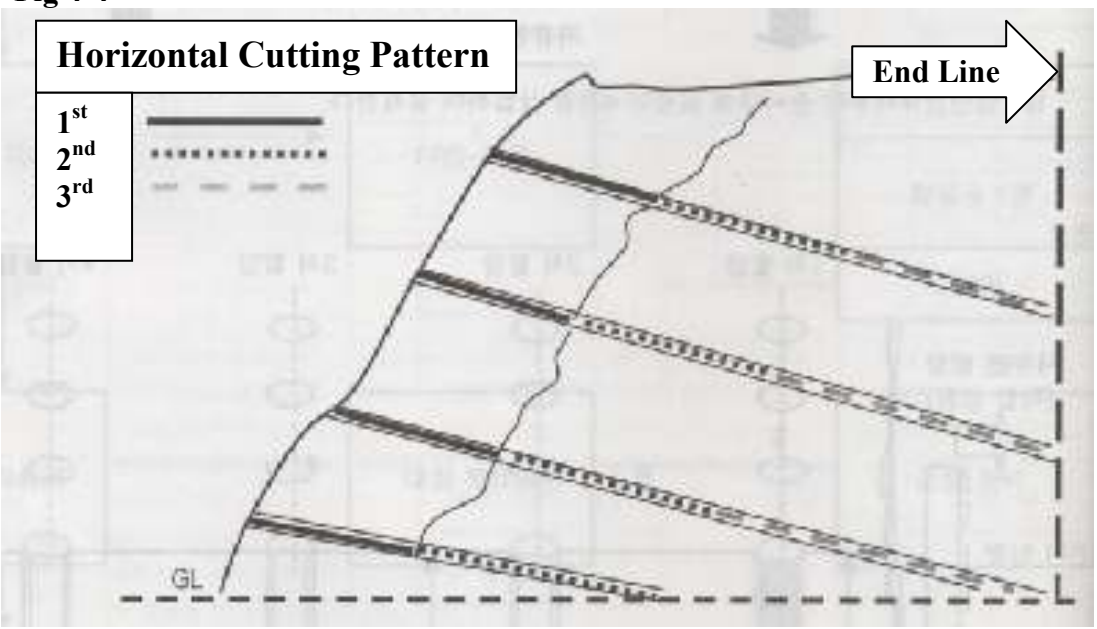
In a well planned operation, the total working time should be far more dependant on the **drill speed** and **drill accuracy,** than it is on the splitting time. Avoid problems with jammed power cylinders and down time due to cracked power cylinder bodies, by drilling holes accurately and to an established pattern.

2) Horizontal Drilling & Breaking

The Power Rock Splitter can also be used in applications where the material must be split horizontally. In this type of application, it is acceptable and more efficient to drill a longer hole (generally the length of the drill rod) and split the material in 31” increments, cleaning the holes before re-inserting the power tubes. This method saves time in that there is no need to set up a drill after the first splitting cycle has been completed. It is not recommended that the holes be drilled any deeper than one rod as hole deviation may be introduced, and it will then be difficult to insert the power tubes.

Horizontal Cutting Pattern

<Fig 4-4>



These are only guidelines based on past experiences, however, and depending on local conditions, ground type, and the amount of fracturing in the material being broken, you will develop a sense of what is the best hole length in each particular application.

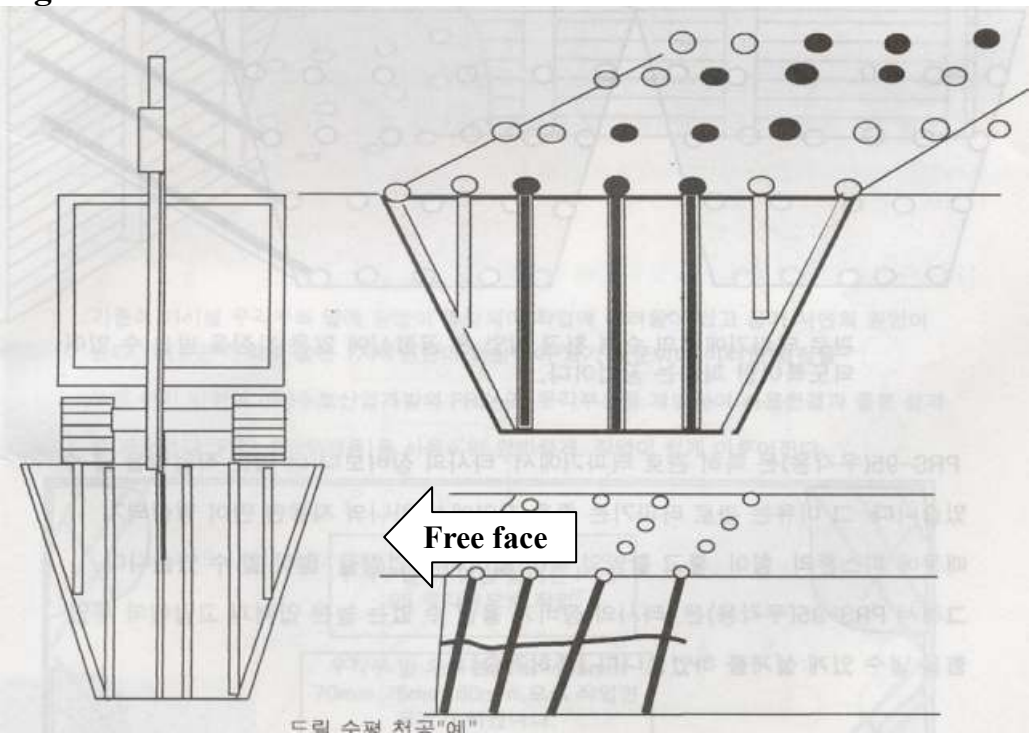
When breaking reinforced concrete, the hole spacing should be fairly close (12”-15”) especially if there is a tight rebar pattern. It is important to ensure that any intersection with the rebar in the concrete is recognized as even the slightest deviation in the accuracy of the hole will have an adverse effect on your ability to insert the power cylinder.

3) Breaking a Trench

Breaking a trench for pipelines in bedrock is another excellent application for the Power Rock splitter. This is especially true where fly rock, and blasting would be a problem. Again in this application, it is advisable to drill the holes to their full depth and split in 31” increments..

Trench Rock Digging

Fig 4-5



Trench Drilling Pattern

Where there is top access and a free face to break to, it is more productive to drill from the top down and split the material to the open face. A wide variety of trench profiles can be easily achieved with clean smooth sides and flat bottoms, minimizing the need for added leveling materials in the trench bottom.

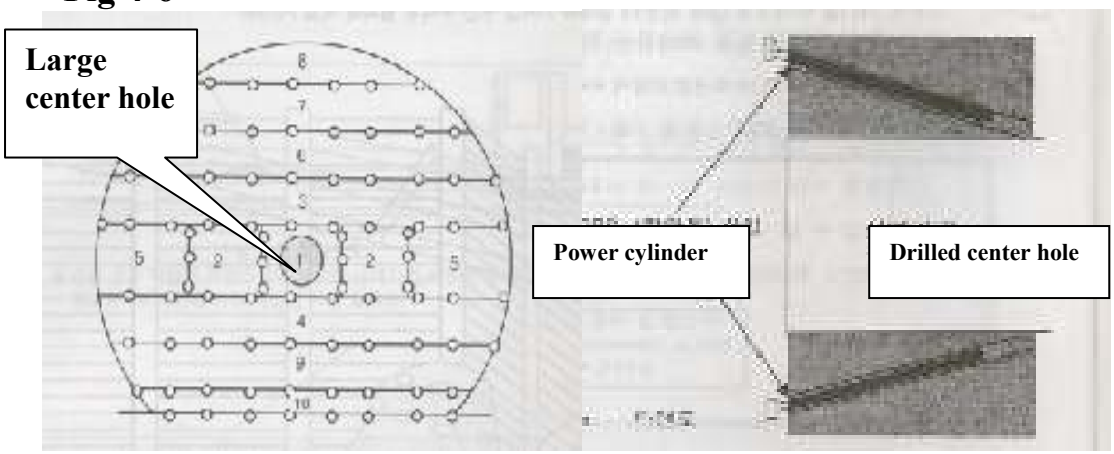
4) Tunneling

Tunneling is another area where there is a good application for the Power Rock splitter. This is especially practical for instances where blasting is not an option, due to security issues or because the smoke or noise would interfere with normal and continuous use of existing, connected operations. Where new tunnels have to go under existing operations or where they must break into existing tunnels there is no safer method than the Power Rock Splitter. The broken material can be easily contained and fragmentation is not a problem. The Power Rock Splitter offers very precise control of what is to be broken and to what specifications. The most difficult part of this type of work is to create a free face or void, allowing the drill and breaking pattern to be expanded. Here are two methods and patterns to create that free face.

The first method is to drill a large diameter hole with a crawler mounted Down-the- Hole (DTH) drill creating an opening for additional holes to break into. The second method is to drill a series of holes, which when broken in sequence creates an ever expanding void, into which the remaining holes are broken.

Large Center Hole Method

<Fig 4-6>



4. COMPONENTS OF PowerRock Splitter

The Power Rock splitter has been designed with three main component groups. The whole concept was to design a unit that was easy to use, was robust, and had interchangeable major component groups.

When the Power Rock Splitter was designed, the most importantly considerations were simplicity of design for easy operation, robust construction for low maintenance requirements when on site, and compatibility of component groups between all SP series splitters. There are three major component groups in each SP series splitter. They are the **POWER PACK, CONNECTING HOSE LINES** and **POWER CYLINDERS.**

The POWER PACK is composed of two sub components; an electric power supply unit, and a hydraulic power generation unit.
Electric power supplies vary from country to country. For this reason, you were asked to specify whether you wanted 50 Hz or 60 Hz, 110 Volts, 220Volts, 380 Volts, or 440 Volts, and whether it was to be 1 phase or 3 phase.
The Hydraulic Power Pack consists of a hydraulic pump powered by an electric motor and various pieces of instrumentation such as a directional control lever, oil filter, accumulator, limit switch, oil pressure gauge and oil tank.

Electric Power Supply Unit

Then standard motor supplied with the unit is a 3-phase, 60 cycle, 220 Volt electric motor. The unit comes equipped with a phase converter that allows the operator to accept single phase power and change it to three phases. It also comes equipped with technology to accept voltages ranging from 110 volts to 440 volts and step up or step down the voltage to 220 volts to make the voltage compatible with the electric motor.
It is however advisable when ordering the SP series splitter, to request that it be set up for local power supplies to avoid any problems at your site.
If a generator is used as the primary power source, you will need a 220V, 3 phase, 10Kw capacity unit.

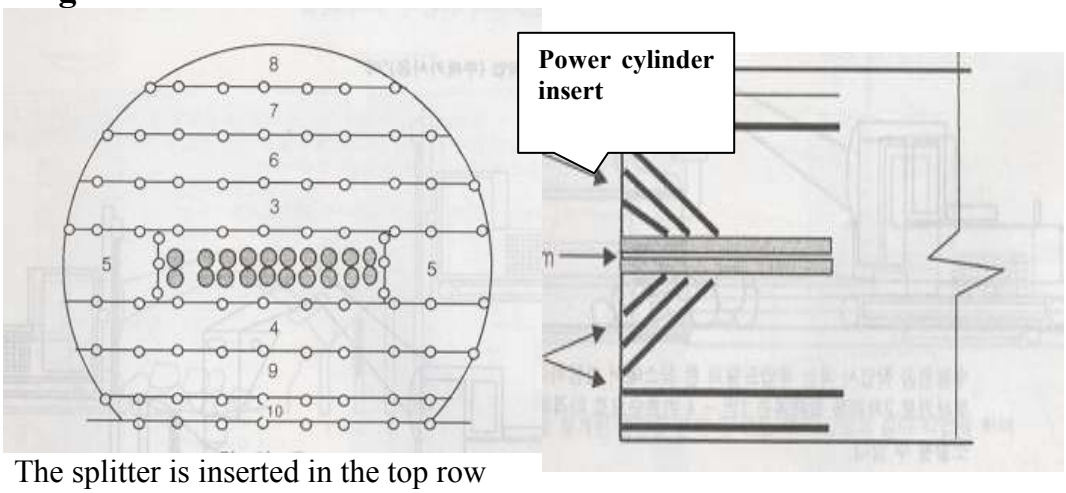
Hydraulic Power Pack

Hydraulic Pump and Oil Tank

The hydraulic pump, supplying oil to the power cylinders is located inside the oil tank. It is connected directly to the electric motor located on top of the tank. The hydraulic pump is a modified piston pump, with oversized pistons, designed to generate more power and supply higher pressures to the power cylinders.

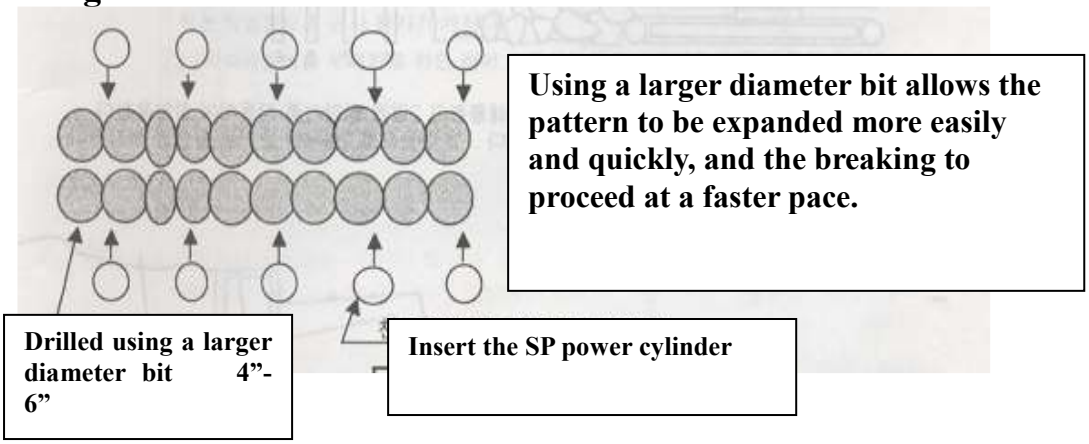
Series of Holes Method

<Fig 4-7>



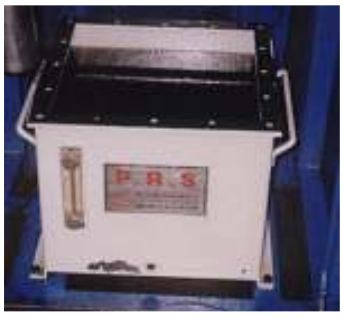
The splitter is inserted in the top row of holes and when force is applied, the rock is fractured creating a slot more than twice the width of the hole. Once the broken material is cleaned out of the newly created slot, successive lines of holes can be broken above and below, and to the left and right of the slot.

<Fig 4-8>



The type and grade of oil to be used will vary with the ambient temperature and the specific requirements of the customer. Any hydraulic oil used in equipment on the job site is suitable for use in the Power Rock Splitter.

The oil tank should be filled to the upper mark of the oil sight gauge (full tank) and it should be checked daily.



If a hose breaks and is replaced, add more oil, once the lines have been charged, in order to maintain maximum efficiency of the pump. Oil should be replaced periodically as should the oil filter. A dark color to the fluid is a good indicator that the oil needs to be changed.

Hydraulic Power Cylinder

In order to increase the productivity and increase the breakage rate, smaller diameter holes with tighter spacings, have proven to be the best combination.
The Power Rock Splitter is designed and manufactured using the very best grades of specialty steel, to allow the unit to be robust yet light enough to be easily managed by one worker. Additionally the unit had to be capable of withstanding very high hydraulic pressures without cracking or leaking..
Through 12 years of testing and countless re-designs, Power Rock Splitter has arrived at a reliable, efficient, environmentally friendly power cylinder that meets and exceeds customer expectations.
The most common, all-purpose units in the Pock Splitter series is the sp-80(international standard).
These units utilize 3.503937”(89mm) holes to achieve production rates that exceed any non-blasting methods.
The sp-80 utilizes 4 power cylinders over a body length of 30.3 inches, generating 1280 tons of force to split the material.

HOSE SET

The hydraulic hose sets consist of pairs of high-pressure lines and low-pressure lines that connect from the distribution manifold to each cylinder. An additional pair of hoses runs from the directional control valve to the distribution manifold.

The longer hoses come in 13’ lengths and in situations where longer runs of hoses are required, can be connected together.
Due to the very high pressure in the high-pressure hoses, it is recommended that the end user inspects the hose regularly for damage or signs of deterioration and replaces the hose with only the hoses recommended in the Parts List, Section 7 of this manual.

5. Things you need to know.

1) Connecting to Local Power Supply

The Electric Supply Control Box is designed for the Power Unit to work in optimal condition, the operator should not alter the unit without consulting us first.

2) Oil

Check the oil level gauge each shift, before you begin operations, to ensure that the tank is full. If the oil level is low, top it up, as low oil levels can result in damage to the oil pump, check valve and potential failure of the electric motor. If the oil appears to be dirty, the lines, and tank should be purged and cleaned thoroughly, before replacing the oil and filter. Oil should be replaced every 6 months or (1000hrs).

Use the hydraulic oil #32 for four seasons.

Where component failure is the result of insufficient oil in the tank or dirty oil or a plugged filter, any damage or failure of power pack unit will not be covered by warranty.

3) Pressure Limit Switch

The oil pressure of the Rock Splitter is preset at the factory. The pressure switch should not be tampered with and resetting the switch to increase the power, is dangerous and harmful to the pump, hoses and power cylinder.

In that case, damage will not be covered by warranty.

4) Hoses

The hydraulic hoses from the power pack to the power cylinder are a critical component and should be inspected on a regular basis. They should be protected from construction equipment in the area so they are not inadvertently damaged.
As you are dealing with extremely high pressure hydraulic oil, even a small pinhole in the hose can result in sever injury. If a pinhole is discovered, replace the hose immediately. Do not attempt to splice a damaged hose or to substitute a lower grade hose. Do not utilize any fittings that are a lower grade, as this will create the potential for an injury. You are risking injury.

Hoses are considered as a consumable item and are therefore not covered under warranty.

5) Location of the Power Unit

When setting up the power unit, try to ensure that the connections, electric motor, and electrical panel are away from pooled water and out of exposure to rain. The power unit should be sheltered from moisture and set up on a flat, horizontal base.

6) Damaged Hoses or Fittings

If one of the power cylinders is out of order (cracked or inner seal damaged) or can't be used due to hose damage near the power cylinder, disconnect the power cylinder and hoses at the distribution block and install a proper and close the oil path hole of oil distribution block with blind Nut for working with remaining power cylinders as temporary. The damaged Power cylinder or hose should be repaired immediately to make it work in normal condition.

7) Supporting the Power Cylinder in Vertical Holes

When splitting rock or concrete on the vertical plane, it is important to ensure that the power cylinder does not go deeply into the hole to be broken. This can be best accomplished using a piece of rebar or similar material, and insert the support through the power cylinder handles, resting the ends on the surface of the material being broken.

8) Maximizing the Power Cylinder Life

In some situations, the drill hole is not deep enough to accommodate the power cylinder completely. Powering up the cylinder with some of the pistons outside the hole will cause an uneven flow of oil of the pistons which are not engaged, which will cause undue wear on the pistons and seals and shorten the life of the pistons and the power cylinder. Where possible, ensure that the holes are always drilled deep enough to accommodate the entire power cylinder, to avoid any damage.

9) Straightness of Holes

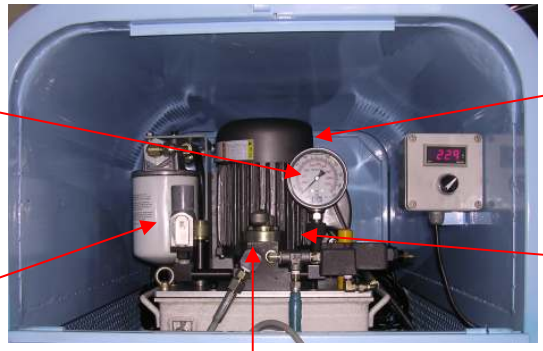
The straightness of the hole is very important. If the hole is not straight, the power cylinder should be bent along with the hole, which is the main cause of cracking of power cylinders and lower productivity.

6. SERVICE MANUAL

1) Sub-Component Identification

Hydraulic Power Pack

Fig.7-1



Front View of Power Pack

Motor : 2 hp, 220V, 3 Ø (3 phase)

Magnet Switch : On/Off switch for the electrical supply to the motor and breaker switch for the oil pressure.

High limit Switch : This switch cuts the oil supply at the factory pre- set pressure, of 15,600 PSI. Do not reset this switch to a higher pressure for better force as you are exceeding the safety factors are creating a hazard to the workers and could cause serious damage to the equipment.

Oil cap : Access to the hydraulic tank to add oil.

High Pressure Line) : This is a line from the high pressure side of the hydraulic pump to the distribution manifold

Directional Control Lever Lever on the three-way valve controlling the direction of oil flow to the distribution manifold.

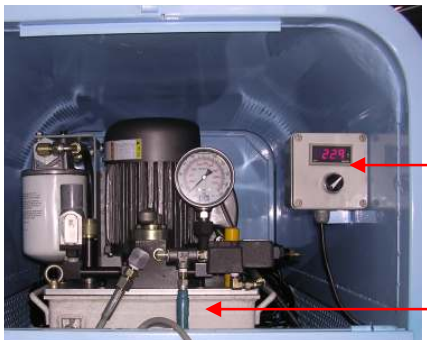
Low Pressure Line: This is a line from the low pressure side of the hydraulic pump to the distribution manifold.

Oil Filter : The oil filter is inside of this steel case. If it is time to replace of the oil filter when oil begins to leak from the cap of this case.

Pressure Gauge : Instantaneous pressure readout during breaking operations. The needle will drop when the rock or concrete is fractured and then go up until the full stroke of the pistons have been achieved

Electric Supply Control Panel

Fig. 7-2



Since the Electric control system is designed for optimal condition, the operator should not alter the unit without consulting us first.

- The power unit motor can stop while running if the input current is not enough.
  When stopped, switch off the front O/N-OFF switch and unplug the input current CODE and wait about 10 seconds and after connecting the input electrical code, switch it on.

Rear view of power pack unit

Volt Meter: Indicates the current voltage of power to motor.

Power Lamp: Indicates whether power is on or off.

ON/OFF Switch: Turns the power on/off to the electric motor for the hydraulic pump. When starting up , this switch is turned on first, and then the magnet switch in the motor side of the cabinet is turned **on. When you finish operation, please turn off the magnet switch first and then the main switch to protect the motor. If not, the motor might be burnt out!!**

Input Connector Block: Incoming power is connected here. If the incoming power is single phase, the power will go to the phase change transformer and be changed to three phase

Caution

- **If the power source is far from the rock splitter, more than 350 feet, we recommend you to use a 10 ~ 15 Kw generator.**
- **Try to ensure that the Rock Splitter is the only equipment drawing from the power source as fluctuations in voltage may be harmful to the electric motor.**

2) Trouble Shooting Guide

Rock Splitter fails to operate

Cause	Corrective Action
No Power to the Electrical Panel	1) Check the electric plug. 2) Check the incoming connection of the wire. 3) The unit is not grounded properly

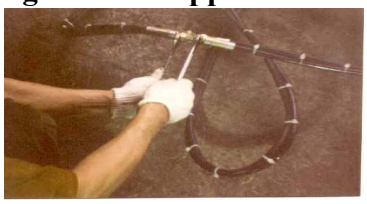
The transformer works but the motor does not.

Cause	Corrective Action
1) Electric line between the transformer and the motor is disconnected.	Check all the electric lines one by one.
2) Oil Pressure is B.O..	Open the magnet switch beside the electric motor and push the small button with a screw driver; if the motor runs, then the Oil Pressure Switch is out of order. Replace the terminal of the oil pressure switch.
3) Motor magnet is burnt out because the electric supply is lower than 220V.	If the electric supply is lower than 220V, irregular sound comes from the Motor magnet. If so, turn the round type electric voltage switch clockwise till voltage reaches 220V. If the electricity is still lower than 220V, the power supply source is at fault and needs to be examined. CAUTION If there is a large number of electrically powered equipment operating simultaneously on jobsites, fluctuating voltage may result. This could create a problem with the motor. Try to ensure a dedicated supply of electric power for the splitter.

Odor from the Motor or Transformer

Cause	Corrective Action
Burnt out by low voltage	**Switch off the power supply immediately and check electric supply. If the voltage is too low take corrective action as above. If the motor is burnt out, replace it or repair, or rewind it. If the transformer is burned out replace it.**

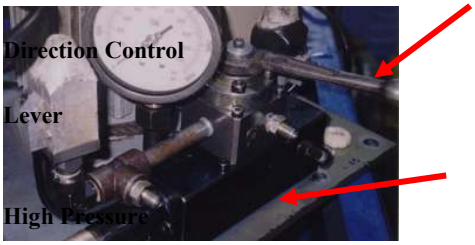
Oil Pressure suddenly drops.

Cause	Corrective Action
A hose connection is disconnected.	**Replace the hose.**
A hose or nipple connection is loose and oil is leaking at the connection	**Tighten the nipple or connector and check the oil lines** 

Pump is not working

Cause	Corrective Action
Pump is not working because of a motor trouble	**Motor magnet is burnt out when the electric supply is lower than 220V.** **If the electric supply is lower than 220V, irregular sound comes from the Motor magnet.** **Repair the motor.**

High Pressure does not reach the set pressure, 15,600 PSI

Cause	Corrective Action
Internal oil leakage in the power cylinder	**Remove all power cylinders from the holes and lay them down with the pistons up.** **Disconnect the low pressure hose on the oil valve block.** **Turn the motor and pump on.**  **Hose Connection** **Low Pressure** **Hose Connection** **Turn the Directional Control Valve lever to the right, (High Pressure mode). If oil leaks out of the low pressure hose then the cylinder is bypassing, which means that one or more seals are damaged on one of the pistons in the power cylinder.** **If no oil leaks from the hose, but a small amount of oil leaks from the low-pressure connection nipple, then there is a problem with the directional control valve.** **If neither the hose nor the directional control valve leaks, then the problem is at the check valve near the oil pump. The main cause of this is low oil level in the tank and air is being sucked into the oil intake, causing blockage.**

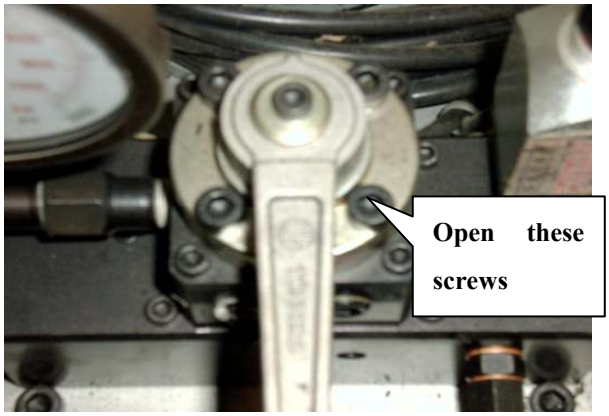
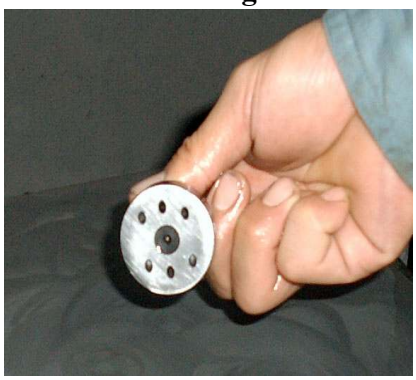
Internal leakage in the power cylinder

Cause	Corrective Action
One of the power cylinders is bypassing.	**This problem will be diagnosed during the previous tests.** **If oil is leaking from the low-pressure hose at the directional control valve, put the valve lever in the neutral position and reconnect the hose. Disconnect one of the low-pressure lines leading from the manifold to the power cylinders. (see picture below)**  **Turn the Directional Control Valve lever to the right, (High Pressure mode). If oil leaks out of the low-pressure hose then the cylinder is bypassing, which means that one or more seals are damaged on one of the pistons in the power cylinder.** **If no oil leaks, return the lever to the neutral position, reconnect the first low pressure hose then disconnect the next low pressure hose and urn the Directional Control Valve lever to the right, (High Pressure mode). Continue this process for all four cylinders and note which cylinder (it may be more than one so check all cylinders) needs to be replaced. If no replacement cylinder is available, you may blank off the high-pressure line leading to the damaged cylinders and continue using the remaining cylinders.**
Cause	**Corrective Action**
Repair procedure for a damaged	**When replacing a seal the working**

the damaged piston seal.	**environment should be clean and dust free. Even a small amount of dust or dirt entering the piston body during this repair could result in damage to the seal when the cylinder goes back into operation.** **You will need to use the hydraulic power pack for some of this repair and for diagnosis of which piston is B.O, and for testing the power cylinder upon completion of the procedure.** **Place the power cylinder in the vice with the pistons facing upwards.**  **Connect the hoses to the cylinder and move the control lever to the high pressure mark, noting which piston is not performing as expected.**  **Extend all pistons to there limit and then move the control lever to the low pressure mark just long enough to retract the pistons a small amount.** **Using the cap removal tool, loosen and**

	remove the cap of the bad piston.  **Remove the piston and inspect the seal and copper ring. Clean the piston thoroughly. Pay particular attention to the piston shoulder, and use emery cloth to take out any scratches.**  **Clear all material from the shoulders, and inspect for damage.** **Once the piston has been cleaned, install a new seal and copper ring.** **Reassemble the piston and tighten down the cap on the repaired piston** **Reconnect the hydraulic hoses and test the unit.**

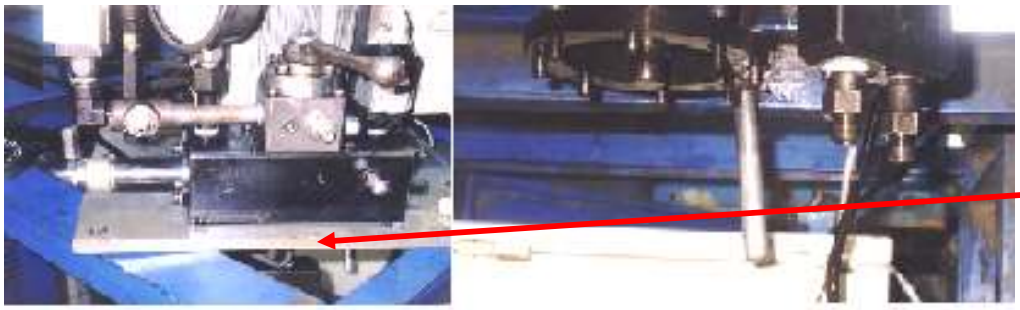
Internal leakage in the oil direction control valve

Cause	Corrective Action
Oil leaks from the low-pressure connection nipple and pressure does not go up to the high-pressure limit.	**Put the directional control lever to the low pressure side and retract the pistons in the power cylinders. Return the lever to the neutral position.** **Turn off the magnet switch.** **Turn off the main power to the pump.** **Open the oil Direction Control Valve.** ***Caution: Do not stand directly over the valve as it may still be under pressure*** **Remove the direction control lever by unscrewing the cap screw holding it in place.** **Loosen and remove the four cap screws on the valve cover.**  **Remove the valve spool and examine it for scratches or damage.**  **If there is a scratch, please polish the valve face on the fine polishing stone.**

Oil leaks from the low-pressure connection nipple and pressure does not go up to the high-pressure limit. (cont'd)	 **Polishing of the valve face should be done, with minimal pressure and using a figure " 8" pattern.**  **On the body of the valve you will see three (3) small valve spools. Remove them and examine each spool carefully for scratches. If any scratches are noted they should be polished on a fine polishing stone using the same technique as was used on the valve face. Once the valve face, valve body and spools have been polished, re-assemble the directional control valve.** **Check the oil level in the tank** **Top it up to the full mark.** **Put the directional control valve in the neutral position.** **Switch on the magnet switch then the motor switch and run the pump in neutral for about three minutes.** **Reconnect all lines and put the directional control lever to the high-pressure side and test the pressure.**

Check Valve is damaged.

Cause	Corrective Action
There is not enough oil in the oil tank, and air has been sucked into the oil line creating an air lock in the pressurized line. This can cause premature failure of the main check valve, the exhaust check valve or the intake check valve.	Take out the bolts on the valve block plate Slowly raise it up, and secure it so that you can safely work on the unit. Start the motor and pump to have oil circulation in the system. Carefully observing the check valves for leakage. If any oil is leaking from any check valve or valves, then it or they must be replaced.



Rod Seal of the piston cap is broken.	**Open the cap and replace the seal. If oil continues to leak from the crack around the piston cap, then the power cylinder body should be discarded.**

The piston does not return.

Piston seal in the Power Cylinder is broken.	**Open the cylinder cap and replace the seal of piston.**

7 SPARE PARTS LIST

1. **Spanner(wrench):**
   14m/m- 1 piece.
   16m/m- 1 piece.
   19m/m- 1 piece.
2. **High-pressure Hose: 300m/m- one.**
3. **Lowe-pressure Hose: 300m/m- one.**
4. **Hose Connecting Nipple:**
   High pressure-4 pieces.
   Low pressure- 4 pieces.
5. **Manual Valve Spool-3 pieces, Spool O-ring- 6 pieces,**
   Back-up Ring-6 pieces, Spring- 3 pieces.
6. **Drilling hole cleaner- 1 piece.**

(Note: The above lists of parts are subject to change due to up-dates and improvement on the machine)

8. WARRANTY POLICY

The Power Rock splitter is made under exacting quality control conditions, based on empirical data gathered on more than 3,000 jobsites in Korea since the first unit appeared in 1987. Since 2001 the SP splitters have been exported to Hong Kong, USA, Saudi Arabia, Iraq, China, India and Japan.

The Power Rock Splitter's Power Unit is guaranteed for 6 months from the date of delivery to the customer.
(If sent to our factory in Korea by the clients' expense, the Power Unit can be repaired free of charge for one year)

Exceptions

Failure caused by substituting defective or non-standard parts, will not be covered by warranty. Problems due to operator error are not covered by warranty. Consumable goods for the machine, such as hoses, filters, etc will not be covered by warranty.

If holes are drilled without using a reaming or retract bit, as recommended by the manufacturer and the power cylinder is inserted into a crooked hole, the Power Cylinder will not be covered by warranty.

Compensation for warranted parts is limited to the replacement of the only damaged parts and does not include any other parts, loss of labor while the equipment is down, or labor hours consumed in the repair process.

Thank you for choosing

BL.KOREA Since 1998 ***POWER ROCK Splitter***

Appendix I

DATA of SP-80 Rock Splitter

Model / Items	UOM	SP-80
PURPOSE		Rock or Concrete
Power Cylinder Diameter	in	3.15”
Piston Diameter	in	1.97
Piston Quantity	ea	10
Power of each Piston	ton	27
Power of each Power Cylinder	ton	302
Power of one unit of Rock splitter	ton	1,209
Power cylinder Quantity for each Rock splitter	ea	4

Technical specifications are subject to change without prior notice as the design is subject to Continuous Improvement studies.

BL.KOREA
Since 1998