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Form 4996
Revision 5

INSTRUCTION MANUAL

For

Paving Breaker

Models: PB85A & PB85AS

INGERSOLL-RAND®
CONSTRUCTION & MINING

Ingersoll–Rand Company
Rock Drill Division
7500 Shadwell Drive
Roanoke, Va. 24019
U.S.A.

Refer All Communications To The
Nearest Address Listed On The Back Cover

INGERSOLL-RAND®
CONSTRUCTION EQUIPMENT

CONSTRUCTION AND DRILLING EQUIPMENT SOLD BY DISTRIBUTORS

Warranty

Ingersoll–Rand, through its distributor, warrants that each item of equipment manufactured by it and delivered hereunder to the initial user to be free of defects in material and workmanship for a period of three (3) months from initial operation or six (6) months from the date of shipment to the initial user, whichever first occurs.

With respect to the following types of equipment, the warranty period enumerated will apply in lieu of the foregoing warranty period.

A. Aftercoolers, Drill Mountings and Klemm Rotary Heads – The earlier of six (6) months from initial operation or nine (9) months from date of shipment to the initial user.
B. Portable Compressors, Portable Generator Sets (GENSET), and Portable Light Towers – The earlier of twelve (12) months from shipment to, or the accumulation of 2,000 hours of service by, the initial user.
C. All Compressor Air Ends, GENSET Generators and Paving Breakers – The earlier of twenty–four (24) months from shipment to, or the accumulation of 4,000 hours of service by, the initial user. For Air Ends, the warranty against defects will include replacement of the complete Air End, provided the original Air End is returned assembled and unopened.
D. Pavers, Forklifts, Milling Machines, Pedestrain Compactors (including baseplates, upright and walk behinds) and Rotary Drills – The earlier of (6) months from shipment to, or the accumulation of 1,000 hours of service by, the initial user.
E. Jackhammers and Self–Propelled Compactors – The earlier of twelve (12) months from shipment to, or the accumulation of 1,000 hours of service by, the initial user.
F. Downhole Drills – In lieu of the repair or replacement of defective parts Ingersoll–Rand may elect to issue full or partial credit toward the purchase of a new part. The extent of credit issued will be determined by prorating against the normal service life of the part in question.
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Accessories or equipment furnished by Ingersoll–Rand, but manufactured by others, including, but not limited to, engines, tires, batteries, engine electrical equipment, hydraulic transmissions, carriers, shall carry whatever warranty the manufacturers have conveyed to Ingersoll–Rand and which can be passed on to the initial user.

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DECLARATION OF CONFORMITY

We ***Ingersoll–Rand, Co.***

(supplier's name)

7500 Shadwell Drive, Roanoke, Va. 24019 USA

(addresss)

declare under our sole responsibility that the product,

Paving Breaker Models PB85A & PB85AS

to which this declaration relates, is in compliance with the following standard(s) or other normative document(s):

EN292, PNEUROP8N1, ISO8662

following the provisions of ***89/392/EEC and 91/368/EEC*** *Directives.*

Date

Authorized signature

Alphabetical Index

1. INTRODUCTION.

This instruction manual contains information for safety, operation, maintenance, service and troubleshooting for the Paving Breaker Models PB85A & PB85AS (hereafter referred to as paving breaker).

2. SUPPORT EQUIPMENT REQUIRED.

The support equipment required to operate and/or maintain the paving breaker is listed in Table 1.

3. REFERENCE MATERIAL.

The reference material required to operate and/or maintain the paving breaker is listed in Table 2.

4. ABBREVIATION LIST.

Abbreviations listed in this manual that are not common are listed in Table 3 with the proper defination.

Table 1. Support Equipment Required

Item	Requirements or Specification
Air Supply	Air compressor that will supply between 90 to 100 psi (6.33 to 7.03 kg/cm^2) air pressure at the paving breaker inlet.

Table 2. Reference Material

Manual No.	Title of Manual
PS–5500.18	Parts List for Paving Breaker Models PB85A & PB85AS

Table 3. Abbreviation List

Abbreviation, Symbol, or Term	Meaning
F	Fahrenheit
ft^3/min.	Cubic Feet Per Minute
Hex.	Hexagon
c	Celsius
in.	Inch
IR	Ingersoll–Rand®
kg	Kilogram
kg/cm^2	Kilograms Per Square Centimeter
lbs.	Pounds
lb–ft	Foot Pound
mm	Millimeter
m	Meter
Nm	Newton Meter
NPT	National Pipe Tap
psi	Pounds Per Square Inch
oz.	Ounce

NOTICE

SAVE THESE INSTRUCTIONS. DO NOT DESTROY.

NOTICE

All information, illustrations, and specifications in this manual are based on the latest information available at the time of publication. Product improvement is a continuing goal at Ingersoll–Rand®. Design and specifications are subject to change without notice or obligation.

When the life of the tool has expired, it is recommended that the tool be disassembled, degreased and parts be separated by material so that they can be recycled.

Alphabetical Index

1. INTRODUCTION.

This section contains important safety information for the Paving Breaker Models PB85A & PB85AS (hereafter referred to as paving breaker).

2. SAFETY FIRST.

SAFETY FIRST is the primary concern for the protection of both, personnel and the paving breaker during any phase of operation. All personnel must thoroughly understand all safety precautions before operating or doing any maintenance work on the paving breaker.

3. SAFETY PRECAUTIONS. (Table 1.)

The Safety Precautions listed in Table 1 are intended to make all personnel aware of the dangers while working on or near a paving breaker. All personnel must use common sense and a good working practice while operating and maintaining this paving breaker. The precautions are of a general nature and cannot cover every possible situation.

All personnel must understand the **DANGER, WARNING, CAUTION,** and **NOTICE** used throughout the text of this instruction manual, and on the Safety Labels located on the paving breaker. The **DANGER, WARNING, CAUTION,** and **NOTICE** are defined as follows:

⚠DANGER

DANGER IS USED TO INDICATE THE PRESENCE OF A HAZARD WHICH WILL CAUSE SEVERE PERSONAL INJURY OR DEATH IF THE WARNING IS IGNORED.

⚠WARNING

WARNING IS USED TO INDICATE THE PRESENCE OF A HAZARD WHICH CAN CAUSE SEVERE INJURY OR DEATH IF THE WARNING IS IGNORED.

⚠CAUTION

CAUTION IS USED TO INDICATE THE PRESENCE OF A HAZARD WHICH **WILL** OR **CAN** CAUSE PERSONAL INJURY, OR PROPERTY DAMAGE IF THE WARNING IS IGNORED.

NOTICE

Notice is used to notify people of installation, operation, or maintenance information which is important but not hazard–related.

By understanding what **DANGER, WARNING, CAUTION,** and **NOTICE** mean; and using good judgment and common sense; all personnel can avoid injuring themselves and/or damaging the paving breaker.

The Safety Labels shown in this manual and on the jackhamer are for operator protection. Replacement Safety Labels can be obtained at no cost from your local Ingersoll–Rand dealer or representative or by contacting the factory at:

Ingersoll–Rand Company
Rock Drill Division
7500 Shadwell Drive
Roanoke, Virginia 24019
U.S.A.
(703) 362–3321

⚠WARNING

Repetitive motions, uncomfortable positions and/or vibrations can cause injury to hands, fingers and/or wrists. Stop using the paving breaker if discomfort, tingling feeling or pain occurs. Consult a doctor before resuming use.

Table 1. Safety Precautions

1. ALWAYS WEAR APPROVED HARD HAT, SAFETY SHOES, SAFETY GLASSES, NOSE MASK, AND EAR PROTECTION WHEN NEAR A PAVING BREAKER IN OPERATION. FAILURE TO WEAR APPROVED SAFETY EQUIPMENT COULD RESULT IN BODILY INJURY.
2. PROLONGED EXPOSURE TO EXCESSIVE NOISE LEVELS WITHOUT THE USE OF PROPER EAR PROTECTION CAN RESULT IN PERMANENT HEARING LOSS.
3. DO NOT INDULGE IN HORSEPLAY. DISTRACTIONS CAN CAUSE ACCIDENTS.
4. KEEP YOUR HANDS OFF THE THROTTLE LEVER UNTIL IT IS TIME TO START BREAKER OPERATION.
5. MAINTAIN A STEADY BALANCE AT ALL TIMES.
6. NEVER PUT YOUR FACE CLOSE TO THE PAVING BREAKER.
7. NEVER REST THE PAVING BREAKER ON YOUR FOOT.
8. NEVER POINT THE PAVING BREAKER AT ANYONE.
9. NEVER START THE PAVING BREAKER WHEN IT IS LYING ON THE GROUND.
10. COMPRESSED AIR IS DANGEROUS. NEVER POINT AN AIR HOSE AT YOURSELF OR CO–WORKERS. NEVER BLOW YOUR CLOTHES FREE OF DUST WITH COMPRESSED AIR.
11. BE SURE ALL HOSE CONNECTIONS ARE TIGHT. A LOOSE HOSE NOT ONLY CAUSES LEAKS, BUT IT MAY COME COMPLETELY OFF THE BREAKER, WHIP AROUND, AND INJURE THE OPERATOR AND OTHERS IN THE AREA. ATTACH SAFETY CABLES TO ALL HOSES TO PREVENT INJURY IF A HOSE IS ACCIDENTALLY BROKEN.
12. NEVER DISCONNECT A PRESSURIZED AIR HOSE, BEFORE DISCONNECTING A HOSE, SHUT–OFF THE AIR AT THE COMPRESSOR AND BLEED THE PAVING BREAKER.

Table 1. Safety Precautions (Cont.)

13. DO NOT OPERATE THE PAVING BREAKER WITHOUT A PAVING BREAKER TOOL LOCKED IN THE FRONTHEAD. HOLD THE TOOL FIRMLY AGAINST THE WORK.
14. ALWAYS KEEP BOTH HANDS ON THE HANDLE WHILE OPERATING THE PAVING BREAKER.
15. THE OPERATOR MUST KEEP HIS LEGS AND FEET CLEAR OF THE PAVING BREAKER TOOL TO PREVENT INJURY IF THE TOOL BREAKS. IF A TOOL BREAKS, THE PAVING BREAKER (WITH PIECE OF BROKEN TOOL PROJECTING FROM FRONTHEAD) WILL SUDDENLY DROP TO THE GROUND.
16. DO NOT "RIDE" THE PAVING BREAKER WITH ONE LEG OVER THE HANDLE. THE OPERATOR CAN BE INJURED IF THE TOOL BREAKS WHILE HE IS RIDING THE PAVING BREAKER.
17. KNOW WHAT IS UNDERNEATH THE MATERIAL YOU ARE ABOUT TO BREAK. BE ALERT FOR ANY BURIED WATER, GAS, SEWER, TELEPHONE, OR ELECTRIC LINES.
18. IF YOU HIT SOMETHING, SHUT–OFF THE PAVING BREAKER IMMEDIATELY AND FIND OUT WHAT IT IS. USE A SHOVEL. NOT THE PAVING BREAKER. TO UNCOVER THE OBJECT CAREFULLY.
19. WHEN USING ANY SOLVENT TO CLEAN PARTS, MAKE SURE THAT IT MEETS CURRENT SAFETY AND HEALTH STANDARDS AND THAT IT IS USED IN AN AREA THAT IS ADEQUATELY VENTILATED.

Alphabetical Index

1. INTRODUCTION.

This section provides a description and specifications for the Paving Breaker Models PB85A & PB85AS (hereafter referred to as paving breaker).

2. DESCRIPTION.

The paving breaker is a heavyweight tool that provides maximum performance at minimum cost.

The paving breaker is designed for general paving–breaker work where a heavy–duty, easy–handling breaker is necessary. It is especially suitable for tearing up concrete, asphalt, or stone paving in road construction and maintenance work, breaking up large rocks and boulders in mines and quarries; and general demolition work in any industry.

3. STANDARD EQUIPMENT.

Each paving breaker is a complete unit ready to be put into service with proper lubrication. There are no extra parts or special fittings required.

The paving breaker comes standard with a fronthead bushing which accommodates a 1–1/4 in. Hex. x 6 in. long (32mm Hex. x 152mm long) paving breaker shank.

The following fronthead is available on special order:

Fronthead which accommodates a 1–1/8 in. Hex. x 6 in. long (28mm Hex. x 152mm long) paving breaker shank.

4. SPECIFICATIONS.

Tables 1 and 2 list the specifications of the paving breaker.

5. VIBRATION AND NOISE LEVEL. (Not Available at this time.)

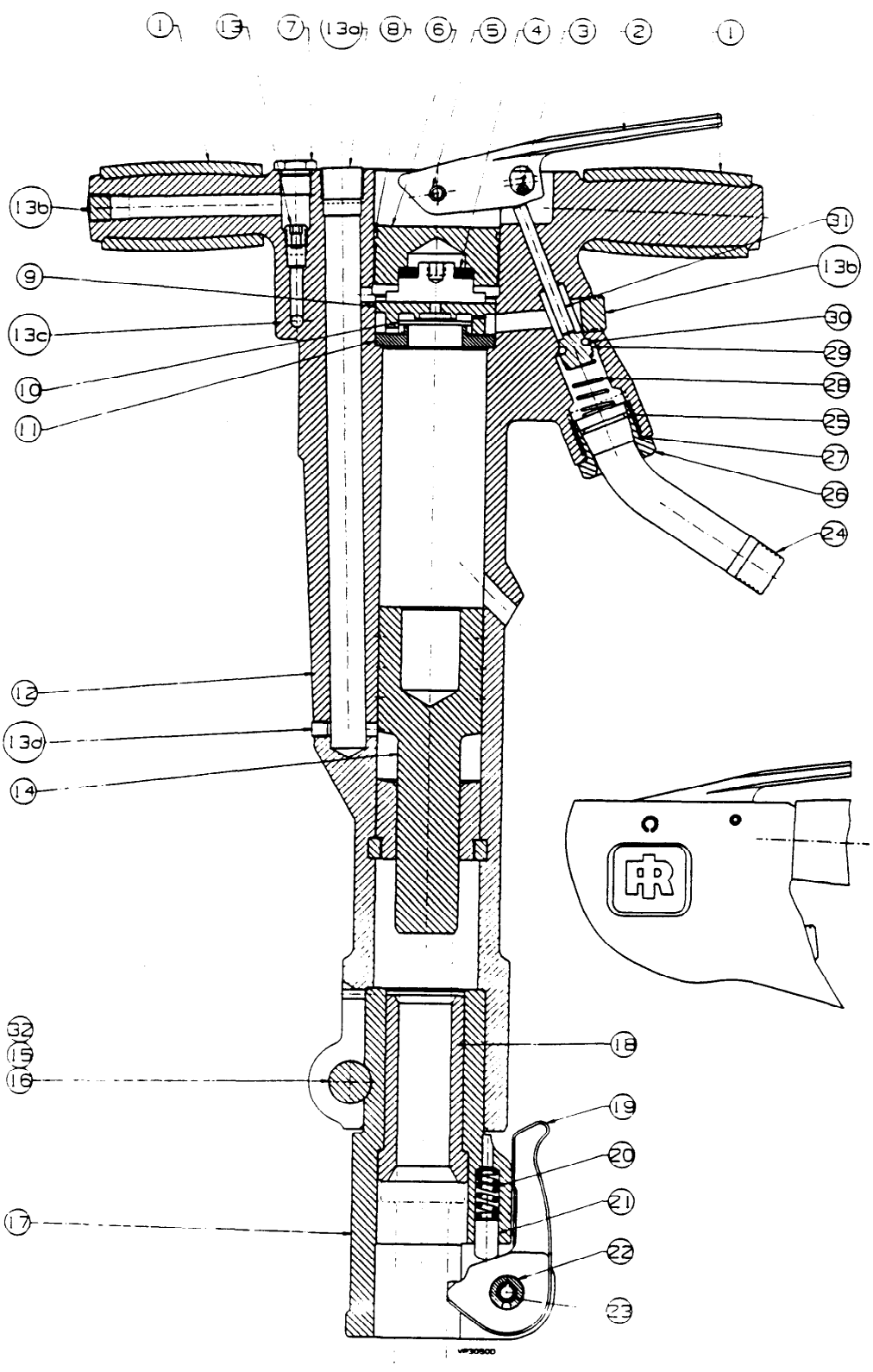
This information will be included with next release of this book.

Table 1. General Specifications

	English	Metric
Net Weight (less tool) PB85A	84 lbs	38 kg
. . . . . PB85AS	89 lbs	40 kg
Overall Length (less tool)	28.5 in.	724 mm
Bore of Cylinder	2.5 in.	63.5 mm
Working Stroke	6.3 in.	160 mm
Size of Standard Paving Breaker Shank (Solid Hex. with Collar)	1–1/4 in. Hex. x 6 in. long 32mm Hex. x 152 mm long	
Size of Optional Paving Breaker Shank (Solid Hex. with Collar)	1–1/8 in. Hex. x 6 in. long 28mm Hex. x 152 mm long	
Size of Air Inlet	3/4 in. NPT	
Size of Air Hose Recommended	3/4 in.	19.1 mm
Air Consumption (at 90 psi [6.32 kg/cm^2]) . .	85 ft^3/min	2.21 m^3/min

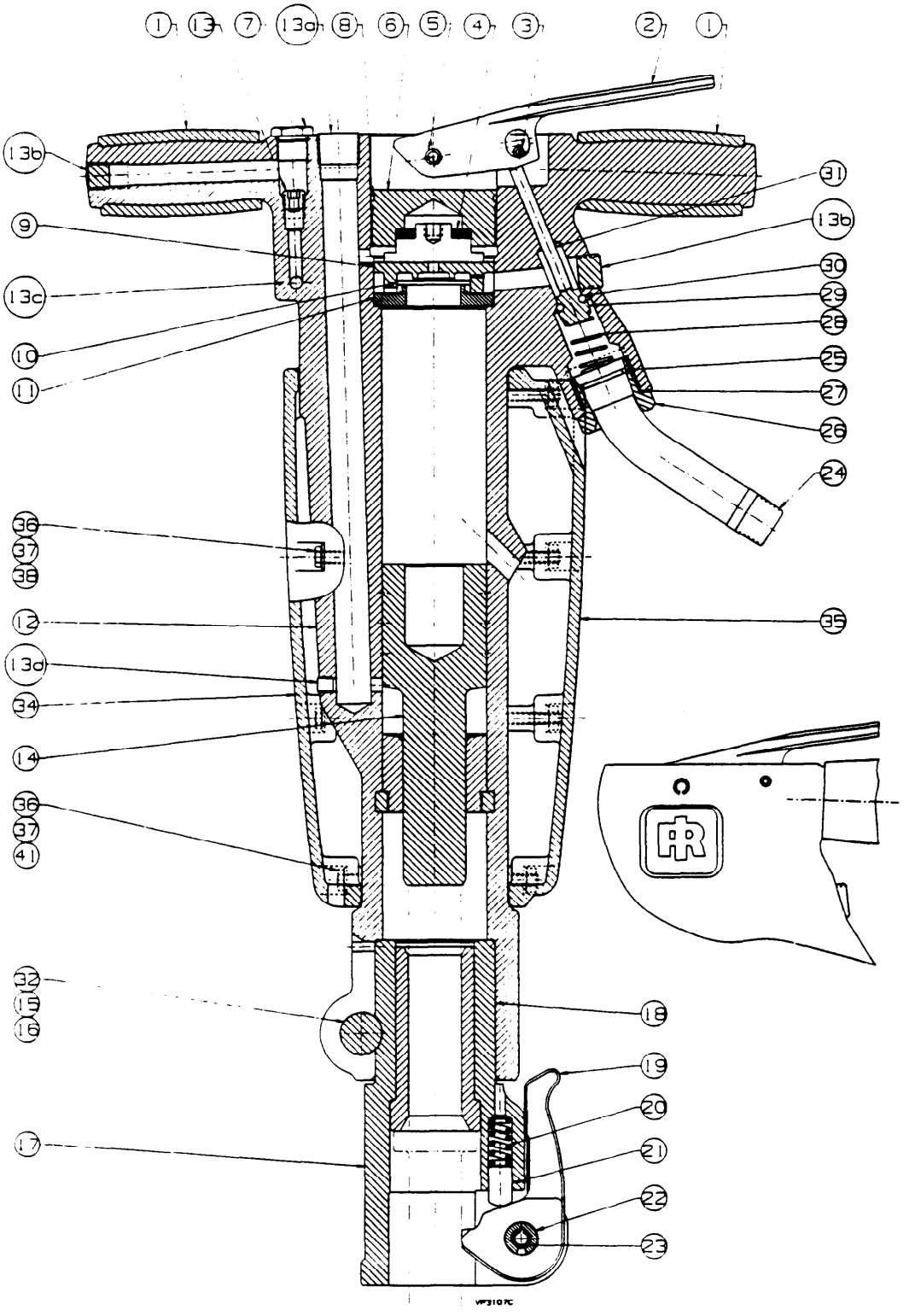
Table 2. Shipping Information

	English	Metric
Net Weight (less tool) PB85A	84 lbs	38 kg
. . . . . PB85AS	89 lbs	40 kg
Shipping Weight PB85A	86 lbs	39 kg
. . . . . PB85AS	91 lbs	41 kg



1. HANDLE SLEEVE
2. THROTTLE LEVER
3. ROLL PIN
4. WASHER
5. ROLL PIN
6. HOUSING PLUG
7. PLUG
8. O–RING
9. VALVE CHEST
10. VALVE
11. VALVE COVER
12. HOUSING
13. FILTER ASSEMBLY
14. PISTON
15. BOLT
16. NUT
17. FRONTHEAD
18. BUSHING
19. RETAINING LEVER
20. SPRING
21. PLUNGER
22. PIN
23. PIN
24. AIR CONNECTION
25. O–RING
26. CAP
27. O–RING
28. SPRING
29. VALVE
30. O–RING
31. PIN
32. WASHER

Figure 1. Paving Breaker PB85A – Sectional Illustration



1. HANDLE SLEEVE
2. THROTTLE LEVER
3. ROLL PIN
4. WASHER
5. ROLL PIN
6. HOUSING PLUG
7. PLUG
8. O–RING
9. VALVE CHEST
10. VALVE
11. VALVE COVER
12. HOUSING
13. FILTER ASSEMBLY
14. PISTON
15. BOLT
16. NUT
17. FRONTHEAD
18. BUSHING
19. RETAINING LEVER
20. SPRING
21. PLUNGER
22. PIN
23. PIN
24. AIR CONNECTION
25. O–RING
26. CAP
27. O–RING
28. SPRING
29. VALVE
30. O–RING
31. PIN
32. WASHER
34. MUFFLER, RS
35. MUFFLER, LS
36. WASHER
37. NUT
38. BOLT
41. BOLT

Figure 2. Paving Breaker PB85AS – Sectional Illustration

Alphabetical Index

1. INTRODUCTION.

This section provides installation and operation requirements for the Paving Breaker Models PB85A & PB85AS (hereafter referred to as paving breaker).

2. AIR REQUIREMENTS.

An air compressor of sufficient capacity is needed to provide the necessary volume of air at the most efficient operating pressure to ensure effective and economical operation of the paving breaker. Refer to (Section 3, Table 1) for air requirements of the paving breaker.

Low or inadequate air pressure at the paving breaker is costly and wasteful, and an insufficient volume of air will not allow it to operate efficiently.

Air pressures of 90 to 100 psi (6.33 to 7.03 kg/cm^2) are recommended for maximum performance. These figures represent air pressures at the paving breaker and not at the compressor. There is always a certain amount of pressure drop between the compressor and the paving breaker; only the pressure and volume at the tool is effective in doing work. If the hose is relatively short and in good condition, the pressure drop between the compressor (or air receiver) and the paving breaker should not exceed 15 percent of the initial pressure.

3. AIR HOSE AND FITTINGS.

Quality hose designed especially for rock drill service should be used. It should be constructed with an outer covering that resists abrasive wear, an oil–resistant inner tube and should be able to withstand the heat of the compressed air. It should have a working pressure safety factor of at least 4 to 1 in relation to burst.

The hose fittings should be kept as tight as possible and should be in good condition. Elimination of leakage involves making the air system tight and then keeping it tight. Air loses through bad connections and worn hose can often reach 10 to 20 percent of the total air compressed. Refer to Section 3, Table 1 for the size of air hose required.

4. BEFORE OPERATION.

a. Determine the method of lubrication to be used. Refer to Section 5, Paragraph 2.

b. Fill the oil reservoir with rock drill oil conforming to the physical and chemical properties listed in Section 5, Table 1.

c. Blow out the main air supply hose to get rid of moisture, rubber particles, and dirt.

d. When using new air hose, blow lubricated air through the hose to completely coat the inside with oil. This may take 10 to 15 minutes.

⚠WARNING

COMPRESSED AIR IS DANGEROUS. WHEN BLOWING OUT AN AIR HOSE, HOLD IT FIRMLY, AND POINT IT AWAY FROM PERSONNEL AND EQUIPMENT. NEVER BLOW YOUR CLOTHES FREE OF DUST WITH COMPRESSED AIR.

e. An air line filter can be installed in the main air supply line to keep dirt from entering the paving breaker. Air line filters are an accessory item and must be specially ordered.

f. Connect the leader hose to the air connection on the paving breaker.

⚠WARNING

BE SURE ALL HOSE CONNECTIONS ARE TIGHT. A LOOSE HOSE NOT ONLY CAUSES LEAKS, BUT CAN COME COMPLETELY OFF THE PAVING BREAKER, WHIP AROUND, AND INJURE PERSONNEL IN THE AREA. ATTACH SAFETY CABLES TO ALL HOSES TO PREVENT INJURY IF A HOSE IS ACCIDENTALLY BROKEN.

g. Open the latch by pushing the lever down.

h. Insert the shank end of the paving–breaker tool in the fronthead, and swing the latch up to lock the tool in the paving breaker. Refer to Section 3, Table 1 for the correct paving breaker shank size.

⚠CAUTION

MAKE SURE THE TOOL IS THE CORRECT SIZE FOR THE FRONTHEAD: EITHER 1–1/8 IN. HEX. (28 MM HEX.) OR 1–1/4 IN. HEX. (32 MM HEX.). DON'T USE A PAVING BREAKER TOOL THAT IS DULL; IT WON'T DO AN EFFECTIVE JOB AND WILL CAUSE UNNECESSARY WEAR TO THE BREAKER.

5. CONTROLS.

The paving breaker is controlled by a self–closing, lever–operated, throttle valve that is built into the T–handle.

When air pressure is directed to the paving breaker, the throttle lever will be in the raised, or off, position. The paving breaker will not start until the lever is depressed. The lever will return to the off position when it is released.

6. OPERATION.

⚠DANGER

a. KNOW WHAT IS UNDERNEATH THE MATERIAL YOU ARE ABOUT TO BREAK. BE ALERT FOR ANY EXISTING WATER, GAS, ELECTRICITY, SEWER, OR TELEPHONE LINES.

b. ALWAYS KEEP BOTH HANDS ON THE HANDLE WHILE OPERATING THE PAVING BREAKER.

c. THE OPERATOR MUST KEEP HIS LEGS AND FEET CLEAR OF THE PAVING BREAKER TOOL TO PREVENT INJURY IF THE TOOL BREAKS. WHEN A TOOL BREAKS, THE PAVING BREAKER (WITH A PIECE OF BROKEN TOOL PROJECTING FROM THE FRONTHEAD) WILL SUDDENLY DROP TO THE GROUND.

⚠CAUTION

DO NOT OPERATE THE PAVING BREAKER WITHOUT A PAVING BREAKER TOOL IN THE FRONTHEAD BUSHING. HOLD THE TOOL FIRMLY AGAINST THE WORK.

1. Grip the paving breaker handle with both hands. Depress the throttle valve lever with the palm of the hand, and apply firm steady pressure to the T–handle. The correct amount of pressure for maximum efficiency can be gained only by experience, but generally the correct pressure is usually recognizable by the rhythmic sound of the exhaust and maximum breaking action. Insufficient pressure will slow down the paving breaker action. Do not "ride" the paving breaker with one leg over the handle.

⚠ DANGER

THE OPERATOR WILL BE SERIOUSLY INJURED IF THE TOOL BREAKS WHILE HE IS RIDING THE PAVING BREAKER WITH ONE LEG OVER THE HANDLE.

⚠CAUTION

RIDING THE PAVING BREAKER HANDLE CREATES EXCESSIVE PRESSURE ON ONE SIDE OF THE PAVING BREAKER, THROWING IT OUT OF ALIGNMENT AND CAUSING UNNECESSARY WEAR ON INTERNAL PARTS.

2. Almost immediately after starting the paving breaker, check for the presence of oil mist at the exhaust port and on the paving breaker tool. This is the only assurance that oil is traveling all the way through the breaker. When checking the paving breaker for proper lubrication, always put the tool against the work.

3. Release the throttle–valve lever to shut the paving breaker off.

4. If exhaust freeze–up occurs, add anti–freeze lubricant directly through the air inlet connection. Use "KILLFROST" anti–freeze lubricant or equivalent.

7. OPERATIONAL TIPS.

To ensure maximum operating efficiency, observe the following suggestions:

a. Never strike the paving breaker with tools; the housing or other parts may be broken or damaged.

b. Never attempt major maintenance of the paving breaker on the job; take it to a repair shop.

c. Never drag the paving breaker along the ground; the air ports and other openings will scoop up dirt.

d. Always blow out the air supply hose before connecting it to the paving breaker. This rids the line of dirt.

e. Always be sure the paving breaker is well lubricated. Adjust the air line lubricator so that the paving breaker tool always shows an oil film. There should be a fine mist of oil coming out of the exhaust port.

f. Always keep rock drill oil in a sealed container so that it doesn't get contaminated with dust or dirt.

g. Do not operate the paving breaker when the tool is not against the work.

h. In extremely cold weather, keep paving breaker tools wrapped in burlap or cloth until just before you use them. At 0°F (–17.8°C) a hardened steel tool loses about 80% of its normal shock resistance.

i. Always keep plastic caps or plugs in all ports when the paving breaker is not in service.

j. Work to the predetermined line (boundary) and grade (depth). Cut straight and cut neatly. To get the exact grade, use a tape or ruler.

k. In certain applications, such as a pipe job where the grade is critical, it pays to over–excavate. If you try to excavate exactly to grade, even a small piece of rock sticking up will throw the pipe off grade. To avoid this problem, excavate a little deeper than grade, then fill and compact to the correct grade. This is easier than having to come back and break out more rock.

l. Always score a sidewalk or portion of a slab before breaking it. This is usually done with a concrete saw, but if it has not been, use the paving breaker to score the job along the designated line to ensure a clean break. When cutting asphalt, cut all the way through the asphalt with each cut, as well as all the way around the perimeter of the area, before you break the asphalt out.

m. When excavating to a critical line for installation of a service, square the sides of the excavation as you work down. Otherwise, you'll either under–cut or over–cut.

n. When making an excavation to work in, it's better to make a "bell–hole" to provide ample working room.

o. Always break any material to the point of "give". This is accomplished by making sure you're breaking the concrete or rock, not just cracking it; otherwise, your're not working to the point of give. Always clear away the rubble as you're breaking the concrete, rock, or asphalt. Uncleared rubble blocks your point of give.

p. Always take the right sized "bite" with the paving breaker. When starting to work the paving breaker in a material, experiment to find the right sized bite for breaking that material efficiently.

If you take bites that are too big, it will be necessary to pry with the paving breaker tool. This could break the tool or damage the paving breaker. The paving breaker is not designed for prying; it's designed for breaking. Always use a pick to pry material free.

If you take bites that are too small, you'll be working too slowly, and you'll have to pick up and move the paving breaker more than necessary.

Alphabetical Index

1. INTRODUCTION.

This section provides information on maintenance, lubrication, disassembly, reassembly, and performance testing of the Paving Breaker Models PB85A & PB85AS (hereafter referred to as paving breaker).

2. LUBRICATION.

3. METHODS OF LUBRICATION.

Proper lubrication is the most important single factor responsible for the service life of the pneumatic paving breaker. A paving breaker can be severely damaged during the first few minutes of operation if it is not properly lubricated.

The lubrication method depends on the actual operating conditions and customer preference.

⚠CAUTION

THE BUILT–IN OIL RESERVOIR MUST BE CHECKED EVERY TWO HOURS AND REFILLED AS NECESSARY.

a. The oil reservoir built into the handle will provide proper lubrication. It must be checked every two hours and refilled as necessary.

b. For intermittent operation with an air supply hose no longer than 50 ft. (15 m), a compressor–mounted lubricator may be used.

c. For continuous operation during an eight hour shift, an Ingersoll–Rand 16LUB16 Air Line Lubricator, or other constant–feed air line lubricator, should be installed in the air–supply line about 11.5 ft. (3.5 m) from the paving breaker. The 16LUB16 Lubricator has a capacity of 1 U.S. pint (0.47 liters) and will be furnished when it is specially ordered. To adjust an air line lubricator initially:

1. Turn the lubricator needle valve clockwise until it is completely closed, and then turn the valve counter–clockwise about 3/4 of a turn off its seat.

2. Almost immediately after starting the paving breaker, check for presence of oil at the exhaust ports and on the paving breaker tool. When checking the paving breaker for proper lubrication, always put the tool against the work.

3. Fine–tune the lubricator needle valve to provide a light film of oil on the paving breaker tool and a fine oil mist coming from the exhaust ports. If there is blue smoke coming from the exhaust port or oil running down the tool, the paving breaker is getting too much oil. Adjust the lubricator for proper rate of feed.

d. Regardless of the method of lubrication, the lubricating oil reservoir must be serv-

iced with the correct grade of rock drill oil as frequently as is necessary to prevent any possibility of the paving breaker running dry.

e. The supply of lubricant in the handle reservoir should be checked every two hours of operating time.

f. The oil level in the air line lubricator should be checked at the beginning of each eight–hour shift and once during the shift.

g. Every effort must be made to avoid oil contamination from dirt or other impurities. Oil should be kept in covered containers and stored in an area that is relatively dust free.

h. Before filling the air line lubricator, the area around the filler plug should be wiped clean.

4. LUBRICATING OIL SPECIFICATIONS.

Ingersoll–Rand® offers a complete line of rock drill oils formulated to provide maximum performance in all types of rock drill equipment. These oils exceed the oil specifications listed in Table 1.

⚠CAUTION

NEVER ALLOW THE LUBRICATOR TO BECOME EMPTY AS THE PARTS WILL BE DAMAGED IF THE PAVING BREAKER IS OPERATED WITHOUT LUBRICATION.

The rock drill oil used in the air line lubricator must be a well refined petroleum lubricating oil. It must be suitably compounded to provide the specified consistency and film strength, and be further compounded to provide the specified steam emulsion number, which is required to provide satisfactory lubricant. Though the composition of the "film strength" additive is not specified, it must be non–corrosive to both steel and bronze, and contain little or no sulphur.

Ingersoll–Rand Rock Drill Oils are formulated to provide maximum performance in all types of rock drill equipment. Use Table 2 for selecting the correct viscosity grade to meet your requirements and Table 3 for selecting the correct rock drill oil part number.

Table 1. Rock Drill Oil Specifications

Characteristic	Test Procedure	Below 20°F (–7°C)	20°F to 90°F (–7°C to 32°C)	Above 90°F (32°C)
Viscosity:				
SUS at 100°F (38°C)	ASTM–D2161	175 min.	450 min.	750 min.
SUS at 210°F (99°C)	ASTM–D2161	46 min.	65 min.	85 min.
cST at 104°F (40°C)	ASTM–D445	37 min.	105 min.	160 min.
cST at 212°F (100°C)	ASTM–D445	6 min.	11 min.	16 min.
Pour Point, °F (°C) max.	ASTM–D97	–10°F (–23°C)	–10°F (–23°C)	0°F (–18°C)
Flash Point,°F (°C) min.	ASTM–D92	370°F (188°C)	400°F (204°C)	450°F (232°C)
Viscosity Index, min.	ASTM–D2270	90	90	90
Steam Emulsion No. min.	ASTM–1935–65	1200	1200	1200
Consistency	. . . . .	Stringy	Stringy	Stringy
Falex Load Test lbs (kg) [min]	ASTM–D2670	2000 lbs (907 kg)	2000 lbs (907 kg)	2000 lbs (907 kg)
Timken E.P. Test lbs (kg) [min]	ASTM–D2782	30 lbs (14 kg)	30 lbs (14 kg)	30 lbs (14 kg)

Table 2. Selection Chart

Typical Operating Conditions	20°F to 90°F (–7°C to 32°C)	Above 90°F (32°C)
90–100 psi (6.33 to 7.03 kg/cm^2)	Light	Medium

Table 3. Ingersoll–Rand Rock Drill Oil Part Numbers

Grade	1 Gallon	5 Gallon	55 Gallon
Light	51378701	51378727	51378743
Medium	51378693	51378719	51378735

⚠CAUTION

KEEP THE ROCK DRILL LUBRICANT CLEAN AND FREE FROM ALL FOREIGN MATTER TO PREVENT DAMAGE TO THE DRILL INTERNAL PARTS.

5. MAINTENANCE.

To ensure maximum life and top performance of the equipment, it is necessary that the maintenance be made before serious damage occurs. It is important to be cautious when performing any service work. A general knowledge of the system and/or components is important before the removal or disassembly of any components. The following is a list of basic precautions that must always be observed:

a. Never attempt major maintenance of the paving breaker on the job; always send the paving breaker to a repair shop.

b. Clean the exterior of the paving breaker before disassembly.

c. Provide a clean work area for disassembling the paving breaker.

d. Handle parts carefully. Hardened parts might chip or break if dropped on a hard surface.

e. Place small parts in a clean box to prevent loss.

f. Keep your hands and the paving breaker clean and free of dirt, while assembling.

g. Wipe a film of clean oil over the working parts as they are assembled.

h. Do not allow dirt or chips from soft drifts and hammers to enter the paving breaker.

i. With the exception of pressed–in parts, all the parts should fit together easily. If excessive force is required, the part is probably cocked and should be removed and realigned.

6. DISASSEMBLY. (Figure 1)

a. If equipped with a muffler, remove bolts (38, 41), washers (36) and nuts (37); then remove muffler halves (34, 35).

b. Place the paving breaker in a vise with the fronthead up.

⚠CAUTION

CLAMP THE PAVING BREAKER HOUSING IN THE AREA OF THE HANDLES. CLAMP IT FIRMLY BUT CAREFULLY. THE HANDLE CAN BE SQUEEZED OUT–OF–ROUND OR CRACKED IF THE VISE IS OVERTIGHTENED.

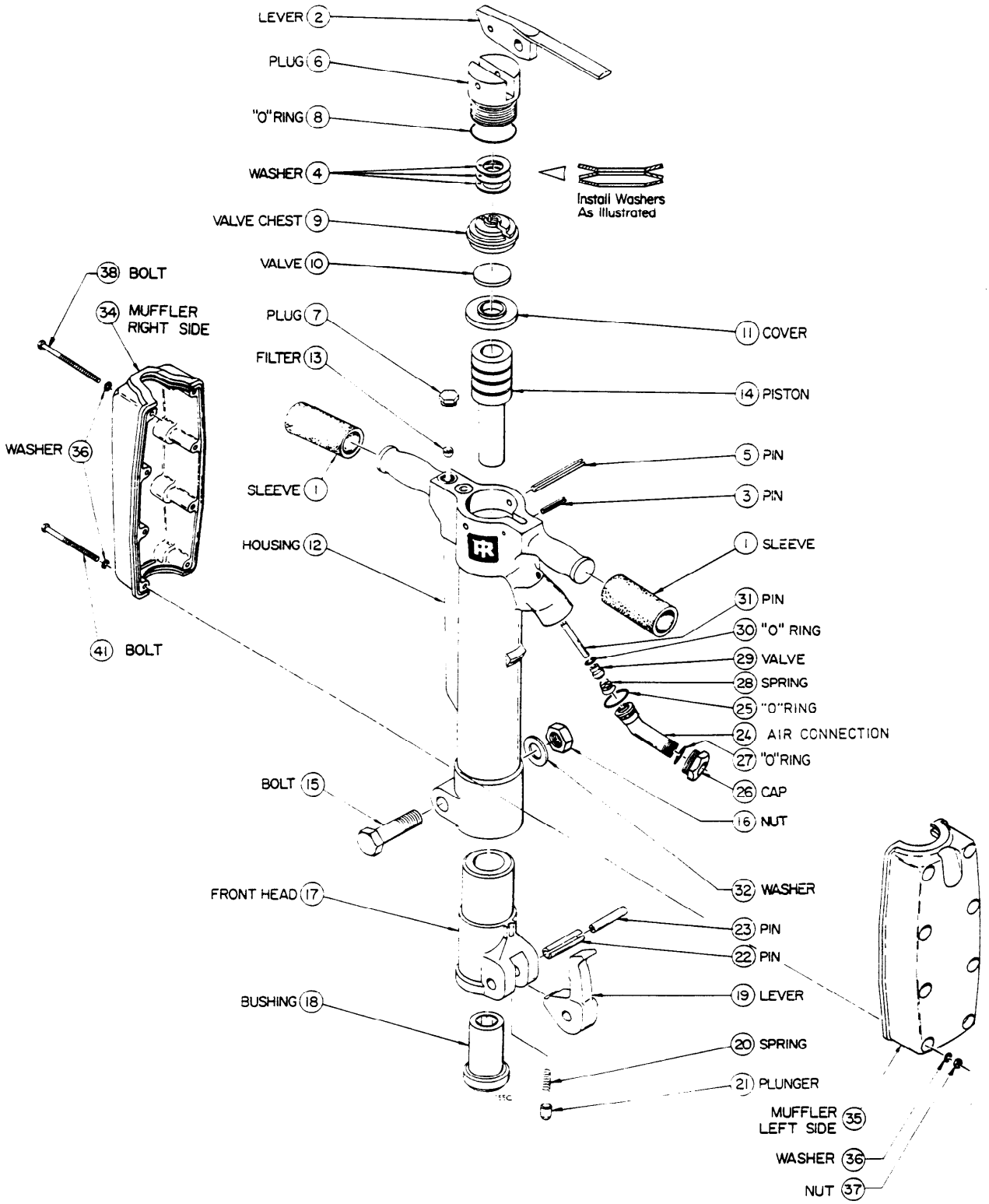


Figure 1. Paving Breaker Models PB85A & PB85AS – Exploded Illustration

c. Remove the nut (16), washer (32) and bolt (15).

d. Pull the fronthead assembly (17) up to remove it from the housing (12).

NOTICE

The fronthead assembly is a tight fit in the housing bore. It may be necessary to drive a wedge into the housing slot to open the housing bore enough to allow the fronthead assembly to be easily removed.

e. Remove the paving breaker from the vise and mount it with the handle up.

f. Remove pin (3) and pin (5) and lift out throttle lever (2).

g. The throttle lever (2) can now be used to unscrew the housing plug (6) from the housing.

h. Remove the o–ring (8) from the plug.

i. Remove the valve chest (9) by screwing a piece of 1/2 – 13UNC–2B threaded rod into the top of the valve chest and pulling out the three washers (4) and valve chest (9).

j. If it is necessary to remove any of the air connection parts, unscrew the air connection cap (26) and the air connection (24); pin (31), valve (29) and spring (28) will drop out.

k. Loosen vise so breaker can be rotated so the valve (10), valve cover (11) and piston (14) fall out.

⚠CAUTION

WHEN LOOSENING THE VISE, MAKE SURE THE PAVING BREAKER IS SUPPORTED TO PREVENT IT FROM FALLING.

l. If it is necessary to remove any of the latch parts, drive out the pins (22) and (23), then remove the lever (19), plunger (21) and spring (20) from the fronthead (17).

m. If the fronthead bushing (18) should require removal from the fronthead (17), make a tool from an old moil point:

1. Cut off the tip of the moil, making sure it is cut square.
2. Leave about 8 in.(203 mm) of steel below the moil collar.
3. Insert the fabricated tool (short end first) in the sleeve end of the fronthead (17), and, with a heavy hydraulic press, drive out the fronthead bushing (18).

n. If the filter assembly (13) must be removed, use a standard screw driver to remove it from the housing (12).

NOTICE

It is not necessary to remove the filter assembly (13) unless it is damaged and must be replaced.

7. INSPECTION AND REPAIR. (Figure 1)

a. Clean the parts in a suitable solvent.

⚠DANGER

WHEN USING ANY SOLVENT TO CLEAN PARTS, MAKE SURE THAT IT MEETS CURRENT SAFETY AND HEALTH STANDARDS, AND THAT IT IS USED IN AN AREA THAT IS ADEQUATELY VENTILATED.

b. All the ports in the housing (12), valve chest (9), and valve cover (11) must be examined, and all dust or dirt particles removed.

c. Check the valve (10) for cracks or coining. If the valve (10) is damaged, replace it.

d. Replace the piston (14) or housing (12) when a 0.007 in. (0.178 mm) feeler gauge can be inserted between them. To determine whether it is the piston (14) or the housing (12) that is worn, install a new piston (14) in the housing (12) and check the clearance.

e. Check the throttle valve (29) and o–ring (30) for wear, and make certain that the throttle pin (31) is free to slide in the handle.

8. REASSEMBLY. (Figure 1)

a. If it was removed, reassemble the steel retaining lever:

1. Insert the spring (20) then the plunger (21) into the fronthead (17).

2. Fit the lever (19) to the fronthead, then secure the lever with the pins (22) and (23).

⚠CAUTION

CLAMP THE HOUSING FIRMLY BUT CAREFULLY: THE HOUSING CAN BE CRACKED IF THE VISE IS OVER TIGHTENED.

b. Secure the housing (12) in a vise with soft jaws. Position the housing with the handles up.

c. Check the housing bore to make sure it is clean. If necessary, use a clean rag to wipe out any dirt or chips.

d. Drop the piston (14) into the housing (12), shank end towards the fronthead end.

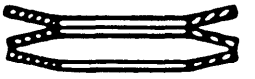
e. Install the valve cover (11) and valve (10).

f. Use a piece of 1/2 – 13 UNC–2B threaded rod to screw into the top of the valve chest (9). Hold the end of the rod and install the valve chest (9) into the housing bore, being careful that it doesn't get cocked.

g. Install the three washers (4) as shown in Figure 2.

⚠CAUTION

BEFORE INSTALLING THE HOUSING PLUG (6), MAKE SURE THE VALVE PARTS ARE PROPERLY ASSEMBLED IN THE HOUSING (12). IF THEY ARE MISALIGNED, THEY MAY BE PERMANENTLY DAMAGED AND THE PAVING BREAKER WILL NOT RUN.



INSTALL WASHERS AS ILLUSTRATED

Figure 2. Valve Chest Washer Orientation

h. Install a new o–ring (8) in its groove in the housing plug (6).

i. Install the housing plug (6) in the housing and use the throttle lever (2) to tighten. After tightening, backoff the plug enough to line the holes in the plug with the holes in the housing.

j. Position the throttle lever (2) in the housing plug (6) slot, and drive in the two roll pins (3) and (5) thru the housing and throttle lever to secure.

k. If removed, install a new filter assembly (13) and tighten with a standard screw driver.

l. Install plug (7) into the housing.

m. Loosen the vise and position the paving breaker so the air connection parts can be easily installed.

n. Insert the throttle pin (31), throttle valve(29) and throttle spring (28) into the housing (12).

NOTICE

The throttle pin (31) must move freely in its bore. The throttle spring (28) is tapered and must be installed with the smaller diameter against the throttle valve (29) and the larger diameter against the air connection (24).

o. Install new o–rings (25,27) into the grooves on the air connection cap (26).

p. Install the air connection (24) into the air connection cap (26) and secure the air connection parts with the air connection cap (26).

q. If the fronthead bushing (18) was removed from the fronthead (17), an assembly tool should be made from an old moil point to assist in reassembling the bushing in the fronthead. Refer to Paragraph 6, Step m, for instructions on fabricating this tool.

NOTICE

Make sure the bushing (18) is aligned in the fronthead (17) so that chisel points, asphalt cutter; and other bladed tools will have the blade parallel to the paving breaker T–handle.

The fronthead assembly is a tight fit in the housing bore. It may be necessary to drive a wedge into the housing slot to open the housing bore enough to allow the fronthead assembly to be easily replaced.

r. Using the fabricated assembly tool, press the fronthead bushing (18) into the front end (steel end) of the fronthead (17) until bottomed.

s. Install fronthead (17) into housing (12) with the steel retainer latch on the same side as the air connection. Line up slot in fronthead with hole in the housing. Insert bolt (15), washer (32) and nut (16). Lubricate screw threads and torque screw to 375 lb–ft (508 Nm).

t. If removed, install muffler parts.

9. PERFORMANCE TESTING.

A reconditioned paving breaker should be tested before it is sent back to the job. Before connecting the air hose, check to see that the lubricator used with the paving breaker is filled with lubricating oil.

With the paving breaker against the work surface, the paving breaker should start with less than 20 psi (1.41 kg/cm^2) air pressure and with the piston reciprocating smoothly. Let the paving breaker run in slowly at reduced pressure long enough to see that it is in good working order. If the paving breaker stalls, turn off the air immediately. Stalling indicates binding caused by tight fits. After a short period of operation, a definite rhythm should develop and an even exhaust note will be heard. The paving breaker may become warm, but should not overheat. If erratic operation continues or stalling persists, dismantle the tool and check for binding of parts.

After an initial period of low pressure operation, check the performance of a reconditioned paving breaker with that of a new one by comparing both under similar conditions and with normal air pressure. Once testing is completed, place plastic caps or plugs in all ports to keep out dirt until the paving breaker is put back into service.

Alphabetical Index

1. INTRODUCTION.

This section contains detailed information for troubleshooting the Paving Breaker Models PB85A & PB85AS (hereafter referred to as paving breaker).

2. TROUBLESHOOTING.

Troubleshooting will be accomplished by using the appropriate illustration provided in this instruction manual and the step by step trouble and remedies. Using both of these together will solve most common problems.

Table 1. Troubleshooting

TROUBLE	PROBABLE CAUSE	REMEDY
Paving breaker will not start.	1. Plugged exhaust port or air passages caused by dirt or hose particles.	1. Dismantle breaker, clean out all ports and air passages. Keep the air hose in good condition; never use a soft deteriorated hose. (Refer to Section 5, Paragraph 6).
	2. Stuck valve due to gummy oil or incorrect assembly.	2. Remove valve chest parts (Refer to Section 5, Paragraph 6, Step i) from the breaker. Clean parts. Never use dirty oil or oil that does not conform to the recommended specifications (Refer to Section 5, Table 1).
	3. Frozen piston due to improper lubrication.	3. Dismantle breaker to remove piston. Repair piston by placing in a high speed lathe and dressing with fine emery cloth. Never run breaker without the proper lubricating oil in the lubricating oil reservoir (Refer to Section 5, Paragraph 6).

(Continued)

Table 1. Troubleshooting

TROUBLE	PROBABLE CAUSE	REMEDY
Paving breaker loses power rapidly.	1. Restriction in air supply line.	1. Never allow the air supply to kink or make sharp bends.
	2. Air supply line too long.	2. As a general rule keep the air supply line under 50 ft. (15m).
	3. Diameter of air supply line too small.	3. A 3/4 in. (19.1 mm) diameter air supply is recommended for the breaker.
Freezing at exhaust ports.	1. Excessive moisture in the air supply line.	1. Install moisture traps in the air supply line or add anti–freeze lubricant directly through the air inlet. Use "KILFROST" anti–freeze lubricant or equivalent.
Paving breaker lacks power.	1. Low air supply pressure.	1. The air supply pressure at the tool should be 90 to 100 psi (6.33 to 7.03 kg/cm^2).
	2. Running on fronthead cushion.	2. Keep shank fed–up to the work. Always maintain a constant pressure when operating the breaker.
	3. Plugged air passages.	3. Dismantle the breaker and clean out all ports and passages. (Refer to Section 5, Paragraph 6)
	4. Lack of lubricating oil.	4. Maintain the proper oil level in the lubricating oil reservoir. Steel shank must show a film of oil. (Refer to Section 5, Paragraph 2)
	5. Sticking valve.	5. Remove valve chest parts (Refer to Section 5, Paragraph 6, Step i) from the breaker. Clean parts. Never use dirty oil or oil that does not conform to the recommended specifications (Refer to Section 5, Table 1).
Overheating of the piston seat on a new machine.	1. Breaker not properly broken in.	1. Stop operating the breaker and perform initial servicing (Refer to Section 4, Paragraph 4). Never run a new breaker at full throttle until a proper break–in period has been completed. (Refer to Section 5, Paragraph 9.)

(Continued)

Table 1. Troubleshooting (cont.)

TROUBLE	PROBABLE CAUSE	REMEDY
Overheating of paving breaker after break–in period.	1. Running on fronthead cushion.	1. Keep shank fed–up to work. Always maintain constant pressure when operating the breaker .
	2. Piston not hitting the shank because of short shank.	2. Remove shank piece from breaker. (Refer to Refer to Section 3, Table 1 for correct paving breaker shank size.)
	3. Pulling steel at full throttle.	3. When pulling steels, always use minimum throttle.
	4. Lack of lubrication or improper lubricating oil.	4. Before operating the breaker make sure the lubricating oil reservoir is full of proper lubricant. (Refer to Section 5, Table 1).
Erratic or sluggish operation.	1. Lubricating oil too heavy, slowing down valve action.	1. Use only the recommended lubricating oil. (Refer to Section 5, Table 1).
	2. Gummed oil or dirt in operating parts.	2. Dismantle breaker and clean out dirt and gummy residue. Service the breaker with clean oil. Protect the tool from dirt when idle. (Refer to Section 5, Paragraph 6).
Fogging.	1. Excessive moisture in the air supply line.	1. Blow out air lines. If moisture traps are installed in the air supply line, drain the moisture.
	2. Over lubrication.	2. Clean lubricating oil reservoir and adjust for proper rate of feed.