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# **OWNER'S MANUAL**

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## **RAMMER S 86**

**Ram  
mer**



**⚠ WARNING**

**Study this manual before installing, operating or maintaining this equipment. You must understand and follow the instructions in this manual. You must observe all relevant laws and regulations. Otherwise You and/or others can be seriously injured.**

For Rammer Hydraulic  
Hammers from Serial  
Number:

86AXA0001-up  
86AAA0001-up  
86WWA0001-up

Publications:

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AS86022  
AS86024

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# C O N T E N T S

## 1

1. Introduction .....	A-1
Hammer model and serial number .....	A-1
Warranty .....	A-2
Hammer card .....	A-2
Spare part orders .....	A-2
1.1 Safety - Yours and other people's .....	A-3
1.2 Rammer S 86 .....	A-6
1.3 Principles of operation ...	A-8

## 2

2. Operation .....	B-1
Choosing tools .....	B-1
Principles of breaking .....	B-1
2.1 Correct working methods .....	B-2
2.2 Operating temperature ..	B-4
2.3 Noise dampening .....	B-4

## 3

3. Maintenance .....	C-1
3.1 Maintenance intervals ...	C-1
3.2 Main inspection .....	C-1
3.3 Yearly service .....	C-1
3.4 Hydraulic oil .....	C-2
Special oils .....	C-2
Hydraulic oil purity .....	C-2
Oil filter .....	C-3
Hydraulic oil cooling .....	C-4
3.5 Lubricating .....	C-4
Greasing interval .....	C-4
Grease type .....	C-5
Recommended greases .....	C-5
3.6 Long term storage .....	C-6
3.7 Washing the hammer ....	C-6
3.8 Trouble shooting .....	C-7

## 4

4. Disassembling and assembling of S 86 .....	D-1
4.1 Removal and installation of tools .....	D-1
4.2 Changing lower tool bushing .....	D-2
4.3 Wear limits for tools and lower tool bushing .....	D-3



# 1. INTRODUCTION

## General information

This manual instructs you on your Rammer hammer and its safe operation and maintenance. Study this manual before installing, operating or maintaining this equipment. The hammer is a powerful tool. Used without proper care, it can cause damage. Use it properly and use it well. Chapter 2 *Operation* is arranged to guide you how to operate the hammer safely.

Pay particular attention to all safety messages. They are there to warn you of possible hazards.

## ⚠ WARNING

**Denotes a hazard exists. If proper precautions are not taken you/others could be seriously injured.**

## CAUTION!

**Denotes a reminder of safety practices. Failure to follow these safety practices could result in injury to the operator/others and possible damage to the equipment.**

To use the hammer correctly, you must also be a competent operator of the carrier machine. Do not use or install the hammer if you can not use the carrier machine.

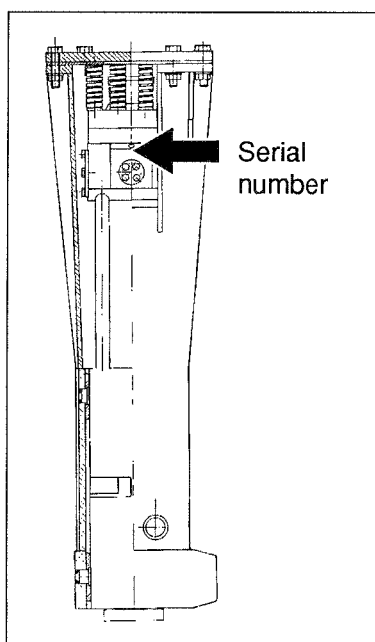
Do not rush the job of learning. Take your time and most important, take it safely.

If there is anything you do not understand, ask your Rammer dealer. He will be pleased to advise you.

## REMEMBER

**BE CAREFUL  
BE ALERT  
BE SAFE**

**Hammer model  
and serial number**



This manual deals with the Rammer S 86. The equipment serial number is stamped on a metal plate, which is in the valve body, near return line connection.

It is important to make correct reference to the serial number of the hammer when making repairs or ordering spare parts. Identification of serial number is the only proper means of maintaining and identifying parts for specific hammer.

## Using the manual

This manual is arranged to give you a good understanding of the equipment and its safe operation. It also contains maintenance information and technical specifications. Read this manual from front to back before using or maintaining for the first time. If you do not understand something or you are unsure, ask your Rammer dealer. Do not guess. Read all safety statements carefully. Be safe and be careful.

Page numbering system in this manual is not continuous. There is a gap of few pages between sections. This allows for the insertion of new pages in later issues.

In this manual, the units of measurement are metric. For example, weights are given in kilograms (kg). In some cases the other unit follows in parenthesis (). For example 28 liters (7.4 USgal).

## **Introduction**

A-2

good condition. If needed, your Rammer dealer will deliver you new manuals.

### **Warranty**

The customer is provided with a separate warranty sheet, where the export warranty terms are explained. Check always that this warranty sheet is provided with the hammer. If not, contact your Rammer dealer immediately.

### **Hammer card**

A hammer card is filled after the installation inspection by the Rammer dealer and a copy of it is sent to the manufacturer. This card is very important because no warranty claims are handled without it. Make sure that you get a copy of it after the installation inspection and that it is correctly filled.

### **Spare part orders**

When you need spare parts or some information concerning maintenance or your hammer, please contact your Rammer dealer.

Quick deliveries are secured by exact orders.

Required information:

- 1) Name of customer, contact person
- 2) Order number (when available)
- 3) Delivery address
- 4) Mode of delivery (air mail etc.)
- 5) Required delivery date
- 6) Invoicing address
- 7) Model and serial number of hammer
- 8) Name, number and required amount of spare parts



## 1.1 SAFETY - YOURS AND OTHER PEOPLE'S

All mechanical equipment can be hazardous if operated without care or correct maintenance.

In this manual you will find warning messages. Read them and understand them. They tell you of hazards and how to avoid them. If you do not understand the messages, ask your employer or your Rammer dealer.

Safety is not just a matter of responding to the warnings. All the time you are working with your Rammer hammer you must be thinking what hazards there might be and how to avoid them. Do not work with the hammer until you are sure that you control it.

Do not start any job until you are sure that you and those around you will be safe.

If you are unsure of anything, about your Rammer hammer or the job, ask someone who knows. Do not assume anything - check it out.

## SAFETY CHECK LIST

### General Safety

### ⚠ WARNING

**Read carefully following warning messages. They tell you of different hazards and how to avoid them. If proper precautions are not taken you/ others could be seriously injured.**

### Manuals

Study this manual before installing, operating or maintaining the hammer. If there is anything you don't understand, ask your employer or your Rammer dealer to explain it. Keep this manual clean and in good condition.

Study also the operating and maintenance manual of your carrier before operating Rammer hammers.

### Clothing

You can be injured if you do not wear proper clothing. Loose clothing can get caught in the machinery. Wear protective clothing to suit the job.

Examples are: a safety helmet, safety shoes, safety glasses, well-fitting overalls, ear-protectors and industrial gloves. Keep cuffs fastened.

Do not wear a necktie or scarf.

Keep long hair restrained.

### Care and alertness

All the time you are working with the hammer, take care and stay alert. Always be careful. Always be alert for hazards.

### Lifting equipment

You can be injured if you use faulty lifting equipment.

Make sure that lifting equipment is in good condition. Make sure that lifting tackle complies with all local regulations and is suitable for the job. Make sure that lifting equipment is strong enough for the job and you know how to use it.

### Tools

Do not use Rammer hammers or hammer tools for lifting. Contact your Rammer dealer to find out how to lift with your carrier.

## CAUTION!

**Read carefully following safety messages. Failure to follow these safety practices could result in injury to the operator/others and possible damage to the equipment.**

### Regulations and laws

Obey all laws, worksite and local regulations which affect you and your equipment.

### **SAFETY CHECK LIST** **Operating Safety**

#### **⚠ WARNING**

**Read carefully following warning messages. They tell you of different hazards and how to avoid them. If proper precautions are not taken you/ others could be seriously injure.**

#### **Practice**

You and others can be killed or injured if you do unfamiliar operations without practicing them first. Practice away from job site, on a clear area.

Keep other people away.

Do not perform new operations until you are sure you can do them safely.

#### **Equipment condition**

Defective equipment can injure you or others. Do not operate equipment which is defective or has missing parts.

Make sure the maintenance procedures in this manual are completed before using the equipment.

#### **Equipment limits**

Operating the equipment beyond its design limits can cause damage. It can also be dangerous.

Do not operate the equipment outside its limits.

Do not try to upgrade the equipment's performance by unapproved modifications.

#### **Communications**

Bad communications can cause accidents.

Keep people around you informed of what you will be doing. If you will be working with other people make sure they understand any hand signals you will be using.

Work sites can be noisy. Do not rely on spoken commands.

#### **Work site**

Work sites can be hazardous. Inspect the site before working on it.

Check for potholes, weak ground, hidden rocks etc. Check for utilities (electric cables, gas and water pipes etc.). Mark the positions of underground cables and pipes if you will be breaking the ground.

#### **Metal splinters**

You can be injured by flying splinters when driving metal pins in and out. Use soft-faced hammer or drift to remove and fit metal pins, such as pivot pins. Always wear safety glasses.

#### **Banks and trenches**

Banked material and trenches can collapse.

Do not work too close to banks and trenches where there is a danger of collapse.

#### **Safety barriers**

Unguarded equipment in public places can be dangerous. In public places, or when your visibility is reduced, place barriers around the machine, to keep people away.

#### **CAUTION!**

**Read carefully following safety messages. Failure to follow these safety practices could result in injury to the operator/others and possible damage to the equipment.**

The hammer must be greased regularly during operation. See Chapter 3 *Maintenance*.

Do not operate hammer as standard assembly under water, or it will be damaged.

Take care when lifting/handling. The Rammer S 86 including its tool, hoses and adapter, weighs 3450 kg (7605 lb).

## **SAFETY CHECK LIST**

### **Maintenance Safety**

### **⚠ WARNING**

**Read carefully following warning messages. They tell you of different hazards and how to avoid them. If proper precautions are not taken you/ others could be seriously injured.**

#### **Repairs and maintenance**

Do not try to do repairs or any other maintenance work you do not understand.

#### **Modifications and welding**

Non-approved modifications can cause injury and damage. Contact your Rammer dealer for advice before modifying the hammer. Before welding on the hammer while it is installed on the carrier, disconnect the carrier alternator and battery. Note that welding of the Rammer hammer tools will render them useless and make the warranty void.

#### **Hydraulic fluid**

Fine jets of hydraulic fluid at high pressure can penetrate the skin. Do not use your fingers to

check for hydraulic fluid leaks. Do not put your face close to suspected leaks. Hold a piece of cardboard close to suspected leaks and then inspect the cardboard for signs of hydraulic fluid. If hydraulic fluid penetrates your skin get medical help quickly.

#### **Accumulator**

The hammer incorporates one pressure accumulator. The accumulator is pressurized even when there is no hydraulic pressure to the hammer. Attempting to dismantle the accumulator without first releasing the pressure can cause injury or death. Do not try to dismantle pressure accumulators, contact your Rammer dealer first.

#### **Hydraulic pressure**

Hydraulic fluid at system pressure can injure you. Before disconnecting or connecting hydraulic hoses, stop the carrier engine and operate the controls to release pressure trapped in the hoses.

During hammer operation, keep people away from the hydraulic hoses.

## Introduction

A-6

### 1.2 RAMMER S 86

The purpose of this part of the manual is to introduce you to the Rammer S 86. The main parts of the hammer will be named and identified. What they do and how they do it will be briefly explained.

Your Rammer dealer will gladly give you more information if you want it.

#### **General description**

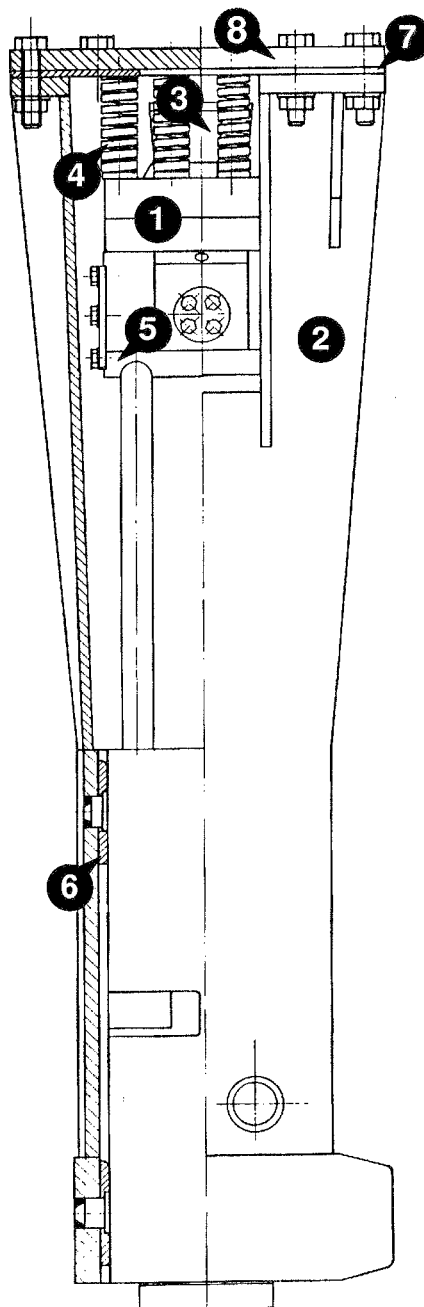
Key

- 1 Hammer
- 2 Housing
- 3 Buffer
- 4 Spring
- 5 Buffer
- 6 Wear plate
- 7 Spacer plate
- 8 Gable plate

The hammer is a hydraulically operated breaker. It can be used on any carrier which meets the necessary hydraulic and mechanical installation requirements (See *Technical specification*).

However, you should pay attention where and how you use your hammer.

**S 86 is designed to be used in breaking oversized boulders, tunneling, demolishing heavily reinforced structures and for major heavy excavation and clearing work.**



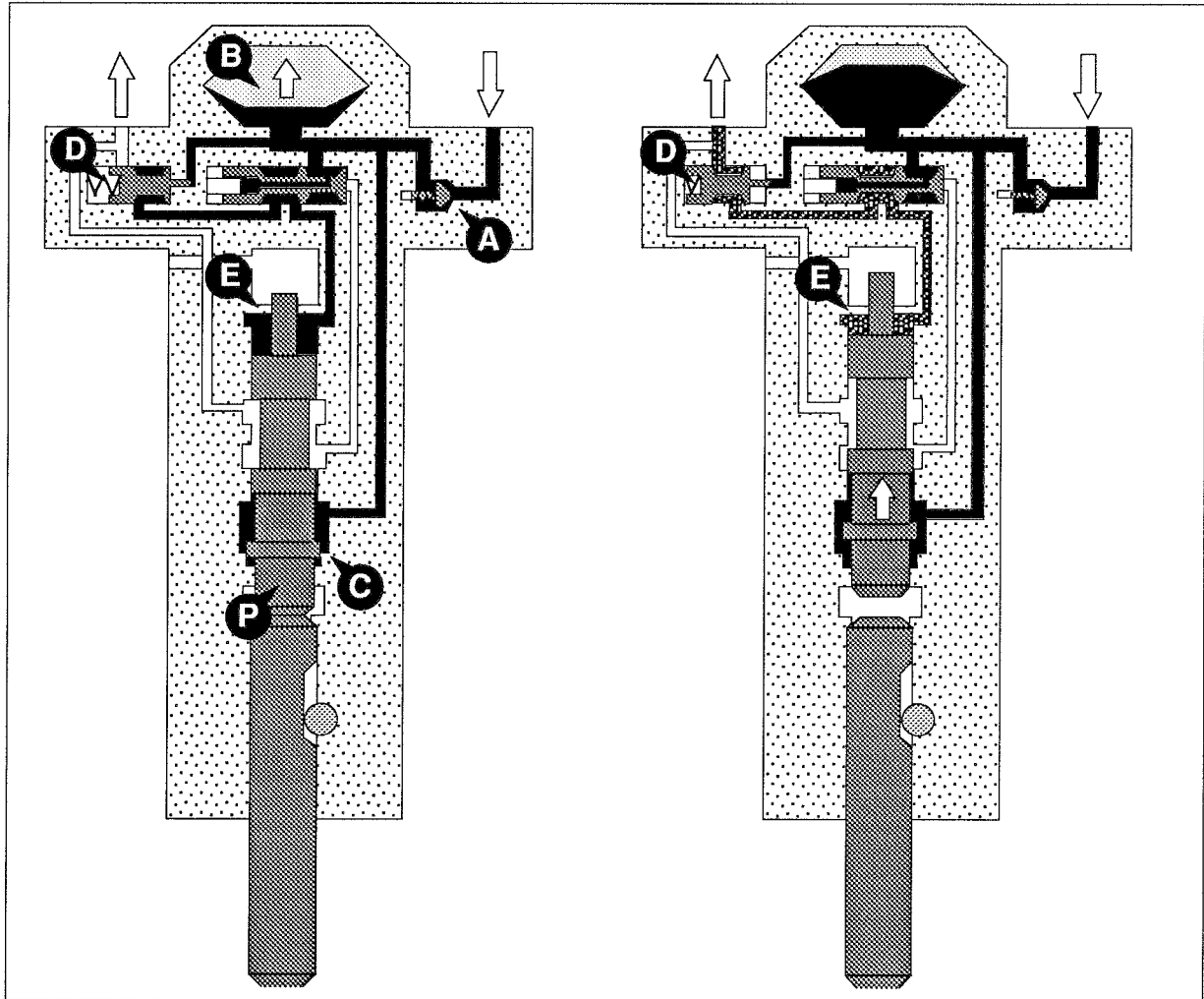
The hammer is located inside a housing, which protects the hammer's mechanism during operation.

Basically, the unit functions by repeatedly raising a steel piston and driving it down onto the head of a removable breaking tool.

No extra pressure accumulators are necessary since the internal pressure accumulator absorbs hydraulic pressure peaks. The impact energy of the hammer is constant and independent of the carrier's hydraulic system.

The operating principles of the hammer are described in the end of the Chapter 1 *Introduction*.

## 1.3 PRINCIPLES OF OPERATION





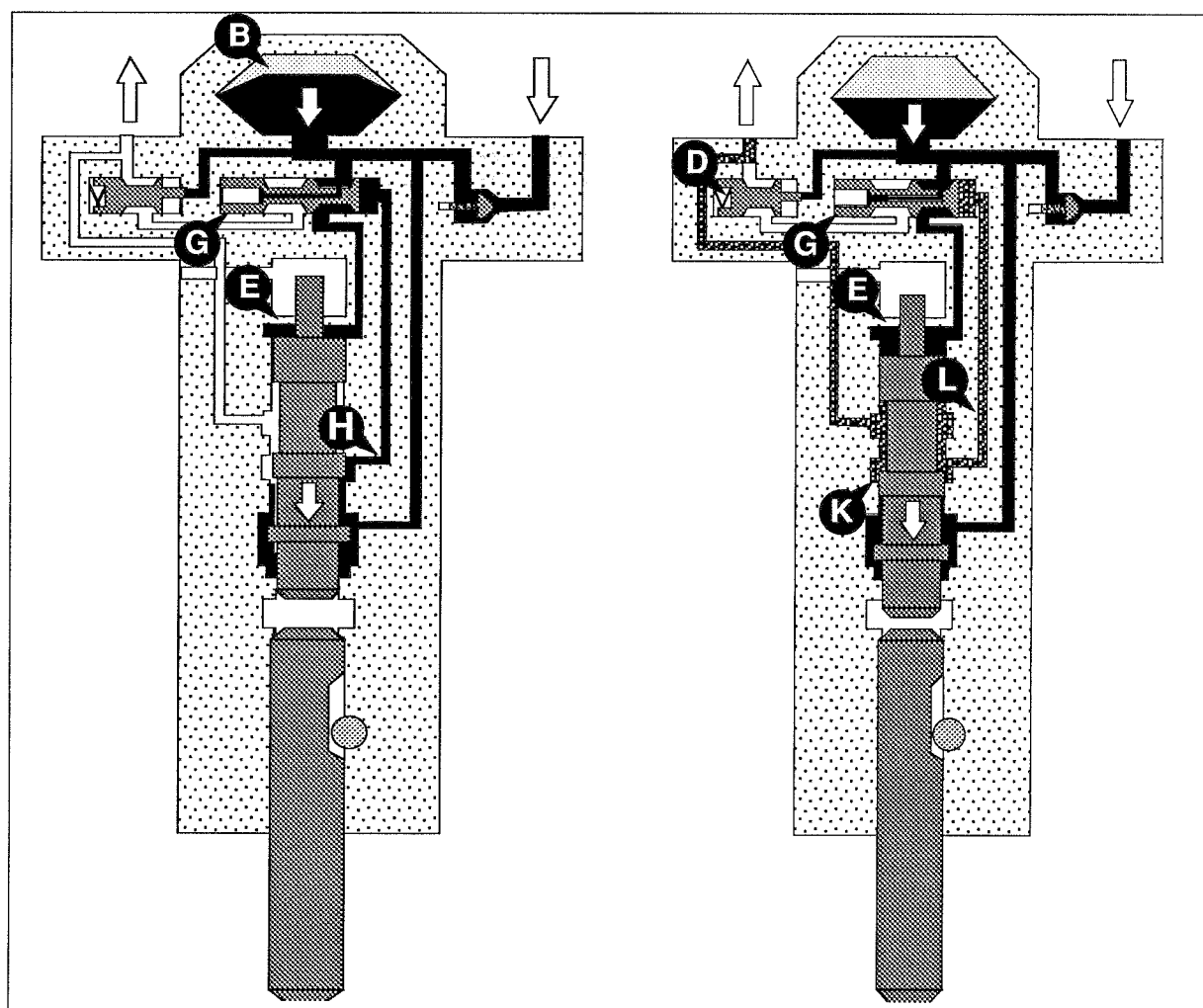
### 1) Start up

Oil flows through the check valve (A) into the accumulator (B) and to the space (C) under the piston (P). The pressure control valve (D) has closed the outlet channel from space (E) and prevents the piston to move. Pressure inside the hammer increases and compresses the nitrogen gas inside the accumulator.

### 2) Return stroke

When the preset operating pressure has been reached, the valve (D) opens the outlet channel from space (E) to tank line. Piston starts the return stroke, due to the pressure under the piston.

High pressure   
Tank pressure 



### 3) Impact stroke

In its highest position, the piston allows the pilot pressure to pass through the channel (H) to the other end of the main valve (G). Main valve changes position and opens the space (E) to the accumulator (B). The piston starts its impact stroke, during which oil is supplied from the accumulator.

### 4) Impact stroke (final stage)

Piston moves downwards with high velocity. Groove (K) in the piston connects pilot channel (L) to tank line. Main valve (G) starts to move back and connects space (E) to outlet channel. Moving of piston causes reduction in the accumulator pressure and activates the pressure control valve (D) to close the outlet channel. After the impact the piston remains in

position until the oil pressure rises and the cycle is repeated (phase 1).





## 2. OPERATION

This chapter describes the correct working methods and how to choose the correct tool for the job. To increase the hammer's working life, pay particular attention to correct working methods.

The hammer is a powerful machine and lots of damage can be done if you do not know how to use the hammer well and safely.

Read this chapter before operating Rammer hammers.

### Choosing tools

Rammer can offer a selection of standard and special tools to suit each application. The correct type of tool must be selected to get the best possible working results and longest life time for tool.

#### 1. Blunt

- For igneous (e.g. granite) and tough metamorphic rock (e.g. gneiss) into which tool doesn't penetrate
- Concrete
- Breaking boulders

#### 2. Chisel and Moil

- For sedimentary (e.g. sandstone) and weak metamorphic rock into which tool penetrates
- Concrete
- Trenching and benching

#### 3. Spade tool

- Frozen or compact ground
- Asphalt

#### 4. Compacting plate

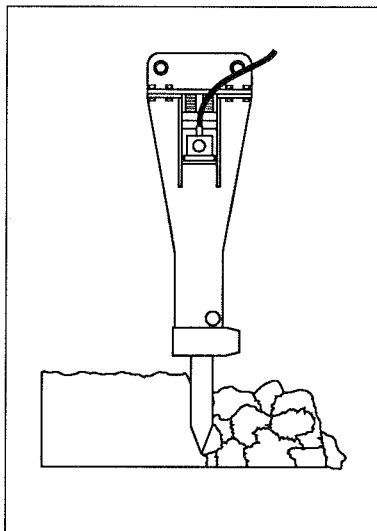
- Ground compacting

### Principles of breaking

There are basically two ways of breaking with a hydraulic hammer:

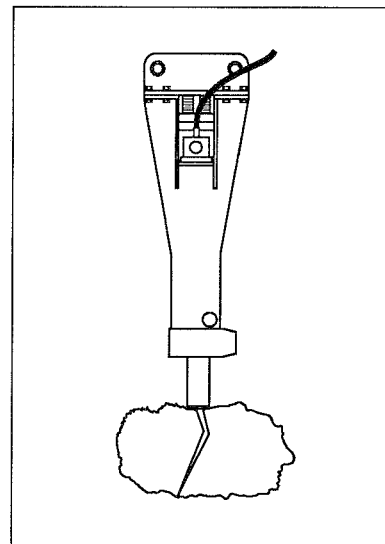
#### a) Penetrative (or cutting) breaking

In this form of breaking moil point or chisel tool is forced inside the material. This method is most effective in soft, layered or plastic, low abrasive material. Using of chisel in hard material will cause the sharp edge to wear very quickly.



#### b) Impact breaking

In impact breaking, material is broken by transferring very strong mechanical stress from the tool into material to be broken. Best possible energy transfer between tool and object is achieved with a blunt tool. Impact breaking is most effective in hard, brittle and very abrasive materials. The high impact energy of the S 86 makes it suitable for impact breaking.



## Operation

B-2

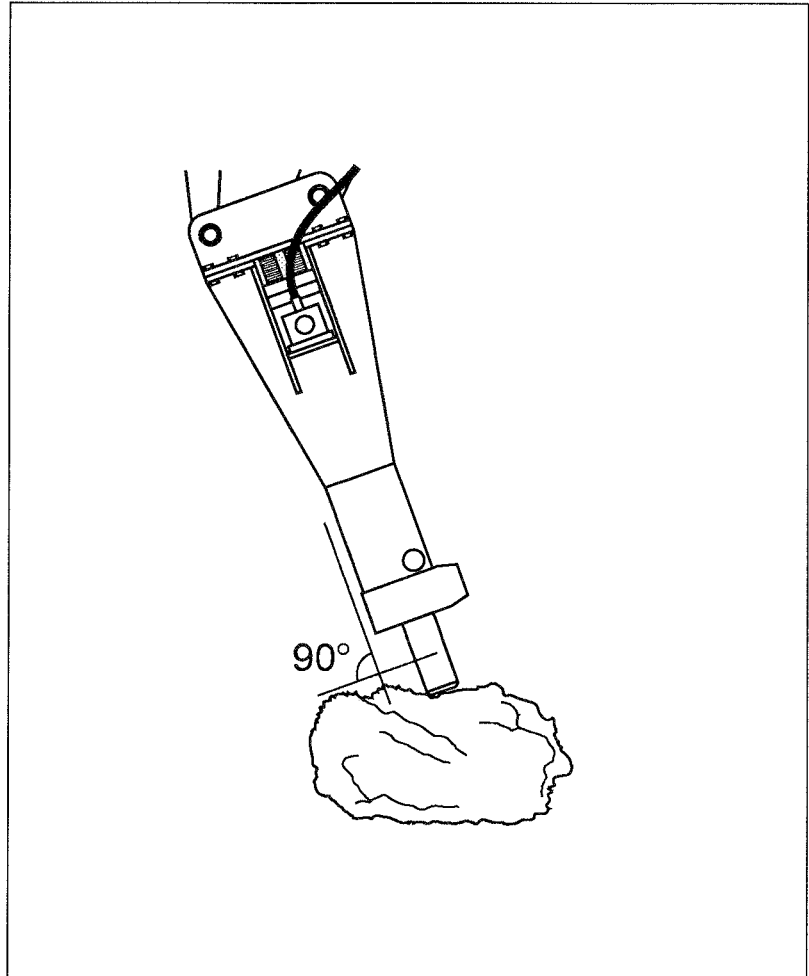
### 2.1 CORRECT WORKING METHODS

1. Prepare the carrier for normal excavation work.
  - a) Move the carrier to required position.
  - b) Engage the parking brake.
  - c) Set the drive to neutral.
  - d) Disengage the boom lock (if fitted).
2. Set the engine speed to the recommended engine RPM.
3. Place the tool against the object at 90 degrees angle. Avoid small irregularities on the object which will break easily and cause either idle strokes or incorrect working angle.
4. Use the excavator boom to press the hammer firmly against of the object. Do not pry the hammer with the boom. Do not press too much or too little with the boom. Correct force is applied when the hammer is compressed against its springs about 5 mm (.2 in).

#### **⚠ WARNING**

**Protect yourself and your neighborhood against flying chips of rock. Do not operate the hammer or carrier if someone is too close to the hammer.**

5. Start the hammer



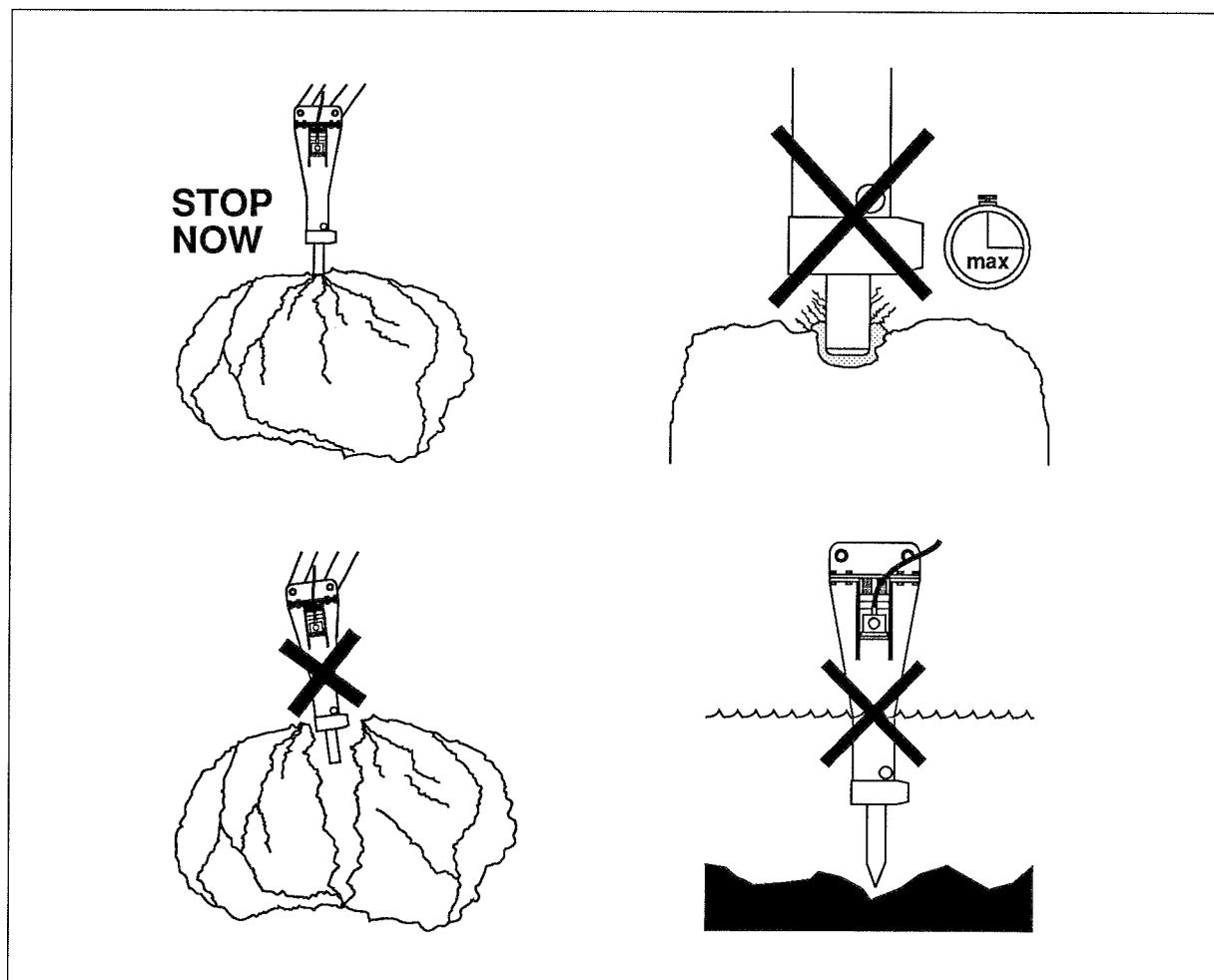
6. Do not let the tool move outwards from hammer when it penetrates. Keep boom down pressure on the hammer
7. Keep the tool at 90 degrees angle at all times. If object moves or its surface breaks, correct angle immediately. Keep feed force and tool aligned.

8. Stop the hammer quickly. Do not allow the hammer to fall down and make idle strokes when object breaks.

Constant idle strokes have a deteriorating effect on the hammer.

If hammer falls down, the housing wears out more quickly.

9. Do not strike in one spot for more than 15 seconds at a



time. If object does not break, stop the hammer and change position of the tool. Working too long in one spot will make stone dust under the tool. Dust dampens impact effect. Also tool will overheat which increases wear of tool.

10. When breaking concrete, hard or frozen ground, **never** strike and bend with the tool at the same time, because the tool may snap off. Bending may be caused by stone

which is inside hard or frozen ground. Be careful and stop striking if you find sudden resistance under the tool.

*Note:* Listen to the hammer's sound while you are using it. If the sound becomes thinner and the impact less efficient, the tool is misaligned with the material and/or there is not enough "pressing" force on the tool. Realign the tool and press the tool firmly against the material.

### CAUTION!

The hammer as a standard assembly, must not be used under water. If water fills the space where the piston strikes the tool, a strong pressure wave is generated and the hammer may be damaged.

## Operation

B-4

### 2.2 OPERATING TEMPERATURE

The operating temperature is  $-20^{\circ}\text{C} - +80^{\circ}\text{C}$  ( $-4^{\circ}\text{F} - +176^{\circ}\text{F}$ ).

If the temperature is lower than  $-20^{\circ}\text{C}$  ( $-4^{\circ}\text{F}$ ), the hammer and tool has to be preheated before starting operation in order to avoid breakage of the accumulator membrane and the tool. During operation they will remain warm.

If the temperature of the hydraulic oil exceeds  $+80^{\circ}\text{C}$  ( $+176^{\circ}\text{F}$ ), an auxiliary oil cooler is needed.

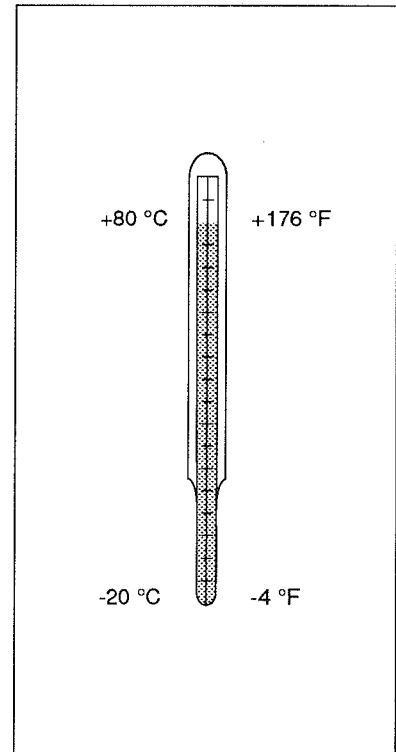
The oil viscosity must be between 1000–15 cSt while the hammer is being used (See Chapter 3 *Maintenance*).

### 2.3 NOISE DAMPENING

Operating the hammer near residential areas or other noise exposure areas can cause noise pollution.

In order to avoid unnecessary noise, please follow these basic rules:

1. When operating with the hammer, keep the tool at  $90^{\circ}$  to the material. Working at other angle presses the hammer against wearing plates (from S 52 to G120) and this increases noise by 10 dB.
2. Replace or fix all parts that are worn out, damaged or loosened. This not only saves your hammer but it decreases the noise level.



## 3. MAINTENANCE

This section of the manual describes how to maintain your hammer.

### General Information

Whenever maintenance work is carried out, keep following basic rules in mind:

1. The hydraulic hammer is a precision made hydraulic machine. Absolute cleanliness and great care are basic and essential matters in the handling of any hydraulic components. Dirt is the worst enemy in hydraulic systems.
2. Handle hammer parts carefully and remember to cover cleaned and dried parts with clean lint free cloth.
3. Do not use any other than purpose designed materials for cleaning hydraulic parts. Never use water, paint thinners or carbon tetrachloride.
4. Components, gaskets and seals in the hydraulic system should be oiled with very clean hydraulic oil before assembly.

### 3.1 MAINTENANCE INTERVALS

*Note:* Times given refer to hours of hammer operation.

#### Every two hours or daily

- Grease the tool shank and the tool bushings. See page C-4.
- Observe hydraulic oil temperature, all lines and connections as well as impact efficiency and evenness of operation.
- Tighten loose connections.

#### Every 10 hours or weekly

- Remove the retaining pin and the tool and check their condition. Grind the burrs away if necessary.
- Check that the tool has received sufficient greasing. Grease more frequently, if necessary.

#### Every 50 hours or monthly

- Check the tool shank and tool bushings for wear. See page D-4.
- Check the hydraulic hoses. Replace if necessary. Do not let dirt get into the hammer or hoses.

### 3.2 MAIN INSPECTION

It is recommended to have the main inspection done by your Rammer dealer after **50–100 operating hours**.

**Contact your Rammer dealer for more information about the main inspection.**

- Check all hydraulic connections.
- Check that the hydraulic hoses do not rub against anything in any boom position.
- Replace the hydraulic oil filters of the carrier.

### 3.3 EVERY 600 HOURS OR YEARLY

Yearly service is recommended to be done by your Rammer dealer after **600 operating hours**.

**Contact your Rammer dealer for more information about yearly service.**

- Check all hydraulic connections.
- Check that the hydraulic hoses do not rub against anything in any boom position.
- Replace the hydraulic oil filters of the carrier.

### 3.4 HYDRAULIC OIL

Generally speaking the hydraulic oil originally intended for the carrier can be used in the Rammer hydraulic hammer. However, since working with the hydraulic hammer will heat the oil much more than the usual excavation work, the viscosity of the oil must be checked.

When the hammer is used continuously, the temperature of the hydraulic oil normalizes at a certain level depending on conditions and on the carrier. At this temperature, the viscosity of the hydraulic oil should be 20–40 cSt (2.90–5.35 °E).

The Rammer hydraulic hammer must not be started if the viscosity of the hydraulic oil is above 1000 cSt (131 °E) or operated when the viscosity of the hydraulic oil is below 15 cSt (2.35 °E).

Table 1 shows hydraulic oils recommended for hammer use. The most suitable oil is selected in such way that the temperature of the hydraulic oil in continuous use is in the ideal area on the chart and the hydraulic system is used to best advantage.

Failures due to incorrect hydraulic oil in hammer:

Oil too thick

- Difficult start up
- Stiff operation
- Hammer strikes irregularly and slowly
- Danger of cavitation in the pumps and hydraulic hammer
- Sticky valves
- Filter bypass, impurities in oil not removed

Oil too thin

- Efficiency losses (internal leaks)
- Damage to gaskets and seals, leaks
- Accelerated wearing of parts, because of decreased lubrication efficiency

*Note:* Rammer strongly recommends different hydraulic oils for use in summer and winter if there is an average temperature difference of more than 35 °C (95 °F). The correct hydraulic oil viscosity would thus be ensured.

#### Special oils

In some cases special oils (e.g. biological oils and non-inflammable oils) can be used with Rammer hydraulic hammers. Observe following aspects when considering the use of special oils:

- The viscosity range in the special oil must be in the given range (15–1000 cSt)
- The lubrication properties

must be good enough  
*Note:* although special oil could be used in carrier, always check suitability with hammer due to the high piston speed in hammer.

- The corrosion resistance properties must be good enough

Contact oil manufacturer or Rammer for more information about special oils.

#### Hydraulic oil purity

No separate filter is required when the Rammer hammer is installed in the hydraulic circuit. The hydraulic oil filter of the carrier will clean the oil flowing through the hammer. The purpose of the oil filter is to remove impurities from the hydraulic oil since they cause accelerated component wear, blockages and even seizure. Impurities also cause the oil to heat and deteriorate. Air and water are also impurities in oil. Not all impurities can be seen with the naked eye.

Impurities enter the hydraulic system:

- During hydraulic oil changes and refilling
- When components are repaired or serviced
- When the hammer is being installed on the carrier
- Because of component wear

#### Oil filter

In hydraulic hammer work, the carrier oil filter must fulfill the following specifications:

- The oil filter must allow maximum particle size of 25 microns (0,025 mm).
- The oil filter material must be man-made fibre cloth or very fine gauge metallic mesh to withstand pressure fluctuations.
- The oil filter must have a volume flow capacity of at least twice the hammer's maximum flow.

In general, oil companies guarantee new oils to have a particle count of 40 microns maximum. When adding oil to existing tank the oil must be filtered.

Damages caused by hydraulic oil impurity in carrier and hammer circuits:

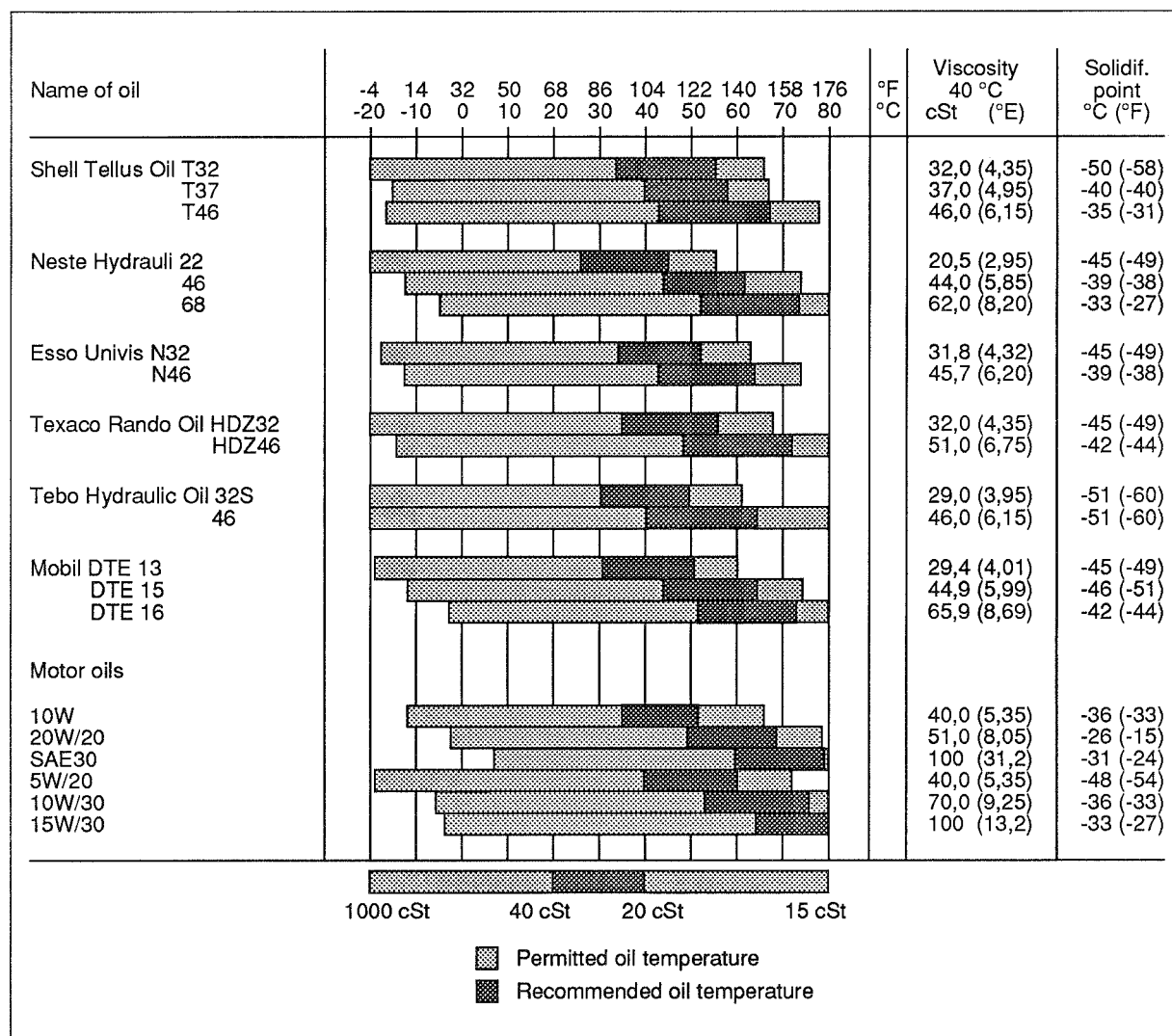
1. The working life of the pumps is significantly shortened

- Rapid wear of parts
- Cavitation

2. Valves do not function properly

- Spools bind
- Rapid wear of parts
- Blocking of small holes

3. Wear of cylinder and gaskets



## Maintenance

C-4

4. Reduced hammer efficiency
- Rapid wear of moving parts and seals
  - Danger of piston seizing up
  - Oil leakage

5. Shortened working life and reduced efficiency of hydraulic oil
- Oil overheats
  - Oil quality deteriorates
  - Electro-chemical changes in hydraulic oil

*Note:* Component damage is only “a symptom”. The trouble will not be cured by removing “the symptom”. After any component damage due to impurities in the oil, the entire hydraulic system must be cleaned. The hammer must be dismantled, cleaned and reassembled and the hydraulic oil must be changed.

### Hydraulic oil cooling

The maximum permitted hydraulic oil temperature in continuous hammer use is 50–80 °C (120–175 °F) depending on the viscosity of the oil in the system. Therefore, a reliable hydraulic oil thermometer is necessary. If there is no thermometer on the carrier one must be installed. The temperature of the hydraulic oil depends on ambient conditions, the cooling system efficiency of the carrier and on the used capacity of the hammer.

When the hydraulic hammer is used continuously it is necessary to have cooling system with extra cooling capacity compared with normal excava-

tion work.

The oil cooler of the carrier must have a volume flow capacity of at least twice the hammer's maximum volume flow.

The cooler must stand the dynamic pressure of 2 MPa (20 bar, 290 psi).

If the carrier's oil cooler is too small either the original cooler must be replaced with a larger one or an auxiliary cooler must be installed.

The auxiliary hydraulic cooler can be installed:

- In the front of the radiator, in which case a fan is not needed (max. rise of the cooling air is 5 °C, 40 °F).
- Any other suitable place, using a fan either hydraulically or electrically driven.

If the oil temperature is still too high in spite of the coolers, please contact your Rammer dealer.

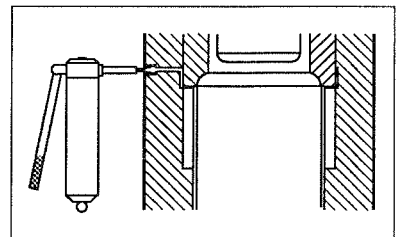
## 3.5 LUBRICATING

### Greasing interval

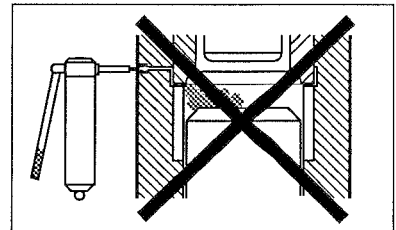
- Every two hours or daily
- 10–15 strokes from grease gun to tool bushings and tool
- Adapt interval and amount of grease to wear rate of tool and working conditions
- Tool shank must be well lubricated before installing the tool

### Greasing

- While greasing hammer must be standing upright against the tool to ensure that the grease will penetrate between the tool and the bushing



- Do not fill the space between piston and tool with grease





Insufficient greasing may cause:

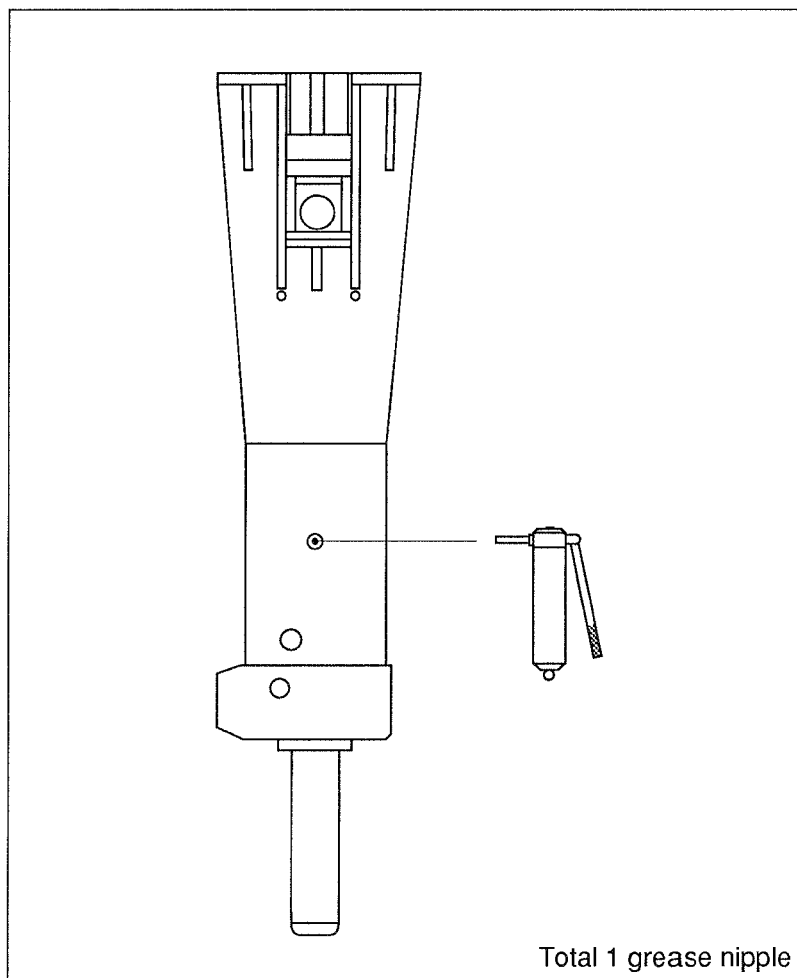
- Abnormal wear of tool bushing and tool
- Tool breakage

#### Grease type

- No dropping point (or very high, over 250 °C/480 °F)
- Max. working temperature over 150 °C/300 °F
- Min. working temperature under lowest ambient temperature
- Additives: molybdenum disulphide ( $\text{MoS}_2$ ), graphite or equivalent
- Grade (thickness) NLGI 0–2
- Water resistant

#### Recommended greases

- ESSO EOL 232, part no. 90 203
- WYNNNS GS80
- SHELL Kuggfett
- SHELL Extrema MDS
- KLÜBER Unimoly GB2
- LE 3751/3752



### **3.6 LONG TERM STORAGE**

Observe following points when the hammer is stored:

- The storage area must be dry
- The tool must be removed
- The lower end of the piston, tool and tool bushings must be well protected with grease.
- Connections must be sealed with clean plugs to prevent oil leakage and dirt from getting into couplings.
- The hammer must be stored in vertical position.
- Make sure the hammer can not fall.

In this way the vital parts of the hammer are protected from rust and the machine is ready to be used whenever necessary.

### **3.7 WASHING THE HAMMER**

When working with hammer and removing it from the carrier, dirt (mud, rock powder etc.) can attach to the hammer. Wash the outside of the hammer with a steam washer before sending it to the workshop. Otherwise dirt can cause difficulties in disassembly and assembly.

#### **CAUTION!**

**Plug the pressure and return line before washing the hammer. Otherwise dirt can enter the hammer and this may cause damage to the hammer.**

## 3.8 TROUBLE SHOOTING

TROUBLE	PROBABLE CAUSE	REMEDY
1. The hammer does not start.	1. The piston is in its lower hydraulic brake.	Keep the hammer control valve open and push the tool firmly against an object. The tool head lifts the piston out of the brake.
	2. The hammer control valve does not open.	When operating the hammer control valve, check that the pressure line will pulsate (that means the hammer control valve opens). If the valve does not operate, check the operating means: mechanical connections, pilot pressure or electrical control.
	3. The relief valve in hydraulic circuit opens at too low pressure. The hammer operating pressure is not reached.	Contact your Rammer dealer.
	4. Leakage from pressure to return in excavator hydraulic circuit.	Check the installation. Check the pump and other hydraulic components.
	5. Too much back pressure.	Check the installation.
	6. Failure in hammer valve or distributor operation.	Contact your Rammer dealer.
	7. Piston failure	Contact your Rammer dealer.
2. The hammer operates irregularly but the blow has full power.	1. The relief valve in hydraulic circuit opens at too low pressure. The hammer operating pressure is not reached.	Contact your Rammer dealer.
	2. Failure in hammer valve or distributor operation.	Contact your Rammer dealer.
	3. Not enough feed force from the carrier.	Refer to correct working methods in Chapter 2 <i>Operation</i> .

## **Maintenance**

C-8

<b>TROUBLE</b>	<b>PROBABLE CAUSE</b>	<b>REMEDY</b>
3. The hammer operates poorly and the blow has no power.	1. The relief valve in hydraulic circuit opens at too low pressure. The hammer operating pressure is not reached.	Contact your Rammer dealer.
	2. There is no pressure in the pressure accumulator.	Contact your Rammer dealer.
	3. The working method is not correct.	Refer to correct working methods in Chapter 2 <i>Operation</i> .
	4. Failure in hammer valve operation.	Contact your Rammer dealer.
4. Impact rate slows down.	1. Oil has overheated (over + 80°C/176°F)	Check for fault in oil cooling system or internal leak in hammer. Check hydraulic circuit of the carrier. Install extra oil cooler.
	2. Too much back pressure.	Contact your Rammer dealer.
	3. The relief valve in hydraulic circuit opens at too low pressure. The hammer operating pressure is not reached.	Contact your Rammer dealer.
	4. Leakage from pressure to return in excavator hydraulic circuit.	Contact your Rammer dealer. Check the pump and other hydraulic components.
	5. Failure in hammer valve or distributor operation.	Contact your Rammer dealer.
	6. There is no pressure in the pressure accumulator.	Contact your Rammer dealer.
	7. Hydraulic oil viscosity is too low.	Check hydraulic oil viscosity.

TROUBLE	PROBABLE CAUSE	REMEDY
5. Oil overheats.	1. The relief valve in hydraulic circuit opens at too low pressure. The hammer operating pressure is not reached.	Contact your Rammer dealer.
	2. Leakage from pressure to return in excavator hydraulic circuit.	Contact your Rammer dealer. Check the pump and other hydraulic components.
	3. Internal oil leak in the hammer.	Contact your Rammer dealer.
	4. Hydraulic oil viscosity is too low.	Check hydraulic oil viscosity.
	5. Cooling capacity of the oil cooler is too small.	Install extra oil cooler.



## 4. DISASSEMBLING AND ASSEMBLING OF S 86

This part of the manual contains detailed information how to disassemble and assemble your Rammer S 86.

### **⚠ WARNING**

**Do not disassemble or assemble this equipment before reading through this chapter of the manual first.**

#### 4.1 REMOVAL AND INSTALLATION OF TOOLS

##### **Removal**

- 1) Set the hammer on level ground.
- 2) Make sure that the carrier's transmission is in neutral and the parking brake is engaged.
- 3) Stop the engine.
- 4) Push the locking pin **A** as far as it will go and...
- 5) Remove the retaining pin **B**.
- 6) Remove the tool.

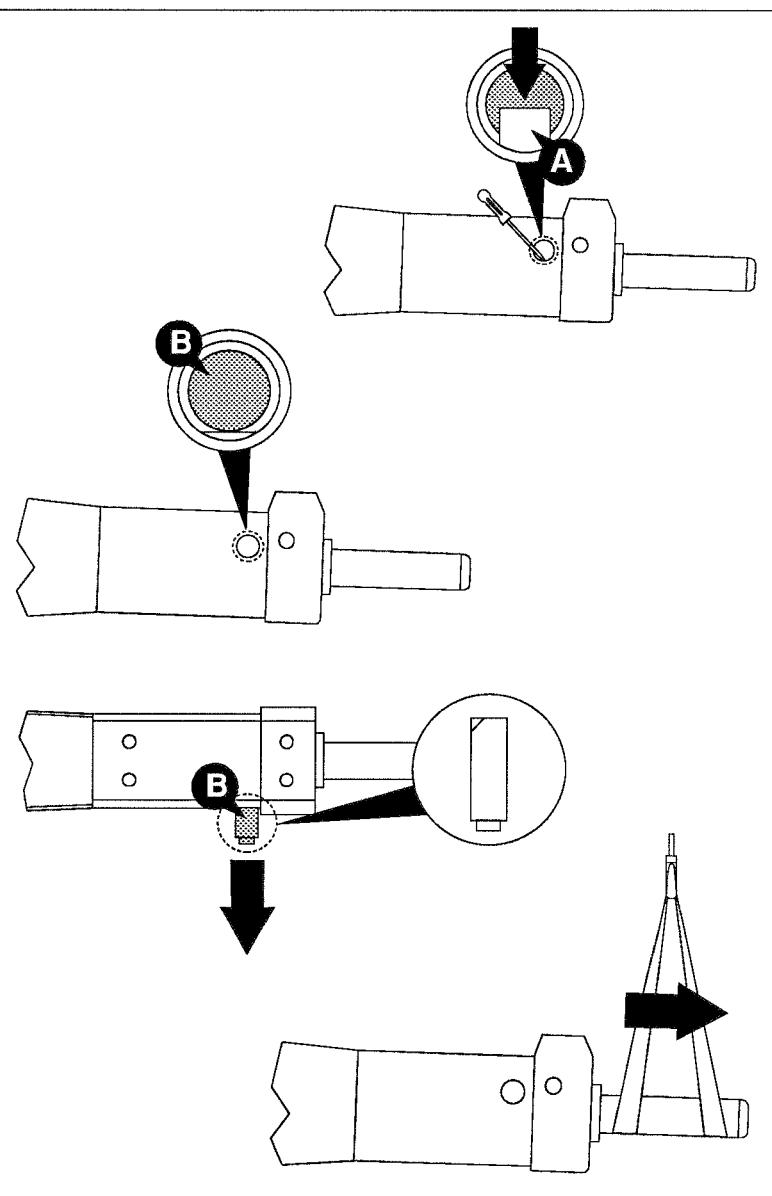
##### **Installation**

- 1) Clean and lubricate the tool and the pin **B**.

If you are using old tools, check the tool for wear.

- 2) Install the tool.

Align the groove of the tool with the pin bore.



Check that the retaining pin **B** is not installed upside down.

**B** is secured by the locking pin **A**.

- 3) Install the retaining pin **B**.

- 4) Check that the retaining pin

## **4.2 CHANGING LOWER TOOL BUSHING**

### **Removal**

- 1) Set the hammer on level ground.
- 2) Make sure that the carrier's transmission is in neutral and the parking brake is engaged. Stop the engine.
- 3) Remove the tool
- 4) Remove split pin **C** and pin **D** by knocking them out with a drift through a hole arrowed.
- 5) Remove the lower tool bushing **E** from the front head.

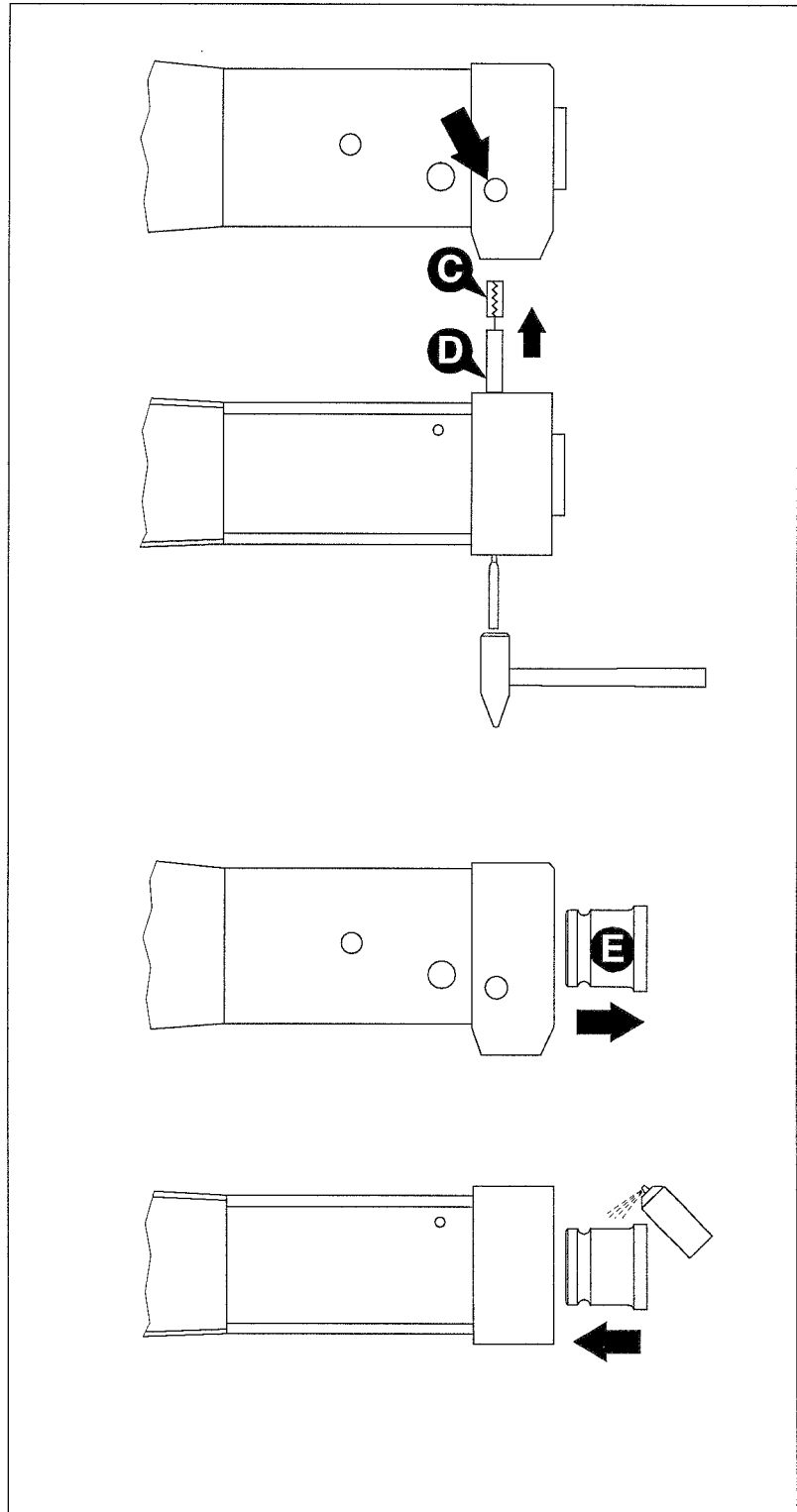
Check tool and lower tool bushing for wear.

### **Installation**

- 1) Clean all parts
- 2) Apply MoS<sub>2</sub> spray to the contact surfaces of lower tool bushing and front head.
- 3) Install lower tool bushing **E**.

Align the groove in the lower tool bushing with the holes in front head.

- 4) Install pin **D**.
- 5) Install split pin **C**.
- 6) Install the tool





#### 4.3 WEAR LIMITS FOR TOOLS AND LOWER TOOL BUSHING

Check the lower tool bushing and the tool shank for wear every 50 hours of hammer use or monthly.

##### Tools

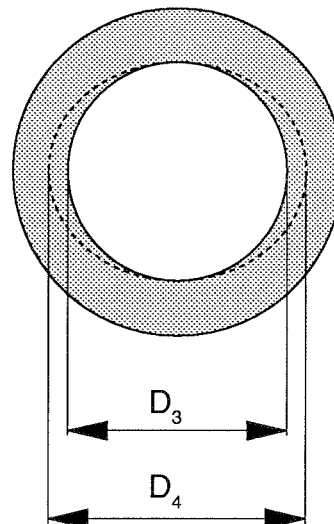
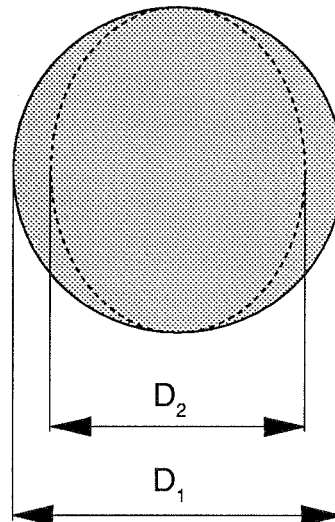
Original diameter ( $D_1$ ) for tool shank is 170 mm (6.69 in).

Replace the tool if the diameter ( $D_2$ ) of the tool shank is less than 167 mm (6.57 in).

##### Lower tool bushing

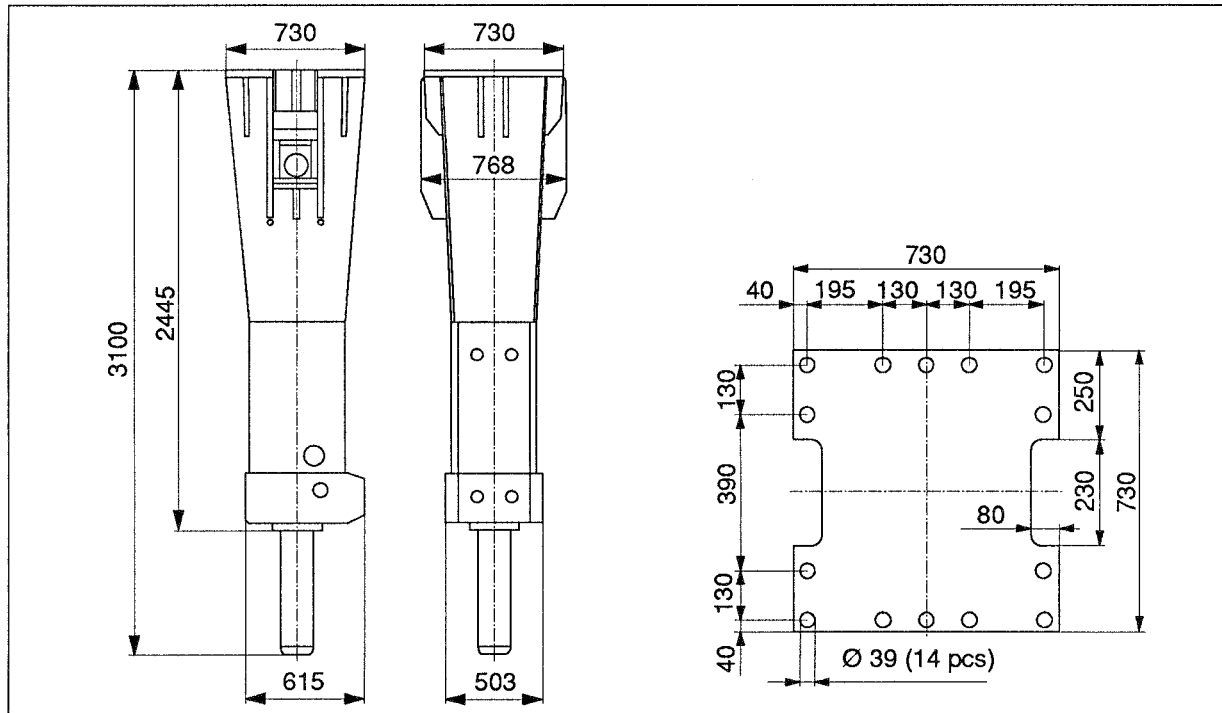
Original diameter ( $D_3$ ) for lower tool bushing is 170 mm (6.69 in).

Replace the lower tool bushing if the diameter ( $D_4$ ) of the lower tool bushing is more than 173 mm (6.81 in).





# RAMMER S 86 TECHNICAL SPECIFICATION

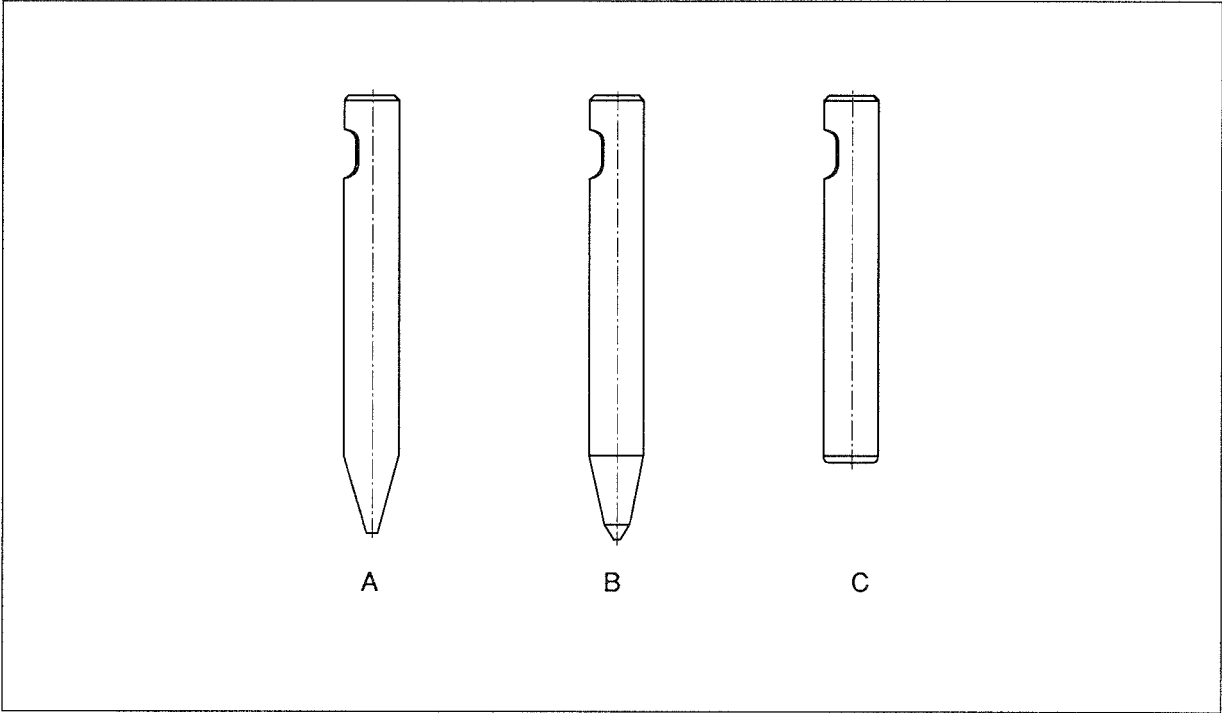


Working weight (with mounting bracket and tool)	3450	kg	Tool shank diameter	170	mm
Impact energy	8200	J	Connections for hoses:		
Impact rate	300...400	1/min	• pressure line	(BSP) R 1"-int	
Operating pressure	155	bar	• return line	(BSP) R 1 1/4"-int	
Pressure relief (min)	190	bar	Line size (min. inner dia.)		
Pressure relief (max)	200	bar	• pressure line	25	mm
Oil flow	190...250	l/min	• return line	32	mm
Back pressure (max)	5	bar	Oil temperature	-20...+80	°C
Input power (max)	65	kW	Hydraulic oil viscosity	1000...15	cSt
Output power (max)	55	kW	Carrier weight	40...80	ton
Efficiency	0.85				



RAMMER S 86

TOOLS



	Standard tools		
	A	B	C
Name	Chisel tool	Moil point	Blunt tool
Prod. no.	861	863	864
Length, mm (in)	1450 (57)	1450 (57)	1300 (51 3/16)
Weight, kg (lb)	230 (506)	230 (506)	230 (506)
Diameter, mm (in)	170 (6 11/16)	170 (6 11/16)	170 (6 11/16)
Note			

