

# **Operating instructions Maintenance instructions**

Original operating instructions

#### BPR 25/40 D - BPR 25/50 D

S/N 101 690 48 .... / S/N 101 692 30 .... / S/N 101 690 49 ....



# **Reversible Vibrating Plate**



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Catalogue No. **12/2012** 

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If the machine is equipped with a battery:

#### **CALIFORNIA**

**Proposition 65 Warning** 

Battery posts, terminals and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

Wash hands after handling.

If the machine is equipped with a diesel engine :

#### **CALIFORNIA**

**Proposition 65 Warning** 

The engine exhaust and some of its constituents are known to the state of California to cause cancer, birth defects, and other reproductive harm.

#### 1 Foreword

BOMAG manufactures machine for earth, asphalt and refuse compaction, stabilizers/recyclers as well as milling machine and finishers.

BOMAG's vast experience in connection with state-of-the-art production and testing methods, such as lifetime tests of all important components and highest quality demands guarantee maximum reliability of your machine.

This manual comprises:

- Safety regulations
- Operating instructions
- maintenance instructions
- Trouble shooting

Using these instructions will

- help you to become familiar with the machine.
- avoid malfunctions caused by unprofessional operation.

Compliance with the maintenance instructions will

- enhance the reliability of the machine on construction sites,
- prolong the lifetime of the machine,
- reduce repair costs and downtimes.

BOMAG will not assume liability for the function of the machine

- if it is handled in a way not complying with the usual modes of use,
- if it is used for purposes other than those mentioned in these instructions.

No warranty claims can be lodged in case of damage resulting from

- operating errors,
- insufficient maintenance and
- wrong fuels and lubricants.

#### Please note!

This manual was written for operators and maintenance personnel on construction sites.

These operating and maintenance instructions are part of the machine.

You should only operate the machine after you have been instructed and in compliance with these instructions.

Strictly observe the safety regulations.

Please observe also the guidelines of the Civil Engineering Liability Association "Safety Rules for the Operation of Road Rollers and Soil Compactors" and all relevant accident prevention regulations.

For your own personal safety you should only use original spare parts from BOMAG.

For your machine BOMAG offers service kits to make maintenance easier.

In the course of technical development we reserve the right for technical modifications without prior notification.

These operating and maintenance instructions are also available in other languages.

Apart from that, the spare parts catalogue is available from your BOMAG dealer against the serial number of your machine.

Your BOMAG dealer will also supply you with information about the correct use of our machines in soil and asphalt construction.

The above notes do not constitute an extension of the warranty and liability conditions specified in the general terms of business of BOMAG.

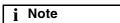
We wish you successful work with your BOMAG machine.

**BOMAG GmbH** 

Copyright by BOMAG

#### **Foreword**

# Please fill in Machine type (Fig. 1) Serial No. (Fig. 1 and 2) Engine type (Fig. 3)



Engine No. (Fig. 3)

Fill in the above listed data when receiving the machine.

Upon receipt of the machine our organization will instruct you about correct operation and maintenance.

Please observe strictly all safety regulations and notes on potential dangers!

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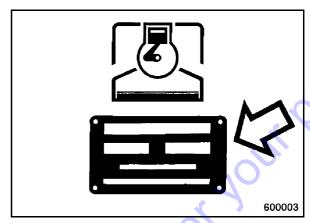


Fig. 1

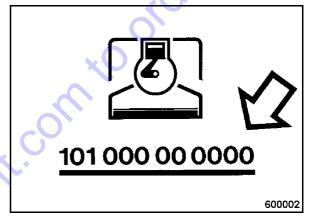


Fig. 2

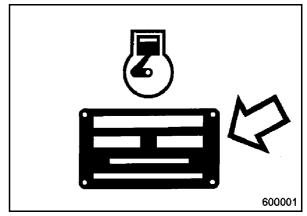


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#### **Technical Data**

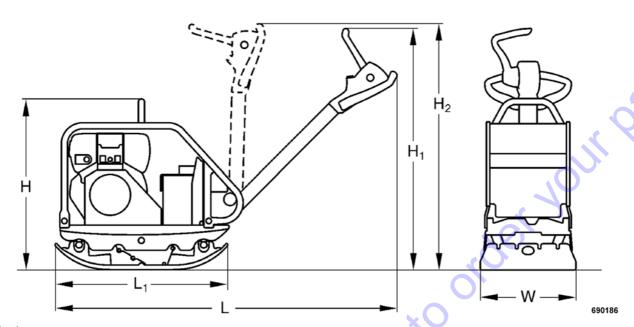


Fig. 4

| BPR 25/40 D      | Н    | H <sub>1</sub> | H <sub>2</sub> | L    | L <sub>1</sub> | W    |
|------------------|------|----------------|----------------|------|----------------|------|
| Dimensions in mm | 740  | 870            | 1220           | 1460 | 650            | 400  |
| Dimensions in    | 29.1 | 34.3           | 48.0           | 57.5 | 25.6           | 15.7 |
| inch             |      |                | X .            |      |                |      |

#### BPR 25/40 D

| W | /ei | ał | nts |
|---|-----|----|-----|
|   |     |    |     |

| Operating weight (CECE)              | 140 kg  | 309 lbs  |
|--------------------------------------|---------|----------|
| Basic weight                         | 137 kg  | 302 lbs  |
| Water sprinkling system <sup>1</sup> | + 13 kg | + 29 lbs |
| Transport wheels <sup>1</sup>        | + 4 kg  | + 9 lbs  |
|                                      |         |          |

#### Travel characteristics

| Working speed                        | 25 m/min | 82 ft/min |
|--------------------------------------|----------|-----------|
| Max. gradability (depending on soil) | 30%      | 30%       |

#### Drive

| Engine manufacturer  | Hatz                   | Hatz     |
|----------------------|------------------------|----------|
| Type                 | 1B20                   | 1B20     |
| Cooling              | Air                    | Air      |
| Number of cylinders  | 1                      | 1        |
| Rated power ISO 9249 | 3.1 KW                 | 4.2 hp   |
| Rated speed          | 3000 min <sup>-1</sup> | 3000 rpm |

#### **BPR 25/40 D**

| Starting device<br>Drive system          | Recoil starter mechanical | Recoil starter mechanical |
|--|---------------------------|---------------------------|
| Exciter system Frequency                 | 85 Hz                     | 5100 vpm                  |
| Centrifugal force                        | 25 kN                     | 5620 lbf                  |
| Filling capacities Fuel (diesel)         | 3.0                       | 0.8 gal us                |
| Water<br>Engine oil                      | 12.0 l<br>0.8 l           | 3.2 gal us<br>0.21 gal us |
| Optional equipment                       |                           | 496                       |
| i Note Subject to technical alterations. | ×O                        | <b>3</b> ,                |
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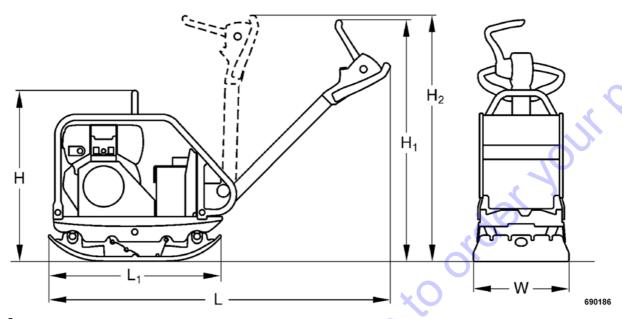


Fig. 5

| BPR 25/50 D      | Н    | H <sub>1</sub> | H <sub>2</sub> | L    | L <sub>1</sub> | W    |
|------------------|------|----------------|----------------|------|----------------|------|
| Dimensions in mm | 740  | 870            | 1220           | 1460 | 650            | 500  |
| Dimensions in    | 29.1 | 34.3           | 48.0           | 57.5 | 25.6           | 19.7 |
| inch             |      |                |                |      |                |      |

#### BPR 25/50 D

| W | /ei | ql | nt | s |
|---|-----|----|----|---|
|   |     |    |    |   |

| 3                                    |         |          |
|--------------------------------------|---------|----------|
| Operating weight (CECE)              | 145 kg  | 320 lbs  |
| Basic weight                         | 142 kg  | 313 lbs  |
| Water sprinkling system <sup>1</sup> | + 13 kg | + 29 lbs |
| Transport wheels <sup>1</sup>        | + 4 kg  | + 9 lbs  |
|                                      |         |          |
| Travel characteristics               |         |          |

25 m/min

30%

#### Drive

Working speed

Max. gradability (depending on soil)

| Engine manufacturer  | Hatz                   | Hatz     |
|----------------------|------------------------|----------|
| Type                 | 1B20                   | 1B20     |
| Cooling              | Air                    | Air      |
| Number of cylinders  | 1                      | 1        |
| Rated power ISO 9249 | 3.1 KW                 | 4.2 hp   |
| Rated speed          | 3000 min <sup>-1</sup> | 3000 rpm |

82 ft/min

30%

#### **BPR 25/50 D**

| Starting device<br>Drive system   | Recoil starter mechanical | Recoil starter mechanical |
|-----------------------------------|---------------------------|---------------------------|
| Exciter system                    |                           |                           |
| Frequency                         | 85 Hz                     | 5100 vpm                  |
| Centrifugal force                 | 25 kN                     | 5620 lbf                  |
| Filling capacities                |                           | 100                       |
| Fuel (diesel)                     | 3.01                      | 0.8 gal us                |
| Water                             | 12.0                      | 3.2 gal us                |
| Engine oil                        | 0.81                      | 0.21 gal us               |
| 1 Optional equipment              |                           | 100                       |
| į Note                            |                           |                           |
| Subject to technical alterations. | V                         |                           |
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|                                   |                           |                           |

#### **Technical Data**

The following noise and vibration data acc. to

- EC Machine Regulation edition 2006/42/EC
- the noise regulation 2000/14/EG, noise protection guideline 2003/10/EC
- Vibration Protection Regulation 2002/44/EC

were determined during conditions typical for this type of equipment and by application of harmonized standards.

During operation these values may vary because of the existing operating conditions.

#### Noise value

#### Sound pressure level on the place of the operator:

BPR 25/40 D:  $L_{pA}$  = 93 dB(A) with tube frame, determined acc. to ISO 11204 and EN 500 BPR 25/50 D:  $L_{pA}$  = 95 dB(A) with tube frame, determined acc. to ISO 11204 and EN 500

#### Guaranteed sound power level:

BPR 25/40 D:  $L_{WA}$  = 108 dB(A) with tube frame, determined acc. to ISO 3744 and EN 500 BPR 25/50 D:  $L_{WA}$  = 108 dB(A) with tube frame, determined acc. to ISO 3744 and EN 500

#### A Danger

#### Loss of hearing!

Wear your personal noise protection means (ear defenders) before starting operation.

#### Vibration value

#### Hand-arm vibration:

Vector total of the weighted effective acceleration in three orthogonal directions:

#### Weighted total vibration value

BPR 25/40 D:  $a_{hv} = 6.2 \text{ m/s}^2$  with tube frame on crushed rock determined acc. to ISO 5349 and EN 500 BPR 25/50 D:  $a_{hv} = 5.8 \text{ m/s}^2$  with tube frame on crushed rock determined acc. to ISO 5349 and EN 500



Observe the daily vibration load (Industrial safety acc. to 2002/44/EEC).

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#### Safety regulations

#### General

This BOMAG machine has been built in compliance with the latest technical standard and complies with the applicable regulations and technical rules. However, dangers for persons and property may arise from this machine, if:

- it is used for purposes other than the ones it is intended for,
- it is operated by untrained personnel,
- it is changed or converted in an unprofessional way,
- the safety instructions are not observed.

Each person involved in the operation, maintenance and repair of the machine must therefore read and comply with these safety regulations. If necessary, this must be confirmed by obtaining the signature of the customer.

Furthermore, the following obviously also applies:

- applicable accident prevention instructions,
- generally accepted safety and road traffic regulations,
- country specific safety regulations. It is the duty of the operator to be acquainted with these instructions and to apply these accordingly. This applies also for local regulations concerning different types of handling work. Should the recommendations in these instructions be different from the regulations valid in your country, you must comply with the safety regulations valid in your country.

#### Intended use

This machine must only be used for:

- Compaction of all types of soils
- Repair work on all types of soil
- Paving of walkways
- Work in trenches
- Underfilling and compaction of hard shoulders

#### Unintended use

Dangers may arise from the machine when it is used for purposes other than the one it is intended for.

Any danger caused by intended use is the sole responsibility of the customer or driver/operator, the manufacturer cannot be made liable.

Examples for unintended use are:

- Dragging the machine along as a measure of transportation
- Throwing the machine off the transport vehicle
- Attaching an additional weight to the machine

It is not permitted to stand on the machine while working.

Any transport ropes fastened to the machine must be removed before operation.

Starting and operation of the machine in explosive environments and in underground mining is prohibited.

#### Remaining dangers, remaining risks

Despite careful work and compliance with standards and regulations it cannot be ruled out that further dangers may arise when working with and handling the machine.

Both the machine as well as all other system components comply with the currently valid safety regulations. Nevertheless, remaining risks cannot be ruled out completely, even when using the machine for the purpose it is intended for and following all information given in the operating instructions.

A remaining risk can also not be excluded beyond the actual danger zone of the machine. Persons remaining in this area must pay particular attention to the machine, so that they can react immediately in case of a possible malfunction, an incident or failure etc.

All persons remaining ion the area of the machine must be informed about the dangers that arise from the operation of the machine.

#### Regular safety inspections

Have the machine inspected by an expert (capable person) as required for the conditions the machine is working under, but at least once every year.

# Who is allowed to operate the machine?

Only trained, instructed and authorized persons of at least 18 years of age are permitted to drive and operate this machine. For operation of the machine the responsibilities must be clearly specified and complied with.

Persons under the influence of alcohol, medicine or drugs are not allowed to operate, service or repair the machine.

Maintenance and repair work requires specific knowledge and must therefore only be performed by trained specialists.

# Changes and conversions to the machine

Unauthorized changes to the machine are prohibited for safety reasons.

Original parts and accessories have been specially designed for this machine.

We wish to make explicitly clear that we have not tested or approved any parts or accessories not supplied by us.

The installation and/or use of such products may have an adverse effect on the active and/or passive safety.

The manufacturer explicitly excludes any liability for damage caused by the use of non-original parts or accessories.

# Damage, deficiencies, misuse of safety installations

Machines which are not safe to operate must be immediately taken out of service and shall not be used, until these deficiencies have been properly rectified.

Safety installations and switches must neither be removed nor must they be made ineffective.

# Notes on safety in the operating and maintenance instructions

#### **A** Danger

Paragraphs marked like this highlight possible dangers for persons.

#### 

Paragraphs marked like this highlight possible dangers for machines or parts of the machine.

#### i Note

Paragraphs marked like this contain technical information for the optimal economical use of the machine.

#### 

Paragraphs marked like this point out practices for safe and environmental disposal of fuels and lubricants as well as replacement parts.

Observe the regulations for the protection of the environment.

#### Loading/transporting the machine

Make sure that persons are not endangered by the machine tipping or sliding off.

Use only safe lifting gear of sufficient load bearing capacity Minimum lifting capacity of lifting gear: see operating weight in chapter "Technical Data".

Loads must only be attached and hoisted by an expert (capable person).

Fasten the lifting gear only at the specified lifting points.

Check lifting eye for damage before use. Do not use a damaged or in any other way impaired lifting eye.

Do not lift or lower the machine jerkily.

The tension must always be effective in vertical direction.

The machine must not swing about when being lifted

Do not step or stand under suspended loads.

Always use suitable lashing gear on the lifting points to lash down the machine.

When lashing down the machine disassemble the transport wheels<sup>1</sup> from the base plate.

Lash the machine down, so that it is secured against rolling, sliding and turning over.

Optional equipment

#### Safety regulations

#### Starting the machine

#### **Before starting**

Become acquainted with the equipment, the control elements, the working principle of the machine and the working area.

Wear your personal protective outfit (hard hat, safety boots, etc.). Wear ear defenders.

Before starting the machine check whether:

- the machine shows any obvious faults
- all guards and safety elements are in place
- the controls are fully functional
- the machine is free of oily and combustible material
- all grips are free of grease, oils, fuel, dirt, snow and ice.

When starting with recoil starter check the starter rope for chafing before starting, replace if necessary. A damaged rope can break and cause injuries during starting.

Use only machines which are serviced at regular intervals

Do not use starting aid sprays or other inflammable fluids for starting.

### Starting and operation of the machine is closed rooms and trenches

Exhaust gases are highly dangerous! Always ensure an adequate supply of fresh air when starting and operating in closed rooms and trenches!

#### Operation

Operate the machine only with the steering rod folded down.

Guide the machine only by the steering rod.

Guide the machine so hat your hands do not hit against solid objects, danger of injury.

As a measure to avoid injury the machine must only be guided from the side by the steering handle

Always keep an eye on a running machine.

Watch out for unusual noises and development of smoke. Perform trouble shooting and have the fault corrected.

Operate the machine only with full engine speed, as otherwise the centrifugal clutch will be destroyed.

#### Parking the machine

Park the machine on level, firm ground.

Before leaving the machine:

- park the machine so that it cannot turn over,
- Shut down the engine.

Mark machines, which could be in the way, with a clearly visible sign.

#### Refuelling

Do not inhale any fuel fumes.

Refuel only with the engine shut down.

Do not refuel in closed rooms.

No open fire, do not smoke.

Do not spill any fuel. Catch running out fuel, do not let it seep into the ground.

Keep dirt and water away from the fuel.

A leaking fuel tank can cause an explosion. Ensure tight fit of the fuel tank cover, if necessary replace immediately.

#### Maintenance work

Comply with the maintenance work described in the operating and maintenance instructions, including the information concerning the replacement of parts.

Maintenance work must only be performed by qualified and authorized persons.

Keep unauthorized persons away from the machine.

Do not touch hot engine parts.

Do not perform maintenance work while the motor is running.

Park the machine on level, firm ground.

#### Working on the engine

Drain the engine oil at operating temperature – danger of scalding!

Wipe off spilled oil, catch running out oil and dispose of environmentally.

My on to order your parties

Store used filters and other oil contaminated materials in a separate, specially marked container and dispose of environmentally.

#### Working on the fuel system

Do not inhale any fuel fumes.

Avoid open fire, do not smoke, do not spill any fuel.

Catch running out fuel, do not let it seep into the ground and dispose off environmentally.

#### Cleaning work

Do not perform cleaning work while the motor is running.

Do not use gasoline or other easily inflammable substances for cleaning.

When using a steam cleaner for cleaning do not subject electrical parts and insulation material to the direct jet or cover these items beforehand.

Do not guide the water jet directly into air filter and air intake or exhaust muffler.

#### After maintenance work

After all maintenance work is completed reinstall all guards and safety installations.

#### Repair

Repair work must only be performed by qualified and authorized persons. Use our repair instructions for this work.

Exhaust gases are highly dangerous! Always ensure an adequate supply of fresh air when starting in closed rooms!

Mark defective machines by attaching a warning note to the steering handle.

#### Welding

Before starting welding work on the machine disconnect the battery and cover the fuel tank with insulating material.

#### Safety stickers on the machine

Keep safety stickers in good condition and legible and follow their meaning.

Replace damaged and illegible safety stickers.

#### Safety regulations

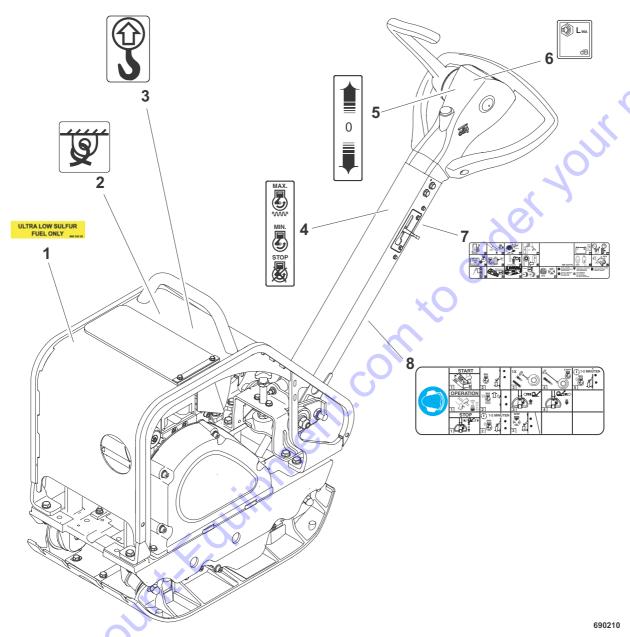


Fig. 6

#### Stickers and decals BPR 25/40 D, BPR 25/50 D

- 1 Information sticker Ultra-low sulphur fuel
- 2 Information sticker Lashing point
- 3 Information sticker Lifting point
- 4 Information sticker Throttle lever

- 5 Information sticker Travel lever
- 6 Information sticker Guaranteed sound capacity level
- 7 Maintenance sticker
- 8 Brief operating instructions

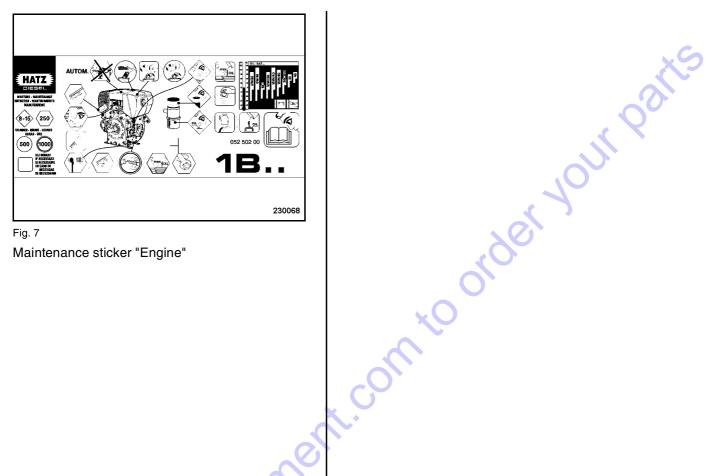


Fig. 7 Maintenance sticker "Engine"

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#### 4.1 General notes

If you are not yet familiar with the control and display elements on this machine you should read this section thoroughly before starting any operation on the machine. Here all functions are described in detail.

The section "Operation" contains only brief descriptions of the individual control steps.

o to Discounting

# 4.2 Description of indicators and control elements

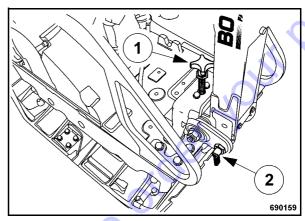


Fig. 8

No. 1 = Steering rod height adjustment

No. 2 = Steering rod lock



The steering rod lock is released by pulling out the locking bolt.

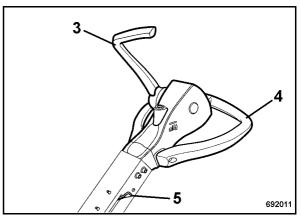


Fig. 9

No. 3 = Travel lever

No. 4 = Handle

No. 5 = Throttle lever

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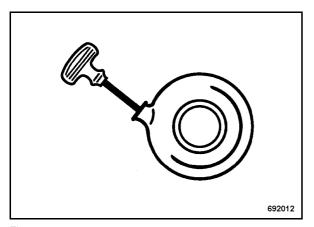


Fig. 10

#### No. 6 = Recoil starter

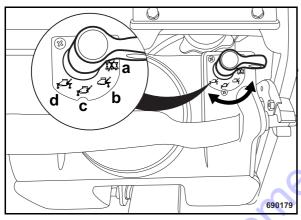


Fig. 11

#### No. 7 = Lever for water sprinkling system<sup>1</sup>

Position "a" = Sprinkling system switched off

Position "b" = Sprinkling through rear spray

bar

Position "c" = Sprinkling through front spray

ba

Position "d" = Sprinkling through both spray

hars

<sup>1</sup> Optional equipment

30 to Discount Equipment control order your PS

#### 5.1 General

If you are not yet acquainted with the controls and indicating elements on this machine you should thoroughly read chapter "Indicators and control elements" before starting work.

All indicators and control elements are described in detail in this chapter.

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# 5.2 Tests before taking into operation

The following inspections must be carried out before each working day or before a longer working period.

#### **A** Danger

**Danger of accident!** 

Please observe strictly the safety regulations in the corresponding section of this instruction manual!

- Park the machine on ground as level as possible.
- Cleaning the machine.

#### Check:

- condition of engine and machine
- fuel tank and fuel lines for leaks
- screw joints for tight fit

#### i Note

For a description of the following tasks refer to the chapter "Daily maintenance".

- Engine oil level, top up if necessary
- Fuel level, top up if necessary.
- Water level<sup>1</sup>, top up if necessary.

1 Optional equipment

# 5.3 Folding down the steering rod

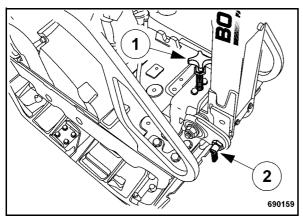


Fig. 12

- Pull out and turn the locking bolt (2) (Fig. 12).
- Fold down the steering rod, so that it can swing freely.
- Adjust the steering rod with the height adjustment (1) to the height of your body.

#### 5.4 Starting the engine

#### ▲ Danger

Exhaust gases are highly dangerous!

Always ensure an adequate supply of fresh air when starting and operating in closed rooms and trenches!

#### **▲** Danger

**Danger of accident!** 

Before starting make sure that there are no persons in the danger area of engine or machine and that all safety installations are in place.

Before starting check the starter rope for chafing, replace if necessary. A damaged rope can break and cause injuries during starting.

Do not use starting aid sprays or other inflammable fluids for starting.

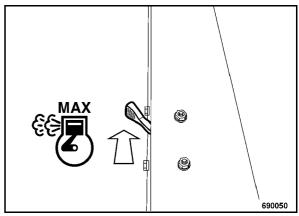
Always hold on to the machine.

Always keep an eye on a running machine.

#### **A** Danger

Loss of hearing!

Wear your personal noise protection means (ear defenders) before starting operation.



Fia. 13

 Set the throttle lever (Fig. 13) to position "MAX".

#### Operation

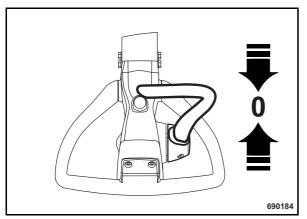


Fig. 14

• Shift the travel lever (Fig. 14) to position "0".

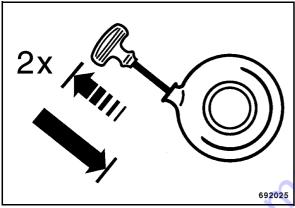
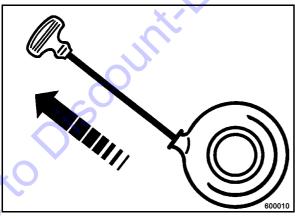


Fig. 15

 Slightly pull the starter handle (Fig. 15) two times, until resistance can be felt (compression pressure), and return it to initial position.



Fia 16

 Pull the starter handle (Fig. 16) quickly and powerful as far out as possible.

#### **⚠** Caution

Do not let the starter handle hit back, but guide it back.

• If the engine does not start during the first attempt, repeat the starting process.

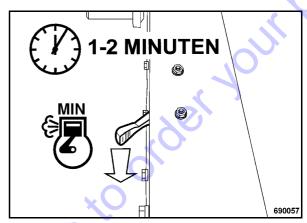


Fig. 17

- Set the throttle lever to position "MIN" (Fig. 17).
- Run the engine warm for approx. 1 to 2 minutes in idle speed.

#### j Note

Operation of the vibratory plate can be started as soon as the engine responds to short throttle commands.

#### 5.5 Work/operation

#### **▲** Danger

**Danger of accident!** 

Operate the machine only with the steering rod folded down.

Guide the machine only by the steering rod.

Guide the machine so hat your hands do not hit against solid objects.

Always keep an eye on a running machine.

Watch out for unusual noises and development of smoke. Perform trouble shooting and have the fault corrected.

#### **⚠** Caution

Operate the vibratory plate only with full engine speed, as otherwise the centrifugal clutch will be destroyed.

For short breaks you should always return the throttle lever to idle speed position, this avoids premature wear of the centrifugal clutch.

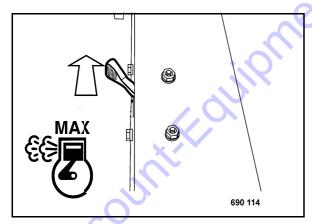


Fig. 18

 Set the throttle lever (Fig. 18) to position "MAX".

#### **Drive forward**

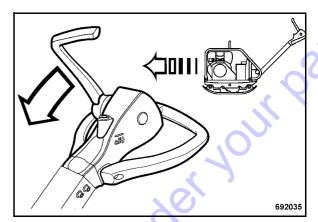


Fig. 19

 Push the travel lever (Fig. 19) forward, until the vibratory plate has reached the desired speed.

The machines drives with a speed which corresponds with the travel lever position.

#### j Note

If the machine moves forward with considerably reduced speed, pull the travel lever completely back and shift it forward again.

#### **Drive backwards**

#### A Danger

Danger of accident!

As a measure to avoid injury the machine must only be guided from the side by the steering handle

#### Operation

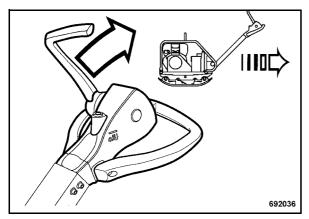


Fig. 20

 Pull the travel lever (Fig. 20) back, until the vibratory plate has reached the desired speed in reverse.

The machines vibrates backwards with a speed which corresponds to the travel lever position.

#### If the vibratory plate got stuck

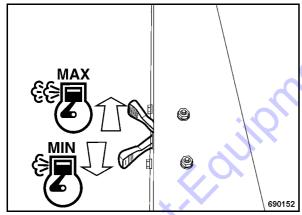


Fig. 21

- Keep shifting the throttle lever (Fig. 21) between "MIN" and "MAX" positions.
- At the same time pull the vibratory plate by the steering rod to the right and left, until it comes free

#### 5.6 Switching the motor off

#### 

Do not shut the engine down all of the sudden from full speed, but let it idle for a while for temperature equalization.

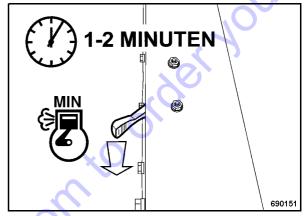


Fig. 22

Shift the throttle lever to position "MIN" (Fig.
 22) and let the engine run with idle speed for a short while.

Vibration is shut down.

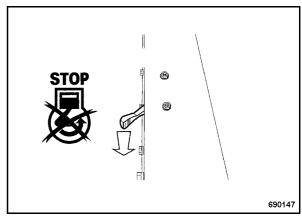


Fig. 23

 Set the throttle lever (Fig. 23) to position "STOP".

# 5.7 Assembling the transport wheels<sup>1</sup>

#### A Danger

Danger of injury!

By the machine tipping over when assembling or disassembling the transport wheels

**⚠** Caution

Shut down the engine.

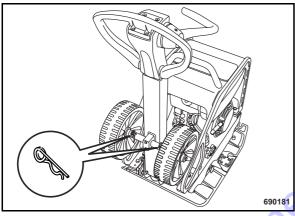


Fig. 24

- Adjust the steering rod upright and lock it. Engage the locking pin securely.
- Remove the spring cotter (Fig. 24) and pull the transport wheels out of the bracket on the steering rod.

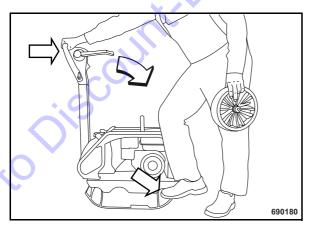


Fig. 25

- Stand at the side of the machine.
- 1 Optional equipment

 Tilt the machine forward by the steering rod (Fig. 25).

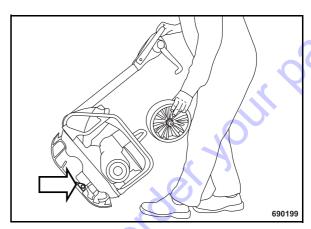


Fig. 26

Insert the transport wheel into the bracket (Fig. 26) on the base plate.

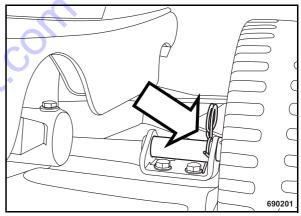


Fig. 27

- In the bracket secure the transport wheel with the spring cotter (Fig. 27).
- Insert the second wheel into the bracket on the opposite side of the base plate and secure it with the spring cotter.

#### Operation

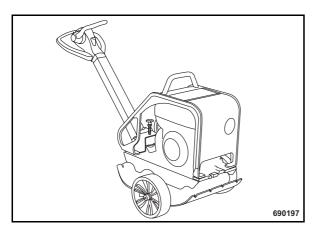


Fig. 28

- Unlock the steering rod and fold it down (Fig. 28).
- Lock the steering rod in working position. Engage the locking pin securely.

The machine can now be moved.

#### 5.8 Loading/transport

#### ▲ Danger

Danger of accident! Life hazard!

Make sure that persons are not endangered by the machine tipping or sliding off.

Use only safe lifting gear of sufficient load bearing capacity Minimum lifting capacity of lifting gear: see operating weight in chapter "Technical Data".

Loads must only be attached and hoisted by an expert (capable person).

For lifting the machine attach the lifting gear only to the lifting eye provided for this purpose.

Check lifting eye for damage before use. Do not use a damaged or in any other way impaired lifting eye.

Do not lift or lower the machine jerkily.

The tension must always be effective in vertical direction.

The machine must not swing about when being lifted.

Do not step or stand under suspended loads.

Always use suitable lashing gear on the lifting points to lash down the machine.

When lashing down the machine disassemble the transport wheels<sup>1</sup> from the base plate.

Lash the machine down, so that it is secured against rolling, sliding and turning over.

<sup>1</sup> Optional equipment

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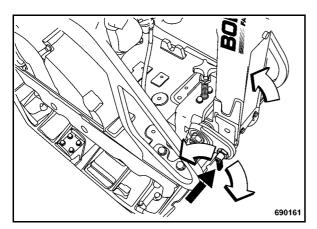


Fig. 29

- Set the steering rod (Fig. 29) to upright position.
- Engage the locking pin securely.

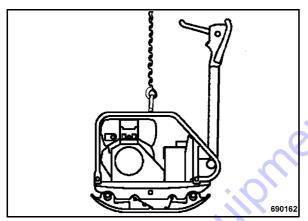


Fig. 30

- Always attach the lifting tackle to the lifting eye to load the vibratory plate (Fig. 30) on a transport vehicle.
- Lash the vibratory plate down to the transport vehicle, so that it is secured against rolling, sliding and turning over. Fasten the lashing tackle at the marked lashing points.

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#### 6.1 General notes on maintenance

When performing maintenance work ensure strict compliance with the respective safety instructions and particularly the safety regulations mentioned in the corresponding section of these operating and maintenance instructions.

Thorough maintenance of the machine guarantees far longer safe functioning of the machine and prolongs the lifetime of important components. The effort needed for this work is only little compared with the problems that may arise when not observing this rule.

- Always clean machine and engine thoroughly before starting maintenance work.
- For maintenance work stand the machine on level ground.
- Do not touch hot engine parts.
- Perform maintenance work only with the engine shut down.

#### Environment

During maintenance work catch all oils and fuels and do not let them seep into the ground or into the sewage system. Dispose of oils and fuels environmentally.

Keep used filters in a separate waste container and dispose of environmentally.

#### Notes on the fuel system

The lifetime of the diesel engine depends to a great extent on the cleanliness of the fuel.

- Keep fuel free of contaminants and water, since this will damage the injection elements of the engine.
- Drums with inside zinc lining are not suitable to store fuel.
- The fuel drum must rest for a longer period of time before drawing off fuel.
- Under no circumstances must the drum be rolled to the tapping point just before drawing out fuel.

- When choosing the storage place for fuel make sure that spilled fuel will not harm the environment.
- Do not let the hose stir up the slurry at the bottom of the drum.
- Do not draw off fuel from near the bottom of the drum.
- Residues in the fuel drum must not be used.

#### Notes on the performance of the engine

On diesel engines both combustion air and fuel injection quantities are thoroughly adapted to each other and determine power, temperature level and exhaust gas quality of the engine.

If your engine has to work permanently in "thin air" (at higher altitudes) and under full load, you should consult our customer service or the customer service of the engine manufacturer.

#### Frequent causes of faults

- Operating errors
- Incorrect, inadequate maintenance

If you cannot locate the cause of a fault or rectify it yourself by following the trouble shooting chart, you should contact our customer service department.

#### 6.2 Fuels and lubricants

#### **Engine oil**

#### Oil viscosity

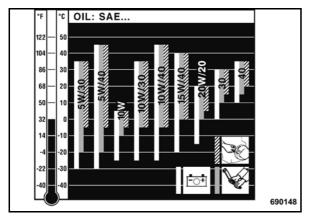


Fig. 31

Choose the oil viscosity in dependence on the ambient temperature at the operating location of the engine (see diagram).

Occasional falling short of the temperature limit (e.g. use of SAE 15W/40 down to -15 °C (+5 °F)) may effect the cold starting ability of the engine, but will not cause any engine damage.

Temperature related lubrication oil changes can be avoided by using multi-purpose oils. The following oil change intervals apply also when using multi-purpose oils.

#### Oil quality

You should preferably use oils of API quality class CD/CE/CF/CF-4/CG-4 or higher, or ACEA B2/E2.

#### Lubrication oil change intervals

API: CD/CE/CF/

CF-4/CG-4 = 6 months or 250 operating

hours

ACEA B2/E2 = 6 months or 250 operating

hours

#### i Note

When changing to a higher alloyed oil quality after a longer period of operation, it is recommended to perform the first oil change of the higher quality oil already after 25 operating hours.

#### **Fuels**

#### Quality

You should only use commercially available brand diesel fuel and ensure strict cleanliness when filling in.

Since this engine complies with the exhaust gas standard acc. to EPA<sup>1</sup>Stage "TIER 4", the use of ultra-low sulphur diesel fuel is mandatory, if the engine is operated within an area where compliance with EPA is required.

The fuel provision should always be topped up in due time, so that the tank will not run dry.

The following fuel specifications are permitted:

- EN 590
- BS 2869: A1 and A2
- ASTM D 975 1-D and 2-D

#### Winter fuel

For winter operation use only winter diesel fuel, to avoid clogging because of paraffin separation. At very low temperatures disturbing paraffin separation can also be expected when using winter diesel fuel.

#### Mineral oil based hydraulic oil

The hydraulic system is operated with hydraulic oil HV 32 (ISO) with a kinematic viscosity of 32 mm $^2$ /s at +40°C (+104°F). For topping up or for oil changes use only high-quality hydraulic oil, type HVLP according to DIN 51524, part 3, or hydraulic oils type HV according to ISO 6743/3. The viscosity index (VI) should be at least 150. (Observe the information of the manufacturer).

United States Environmental Protection Agency

# 6.3 Table of fuels and lubricants

| Assembly               | Fuel or lubricant   |   | Quantity approx.            |
|------------------------|---|---|-----------------------------|
|                        | Summer  | Winter  | Attention                   |
|                        |   |   | Observe the level marks     |
| Motor                  |   |   | 70                          |
| - Engine oil           | API CD/CE/CF/CF-4/CG-4 SAE 5W/30 (-5°C to +35°C) (+23 °F to +95 °F)                                 |   | approx. 0.8 I (0.21 gal us) |
|                        |   |   | Yo.                         |
|                        | SAE 5W/40 (-5 °C bis +4   |   |                             |
|                        | SAE 10W/30 (-5 °C to +5   | )   |                             |
|                        | SAE 10W/40 (-5 °C to +45 °C) (+23 °F to +113 °F)<br>SAE 10W/40 (0 °C to +40 °C) (+32 °F to +104 °F) |   |                             |
|                        |   |   |                             |
|                        | SAE 30<br>(+15 °C to +30 °C)<br>(+59 °F to +86 °F)  | SAE 10W<br>(-5 °C to +5 °C)<br>(+23 °F to +41 °F) |                             |
|                        | SAE 40<br>(+20 °C to +35 °C)<br>(+68 °F to +95 °F)  |   |                             |
| - Fuel                 | Diesel  | Winter diesel fuel                                | 3.0 I (0.8 USgal)           |
|                        |   | (-12 °C) (+10.4 °F)                               |                             |
| Water tank             | Water   | Water with anti-freeze agent                      | 12.0 I (3.2 USgal)          |
| Vibrator shaft housing | as engine oil   |   | 0.4 I (0.11 USgal)          |
| Steering rod           | Hydraulic oil HV 32   |   | approx. 0.4 l (0.11 gal us) |

#### 6.4 Running-in instructions

The following maintenance work must be performed when running in new machines or overhauled engines:

#### **⚠** Caution

During the running-in period, up to approx. 200 operating hours, check the engine oil level twice every day.

Depending on the load the engine is subjected to, the oil consumption will drop to the normal level after approx. 100 to 200 operating hours.

#### After 25 operating hours

- Change the engine oil.
- Check engine and machine for leaks.
- Retighten the fastening screws on air filter exhaust, fuel tank and other attachments.
- Retighten the bolted connections on the machine.
- Check the vibration drive V-belts.
- Check the oil level in the vibrator housing.

#### 6.5 Maintenance table

With all maintenance intervals perform also the work for shorter preceding service intervals.

| No.  | Maintenance work   | Comment                                   | daily | weekly | monthly | half-annually | annually | as required |
|------|--|---|-------|--------|---------|---------------|----------|-------------|
| 6.6  | Cleaning machine / engine                                  |   | Χ     |        | )       |               |          |             |
| 6.7  | Check the engine oil level                                 | Dipstick mark                             | Х     |        | Y       |               |          |             |
| 6.8  | Check the fuel level                                       |   | Χ     | 1      | )       |               |          |             |
| 6.9  | Fill the water tank  |   | Х     | U      |         |               |          |             |
| 6.10 | Check, clean the water separator                           | ,   | O     | Х      |         |               |          |             |
| 6.11 | Check, clean the air filter, replace if necessary          | in case of extreme dust clean every day   |       |        | Х       |               |          |             |
| 6.12 | Clean the cooling fins and the cooling air intake openings | x C                                       |       |        | Х       |               |          |             |
| 6.13 | Check the oil level in the exciter housing                 | -8/                                       |       |        |         | Х             |          |             |
| 6.14 | Check the V-belt tension, if necessary replace the V-belt  |   |       |        |         | Х             |          |             |
| 6.15 | Check, adjust the valve clearance                          | automatic valve clear-<br>ance adjustment |       |        |         | Х             |          |             |
| 6.16 | Change the engine oil                                      | at least every 250 operating hours        |       |        |         |               | Х        |             |
| 6.17 | Clean the engine oil filter                                | at least every 1000 oper-<br>ating hours  |       |        |         |               | Х        |             |
| 6.18 | Clean the exhaust screen                                   | at least every 250 operating hours        |       |        |         |               | Х        |             |
| 6.19 | Replace the fuel filter                                    |   |       |        |         |               | Х        |             |
| 6.20 | Replace the starter rope                                   |   |       |        |         |               | Х        |             |
| 6.21 | Change the oil in the exciter shaft housing                | at least every 500 operating hours        |       |        |         |               | Х        |             |
| 6.22 | Check the hydraulic oil level                              |   |       |        |         |               | Х        |             |
| 6.23 | Check the rubber buffers                                   |   |       |        |         |               | Х        |             |
| 6.24 | Tighten all bolted connections                             |   |       |        |         |               |          | Χ           |

|   | No.  | Maintenance work     | Comment   | daily | weekly | monthly | half-annually | annually | as required | X |
|---|------|----------------------|-----------|-------|--------|---------|---------------|----------|-------------|---|
|   | 6.25 | Engine conservation  |           |       |        | _       |               |          | X           | 0 |
| S | X.O  | jescountie           | nerit.com |       | 510    | es      |               |          |             |   |
|   |      | 25/40 D, BPR 25/50 D | BOMAG     |       |        |         |               |          | 41          |   |

#### 6.6 Cleaning machine / engine

#### **⚠** Caution

Perform cleaning work only after the engine has cooled down and with the engine stopped.

Dirty operating conditions, particularly lubrication oil and fuel deposits on the cooling fins of the engine and the cooling air intake opening have an adverse effect on the cooling of the engine. You should therefore immediately seal any oil or fuel leaks near fuel tank, cylinder or cooling air intake and subsequently clean the cooling fins.

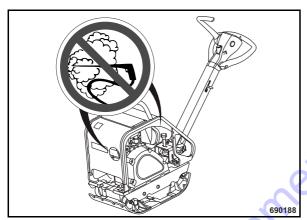


Fig. 32

#### 

Do not guide the water jet directly into the cooling air openings of the recoil starter, into the air filter and on electrical equipment (Fig. 32).

 After wet cleaning run the engine warm to evaporate all water residues and to avoid corrosion.

#### 6.7 Check the engine oil level

#### **⚠** Caution

Park the machine on level ground so that the engine is in horizontal position.

For quality and quantity of oil refer to the "table of fuels and lubricants".

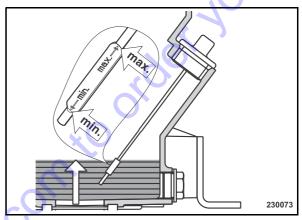


Fig. 33

- Shut down the engine.
- Screw out the dipstick (1) (Fig. 33), wipe it off with a lint-free, clean cloth and screw it completely back in.
- Unscrew the oil dipstick again and read the oil level.

#### **⚠** Caution

Operation with an oil level below the min mark or above the max mark can cause engine damage.

- The oil level should reach the upper mark on the dipstick. If the oil level is too low top up oil immediately.
- Check the seal on the dipstick, replace if necessary.
- Screw the dipstick in again until it bottoms.

#### 6.8 Check the fuel level

#### ▲ Danger

Fire hazard!

When working on the fuel system do not use open fire, do not smoke, do not spill any fuel.

Do not refuel in closed rooms.

Shut down the engine.

#### ▲ Danger

Health hazard!

Do not inhale any fuel fumes.

#### **⚠** Caution

For quality and quantity of fuel refer to the "table of fuels and lubricants".

#### ☆ Environment

Catch running out fuel, do not let it seep into the ground.

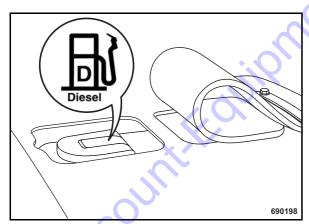


Fig. 34

 Clean the area around the filler cover, unscrew the filler cover (Fig. 34).

#### 

Contaminated fuel can cause malfunction or even damage of the engine.

- Fill in fuel through a funnel with screen.
- Close the tank again.

#### 6.9 Filling the water tank<sup>1</sup>

#### 

Dirty or contaminated water can block the nozzles!

Fill only with clean water.

If there is a risk of frost the water sprinkler system must be emptied or filled with an antifreeze mixture.

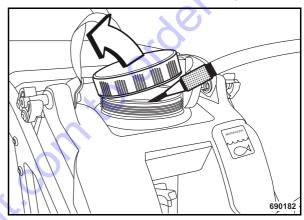


Fig. 35

Open the water tank (Fig. 35) and fill in clean water

I Optional equipment

## 6.10 Check, clean the water separator

#### A Danger

Fire hazard!

When working on the fuel system do not use open fire, do not smoke, do not spill any fuel. Shut down the engine.

#### ▲ Danger

Health hazard!

Do not inhale any fuel fumes.

#### 

Any fuel must be caught and disposed of in an environmentally friendly manner.

#### i Note

The inspection interval for the water separator depends on the water proportion in the fuel and the care that is execised when refuelling.

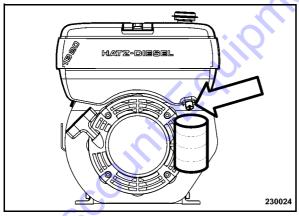


Fig. 36

- Place the transparent container (Fig. 36) under the drain plug.
- Loosen the screw for approx. 3 to 4 turns and collect running out water/fuel.

#### i Note

Since water is heavier than diesel fuel, water will run out before the fuel. This can be noticed by a clearly visible parting line.

When only fuel comes running out, tighten the drain plug again.

## 6.11 Check, clean the air filter, replace if necessary

#### **⚠** Caution

Do not use gasoline or hot fluids to clean the air filter.

Do not continue to use a damaged air filter. If in doubt use a new air filter.

Replace the air filter after five times cleaning, but at the latest after half a year.

Each cleaning interval must be marked with a cross on the cover of the air filter.

Cleaning does not make sense if the air filter element is covered with a sooty deposit. Use a new air filter.

Incorrectly handled air filters may be ineffective because of damage (e.g. cracks) and cause damage to the engine.

In case of wet or oily dirt replace the filter element.

Do not run the engine without air filter.

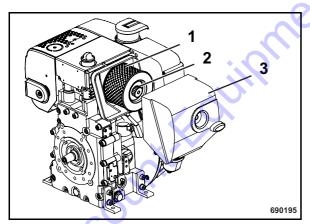


Fig. 37

- Remove the filter cover (3) (Fig. 37).
- Unscrew the knurled nut (2) and pull out the air filter (1).

#### Caution

The clean air side must be kept clean of dirt and foreign particles.

Do not blow the inside of the filter housing out with compressed air.

- Wipe the inside of the filter housing only with a clean cloth.
- Clean the cover thoroughly.

#### **▲** Danger

Danger of injury!

Always wear protective clothes (goggles, gloves) when working with compressed air.

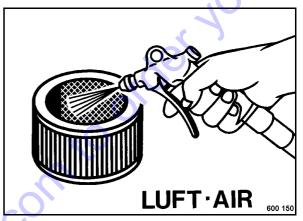


Fig. 38

- Blow the air filter (Fig. 38) out from inside to outside with dry compressed air (max. 5 bar (73 psi)).
- Check the air filter for damage, replace if necessary.
- Insert the air filter (1) (Fig. 37) into the housing and fasten it with the knurled nut (2).
- Install the filter cover (3), ensure correct fit of cover and seal.

#### Maintenance every month

# 6.12 Clean the cooling fins and the cooling air intake openings

#### ▲ Danger

Danger of injury!

Always wear protective clothes (goggles, gloves) when working with compressed air.

#### **⚠** Caution

Dirty operating conditions, particularly lubrication oil and fuel deposits on the cooling fins of the engine and the cooling air intake opening have an adverse effect on the cooling of the engine.

You should therefore immediately seal any oil or fuel leaks near fuel tank, cylinder or cooling air intake.

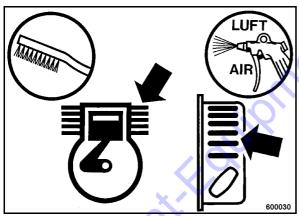


Fig. 39

 Loosen dried on dirt with a suitable brush (Fig. 39) from all cooling fins and cooling air intake openings and blow it off with compressed air .

#### **A** Danger

Fire hazard!

Do not use any inflammable solvents.

#### **⚠** Caution

Do not guide the water jet directly into the cooling air openings of the recoil starter, into the air filter and on electrical equipment.

- On a oil contaminated engine use a cold cleansing agent for cleaning.
- After a sufficient soaking time clean off with a water or steam jet and blow out with compressed air.
- Run the engine warm for a while to avoid corrosion

#### **⚠** Caution

Look for the cause of oily contamination and have any leaks sealed by our customer service.

## 6.13 Check the oil level in the exciter housing

**⚠** Caution

Park the machine on level ground.

For quality and quantity of oil refer to the "table of fuels and lubricants".

 Clean the area around breather and drain plug.

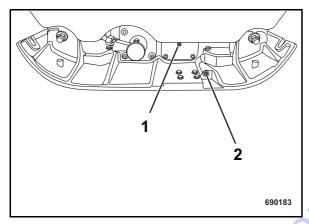


Fig. 40

- Unscrew the bleeding screw (1) (Fig. 40).
- Unscrew the oil drain plug (2) and check the oil level.

The oil level must reach the bottom edge of the drain bore.

- If the oil level is too low top up oil immediately.
- Clean oil drain and bleeding screw and assemble both screws with sealing compound (e.g. BOMAG part-no. 00970016).

## 6.14 Check the V-belt tension, if necessary replace the V-belt

#### **Checking the V-belt**

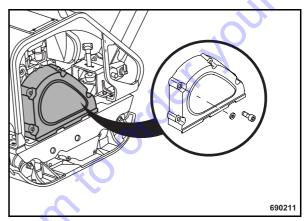


Fig. 41

Remove the V-belt guard (Fig. 41).

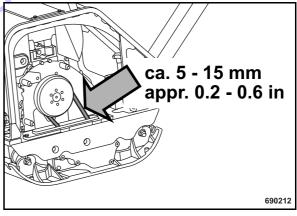


Fig. 42

• Check condition and tightness of V-belt (Fig. 42).

#### i Note

Compression measurement approx. 5 - 15 mm (02 - 06 in)

#### Maintenance every 6 months

**⚠** Caution

Replace a damaged V-belt.

The V-belt cannot be tightened manually. Always replace the V-belt, if the compression measurement is exceeded.

#### Replacing the V-belt

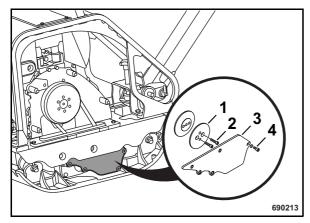


Fig. 43

- Remove the safety cover (3) (Fig. 43).
- Loosen screw (2).
- Remove the front disc (1) from the centrifugal clutch
- Take off the V-belt and replace it by a new one.
- Attach the front disc (1).
- Tighten the screws (2) (tightening torque: 35 Nm (26 ft.lbs)).
- Reinstall the protective cover (3) and tighten the screws (4) (tightening torque 15 Nm (11 ft.lbs)).
- Install the top V-belt guard (Fig. 41).

## 6.15 Checking, adjusting the valve clearance

**⚠** Caution

The engines are equipped with an automatic valve clearance adjustment, the valve clearance does therefore not need to be checked and adjusted.

#### 6.16 Change the engine oil

#### Danger

Danger of scalding!

When draining off hot oil.



Park the machine on level ground.

Drain the engine oil only when the engine is warm.

Change the engine oil at the latest after 250 operating hours.

For quality and quantity of oil refer to the "table of fuels and lubricants".

#### 

Catch running out old oil, do not let it seep into the ground and dispose off environmentally.

Screw the oil dipstick out of the oil filler opening.

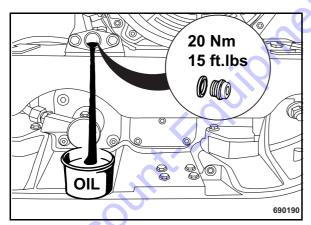


Fig. 44

- Unscrew the oil drain plug and catch running out old oil (Fig. 44).
- Clean the oil drain plug and screw it back in with a new seal ring (tightening torque: 20 Nm (15 ft.lbs)).
- Fill in fresh engine oil through the oil filler opening.
- Screw the oil dipstick back in.

- Perform a test and check the oil level, correct if necessary.
- Check the drain plug for leak tightness.

#### 6.17 Clean the engine oil filter

#### ▲ Danger

Danger of scalding!

When draining off hot oil.

By hot oil when unscrewing the engine oil filter

#### **⚠** Caution

Remove and clean the engine oil filter only after draining off the engine oil.

Park the machine on level ground so that the engine is in horizontal position.

#### 

Catch running out old oil, do not let it seep into the ground and dispose off environmentally.

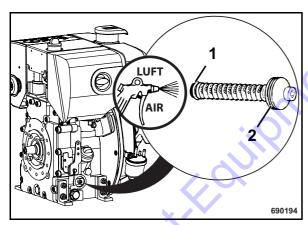


Fig. 45

 Loosen the fastening screw for approx. 5 turns and pull the engine oil filter out of the housing (Fig. 45).

#### **A** Danger

Danger of injury!

Always wear goggles when working with compressed air.

- Blow the engine oil filter out with compressed air from inside to outside.
- Check the seal (1) for damage, change if necessary.

- Cover seal rings (1) and (2) slightly with oil before assembling.
- Push the engine oil filter into the housing.

#### i Note

Before tightening the screw make sure that the tensioning springs touch the oil filter with both ends.

- Tighten the fastening screw.
- After filling in engine oil perform a short test run and check for leaks, if necessary tighten the fastening screw.

#### 6.18 Clean the exhaust screen

#### ▲ Danger

Danger of burning!

During and after operation the exhaust system is very hot. Perform this work only after the machine has cooled down.

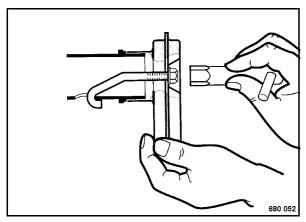


Fig. 46

Loosen the fastening nuts (Fig. 46) and remove the exhaust screen with the fastening strap.

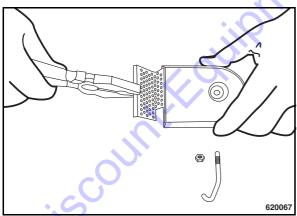


Fig. 47

• Take off the fastening nut and the fastening strap, then pull out the screen insert (Fig. 47).

#### ▲ Danger

Danger of injury!

Wear gloves when cleaning.

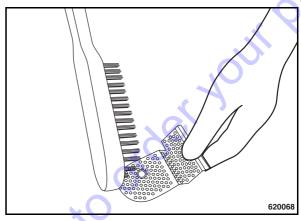


Fig. 48

- Remove deposits from the screen insert with an appropriate wire brush (Fig. 48).
- Check the screen insert for cracks and damage, replace if necessary.

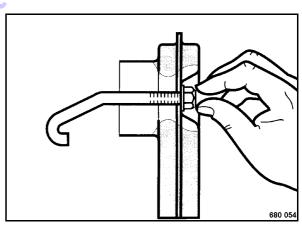


Fig. 49

 Re-assemble screen insert and fastening strap and screw the fastening nut if for approx. one turn (Fig. 49).

#### Maintenance every year

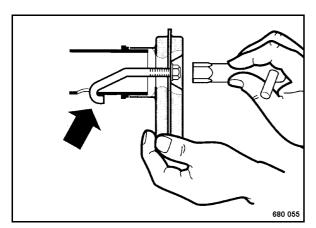


Fig. 50

- Slide on the exhaust screen with fastening bow (Fig. 50).
- Hook the fastening bow into the bore and tighten the fastening nut.

#### 6.19 Replace the fuel filter

#### **▲** Danger

Fire hazard!

When working on the fuel system do not use open fire, do not smoke, do not spill any fuel.

Do not refuel in closed rooms.

Shut down the engine.

#### ▲ Danger

Health hazard!

Do not inhale any fuel fumes.

#### **⚠** Caution

Ensure strict cleanliness to keep dirt out of the fuel lines. Dirt particles can destroy the injection system.

The service interval to change the fuel filter depends on the cleanliness of the fuel. If necessary this service must be performed every six months.

#### ∰ Environment

Catch running out fuel, do not let it seep into the ground.

Dispose of the used fuel filter environmentally.

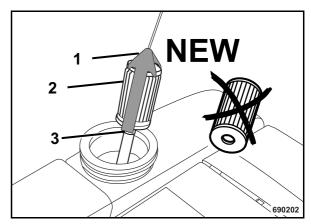


Fig. 51

- Open the quick lock on the tank.
- Pull the holder (1) (Fig. 51) with the fuel filter (2) by the cord out of the tank.

- Pull the fuel hose (3) off the fuel filter
- Push the fuel filter out of the holder.
- Push the new fuel filter into the holder.
- Push the fuel hose onto the new fuel filter.

#### **⚠** Caution

Do not insert the hose into the tank without a filter. Danger of contamination!

 Insert the holder with the fuel filter into the tank and attach the quick lock.

#### i Note

The fuel system is self bleeding.

#### 6.20 Replacing the starter rope

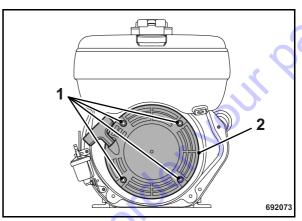


Fig. 52

 Unscrew the fastening screws (1) (Fig. 52) and pull the recoil starter (2) from the engine housing.

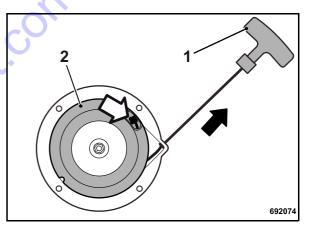


Fig. 53

- Pull the starter rope with the starter handle (1) out completely (Fig. 53).
- Secure the coil (2) against winding up.
- Loosen the knot of the starter rope on the coil and remove the old starter rope.
- Carefully turn the coil back, until the recoil spring is relieved.

#### Maintenance every year

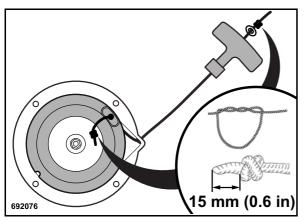


Fig. 54

 Thread in the new starter rope and fix it with knots on both ends (Fig. 54).

#### **⚠** Caution

Incorrect sense of rotation will damage the spring ends of the recoil spring.

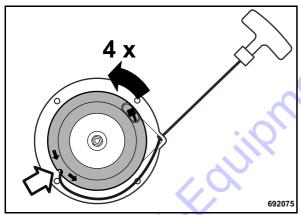


Fig. 55

 Pre-tension the coil by approx. 4 rotations in direction of arrow. Thereby place the starter rope into the recess in the coil (Fig. 55).

#### A Danger

Danger of injury!

Do not let the starter handle hit back, but guide it back slowly.

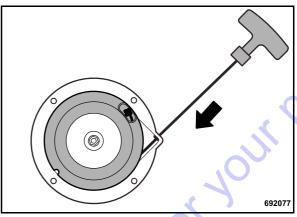


Fig. 56

- Slowly guide the starter handle back to initial position (Fig. 56). The rope is thereby wound on the coil.
- Test function and light movement of the recoil starter by pulling the starter handle.
- Mount the recoil starter to the engine housing.

## 6.21 Change the oil in the exciter shaft housing

**⚠** Caution

Park the machine on level ground.

For quality and quantity of oil refer to the "table of fuels and lubricants".



Catch running out old oil, do not let it seep into the ground and dispose off environmentally.

 Clean the area around breather and drain plug.

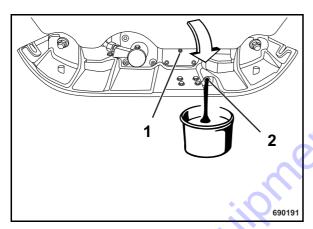


Fig. 57

- Tilt the machine to the side with the oil drain plug and support it safely.
- Unscrew the bleeding screw (1) (Fig. 57).
- Unscrew oil drain plug (2), drain and catch running out old oil.

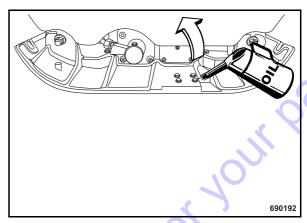


Fig. 58

- Tilt the machine to the opposite side and secure it properly.
- Fill in fresh engine oil through the drain opening (Fig. 58).
- Park the machine on level ground.

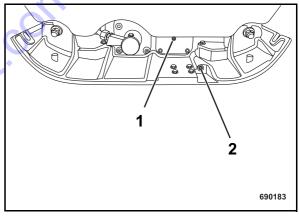


Fig. 59

Check the oil level.

The oil level must reach the bottom edge of the drain bore.

Clean oil drain (2) (Fig. 59) and bleeding screw
 (1) and assemble both screws with sealing compound (e.g. BOMAG part-no. 00970016).

#### 6.22 Check the hydraulic oil level

**⚠** Caution

Park the machine horizontally.

For quality of oil refer to the "table of fuels and lubricants".

Catch running out old oil, do not let it seep into the ground and dispose off environmentally.

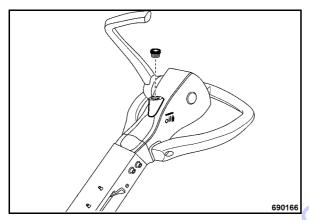


Fig. 60

- Adjust the steering rod with height adjustment (Fig. 60) so that the area with the level inspection plugs is horizontal.
- Unscrew the plug.

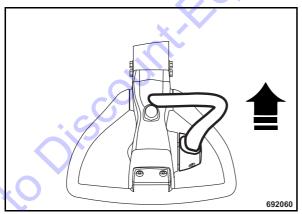


Fig. 61

Hold the travel lever in forward position (Fig. 61).

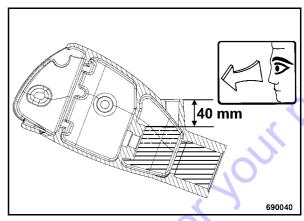


Fig. 62

Check whether the hydraulic oil level is approx. 40 mm (1.6 in) below the filler opening (Fig. 62) (see also mark on steering rod head), top up hydraulic oil if necessary.

#### Filling up hydraulic oil

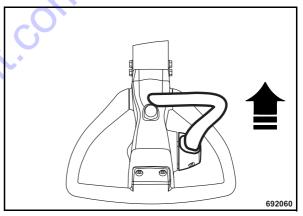


Fig. 63

• Shift the travel lever forward against the stop (Fig. 63).

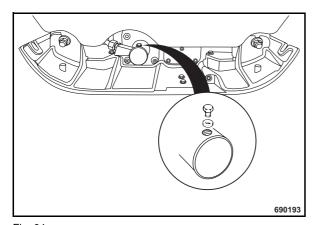


Fig. 64

#### j Note

Lay a cloth down before loosening the venting screw.

- Slacken the bleeding screw (Fig. 64).
- Wait until all air has escaped, then tighten the bleeding screw.

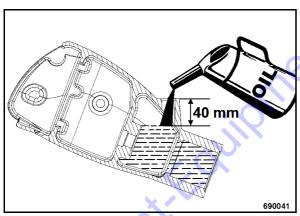


Fig. 65

• Fill in hydraulic oil to approx. 40 mm (1.6 in) below the edge of the filler opening (Fig. 65).

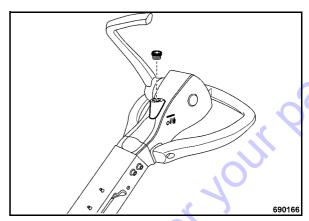


Fig. 66

Screw in and tighten the plug (Fig. 66).

#### 6.23 Check the rubber buffers

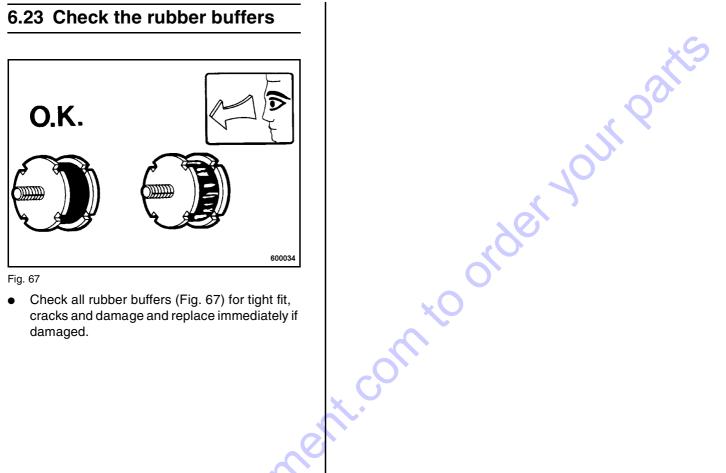


Fig. 67

Check all rubber buffers (Fig. 67) for tight fit, cracks and damage and replace immediately if damaged.

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#### 6.24 Tightening the screws

i Note

Self locking nuts must always be replaced by new ones after they have been unscrewed.

| Bolt dimensions   | Tightening torques* ft - Ib |      |      |  |  |
|-------------------|-----------------------------|------|------|--|--|
| Bolt dilliensions | 8.8                         | 10.9 | 12.9 |  |  |
| M4                | 2                           | 3    | 4    |  |  |
| M5                | 4                           | 7    | 7    |  |  |
| M6                | 7                           | 11   | 13   |  |  |
| M8                | 18                          | 26   | 33   |  |  |
| M10               | 37                          | 55   | 61   |  |  |
| M12               | 65                          | 91   | 108  |  |  |
| M14               | 101                         | 145  | 173  |  |  |
| M16               | 156                         | 221  | 264  |  |  |
| M18               | 213                         | 303  | 361  |  |  |
| M20               | 304                         | 426  | 513  |  |  |
| M22               | 413                         | 559  | 695  |  |  |
| M24               | 524                         | 738  | 885  |  |  |
| M27               | 774                         | 1092 | 1308 |  |  |
| M30               | 1047                        | 1482 | 1770 |  |  |

Fig. 68

\*Strength classes for screws with untreated, nonlubricated surfaces. The quality designations are stamped on the screw heads.

8.8 = 8 G

10.9 = 10 K

12.9 = 12 K

The values result in a 90% utilization of the screw's yielding point at a coefficient of friction of  $\mu$  total = 0.14.

The compliance with the tightening torques is to be checked with torque wrenches.

The tightening torques are not applicable when using  $MoS_2$  lubricants.

#### 6.25 Engine conservation

If the engine is to be shut down for a longer period of time (e.g. during the winter) we recommend the following conservation measures for the engine to avoid corrosion:

- Clean the engine including the cooling system: with cold cleansing agent or, even better, with a steam cleaner.
- Run the engine warm and shut it down.
- Drain the still warm engine oil and fill in anticorrosion engine oil.
- Drain the fuel from the fuel tank, mix it well with 10% anti-corrosion oil and fill it in again. Instead of mixing anti-corrosion oil with the fuel it is also possible to fill the tank with injection pump testing oil with anti-corrosive properties (e.g. Calibration Fluid B).
- Run the engine for 10 minutes until all lines, filters, pump and nozzles are filled with the conserving mixture and the new engine oil is distributed to all parts.
- After running the engine remove the valve cover and spray the rocker chamber with a mixture of diesel fuel and 10% anti-corrosion oil.
   After this screw the cover back on.
- Crank the engine several times by hand (throttle lever in stop position) to spray the combustion chamber.
- Take the V-belt off and spray the grooves in the V-belt pulleys with anti-corrosion oil. Remove the anti-corrosion oil before taking the machine back into operation.
- Close the air intake opening on the air filter and the exhaust tube.

#### i Note

Depending on weather conditions these conserving measures will provide protection for approx. 6 - 12 months.

The conserving oil must be replaced by engine oil according to the API- (MIL) classification before taking the machine into service.

Anti-corrosion oils are those that comply with the MIL-L-21260 or TL 9150-037/2 resp. Nato Code C 640/642.

**⚠** Caution

62

it.com to order your partie Mark a machine with a conserved engine by attaching a clearly visible warning tag.

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#### 7.1 General notes

Please observe strictly the safety regulations in the corresponding section of these operating and maintenance instructions.

Malfunctions are frequently caused by incorrect operation of the machine or insufficient maintenance. Whenever a fault occurs you should therefore thoroughly read these instruction on correct operation and maintenance.

If you cannot locate the cause of a fault or rectify it yourself by following the trouble shooting chart, you should contact our customer service department.

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## 7.2 Changing the injection pump

#### ▲ Danger

Fire hazard!

When working on the fuel system do not use open fire, do not smoke, do not spill any fuel.

#### ▲ Danger

Health hazard!

Do not inhale any fuel fumes.



Ensure strict cleanliness to keep dirt out of the fuel lines. Dirt particles can destroy the injection system.

☆ Environment

Catch running out fuel, do not let it seep into the ground.

#### Disassembly

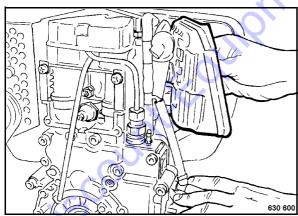


Fig 69

• Remove the air filter console (Fig. 69).

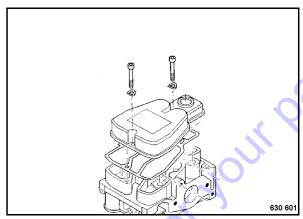


Fig. 70

Remove the valve cover (Fig. 70).

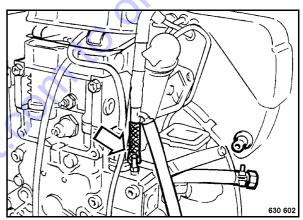


Fig. 71

- Pull the fuel hose off the leak oil socket on the pump (Fig. 71).
- Place a suitable container under the hose socket to catch running out fuel.

#### **Trouble shooting**

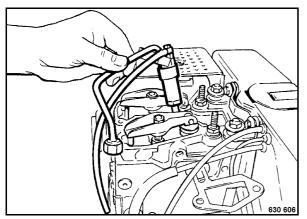


Fig. 72

Remove the injection nozzles (Fig. 72) completely with the nozzle base.

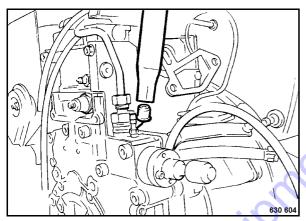


Fig. 73

• Disassemble the crankcase ventilation grommet (Fig. 73).

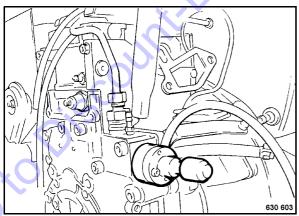


Fig. 74

Unscrew the oil shut-off valve (Fig. 74).

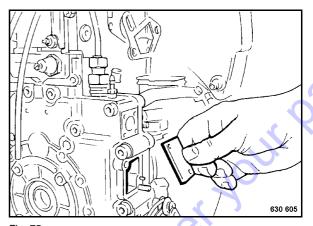


Fig. 75

Remove the cover plate (Fig. 75).

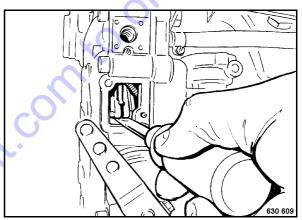


Fig. 76

 Unhook pump piston (Fig. 76) from the rokker arm to the injection pump.

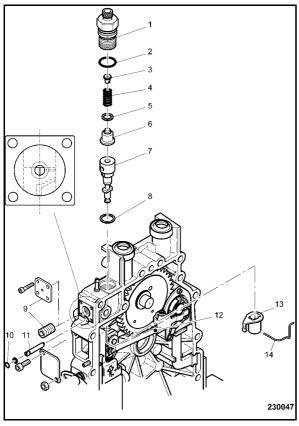


Fig. 77

- Unscrew the pressure valve holder (1) (Fig. 77) with O-ring (2).
- Remove filling piece (3), spring (4), seal ring (5) and pressure valve (6).

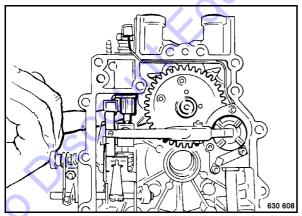


Fig. 78

- Press the pump element (Fig. 78) through the lateral opening up with your fingers and lift it out with a magnetic rod.
- Remove shim (8) (Fig. 77).

#### i Note

The control bushing (13) (Fig. 77) is located by the bracket (14) and does not need to be removed.

#### Inspection / repair

- Check the pump piston for light movement over the entire control range.
- Replace damaged or worn parts.

#### **Assembly**

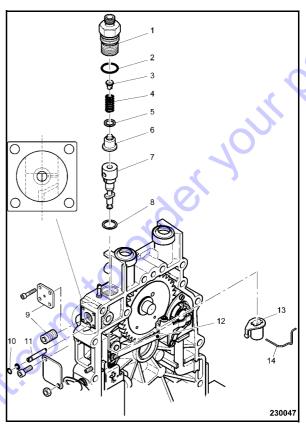


Fig. 79

• Assemble shim (8) (Fig. 79).

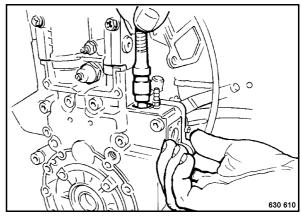


Fig. 80

 Insert the pump element (Fig. 80), observe correct positioning of the suction hole (tapered bore) (Fig. 79) and element flag (the number with 400 or 4 belongs to the side that should be opposite the suction hole).

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- When inserting the element group make sure that the plunger flag also is inserted through the control sleeve (is achieved by turning the regulating sleeve slightly to and fro) and that the eccentric peg (11) also engages in the groove of the element cylinder (Fig. 79).
- Hook the pump piston to the rocker arm to the injection pump.
- Assemble parts (6...1), tighten pressure valve holder (1) only slightly (approx. 10 Nm).
- Turn the throttle lever completely to the right and lock it.
- Lift the pump piston by approx. 2 mm.
- Now check the position of the starting slot to the suction bore (visible through the bore the plug is screwed into).
- The starting slot must be arranged centrally to the suction bore, or may be maximum one slot width offset to the left. If this is not the case lift flap (10) with a scriber and correct the position by turning the eccentric (11) accordingly.
- If this places the suction bore too far out of centre, the deflection lever (12) is damaged and needs to be replaced.
- Tighten the pressure valve holder with the folyo to Discounting lowing torque:  $30 - 0 - 30 - 0 - 35 \pm 2$  Nm (tight-

#### **Trouble shooting**

#### 7.3 Engine problems

| Fault   | Possible cause   | Remedy   |  |  |  |
|---|--|--|--|--|--|
| No or poor start-   | Fuel tank empty  | Fill in fuel   |  |  |  |
| ing of engine   | No fuel at the injection pump, supply not correct, fuel filter clogged (can be notice if no fuel runs out when the fuel supply line is pulled off) | Check the fuel supply Check the fuel supply line to the engine Check the fuel filter, replace if necessary |  |  |  |
|   | Injection nozzle out of order  | Have examined by a specialist  |  |  |  |
| Engine does not<br>start or starts<br>poorly (at low<br>temperatures) | Paraffin separation in the fuel  | Check the fuel, if necessary drain the fuel tank and fill in winter fuel                                   |  |  |  |
| Engine difficult to crank   | Oil with too high viscosity  | Drain off oil and fill in oil of correct viscosity   |  |  |  |
| Engine has no compression   | Incorrect valve clearance<br>Engine defective  | Have examined by a specialist  |  |  |  |
| Engine looses   | Fuel tank empty  | Fill in fuel   |  |  |  |
| power and speed   | Throttle lever does not stay in selected position  | Tighten the nuts   |  |  |  |
|   | Fuel filter clogged  | Change the fuel filter   |  |  |  |
|   | Tank ventilation blocked   | Check the tank ventilation   |  |  |  |
| Engine looses   | Air filter clogged   | Clean the air filter   |  |  |  |
| power and speed, black ex-  | Incorrect valve clearance  | Have examined by a specialist  |  |  |  |
| haust smoke   | Injection nozzle defective   | Have examined by a specialist  |  |  |  |
|   | Too much oil in crankcase  | Drain the oil down to the MAX-mark on the dipstick   |  |  |  |

| Fault |                              | Possible cause               |       | Remedy  |  |  |  |
|-------|------------------------------|------------------------------|-------|---|--|--|--|
|       | Engine over-                 | Lack of cooling air          |       | Clean cooling air inlet and cooling fins                  |  |  |  |
|       | heating                      |                              |       | Have examined by a specialist                             |  |  |  |
|       |                              |                              |       | Drain the oil down to the MAX-mark on the dipstick        |  |  |  |
|       | Engine stops                 | Fuel tank empty              |       | Fill in fuel  |  |  |  |
|       |                              | Fuel filter clogged          |       | Check the fuel filter, replace if necessary               |  |  |  |
|       |                              | Tank ventilation blocked     |       | Check the tank ventilation                                |  |  |  |
|       |                              | Air in the fuel system       |       | Check the fuel system for air<br>Check the bleeding valve |  |  |  |
|       | Engine runs with             | Centrifugal clutch defective |       | Change the centrifugal clutch                             |  |  |  |
|       | high speed, but no vibration | V-belt                       |       | Check tension, replace if necessary                       |  |  |  |
| COX   | Oisco                        |                              |       |   |  |  |  |
|       | BPR 25/40 D, BPR             | 25/50 D                      | BOMAG | 71  |  |  |  |

#### Final shut-down of machine 8.1

At. com to order your partie If the machine can no longer be used and needs to be finally shut down you must carry out the following work and have the machine disassembled by an officially recognized specialist workshop.

#### **Environment**

Catch all fuels and lubricants, do not let them seep into the ground and dispose of in compliance with legal regulations.

- Empty the fuel tank.
- Drain lubrication oil from engine and exciter housing.
- Drain off hydraulic oil.

#### ▲ Danger

Danger of explosion!

Parts that previously contained combustible fluids must not be cut with a cutting torch.

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