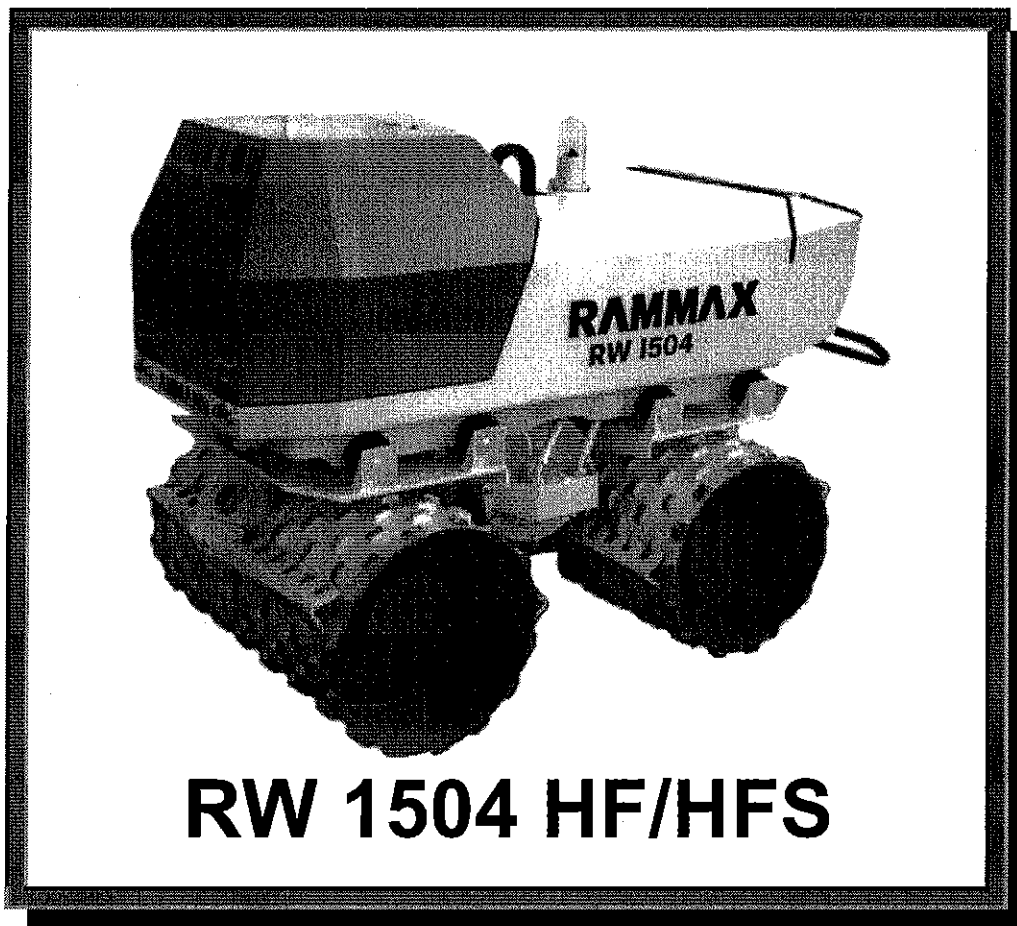


RAMMAX

company of the Ammann Group
Vibratory Trench Roller

Operating and Maintenance Instructions



RW 1504 HF/HFS

RAMMAX

Maschinenbau GmbH
Gutenbergstraße 33
72555 Metzingen
Phone: ++49 (0) 7123 / 9223-0
Fax: ++49 (0) 7123 / 9223-50
E-Mail: Service@Rammmax.de
West Germany

Valid as of: 12/01
Technical modifications reserved

Printed in Western Germany

Practically-oriented development and design and many years of experience in the construction of vibratory trench rollers are your guarantee of a machine complying with the highest standard of quality and reliability.

This operating and maintenance manual encompasses:

- Safety regulations
- A machine description
- Operating instructions
- Maintenance instructions
- Troubleshooting table

Use of this operating manual will

- simplify the process of familiarization with your machine.
- prevent malfunctions due to operating errors.

Correct observation of the operating instructions will

- increase reliability in on-site operation,
- enhance the service life of the machine,
- reduce repair costs and downtimes.

Rammax GmbH accepts no liability for machine function

- in the event of incorrect handling or operation not in compliance with the prescribed mode of operation and procedures,
- where the machine is used for purposes other than its designated use (see designated purpose, section 3.1) or for fields of application other than those listed (Section 2.1).

No warranty claims may be asserted in the case of

- Operating errors
- Insufficient maintenance and/or
- Use of incorrect fuels and operating materials

Remark :

- These instructions were written for the use of machine operators and maintenance staff on the building site.
- The operating and maintenance instructions must always be kept within easy reach of the machine
- Machine operation is only admissible after proper instruction and in observance of this manual.
- The safety regulations outlined on pages 10 - 15, Section 3.0 must be observed under all circumstances. The directives of the German Civil Engineering Professional Association "Safety Regulations for the operation of road rollers and compaction machinery" and the valid accident prevention regulations must be observed.

For your own safety, and in order not to impair the functional characteristics of the machine, exclusively Rammax spare parts must be used (Section 2.2 Modifications to the machine).

The catalogue of spare parts and the operating instructions are also available in all languages from your Rammax dealer on specification of the machine number.

The warranty and liability conditions contained in the General Terms and Conditions of Rammax are not extended or replaced by the information contained above or below.

Rammax GmbH Metzingen

On transfer of the machine, please complete:

.....
Machine model (Fig. 3)

.....
Serial number (Fig. 1)

.....
Engine type

.....
Engine number (Fig. 2)

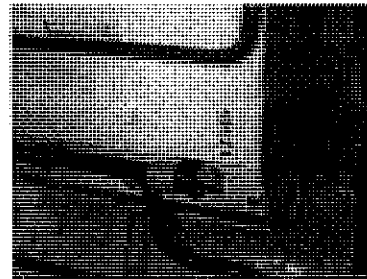
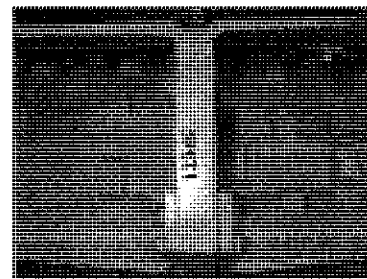


Fig. 1



Note :

On machine acceptance, you will receive instruction in the operation and maintenance of the machine by one of our staff or by an authorized dealer. It is vital that you pay particular attention to the instructions relating to safety aspects and hazards which can arise at the machine.

Fig. 2

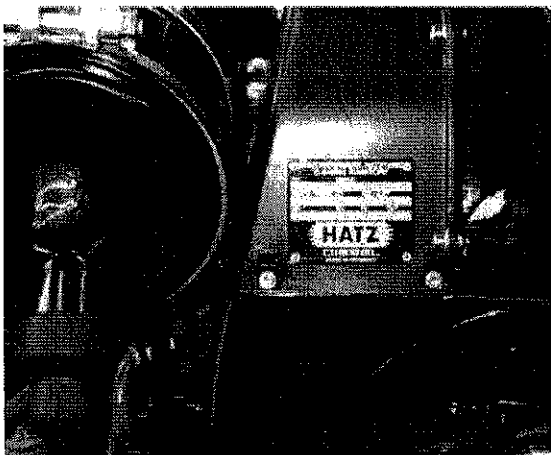


Fig. 3

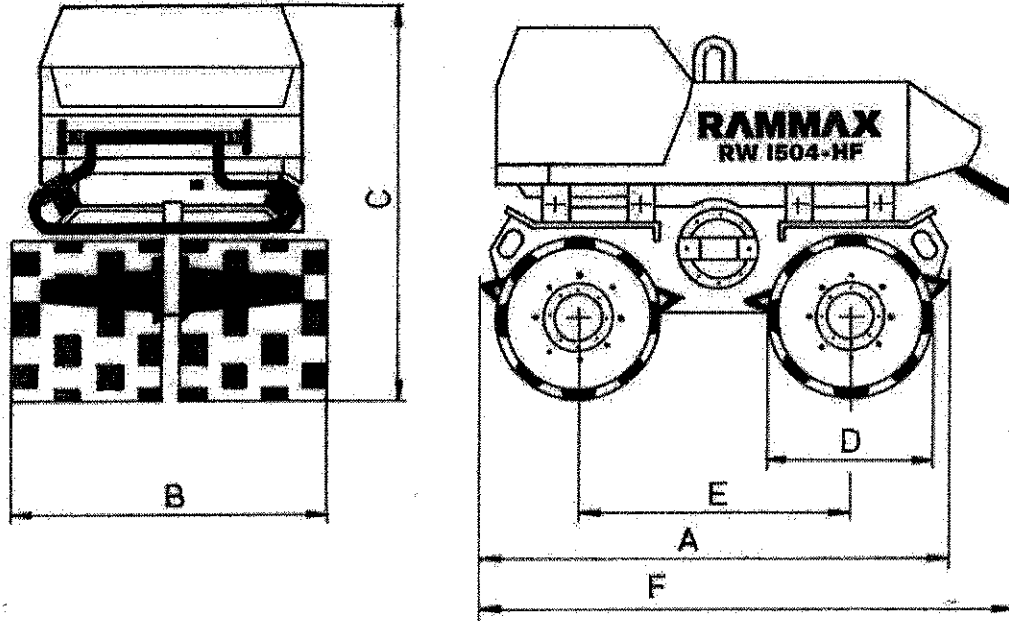


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Troubleshooting and localization at the infrared remote control RW 1504-HF

1.Specifications



1.1 Main dimensions

Dimensions :	A	B	C	D	E	F
cm :	146	85	120	50	85	177

Weights :	RW 1504 HF 85 cm wide	RW 1504 HF 63 cm wide
Intrinsic weight :	1413 kg	1341 kg
Operational weight :	1480 kg	1408 kg
Central axle load :	740 kg	704 kg

Driving characteristics :

Driving speed
Forward/reverse :

With vibration :	0 - 16 m/min	0 - 16 m/min
Without vibration :	0 - 16 m/min	0 - 16 m/min
Rapid traverse :	0 - 35 m/min	0 - 35 m/min

Maximum climbing ability :

With vibration :	45 %	45 %
Without vibration :	55 %	55 %

Specifications

Drive system :

Engine manufacturer :	Hatz	Hatz
Type :	2G40	2G40
Cooling :	air cooled	air cooled
No. of cylinders :	2	2
Output :	13,2 kW (18 hp)	13,2 kW (18 hp)
Speed :	2700 rpm	2700 rpm
Battery :	12V 72Ah	12V 72Ah
Drive mode :	hydrostatic	hydrostatic
Driven facings :	4	4

Brakes :

Service brake :	hydrostatic	hydrostatic
Parking brake :	hydromechanical	hydromechanical

Steering :

Steering mode :	lever steering	lever steering
Steering actuation :	hydrostatic	hydrostatic

Vibration system :

Vibrating facings :	4	4
Drive mode :	hydrostatic	hydrostatic
Frequency :	30	30
Amplitude :	2.2 mm	2.2 mm
Centrifugal force :	82 kN (8200 kp)	82 kN (8200 kp)

Filling quantities :

Fuel :	25 l	25 l
Hydraulic oil :	47 l	47 l
Gear oil :	1.1 l	1.1 l
(per drive system)		

Special equipment :

Facings :	Standard profile Cam height 15 mm	Standard profile Cam height 15 mm
	Round profile Cam height 18 mm	Round profile Cam height 18 mm

RW 1504 HF 85 cm wide

RW 1504 HF 63 cm wide

1.2 Noise and vibration specifications

The noise and vibration specifications listed below in accordance with the EC Machine Directive in the draft (93/68/EEC) were determined under operating conditions typical for the machinery in question with vibration over a specified travel surface (DIN 45635).

In operational application, deviating values may result depending on the prevailing operating conditions.

Noise specification

The noise emission specification stipulated in accordance with Annex 1, Section 1.7.4.f of the EC Machine Directive is as follows

- Sound pressure level at the operator position : $L_{pA} = 86.9 \text{ dB(A)}$

- Sound power level : $L_{WA} = 102.7 \text{ dB(A)}$

These noise emission values were determined in accordance with ISO 6081 for the sound pressure level (L_{pA}) and ISO 3744, DIN 45635, for the sound power level (L_{WA}).

Vibration specification

The vibration specifications stipulated in accordance with Annex 1, Section 2.2 / 3.6.3. a of the EC Machine Directive are as follows :

Hand-Arm vibration values

The weighted effective acceleration value, determined in accordance with ISO 8662 Part 1, DIN 45675, Part 9, is appr. 10.3 m/sec^2 .

Subject to modifications

Rammax RW 1504 HF

2.0 Description

Many years of experience in the development and design of vibratory trench rollers created the basis for the new development of the infrared-controlled model RW 1504-HF.

The enormous degree of operating convenience, which provides both for manual and infrared control, permits the user to make even more flexible use of the machine.

The hardwearing, compact design offers a high degree of security even in the most difficult terrain. Using the remote control facility, it is possible to control, start and switch off the machine up to 15 metres away from the operator.

Steering, vibration and travel drive in the RW 1504-HF are performed hydrostatically. The machine is enormously maintenance friendly (with the exception of the diesel engine). There are no V-belts, toothed belts, lubricating nipples or clutches with shift facility. This modern vibratory trench roller features easy access to the servicing points at the diesel engine, one-handed operation and sound absorption, 8 strippers and an hours-run counter.

2.1 Fields of application :

The vibratory trench roller RW 1504-HF is designed especially for trench compaction work. The complete lateral clearance of the facings guarantees compaction right up to the trench wall even in extremely tight and narrow trenches. The fields of application for this modern vibratory roller include wet, clay soil of the type encountered in canal building, pipe-laying, road substructure work and backfill work.

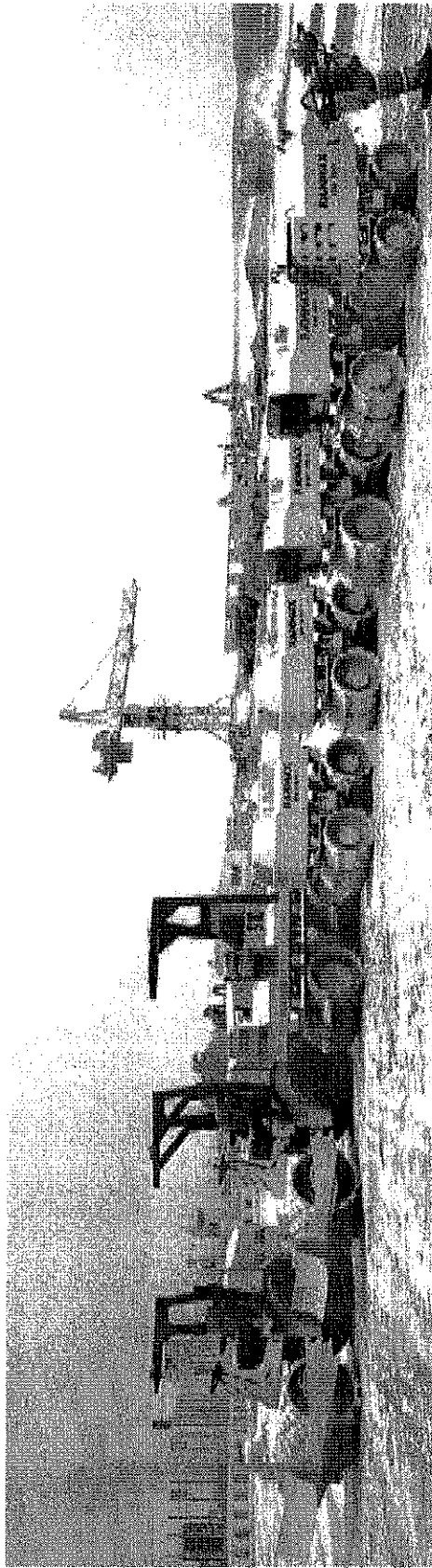
The infrared control facility also permits passage through trench sheeting and bracing, and underneath cross struts. In case of hazardous site missions, it is possible for the operator to control the machine from a safe distance and thus avoid exposure to personal danger.

2.2 Modifications to the machine :

For reasons of safety, users are prohibited from making their own modifications or conversions to the machine. This machine must only be equipped using original spare parts designed for use with the machine and in compliance with the requirements of the manufacturer. The installation or utilization of special equipment or special parts can impair driving safety.

The manufacturer is exonerated of any liability for damage caused as a result of the use of non-original parts or special equipment.

3.0 Safety Regulations



3.1 Use in accordance with the designated purpose:

Vibratory trench roller RW 1504-HF is constructed in accordance with the state of the art and with accepted rules of operating safety. However, its use can still give rise to hazardous situations which constitute a danger to life and limb for the operator or for third parties or which can lead to impairment of the machine or damage to other property if

- it is used for any other than its designated purpose
- it is modified or conversion work carried out by unqualified persons
- the safety remarks are not observed
- it is not operated or maintained by suitably qualified personnel.

The RW 1504-HF must only be operated when in a technically flawless condition and in accordance with its designated purpose with sufficient awareness of safety aspects and potential hazards and in strict observance of the operating instructions. In particular malfunctions which could detract from the safety of the equipment must be remedied without delay.

When operating the roller, adherence to the valid accident prevention regulations and the generally accepted rules of safety, as well as country-specific regulations is assumed.

The point "Fields of application" (Section 2.1) outlines the designated purpose for which the RW 1504-HF is exclusively intended. Any other or further reaching use is deemed to be not in accordance with the designated purpose. The manufacturer/supplier accepts no liability for any damage arising as a result of such incorrect use. All risk arising rests solely with the user.

3.2 Machine operation :

Only suitably qualified and designated persons who have received the appropriate training, and who are over 18 may drive and operate the machine. Fields of responsibility during operation must be clearly defined and adhered to.

All persons entrusted with operation, maintenance or repair of the machine must read and adhere to the safety regulations. Where appropriate, this must be confirmed by the user's company by means of a signature by the person or persons concerned.

Persons acting under the influence of drugs, medicines or alcohol may not operate, maintain or repair the machine.

3.3 Safety remarks in the operating and maintenance instructions:

**Danger**

This warning sign is an indication of possible danger of personal injury

Note :

This warning sign is an indication of possible impairment to the machine or parts of the equipment.

Remark :

These parts of the instructions provide technical information intended to ensure optimum economy and efficient use of the machine.

3.4 Safety signs applied to the machine :

Keep all safety plates and labels in good legible order and ensure their observance.

Damaged and illegible safety plates and labels must be renewed without delay.

Spares of all plates and labels are available, see the spare parts list.

3.5 Loading the machine for transport :

- Only use stable loading ramps with sufficient load-bearing capacity. The ramp incline must not be any steeper than the specified climbing ability (see Specifications) of the machine.
- Safeguard the machine against tilting or slipping.
- Safeguard the machine on transport vehicles against rolling, slipping and tipping over.

The following situations represent a danger to life and limb:

- Walking or standing under suspended loads.
- Remaining within the driving area of the machine while it is being guided into position and loaded.

3.6 Starting the machine :

3.6.1 Before starting

- The machine may only be operated from the operator's side (behind the machine)
- Familiarize yourself with the equipment, the operating and control elements and the functional characteristics of the machine.
- Use personal safety gear (safety helmet, safety shoes, ear protection etc.).

Before starting, check whether

- there are persons or impediments located next to or under the machine
 - the machine is free of oily and flammable materials
 - all handles, steps and platforms are free of grease, oil, fuels, dirt, snow and ice
 - the machine demonstrates any obvious defects
 - all protective gear is firmly in place
 - brakes, steering and operating elements are working
- Never start the machine if any instruments, pilot lamps or control organs are defective.
 - Do not tie any loose objects onto the machine.

3.6.2 Starting :

For starting, all operating levers must be in the "**Neutral position**"

After starting, check all display and operating elements.

3.6.3 Jump starting with jump leads:

Note :

The machine is equipped with a **12-Volt system!**

Connect the plus to the plus terminal and the minus to the minus terminal (earth cable). Connect the earth cable last and disconnect first! Incorrect connection will result in serious damage to the machine's electrical system.

3.6.4 Starting in closed rooms :

Exhaust fumes are lethal!

When starting in closed rooms, therefore, always ensure sufficient ventilation.

3.7 Driving the machine:

3.7.1 Persons in the hazard area

Each time before starting work, also after interruptions, check whether there are persons or obstacles positioned in the hazard area, particularly when reversing.

If required, give a warning signal. Stop work immediately if persons fail to leave the hazard area despite warning.

3.7.2 Driving :

- In emergency situations and in case of danger, stop the machine immediately. Only resume operation when the danger which caused the stop has been remedied.
- The machine may not be used to transport persons.
- In case of unusual noises and generation of smoke, ascertain the cause and have the problem remedied.

3.7.3 Negotiating uphill and downhill slopes :

- Do not drive up or down slopes steeper than the maximum climbing ability of the machine.
- On slopes, always drive directly upwards or downwards and proceed with caution. Before approaching, select a lower gear.
- Damp and loose substrates substantially reduce the machine's grip on sloping surfaces and inclines.
Increased risk of accidents!

3.7.4 Driving in traffic :

- Adjust your speed to the work conditions.
- Always give way to loaded transport vehicles.
- Keep your distance from edges and embankments.

3.7.5 Checking the effects of vibration :

During compaction work with vibration, check the effect on adjacent buildings and buried pipelines (gas, water, sewage, electrical). If necessary, compaction work may have to be discontinued.

Never use vibration on hard substrates (concrete or frozen earth), as this will damage the bearings!

3.7.6 Parking the machine :

Wherever possible, park the machine on a firm, even surface.

Before leaving the machine :

- Switch off the engine and pull out the ignition key

Parked machines which could represent an obstruction must be safeguarded by clearly identifiable measures.

3.7.7 Parking on slopes and inclines :

Safeguard the machine against rolling away. To do this use metal chocks in front of and behind the facings.

3.8 Refuelling :

- Never breathe in fuel fumes.
- Never refuel in enclosed areas.
- Do not spill fuel, mop up any splashes of fuel, do not allow to seep into the ground.
- Mixtures of diesel fuel and petrol (never Super petrol) should only be combined in the tank itself. First fill in the necessary quantity of petrol, then top up with diesel fuel. Petrol diesel fuel mixes are equally inflammable as petrol.
- Only refuel when the engine is switched off.
- No naked flames, no smoking.

3.9 Maintenance work :

- Maintenance work may only be performed by suitably qualified and trained personnel.
- Keep unauthorized persons away from the machine.
- Never carry out maintenance work on a driving machine or with the engine running.
- Park the machine on a firm, even surface.
- Take the key out of the ignition.

3.9.1 Work on the hydraulic lines :

Before performing any work on hydraulic systems, they must be depressurized. Hydraulic oil emerging under pressure can penetrate the skin and cause serious injury. In case of injury due to oil emerging at high pressure, immediately consult a doctor as serious infections can result.

When performing setting work at the hydraulic system, do not tread in front of or behind the facings.

Do not adjust the pressure relief valve.

Drain off the hydraulic oil at operating temperature – **danger of scalding!**

Collect up emerging hydraulic oil and dispose of in an environmentally responsible manner.

Never attempt to start the engine when the hydraulic oil has been drained.

After the completion of all work (with the system still depressurized!), check the seal of all connections and screw joints.

3.9.2 Exchanging hydraulic hose lines :

Hose lines must never be swapped or exchanged.

Subject hydraulic hose lines to regular visual inspections.

The immediate exchange of hydraulic hose lines is essential in the following cases :

- Damage of the outer ply through to the inlay (e.g. abrasion, cuts)
- Brittleness of the outer ply (crack formation in the hose material).
- Deformation in pressureless or pressurized condition which does not correspond with the original shape of the hydraulic hose line.
- Deformation on bending, e.g. crushing points, kinks, separation of plies, formation of blisters.
- Leaks.
- Incorrectly executed installation.
- Migration of the hydraulic hose from the fitting.
- Corrosion of the fitting which impairs functional characteristics and strength.
- Damage or deformation of the fitting which impairs functional characteristics, strength or the hose to hose connection

Only original RAMMAX spare hydraulic hose lines offer the security of using the correct hose type (pressure stage) in the right situation.

3.9.3 Work at the engine:

Drain off the engine oil at operating temperature – **Danger of scalding!**

Wipe away any spilt oil, collect emerging oil and dispose of in an environmentally responsible manner.

Keep used filters and other oil-soiled materials in a separate, specially marked container and dispose of in an environmentally responsible manner.

3.9.4 Work on the electrical system :

- Before performing work on the electrical system, disconnect the battery and cover with isolating material.
- Do not use fuses with a higher amperage or repair fuses. **Fire hazard!**

3.9.5 Work on the battery :

- When carrying out work at the battery, never smoke or expose to a naked flame.
- Do not allow acid to contact hands or clothing. In case of injury due to acid spillage, rinse with clear water and consult a doctor.
- Never place any tools on the battery.
- Dispose of old batteries in compliance with regulations.

3.9.6 Work at the fuel system :

No naked flames, no smoking, do not spill fuel.

Collect emerging fuel, do not allow to seep into the ground and dispose of in an environmentally friendly manner.

3.9.7 Cleaning work :

- Never carry out cleaning work with the engine running.
- Never use petrol or other easily flammable materials for cleaning.
- When cleaning using a steam jet cleaning device, cover all electrical parts and the insulating material or do not expose to direct water or steam jet.
- Do not hold the cleaning jet in the sound absorber.

3.9.8 After completing maintenance work :

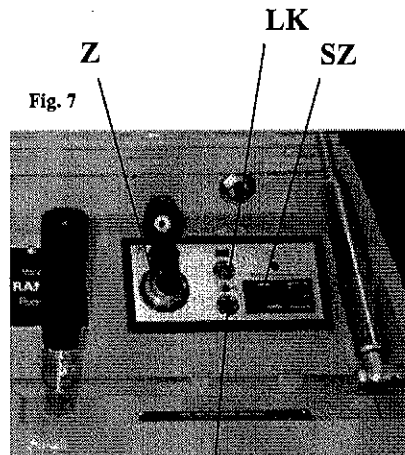
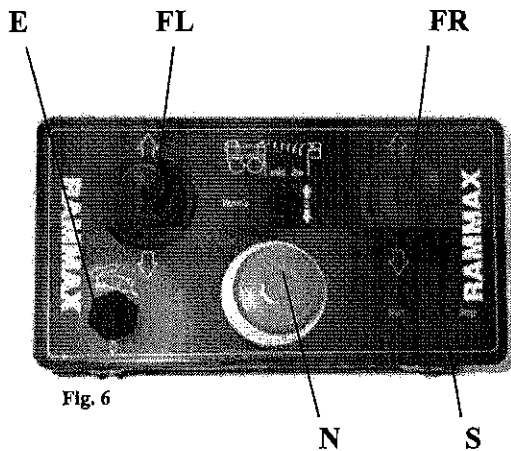
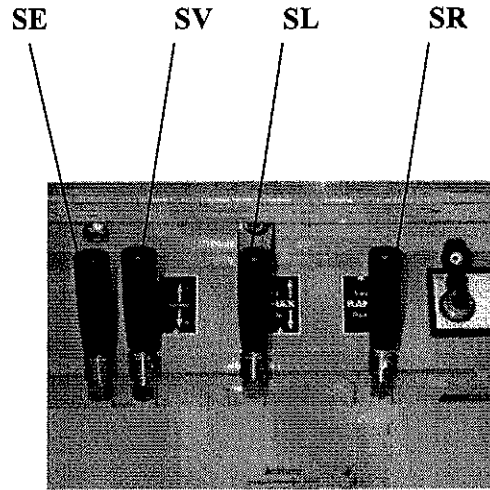
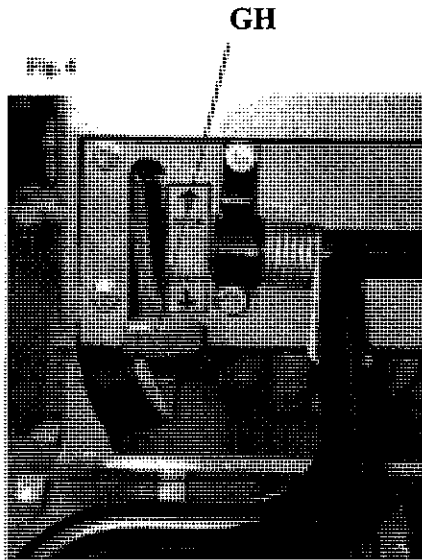
- All protective devices must be replaced after cleaning and maintenance work.
- Carry out performance checks.

3.10 Repairs :

If the machine is defective, hang a warning sign on the machine.

Repairs may only be performed by qualified and specially commissioned personnel.

4. Display and operating elements



- LK : Charge pilot lamp
- ÖK : Oil pilot lamp
- GH : Gas lever
- Z : Ignition switch
- SZ : Hours-run counter

Transmitter :

- FL : Travel, right
- FR : Travel, left
- S : Engine start/stop
- E : Rapid traverse
- N : Emergency stop switch

Machine :

- SR : Switching lever, travel drive, right
- SL : Switching lever, travel drive, left
- SV : Switching lever, vibration
- SE : Switching lever, rapid traverse

4.1 Description of display and operating elements :

LK : Charge pilot lamp

- Lights up: - When the ignition is switched on
- In case of charging faults in operation, ascertain cause
- Goes out: - After starting the engine.

ÖK : Oil pressure gauge lamp

- Lights up: - When the ignition is switched on
- On a drop of oil pressure in operation, **switch off engine immediately**
- Goes out : - After starting the engine.

GH : Speed adjustment lever

- Position " 0 " : - Switches off the engine
- Position " I " : - Starts the engine
- Operating position for drive and vibration

Z : Ignition switch

- Position " 0 " : - Inserting and removing the key.
- Position " I " : - Ignition on, charge pilot lamp "LK" and oil pressure gauge lamp "ÖK" light up.
- Position " II " : - Turn the ignition key further against spring pressure towards position II Engine starts up. After engine start, release key, pilot lamps go out.

Remark :

The ignition switch has a start repeat disable function. To restart the engine, first turn the key to the "0" position.
Continue to start without interruption for max. 15 to 20 seconds, with pauses of appr. one minute between. If the engine fails to start within this time, ascertain the cause of the fault and remedy.

Transmitter :

FR : Travel lever for facings, right

- | | | |
|--------------------|---|--------------------------------|
| Position " 0 " | = | Zero position for engine start |
| Position " Front " | = | Forwards travel ! |
| Position " Back " | = | Reverse travel ! |

Remark :

The position of the two travel levers FR and FL relative to each other determines the direction of travel: straight on, left-and curve, right-hand curve or turning around the vertical axis (rotating on the spot)

Display and operating elements

FL : Travel lever for facings, left

Position " 0 "	=	Zero position for engine start
Position " Front "	=	Forwards travel !
Position " Back "	=	Reverse travel !

S : Engine Start/Stop

- This tilting lever is used to start and stop the engine by remote control.
(Starting the engine is described in detail on page 21, section 5.3)

N : Emergency stop switch

- Emergency stop switch in danger situations !!!



Danger

In emergency situations, actuate the emergency stop switch !!!

SR : Switch lever for facings, right

Position " 0 "	=	Zero position for engine startup
Position " Front "	=	Forward travel !
Position " Back "	=	Reverse travel !

SL : Switch lever for facings, left

Position " 0 "	=	Zero position for engine startup
Position " Front "	=	Forward travel !
Position " Back "	=	Reverse travel !

SV : Switch lever for vibration

Position " 0 "	=	Zero position for engine startup
Position " Front "	=	Vibration in forward direction of travel
Position " Back "	=	Vibration in reverse direction of travel

Remark :

When working on even terrain, the switch position of the vibration lever is not important. However, if the machine has to negotiate an incline, the vibration switching lever "SV" must be switched to the direction of travel in order to increase the machine's climbing ability.

SE : Switching lever for rapid traverse

Position " 0 "	=	Zero position on engine startup
Position " Front "	=	Both travel levers " SR, SL " in rapid traverse mode.



Danger

The machine travels at double the speed in forward and reverse operation when in the rapid traverse mode !!!

SZ : Hours-run counter

The hours-run counter counts the operating hours with the engine running.
The indication of operating hours run provides a guideline for maintenance.

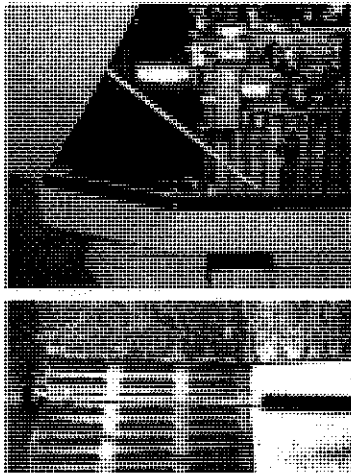
4.2 Back-up safety bar :

- Forward travel : no function !
- Reverse travel : When actuating the safety bar, the machine comes to an immediate standstill.
- Moving clear : Both travel levers " SR " and " SL " in the " front " position, the machine travels away from the obstacle !



Fig. 8


Fig. 9



4.3 Engine safety support:

Used for filling the fuel tank or when the engine hood is opened to carry out repairs. The hood is safeguarded against dropping by the gas pressure spring.

Danger :

 Engine hood falling down can lead to serious Injury! The gas compression spring must not be removed and must always be replaced in order to exclude the danger of injury.

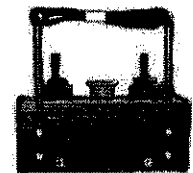
4.4 Address study

- Open cover D.
- Release plug " S-A" at the transmitter and receiver. (Fig. 10-11)
- Using a screwdriver, it is then possible to set up to four addresses.



Fig. 10

Fig. 11



A

Note :

- The addresses at the transmitter and receiver must be in agreement.
- Example.: 1 - 1/3 - 3 etc.

5.0 Operation with remote control

5.1 Pre-commissioning checks :

Before putting the machine into service every day or before a long work period, the following checks must be performed.



Danger :

Observe the safety remarks in section 3.0 of this operating and maintenance manual.

- Place the machine on an even, load-bearing surface.

- Check :**
- All screw joints
 - Function of the travel lever
 - Function of the safety bar
 - The machine for any damage
 - The emergency stop switch of the transmitter

Remark :

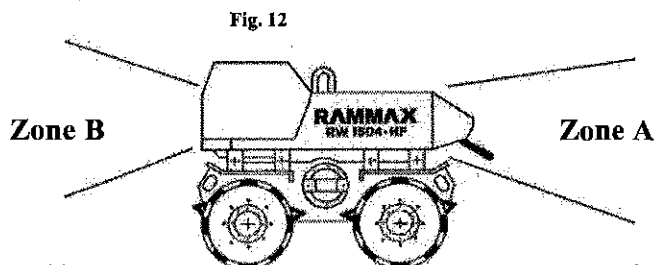
The following checks are described in the section "10.0 Maintenance"!

- Engine oil level
- Hydraulic oil level
- Fuel supply

5.2 Operation :

When operating the machine with remote control, the correct position is behind the roller. Zone "A".

If the operator is standing on the other side - Zone "B" -, the actuating directions of the control elements do not correspond to those of the roller.



When operating the machine with remote control, the minimum distance from the machine must be 2 metres, as under some operating conditions reflections occur which can cause errors in the close range stop function.

Note :

- Desist from any method of operation which could pose a safety hazard or impair the static stability of the machine.
- Never travel on sloping surfaces transversely, but always directly upwards or downwards.
- Every time before starting up, always clean the transmitter and receiver elements.
- For safety reasons, never deposit the transmitter near the machine. During breaks in work, the emergency stop switch must always be activated (Position " 0 ").

Should the transmitter be defective for any reason, switch off the machine immediately using the gas lever " GH ".



Danger : Before driving, check whether persons are located in the driving area.

Damp and loose substrates substantially reduce the machine's grip on sloping surface and inclines.

When driving up slopes and inclines, the speed must be adjusted in line with the terrain.

Remark :

The transmitter is fitted with solar cells :

- Steps must be taken to guarantee that the solar cells are not covered during and after operation, in order to guarantee automatic charging.
- The solar cells must also be cleared of dirt, as automatic charging cannot be guaranteed.

5.3 Starting the engine :

When starting the engine, the starting conditions of the engine manufacturer must be observed.

1. Fill with fuel (see Maintenance section 10.6)
2. Move the gas lever to the " Start " position (page 18, Fig. 4).
3. All switching levers must be in the neutral position. (page 18, Fig. 5)
4. Slip on the transmitter, set the emergency stop switch " N " to the " I " position (page 18, Fig. 6).
5. Press the Start/Stop switch " S " (page 18, Fig. 6) to the left and hold until the engine runs.

Fig. 4

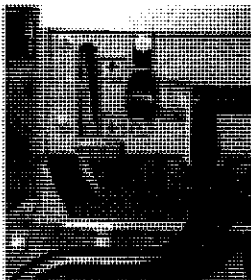


Fig. 5

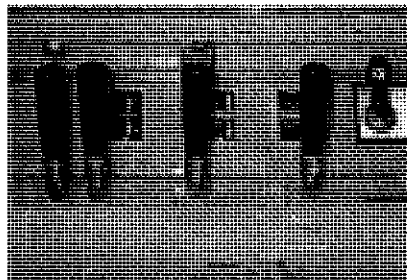
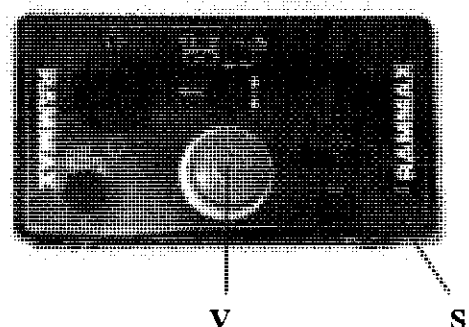


Fig. 6



Remark :

- Do not actuate the start switch for longer than 15 secs. If the engine fails to start repeat the process.
- For starting with jump leads, see section 7.0, page 29.

Note :

- The minimum distance between the transmitter (operator) and the receiver (machine) is 2 metres. If the the minimum distance is not adhered to, the safety close-range function is activated, i.e. the machine cannot be started.
- If the minimum distance is not adhered to during operation, the engine continues to run but the machine comes to a standstill. In both cases, increase the distance and repeat the process.
- If several machines are in use at the same location, the addresses must be coordinated.



Danger :

Switching errors or malfunctions can be caused as a result of identical frequencies!!!

5.4 Switching on and reversing the direction of travel

- Travel lever " FL " and " FR " in "front" position : Machine travels forwards.
- Travel lever " FL " and " FR " in "back" position : Machine travels back.
- When the travel levers are moved in opposite directions, the machine travels around its vertical axis (on the spot).
- The machine comes to a stop when the travel levers are not actuated.

5.5 Driving in rapid traverse

- Rapid traverse movement is only possible if the switching lever " E " is pushed forwards (Fig. 6, page 18)
- Operate both travel levers " FL " and " FR " as for normal operation.

Note

The roller travels at twice the speed in the rapid traverse mode.

5.6 Driving with vibration

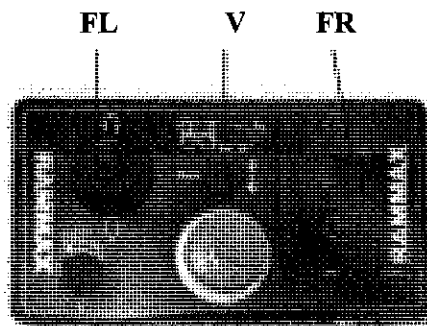
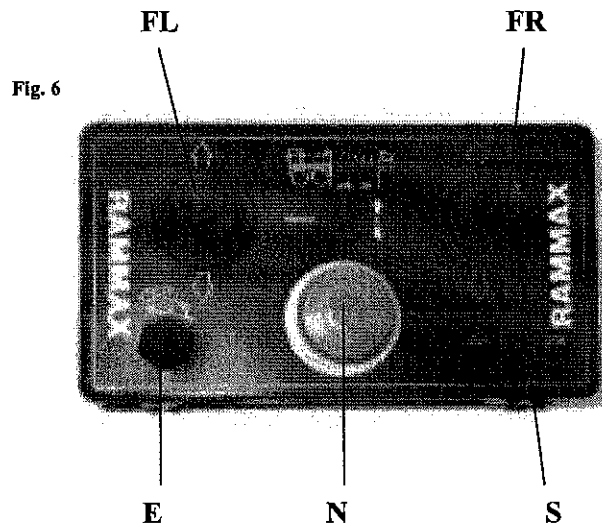


Fig. 6

- The vibration switches on when the switching lever " V " is pressed forwards or back (Fig. 6, page 18).
- If the switching lever is pushed forwards, the vibration runs "forwards", if the lever is pushed back, it runs "in reverse".
- In even terrain, the switch position is of no consequence.
- However, if the machine has to negotiate an incline, the vibration be switched to the direction of travel in order to increase the machine's climbing ability.

5.7 Switching off the machine

1. Move the switches "FL", "FR", "V" and "E" to their central position / switch off (page 18, Fig. 6).
2. Press the Start/Stop switch "S" to the right and hold there until the engine comes to a complete standstill.
3. Actuate the emergency stop switch "N" by pressing down. (Fig. 6, page 18)



Note :

After switching off the machine, the ignition key must be removed.

6.0 Manual control

Note :

All safety conditions from Section 5.0 Operation with remote control must be observed when working with manual control.

6.1 Start procedure :

When starting the engine, the starting conditions of the engine manufacturer must be observed.

1. Fill the tank with fuel (see Maintenance, section 10.06)
2. Move the gas lever to position "I" (Fig. 4, page 18).
3. All switching levers must be in the neutral position (page 18, Fig. 5).
4. Turn the ignition switch to the position "I" (page 18, Fig. 7).

The oil pilot lamp "ÖK" and the charge pilot lamp "LK" light up

Bild 4



Fig. 5

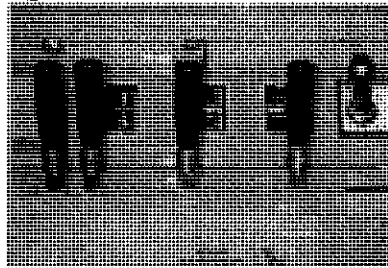
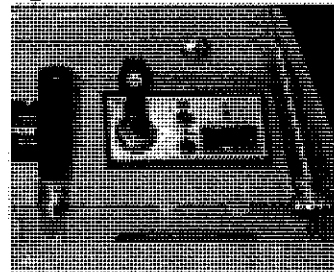


Fig. 7

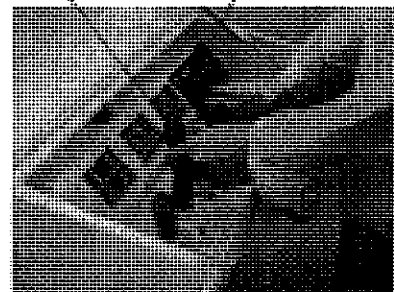


SL

SR

6.2 Travel operation :

Push both travel levers "SL" and "SR" to the front. The machine begins to travel forwards (page 18, Fig. 5).
For reverse travel, pull both travel levers backwards. To steer to the side, the travel levers are switched in opposition (turning on the spot).



6.3 Rapid traverse:

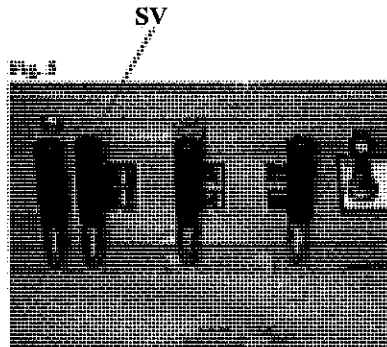
Push the switch lever "SE" forwards. The functional mode is the same as for the work mode.

Note :

The machine travels twice as fast in rapid traverse as in the working mode !

6.4 Vibration :

When travelling with vibration, in addition to travel levers " SL " and " SR ", the switching lever " SV " is actuated (page 18, Fig. 5).
In the central position, vibration is switched off, in position " V " forwards or " R " reverse.

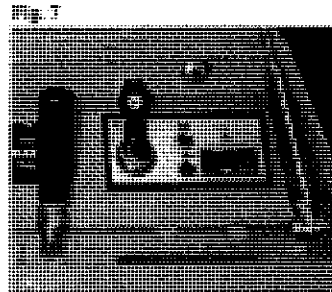
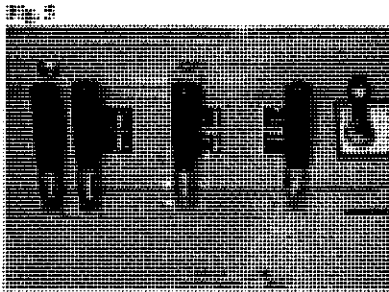


Remark :

When working on even terrain, the switch position of the vibration lever " V " or " R " is not important. However, if the machine has to negotiate an incline, the vibration switching lever must be switched to the direction of travel in order to increase the machine's climbing ability.

6.5 Switching off the machine

1. Move switches " FL ", " FR ", " SV " and " SE " to their central position or off position (page 18, Fig. 5).
2. Gas lever " GH " to the " 0 " position.
3. Ignition start switch in position " 0 "(page 18, Fig. 7).



Note :

After switching off the machine, the ignition key must be pulled out.

7.0 Jump starting device (FSE):

Note : 12 V System !!!

1. Apply the clip to » + « -pole of the battery and connect to »+« pole of the FSE at the machine. (Fig. 14)
2. Apply the clip to the »-« pole of the battery and connect to the »-« pole of the FSE.
3. Start the machine (page 26, section 6.1) Start procedure
4. Disconnect the battery in reverse order.

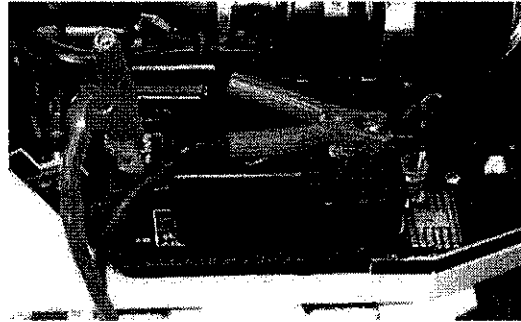


Fig. 14

Remark :

In order to avoid danger when connecting and disconnecting the battery, connect the "+" pole first and disconnect it last.
The »-« pole should never be connected alone.

8.0 Loading and transport:

- To load the roller using hoisting gear, there is a hinging transport eye bolt "B" positioned on the roof (Fig. 13).
- The roller can also be loaded by being driven up a suitable loading ramp.

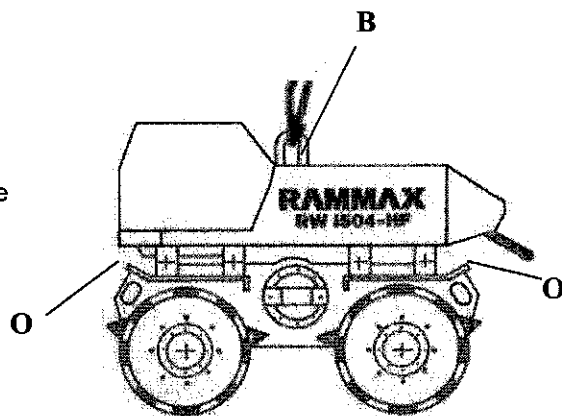


Fig. 13

Note :

- Only loading ramps with sufficient loading capacity and static stability must be used which exclude any possibility of personal injury.
- To lash the roller, always use shackles which are fastened to the transportation eye bolts "Ö" (at the front and back of the central web).
- The roller must be lashed in such a way that it is secured against tipping over, slipping or rolling away.
- Do not tread or stand under suspended loads.

10.0 Maintenance

10.01 General remarks on maintenance and maintenance work:

Steps must be taken to ensure that all safety regulations are adhered to in the execution of maintenance work!

Careful machine maintenance guarantees far greater functional reliability and increases the life of all important components. The necessary input is minimal in relation to the faults and problems which can occur as a result of failure to perform maintenance work.

- The engine and machine must be thoroughly cleaned before performing any maintenance work.
- Maintenance work may only be performed when the engine is at a standstill.
- When working with the hydraulic system, this must first be depressurized.
- Before working on the electrical system, detach the battery, cover it and protect with insulating material.
- Check the electrical equipment of the machine at regular intervals. Defects such as loose connections or melted cables must be remedied immediately and replaced by new ones.
- Only carry out maintenance and repair work when the machine is positioned on an even surface capable of bearing loads and safeguarded against rolling away.
- Adhere to the prescribed maintenance and inspection procedures in the operating instructions, including instructions in the exchange of parts. This work may only be performed by **specialized personnel**.
- Oil and fuels must not be permitted to seep into the ground or sewage system during maintenance work. These must be collected using suitable means and disposed of in an environmentally responsible manner.

Remarks on the hydraulic system:

Avoid dirt or other contaminants entering the hydraulic system. Even the smallest dirt particles in the hydraulic pipework can lead to tremendous impairment to hydraulic units and so to costly repairs.

- Should it be discovered during the daily check of the hydraulic oil level that the oil level is sinking, the complete hydraulic pipework must be checked immediately for leaks.
- Leaks must be repaired immediately. If necessary, inform the responsible after-sales service.
- If possible fill the hydraulic system with filling aggregate.
- Clean screw joints, the filling cap and its surroundings before removal to prevent the ingress of dirt particles.
- Do not leave the tank cap open unnecessarily to prevent foreign bodies entering the system.

10.02 Running in regulations :

Maintenance after 25 hours of operation:

- Check all screw connections and tighten if necessary.
- Check hydraulic hoses and the complete hydraulic oil system for leaks.
- Exchange the fuel filter. (Fig. 18, Section 10.7))
- Engine : See maintenance instructions Hatz 2G40 !



10.3 Maintenance plan

No.	Description	Remarks	Page
Every day			
10.04	- Check engine oil level	- Note gauge marking	32
10.05	- Check the hydraulic oil level		32
10.05	- Check hydraulic filter insert		32
10.06	- Check fuel supply - Diesel engine, see Hatz 2G40 Manual	(Annex)	33
After 25 hours of operation			
10.07	- Check all screws for firm fit - Exchange fuel filter - Diesel engine, see Hatz 2G40 Manual	see 11.0 tightening torque (Annex)	38 32
10.12.2	- Exchange high pressure filter insert	(1 st service)	37
Every 100 hours of operation			
10.10	- Clean air filter cartridge, change	(earlier if necessary)	35
10.08	- Service the battery		34
Every 250 hours of operation			
10.09	- Check oil level in travel drive systems - Check screws for firm fit		35
10.07	- Drain off water from the diesel line filter or change - Check all diesel lines for leaks		33
Every 500 hours of operation			
10.09	- For diesel engine, see Hatz 2G40 Manual - Exchange gear oil in travel drive systems	(Annex) (at least every 6 months)	34
10.12.2	- Exchange high-pressure filter insert	(2 nd service)	35
Every 1000 hours of operation			
10.12	- Exchange the hydraulic oil	(at least 1 x a year)	36 / 37
10.12.2	- Exchange the high pressure filter insert		37
10.07	- Exchange the fuel filter	(After 3 rd service, at least 1x a year)	33
10.13	- Exchange the extraction filter		37
As required			
10.14	- Readjust the strippers - Check screws for firm fit - Engine conservation	See 11.0 tightening torque values See Hatz Manual 2G40 (Annex)	38

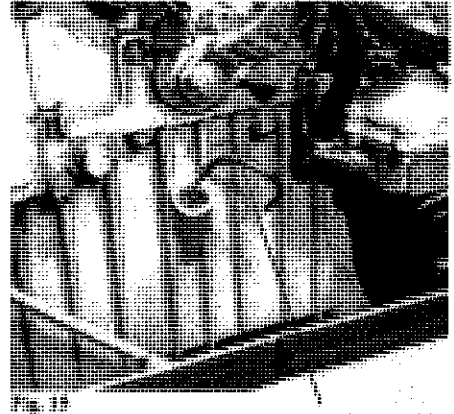
10.04 Check the oil level in the engine

Remark :

Set the machine on an even, load-bearing surface in such a way that it is horizontal.

- Pull out the oil dip stick "MS" and wipe off with a lint-free cloth (Fig. 15).
- Insert the oil dip stick as far as it will go and pull out again.
- The oil level must be between the two markings.
- If the oil level lies below the bottom marking, top up with oil immediately.

For suitable oil types, see the Hatz 2G40 Manual



MS

10.05 Checking the hydraulic oil level

Remark :

Set the machine on an even, load-bearing surface in such a way that it is horizontal.

- Check the hydraulic oil level at the oil viewing window under the engine hood.
- Only check the oil level when the engine is cold. The hydraulic oil should come up to the centre of the viewing window.
- If necessary, top up with hydraulic oil.

Recommended oil types : Mobil HPL 46, Texaco Rando HD-C.
Corresponding oil types from other manufacturers can be used.

Remark :

If it is discovered during the daily oil level check that there is hydraulic oil missing, check all units, pipelines and houses immediately for leaks

10.06 Checking the fuel supply:

 **Danger :**
Danger of fire !

When working with the fuel system, no naked flames,
 no smoking.

Do not refuel in enclosed areas.
 Do not breathe fuel fumes.

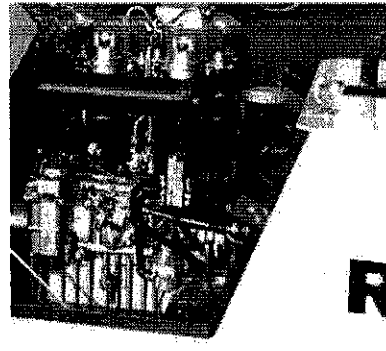


Fig. 17

Note :

Contaminated fuel can lead to the failure of or damage to the engine. If necessary,
 top up fuel through a sieve filter (Fig. 17).

Clean the area surrounding the filling hole and refuel.

Fuel: see Hatz 2G40 Manual! (Annex)

10.07 Exchanging the fuel filter

Note :

When working with the fuel system, no naked flames,
 no smoking.

- The diesel line filter "DF" must be drained of water at least once a year or every 200 hours (Fig. 18).

- To drain off the filter, the handwheel must be opened, until surplus water runs away and pure diesel fuel emerges. After draining, close the hand wheel and check the filter for leaks

- **Exchanging the fuel filter :**

- Release both fillister-head screws at the filter holder and remove the fuel filter "DF". (Fig. 18).
- Detach the fuel hoses and insert new fuel filter "DF". Exchange fuel hoses which are porous or leaking.
- Mount the fuel filter " DF " in reverse order and check for leaks.
- **The fuel system is self-venting.**



Fig. 18

DF

Note :

Collect any emerging fuel and dispose of in an environmentally responsible manner using a fuel filter!

10.08 Battery:

Danger



When working with the battery, no naked flame, no smoking !
Do not allow acid to come into contact with clothes or skin !
Wear protective goggles !
Do not lay any tools on the battery !!

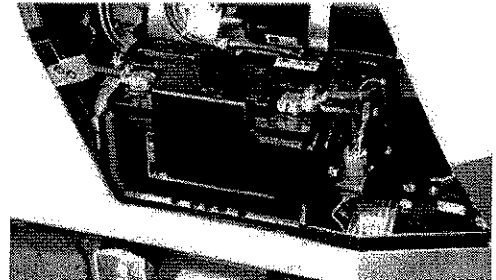


Fig. 19

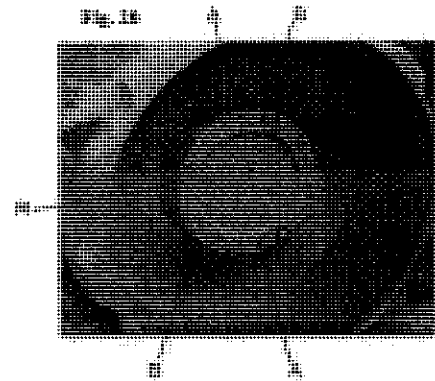
The battery is located under the hood (fig. 19). It is very important to keep clean the battery and to carry out maintenance correctly in order to have a perfect function of this battery. If the machine is out of action for a longer period of time the battery has to be pinched off in order to prevent a deep discharge. Especially the terminals and clamps must be cleaned regularly and afterwards be greased thickly with an acidproof grease.

Note :

Dispose of old batteries correctly.

10.09 Changing the gear oil :

- Unscrew magnetic plug " M " and clean. (Fig. 20)
- Release the fastening screws " B " at the gear cover
- With the aid of press-off screws " A " (M8x25 DIN 933-8.8) pull off the gear cover.



Note :

Collect the gear oil in a suitable container and dispose of in an environmentally responsible manner

- Wash out the drive system and remount the gear cover (the seal on the gear cover must not be damaged.)
- Top up gear oil through the magnetic plug opening (1.1 litres) and screw the cleaned magnetic plug back in.
- Check the drive system for leaks.

10.10 Cleaning/checking/exchanging/ the air filter

Exchange the air filter cartridge:

- Release the sealing cap " D " from the air filter housing and remove air filter cartridge " P ".
- After inserting the cleaned or new filter cartridge, mount the sealing cover " D ". (Fig. 15)

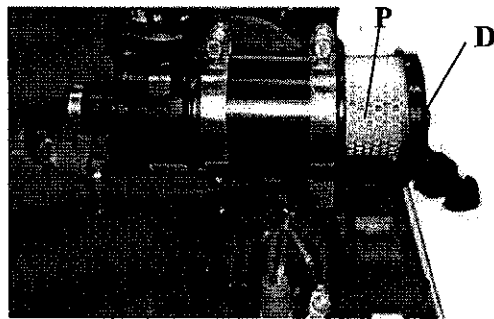


Fig. 15

Note :

Never use petrol or hot fluid to clean the filter cartridge !!!

After cleaning, the filter cartridge must be examined using a lamp for damage.

Filter cartridges which are damaged at the seal or at the cartridge itself must be exchanged without fail.

The filter cartridge of the air filter must be exchanged after being cleaned three times or after a year at the latest.

If the filter cartridge is contaminated with sooty deposits, cleaning is not possible. Use a new cartridge.

Each completed cleaning process of the filter cartridge must be documented on the lid of the cartridge.

Insufficient cleaning and handling of the filter cartridge can lead to serious damage to the engine!!!

Dry cleaning :



Danger
Danger to the eyes!

Wear protective clothing (protective goggles, gloves)

- Blow through the filter cartridge using dry compressed air (max. 5 bar) from the inside to the outside.

Wet cleaning :

Clean the filter cartridge by waving backwards and forwards in lukewarm water using a standard commercially available mild detergent. Then rinse well in cold water, spin and leave to dry well.

10.11 Exchanging the engine oil:

Remark :

Only drain off the engine oil when the engine is warm.

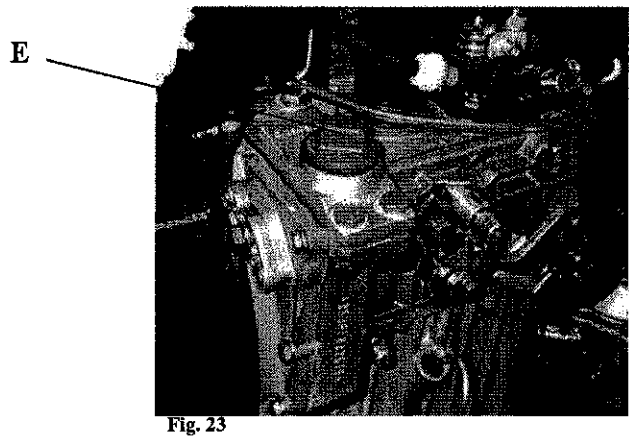
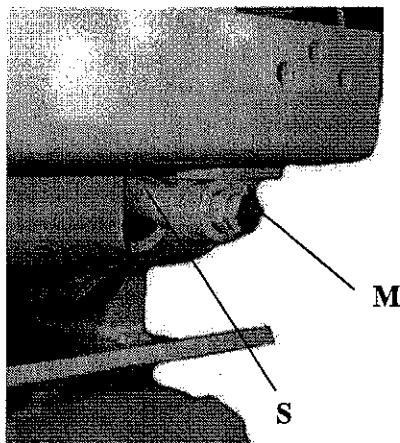
For exchange intervals for engine oil, see the Hatz 2G40 Manual (Annex)



Danger

Danger of scalding !

When draining off hot engine oil, beware of scalding!



Detach the oil drainage hose "S" and dismantle the plug "M". Catch the oil in a suitable container and dispose of in an environmentally responsible manner (Fig. 22).

Exchange the oil filter (see Fig. 18 Section 10.7)

Fill with oil ! (Fig. 23)

Mount the oil drainage hose and top up with new oil in the filling hole "E" (Fig. 23).

10.12 Exchanging the hydraulic oil:



Danger

Danger of scalding !

When draining off hot hydraulic oil, beware of scalding!



10.12.1 Hydraulic system

All maintenance work at the hydraulic system is limited in the main to the filter and hydraulic oil tank. All other units require no maintenance. The hydraulic line network should, however, be checked at regular intervals for leaks. Do not spray hydraulic lines with paint.

10.12.2 Hydraulic oil change

Clean the area surrounding the pressure line filter. ➔ Remove the pressure line filter (Fig. 25) and clean.
 ➔ For complete tank drainage, lift the roller at the front transport eye bolt " O " (page 28, Fig. 13) using a crane.
 ➔ When the oil tank has been completely drained, screw the oil plug " S " back in with a new seal.
 ➔ Fill the tank with oil. ➔ Start the engine and leave to run until the hydraulic oil has distributed around the line system. ➔ Switch off the engine. ➔ Top up the tank again if necessary. ➔ Fill the oil level up to the centre of the viewing window. ➔ Tank capacity appr. 70 l

Recommended oil types : Mobil HLP 46, Texaco Rando HD-C.
 Corresponding oil types from other manufacturers can also be used.

Note :

With the hydraulic oil drained off, never start the engine. Never allow the pumps to run without oil!

10.13 High pressure line filter

Clean the area surrounding the high-pressure line filter. ➔ Remove the filter cartridge from the high-pressure line filter (Fig. 25) and exchange.

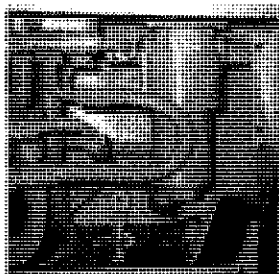


Fig. 25

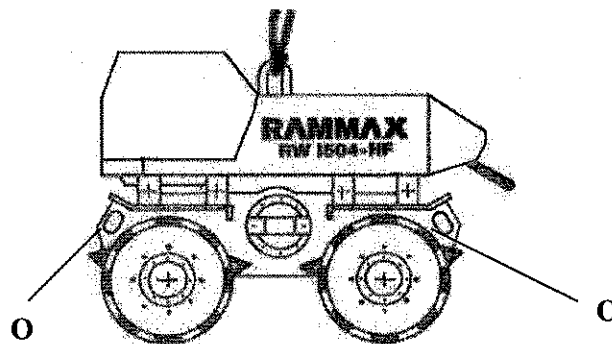


Fig. 13

Remark :

Work at hydraulic systems may only ever be performed by specially qualified staff with the relevant knowledge and experience in hydraulics. Drain off oil into a suitable container and dispose of the filter cartridge in an environmentally responsible manner.

Recommendation : Where major repairs must be carried out at the hydraulic pipeline network, the hydraulic oil should also be exchanged.

10.14 Exchanging the extraction filter :

The extraction filter " S " must be exchanged after every hydraulic oil change and every 1000 operating hours.

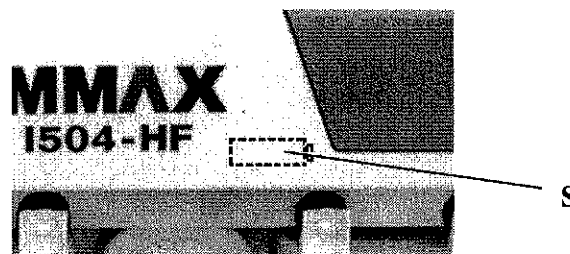


Fig. 26

10.15 Adjusting the strippers

- Release all three screws " S " and push the stripper towards the facing.
- The distance between the stripper and the facing must be at least 2 mm
- Tighten the screws " S " again. (Fig. 27)

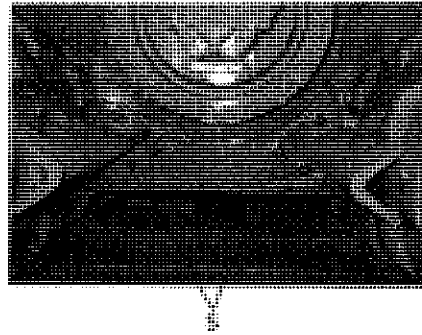


Fig. 27

Remark :

In case of stripper wear (two strippers each per facing) these must be readjusted or replaced.

11.0 Tightening torque levels for screws with standard metric thread

Screw dimension	Tightening torque Nm		
	8.8	10.9	12.9
M4	3	5	5
M5	6	9	10
M6	10	15	18
M8	25	35	45
M10	50	75	83
M12	88	123	147
M14	137	196	235
M16	211	300	358
M18	290	412	490
M20	412	578	696
M22	560	785	942
M24	711	1000	1200
M27	1050	1480	1774
M30	1420	2010	2400

Screw dimension	Tightening torque ft-lb		
	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	798	885
M27	774	1092	1308
M30	1047	1482	1770

Strength classes for screws with untreated, unlubricated surface. The screw quality designation is indicated on the screw heads.

8.8 = 8G ; 10.9 = 10K ; 12.9 = 12K

The values result in 90% utilization of the screw yield strength, with a coefficient of abrasion of $\mu_{total} = 0.14$.

Adherence to the tightening torque levels is checked using a torque wrench. When using lubricant MoSo2, the specified tightening torque levels do not apply.

Remark :

Self-locking nuts must be renewed after dismantling !

12.0 Troubleshooting table

Fault :	Possible cause :	Remedy :
Engine running, machine does not move!	Insufficient hydraulic oil in the tank.	Check hydraulic oil level - Check the hydraulic system for leaks
Engine running, machine can only be driven forwards !	Safety bar in engaged position	- Pull safety bar out of engaged position. - Only engage safety bar during transport, not in the work mode