Translation of the ORIGINAL INSTRUCTION BOOK

HATZ DIESEL

2-4 L41 C
2-4 M41.
4 L42 C
4 M42

0000 433 402 09 - ENG - 11.11 - 2
Printed in Germany
A new HATZ Diesel engine - working for you

This engine is intended only for the purpose determined and tested by the manufacturer of the equipment in which it is installed. Using it in any other manner contravenes the intended purpose. For danger and damage due to this, Motorenfabrik HATZ assumes no liability. The risk is with the user only.

Use of this engine in the intended manner presupposes compliance with the maintenance and repair instructions laid down for it. Noncompliance leads to engine breakdown.

Please do not fail to read this operating manual before starting the engine. This will help you to avoid accidents, ensure that you operate the engine correctly and assist you in complying with the maintenance intervals in order to ensure long-lasting, reliable performance.

Please pass this Instruction Manual on to the next user or to the following engine owner.

Always have service work performed by qualified specialists. To this effect, we recommend that you consult one of the 500 HATZ service stations. There, your engine is repaired by staff who constantly undergo training and who use both original HATZ spare parts and HATZ tools. The world-wide HATZ service network is also available to you for consultation and spare parts supply.

For the address of your nearest HATZ service station, please refer to the attached list or the internet under: www.hatz-diesel.com

The installation of inappropriate spare parts may cause problems. We cannot accept any liability for damage or consequential damage resulting therefrom.

Thus, we recommend that you use original HATZ spare parts. These parts are manufactured following the strict HATZ specifications and ensure, thanks to their perfect fit and function, maximum operating reliability. For the reference number, please consult the attached spare part list or the internet under: www.hatz-diesel.com. Please take the complete spare parts kits in Table M00 into account.

We reserve the right to make modifications in the course of technical progress.

MOTORENFABRIK HATZ GMBH & CO KG
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This symbol draws attention to important safety precautions. Please comply with them most carefully in order to avoid any risk of injury to persons or damage to materials. General legal requirements or safety regulations issued by the competent authorities or industrial accident insurers are also applicable.
1. Important notes on safe operation of the engine

HATZ diesel engines are economical, strongly built and long-lasting. They are therefore frequently chosen for commercially and industrially operated equipment and machinery.

If the engine forms part of the finished equipment or machine, its manufacturer will take all the applicable safety regulations into account.

Nevertheless, we would like you to note certain additional comments on operating safety which follow. Depending on the manner in which the engine is installed and its intended application, the equipment manufacturer or operator may have to attach additional safety devices and prohibit potentially hazardous aspects of operation, for example:

- Exhaust system components as well as the surface of the engine will naturally be hot and must not be touched while the engine is running or until it has cooled down after being stopped.

- Faulty wiring or incorrect operation of electrical equipment may lead to sparks forming, and must be avoided as a potential fire hazard.

- Rotating parts must be shielded so that they cannot be touched accidentally when the engine is installed in other equipment or machinery.
  
  Guards are available from HATZ to protect belt drives for cooling fans and generators.

- Before attempting to start the engine it is essential to have studied the starting information in the Instruction Book.

- Mechanical starting devices must not be used by children or persons of insufficient physical strength.

- In order to benefit from the advantages of the starting handle with kick-back damping, it must be used precisely as recommended in this Instruction Book.

- Before starting the engine, ensure that all the specified protective guards are in place.

- The engine must only be operated, serviced or repaired by persons who have received the appropriate training.

- Keep the starting handle and the key out of reach of unauthorized persons.

- Do not run the engine in closed or badly ventilated rooms.
  
  Do not breath in emissions – danger of poisoning!

- Also fuel and lubricants could contain poisonous components. Please follow the instructions of the mineral oil producer (safety data sheets).
Important notes on safe operation of the engine

– Stop the engine before performing any maintenance, cleaning- and repair work.

– Stop the engine before refuelling.
  Never refuel near a naked flame or sparks which could start a fire. Don’t smoke. Don’t spill fuel.

– Keep explosive materials as well as flammable materials away from the engine because the exhaust gets very hot during operation.

– Wear close-fitting clothing when working on the engine while it is running.
  Please don’t wear necklaces, bracelets or any other things which you could get caught with.

– Please pay attention to all advice- and warning stickers placed on the engine and keep them in legible condition. In case a label has come off or is no longer clearly legible, it must be replaced immediately. To this effect, please contact the HATZ service station in your area.

– Note that any unauthorized modifications to the engine absolve its manufacturer from liability for the consequences.

Regular servicing in accordance with the details provided in this Instruction Book is essential to keep the engine operating reliably.
In case of doubt, always consult your nearest HATZ service station before starting the engine.
2. Description of engine

Fully encapsulated „Silent Pack“ version
Engine 2...4 L41 C

1. Access cover for fuel delivery pump
2. Oil filler pipe and dipstick
3. Type plate
4. Speed control lever
5. Replaceable-element oil filter
6. Exhaust silencer (in capsule)
7. Cover for air guide housing
   (Access to fan drive belt)
8. Engine support feet
9. Oil drain plug
10. Cover plate, control side
11. Side panel
12. Air outlet duct
13. Capsule hood
14. Suspension lug (retractable),
    max. load 5000 N
15. Air intake duct for capsule
16. Combustion air intake aperture
17. Fuel feed line line with fuel pre-filter
18. Fuel return line
19. Cover plate, air outlet side
20. Central plug for electrical system
21. Battery connections
22. Power-Box
23. Electrical maintenance switch for
    air cleaner
Description of engine

Fully encapsulated „Silent Pack“ version
Engine 4L42C

1. Electronic control unit
2. Oil filler pipe and dipstick
3. Type plate
4. Speed control lever
5. Replaceable-element oil filter
6. Exhaust silencer (in capsule)
7. Cover for air guide housing
   (Access to fan drive belt)
8. Engine support feet
9. Oil drain plug
10. Cover plate, control side
11. Side panel
12. Air outlet duct
13. Capsule hood
14. Suspension lug (retractable), max. load 5000 N
15. Air intake duct for capsule
16. Combustion air intake aperture
17. Fuel feed line with fuel pre-filter and manual fuel pump
18. Fuel return line
19. Cover plate, air outlet side
20. Central plug for electrical system
21. Battery connections
22. Power-Box
23. Electrical maintenance switch for air cleaner
24. Fuel filter
Description of engine

Standard version
Engine 2 ... 4 M41 • 2 ... 4 M41Z

1  Oil filler pipe and dipstick
2  Side panel
3  Combustion air intake aperture
4  Cooling fan drive belt
5  Cooling fan with alternator attached
6  1/2-inch intl. hex socket for turning over engine
7  Oil drain plug
8  Speed control lever
9  Replaceable-element oil filter
10 Oil drain plug (if sump is fitted)
11 Cooling air duct for engine oil cooler
12 Access cover for fuel delivery pump
13 Cylinder head cover
14 Air cleaner cover
15 Suspension lug, max. load 5000 N
16 Fuel return line
17 Fuel feed line with fuel pre-filter
18 Type plate
19 Exhaust silencer
20 Central plug for electrical system
21 Battery connections
22 Power-Box
23 Electrical maintenance switch for air cleaner
Description of engine

Standard version
Engine 4 M 42

1 Oil filler pipe and dipstick
2 Side panel
3 Combustion air intake aperture
4 Cooling fan drive belt
5 Cooling fan with alternator attached
6 1/2-inch intl. hex socket for turning over engine
7 Oil drain plug
8 Speed control lever
9 Replaceable-element oil filter
10 Oil drain plug (if sump is fitted)
11 Cooling air duct for engine oil cooler
12 Fuel filter
13 Cylinder head cover
14 Air cleaner cover
15 Suspension lug, max. load 5000 N
16 Fuel return line
17 Fuel feed line with fuel pre-filter and manual fuel pump
18 Type plate
19 Exhaust silencer
20 Central plug for electrical system
21 Battery connections
22 Power-Box
23 Electrical maintenance switch for air cleaner
24 Exhaust gas return valve (EGR)
25 Electronic control unit
## 3. General information

### 3.1. Technical data

<table>
<thead>
<tr>
<th></th>
<th>2L41C 2M41.</th>
<th>3L41C 3M41.</th>
<th>4L41C / 4L42C 4M41. / 4M42.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type</strong></td>
<td>Air-cooled, four-stroke diesel engine</td>
<td>Direct fuel injection</td>
<td></td>
</tr>
<tr>
<td><strong>Combustion method</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Number of cylinders</strong></td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td><strong>Bore/stroke</strong></td>
<td>mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Displacement</strong></td>
<td>cm³</td>
<td>1716</td>
<td>2574</td>
</tr>
<tr>
<td><strong>Engine oil pressure</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Oil temperature</strong></td>
<td>100 ± 20°C</td>
<td>min. 0.6 bar at 850 r.p.m.</td>
<td></td>
</tr>
<tr>
<td><strong>Consumption of lubrication</strong></td>
<td></td>
<td>max. 1 % of fuel consumption</td>
<td>max. 1 % of fuel consumption</td>
</tr>
<tr>
<td><strong>Direction of rotation</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Valve clearance (at 10 - 30 °C)</strong></td>
<td>mm</td>
<td>0.10</td>
<td></td>
</tr>
<tr>
<td><strong>Net weight</strong></td>
<td>approx. kg</td>
<td>258</td>
<td>308</td>
</tr>
<tr>
<td><strong>.M41</strong></td>
<td></td>
<td>263</td>
<td>315</td>
</tr>
<tr>
<td><strong>.M41 Z</strong></td>
<td></td>
<td>303</td>
<td>363</td>
</tr>
<tr>
<td><strong>4M42</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>.L41 C</strong></td>
<td></td>
<td>303</td>
<td>363</td>
</tr>
<tr>
<td><strong>4L42 C</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Max. angle from vertical in any direction (in continuous operation)</strong></td>
<td></td>
<td>with and without</td>
<td>with and without</td>
</tr>
<tr>
<td><strong>Control side</strong></td>
<td>sump</td>
<td>30° 1)</td>
<td>30° 1)</td>
</tr>
<tr>
<td><strong>Air outlet side</strong></td>
<td></td>
<td>30° 1)</td>
<td>30° 1)</td>
</tr>
<tr>
<td><strong>Timing gear side</strong></td>
<td></td>
<td>30° 1)</td>
<td>25° 1)</td>
</tr>
<tr>
<td><strong>Flywheel side</strong></td>
<td></td>
<td>30° 1)</td>
<td>22° 1)</td>
</tr>
<tr>
<td><strong>Battery capacity</strong></td>
<td>min / max</td>
<td>12 V - 88 / 143 Ah</td>
<td>24 V - 55 / 110 Ah</td>
</tr>
</tbody>
</table>

1) Exceeding these limits causes engine breakdown.
3.2. Transport

A suspension lug is provided as standard equipment, so that the engine can be lifted safely. It is not suitable for lifting complete machines or similar to which the engine has been attached, and this is strictly prohibited. (See Chapter 2.)

3.3. Instructions for installation

If you have an engine which is not yet installed in a machine and still has to be installed, make sure that the Assembly Instructions for HATZ Diesel Engines are complied with prior to installation. These Assembly Instructions contain important information about safe assembly of the engine and are available from your the HATZ service center in your area.

Pending complete installation, the engine must not be started!

Moreover, we would like to point out that in this case, commissioning of the machine is also prohibited until it has been verified that the machine into which this engine is to be incorporated complies with all the safety precautions and regulations provided by law.

Refer also to the Declaration for Incorporation at the end of these Operating Instructions.

3.4. Load on engine

Operating the engine for a lengthy period off-load or at very low loads can affect its running quality.

We therefore recommend a minimum engine load of 15%. If operated at such low loads, it is best to operate the engine at a significantly higher load for a short period before switching it off.

3.5. Type plate

The type plate is placed on the crankcase resp. on the capsule (chapt. 2) and includes the following engine information (pict. 5):

1. Number of the engine family or of EU approval (only for engines with exhaust gas certificate)
2. Engine type, customer specification and setting of beginning of delivery
3. Engine number
4. Max. engine speed
5. Manuf. year
6. Displacement and test procedure for specific settings
7. Injection pump delivery lift and engine power output
8. “constant speed only” (only for engines with EPA/CARB exhaust gas certificate)
9. “variable speed” (only for engines with EPA/CARB exhaust gas certificate)

For any offer as well as spare part orders it is necessary to mention these data (also see spare parts list, page 1).

1. Engine type and customer specification
2. Engine number
3. Max. engine speed.
4. Operation

4.1. Before first start-up

Engines are normally delivered without any fuel or oil.

4.1.1. Engine oil

Oil quality
Qualified are all trademark oils which fulfil at least one of the following specifications:
ACEA – B2 / E2 or more significant
API – CD / CE / CF / CF-4 / CG-4 or more significant.

If engine oils with low quality standard are being used, the intervals of changing the engine oil have to be reduced from 250 to 150 resp. 500 to 250 hours of operation, see chapter 5.1.

Oil viscosity

Please select the recommended viscosity depending on the ambient temperature at which the engine is operated.

Inappropriate engine oil may shorten the engine’s service life significantly.

<table>
<thead>
<tr>
<th>Engine type</th>
<th>Sump</th>
<th>Oil content (liter)</th>
<th>dipstick marking</th>
</tr>
</thead>
<tbody>
<tr>
<td>2L41 C, 2M41 Z</td>
<td>Yes</td>
<td>7.5</td>
<td>C</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>4.5</td>
<td>A</td>
</tr>
<tr>
<td>2M41</td>
<td>Yes</td>
<td>8.5</td>
<td>C</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>5.5</td>
<td>A</td>
</tr>
<tr>
<td>3L41 C, 3M41 Z</td>
<td>Yes</td>
<td>10.5</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>8.0</td>
<td>A</td>
</tr>
<tr>
<td>3M41</td>
<td>Yes</td>
<td>11.0</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>8.5</td>
<td>A</td>
</tr>
<tr>
<td>4L41 C, 4L42 C</td>
<td>Yes</td>
<td>13.0</td>
<td>D</td>
</tr>
<tr>
<td>4M41 Z</td>
<td>No</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>4M41, 4M42</td>
<td>Yes</td>
<td>14.0</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

Note:
The engine oil contents stated here are to be regarded as approximate.

In all cases, the MAX marking on the dipstick should be complied with.
The engine should be in a horizontal position before adding oil or checking the oil level.

7
– Pull out dipstick „1“.

8
– Add engine oil up to the MAX mark on dipstick „1“ (Figures 7 and 8).

– Run the engine for a short time, then check oil level again and correct if necessary.

Attention!
If the engine is operated while the oil level is below the min. mark or above the max. mark, it can cause damage to the engine.

4.1.2. Fuel

Stop the engine before refilling the fuel tank. Never refuel near a naked flame or sparks which could start a fire. Don’t smoke. Use only pure fuel and clean filling equipment. Take care not to spill fuel.

All diesel oils sold as fuel and complying with the following minimum specifications can be used:

EN 590 or
BS 2869 A1 / A2 or
ASTM D 975 - 1D / 2D

Important!
The use of fuels of different specifications requires the prior written consent of the HATZ headquarters.

Standard version

9
– Before the engine is first started, or if the fuel system was run dry, prime the fuel delivery pump at lever „1“ until fuel is heard to flow back through the return line „2“ to the fuel tank.

Important!
Remember to replace the access cover for the fuel delivery pump in the side panel of the engine enclosure after priming the pump (Chap. 2).
Models with manual fuel pump
(On 4L42C and 4M42 engines only)

10
– Place a suitable vessel under the filter to trap escaping fuel.
– Open the vent screw 1 by approx. one turn.

11
– Compress and release rubber ball repeatedly, until fuel escapes from the vent screw 1.
– Close vent screw 1, then actuate rubber ball another two times.

Low temperature resistance
At low temperatures, the viscosity of Diesel fuel increases. This may result in clogging of the fuel system. Thus, winter fuel must be used at outside temperatures below 0 °C, or petroleum must be added in time.

<table>
<thead>
<tr>
<th>Lowest ambient temperature when starting, in °C</th>
<th>Paraffin content for:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Summer fuel</td>
</tr>
<tr>
<td>0 up to −10</td>
<td>20 %</td>
</tr>
<tr>
<td>−10 up to −15</td>
<td>30 %</td>
</tr>
<tr>
<td>−15 up to −20</td>
<td>50 %</td>
</tr>
<tr>
<td>−20 up to −30</td>
<td>–</td>
</tr>
</tbody>
</table>

4.2. Starting

⚠️ Do not run the engine in closed or badly ventilated rooms – danger of poisoning! Before the engine is started, always make sure that nobody is in the danger area (moving parts on engine or machinery) and that all safety guards are in place.

Never use any spray starting aids
If possible, disengage the engine from any driven equipment. The auxiliary equipment should always be placed in neutral.

### 4.2.1. Starting with the electric starter

1. Move the speed control lever to the 1/2 START or max. START position, according to requirements and starting conditions. Note that a lower speed setting will cause less exhaust smoke when starting.

2. Insert the key to its stop and turn it to position I.

3. Battery charge telltale “2” and oil pressure warning “3” must light up.

4. Turn start key to position II (Fig. 14).

5. As soon as the engine runs, release the start key. It must return to position I by itself and remain in this position during operation. The battery charge telltale and oil pressure warning must go out immediately after starting. Indicator light “1” is on when the engine is in operation.

6. The air cleaner maintenance indicator “5” only lights up during operation if the air cleaner element needs to be cleaned or renewed (Fig. 15, see chapter 5.4.2.).

7. The engine temperature display “4” (additional equipment) lights up if the temperature at the cylinder head becomes too high. **Switch off the engine and trace and eliminate the cause of the problem,** see chapter 7.

8. Always turn the start key back to position 0 before re-starting the engine. The repeat lock in the ignition lock prevents the starter motor from engaging and possibly being damaged while the engine is still running.

– Insert the key to its stop and turn it to position I.
Important!
If a starter protection module is installed, the start key has to be returned to position 0 for at least 8 seconds after the engine has failed to start or after switching it off before a further attempt can be made to start the engine.

Note: Start for max. 30 seconds. If the engine does not run after this time, turn starter key back to position 0 and eliminate the cause, Chapter 7.

Preheating device with automatic heating timer (additional equipment)
The preheating light „6“ lights up additionally at temperatures below 0° Celsius (Fig. 15).

– After the light has gone out, start the engine without delay.

On 4L42C and 4M42 engines only

The pilot lamp „5“ flashes during operation only if there is a problem in conjunction with the exhaust gas recirculation system. This also includes a contaminated air cleaner. This is indicated by the following flashing code of pilot lamp „5“:
7 short flashes (approx. 0.5 seconds) and 1 long flash (approx. 1.5 seconds)
The flashing code indicates that the air cleaner must be cleaned or replaced, chapter 5.4.2.
In case of flashing codes different from those mentioned, please contact your nearest HATZ service center immediately.

Note: If the electronic system has been indicating a problem for more than 15 minutes without interruption (flashing code - pilot lamp 5), the engine will be stopped automatically. If the problem persists, the engine can be started, but will run only for another 15 minutes.

Please contact the HATZ service center in your area if necessary.
Automatic shut-down function
(additional equipment)

This is characterized by a brief flashing of all pilot lamps once the starter key has been turned to position I, figure 15.

Important!
If the engine cuts out immediately after starting or switches off by itself during operation, a monitoring element in the automatic shutdown system has tripped. The corresponding indicator light (Fig. 15, positions 2 - 4) will come on. After the engine has stopped, the display continues to glow for about 2 minutes. The electrical device then switches itself off automatically. The display lights up again after the start key has been turned back to position 0 and then to position I again.

Trace and eliminate the cause of the operating fault before trying to restart the engine (see chapter 7).

The display light goes out when the engine is next started.

Even with automatic shutdown monitoring the oil level must be checked every 8 – 15 operating hours (Chapter 5.2.1.).

4.2.2. Emergency starting

If the engine has been stopped by the automatic shutdown system because of an electrical fault signal or inadequate oil pressure, an emergency start can be attempted, though in this case the manufacturer will accept no liability for consequential damage.

An emergency start could for example be unavoidable if the engine is used to power a vehicle which has come to a halt in a potentially dangerous area (for example on a rail crossing or road junction).

Proceed as follows:

– Detach the hood of enclosure „13“ (Figures 1 and 2) or side panel „2“ (Figures 3 and 4).

– Place a suitable tool, for example a screwdriver, behind emergency start lever „2“ and pull sharply outwards. This will break the lead seal „3“ between the emergency start lever and the screw on the engine block.

– As soon as the emergency start lever is in the starting position, the engine can be started again.

Important:
If the emergency start lever is used, the automatic shutdown system ceases to operate and the warranty is invalidated. For this reason, run the engine only in a genuine emergency and for a very short time (a few seconds) after operating the emergency start lever. Make sure before restarting the engine that there is sufficient oil in the engine; if oil pressure is too low, irreparable engine damage may occur very quickly.

Immediately after running the engine in an emergency, locate the origin of the fault signal and rectify the fault (see Chapter 7).

If any problems arise, please contact the nearest HATZ service point.
4.2.3. Starting with handle without kick-back damping
(on 2-4 M 41 engines only)

In the countries of the European Union, starting cranks without kick-back damping must not be used.

Preparations
– Move the speed control lever to START position (Fig. 13).

18
– Turn all decompression levers (1 on two-cylinder engines, 3 on three-cylinder engines, 4 on four-cylinder engines) to position 1.

Important!
Turn decompression levers only in the direction shown by the arrow.

Exception:
the lever can be moved back directly from position „1“ to „0“.

Never operate the automatic decompression system when the engine is running.

– Check that the starting handle is in correct working order, without a broken tubular handle worn engagement dogs or similar faults.

– Lightly grease the sliding-contact area between the starting handle and the guide sleeve.

19
– Insert the starting handle, hold it with both hands and stand in the correct position in relation to the engine (Fig. 19 and 20).

20
– Turn the engine over until it is felt to move more freely.
2M41 two-cylinder engines
– Turn the decompression lever to position „2“ (Figure 18).

3M41 three-cylinder engines
– Turn the decompression levers for cylinders 1 and 3 (counting from the fan end) to position „2“ (Figures 18 and 21).
– Turn the decompression lever for cylinder 2 to position „3“.

4M41 four-cylinder engines
– Turn the decompression levers for cylinders 1, 3 and 4 (counting from the fan end) to position „2“ (Figures 18 and 21).
– Turn the decompression lever for cylinder 2 to position „3“.

Starting procedure
– Turn the starting handle with both hands at an increasing speed.

The maximum speed of rotation must have been reached by the time the decompression lever has returned to position „0“.
– As soon as the engine has started, pull the starting handle out of the guide sleeve.

– If the engine backfires during starting because it was not turned over with sufficient force (the engine could even start to run backwards in certain circumstances), release the starting handle immediately and move the speed control lever to the STOP position (Chapt. 4.3.).

⚠️ The starting handle could be driven round by the engine and cause injury.

– Wait until the engine has come to a standstill before repeating the preparatory procedure and making another attempt to start it.
4.2.4. Starting with the handle with kick-back damping

You must hold the tubular grip firmly to maintain contact all the time between the starting handle and the engine. Maintain turning force during the entire hand starting operation.

- If backfiring should occur while hand starting the engine too soft, the brief reversal of movement disengages the pawl between the crankshaft „2“ and the drive dog „3“ (Fig. 23).

- If backfiring occurred and the engine starts running backwards (smoke from airfilter), release crankhandle immediately and move speed control lever into STOP-position, chapt. 4.3.

- To repeat the starting attempt, wait for the engine to cease rotating, reset the automatic decompression device and turn the starting handle in the correct starting direction again.

– Preparations for starting the engine and the hand starting procedure are precisely the same as with the handle without kick-back damping.

– Always hold tubular grip „1“ with both hands (Figures 22 and 23).

– Turn the handle slowly at first, until the pawl engages in the ratchet, then increase turning force to build up speed. The highest speed must have been reached by the time the decompression lever returns to position „0“. As soon as the engine has started, pull the starting handle out of the guide sleeve.
4.3. Stopping the engine

If the engine is shut down for a short period, or at the end of the working day or shift, keep the key and the starting handle in a safe place, out of reach of unauthorized persons.

Engines with electric starter

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– Move the speed control lever to the stop position; the engine will be shut down.

Note:
Engines with an automatic shut-down function can also be switched off by turning the start key back to position 0.

Engines with starting handle

– Move the speed control lever to the stop position; the engine will be shut down (Picture 24).

Never stop the engine by actuating the decompression lever!
Risk of damage to the engine.

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– Turn the starter key to the 0 position and pull it out. The pilot lamp lights must then go out.
5. Maintenance

The engine must be stopped before any maintenance work is attempted. Comply with legal requirements when handling and disposing of old oil, filters and cleaning materials. Keep the engine’s starting key out of reach of unauthorized persons. Disconnect the negative battery terminal. At the end of the maintenance work, check that all tools have been removed from the engine and all safety guards, covers etc. replaced in their correct positions. Before starting the engine, make sure that nobody is in the danger area (engine or driven machinery).

5.1. Maintenance summary

<table>
<thead>
<tr>
<th>Maintenance intervals</th>
<th>Maintenance work required</th>
<th>Chap.</th>
</tr>
</thead>
<tbody>
<tr>
<td>8-15 Every 8 – 15 hours of operation, or before each daily start-up</td>
<td>Check oil level.</td>
<td>5.2.1.</td>
</tr>
<tr>
<td></td>
<td>Check combustion air intake area.</td>
<td>5.2.2.</td>
</tr>
<tr>
<td></td>
<td>Check the cooling air system</td>
<td>5.2.3.</td>
</tr>
<tr>
<td>250 Every 250 hours of operation</td>
<td>Engine oil change (2 M 41 without sump, 2...4 L 41 C and 4 L 42 C in general).</td>
<td>5.3.1.</td>
</tr>
<tr>
<td></td>
<td>Clean fan, cooling fins and oil cooler.</td>
<td>5.3.2.</td>
</tr>
<tr>
<td></td>
<td>Check tightness of threaded connections.</td>
<td>5.3.3.</td>
</tr>
<tr>
<td></td>
<td>Cleaning of mesh insert in exhaust pipe.</td>
<td>5.3.4.</td>
</tr>
<tr>
<td></td>
<td>Check water trap</td>
<td>5.3.5.</td>
</tr>
<tr>
<td></td>
<td>Check for contamination of fuel pre-filter, renew if necessary.*</td>
<td>5.4.1.</td>
</tr>
<tr>
<td></td>
<td>Checking operation of air cleaner maintenance indicator.</td>
<td>6.1.</td>
</tr>
<tr>
<td></td>
<td>Do not tighten the cylinder head nuts.</td>
<td></td>
</tr>
<tr>
<td>500 Every 500 hours of operation</td>
<td>Renew the fuel pre-filter.</td>
<td>5.4.1.</td>
</tr>
<tr>
<td></td>
<td>Air cleaner maintenance.</td>
<td>5.4.2.</td>
</tr>
<tr>
<td></td>
<td>Check and adjust valve clearances.</td>
<td>5.4.3.</td>
</tr>
<tr>
<td></td>
<td>Engine oil change (2 M 41 with sump, 3...4 M 41 and 4 M 42 in general).</td>
<td>5.4.4.</td>
</tr>
<tr>
<td></td>
<td>Renew the oilfilter</td>
<td>5.4.5.</td>
</tr>
<tr>
<td>1000 Every 1000 hours of operation</td>
<td>Renew the fuel filter</td>
<td>5.5.1.</td>
</tr>
</tbody>
</table>

* Fuel pre-filter renewal intervals depend on the degree of fuel contamination, the care taken when refuelling and the amount of contamination inside the fuel tank.
2 M 41 without oil pan

2 M 41 with oil pan; 3 - 4 M 41 and 4 M 42 in all cases
Depending on engine type and version, one of the three self-adhesive maintenance charts illustrated here and on the previous page will be supplied. It should be attached to the engine or equipment at a point where it is clearly visible. Comply with the maintenance intervals stated in the maintenance summary in this chapter.

The following work is essential on new or reconditioned engines after the first 25 hours of operation:
- Change the engine oil and renew the oil filter element (Chapter 5.3.1. and 5.4.5.).
- Check valve clearances and adjust if necessary (Chapter 5.4.3.).
- Check tightness of all screw connections (Chapter 5.3.3.).

Do not take up slack at cylinder head bolts.

If the engine has not been operated for long periods at a time, change the oil and renew the filter element after a maximum of 12 months, regardless of how many operating hours have been recorded.
5.2 Maintenance every 8 – 15 hours of operation

5.2.1. Check engine oil level

When checking the oil level, the engine should be standing level, and must not be running.

– Remove any dirt in the dipstick area.

– For oil level inspection, remove the dipstick and wipe it dry using a lint-free, clean piece of cloth; then insert it to its stop and pull it out again.

– Check oil level at the dipstick. Add oil up to the MAX mark on dipstick „1“ if necessary (Chapter 4.1.1.).

Attention!
If the engine is operated while the oil level is below the min. mark or above the max. mark, it can cause damage to the engine.

5.2.2. Check combustion air intake area

Severe contamination is a sign that the air contains a high level of dust, and that the maintenance intervals should be shortened accordingly (Chapter 5.4.2.).

– Inspect intake opening „1“ on the rain protection cap or cyclone separator for severe blockage with dirt, for instance leaves, heavy dust deposits etc., and clean if necessary (Figures 30 and 31).

– Check for free airflow at dust outlet hole „2“ on the underside of the housing, and clean if necessary (Picture 30). With oily contamination remove cyclone and clean it.
On 2-4L41 C and 2-4M41 engines

- Run the engine at full speed briefly once a day, shortly after starting it. Check that indicator light „5“ comes on briefly or, depending on version, red zone „1“ is seen in the mechanical maintenance indicator (Figures 31 and 32, Chapter 5.4.2.).

On 4L42 C and 4M42 engines

- Increase the engine speed briefly to maximum level and watch out for the pilot lamp „5“ to flash. The following flashing code indicates that maintenance work is required on the air cleaner (Chapter 5.4.2).
  7 short flashes (approx. 0.5 seconds) and 1 long flash (approx. 1.5 seconds)
5.2.3. Check the cooling air system

Severe contamination with dirt is a sign that the air contains a high level of dust, and that the maintenance intervals should be shortened accordingly.

– Inspect the air inlet and outlet areas for severe blockage with dirt, for instance leaves, heavy dust deposits etc., and clean if necessary (see Chapter 5.3.2.).

Temperature display „4“ (if fitted) lights up as soon as the engine starts to overheat (Fig. 32). Stop the engine immediately and trace and eliminate the cause of the problem. (Chap. 5.3.2.).

The engine diagnostic display „4“ (only 4L42 C and 4M42) is lit as soon as the cylinder head temperature is inadmissibly high or the exhaust gas recirculation valve is faulty (Fig. 34). Stop the engine immediately and eliminate the cause, as described in (Chapters 5.3.2. and 7).

5.3. Maintenance every 250 hours of operation

5.3.1. Engine oil change
(see Chapter 5.1.)

The dipstick mark will indicate whether or not the engine has a sump (see Chapter 4.1.1.). The engine must be stopped, and should be standing on a flat, level surface.

– Drain the engine oil only when it is warm.

Risk of scalding from hot oil. Trap the old oil and dispose of it in an environmentally acceptable manner.

– Unscrew oil drain plugs „1“ and allow all the oil to drain out.

– Attach a new seal and insert and tighten the oil drain plug.
Important!
When unscrewing and removing drain plug "1", make sure that drain tube "2" is not accidentally loosened. If necessary, prevent it from turning with a suitable open-ended wrench.

5.3.2. Cleaning cooling fan, cooling fins and oil cooler

Before cleaning, the engine must be stopped and allowed to cool down.

- On encapsulated engines, unscrew and remove the hood, side panel with speed control lever, cover plate on operating side and air outlet duct and cover plate on air outlet side (see Chapter 2).
- On non-encapsulated engines, take off the side trim and the air duct to the engine oil cooler.

- Add lubricating oil of suitable quality and viscosity up to the MAX. mark on the dipstick. (Chapter 4.1.1.).
- Run the engine for a short period, then check the oil level again and top up if necessary.
Removing dry dirt

Persons handling compressed air must wear protective goggles. Never direct the jet to animals, persons or yourself!

- Clean the cooling fan, cylinder head and cylinders with a suitable brush.

- Blow out the entire cooling area zone with compressed air.

- Clean the engine oil cooler only by blowing out with compressed air. In this case, do not direct a powerful air jet against the easily damaged cooling fins (Figure 40).

Removing damp or oily dirt

- Disconnect the negative lead at the battery.

- Manually clean alternator and regulator.

- Shield the alternator with attached voltage regulator; do not spray it directly.

- Clean the complete area with a suitable detergent solution in accordance with its manufacturer's instructions, then spray down with a powerful water jet. Do not splash electrical system with water jet or pressure jet during engine cleaning.

Note:
Do not use petrol (gasoline) or acid cleaning agents.

- Dry the engine with a compressed air jet.

- Trace the cause of any contamination with oil and have the leak eliminated by a HATZ service station.

- Install the capsule or air guide elements previously removed.

- Run the engine until warm, to prevent residual moisture from causing rust.

Note:
On the encapsulated engine, also clean the area between the baseplate and the crankcase.

- Blow out the entire cooling area zone with compressed air.
5.3.3. Checking threaded connections

Check the tightness of all threaded connections and take up slack if necessary, provided that these can be reached during maintenance work.

Note:
Do not tighten the cylinder head nuts.

The adjusting screws at the engine governor and on the injection system are sealed with lacquer or with lead and are not to be tightened or adjusted.

5.3.4. Cleaning of mesh insert in exhaust pipe (additional equipment)

Exhaust system components will naturally be hot and must not be touched while the engine is running or until it has cooled down after being stopped.

– Loosen pipe clip „1“ and remove with exhaust pipe.
– Remove deposits in mesh insert „2“.
– Check mesh insert on chinks or fractures, replace if necessary.

Remark:
Engine operation for a longer period of time without load or with less load can lead to deposits in the mesh insert. Shorten maintenance interval.
5.3.5. Check water trap  
(On 4L42C and 4M42 engines only)  
The water trap inspection interval depends exclusively on the water contained in the fuel and on the care applied in refuelling. It may be admissible to extend the intervals, or it may be necessary to considerably shorten the intervals.

– Release the drain plug „1“ and collect the liquid in a transparent vessel.  
If the drain plug is not easily accessible, an extension piece of hose can be slipped on the plug.

– If an insufficient amount of liquid leaves the tank, release additionally plug „2“.

As water is heavier than diesel fuel, first the water, then the fuel will escape. This is indicated by the clearly visible separating line.

– If finally only fuel leaves through the port, the drain plug „1“ can be closed again.

– Subsequently, re-tighten plug „2“.

**Note:**  
If starting appears difficult, bleed the injection system using the manual fuel pump (Chapter 4.1.2.)

5.4. Maintenance every 500 hours of operation  

5.4.1. Replace fuel pre-filter  

⚠️ Do not smoke and never bring a naked flame near the fuel system when working on it.

**Important!**  
Maximum cleanliness is required to prevent dirt from entering the fuel system. Fuel particles may damage the injection system.

– Place a suitable vessel under the filter to trap escaping fuel.

– Close the fuel supply line.

**Note:**  
Fuel pre-filter maintenance intervals depend on the purity of the fuel used in the engine and should be reduced to 250 hours if necessary.

**Replace fuel pre-filter**

– Pull fuel supply line „1“ off fuel pre-filter „2“ at both sides.

– Insert the new pre-filter.
Important!
When installing a new filter, note the arrow indicating the correct flow direction (depends on whether the tank is mounted HIGH or LOW). The pre-filter's installed position (direction of flow) should be as vertical as possible.

– Open the fuel supply line.

Note:
On 2-4L41 C and 2-4M41 engines
To make starting easier, it is best to prime the fuel delivery pump at lever „1“ until fuel is heard to flow back through return line „2“ and into the fuel tank.

– Operate the lever to check for leaks.

Important!
Remember to replace the access cover for the fuel delivery pump in the side panel of the engine enclosure after priming the pump (Chap. 2).

On 4L42 C and 4M42 engines
If starting appears difficult, bleed the injection system by means of the manual fuel pump (Chapter 4.1.2.)

5.4.2. Air cleaner maintenance
It is best to clean the filter cartridge (two pcs. on four-cylinder engines) only when the maintenance indicator displays the appropriate signal. Apart from this, the cartridge should be renewed after 500 hours of operation.

Removing the air filter cartridge
(on 2-4L41 C and 4L42 C engines)
– Take off the capsule hood. chap. 2.
– Remove dirt adhering in the region of the air cleaner housing.

– Slacken of screws „1“ only sufficiently to enable the complete air cleaner housing to be lifted off.
– Cover the opening in the intake pipe so that nor dirt or other forien bodies can enter.
– After this, open the air cleaner housing and take out element „3“.
With 3-cyl. engines the cover „2“ is additionally fixed with clamp „7“.

– Clean the housing and the cover.
Spacer „5“ is attached to screw „1“ by flexible bushing „6“, so that it cannot drop into the intake pipe during dismantling and assembly work.

– If the spacer is loose, renew bushing „6“.

Removing the air filter cartridge
(on 2..4 M 41 and 4M42 engines)

– Release clips „1“ and take off the cover of air cleaner housing „2“ (Figure 48).

– Remove dirt adhering in the air cleaner area.

– Slacken off screws „3“ only sufficiently to enable cover „4“ with the filter element to be lifted off.

– Blank off the intake pipe opening with cloths so that dirt or other foreign bodies cannot enter.

– Clean filter housing and cover.
Spacer „5“ is attached to screw „3“ by flexible bushing „6“, so that it cannot drop into the intake pipe during dismantling and assembly work.

– If the spacer is loose, renew bushing „6“.

The filter cartridge is either renewed or, depending on the degree of contamination, checked and cleaned as follows:

Cleaning the air filter cartridge

Persons handling compressed air must wear protective goggles. Never direct the jet to animals, persons or yourself!

Dry contamination

– Blow through the filter cartridge from the inside outwards with dry compressed air until no more dust emerges.
**Important**
Air pressure must not exceed 5 bar, and the compressed air jet must be held approx. 150 mm (6 in) away from the filter cartridge.

**Damp or oily contamination**
- Renew the filter cartridge

**Checking the air filter cartridge**

- Examine sealing faces „1“ on the filter cartridge for damage.

- Hold the air filter cartridge at an angle against the light or shine a lamp through it to detect any cracks or other damage to the paper element.

**Important:**
If there is the slightest damage in these areas, the filter cartridge should not be re-used.

**Installing the air filter cartridge**

- Assemble all parts in succession, making sure that they seat firmly and make a reliable seal.

**Mechanical contamination indicator**

After the air cleaner has been re-assembled, the red zone „1“ visible in the maintenance indicator must be cancelled by pressing reset knob „2“.
5.4.3. Checking and adjusting valve clearances

- On the encapsulated engine, take off the capsule hood (see Chapter 2).
- Unscrew the hex nuts and take off the cylinder head cover (Figure 3, Item 13).
- Take off the covers for the air guide housing and belt guard (see Chapter 2).

Important!
Turn the engine over in the normal direction of rotation.
This is counter-clockwise in either case – at the flywheel or timing gear end.

Adjusting method for two-cylinder engines

- The valves in cylinder 1 (at the fan end) must be in the overlap position (exhaust valve not yet closed, inlet valve just starting to open).
- Turn the crankshaft through 180 degrees in the normal direction of rotation, and check valve clearances at cylinder 2.
- Turn the crankshaft a further 180 degrees in the same direction as before, and check the valve clearances at cylinder 1.

Adjusting method for three- and four-cylinder engines (Fig. 53)

<table>
<thead>
<tr>
<th>Type</th>
<th>Valve No. ... fully open</th>
<th>Check valves at cyl. No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-cylinder</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>4-cylinder</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>1</td>
</tr>
</tbody>
</table>
– Check valve clearances with a feeler gauge.

– Valve clearances (inlet and exhaust valves) = 0.10 mm with engine cold.

– If valve clearance is incorrect, slacken off hex nut „1“. Turn adjusting screw „2“ until feeler gauge „3“ can just be pulled through between the rocker and the valve stem, with slight resistance to its movement, after nut „1“ has been retightened.

**Important !**
Repeat the procedure for all valves, noting the adjusting method described above.

– Attach the cover to the cylinder head again; always use new sealing rings.

– Do not use the nuts securing the cover to the cylinder head more than twice before renewing them.

**Tightening torque: 10 Nm.**

– Run the engine briefly and check that the cover is not leaking at the cylinder head.

The engine must never be run without all guards and covers in position.

### 5.4.4. Engine oil change
(see Chapters 5.3.1. and 5.1.)

### 5.4.5. Renewing oil filter

Risk of scalding from hot oil. Trap the old oil and dispose of it in an environmentally acceptable manner.

– Using a strap wrench, unscrew the engine oil filter with replaceable element and pull it out. Order number for strap wrench: 620 307 01.

– Wipe escaping oil out of the oil trap plate.

– Oil the sealing lip of the new filter element lightly. Insert the filter element and screw up handtight.

– Add engine oil of a suitable specification and viscosity up to the MAX mark on the dipstick (See Chapter 4.1.1.).

– After running the engine for a short time, check the oil level again and correct it if necessary.

– Check the filter element for leaks and tighten by hand.
5.5. Maintenance every 1000 hours of operation

5.5.1. Renewing the fuel filter

！ Do not smoke and never bring a naked flame near the fuel system when working on it.

– On the encapsulated engine, take off the capsule hood (see Chapter 2).
– On non-encapsulated engines, take off the side trim.
– Place an absorbent cloth or wadding under the filter to trap escaping fuel.
– Close the fuel supply line.

Note:
Fuel filter maintenance intervals depend on the purity of the fuel used in the engine and should be reduced to 500 hours if necessary.

Renewing the fuel filter
(on 2-4L41 C and 2-4M41 engines)

– Push on strap wrench „1“ and unscrew the replaceable filter element by turning to the left. Order number for strap wrench: 620 307 01.
– Oil the sealing lip of the new filter element lightly.
– Install the filter element and screw up handtight.
– Open the fuel supply line again.

Note:
To make starting easier, it is best to prime the fuel delivery pump at lever „1“ until fuel is heard to flow back through return line „2“ and into the fuel tank.

– Operate the lever to check for leaks.

Important!
Remember to replace the access cover for the fuel delivery pump in the side panel of the engine enclosure after priming the pump (Chap. 2).

– Install the enclosure and air guide elements again.
Renewing the fuel filter
(On 4L42C and 4M42 engines)

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– Close the fuel lines at the filter housing.

59

– Place a suitable vessel under the filter to trap escaping fuel.

– Release drain plug „1“ to drain the fuel.

60

– Release the fuel filter using a strap wrench or a similar tool, and remove it.

61

– Slightly grease the seal „1“ of the new replaceable-cartridge filter

– Assemble replaceable-cartridge filter and tighten it by hand.

– Bleed the injection system by means of the manual fuel pump (Chapter 4.1.2).

– After a short test run, check fuel filter for leakage; if necessary, re-tighten it by hand.
6. Operating checks and repair work

6.1. Checking operation of air cleaner maintenance indicator

Every 250 hours of operation, perform a routine check on the maintenance indicator or maintenance switch and the display light.

– Detach the capsule hood or side trim (see Chapter 2).

Electric maintenance switch

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– Turn switch key to position I.

63

– Pull hose „2“ off air intake pipe and build up a strong vacuum at the open end.

64

Indicator light „5“ will come on.
If this response is not obtained, check the following points:
– electrical section: cable connections etc.
– Indicator light
– function of maintenance switch.

Note:
This function test cannot be performed for the engine types 4L42 and 4M42.
Mechanical maintenance indicator
– Pull hose „2“ off air intake pipe and build up a strong vacuum at the open end (Figure 63).

– Red zone „1“ will appear and engage in position.
– After the functional check, release red zone „1“ by pressing reset knob „2“.
Renew any defective components without delay.

6.2. Renewing fan drive belt, checking operation of belt monitor

– Remove one machine screw at belt pulley „1“.
– Press back tensioning pulley „2“ and lock it with the machine screw provided.
– Unscrew and remove the belt pulley.
– Take off the Poly-V belt.

Note:
If any grooves on the belt pulley have broken off or are bent, always renew the pulley.

Checking operation of belt monitor
Always check operation of the shutdown device when the belt is renewed.
– Remove the machine screw to release the piston with tensioning pulley „1“.

– Spring pressure will force the piston with tensioning pulley out of the housing.

– Angled lever „2“ rotates downwards and releases shutdown pin „3“.

**Important !**
Shutdown pin „3“ must be forced out by spring loading or else automatic shutdown will not take place if the belt breaks.

**Installing the fan drive belt**

– Push piston with tensioning pulley „2“ into housing „3“ and lock with the machine screw (Figure 68).

– Place the Poly-V belt centrally on the fan pulley and install the tensioning pulley and the lower belt pulley.

– Retain the belt pulley with one machine screw „1“ without pushing it fully on to the centering hub.
– Insert a large screwdriver between the hydraulic belt tensioner and the belt pulley and press it down until the pulley slides on to the centering hub.

– Insert and tighten the remaining machine screws „1“.

**Types of belt**

Since the belt pulleys on the fan side differ in diameter on various engine types and versions, Poly-V belts of differing lengths are fitted.

<table>
<thead>
<tr>
<th>Type and engine version</th>
<th>Ident. No.</th>
<th>Belt length (mm)</th>
<th>Fan pulley diameter (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 L 41 C</td>
<td>502 031 00</td>
<td>920</td>
<td>72</td>
</tr>
<tr>
<td>All other types and versions</td>
<td>501 415 00</td>
<td>910</td>
<td>64</td>
</tr>
</tbody>
</table>

**Note:**

In order to be sure of avoiding mistakes concerning the length of Poly-V belts when ordering them, it is best to measure the diameter of the belt pulley at the fan end and refer to the above table, using this figure as a starting point.
### 7. Malfunctions – causes and remedies

<table>
<thead>
<tr>
<th>Kind of trouble</th>
<th>Possibly caused by</th>
<th>Remedy</th>
<th>Chapt.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine will not start or is reluctant to start although it can be turned over with the starter.</td>
<td>Speed control lever is in stop or idle position.</td>
<td>Move lever to 1/2 START or max. START position according to operating conditions. Lever must remain fixed in this position.</td>
<td>4.2.1.</td>
</tr>
<tr>
<td>No fuel reaching injection pump.</td>
<td></td>
<td>Add fuel. Prime the delivery pump until fuel is heard to flow back through the return line to the fuel tank.</td>
<td>4.1.2.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Check through the entire fuel supply system systematically. If there is no improvement, check</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- feed line to engine</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- fuel pre-filter</td>
<td>5.4.1.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- fuel filter</td>
<td>5.5.1.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- delivery pump function</td>
<td></td>
</tr>
<tr>
<td>If the engine is difficult to start after having been out of use for a lengthy period, but the problem can be solved by priming the delivery pump for some time: check that the fuel system is correctly laid out.</td>
<td></td>
<td></td>
<td>3.3.</td>
</tr>
<tr>
<td>Compression too low:</td>
<td></td>
<td>Check valve clearances and adjust if necessary.</td>
<td>5.4.3.</td>
</tr>
<tr>
<td>- incorrect valve clearances.</td>
<td></td>
<td>See workshop manual.</td>
<td></td>
</tr>
<tr>
<td>- cylinder or piston ring wear</td>
<td></td>
<td>See workshop manual.</td>
<td></td>
</tr>
<tr>
<td>- fault in automatic decompression device</td>
<td></td>
<td>See workshop manual.</td>
<td></td>
</tr>
<tr>
<td>Injectors not working correctly.</td>
<td></td>
<td>See workshop manual.</td>
<td></td>
</tr>
<tr>
<td>Fan drive belt broken.</td>
<td></td>
<td>Renew the Poly-V belt.</td>
<td>6.2.</td>
</tr>
<tr>
<td>Kind of trouble</td>
<td>Possibly caused by</td>
<td>Remedy</td>
<td>Chapt.</td>
</tr>
<tr>
<td>----------------</td>
<td>-------------------</td>
<td>--------</td>
<td>--------</td>
</tr>
<tr>
<td>At low temperatures.</td>
<td>Pre-heat system (optional extra) has a fault.</td>
<td>See workshop manual.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fuel has separated (inadequate low-temperature resistance).</td>
<td>Pull off fuel return line and check that clear (not turbid) fuel emerges.</td>
<td>4.1.2.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If fuel has separated, heat up the engine or drain the entire fuel supply system. Refill with a fuel mixture that is resistant to low temperatures.</td>
<td></td>
</tr>
<tr>
<td>Starting speed too low:</td>
<td>- oil viscosity is too high.</td>
<td>Change engine oil; use correct viscosity grade.</td>
<td>4.1.1.</td>
</tr>
<tr>
<td></td>
<td>- insufficient battery charge.</td>
<td>Check battery; Contact specialist workshop if necessary.</td>
<td>8.</td>
</tr>
<tr>
<td></td>
<td>- engine not declutched from machinery.</td>
<td>If possible, declutch or otherwise disconnect the engine from the machinery it is used to drive.</td>
<td></td>
</tr>
<tr>
<td>Starter motor is not energized, or does not turn the engine over.</td>
<td>Fault in electrical system:</td>
<td>Check electrical system and its components; consult a specialist workshop if necessary.</td>
<td>8.</td>
</tr>
<tr>
<td></td>
<td>- battery and / or other cable connections are not correct.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- loose and / or corroded cable connections.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- battery defective and / or flat.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- starter motor defective.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- defective relays, monitoring elements etc.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engine fires but does not run after the starter motor is switched off.</td>
<td>Speed control lever not moved far enough in the start direction.</td>
<td>Move lever farther towards „START“.</td>
<td>4.2.1.</td>
</tr>
<tr>
<td></td>
<td>Engine not decoupled from machinery.</td>
<td>If possible, declutch or otherwise separate engine from the machinery it drives.</td>
<td>5.4.1.</td>
</tr>
<tr>
<td></td>
<td>Fuel pre-filter or main fuel filter blocked.</td>
<td>Renew the filter.</td>
<td>5.5.1.</td>
</tr>
<tr>
<td></td>
<td>Fuel supply is interrupted.</td>
<td>Check through complete fuel supply system systematically.</td>
<td></td>
</tr>
<tr>
<td>Kind of trouble</td>
<td>Possibly caused by</td>
<td>Remedy</td>
<td>Chapt.</td>
</tr>
<tr>
<td>-----------------</td>
<td>--------------------</td>
<td>--------</td>
<td>--------</td>
</tr>
<tr>
<td>Engine fires but does not run after the starter motor is switched off.</td>
<td>Stop signal from monitoring element for automatic shutdown system (optional extra): - oil pressure lost - air cleaner blocked. - alternator has failed.</td>
<td>Check oil level. Check the amount of dirt adhering to the air filter; clean or if necessary renew. See workshop manual.</td>
<td>5.2.1. 5.4.2.</td>
</tr>
<tr>
<td>Engine shuts down during operation.</td>
<td>Fuel tank is empty. Fuel pre-filter or main fuel filter blocked. Fan drive belt is broken. Mechanical defect.</td>
<td>Add fuel. Renew filter. Renew the Poly-V belt.</td>
<td>4.1.2. 5.4.1. 5.5.1 6.2</td>
</tr>
<tr>
<td>In addition, if automatic engine shut-down is installed.</td>
<td>Stop signal from monitoring element because of: - oil pressure too low. - cylinder head temperature too high.</td>
<td>Check engine for: Engine oil level. Cooling air passages blocked or cooling system otherwise affected.</td>
<td>5.2.1. 5.3.2.</td>
</tr>
<tr>
<td>Faults in electrical system, for instance:</td>
<td></td>
<td>Check electrical system and its components; consult a specialist workshop if necessary.</td>
<td>8.</td>
</tr>
<tr>
<td>Pilot lamp for EGR is flashing (only for 4L42 and 4M42)</td>
<td>Air cleaner contaminated Problems regarding the exhaust gas recirculation system</td>
<td>Check the air cleaner for degree of contamination; clean or, if necessary, replace. Please contact the HATZ service center.</td>
<td>5.4.2.</td>
</tr>
<tr>
<td>Kind of trouble</td>
<td>Possibly caused by</td>
<td>Remedy</td>
<td>Chapt.</td>
</tr>
<tr>
<td>-----------------</td>
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</tr>
<tr>
<td>Engine power and speed drop.</td>
<td>Poor fuel supply:  - tank is running dry.  - fuel pre-filter or main fuel filter blocked.  - inadequate fuel tank venting.  - leaks at fuel line connections.  - speed control lever does not remain in the selected position.</td>
<td>Add more fuel.  Renew the filter.  Ensure that tank is properly vented.  Check threaded unions for leaks.  Tighten the speed control so that it cannot move accidentally.</td>
<td>4.1.2.  5.4.1.  5.5.1.</td>
</tr>
<tr>
<td>Engine power and speed drop, black smoke from exhaust.</td>
<td>Air cleaner is blocked.</td>
<td>Check degree of air cleaner contamination and renew filter element if necessary.</td>
<td>5.4.2</td>
</tr>
<tr>
<td></td>
<td>Valve clearances incorrect.</td>
<td>Adjust valve clearances.</td>
<td>5.4.3.</td>
</tr>
<tr>
<td></td>
<td>Injectors not operating correctly.</td>
<td>See workshop manual.</td>
<td></td>
</tr>
<tr>
<td>Engine runs very hot. Warning light for cylinder head overheating (optional extra) comes on.</td>
<td>Engine oil level is too high.</td>
<td>Drain off engine oil until level is at upper dipstick mark.</td>
<td>5.3.1.</td>
</tr>
<tr>
<td></td>
<td>Inadequate cooling:  - contamination at some point in cooling air supply.  - missing or loose air guide plates or sections of capsule.</td>
<td>Clean the cooling air path.</td>
<td>5.3.2.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Check that all air guide plates and capsule sections are fitted and not leaking.</td>
<td></td>
</tr>
</tbody>
</table>
8. Work on the electrical system

Batteries generate explosive gases. Keep them away from naked flame and sparks which could cause them to ignite. Do not smoke. Protect eyes, skin and cloth against the corrosive battery acid. Pour clear water over acid splashes immediately. In case of emergency call doctor. Do not place any tools on top of the battery.

Always disconnect the negative (–) terminal of the battery before working on the electrical system.

– The positive (+) and negative (–) battery terminals must not be accidentally interchanged.

– When installing the battery, connect the positive lead first, followed by the negative lead. Negative pole to earth (ground) on engine block.

– When removing the battery, disconnect the negative lead first, followed by the positive lead.

– In all circumstances, avoid short circuits and shorts to earth (ground) at live cables.

– If electrical faults occur, first check for good contact at the cable connections.

– Replace a failed indicator light without delay.

– Do not take the key out while the engine is running.

– Never disconnect the battery while the engine is running. Electric voltage peaks can cause damage to electronic components.

– Do not splash electrical system with water jet or pressure jet during engine cleaning.

– When carrying out welding work on the engine or attached equipment, attach the earth (ground) clip as near as possible to the welding point, and disconnect the battery. If an alternator is fitted, separate the plug connector leading to the voltage regulator.

The relevant circuit diagrams are supplied with engines which have an electrical system. Additional copies of circuit diagrams can be obtained on request. HATZ assumes no liability for electrical systems which have not been carried out acc. to HATZ circuit diagrams.

9. Protective treatment

A new engine can normally be stored for up to 12 months in a dry place. If atmospheric humidity is high (or if exposed to sea air), protection is sufficient for about 6 months’ storage. If the engine is to be stored for a longer period, or laid up out of use, please consult the nearest HATZ service point.
Extended manufacturer's declaration / Declaration of Incorporation
EC Machinery Directive 98/37/EC or 2006/42/EC*)

The manufacturer:  
Motorenfabrik Hatz GmbH & Co.KG
Ernst-Hatz-Straße 16
D-94099 Ruhstorf a. d. Rott

hereby declares that the incomplete machine: product description: Hatz diesel engine
Type designation and as of serial number:
2L41=10214; 3L41=10314; 4L41=10414; 4L42=14010;
2M41=10514; 3M41=10614; 4M41=10714; 4M42=14310

satisfies the following basic safety and health protection requirements in acc. with Annex I to the above-mentioned Directive.

- Annex I, General principles no. 1
  - Nr. 1.1.2., 1.1.3., 1.1.5., 1.2.1., 1.2.2., 1.2.3., 1.2.4.1., 1.2.4.2., 1.3.1., 1.3.2., 1.3.3., 1.3.4.,
    1.3.7., 1.3.9., 1.4.1., 1.5.1., 1.5.2., 1.5.3., 1.5.8., 1.5.9., 1.6.1., 1.6.2., 1.6.4., 1.7.

All relevant basic safety and health protection requirements down to the interfaces described
☒ in the operating manual
☒ in the enclosed data sheets
☒ in the enclosed technical documents
have been complied with.

The special technical documents in acc. with Annex VII B of the Directive 2006/42/EC have been prepared **).

Conformity with the provisions of the following, other EC Directives, i.e.

The following standards have been used (completely or partially):
- EN 1679-1: 051998  
- EN ISO 12100-1: 042004  
- EN ISO 13857: 062008
- EN ISO 14121-1: 122007  
- EN ISO 12100-2: 042004  
- EN ISO 11102: 111997

I will submit the above-mentioned specific technical documents electronically to the competent government authority, if applicable**)

The Operating Manual has been enclosed to the incomplete machine and the Assembly Instructions have been provided to the customer electronically together with the order confirmation.

Commissioning has been prohibited until it has been established, if applicable, that the machine into which the above-mentioned incomplete machine is to be incorporated, satisfies the provisions of the Machinery Directive.

Wolfgang Krautloher / see "Manufacturer"
Name / address of EC documentation officer **)  

02/12/2009  
Krautloher / Directives official

Date  
Signature and information on the undersigned

*) The machine satisfies the substantial requirements of both directives 98/37/EC shall apply until 28.12.2009; 2006/42/EC shall apply as of 29.12.2009

**) applies only to the Directive 2006/42/EC
CALIFORNIA
Proposition 65 Warning

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