

Appendix B

Additional Information for Engines with Oil Injection



Attention: The chapter on Oil Injection (Appendix B) is only to be used in connection with the service manual for the corresponding engine type. All sections of the manual, with exception of the chapters concerning lubrication, are from here on still fully valid. Please read all instructions before installing the engine or its operation.

General Directions:

In order to provide for the continuing further development of our products we have to reserve the right to make changes in the size of deliveries, in form, technical execution, and equipment. We also ask for your understanding that no claims can be made based on information contained in this manual.

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1 Description of Oil Injection

1.1 General description of oil injection

An oil pump transports the two stroke oil directly from a container into the intake manifold and in special constructions also directly to hard to reach areas to be lubricated (for example: top bearing when vertically installed [H30; H32]).

The oil pump is fastened to the recoil starter or to a support of the fan housing and is connected by way of the clutch directly to the crankshaft.

With the exception of the H30, H37 and the H32, the oil ratio depends on 2 variables.

1. Number of rotations
2. Throttle position (loaded condition)

The oil ratio of the H30, H37 and the H32 depends **solely** on the engine rpm.

1.2 Names and description of individual parts

- Oil container (**sketch 5.1 pos. 5**)

Function: Reservoir for the two stroke oil for the oil injection

Minimum amount of oil: F30, H30, 3701 und H37 > 2,5 Liter

All others > 1,5 Liter

1. Filling socket with air vent
2. Connection of oil line to oil pump

- Oil level indicator and/or warning light (**sketch 5.1. pos. 4**)

Function: Gives information about present oil level and/or warns when below minimum level.

- Oil filter (**sketch 5.1. pos. 3**)

Function: Cleaning the oil from foreign parts which may damage or congest the oil injection system.

- Oil pump (**sketch 5.1. pos. 2**)

Function: To dispatch and measure out the oil for the suction sockets and the areas to be lubricated.

The oil pump consists of the following main components:

1. Rope disc and Bowden cable holder (**pict. 1**)

Function: Guide for load depending regulator for the amount of oil

Note: With motors of the H-series the amount of oil will only be changed in connection with the rotation number. Therefore, the lever has been adjusted and set at the factory and may not be changed.

2. Oil connections (**pict. 1**)

Function: The connection from oil pump to motor has been factory-installed. The open oil connector is for the connection from the oil reservoir.

2. Installation Instructions

The following instructions have to be adhered to for a safe and trouble free operation

2.1. Mechanical Installation (oil pump control):

- Install a "splitter" into the throttle cable for the carburettor - i.e. throttle valve control.
- Install a Bowden cable between splitter and oil pump.
- Measure and cut the end of Bowden cable and affix lead seal.
- Hang Bowden cable into guide disc.

For 2-cylinder engines:

- Open carburettor i.e. throttle valve completely and adjust the Bowden cable to the required length (**pict. 1a**).

Attention: please note that the respective marks on control dial of oil pump are to be understood only as the minimum settings requiring the final adjustment to the desired mixture ratio.

Remarks: For engines with 2 carburettors or throttle valve sockets, the 2 carburettors, i.e. throttle valves first have to be synchronized to each other, before adjusting the oil pump.

For 3-cylinder engines:

- keep the basic engine setting from factory or adjust the engine without load (e.g. propeller) to idle speed 1400-1500 rpm
Stop the engine and keep position of throttle valve in idle position.
Harmonize mark on oil pump housing and line mark on sheave.

In general:

- Secure the adjusting screw with counter nut.
- Activate throttle control several times, then check the adjustment and if necessary readjust. Repeat until the setting does not change anymore.
- Check that the Bowden cable to the oil pump action is not bent and runs smoothly. Furthermore, assure that the Bowden cable can not be damaged by sharp edges or nearby heat, etc.
- Check that the Bowden cable can not jump from the guide disc.

Note: The amount of oil may not be reduced by changing the setting of the guide disc, because too lean an operation in the partial load may cause serious engine damage. There is no way the operator can adjust the amount of oil.

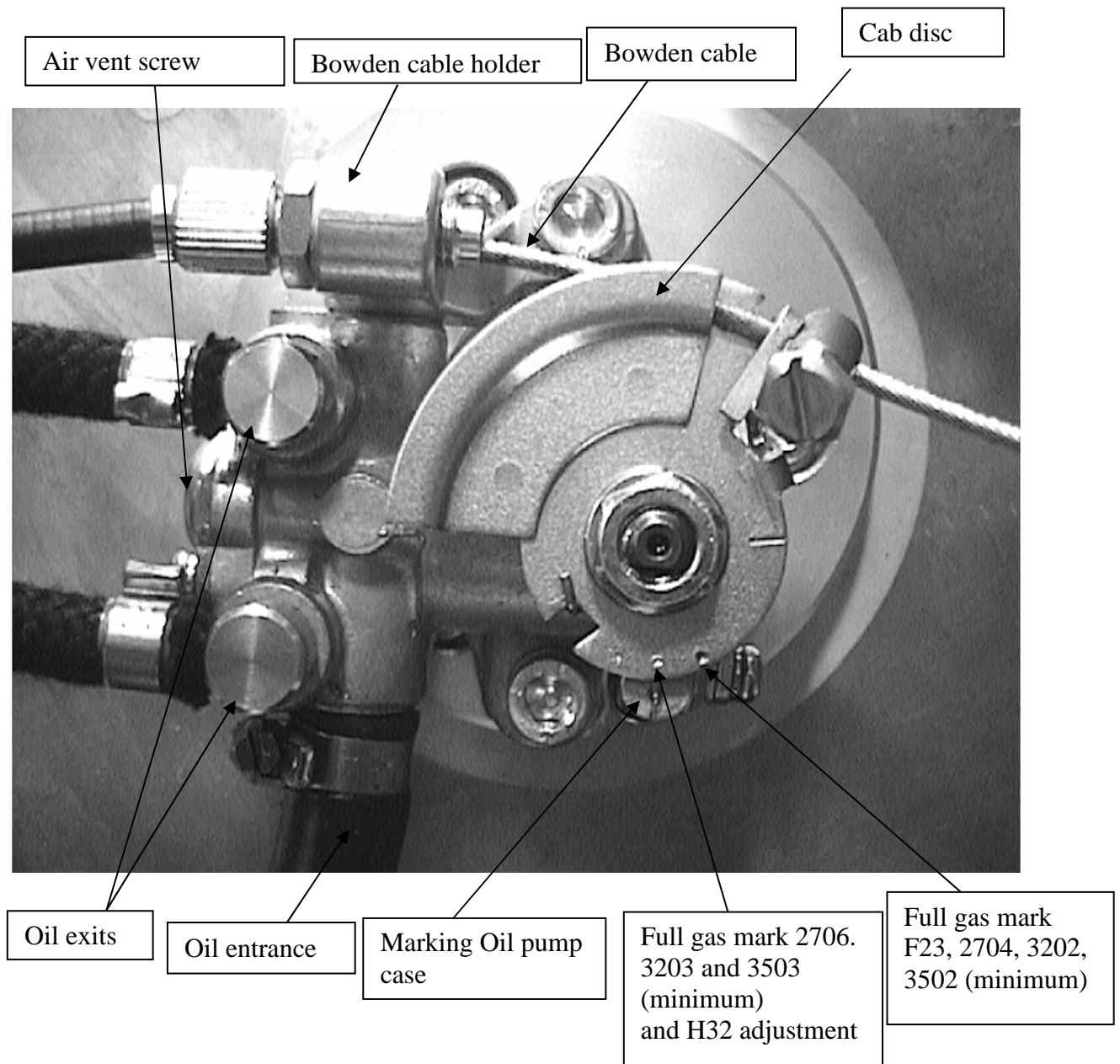
2.2. Hydraulic Installation:

- The oil reservoir must be situated higher than the oil pump, since the oil pump can not begin suction independently.
- An oil filter has to be installed between the oil reservoir and the oil pump in order to avoid damage or clogging of the oil pump.
- All lines have to be attached in sufficient distance to hot parts (i.e. exhaust system).
- The oil lines have to be laid out in such a way, that they may not be damaged by sharp edges.
- The oil lines must not be bent. They have to be secured in such a way that bending can not occur even during operation.
- For safety, hose clamps must be affixed to all connections of the oil lines.

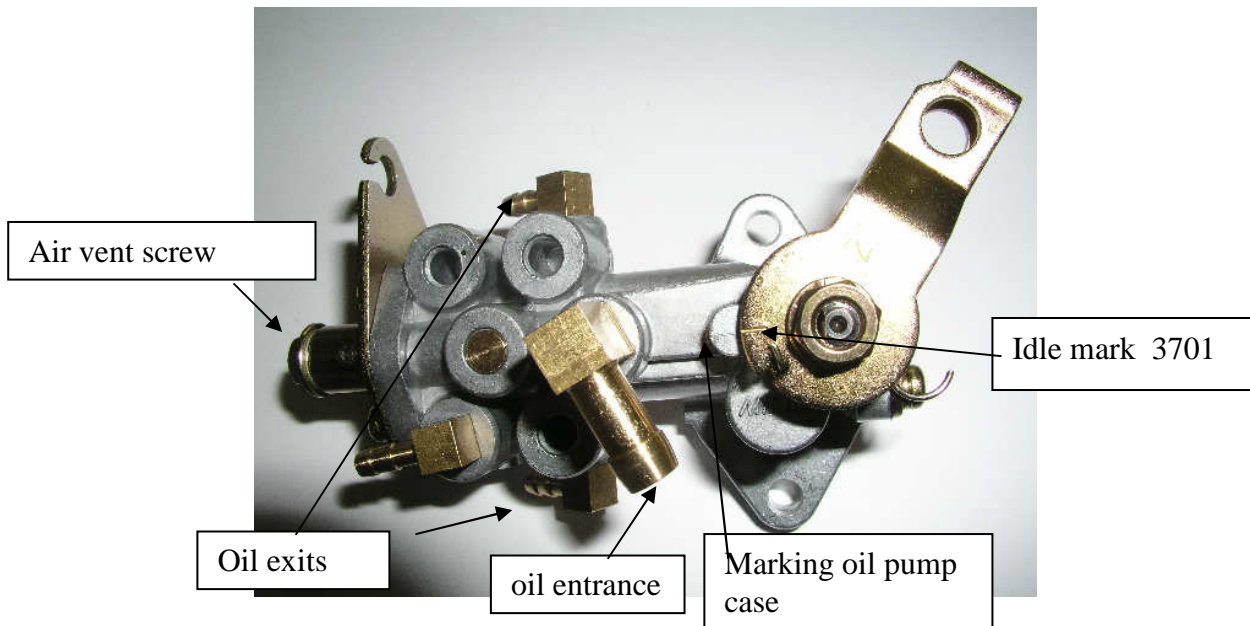
2.3. Installation Instruction

1. Mount the engine as described in the individual service manual.
2. Mount the oil reservoir as described in section 2.2 above.
3. Connect oil reservoir and oil pump, insert an oil filter into the line.
4. Ensure that the necessary amount of oil can flow from the oil reservoir to the oil pump. To do this, hang the oil hose into a measuring cup at the level of the pump, fill 200 ml 2 stroke oil for the oil injection into the oil reservoir. Clock the time between the beginning and the end of the oil flow.
5. For engines H30, F30, 3701, the 200ml must have run through a maximum of 20 min. For engines 2702-2706 and H32 E, 30 min maximum. When measuring, the oil- and surrounding temperature should be between 10-20°C. Should the passage take longer than stated, the position of the oil reservoir has to be changed accordingly until the flow condition described is reached.
6. Connect the oil hose to the entrance of the oil pump and secure with a hose clamp.
7. Fill oil reservoir with 2 stroke oil for the oil injection.
8. Vent the oil pump by opening the air vent screw (**pictures 1a and 1b**). Wait until the oil exits the bore hole without bubbles. Then the vent bore hole must be closed again.

Picture 1a: Front view of Oil pump



Picture 1b: Front view of oil pump (3-cylinder engines)



2.4 Additional Measures to Ensure Safety of the Construction:

The following measures are not necessary for a secure operation of the installation.

1. Install a fill level indicator into the oil reservoir to control the oil level.
2. Install a warning light when going under the minimum amount of oil.
Recommendation: The setting for the minimum amount of oil should be chosen so as to ensure that the remaining amount of oil is sufficient for the entire fuel tank capacity.
3. Check the used amount of oil in relationship to the used amount of fuel in order to be able to react in time to a blocked or worn out oil pump.
Note: The consumption of oil is strongly influenced by the fuel setting. If the engine is operated with various loads the oil consumption may vary also.

3. Operation of the System

3.1. Operational means

Only brand name 2 stroke oils may be used. They have to be suitable for oil injection and must be labeled accordingly.

For safe engine operation and least wear Göbler-Hirth Engines recommends **BlueMax AL** 2-stroke oil.

3.2. First Time Operation:

1. Fill fuel tank with at least 10 liters of mixture (1:50).
2. Start engine and let idle.
3. Manually completely open guide disc of the oil pump (**see picture 1**).
4. Check that oil lines fill evenly with oil.
5. After all oil lines have filled with oil, reposition guide disc to the idle position.
6. Let engine run for another 5-10 minutes and turn off.
7. Check all oil lines for leaks and whether the oil pump setting is still correctly adjusted.
8. Operate engine with the rest of the mixture, before refuelling.

3.3. Operation of the Oil Injection System:

See chapter 4 about maintenance and service intervals.

Before each operation it is necessary to ensure, that the oil reservoir contains a sufficient amount of oil for the planned time of operation, since an interruption of the oil supply may lead to serious engine damage.

4. Maintenance-/Service Intervals

Oil injection needs no service with the exception of the components described on the chart.

The following service and checks must be executed:

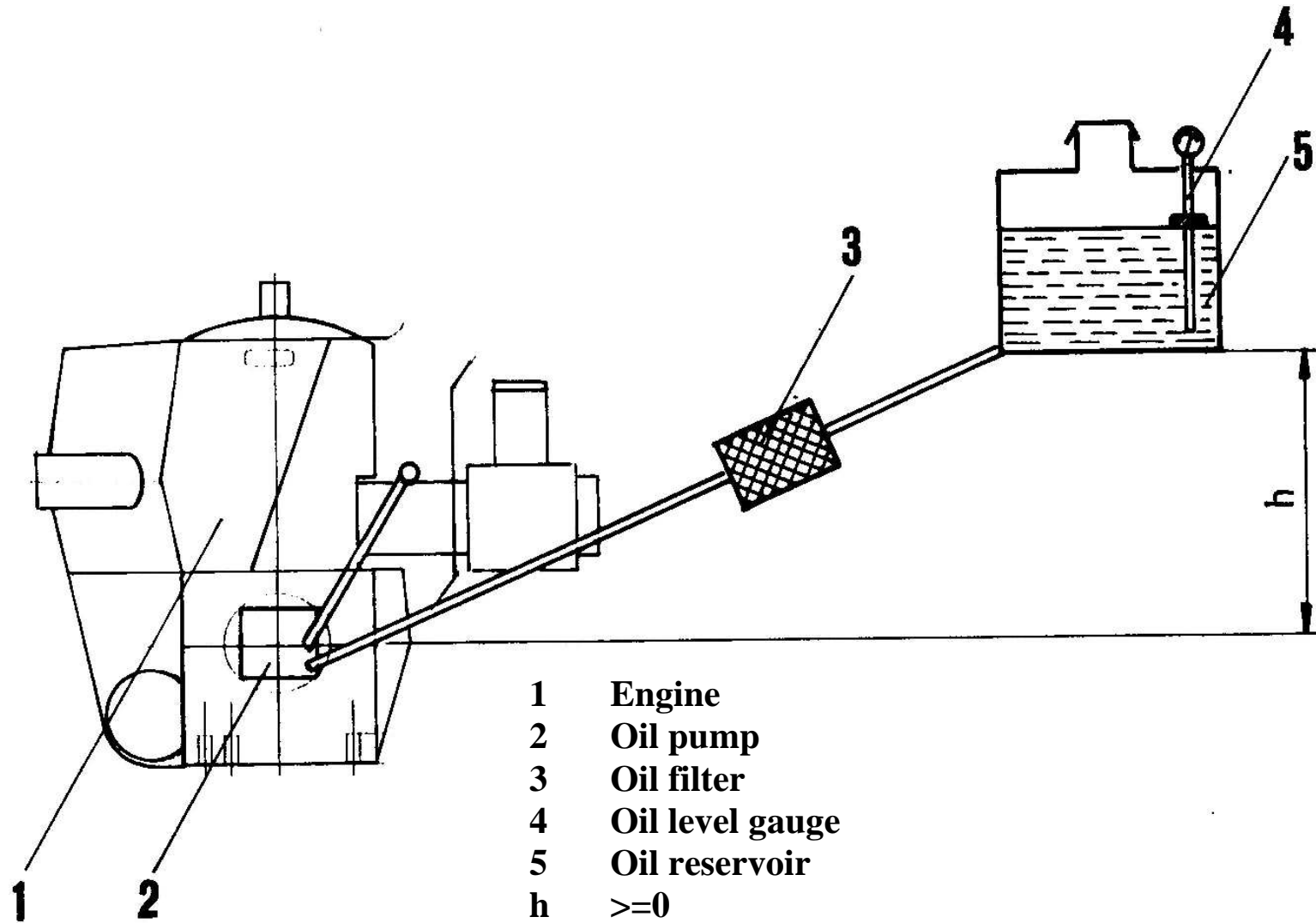
Nr.	Description	Timeinterval				
		In beginning After (hours)				Then every (hours)
		1	5	10	25	
1.	Check setting of oil pump	X				50h
2.	Check whether oil filter is clean		X			25h
3.	Check whether oil pump setting is functioning	Before each operation				
4.	Check oil level in the reservoir	Before each operation				
5.	Check the hydraulic system for leaks	Before each operation				

The following parts have to be replaced:

Nr.	Name	Exchange intervall
1.	Oil filter	Each 200h
2.	Oil pump	Each 1000h

5. Diagram

5.1. Hydraulic Diagram



6. Trouble Shooting

Attention, should it become clear that no or too little oil is being moved, the engine must immediately be changed to a lubrication mixture of 1:50 until the problem is solved, otherwise serious damage to the engine may occur.

Problem	Cause	Control	Elimination
Insufficient oil flow	Oil pump setting not properly adjusted	See Chapter 2.1.	Readjust oil pump setting
	Oil filter blocked	Check amount of flow (see Chapter 2.3. Pos.5)	Exchange filter
Too much oil flow	Oil pump setting not properly adjusted	See Chapter 2.1	Read just pump setting
	Defektive injection valve	Exchange injection valves and check whether or not the defect changes too.	Replace injection valve
No or too small amount of oil in one channel	Oil line blocked or pinched	Check oil lines visually	Exchange oil line
	Oil pump defective	Measure amount of oil flow of all channels without injection valve and with new lines	Exchange oil pump
No amount of oil flow	Inflow stopped up, Oil filter blocked	Check amount of flow (see Chapter 2.3. Pos.5)	Exchange filter
	Oil pump defective	Measure amount of oil flow of all channels without injection valve	Exchange oil pump