Graupner

Instructions
technical data
and accessories

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caractéristiques
techniques
et accessoires

Istruzioni
dati tecnici
e accessori

Glo engines

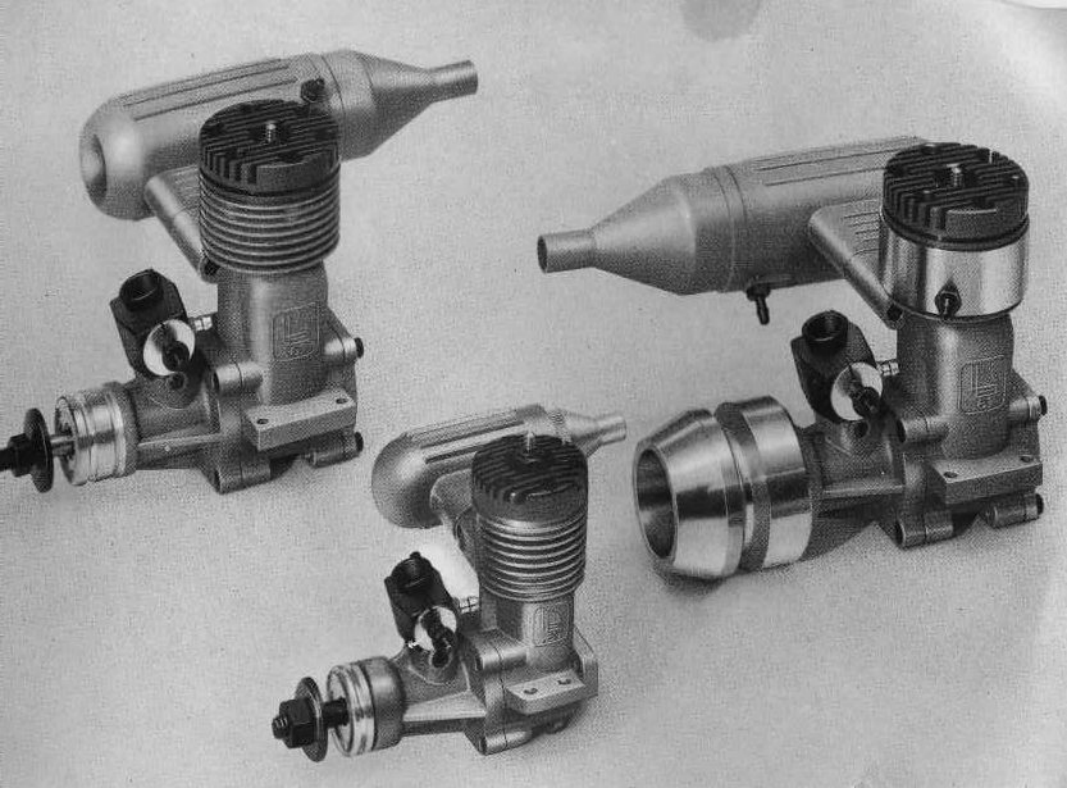
Helmut Bernhardt
engines

Moteurs à bougie

Moteurs
Helmut Bernhardt

Motori a candela

Motori
Helmut Bernhardt



HB 20

3,27 cc = .20 cu.in. displ.
twin ball races
with throttle and silencer
Indent No. **1525**

HB 20

same engine, additionally equipped with water cooling jacket and flywheel
Indent No. **1526** * (not illustrated)

HB 61

9.97 cc = .61 cu.in. displ.
twin ball races
with throttle and silencer
Indent No. **1531**

HB 61

same engine, additionally equipped with water cooling jacket and flywheel
Indent No. **1532** *

* threaded shaft adapter:
Indent No. 452/2

For matching universals and accessories, such as marine propellers, prop shafts etc. refer to the GRAUPNER main catalog FS.

Superlative quality and outstanding performances characterize the model engines of this line.
They are built to the stringent engineering requirements of the art of precise mechanical work.
Modern tools and equipment ensure that ultra-high precision standards are fully met.
Precision matching of all parts for top performance and long life.
The integral throttle ensures instant and reliable throttle response from top speed to a dependable smooth idle, thanks to automatic mixture control, even at the slowest idle possible.
Mufflers, individually tailored to their respective engine types, provide optimum noise reduction without noticeably affecting the power output.
Do read the following instructions thoroughly, so you can fully exploit the potential of these marvellous engines.

Mounting the engine

The engine must be fastened firmly to its engine mount. The HB 20 engine may be either beam or radially mounted. The HB 61 engine sports lateral mounting lugs, but it, too, may be rear-mounted. In the latter case a threaded backplate has to be attached to the rear cover of the crankcase, using the bolts that hold the rear cover in place (see p. 8). Countersink backplate to suit, if the latter is 1/8" or thicker. Attach threaded backplate to a robust firewall of the model.

Technical data

Technical data	HB 20		HB 61	
displacement	3.27 cc	.20 cu.in.	9.97 cc	.61 cu.in.
weight (without silencer)	$6^{3}/_{8}$ ozs.		$14^{16}/_{25}$ ozs.	
power output	.45 hp/12.500 r.p.m.		1,45 hp/13.800 r.p.m.	
speed range	2000—16 000		1800—16 000	
bore	16,1 mm	.634"	24 mm	.945"
stroke	16,0 mm	.63"	22 mm	.866"
shaft thread	$^{1}/_{4}$"—28		$^{1}/_{4}$"—28	

Installation data				
approx. length, less muffler	87,0 mm	$3^{27}/_{64}$"	112,5 mm	$4^{7}/_{16}$"
approx. width, less muffler	43,0 mm	$1^{11}/_{16}$"	64,6 mm	$2^{17}/_{43}$"
approx. height	69,4 mm	$2^{47}/_{64}$"	98 mm	$3^{55}/_{64}$"
spacing of mounting holes lateral	36,5 mm	$1^{7}/_{16}$"	52 mm	$2^{3}/_{64}$"
longitudinal	15,9 mm	$^{5}/_{8}$"	25 mm	$^{63}/_{64}$"
hole diameter	3,1 mm	$^{1}/_{8}$"	3,6 mm	$^{9}/_{64}$"

Recommended propellers (see also chapter "propeller", p. 6)

	diam/pitch		diam/pitch	
Free flight and R/C	20/12 cm	8 x 5"	28/18 cm	11 x 7"
	23/10 cm	9 x 4"	28/20 cm	11 x 8"
			30/15 cm	12 x 6"
Control line	23/15 cm	9 x 6"	—	

Silencer
Engine and muffler have been carefully matched to eachother; modifications are bound to result in a loss of power. Removal of the muffler only serves to make the engine noisier — but does not increase its speed and output. In view of the necessity of combatting the noise nuisance the engine should always be operated with its silencer fitted.

Positioning the tank
Mount tank as close as possible to engine; with its centerline level with the carburettor spray bar. As a result of the ever changing attitude of a model in flight, the suction head, too, varies continuously, resulting in a rich mixture at one moment and a lean one at the next. The closer tank and engine are, and the better the centerlines of fuel tank and spray bar coincide, the less will the disturbing variations of the suction head make themselves felt. The engine may then be adjusted to leaner running, thereby improving its output.

Fuel
GRAUPNER TITAN G fuel with 1 % nitromethane contents is recommended for the break-in period. Once the engine is completely free (refer to chapter "Breaking in your engine", p. 6) it may be operated on GRAUPNER TITAN SUPER G fuel with 5 % nitromethane contents for top performance.

Carburettor needle extension
The carburettor comes with a short carburettor needle, the common type of needle for uncowled engines.
In case a longer needle should be desirable, be sure to install a lightweight extension in order to prevent the fine threads from getting damaged as a result of engine vibrations. The brass bushing supplied with the engine is suitable for the purpose and fits the stepped carb. needle. Insert a length of piano wire of 1 mm Ø (approx. $^{3}/_{64}$") in the small hole of the bushing. Sand and solder these parts. The piano wire is then angled to suit, with the end shortened to approx. $^{13}/_{64}$".

Adjusting the carburettor
Feed fuel to engine via a filter (see accessories, p. 8) which prevents foreign objects from clogging the fine openings in the carburettor.
The middle adjustment disc is sealed by two O-rings. As supplied ex works these rings may tend to stick slightly. This is easily cured by permitting ample fuel to flow via fuel line into the carburettor and by smartly turning the adjustment disc clock- and counter clockwise before one tries to adjust the carburettor setting; this method lubricates and frees the O-rings. Then re-set the disc, with its slot coinciding with the central marking.
Start by adjusting the full throttle setting. To this end the throttle is opened fully, proper mixture for maximum revs being obtained by adjusting the carburettor needle accordingly: screwing the needle in will lean out the mixture, unscrewing it provides a richer mixture. Be sure to check engine for reliable running at all attitudes, in particular with the model held vertically and its engine running at various speeds. The engine — provided it has been equipped with a stunt tank — must not stop or stutter under these conditions.
Idle setting adjustment follows next. This is obtained by turning the screw located at the side of the venturi. Idle mixture is controlled via the slotted disc, using a screwdriver to rotate the latter. Turning the disc clock-

wise makes the idle mixture leaner, turning it in the opposite direction makes it richer.
In case the engine tends to speed up while idling and then stops, this is an indication that the mixture is too lean. If the engine slows down and stops, the mixture is too rich. Lean it out.
After optimum idle setting has been found the engine will tick over at the lowest practical idling revs, yet respond instantly when full throttle is applied after prolonged idling without missing a beat.
Proper idle setting can only be obtained after the engine has been broken in and is perfectly "free".

Propeller
Selecting the best propeller for a particular engine requires taking a lot of aspects into account; so there is no such a thing as a fast rule for choosing the right propeller. Too much depends on the aerodynamic features and the weight of the model with which engine and prop are to go. And whether the three components are properly matched for optimum performance can only be proved in practice. The table on p. 4 lists various prop sizes to start with. Properly balanced airscrews pay dividends by improving performance and running properties. A propeller insert of approx. $^1/_4$" O.D. is supplied with the HB 61 engine; it fits the bore of the propeller. In case the latter sports a stepped bore ($^{23}/_{64}$— $^{25}/_{64}$") the insert is used in conjunction with the airscrew adapter, indent No. 194.
By inserting a length of $^3/_{64}$" Ø wire in the hole of the insert any unbalance of the prop can be checked and detected. In the case of a plastic propeller the heavier blade may be scraped down, until balance has been obtained. In the case of a wooden propeller paint the lighter blade with clear varnish. As the latter loses weight on drying, the process must be repeated. Balance prop when completely dry; add another coat of varnish, if necessary.

Glo plug
See relevant column of chapter "accessories" on p. 8 for recommended glo plugs.
The element of the live glo plug should glow bright orange; this can be easily checked if the glo plug has been removed from the engine. If the plug glows dull red shorten the leads. After prolonged operation the element may get fouled up by residue. Replace glo plug by a new one in such a case.

Starting the engine
On principle the engine should be started set for i d l i n g. Inject a little fuel in the carburettor, slowly rotating the prop at the same time. Then wire the glo plug and flip the prop over. With idle setting properly adjusted the engine should fire instantly. Allow engine to pick up speed for five seconds or so, then disconnect leads.

Breaking in your engine
The engine mixture should be rather rich for the first run at full throttle for some 30 minutes (turn carburettor needle clockwise). Stop engine at 5 minute intervals, restart engine after a short while. If desired the engine may be left running at idling speed for one minute between the 5-minute hi-speed runs, instead of stopping it.
Experienced modellers may break in their engines after installation in the models which they are to power. The mixture should be very rich and the engine should be alternatively run at full throttle — idling — full throttle. After about 2 hours of running the engine should be completely free and deliver its peak output.

Instructions

HB 61 with left-hand rotation
The design of the HB 61 engine permits it to be run anti-clockwise, if desired. By simply altering the direction of rotation it may therefore be used in conjunction with standard, i. e. right-hand propellers for pusher installations. It is converted to pusher operation (i. e. left-hand rotation) by removal of the crankcase backplate and the front part of the crankcase, complete with crankshaft. The front part plus crankshaft assembly is then mounted at the rear end of the motor, in place of the back plate. The front assembly has to be rotated by 90° so that the carburettor is now located at the side sporting the transfer channel. Close the remaining open end of the assembly by adding the backplate. In the case of the now anti-clockwise running engine, care must be taken to fasten the propeller firmly, preferably by using contranuts. Due to the reversal of the direction of rotation the nut tends to unscrew if not tightened firmly.

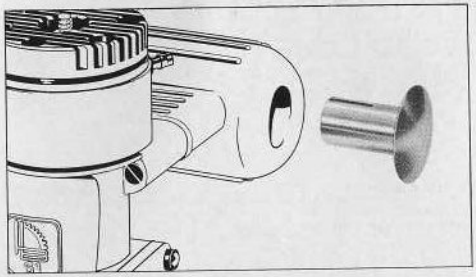
Care and maintenance
Wrap engine in clean linnen cloth, while not in use, to protect it against dirt and dust.
If the engine is to be cleaned, squirt unleaded gasoline or filtered kerosene through inlet and exhaust ports and slowly turn propeller over several times. After cleaning the engine squirt a few droplets of very fine machine oil through inlet and exhaust ports, rotate propeller several times again.
If you wish to dismantle the carburettor, mark the position of the idle setting disc for foolproof reassembly of the carb. After removal of the carburettor needle including spring, remove the circlip. Next follows the idle setting control screw, the carburettor plug is then pulled out at the throttle lever. This permits the idle mixture control disc to be removed from the carburettor body. Re-assembly follows the same procedure, but in reverse order.
Careful handling and proper maintenance of these engines guarantee permanent "availability" and uniform peak performance. It pays to treat our engines well.

Accessories
(for indent Nos. refer to table, p. 8/9)

Spinner
required for engines using mechanical starters and Quickstart devices

HB 61 silencer spacer
permits increasing the distance cylinderhead to silencer by $^{25}/_{64}$"

HB 61 silencer plug
used for plugging the air intake of the muffler, helps keep the interior of boat hulls free of fuel residue.



Accessories

for detailed descriptions and miscellaneous accessories refer to GRAUPNER main catalog FS

Engine accessories	Indent No.
1.5 volt glo plug	177/2
1.5 volt throttle-type glo plug	1604
fuel filter	1648

Engine mounts	Indent No.
engine mount for .488 cu.in. displ. engines and up	1611
1/4" threaded backplate for .30—.60 cu.in. engines	149

HB 61 mounting hardware	Indent No.
hexagonal slotted screw M 3.5 x 30, steel, nickel-plated, pack of 20	690
hexagonal nut M 3.5, steel, nickel-plated, pack of 20	695
hexagonal STOP nuts M 3.5 steel with plastic insert, pack of 20	696

glo plug clip	Indent No.
clip wired to plug for DAIMON No. 195 dry battery	1628
clip, less accessories	1608
dual leads, 2 x 1/32" Ø, 79" lg.	3532

Starter batteries	Indent No.
DAIMON 1.5 volts dry battery	195
VARTA lead accumulator 2 volts/3Ah *	3625
SONNENSCHEIN accumulator 2 volts/6 Ah *	206
SONNENSCHEIN dryfit accumulator 2 volts/7.5 Ah *	3694

* = rechargeable; use versatile charger MULTILADER ind. No. 3685

Fuels	Indent No.
TITAN G, with 1 % nitromethane contents	
.5 l = .11 Imp. Galls.	1632
5 l = 1.1 Imp. Galls.	1632/5L
TITAN SUPER G, with 5 % nitromethane contents	
.5 l = .11 Imp. Galls.	1633
5 l = 1.1 Imp. Galls.	1633/5L
TITAN SUPER G 12, with 12 % nitromethane contents	
.5 l = .11 Imp. Galls.	1634
5 l = 1.1 Imp. Galls.	1634/5L

Starters	Indent No.
HECTOPERM 12 volts electric starter	1620
BOSCH 12 volts electric starter	1600
TAIFUN recoil starter	1602

Rev. Counter	Indent No.
MULTIMETER combined with Universal meter 18 test ranges, electronic "no-friction-load" r.p.m. indicator	3506

Spare parts and accessories

Spare parts	HB 20 Ind. No.	HB 61 Ind. No.
prop nut	1525/1	1531/1
prop washer	/2	/2
driving washer	/3	/3
clamping cone for drive washer	/4	/4
crankshaft	/5	/5
crankcase	/6	/6
crankcase front section	/7	/7
crankcase rear cover	—	/8
connecting rod	/9	/9
piston bolt	/10	/10
cylinder head	/11	/11
gasket set	/12	/12
cylinderhead and crankcase bolt set	/13	/13
carb. needle with spring	/14	/14
carburettor	/15	/15
set of carburettor threaded pins	/16	/16
cylinder liner	—	/17
piston ring	—	/18
piston	—	/19
cylinder liner with piston	/20	—
front ball race	/21	/21
rear ball race	/22	/22
silencer with bolts	/23	/23
set of silencer bolts	/24	/24
crankcase with water cooling jacket	1526/25	1532/25
water cooling jacket gasket	/26	/26
flywheel	/27	/27
Accessories		
glo plug	177/2	177/2
throttle-type glo plug	1604	1604
spinner	254	254
spacer for silencer	—	1540
silencer air intake plug	—	1541

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Modelle
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