SERVICE MANUAL WITH PERIODIC INSPECTIONS TIMETABLE ENGINE AEROHONDA BF 50D

CONTENTS

PART 1
G E N E R A L I N F O R M A T I O N

1.1 INTRODUCTION

This Service Manual has been prepared to provide pilots and mechanics with neccesary information needed for safe and efficient use of AEROHONDA BF 50D engine, installed on J-6 Fregata motorglider.

1.2 BASE OF APPROVAL

This engine has been approved with the J-6 Fregata motorglider by the Civil Aviation Authority in accordance with the SPECIAL categories: TEMPORARY AIRCRAFT TESTING RULES built in single copies.

1.3 CAUTIONS, WARNINGS, REMARKS

CAUTION:

INDICATES THAT THE FAILURE OF FOLLOWING APPLICABLE PROCEDURE WILL ENDANGER OR DETERIORATE FLIGHT SAFETY.

WARNING:

INDICATES THAT THE FAILURE OF FOLLOWING PROCEDURE LEADS TO MINOR OR LONG-TERM MORE OR LESS FLIGHT SAFETY DETERIORATION.

REMARK:

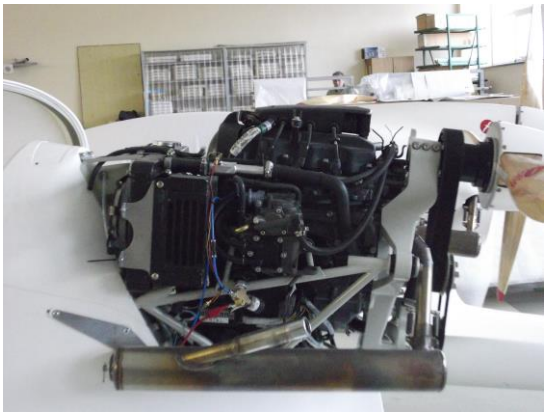
Draws attention to detail not related directly to the safety of the flight, but important or unusual.

PART 2

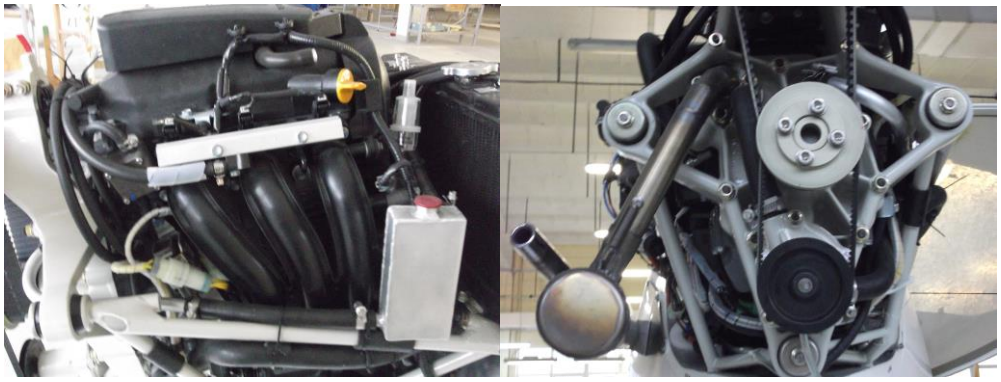
D E S C R I P T I O N

2.1 INTRODUCTION

AEROHONDA BF 50D engine was made as the result of adjustments the drive to motorglider outboard motorboats. Adaptation consisted mainly of repositioning the engine from vertical to lateral (setting the crankshaft axis), and the addition of a belt transmission decreasing routes.



Engine installed on fuselage



Engine mount viewed from the one side and from the side of the transmission.

2.2 DESCRIPTION

Three cylinders – 4 strokes – spark plag ignition, in-line engine.

Cooling – liquid – forced by pump in closed system.

Lubricating – pressure, dry sump, additional oil reservoir.

Feeding – direct injection (programmable).

Ignition – magnetos (electronic) - single.

Propeller drive unit – by belt transmission.

Electrical starter.

AC generator.

Mechanical end electrical fuel pump.

PART 3

T E C H N I C A L D A T A

3.1 TECHNICAL DATA

3.2 POWER CHARACTERISTIC

3.1 TECHNICAL DATA

3.1.1 Weight and dimensions:

Cylinder diameter	70 mm
Piston travel	70 mm
Piston displacement	808 cm^3
Compression ratio	9.2 : 1
Propeller torque direction:	to the left viewed from the side of propeller (transmission)

Engine weight including transmission, liquids and radiators: 56 kg

3.1.2 Equipment:

Magneto	electronic, maintenance-free (CDI)
Advance angle	**5 - 32°** before top dead centre
Ignition sequence	1-3-2

Spark plugs	NKG DR7EA or ND X 22 ESR-U
Spark air gap	0.6 – 0.7 mm
Ignition harness one set	
Injection	indirect - programmable
Fuel pump	mechanical and elecrical
Generator	AC generator placed inside handwheel
Starter	electrical
Transmission	double reduction final belt and mechanic drive, total ratio 1:2.12
Propeller hub	shaft shoulder

3.1.3 Power

Take-off (5 minutes)	36.8 kW/50 KM at 5750 rpm
Continuous	34.8 kW/46.3 KM at 5250 rpm

3.1.4 RPM of the engine

The highest take-off value	5750 rpm
Maximum continuous value	5250 rpm
Idle cut-off value	around 1000 rpm

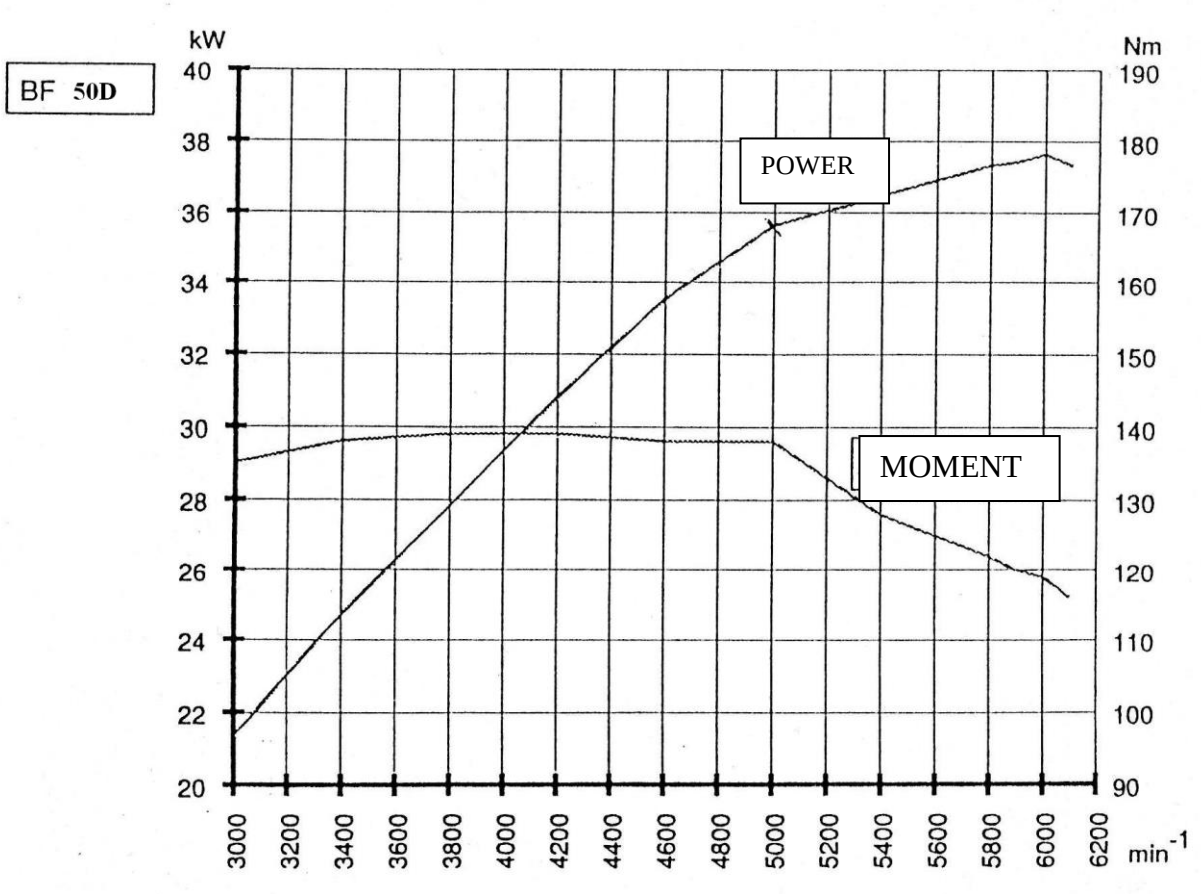
3.1.5 Fuel and oil

Fuel:	automotive, unleaded, anti-knock value min.95 or AVGAS 100 LL, 85ul
Oil:	minimum SAE 5W-30 synthetic recommended 5W/30
Oil pressure:	min 1.5 kG/cm^2
Oil temp.:	minimum 40^oC (104^oF) maximum 120^oC (248^oF)

3.1.6 Cooling liquid:

automotive liquid for coolers based on glycol, according to specification of ASTM D3306 and ASTM D4985 (boiling temperature above 120^{o}C)

3.2 POWER CHARACTERISTIC



PART 4

M A N U A L

4.1 BEFORE STARTING-UP

Has everyday inspection been made ?

Chceck for leakage under engine cowling.

Make sure for sufficient level of oil and cooling liquids.

Throtlle must be in closed position and check for free of movement.

4.2 STARTING-UP

Caution: chceck if the propeller area is clear.

Fule valve	open
Throttle	close
Battery master	on
Ignition	on
Starter switch	on

After start-up immidiately switch off the starter. Check oil pressure (should increase in around 20 sec.).

4.3 WARMING UP

In low temperatures (below 5° C) warming up should be performed at 2500 – 3000 rpm not longer than 1 min. Do not exceed 5750rpm and permissible oil and colling liquid temperatures.

Next perform run-up test:

- check maximum rpm (value according to airframe service manual),
- check minimum and maximum rpm passage and opposite,
- check if the engine has no tendency to shutting-down when moving throtlle rapidly from minimum to maximum position,
- check regurality of engine working at minimum and maximum rpm.

CAUTION:

In the time of engine run-in that takes around 30 hours slowly increase and decrease the rpm without overloading (not a long time to work at high speed) the engine.

4.4 START

Smoothly open throttle up to maximum position and continue take-off to 100m AGL, then reduce power to 5250rpm.

Pay attention on oil pressure and temperature. Do not exceed permissible limitations.

4.5 SHUTTING DOWN

Under normal conditions, the cooling system keeps the temperature of the engine that allows shutting down after taxiing or after the run-up test. However, if the coolant temperature is close to the maximum (100 ÷ 120 ° C), the engine should be cooled to a temperature of about 80 ° C.

4.6 SHUTTING DOWN AND STARTING DURING THE FLIGHT

In order to shut down, set throttle to idle cut-off position, reduce velocity to around 100kph and off ignition..

Starting engine in the air.

Permorm start-up as usuall done on the ground and lead all the parameters to normal values.

PART 5

P E R I O D I C I N S P E C T I O N S

5.1 DAILY INSPECTION

5.2 PERIODIC INSPECTION

5.3 INSPECTION AFTER FIRST 20 HOURS OR 1 MONTH

5.4 INSPECTION AFTER 100 HOURS OR 6 MONTHS

5.5 INSPECTION AFETR 200 HOURS OR 12 MONTHS

5.6 INSPECTION AFETR 400 HOURS OR 2 YEARS

DAILY INSPECTION

- remove engine cowlings if any leakage of oil or cooling liquid was found,
- thoroughly check the engine if there is no lack or loose nuts, bolts, pins, etc., check security, places exposed to friction and ignition wires,
- check control surfaces and throttle for proper movements,
- check oil quantity in reservoir,
- check cooling liquid quantity,
- check mounting of all fuel, oil and cooling system lines,
- chceck if there is no oil, fuel and cooling liquid leakage,
- check mounting of all engine components,
- check condition and tension of tothed belt and clearance for propeller shaft,
- check condition and tension of V-belt that drives cooling system pump,
- check mounting of engine cowlings,
- chceck mounting of exhaust silencer,

5.1 PERIODIC INSPECTION

After first 20 hours (or after 1 month – whichever comes first) perform maintenance according to point 5.3, next maintenace must be performed after 100 hours (or after six months – whichever comes first) and every time after next 100 hours according to point 5.4.

After every **200** hours (or after 12 months – whichever comes first) additionally perform maintenace according to point 5.5.

After every **400** hours (or after 24 months – whichever comes first) additionally perform maintenace according to point 5.6.

5.2 INSPECTION AFTER FIRST 20 HOURS OR 1 MONTH

- Replace oil and strainer
- Check and if needed, adjust throttle
- Grease lubricant fitting
- Check connections of electrical wires
- Check all nuts and bolts
- Check torque moments of bolts, pins and nuts and if needed, tighten them:
  - propeller to hub
  - engine to engine mount
  - engine mount to fuselage

  Secure connections of bolts and nuts.

5.3 INSPECTION AFTER 100 HOURS OR 6 MONTHS

- Replace oil and strainer
- Check and if needed, adjust throttle
- Check connections of electrical wires
- Check and if needed, clean all spark plugs
- Check all bolts and nuts and if needed, tighten them
- Check fuel filters (high and low pressure)

5.4 INSPECTION AFETR 200 HOURS OR 12 MONTHS

- Change oil in gearing
- Check condition and tension of camshaft belt
- Check tapet clearance and if needed, adjust
- Check operation of thermostat
- Replace spark plugs
- Replace V-belt of cooling system pump

- Check internal anode
- Clean fuel filters and tanks
- Check venting
- Check cooling system pump

5.5 INSPECTION AFETR 400 HOURS OR 2 YEARS

- Replace tothed belt of propeller transmission
- Replace ignition harness
- Change cooling liquid (unless manufacturer recommends shorter time of replacing)
- Replace fuel filters (high and low pressure)
- Replace fuel lines

PART 6

M A I N T E N A N C E

6.1 OIL CHANGE

After heating the oil to a temperature above 50 ° C drain the oil from the reservoir that is located inside the hull. For this action is to be prepared, so as not to pour the hot oil to the interior of the hull. Then, drain the additional starting tank placed in the engine and after oil filling plug to installation. Fill the oil tank to the required level.

In case of any doubts that may indicate oil contamination (for example fillings) check oil stariner by unscrewing, cutting it and examining the oil strainer element.

6.2 COMPRESSION CHECK

If you suspect that the compression in any of the cylinders can be reduced, it should be measured by the direct method, at around 500rpm. Compare the result with a nominal value of 15±1 kG/cm^2.

6.3 REPLACEMENT AND MAINTENANCE OF SPARK PLUGS

After 100 hours all the spark plugs must be removed from engine head. Before removing, clean seats of dust and dirt. Check clearance of electrodes – that contains between 0.6-0.7 mm (adjusting by side bend the electrode). Visually inspect the insulators for cracks or defects. In the case of detection of such defects in at least one spark plug should all be replaced. Spark plugs with new (unused) sealed, screw using your fingers and then use a spark plug wrench, tighten by ½ turn. If the seal has been used, but the state does not raise any objections, it can be used it with your fingers tightening and tightening spark plugs with key by ⅛ - ¼ turn.

6.4 INSPECTION AND TENSION ADJUSTMENT OF PROPELLER TRANSMISSION TOTHED BELT

Measurement carried out by pressing the tension force of 1 kg in the middle of the strip. The deflection of the belt measured in relation to the state of no pressure should be in the range of 7 - 8 mm.

In case of improper tension (too big or too small deflection) of toothed belt the adjustment should be carried out. To do this, loosen the three screws fixing the bushing bearings in the propeller gearbox housing. Then turn the bushing and using the eccentric rear bar lead to the correct tension. Torque moment is 1 kgm.

6.5 OIL STARINER REPLACEMENT

After 100 hours or 12 months during oil change the oil strainer must be replaced as well.

6.6 FUEL FILTERS REPLACEMENT

After 400 hours or 2 years fuel filters must be replaced with new. After closing the fuel valve all the unscrew the fuel lines. Then replace the filters, installing new fuel lines and hose clamps to seal it.

6.7 TAPPET CLEARANCE

After gaining access to the shaft levers set the timing of the first cylinder piston at top dead center and using traditional method check and set the correct tappet clearance. Then, turning the crankshaft by 120 ° just set the clearance for the second cylinder. After turning by 120 ° repeate procedure for the third cylinder. Tappet clearance (on a cold engine) must contain in the following limits:

Intake valve: 0.13 – 0.17 mm,

Exhaust valve: 0.21 – 0.25 mm.

PART 7

R E P A I R S

7.1 INTRODUCTION

Any damages occured, even the smallest one must be reported to engine manufacturer.

DO NOT PERFORM ANY REPAIRS WITHOUT CONTACT WITH THE MANUFACTURER OF AEROHONDA BF 50D ENGINE.

PART 8

L U B R I C A N T S T A B L E

MANUFACTURER RECOMMENDS USING SYNTHETIC OIL
(VISCOSITY CLASS OF 5W/30)
IN TOTAL AMBIENT TEMPERATURE RANGE.

PART 9

T O R Q U E M O M E N T S

Torque moments are given in HONDA MARINE BF 40D, BF 50D SHOP MANUAL issued by HONDA MOTOR CO., LTD. march 2008.

Other moments as follows:

Torque moment for M8 Bolts that fasten tarnsmission housing to engine corpus is 2.2 kGm

Torque moment for nuts that fasten propeller is 1.5 kGm M8

Tabel of standard torque moments

Type of connection	Thread diameter	Torque moment
		kGm
Bolts and nuts	5 mm	0.5
	6 mm	1.0
	8 mm	2.1
	10 mm	3.5
	12 mm	5.5
Bolts and flange nuts	6 mm	1.2
	8 mm	2.7
	10 mm	3.5
	12 mm	6.0
Screws	5 mm	0.4
	6 mm	0.9