



**BOMBARDIER-ROTAX GMBH**

MOTORENFABRIK A-4623 GUNSKIRCHEN · AUSTRIA

**M A N U A L**

for

ROTAX-engine type 501

Manufacturer: BOMBARDIER-ROTAX GmbH  
A-4623 Gunskirchen/Austria

Engine serial no.: . . . . .

Aircraft type: . . . . .

Registration no.: . . . . .

Operator: . . . . .

1st Edition: December 1978

Approved by the Federal Office for Civil  
Aviation, Austria

- ROTAX 501 -

TABLE OF CONTENTS

1. Cover page	page 1
2. Table of contents	page 2
3. Log revisions	page 3
4. General engine description	page 4
5. Technical data	page 5
6. Operational data and limitations	page 6
7. Operating instructions	page 7
8. Maintenance instructions	page 9
9. Trouble shooting	page 12
10. Wiring diagram	page 14
11. Power curve	page 15

December 1978

page 2

### 3. Log revisions

December 1978

- ROTAX 501 -

4. General engine description

Twin-cylinder in line- 2-stroke  
Otto engine  
ram air cooling  
lubrication by fuel-oil-mixture  
single magneto ignition  
crankshaft layout for belt trans-  
mission  
electric starter  
AC-generator  
pneumatic fuel pump

December 1978

page 4

5. Technical Data

Bore: 2 x 72 mm  
Stroke: 61 mm  
Displacement: 496,7 cm<sup>3</sup>  
Compression ratio: 10,8 : 1  
Ignition unit: BOSCH magneto generator  
SCP 2, 12V 140W  
Contact breaker  
gap: 0,35 - 0,45 mm  
Ignition timing: 2,07 ± 0,25, 19° B.T.D.C.  
Spark plugs: NGK B8ES, Champion N3  
Bosch W 250 T2  
Electrode gap: 0,4 - 0,6 mm  
Carburetors: 2 TILLOTSON diaphragm type  
carburetor HR  
main jet size 0,046  
Direction of  
rotation: counter-clockwise rotation  
looking on drive side  
Starter: inertia drive electric  
starter BOSCH Type DG  
Fuel: 2-stroke mixture  
Premium fuel not below  
ROZ 96  
AVGAS 100LL  
Lubrication: Oil-fuel mixture, mixing  
ratio 1 : 40, with Super  
2-stroke oil  
Weight: with exhaust system and  
electric starter 33,5 kg

6. Operational data and limitations

Take-off power:	31,7 kW/43 HP at 6200 1/min
Maximum continuous power:	29,5 kW/40 HP at 6050 1/min
Maximum allowed r.p.m.:	6800 1/min
Recommended cruising r.p.m.:	6050 1/min
Idle r.p.m.	approx. 2000 1/min
Further data see page 15	
Temperature of cylinder head:	Measured with thermo-couple under spark plug, max. 250 °C allowed

Fuel consumption:

at 100 % power:	approx. 22,4 l/h
at 75 % power:	approx. 17,2 l/h

## 7. Operating instructions

For correct function of engine it is imperative to observe exactly the following operating and maintenance instructions.

### 7.1 Before starting the engine:

Has daily check been made? (See page 9)

Open throttle lever fully.

Check throttle lever for free movement on full range.

Check choke command to open and close fully.

Ignition: "OFF"

Turn propeller several times by hand to check for abnormal noises or heavy motion of engine.

### 7.2 Starting:

Wheel brake . . . . . locked

Propeller brake . . . . . released

Fuel cock . . . . . open

Choke . . . . . close 3/4 to fully

Throttle lever . . . . . 1/4 open from idling position

Ignition / main switch "ON"

Starter button . . . . . press

As soon as engine has started, release starter button, open choke and set throttle lever in a position that engine runs smoothly at 2000 1/min.

### 7.3 Warmup, ground test:

Allow engine to warm up at 2000 1/min for about 2 minutes, then continue warming up during taxiing at increased r.p.m.

#### 7.4 Starting

Accelerate up to full throttle, maintain this throttle position during initial climb, then reduce power. Observe temperature of cylinder head. The limit values must not be exceeded.

#### 7.5 Stopping

Before stopping the engine run it for approx. 1 minute at idle speed to balance heat stress and to build up a sufficient lubricating film.

Then stop engine by switching off the ignition. In case of run-on actuate decompressor.

#### 7.6 Stopping and starting the engine during flight:

To stop, set throttle lever at idle speed, reduce speed to about 100 km/h and switch off ignition. The propeller continues turning after switching off the ignition (wind mill effect). Actuate decompressor and if necessary propeller brake.

Starting procedure is the same as on ground. As long as the engine still is warm, the choke remains pushed.



## 8. Maintenance instructions

### 8.1 Daily check before flight:

Check fuel quantity.  
Check throttle lever, choke and decompressor  
for free movement.  
Check outside of engine, engine compartment,  
belt transmission, covering sheet and  
mountings for proper condition.

### 8.2 Inspection after every 12 1/2 hours of operation or once a year:

Replace spark plugs.

### 8.3 Inspection after every 25 hours of operation or once a year:

Visual control of engine.  
Replace fuel filter.  
Check fuel line for its condition and  
for leaks.  
Check mounting screws for tightness.  
Check wires and electrical connections.  
Check ignition timing.  
Clean carburetor cover.  
If necessary, re-adjust idle r.p.m.  
Clean engine.  
(At first 25 hours inspection re-tighten  
cylinder head nuts to 18 - 21 Nm).  
Check and grease starter gear.  
Check ignition damping box.

8.4 Inspection after 300 hours of operation:

General overhaul by manufacturer or by a maintenance workshop authorized by the manufacturer and the civil aviation authorities.

8.5 Conservation and storage of engine:

If the engine is stored for prolonged time (2 months and more) or is out of use, preserve and store it as follows:

When engine is warm, inject approx. 20 c.c. of conservation oil (Shell Ensic, Mobil-arma 524, BP Protective Oil or adequate oil) and stop engine. Crank engine through by hand until compression can be felt. Cover intake openings on carburetors and exhaust tube on muffler. Drain fuel system.

8.6 Table of screw torques:

Spark plug:	28 Nm
Cylinder head screw:	20 Nm
Magneto flywheel:	100 Nm
Drive pulley:	50 Nm
Crankcase studs M12:	50 Nm
and screws: M8 :	24 Nm
M6 :	10 Nm

### 8.7 Setting idle speed:

Set throttle valves synchronous by turning the idle speed screws. The idle mixture screws should be set  $3/4$  open. Let engine run warm and set idle speed at 2000 1/min by simultaneous turning of both throttle stop screws. It should be tried to achieve smooth running of engine by separate adjustment of the idle mixture screws. Check adjustment by alternating actuation of throttle valves and observation of engine reaction, which has to be equal on both carburetors.

### 8.8 Inspection of ignition timing:

The ignition timing mark is stamped on the starter gear. As corresponding mark take the crankcase parting line on exhaust side. For checking the ignition point, an ignition setting device (buzzer or check lamp) has to be connected to the shorting line of the respective ignition circuit. The opening of contact breakers is indicated by a change of the buzzing tone or shine of the lamp.

The ignition is set correctly if the spark comes within 2 mm before or after the timing mark.

For correction, the contact breaker has to be re-set.

### 8.9 Function control of ignition damping box:

Take off spark plug protector, switch on ignition, crank the engine - ignition spark appears.

Exchange connections of ignition damping box - if function is correct - no spark occurs.

- ROTAX 501 -

9. Trouble shooting

Engine does not start:

No fuel supply:

Check fuel line to carburetor.  
Check function of fuel pump.  
When starting cold engine: Choke  
does not close fully.

No spark:

Shorting cables remain connected to  
ground or short circuit of the wires  
to ground.  
Electrical connections to the igni-  
tion coils are out of order. See  
wiring diagram.  
Check spark plugs and ignition unit.

Engine is flooded:

Actuate decompressor and actuate  
starter until engine starts,  
or:  
Start at full throttle until engine  
starts.

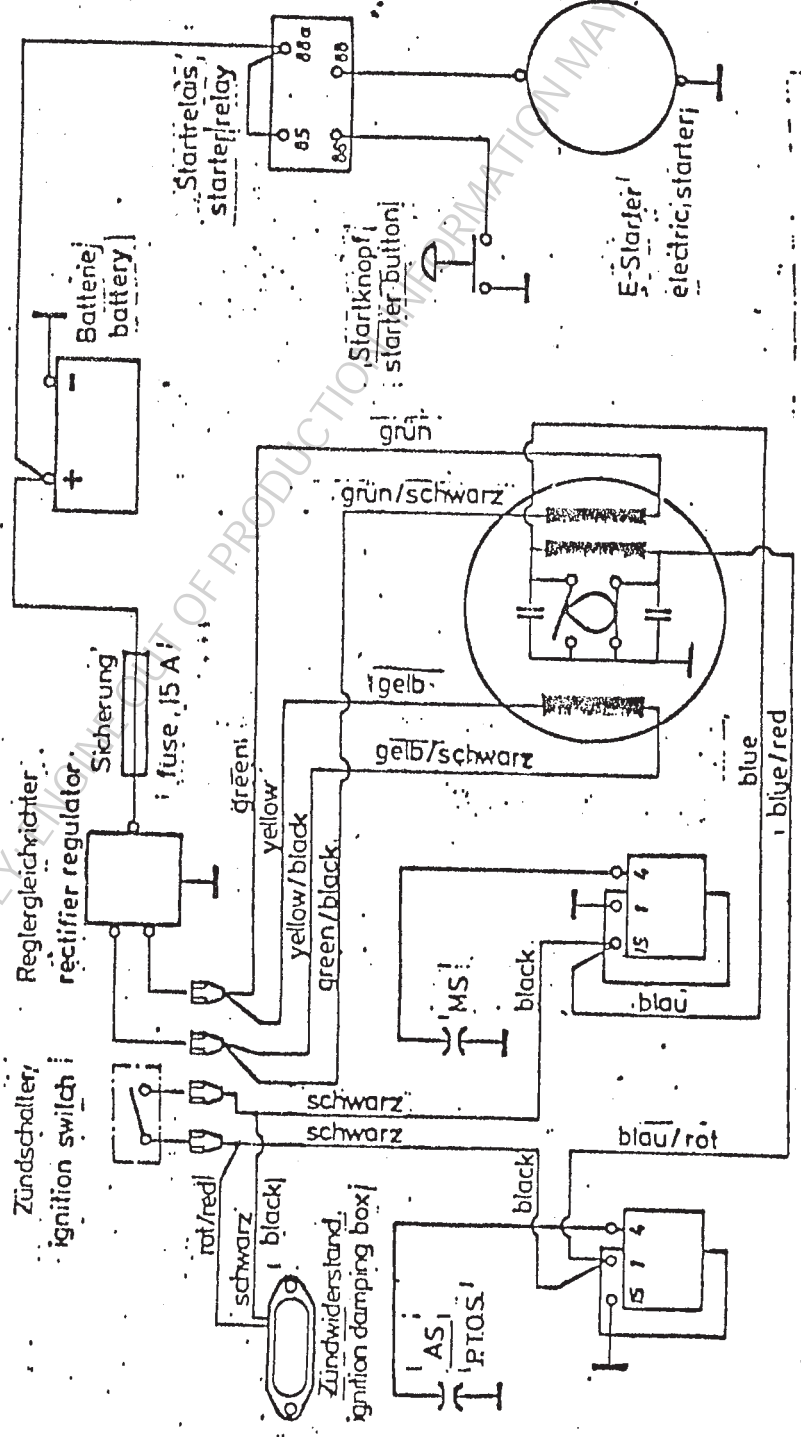
Engine gets hot:

Carburetor jets clogged.  
Insufficient fuel supply.  
Fuel filter clogged.  
Ram air guiding out of order.  
Spark plug defective.  
Ignition out of adjustment.

Engine does not reach ground-test r.p.m.:

Fuel supply insufficient.  
Carburetor contaminated.  
Throttle valve does not open fully.  
Choke does not open fully.  
Spark plugs defective.  
Decompressor leaking.  
Impulse line for fuel pump clogged  
or leaking.  
Inspection by manufacturer or in an  
authorized maintenance workshop  
(see 8.4).

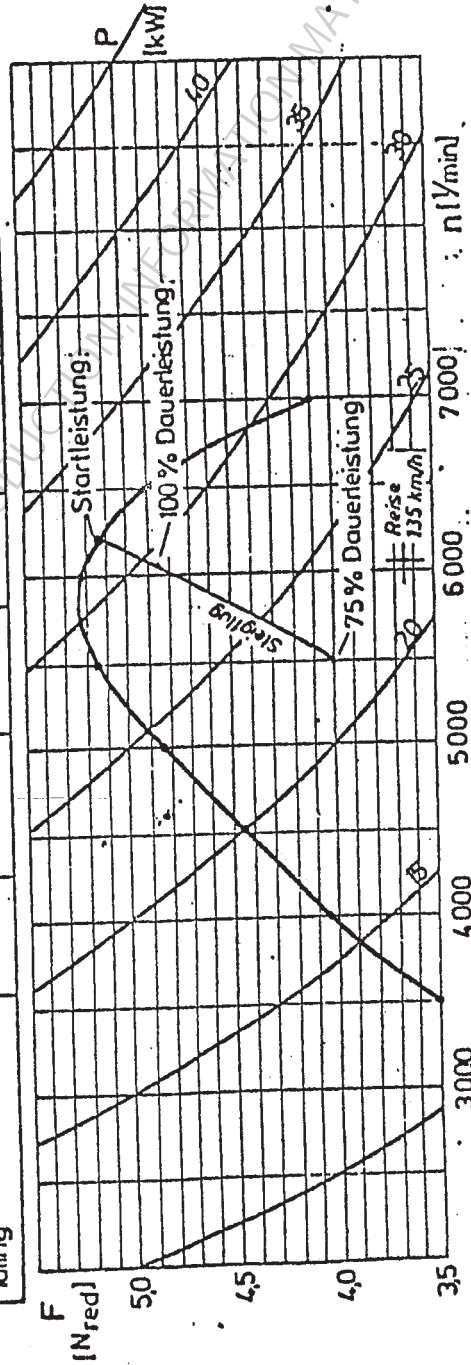
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Leitungsschema ROTAX 501  
Wiring Diagram

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	F [N]	n [1/min]	P		b <sub>e</sub> [g/kWh]	B [h]	KS-Temp [°C]
			[kW]	[PS]			
Startleistung max. power	5,1	6200	31,7	43	500	21,9	200
Höchste Dauerleistung max. continuous power	4,85	6050	29,5	40	550	22,4	200
75% Dauerleistung 75% power	3,65	6050	22,1	30	564	17,2	190
Leerlauf idling	-	2000	-	-	-	-	-



Leistungsbblatt ROTAX 501  
Power Sheet

Ausgabe : Oktober 1978  
Edition

Blatt 15  
Sheet