

14 TROUBLESHOOTING

<i>Does fuel reach the carburetor?</i>	NO → YES ↓	1. Fuel tank empty 2. Faulty fuel intake ¹
<i>Does fuel reach the engine?</i>	NO → YES ↓	1. Blocked carburetor
<i>Does the carburetor overflow?</i>	YES → NO ↓	1. Faulty float valve operation ²
<i>Is the engine flooding?</i>	YES → NO ↓	1. Excessive use of choke or primer 2. Too long starting periods 3. Faulty ignition system ³ 4. Fuel/air mixture too rich ⁵
<i>Is there a spark at the spark plug cap?</i>	NO → YES ↓	1. Ignition switch in off position 2. Faulty ignition system ³
<i>Is there a spark at the spark plug</i>	NO → YES ↓	1. Spark plug problem ⁴
<i>Is the engine hard to start?</i>	YES → NO ↓	1. Wrong ignition timing 2. Faulty carburetor 3. Water or ice in fuel 4. Throttle open at the same time as choke 5. Wrong idle air screw adjustment 6. Too much clearance of rotary valve or wrong timing (if so equipped) 7. Insufficient pretension of spring washers (A and B gearboxes) 8. Faulty float valve operation ² 9. Spark plug problem ⁴ 10. Fuel/air mixture too rich ⁵ 11. Fuel/air mixture too lean ⁶ 12. Low compression ⁷ 13. Pressure loss ⁸ 14. Excessive propeller load ⁹
<i>Does the engine backfire without starting?</i>	YES → NO ↓	1. Wrong ignition timing 2. Misaligned magneto flywheel
<i>Does the engine run on only one cylinder?</i>	YES → NO ↓	1. Wrong ignition timing 2. Faulty ignition system ³ 3. Spark plug problem ⁴ 4. Low compression ⁷ 5. Pressure loss ⁸
<i>Does the engine turn over with very little resistance?</i>	YES → NO ↓	1. Low compression ⁷
<i>Is the engine blocked in its rotation?</i>	YES → NO ↓	1. Seized piston 2. Faulty engine assembly 3. Loose object in crankcase 4. Faulty connecting rod 5. Seized crankshaft 6. Corrosion between rings and cylinder 7. Magneto flywheel and stator in contact
<i>Is the engine missing and having trouble maintaining a constant idle speed?</i>	YES → NO ↓	1. Wrong fuel/oil mixture 2. Dirty carburetor 3. Wrong adjustment of idle position and idle air screws 4. Spark plug problem ⁴ 5. Low compression ⁷

<i>Is the engine running well at idle but coughs instead of accelerating?</i>	YES → NO ↓	1. Wrong carburetor piston 2. Wrong ignition timing 3. Wrong idle air screw adjustment 4. <i>Faulty fuel intake</i> ¹ 5. <i>Spark plug problem</i> ⁴ 6. <i>Fuel/air mixture too lean</i> ⁶
<i>Does the engine accelerate laboriously from idle to full power?</i>	YES → NO ↓	1. Wrong carburetor piston 2. <i>Spark plug problem</i> ⁴ 3. <i>Fuel/air mixture too rich</i> ⁵ 4. <i>Low compression</i> ⁷ 5. <i>Pressure loss</i> ⁸ 6. <i>Excessive propeller load</i> ⁹
<i>Does the engine suddenly change speeds, coughs, spits, and runs poorly at all power settings?</i>	YES → NO ↓	1. Dirty carburetor 2. <i>Faulty fuel intake</i> ¹ 3. <i>Fuel/air mixture too lean</i> ⁶
<i>Does the engine run rough with excessive vibrations?</i>	YES → NO ↓	1. Choke activated 2. Fuel contaminated by water 3. Carburetor obstructed 4. Exhaust system obstructed 5. Worn engine mounting dampers 6. Propeller out of balance 7. <i>Fuel/air mixture too rich</i> ⁵
<i>Is the engine running well at high speed?</i>	NO → YES ↓	Engine "four-stroking" 1. Worn jet needle or needle jet 2. Too much oil in fuel 3. Wrong ignition timing 4. Exhaust system obstructed 5. <i>Fuel/air mixture too rich</i> ⁵ Backfiring through carburetor 1. Dirty carburetor 2. Wrong ignition timing 3. Sticking piston rings 4. <i>Faulty fuel intake</i> ¹ 5. <i>Faulty float valve operation</i> ² 6. <i>Faulty ignition system</i> ³ 7. <i>Spark plug problem</i> ⁴ 8. <i>Fuel/air mixture too lean</i> ⁶ 9. <i>Pressure loss</i> ⁸ Pre-ignition 1. Wrong ignition timing 2. Too low octane rating or old fuel 3. Excessive carbon accumulation 4. Crankshaft play due to misalignment or bearing wear Engine missing when subjected to high loads 1. Wrong ignition timing 2. <i>Faulty ignition system</i> ³ 3. <i>Spark plug problem</i> ⁴ 4. <i>Fuel/air mixture too rich</i> ⁵ / <i>too lean</i> ⁶ 5. <i>Excessive propeller load</i> ⁹
<i>Is the engine overheating?</i>	YES → NO ↓	1. Misadjusted v-belt (air cooling) 2. Dirty engine or blocked fan (air cooling) 3. Wrong water/antifreeze mix (liquid cooling) 4. Obstruction in radiator or cooling circuit (liquid cooling) 5. Faulty impeller (liquid cooling) 6. Wrong ignition timing 7. Too low octane rating or old fuel 8. Excessive carbon accumulation 9. Misadjusted carburetor 10. Defective instrument (faulty reading) 11. <i>Faulty fuel intake</i> ¹ 12. <i>Fuel/air mixture too lean</i> ⁶ 13. <i>Excessive propeller load</i> ⁹

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Does the engine lose power after takeoff or won't return to full power after power was reduced?	YES → NO ↓	1. Wrong carburetor piston 2. Light piston seizure 3. Faulty fuel intake ⁴ 4. Fuel/air mixture too rich ⁵ 5. Excessive propeller load ⁹
Does the engine stop suddenly?	YES → NO ↓	1. Piston seizure 2. Carburetor icing
Does the engine keep running with the ignition switch off?	YES →	1. Faulty wiring 2. Excessive carbon accumulation

1. Faulty fuel intake

- Obstruction in fuel circuit (tubing, filter, pump, fittings, selectors, carburetor fuel intake cock)
- Fuel tank vent obstructed or inadequate
- Worn fuel pump diaphragm
- Inadequate or worn pulse line or leaks at its connections
- Fuel circuit installation (length, height, restrictions) overwhelms pump capacity

2. Faulty float valve operation

- Worn float valve
- Dirt on valve sealing surface
- Blocked floats
- Permeable floats: low floatation

3. Faulty ignition system

- Faulty connection between coil and ignition cable
- Defective ignition coils
- Shorted or damaged ignition cable
- Defective spark plug cap
- Defective ignition switch or wiring

4. Spark plug problem

- Wrong electrode gap
- Electrode contact or bridging
- Fouled spark plug
- Broken or wet insulating porcelain
- Worn or defective spark plug
- Inadequate spark plug range (too hot/cold)

5. Fuel/air mixture too rich

- Main jet too large
- Needle jet too large
- Wrong needle or adjusted too high
- Float level too high
- Air filter obstructed by water, fuel, dirt or excess oil

6. Fuel/air mixture too lean

- Main jet too small
- Needle jet too small
- Wrong needle or adjusted too low
- Float level too low
- Air leaking in from fuel or primer circuit
- Air leaking in from carburetor sockets or intake gaskets

7. Low compression

- Piston and cylinder wear
- Scored piston
- Ring gap too large
- Untightened spark plugs
- Untightened cylinder head
- Cylinder head gasket leak

8. Pressure loss

- Leak from a gasket or seal (intake, exhaust, cylinder head, cylinder base, oil seals)
- Crack or porosity in engine block component

9. Excessive propeller load

- Excessive pitch, diameter or number of blades
- Excessive moment of inertia

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OPERATING PARAMETERS

		Air cooled		Liquid cooled	
		°C	°F	°C	°F
Cylinder Head (CHT)	Normal temperature	180-220	350-430	110-130	230-270
	Maximum temperature	250	480	150	300
	Maximum difference between cyl.	20	36	10	18
Exhaust gases (EGT)	Normal temperature	460-580	860-1080	500-620	930-1150
	Maximum temperature	654	1200	654	1200
	Maximum difference between cyl.	25	45	25	45
Cooling liquid	Normal temperature	n/a	n/a	60-80	140-176
	Maximum temperature			95	203
Crankcase	Maximum temperature	80	176	80	176
Outside air	Minimum temperature	-25	-13	-25	-13
	Maximum temperature	50	120	50	120
Fuel pressure	Minimum	0.2 bar	3 psi	0.2 bar	3 psi
	Maximum	0.4 bar	6 psi	0.4 bar	6 psi
RPM	Minimum idle	2000 RPM			
	Maximum sustained	6500 RPM			
	Maximum 5 minutes	6800 RPM			