

Subject: Engine Overheating

Affected engine models: All engine models

- SL 1700
- L 1700
- L 2000
- L 2400

Background Information:

Engine overheating is one of the major causes for unscheduled engine repairs.

Basically there are two causes for overheating:

- Excessive generation of heat
- Insufficient cooling

During the type certification process the engine manufacturer must show that the engine may be operated without overheating if adjusted to the specifications. Cautious quality checks during production insure that each engine behaves just like the once tested prototype. On new or overhauled engines mainly external reasons are responsible for the appearance of overheating symptoms. Often not only one, but several minor faults are responsible for engine overheating.

The temperature limits shown in the engine Handbooks must be understood as maximum values, which may never be exceeded. Under no circumstances may the engine be operated continuously near the temperature limits.

Failure:

Checking/Correcting:

- 1. Excessive Generation of Heat:
 - 1.1 Fuel Starvation
 - 1.1.1 Changes in the fuel line system

Needle valve plugged	Clean needle valve, blow through with compressed air. Replace fuel.
Fuel lines plugged	Fuel pump pressure to low. Check routing of fuel lines, correct sharp bends. Clean fuel lines, blow through with compressed air in reverse flow direction. Replace fuel
Fuel shut off valve defective or plugged	Fuel pump pressure to low. Clean fuel shut off valve, disassemble if necessary, blow through with compressed air. Replace fuel.
Fuel filter clogged.	Fuel pump pressure to low. Clean filter bowl, disassemble if necessary, blow trough with compressed air. Replace filter element. Replace fuel.
Water inside fuel system.	Clean fuel lines (see above), remove floatchamber, clean needle valve. Replace fuel.

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Failure:

Checking/Correcting:

Fuel tank vent clogged

Fuel pump pressure to low.
Check tank lid.¹ Check venting lines resp. holes. Blow through with compressed air.

Fuel lines leaky
(Suction side of fuel pump)

Fuel pump pressure to low.
Check fuel lines², replace if necessary.

1.1.2 Changes in the Fuel Supply and Volume Control

Fuel pump diaphragm defective

Fuel pump pressure to low.
Diaphragm hardened, cracked. Diaphragm spring too soft. Replace diaphragm.

Valves in fuel pump (electr./mech.)
leaky or defective

Fuel pump pressure to low.
Check fuel pump according to Maintenance Instruction 12.

Pushrod for fuel pump worn out

Fuel pump pressure to low.
Check travel of pushrod., replace.

Fuel pump not mounted correctly,
fuel pump diaphragm warped

Fuel pump pressure to low. Check travel of pushrod, adjust with gaskets. Reassemble top fuel pump housing according to manufacturers instructions.

Air valve shaft in carburetor sticking

Check for free travel, clean carburetor, replace if surface deeply scored.³

Ventilation of float chamber clogged

Clean carburetor, blow through with compressed air.

Float level misadjusted

Check float level, adjust.

Needle valve or float sticking

Check for free travel and/or foreign objects, replace.

Carburetor gaskets mounted incorrectly
(air filter side)

Look for cut outs, replace gaskets.

Metering needle not adjusted correctly

Check adjustment according to adjusting table, readjust if necessary.

Carburetor diaphragm porous,
cracked or swollen.

Check diaphragm for damage, must fit into receiving lug without force, replace diaphragm.

Damper piston defective

Replace

Wrong or not enough damping oil

Replace oil filling, check oil level and fill up if necessary. Use only genuine Zenith (Solex) lube oil.

Isolating flange on carburetor missing

Install (EB1.A series only)

Intake of warm air

Heat shield missing or defective.⁴

1 Gasket: Size, type, damage
Venting holes: free passage

2 Porosities, loose fittings, expiration date

3 Check air filter for corrosion. Broken pieces of filter mesh may lead to sticking of air valve shaft. Oil air filter (wire mesh filters only!) replace if necessary

4 Only engines with dual carburetors, replace.



Failure:
Checking/Correcting:
1.2 Excessive amount of air

Balance tube leaky

Check for cracks and porosity, replace if necessary. Tighten hose clamps.

Line to manifold pressure indicator leaky

Check for cracks and porosity, replace if necessary. Tighten hose clamps.

Connecting hoses for intake manifolds cracked or porous

 Check hoses for obvious damage. Spray with fuel.¹

Intake manifolds loose, incorrectly mounted or gaskets defective

 Check hoses for obvious damage. Tighten loose nuts². Spray with fuel, replace damaged parts.

Intake manifold cracked

See above

Carburetor loose, flange gaskets defective.

See above

Throttle shafts worn out

 Shafts may have only slightly feelable clearance³. Replace carburetors.

Air cleaner leaky

 Check air cleaner shell for obvious damage.
 Check air cleaner element for obvious damage.
 Replace air cleaner resp. air cleaner element.

Carburetor preheat defective

Examine carburetor preheat system for damage, flaps close completely and travel freely.

1.3 Irregular Combustion
1.3.1 Fuel Problems

 Fuel does not have correct octane rating⁴ Fuel stored too long, unsuitable fuel additives used, mixed with wrong fuel (Kerosene, Diesel etc.)

Replace fuel.

1.3.2 Ignition Problems

Wrong ignition timing

 Check timing and readjust⁵.

1 For this check fuel is sprayed onto the part to be examined. The engine speed must not change. Because of the danger while working on running engines, appropriate safety precautions must be taken.

2 Observe the torque values

3 0.8 mm radial maximum.

4 Automotive fuels (MOGAS) have summer- and winter grades. Winter fuel does not always reach the octane ratings as claimed by the manufacturer. Especially during the transition to the warm seasons it may happen, that winter fuel is sold, although it is not suitable anymore for the ambient temperatures.

5 If differences of more than 2.5° from the datum position are observed, either the magneto or the magneto drive must be serviced.



Failure:

Checking/Correcting:

Magneto coupling or impulse coupling worn out.

Check according to manufacturer, replace.

Magneto points burnt.

Check according to manufacturer, replace.

Spark plug loose

Check for installation of spiral gasket, clean spark plug threads, apply lubrication.¹

Wrong spark plug

Check spark plug type according to manual, replace.

Spark plug worn out

Electrodes burnt, wrong electrode gap. Readjust, replace if necessary.

1.3.3 Changes within the Engine.

Heavy deposits in the combustion chamber and/or on the valves

Engine knocks², visual inspection with endoscope, disassemble cylinder heads and repair.

Valve clearance too small.

Check valve clearance and readjust.

Valve(s) burnt

Check compression pressure, visual inspection with endoscope, disassemble cylinder heads and repair.

Foreign object in combustion chamber

Visual inspection with endoscope, repair cylinder heads resp. engine.

2. Insufficient Cooling

2.1 Leaks in the cooling system

Seal to cowling defective.

Sealing profile does not follow the contour of the cowling or are hardened.

Cooling air baffles defective

Cooling air baffles do not follow the contour of the cowling, are not close enough to the engine or are missing.

Firewall or baffle openings defective

Openings for lines and cables not sealed, grommets too large or defective.

Hot air entry

Hoses for cabin heat or carb preheat missing or defective. Hot air from the cabin heat muff or carb preheat exits directly into the cowling.

2.2 Impaired Airflow

Propeller spinner missing

Install

Cowling exit flap does not open or not far enough

Check travel, repair stops or actuating cable.

Cowling exit flap has no side skirts.

Modify resp. repair cowling exit flap.

Actuating cable for cowling exit flap sticking

Repair cable.

Lip on cooling air entry broken.

Repair cowling.

Shield in front of oil cooler not removed (winter operation)

Remove.

1 Champion Anti-Seize Compound. Warning: The lubricating fluid contains graphite and may never contact the electrode.

2 High pressures and temperatures occur which are extremely damaging to the engine and which may lead to mechanical failure. Immediate repair is absolutely necessary!



Failure:

Checking/Correcting:

Oil cooler fins dirty

Clean oil cooler, blow through fins with compressed air.

Cowling exit opening to small

Measure cross section, repair cowling.

2.3 Other Defects In the Cooling System.

Oil cooler thermostat defective

Replace.

Oil cooler hoses not installed correctly

Check routing, relieve sharp bends.

3. Defects In the Indicating System

Indicator or sender defective

Check temperature readings with digital thermometer.

Resistance in the connecting wires to high or bad ground¹

Check connectors (corrosion, faulty crimping).

Frequently overheating problems and insufficient power output coincide. When looking for the reasons one should take into account that often not only one failure is responsible for the occurrence of overheating symptoms, but the sum of several. This makes troubleshooting more difficult though it is unfortunately real life.

The probability for the occurrence of specific failures changes with different aircraft types. Customers often refer to these as design errors. The influence of the aircraft on the engine however is so manifold, that design errors are discovered with in creasing operational experience. In this stage major changes are hardly possible.

Priority:

At next 100h inspection or immediately when overheating symptoms occur.

Compliance:

At 100 h check:
Inspect cooling system according to para 2.1 and 2.2
On occurrence of acute complete inspection of engine and cooling system according to the procedures described above.

Remarks:

Although this technical bulletin contains references to modifications, these may not be carried out without permission. The engine manufacturer may and cannot provide any release statement for modifications to the airframe. Please contact your airframe manufacturer.

This document has been translated to the best of our knowledge. In case of doubt however only the German original shall be considered authoritative.

LBA approved:

J. J.
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¹ Applies only to indicating systems with electrical supply

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