Introduction

Due to the TM 4603-10 the following change results for the owners of a SOLO 2 350 aircraft engines :

1. The overhaul of the engine after a period of operation of 5 years, is no longer necessary and is replaced by a special inspection, which can be conducted by the manufacturer or a certified maintenance organisation or a certified maintenance person. For this purpose the “Maintenance instruction for the engine SOLO 2 350 after 5 years of operation” was released. This instruction also contents a list of the necessary material. In principal it is mandatory, that if one of the examinations leads to a negative result and cannot be repaired by the implementing person, the engine has to be sent to the manufacturer.
2. The execution of the inspection has to be documented in the attached finding report.

All parts necessary for the inspection can be ordered from the manufacturer as a kit. To order the kit the serial number of the engine or the correct part number of the suitable kit has to be sent.

From serial number 1 to 338	order number 05 10 927
from serial number 339 up	order number 05 10 928

Up to serial number 338, carburettor-parts from Tillotsen were used. Later the carburettor-parts from Walbro were used.

Checklist

1. Check the torques of all reachable nuts and bolts.

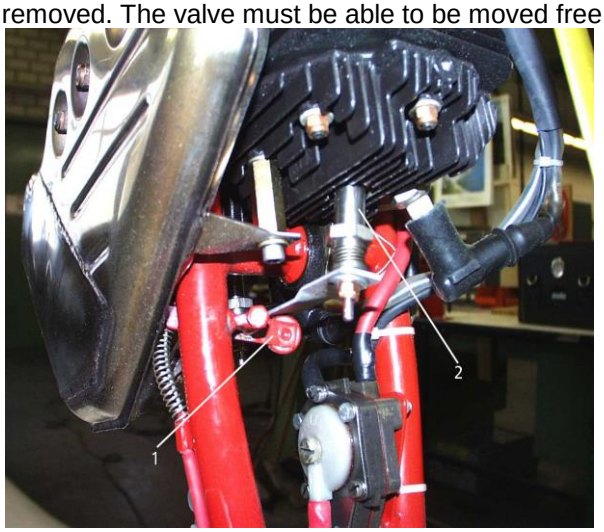
The values from the current engine manual apply. (section 5, service instructions)

Spark plug	20	Nm	14,5	ft. lbs
Hub on crankshaft (left hand)	50	Nm	36	ft. lbs
Nuts M6 on cylinder head	13	Nm	9,5	ft. lbs
Nuts M8 on cylinder head	20	Nm	14,5	ft. lbs
Nuts M8 an cylinder base	13	Nm	9,5	ft. lbs
Hex. Head bolts and allen				
M4	3	Nm	12	ft. lbs
M6	13	Nm	19,5	ft. lbs
M8	23	Nm	16,5	ft. lbs
Slotted Screws				
M3	0,9	Nm	0,6	ft. lbs
M4	2	Nm	1,5	ft. lbs
M5	4	Nm	3	ft. lbs

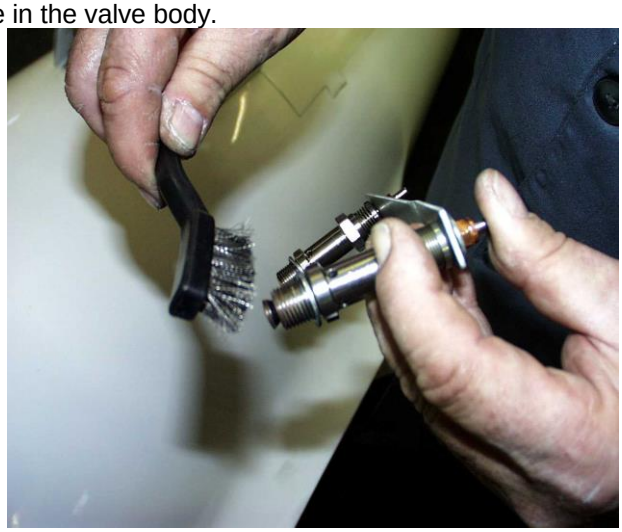
A suitable torque wrench has to be used.

2. Decompression valves clean and check

Remove the operation lever (1) on the engine mount. Remove the decompression valves (2). Clean the valves with fuel. Clean the valve seat with a fine wire brush. All oil-carbon deposit has to be removed. The valve must be able to be moved free in the valve body.

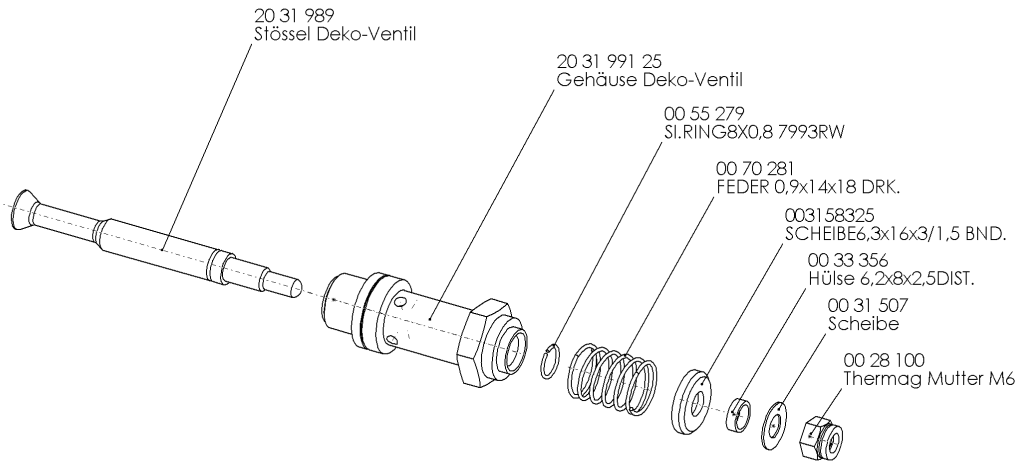


Picture 1
Removing the decompression valves



Picture 2
Cleaning of the decompression valves

If the valve in the assembled condition cannot be cleaned, then it has to be disassembled. To do this you have to remove the snap ring (Picture 3, part 00 55 279) on the upper end. Push the valve out of the housing. All parts have to be cleaned completely. Reassemble the decompression valve. Insert the decompression valves in the cylinder head (torque 20 Nm). Pay attention to the bended connecting sheet metal. The shorter section must point forward in flight direction.
To check the correct sealing of the decompression valves turn the propeller (No exit of compressed air should be heard). If the valves don't seal after the cleaning, they must be replaced. (part no. 28 00 272, decompression valve complete).



Picture 3: Decompression valve

3. Check the sealing of the engine, especially the cylinder head gaskets. Check the compression of the engine.

4.

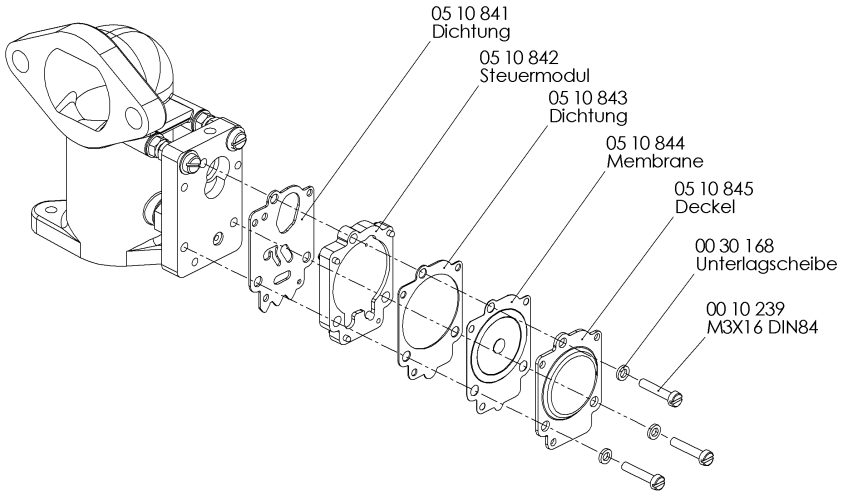
Check if near the cylinder head gasket carbon-leaks can be seen. Leaky decompression valves can also lead to such findings. Turn the engine with the propeller. Pay attention if leaks of compressed air can be heard. Together this check the function of the piston rings can be examined at the same time. During turning the engine slowly there must be a noticeably compression. After exceeding the top dead center of each piston-movement there must be a noticeable acceleration. The reason of missing compression is usually caused by leaking cylinder head gaskets
If one or both of the cylinder head gaskets are defect, the engine has to be removed and the gaskets (part number 20 61 407) have to be replaced. Torque values for nuts and bolts see above.
If the suspicion on defective piston rings exists, these can be examined after disassembly of the exhaust system. Turn the engine in such a way that the rings are visible through the exhaust port. The piston rings as well as the pistons should not have deep scratches. With a small screwdriver the rings can be examined for free movement in their grooves. Push on each ring. They must be able to move free and move back into their original position. If one or more of the piston rings are defect the engine has to be sent to the manufacturer.
The instruction for the replacement of the engine can be found in the service manual of the airplane manufacturer.

Picture 4
Piston ring check

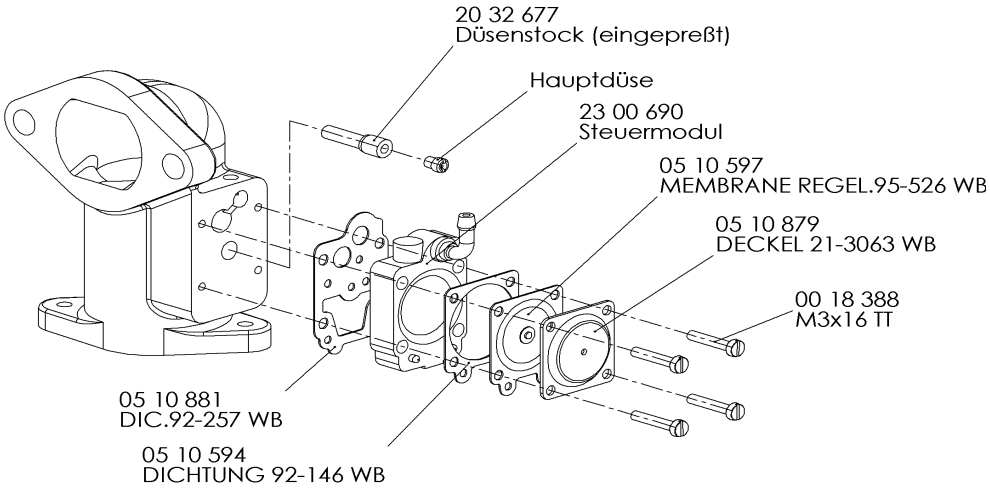
Attention!!!
During all work on the engine with dismantled parts make shure that no parts and no dirt can enter the engine. These parts can lead to the destruction of the engine.

5. Carburettor check

From serial number 1 to 338 parts of the manufacturer Tillotson were used. Starting from serial number 339 and higher parts of the manufacturer Walbro were used. This can be recognized by the fact , that on the Walbro system the metering unit is cast on to the intake manifold.

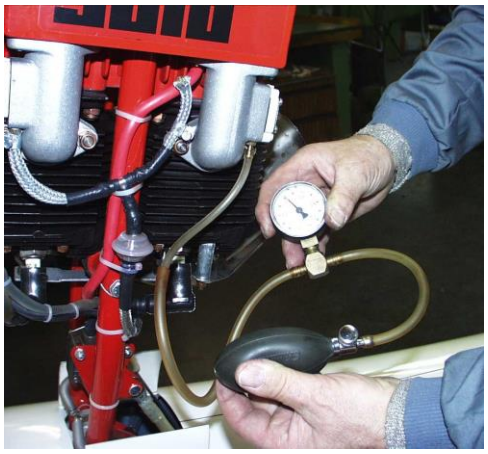


Picture 5 : Structure of the metering unit from Tillotson, serial numbers 1 to 338

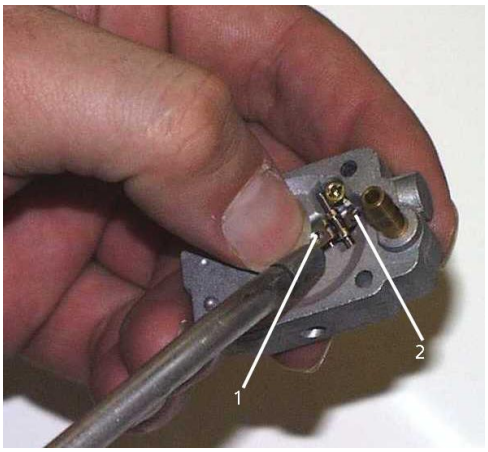


Picture 6 : structure of the metering unit from Walbro, from serial number 339 and higher

Remove the fuel hoses. Remove the 4 screws (3 screws on Tillotsen) on the covers. Remove the metering module and clean it with compressed air. To do this, you have to press the small lever (1) against the spring. Then you can blow air to the valve seat (2). Reassemble the metering module in the order as shown in the picture above. All seals and diaphragms have to be replaced. Check the controle module for correct sealing. To do this you have to use a manometer (Picture 7). Check-pressure 0.4 bar. Permissible decrease of pressure 0.1 bar/min. This examination is particularly important, because only sealing carburettors ensure a perfect engine run. If necessary the control modules have to be replaced (part numbers see below).



Picture 7: Seal check



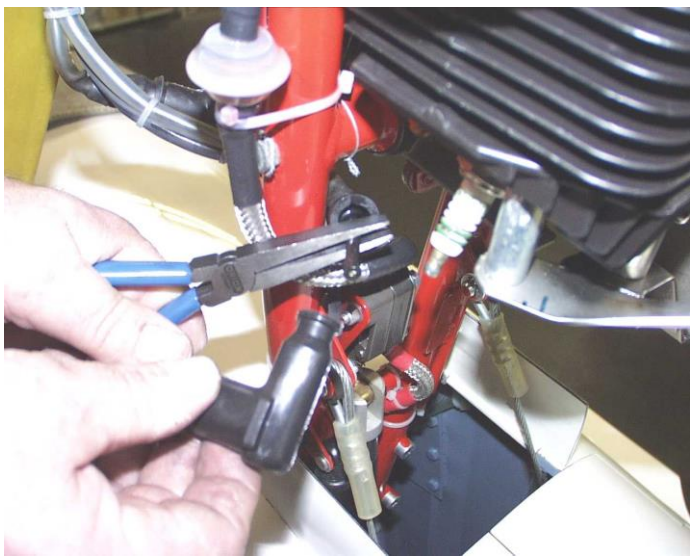
Picture 8: Cleaning the metering module

6. Replacing the fuel hoses

If necessary the supplied fuel hose must be shortened. The hose and the metal protection can be cut to correct length with a side cutter. Be sure that the hoses are mounted ascending and that there are no breaks. Make sure that the hoses are not too far away from the engine, in order to prevent a hook when retracting the engine into the fuselage. The hoses have to be secured with safety wire on the nipples. The metal protection has to be fastened with the hose clamps over the nipples.

7. Replace spark plug and spark plug cap

Remove the spark plugs and check the color of the spark plug electrode. The color should be brown to grey. In the case of dark or black colour of the electrodes it can be assumed that the metering module in the carburetors was leaking (see check 3). Replace spark plugs (Bosch W5AC part number 23 00 500). Replace spark plug cap (part number23 00 701). To do this you have to turn the cap counterclockwise off the ignition wire. The new cap has to be turned clockwise onto the ignition cable. Insert the new spark plugs (torque 20Nm) and push on the cap firmly.



Picture 9: Replacing the spark plug cap

8. Visual check of the exhaust system

Check the exhaust system if there are any visible cracks. These can be found by rests of black carbon deposits on the exhaust. If the findings are uncertain, then the carbon should be wiped off with gasoline. So possible cracks become visible. If the exhaust system is removeded for better investigation, make sure that new gaskets are used for reassembly. Before you reassemble the exhaust the sealing surfaces must be cleaned from rests of the old gaskets.

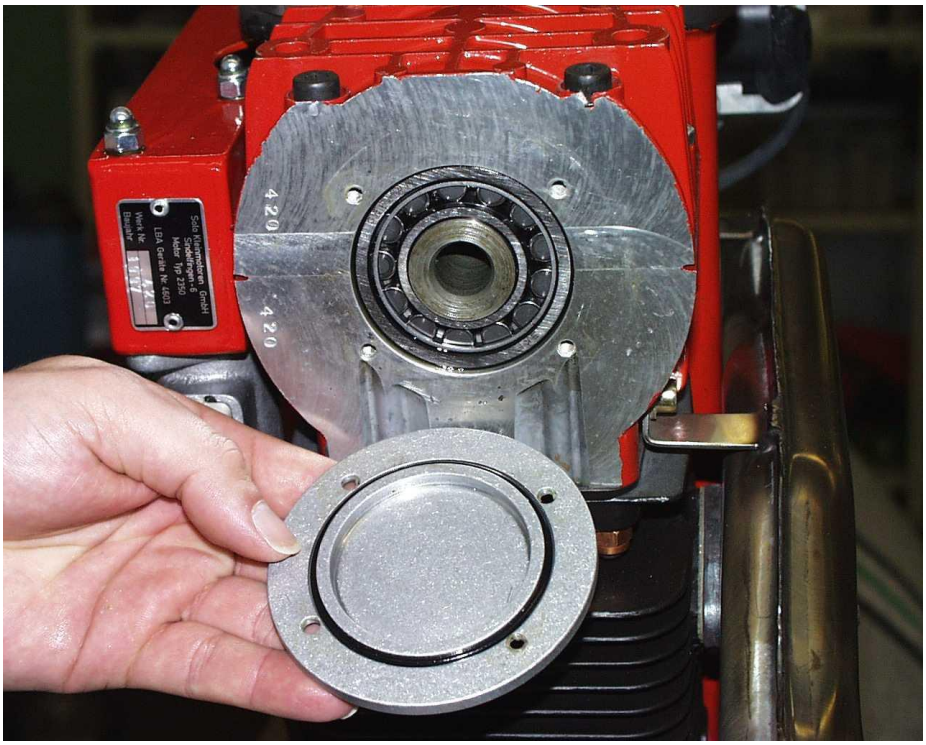
Attention!!!
During all work on the engine with dismantled parts make shure that no parts and no dirt can enter the engine. These parts can lead to the destruction of the engine.

9. Check the entire engine, particularly the cylinder fins for damages.

Examine the entire engine for damages and broken off ribs or cracks at the housing. If individual cooling fins should have broken off, the engine has to be sent to the manufacturer.

10. Check of the rear crankshaft bearing on corrosion or overheating

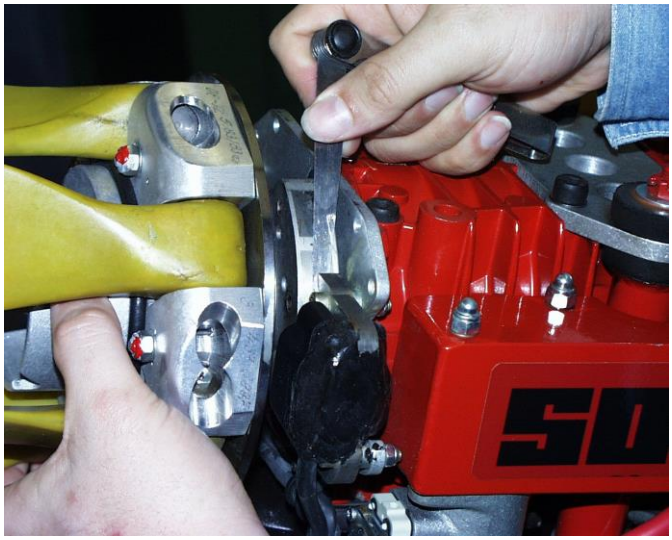
Remove the rear cover. In order to loosen the 4 screws apply a screwdriver and strike on it with a hammer. check roller bearing for corrosion (rust) or discoloration (blue, caused by overheating, visual check). If there is any damage recognizable the engine has to be sent to the manufacturer. Reassemble and secure the screws with Loctite 243.



Picture 10: Check of the rear bearing

11. Examine the air gap between the ignition coils and the flywheel.

Check the distance between the magnet and the ignition coils with a gage. The distance should be between 0.2mm and 0.4mm. In no case the flywheel should contact the ignition coils. If the gap must be corrected, the bolts holding the ignition coil must be loosened. Then put a gage (0.4 mm) between the flywheel and the ignition coil. Press the ignition coil against the flywheel and tighten the bolts. Make sure that the flywheel is positioned in such a way that the magnet (machined surface of the flywheel) is showing towards the ignition coil which has to be adjusted. Tighten the bolts with a torque of 2Nm. Pull out the gage and check the distance again. When the distance is within the indicated range (0.2 to 0.4mm) the screws must be secured with the nuts on the backside of the holding plate.



Picture 11: Check of theair gap at the ignition coil.

12. Check of the wiring

A visual check has to be made to all wires. If there are visible breaks of the isolation, especially on the ignition cables, they have to be replaced. Inside the ignition coil and the spark plug cap there are threads. For this reason the cables can simply be dismantled by turning the cable in counterclockwise direction. The new cables can be mounted by turning the cable clockwise. The cables have to be secured with a heat shrink sleeve against damages.

13. Check of the rubber isolaters of the engine mounting

The rubber isolater have to be checked visually. They may not show cracks, damages or excessive swelling.

14. Functional check with test run

A test run on the ground is not advisable. It is safer to accomplish the functional check during a flight with engine on over the airfield. The engine performance can simply be judged over the RPM indication (green LED showing correct RPM must light up). Pay attention on possible uneven run or unusual vibrations.

If the test run has to be made on the ground, the airplane must be mounted and fixed completely. Fuel valve open. Ignition and electric fuel pump on (if available) or operate manual pump. Use a piece of safety wire to slightly press on the diaphragms in the carburettors (hole in the covers of the metering module). This is necessary to prime the engine. Start the engine with the provided starting belt. If the engine has gotten to much fuel, press the decompression valves. Too much fuel can exit through the decompression valves. The RPM on the ground must be at least 4,200 1/min. The RPM can be measured on the control panel with a voltmeter, which is connected at the pin 10 and ground. One volt corresponds to 1,000 1/min.

15. Visual check after test run

After the test run another visual check has to be made. Pay attention in particular to leakages, which are recognizable by leaking oil or fuel. If the cylinder heads have been removed all nuts on the cylinder head have to be retorqued with the indicated torque.

Material list

Pos.	pcs.	Part nr.	Description
1	2	00 55 279	Circlip RW8 DIN 7993
2	12	00 28 100	Thermag Hexagon nut SW9 M6 SSN 441
3	6	00 20 208	Thermag Hexagon nut SW12 M8 SSN 441
4	12	00 72 143	Lock washer 6
5	4	00 72 145	Lock washer 8
4	2	23 00 701	Spark plug cap 5 k Ohm
5	2	23 00 500	Spark plug W5AC
6	1	27 00 397	Fuel line, complete
7	2	00 66 154	Hose clamp 9/9 S NORMA
8	1	00 62 231	O-Ring 62x2 NBR 70 SH
9	2	05 10 841	Gasket Tillotson until s.no.338
10	2	05 10 843	Gasket Tillotson until s.no.338
11	2	05 10 844	Diaphragm Tillotson until s.no.338
12	2	05 10 881	Gasket Walbro from s.no.339 and over
13	2	05 10 594	Gasket Walbro from s.no.339 and over
14	2	05 10 597	Diaphragm Walbro from s.no.339 and over
15	2	20 61 395	Gasket, exhaust system, thickness 1,5mm

Part number complete kit (from serial number 1 to 338) 05 10 927
Part number complete kit (from serial number 339 and over) 05 10 928

Additionally to the parts contained in the kit, maybe you need the following parts:

Pos.	pcs.	Part No..	Description
1	2	28 00 272	Decompression valves, complete
2	2	20 61 407	Cylinder head gasket
			Safety wire

For the procedure you need the follwing special tools:

Torque wrench
Carburettor tester (No. 00 80 314, Manometer)

Finding report on the special inspection

Engine 2 350 Serial number :.....

Nr.	Check	Result	Signature
1	Torques check		
2	Decompression valves, clean and check		
3	Check of sealing and compression		
4	Carburettor check		
5	Replacing the fuel hoses		
6	Replace spark plug and spark plug cap		
7	Exhaust system check		
8	Check of the engine for damages		
9	Check of the rear crankshaft bearing		
10	Check the air gap of the ignition coils		
11	Check of the wiring		
12	Check of the rubber isolators		
13	Functional check (on the ground or in flight)		
14	Visual check after test run		

Date			
Special inspection accomplished by (name, signature)			
Confirmation of the special inspection by inspector	name/signature	Inspection stamp	Date