DG Aviation GmbH

INSTRUCTIONS FOR CONTINUED AIRWORTHINESS

MAINTENANCE MANUAL

FOR THE MOTORGLIDER

DG-500MB

Commercial designation: ***DG-505MB***

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Manual amendments

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13	Title, 1a, 3, 4, 5, 6, 19, 49 – 54, 91	TN500/14 Life time of the drive belt, manual revision	May 2023

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5E102 Wiring plan DIN A 1 (in aircraft log) **or**		2.07.03
5E102 Wiring plan DIN A 1 **together with**		02.02.99
5E218 Amendment to the wiring plan 5E102		25.06.03
Instructions for inspection 500/20		July 1995
Questionnaire for TN 348/4		" "
Working instruction No. 1 for TN 348/4		Oct. 1994
Working instruction No. 2 for TN 348/4		" "
5V18 Tool for airbrake adjustment		14.10.94
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Drawing W51		20.11.96
Drawing W57		10.09.99
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Drawing 5M110		23.10.02
Enclosure 1 Instructions for transponder Installation		Jan. 06
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Instructions for continued airworthiness

0 Airworthiness limitations

0.1 **Repairs:**
Repair or replace damaged parts prior to next flight. Follow the instructions of the DG-500MB repair manual. Repairs outside the scope of DG-500 MB repair manual and major repairs must be accomplished at a certified repair station or by a certified mechanic rated for composite aircraft structure work in accordance with DG repair methods.
Use only genuine parts for all repairs.

0.2 **Life time of the airframe**
The maximum allowable operating time for composite sailplanes is 12000 flight hours. Therefore inspections according to sect. 2.4 of this manual have to be executed at 3000 h, 6000 h, 9000 h and every 1000 hours following thereafter.

0.3. **Life time of components**
Use only genuine spare parts. For part. No.'s of all parts please refer to section 8.

a) The following components of the power plant have to be replaced after 400 engine hours.
   1. All nuts and bolts on the engine
   2. The bearings of the upper drive belt pulley

b) All flexible fuel lines and the gasket for the drainer valve have to be exchanged after 6 years.
   TN 500/10: When instructions 2 and 3 of this TN have been accomplished the life time of the flexible fuel lines is 10 years.

c) The **coolant hoses** have to be exchanged after 6 years.

Note: The **coolant** (type see section 1.11.2) has to be exchanged after 6 years.

d) The life time of the **drive belt** is 50 engine hours and may be extended by special inspections according to section 3.5.3 of this manual for another 25 engine hours after each inspection..

e) The 2 upper **rollers for the drive belt** have to be exchanged every 50 engine hours

f) The **spark plugs** have to be exchanged after 25 engine hours.

g) The **fabric straps of the safety harness** have to be exchanged after 12 years.

h) The rubber cords in the elevator control system see sect. 1.2.6 and in the wing flap control system see sect. 1.4.6 have to be replaced at least every 6 years.

Instructions for continued airworthiness continued

j) **Flexible fuel bags in the wings (option)**
These have to be exchanged after 10 years.

Note: The **brake fluid of the wheel brake** has to be exchanged after 4 years (types see section1.6.4).
Note: All **other components** like wheels, gas struts, control system parts, bolts, pins etc. have no life time limitation, but should be replaced when worn, damaged or disqualified by excessive corrosion.

0.4 **Service time, maintenance documents**
Follow the instructions of the respective manufacturer.

a) Operating Manual for Tow Releases
Series: E 85 Nose Tow Release
latest approved version

Operating Manual for Safety Tow Releases
Series: Europa G 88 Safety Tow Release
latest approved version

b) Safety harness: instructions of the manufacturer latest approved version.
Approved types see section 6.3.

c) Minimum instrumentation: instructions of the manufacturer.
Approved types see section 6.1, 6.2 and 6.4.

d) Engine: Manual for Solo 2625 02 latest approved version

e) Propeller: Technoflug Operation and maintenance manual No. P3 latest approved version

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0.5 **Power plant trouble shooting**
Please find a checklist in in the DG-500MB flight manual sect. 8.8.

1.9 Massbalance and weights of control surfaces

After repairs or repainting the control surfaces weights and moments should not exceed the following limits.

Control Surface	Weight		Moment		Spring balance reading see instructions below	
	kg (lbs.)		kg×cm (lbs.×in.)		kg (lbs.)	
	min.	max.	min.	max.	min.	max.
Rudder (incl.massbalance)	4.4 (9.7)	5.1 (11.2)	7 (6.08)	10 (8.68)	0.350 (0.77)	0.500 (1.1)
Elevator (without pushrod)	4.3 (9.5)	5.1 (11.2)	13 (11.28)	15.25 (13.24)	0.572 (1.26)	0.672 (1.48)
Wing flaps	5.9 (13.0)	8.0 (17.6)	22.24 (19.30)	27.56 (23.92)	1.049 (2.312)	1.300 (2.865)
Inboard ailerons	0.8 (1.76)	1.1 (2.43)	2.95 (2.56)	3.86 (3.35)	0.162 (0.357)	0.212 (0.467)
Outboard ailerons (22 m no parting)	3.6 (7.94)	5.0 (11.0)	4.01 (3.48)	5.99 (5.20)	0.288 (0.636)	0.431 (0.950)
Outboard ailerons (20 m)	3.24 (7.14)	4.4 (9.70)	2.76 (2.40)	5.00 (4.34)	0.199 (0.439)	0.360 (0.793)
Outboard ailerons (22 m extension)	0.36 (0.79)	0.60 (1.32)	0.8 (0.694)	1.61 (1.398)	0.087 (0.192)	0.175 (0.384)

Note: Before any changes to the massbalance weights are made, contact the DG Flugzeugbau factory.

Method for determining control surface moments

Rudder

Disconnect rudder cables, lay the fuselage on its side so that the fin is horizontal. Attach (by tape) a spring balance to the lower end of the rudder 200 mm (7.9 in.) behind the hinge axis.

All other control surfaces

Remove the control surface and hang it friction free on two hinge points.

Control surface	measuring point	behind hinge axis	
		mm	(in.)
Elevator	center	227	(8.94)
Wingflap	1. hinge outboard from root	212	(8.35)
Inboard aileron	root	182	(7.17)
Outboard aileron (20+22m)	2. hinge	139	(5.47)
aileron (22 m extension)	root	92	(3.62)

14. Check all engine nuts and bolts with a torque wrench (see sect. 1.11.10).

15. Check the rubber engine mounts, especially for cracks. Therefore apply strong pressure to the propeller mount in forward, backward and sideways direction.

16. Check and grease the starter motor gear shaft (don't grease the starter motor gear) Check starter motor for tight mounting. There should be no excessive radial free play of the starter motor gear axle. With too much free play the starter must be exchanged.

17. Clean the starter ring gear and check for damage. Check if the starter ring gear was bent forwards by the starter motor. There should be approx. 1mm (.04 in.) clearance between starter ring gear and drive belt.

18. Remove the fairings which protect the drive belt.
Check the drive belt for wear.
To accomplish this remove the drive belt see section 4.12 a) and c).
If not already existing, apply a mark at the narrow side of the belt e.g. with a white Edding marker. Inspect the belt step by step until you reach the starting position again.
Visually check each tooth and also the back and the sides of the belt for cracks especially at the tooth base or any unusual wear. For the check bend the belt also to the outside.
If the drive belt shows signs of wear or if there are any cracks, the drive belt must be replaced. In case of doubt you may send the belt to DG for inspection.

Caution: If no damage was detected the belt may be operated for another 25 engine hours. See section 3.5.3
If damage was detected in addition to the change of the belt you must send a report giving the kind of damage, the operating time of the belt and the serial No. of the aircraft to DG Aviation.
In case a drive belt was torn off you must send a report to DG Aviation too.

Re-install the drive belt. In contrary to installation of a new belt use the marked position of the upper pulley see 4.11 a) 3.
Check the drive belt tension according to section 4.11 item c and adjust if necessary.

Check the 6 rollers 5M131 which guide the drive belt for tight fit to their mounting brackets and for easy turning. If there is any significant friction in their bearings, the rollers have to be replaced.

19. Clean the spindle drive. Operation test. The bare surface of the spindle drive piston must be greased slightly. If necessary apply some grease.
Check the rubber mounts at the front and rear attachment of the spindle drive for wear. The fork at the rear attachment must rotate without twisting the rubber mount.
To accomplish this extend the engine only so far, that you still can see the connection to the engine mount. Check especially for cracks in the spindle drive fork.

20. Oil all hinge points of the powerplant.

21. Check the time taken to extend the power plant. Batteries must be fully charged. If it takes longer than described under sect. 1.12.3 first check the wiring of the spindle drive for any damage. If no other reason for the slow extension can be detected the spindle drive has to be replaced.

22. Check the engine retaining cable for wear and kinks.
Check thimble and bolt of the upper cable connection for wear.
Check the adjustment of the retaining cable according to sect. 1.12.4. If necessary adjust the cable at the adjustment screw in the rear end of the engine bay.

23. Check the main bearings of the upper pulley for any free play.

24. Check the tension of the propeller bolts: remove the lockwire, loosen the propeller bolts and retorque them with a torque wrench, torque value see sect. 1.11.10. Secure again with lockwire.

25. Check the propeller blades for any damage.

26. Check all electric cables and connectors. Check the terminals especially of the starter positive and earth wire for cracks.

Note: The critical spots may be covered by heat shrink tubing.

27. Check the whole electrical system wiring, ensure all equipment is secure and all connections are OK. Check proper functioning of all systems and fuses/circuit breakers.

28. Re-install the engine doors. Check all the hinges on the engine compartment doors for proper fit and any cracks, tears etc. Check if hinge pins are secured properly.
Check the engine door rubber cord and its retaining cord for wear and function.

Ground test run:
Warning: Never run the engine without the wings assembled,

29. If needed adjust the idle RPM (see sect. 1.13.7).
30. Check the magnetos - at 3000 RPM, drop should not be more than 300 RPM.
31. Check max. engine RPM - 6300 RPM minimum.
32. Check EGT's (only with optional EGT probes) EGT should be adjusted according to the instructions see sect. 1.13.7, item 5.
33. With engine running at full power press the test button on the front instrument panel for 10 seconds to switch off the first fuel pump. The engine must run with the same speed with the fuel supplied by the second pump.

3.5.2 **Every 3 years**
Section no more effective.

3.5.3 **After 50 engine hours, then following every 25 engine hours**
The life time of the **drive belt** is 50 engine hours and may be extended by special inspections for another 25 engine hours after each inspection.
It is recommended to perform this inspection together with the 25 h inspection see 3.5.1.
In case the operation time of the drive belt doesn´t match the 25 h periods the inspection must be performed and documented separately.
Damaged drive belts must be reported to DG Aviation.
The inspection and the reporting is detailed in section 3.5.1 item 18

3.5.4. **After 400 engine hours** the power plant must undergo a major overhaul.
Apart from the items listed in section 3.4.1., the following items also need to be done.

1. Remove the power plant and remove the engine from the powerplant. Ship the engine to the manufacturer or an aircraft engine maintenance workshop approved by the manufacturer and by the authorities.
2. Replace all the nuts and bolts on the engine
3. Replace the bearings of the upper drive belt pulley.

3.5.5. **After 6 years**

1. Replace all rubber fuel lines and the gasket of the drainer valve.
   TN500/10: When instructions 2 and 3 of this TN have been accomplished the above mentioned fuel lines must not be exchanged after 3 years. But after 6 years all fuel hoses are to be inspected visually thoroughly and completely for any damage especially fissures, kinks or leaks. For the check switch on the ignition to run the electric fuel pump to demonstrate operating fuel pressure.
   Repeat this inspection every following year until the life time of the fuel lines (see section 0.3) is reached.

Note: The new fuel lines must be flushed thoroughly with fuel after assembly.

2. Replace all coolant hoses and the coolant.

3.5.6 **When required**

1. If the fuel tank is excessively dirty or when the fuel gauge gives false indications, a thorough flushing of the fuel tank is required (see sect. 1.13.6).
2. If the engine should run rough between idle and full throttle even after all the points in sect. 3.4.1. are OK, then it is possible that the membranes in the carburettors have hardened. They should then be replaced.
3. After sudden power loss at full throttle:

Check pistons and cylinders for seizing marks, see sect. 3.5.1 item 12b.

3.6 **Hydraulic wheel brake**

The brake fluid must be exchanged at least every 4 years see sec. 1.6.4.

4. Detailed instructions for assembly and servicing work

4.1 Water ballast system

See diagram 6

a) **Replacement of the water ballast bags and servicing the dump valves**

Unscrew the bolt attaching the perlon line to the root rib and attach an additional 5 m (17 ft) long perlon line dia. 3 mm (.12 in.) to it.
Unscrew the water ballast dump valve cap nut. Remove the dump valve with attached water ballast bag out of its wing stand by pushing the valve towards the wingtip. Remove the valve and ballast tank through the hole in the wing root. Remove the perlon line and loosen the hose clamp.
Assemble the new tank to the valve body. Therefore apply some silicone sealing agent onto the neck of the valve body.
Before reassembling the hose clamp wrap fabric tape (Tesaband 651) 3 times around the bag at this place.
The lines holding the tank are to be fixed, so that the key ring will remain 5 cm (2 in.) inside of the wing when the lines are just tensioned. By this the tension of the lines will be satisfactory even if the lines will strain.
Every 3 months, you should check, that the lines are still tensioned. If not, undo the knot and tie it again to the key ring (see above).
Each time you unscrew the valve, grease its thread, otherwise you won't be able to open it again. The seat of the valve ball should be greased. Fill the new water ballast tank(s) and check for water tightness and test the dump time.

b) **Replacement of the probe in the fin tank**

Remove the cover of the coupling (located in front of the tailwheel) by pressing the spring clamp. Unplug the electrical probe connector which is fixed to the bulkhead at the rear end of the opening.
Use a long 19 mm socket-wrench to screw out the probe.

4.2 Replacement of control circuit cables

The following cable connections are approved:

3.2 mm dia. control cable construction 7×19 zinc plated with Nicopress-sleeves 28-3-M Copper and tool No. 51-M-850 or 63-V-XPM or 64-CGMP where the M groove is to be used. The above applies to the rudder cables, the tow release cable and the engine retaining cable.

The cable for the rudder pedal adjustment is 1.6 mm dia. construction 7×7 zinc plated with Nicopress-sleeves 28-1C Copper and the C groove for tool 64-CGMP should be used.

Attachment of the Nicopress sleeves should only be done using the respective tool. All the procedures and checks noted by the tool manufacturers should be followed.

4.2 **Replacement of control circuit cables continued**

Please refer to aircraft inspection and repair FAA AC 43.13-1 A.

Note: For the manual propeller brakes and the throttle cable Ø 1.6mm construction 7×7 zinc plated is used. Only for the electrical propeller brake Bowden cable Ø 1.5 mm 19 x 0.31 is used.

All Bowden outers (2.6 mm inside dia.) are without liner; only the Bowden outer for the electrical propeller brake has a teflon liner.

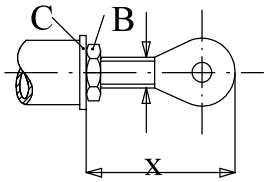
Caution: Control cables according to MIL-W-83420 I/A (former MIL-W-1511A) or ISO 2020 (former LN 9374) should be used.

4.3 **Adjustment and servicing of the control circuit**

a) In all cases, new self locking nuts DIN 985.8 or LN 9348 must be used.

b) Bolts which are not secured with locking nuts have to be secured with Loctite 243. Before installing the bolt clean the thread and the inside thread see section 4.8. Apply only 1 drop of Loctite on the bolt thread. Too much Loctite may cause damage when you try to loosen the bolt again.

c) With all adjustment work, it should be ensured that the rod ends are not screwed out too far from the pushrod - see sketch below for allowable max. distances for the two sizes used.



A	max. of x	
	mm	inch
M 6	36	1.4
M 8	60	2.36

Caution: All lock nuts (B) are secured by a spring washer (C) DIN 6798 I. Be careful not to loose that washer!
Check all lock nuts for tight fit. If one or more came loose tighten those lock nuts firmly with an open end spanner.
Apply to all checked lock nuts a mark from nut to rod e.g. with securing paint to make it easy visible if the nut came loose.

In case you have to re- adjust a rod end you have to remove the existing mark and apply a new one.

8. Part list

In this list you will find only parts of the powerplant and the electrical system. Please find the part no's of the control-system parts and of the metal fittings of the powerplant in the following diagrams.

8.1 Parts for the powerplant

a) necessary for the 25 hours inspection

40050360 Spark plugs S36 (Bosch W5AC electrode gap 0.5 mm) with screw cap fastened to the thread by crimping (4 pieces necessary)

Caution: Bosch delivers the W5AC spark plugs with removable caps. It is not allowed to use these spark plugs. Spark plugs S36 can be identified by a dot of red paint on the insulator.

60507570 Fuel filter Entrata IN straight CH27
60507569 Fuel filter Entrata IN 90° elbow CH28
60500150 Gaskets for exhaust manifold (2 pieces needed)
60500142 Air filter
70002200 Oil for air filters with cotton fabric K&N 99-05046

b) **Spare parts**

60510821 Spark plug connector Bosch 0356351032 1kΩ
45002085 Spark plug connector PVL401222 5kΩ (alternative to Bosch)
45020850 Spark plug connector Champion pro-5U 5 kΩ (alternative to Bosch or PVL)
60500127 Nut for spring coupling M 8 for exhaust muffler (Rotax 842330)
60500128 Spring for spring coupling M 8 (Rotax 239628)
60502500 Starter motor: DENSO 128 000-1671 12 V
or DENSO 12 000-1679 12 V
60500155 Gasket for coolant outlet
60504013 Drive belt Poly Chain GT 8 M 2520-45
59332050 Front bearing for upper pulley 32205B
59320320 Rear " " " " 320/32X
52200054 Securing washer 20 DIN 462 for upper pulley front bearing
30002028 Special grease for upper pulley bearings SKF LGMT3
39001026 Exchange kit nuts and bolts for 400 h overhaul
60000182 Gas strut for muffler frame E1 E1-76-040-130/150N
60507561 Electric fuel pump Facet 40106
60001200 Electric water pump Webasto U4810 modified
60504049 Radiator KTM VW 00425
60504045 Extension-retraction spindle drive type Stross BSA 10 special version for DG-500MB
60504046 Voltage transformer for BSA 10
40872873 Brake pad for propeller brake (glued to mounting bracket)
40050350 Screw nipple S35 (Attachment of the throttle cable to the carburettors, omitted from ser.no 5E213 on)
52130011 Securing washer DIN432 zn 13mm (powerplant main bearings)