

Manual amendments

No.	Page	Description	Date	Signature
32	0.3, 2a, diagram 6	Powerplant TN 826/42	August 01	
33	1, 2, 2a, 3, 12, 13, 34a, 46d, 52, 53, diagram 8a	Manual revision TN826/45	June 04	

Instructions for continued airworthiness
DG-400

content	page	issued
Airworthiness limitations	3	June 04
System description and adjustment data	3a	
1.0 General	3a	June 97
1.1 Wing and tailgroup setting data	4	Febr. 87
1.2 Elevator deflections and adjustment	5	Sept. 85
1.3 Rudder	6	July 84
1.4 Ailerons and flaps	7	July 84
" " "	8	July 84
" " "	9	July 84
1.5 Spoilers and wheel brake	10	Sept. 85
1.6 Undercarriage	11	April 88
1.7 Tow hook	12	June 04
1.8 Waterballast	12	" "
1.9 Powerplant	13	June 04
" "	14	Aug. 92
" "	14a	July 96
1.10 Extension-retraction mechanism	15	Aug. 92
1.11 Fuel system	16	Aug. 91
" Tillotson carburettor	17	Sept. 85
" Mikuni carburettor	17a	May 86
" "	17b	May 86
" wing fuel bags	17c	April 88
1.12 Electrical system	18	April 88
" "	19	Febr. 87
" "	20	Febr. 87
" "	21	Aug. 91
" "	22	Febr. 87
" charging the batteries	23	April 88
1.13 Mass Balance of control surfaces	24	May 83
1.14 Fore and aft play of wings	25	July 84
1.15 Option BEA automatic propeller	25aBEA	Sept. 90
brake - engine retraction	25bBEA	Sept. 90
2. Inspections		
2.1 Daily Inspection	26	Aug. 91
2.2 Regular Inspections	26	" "
" "	26a	Febr. 87
" "	26b	Oct. 96
2.3 Inspection after a heavy landing	27	Aug. 82
" " " "	28	Sept. 85
2.4 Inspection for increase of service time	29	March 97
" "	29a	" "
3. Maintenance		
3.1 General maintenance	30	April 88
3.2 Maintenance of the airframe	30	" "
3.3 Greasing programme	31	April 88
Service information	31a	Nov. 92
3.4 Engine maintenance	32	Dec. 94
(5 h, 25 h, 50 h, . . . 300 h)	33	" "

Instructions for continued airworthiness
DG-400

content	page	issued
3.4 cont.	34	Dec. 94
"	34a	June 04
3.5. Damage to the airframe	35	Aug. 82
4. Detailed instructions for assembly + servicing work		
4.1. Drive belt mounting and tensioning	36	Aug. 92
"	37	July 96
4.2. Replacement of the propeller bearings	38	July 96
4.3. Removal and disassembly of the retraction-extension spindle assembly	39	April 88
4.4. Removal of retraction-extension motor	40	April 88
4.5. Replacement of gas strut of retraction-extension assembly	41	April 88
4.6. Installation and removal of the power plant	42	Febr. 87
"	43	Febr. 87
" " " " " "	44	Febr. 87
4.7. Replacement of the water ballast bags	45	Nov. 86
4.8. Replacement of wing fuel tanks	45	" "
4.9. Replacement of control cables	46	Sept. 85
4.10. Adjustment of control rods	46	" "
4.11. Removal and installation of the undercarriage	46a	July 84
4.12. Access to cylinderhead nuts	46b	Dec. 94
4.13. Fixing excessive free play of the canopy	46c	Febr. 87
4.14. Working instructions for heat shrink tubing	46d	June 04
Securing with Loctite 72b		March 97
4.15. Instruction for securing the propeller bolts	46e	Febr. 87
4.16. Checking the ignition unit	46f	Aug. 91
"	46g	Aug. 92
4.17. Ignition unit-trouble shooting	46h	Aug. 92
"	46i	Aug. 92
" " " " " "	46j	Aug. 92
4.18. Instructions for the removal and refitting of magneto flywheel	46k	Aug. 91
ass'y and exchange of starter gear	46l	Aug. 91
5. Centre of Gravity measurements-weighing	47	May 83
"	48	April 88
6. Instruments and Accessories list	49	Aug. 92
"	50	Febr. 87
7. List of special tools	51	April 88
8. Part list	52	June 04
"	53	June 04
"	54	Aug. 92

Instructions for continued airworthiness
DG-400

content	page	issued
Diagrams		
1. Elevator control circuit, adjustment		Febr. 87
2. Rudder control circuit, undercarriage		July 88
2a. Tail wheel		July 88
3. Aileron, flap and spoiler control circuits, wheel brake		Febr. 87
4. Template for checking aileron deflection	Oct. 81	
5. Tow hook, water ballast release system	April 88	
6. Powerplant with Bosch electronic boxes (for Ducati electronic boxes refer in addition to drawing 4 M 71 see enclosure)	Aug. 01	
7. Powerplant extension-retraction mechanism	April 88	
8. Fuel system	April 88	
8a. Fuel system (TN826/45 instr. 1 executed)	June 04	
9. Electrical system	July 84	
10. Empty weight centre of gravity range	April 88	
11. Placards	June 86	
12. Installation brake motor (Option BEA)	Sept. 90	
13. Electrical system with Option BEA	Sept. 90	

Enclosures

Installation sketch EFWK "landing gear doors"	Oct. 87
Drawing W 33 special wrenches	March 88
Drawing W 34 " "	March 88
Installation sketch EPK additional tow hook for aerotow	Oct. 85
Installation sketch EOD Dräger oxygen system	July 7,84
Installation sketch 4EP ELT (3) ELT Pointer	May 6,91
Hotellier Instructions for the maintenance IM 10.01 A	01/89
Drawing 4 M 71 ducati ignition boxes	April 92
Service-information 0-2/92	March 92
Service-information 0-4/92	Nov. 92
TN 826/34 incl. Working instructions No. 1 and No. 2	Oct. 96

0. **Airworthiness limitations**

Note: Repair damaged wings, fuselage and tail surfaces prior to next flight. Repairs outside the scope of Glaser-Dirks DG-400 repair manual dated September 1982 and major repairs must be accomplished at a certified repair station rated for composite aircraft structure work in accordance with Glaser-Dirks repair methods.

0.1 **Life time of the airframe**

The maximum allowable operating time for composite sailplanes is 12000 flight hours. Therefore inspection according to sect. 2.4 of this manual has to be executed at 3000 h, 6000 h and every 1000 hours following thereafter.

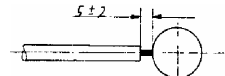
0.2. **Life time of components**

- a) The following components of the power plant have to be replaced after 300 engine hours.
 1. All nuts and bolts on the engine
 2. The drive belt
 3. The relays (starter, extension-retraction)
 4. The propeller bearings (see 4.2)
- b) All **flexible fuel lines** including the plugged piece of hose at the pneumatic fuel pump and the shut off valves have to be exchanged after 6 years. The fuel lines at the engine have to be exchanged every 2-3 years (see sect. 3.4.3). The shut off valves must no longer be exchanged as soon as TN826/45 instruction 1 has been accomplished.
- c) The **spark plugs** have a life time of 25 engine hours.
- d) The **fabric straps of the safety harness** have to be exchanged after 12 years.
- e) **Other components**
All other components like propeller, tow hook, 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.
- f) **Flexible fuel bags in the wings** (option)
These have to be exchanged after 10 years.

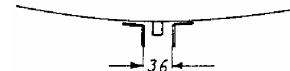
1.7. **Tow Hook**

1.7.1. **Tow release circuit** see Diagram 5 and in case of an additional tow hook for aerotow installation sketch EFF.

1.7.2. **Adjustment**
There should be 5±2 mm (.2±.08in.) space between the tow release knob and the nylon cable guide.



1.7.3. **The belly cable deflectors** (R 29) should not be bent or ground down. Damaged parts should be replaced immediately. The inside clearance between the cable deflectors should be 36 mm (1.42 in.).



1.7.4. **Removing the tow hook**

The tow hook is to be removed in upward direction (use a piece of hard wood and a hammer). Be careful not to break loose the seat shell from the tow hook bulkheads.

1.7.5. The operating and maintenance instructions for the release-mechanism see sect. 1.02 of this manual have to be followed.

1.8. **Water ballast System**

1.8.1. **Water ballast release circuit** see Diagram 5

1.8.2. **Adjustment**
For the dump valve in the closed position, there should be 1 mm (.04in.) space between the 8 mm dia. (.32in.) PVC rod from the dump valve, and the plate lever on the fuselage. An adjustment can be made using the adjustment screw. If this is insufficient, the 8mm (.32in.) dia. PVC rod can be shortened. If the valve still leaks, then the rubber gasket and the associated spring at the end of the 8 mm dia. (.32 in.) PVC rod should be loosened, pressed further in, and tightened again.

- 1.9. **Power Plant**
- 1.9.1. **Power Plant Arrangement** see diagram 6
- 1.9.2. The **engine** is a Rotax-Motor type 505 with electronic dual ignition. Installation is with the cylinder heads hanging and the carburetors on the right hand side when looking towards the nose.
- Idle RPM adjustment:** Turn the idle mixture control screw $3/4$ of a turn out (Tillotson carburettor) or $7/8$ of a turn (Mikuni carburettor) from the full closed position. Adjust further when the motor is warm to a 2500 RPM with the idle adjustment (stop) screw.
- Additional adjustment** on the motor is not required. For further engine specifications refer to "Manual for ROTAX-engine type 505 Execution without decompressor" see sect. 1.02 of this manual.
- 1.9.3. **Exhaust Muffler:**
The muffler has been specially designed for the DG-400 by Rotax, and is attached by three Rotax spring couplings secured with Loctite 72 B.
- 1.9.4. **Propeller:**
Hoffmann HO 11 F - 128 B 84
or as an Option
MT-Propeller MT 136 R 75 - 1 B
Attachment bolts: - four M 8 x 85 DIN 931 - 8.8, head with a 2 mm (0.08 in.) dia. hole for lock-wiring. Tightening torque of the bolts - 1,5 daNm (11 ft lb).
- Propeller Positioning:**
To assist in having the propeller stop in a vertical position during flight, the propeller should be positioned vertically such that the timing mark on the ring gear is 45 ± 15 mm ($1.77 \pm .6$ in) above the engine block joint on the right hand side looking towards the nose. Adjustment is made slipping the drive belt into the required position. See sect. 4.1.
- 1.9.5. **Drive Belt:**
The drive belt is a 1200-8m-50. Replacement belts should be ordered through Glaser-Dirks Factory.
- Drive Belt Tensioning:**
With either a push or pull of 5 daN (11 lb) at the midpoint between upper and lower pulleys, there should be a deflection of at least 3 mm (.12 in) or a max. of 12 mm (.48 in). Tensioning adjustment can be made by turning the eccentric propeller shaft, see sect. 4.1.

- 3.4.2. After **300 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 (see sect. 4.6.). Disassemble the power plant see sect. 4.6.4. and ship the engine to the manufacturer - Bombardier Rotax or a Rotax licensed aircraft engine maintenance workshop for the major overhaul.
2. Replace all the nuts and bolts on the engine
3. Replace the drive belt
4. Replace all the fuel lines, see. 3.4.3a).
5. Replace all the relays
6. Replace the propeller bearings (see sect. 4.2.)

- 3.4.3.a) **After 2-3 years** the fuel lines at the engine have to be exchanged (the lines above the automatic fuel cock and the two connectors GS6 near the automatic fuel cock).
- b) **After 6 years** all flexible fuel lines including the plugged piece of hose at the pneumatic fuel pump and the two shut off valves have to be exchanged.
- After the accomplishment of TN826/45 instruction 1 the shut off valves no longer need to be exchanged.
- The line from tank to drainer valve shall be located so that it does not lie directly on the fuselage shell.

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

3.4.4. 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. 1.11.).
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 carburetors have hardened. They should then be replaced.
3. **After sudden power loss at full throttle**
Check pistons and cylinders for seizing marks, see sect. 3.1 item 11b.

Maintenance manual DG-400

4.14.1 Working instructions for heat-shrink tubing

To insulate various parts of the electrical system heat-shrink tubing is used. For repair and maintenance the heat-shrink tubing often has to be removed. For removal use a sharp knife. To insulate again slip a new piece of heat-shrink tubing over the part which is to be insulated. Use a hot air gun (min. 200°C, 390°F) to heat the tubing until it shrinks and gives a tight fit.

4.14.2 Securing with Loctite

All bolts on the engine except for the propeller-mounting bolts (lockwire) which are not secured with locking nuts have to be secured with Loctite 72 b (672). Loctite 243 may be used as an alternative.

If a bolt can't be unscrewed you must heat this section with a hot air gun to reduce the locking force of the Loctite.

Before reinstallation you have to clean the thread of the bolt and the inside thread from any remains of Loctite. For this procedure use Loctite 18896. If necessary recut the inside thread. Before you apply Loctite, the bolt and inside thread have to be degreased with spray cleaner Loctite 7063. Wipe off the bolt and clean the inside thread with compressed air. Repeat twice for inside threads.

Apply only a small amount of Loctite to the thread. Too much Loctite may cause damage when you try to loosen the bolt again.

With blind holes the Loctite must be applied to the thread in the hole and not to the bolt.

All locked and secured bolts have to be marked with red securing paint which also marks the respective component at that particular point. Remove the old red securing paint before reinstallation of the bolt.

Caution: Loctite must be used within 2 years of production date. The production date is printed on the bottom of the bottle. 96A means January 1996, 96B means February 1996 and so on.

Issued: June 2004 TN 826/45

46d

8. Partlist

In this list you will find only parts of the powerplant and the electrical system. Only parts which are available at the date of issue of the partlist are listed. The type designations may be different in some cases from the designations than in the preceding chapters. Please find the part no's of the control-system parts and of the metal fittings of the powerplant in the following diagrams.

Parts for the powerplant

a) necessary for the 25 hours inspection
Spark plugs: electrode gap 0.4-0.6 mm

With Bosch electronic boxes:

60510811 3 items NGK B 8 ES
60510810 1 item (front plug) Bosch W 3 CC, without cap

With Ducati electronic boxes:

60510809 NGK BR 8 ES.

The spark plugs should not have a cap which can be screwed off! Such fixed cap spark plugs are a special version which can only be supplied by Rotax or DG Flugzeugbau.

60507570 fuel filter, filter mesh size 200µ

b) Spare parts

With Bosch electronic boxes:

60510821 3 items spark plug connectors elbow 0356 351 032
60510820 1 item (front plug) spark plug connector long elbow

With Ducati electronic boxes:

60502312 spark plug connector NGK TB 05 EMA

60500115 Return spring for muffler Rotax 938790
60500127 Nut for spring coupling M 8 for exhaust muffler (Rotax 842330)
60500128 Spring for spring coupling M8 (Rotax 239628)
60500131 Starter motor: Bosch American E-Starter 992807 from ser.no. 151 on
Note: The old Bosch starter 000 116 0001 is no longer available. For installing type 992 807 the mounting parts 4M5/1 and 4M5/2 and 4M70 are needed.

60504010 Drive belt HTD 1200-8M-50
57600922 Ball bearings for upper pulley 6009-2Z
39001024 Service kit nuts and bolts for 300 hour overhaul
60000175 Gas spring for extension-retraction drive A1LO-02-250-585/1200N
60000174 Gas spring for engine door A1A1-90-71-225/120N

Issued: June 2004

TN826/45

52

8. cont.

- 60507560 Electric fuel pump Facet 40105
- 60500246 Diaphragm vacuum pump Mikuni DF 52-48, 994 485
- 60507550 Drainer CAV 110 (1/8" NPT)
Warning: Replace sealing ring of the drainer by partno.60504402 prior to installation!
- 60504402 Sealing ring for Drainer CAV 110 (for automotive fuel)
- 40470300 Probe for cylinder head temperature 4M30
- Service kit fuel lines (necessary every 6 years, TN826/45 instruction 1 must have been accomplished):**
- 39001012 for Tillotson carburetors
39001013 for Mikuni carburetors
- Service kit fuel line at the engine (necessary every 3 years)**
- 39001003 for Tillotson carburetors
39001002 for Mikuni carburetors
- 60507660 fuel cock PN 16 V 6 12026 omitted with TN826/45 instruction 1 replaced by:
60507650 fuel cock KH 1075 1/4" with red handle
60507660 threaded connector with pipe olive and cap nut (2 items necessary)
- 60507650 fuel cock Götz 755.008 omitted with TN826/45 instruction 1 replaced by:
60000527 fuel cock KH 1072T PTFE
80012130 threaded connector 1/4" (female), 8mm
80012131 threaded connector 1/4" (male), 8mm

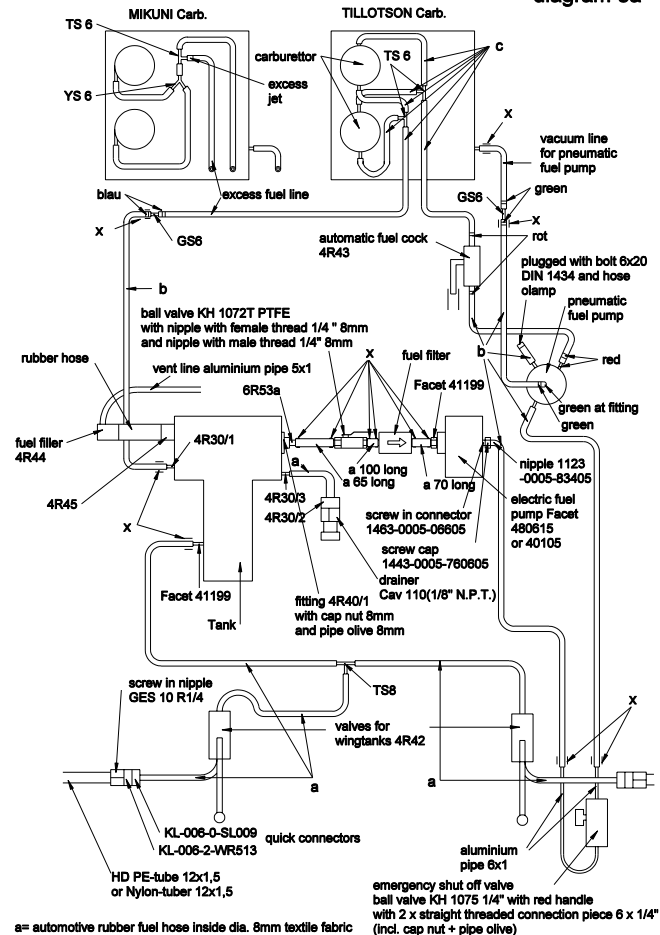
In addition with noise absorbing engine fairing for Tillotson carburetors

- 60500238 Intake funnel
60500239 Sealing
60500141 Air filter

for Mikuni carburetors

- 60500242 Intake funnel
60500140 Air filter

diagram 8a



a= automotive rubber fuel hose inside dia. 8mm textile fabric

b= automotive rubber fuel hose inside dia. 6mm textile fabric

c= rubber fuel hose inside dia. 6mm metal fabric shield

x= hose clamp 8-12, 9mm