

## Maintenance Manual DG-1000T

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## Maintenance Manual DG-1000T

### 0.2 List of effective pages

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0	0.0	June 2005	January 2007		
	0.1	see manual amendments			
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- Encl. 1 Download instructions for flightlog and service data from the DEI-NT
- Encl. 2 Instructions for transponder installation
- Encl. 3 Throttle handle in front and rear Cockpit TN1000/15
- Encl. 4 Electrically operated main landing gear
- SI 67-07 Service Info ballast box in the fin foam rubber rings
- Z193 406 MHZ ELT antenna BD3 installation 2-seaters

## **0.4 Airworthiness limitations**

### **0.4.1 Repairs**

Repair or replace damaged parts prior to next flight. Follow the instructions of the DG-1000 repair manual for repairs of the airframe. Repairs outside the scope of DG-1000 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 spare parts.

For all aircraft under EASA regulations the following applies: According to part 21, subpart M to accomplish major repairs an approved repair instruction is required, see also TN DG-G-01 “Approved repair methods according to EU Commission Regulation 1702/2003 part 21, subpart M”

### **0.4.2 Life time of the airframe**

The maximum allowable operating time for the DG-1000T is 12000 flight hours. Therefore inspections according to section 2.4 of this manual have to be executed at 3000 h, 6000 h, 9000 h and every 1000 hours following thereafter.

### **0.4.3 Life time of components**

- a) The **gasket for the drainer valve** has to be exchanged after 6 years.
- b) The **spark plugs** have to be exchanged after 25 engine hours.
- c) The **fabric straps of the safety harness** have to be exchanged after 12 years.
- d) The **rubber cord** in the elevator control system see section 1.2.6 has to be replaced at least every 6 years.

#### **e) Other components:**

All other components like 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.

#### **0.4.4 Service time, maintenance documents**

Follow the instructions of the respective manufacturer:

- a) Operating Manual for Safety Tow Releases  
Series: Europa G 88 Safety Tow Release  
latest approved version  
Operating Manual for Tow Releases  
Series: E 85 Nose Tow Release  
latest approved version
- b) Safety harness: instructions of the manufacturer latest approved version.
- c) Minimum instrumentation: instructions of the manufacturer latest approved version.
- d) Engine: Manual of the engine manufacturer latest approved version.
- e) Operating- and Service Instructions for propeller DG-P001 latest approved version.

**Note:** The Airworthiness Limitations section is FAA approved and specifies maintenance required under Secs. 43.16 and 91.403 of the Federal Aviation Regulation unless an alternative program has been FAA approved.

## 1.2 Elevator control and trim system

### 1.2.1 Control system

see diagram 1

### 1.2.2 Elevator deflections and tolerances

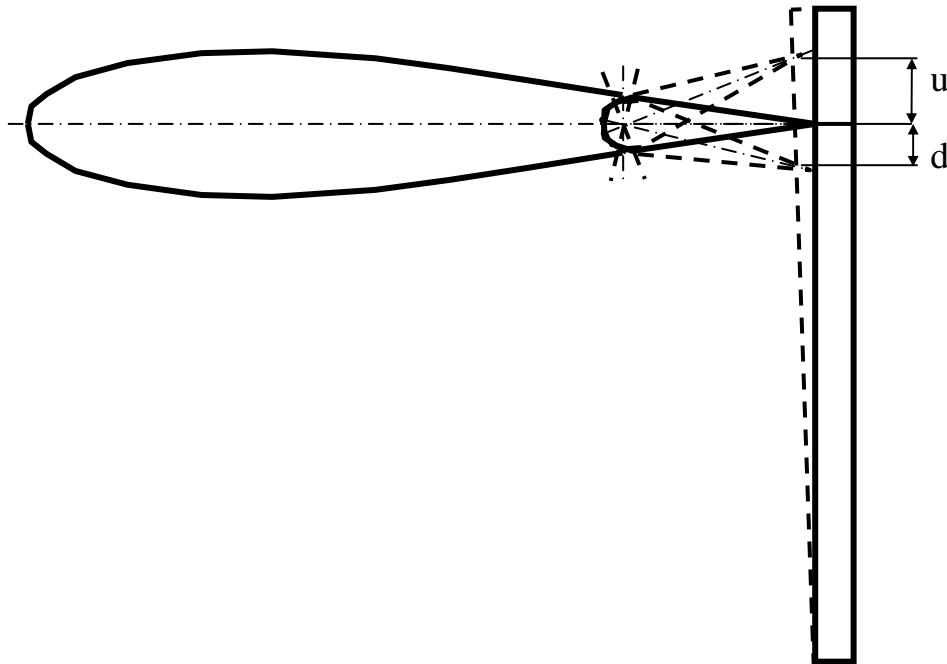
up:  $27^\circ$   $u = 77$  up to  $79$  mm (3.03 up to 3.11)

down:  $21^\circ$   $d = 61$  up to  $63$  mm (2.40 up to 2.48)

measured at 168 mm (6.61 in.) from hinge axis which is directly at the edge of the cut out for the rudder

Measurement:

- Hold a measuring stick with one end on the floor, the stick must be vertical when touching the elevator trailing edge.
- Set the elevator to zero by using a pattern. A drawing for the zero-pattern is available from DG Flugzeugbau.
- Mark the 0-point on the stick.
- Then measure the up and down deflections according to the sketch.



### 1.2.3 Elevator stops

The elevator stops are located at the rear control column and can be adjusted with a 10 mm open end wrench.

### 1.3 Rudder control

#### 1.3.1 Rudder control circuit

see diagram 2

#### 1.3.2 Rudder deflections and tolerances

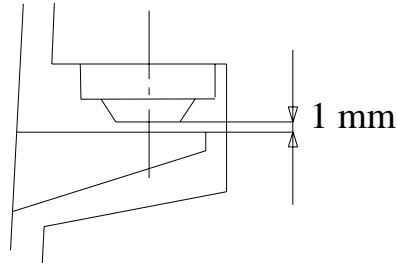
28° up to 29° which is 160 up to 165 mm (6.3 up to 6.5 in.) to both sides measured at 330 mm (13 in.) behind the hinge axis (lower rear end of the rudder).

#### 1.3.3 Rudder stops

The rudder stops are located at the lower hinge of the rudder.

#### 1.3.4 Axial space and free play

The maximum allowable space including free play at the upper hinge point is 1mm (0.04 inch).



#### 1.3.5 Seal the rudder

The rudder is sealed on both sides. On the outside Mylar seals and inside the fin with V seal tapes.

These seals are not to be removed.

If damaged replace the seals according to section 4.7.4.

### 1.6.3 Main wheel (non retractable Version)

see diagram 9

This landing gear version is equipped with a drum brake instead of a hydraulic disc brake.

### 1.6.4 Hydraulic brake system

- a) Brake fluid approved specification DOT 3, DOT 4, SAEJ 1703.  
The brake fluid must be exchanged at least every 4 years.

**Warning:** brake fluid is poisonous.

- b) Adjustment: see section 1.5.2c)

If adjustment does not increase the braking effect as desired, the brake system is leaking or there is air in the brake system. Bleeding of the brake system see section 4.6. The brake linings must be replaced if they are worn down to a thickness of 1.5 mm (0.06 in.). Replacement see section 4.5B.

Replacement set (2 linings, 6 rivets) Tost Nr. 075860.

### 1.6.5 Wheels, tyres, tyre pressures

#### Main wheel:

Tyre: 380 x 150 6 PR, diameter 380 mm (15 in.),  
Wheel: Tost 5" wheel with disc brake, width 134 mm, axle 30 mm  
Tyre pressure: 2,5 bar (36 psi)

#### Tail wheel:

Tyre 200 x 50 6 PR, diameter 200 mm (7,87in.)  
Wheel: Plastic hub with ball bearings, part. No. S23  
Tyre pressure 4 bar (58 psi)

#### Nose wheel (only version B) and C):

Tyre: 260 x 85, diameter 260 mm (10,2 in)  
Wheel: Tost 4" wheel, width 85 mm, axle 20 mm  
Tyre pressure: 2,5 bar (36 psi)

### 1.8.2 Fin tank

The fin ballast tank is constructed as integral tank.

a) Adjustment

The release cable must be adjusted so that the cable just becomes loose when the handle is parallel to the fuselage wall.

b) Inspection

According to sect. 2.2 a special inspection is to be carried out on the fin ballast tank system at each annual inspection.

The dump time of the full fin tank should be timed and should not exceed 120 seconds.

Check the calibration of the outside air temperature gauge (in the DEI-NT).

**Up to ser.no. 10-100 and ser.no. 10-102 to 10-127:**

Remove the tailwheel and the cover plate in the tailwheel box. Check the control cable and the lever of the valve carefully for wear. Check the control cable at the operating handle too. If the cable or the lever is worn, further use of the fin tank is prohibited. Please contact DG Flugzeugbau for a detailed repair instruction.

**Ser.no. 10-101, and from ser. no. 10-128 on:**

Check the control cable at the operating handle and at the dump valve (installed in the lower rudder mounting bracket). If the cable is worn, further use of the fin tank is prohibited.



## **1.9 Ballast box in the fin**

### **1.9.1 Inspection of the control light in the front instrument panel**

Slide one weight after the other into the rails of the box. Check with each additional weight if the correct amount of blinks is displayed.

The heavy weights with 2,4 kg (5.3 lbs.) each must be installed in the lower 4 sections and the lighter weights with 1,2 kg (2.65 lbs.) each in the upper 2 sections. It doesn't matter in which sections the weights are installed, but it is not allowed to insert the light weights into the sections for the heavy weights.

The control light in the front instrument panel must start blinking after each transaction with the weights. By counting the amount of blinks check if the correct amount of ballast is displayed. For a heavy weight 2 blinks appear and 1 blink for a light weight, this means 10 blinks if the box is filled up completely. After a pause of 2-3 seconds the blinking must be repeated etc. The blinking can be stopped by pressing on the control light. Pressing again on the control light must reactivate the blinking feature.

### **1.9.2 Protection of the control light**

There is a fuse holder in the positive wire to the control light (in the front instrument console near the light).

Fuse: 250V 5x20m 0,2A.

### **1.9.3 Inspection of the locking device of the ballast box cover plate**

Check the locking device at the cover plate, the locking pin must be pressed by its spring towards its stop.

Insert the cover plate to close the compartment, it must be possible to push the locking pin with the tool up to its stop and the pin must stay in this position.

### **1.9.4 Inspection of the foam rubber rings**

Check condition and correct gluing of the foam rubber rings 10L45/2 in the ballast box in the fin. Without these rings a correct indication is not possible. Replace damaged rings according to Service Info 67-07, attached to this MM.

## 1.15 Electrical system

Note: Before doing any work on the electrical system, isolate the power supply by switching off the main switch. The battery should also be disconnected before working at the control unit. This is done by disconnecting the positive wire from the main battery (located in the engine bay). Isolate the terminal of the wire with tape.

In addition the plugs from the wiring leading to control unit and DEI-NT shall be sealed with tape when they are removed from the control unit or from the DEI-NT.

### 1.15.1 Layout

see wiring scheme and wiring plan enclosed to this manual.

### 1.15.2 Batteries

#### 1.15.2.1 Main battery

The installed battery is a sealed maintenance free battery 12V/17Ah with screwed terminals. The battery is installed in the engine bay.

- Recharging is via the 12 V sockets in the front and rear cockpit. Therefore switch on the main switch to the first position (charging). You don't need to remove the battery for charging.

#### 1.15.2.2 Additional batteries

Wiring with plugs BSK12 (from ser. No. 10-120 on, before a Preh plug was installed) for additional batteries in baggage compartment and fin are standard equipment.

**Caution plugs BSK12:** The screws to fix the wires in the plugs must be tightened and secured with securing paint.

- a) An additional battery Z73 12V/7Ah with holder Z72 or Z01 12V/10Ah with holder Z200 may be installed in the baggage compartment.

In this case a battery selector switch must be installed in the front instrument panel.

- b) A battery Z110 (12 V, min. 12 Ah, mass 5.5 kg, 12.1 lbs.) may be installed in the battery box in the fin.

The wiring for this battery is in parallel to the battery in the baggage compartment.

#### 1.15.2.3 All batteries

**Caution:** Use only automatic chargers suitable for sealed liquid acid batteries. To charge the batteries to their max. capacity a charger with a max. output voltage of 14.4 V is required (most chargers supply only 13.8 V). A suitable charger No. Z 08 is supplied by DG Flugzeugbau.

**Note:** Don't charge longer than for 1 week.

### 1.15.3 Control unit

This aluminium box is located in the engine bay at the right wall.

The control unit incorporates the following functions:

1. Master switch relays.
2. Control of the extension-retraction procedure. The extension-retraction relays are also mounted inside the unit.
3. Startermotor control: The starter motor is actuated by a power electronic, no relays. This applies to the normal engine start (ignition on) and also the slow turning of the propeller into retraction position (ignition off). Activation is via the starter button.
4. Control of the primer valve.
5. Control of the refuelling pump.
6. Fuses for several circuits are installed in the control unit see section 1.15.12.

**Warning:** To avoid damage disconnect the power plug first when removing the control unit. Plug in the power plug after the other plugs when installing the unit,

**Caution:** When you plug in the connector plugs, carefully fix the plugs with their screws. Secure the screws with Loctite 221.

### 1.15.4 Master Switch:

The aircraft is supplied with a master switch (no separate engine master switch). The master switch supplies in “on” position electrical power to all systems. The master switch is a key operated switch located in the console below the instrument panel. The key switch controls a relay in the control unit which cuts off the electric power.

### 1.15.5 Engine elapsed - time indicator:

The engine time indicator is incorporated in the DEI-NT and counts as soon as the proximity switch detects that the propeller is turning and therefore counts only the pure engine running time.

In addition the time to the next 25 hour maintenance will be displayed. When the maintenance has been executed, this time must be reset to zero in the DEI-NT set up menu.

### 1.15.6 Electric fuel pump:

Fuel pump: Power supply from the battery, protection via a re-settable fuse in the control unit.

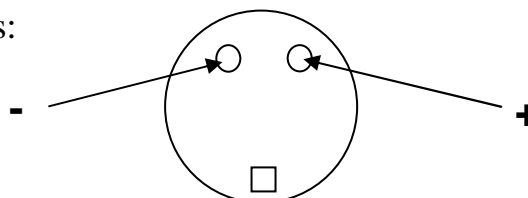
### 1.15.7 12 V Socket:

A socket is located in the front and in the rear cockpit (behind the pilots right shoulder). It is used for:

- battery charging (main switch in charging position)
- to provide power for external accessories (main switch “on”).

Connection of the socket terminals:

view from the cockpit



**From ser. No. 10-120 on** a BSB12 socket is installed.

Connection of the socket terminals: centre pin= + pole.

Suitable plugs see parts list section 8.3.

### 1.15.8 Power plant extension-retraction mechanism:

See also sect. 1.13

The automatic extension and retraction is controlled by the control unit see sect. 1.15.3.

The extension-retraction motor will be switched off at the end limits by position switches see sect. 1.13.5.

Caution: If the proximity switch is defective (short circuit) a safety interlock in the control unit prevents the engine from being retracted automatically with the propeller not in the correct position. The retraction of the powerplant must be done with the manual switch. The DEI-NT will display the failure message “RPM Pickup”.

The proximity switch must be exchanged prior to the next engine start.

### 1.15.9 Manual extension-retraction switch

Manual extension and retraction is via one switch which is located on the instrument panel. When this switch is operated, the automatic extension/retraction system will be switched off. The automatic system will be switched on again when you operate the ignition switch. The manual switch activates the extension/retraction relays in the control unit directly, by-passing the safety.

### 1.15.16 Connector plugs between fuselage and engine

For removal of the engine disconnect the plugs from the control unit, disconnect the starter earth wire from the distributor plate and disconnect the coaxial connector of the CHT probe.

### 1.15.17 DEI NT= (Digital Engine Indicator)

For a description of the readouts and the various functions and the set up menu see flight manual sect. 7.4. The DEI-NT controls all functions together with the control unit see section 1.15.3.

- The RPM measurement is fully digital and counts the impulses of the proximity switch.
- The cylinder head temperature (CHT) is measured by a temperature probe which is screwed into the rear cylinder head.
- Fuel level measurement see sect. 1.14.8.

Functions:

The following functions are controlled by the DEI-NT:

- a) by the ignition switch
  - the ignition (shorting of the magneto coils)
  - with the ignition switched off the engine automatic retraction and the control of the propeller position will be activated.
  - with the ignition switched on the electric fuel pump, the automatic extension of the engine and the control of the starter motor will be activated.
- b) the RPM indicator controls a relay which prevents the starter motor working whilst the engine is running.
- c) the limit switch see sect. 1.13.4 at the engine mount activates the control of the starter motor only when the engine is extended
- d) the proximity switch see 1.15.14 prevents the automatic retraction of the engine as long as the propeller is not in the correct position for retraction (with the manual extension-retraction switch see sect. 1.15.9 not operated).

**Note:** If a new DEI-NT or a replacement DEI-NT should be installed, you have to report your actual elapsed engine time to DG Flugzeugbau to enable them to adjust the new DEI-NT to that value.

**Warning:** With the connector plug disconnected from the DEI-NT, the ignition is not short-circuit. This means the ignition is on.

Don't turn the propeller!

**Caution:** When you plug in the connector plug, carefully fix the plug with their screws. Secure the screws with Loctite 221.

## 2 Inspections

### 2.1 Daily inspection

see flight manual section 4.3

### 2.2 Regular inspections

#### A After 200 flight hours and during the annual inspection

Check the rudder cables for wear especially around the S tubes on the rudder pedals. Worn rudder cables should be replaced (see section 4.2). Check the seal of the rudder (see section 1.3.5).

#### B Annual inspection (and 100hr inspection – only for USA)

- Execute all items of the daily inspection see flight manual section 4.3.
- Inspect all bolted connections and locking devices ie. locknuts, split pins etc.
- Check all metal parts for adequate greasing and rust prevention. (see section 3.3).
- Check the control surface deflections (see sections 1.2 up to 1.4).
- Check the free play in all control circuits (see section 1.2 up to 1.6)
- Check the fore and aft play of the wings (see section 1.11).
- Check the canopy emergency releases according to section 7.14 of the flight manual.
- Check the rubber cords in the control system (see sections 1.2.6 and 1.7.5).
- Check the thickness of the wheel brake linings (see section 1.6.4).
- Check if the brake fluid has to be exchanged (see section 1.6.4).
- Check the airbrakes according to section 4.4.
- Check the fin ballast tank system according to section 1.8.2.
- Check the fin ballast box according to section 1.9.
- Check the friction of the canopy opening handles: A force of 10 – 20N (2.2 up to 4.4 lbs.) should be required at the end of the handle. If the force is too low tighten the hinge bolt of the handle accordingly.
- Check if the powerplant has been serviced according to section 3.6.1.
- Check the friction brake of the throttle control (see section 1.12.8).  
**Option: throttle handle in rear cockpit TN1000/15:**  
Check of friction brake not applicable, not installed.
- Check the torque of the propeller bolts (see section 3.6.1 item 23).
- **Tow hooks:** The operating and maintenance instructions for the release mechanisms, see sect. 0.4.4 of this maintenance manual have to be followed.
- **All-up weight and centre of gravity:** These should be checked at least every 4 years during the yearly inspection.

**Fuselage - fin intersection:**

Check for cracks. Remove gelcoat and any filler along the cracks. Apply pressure to the fin (push the fin towards the nose as well as applying torsion).

Do the cracks penetrate the glass fibre structure?

Disassemble the rudder and check the glued connection of the fuselage end bulkhead and the fin trailing edge web.

To check the elevator control circuit and the bulkhead attachments in the fin area, the tailwheel and the cover plate in the wheel box should be removed.

**Tailplane attachment:**

Increased free play? Cracks in the fin top rib? Check the aluminium parts of the tailplane attachment if bent or loose, check the tailplane locking device.

**Rudder mounts:**

Increased free play? White areas in the glass fibre, bent rudder hinge pin supports?

**Fuselage skin:**

Outside: cracks, nicks, folds? Any separation of the skin from the core? Inside: white spots, zig zag white lines, cracks? Has any bulkhead become loose?

**C.G. tow release:**

Especially after a wheel up landing, check for dirt etc., check for proper functioning. Has the tow release housing become detached from the fuselage?

**Seat back bulkhead:**

Cracks? Shoulder strap attachment points?

**Belly harness attachment points:**

Check for cracking around the mountings in the seat. Check the safety harness assembly.

**Controls:**

Check for proper functioning and condition of all controls and adjustment mechanisms (i.e. rudder pedal adjustment, tow release, air brake, control column and trim etc.).

**Instruments:**

Proper functioning? Dirt in the static ports or in the pitot probe?

**Engine compartment:**

Check for damage of the walls. Does the engine retract without scratching the side walls? Do the engine doors fit as well as before?

Check the condition of the fire resistant paint.

Check the engine support.

**Undercarriage:**

Check to insure if properly aligned. No bent forks? Proper extension and retraction? Any dirt in the forward fork pivot?

Any white areas or cracks in the wheel box? Remove the baggage area floor panels and inspect the wheel box from above. Undercarriage control circuit condition. Is there free play between actuating lever and upper fork?

**Nose wheel (if applicable) and tail wheel:**

Any cracks or white patches around the attachment?

**Ballast box in the fin**

Check especially after a ground loop if the rod which secures the ballast weights is bent and if the locking mechanism is still working properly.

Check also the GFRP parts of the box.

**Horizontal tailplane-stabilizer:**

**Outer skins:** Crushing, cracks, delaminations?

**Mounting:** Glued joint of the bushes, white areas around bushes, cracks in shear webs, cracks around locking plate?

**Hinge mounts:** checked?

**Elevator:**

Crushing, cracks, delaminations?

Hinge mounts checked? - Control surface horn bent or loose?

Do **all checks of the daily inspection** see flight manual section 4.3.



## 2.4 Inspection procedure for increase of service time

### 1. General

The results of fatigue tests of wingspar sections have demonstrated that the service time of GFRP/CFRP gliders and motorgliders may be limited to 12000 hours, if for each individual glider (in addition to the obligatory annual inspections) the airworthiness is demonstrated according to a special multi-step inspection program particularly with regard to the service life.

### 2. Dates

When the glider has reached a service time of 3000 hours, an inspection must be done in accordance with the inspection program mentioned under point 3. If the results of this inspection are positive or if any defects found have been duly repaired, the service time of the glider is extended by another 3000 hours to a total of 6000 hours (first step).

The above inspection program must be repeated when the glider has reached a service time of 6000 hours. If the results of this inspection are positive or if any defects found have been duly repaired, the service time of the glider is extended to 9000 hours (second step).

When the glider has reached a service time of 9000 h the above inspection program must be repeated. If the results of the inspection are still positive, or if any defects found have been duly repaired, the service time may be extended to a total of 10000 hours (third step).

Proceed analogous when reaching 10000 and 11000 hours (4. + 5. step).

### 3. Ask the DG Flugzeugbau for the necessary inspection document.

When you request the inspection document, the following data should be submitted: Model/Type, Registration, Serial Number and the operating hours at which the inspection will be performed. A charge will be made for the inspection document.

### 4. The inspection must only be done by a licensed repair station or inspector.

### 5. The results of the inspections have to be recorded in an inspection test report wherein comments are required for each inspection instruction. If the inspections are done outside the DG Flugzeugbau facilities, a copy of the records must be sent to DG Flugzeugbau for evaluation and information.

### 3.3 Greasing and oiling

- A The contact surfaces of the canopies to the fuselage are to be rubbed with colourless floor-polish (canopy and fuselage side) to reduce grating noise in flight. Polish at the beginning of the flight season and then every month.
- B Once a year your glider should be carefully checked and all bearings, including control surface hinges, should be cleaned and greased if necessary. The various greasing points are as follows:

- Aileron drive connections at the inboard aileron.
- Airbrake drive connection - in airbrake box, also grease the brake paddle pivots.
- Remove the access panels on the left hand cockpit walls and grease all the pushrod guides, but not those with Teflon linings, note see below.
- Remove the baggage compartment floors and open the baggage compartment rear cover to grease all bearings.
- Open the access panels (2 in the front and 2 in the rear cockpit). In the rear cockpit you have to remove the height adjustable seat pan first. Grease all accessible bearings (ball bearings and rod ends with universal bearings)
- Remove the control column boots and grease all the bearings associated with the control columns.
- Grease the rudder pedal adjustment slide.
- Oil all hinge points on the undercarriage in the undercarriage box.
- Clean and grease all control surfaces hinges.
- Clean and grease the control hook ups for ailerons, airbrakes and elevator control.
- Clean and grease all pins and bushes of the wing and tailplane attachment.
- Clean and grease the lower ball fitting of the gas strut at the front canopy (if installed).

**Note:** The greases we recommend are lithium based pressure-resistant anti-corrosion greases or lithium-soap greases (multi-purpose greases for rolling element bearings).

Use thin engine oil eg. SAE 5W30

**Caution:** The sliding guides of the following parts are made from Teflon and should not be greased:

- Landing gear controlhandle 5FW39 on 5St68/2
- Airbrake control handle 5St69 on 5St68/1

If these parts have been greased inadvertently you have to disassemble the parts and to clean them completely with Acetone.

F Removal of the front fork 10FW10/1

1. Remove the baggage compartment floor and the rear cover of the baggage compartment.
2. Remove the main wheel see A.
3. Remove the lower fork 10FW11/1 see C.
4. Remove the spring legs see D.
5. Remove the struts see E.
6. Remove the nut M12 from the left hand side of the axle 10FW10/2. Shift the axle towards the fuselage wall. Mark the head of the axis at the outside fuselage wall (e.g. by illuminating this area from the inside) and drill a dia. 24 mm hole through the fuselage wall. Insert a bolt with thread M12 into the head of the axle (from ser. no. 10-7 on) to pull out the axle through the hole.
7. Remove the front fork 10FW10/1.

G Removal of the rear fork 10FW12/2

1. Remove the main wheel see A.
2. Retract the landing gear.  
**Warning:** The landing gear will retract by itself when unlocked by the force of the gas spring!
3. Disassemble the gas spring from the left side of the undercarriage box see 4.5.0.
4. Extend the landing gear again.
5. Remove the 2 bolts M8×40 LN9037 which connect the struts to the rear fork 10FW12/2.  
**With TN1000/13 executed, standard from ser. no. 10-133 on:** bolt M8x40 LN9037 on the right hand side and bolt M8x42 LN9037 on the left hand side.
6. Remove the 2 bolts M6×24 LN9037 which connect the struts to the rear fork 10FW12/2, don't change the length of the struts and don't mix up right and left strut.
7. **Up to ser. no. 10-132:** Remove the nut M12 from the left hand side of the axle 10FW12/1. Shift the axle towards the fuselage wall. Mark the head of the axle at the outside fuselage wall (e.g. by illuminating this area from the inside) and drill a dia. 24 mm hole (ser. no. 10-1 up to 10-6) resp. dia. 20mm (from ser,no. 10-7 on) through the fuselage wall. Insert a bolt with thread M8 into the head of the axle (from ser. no. 10-7 on) to pull out the axle through the hole.  
**From ser. no. 10-133 on:** Remove both axles with cone clamping devices 10FW127. To remove an axle hold the screw head with a spanner and unfasten the counter nut with an open end spanner until the axis can be pulled out.
8. Remove the fork 10FW12/2.

## 5 Weight and balance

1. Assemble the glider completely with gear down.
2. Empty ballast boxes in fin and Cockpit (Option), empty water ballast tanks and fuel tank, retract the powerplant.
3. Place scales under the tailwheel and if suitable scales are available under the main wheel.
4. The fuselage must be levelled so that the top of the aft fuselage boom has a tail-down slope of 1000 : 33.
5. Read weight of tail wheel: W<sub>2</sub>, be certain the wings are level and hold so that no load is applied. Read W<sub>1</sub> if suitable scales are available, otherwise see note below.
6. Measure the distance between perpendiculars through points a and b. (See figure, next page).

**Caution:** The distances a and b may change with different masses due to deflection of the landing gear.

**Note:** The total mass M may be determined by weighing and adding W<sub>1</sub> and W<sub>2</sub> or by weighing and adding the masses of all components.

Using the empty mass and the values determined above, calculate the C.G. as follows:

**C.G. empty:**  $X_{SL}: X_{SL} = W_{2L} \cdot b / M_L + a$

$M_L = \text{empty mass} = W_{1L} + W_{2L}$

$W_{2L} = \text{load on tailwheel (empty)}$

The empty weight includes all accessories but excludes pilots and parachutes. Remove loose objects and any removable trim ballast from the cockpit.

**C.G. in flight:**  $X_{SF}: X_{SF} = W_{2F} \cdot b / M_F + a$

$M_F = \text{flight mass} = W_{1F} + W_{2F}$

$W_{2F} = \text{load on tailwheel (flight mass)}$

The flight mass includes empty weight items plus pilot, parachute, trim ballast and all items needed in flight (barograph, camera, cushions, etc.). In addition, the rudder pedals and seating position should be adjusted as in flight.

## 6 Instrumentation and accessories list

### Air speed indicator (0 - 300 km/h, 165 kts)

<b>Manufacturer</b>	<b>Type</b>	<b>Certification No.</b>
Winter	6 FMS 4(diam. 80mm)	TS 10.210/15
	0-300 km/h Ident.No. 6421514 0-160 kts Ident.No. 6423514	
Winter	7 FMS 4(diam. 58mm)	TS 10.210/19
	0-300 km/h Ident.No. 7421514 0-160 kts Ident.No. 7423514	

The airspeed indicator must have colour coded speed ranges marked as indicated in the flight manual section 2.3.

### Altimeter

<b>Manufacturer</b>	<b>Type</b>	<b>Certification No.</b>
Winter	4 FGH 10 (diam. 80mm)	TS 10.220/46
	1.000-10.000m Ident.No.4110 3.000-30.000ft Ident.No.4330	
Winter	4 FGH 20 (diam.58mm)	TS 10.220/47
	1.000-10.000m Ident.No.4220	
Winter	4 FGH 40 (diam.58mm)	TS 10.220/48
	1.000-20.000ft Ident.No.4550	

Or any other TSO C 10b specified and approved altimeter with fine range pointer 1 turn max. 1000 m, 3000 ft.

### Harness (seat)

<b>Manufacturer</b>	<b>Type</b>	<b>Certification No.</b>
Gadringer	BAGU 5202 G	40.070/32
	SCHUGU 2700 G	40.071/05
	rubber coated adjuster bars	
Schroth	4-01-0.104	40.073/11

**Compass**

<b>Manufacturer</b>	<b>Type</b>	<b>Certification No.</b>
PZL	B - 13	FD 19/77
Ludolph	FK 16	10.410/3
Airpath	C 2300	
Hamilton	H I 400 46 MFK 1	TSO C 7c Type1 (only as additional equipment.)

The compass should be compensated in the A/C. A deviation table must be installed if deviation is more than 5°.

**VHF transceiver**

<b>Manufacturer</b>	<b>Type</b>	<b>Certification No.</b>
Dittel	FSG-40 S	10.911/45
	FSG-50	10.911/71
	FSG-60 M	10.911/72
	FSG-70,71 M	10.911/81
	FSG-90	10.911/98JTSO
	FSG 2T	LBA.0.10.911/103JTSO
Becker	AR 3201-(1)	10.911/76
	AR 2008/25 (A)	10.911/48
	AR 4201	JTSO-2C37 D, ED-23A
	AR 6201	EASA.210.1249
Filser/Funkwerk	ATR 720 A	10.911/74
	ATR 720 C	10.911/83
	ATR 600	LBA.0.10.911/106JTSO
	ATR 500	LBA.0.10.911/113JTSO
	ATR 833	EASA.210.0193

or other instruments certified for aircraft use according to TSO or JTSO or ETSO standards may be installed.

**Note:** Only radios with diameter 58mm (2 ¼ in.) can be installed at the assigned place in the console below the instrument panel.

**Instruments which are not part of the minimum equipment:**

**Transponders:**

Transponders certified for aircraft use according to TSO or JTSO or ETSO standards may be installed.

Installation of transponder and transponder antenna must be accomplished according to enclosure 2 for this MM or technical note DG-G-02.

After installation, a functional test and inspection must be performed by a licensed inspector.

**ELT:**

The ELT is or must be installed according to the ELT manufacturers instructions.

The designated place is the baggage compartment on the floor.

Installation of ELT antenna must be accomplished according to drawing Z193 (attached to the MM).

After installation, a functional test and inspection must be performed by a licensed inspector.

The ELT must be switched off during road transport.

**Other instruments and equipment (eg. variometers, gliding computers or flight data recorders):**

Instruments and other equipment may be installed if they do not in themselves, or by their effect upon the sailplane, constitute a hazard to safe operation.

**Caution:** If additional instruments or equipment are to be installed after production of the glider, it must be assured that they will be installed in the places provided by the design. If installed in other places it must be assured that they are secured safely.

Electrical instruments and equipment must be connected via appropriately rated fuses, the power consumption of each single part should not exceed 3A.

After installation raise a new weight and balance report.

**Warning:** If equipment is mounted on the canopies special care must be taken that canopy jettison is not impaired. To accomplish this any wire must be equipped with a plug in the vertical part. All plugs must be able to disconnect with low force, max. 10 N (2 lbs.). The wires must be long enough for the canopies to be opened completely before the wires are tight.

Equipment shall only be mounted at the fastening threads in the canopy frame provided by the design.

Max. mass of the equipment per canopy: 1 kg (2 lbs.).

### 8.3 Parts for the electrical system

- 60510898 Battery 12V 17Ah
- 41076000 DEI-NT-DG1000T
- 41076010 Control unit-NT 10E601
  
- 60510815 Limit switch 164-025 05 for positions engine extended and for stopping the engine
- 60510463 Limit switch for propeller-stopper 164-564
- 60510464 Limit-switch engine retracted and engine extended 164-574
- 60510484 Manual extension-retraction switch MTG 206 S
- 60510854 Key switch 3 Pos, 2 Pol KL09-1908KA (Master switch)
- 60510362 Switch STA 106 E (selector intern-extern)
- 60510372 Press-button DJET 07.17502.21 for starter
- 60510375 Press-button 12G2904 for refuelling pump
  
- 60510385 Circuit breaker ETA 2A
- 60510386 Circuit breaker ETA 3A
  
- 60510437 Fuse 80 A for main battery
- 60510434 Fuse socket for main battery fuse 80 A
  
- 60510550 Proximity switch Insor INCT 1212
- 40871350 Proximity switch ready assembled with wiring and plug
  
- 10002317 Preh plug for 12V sockets
  
- From ser. No. 10-120 on:**
- 60510796 Socket BSB12 (in main bulkhead)
- 60510797 Plug BSK12 (for socket BSB12)



**9.2 Checklist for checks and maintenance work**  
according to sect. 3.5.1 of the maintenance manual

h	25	50	75	100	125	150	175	200	225	250	275	300
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
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20												
21												
22												
23												
24												
25												
26												
27												
28												
29												
30												
executed by												
place												
date												
engine hrs												
signature												

Each item shall be signed off or the data which was determined shall be entered.  
The list is valid for the engine hour range:.....h - .....h  
DG-1000T Ser.no. 10-.....TB.....

Höhensteuerung  
elevator control

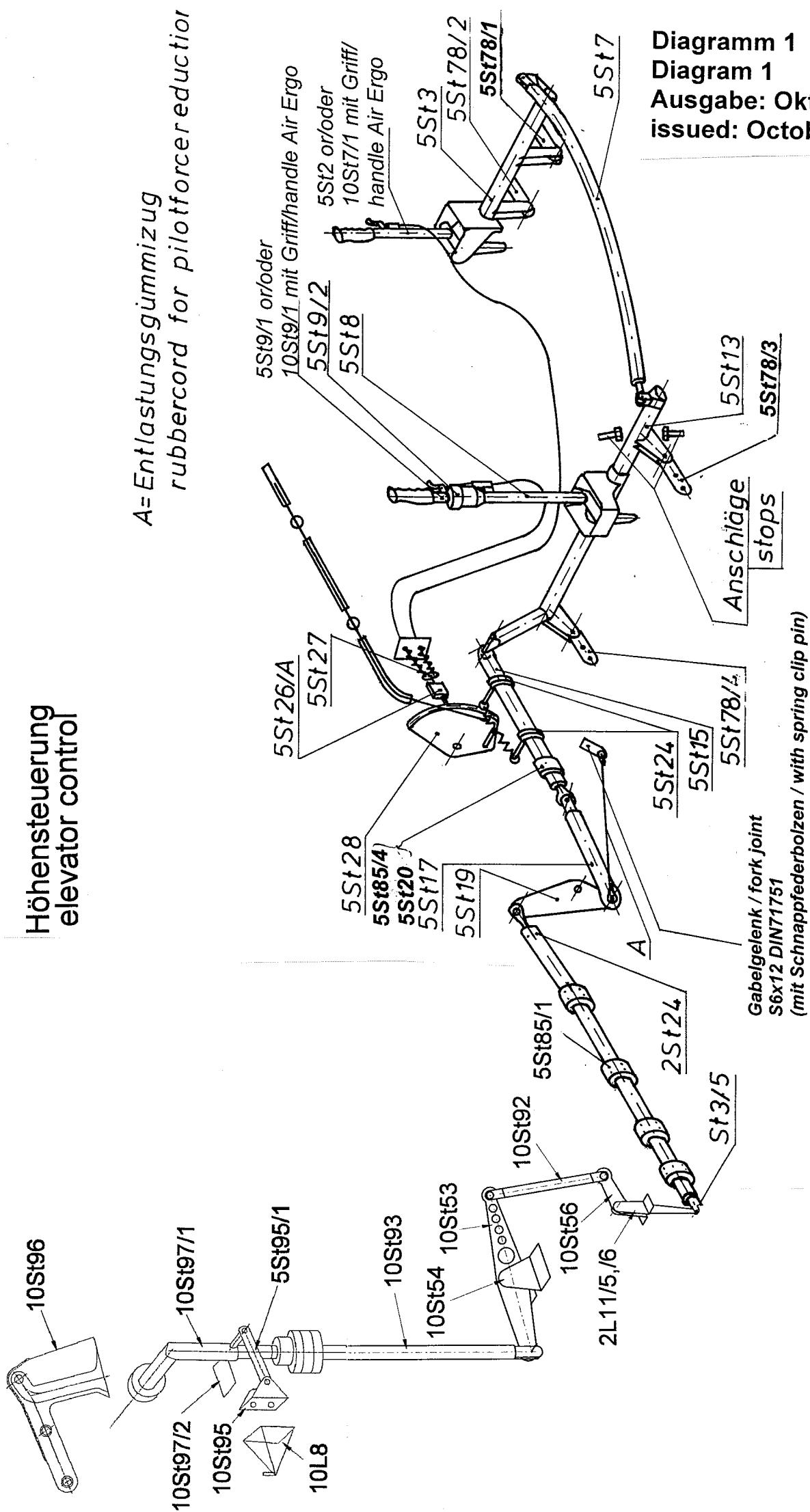
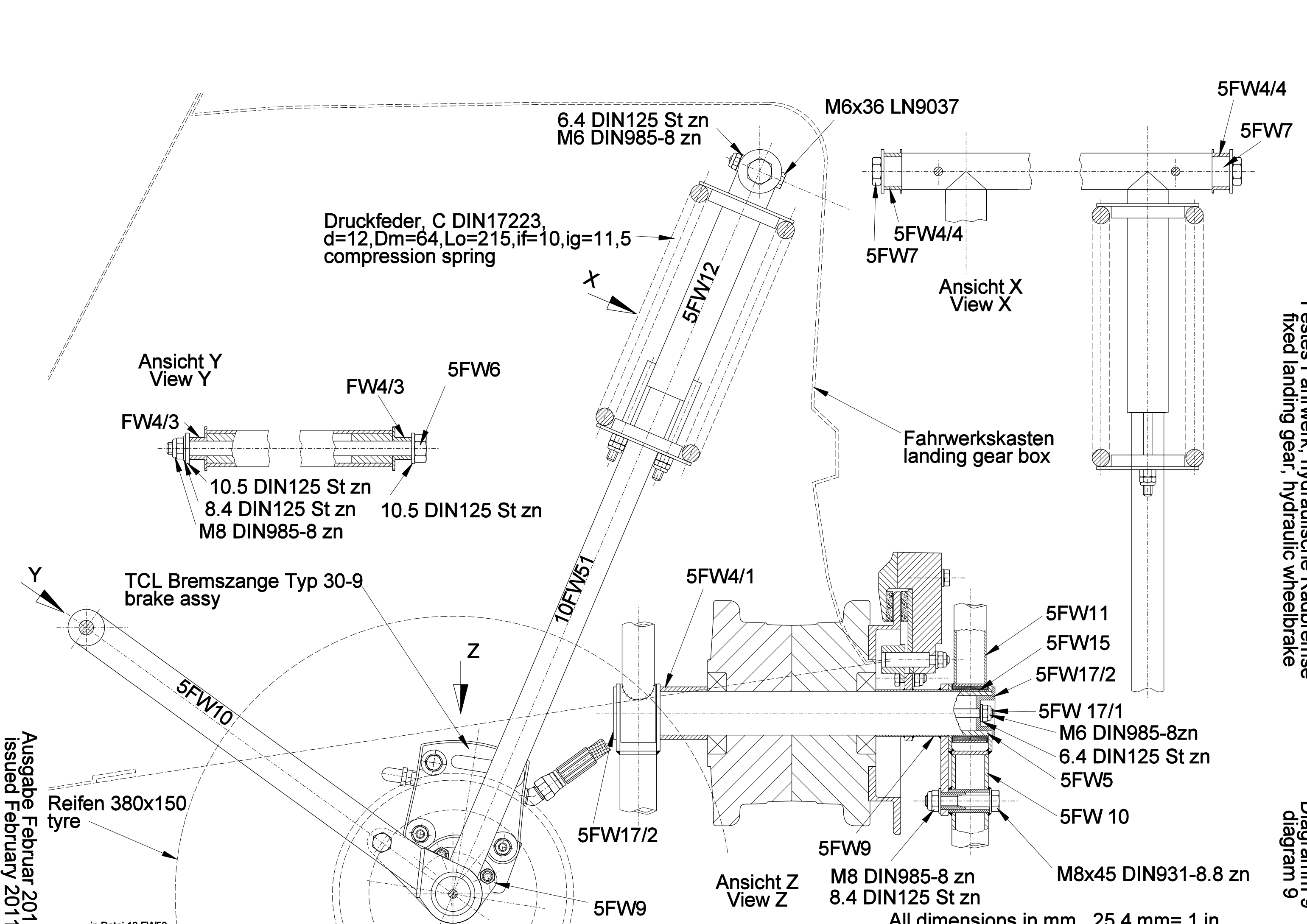


Diagramm 1  
Diagram 1  
Ausgabe: Okt. 2010  
issued: October 2010

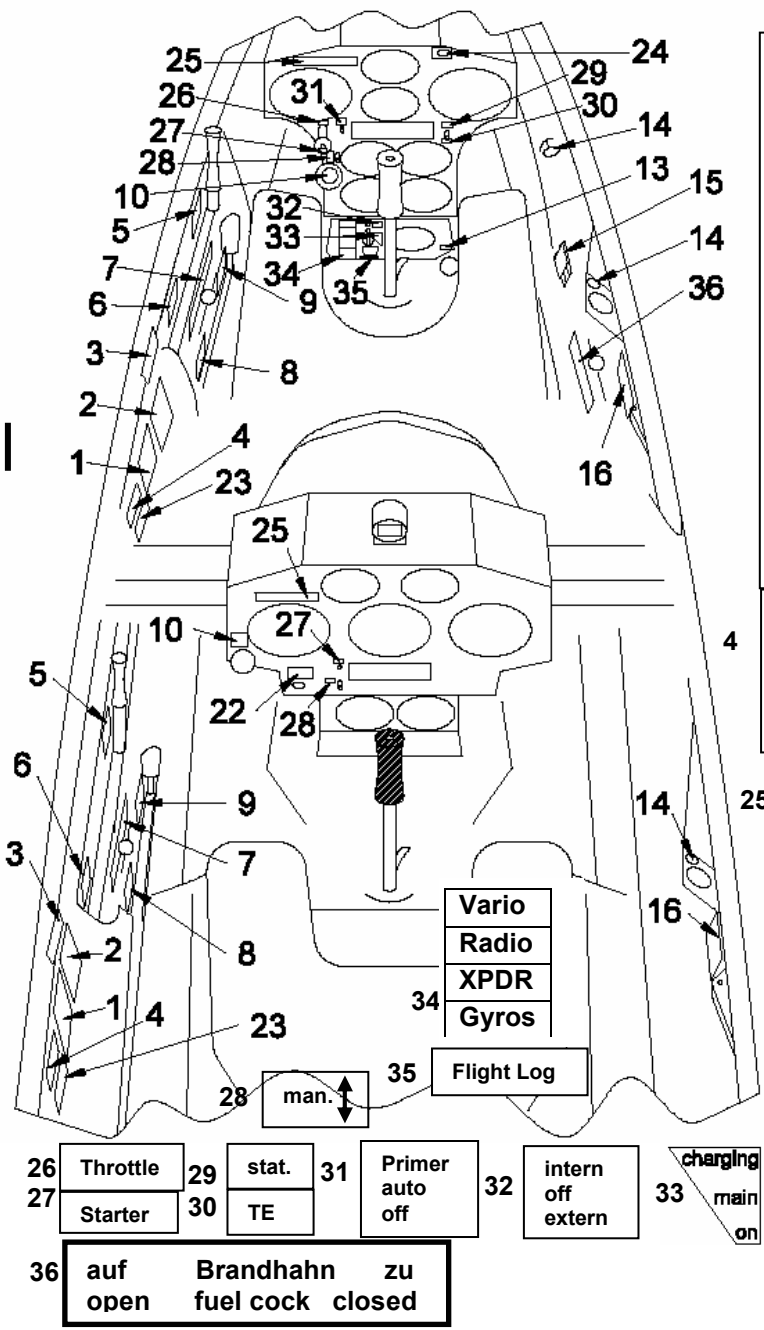


Festes Fahrwerk, hydraulische Radbremse  
 fixed landing gear, hydraulic wheelbrake

Diagramm 9  
 diagram 9

Ausgabe Februar 2011  
 issued February 2011

in Datei 10 FW50



### placards DG-1000T

**DG Flugzeugbau GmbH**  
 Type: DG – 1000T Serial No.: 10-  
 Year of construction:

Maximum airspeeds	km/h	kts.
Winch launching	150	81
Aero-tow	185	100
Manoeuvring V <sub>A</sub>	185	100
Rough air	185	100
Maximum speed V <sub>NE</sub>	270	146
Powerplant extended	185	100
Powerplant extension-retraction	100	54

Approved aerobatic manoeuvres, only without waterballast:  
*Pos. Loop, Chandelle, Spin, Stall turn*  
 In addition Category A:  
 Only with 18 m span without waterballast, engine retracted or removed:  
*Half loop and half roll, half roll and half loop, slow roll, inverted flight, half positive flick roll from normal flight with half loop, half negative flick roll from inverted flight*

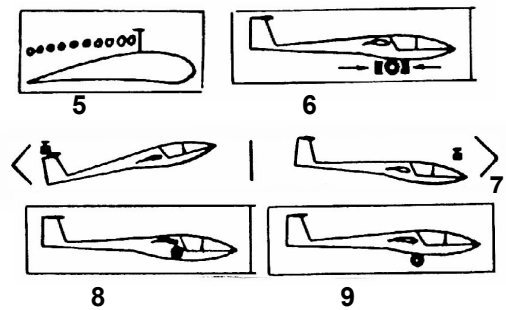
<b>Maximum mass:</b>		
Category A	630 kg	1389 lbs.
Category U	750 kg	1653 lbs.
Category U without waterballast	kg	lbs.

**Loading chart**

Cockpit load maximum	front seat	rear seat	(Parachute included)
	110 kg 242 lbs.	90 kg 198 lbs.	
or maximum minimum	105 kg 231 lbs.	105 kg 231 lbs.	
	kg	lbs.	

With lower pilot weight necessary ballast must be added.

Altitude in [m]	0-3000	4000	5000	6000	7000	8000
V <sub>NE</sub> IAS km/h	270	256	243	230	217	205
Altitude in [ft]	0-10000	13000	16000	20000	23000	26000
V <sub>NE</sub> IAS kts.	146	138	131	124	117	111



**Benzin min. 95 Okt. 50:1**    **Zweitaktöl two stroke oil 22 l**  
 petrol min. 95 ROZ.

- Cockpit Check**
- Lead ballast (for under weight pilot)?
  - Parachute worn properly?
  - Safety harness buckled?
  - Front seat: pedals adjusted?  
Rear seat: seating height adjusted?
  - All controls and knobs in reach?
  - Altimeter?
  - Dive brakes cycled and locked?
  - Positive control check ? (One person at the control surfaces).
  - Fin ballast tank emptied or correct amount filled in?
  - Trim ballast box in the fin, correct amount filled in? Locking device completely engaged?
  - Battery in the fin? Loading chart regarded?
  - Trim?
  - Fuel level?
  - Fuel cock open?
  - Both canopies locked?
  - Runway free?

**1** **Senden transmit** **22**

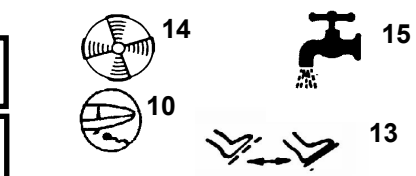
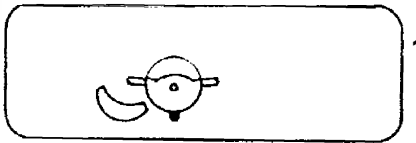
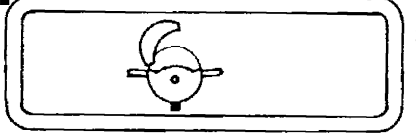
**23**

limits for use of the fin waterballast tank

minimum ground temperature	°C	13.5	17	24	31	38
	°F	56	63	75	88	100
maximum flight altitude above GND	m	1500	2000	3000	4000	5000
	ft	5000	6500	10000	13000	16500

**Ballast box in the fin**  
 Min. load in the front seat

kg	kg
box empty	box filled



Bauteil Nr.:  
 part no. of component at all parts  
 Typ: DG-1000T  
 W.Nr.

fire proof placard at front main bulkhead

Gepäck max. 15 kg  
 baggage max. 33 lbs.

at front main bulkhead



at cover plate of fin ballast box

Reifendruck 2,5 bar  
 Tyre pressure 36 psi

at the right wheel door

Sollbruchstelle 10000 N  
 rated load 2200 lbs.

**Drainer** ↑

at the right wheel door rear

Reifendruck 4 bar  
 Tyre pressure 58 psi

right above the tail wheel

Reifendruck 2,5 bar  
 Tyre pressure 36 psi

right above the nose wheel if installed

Bremssflüssigkeit  
 --- brake fluid  
 min. DOT 3 / DOT 4

on brake fluid reservoir

Warning:  
 Rigging of the horizontal tailplane is only permitted with nose down trim-setting

upper left hand side of the fin

diagram 11  
 issued February 2011

at the holder in the engine bay

**Tankpumpe Refueling pump**

## **Electrically operated main landing gear**

Part designations see MM diagrams 20 und 21

In the following text the changes to those sections of the maintenance manual which are effected by the installation of the electrically operated main landing gear will be given.

### **Section 1.6 Undercarriage**

new subsection

#### **1.6.5 Electrically operated main landing gear**

This subsection replaces MM subsection 1.6.1.

##### 1.6.5.1 Landing gear control circuit

See diagrams 20 (in LG box) and 21

With this version there are no handles and control rods for manual operation of the landing gear like Version A.

In the normal operating mode the landing gear will be retracted and extended by an electrical spindle drive.

A control unit which is installed in the rear instrument tower controls all electrical functions and the control lights.

A landing gear warning device is integrated into the system.

The landing gear will be locked in the extended position by over centre locking of the drag struts and held in this position by the spindle drive.

The landing gear will be locked in the retracted position by 2 bolts at the drag struts which engage into 2 latches at shaft 10FW102.

Unlocking is actuated by a cam mounted to the spindle drive, which rotates the shaft 10FW109 via a bell crank and a push rod to release the bolts (see diagram 20).

Emergency operation: The landing gear may be extended manually. The handles are located at the left hand fuselage wall, one in each cockpit at the positions of the handles for the manually operated landing gears.

Pulling on one of the 2 red emergency extension handles will open the valve of a lockable gas strut. The gas strut will push the spindle drive forward on a linear guide to extend and lock the landing gear.

### 1.6.5.2 Adjustment / limit switches

With the electrically operated landing gear only the limit switches have to be adjusted

#### a) Limit switch landing gear extended

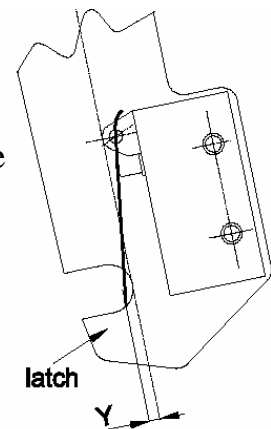
1. Extend the landing gear electrically and check if the drag struts 10FW102 and the struts of the rear fork 10FW91 touch each other at their joint hinge point.
2. Apply a force of 100 N (2 lbs.) to the hinge point perpendicular to the centre line of the struts in an upward direction. The system should be so stiff that you can move the hinge point no more than 2 mm (0.08 in.) out of line.
3. If it is possible to move the hinge point more than 2 mm, the limit switch must be adjusted. To accomplish this you have to bend the arm of the switch accordingly. The limit switch is mounted on the landing gear box and is activated by the lever 10FW108.
4. Retract the landing gear a small amount, extend again and check if the lower green control light starts shining. If not, the arm was bent too far.
5. If the adjustment is correct, retract the landing gear and extend via the emergency system. Check if the lower green control light starts shining. If not, the arm was bent too far. After adjustment repeat the check according to item 2.

#### b) Limit switch landing gear retracted

The spindle drive must be shut off in the retracted position when the bolt at the left drag strut 10FW102 engages in the notch of the left latch on shaft 10FW109 and activates the limit switch which is mounted to the latch.

Check: Activate the limit switch. The distance Y shall be 2 - 3 mm (0.08 - 0.12 in.) when the switch activates.

If necessary adjust the switch by bending its arm.



#### c) Limit switch gas strut (emergency extension system)

This switch (position 12 in diagram 21) is mounted to the upper end of the gas-strut at bracket 10FW120. When resetting the gas strut the spindle drive must be stopped by the limit switch when the distance X in diagram 21 (from counter nut up to gas strut body) is 17 - 20 mm (0.67 - 0.8 in.). If necessary loosen the mounting screws and rotate the switch for adjustment.

**d) Switch emergency extension system (optional with TN1000/19, standard from ser.no. 10-157 on)**

This switch (position 20 in diagram 21) activates higher current for the spindle drive via the LG control unit to reset the gas-strut as long as one of the emergency extension handles is pulled. The switch is mounted to a bracket 10FW143 which is mounted to the bracket 10FW120 see item c). The switch is activated by the deblocking lever in the upper gas-strut end. In case the spindle drive doesn't have enough power to reset the gas-strut check the function of the switch. To accomplish this disconnect the 2 wires from the switch. With one of the emergency extension handles pulled the resistance between these 2 terminals must be zero. If necessary adjust the switch by bending it's arm.

1.16.5.3 Free play

Free play between bell crank 10FW108 and shaft 10FW91 is not allowed. If there is any free play tighten the two bolts M6x40 inside the landing gear box with a 10 mm open-end wrench. If there is still some free play, the bolts should be removed and the holes drilled out and reamed to diameter 8 H7. M 8 x 40 LN 9037 bolts should then be installed.

## **1.15**

new subsection

### **1.15.18**

Wiring see wiring plan 10E4 enclosed to the MM.

Description of operation see AFM section 9.3.

In the normal operating mode the landing gear will be retracted and extended by an electrical spindle drive.

A control unit which is installed in the rear instrument tower controls all electrical functions and the control lights.

For extension or retraction you have to operate the toggle switch. In addition for retraction you must press the press button twice while holding the toggle (safety circuit), see AFM section 9.3).

The system is equipped with an over current cut off which stops the extension or retraction if high accelerations occur to protect the drive against damage. As soon as the g-loads decrease, the landing gear will continue to travel.

The limit switches are described in section 1.6.5.2.

#### **Fuses and circuit breakers:**

The electrically operated landing gear is protected by an automatically reset fuse in the landing gear control unit.

#### **Landing gear warning:**

A landing gear warning device is integrated into the system. Warning is by a buzzer and in addition via the DEI-NT see Flight Manual section 7.4.5.

Switches:

1. A magnet at the airbrake control rod 5St69 activates a solenoid operated switch mounted at the fuselage wall in the front cockpit.
2. Limit switch landing gear extended.

#### **Part extension and retraction for inspection and servicing**

The retraction may be stopped by switching the toggle switch down,

The extension may be stopped by switching the toggle switch up and pressing simultaneously the press button.

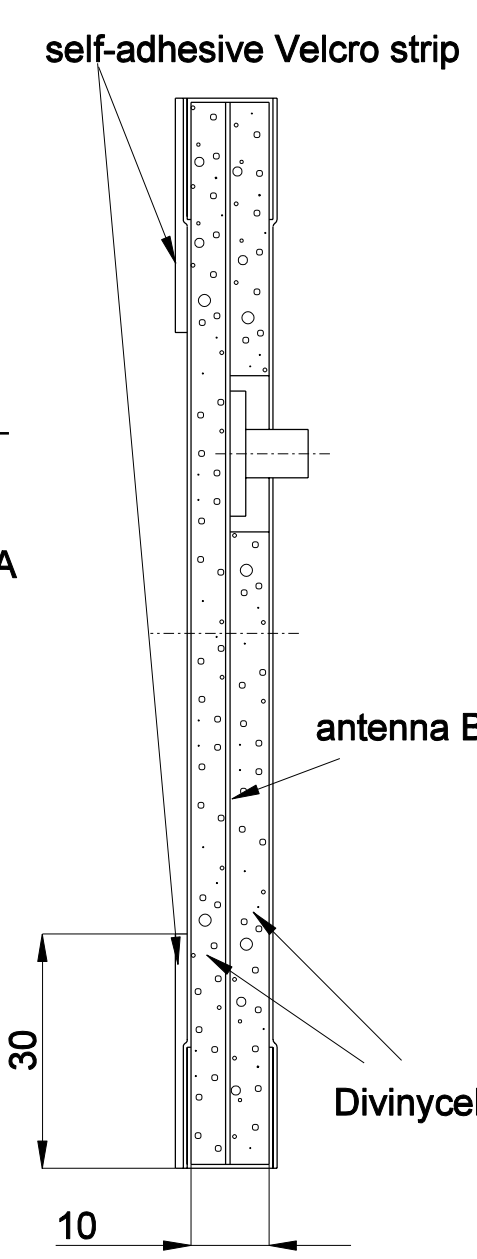
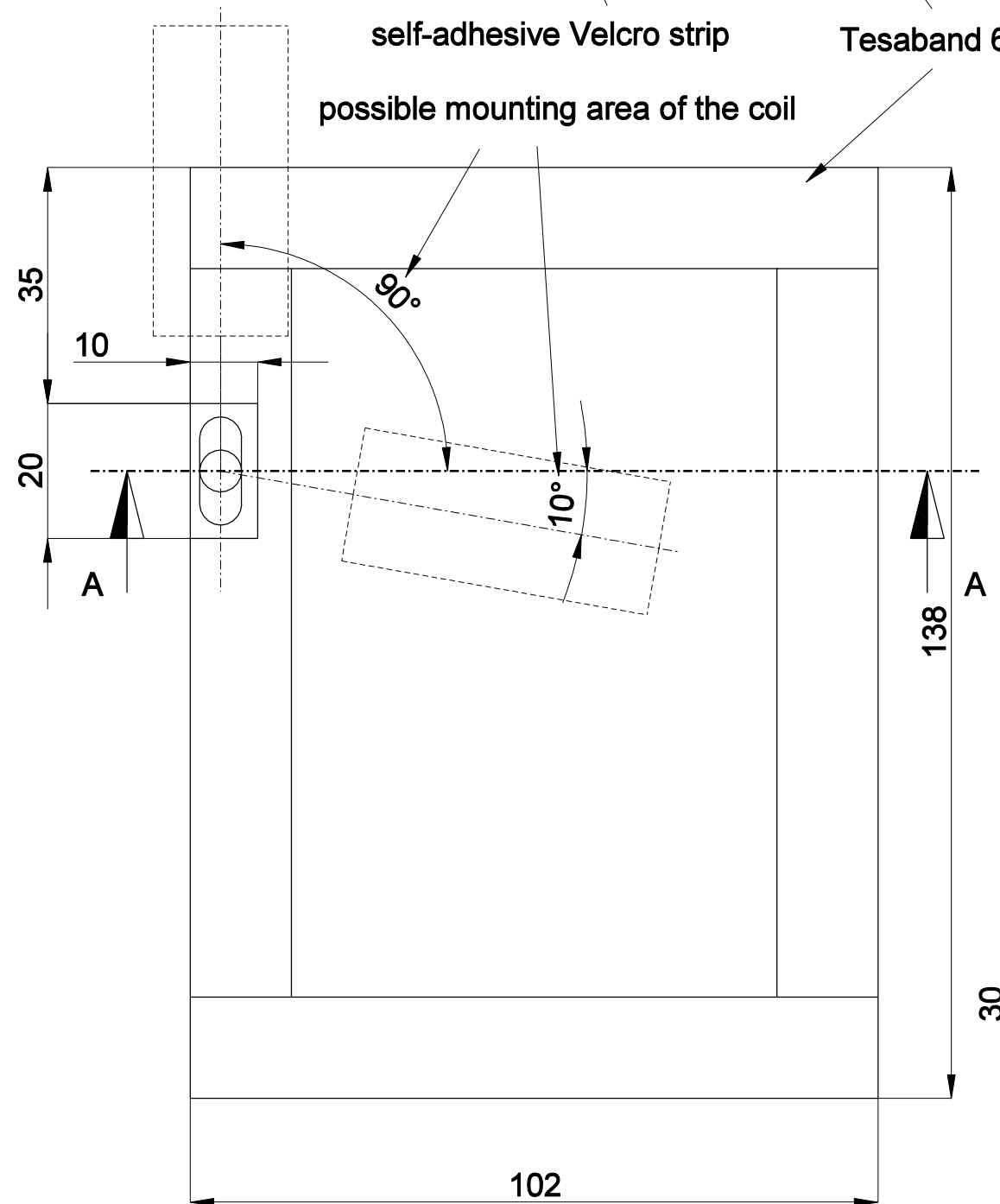
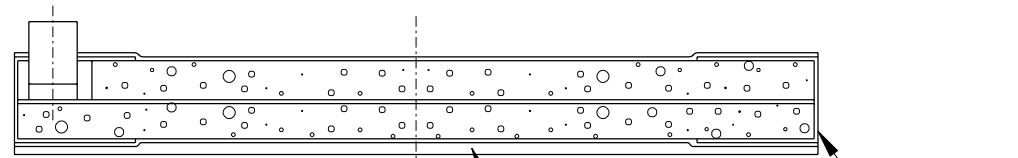
Only the centre (red) LED will shine.

For any service work switch off the main switch!

With the normal procedures you may retract or extend the landing gear again.



cross section A-A



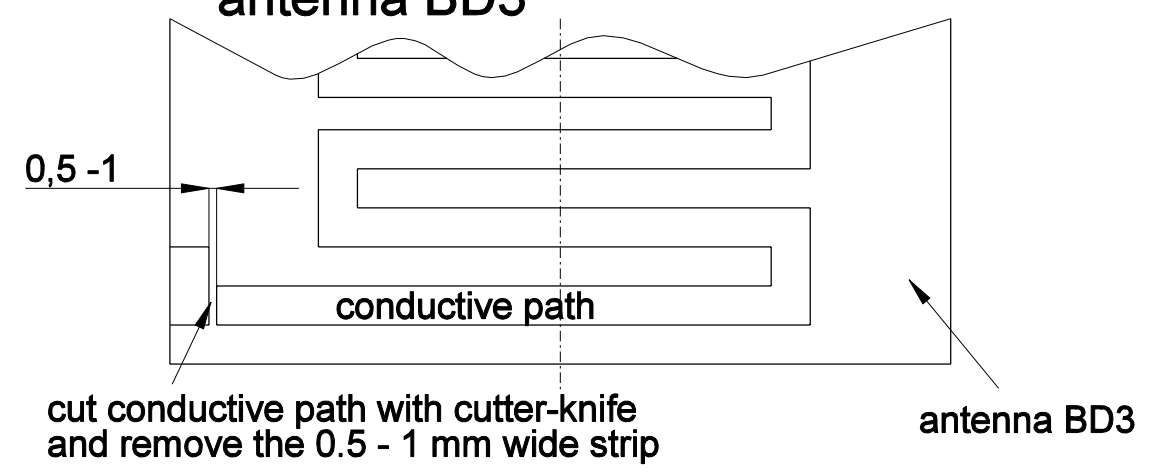
self-adhesive Velcro strip

mount antenna as far as possible to the front

rear instrumentpanel cover  
(view in direction of flight)

depending on the other instruments  
the antenna installation may be  
executed on the right hand side

modification of the  
antenna BD3



Toleranzen nach Arbeitsanweisung BA 1					Tag	Name	DG Flugzeugbau GmbH 76646 Bruchsal Otto-Lilienthal-Weg 2
Schweißen nach Arbeitsanweisung SA 1					04.11.09	C. Stein.	
					Gepr.		
					Norm.		
					Maßstab	406 MHZ ELT antenna BD3 installation 2-seaters	DG Z193
					1:1		
					Maße ohne Toleranzang. nach:		
Ausg.	Änderung	ÄM	Tag	Name			

- Subject : Ballast box in the fin, foam rubber rings
- Affected : DG-1000S, DG-1000T, DG-1000M all ser.no.'s
- Urgency : prior to next flight and upon changing the trim ballast in the ballast box
- Reason : In a DG-1000T a foam rubber ring glued to the mounting plate of the optical sensors for checking the trim ballast has detached. This caused an indication error of the control lamp in the front instrument panel.
- Instructions : 1. Check condition and correct gluing of the foam rubber rings 10L45/2 (in older factory serial numbers felt strips and/or rings) in the ballast box in the fin.  
2. Remove detached and damaged rings and replace them by new rings according to drawing on page 2. If felt strips are installed, replace them if damaged by foam rings.  
Remove adhesive remains before bonding the new rings.  
3. Check the foam rubber rings according to point 1 when changing the trim ballast.
- Material : - order no. 41020452 Foam rubber rings 10L45/2  
- order no. 30002009 Instant adhesive (Cyanoacrylate)  
Type Pattex Blitz
- Weight and balance : influence negligible
- Remarks : The instructions may be executed by the owner himself.

Bruchsal, date:  
05.11.2007

Author:  
H. Könen

This service info has been approved by EASA date 23. April 2008 with technical note DG-G-04.  
Approval No. EASA.A.C.09568.

**Assembly drawing for foam rubber rings 10L45/2:**

