DG Aviation GmbH

MAINTENANCE MANUAL
FOR THE MOTORGLIDER

DG-1001M

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VARIANT:	DG-1000M
TC Data Sheet No.:	EASA.A.072
Issued:	October 2010



Owner:

Ser. No.:

Registration:

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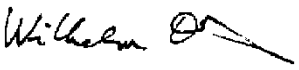
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Recommendations to order spare parts

Please try to determine the exact designations of the spare parts for your order using the maintenance manual. This is to guarantee a fast and correct delivery of the parts.
The designations are to be found in the sections system description, instructions for assembly and servicing work, in the partlist in section 8 and especially in the diagrams of the maintenance manual.

Yours sincerely
DG AVIATION GMBH



Dipl.- Ing. W. Dirks

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0 General

0.1 Manual amendments

No.	Page	Description	Date
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2	0.1, 0.3, 0.6, 0.11, 0.13, 0.14, 1.3, 1.4, 1.10, 8.2, 8.3, 8.5	Manual revision TN1000/23	July 2014
3	0.1, 0.3- 0.6, 1.11, 1.28, 3.8, 4.12, 8.2, 8.3, diagram 16	Fuel pressure regulator Manual revision TN1000/27	July 2015
4	0.1, 0.4 ÷ 0.7, 3.7, 4.25, 7.1, 7.2, 8.3, diagram 2, 10E202, Inspection instruction No. 1 for TN1000/30	Inspections drive mount Manual revision TN1000/30	March 2016
5	0.1, 0.7, drawing 10E202 issue h	Electrical system, manual revision TN1000/31	December 2016
6	0.1, 0.3, 0.4, 0.6, 0.8, 0.13 - 0.15, 2.1, 2.2, 2.6, 3.5, 8.1, 8.2, diagrams 10, 12, 14, 23	Manual revision TN1000/32	July 2017
7	0.1, 0.6, diagrams 7 + 15	Main landing gear-brake hose, manual revision TN1000/35	December 2017
8	0.1, 0.4, 3.7	Drive mount, inspections TN1000/37	February 2018
9	0.1, 0.6, diagram 7	Revision 1 of TN1000/35	March 2018
10	0.1, 0.7, 0.12, Enclosure 1 (including diagrams 2a and 12a)	Rudder control operated by hand TN1000/36	August 2018

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12	0.1, 0.7, Enclosure 1 page 2 and diagram 2a	Rudder control operated by hand TN1000/36 Revision 1	January 2019
13	0.2, 0.6, 0.12, diagram 13, diagram 16A	TN1000/43, fuel injection system	September 2019
14	0.2, 0.7, enclosure 3 incl. diagram 2b	TN1000/36 Revision 2 Manual rudder control	May 2020
15	Title, 0.2 - 0.4, 0.6, 0.7, 0.12, 0.14, 1.3, 1.10, 1.12, 1.24, 2.6, 8.1, 8.3, 8.4, diagrams 5, 7, 12, 12a, drawing 10R146	TN1000/45 Manual revision	October 2021
16	0.2, 0.6, 0.7, Enclosure 1 page 3 and diagram 2b	TN1000/36 Revision 3 Manual rudder control	February 2023

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14	October 10	July 2017			
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16	October 10	October 2012	July 2015		
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17	October 10				
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26	October 10				
27	October 10				

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5EP31	Installation plan Dräger oxygen system	5.02.90		
10E4	Wiring plan electrically operated main landing gear	28.09.10		
10E202	Wiring plan DINA1 (in aircraft log)	29.07.10 1.06.2016 Issue H	28.09.12 issue C With coolant pump Pierburg	22.01.15 issue G with fuel pressure regulator Bosch
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SI 67/07	Service Info Ballast box in the fin / foam rubber rings	5.11.2007		
/	Inspection instruction No. 1 for TN1000/30	March 2016		
Encl. 1	Rudder control operated by hand TN1000/36	August 2018 February 2023 Page3,diagr.2b	January 2019	May 2020
10R146	Installation of 3L oxygen cylinders	9.08.19		

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Z181	Installation of aerial for transponder in vertical fin DG-1000
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0.4 Airworthiness limitations

0.4.1 Repairs

Repair damaged airframe parts prior to next flight. Follow the instructions of the DG-1000 repair manual. Repairs outside the scope of the DG-1000 repair manual and major repairs must be accomplished at an approved repair station or by an approved mechanic rated for composite aircraft structure work in accordance with DG repair methods or those methods approved by the national aviation authorities.

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 German composite sailplanes and motorgliders was proofed for 12000 flight hours.

The initial life time for the DG-1000M is 3000 flight hours.

Extension of the life time to 12000 hours can only be achieved by implementing a comprehensive inspection program for the aircraft to be carried out in accordance with data that has been approved by an applicable aviation authority, see section 2.4 of this manual.

Only for USA

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.*

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0.5 Further service information

0.5.1 Life time of equipment and components

Use only genuine spare parts. For part. No.'s of all parts please refer to section 8.
Note: You will find detailed instructions for replacement of the life limited parts (if applicable) in section 4 of this manual.
After exchanging life limited parts change the "Summary of operating hours" for your motorglider by entering the replacement dates of the exchanged parts.

a) The following components of the power plant have to be replaced every 400 engine hours.
   1. All nuts and bolts on the engine, parts-kit with reference list and instructions part no. 39001028
   2. The bearings in the upper drive belt pulley, part no. 59332050 and 59320320
b) The **gasket for the drainer valve** has to be exchanged every 6 years, part no. 60504402.
c) The **coolant hoses ,** part no. 39001029) have to be exchanged every 6 years.
d) All **flexible fuel lines** have to be exchanged every 6 years (part no.s 48000009 and 48000092).
e) The **drive belts** have to be exchanged every 100 engine hours, part no. 60510831).
f) The **spark plugs** have to be exchanged every 100 engine hours, part no.40050360.
g) The **fabric straps of the safety harness** have to be exchanged according to the instructions of the respective manufacturer. If no limitations are given, exchange every 12 years, approved types see section 6.3.
h) The **rubber cord** in the elevator control system see section 1.2.6 has to be replaced at least every 6 years, part no. 39001040.

0.5.2 Service times for other than life limited parts

The **coolant ha**s to be exchanged every 6 years (type see section 2.12.2).

The **brake fluid of the wheel brake** has to be exchanged every r 4 years (types see section 1.6.2).

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.

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0.5.3 Service time, maintenance documents of equipment and components

Follow the instructions of the respective manufacturer.

a) Tow releases:

   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. Approved types see section 6.3.

c) Minimum instrumentation: instructions of the manufacturer, approved instruments see sections 6.1, 6.2 and 6.4.

d) Engine: Manual for the engine SOLO Type 2625 02 I, latest approved version.

e) Propeller: Operation- and Maintenance manual for fixed pitch propeller in Glass or Carbon reinforced Plastic type BM, latest approved version.

0.5.4 Power plant trouble shooting

Please find a checklist in AFM section 8.8.

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1 System description and adjustment data

1.1 Wing and tailplane setting data

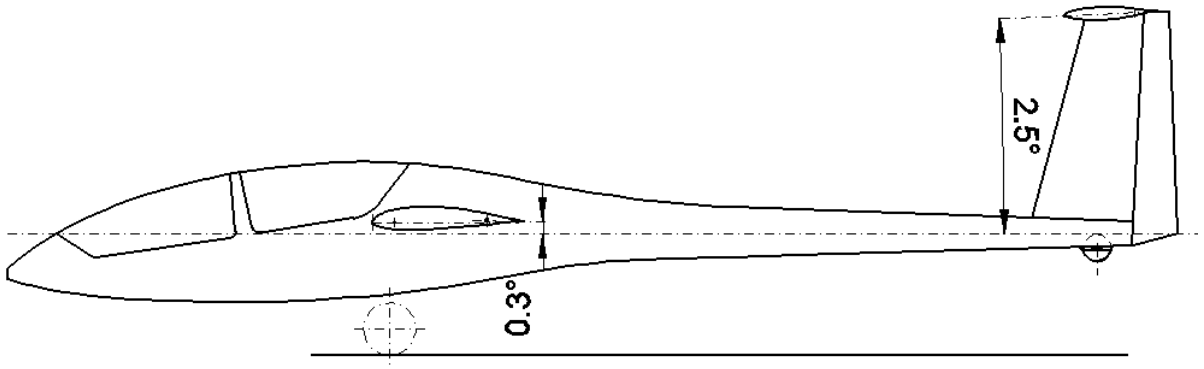
Wing:

Sweep Back (Leading edge): 0° between y= 3490 mm (137 in.) and y= 6979 mm (275 in.)

Dihedral (Leading edge line): inboard wing panel up to parting: 2,5° to measure: 152 mm (6 in.) between y= 3490 mm (137 in.) and y= 6979 mm (275 in.) outboard wing panels: 14.5°

Angles of Incidence: -0,3° at the wing root, +1° from y=1200 mm (47 in.) up to tip

Horizontal tailplane: -2,5°



Fuselage center line
(corresponding to boom slope 1000:33)

Wing oscillation frequency: approx. 125/min
Aircraft should rest on main wheel and tailwheel during frequency measurements

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1.2 Elevator control and trim system

1.2.1 Control system

see diagram 1

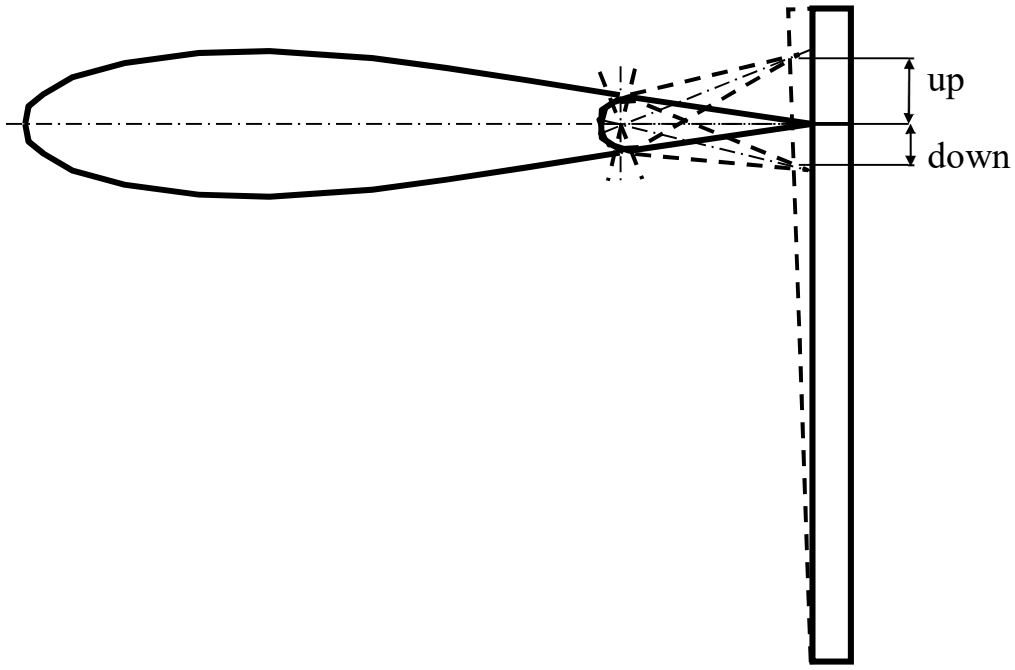
1.2.2 Elevator deflections and tolerances

up:	27°	77 up to 79 mm	(3.03 up to 3.11 in.)
down:	21°	61 up to 63 mm	(2.40 up to 2.48 in.)

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 Aviation.
- Mark the 0-point on the stick.
- Then measure the up and down deflections according to the sketch.



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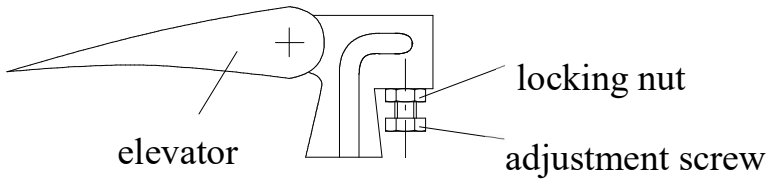
1.2.3 Elevator stops

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

1.2.4 Elevator control circuit free play

With the elevator held fixed in the zero position, the free play at the top of the control column can be ± 2 mm (± 0.08 in.). Within the automatic elevator connection there should be no free play noticeable in the zero position when the elevator is moved at its trailing edge.

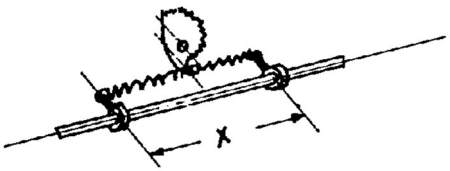
Any free play can be reduced by screwing in the adjustment screw on the automatic connector funnel.



1.2.5 Trim

Re-adjustment

The trim mechanism should be adjusted so that with full forward (nose down) trim the control column is pulled by the trim springs into it's maximum forward position with a force P of approx. 30 N (6.6 lbs.).
The force P is to be measured with a spring balance at the upper end of the control stick. Read the force, when the stick just starts to move.



The tensioning of the trim mechanism springs is adjusted as shown in the sketch. x = 340 mm (13.4 in.)

The springs are located in the rear cockpit on the left hand side.

The correct adjustment should be verified in flight and corrected if necessary.
Trimming should be possible up to 200 – 220 km/h (108 - 119 kts.).

Note: If the DG-1000M can be trimmed up to higher speeds it is likely that the trim is not sufficient in circling flight.

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1.2.6 Pilot force reducing rubber-cord

The rubber cord (part No. 30091131 dia. 6 mm white) produces an elevator stick force in push direction. If the trim efficiency of your glider in push direction is reduced, you have to inspect the rubber cord.

The rubber cord is located on the left hand side behind the main bulkhead below the baggage compartment floor. The rubber cord runs from bellcrank 5St19 to a fork beside the left hand front edge of the landing gear box.

The length of the rubber cord when loose should be 470 mm (18.5 in.).
If the cord is longer or worn it must be replaced.

The cord must be replaced at least every 6 years.

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1.3 Rudder control

see diagram 2

1.3.1 Rudder deflections and tolerances

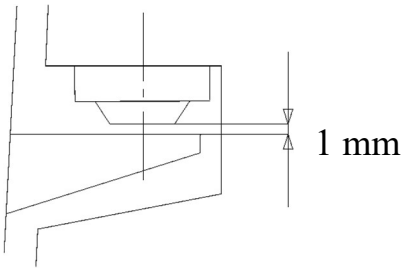
28 up to 29° which is 160 mm up to 165 mm (6.3 up to 6.5 in.) to both sides measured at 330 mm (13 in.) behind the hinge axis (lower rear end of the rudder).

1.3.2 Rudder stops

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

1.3.3 Axial space and free play

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



1.3.4 Sealing the rudder

The rudder is sealed on both sides. On the outside Mylar seals and inside the fin with V sealing tapes.
These seals are not to be removed.
If damaged replace the seals according to section4.7.4.

1.3.5 Retaining spring for the pedal adjustment handle

A rubber cord with 2 mm (0.08 in.) diameter which pulls the pedal adjustment cable tight is installed in the console below the instrument panel. If this rubber cord is defective the handle of the pedal adjustment cable won't be pulled to the front so that it may hook into the trim release lever at the control stick with pedals in a rear position.

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1.4 Aileron control

1.4.1 Control circuit

see diagrams 3 and 4.

1.4.2 Deflections and tolerances

Aileron deflections:	up	25°	71±2 mm (2.8 ± 0.08 in.)
	down	12°	34±2 mm (1.34 ± 0.08 in.)

measured at 164 mm (6.46 in.) from hinge axis (at the aileron root)

1.4.3 Stops

The aileron stops are located at the rear control column and can be adjusted with two 10 mm open-end wrenches.

1.4.4 Free play

The max. free play at the trailing edge of the ailerons measured at 164mm (6.46 in.) from hinge axis should not exceed ± 1.5 mm (± 0.06 in.) with the control stick in neutral position and fixed.

With both ailerons fixed, a maximum free play of ± 2 mm (± 0.08 in.) at the top of the control stick is allowed.

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1.4.5 Complete readjustment

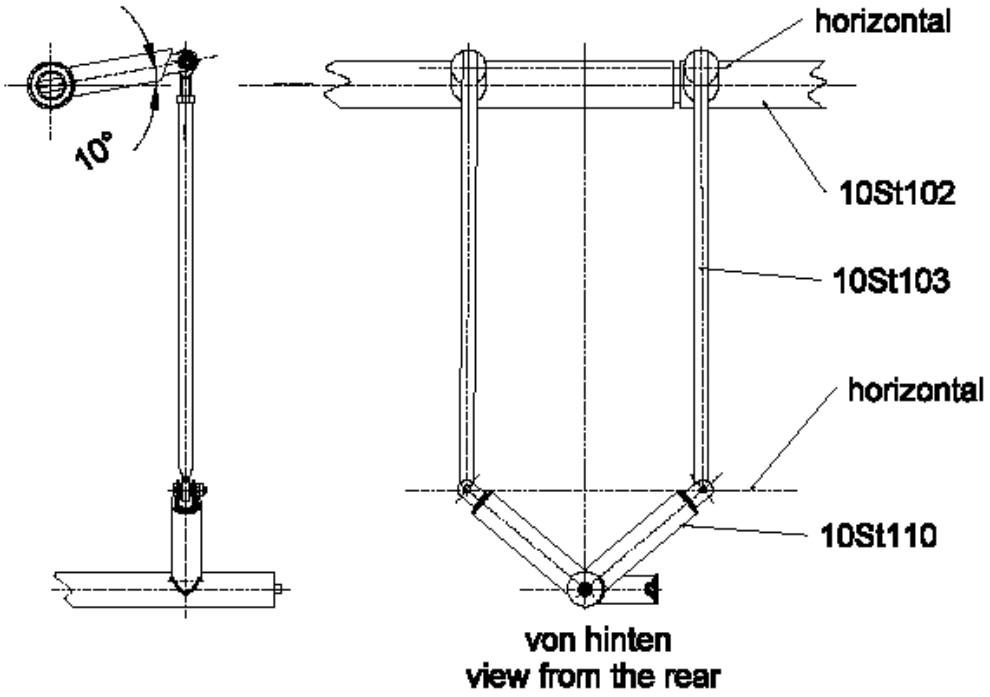
Should it be necessary to completely reset the aileron control (e.g. after a repair), proceed as follows:

- Rig the glider with the inboard wing panels only.
- Place the fuselage with the centre line horizontal see sect. 1.1.

then:

1. Adjust the mixer shaft 10St110 so that the mounting points of the control rods 10St103 (going upwards) are horizontal.
2. Adjust the control stick to neutral.
3. Adjust the length of the pushrods 10St103 so that the two lever arms of the shaft 10St102 point 10° upwards (higher at their rear ends).
4. Set the ailerons to neutral at their drives directly at the ailerons.
5. Adjust the aileron deflections at the stops.

for 1. and 3.



for 4.

To adjust the ailerons you must first remove the fairings from the control surface horns. Then unscrew the horns (Allen key wrench) and loosen the lock nut (12 mm open end wrench) at the rod ends. Adjustment is made by rotating the complete drive.

Note: Secure the bolts again with a small amount of Loctite 243.

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1.5 Airbrake control, wheelbrake

1.5.1 Control circuit

see diagrams 3 and 4

The wheelbrake is connected to the airbrake torsion shaft (part 10St105).

1.5.2 Adjustment

a) **Airbrake overcentre locking force:** Adjustment according to section 4.4. The adjustment must be inspected once a year.

b) **Airbrake extension height:** The height the airbrakes extend depends on the wheelbrake adjustment see c).

c) **Wheel brake:** The wheelbrake can be adjusted at the adjustment screws between torsion shaft 10St105 and the master cylinder (at the landing gear box).

The adjustment should be made so that with wheel brake engaged, the airbrake levers 10F20 are vertical to the wing surface.

If with this adjustment the braking effect is insufficient you have to bleed the brake system see 4.6.

1.5.3 Airbrake stops

The airbrake control extension stop is located in front of the main bulkhead. The stop, in locked direction, is located at the wing rootribs. The corresponding stop at the guide rod 5St68/1 in the cockpit should be placed to allow a free play of 0-3 mm (0-.12 in.) between the airbrake handle and the stop at the guide rod with the airbrakes locked over centre.

Adjustment can be made by adjusting the rod end between pushrod 10St71 and the airbrake torsion shaft 10St105.

1.5.4 Free play

Free play in the airbrake control system has no effect.

The airbrakes themselves at their hinges should not have so much free play that the bolt heads at the airbrake plates hit the wing surface instead of entering into the airbrake boxes during retraction under airloads.

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1.6 Undercarriage

1.6.1 Electrically operated main landing gear

1.6.1.1 Landing gear control circuit

See diagrams 7, 8 (in LG box) and 9

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 diagrams 7 and 9).

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 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.

1.6.1.2 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 stops at the drag struts 10FW255 touch the struts of the rear fork 10FW254.
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't move the hinge point out of line (stops still touch the struts).
3. If item 2 is not fulfilled, 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.

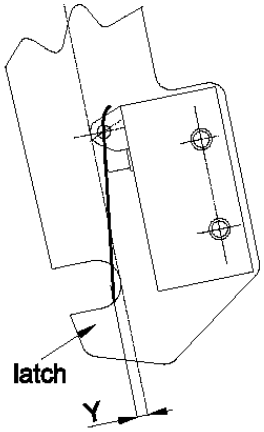
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4. Retract the landing gear a small amount, extend again and check if the lower green control light starts shining. If not, the arm was bent too far.
5. If the adjustment is correct, retract the landing gear and extend via the emergency system. Check 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 is activated. If necessary adjust the switch by bending its arm.



c) Limit switch gas strut (emergency extension system)

d) This switch (position 12 in diagram 9) 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 before the gas strut becomes completely compressed. To accomplish this the distance X in diagram 9 (from counter nut up to gas strut body) must be minimum 8 mm (0.32 in.). If necessary shift the limit switch. To accomplish this the switch must be dissembled and the holes in the bracket must be elongated.

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

This switch (position 20 in diagram 9) 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 its arm.

1.6.1.3 Free play

Free play between bell crank 10FW108 and shaft 10FW91 is not allowed. If there is any free play tighten the two bolts M8x45 inside the landing gear box with a 13 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 10 H7. M10 x 45 LN9037 bolts should then be installed.

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1.6.2 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.
Exchange see section 4.6.

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.

c) The brake linings must be replaced if they are worn down to a thickness of 2.5 mm (0.098 in.). Removal of the brake calliper see section 4.5B.
Replacement set (2 linings, 6 rivets) Tost Nr. 075860.

d) The brake disc must be replaced if it is worn down to a thickness of 4.3 mm (0.17 in.).

1.6.3 Tailwheel

Steerable tail wheel linked to the rudder via springs, see diagram 10.

1.6.4 Wheels, tyres and tyre pressures

Main wheel

Tyre:	380 x 150 6 PR, diameter 380 mm (15 in.),
Wheel:	Tost 5” wheel with disc brake Penta 130-30
Tyre pressure	3 bar (43 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)

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1.7 Tow hooks

1.7.1 Tow release circuit

see diagram 5

1.7.2 Adjustment

Check if both tow releases open fully.
Adjustment is done at the connection of pushrod 10R162 to bellcrank 10R161 in the rear cockpit. The adjustable seat shell and the cover 10RU170 must be removed to accomplish the adjustment..

1.7.3 Damages

The ring muzzle of the C.G. hook should not be bent or ground down and should move easily. If the muzzle is damaged, the tow release has to be exchanged and repaired by the manufacturer (Tost).

1.7.4 Removing the tow hooks

1.7.4.1 C.G. tow hook:

Remove the cover (front side of rear seat).
Remove the mounting bolts and the actuating lever. Don't remove the bolt which carries the actuating lever.
Move the tow hook some mm in an upward direction (use a piece of hard wood and a hammer). Then pull it out in forward and upward direction.

1.7.4.2 Nose tow hook:

Remove the control cable from lever 5R2/1.
Remove the tow hook with the fittings 5R3/2 and 3.

1.7.5 Rubber cords

To keep the actuating cables tight there is a rubber cord at both of the cables in the compartment below the foot of the rear instrument panel behind the main battery.
From ser.No. 10-276 on the rubber cords have been replaced by 2 tension springs.
Replace the rubber cords if worn.
To accomplish this you have to detach and swivel the foot of the rear instrument panel to the back.

For further information refer to the operating and maintenance instructions for the release mechanism, see section 0.4.4 a).

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1.8 Water ballast system

Wing tanks (optional)

1.8.1 Water ballast release circuit

see diagram 6

1.8.2 Adjustment

For the dump valve in the closed position, there should be 1 mm (.04 in.) space between the 8 mm (.315 in.) diameter PVC rod from the dump valve, and the lever plate on the fuselage. Adjust at the adjustment screw located at the fuselage wall. If this is insufficient, the 8 mm PVC rod can be shortened.

If a valve still leaks, then the rubber gasket and the associated spring at the end of the 8 mm PVC rod should be loosened, pressed further in and secured again. If this is not successful, the valve ball seat should be greased. (see section 4.1)

1.8.3 Servicing

see section 4.1.

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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.

Caution: When changing trim ballast, 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 the MM.

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.

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1.10 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)	3,1 (6.83)	4,0 (8.82)	-2,5 (-2,17)	+0,5 (0,434)	-0,25 (-0,55)	+0,05 (0,11)
Elevator (without pushrod)	2,25 (4,9)	3,0 (6,61)	9,0 (7,81)	11.21 (9.73)	0,53 (1,182)	0.67 (1.47)
Inboard ailerons	4,5 (9.92)	5,7 (12.57)	0 (0)	3,4 (2.95)	0 (0)	0,207 (0.457)
Outboard ailerons (20m extension)	0,35 (0,77)	0,55 (1,2)	0.71 (0.62)	1.2 (1.04)	0.073 (0.16)	0.12 (0.27)

Negative moment means that the control surface is balanced more than 100%. In such case you have to apply a downward load at the measuring point.

Caution: Before any changes to the massbalance weights are made, contact the DG Aviation factory.

Method for determining control surface moments

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

It is important that ailerons and elevator are positioned upside up.

The inboard aileron must be hung at its first (root) and 5. hinge.

The elevator must be hung at hinges 2 and 5.

Control surface	measuring point	behind hinge axis	
		mm	in.
Rudder	lower edge	100	3,94
Elevator	centre, y= 70mm (2.76 in.)	168	6,61
Inboard aileron	aileron root	164	6,46
Outboard aileron (20m)	aileron root	98	3,86

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1.11 Fore and aft play of the wings

1.11.1 At fuselage

a) Fore and aft play at the front wing suspension is acceptable and a design feature.

b) The fore and aft play at the rear wing suspension shall not exceed 0.5 mm (0.02 in.) at each wing. Move the wings fore and aft to determine the free play.

   If the free play is excessive the rear locking pins must be replaced by oversize pins (10F28 oversize 1).
   Therefore you must ream the hole for the locking pin with the glider rigged. Allow no free play when reaming.
   The max. allowable oversize is no. 4 (diameter 14mm). If this oversize is too small, you have to remove the screwed in bushes 10F27/1 from the wings and their counterparts 5R11 from the fuselage.
   Install new parts and secure with Loctite 243. Ream the holes for the locking pins with the glider rigged to diameter 12H7. Use the original locking pins 10F28 without oversize.

1.11.2 At the wing parting

a) Check see above.
   The free play at both pins together shall not exceed 0.5 mm (0.02 in.) between pin collar and bush.

b) Roughen the area around the lift pin and attach a distance washer inside diameter 10.5 mm (0.41 in.) with a suitable metal adhesive (e.g. Stabilit Express). Note the total thickness of the washers at the root rib with a waterproof marker pen.

c) Rig the outboard wing panels again and check the free play.

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1.12 Power Plant

Note: Please find a checklist for power plant trouble shooting in the DG-1000M flight manual section 8.8.

1.12.1 Arrangement

see diagram 13.
You will find a part list with the designations and the reference numbers for the powerplant parts in section 8.1.2.
The engine is flexibly mounted by 3 rubber shock mounts to the steel drive mount, see diagrams 20 and 21. The tilt of the engine against the drive mount due to the engine torque is limited by a rubber buffer, see diagram 27. The clearance between the buffer and the engine mount shall be between 2 mm and 4 mm (0.08 in. and 0.16 in.). Adjustment is by washers 6,4 DIN9021 St zn between buffer and mounting bracket.

1.12.2 Engine type, coolant

The engine is a SOLO 2625 02i two stroke engine with electronic fuel injection and liquid cooling. For further engine specifications refer to the engine manual, see sect. 0.4. of this manual. The cooling circuit is equipped with an electric waterpump. The pump operates with ignition on. If the glider electrics are switched off (master switch) with running engine, the pump will still receive electric power from the generator.

Coolant: Commercially available anti-freeze for car engines (recommended: BASF Glysantin G48 Protect Plus concentrate) and tap water (hardness 0-20°dH) Normal operation: mixing ratio 1:2 (up to approx. –20°C, -4°F).
May be changed for high altitude flying to mixing ratio 1:1 (up to approx. –40°C, -40°F).
Instructions see section 4.10.5.

Caution: If you don't operate the engine for periods longer than 2 months you must preserve your engine according to the instructions in the engine manual. The same applies for any overseas transportation.

1.12.3 Exhaust Muffler

The muffler has been specially designed for the DG-1000M and is attached by four spring couplings in a movable frame, secured with Loctite 243.
Installation see diagram 23.

1.12.4 Propeller

Type: BM-G1-160-R-120-1
Constructuion: Composite
Attachment bolts: - six M 8 x 65 DIN 931 - 8.8, head with a 2 mm (0.08 in.) dia. hole for lockwiring.

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1.12.5 Reduction gear

Drive belt reduction with 5 V-belts, reduction ration approx. 1:2.8.
Drive Belt Tensioning: The drive belt should not be loose. Tensioning instructions and tolerances see section 4.10.2.

1.12.6 Starter motor

Electric starter motor

1.12.7 Fuel injection and ignition system

1. **Normal system:** The fuel injection and the ignition is controlled by an engine control unit (ECU). A pressure sensor is integrated in the ECU to adapt the amount of fuel injected to the flight altitude.
2. **Emergency system:** The engine is equipped with an emergency system which may be activated via a switch in the front (and optionally in the rear) instrument panel in case of a failure of the engine control unit (ECU). This system ensures uninterrupted engine operation during take-off and climb.
3. Details for **both systems**
   a) Battery ignition with normal and emergency system.
   b) Spark plugs; Electrode gap 0.5 mm (0.02 in.)
      Type see section 8.1.2.1.
   c) The ignition coils are mounted at the drive mount. The control unit-NT provides the necessary 12 V to the ignition coils. With the ignition circuit test switch the 12V will be cut for one of the 2 ignition circuits. This is the case in normal and in emergency mode.

Caution: You can't adjust anything yourself at the ECU and the control of the emergency system. If any problems arise please contact DG-Aviation or the engine manufacturer Solo or a DG trained and approved service station.
Any failures of sensors will be displayed by the DEI-NT see flight manual section 7.4.5.

1.12.8 Throttle control

The throttle control cable is connected to the bellcrank in the front cockpit. The cable can be adjusted via the nipple at the lever of the throttle butterfly valves.
With fully open throttle (butterfly valve vertical) the cable should be loose. The cable is a Bowden-cable (outer dia. 5 mm diameter, inner dia. 1.5 mm with nipple pressed on).
With the throttle handle set to idle the lever at the throttle butterfly valves must touch the idle stop screw, if not you have to tighten the throttle cable accordingly.

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Caution: Don't change the adjustment of the idle stop screw.

The interconnection between the throttle handle in the front and in the rear cockpit is by 2 Bowden-cables (outer dia. 5 mm diameter, inner dia. 1.5 mm with nipple pressed on). The cables can be adjusted and tensioned at the bellcrank in the rear instrument console.

1.12.9 Tightening torques and locking

a) All bolts on the engine which are not secured by selflocking nuts should be tightened according to the following table:

M 10	40 Nm (29 ft lb)
M 8	20 Nm (15 ft lb)
M 6	12 Nm (9 ft lb)

They should also be secured with Loctite 243. All locked and secured bolts are marked with red paint which also marks the respective component at that particular point. Whenever a bolt has to be tightened or taken off, the red paint should also be removed and only renewed after the bolt is once again securely attached with Loctite.

b) further tightening torques:

Cylinder head nuts	20 Nm (15 ft lb)
CHT probe	15 Nm (11 ft lb)
Spark plugs	20 Nm (15 ft lb)
Propeller	20 Nm (15 ft lb)
magneto flywheel	80 Nm (58 ft lb)
lower drive belt pulley	100 Nm (73 ft lb)

The drive mounting bolts have to be secured with lockwire according to section 4.10.6.

The bolts of magneto flywheel and lower drive belt pulley have to be secured with Loctite 243. All locked and secured bolts are marked with red paint which also marks the respective component at that particular point. Whenever a bolt has to be tightened or taken off, the red paint should also be removed and only renewed after the bolt is once again securely attached with Loctite.

1.12.10 Fire warning device

The probe is located at the left hand side engine bay wall opposite to the engine air intake.

To check its function you may heat the probe up to 160° C (320 °F). Use a fan heater with a thin nozzle to heat the probe only. The DEI-NT must display a warning message „Fire".

Warning: Don't execute this test without measuring the temperature close to the probe. 160° C (320 °F) must not be exceeded.

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1.13 Retraction - extension mechanism

1.13.1 Layout:

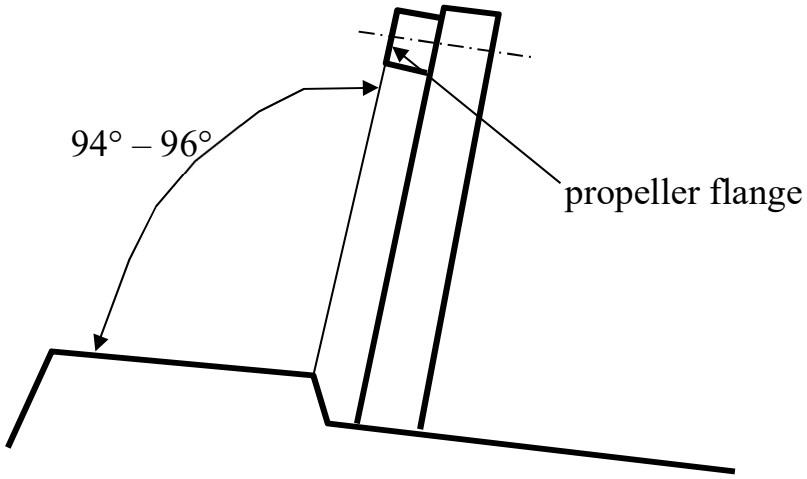
see diagrams 25 and 26 and 15 (propeller stopper)
Type of parts see section 8.1.2.
The retraction-/extension mechanism (spindle drive) consists of a 12 V electrically driven sealed ball screw shaft with electromagnetic brake.
A tension gas-strut is installed parallel to the spindle drive to compensate the engine weight.

1.13.2 Extension force of the gas-strut

Time for extension approx. 8 seconds, time for retraction approx. 8 seconds. If the extension takes much longer than the retraction (3 seconds) then the gas-strut must be replaced. Measure at room temperature, with full batteries and via the ignition switch.

1.13.3 Adjusting the powerplant retaining cable

Extend the engine via the ignition switch until the extension is switched off by the position switch.
The powerplant shall be in the position shown on the sketch.
The retaining cable must be tensioned. If necessary adjust the limit switch (see section 1.13.5.1) and/or via the adjustment screw at the rear engine bay bulkhead, see diagram 18. Secure the adjustment screw by fastening its lock nut.



1.13.4 Position switches

Position engine retracted: via a switch actuated by the drive mount.
Position engine extended: via a switch actuated by the muffler frame

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1.13.5 Adjustment of the powerplant positions

1.13.5.1 Position engine extended:

Extend the engine via the ignition switch until the extension is switched off by the position switch. The angle must be 94° - 96° see section 1.13.3.
If necessary, the angle has to be corrected by bending the metal lever of the limit switch.

Caution: The starter motor can't be activated if the position engine extended is not activated.

1.13.5.2 Position engine retracted:

When the drive mount touches the stop (at the upper part of the drive mount) the spindle drive should not be switched off, but should move the powerplant backwards a little before the position switch is actuated. This prevents the powerplant from moving upwards with negative g-loads (flexibility of the rubber mounts).

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1.14 Fuel system

1.14.1 Layout

see diagram 16

Type of parts see section 8.1.2.

Operating pressure: 3 bar (43.5 psi)

The fuel pump generates a higher pressure of approx. 5 bar which is reduced by a fuel pressure regulator (see section 1.14.4) to the operating pressure.

The regulator is installed in the fuel return line which feeds the excess fuel back into the fuselage tank at the upper rear end.

The operating pressure must be checked during each 25 hour inspection. Due to this check and the continuous monitoring of the fuel pressure via a pressure switch (see section 1.14.5) it is not necessary to change the fuel filters periodically. The pressure switch generates a warning message on the DEI-NT as soon as the fuel pressure drops below 2.2 bar.

1.14.2 Tank

The fuselage tank is permanently fixed and has 41 litres (10.8 US gal.) capacity which can be used down to at least 1 l (0.26 US gal.). The tank can be drained via a drainer located in the landing gear box at its rear wall. The tank can be flushed after removing the drainer. The vent outlet of the fuselage tank is at the bottom of the fuselage.

Filling the fuselage tank should be done with the permanently installed electric fuel pump.

A sensor at the lower end of the fuel filler switches off the electric power to the pump when the fuel tank is filled completely.

Filling is also possible via the fuel filler opening on the fuselage exterior surface (Option).

1.14.3 Fuel pumps and filters

1. **Normal system:** Electric fuel pump mounted in the fuselage centre section. This pump operates as soon as the ignition is switched on. In case the electric power is switched off via the master switch with running engine, the pump will receive electric power directly from the generator.

   As long as the engine is not started the fuel pump will be switched off as soon as a fuel pressure of approx. 2.8 bar is reached to save electric power. When the pressure drops below approx. 2.2 bar the pump is switched on again.

   Upstream of the pump a coarse fuel filter (mesh size 60 – 100 µm) and downstream a fine fuel filter (mesh size 10 µm) is installed.

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2. **Emergency system:** In parallel with the pump and filters described above, a second identical set of pump and filters is installed.
   When switching over to the emergency system the pump of the normal system is switched off and the pump of the emergency system is switched on. Check valves in both pumps prevent back-streaming of fuel via the pump which is not running.
   The pump of the emergency system is not switched off when the engine is not running.
3. **Refuelling pump:** Installed as standard at the landing gear box. A filter is installed upstream of the pump.

1.14.4 Fuel pressure regulator

Mechanical regulator adjusted to 3 bar installed downstream of the injection valves in the return fuel line in the fuselage centre section at the lead through of the return line through the rear main bulkhead.

1.14.5 Fuel pressure switch

Via the pressure switch the „Fuel pressure“ warning in the DEI-NT and the fuel pump of the normal system see section 1.14.3 1. are controlled.
Switch pressure: 2.7 bar, back switch pressure: 2.2 bar, tolerance: ±5%.

1.14.6 Fuel injection

1. Normal system: One injection valve per cylinder mounted directly at the throttle body (intake tube).
2. Emergency system: One injection valve per cylinder (identical type as system) mounted at the rear upper end of the engine. The connection is via a hose leading from the valve to a nipple at the intake manifold of the respective cylinder.

1.14.7 Fuel cock

The fuel cock is mounted on the fuselage floor between the tank and the electric fuel pump. The cock is controlled by a dia. 2 mm (0.08 in.) pianowire from the cockpit. The stops are located directly at the lever of the fuel cock.

1.14.8 Fuel quantity indication

The fuel quantity measuring system in the fuselage tank is by two electric float gauges.
The aircraft's attitude hardly affects the readout.
After replacement of a gauge or of the DEI you have to execute a fuel gauge calibration according to section 4.11.1.

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1.15 Electrical system

Caution: 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 fuse for the main battery (located in a recess in the floor behind the foot of the rear instrument console).

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

1.15.1 Layout

see wiring plan enclosed with this manual.
Type of parts see section 8.1.2.4.

1.15.2 Batteries

1.15.2.1 Main battery

The installed battery is a sealed maintenance free battery 12V/18Ah with screwed terminals. The battery is installed in the lower part of the rear instrument console.
Type see section 8.1.2.4.
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 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 part No. Z 08 is supplied by DG Aviation.
Note: Don't charge longer than for 1 week.

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1.15.3 Control unit

This aluminium box is in the upper mid fuselage on the right hand side.
The control unit incorporates the following functions:

1. Master switch for battery: MOSFET-semi-conductor relays.
2. Master switch for generator: MOSFET-semi-conductor relays.
3. Startermotor control: The starter motor is actuated by a MOSFET-semi-conductor relay. 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.
   The control unit prevents the starter motor working whilst the engine is running.
   The position switch “engine extended” (see sect. 1.13.4 and 1.13.5) activates the control of the starter motor only when the engine is extended.
4. Control of the extension-retraction procedure. The extension-retraction relays are also mounted inside the unit.
   The proximity switch see 1.15.16 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. 1.15.11 not operated).
5. Switched 12V outputs with MOSFET-semi-conductor relays:
   a) Fuel pump
   b) coolant pump
   c) Ignition coil (2 x) (provides 12V to the ignition coils with ignition on)
   d) ECU + injection valves
   e) Emergency system
   f) Refuelling pump
   g) Spindle motor brake
6. Propeller speed measurement for slip indication and for engine speed indication when switched over to the emergency system. Measurement is via the proximity switch see section 1.15.16. The drive belt slip will be determined by comparing the engine speed given by the ECU with the propeller speed, taking into account the reduction ratio.
7. Fuses for several circuits are installed in the control unit (see section 1.15.14).

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 and secure the screws with Loctite 221.

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1.15.4 Engine control unit and sensors

1.15.4.1 Normal system

The engine control unit (ECU) is mounted in the upper mid fuselage on the right hand side.

The ECU receives input data from the following sensors:

1. Engine speed sensor (for engine speed and crank shaft position). This sensor is mounted at the rear left hand side of the engine and is activated by notches on the generator magneto housing.
2. Throttle valve sensor
3. Probe for coolant temperature
4. Intake air temperature sensor
5. Internal air pressure sensor

The ECU controls the amount of fuel to be injected and the ignition timing according to an engine characteristic map. Thus altitude and temperature compensation of the engine are provided.

Note: The ECU has a failure memory, which detects and stores failures of the system. This memory can only be checked by the manufacturer. For a check please send the ECU to DG Aviation or the engine manufacturer Solo or to a DG trained and approved service station.

1.15.4.2 Emergency system

The controller of the emergency system is mounted in the upper mid fuselage on the left hand side.

The controller receives input data only from an engine speed sensor (same type as for normal system but separate sensor). This sensor is mounted at the right hand side of the front engine carbon mounting part and is activated by pins at the starter ring gear.

The amount of fuel injected is controlled dependant on the engine speed according to an engine characteristic diagram.

Due to this simple arrangement engine operation in cruising mode is not possible.

Ignition timing is fixed.

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1.15.5 Generator - Regulator

AC generator 12V/max. 500W mounted on the rear end of the engine crankshaft connected to a voltage regulator which combined with a condenser and a voltage reducing module provides maximum charging voltage of 15 V and current of max. 36 Amp.
Regulator, condenser and voltage reducing module are located in the mid fuselage section mounted to the front side of the engine fire wall.
When the engine is running the generator supplies electrical power to the fuel and water pumps, even with the master switch off.

1.15.6 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 front instrument panel. The key switch controls one MOSFET-semi-conductor relay for the battery circuit and another one for the generator circuit in the control unit-NT which cut off the electric power.

Note: The MOSFET-semi-conductor relay for the generator circuit switches off the power supply to the main bus but not the engine. So with the engine running the engine accessories will still be supplied with electric power even with the master switch off.

1.15.7 Engine elapsed - time indicator

The engine time indicator is incorporated in the DEI-NT and counts as soon as the DEI-NT receives a RPM signal from the ECU or from the control unit-NT (measured by the proximity switch). Therefore it 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, see section 4.11.2..

1.15.8 Electric fuel pumps and fuel pressure switch

Description see sections 1.14.3 and 1.14.5.
The pumps are secured by fuses located in the control unit-NT.

1.15.9 12 V Socket

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

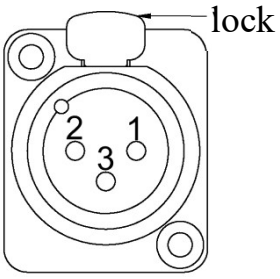
- battery charging (main switch in charging position)
- to provide power for external accessories (main switch “on”).

The 2 12 V sockets are wired in parallel and secured by one 4 A resettable fuse in the control unit-NT.

Required plug see sect. 8.1.2.
Connection of the socket terminals: centre pin is positive.

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From ser. No. 10-225 on a Socket
XLR 3-pole NC3FD-LX-BAG is installed.
Connection of the socket terminals:
1= +
2= -
3= not used
view from the cockpit



Suitable plugs see parts list section 8.1.2.

1.15.10 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 control unit detects that the proximity switch is defective a safety interlock 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 "PropSensor".
The proximity switch must be exchanged prior to the next engine start.

1.15.11 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 functions.

Caution: With the manual switch a running powerplant may be retracted.

1.15.12 Starter Press Button

A starter press button is located in the centre of each throttle handle and activates,, via the interlocks, the starter relay in the control unit, see sect. 1.15.3.

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1.15.13 Wiring

The wire gauges are given in the wiring plan 10E202 at the end of the wire No. inm² or in AWG.
Shielded wires may be identified by circles at their ends.

Specification			AWG	mm²	
MIL-W_22759/16-	64	-WS	4	21,2	
MIL-W_22759/16-	6	-WS	6	13,3	
MIL-W_22759/16-	8	-WS	8	8,4	
MIL-W_22759/16-	10	-WS	10	5,3	
MIL-W_22759/16-	12	-WS	12	3,3	
MIL-W_22759/16-	14	-WS	14	2,1	
MIL-W_22759/16-	16	-WS	16	1,3	
MIL-W_22759/16-	18	-WS	18	0,8	
MIL-W_22759/16-	22	-WS	22	0,4	
MIL-C_27500-	22	TG1T14	22	0,3	with shielding
MIL-C_27500-	22	TG2T14	2x22	2x0,3	with shielding
RG 174				0,25	with shielding
JCJ / IEZ584-3			2x24	2x0,22	NiCr-Ni with shielding
LiYCY				2x0,38	with shielding
LiYCY				6x0,25	with shielding
Flexi-E/HK 1 yellow			18	1	high flexible wires located at the engine
Wire blue			14	2,5	Generator

Instead of wires from the MIL specifications mentioned above suitable wires approved for aircraft use from other aircraft or MIL specifications may be used: Operating range min.: -55°C up to 105°C (-67°F up to 220° F), in the engine compartment up to 150°C (300°F), operating voltage 600 V.

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1.15.14 Circuit breakers and fuses

1. In the console of the instrument panel:
   a) Circuit breaker 2 A for electric variometers etc.
   b) Circuit breaker 3 A for the radio
   c) 3A for turn and bank or artificial horizon
   d) Circuit breaker 3 A spare eg. for the transponder
2. The battery main fuse is located in the cockpit floor in a recess behind the foot of the instrument panel: 1 piece1s 80 A.
4. Resettable fuses are installed in the DEI-NT unit for the following circuits:
   a) Alarm outlet 2 fuses 0,2A
   b) Change over switch when extending the powerplant 0,2A e.g. for a Headset.
5. In the control unit-NT:
   Resettable fuses are protecting the following circuits:
   a. DEI-NT 0.4A
   b. DEI-NT rear cockpit 0.4A
   c. 12V sockets 4A
   d. Bug wipers 7A
   e. 12V sensors 0.2A,
   f. 5V sensors 0,05A

   A safety fuse 40A protects the Generator

   The following circuits are activated by semiconductor switches and protected by resettable fuses:
   a. Engine extension-retraction motor 9 A
   b. Fuel pump 9A
   c. Coolant pump 4A
   b) Ignition coils 2 x 4A
   c) ECU and injection valves 4A
   d) Emergency sysem 9A
   e) Refuelling pump 4A
   f) Spindle motor brake 2,5A

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1.15.15 Position switches for the powerplant

see sect. 1.13.4 and 1.13.5.

1.15.16 Proximity switch

The proximity switch at the engine receives the switching pulses by the steel pins located at the upper drive belt pulley, see diagram 19.
The proximity switch effects the following functions:

1. Activation of the retraction mechanism and indication in the DEI-NT
2. Pulses for the RPM measurement for drive belt slip indication and RPM indication for operation with the emergency system

The switch must be adjusted so that the propeller can't hit the fuselage cut out (left hand rear end) during retraction.
The switch range may be shifted by moving the switch in the elongated hole in the drive mount,
If the switch is moved (distance to the steel pins reduced) the range will be enlarged.
If the distance is too large, the RPM measurement won't work correctly.
For a new adjustment start with a distance of 1.0 mm (.04 in.).
Check if the switch activates by watching the DEI-NT display (main switch on). The propeller symbol must change from small to large.
It is absolutely essential to secure the switch with the 2 counter nuts, as damage to the switch will stop the RPM measurement and the retraction-extension control.
Secure the nuts with lockwire.
With a defective proximity switch the failure message "PropSensor"will be displayed on the DEI-NT.

1.15.17 External power supply socket (Option)

An external power supply socket to assist the gliders electrical system during engine start may be installed in the console of the rear instrument panel.
Suitable jump start cable: part no. Z69

1.15.18 Refuelling pump system

Start the pump by pressing the push button located in the fuselage main-bulkhead (behind the pilots left shoulder). As soon as the fuselage tank is full the control unit-NT automatically switches off the pump. If you want to interrupt or to stop the filling procedure before the tank is full press the push button again. Starting the pumping again is only possible by pressing the push button again.

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1.15.19 Connector plugs between fuselage and engine

Except for the starter motor positive and earth wires all wires can be disconnected by a multiple plug to facilitate the removal of the engine. The main plug is located at the bulkhead in the front upper edge of the engine compartment. 2 plugs for the EGT probes are located at the right upper edge of the engine bay wall

1.15.20 DEI-NT (Digital Engine Indicator)

Caution: When you plug in the connector plug, carefully fix the plug with its screws and secure the screws with Loctite 221.

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 Aviation to enable them to adjust the new DEI-NT to that value.

1.15.20.1 Main unit in front cockpit

For a description of the readouts and the various functions and the set up menu see flight manual sect. 7.4. The DEI-NT receives input data from the ECU and the control unit and controls all functions together with the control unit, see section 1.15.4.

- The RPM measurement is fully digital
  In normal mode the DEI-NT receives the engine RPM from the ECU. In addition it counts the impulses of the proximity switch. This information is used in the normal mode for the calculation of the drive belt slip and in emergency mode for engine RPM indication.
- The DEI-NT receives the coolant temperature (CHT) from the ECU It is measured by a temperature probe which is screwed into the coolant circuit in the rear cylinderhead.
- The DEI-NT receives the outside air temperature OAT from a sensor in the fuselage nose air inlet.
- The DEI-NT receives the engine gas temperature EGT from 1 NiCr-Ni sensor per cylinder mounted in the exhaust manifold.
- Fuel level measurement see sect. 1.14.8. The DEI-NT calculates from the resistance of the 2 fuel level sensors via a data map the tank fuel level which is as far as possible independent of the aircraft attitude.
- The following signals are given to the control unit-NT by the ignition switch:
  - the ignition on / off
  - 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, coolant pump, the automatic extension of the engine and the control of the starter motor will be activated.

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1.15.20.2 Second unit in rear cockpit

The second unit has no control functions except for the ignition switch. It receives all data from the main unit, the ECU and the control unit-NT via CAN-bus.

1.15.21 Coolant pump

The coolant pump receives electric power as long as the ignition is switched on. Types see section 8.1.2.2.
With the coolant pump type Pierburg installed a voltage converter is installed in the upper mid fuselage section on the rear main bulkhead
Type see section 8.1.2.4.
The voltage converter supplies 18 V to the pump, necessary for sufficient cooling efficiency. The wiring plan 10E202 issue C or higher is applicable.

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1.15.22 Electrical system of the electrically operated main landing gear

Wiring see wiring plan 10E4 enclosed to the MM.
Description of operation see AFM section 4.2.2 and 4.5.1.

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 4.5.1).

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 1.6.1.2.

Fuses and circuit breakers:
The electrically operated landing gear is protected by a resettable fuse 10 A in the landing gear control unit.

Landing gear warning:
A landing gear warning device is integrated into the system. Warning is by a buzzer (only installed p to ser. no. M4) and in addition via the DEI-NT see AFM section 7.4.5.2 item 9.
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.

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1.16 Pitot and static system

1.16.1 Layout

see diagram 11

1.16.2 Maintenance

No special maintenance needed.

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2 Inspections

2.1 Daily inspection

see flight manual section 4.3

2.2 Regular inspections

A Annual inspection (and 100hr inspection – only for USA)

- Execute all items of the daily inspection (see flight manual section 4.3).
- 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 seals of the rudder (see section 1.3.4).
- 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 7.16 of the flight manual.
- Check the tension of the lines of the waterbag attachment (see section 4.1).
- Check the rubber cords in the control system (see sections 1.2.6, 1.3.6 and 1.7.5.
- Check the rubber cords in the control system (see sections 1.2.6, 1.3.6 and 1.7.5.
- Check the thickness of the wheel brake linings and of the brake disc (see section 1.6.2).
- Check if the brake fluid has to be exchanged (see section 1.6.2).
- Check the airbrakes according to section 4.4.
- Check the fin ballast box according to section 1.9.
- Check the canopy opening and canopy emergency release handles for enough friction (canopies removed from fuselage). A force of 15 – 20 N (3.3 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 handles accordingly.
- Check if the powerplant has been serviced according to section 3.6.1.
- 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 annual inspection.

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B Special inspections

C.G. tow hook:
After a wheel-up landing, the C.G. tow hook is to be cleaned and to be carefully checked for any damage.

Fuselage nose:
After a landing where the fuselage nose has touched the ground, the nose tow hook is to be cleaned and to be checked for correct functioning. Clean the hole of the PC port (necessary for the stall warning) located behind the fuselage nose on the lower surface.

C.G. weighing: After all work which may influence the C.G.

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2.3 Inspections after a heavy landing

The whole aircraft:

Check that the tailplane is still properly aligned in the vertical and horizontal axis. Check the wing oscillating frequency with respect to previous checks

Wings:

Spar ends:

Check the wing pins and bushes for any deformation - are there any white areas around the bushes?

Root ribs:

Are there any cracks at the rib/wing skin joint or rib/spar joint? If so, remove any paint or filler to see if the crack continues into the structure. Any white areas around the bushes?

Outer skins:

Crushing, cracks, delaminations?

Note: Hairline cracks from the edges of the airbrake housing are harmless. Hairline cracks on the wing leading edge running along the span are harmless, if these don't enlarge when you press on the wing shells.

Ailerons:

Crushing, cracks, delaminations?
Hinge mounts checked? - Control circuit drives checked?

Fuselage:

Fuselage wing connection:

White areas, increased free play, bent lift pin tubes, damaged locking pins at the rear wing suspension, difficult assembly?

Torsion check:

Hold the fuselage fixed and from the top of the fin try to turn the fin around the fuselage. While applying this torsion are any cracks made visible? Does the fuselage shell show any uncommon deformations?

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.

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Tailplane attachment:
Increased free play? Cracks in the fin top rib? Check if the aluminium parts of the tailplane attachment are 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, in the PC port (located behind the fuselage nose on the lower surface) 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 engine bay insulation.

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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?
Function check: normal and emergency operation.

Tail wheel:
Any cracks or white patches around the attachment?
Is the tail wheel fork bent?

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.
Function check according to section 1.9.1 and 1.9.3.

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?

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

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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. DG Aviation will develop an inspection program to be executed at 3000 h, 6000 h, 9000h, and every 1000 hours thereafter up to the 12000 hour limit. This program will be approved by the aviation authorities and will be available for purchase from DG Aviation.
   When you request the inspection program, 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 program.

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 Aviation facilities, a copy of the records must be sent to DG Aviation for evaluation and information.

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3 Maintenance

3.1 General maintenance

See also flight manual section 8.

Exterior surfaces of the fibre reinforced plastic parts

The surfaces are coated by a UP-gelcoat or by PU paint (Option). This gelcoat is protected by a hard wax coating which has been applied during production with a rotating disc ("Schwabbel" procedure). Do not remove the wax, because this would lead to shading, swelling and cracking of the surface. In general, the wax coat is very resistant. As soon as the wax coat is damaged or worn, a new coat has to be applied. If you store your aircraft often outside, this may be necessary every half year!

"Schwabbel" procedure: The best method is with an electric power buffer as we do in the factory. Also an electric drill may be used. Speed approximately 2000 RPM. Two packages of special cloth discs (Schwabbelscheiben) have to be installed. A block of hard wax has to be pressed against the rotating discs. By doing so, the wax becomes hot and is taken up by the cloth. The hard wax and the cloth discs should be purchased from the DG Aviation factory.

Wax	Part-No. 70000121
Cloth disc	Part-No. 70000600
Adapter W67 (for mounting the cloth discs to a power buffer with thread M14)	Part-No. 80010026

You get the best effect when polishing 90° to the microscratches of the sanding process.

Caution: Make sure that the surface does not get too hot, otherwise the finish will be damaged. Therefore move the polishing machine all the time, and do not stay on one spot!

Plexiglas canopy:

Small scratches on the exterior surfaces of the canopies can be removed by the "Schwabbel" procedure (see above). Lock the canopies to the fuselage!

Metal parts:

The pins and bushes for rigging the aircraft are not surface protected and must be covered with grease all the time (see section 3.3). The other metal parts, especially the control stick and all handles, should be preserved with metal polishes occasionally.

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3.2 Maintenance of the airframe

The sailplane is service free except for the care of the surfaces (see above) and greasing and oiling of the control system and all pins (see section 3.3). After a landing in a soft field, the undercarriage box and tow hook should be thoroughly cleaned.

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.
- Electrically operated landing gear: Clean and grease the slotted hole at the attachment of the spindle drive to the bell crank 10FW106 (see diagram 9).

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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:

- Airbrake control handle 5St69 on 5St68/1
- The linear guide on which the spindle drive is moving during emergency extension of the landing gear is made from plastic and should not be greased.

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

3.4 Damage of the airframe

Before every flight, especially after a longer period of non-use, an inspection should be carried out. Check for any small changes such as small holes, bubbles and uneven areas on any skin surfaces, as these signal that something may be wrong.
With major damage, contact the DG Aviation factory and send photographs and a damage report from a licensed inspector or from an appropriately rated mechanic. With this information, the correct repair procedures can then be determined.

Minor damage such as small cracks and holes in the skin surfaces (as specified in the repair manual) may be self-repaired or be repaired by a certified repair station.

Additional information, such as a listing of all materials used in your aircraft can be found in the repair manual.

Home repairs should not be attempted when:

- the main spars or the spar ends are damaged or major fittings on the wings, fuselage or tailplane are broken out or white patches are noted around them in the laminate!
- When areas are so badly damaged that component parts cannot be repaired without special jigs for proper positioning and alignment!
- Whenever it is necessary to cut into undamaged areas to execute repairs!

3.5 Hydraulic wheel brake

The brake fluid must be exchanged at least every 4 years (see section 1.6.2 and 4.6).

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3.6 Servicing the Engine

Caution: If you don't operate the engine for periods longer than 2 months you must preserve your engine according to the instructions in the engine manual. The same applies for any overseas transportation.

3.6.1 25 hour inspection

Note: The engine time until the next maintenance is displayed on the DEI-NT operating time screen. After completion of the 25 hour inspection reset this time to zero, see section 4.11.2.1.

The following checks and maintenance work should be done every 25 hours engine time. Items 1, 7, 12, 13 and 23 should be executed at least 1 year after the last 25 hour inspection, preferably with the annual inspection. In your aircraft log you will find stickers on which you can enter the next maintenance dates. Fix these stickers in a visible place in the cockpit, preferably on the right side console. You find checklists for this maintenance work in section 9.2. Please complete the checklist when executing the inspection and file it in the aircraft log.

1) Remove the engine bay doors, general visual inspection.
2) Check spark plugs (Exchange latest after 100 hours).
   Check if the spark plug connectors have a tight fit on the spark plugs after you have installed the spark plugs. If not, the connector must be replaced.
3) Measure fuel pressure:
   Install the manometer (see section 7 item R). To accomplish this remove the screw cap from the block on top of the injection valves of the emergency system (see diagram 16 “service port”). Run the hose to the rear cockpit and secure it so that it can’t be caught by the running propeller.
   Switch to normal system, switch on ignition, don’t run the engine: the fuel pressure must pulse between 2.2 and 2.7 bar, tolerance $\pm$5%, this is a check for correct operation of the pressure switch. If you measure other pressure values exchange the fuel pressure switch.
   Switch over to emergency system: the fuel pressure must be 3 up to 3.2 bar. If the pressure is lower exchange the fuel filters and / or the fuel pump of the emergency system. If the pressure is higher exchange the pressure reducer.
   Further check with running engine see item 32.
4) Check all fuel lines for any wear, kinks, tight fit and leaks.

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5) Check the intake airfilters for excessive dirt and wear, wash with pure petroleum spirit and blow compressed air in reverse direction through the filters. Spray the outside with oil for filters with cotton fabric, reinstall the filters. To clean the front filter it may be advantageous to disconnect the wiring of the air intake sensor, to accomplish this remove the heat shrink tubing from the plugs/sockets and reinstall the tubing after the work.
We recommend to exchange the filters every 25 hours. Also new filters must be sprayed with filter oil. To accomplish the exchange remove the air intake sensor from the front filter by removing with caution the sealing compound which fixes the sensor. Drill a dia. 6 mm hole from the lower side into the flange of the new filter and install the sensor the same way as in the old filter, fix with suitable sealing compound, e.g. silicone.

5a) With the airfilters still removed check visually the screws of the throttle valves for tight fit.

6) Check the throttle cable and associated lever. Replace cable when worn.

7) Clean engine and radiator.

8) Check cooling system for leaks, refill coolant if necessary, check antifreeze (data see section 1.12.2). Check the radiator and its mounting. Check the coolant hoses.
To check the water pump, switch on the ignition. You should hear a buzz.

9) Remove the exhaust manifold.
For the lower bolts a shortened wrench is needed see section 7 item U.
Check the cylinders and pistons via the exhaust ports for seizing marks, for carbon remains and for sticking piston rings. Press against the piston rings with a suitable tool (e.g. small flat end screw driver). The rings must be movable. Black remains on the outside of the pistons below the rings indicate sticking or damaged piston rings, this is not acceptable.
Illuminate the combustion chamber, check for combustion deposits and for cracks in the cylinder coating especially at the inlet and transfer ports. Use a torch and mirror for these checks. If seizing marks or cracks are detected the engine must not be used. Excessive combustion deposits have to be removed. With sticking piston rings the cylinders must be removed.
Take out the piston rings and clean the grooves and the rings or replace the rings. Remove also any combustion deposits inside the pistons.

Caution: Necessary repair work including removal of combustion deposits must be accomplished at a certified repair station rated for such engine work.

10) Check the cylinder base for indications of leaking and/or damaged gaskets. When gaskets are damaged or leaking they must be exchanged.

Caution: The exchange of cylinder base gaskets must be accomplished at a certified repair station rated for such engine work.

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11) Check the muffler for cracks and ensure mounting is secure.
Check especially the cable which lifts the muffler during engine extension.
Check the moving part at the front end of the muffler for any cracks.
Check the exhaust manifold (already removed) for cracks. Reinstall the exhaust manifold, therefore remove any remains of the gaskets, install new gaskets.
Check the length of the cable which lifts the muffler. To accomplish this extend the engine and press the muffler body in downward direction at its front end with a force of approx. 50 N (11 lbs.). If the cable is too long or if the spring in the cable has been permanently stretched, the muffler will interfere with the exhaust manifold.
Check the spring pressure at the coupling of exhaust manifold to muffler. To accomplish this, measure the distance between the brackets for the spring couplings at the muffler pipe and at the movable part of the muffler in disengaged and in operating position. Extend the powerplant completely via the manual switch. In this position the distance should be approx. 1 mm (0.04 in.) smaller than when disengaged. If the difference should be less than 0.5 mm (0.02 in.) you have to adjust to 1mm using the nut on the eyebolt. By this procedure you will pull the muffler forwards in its frame.

Note: With new manifold and/or new movable part the difference should be adjusted to 2 – 3 mm (0.04 – 0.12 in.) to allow breaking in of the parts.

12) Check the spring tension of the bungee which pulls the cable (which lifts the muffler) back. With engine completely extended pull the bungee upwards in the centre with a spring balance, hold the front steel cable down at the muffler lifting cable. With 100 mm deflection the force needed should be min. 6 N. (1.3 lbs.) If the force is lower or if the bungee is damaged exchange the bungee.

13) Check the spring tension of the bungee which pulls the muffler down. retract the engine so far that the muffler disengages and rests on its lower stop. Install a spring balance to the muffler frame at the point where the cable running to the bungee is installed. Pull the mufflerframe upwards. A force of min. 60 N (13 lbs.) should be needed. If the force is lower or if the bungee is damaged exchange the bungee.

14) Check all engine nuts and bolts with a torque wrench (see section 1.12.9).

15) Check the rubber engine mounts, especially for cracks. Therefore apply strong pressure to the drive mount in forward, backward and sideways direction.
Check the rubber buffer which limits the tilt of the engine against the drive mount due to the engine torque (see diagram 27) according to section 1.12.1. Adjust if necessary.

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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.

18) Remove the fairings which protect the drive belts. Check the drive belts for wear If a drive belt shows signs of wear all drive belts must be replaced.
Check and correct tension (see sect. 4.10.2).
Check if drive belt operating time is exceeded see section 0.4.
Check the rollers which guide the drive belts 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.
Check the complete drive mount for cracks according to Inspection instruction No. 1 for TN1000/30, check additionally the upper part of the drive mount especially at the connection of the tubes to the propeller support area..
Re-install the drive belt fairings, secure screws with Loctite 243.

19) Clean the spindle drive. Check the connections of the spindle drive to fuselage and powerplant.

20) Check the time taken to retract and to extend the power plant. If it takes longer than described under sect. 1.13.2 the gas strut has to be replaced.

21) Check the engine retaining cable for wear and kinks.
Check the engine position with the retaining cable fully tensioned according to sect. 1.13.3. If the cable is too long it has to be adjusted at the adjustment screw in the rear end of the engine bay.

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

23) Check the tension of the propeller bolts: remove the lockwire, loosen the propeller bolts and retorque them with a torque wrench, torque value see section 1.12.9. Secure again with lockwire according to section 4.10.6.

24) Check the propeller blades for any damage.

25) 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.

26) 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.

27) Reinstall the engine bay 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 control system.

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Ground test run:

Warning: Never run the engine without the wings assembled.

28) Check the ignition circuits at 4000 RPM, drop should not be more than 300 RPM.

29) Check emergency system: Switch over from normal system at 4000 RPM. After a short RPM drop the engine should run with approx. the same RPM.

30) Check max. engine RPM - minimum 5900 RPM at CHT of 65°C.

31) Check EGT's: EGT should be 600°C ± 20°C at full power and engine warmed up.

32) Check the fuel pressure with normal and emergency system at 4000 RPM. Pressure should be 3 up to 3.2 bar. With lower pressure the filters and / or the fuel pump of the respective system must be exchanged.
Remove the manometer and reinstall the screw plug to the service port. Use a new copper sealing ring 10x14x0,8 DIN 7603 A.

3.6.2 After every 100 engine hours

The drive belts and the spark plugs have to be exchanged.

3.6.3 After every 400 engine hours

The power plant must undergo a major overhaul.

Apart from the items listed in section 3.6.1., 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 drive belt.
4. Replace the bearings of the upper drive belt pulley.

3.6.4 After 6 years

1. Replace all fuel filters
2. Replace the rubber fuel lines and the gasket of the drainer valve.

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

3. Replace all coolant hoses and the coolant.

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4 Detailed instructions for assembly and servicing work

4.1 Water ballast system

see diagram 6

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 doing this the tension of the lines will be satisfactory even if the lines 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.

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4.2 Replacement of control circuit cables

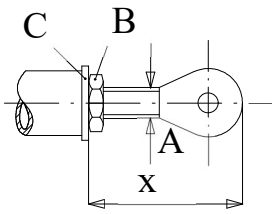
The following cable connections are approved:
3.2 mm dia. control cable construction 7x19 with Nicopress-sleeves 28-3-M Copper and tool No. 51-M850 or 63-V-XPM or 64-CGMP where the M groove is to be used. The above applies to the rudder cables, the tow release cable and the powerplant retaining cable.
The cable for the rudder pedal adjustment and the throttle control are 1.6 mm dia. control cable construction 7x7 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.
Please refer to aircraft inspection and repair FAA AC 43.13-1 B or later issues.

Cauton: Control cables according to MIL-W-83420 I/A (was MIL-W-1511A) or ISO 2020 (was LN9374) should be used.

4.3 Adjustment and servicing of the control circuit

a) In all cases, new self locking nuts LN9348 should be used.
b) Bolts which are not secured with self-locking nuts have to be secured with Loctite 243. Before installing the bolt clean the thread and the inside thread. 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) DIN6798 I. Be careful not to loose that washer!

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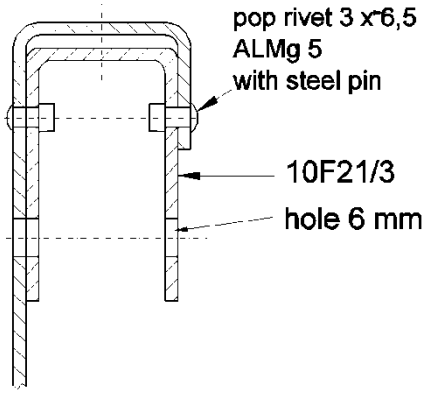
4.4 Inspection and adjustment of the airbrakes

4.4.1 Retracted position

The airbrakes must retract at their outboard end first. When the airbrake cap is flush with the wing surface at the outboard end, the inboard end must be 2 - 4 mm (0.08 - 0.16 in.) above the wing surface.

If not, modify as follows:
With the modification a value of 3 –4 mm (0.12 – 0.14 in.) shall be adjusted.

1. Remove the bolt fixing the upper airbrake plate to the outboard bellcrank.
2. Drill out the 4 rivets which fasten the U-bracket 10F21/3 to the airbrake plate. Use a 3 mm (0.118 in.) drill. Remove 10F21/3.
3. Enlarge the 6 mm hole at which the outboard bellcrank was screwed to the airbrake plate to 7 mm (0.276 in.) diameter.
4. Insert a new bracket 10F21/3 into the upper airbrake plate and bolt it together with the airbrake plate and with the bellcrank, but don't fasten the nut. Move the bellcrank as far as possible in outboard direction relative to the airbrake plate, fasten the nut.
5. Retract the airbrakes and measure the distance of the inboard edge of the airbrake cap to the wing surface. If the desired value of 3 - 4 mm is not reached, you must repeat items 3 and 4. Enlarge the hole in steps from 7 mm to 8 mm (0-314 in.).
6. Drill the 3 mm (0.118 in.) rivet holes through the existing holes in the airbrake plate into bracket 10F21/3. Fasten 10F21/3 with 4 aluminium poprivets type Fero 3 x 6.5 AL Mg5 with steel pin to the airbrake plate.



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4.4.2 Overcentre locking moment and locking travel

Caution: Checks and installation must be done at room temperature (20 – 25° C). Please make sure that the wings have been warmed up or cooled down to this temperature. At other temperatures wrong measurement of the locking moment will occur.

If it was necessary to adjust the locking moments, rig the glider after the adjustment and check if both airbrakes retract at the same time. Tolerance is 3 mm (0.12 in.). To measure retract the airbrakes until the first cap is flush with the wing surface at the outboard end. Hold the airbrake handle in this position and measure how high the outboard end of the other airbrake is above the wing surface. If this is out of tolerance you have to reduce the locking moment at the brake which retracts first or to increase the locking moment at the brake which retracts last. But check that the locking moments remain within their tolerances. For this adjustment adjust the rod end in the airbrake box by 1/2 turn only.

1. **Overcentre locking moment**

   To determine the moment a tool 5V17 and a rod which you must produce according to drawing 5V18 (enclosed to the MM) are needed. Place the tool on the airbrake control hook up at the wing root rib.

   Unlock: Rotate away from the stop
   Lock: Rotate until the transversal pin of the hook-up touches the stop.

   Measure the moment to lock the airbrake. The locking moment must be measured as a force at 200 mm (7.87 in.) from the point of rotation at rod 5V18. The force shall be 60 - 80 N (13.2 - 17.6 lbs.). The sum of the forces of the left and the-right wing shall not exceed 150 N (33.0 lbs.).

   Adjustment of the moment is made by adjusting the rod end at the pushrod inside the airbrake box.

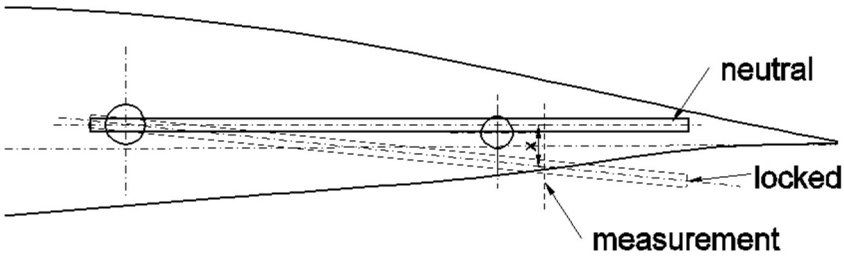
   Turn in the rod end: reduce the moment
   Turn out the rod end: increase the moment

   1/2 turn of the rod end changes the force by approx. 14 N (3 lbs.).

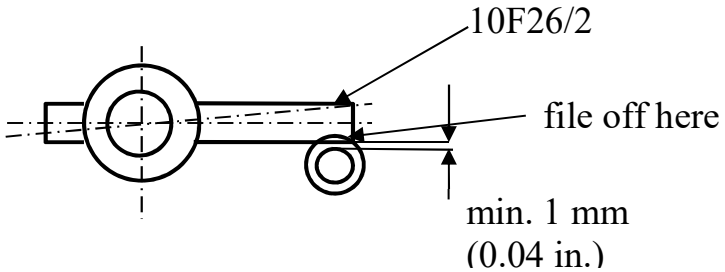
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2. **Overcentre travel (angle)**
   To determine the overcentre travel use again the tool, see above.
   Place the wing horizontal on stands, upside up.
   Place the tool on the airbrake control hook up at the wing root rib. Unlock the airbrake just so far that the airbrake does not unlock or lock again by itself.
   This is only possible over a very small range.

   Measure the centre of this range at the position marked on the rod (300 mm, 11.8 in. behind axis of rotation) from the lower side of the wing. Then lock the airbrakes and measure this value too.
   The difference shall be 16 mm $\pm$ 2 mm (0.63 + 0.08 in.). This corresponds to an overcentre angle of 3° $\pm$ 0.4°.



   For adjustment file off the brass bush 10F26/2 at the stop or use a larger brass bush if necessary (see sketch).
   You may produce this part yourself or order such a bush from DG.
   Please, indicate the necessary diameter with your order.



3. **Overcentre locking moment**
   Check again see 1. .

4. **Other wing**
   Follow instructions 1. - 3. for the other wing.

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4.5 Removal and installation of the undercarriage (main wheel)

see diagrams 7 up to 9

Warning: A gas strut is installed inside the landing gear box to compensate the mass of the landing gear. The landing gear may retract by itself when the spindle drive is removed by the force of the gas strut, especially when the glider is not in the normal position. So when working on the landing gear make sure that inadvertent retraction of the landing gear is prevented e.g. by fixing the drag struts.

0 **Removal of the gas strut in the landing gear control system:** Use a screw clamp to pre-stress the gas strut sufficiently so that the bolts can be removed.

A Removal of the main wheel

1. Remove axis 10FW11/7 together with the 2 parts 10FW11/2.
2. Remove the wheel axle 10FW11/6 and the 2 bushes 10FW257/1 and /2.
3. Move the wheel with the brake assembly to the right, so that the pin of part 10FW18 slides out of the fork 10FW11/1. Now remove the wheel with the brake assembly.

B Removal of the brake assembly from the main wheel

1. This is only necessary if the tyre is to be removed or if the brake linings are to be exchanged.
2. Remove the 2 bolts A (see diagram 8) from the brake assembly.
3. Take off brake assembly with holder 10FW18 and take away the loose part (back plate assy.) with the brake lining.
4. During reassembly secure the 2 bolts A with Loctite 243 or safety wire.

Caution: Don't operate the airbrake and thus the wheelbrake with brake assembly disassembled, as the piston and the brake-fluid will be pressed out of the brake assembly.

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C Removal of the lower landing gear fork 10FW11/1

1. Remove the main wheel see A.
2. Retract the landing gear.
3. Disassemble the gas spring from the left side of the undercarriage box see item 0.
4. Extend the landing gear again.
5. Remove the 2 bolts M10 LN9037 which connect 10FW11/1 to 10FW10/1. (Mark the bolts and don't mix them up when reassembling the parts).
6. Remove fork 10FW11/1.

D Removal of the spring legs (parts 10FW16 and 10FW17)

1. Remove the main wheel see A.
2. Remove the bolts M8×62 LN9037 which connect the spring legs to the fork 10FW10/1.
3. Remove the spring legs.
4. If it is necessary to disassemble the spring leg to exchange a component, the reassembly must be done according to diagram 8.

E. Removal of the drag struts 10FW255/1 (right), 10FW255/2 (left)

1 Disassemble the gas strut from the left side of the landing gear box see item 0

2 Remove the 2 bolts M8 LN9037 which connect the struts to fork 10FW10/1. Mark the bolts. Don't interchange the bolts during reassembly!

3 Remove the 2 bolts M8×40 LN9037 which connect the struts to the rear fork 10FW254.

4 Remove the drag struts.

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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. Enlarge the marking hole dia. 6 mm at the right hand fuselage side to dia. 25 mm (1 in.). Remove the nut M12 from the left hand side of the axle 10FW10/2, to accomplish this hold the axle at the right hand side with a thin socket wrench if necessary. Insert a long bolt with thread M12 into the head of the axle to pull out the axle through the hole.
7. Remove the front fork 10FW10/1.

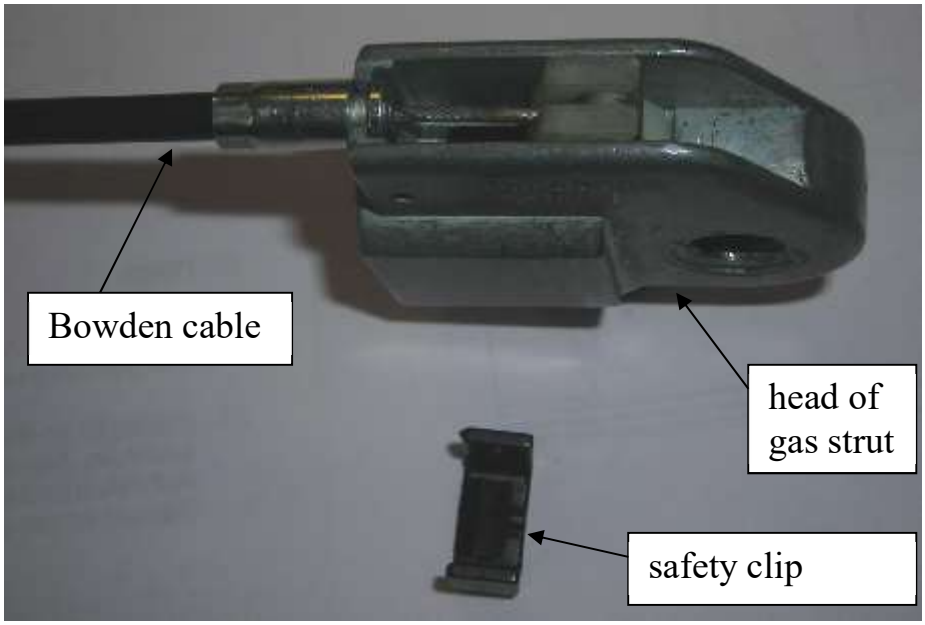
G. Removal of the shaft10FW256 (with the latches for locking the LG in retracted position)

1 Remove the baggage compartment floor and the rear cover of the baggage compartment.
2 Disconnect the wiring from the limit switch (mounted to the left latch of the shaft).
3 Remove the push rod 10FW121 between bell crank 10FW130 and lever 10FW89.
4 Remove bolt M6x32, which connects the lever 10FW89 to the shaft 10FW256.
5 Pull out the lever10FW89.
6 If not already existent, drill a 10 mm hole into the left fuselage wall on an extended centre line of the shaft.
7 Insert a threaded rod M8 min. 310 mm long and screw it into axle 10FW252/1.
8 Remove bolt M6x32, which connects the axle 10FW252/1 to the shaft 10FW256.
9 Pull out the threaded rod with the axle.
10 Remove the shaft 10FW109.

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H. Removal of the drive unit

1 Retract the landing gear
2 Press the toggle switch down and immediately up again and press simultaneously the press button. The landing gear now should be extended so far that the bolt which connects the spindle drive to the lever 10FW108 is located in the centre of the elongated hole. The bolts at the drag struts should be still in the latches. Remove the bolt.
3 Remove the wiring from the spindle drive, disconnect the connector plugs in the wiring to the limit switch (gas strut). Remove the Ty-rap which fixes the wires to the landing gear box.
4 Disconnect the Bowden cable of the emergency extension system from the head of the gas strut. To accomplish this remove the safety clip from the head and take out the Bowden cable, see picture.



5 Remove the bolt which mounts the gas strut to the extension of the landing gear box.
6 Slip the drive unit on the linear guide to the front position.
7 Remove the 2 rear bolts M6x28 which mount the linear guide to the landing gear box.
8 Slide the drive unit on the linear guide to the rear position. Be careful not to slide the drive unit too far so that it may slide off the linear guide.
9 Remove the 2 front bolts M6x28 which mount the linear guide to the landing gear box.
10 Remove the drive unit from the fuselage.

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I. Removal of the rear fork 10FW254

1 Remove the main wheel see A.
2 Disassemble the gas strut from the left side of the undercarriage box see item 0
3 Remove the 2 bolts M8×42 LN9037 which connect the drag struts to the rear fork 10FW254.
4 Remove the drag struts.
5 Remove the landing gear drive unit according to H.
6 Remove the bolts M8×45 LN9037 which connect the rear fork with the lever 10FW108.
7 Pull out the lever 10FW108.
8 If not already existent, drill a 10 mm hole into the left fuselage wall on an extended centre line of the fork shaft.
9 Insert a threaded rod M8 min. 310 mm long and screw it into axle 10FW251/1.
10 Remove bolt M6x35, which connects the axle 10FW251/1 to the fork 10FW254.
11 Pull out the threaded rod with the axle.
12 Remove the rear fork.

J. Reinstallation

1 Reverse the above procedures.
2 Use new lock nuts and a new split pin dia. 1.6x12 DIN94 zn. Install bolts in same directions and washers at same positions.. During reassembly of the brake assembly secure the 2 bolts A with Loctite 243 or safety wire.
3 Secure the bolt M10x 44 which mounts the gas strut to the extension of the landing gear box with Loctite 243.

Note: It is sufficient to tape the holes drilled for removal of the axles. GFRP repair is not necessary.

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4.6 Filling and bleeding the hydraulic disc brake

Caution: The master cylinder is mounted in an horizontal position. Due to the position of the reservoir filling and bleeding of the system is only possible from the lowest point which is the brake cylinder assembly at the wheel.

1. **Necessary tools and material:**
   - 1 open-end wrench 1/4" = 6.35 mm for the bleeder valve at the cylinder assy..
   - 1 open-end wrench 11/16" = 18 mm.
   - 2 Plastic syringes acid resistant, volume ca. 100 ml (6 cu.in.). Use this syringe for brake fluid only!
   - 1 bleeder assy. Tost No. 075890.
   - 1 m (3 ft.) transparent PVC hose inside diameter 8 mm (0.31 in.), fixed to syringe and bleeder assy. with hose clamps.
   - Brake-fluid DOT 3, DOT 4 or SAEJ 1703.
2. **Preparations**
   - Raise the fuselage, extend the landing gear
   - Ffix left wheel door in the fully open position
   - Set the airbrake control in the retracted position
   - Remove the baggage compartment floor and rear cover, check that the actuating cable for the master cylinder is loose and that the piston rod of the master cylinder is at its stop (brake open).
   - Unscrew and pull out the eye-bolt which fixes the brake hose to the rear landing gear strut. Flap the hose to the right hand side so that the hose makes no bow above or below the horizontal. Fix the hose in this position.
3. **Filling**

Warning: Brake fluid is poisonous!
Protect your hands and clothes. Remove all spilled brake fluid. Clean all parts which had contact with brake fluid with alcohol, don't use fuel or solvents.

- Remove the cap and the membrane from the reservoir.
- Fill the first syringe (with hose and bleeder assy.) with brake fluid, eliminate all air bubbles.
- Remove the protection cap from the bleeder valve at the brake calliper, attach the bleeder assy. and fix it with the 11/16" wrench.
- Open the bleeder valve at the cylinder assy, use the 1/4" wrench, fill in slowly the complete volume avoiding air bubbles.
- Fill the complete system up to 15 mm (0.6 in.) below the upper edge of the reservoir, avoid over filling.
- Close the bleeder valve at the brake calliper.
- Use the second syringe to remove all brake fluid from the reservoir.
- Close the bleeder valve with the protection cap.

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- Fill the first syringe again, open the bleeder valve and fill in further brake-fluid. Look at the reservoir while filling to see if air bubbles are coming out of the line. Fill up to 15 mm (0.6 in.) below the upper edge of the reservoir.
- Close the bleeder valve, reinstall the membrane and the cap to the reservoir and remove the bleeder assy.
- Check brake pressure according to step 4.
- Reinstall the eye bolt.

4. Check brake pressure

- extend the airbrakes, there must be a strong pressure when the wheel brake engages.
- check several times, the wheel brake must engage at the same point every time
- if this is not the case, you have to bleed the system again

5. Check the hydraulic brake system for leaks

- extend the airbrakes with high force and hold it in this position for 2 minutes.
- Then check the whole hydraulic system visually for leaks. If necessary tighten the screwed joints or replace the sealings and bleed the system again.

Note: The adjustment of the length of the cable between the master cylinder and the airbrake control shaft restricts the max. airbrake extension height. The adjustment of this cable should be done with the glider rigged.

6. Bleeding the hydraulic brake system

- Remove the brake fluid from the reservoir using the syringe.
- Then execute again items 3 and 4 of this instruction.

7. Exchanging brake fluid (every 4 years)

- Perform preparations (see step 2.) of this instruction. It is not necessary to remove the main wheel.
- Fill the system with new brake fluid (see step 3.). To accomplish this remove all brake fluid from the reservoir first with the second syringe. Used brake fluid is darker than new brake fluid and can easily be identified. Watch the reservoir while filling to see when the new fluid streams into the reservoir. Repeat the filling process until only new fluid is in the system and no air bubbles can be detected.
- Perform steps 4. and 5. of this instruction.

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4.7 Control surface seals and turbulators

Materials see section 8.2.

Note: To minimise the friction of the seals, the trailing edge of the seals should be chamfered. Apply a fine grinding paper (e.g. 400 grit) between sealing and control surface and move it up and down in spanwise direction to sand the trailing edge of the sealing.

Warning: Use only original materials see section 8.2. Otherwise the function of the sealings is not guaranteed. Seals which are too loose may cause control surface flutter.

4.7.1 Ailerons

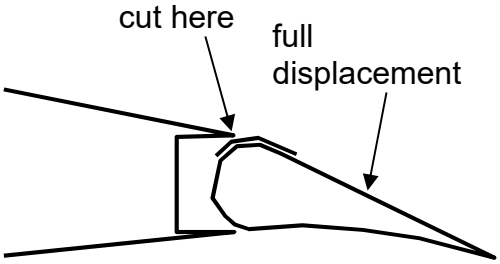
To remove an aileron carefully break away the fairing from the control surface horn at the aileron and unscrew the horn.

4.7.1.1 Upper surface

To reduce the friction as far as possible a 38 mm (1.7 in.) wide selfadhesive Teflon coated glass fabric is glued on the upper side of the aileron see sketch.

Prior to removing the old fabric, mark its trailing edge with a pencil on the aileron surface. The fabric must be installed so that the seal slides always on the fabric.

Cutting the front of the fabric is easiest if the seals are not installed.



Insert the aileron and use full displacement. Cut the front end of the fabric with a sharp knife along the wing trailing edge see sketch.

With the seal installed, you have to measure the position of the front end. Cut it off by hand with the aileron removed from the wing.

Cut away the Teflon glass fabric at the edges of the cut-outs for the aileron hinges.

The seal is installed in a groove at the trailing edge of the wing.

Curved Mylar seal is glued into the groove with film tape at the leading edge of the seal. PVC tape is glued over the seal to cover the gap between wing and seal. The leading edge of the PVC tape shall be 5 mm (1/5 in.) in front of this gap.

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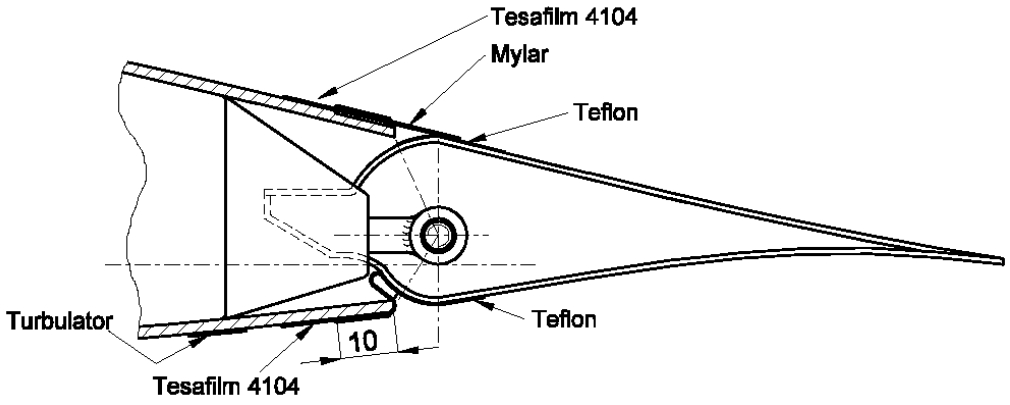
4.7.1.2 Lower surface

The ailerons are to be sealed at the lower surface with 38 mm wide Teflon-glass fabric tape. The Teflon-glass fabric tape must be glued 10 mm (.4 in.) wide to the lower wing surface. PVC tape (19mm wide) is glued over the leading edge of the sealing to protect the sealing from coming loose.

a) Removing the ailerons
To remove the ailerons you have to remove the Teflon-glass fabric tape first. Peel off carefully so that the tape does not tear and no remains of the glue remain on the wing surface.

b) Reinstalling the seal
Remove carefully any remains of the glue. Install the aileron in the wing but don't screw on the control surface horn.
Rotate the wing upper surface up and deflect the aileron to its max. negative displacement. Use a small brush and apply talcum powder onto the aileron leading edge. Then deflect the aileron to its max. positive displacement and remove the talcum powder from wing and aileron surface.. Clean the gluing areas with Acetone.
Deflect the aileron to its max. negative displacement again and fix in this position e.g. with tape. Glue the Teflon glass fabric tape to the wing with 10mm overlap.
Press the Teflon-glass fabric tape with a wooden stick into the gap between aileron and wing and press the fabric tape to the aileron surface.
Then deflect the aileron several times in both directions. If there is still a noise which sounds like the fabric sticking to the aileron and getting loose again, you should blow compressed air into the fairing of the control linkage pushrod to distribute the talcum powder.
Glue a PVC tape (19mm wide) over the leading edge of the seal.

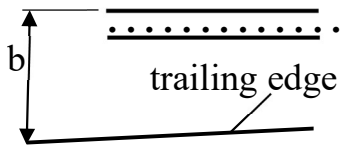
Screw on the control surface horn, securing the bolts with Loctite 243.
Glue the fairing again to the control surface horn with polyester resin.
Apply pressure when gluing to prevent the fairings interfering.



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4.7.2 Wing lower surface

Dimple tape is installed as turbulator. The leading edge of the dimple tape is located at distances b in front of the wing trailing edge.



1 in.=25.4 mm

Position	y mm	b mm
300mm from wing root	660	277
1. contour brake	3490	264
2. contour brake	6979	209
parting	8593	147
3. contour brake	9303	119
550mm outside 3. contour brake	9843	81

4.7.3 Horizontal tailplane

4.7.3.1 Turbulators

60° zig-zag turbulators are installed on upper and lower surface.
Prior to removing the turbulators mark the positions of the turbulator leading edges with a pencil on the stabilizer surface, otherwise see table below. The dimensions a are from the turbulator leading edges up to the leading edges of the grooves at the trailing edges of the stabilizer.

1 in.=25.4 mm

Position	y mm	a mm
centre	0	81.5
inboard ends of the turbulators on the lower surface	100	80
1. contour brake	960	69,5
tip	1580	29

4.7.3.2 Seals

The seals are installed in grooves at the trailing edges of the stabilizer. Curved Mylar sealing tape is used on the upper surface and flat Mylar sealing tape is used on the lower surface. The seals are glued into the grooves with film tape at the leading edges of the seals. PVC tape is glued over the seal to cover the gaps between stabilizer and seals. The leading edges of the PVC tape shall be 5 mm (1/5 in.) in front of the gaps.

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4.7.4 Vertical tailplane

4.7.4.1 Turbulators

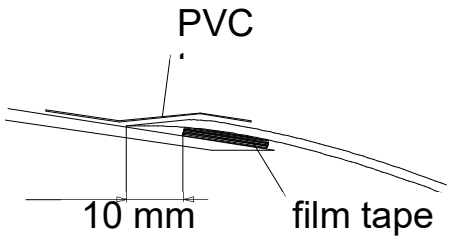
First install the seals see b), as the turbulators have to be glued on top of the seals at the upper end of the fin.
60° zig-zag turbulators are installed on both sides.
Prior to removing the turbulators mark the positions of the turbulator leading edges with a pencil on the fin surface, otherwise see table below.
The dimensions a are from the fin leading edges up to the trailing edges of the turbulators. The lower ends of the turbulators are at the fairings for the rudder cables.

1 in.=25.4 mm

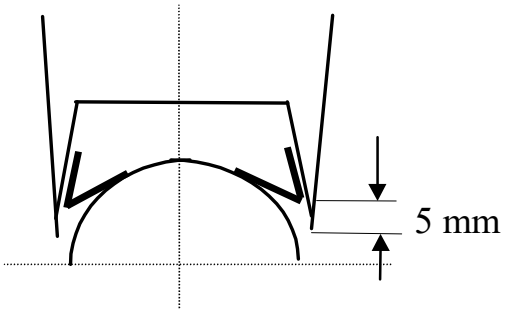
Position	a mm
100mm below upper end of the rudder	423
200 mm above the upper side of the lower rudder mounting bracket	701

4.7.4.2 Seals

a) As seals 30 mm (1.2 in.) wide Mylar seals with scarfed leading edges are used, so that no step occurs.
Don't glue the film tape to the leading edges of the seals. The scarfed leading edges of the seals must be pressed to the fin surfaces by PVC tapes.
Prior to removing the seals mark the leading edges with a pencil to the fin surfaces.



b) Internal sealing
Additional internal sealing with V-sealing strips.
Install the V strips according to the sketch.



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4.8 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.

4.9 Securing with Loctite

All bolts and screws which are not secured with self-locking nuts or other means e.g. lockwire or split pins have to be secured with Loctite 243.

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 Acetone.
If necessary recut the inside thread. Before you apply the Loctite, 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 two times for inside threads.
Apply only a small amount of Loctite on 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 use-by date is printed on the bottom of the bottle. 07-12 means July 2012.

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4.10 Working at the powerplant

Note: Please find a checklist for power plant trouble shooting in the DG-1000M flight manual section 8.8.

4.10.1 Removal and assembly of the engine doors

See diagram 17.

Note: For all maintenance work at the lower part of the powerplant we recommend the removal of both engine doors

a) Removal of the left engine door:
   Extend the engine until the doors are just open.
   Remove the securing spring from the rod end (toggle joint) at the upper end of the engine door control pushrod 10R304 see diagram 17. Pull the rod end from it's ball at the engine door hinge. To accomplish this push the bellcrank 5R160 to the front at the upper end to release the overcentre locking of the pushrod. Pivot the pushrod carefully downwards into the engine bay.
   Pull the spring pins out of the hinge pins of the engine door. Remove the hinge pins. Lift the door away.
b) Removal of the right hand engine door according to a).
c) Assembly is the reverse of disassembly.

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4.10.2 Mounting and tensioning of the drive belts

See diagram 20.

a) Tensioning of the drive belts

1. Tensioning and loosening of the drive belts is accomplished by the bolts of the front engine mounting.
2. Extend the engine so far that you are still able to hold the nut M14 of the rear bolt. Tension the bolt M14x110 with a 22 mm socket and ratchet from below the engine.
3. Measure the drive belt tension according to item c). If the tension is not correct proceed again according to item 2. with lower or higher tension, as necessary. Measure tension again.
4. If the tension is in the limits, torque the front bolt just so far that you still can turn it by hand.

Note: The front bolt acts as a fail safe device in case the rear bolt fails. The front bolt shouldn't be tightened as otherwise the flexible engine mounting will be impaired.

Caution: With a failed rear bolt the drive belt slip will be higher and a failure message will be given by the DEI-NT. Exchange the bolt prior to the next engine operation.

b) Exchanging the drive belts

Additional to the items see a):

1. Remove the drive belt covers.
2. Eliminate tension of the belts be loosening the 2 bolts see a).
3. Exchange the belts.
4. Tension the belts according to a).

Note: To exchange the drive belts it is not necessary to remove the propeller and to disconnect gas strut and spindle drive from powerplant.

c) Measuring the drive belt tension

Accomplish measurement according to drawing W66 (enclosed to the MM). Turn the propeller one turn by hand prior to the measurement.
Use tools W66 and a calliper according to drawing W66.
Apply 100 N (22 lbs.) tension to the drive belts in the centre of the belts and vertically to the belts. The displacement of the belts shall be from 6 up to 9 mm.

Caution: After exchanging the belts activate the slip indication in the DEI-NT and watch the slip while operating the engine. With slip more than 4% you have to tension the belts prior to the next take-off. Tensioning may be necessary more than one time until the belts reach their final length.

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4.10.3 Replacing the bearings of the upper drive belt pulley

see diagram 19

a) **Removing the bearings**

1. Remove the propeller.
2. Remove the proximity switch. Mark the position prior to removal.
3. Remove the drive belts see sect. 4.10.2.
4. Remove the sealing cap 8M118/1.
5. Bend up the securing washer DIN462-20.
6. Screw off the nuts KM4 one after the other.
   Note: left hand thread.
   Use one of the 2 specially bent hook spanners according to drawing W51 (encl. with this manual). Remove the antirotation securing washer.
7. Now you can pull off the complete pulley 10M102 from the shaft 10M166.
8. Take the inner ring and the rollers of the front bearing out of the pulley.
9. To remove the outer rings of both bearings from the pulley you have to produce 2 pieces of round material each 100 mm (4 in.) long and with 47 mm (1.85 in.) and with 53 mm (2.09 in.) diameter.
10. Press out the outer rings together with the Nilos rings (32 205 JV and 320/32 JV) carefully using a press or a hammer.
11. Pull off the inner ring of the rear bearing together with part 8M117/1 from shaft 10M166. Use a suitable puller assy..

b) **Installation of the new bearings**

1. To press the outer rings of both bearings into the pulley you have to produce 2 pieces of round material each 30 mm (1.6 in.) long and with 51 mm (2 in.) and with 57 mm (2.24 in.) diameter.
2. Press in new outer ring together with new Nilos rings.
3. To press the inner ring of the rear bearing to the shaft you have to produce a piece of tube with 32 mm (1.26 in.) inside diameter and 90 mm (3.54 in.) long.
4. Press the inner ring together with part 8M117/1 to the shaft.
5. Fill the space in the pulley for both bearings with grease.
6. Apply grease to the inner ring of the rear bearing and place the rollers onto the ring. Apply enough grease to completely fill the bearing.
7. Place the pulley onto the shaft with care. It’s best if the powerplant is retracted so that the shaft is in vertical direction.

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8. Put the rollers and the inner ring of the front bearing into place, apply grease according to item 6. Put on the antirotation securing washer and the first one of the KM4 nuts. Tighten the nut with the other hook spanner see a) 6. until the pulley starts to rotate a little stiffer than with a loose nut. Put on a new securing washer DIN462-20. Screw on the second nut. Secure this nut with Loctite 243. Fix the first nut with a hook spanner so that the adjustment doesn't change and tighten the second nut as far as possible. Check again the rotation of the pulley. No free play is allowable.
9. Press the sheet metal securing washer into the grooves of the rear nut.
10. Fill the sealing cap with grease and put it into place.
11. Install the drive belt and adjust it according to sect. 4.10.2.
12. Reinstall the proximity switch and check its adjustment according to section 1.15.16. Secure with lockwire.
13. Reinstall the propeller and secure with lockwire according to sect. 4.10:6.

Necessary material

1. roller bearing	32205B
2. "	320/32X
3. Nilos ring	32205 JV
4. " "	320/32 JV
5. securing washer	DIN 462-20
6. grease for bearings	SKF LGMT3

Caution: Don't use another type of grease

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4.10.4 Replacement of the engine retaining cable

Please refer to diagram 18

1. Extend the powerplant.
2. Remove the access panel from the rear engine bay floor.
3. Remove the engine retaining cable from the propeller mount. Let the cable retract slowly, otherwise the retraction bungee may jump from its pulley located inside the rear end of the fuselage. The bungee pulley is accessible via the access hole inside the tailwheel box.
4. Pull out the bungee via the access hole in the rear engine bay floor until you reach the terminal of the retaining cable.
5. Fix the bungee to the floor to prevent it from disappearing into the fuselage boom.
6. Cut off the retaining cable and pull it out. Don't damage the bungee! Don't loose the steel washer.
7. Loosen the counter nut and turn out the adjustment screw at the rear bulkhead as far as possible (anti-clockwise direction). Then turn in the screw for 5 mm (0.2in.).
8. Push the retaining cable from the front via the adjustment screw through the rear engine bay bulkhead and pull it out of the access hole.
   An absorber element is installed on the adjustment screw. Check if the washer at the rear end of the absorber is in place and fixed and if the absorber element is still glued firmly to the adjustment screw (see diagram 18 Detail X).
9. Install the steel washer 5R28/3 on the new cable. Attach the cable with thimble and 2 Nicopress sleeves to the bungee. Press the Nicopress sleeve, the end of the cable must be inside the second Nicopress sleeve. and wrap Tesaband 651 twice around washer and Nicopress sleeves.
10. Let the bungee retract slowly into the aft fuselage.
11. Install the retaining cable together with thimble and Nicopress sleeve to the propeller mount. Don't press the sleeve. Adjust the position of the powerplant and the cable length according to section 1.13.3. Press the Nicopress sleeve. Cut off the excess cable.
12. Check again the length of the retaining cable according to section 1.13.3. Adjustment is possible at the adjustment screw at the rear bulkhead. Fasten the counter nut.
13. Reinstall the access cover to the rear engine bay floor.

Material:

Steel cable diameter 3.2 mm (1/8 in.) type see sect. 4.2 approx. 2.3 m (91 in.) long
2 thimbles 3mm DIN 6899A
3 Nicopress sleeves 28-3-M
Tesaband 651 (self-adhesive textile tape)

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4.10.5 Filling and bleeding the cooling system

Please refer to diagram 14.

Coolant: Total amount needed: approx. 1.7 Litres (0.45 US. Gal.),
Commercially available anti-freeze for car engines (recommended: BASF Glysantin G48 Protect Plus concentrate) and tap water (hardness 0-20°dH).
Normal operation: mixing ratio 1:2 (up to approx. –20°C, -4°F).
May be changed for high altitude flying to mixing ratio 1:1 (up to approx. –40°C, -40°F).

4.10.5.1 Adjustment of coolant mixture

I) Initial condition -20°C, increase anti-freeze protection:

a) Fix an instrument-hose approx. 200 mm long to a syringe (min. 100 mL 0.0265 US. gal.). Remove the radiator cap and insert the hose into the radiator down into the coolant hose (at the side at the upper end of the radiator). Suck coolant out of the radiator while squeezing the coolant hose as far as possible to get out as much coolant as possible.

b) Disconnect the coolant hose from the upper fitting at the radiator and hold it into a container. Move the hose with the container down to cylinder head level.

c) Remove approx. 0.4 Liter (0.106 US. gal.) coolant (incl. the coolant in the syringe).

d) Reinstall the coolant hose to the radiator and fill in 0.4 Liter pure anti-freeze. Switch the ignition on to run the coolant pump.

e) Check the anti-freeze protection with an “antifreeze coolant tester”, it should be good for approx. -40°C.

II) Initial condition -40°C, decrease anti-freeze protection:

a) Remove as much coolant as possible, method see a). approx. 0.55 Liter (0.145 US. gal.) should be removed.

b) Fill in 0.55 Liter water. Switch the ignition on to run the coolant pump.

c) Check the anti-freeze protection with an “antifreeze coolant tester”, it should be good for approx. -20°C.

4.10.5.2 Filling and bleeding

a) The engine must be cold. Extend the powerplant.

b) Remove the screw cap of the radiator. Press down on cap for easier handling. Fill in coolant until the radiator is completely filled.

c) Switch on the ignition to run the coolant pump. Look into the radiator, you must see the coolant bubbling. If this is not the case there may be air bubbles in the hoses. Squeeze the hoses 1 and 5 (see diagram 9) several time until the coolant starts bubbling. Run the coolant pump for approx. 1 minute. Switch off the ignition. If necessary top up the radiator.

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d) Close the radiator cap.
e) Run the engine to warm up, then run approx. ½ minute at full throttle. Stop the engine.
f) Allow the engine to cool down. Remove the radiator cap and check the coolant level. The coolant level should be approx. 2 cm (0.8 in.) below the top of the radiator. If necessary top up to this level.
g) Close the radiator cap again.

4.10.5.3 Removal of the coolant

a) Extend the powerplant completely, don't remove the radiator cap.
b) Remove the screw plug from the coolant inlet fitting 10M171 at the lower rear end of the rear cylinder (service port see diagram 14), catch any coolant dripping out with cloth or cleaning paper. Screw in a hose connector GES8/M10x1 with hose 2 m long.
c) Hold the hose into a container with approx. 2 Liter (0.53 US. gal.) volume.
d) Remove the radiator cap and let the coolant drain into the container.
e) Reinstall the screw plug, use a new copper sealing ring 10x14x0,8 DIN 7603 A.

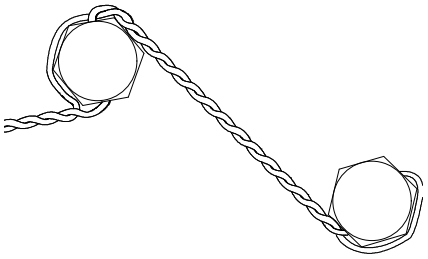
4.10.5.4 Inspection of the coolant pump

a) Extend the engine.
b) Remove the coolant hose from the radiator (upper end). insert the test adapter W59 (drawing see enclosure to this MM) into the hose and secure with a hose clamp. Install a PVC hose (instrument line) on the other end of the adapter and put its end in a calibrated container.
c) Switch on the ignition and measure the time needed to fill 0.2 liters into the container, then switch off the ignition immediately. Otherwise the pump will suck in air and bleeding may be difficult.
Normal time is about 15 seconds.
d) If the time needed exceeds 20 seconds the pump is worn and should be exchanged. Repeat the test after installation of the new pump.
e) Remove the adapter and connect the coolant hose to the radiator again.
f) Remove the screw cap of the radiator. Press down on cap for easier handling and fill in the coolant from the test, if necessary refill coolant.
g) Switch on the ignition to run the coolant pump. Run for approx. 1 minute. Switch off the ignition. If necessary top up the radiator.
h) Close the radiator cap.

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4.10.6 Securing the propeller bolts and the bolts of the rear engine mount

1. Use lockwire with min. 0.8 mm (0.03 in.) diameter.
2. Secure the propeller bolts as follows:
   a) Slide the wire through the hole in the bolthead and bend it around the head. The wire should run tangential to the bolthead so that it secures the bolt clockwise to tighten it. Direct the end of the wire which was laid around the head underneath the wire which runs through the hole.
   b) Twist both ends of the wire clockwise up to the other bolthead. Slide the upper wire through the hole in the bolthead and bend the other wire around the head. Twist with max. 8 rotations per inch.
   c) Direct the end of the wire which was laid around the head underneath the wire which runs through the hole. Twist the ends anticlockwise min. 3 max. 8 rotation. Cut off the surplus and bend the end to prevent injuries.

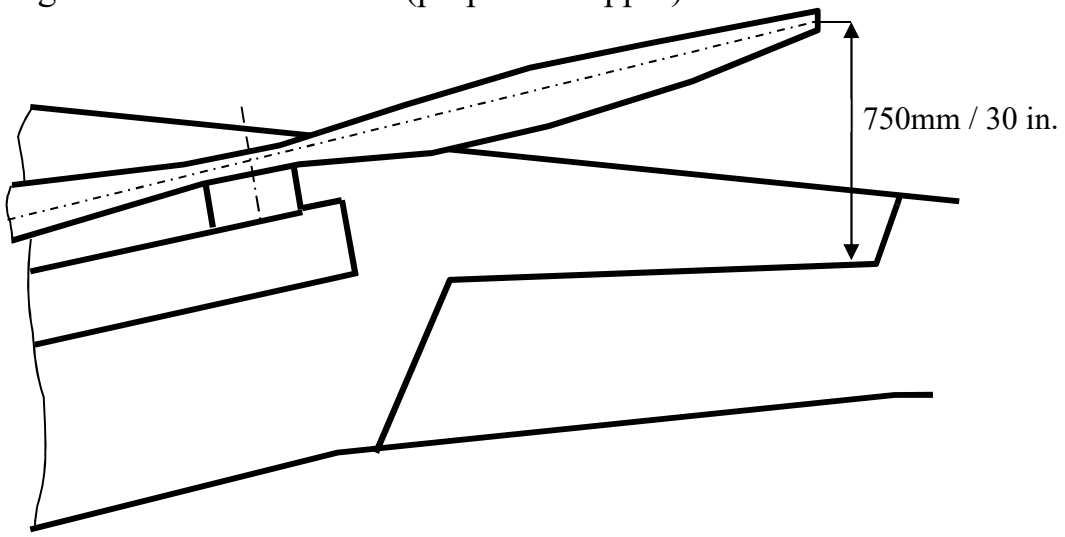


Caution. Don't damage the lock wire. Also minor scratches or removal of the galvanisation have to be considered as damage.

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4.10.7 Installation and removal of the extension/retraction unit

See diagrams 25 and 26 and 15 (propeller stopper)



a) Removal

1. Retract the engine to the position shown in the sketch.
2. Remove the baggage compartment rear cover.
3. Disconnect the plug for the spindle drive wiring inside the fuselage.
4. Open the hose clamp fixing the rubber boot to the spindle drive.
5. Remove the nuts of the spindle drive mounting bolts, M12 at the front and M10 at the powerplant.
6. Remove the mounting bolt at the powerplant and rest the powerplant in the engine bay.
7. Remove the actuating plate for the propeller-stopper with mounting bracket 10M206 from the fork at the spindle drive (bolt M6x10).
8. Remove the mounting bolt at the fuselage.
9. Pull out the spindle drive to the front.

b) Reinstallation

1. Reinstallation is the reverse of removal. Use new self-locking nuts.
2. Secure the bolt M6x10 to fix 10M206 to the fork.with Loctite 243
3. Don’t tighten the bolt which connects the spindle drive to its front mounting block. Extend the powerplant to the position (see sketch). Then tighten the bolt. The reason for this procedure is to make sure that the rubber bush in the mounting block will be twisted approx. by the same amount in upward and downward direction. False adjustment may result in cracks in the rubber.

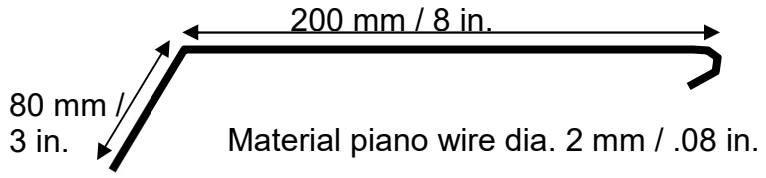
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4.10.8 Removal and installation of the tension gas-strut

See diagrams 25 and 26 and 15 (propeller stopper)

a) Removal:

1. Retract the powerplant to the position with propeller stopper fully extended.
2. Hang out the tension spring of the propeller stopper at the bellcrank 10M109. To accomplish this use a tool (see sketch):



3. Take a piece of tube with 12mm (.47 in.) inside diameter and 80 mm (3.15 in.) length and cut it to receive two halfshells.
4. Retract the powerplant until the gas-strut is extended a little further than 80mm.
5. Place both halfshells onto the piston rod of the gas-strut and secure with a Ty-rap.
6. Remove the mounting bolts of the spindle drive. It must be possible to move the spindle drive so far that you can remove the front mounting bolt of the gas-strut.
7. Remove the nuts of the gas-strut mounting bolts, M8 at the front and M10 at the powerplant.
8. Open the hose clamp fixing the rubber boot to the gas-strut.
9. . Lift the engine a little further, so that the two halfshells block the gas-strut.
10. Remove the gas-strut mounting bolt at the powerplant, take off the bush 10M209 and the propeller stopper bellcrank 10M109. To accomplish the removal of the bolt a helper is needed who pushes the powerplant forward at the upper end.
11. Rest the powerplant in the engine bay.
12. Remove the mounting bolt at the fuselage and pull out the gas-strut to the front.

b) Reinstallation is the reverse of removal

c) Installation of a new gas-strut

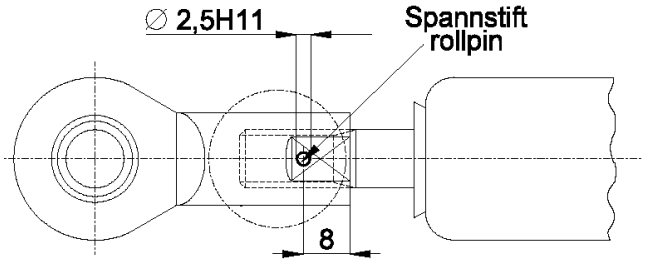
Warning: Only installation of the gas-strut S47/2 (see section 8.1.2.1) is permitted.

Usually the gas-strut is delivered ready to install with a halfshell according to a) item 4 .If this should not be the case extend the new gas-strut with a pulley block to place the halfshells

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d) **Securing the rod end to the piston rod**

The rod end of the gas-strut is glued onto the thread of the piston rod with Loctite 638. The correct securing is marked by a red dot of marking paint on piston rod and rod end. After removal of the gas-strut check if the marking exists and not damaged.
If not, the rod end must be screwed off and glued on again.
Remove any remains of Loctite and any dirt according to the instructions in section 4.9. To tighten the screwed connection, hold the piston rod against rotation using a small pipe wrench, wrap a piece of fine emery cloth around the end of the piston rod to protect the rod.
In addition the rod end is secured with a roll pin 2.5x14 DIN 7346 St, see sketch.



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4.10.9 Removal and reinstallation of the powerplant

Removal

Remove fuel return from the tube 10M198, remove the supply line directly at the fitting 4R30/2 at the fire wall (see diagram 16).
Remove the hose clamp which fixes the fuel hoses to the left hand side ignition coil.
Open the main plug at the bulkhead in the front upper edge of the engine compartment and dismount the clamp holding the wires.
Open the 2 plugs for the EGT probes located at the right upper edge of the engine bay wall.
Screw off the starter positive wire from the starter motor and the earth wire from the engine block.
Disassemble the engine retaining cable from the powerplant (see diagram 18).
Disassemble the spring of the muffler lifting cable from the bracket at the cylinder head (see diagram 23).
Throttle cable: Remove the nipple from the lever at the throttle axis and the clamp which fixes the Bowden cable.
Rest the powerplant on a wooden bar layed across the engine bay cutout.
Diassemble gasstrut including the bell crank for the propeller stopper and spindle drive from the powerplant according to sections 4.10.7 and 4.10.8 and diagram 15.
Remove the bolts of the main powerplant bearings (hinge axis of drive mount at fuselage) according to diagram 22. Mark the position of the now accessible eccentric brass bushes to be able to reinstall them in the same position.
Lift the powerplant with 2 persons or a crane out of the fuselage.

Reinstallation

Reinstallaton is the reverse of removal. Use new selflocking nuts and secure with Loctite243 where applicable.
When reinstalling take into account that the sideways position of the upper end of the drive mount may be adjusted by the eccentric bushes at the main powerplant bearings see diagram 22.
Adjust so that the powerplant retracts in the centre of the engine bay cut out.
Secure powerplant main hinges with new securing washers 13 DIN432-St zn.

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4.10.10 Removal and reinstallation of the engine (from the drive mount)

Removal:

Remove coolant (see section 4.10.5.3) and disconnectthe following coolant hoses see diagram 14:

a) right hand hose from the rear end of the coolant pump,
b) hose which comes down from the radiator from the T-fitting on top of the engine.

Pull off the spark plug connectors.
Disconnect the plug of the propeller sensor.
Remove the flat pin terminals from the primary side of the ignition coils.
Disassemble the EGT probe wires from the right hand side ignition coil.
Open the flat pin terminals in the wiring of the coolant pump.
Remove Ty-raps as necessary.
Disassemble the bolts of the front engine mounting (see diagram 20 and section 4.10.2).
Disassemble the bolts of the rear engine mounting (see diagram 21). Don't loose the rings 10M222 which are installed between the 2 rubber elements.
Remove engine from the drive mount.

Note: The carbonfibre mounting bracket must not be removed from the front end of the engine and the wiring harness must not be removed when shipping the engine for repair. Thus also the lower drive belt pulley with starter ring gear must not be removed.

Reinstallation:

Reinstallaton is the reverse of removal. Use new selflocking nuts and secure with Loctite243 where applicable.
Secure the bolts of the rear engine mount with lock wire according to section 4.10.6.
During reassembly tension the drive belts according to section 4.10.2.
Check the rubber buffer which limits the tilt of the engine against the drive mount due to the engine torque (see diagram 27) according to section 1.12.1. Adjust if necessary.

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4.10.11 Removal and reinstallation of the lower drive belt pulley with starter ring gear

Removal:

Carry out work according to sections 4.10.9 and 4.10.10 as far as necessary.
Remove the RPM sensor of the emergency system from the carbonfibre mounting bracket.
Secure the pulley with a 6 mm pin pushed through a hole in the starter ring gear and a corresponding hole at the right hand side of the carbonfibre engine mounting bracket against rotation.
Heat the bolt at the crank shaft with a hot air gun, then remove it with a 19 mm socket wrench.
Use the puller assy. incl. flange bolt see section 7 item T.
Put the flange bolt in the crankshaft thread.
Screw the puller assy. in the thread of the pulley.
Then screw in the bolt of the puller until the pulley comes loose from the crankshaft. If the pulley resists coming off you should hit the head of the bolt with a hammer to loosen the pulley.

Reinstallation;

Reinstallaton is the reverse of removal. Secure the bolt with Loctite 243 and torque with 100 Nm (73 ft lb).

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4.10.12 Checking the ignition unit and the generator

4.10.12.1 Ignition coils

Primary side: Remove the flat pin terminals from the ignition coil and measure the resistance between the 2 terminals at the coil. The resistance should be about 0.6 Ohm.

Primary side: Remove the ignition wires from the ignition coil and measure the resistance between the 2 terminals at the coil. The resistance should be about 8.7 k Ohm.

4.10.12.2 Generator

Remove the plug from the generator terminal at the rear end of the engine. Measure the resistance between pins 1 and 2, 2 and 3, 1 and 3. All 3 measurements must give approx. 0 Ohm.

Measure the resistance of 1 of the 3 pins to earth. The resistance must be infinite.

4.10.12.3 Engine speed sensor (normal and emergency system)

The connecting plugs between sensor and wiring at the engine is located close to the sensor but covered by the wiring shield. Open the shield, remove heat shrink tubing and disconnect the 2 flat pin terminals. The resistance between the 2 terminals should be 860 $\pm$ 10 Ohm.

Note: If the components (see above) are measured OK but the failure still exists measure the wiring between the measured points and the main plug at the upper front end of the engine bay and between the socket for the main plug and the plug at the control unit-NT and at the ECU for conductivity (low resistance) and for bad crimped contacts.
Refer to wiring plan 10E202 for wire numbers.
Check all earth connection points for tight fit of all terminals.

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4.11 DEI-NT settings

4.11.1 Calibration of the fuel display in the DEI-NT

(only necessary with replacement or repair of the DEI-NT or installation of a new fuel sensor)

1. Preparations:
   Drain the fuselage tank using the built-in electrical fuel pump. To accomplish this remove the service screw plug (see diagram 16 at block on top of the injection valves of the emergency system), screw in the connector with hose (see section 7 item R but without manometer) and stick the hose into an appropriate can.
   Switch over to the emergency system and switch on the ignition, wait until the tank is drained.
   Remove the hose and reinstall the screw plug to the service port. Use a new copper sealing ring 10x14x0,8 DIN 7603 A
   Levelling: Glider positioned with main wheel and tailwheel on a flat surface.

2. Calibration procedure:
   Change to the set up screen in the DEI-NT by pushing the selector knob (right hand side) until the DEI-NT beeps twice for 2 times.
   The following screens will appear: Flight log, Set up

   Select item CALIBRATE FUEL G(auge) by turning the selector knob: Calibration of the fuel gauge with empty tank. Push the selector knob, N will be displayed, rotate the selector knob, Y will be displayed. Push the selector knob to execute the calibration.

   Push the selector knob until the DEI-NT beeps twice for 2 times to return to the flight screen.

4.11.2 Further DEI-NT settings

Change to the set up screen in the DEI-NT by pushing the selector knob (right hand side) until the DEI-NT beeps twice for 2 times.
The following screens will appear: Flight log, Set up
Select the menu point via the turning knob:

4.11.2.1 Resetting the time until the next 25 hour maintenance

RESET MAINT. TIMER: Push the selector knob, N (no) will be displayed, rotate the selector knob Y (yes) will be displayed, push the selector knob to reset the time to the service-interval (25 hours).

4.11.2.2 Further settings

See flight manual section 7.4.3.

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4.11.3 Download of flight log and service data

FLIGHTLOG → PC: Push the selector knob, N (no) will be displayed, rotate the selector knob Y (yes) will be displayed, push the selector knob to reset start the download of the recorded data. The PC must be connected to the serial interface (socket close to the radio).
Download instruction can be found in section 9.3.

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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, close canopies.
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 W2, be certain the wings are level and hold so that no load is applied. Read W1 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 W1 and W2 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}: $X_{SL} = W_{2L} \bullet b/M_L + a$

M_L = empty mass = $W_{1L}+W_{2L}$
W_{2L} = 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}: $X_{SF} = W_{2F} \bullet b/M_F + a$

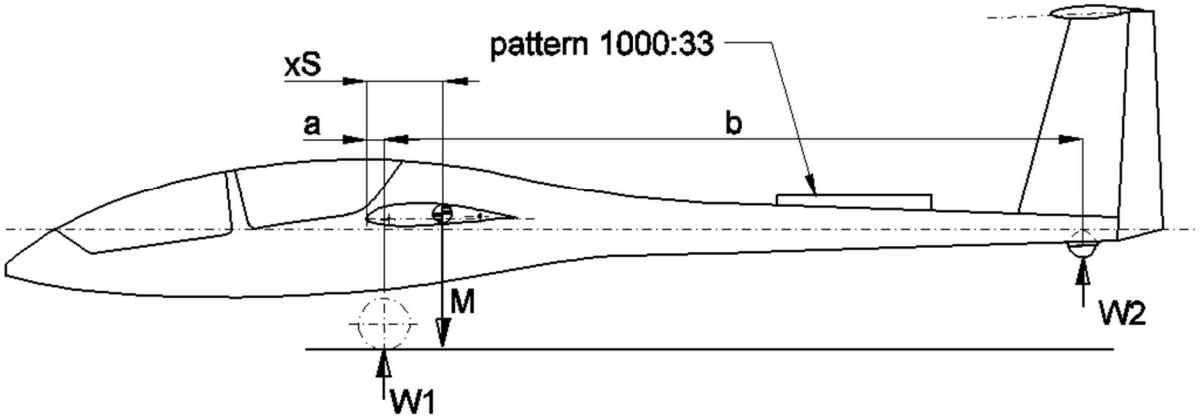
M_F = flight mass = $W_{1F}+W_{2F}$
W_{2F} = load on tailwheel (flight mass)

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.

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Datum (BE): Wing leading edge at root rib

Levelling line: Aft fuselage boom slope 1000:33 (tail down)



Moment arms of pilots and equipment see flight manual sect. 6.9

Empty weight C.G. measurements

After the addition or deletion of equipment or accessories, repairs, painting, or any change in the aircraft that could influence the weight and balance a new weight and balance must be carried out. Aircraft certified as Standard Category must have the weight and balance carried out by a licensed Airframe Mechanic. Empty weight C.G. range is determined by reference to the diagrams in sect. 6.8.9 of the flight manual. If the C.G. is out of limits, adjustments may be made by ballasting or by relocating equipment or accessories.

The result has to be entered in the flight manual section 6.8.8 and in the aircraft logs. If the min. cockpit load or the max. flight mass without waterballast have changed, the new values are to be entered in the cockpit placard.

Weight and balance must be carried out at least every four years.

C.G. shift due to extension of the powerplant:
See flight manual section 6.9.

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6 Instrumentation and accessories list

6.1 Air speed indicator

(range : 0 - 300 km/h, 165 kts)

Manufacturer	Type	Certification No.
Winter	6 FMS 4(diam. 80mm)	TS 10.210/15
	0-300 km/h Ident.No. 6421567	
	0-160 kts Ident.No. 6423567	
Winter	7 FMS 4(diam. 58mm)	TS 10.210/19
	0-300 km/h Ident.No. 7421567	
	0-160 kts Ident.No. 7423567	

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

6.2 Altimeter

Manufacturer	Type	Certification No.
Winter	4 FGH 10 (diam. 80mm)	TS 10.220/46
	1.000-10.000m Ident.No.4110	
	1.000-20.000ft Ident.No.4320	
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.

6.3 Harness (seat)

Manufacturer	Type	Certification No.
Gadringer	BAGU 5202 G	40.070/32
	SCHUGU 2700 G	40.071/05
	rubber coated adjuster bars	
alternatively	BAGU 5202	40.070/32
	SCHUGU 2700	40.071/05
	from manufacturing year 2000 on	
Schroth	4-01-0.104	40.073/11

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6.4 Compass

Manufacturer	Type	Certification No.
PZL	B - 13	FD 19/77
Ludolph	FK 16	10.410/3
Airpath	C 2300	
Airpath	C 2400P	
Hamilton	H I 400	TSO C 7c Type1
Bohli	46 MFK 1	(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°.

6.5 VHF transceiver

Manufacturer	Type	Certification No.
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.

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6.6 Variometer

Manufacturer	Type		Certification No.
Winter	5 StVM5 (diam. 58)		TS 10.230/14
	± 5 m/s	Ident.No. 5451	
	±1000 ft/min	Ident.No. 5452	
	± 10 kts	Ident.No. 5453	
Winter	5 STV 5 (diam. 80)		TS 10.230/13
	± 5 m/s	Ident.No. 5251	
	±1000 ft/min	Ident.No. 5252	
	± 10 kts	Ident.No. 5253	

6.7 Turn and bank indicator

Manufacturer	Type	Certification No.
Apparatebau Gauting	WZ-402/31 12 V	10.241/8

6.8 Outside air temperature gauge

incorporated in the DEI-NT see below

6.9 Engine instrumentation

(RPM, fuel, CHT, voltmeter, engine elapsed time, outside air temperature

Manufacturer	Type	
DG Aviation	DEI-NT-DG-1000M	Front cockpit
DG Aviation	DEI-NT-DG-1000M Zweitanzeige	Rear cockpit

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6.10 Instruments which are not part of the minimum equipment:

6.10.1 Transponders:

Transponders certified for aircraft use according to TSO or JTSO or ETSO standards may be installed.
Installation of Transponder antenna must be accomplished according to drawing Z181 (attached to the MM) or according to TN DG-G-02.
After installation, a functional test and inspection must be performed by a licensed inspector.

Caution: The antenna wire must be installed during production of the aircraft, retrofit is not possible.

6.10.2 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).
Further installations possibilities see TN DG-G-08.
After installation, a functional test and inspection must be performed by a licensed inspector.
The ELT must be switched off during road transport.

6.10.3 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.
TN DG-G-07 must be regarded.

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.

Warning: If equipment is mounted on the canopy 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.).
Equipment shall only be mounted at the fastening threads in the canopy frame provided by the design.
Max. mass of the equipment: 1 kg (2 lbs.).

Caution: After installation raise a new weight and balance report.

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7 List of special tools etc.

A Special tool with 6 mm thread (W38/2) to operate the tailplane locking pin and for the locking pins of the rear wing suspension.

B Special tool W36 (or a suitable pin with 6mm diameter) for derigging of the outboard wings and for the cover plate of the ballast box in the fin.

C Tool for airbrake adjustment: 5V17 and rod according to drawing 5V18.

D Open-end wrenches

1/4" = 6,35 mm	SW 12	SW 19
SW 7	SW 13	SW 22
SW 8	SW 14	
SW 9	SW 17	
SW 10	11/16" = 18 mm	

E 22 mm socket and ratchet (for tensioning the drive belts)

F Allen key wrench
3 mm, 4 mm, 5 mm, 6 mm, 7 mm, 8 mm, 10 mm and 12 mm

G Wrenches for slotted nuts (hook spanner) according to drawing W51 (encl.) (for the bearings of the upper drive belt pulley)

H Spring balance max. reading 50 N (11 lbs.) (to determine control surface moments)

I Spring balance max. reading 100 N (22 lbs.) (to determine the over-centre locking moment of the airbrakes)

J Nicopress tool 64 – CGMP (to produce cable connections)

K For filling the wing ballast tanks (Option): Hose with outside dia. 25 mm (1 in.), 1 m (3.2 ft.) long.

L Refuelling hose for fuselage fuel tank Z155/2

M Torque wrench Torque range 0 - 150 Nm (o - 110 ft lb) with socket wrench 19 mm (for assembly of the drive belt pulley and the magneto housing of the generator)

N Torque wrench range 0 - 50 Nm (0 - 370 ft lb) with socket wrenches 10, 13, 17, 19 mm and 21 mm (13/16 in.) for sparkplugs and Allen key inserts 3, 4, 5, 10 mm

O Wrench for spark plugs 21 mm (13/16 in.)

P Spring balance max. reading 200 N (44 lbs.) for measuring belt tension

Q Crimp tool for clamps XO for 6mm bungee (bungee for retaining cable)

R Crimp tool for hose clamps OETIKER 14100083 (especially at the coolant hoses)

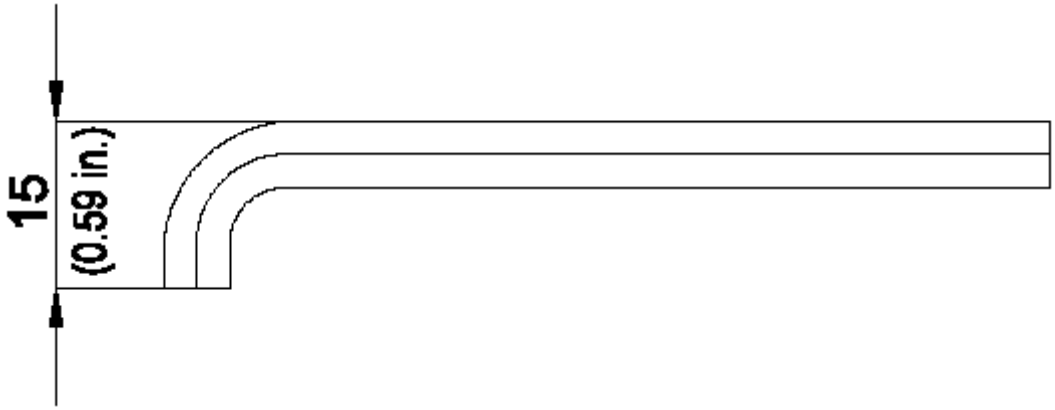
S Manometer 0 - 6 bar fuel resistant with hose 3 m long and hose connector GES8/M10x1 (to measure the fuel pressure during the 25h inspection)

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T Hose connector GES8/M10x1 with hose 2 m long (for emptying the cooling system)

U Solo engine tool set incl. puller assembly for lower drive belt pulley incl. flange bolt and puller assembly for magneto housing

V Shortened Allen key wrench see sketch (for removing the lower bolts of the exhaust manifold)



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8 Partlist

Please find the part no's of the control-system parts and of the metal fittings of the powerplant in the following diagrams.

Note: The number at the left hand side is the DG part no.. Please use these numbers for ordering any parts.

8.1 Parts for the powerplant

8.1.1 Parts necessary for the 25 hours inspection

60500150 Gaskets for exhaust manifold (2 pieces needed)
60500185 Air intake filter K&N RU2760
70002200 Oil for airfilters with cottonfabric K&N 99-05046
60000377 Copper sealing ring 10x14x0,8 DIN 7603 A

8.1.2 Spare parts

8.1.2.1 Power plant and extension retraction system

40050360 Spark plug S36 (Bosch W5AC electrode gap 0.5 mm) with screw cap fastened to the thread by crimping, marked with a red dot of paint on the insulator
60510821 Spark plug connector Bosch 0356351032 1kΩ, no more available
4502085 Spark plug connector PVL (alternative to Bosch)
4502085 Spark plug connector Champion (alternative to Bosch)
60500155 Gasket for coolant outlet
60500127 Nut for spring coupling M8 for exhaust muffler
60500128 Spring for spring coupling M8
60000337 Spring for propeller stopper
41071730 Starter motor: 10M173DENSO 128 000-1671 12 V modified
60510831 V-drive belt Optibelt Super X-Power XPZ 2540 Ld (5 pieces needed)
40871711 Drive belt roller 10M101
59332050 Front bearing for upper pulley 32205 B
59320320 Rear bearing for upper pulley 320/32 X
52200054 Securing washer 20 DIN462 for upper pulley front bearing
30002028 Special grease for upper pulley bearings SKF LGMT3
39001028 Exchange kit nuts and bolts for 400 h overhaul
60000157 Gas strut for ext.-retr. drive S47/2 with Ultra-bush
60504045 Ext.-retr. spindledrive type Stross BSA10 RN1 C205
60504043 Ext.-retr. spindledrive type Stross BSA10 RN1 C205 assembled with fork 10M170 and flange 8M230/2
60000219 Rubber mount at engine hinge axis in engine mount: Ultra-bush 0118055.60
41071170 Front engine shock mount 10M117
60504014 Rear engine mount Lord J-3608-1 Shock mount
60001115 Clamps XO for 6mm bungee (bungee for retaining cable)
52130011 Securing washer 13 DIN432-St zn for powerplant main hinges
60000338 Rubber buffer 3917210000 (engine tilt limit stop)

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8.1.2.2 Parts for cooling system

60001201 Electric water pump Webasto U4810 modified (no longer available)
60001210 Coolant pump Pierburg modified (replacement for Webasto).
41072800 Elastic adapter-ring10M280
Note: A voltage converter 10E211 (see section 8.1.2.4) must be installed to run the coolant pump Pierburg with sufficient power.
60504049 Radiator KTM VW 0425 or later type VW2192

39001019 Service kit cooling system hoses

Rubber mounts for radiator
60000275 2 pieces Rundlager Type B (upper mount)
60000262 1 piece Rundlager Type A (lower mount)

60000377 Copper sealing ring 10x14x0,8 DIN 7603 A for service port

8.1.2.3 Parts for fuel system

60507550 Drainer CAV 110 (1/8" NPT)
Warning: Replace the sealing ring of the drainer against partno. 60504402 prior to installation
60504402 Sealing ring for drainer CAV 110 (for automotive fuel)

60510516 Fuel pressure switch DRS 5 ES 0,5 – 5 bar seal FKM or
60510519 Fuel pressure switch Beck 901.51
60507577 Fuel pressure regulator Pierburg 7.21476.50.0 (no more available)
Note: When replacing by 60507578 follow the working instructions No. 1 for TN1000/27.
60507578 fuel pressure regulator Solo 2300884 (Bosch 0280160557 with bracket from Solo)
60507575 Fuelpump Pierburg with rubber sleeve 7.22156.60.0
60507562 Refuelling pump Facet 60106
60507576 Fuel filter Pierburg Nr. 4.00030.80.0 (in front of fuel pump)
60507568 Fuel filter MANN WK 613 (behind fuel pump)
60507571 MANN-fuel- filter 500009180 WK 31/2(10) for refuelling pump

60510833 Injection valve Bosch 0 280 155 868
60504407 O-Ring for Injection valve Bosch

60507802 Front fuel gauge: VDO 224-011-020-279X
60507800 Rear fuel gauge: VDO224 082 005 088
60000527 Fuel cock KH 1072 T
60507607 Coupling for fuel filler hose KL-006-0-SL007
45001605 Full tank sensor with wiring, plug and gasket 60507547
60507547 Gasket O-ring 10 x 2,5 80FPM610 for full tank sensor
48000009 Fuel hose 7,5x13,5 mm DIN 73379-2A
48000092 Fuel hose Inner dia. 3,5 mm fabric braided 2122.0200 (for emergency system)

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60507526 Fuel hose 15 x 23 mm fabric braided (at fuel pump)
30092051 Metal braiding inner dia. 8 mm

60000377 Copper sealing ring 10x14x0,8 DIN 7603 A for service port

8.1.2.4 Parts for the electrical system

60510899 Main battery: Odyssey PC625 12V/18Ah
41076003 DEI-NT- DG-1000M
41076004 DEI-NT-DG-1000M second unit (rear cockpit)
41076005 Control unit-NT-DG-1000M
41076006 Engine control unit ECU Trijekt-Plus T101 Solo No. 23 00 886
41076007 Controler for emergency system Solo No. 23 00 896

41075210 Engine speed sensor (normal system+emergency system) Bosch 0261210147 assembled with wiring and plugs
60510836 Throttle valve sensor: Bosch 0 280 122 201
60510837 Probe for coolant temperature Bosch 0 281 002 209
60510669 Intake air sensor Epcos B57881S212F
41075204 Proximity switch ready assembled with wiring and plug
41075211 Voltage converter 10E211 for coolant pump Pierburg

60510834 Ignition coil Solo No. 23 00 883

60510832 Regulator Ducati 34407011
60504044 Voltage reducing module for generator/regulator
60510202 Condensor for generator/regulator 100.000µF/40V

60510464 Limit-switch engine retracted and engine extended 164-574, alternatively SI2010-B2T20YR30,5m
60510506 Manual extension-retraction switch MTG 106 G
60510465 Black cap for switch MTG206S
60510483 Switch for emergency engine control: APEM 5636 MA
60510466 Red cap for APEM 5636 MA

60510859 Key switch 3 Pos, 2 Pol KL09-1908KA with wiring (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 01191017003 80 A for battery

60510796 Socket BSB 12 (in main bulkhead)
60510797 Plug BSK12 for socket BSB 12

From ser. No. 10-225 on:

60510880 Socket XLR 3-pole NC3FD-LX-BAG
60510881 Plug XLR 3-pole NC3MX-BAG (for socket XLR

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8.2 Control surface sealings and turbulators

25.4 mm= 1 in., 1 m = 3.2809 ft.

1. Wings - upper surface
   30003125 Mylar sealing 0.19 x 22 mm without glue, curved
   70000253 Tesafix No. 4965, 9 mm wide, 50 m roll glue film
   70000229 Tesafilm 4104 white, 19 mm wide, 66 m roll PVC tape
2. Wings - lower surface
   30003300 Noppenband 10m roll (dimple turbulator tape)
3. Ailerons (sliding surface and internal sealing)
   30003136 Teflon-glass fabric 0.08 x 38 mm, 33 m roll selfadhesive
   70000229 Tesafilm 4104 white, 19 mm wide, 66 m roll PVC tape
4. Horizontal tailplane
   30003129 Zig-zag turbulatortape 60 degree 0.4 mm thick
   30003125 Upper surface: Mylar sealing 0.19 x 22 mm without glue, curved
   30003124 Lower surface: Mylar sealing 0.19 x 22 mm without glue, flat
   70000253 Tesafix No. 4965, 9 mm wide, 50 m roll glue film
   70000229 Tesafilm 4104 white, 19 mm wide, 66 m roll PVC tape
5. Vertical tailplane
   30003142 Zig-zag turbulatortape 60 degree 0.8 mm thick
   30003128 Mylar sealing 0.19 x 30 mm without adhesive, curved, leading edge scarfed
   70000253 Tesafix No. 4965, 9 mm wide, 50 m roll glue film
   70000229 Tesafilm 4104 white, 19 mm wide, 66 m roll PVC tape
   70000295 Internal sealing: 3M Scotch V-seal weatherstrip Cat.Nr.2101 5.2 m roll

8.3 Parts for landing gear

60000322 Gasstrut A1-A1-0-0-105-317-560N (for LG- retraction)
60000072 Mainwheel assembled Tost No.: 055536+665681+065995, 5" "Scheibenbremsrad Penta 130-30"
60000139 Lockable gas strut K0V2P-3-200-647-004/460N
41041400 Spindle drive completely assembled
60510463 Limit switch 164-(LG retracted)
60510464 Limit switch 164-574 (LG extended)
41040008 Limit switch XGG2-88-S20Z1 (gas strut)
60510506 Manual extension-retraction switch MTG 106 G (LG up, down)
60510375 Press button 12G2904 with cap 12G2910 black (LG up)
60510865 Switch 1006.1511 **(optional with TN1000/19, standard from ser.no. 10-157 on)**

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8.4 Other parts

30091131 Rubber cord dia. 6 mm white
30091130 Rubber cord dia. 2 mm white
30091132 Rubber cord dia. 2 mm black

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9 Enclosures

9.1 Equipment list

1 kg = 2.2046 lbs 25.4 mm = 1 in.

Subject	type	mass kg	arm mm	date of installation	date of removal
Airspeed indicator front					
Airspeed indicator rear					
Altimeter front					
Altimeter rear					
Variometer front					
Variometer rear					
el. Variometer					
Compass front					
Compass rear					
Radio					
Engine Indicator and OAT gauge front	DEI-NT DG-1000M				
Engine Indicator and OAT gauge rear	DEI-NT DG-1000M second unit				
C.G. hook	G 88				
forward hook	E 85				
Seat harness front					
Seat harness rear					

Note: If this list is not filled out, you will find a similar list in your aircraft logs. Parts of the min. equipment are to be chosen from sect. 6 of the maintenance manual.

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9.2 Checklist for checks and maintenance work

according to sect. 3.6.1 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												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												
26												
27												
28												
29												
30												
31												
32												
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-1000M Ser.no. 10-.....M.....

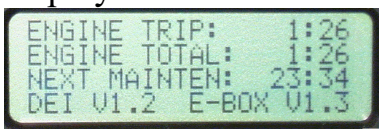
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9.3 Instruction for downloading log book and service data from the DEI-NT

1) **Hardware requirements:** - serial data cable (zero modem cable, 9 pin)
   - pc with terminal program (e.g. hyperterminal)

2) **Transfer of data from DEI-NT to PC** (Example for Windows / hyperterminal):

a) switch off PC and glider master switch
b) connect zero modem cable
c) switch on PC
d) start hyperterminal (click on START, then ACCESSORIES, then COMMUNICATIONS, then HYPERTERMINAL), select new connection, enter name e.g. “DEI-LOG”, select Symbol, click ok
e) in the next window, select appropriated COM – port (e.g. COM1 or direct connection COM1)
f) select config and configure the serial data:
– 9600 baud
– 8 data bits
– parity no
– 1 stop bit
– flow control: XON/XOFF or none
g) save changes “File/Save”
h) select “transfer/capture text”
i) enter a new filename. Attention: if you use an existing file, all data will be appended to this file!
j) click start. Hyperterminal is now ready to receive
k) Switch on glider master switch. The DEI-NT starts up with the opening display



l) And changes after 3 – 5 seconds to the flight display. Push the selector knob, until the DEI-NT beeps twice and the screen changes.
The following screens will appear in this order:
flight screen □ Flight log screen □ Setup Screen □ Operation time screen □ flight screen …
Change to setup-screen:



m) by rotating the selector knob select FLIGHTLOG □ PC
n) push selector knob briefly. N appears on the screen.
o) rotate mode button until Y appears
p) The data transfer can now been started by pushing the selector knob, RUN appears on the screen.

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q) The data transfer may be cancelled by pushing the selector knob, while the data transfer is in progress.

r) After the data transfer is complete, the DEI-NT beeps long.
To save the log file select Transfer/capture text/hold in the terminal program. After the logfile was saved add an ending .txt to the file. The logfile may be viewed with a text editor.
You may download an Excel program from the DG web-site for better visualisation of the DEI-NT logfile.

3) Data format of the Logfile:

Every flight is displayed in one line, the entries are separated by tabs. These entries are from left to right:

Flight data:

date (TT.MM.JJ)
takeoff time (HH:MM)
landing time (HH:MM)
flight duration (HH:MM)
engine operating time (HH:MM)
Max engine speed of this flight (RPM)
Operating time engine speed exceeding the limit (sec)
Max. engine temperature of this flight (°C)
Operating time engine temperature exceeding the limit (sec)
Max. EGT1 temperature of this flight (°C)
Operating time EGT1 temperature exceeding the limit (sec)
Max. EGT2 temperature of this flight (°C)
Operating time EGT2 temperature exceeding the limit (sec)

Warning messages :

Log entry interrupted (Y/N), appears in case the DEI_NT is switched off and shortly thereafter on during flight, e.g. by the pilot or by low voltage during starter motor operation, or if the DEI-NT is switched off in flight and on again after landing.
Was a flight executed? (Y/N)
Low temperature warning (Y/N)
Low voltage warning (Y/N)
Over voltage warning(Y/N)
Fuel-reserve warning (Y/N)
Airbrake warning (Y/N)
Gear warning (Y/N)
Fuel gauge failure (Y/N)
CHT – sensor failure warning (Y/N)
EGT – sensor failure warning (Y/N)
OAT – sensor failure warning (Y/N)
Communication failure with control unit (Y/N)
Proximity switch failure (Y/N)
starter warning (Y/N)
control unit over temperature warning (Y/N)

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Failure messages:

Extension-retraction unit fuse blown (Y/N)
Fire- warning (Y/N)
Generator failure (Y/N)
Spindlemotor-brake failure (Y/N)
Propeller brake failure (Y/N)
Water pump failure (Y/N)
Engine speed sensor failure (Y/N)
Fuel pump failure (Y/N)
Ignition coil 1 failure (Y/N)
Ignition coil 2 failure (Y/N)
Fuel pressure warning (Y/N)
Stall warning (Y/N)
Canopy warning (Y/N)
Intake air sensor failure (Y/N)
Slip warning (Y/N) (for drive belt slip)

Verifying the messages:

Engine speed limit exceeded acknowledge (Y/N)
Engine overheating acknowledge (Y/N)
EGT over temperature acknowledge (Y/N)
Low temperature warning acknowledge (Y/N)
Low voltage warning acknowledge (Y/N)
Over voltage warning acknowledge (Y/N)
Fuel reserve warning acknowledge (Y/N)
Airbrake warning acknowledge (Y/N)
Gear warning acknowledge (Y/N)
Fuel gauge failure acknowledge (Y/N)
CHT – sensor failure warning acknowledge (Y/N)
EGT – sensor failure warning acknowledge (Y/N)
Slip warning acknowledge (Y/N) (for drive belt slip)
Communication failure with control unit acknowledge (Y/N)
Proximity switch failure acknowledge (Y/N)
Control unit over temperature warning acknowledge (Y/N)
Ext.-retr.-unit fuse failure acknowledge (Y/N)
Fire warning acknowledge (Y/N)
Generator failure acknowledge (Y/N)
Spindlemotor brake failure acknowledge (Y/N)
Propeller brake failure acknowledge (Y/N)
Water pump failure acknowledge (Y/N)

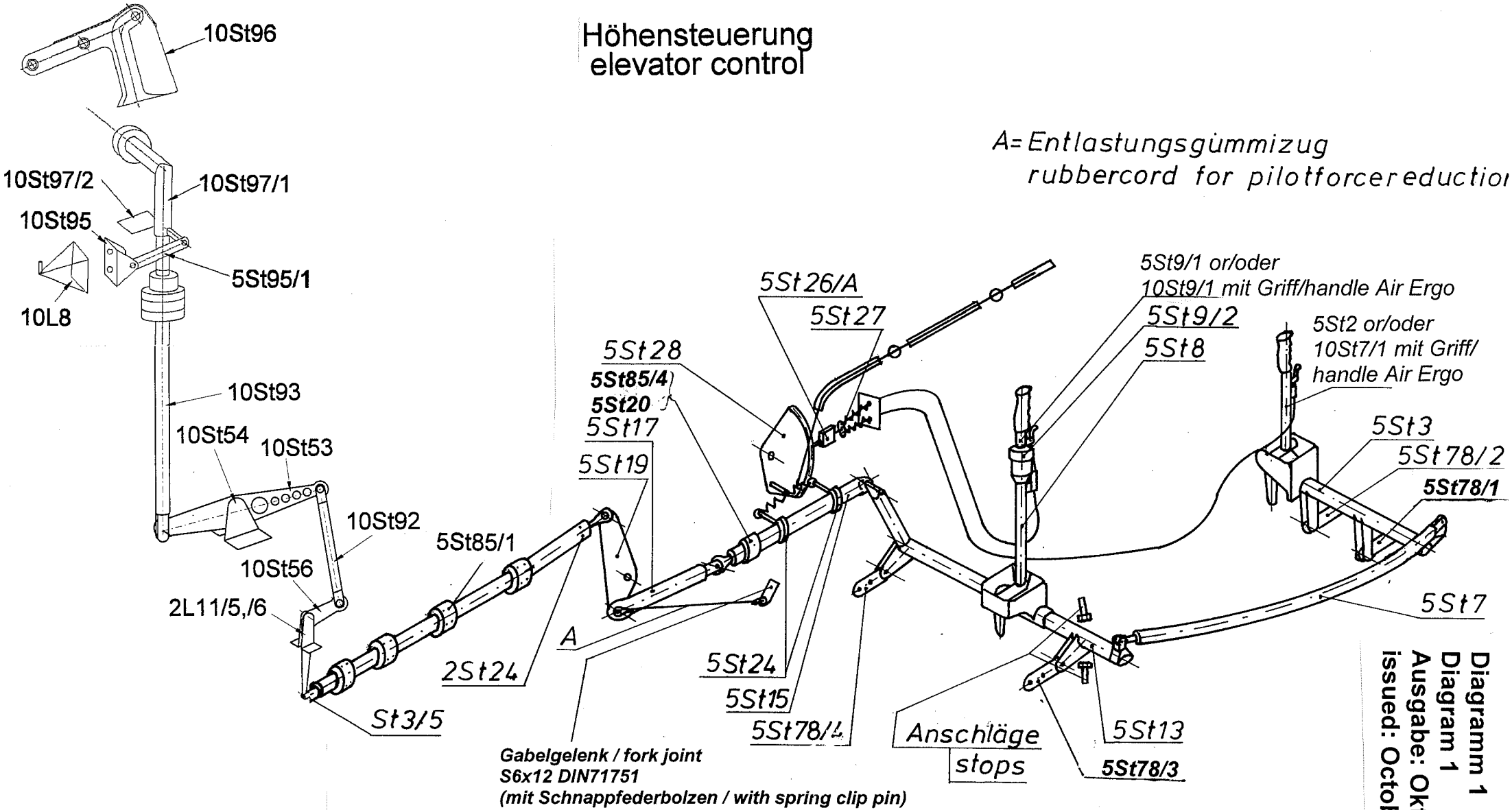
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Engine speed sensor failure acknowledge (Y/N)
Fuel pump failure acknowledge (Y/N)
Ignition coil 1 failure acknowledge (Y/N)
Ignition coil 2 failure acknowledge (Y/N)
Fuel pressure warning acknowledge (Y/N)
Stall warning acknowledge (Y/N)
Landing gear warning acknowledge (Y/N)
Canopy warning acknowledge (Y/N)
Intake air sensor failure acknowledge (Y/N)
Throttle sensor failure acknowledge (Y/N)

Notes: Warnings and failures which have been verified within 1 second by the pilot are not indicated with Y under messages, but are only indicated with Y under acknowledgements.
In the logfile you will find entries for hardware components which may not be installed in your glider. Ignore the entries in these columns.
Ignore entries in lines without flight duration or engine operating time.

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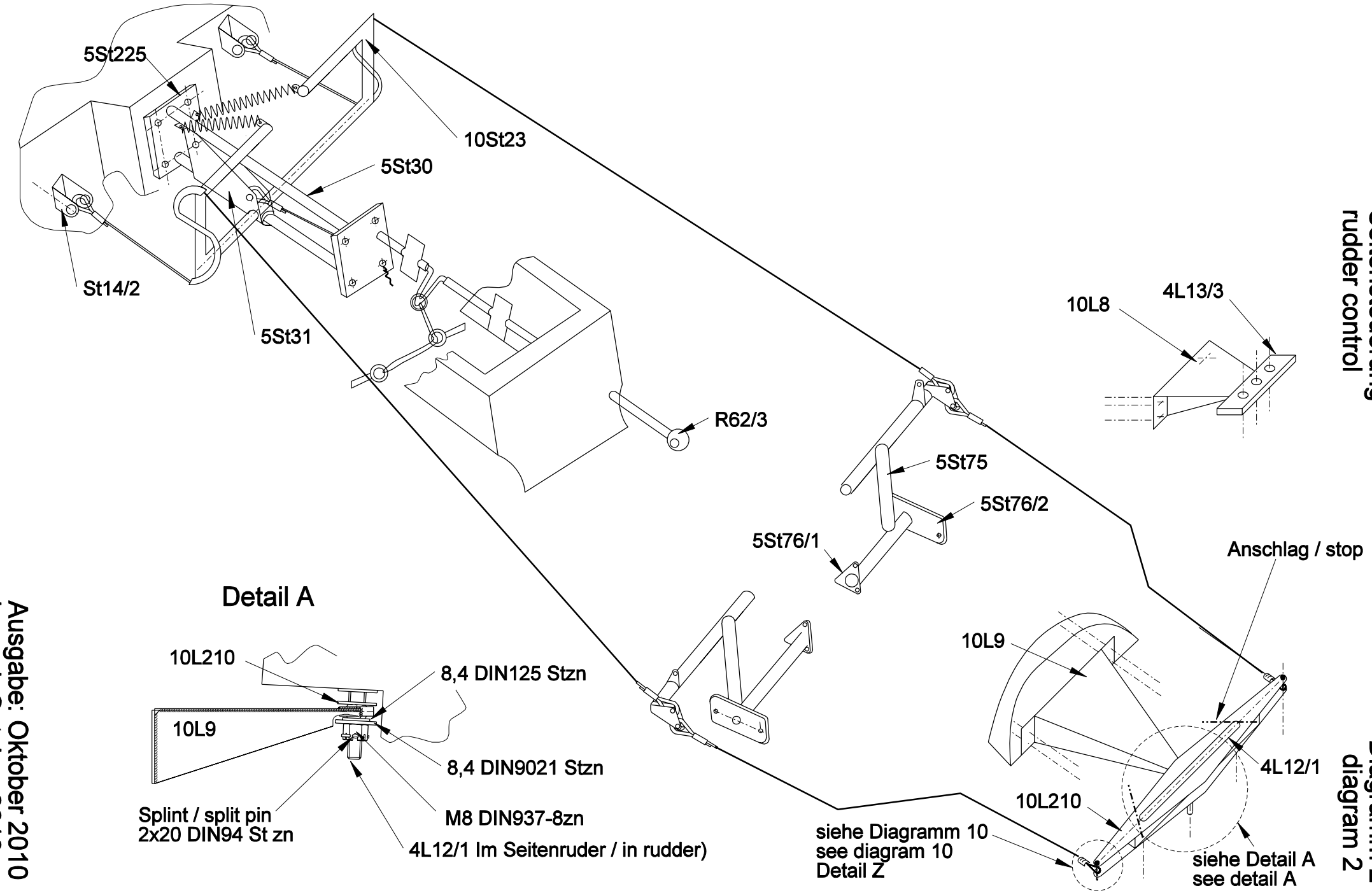
Höhensteuerung
elevator control



A= Entlastungsgümmizug
rubbercord for pilotforcereductio

Gabelgelenk / fork joint
S6x12 DIN71751
(mit Schnappfederbolzen / with spring clip pin)

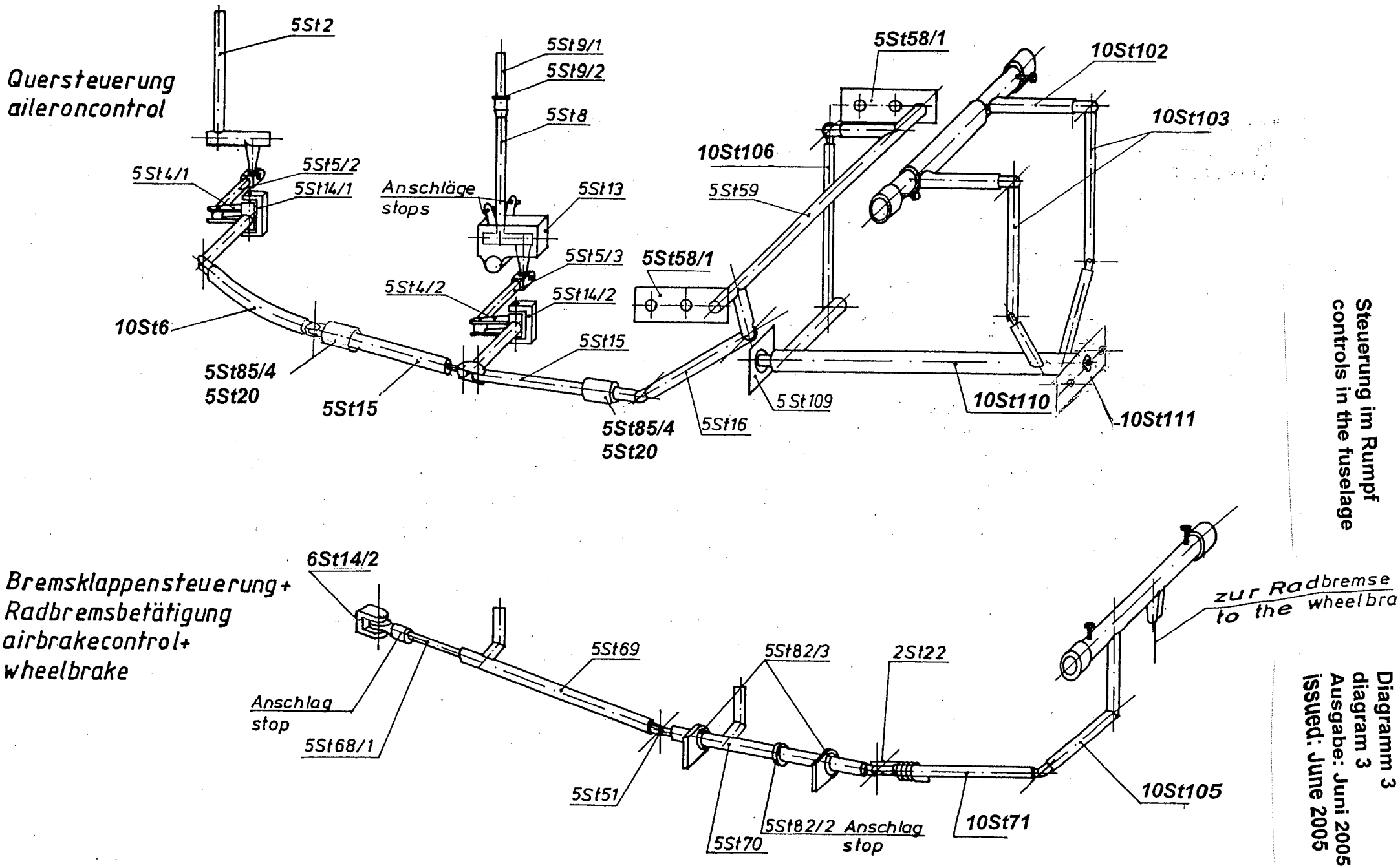
Diagramm 1
Diagram 1
Ausgabe: Okt. 2010
issued: October 2010



Seitensteuerung
rudder control

Diagramm 2
diagram 2

Ausgabe: Oktober 2010
issued: October 2010

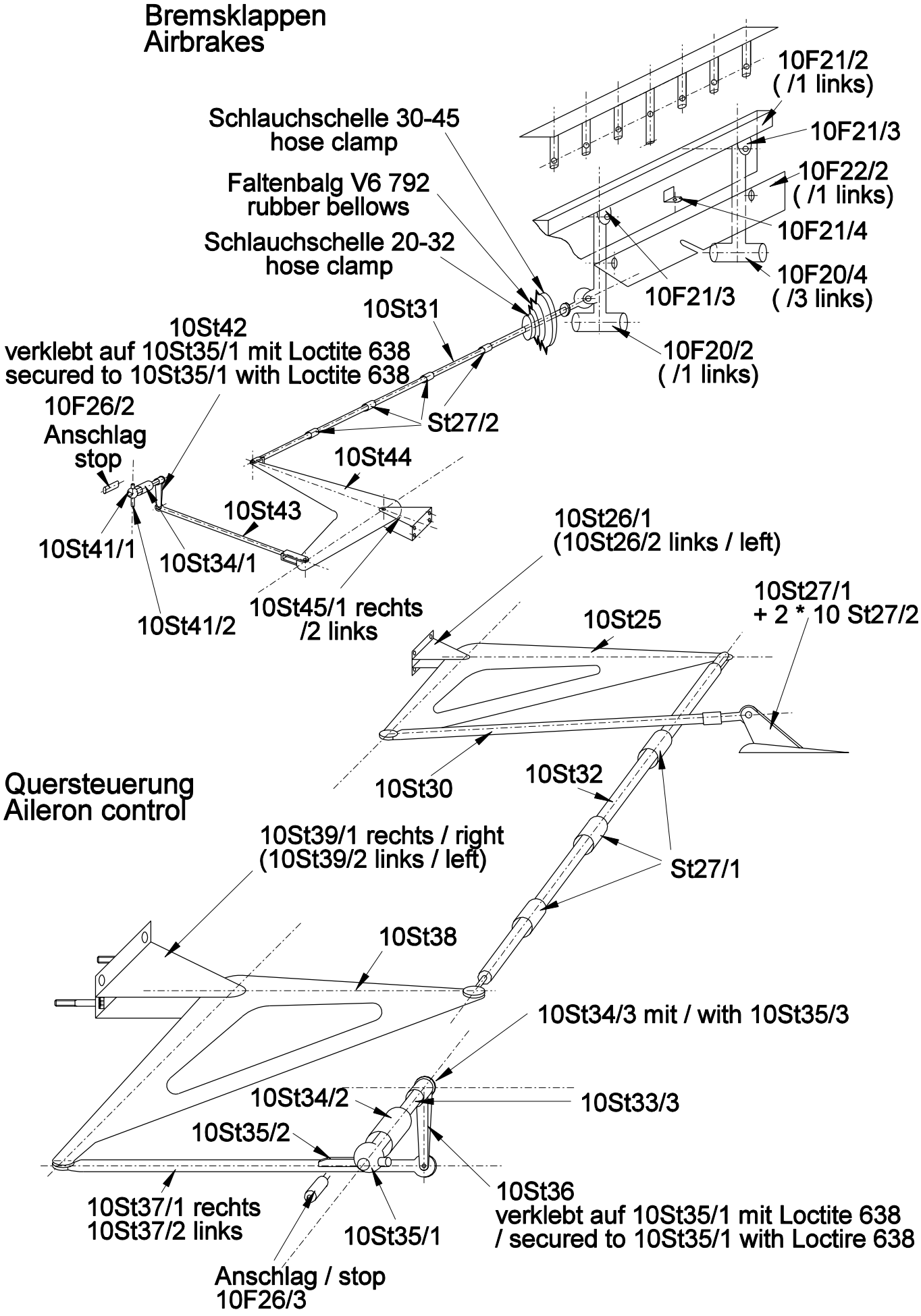


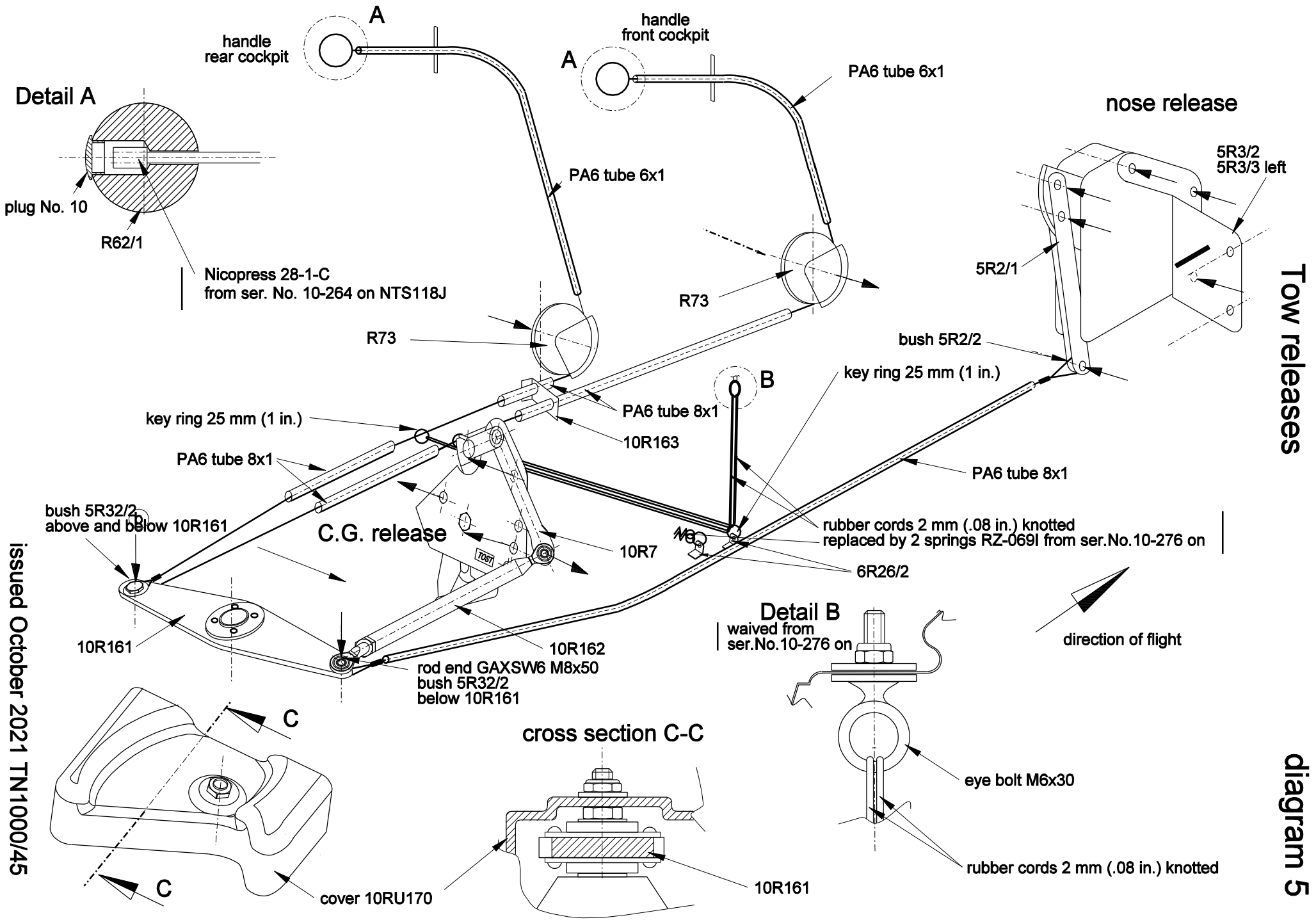
Steuerung im Rumpf
controls in the fuselage

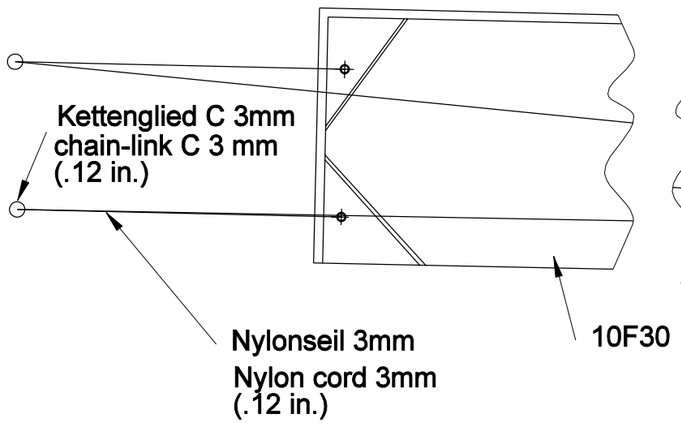
Diagramm 3
diagram 3
Ausgabe: Juni 2005
issued: June 2005

DG-1000S
Steuerung im Flügel
Controls in the wings

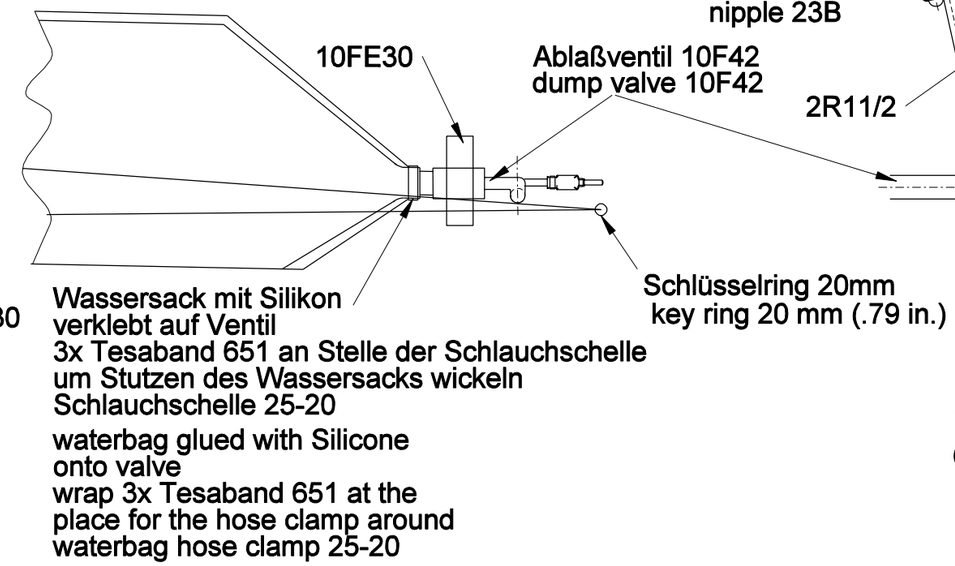
Diagramm 4
diagram 4
Ausgabe: Nov. 2001
issued Nov. 2001



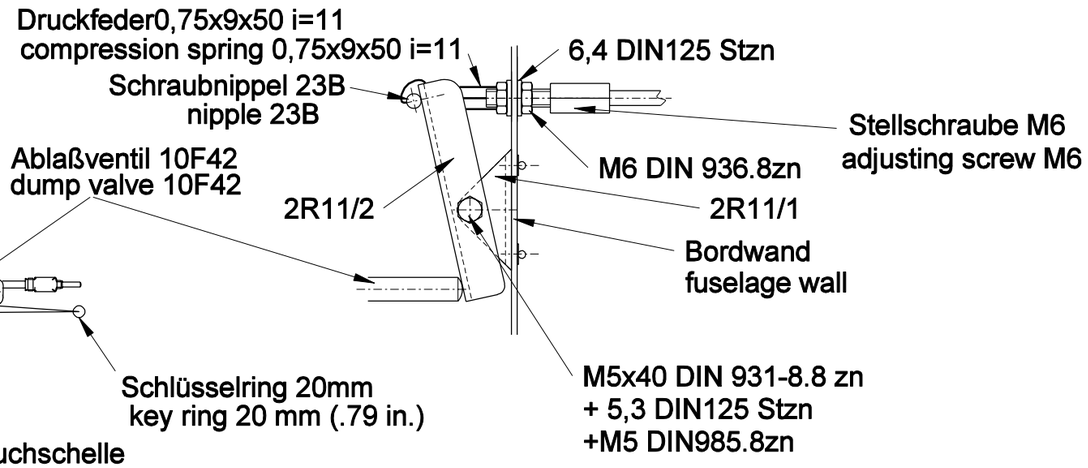

Tow releases
diagram 5
issued October 2021 TN1000/45
Detail A
plug No. 10
R62/1
Nicopress 28-1-C
from ser. No. 10-264 on NTS118J
handle
rear cockpit
A
handle
front cockpit
A
PA6 tube 6x1
PA6 tube 6x1
R73
R73
nose release
5R3/2
5R3/3 left
5R2/1
bush 5R2/2
key ring 25 mm (1 in.)
B
PA6 tube 8x1
10R163
key ring 25 mm (1 in.)
PA6 tube 8x1
PA6 tube 8x1
bush 5R32/2
above and below 10R161
C.G. release
10R7
rubber cords 2 mm (.08 in.) knotted
replaced by 2 springs RZ-069I from ser.No.10-276 on
6R26/2
Detail B
waived from
ser.No.10-276 on
direction of flight
10R161
10R162
rod end GAXSW6 M8x50
bush 5R32/2
below 10R161
C
C
cover 10RU170
cross section C-C
10R161
eye bolt M6x30
rubber cords 2 mm (.08 in.) knotted



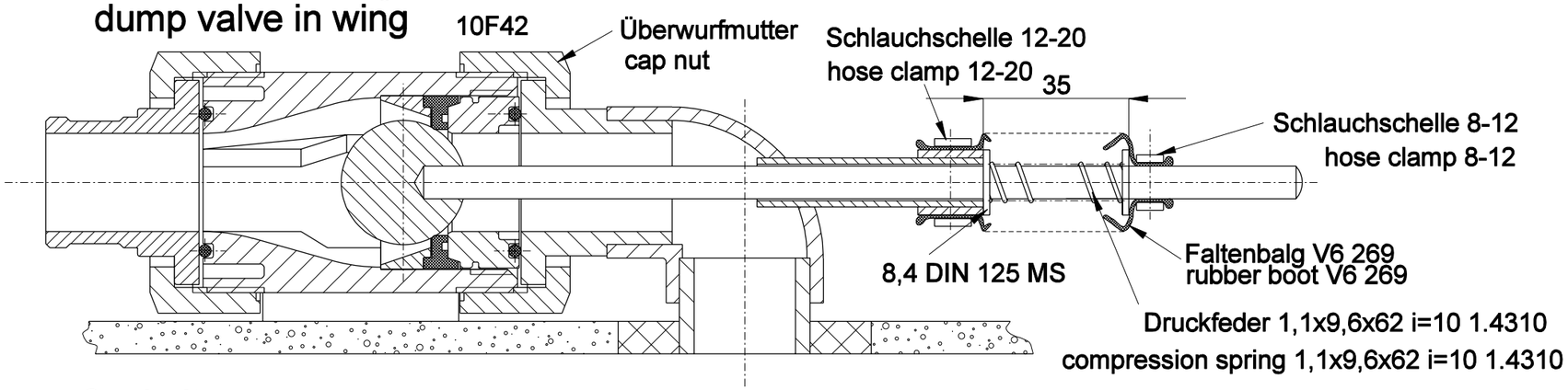
Wasserballastsystem im Flügel
waterballast system in the wings



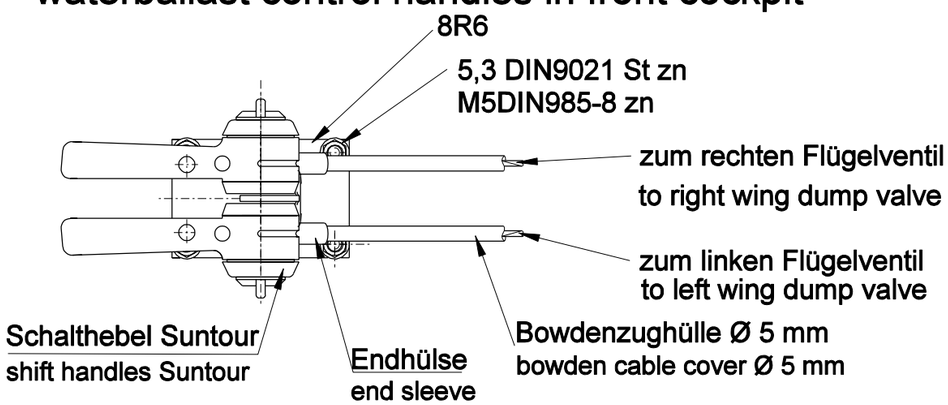
Ablaßventil im Flügel
dump valve in wing



Antrieb der Flügelventile am Rumpf
dump valve drive at fuselage



Wasserablaßbedienung im vorderen Cockpit
waterballast control handles in front cockpit

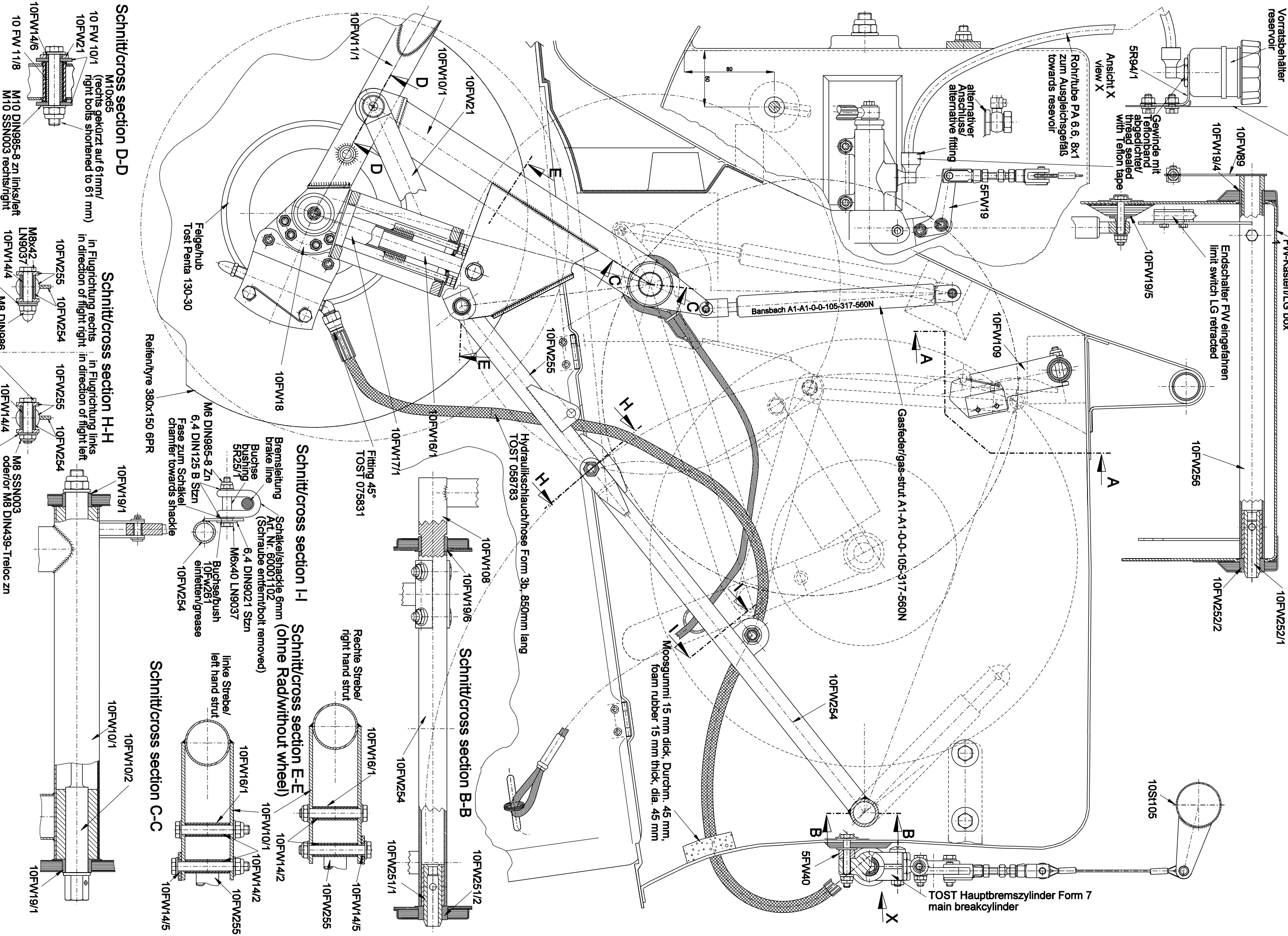


Wasserballastanlage

waterballast system

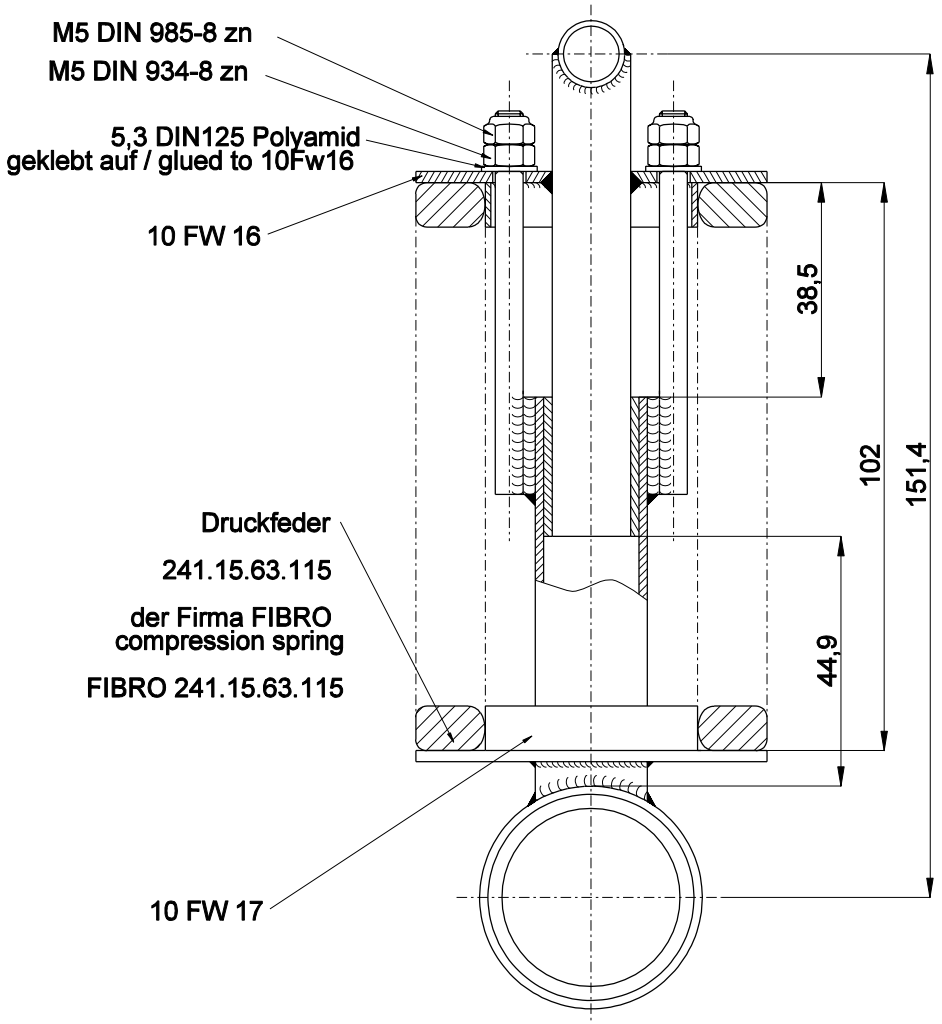
All dimensions in mm, 25.4 mm= 1 in.

Diagramm 6
Ausgabe Oktober 2010
diagram 6
issued October 2010



Hauptfahrwerk, hydraulische Radbremse, Einbau im Fahrwerkskasten, Blatt 1 Ausgabe: Oktober 2021 TM1000/45 Diagramm 7
Main landing gear, hydraulic wheel brake, installation in the LG box, page 1 issued October 2021 TN1000/45 diagram 7

Hauptfahrwerk, hydraulische Radbremse, Einbau im Fahrwerkskasten, Blatt 2 Diagramm 8
Main landing gear, hydraulic wheel brake, installation in the LG box, page 2 diagram 8



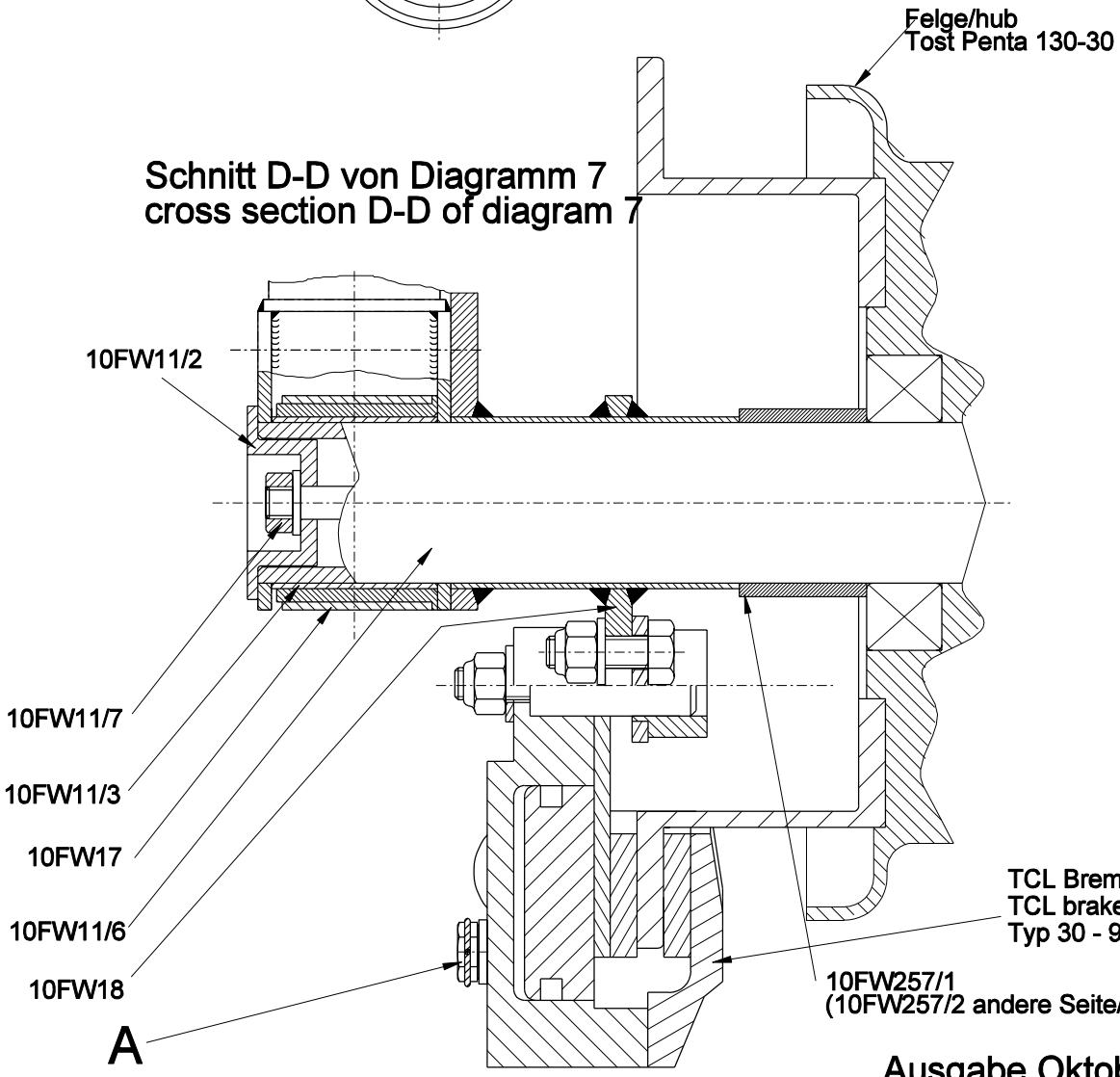
Montage Federbein
Assembly spring leg

Federweg : 37 mm
spring travel 37 mm

Alle Maße mit vorgespannte Feder

All dimensions with spring precompressed

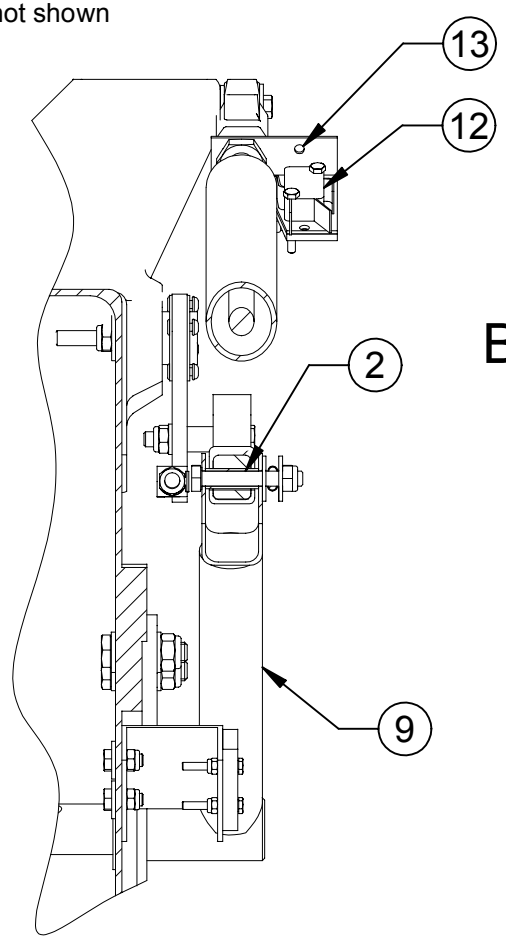
All dimensions in mm, 25.4 mm= 1 in.



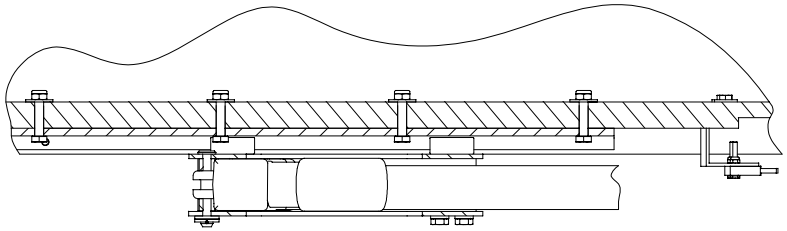
Schnitt D-D von Diagramm 7
cross section D-D of diagram 7

Ausgabe Oktober 2010
issued October 2010

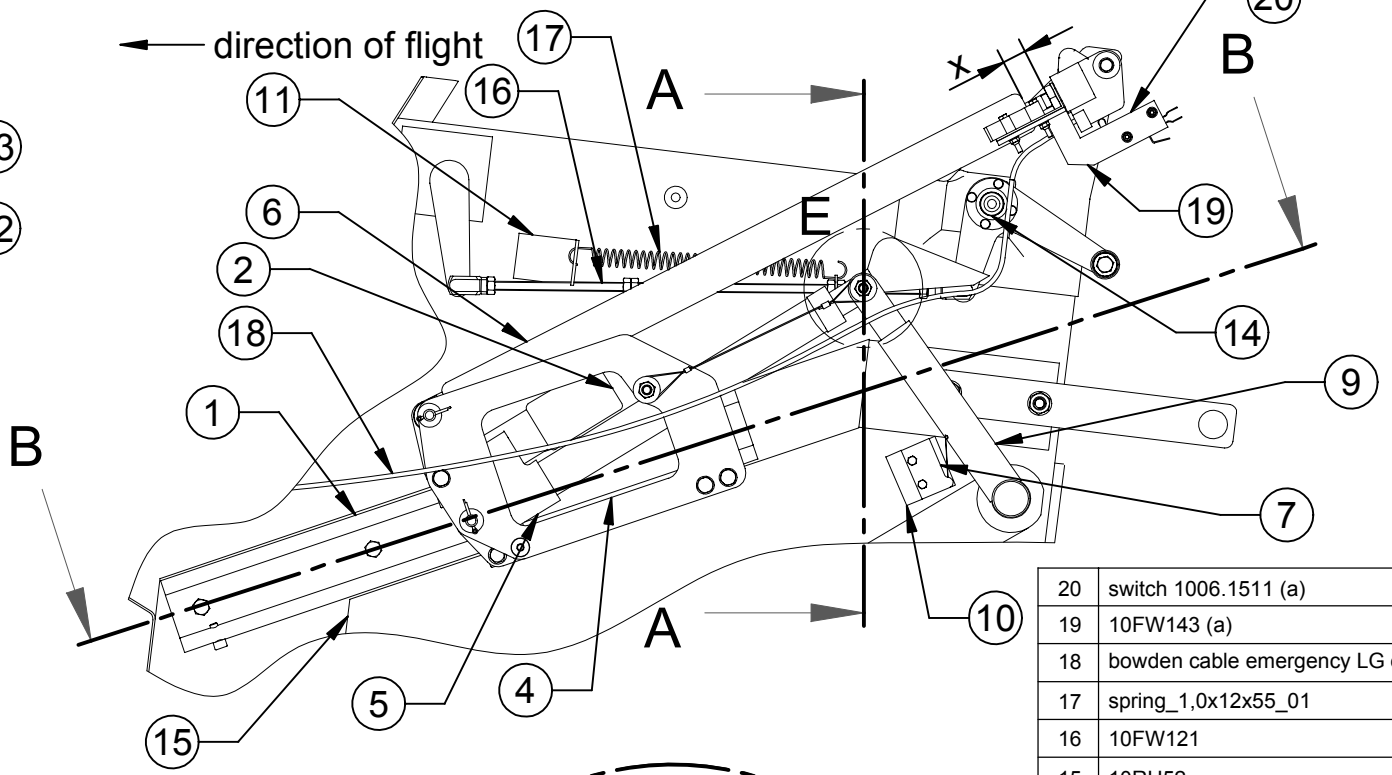
cable to the limit
switch gas strut
not shown



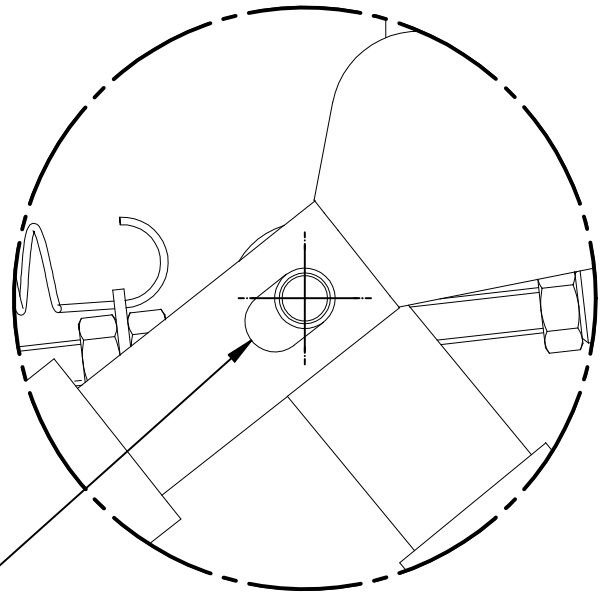
Schnitt A-A



Section B-B



Detail E



elongated hole in head of spindle drive

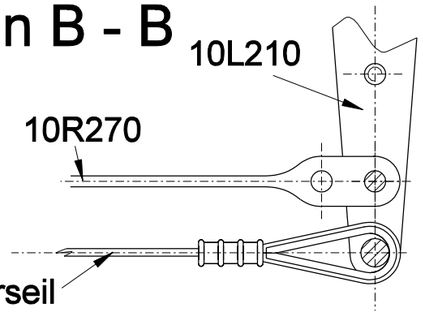
No.	PART NAME	QTY
20	switch 1006.1511 (a)	1
19	10FW143 (a)	1
18	bowden cable emergency LG extension	1
17	spring_1,0x12x55_01	1
16	10FW121	1
15	10RU52	1
14	10FW130	1
13	10FW120	1
12	limit switch gas strut XGG2-88-S20Z1	1
11	10FW92	1
10	10FW93	1
9	10FW108	1
8	10FW90	1
7	limit switch LG ext. 164-574	1
6	K0V2P-3-200-647--001/460N	1
5	spindle drive 10 FW140	1
4	10FW98	1
3	10FW89	1
2	10FW135	1
1	10FW103	1

(a) only with TN1000/19 applied,
standard from ser. no. 10-157 on

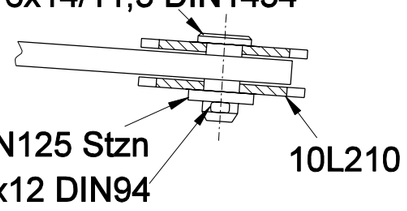
Sporrad
Tail wheel

10R268
10R267
10RU148 (M1+M2)
10RU236 (ab M3)
10Ru80
WC 22 DU (di=24mm, da=42mm)
DU-Schicht unten
(Einbau vor Montage der
Innenringe Nadellager)
DU-coating on lower side
(install prior to inner rings
of the needle bearings)
10R269
Nadellager NKI 22/16 (needle bearing)
Innenringe mit Loctite 638 auf 10R266 verklebt
(inner rings secured with Loctite 638 to 10R266)
10Ru231
10Ru232
10Ru230
10R270
Z
Y
Anschlag für
stop for
10R266
B
C
B
A
A
10R266
Reifen 200x50
tyre
Kugelgelagertes
Spornrad S23
hub with
ball bearings
Z162M Zugfeder (spring)

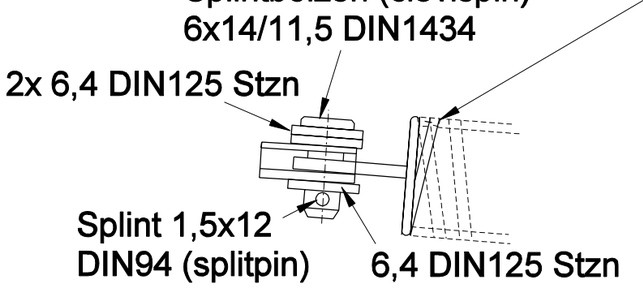
Schnitt B - B
Section B - B



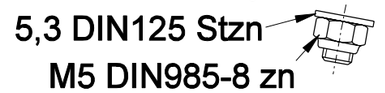
Detail C
gilt für Seitenruderseil und 10R270
valid for rudder cable and 10R270



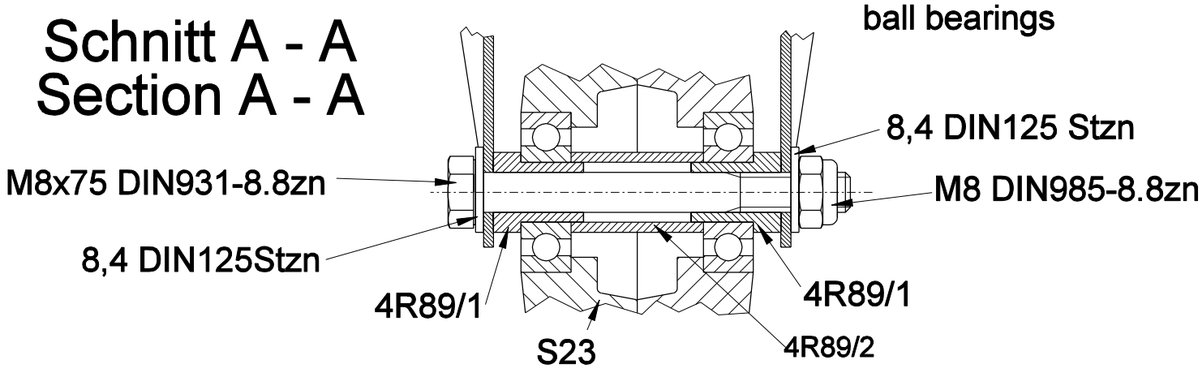
Detail Z



Detail Y
Verschraubung 10R266
screwed joint 10R266



Schnitt A - A
Section A - A



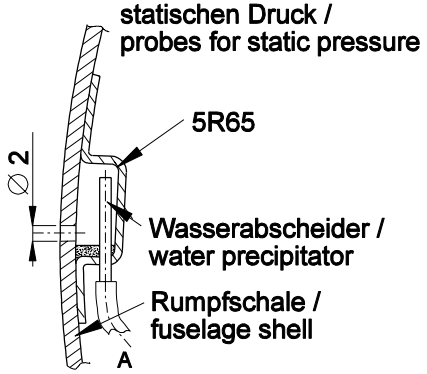
Ausgabe: Oktober 2010
issued: October 2010

Diagramm 10
diagram 10

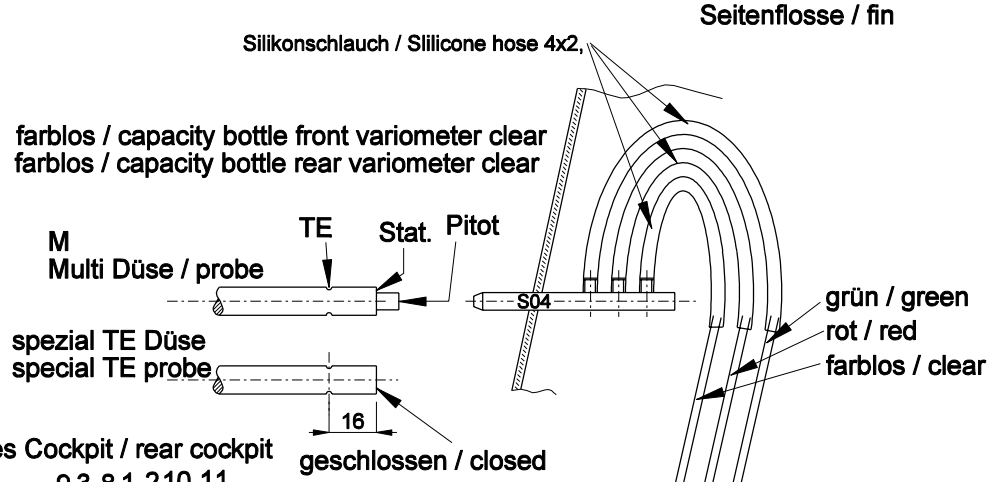
Anlagen für statischen und Gesamtdruck
systems for static and total pressure
DG-1000M

Diagramm 11
diagram 11

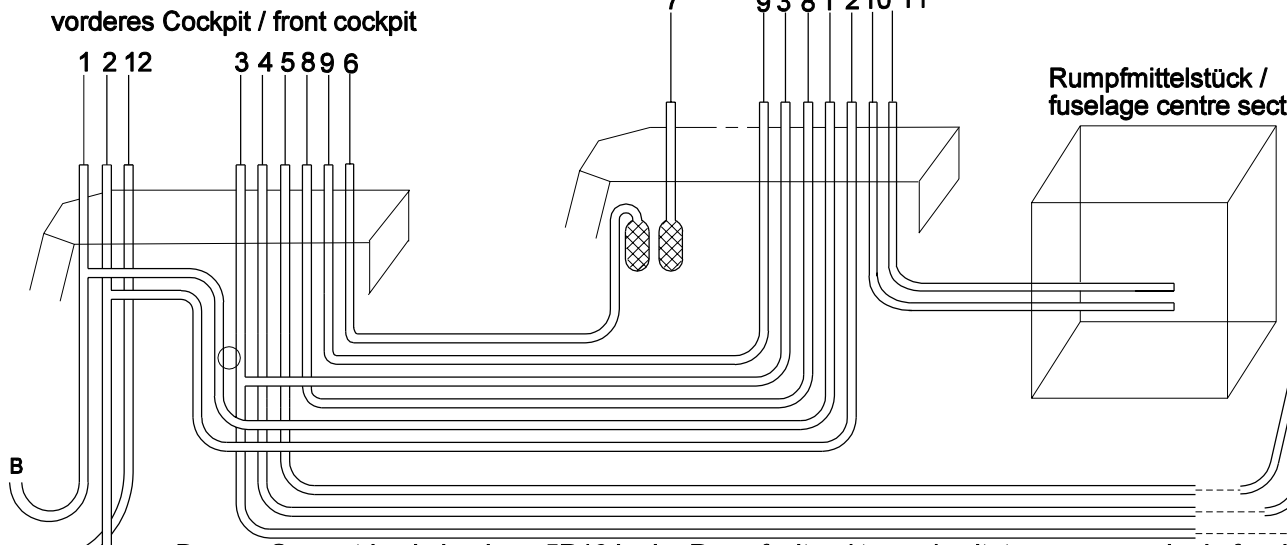
Ausgabe: Oktober 2010
issued: October 2010

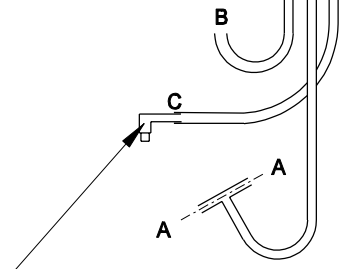


1 = Pitot V farblos / clear
2 = Stat. V farblos / clear
3 = TE grün / green
4 = Stat. M rot / red
5 = Pitot M farblos / clear
6 = Ausgleichsgefäß f. Variometer vorne farblos / capacity bottle front variometer clear
7 = Ausgleichsgefäß f. Variometer hinten farblos / capacity bottle rear variometer clear
8 = freie Leitung farblos / free line clear
9 = freie Leitung farblos / free line clear
10 = freie Leitung gelb / free line yellow
11 = freie Leitung gelb / free line yellow
12 = PC farblos / clear



All dimensions in mm, 25.4 mm= 1 in.





6R37/2 in Unterseite Rumpfspitze /
probe 6R37/2 below fuselage nose

B = zur Gesamtdruckabnahme 5R16 in der Rumpfspitze / towards pitot pressure probe in fuselage nose
C = zur Druckabnahme 6R37/2 in Unterseite Rumpfspitze / towards probe 6R37/2 below fuselage nose

Wichtiger Hinweis: Der Fahrtmesser darf nur an den vorderen Druckabnahmen Stat V + Pitot V angeschlossen werden. /
Caution: The airspeed indicator must be connected to the front probes Stat V + Pitot V.

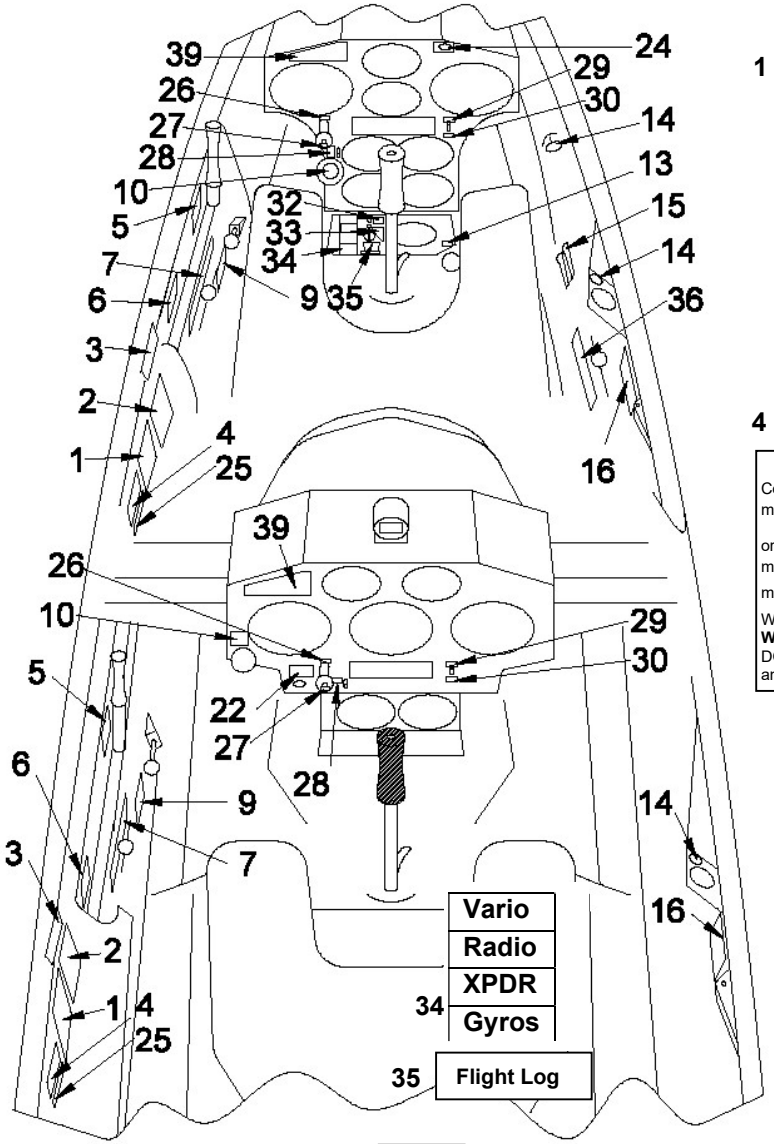
Am DEI-NT werden 1=Pitot V, 2 Stat V und 12=PC angeschlossen /
1=Pitot V, 2 Stat V and 12=PC must be connected to the DEI-NT

Die Anschlüsse der Multi Düse sind zum Anschließen von Variometer- und Rechnersystemen bestimmt. /
The multi probe is intended to connect variometers and gliding computers.

Alle Schläuche PVC weich 8x1,5 / all hoses soft PVC 8x1,5

Leitungen / lines 3, 4, 5 ab / from M2 , 12 ab / from M8: Rohre / tubes 5x0,75 PELD. Farbmarkierung mit / coluur coding with Tesafilm.
Verbindung zu den Schlauchverbindern etc. mit Silikonschlauch 4x2 / connection to fittings with silicone hose 4x2

Placards DG-1000M



1

DG Aviation GmbH
Type: DG – 1000M Serial No.: 10- M
Year of construction:

Maximum airspeeds	km/h	kts.
Winch launching	150	81
Aero-tow	185	100
Manoeuvring V_A	185	100
Rough air	185	100
Maximum speed V_{NE}	270	146
Powerplant extended	185	100
Powerplant extension-retraction	100	54

Approved aerobatic manoeuvres, approved up to a max. mass of 683 kg /1506 lbs:
Pos. Loop, Chandelle, Spin, Stall turn

4

Maximum mass: 790 kg /1742 lbs.

Loading chart

Cockpit load	front seat		rear seat		(Parachute
maximum	110 kg	242 lbs.	90 kg	198 lbs.	included)
or maximum	105 kg	231 lbs.	105 kg	231 lbs.	
minimum	kg	lbs.	/	/	without fin battery
minimum	kg	lbs.	/	/	With fin battery

With lower pilot weight necessary ballast must be added.
Warning: To keep from exceeding the forward C.G. limits when flying the DG-1000M two-seated, heavy pilots must compensate the mass of the front and the rear pilot according to AFM section 6.8.7.

0.1.1.1 Pre-flight Check

1. Lead ballast (for under weight pilot)?
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3. Safety harness buckled?
4. Front seat: pedals adjusted?
   Rear seat: seating height adjusted?
5. All controls and knobs in reach?
6. Altimeter?
7. Dive brakes cycled and locked?
8. Positive control check ? (One person at the control surfaces).
9. Trim ballast box in the fin, correct amount filled in? Locking device completely engaged?
10. Battery in the fin? Loading chart regarded?
11. Trim?

In addition for self launching

12. Fuel level?
13. Fuel cock open?
14. Canopy open, propeller circle clear?
15. After engine start close and lock both canopies.
16. Check max. engine RPM, min. 5900RPM.
17. Check both ignition circuits (4000 RPM)
18. Check emergency system (4000 RPM)

2

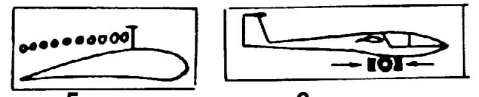
Senden transmit **22**

Ballastkasten Seitenflosse
Mindestzuladung im vorderen Sitz **24**

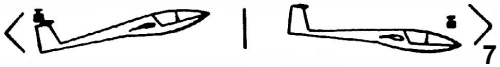
kg Kasten leer — kg Kasten befüllt

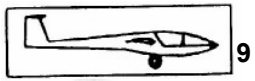
Altitude in [m]	0-3000	4000	5000	6000	7000	8000
V_{NE} IAS km/h	270	256	243	230	217	205
Altitude in [ft]	0-10000	13000	16000	20000	23000	26000
V_{NE} IAS kts.	146	138	131	124	117	111

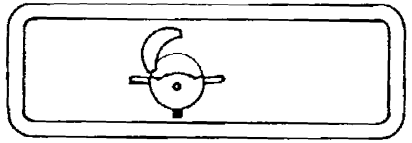
25

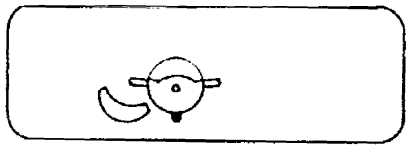

5

6


7


9


3


16

Bauteil Nr.:

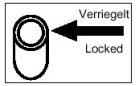
part No. of components at all components

Typ:	DG-1000M
W.Nr.	

Fire proof placard at main bulkhead

Gepäck max. 15 kg
baggage max. 33 lbs.

at main bulkhead



at cover plate of fin ballast box

Reifendruck 3 bar
Tyre pressure 43.5 psi

at right wheel door front

Sollbruchstelle 10000 N
rated load 2200 lbs.

Drainer

at right wheel door rear

Reifendruck 4 bar
Tyre pressure 58 psi

above tailwheel right

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

on break fluid reservoir

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

fin upper left hand side

26 Throttle
27 Starter
28 man.
29 normal
30 emergency
32 intern / off / extern
33 charging / main / on

36 auf open — Brandhahn fuel cock — zu closed

39 placards landing gear see diagram 24

Benzin min. 95 Okt. petrol min. 95 ROZ. **50:1** Zweitaktöl two stroke oil **40 l**

on top of main bulkhead left hand side and at fuel filler (Option)


14


15


10

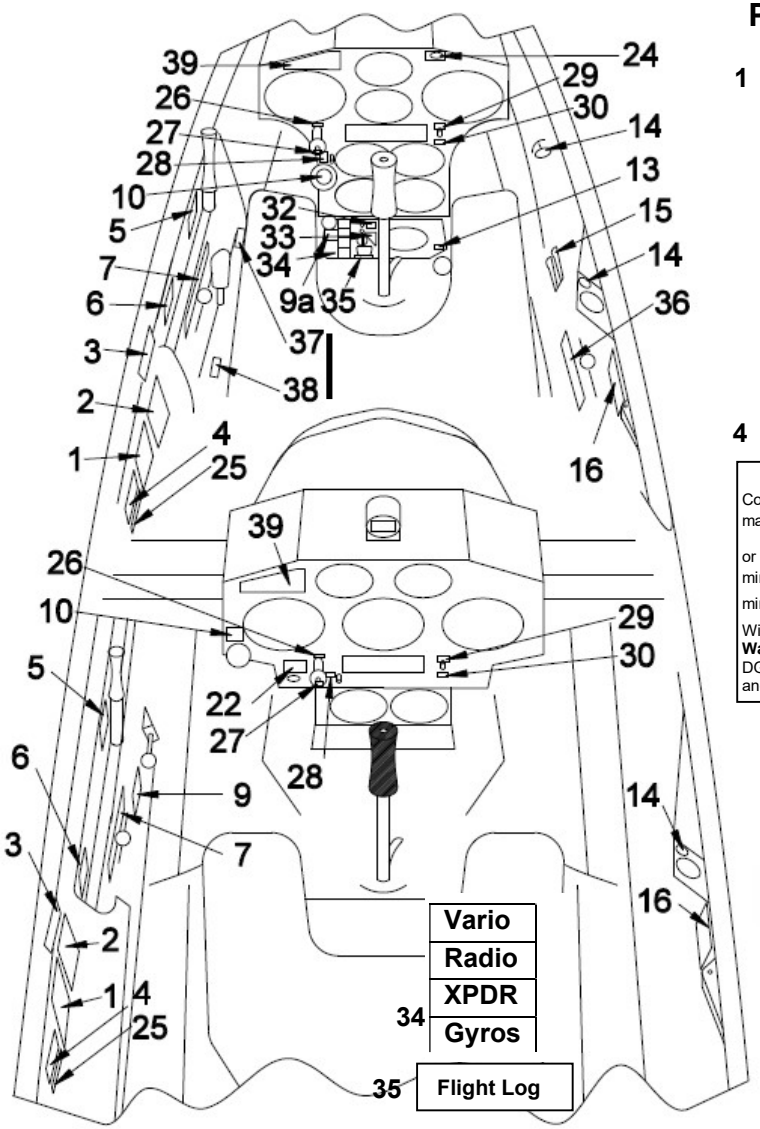

13

Tankpumpe
Refueling pump

on top of main bulkhead left hand side

diagram 12
issued October 2021
TN1000/45

Placards DG-1000M with optional rudder control operated by hand



1

DG Aviation GmbH
Type: DG – 1000M Serial No.: 10- M
Year of construction:

Maximum airspeeds	km/h	kts.
Winch launching	150	81
Aero-tow	185	100
Manoeuvring V_A	185	100
Rough air	185	100
Maximum speed V_{NE}	270	146
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Maximum mass: 790 kg /1742 lbs.

4

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or maximum	105 kg	231 lbs.	105 kg	231 lbs.	
minimum	kg	lbs.	/	/	without fin battery
minimum	kg	lbs.	/	/	With fin battery

With lower pilot weight necessary ballast must be added.
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11. Trim?

In addition for self launching

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13. Fuel cock open?
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16. Check max. engine RPM, min. 5900RPM.
17. Check both ignition circuits (4000 RPM)
18. Check emergency system (4000 RPM)

2

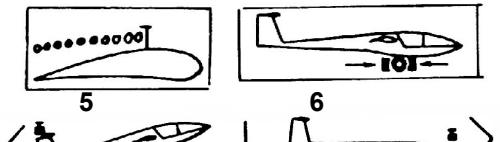
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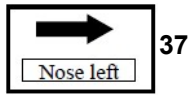
Ballastkasten Seitenflosse
Mindestzuladung im vorderen Sitz **24**

kg	kg
Kasten leer	Kasten befüllt

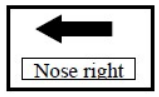
Altitude in [m]	0-3000	4000	5000	6000	7000	8000
V_{NE} IAS km/h	270	256	243	230	217	205
Altitude in [ft]	0-10000	13000	16000	20000	23000	26000
V_{NE} IAS kts.	146	138	131	124	117	111

25

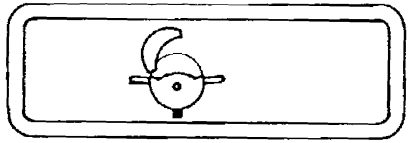




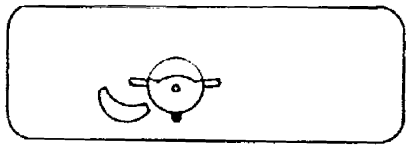
37



38



3



16



14



15



10

13

26 Throttle
27 Starter
28 man.
29 normal
30 emergency
32 intern / off / extern
33 charging / main / on

36 auf open — Brandhahn fuel cock — zu closed

39 placards landing gear see diagram 24

Benzin min. 95 Okt. petrol min. 95 ROZ. 50:1 Zweitaktöl two stroke oil 40 l

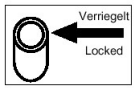
on top of main bulkhead left hand side and at fuel filler (Option)

Bauteil Nr.:
part No. of components at all components

Typ:	DG-1000M
W.Nr.	

Fire proof placard at main bulkhead

Gepäck max. 15 kg
baggage max. 33 lbs.
at main bulkhead



at cover plate of fin ballast box

Reifendruck 3 bar
Tyre pressure 43.5 psi
at right wheel door front

Sollbruchstelle 10000 N
rated load 2200 lbs.

Drainer
at right wheel door rear

Reifendruck 4 bar
Tyre pressure 58 psi
above tailwheel right

Bemsflüssigkeit
----
min.
brake fluid
DOT 3 / DOT 4
on break fluid reservoir

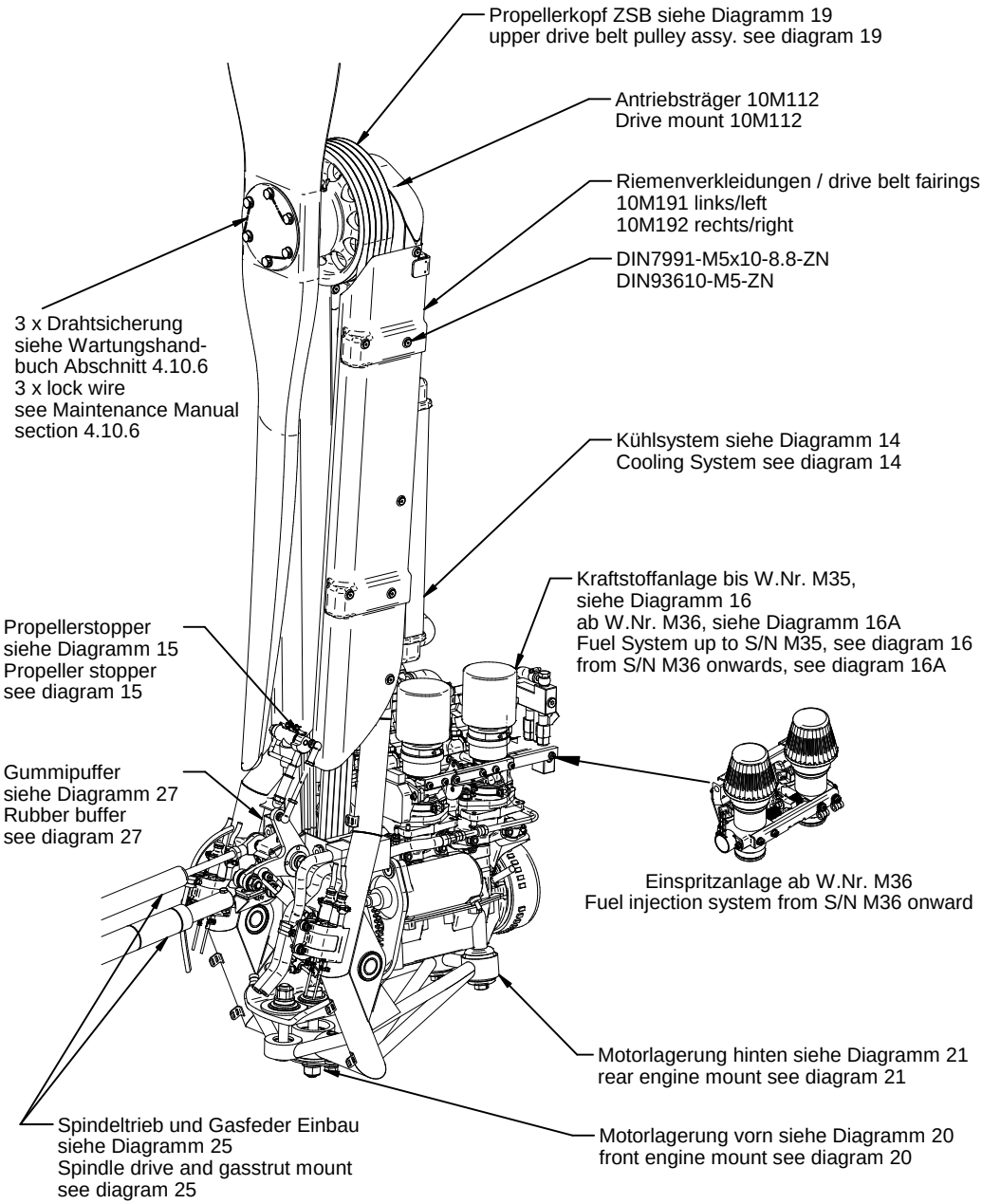
Warning:
Rigging of the horizontal tailplane is only permitted with nose down trim-setting
fin upper left hand side

Tankpumpe
Refueling pump
on top of main bulkhead left hand side

diagram 12a
issued October 2021
TN1000/45

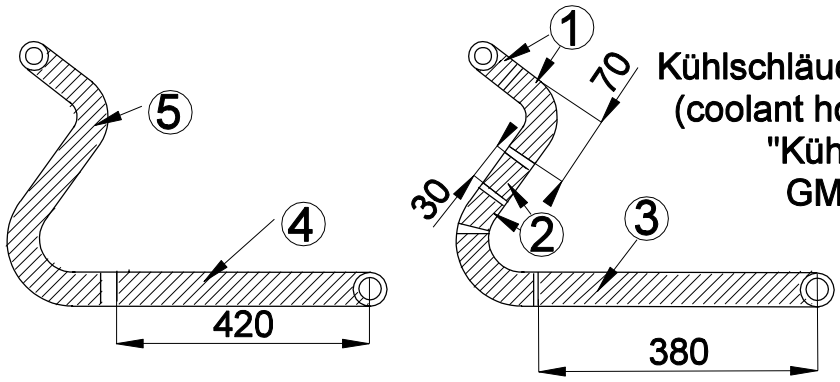
Triebwerk
Powerplant

Diagramm 13
diagram 13



Kühlsystem
Coolant system

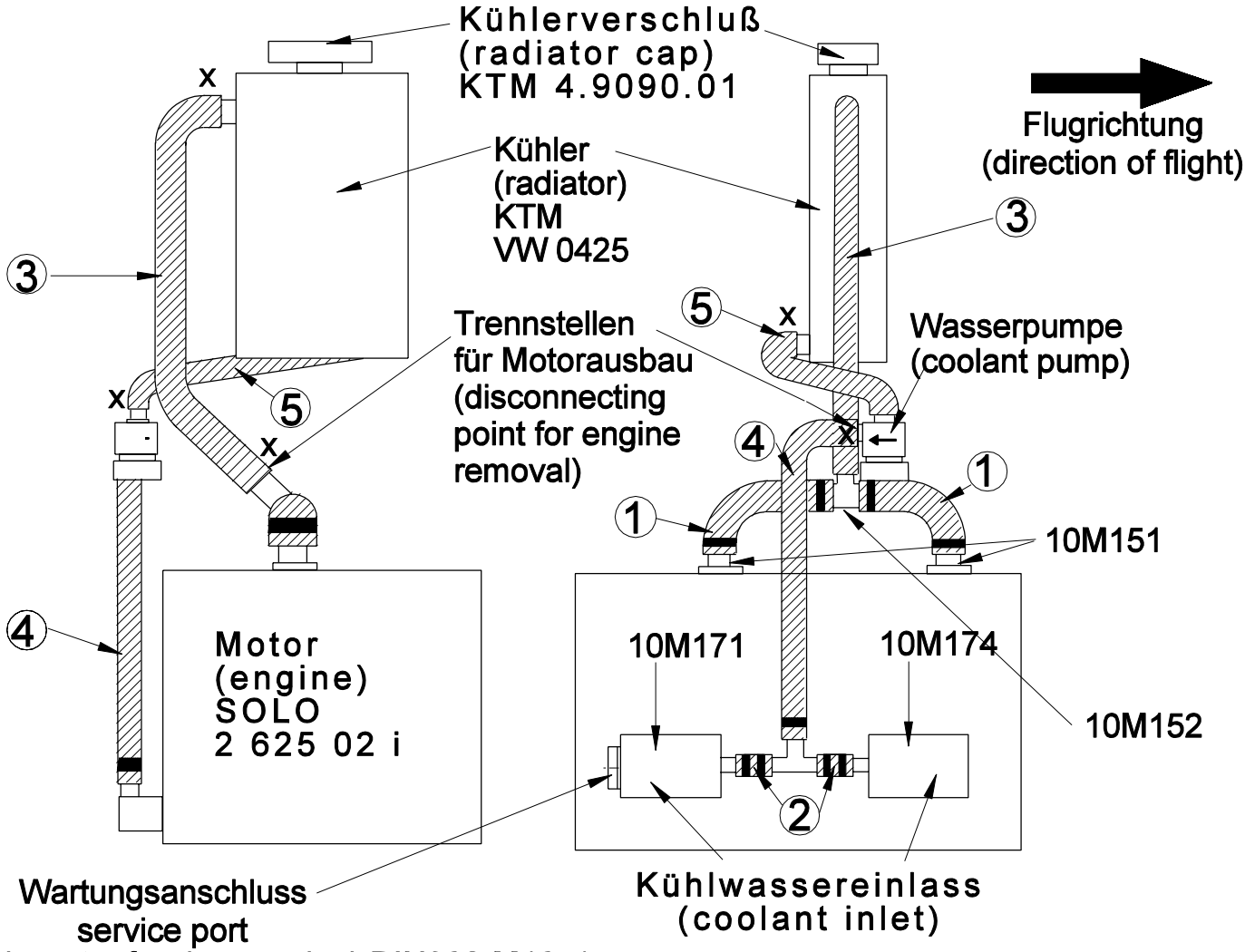
Diagramm 14
diagram 14



Kühlschläuche hergestellt aus 2 Stück:
(coolant hoses made from 2 pieces:)
"Kühlschlauch 08-26888
GM8974835 1818250"

Ansicht von vorn (front view)

Ansicht von Seite (side view)



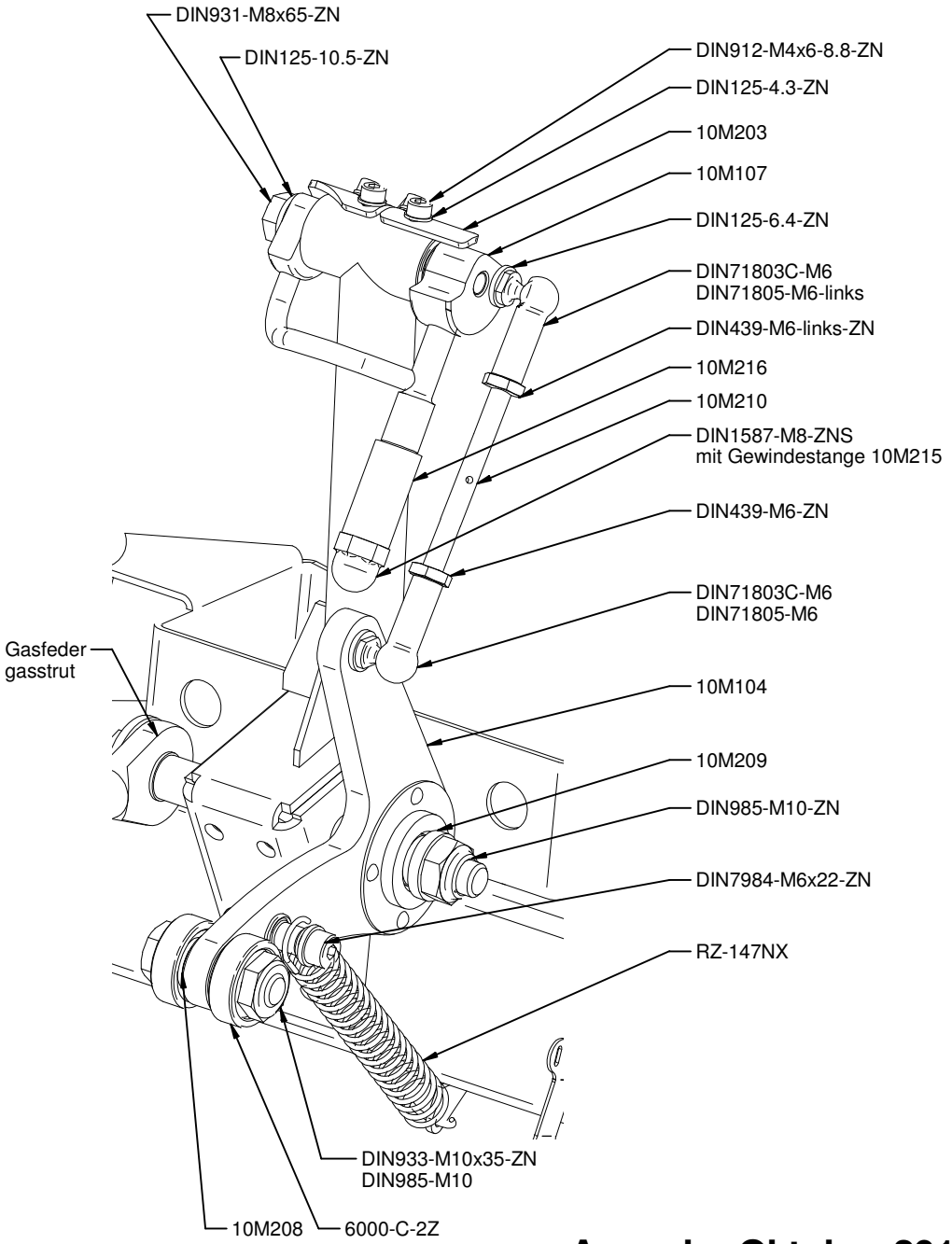
Verschlussstopfen (screw plug) DIN908-M10x1-zn
mit Kupferdichtscheibe (with copper ring) DIN7603A-10x14x0,8

x...Schlauchschelle (hose clamp) 24.5OET
▨.1-Ohr-Klemme mit Einlagering (clamp) 24.5RER

Ausgabe: Oktober 2010
issued: Octber 2010

Propellerstopper
Propeller stopper

Diagramm 15
diagram 15



Ausgabe Oktober 2010
issued October 2010

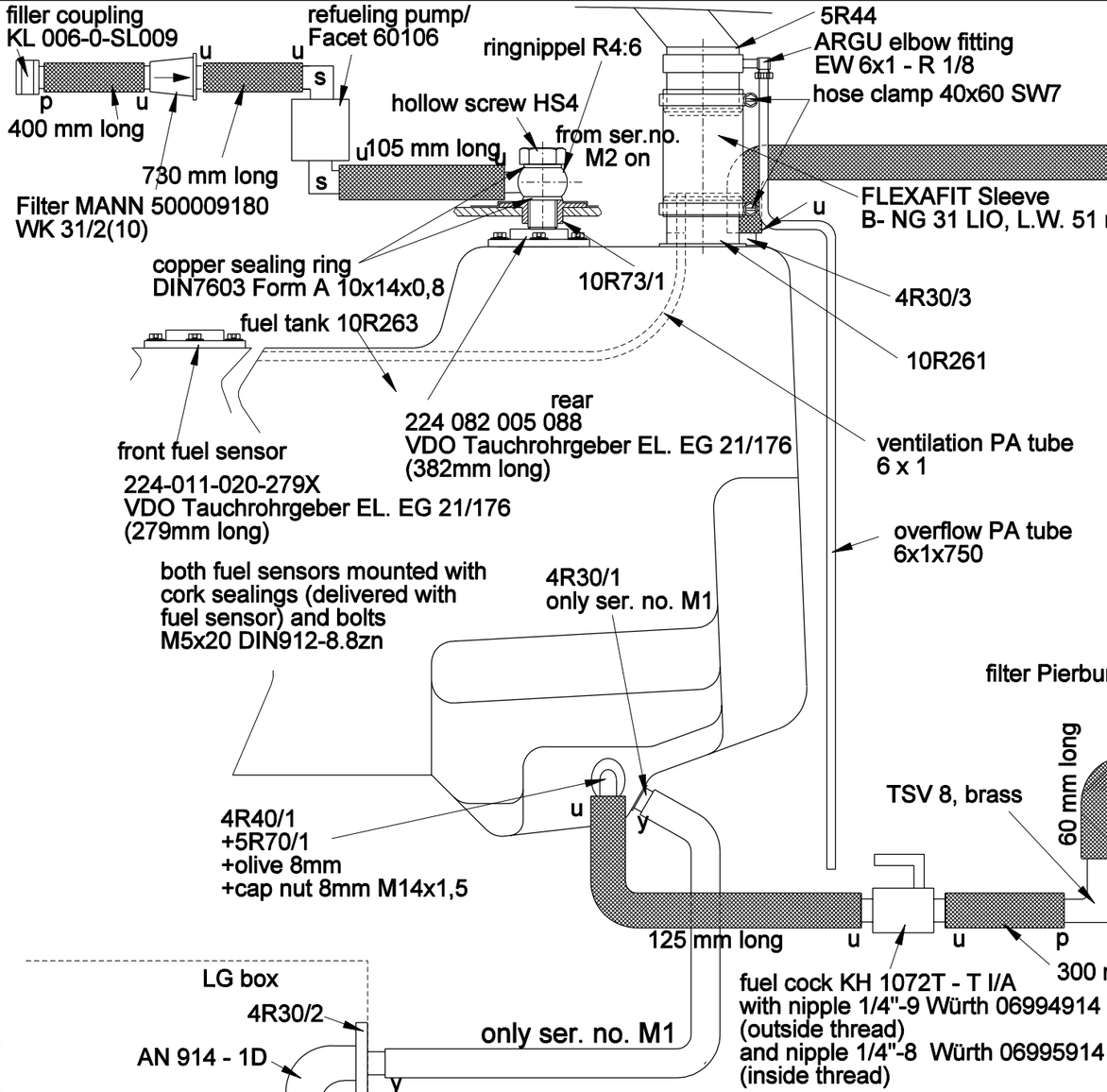
Fuel system

fuel hoses

- 8x2x12 PUR, transparent
  PU hydrolyse and microbe resistant
- 7,5x13,5 DIN 73379-2A, with metal shield
- 3,5x7,5 fabric braided with metal shield
- 7,5x13,5 DIN 73379-2A
- 16x22 fabric braided

Fittings and clamps

- m red heat shrink tubing, 30mm long
- n blue heat shrink tubing, 30mm long
- o clamp 95
- p clamp 145
- r elbow fitting WSAG 06 1/8" brass
- s elbow fitting WSAG 08 1/8" brass
- t nippple SAG 08/R 1/8"
- u hose clamp S70/7 (14/9)
- v hose clamp S70/4 (6/7)
- w hose clamp S70/1 (9/9)
- x hose clamp S70/2 (11/9)
- y hose clamp 539, 8-16mm, width 9mm W2
- z hose clamp 539, 16-25mm, width 9mm W2



issued October 2010

diagram 16

fuel hoses

7,5x13,5 DIN 73379-2A, with metal shield

7,5x13,5 DIN 73379-2A

15x23 fabric braided

Fittings and clamps

m red heat shrink tubing, 30mm long
n blue heat shrink tubing, 30mm long

p clamp 145
r elbow fitting WSAG 06 1/8" brass
s elbow fitting WSAG 08 1/8" brass
t nippple SAG 08/R 1/8"
u hose clamp S70/7 (14/9)

y hose clamp 539, 8-16mm, width 9mm W2
z hose clamp 539, 16-25mm, width 9mm W2

filler coupling
KL 006-0-SL009
400 mm long
730 mm long
Filter MANN 500009180
WK 31/2(10)
refueling pump/
Facet 60106
ringnippel R4:6
hollow screw HS4
105 mm long
5R44
ARGU elbow fitting
EW 6x1 - R 1/8
hose clamp 40x60 SW7
FLEXAFIT Sleeve
B- NG 31 LIO, L.W. 51 mm
copper sealing ring
DIN7603 Form A 10x14x0,8
10R73/1
4R30/3
10R261
fuel tank 10R263
front fuel sensor
224-011-020-279X
VDO Tauchrohrgeber EL. EG 21/176
(279mm long)
rear
224 082 005 088
VDO Tauchrohrgeber EL. EG 21/176
(382mm long)
ventilation PA tube
6 x 1
overflow PA tube
6x1x750
both fuel sensors mounted with
cork sealings (delivered with
fuel sensor) and bolts
M5x20 DIN912-8.8zn
4R40/1
+5R70/1
+olive 8mm
+cap nut 8mm M14x1,5
LG box
Drainer
CAV 110
copper sealing ring
DIN7603 Form A 10x14x0,8
10R262/1
10R73/1
fuel tank lower side
2x92125 50x50
ringnippel R4:6
hollow screw HS4
120 mm long
125 mm long
fuel cock KH 1072T - T I/A
with nipple 1/4"-9 Würth 06994914
(outside thread)
and nipple 1/4"-8 Würth 06995914
(inside thread)
300 mm long
700 mm long (620 with
regulator Pierburg)
fuel pressure regulator Solo 2300884
(Bosch 0280160557 with bracket from Solo)
Hollow bolt HS4
Ring nippel R4:6
2x copper sealing
DIN7603 Form A
10x14x0,8
fuel injection system
Hollow bolt HS4
Ring nippel R4:6
2x copper sealing ring
DIN7603 Form A 10x14x0,8
Service Port
Screw cap
DIN908-M10x1-zn
with copper sealing ring
DIN7603A-10x14x0,8
fuel supply
850 long
return line
750 long
4R30/2
pressure switch
DRS 5 ES
or
pressure switch Beck 901.51
110 mm long
nipple
GT 148 K MSV)
T 14 MS
55 mm long
TSV 8, brass
45 mm long
105 lang
reducing hose connector 10R264
fuel pump
Pierburg
7.22156.60.0
365 mm long
filter Pierburg 4.00030.80.0
140 mm long
35 mm long
60 mm long
TSV 8, brass
170 mm long
35 lang
140 mm long
455 mm long
fuel filter
MANN WK 613

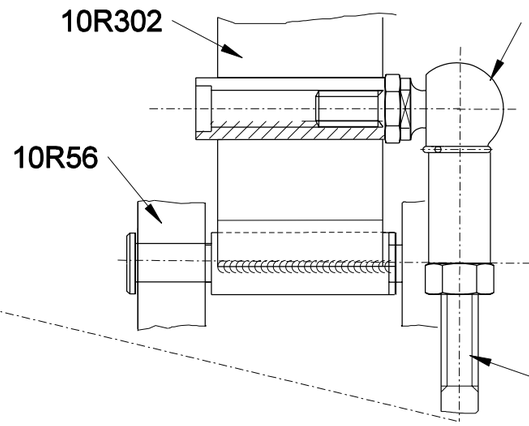
Fuel system for S/N M36 onward

diagram 16A

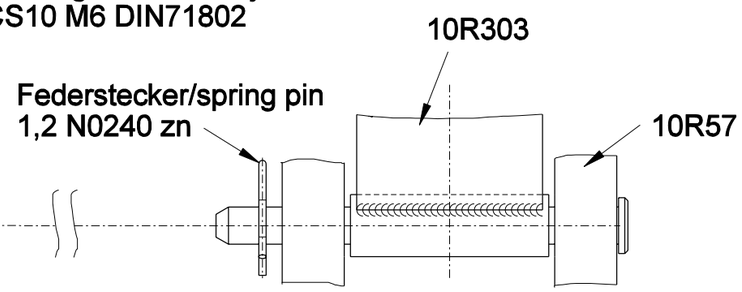
issued September 2019 TN1000/43

Motordeckelsteuerung
engine door control

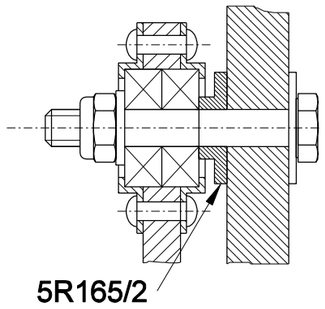
vorderes Motordeckelscharnier
front engine door hinge



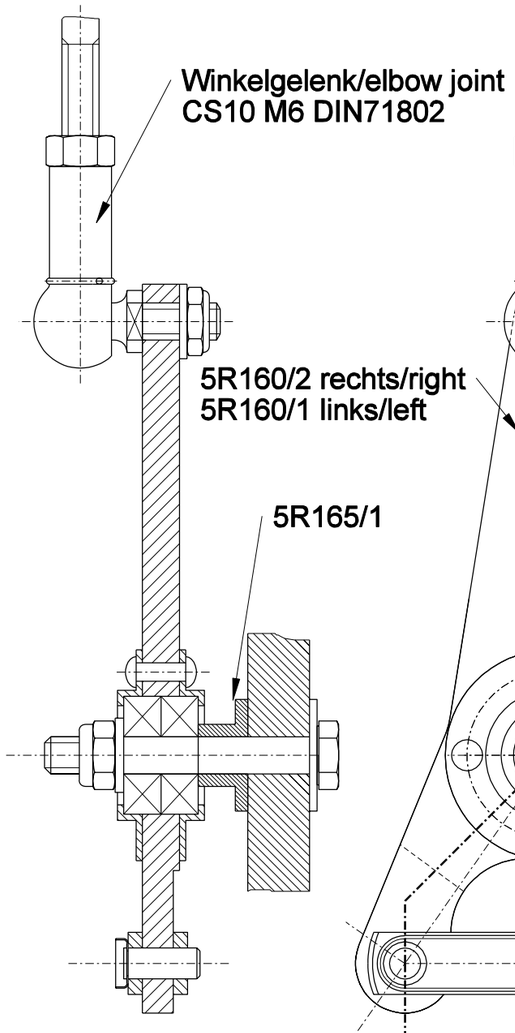
hinteres Motordeckelscharnier
rear engine door hinge



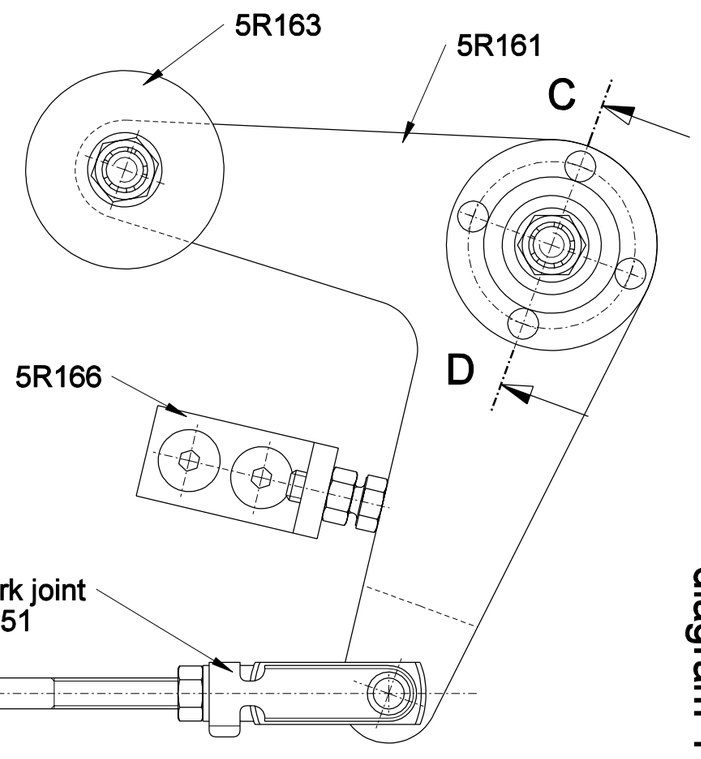
Schnitt C-D
cross section C-D



Schnitt A-B
cross section A-B



Schnitt E-F
cross section E-F
Rechte + linke Seite
right and left hand side

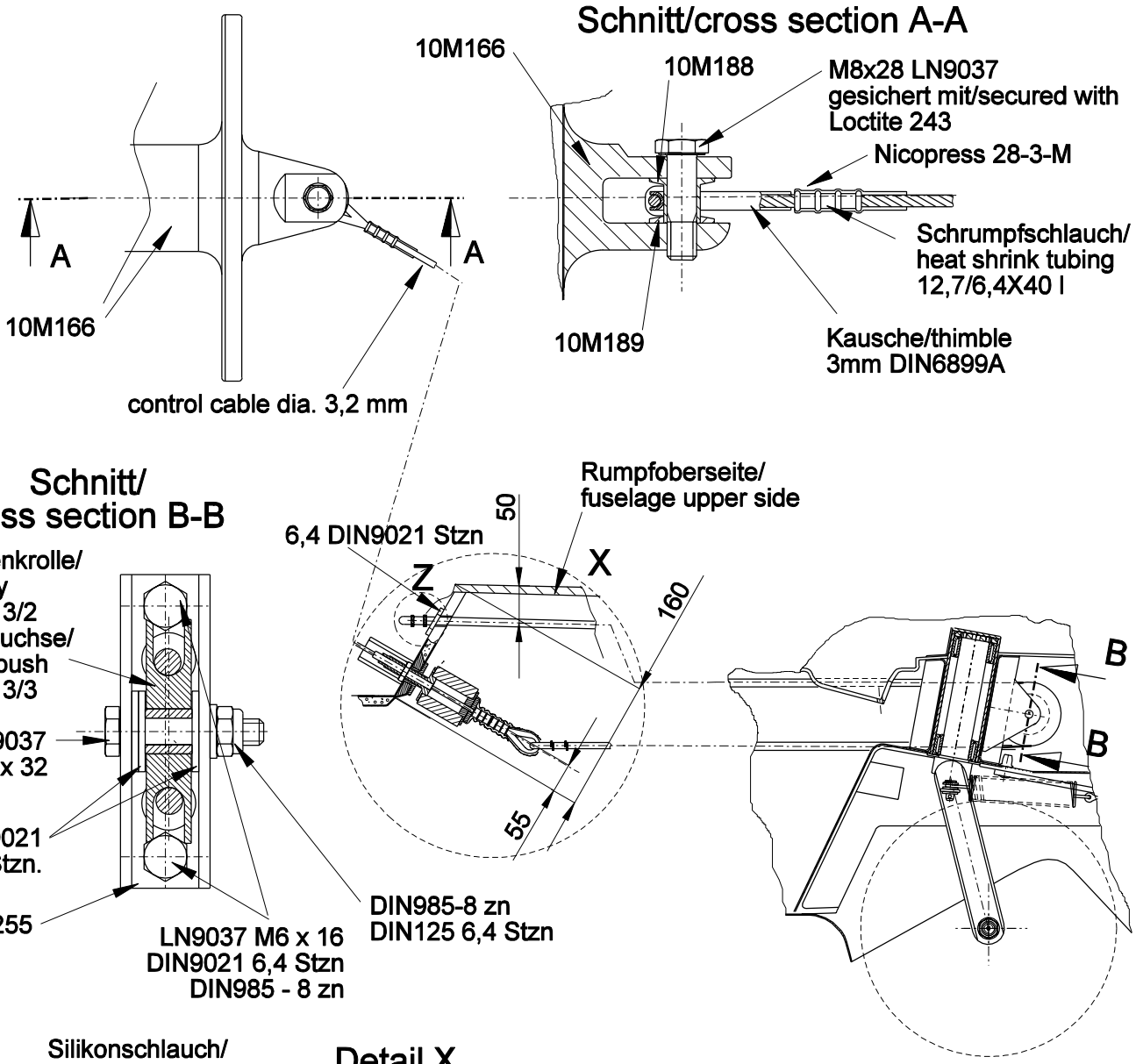


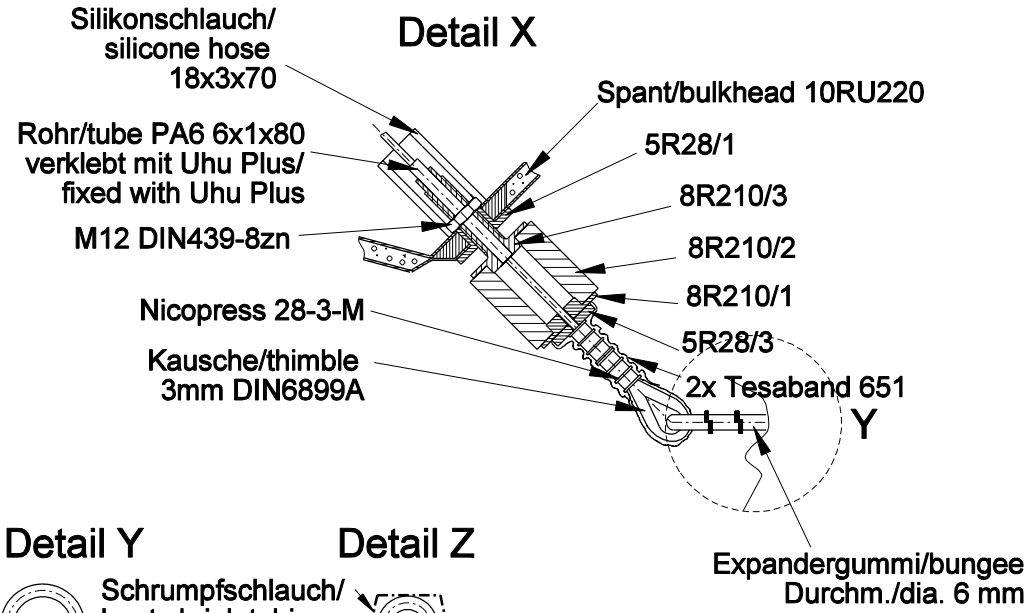
Ausgabe: Oktober 2010
issued: October 2010

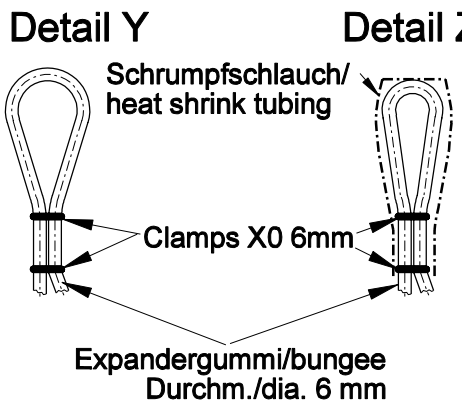
Diagramm 17
diagram 17

Fangseil
Retaining cable

Diagramm 18
diagram 18







Ausgabe Oktober 2010
issued October 2010

Zusammenbau Propellerkopf
Assembly upper drive belt pulley

Diagramm 19
diagram 19

Drahtsicherung der Propellerbefestigungsschrauben siehe Abschnitt 4.10.6
Lock wire securing of the propeller bolts see section 4.10.6

Ausgabe Oktober 2010
issued October 2010

Schnitt / Cut A-A

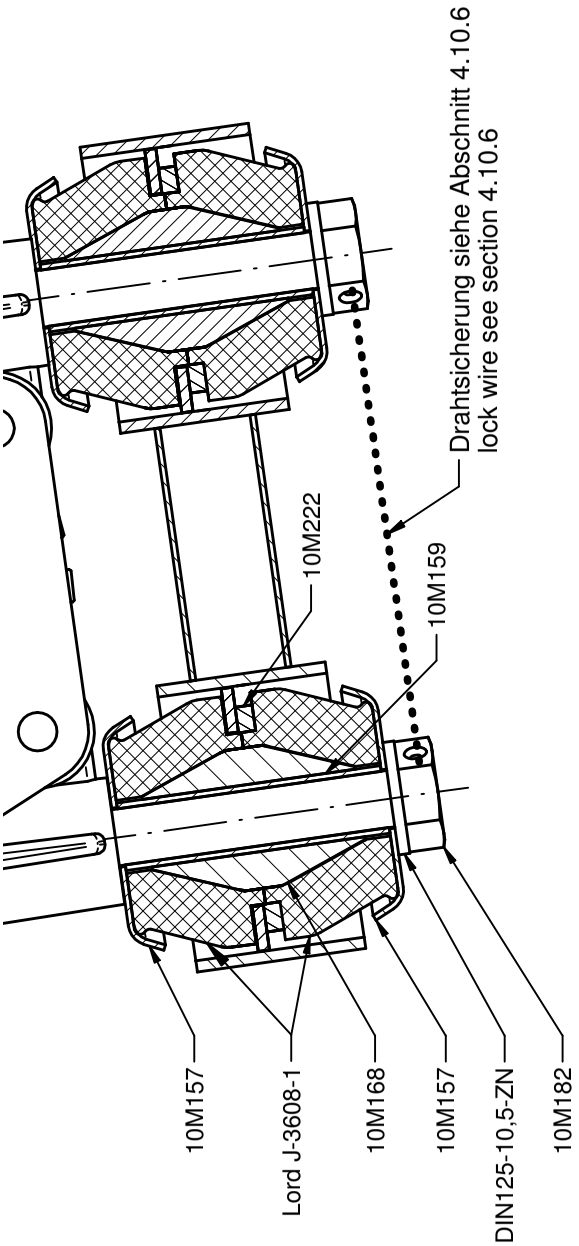
Motorlagerung vorne
Engine mount front

Diagramm 20
diagram 20

Ausgabe Oktober 2010
issued October 2010

Motorlagerung hinten
Engine mount rear

Diagramm 21
diagram 21



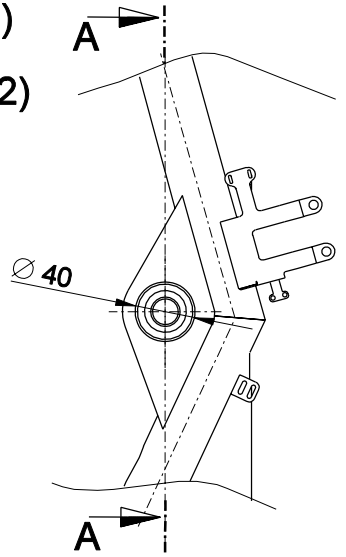
Ausgabe Oktober 2010
issued October 2010

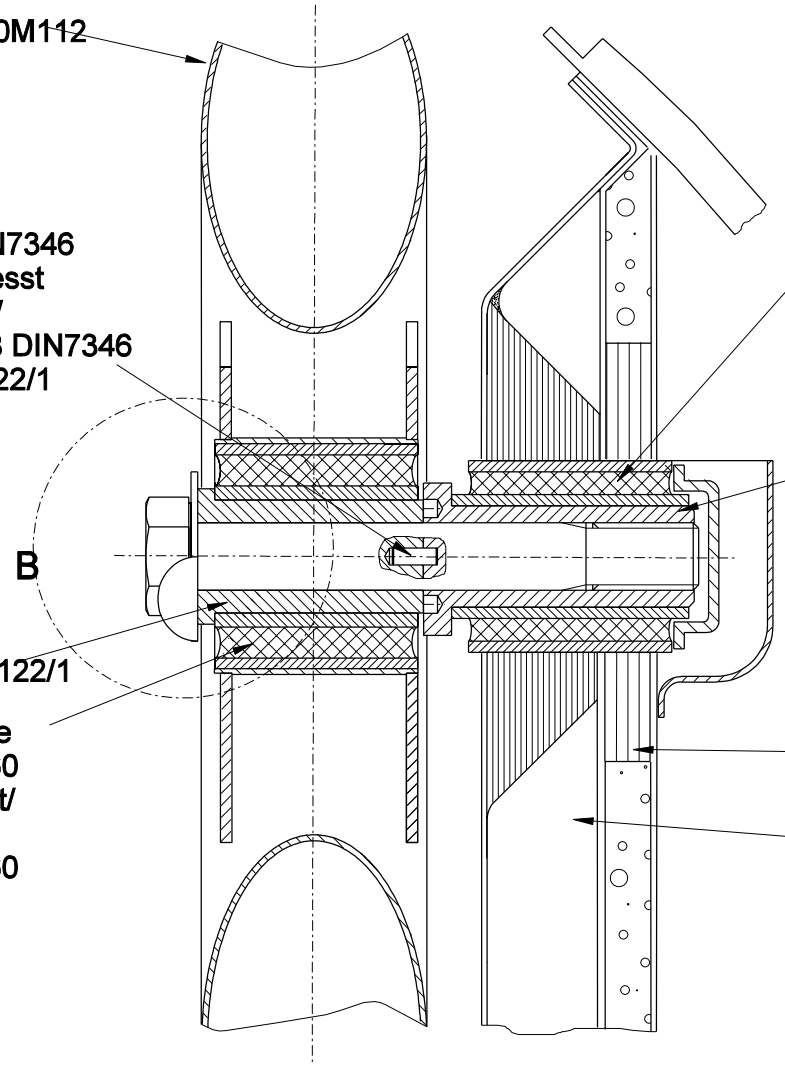
Triebwerkshauptlager
main powerplant hinge

Ausgabe Oktober 2010
issued October 2010

Diagramm 22
diagram 22

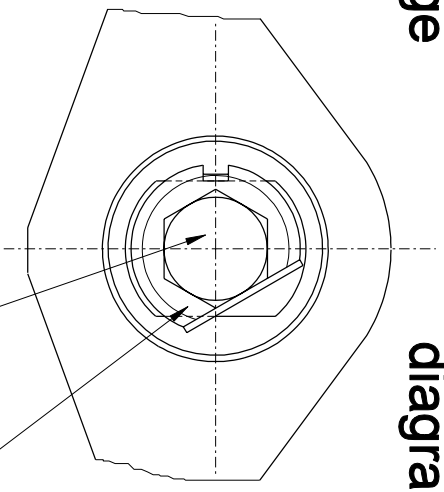
Ansicht von rechts
(nur Propellerträger 10M112)
view from right hand side
(only propellermount 10M112)





Schnitt A-A
Ansicht von hinten, rechte Seite

Detail B



rear right cylinder head bolt
sealed

6,4 DIN 9021 Stzn

8M267

M6 x 22 LN 9037

8M266/2

M6 SSN 003

thimble 3 mm
DIN 6899 A

steel spring S37

Nicopress 28-3-M

Steel cable 3,2 mm

75

Nicopress 28-1-C

Seil 1,6 mm

thimble HC 2

M6x20 LN9037
6,4 DIN 125 Stzn
M6 SSN 003

5M153

Detail X
muffler lifting cable

Detail Z

8R125

5R188

bush 8M154/1

8,4 DIN125 Stzn

M8x38 LN9037
secured with Loctite 243

see detail X

5M153

3 x 6,4 DIN 125 Stzn
M6 SSN 003

5R186/2

8M140

Z

assembly of muffler
see drawing 5M155

5M151

muffler bungee see detail Y

pulley for
throttle cable

pulley assembly see detail Y

knot

Ty-rap

retaining bungee for muffler lifting cable
rubber cord dia. 2 mm

A

unstretched length 170 mm

A

cross section A-A

retaining bungee for muffler lifting cable

DU- bush 0508 DU

M5x25 DIN 931-8.8zn
5.3 DIN 9021-Stzn

8

Detail Y muffler bungee

Bowden inner 1,5x700
with nipple pressed on

shackle 5 mm, PI185205

heat shrink tubing
DERAY-I 1/2", blue

Ty-rap

25 mm with
muffler frame
fully up

pulley
9R92/2

rubber cord 6 mm

10R313/2

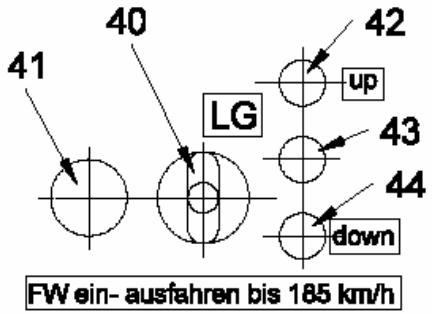
Clamps XO for 6mm rubber cord

nipple
2-23B 5x7,5

unstretched length 370 mm

Datenschilder elektrisch betätigtes Hauptfahrwerk DG-1000
placards electrically operated mainlanding gear DG-1000

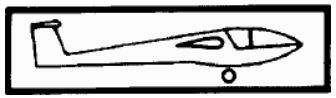
Bedienelemente und Anzeigen für das elektrisch betätigte Fahrwerk im vorderen und hinteren Cockpit jeweils links oben im Instrumentenbrett
Controls and control lights for the electrically operated landing gear in front and rear instrument panel (upper left hand side):



or english

LG ext.-retr. up to 185 km/h 100 kts.





45

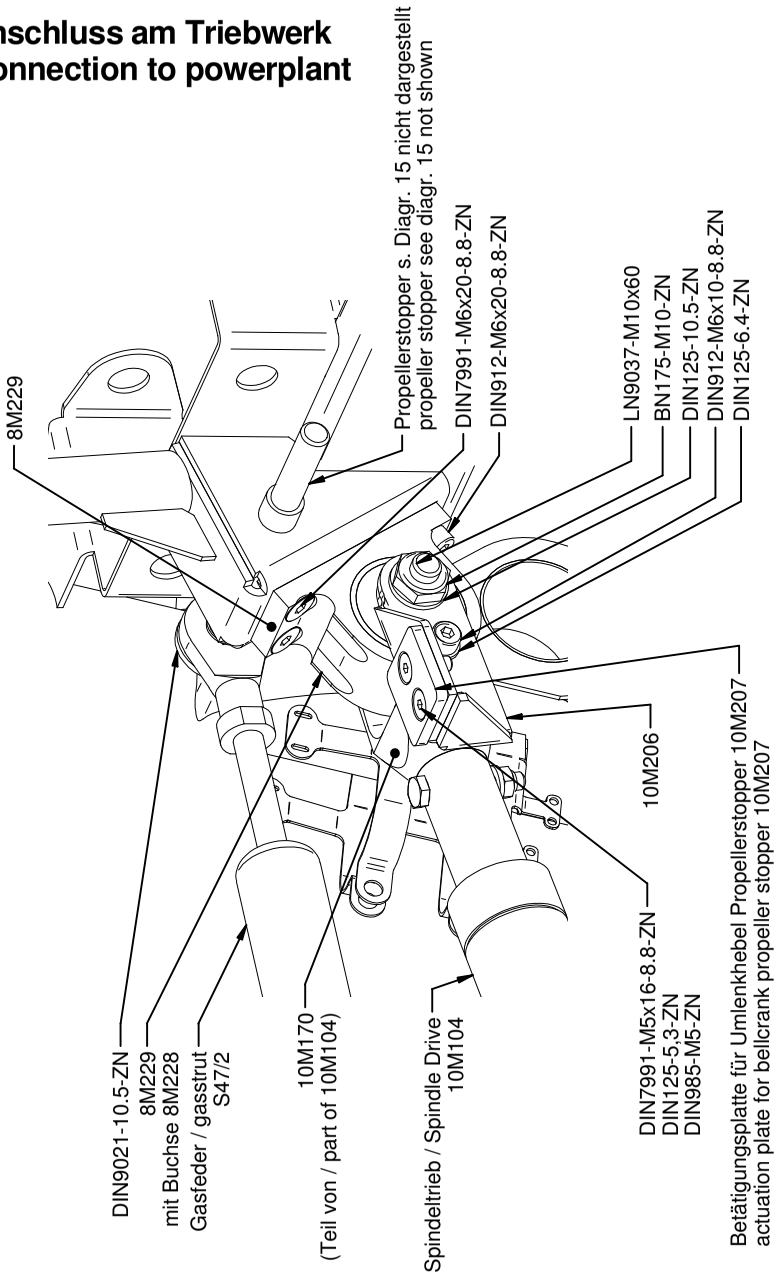
linke Bordwand vorderes und hinteres Cockpit
left fuselage wall front and rear cockpit

Diagramm 24
diagram
Ausgabe Oktober 2010
Issued October 2010

Aus-/ Einfahrmechanismus
Extension/ retraction mechanism

Diagramm 25
diagram 25

Anschluss am Triebwerk
Connection to powerplant



Ausgabe Oktober 2010
issued October 2010

Aus-/ Einfahrmechanismus
Extension/ retraction mechanism

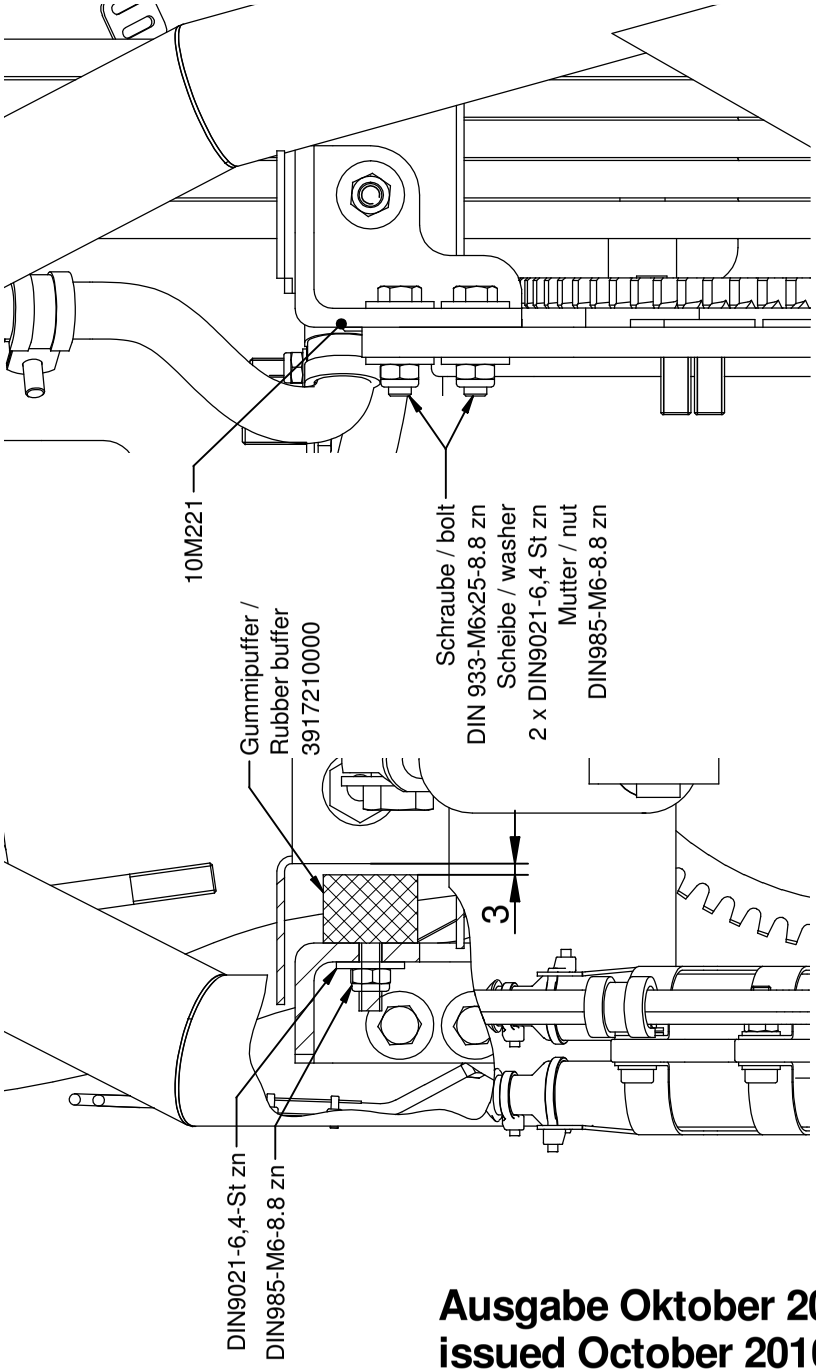
Diagramm 26
diagram 26

Anschluss am Rumpf
Connection to fuselage

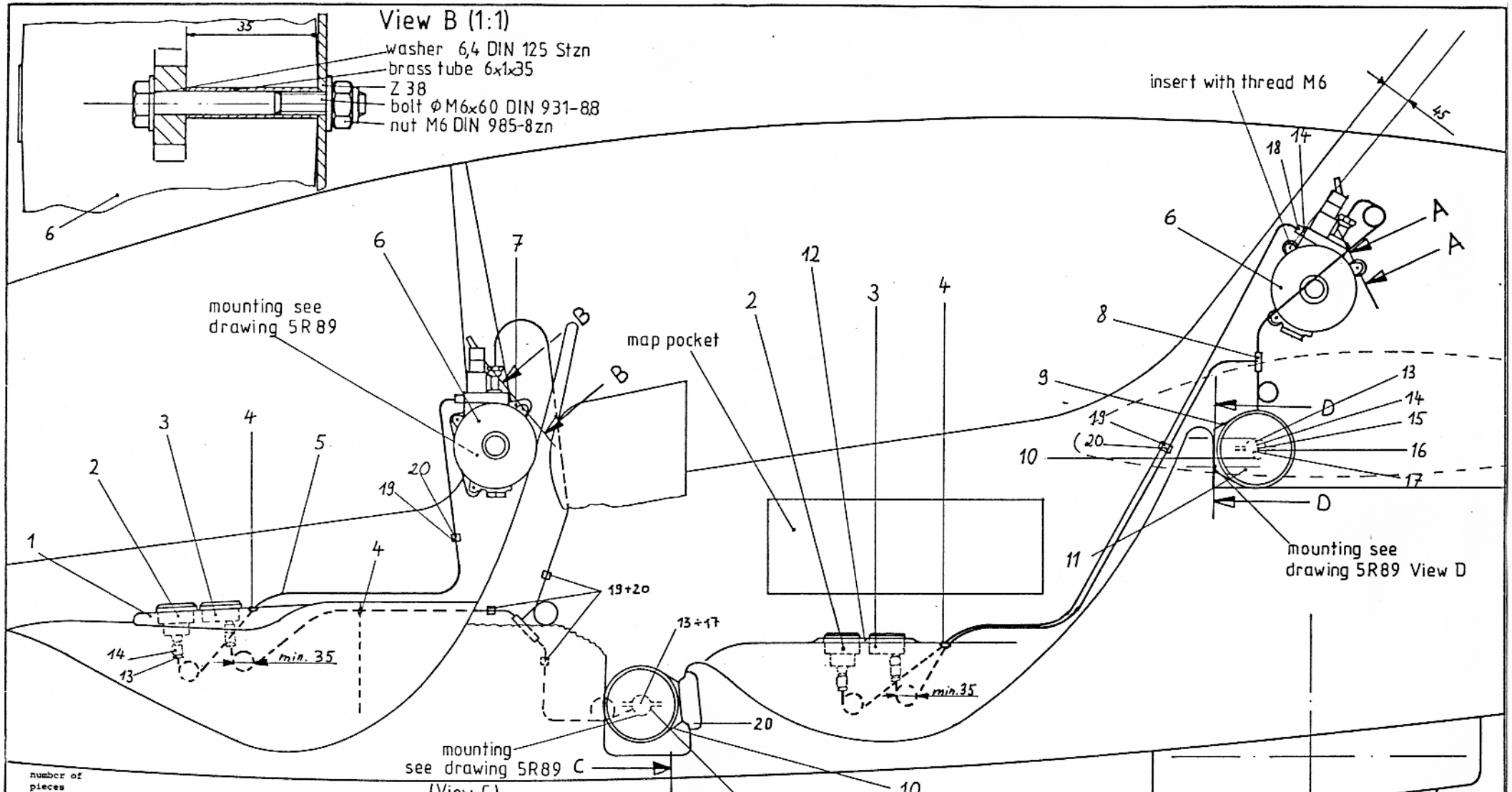
Ausgabe Oktober 2010
issued October 2010

Motor-Verdrehbegrenzung
Engine-tilt limit stop

Diagramm 27
diagram 27



Ausgabe Oktober 2010
issued October 2010



	number of pieces		
1	1	5RU111	panel for oxygen instruments
2	2	E6995	blinker
3	1	E5368	pressure gauge
4	3	HV 160	rubbersleeve
5	7m		copper tube
6	2	E20088	diluter demand O_2 regulator
7	1	Z38	mounting plate
8	2	E6826	filter
9	2	Z37	oxygen bottle holder
10	2	Z36	oxygen bottle holder
11	2		oxygen bottle (3 litre)
12	1	5RU112	panel for oxygen instruments rear
13	6	R10665	coupling screw
14	8	R10666	sleeve
15	2	E22165	pipe connection
16	2	E20971	coupling nut
17	2	D15071	gasket
18	2	R6994	coupling screw
19	5	502625	cable holder
20	5		ty-rap
21	1	5RU104	gfrp pedestal
22	1	5RU105	gfrp pedestal

min. radius of the copper tubes is 15mm
the ends of the copper tubes must be flared with the correct flare tool

	Ausg.	Änderung	Am	Tag	Name

	Tag	Name
Gez.	5.7.90	Geiger
Gepr.		
Norm		

Maßstab

Maße ohne Toleranzang. nach:

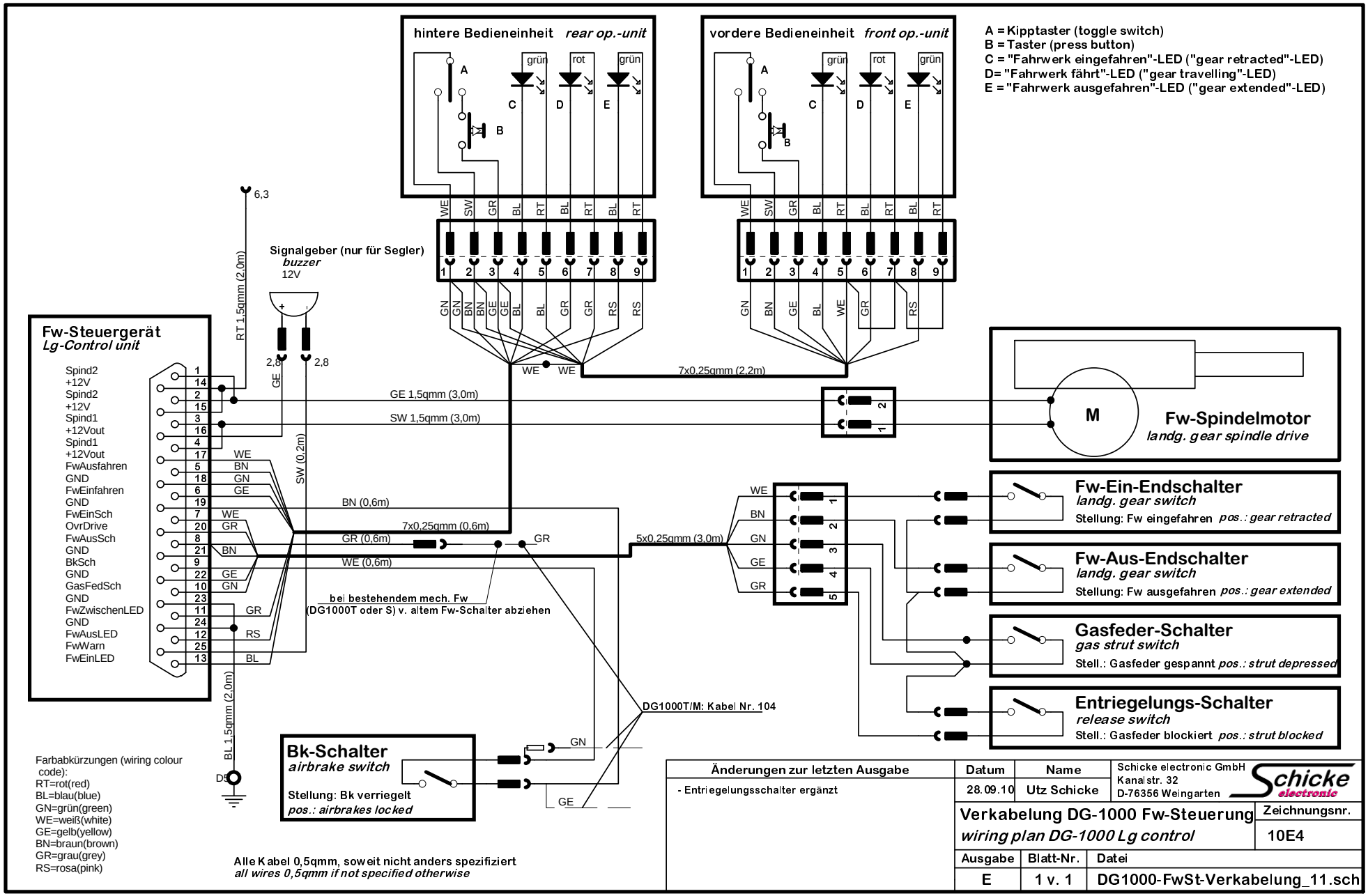
see also drawing 5R89

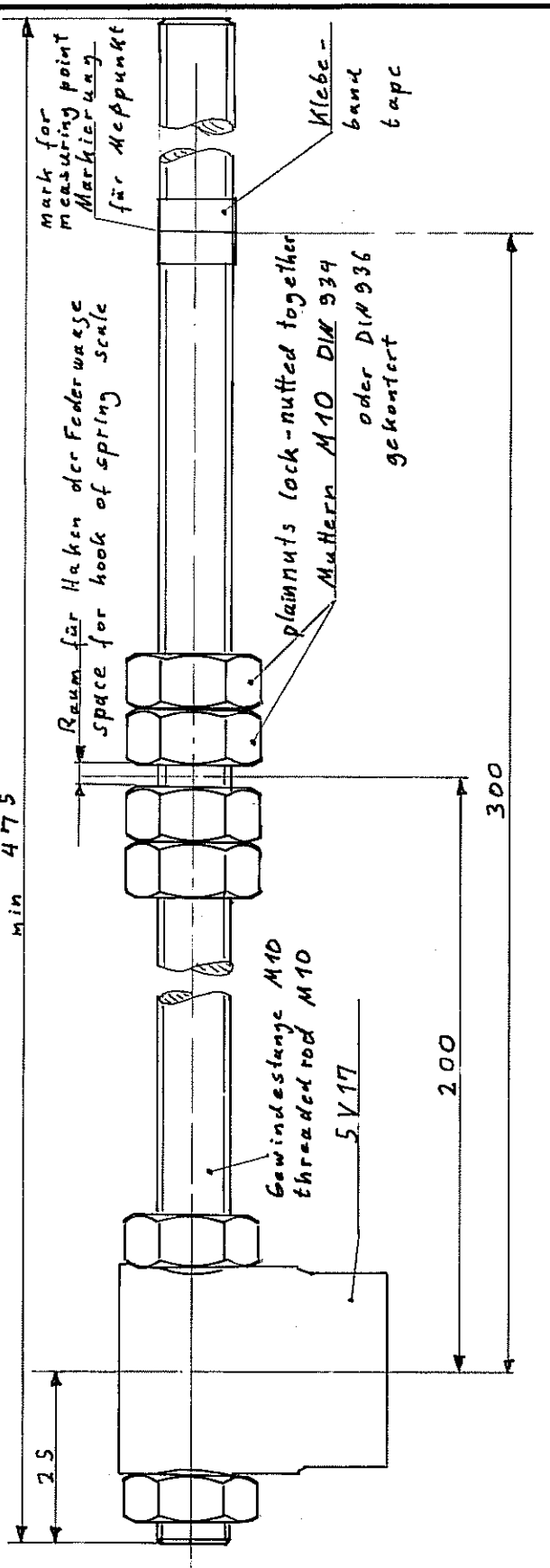
installation sketch
oxygen system
DG 500 M

Glaser-Dirks Flugzeugbau GmbH
7520 Bruchsal 4
Im Schollengarten 19-20

DG

5 EP 31


hintere Bedieneinheit rear op.-unit
vordere Bedieneinheit front op.-unit
A = Kipptaster (toggle switch)
B = Taster (press button)
C = "Fahrwerk eingefahren"-LED ("gear retracted"-LED)
D= "Fahrwerk fährt"-LED ("gear travelling"-LED)
E = "Fahrwerk ausgefahren"-LED ("gear extended"-LED)
grün
rot
Signalgeber (nur für Segler)
buzzer
12V
6,3
RT 1,5qmm (2,0m)
Fw-Steuergerät
Lg-Control unit
Spind2
+12V
Spind2
+12V
Spind1
+12Vout
Spind1
+12Vout
FwAusfahren
GND
FwEinfahren
GND
FwEinSch
OvrDrive
FwAusSch
GND
BkSch
GND
GasFedSch
GND
FwZwischenLED
GND
FwAusLED
FwWarn
FwEinLED
GE 1,5qmm (3,0m)
SW 1,5qmm (3,0m)
SW (0,2m)
BN (0,6m)
7x0,25qmm (0,6m)
GR (0,6m)
WE (0,6m)
7x0,25qmm (2,2m)
5x0,25qmm (3,0m)
bei bestehendem mech. Fw
(DG1000T oder S) v. altem Fw-Schalter abziehen
DG1000T/M: Kabel Nr. 104
BL 1,5qmm (2,0m)
M
Fw-Spindelmotor
landg. gear spindle drive
Fw-Ein-Endschalter
landg. gear switch
Stellung: Fw eingefahren pos.: gear retracted
Fw-Aus-Endschalter
landg. gear switch
Stellung: Fw ausgefahren pos.: gear extended
Gasfeder-Schalter
gas strut switch
Stell.: Gasfeder gespannt pos.: strut depressed
Entriegelungs-Schalter
release switch
Stell.: Gasfeder blockiert pos.: strut blocked
Bk-Schalter
airbrake switch
Stellung: Bk verriegelt
pos.: airbrakes locked
Farbabkürzungen (wiring colour code):
RT=rot(red)
BL=blau(blue)
GN=grün(green)
WE=weiß(white)
GE=gelb(yellow)
BN=braun(brown)
GR=grau(grey)
RS=rosa(pink)
Alle Kabel 0,5qmm, soweit nicht anders spezifiziert
all wires 0,5qmm if not specified otherwise
Änderungen zur letzten Ausgabe
- Entriegelungsschalter ergänzt
Datum
28.09.10
Name
Utz Schicke
Schicke electronic GmbH
Kanalstr. 32
D-76356 Weingarten
Schicke electronic
Verkabelung DG-1000 Fw-Steuerung
wiring plan DG-1000 Lg control
Zeichnungsnr.
10E4
Ausgabe
E
Blatt-Nr.
1 v. 1
Datei
DG1000-FwSt-Verkabelung_11.sch



	Tag	Name
Gez.	14.12.79	W. Dirks
Gepr.		
Norm.		

Maßstab: 1:1

Maße ohne Toleranz-ang. nach:

Prüfwerkzeug für Bremsklappeneinstellung

Tool for air brake adjustment

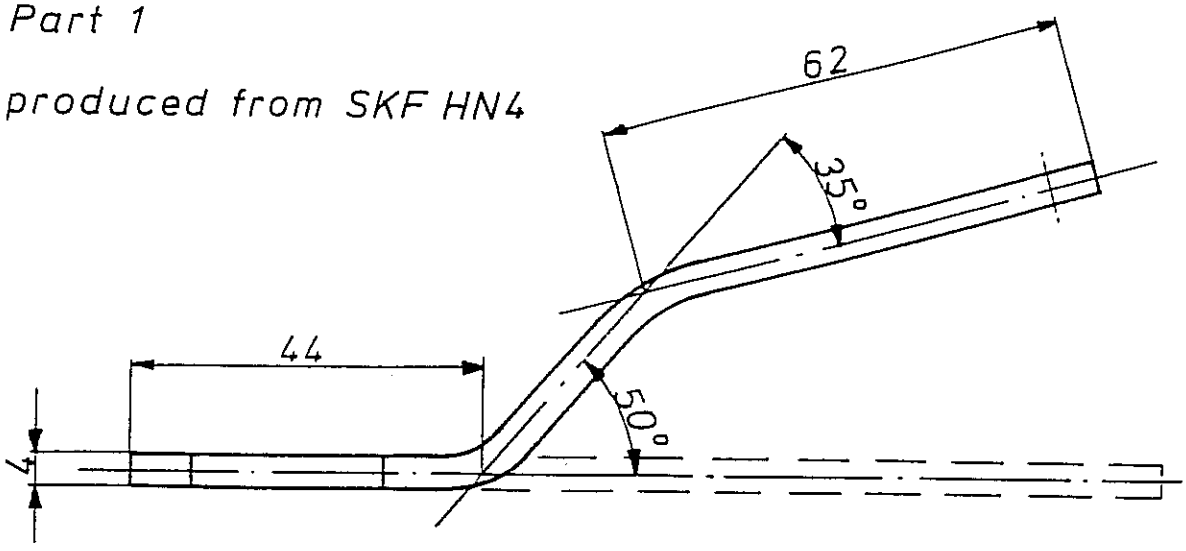
Ausg.	Änderung	ÄM	Tag	Name

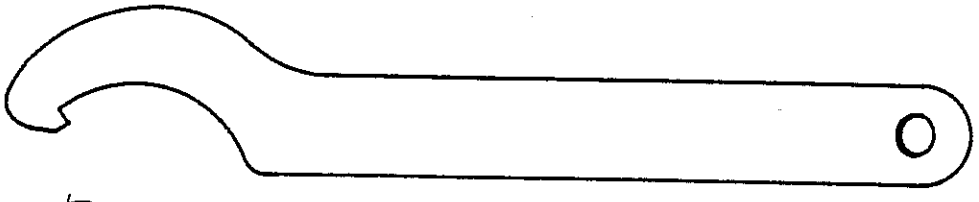
Glaser-Dirks Flugzeugbau GmbH
7520 Bruchsal 4
Im Schollengarten 19-20

SV 18

Part 1

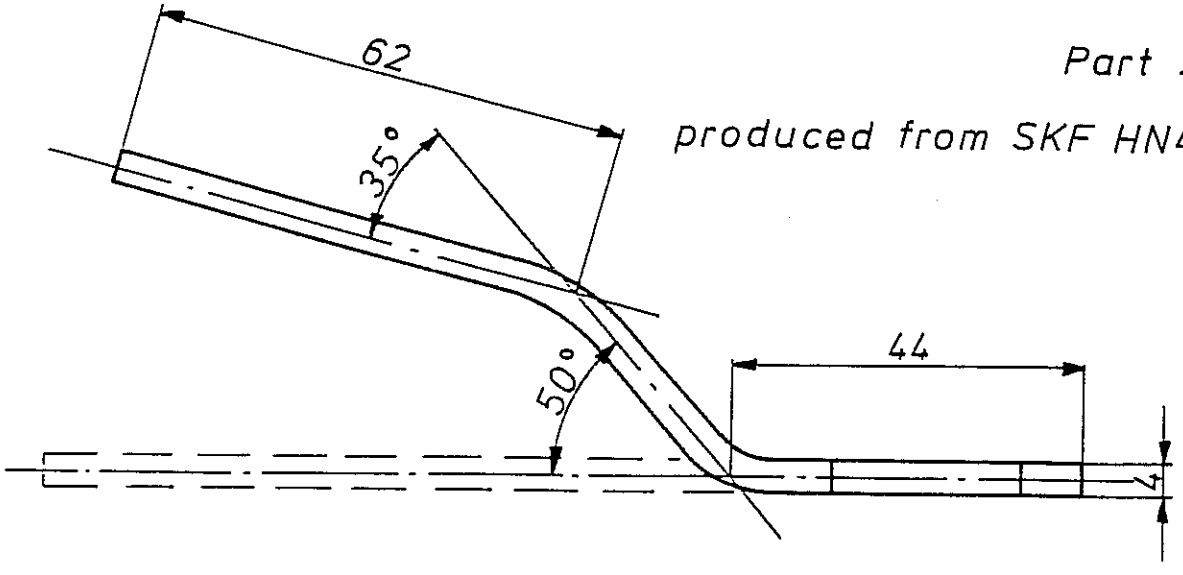
produced from SKF HN4

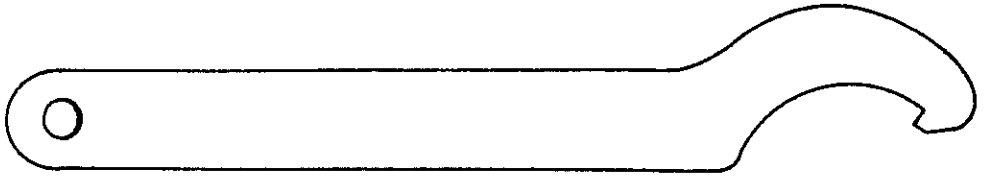




Part 2

produced from SKF HN4





					1996	Tag	Name
					Gez.	20.11	M. Gisbel
					Gepr.		
					Norm.		
Ausg.	Änderung	ÄM	Tag	Name			

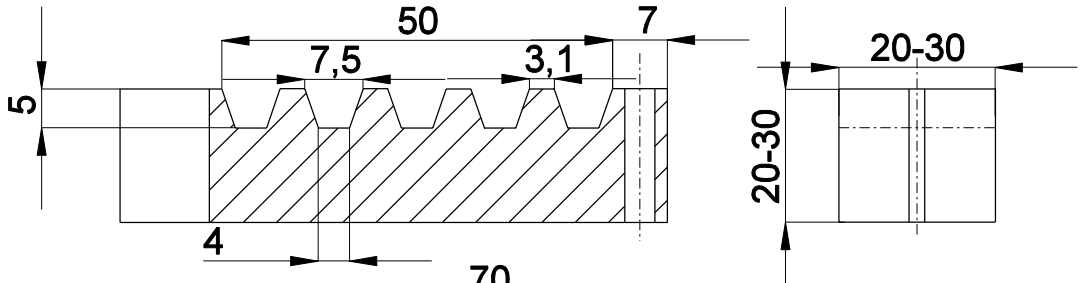
Maßstab 1:1

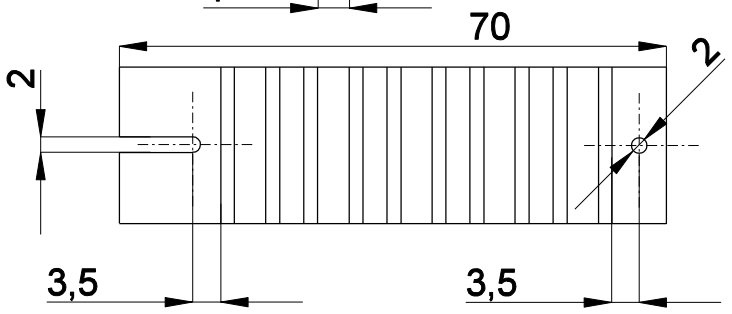
Maße ohne Toleranzang. nach

Drawing hook spanner for bearings of upper drive belt pulley

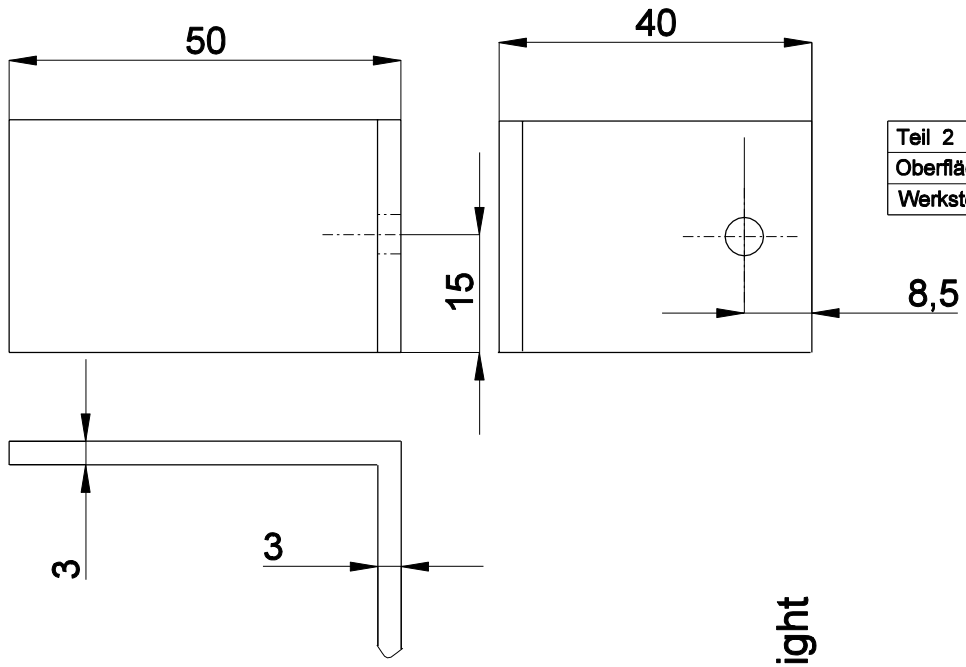
Glaser-Dirks Flugzeugbau GmbH
76646 Bruchsal 4
Im Schollengarten 19-20

W 51

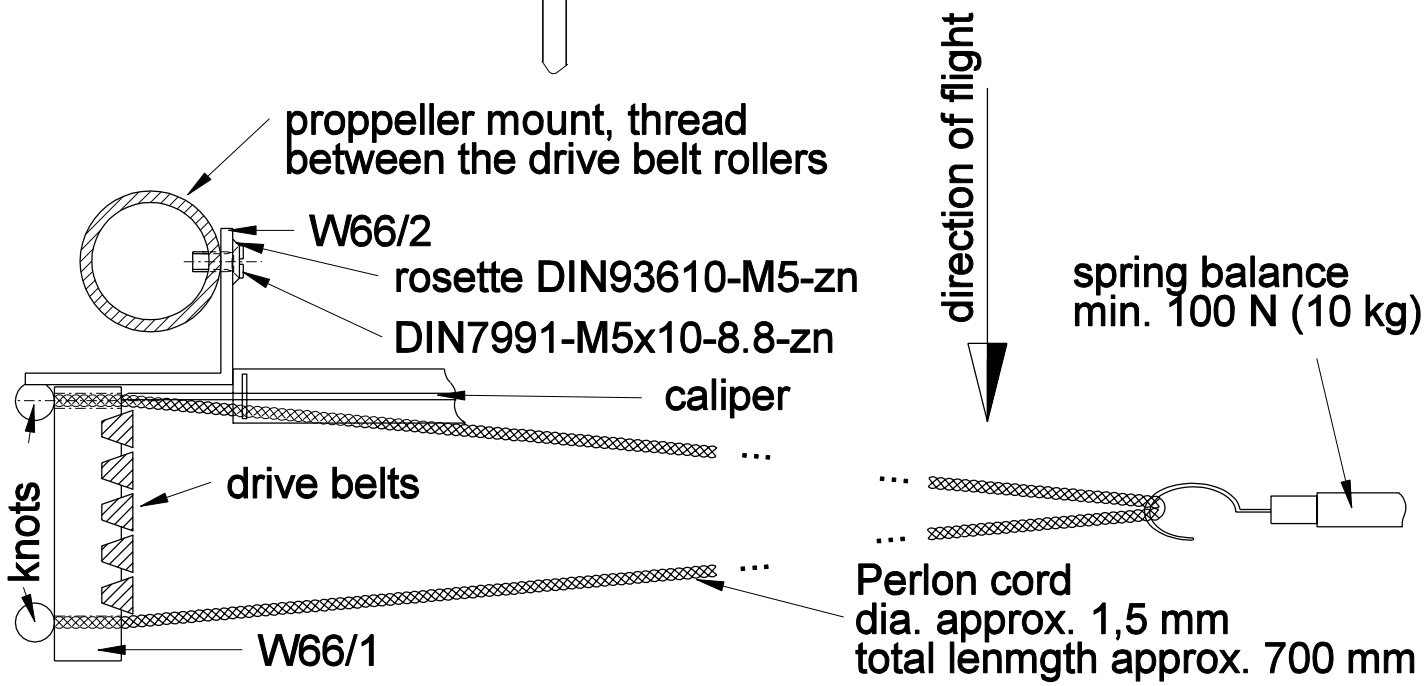




Teil 1	Stück 1
Oberflächenschutz: /	
Werkstoff: Holzleiste	



Teil 2	Stück 1
Oberflächenschutz: /	
Werkstoff: AlMgSi Winkel 40x50x3	



Toleranzen nach Arbeitsanweisung BA 1				
Schweißen nach Arbeitsanweisung SA 1				
Ausg.	Änderung	ÄM	Tag	Name

	Tag	Name
Gez.	17.09.10	Zierahn
Gepr.		
Norm.		

Maßstab 1:1

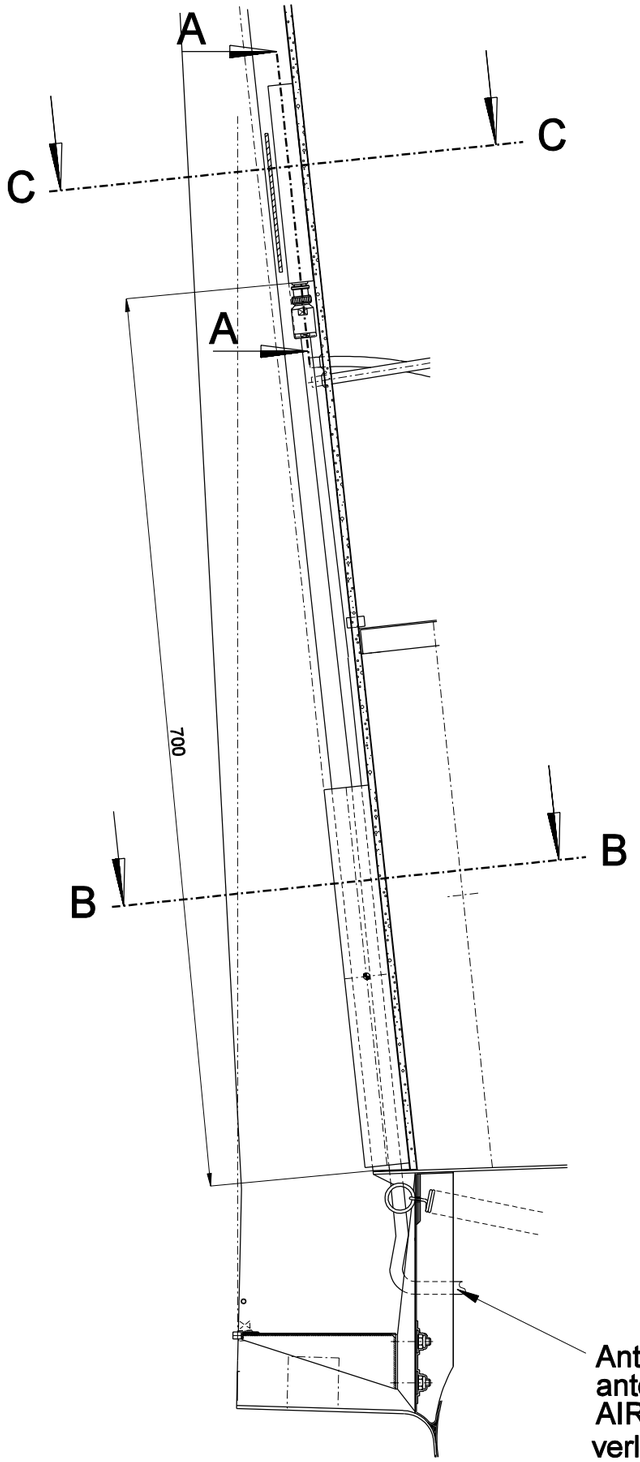
Maße ohne Toleranz-ang. nach:

measuring tool for
drive belt tension

1 tool
2 bracket

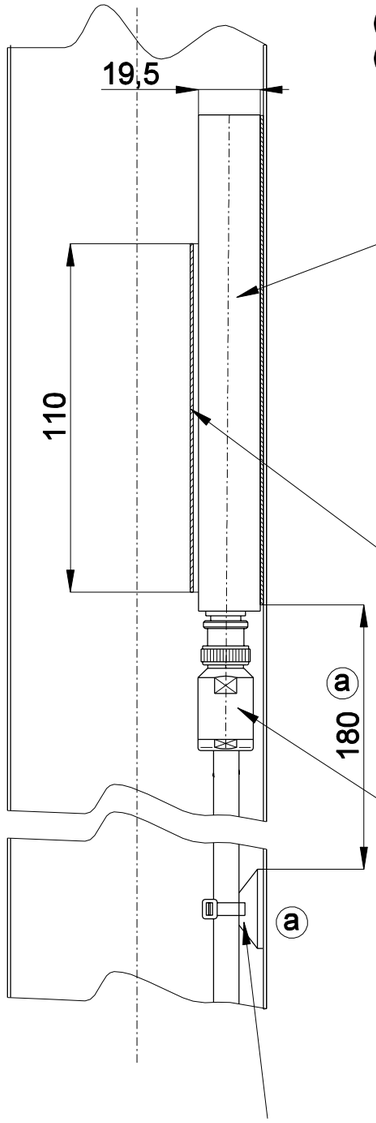
DG
Flugzeugbau GmbH
76646 Bruchsal 4
Im Schollengarten 20

W66



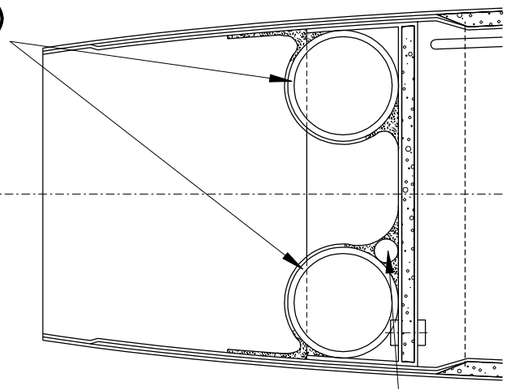
Antennenkabel
antenna cable
AIRCELL 7
verlegt in rechter Rumpfseite
(siehe Zeichnung 10L01 ab Ausgabe d)
routed in right hand fuselage side
(see drawing 10L01 from issue d on)

Schnitt A-A M 1:2
cross section



TyRap-Halter + Ty-Rap
ty-rap holder + ty-rap

Schnitt B-B M 1:2
cross section



Rohr / tube 35x2 mm
(Einbau siehe Zeichnung 10L51)
(installation see drawing 10L51)

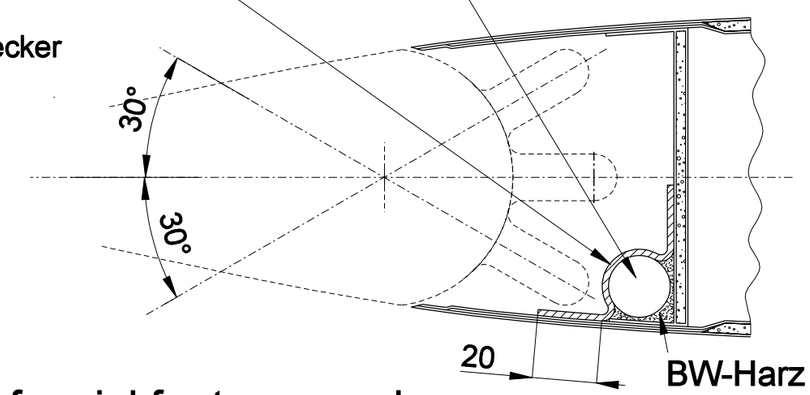
Transponderantenne BD1
transponder antenna

Antennenkabel
antenna cable
AIRCELL 7

2 Lagen / 2 layers
92125 +-45° 100mmx110mm

BNC-Stecker
plug

Schnitt C-C M 1:2
cross section



BW-Harz
resin thickened
with cotton flocks

Installation of aerial for transponder in vertical fin DG-1000

Toleranzen nach Arbeitsanweisung BA 1				
Schweißen nach Arbeitsanweisung SA 1				
a	nur 1 Tyrap-Halter, an Flosse statt an Steg	ab 10-124	18.04.08	W.Dirks
Ausg.	Änderung	ÄM	Tag	Name

	Tag	Name
Gez.	09.03.07	Bruchmüller
Gepr.		
Norm.		

DG Flugzeugbau GmbH
76646 Bruchsal
Otto-Lilienthal-Weg 2

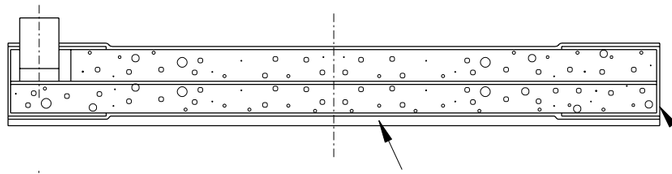
Maßstab 1:2 1:5

Maße ohne Toleranz-ang. nach:

Transponderantenne in Seitenflosse
DG-1000

Z181

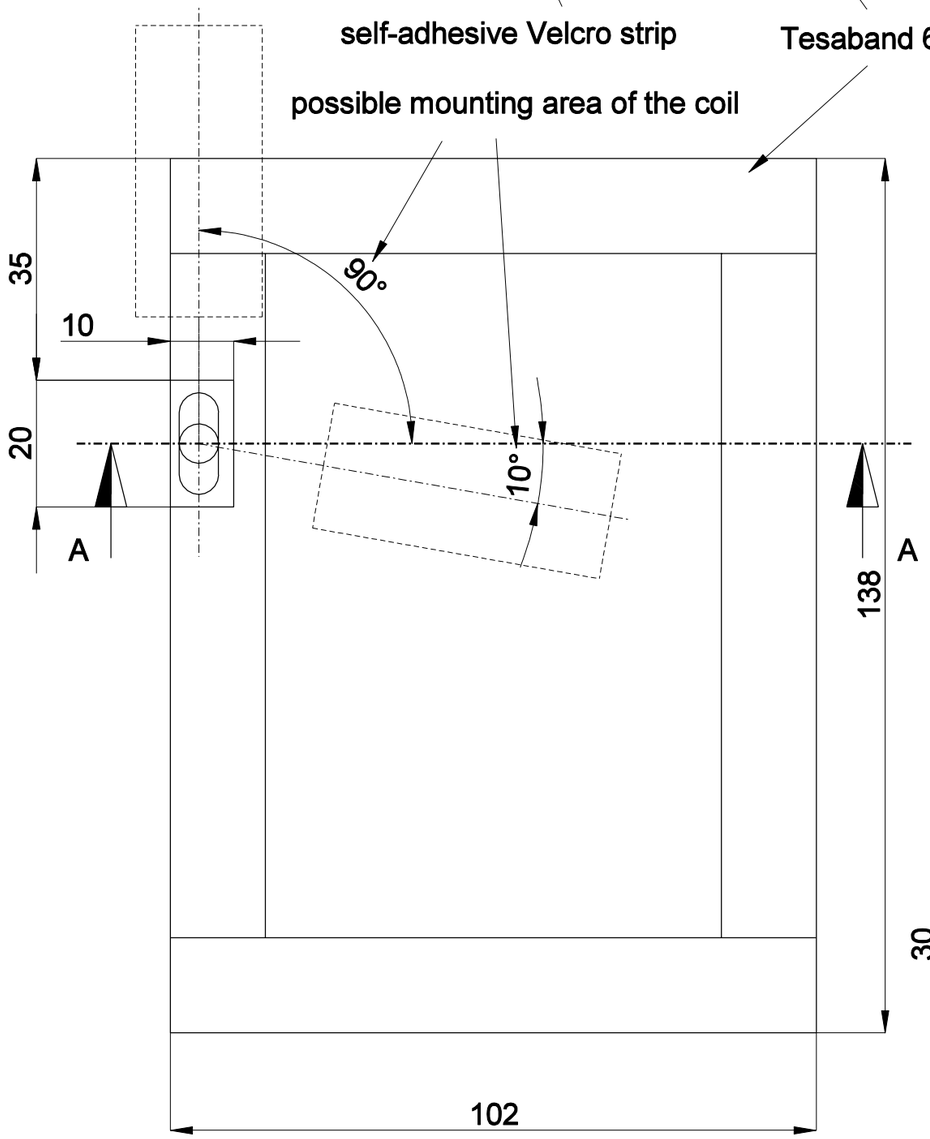
cross section A-A



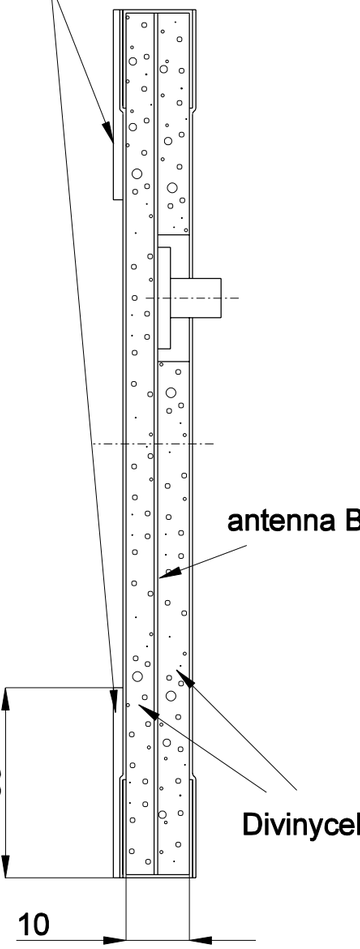
self-adhesive Velcro strip

Tesaband 651

possible mounting area of the coil

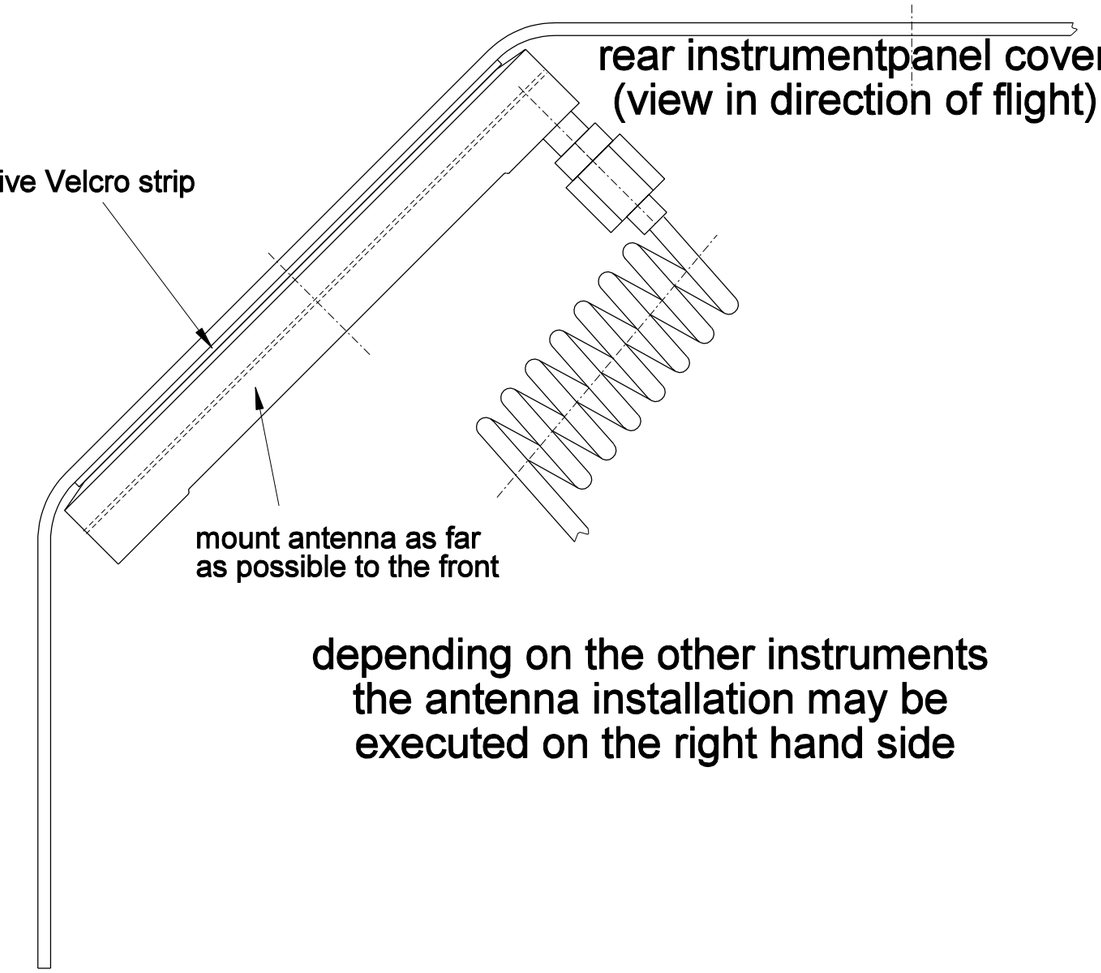


self-adhesive Velcro strip



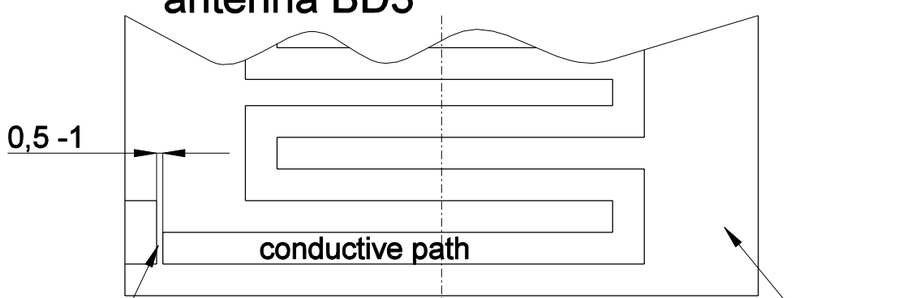
Divinycell H60 5 mm thick 102 mm x 136 mm

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				
Schweißen nach Arbeitsanweisung SA 1				
Ausg.	Änderung	ÄM	Tag	Name

	Tag	Name
Gez.	04.11.09	C. Stein.
Gepr.		
Norm.		

Maßstab 1:1 :

Maße ohne Toleranz-ang. nach:

406 MHZ ELT
antenna BD3
installation 2-seaters

DG Flugzeugbau GmbH
76646 Bruchsal
Otto-Lilienthal-Weg 2

Z193

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

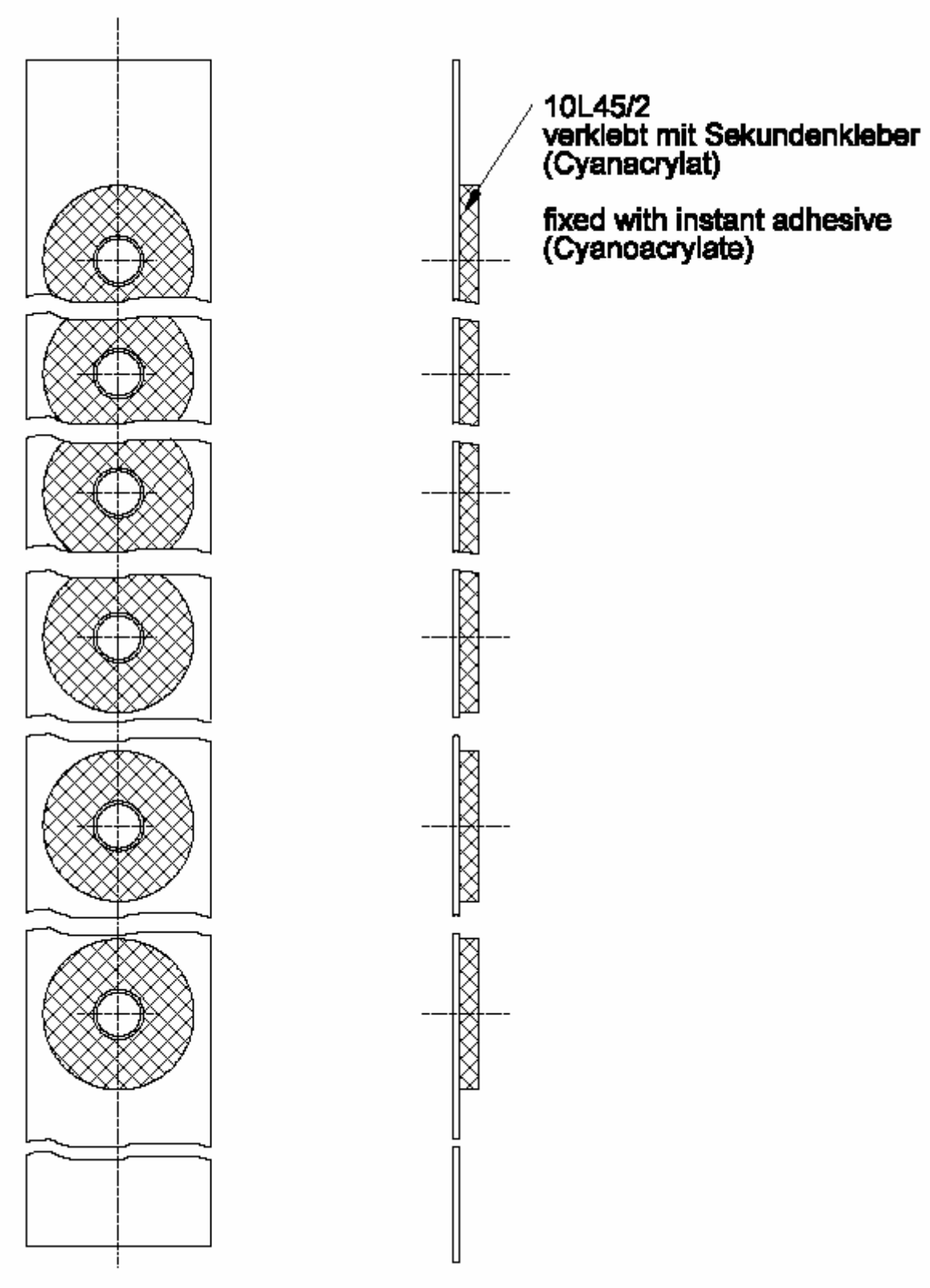
Remarks : The instructions may be executed by the owner himself.

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:



Rudder control operated by hand

Part designations see MM diagram 2a

In the following text the changes to those sections of the maintenance manual which are effected by the installation of the manual rudder control will be given.

Section 1.3 Rudder control

new subsection

1.3.7 Rudder control operated by hand

1.3.7.1 General

System see diagram 2a for **ser. No. 10-265**, resp. diagram 2b **from ser. No. 10-283 on**.

Position of placards see diagram 12a.

To enable handicapped pilots to operate the DG-1000 an optional hand operated rudder control system for left hand operation has been developed. This system is only available for the front seat.

The normal rudder control system will not be waived to allow normal operation of the DG-1000 too. The handle must not and can't be removed for normal operation.

1.3.7.2 Adjustment

With the hand operated rudder control the rudder cable system is no more an open circuit, so the tensions of the cables must be adjusted, see section 4.12.

Section 2 Inspections

2.1 Daily inspection

- With optional hand operated rudder control: Check especially the rudder control for slack in the cable system. If the cables are not tensioned full rudder displacements via the manual control are not possible (see section 4.12).

Section 3 Maintenance

3.3 Greasing and oiling

B

Apply "Molykote BR2 Plus" to part 10St130. No other grease or oil is permitted.

Caution: If 10St130 was greased inadvertently you have to disassemble parts 10St130 and 10St131, clean them completely with Acetone and apply "Molykote BR2 Plus" to 10St130 again.

Section 4 Detailed instructions for assembly and servicing work

New subsection

4.12 Servicing the hand operated rudder control

4.12.1 Rudder cables

Check rudder deflections, if full deflection is not reached increase the cable tension: Dismount cables at rudder and twist cables counter-clockwise (maximum 10 turns). Check if rudder deflection is symmetrical.

Caution: Never twist cables clockwise!

Only **from ser. No. 10-283 on**:
Should more than 10 turns be necessary for alignment, the cable between the rear rudder pedals may be tightened, see section 4.12.2. In case the adjustment range is not sufficient exchange the cables between rudder and rear rudder pedals against new shorter cables.

4.12.2 Connection between right and left rudder cables

Ser.No. 10-256: Connecting cables are installed between front rudder pedals and bell-crank 10St141
The length of these cables was determined during factory installation. When exchanging these cables produce cables with the same length as the existing cables.
Note: When rudder cables have elongated this problem may be rectified by producing shorter connection cables or installation of new shorter cables between rear pedals and rudder.

From ser.No. 10-283 on: A connecting cable is installed between the rear rudder pedals and may be tightened.
To accomplish tightening loosen the counter-nuts at the adjustment screw R79/3 located at the rear rudder pedal at the connection to the upper cable. Remove the adjustment screw. Remove the old Loctite. Apply new Loctite 243 to the screw R79/3 and reassemble the unit. Tighten the cable via R79/3 and the counter nuts, all items must be performed as long as the Loctite is still liquid.

Section 8 Parts list

New Subsection

8.5 Parts for the manual rudder control

For all ser.No.:

10St130	Guide rod for handle
10St131	Handle
10St132	Pushrod
10St133	Linear guide cylinder
10St143	Airbrake guide plate (with notches)
10St144	Bushes
10St145	Linear guide piston
	Special grease Molykote BR2 Plus

Only for ser.No. 10-256:

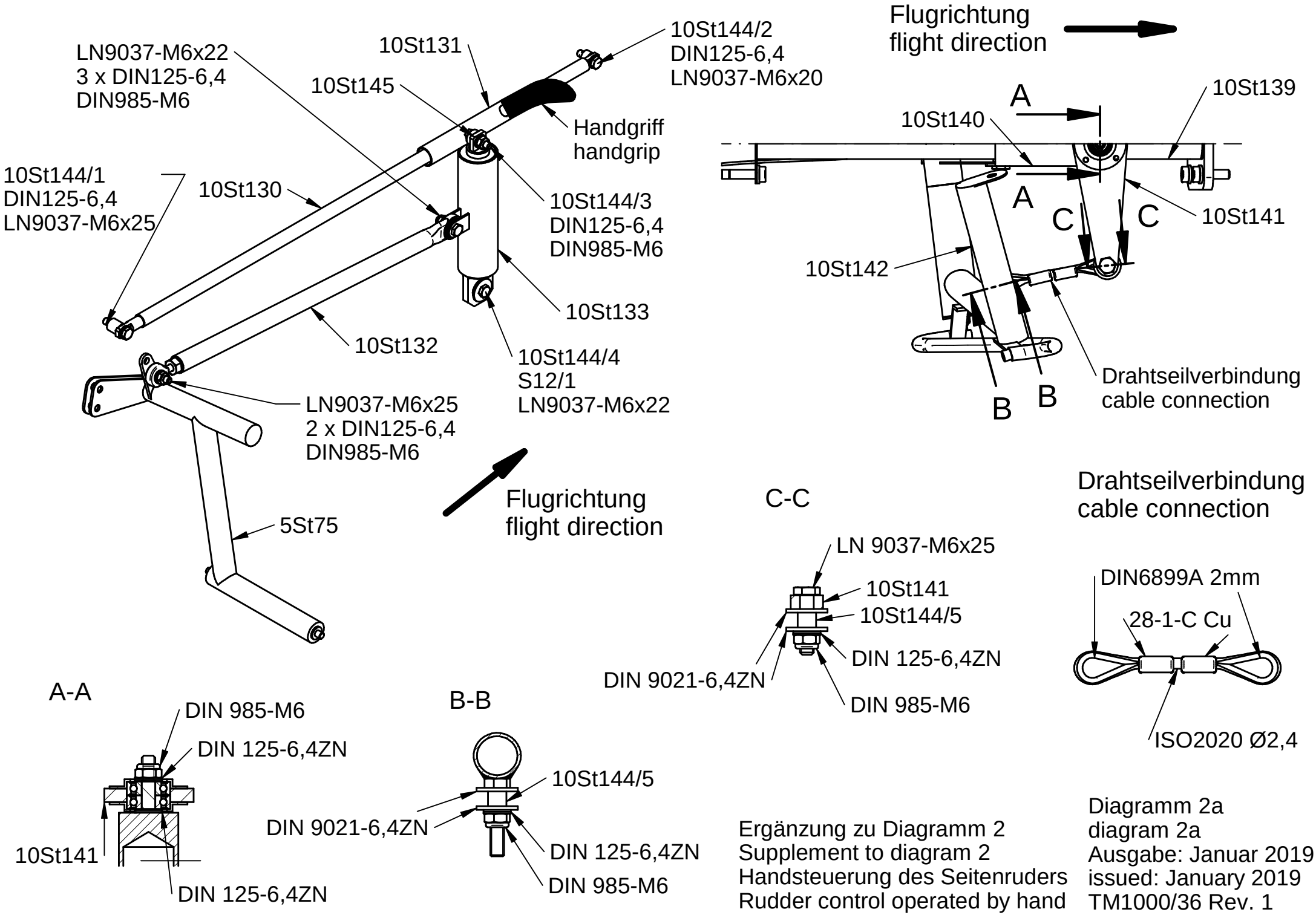
10St139	Reinforcement pedal guide tubes
10St140	Modification Pedal block
10St141	Bell-crank
10St142	Modification rudder pedals

From ser.No. 10-283 on:

R73/1	Pulley 2 pieces
R79/3	Adjustment screw
	Fork end S 6x24 DIN 71751
	Fork end S 6x12 DIN 71751 left hand thread
	2 pieces bolt 6H11 16x13,5 DIN 1434 St
	2 piece split pin 1,6 DIN 94 Zn
	2 piece washer DIN 125 6,3 StZn
	Special grease Molykote BR2 Plus
	Loctite 243

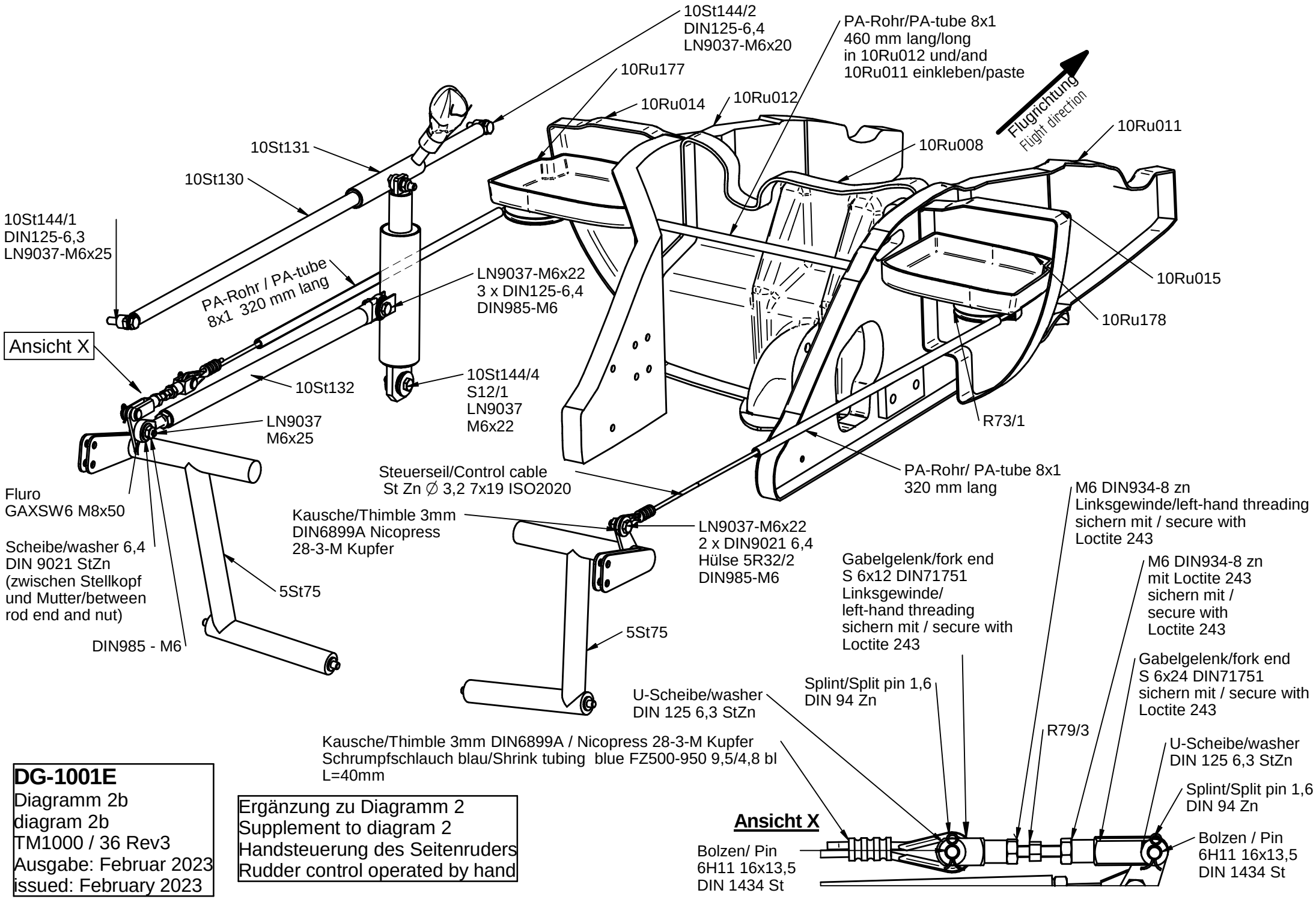
Attachments to enclosure 1

Diagram		issued
2a	Rudder control operated by hand, supplement to diagram 2 for **ser.No. 10-265**	January 2019
2b	dto. **from ser.No. 10-283 on**	February 2023
12a	Placards with rudder control operated by hand	August 2018



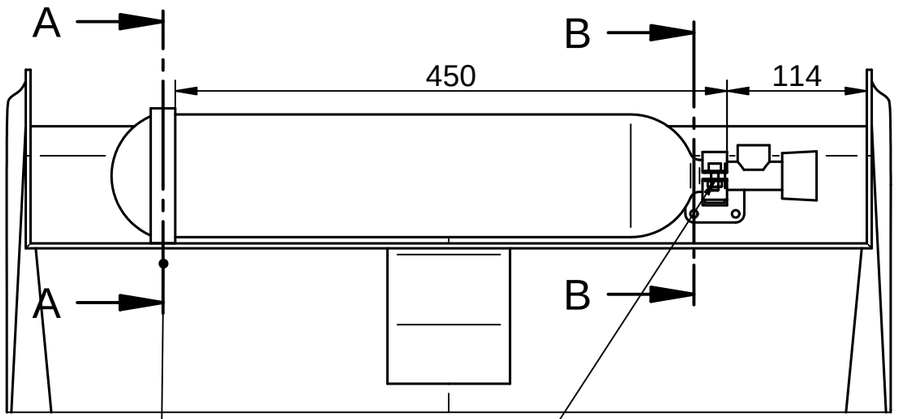
Ergänzung zu Diagramm 2
Supplement to diagram 2
Handsteuerung des Seitenruders
Rudder control operated by hand

Diagramm 2a
diagram 2a
Ausgabe: Januar 2019
issued: January 2019
TM1000/36 Rev. 1



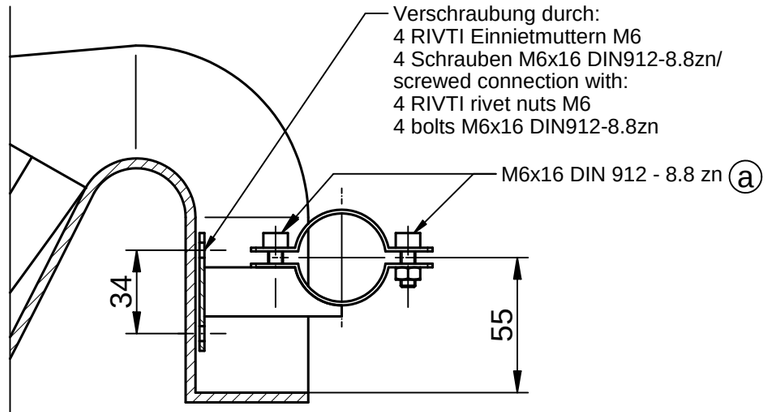
DG-1001E
Diagramm 2b
diagram 2b
TM1000 / 36 Rev3
Ausgabe: Februar 2023
issued: February 2023

Ergänzung zu Diagramm 2
Supplement to diagram 2
Handsteuerung des Seitenruders
Rudder control operated by hand



Halterung für
Sauerstoffflasche Z37/
holder for oxygen cylinder

Halterung für
Sauerstoffflasche Z36/
holder for oxygen cylinder



Schnitt B-B

Montage Gepäckraum/Installation in baggage compartment

Montage Fußraum (Blickrichtung entgegesetzt Flugrichtung)/ Installation behind pilots feet (view against direction of flieght)

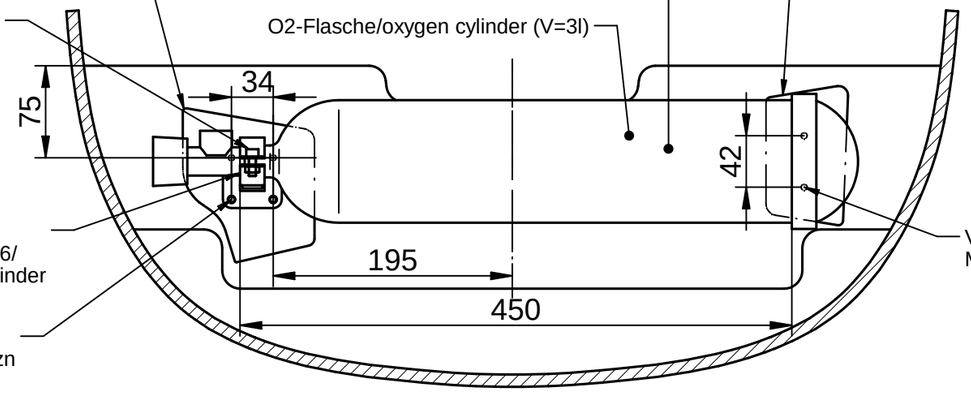
5Ru105 bei W.Nr. 10-264, 10-265, 10-267, 10-269, 10-270 und ab W.Nr. 10-275 in 10Ru32/2 integriert/ 5Ru105 for ser.No. 10-264, 10-265, 10-267, 10-269, 10-270 and from ser.No. 10-275 on integrated in 10Ru32/2

Halterung für Sauerstoffflasche Z37/ holder for oxygen cylinder

5Ru104 bei W.Nr. 10-264, 10-265, 10-267, 10-269, 10-270 und ab W.Nr. 10-275 in 10Ru32/3 integriert/ 5Ru104 for ser.No. 10-264, 10-265, 10-267, 10-269, 10-270 and from ser.No. 10-275 on integrated in 10Ru32/3

4x M6x16 DIN 912 - 8.8 zn ⓐ

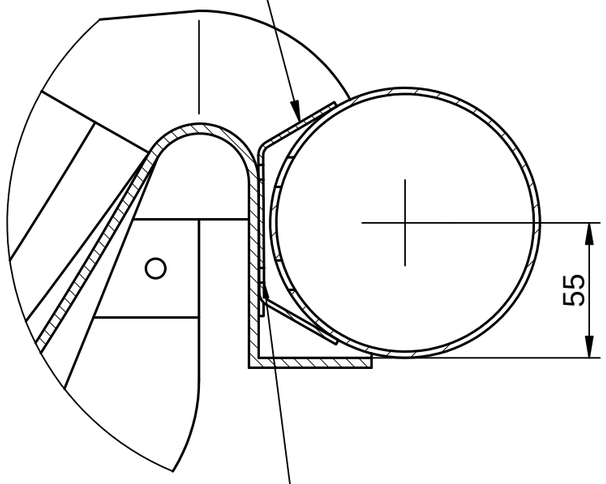
O2-Flasche/oxygen cylinder (V=3l)



Halterung für
Sauerstoffflasche Z36/
holder for oxygen cylinder

Verschraubt mit 4x
M6x16 DIN 912 -8.8zn
ⓐ

Verschraubt mit 2x
M6x16 DIN 912 -8.8zn
ⓐ



Ansicht/view A

Halterung Z36 ausgeblendet
holder Z36 not shown

Verschraubung durch:
2 RIVTI Einnietmuttern M6
2 Schrauben M6x16 DIN912-8.8zn/
screwed connection with:
2 RIVTI rivet nuts M6
2 bolts M6x16 DIN912-8.8zn

Rev.	Change Description	S/N	Date	Name
a	Verschraubung hinzugefügt		09.08.19	Schenk

	Date	Name
Design	09.01.19	Breidenbach
Checked	26.09.19	
Approved		

Scale: 1:x

General Tolerance according to: BA1
Welding according to: SA1

Einbau Sauerstoffflaschen 3L/
Installation of 3L oxygen cylinders

Next Assembly:

DG Flugzeugbau GmbH
76646 Bruchsal
Otto-Lilienthal-Weg 2

10R146

Solid Edge

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