DG Aviation GmbH

INSTRUCTIONS FOR CONTINUED AIRWORTHINESS

MAINTENANCE MANUAL

FOR THE MOTORGLIDER

DG-1001E

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0 General

0.1 Manual amendments

No.	Page	Description	Date
1	0.2, 0.4, 0.6, 0.8, 0.11, 1.3, 1.4, 1.8, 1.11. 1.18 - 1.21, 2.1, 2.3, 3.4, 4.19, 4.20, 5.1, 8.2, diagram 5b, diagram 9, 10E250	TN1000/48 Larger FES batteries GEN4 16S, adjustment of elevator free play, FCU updating procedure	October 2023

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0.2 List of effective pages

Section	page	issued	replaced	replaced	replaced	replaced
0	Title	December 2022				
	0.2	see manual amendments				
	0.3	“				
	0.4	“				
	0.5	“				
	0.6	“				
	0.7	December 2022				
	0.8	“	October 23			
	0.9	“				
	0.10	“				
	0.11	“	October 23			
1	1.1	December 2022				
	1.2	“				
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	1.4	“	October 23			
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	1.6	“				
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	1.8	“	October 23			
	1.9	“				
	1.10.	“				
	1.11	“	October 23			
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	1.16	“				
	1.17	“				
	1.18	“	October 23			
	1.19	“	October 23			
	1.20	"	October 23			
	1.21	"	October 23			
	1.22	"				
	1.23	"				
	1.24	"				
	1.25	"				

Section	page	issued	replaced	replaced	replaced	replaced
2	2.1	December 2022	October 23			
	2.2	“				
	2.3	“	October 23			
	2.4	“				
	2.5	“				
	2.6	“				
	2.7	“				
3	3.1	December 2022				
	3.2	“				
	3.3	“				
	3.4	“	October 23			
4	4.1	December 2022				
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	4.3	“				
	4.4	“				
	4.5	“				
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	4.8	“				
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	4.10	“				
	4.11	“				
	4.12	“				
	4.13	“				
	4.14	“				
	4.15	“				
	4.16	“				
	4.17	“				
	4.18	„				
	4.19	„	October 23			
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	6.3	“				
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7	7.1	December 2022				
8	8.1	December 2022				
	8.2	“	October 23			
9	9.1	December 2022				

diagram	issued	replaced	replaced	replaced	replaced
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2	December 2018				
2b	December 2022				
3	December 2022				
4	December 2022				
5b	December 2022	October 23			
6a	March 2008				
8	March 2022				
9	March 2022	October 23			
11	March 2022				
11a	March 2022				
11b	Mai 2022				
20	Oct. 2021				
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22	December 2022				
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10FW2	5.10.1999				
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10R146	7.01.2019				

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10R146	Installation of 3L oxygen cylinders

0.4 Airworthiness limitations

0.4.1 Repairs

Repair or replace damaged parts prior to next flight. Follow the instructions of the DG-1001E repair manual for repairs of the airframe. Repairs outside the scope of DG-1001E repair manual and major repairs must be accomplished at a certified repair station or by a certified mechanic rated for composite aircraft structure work in accordance with DG repair methods 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 motor gliders and motor gliders was proofed for 12000 flight hours.
The initial life time for the DG-1001E 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.*

0.5 Further service information

0.5.1 Life time of components

Use only genuine spare parts. For part numbers see section 8 of this MM. After exchanging life limited parts change the “Summary of operating hours” for your glider by entering the replacement dates of the exchanged parts.

a) 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.
b) 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 **brake fluid of the wheel brake (option)** has to be exchanged every 4 years (types see section 1.6.4).

Note: All other components like tow hook, wheels, gas struts, control system parts, bolts, pins and all components of the FES System have no life time limitation, but should be replaced when worn, damaged or disqualified by excessive corrosion.

0.5.3 Service time, maintenance documents

Latest approved versions each of Operating and Maintenance Manuals of relevant manufacturers are valid:

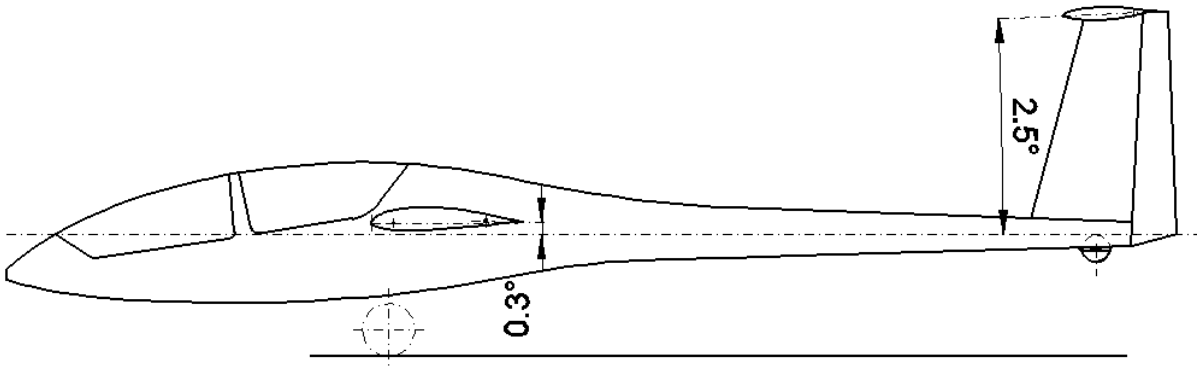
1. C.G. hook TOST Europa G 88:
   Operating Manual for tow hook version safety hook „Europa G88“.
2. Nose hook TOST E 85:
   Operating Manual for tow hook version nose hook E85.
3. Safety Harness:
   Operating Instructions of Manufacturer. Approved types see section 6
4. Motor:
   FES-DG-M100 MOTOR MANUAL of manufacturer LZ design, endorsed by DG, Version 1.0 or later
   (no inspection periods given)
5. Propeller:
   FES –DG-P- 102 PROPELLER MANUAL of manufacturer LZ design, endorsed by DG, Version 1.24 or later.
   (Containing a special inspection at 200 operating hours at DG Aviation or at LZ design).
6. Battery packs:
   FES BATTERY PACK GEN4 16S 84Ah manual of manufacturer LZ design, Version 1.0 or later
   (no inspection periods given)
7. FES FCU instrument User Manual, Version 1.93 or later
8. Minimum instrumentation: instructions of the manufacturer, approved instruments see sections 6.

1 System description and adjustment data

1.1 Wing and tailplane setting data

Wing:

Sweep Back (Leading edge):	0° between y= 3490mm and y= 6979mm
Dihedral (Leading edge line):	inboard wing panel up to parting: 2,5° to measure: 152 mm between y= 3490mm and y= 6979mm outboard wing panels: 14.5°
Angles of Incidence:	-0,3° at the wing root, +1° from y=1200mm up to tip
Horizontal tailplane:	-2,5°



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

Wing oscillation frequency:	ca. 125/min	20 m wing span
	ca. 143/min	18 m wing span

Aircraft should rest on main wheel and tailwheel during frequency measurements.

1.2 Elevator control and trim system

1.2.1 Control system

see diagram 1

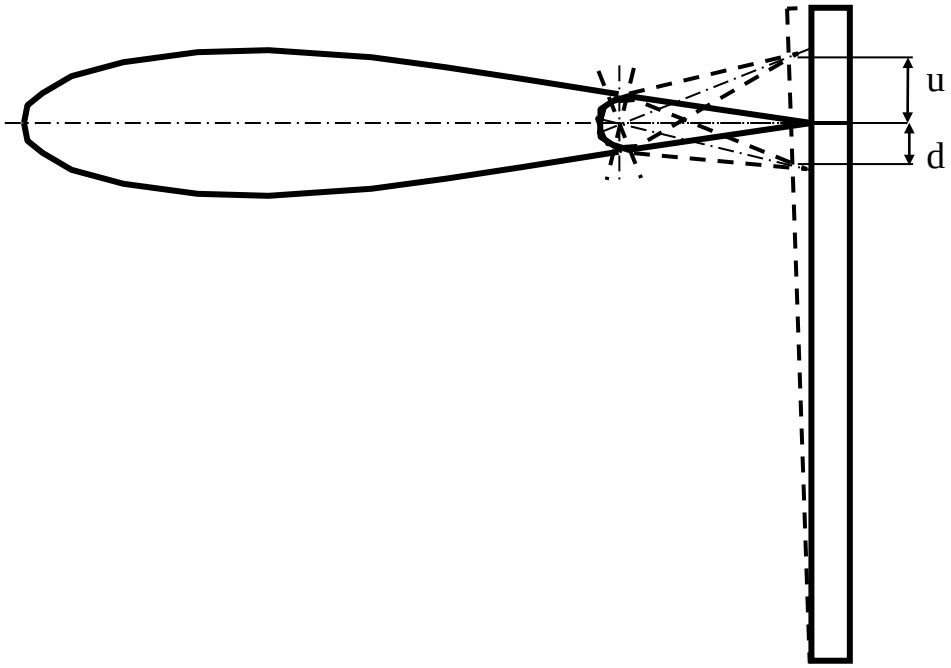
1.2.2 Elevator deflections and tolerances

up:	27°	u= 77 up to 79 mm	(3.03 up to 3.11)
down:	21°	d= 61 up to 63 mm	(2.40 up to 2.48)

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

Measurement:

- Hold a measuring stick with one end on the floor, the stick must be vertical when touching the elevator trailing edge.
- Set the elevator to zero by using a pattern. A drawing for the zero-pattern 10V99 is available from DG Aviation.
- Mark the 0-point on the stick.
- Then measure the up and down deflections according to the sketch.



1.2.3 Elevator stops

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

1.2.4 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.).

Free play within the automatic elevator connection

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.

Warning: In case the adjustment screw was turned in too far, the roller will jam inside the funnel and can´t be moved or only with larger force to the front of the funnel. Moving the horizontal tailplane backwards for rigging might not be possible or only with large effort. Each time a bending force will act on the rod end which might lead to failure of the rod end with time.

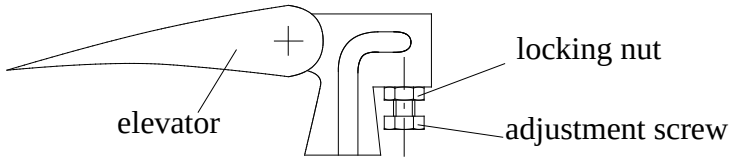
For this reason after adjusting the free play it is necessary to check if the roller can be moved without force in the funnel.

To accomplish this, remove the compete rod end with the roller or remove the roller from the rod end and stick it on an 8 mm f7 pin and move the roller in the funnel. Prior to removal of the rod end mark it´s position.

If the roller can´t be moved without force completely zo the front you must turn back the adjustment screw and bend back the sheet metal which was bent by the adjustment screw. Then adjust the free play again.

In case the roller has too much free play on the rod end or if the roller is no more round you must replace the roller by a new one 5St95/3.

In case the glider was operated for a longer time with the adjustment screw turned in too far the rod end must be replaced by a new one 10St97/1.



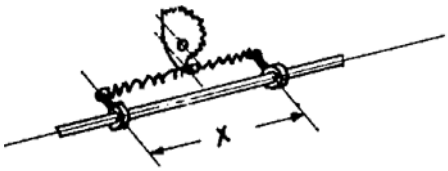
After completion of this work check the elevator displacements and adjust if necessary.

1.2.5 Trim

Complete readjustment

The trim mechanism should be adjusted so that with full forward (nose down) trim the control column is pulled by the trim springs into its 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-1001E can be trimmed up to higher speeds it is likely that the trim is not sufficient in circling flight.

1.2.6 Pilot force reducing rubber-cord

The rubber cord 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.

1.3 Rudder control

1.3.1 Rudder control circuit

see diagram 2

1.3.2 Rudder deflections and tolerances

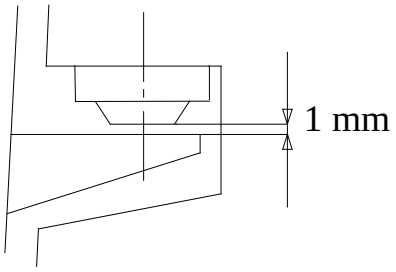
28° up to 29° which is 160 up to 165 mm (6.3 up to 6.5 in.) to both sides measured at 330 mm (13 in.) behind the hinge axis (lower rear end of the rudder).

1.3.3 Rudder stops

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

1.3.4 Axial space and free play

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



1.3.5 Sealing the rudder

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

These seals are not to be removed.

If damaged replace the seals according to section 4.7.4.

1.3.6 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.

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.

1.4.5 Complete readjustment

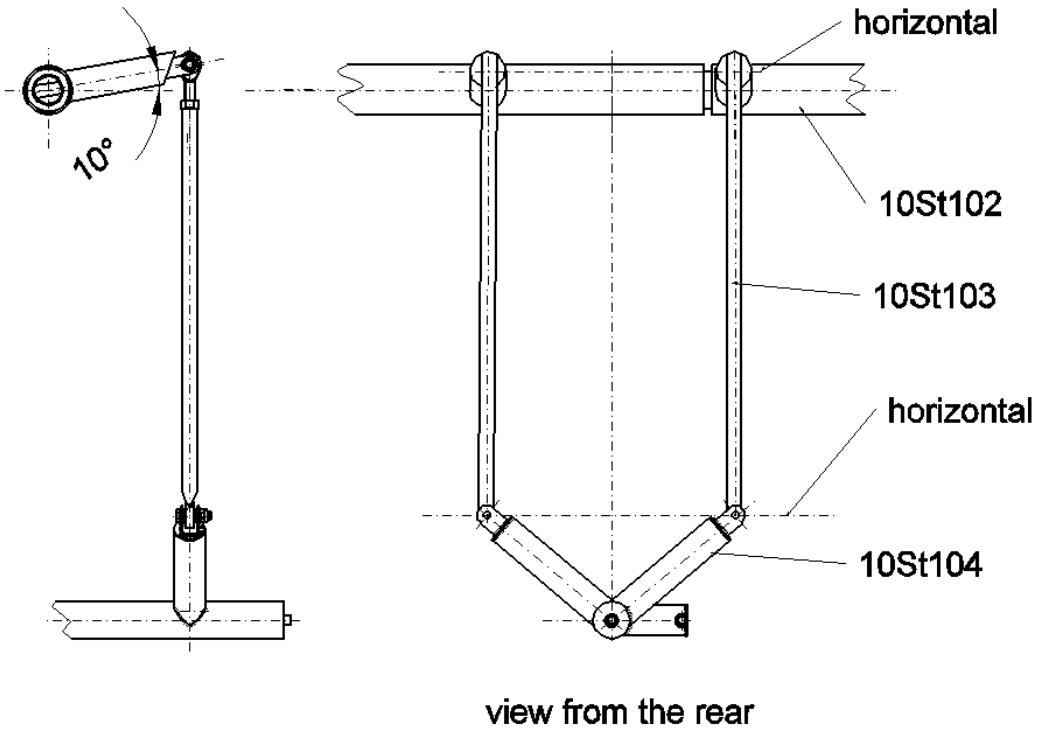
Should it be necessary to completely reset the aileron control (e.g. after a repair), proceed as follows:

- 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 10St104 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. ar



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 ended 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.

1.5 Airbrake control, wheel brake

1.5.1 Control circuit

see diagrams 3 and 4

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

1.5.2 Adjustment

a) **Airbrake over centre 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 wheel brake adjustment see c).

c) **Wheel brake:** The wheel brake 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 root ribs. 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 air loads.

1.6 Undercarriage

1.6.1 Electrically operated main landing gear

1.6.1.1 Landing gear control circuit

There are no handles and control rods for manual operation of the landing gear.
In the normal operating mode the landing gear will be retracted and extended by an electrical spindle drive.
A control unit which is installed in the rear instrument tower controls all electrical functions and the control lights.
A landing gear warning device is integrated into the system.

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

The landing gear will be locked in the retracted position by 2 bolts at the drag struts which engage into 2 latches at shaft 10FW102.
Unlocking is actuated by a cam mounted to the spindle drive, which rotates the shaft 10FW109 via a bell crank and a push rod to release the bolts (see diagram 20).

Emergency operation: The landing gear may be extended manually. The handles are located at the left hand fuselage wall, one in each cockpit at the positions of the handles for the manually operated landing gears.
Pulling on one of the 2 red emergency extension handles will open the valve of a lockable gas strut. The gas strut will push the spindle drive forward on a linear guide to extend and lock the landing gear.

1.6.1.2 Adjustment / limit switches

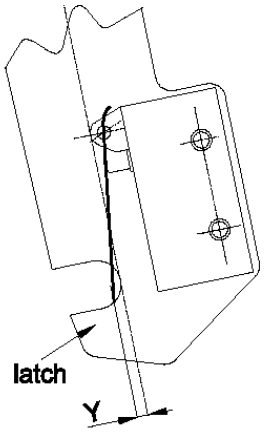
With the electrically operated landing gear only the limit switches have to be adjusted

a) Limit switch landing gear extended

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

5. If the adjustment is correct, retract the landing gear and extend via the emergency system. Check if the lower green control light starts shining. If not, the arm was bent too far. After adjustment repeat the check according to item 2.

b) Limit switch landing gear retracted



The spindle drive must be shut off in the retracted position when the bolt at the left drag strut 10FW102 engages in the notch of the left latch on shaft 10FW109 and activates the limit switch which is mounted to the latch.
Check: Activate the limit switch. The distance Y shall be 2 - 3 mm (0.08 – 0.12 in.) when the switch activates.
If necessary adjust the switch by bending its arm.

c) Limit switch gas strut (emergency extension system)

This switch (position 12 in diagram 21) is mounted to the upper end of the gas-strut at bracket 10FW120. When resetting the gas strut the spindle drive must be stopped by the limit switch before the gas strut becomes completely compressed. To accomplish this the distance X in diagram 21 (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.

d) Switch emergency extension

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

1.6.1.3 Free play

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

1.6.2 Wheels, tyres, tyre pressures

Main wheel:

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

Tail wheel:

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

1.6.3 Hydraulic brake system

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

Warning: brake fluid is poisonous.

b) Adjustment: see section1.5.2 c)
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 4.5.1B. 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.).

1.7 Tow hooks

1.7.1 Tow release circuit

See diagram 5a.

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

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.

Nose tow hook:

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 tension spring at both of the cables in the compartment below the foot of the rear instrument panel.

For further information refer to the operating and maintenance instructions for the release mechanism.

1.8 Water ballast system

(Optional with 18m wingspan, standard with 20m wingspan)

1.8.1 Wing tanks

1.8.1.1 Water ballast release circuit

see diagram 6

1.8.1.2 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)

1.8.1.3 Servicing

see section 4.1.

1.8.2 Fin tank

The fin ballast tank is constructed as integral tank.

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

b) Inspection
According to sect. 2.2 a special inspection is to be carried out on the fin ballast tank system at each annual inspection.
The dump time of the full fin tank should be timed and should not exceed 120 seconds.
Check the indication of the outside air temperature gauge, e.g. with a calibrated thermometer.

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

1.9 Ballast box in the fin

1.9.1 Inspection of the control light in the front instrument panel

Slide one weight after the other into the rails of the box. Check with each additional weight if the correct amount of blinks is displayed.
The heavy weights with 2,4 kg (5.3 lbs.) each must be installed in the lower 4 sections and the lighter weights with 1,2 kg (2.65 lbs.) each in the upper 2 sections. It doesn't matter in which sections the weights are installed, but it is not allowed to insert the light weights into the sections for the heavy weights.

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

1.9.2 Protection of the control light

There is a fuse holder in the positive wire to the control light (in the front instrument console near the light).
Fuse: 250V 5x20m 0,2A.

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

Check the locking device at the cover plate, the locking pin must be pressed by its spring towards its stop.
Insert the cover plate to close the compartment, it must be possible to push the locking pin with the tool up to its stop and the pin must stay in this position.

1.9.4 Inspection of the foam rubber rings

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

1.10 Mass balance 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. mass balance)	3,5 (7,72)	5,2 (11,46)	-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)	12,0 (10,42)	0,53 (1,182)	0,71 (1,576)
Inboard ailerons light version	4,7 (10,36)	6,0 (13,23)	0 (0)	3,4 (2,95)	0 (0)	0,207 (0,457)
Inboard ailerons heavy version	5,7 (12,57)	7,0 (15,43)	0 (0)	2,5 (2,17)	0 (0)	0,152 (0,336)
Outboard ailerons (20m extension)	0,35 (0,77)	0,55 (1,2)	0,7 (0,61)	1,2 (1,04)	0,07 (0,157)	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.

Note: Before any changes to the mass balance 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

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.

1.12 Powerplant

1.12.1 General Arrangement

FES system is shown in diagram 9, main parts are:

- Brushless electric motor with foldable propeller and spinner installed in the fuselage nose.
- FCU (FES control unit) motor indication and control instrument installed in both instrument panels, master switch for FCU and Avionics installed in the console below the front instrument panel.
- Fire warning system with control light, test switch installed in both instrument panels, 9V battery block installed in the front instrument panel and sensors in the battery compartment.
- Switch “FES power” installed in the consoles below both instrument panels.
- Controller for motor installed at the right hand side of the landing gear box, 2 ventilators to cool the controller are installed on the lower side of the baggage compartment floor above, behind the controller, they run as long as the Switch “FES power” is “on”.
- DC/DC converter (converts high voltage to 12V) installed at the front wall of the battery compartment.
- LXUI box with shunt (for current and voltage measurements), battery fuses and other electronic components installed on a carrier plate in front of the rear main bulkhead.
- Isometer box at the right hand side of the rear main bulkhead (measures resistance between power wires an ground to detect if insulation of wires becomes damaged.
- FCC box (FES connecting circuit) at the right hand side of the landing gear box behind the controller.
- 2 FES GEN4 Battery packs with internal BMS (Battery Management System) to be installed in the battery compartment.
- Canopy switch: The switch of the canopy warning system which is activated when closing the front canopies used also as canopy switch. This switch deactivates the FES motor in case the canopy isn’t closed.
- 2 external chargers (600W or 1200W)

1.12.2 Motor

The motor construction is an outrunner brushless synchronous permanent magnet motor with electronically controlled commutation system 3 phase. The Rotor position is determined by 3 hall sensors and an additional 4th hall sensor for automatic propeller positioning.
The motor can work only in combination with a suitable electronic motor Controller which transforms DC current from the battery packs to 3 phase current which supplies the motor.

More detailed description of motor is provided in the „FES-DG-M100 MOTOR MANUAL".

1.12.3 Propeller

The propeller is a foldable fixed pitch carbon fibre composite propeller installed at the fuselage nose. When not running the propeller folds against the fuselage contour and will be positioned by the electric motor. When rotation starts the propeller will unfold due to the centrifugal forces.

More detailed description of propeller is provided in the „FES-DG-P1 102 PROPELLER MANUAL".

1.12.4 FCU Instrument

The FCU (FES control unit) motor indication and control instrument is installed in both instrument panels. It was designed exclusively for the FES system.

The most important FCU indications and functions are also described in the DG-1001E flight manual section 7.4.2.

Please find detailed instructions in the **FES FCU INSTRUMENT manual.**
Instructions for settings and updates can be found in section 9 and 10 of the FCU manual

Caution: Only updates approved and supplied by DG are allowed to be used.
Updating procedures:
The pilot/owner is not allowed to perform update. The update must be performed in a licensed workshop. All actions are to be inspected and released by a licensed inspector and to be entered in the aircraft logs.

The current software version is 3.24

1.12.5 Battery packs

For FES application you need two FES battery packs. They are marked with serial number and a letter first as A pack and second as B pack!

The “Battery packs ” are equipped with an internal BMS (Battery Management System) which is fixed above the cells and is equipped with 16 LEDs to monitor its operation.

For + and - terminals Amphenol Radsok hyperbolic high-power contact technology are used. High current female contacts are hidden in the housings of the packs.
To avoid possible wrong connections there are 8mm contacts for – pole and 10 mm contacts for +pole.

FES GEN4 16S 84 Ah battery packs
The FES system needs 2 battery packs wired in serial.
Each pack contains 480 Li Ion cells Type 18650.
Please find a detailed description and performance data of the battery packs and handling and re-charging instructions in the “**FES BATTERY PACK GEN4 16S 84 Ah manual“.** In addition, the FES BMS (Battery management system), the FES battery chargers and the BMS control software is described in this manual.

Warning: Charging the batteries by flying with windmilling propeller is not permitted. After engine use stop the propeller or if this isn´t possible switch off the “FES power switch” to prevent overcharging the batteries. The BMS can´t prevent overcharging when the engine is working as generator, it can only prevent overcharging when charging with a charger.

Caution: Battery packs deep-discharge:
If the voltage of both packs together will be 102 V or lower, the FCU will display “Critical voltage! Stop FES motor”. If you continue to discharge the batteries, they will be deep-discharged and may be damaged. When trying to charge deep-discharged batteries, the BMS (in the battery packs) will not send the signal to the charger to start charging of the batteries.
Any deep-discharged battery packs must be removed from the DG-1001E and shipped to DG-Aviation or to a DG Aviation authorized battery service station. The battery packs will need to be inspected and repaired as necessary, e.g. by exchange of damaged cells or even by replacing all cells.

Caution: FES GEN4 Battery packs have a **built-in G-load sensor** which measures the accelerated motions. In case of excessive loads, it triggers an error message which appears on the e-ink display on top of the battery pack: Battery not operational, Contact service. The battery pack is inoperational and needs to be inspected.

1.13 Electrical system

The complete wiring of all electrical components is shown in drawing 10E250 wiring plan DG-1001E DIN A1 (in air craft log).

Caution: Before commencing work at the electrical system, disconnect power supply by main switch and “FES Power switch” to the „OFF“ position and subsequently by pulling the battery connecting cable and the battery terminal connectors out of the batteries!

1.13.1 Arrangement

- See section 1.12 for the power plant.
- 2 FES battery packs will be installed in the battery compartment see AFM DG-1001E section 4.2.3 and are activated by plugging in the battery terminal connectors and then plugging in the battery connecting cable.
- The FCU and the avionics will be activated via a master switch see AFM section 7.3 item 25.
- The motor controller is activated by switching on the “FES Power switch” see AFM section 7.3 item 27.
- In addition to the 2 FES battery packs 1 sealed 12V battery type Z01 must be installed in the baggage compartment to provide electrical power to the landing gear and in case the FES batteries are not connected to the FCU and the other consumers.
  This battery must be equipped with a fuse G 250V 5x20 / 16A MT (medium slow.
- A battery type Z110 12 V 14Ah (5,5 kg) may be installed in the fin. This battery raises the minimum front cockpit load by 16 kg.
  For flight without the battery packs this battery must be installed in the fin
  The battery fuse is installed at the battery, type: G fuse 250 V 5 x 20 / 4 A fast.

- The battery selection switch and the main switch are in the console below the front instrument panel see section 7.4 items 25 and 26.

Note: As soon as the battery packs are activated the battery selected by the selection switch will be charged from the battery packs via the DC/DC converter even with the switch “FES power” off.

Caution for batteries in the baggage compartment and in the fin: To supply power and to charge these batteries via the socket (see section 7.4 item 20) switch on the main switch (see section 7.4 item 25) and switch the selection switch 26) to the selected battery.
Use only automatic chargers designed to charge sealed lead acid batteries. To charge the battery to its full capacity a charger with 14.4 V max. charging voltage is necessary (normal automatic chargers charge only up to 13.8V). Such a charger is available from DG Aviation designation Z 08.

- To protect the different circuits, circuit breakers are installed see section AFM 7.3 items 31 and 32.
- All current - carrying wiring conforms to aeronautical specifications.

1.13.2 Wiring and further components

Wiring of the glider system

Specification			AWG	mm²	
MIL-W_22759/16-	14	-WS	14	2	
MIL-W_22759/16-	16	-WS	16	1,3	
MIL-W_22759/16-	22	-WS	22	0,4	
MIL-C_27500-	22	TG1T14	22	0,4	shielded
MIL-C_27500-	22	TG2T14	2x22	2x0,4	shielded

Instead of specifications named above, other cables approved for use in aircraft according to different specifications or MIL specifications can be used: Operating range min: -55° to 105°C <-67 to 221°F>, operating voltage 600V.

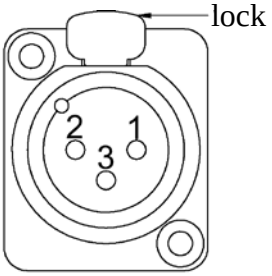
Wiring and further components of the FES system

- The FES wiring consists of power, signal and 12V wires, and different types of connectors.
  For the power cables high quality Betatherm 155 wires with cross section of 35 sq. mm are used.
  or signal wires high quality tinned and shielded wires are used.
  or all 12V circuits aviation grade Spec 55 (corresponds to MIL-W_22759/32) wires are used.
  To the ends of the power wires suitable cable shoes and Radsok power connectors are crimped.
  Signal wires, are soldered to multipole DB9 or DB15 connectors, and on other side directly to the FCC box electronic circuit board.
  12V circuits are equipped with cables shoes.

- The DC/DC converter is used to convert high voltage from the FES battery packs to 12V which is used to supply instruments and main contactor. It also charges the 12V batteries.
- The main contactor is used to connect and disconnect the FES battery packs to the motor controller. Also a pre-charge resistor is installed.
- The motor controller is used to convert high voltage DC to three phase AC voltage which supplies the motor. The controller also sends RPM and controller temperature by CAN bus to the FCU instrument.
- Ventilators are used to cool down the motor controller.
- The FES Power switch (double pole) is used to supply 12V power to the main contactor and to supply the electronic circuit board in the motor controller.
- The BMS inside the battery packs is used to balance and to control charging. It can be connected to a PC with a special cable in order to monitor the charging process with the BMS Control software. During flight the BMS is sending data to the FCU instrument about temperature of the pack and voltage levels of each cell.
- The shunt is used to measure the current from the battery packs.
- The LXUI box converts analog measurement of current and voltage to digital signals which are sent via CAN bus to the FCU instrument.
- The Isometer box measures the resistance between power wires an ground to detect if insulation of wires becomes damaged.
- The FCC box has an electronic circuit board where all signal and 12V wires come together and are split to right directions. It consist also a microprocessor for automatic propeller positioning. Also a 2A fuse, a potentiometer for adjusting of electronic braking and a DB9 female connector for FCU update are incorporated.
- A 325A power fuse protects the whole system in case of a high power short-circuit.

1.13.3 12 V Socket

A socket is located in the rear cockpit (behind the pilots right shoulder).
It is used for: battery charging and to provide power for external accessories



A Socket XLR 3-pole NC3FD-LX-BAG is installed.
Connection of the socket terminals:
1= +
2= -
3= not used
view from the cockpit

1.13.4 Plugs

Wiring with plugs for additional batteries in baggage compartment and fin are standard equipment.
Plug type: 60510881 Plug XLR 3-pole NC3MX-BAG (for socket XLR)

1.13.5 Electrical system of the electrically operated main landing gear

Wiring see wiring plans 10E3 and 10E4 enclosed to the MM.
Description of operation see AFM section 4.5.10.

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 4.5.10).

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.

Limit switches see section 1.6.1.2.

Batteries: To operate the electrically operated main landing gear a battery Z01/2 must be installed in the baggage compartment see section 1.13.1.

Fuses and circuit breakers:
The electrically operated landing gear is protected by an automatically reset fuse in the landing gear control unit.
The wiring up to the control unit is protected by a 16 A fuse at the battery in the baggage compartment.
The instruments are protected by a 4 A circuit breaker in the console below the front instrument panel.

Landing gear warning:
A landing gear warning device is integrated into the system. Warning is by a buzzer
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.

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 seal of the rudder (see section 1.3.5).
- Inspect all bolted connections and locking devices ie. nuts, split pins etc. Check especially the lock nuts which secure the rod ends for tight fit.
- 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 especially if the roller at the automatic elevator hook up is still round.
- Check the fore and aft play of the wings (see section 1.11).
- Check the rubber cords in the control system (see sections 1.2.6 and 1.7.5.
- Check the thickness of the wheel brake linings and of the brake disc (see section 1.6.3).
- Check if the brake fluid has to be exchanged (see section 1.6.3.
- Check the airbrakes according to section 4.4.
- Check the fin ballast tank system according to section 1.8.2.
- Check the fin ballast box according to section 1.9.
- Check the canopy emergency releases according to section 7.14 of the flight manual.
- Check the friction of the canopy opening handles (canopies removed from fuselage): A force of 10 – 20N (2.2 up to 4.4 lbs.) should be required at the end of the handle. If the force is too low tighten the hinge bolt of the handle accordingly.
- **Tow hooks:** The operating and maintenance instructions for the release mechanisms, see sect. 0.5.3 of this maintenance manual have to be followed.
- **All-up weight and centre of gravity:** These should be checked at least every 4 years during the yearly inspection.

FES system

1. Check FCU instrument wiring and functioning.
2. Check propeller blades for damage.
3. Remove the spinner, removal and installation see “FES-DG-P1 102 PROPELLER MANUAL“ section 5 and 6. Regard section 4.8.5 of this manual.
4. Check if motor mounting is OK by giving pressure to the motor in any directions, check for free play and any cracks, especially in the rubber mounts.
5. Check all bolted connections.
6. Check power cables and their terminals for any damage.
7. Re-install the spinner according to section 4.8.5.
8. Check gap between spinner and fuselage is 0,5 – 1 mm.
9. Check battery packs for any visual damage.
10. Inspect controller and main contactor for any visual damage and damaged wiring at connectors.
11. Perform ground test run of the motor according to section 4.8.4.
12. Check functioning of the propeller brake and positioning.

B Special inspections

Tow hook:

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

C.G. weighing: The empty weight and corresponding center of gravity must be re-determined every time the airplane or its equipment is modified or repaired in a way that might influence its weight or center of gravity position.

C Power plant

(a) Motor:

The motor is maintenance free and requires no inspection at intervals. However no foreign objects shall enter the interior of the motor. Furthermore it is necessary to protect the motor from humidity, dirt, paint, glues etc. If this is ignored, a proper functionality of the motor can't be guaranteed and irreparable damages are possible. In case of damage, ship the motor back to the manufacturer for repairs.
The small gap between the stator and the magnets of the rotor function-bound has a thickness of only a few tenth of a millimeter. Here, the danger of foreign objects accumulating in this gap exists but can be heard by scratching-sounds. In this case the spinner should be removed and the motor should be blown-out with compressed air. Do not at all keep on using the drive. Be especially aware of metal cuttings which can almost irremovably stick to the magnets. In this case, the fix is a disassembly of the motor by the manufacturer.

(b) Propeller:

Check every 50 h motor run according to FES-DG-P1 102 PROPELLER MANUAL section 9 item 1.
Every 200 h motor run a special inspection of the propeller is required. It can be performed by DG Flugzeugbau, LZ design or by workshops which are approved by the manufacturer.

(c) Battery packs:

The battery packs requires no inspection at intervals.
However to maintain the battery packs in good and powerful condition it is essential to follow the instructions in the FES BATTERY PACK GEN4 manual.

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 and 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.

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 or in the pitot probe?

Undercarriage:
Check to insure if properly aligned. No bent forks? Proper extension and retraction? Any dirt in the forward fork pivot?
Any white areas or cracks in the wheel box? Remove the baggage area floor panels and inspect the wheel box from above. Undercarriage control circuit condition. Is there free play between actuating lever and upper fork?

Nose wheel (if applicable) and tail wheel:
Any cracks or white patches around the attachment?

Ballast box in the fin
Check especially after a ground loop if the rod which secures the ballast weights is bent and if the locking mechanism is still working properly. Check also the GFRP parts of the box.

Horizontal tailplane-stabilizer:
Outer skins: Crushing, cracks, delaminations?
Mounting: Glued joint of the bushes, white areas around bushes, cracks in shear webs, cracks around locking plate?
Hinge mounts: checked?

Elevator:
Crushing, cracks, delaminations?
Hinge mounts checked? - Control surface horn bent or loose?

Battery compartment:
Cracks or kinks at walls?

Powerplant:
Same checks as for the annual inspection, see section 2.2.1 from item 17 on.

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

2.4 Inspection procedure for increase of service time

1. **General**
   The results of fatigue tests of wing spar sections have demonstrated that the service time of GFRP/CFRP gliders and motor gliders 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 document, the following data should be submitted: Model/Type, Registration, Serial Number and the operating hours at which the inspection will be performed. A charge will be made for the inspection document.

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

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

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 micro scratches of the sanding process.

Caution: Make sure that the surface does not become 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.

3.2 Maintenance of the airframe

The motor glider 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

3.3.1 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.

3.3.2 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 21).

Caution: 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.

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

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

- Airbrake control handle 5St69 on 5St68/1
  If these parts have been greased inadvertently you have to disassemble the parts and to clean them completely with Acetone.

3.3.3 **FES system:** Only the propeller hinges need lubrication.
The two propeller pins which hold the propeller blades must be very slightly lubricated once a year.
Avoid too much lubricant, as the centrifugal force will quickly spill it out, resulting in a dirty spinner inside, and a dirty lower surface of the propeller blades, which might initially look like a crack, but is only excessive lubricant.
To perform the lubrication the propeller bolts must be removed which requires also removal of the spinner.
Removal and installation see “FES-DG-P1 102 PROPELLER MANUAL“ sections 5 and 6.

Caution: Regard section 4.8.5 of this manual.
First remove one bolt, grease and reassemble, then the other one to avoid to mix up the parts.

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 can 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 1.6.4).

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 seal 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.

4.2 Replacement of control circuit cables

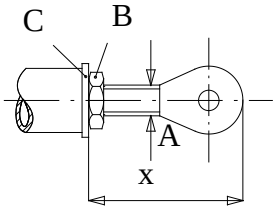
The following cable connections are approved:
3.2 mm dia. control cable construction 7x19 with Nicopress-sleeves 28-3-M Copper and tool No. 51-M850 or 63-V-XPM or 64-CGMP where the M groove is to be used. The above applies to the rudder cables and the tow release cable.
The cable for the rudder pedal adjustment and the fin tank valve 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 A.

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

4.3 Adjustment and servicing of the control circuit

a) In all cases, new self-locking nuts DIN985-8zn or LN 9348 should be used.
b) Bolts which are not secured with locking nuts have to be secured with Loctite 243. Before installing the bolt clean the thread and the inside thread. 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

Note: All lock nuts (B) are secured by a spring washer (C) DIN6798 I. Be careful not to lose that washer!
Tighten the lock nuts firmly with an open end spanner.
Apply a mark from nut to rod e.g. with securing paint to make it easy visible if the nut came loose.

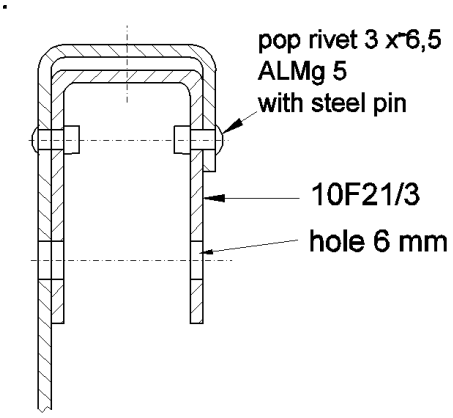
4.4 Inspection and adjustment of the airbrakes

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.



4.4.2 Over centre 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. **Over centre 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.).

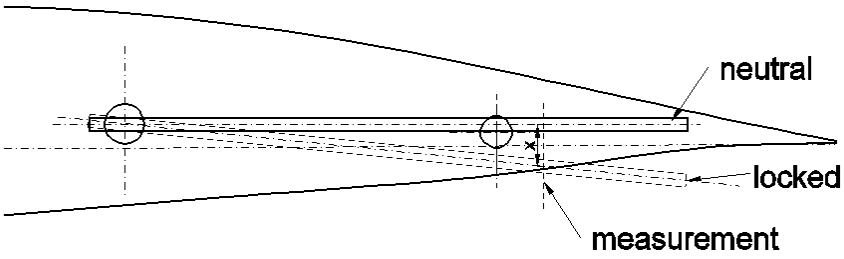
   Adjustment of the moment is made by adjusting the rod end at the pushrod inside the airbrake box.

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

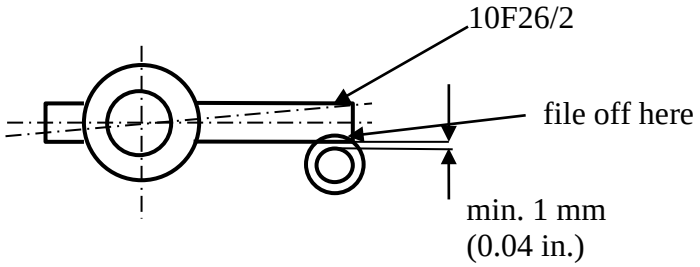
   1/2 turn of the rod end changes the force by approx. 14 N (3 lbs.).

2. Over centre travel (angle)
   To determine the over centre 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 over centre 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. Check the over centre locking moment, see 1. again.
4. Follow instructions 1. - 3. for the other wing.

4.5 Removal and installation of the undercarriage (main wheel)

4.5.0 General

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 unlocked 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.

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.

4.5.1 Main landing gear

see diagrams 20 and 21

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 bush 10FW11/4.
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 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 wheel brake with brake assembly disassembled, as the piston and the brake-fluid will be pressed out of the brake assembly.

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

1 Remove the main wheel see A.
2 Retract the landing gear.
Warning: The landing gear will retract by itself when unlocked by the force of the gas spring!
3 Disassemble the gas spring from the left side of the undercarriage box see 4.5.0.
4 Extend the landing gear again.
5 Remove the 2 bolts 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 drawing 10FW2 (enclosed to this manual).

E. Removal of the drag struts 10FW102 (left) 10FW102/2 (right)

1 Remove the main wheel see section 4.5.1 A.
2 Disassemble the gas strut from the left side of the landing gear box see section 4.5.0
3 Remove the 2 bolts M8 LN9037 which connect the struts to fork 10FW10/1. Mark the bolts. Don't interchange the bolts during reassembly!
4 Remove the 2 bolts M8×40 LN9037 which connect the struts to the rear fork 10FW91.
5 Remove the struts.

F. Removal of the front fork 10Fw10/1

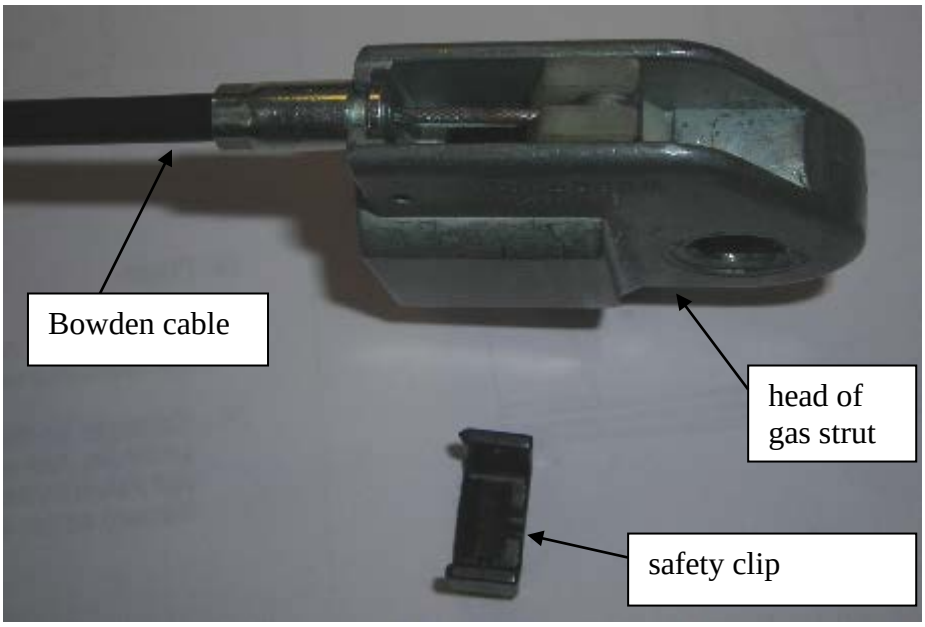
1 Remove the baggage compartment floor and the rear cover of the baggage compartment.
2 Remove the main wheel see A.
3 Remove the lower fork 10FW11/1 see C.
4 Remove the spring legs see D.
5 Remove the struts see E.
6 Remove the nut M12 from the left hand side of the axle 10FW10/2. Shift the axle towards the fuselage wall. Mark the head of the axis at the outside fuselage wall (e.g. by illuminating this area from the inside) and drill a dia. 24 mm hole through the fuselage wall. Insert a bolt with thread M12 into the head of the axle to pull out the axle through the hole.
7 Remove the front fork 10FW10/1.

G. Removal of the shaft 10FW268 (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 10FW268.
5 Remove axle 10FW252/1. To remove the axle screw a bolt M10 into the axle from the outside, then remove the bolt M6x32 LN9037 which fixes the axle in the shaft, pull out the axle at the M10 bolt.
6 Pull out the lever10FW89.
7 Remove the shaft.

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.

I. Removal of the rear fork 10FW91

1 Remove the main wheel see A.
2 Disassemble the gas strut from the left side of the undercarriage box see section 4.5.0
3 Remove the 2 bolts M8×40 LN9037 which connect the drag struts to the rear fork 10FW91.
4 Remove the drag struts.
5 Remove the landing gear drive unit according to H.
6 Remove the bolts which connect the rear fork with the lever 10FW108.
7 Remove axle 10FW251/1. To remove the axle screw a bolt M10 into the axle from the outside, then remove the bolt M6x35 LN9037 which fixes the axle in the fork, pull out the axle at the M10 bolt.
8 Pull out the lever 10FW108.
9 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.

4.6 Filling and bleeding the hydraulic disc brake

Note: 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.

Necessary tools and material:

- 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.

1. **Preparations**

- Raise the fuselage, extend the landing gear
- Fix the 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).
- Remove the main wheel according to section 4..5.1. Place the wheel so that the brake hose makes no bow above or below the horizontal. If necessary lift the fuselage even more.

2. **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.

- Open the cover of 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, attach the bleeder assy. and fix it with the wrench 11/16".
- 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.
- 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 3..
- Reinstall the main wheel.

3. **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

4. **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 seals 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.

5. **Bleeding the hydraulic brake system**

- Remove the brake fluid from the reservoir using the syringe.
- Then repeat items 2 and 3 of this instruction.

6. **Exchanging brake fluid** (every 4 years)

- Perform preparations (see step 1.) of this instruction. It is not necessary to remove the main wheel.
- Fill the system with new brake fluid (see step 2.). 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 3. and 4. of this instruction.

4.7 Control surface seals and turbulators

Materials see section 0.

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 seal and control surface and move it up and down in spanwise direction to sand the trailing edge of the seal.

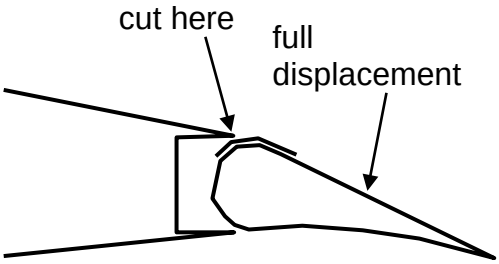
Warning: Use only original materials see section 0. Otherwise the function of the seals is not guaranteed. Seals which are too loose may cause control surface flutter.

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

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.
To reduce the friction as far as possible a 38 mm (1.7 in.) wide self-adhesive 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 pencil on the aileron surface. The fabric must be installed so that the seal slides always on the fabric.



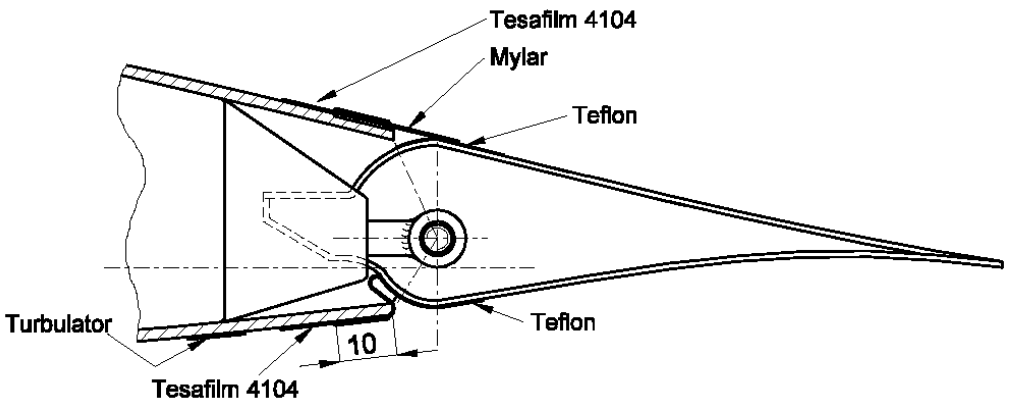
Cutting the front of the fabric is easiest if the seals are not installed.
Insert the aileron and use full displacement. Cut the front end of the fabric with a sharp knife along the wing trailing edge see sketch.
With the seal installed, you have to measure the position of the front end. Cut it off by 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.

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 seal to protect the seal from coming loose.

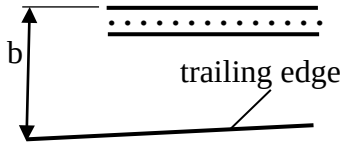
a) Removing the ailerons
   To remove the ailerons you have to remove the Teflon-glass fabric tape first. Peel off carefully so that the tape does not tear and no remains of the glue remain on the wing surface.
b) Reinstalling the seal
   Remove carefully any remains of the glue. Install the aileron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



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.



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

a) 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.

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

b) Seals

The seals are installed in grooves at the trailing edges of the stabilizer. Curved Mylar seal tape is used on the upper surface and flat Mylar seal 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 seals 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.

4.7.4 Vertical tailplane

a) 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.

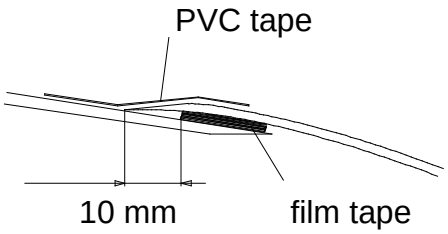
Position	a mm
100mm below upper end of the rudder	423
200 mm above the upper side of the lower rudder mounting bracket	701

b) Seals

As seals 30 mm (1.2 in.) wide Mylar seals with scarfed leading edges are used, so that no step occurs.

Note: 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.

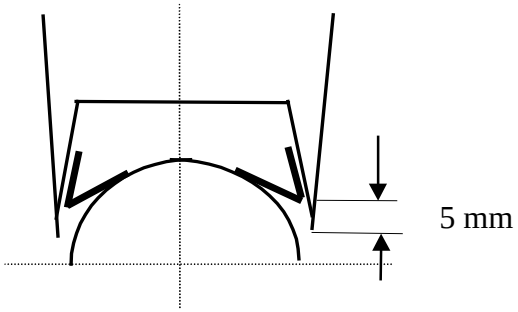
Prior to removing the seals mark the leading edges with a pencil to the fin surfaces.



c) Internal seal

Additional internal seal with V-seal strips.

Install the V strips according to the sketch.



4.8 FES System

4.8.1 Removing the motor from the glider (complete with spinner and propeller)

1. From the cockpit side remove the glass fibre cover mounted in the centre of the motor mounting rib, to accomplish this remove the 4 M4 bolts.
2. Remove the pitot tube assembly which is fixed on the back side of the motor mounting plate. To accomplish this it is necessary to unscrew two M5 bolts on top, and carefully pull out the pitot tube assembly.
3. Unlock two springs which secure the DB15 cable connector and then carefully unplug the connector from the socket at the motor rear side.
4. Unscrew the 3 self-locking nuts from the rear motor side and disconnect the 3 power cables.
   Each cable is marked with a different colour (red, blue and black). Prior to disconnecting the cables take a photo to enable the correct re-assembly.
5. Unsecure the 6 M8 bolts and remove the bolts (the M8 bolt which is mounted underneath the power cables has a lowered head). To accomplish the bolt removal, support the motor assembly. Then take it out of the fuselage carefully.
6. The centrifugal ventilator on the back side of the motor has a bigger diameter than the rotor ring, so the motor will not go out straight, as the opening is not wide enough. You need to rotate the motor about 30 degrees to one side in order to get it out. Be careful not to damage the spinner or the plastic covers below the spinner.

4.8.2 Re-installation of the motor

To re-install the motor, follow the reverse order.
Take care about additional steps:

1. It is recommended to use new securing washers to secure the M8 motor mounting bolts.
2. Make sure that power cables are connected in the same order as before. (like on the photo taken prior to removal) otherwise the motor wouldn't run or will rotate in the wrong direction. Use new M6 self-locking nuts (metal nuts with deformation for locking force)
3. Make sure that there is at least 3mm of clearance between cable shoes and mounting wall and between cable shoes and M8 bolts.
   Underneath the power cables the M8 bolt with the shortened head must be installed.
4. Carefully plug in signal wires connector into socket at motor rear side.
   Lock springs which secure connector in place.

After the motor is reinstalled, check if:

- The spinner is in the center of the fuselage with the propeller in the aligned position.
  This means that surface of the spinner is as much as possible tangent to the fuselage contour in area of gap between spinner and fuselage.
- The gap between spinner and fuselage is approx. 1mm.
  The gap should be equal all around (on top should be the same as on bottom side, on left side should be equal as on right side). If gap is wider than 1mm is not nice.
- All bolted connections assembled correctly and secured properly.
  Below the six M8 bolts which hold the motor in place are brass securing washers, which needs to be bend 90 degrees against one of the 6 vertical surfaces of M8 hex head bolts.

Test run the motor on the ground and run it for a few seconds to check for:

- Motor rotating direction is counter-clockwise, looking from the front, smooth run of motor.
- Electronic braking and positioning of the propeller works OK (above 1500 RPM).
- FCU instrument is functioning properly. Check functions according to flight manual LS8-e section 7.3.2.

4.8.3 Removal and re-installation of the propeller-blades

According to the „FES-DG-P1 102 PROPELLER MANUAL“ section 5 and 6.
Regard section 4.8.5 of this manual.

4.8.4 FES test run on the ground

1. Remove propeller covers (if existent) and tail dolly.
2. Open battery compartment cover.
3. Check that Power switch is OFF.
4. Insert connecting cable between the battery packs.
5. Switch on BMS on both battery packs.
6. Seal battery compartment cover with glider tape.
7. Check that area in front of glider or in line of propeller is clean; risk of foreign object damage to propeller.
8. Check propeller ground clearance.
9. Seat into the glider, and close canopy.
10. Check that no one is around propeller zone
11. Open ventilation completely.
12. Switch on FCU.
13. Switch on FES-Power switch, and rotate gently a throttle knob clockwise.
14. Wait about 8 second, for FCU to show all battery bottles.
15. Start motor but use only low power to check proper operation.

Caution: In case that you would like to the test the system at maximum power somebody needs to hold the fuselage tube down, and tie down the tail of the glider.
Warning: Don´t run the motor for longer time at the ground especially with higher power setting. When stopping the motor also the cooling will be terminated. The resulting temperature rise may damage the motor.

16. Check if the propeller braking and automatic positioning are working properly.
17. Switch OFF „FES Power switch“.
18. Switch OFF FCU.

4.8.5 Balance of rotating parts

In order to have a smooth run of FES, the complete assembly of motor, spinner, and propeller blades is balanced (to vibration level of less than 0,1 IPS) with special equipment before installation to the glider.

Caution: At that time all components are marked with small marking dots and assembled so that all this little dots are all located on the same side. These marks must be taken into account when assembling spinner or propeller blades, so that they are assembled in proper orientation as before. If these marks are not taken into account, excessive vibrations could occur during motor run!

4.8.6 Repair of minor damage on propeller blades

- use white polyester filler (or epoxy resin), for repair of small damages on the propeller blades
- sand away excessive filler with fine sanding paper (initially granulation 360, later 600 and 800, and finally 1000)

4.8.7 List of potential problems

Charger does not start charging	Check if power cord is plugged into wall outlet
Charger does not start charging	Check if connecting cable is connected between Battery pack (DATA) and charger.
Charger does not start charging	Check grid fuse
Charger does not start charging	Battery pack deep discharged. The affected or both packs must be shipped for inspection and repair see section 1.12.5.
Battery not operational	Too high g-load occurred. On the e-ink display (mounted on each battery pack) a message “Battery not operational contact service” is shown. The affected or both packs must be shipped for inspection and repair see section 1.12.5.
Capacity bottles on FCU do not fill up after installation of fully charged batteries.	You must wait about 8 second after power switch is turned ON. Additionally, total Voltage level of packs must be above 131V.
Remaining time is not showing on FCU	Enter code 00040 and then 00030
Voltage and Current measurement is not available	Check connectors on LXUI box
Motor is not starting, or it starts just a little and then stops	Check power switch, flip it OFF an ON a few times

When you are reporting a problem, please describe the problem and its behaviour as much as possible accurately and send it to DG.
It will be helpful if you fill out the following table and add it to the report:

FCU serial number	
Software version of FCU	
When power switch is OFF *	
Are Battery pack temperatures available?	
Is motor temperature available?	
When power switch is ON, motor stopped *	
Is lower left Green LED shining?	
Is »CONTROLLER READY« message visible?	
Is lower right Red LED shining or blinking?	
Is controller temperature available?	
Voltage measurement data available?	
Voltage level?	
Any message appears, which one?	
Power switch is ON, motor starting and running *	
Is lower left Green LED shining	
Is »CONTROLLER READY« message visible?	
Is lower right Red LED blinking?	
Current measurement data available?	
Power calculation data available?	
RPM data available?	
Any message appears, which one?	

*If possible take a photo of the FCU main screen and info page.

5 Weight and balance

1. Assemble the glider completely with gear down.
2. Empty fin ballast box and water ballast tanks.
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.

2 weighings have to be performed:
1. With 20 m span with battery packs installed, no battery in the fin.
2. With 17.2 or 18 m spa with battery packs removed, battery in the fin installed.

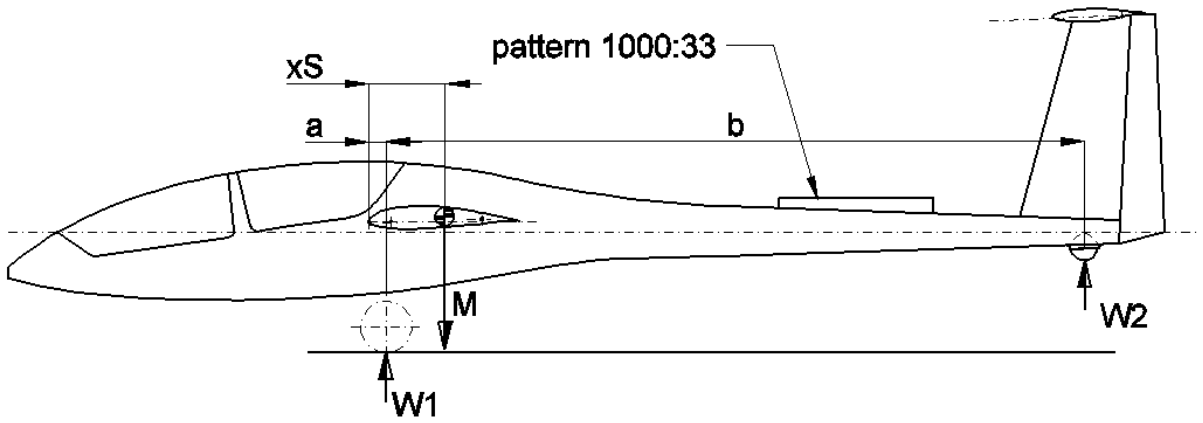
C.G. in flight: X_{SF}: $X_{SF} = W_{2F} \bullet b/M_F + a$

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.

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 diagram in sect. 6.4 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 water ballast 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.

6 Instrumentation and accessories list

6.1 Air speed indicator (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. 6421453	
	0-160 kts Ident.No. 6423453	
Winter	7 FMS 4(diam. 58mm)	TS 10.210/19
	0-300 km/h Ident.No. 7421453	
	0-160 kts Ident.No. 7423453	

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	
	1.000-20.000 ft 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	
Garrecht Avionik	ACD-57 Multifunctional dev.w. electr. indication, resolution 2m	EASA.21O.10063331

Or any other ETSO 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	
Optional in addition	Crotch strap BOGU1303 8 mm hole	40.072/4
Schroth	4-01-0.104	40.073/11
Optional in addition	with crotch strap	

6.4 Compass

Manufacturer	Type	**Certification No.**
PZL	B - 13	FD 19/77
Ludolph	FK 16	10.410/3
Airpath	C 2300	
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-90	10.911/98JTSO
	FSG 2T	LBA.0.10.911/103JTSO
TQ	KRT-2	EASA.21O.10038036
Becker	AR 6201	EASA.210.1249
	RT 6201 (blind)	EASA.210.1249
Garrecht	AIR COM AC-1	EASA.21O.10075458
F.U.N.K.E.	ATR 833	EASA.210.0193

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

Note: Only radios with diameter 57mm (2 ¼ in.) can be installed at the assigned place in the console below the instrument panel.

6.6 Variometer

Manufacturer	Type	**Certification No.**
Winter	5 StVM5 (Durchm.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 (Durchm.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

Manufacturer	Type	**Certification No.**
Störk	TF 00-059 K (-20 - + 40 °C)	/

or a warning device integrated in the gliding computer which gives a warning for temperatures below 5°C.

6.9 Accelerometer

(for Category A Aerobatics)

Accelerometer capable of retaining max. and min. g-values with markings red radial lines at +7g and -5g.

Manufacturer	Type	**Standard**
Falcon Gauge	GM5 10-2	MIL-A-5885 C
AOA	BM 470-RL/L	MIL-A-5885 A

or other instruments designed for aircraft use according to MIL-A-5885 C (or later issues) standards may be installed.

6.10 FES Control and indication instrument

Manufacturer	**Type**	**TCDS No.**
LZ design	FES FCU	/

6.11 Instruments which are not part of the minimum equipment:

Transponders:
Transponders certified for aircraft use according to TSO or JTSO or ETSO standards may be installed.
Installation of transponder and transponder antenna must be accomplished according to technical note DG-G-02.
After installation, a functional test and inspection must be performed by a licensed inspector.

ELT:
The ELT is or must be installed according to the ELT manufacturer's instructions.
The designated place is the baggage compartment on the floor.
Installation of ELT antenna must be accomplished according to drawing Z193 (attached to the MM).
After installation, a functional test and inspection must be performed by a licensed inspector.
The ELT must be switched off during road transport.

Other instruments and equipment (eg. variometers, gliding computers or flight data recorders):
Instruments and other equipment may be installed if they do not in themselves, or by their effect upon the motor glider, constitute a hazard to safe operation.

Caution: If additional instruments or equipment are to be installed after production of the glider, it must be assured that they will be installed in the places provided by the design. If installed in other places it must be assured that they are secured safely.
Electrical instruments and equipment must be connected via a appropriately rated fuses, the power consumption of each single part should not exceed 3A.

After installation raise a new weight and balance report.

Warning: If equipment is mounted on the canopies special care must be taken that canopy jettison is not impaired. To accomplish this any wire must be equipped with a plug in the vertical part. All plugs must be able to disconnect with low force, max. 10 N (2 lbs.). The wires must be long enough for the canopies to be opened completely before the wires are tight.
Equipment shall only be mounted at the fastening threads in the canopy frame provided by the design.
Max. mass of the equipment per canopy: 1 kg (2 lbs.).

7 List of special tools etc.

A Special tool with 6 mm thread (W38/2) for the securing of the tailplane 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 14
SW 7	SW 17
SW 8	11/16" = 18 mm
SW 9	SW 19
SW 10	SW 22
SW 13	

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

F Circlip pliers A (outside) for the range 8-14 mm for the tail wheel axis

G Spring balance max. reading 50 N (11 lbs.) for determination of control surface moments (see section 1.10)

H Spring balance max. reading 100 N (22 lbs.) for determination of airbrake over centre locking moments (see section 4.4.2

I Nicopress tool 64 – CGMP for cable connections

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

K For filling the fin ballast tank: Z27/2 Funnel with clear PVC hose inner diameter 12 mm (.47 in.) 1.9 m (6 ft.) long and hose connector GS 12.

8 Parts list

Please find the part no's of the control-system parts in the following diagrams:

8.1 Control surface seals and turbulators

1. Wings - upper surface
   30003125 Mylar seal 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 seal)
   30003136 Teflon-glass fabric 0.08 x 38 mm, 33 m roll self-adhesive
   70000229 Tesafilm 4104 white, 19 mm wide, 66 m roll PVC tape
4. Horizontal tailplane
   30003129 Zig-zag turbulator tape 60 degree 0.4 mm thick
   30003125 Upper surface: Mylar seal 0.19 x 22 mm without glue, curved
   30003124 Lower surface: Mylar seal 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 seal 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 seal: 3M Scotch V-seal weatherstrip Cat.Nr.2101 5.2 m roll

8.2 Parts for electrical system (special for FES system see section 8.4)

10180012 Battery Z01/2 (12V/12 Ah) with fuse 60510459

60510385 Protective circuit breaker ETA 2A (automatic cut off)
60510386 Protective circuit breaker ETA 3A (automatic cut off)
60510387 Protective circuit breaker ETA 4A (automatic cut off)

8.3 Parts for the electrically operated landing gear

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 Extension-retraction switch MTG 106 G (LG up, down)
60510375 Press button 12G2904 with cap 12G2910 black (LG up)

60510387 Circuit breaker ETA 4A
60510360 Toggle switch MTA 106 D (selector switch Avionic)
60510476 Toggle switch 20-647 H (main switch)
10180012 Battery Z01/2 (12V/12 Ah) with fuse 60510459
60510459 Fuse G 250V 5x20 / 16 A
60510865 Switch 1006.1511

8.4 Parts fort he FES System

41005100 propeller blades FES DG-P1-102
45005098 propeller bolts with spacer, castle nut and safety pin
41005101 propeller hub DG-1001E
41005102 composite spinner FES DG-1001E
41005103 motor bulkhead inspection cover DG-1001E
45005106 FCU Instrument
41005104 Isometer box
45005107 FCC Box (FES control circuit board)
45005108 battery main contactor, Kilovac EV200
45005109 FES power switch (with red cover)
45005111 motor controller, KHB14401CL
41005105 motor FES-DG-M100
45005113 2A fuse inside of FCC box
45005114 325A power fuse
45005115 LXIU Box
45005116 DCPR Box incl. DC-DC converter
45005117 battery packs 16S (GEN4)
45005118 internal BMS electronic circuit board
41005107 battery connecting cable DG-1001E for GEN4 batteries
41005108 upper battery holder front - 310 mm
41005109 upper battery holder rear - 290 mm
41005122 lower battery fixation plate with rubber padding
41005123 battery fixation bolt, GR-362

9 Enclosures

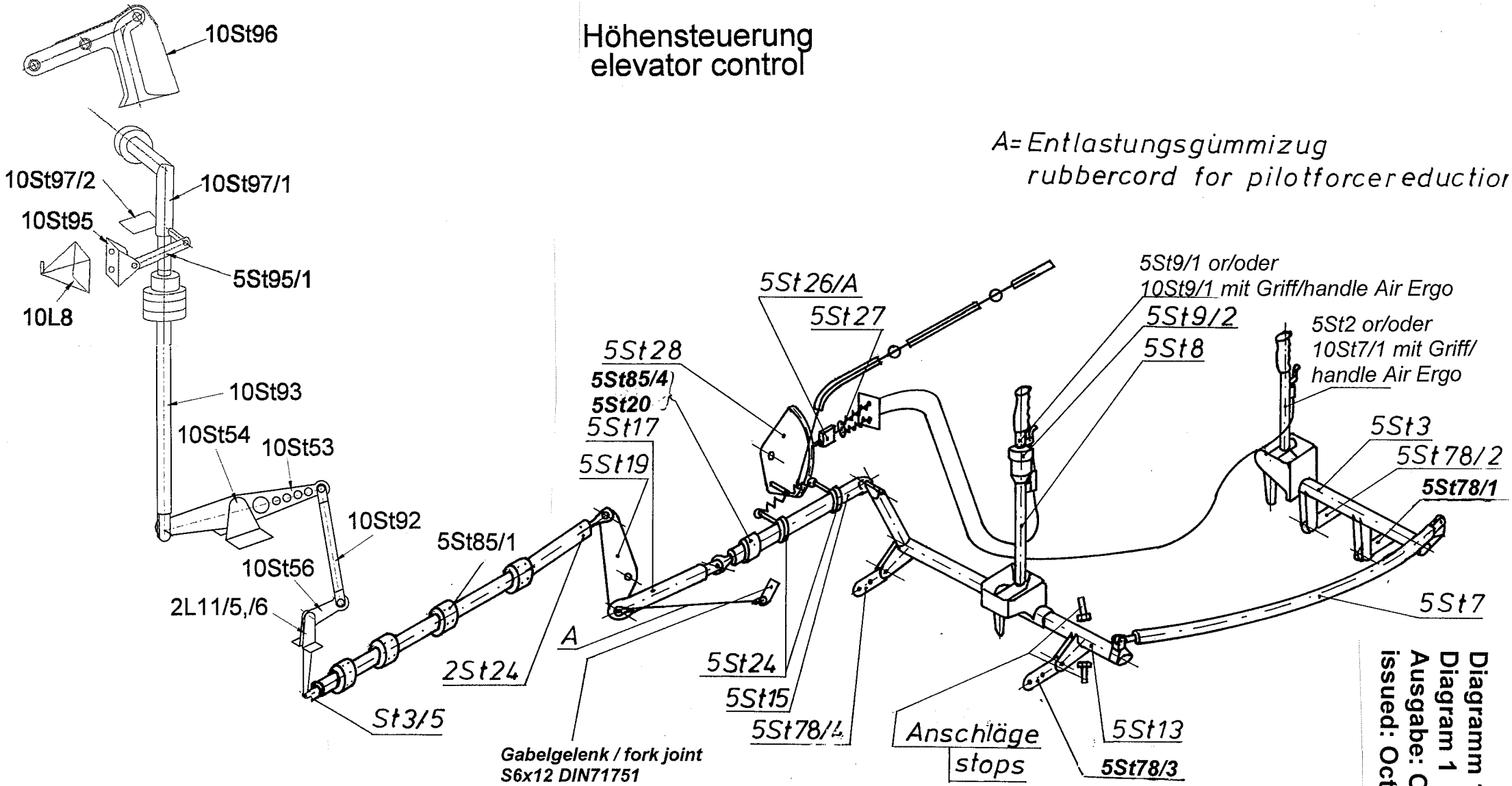
9.1 Equipment list

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					
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.

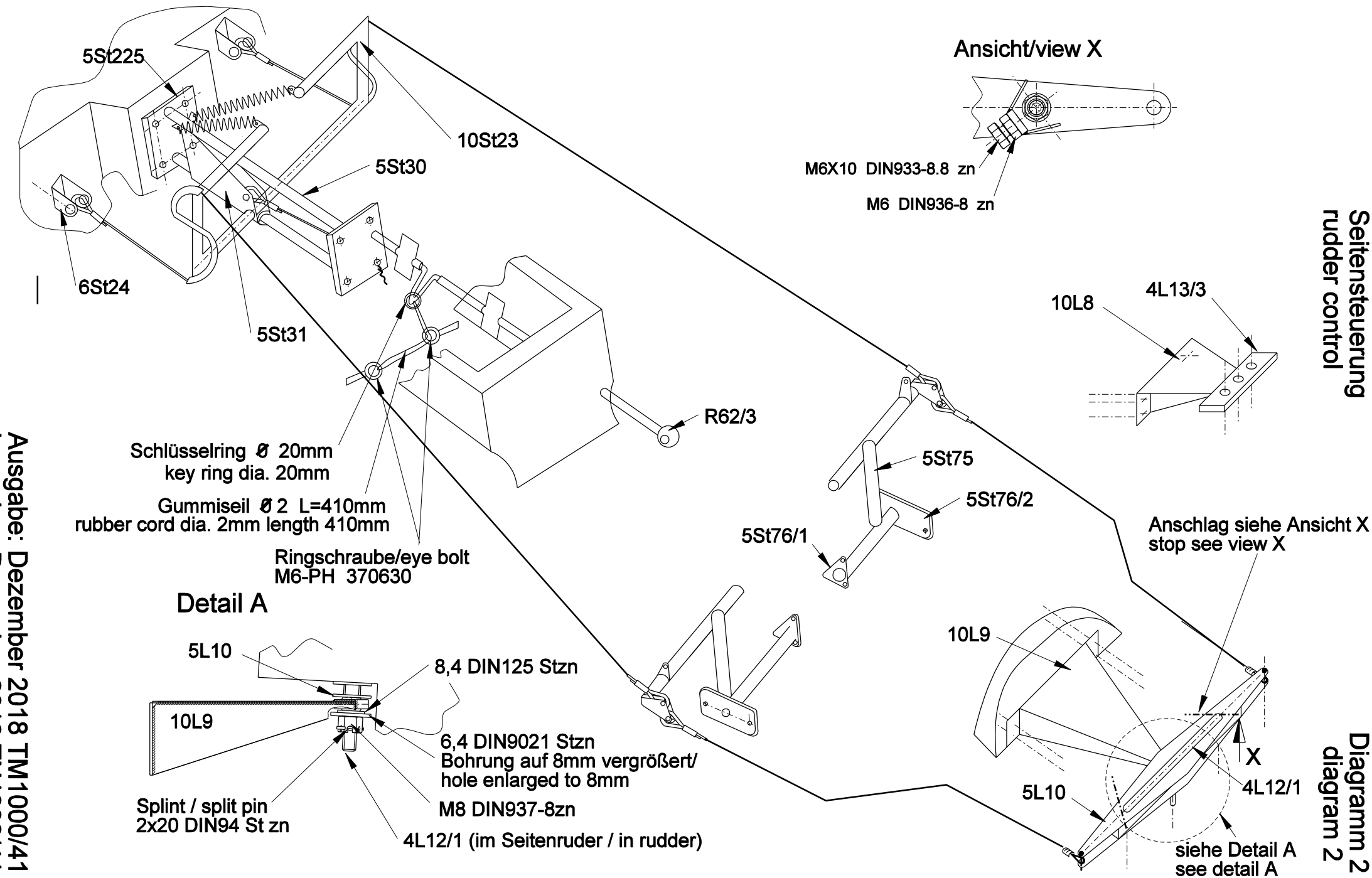
Höhensteuerung
elevator control



A= Entlastungsgümmizug
rubbercord for pilotforcereductior

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

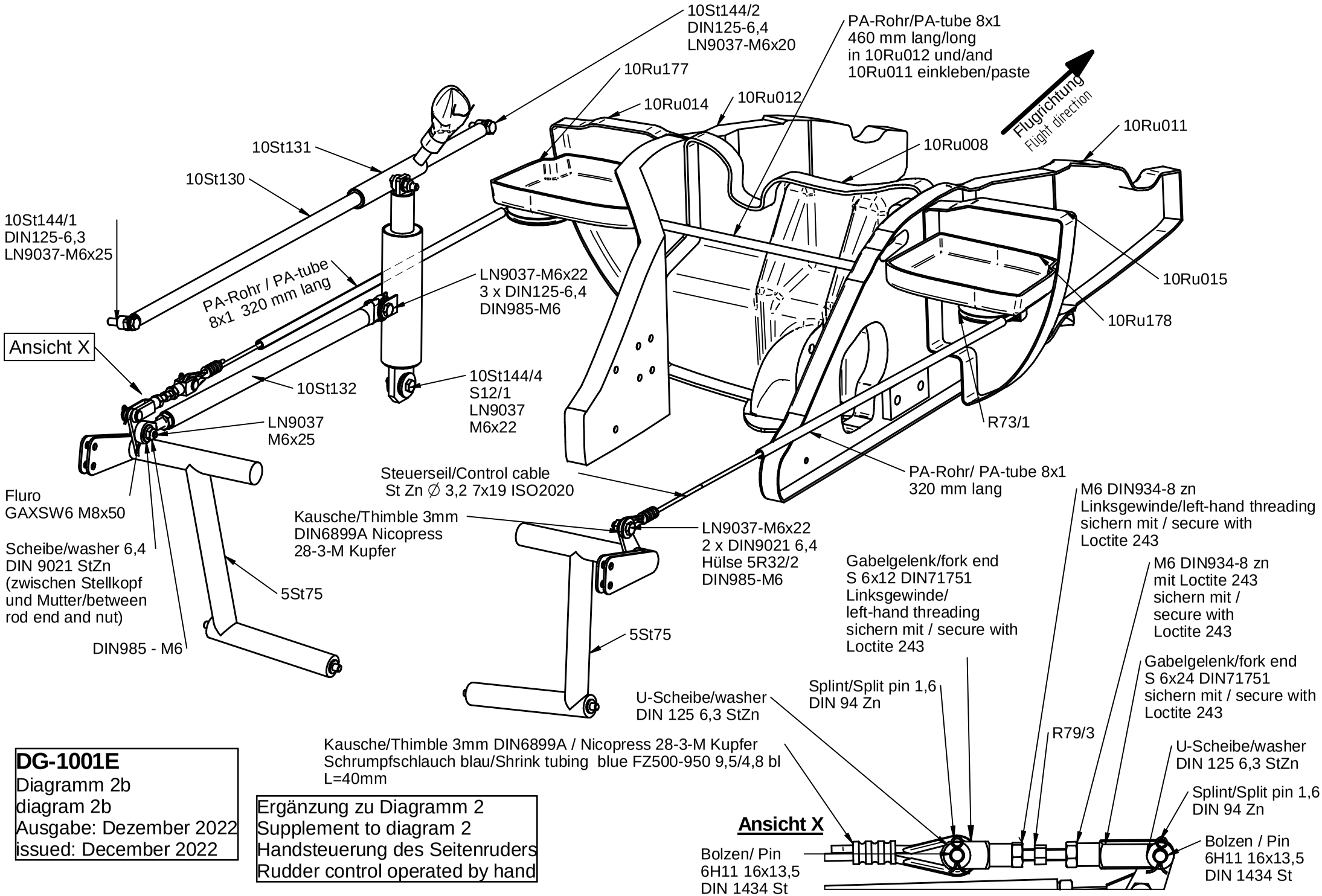
Diagramm 1
Diagram 1
Ausgabe: Okt. 2010
issued: October 2010



Seitensteuerung
rudder control

Diagramm 2
diagram 2

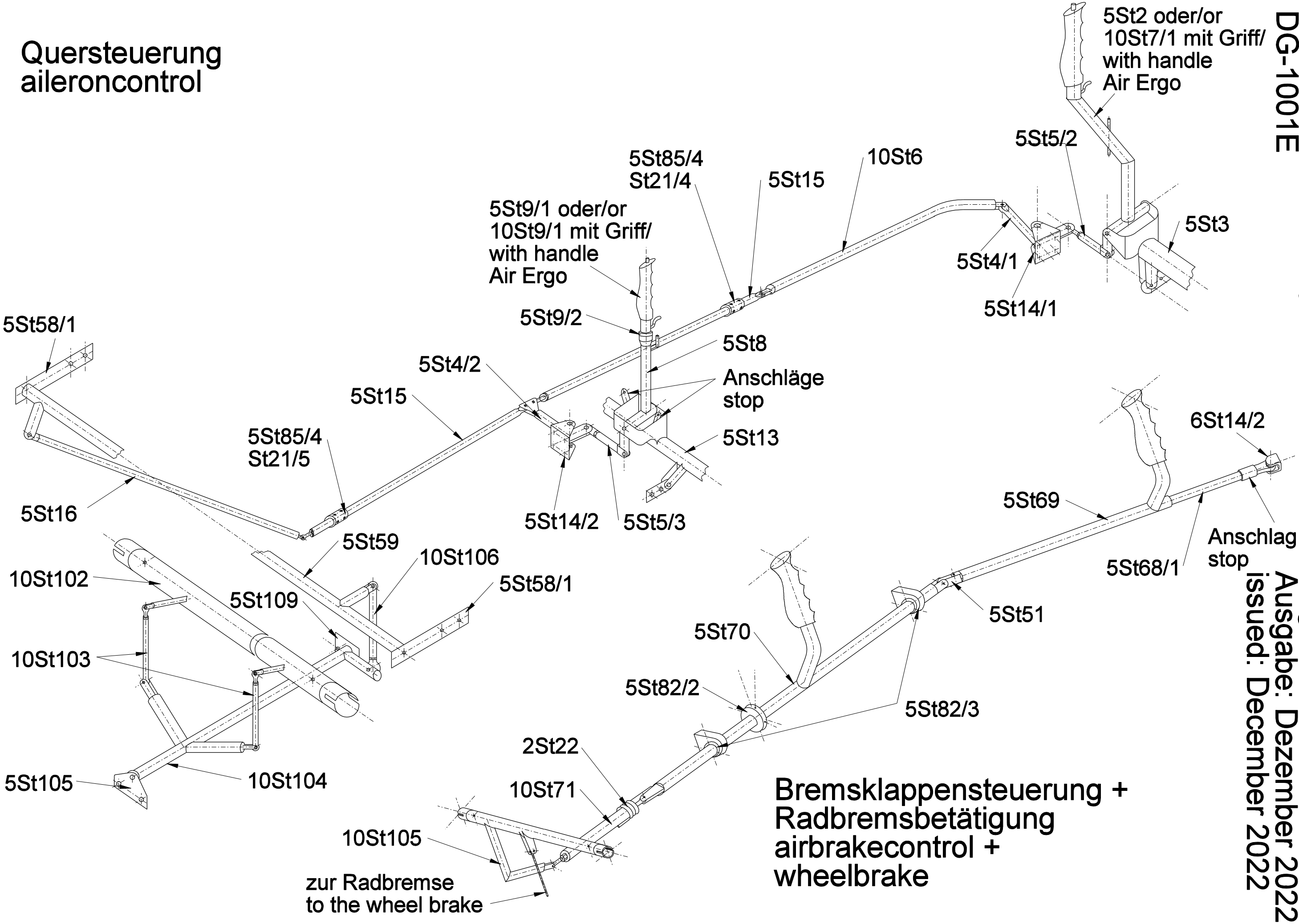
Ausgabe: Dezember 2018 TM1000/41
issued: December 2018 TN1000/41



DG-1001E
Diagramm 2b
diagram 2b
Ausgabe: Dezember 2022
issued: December 2022

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

Quersteuerung
aileroncontrol



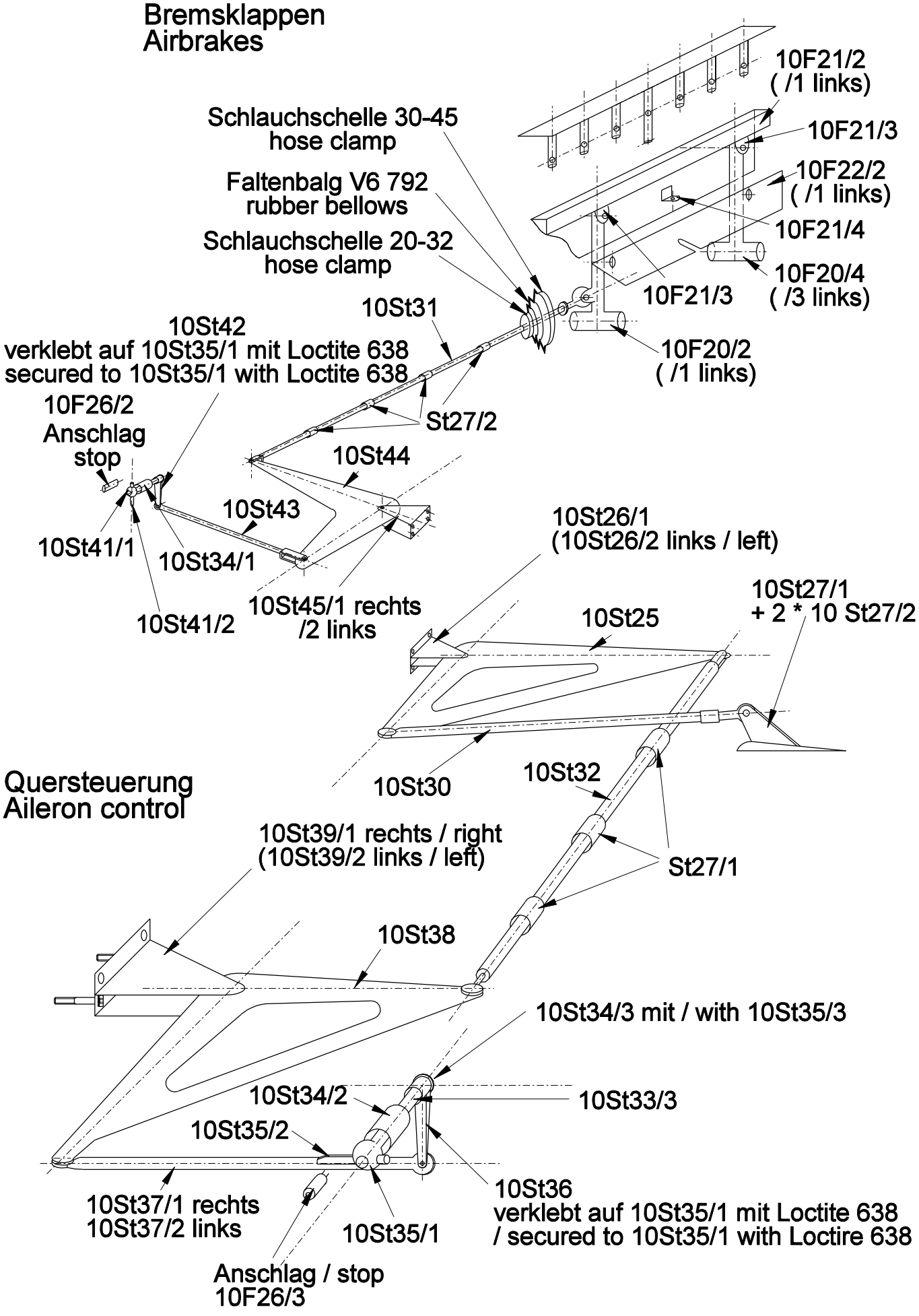
Bremsklappensteuerung + Radbremsbetätigung
airbrakecontrol + wheelbrake

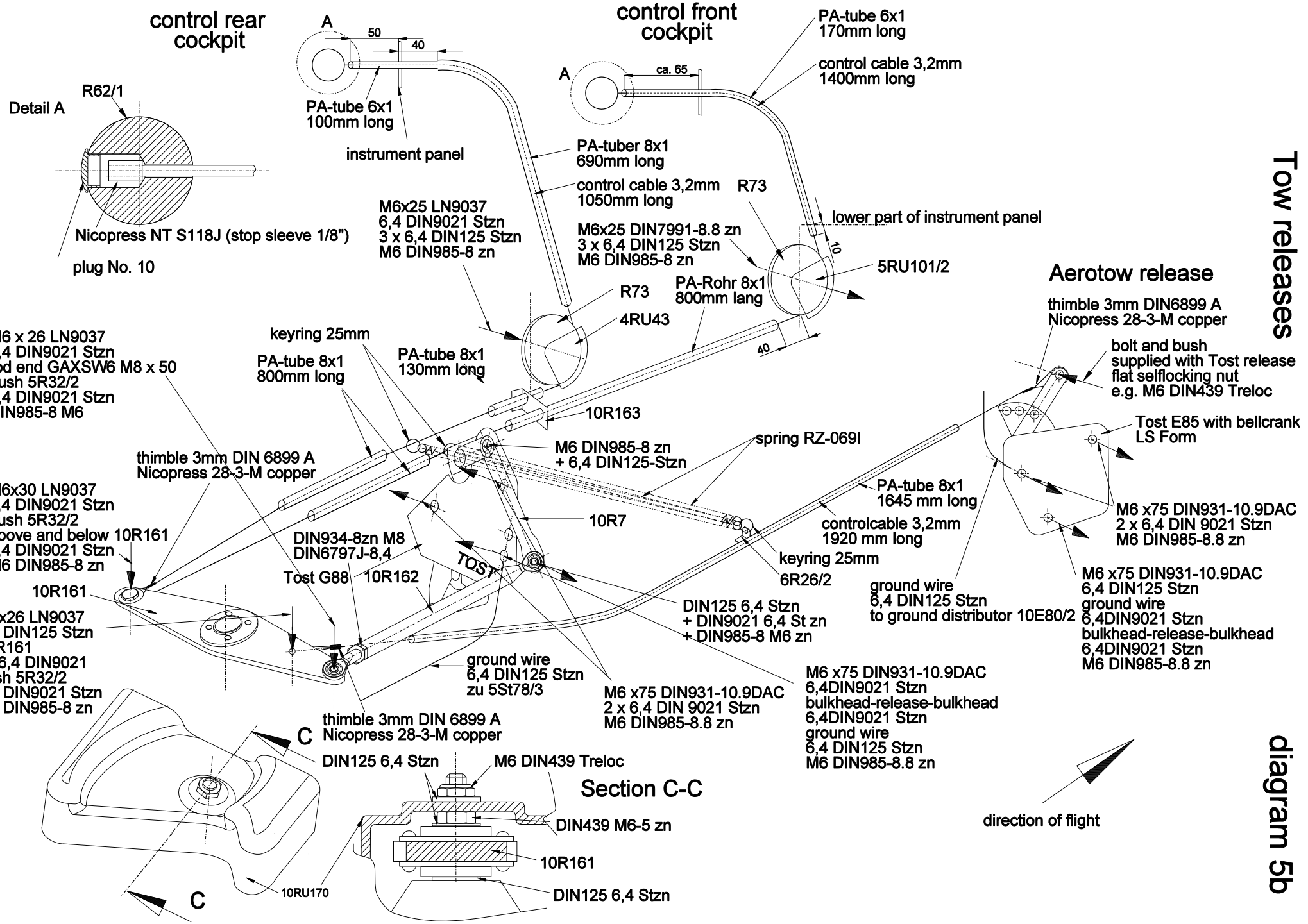
Steuerung im Rumpf
controls in the fuselage
DG-1001E

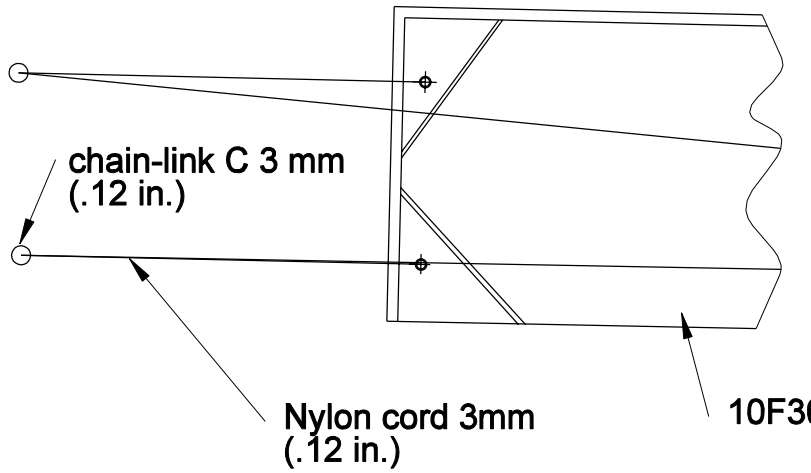
Diagramm 3
diagramm 3
Ausgabe: Dezember 2022
issued: December 2022

DG-1000
Steuerung im Flügel
Controls in the wings

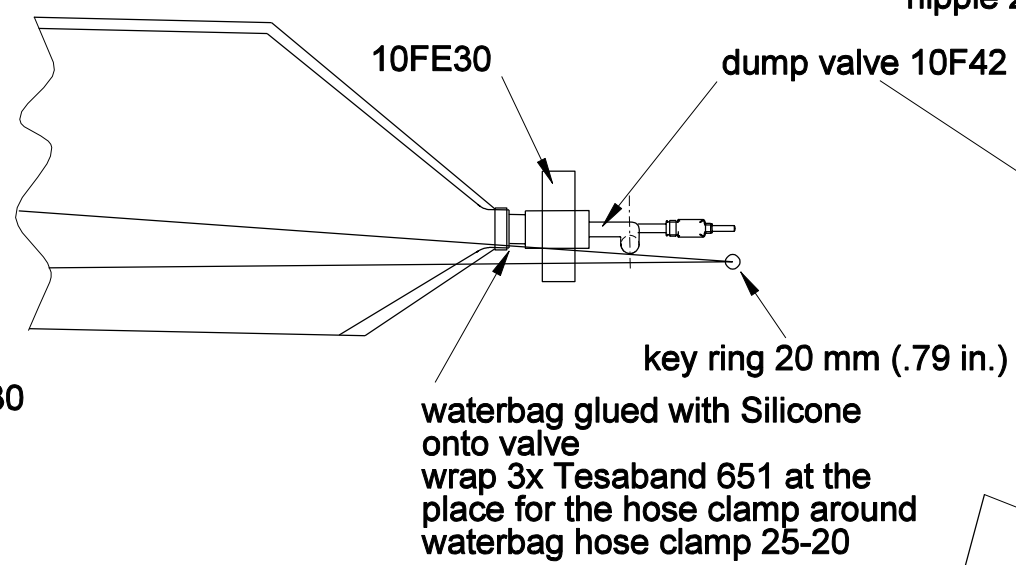
Diagramm 4
diagram 4
Ausgabe: Dezember 2022
issued: December 2022

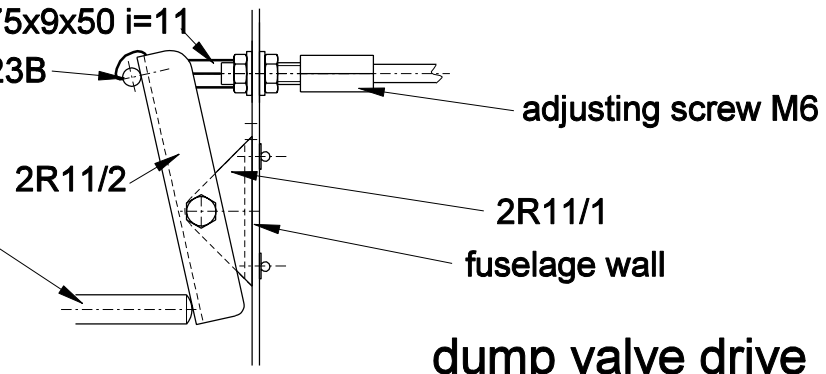



control rear cockpit
Detail A
R62/1
Nicopress NT S118J (stop sleeve 1/8")
plug No. 10
A
50
40
PA-tube 6x1
100mm long
instrument panel
control front cockpit
A
ca. 65
PA-tube 6x1
170mm long
control cable 3,2mm
1400mm long
PA-tuber 8x1
690mm long
control cable 3,2mm
1050mm long
R73
lower part of instrument panel
M6x25 LN9037
6,4 DIN9021 Stzn
3 x 6,4 DIN125 Stzn
M6 DIN985-8 zn
M6x25 DIN7991-8.8 zn
3 x 6,4 DIN125 Stzn
M6 DIN985-8 zn
10
5RU101/2
R73
4RU43
PA-Rohr 8x1
800mm lang
40
keyring 25mm
PA-tube 8x1
800mm long
PA-tube 8x1
130mm long
10R163
M6 x 26 LN9037
6,4 DIN9021 Stzn
rod end GAXSW6 M8 x 50
bush 5R32/2
6,4 DIN9021 Stzn
DIN985-8 M6
thimble 3mm DIN 6899 A
Nicopress 28-3-M copper
M6 DIN985-8 zn
+ 6,4 DIN125-Stzn
spring RZ-069I
M6x30 LN9037
6,4 DIN9021 Stzn
bush 5R32/2
above and below 10R161
6,4 DIN9021 Stzn
M6 DIN985-8 zn
10R7
DIN934-8zn M8
DIN6797J-8,4
Tost G88
10R162
TOST
10R161
M6x26 LN9037
6,4 DIN125 Stzn
10R161
2x 6,4 DIN9021
bush 5R32/2
6,4 DIN9021 Stzn
M6 DIN985-8 zn
PA-tube 8x1
1645 mm long
controlcable 3,2mm
1920 mm long
keyring 25mm
6R26/2
DIN125 6,4 Stzn
+ DIN9021 6,4 St zn
+ DIN985-8 M6 zn
ground wire
6,4 DIN125 Stzn
to ground distributor 10E80/2
ground wire
6,4 DIN125 Stzn
zu 5St78/3
thimble 3mm DIN 6899 A
Nicopress 28-3-M copper
M6 x75 DIN931-10.9DAC
2 x 6,4 DIN 9021 Stzn
M6 DIN985-8.8 zn
M6 x75 DIN931-10.9DAC
6,4DIN9021 Stzn
bulkhead-release-bulkhead
6,4DIN9021 Stzn
ground wire
6,4 DIN125 Stzn
M6 DIN985-8.8 zn
Aerotow release
thimble 3mm DIN6899 A
Nicopress 28-3-M copper
bolt and bush
supplied with Tost release
flat selflocking nut
e.g. M6 DIN439 Treloc
Tost E85 with bellcrank
LS Form
M6 x75 DIN931-10.9DAC
2 x 6,4 DIN 9021 Stzn
M6 DIN985-8.8 zn
M6 x75 DIN931-10.9DAC
6,4 DIN125 Stzn
ground wire
6,4DIN9021 Stzn
bulkhead-release-bulkhead
6,4DIN9021 Stzn
M6 DIN985-8.8 zn
C
C
10RU170
DIN125 6,4 Stzn
M6 DIN439 Treloc
Section C-C
DIN439 M6-5 zn
10R161
DIN125 6,4 Stzn
direction of flight
Tow releases
diagram 5b
issued October 2023



waterballast system in the wings

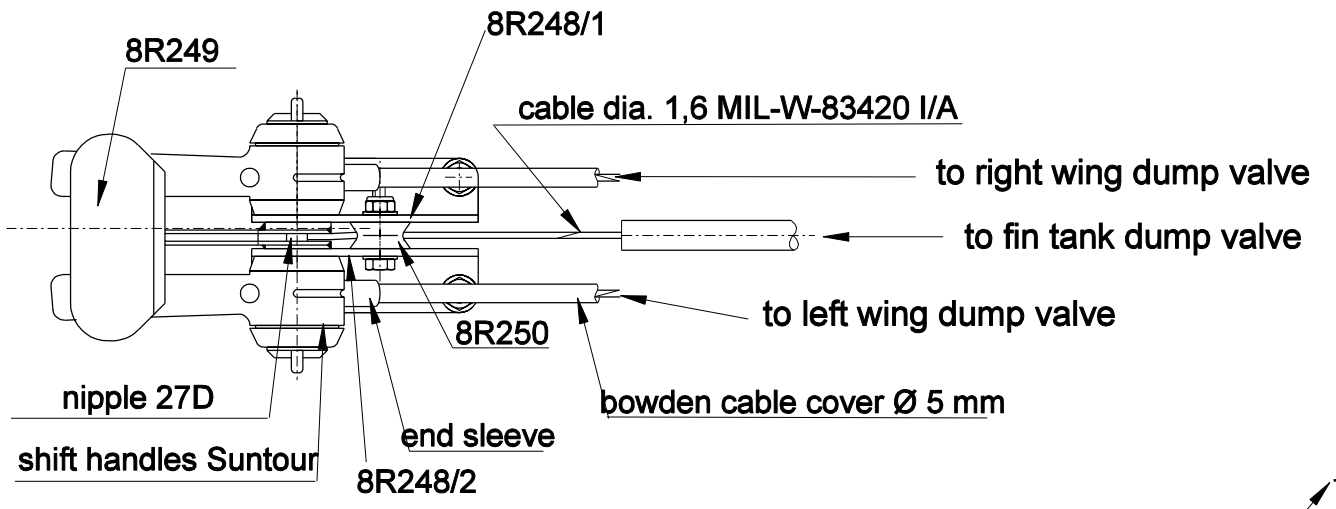




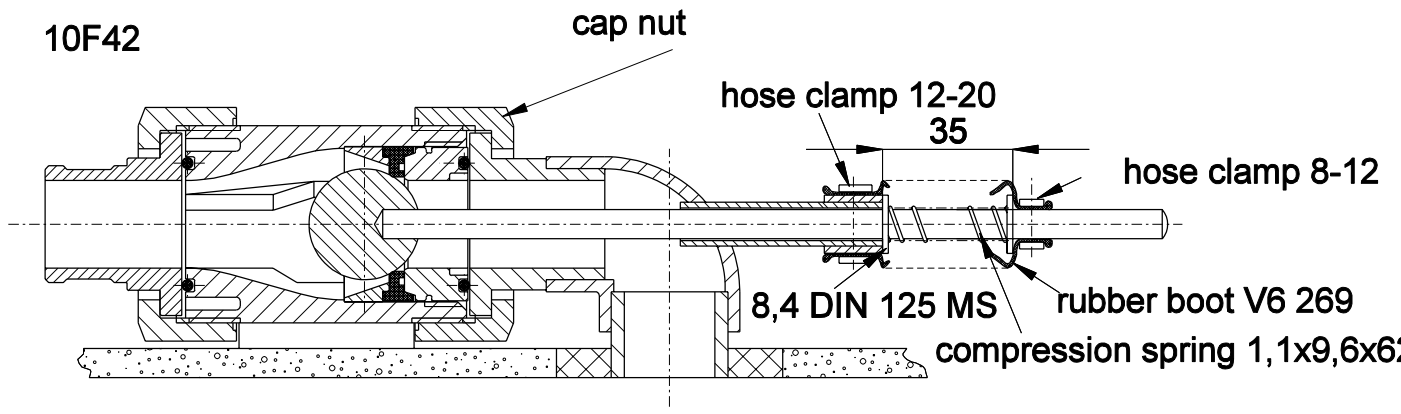
dump valve drive
at fuselage

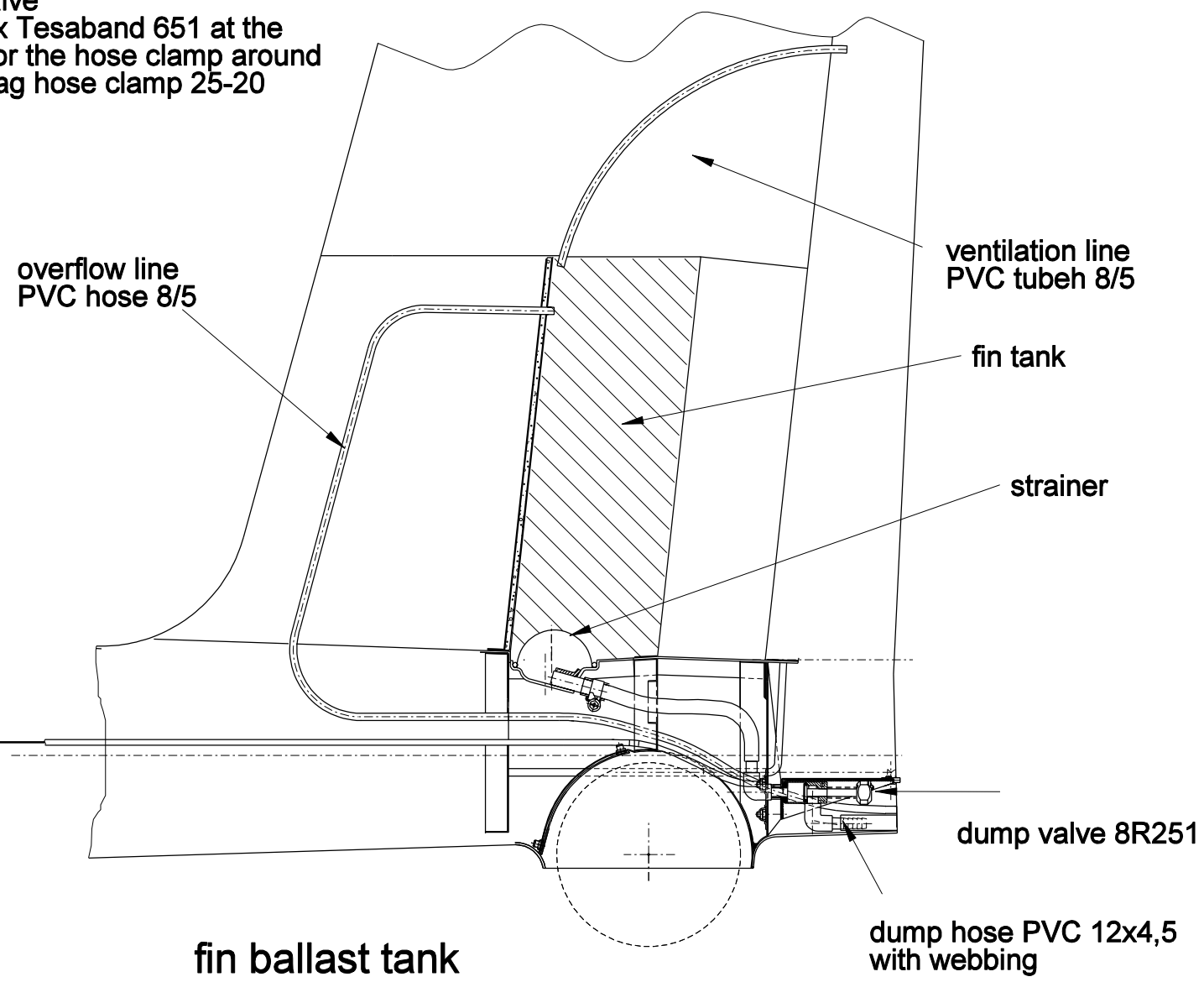
waterballast control handles in front cockpit

see drawing 8R247



dump valve in wing





fin ballast tank

All dimensions in mm, 25.4 mm= 1 in.

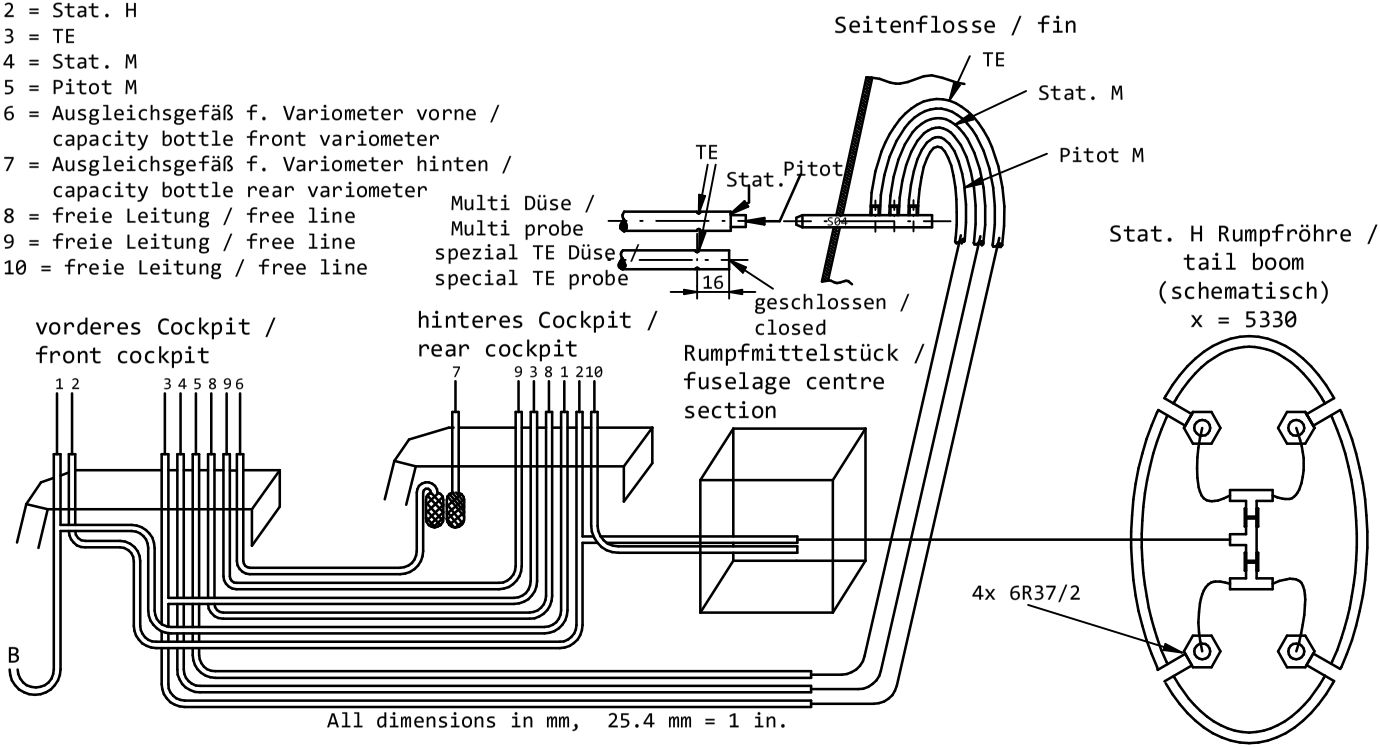
waterballast system

ser. no 10-101, from 10-128 on

diagram 6a
issued March 2008
ÄM1000/02

Datei 10ep23

1 = Pitot V (FES Motor)
2 = Stat. H
3 = TE
4 = Stat. M
5 = Pitot M
6 = Ausgleichsgefäß f. Variometer vorne /
capacity bottle front variometer
7 = Ausgleichsgefäß f. Variometer hinten /
capacity bottle rear variometer
8 = freie Leitung / free line
9 = freie Leitung / free line
10 = freie Leitung / free line



B = zur Gesamtdruckabnahme im FES Motor / towards pitot pressure probe in FES motor

Wichtiger Hinweis: Der Fahrtmesser darf nur an den Druckabnahmen Stat. H (Rumpfröhre) + Pitot V (FES) angeschlossen
Caution: The airspeed indicator must be connected to the probes Stat. H (tail boom) + Pitot V (FES).

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 farblos, die vorgesehenen Namen werden mit bedrucktem Schrumpfschlauch vor den Enden
All lines soft PVC 8x1,5 clear, coding is made with labeled heatshrink tubing near the ends.

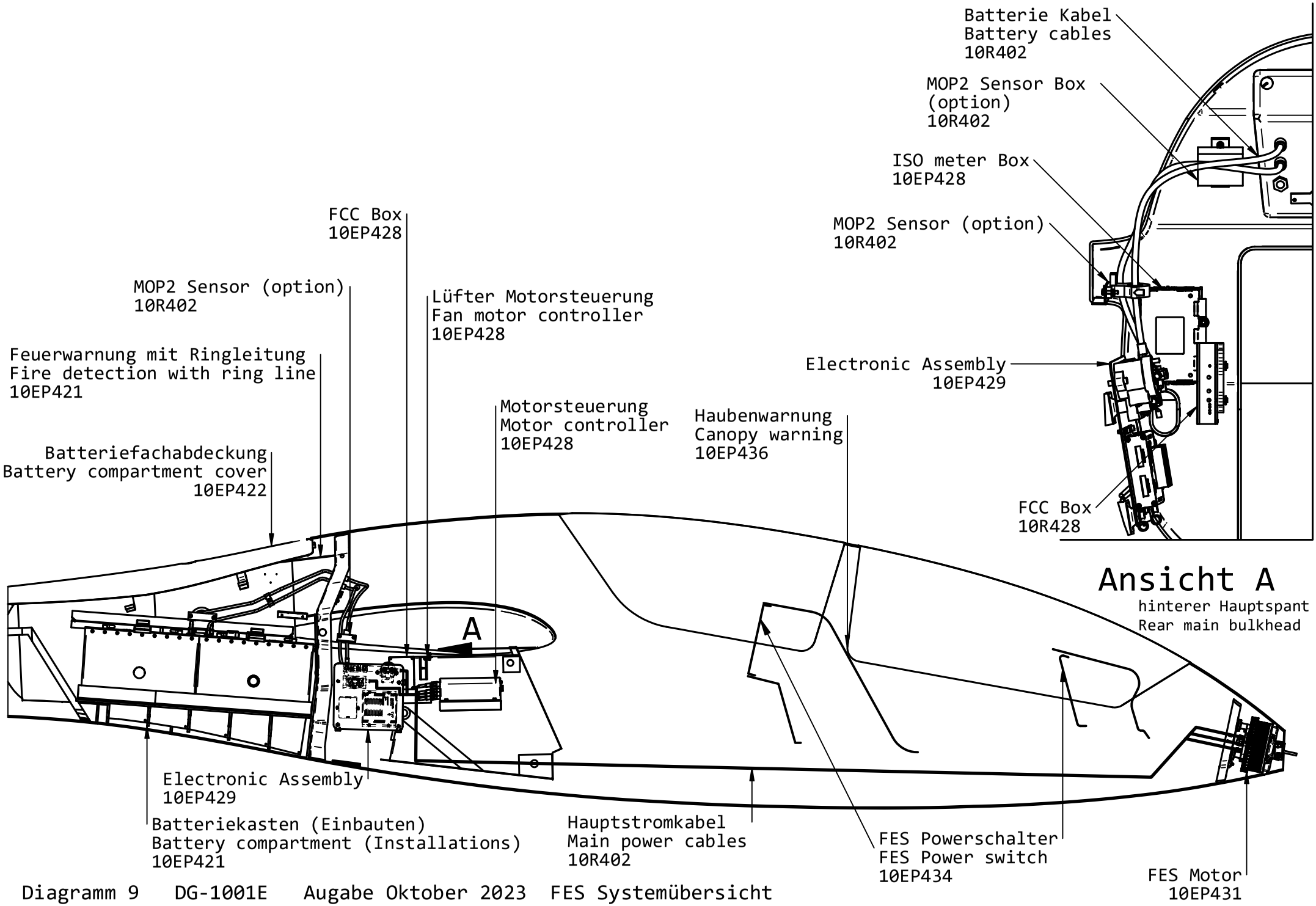
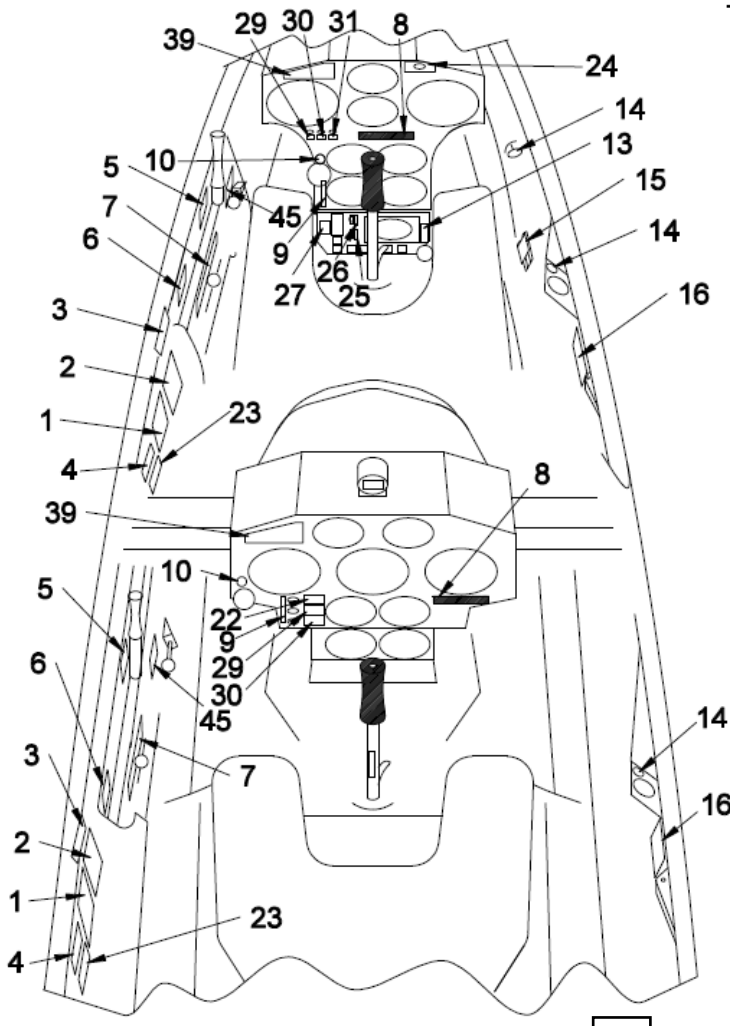


Diagramm 9 DG-1001E Augabe Oktober 2023 FES Systemübersicht
Diagram 9 DG-1001E issue october 2023 FES system overview

placards DG-1001E



LG ○ up ○ ○ ○ down 39

LG ext.-retr. up to185 km/h

on main off 25

intern battery fin 26

GEN2 9 oder GEN4

FIRE 29

1

DG Aviation GmbH
Type: DG – 1000S Serial No.: 10- E
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
Propeller rotating (VPE)	160	86
Motor start VPO max.	120	65
Motor start VPO min.	80	43

Selflaunching is prohibited.
Taxiing is prohibited.

Approved aerobatic manoeuvres, Only allowed in configurations as described in AFM section 2.8.
Pos. Loop, Chandelle, Spin, Stall turn
In addition Category A:
Only allowed in configurations as described in AFM section 2.8.
Half loop and half roll, half roll and half loop, slow roll, inverted flight, half positive flick roll from normal flight with half loop, half negative flick roll from inverted flight

Maximum mass:

With wing span m	17.2 or 18		20	
Category A	630 kg	1389 lbs.	/	/.
Category U	750 kg	1653 lbs	790 kg.	1742 lbs.
Category U without waterballast	kg	kg	kg.	lbs.

4

Loading chart

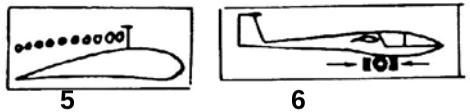
Cockpit load	front seat		rear seat		(Parachute
maximum	105 kg	231 lbs.	105 kg	231 lbs.	included)
or maximum	110 kg	242 lbs.	90 kg	198 lbs.	
minimum	kg	lbs.	/	/	

The load in the front and in the rear seat may be increased to max. 110 kg (242 lbs,) per seat. To accomplish this the mass of the rear pilot must be compensated by ballast in the ballast box in the fin.

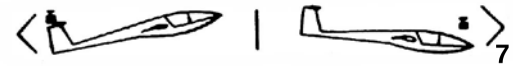
With lower pilot weight necessary ballast must be added.

Flughöhe m	0-3000	4000	5000	6000	7000	8000
V_{NE} IAS km/h	270	256	243	230	217	205

8



5 6



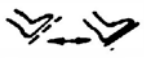
7

TEST FIRE WARNING 30

45



10

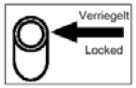


13

Cockpit Check

1. Lead ballast (for under weight pilot)?
2. Parachute worn properly?
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. Fin ballast tank emptied or correct amount filled in?
10. Trim ballast box in the fin, correct amount filled in? Locking device completely engaged?
11. Trim?
12. Both canopies locked?
13. Runway free?
14. Switch "FES power" off?
15. FCU on?

Senden transmit 22



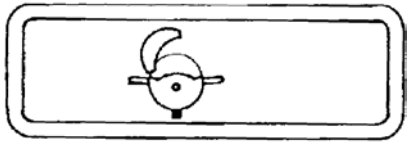
at cover plate of fin ballast box

Betriebsgrenzen für den Seitenflossenwasserballast 23

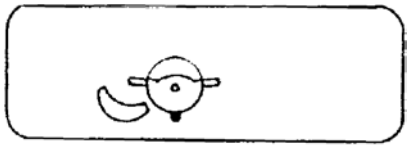
min. Temperatur °C	13,5	17	24	31	38
am Boden					
max. Flughöhe über Grund	m 1500	2000	3000	4000	5000

Ballastkasten Seitenflosse
Mindestzuladung im vorderen Sitz 24

kg	kg
Kasten leer	Kasten befüllt



3



16

14



15

Bauteil Nr.:

part no. of components at all parts

Typ:	DG-1001E
W.Nr.	

fire proof placard at front main bulkhead

Gepäck max. 15 kg
baggage max. 33 lbs.

at front main bulkhead

2

Abflugmasse	750 kg	790 kg
TOW	1653 lbs.	1742 lbs.
Reifendruck	2,5 bar	3 bar
Tyre pressure	36 psi	43.5 psi

at the right wheel door

Sollbruchstelle 10000 N
rated load 2200 lbs.

Reifendruck	4 bar
Tyre pressure	58 psi

on brake fluid reservoir

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

on brake fluid reservoir

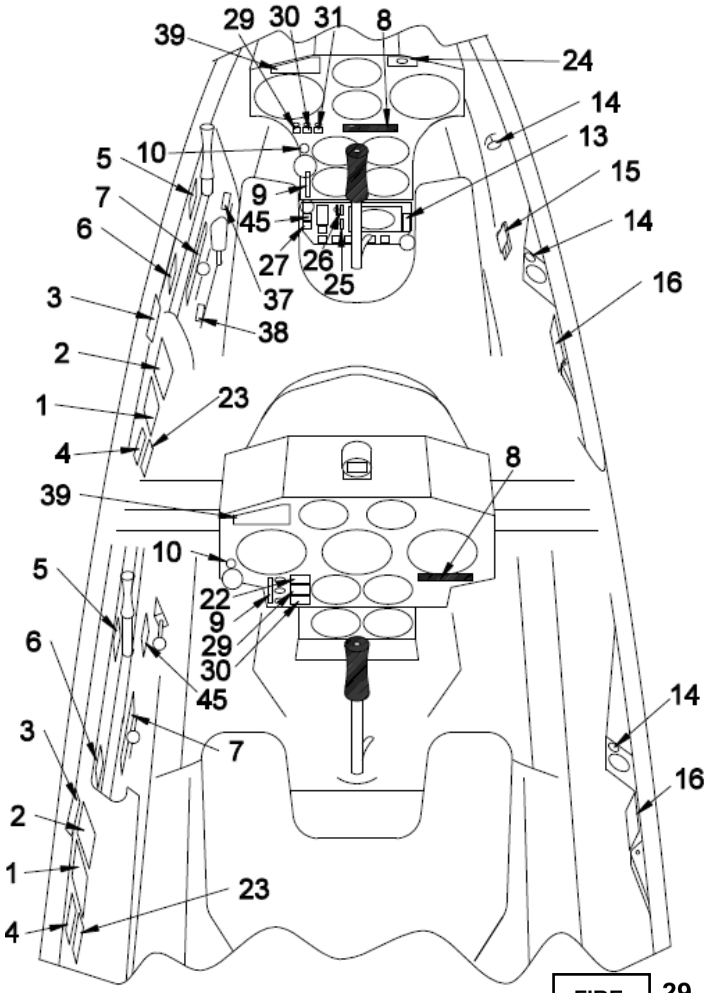
Warning:
Rigging of the horizontal tailplane is only permitted with nose down trim-setting!

Seitenflosse oben links

Diagramm 11
issued March 2022
continued on diagram 11b

placards DG-1001E

(with manual rudder control)



1

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

	km/h	kts.
Maximum airspeeds		
Winch launching	150	81
Aero-tow	185	100
Manoeuvring V_A	185	100
Rough air	185	100
Maximum speed V_{NE}	270	146
Propeller rotating (VPE)	160	86
Motor start VPO max.	120	65
Motor start VPO min.	80	43

Selflaunching is prohibited.
Taxiing is prohibited.

Approved aerobatic manoeuvres, Only allowed in configurations as described in AFM section 2.8.
Pos. Loop, Chandelle, Spin, Stall turn
In addition Category A:
Only allowed in configurations as described in AFM section 2.8.
Half loop and half roll, half roll and half loop, slow roll, inverted flight, half positive flick roll from normal flight with half loop, half negative flick roll from inverted flight

Maximum mass:

With wing span m	17.2 or 18		20	
Category A	630 kg	1389 lbs.	/	/.
Category U	750 kg	1653 lbs	790 kg.	1742 lbs.
Category U without waterballast	kg	kg	kg.	lbs.

Cockpit Check

1. Lead ballast (for under weight pilot)?
2. Parachute worn properly?
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. Fin ballast tank emptied or correct amount filled in?
10. Trim ballast box in the fin, correct amount filled in? Locking device completely engaged?
11. Trim?
12. Both canopies locked?
13. Runway free?
14. Switch "FES power" off?
15. FCU on?

Bauteil Nr.:

part no. of components at all parts

Typ:	DG-1001E
W.Nr.	

fire proof placard at front main bulkhead

Gepäck max. 15 kg
baggage max. 33 lbs.

at front main bulkhead

2

Abflugmasse	750 kg	790 kg
TOW	1653 lbs.	1742 lbs.
Reifendruck	2,5 bar	3 bar
Tyre pressure	36 psi	43.5 psi

at the right wheel door

Sollbruchstelle 10000 N
rated load 2200 lbs.

4

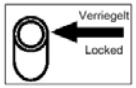
Loading chart

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

The load in the front and in the rear seat may be increased to max. 110 kg (242 lbs,) per seat. To accomplish this the mass of the rear pilot must be compensated by ballast in the ballast box in the fin.

With lower pilot weight necessary ballast must be added.

Senden transmit **22**



at cover plate of fin ballast box

Betriebsgrenzen für den Seitenflossenwasserballast **23**

min. Temperatur am Boden	°C	13,5	17	24	31	38
max. Flughöhe über Grund	m	1500	2000	3000	4000	5000

Ballastkasten Seitenflosse
Mindestzuladung im vorderen Sitz **24**

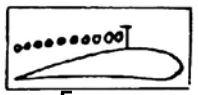
kg	kg
Kasten leer	Kasten befüllt

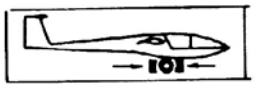
Reifendruck 4 bar
Tyre pressure 58 psi

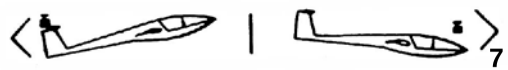
on brake fluid reservoir

Flughöhe m	0-3000	4000	5000	6000	7000	8000
V_{NE} IAS km/h	270	256	243	230	217	205

8

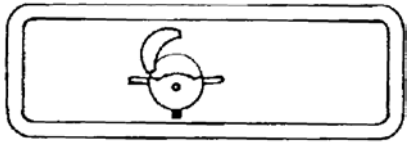

5

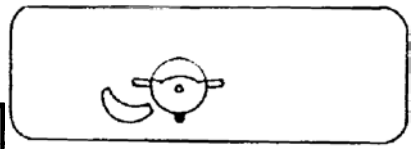

6


7

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

on brake fluid reservoir


3


16

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

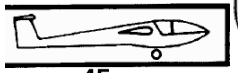
Seitenflosse oben links

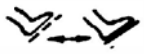
FIRE **29**

G E N 2 **9** oder GEN4

TEST FIRE WARNING **30**


10


45


13

LG up / down **39**

LG ext.-retr. up to185 km/h

on main off **25**

intern battery fin **26**

Nose left **37**

Nose right **38**


14


15

Diagramm 11a
issued March 2022

continued on diagram 11b

Placards continued

Flugzeug mit Elektroantrieb / Aircraft with electric propulsion

Im Notfall **Rettungskarte** im vorderen Cockpit beachten (Kartentasche auf der rechten Seite)!

In Case of emergency refer to **Rescue Card** in front Cockpit (on the right side in map pocket)!

Placard on fuselage top directly behind rear canopy

Rescue card

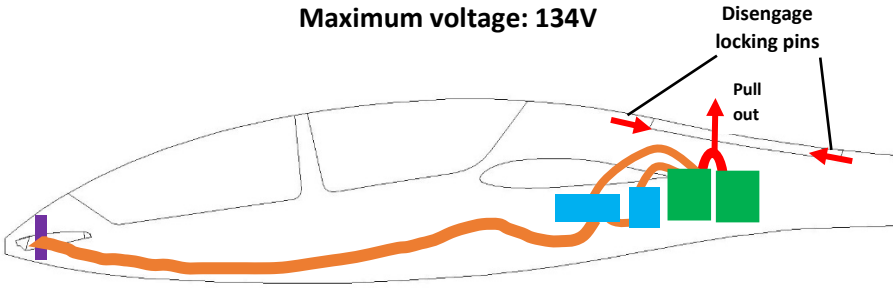
The card shall be carried on board in the front map pocket

Deutsche Version, siehe Rückseite

! Rescue Card !

Powered sailplane with electric propulsion system

Maximum voltage: 134V



Legende:

- Battery connecting cable
- Electric motor
- Power electronics
- Li-ion batteries
- High voltage cable

In case of crash, hard landing or similar emergency situation:

➔ Open battery compartment cover (operate 2x locking pins) on top of fuselage behind wing
Pull out battery connecting cable on the left side which connects front and rear battery pack

➔ In Case of fire in battery compartment:
Extinguish and cool batteries with lots of water even after extinguishing of the fire! Take care for possibly developing ignitable hydrogen / oxygen mixture!

Diagramm 20
diagram 20

TM1000/45

Ausgabe: Oktober 2021
issued: October 2021

TM1000/45

elektrisch betätigtes Hauptfahrwerk, hydraulische Radbremse
electrically operated main landing gear, hydraulic wheelbrake

Schnitt A-A
section

Vorratsbehälter
reservoir

Gepäckraumrückwand/
rear baggage compsrtment wall

10FW109, ab/from 10-268 10FW256

10FW124, ab/from 10/268
10FW252/1 verschraubt/bolted

10FW89

Endschalter (FW ein)
164-564
limit switch
(LG retracted)

Fahrwerkskasten 10Ru48
landing gear box
ab/from 10-268 10Ru48/3

10St105

EW 8x1-R1/8"

5R94/1 DG-1000S
10R94/1 DG-1000T

Gewinde mit
Teflonband
abgedichtet/
thread sealed
with Teflon tape

A

Ansicht X
view

Schnitt B-B
section

10FW127, ab/from 10/268
10FW251/1 verschraubt/bolted

alternativer
Anschluss/
alternative fitting

10FW108

A

10FW91

Schnitt C-C
section

10FW10/2

B

TOST Hauptbremszylinder Form 7
master cylinder

X

10FW91

10FW19/1

10FW10/1

C

C

Fahrwerksklappe 10Ru46 links (left)
landing gear door 10Ru47 rechts (right)
ab/from 10-268: 10Ru46/2 + 10Ru47/2

10FW102 rechts (right)
10FW102/2 links (left)

10FW21

10FW10/1

Siehe 10Fw2
see

10FW11/1

Schnitt D-D
section

D

D

10FW11/7

S84

A

10FW18

Reifen 380x150
tyre

10FW11/2

10FW11/7

10FW11/3

10FW17

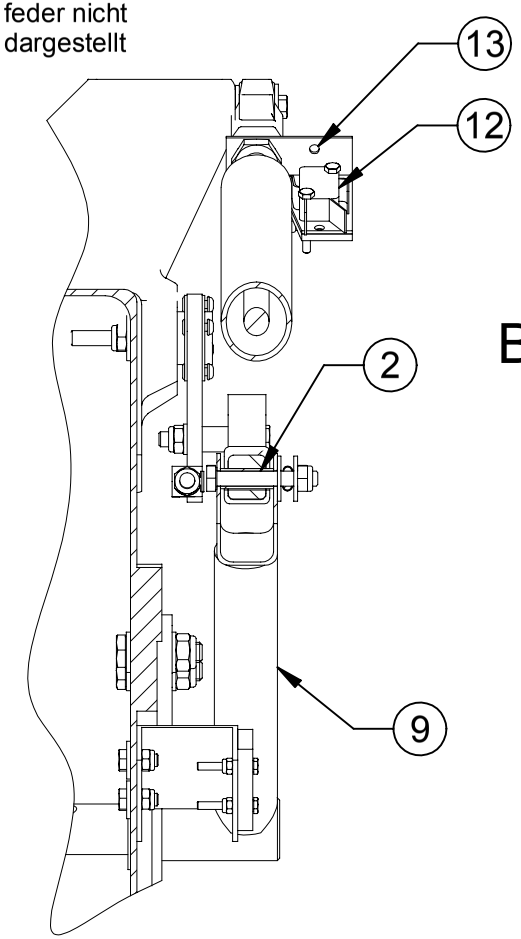
10FW11/6

10FW18

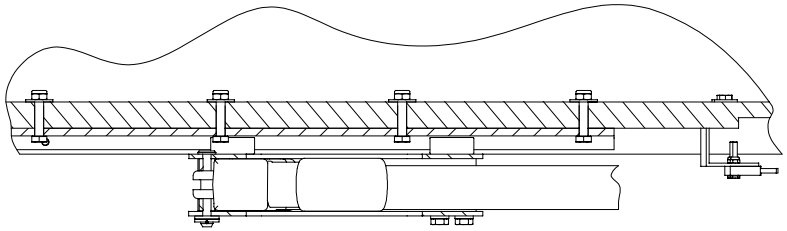
A

Benabteil A1-A1-0-0-105-317-6000N

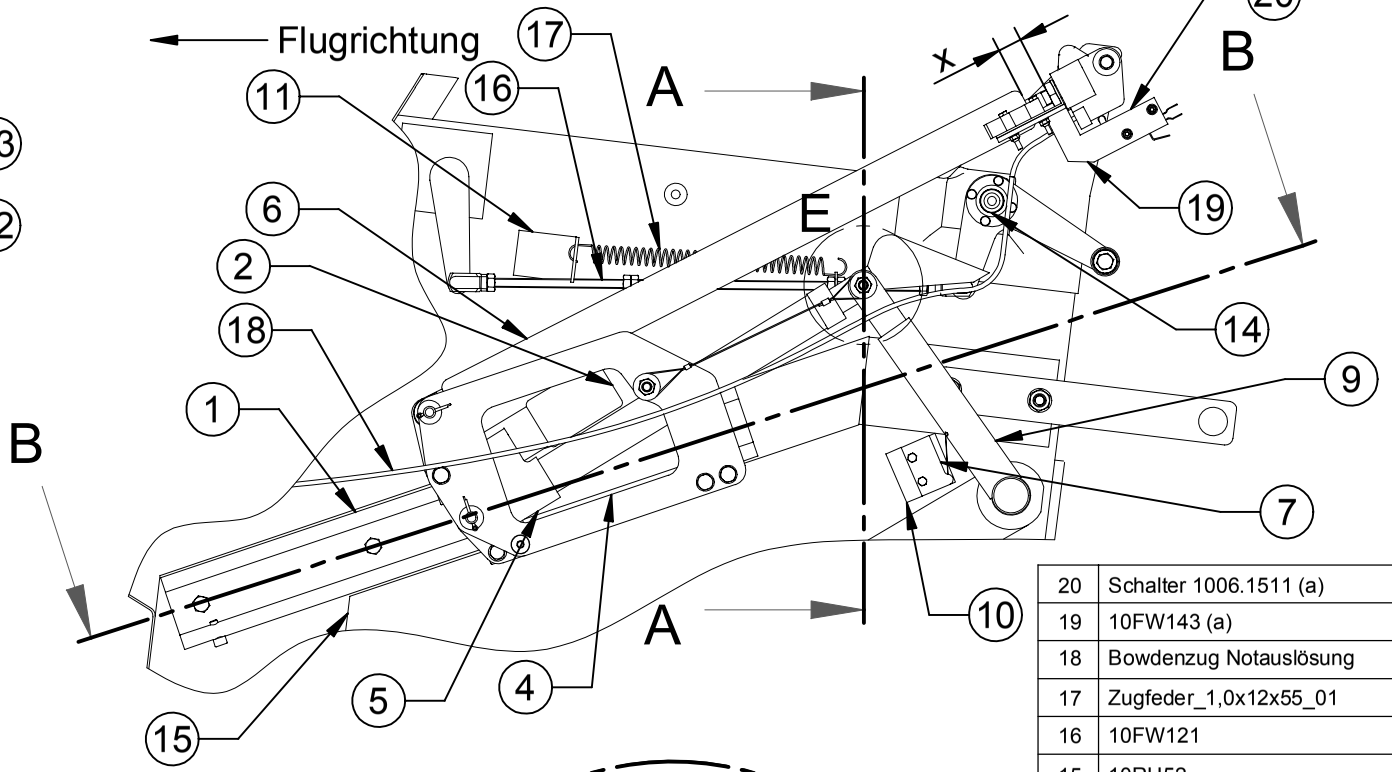
Kabel zum Endschalter Gasfeder nicht dargestellt



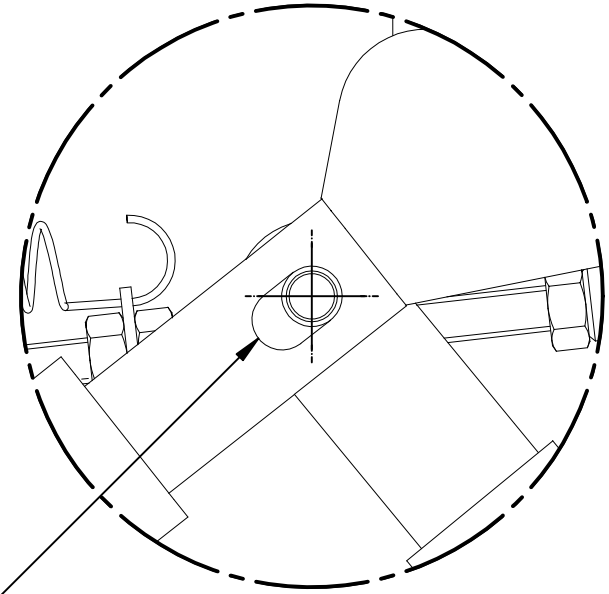
Schnitt A-A



Schnitt B-B



Detail E



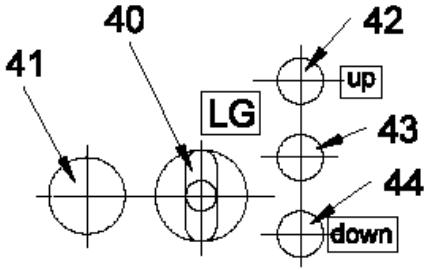
Langloch im Kopf des Spindeltriebs

Nr.	Bezeichnung	QTY
20	Schalter 1006.1511 (a)	1
19	10FW143 (a)	1
18	Bowdenzug Notauslösung	1
17	Zugfeder_1,0x12x55_01	1
16	10FW121	1
15	10RU52	1
14	10FW130	1
13	10FW120	1
12	Endschalter Gasfeder XGG2-88-S20Z1	1
11	10FW92	1
10	10FW93	1
9	10FW108	1
8	10FW90	1
7	Endschalter FW aus 164-574	1
6	K0V2P-3-200-647--001/460N	1
5	Spindeltrieb 10 FW140	1
4	10FW98	1
3	10FW89	1
2	10FW135	1
1	10FW103	1

(a) nur wenn TM1000/19 durchgeführt, serienmäßig ab W.Nr. 10-157

Datenschilder elektrisch betätigtes Hauptfahrwerk DG-1000S + DG-1001E
placards electrically operated mainlanding gear DG-1000S + DG-1001E

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):

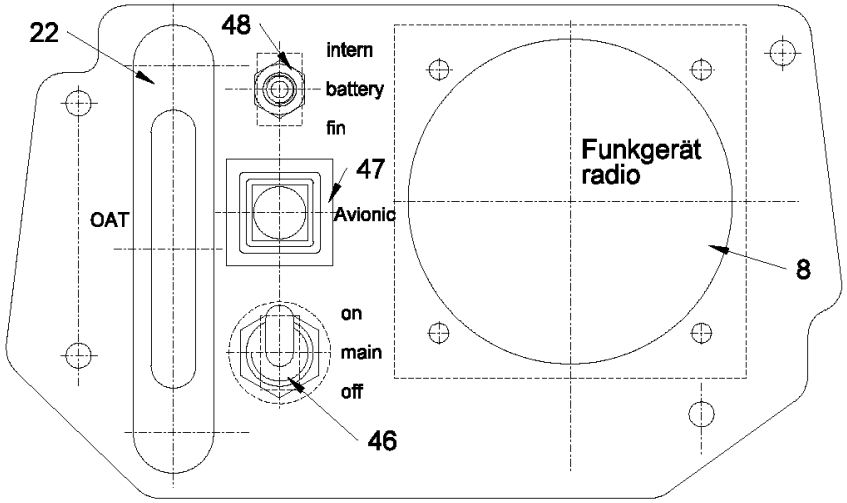


or english

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

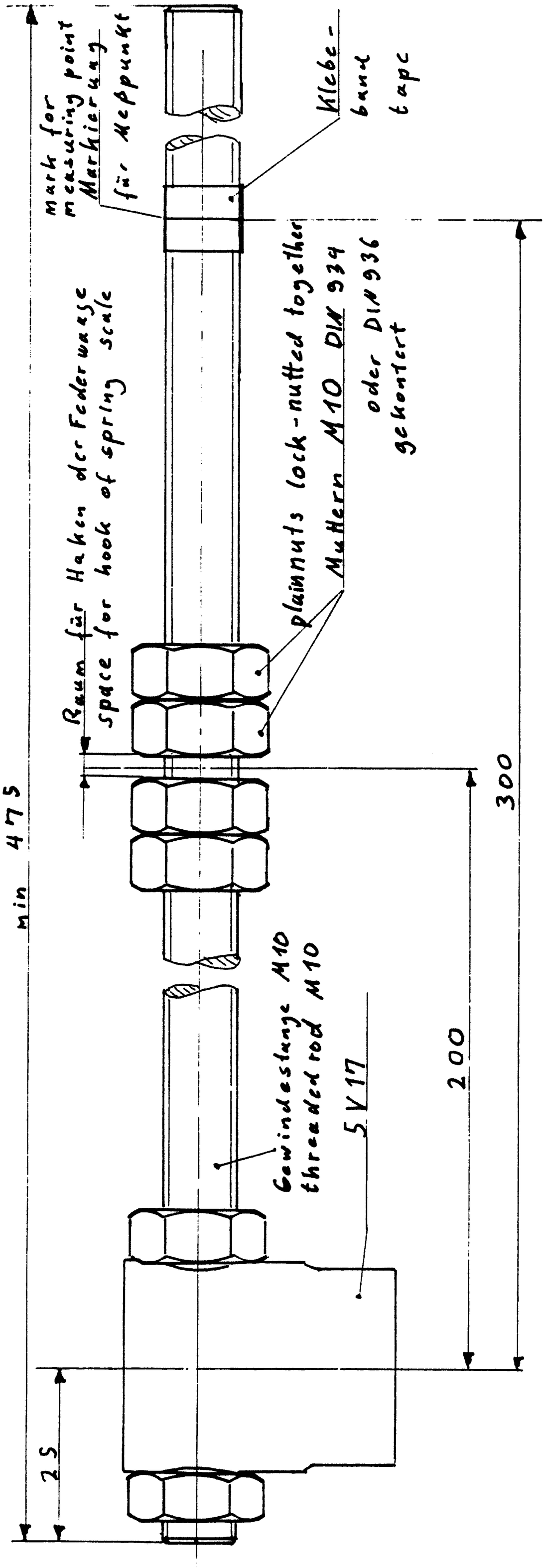


linke Bordwand vorderes und hinteres Cockpit
left fuselage wall front and rear cockpit



Instrumententurmunterteil vorn
console below the front instrument panel

Diagramm 22
Diagram 22
Ausgabe Dezember 2022
Issued December 2022



Ausg.	Änderung	ÄM	Tag	Name

	Tag	Name
Gez.	19.10.79	W. Dirks
Gepr.		
Norm.		

Maßstab: 1:1

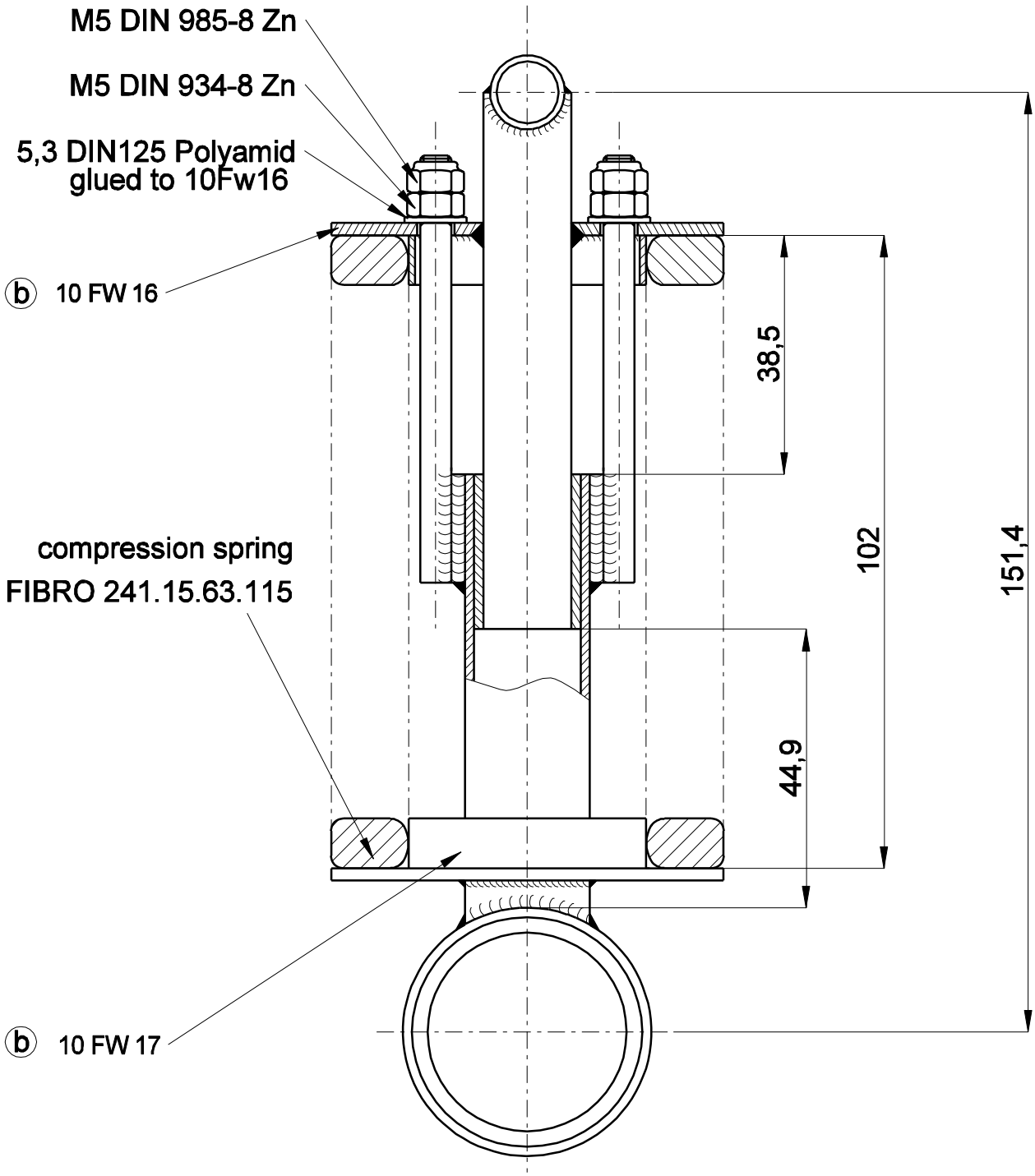
Maße ohne Toleranz-ang. nach:

Prüfwerkzeug für Bremsklappeneinstellung

Tool for airbrake adjustment

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

5 V 18



spring travel 37 mm

all dimensions with spring precompressed

Toleranzen nach Arbeitsanweisung BA 1				
Schweißen nach Arbeitsanweisung SA 1				
b		10-2	05.10.99	Lehner
a		alle	18.02.99	Lehner
Ausg.	Änderung	ÄM	Tag	Name

	Tag	Name
Gez.	11.12.97	Camus
Gepr.		
Norm.		

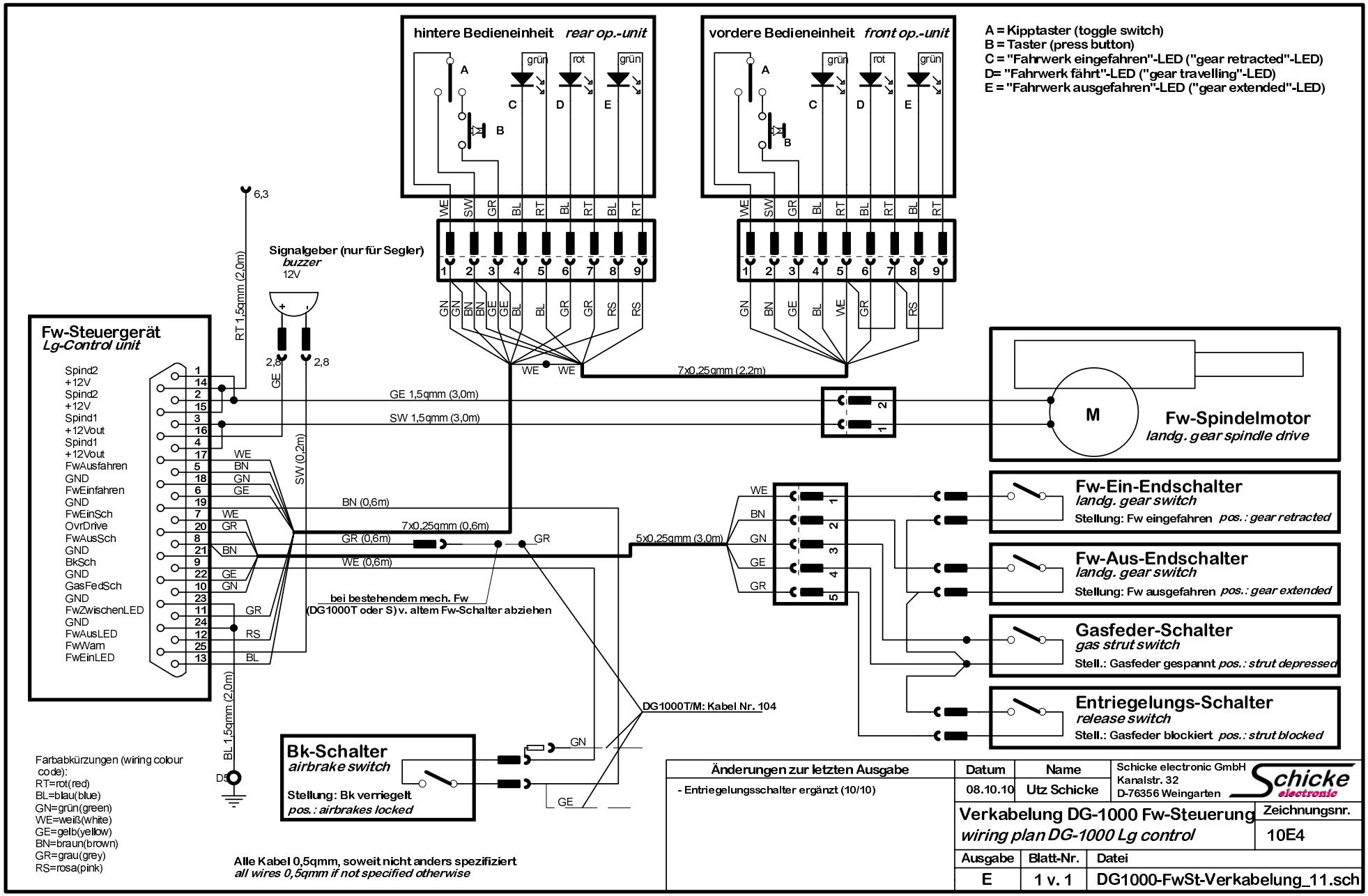
Maßstab 1:1 :

Maße ohne Toleranz-ang. nach:

Assembly Spring leg (landing gear)

DG Flugzeugbau GmbH
76646 Bruchsal 4
Im Schollengarten 20

10 FW 2


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
grün
WE SW GR BL RT BL RT BL RT
1 2 3 4 5 6 7 8 9
GN GN BN BN GE GE BL BL GR GR RS RS
7x0,25qmm (2,2m)
Signalgeber (nur für Segler)
buzzer
12V
6,3
RT 1,5qmm (2,0m)
2,8
2,8
GE
SW (0,2m)
Fw-Steuergerät
Lg-Control unit
Spind2 1
+12V 14
Spind2 2
+12V 15
Spind1 3
+12Vout 16
Spind1 4
+12Vout 17
FwAusfahren 5
GND 18
FwEinfahren 6
GND 19
FwEinSch 7
OvrDrive 20
FwAusSch 8
GND 21
BkSch 9
GND 22
GasFedSch 10
GND 23
FwZwischenLED 11
GND 24
FwAusLED 12
FwWarn 25
FwEinLED 13
GE 1,5qmm (3,0m)
SW 1,5qmm (3,0m)
WE
BN
GN
GE
BN (0,6m)
WE
GR
7x0,25qmm (0,6m)
GR (0,6m)
BN
WE (0,6m)
GE
GN
GR
RS
BL
bei bestehendem mech. Fw
(DG1000T oder S) v. altem Fw-Schalter abziehen
BL 1,5qmm (2,0m)
D5
M
Fw-Spindelmotor
landg. gear spindle drive
5x0,25qmm (3,0m)
WE
BN
GN
GE
GR
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
DG1000T/M: Kabel Nr. 104
Bk-Schalter
airbrake switch
Stellung: Bk verriegelt
pos.: airbrakes locked
GN
GE
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 (10/10)
Datum 08.10.10
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

Farbkodierung / colour codes	
RT	rot / red
BL	blau / blue
GN	grün / green
OG	orange
BR	braun / brown
WE	weiß / white
SW	schwarz / black
RS	rosa / pink
GR	grau / grey
GE	gelb / yellow
CU	Schirm / Shield

Kabeltypen/Cable Types	
Datenkabel 4-adrig	Kabeltronic LiYCY 4x AWG24
Datenkabel 8-adrig	Kabeltronic LiYCY 8xAWG24
Leistungselektronik	BETAtherm 155 35mm²
12V Kabel	Sommer 44A0111 AGW18

Zeichnungsdarstellung/Drawing representation			
Hochstromkabel Betatherm 155 35mm²	dicke Volllinie	Orange	
GND	dünne Volllinie	Blau	
+12V	dünne Volllinie	Rot	
mehradiges Datenkabel Kabeltronic LiYCY	Volllinie	Schwarz	
Schirm/Shield	dünne Volllinie	Schwarz	

ausschlaggebend für die tatsächliche Farbe der Kabel ist die Farbkodierung (colour code) mit Kurzzeichen entsprechend der Tabelle

colour code with abbreviations according to table is the decisive factor for actual cable colour

Schaltzeichen / signs	
	Steckkontakt / male
	Buchsenkontakt / female
	Steckverteiler / male + female
	Ringkabelschuhring / ring terminal
	Lotanschluss / soldering
	abgeschirmtes Kabel / shielded
	Sicherung / fuse

Funkplatte 10R424

20-646H d — Hauptschalter / main switch, Stellung: aus / position: off

20-646H d c — Batterieumschalter / battery selector

10E80/2

1/AWG14 · 2/AWG14 · 3/AWG18 · 4/AWG14 · 19/AWG14 · 20/AWG18 ACL · 021/AWG14

In vordere Sitzschale / In front seat — 12V Steckdose / 12V socket

In hintere Sitzschale / In rear seat — 12V Steckdose / 12V socket

2/AWG14 · 15A · 019/AWG14 · 005/AWG14 · 1/AWG14 · 15A

Gepäckraumbatterie / baggage compartment battery 12V / 7Ah (optional)

Heckbatterie / fin battery 12V / 7Ah (optional)

Schaltplan 10E4 / wiring plan 10E4 — Steuergerät elektrisches Fahrwerk / controller electric landing gear

FCC Box (FES connecting circuit)

MOTOR: +5V OUT, +5V_FCU, TE DATA, GND, HALL A, HALL B, HALL C, HALL D

J2 CTRL: 110V_CTRL, 110V_FUSED, HALL A, HALL B, HALL C, THROTLE, BRAKE, +5V OUT, BRAKE_ADJ, GND

DATA: GND, CAN HIGH, CAN LOW, +5V_FCU

J1 CTRL: LED GREEN, LED RED, GND, CAN L, CAN H

FCU 15P: shottky diode, +5V_FCU, TE DATA, THROTLE, BRAKE, LED GREEN, LED RED, GND

LX UI: GND, CAN H, CAN L, +12V

FCU 9P: GND, RXD, TXD, CAN H, CAN L

12V PWR: GND, +12V, +12V, GND

POWER: BAT+, BAT-, DC+, DC-, SW, +12V

MPDCD3-B

LXUI-4Pin-Stecker (Rückansicht/back side): CAN L, +12V, CAN H, GND

2 Pol - AMP weiblich (Rückansicht/back side): Lüfter Intercom Nr.020, Intercom Nr.18

FES power switch Relais Kilovac EV200 mit economizer

Motorkontrolleinheit / Motor Controller KHB14401CL

LXUI-8Pin-Stecker (Ruckansicht/back side)

DCPR

Shunt

BENDER Isometer "A" · BENDER Isometer "B"

MOP2 Sensor Box (Optional) · MOP2 Sensor (Optional) · 325A

FES Batterie Datenkabel — DB15 Stecker (kabelrückseite) / FES Battery Data cable — DB15 on cable back side

FES Batterie A / FES battery A — Batteriefach

FES Batterie B / FES battery B — Batteriefach

Batteriefach / battery compartment

ACD 57 d · Funk / radio · Transponder XPDR · E-Vario · 12V Steckdose / 12V Socket · FCU (FES Kontrolleinheit) / FCU (FES Control Unit) · Optional · Optional

E-Vario · electrical variometer · Segelflugrechner / Solfahrt/Vario Umschaltung / Gliding computer variio/speed command switch)

Im Griff oder im Brett / In control stick or instrument panel — Schalter Vario/Solfahrt / switch variio/speed commane

Schaltplan 10E002 / wiring plan 10E002 — HBI (Heck Ballast Indikator) / tail ballast indicator

Funkkopf PTT switch

"Master" FES Power switch · "Slave" FES Power switch

Haube geöffnet, Schalter geöffnet / Canopy opened, switch opened — Einbau Schalter Haubenwarnung s. 10EP436

Feuerwarnung s. 10E254 / Fire detection

Master FCU — FCU (FES Kontrolleinheit) / FCU (FES control unit)

DB9 Stecker pinseitig / DB9 pin side — DB15 Stecker pinseitig / DB15 pin side

DB9 Buchse kabelrückseitig (ohne Kunststoffgehäuse) / DB 9 on cable back side

DB15 Buchse kabelrückseitig (ohne Kunststoffgehäuse) / DB15 on cable back side

Slave FCU — FCU (FES Kontrolleinheit) / FCU (FES control unit)

DB9 Buchse female plug · FES Brücke / FES bridge

BLDC MOTOR — Motor type FES-DG-M100 — A C B

DB15 Stecker kabelrückseitig (ohne Plastik Gehäuse) / DB15 on cable back side

DB 15 Buchse im Motor (Kabelrückseitig) / DB 15 in Motor (cable back side)

RT · SW · HALL POZ · TEMP +5V · RS · BR · BL · GND · Temp. sensor DS1820 for motor (bottom view) · BL · GE · OG · GN · RT +5V

HALL EFECT SWITCH US5781 EUA (U57 110)

Draufsicht (top end view)

Diese Zeichnung ist Eigentum der DG Flugzeugbau GmbH. Nicht ausdrücklich freigegebene Vervielfältigung oder Weitergabe an Dritte ist verboten. DG Flugzeugbau GmbH

Bug / nose · vorderes Instrumentenbrett / front instrument panel · hinteres Instrumentenbrett / rear instrument panel · hinter dem vorderen Hauptspant / behind the front main spar

Ausg.	Änderung	ab Wnr.	Datum	Name
d	DC/DC Wandler gegen DCPR getauscht, div. Änd.		16.10.2023	Baur
c	div. Änderungen		29.09.2021	de Boer
b	div. Änderungen		09.09.2021	de Boer
a	MOP2 Sensor eingefügt		16.08.2021	de Boer

	Datum	Name
Gez.	13.07.2020	C. Müller
Gepr.		
Norm.		

Maßstab:

Verkabelungsplan DG-1001E

Toleranzen nach BA1 Schweißen nach SA 1

Nächster Zusammenbau:

DG Flugzeugbau GmbH, 76646 Bruchsal, Otto-Lilienthal-Weg 2

10E250

Seite 1 von 1

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 2b.

Position of placards see diagram 11a.

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

4.8 Servicing the hand operated rudder control

4.8.1 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!

Should more than 10 turns be necessary for alignment, the cable between the rear rudder pedals may be tightened, see section 4.8.2. In case the adjustment range is not sufficient, exchange the cables between rudder and rear rudder pedals against new shorter cables.

4.8.2 Connecting cable between the rear rudder pedals.
This cable 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

Parts for the manual rudder control

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
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
2b	Rudder control operated by hand, supplement to diagram 2	December 2022
11a	Placards with rudder control operated by hand	December 2022

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

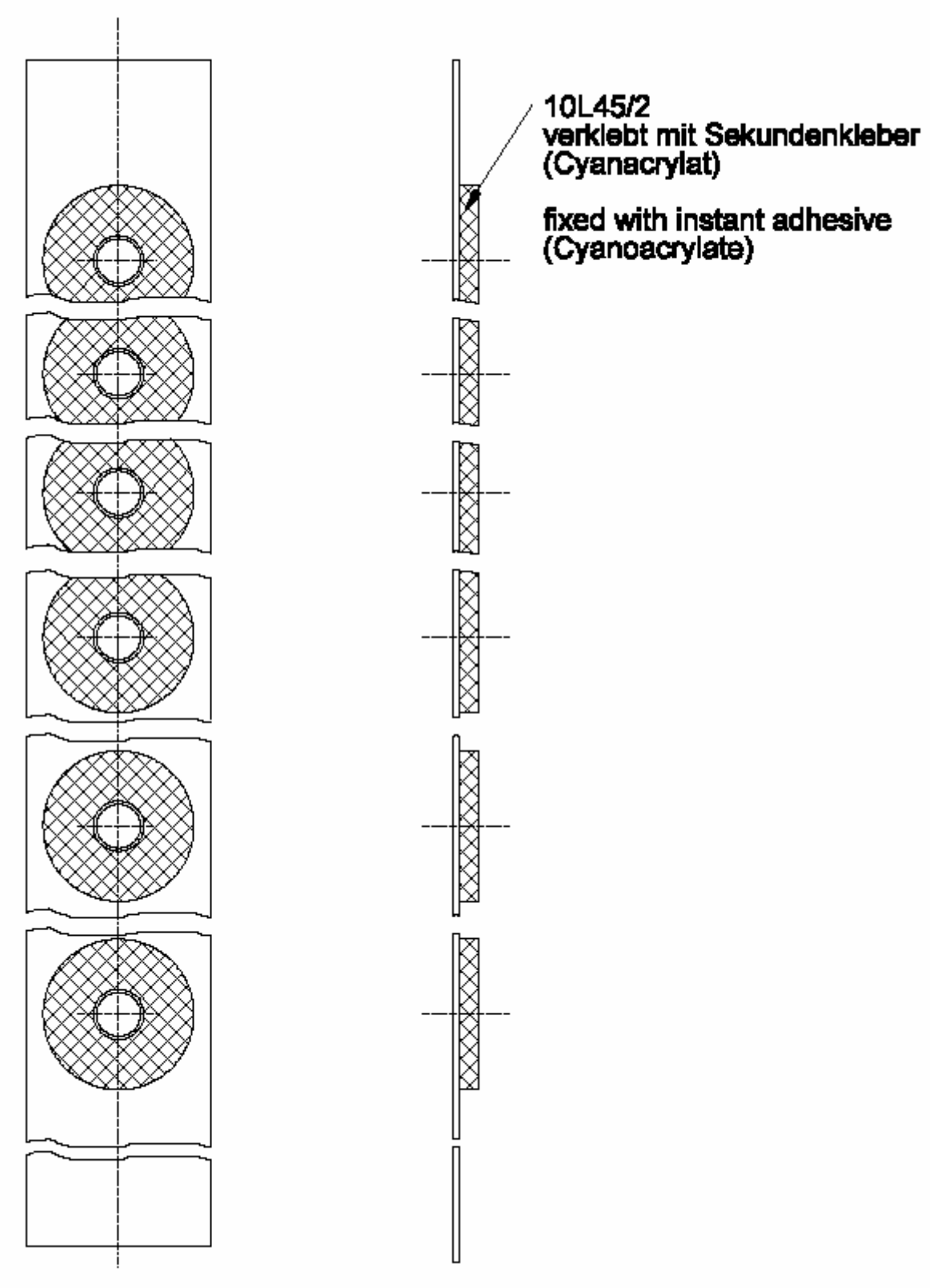
Remarks : The instructions may be executed by the owner himself.

Bruchsal, date:
05.11.2007

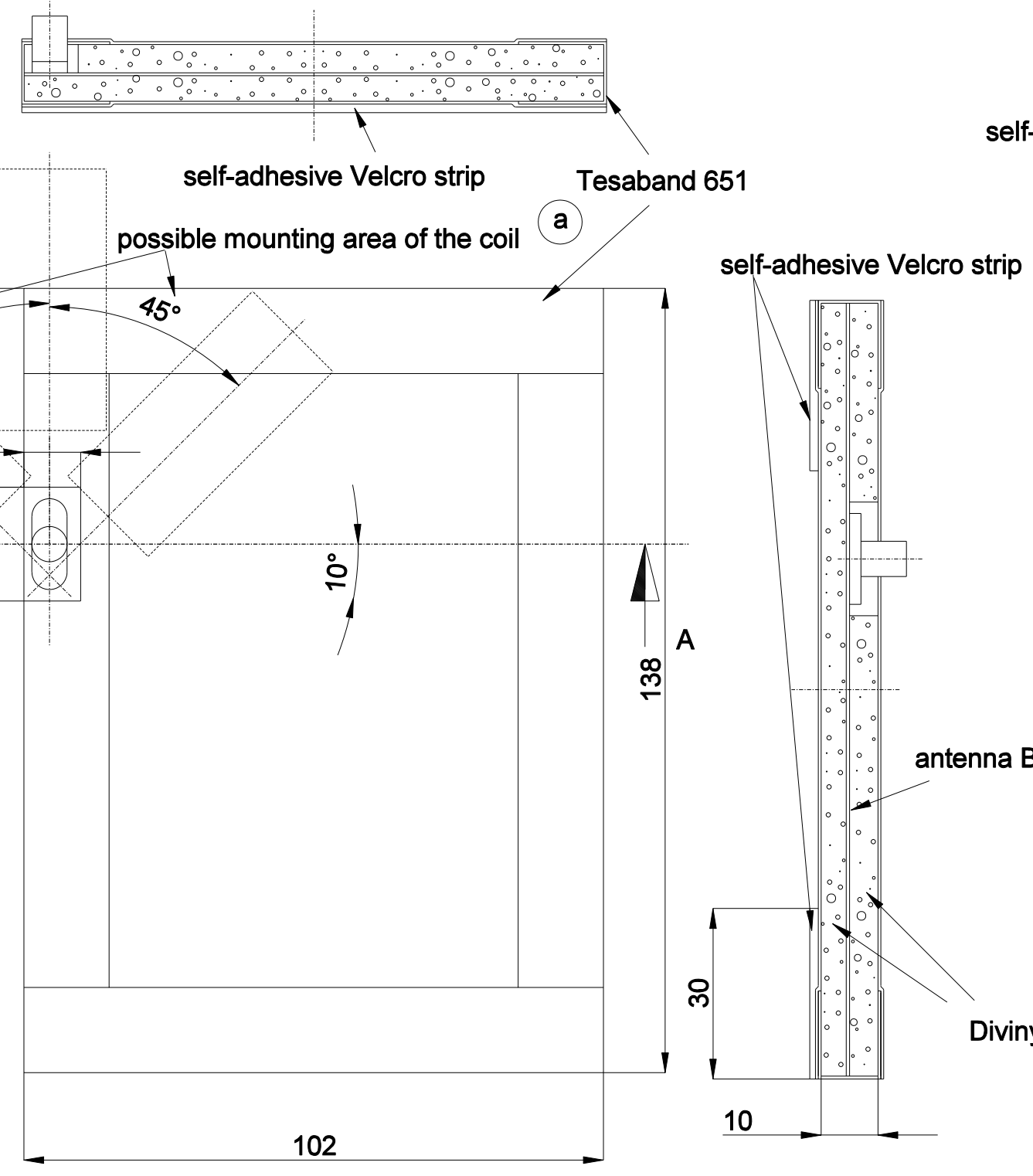
Author:
H. Könen

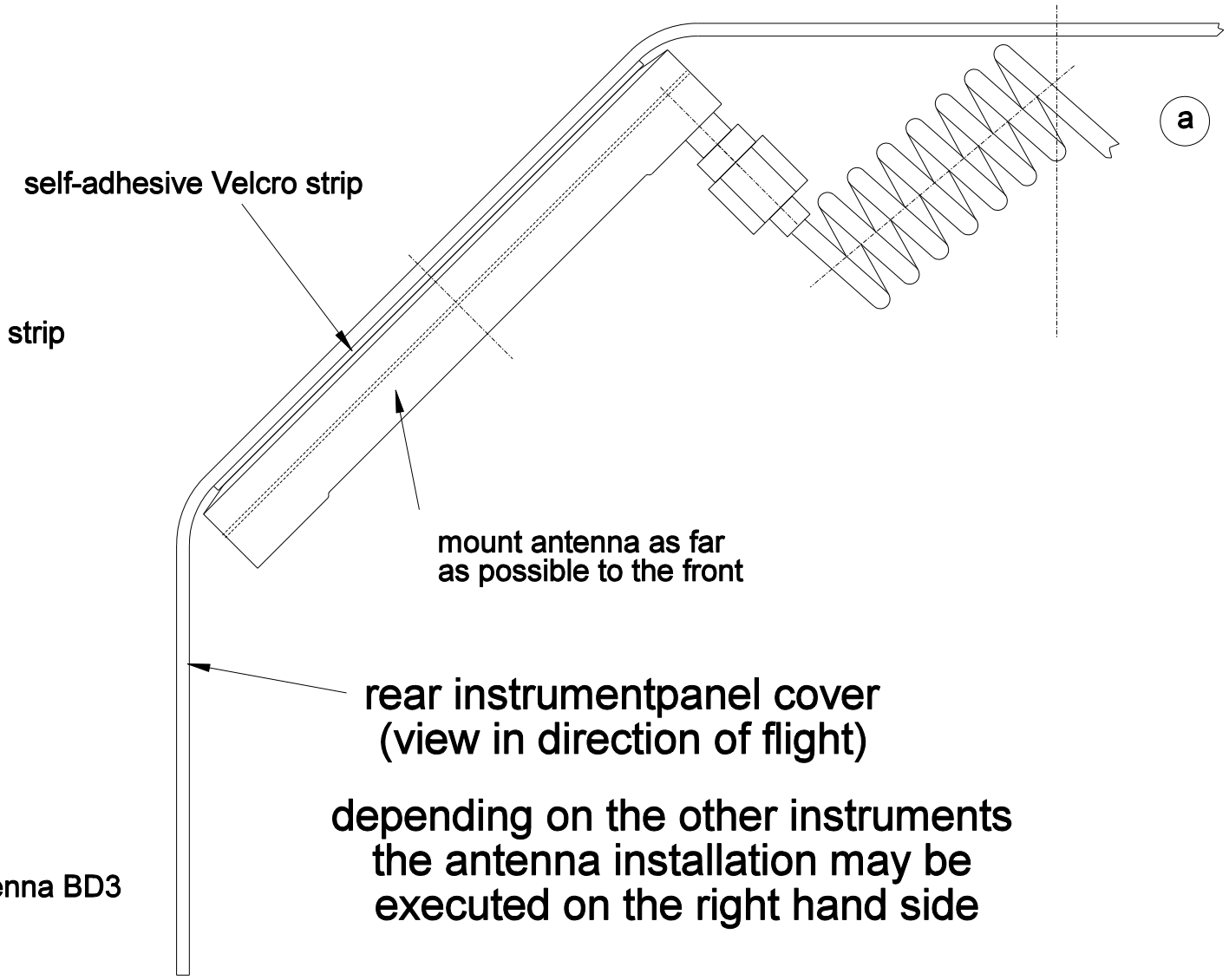
This service info has been approved by EASA date 23. April 2008 with technical note DG-G-04.
Approval No. EASA.A.C.09568.

Assembly drawing for foam rubber rings 10L45/2:



cross section A-A



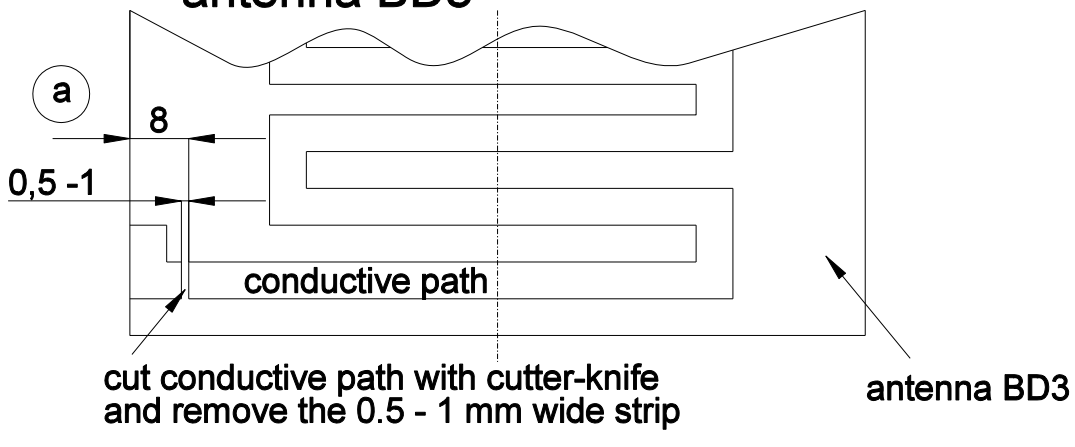


rear instrumentpanel cover
(view in direction of flight)

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

Divinycell H60 5 mm thick 102 mm x 136 mm

modification of the
antenna BD3



Toleranzen nach Arbeitsanweisung BA 1				
Schweißen nach Arbeitsanweisung SA 1				
a	coil rotated, conductive path shortened		19.02.14	W.Dirks
Ausg.	Änderung	ÄM	Tag	Name

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

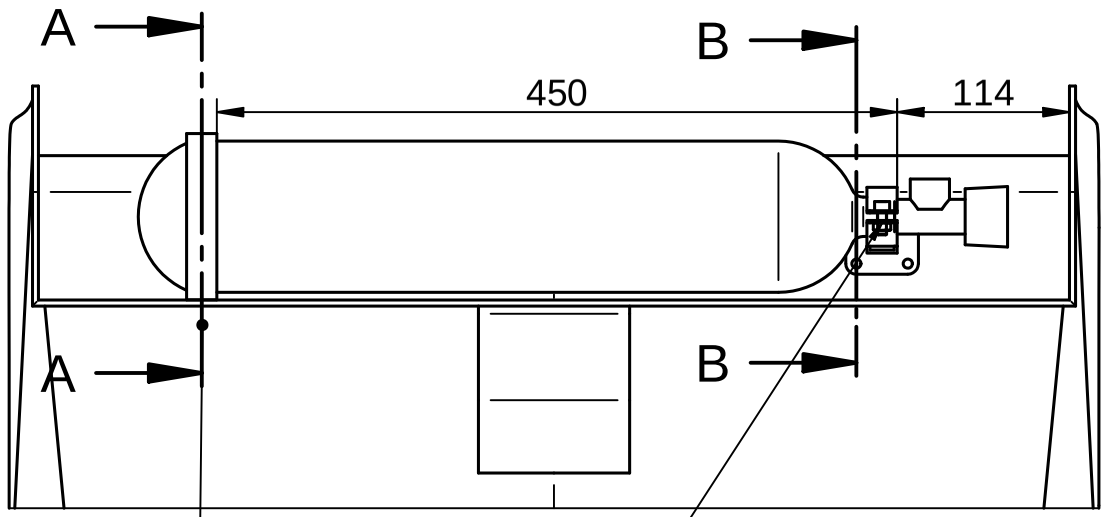
Maßstab 1:1

Maße ohne Toleranz-ang. nach:

406 MHZ ELT
antenna BD3
installation 2-seaters

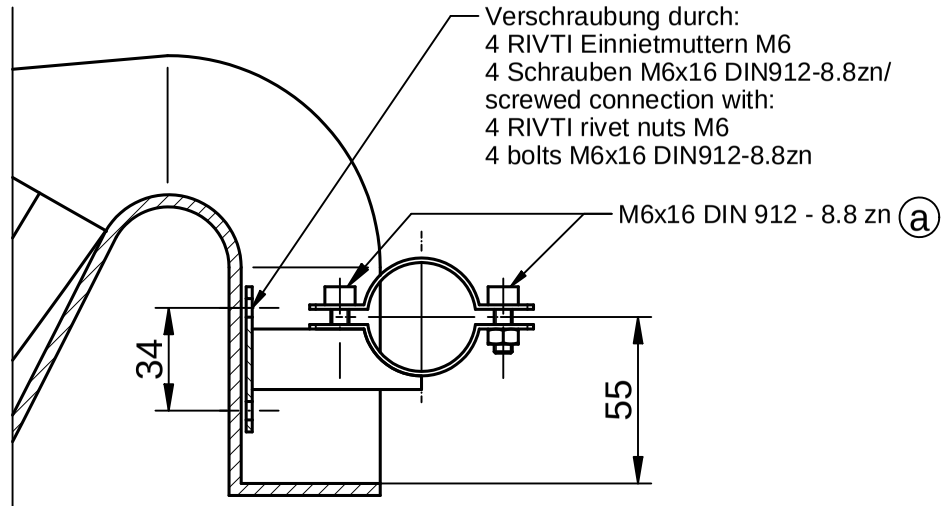
DG
Flugzeugbau GmbH
76646 Bruchsal
Otto-Lilienthal-Weg 2

Z193



Halterung für
Sauerstoffflasche Z37/
holder for oxygen cylinder

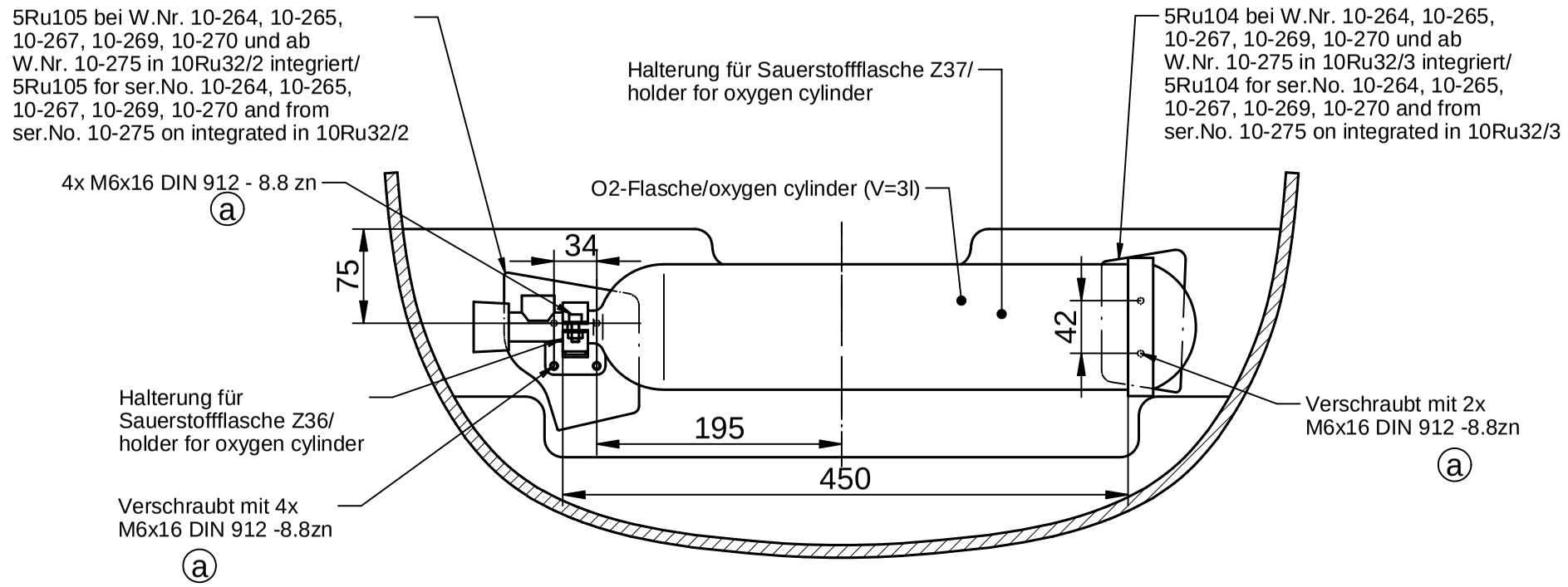
Halterung für
Sauerstoffflasche Z36/
holder for oxygen cylinder

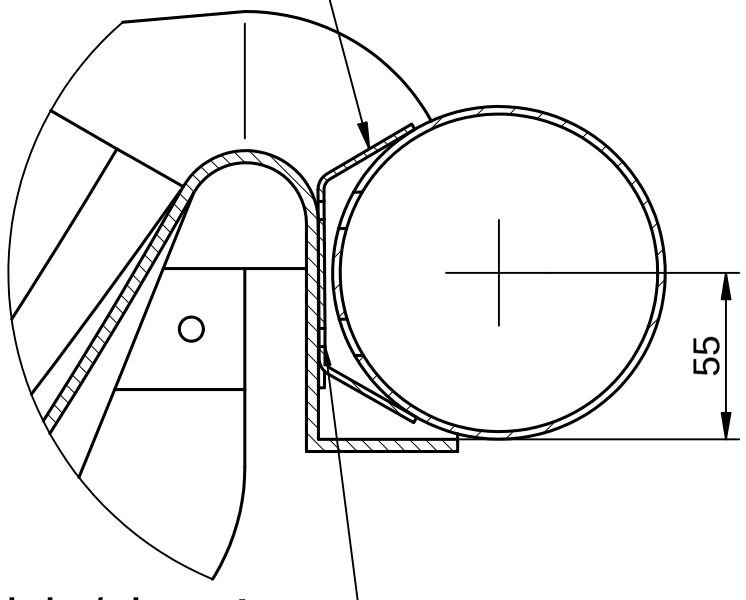


Schnitt B-B

Montage Gepäckraum/Installation in baggage compartment

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





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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