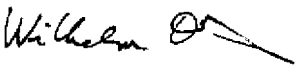
Recommendations to order spare parts

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

Yours sincerely
DG FLUGZEUGBAU GMBH



Dipl.- Ing. W. Dirks

0 General

0.1 Manual amendments

No	Page	Description	Date
0.1	all	Combination of the initial Maintenance Manuals of the Variants LS8, LS8-a, LS8-b, LS8-18, new standardized format	Dec. 2009
0.2	0-9, 1-15, 1-16, 2-3, 2-5, 3-2, 3-3, 3-6, 4-12, 4-13, 4-15 up to 4-17, 5-2, 5-3, 5.4, 6-1, 9-1 up to 9-4, 10-1 up to 10-3, 11-1, 11-2, 12-2, 12-3	Miscellaneous changes to the contents of the latest amendments of the initial maintenance manuals	Dec. 2009
1	0-1, 0-3, 0-5, 1-1, 1-6, 1-10, 7-5, 7-6	TN8019, wheel brake actuated by airbrake handle.	Feb. 2011
2	0-1, 0-3, 0-5, 1-11, 7-1, 7-2, 7-4, 8-3 and 12-1	TN8020, retrofit of a 5” landing gear	Sept. 2011
3	0-1, 0-3, 0-5, 7-1 ÷ 7-4	TN 8021 Small tailwheel	January 2015
4	0-1, 0-3 ÷ 0-5, 0-9, 2-2, 2-3, 2-5, 3-1, 4-4, 5-2, 5-6, 5-7, 7-1 ÷ 7-4, 7-6, 9-1, 9-2, 10-1	TN 8024 Manual revision, repair manual	June 2016

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0.2 List of effective pages

Section	page	issued	replaced	replaced	replaced
0	0-0	December 09			
	0-1	See manual amendments			
	0-2	See manual amendments			
	0-3	See manual amendments			
	0-4	See manual amendments			
	0-5	See manual amendments			
	0-6	December 09			
	0-7	"			
	0-8	"			
	0-9	"	June 2016		
1	1-1	December 09	Feb. 2011		
	1-2	"			
	1-3	"			
	1-4	"			
	1-5	"			
	1-6	"	Feb. 2011		
	1-7	"			
	1-8	"			
	1-9	"			
	1-10	"	Feb. 2011		
	1-11	"	Sept. 2011		
	1-12	"			
	1-13	"			
	1-14	"			
	1-15	"			
	1-16	"			
	1-17	"			
	1-18	"			
	1-19	"			
2	2-1	December 09			
	2-2	“	June 2016		
	2-3	“	June 2016		
	2-4	“			
	2-5	“	June 2016		
	2-6	“			
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	2-10	“			
	2-11	"			

0.2 List of effective pages (continued)

Section	page	issued	replaced	replaced	replaced
	2-12	"			
	2-13	"			
	2-14	"			
	2-15	"			
	2-16	"			
	2-17	"			
3	3-1	December 09	June 2016		
	3-2	"			
	3-3	"			
	3-4	"			
	3-5	"			
	3-6	"			
	3-7	"			
4	4-1	December 09			
	4-2	"			
	4-3	"			
	4-4	"	June 2016		
	4-5	"			
	4-6	"			
	4-7	"			
	4-8	"			
	4-9	"			
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	4-23	"			
	4-24	"			

0.2 List of effective pages (continued)

Section	page	issued	replaced	replaced	replaced
5	5-1	December 09			
	5-2	"	June 2016		
	5-3	"			
	5-4	"			
	5-5	"			
	5-6	"	June 2016		
	5-7	"	June 2016		
6	6-1	December 09			
7	7-1	"	Sept. 2011	Jan. 2015	June 2016
	7-2	"	Sept. 2011	Jan. 2015	June 2016
	7-3	"	Jan. 2015	June 2016	
	7-4	"	Sept. 2011	Jan. 2015	June 2016
	7-5	"	Feb. 2011		
	7-6	"	Feb. 2011	June 2016	
8	8-1	December 09			
	8-2	"			
	8-3	"	Sept. 2011		
9	9-1	December 09	June 2016		
	9-2	"	June 2016		
	9-3	"			
	9-4	"			
10	10-1	December 09	June 2016		
	10-2	"			
	10-3	"			
11	11-1	December 09			
	11-2	"			
	11-3	"			
12	12-1	December 09	Sept. 2011		
	12-2	"			
	12-3	"			
	12-4	"			

0.3 Table of Contents

0.4 Airworthiness limitations

0.4.1 Repairs

Repair or replace damaged parts prior to next flight. Follow the instructions of section 11 of this manual for repairs of the airframe.

Note: You will find more detailed instructions in the Repair Manual LS8.

Major repairs must be accomplished by an approved repair station or by an approved mechanic rated for composite aircraft structure work in accordance with DG repair methods.

Use only genuine spare parts.

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

0.4.2 Life time of the airframe

The maximum allowable operating time for composite sailplanes is 12000 flight hours. Therefore inspections according to section 3.3 of this manual have to be executed at 3000 h, 6000 h, 9000 h and every 1000 hours following thereafter.

0.4.3 Life time of equipment and components

a) The **fabric straps of the safety harness** (not the buckles) have to be exchanged according to the instructions of the respective manufacturer. If no limitations are given, exchange after 12 years.

b) **Other components**:
All other components like tow hook, wheels, gas struts, control system parts, bolts, pins etc. have no life time limitation, but should be replaced when worn, damaged or disqualified by excessive corrosion.

0.4.4 Service time, maintenance documents of equipment and components

Follow the instructions of the respective manufacturer:

a) Operating Manual for Safety Tow Releases
Series: Europa G 72 or Europa G 73 or Europa G 88 Safety Tow Release latest approved version
And if installed:
Operating Manual for Tow Releases Series: E72 or E75 or E 85 Nose Tow Release latest approved version
Safety harness: instructions of the manufacturer.

b) Minimum instrumentation: instructions of the manufacturer.

1 Description of systems

1.1 Overview

Wings

LS8 and LS8-a: Wingspan 15 m with removable winglets.

LS8-b and LS8-18: Wingspan variable by exchange of 15m winglets with 18m tips with Winglets.

Aileron Controls

Aileron system activated via pushrods guided in longitudinal motion ball bearings, connection of system by automatic coupling during rigging. Dynamic aileron mass balance in wings.

Only LS8: Aileron parted at wing contour brake

LS8-b and LS8-18: Additional ailerons at 18m wingtips.

Elevator Controls

Elevator system activated via pushrods guided in longitudinal motion ball bearings, automatic coupling of system during rigging. 100% mass balance in vertical tail fin pushrod.

Rudder Controls

Rudder system activated via steel cables guided in polyamide tubing, no closed control circuit. mass balance at rudder.

Wheel Brake

Feet operated, activated by bowden cable from rudder pedals.

With TN8019 executed: The wheel brake Bowden cable is connected to the airbrake drive instead of the rudder pedals.

Air Brakes

Activated via pushrods, guided partly in longitudinal motion ball bearings, partly in plain bearings. Automatic connection of system during rigging. Locking mechanism in wings. Upper surface double height air brakes with spring loaded cover blades. Friction damper in box to prevent oscillations during extension.

Water Ballast System

LS8:

One double water bag per wing, maximum capacity per wing 75 Liters <19.8 US gallons, 16.5 Imp. gallons>. Optionally one single water bag , maximum capacity per wing 50 Liters <13.2 US gallons, 11 Imp. gallons>. Double valve or single valve at wing root, one loading and dumping orifice on under side of wings near root. Automatic connection during rigging.

In the vertical tail fin either battery receptacle or ballast tank allowing to compensate C.G. movement due to wing water ballast or mass of heavy pilots, maximum capacity 5.5 Liters <1.45 US gallons, 1.21 Imp. gallons>. When the tail fin tank is combined with a battery receptacle, the maximum capacity is 4.1 Liters <1.08 US gal., 0.9 Imp.gal.>. (Maximum permissible compensation allowed for in tables)

Water Ballast System cont.

LS8-a

Two integral tanks per wing, maximum capacity per wing 95 Litres <25.1 US gallons, 20.9 Imp. gal.>. Two valves at under side of wing for loading and dumping. Automatic connection during rigging.
Two different ventilation systems: Winglet ventilation or root-rib ventilation.
Ballast tank in the vertical tail fin allowing to compensate C.G. movement due to wing water ballast or mass of heavy pilots, capacity between 3.8 Litres <1.0 US gal., 0.84 Imp.gal.> and 12 Litres <3.2 US gal., 2.64 Imp. gal.>, depending on version (integral or slide-in tank, with or without battery receptacle).

LS8-b

Two integral tanks per wing, maximum capacity per wing 95 Litres <25.1 US gallons, 20.9 Imp. gal.>. Two valves at under side of wing for loading and dumping. Automatic connection during rigging.
Ventilation of wing integral tanks by root-rib ventilation.
Ballast tank in the vertical tail fin allowing to compensate C.G. movement due to wing water ballast or mass of heavy pilots, capacity 7.5 Litres <1.98 US gal., 1.65 Imp.gal.>.

LS8-18

Two integral tanks per wing, maximum capacity per wing 95 Litres <25.1 US gallons, 20.9 Imp. gal.>. Two valves at under side of wing for loading and dumping. Automatic connection during rigging.
Ventilation of wing integral tanks by root-rib ventilation.
Ballast tank in the vertical tail fin allowing to compensate C.G. movement due to wing water ballast or mass of heavy pilots, capacity between 3.8 Litres <1.0 US gal., 0.84 Imp.gal.> and 12 Litres <3.2 US gal., 2.64 Imp. gal.>, depending on version (integral or slide-in tank, with or without battery receptacle).

Cockpit

Double fiberglass shell. Controls for air brakes, longitudinal trim and trim position indicator located on left cockpit side, trim locking lever at control stick. Control for tow cable release on left cockpit frame (operating both C.G. hook and nose hook), for pedal adjustment on seat, for ventilation on instrument panel cover, for landing gear and water ballast valves on right side of cockpit, for canopy opening on both sides. When operating right canopy lever over full possible travel, the forward canopy mount becomes unlocked (emergency canopy release).

Canopy

One piece hinged up front with instrument panel cover. In case of an emergency exit, a spring loaded latch at the rear canopy edge acts as a temporary hinge for clean separation of the canopy from the fuselage. Designation of this item in other parts of this manual: LS-latch (Röger hook) for canopy emergency release

Instrument Panel

Panel lifts together with canopy allowing unobstructed entry and exit. Depending on version, allows for installation of up to 10 instruments including radio.

Baggage Compartment

Baggage compartment behind pilot's shoulders is for light and soft materials only. Permanent installation of batteries or other equipment possible.

Oxygen System

Receptacle for oxygen bottles provided, size of bottles 3 or 4 Litres, diameter 100 mm (3.94 in).

Landing Gear

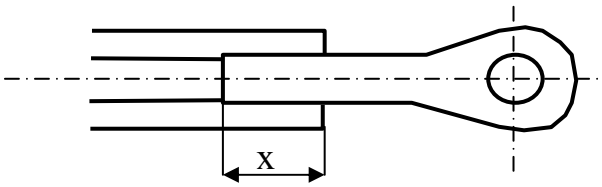
Sprung and retractable, housed in a closed box, right hand operation. Tail skid including cable deflector or tail wheel optional.

Tail Fin Battery

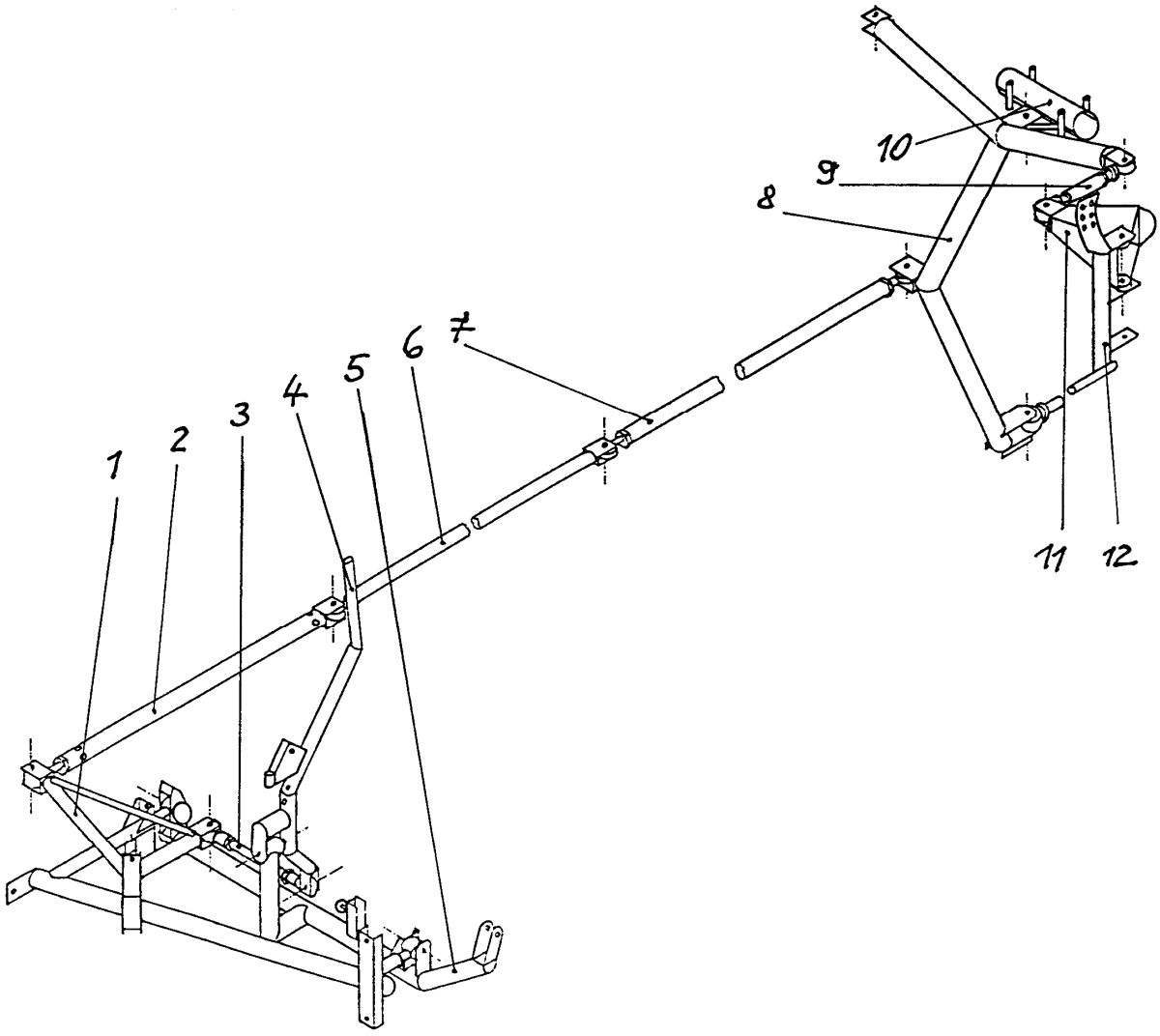
The tail fin battery may removed to decrease Minimum Cockpit Load. It must be fitted in the baggage compartment, if there is no other battery installed.

Caution: when working at control systems
To keep humidity out of the pushrods and prevent corrosion, there are no inspection holes to check rod end depth.
Rod end bearings used may have different thread lengths with identical heads. Therefore, before adjusting rod end bearings, remaining thread reach must be checked by disassembly.

Thread diameter	Minimum reach x	Rod end designation
M6 x 1 (Standart)	17 mm / 0.67 in	EM 6 R (used in single cases only)
M8 x 1,25 (Standart)	17 mm / 0.67 in	various versions possible
M10 x 1 (Fine thread)	17 mm / 0.67 in	PM 6 long

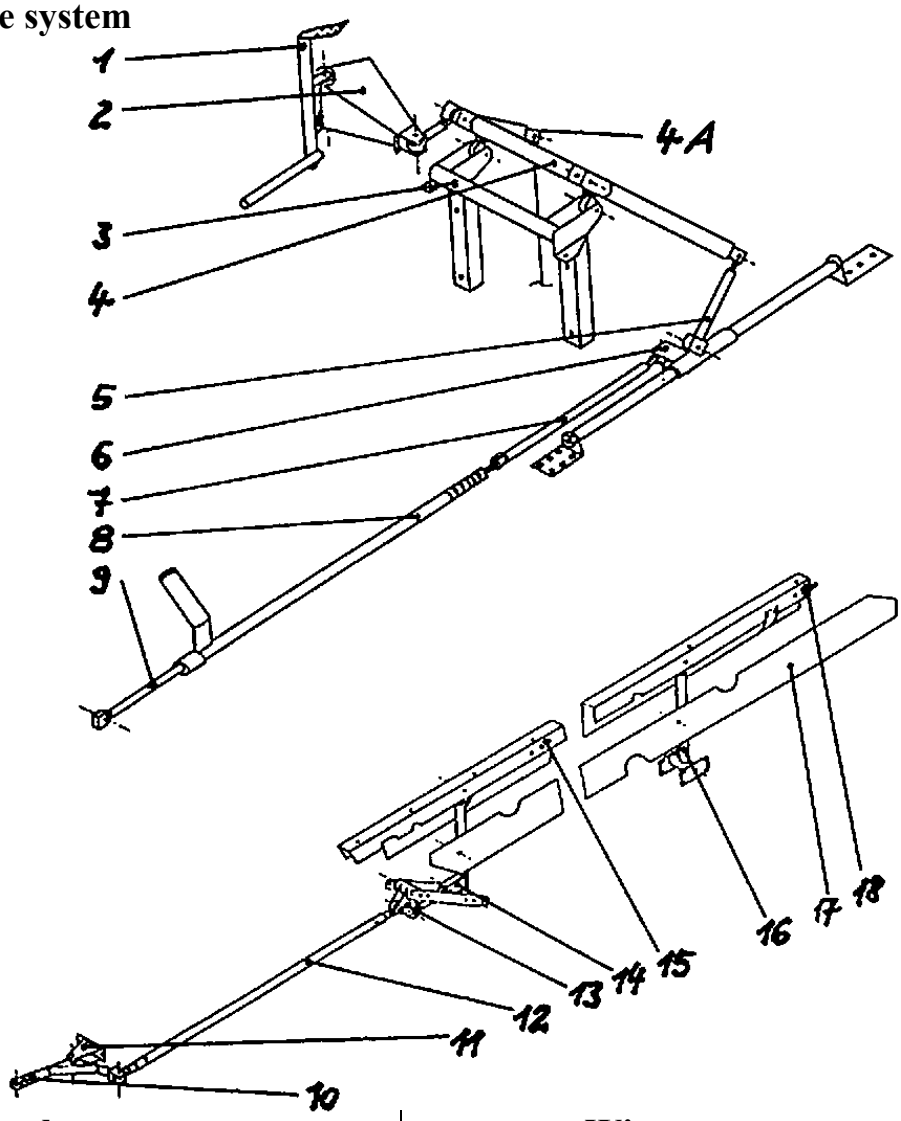


1.2 Aileron control system (Fuselage)



No.	Designation	Drawing	No.	Designation	Drawing
1	Forward fuselage aileron l	3R10-72	7	Rear aileron pushrod	4R10-118
2	Forward aileron pushrod	4R10-73	8	Aileron lever	1R10-178
	or	4R10-179	9	Parallelogram pushrod	4R10-49
3	Stick aileron pushrod	4F3-37	10	Aileron lever bearing	4R10-69
4	Control stick	3R3-49	11	Aileron connector	3R10-116
5	Control stick support	1R3-86	12	Automatic connector bearing	3R10-119
6	Middle aileron pushrod	4R10-74			

1.3 Air brake system

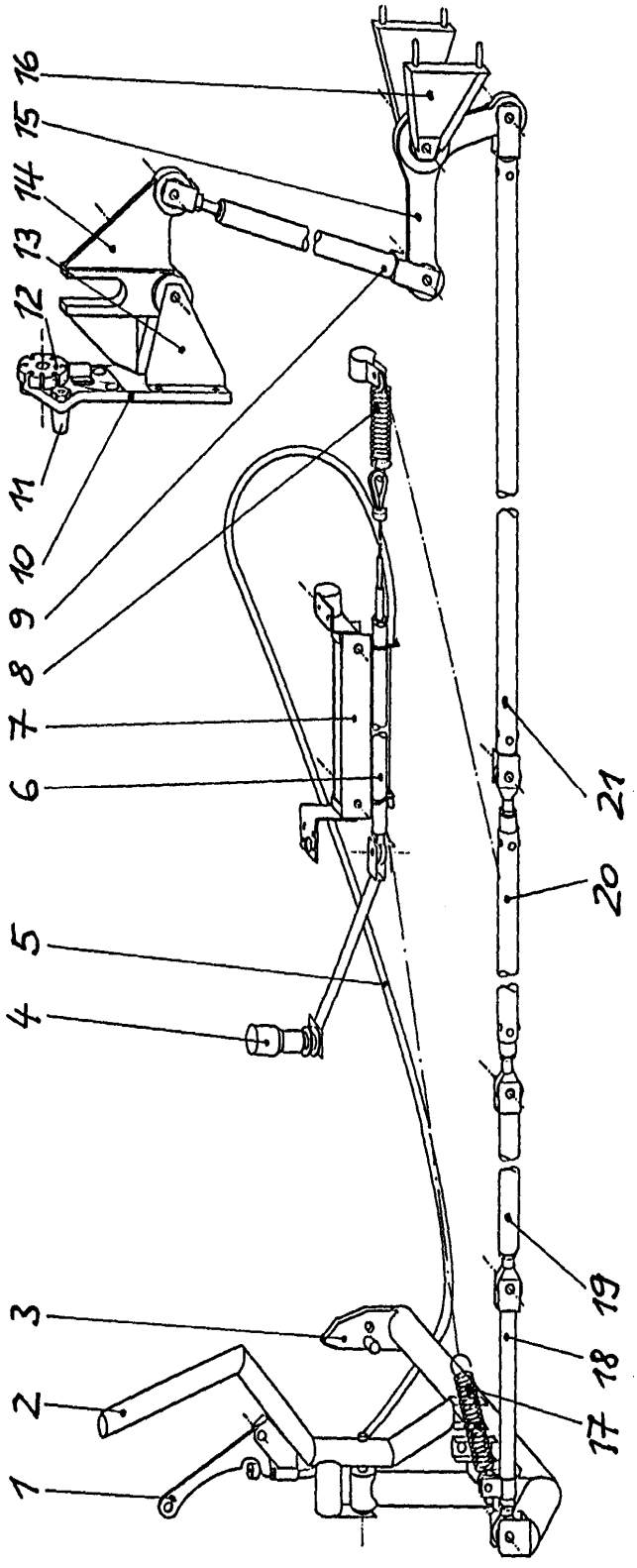


Fuselage			Wings		
No.	**Designation**	**Drawing**	**No.**	**Designation**	**Drawing**
1	Automatic connector bear	3R10-119	10	Root rib drive lever	3F4-71
2	Air brake connector	3R6-44		or	3F4-64
3	Air brake drive bracket	3R6-54	11	Root rib bracket	4F3-76
4	Air brake drive	3R6-50	12	Wing pushrod	4F4-63
With TN8019 executed:			13	Locking lever	4F4-53
4	Air brake lever with wheel brake attachment	9St13	14	Inner lever	3F4-51
4A	Bowden cable attachment for wheel brake		15	Upper blade	3F4-60
5	Intermediate rod	4R10-77	16	Outer lever	3F4-52
6	Sliding member	4R6-47	17	Lower blade	3F4-54
7	Air brake rod	4R6-59	18	Friction brake	
8	Air brake lever	3R6-58			
9	Lever guide tube	4R6-31			

1.4 Elevator control system

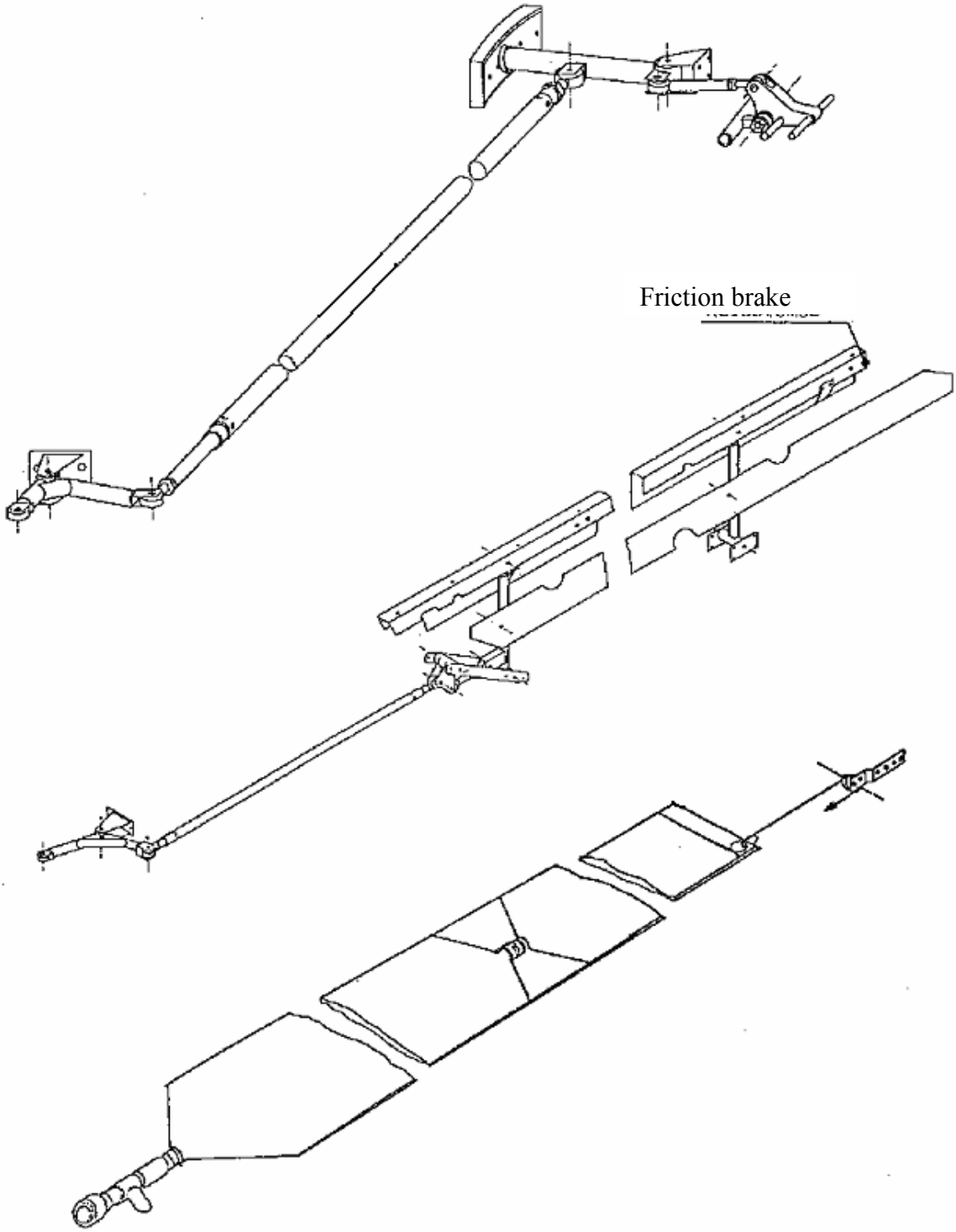
The mass of the elevator pushrod in the vertical tail fin is adapted to elevator mass.
See mass value entered in inspection form "Control Surface mass and Moment" for this serial number

No	Designation	Drawing
1	Trim locking lever	4R9-24
2	Control stick	3R3-49
3	Control stick support	1R3-65
4	Trim lever	4R9-95
5	Trim bowden cable	
6	Trim rod	4R9-76
7	Trim locking housing	3R9-74
8	Rear trim spring	
9	Vertical tail fin elevator pushrod	4R3-79
10	Rear horizontal tail bracket	4R4-6
11	Rear tapered bolts	4R4-4
12	Securing nut	4R4-8
13	Elevator connector bracket	4R3-62
14	Automatic connector	3R3-63
15	Elevator lever	4R3-7
16	Elevator lever bracket	4R3-40
17	Forward trim spring	
18	Forward elevator pushrod	4R3-84
19	Elevator pushrod 2	4R3-85
20	Elevator pushrod 3	4R3-76
21	Rear elevator pushrod	4R3-69



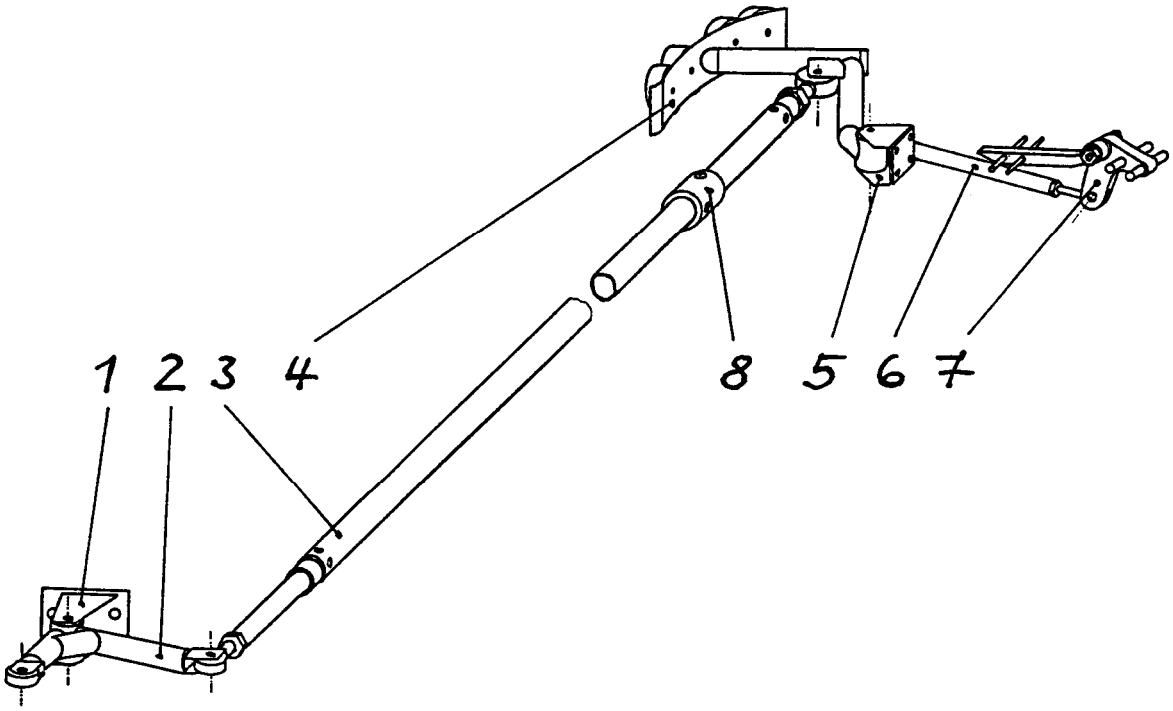
1.5 Wing control systems and wing waterballast (only LS8)

Shown: Waterbag LS6-18w: drawing lF-97
(max. 75 Liter per wing)



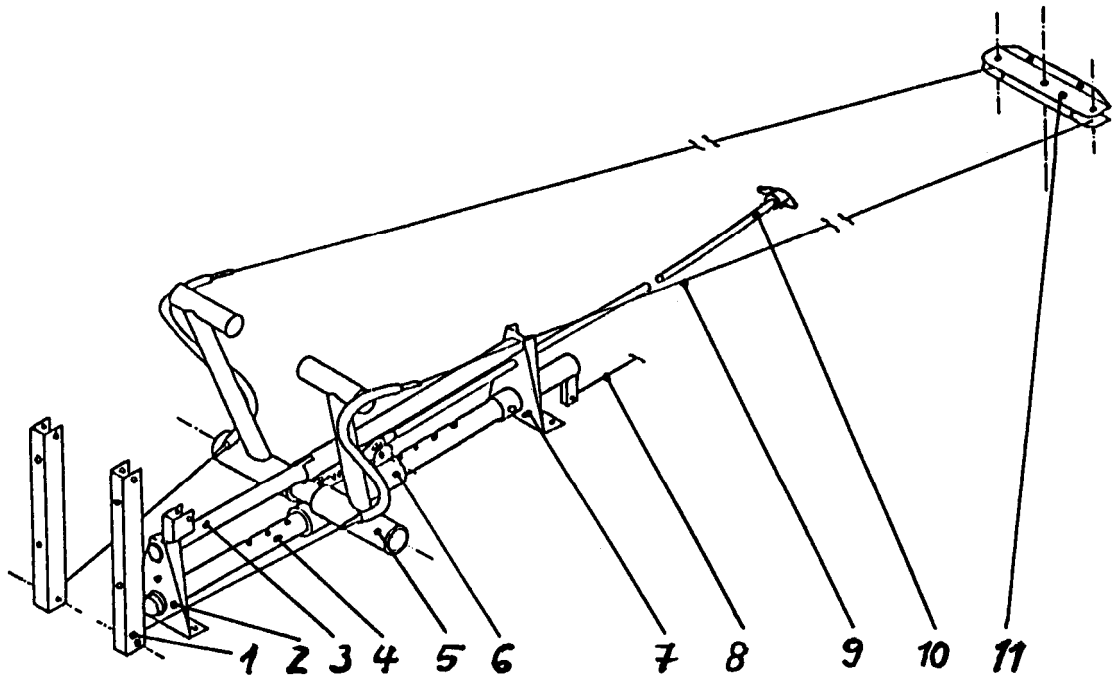
1.6 Aileron control system wings (LS8-a, LS8-b, LS8-18)

No.	Designation	Drawing
1	Root rib bracket	4F3-76
2	Root rib aileron drive	3F3-78
3	Right aileron pushrod	4F3-135
	Left aileron pushrod	4F3-139
4	Aileron drive lever	1F3-133
5	Wing aileron drive bracket	4F3-134
6	Aileron drive rod	4F3-137
7	Drive bracket at aileron	4Q1-40
8	Aileron stop	4F32-136



1.7 Rudder control system

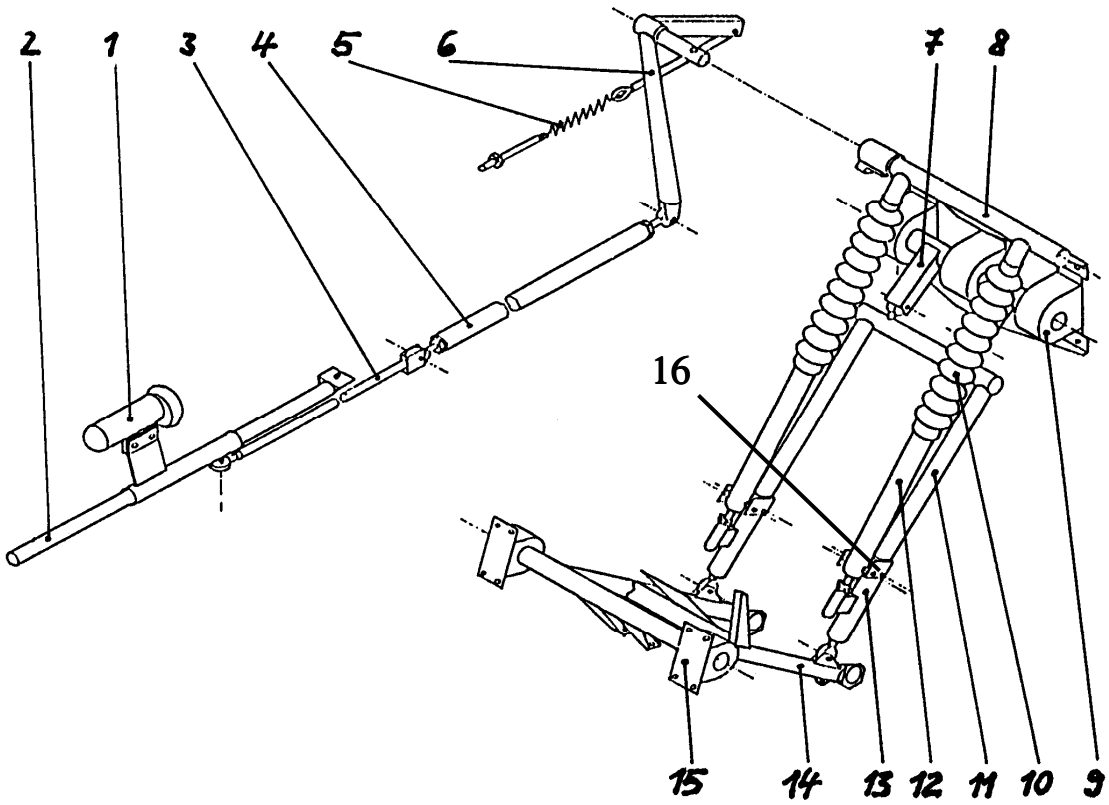
No.	Designation	Drawing
1	Canopy opener bracket	4R8-67
2	Forward pedal guide bracket	3R14-14
3	Upper pedal guide tube	4R14-18
4	Lower pedal guide tube	4R14-19
5	Rudder pedal	1R14-21
6	Pedal support	3R14-16
7	Rear pedal guide bracket	3R14-15
8	Wheel brake cable	
8	**Not installed with TN8019 executed**	
9	Rudder cable	
10	Pedal adjustment cable	4R14-31
11	Rudder drive bracket	4S1-10



1.8 Main landing gear

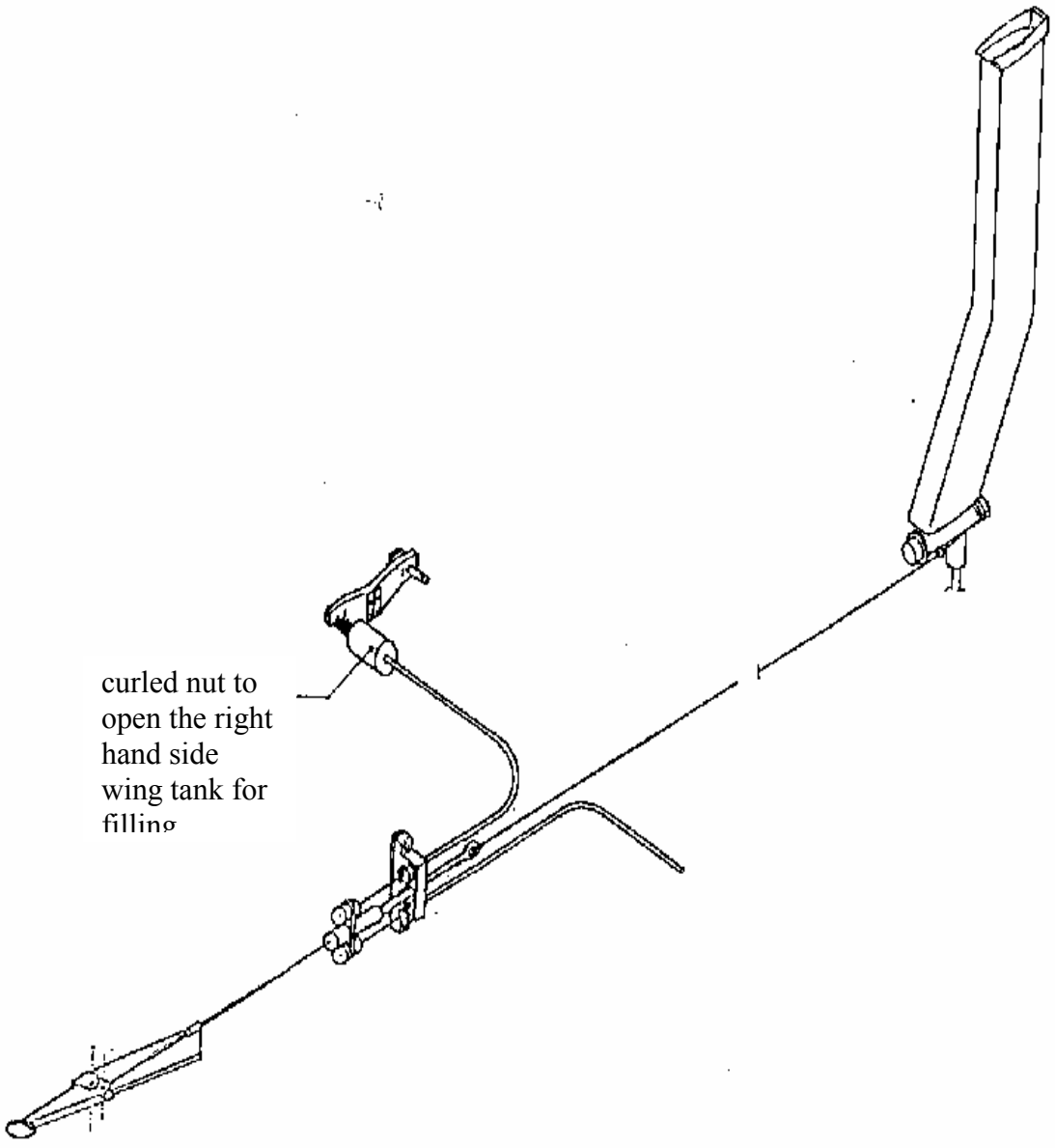
No.	Designation	Drawing for 4" wheel	Drawing for 5" wheel TN8020 (not for LS8-b)
1	Gear handle	4R2-87	4R2-87
2	Gear handle guide tube	4R2-89	4R2-89
3	Forward landing gear drive rod	4R2-90	4R2-90, or 9Fw3
4	Rear landing gear drive rod	4R2-112	4R2-112
5	Compensating spring	4R2-49	4R2-215
6	Outer drive	1R2-84	1R2-84
7	Swinging arm	3R2-83	3R2-83
8	Inner drive	3R2-75	3R2-202
9	Rubber torsion element (large unit)		
10	Rubber bellow		
11	Upper folding strut	3R2-74	3R2-210
12	Inner drive sliding tube	4R2-73	4R2-211
13	Lower folding strut	4R2-72	4R2-207
14	Landing gear fork	1R2-1	1R2-200
15	Fork rubber bearing (small unit)		
16	Deflector	4R2-104	4R2-204

Important:
Always exchange parts 6 and 8 together because of close tolerances required.



1.9 Fuselage water ballast system (LS8)

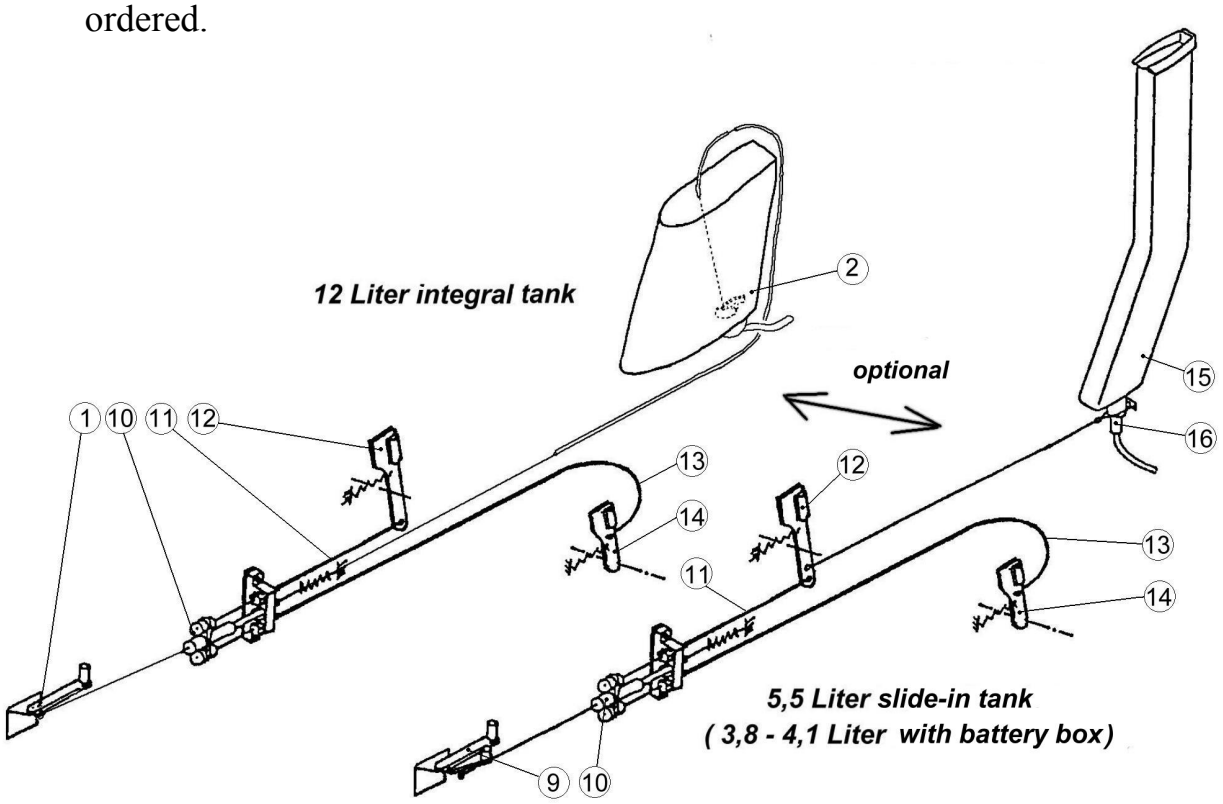
Tail fin slide in tank 5.5 Liter
or optional 4.1 Liter with battery box



1.10 Fuselage water ballast system (LS8-a, LS8-18)

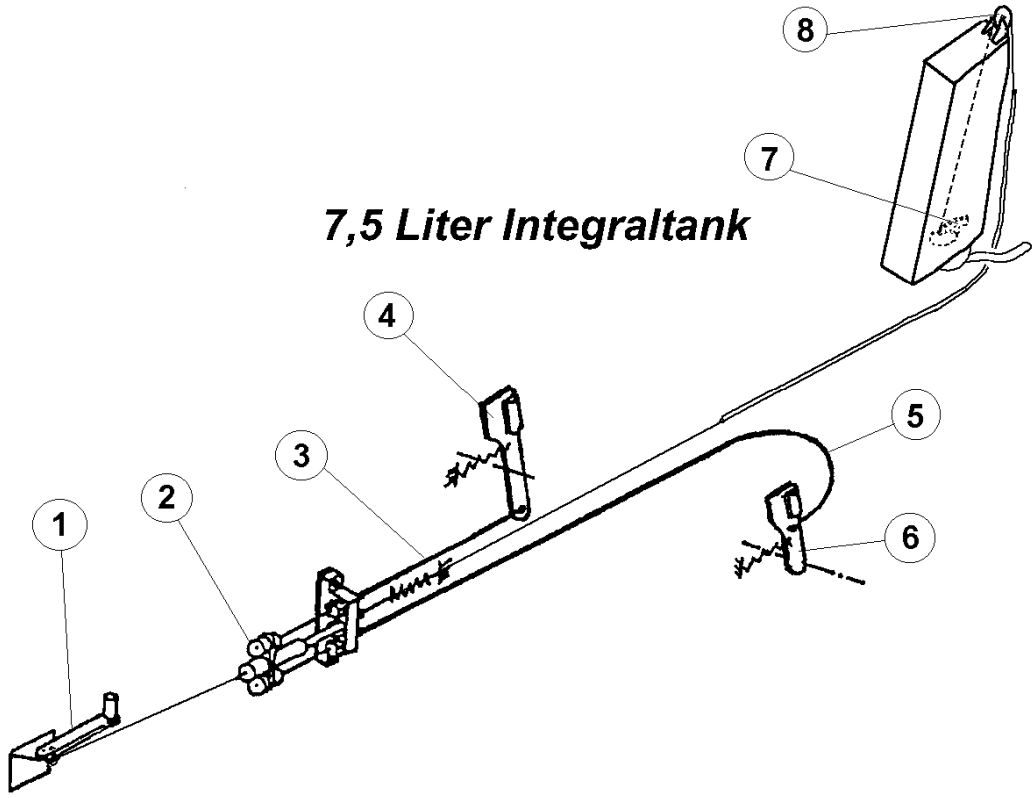
No.	Designation	Drawing
1	Cockpit lever (Integral tank)	4R12-141
2	Tail tank valve (Integral tank)	1BR-213
9	Cockpit lever (Slide-in tank)	1BR-188a
10	Water ballast drive distributor	1BR-188a
11	Right side bowden cable	4R12-129
12	Right side fuselage lever	4R12-113
13	Left side bowden cable	4R12-130
14	Left side fuselage lever	4R12-114
15	Slide-in tail tank	3GR-122
16	Slide-in tail tank valve	4BR-121

Note: Which one of the 3 fin tank versions is installed is dependent on what was ordered.



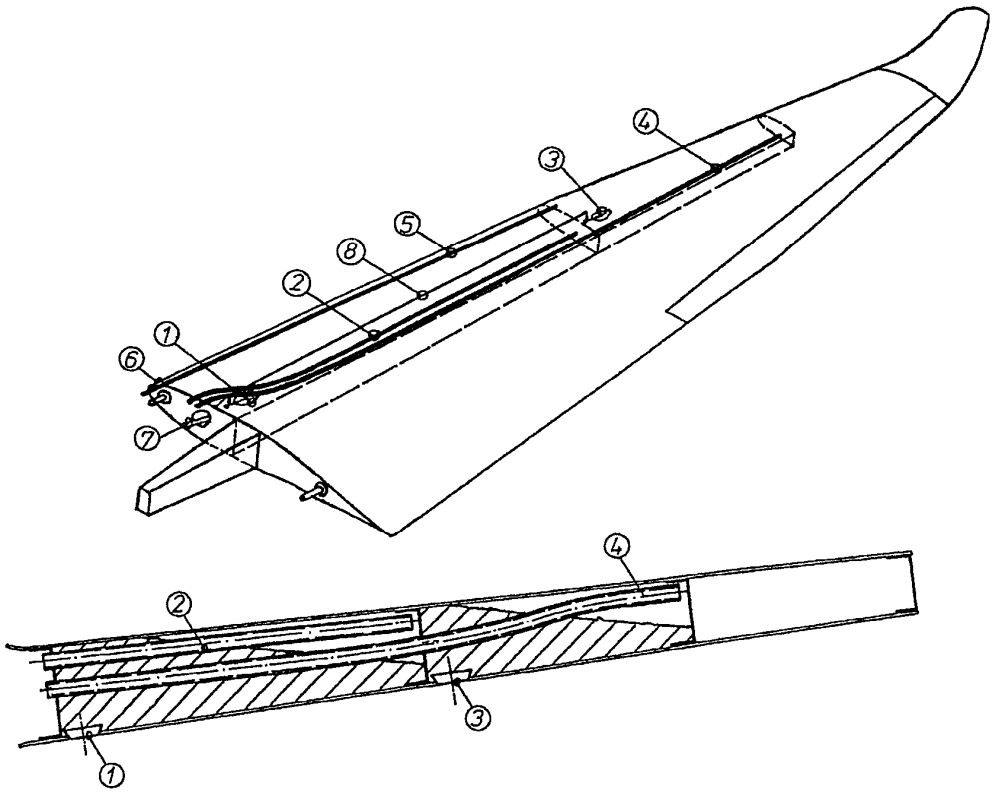
1.11 Fuselage water ballast system (LS8-b)

No.	Designation	Drawing
1	Cockpit lever	4R12-141
2	Water ballast drive distributor	1BR-188a
3	Right side bowden cable	4R12-129
4	Right side fuselage lever	4R12-113
5	Left side bowden cable	4R12-130
6	Left side fuselage lever	4R12-114
7	Tail tank valve	1BR-213
8	Tail fin pulley	1BR-225



1.12 Wing water ballast system (LS8-a from ser. no. 8066 on, LS8-b, LS8-18)

No.	Designation
1	Valve of inner tank
2	Ventilation tube of inner tank
3	Valve of outer tank
4	Ventilation tube of outer tank
5	Drain tube of outer tank (may be closed due to malfunction see TN8006 and log book entry) From ser. no. 8323 on always open
6	Draining valve for both tanks
7	Drive lever
8	Cable to valve of outer tank

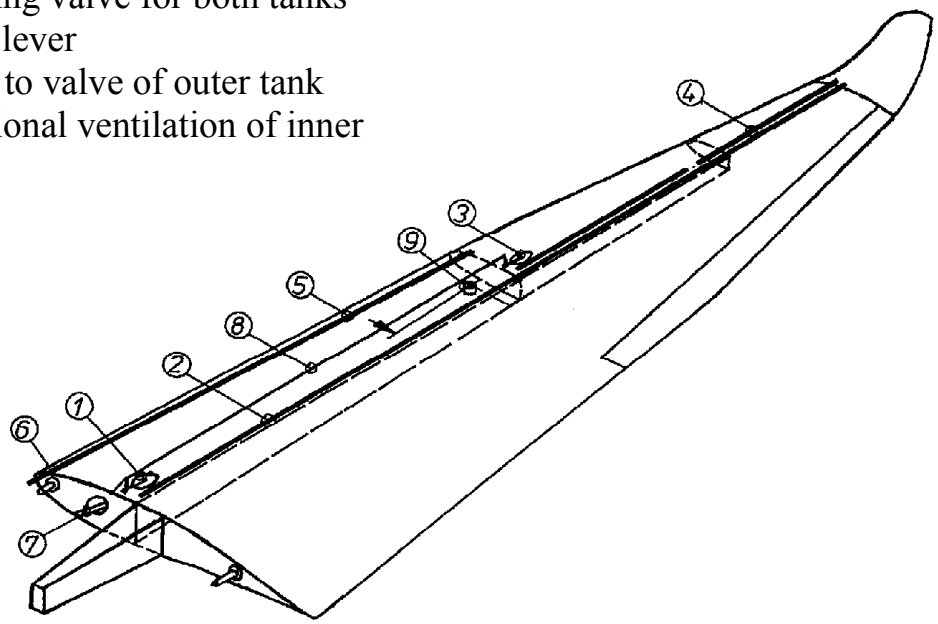


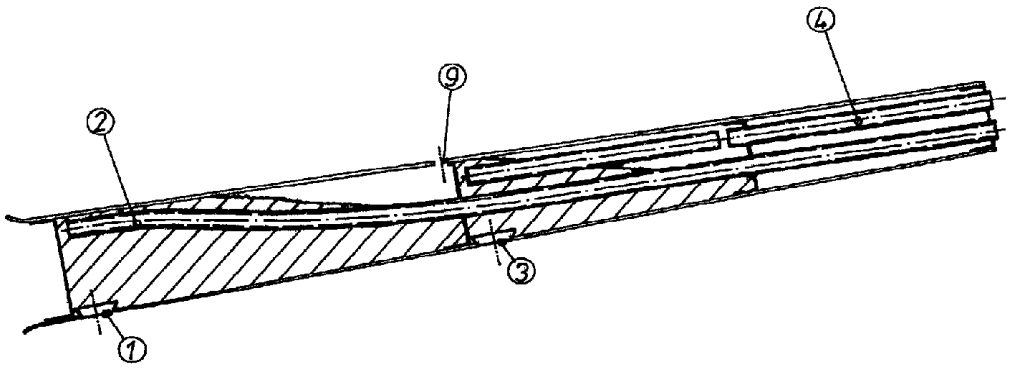
1.13 Wing water ballast system with winglet ventilation (only LS8-a up to ser. no. 8065)

Note: There are 2 versions of winglet ventilation. Which version is installed can be determined from the outside only by the position of the ventilation hole at the wing upper surface.
Note: On all LS8-a's ser. no's 8007 up to 8065 which have been retrofitted to LS8-18 the ventilation was modified to the system see section 1.12.

1. Version

No.	Designation
1	Valve of inner tank
2	Ventilation tube of inner tank
3	Valve of outer tank
4	Ventilation tube of outer tank
5	Drain tube of outer tank (may be closed due to malfunction see TN8006 and log book entry)
6	Draining valve for both tanks
7	Drive lever
8	Cable to valve of outer tank
9	Additional ventilation of inner tank

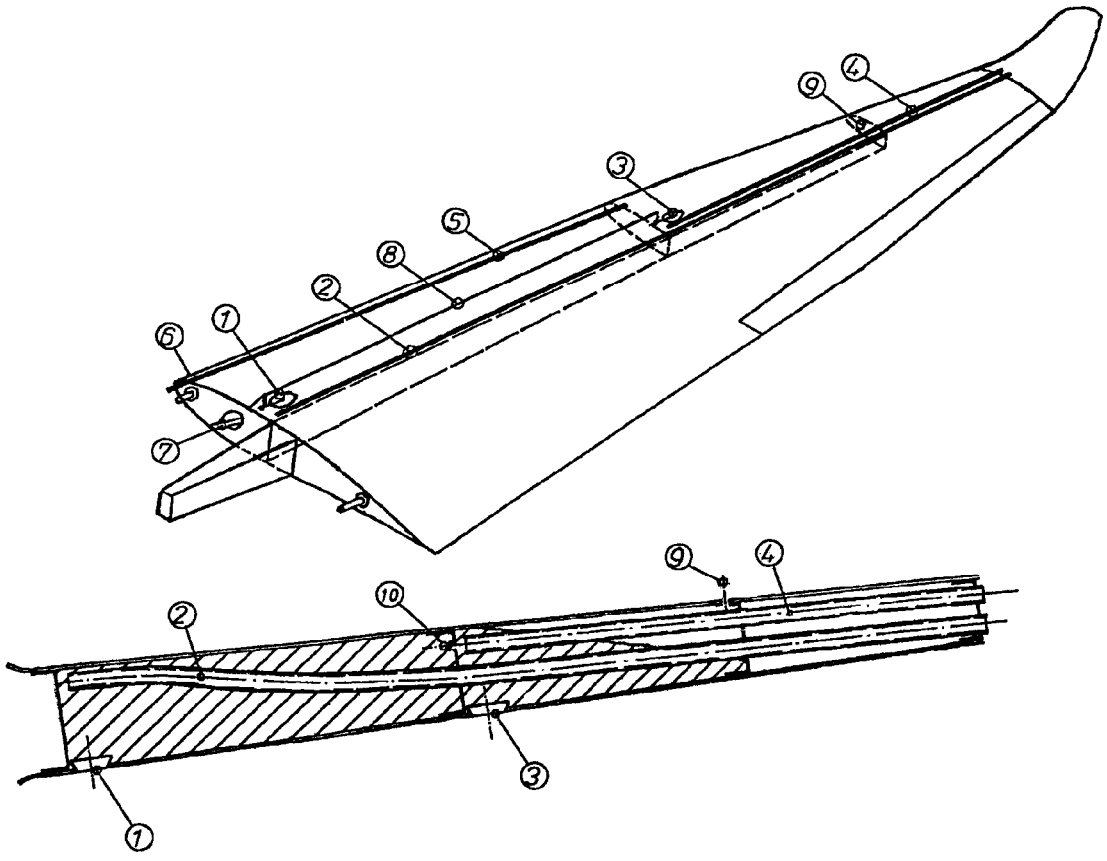




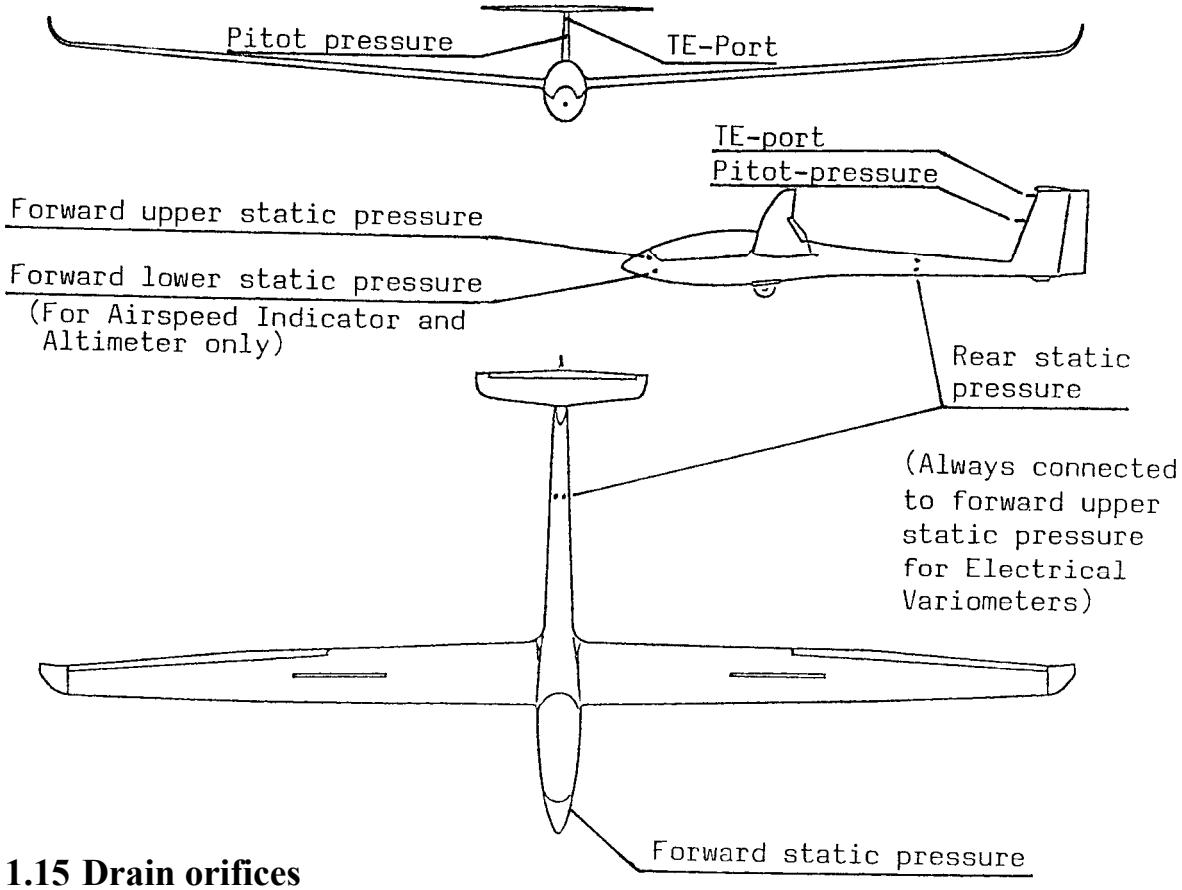
Wing water ballast system with winglet ventilation (only LS8-a up to ser. no. 8065)

2. Version

No.	Designation
1	Valve of inner tank
2	Ventilation tube of inner tank
3	Valve of outer tank
4	Ventilation tube of outer tank
5	Drain tube of outer tank (may be closed due to malfunction see TN8006 and log book entry)
6	Draining valve for both tanks
7	Drive lever
8	Cable to valve of outer tank
9	Additional ventilation of outer tank
10	Inner ventilation

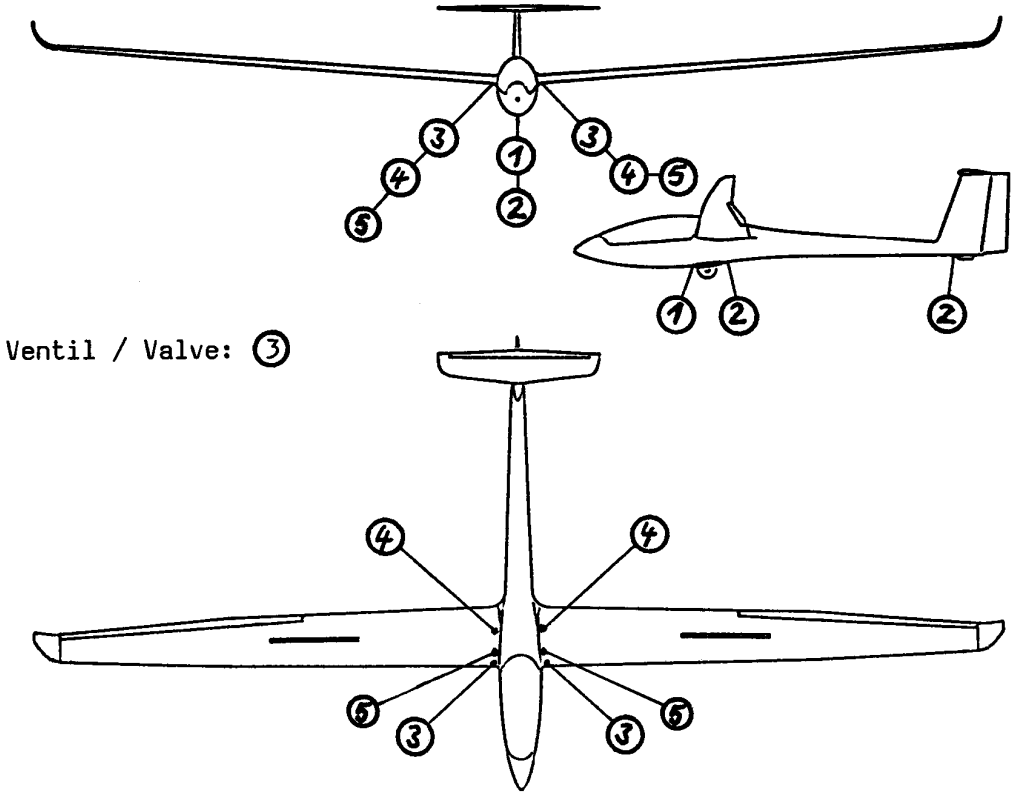


1.14 Pressure ports

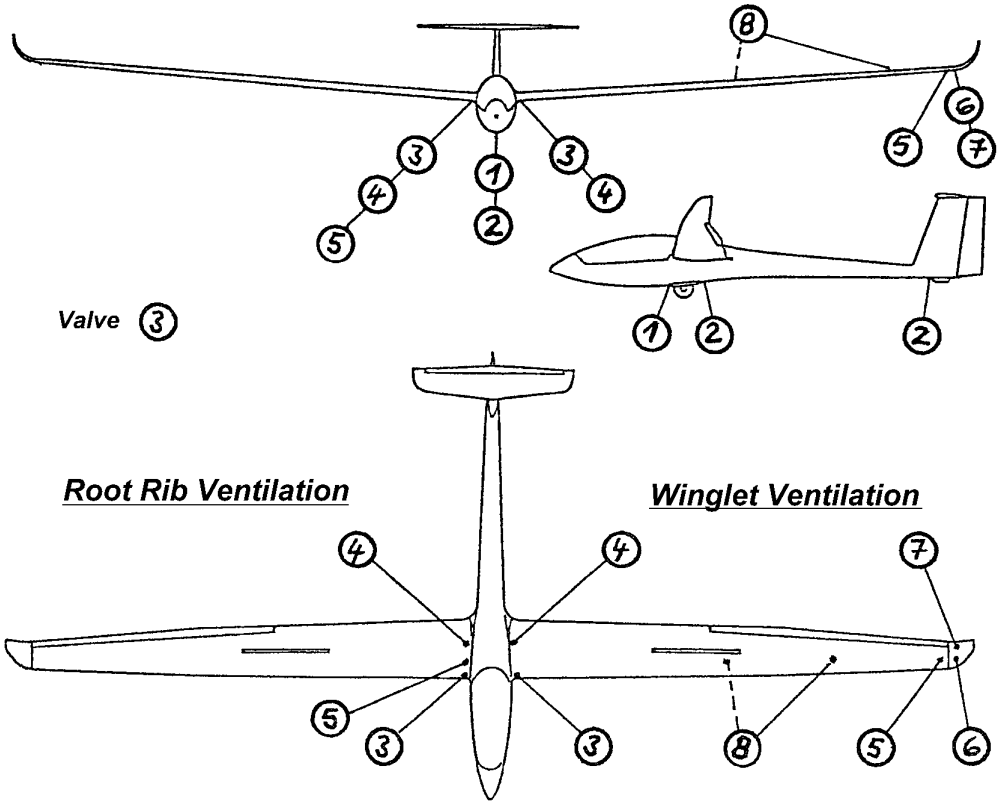


1.15 Drain orifices

1.15.1 Drain orifices (LS8, LS8-18, LS8-b)



1.15.2 Drain orifices (LS8-a)



1.16 Primary and secondary structure

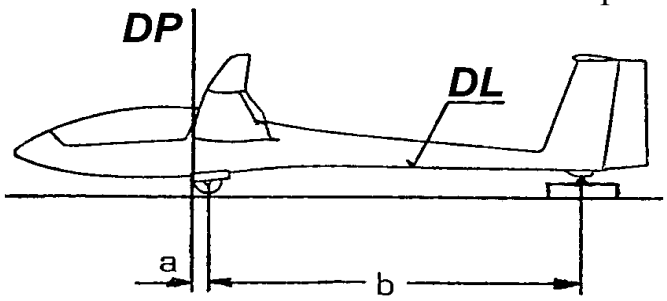
No secondary structure available

2 Mass and balance

2.1 Weighing procedure

Datum Line <DL>: Under side of fuselage boom placed horizontally
Datum Point <DP>: Leading edge of wing at root

1. **Determine total mass** (Empty or take-off mass) for both wing span versions, in most cases by weighing all parts and adding together. **When a tail fin battery is being used, weighing must always be done with tail fin battery installed**. Weigh mass of tail fin battery separately (**3BR-199**, 2.5 to 2.7 kg; <5.5 to 6 lbs>). For details see under Calculation of Loading Limits.
2. **Assemble the sailplane** in the 15 m version. For in-flight C.G. position, the pilot must be seated in the sailplane.
3. **Raise tail on weighing machine** until datum line is level using wooden blocks or adjustable rack. Check with levelling gauge.
4. **Measure distance <b>** from tail support to centre of landing gear axis.
5. Using plumb lead, determine points on floor perpendicular to left and right datum points, and points on floor perpendicular to centre of landing gear axis. **Measure distance <a>** from wheel axis to datum point.



6. Determine tail mass and deduct mass of auxiliary support used under 3) to get **net tail mass**.
7. Calculate C.G. position for empty vertical tail fin tank:

$$Xcg = \frac{\text{net tail mass} * b}{\text{total mass}} + a$$

8. Calculate C.G. position for full vertical tail fin tank:

$$Xcg = \frac{(\text{net tail mass} + \text{tail fin water mass}) * b}{\text{total mass} + \text{tail fin water mass}} + a$$

9. Calculate loading limits according to section 2.2.

2.2 Calculation of loading limits

1. Determine Minimum Cockpit Load for the **15 m wingspan** and **full and empty tail fin tank version** following procedure from tables "Empty mass C.G. Position",

When being used in a club, Minimum Cockpit Load should be 70 kg <154 lbs> for empty tail fin tank.

If it is higher, permanent ballast may be fitted under the forward seat portion, see Maintenance Manual section 8.1.

Minimum Cockpit Load for **tail fin battery (3BR-199) removed** (and installed in baggage compartment, when required) decreases **by 10 kg <22 lbs>**.

Finally resulting 4 different cockpit loads should be entered in the following places:

a. in weighing report of inspection
b. in Flight Manual section 6.2
c. in cockpit placard under instrument panel cover
d. in cockpit on data placard

1. Minimum Cockpit Load for full tail fin tank with tail fin battery
2. Minimum Cockpit Load for empty tail fin tank with tail fin battery
3. Minimum Cockpit Load for full tail fin tank without tail fin battery
4. Minimum Cockpit Load for empty tail fin tank without tail fin battery

2. Maximum approved mass of Non-lifting Parts may vary between 239 kg and 249kg <527 to 549 lbs> **(LS8-b and LS8/18)**, 244 kg and 253kg <538 to 558 lbs>**(LS8 and LS8-a)** depending on empty mass and empty mass C.G. position.
   Contrary to methods used up to now, maximum mass of non-lifting parts can be determined in relation to empty mass and empty mass C.G. position according to table section 2.3.
   Maximum mass of Non-lifting Parts should be entered into weighing report.

Note: The values shaded grey in the tables are empty mass C.G. values which are not covered by the empty mass C.G. tables in section 2.4. This means the glider is not inside the empty mass C.G. limits and must be corrected by installation of fixed ballast.

3. Determine Maximum Cockpit Load from table "Empty mass C.G. Position" section 2.4. Maximum Cockpit Load normally should be 110 kg <242 lbs>, as given in empty mass C.G. table. It may be lower due to trim conditions, excessive equipment or repairs.
   Calculate Maximum Cockpit Load on weighing report, see also examples
   Resulting Maximum Cockpit Load should be entered in the following places:
   a. in weighing report
   b. in Flight Manual, section 6.2
   c. on Data Placard in cockpit
4. Empty mass (perhaps increased by mass of permanently fitted trim ballast) should be entered in the following places:
   a. in weighing report
   b. in Flight section 6.2 for calculation of maximum permissible water ballast mass
5. Battery position during weighing should be entered in the following places:
   a. in weighing report and equipment list
   b. on Data Placard in cockpit
   c. in Flight Manual, section 6.2 if installed in the fin

For permanent installation of trim ballast mass, see Maintenance Manual section 8.

Example for calculation of loading limits (example is for ***LS8-b)***

1) Minimum Cockpit Load (tail fin tank empty, with tail fin battery)
   For empty mass ***265*** kg <584 lbs>
   and empty mass C.G. position
   659 mm <25.945 in> Minimum Cockpit Load
   according to table in section 2.3 is ***80***kg <176 lbs>
   Limit value ***674*** mm <26.535 in> greater
   than calc. value ***659*** mm <25.945 in>
   Minimum Cockpit Load (tail fin tank empty,
   no tail fin battery) ***70***kg <154 lbs>

2) Minimum Cockpit Load (tail fin tank ***7.5*** kg <16,5 lbs> full, with tail fin battery)
   For empty mass ***272,5*** kg <601 lbs>, new empty mass C.G. position
   761 mm <28.961 in>, Minimum Cockpit Load
   according to tables in section 2.3 is ***110***kg <242 lbs>
   Limit value ***761*** mm <28.961 in>
   greater than calc. value ***761*** mm <28.961 in>
   Minimum Cockpit Load (tail fin tank ***7.5*** kg <16.5 lbs> full,
   no tail fin battery)
   100kg <309 lbs>

3) Maximum mass of Non-lifting Parts
   Maximum non-lifting parts mass at empty
   mass ***265*** kg <584 lbs>
   and empty mass C.G. position ***659*** mm <25.945 in>
   is according to table in section 2.3 ***239***kg <527 lbs>

4) Maximum permissible Cockpit Load
   Fuselage with complete equipment,
   battery, canopy and main pins . ***128.2***kg <283 lbs>
   Horizontal tail ***6.5***kg < 14 lbs>
   Cockpit Load (maximum 110 kg <242 lbs>) ***104***kg <229 lbs>

   _____
   mass of Non-lifting Parts ***238.7***kg <526 lbs>

   _____
   Maximum Cockpit Load (max. 110 kg <242 lbs>) ***104***kg <229 lbs>
   Maximum all-up mass 525kg <1157 lbs>

Calculation of loading limits continued

Example for entry in Flight Manual, section 6.2:

		Wing span	[m]	15	18
		Empty mass	[kg / lbs]	**265/584**	**275/606**
		C.G. position	[mm / in]	**659/25.9**	
		Max. Cockpit Load	[kg / lbs]	**104/229**	
Minimum Cockpit Load	With tail battery	Tail tank full	[kg / lbs]	**110/243**	
		Tail tank empty (+)	[kg / lbs]	**100/220**	
	Without tail battery	Tail tank full	[kg / lbs]	**80/176**	
		Tail tank empty (+)	[kg / lbs]	**70/154**	
	Fixed trim ballast	front	[kg / lbs]	**--**	
		rear	[kg / lbs]	**--**	
	Batteries installed	Seat front end	[number]	**1**	
		Baggage Comp.	[number]	**0**	
		Vertical tail fin	[number]	**1**	
Date / Inspector				**18.3.2002 GS**	

Warning: The discrepancy between Maximum Cockpit Load of 104 kg <229 lbs> and Minimum Cockpit Load of 110 kg <242 lbs> with tail fin tank full indicates, that before each take off the installation position of the tail fin battery must be checked and functional check for the tail fin tank valve is required to make sure that no unintended amount of water remains in the fin tank..
To check the valve place tail tank filling adapter into the tank outlet and open the cockpit lever. If air cannot be blown into the tank, the valve is not functioning properly (for instance frozen solid or operating cable fractured)

2.3 Calculation of maximum mass of non-lifting parts

2.3.1 MNLP LS8

Maximum mass of non-lifting parts of 254 kg <560 lbs> must be reduced in relation to empty mass and empty mass C.G. position **Xs** according to table below (For lbs/inch values see following page).

Example: For empty mass C.G. position of **665** mm <26.181 in> and empty mass of 255kg<562 lbs> the permissible mass of non-lifting parts is 245 kg <540 lbs>.

	Empty mass C.G. position Xs <mm>										
Empty mass G <kg>	from 580 to 599	from 600 to 619	from 620 to 639	from 640 to 659	from 660 to 679	from 680 to 699	from 700 to 719	from 720 to 739	from 740 to 759	from 760 to 779	from 780 to 799
250-251	244	244	244	244	244	245	247	248	249	250	251
251-252	244	244	244	244	244	245	247	248	249	250	251
252-253	244	244	244	244	244	246	247	248	249	250	252
253-254	244	244	244	244	244	246	247	248	249	251	252
254-255	244	244	244	244	245	246	247	248	249	251	252
255-256	244	244	244	244	245	246	247	248	250	251	252
256-257	244	244	244	244	245	246	247	248	250	251	252
257-258	244	244	244	244	245	246	247	249	250	251	252
258-259	244	244	244	244	245	246	247	249	250	251	252
259-260	244	244	244	244	245	246	248	249	250	251	253
260-261	244	244	244	244	245	246	248	249	250	251	253
261-262	244	244	244	244	245	246	248	249	250	252	253
262-263	244	244	244	244	245	246	248	249	250	252	253
263-264	244	244	244	244	245	246	248	249	251	252	253
264-265	244	244	244	244	245	247	248	249	251	252	253
265-266	244	244	244	245	245	247	248	250	251	252	253
266-267	244	244	244	245	246	247	248	250	251	252	253
267-268	244	244	244	245	246	247	249	250	251	252	254
268-269	244	244	244	245	246	247	249	250	251	252	254
269-270	244	244	244	245	246	247	249	250	251	253	254
270-271	244	244	244	245	246	248	249	250	251	253	254
271-272	244	244	244	245	246	248	249	250	252	253	254
272-273	244	244	244	245	246	248	249	250	252	253	254
273-274	244	244	244	245	246	248	249	251	252	253	254
274-275	244	244	244	246	246	248	249	251	252	253	255
275-276	244	244	244	246	247	248	249	251	252	253	255
276-277	244	244	244	246	247	248	250	251	252	254	255
277-278	244	244	244	246	247	248	250	251	252	254	255
278-279	244	244	245	246	247	248	250	251	253	254	255
279-280	244	244	245	246	247	249	250	251	253	254	255
280-281	244	244	245	246	247	249	250	251	253	254	255
281-282	244	244	245	246	247	249	250	251	253	254	256
282-283	244	244	245	246	248	249	250	252	253	254	256
283-284	244	244	245	246	248	249	250	252	253	254	256
284-285	244	244	245	246	248	249	251	252	253	255	256
285-286	244	244	245	247	248	249	251	252	253	255	256
286-287	244	244	245	247	248	249	251	252	253	255	255
287-288	244	244	245	247	248	249	251	252	253	255	255
288-289	244	244	245	247	248	250	251	252	253	255	255
289-290	244	244	246	247	248	250	251	252	254	255	257
290-291	244	244	246	247	248	250	251	253	254	255	257

MNLP LS8 continued

Values lbs. in.

Empty mass G<lbs>	Empty mass C.G. position Xs <in>										
	from 22.8 to 23.6	from 23.6 to 24.4	from 24.4 to 25.2	from 25.2 to 25.9	From 25.9 to 26.7	from 26.7 to 27.5	from 27.5 to 28.3	from 28.3 to 29.1	from 29.1 to 29.9	From 29.97 to 30.7	from 30.7 to 31.5
551-553	538	538	538	538	538	540	545	547	549	551	553
553-556	538	538	538	538	538	540	545	547	549	551	553
556-558	538	538	538	538	538	542	545	547	549	551	556
558-560	538	538	538	538	538	542	545	547	549	553	556
560-562	538	538	538	538	540	542	545	547	549	553	556
562-564	538	538	538	538	540	542	545	547	551	553	556
564-567	538	538	538	538	540	542	545	547	551	553	556
567-569	538	538	538	538	540	542	545	549	551	553	556
569-571	538	538	538	538	540	542	545	549	551	553	556
571-573	538	538	538	538	540	542	547	549	551	553	558
573-575	538	538	538	538	540	542	547	549	551	553	558
575-578	538	538	538	538	540	545	547	549	551	556	558
578-580	538	538	538	538	540	545	547	549	551	556	558
580-582	538	538	538	538	542	545	547	549	553	556	558
582-584	538	538	538	538	542	545	547	549	553	556	558
584-586	538	538	538	540	542	545	547	551	553	556	558
586-589	538	538	538	540	542	545	547	551	553	556	558
589-591	538	538	538	540	542	545	549	551	553	556	560
591-593	538	538	538	540	542	545	549	551	553	556	560
593-595	538	538	538	540	542	545	549	551	553	558	560
595-597	538	538	538	540	542	547	549	551	553	558	560
597-600	538	538	538	540	542	547	549	551	556	558	560
600-602	538	538	538	540	545	547	549	551	556	558	560
602-604	538	538	538	540	545	547	549	553	556	558	560
604-606	538	538	538	540	545	547	549	553	556	558	560
606-608	538	538	538	542	545	547	549	553	556	558	560
608-611	538	538	538	542	545	547	551	553	556	560	560
611-613	538	538	538	542	545	547	551	553	556	560	562
613-615	538	538	540	542	545	547	551	553	556	560	562
615-617	538	538	540	542	545	549	551	553	558	560	562
617-619	538	538	540	542	545	549	551	553	558	560	562
619-622	538	538	540	542	545	549	551	553	558	560	562
622-624	538	538	540	542	547	549	551	556	558	560	562
624-626	538	538	540	542	547	549	551	556	558	560	562
626-628	538	538	540	542	547	549	553	556	558	560	564
628-631	538	538	540	545	547	549	553	556	558	560	564
631-633	538	538	540	545	547	549	553	556	558	560	562
633-635	538	538	540	545	547	549	553	556	560	560	562
635-637	538	538	540	545	547	551	553	556	560	560	562
637-639	538	538	542	545	547	551	553	556	560	560	564
639-642	538	538	542	545	547	551	553	558	560	560	564

2.3.2 MNLP LS8-a

Maximum mass of non-lifting parts of 255 kg <562 lbs> must be reduced in relation to empty mass at 15 m span and empty mass C.G. position **Xs** according to table below

Example: For empty mass C.G. position of **665** mm <26.181 in> and empty mass of 255kg<562 lbs> the permissible mass of non-lifting parts is 239 kg <527 lbs>.

Empty mass G <kg>	Empty mass C.G. range [mm]										
	from 580 to 599	von 600 to 599	from 620 to 639	from 640 to 659	from 660 to 679	from 680 to 699	from 700 to 719	from 720 to 739	from 740 to 759	from 760 to 779	from 780 to 799
245-246	244	244	244	244	244	244	246	247	248	249	250
246-247	244	244	244	244	244	245	246	247	248	249	250
247-248	244	244	244	244	244	245	246	247	248	249	250
248-249	244	244	244	244	244	245	246	247	248	249	251
249-250	244	244	244	244	244	245	246	247	248	250	251
250-251	244	244	244	244	244	245	246	247	249	250	251
251-252	244	244	244	244	244	245	246	247	249	250	251
252-253	244	244	244	244	244	245	246	248	249	250	251
253-254	244	244	244	244	244	245	247	248	249	250	251
254-255	244	244	244	244	244	245	247	248	249	250	251
255-256	244	244	244	244	244	246	247	248	249	250	252
256-257	244	244	244	244	244	246	247	248	249	251	252
257-258	244	244	244	244	245	246	247	248	249	251	252
258-259	244	244	244	244	245	246	247	248	250	251	252
259-260	244	244	244	244	245	246	247	248	250	251	252
260-261	244	244	244	244	245	246	247	249	250	251	252
261-262	244	244	244	244	245	246	247	249	250	251	252
262-263	244	244	244	244	245	246	248	249	250	251	253
263-264	244	244	244	244	245	246	248	249	250	251	253
264-265	244	244	244	244	245	247	248	249	250	252	253
265-266	244	244	244	244	245	247	248	249	250	252	253
266-267	244	244	244	244	246	247	248	249	251	252	253
267-268	244	244	244	244	246	247	248	249	251	252	253
268-269	244	244	244	244	246	247	248	250	251	252	253
269-270	244	244	244	245	246	247	248	250	251	252	254
270-271	244	244	244	245	246	247	249	250	251	252	254
271-272	244	244	244	245	246	247	249	250	251	253	254
272-273	244	244	244	245	246	247	249	250	251	253	254
273-274	244	244	244	245	246	248	249	250	251	253	254
274-275	244	244	244	245	246	248	249	250	252	253	254
275-276	244	244	244	245	247	248	249	250	252	253	254
276-277	244	244	244	245	247	248	249	251	252	253	254
277-278	244	244	244	245	247	248	249	251	252	253	255
278-279	244	244	244	246	247	248	249	251	252	253	255
279-280	244	244	244	246	247	248	250	251	252	254	255
280-281	244	244	244	246	247	248	250	251	252	254	255
281-282	244	244	244	246	247	248	250	251	253	254	255
282-283	244	244	245	246	247	249	250	251	253	254	255
283-284	244	244	245	246	247	249	250	251	253	254	255
284-285	244	244	245	246	247	249	250	252	253	254	256
285-286	244	244	245	246	248	249	250	252	253	254	256
286-287	244	244	245	246	248	249	250	252	253	254	255
287-288	244	244	245	246	248	249	251	252	253	254	255
288-289	244	244	245	247	248	249	251	252	253	254	255
289-290	244	244	245	247	248	249	251	252	254	254	256
290-291	244	244	245	247	248	250	251	252	254	254	256

MNLP LS8-a continued

lbs. / in.

Empty mass G<lbs>	Empty mass C.G. position Xs <in>										
	from 22.8 to 23.6	from 23.62 to 24.4	from 24.4 to 25.2	from 25.2 to 25.9	From 25.9 to 26.7	from 26.7 to 27.5	from 27.5 to 28.3	from 28.3 to 29.14	from 29.1 to 29.97	From 29.9 to 30.7	from 30.7 to 31.5
540-542	538	538	538	538	538	538	542	545	547	549	551
542-545	538	538	538	538	538	540	542	545	547	549	551
545-547	538	538	538	538	538	540	542	545	547	549	551
547-549	538	538	538	538	538	540	542	545	547	549	553
549-551	538	538	538	538	538	540	542	545	547	551	553
551-553	538	538	538	538	538	540	542	545	549	551	553
553-556	538	538	538	538	538	540	542	545	549	551	553
556-558	538	538	538	538	538	540	542	547	549	551	553
558-560	538	538	538	538	538	540	545	547	549	551	553
560-562	538	538	538	538	538	540	545	547	549	551	553
562-564	538	538	538	538	538	542	545	547	549	551	556
564-567	538	538	538	538	538	542	545	547	549	553	556
567-569	538	538	538	538	540	542	545	547	549	553	556
569-571	538	538	538	538	540	542	545	547	551	553	556
571-573	538	538	538	538	540	542	545	547	551	553	556
573-575	538	538	538	538	540	542	545	549	551	553	556
575-578	538	538	538	538	540	542	545	549	551	553	556
578-580	538	538	538	538	540	542	547	549	551	553	558
580-582	538	538	538	538	540	542	547	549	551	553	558
582-584	538	538	538	538	540	545	547	549	551	556	558
584-586	538	538	538	538	540	545	547	549	551	556	558
586-589	538	538	538	538	542	545	547	549	553	556	558
589-591	538	538	538	538	542	545	547	549	553	556	558
591-593	538	538	538	538	542	545	547	551	553	556	558
593-595	538	538	538	540	542	545	547	551	553	556	560
595-597	538	538	538	540	542	545	549	551	553	556	560
597-600	538	538	538	540	542	545	549	551	553	558	560
600-602	538	538	538	540	542	545	549	551	553	558	560
602-604	538	538	538	540	542	547	549	551	553	558	560
604-606	538	538	538	540	542	547	549	551	556	558	560
606-608	538	538	538	540	545	547	549	551	556	558	560
608-611	538	538	538	540	545	547	549	553	556	558	560
611-613	538	538	538	540	545	547	549	553	556	558	562
613-615	538	538	538	542	545	547	549	553	556	558	562
615-617	538	538	538	542	545	547	551	553	556	560	562
617-619	538	538	538	542	545	547	551	553	556	560	562
619-622	538	538	538	542	545	547	551	553	558	560	562
622-624	538	538	540	542	545	549	551	553	558	560	562
624-626	538	538	540	542	545	549	551	553	558	560	562
626-628	538	538	540	542	545	549	551	556	558	560	564
628-631	538	538	540	542	547	549	551	556	558	560	564
631-633	538	538	540	542	547	549	551	556	558	560	562
633-635	538	538	540	542	547	549	553	556	558	560	562
635-637	538	538	540	545	547	549	553	556	558	560	562
637-639	538	538	540	545	547	549	553	556	560	560	564
639-642	538	538	540	545	547	551	553	556	560	560	564

2.3.3 MNLP LS8-b and LS8-18

Maximum mass of non-lifting parts of 255 kg <562 lbs> must be reduced in relation to empty mass at 15 m span and empty mass C.G. position **Xs** according to table below (For lbs/inch values see following page). Example: For empty mass C.G. position of **665** mm <26.181 in> and empty mass of 265kg<584 lbs> the permissible mass of non-lifting parts is 240 kg <529 lbs>.

Empty mass G <kg>	Empty mass C.G. position Xs <mm>										
	from 580 to 599	from 600 to 619	from 620 to 639	from 640 to 659	from 660 to 679	from 680 to 699	from 700 to 719	from 720 to 739	from 740 to 759	from 760 to 779	from 780 to 799
255 -256	239	239	239	239	239	241	242	243	244	245	247
256 -257	239	239	239	239	239	241	242	243	244	246	247
257 -258	239	239	239	239	240	241	242	243	244	246	247
258 -259	239	239	239	239	240	241	242	243	245	246	247
259 -260	239	239	239	239	240	241	242	243	245	246	247
260 -261	239	239	239	239	240	241	242	244	245	246	247
261 -262	239	239	239	239	240	241	242	244	245	246	247
262 -263	239	239	239	239	240	241	243	244	245	246	248
263 -264	239	239	239	239	240	241	243	244	245	246	248
264 -265	239	239	239	239	240	242	243	244	245	247	248
265 -266	239	239	239	239	240	242	243	244	245	247	248
266 -267	239	239	239	239	241	242	243	244	246	247	248
267 -268	239	239	239	239	241	242	243	244	246	247	248
268 -269	239	239	239	239	241	242	243	245	246	247	248
269 -270	239	239	239	240	241	242	243	245	246	247	249
270 -271	239	239	239	240	241	242	244	245	246	247	249
271 -272	239	239	239	240	241	242	244	245	246	248	249
272 -273	239	239	239	240	241	242	244	245	246	248	249
273 -274	239	239	239	240	241	243	244	245	246	248	249
274 -275	239	239	239	240	241	243	244	245	247	248	249
275 -276	239	239	239	240	242	243	244	245	247	248	249
276 -277	239	239	239	240	242	243	244	246	247	248	249
277 -278	239	239	239	240	242	243	244	246	247	248	250
278 -279	239	239	239	241	242	243	244	246	247	248	250
279 -280	239	239	239	241	242	243	245	246	247	249	250
280 -281	239	239	239	241	242	243	245	246	247	249	250
281 -282	239	239	239	241	242	243	245	246	248	249	250
282 -283	239	239	240	241	242	244	245	246	248	249	250
283 -284	239	239	240	241	242	244	245	246	248	249	250
284 -285	239	239	240	241	242	244	245	247	248	249	251
285 -286	239	239	240	241	243	244	245	247	248	249	251
286 -287	239	239	240	241	243	244	245	247	248	250	251
287 -288	239	239	240	241	243	244	246	247	248	250	251
288 -289	239	239	240	242	243	244	246	247	248	250	251
289 -290	239	239	240	242	243	244	246	247	249	250	251
290 -291	239	239	240	242	243	245	246	247	249	250	251
291 -292	239	239	240	242	243	245	246	247	249	250	252
292 -293	239	239	241	242	243	245	246	248	249	250	252
293 -294	239	239	241	242	243	245	246	248	249	250	252
294 -295	239	239	241	242	244	245	246	248	249	251	252
295 -296	239	239	241	242	244	245	247	248	249	251	252
296 -297	239	240	241	243	244	245	247	248	249	251	252
297 -298	239	240	241	243	244	245	247	248	250	251	252
298 -299	239	240	241	243	244	245	247	248	250	251	253
299 -300	239	240	241	243	244	246	247	248	250	251	253
300 -301	239	240	241	243	244	246	247	249	250	251	253

MNLP LS8-b and LS8-18 continued

lbs. / in.

Empty mass G <lbs>	Empty mass C.G. position Xs <in>										
	from 22.8 to 23.6	from 23.6 to 24.4	from 24.4 to 25.2	from 25.2 to 25.9	from 25.9 to 26.7	from 26.7 to 27.5	from 27.5 to 28.3	from 28.3 to 29.1	from 29.1 to 29.9	From 29.9 to 30.7	from 30.7 to 31.5
562-564	527	527	527	527	527	531	534	536	538	540	545
564-567	527	527	527	527	527	531	534	536	538	542	545
567-569	527	527	527	527	529	531	534	536	538	542	545
569-571	527	527	527	527	529	531	534	536	540	542	545
571-573	527	527	527	527	529	531	534	536	540	542	545
573-575	527	527	527	527	529	531	534	538	540	542	545
575-578	527	527	527	527	529	531	534	538	540	542	545
578-580	527	527	527	527	529	531	536	538	540	542	547
580-582	527	527	527	527	529	531	536	538	540	542	547
582-584	527	527	527	527	529	534	536	538	540	544	547
584-586	527	527	527	527	529	534	536	538	540	544	547
586-589	527	527	527	527	531	534	536	538	542	544	547
589-591	527	527	527	527	531	534	536	538	542	544	547
591-593	527	527	527	529	531	534	536	540	542	544	547
593-595	527	527	527	529	531	534	536	540	542	544	549
595-597	527	527	527	529	531	534	538	540	542	544	549
597-600	527	527	527	529	531	534	538	540	542	547	549
600-602	527	527	527	529	531	534	538	540	542	547	549
602-604	527	527	527	529	531	536	538	540	542	547	549
604-606	527	527	527	529	531	536	538	540	544	547	549
606-608	527	527	527	529	534	536	538	540	544	547	549
608-611	527	527	527	529	534	536	538	542	544	547	549
611-613	527	527	527	529	534	536	538	542	544	547	551
613-615	527	527	527	531	534	536	538	542	544	547	551
615-617	527	527	527	531	534	536	540	542	544	549	551
617-619	527	527	527	531	534	536	540	542	544	549	551
619-622	527	527	527	531	534	536	540	542	547	549	551
622-624	527	527	529	531	534	538	540	542	547	549	551
624-626	527	527	529	531	534	538	540	542	547	549	551
626-628	527	527	529	531	534	538	540	544	547	549	553
628-631	527	527	529	531	536	538	540	544	547	549	553
631-633	527	527	529	531	536	538	540	544	547	551	553
633-635	527	527	529	531	536	538	542	544	547	551	553
635-637	527	527	529	531	536	538	542	544	547	551	553
637-639	527	527	529	534	536	538	542	544	549	551	553
639-642	527	527	529	534	536	540	542	544	549	551	553
642-644	527	527	529	534	536	540	542	544	549	551	556
644-646	527	527	531	534	536	549	542	547	549	551	556
646-648	527	527	531	534	536	540	542	547	549	551	556
648-650	527	527	531	534	538	540	542	547	549	553	556
650-653	527	527	531	534	538	540	545	547	549	553	556
653-655	527	529	531	534	538	540	545	547	549	553	556
655-657	527	529	531	536	538	540	545	547	551	553	556
657-659	527	529	531	536	538	540	545	547	551	553	558
659-661	527	529	531	536	538	542	545	547	551	553	558
661-664	527	529	531	536	538	542	545	549	551	553	558

2.4 Empty mass C.G. range

m empty	range in <mm > at **max. cockpit load 110 kg a**nd at **min. cockpit load of::**						
<kg>	70 kg	75 kg	80 kg	85 kg	90 kg	95 kg	100 kg
245	658 -660	658 -678	658 -696	658 -714	658 -732	658 -749	658 -767
246	657 -659	657 -677	657 -695	657 -713	657 -730	657 -748	657 -765
247	655 -658	655 -676	655 -694	655 -711	655 -729	655 -747	655 -764
248	654 -657	654 -675	654 -693	654 -710	654 -728	654 -745	654 -763
249	652 -656	652 -674	652 -691	652 -709	652 -726	652 -744	652 -761
250	651 -655	651 -673	651 -690	651 -708	651 -725	651 -742	651 -760
251	649 -654	649 -672	649 -689	649 -706	649 -724	649 -741	649 -758
252	648 -653	648 -671	648 -688	648 -705	648 -723	648 -740	648 -757
253	647 -652	647 -669	647 -687	647 -704	647 -721	647 -738	647 -755
254	645 -651	645 -668	645 -686	645 -703	645 -720	645 -737	645 -754
255	644 -650	644 -667	644 -685	644 -702	644 -719	644 -736	644 -753
256	642 -649	642 -666	642 -683	642 -700	642 -717	642 -734	642 -751
257	641 -648	641 -665	641 -682	641 -699	641 -716	641 -733	641 -750
258	639 -647	639 -664	639 -681	639 -698	639 -715	639 -732	639 -748
259	638 -646	638 -663	638 -680	638 -697	638 -714	638 -730	638 -747
260	637 -645	637 -662	637 -679	637 -696	637 -713	637 -729	637 -746
261	635 -644	635 -661	635 -678	635 -695	635 -711	635 -728	635 -744
262	634 -643	634 -660	634 -677	634 -694	634 -710	634 -727	634 -743
263	633 -642	633 -659	633 -676	633 -692	633 -709	633 -725	633 -742
264	631 -642	631 -658	631 -675	631 -691	631 -708	631 -724	631 -741
265	630 -641	630 -657	630 -674	630 -690	630 -707	630 -723	630 -739
266	629 -640	629 -656	629 -673	629 -689	629 -706	629 -722	629 -738
267	627 -639	627 -655	627 -672	627 -688	627 -704	627 -721	627 -737
268	626 -638	626 -654	626 -671	626 -687	626 -703	626 -719	626 -735
269	625 -637	625 -653	625 -670	625 -686	625 -702	625 -718	625 -734
270	623 -636	623 -653	623 -669	623 -685	623 -701	623 -717	623 -733
271	622 -635	622 -652	622 -668	622 -684	622 -700	622 -716	622 -732
272	621 -634	621 -651	621 -667	621 -683	621 -699	621 -715	621 -731
273	620 -634	620 -650	620 -666	620 -682	620 -698	620 -714	620 -729
274	618 -633	618 -649	618 -665	618 -681	618 -697	618 -712	618 -728
275	617 -632	617 -648	617 -664	617 -680	617 -696	617 -711	617 -727
276	616 -631	616 -647	616 -663	616 -679	616 -694	616 -710	616 -726
277	615 -630	615 -646	615 -662	615 -678	615 -693	615 -709	615 -725
278	614 -629	614 -645	614 -661	614 -677	614 -692	614 -708	614 -723
279	612 -629	612 -644	612 -660	612 -676	612 -691	612 -707	612 -722
280	611 -628	611 -643	611 -659	611 -675	611 -690	611 -706	611 -721
281	610 -627	610 -643	610 -658	610 -674	610 -689	610 -705	610 -720
282	609 -626	609 -642	609 -657	609 -673	609 -688	609 -704	609 -719
283	608 -625	608 -641	608 -656	608 -672	608 -687	608 -702	608 -718
284	607 -625	607 -640	607 -655	607 -671	607 -686	607 -701	607 -717
285	605 -624	605 -639	605 -655	605 -670	605 -685	605 -700	605 -715
286	604 -623	604 -638	604 -654	604 -669	604 -684	604 -699	604 -714
287	603 -622	603 -638	603 -653	603 -668	603 -683	603 -698	603 -713
288	602 -621	602 -637	602 -652	602 -667	602 -682	602 -697	602 -712
289	601 -621	601 -636	601 -651	601 -666	601 -681	601 -696	601 -711
290	600 -620	600 -635	600 -650	600 -665	600 -680	600 -695	600 -710
291	599 -619	599 -634	599 -649	599 -664	599 -679	599 -694	599 -709
292	598 -618	598 -633	598 -648	598 -663	598 -678	598 -693	598 -708
293	596 -618	596 -633	596 -648	596 -663	596 -677	596 -692	596 -707
294	595 -617	595 -632	595 -647	595 -662	595 -676	595 -691	595 706
295	594 -616	594 -631	594 -646	594 -661	594 -675	594 -690	594 -705
296	593 -615	593 -630	593 -645	593 -660	593 -675	593 -689	593 -704
297	592 -615	592 -630	592 -644	592 -659	592 -674	592 -688	592 -703
298	591 -614	591 -629	591 -643	591 -658	591 -673	591 -687	591 -702
299	590 -613	590 -628	590 -643	590 -657	590 -672	590 -686	590 -701
300	589 -613	589 -627	589 -642	589 -656	589 -671	589 -685	589 -700

W empty	range in <mm > at **max. cockpit load 110 kg a**nd at **min. cockpit load of:::**					
<kg>	105 kg	110 kg	120 kg	130 kg	140 kg	150 kg
245	658 -784	658 -802	658 -836	658 -871	658 -906	658 -940
246	657 -783	657 -800	657 -835	657 -869	657 -904	657 -938
247	655 -781	655 -799	655 -833	655 -867	655 -902	655 -936
248	654 -780	654 -797	654 -831	654 -865	654 -899	654 -933
249	652 -778	652 -795	652 -829	652 -863	652 -897	652 -931
250	651 -777	651 -794	651 -828	651 -862	651 -895	651 -929
251	649 -775	649 -792	649 -826	649 -860	649 -894	649 -927
252	648 -774	648 -791	648 -824	648 -858	648 -892	648 -925
253	647 -772	647 -789	647 -823	647 -856	647 -890	647 -923
254	645 -771	645 -788	645 -821	645 -854	645 -888	645 -921
255	644 -769	644 -786	644 -819	644 -853	644 -886	644 -919
256	642 -768	642 -785	642 -818	642 -851	642 -884	642 -917
257	641 -766	641 -783	641 -816	641 -849	641 -882	641 -915
258	639 -765	639 -782	639 -814	639 -847	639 -880	639 -913
259	638 -764	638 -780	638 -813	638 -846	638 -878	638 -911
260	637 -762	637 -779	637 -811	637 -844	637 -876	637 -909
261	635 -761	635 -777	635 -810	635 -842	635 -875	635 -907
262	634 -759	634 -776	634 -808	634 -840	634 -873	634 -905
263	633 -758	633 -774	633 -807	633 -839	633 -871	633 -903
264	631 -757	631 -773	631 -805	631 -837	631 -869	631 -901
265	630 -755	630 -772	630 -803	630 -835	630 -867	630 -899
266	629 -754	629 -770	629 -802	629 -834	629 -866	629 -897
267	627 -753	627 -769	627 -800	627 -832	627 -864	627 -896
268	626 -751	626 -767	626 -799	626 -831	626 -862	626 -894
269	625 -750	625 -766	625 -797	625 -829	625 -860	625 -892
270	623 -749	623 -765	623 -796	623 -827	623 -859	623 -890
271	622 -748	622 -763	622 -795	622 -826	622 -857	622 -888
272	621 -746	621 -762	621 -793	621 -824	621 -855	621 -886
273	620 -745	620 -761	620 -792	620 -823	620 -854	620 -885
274	618 -744	618 -759	618 -790	618 -821	618 -852	618 -883
275	617 -742	617 -758	617 -789	617 -820	617 -850	617 -881
276	616 -741	616 -757	616 -787	616 -818	616 -849	616 -879
277	615 -740	615 -755	615 -786	615 -817	615 -847	615 -878
278	614 -739	614 -754	614 -785	614 -815	614 -846	614 -876
279	612 -738	612 -753	612 -783	612 -814	612 -844	612 -874
280	611 -736	611 -752	611 -782	611 -812	611 -842	611 -873
281	610 -735	610 -750	610 -780	610 -811	610 -841	610 -871
282	609 -734	609 -749	609 -779	609 -809	609 -839	609 -869
283	608 -733	608 -748	608 -778	608 -808	608 -838	608 -867
284	607 -732	607 -747	607 -776	607 -806	607 -836	607 -866
285	605 -730	605 -745	605 -775	605 -805	605 -835	605 -864
286	604 -729	604 -744	604 -774	604 -803	604 -833	604 -863
287	603 -728	603 -743	603 -773	603 -802	603 -832	603 -861
288	602 -727	602 -742	602 -771	602 -801	602 -830	602 -859
289	601 -726	601 -741	601 -770	601 -799	601 -829	601 -858
290	600 -725	600 -739	600 -769	600 -798	600 -827	600 -856
291	599 -724	599 -738	599 -767	599 -797	599 -826	599 -855
292	598 -723	598 -737	598 -766	598 -795	598 -824	598 -853
293	596 -721	596 -736	596 -765	596 -794	596 -823	596 -852
294	595 -720	595 -735	595 -764	595 -792	595 -821	595 -850
295	594 -719	594 -734	594 -762	594 -791	594 -820	594 -848
296	593 -718	593 -733	593 -761	593 -790	593 -818	593 -847
297	592 -717	592 -731	592 -760	592 -789	592 -817	592 -845
298	591 -716	591 -730	591 -759	591 -787	591 -816	591 -844
299	590 -715	590 -729	590 -758	590 -786	590 -814	590 -842
300	589 -714	589 -728	589 -756	589 -785	589 -813	589 -841

Empty mass C.G. range – tables in lbs. / in.

Empty mass (lbs)	Empty mass C.G. Range (inches) at **Maximum Cockpit Load of 242 lbs** and for a **Minimum Cockpit Load of**:				
	154 lbs	165 lbs	176 lbs	187 lbs	198 lbs
540	25.906 -25984	25.906 -26.693	25.906 -27.402	25.906 -28.110	25.906 -28.819
542	25.866 -25.945	25.866 -26.654	25.866 -27.362	25.866 -28.071	25.866 -28.740
545	25.787 -25.906	25.787 -26.614	25.787 -27.323	25.787 -27.992	25.787 -28.701
547	25.748 -25.866	25.748 -26.575	25.748 -27.283	25.748 -27.953	25.748 -28.661
549	25.669 -25.827	25.669 -26.535	25.669 -27.205	25.669 -27.913	25.669 -28.583
551	25.630 -25.787	25.630 -26.496	25.630 -27.165	25.630 -27.874	25.630 -28.543
553	25.551 -25.748	25.551 -26.457	25.551 -27.126	25.551 -27.795	25.551 -28.504
556	25.512 -25.709	25.512 -26.417	25.512 -27.087	25.512 -27.756	25.512 -28.465
558	25.472 -25.669	25.472 -26.339	25.472 -27.047	25.472 -27.717	25.472 -28.386
560	25.394 -25.630	25.394 -26.299	25.394 -27.008	25.394 -27.677	25.394 -28.346
562	25.354 -25.591	25.354 -26.260	25.354 -26.969	25.354 -27.638	25.354 -28.307
564	25.276 -25.551	25.276 -26.220	25.276 -26.890	25.276 -27.559	25.276 -28.228
567	25.236 -25.512	25.236 -26.181	25.236 -26.850	25.236 -27.520	25.236 -28.189
569	25.157 -25.472	25.157 -26.142	25.157 -26.811	25.157 -27.480	25.157 -28.150
571	25.118 -25.433	25.118 -26.102	25.118 -26.772	25.118 -27.441	25.118 -28.110
573	25.079 -25.394	25.079 -26.063	25.079 -26.732	25.079 -27.402	25.079 -28.071
575	25.000 -25.354	25.000 -26.024	25.000 -26.693	25.000 -27.362	25.000 -27.992
578	24.961 -25.315	24.961 -25.984	24.961 -26.654	24.961 -27.323	24.961 -27.953
580	24.921 -25.276	24.921 -25.945	24.921 -26.614	24.921 -27.244	24.921 -27.913
582	24.843 -25.276	24.843 -25.906	24.843 -26.575	24.843 -27.205	24.843 -27.874
584	24.803 -25.236	24.803 -25.866	24.803 -26.535	24.803 -27.165	24.803 -27.835
586	24.764 -25.197	24.764 -25.827	24.764 -26.496	24.764 -27.126	24.764 -27.795
589	24.685 -25.157	24.685 -25.787	24.685 -26.457	24.685 -27.087	24.685 -27.717
591	24.646 -25.118	24.646 -25.748	24.646 -26.417	24.646 -27.047	24.646 -27.677
593	24.606 -25.079	24.606 -25.709	24.606 -26.378	24.606 -27.008	24.606 -27.638
595	24.528 -25.039	24.528 -25.709	24.528 -26.339	24.528 -26.969	24.528 -27.598
597	24.488 -25.000	24.488 -25.669	24.488 -26.299	24.488 -26.929	24.488 -27.559
600	24.449 -24.961	24.449 -25.630	24.449 -26.260	24.449 -26.890	24.449 -27.520
602	24.409 -24.961	24.409 -25.591	24.409 -26.220	24.409 -26.850	24.409 -27.480
604	24.331 -24.921	24.331 -25.551	24.331 -26.181	24.331 -26.811	24.331 -27.441
606	24.291 -24.882	24.291 -25.512	24.291 -26.142	24.291 -26.772	24.291 -27.402
608	24.252 -24.843	24.252 -25.472	24.252 -26.102	24.252 -26.732	24.252 -27.323
611	24.213 -24.803	24.213 -25.433	24.213 -26.063	24.213 -26.693	24.213 -27.283
613	24.173 -24.764	24.173 -25.394	24.173 -26.024	24.173 -26.654	24.173 -27.244
615	24.094 -24.764	24.094 -25.354	24.094 -25.984	24.094 -26.614	24.094 -27.205
617	24.055 -24.724	24.055 -25.315	24.055 -25.945	24.055 -26.575	24.055 -27.165
619	24.016 -24.685	24.016 -25.315	24.016 -25.906	24.016 -26.535	24.016 -27.126
622	23.976 -24.646	23.976 -25.276	23.976 -25.866	23.976 -26.496	23.976 -27.087
624	23.937 -24.606	23.937 -25.236	23.937 -25.827	23.937 -26.457	23.937 -27.047
626	23.898 -24.606	23.898 -25.197	23.898 -25.787	23.898 -26.417	23.898 -27.008
628	23.819 -24.567	23.819 -25.157	23.819 -25.787	23.819 -26.378	23.819 -26.969
631	23.780 -24.528	23.780 -25.118	23.780 -25.748	23.780 -26.339	23.780 -26.929
633	23.740 -24.488	23.740 -25.118	23.740 -25.709	23.740 -26.299	23.740 -26.890
635	23.701 -24.449	23.701 -25.079	23.701 -25.669	23.701 -26.260	23.701 -26.850
637	23.661 -24.449	23.661 -25.039	23.661 -25.630	23.661 -26.220	23.661 -26.811
639	23.622 -24.409	23.622 -25.000	23.622 -25.591	23.622 -26.181	23.622 -26.772
642	23.583 -24.370	23.583 -24.961	23.583 -25.551	23.583 -26.142	23.583 -26.732
644	23.543 -24.331	23.543 -24.921	23.543 -25.512	23.543 -26.102	23.543 -26.693
646	23.465 -24.331	23.465 -24.921	23.465 .-25.512	23.465 -26.102	23.465 -26.654
648	23.425 -24.291	23.425 -24.882	23.425 -25.472	23.425 -26.063	23.425 -26.614
650	23.386 -24.252	23.386 -24.843	23.386 -25.433	23.386 -26.024	23.386 -26.575
653	23.346 -24.213	23.346 -24.803	23.346 -25.394	23.346 -25.984	23.346 -26.575
655	23.307 -24.213	23.307 -24.803	23.307 -25.354	23.307 -25.945	23.307 -26.535
657	23.268 -24.173	23.268 -24.764	23.268 -25.315	23.268 -25.906	23.268 -26.496
659	23.228 -24.134	23.228 -24.724	23.228 -25.315	23.228 -25.866	23.228 -26.457
661	23.189 -24.134	23.189 -24.685	23.189 -25.276	23.189 -25.827	23.189 -26.417

Empty mass C.G. range – tables in lbs. / in.

Empty mass (lbs)	Empty mass C.G. Range (inches) at **Maximum Cockpit Load of 242 lbs** and for a **Minimum Cockpit Load of**:				
	209 lbs	220 lbs	231 lbs	242 lbs	265 lbs
540	25.906 -29.488	25.906 -30.197	25.906 -30.866	25.906 -31.575	25.906 -32.913
542	25.866 -29.449	25.866 -30.118	25.866 -30.827	25.866 -31.496	25.866 -32.874
545	25.787 -29.409	25.787 -30.079	25.787 -30.748	25.787 -31.457	25.787 -32.795
547	25.748 -29.331	25.748 -30.039	25.748 -30.709	25.748 -31.378	25.748 -32.717
549	25.669 -29.291	25.669 -29.961	25.669 -30.630	25.669 -31.299	25.669 -32.638
551	25.630 -29.213	25.630 -29.921	25.630 -30.591	25.630 -31.260	25.630 -32.598
553	25.551 -29.173	25.551 -29.843	25.551 -30.512	25.551 -31.181	25.551 -32.520
556	25.512 -29.094	25.512 -29.803	25.512 -30.472	25.512 -31.142	25.512 -32.441
558	25.472 -29.055	25.472 -29.724	25.472 -30.394	25.472 -31.063	25.472 -32.402
560	25.394 -29.016	25.394 -29.685	25.394 -30.354	25.394 -31.024	25.394 -32.323
562	25.354 -28.976	25.354 -29.646	25.354 -30.276	25.354 -30.945	25.354 -32.244
564	25.276 -28.898	25.276 -29.567	25.276 -30.236	25.276 -30.906	25.276 -32.205
567	25.236 -28.858	25.236 -29.528	25.236 -30.157	25.236 -30.827	25.236 -32.126
569	25.157 -28.819	25.157 -29.449	25.157 -30.118	25.157 -30.787	25.157 -32.047
571	25.118 -28.740	25.118 -29.409	25.118 -30.079	25.118 -30.709	25.118 -32.008
573	25.079 -28.701	25.079 -29.370	25.079 -30.000	25.079 -30.669	25.079 -31.929
575	25.000 -28.661	25.000 -29.291	25.000 -29.961	25.000 -30.591	25.000 -31.890
578	24.961 -28.622	24.961 -29.252	24.961 -29.882	24.961 -30.551	24.961 -31.811
580	24.921 -28.543	24.921 -29.213	24.921 -29.843	24.921 -30.472	24.921 -31.772
582	24.843 -28.504	24.843 -29.173	24.843 -29.803	24.843 -30.433	24.843 -31.693
584	24.803 -28.465	24.803 -29.094	24.803 -29.724	24.803 -30.394	24.803 -31.614
586	24.764 -28.425	24.764 -29.055	24.764 -29.685	24.764 -30.315	24.764 -31.575
589	24.685 -28.386	24.685 -29.016	24.685 -29.646	24.685 -30.276	24.685 -31.496
591	24.646 -28.307	24.646 -28.937	24.646 -29.567	24.646 -30.197	24.646 -31.457
593	24.606 -28.268	24.606 -28.898	24.606 -29.528	24.606 -30.157	24.606 -31.378
595	24.528 -28.228	24.528 -28.858	24.528 -29.488	24.528 -30.118	24.528 -31.339
597	24.488 -28.189	24.488 -28.819	24.488 -29.449	24.488 -30.039	24.488 -31.299
600	24.449 -28.150	24.449 -28.780	24.449 -29.370	24.449 -30.000	24.449 -31.220
602	24.409 -28.110	24.409 -28.701	24.409 -29.331	24.409 -29.961	24.409 -31.181
604	24.331 -28.031	24.331 -28.661	24.331 -29.291	24.331 -29.882	24.331 -31.102
606	24.291 -27.992	24.291 -28.622	24.291 -29.213	24.291 -29.843	24.291 -31.063
608	24.252 -27.953	24.252 -28.583	24.252 -29.173	24.252 -29.803	24.252 -30.984
611	24.213 -27.913	24.213 -28.543	24.213 -29.134	24.213 -29.724	24.213 -30.945
613	24.173 -27.874	24.173 -28.465	24.173 -29.094	24.173 -29.685	24.173 -30.906
615	24.094 -27.835	24.094 -28.425	24.094 -29.055	24.094 -29.646	24.094 -30.827
617	24.055 -27.795	24.055 -28.386	24.055 -28.976	24.055 -29.606	24.055 -30.787
619	24.016 -27.756	24.016 -28.346	24.016 -28.937	24.016 -29.528	24.016 -30.709
622	23.976 -27.717	23.976 -28.307	23.976 -28.898	23.976 -29.488	23.976 -30.669
624	23.937 -27.638	23.937 -28.268	23.937 -28.858	23.937 -29.449	23.937 -30.630
626	23.898 -27.598	23.898 -28.228	23.898 -28.819	23.898 -29.409	23.898 -30.551
628	23.819 -27.559	23.819 -28.150	23.819 -28.740	23.819 -29.331	23.819 -30.512
631	23.780 -27.520	23.780 -28.110	23.780 -28.701	23.780 -29.291	23.780 -30.472
633	23.740 -27.480	23.740 -28.071	23.740 -28.661	23.740 -29.252	23.740 -30.433
635	23.701 -27.441	23.701 -28.031	23.701 -28.622	23.701 -29.213	23.701 -30.354
637	23.661 -27.402	23.661 -27.992	23.661 -28.583	23.661 -29.173	23.661 -30.315
639	23.622 -27.362	23.622 -27.953	23.622 -28.543	23.622 -29.094	23.622 -30.276
642	23.583 -27.323	23.583 -27.913	23.583 -28.504	23.583 -29.055	23.583 -30.197
644	23.543 -27.283	23.543 -27.874	23.543 -28.465	23.543 -29.016	23.543 -30.157
646	23.465 -27.244	23.465 -27.835	23.465 -28.386	23.465 -28.976	23.465 -30.118
648	23.425 -27.205	23.425 -27.795	23.425 -28.346	23.425 -28.937	23.425 -30.079
650	23.386 -27.165	23.386 -27.756	23.386 -28.307	23.386 -28.898	23.386 -30.000
653	23.346 -27.126	23.346 -27.717	23.346 -28.268	23.346 -28.858	23.346 -29.961
655	23.307 -27.087	23.307 -27.677	23.307 -28.228	23.307 -28.780	23.307 -29.921
657	23.268 -27.047	23.268 -27.638	23.268 -28.189	23.268 -28.740	23.268 -29.882
659	23.228 -27.008	23.228 -27.598	23.228 -28.150	23.228 -28.701	23.228 -29.843
661	23.189 -26.969	23.189 -27.559	23.189 -28.110	23.189 -28.661	23.189 -29.764

Empty mass C.G. range – tables in lbs. / in.

Empty mass (lbs)	Empty mass C.G. Range (inches) at **Maximum Cockpit Load of 242 lbs** and for a **Minimum Cockpit Load of**:		
	287 lbs	309 lbs	331 lbs
540	25.906 -34.291	25.906 -35.669	25.906 -37.008
542	25.866 -34.213	25.866 -35.591	25.866 -36.929
545	25.787 -34.134	25.787 -35.512	25.787 -36.850
547	25.748 -34.055	25.748 -35.394	25.748 -36.732
549	25.669 -33.976	25.669 -35.315	25.669 -36.654
551	25.630 -33.937	25.630 -35.236	25.630 -36.575
553	25.551 -33.858	25.551 -35.197	25.551 -36.496
556	25.512 -33.780	25.512 -35.118	25.512 -36.417
558	25.472 -33.701	25.472 -35.039	25.472 -36.339
560	25.394 -33.622	25.394 -34.961	25.394 -36.260
562	25.354 -33.583	25.354 -34.882	25.354 -36.181
564	25.276 -33.504	25.276 -34.803	25.276 -36.102
567	25.236 -33.425	25.236 -34.724	25.236 -36.024
569	25.157 -33.346	25.157 -34.646	25.157 -35.945
571	25.118 -33.307	25.118 -34.567	25.118 -35.866
573	25.079 -33.228	25.079 -34.488	25.079 -35.787
575	25.000 -33.150	25.000 -34.449	25.000 -35.709
578	24.961 -33.071	24.961 -34.370	24.961 -35.630
580	24.921 -33.031	24.921 -34.291	24.921 -35.551
582	24.843 -32.953	24.843 -34.213	24.843 -35.472
584	24.803 -32.874	24.803 -34.134	24.803 -35.394
586	24.764 -32.835	24.764 -34.094	24.764 -35.315
589	24.685 -32.756	24.685 -34.016	24.685 -35.276
591	24.646 -32.717	24.646 -33.937	24.646 -35.197
593	24.606 -32.638	24.606 -33.858	24.606 -35.118
595	24.528 -32.559	24.528 -33.819	24.528 -35.039
597	24.488 -32.520	24.488 -33.740	24.488 -34.961
600	24.449 -32.441	24.449 -33.661	24.449 -34.882
602	24.409 -32.402	24.409 -33.622	24.409 -34.843
604	24.331 -32.323	24.331 -33.543	24.331 -34.764
606	24.291 -32.283	24.291 -33.465	24.291 -34.685
608	24.252 -32.205	24.252 -33.425	24.252 -34.606
611	24.213 -32.165	24.213 -33.346	24.213 -34.567
613	24.173 -32.087	24.173 -33.307	24.173 -34.488
615	24.094 -32.047	24.094 -33.228	24.094 -34.409
617	24.055 -31.969	24.055 -33.150	24.055 -34.370
619	24.016 -31.929	24.016 -33.110	24.016 -34.291
622	23.976 -31.850	23.976 -33.031	23.976 -34.213
624	23.937 -31.811	23.937 -32.992	23.937 -34.134
626	23.898 -31.732	23.898 -32.913	23.898 -34.094
628	23.819 -31.693	23.819 -32.874	23.819 -34.016
631	23.780 -31.614	23.780 -32.795	23.780 -33.976
633	23.740 -31.575	23.740 -32.756	23.740 -33.898
635	23.701 -31.535	23.701 -32.677	23.701 -33.819
637	23.661 -31.457	23.661 -32.638	23.661 -33.780
639	23.622 -31.417	23.622 -32.559	23.622 -33.701
642	23.583 -31.378	23.583 -32.520	23.583 -33.661
644	23.543 -31.299	23.543 -32.441	23.543 -33.583
646	23.465 -31.260	23.465 -32.402	23.465 -33.543
648	23.425 -31.181	23.425 -32.323	23.425 -33.465
650	23.386 -31.142	23.386 -32.283	23.386 -33.386
653	23.346 -31.102	23.346 -32.205	23.346 -33.346
655	23.307 -31.063	23.307 -32.165	23.307 -33.268
657	23.268 -30.984	23.268 -32.126	23.268 -33.228
659	23.228 -30.945	23.228 -32.047	23.228 -33.150
661	23.189 -30.906	23.189 -32.008	23.189 -33.110

Remarks for empty mass C.G. range
Calculated C.G. position for weighed empty mass must be within limit values. Related cockpit loads are permissible Minimum Cockpit Load and Maximum Cockpit Load.

Some of the given values for Minimum Cockpit Load exceed permissible Maximum Cockpit Load considerably. These values are needed to determine the data for the use of the vertical tail fin ballast tank. In addition they are a distinct warning, that its use is limited.

3 Inspections

3.1 Ordinary inspections

Daily Inspection and Pre-flight Check see Flight Manual section 4.3.
Post-flight Check see Flight Manual section 4.6.

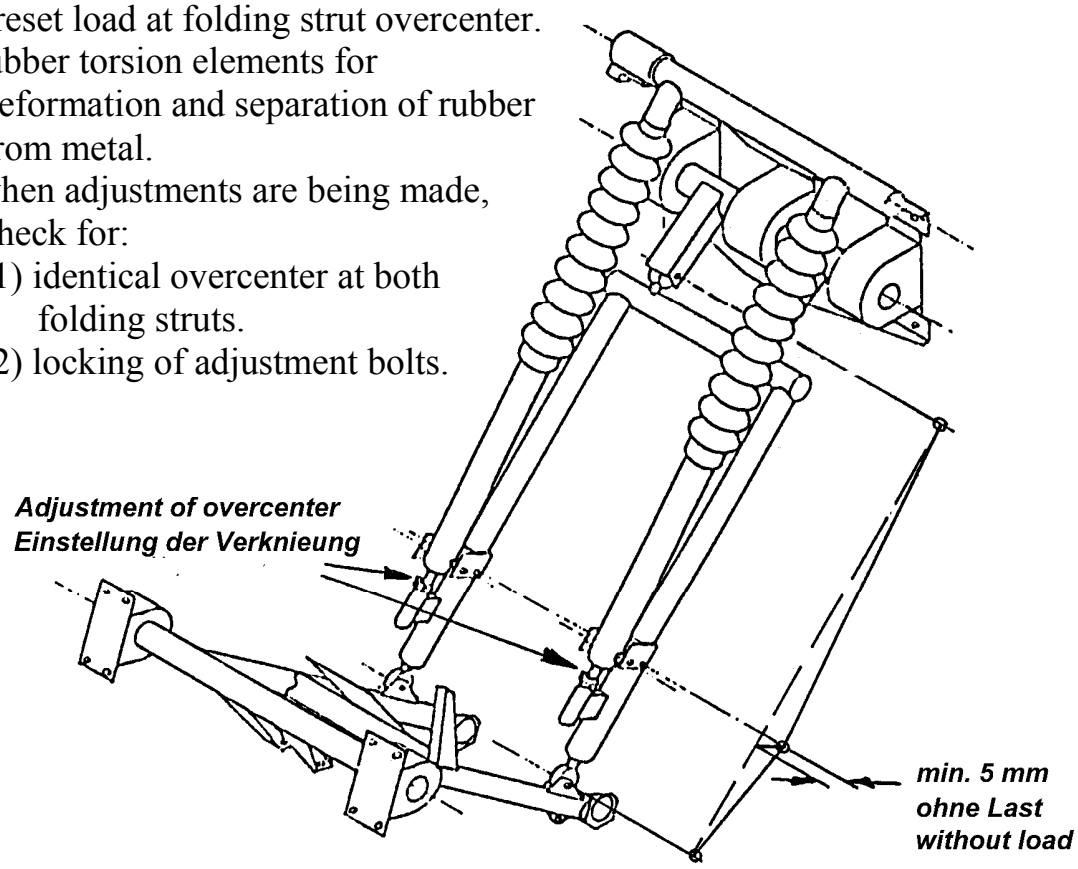
Annual Inspection

1. Check wing shell, **especially in the spar region**, for:
   (a) Cracks, scratches, pressure marks (Shell and spar caps are made from carbon fibre material. This is sensitive to impact and compression, damage is difficult to detect.)
      (1) If damage is suspected, tap the suspected surface with a pencil to find any delamination.
   (b) **Only LS8-a, LS8-b, LS8-18:** If moisture is suspected in the structure near the integral tanks (recognisable for instance by an irregular, mirror surface finish).
      (1) Inspect structure through water discharge openings using an endoscope and store units in dry environment according to instructions given in Flight Manual section 8.5. Irregularities should slowly disappear.
      > If necessary, contact DG Flugzeugbau!
2. The aileron sandwich is pressure sensitive.
   If pressure marks are present, then the sailplane may be no longer airworthy. Because of possible resultant structural problems and flutter hazard, contact DG Flugzeugbau for damage classification and repair!
3. Fuselage automatic aileron connectors are equipped with deflectors to avoid incorrect rigging:
   Check if rigging of the second wing is impossible with intentionally incorrect aileron deflection, namely in neutral position or deflected upward ?
4. Lubricate various parts according to lubrication schedule, see section 3.4.
5. Protect gelcoat with car polish
   (the wax film protects the gelcoat against embrittlement and cracking due to ultra violet light)
   (a) See also Flight Manual section 8.5, Cleaning and Care.
   (b) If you use a polishing machine, be careful not to damage:
      (1) registration signs
      (2) anti-collision colour markings
      (3) gap seals

6. Check anti-friction tape at elevator leading edge under plastic strip seals:
   (a) Damaged anti-friction will yield damage to gelcoat at control surface very quickly.
   (b) for installation of seals see section 4.2.

7. Check air brakes:
   (a) friction damper at outer side of air brake box for proper operation of damper rods and friction pads free from grease.
   (b) Check bearings of air brake levers for corrosion and possible jamming/blocking under load:
   - pull simultaneously with about 25 kg <55 lbs> force at upper end of each lever in flight direction and retract the airbrake(do not counterhold at cockpit lever!).
   - if needed, repair bearing according to separately available repair instruction.

8. Check landing gear for:
   (a) overcenter of folding strut: (1) adjustable overcenter should be 5 mm <0.2 in>, gear without load.
   (2) value increases with load.
   (b) preset load at folding strut overcenter.
   (c) rubber torsion elements for deformation and separation of rubber from metal.
   (d) when adjustments are being made, check for:
   (1) identical overcenter at both folding struts.
   (2) locking of adjustment bolts.



9. Perform Annual Inspection according to checklist in Appendix,
   The annual inspection checklist contains items (aileron lateral bearing play, aileron vent holes), which may only be checked after removing seals. Unless changes are suspected (for instance lateral control surface gaps differing from design values, see also section 4.1.1 installation of ailerons item 9 and 10), it is illogical to remove (destroy) seals just for inspection purpose. Existence of washer at fixed bearings can be checked after lifting seals lids cautiously.

10. Inspection of the water ballast system
    LS8: Inspect water ballast bags and vertical tail fin tank for function and tightness. Wire meshing at tail fin tank upper end ventilation orifice and in filling funnel are mandatory to establish proper function of vertical tail fin valve. Check wing water system for proper filling. Leaking components must be removed and repaired. Check existence of tail tank filling hose **(Minimum Equipment)**!
    Tail fin tank discharge time for tank filled with 5.2 Liter: maximum 90 seconds.

    LS8-a, LS8-b, LS8-18:
    Check the following items of the water ballast system:
    (a) Wing and vertical tail fin water tanks for external tightness.
    (b) Wing tanks and 12 L / 7,5 L tail fin tank for leaks into structure (irregular surface mirror finish visible).
    (c) Ventilation and drain tubes for free passage see section 4.4.2 for LS8-a, LS8-b, LS8-18**.**
    (d) Existence of tail fin tank filling markings under translucent rudder seals.
    (e) Wire meshing in filling funnel is mandatory to establish proper function of vertical tail fin valve. Tail tank leaks must be repaired (the slide-in tank may be removed for repair). Check existence of tail tank filling hose adapter **(Minimum Equipment)**!
    (f) Tail fin tank discharge time for tank filled with 7.5 Liter: maximum 90 seconds.

11. Outside air temperature gauge: Check for correct indication e-g- by comparing with another thermometer.

12. Check **canopy locking and emergency release function**:
    Measure force required to open canopy emergency release according to following steps (If this measurement or an operational check is performed without a helper, the spring at the rear end temporary hinge bolt becomes deformed and must be exchanged):
    (a) "pilot" in seat with spring gauge.
    (b) both canopy locking levers opened.
    (c) Helper at front canopy end to avoid lifting of canopy by gas spring.
    (d) Force required to open right side emergency release max. 15 kg <33 lbs>.
    (e) After force measurement, the pilot pushes the rear end of the canopy up to disengage the LS-latch (Röger hook) from the spring at the fuselage and lifts the canopy at the opening handles, the helper holds the front end on the opener. With canopy fully open, the helper pushes the connecting pin upward and engages canopy to opener by turning driving lug anti-clockwise.
    When emergency release force is too high, grease all moving parts, contact DG Flugzeugbau if necessary.

13. Check **function of LS-latch (Röger hook) for canopy emergency release**
    Measure force required to lift canopy rear edge free from spring:
    Reference value 8 to 15 kg <18 to 33 lbs>
    If force required is considerably lower, the spring must be exchanged to ensure proper functioning of canopy jettison.

14. Empty mass C.G. should be recalculated (see chapter 2):
    a. when equipment is **different** compared to valid equipment list, file new equipment list
    b. with equipment unaltered, **every four years**.

3.2 Extraordinary inspections after heavy landings

Extraordinary inspections should be performed depending on circumstances (rough landings, ground loops etc.)

a) landing gear functioning, attachment and drive,
b) landing gear box for damage, rubber torsion springing, elements for deformation
c) tail skid bonding or tail wheel attachment, function and tyre pressure.
d) wings. fuselage and tail unit for damage (cracks, buckling, compression).
e) tangential tubes across fuselage for straightness.
f) control system function, free movement and deflections.

3.3 Inspection procedure for increase of service time

1. **General**

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

2. **Dates**

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

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

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

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

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

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

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

3.4 Lubrication schedule

Location	Frequency	Lubricant
Main pins and matching bushes of (1) wing fuselage connection (2) elevator connection (2) winglet connection Wingside bearings of automatic aileron and air brake system connectors, which are inserted into fuselage couplings	Before each assembly	Water insoluble bearing grease or grease containing molybdenum, for instance: Molykote BR2 (Temperature range from -30° to130° C <-22° F to 266° F>)
Landing gear: all joints (also at forward rubber bearings)	Once a year	Oil Note: protect rubber parts against oil.
Bearings at control surfaces	After disassembly only	Molykote grease BR2 (-30° C to 130°C <-22° F to 266° F >) or Molykote grease 33 (-70° C to 180°C<-94° F to 356° F>)

Caution: Never grease longitudinal motion pushrod bearings. They will soon be destroyed due collection of foreign matter. These bearings are used in elevator system, aileron system, air brake system and landing gear drive.

Caution: The friction dampers inside the air brake boxes prevent oscillations during extension of air brakes. Therefore, friction pads should never be greased or oiled !

Tow Release: see Maintenance Instructions of manufacturer (TOST)

Multiple point buckle MS-17/B of FAG-12 safety harness: see Maintenance Instructions of manufacturer (Autoflug)

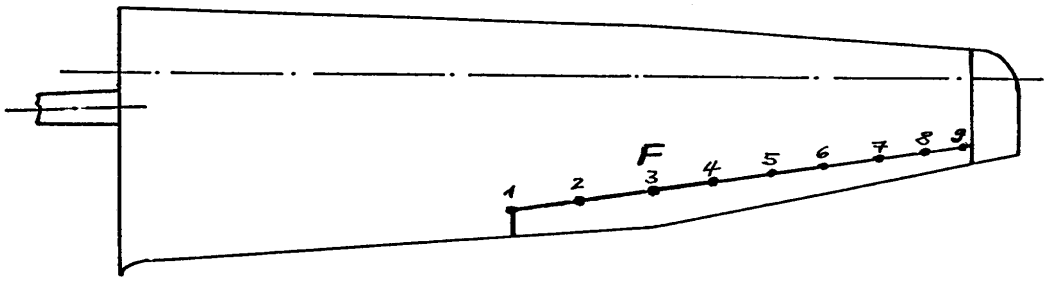
4 Working instructions

4.1 Removal and installation of control surfaces

4.1.1 Ailerons

Wing scheme with aileron bearings (15 m version shown)

F = laterally fixed bearing



Removal of ailerons

(1) Remove winglet or wing Tipp extension.

(2) **LS8:** remove lower side gap seal (convex plastic or metal strip) and inner seals tape (Teflon tape) completely.
LS8-a, LS8-b, LS8-18: remove inner seals tapes (Teflon tape) completely, upper and lower side.

(3) Lift bonded-on drive covers cautiously using knife.

(4) Disconnect drive rods from aileron (6 mm thread, nut M6 LN9348 or DIN985-8 zn, width over flats 10mm), remember sequence and position of washers, if applicable.

(5) Loosen nut (6 mm thread, M6 LN9348 or DIN985-8 zn, width over flats 10 mm) from bearing No. 3 (fixed bearing), remember sequence and position of washers.

(6) deflect ailerons fully downwards, then remove outer aileron, then inner aileron (**only LS8**) from bearing pins towards wingtip. Use two persons to avoid damage, low bending stiffness.

(7) Watch washers, if existent, at inner side of bearing pin of fixed bearing No. 3.

(8) **Only LS8-b, LS8-18:** 18 m wingtip aileron may be removed from tip towards fuselage after removing both inner seals tapes completely (Teflon tape). Inner tip “bearing” intentionally has no bushing pressed in !

Installation of ailerons

(1) **Only LS8-a, LS8-b, LS8-18:** Install inner seals tapes on wing according to instructions in section 4.2, fix free end on wing outside provisionally using tape.

(2) Grease bearings according to lubrication schedule, see section 3.4.

(3) Make sure that washers, if existent, are installed on the fixed bearing pin (bearing No. 3).

(4) match inner aileron (**only LS8**) and then outer aileron pins with bearings with aileron fully deflected downward,.

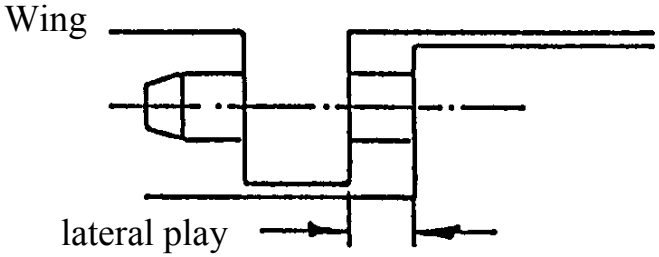
(5) Use 2 persons, do not use force !

(6) **only LS8:** align aileron connecting pins of outer into inner aileron.

(7) set up washers at bearing No. 3 as found during disassembly.

(8) Tighten nut (6 mm thread, M6 LN9348 or DIN985-8 zn, width over flats 1 0m m, maximum torque 6.4 Nm (0.64 mkg, 4.623 ft lbs)

(9) Check lateral bearing play: minimum of 3 mm <0.12 in>



(10) Check lateral aileron gaps:

15 m wing winglet fitted, aileron outer end	-minimum 2 mm <0.08 in>
aileron inner end	-minimum 1 mm <0.04 in>
Only LS8: Between both aileron parts	-minimum 3 mm <0.12in>
Only LS8-b and LS8-18: 18 m wing tip, aileron outer end	-minimum 3 mm <0.12 in>

(10) fix drive rods to aileron drive bracket using bolt (LN 9037), nut (6mm thread M6, LN9348 or DIN985-8 zn, width over flats 10 mm) and washers, maximum torque 6.4 Nm (0.64 mkg, 4.623 ft lbs).

(11) bond drive covers using polyester filler.

(13) **Only LS8-a, LS8-b, LS8-18:** install internal seals (38 mm <1.5 in> wide Teflon tape) at appropriate full deflection, see section 4.2 for details.

(14) **Only LS8:** Install lower side gap seal according to instructions in section 4.2

4.1.2 Elevator

Removal of elevator

(1) remove bearings and washers at elevator drive , remember sequence and position of washers, width over flats 10 mm.
(2) remove elevator halves towards centre
(3) watch washers, if existent, at inner side of both inner bearing pins.

Installation of elevator

(1) grease bearings according to lubrication schedule, see section 3.4.
(2) make sure that washers, if existent, are on inner side of fixed bearing pins.
(3) match elevator pins of halves with bearings, do not use force !
(4) with inner bearings just touching shoulders, check outer end lateral gaps for minimum 1 mm <0.04 in>.
(5) install both drive bearings with washers (0.1 mm <0.004 in> shim between both bearings), screw halves together (6mm thread M6, LN9348 or DIN985-8 zn, width over flats 10 mm), maximum torque 6.4 Nm (0.64 mkg, 4.623 ft in).
(6) do not brace elevator halves against inner bearings, maximum axial play 0.5 mm <0.02 in>.
(7) if need be, install new gap seals, see section 4.2.2.

4.1.3 Rudder

Removal of the rudder

(1) disconnect rudder cables.

Attention: Don't lose spacing casings.

Attention: Rudder cables may be drilled. If this is changed unintentionally, neutral positions of rudder and pedals do no longer match and must be realigned as detailed below.

(2) loosen nut at lower bearing (6mm thread, M6 LN9348 or DIN985-8 zn, width over flats 10mm) using a socket wrench, remember sequence and position of washers.

(3) lift rudder upward from bearings.

Installation of the rudder

(1) grease bearings according to lubrication schedule, see section 3.4.

(2) install new V-seals if necessary

(3) lower rudder into bearings, do not use force !

(4) check radial play of upper bearing: maximum permissible radial play 0.5 mm <0.02 in>. If necessary renew brass bushing. Make sure that non-concentric position of bearing keeps relative position to direction of flight. Bond bushing with e.g. Loctite 638.

(5) connect rudder cables provisionally, do not forget to insert spacing casings into thimbles.

(6) check rudder pedal alignment: with pedals in neutral position check if rudder is neutral.
If rudder is deflected to one side, twist **opposite** cable **counter-clockwise** (**maximum 5 turns**) until properly aligned.
Should more than 5 turns be necessary for alignment, exchange cables.

Caution: Never turn cables **clockwise** !

(7) place washers on cable connection bolts and tighten nuts M6 LN9348 or DIN985-8 zn, width over flats 10 mm, with maximum torque 6.4 Nm (0.64 mkg, 4.623 ft lbs).

(8) set up washers at lower bearing as found during disassembly (normally: recessed washer first, then large washer). Tighten nut (6 mm thread, LN9348 or DIN985-8 zn, width over flats 10 mm) with maximum torque 6.4 Nm, (0.64 mkg, 4.623 ft lbs). After assembly the rudder should have slight axial play, maximum axial play 1 mm (0.04 in).

(9) if necessary, restore gap seals (convex plastic strip), see section 4.2.3 for details.

4.2 Installation of control surface gap seals

4.2.1 Gap seals ailerons

Gap seals ailerons LS8

(1) Lay wing upside down on adequately padded supports at root rib and wingtip, outside of aileron. Always tighten plastic gap seal during bonding with 2 persons.

(2) Clean bonding area from adhesive residues; if bonding area is milled (no or almost no white gelcoat existent) prime with contact adhesive (Example: Pattex)..

(3) Deflect control surface fully downward, mark rear edge of seal on control surface with a soft pencil using a short length of seals material as template.

(4) Deflect control surface fully upward, place self-adhesive Teflon tape with its rear edge 2 mm <0.08 in> behind marking of seal's rear edge. Use double tape at wider bearing pin cutouts (Short piece under continuous seal.

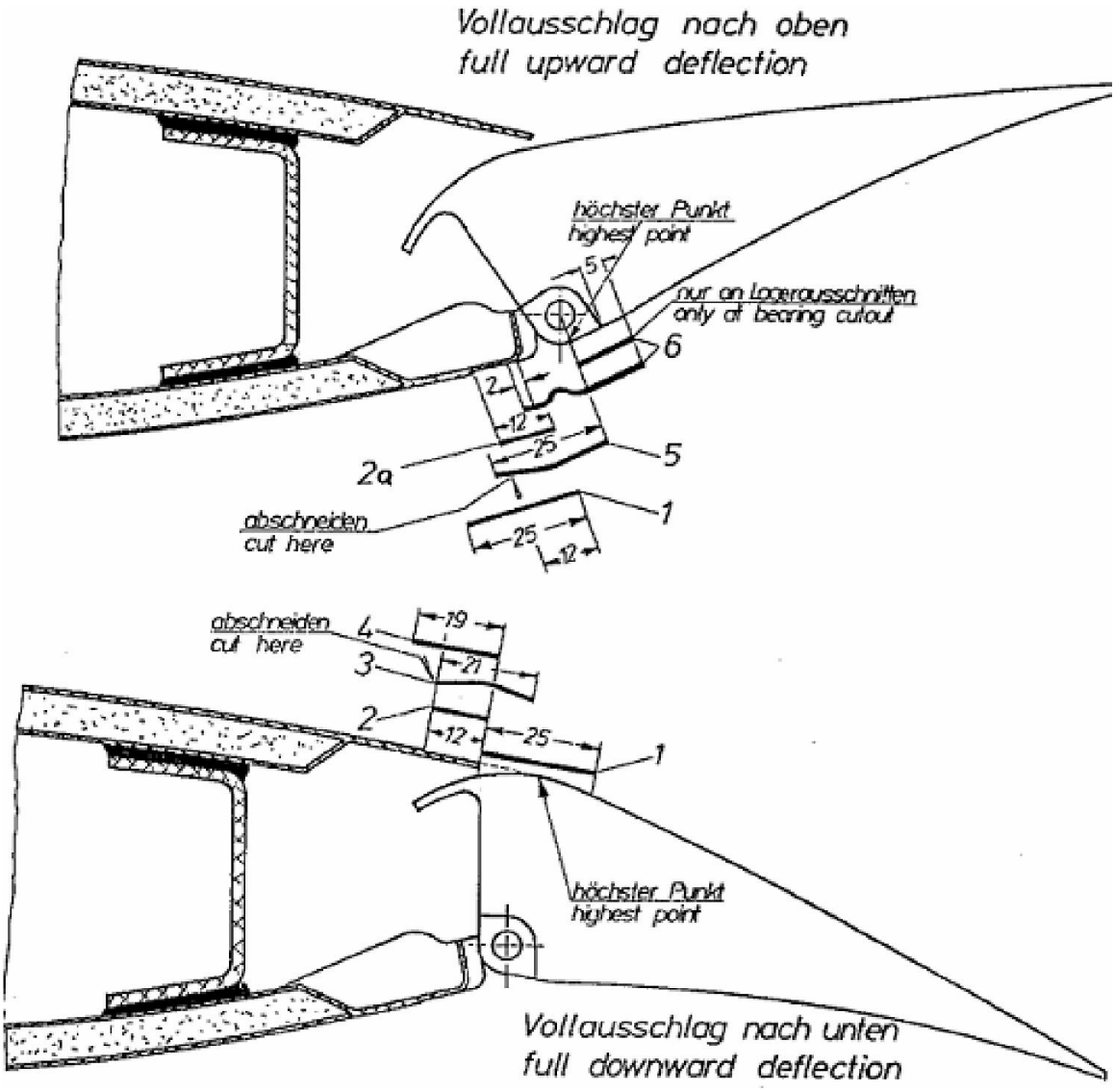
(5) Cut Teflon tape leading edge on wing using a sharp knife such, that bonding width on wing is 2 mm <0.08 in>. When Teflon tape bonding width on wing is wider, bonding width for convex plastic seal is insufficient because Teflon prevents proper bonding.

(6) Remove masking tape from convex plastic seal and position leading edge flush with wing side recess.

(7) Cover leading edge of convex plastic seal with tape against warping (Example: Tescal 4178 white). See also details and sketches on following pages.

Material:

No.	Designation	Amount
1	Tesafilm 4104 white 25 mm [0.75in]	16 m <52.5 ft>
2	Bonding film Tesafix 12 mm [0.59in]	8 m <25 ft>
2a	Tesaband 4976 0.4 dick schwarz 12 mm	8 m <25 ft>
3	Convex seals strip 0.25, form 1, 21 mm	8 m <25 ft>
4	Tesafilm 4104 white 19 mm [1.0in]	8 m <25 ft>
5	Convex seals strip 0.25, form 2, 25 mm	8 m <25 ft>
6	Teflon-glass tape 0.08*38 mm [1.5in]	8 m <25 ft>



Rear edges of strips 3 and 5 should end before or at highest point.

Gap seals ailerons LS8-a, LS8-b, LS8-18:

(1) Place wing vertically on padded supports with leading edge downward and secure at spar tongue or fork against falling down.

(2) Cut Teflon tape to ample aileron length and cover one edge with 4965 adhesive strip (9mm wide) without pretension to avoid warping.

(3) Clean bonding region on wing after aileron disassembly from adhesive residues and paint with primer (Pattex).

(4) After approximately half an hour of drying, place inner Teflon seals tapes to wing such, that about 2 mm (0.08 in) of the wing trailing edge are not covered. Remove masking from seals tape during bonding process.

(5) Place aileron into bearings provisionally, deflect fully and mark rear wing edge position on aileron using a pencil for both deflections.

(6) Bond adhesive strip to aileron such that its leading edge is at least 5 mm (0.197 in) in front of marking. Also at bearing cut-outs a minimum of 5 mm (0.197 in) must remain.

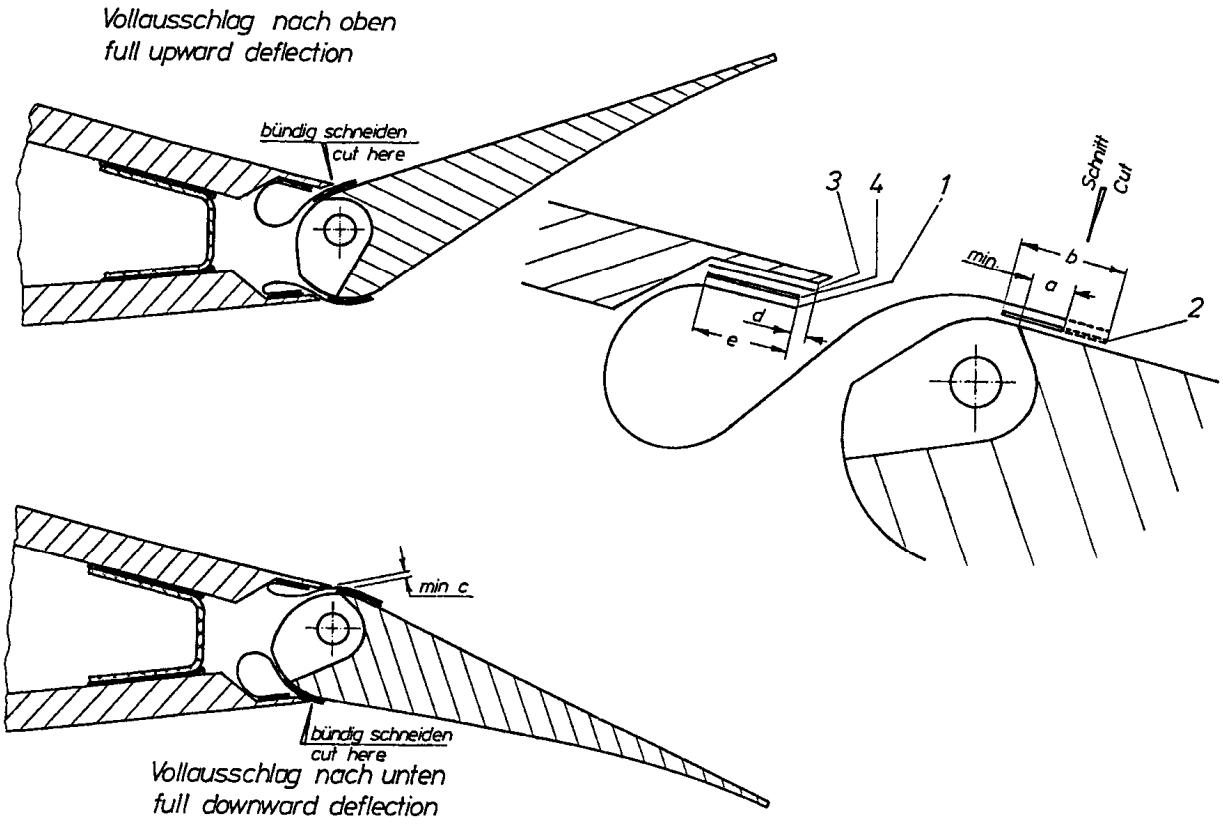
(7) Install aileron completely, see section 4.1. Remove masking tape from aileron bonding strip and press Teflon tape on without undue pulling or warp. Cut surplus Teflon tape along wing rear edge marking (or edge 5mm behind bearing cut-out), but avoid cutting into gelcoat.

Material:

No.	Designation	Amount required
1	Teflon-Glass tape 0.08*38	15.2 m <49.9 ft>
2	Bonding film Tesafix 4965 translucent 12 mm	15.2 m <49.9 ft>
3	Primer (Pattex)	
4	Bonding film Tesafix 4965 translucent 9 mm	15.2 m <49.9 ft>

Dimensions:

a = 5 mm <0.197 in>
b = 12 mm <0.472 in>
c = minimum 1 mm <0.039 in>
d = 2 mm <0.079 in>
e = 9 mm <0.354 in>



4.2.2 Gap seals elevator

(1) Apply 2 layers of Tesa film 4104.

(2) Bond plastic seals tape after removing masking tape to elevator upper side. Protect leading edge of seals tape with Tesa film 4104 against warping. See drawings

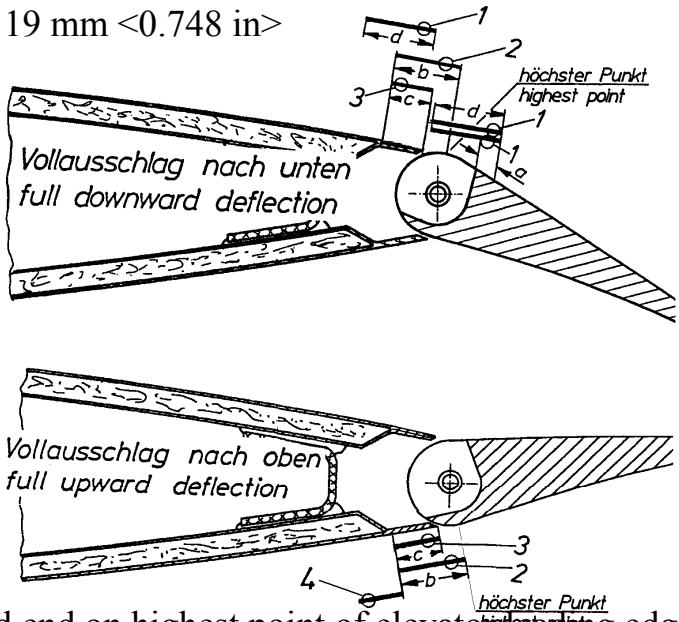
Always tighten plastic seals tape during bonding with 2 persons.

(3) Bond plastic seals tape after removing masking tape to elevator under side. Thereafter bond 3-D-Zigzag tape flush to leading edge of seals tape.

Material:

No.	Designation	Amount required
1	Tesa film 4104 white 19mm	7.0 m <23 ft>
2	Plastic seal 0.25 21 mm	4.6 m <15.1 ft>
3	Bonding film Tesafix 4965 translucent 12 mm	2.3 m <7.5 ft>
4	3-D Zigzag tape 0.9 mm, 90	2.3 m <7.5 ft>
	Plastic seal 0.25 Form 2, 30 mm, convex (for centre portion between elevator halves)	0.1 m <4 in>

Dimensions:a = 5 mm <0.197 in>
b = 21 mm <0.827 in>
c = 12 mm <0.472 in>
d = 19 mm <0.748 in>



Tape 2 rear edge should end on highest point of elevator leading edge.

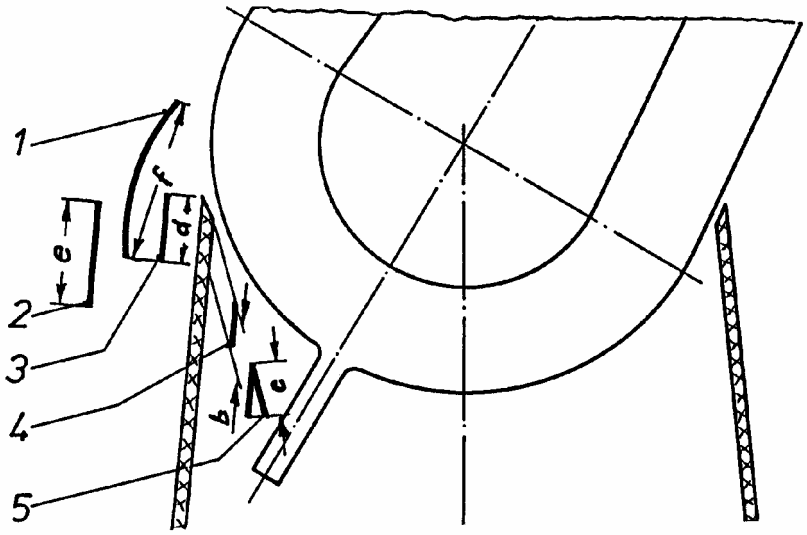
4.2.3 Gap seals rudder

Material:

No.	Designation	Amount required
1	Plastic seal 0.25 Form 2, 30 mm, convex	2.3 m <7.55 ft>
2	Tesa film 4104 white 19 mm	2.3 m <7.55 ft>
3	Bonding film Tesafix 4965 translucent 12 mm	2.3 m <7.55 ft>
4	Bonding film Tesafix 4965 translucent 9 mm (only if V-seals is not self adhesive)	2.3 m <7.55 ft>
5	V-Type seals	2.3 m<7.55 ft>

Dimensions [mm, <in>]

b = 9 <0.354>
c = 10 <0.394>
d = 12 <0.472>
e = 19 <0.748>
f = 30 <1.181>



Items 4 and 5may not be installed at LS8-b

4.3 Seat shell removal and installation

Seat shell removal

(1) **Only LS8-b:** Remove perhaps installed battery(s) from front seat end and remove battery cables from seat boxes*(LS8-b)*
(2) remove 6 bolts (6 mm thread) hexagon recess No. 5, watch for length and position of bolts, colour mark short ones !
(3) Disconnect backrest base from seat, remove backrest.
(4) Remove all countersunk screws each (Philips recess) at left side along air brake handle guide plate and at right side at landing gear handle guide plate.
(5) Remove ball-handle from pedal adjuster cable (5 mm thread, nut LN9348 or DIN985-8 zn, width over flats 8 mm). Use pliers at pressed-on end fitting to avoid cable twisting.
(6) Loosen control stick opening cover, place air brake lever into forward position.
(7) Swivel left side of seat upward. Direct left lap belt fixing at seat around longitudinal motion pushrod guide by pulling inward at belt. Take seat out to upper left.

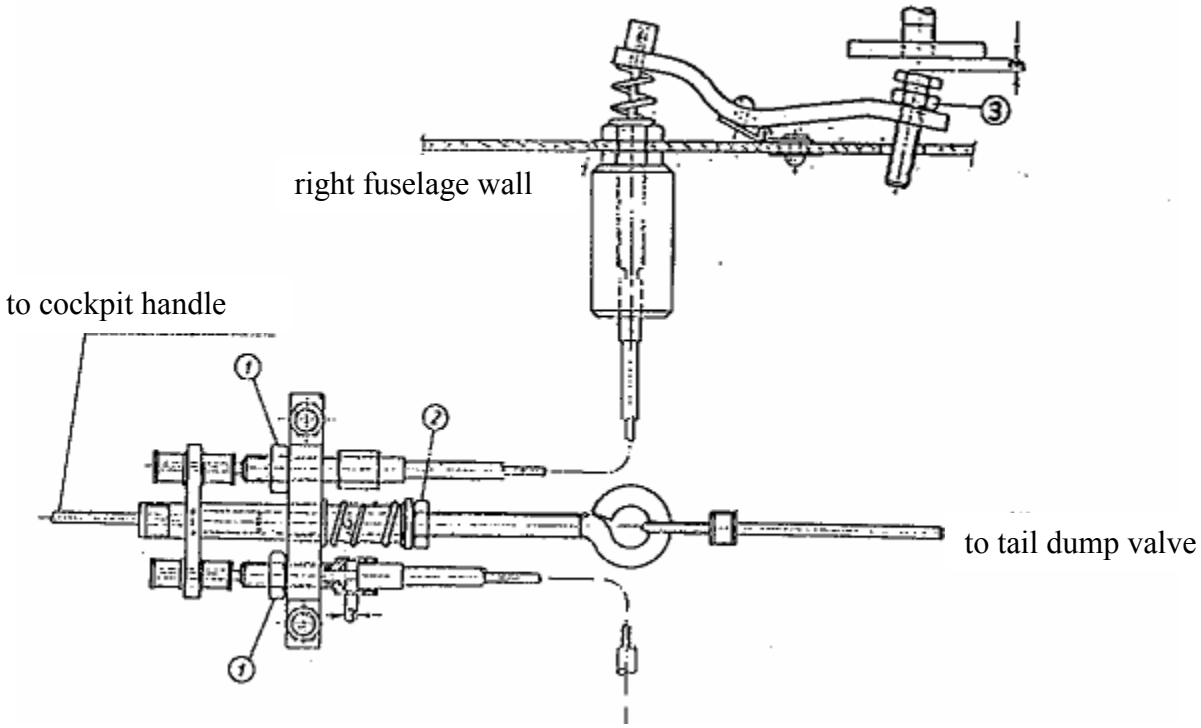
Seat shell installation

(1) Inspect under seat region for foreign matter, tools etc.
(2) Rest right seat side on support and direct control stick into cut-out.
(3) Direct pedal adjuster cable into guide, place air brake handle into forward position.
(4) **Only LS8-b:** Route and connect battery cables to batteries.
(5) When lowering seat, direct release handle around seat edge and watch especially for left lap belt fixing, this should never be forced over the seat support and elevator pushrod guide.
(5) If seat fixing bolts are different in length, the short one must be fitted behind trim indicator to avoid chafing at trim system or trim misfunction.
(6) Fix countersunk screws along left side air brake guide and right side gear handle guide.
(7) Fix airbrake handle guide plate (left hand side) and landing gear handle guide plate (right hand side).
(8) Insert remaining 8 mm thread bolts with hexagon recess No. 5, watch bolt length and positions as noted before.
(9) Screw ball- handle to pedal adjuster cable; use pliers to prevent rotation of cable end fitting.
(10) Check control system after installation for proper operation.

4.4 Adjustment of water ballast system

4.4.1 Adjustment of water ballast system LS8

(1) check cockpit operating toggle lever for overcenter in open position.
(2) check bowden cable end play >1< at fuselage to wing mechanism for nominal value of 3 mm <0.118 in>, when knurled nuts at drives inside baggage compartment are at clockwise stops.
(3) check vertical tail fin tank opening after filling some water: nominal value 5 to 7 mm <0.197 to 0.276 in> travel (behind forward position) measured at end of operating handle. If necessary, adjust at >2<.
(4) check play at >3< by pressing fuselage to wing mechanism until touching wing valve for nominal value 3 mm <0.118 in>. If necessary, adjust at fuselage rocking lever.
(5) do not forget to lock and colour-mark all nuts after adjusting.



4.4.2 Adjustment of water ballast system LS8-a, LS8-b, LS8-18

4.4.2.1 Adjustment of water ballast system LS8-a, LS8-b, LS8-18, instructions for all versions

Note: To determine which version water ballast system is installed in your LS8 please refer to the sketches in sections 1.9 up to 1.13.

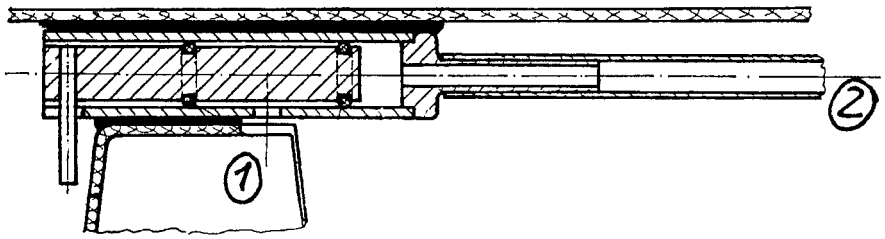
Sketch 1

Root rib drain valve

(1) - Opening for inner tank

(2) - Tube from outer tank:

LS8-a: may be closed in single cases after malfunction
LS8-b: with free passage
LS8-18: may be closed in some cases after malfunction



4.4.2.2 Adjustment of water ballast system LS8-a and LS8-18 with slide in tail fin tank

(1) Before adjusting wing system, check ventilation tubes No. 2 and 4 (see sketch section1) and draining tube No. 5 free from clogging.
   a) **Only LS8-a with winglet ventilation:** Cleaning of ventilation tubes 2 and 4 possible from the tip. check vent holes 9 according to sketches in section 1.13.
   b) **All variants with ventilation at the root rib:** Cleaning of ventilation tubes 2 and 4 possible from root rib after removing two plugs at root rib.
   c) Cleaning of tube 5 after removing drain valve at root rib (See sketch 1 in section 4.4.2.1).
   d) Reinstall the 2 plugs and the drain valve.

(2) For adjustment of wing system (see sketch 2), after disassembly of baggage compartment cover, remove tail fin tank drive >1< from right wing drive lever, (Lift ball joint from ball against preload of securing ring) and extend cable with nylon cord to avoid disappearing into fuselage.

(3) Check cockpit operating toggle lever for overcenter in open position.

(4) Adjusters at >2< and >3< see sketch 2 are used for adjustment of bowden cable synchronisation and simultaneous opening.

(5) Inspect opening moment of outer (LS8-a) resp. inner (LS8-18) wing valve: with root rib lever distance >b< = 5 mm <0.2 in> from edge, the valve starts opening. See sketch 2 at >b<.

(6) **Only LS8-a:** Inspect maximum opening of outer valve: with inner valve still closed, opening travel of outer valve should be between 11 and 15 mm <0.43 to 0.6 in>. sketch 2 at >c<. Possible adjustment at >5<.

(7) **Only LS8-18:** Inspect maximum opening of inner valve: with outer valve still closed, opening travel of inner valve should be between 10 and 13 mm <0.39 to 0.51 in>. sketch 2 at >c<. Possible adjustment at >5<.

(8) Both wings must be adjusted symmetrically.

(9) Play between fuselage and wing drive levers at >a< should be between 0 and maximum 2 mm <0 to
0.08 in>, measure from baggage compartment.

(10) After checking wing water ballast system adjustments, re-install vertical tail tank drive at right side drive lever in baggage compartment. Securing ring in ball joint coupling must snap over ball..

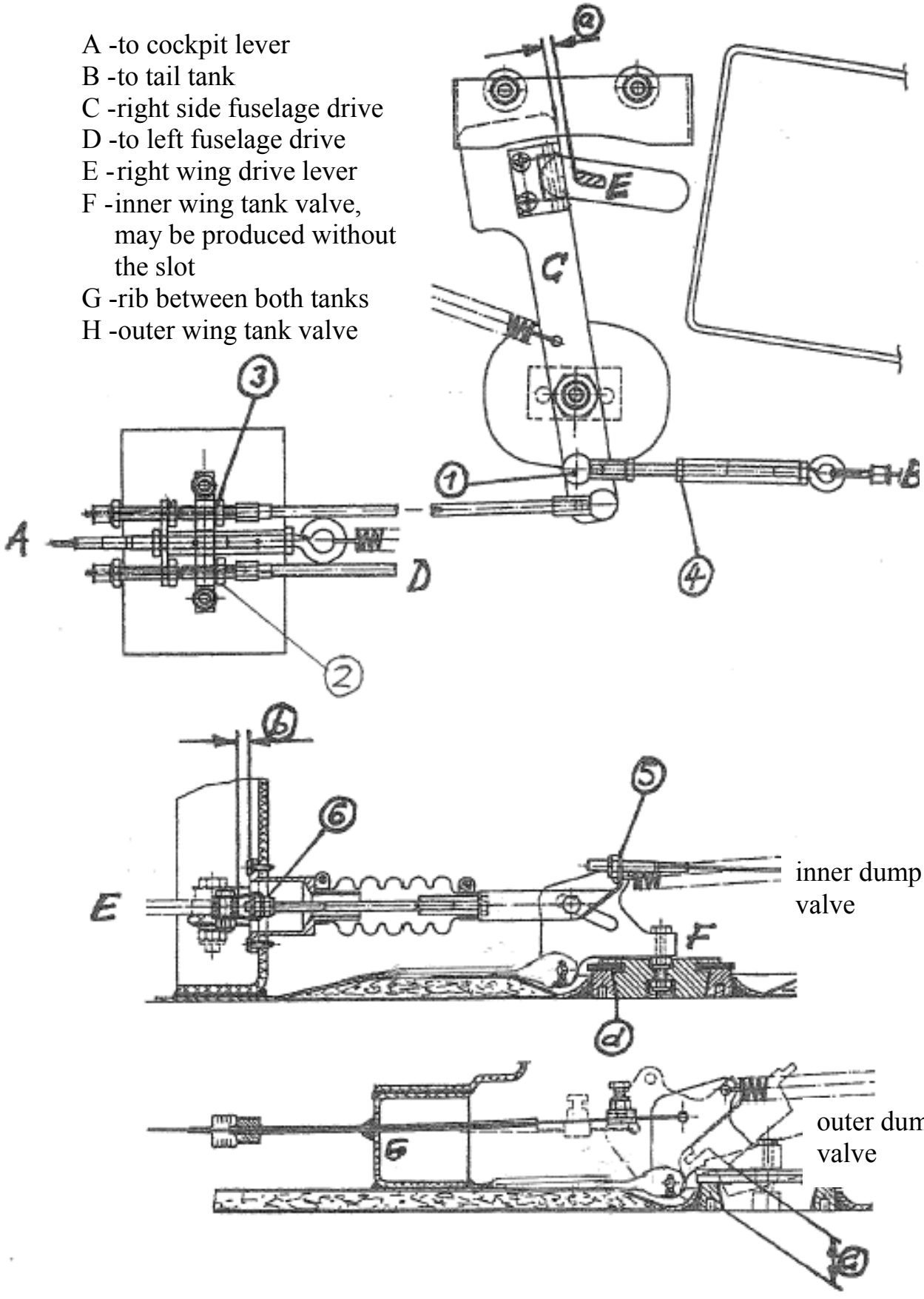
(11)Check vertical tail fin tank opening after filling some water: Opening simultaneously with or before inner wing tank.
Tail fin tank adjustment possible at >4< after wing system adjustment or inspection.

(12) Do not forget to lock and colour mark all nuts after adjustments.

.

Sketch 2
LS8-a und LS8-18 with slide in tail fin tank

A -to cockpit lever
B -to tail tank
C -right side fuselage drive
D -to left fuselage drive
E -right wing drive lever
F -inner wing tank valve,
may be produced without
the slot
G -rib between both tanks
H -outer wing tank valve



4.4.2.3 Adjustment of water ballast system LS8-b and LS8-a and LS8-18 with integral tail tank

(1) Before adjusting wing system, check ventilation tubes No. 2 and 4 (see sketch section1) and draining tube No. 5 free from clogging.
   a) **Only LS8-a with winglet ventilation:** Cleaning of ventilation tubes 2 and 4 possible from the tip, see sketches in section 1.13.
   b) **All variants with ventilation at the root rib:** Cleaning of ventilation tubes 2 and 4 possible from root rib after removing two plugs at root rib.
   c) Cleaning of tube 5 after removing drain valve at root rib (See sketch 1 in section 4.4.2.1).
   d) Reinstall the 2 plugs and the drain valve.

(2) Check cockpit operating toggle lever for overcenter in open position.

(3) Adjusters at >2< and >3< (see sketch 3) are used for adjustment of bowden cable synchronisation and simultaneous opening.

(4) Inspect maximum opening of both valves: opening travel of both valves should be between 13 and 15 mm <0.51 to 0.59 in>. See sketch 3 at >d<, method of measurement as indicated under >c< (in lower part of sketch 3 at outer dump valve). Possible adjustment at >6<.

(5) Both wings must be adjusted symmetrically.

(6) Play between fuselage and wing drive levers at >a< should be between 0 and maximum 2 mm <0 to
0.08 in>, measure from baggage compartment.

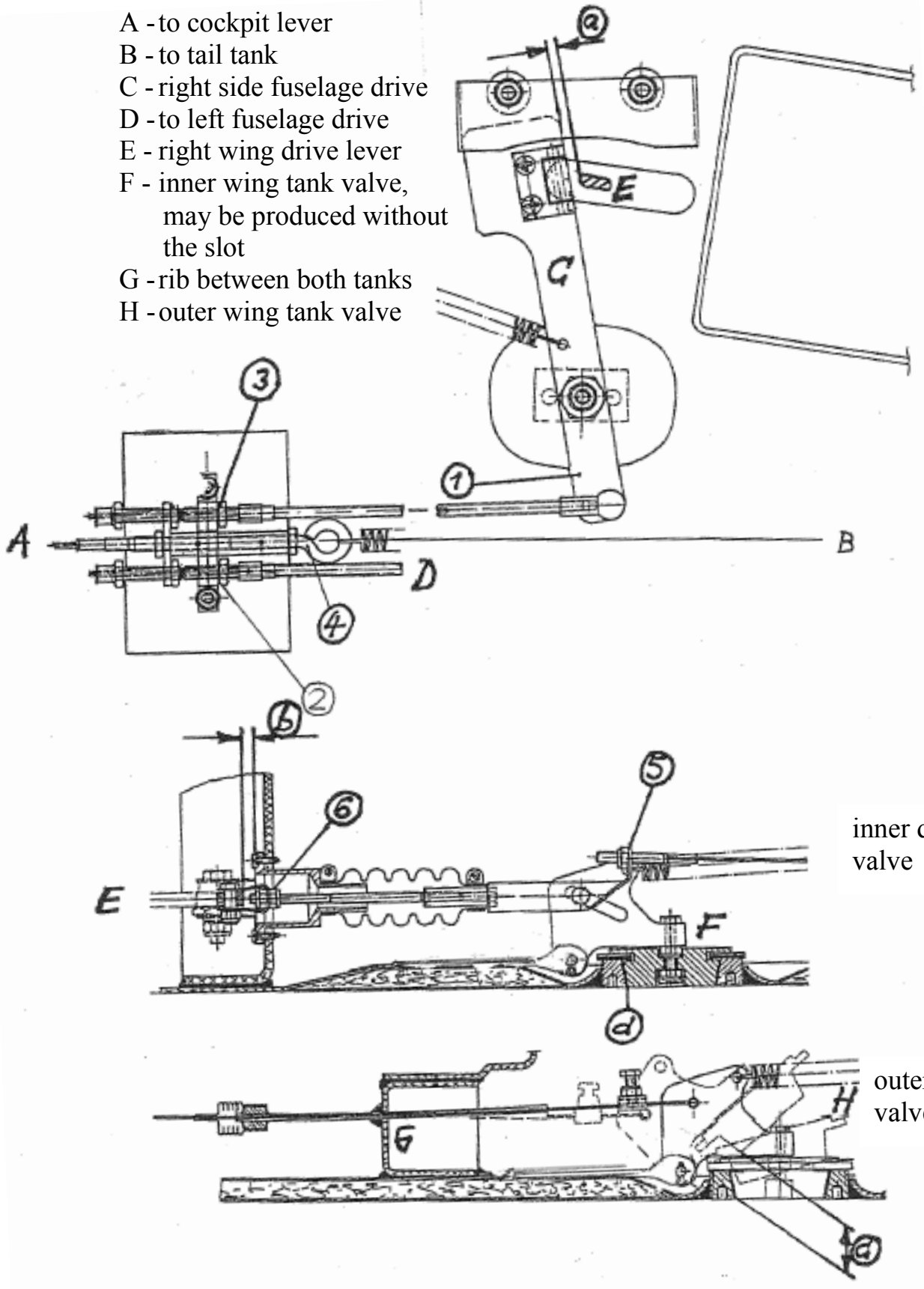
(7)Check vertical tail fin tank opening after filling some water: Opening simultaneously with or before inner wing tank.
Tail fin tank adjustment possible at >4< after wing system adjustment or inspection.

(8) Do not forget to lock and colour mark all nuts after adjustments.

.

Sketch 3
LS8-b and LS8-a and LS8-18 with integral tail tank

A - to cockpit lever
B - to tail tank
C - right side fuselage drive
D - to left fuselage drive
E - right wing drive lever
F - inner wing tank valve, may be produced without the slot
G - rib between both tanks
H - outer wing tank valve



inner dump valve

outer dump valve

4.5 Removal and installation of the slide-in tail tank

Removal

(1) Disconnect operating cable from right drive lever at position >1<, see sketch 2 in section 4.4, and extend with approx. 6 m <20 ft> of thin nylon cord.
(2) Loosen clamp (or cut open bonding) holding discharge tube at right lower rudder cut-out. Push stiff tube of approx. 7 to 8 mm <0.28 to 0.32 in> outside diameter and 1.5 m <5 ft> length into discharge tube.
(3) Dismount 2 bolts holding upper tank end at rib (8 mm thread, LN9037, width over flats 13 mm).
(4) Cut silicone rubber seals along upper edge cautiously with sharp knife.
(5) Pull tank upward, at the same time push auxiliary tube from lower end accordingly.

Installation

(1) Before installation, check valve tightness using water; check also tightness with valve fully open, but discharge tube held closed. Total valve travel between 7 and 9 mm <0.28 to 0.35 in>. (In fully open position spring coils are solid).
(2) Push discharge tube onto auxiliary tube, cover joint with tape to avoid edge catching at ribs or webs.
(3) Connect drive cable with auxiliary cord.
(4) Insert tank into vertical tail fin upper end, simultaneously pull with caution at auxiliary tube from lower end and at cord from cockpit.
(5) Valve must be inserted into cut-out in lower tail fin rib, use caution to avoid valve damage.
(6) Seal upper tank edge with silicon rubber to surrounding structure.
(7) Mount 2 bolts holding upper tank end (and horizontal tail bracket), 8 mm thread, LN 9037, width over flats 13 mm. When tank is combined with battery box, these bolts also hold the hinged battery box cover.
(8) Clamp end of discharge tube (or fix by bonding) in right lower rudder cut-out.
(9) Adjust valve operation as outlined in section 4.4.

Function check

a) Watertight with valve closed.

b) Check proper timing of opening of the fin ballast dump valve according to section 4.4.1 item (3) **LS8** resp. section 4.4.2.2 item (11) **LS8-a and LS8-18**..

c) Tightness during filling (back to front via funnel). With valve open, water level in filling tube must remain constant.

4.6 Removal and installation of wing water ballast bags only LS8

Wing water bags are kept in straight position by nylon rope, running from the bag end over a pulley to the root rib, tension approx. 10 kg <45 lbs>.

Removal

(1) using water valve key part. No. 4F05-82 (standard equipment), disconnect screwed joint of valve and release tube from wing under side through release outlet

(2) open knot at rope end and connect approx. 15 m <49 ft> of braided nylon rope (ends heat sealed) by stitching for about 50 mm <2 in>. Do not connect by knot, this will not pass through pulley guide.

Caution: if water bags are taken out of wings without additional rope, the wing shell must be cut open near the pulley to reinstall the rope!

(3) pull valve and bag through opening in root rib, disconnect rope from bag.

Warning: The tube between double valve and outer bag is prone to collapse, therefore disassemble and assemble with two persons!

Assembly

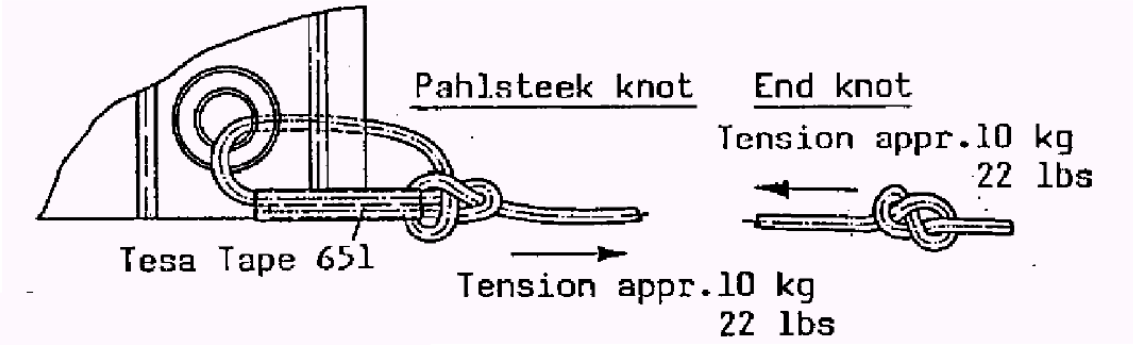
(1) pull bicycle type inner tube over valve end, 60 mm <2.4 in> long.

(2) adjust ballast bag with seam to leading edge and with valve as shown below (different valve position increases discharge time considerably).

(3) push bag on valve stub, cover bag on stub with 1 layer of tape (example Tesaflex 4163) to protect bag against damage by hose clamps. Turn both seams during taping in the same circumferential direction, otherwise there will also be a considerable increase in discharge time.

(4) tighten hose clamps and check for water tightness before installation into wing.

(5) connect braided nylon rope to brass eye at bag end by special knot ("Pahlsteek") as shown before, fix free rope end with tape.



(6) connect rope to intermediate rope in wing (if no. longer connected) by stitching.
(7) check existence of bonded-on gasket at valve discharge orifice inner end.

Installation

(1) place bag with seam to leading edge and valve discharge orifice 45° downward to the trailing edge, fold bag zigzagged parallel to valve and tube and insert into root rib cutout, pull cautiously only at intermediate rope.
(2) screw valve to discharge tube from outside through outlet using brass nut and water valve key.
(3) pretension rope with about 10 kg <45 lbs), place end knot as shown on. Fix rope end (about 0.5 m <20 in> long) at root rib, do not cut off.
(4) check adjustment of water valves see section 4.4.1.
(5) fill bags according to instructions given in Flight Manual, check for tightness, proper discharge and discharge time.
If discharge time exceeds 4.5 minutes, the bag may be twisted. When not tight - water may drip from one of the drain holes, the fault must be located and fixed, this necessitates disassembly!

4.7 Removal and installation of the C.G. hook

Tools: 3/4" drive ratchet, 8 and 10 mm sockets, 8 and 10 mm ring- or open end spanners.

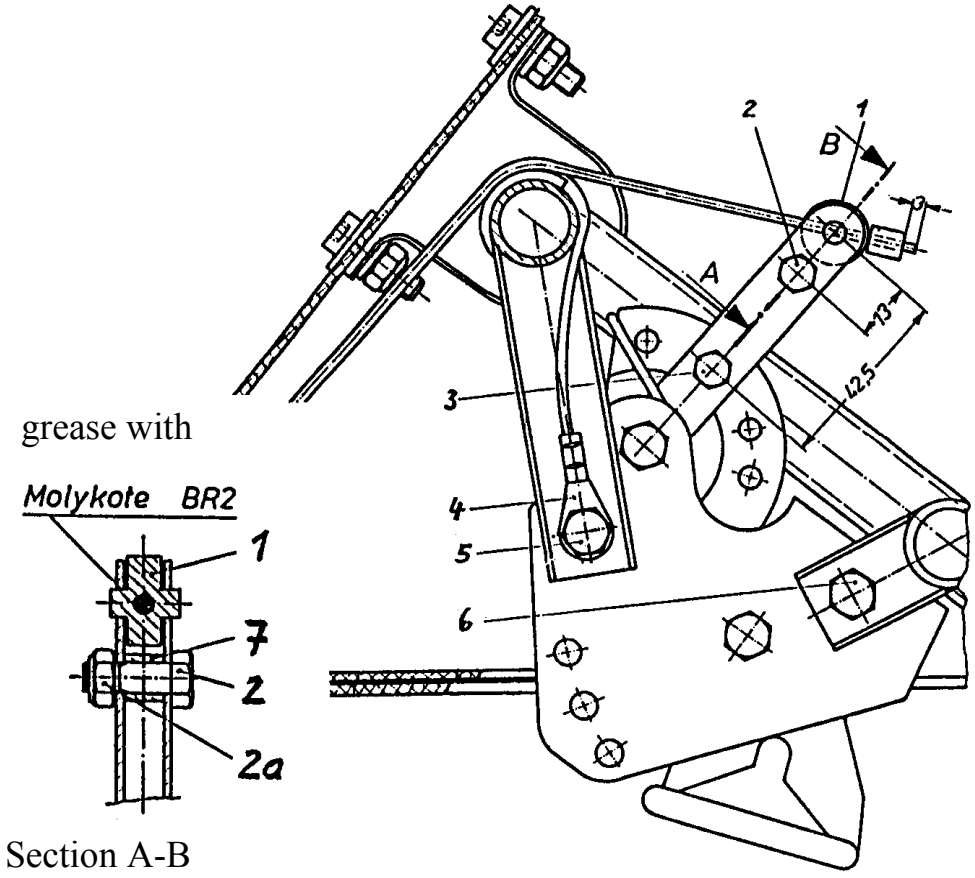
General hints: Note length of bolts and positioning of washers for all assembly positions.
Keep fixing bolts with plane during hook overhaul.

Removal of C.G. hook

(1) Take canopy off from fuselage according to Flight Manual section 4.3 with a helper after pulling emergency canopy release.
(2) Disassemble seat according to section 4.3.
(3) Under seat, disconnect C.G. release cable from pulley, watch for spacer.
(4) Disassemble C.G. hook from brackets at landing gear fork.
(5) Pull hook downward.
(6) Open screwed joints ***>2<*** below cable and ***>3<*** at lower end of drive lever for about 4 mm <0.16 in>, expand lever arms and remove cable end ***>1<***.

Installation of C.G. hook

Proceed in reverse order of removal, watch out especially for the following:
(1) Exchange cable, when wear is considerable, see also section 11.3.
(2) Cable must be routed **over** cross member of landing gear fork.
(3) For position of drive lever at circular segment and fixing bores see sketch below.
(4) Bushing ***>7<*** between lever arms and below cable end avoids clamping of connector.
(5) Grease cable connector ***>1<*** , set into bores at drive lever end and tighten at ***>2<*** and ***>3<*** .
(6) Connect earth cable from control stick ***>4<*** together with forward fixing bolt ***>5<*** .
(7) Connect cable to pulley under seat (spacer!) and check function of C.G. hook.
(8) For proper overcenter of hook system, 5 mm <0.2 in> of free cable travel must be available at cockpit T-shaped handle.
(9) Before installation of seat, **check for absence of foreign matter**.



Section A-B

Caution: The following items result in improper hook function:

(a) Missing bushing >7< between drive levers below cable connector >1< .
(b) Cable below cross member of landing gear fork.
(c) Wrong drive lever position at segment.
(d) Use of other hook fixing positions.

4.8 Removal and installation of the nose hook

Tools: 3/4" drive ratchet, 8 and 10 mm sockets, 3 and 4 mm hex head driver sockets, 10 mm ring spanner, 12 mm open end spanner.

General: Note length of bolts and positioning of washers for all assembly positions.
Keep fixing bolts, 5 spacers and lever extension with plane during hook overhaul.

Removal of nose hook

(1) Take canopy off from fuselage according to Flight Manual section 4.3 with a helper after pulling emergency canopy release.
(2) Disassemble seat according to section 4.3.
(3) Under seat, disconnect C.G. release cable from pulley, watch for spacer.
(4) Pull pedals to rearmost position.
(5) Disconnect trim mass holder from pedal guide at ***>1<*** .
(6) Disconnect 2 bolts ***>2<*** at front end of canopy support from bracket, move support as far back into cockpit as possible, disconnect gas strut at one end if necessary.
(7) Disconnect both canopy support brackets including trim mass holder from nose bulkhead at ***>3<*** and move backward too.
(8) Pull nose hook together with bracket backward from bulkhead.
(9) Disassemble nose hook from bracket at ***>4<*** and ***>6<***, watch for 4 spacers between nose hook body and bracket and for 1 spacer inside nose hook body at position ***>6<*** .
(10) Disassemble drive extension with cable from drive lever at ***>5<*** .

Installation of nose hook

Proceed in reverse order of removal, watch out especially for the following:

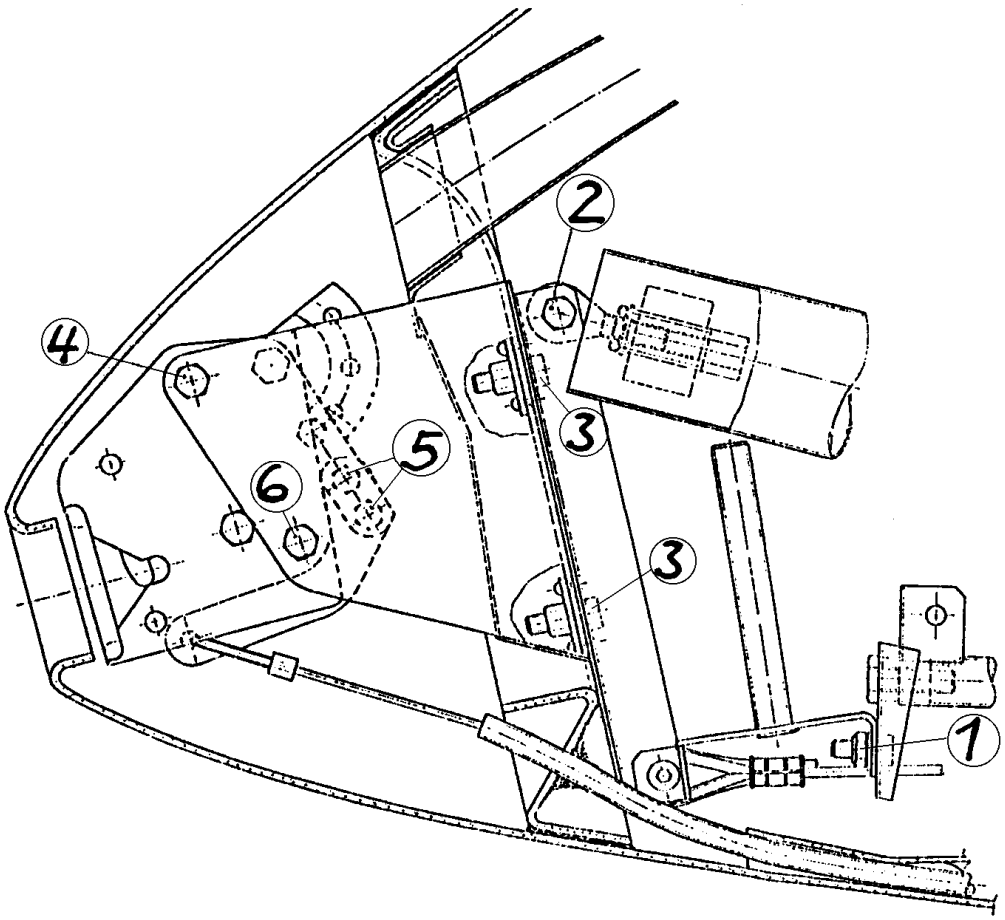
(1) Insert spacer at position ***>6<*** inside hook body before assembly of lever extension.

(2) When assembling nose hook into bracket, guide spacers into position using 12 mm open end spanner.

(3) After assembly at ***>3<*** and connecting C.G. hook cable at pulley (spacer!) – check proper function of both hooks.

(4) For proper overcenter of hook system, 5 mm <0.2 in> of free cable travel must be available at cockpit T-shaped handle.

(5) Before installation of seat, check functions of pedal system and locking of pedal adjustment, function of canopy support, electrical and pneumatic
installations of total instrumentation and **check for absence of foreign matter**.



5 Control surfaces

5.1 Control surface deflection limits

(Inspect annually)

LS8

Aileron:	Up	21° - 22
	Down	16° - 17°

Elevator:	Up	28° - 30°
	Down	22° - 24°

Rudder:	To both sides 26° - 30°

Air Brake:	Fully extended minimum average height 150 mm <5.906 in>

LS8-a, LS8-b, LS8-18

Aileron:	Up	26° - 30°
	Down	13° - 15°

Elevator:	Up	28° - 30°
	Down	22° - 26°

Rudder:	To both sides 26° - 30°

Air Brake:	Fully extended minimum average height 150 mm <5.906 in>

For easier checking, measured angles may be converted to mm / in deflection values, using the actual local radius of the defined measuring place. See also table section 5.5 or deflections report of final production inspection.

5.2 Control surface mass and mass balance

Should be inspected when suspecting changes of mass and after repairs

5.2.1 Data

Mass and mass balance must be within given limits for safety against flutter
(1 cm*kg = 13.887 in*oz)

LS8	Mass	Hinge moment	Horizontal reference line
Inner Aileron	0.73 to 0.97 kg	2.33 to 3.15 kg*cm	Leading and trailing edges of under side connected
	1.61 to 2.14 lbs	32.36 to 47,74 in*oz	
Outer Aileron	1.30 to 1.76 kg	3.43 to 4.63 kg*cm	
	2.87 to 3.88 lbs	47.63 to 64.30 in*oz	
Elevator both halves together	1.30 to 1.60 kg	3.48 to 4.40	Straight region of upper side
	2.87 to 3.53 lbs	48.33 to 63.88 in*oz	
Note: mass balancing of the elevator (approx. 100 %) is by a heavy pushrod in the fin see section 5.2.2			
Rudder	3.90 to 4.90 kg	± 7.40 kg*cm	Centreline
	8.60 to 10.80 lbs	±102.77 in*oz	
In case a spare rudder ser.No. 28531 and uü is installed, TN8025			
Rudder	4.00 to 6.00 kg	±1.60 kg*cm	Centreline
	8.82 to 13.23 lbs	±22.2 in*oz	

LS8-a	Mass/mass	Hinge moment	Horizontal reference line
Aileron without balance	2.16 to 2.86 kg	5.67 to 7.50 kg*cm	Leading and trailing edges of under side connected
	4.76 to 6.31 lbs	78.7 to 104.2 in*oz	
Aileron with balance	3.40 to 4.40 kg	2.04 to 3.87 kg*cm	
	7.50 to 9.70 lbs	28.3 to 53.7 in*oz	
Elevator both halves together	1.30 to 1.65 kg	3.48 to 4.60	Straight region of upper side
	2.87 to 3.64 lbs	48.3 to 63.9 in*oz	
Note: mass balancing of the elevator (approx. 100 %) is by a heavy pushrod in the fin see section 5.2.2			
Rudder	4.00 to 6.00 kg	±1.60 kg*cm	Centreline
	8.82 to 13.23 lbs	±22.2 in*oz	

Note for LS8-a: Ailerons with balance will be installed in case the LS8-a is prepared for retrofit to LS8-18.

LS8-b	Mass	Hinge moment	Horizontal reference line
Inner Aileron	3.40 to 4.40 kg	2.04 to 3.67 kg*cm	Leading and trailing edges of under side connected
	7.496 to 9.70 lbs	28.330 to 50.97 in*oz	
Outer Aileron	0.42 to 0.60 kg	0.82 to 1.12 kg*cm	
	0.936 to 1.543 lbs	11.39 to 15.55 in*oz	
Elevator both halves together	1.30 to 1.65 kg	3.48 to 4.60	Straight region of upper side
	2.866 to 3.638 lbs	48.328 to 63.882 in*oz	
Note: mass balancing of the elevator (approx. 100 %) is by a heavy pushrod in the fin see section 5.2.2			
Rudder	4.30 to 5.40 kg	-1.02 to 1.60 kg*cm	Centreline
	9.48 to 11.91 lbs	-14.17 to 22.22 in*oz	

LS8-18	Mass	Hinge moment	Horizontal reference line
Inner Aileron	3.40 to 4.40 kg	2.04 to 3.87 kg*cm	Leading and trailing edges of under side connected
	7.496 to 9.70 lbs	28.330 to 53.744 in*oz	
Outer Aileron	0.42 to 0.70 kg	0.81 to 1.38 kg*cm	
	0.936 to 1.543 lbs	11.249 to 19.165 in*oz	
Elevator both halves together	1.30 to 1.65 kg	3.48 to 4.60	Straight region of upper side
	2.866 to 3.638 lbs	48.328 to 63.882 in*oz	
Note: mass balancing of the elevator (approx. 100 %) is by a heavy pushrod in the fin see section 5.2.2			
Rudder	4.30 to 5.40 kg	-1.02 to 1.60 kg*cm	Centreline
	9.48 to 11.91 lbs	-14.17 to 22.22 in*oz	

5.2.2 Instructions

Mass balancing of the elevator

The mass balancing of the elevator (approx. 100 %) is by the heavy pushrod in the fin. It is prohibited to remove the mass fixed to the top of the pushrod (washers or turned part).

If a change of the hinge moment of the elevator is suspected, proceed as follows: Remove the mass from the pushrod.

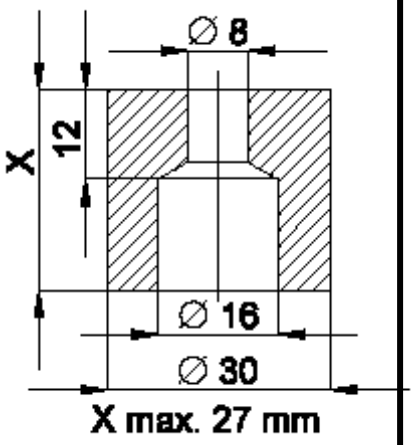
Determine the new mass with the following equation:

M=(MR x 0,115)-0,4 <kg>

MR= hinge moment in <kg cm>

Determine the number of washers necessary: Steel or brass washers inner dia. 8 mm, outer dia. 30 mm.

If it is not possible to install enough washers, a brass turned part with the correct mass must be produced according to sketch and installed.



Measuring technique for hinge moments: Remove surfaces suspend singly (also each elevator half) at two bearings without any tension or friction.

Measure load at trailing edge with reference line horizontal with a spring balance in vertical direction. Measure the local radius from hinge line. Multiply load and radius to yield hinge moment.

When using identical locations for measuring as used in final production inspection then trailing edge load only must be checked.

Caution: Repairs are possible only in exceptional cases, because after changes of local static moment due to repairs, mass balance must be fixed in this region to yield identical static moment values as in the original condition. As this requirement from the flutter investigation due to low moment tolerances and little room may exclude a repair, you should contact DG Flugzeugbau beforehand.

5.3 Control surfaces free play

(Inspect annually)

	Free play
Elevator	Maximum 2.5 mm <0.1 in> at inner edge
Aileron <*>	Maximum 2.5 mm <0.1 in> at drive
Rudder	Not applicable

Measuring Technique

Free play should be measured with control stick fixed to zero position.
Measure at the trailing edge of the control surface.

5.4 Control surfaces friction

(Inspect annually)

	Friction
Elevator	Maximum **travel due to friction** 50 mm <1.97 in>, measured at top end of control stick.
Aileron <*>	200 to 500 grams <0.441 to 1.102 lbs> measured 30 mm below top end of control stick
Rudder	Up to 500 grams <1.102 lbs> measured at lower end of rudder

<*> *Upper and lower side aileron seals must always be installed!*

Measuring technique for control friction:
Rudder friction should be measured at upper rudder edge.

Aileron friction should be measured 30 mm <1.2 in> from top end of control stick. Values include seals.

For elevator friction travel, set trim to about zero elevator deflection. Apply approximately 1/3 of control stick travel, then allow stick slowly to return until it stops by itself, retarding this movement by hand. Measure final stick position. Repeat procedure for opposite movement, difference of both resulting positions yields **travel due to friction** .

5.5 Limit values for control surface deflections

Deflections in mm / in

Ailerons:

LS8

local radius		16° to 17°		21° to 22°	
		down		up	
mm	in	mm	in	mm	in
120	4.724	33 to 35	1.299 to 1.378	44 to 46	1.732 to 1.811
121	4.764	34 to 36	1.339 to 1.417	44 to 46	1.732 to 1.811
122	4.803	34 to 36	1.339 to 1.417	44 to 47	1.732 to 1.850
123	4.843	34 to 36	1.339 to 1.417	45 to 47	1.772 to 1.850
124	4.882	35 to 37	1.378 to 1.457	45 to 47	1.772 to 1.850
125	4.921	35 to 37	1.378 to 1.457	46 to 48	1.811 to 1.890
126	4.961	35 to 37	1.378 to 1.457	46 to 48	1.811 to 1.890
127	5.000	35 to 38	1.378 to 1.496	46 to 48	1.811 to 1.890
128	5.039	36 to 38	1.417 to 1.496	47 to 49	1.850 to 1.929
129	5.079	36 to 38	1.417 to 1.496	47 to 49	1.850 to 1.929
130	5.118	36 to 38	1.417 to 1.496	47 to 50	1.850 to 1.969

LS8-a, LS8-b, LS8-18

local radius		13° to 15°		26° to 30°	
		down		up	
mm	in	mm	in	mm	in
75	2.953	17 to 20	0.669 to 0.787	34 to 39	1.339 to 1.535
76	2.992	17 to 20	0.669 to 0.787	34 to 39	1.339 to 1.535
77	3.031	17 to 20	0.669 to 0.787	35 to 40	1.378 to 1.575
78	3.071	18 to 20	0.709 to 0.787	35 to 40	1.378 to 1.575
79	3.110	18 to 21	0.709 to 0.827	36 to 41	1.417 to 1.614
80	3.150	18 to 21	0.709 to 0.827	36 to 41	1.417 to 1.614
81	3.189	18 to 21	0.709 to 0.827	36 to 42	1.417 to 1.654
82	3.228	19 to 21	0.748 to 0.827	37 to 42	1.457 to 1.654
83	3.268	19 to 22	0.748 to 0.866	37 to 43	1.457 to 1.693
84	3.307	19 to 22	0.748 to 0.866	38 to 43	1.496 to 1.693
85	3.346	19 to 22	0.748 to 0.866	38 to 44	1.496 to 1.732

Elevator

LS8

local radius		22°to 24°		28°to 30°	
		down		up	
mm	in	mm	in	mm	in
67	2.638	26 to 28	1.024 to 1.102	32 to 35	1.260 to 1.378
68	2.677	26 to 28	1.024 to 1.102	33 to 35	1.299 to 1.378
69	2.717	26 to 29	1.024 to 1.142	33 to 36	1.299 to 1.417
70	2.756	27 to 29	1.063 to 1.142	34 to 36	1.339 to 1.417
71	2.795	27 to 30	1.063 to 1.181	34 to 37	1.339 to 1.457
72	2.835	27 to 30	1.063 to 1.181	35 to 37	1.378 to 1.457

LS8-a, LS8-b, LS8-18

local radius		22°to 26°		28°to 30°	
		down		up	
mm	in	mm	in	mm	in
67	2.638	26 to 30	1.024 to 1.181	32 to 35	1.260 to 1.378
68	2.677	26 to 31	1.024 to 1.220	33 to 35	1.299 to 1.378
69	2.717	26 to 31	1.024 to 1.220	33 to 36	1.299 to 1.417
70	2.756	27 to 31	1.063 to 1.220	34 to 36	1.339 to 1.417
71	2.795	27 to 32	1.063 to 1.260	34 to 37	1.339 to 1.457
72	2.835	27 to 32	1.063 to 1.260	35 to 37	1.378 to 1.457

Rudder all LS8

Measured value = Distance from trailing edge to centre of cable bolt

measured value		local radius		26°to 30°	
mm	in	mm	in	mm	in
395	15.551	390	15.354	175 to 202	6.890 to 7.953
396	15.591	391	15.394	176 to 202	6.929 to 7.953
397	15.630	392	15.433	176 to 203	6.929 to 7.992
398	15.669	393	15.472	177 to 203	6.969 to 7.992
399	15.709	394	15.512	177 to 204	6.969 to 8.031
400	15.748	395	15.551	178 to 204	7.008 to 8.031

6 List of special tools

Tool	Function
Ratched Key	for assembly / disassembly of elevator and winglets
Filling funnel with wire meshing	for filling of water ballast system through discharge openings, use together with adapters
Vertical tail tank adapter	for testing of vertical tail fin valve, to avoid take-offs with unintentionally filled vertical tail tank, as well as for filling of tail tank together with filling funnel with wire meshing
LS8-a, LS8-b, LS8-18 Braceable wing tank adapter	for filling of inner wing tanks through discharge openings together with filling funnel with wire meshing
LS8-b, LS8-18 Tapered wing tankadapter	for filling of outer wing tanks through discharge openings together with filling funnel with wire meshing
LS8 Valve key 4F05-82	for removal and installation of the waterbag from the wing dump valve

7 Placards and markings

Numbers refer to placards, for positions of placards see drawings at end of this section.

7.1 LS8

LS8 Checklist

This sailplane must be operated in compliance with operating limitations stated in the form of markings, placards and EASA approved Flight Manual.

1. Main pins secured?
2. Elevator secured?
3. Winglets secured?
4. Check controls
5. Tail fin valve operation checked?
6. When using water ballast, then always in wing and tail!
7. Check loading conditions
8. Check tail dolly removed?
9. Fasten seat belt harness
10. Fasten parachute and connect parachute static line
11. Lock air brakes
12. Check trim position
13. Check release system
14. Lock canopy

>1< at under side of instrument panel

MINIMUM COCKPIT LOAD:	kg / *lbs*
with tail battery, tail tank full	min. _____
with tail battery, tail tank empty	min. _____
without tail battery, tail tank full	min. _____
without tail battery, tail tank empty	min. _____

>2< under instrument panel cover

DG Flugzeugbau GmbH
Type: LS8 Serial No.:_____

Data Placard

Airspeed Limits:	km/h	mph	kt.
Winch launch/Auto tow	140	87	76
Aero tow	190	118	103
In rough air	190	118	103
Never exceed (VNE)	280	174	151

Max. Take-off mass 525 kg / 1157 lbs
Aerobatic manoeuvres **not** approved

Weight Limitations

Maximum Cockpit Load .... max._____kg/lbs
Minimum Cockpit Load
with tail battery, tail tank full min. _____kg/lbs
with tail battery, tail tank empty min. _____kg/lbs
without tail battery, tail tank full min. _____kg/lbs
without tail battery, tail tank empty min. _____kg/lbs
Lighter pilots must compensate lack of weight as suggested in Flight Manual

>3< at right hand cockpit side

Tyre Pressure
3 - 3.5 bar
43.5 to 50.8 psi
For 4” wheel, on right landing gear door

Tyre Pressure
3.5 bar
50.8 psi
For 5” wheel, on right landing gear door

Ball of bearing
Must be fixed
at forward horizontal tail attachment on vertical tail fin

Tyre Pressure
2.5 - 3.5 bar
36.3 to 50.8 psi
Above tail wheel, when fitted

Tyre Pressure
6,2 bar/90 psi
above tailwheel
small tailwheel according to TN 8021, if installed

Maximum Baggage mass 5 kg / 11 lbs
(Soft items only)
at main bulkhead

DG Flugzeugbau GmbH
TYPE LS 8 .
TCDS A.047 .
Serial No. 8xxx . Made in
Registration D-xxxx . Germany

>4< Type placard at main bulkhead

Batt. I
Batt. II
OFF
Electrical switch positions

7.2 LS8-a

LS8-a Checklist

This sailplane must be operated in compliance with operating limitations stated in the form of markings, placards and EASA approved Flight Manual.

1. Main pins secured?
2. Elevator secured?
3. Winglets secured?
4. Check controls
5. Tail fin valve operation checked?
6. When using water ballast, then always in wing and tail!
7. Check loading conditions
8. Check tail dolly removed?
9. Fasten seat belt harness
10. Fasten parachute and connect parachute static line
11. Lock air brakes
12. Check trim position
13. Check release system
14. Lock canopy

>1< at under side of instrument panel

MINIMUM COCKPIT LOAD:	kg / *lbs*
with tail battery, tail tank full	min. _____
with tail battery, tail tank empty	min. _____
without tail battery, tail tank full	min. _____
without tail battery, tail tank empty	min. _____

>2< under instrument panel cover

DG Flugzeugbau GmbH
Type: LS8-a Serial No.:_____

Data Placard

Airspeed Limits:	km/h	mph	kt.
Winch launch/Auto tow	140	87	76
Aero tow	190	118	103
In rough air	190	118	103
Never exceed (VNE)	280	174	151

Max. Take-off mass 525 kg / 1157 lbs
Aerobatic manoeuvres **not** approved

Weight Limitations

Maximum Cockpit Load .... max._____kg/lbs
Minimum Cockpit Load
with tail battery, tail tank full min. _____kg/lbs
with tail battery, tail tank empty min. _____kg/lbs
without tail battery, tail tank full min. _____kg/lbs
without tail battery, tail tank empty min. _____kg/lbs
Lighter pilots must compensate lack of weight as suggested in Flight Manual

>3< at right hand cockpit side

Tyre Pressure 3 - 3.5 bar 43.5 to 50.8 psi	For 4” wheel, on right landing gear door

Tyre Pressure 3.5 bar 50.8 psi	For 5” wheel, on right landing gear door

Ball of bearing Must be fixed	at forward horizontal tail attachment on vertical tail fin

Tyre Pressure 2.5 - 3.5 bar 36.3 to 50.8 psi	Above tail wheel, when fitted

Tyre Pressure **6,2 bar/90 psi**	above tailwheel small tailwheel according to TN 8021, if installed

Maximum Baggage mass 5 kg / 11 lbs (Soft items only)	at main bulkhead

ROLLADEN-SCHNEIDER Flugzeugbau GmbH

TYPE	LS 8-a .	
TCDS	402 .	
Serial No.	8xxx .	Made in
Registration	D-xxxx .	Germany

>4< Type placard at main bulkhead

Batt. I Batt. II OFF	Electrical switch positions

7.3 LS8-b

LS8-b Checklist

This sailplane must be operated in compliance with operating limitations stated in the form of markings, placards and EASA approved Flight Manual.

15. Main pins secured?
16. Elevator secured?
17. Winglets secured?
18. Check controls
19. Tail fin valve operation checked?
20. When using water ballast, then always in wing and tail!
21. Check loading conditions
22. Check tail dolly removed?
23. Fasten seat belt harness
24. Fasten parachute and connect parachute static line
25. Lock air brakes
26. Check trim position
27. Check release system
28. Lock canopy

>1< at under side of instrument panel

MINIMUM COCKPIT LOAD: kg / *lbs*

with tail battery, tail tank full	min. _____
with tail battery, tail tank empty	min. _____
without tail battery, tail tank full	min. _____
without tail battery, tail tank empty	min. _____

>2< under instrument panel cover

DG Flugzeugbau GmbH
Type: LS8-b Serial No.:_____

Data Placard

Airspeed Limits:	km/h	mph	kt.
Winch launch/Auto tow	140	87	76
Aero tow	190	118	103
In rough air	190	118	103
Never exceed (VNE)	280	174	151

Max. Take-off mass 525 kg / 1157 lbs
Aerobatic manoeuvres **not** approved

Weight Limitations

Maximum Cockpit Load .... max._____kg/lbs
Minimum Cockpit Load

with tail battery, tail tank full	min. _____kg/lbs
with tail battery, tail tank empty	min. _____kg/lbs
without tail battery, tail tank full	min. _____kg/lbs
without tail battery, tail tank empty	min. _____kg/lbs

Lighter pilots must compensate lack of weight as suggested in Flight Manual

>3< at right hand cockpit side

Tyre Pressure
3 - 3.5 bar
43.5 to 50.8 psi
on right landing gear door

Tyre Pressure
2.5 - 3.5 bar
36.3 to 50.8 psi
Above tail wheel, when fitted

Ball of bearing
Must be fixed
at forward horizontal tail attachment on vertical tail fin

Tyre Pressure
ee6,2 bar/90 psi
above tailwheel small tailwheel according to 8021, if installed

Maximum Baggage mass 5 kg / 11 lbs
(Soft items only)
at main bulkhead

ROLLADEN-SCHNEIDER Flugzeugbau GmbH

TYPE	LS 8-b .	
TCDS	402 .	
Serial No.	8xxx .	Made in
Registration	D-xxxx .	Germany

>4< Type placard at main bulkhead

Batt. I
Batt. II
OFF
Electrical switch positions

7.4 LS8-18

LS8-18 Checklist

This sailplane must be operated in compliance with operating limitations stated in the form of markings, placards and EASA approved Flight Manual.

29. Main pins secured?
30. Elevator secured?
31. Winglets secured?
32. Check controls
33. Tail fin valve operation checked?
34. When using water ballast, then always in wing and tail!
35. Check loading conditions
36. Check tail dolly removed?
37. Fasten seat belt harness
38. Fasten parachute and connect parachute static line
39. Lock air brakes
40. Check trim position
41. Check release system
42. Lock canopy

>1< at under side of instrument panel

MINIMUM COCKPIT LOAD:	kg / *lbs*
with tail battery, tail tank full	min. _____
with tail battery, tail tank empty	min. _____
without tail battery, tail tank full	min. _____
without tail battery, tail tank empty	min. _____

>2< under instrument panel cover

DG Flugzeugbau GmbH
Type: LS8-18 Serial No.:_____

Data Placard

Airspeed Limits:	km/h	mph	kt.
Winch launch/Auto tow	140	87	76
Aero tow	190	118	103
In rough air	190	118	103
Never exceed (VNE)	280	174	151

Max. Take-off mass 525 kg / 1157 lbs
Aerobatic manoeuvres **not** approved

Weight Limitations

Maximum Cockpit Load .... max._____kg/lbs
Minimum Cockpit Load
with tail battery, tail tank full min. _____kg/lbs
with tail battery, tail tank empty min. _____kg/lbs
without tail battery, tail tank full min. _____kg/lbs
without tail battery, tail tank empty min. _____kg/lbs
Lighter pilots must compensate lack of weight as suggested in Flight Manual

>3< at right hand cockpit side

Tyre Pressure
3 - 3.5 bar
43.5 to 50.8 psi
For 4" wheel, on right landing gear door

Tyre Pressure
3.5 bar
50.8 psi
For 5" wheel, on right landing gear door

Tyre Pressure
2.5 - 3.5 bar
36.3 to 50.8 psi
Above tail wheel, when fitted

Ball of bearing
Must be fixed
at forward horizontal tail attachment on vertical tail fin

Tyre Pressure
6,2 bar/90 psi
above tailwheel
small tailwheel according to TN 8021, if installed

Maximum Baggage mass 5 kg / 11 lbs
(Soft items only)
at main bulkhead

ROLLADEN-SCHNEIDER Flugzeugbau GmbH

TYPE	LS 8-18 .	
TCDS	402 .	
Serial No.	8xxx .	Made in
Registration	D-xxxx .	Germany

>4< Type placard at main bulkhead

Batt. I
Batt. II
OFF
Electrical switch positions

7.5 LS8, LS8-a, LS8-b, LS8-18

Numbers refer to placards, for positions of placards see drawings at end of this section.

Use vertical tail fin battery only
With main fuse at battery

(under battery box cover of vertical tail, if fitted)

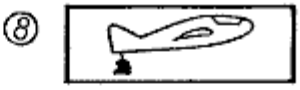
When using a battery in the vertical tail fin. Minimum Cockpit Load must be redetermined by weighing

(under battery box cover of Vertical tail, if fitted)

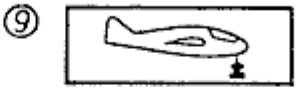
Canopy Emergency Release: open left side normally,
Pull right side with approx.15 kg/33 lbs force to stop

>19< at right canopy frame

⑥ ⑦ *Retracted in front of lever* *Landing gear* *Extended behind lever*



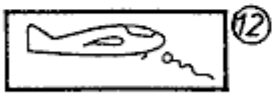
⑧ *Trim tail heavy near trim lever*



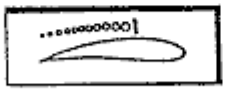
⑨ *Trim nose heavy near trim lever*

⑩ *Canopy opening at left lever*

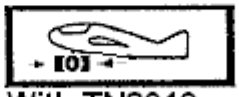
⑪ *Canopy opening and emergency release at right lever*

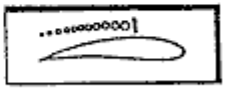


⑫ *Tow cable release left cockpit side*

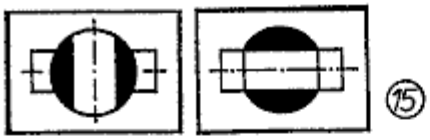


⑬ *Air brakes left cockpit side*

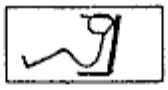




⑬ With TN8019 executed:
Air brakes and wheel brake left cockpit side

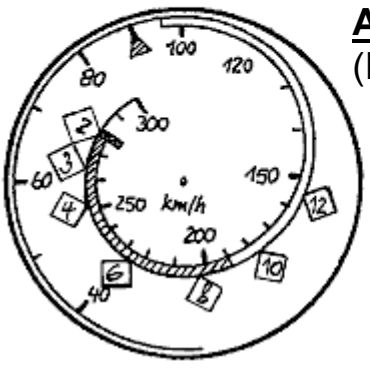


⑭ *Closed* ⑮ *Open*
Water ballast valve at right cockpit side



⑯ *Backrest adjustment at main bulkhead*

⑰ *Ventilation at instrument panel*



Airspeed Indicator
(Diameter 80 mm <3.15 in>)

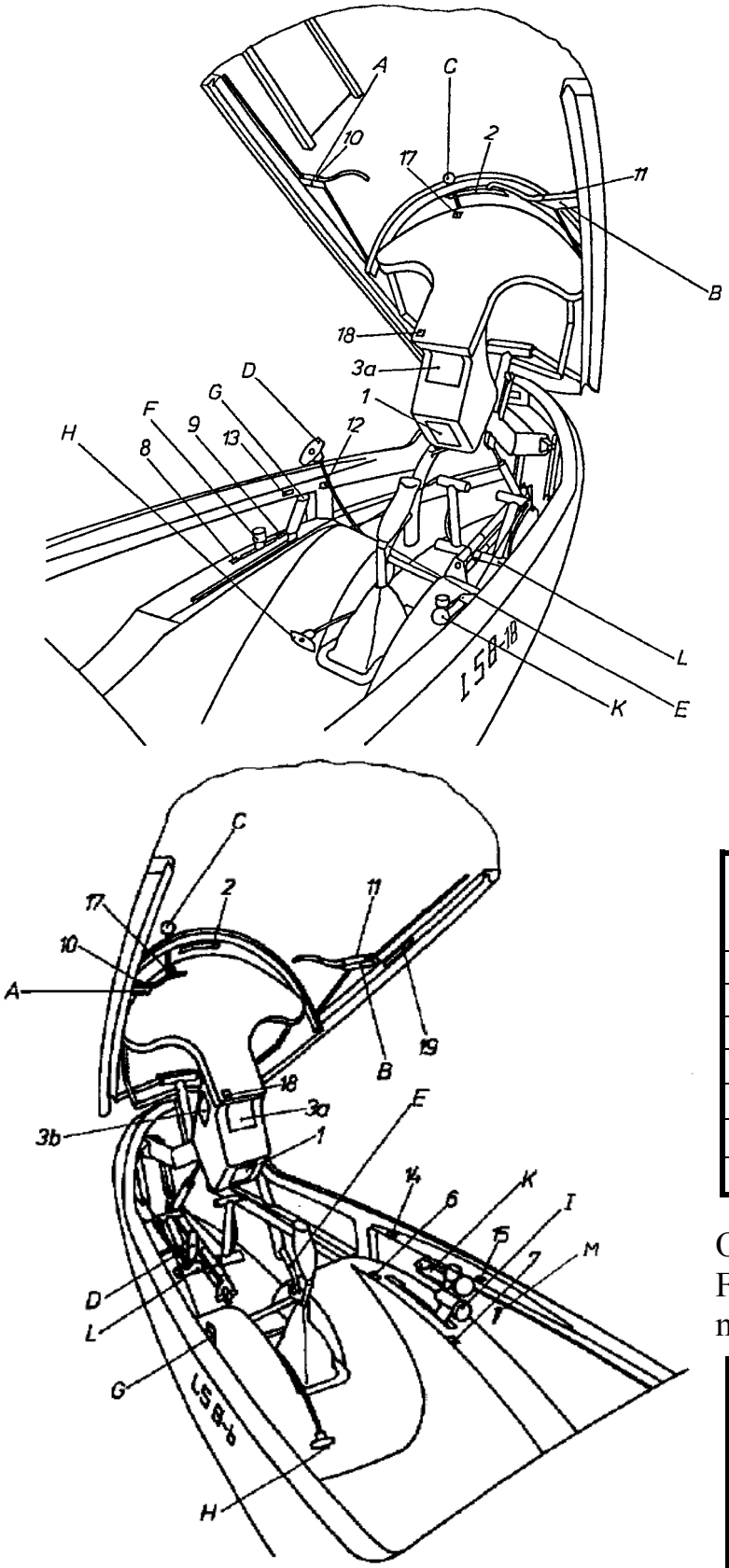
green
yellow
red

② *red altitude related VNE-marking (here in km)*

⑱ *Pedal adjustment at lower edge of instrument panel*

When the airspeed indicator is not equipped with these altitude related VNE markings, a placard must be near the ASI. For possible versions see next page.

Placards and markings continued



A – Left canopy locking
B – Right canopy locking and emergency canopy release
C – Ventilation
D – Tow cable release
E – Trim locking lever
F – Trim lever, also indicating trim position
G – Air brake handle
G with TN8019 executed: Air brake and wheel brake handle
H – Pedal adjustment
I – Landing gear lever
K – Water ballast
L – Rudder pedals and wheel brake (feet operated)
L with TN8019 executed: Rudder pedals
M **Only LS8-b** – Dummy handle instead of fuel cock

Altitude related Never Exceed Speed	km/h
Up to 2000 m MSL	280
Up to 3000 m MSL	266
Up to 4000 m MSL	253
Up to 6000 m MSL	227
Up to 8000 m MSL	202
Up to 10000 m MSL	179
Up to 12000 m MSL	156

On panel near airspeed indicator,
For countries operating with metric units only

Altitude related Never Exceed Speed	km/h	Kt.	mph
Up to 6500 ft MSL	280	151	174
Up to 9800 ft MSL	266	144	165
Up to 13100 ft MSL	253	136	157
Up to 19700 ft MSL	227	122	141
Up to 26200 ft MSL	202	109	126
Up to 32800 ft MSL	179	97	111
Up to 39400 ft MSL	156	84	97

8 Permanent installation of fixed ballast

8.1 Fixed ballast under instrument panel

If empty mass C.G. position is too far back to allow 70 kg <154 lbs> as Minimum Cockpit Load, permanent installation of trim ballast (at position 1050 mm <41.34 in> in front of datum) under seat in front of control stick is possible. The trim mass holder according to drawing 4R8-134 can be ordered as optional equipment, installation according to drawing 3BR-149. One mass (drawing 4R8-108) of approx. 2.45 kg <5.4 lbs> shifts empty mass C.G. position about 17 mm <0.669 in> forward.

After permanent installation of fixed ballast, execute a new empty mass and balance weighing, see chapter 2.

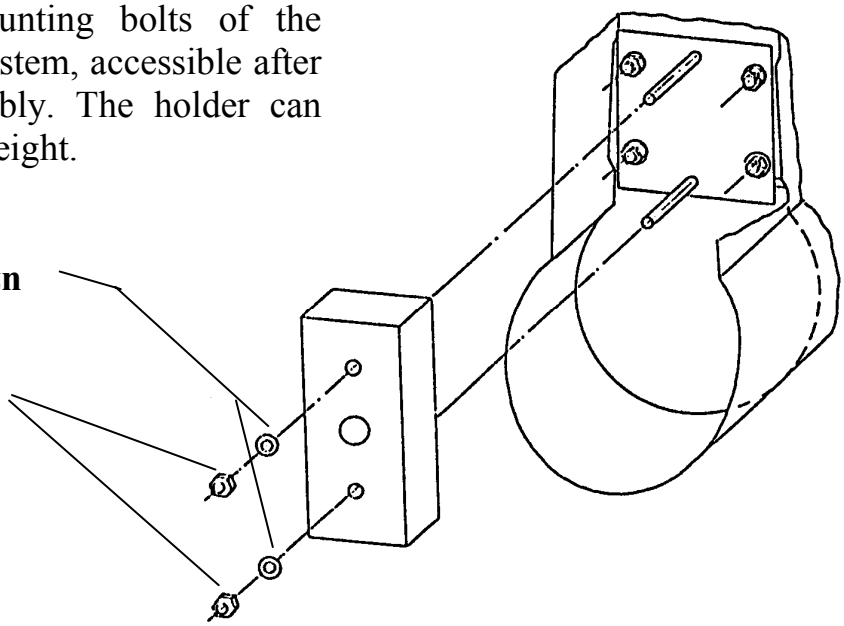
8.2 Fixed Ballast at rear fuselage end

In special cases empty weight C.G. position may be shifted rearward to allow heavy pilots to fly with rearward in-flight C.G. positions.
Therefore it is possible to install a battery see section 9.9 (when a battery box is fitted), a heavy tail wheel hub or a trim weight (drawing 4R8-109) at the vertical tail fin web lower end using a holder (according to drawing 4R8-107b), see Sketch (Tail wheel box and lower rudder bearing not drawn).

The rear trim weight holder must be fitted to 4 mounting bolts of the elevator drive system, accessible after rudder disassembly. The holder can carry one trim weight.

Washers
B6.4 DIN9021-Stzn

Nuts
M6 LN9348 or
M6 DIN985-8zn
(width over flats 10 mm)



Warning: Never dismount the rear trim weight holder, bolts and nuts are fixing points for the elevator system!

Disassembly and assembly of rudder see section 4. Check for unobstructed movement of rudder and measure rudder deflections after work!

After permanent installation of fixed ballast, execute a new empty mass and balance weighing, see chapter 2.

Maximum weight of rear trim weight: approx. 2.45 kg <5.4 lbs>. (Part 4R8-109)

8.3 Permanent installation of equipment in baggage compartment

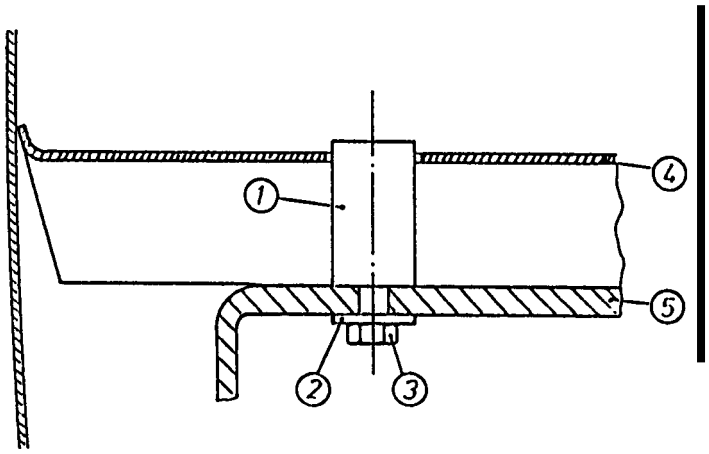
Equipment may be permanently installed:

a) Attached to landing gear box >5< (not directly on the baggage compartment floor >4<!) using threaded spacers >1<, three of which are required per unit. Baggage compartment cover >4< has to be cut to insert spacers, see drawing.

1 - Spacer, diameter 15 mm <0.6 in>,

For 4''-wheel:
Part No. 4R7-8d,
length 23mm <0.906 in>.

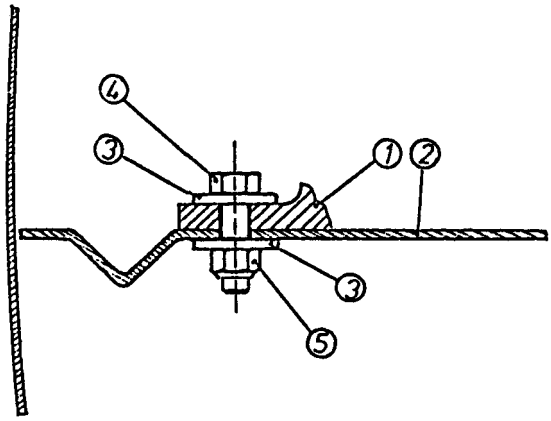
For 5''-wheel:
Part No. 4R7-96
length 45 mm <1.772 in>.



2 - Washer B6.4 DIN9021-St
outer diameter 18 mm <0.71 in>
3 - Bolt 6 mm thread*10 mm
DIN 85-A2, corrosion resistant
4 - Baggage compartment cover
5 - Landing gear box

b) Attached to cover >2< behind spar connection and as close as possible to stiffening corrugation, approved for ELT and barograph only.
See drawing.

1 - Flange of unit
2 - Rear baggage compartment cover
3 - Washer B5.3 DIN9021-St
outer diameter 15 mm <0.59 in>
4 - Bolt 5 mm thread, length depending on flange thickness,
5 - Self locking nut, 5 mm thread, width over flats 8 mm, M5 DIN985-8



9 Instruments- and Equipment List (Master Equipment List)

Maximum mass of all Instrument Panel Installations max. 6.7 kg <14.8 lbs>.

9.1 Airspeed Indicator

Manufacturer	Type	TCDS No.
Winter	6FMS-4 (Diameter 80mm) 0-300 km/h Ident.No.. LS-8-2 0-160 kts Ident.No.. LS-8K-2 6FMS-5 in km/h	TS 10.210/15
Winter	7FMS-4 (Diameter 58mm) 0-300 km/h Ident.No.. LS-8-2 0-160 kts Ident.No.. LS-8K-2	TS 10.210/19
Thommen	5A58() range 300 km/h	
PZL	PR-400 S-A in km/h	

or other Airspeed indicators approved according to TSO, JTSO or ETSO for use in aircraft or similar FAA approved airspeed indicators to meet TSO C2 reading to 300 km/h <160 Kt., 180 mph> may be used. Maximum instrument error ±2%. Colour marking must be according to Flight Manual section 2-3.

9.2 Altimeter

Manufacturer	Type	TCDS No.
Winter	4 FGH 10 (Diameter 80mm) 1000-10000m Ident.No.. 4110 3000-30000ft Ident.No.. 4330	TS 10.220/46
Winter	4 FGH 20 (Diameter 58mm) 1000-10000m Ident.No. 4220	TS 10.220/47
Winter	4 FGH 40 (Diameter 58mm) 1000-20000ft Ident.No.. 4550	TS 10.220/48
PZL	W-12S in m	

or other Altimeters approved according to TSO, JTSO or ETSO for use in aircraft; one turn of dial max. 1000 m or 3000 ft. A similar FAA approved altimeter to meet TSO C10 with a range of approximately 33000 ft and a mercury or millibar or hektopascal subscale may be used. When an altimeter of up to 20000 ft only is being used, a placard must be near the altimeter stating: Maximum flying altitude 20000 ft. See also Flight Manual section 2-8.

9.3 Seat Belt Harness (with multiple point buckles)

Manufacturer	Type	TCDS No.
Schroth	4-01-0104 (Lap belt and shoulder strap)	40.073/11
Schroth	4-01-1A52	
Gadringer	Lap belt 5202 or 5402 Shoulder strap 2700	40.070/32 40.071/05
Autoflug	BAGU FAG-12 D with multiple point buckle MS-17/B SCHUGU FAG-12 H	40.070/47 40.071/25

9.4 Compass

Manufacturer	Type	TCDS No.
Ludolph	FK 16, FK 5, FK 10	10.410/3
Airpath	C 2300, C 2400	TS 10.220/47
PZL	BS1, KJ-13A	FD 19/77
Bohli	46 MFK 1	Not approved, only as additional system

9.5 UHF – Transmitter and Receiver

Manufacturer	Type	TCDS No.
Dittel	FSG-40 S	10.911/45
	FSG-50	10.911/71
	FSG-60 M	10.911/72
	FSG-70,71 M	10.911/81
	FSG-90	10.911/98JTSO
	FSG 2T	LBA.0.10.911/103JTSO
Becker	AR 3201-(1)	10.911/76
	AR 2008/25 (A)	10.911/48
	AR 4201	JTSO-2C37 D, ED-23A
	AR 6201	EASA.210.1249
Filser / Funkwerk	ATR 720 A	10.911/74
	ATR 720 C	10.911/83
	ATR 600	LBA.0.10.911/106JTSO
	ATR 500	LBA.0.10.911/113JTSO
	ATR 833	EASA.210.0193
Dittel Avionik	KRT2	EASA.210.10038036

or other radios approved according to TSO, JTSO or ETSO for use in aircraft.

9.6 Variometer

Manufacturer	Type	TCDS No.
Winter	5 StVM5 (Diameter 58 mm)	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 (Diameter 80 mm)	TS 10.230/13
	+ 5 m/s Ident.No.. 5251	
	+1000 ft/min Ident.No. 5252	
	+ 10 kts Ident.No.. 5253	
Thommen	4A16() or 4A58()	
Bohli	68PVF1 or 68PVF2 in m/s	
PZL	WRS-5D in m/s	

9.7 Turn and Bank Indicator

Manufacturer	Type	TCDS No.
Apparatebau Gauting	WZ 402/31 12V	10.241/8
Kelvin & Hughes	KTS 0406 or KTS 0406 R	TS 10.210/19
PZL	EZS-3	

9.8 Thermometer

Störck	TF-00-59K	

Temperature sensor in ventilation inlet or landing gear box..

9.9 Electrical Supply:

Only sealed batteries with built in fuse may be used.

Vertical Tail Fin Battery: Optional. Only batteries according to drawing No. 3BR-199 are approved for use.

Battery in baggage compartment: Optional. Fixing to landing gear box only

9.10 Equipment, not being part of minimum equipment:

Transponder: Units approved according to TSO, JTSO or ETSO for use in airplanes can be installed.
Installation of transponder and transponder antenna must be accomplished according to technical note DG-G-03.

Other equipment as gliding computers or loggers: These instruments can be installed, as long as it is guaranteed that they themselves or their effect on the aircraft do not impair safe operation.

Caution: When additional instruments are installed after production, these must be properly secured as long as they are not installed to a manufacturer provided position.
Electrical instruments must be connected via appropriately dimensioned fuses, current for one instrument must not exceed 3A.

After installation a new weighing report must be filed.

10 Materials for repair

Resin systems for repairs

Resin Hexion EPIKOTE ™ Resin MGS LR 285 with
Hardener EPIKURE ™ Curing Agent MGS LH 286
mixing ratio 100:40 ±2 by weight
or
Resin Hexion EPIKOTE ™ Resin MGS LR 385 with
Hardener EPIKURE ™ Curing Agent MGS LH 386
mixing ratio 100:35 ±2 by weight

Caution: This resin system is not suitable for repair of glasfibre structures, use only with Aramid or carbon fibres.

The repaired areas must be post-cured for 20 hours at a min. of 54°C (129°F) before the next take-off.

Fibre Glass Fabric:
Alkalifree E-glass with finish I-550 or FK 144 Manufacturer: Interglas

Interglas No.	Kind of weave	mass(g/m²)	Usage
90070	Linen	79	elevator
92110	2/2 twill	163	stabiliser
92125	2/2 twill	280	local reinforcing
92145	Unidir. Plain	216	fuselage
92146	Unidir. Plain	440	fuselage

Carbon Fibre Fabric: Manufacturer Interglas

98320	Linen	132	wings, spar box, stabiliser and elevator, aileron

Aramid Fibre Fabric (Kevlar): Manufacturer Interglas

98605	Linen	61	Rudder, Elevator

Polyester (Diolen) Fabric Manufacturer: Lückenhaus

No.	Kind of weave	mass(g/m²)	Usage
34048	Linen	206	Fuselage

Foam:

PVC foam Divinycell H 60, 8 mm thick, mass 60 kg/m²,
<wing shells>, <vertical tail fin> Manufacturer: Diab

PVC foam Divinycell H 80, 6 mm thick, mass 80 kg/m²,
<horizontal tail shells> Manufacturer: Diab

PVC foam Divinycell HP 80, 10 mm thick, mass 80 kg/m²,
<spar shearweb > Manufacturer: Diab

alternative

PVC foam Divinycell HT 70, 6/8/10 mm thick, mass 70 kg/m²,
<spar shearweb, horizontal tail>, Manufacturer: Diab

alternative

PVC foam Klegecell TR 75, 8mm thick, mass 75 kg/m²,:
<wing shells> Manufacturer Polimex S.p.A.

Foam Rohacell 71, 2.5 mm thick, mass 70 kg/m²,
<control surfaces> Manufacturer: Röhm

Only LS8-a, LS8-b, LS8-18

Corrugated paper E-Wellpappe, einseitig (370) API 80 (80g/m²)
<Aileron> Manufacturer:Ludwig Clemens

Glue for Plexiglas

To attach the canopy:
glue Teroson Macroplast UK 8303B60
hardener Teroson Macroplast UK5400
mixing ratio: 6 : 1 by mass
thickened with Aerosil.

To repair cracks in the canopy:
Röhm Acrifix 192 which hardens by exposure to light.

Filler

For gluing, the resin-hardener mix should be thickened with chopped cotton fibres FL l f. (add enough so that the resin no longer flows). The surfaces to be glued should be wetted with non-thickened resin + hardener before.

To glue foam pieces into place when repairing sandwich sections and to fill in irregularities and gaps etc. around the repair, Microballoon BJO - 0930 can be used mixed with the resin + hardener. Application and mixing is the same as for the cotton flocks.

Paint UP (Polyester Gelcoats)
Akzo Nobel UP Schwabbellack 03-69066
with hardener 07-20510
mixing ratio: 100:2
Up to 10 % thinner 0630260 can be used.

or Hexion T35 with hardener SF 2
mixing ratio: 100:2-3
Up to 10 % thinner SF can be used.

or PUR paint if such paint was optionally applied

Warning Colour:
Nitro Cellulose Kombilack: Manufacturer: various
reinorange RAL 2004 (orange) or
rot RAL 3000 (red)

Only LS8-a, LS8-b, LS8-18

Water tank inner protective paint
780 CC Kronalux Schwimmbadfarbe: Manufacturer: Paul Jaeger GmbH & Co KG

Sources for material
All materials can be obtained from the DG Flugzeugbau Factory.

11 Repairs

11.1 Composite repairs

Caution: You are only allowed to use the materials specified in section 10.

Warning: Major damage which is outside the scope of the list below should only be repaired by an approved repair station rated for composite aircraft structure work.
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"

1. The following can be repaired:
   a. All damage to paint and putty.
   b. Holes on the belly of the fuselage if the maximum diameter does not exceed the following:
      Forward fuselage 80 mm
      Aft boom 40 mm
      Cracks in the belly maximum length:
      Forward fuselage 120 mm
      Aft boom 80 mm
      The blind glue joints of the fuselage boom must not be damaged.
   c. Holes, cracks, blisters in the wings, and control surfaces not in excess of the following dimensions:

	Average Diameter	Length
Wings	100 mm	150 mm
Aileron, Rudder, Elevator	50 mm	80 mm

      Wings must not be damaged in the spar region.

Caution: The stabilizer is a load carrying structure without spar. Damage in the region 600mm (23,6 in.) from the centerline need not be repaired. For control surfaces, Limit values for Mass and Mass Balance are mandatory (see section 5.2). In case of doubt ask DG prior to repairing.

   d. Replacement of bent fittings.

Note: Special hints for handling FRP repairs are found in the Petite Plane Patch Primer (Author U. Hänle).
Caution: In the rear fuselage shell a layer of Diolen-fabric is installed between the fibreglass-layers. In case of repair replace this layer by 2 layers of fibreglass 92125 $\pm$45°.

11.2 Repairs of Metal Fittings

Repairs of Metal Fittings should not be performed before the manufacturer has been consulted. Most fittings are made from 1.7734.4 aircraft material and welded in 141-WIG process (Shielded arc welding). In no case should they be gas welded, because required properties of the material will disappear.

11.3 Control cables and connections

For processing Nicopress sleeves refer to FAA "Aircraft Inspection and Repair" FAA AC 43.13-1 A or later issue

1. Rudder cables
   Cable: B 3.2 MIL-W-83420 I/A resp. ISO 2020 (former LN9374) zinc plated
   Steel thimbles: A 3.5 DIN6899
   Cable sleeves: Nicopress NT 283M (28-3-M), 3 pressings required, with tool groove Oval M tool 64-CGMP
2. Tow hook operation and wheel brake
   Cable: A 2.4 MIL-W-83420 I/A resp. ISO 2020 (former LN9374)
   A 2.4 LN9389 corrosion resistant (C.G. hook)
   2.5 DIN3055 corrosion resistant with steel core (C.G. hook)
   Steel thimbles: A 2.5 DIN6899
   Cable sleeves: Nicopress NT 282GA (28-2-G), for pressing use tool groove Oval G of tool 64-CGMP. 1 press (
   Stop sleeve: Nicopress NT S117J (871-17-J), use tool groove "J" of tool 51-MJ 1-press
3. Waterballast control
   Cable: 1.2 LN9389 (stainless) resp. 1,25mm D construction 7x7 DIN3055 stainless steel 1.4401
   Steel thimble: A 1.7 DIN 6899
   connected with screw nipple 4F5-120
   Stop sleeve: Nicopress NT S117J (871-17-J), for pressing use
   a. groove "J" of tool 51-MJ, **thereafter**
   b. groove "G" of tool 64-CGMP, 1 press each in given sequence

11.4 Longitudinal motion pushrod bearings

During repairs, never pull pushrods out of longitudinal motion bearings, because all balls will leave their cages. Consequently, for re-installation near each bearing an opening must be cut and repaired afterwards.

These bearings are being used throughout the wing control systems, in the fuselage for elevator-, aileron- and landing gear drive systems.

Caution: Longitudinal motion pushrod bearings should never be greased or oiled, their plastic balls and bearing surfaces will soon be destroyed due to collection of small foreign matter !

12 Appendix

12.1 Equipment list

Serial No.:	Reg. Signs:	Year of Manuf.:

Minimum equipment (check function annually, calibrate every fourth year)

	Type	Manufac-turer	Serial No.	Position	Certificate	Function
Airspeed Ind.						
Altimeter						
Radio						
Microphone			---			
Loudspeaker			---			
Battery			---	Seat front		
Batteryholder			---	Seat front		
Lapbelt				Seat		
Shoulder strap				Main bulkh.		
CG-Hook	G 88	Tost		Landing gear		
Nose hook	E 85	Tost		Nose		
Thermometer	TF-00-59K	Störck	---	Below Panel	---	
Tail tank adapter	4 BR-169			Cockpit pocket		

Additional equipment

	Type	Manufac-turer	Serial No.	Position	Certificate	Function
TEK-Unit				Vert. Tail		
Variometer						
E- Variometer						
4"-braked wheel	Kobold 103-20	Tost		Landing gear		
5"-braked wheel	Standard 113-20	Tost		Landing gear		

Place: _____ **Date:** _____ **Stamp:** _____ **Signature:** _____

12.2 Annual inspection checklist
Page 1 of 3

Serial No.:	Reg. Signs:	Year of Manuf.:

	Wings		**Winglets**		**Fuselage continued**
	Serial No.: _____		Winglet shell		Aileron syst. under seat
	Finish condition		Spar tube		Aileron connectors
	Wings pressure marks		Pins		-Deflectors straight
	Spar stub		Winglet skids		Air brake system
	Root ribs and pins		Assembly free from play		Air brake connectors
	Sandwich shell condition		Locking of ratchet		Trim system
	Drain orifices		Ventilation openings		Trim operation + locking
	Ailerons		Outer tip aileron		Pedals
	Air brakes				-Adjustment + locking
	Connecting means		**Horizontal Tail**		Rudder cables
	Aileron pressure marks		Serial No.: _____		Ground connections
	-Drives at ailerons		Finish condition		Backrest locking
	-Drives at root ribs		Sandwich shell condition		Trim weight holder
	-fixed bearing + washer		Stabiliser ventilation		-Upper end stop
	-Bearings		Elevator ventilation		-Lower end pins + bolt
	-Lateral bearing gaps		Elevator drive lever		-Fixing nut
	-Lateral gaps to wing		drive bearings		Nose hook fitting
	-Seals		Bearings		-Drive
	-Stops		Fuselage connection		Tail skid – cable deflector
	-Ventilation		Connecting means		at front end
	-Cracks / buckling		Seals		-Skid bonding
	Air brake bearings		**Fuselage**		Tail wheel
	-Corrosion at levers		Serial No.: _____		Connecting means
	-Cover springing		Finish condition		Water ballast system
	-Drive at root rib		Shell condition		
	-locking		Cracks		**Tail fin tank**
	-Friction damper function		Drain orifices		Volume: _____ Litres
	Main pins		Rudder mounting		Tail tank adapter existent
			Stabiliser mounting		Cable wear
	Wing water system		Tangential tubes		-Corrosion
	Drain valve at root rib		Bushes for wing root pins		Valve operating ease
	Function + tightness		Locking of bushes		Functioning
	Water bags condition,		Cockpit		Funnel filter + level ind.
	ropes tight		Seat		Opening before/with wing
	Integral Tanks-		Under seat		Discharge time for
	Externally tight		Lap belt fixing at seat		(LS8 5.2 Ltr., others
	-Tight between tanks		Control stick		7.5 Ltr.): _____ Sec.
	-Valve adjustment		Elevator drive under seat		(max. 90 Sec)
	1.Ventilation inner tank				Tail fin battery box
	2.Ventilation inner tank				-battery box cover
	Ventilation outer tank				

Place: _____ Date: _____ Stamp: _____ Signature: _____

Annual inspection checklist
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Serial No.:	Reg. Signs:	Year of Manuf.:

	Canopy
	Serial No.: _____
	Locking mechanism
	Emergency release funct.
	Window
	Ventilation system
	Canopy fixing system
	Gas strut operation
	LS latch (for emerg. release)
	Lift force:____ (8-15 kg)
	(18-33 lbs)
	Rudder
	Finish condition
	Shell
	Ventilation openings
	Drive
	Fixed bearing + washer
	Bearings
	Connecting means
	Landing gear
	Undercarriage + axle
	Tyre
	Springing
	Bearings + joints
	Folding strut overcenter
	Folding strut preset load
	Cockpit locking in flight-
	direction: no play
	Doors
	Drive rods + longitudinal
	Motion bearing
	Connecting means
	Wheel brake system
	C.G. hook + drive
	Ground conn. to contr. stick
	Baggage comp. cover
	Oxygen bottle receptacle
	Fixed ballast at front/rear

	Equipment
	Minimum instrumentation
	Additional Instrumentatio
	Operating range marks
	Limit marks
	Vacuum flasks
	Pneumatic tubing
	Instruments functioning
	Total energy unit
	Systems free from leaks
	Total pressure
	Static pressure
	T.E. system
	Electrical wiring
	Battery + fitting
	Battery main fuse
	Tail fin battery
	Tail fin battery main fuse
	Radio
	Antenna system
	SWR: _____
	Communication check
	Hooks
	C.G. hook
	-Function + automatic rel.
	-Serial No.: _____
	-Op.Limit: _____
	Nose hook function
	-Serial No.: _____
	-Op.Limit: _____
	Release cable end play
	existent w. gear down
	Data placard
	Placards accord. to Maint.
	Manual
	Compass deviation list

	Adjustments
	Wings and horizontal tail
	Tangential play
	Zero position of controls
	Control surface deflections
	acc. to sect. 5
	Max. air brake extension
	Min. 150 mm average
	Air brake locked, lateral
	Gap min. 1 mm inner end
	min.2.5 mm outer end
	Air brake locked, cockpit
	Lever min. 12mm from
	stop
	Control surface friction
	Control surf. Rear edge play
	Landing gear locking
	Trim system function
	Harness function
	Multiple point buckle funct.
	Op.Limit: _____
	Ballast system function
	Absolutely tight?
	General
	Registration signs
	Nationality marks
	Fireproof type placard
	External colour marking
	Checklist
	Minimum cockpit load
	Flight Manual
	Maintenance Manual
	AD status
	Cert. of Airworthiness
	Logbook notation
	Placard notations
	TB-AD-List up to date
	Non-exist. of foreign matter

Place: _____ Date: _____ Stamp: _____ Signature: _____

Annual inspection checklist
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Serial No.:	Reg. Signs:	Year of Manuf.:

	Check wing air brake levers for corrosion at lower end.
	Pull with about 25 kg <55 lbs> force at upper end of each lever in flight direction, simultaneously retract without twisting upper member (do not counter hold at cockpit lever!).
	When under load of last item locking at wing structure results, then bearings at related lever must be exchanged immediately by repair station according to repair instruction "Air Brake Levers".
	Bearings should be exchanged within 6 months, when corrosion is clearly visible, but no locking or jamming occurs.

	Valid C.G. weighing dated _____		**Flight Hours** Total _____ hr.		Entry of Cockpit Load in Cockpit + Flight Manual 6.2 checked, unaltered
	Valid Equipment List dated _____		Last Ann.. _____ hr.		changed to _____kg/lbs
			Take-offs Total _____		
			Last Ann.. _____		

	Inspect automatic couplings for possible wrong rigging
	Permanent installation of equipment in baggage compartment according to chapter 8
	Special inspection hints according to chapter 3 taken care of
	Technical Bulletins performed: _____
	AD's performed: _____
	TB-AD-List updated
	Life time limits / Repetitive Inspections taken care of, see MM section 0.4

Findings / Complaints / Remedy

No.	Findings	Remedy / Repair	Inspector

Place: _____ Date: _____ Stamp: _____ Signature: _____