

ROLLADEN-SCHNEIDER Flugzeugbau GmbH LBA-Nr. EB - 4	MAINTENANCE MANUAL	LS4-b	
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Title for USA: Instructions for Continued Airworthiness

MAINTENANCE MANUAL FOR THE *LS4-b* SAILPLANE

REGISTRATION : _____

SERIAL NUMBER : _____

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OWNER

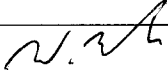
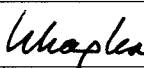
Published: Apr. 15, 1992

The translation of this Manual from German has received our most careful attention. However, in any case of doubt or ambiguity, the original German language text must be considered authoritative.

Erstellt: <i>Heucke</i>	Geprüft: 24. AUG. 1992 <i>Whopra</i>
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Log of Revisions

No.	Pages affected	Description	LBA-Approval Signature / Date
0	2-6 14-12	Typo in metric 80 kg table corrected (TB 4043) Addendum to Annual Inspection Checklist	
1	0-1, 0-2, 2-3, 2-4a, 2-5a, 5-1, 5-2 5-3	Update for possible increase of non-lifting parts weight Increase of life limit to 12000 h Tow hook time limit waived by manufacturer (TB 4046)	 27. AUG. 2003 

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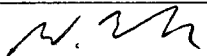
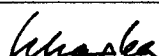
Pages included

Chapter	Page	Date	Chapter	Page	Date	
0	Title page	Apr. 15, 1992	6	6-1	Apr. 15, 1992	
	0-1	<i>Dec. 2002 (TB 4046)</i>		6-2	Apr. 15, 1992	
	0-2	<i>Dec. 2002 (TB 4046)</i>		6-3	Apr. 15, 1992	
	0-3	Apr. 15, 1992		6-4	Apr. 15, 1992	
	0-4	Apr. 15, 1992	8	8-1	Apr. 15, 1992	
1	1-1	Apr. 15, 1992		8-2	Apr. 15, 1992	
	1-1a	Apr. 15, 1992	10	10-1	Apr. 15, 1992	
	1-2	Apr. 15, 1992		10-2	Apr. 15, 1992	
	1-3	Apr. 15, 1992	11	11-1	Apr. 15, 1992	
	1-4	Apr. 15, 1992		11-2	Apr. 15, 1992	
	1-5	Apr. 15, 1992		12	12-1	Apr. 15, 1992
	1-6	Apr. 15, 1992			12-2	Apr. 15, 1992
	1-7	Apr. 15, 1992		13	13-1	Apr. 15, 1992
2	2-1	Apr. 15, 1992			13-2	Apr. 15, 1992
	2-2	Apr. 15, 1992		14	14-1	Apr. 15, 1992
	2-3	<i>Dec. 2002 (TB 4046)</i>			14-1a	Apr. 15, 1992
	2-4	Apr. 15, 1992	14-2		Apr. 15, 1992	
	2-4a	<i>Dec. 2002 (TB 4046)</i>	14-3	Apr. 15, 1992		
	2-5	Apr. 15, 1992	14-4	Apr. 15, 1992		
	2-5a	<i>Dec. 2002 (TB 4046)</i>	14-5	Apr. 15, 1992		
	2-6	Apr. 15, 1992	14-6	Apr. 15, 1992		
2-7	Apr. 15, 1992	14-7	Apr. 15, 1992			
2-8	Apr. 15, 1992	14-8	Apr. 15, 1992			
3	3-1	Apr. 15, 1992	14-9	Apr. 15, 1992		
	3-2	Apr. 15, 1992	14-10	Apr. 15, 1992		
	3-3	Apr. 15, 1992	14-11	Apr. 15, 1992		
4	4-1	Apr. 15, 1992	14-12	Oct. 1999 (TB 4043)		
	4-2	Apr. 15, 1992	15	15-1	Apr. 15, 1992	
	4-3	Apr. 15, 1992		5	5-1	<i>Dec. 2002 (TB 4046)</i>
	4-4	Apr. 15, 1992	5-2		<i>Dec. 2002 (TB 4046)</i>	
	4-5	Apr. 15, 1992	5-3		<i>Dec. 2002 (TB 4046)</i>	
	4-6	Apr. 15, 1992				
	4-7	Apr. 15, 1992				
	4-8	Apr. 15, 1992				
	4-9	Apr. 15, 1992				

Edition: Dec. 2002

Revision – 1 (TB 4046)

Page 0-2

Erstellt: 18.12.02 	Geprüft: 	Complies:
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0.4 CONTENTS

	Page
0 GENERAL	
0.1 Log of Revisions	0-1
0.2 Pages included	0-2
0.3 Contents	0-3, 0-4
1 SYSTEMS	
1.1 Description of Systems	1-1
1.2 Aileron System (Fuselage)	1-2
1.3 Air Brake System (Fuselage)	1-3
1.4 Elevator System	1-4
1.5 Wing Control Systems and Water Ballast System	1-5
1.6 Rudder Control System	1-6
1.7 Landing Gear System	1-6
1.8 Water Ballast System (Fuselage)	1-7
2 WEIGHT AND BALANCE	
2.1 Introduction	2-1
2.2 Weighing Procedure	2-1
2.3 Calculation of Loading Limits	2-2, 2-3
2.4 Calculation of Maximum Weight of Non-Lifting Parts	2-4, 2-5
2.5 Empty Weight C.G. Table	2-6, 2-7, 2-8
3 INSPECTIONS	
3.1 Ordinary Inspections	3-1
Annual Inspection	3-1, 3-2
3.2 Extraordinary Inspections	3-2
3.3 Lubrication Schedule	3-3
4 INSTALLATIONS	
4.1 Installation of Ailerons	4-1, 4-2
Elevator	4-2
Rudder	4-3
4.2 Installation of Internal Gap Sealing	4-4
4.3 Installation of Upper Side Gap Sealing	4-5
4.4 Turbulator tape	4-5
4.5 Seat	4-6
4.6 Adjustment of Water Ballast Drives	4-6
4.7 Water Ballast System	4-7, 4-8
4.8 Nose Hook System	4-9
5 TIME BETWEEN OVERHAUL (TBO) / AIRWORTHINESS LIMITATIONS	
5.1 TBO	5-1
5.2 AIRWORTHINESS LIMITATIONS SECTION (LBA appr.)	5-1
5.3 Log of Revisions for Airworthiness Limitations Section	5-1
5.4 Airworthiness Limitations	5-2
5.5 Inspection Sequence to increase Service Life	5-3

0.4 CONTENTS continued

6	<u>CONTROL SURFACES</u>	
6.1	Flight Control Travel Limits	6-1
6.2	Weight and Mass Balance	6-1
6.3	Control Surfaces Play and Friction	6-2
6.4	Limit Values for Control Surface Deflections in mm / inches	6-3, 6-4
8	<u>STRUCTURE</u>	
8.1	Pressure Ports	8-1
8.2	Drain Orifices	8-1
8.3	Primary and Secondary Structure	8-2
10	<u>PLACARDS</u>	
	Placards	10-1, 10-2
11	<u>BALLAST AND EQUIPMENT INSTALLATION</u>	
11.1	Permanent Installation of Fixed Ballast	11-1
11.2	Permanent Installation of Equipment in Baggage Compartment	11-2
12	<u>MASTER EQUIPMENT LIST</u>	
		12-1, 12-2
13	<u>MATERIALS</u>	
	Materials and Sources of Supply	13-1, 13-2
14	<u>INSPECTION FORMS</u>	
	TB-AD-Accomplishment List No. 1	14-1
	TB-AD-Accomplishment List No. (blank)	14-2
	Inspection Report	14-3
	Weighing Report	14-4
	Flight Test Report	14-5
	Equipment List	14-6
	Control Surface Weight/Moment Report	14-7
	Control Surface Deflections	14-8
	Annual Inspection Checklist 1	14-9
	Annual Inspection Checklist 2	14-10
	Annual Inspection Checklist 3	14-11
15	<u>CHANGE OF OWNERSHIP</u>	
	Change of Ownership Form	15-1

Technical Bulletins (TB) and Airworthiness Directives (AD) must be entered at end of Maintenance Manual.

Accomplishment of TB and AD should be entered into list page 14-1 and signed by inspector.

DESCRIPTION OF SYSTEMS

AILERON CONTROLS

Aileron system activated via pushrod's guided in longitudinal motion ball bearings. Connection of system by automatic coupling during rigging (Hänle system). Ailerons partly mass balanced.

ELEVATOR CONTROLS

Elevator system activated via pushrods guided in longitudinal motion ball bearings. Automatic coupling during assembly of horizontal tail unit. 100% mass balance in vertical tail fin pushrod.

RUDDER CONTROLS

Rudder system activated via steel cables guided in polyamide tubing, no closed control circuit. 100% mass balance at rudder.

WHEEL BRAKE

Feet operated, activated by bowden cable from rudder pedals.

AIR BRAKES

Activated via pushrods guided partly in longitudinal motion ball bearings. Automatic connection of system during rigging (Hänle system). Upper surface double height air brakes with flexible cover blades. Friction damper in box to prevent oscillations during extension.

WATER BALLAST SYSTEM

One tank per wing, maximum capacity per wing 70 Liters (18.5 US gal., 15.4 Imp. gal.), optionally 50 Liter tanks (13.2 US gal., 11.0 Imp. gal.) are available. Valves at wing root, loading and dumping orifice on under side of wings near root. Automatic connection during rigging.

COCKPIT

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

CANOPY

One piece hinged up front. A spring-loaded peg at the canopy frame rear edge acts as temporary hinge for clean separation from the fuselage during emergency jettison.

INSTRUMENT PANEL

Panel lifting 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 liters, diameter 100 mm (3.94 in).

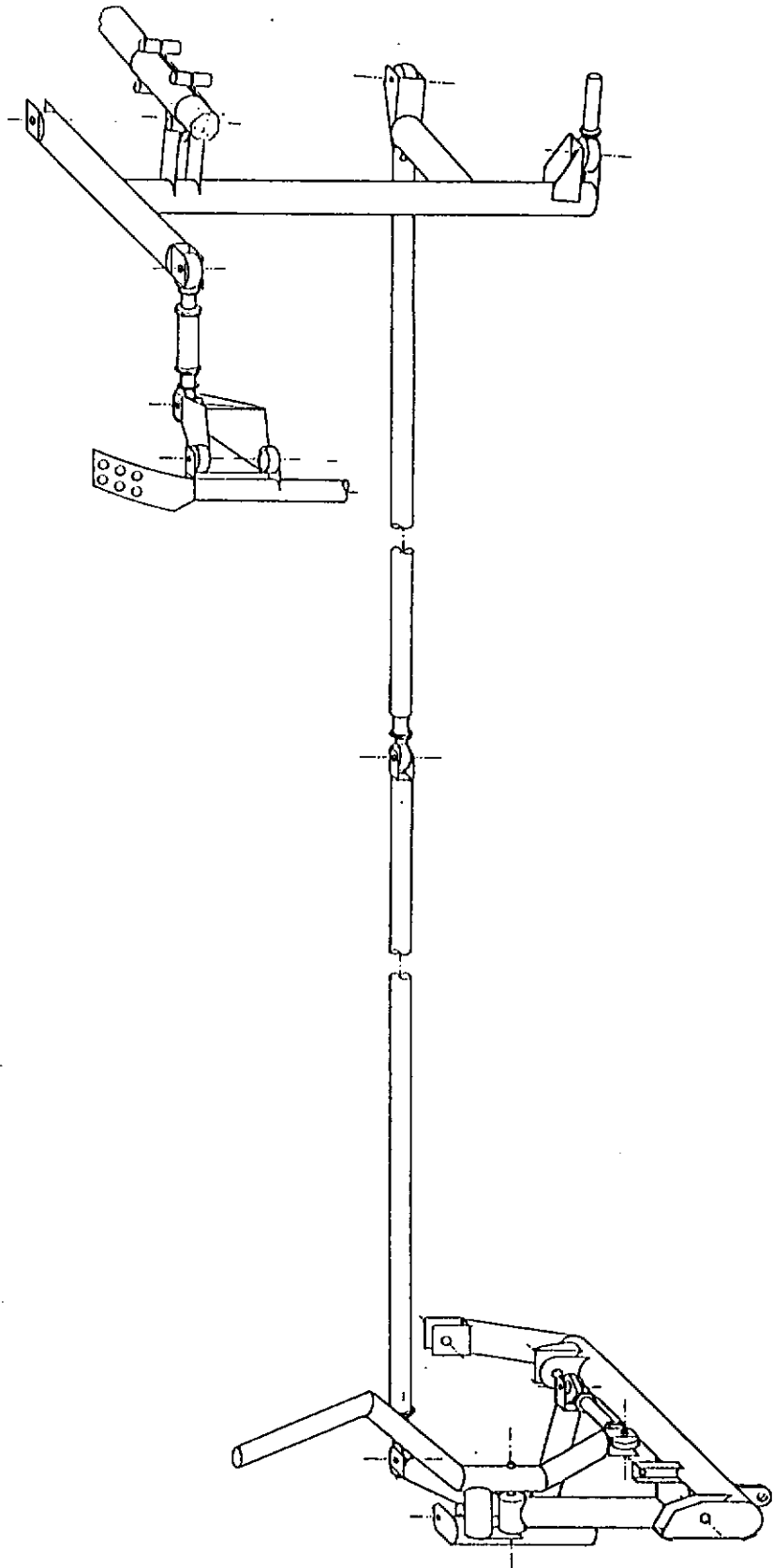
LANDING GEAR

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

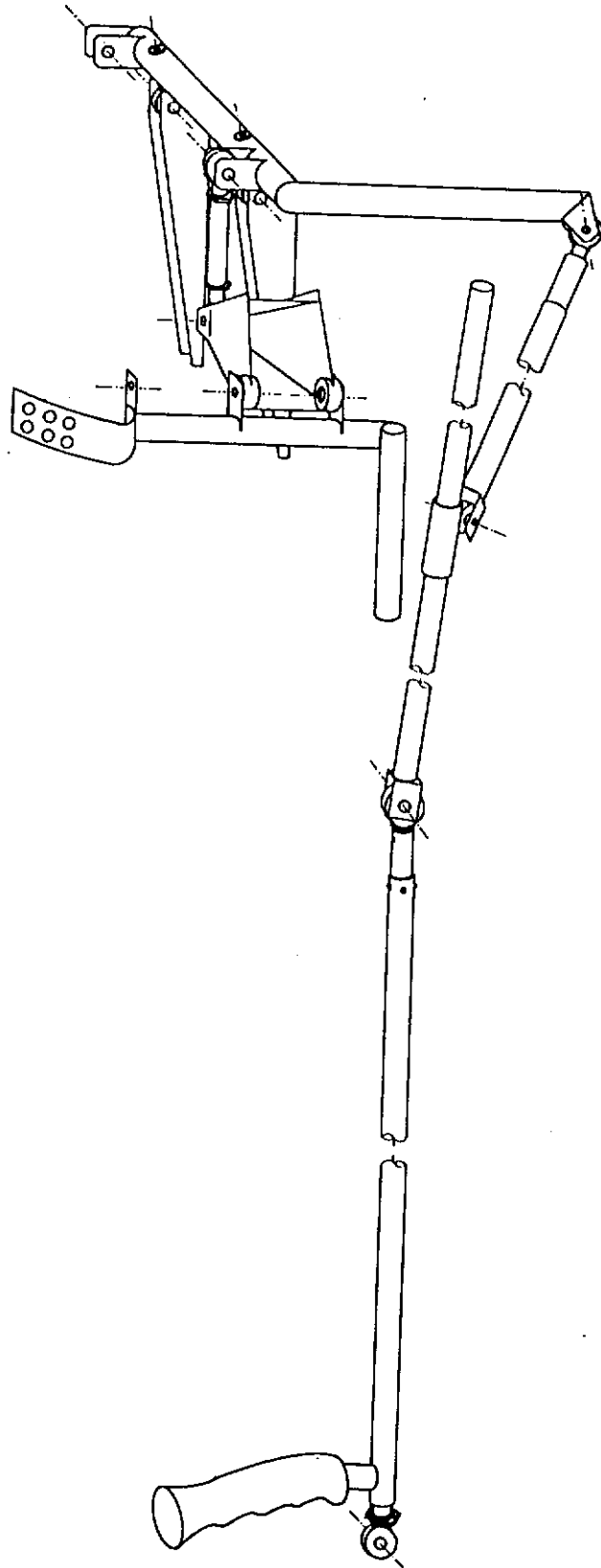
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0-1	Apr. 15, 1992	8-1	Apr. 15, 1992
0-2	Apr. 15, 1992	8-2	Apr. 15, 1992
0-3	Apr. 15, 1992		
0-4	Apr. 15, 1992	10-1	Apr. 15, 1992
		10-2	Apr. 15, 1992
1-1	Apr. 15, 1992		
1-2	Apr. 15, 1992	11-1	Apr. 15, 1992
1-3	Apr. 15, 1992	11-2	Apr. 15, 1992
1-4	Apr. 15, 1992		
1-5	Apr. 15, 1992	12-1	Apr. 15, 1992
1-6	Apr. 15, 1992	12-2	Apr. 15, 1992
1-7	Apr. 15, 1992		
		13-1	Apr. 15, 1992
2-1	Apr. 15, 1992	13-2	Apr. 15, 1992
2-2	Apr. 15, 1992		
2-3	Apr. 15, 1992	14-1	Apr. 15, 1992
2-4	Apr. 15, 1992	14-2	Apr. 15, 1992
2-5	Apr. 15, 1992	14-3	Apr. 15, 1992
2-6	Apr. 15, 1992	14-4	Apr. 15, 1992
2-7	Apr. 15, 1992	14-5	Apr. 15, 1992
2-8	Apr. 15, 1992	14-6	Apr. 15, 1992
		14-7	Apr. 15, 1992
3-1	Apr. 15, 1992	14-8	Apr. 15, 1992
3-2	Apr. 15, 1992	14-9	Apr. 15, 1992
3-3	Apr. 15, 1992	14-10	Apr. 15, 1992
		14-11	Apr. 15, 1992
4-1	Apr. 15, 1992		
4-2	Apr. 15, 1992	15-1	Apr. 15, 1992
4-3	Apr. 15, 1992		
4-4	Apr. 15, 1992		
4-5	Apr. 15, 1992		
4-6	Apr. 15, 1992		
4-7	Apr. 15, 1992		
4-8	Apr. 15, 1992		
4-9	Apr. 15, 1992		
5-1	Apr. 15, 1992		
5-2	Apr. 15, 1992		
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6-4	Apr. 15, 1992		

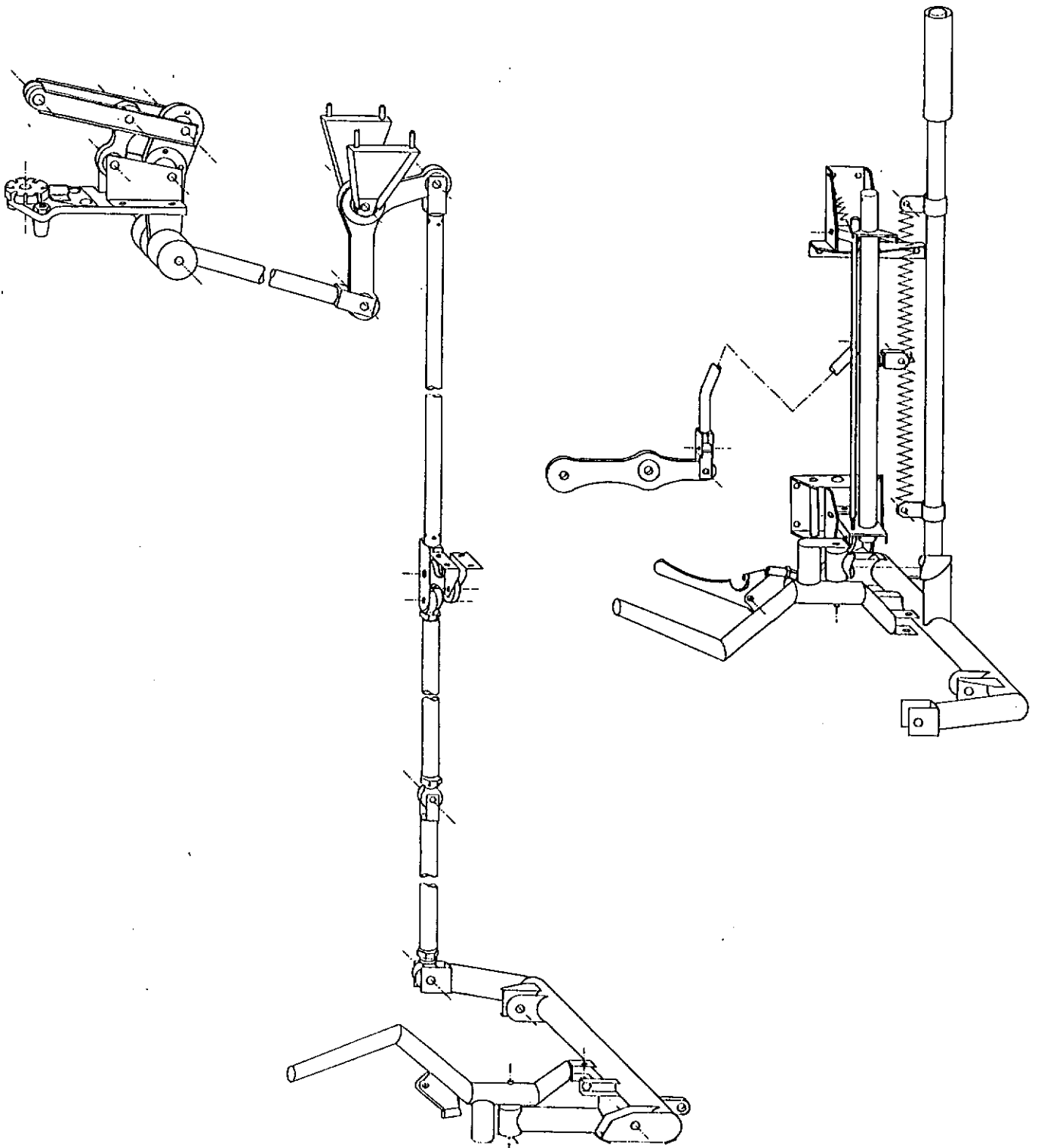
AILERON SYSTEM (Fuselage)



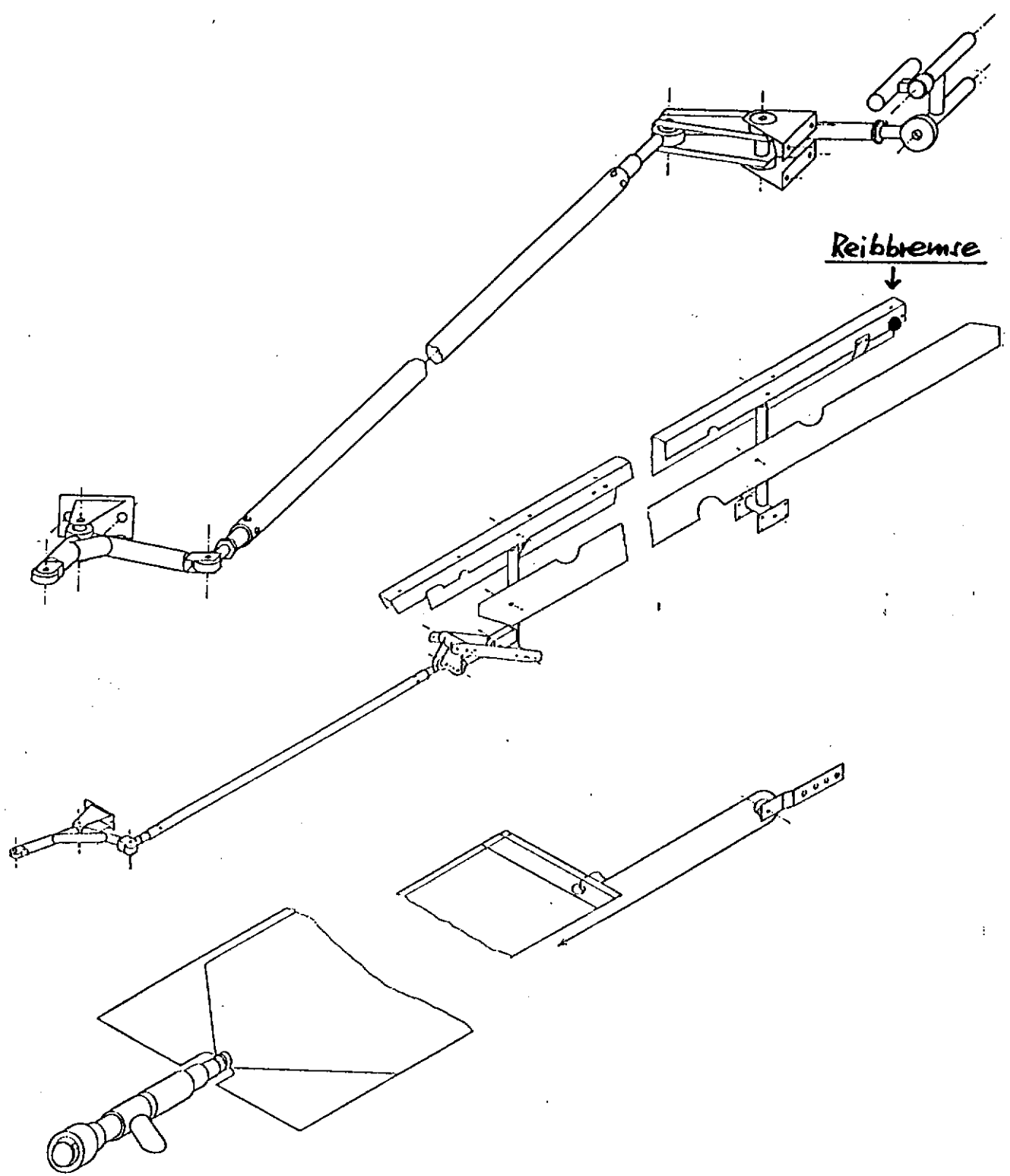
AIR BRAKE SYSTEM (Fuselage)



ELEVATOR SYSTEM

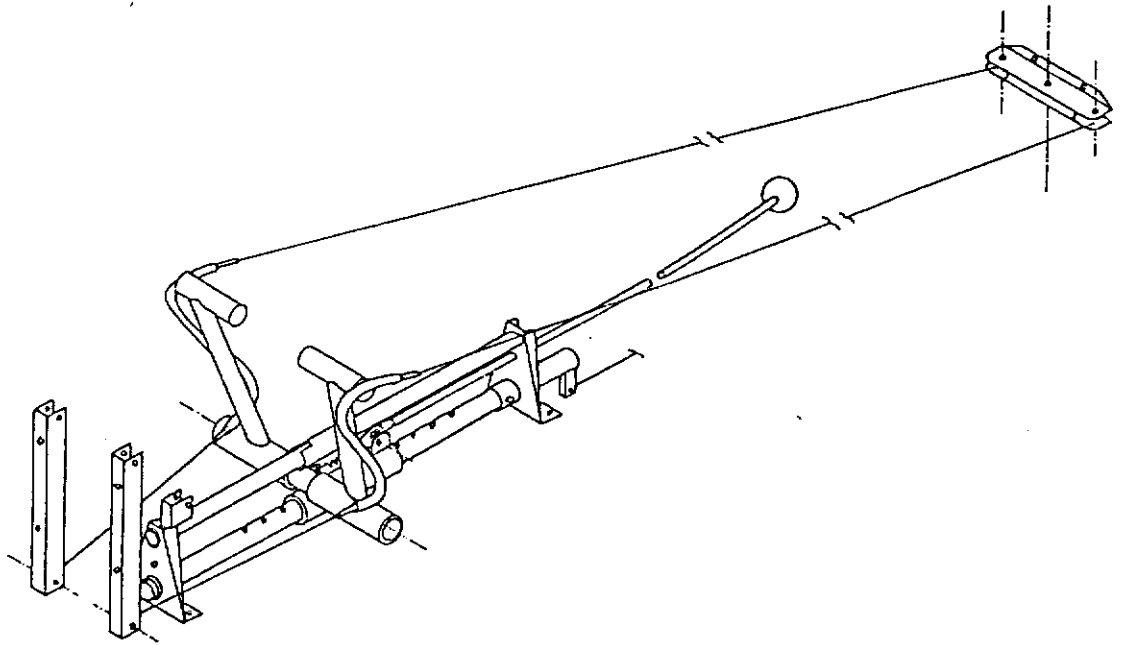


FLÜGEL STEUERUNG UND WASSERBALLAST

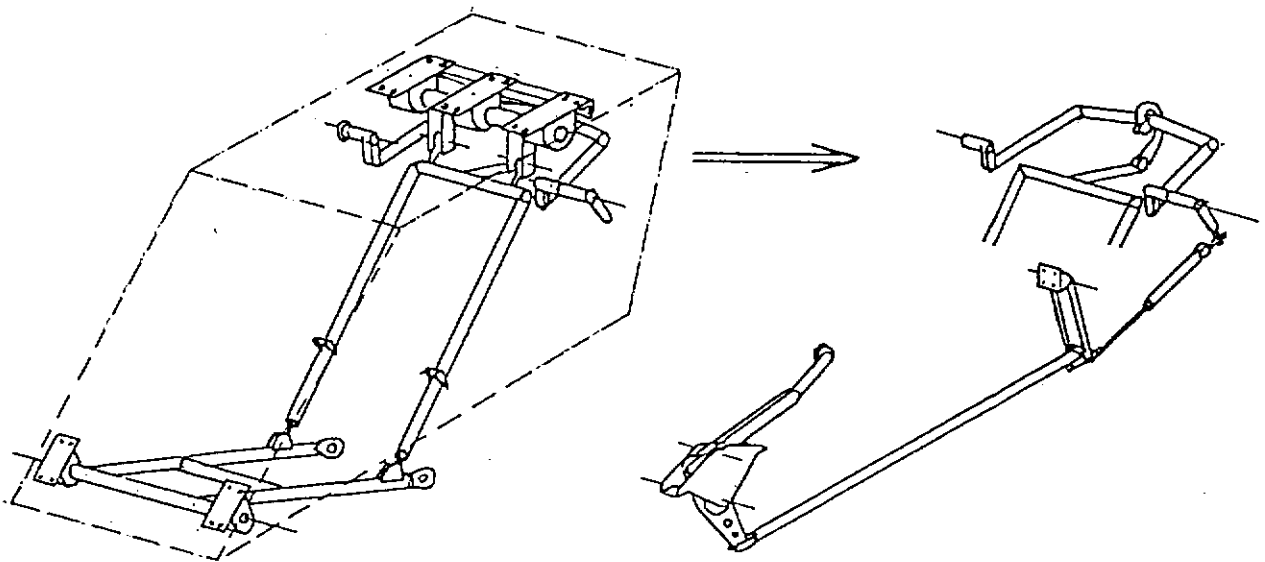


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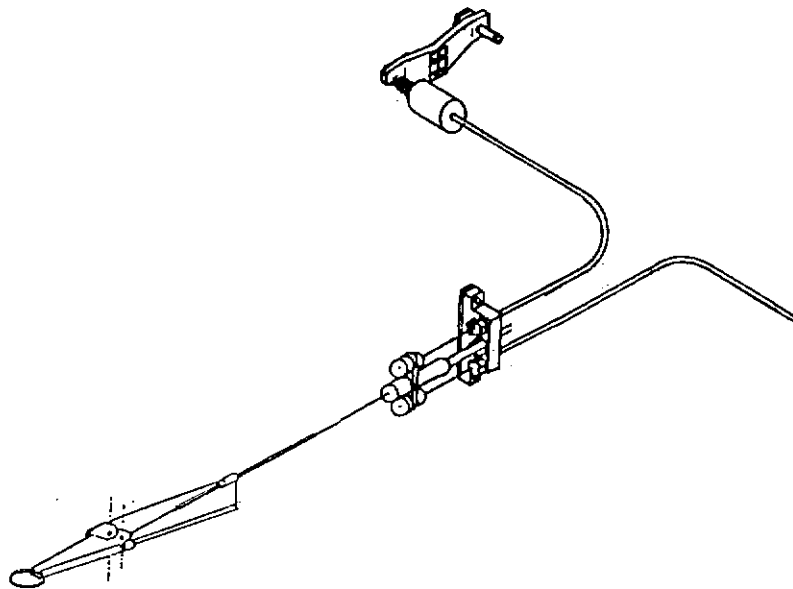
RUDDER CONTROL SYSTEM



LANDING GEAR SYSTEM



WATER BALLAST SYSTEM Fuselage



2.1 INTRODUCTION

This section describes the procedures for establishing the basic empty mass and C.G. position of the sailplane, procedures for determining permissible Cockpit Loading and approved mass limitations.

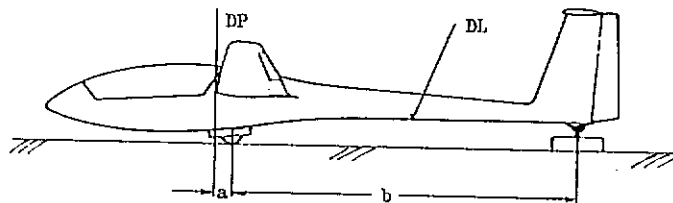
Complying with these procedures, the pilot is able to load the sailplane properly without any additional calculations due to loading limits placarded in the cockpit and provided in the Flight Manual page 6-2.

A comprehensive list of all equipment available for this sailplane is included in chapter 12.

2.2 WEIGHING PROCEDURE

DATUM LINE (DL): Under side of fuselage boom placed horizontal
 DATUM POINT (DP): Leading edge of wing at root

1. Determine total weight by weighing all parts and adding together. For inflight C.G. position, the pilot's weight must be added too.
2. Assemble sailplane. For inflight C.G., the pilot must be seated in the sailplane.
3. Raise tail on weighing machine until datumline is level using wooden blocks or adjustable jack. (Check with leveling gauge)
4. Determine gross tail weight.
5. Measure distance (b) from tail support to center of landing gear axis.
6. Using plumb lead, determine points on floor perpendicular to left and right datum points, and points on floor perpendicular to center of landing gear axis. Measure distance (a) from wheel axis to datum point.



7. Determine tare tail weight (Weight of auxiliary support used under 3)
8. Calculate nett tail weight = gross tail weight minus tare tail weight
9. Calculate empty weight C.G. position:

$$X_{cg} = \frac{\text{nett tail weight} * b}{\text{empty weight}} + a$$

10. When a battery is fitted in the vertical tail fin, weighing must be done in this configuration. Weigh tail fin battery separately. (Maximum 2.6 kg <5.7 lbs>).
11. Calculate loading limits according to page 2-2.

Form for Weighing Report see Maintenance Manual, page 14-4

2.3 CALCULATION OF LOADING LIMITS

1. Determine Minimum Cockpit Load from Table "Empty Weight C.G. Position", pages 2-6 or 2-7/8.
When being used in a club, Minimum Cockpit Load should be 70 kg (154 lbs). If it is higher, permanent ballast may be fitted under the forward seat portion, see page 11-1.

Finally, resulting Minimum Cockpit Load should be entered in the following places:

- 1) in weighing report of inspection
 - 2) in Flight Manual page 6-2
 - 3) under instrument panel cover
 - 4) on Data Placard in cockpit
2. Maximum approved Weight of Non-lifting Parts may vary between 230 kg and 247 kg (507 lbs to 545 lbs).
In contrast to methods used up to now, Maximum Weight of Non-lifting Parts can be determined in relation to Empty Weight and Empty Weight C.G. Position according to table on page 2-4 and 2-5. See also examples on page 2-3.
Maximum Weight of Non-lifting Parts should be entered into Weighing Report.
3. Determine Maximum approved Cockpit Load from table "Empty Weight C.G. Position", page 2-8 and 2-9.
Maximum Cockpit Load normally should be 110 kg (242 lbs), as given in empty weight C.G. table, when being used in a club. It may be lower due to trim conditions, excessive equipment or repairs.
Calculate Maximum Cockpit Load on weighing report, see also examples on page 2-3.
Resulting Maximum Cockpit Load should be entered in the following places:
 - 1) in weighing report of inspection
 - 2) in Flight Manual, page 6-2
 - 3) on Data Placard in cockpit
4. Empty weight (perhaps increased by weight of permanently fitted trim ballast) should be entered in the following places:
 - 1) in weighing report of inspection
 - 2) in Flight Manual, page 6-2 for calculation of maximum permissible water ballast weight
5. Battery position during weighing should be entered in the following places:
 - 1) in equipment list and weighing report of inspection
 - 2) on Data Placard in cockpit
 - 3) in Flight Manual, page 6-2, if fitted in tail fin

For permanent installation of trim ballast weights see page 11-1.

Form for Weighing Report see Maintenance Manual, page 14-4

Calculation of Loading Limits continued

Examples for calculation of loading limits:

See also Maintenance Manual page 14-4, form Weighing Report

1) Minimum Cockpit Load

For empty weight **255** kg <562 lbs> and empty weight C.G. position

665 mm <26.181 in> Minimum Cockpit Load according to table pages

2-6/7 or 2-8/10 is **75** kg <165 lbs>

Limit value **680** mm <26.772 in> greater than calc. value **665** mm <26.181 in>

2) Maximum Weight of Non-lifting Parts

Maximum non-lifting parts weight at empty weight **255** kg <562 lbs>

and empty weight C.G. position **665** mm <26.181 in> is according to

table pages 2-4/5 (Normal water ballast bags)..... **234** kg <516 lbs>

table pages 2-4a/5a (TB 4047, "V112") **254** kg <560 lbs>

3) Maximum permissible Cockpit Load *Wing water bags*

Fuselage with complete equipment, **Normal** *TB 4047, "V112"*

battery, canopy and main pins 130.6 kg <288 lbs> **130.6** kg <288 lbs>

Horizontal tail 6.3 kg < 14 lbs> **6.3** kg < 14 lbs>

Cockpit Load (maximum 110 kg <242 lbs>) **97** kg <214 lbs> **110** kg <242 lbs>

Weight of Non-lifting Parts 233.9 kg <516 lbs> **246.9** kg <544 lbs>

Maximum Cockpit Load (max. 110 kg <242 lbs>) **97** kg < lbs> **110**kg <242 lbs>

Maximum all-up mass 525 kg <1157 lbs>

Entry in Flight Manual, page 6-2, for both examples above:

Empty Weight	C.G. position	Max. Cockpit Load	Minimum Cockpit Load	Permanently fitted Ballast Mass		Battery in tail fin	Wing Tank-Volume	Date / Inspector
				<i>forward</i>	<i>aft</i>			
[kg]	[mm]	[kg]	[kg]	[kg]	[kg]	YES/NO	[kg]	
255	665	97	75	0	0	NO	160	19.Dec.2002 GS
255	665	110	75	0	0	NO	"V112"	19.Dec.2002 GS

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2.4 CALCULATION OF MAXIMUM WEIGHT OF NON-LIFTING PARTS

Maximum weight of non-lifting parts of 247 kg (545 lbs) must be reduced in relation to empty weight and empty weight C.G. position according to table below. (For lbs / inch values see following page)

Example: For empty weight C.G. position of 665 mm (26.18 in) and empty weight of 255 kg (562 lbs), the permissible weight of non-lifting parts is 234 kg (516 lbs).

Empty weight C.G. Position Xs (mm)

Empty Weight G (kg) from-to	from 540	from 560	from 580	from 600	from 620	from 640	from 660	from 680	from 700	from 720	from 740	from 760
	to 559	to 579	to 599	to 619	to 639	to 659	to 679	to 699	to 719	to 739	to 759	to 779
240-241	230	230	230	230	230	231	233	234	235	236	237	239
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273-274	230	230	231	232	233	235	236	237	239	240	242	243
274-275	230	230	231	232	234	235	236	238	239	240	242	243
275-276	230	230	231	232	234	235	236	238	239	240	242	243
276-277	230	230	231	232	234	235	236	238	239	241	242	243
277-278	230	230	231	232	234	235	237	238	239	241	242	243
278-279	230	230	231	233	234	235	237	238	239	241	242	244
279-280	230	230	231	233	234	235	237	238	240	241	242	244
280-281	230	230	231	233	234	235	237	238	240	241	242	244
281-282	230	230	231	233	234	236	237	238	240	241	243	244
282-283	230	230	232	233	234	236	237	238	240	241	243	244
283-284	230	230	232	233	234	236	237	239	240	241	243	244
284-285	230	230	232	233	234	236	237	239	240	242	243	244

Contact manufacturer for values beyond printed table !

Calculation of Maximum Weight of Non-Lifting Parts

Valid for Water bags "V112"

Maximum weight of non-lifting parts of 255 kg <562 lbs> must be reduced in relation to empty weight at 15 m span and empty weight C.G. position Xs according to table below (For lbs/inch values see following page). Example: For empty weight C.G. position of **665** mm <26.181 in> and empty weight of **255** kg <562 lbs> the permissible weight of non-lifting parts is **254** kg <560 lbs>.

Empty Weight G <kg>	Empty Weight C.G. position Xs <mm>											
	from 560 to 579	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
245 -246	250	250	250	251	252	253	254	256	257	258	259	260
246 -247	250	250	250	251	252	253	254	256	257	258	259	261
247 -248	250	250	250	251	252	253	255	256	257	258	259	261
248 -249	250	250	250	251	252	253	255	256	257	258	260	261
249 -250	250	250	250	251	252	254	255	256	257	258	260	261
250 -251	250	250	250	251	252	254	255	256	257	259	260	261
251 -252	250	250	250	251	253	254	255	256	257	259	260	261
252 -253	250	250	250	251	253	254	255	256	258	259	260	261
253 -254	250	250	250	251	253	254	255	256	258	259	260	261
254 -255	250	250	250	252	253	254	255	257	258	259	260	262
255 -256	250	250	250	252	253	254	255	257	258	259	260	262
256 -257	250	250	250	252	253	254	256	257	258	259	261	262
257 -258	250	250	251	252	253	254	256	257	258	259	261	262
258 -259	250	250	251	252	253	255	256	257	258	260	261	262
259 -260	250	250	251	252	253	255	256	257	258	260	261	262
260 -261	250	250	251	252	253	255	256	257	259	260	261	262
261 -262	250	250	251	252	254	255	256	257	259	260	261	263
262 -263	250	250	251	252	254	255	256	258	259	260	261	263
263 -264	250	250	251	252	254	255	256	258	259	260	262	263
264 -265	250	250	251	253	254	255	256	258	259	260	262	263
265 -266	250	250	251	253	254	255	257	258	259	260	262	263
266 -267	250	250	251	253	254	255	257	258	259	261	262	263
267 -268	250	250	252	253	254	255	257	258	259	261	262	263
268 -269	250	250	252	253	254	256	257	258	260	261	262	264
269 -270	250	250	252	253	254	256	257	258	260	261	262	264
270 -271	250	250	252	253	254	256	257	258	260	261	262	264
271 -272	250	251	252	253	255	256	257	259	260	261	263	264
272 -273	250	251	252	253	255	256	257	259	260	261	263	264
273 -274	250	251	252	253	255	256	257	259	260	262	263	264
274 -275	250	251	252	254	255	256	258	259	260	262	263	264
275 -276	250	251	252	254	255	256	258	259	260	262	263	264
276 -277	250	251	252	254	255	256	258	259	261	262	263	265
277 -278	250	251	252	254	255	257	258	259	261	262	263	265
278 -279	250	251	253	254	255	257	258	259	261	262	264	265
279 -280	250	251	253	254	255	257	258	260	261	262	264	265
280 -281	250	251	253	254	255	257	258	260	261	262	264	265
281 -282	250	251	253	254	256	257	258	260	261	263	264	265
282 -282	250	252	253	254	256	257	258	260	261	263	264	265
282 -284	250	252	253	254	256	257	259	260	261	263	264	266
284 -285	250	252	253	254	256	257	259	260	262	263	264	266

Erstellt: 18.12.02	Geprüft: <i>Wapka</i>	Complies:
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2.4 CALCULATION OF MAXIMUM WEIGHT OF NON-LIFTING PARTS continued

Maximum weight of non-lifting parts of 549 lbs (249 kg) must be reduced in relation to empty weight and empty weight C.G. position according to table below. (For kg / mm values see preceding page)

Example: For an empty weight C.G. position of 26.18 in (665 mm) and an empty weight of 562 lbs (255 kg), the permissible weight of non-lifting parts is 516 lbs (234 kg).

Empty weight C.G. Position Xs (inches)

Empty Weight G (lbs)	from	from	from	from	from	from	from	from	from	from	from	from
	21.26 to 22.01	22.05 to 22.80	22.83 to 23.58	23.62 to 24.37	24.41 to 25.16	25.20 to 25.95	25.98 to 26.73	26.77 to 27.52	27.56 to 28.31	28.35 to 29.09	29.13 to 29.88	29.92 to 30.67
529-531	507	507	507	507	507	509	514	516	518	520	522	527
531-534	507	507	507	507	507	509	514	516	518	520	522	527
534-536	507	507	507	507	507	511	514	516	518	520	525	527
536-538	507	507	507	507	507	511	514	516	518	520	525	527
538-540	507	507	507	507	509	511	514	516	518	522	525	527
540-542	507	507	507	507	509	511	514	516	520	522	525	527
542-545	507	507	507	507	509	511	514	516	520	522	525	527
545-547	507	507	507	507	509	511	514	518	520	522	525	527
547-549	507	507	507	507	509	511	514	518	520	522	525	529
549-551	507	507	507	507	509	511	516	518	520	522	525	529
551-553	507	507	507	507	509	511	516	518	520	522	527	529
553-556	507	507	507	507	509	514	516	518	520	522	527	529
556-558	507	507	507	507	509	514	516	518	520	525	527	529
558-560	507	507	507	507	509	514	516	518	520	525	527	529
560-562	507	507	507	507	511	514	516	518	522	525	527	529
562-564	507	507	507	507	511	514	516	518	522	525	527	529
564-567	507	507	507	507	511	514	516	520	522	525	527	531
567-569	507	507	507	509	511	514	516	520	522	525	527	531
569-571	507	507	507	509	511	514	518	520	522	525	529	531
571-573	507	507	507	509	511	514	518	520	522	525	529	531
573-575	507	507	507	509	511	514	518	520	522	527	529	531
575-578	507	507	507	509	511	516	518	520	522	527	529	531
578-580	507	507	507	509	511	516	518	520	525	527	529	531
580-582	507	507	507	509	511	516	518	520	525	527	529	534
582-584	507	507	507	509	514	516	518	520	525	527	529	534
584-586	507	507	507	509	514	516	518	522	525	527	529	534
586-589	507	507	507	509	514	516	518	522	525	527	531	534
589-591	507	507	507	511	514	516	518	522	525	527	531	534
591-593	507	507	507	511	514	516	520	522	525	529	531	534
593-595	507	507	507	511	514	516	520	522	525	529	531	534
595-597	507	507	507	511	514	516	520	522	525	529	531	534
597-600	507	507	509	511	514	518	520	522	527	529	531	536
600-602	507	507	509	511	514	518	520	522	527	529	531	536
602-604	507	507	509	511	514	518	520	522	527	529	534	536
604-606	507	507	509	511	516	518	520	525	527	529	534	536
606-608	507	507	509	511	516	518	520	525	527	529	534	536
608-611	507	507	509	511	516	518	520	525	527	531	534	536
611-613	507	507	509	511	516	518	522	525	527	531	534	536
613-615	507	507	509	516	516	518	522	525	527	531	534	538
615-617	507	507	509	516	516	518	522	525	529	531	534	538
617-619	507	507	509	516	516	518	522	525	529	531	534	538
619-622	507	507	509	516	516	520	522	525	529	531	536	538
622-624	507	507	511	516	516	520	522	525	529	531	536	538
624-626	507	507	511	516	516	520	522	527	529	531	536	538
626-628	507	507	511	516	516	520	522	527	529	534	536	538

Contact manufacturer for values beyond printed table !

Calculation of Maximum Weight of Non-Lifting Parts

Valid for Water bags "V112"

Maximum weight of non-lifting parts of 562 lbs <255 kg> must be reduced in relation to empty weight and empty weight C.G. position Xs according to table below (For kg/mm values see preceding page).

Example: For empty weight C.G. position of **26.181** in <665 mm> and empty weight of **562** lbs <255 kg> the permissible weight of non-lifting parts is **560** lbs <254 kg>.

Empty Weight G <lbs>	Empty Weight C.G. position Xs <in>											
	from 22.047 to 22.795	from 22.835 to 23.583	From 23.622 to 24.370	from 24.409 to 25.157	from 25.197 to 25.945	from 25.984 to 26.732	from 26.772 to 27.520	from 27.559 to 28.307	from 28.346 to 29.094	from 29.134 to 29.882	from 29.921 to 30.669	from 30.709 to 31.457
540 -542	551	551	551	553	556	558	560	564	567	569	571	573
542 -545	551	551	551	553	556	558	560	564	567	569	571	575
545 -547	551	551	551	553	556	558	562	564	567	569	571	575
547 -549	551	551	551	553	556	558	562	564	567	569	573	575
549 -551	551	551	551	553	556	560	562	564	567	569	573	575
551 -553	551	551	551	553	556	560	562	564	567	571	573	575
553 -556	551	551	551	553	558	560	562	564	567	571	573	575
556 -558	551	551	551	553	558	560	562	564	569	571	573	575
558 -560	551	551	551	553	558	560	562	564	569	571	573	575
560 -562	551	551	551	556	558	560	562	567	569	571	573	578
562 -564	551	551	551	556	558	560	562	567	569	571	573	578
564 -557	551	551	551	556	558	560	564	567	569	571	575	578
557 -569	551	551	553	556	558	560	564	567	569	571	575	578
569 -571	551	551	553	556	558	562	564	567	569	573	575	578
571 -573	551	551	553	556	558	562	564	567	569	573	575	578
573 -575	551	551	553	556	558	562	564	567	571	573	575	578
575 -578	551	551	553	556	560	562	564	567	571	573	575	580
578 -580	551	551	553	556	560	562	564	569	571	573	575	580
580 -582	551	551	553	556	560	562	564	569	571	573	578	580
582 -584	551	551	553	558	560	562	564	569	571	573	578	580
584 -586	551	551	553	558	560	562	567	569	571	573	578	580
586 -589	551	551	553	558	560	562	567	569	571	575	578	580
589 -591	551	551	556	558	560	562	567	569	571	575	578	580
591 -593	551	551	556	558	560	564	567	569	573	575	578	582
593 -595	551	551	556	558	560	564	567	569	573	575	578	582
595 -597	551	551	556	558	560	564	567	569	573	575	578	582
597 -600	551	553	556	558	562	564	567	571	573	575	580	582
600 -602	551	553	556	558	562	564	567	571	573	575	580	582
602 -604	551	553	556	558	562	564	567	571	573	578	580	582
604 -606	551	553	556	560	562	564	569	571	573	578	580	582
606 -608	551	553	556	560	562	564	569	571	573	578	580	582
608 -611	551	553	556	560	562	564	569	571	575	578	580	584
611 -613	551	553	556	560	562	257	569	571	575	578	580	584
613 -615	551	553	558	560	562	567	569	571	575	578	582	584
615 -617	551	553	558	560	562	567	569	573	575	578	582	584
617 -619	551	553	558	560	562	567	569	573	575	578	582	584
619 -622	551	553	558	560	564	567	569	573	575	580	582	584
622 -624	551	556	558	560	564	567	569	573	575	580	582	584
624 -626	551	556	558	560	564	567	571	573	575	580	582	586
626 -628	551	556	558	560	564	567	571	573	578	580	582	596

Erstellt: 18.12.02	Geprüft: <i>M. Hopf</i>	Complies:
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2.5 EMPTY WEIGHT C.G. TABLE <mm, kg> For in, lbs values see following page
For weighed empty weight the calculated C.G. position must be between two limit values. Cockpit Loads related to these C.G. position limit values are permissible Minimum- and Maximum Cockpit Loads.

Example: For empty weight of 250 kg <551 lbs> and empty weight C.G. position of 595 mm <23.425 in> the Minimum Cockpit Load is 60 kg <132 lbs>, the Maximum Cockpit Load is 110 kg <243 lbs>.

Contact manufacturer for values beyond printed table !

Empty Weight <kg>	Maximum Cockpit Load and Minimum Cockpit Load <kg>						
	110-60	110-65	110-70	110-75	110-80	110-85	110-90
240	608-640	608-659	608-678	608-698	608-717	608-737	608-757
241	607-639	607-658	607-677	607-696	607-716	607-736	607-756
242	605-638	605-657	605-676	605-695	605-715	605-734	605-754
243	603-637	603-656	603-675	603-694	603-713	603-733	603-753
244	602-636	602-655	602-674	602-693	602-712	602-732	602-752
245	600-635	600-654	600-673	600-691	600-711	600-730	600-750
246	599-634	599-653	599-671	599-690	599-710	599-729	599-749
247	597-633	597-652	597-670	597-689	597-708	597-728	597-747
248	596-632	596-651	596-669	596-688	596-707	596-726	596-746
249	594-631	594-650	594-668	594-687	594-706	594-725	594-744
250	593-630	593-649	593-667	593-686	593-705	593-724	593-743
251	591-629	591-648	591-666	591-684	591-703	591-722	591-742
252	590-628	590-647	590-665	590-683	590-702	590-721	590-740
253	588-627	588-646	588-664	588-682	588-701	588-720	588-739
254	587-626	587-645	587-663	587-681	587-700	587-719	587-738
255	586-625	586-644	586-662	586-680	586-699	586-717	586-736
256	584-625	584-643	584-661	584-679	584-698	584-716	584-735
257	583-624	583-642	583-660	583-678	583-696	583-715	583-734
258	581-623	581-641	581-659	581-677	581-695	581-714	581-732
259	580-622	580-640	580-658	580-676	580-694	580-712	580-731
260	579-621	579-639	579-657	579-675	579-693	579-711	579-730
261	577-620	577-638	577-656	577-674	577-692	577-710	577-729
262	576-619	576-637	576-655	576-673	576-691	576-709	576-727
263	575-619	575-636	575-654	575-671	575-690	575-708	575-726
264	573-618	573-635	573-653	573-670	573-688	573-707	573-725
265	572-617	572-634	572-652	572-669	572-687	572-705	572-724
266	571-616	571-634	571-651	571-668	571-686	571-704	571-722
267	569-615	569-633	569-650	569-667	569-685	569-703	569-721
268	568-614	568-632	568-649	568-666	568-684	568-702	568-720
269	567-614	567-631	567-648	567-665	567-683	567-701	567-719
270	566-613	566-630	566-647	566-664	566-682	566-700	566-718
271	564-612	564-629	564-646	564-663	564-681	564-699	564-716
272	563-611	563-628	563-646	563-663	563-680	563-698	563-715
273	562-611	562-628	562-645	562-662	562-679	562-696	562-714
274	561-610	561-627	561-644	561-661	561-678	561-695	561-713
275	559-609	559-626	559-643	559-660	559-677	559-694	559-712
276	558-608	558-625	558-642	558-659	558-676	558-693	558-711
277	557-608	557-624	557-641	557-658	557-675	557-692	557-710
278	556-607	556-624	556-640	556-657	556-674	556-691	556-709
279	555-606	555-623	555-639	555-656	555-673	555-690	555-707
280	553-605	553-622	553-639	553-655	553-672	553-689	553-706
281	552-605	552-621	552-638	552-654	552-671	552-688	552-705
282	551-604	551-620	551-637	551-653	551-670	551-687	551-704
283	550-603	550-620	550-636	550-652	550-669	550-686	550-703
284	549-602	549-619	549-635	549-651	549-668	549-685	549-702
285	548-602	548-618	548-634	548-651	548-667	548-684	548-701

2.5 EMPTY WEIGHT C.G. TABLE (in, lbs) For mm, kg values see preceding page
 For weighed empty weight the calculated C.G. position must be between two
 limit values. Cockpit Loads related to these C.G. position limit values
 are permissible Minimum- and Maximum Cockpit Loads.

Example: For empty weight of 551 lbs (250kg) and empty weight C.G.
 position of 23.425 in (595 mm) the Minimum Cockpit Load is
 132 lbs (60 kg), the Maximum Cockpit Load is 243 lbs (110 kg).

Contact manufacturer for values beyond printed table !

Empty Weight (lbs)	Maximum Cockpit Load and Minimum Cockpit Load (lbs)			
	243-132	243-143	243-154	243-165
529	23.937-25.197	23.937-25.945	23.937-26.693	23.937-27.480
531	23.898-25.157	23.898-25.906	23.898-26.654	23.898-27.402
534	23.819-25.118	23.819-25.866	23.819-26.614	23.819-27.362
536	23.740-25.079	23.740-25.827	23.740-26.575	23.740-27.323
538	23.701-25.039	23.701-25.787	23.701-26.535	23.701-27.283
540	23.622-25.000	23.622-25.748	23.622-26.496	23.622-27.205
542	23.583-24.961	23.583-25.709	23.583-26.417	23.583-27.165
545	23.504-24.921	23.504-25.669	23.504-26.378	23.504-27.126
547	23.465-24.882	23.465-25.630	23.465-26.339	23.465-27.087
549	23.386-24.843	23.386-25.591	23.386-26.299	23.386-27.047
551	23.346-24.803	23.346-25.551	23.346-26.260	23.346-27.008
553	23.268-24.764	23.268-25.512	23.268-26.220	23.268-26.929
556	23.228-24.724	23.228-25.472	23.228-26.181	23.228-26.890
558	23.150-24.685	23.150-25.433	23.150-26.142	23.150-26.850
560	23.110-24.646	23.110-25.394	23.110-26.102	23.110-26.811
562	23.071-24.606	23.071-25.354	23.071-26.063	23.071-26.772
564	22.992-24.606	22.992-25.315	22.992-26.024	22.992-26.732
567	22.953-24.567	22.953-25.276	22.953-25.984	22.953-26.693
569	22.874-24.528	22.874-25.236	22.874-25.945	22.874-26.654
571	22.835-24.488	22.835-25.197	22.835-25.906	22.835-26.614
573	22.795-24.449	22.795-25.157	22.795-25.866	22.795-26.575
575	22.717-24.409	22.717-25.118	22.717-25.827	22.717-26.535
578	22.677-24.370	22.677-25.079	22.677-25.787	22.677-26.496
580	22.638-24.370	22.638-25.039	22.638-25.748	22.638-26.417
582	22.559-24.331	22.559-25.000	22.559-25.709	22.559-26.378
584	22.520-24.291	22.520-24.961	22.520-25.669	22.520-26.339
586	22.480-24.252	22.480-24.961	22.480-25.630	22.480-26.299
589	22.402-24.213	22.402-24.921	22.402-25.591	22.402-26.260
591	22.362-24.173	22.362-24.882	22.362-25.551	22.362-26.220
593	22.323-24.173	22.323-24.843	22.323-25.512	22.323-26.181
595	22.283-24.134	22.283-24.803	22.283-25.472	22.283-26.142
597	22.205-24.094	22.205-24.764	22.205-25.433	22.205-26.102
600	22.165-24.055	22.165-24.724	22.165-25.433	22.165-26.102
602	22.126-24.055	22.126-24.724	22.126-25.394	22.126-26.063
604	22.087-24.016	22.087-24.685	22.087-25.354	22.087-26.024
606	22.008-23.976	22.008-24.646	22.008-25.315	22.008-25.984
608	21.969-23.937	21.969-24.606	21.969-25.276	21.969-25.945
611	21.929-23.937	21.929-24.567	21.929-25.236	21.929-25.906
613	21.890-23.898	21.890-24.567	21.890-25.197	21.890-25.866
615	21.850-23.858	21.850-24.528	21.850-25.157	21.850-25.827
617	21.772-23.819	21.772-24.488	21.772-25.157	21.772-25.787
619	21.732-23.819	21.732-24.449	21.732-25.118	21.732-25.748
622	21.693-23.780	21.693-24.409	21.693-25.079	21.693-25.709
624	21.654-23.740	21.654-24.409	21.654-25.039	21.654-25.669
626	21.614-23.701	21.614-24.370	21.614-25.000	21.614-25.630
628	21.575-23.701	21.575-24.331	21.575-24.961	21.575-25.630

2.5 EMPTY WEIGHT C.G. TABLE (in, lbs) For mm, kg values see page 2-6

For weighed empty weight the C.G. position must be between two limit values. Cockpit Loads related to these C.G. position limit values are permissible Minimum- and Maximum Cockpit Loads.

Example: For empty weight of 551 lbs (250kg) and empty weight C.G. position of 23.425 in (595 mm) the Minimum Cockpit Load is 132 lbs (60 kg), the Maximum Cockpit Load is 243 lbs (110 kg).

Contact manufacturer for values beyond printed table !

Empty Weight (lbs)	Maximum Cockpit Load and Minimum Cockpit Load (lbs)		
	243-176	243-187	243-198
529	23.937-28.228	23.937-29.016	23.937-29.803
531	23.898-28.189	23.898-28.976	23.898-29.764
534	23.819-28.150	23.819-28.898	23.819-29.685
536	23.740-28.071	23.740-28.858	23.740-29.646
538	23.701-28.031	23.701-28.819	23.701-29.606
540	23.622-27.992	23.622-28.740	23.622-29.528
542	23.583-27.953	23.583-28.701	23.583-29.488
545	23.504-27.874	23.504-28.661	23.504-29.409
547	23.465-27.835	23.465-28.583	23.465-29.370
549	23.386-27.795	23.386-28.543	23.386-29.291
551	23.346-27.756	23.346-28.504	23.346-29.252
553	23.268-27.677	23.268-28.425	23.268-29.213
556	23.228-27.638	23.228-28.386	23.228-29.134
558	23.150-27.598	23.150-28.346	23.150-29.094
560	23.110-27.559	23.110-28.307	23.110-29.055
562	23.071-27.520	23.071-28.228	23.071-28.976
564	22.992-27.480	22.992-28.189	22.992-28.937
567	22.953-27.402	22.953-28.150	22.953-28.898
569	22.874-27.362	22.874-28.110	22.874-28.819
571	22.835-27.323	22.835-28.031	22.835-28.780
573	22.795-27.283	22.795-27.992	22.795-28.740
575	22.717-27.244	22.717-27.953	22.717-28.701
578	22.677-27.205	22.677-27.913	22.677-28.622
580	22.638-27.165	22.638-27.874	22.638-28.583
582	22.559-27.087	22.559-27.835	22.559-28.543
584	22.520-27.047	22.520-27.756	22.520-28.504
586	22.480-27.008	22.480-27.717	22.480-28.425
589	22.402-26.969	22.402-27.677	22.402-28.386
591	22.362-26.929	22.362-27.638	22.362-28.346
593	22.323-26.890	22.323-27.598	22.323-28.307
595	22.283-26.850	22.283-27.559	22.283-28.268
597	22.205-26.811	22.205-27.520	22.205-28.189
600	22.165-26.772	22.165-27.480	22.165-28.150
602	22.126-26.732	22.126-27.402	22.126-28.110
604	22.087-26.693	22.087-27.362	22.087-28.071
606	22.008-26.654	22.008-27.323	22.008-28.031
608	21.969-26.614	21.969-27.283	21.969-27.992
611	21.929-26.575	21.929-27.244	21.929-27.953
613	21.890-26.535	21.890-27.205	21.890-27.913
615	21.850-26.496	21.850-27.165	21.850-27.835
617	21.772-26.457	21.772-27.126	21.772-27.795
619	21.732-26.417	21.732-27.087	21.732-27.756
622	21.693-26.378	21.693-27.047	21.693-27.717
624	21.654-26.339	21.654-27.008	21.654-27.677
626	21.614-26.299	21.614-26.969	21.614-27.638
628	21.575-26.260	21.575-26.929	21.575-27.598

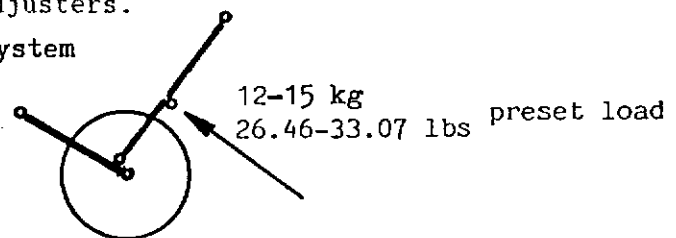
3.1 ORDINARY INSPECTIONS

DAILY INSPECTION and PREFLIGHT CHECK see Flight Manual pages 4-3 / 4-4.
POSTFLIGHT CHECK see Flight Manual page 4-13.

ANNUAL INSPECTION

1. The aileron sandwich is pressure sensitive. When pressure marks are present, the sailplane may be no longer airworthy. Because of resulting possible danger of flutter, contact manufacturer for damage classification and repair.
2. Fuselage automatic aileron connectors are equipped with deflectors to avoid incorrect rigging. It must be checked that it is impossible to rig the second wing with intentionally incorrect aileron deflection (aileron deflected upward).
3. Lubricate various parts according to plan (Page 3-3)
4. Protect gelcoat with car polish (See also Flight Manual pages 8-5/8-6, Cleaning and Care). This wax film protects gelcoat against embrittlement and cracking due to ultra violet light. If you use a polishing machine, be careful not to damage sealings or anti-collision colour markings or registration signs (these synthetic resin varnishes are temperature sensitive).
5. Check anti-friction tape at aileron leading edge sealings (normally plastic strip seals). Damaged anti-friction tape will yield damage of gelcoat at control surface very quickly. For installation of sealing see pages 4-4/5. Remove residual adhesive using lead-free petrol, see also Flight Manual page 8-5, Cleaning and Care.
6. Check 3D-turbulator tape ("Zig-Zag") on wing under side (Flight performance!) and restore if necessary. See also page 4-5.
7. Check friction damper at outer air brake edges for proper operation of damper rod and friction surfaces being free from grease.
8. Check landing gear folding strut for overcenter and preset load. When preset load is too small, the landing gear drive gas strut must be exchanged. Check rubber torsion elements for deformation or separation of rubber from metal. When adjustments are being made, check for identical overcenter at both folding struts and for locking of adjusters.

Landing gear system



9. Perform Annual Inspection according to checklist, chapter 14. 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 page 4-2), it is illogical to remove (destroy) seals just for inspection purpose. Existence of washer at fixed bearings can be checked after lifting sealing lids cautiously.
10. When equipment has been altered compared to valid equipment list, file new equipment list and redetermine C.G. (See chapter 2). With equipment unaltered, C.G. should be redetermined every four years. Appropriate forms see chapter 14.

3.1 ORDINARY INSPECTIONS continued
ANNUAL INSPECTION continued11. Check function of canopy emergency release

Measure force required for canopy emergency release according to following procedure (When this measurement or a release test is being performed without a helper, the spring of the canopy jettison rear edge temporary bolt becomes distorted and must be exchanged):

- "Pilot" with appropriate dynamometer in cockpit
 - both canopy openers in open position
 - helper at front canopy end to avoid gas spring to lift unit upward
 - maximum force for emergency release 15 kg (33 lbs)
 - after force measurement: the "pilot" pushes the rear end temporary hinge bolt free and lifts canopy at opening levers, the helper holds the front end on the connector. When in fully open position, the helper pushes the connection pin upward and engages canopy to opener by turning driving lug.
- * If emergency release force is too high, all moving parts should be greased. In doubt contact manufacturer.

12. Check function of canopy jettison rear edge temporary hinge bolt. Measure force required to pull bolt free from spring during opening of canopy at rear canopy edge: force should be between 8 and 15 kg (18 to 33 lbs). When force is clearly lower, the spring must be exchanged to guarantee proper separation of canopy from fuselage during jettison.

3.2 EXTRAORDINARY INSPECTIONS

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

1. Landing gear functioning, attachment and drive
2. Landing gear box for damage
3. Tail skid bonding or tail wheel attachment
4. Wings, fuselage and tail for damage (cracks, buckling, compression)
5. Wing's flex number (support fuselage in front of landing gear)
6. Tangential tubes across fuselage for straightness
7. Control surfaces function and deflections

3.3 LUBRICATION SCHEDULE

Location	Frequency	Lubricant
Main pins and matching holes Pins and matching holes of elevator connections Wing side bearings at automatic aileron and air brake system connectors, which are inserted into fuselage couplings	Before assembly	Water insoluble bearing grease or grease containing molybdenum, for instance: Molykote BR2 (Temperature range from -30°C to 130°C, -22°F to 266°F)
Landing gear: all joints at rubber bearings Landing gear, all metal parts	Once a year	Engine oil Noncorrosive (acidless) spray oil (for instance: Branotect Spray) Note: Protect rubber parts against oil
Bearings of control surfaces	after dis-assembly only	Molykote grease BR2 (Temperature range from -30°C to 130°C, -22°F to 266°F) or Molykote grease 33 (Temperature range from -70°C to 180°C, -94°F to 356°F)

IMPORTANT NOTE: NEVER grease or oil LONGITUDINAL MOTION PUSHROD BEARINGS, the balls will be destroyed soon due to collection of small foreign matter. These bearings are used in the elevator system, aileron system and airbrake system.

WARNING: The friction dampers at the outside airbrake edges (see also page 1-5) prevent oscillations during extension of airbrakes. Therefore, friction pads should never be greased or oiled.

TOW RELEASE: See Maintenance Instructions of manufacturer (Tost)

MULTIPLE POINT BUCKLE

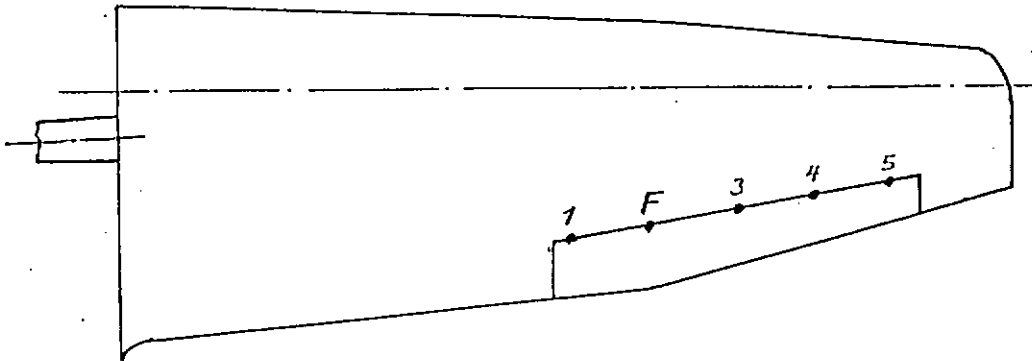
of FAG-7D safety harness: See Maintenance Instructions of manufacturer (Autoflug) <Excerpt see in Appendix>

4.1 INSTALLATION OF CONTROL SURFACES

WARNING: Nuts according to specification LN 9348 may be replaced by nuts according to specification DIN 6924 (985) - M..-8 (the dots represent the nominal thread diameter). The -8 code on each nut indicates the category of strength. If this code is not existent, the nut complies to a lower category of strength and is unsuitable for this use!

DISASSEMBLY OF AILERONS

Wing scheme with aileron bearings, F= laterally fixed bearing



- remove seal (convex plastic strip) from upper aileron side and internal Teflon strip seal.
- remove fillet on outside upper edge of aileron near bearing No. 5 .
- turn wing upside down, remove under side Teflon strip seal completely.
- disconnect drive rods from aileron (6mm thread, nut LN 9348, bolt LN 9037, width over flats 10 mm), remember sequence and position of washers, if applicable.
- loosen nut (6 mm thread, LN 9348, width over flats 10 mm) from bearing No. 2, (fixed bearing) remember sequence and position of washers.
- deflect aileron fully upward and remove it from bearing pins towards wing-tip. Use two persons to avoid damage!
- watch washers, if existent, at inner side of bearing pin No. 2 .

ASSEMBLY OF AILERONS

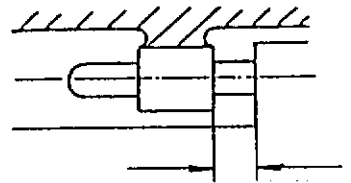
- grease bearings according to Lubrication Schedule, page 3-3.
- make sure that washers, if existent, are on inner side of fixed bearing pin, No. 2
- install internal gap seal at wing, see page 4-3

4.1 INSTALLATION OF CONTROL SURFACES continued

ASSEMBLY OF AILERONS continued

- match aileron pins with bearings, when aileron fully deflected upward. Use 2 persons. Do not use force. Set up washers at bearing No. 2 as found during disassembly.
- tighten nut (6 mm thread, LN 9348, width over flats 10 mm) at bearing No. 2 with maximum torque 6.4 Nm (0.64 mkg, 4.623 ft lbs).
- check lateral bearing play:

bearing No.	1	2	3	4	5
play (mm)	0.5	fixed	0.5	1.0	1.5
(in)	0.02		0.02	0.04	0.06
- check lateral aileron gaps:
 - at tip minimum of 2 mm (0.08 in)
 - at inner edge minimum of 2 mm (0.08 in)
- fix drive rod to aileron drive using nut (LN 9348) and washers, if applicable (6 mm thread, LN 9348, width over flats 10 mm). Maximum torque 6.4 Nm (0.64 mkg, 4.623 ft lbs).
- bond lower side internal seal (Teflon tape 38 mm (1.5 in) wide) to aileron leading edge when fully deflected upward, see also page 4-3
- bond fillet flush into outer edge cutout using contact adhesive (for instance Pattex), check unobstructed movement.
- restore upper side gap seals, see page 4-3 for details.



DISASSEMBLY OF ELEVATOR

- remove internal sealing with elevator fully deflected downward.
- loosen nut on left inside bearing (5 mm thread, LN 9348, width over flats 8 mm) and remove washer.
- remove elevator to the left, do not loose spacing washer on left inside bearing pin, if existent.
- remove internal sealing from stabilizer.

4.1 INSTALLATION OF CONTROL SURFACES continued

ASSEMBLY OF ELEVATOR

- install internal sealing to stabilizer as described on page 4-4.
- grease bearings according to Lubrication Schedule, page 3-3.
- make sure that washers, if existent, are on inner side of left inside bearing pin.
- match pins with bearings, do not use force.
- Insert washer on left inside bearing before tightening nut (M5, LN 9348, width over flats 8 mm). Maximum torque 3.6 Nm (0.36 mkg, 2.604 ft lbs).
- fix internal sealing to elevator, see page 4-4 for details.

DISASSEMBLY OF RUDDER

- disconnect rudder cables, watch spacing casing.
ATTENTION: rudder cables may be drilled. If this is changed unintentionally, neutral position of rudder and pedals do no longer correspond and must be realigned as detailed below.
- loosen nut at lower bearing (6 mm thread, LN 9348, width over flats 10 mm) using a socket wrench, remember sequence and position of washers.
- lift rudder upward from bearings.

ASSEMBLY OF RUDDER

- grease bearings according to Lubrication Schedule, page 3-3.
- if necessary, renew V-type sealing tape.
- set rudder into bearings, do not use force!
- check radial play of upper bearing. Maximum allowable radial play 0.5 mm. If necessary, renew brass bushing. Make sure, that nonconcentric position of bearing keeps relative position to direction of flight.
- connect rudder cables provisionally, do not forget to insert spacing casings.
- check pedal-rudder alignment: with pedals in neutral position and rudder deflected to one side, twist opposite cable clockwise (maximum 5 turns) until properly aligned.
Should more than 5 turns be necessary for alignment, exchange cables. **Never** turn cables counter clockwise!
- tighten nuts at rudder cable connection (6 mm thread, LN 9348, width over flats 10 mm) with maximum torque 6.4 Nm (0.64 mkg, 4.623 ft lbs).

4.1 INSTALLATION OF CONTROL SURFACES continued ASSEMBLY OF RUDDER continued

- set up washers at lower bearing as found during disassembly (normally: recessed washer first, then large washer). Tighten nut (6 mm thread, LM 9348, 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 permissible axial play is 1 mm (0.04 in).
- if necessary, restore gap seals (convex plastic strip), see below and page 4-5 for details.

CAUTION: In case of repairs, never pull longitudinal motion control system pushrods out of their bearings, all balls will leave their cages. Subsequently a hole near each bearing is necessary to reinstall them.

Longitudinal motion ball bearings are used throughout the wing control systems and in the fuselage elevator and aileron systems.

4.2 INSTALLATION OF INTERNAL GAP SEALING AT AILERON AND ELEVATOR

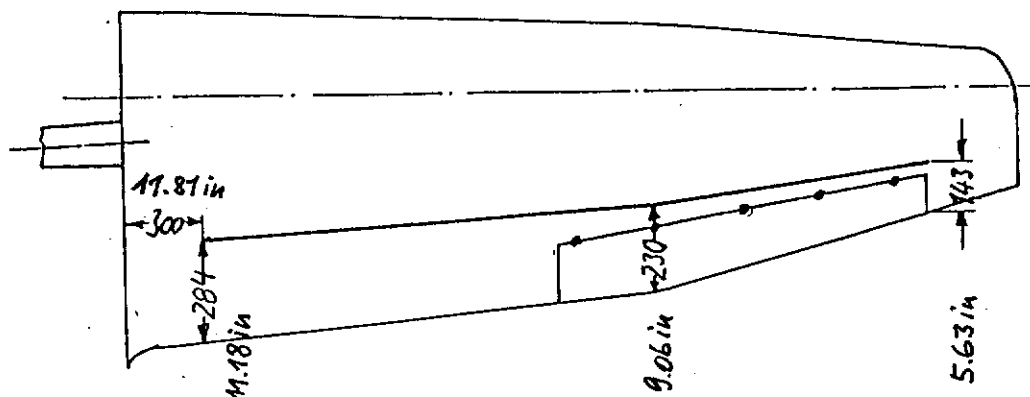
1. Lay wing upside down on adequately padded supports at root rib and wingtip, outside of aileron. Control surface gaps in the sealing region should be at least 1 mm (0.04 in) wide in all control surface deflections. If less, increase at wing or fin trailing edge using sanding paper.
2. Deflect control surface fully away from sealing, mark rear edge of seal on control surface using a short length of seal and soft pencil. Dismount control surface.
3. Gently roughen bonding region at wing or fin side using 60 grade sanding paper, round trailing edge slightly using 180 grade sanding paper, wipe off sanding dust.
4. Clean bonding area at wing or fin, control surface and sealing tape, using lead free petrol.
5. Set bonding film flush on sealing tape edge.
6. Mark bonding area at inside of wing or fin edge, approximately 2 mm (0.08 in) away from edge; place sealing tape along marking line.
7. Place bonding film to control surface leading edge along marking line, assemble control surface completely.
8. Deflect control surface fully downward, pull internal seal out of gap, remove masking tape from bonding film and place seal to film, avoid distortion or lateral displacement of seal. Use spatula for short time pressing of bonding region.
9. Cut surplus sealing tape leading edge using a sharp knife and straightedge.

4.3 INSTALLATION OF UPPER SIDE GAP SEALING for aileron

1. Lay wing upside down on adequately padded supports at root rib and wingtip, outside of aileron.
Tighten plastic gap seal during bonding always with 2 persons.
2. Clean bonding area from adhesive residues
3. Deflect control surface fully towards sealing, mark rear edge of seal on control surface using a short length of seal and soft pencil.
4. Bond Teflon tape (38 mm (1.45 in) wide) with its rear edge 2 mm (0.08 in) behind marking of seal's rear edge.
5. Cut Teflon tape leading edge using a sharp knife such, that bonding width on wing is 2 mm (0.08 in). When 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 with full bonding width on wing.
5. Cover leading edge of convex plastic seal with tape against warping (Example: Tesca 4178 white).

4.4 INSTALLATION OF 90 Degree Zig Zag TURBULATOR TAPE ON WING UNDER SIDE

Given measurements from wing trailing edge to turbulator leading edge, values in mm and inches.



4.5 SEAT

DISASSEMBLY

- remove 4 countersunk screws, Phillips recess, at front seat end
- remove 8 bolts, hexagon recess No. 4
- remove backrest after disconnecting base from seat
- remove T-shaped handle from pedal adjuster cable (5 mm thread, nut LN 9348, width over flats 8 mm, use 8 mm socket wrench) and pull cable through seat guide tube.
- loosen stick cover, move air brake handle into rearward position
- swivel left seat side up and take seat out to upper left
- disconnect release cable pulley cage from forward mounting at pedal support

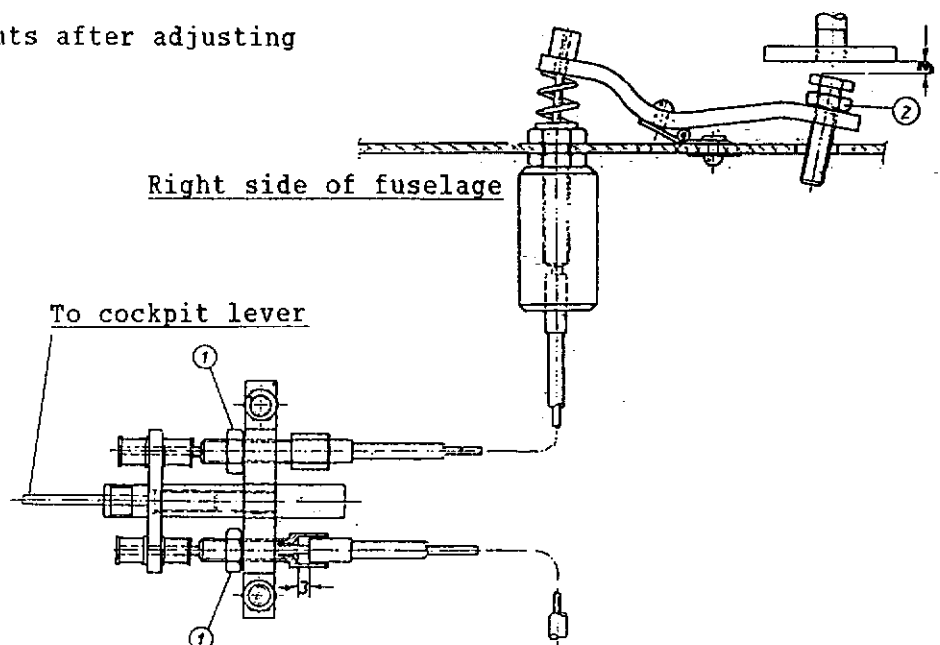
ASSEMBLY

Follow disassembly steps in reverse order, in addition observe the following:

- inspect under seat region for foreign matter, tools etc.
- rest seat right side on support, direct control stick into cutout and pedal adjuster cable into guide, place air brake handle into rearward position
- 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 malfunction
- screw T-shaped handle to pedal adjuster cable, hold cable with pliers to avoid turning cable
- connect release cable pulley cage to mounting at pedal support
- check control system after installation for proper operation, especially function of release system: hook opening completely as well as free play at T-shaped handle with landing gear down and locked

4.6 ADJUSTMENT OF WATER BALLAST DRIVE

- check cockpit operating lever for overcenter in open position
- 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
- check play at >2< by pressing fuselage to wing mechanism until touching wing valve for nominal value 3 mm (0.118 in). If necessary, adjust at fuselage from outside
- do not forget to lock nuts after adjusting



4.7 WATER BALLAST SYSTEM Disassembly and AssemblyWING WATER BALLAST BAGS

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 (22 lbs).

Disassembly

- using water valve key (standard equipment), disconnect screwed joint of valve with release tube from under side through release tube
- unscrew large PVC-nut at root rib
- 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
- 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!
- pull valve and bag through opening in root rib

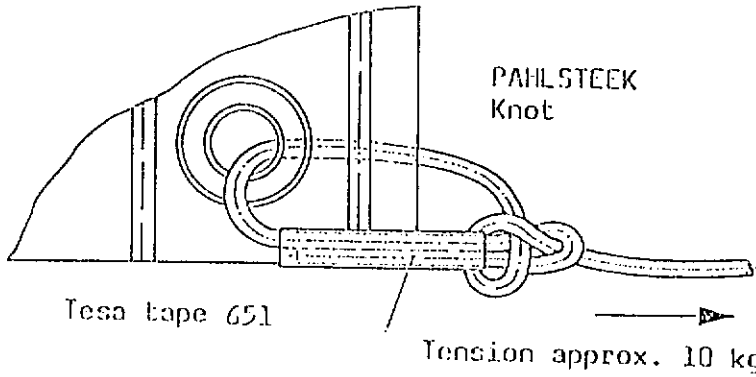
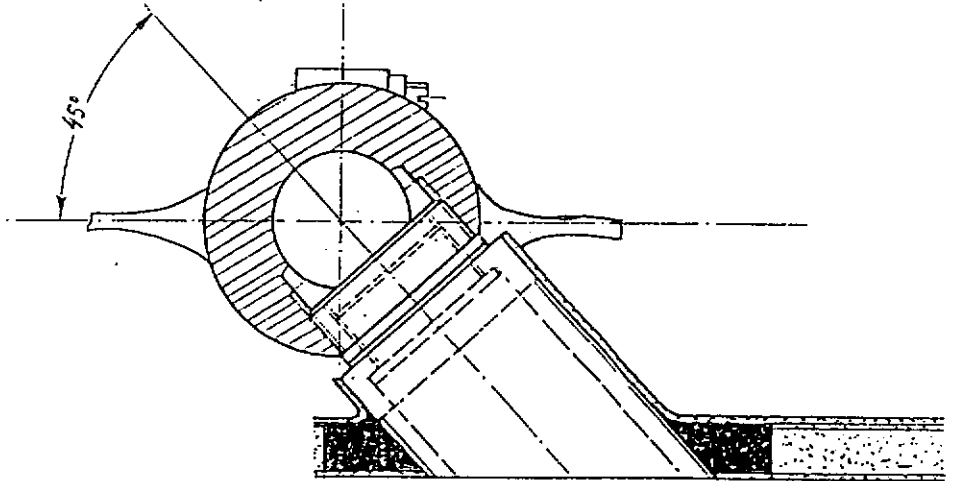
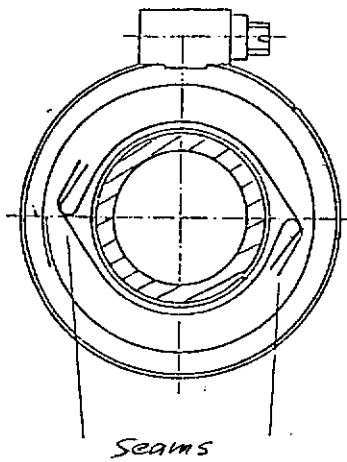
Assembly

- pull bicycle type inner tube over valve end, 60 mm (2.4 in) long
- adjust ballast bag with seam to leading edge and to valve as shown below (different adjustment to valve increases discharge time considerably)
- push bag on valve stub, cover bag on stub with tape (example Tesaflex 4163) to protect bag against damage by hose clamps. Turn both seams during taping in the same circumferential direction, otherwise again considerable increase of discharge time.
- tighten hose clamps and check for water tightness before installation into wing
- connect braided nylon rope to brass eye at bag end by special knot ("Pahlsteek") as shown overleaf, fix free rope end using tape
- connect rope to intermediate rope in wing (if no longer connected) by stitching
- check existence of bonded-on rubber gasket at valve discharge orifice

Installation

- place bag with seam to leading edge and valve discharge orifice 45° downward to the trailing edge, roll bag and push into root rib cutout, pull cautiously at intermediate rope only
- screw valve to discharge tube from outside through tube using brass nut and water valve key
- screw PVC-nut to valve on outside of root rib by hand, no tools. This nut takes part of the tensional load from the discharge tube.
- pretension rope with about 10 kg (22 lbs), place end knot as shown overleaf. Fix rope end (about 0.5 m (20 in) long) at root rib, do not cut off
- check adjustment of water valves as outlined on preceding page
- fill bags according to instructions given in Flight Manual, check for tightness, proper discharge and discharge time
- when discharge time exceeds 4.5 minutes, the bag may possibly be twisted. When not tight - water dripping from one of the drain holes, the fault must be searched and cleared, this necessitates disassembly!

4.7 WATER BALLAST SYSTEM Disassembly and Assembly continued



Endknot

Tension approx. 10 kg
22 lbs



4.8 NOSE HOOK SYSTEM Disassembly and Assembly (Optional equipment)

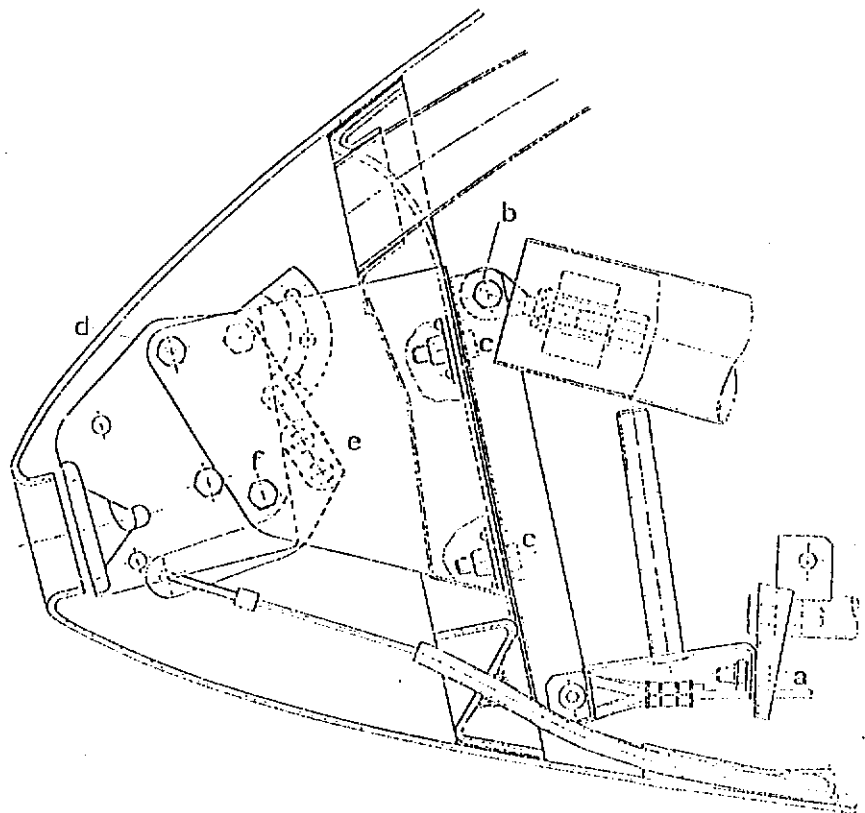
Tools: 3/4" drive ratchet, 8 and 10 mm sockets, 3 and 4 mm hex head driver sockets, 12 mm open end spanner, 10 mm ring spanner

General hint: Note length of bolts and positioning of washers for all assembly positions

- take canopy off fuselage with a helper after pulling emergency canopy release
- disassemble seat according to page 4-5
- under seat, disconnect C.G. release cable pulley from mounting
- pull pedals to rearmost position
- disconnect trim weight holder from pedal guide >a<
- disconnect 2 bolts >b< at front end of canopy support from bracket, move support as far back into cockpit as possible, perhaps disconnect gas strut at one end as well
- disconnect both canopy support brackets from nose bulkhead >c< and move backwards too
- pull nose hook support backward from bulkhead
- disassemble nose hook from support >d<, watch for 4 spacers between nose hook case and support, at >f< 1 spacer inside nose hook case
- disassemble drive extension with cable at >e< from drive lever

ASSEMBLY of nose hook in reverse order, watch out especially for the following:

- insert spacer at >f< before assembly of drive lever extension
- when assembling nose hook into support, place spacers into position using a 12 mm open ended wrench
- after assembly at >c< and connection of C.G. hook cable to pulley, check function of both hooks
- 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 foreign matter



5.1 TIME BETWEEN OVERHAUL (TBO)

- 1. C.G. hook TOST Europa G 73: **2000 take-offs)***
 or TOST Europa G 72
 or TOST Europa G 88

- 2. Nose hook TOST E 75 or E 72: **2000 take-offs)***
 or TOST E 85

)* See also Maintenance- and Operating Instructions of manufacturers.

5.2 AIRWORTHINESS LIMITATIONS SECTION


This Airworthiness Limitations Section is LBA-approved.
 LBA-approved:



[Handwritten Signature]

27. AUG. 2003

5.3 LOG OF REVISIONS FOR AIRWORTHINESS LIMITATIONS SECTION

No.	Pages affected	Description	LBA-Approval Signature / Date
1	5-1, 5-2 5-3	Structural life limit increased to 12000 h. Schroth safety harness added.	 27. AUG. 2003 <i>[Handwritten Signature]</i>

Erstellt: 18.12.02	Geprüft: <i>[Handwritten Signature]</i>	Complies:
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5.5 INSPECTION SEQUENCE TO INCREASE SERVICE LIFE

1. General

Results of supplementary serviceability tests at main spar booms for wings proved, that service life of GRP sailplanes may be increased to 12.000 hours if airworthiness of each single sailplane (in addition to annual inspections) is checked according to a special multi-step inspection programme.

2. Schedule

When the sailplane has reached 3000 hours service life an inspection according to the programme mentioned under 3. Must be carried out. If the result of the inspection is positive or found defects repaired properly, the service life of this sailplane will be increased by 3000 hours to 6000 hours (1. Step).

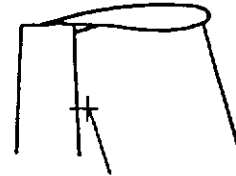
The inspection routine should be repeated when reaching 6000 hours. With a positive result or found defects repaired properly, service life will be increased by another 3000 hours to 9000 hours (2. Step).

The inspection routine should be repeated when reaching 9000 hours. With a positive result or found defects repaired properly, service life will be increased by 1000 hours each to 10000 hours (3. Step), 11000 hours (4. Step) and 12000 hours (5. Step).

3. The valid **Inspection Programme** should be requested from the manufacturer stating serial number and service time.
4. Inspections should be carried out at the manufacturer or an adequately licenced repair shop.
5. Results of inspections must be recorded in an inspection report, commenting to each inspection step. If inspections are not carried out at the manufacturer, a copy of the report must be sent to them for analysis.
6. This inspection does not affect annual inspections.

6.1 FLIGHT CONTROL TRAVEL LIMITS

- ELEVATOR:** Up 24° to 30°
Down 19° to 23°
- RUDDER:** To both sides 26° to 30°
- AILERON:** Up 21° to 25°
Down 13° to 15°



Elevator reference point

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 page 6-3 or deflections report of final production inspection.

6.2 CONTROL SURFACE WEIGHT AND MASS BALANCE

(Should be inspected when suspecting changes of mass / weight and after repairs)

Weight and mass balance should be within given limits for safety against flutter.

	Mass/Weight	Hor. Ref. Line	Hinge Moment
Elevator (*>)	1.41 to 1.90 kg 3.109 to 4.189 lbs	Straight region of upper side	4.88 to 6.50 kgcm 67.770 to 90.268 in oz
Rudder	3.70 to 4.50 kg 8.157 to 9.921 lbs	Centerline of section	0 to 3.50 kgcm 0 to 48.606 in oz
Aileron	3.50 to 5.00 kg 7.716 to 11.023 lbs	Upper side	10.00 to 13.70 kgcm 138.874 to 190.257 in oz



Measuring Technique for hinge moment:

Control surface should be attached to bearings without any tension or friction. Measure weight at rear edge with reference line level and local radius from hinge, multiply weight and radius to yield hinge moment. When using identical locations for measuring as used in final production inspection (see Control Surface Deflections inspection form, page 14-7), then rear edge weight only must be checked.

Warning: When during repairs local static moment is being changed, mass balance must be fixed in this region to yield identical static moment values as in original condition

6.3 CONTROL SURFACES PLAY AND FRICTION (Should be inspected annually)

	Play at inner rear edge	Friction
Elevator	maximum 3.0 mm <0.118 in>	maximum 150 grams <0.331 lbs>
Aileron <*>	maximum 3.0 mm <0.118 in>	200 to 500 grams <0.441 to 1.102 lbs>
Rudder	not applicable	up to 500 grams <1.102 lbs>

<*> Aileron sealing on upper side must be fitted !

Measuring Technique for rear edge play:

Play should be measured with control stick fixed to zero position.

Measuring Technique for friction:

Friction should be measured 30 mm <1.2 in> from top end of control stick for elevator and aileron. Values include seals.

Rudder friction should be measured at lower rudder edge.

6.4 LIMIT VALUES FOR CONTROL SURFACE DEFLECTIONS IN MM/IN

Elevator

Aileron

local radius mm/in	23°to 19°	24°to 30°
145 mm 5.709	241 to 251 mm 9.488 to 9.882	352 to 363 mm 13.858 to 14.291
146 mm 5.748	241 to 251 mm 9.488 to 9.882	352 to 364 mm 13.858 to 14.331
147 mm 5.787	241 to 251 mm 9.488 to 9.882	353 to 365 mm 13.898 to 14.370
148 mm 5.827	241 to 251 mm 9.488 to 9.882	353 to 365 mm 13.898 to 14.370
149 mm 5.866	241 to 251 mm 9.488 to 9.882	354 to 366 mm 13.937 to 14.409
150 mm 5.906	241 to 251 mm 9.488 to 9.882	355 to 367 mm 13.976 to 14.449
151 mm 5.945	241 to 251 mm 9.488 to 9.882	355 to 367 mm 13.976 to 14.449
152 mm 5.984	241 to 251 mm 9.488 to 9.882	356 to 368 mm 14.016 to 14.488
153 mm 6.024	241 to 251 mm 9.488 to 9.882	357 to 369 mm 14.055 to 14.528
154 mm 6.063	241 to 252 mm 9.488 to 9.921	357 to 369 mm 14.055 to 14.528
155 mm 6.102	241 to 252 mm 9.488 to 9.921	358 to 370 mm 14.095 to 14.567

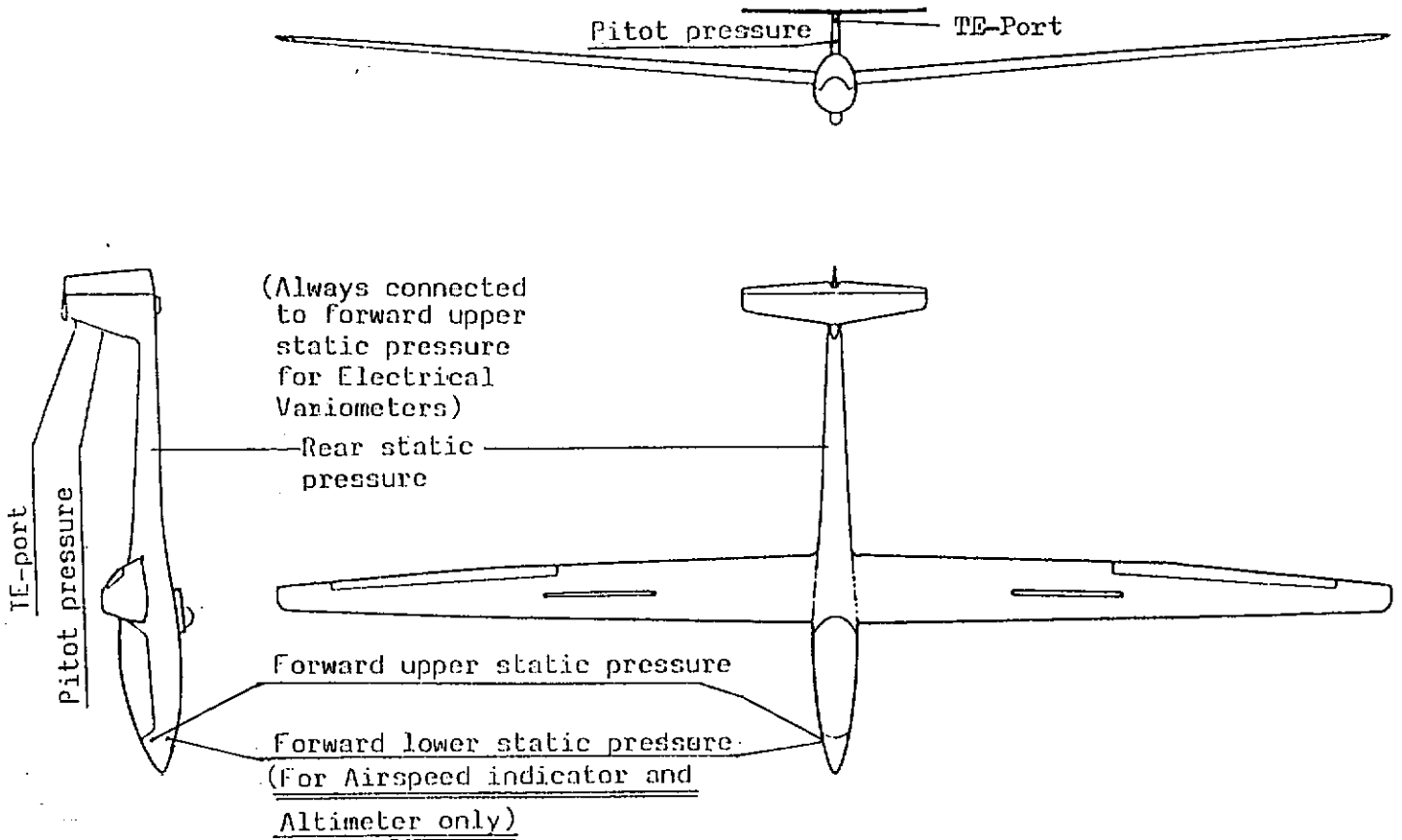
local radius mm/in	13°to 15°	21°to 25°
155 mm 3.268	35 to 40 mm 0.551 to 0.748	56 to 67 mm 2.205 to 2.638
156 mm 6.142	35 to 41 mm 1.378 to 1.614	57 to 68 mm 2.244 to 2.677
157 mm 6.181	36 to 41 mm 1.417 to 1.614	57 to 68 mm 2.244 to 2.677
158 mm 6.221	36 to 41 mm 1.417 to 1.614	58 to 68 mm 2.284 to 2.677
159 mm 6.260	36 to 42 mm 1.417 to 1.654	58 to 69 mm 2.284 to 2.717
160 mm 6.299	36 to 42 mm 1.417 to 1.654	58 to 69 mm 2.284 to 2.717
161 mm 6.339	36 to 42 mm 1.417 to 1.654	59 to 70 mm 2.323 to 2.756
162 mm 6.378	37 to 42 mm 1.457 to 1.654	59 to 70 mm 2.323 to 2.756
163 mm 6.417	37 to 43 mm 1.457 to 1.693	59 to 71 mm 2.323 to 2.795
164 mm 6.457	37 to 43 mm 1.457 to 1.693	60 to 71 mm 2.362 to 2.795
165 mm 6.496	37 to 43 mm 1.457 to 1.693	60 to 71 mm 2.362 to 2.795

6.4 LIMIT VALUES FOR CONTROL SURFACE DEFLECTIONS IN MM/IN cont.

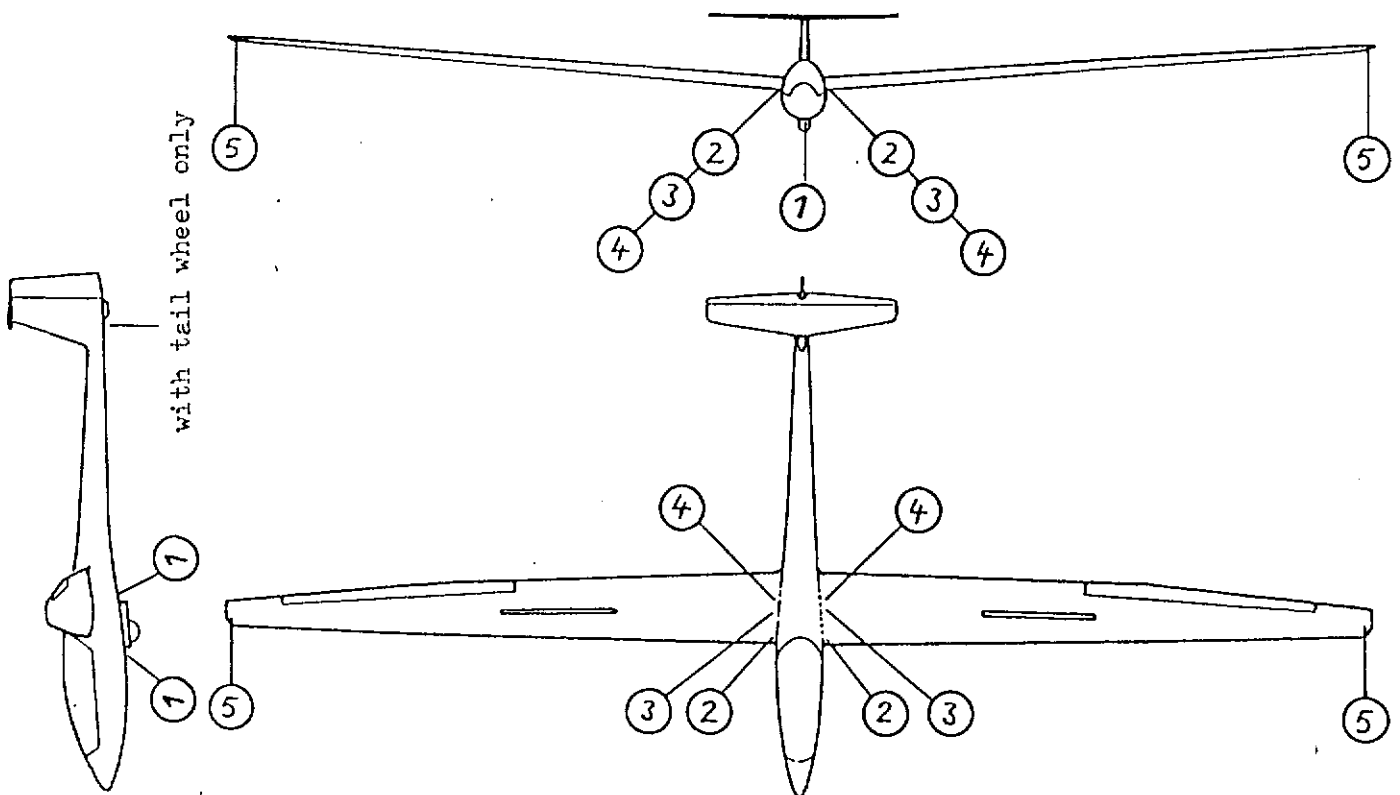
Rudder

local radius mm/in	26° to 30°
305 mm / 12.008 in	137 to 158 mm / 5.394 to 6.221 in
306 mm / 12.047 in	138 to 158 mm / 5.433 to 6.221 in
307 mm / 12.087 in	138 to 159 mm / 5.433 to 6.260 in
308 mm / 12.126 in	139 to 159 mm / 5.472 to 6.260 in
309 mm / 12.165 in	139 to 160 mm / 5.472 to 6.299 in
310 mm / 12.205 in	139 to 160 mm / 5.472 to 6.299 in
311 mm / 12.244 in	140 to 161 mm / 5.512 to 6.339 in
312 mm / 12.283 in	140 to 162 mm / 5.512 to 6.378 in
313 mm / 12.323 in	141 to 162 mm / 5.551 to 6.378 in
314 mm / 12.362 in	141 to 163 mm / 5.551 to 6.417 in
315 mm / 12.402 in	142 to 163 mm / 5.591 to 6.417 in

8.1 PRESSURE PORTS



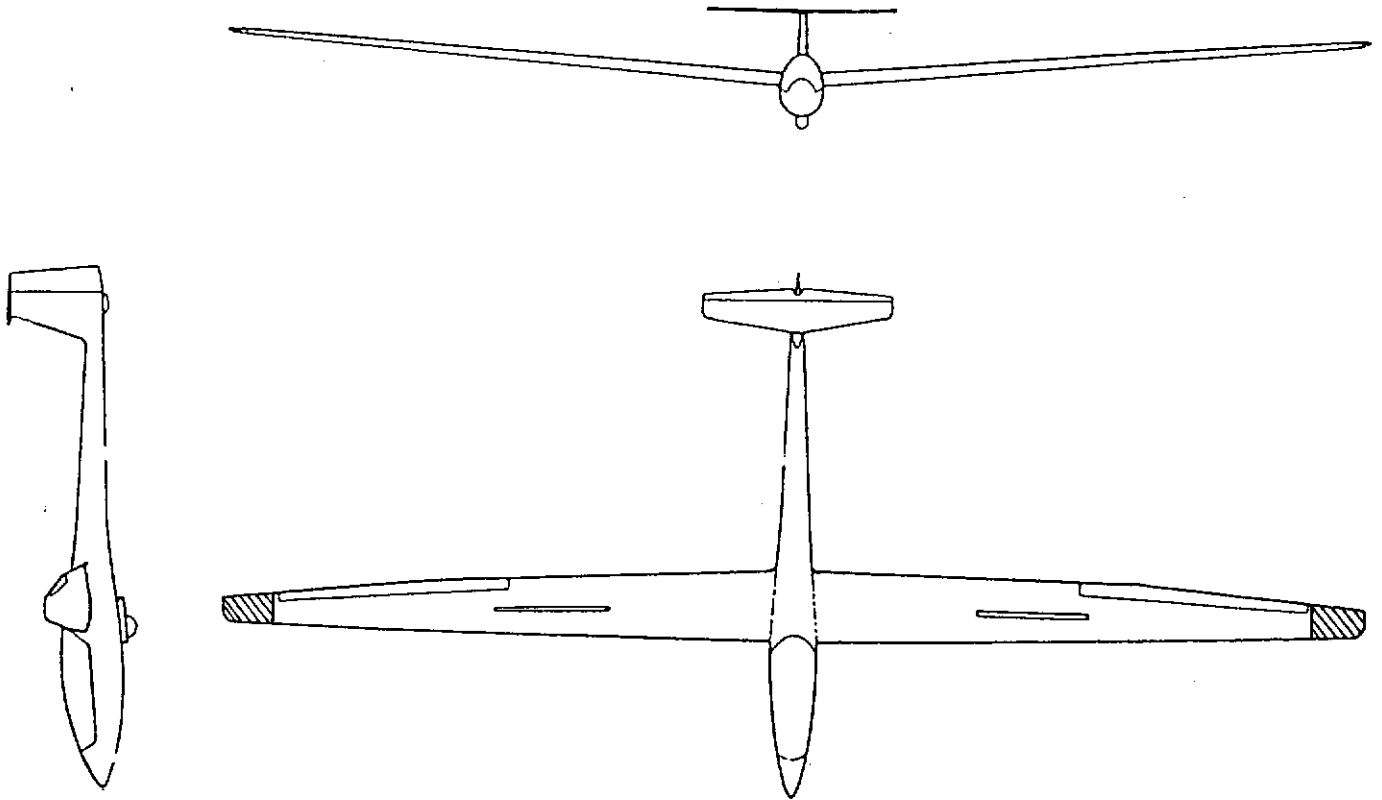
8.2 DRAIN ORIFICES



8.3 PRIMARY AND SECONDARY STRUCTURE



denotes secondary structure.



PLACARDS

Numbers relate placards to positions in Flight Manual page 7-2.

LS4-b CHECKLIST

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

1. Main pins secured ?
2. Horizontal tail secured ?
3. Test controls
4. Check loading conditions
5. Fasten seat belt harness
6. Connect parachute static line
7. Lock airbrakes
8. Trim neutral
9. Check release
10. Check tail dolly removed
11. Lock canopy

Tyre pressure on right side
 3 -3.5 bar landing gear door
 44-51 psi

Tyre pressure above tail wheel,
 2.5-3.5 bar when fitted
 36-51 psi
 at main bulkhead

Maximum Baggage Weight 5 kg/11 lbs
 (Soft items only)

ROLLADEN-SCHNEIDER FLUGZEUGBAU GMBH
 TYPE LS4-b
 TCDS No. _____
 Serial Number 4xxx
 Registration _____

Type Placard at main bulkhead

Use vertical tail fin battery only
 with main fuse at battery

(under battery box cover of
 vertical tail)

MINIMUM COCKPIT LOAD kg/ lbs

under instrument panel cover >2<

Rolladen-Schneider Flugzeugbau GmbH

Type: LS4-b Serial Number: 4xxx

DATA PLACARD

Airspeed Limits (IAS)	km/h	MPH	kts
Winch launch / Auto tow	140	87	76
Aero Tow	190	118	103
In Rough Air	190	118	103
Never Exceed (VNE)	280	174	151
Maximum Weight	525 kg (1157 lbs)		
including Water Ballast			
Aerobatic manoeuvres not approved			

WEIGHT LIMITATIONS

Maximum Cockpit Load kg. lbs.
Minimum Cockpit Load kg. lbs.

Battery in fin / Baggage Compartment
 Lighter Pilots must compensate lack of
 of weight as suggested in Flight Manual

on right side of cockpit >3<

Ball of bearing
 must be fixed

at forward horizontal
 tail attachment on
 vertical tail fin

Batt. I

Batt. II

OFF

Electrical switch positions

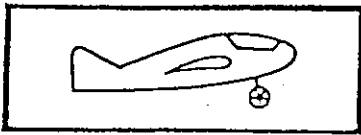
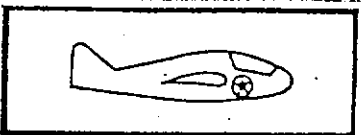

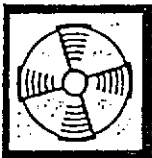


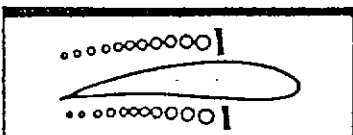

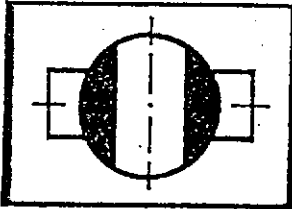
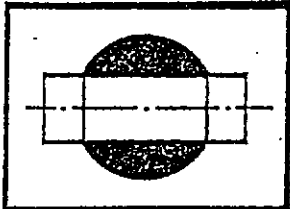



When using a battery in
 the vertical tail fin,
 Minimum Cockpit Load must
 be redetermined by weighing

(under battery box cover of
 vertical tail)

PLACARDS continued

Numbers relate placards to positions in Flight Manual page 7-2.

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

④	⑤	⑥	⑦
			
Extended	Landing gear lever Retracted	Tow cable release	Ventilation
			
Trim tail heavy	Trim nose heavy	Air brakes	Pedal adjustment
⑧	⑨	⑩	⑪
⑫	⑬	⑭	⑮
			
Water ballast closed	Water ballast opened	Canopy opening	Canopy opening and emergency release
			Backrest adjustment

11.1 PERMANENT INSTALLATION OF FIXED BALLAST

If empty weight C.G. position is too far back to allow 70 kg (154 lbs) as Minimum Cockpit Load, permanent installation of ballast (trim weights, 2.5 kg (5.5 lbs) each) under seat in front of control stick is possible. Lever arm of weights approx. 1050 mm (41.3 in) in front of datum.

A trim weight holder can be ordered as optional equipment. Weights should be fixed in flight direction, using large washers and self-locking nuts such that vibration will not allow weights to rotate.

One weight of 2.5 kg (5.5 lbs) shifts empty weight C.G. position approximately 17 mm (0.669 in) forward.

After permanent installation of fixed ballast, empty weight C.G. position should be redetermined by weighing. See Chapter 2.

In special cases empty weight C.G. position may be shifted rearward to allow heavy pilots to fly with rearward inflight C.G. positions.

Therefore it is possible to install a battery into the vertical tail fin (if a battery receptacle is fitted there) or a trim weight at the vertical tail fin web lower end using a rear trim weight holder. This holder is fitted to 4 mounting bolts of the elevator drive system and can be accessed after disassembly of the rudder.

WARNING: NEVER dismount the rear trim weight holder, bolts and nuts are fixing points for the elevator system.

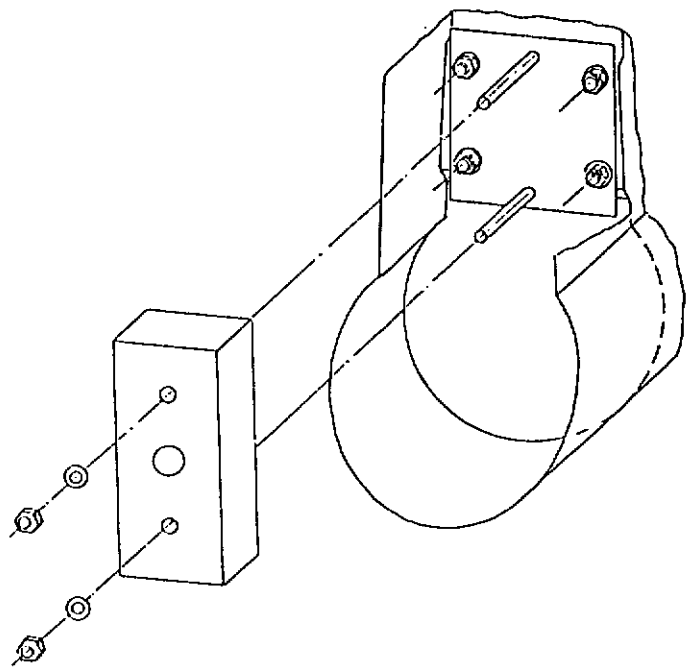
Maximum weight of rear trim weight: 2.45 kg (5.4 lbs), Part No. 4R8-108
Tail fin battery type Dryfit or similar maintenancefree and gastight type, 12V 6.5 Ah, measurements 232* 90* 50 mm (9.13* 3.54* 1.97 in)
weight 2.6 kg (5.7 lbs)

All nuts self-locking M6, LN 9348,
10 mm width over flats, washers
B 6.4, DIN 9021-St

For disassembly and assembly of rudder see Maintenance Manual, chapter 4. Pay special attention to unobstructed movement.

When fitting a trim weight to the vertical tail fin web, C.G. position must be redetermined by weighing according to chapter 2.

Trim weight installation at vertical tail fin web using rear holder (tail wheel box and lower rudder bearing bracket not shown)

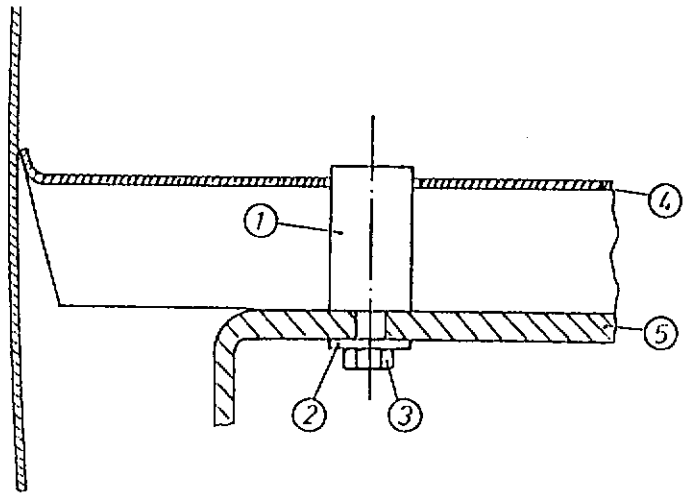


11.2 PERMANENT INSTALLATION OF EQUIPMENT IN BAGGAGE COMPARTMENT

Installation is possible as follows:

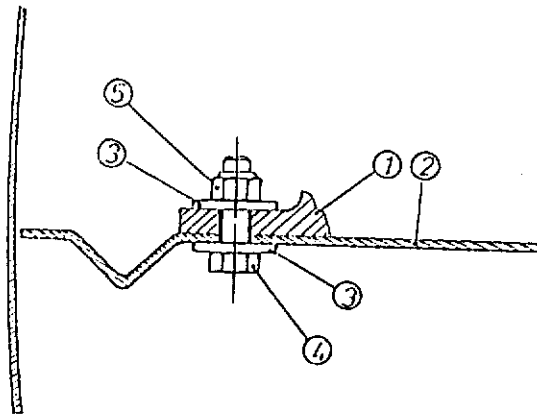
- a) Equipment must be attached to landing gear box using threaded spacers, three of which are necessary per unit. Baggage compartment cover has to be cut to avoid spacers. See sketch.

1. Spacer, diameter 15 mm (0.6 in), length 27 mm (1.1 in).
2. Washer B 6.4 DIN 9021-St outer diameter 18 mm (0.7 in)
3. Screw M6*10 DIN 85-A2
4. Baggage compartment cover
5. Landing gear box



- b) Equipment may be fitted to rear baggage compartment cover >2< behind spar connection { barographs or ELT's only }, as near as possible to side stiffening corrugations. Use large washers >3< (DIN 9021, 15 mm (0.6 in) in diameter) and self-locking nuts >5< M5 LN 9348. See sketch below:

- >1< mounting flange of equipment
>4< bolt M5 LN 9037



SPECIFICATIONS FOR BASIC EQUIPMENT

1) AIRSPPEED INDICATOR

Original certification was carried out using Winter 6FMS4-2 and 7FMS4-2 airspeed indicators with a range of 30 to 300 km/h and colour marking according to Flight Manual page 2-2.

A similar FAA approved airspeed indicator to meet TSO C2 reading to 300 km/h (160 kts, 180 mph) may be used. Maximum instrument error ±2%. Colour marking must be according to Flight Manual page 2-2.
Examples: AID 11-1002-1 or KI 8000

2) ALTIMETER

Original certification was carried out using Winter 4FGH10 or 4FGH20 altimeters with a range of 0-1000-10000 meters (approx. 33000 ft).

A similar FAA approved altimeter to meet TSO C10 with a range of approximately 33000 ft and a mercury or millibar 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 page 2-6, 2-7)

Examples: Kollsman Type 378222 or AID 13-2000-1 or AID 13-2000-5

3) MAGNETIC COMPASS

Original certification was carried out using an Airpath C 2400 compass.

Any FAA approved magnetic compass (non-stabilized type) to meet TSO C7 may be used.

Examples: Airpath C 2300

4) SEAT BELT HARNESS

lap belts without belly plate

Autoflug lap belt	Bagu	FAG-7D-0	(multiple point buckle)
shoulder strap	Schugu	FAG-7H-0	

Gadringer lap belt	Bagu	5402	(multiple point buckle)
shoulder strap	Schugu	2700	

5) OPTIONAL INSTRUMENTS

a) Mechanical Variometer (Vertical Speed Indicator)

Winter 5 StV5 or 5 StVM5	Bohli 68 PVF 1 or 68 PVF 2
PZL WRS-5D	Schueman SV or CV

b) Electrical Variometer

All models of the following named manufacturers:

Blumenauer - Flexum - Ilec - Peschges - Westerboer - Zander

c) Turn and Bank Indicator

Gauting WZ 402 models	PZL EZS-3
RC Allen 12W2D2A or 12W2D2S	

d) Horizon Reference Indicator (Electrical Gyro Horizon)

Gauting 6532/6	AIM 500-DCF
RC Allen RCA 26 AK-4	

6) ELECTRICAL INSTALLATION

- a) Battery Only life sealed batteries are recommended (Gel cell or Nickel-Cadmium types).
Battery size must be chosen in relation to power requirements to guarantee 8 hours of continuous service. For "German" type radio plus electrical variometer 12V/5.7 Ah are adequate.
Power requirement for average "German" type radio is 1.5 A for transmitting, 0.4 A for receiving voice and 0.06 A for standby.
Examples: Dittel (Dryfit) 12V 6.5 Ah including battery holder for baggage compartment. Installation according to page 11-2, measurements 170*73*140 mm (length*width*height) <6.69*2.87*5.51 in>, weight 3.1 kg <6.8 lbs>. For tail fin batteries see page 11-1.
- b) Switches Marquardt 2A 250V or other manufacturers
- c) Fuses Microfuse 20*5 mm DIN 41571 or
Circuit Breakers Klixon 7277-2 or 7274-2 or similar ones
Ratings: Master: 3 A (Minimum) quick acting
 10 A (Maximum) quick acting
 2 A quick acting: Radio Becker/Dittel
 1 A quick acting: Electrical variometers
 Turn and bank indicator
- d) Radio Walter Dittel FSG series
Avionic Dittel ATR 720 models
Becker AR 2000 and AR 3000 series
Antenna Becker Antenna for vertical tail fin, 118-136 MHz

7) LANDING GEAR

- | | |
|-------------------------|---|
| <u>Main wheel</u> | Tost Kobold 103/20, 4 inch in diameter |
| <u>Tyre</u> | Continental 4.00-4 6PR / Tost Aero 61J 4.00-4 6PR |
| <u>Tube</u> | Continental 4.00-4 |
| <u>Tail wheel (opt)</u> | Streifeneder 210 * 65 |
| <u>Tyre</u> | Continental 210 * 65 |
| <u>Tube</u> | Continental 210 * 65 |

8) RELEASE MECHANISMS

- | | |
|-----------|-----------------------------|
| C.G. hook | Tost Europa G88, G73 or G72 |
| Nose hook | Tost E85, E75 or E72 |

Maximum total weight of instrumentation in panel 6.7 kg (14.8 lbs).

MATERIALS AND SOURCES OF SUPPLY

EPOXY RESIN: Shell Epikote 162 <all parts except fuselage>
Epikote 163 <all parts>
with hardener Shell Epikure 113 for both Epikote versions

Scheufler L 285 <all parts>
with hardener: Scheufler 286 or 287

Mixture ratio for all resins: 38 parts per weight hardener for 100 parts
of resin. After mixing stir thoroughly until
all optical inhomogeneities have
disappeared. Add filler material later.

GLASS FIBER FABRIC:

Alkalifree E-glass, Volan-A-finish or finish I-550 (Interglas)
Manufacturer: Interglas Textil GmbH, Söflinger Str.246, 7900 Ulm

Interglas No.	Kind of weave	Weight g/(m*m)	Usage
90070	linen	79	elevator
92110	2/2 twill	163	rudder
92125	2/2 twill	280	local reinforcing
92145	Unidir. Plain	216	wing, fuselage
92146	Unidir. Plain	440	fuselage

CARBON FIBER FABRIC:

98320	Unidir. Plain	132	fuselage canopy frame
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Equivalent fabric types of other manufacturers according to materials
list 4BA-1 may be requested from manufacturer.

POLYESTER FABRIC:

34048	linen	206	fuselage
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Manufacturer: P.A.Lückenhaus & Co., Postfach 200805, 5600 Wuppertal

FOAM:

PVC foam Divinycell H 60, 8 mm thick, weight 60 kg/(m*m*m) <wing>
Manufacturer: Diab-Barracuda GmbH, Freudenthalstr. 25, 3000 Hannover 21

Foam Rohacell 71, 2.5 mm thick, weight 70 kg/(m*m*m) <control surfaces>
Manufacturer: Röhm GmbH, Kirschenallee, 6100 Darmstadt

FILLER MATERIALS:

Microballon	Lackfabrik Bäder KG, Postfach 25, 7300 Esslingen
Aerosil Type 200	A+E Fischer, Postfach 130202, 6200 Wiesbaden 13
Cotton flocks	
Type FL1f	Schwarzwälder Textilwerke, Postfach 25, 7623 Schenkenzell

MATERIALS AND SOURCES OF SUPPLY continuedGELCOAT:

UP-Vorgelat white T 35	Manufacturer: Martin G. Scheufler
Hardener SF 2	Kunstharzprodukte GmbH, Am Ostkai
Thinner SF	21/22 im Stuttgarter Hafen,
	7000 Stuttgart 61 (Obertürkheim)
Mixture ratio 2% (weight) of hardener	to 100% of T35 for brushing on.
For spraying: 10% (weight) of thinner	to 100% of T 35, than add 2
to 3% of hardener	

WARNING COLOUR:

Nitro Cellulose Kombilack	Manufacturer: Lackfabrik Bäder KG,
Reinorange RAL 2004 (orange) or	Postfach 25, 7300 Esslingen
Rot RAL 3000 (red)	

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 WIG-process (Shielded arc welding). In no case should they be gas welded, because required properties of the material will disappear.

CABLE SYSTEMS:

Rudder:	cable	B3.2 LN 9374
	cable sleeves	Nicopress 28-3-M, 3 pressings requ. with tool groove Oval M
	steel thimbles	A3.5 DIN 6899
Release mechanism and wheel brake:	cable	A2.4 LN 9374 A2.4 LN 9389 corrosion resistant, (release system under seat)
	cable sleeves	Nicopress 28-2-G, 1 pressing requ. with tool groove J
	stop sleeves	Nicopress 871-17-J, 1 pressing requ. with tool groove 51-MJ
	steel thimbles	A2.5 DIN 6899

LONGITUDINAL MOTION PUSHROD BEARINGS

During repairs, never pull pushrods out of longitudinal motion bearings, because all balls will leave their cages. Consequently, for reinstallation near each bearing a hole must be cut and repaired afterwards. These bearings are being used throughout the wing control systems, in the fuselage for elevator and aileron systems.

WARNING:

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.

TB-AD-ACCOMPLISHMENT LIST

Sailplane LS4-b Serial No. _____ Reg. Signs _____ Year of Manuf. _____

TB LBA-AD	Components concerned	Date	Steps / Modification	periodical		Page No. 1	
				1*		Time Limit	Accomplishm. Inspector
<u>4038</u>	Flight Manual - correction of pages	17.05.95	Exchange	x		next annual	<i>29.5.95</i> <i>Whapka</i>

TB-AD-ACCOMPLISHMENT LIST

Sailplane LS4-b Serial No. _____ Reg. Signs _____ Year of Manuf. _____

<u>TB</u> LBA-AD	Components concerned	Date	Steps / Modification	periodical		Page No.	
				1*		Time Limit	Accomplishm. Inspector

Serial No.:	Reg.Signs:	INSPECTION REPORT
-------------	------------	-------------------

Operator: _____

Total flying time since manufacture: _____ Hours with _____ landings
 Flying time since last Annual Inspection: _____ Hours with _____ landings

- | | |
|--|---|
| <input type="checkbox"/> Final Production Inspection | <input type="checkbox"/> Airworthiness Directive Inspection |
| <input type="checkbox"/> Annual Inspection | <input type="checkbox"/> Repair Inspection |
| <input type="checkbox"/> _____ | <input type="checkbox"/> _____ |

Seq. No.	Report or Findings	Remarks	Signed
1.	Check Control Surface Deflections		
2.	Check Operating Instructions according to TCDS		
3.	Check Placards as given in Flight Manual		
4.	MINIMUM COCKPIT LOAD is _____ kg/lbs		
5.	C.G.Release S/N _____ operational until _____		
6.	Wings Flex Number _____ cycles per minute (Fuselage supported in front of landing gear and on tail skid/wheel)		
7.	Airworthiness Directives accomplished:		
8.	Technical Bulletins accomplished:		
9.	TB-AD-List updated:		
10.	Del.with: Battery in fin		
11.	Del.with wing water bags 100 / 150 Liters		

The following reports are valid for this inspection report:

Checklist dated _____	Equipment List dated _____
Inspection Certificate dated _____	Control System Adjust- ment Report dated _____
Flight Test Report dated _____	Parts Inspection Certificate _____
Findings Report dated _____	Welding Report _____
Weighing Report dated _____	Control Surface Weight/Moment _____

The sailplane is / is not airworthy.

_____ (Stamp) _____ (Signature of inspector)

Place and date of inspection

Edition Apr. 15, 1992

Erstellt:	Ersetzt:	Geprüft:
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Serial No.	Reg.Signs	Date:	WEIGHING REPORT
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COMPONENT WEIGHTS (Check when equipment altered or every fourth year)

Right Wing (min. weight 60 kg/132 lbs)	kg lbs	Maximum all-up Weight	525 kg/1157 lbs
Left Wing (min. weight 60 kg/132 lbs)	kg lbs	Maximum Weight of Non-lifting Parts at W= kg/lbs and Xcg= mm/in	kg lbs
		according to table pages 2-4/2-5	
Fuselage + Canopy + Main pins + Equipment	kg lbs	Fuselage (completely equipped)	—
		Horizontal tail	—
		Cockpit Load (max.110 kg or 242 lbs)	—
Horizontal Tail	—	Weight of Non-lifting Parts	—
Empty Weight <W>	—		

BATTERY POSITION	None Baggage Compartment Tail Fin
-------------------------	---

FIXED BALLAST WEIGHT POSITION

. kg/lbs in Tail Fin /

WEIGHING AND EMPTY WEIGHT C.G. DETERMINATION (Check when equipment altered or every fourth year)

Technical data according to TCDS: Datum Point <DP>: Leading edge of wing at root
 Datum Line <DL>: Under side of fuselage boom horizontal

Empty Weight <W>	—	Distance Wheel axis - Datum Point <a>	mm/in
Nett Tail Weight <W2>	kg lbs	Distance Wheel axis - Tail support 	mm/in

NOTE: See also Maintenance M. Chapter 2

State dimensions used. Redetermine distances a and b, because of possibly altered suspension level.

$$\frac{W2 * b}{W} + a = Xcg \quad \frac{\quad * \quad}{\quad} + \quad = \quad \begin{matrix} \text{mm} \\ \text{in} \end{matrix}$$

Empty Weight C.G. Range according to Maintenance Manual, pages 2-5 to 2-8
 from mm / in to mm / in at Empty Weight <W> kg / lbs
 yields permissible Cockpit Load Range
 from kg / lbs to kg / lbs.
 Weighed and calculated C.G. positions are within permissible limits.

MINIMUM COCKPIT LOAD: kg / lbs **MAXIMUM COCKPIT LOAD:** kg / lbs
 (Maximum limited by Non-Lifting Parts or C.G.Table)
 Weight and Balance Placard and Minimum Cockpit Load Placard in Cockpit as well as entry
 in Flight Manual Page 6-2 have been checked/updated.
 Equipment during weighing/calculation see Equipment List dated:

(Stamp) _____ Signature of Inspector

Serial No.	Reg. Signs	Date:	FLIGHT TEST REPORT
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Operator _____

PILOT: _____ Airfield: _____

Winch Launch / Aero Tow _____ Take off Time: _____ Landing Time: _____

Empty Weight :	FINDINGS Mark as follows: Ø = not available + = without objections - = objections, specify at end or overleaf Mark dimensions used under remarks below
Pilot and Parachute Weight:	
Battery Position :	
Remov. Trim Ballast Weight:	
Total Flying Weight :	

1. On Safety Harness : ()	Handles : ()	Canopy Locking: ()	Visibility : ()
Ground Seat Adjustment: ()	Pedal Adjustment: ()	Control System: ()	Ventilation: ()

2. Take Off Tow altitude : Tow Speed (IAS): Handling : ()

3. Tow Release Function Automatic: () Manual : () 4. Landing Gear Retracting : ()

5. Radio Function On Ground: () During Take Off: () 6. Instrumentation Function : ()

7. Slow Flight Stalling Speed (IAS): ()

8. Normal Flight Controls free, Trim neutral: (IAS): ()
 Ref. 100 - 125 km/h

9. Trim Range from (IAS): to: ()
 Ref. from slow flight to 200-230 km/h

10. Circling Flight : () 11. Effectiveness of Controls Elevator, Rudder, Ailerons : ()

12. Straight Flight at 80 km/h: () at 120 km/h: () at 200 km/h: ()

13. High Speed Flight up to (IAS): **Be alert to danger of flutter !** ()

15. Landing Gear Extending : ()

16. Air Brakes Effectiveness/forces : () 17. Sideslip / Landing (with/without air brakes): ()

Remarks: All speeds km/h / kts / MPH
 All weights kg / lbs
 Altitudes m / ft

Sailplane regarding operation allright Allright after accomplishing complaints New Flight Test necessary
--

Cross out invalid statements !

Reference Speed Value Table

km/h	kts	MPH
80	43	50
100	54	62
120	65	75
200	108	124
230	124	143

 <Signature of Pilot>

Serial No.	Reg.Signs	Date:	EQUIPMENT LIST
--------------------	---------------------	-----------------	-----------------------

MINIMUM EQUIPMENT: (Check function annually, calibrate every fourth year)

	Type	Manufacturer	Serial-No.	Inst.Pos.	Certif.	Function
Airspeed Ind.				I-Panel		
Altimeter				I-Panel		
Radio						
Microphone						
Loudspeaker						
Battery						
Lap Belt	5402/FAG7D	Gadr./Autofl		Seat		
Shoulder Str.	2700/FAG7H	Gadr./Autofl		Seat		
C.G.Hook	G 72/73/88	Tost		Landing G.		

Additionally for Cloud Flying:

Turn and Bank						
Compaß, compens.						
Variometer						

Additional Equipment: (Check annually, Calibration not required)

Variometer						
Variometer						
Permanently fixed Ballast				Forward/Aft NONE		
Wheel	Kobold	Tost				
Water Ballast Bags	1F5-35R=150 3F5-81 =100	Liters Liters				

<Stamp> _____
Signature of inspector

SERIAL-No.: _____	Reg.Signs: _____	CONTROL SURFACE WEIGHT / MOMENT
		Date: _____

Check whenever a change is suspected and after repairs

CONTROL SURFACE WEIGHT

	Limit Values	Measured Values	Cross invalid dimensions!
Left Aileron	3.50 - 5.00 kg 7.72 - 11.02 lbs	kg lbs	
Right Aileron		kg lbs	
Elevator	1.41 - 1.90 kg 3.11 - 4.19 lbs	kg lbs	
Rudder	3.70 - 4.50 kg 8.16 - 9.92 lbs	kg lbs	

CONTROL SURFACE MOMENT

Cross invalid dimensions!

	Limit-Moment	Rear Edge Weight	* Radius	= Moment
Left Aileron	10.00 - 13.70 cmkg 138.87-190.26 in oz	kg oz	cm in	cmkg in oz
Right Aileron		kg oz	cm in	cmkg in oz
Elevator	4.88 - 6.50 cmkg 67.77 - 90.27 in oz	kg oz	cm in	cmkg in oz
Rudder	0 - 3.50 cmkg 0 - 48.61 in oz	kg oz	cm in	cmkg in oz

(1 cmkg = 13.888 in oz)

<Stamp> _____
 Signature of inspector

SERIAL-No.: _____ Reg.Signs: _____

CONTROL SURFACE DEFLECTIONS

Check control surface deflections annually

Date: _____

CONTROL SURFACE DEFLECTIONS, measure at inner edge

	Radius <mm/in>	Limit <mm/in>	Actual <mm/in>
LEFT AILERON	up		
	down		
RIGHT AILERON	up		
	down		
HORIZ. TAIL	up		
	down		

for limit values
see Chapter 6 !

RUDDER Measure at lower edge, Radius _____ mm/in

	Limit <mm/in>	Actual <mm/in>
left		
right		

CONTROL SYSTEM FRICTION Check control surface friction/play annually

	Limit <grams/lbs>	Actual <g/lbs>	Point of measurement
Elevator	maximum 150 / 0.331		30mm/1.2in below stick end
Aileron	about 200 / 0.441		30mm/1.2in below stick end
Rudder	about 500 / 1.102		at lower rudder edge

CONTROL SURFACES REAR EDGE PLAY

Fix control stick at neutral position of control surface

Aileron maximum of 3.0 mm/0.118 in left: _____ mm/in

right: _____ mm/in

Elevator maximum of 3.0 mm/0.118 in _____ mm/in

Cross invalid dimensions!

(Stamp) (Signature of Inspector)

SERIAL-No.: _____ Reg.Signs: _____ ANNUAL INSPECTION CHECKLIST 1

Mark as \emptyset not existing/not examined + no faults follows: - defective, specify separately

Inspection date: _____

See also page 3-1: Annual Inspection

WING UNIT

- Serial No. _____
- Finish
- Spar
- Root ribs
- Root rib pins
- Water tanks
- Drain holes
- Ailerons
- Air brakes
- Connecting means

- Aileron pressure marks
- drives at ailerons
- drives at root ribs
- fixed bearing and washer
- bearings
- sealing
- stops
- ventilation
- Aileron-wing lateral gaps
- Cracks
- Compression or buckling

- Air brake bearings
- cover springing
- drive at root rib
- locking
- friction damper function

- Main pins
- Main pins serial No. _____
- Turbulator tape bonding
- Wing tip skids

FUSELAGE

- Serial No. _____
- Finish
- Shell
- Cracks in structure
- Drain holes
- Rudder mounting
- Stabilizer mounting

- Bushes for wing root pins
- Tangential tubes
- Tangential tubes, locking of bushes
- Cockpit
- Seat
- under seat
- lap belt fixing at seat
- shoulder strap fixing
- Control stick
- Elevator drive under seat
- Aileron drive under seat
- Air brake drive
- Aileron automatic connectors
- Airbrake automatic connectors
- Trim system
- Trim system locking
- Pedals
- Pedal adjustment
- Rudder cables
- Earth connections
- Backrest lower end adjustment
- Backrest upper end locking
- upper end safety bolt existent
- Trim weight fixing and nut
- Nose hook fixing and drive
- Tail skid condition
- cable deflector at front end
- Tail wheel
- Connecting means
- Water ballast operating system
- Tail fin battery box and cover

HORIZONTAL TAIL UNIT

- Serial No. _____
- Finish
- Sandwich shell
- Stabilizer ventilation
- Elevator ventilation
- Elevator drive
- Fixed bearing and washer
- Bearings
- Connection to fuselage
- Connecting means
- Sealing

 (Stamp) (Signature of Inspector)

SERIAL-No.: _____	Reg.Signs: _____	ANNUAL INSPECTION CHECKLIST 2
		Inspection date: _____

CANOPY

- | | |
|---|---|
| <input type="checkbox"/> Serial No. _____ | <input type="checkbox"/> Electrical wiring |
| <input type="checkbox"/> Locking mechanism | <input type="checkbox"/> Battery and fitting |
| <input type="checkbox"/> Emergency release function | <input type="checkbox"/> Tail fin battery with fuse |
| <input type="checkbox"/> Release force below 15 kg/33 lbs | <input type="checkbox"/> Radio |
| <input type="checkbox"/> Ventilation system | <input type="checkbox"/> Antenna system |
| <input type="checkbox"/> Window | <input type="checkbox"/> SWR _____ |
| <input type="checkbox"/> Canopy fixing system | <input type="checkbox"/> Communication check |
| <input type="checkbox"/> Gas strut operation | <input type="checkbox"/> Compass deviation list |
| <input type="checkbox"/> Lift canopy at rear end: force required: _____ (8-15 kg) _____ (18-33 lbs) | <input type="checkbox"/> Seat belt harness operational until: _____ |
| | <input type="checkbox"/> Weight and balance plan |
| | <input type="checkbox"/> Data placard |
| | <input type="checkbox"/> Cockpit placards |
| | <input type="checkbox"/> Baggage compartment cover |
| | <input type="checkbox"/> Oxygen bottle receptacle |

RUDDER

- Finish
- Shell
- Ventilation
- Drive
- Fixed bearing and washer
- Bearings
- Connecting means

ADJUSTMENTS

- Wings and horizontal tail
- Play at root ribs
- Zero setting of control surfaces
- Control surface deflections according to page 6-1
- Air brake extension min. 147 mm <5.787 in> at inner edge
- locked, lateral gaps of cover: inner edge min. 1 mm <0.04 in> outer edge min. 2.5 mm <0.1 in>
- locked, cockpit lever at least 6 mm <0.24 in> away from stop
- Control surface friction Elev: _____ Ail: _____ Rudder: _____
- Control surface rear edge play Elev: _____ l.Ail: _____ r.Ail: _____
- Trim system operation + locking
- C.G. hook function/automatic release
- Nose hook function operational until: _____
- Release cable end play existent with landing gear down?

LANDING GEAR

- Undercarriage and axle
- Tyre
- Springing
- Bearings and joints
- Preset load at folding strut
- Doors
- Drive rods and bearings
- Connecting means
- Locking and overcenter
- Wheel brake system
- C.G. hook fitting and drive operational until: _____
- Earth connection to control stick

EQUIPMENT

- | | |
|--|--|
| <input type="checkbox"/> Minimum instrumentation | <input type="checkbox"/> Safety harness/multiple point buckle |
| <input type="checkbox"/> Additional instrumentation | <input type="checkbox"/> Water ballast discharge |
| <input type="checkbox"/> Operating range and limit marks | <input type="checkbox"/> Water system absolutely tight ? |
| <input type="checkbox"/> Vacuum flasks | <input type="checkbox"/> Wing flex number _____/Minute (fuselage supported in front of landing gear) |
| <input type="checkbox"/> Function of instrumentation | |
| <input type="checkbox"/> Tubing | |
| <input type="checkbox"/> Total energy unit | |
| <input type="checkbox"/> Pitot system free of leaks | |
| <input type="checkbox"/> Static system free of leaks | |
| <input type="checkbox"/> T.E. system free of leaks | |

(Stamp) _____ (Signature of Inspector)

SERIAL-No.: _____ Reg.Signs: _____

ANNUAL INSPECTION CHECKLIST 3

Inspection date: _____

GENERAL

- () Checklist
- () Fireproof type placard
- () Minimum Cockpit Load placard
- () Registration signs
- () Nationality marks
- () Anti-collision marking
- () Logbook
- () Flight Manual
- () Maintenance Manual
- () Airworthiness Directives
- () Inspection for foreign matter
- () Logbook notation
- () Flight Manual notation page 6-2
- () Min.Cockpit Load placard notation
- () Weight and Balance plan notation
- () Updating of TB-AD-List in
Maintenance Manual
- () Valid C.G.weighing dated _____
- () Valid Equipm. List dated _____
- () Insp. of automatic couplings for
possible wrong rigging
- () Permanent installation of equipment in
baggage compartment according to
Maintenance Manual chapter 11.
- () Annual inspection hints page 3-1 checked
- () Faults specified on findings report

(Stamp) (Signature of Inspector)

(Valid for Edition 1992 of LS4-b Maintenance Manual)

Check air brakes for jamming/locking during retracting under load:

		Inspector
1	Check air brake levers in wing for corrosion at lower end.	
2	Check air brakes for jamming/locking during retracting under load: Simultaneously apply about 25 kg <55 lbs> to the rear at each lever without twisting upper member and retract.	
3	When under the load according to item 2 any kind of jamming on wing occurs, bearings must be replaced according to repair instruction "Air Brake Levers" immediately.	
4	With corrosion existent, but no jamming, bearings must be changed within 6 months.	

Prepared: 15. Oktober 1999 <i>Seuck</i>	Verified: <i>Whapler</i>
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In a case of change of ownership please complete this form and send it back to the manufacturer's address below. This is the only practicable way to give you immediate notice of future technical changes, should they become necessary.

Type of sailplane: LS4-b

Serial Number: _____

Registration Signs: _____

Address of new owner:

Address of former owner:

Send to:

Rolladen-Schneider Flugzeugbau GmbH
Mühlstrasse 10
D-6073 Egelsbach
Germany

Telephone: 06103-4126
Teletex: 6103985=LSFLUG
Telex: 176103985=LSFLUG
Fax: 06103-45526