

ROLLADEN SCHNEIDER FLUGZEUGBAU GmbH
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MAINTENANCE MANUAL

LS4-a

This Manual is issued for U.S. registered sailplanes.
Type Certificate Data Sheet No. G 45 EU.

Registration Signs: N30SZ Serial Number: 4473

Owner: Colorado Soaring Association

Wellington, CO USA

(Updated for nose release TN4041)

Published 15. Nov. 83

Approval of translation has been done by best knowledge and judgement.
In any case the original text in German language is authoritative.

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LOG OF REVISIONS

Revision No.	Pages affected	Description	LBA approval signature	Date
1	1-1, 1-2, 4-1	New tow hook models included		
2	1-1, 1-2, 4-1, 4-2, 10-1,10-2 10-3	Inspection Sequence to increase Service Life (TB 4027a)	LBA-approval 08.04.97	
3	1-1, 1-2, 1-3, 3-6	Optional Nose Release (TN 4041)		

LS4-a Manuals can be ordered from

DG Flugzeugbau GmbH
 Otto Lilienthal Weg 2
 D-76646 Bruchsal
 Germany

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LBA-ankerk.

Revision TM4041

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Eratellt: Translation - See German version	Ersetzt:	Gepuft: Translation - See German version
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1-3	Nov 15, 1983		Mar 99
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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 of Chapter 6 and signed by inspector.

EXTRAORDINARY INSPECTIONS

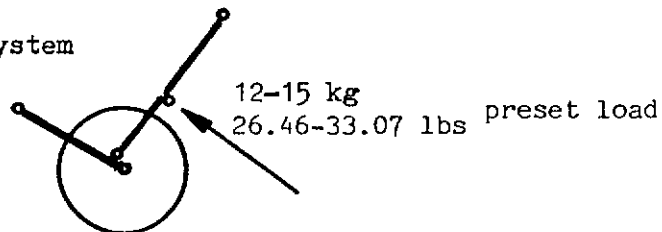
Extraordinary inspections should be performed, depending on circumstances (rough landings, ground loops etc.)

1. Landing gear functioning, attachment and preset load (See below).
2. Landing gear box for damage.
3. Tail skid gluing or tail wheel attachment.
4. Wings, fuselage and tail for damage (cracks, buckling, compression).
5. Wings flex number (support fuselage in front of landing gear).
6. Control surfaces function and deflections.

ANNUAL INSPECTION

1. Lubricate various parts according to plan (Page 2-2).
2. Protect gelcoat with car polish. 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 anti-collision colour marking.
3. Replace gap tape on upper side of ailerons, if old tape has shrunk. If you use lead-free petrol to remove residual adhesive, be careful not to damage anti collision colour marking. Fresh tape should be attached while ailerons are fully deflected downward.
4. Check colour marking on ball snap joints of aileron and airbrake systems and replace if necessary.
5. Inspect landing gear system for preset load at folding struts of 12 - 15 kg (26.46 - 33.07 lbs).
6. Perform Annual Inspection according to checklist, Chapter 8.
7. When equipment is altered compared to last equipment list, file new equipment list and redetermine C.G. (See Flight Manual Chapter 6). With equipment unaltered, C.G. should be redetermined every 4 years. Appropriate forms see Chapter 7.

Landing gear system



LUBRICATION SCHEDULE

Location	Frequency	Lubricant
Main pins and matching holes Pins and matching holes of elevator connetions Ball snap joints of aileron and airbrake systems	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) or Molykote 33 (Temperature range -70°C to 180°C, -94°F to 356°F)
Landing gear, all joints and at rubber bearings Landing gear, all metal parts	Once a year	Oil Spray oil
Bearings of control surfaces	After dis-assembly only	Water insoluble bearing grease or Grease containing Molybdenum

Tow release:

See Maintenance Instructions of Manufacturer (Tost)

FAG-7H safety harness
multiple point buckle:

See Maintenance Instructions of Manufacturer (Autoflug)

IMPORTANT NOTE : Longitudinal motion bearings of pushrods in aileron and elevator system should never be lubricated !

INSTALLATION OF CONTROL SURFACES

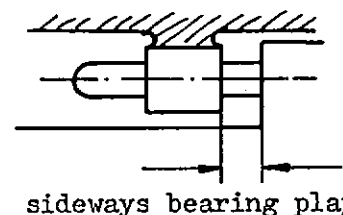
Disassembly of Ailerons

1. Remove gap tape on upper wing surface, fillet on outside lower edge of aileron and internal seal, if installed, from lower side of aileron.
2. Loosen nut (6 mm thread, LN 9348, width over flats 10 mm), at bearing No. 2 and remove washers, remember sequence and position of washers.
3. Loosen aileron drive nut (6 mm thread, LN 9348, width over flats 10 mm), remove washer and pull drive rod from bolt.
4. Deflect aileron fully upward and remove it from bearings towards wingtip.
5. Watch washers, if existent, at inner side of bearing No.2 .
6. Remove internal sealing, if installed, from wing.

Assembly of Ailerons

1. Install internal sealing at inner lower rear edge of wing analogous to description on page 3-4.
2. Grease bearings according to Lubrication Schedule, page 2-2.
3. Make sure that washers, if existent, are on inner side of bearing No.2 .
4. Match pins with bearings when aileron fully deflected upward. Do not use force. Set up washers at bearing No.2 as found during disassembly.
5. Tighten nut (6 mm thread, LN 9348, width over flats 10 mm) at bearing No.2 with maximum torque 1 mkg (7.223 ft lbs).
6. Check Sideways Minimum Bearing Play between aileron and bearings:

Bearing No.	1	2	3	4	5
Play (mm)	0.5	fixed	0.5	1.0	1.5
Play (in)	0.020		0.020	0.039	0.059



7. Fix rod to aileron drive bolt using washer and nut and tighten with maximum torque of 1 mkg (7.223 ft lbs).
8. Tape gap on upper side when aileron is fully deflected downward and glue fillet into outer edge.

INSTALLATION OF CONTROL SURFACES continued

Disassembly of Elevator

1. Remove internal sealing with elevator fully deflected downward.
2. Loosen nut on left inside bearing (5 mm thread, LN 9348, width over flats 8 mm) and remove washer.
3. Remove elevator to the left, do not loose spacing washer on left inside bearing.
4. Remove internal sealing from stabilizer.

Assembly of Elevator

1. Fit internal sealing to stabilizer as described on page 3-4.
2. Grease bearings according to Lubrication Schedule.
3. Fit spacing washer to left inside bearing pin.
4. Match pins with bearings. Do not use force.
5. Insert washer on left inside bearing before tightening nut with maximum torque 1 mkg (7.223 ft lbs).
6. Fix internal sealing, see page 3-4.

Disassembly of Rudder

1. Remove internal sealing from both sides of rudder.
2. Disconnect rudder cables, watch spacing casings.
3. Loosen nut at lower bearing (6 mm thread, LN 9348, width over flats 10 mm). Remove small washer, then large washer.
4. Before lifting rudder upward from bearings mark rear upper edge of fin on both sides of rudder with rudder in neutral position using soft pencil.
5. Remove internal sealing from fin.

INSTALLATION OF CONTROL SURFACES continued

Assembly of Rudder

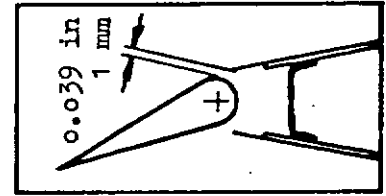
1. Fit internal sealing to both sides of fin analogous to page 3-4.
2. Grease bearings according to Lubrication Schedule, page 2-2.
3. Set rudder on bearings. If both upper edge markings are not visible at the same time when in neutral position, the upper bearing pin is in front of its needle roller bearing.
4. Insert large washer, then small washer on lower bearing. Tighten nut with maximum torque of 1 mkg (7.223 ft lbs). After assembly the rudder should have slight axial play. Maximum axial play is 1 mm (0.039 in).
5. Connect rudder cables. Do not forget to insert spacing casings.
6. If not equipped with turnbuckles near pedals, check pedal-rudder alignment: Set pedals to neutral position. If rudder is deflected to one side, twist opposite cable clockwise until properly aligned.
7. Tighten nuts at rudder cable connections with maximum torque of 1 mkg (7.223 ft lbs).
8. Fix internal sealings on both sides of rudder. See page 3-4.

CAUTION

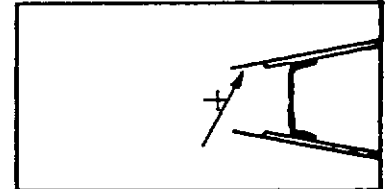
In case of repairs, never pull longitudinal motion control system pushrods out of their bearings, all the balls will leave their cages. Subsequently a hole near each bearing is necessary to reinstall them !

INSTALLATION OF INTERNAL SEALING FOR ELEVATOR

1. Gap between fin and elevator upper side must be at least 1 mm (0.039 in) wide in all positions. Enlarge smaller gap on fin side only using sanding paper grade 60 glued to 0.5 mm (0.020 in) thick sheet metal.

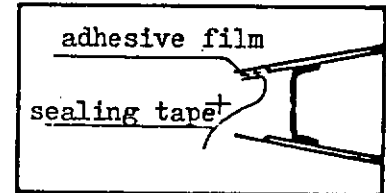


2. Mark rear edge of fin on upper side of elevator using soft pencil, when fully deflected downward. Take elevator off.
3. Roughen gluing area on inside upper rear fin edge using sanding paper grade 60. Round sharp edge slightly (sanding paper grade 180) and blow off dust.



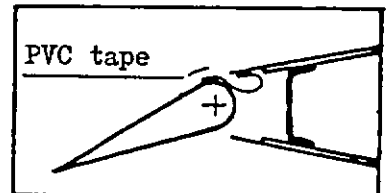
4. Clean gluing area at inner fin edge and on sealing tape using lead-free petrol. Lay sealing tape on table and stick adhesive film edge flush to sealing tape edge.
5. Mark rear gluing edge inside rear fin edge approximately 2 mm (0.079 in) forward of rear edge.

6. Pull masking tape off prepared sealing tape and glue to inside rear fin edge along marked line. Press gluing temporarily.



7. Clean leading edge of elevator behind marked rear edge of fin using lead-free petrol, and second side of sealing tape.
8. Stick adhesive film to leading edge of elevator flush behind marking line.

9. Assemble elevator according to page and deflect fully downward. Pull sealing tape out of gap, pull masking tape off and lay sealing tape on adhesive film avoiding branching or lateral displacement. Press adhesive film area temporarily using roller.



10. Cut surplus sealing tape along rear edge of adhesive film using sharp knife and straightedge.
11. Mask rear edge of sealing tape with white PVC tape to avoid warping.

Procedure is analogous for rudder (seal on both sides) and aileron (seal on lower side of wing).

FLIGHT CONTROL TRAVEL LIMITS

Elevator: Up $27 \pm 3^\circ = 364 \pm 5 \text{ mm (14.33 \pm 0.2 in)}$
 Down $21 \pm 2^\circ = 245 \pm 5 \text{ mm (9.65 \pm 0.2 in)}$
 Radius 148 mm (5.83 in)
 Distance of reference point on fin 300 mm
 (11.81 in) at neutral position



Elevator reference point

Rudder : To both sides $28 \pm 1^\circ = 150 \pm 10 \text{ mm (5.91 \pm 0.39 in)}$
 Radius 310 mm (12.20 in)

Air Brake: Up not less than 150 mm (5.91 in) at inner lever

Aileron : Up $23 \pm 2^\circ = 65 \pm 5 \text{ mm (2.56 \pm 0.2 in)}$
 Down $14 \pm 1^\circ = 40 \pm 3 \text{ mm (1.58 \pm 0.12 in)}$
 Radius 165 mm (6.50 in)

WEIGHT, MASS BALANCE, PLAY and FRICTION

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

	Elevator	Rudder	Aileron
Radius	148 mm 5.83 in	310 mm 12.20 in	165 mm 6.50 in
Horizontal reference line	centerline of section	centerline of section	upper side of section
Weight at rear edge of reference line	0.330 to 0.440 kg 0.728 to 0.970 lbs	-0.040 to 0.100 kg -0.088 to 0.220 lbs	0.600 to 0.800 kg 1.323 to 1.764 lbs
All-up weight	1.410 to 1.900 kg 3.109 to 4.189 lbs	3.700 to 4.500 kg 8.157 to 9.921 lbs	3.500 to 5.000 kg 7.716 to 11.023 lbs
Play at rear edge of reference line	3.0 mm 0.118 in	not affected	3.0 mm 0.118 in
Friction	max. 0.150 kg max. 0.330 lbs	around 0.500 kg around 1.100 lbs	around 0.200 kg around 0.440 lbs

MEASURING TECHNIQUES

- for rear edge weight : Control surface should be attached to bearings without any tension or friction, weight at rear edge should be measured with reference line level.
- for rear edge play : Play should be measured with control stick fixed to zero position.
- for friction : Friction should be measured 30 mm (1.2 in) from top end of control stick for elevator and aileron. Aileron values may be higher with internal seal installed. Rudder friction should be measured at rudder reference radius 310 mm (12.20 in).

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Erstellt: 15. April 83 *le*

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Geprüft: 15. 4. 83 *Whepha*

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Installation and Removal of Nose Release (optional equipment)

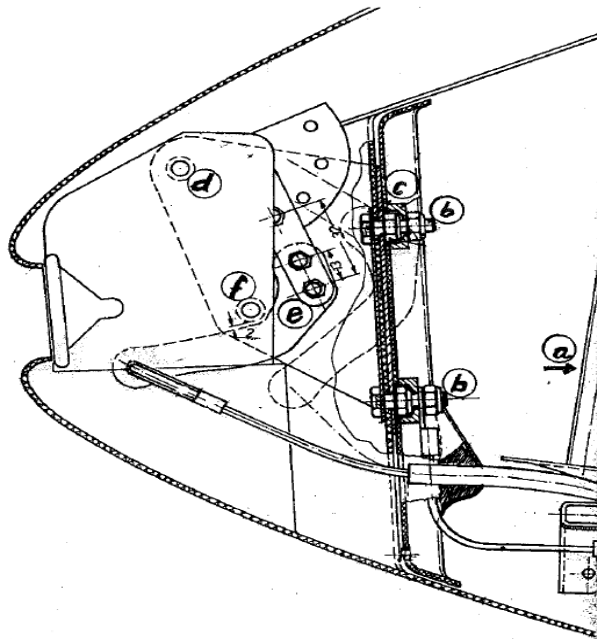
Tools: ratchet with $\frac{3}{4}$ " extension, 8 and 10 mm nuts, 4 mm Allen wrench, 10 mm box wrench, 12 mm open-end wrench

In General: Itemize the places where screws, nuts and washers are removed

- Cover after extracting the release from fuselage mount
- Remove the seat pan
- Unfasten the main coupling guide pulley under the seat
- Pedals in rear position
- Loosen connections for the nose weight holder-pedal guide >a<
- Remove lock nuts for nose rib cover and loosen lock nuts for release mount
- Tip the cover to the rear, pull the release together with brackets back around the pedal holder
- Dismantle release from brackets >d< and >f<, attention: four spacers are on the outside of the release housing with an additional bushing >f< inside
- Extend the release drive arm by loosening the release cable

For Installation follow instructions in the reverse order:

- Insert bushing inside >f< before assembly of drive arm
- Mount brackets to release with spacers between release housing and brackets
- After screwing together at >c< and screwing on the main coupling in the guide pulley function test both releases, pay special attention that there is 5 mm of play at the T-handle with the landing gear both extended and retracted.
- Connect grounding cable to mounting bracket on cover screw
- Install the nose weight holder
- Before installation of the seat pan function test pedal control system and detent contact as well as Foreign Body Control



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Components Life / TBO

1. Sailplane structural life limit: 3000 hours total flying time.

The life limit may be increased to 12000 hours according to the procedure outlined on page 5-2.

2. Safety harness Autoflug FAG-7H: Webbing life limit 12 years from manufacturing date.
(if fitted)

See also Maintenance and Operating Instructions of manufacturer.

3. All Gadringer safety harnesses: Webbing life limit 12 years from manufacturing date.

See also Maintenance and Operating Instructions of manufacturer.

4. C.G. hook Tost Europa G 73: 48 months or 2000 take offs >*
 or Tost Europa G 72
 or Tost Europa G 88

5. Nose hook Tost E 75: 48 months or 2000 take offs >*
 or Tost E 72
 or Tost E 85

>* See also Maintenance and Operating Instructions of manufacturer.

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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 12000 hours if airworthiness of each single sailplane (in addition to annual inspections) is checked according to a special multi-step inspection program.

2. Schedule

When the sailplane has reached 3000 hours service life an inspection according to the program 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 inspecting routine should be repeated when reaching 9000 hours. With a positive result or found defects repaired properly, service life will be increased by another 1000 hours each to 10000 hours (3. step), 11000 hours (4. step) and 12000 hours (5. step).

3. The valid inspection program should be requested from the manufacturer stating serial number and service time.
4. Inspections should be carried out at the manufacturer or an adequately licensed 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.

MATERIALS AND SOURCES OF SUPPLY

Epoxy resin: Shell Glycidäther 162 (Epikote 162)
Hardener: Shell Epikure 113
Mixture ratio: 38 parts (per weight) hardener for 100 parts of resin. After mixing stir thoroughly until all optical inhomogeneities have disappeared. Add Filler material later.

Fiber glass fabric:

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

Interglas No.	Kind of weave	Weight p/m ²	Usage
92110	2/2 Twill	163	control Surfaces, wing
92125	2/2 Twill	280	fuselage
92145	Unidir.Plain	216	wing, fuselage
92146	Unidir.Plain	440	fuselage

Foam:

PVC foam Conticell C60, 8 mm thick, weight 60 kg/m³
 Maker: Continental AG, 3000 Hannover

Filler materials:

Microballon Lackfabrik Bäder KG, Postfach 25, 7300 Esslingen
 Cotton flocks Type FL 1 f Schwarzwälder Textilwerke, Postfach 12, 7623 Schenkenzell

Gelcoat:

PE-Vorgelat white No.03-69100 Maker: Lesonal-Werke, Postfach 300709
 Hardener No.07-20510 7000 Stuttgart 30
 Thinner No.06-30260
 Mixture ratio 2% (weight) hardener. For spraying add 30% thinner.

Warning colour:

Nitro Cellulose Kombilack Maker: Lackfabrik Bäder KG, Postfach 25,
 Reinorange RAL 2004 7300 Esslingen

Repairs of metal fittings should not be performed until 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.

Note: Small quantities of materials will normally be obtainable only from Rolladen Schneider

Cable Systems

1. Rudder cable B3.2 LN 9374
cable sleeves Nicopress 28-3-M (or Talurit Kl.4 DIN 1725)
steel thimbles A3.5 DIN 6899
turnbuckles A5 LN 9358
locking of turnbuckle with safety wire according to LN 9387 using
corrosion resistant safety wire 0.8 mm (0.031 in) diameter LN 9424.

2. Release mechanism and wheel brake:

- cable A2.4 LN 9374
A2.4 LN 9389 corrosion resistant, release system
under seat.
cable sleeves Talurit Klemme Nr.3 DIN 1725
Nicopress 28-2-G
steel thimbles A2.5 DIN 6899

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				Page No. <u>1</u>		
TB AD	Components Concerned	Date	Steps Modification	Once periodic	Time Limit	Accomplishment Inspector
<u>4001</u>	Cerification Netherlands	28.1.81		x		NA
<u>4002</u>	Maintenance Manual Version in German	30.1.81	Page 6-1 updated	x		NA
<u>4003</u>	Seat		Modification for S/N 4050	x		NA
<u>4004</u> 81-112	Conducting connection	31.3.81	Fitting	x	6 months	NA
<u>4005</u> 81-113	Air brakes	4.5.81	Modification	x	31.7.81	NA
<u>4006</u>	Seat Belt Harness FAG-7H	21.9.81	Modification	x	optional	
<u>4007</u>	Air brakes	1.2.82	Production Modification	x	opt.	NA
<u>4008</u>	Flight Manual in English	20.8.82	Improvement	x	opt.	NA
<u>4009</u>	Maintenance Manual	1.10.82	Improvement	x	opt.	NA
<u>4010</u> 82-214	Forward trim weight attachment bracket	7.10.82	Check and modify	x	Before next fl.	NA
<u>4011</u>	Shoulder strap attachment bracket	6.1.83	Production Modification	x	opt.	
<u>4012</u>	Landing gear	26.1.83	Production Modification	x	opt.	NA
<u>4013</u>	Landing gear	17.2.83	Third spring unit	x	opt.	NA
—						
<u>4014</u>	Water Ballast Bag		Modification	x	opt.	NA
<u>4015</u>	Maintenance Manual	1.3.83	Improvement	x	opt.	NA
<u>4016</u>	Wing shell outside reinforcing	5.4.83	Production Modification	x	opt.	
<u>4017</u>	US Certification	12.8.83		x		NA
<u>4018 a</u>	LS4 modification to LS4-a	28.10.83		x	opt.	NA
<u>4019</u> 83-118	Kobold hub brake lever arrangement	1.6.83	Modification	x	31.8.83	
<u>4020</u> 83-158	Air brakes, overlap of lower blade	1.9.83	Check	x	Bef. next fl.	
<u>4021</u>	LS4-a US Certification					
<u>4022</u>	LS4-a US Flight Manual used for other countries	10.1.84	Modification	x		
<u>4023</u>	LS4-a certification for cloud flying	10.1.84	NOT for USA	x	opt.	
<u>4024</u>	ELT supplemental installation	10.2.84		x	opt.	

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	TB-AD-Accomplishment List		Edition Mar. 83

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TB LBA-AD	Components concerned	Date	Steps / Modification	periodical		Page Nr. 2	
				1*		Time Limit	Accomplishm. Inspector
<u>4025</u>	Shoulder strap attachment bracket	15.10.84	Production Modification	x		----	
<u>4026</u>	Instrument Panel	19.05.88	Modification			opt.	
<u>4027a</u> 87-254/2	Increase of Service life up to 12000 hours	08.04.97	Maintenance Manual update	x			
<u>4028a</u>	Barbed wire fence deflector (Netherlands)	07.01.93	Netherlands			opt.	
<u>4029</u>	Fuselage lay-up plan	04.03.88	Prod. Modification after S/N 4699	x		---	
<u>4030</u>	Additional tow hook types approved	Dec. 89	Maintenance Manual update	x		opt.	

<u>4033</u> 93-083	Trim weight holder	Jan.93	Check for cracks / Exchange	x	--	immediately/ 31.12.93	

<u>4035</u> 93-155	Forward horizontal tail mounting	July 93	Check for bracket fixed	x		immediately	
<u>4036</u> 93-157	Landing gear drive	July 93	Check for locking of nuts	x		immediately	

<u>4041</u>	Nose hook	Jan. 99	additional nose hook installation	x		opt.	

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TB LBA-AD	Components concerned	Date	Steps / Modification	periodical		Page Nr. 3	
				1*		Time Limit	Accomplishm. Inspector
4042 99-270	Fuselage air brake locking bracket	02.07.99	1. Inspection 2. Repair	x		bef. nxt flight	
4043 00-076	Wing air brake levers	14.09.99	Check for corrosion and jamming	x	-	bef. nxt flight	

Sailplane LS4-a Serial Number _____ Reg. Signs _____ Year of Manuf. _____

TB AD	Components Concerned	Date	Steps Modification	Once periodic	Page No. _____	
					Time Limit	Accomplishment Inspector

Erstellt: 15. April 83 *Se* Ersetzt: Geprüft: 15. 4. 83 *Whepha*

Serial No.:	Reg. Signs:
-------------	-------------

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"/> _____ |

Sequ. No.	Report or Findings	Remarks	Signed
1.	Check Control Surface Deflections		
2.	Check Operating Instructions according to TCDS		
3.	Check Placards as given in Maintenance 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.	TM-AD-Accomplishment List, Maintenance Manual page 6-1/2 updated		

The following reports are valid for this inspection report:

Checklist dated _____	Equipment List dated _____
Inspection Certificate dated _____	Control System Adjustment Report dated _____
Flight Test Report dated _____	Parts Inspection Certificate _____
Findings Report dated _____	Welding Report _____
Weighing Report dated _____	_____

The sailplane is / is not airworthy.

_____ Place and date of inspection	_____ (Stamp) (Signature of inspector)
---------------------------------------	-------------------------------------------

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

Operator: _____

Pilot: _____ Airfield: _____

Winch Launch/Aero Tow	Takeoff Time:	Landing Time:
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Empty Weight (See valid Weighing Report)	Removable Trim Ballast Weight
---------------------------------------------	----------------------------------

Pilot + Parachute Weight	Total Flying Weight
--------------------------	---------------------

Battery Position _____

FINDINGS Mark as follows: 0 = not available + = without objections
- = objections, specify at end or overleaf

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

2. Takeoff Tow altitude Tow Speed IAS Handling

3. Tow Release automatic release manual release

4. Instrumentation function _____

5. Radio function before Takeoff during Flight

6. Slow Flight Stalling Speed IAS _____

7. Normal Flight, Controls free, trimmed to 1.4 x Stalling Speed _____

8. Speed indicated with neutral trim position and Controls free

9. Trim operation from IAS to IAS _____

10. Straight Flight at 80 km/h 120 km/h 200 km/h
 (43 kts, 50 mph) (65 kts, 75 mph) (108 kts, 124 mph)

11. Circling Flight _____

12. Effectiveness of Controls Elevator Rudder Ailerons _____

13. High Speed Flight up to IAS, be alert to flutter ! _____

14. Landing Gear Operation _____

15. Air Brake Operation, Effectiveness and Forces _____

16. Sideslip and Landing (with/without air brakes) _____

<p>Remarks: Unless otherwise stated, all speeds in Km/h, weights in Kg, altitudes in m .</p>	<p>Cross out invalid statements</p> <div style="border: 1px solid black; padding: 5px;"> <p>Sailplane regarding operation allright Allright after accomplishing complaints New Flight Test necessary</p> </div>
----------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

(Place)

(Signature of Pilot)

Erstellt: 15. April 83 <i>le</i>	Ersetzt:	Geprüft: 18. 4. 83 <i>hhepha</i>
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Serial No.:	Reg. Signs:	Date:
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Component Weights (Check when equipment altered or every fourth year)

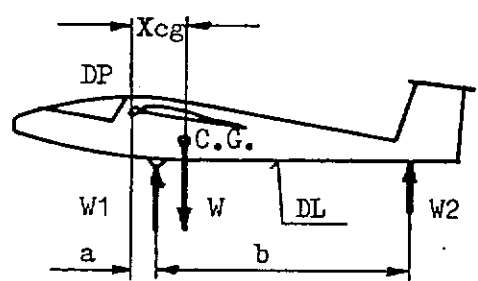
Right Wing			Maximum all-up Weight	525 kg (1157 lbs)
Left Wing			Maximum Weight of Non-lifting Parts	230 kg(507 lbs)
Fuselage + Equipment + Main Pins + Canopy			Fuselage + Equipment + Main Pins + Canopy	
Horizontal Tail			Horizontal Tail	
Empty Weight (W)			Maximum Cockpit Load (Pilot + Parachute)	
			Actual Weight of Non-lifting Parts	

Weighing and Empty Weight C.G. Determination (Check when equipment altered or every fourth year)

Technical Data according to Type Certificate Data Sheet:

1. Datum Point (DP): Leading edge of wing at root
2. Datum Line (DL): Under side of fuselage placed horizontal

Empty Weight (W)			Distance from wheel axis to Datum Point DP (a)	
Nett Tail Weight (W2)			Distance from wheel axis to tail support (b)	



$$\frac{W2 \times b}{W} + a = Xcg$$

$$\underline{\quad\quad\quad} + \quad\quad\quad = \quad\quad\quad (\quad)$$

Empty Weight C.G. Range according to Maintenance Manual Chapter 2 from _____ to _____ at Empty Weight (W) _____ yields permissible Cockpit Load Range from _____ to _____.

Weighed and calculated C.G. position is within permissible Limits.
 Weight and Balance Placard and Minimum Cockpit Load Placard in Cockpit as well as entry in Flight Manual have been checked/updated.
 Equipment during weighing/calculation see Equipment List dated: _____

NOTE: See also Flight Manual Chapter 6.

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

(Stamp) _____ (Signature of inspector)

Edition 15. Nov. 83

Page 7-3

Rolladen Schneider
Flugzeugbau GmbH

MAINTENANCE MANUAL
7 - Inspection Forms
EQUIPMENT LIST

LS4-a

Page 7-4
USA

Serial No.:

Reg. Signs:

Date:

Minimum Equipment (Check function annually, calibrate every fourth year)

	Type	Manufacturer	S/N	Installation Position	Examination Certificate	Function
Airspeed Indicator						
Altimeter						
Lap Belt						
Shoulder Strap						
C.G. Release						

Additional Equipment (Check function annually, calibration not required)

Variometer						
Variometer						
Radio						
Speaker						
Microphone						
Battery						
Permanently Fixed Ballast				Forward/Aft NONE		

NOTE: See also Flight Manual page 2-5 and chapter 9.

(Stamp) (Signature of Inspector)

Erstellt: 15. April 83 <i>Le</i>	Ersetzt:	Geprüft: 10. 6. 88 <i>hlapha</i>
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Rolladen Schneider Flugzeugbau GmbH	MAINTENANCE MANUAL 7 - Inspection Forms CONTROL SYSTEM ADJUSTMENT REPORT	LS4-a	Page 7-5 USA
----------------------------------------	--------------------------------------------------------------------------------	-------	-----------------

Serial No.:	Reg.Sigs:	Date:
-------------	-----------	-------

Control Surface Weight and Rear Edge Weight (Check whenever a change is suspected)

	Weight Limits	Actual Weight	Rear Edge Weight Limits	Actual Rear Edge Weight
Left Aileron	3.500 - 5.000 kg 7.716 - 11.023 lbs		0.600 - 0.800 kg 1.323 - 1.764 lbs	
Right Aileron	3.500 - 5.000 kg 7.716 - 11.023 lbs		0.600 - 0.800 kg 1.323 - 1.764 lbs	
Elevator	1.410 - 1.900 kg 3.109 - 4.189 lbs		0.330 - 0.440 kg 0.728 - 0.970 lbs	
Rudder	3.700 - 4.500 kg 8.157 - 9.921 lbs		-0.040 - 0.100 kg -0.088 - 0.220 lbs	

Control Surface Deflections (Check annually)

	Up		Down		Radius from Hinge Line
	Limit	Actual	Limit	Actual	
Left Aileron	65 ± 5 mm 2.56 ± 0.20 in		40 ± 3 mm 1.58 ± 0.12 in		165 mm 6.50 in
Right Aileron	65 ± 5 mm 2.56 ± 0.20 in		40 ± 3 mm 1.58 ± 0.12 in		165 mm 6.50 in
Elevator	364 ± 5 mm 14.33 ± 0.20 in		245 ± 5 mm 9.65 ± 0.20 in		148 mm 5.83 in
	Left		Right		
	Limit	Actual	Limit	Actual	
Rudder	150 ± 10 mm 5.91 ± 0.39 in		150 ± 10 mm 5.91 ± 0.39 in		310 mm 12.20 in

Control System Friction (Check annually)

	Limit	Actual	Point of Measurement
Elevator System	max. 0.150 kg 0.331 lbs		30 mm 1.18 in from upper control stick end
Aileron System	about 0.200 kg 0.441 lbs		30 mm 1.18 in from upper control stick end
Rudder System	about 0.500 kg 1.102 lbs		at rudder reference point 310 mm 12.20 in

Play at Control Surface Rear Edge, Control Stick fixed (Check annually)

	Maximum	Actual
Left Aileron	3.0 mm 0.118 in	
Right Aileron	3.0 mm 0.118 in	
Elevator	3.0 mm 0.118 in	

Note: See also Maintenance Manual Chapter 3.
State Dimensions used !

(Stamp) _____ (Signature of inspector)

Edition 15. Nov. 83

Page 7-5

Erstellt: 15. April 83 <i>Le</i>	Ersetzt:	Geprüft: 15. 4. 83 <i>Wapka</i>
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Approved Repair Station

Date:

Serial No.:

Page of

Type:

Reg. Signs:

Operator:

Sequ.
No.

Report

Accomplishment and
Remarks

Sign.

Report filed by:

Approved:

Place: _____

Date: _____ Stamp _____

Signature

Edition

15. Nov. 83

Page 7-6

Erstellt: 15. April 83 *he*

Ersetzt:

Geprüft: 15. 4. 83 *Wlapha*

- WING UNIT S/N _____
- Serial no. _____
 - Finish
 - Spar
 - Root ribs
 - Root rib pins
 - Water tanks
 - Drain holes
 - Aileron
 - Divebrakes
 - Connecting means
 - Aileron drive
 - bearings
 - sideways bearing play
 - gap taping
 - stop
 - ball head
 - LS-sleeve
 - ventilation
 - Aileron-wing lateral gaps
 - Cracks
 - Compression or buckling
 - Divebrake bearings
 - cover springing
 - ball head
 - LS-sleeve
 - Main pins No.
 - Main pins

- HORIZONTAL TAIL UNIT
- Serial No. _____
 - Finish
 - Sandwich shell
 - Stabilizer ventilation
 - Elevator ventilation
 - Elevator drive
 - Bearings
 - Connection to fuselage
 - Connecting means
 - Gap taping

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

- Bushes for wing root pins
- Cockpit
- Seat
- under seat
- Control stick
- Elevator drive under seat
- Aileron ball snap joint coupling
- Divebrake ball snap joint coupling
- Trim control
- Trim locking lever
- Pedals
- Pedal adjustment
- Rudder cables
- Turnbuckle locking
- Earth connections
- Water ballast system
- Cockpit ventilation system
- Backrest adjustment
- Connecting means

- CANOPY
- Canopy locking mechanism
 - emergency release
 - window

- RUDDER
- Finish
 - Shell
 - Rudder ventilation
 - Rudder drive
 - Bearings
 - Connecting means

- LANDING GEAR
- Undercarriage and axle
 - Tyre
 - Springing
 - Pneumatic spring
 - Damper
 - Preset load at folding strut
 - Doors
 - Bearings and joints
 - Drive rod
 - Connecting means
 - Locking
 - Overcenter
 - Wheel brake system
 - C.G. release fitting

Inspection Date _____
Inspector's signature _____

S/N _____

EQUIPMENT

- Minimum Instrumentation
- Additional Instrumentation
- Operating range
- Limit marks
- Vacuum bottles
- Function of instrumentation
- Tubing
- Total energy unit
- Pitot system free of leaks
- Static systems free of leaks
- T.E. system free of leaks
- Electrical wiring
- Battery and fitting
- Radio
- Antenna system
- Communication check
- Compass deviation list
-
- Seat belt harness
- Nose release
- Weight and balance plan
- Data placard
- Cockpit placards
- Baggage compartment cover
- Colour marking at ball snap joints
-

GENERAL

- Checklist
- Fireproof type placard
- Minimum cockpit load placard
- Registration numbers
- Nationality marks
- Anti-collision marking
-
-
- Logbook
- Flight Manual
- Maintenance Manual
- Airworthiness directives
-
- Inspection for foreign bodies
-
- Logbook notation
- Flight manual notation page 1-7
- Minimum cockpit load placard notation
- Weight and balance plan notation
-

ADJUSTMENT

- Wings and horizontal tail
- Play at root ribs
- Zero setting of control surfaces
- Control surfaces deflections
- Divebrake deflection
- Wheel brake
- Trim control and locking
- Nose release
- C.G. release
- Automatic C.G. release
- Water ballast discharge
- Aileron differentiation
-

Mark as follows:

- o for not existing
- + for no faults
- / for defective, specify separately

Inspection Date _____

Inspector's signature _____

Measurement of Control Surface Weight and Rear Edge Weight:

Measurement of Control System Friction:

Control Surface Rear Edge Play:

(See also pages 3-5 and 7-5)

Control System Deflections

S/N _____

Ailerons up 65 ± 5 mm left: _____ right: _____
 2.56 ± 0.2 in

down 40 ± 3 mm left: _____ right: _____
 1.58 ± 0.12 in

Radius 165 mm (6.50 in)

Elevator up 364 ± 5 mm _____
 14.33 ± 0.2 in

down 245 ± 5 mm _____
 9.65 ± 0.2 in

Radius 148 mm (5.83 in)

Distance of reference point on fin 300 mm (11.81 in) at neutral position (See also page 6-1).

Rudder to both sides 150 ± 10 mm left: _____ right: _____
 5.91 ± 0.39 in
Radius 310 mm (12.20 in)

Divebrakes up not less than 150 mm (5.91 in) at inner lever

left: _____ right: _____

Wings flex number _____ /minute, support fuselage 300 mm (11.8 in) in front of landing gear and at tail skid or wheel

Date of valid equipment list : _____

Date of valid C.G. weighing : _____

Nose release No. _____ operating limit until: _____

C.G. release No. _____ operating limit until: _____

Total flying time: _____ Flying time since last annual inspection: _____

Total No. of landings: _____ Landings since last annual inspection: _____

FAULT SPECIFICATION

Inspection Date _____

Inspector's signature _____

Edition 15. Nov. 83

Page 8-3

Erstellt: 15. April 83 *Le*

Ersetzt:

Geprüft: 15. 4. 84 *hshapha*

(Valid for: FAA-Edition of LS4 Maintenance Manual)

(Valid for: all Editions of LS4-a 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>Heuck</i>	Verified: <i>Whapka</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-a

Serial Number: _____

Registration Signs: _____

Address of new owner:

Address of former owner:

Send to: Rolladen Schneider
Flugzeugbau GmbH
Mühlstrasse 10
D-6073 Egelsbach
Germany

Airworthiness Limitations Section


This Airworthiness Limitations section is FAA-approved for U.S. registered sailplanes in accordance with the provisions of 14 CFR Section 21.29. In addition, this section is required by FAA Type Certificate Data Sheet No. G 45 EU and it specifies maintenance required under 14 CFR Sections 43.16 and 91.163 unless an alternative program has been FAA-approved.

LBA approved: **08.04.97**



B.O. Gung

Log of Revisions for Airworthiness Limitations Section

Revision No.	Pages affected	Description	LBA-approval signature	Date
1	10-2 10-3 added	Safety harness webbing life limit for all harness types included. Inspection procedure for increase of Service Life above 3000 hours.		
2	10-2, 10-3	Safety harness webbing life limit for all harness types updated. Inspection procedure for increase of Service Life up to 12000 hours updated.	 <i>B.O. Gung</i>	08.04.97

ROLLADEN-SCHNEIDER Flugzeugbau GmbH LBA-Nr. EB - 4	Maintenance Manual	LS4	Page 10-2
		LS4-a	USA

Airworthiness Limitations

1. Sailplane structural life limit: 3000 hours total flying time.

The life limit may be increased to 12000 hours by Small Airplane Directorate, Kansas City, MO 64106, USA, upon receipt of the necessary substantiating data. See also page 10-3.

2. Safety harness Autoflug FAG-7H: Webbing life limit 12 years from manufacturing date.
(if fitted)

See also Maintenance and Operating Instructions of manufacturer.

3. All Gadringer safety harnesses: Webbing life limit 12 years from manufacturing date.

See also Maintenance and Operating Instructions of manufacturer.

Note: Repair damage prior to next flight.

When in doubt whether a "small repair" or a "major repair" is necessary, contact the manufacturer.

Major repairs must be accomplished at FAA-certified repair stations rated for composite aircraft structure work in accordance with Rolladen-Schneider repair methods.

Certain major repairs may only be performed by the manufacturer due to necessary jigs. This has to be checked with the manufacturer for the case in question.

ROLLADEN-SCHNEIDER Flugzeugbau GmbH LBA-Nr. EB - 4	Maintenance Manual	LS4 LS4-a	Page 10-3 USA
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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 12000 hours if airworthiness of each single sailplane (in addition to annual inspections) is checked according to a special multi-step inspection program.

2. Schedule

When the sailplane has reached 3000 hours service life an inspection according to the program 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 inspecting routine should be repeated when reaching 9000 hours. With a positive result or found defects repaired properly, service life will be increased by another 1000 hours each to 10000 hours (3. step), 11000 hours (4. step) and 12000 hours (5. step).

3. The valid inspection program should be requested from the manufacturer stating serial number and service time.

4. Inspections should be carried out at the manufacturer or an adequately licensed 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.