FLIGHT MANUAL FOR THE *LS7-WL* SAILPLANE

This Manual should be carried in the sailplane at all times.

REGISTRATION

SERIAL NUMBER

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OWNER

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LBA-approved:

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In order that the manufacturer can continue to provide essential service information, any change of ownership should be notified to the manufacturer immediately.

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.

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Ø.1 LOG OF REVISIONS

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LS7-WL Manuals can be ordered from:
ROLLADEN-SCHNEIDER Flugzeugbau GmbH
Mühlstrasse 10
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Federal Republic of West Germany

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1.1 INTRODUCTION

This sailplane Flight Manual has been prepared to provide pilots and instructors with information for the safe and efficient operation of the LS7-WL sailplane.
This manual includes the material required to be furnished to the pilot by JAR Part 22. It also contains supplementary data supplied by the sailplane manufacturer.

The LS7-WL is a high performance sailplane, not a basic trainer. However excellent its design, construction, performance and handling qualities, flying it requires a skilled pilot, who observes the limitations and recommendations set out in this manual.

1.2 CERTIFICATION BASIS

This type of sailplane has been approved by Luftfahrt-Bundesamt (LBA) Braunschweig in accordance with JAR Part 22 including amendments Change 4 plus amendment 22/90/1 and the Type Certificate No. 375, LS7-WL, Edition 1 has been issued 22.Dec.1992 .
Category of Airworthiness: Utility

1.3 WARNINGS, CAUTIONS AND NOTES

The following definitions apply to warnings, cautions and notes used in the flight manual.

WARNING Any operating procedure, practice or condition which, if not strictly complied with, may result in personal injury or loss of life.

CAUTION Any operating procedure, practice or condition which, if not strictly complied with, may result in damage to the aircraft or equipment.

Note Any operating procedure, practice or condition which is essential to emphasize.

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1.4 DESCRIPTIVE DATA

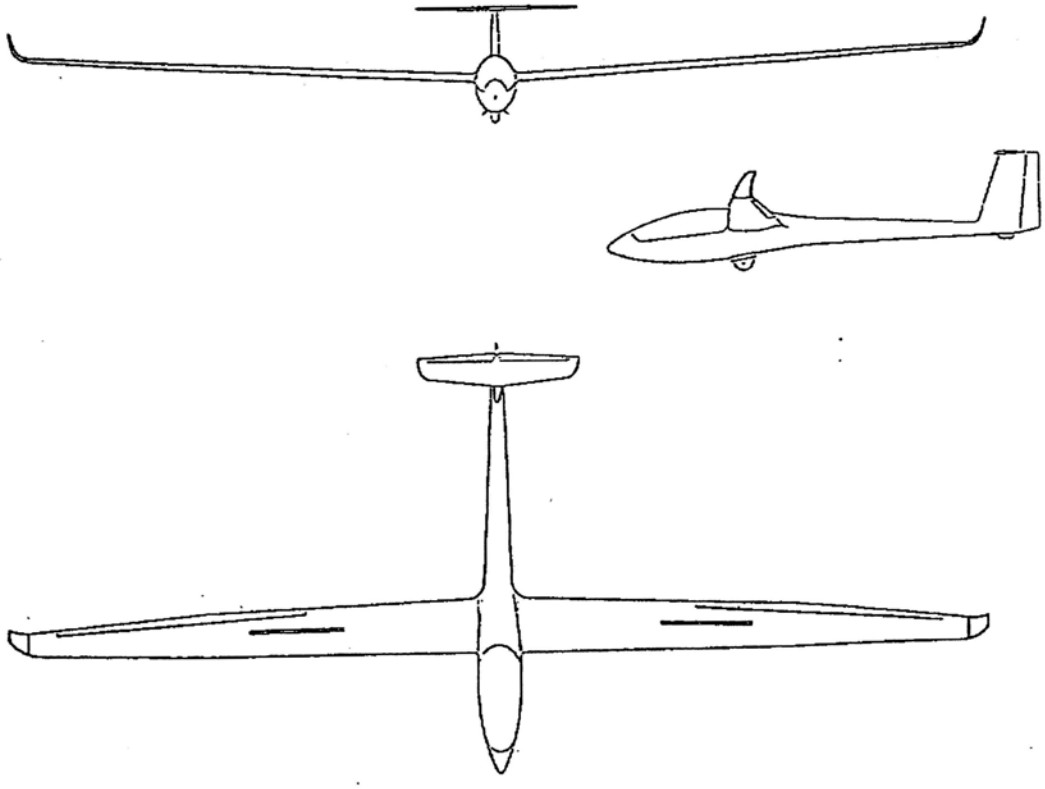
The LS7-WL is a standard class single seater sailplane with winglets, carbon fibre wing shell, T-tail, wing and optional vertical tail fin water ballast systems, retractable and sprung landing gear and upper wing surface air brakes.

This sailplane has been produced using the latest technology of industrial fibre design (Glass, Aramid and Carbon fibres).

It is designed for competition flights - high performance combined with excellent handling characteristics.

Wing span	15 m (49.21 ft)
Length	6.66 m (21.84 ft)
Height	1.33 m (4.36 ft)
MAC	Ø.649 m (2.13 ft)
Wing area	9.73 m² (1Ø4.8 sq.ft)
Wing aspect ratio	23.1
Maximum gross weight	486 kg (1Ø71 lbs)
Maximum wing loading	5Ø kg/(m²) (1Ø.2 lbs sq.ft)
Airfoil	Wortmann modified

1.5 THREE VIEW DRAWING



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1 INTRODUCTION

Section 2 includes operating limitations, instrument markings, and basic placards necessary for safe operation of the sailplane, its standard systems and standard equipment.
The limitations included in this section have been approved by LBA (Luftfahrt-Bundesamt Braunschweig).

The LS7-WL sailplane has been designed and approved according to JAR 22 requirements. Factors of safety (relation of ultimate loads to permissible maximum loads occurring during operation) are 1.5 only. Thus, ultimate loads will be reached, when exceeding permissible load factors by 50%. When exceeding permissible speeds, the safety reserve is much lower (1.22).
Maximum loads should never be caused by the pilot's control surface deflections - they result from severe turbulence and the necessary control surface deflections to retain the desired flight attitude. Severe turbulence according to airworthiness requirements includes wave rotors, cumulonimbus clouds, dust devils and turbulences when crossing mountain ridges in strong winds.

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2.2 AIRSPEED

Airspeed limitations and their operational significance are shown below:

	Speed	IAS km/h	IAS kts	IAS MPH	Remarks
VNE	Never Exceed speed (calm weather)	270	146	168	Do not exceed this speed in any operation and do not use more than one third of control deflections. from sea level to 2000 m (6500 ft) MSL
		257	139	160	from 2000 m(6500 ft) to 3000 m(9800 ft) MSL
		244	132	152	from 3000 m(9800 ft) to 4000 m(13100 ft) MSL
		219	118	136	from 4000 m(13100 ft) to 6000 m(19700 ft) MSL
		195	105	121	from 6000 m(19700 ft) to 8000 m(26200 ft) MSL
		173	93	107	from 8000 m(26200 ft) to 10000 m(32800 ft) MSL
VRA	Rough air speed	190	103	118	Do not exceed this speed except in smooth air and then only with caution. Air move ments in lee-wave rotors, thunderclouds, visible whirlwinds, or over mountain crests are to be understood as rough air.
VA	Manoeuvering speed	190	103	118	Do not make full or abrupt control movement above this speed, because under certain circumstances loads due to manoeuvering, gusts and control surface deflections may exceed design limits.
VW	Maximum Winch Launching speed	140	76	87	Do not exceed during winch- or auto-tow-launching
VT	Maximum Aero Tow speed	190	103	118	Do not exceed during aero tow
VL	Maximum Landing Gear operating	270	146	168	Do not exceed during winch- or auto-tow-launching
	Air brakes	270	146	168	

WARNING: When flying at altitude, the lower limit IAS is always authoritative.

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2.3 AIRSPEED INDICATOR MARKINGS

Airspeed indicator markings and their colour code significance are shown below:

Marking	IAS value or range	Significance
Green arc	73 - 190 km/h 39 - 103 kts 45 - 118 MPH	Normal operating range (Air brakes retracted)
Yellow arc	190 - 270 km/h 103 - 146 kts 118 - 168 MPH	Within this speed range "Severe turbulence" or control surface deflections of more than 1/3 of possible travel may exceed the design limit and should be avoided. Manoeuvering loads, gust loads and loads due to control surface deflections should not be encountered simultaneously.
Red line	270 km/h 146 kts 168 MPH	Maximum speed from MSL up to 2000 m / 6500 ft above MSL flying altitude for all not otherwise restricted operations
Yellow triangle	90 km/h 49 kts 56 MPH	Minimum recommended approach to landing speed without water ballast

For an example of airspeed indicator marking see page 2-7.

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2.4 MASS (WEIGHT)

Maximum take-off mass with water ballast ..... 486 kg (1071 lbs)
without water ballast ..... 389 kg (858 lbs)

Maximum landing mass ..... 486 kg (1071 lbs)
Maximum mass of all non-lifting parts ..... 235 to 249 kg (518-549 lbs)

Value must be determined according to table in Maintenance Manual, chapter 2, related to empty weight and empty weight C.G. position.
The term "non-lifting parts" includes the following: fuselage inclusive permanently fitted equipment, canopy and main pins plus maximum cockpit load. Tail fin water ballast, if system is installed, is not counted for nonlifting parts, but for maximum weight.

Maximum wing water ballast mass, depending on loading conditions and ballast bags size .... max. 100 kg (220 lbs) or 150 kg (331 lbs)
Loading instructions see page 4-8 or 4-10.

If installed:
Vertical tail fin water ballast mass, depending on wing water ballast loading ..... maximum 5.5 kg (12 lbs)
Loading instructions see page 4-12.
When the tail fin tank is combined with a tail battery receptacle, maximum tail fin water ballast mass is ..... 4.1 kg (9 lbs)

Maximum mass in Baggage Compartment ..... 5 kg (11 lbs)
Loading instructions see page 4-6.

Maximum mass of all instrument panel installations ..... 6.7 kg (14.7 lbs)

WARNING: If C.G. weighing had been performed with a vertical tail fin battery, see entry on page 6-2, then the battery must always be carried in the vertical tail fin.

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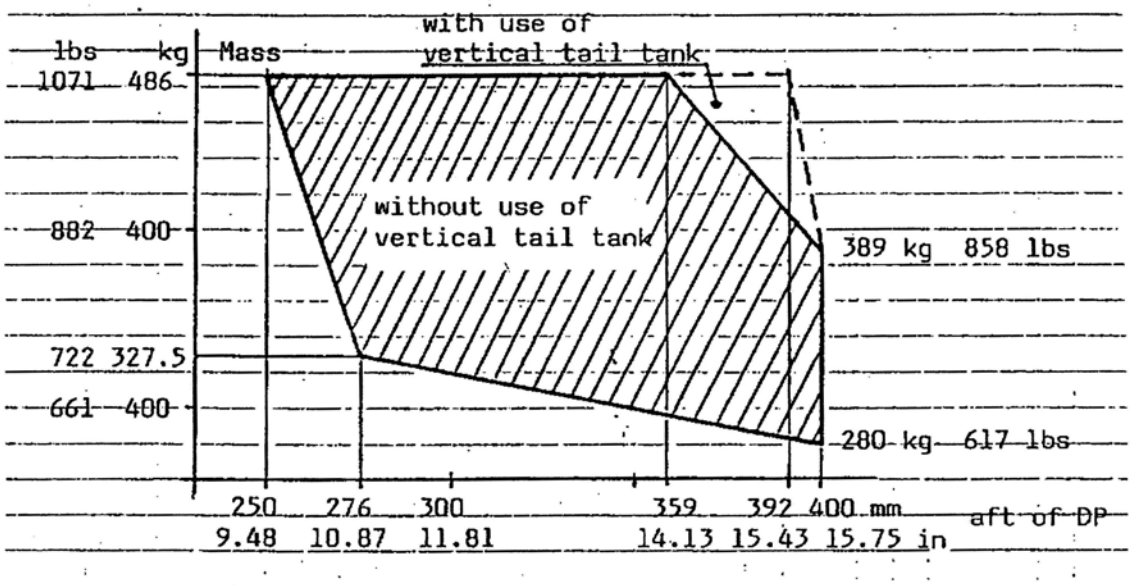
2.5 CENTER OF GRAVITY LIMITS

Position of C.G. in flight
Maximum allowable:
forward C.G. position ..... 250 mm (9.84 in) aft of DP

rearward C.G. position ..... 400 mm (15.75 in) aft of DP

Datum point (DP): leading edge of wing at root, when under side of fuselage boom placed horizontal.



WARNING: Vertical tail fin water ballast (if fitted) may be used to compensate C.G. displacement due to wing water ballast mass, pilot mass or both. Permissible amounts see table page 4-12.

2.6 MANOEUVER LIMITS / CATEGORY OF AIRWORTHINESS

The LS7-WL sailplane is certified in the U (Utility) category according to JAR 22

Acrobatic manoeuvers not approved.

Cloud flying with water ballast not approved.

For Italy: Spins not approved.

2.7 FLIGHT LOAD FACTOR LIMITS

At 190 km/h (103 kts, 118 MPH) 5.3 G positive and 2.65 G negative.
At 270 km/h (146 kts, 168 MPH) 4.0 G positive and 1.5 G negative.

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2.8 CREW

Maximum Cockpit Load ..... maximum 120 kg (265 lbs)

The term "Cockpit Load" includes the following:
Pilot, parachute, baggage and temporary equipment.
Maximum cockpit load may be limited by mass of non-lifting parts.
See entry on page 6-2.

Minimum Cockpit Load for club use (recommended)

Pilot and parachute ..... 70 kg (154 lbs)
No baggage, no temporary equipment, no trim ballast

Pilot and parachute ..... 55 kg (121 lbs)
3 trim weights fitted, no baggage, no temporary equipment
One trim weight (2.5 kg, 6 lbs) corresponds to 5 kg (11 lbs) of pilot mass.

If the sailplane does not fly in a club, it may be trimmed for higher minimum cockpit load. See instructions in chapter 11 of Maintenance Manual.
For minimum cockpit load see entry on page 6-2 and placards.

With tail fin tank present *the placarded Minimum Cockpit Load value includes full tail fin tank for reasons of safety. Lighter pilots may only then use the lower minimum value given on page 6-2, when they have positively checked that the valve passage is free - i.e. that no water stays in the tail fin tank unintentionally - by blowing back to front through the valve using the discharge tube with funnel disconnected.*

2.9 KINDS OF OPERATION LIMITS

The LS7-WL sailplane is approved for Day-VFR. Minimum equipment see page 2-7.

Cloud flying only approved without water ballast (Applicable only for countries which permit cloud flying and when Minimum Equipment is approved for cloud flying, see inspector's entry in inspection certificate). Minimum equipment see page 2-7.

For USA only:
Night-VFR, IFR and Flight into known icing conditions are not approved.
Use of water ballast limited to non-freezing conditions.

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2.10 MINIMUM EQUIPMENT LIST

1. Airspeed Indicator, scale 50-300 km/h (27-162 kts, 31-186 MPH)

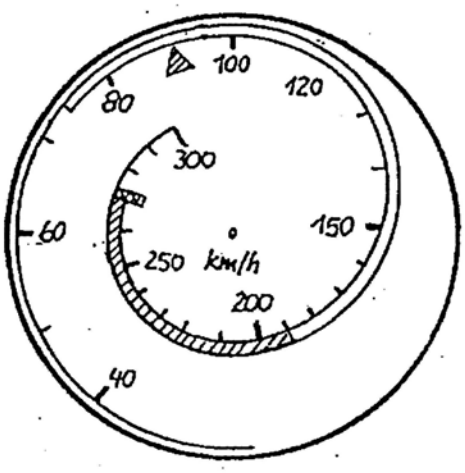
   Colour marking see page 2-3 and example below.
   Approved types see Master Equipment List.
   Pressure pick-ups: Vertical tail fin pitot and lower forward fuselage side statics.

2. Altimeter in m (For Italy) or ft — See Master Equipment List in Maintenance Manual
3. Four piece seat belt harness
4. Magnetic compass (For USA and Canada)

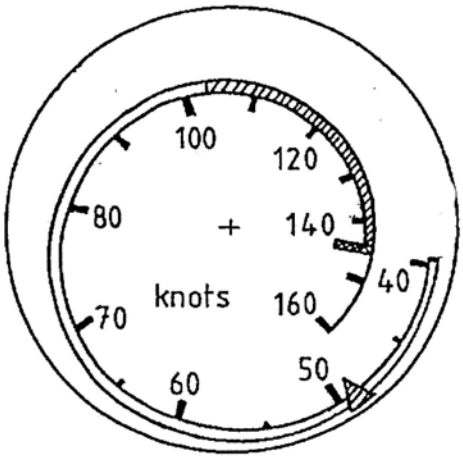
5. Back cushion or parachute in compressed form should not be thinner than 80 mm to 100 mm (3 to 4 in).
6. Checklist, type placard, data and loading placard, operating placards. For placards see pages 2-8 and Maintenance Manual chapter 10.
7. Flight Manual LS7-WL.
8. Remote indicating thermometer, when tail fin water ballast system is fitted. Approved types see Master Equipment List in Maintenance Manual.

Additionally for cloud flying:
Turn and Bank indicator
Compass, compensated in sailplane (Not for USA and Canada)
Variometer, range at least ±10 m/s (1970 ft/min, 19.4 kts)

Example of airspeed indicator colour marking :



Green
Yellow
Red



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2.11 BREAK AWAY LINKS FOR AEROTOW, WINCH LAUNCH AND AUTO TOW

Maximum winch launch / auto tow speed 140 km/h (76 kts, 87 MPH)
Maximum aero tow speed 190 km/h (103 kts, 118 MPH)

Maximum break away link in tow cable
for winch launch and auto tow: 825 kg (1819 lbs)
for aero tow: 550 kg (1212 lbs)

Recommended: for winch launch/ auto tow: Tost weak link No.3, colour code red, rated break away load 750 kg (1650 lbs)
for aero tow: Tost weak link No.5, colour code white, rated break away load 500 kg (1100 lbs)

MINIMUM AERO TOW CABLE LENGTH: 30 m (100 ft)
Recommended tow cable length up to 80 m (263 ft)

2.12 OPERATING PLACARDS FOR LIMITATIONS

For positions of placards see page 7-2.

Rolladen-Schneider Flugzeugbau GmbH

Type: LS7-WL Serial Number: xxxx

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)	270	168	146

Maximum Weight 486 kg (1071 lbs) including Water Ballast
Aerobatic manoeuvres not approved

WEIGHT LIMITATIONS

Maximum Cockpit Load kg. . lbs. .
Minimum Cockpit Load kg. . lbs. .
For lower Minimum Cockpit Loads see Flight Manual pages 2-6 and 6-2

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

on right side of cockpit >3<

MINIMUM COCKPIT LOAD kg/ lbs
For use of lower Minimum Cockpit Load see Flight Manual pages 2-6 and 6-2

under instrument panel cover >2<

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

at main bulkhead

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3.1 INTRODUCTION

Section 3 provides checklist and amplified procedures for coping with emergencies that may occur. Emergencies caused by sailplane malfunction are extremely rare if proper preflight inspections and maintenance are practised.

However, should an emergency arise, the basic guidelines described in this section should be considered and applied as necessary to correct the problem.

3.2 EMERGENCY CANOPY RELEASE AND EXIT

Canopy locks	* Pull both handles open to stops. - Right handle operates emergency release, therefore longer travel as on left handle - Hand force increases for emergency release travel to avoid unintentional jettison during normal operation
Canopy	* Push off, assisted by lifting panel * Spring loaded peg at canopy frame rear edge acts as temporary hinge for clean separation from fuselage.

3.3 EMERGENCY EXIT

Canopy	* Jettison
Seat harness	* Open
Exit	* Lift with arms over cockpit rim and push yourself away from the sailplane to avoid the tail

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3.4 STALL RECOVERY

Warning	- Slight tail shudder prior to entry
Aileron	- Effectiveness reduced by about 50%
Sink rate	- Increases considerably
Termination	- Stick forward to neutral

Stalling speed at maximum weight (486 kg, 1071 lbs), straight flight, airbrakes retracted :

67 km/h 36 kts 42 MPH

When during stalled flight the angle of incidence is increased considerably by further "pulling", then - depending on C.G. position - spinning may result from asymmetric stall.

Warning: During pronounced yawing, due to the winglets the forward facing wing will stall first

3.5 SPIN RECOVERY

Rudder	- Opposite to spin rotation until rotation stops
Elevator	- Neutral or slightly forward
Aileron	- Neutral
Smooth pull-out	
Altitude loss during recovery	- About 100 m (300 ft)

Note: Depending on aileron deflection and C.G.position, more or less pronounced floating of the longitudinal angle occurs during spinning.

3.6 SPIRAL DIVE RECOVERY

Spiral dive may occur when the sailplane terminates spinning on its own and not by pilot's action

Elevator	- Pull cautiously
Rudder	- Opposite to dive rotation
Aileron	- Opposite to angle of bank

Warning: During dive-out be alert not to exceed maximum permissible speed VNE, see page 2-2, inadvertently !

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3.7 OTHER EMERGENCIES

3.7.1 LIMITATION OF HIGH SPEED FLIGHT

* If there are indications that the intended air speed will be exceeded, for instance
  - while flying under large cloudbanks
  - during cloud flying at heavy turbulences

  then
* air brakes should be extended carefully before 190 km/h (103 kts, 118 MPH) is reached - within green airspeed indicator range.

WARNING:

* In emergencies, air brakes can also be extended up to a speed of 270 km/h (146 kts, 168 MPH).
* However, pay attention to the following:
  - extend airbrakes with care

WARNING:

- in this speed range air brakes are sucked open suddenly during unlocking, resulting in short time negative acceleration.
- this may support pilot induced oscillations (P.I.O.)

* Once extended, the air brakes can only be retracted completely at speeds below 240 km/h (130 kts, 149 MPH): spring loaded covers stay open due to aerodynamic suction.

* When air brakes are extended during descent after high altitude wave flights, a speed of 190 km/h (103 kts, 118 MPH) -green ASI range upper end- should not be exceeded because of possible severe turbulence.

3.7.2 RAIN

During rain
* expect considerable decrease of performance.
* Increase approach to landing speed at least by 10 km/h (5 kts, 6MPH) over normal approach speed, because
  - stall speed increases
  - effectivity of controls decreases.
* Open canopy window to increase visibility.

3.7.3 INADVERTENT FREEZING / ICING

Water ballast in wings and tail fin

Water ballast must be dumped below +5° C (41° F), see built in thermometer near landing gear handle.

Water ballast in wings only

Do not dump below 5° C (41° F)
The rear fuselage may collect ice or the vertical tail fin valve may be frozen solid. Both cases can result in very dangerous rearward C.G. displacement. Additionally, one wing valve may be frozen solid. Therefore: For prolonged flights below 5° C (41° F) use no waterballast or add commercial antifreeze solution.

ICING CONDITIONS: Move control surfaces continually to avoid freezing solid. Open window to increase visibility.

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3.7 OTHER EMERGENCIES continued

3.7.4 FLIGHT WITH ASYMMETRIC WATER BALLAST LOADING

* Uneven water ballast dumping may be recognized as follows:
  - with free aileron, one wing tends downward.
  - for straight flight at low speeds considerable aileron deflection is necessary.
* Avoid stalling
* Increase approach to landing speed at least by 10 km/h (5 kts, 6MPH) over normal approach speed and touch down with this increased speed.
* To avoid ground looping, apply aileron in the direction as noticed before shortly after touchdown.

3.7.5 CABLE FAILURE DURING WINCH LAUNCH

* Immediately push stick fully forward until air speed indication is within green range.
* Release cable
* according to altitude:
  - use short traffic pattern and make safety landing on airfield
  - extend air brakes immediately and land in front of winch

3.7.6 EMERGENCY LANDING WITH LANDING GEAR RETRACTED

Emergency landings with landing gear retracted are not recommended, because energy absorption of the sprung landing gear compared to the fuselage shell is higher.

If however an emergency landing with gear retracted is necessary, do not touch down with minimum speed to avoid dropping cockpit region.

3.7.7 GROUND LOOP

When a landing strip obviously will not be long enough for a normal landing, initiate a ground loop at least 50 m (150 ft) before the end:

* lay the windward wingtip onto the ground.
* simultaneously decrease tail skid load by controlled forward stick deflection.

3.7.8 EMERGENCY LANDING ON WATER

During a water landing test with landing gear retracted, the sailplane used submarined completely.

As submarining may be possible also with gear extended, the following procedure is recommended:

* In the downwind leg of your landing pattern
  - extend landing gear
  - open parachute harness.
* Touch down with gear extended and speed as low as possible.
* At touch down point use left arm to protect face against possible canopy fracture.
* After touch-down undo parachute and seat belt harnesses.
* Leaving the cockpit under water, when the canopy has not fractured, is perhaps possible only after the forward fuselage is almost completely full of water.

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4.1 INTRODUCTION

Section 4 provides checklist and amplified procedures for the conduct of normal operation. Normal procedures associated with optional systems can be found in Section 9.

4.2 RIGGING AND DE-RIGGING

1. Before extending landing gear check for adequate ground clearance
2. Clean and grease all pins and matching bushes including main pins
3. Position control stick into zero aileron deflection position
4. Insert left spar end into fuselage, aileron must be slightly down and watch for angle of dihedral
5. Insert right spar end into fuselage, aileron must be slightly down and watch for angle of dihedral

WARNING: When ailerons are deflected upward during rigging, then the automatic aileron connector prevents rigging. Do not use brute force !

IMPORTANT NOTE: *The aileron sandwich is pressure sensitive, handle carefully! Sufficient strength for handling around drive brackets.*

Erstellt: 03.Nov.92 Reucke	Geprüft: 13. NOV. 1992 Schapka

4.2 RIGGING AND DE-RIGGING continued

6. Insert main pins, when bushes are lined up correctly
7. Secure main pins by placing handles behind spring loaded pegs
8. Insert battery into vertical tail fin (if weighing was performed in this configuration, see Data Placard in cockpit or page 6-2), connect to system and check operation.
   The tail fin battery must be equipped with an appropriate main fuse
9. Install winglets, see below.
10. When using water ballast, then only according to instructions, pages 4-8 or 4-12) and check: a) opening of dump valves?
    Only when using the tail fin tank:
    Check a) if tail fin valve really opens.
    b) wing system completely water tight?
11. Check forward horizontal tail attachment for ball being fixed
    WARNING: When ball is loose refer to page 8-6
12. Install horizontal tail, span until free from play and secure with slotted nut against tapered pins (using supplied key or a suitable coin) until red marking on attachment bracket is invisible
13. Install total energy tube, mount battery into baggage compartment (if weighing was performed in this configuration) and temporary equipment (barograph etc.)
14. Connect automatic parachute ripcord to red marked portion of main bulkhead using special loop only
15. Seal wing fuselage intersection by taping upper and lower sides and cutout on upper horizontal tail fin
16. When using water ballast, then only according to instructions, pages from 4-8 onwards and
    check: a) opening of dump valves ?
    Only when using the tail fin tank:
    CHECK: a) if tail fin valve really opens.
    b) wing system completely water tight ?
17. **Check control system functions using a helper**
18. Perform Daily Inspection, see page 4-3

Important Note: The aileron sandwich is pressure sensitive, handle carefully! Sufficient strength for handling around drive brackets.

INSTALLATION of WINGLETS or NORMAL TIPS (if available)

1. If necessary, Remove sealing tape from wing-tip intersection
   Push out securing pin
   Remove fitted tip from tubular spar by pulling outward and moving fore and aft at the same time
2. Push other tip onto tubular spar, direct pins into bushes, move tip fore and aft until fully home
3. Push in securing pin until spring loaded ball catches in nut
4. Tape intersection

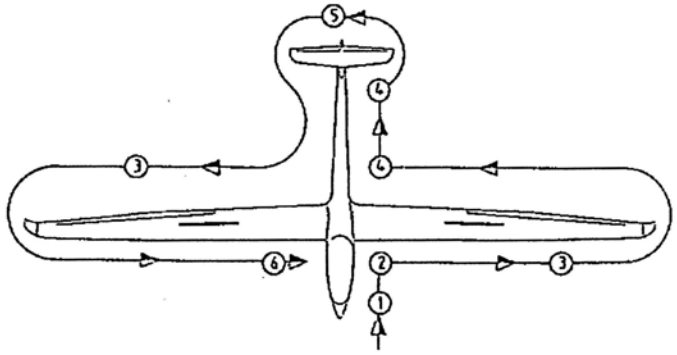
DE-RIGGING

* Reverse assembly sequence.
* After disassembly of winglets, assemble normal tips (if availabe) and secure. If no normal tips are available, tape securing pin to winglet against loosing.
* Air brake system should be unlocked to avoid permanent pressure on flexible covers and resulting possible deformations (overcenter in wing).

Erstellt: 23.Apr.93	Geprüft: 26. MAI 1993

4.3 DAILY INSPECTION

The Daily Inspection according to the following diagram and related checklist must be performed each day and is essential for flight safety.



1 Forward Fuselage
- Forward static pressure ports for clogging
- Function of nose hook, if fitted

2 Landing gear
- Recommended tyre pressure 3 to 3.5 bar (43 to 50 psi)
  When using water ballast increase up to 4 bar (58 psi)
- Slip mark and tyre condition
- C.G. hook manual and automatic operation working properly
- Water drain orifices in front and behind of landing gear box free from clogging

3 Wings
- Water drain orifices at root and tip free from clogging
- Condition, gelcoat- or structural damage, cracks
- Attachment
- Air brakes for proper function and locking
- Ailerons for unobstructed movement and free from play

IMPORTANT NOTE: The aileron sandwich is pressure sensitive, handle carefully! Sufficient strength for handling around drive brackets.

- installation of wingtip or winglet for securing and free from play

4 Fuselage
- Condition, gelcoat- or structural damage, cracks, especially on lower side
- Rear static ports at fuselage boom free from clogging
- Recommended tail wheel pressure, if fitted, 2.5 to 3.5 bar (36 to 50 psi)
- Water drain orifice in front of tail skid or tail wheel free from clogging
- Tail skid, if fitted, for proper adhesion

Erstellt: 03.Nov.92 Heuck	Geprüft: 13. NOV. 1992 Schapka

4.3 DAILY INSPECTION continued

5 Tail Unit
- Condition, gelcoat or structural damage, cracks
- Total energy port at upper end of vertical tail fin leading edge and pitot pressure port below total energy port free from clogging
- Charged rear battery connected, if this battery location was fixed during the last C.G. weighing, see entry on page 6-2
- Check vertical tail tank valve for proper opening:
  - open cockpit lever
  - place filling tube into discharge tube
  - if air cannot be blown into the tank, the valve is not functioning properly (for instance frozen solid or operating cable fractured). Take off permitted only, when unintentional use of tail fin water ballast can be positively excluded !
- Vertical tail fin tank, if fitted, absolutely water tight
- Horizontal tail fin: no pressure marks permitted in center portion
- Horizontal tail properly installed and free from play
- Movement of tail control surfaces unobstructed and free from play

6 Cockpit
- Canopy cleaned, if required
- Canopy locking and emergency release working properly (Be careful when testing emergency release, the canopy opening system lifts the canopy immediately. Use a helper for reinstallation)
- Main pins properly secured
- Proper connection of aileron and air brake system connection: With control stick in center position ailerons must be flush with trailing edge, both airbrakes must be locked with handle in forward position
- Charged battery fixed in baggage compartment and connected (when weighing was performed in this configuration, see Data Placard in cockpit or entry on page 6-2)
- Thermometer near landing gear handle for function (only existent when a vertical tail fin tank is fitted)
- *check for non-existence of foreign matter*

Erstellt: 03.Nov.92	Geprüft: 13. NOV. 1992

4.4 PREFLIGHT CHECK

Daily inspection	- performed
Control systems	- check functions using a helper
Vertical tail fin tank	- valve opening positively checked (See page 4-4)
Water ballast system	- check for leaks, if filled - no leaks in wing system allowed, when using tail fin ballast also, to avoid unintentional rearward C.G. displacement - check proper dumping: tail fin system starts dumping before wing system
Total energy tube	- fitted and connection properly sealed
Weight and Balance, especially Minimum and Maximum Cockpit Loads, trim weights and tail fin ballast amount	- checked
Altimeter	- set
Other instrumentation	- checked, normally indicating zero
Radio	- operational check
Backrest	- adjusted and locking checked
Rudder pedals	- adjusted
Papers (C of A, logbook etc.)	- complete and valid
Landing gear locking	- without play
Wheel brake	- check operation
Before take off	- perform cockpit checklist procedure

4.5.Ø COCKPIT CHECKLIST

LS7-WL 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. Wingtip secured ?
4. Test controls
5. Check opening of tail fin valve
6. Check loading conditions
7. Check tail dolly removed
8. Fasten seat belt harness
9. Connect parachute static line
10. Lock airbrakes
11. Trim slightly forward
12. Check release system
13. Lock canopy

Erstellt: Ø3.Nov.92 Heucke	Geprüft: 13. NOV. 1992 Schapka

4.5.1 ADJUSTMENT OF RUDDER PEDALS

- Possible in flight or on the ground
- Release pressure on pedals
- Unlock pawl by pulling black pedal release handle
- Forward adjustment: push pedals forward with feet into desired position and lock
- Rearward adjustment: pull pedals with release handle into desired position and lock

4.5.2 ADJUSTMENT OF BACKREST

WARNING:
Adjust backrest in such way that lower spine end is well supported and not bent and lap belt can be adjusted tight.

- Two possibilities of adjustment, both can be used on the ground only
  - Lower bracket adjustment allows use of various types of parachutes (locating pegs and screw)
  - upper end slope adjustment
  - Remove screw using suitable coin
  - Insert two locating pegs into desired position
  - Secure with screw

During adjustment pay attention to the following:
- Remember colour code at backrest support to allow for easy position identification of personal adjustment
- position head be as high as possible for good visibility
- the tow hook handle must be within easy reach

WARNING: Check locking pin in baggage compartment fully home.

WARNING: Moving aileron with stick fully back, the stick must not open the safety harness !

WARNING: When the backrest is removed for huge pilots, then the guide tube must also be removed. Otherwise it may obstruct an emergency exit.

4.5.3 AUTOMATIC PARACHUTE RIPCORD

- Attach to red main bulkhead portion at left rear of pilot
- Use special loop only

4.5.4 LANDING GEAR

- Extension or retraction permitted over whole approved speed range
- Rapid operation eases retraction
- Handle in forward position locked - gear up
- Handle in rearward position locked - gear down
- When using the C.G. hook, retract gear after releasing tow cable, because C.G. hook is fitted to gear fork

Erstellt: 23.Apr.93	Geprüft: 26. MAI 1993

4.5.5 WHEEL BRAKE

- Press rudder pedals with both feet to activate wheel brake
- Wheel brake is an emergency brake, therefore it should be used sparingly because of high wear rate of linings

4.5.6 TRIM SYSTEM

Trim locking lever at control stick	- pull to free trim knob
Trim knob at left cockpit side	- forward for nose down - rearward for nose up
Use trim knob	- to trim elevator stick force to zero - to trim for desired speed
Fix trim setting	- release locking lever
Indication of trim setting	- indicated by position of trim knob relative to neutral mark

4.5.7 BAGGAGE COMPARTMENT

Baggage compartment should be used for soft and light materials which would not obstruct the pilot after deceleration or injure the pilot in crash landings. **Maximum Baggage 5 kg (11 lbs)**. Baggage compartment load counts for useful load and must therefore be included, when checking loading conditions.
For permanent installation of equipment see Maintenance Manual, chapter 11.

4.5.8 BALANCING OF PILOTS WITH INSUFFICIENT WEIGHT

Balancing of pilots with insufficient weight

- 3 trim weights can be fitted to a threaded rod in front of rudder pedals and secured by knurled nut.

  One trim weight of 2.5 kg (5.5 lbs)
  corresponds to 5 kg (11 lbs) of pilot weight

Balancing of heavy pilots, who want to fly with rearward C.G. positions

- for 10 kg (22 lbs) of pilot weight above Minimum Cockpit Load without water ballast in tail fin tank, 1 Liter (0.264 US gal, 0.22 IMP gal) of water may be filled into the tail fin tank.
- When using wing water ballast, this balancing method may be restricted due to insufficient free volume, see also table page 4-14.
- When discharging water ballast, this trim condition cannot be kept due to quicker discharge of tail fin water ballast.

Erstellt: 03.Nov.92	Geprüft: 13. NOV. 1992

4.5.9 WATER BALLAST

- increase tyre pressure to 4 bar (58 psi), when using full water ballast.
- both wings together hold about 150 liters (39.6 US gallons, 33 Imp. gallons. Optionally, tanks of about 100 liters (26.42 US gal., 22 Imp. gal.) may be fitted. For size of ballast tanks see entry on page 6-2.
- one tank and one valve per wing, operated by pushrod at root rib
- use as clean water as possible to avoid damage of sealing rings by foreign matter
- maximum permissible water ballast depends on loading conditions, see pages 4-10 or 4-12 for water ballast loading instructions

FILLING SEQUENCE:

- open dump valve by shifting lever on right cockpit rim backwards
- when the tail fin tank is going to be used,
- fill tail fin tank first:
  - connect tube of tail fin funnel with wire meshing to dumping tube just inside lower right rudder cut-out with rudder deflected to the left and place funnel on top of the rudder.
  - fill tail fin tank via funnel in relation to wing water amount, see tables page 4-12 to 4-14.
  - Markings on inside of translucent right rudder gap seal correspond to 0.5 Liter (0.13 US gallons, 0.11 Imp. gallons).
  - use water level in funnel tube relative to markings to determine correct amount in relation to wing amount
  - the upper red marking corresponds to maximum amount of tail fin water ballast, 5.5 Liters (1.45 US gallons, 1.21 Imp. gallons) or 4.1 Liters (1.08 US gal., 0.90 Imp. gal.) for the combination of tail fin tank with tail fin battery compartment
  - close valves by shifting cockpit valve lever (operating all valves) and remove funnel from rudder
- open left wing valve through baggage compartment using knurled nut, turn 10 turns counterclockwise
- suck residual air from left water bag through dump orifice on under side of wing using connection hose, close dump valve before terminating sucking, to avoid air entering into bags again
- residual air may reduce amount of water

WARNING: residual air may create undue pressure during high altitude flights above 3000 m (10000 ft)

WARNING: never use more than 0.1 bar of water pressure (funnel max. 1 m (3.3 ft) above wing) because of possible damage of structure

- lay left wing down for filling
- connect funnel to dump orifice on under side of left wing - fill half of desired total amount of water using funnel
- close left wing valve with knurled nut, turn clockwise against stop
- open right wing valve through baggage compartment using knurled nut, turn 10 turns counterclockwise
- after sucking residual air out of bag let a helper keep the wing tip on the ground and fill the same amount as in left wing
- close right wing valve with knurled nut, turn clockwise against stop
- see also icing conditions in Emergency Procedures, Chapter 3

continued on next page

Erstellt: 23.Apr.93 Heucke	Geprüft: 26. MAI 1993 Wagner

4.5.9 **WATER BALLAST** continued

WARNING: When amount of water ballast in wings is not equal, this may favour tendencies to ground loop during take off

WARNING: Check proper dumping - tail fin system must start dumping before wing system to avoid C.G. shifting backwards

- use of water ballast limited to non-freezing conditions, see also Flight Manual page 2-6.

DUMPING:

- open valves by shifting cockpit lever backwards
- 10 liters (2.6 US gallons, 2.2 Imp. gallons) will be dumped in approx. 15 seconds
- if aileron stick force is needed to maintain level flight after dumping, this may indicate unequal dumping
- to avoid ground looping in case of unequal dumping, apply aileron in the direction as noticed before shortly after touchdown

WARNING Check thermometer (if tail fin tank is fitted) regularly during flight. Dump water at 5° Centigrade (41° F) to ensure proper dumping before tail fin valve freezes solid.

Erstellt: 04.Nov.92 Heuck	Geprüft: 13. NOV. 1992 Knapka

4.5.9a MAXIMUM WATER BALLAST (wing tank only, no tail tank)

Maximum approved capacity per wing 75 kg (165 lbs) = 150 kg (331 lbs) total
Optional capacity per wing 50 kg (110 lbs) = 100 kg (220 lbs) total

Table provides maximum total water ballast weight in relation to empty weight and cockpit load. Baggage and temporary equipment reduce maximum water ballast weight accordingly.

For values in lbs see following page !

Cockpit load Pilot+parachute +equipment (kg)	Empty weight (kg) 240	245	250	255	260	265	270	275	280	285
70	150	150	150	150	150	150	146	141	136	131
75	150	150	150	150	150	146	141	136	131	126
80	150	150	150	150	146	141	136	131	126	121
85	150	150	150	146	141	136	131	126	121	116
90	150	150	146	141	136	131	126	121	116	111
95	150	146	141	136	131	126	121	116	111	106
100	146	141	136	131	126	121	116	111	106	101
105	141	136	131	126	121	116	111	106	101	96
110	136	131	126	121	116	111	106	101	96	91
115	131	126	121	116	111	106	101	96	91	86
120	126	121	116	111	106	101	96	91	86	81

Example: When empty weight is 265 kg (584 lbs) and pilot and parachute weight is 110 kg (242 lbs), maximum permissible total water ballast weight is 111 kg (245 lbs).

When the optional tail fin tank is fitted, see ballast loading instructions pages 4-12 to 4-14.

Erstellt: 03.Nov.92	Geprüft: 13. NOV. 1992

4.5.9a MAXIMUM WATER BALLAST (wing tank only, no tail tank)

Maximum approved capacity per wing 75 kg (165 lbs) = 150 kg (331 lbs) total
Optional capacity per wing 50 kg (110 lbs) = 100 kg (220 lbs) total

Table provides maximum total water ballast weight in relation to empty weight and cockpit load. Baggage and temporary equipment reduce maximum water ballast weight accordingly.

For values in kg see preceding page !

Empty weight Pilot+parachute +equipment (lbs)	(lbs) 529	540	551	562	573	584	595	606	617	628
154	331	331	331	331	331	331	322	311	300	289
165	331	331	331	331	331	322	311	300	289	278
176	331	331	331	331	322	311	300	289	278	267
187	331	331	331	322	311	300	289	278	267	256
198	331	331	322	311	300	289	278	267	256	245
209	331	322	311	300	289	278	267	256	245	234
220	322	311	300	289	278	267	256	245	234	223
231	311	300	289	278	267	256	245	234	223	212
242	300	289	278	267	256	245	234	223	212	201
254	289	278	267	256	245	234	223	212	201	190
265	278	267	256	245	234	223	212	201	190	179

Example: When empty weight is 265 kg (584 lbs) and pilot and parachute weight is 110 kg (242 lbs), maximum permissible total water ballast weight is 111 kg (245 lbs).

When the optional tail fin tank is fitted, see ballast loading instructions pages 4-12 to 4-14.

Erstellt: 23.Apr.93	Geprüft: 26. MAI 1993

4.5.9b MAXIMUM WATER BALLAST
(Loading Instructions for wing and tail fin tank in use)

Maximum approved capacity per wing 75 kg (165 lbs) = 150 kg (331 lbs) total
Optional capacity per wing 50 kg (110 lbs) = 100 kg (220 lbs) total

Maximum tail fin tank capacity 5.5 kg (12 lbs)
Optional tail fin tank capacity 4.1 kg (9 lbs), when the tail fin tank is combined with a tail fin battery receptacle

Table provides maximum total water ballast weight in wing related to empty weight and cockpit load. For permissible tail fin ballast amount see table page 4-14. Baggage and temporary equipment reduce maximum water ballast weight accordingly.

4.5.9c MAXIMUM WATER BALLAST
(Loading plan for wing and tail fin tank in use)

For values in lbs see following page !

Cockpit load: Pilot+parachute +equipment (kg)	Empty weight (kg)									
	240	245	250	255	260	265	270	275	280	285
70	150	150	150	150	150	145	140	135	130	125
75	150	150	150	150	145	140	135	130	125	120
80	150	150	150	145	140	135	130	125	120	115
85	150	150	145	140	135	130	125	120	115	110
90	150	145	140	135	130	125	120	115	110	105
95	145	140	135	130	125	120	115	110	105	100
100	140	135	130	125	120	115	110	105	100	95
105	135	130	125	120	115	110	105	100	95	90
110	130	125	120	115	110	105	100	95	90	85
115	125	120	115	110	105	100	95	90	85	80
120	120	115	110	105	100	95	90	85	80	75

Example: When empty weight is 265 kg (584 lbs) and pilot and parachute weight is 110 kg (242 lbs), maximum permissible total water ballast weight is 105 kg (231 lbs).

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4.5.9c MAXIMUM WATER BALLAST
(Loading Instructions for wing and tail fin tank in use) continued

For values in kg see preceding page !

Cockpit load Pilot+parachute +equipment <lbs>	Empty weight <lbs> 529	540	551	562	573	584	595	606	617	628
154	331	331	331	331	331	320	309	298	287	276
165	331	331	331	331	320	309	298	287	276	265
176	331	331	331	320	309	298	287	276	265	254
187	331	331	320	309	298	287	276	265	254	243
198	331	320	309	298	287	276	265	254	243	231
209	320	309	298	287	276	265	254	243	231	220
220	309	298	287	276	265	254	243	231	220	209
231	298	287	276	265	254	243	231	220	209	198
242	287	276	265	254	243	231	220	209	198	187
254	276	265	254	243	231	220	209	198	187	176
265	265	254	243	231	220	209	198	187	176	165

Example: When empty weight is 265 kg <584 lbs> and pilot and parachute weight is 110 kg <242 lbs>, maximum permissible total water ballast weight is 105 kg <231 lbs>.

Erstellt: 23.Apr.93 Heucke	Geprüft: 26. MAI 1993 Whaplan

4.5.10 VERTICAL TAIL FIN WATER BALLAST LOADING INSTRUCTIONS

- filling marks for the tail fin tank are on inside of translucent rudder seal
- Each mark = 0.5 Liter ‹0.132 US gal., 0.11 Imp.gal› = 0.5 kg ‹1.1 lbs›
- when water level in filling tube corresponds with filling marks, exact volume filled can be determined
- the combination of battery and/or water cannot be chosen independently, as position of battery was fixed during last weighing of C.G., see also entry on page 6-2.

WARNING: Filling ballast into the vertical tail fin must be exactly according to marks on inside of the translucent rudder seal and corresponding water level in filling tube in relation to wing water amount, otherwise C.G. position may be outside approved range. See table below.

WARNING: Filling funnel must be equipped with wire meshing to guarantee proper function of valve.

- After filling and before take off, the following must be checked:
  a) No leaks allowed in wing water ballast system
  b) Discharge of tail fin tank starting before wing tanks

Maximum tail fin tank capacity 5.5 kg ‹12 lbs›.
When the tail fin tank is combined with a battery receptacle, the maximum capacity is 4.1 kg ‹9 lbs›

Table provides maximum tail fin water ballast weight in relation to wing water ballast weight.

wable | Total maximum | Amount of tail fin tank of wing water | tail fin water | water ballast | water available for trim- water ballast | ballast weight | weight | ming of heavy pilots weight | | | ‹kg/lbs›, for tank volume of | | | 5.5 Liter 4.1 Liter | | | 1.45/1.21 1.08/0.90 US./Imp.gal
kg / lbs	kg / lbs	kg / lbs	kg/lbs kg/lbs
26 / 57	1.0 / 2.2	27 / 59	4.5/9.9 3.0/6.6
39 / 86	1.5 / 3.3	41 / 90	4.0/8.8 2.5/5.5
52 / 114	2.0 / 4.4	54 / 119	3.5/7.7 2.0/4.4
65 / 143	2.5 / 5.5	68 / 149	3.0/6.6 1.5/3.3
78 / 172	3.0 / 6.6	81 / 178	2.5/5.5 1.0/2.2
91 / 201	3.5 / 7.7	95 / 209	2.0/4.4 0.5/1.1
104 / 229	4.0 / 8.8	108 / 238	1.5/3.3 0
117 / 258	)* 4.5 / 9.9	122 / 268	1.0/2.2 ---
130 / 287	)* 5.0 / 11.0	135 / 298	0.5/1.1 ---
143 / 315	)* 5.5 / 12.0 (max.)	149 / 328	0 ---
150 / 331	)* 5.5 / 12.0 (max.)	156 / 344	0 ---

When tail fin water is being used for trimming of heavy pilots see also page 6-7.

) not usable for tail fin tank combined with battery receptacle*

WARNING: For the combination of tail fin tank with battery receptacle, filling marks between 4 Liters ‹1.057 US gal., 0.80 Imp. gal› and full are not in even distance due to receptacle

WARNING: See also page 3-3, Inadvertent Freezing / Icing

Erstellt: 23.Apr.93 Heuck	Geprüft: 26. MAI 1993 Schapka

4.5.11 WINCH LAUNCH or AUTO TOW

- adjust backrest properly (see page 4-6) to avoid sliding backwards
- tighten seat belt harness during acceleration and steep climb

- trim slightly nose heavy: trim lever in front of neutral mark

- break away link in tow cable max. 825 kg (1819 lbs)

- ask winch operator to avoid too high acceleration. The higher the initial acceleration, the higher is the pitch up tendency

- use wheel brake during tightening of tow cable to avoid rolling over tow cable

- pronounced forward stick pressure is required during transition arc

- Minimum winch launch/auto tow speed:
  without water ballast ..... 90 km/h ‹49 kts, 56 MPH›
  with water ballast ..... 100 km/h ‹54 kts, 62 MPH›

- retract landing gear after tow, because C.G. hook is fitted to landing gear fork

4.5.12 AERO TOW

- adjust backrest properly and tighten seat belt harness

- trim slightly nose heavy: trim lever in front of neutral mark

- break away link in tow cable max. 550 kg (1212 lbs)

- use wheel brake during tightening of tow cable to avoid rolling over tow cable

- Minimum tow speed:
  without water ballast ..... 100 km/h ‹54 kts, 62 MPH›
  with water ballast ..... 120 km/h ‹65 kts, 75 MPH›

- recommended tow cable length: 30 - 80 m ‹100 - 260 ft›

- when a nose hook is fitted, this must be used for aero tow

- when the C.G. hook is being used, retract landing gear after tow, because C.G. hook is fitted to landing gear fork

Erstellt: 23.Apr.93	Geprüft: 26. MAI 1993

4.5.13 FREE FLIGHT

- stalling speed (IAS) for straight and level flight

without water ballast			with maximum water		
km/h	kts	MPH	km/h	kts	MPH
54-62	29-33	34-39	65-67	35-36	40-42

WARNING: when flying with empty water tanks, leave dump valve in open position to avoid pressure built up inside tanks at altitude

- during circling flight (thermalling) trim stick forces to zero
- best glide angle between 95 and 105 km/h (52-57 kts, 59-65 MPH)
- high speed flight:
  - reduce stick forces by trimming
  - check speed indication regularly to avoid exceeding limit values

WARNING: Observe airspeed limits versus altitude (see page 2-2)

WARNING: * In emergencies, air bakes can be extended up to VNE=270 km/h (146 kts, 168 MPH).
WARNING: In this speed range air brakes are sucked out suddenly. This may cause uncomfortable negative accelerations and initiate pilot induced oscillations.

WARNING: Check thermometer (if tail fin tank is fitted) regularly during flight. Dump water at 5° Centigrade (41° F) to ensure proper dumping before tail fin valve freezes solid.

4.5.14 HIGH ALTITUDE FLIGHTS

Increasing altitude yields higher true airspeed than indicated airspeed and this difference increases with increasing altitude.

This does not influence loads on the structure, which means that colour markings on airspeed indicator are valid unless limited by red lines.

However, as flutter depends on true airspeed, this should never be above 270 km/h IAS (146 kts, 168 mph) up to 2000 m (6500 ft) above MSL.

Using the table on page 2-2, maximum permissible airspeeds depending on altitude, the pilot is able to avoid flying faster than true airspeed of 270 km/h CAS (146 kts, 168 mph).

Example: Indicated airspeed of 219 km/h (118 kts, 136 mph) at 6000 m (19700 ft) altitude correspond to 270 km/h (146 kts, 168 mph) true airspeed.

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4.5.15 SIDESLIP

WARNING: *Sideslip with winglets prohibited, because during speed reduction stalling of the leading wing occurs (example: during left hand side slip, stalling to the left!)*

4.5.16 LANDING

- water ballast should normally be dumped prior to landing (For possible unequal dumping see page 4-9)
- extend landing gear in time and lock (right hand gear handle)
- always extend landing gear, especially in case of an emergency outlanding, because the sprung landing gear protects the pilot much better than the fuselage shell alone.

WARNING: minimum approach speed with air brakes fully extended:
without water ballast not below 90 km/h (49 kts, 56 mph)
with water ballast not below 100 km/h (54 kts, 62 mph)

- air brakes allow control of glide angle within wide limits

WARNING: minimum speed increases
with airbrakes extended, by about 10km/h, ‹5 kts, 6 mph›
with rain and airbrakes extended by about 20 km/h ‹10 kts, 12 mph›

WARNING: *Side slipping with winglets prohibited*

4.5.17 FLIGHT IN RAIN

During rain expect considerable decrease of performance. Increase approach to landing speed at least by 10 km/h (5 kts, 6 mph) over normal approach speed because stall speed increases and effectivity of controls decreases.

Open canopy window to increase visibility.

4.6 POSTFLIGHT CHECK

Electrical instruments	- switch off
Battery	- recharge, if necessary
Insects and dust	- remove using water, sponge and chamois leather (See also chapter 8, Cleaning and Care)
Air brake boxes	- check if moisture has accumulated and remove with sponge
Water ballast system	- check proper dumping
Air brakes	- unlock

For Cleaning and Care see Chapter 8.

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SECTION 5

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5.1 INTRODUCTION

Section 5 provides approved data for airspeed calibration, stall speeds and take off performance and non-approved additional information.

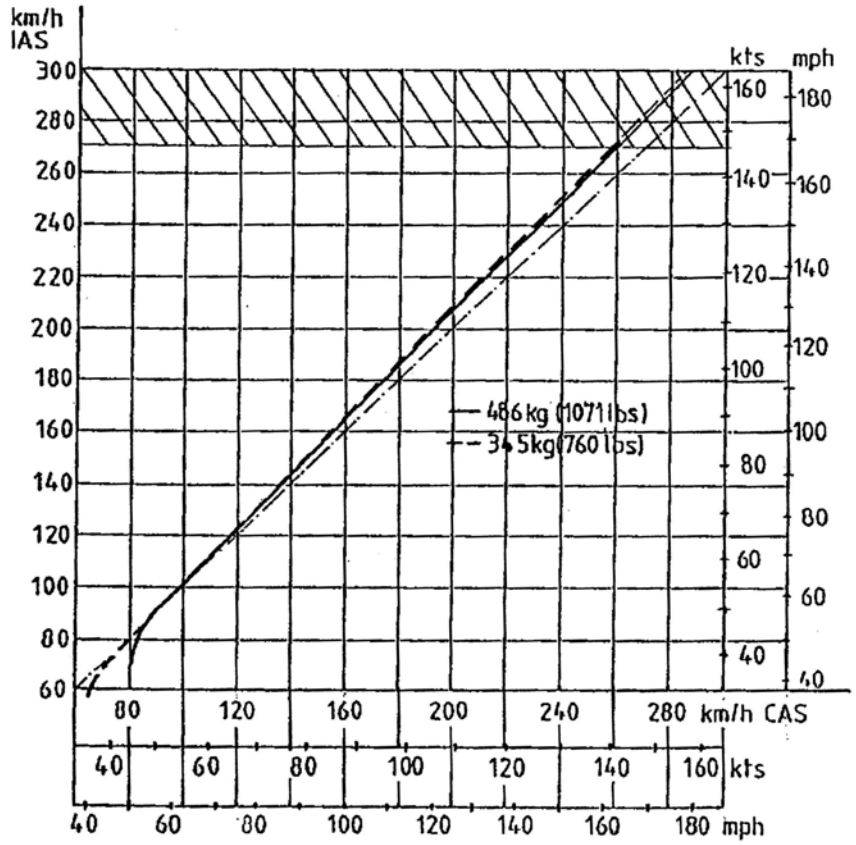
The data in the charts has been computed from actual flight tests with the sailplane in good condition and using average piloting techniques.

5.2 APPROVED DATA

5.2.1 AIRSPEED INDICATOR SYSTEM CALIBRATION

This diagram shows airspeed indicator error due to position of pressure ports.

Pressure ports: Vertical tail fin pitot
Lower forward fuselage side statics



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5.2.2 STALLING SPEEDS

Stalling speeds (IAS) for straight and level flight:

without water ballast Total weight 384 kg (847 lbs)			with maximum water ballast Total weight 486 kg (1071 lbs) (Maximum approved)		
62 km/h	33 kts	39 mph	67 km/h	36 kts	42 mph

5.3 ADDITIONAL INFORMATION

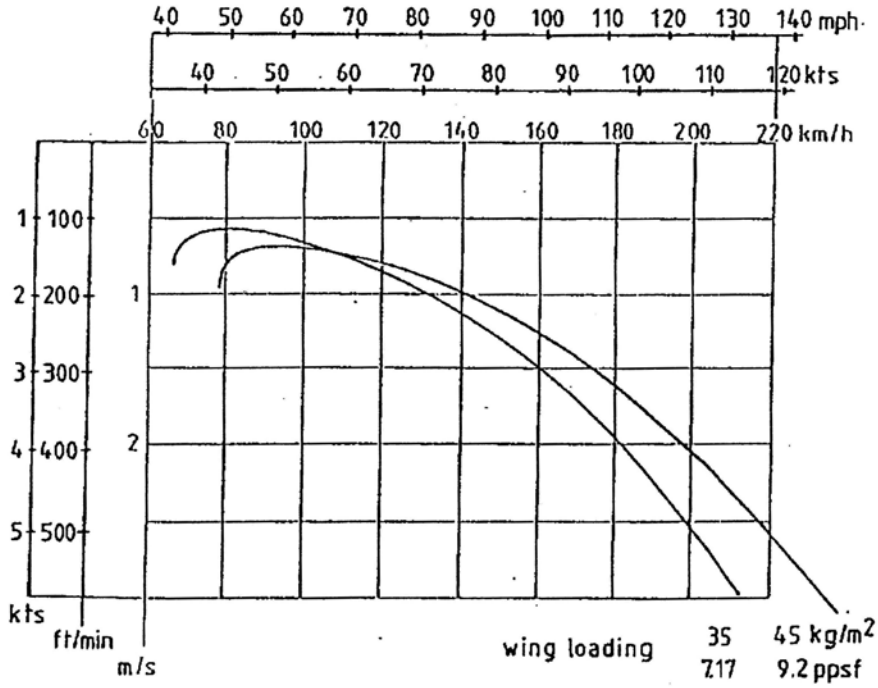
5.3.1 DEMONSTRATED CROSSWIND PERFORMANCE

Demonstrated crosswind components:

during aero tow:	20 km/h (11 kts, 12 mph)
during winch launch:	30 km/h (16 kts, 19 mph)

5.3.2 FLIGHT POLAR

The flight polar gives forward speed versus sinking speed related to flap settings and wing loading.
It is valid for "clean" wing. Insects and raindrops on wing decrease performance and handling, see also page 4-17, Landing.



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6.1 INTRODUCTION

This section gives details about permissible Cockpit Loading and approved mass limitations of this sailplane.

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 this manual on page 6-2.

The procedures for establishing the basic empty mass, mass of non-lifting parts, center of gravity and loading limits are given in Maintenance Manual chapter 2.

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6.2 COCKPIT LOADING PLAN <Pilot and parachute>

WARNING: New entry with each annual inspection and when changing equipment. Entry should be calculated in accordance with chapter 2 of Maintenance Manual.

State dimensions used!
State amount of permanently fitted ballast in appropriate position or None.

Empty weight	Empty weight C.G. Pos.	Maximum Perm. Cockpit Load	Minimum Perm. Cockpit Load	Permanently fitted Ballast forward	aft	Battery in tail fin Yes/No	Tail-fin water tank Yes/No	Wing ballast volume	Date / Inspector

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SECTION 7

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7.1 INTRODUCTION

This section provides description of the sailplane's operating systems, instrumentation and other information necessary for the safe operation of the sailplane and its systems.

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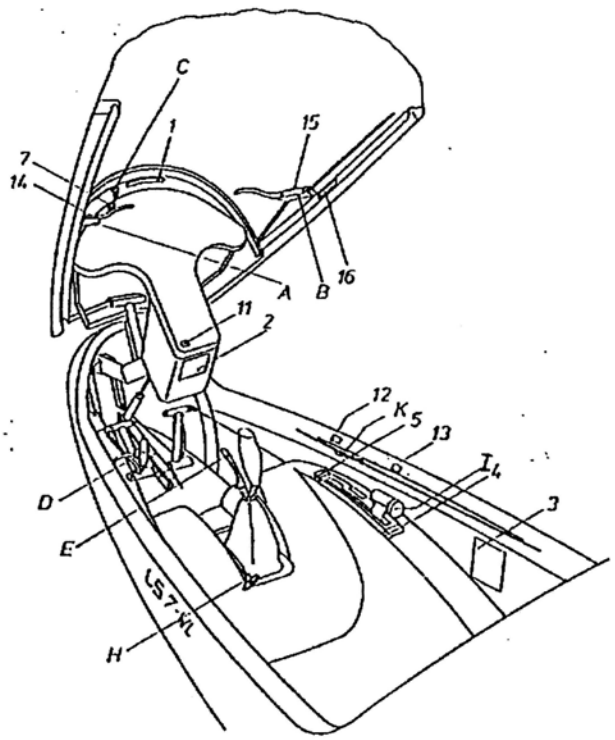
7.2 COCKPIT CONTROLS

Numbers refer to placards, see also Flight Manual, page 2-8 and Maintenance Manual chapter 10.



A Left canopy locking

B Right canopy locking and emergency canopy release

C Ventilation

D Tow cable release

E Trim locking lever

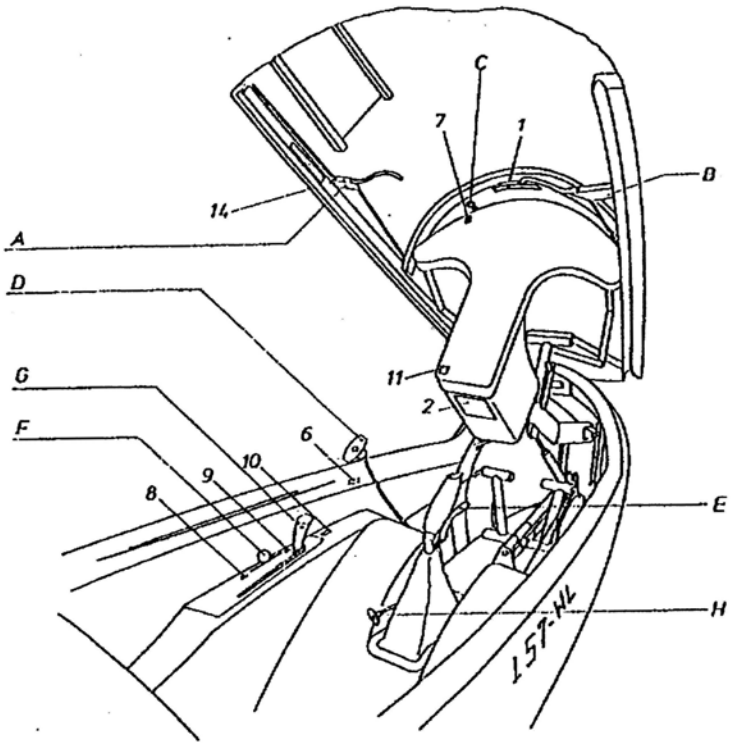
F Trim lever, also indicating trim position

G Air brake handle

H Pedal adjustment

I Landing gear

K Water ballast valve



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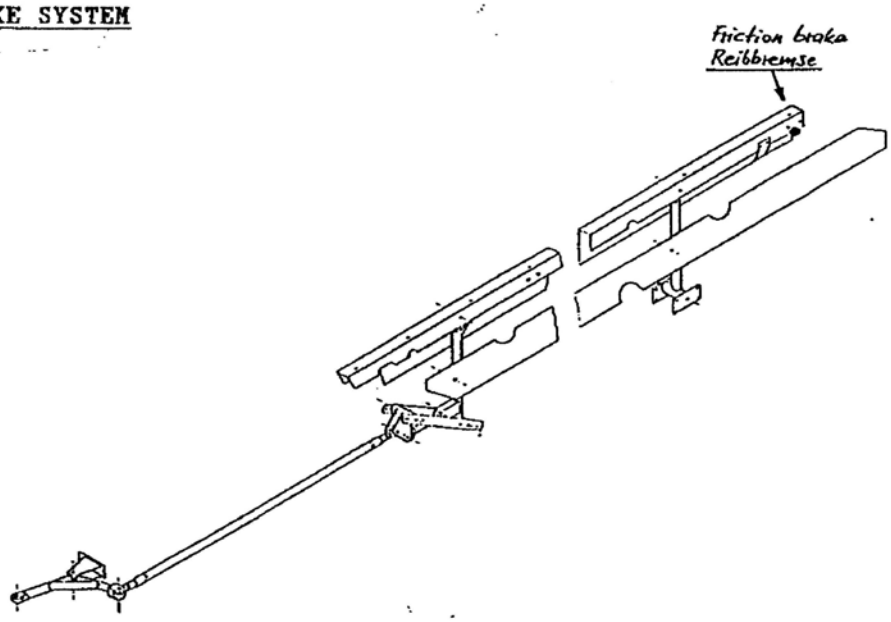
7.3 AIR BRAKE SYSTEM



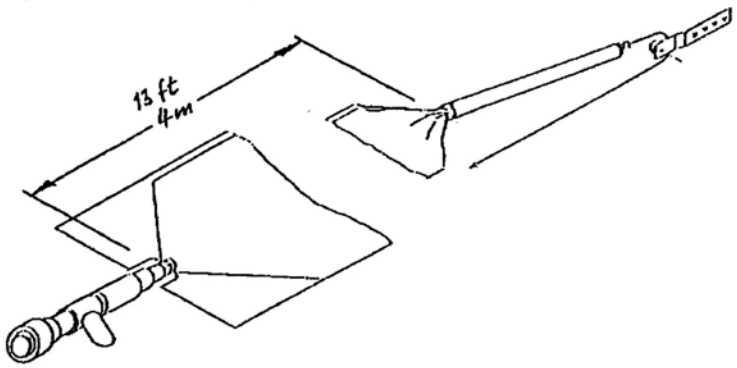
7.4 BAGGAGE COMPARTMENT

Baggage compartment is accessible only on the ground after swiveling backrest forward. Loading possible after rigging. Equipment (for instance batteries) must be installed according to Maintenance Manual, chapter 11. Not permanently fixed, soft items count for Cockpit Load.

7.5 WATERBALLAST SYSTEM and OPERATION

Lever at right cockpit rim operates total water ballast system (Wing tanks and optional tail fin tank). Wing operating system couples automatically during rigging. Use as clean water as possible to avoid damage of seals due to foreign matter.

Wing Water Ballast System:



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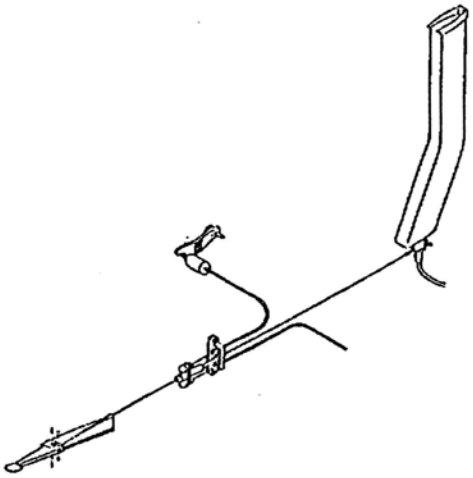
7.5 WATERBALLAST SYSTEM and OPERATION continued

Fuselage Water Ballast System:



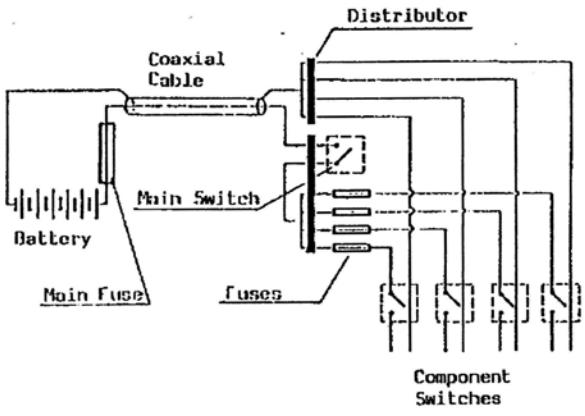
7.6 ELECTRICAL SYSTEM and OPERATION

For electrical system principle see wiring diagram below. Power supply by 12V battery, for types and minimum capacity see Master Equipment List in Maintenance Manual, chapter 12.

In case of two batteries, a three-position switch may be used as main switch. A current limiting device must be provided for each electrical user (microfuses or circuitbreakers, details see Master Equipment List). When using circuitbreakers, a separate main switch is not necessary.

Position of fuses: Main fuse at battery
Single component fuses at lower instrument panel area

Fuse ratings:
- 5 A (quick acting) for main fuse at battery
- 2 A quick acting: Radio (Becker/Dittel types)
- 1 A quick acting: Electrical variometers
  Turn and bank indicator



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7.7 PNEUMATIC SYSTEM (Static and total pressure)

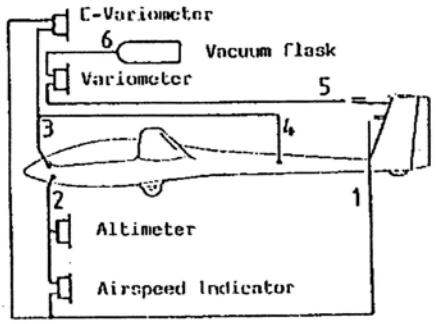
Pressure ports: Vertical tail fin pitot below TE port

Statics: For airspeed indicator and altimeter :
Lower forward fuselage side statics
For Variometers: Upper forward fuselage side statics
Fuselage boom

Total energy port at upper vertical tail fin

Tubing colour code:

1 Fin pitot **red**
2 Lower side statics **blue**
for airspeed and altimeter only !
3 Upper side statics **clear 6 mm Ø.24 in ⌀**
4 Boom statics **yellow**
5 T.E.port **green**
6 Vacuum bottles for variometers **clear 8 mm Ø.32 in ⌀**



When connecting an electrical variometer (E.V.) additionally to the boom static ports (tube No. 4), a blowing circuit must be switched operative to avoid water entering system during water ballast discharge. Thus the electrical variometer is inoperative during water discharge.

7.8 VARIOUS EQUIPMENT

7.8.1 EXPENDABLE BALLAST (TRIM WEIGHTS)

Expendable ballast to compensate pilot weight below Minimum Cockpit Load may be fitted on threaded rod in front of rudder pedals and secured with knurled nut (12 mm thread).

7.8.2 OXYGEN SYSTEM

Fiberglass receptacle at left main bulkhead for 3 or 4 Liter ‹183 or 244 cu in› oxygen bottles of 100 mm ‹3.94 in› in diameter.
After permanent installation of an oxygen system according to it's manufacturers instructions by an adequately licenced repair shop, the sailplane including oxygen system must be inspected (Weight and Balance, Loading Instructions).
When using a removable oxygen unit, it's weight must be counted as useful load.

7.8.3 EMERGENCY LOCATOR TRANSMITTER

Possible installation location behind baggage compartment, base plate bonded to upper fuselage shell. Remote control from instrument panel necessary. After installation, loading limit values must be checked according to Maintenance Manual chapter 2.

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SECTION 8

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	Supporting Area for Road Transport	8-4
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8.1 INTRODUCTION

This section contains manufacturer's recommended procedures for proper ground handling and servicing of the sailplane. It also identifies certain inspection and maintenance requirements which must be followed if the sailplane is to retain that new-plane performance and dependability. It is wise to follow a planned schedule of lubrication and preventive maintenance based on climatic and flying conditions encountered.

a) For service and information not contained within this manual, it is recommended to contact agent or manufacturer.

b) All correspondence regarding the sailplane should carry its serial number.

c) The serial number can be found on the type placard, on the right side of the main bulkhead.

d) A Maintenance Manual is issued with each sailplane.

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8.2 SAILPLANE INSPECTION PERIODS

a) Annual Inspection according to checklist and inspection forms provided in Maintenance Manual, chapter 2, after performance of annual maintenance procedure.

b) Manufacturer recommended daily inspection, preflight check and cockpit checklist procedure according to checklists, chapter 4.

c) Manufacturer recommended extraordinary inspection, depending on circumstances (rough landings, ground loops etc.) as provided in Maintenance Manual, chapter 2.

d) Other inspections may be required by the issuance of airworthiness directives applicable to the aircraft or components.

It is the responsibility of the owner/operator to determine that all applicable airworthiness directives are complied with.

When inspections are repetitive, inadvertent noncompliance may be prevented by adding them to the end of the annual inspection checklist or by a special inspection schedule.

e) Life limited parts, such as tow release system components or seat belt harness may require other inspections. See chapter 10 and Maintenance Manual, chapter 5.

Agency or personnel accomplishing the required inspections and most of the manufacturer recommended inspections must be properly certificated.
In case of doubt, consult agent, manufacturer or FAA.

8.3 PREVENTIVE MAINTENANCE that may be accomplished by a certificated pilot

For USA only !

a) A certificated pilot who owns or operates an airplane not used as an air carrier is authorized by FAR Part 43 to perform limited preventive maintenance on his airplane. Refer to FAR Part 43 for appropriate list.

b) All other maintenance required is to be accomplished by appropriately licensed personnel.

c) Preventive maintenance should be accomplished in accordance with the appropriate airplane Maintenance Manual, to be sure that proper procedures are followed. A Maintenance Manual is delivered with each sailplane, carrying the serial number.

8.3.1 ALTERATIONS OR REPAIRS

a) Alterations or repairs must be accomplished by licensed personnel.

b) *FOR USA:* Prior to any alteration the FAA should be contacted to make sure that airworthiness of the airplane is not violated.

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8.3.1 ALTERATIONS OR REPAIRS continued

c) For alterations or repairs a written approval from the manufacturer is required. (Special advice, drawings, etc.)

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 national authority-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.

LONGITUDINAL MOTION PUSHROD BEARINGS

During repairs, never pull pushrods out of longitudinal motion bearings, all balls will leave their cage. To re-install them, a cut-out near each bearing must be cut and closed afterwards. These bearings are being used throughout the wing control systems, in the fuselage for elevator and aileron systems.

IMPORTANT NOTE Longitudinal motion pushrod bearings should never be greased or oiled.

FORWARD HORIZONTAL TAIL ATTACHMENT

The forward horizontal tail attachment on the vertical tail fin consists of a special rod end bearing, which is cemented in the correctly aligned position. (See also placards page 2-6, 2-7).
When the ball becomes loose (by deliberate action or inadvertently), the attachment may damaged during horizontal tail assembly due to non-alignment of ball and corresponding pin.

WARNING: Ask the manufacturer for special advice if this has happened !

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8.4 GROUND HANDLING / ROAD TRANSPORT

For assembly and disassembly procedures see Normal Procedures, chapter 4.

GROUND TOWING

- tow at walking speed only
- use elastic cable from tow release and helper at wingtip

or

- use tail dolly with tow bar and sprung wheel at one outer wing

PARKING

- sailplanes should never be parked without permanent supervision
- their weight compared to wing area is so small, that already moderate wind may cause damage

STRAPPING DOWN

- strapping down as a substitute for a hangar place should never be considered: weathering marks due to changes of temperature, humidity and ultra violet radiation can result in rapid paint deterioration; resulting cracks can cause damage to structure
- if permanent supervision for parking cannot be guaranteed, proceed as follows:
  - place tail 45° into main wind direction
  - lay windward wingtip down
  - place ground anchors to both sides of rear fuselage boom and wingtip
  - strap wingtip and rear fuselage down using rope and foam to avoid scratching

SUPPORTING AREA FOR ROAD TRANSPORT

FUSELAGE:
- tail skid or tail wheel
- main wheel
- shell in front of landing gear, minimum width of support 300 mm ‹11.8 in›

WING:
- right spar at inner or outer main pin hole
- left forked spar at inner main pin hole. At outer main pin hole only, if both fork end are supported.
- shell at root, minimum width of support 150 mm ‹5.9 in›
- shell at half span of wing half, minimum width of support 250 mm ‹10 in›

IMPORTANT NOTE: The aileron sandwich is pressure sensitive, handle carefully!

HORIZONTAL TAIL UNIT
- at any place, minimum width of support 80 mm ‹3.2 in›

SUPPORTING AREA TO LIFT WHOLE SAILPLANE

- under wing spar, never under nose section
- under fuselage shell in front of wing
- under fuselage shell behind wing

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8.5 CLEANING AND CARE

IMPORTANT WARNING: Unless regularly polished with hard wax after each cleaning, sanded gelcoat shows distinctive weathering marks due to changes of temperature, ultra violet radiation and humidity.

Humidity enters resin structure after prolonged application and causes swelling up. High temperatures at the same time speed this process up. Conserving gelcoat with wax decelerates this process, but is unable to stop it completely.
Therefore, try to remove water whenever it enters interior as far as possible using a sponge. If need be, store in dry environment for drying.

Ultra violet radiation (sunlight, particularly strong during high altitude flights) causes the polyester coat to embrittle and to become yellow. Therefore, avoid unnecessary exposure to sunlight (for instance outside parking instead of packing into the trailer).

Self-adhesive tape residues should only be wiped off with white gasoline. (See also following recommendations from paint manufacturer Lesonal)

For Plexiglas care never use dry cloth because of resulting static charge, consequent collection of dust particles and scratching. Cleanse with clear water and clean chamois leather, use anti static fluid afterwards (for instance Plexiklar).

CLEANING AND CARE recommendations according to paint manufacturer Lesonal's note dated 7.7.81:

Suitable
- water with washing-up liquid, added in recommended quantities
- car polish with or without silicone
- car hardwax

Suitable with reservations
- tar remover for cars based on petrol or white gasoline
- alcohol, like spirit or isopropyl alcohol

‖ Reservations are, that these liquids should only be used for wiping off, not for soaking with rags.

Unsuitable
- strong solvents and thinners (acetone)

‖ These items may decompose gelcoat and cause local shrinking.

Completely unsuitable
- trichlorethylene
- carbon tetrachloride or similar hydrocarbon chlorides

‖ These liquids destroy the gelcoat

Other over the counter products must be tested before being used !

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8.5 CLEANING AND CARE continued

Pins, bushes and control system connectors

Due to required tolerances not all these items can be protected against corrosion. Cover regularly with noncorrosive grease.

Seat belt harness

Check regularly for condition (fraying of edges), mildew and wear. Check fittings and buckle regularly for corrosion and proper function. (See also excerpt of harness manufacturer's maintenance instructions, accompanying this manual)

Control surface gap sealing

When derigged, fix control surfaces to zero deflection to avoid loss of initial tension of elastic tapes and consequent inability to seal.

Tow release

Clean regularly by blowing out and lubricate with spray oil. See also maintenance instructions of manufacturer.

LONGITUDINAL MOTION PUSHROD BEARINGS

These bearings should never be greased or oiled, their plastic balls and bearing surfaces will soon be destroyed due to collection of small foreign matter.
These bearings are being used throughout the wing control systems, in the fuselage for elevator-, aileron- and landing gear drive systems.

LONG TERM STORAGE

Preparation for long term storage

- remove instrumentation and store separately
- close external pressure ports (See below) and inner tube ends
- protect all metal parts using spray oil and vaseline
- close all orifices without preventing air circulation wire cloth or similar means to prevent entry of small animals

Return to service

- Inspection according to Annual Inspection (See Maintenance Manual page 2-1 and blank inspection forms chapter 14 as well as Flight Manual chapter 8.
- inspect inside of wings and fuselage for small animals (mice, birds etc.) and/or nests.

FORWARD HORIZONTAL TAIL ATTACHMENT

The forward horizontal tail attachment on the vertical tail fin consists of a special rod end bearing, which is cemented in the correctly aligned position. (See also placards page 2-6, 2-7).
When the ball becomes loose (by deliberate action or inadvertently), the attachment may damaged during horizontal tail assembly due to non-alignment of ball and corresponding pin.

WARNING: Ask the manufacturer for special advice if this has happened !

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SECTION 9

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9.1 INTRODUCTION

This section contains the appropriate supplements necessary to safely and efficiently operate the sailplane when equipped with various optional systems and equipment not provided with the standard sailplane.

9.2 LIST OF INSERTED SUPPLEMENTS

Date of Insertion	Document No.	Title of the inserted Supplement
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Erstellt: 03.Nov.92 Heinecke	Geprüft: 13. NOV. 1992 Schapka