ROLLADEN SCHNEIDER FLUGZEUGBAU GmbH
Mühlstraße 1o
D-6o73 Egelsbach
Tel. o61o3/4126

# FLIGHT MANUAL

# LS4

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

This Flight Manual is FAA approved for U.S. registered sailplanes in accordance with the provisions of 14 CFR Section 21.29 and is required by FAA Type Certificate Data Sheet No. G 45 EU.

Registration Signs: N30RD Serial Number: 4209

Owner: Mark S. Martin
957 Karlslyle Drive
Columbus, Ohio 43228

German edition of Flight Manual approved under § 12(1)2. LuftGerPO.
Published 12. Aug. 83

Because of responsibility of information a change of ownership should be reported to the manufacturer immediately.

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

12. Aug. 83

Subject : Manual revisions

Effectivity : **Type:** LS Sailplanes
**Variants:**
LS1-0, LS1-a, LS1-b, LS1-c, LS1-d, LS1-f. LS1-f (45)
LS4, LS4-a, LS4-b
LS6, LS6-a, LS6-b, LS6-c, LS6-c18, LS6-18w

Accomplishment : Instructions 1 – 3: Prior to the next maintenance or next annual inspection, latest December 31. 2011
Instructions 4 ÷ 6: optionally

Reason : New flight and maintenance manuals have been issued for the above mentioned LS1 variants. New maintenance manuals have been issued for the above mentioned LS4 and LS6 variants.

Manuals of different variants have been combined into one manual as far as reasonable. All manuals have been updated to the latest level of knowledge.

In the LS1 flight manuals the recommended winch launching speeds and the data for the weak links have been changed.

Flight manual changes for LS4, LS4-a and LS4-b are resulting from maintenance manual changes for the LS4 variants. As the flight manuals won't be combined only single pages must be exchanged.

The placards of all LS1 variants are no more up to date and must be exchanged.

The data for in-flight C.G. and max. mass of the non lifting parts were not the same for all LS4 variants although the gliders are equal concerning structure and aerodynamics. The data and procedures of the latest variant LS4-b will be adopted for the other variants too.
This means that cockpit load limits of the LS4 may be increased and the max. mass of the non lifting parts of LS4 and LS4-a may be increased. TN 4046 and 4047 are valid for variants LS4 and LS4-a also.

In the LS4-b AFM a fixed value for the max. TOW without waterballast is given. This value will be replaced by the equation Wmax= Wnon lifting parts + Wwings.

In the initialLS4-b maintenance manuals the placard for "Canopy Emergency Release" is not shown.

Instructions : **1. Exchange of manuals:**
**LS1-0, LS1-a, LS1-b, LS1-c, LS1-d:**
Flight manual for the sailplane LS1 issue May 2011,
Maintenance manual for the sailplane LS1 issue May 2011

**LS1-f. LS1-f (45):**
Flight manual for the sailplane LS1-f issue May 2011,
Maintenance manual for the sailplane LS1-f issue May 2011

**LS4, LS4-a, LS4-b:**
Maintenance manual for the sailplane LS4 issue May 2011

**LS6, LS6-a, LS6-b, LS6-c, LS6-c18, LS6-18w:**
maintenance manual for the sailplane LS6 issue May 2011

**All variants:** Those manual pages or other documents which have been changed with regards to contents are listed in the amendments list of the respective manual. The new or amended text is indicated by a black vertical line at the right hand margin of the revised page and should be regarded

**2.** Exchange the following flight manual pages against new pages issued May 2011 marked with TNLS-S-01. Respect the changes marked in the right hand margin.
**LS4:** 0-5, 1-5, 1-6
**LS4 USA edition:** 1-1, 1-2, 1-4, 2-3, 2-4 remove pages 6-3 ÷ 6-5
**LS4-a:** 1-1, 1-2, 1-4, 2-3 remove pages 6-3 ÷ 6-5
**LS4-a USA edition:** 1-1, 1-2, 1-4, 2-3, remove pages 6-3 ÷ 6-5
**LS4-b (without fin tank):** 0-1, 0-2, 2-4
**LS4-b (with fin tank):** 0-1, 0-2, 2-4

**3. All LS1 variants:** exchange all placards against new ones according to maintenance manual section 6.

**4. LS4:** Determine new cockpit loading limits according to maintenance manual LS4 section 2.3 and enter into the cockpit data placard and in the flight manual.

**5. LS4 and LS4-a:** Determine new max. mass of non-lifting parts according to maintenance manual LS4 section 2.4.

**6. LS4, LS4-a and LS4-b:** Determine new max. TOW for flight without waterballast from existing weighing report with new max. mass of non-lifting parts determined under instructions 5 (LS4 and LS4-a ) and equation Wmax= Wnon lifting parts + Wwings, calculate new max. cockpit load and enter in the flight manual and in the cockpit data placard.

**7. LS4-b:** Check if the placard for "Canopy Emergency Release" is installed according to MM LS4 section 7.3. Install the placard if not existing.

Material : Manuals see instructions 1
These manuals have to be ordered from the TC holder DG Flugzeugbau GmbH.

They are only valid for the aircraft ser.no. printed on the cover page.

**Only LS4, LS4-a and LS4-b:** Flight manual pages see instruction 2

**Only all LS1 variants:** all data and limitation placards see instruction 3

**Only LS4-b:** placard for "Canopy Emergency Release" if not installed

Weight and balance : For instructions 4 up to 6 a new weight and balance report must be produced.

Remarks : The instructions 1 ÷ 3 may be executed by the pilot/owner himself and are to be inspected and entered in the aircraft logs by a licensed inspector at latest with the next annual inspection.

Maintenance or annual inspections are only allowed to be carried out if the valid manuals actually issued for the respective ser. No. are existent.

Instructions No. 4 ÷ 6:

1. EASA countries: The actions have to be performed in a Part -145 approved organisation, or in a Part M, Subpart F approved organisation according to the regulations of the Part M and released according to M.A.801.
2. Non EASA countries: The actions have to be performed in a licensed workshop. All instructions are to be inspected and entered in the aircraft logs by a licensed inspector.

Due to the new manual editions EASA will publish a new TCDS EASA.A.095 with the type designation "LS Sailplanes" which combines the LBA TCDS's 262, 317, 345, 357 and 375.

The existing manuals of the variant LS1-e remain valid.

The new manuals for the LS3 and LS7 variants which are contained in the EASA TCDS too, have already been published with TN 3053 and TN 7016.

Bruchsal, date:
June 15. 2011
Wilhelm Dirks
Author:

Modifications approved by EASA Date 2.09.2011
under Approval No. 10036360

Wilhelm Dirks

## Log of Revisions

Any revision of the present manual, except actual weighing data, must be recorded in the following table and in case of approved sections endorsed by the responsible airworthiness authority.
The new or amended text in the revised page will be indicated by a black vertical line in the right hand margin, and the revision No. and the date will be shown on the bottom of the page.

| Rev. No. | Pages affected | Date of issue | Approval | Date of approval | Date of insertion | Signature |
|---|---|---|---|---|---|---|
| 1 | 1-1, 1-2, 4-6, 4-10 | Oct. 1999 | LBA | 4.11.99 | | |
| 2 | 1-1, 1-2, 3-1, 4-2 TN 4032 Rev. 1 | Oct. 2010 | EASA | 3.11.2010 | | |
| 3 | 1-1, 1-2, 1-4, 2-3, 2-4, remove pages 6-3 ÷ 6-5 TN LS-S-01 | May 2011 | EASA | 2.09.2011 | | |
| 4 | 1-1, 1-2, 3-1, 4-2 TN 4032 Rev. 2 | May 2011 | EASA | 28.09.2011 | | |

| Page | Issue Date | Current / TN | | Page | Original | Current / TN |
|---|---|---|---|---|---|---|
| Title | Aug.12,1983 | | | | | |
| 1-1 | Oct. 1999 | May 2011 / LS-S-01 4032 rev. 2 | | 6-1 | Aug.12,1983 | |
| 1-2 | Oct. 1999 | May 2011 / LS-S-01 4032 rev. 21 | | 6-2 | May 2,1983 | |
| 1-3 | May 2,1983 | | | 6-3 | May 2,1983 | Removed / LS-S-01 |
| 1-4 | May 2,1983 | May 2011 / LS-S-01 | | 6-4 | May 2,1983 | Removed / LS-S-01 |
| 1-5 | May 2,1983 | | | 6-5 | Oct. 1999 | Removed / LS-S-01 |
| 1-6 | May 2,1983 | | | 6-6 | May 2,1983 | |
| 1-7 | May 2,1983 | | | | | |
| | | | | 7-1 | Aug.12,1983 | |
| 2-1 | Aug.12,1983 | | | 7-2 | May 2,1983 | |
| 2-2 | Aug.12,1983 | | | | | |
| 2-3 | May 2,1983 | May 2011 / LS-S-01 | | 8-1 | Aug.12,1983 | |
| 2-4 | May 2,1983 | May 2011 / LS-S-01 | | 8-2 | Aug.12,1983 | |
| 2-5 | May 2,1983 | | | 8-3 | Aug.12,1983 | |
| 2-6 | May 2,1983 | | | 8-4 | May 2,1983 | |
| 2-7 | May 2,1983 | | | 8-5 | Aug.12,1983 | |
| | | | | 8-6 | May 2,1983 | |
| 3-1 | May 2,1983 | May 2011/4032 Rev. 2 | | | | |
| 3-2 | May 2,1983 | | | 9-1 | May 2,1983 | |
| | | | | 9-2 | May 2,1983 | |
| 4-1 | Aug.12,1983 | | | 9-3 | May 2,1983 | |
| 4-2 | May 2,1983 | May 2011/4032 Rev. 2 | | 9-4 | May 2,1983 | |
| 4-3 | May 2,1983 | | | 9-5 | Aug.12,1983 | |
| 4-4 | May 2,1983 | | | 9-6 | May 2,1983 | |
| 4-5 | May 2,1983 | | | 9-7 | May 2,1983 | |
| 4-6 | May 2,1983 | Oct. 1999 / 4043 | | | | |
| 4-7 | May 2,1983 | | | | | |
| 4-8 | May 2,1983 | | | | | |
| 4-9 | May 2,1983 | | | | | |
| 4-10 | May 2,1983 | Oct. 1999 / 4043 | | | | |
| 4-11 | May 2,1983 | | | | | |
| 4-12 | May 2,1983 | | | | | |
| | | | | | | |
| 5-1 | Aug.12,1983 | | | | | |

CONTENTS

**Contents continued**

CONTENTS continued

DESCRIPTION

The LS4 is a Standard Class single seater sailplane with T-tail, retractable landing gear and upper wing surface air brakes.

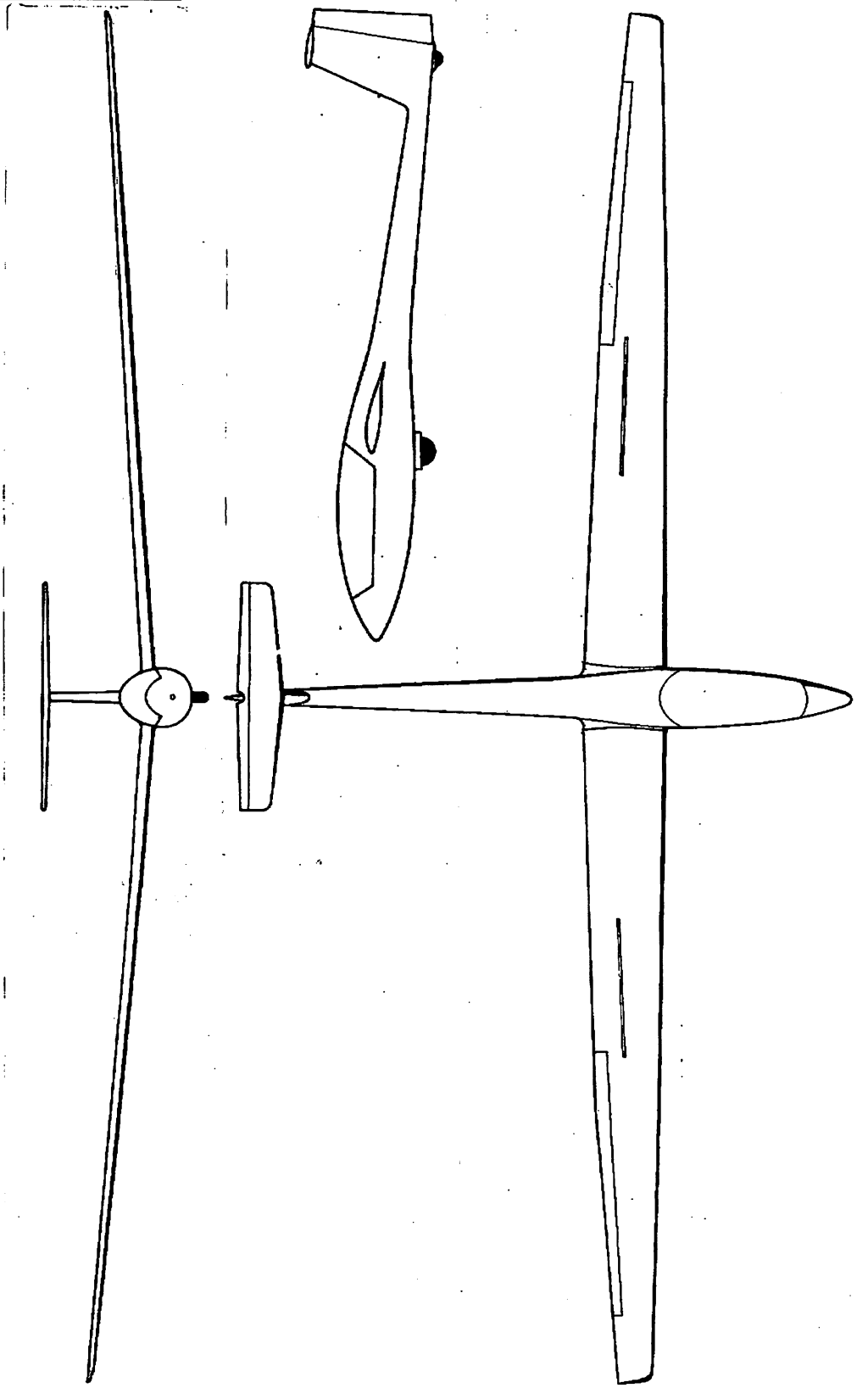
This sailplane has been produced using the latest technology of industrial glass-fibre design.

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

Technical data

| | |
|---|---|
| Wing span | 15 m ( 49,21 ft) |
| Length | 6.79 m (22.27 ft) |
| Height | 1.32 m ( 4.31 ft) |
| Wing area | 1o.5 $m^2$ (113.o sq.ft) |
| Wing aspect ratio | 21.4 |
| Maximum gross weight | 472 kg (1o41 lbs) |
| Maximum wing loading | 45 $kg/m^2$ (9.22 ppsf) |
| Airfoil | Wortmann modified |

## THREE DIMENSIONAL DRAWING



## GENERAL

The LS4 sailplane is designed and originally approved according to LFSM regulations. The safety margin - ratio of ultimate loads to permissible loads, which may occur some times - is only 1.5 . This means that ultimate loads will be achieved when exceeding permissible load factors by 5o %. When exceeding permissible speeds, the safety margin is much lower !

Maximum permissible loads should not be achieved by the pilot's control surface deflections - they result from severe turbulence and the necessary control surface deflections to maintain the desired attitude.

Severe turbulence would include wave rotors, flying in cumulonimbus clouds, dust devils and when crossing mountain ridges in strong winds.

## AIRSPEED LIMITS

All airspeed limits are indicated airspeeds (IAS)

| | km/h | kts | mph |
|---|---|---|---|
| Never Exceed $V_{NE}$ | | | |
| from sea level up to 65oo ft ..... | 27o | 146 | 168 |
| up to 98oo ft ..... | 257 | 139 | 16o |
| up to 197oo ft ..... | 219 | 118 | 136 |
| up to 328oo ft ..... | 173 | 93 | 1o7 |
| Manoeuvering Speed $V_A$ ..... | 18o | 97 | 112 |
| Limit Speed in "Severe Turbulence"..... | 18o | 97 | 112 |
| Winch Launch $V_W$ ..... | 13o | 7o | 81 |
| Aero Tow $V_T$ ..... | 18o | 97 | 112 |
| Landing Gear $V_{Lo}$ and $V_{LE}$ .... | 27o | 146 | 168 |
| Air Brakes ..... | 27o | 146 | 168 |

For "Severe Turbulence" see above.
NOTE: When flying at altitude, the lower limit IAS is always authoritative.

## AIRSPEED INDICATOR MARKINGS

**Green Arc:** 88 – 18o km/h (48 – 97 kts, 55 – 112 mph)

Within this speed range it is not possible to overload the sailplane by "Severe Turbulence" and the necessary maximum control surface deflections to maintain the desired attitude.

**Yellow Arc:** 18o – 27o km/h (97 – 146 kts, 112 – 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.

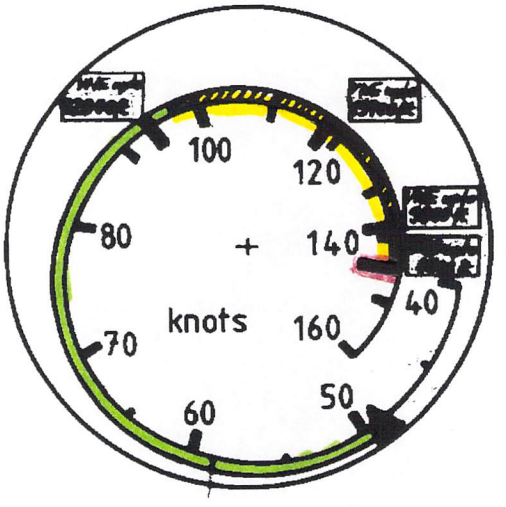
**Red Line:** 27o km/h (146 kts, 168 mph)

Never exceed up to 65oo ft above MSL flying altitude. For higher altitudes see page 2-1.

**Yellow Triangle:** 9o km/h (49 kts, 56 mph)

Minimum recommended approach to landing speed without water ballast.

Example: Airspeed Indicator
Winter 6 FMS 4-2




Red

Green

Yellow

Placards see page 2-7

## WEIGHT LIMITS

Maximum gross weight . . . . . 472 kg (1o41 lbs)

Maximum weight of non-lifting parts . . . . . 23o kg (5o7 lbs)

The term "non-lifting parts" includes the following: fuselage inclusive permanently fitted equipment, canopy and main pins plus horizontal tail plus maximum cockpit load.

Maximum cockpit load . . . . . 11o kg (242 lbs)

The term "cockpit load" includes the following: Pilot, parachute, baggage and temporary equipment

Maximum cockpit load may be limited by weight of non-lifting parts. See entry on page 9-1.

Minimum load for club use

Pilot and parachute . . . . . 7o kg (154 lbs)
No baggage, no temporary equipment, no trim ballast fitted

Pilot and parachute . . . . . 55 kg (121 lbs)
3 trim weights fitted, no baggage, no temporary equipment

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

If the sailplane does not fly in a club, it may be trimmed for higher minimum cockpit load. See instructions on page 9-3.

For minimum cockpit load see entry on page 9-1.

Maximum water ballast weight . . . . . 14o kg (3o8 lbs)

Loading instructions see page 4-7.

Maximum baggage weight . . . . . 5 kg (11 lbs)

Loading instructions see page 4-6.

Maximum instrument weight installed in upper portion of instrument panel . . . . . 4 kg (8.8 lbs)

## CENTER OF GRAVITY LIMITS

Position of C.G. in flight (without water ballast)

Maximum allowable:

forward C.G. position . . . . . 225 mm (8.86 in) aft of DP

rearward C.G. position . . . . . 375 mm (14.76 in)aft of DP

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

Loading water ballast moves inflight C.G. position forward.
From rearward flight C.G. position, 140 liters (308 lbs, 37 US Gal, 30.8 Imp Gal) shift C.G. approximately 50 mm (1.97 in) forward.

## MANOEUVER LIMITS

Aerobatic manoeuvers not approved.
Spins not approved.

## FLIGHT LOAD FACTOR LIMITS

At 180 km/h (97 kts, 112 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.

## KINDS OF OPERATION LIMITS

The LS4 sailplane is approved for Day VFR. Minimum equipment see page 2-5.
Night VFR, IFR and Flight into known icing conditions are not approved.
Use of water ballast limited to non-freezing conditions.

## CATEGORY OF AIRWORTHINESS

U (Utility) according to JAR 22.

MIMIMUM EQUIPMENT LIST

1. Airspeed Indicator, scale 50-300 km/h (27-162 kts, 31-186 mph)
   Colour markings see page 2-2
   Approved types see Master Equipment List page 9-4
   Pressure pick-ups: Fuselage nose pitot (without nose release) or vertical tail fin pitot (with nose release) and forward fuselage side statics.
2. Altimeter in ft
3. Magnetic compass
4. Four piece seat belt harness

   } See Master Equipment List on pages 9-4 to 9-6

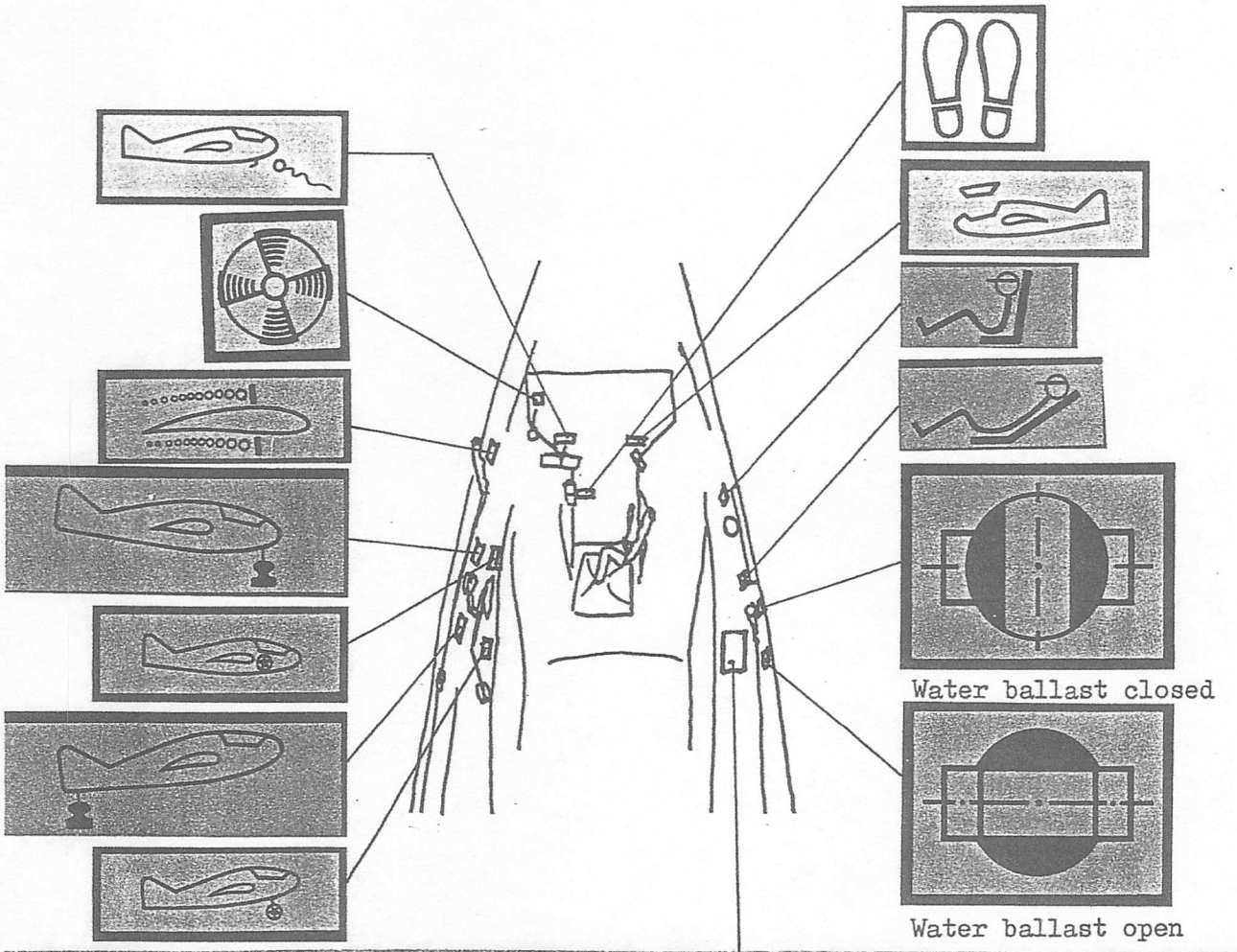
5. Back cushion or parachute in compressed form should not be thinner than 80 - 100 mm (3 - 4 in).
6. Checklist, type placard, data and loading placard, operating placards. For placards see pages 2-6 and 2-7.
7. LS4 Flight Manual

BREAK AWAY LINK IN TOW CABLE

Break away link in tow cable for winch launch and aero tow maximum 600 kg (1323 lbs).

18. 10. 83 USA

## OPERATING PLACARDS




**ROLLADEN SCHNEIDER FLUGZEUGBAU GMBH**

**Type LS4** **Serial No.**

**AIRSPEED LIMITS (IAS)**

| | km/h | MPH | kts |
|---|---|---|---|
| Never Exceed (VNE) | 270 | 168 | 146 |
| In Rough Air (VB) | 180 | 112 | 97 |
| Maneuvering (VA) | 180 | 112 | 97 |
| Aero Tow (VT) | 180 | 112 | 97 |
| Winch Tow (VW) | 130 | 81 | 70 |
| Dive Brakes | 270 | 168 | 146 |
| Landing Gear (VL) | 270 | 168 | 146 |

BATTERY in fin
in baggage compartment

Maximum Weight 472 kg (1041 lbs)
including water ballast.
No acrobatic manoenvers approved.

| Weight Limitations | | kg | lbs |
|---|---|---|---|
| Pilot Weight incl. parachute | Max. | | |
| | Min. | | |

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



| Erstellt: 15. April 83 He | Ersetzt: | Geprüft: 18. 4. 83 Schaefer |
|---|---|---|

OPERATING PLACARDS

| | |
|---|---|
| VNE up to 6500 ft | VNE up to 9800 ft |
| VNE up to 19700 ft | VNE up to 32800 ft |

Airspeed Indicator Placards

Refer to page 2-1 for speeds and page 2-2 for positioning diagram

# Minimum Cockpit Load kg

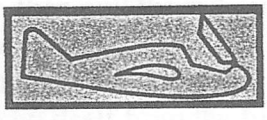
Under Instrument Panel Cover

## LS4 CHECKLIST

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

1. Lock main pins
2. Lock aileron connections
3. Lock dive brake connections
4. Lock horizontal tail
5. Test controls
6. Check loading conditions
7. Fasten seat belt harness
8. Connect parachute static line
9. Lock dive brakes
10. Lock canopy
11. Trim forward for take off
12. Check release

Under Instrument Panel Cover



Canopy Release on both canopy frames

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

Under battery box cover of vertical tail fin

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

Baggage Compartment Placard

Max. Flying Altitude 20000 ft

Near Altimeter, when range is 20000 ft

ON
OFF

Electrical switch positions

Tyre Pressure 3-3.5 bar (43-50 psi)

On left main wheel door

Tyre Pressure 2.5-3.5 bar (36-50 psi)

Near tailwheel, if fitted

Rolladen Schneider Flugzeugbau GmbH
Type LS 4
Serial No. 4209
FAA TC
Reg. No. N30RD
Made in West-Germany

Type Placard at main bulkhead

## Spin Recovery

| | | |
|---|---|---|
| Rudder | - | Opposite to spin rotation |
| Elevator | - | Neutral or slightly forward |
| Aileron | - | Neutral |
| Smooth pull-out | | |
| Altitude loss - | About 50 m (150 ft) | |

## Emergency Canopy Release and Exit

Pull open both canopy locks and pull emergency canopy release handle until the stop. Push the canopy upwards.

**With TN 4032 executed:**
To bail out open canopy locking handles, then pull the red canopy emergency release handle until the canopy hinge disengages.
A spring at the canopy hinge lifts the canopy at the front end.
Only in case the canopy doesn't separate by itself from the fuselage, you have to push the canopy upwards with both hands on the Plexiglas.
The latch on the rear of the canopy is held back by a spring in the fuselage.
This creates a point of rotation to ensure a safe separation of the canopy.

## Other Emergencies

### Stalls

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

### Spiral Dive

At high speeds (250 km/h, 135 kts, 157 mph) stable against spiral dive (load factor of 2G).

At low speeds slight tendency.

| | | |
|---|---|---|
| Elevator | - | Pull |
| Rudder | - | Hold opposite to dive rotation |
| Aileron | - | Hold opposite to angle of bank |

## LIMITATION OF HIGH SPEED FLIGHT

If there are indications while flying under large cloudbanks that the maximum permissible rough air speed ($V_A$) will be exceeded, air brakes should be extended carefully before 180 km/h (97 kts, 112 mph) is reached. In emergencies, air brakes can also be extended up to a speed of 270 km/h (146 kts, 168 mph).

When air brakes are extended during descent after high altitude wave flights, a speed of 180 km/h (97 kts, 112 mph) should not be exceeded because of possible severe turbulence.

## DAILY INSPECTION

(1) Forward fuselage

- Pitot pressure port, if no nose release is fitted, for clogging
- Nose release, if fitted, working properly

(2) Landing gear

- Recommended tyre pressure 3 - 3.5 bar (43 - 5o psi)
- Slip mark and tyre condition
- C.G. release including automatic release working properly
- Water drain orifices in front of and behind landing gear box free from clogging (See also page 8-6)

(3) Wings

- Water drain orifices at root and tip free from clogging
- Condition, damage or cracks
- Attachment
- Air brakes working properly
- Ailerons for unobstructed movement and free from play

(4) Fuselage

- Condition, damage or cracks
- Rear static ports at fuselage boom free from clogging
- Recomm.tail wheel tyre pressure, if fitted, 2.5-3.5 bar (36-5o psi)
- Water drain orifice in front of tail wheel, if fitted, free from clogging
- Tail skid for proper adhesion, if fitted

(5) Tail unit

- Condition, damage or cracks
- TE port at upper end of vertical tail fin leading edge free from clogging
- Pitôt pressure port half way down vertical tail fin leading edge free from clogging (only if nose release is fitted)
- Charged rear battery connected, if used
- Horizontal tail properly installed
- Horizontal tail for damage or pressure marks
- Tail control surfaces movement unobstructed and free from play

**Daily Inspection** continued

6. Cockpit

- Canopy cleaned, if necessary
- Proper function of canopy locking and emergency release (not daily, but to be completed at minimum every 3 months):
  a) "Pilot" in seat, both canopy locking handles opened. One person at the front end to lift the canopy from the fuselage.
  b) After puling the emergency canopy release handle the pilot pushes the canopy up at the rear to disengage the LS-Latch (Röger hook) from the spring on the fuselage.
  After pulling the emergency canopy release handle the canopy must be freely moveable at the front.
  **With TN4032 executed:** The canopy must be lifted at the front by the spring at the hinge by about 60 mm <2.4 in.>.
  c) Then the pilot lifts the canopy at the rear end up as far as possible, the person at the front end holds the canopy.

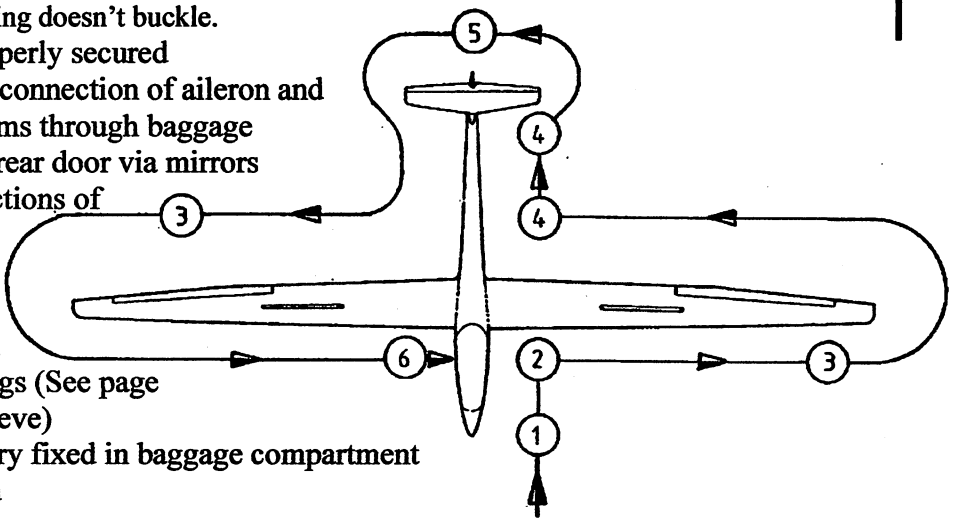
**Caution:** The person at the front end should not lift the canopy too far up. Otherwise this would unduly deform the spring of the LS-Latch (Röger hook) located at the fuselage.

**Note:** b) and "Caution*" apply only if TN 4032 LS-Latch (Röger Hook) has been completed

**Reinstalling the canopy:** 2 persons are needed

a) Pull up the canopy hinge to the open position.
b) One person (at the front end) holds with one hand the emergency release lock in open position (rotate clockwise) and places the canopy with the other hand onto the hinge. The other person holds the canopy at the rear end so far up that it matches the canopy hinge.
c) The front person engages the canopy by turning the emergency release lock anti-clockwise to the stop.
**With TN4032 executed:** The spring fixed at the canopy must be inserted into the ring at the canopy lifting mechanism. When pressing down the canopy make sure that the spring doesn't buckle.

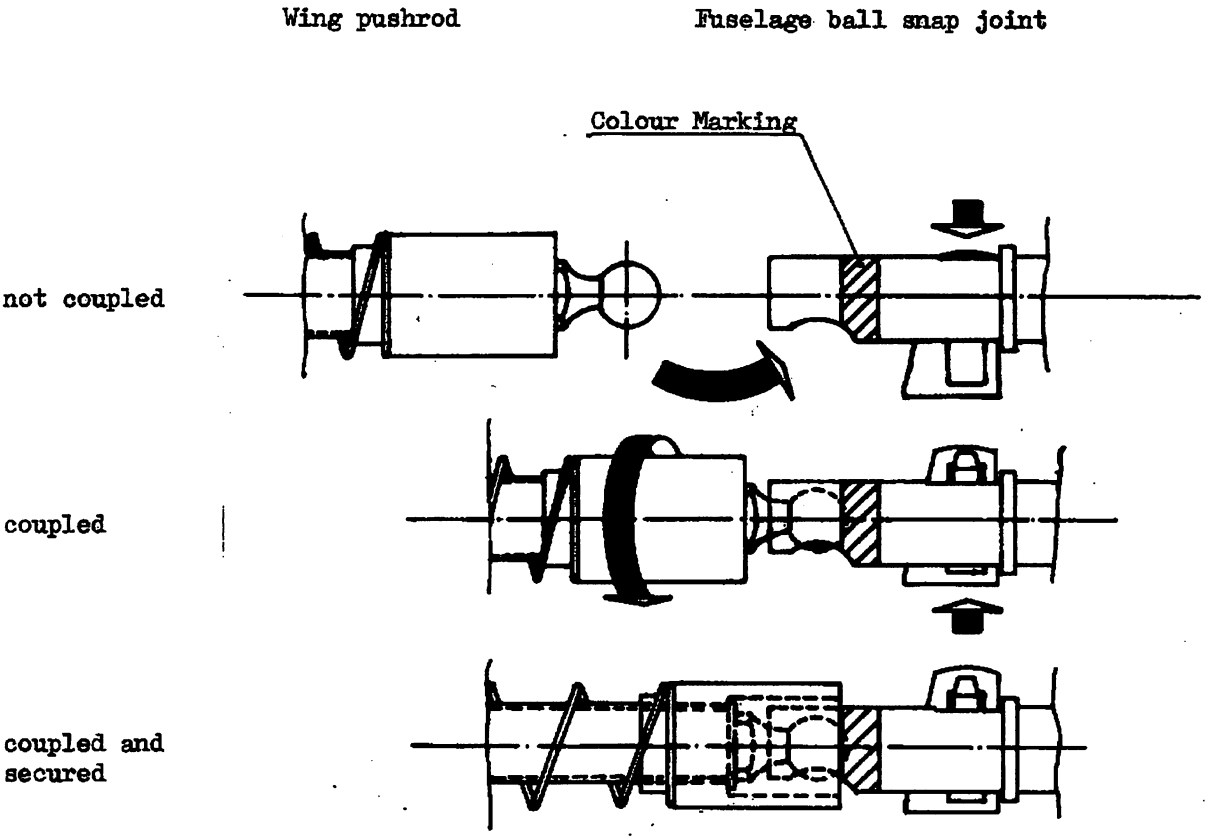
- Main pins properly secured
- Check proper connection of aileron and airbrake systems through baggage compartment rear door via mirrors
- Secure connections of aileron and airbrake systems using LS-sleeve and colour markings (See page 4-3 for LS-sleeve)
- Charged battery fixed in baggage compartment and connected




For assembly and disassembly procedures see Chapter 8.

## AILERON AND AIR BRAKE CONNECTION

Connection of aileron and air brake systems using LS-sleeve and colour marking :



## PREFLIGHT CHECK

| | |
|---|---|
| Daily inspection | - performed |
| Water ballast system | - check for leaks,if filled |
| Total energy tube | -fitted and connection properly sealed |
| Weight and balance, especially Minimum and Maximum Cockpit Loads, trim weights and battery position | - checked |
| Altimeter | - set |
| Other instrumentation | - checked, normally indicating zero |
| Radio | - operation check |
| Backrest | - adjusted |
| Rudder pedals | - adjusted |
| Papers (C of A, Logbook, etc.) | - complete and valid |
| Before take off | - perform cockpit checklist procedure |

## POSTFLIGHT CHECK

| | |
|---|---|
| Electrical instruments | - switch off |
| Battery | - recharge,if necessary |
| Insects and dust | - remove, using water and sponge and chamois leather |
| Air brake boxes | - check, if moisture has accumulated and remove with sponge |
| Water ballast system | - check proper dumping |

## 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

## ADJUSTMENT OF BACKREST

Lower bracket adjustable only on the ground, allows use of various

- types of parachutes
- pull cable through slot for unlocking
- lock in desired position

Slope adjustment possible in flight or on the ground

Forward adjustment:

- slacken shoulder straps
- release pressure of backrest
- push ratchet at right cockpit rim forward and outward into desired position and lock
- check proper locking of ratchet
- retighten shoulder straps

Rearward adjustment:

- release pressure of backrest
- push ratchet at right cockpit rim slightly forward and outward
- push backrest backward into desired position and lock
- check proper locking of ratchet
- tighten shoulder straps

## Automatic parachute ripcord

(a) Attach to red main bulkhead portion at left rear of pilot
(b) Use special loop only

## Retractable Landing Gear

(e) Extension or retraction permitted over whole approved speed range
(f) Rapid operation eases retraction
(g) Handle locked in forward overcenter position = gear up
(h) Handle locked in rearward overcenter position = gear down

**Important Note:** **During winch launch, retract gear after releasing tow cable, because C.G. hook is fitted to landing gear fork.**

**Warning:** **Extend or retract landing gear only, when air brakes are retracted and locked or completely extended.**

## Wheel Brake

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

## Trim System

(a) Trim lever and trim-locking lever are separate
(b) Trim-locking lever is at control stick
(c) Pull locking lever to free trim knob at left cockpit side
(d) With the trim knob:
  (1) Elevator stick force can be trimmed to zero
  (2) Desired speed can be trimmed
  (3) Release locking lever after trimming to fix trim setting
  (4) Indication of trim setting shown by position of trim knob relative to neutral mark

***Warning:*** ***Elevator trim system must not be used for compensation of minimum cockpit load deficiency.*** *(see below)*

## 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 batteries, barographs, ELT etc. see Maintenance Manual chapter 11.

## WATER BALLAST

- each tank holds about 6o - 7o liters (15.9 - 18.5 US gallons, 13.2 - 15.4 Imp. gallons)
- maximum permissible load depends on loading conditions, see page 9-2 for water ballast loading instructions
- filling of water tanks:
  - Dump valve operating levers are marked R and L
  - open appropriate dump valve by shifting its lever backwards
  - lay wingtip on the ground
  - suck residual air from water bag through dump orifice using connection hose
  - connect funnel to dump orifice
  - fill desired amount of water, use clean water only to avoid destroying gasket of valve and consequent leaking
  - during filling disconnect funnel several times to allow residual air to escape
  - never use more than o.1 bar of water pressure (funnel max. 1 m (3.3 ft) above wing)
  - close valve by shifting lever forward
  - repeat procedure for other wing
- dumping of water:
  - open both valves simultaneously by shifting levers backwards
  - 1o liters (2.6 US gal, 2.2 Imp. gal) will be dumped in approximately 1o 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
- use of water ballast limited to non freezing conditions, see also Flight Manual page 2-4

## WINCH LAUNCH

- adjust backrest properly (See page 4-4) } to avoid sliding backwards during acceleration and steep climb
- tighten seat belt harness }
- trim slightly forward, trim lever just before reference mark
- when water tanks are partially filled, keep wings horizontal before take off to avoid unequal water distribution
- break away link in tow cable max. 600 kg (1323 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 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. release is fitted to landing gear fork

## AERO TOW

- adjust backrest properly and tighten seat belt harness
- trim slightly forward, trim lever just before reference mark
- additional aileron effectiveness during initial take off roll may be achieved by extending air brakes, retract air brakes before leaving ground
- when water tanks are partially filled, keep wings horizontal before take off to avoid unequal water distribution
- break away link in tow cable max. 600 kg (1323 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)
- either nose or C.G. release can be used. While using the C.G. release, the landing gear may not be retracted during tow, because release is fitted to landing gear fork

FREE FLIGHT

- Stalling speed for straight and level flight
  without water ballast 65 - 7o km/h (35-38 kts, 4o-44 mph)
  with water ballast 75 - 8o km/h (41-43 kts, 47-5o mph)
- Stalling speeds for banked flight see table below
- best glide angle between 9o - 1oo km/h (49-54 kts, 56-62 mph)
- high speed flight
  - trim high speeds
  - check speed indication regularly to avoid exceeding limit values
- observe airspeed limits versus altitude
- CAUTION: When flying with empty water tanks, leave dump valve in open position to avoid pressure built up inside tanks at altitude

Banked flight stalling speeds

| Angle of bank | Stalling speed without water ballast, wingloading 33 kg/m² (6.76 ppsf) | | | Stalling speed with water ballast, wingloading 45 kg/m² (9.22 ppsf) | | |
|---|---|---|---|---|---|---|
| (Deg) | (km/h) | (kts) | (mph) | (km/h) | (kts) | (mph) |
| 0 | 65-7o | 35-38 | 4o-44 | 76-82 | 41-44 | 47-51 |
| 2o | 67-72 | 36-39 | 42-45 | 78-84 | 42-45 | 48-52 |
| 3o | 7o-75 | 38-41 | 44-47 | 82-88 | 44-48 | 51-55 |
| 4o | 74-8o | 4o-43 | 46-5o | 87-94 | 47-51 | 54-58 |
| 45 | 77-83 | 42-45 | 48-52 | 9o-98 | 49-53 | 56-61 |
| 5o | 81-87 | 44-47 | 5o-54 | 95-1o2 | 51-55 | 59-63 |
| 6o | 92-99 | 5o-53 | 57-62 | 1o7-116 | 58-63 | 66-72 |

Banked flight stalling speeds are calculated from straight flight data

## Sideslip

(1) Sideslip can be recommended for landing only with a small amount of air brakes extended. Low-speed sideslip is not possible because of nose-heavy moment of fully extended air brakes.

(2) Sideslip speed range up to VA = 180 km/h <97 Kt., 112 mph>

(3) For a straight and steady sideslip 100 % rudder and between 50% to 75% aileron deflection are necessary. During sideslip, rudder control force decreases to almost zero force.

(4) Degradation in airspeed system goes down to zero airspeed indication. Depending on airspeed indicator, negative values may be indicated.

Pressure pick-ups: Vertical tail fin **pitot pressure**
Forward fuselage **lower side static pressure**

(5) Partial water ballast yields unimportant difference in sideslip handling.

## Landing

(e) Always extend landing gear in time and lock.

***Warning:*** ***In case of late landing gear extension during final approach, do retract airbrakes and lock beforehand.***

(f) Landing with gear retracted not advisable, because pilot is much better protected by the sprung landing gear compared to the fuselage shell.

(g) Water ballast should normally be dumped prior to landing. Because of possible unequal dumping leave valves open.

***Warning:*** ***Minimum approach speed with air brakes fully extended:***
***without water ballast not below 90 km/h <49 Kt., 56 mph>.***
***with water ballast not below 100 km/h <54 Kt., 62 mph>.***

(h) Air brakes allow control of glide angle within wide limits, therefore sideslipping is not necessary.

***Warning:*** ***Minimum speed increases***
***With air brakes extended by about 10 km/h <5 Kt., 6 mph>.***
***In rain and with air brakes extended by about 20 km/h <11 Kt., 12 mph>.***

***Warning:*** ***Sideslip with air brakes extended is not recommended for landing, because nose heavy moment of air brakes allows no* slow speed *sideslip.***

## 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.

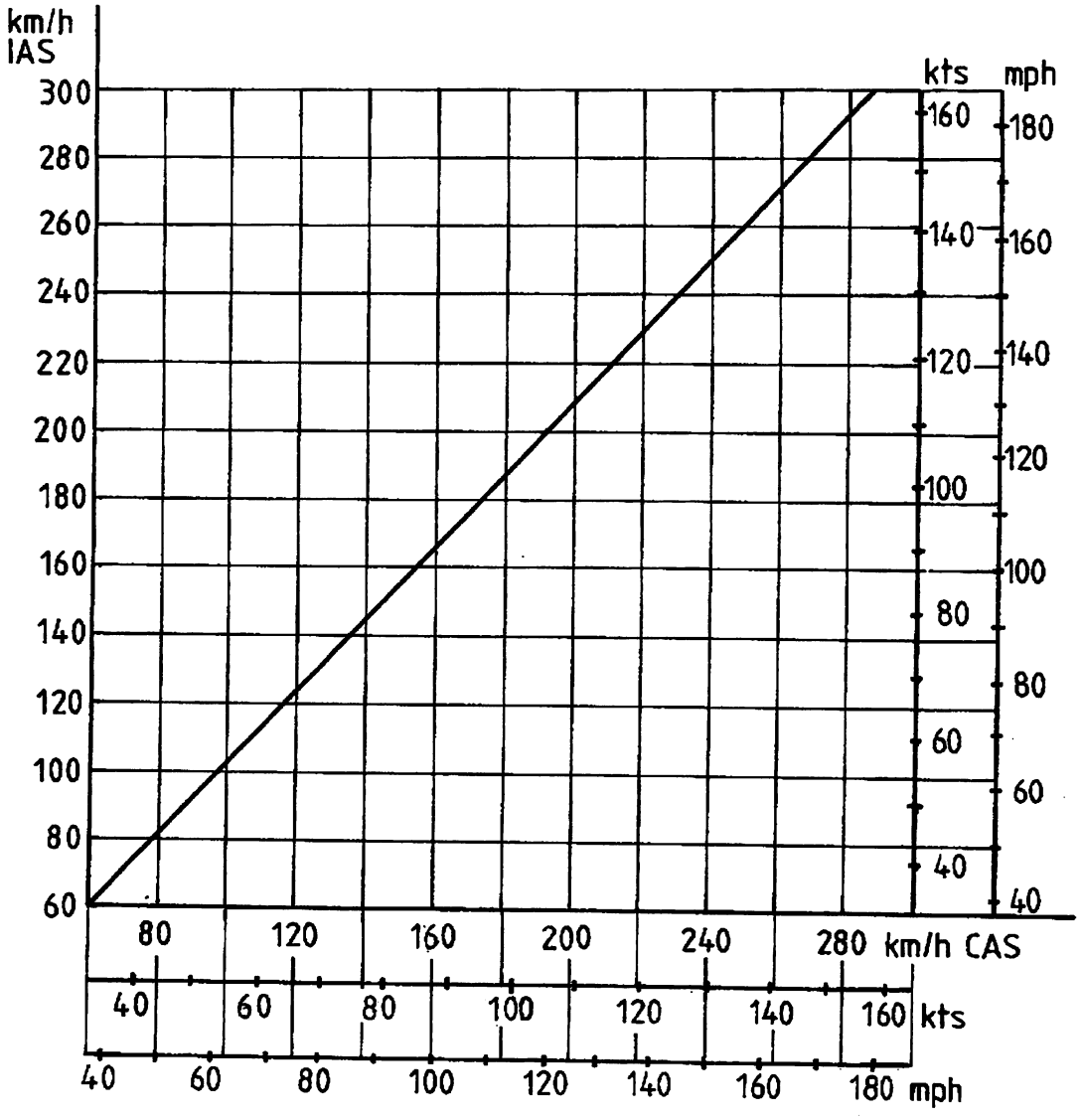
However, as structural limitation depends on true airspeed, this should never be above 270 km/h IAS (146 kts, 168 mph) up to 2000 m (6500 ft) above MSL.

Using the table on page 2-1, 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 corresponds to 270 km/h (146 kts, 168 mph) true airspeed.

## AIRSPEED SYSTEM CALIBRATION

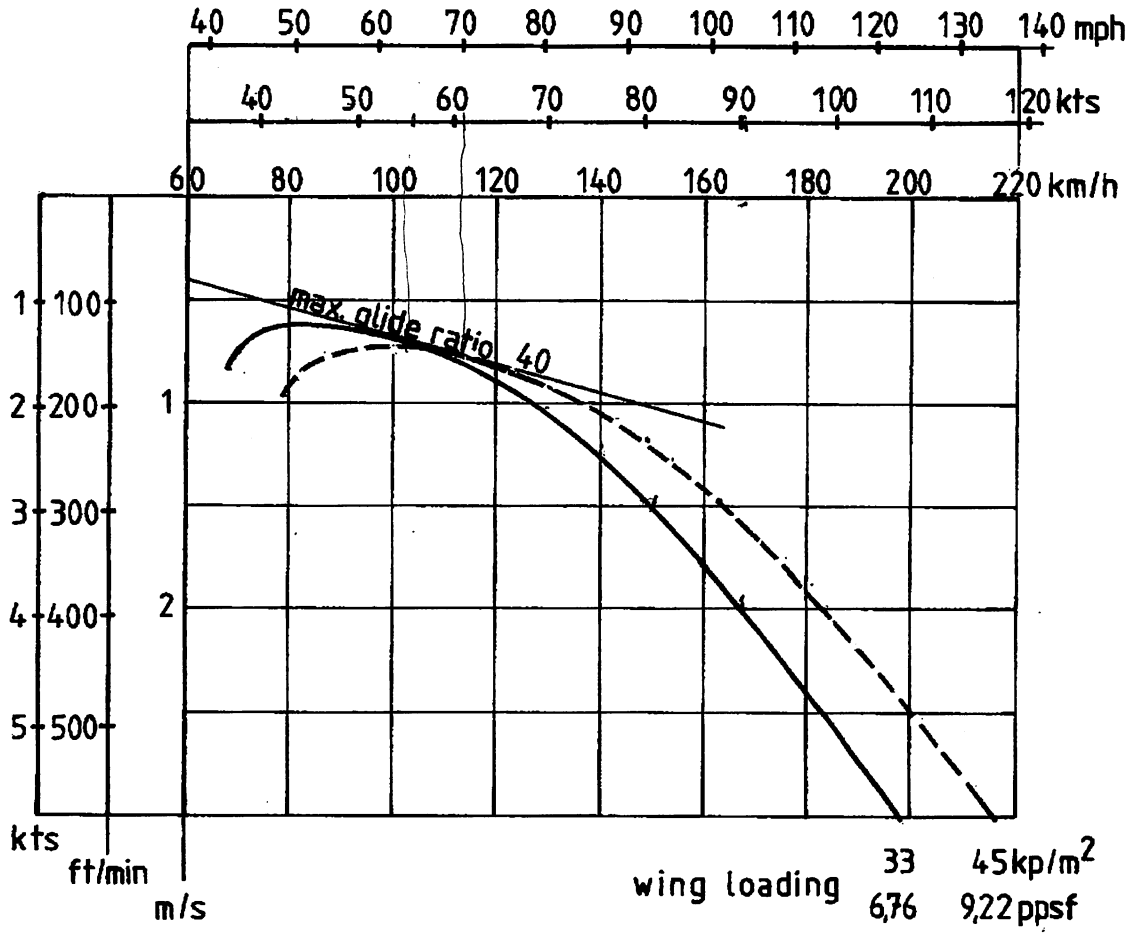
This diagram shows airspeed indicator error due to position of pressure ports.




**Pressure ports:** Fuselage nose pitot (without nose release)
Vertical tail fin pitot (with nose release)
Forward fuselage side statics

## FLIGHT POLAR

The flight polar gives forward speed versus sinking speed related to wing loading.




The flight polar is valid for "clean" wing.
Insects and raindrops on wing decrease performance and handling, see page 4-1o Landing.

40.30.975 / 80.03.8

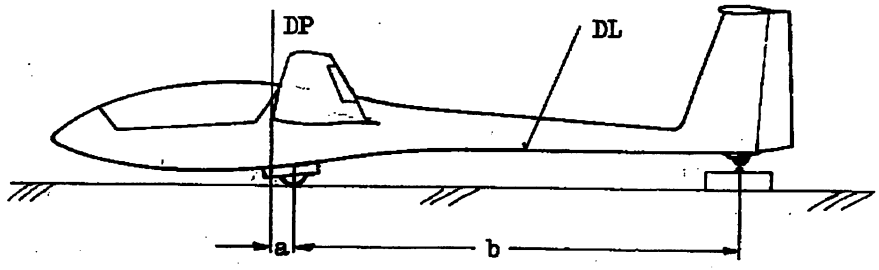
## WEIGHING PROCEDURE

To determine in-flight C.G. position, the empty weight C.G. position must be known.

1. Determine weight by weighing all parts and adding together.
2. Assemble sailplane.
3. Raise tail on weighing machine until datum line level using wooden blocks or adjustable jack.
4. Weigh gross tail weight.
5. Measure distance b from tail support to center of landing gear axis.
6. Using plumb lead, determine points on floor perpendicular to left and right datum points, and points on floor perpendicular to center of landing gear axis. Measure distance a from axis to datum point.
7. Determine tare tail weight (Weight of additional material used under 3).
8. Calculate nett tail weight = gross tail weight - tare tail weight
9. Calculate empty weight C.G. position:

$$Xcg = \frac{\text{nett tail weight x b}}{\text{empty weight}} + a$$

10. When battery is fitted in vertical tail fin, weighing must be done in this configuration.




DATUM LINE (DL): under side of fuselage boom placed horizontal.
DATUM POINT (DP): leading edge of wing at root.

## CALCULATION OF LOADING LIMITS

1. Determine Minimum Cockpit Load from table "Empty Weight C.G. Limits".

   When being used in a club, Minimum Cockpit Load should be 7o kg (154 lbs). If it is higher, permanent ballast may be fitted under forward seat portion. See page 9-3.

   Minimum Cockpit Load should be entered in the following places:

   1) in weighing report of inspection
   2) in Flight Manual, page 9-1
   3) under instrument panel cover
   4) on Data Placard in cockpit

2. Maximum Cockpit Load normally is 11o kg (242 lbs), as given in empty weight C.G. table.

   It may be lower due to excessive equipment or repairs. Calculate Maximum Cockpit Load by deducting weight of fuselage (including permanently fitted equipment, canopy and main pins) and horizontal tail from maximum weight of nonlifting parts. (23o kg, 242 lbs)

   Maximum Cockpit Load should be entered in the following places:

   1) in weighing report of inspection
   2) in Flight Manual, page 9-1
   3) on Data Placard in cockpit

3. Empty Weight (perhaps increased by weight of permanently fixed ballast) should be entered in the following places:

   1) in weighing report of inspection
   2) in Flight Manual, page 9-1 for calculation of maximum permissible water ballast weight.

4. Battery position during weighing should be entered in the following places:

   1) in equipment list of inspection
   2) on Data Placard in cockpit

## INFLIGHT C.G. POSITION

When loading within limits determined from empty weight C.G. weighing, inflight C.G. position is always within certified range. However, it might be interesting to know the actual inflight C.G. position, which can be obtained by two methods:

1) Weigh as described on page 6-1, but place pilot into seat. Add pilot weight to empty weight. Redetermine values a and b, because of altered suspension level. This method yields exact values.

2) The analytical method yields maximum and minimum inflight C.G. values, because pilot leverage varies according to weight and size of the pilot. Therefore, calculation for inflight C.G. position $Xcg_F$ must be performed twice to find the C.G. range within which the exact inflight C.G. value is.

$$Xcg_F := \frac{(Xcg \times W) - (Xp \times Wp)}{W + Wp}$$

with Xcg = empty weight C.G.position
W = empty weight
Xp = pilot leverage
Wp = pilot weight

Pilot leverage in relation to pilot weight:

| Pilot weight | | Leverage for foremost C.G.position | | Leverage for rearmost C.G.position | |
|---|---|---|---|---|---|
| (kg) | (lbs) | (mm) | (in) | (mm) | (in) |
| 6o | 132 | 598 | 23.543 | 533 | 2o.984 |
| 65 | 143 | 595 | 23.425 | 531 | 2o.9o6 |
| 7o | 154 | 592 | 23.3o7 | 529 | 2o.827 |
| 75 | 165 | 59o | 23.228 | 527 | 2o.748 |
| 8o | 176 | 588 | 23.15o | 527 | 2o.748 |
| 85 | 187 | 587 | 23.11o | 527 | 2o.748 |
| 9o | 198 | 586 | 23.o71 | 528 | 2o.787 |
| 95 | 2o9 | 585 | 23.o31 | 53o | 2o.866 |
| 1oo | 22o | 585 | 23.o31 | 533 | 2o.984 |
| 1o5 | 231 | 585 | 23.o31 | 537 | 21.142 |
| 11o | 242 | 586 | 23.o71 | 543 | 21.378 |

For approved inflight C.G. limit values see page 2-4

## DESCRIPTION OF SYSTEMS

### Airframe

Fuselage structure is a pure fiberglass shell partly reinforced by stiffening frames. The cockpit portion is a double fiberglass shell.

Wing structure is a fiberglass-foam sandwich, a double T section spar carrying bending load

Horizontal tail structure is a fiberglass foam sandwich, carrying all loads without a spar.

### Flight Controls

Aileron system activated via pushrods guided in longitudinal motion ball bearings. Connection of system by ball snap joints in fuselage, LS-securing sleeve on wing side pushrod. Aileron partly mass balanced.

Elevator system activated via pushrods guided in longitudinal motion ball bearings. Automatic coupling during assembly of horizontal tail unit. Mass balance in vertical tail fin. Longitudinal trim by adjustable spring system, trim locking lever on control stick, trim lever at left side of cockpit.

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

### Instrument Panel

Panel mounted on floor of cockpit. Depending on version allows for installation of up to 8 instruments plus radio. Weight limitation on instruments installed in upper portion of panel see page 2-3.

**Air Brakes** Activated via pushrods guided in plain bearings. Connection of system by ball snap joints in fuselage, LS-securing sleeve on wing side pushrod. Upper surface airbrakes of double height, flexible cover blades.

**Landing Gear** is sprung and retractable, housed in a closed box. Tail skid or tail wheel optional.

**Baggage Compartment** behind pilot's shoulders is for light and soft materials only. For maximum weight of baggage see page 2-3. For permanent installation of batteries etc. see page 9-3.

**Seat** Adjustment of backrest see page 4-5.

**Water Ballast System** One tank per wing, capacity 60 - 70 liters per wing (15.9-18.5 US gallons, 13.2-15.4 Imp gallons). Loading and dump valve on under side of wing. Automatic coupling of valve operating mechanism during assembly.

Cockpit

Double fiberglass shell. Controls for landing gear and air brakes located on left cockpit side. Trim lever located on left side of landing gear control, trim release lever on control stick. Controls for tow release, pedal adjustment, canopy emergency release and ventilation are located on instrument panel, water ballast valve control and backrest slope control on right side of cockpit.

Canopy

One piece hinged up front with cover for instrument panel. Canopy frame includes 6 mm metric threads for camera mounts.

Oxygen Installation

Fiberglass receptacle for 3 liter oxygen bottles of 1oo mm (3.94 in) diameter.

## HANDLING, SERVICING AND MAINTENANCE

### INTRODUCTION

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. To keep this up to date, a special product information service may be subscribed. Contact the manufacturer for this information service, which too includes Technical Bulletins and general information.

### AIRPLANE INSPECTION PERIODS

a) FAA required annual inspection according to checklist provided in Maintenance Manual after performance of annual maintenance procedure.

b) Manufacturer recommended daily inspection.

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

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.

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.

PREVENTIVE MAINTENANCE that may be accomplished by a certificated pilot

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 licenced 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.

ALTERATIONS OR REPAIRS

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

b) Prior to any alterations the FAA should be contacted to insure that airworthiness of the airplane is not violated.

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

GROUND HANDLING

Assembly Procedure

- clean and grease all pins and matching holes
- insert left spar end into fuselage and watch for angle of dihedral
- insert right spar end into fuselage and watch for angle of dihedral
- insert main pins when holes are lined up correctly
- secure main pins by placing handle behind spring loaded peg
- connect air brake system with ball snap joints
- secure ball snap joints of air brake system by turning LS-sleeve over joint as far as possible. Check securing by trying to disassemble connectors. See also drawing on page 4-3.
- connect aileron system with ball snap joints
- secure ball snap joints of aileron system by turning LS-sleeve over joint as far as possible. Check securing by trying to disassemble connectors. See also drawing on page 4-3.
- use built in mirrors and colour markings at aileron and air brake system connections as an additional visual aid to check positioning of LS-sleeve only
- insert battery into vertical tail fin if weighing was performed in this configuration (see Data Placard in cockpit), connect to system and check operation.

## GROUND HANDLING

### Assembly Procedure continued

- install horizontal tail and secure with slotted nut against tapered pins using a suitable coin until red marking on attachment bracket is invisible.
- install total energy tube, battery (if not already in vertical tail fin) and barograph.
- connect automatic parachute to red marked portion of main bulkhead using special loop only
- seal wing fuselage intersection by taping on upper and lower sides
- seal access hole on upper side of horizontal tail by taping
- perform Daily Inspection

### Disassembly Procedure

- reverse assembly sequence, except before removing main pins turn LS-sleeves away from ball snap joints and disconnect aileron and air brake systems

## 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 ends are supported |
| | - shell at root, minimum width of support 150 mm (5.9 in) |
| | - shell near inner aileron end, minimum width of support 250 mm (10 in) |
| 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

LONG TERM STORAGE

Preparation for Long Term Storage

- remove instrumentation and store separately
- close external pressure ports (see page 8-6) and inner tube ends
- protect all metal parts using spray oil and vaseline
- close all orifices without preventing air circulation using 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 Chapter 8)
- inspect inside of wings and fuselage for small animals (mice, birds etc.) and/or nests

## CLEANING AND CARE

These recommendations are 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 and 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**

- trichloroethylene
- carbon tetrachloride or similar hydrocarbon chlorides

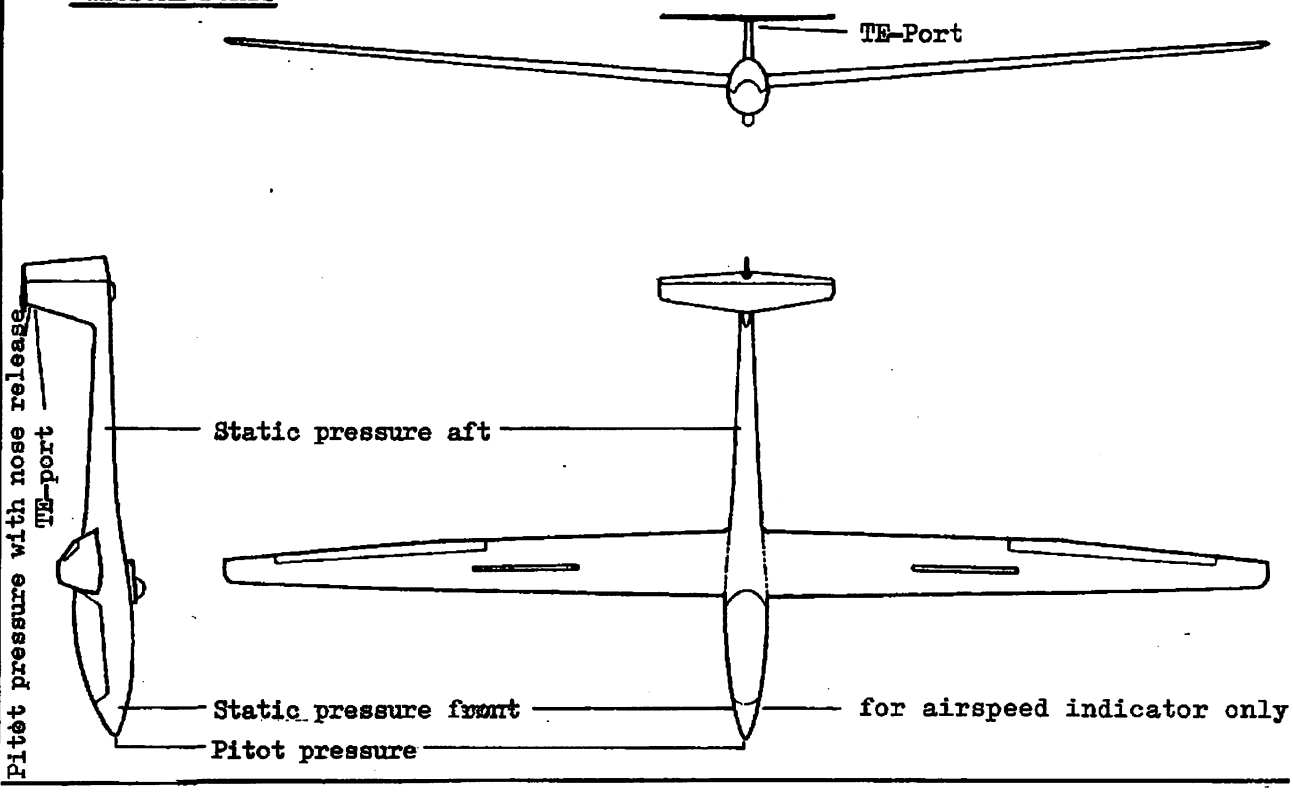
These liquids destroy the gelcoat.

| Warning: | Unless regularly polished with hardwax, sanded gelcoat shows distinctive weathering marks due to changes of temperature, ultra violet radiation and humidity. |
|---|---|

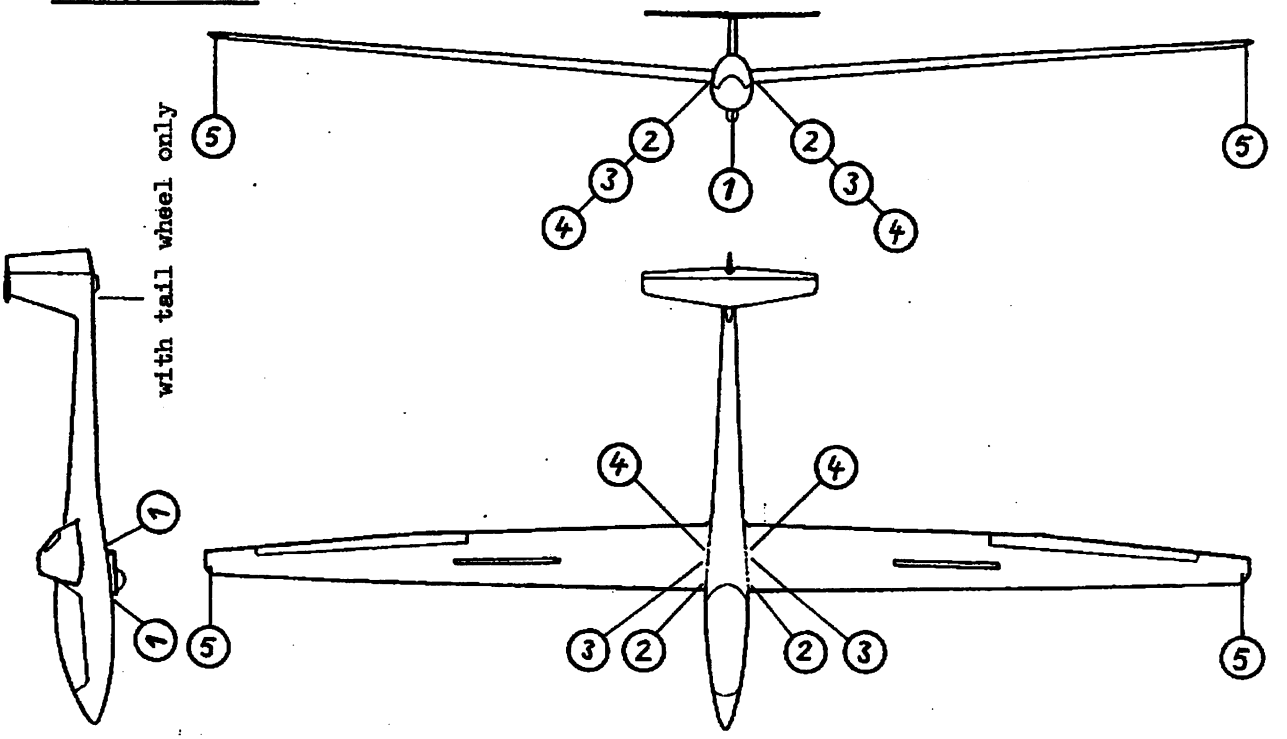
### Longitudinal motion pushrod bearings

Never grease these bearings, they will be destroyed soon due to collection of small foreign matter. Longitudinal motion bearings are used in elevator and aileron control systems.

## PRESSURE PORTS




## DRAIN ORIFICES






| Erstellt: 15. April 83 Ke | Ersetzt: | Geprüft: 15. 4. 83 Schapla |
|---|---|---|

## COCKPIT LOADING PLAN

New entry with each annual inspection and when changing equipment. Should be calculated in accordance with chapter 6. Abbreviate battery position as follows: O = None, B = Baggage Compartment, V = Vertical Tail Fin.

| Empty Weight | Maximum Permissible Load | Minimum Permissible Load | Permanently Fixed Ballast forward | Permanently Fixed Ballast aft | Battery Position | Date | Inspector |
|---|---|---|---|---|---|---|---|
| 563.5 | 230.5 | 154.3 | | | Baggage | 4-18-11 | Paul B. Worge A+P 1258764 |

## COCKPIT LOADING PLAN

New entry with each annual inspection and when changing equipment. Should be calculated in accordance with chapter 6. Abbreviate battery position as follows: O = None, B = Baggage Compartment, V = Vertical Tail Fin.

| Date | Inspector | Permanently Fixed Ballast forward | Permanently Fixed Ballast aft | Battery Position | Minimum Permissible Load | Maximum Permissible Load | Empty Weight |
|---|---|---|---|---|---|---|---|
| | | | | | | | |

## WATER BALLAST LOADING INSTRUCTIONS

Maximum capacity 6o - 7o kg (132 - 154 lbs) per tank.

Maximum total capacity 12o - 14o kg (264 - 3o8 lbs).

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

| Pilot and Parachute (kg) | Empty weight (kg) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 23o | 235 | 24o | 245 | 25o | 255 | 26o | 265 | 27o | 275 |
| 7o | 14o | 14o | 14o | 14o | 14o | 14o | 14o | 137 | 132 | 127 kg |
| 75 | 14o | 14o | 14o | 14o | 14o | 14o | 137 | 132 | 127 | 122 kg |
| 8o | 14o | 14o | 14o | 14o | 14o | 137 | 132 | 127 | 122 | 117 kg |
| 85 | 14o | 14o | 14o | 14o | 137 | 132 | 127 | 122 | 117 | 112 kg |
| 9o | 14o | 14o | 14o | 137 | 132 | 127 | 122 | 117 | 112 | 1o7 kg |
| 95 | 14o | 14o | 137 | 132 | 127 | 122 | 117 | 112 | 1o7 | 1o2 kg |
| 1oo | 14o | 137 | 132 | 127 | 122 | 117 | 112 | 1o7 | 1o2 | 97 kg |
| 1o5 | 137 | 132 | 127 | 122 | 117 | 112 | 1o7 | 1o2 | 97 | 92 kg |
| 11o | 132 | 127 | 122 | 117 | 112 | 1o7 | 1o2 | 97 | 92 | 87 kg |

| Pilot and Parachute (lbs) | Empty Weight (lbs) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 5o7 | 518 | 529 | 54o | 551 | 562 | 573 | 584 | 595 | 6o6 |
| 154 | 3o9 | 3o9 | 3o9 | 3o9 | 3o9 | 3o9 | 3o9 | 3o2 | 291 | 28o lbs |
| 165 | 3o9 | 3o9 | 3o9 | 3o9 | 3o9 | 3o9 | 3o2 | 291 | 28o | 269 lbs |
| 176 | 3o9 | 3o9 | 3o9 | 3o9 | 3o9 | 3o2 | 291 | 28o | 269 | 258 lbs |
| 187 | 3o9 | 3o9 | 3o9 | 3o9 | 3o2 | 291 | 28o | 269 | 258 | 247 lbs |
| 198 | 3o9 | 3o9 | 3o9 | 3o2 | 291 | 28o | 269 | 258 | 247 | 236 lbs |
| 2o9 | 3o9 | 3o9 | 3o2 | 291 | 28o | 269 | 258 | 247 | 236 | 225 lbs |
| 22o | 3o9 | 3o2 | 291 | 28o | 269 | 258 | 247 | 236 | 225 | 214 lbs |
| 231 | 3o2 | 291 | 28o | 269 | 258 | 247 | 236 | 225 | 214 | 2o3 lbs |
| 242 | 291 | 28o | 269 | 258 | 247 | 236 | 225 | 214 | 2o3 | 192 lbs |

EXAMPLE: When empty weight is 24o kg (529 lbs) and pilot and parachute weight is 95 kg (2o9 lbs), maximum permissible water ballast weight is 137 kg (3o2 lbs).

## PERMANENT INSTALLATION OF FIXED BALLAST

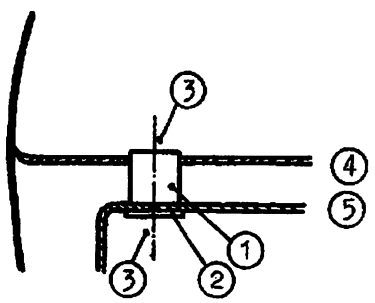
If empty weight C.G. position is too far behind to allow 7o kg (154 lbs) as Minimum Cockpit Load, permanent installation of ballast (trim weights, 2.45 kg (5.4 lbs) each) under instrument panel portion of seat is possible. A trim weight holder can be ordered as optional equipment. Weights should be fixed in flight direction using large washers and selflocking nuts such that vibrations may not cause them to turn round. One weight of 2.45 kg (5.4 lbs) shifts empty weight C.G. position approximately 17 mm (o.669 in) forward.
After permanent installation of fixed ballast empty weight C.G. position should be redetermined by weighing. See chapter 6.

In special cases empty weight C.G. position may be shifted rearward to allow heavy pilots to fly with rearward C.G. positions. Therefore it is possible to fit a battery (Dryfit, measurements 232 x 9o x 5o mm (9.134 x 3.543 x 1.969 in), weight 2.7 kg (5.95 lbs) ) into the vertical tail fin battery box. Installation of lead weight is not allowed in battery box.
After installation of battery in vertical tail fin battery box empty weight C.G. position should be redetermined by weighing. See chapter 6.

## INSTALLATION OF EQUIPMENT IN BAGGAGE COMPARTMENT

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

(1) Spacer, diameter 18-2o mm (o.7-o.8 in), length 15 mm (o.6 in).
(2) Washer B5.3 DIN 9o21-St outer diameter 15 mm (o.6 in)
(3) Screw M5x1o DIN 85-A2
(4) Baggage compartment cover
(5) Landing gear box



## MASTER EQUIPMENT LIST

## SPECIFICATIONS FOR BASIC EQUIPMENT

### 1) AIRSPEED INDICATOR

Original certification was carried out using a Winter 6FMS4-2 airspeed indicator with a range of 3o to 3oo km/h and colour marking according to Flight Manual page 2-2.

A similar FAA approved airspeed indicator to meet TSO C2 reading to 3oo km/h (16o kts, 18o mph) may be used. Maximum instrument error ±2%. Colour marking must be according to Flight Manual page 2-2.

Examples: AID 11-1oo2-1 or KI 8ooo

### 2) ALTIMETER

Original certification was carried out using a Winter 4FGH-1o altimeter with a range of o-1ooo-1oooo meters. (approx. 33ooo ft)

A similar FAA approved altimeter to meet TSO C1o with a range of approximately 33ooo ft and a mercury or millibar subscale may be used.
When an altimeter of up to 2oooo ft only is being used, a placard must be near the altimeter stating: Maximum flying altitude 2oooo ft. (See also Flight Manual page 2-7).

Examples: Kollsman Type 378222 or AID 13-2ooo-1 or AID 13-2ooo-5

### 3) MAGNETIC COMPASS

Original certification was carried out using no compass.

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

Examples: Airpath C 23oo or Airpath C 24oo or PZL BS-1 or PZL KJ-13A

### 4) SEAT BELT HARNESS

The following types are certified:

| | | | | |
|---|---|---|---|---|
| Gadringer | lap belt | Bagu | IV-E/2 | |
| | shoulder strap | Schugu | II/C | |
| Gadringer | lap belt | Bagu | V-BB/2 | (multiple point buckle) |
| | shoulder strap | Schugu | II-C/V | |
| Autoflug | lap belt | Bagu | FAG-7H | (multiple point buckle) |
| | shoulder strap | Schugu | FAG-7H | |

MASTER EQUIPMENT LIST continued

5) OPTIONAL INSTRUMENTS

a) Mechanical Variometer (Vertical Speed Indicator)

| | | | |
|---|---|---|---|
| Winter | 5StV5 or 5StVM5 | Bohli | 68PVF1 |
| PZL | WRS-5D | Schuemann | SV or CV |

b) Electrical Variometer (Vertical Speed Indicator)

| | |
|---|---|
| Blumenauer | all models |
| Cambridge | all models |
| Flexum | all models |
| Peschges | all models |
| Westerboer | all models |
| Zander | all models |

c) Turn and Bank Indicator

| | | | |
|---|---|---|---|
| Gauting | WZ 402/31 | PZL | EZS-3 |
| RC Allen | 12W2D2A or 12W2D2S | | |

d) Horizon Reference Indicator (Electrical Gyro Horizon)

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

6) ELECTRICAL INSTALLATION

a) Battery Only life sealed batteries are recommended (Gel cell or Nickel-Cadmium types).
Battery size must be chosen in relation to power requirements to guarantee 8 hours of continuous service. For "German" type radio plus electrical variometer 12V/6.5Ah are adequate.
Power requirement for average "German" type radio is 1.5 A for transmitting, 0.4 A for receiving voice and 0.06 A for standby.

Examples: Dittel (Dryfit) 12V 6.5Ah including battery holder

Battery installation see Flight Manual page 9-3

b) Switches Marquardt 2A 250V or other manufacturers

c) Fuses or Microfuse 20x5 mm DIN 41571

Circuit Breakers Klixon 7277-2 or 7274-2 or similar

| | | |
|---|---|---|
| Ratings: 3.15 A | quick acting: | Master |
| 2 A | quick acting: | Radio Dittel FSG 40S |
| 1 A | quick acting: | Electrical variometer<br>Turn and bank indicator |

MASTER EQUIPMENT LIST continued

d) Radio — Walter Dittel FSG 40S, FSG 50, FSG 60 models
Avionic Dittel ATR 720 models
Becker AR 2000 and AR 3000 models

Antenna — Dittel antenna for vertical fin, 118-136 MHz

7) LANDING GEAR

| | | |
|---|---|---|
| Main wheel | Tost Kobold 103/20,4 inch in diameter | |
| Tyre | Continental 4.00-4 | 4PR |
| Tube | Continental 4.00-4 | |
| Tail wheel | Streifeneder 210 x 65 | |
| Tyre | Continental 210 x 65 | |
| Tube | Continental 210 x 65 | |

8) RELEASE MECHANISM

| | |
|---|---|
| C.G. release | Tost G 73 |
| Nose release | Tost E 75 |

## COLOUR CODE OF INSTRUMENT TUBING

The following colour code is used for instrument tubes:

| | | |
|---|---|---|
| Red | = | pitot pressure |
| Blue | = | static pressure forward for airspeed indicator only |
| Yellow | = | static pressure aft |
| Green | = | total energy tube pressure |

In addition three clear tubes are installed from the vacuum bottle stowage compartment to the instrument panel.