2.3 Airspeed Indicator Markings

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

Marking	(IAS) value or range km/h and (kts)	Significance
Green Arc	102 - 205 (55 - 110,5)	Normal Operating Range. (Lower limit is maximum weight 1.1 V_{S1} at most forward c.g. Upper limit is rough air speed)
Yellow Arc	205 - 280 (110,5 - 151)	Manoeuvres must be conducted with caution and only in smooth air.
Red Line	280 (151)	Maximum speed for all operations.
Yellow triangle	95 (51,5)	Approach speed at maximum weight without water ballast.

2.4 Mass (Weight)

Maximum Take-Off Mass:		
-with water ballast	500 kg	(1102 lbs)
-without water ballast	365 kg	(804,8 lbs)
Maximum Landing Mass:	500 kg	(1102 lbs)
Max. mass of all non-lifting parts	245 kg	(540,2 lbs)
Max. mass in the baggage compartment:	15 kg	(33 lbs)

2.5 Centre of Gravity

Centre of gravity range (for flight):

forward limit	0.24 m (0,79 ft) aft of RP
aft limit	0.37 m (1,21 ft) aft of RP

"RP" stands in this context for "Reference Datum Point" which is situated at the wing leading edge at the wing root rib.
An example of the c.g. position calculation and a table of c.g. ranges at different empty weights can be found in Section 6 of the ASW 24 Maintenance Manual.

2.6 Approved Manoeuvres

This glider is approved for use in normal gliding operation (Airworthiness Category "Utility").
Within this Airworthiness Category U the following aerobatic figures are approved for the ASW 24:-
Lazy Eight, Chandelle, Stall Turn, Steep Turn and positive Loop. Further details concerning these manoeuvres will be found in Section 4.5.9.

SECTION 3

3. Emergency Procedures

3.1 Introduction

3.2 Canopy Jettison

3.3 Bailing Out

3.4 Stall Recovery

3.5 Spin Recovery

3.6 Spiral Dive Recovery

3.7 Other Emergencies

3.1 Introduction

Section 3 provides checklist and amplified procedures for coping with emergencies that may occur.

Brief head-words are followed by a more detailed description.

EMERGENCY PROCEDURES

(1) **To Jettison Canopy**

- Pull both the left and right-hand red levers at the canopy frame back all the way and
- push canopy **REARWARD and UP!**

(2) **Bailing Out**

- Push instrument panel UP
- release safety harness
- roll over cockpit side
- push off strongly
- watch wings and tail surfaces!
- pull parachute!

(3) **Spinning**

(a) apply opposite rudder and at the same time
(b) relax back pressure on stick until rotation stops
(c) centralise rudder and immediately pull out gently from dive !

3.2 Jettisoning of Canopy

Pull canopy jettison (red levers mounted left and right at canopy frame) and push canopy rearwards and up!

3.3 Bailing Out

If bailing out becomes inevitable, first jettison canopy and only then release safety harness.

Push instrument panel UP (if this was not done in the course of jettisoning the canopy). Get up or simply roll over cockpit side.
When jumping, push yourself away from the aircraft as strongly as possible. Try to avoid contact with wing leading edges or tail surfaces!

3.4 Stall Recovery

In straight or circling flight, relaxing of back pressure on the stick will always lead to recovery.
Due to its aerodynamic qualities the ASW 24 will immediately re-gain flying speed.
If opposite aileron is applied during stalled 'mushing' flight, the ASW 24 will roll outwards a little as back pressure is relaxed.

3.5 Spin Recovery

(1) Apply opposite rudder (i.e: in the direction opposite to the rotation of the spin) and at the same time
(2) relax back pressure on the stick until rotation stops
(3) centralise rudder and gently pull out of the dive.

CAUTION:

Spinning is not noticeably affected by extending the airbrake paddles, but it will increase the height loss when pulling-out, and is therefore inadvisable.

3.6 Spiral Dive Recovery

Depending on the aileron position during spinning with forward C.G. positions - that is: the C.G. range when the ASW 24 will no more sustain a steady spin - it will immediately or after a few turns develop a spiral dive, or a slipping turn similar to a spiral dive.

These conditions will both be terminated by:

(1) applying opposite rudder
(2) applying aileron opposite to direction of turn.

1- Open canopy and check canopy jettison.

- Main pins home and secured?

- Check positive control connections - ailerons, elevator and airbrakes - in fuselage/wing mounting area.

- Check cockpit and control runs for loose objects or components.

- Check full, free and stress-free operation of all controls.
  Hold controls firmly at full deflection while loads are applied to control surfaces.

- Check ventilation opening and - if installed - pitot tube (optional extra) in fuselage nose.

- Check condition and operation of towing hook(s). Release control operating freely ? Don't forget release checks!

- Check wheel brake for operation and leaks. With airbrake paddles fully extended the resilient brake pressure from the main brake cylinder should be felt through the brake handle.

2- Check both upper and lower wing surfaces for damage and water outlets to be clean.

3- Ailerons:
Check condition and full and free movement (control surface clearances). Check linkage fairing for clearance.

- If installed: Are the winglets undamaged and safetied?

4- Airbrake paddles:
Check condition and control connections. Do both sides have good over-center lock?

5- Check inflation and condition of tires:

Main wheel : 2.5 bar +/- 0.1 bar
(= 35,6 psi +/- 1,5 psi)

Tail wheel : 2.5 bar +/- 0.1 bar
(= 35,6 psi +/- 1,5 psi)

6- Check fuselage, especially underside, for damage.

7- Check that static ports in the fuselage tail boom are unobstructed.

8- Check the pressure port in the fin :
is the probe properly seated and tight ?

9- Check that the tailplane bolt is tight and locked.

10- Check that rudder, tailplane and elevator are correctly fitted, and for damage or excessive play.

The numbers against the above points correspond with those in the following illustration "Tour of Inspection".

SECTION 6

6. Mass (Weight) and Balance / Equipment List

6.1 Introduction

6.2 Mass (Weight) and Balance Form

6.1 Introduction

This Section describes the procedures for establishing the basic empty mass and moment of the sailplane.
A comprehensive list of all equipment available for this sailplane is included in the Maintenance Manual, Section 6.

6.2 Mass (Weight) and Balance Form

The Mass and Balance Form overleaf shows the maximum and minimum cockpit loads, and any additional load still permissible for the baggage compartment.

These mass and balance data must be calculated in accordance with the currently valid weighing data. The data and diagrams needed for establishing these are to be found in the Maintenance Manual, Section 6.

This Mass and Balance Form is valid only for the aircraft bearing the S.No. shown on the title page of this manual.

If pilot mass is less than the minimum stated in the Mass and Balance Form, this can be rectified by means of trim ballast plates fitted in front of the rudder pedals. See also Section 7.11.

Heavy pilots often like to ballast their aircraft for optimum performance to suit their individual weight. A housing is provided for this purpose in

the upper part of the fin where trim ballast, for instance in the form of a battery, may be fitted. If any trim ballast is mounted in the fin, the minimum cockpit load will of course be increased ! This increased minimum cockpit load must also be shown in the DATA and LOADING PLACARD in the cockpit. The lower permissible cockpit load without trim ballast in the fin will be shown only on page 6.4 of the Flight Manual.

In the cockpit, an additional placard is to be affixed:

REDUCED MINIMUM COCKPIT LOAD WITHOUT TRIM BALLAST IN THE FIN: SEE FLIGHT MANUAL - PAGE 6.4 !

Sight apertures in the fin make it easy to check whether any trim ballast has been fitted. Clear view through the fin means: No trim ballast fitted! See also Section 7.11.

MASS AND BALANCE FORM

Date of Weighing	Empty mass 1)	Empty mass C.G. 2) aft of RP	Pilot mass incl. chute 1)		Load in baggage compart.* 1)	Inspector's stamp and signature
			min.	max.		

* Permissible baggage load = 245 kg (= 540,2 lbs) less empty mass of non-lifting parts less pilot mass less mass of parachute: BUT not more than 15 kg (= 33 lbs) !!

1) For U.S.-registered sailplanes show lbs.
2) For U.S.-registered sailplanes show inches.
Other countries may use metric or SI units.

SECTION 7

7. Sailplane and Systems Description

7.1 Introduction

7.2 Airframe

7.3 Flight Controls including Trim

7.4 Airbrake System

7.5 Landing Gear System

7.6 Cockpit, Canopy, Safety Harness and Instrument Panel

7.7 Baggage Compartment

7.8 Water Ballast System

7.9 Electrical System

7.10 Pitot and Static System

7.11 Miscellaneous Equipment (Removable ballast, Oxygen, ELT, etc.)

7.1 Introduction

This Section provides description and operation of the sailplane and its systems. Refer to Section 9, Supplements, for details of optional systems and equipment.

A detailed technical description of the glider with layout drawings can be found in the Maintenance Manual.

The principal purpose of this Section is to describe the controls in the cockpit, their layout and placards.

7.2 Airframe

The wing profile is equipped with "Zig-Zag Tape" on the lower surface for the purpose of controlling the boundary layer as well as all tailplane surfaces. The optimum position and thickness of the tape are given in Maintenance Instruction B, see annex of the Maintenance Manual, as demonstrated to be very effective in DLVFR-Idaflieg performance tests. In every ASW 24 there is provision for an "air pressure duct" to facilitate the possible installation of "blow turbulators".

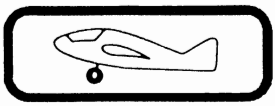
7.3 Flight Controls including Trim

(1) Aileron and Elevator

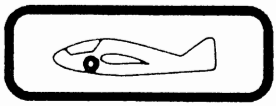
Both these controls are operated by means of the control column. The stick is also fitted with the trim release lever for setting the trim, and with the radio transmit button.

7.5 Landing Gear System

The landing gear is extended and retracted, and locked at either position, by means of the black handled lever mounted at the right-hand cockpit wall.



Landing gear extended (lever forward)



Landing gear retracted (lever aft)

Tire pressures: Main wheel: 2.5 bar +/- 0.1 bar
(35,6 psi +/- 1,5 psi)

Tail wheel: 2.5 bar +/- 0.1 bar
(35,6 psi +/- 1,5 psi)

7.6 Cockpit, Canopy, Safety Harness and Instrument Panel

(1) Launch Cable / Towing Hook Release:

High on the left cockpit wall you will find the :-

yellow cable release knob.

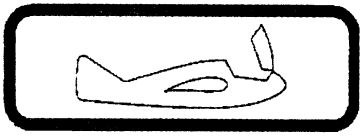
Pulling the yellow knob will open one or both of the towing hooks.
For the launch cable to be attached, pull the yellow knob back and then merely release it to allow the towing hook to snap shut and lock.

(2) Seat and Seating Positions:

The seat is designed to allow tall and medium sized pilots to sit comfortably, and improve their position by means of cushions and an appropriate choice of parachute. For tall pilots we would recommend the use of thin parachute packs of the new type. Very short pilots will have to adjust their seating position by means of a firm cushion so that all controls are within comfortable reach, that their view to the outside is improved, and that they are prevented from sliding back during initial take-off (winch launch) acceleration.
Very tall pilots may fly without the seat back, but must then fit a spinal support by means of a hard foam (e.g. Styrofoam, Conticell or Rohacell) !
When the oxygen bottle is removed the hole in the main bulkhead opening must be covered. Covers are obtainable as accessories from Schleichers.

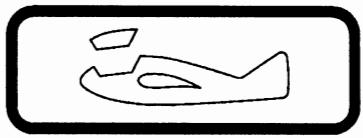
(3) Canopy Operation:

The canopy is locked by means of the two white lever handles fitted to the canopy frame at the right and left.



These levers are marked by these adhesive labels.

To open the canopy, both levers are pivoted to the rear and the canopy is pushed forward and up.



To jettison the canopy, pull jettison levers (red levers mounted at either side of the canopy frame) and pull canopy away **rearward** and **up**!

Operating the red jettison levers will automatically open the white locking levers, leaving the canopy resting loose on the cockpit rim.

NOTE: If possible, do not leave the aircraft parked or unattended with canopy open, because:

1. The canopy could be slammed shut by a gust of wind which might shatter the perspex.
2. At certain elevations of the sun it could act as a lens concentrating the sun's rays, which might ignite cockpit instruments and equipment.

NOTE: Operating the jettison levers allows the canopy to be removed for easy access when inspecting instruments.

(4) Safety Harness:

The safety harness is anchored in such a way that it cannot jam the control runs underneath the seat pan.
The safety harness (seat straps including shoulder straps) should be worn at all times, and should be fully tightened. Check every time that each individual strap is properly secured in the harness lock.

The lock should also be tested from time to time to ensure that it can be satisfactorily released under load.

(5) Ventilation

The ventilation flap is located at the front of the canopy frame and is operated by means of the small black knob on the instrument panel.
Pull to open.

This flap also serves as a demister.

A further air outlet nozzle is fitted at the right cockpit wall to the right of the instrument panel, which is opened and closed by twisting the rim and the direction of which can also be adjusted. This air outlet should be closed if the demisting function of the front canopy ventilation flap needs to be made more effective.

(6) Instrument Panel

For safety reasons, only a GRP panel made in accordance with the lamination plan specified by the manufacturer may be used.
Instruments weighing more than 1 daN need further support, in addition to the fixing screws provided. This can be done by means of aluminum straps fixed to the instrument pod.
Equipment with operating controls must be fitted conveniently to hand and within reach, even when the safety harness is worn. Flight monitoring instruments, like ASI and altimeter, must be mounted within the pilots field of view.

(7) Automatical parachute static line:

An anchor ring is provided for the static line (rip chord) of an automatic parachute lefthand on the main bulkhead beneath the lift pin tube.

7.7 Baggage Compartment

Hard objects may not be carried in the baggage compartment in front or on top of the spar without a suitably designed lashing or anchorage !
If, for instance, a barograph is to be carried in this space, a mounting recommended by the manufacturer must be used. A moulded seating for a 12V and 5.6Ah battery is supplied with the glider as standard equipment.

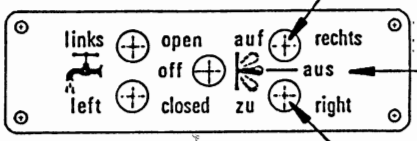
The baggage load in the compartment may not exceed 15 kg = 33 lbs.

BAGGAGE COMPARTMENT LOAD max. 15kg (33 lbs.)

7.8 Water Ballast System

The water ballast valves in the wings are operated electrically. A switch panel is fitted for this purpose in the instrument panel.

Water Ballast Switch Panel



Green Diode illuminated: valve open!

Three-Position Switch: center position saves current !

Red Diode illuminated: valve closed!

The above drawing showing the layout of the switch panel illustrates the 3-position switch for both wing tanks.
By combining the switch connection of the left and right tank, an inadvertent opening of only one valve, resulting in a one-sided ballast load, becomes impossible.

The LEDs (top green = valves open; or bottom red = valves closed) are confirmation signals monitoring the state of the valve, for which the circuit is completed by limit switch actuators at the valve.

In order to save current, the switches should be re-set to their center position after operating the valves. This will also switch off the LEDs.

7.9 Electrical System

The electrical system is supplied by a 12V battery. Each electrical applicance is protected by its own fuse. A fuse is also fitted in the cable connected to the fin-mmounted battery, close to the battery.

The water ballast system uses current at 6V which allows the valves to be operated even with an almost flat battery. The 6V current is induced by an integrated circuit (IC) from the battery voltage.

7.10 Pitot and Static Systems

Pitot pressure is obtained from a Prandtl-tube mounted in the fin. Ensure that this Prandtl tube is fully pushed home in its seating in the fin. The inner end of the probe should from time to time be lightly lubricated with Vaseline or a similar lubricant, in order to save the O-ring gaskets from wear.

At the same time, the Prandtl tube provides air at accurate static pressure which can be used for electrically compensated variometer systems.

Static pressure for the ASI is obtained from the static ports at either side of the fuselage tail boom.

7.11 Miscellaneous Equipment

(1) Removable Trim Ballast

If required, the ASW 24 can be fitted with a fitting for lead trim ballast plates which can be bolted into place in front of the rudder pedals.

In this location, a 1.11 kg (= 2.45 lbs) lead trim plate equals an additional pilot weight of 2.5 kg (= 5.5 lbs).
Thus, a pilot weighing 10 kg (22 lbs) less than the minimum cockpit load must fit four trim plates weighing 1.11 kg (=2.45 lbs) each.

(2) Trim Mass (Battery) mounted in the fin

If a trim mass (battery) is fitted in the fin, the minimum cockpit seat load will be more than 70 kg = 154,5 lbs (incl. parachute). This increased minimum cockpit load must then be shown in the DATA and LOADING PLACARD in the cockpit.

Any reduced minimum cockpit load when no tail ballast is fitted will be quoted on page 6.4.

For further details of minimum cockpit load see page 2.7 of this manual.

The foam buffer fitted over the battery secures it above. This plastic foam pad must not be forgotten when changing or replacing batteries.
You should also ensure that there is adequate plastic foam seating under the battery to protect it from hard knocks!

(3) Oxygen

The seating for the oxygen bottle is fitted as standard equipment, in the form of the tube at the bottom right in the main bulkhead, beside the wheelbox. A 3-liter bottle of 100 mm dia. will found the most suitable to fit in this opening.

A suitable bottle fixing bracket is required, and is an optional accessory with Schleichers.

When fitting the oxygen bottle, ensure that it is properly installed and securely anchored.

WARNING: When the oxygene bottle is removed the cover for the hole in the bulkhead must be installed as otherwise loose objects may get from the cockpit rearward into the control circuits.

NOTE: Fitting of oxygen equipment only causes a minimal change in the empty-mass c.g. position !

(4) Emergency Location Transmitter

The location least vulnerable to damage in case of accident is the area between the two drag spar pins at either side of the fuselage.
Therefore, the emergency location transmitter (ELT) should be fitted to the fuselage wall in the baggage compartment area, in an approprate mounting.
Since the whole of the air frame except for the fin and a small area above the baggage space contains CRP layers, and carbon fiber laminations screen the transmission radiation, the ELT aerial must be fitted in the area between wing spar and canopy.

Rudder

Surface area	0.27 m²	(2.91 ft²)

Horizontal Tail

Span	2.55 m	(8.37 ft)
Surface area	0.90 m²	(9.67 ft²)
Aspect ratio		7.11
Airfoil Section		DU 86-137/25

Elevator

Surface area	0.21 m²	(2.26 ft²)

Airbrake Paddles (Schempp-Hirth - top sfce.only)

Length	1.10 m	(3.61 ft)
Surface area (both together)	0.37 m²	(3.98 ft²)
Max. Height above wing top surface	0.18 m	(0.59 ft)

Aileron

Span	3.00 m	(9.84 ft)
Surface area (each)	0.25 m²	(2.69 ft²)

Masses (Weights)

Empty mass	approx.	230 kg	(507 lb)
Max. cockpit load		130 kg	(286.7 lb)
Max. load pilot seat		115 kg	(253.6 lb)
Max. mass of non-lifting parts		245 kg	(540.2 lb)
Max. all-up mass **with** water ballast		500 kg	(1102 lb)
Max. all-up mass **without** water ballast		365 kg	(804.8 lb)
Wing loading		30.0 ÷ 50.0 kg/m²	
		(6.14 ÷ 10.24 lb/ft²)	
Max. loading of baggage compartment		15 kg	(33 lb)
Max. trim ballast (battery) in the fin		6 kg	(13.2 lb)

See also **Flight Manual** Section 2 !

2.3 Landing gear

2.3.1 Main Wheel

The sprung main wheel consists of a Cleveland rim (P/N 40 78B) with a Goodyear tire 5.00-5, 6pr TT and inner tube 5.00-5 TR67A.

The wheel is equipped with an hydraulic brake:-

Cleveland wheel brake cylinder 30-9
with Master Cylinder 10-20

The landing gear wheel fork is damped and sprung by a system of two shock absorber legs with hollow-type rubber springs TO 55/55, core N, RTE II (made by MGW).

2.3.2 Tail Wheel or Tail Skid

In the series production standard the sailplane comes with a tail wheel :

Wheel hub "Moritz" 210 x 65
Tire with inner tube 210 x 65.

On customer request the tail wheel can be replaced by a tail skid of integral foam fitted with a metal wear plate. The tail skid is fitted into the tail wheel box by means of the axle of the tail wheel. You must apply plasticised fabric adhesive tape over the gap between skid and fuselage (e.g. Tesa tape no. 4651, 38 mm / 1.5 in. wide) !

2.3.3 Wheel Brake System

The master cylinder of the hydraulic disc brake system is connected to the airbrake control linkage. When the airbrake paddles are fully extended, the wheel brake is also actuated.
The master cylinder is mounted vertically near the rear cross tube in front of the bulkhead at the right hand side. The master cylinder is actuated by the automatic airbrakes funnel-type connector via an adjustable oblong hole gate.
From the master cylinder, a brake hose leads to the wheel brake cylinder at the wheel fork. The brake fluid reservoir is mounted in front of the rear drag pin at the right-hand inner side in the fuselage-wing mounting area. When the glider is de-rigged, it is possible to check the brake fluid level via an inspection hole; To check the brake fluid with the aircraft rigged, it is necessary to remove the rear baggage compartment floor/wall.

WARNING: Only use brake fluid ESSO UNIVIS I-13 or Aeroshell Fluid 4!

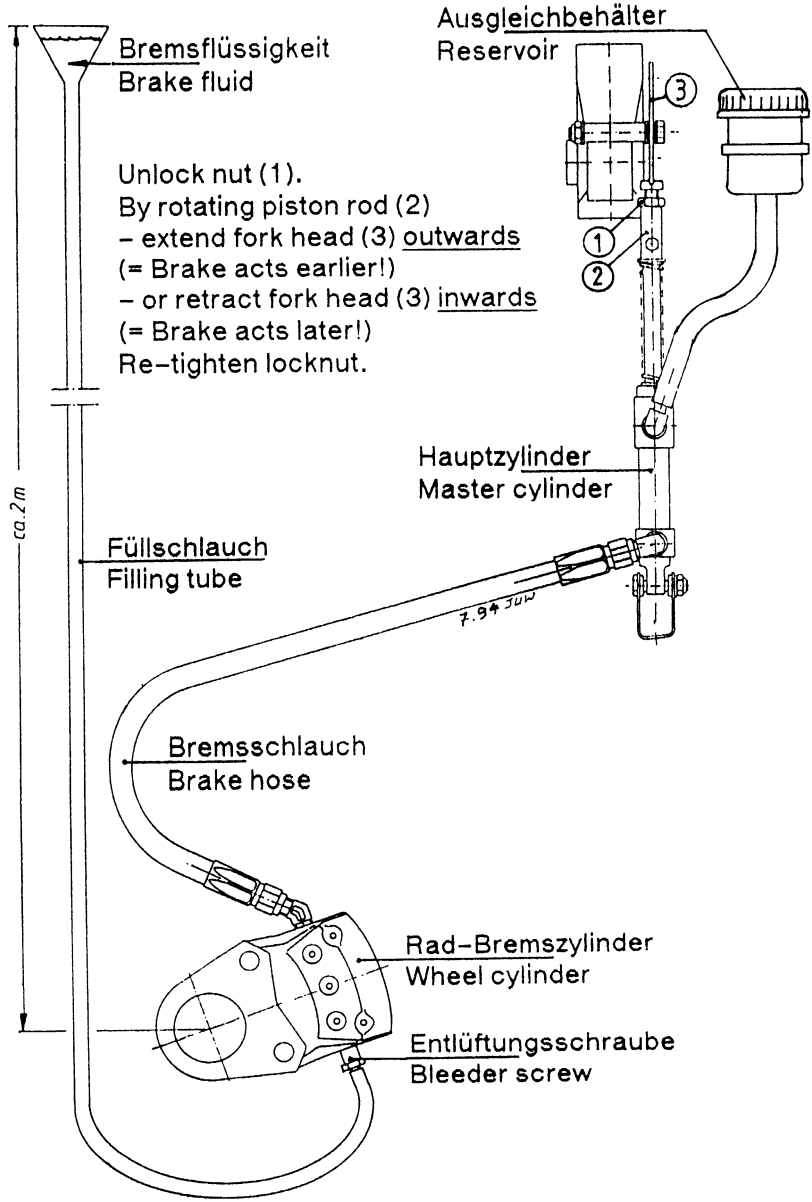
It is essential to ensure that only mineral oil based brake fluid is used.

Brake fluids based on ester - as used in motor vehicles - will quickly destroy gaskets and hoses.

Disposal of brake fluid:

Waste brake fluid is polluting water, see german regulations WCK 2 and TA Luft, class III.
Oil separators elinimates it from waste water.
Do not let it enter the sewerage or the environment, but always give it to collecting points for separate refuse!

Fig. 2.3-1 Adjustment of the Wheel Brake



Exchange of Brake Linings

With landing gear extended, you will find the wheel brake cylinder right-hand at the wheel fork. At the rear end of the cylinder there are two 1/4" screws secured with locking wire. Remove the locking wire and fully undo both screws.
You can now remove the inner brake lining incl. its back plate assy, and the wheel brake cylinder assy can be pulled off the torque plate assembly.
The brake hoseline must be left attached throughout, as otherwise the system will have to be bled.

Now the outer brake lining with its back plate assy can be removed.
While the brake is dismantled the brake lever (air-brakes) must not be operated !

The linings must be renewed before they have been worn down as far as the rivets (minimum residual lining thickness 2.54mm = 0.10 in !) as otherwise the brake disc will be damaged and the braking effectiveness unacceptably reduced.
To rivet the new linings in place it is best to use a riveting tool designed for the purpose. Alternatively, however, a hammer, centerpunch, and drift pin of not less than ⌀ 6 mm (0.24 in) at the tip may be used.

Now replace the brake back plate and torque plate assy, tighten the two 1/4" screws and secure them with locking wire.

Brake linings and rivets to suit can be obtained direct from Messrs. Schleicher. Orders must specify brake linings suitable for the Cleveland 30-9 brake assy.

2.7 Oxygen Installation

At the right-hand side of the landing gear box, behind the seatback space is provided, to accommodate one 3-liter oxygen bottle.
If required and as an optional extra, one support fitting can be provided for fixing the front end of the oxygen bottle (AS P/N 240.01.0027) as well as a FRP support for the rear end of the oxygene bottle.
When the bottle is removed the hole in the bulkhead must be closed by a cover.
Only use oxygen system which monitor the oxygen contents and comply with JAR 22.1449.

2.8 Pitot and Static Lines and Instrument Connections

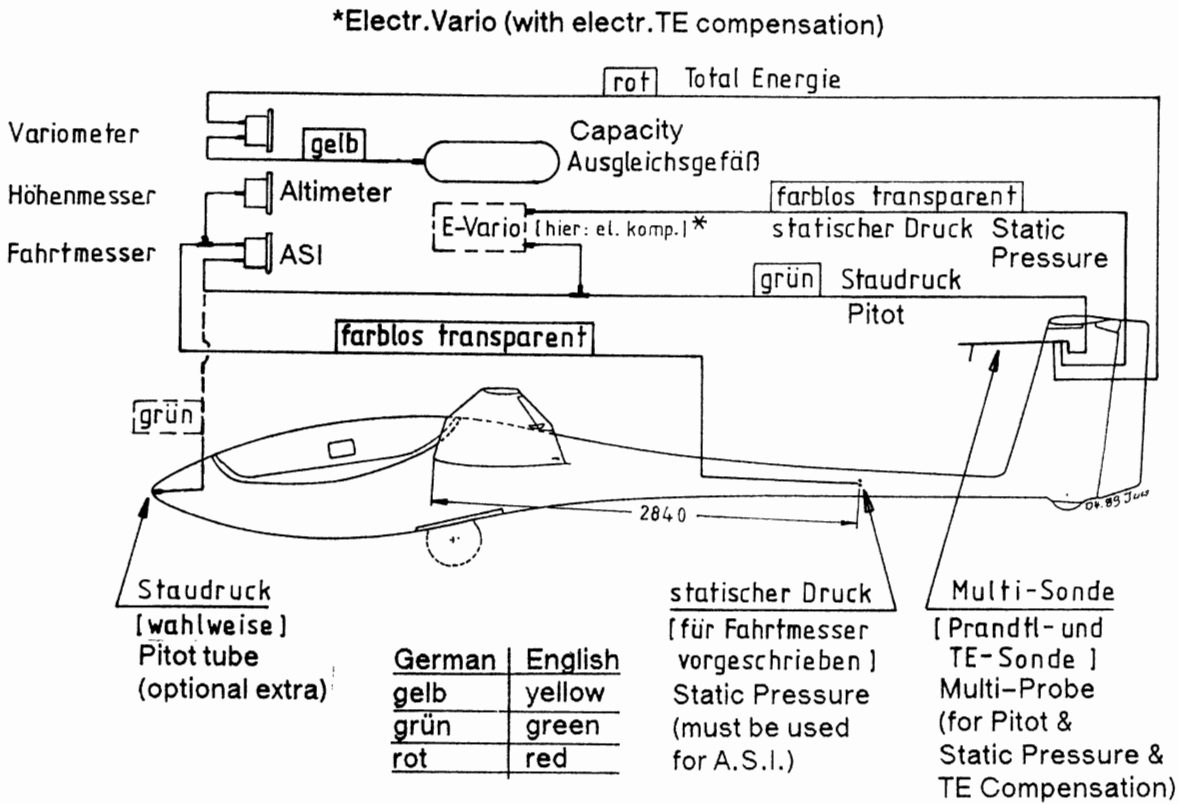
See also Fig. 2.8.-1

1. Altimeter
2. Air Speed Indicator
3. Variometer
4. Multi-Probe (Pitot and Static Pressure and TE Compensation).
5. Static Ports in Fuselage.
6. Pitot tube in the fusealge nose (offered as an optional extra only).

Instead of the above multi-probe a customer may also use a Prandtl Tube, as the mounting provided in the fin is designed to be suitable also for this type of tube.

CAUTION: The A.S.I. must only be connected to the static ports in the fuselage tail boom for reasons of avoiding A.S.I. calibration errors!

Fig 2.8-1 Pitot and Static Lines and Instrument Connections



German	English
gelb	yellow
grün	green
rot	red

2.9 Jacking Points and Ground Transport

Jacking Points

For wing bending frequency tests, the aircraft must be jacked up so that the main wheel springing should not distort the results.

Jacking points for the wing bending frequency tests are:

1. In front of the tail wheel
2. Front part of fuselage in the region of the lap belt anchoring points, on a support trestle.

The jacking points are also illustrated in Fig. 3.0-1.

The wings may be supported on trestles positioned in the area of the root ribs and at approx. 2/3ds span. The trestles should be padded, or cushioned with foam rubber or similar resilient underlay. When jacking up wings, avoid stress or damage to control surfaces and linkage fairings.
The fuselage may be propped up in the cockpit region by means of suitable supports.

Before inverting the fuselage, remove the canopy. The instrument pod should be either fixed in place or hinged up to its fullest extent.
The vent hole of the brake fluid reservoir cover must be sealed by tape!
WARNING: After rotating the fuselage back upright remove the tape! Remove spilled fluid and clean with cleaning spirit.

The elevator actuator must be protected from damage. A wooden block of appropriate height must be laid under the fin-stabilizer attachment area.

Ground Transport

The wings may be supported at the spar stubs, root ribs and wingtips.
If installed, derig the winglets first.

2.10 Tow Release Couplings

The tow release coupling fitted at the C.G. is model TOST "Europa G 73". (Data Sheet No:60.230/2). Model TOST "Europa G 72 or G 88" may be used as a replacement tow release coupling.

The tow release coupling fitted at the fuselage nose is model TOST "E 72" or "E 75" or "E 85". (Data Sheet No:60.230/1).

The replacing of tow release couplings is described in Section 10.4.

6.7 Useful Loads

The useful cockpit load is influenced and limited by various factors:

(1) Total mass of non-lifting parts (must not exceed 245 kg (540,13 lbs).

(2) In-flight C.G. position (must remain within 0.24 m and 0.37 m (9,45 inch and 14,57 inches) aft of Datum whatever the cockpit load)

(3) Maximum Take-Off Mass (must not exceed 500 kg (1102,50 lbs) and mainly affects the water ballast load).

Load in the baggage compartment

The mass of the baggage is calculated as follows:

max. mass of non-lifting parts	= 245 kg(540,13lb)
- weighed mass of non-lift. parts	= xxx kg (xxx lbs)
- actual load in the seat	= xxx kg (xxx lbs)
= permissible load in the baggage compartment	= xx kg (xx lbs)

But never to exceed 15 kg (33 lbs) in the baggage compartment.

6.8 In-Flight Mass/C.G. Envelopes and Pilot Mass Arms

(1) How to determine pilot mass arms:

In the normal seating position the pilot mass arm is for:
a 55 kg (121,25 lbs) pilot including parachute 0.54 m (21,26 inch) forward of datum and for:
a 115 kg (253.53 lbs) pilot incl. parachute 0.535 m (21,06 inch) forward of datum.
If an exact pilot mass arm is needed, a weighing must be done with the pilot including parachute in place.

(2) Calculation of In-Flight C.G. Position

$$X_{CG} = \frac{X_L * m_L + X_P * m_P + X_W * m_W + X_{O2} * m_{O2} + X_B * m_B + X_C * m_C}{m_L + m_P + m_W + m_{O2} + m_B + m_C}$$

Where the symbols stand for:-

X_L	Empty mass C.G. position
m_L	Empty mass
X_P	Pilot mass arm
m_P	Mass of pilot incl. parachute
X_{O2}	Distance of oxygen bottle from datum point in standard fitting location
m_{O2}	Mass of oxygen bottle
X_W	Distance of water ballast from datum point
m_W	Mass of water ballast (1 Liter = 1 kg or 2,2 lbs)
X_B	Distance of fin mounted battery from datum point (if fitted)
m_B	Mass of battery
X_C	Distance of baggage compartment from datum point
m_C	Mass of load in baggage compartment

Table of established Arms and Masses

Designation	Unit of Measmt.	Amount	Remarks
x_{o2}	Meter inch	+0,17 +6,69	in factory-standard fitting location
m_{o2}	kg lbs.	4,4 9,70	O_2-bottle, 3 Liters
x_T	Meter inch	-1,68 -66,1	Trim discs in front cockpit
x_W	Meter inch	+0,258 +10,16	waterballast dist. from Datum
x_B	Meter inch	+4,19 +164,96	Trim Ballast (Battery) in fin
m_B	kg lbs.	≈1,8* ≈4,0*	Optional Battery for Fin Position
x_I	Meter inch	-0,93 -36,61	instrument mass arm in instr. panel
x_C	Meter inch	+0,175 +6,89	baggage in baggage compartment

* The exact mass of the battery (see chapter 2.6) or the mass of the trim ballast has to be weighed!
The max. permissible mass of 6 kg (13.23 lbs.) in the fin must not be exceeded (see flutter calculation).

Examples of C.G. Position Calculation

1. Example of a weight and balance for empty mass

$$X_L = \frac{m_2 * b}{m_L} + a$$

m_L = 235 kg, from weighing of all components
m_2 = 27,7 kg
b = 4038 mm
a = 150 mm
For weighing the sailplane was levelled correctly.

$$X_L = \frac{27,7 * 4038}{235} + 150$$

x_L = 625,9 ≈ 626 mm aft of datum.

Note: Distance "a" is not constant due to the landing gear suspension and must therefore be determined again for every change of the mass.

2. Example of a change of empty mass (weight) and empty weight C.ofG.:

Into an ASW 24 according to example 1. showing the weight and balance data m_L = 235 kg and x_L = 626 mm a pneumatic variometer (m_{I1} = 0,3 kg) is exchanged against an electric one (m_{I2} = 1,3 kg); the capacities will not be changed.

4a: With an ASW 24 of an empty mass of m_L = 235 kg and an empty mass C.of G. of x_L = 626 mm a pilot of 85 kg (incl. parachute) plans his flight. He takes 2 kg of food with him in the cockpit and 5 kg baggage (barograph, tie dowm equipment, canopy cover and raincoat etc.) in the baggage compartment.
What is the in-flight C.of G. position?

In the above mentioned case the cockpit load adds up to:
m_P = 85 kg (pilot + parachute) + 2 kg food supply
m_P = 87 kg

According to the formula given under 6.8 (2) results:

$$x_{CG} = \frac{x_L * m_L + x_P * m_P + x_C * m_C}{m_L + m_P + m_C}$$

(here $m_{W,} = m_{O2} = m_B = 0$)

$$x_{CG} = \frac{626 * 235 + (-538) * 87 + 175 * 5}{235 + 87 + 5}$$

x_{CG} = 309 mm

The in-flight C.of G. is about in the middle of the approved range.

4b: If the sailplane according to example 4a is loaded with 100 Liters of water ballast the in-flight mass C.of G. changes as follows:

$$X_{CG} = \frac{X_L * m_L + X_P * m_P + X_W * m_W + X_C * m_C}{m_L + m_P + m_W + m_C}$$

$$X_{CG} = \frac{626*235+(-538)*87+258*100+175*5}{235 + 87 + 100 + 5}$$

X_{CG} = 297 mm for an in-flight mass of 427 kg.

The water ballast load of 100 kg shifts the C.of G. only marginally forward by 12 mm.

4c: Into an ASW 24 according to example 4a a battery weighing 1,8 kg is mouted into the fin. How does the in-flight mass C.of G. shift?

$$X_{CG} = \frac{X_L * m_L + X_P * m_P + X_C * m_C + X_B * m_B}{m_L + m_P + m_C + m_B}$$

$$X_{CG} = \frac{626*235+(-538)*87+175*5+4190*1,8}{235 + 87 + 5 + 1,8}$$

X_{CG} = 331 mm

The in-flight mass C.of G. is in the rear part of the approved range.

SECTION 9

9. Placards, Labels and Markings

9. Placards, Labels and Markings

The whole of the marking scheme is listed and explained in Sections 2 and 7 of the **Flight Manual.**

The consecutive numbers marked against the labels shown hereafter refer to their location in the aircraft and match the numbers shown in the view of the cockpit (Fig. 9.0-1) illustrated in this Section.

Hersteller-Manufacturer
Alexander Schleicher
GmbH & Co

D-6416 Poppenhausen/Wasserkuppe

Muster:
Model: ASW 24 B

Werk-Nr.:
Serial-No.: 24 XXX

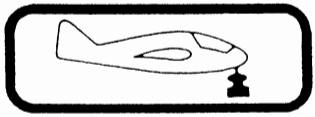
Kennzeichen:
Registration:

Made in Germany

This placard is located on the inner left canopy frame behind the seat back.

(1)

(2)



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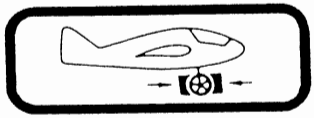

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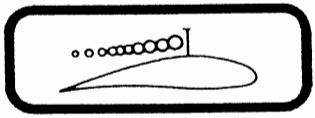
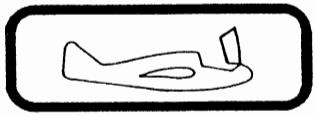


(7)

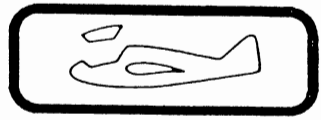
(8a)



(8b)

(9a)

(9b)



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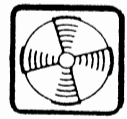

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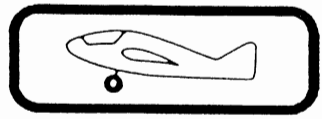

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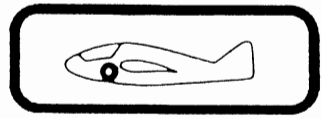
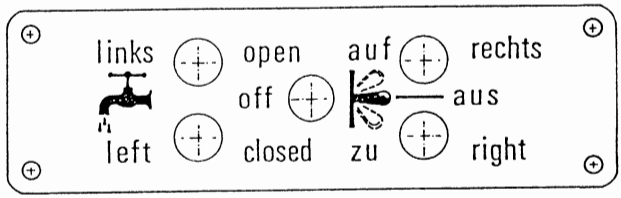


(17)

(10)



FOR ASW 24 B

(13)

Segelflugzeugbau A. Schleicher GmbH & Co. Poppenhausen

Model: ASW24 B *S.No.:* 24 xxx

DATA and LOADING PLACARD

Empty Mass (Weight):	kg
Max. Mass (Weight):	1102 lbs. 500 kg
Min. Cockpit Load:	kg
Max. Cockpit Load:	kg
Maximum Speeds:	
Auto or Winch Launch W/L:	75.5 kts. 140 km/h
Aerotow A/T:	97 kts. 180 km/h
Operating Landing Gear:	110.6 kts. 205 km/h
Maneuvering Speed:	110.6 kts. 205 km/h
Strength of Weak Link for A/T and W/L	560 to 660 daN
Tire Pressure: Main Wheel:	34 to 37 psi 2.4 to 2.6 bar
Tail Wheel:	34 to 37 psi 2.4 to 2.6 bar

(14)

REDUCED MINIMUM COCKPIT LOAD
WITHOUT TRIM BALLAST IN THE FIN:
SEE FLIGHT MANUAL - PAGE 6.4 !

This placard is located on the bulkhead in the center of the cross tube.

BAGGAGE COM- max. 15kg
PARTMENT LOAD (33 lbs.)

(12)

Pre-Flight Checks

1. *Main pins fully home and secured ? Tailplane bolt fitted ?*
2. *Controls checked for positive connections and*
3. *control gaps in flight direction must have a clearance of min. 1.5 mm (1/16 in) !*
4. *Parachute ripcord connected ?*
5. *Check C.G. position ! (Battery in fin ? Trim ballast plates in fuselage nose ?)*
6. *Comply with Loading Placard !*
7. *Water tank drain and vent opening, and pressure ports unobstructed ?*

Pre-Take-Off Checks:

1 *Parachute clipped on ?*
2. *Safety harnesses secure and tight ?*
3. *Wheel locked down ?*
4. *Airbrakes closed and locked ?*
5. *Trim set for Take-Off ?*
6. *Altimeter set ?*
7 *Tail dolly removed ?*
8. *Check wind direction !*
9. *Close and lock canopy !*

Location at the under side of the instrument pod.

(5)

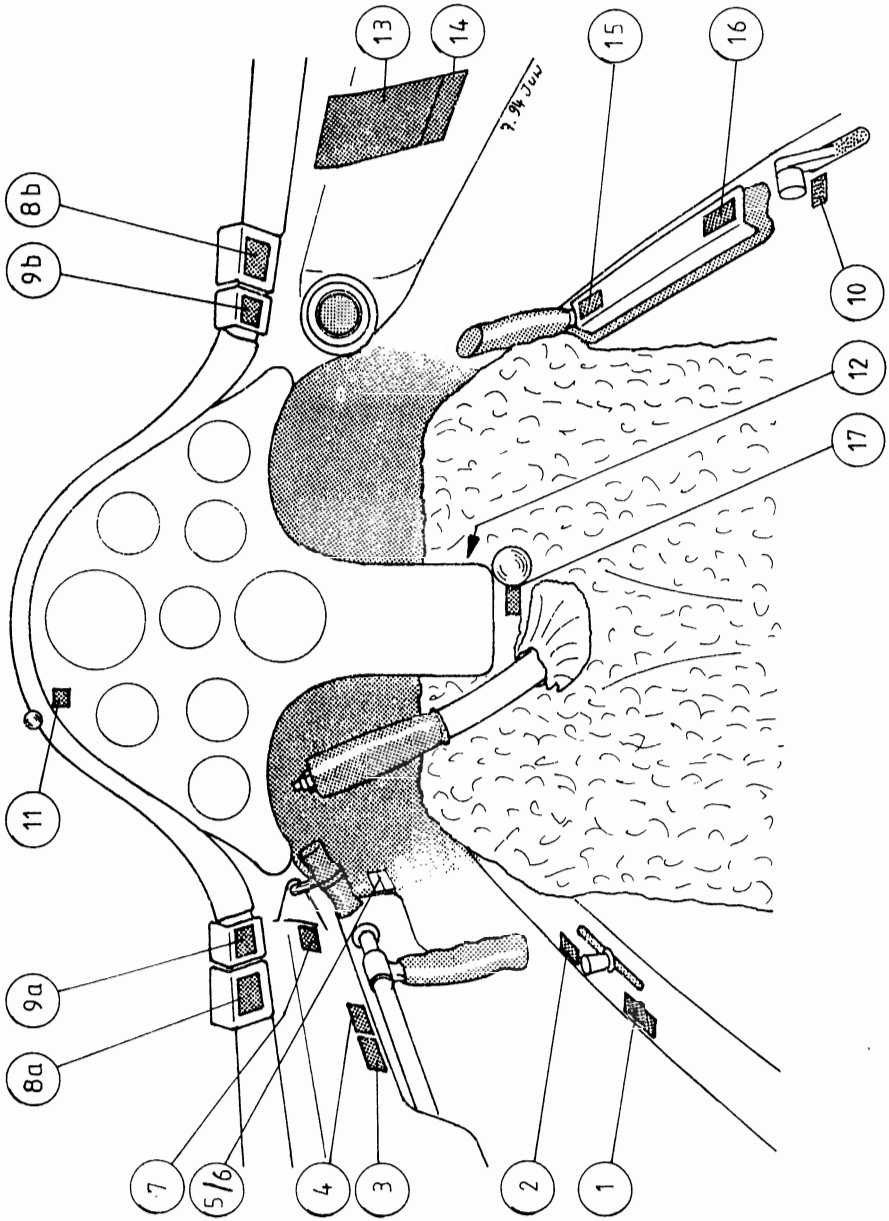
PRIOR TO TAKE-OFF CHECK THE WEIGHT OF THE TRIM PLATES AND THEIR SECURE FIXING !

(6)

ONE TRIM PLATE OF 1.11 KG EQUALS A PILOT MASS OF 2.5 KG (5.5 lbs.)

Only fitted where the support fittings for trim weights have been installed! (Optional extra!)

Fig.9.0-1 Cockpit View



10.3.2 Removing the landing gear

1. Undo the safety springs from the L/G doors.

2. Remove the wheel. In this case first unscrew the brake hose from the wheel brake cylinder and tape the apertures so that no brake fluid may run out. The bolt which holds the torque plate of the wheel brake cylinder, and the wheel axle must be removed. Now the wheel with the wheel brake cylinder can be pulled off the wheel fork.

3. Take off the two safety springs from the horizontal struts.

4. Unscrew the shock absorber legs and the horizontal struts from the wheel fork.

5. Dismount the battery box in the baggage compartment.

6. Undo the bolts which connect the A-strut on the right side with the actuating lever and on the left side with the bearing.
   Pull the actuating lever and the bearing from the side out of the A-strut.

Installing the Landing Gear back in place is done in the reverse order. When installing the shock aborsber legs be sure that the flat side of the rubber buffer discs shows upwards !
Bleed the wheel braking system. Check the brake system for leaks, action and effective brake operation !

10.4 Removing and installing tow release couplings

10.4.1 Tow release coupling fitted at the C.G.

1. Remove the seat back and the seat pan.
2. Undo the safety springs from the L/G doors.
3. Remove the wheel. First proceed as described in Section 2.3.4 Exchange of Brake Linings: dismount the wheel brake cylinder. The brake hoseline must be left attached throughout! The bolt which holds the torque plate of the wheel brake cylinder, and the wheel axle must be removed. Now the wheel with the wheel brake cylinder can be pulled off the wheel fork.
4. Take the two safety springs off the horizontal struts.
5. Remove the shock absorber legs.
6. Unscrew the release cable off the end fitting and turn out the three bolts which hold the tow release coupling. Pull out the release coupling to the front.

10.4.2 Tow release coupling fitted at the nose

1. Remove the fitting for pedal adjustment and the trim knob if applicable.
2. Remove back rest and the seat pan.
3. Unscrew the cover plate and the plate connecting the actuating cable.
4. Turn out the three bolts which hold the tow release coupling. Pull out the release coupling to the rear.

Installing the tow release couplings is done in the reverse order. When replacing tow release couplings, care should be taken to use again the production bolts of strength grade 8.8 for re-fitting as well as new lock-nuts.