DG
FLUGZEUGBAU GMBH

FLIGHT MANUAL

FOR THE SAILPLANE

DG-100

TYPE: DG-SINGLE SEATERS

VARIANT:
DG-100
DG-100 ELAN
DG-100 G
DG-100 G ELAN

TC DATA SHEET NO: EASA.A.239

ISSUED: December 2009

(Changes to and combination of the initial Service Manuals of all DG-100 Variants)

Owner: Aeroclub Volovelistico Lariano

Serial-No: E61G37 **Ident-No:** 553888

Registration: I-AYAX

Flight manual approved by EASA, Date 13.07.2010 under Approval No. 10030926

This sailplane is to be operated in compliance with information and limitations contained herein.

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0 General

0.1 Amendments

No.	Page	Description	Date	Inserted Signature
1	0.0-7.6	Combination of the initial flight manuals of the Variants DG-100, DG-100 ELAN, DG-100G and DG-100G ELAN, new standardized format	December 2009	
2	1.2, 2.1, 2.2, 2.4, 3.2, 4.7, 4.10 – 4.12, 6.1, 6.2	Miscellaneous changes to the contents of the latest amendments of the initial flight manuals	December 2009	

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0.2 Table of contents

Section Content **page**

1 Brief Description

Single-seat, high performance, Standard Class sailplane.

1.1 Construction

Wings and tail: GFRP foam-sandwich shell
GFRP roving flanged spar

Fuselage: GFRP shell

1.2 Landing gear

Main landing gear: retractable
Tire and Wheel: 5.00 x 5 Internal drum brake 14.5 inches circumferance.
The wheel well is completely sealed and isolated from the fuselage.
Tail wheel: tyre 200 x 50

1.3 Tow Hooks

DG-100 up to ser. no. 32:
C.G. hook: Safety tow release Europa G72 or Europa G73,
additional as an option: Nose release E85 installed below the instrument console only for aerotow

DG-100 from ser. No. 33 on and all other variants:
C.G. hook: Sonderkupplung SH 72
additional as an option: Nose release E85 installed below the instrument console only for aerotow

1.4 Cockpit

Inflight adjustable rudder pedals. Optional inflight adjustable backrest with provision for automatic or manual parachute.

Long canopy extends far down side of fuselage for excellent visibility. Quick-disconnect instrument console.

Trim, landing gear, and spoiler controls all on left side.

Parallelogram mechanism at stick for elevator control prevents PIO´s and unintentional movement of stick and elevator in turbulance.

1.5 Spoilers

Schempp-Hirth type on upper wing surface only.

1.6 Tailplane

1.6.1 DG-100 & DG-100 ELAN:

Mass-balanced, all flying horizontal T-tail with cockpit controlled, trimmable anti-tab.

1.6.2 DG-100 G & DG-100 G ELAN:

Damped stabilizer-elevator T type tail with spring trimmer.

1.7 Colour:

White, registration numbers grey or red or blue

1.8 Technical data

Wing span	b = 49.2 feet	15 m
Wing area	S = 118.4 square feet	11 m^2
Aspect ratio	$b^2/S = 20,5$	
Length	l = 23 feet	7 m
Airfoils	FX 61 – 184, FX 60 – 126	
Water ballast	21 US gal (176 lb) (80 kg) or 26 US gal (220 lb) (100 kg)	

2 Operational limitations and operational values

Category: N Normal category according to airworthiness regulations LFS

2.1 Airspeed Limits

All speeds I.A.S.

Never exceed (V_{NE})	260 km/h	(140 kts.)
Maximum speed in rough air (V_B)	260 km/h	(140 kts.)
Maneuvering (VA)	165 km/h	(89 kts.)
On aerotow (V_T)	165 km/h	(89 kts.)
On winch tow (V_W)	130 km/h	(70 kts.)
Landing gear extended	165 km/h	(89 kts.)
Spoilers extended	260 km/h	(140 kts.)

Full control deflection is permitted at all speeds up to maneuvering speed. At speeds in excess of maneuvering speed, control deflection should be reduced to prevent structural overloads. At maximum permissible airspeed only 1/3 of full control deflection should be used.

Maximum permissible airspeed is based on true airspeed. The airspeed indicator reads indicated airspeed. The higher the altitude, the greater the difference between true and indicated airspeed. The following table shows the indicated airspeed for V_{NE} at altitude.

Altitude in [m]	0-2000	3000	4000	5000	6000	7000	8000	9000	10000
V_{NE} IAS km/h	260	247	234	222	210	199	188	177	166
Altitude in [ft]	0-6560	9843	1312 4	1640 5	1968 5	2296 6	2624 7	2952 8	32809
V_{NE} IAS kts.	140	133	127	120	114	107	101	95	90

2.2 Center of gravity in flight

leveling means: Tail down slope of 100 : 3.67 measured at top surfacof aft fuselage boom. (See Maintenance Manual section 1.1)

Datum (d): Leading edge of wing at root.

DG-100 & DG-100 ELAN:

Forward limit:	199,6mm	7.86 inches	aft of datum
Aft limit:	365 mm	14.37 inches	aft of datum

DG-100 & DG-100 ELAN:

Forward limit:	200mm	8.66 inches	aft of datum
Aft limit:	357 mm	14.1 inches	aft of datum

2.3 Weights

Empty weight approx. 230kg (500lbs)
Maximum Take-Off mass
with 80kg (176lbs) waterballast at least: 418kg (922lbs)
without waterballast: W = WNLP + Wwings
WNLP = max. mass of al non lifting parts, see below
Wwings = actual mass of the wings (see weighing record)
Maximum landing mass: 418kg

Caution: It is recommended to dump the wateballast before landing on airfields. Dump the ballast before an outlanding in any case.

Maximum mass of all non lifting parts (for operation without waterballast): 265kg (584lbs)

2.4 Loading Plan

Cockpit payload (Pilot including parachute)
min. 75kg (165lbs) max.117kg (258lbs)
Pilots C.G. most forward position at max payload 492 mm, most backward position at min payload 537mm.
Maximum allowable gross takeoff weight must be observed.
It is essential to compensate for too little cockpit weight either by ballast in the pilots seat or trim weights in the trim weight holder (46,1 inches forward of datum). One 4.9 lbs. trim weight will compensate for 8 lbs. missing from the pilot seat. Seat ballast (metal or sand bags) must be securely fastened to the glider at the seat belt attachment points.
Baggage: 30kg (66lbs) at station 230mm (9.1 in.) aft datum.

Waterballast
Each wing tank has a capacity of 10 ½ gal (88lb) (40kg)
or 26 gal (110lb) (50kg).
Maximum allowable ballast ist determined by the empty weight and fuselage payload by means of diagram 6. Both tanks should contain equal amounts of ballast. Station 200mm (7.9 in) aft of datum.

2.5 Safety weak links

	Winch launch	aero tow
max.	5500 N (1240 lbs.)	5500 N (1240 lbs.)
recommended	5000 N ± 500 N (1120 ± 112 lbs.)	5000 N ± 500 N (1120 ± 112 lbs.) behind aircraft 3000 N ± 300 N (670+ 67 lbs.) behind ultralight aircraft or powerded sailplanes

2.6 Tire pressure

Main wheel: 36 lbs. (2.5bar)

Tail wheel: 28 lbs. (2 bar)

2.7 Aerobatics

(only without waterballast)

The following maneuvers are approved:

1. Spins:
   Entry: Start a slow pull-up. When the aircraft starts to buffet apply full back stick with rudder in the desired direction of rotation.
   Recovery: Rudder in the direction opposite to rotation, pause, then ease the stick forward. When rotation stops, neutralize rudder and gently recover from dive.
   A spin is not possible with the C.G. far forward, therefore, the C.G. should be mid-range when attempting spins. An aft C.G. will produce a flatter spin.
2. Loops: entry speed: 170 km/h (92 kts.)
3. Wingovers (Stall Turns):
   entry speed: 170 km/h (92 kts.)
4. Chandelles: entry speed: 170 km/h (92 kts.)

2.8 Instrument Flight (Cloud Flying)

Apprbved if properly equipped (see sect. 2.9)

2.9 Minimum Required Equipment

Airspeed indicator	50 - 300 km/h	(27 – 162 kts.)
green arc	65 - 165 km/h	(35 – 89 kts.)
yellow arc	165 - 260 km/h	(89 – 140 kts.)
red radial line	140 kts.	260 km/h

Airspeed indicator is to be installed so as to utilize the forward static ports.

4-piece safety belt

Altimeter, Magnetic Compass

Automatic or manual parachute or back cushiong(about 3 inches thick)

Cockpit placards, check list, data placards, flight manual

Additional for instrument flight (cloud flying)

- Radio (in working .order)
- Compass (properly compensated)
- Variometer
- Turn and bank indicator or gyro horizon

Note: Experience so far has proven the airspeed indicator installation suitable for instrument flight (cloud flying).

Caution: As minimum equipment only the instruments and equipment specified in the "instrument and equipment list" in the maintenance manual are permitted.

3 Emergency procedures

3.1 Spin Recovery

Keep aileron neutral!
Rudder in the direction opposite to rotation, pause, then ease the stick forward. When rotation stops, neutralize rudder and gently recover from dive.
Further details see section 4.7.

3.2 Recovery from unintentional cloud flying

Open the spoilers fully and maintain a speed of approximately 200 km/h, (108 kts.) until regaining visual flight conditions. Spinning should not be used as a rescue measure.

3.3 Rain and Ice

1. Influence on flight characteristics
   Landing speeds and stall speeds are only slightly affected. Otherwise, there is no discernable influence in flight characteristics due to rain or light icing.
2. Water ballast installation
   Freezing of the water is a possibility at ambient temperatures of 0° C. (32° F) or below so it is advisable to dump the ballast prior to encountering these conditions.

3.4 Canopy emergency release/ bail out

a) Two piece canopy:
   To bail out, open the canopy a few inches and it will be blown open and tear off in the airstream.

b) Single piece canopy:
   Open the canopy-opening lever and pull then the emergency release knob.

The low sides of the cockpit allows for a quick push-off exit.

3.5 Emergency landing on water

From the experience with emergency water landing we know that it is likely that the motorglider will dive into the water, cockpit first.

Therefore an emergency landing on water should be the last choice.
In the case of a water landing, however, extend the landing gear.

Recommended procedures :

On downwind leg of the landing pattern: Extend the landing gear, unlock the parachute harness (not the seat harness)

Touch down: With landing gear extended and airspeed as low as possible.

At point of touch-down: Use your left arm to protect your face against possible canopy fracture.

After touch down: Unfasten seat belt harnesses and undo parachute.

Leaving the cockpit under water: If the canopy has not fractured, opening the canopy may be possible only after the forward fuselage is almost completely filled with water.

4 Normal Operations

4.1 Daily Inspection

a) The aircraft surface must be free from uneveness or irregularities, blisters, depressions, or cracks in the finish. See also 1.6 in the service manual.

b) All control system quick-disconnect fittings and assembly pins are to be inspected. (See also part 5)

c) Check for any kind of extraneous matter or objects

d) Check aileron and rudder connections

e) Check all control elements for security and freedom of movement.

f) Tow release check. Function and free of dirt.

g) Visual check of landing gear, wheels, and tires

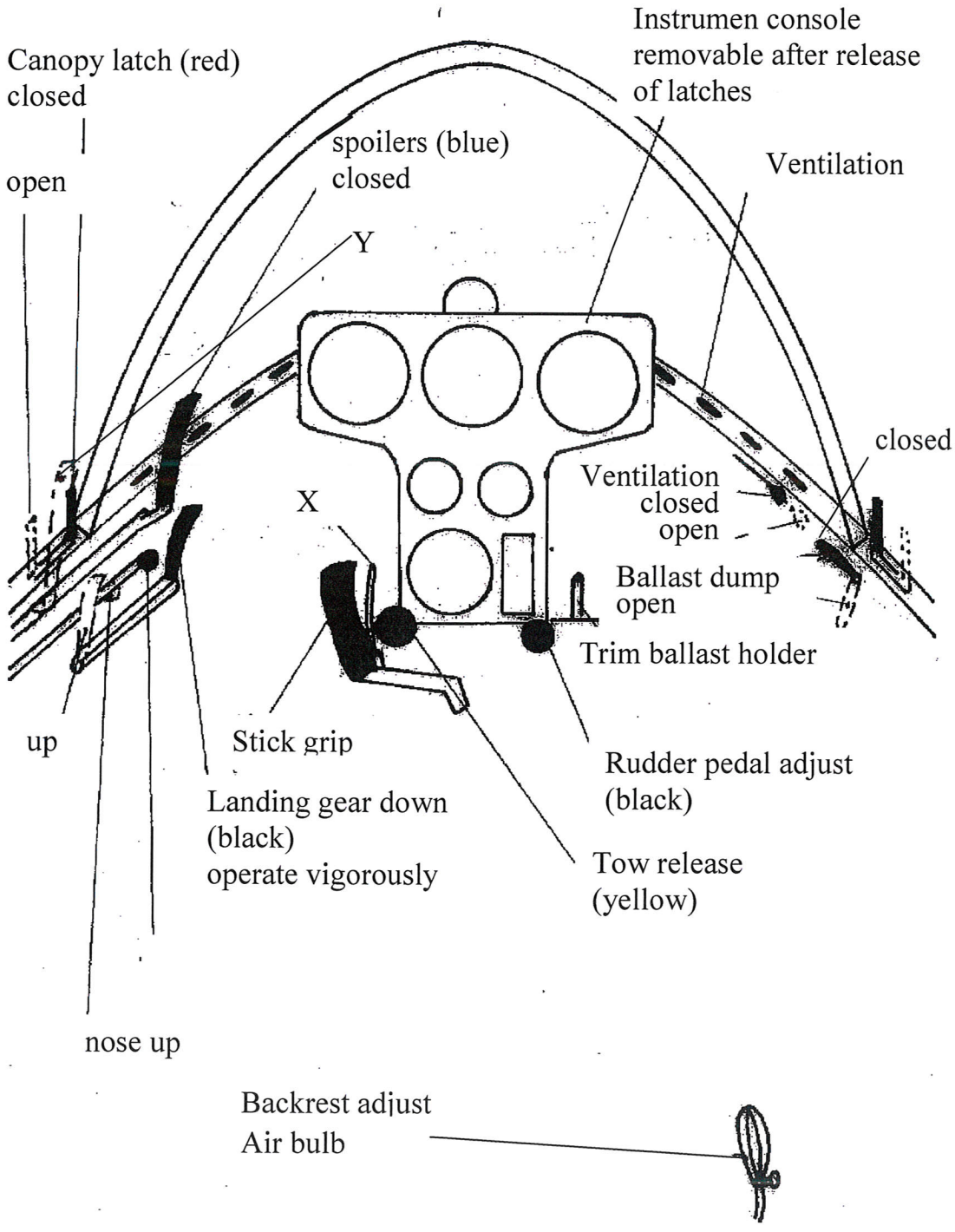
Dirt in the forks of the main gear may cause later retraction problems.

4.2 Cockpit and Controls

Handle X: DG-100 & DG-100 ELAN: Wheel brake
DG-100 G & DG-100 G ELAN: release of automatic trim (green)

Airbrake handle in position Y: All: Spoilers extended
Only DG-100 G & DG-100 G ELAN: in addition wheel brake operated

4.2.1 Two piece canopy

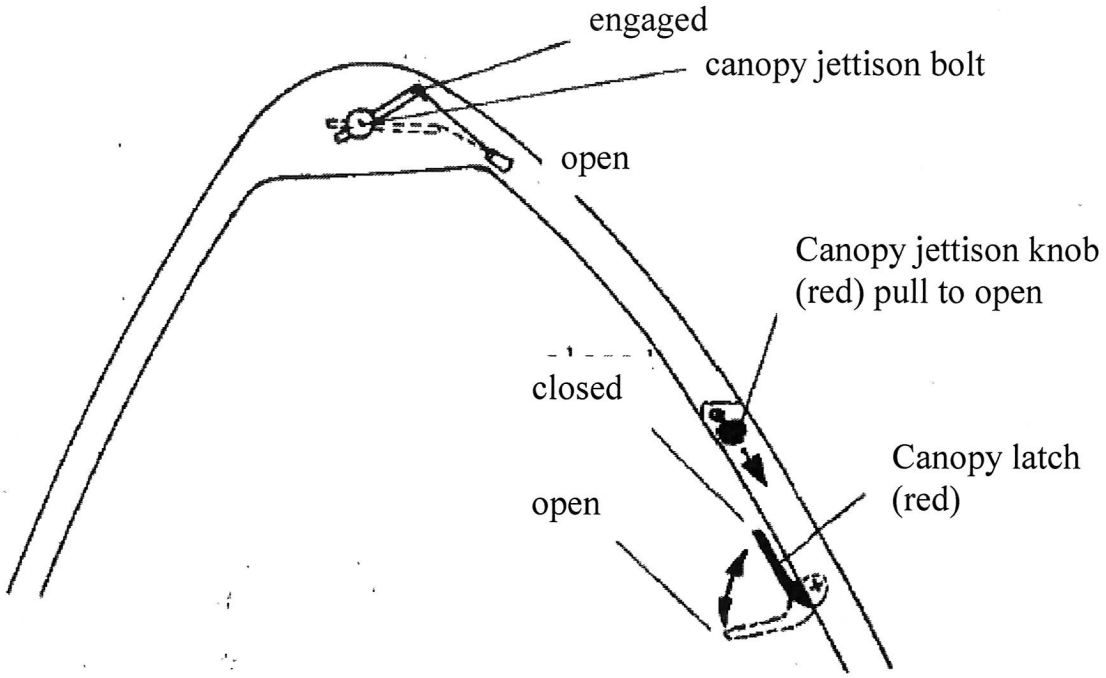


Warning: DG-100 & DG-100 G with with hinged 2-piece canopy
The open canopy has the effect of a burning glass when the sunshine is strong.

Especially the leatherette parts might be heated too much.

We recommend to keep the canopy closed or to cover it with a cloth.

4.2.2 Single piece canopy



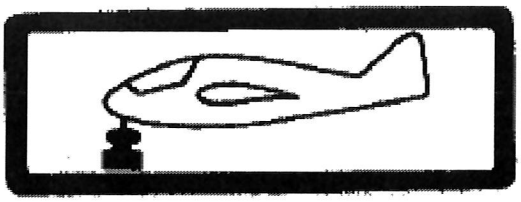
Canopy jettison:

1. open canopy latch
2. Pull canopy jettison knob
   The spiral spring installed in the front hinge will lift the canopy as far as necessary to be blown open by the airstream.

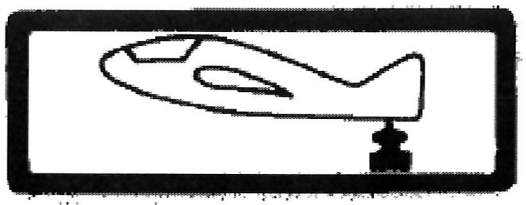
Ground function test of the canopy jettison:
Pull canopy jettison knob. The spring must lift the canopy 1 to 2 cm in the front even if the canopy latch is in its closed position.

Reassembly of the canopy:
Pull canopy jettison knob to fully open position. Pull the canopy hinge to its opened position. Insert the jettison spirng.
Take the canopy, one person in front, one person at the rear.
Attach the canopy on the hinge an press it down. Push the canopy jettison bolt with one hand into its forward engaged position.

4.3 Cockpit placards

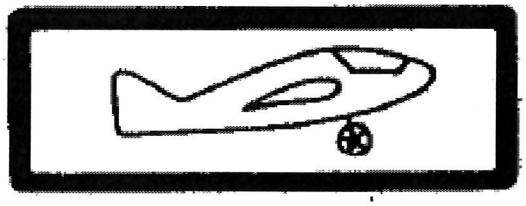


Nose down

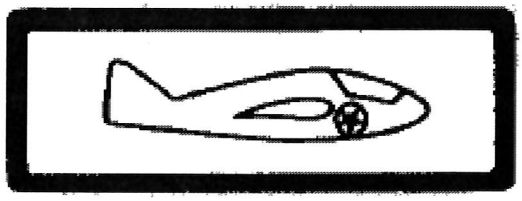


Trim

Nose up

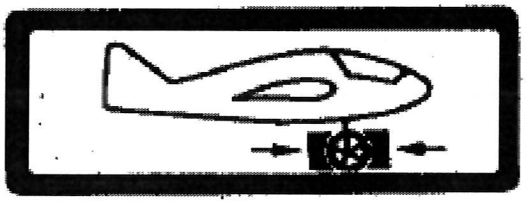


down

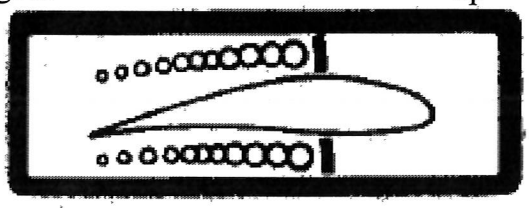


Landing gear

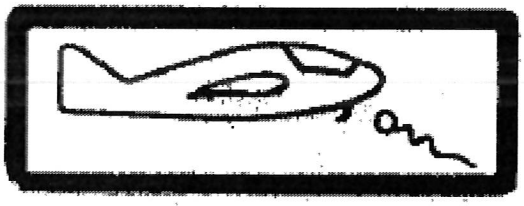
up



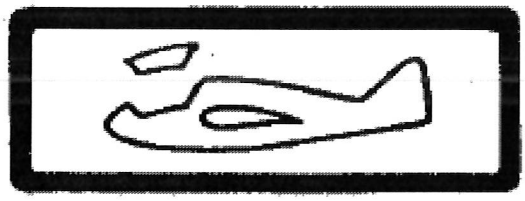
Wheel Brake



Spoilers



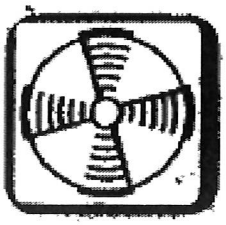
Tow release



Canopy latch

Rudder pedal adjust

Water ballast dump



Ventilation

4.4 Pre-flight check:

1. Trim weights?
2. Parachute worn correctly?
3. Pilot seat belts and shoulder harnest fastened?
4. Seat back and rudder pedals adjusted?
5. All controls and instruments in easy reach?
6. Altimeter?
7. Spoilers checked for operation and locked?
8. Flight controls tested?
9. Trim set?
10. Canopy properly closed and locked?

4.5 Trim system

4.5.1.1 Trim DG-100 and DG-100 ELAN:

Trimming is via handforce encreasing trim tabs at the all flying tailplane. The trim is a friction type having no notches. The friction force may be adjusted (see maintenance manual section 1.3.4).

4.5.1.2 Trim: **DG-100 G & DG-100G ELAN up to ser. No. E 57:**

The trim is a friction type having no notches. The friction force may be adjusted (see maintenance manual section 1.3.4).
The trim can be locked in position by tightening the green knob. This is recommended for take-off. After release, the green trim knob should be loosened so that it does not rub on the cover plate

4.5.1.3 Automatic trim control: **DG-100G ELAN from ser. No. E 58 on:**

To adjust the trim you have to pull the small release handle at the control stick and to place the control stick in the desired position.
When you let go the release handle your aircraft is trimmed to the adjusted control stick position.

4.6 Take – off

4.6.1 Take off Roll:

The location of the tow hitch in the fuselage centre line, the extraordinary aileron control, and the low lift-off speed with its reduced ground roll all combine in a controllability that effectively reduces possibility of wing drop and ground loop. These factors also enhance crosswind performance.

4.6.2 Aero-tow:

a) If only a C.G. release is installed, then the aerotow is to be executed with this release.
DG-100 & DG-100 ELAN; Set trim ½ in. (12 cm) aft of full nose down.
DG-100 G & DG-100 G ELAN: Set trim full nose down.

b) If an additional tow release for aerotow is installed, only this release should be used for aerotow.
DG-100 & DG-100 ELAN: Adjust the trim for aerotow so that the indicator is 3 cm (1.2 in.) behind the forward position.
DG-100 G & DG-100 G ELAN: Adjust the trim for aerotow so that the indicator is 2 cm (0.8 in.) behind the forward position.

c) General: Hold stick in resulting position and at 75 – 80 km/h (38-43 kts.) ease stick back to lift off. On very rough surfaces keep a tight grip on the stick. After attaining safety altitude the landing gear can be retracted with a forceful operation of the gear handle. Normal tow speed is 100-120 km/h (54-65 kts.). Cruising tow speed is 165 km/h (90 kts.).

4.6.3 Winch Launch:

(only allowed at the C.G. release)
All phases of the takeoff are normal. After reaching a safe height, the stick should be pulled back slowly, so that not too much speed is gained. The most comfortable winch speed is 100-110 km/h (54-60 kts.), with a minimum of 90 km/h (49 kts.), and a maximum of 130 km/h (70 kts.). Pull the tow release after reaching launch altitude. Do not wait for the automatic to function.

4.7 Free Flight

4.7.1 Thermal Soaring:

Because of the long tail moment arm all DG-l00 variants have good directional stability. The good roll rate (3.5 sec. from 45° bank to the opposite 45° bank) provides the maneuverability to immediately compensate for irregularities in thermal strength or size. Quick maneuvering at very slow speeds can be done without fear of stall.

4.7.2 Stall Characteristics:

When the DG-100 (all variants) stalls it really only mushes without a distinct stall break. Full aileron control is always available. Entering the stall with more speed and a sharp pull-up will force the glider to a more distinct stall break and a roll to the side. Easing up on the stick and rudder in opposition to the roll will execute a recovery without much loss of altitude. Rain has been found to have very little effect on stall characteristics.

4.7.3 High Speed Flight:

DG-100 & DG-100 ELAN: The stabilator is mounted in such a way that rough air does not transmit pitching forces to the stick. The trimmable anti-tab provides stability.

All DG-100 variants: The parallelogram stick configuration adds to the stable flight characteristics. It helps reduce the possibility of pilot induced oscillations.

All DG-l00 variants may be trimmed at any speed up to maximum, however, the pilot should maintain a grip on the stick at all times at high speeds. Maximum permissable speed of 270 km/h (135 kts.) must be observed.

Do not exceed the maximum airspeed of 260 km/h, 140 knots.

4.8 Spins

Water ballast in both wings does not affect spin performance. Spoilers should not be opened at any time to enter or recover from a spin. The DC-loo has no spiral dive tendency.

4.8.1 Spins DG-100 & DG-100 ELAN:

The spin performance is strongly dependent upon the C.G. location.
The following are some examples of spin characteristics for typical C.G. locations.

x_S = 19,96 cm (7.86 in.): A spin is not possible with this C.G. location. Depending upon the manner of pull-up the aircraft may stall and change heading 90-180 degrees before resuming straight flight or it may simply mush straight ahead.

x_S = 32,18 cm (12.67 in.): A spin is possible under the following conditions:
From slow flight just slightly above Vs, quickly pull back on the stick all the way and then apply full rudder. When the rudder tends to stay in this position, a steady state spin is achieved. Accompanying this is a slow longitudinal pitch down tendency which does not affect the recovery pull out.
If on recovery the rudder is only returned to neutral, the aircraft will continue to rotate ¾ of a turn. Full opposite rudder will result in only ¼ to 1/3 turn before recovery. The highest recovery speed will be 150 – 160 km/h (81-86 kts.).

x_S = 36,5 cm (15.2 in.): The pitch down in the spin is the very minimal as is also the airspeed during pull out. Recovery is normal with opposite rudder. Spinning from 45° bank with rudder into the rotation- simply neutralizing the rudder will not stop the spin. Full opposite rudder and full back stick will result in a recovery after 3 more turns.
Neutral stick then full opposite rudder will cause the aircraft to make 1 ½ turns before recovery. The quickest method is full opposite rudder followed by neutral stick or slightly forward of neutral which will result in recovery after ½ turn.

4.8.2 Spins DG-100 G & DG-100 G ELAN:

Inducing a spin:

With the C.G. position forward or in the middle of the C.G. limits the DG-100 G will not remain in a spin regardless of a stick position. Trying to induce a spin in the usual manner will result in a skid or a stall over one wing with the DG-100 G recovering after a quarter turn.

With the C.G. further aft the pilot can induce a spin by the standard method.

Inducing a spin: gradually bring the sailplane into a stall. When it starts to burble, pull the stick back completely and kick in full rudder in the spin direction.

Recovering from a spin:

Opposite full rudder, pause, then ease stick forward, after the spin has stopped neutralize the controls and carefully pull off excess speed.

4.9 Cloud flying

Take care to fly cleanly. Do not induce a spin as a method for losing altitude in the clouds. In a case of emergency pull out the drive brakes fully before exceeding a speed of 200 km/h and drive at 200 km/h (108 knots) to leave the cloud.

At higher speeds up to VD carefully pull out the airbrakes to prvent the aircraft from damage caused by high aerodynamic and g-loads.

Warning: Flying in or near thunderstorm-clouds is prohibited.

4.10 Flight in rain and thunderstorms

With light rain the stall speed and the sink rate increases slightly and the approach speed has to be increased.

Warning: Flights and especially winch launches in the vicinity of thunderstorms should be avoided. Due to lightning discharge, composite structures may be destroyed.

4.11 Aerobatics

(only without waterballast)

Only the maneuvers listed below are approved. If the given entry speeds are observed, there will be no necessity for especially vigorous control application and high structura loads will be avoided. All maneuvers are to be done gently.

The following maneuvers are approved:

1. Spins		entry speed
2. Loops	170 km/h	(92 kts.)
3. Wingovers (Stall Turns)	170 km/h	(92 kts.)
4. Chandelles	170 km/h	(92 kts.)

The wingover is especially graceful when not only rudder is used but also a little aileron in the direction of turn. The amount of aileron should be reduced at the top of the maneuver.

4.12 Approach and Landing

Final approach speed in smooth air 90 km/h (49 kts.). Good short field landing capability due to the high rate of descent possible with the Schempp-Hirth spoilers. The DG-100 (G) slips well and this can be used as an approach aid. Low speed controllability is such that landings in even strong crosswinds are simple and routine.

The approach speed should be increased by approximately ½ the wind velocity to protect against low level wind shear. This extra speed can be reduced just prior to touchdown. Additionally, in gusty conditions the approach speed should be increased and this extra speed should be carried to touchdown.

The docile nature of the FX 61 – 184 airfoil will permit even a tail whell first touchdown without the subsequent hard drop-in.

Landings in very soft fields with the landing gear down are possible if the stick is held back during roll-out. Only for landings in very short fields should the landing gear be left retracted.

After a soft field landing it is important to remove dirt or other foreign matter from the retraction cables to prevent the possibility of future retraction problems. A simple hosing with water is the best cleaning method.

4.13 Hints for the Competition Pilot

A few general tips on ballast:

For lift of less than 1 m/s (2 kts.) it will be profitable to fly **without ballast.** This is also true for extremely weak weather or when working the weak evening lift.

Medium lift of 2 m/s (4 kts.) will require about **half ballast**, 40 l or 11 US gal. (9 Imp. gal.).

Use **full ballast** in lift of 3 m/s (6 kts.) or more.

Maximum allowable takeoff gross weight must be observed. The maximum ballast is determined by empty weight and fuselage payload by means of Diagram 5.

While in flight, ballast may be reduced as desired by using a dump rate of approximately one quart per second (1 l/sec.).

The competition pilot will appreciate the enhanced response given by a center of gravity which lies near the aft limit.

To obtain maximum performance, the sailplane surfaces should be clean and gaps at the wing and fuselage junction and at the tail should be sealed with tape.

The polar (diagram 1) is valid only under these conditions.

An accumulation of dirt, rain etc. will degrade performance slightly.

Good instrumentation is necessary to achieve high efficiency flight. In addition to a variometer, one certainly should have a combination instrument which displays airspeed, vertical velocity, and Mc Cready values. Several "Sollfahrtgeber" instruments are available from German manufacturers. The following Mc Cready values are computed for still air.

Mc Cready value		Wing loading			
		5.9 lbs/sqf	29 kg/m^2	6.8 lbs/sqf	33 kg/m^2
		Airspeed			
m/s	kts.	kts.	km/h	kts.	km/h
0	0	51	95	54	100
1	2	68	125	70	130
2	4	78	145	84	155
3	6	90	165	96	175
4	8	98	180	101	185

4.14 Water ballast

4.14.1 Water ballast DG-100 (G) up to Ser.No. 103

One 40 kg or 50 kg water bag in each wing.

4.14.1.1 Filling the ballast

Close dump valve and lower a wing. Connect the supplied clear plastic tube. Fill ballast tank while observing tube. After the tank is full (as indicated by the sight tube), raise the wing and drain the water remaining in the tube. Remove the fill tube and connect hose to dump valve. Repeat for other wing. After loading ballast, level wings and check for inbalance. Correct imbalance by draining the required amount from the heavy wing.

The PVC connections should be lubed occasionally to prevent binding.

4.14.1.2 Dumping the ballast

Dump is accomplished through a central valve in the fuselage and out of an opening behind the main gear. On the ground each wing can be drained individually by lowering the opposite wing. The dump rate in flight is about one Liter per second (1 quart per second) so the amount remaining can be easily controlled.

4.14.2 Water ballast DG-100 (G) from Ser.No. 104 & DG-100 (G) Elan

One 50 kg water bag in each wing.

4.14.2.1 Filling the ballast

For filling the waterballast pull back the lever (top-right tank, bottom-left tank) in the cockpit.
Place one wingtip on the ground. Attach the hose connection in the water outlet on the undersurface of the wing.

Fill with the desired amount of water, remove the hose and close the valve with the waterballast lever. Place the other tank.
In case the valve leaks slightly, apply some grease to the valve surfaces.
After filling the tanks, check to see if the wings are balanced. If one wing is heavy, release enough water to balance the wings.

4.14.2.2 Dumping the ballast

Dump is accomplished through two valves, one in each wings bottomside near the fuselage. On the ground each wing can be drained individually by opening only one valve. The dump rate in flight is about one quart per second so the amount remaining ca be easily controlled.

4.14.3 Precautions Concerning Flight with Ballast

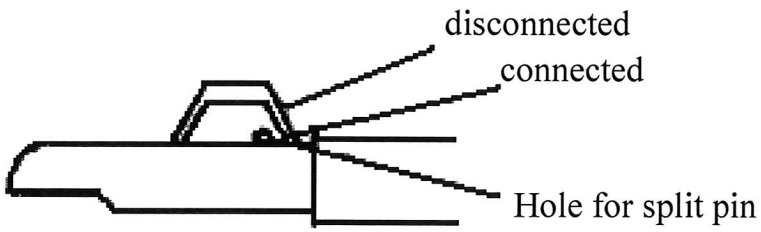
Ambient temperatures of less than 0° C could cause the water to freeze so dump ballast prior to encountering these conditions. Ballast raises the landing speed and increases the landing roll. It is, therefore, recommended that ballast be dumped before landing off-field.

Dump immediately in case of leak.

Maximum allowable ballast is determined by use of diagram 6.

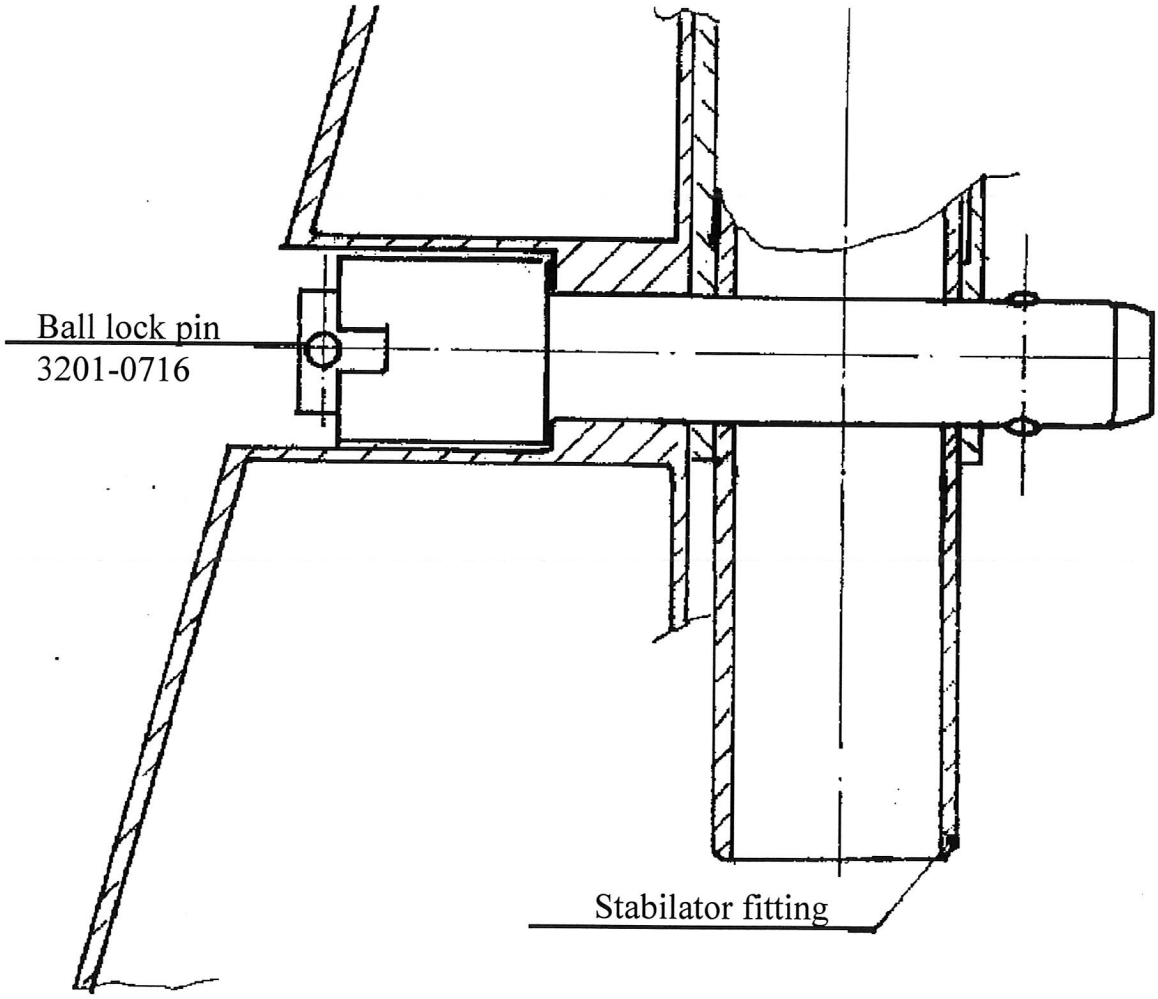
5 Rigging

1. Open the canopy (2 piece canopy without hinge: take off the canopy) and open the access cover with a coin or a screwdriver.
2. Clean and lube the pins, bushings and the ball ends of the control rod quick connects.
3. With a helper on the wingtip, lead the wings into place. Sight through the wing main pin bushings to determine alignment. Push the main pins in as far as possible.
   DG-100 & DG-100G, DG-100 ELAN & DG-100 G ELAN up to ser. No.E 45: With wings in place, sight through wing spar pin bushings and align by adjusting wing tip heigth. Completely insert wing spar pins and turn the grips into the U-shaped keepers. Secure with safety pins.
   DG-100 & DG-100G, DG-100 ELAN & DG-100 G ELAN from ser. No. E 46 on: Turn the handles up to the fuselage wall. Therefore pull out the white securing knob. Set the knob back in its locking position.
4. Connect aileron and spoiler controls. Spoilers are best connected in the closed but not locked position. To check the quick connects, ensure that the sliding latch has returned as far as it can locking the ball end in place. The hole must be visible. It is recommended to fit a diameter. 1 mm spring pin in the hole (50030771). Attach cover plate.



Only: DG-100 & DG-100G, DG-100 ELAN & DG-100 G ELAN up to ser. No.E 45: Connect water ballast cables.

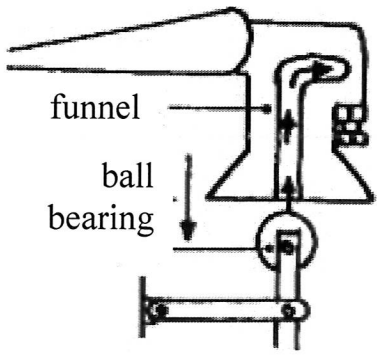
5. **Rigging the horizontal tailplane**
   DG-100 & DG-100 ELAN: Mount stabilizer, letting it rest, for the moment, on the locking pin. Attach the trim tab fork to the trim drive. (The cockpit control should be in the full backward position). Pull out locking pin. Seat stabilizer completely and secure locking pin. Attach stabilizer control quick-disconnect. (See step 4 above).
   Attach cover plate (screwdriver).



5. horizontal tailplane cont.

DG-100 G & DG-100 G ELAN up to E 45: Set the trim nose down. Set the stabilizer on, leading the lower pins into the holes bored to hold the stabilizer temporarily a few inches above the fin. Connect the elevator with the quick connect. Pull the stabilizer forward letting it down and push it back into final position. Using an 8 mm wrench (supplied with DG-l00 G) tighten the front mounting bolt. Turn it so that the safety spring locks.

DG-100 G ELAN from E 46: Rigging of the stabilizer with the automatic elevator control self connection mechanism. Set the trim nose down. Set the stabilizer on, so the the hall bearing at the fuselage side push road is inserted into the funnel at the elevator. Look through the plexiglas disc to watch the procedure. When stabilizer is set down laying on the fin push it back. The ball bearing will slide forward in the funnel if you will hold the elevator in the pertinent position. Use an 8 mm wrench (supplied with your glider) to tighten the front mounting bolt. Turn it so that the securing spring engages into the slit of the bolt.



6. Check flight control movement
7. Check: Main tire pressure 2,5 bar 36 psi
   Tail wheel 2 bar 28 psi
8. Check instruments

6 Emergency bail-out aid NOAH (Option)

Section 1

Introduction

In the following text the changes to those sections of the flight manual which are effected by the installation of winglets at the 18m wingtips will be given

Brief description

NOAH is a system to facilitate the bail-out of the cockpit in an emergency.
NOAH is a supplementation to the parachute.
NOAH features an airbag similar to a car airbag. The gas which is necessary to inflate the bag is stored in a pressurised gas cylinder. The actuation is by mechanical means via a handle at the right hand side near the control stick.
To actuate NOAH the canopy must be opened or jettisoned first. The system is secured by a metal plate at the actuation unit which is blocked by a GFRP block at the canopy frame.
When the NOAH system is activated the seat harness buckle will be opened prior to the opening of the pressurised gas cylinder. The pilot will be lifted by the airbag so that he can roll himself out of the cockpit.
If NOAH is used together with an automatic parachute, the emergency bail out procedure will be more or less automatic after operation of the NOAH handle.

Note: The NOAH airbag is constructed with a designed porosity so that after filling the gas will stream out slowly. This is to prevent injuries to the pilot if the seat harness buckle is not opened.

Technical data:

Mass of all parts: approx. 4,5 kg
Generation of pressure: nitrogen approx. 200 bar
Filling time: approx. 2 seconds
Design range: pilot mass 110 kg up to 4 g

Section 3

Use of NOAH in case of an emergency bail out:

Caution: We recommend strongly the use of an automatic parachute. Only with an automatic parachute will the bail out procedure be nearly automatic and precious time and altitude can be saved.

For the bail out jettison the canopy first, therefore pull the canopy emergency release and if necessary push the canopy upwards.

of the loops first.

Then pull the NOAH handle (at the right hand side next to the control stick, marked black and yellow) **strongly and quickly** up to its stop.

Roll out of the cockpit to the right hand side if possible, as on the left hand side the airbrake handle may impede the procedure.

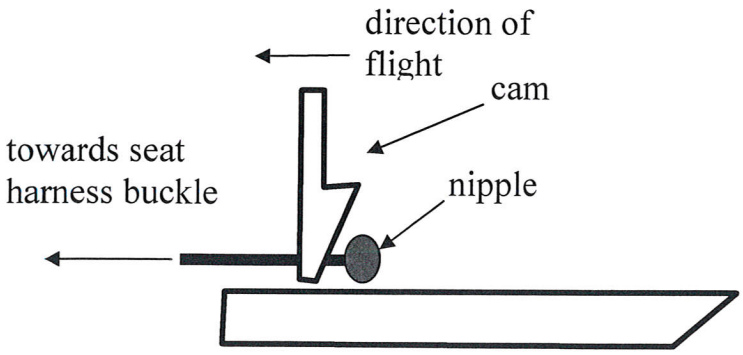
Caution: Don't operate the NOAH handle on the ground with open canopy as you may release NOAH and the pressurised gas cylinder must be filled again.

Section 4.1

The NOAH actuation handle is located at the right hand side abeam the control stick, it is marked black and yellow.
A sticker is wrapped around the actuation handle and the guiding tube for the actuation cable. The sticker serves as an additional means to guard against inadvertent operation.

Section 4.4

a) Pre-flight inspection
Check the airbag, the high pressure hose and the operating cables for correct positioning and for any wear.
Check especially if the nipple of the cable which opens the seat harness buckle is positioned aft of the cam of the actuation unit see sketch:



detail of the actuation unit
(at the right hand side cockpit wall in front of the main bulkhead)

b) For normal opening of the seat harness buckle rotate the buckle only in clockwise direction.

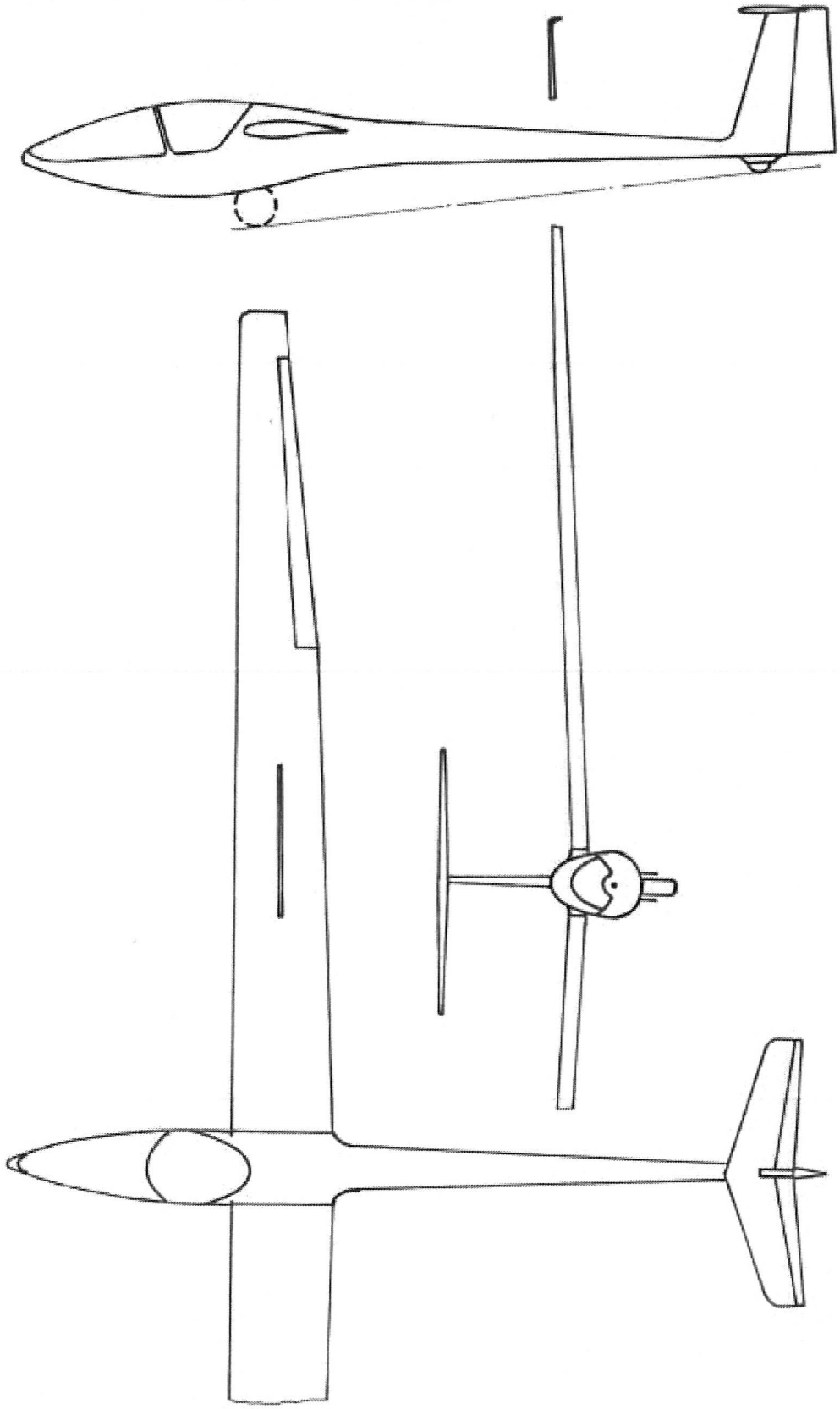
Inspections and maintenance

For inspections and maintenance please refer to the "manual for the emergency bail out-aid NOAH".

7 Diagrams

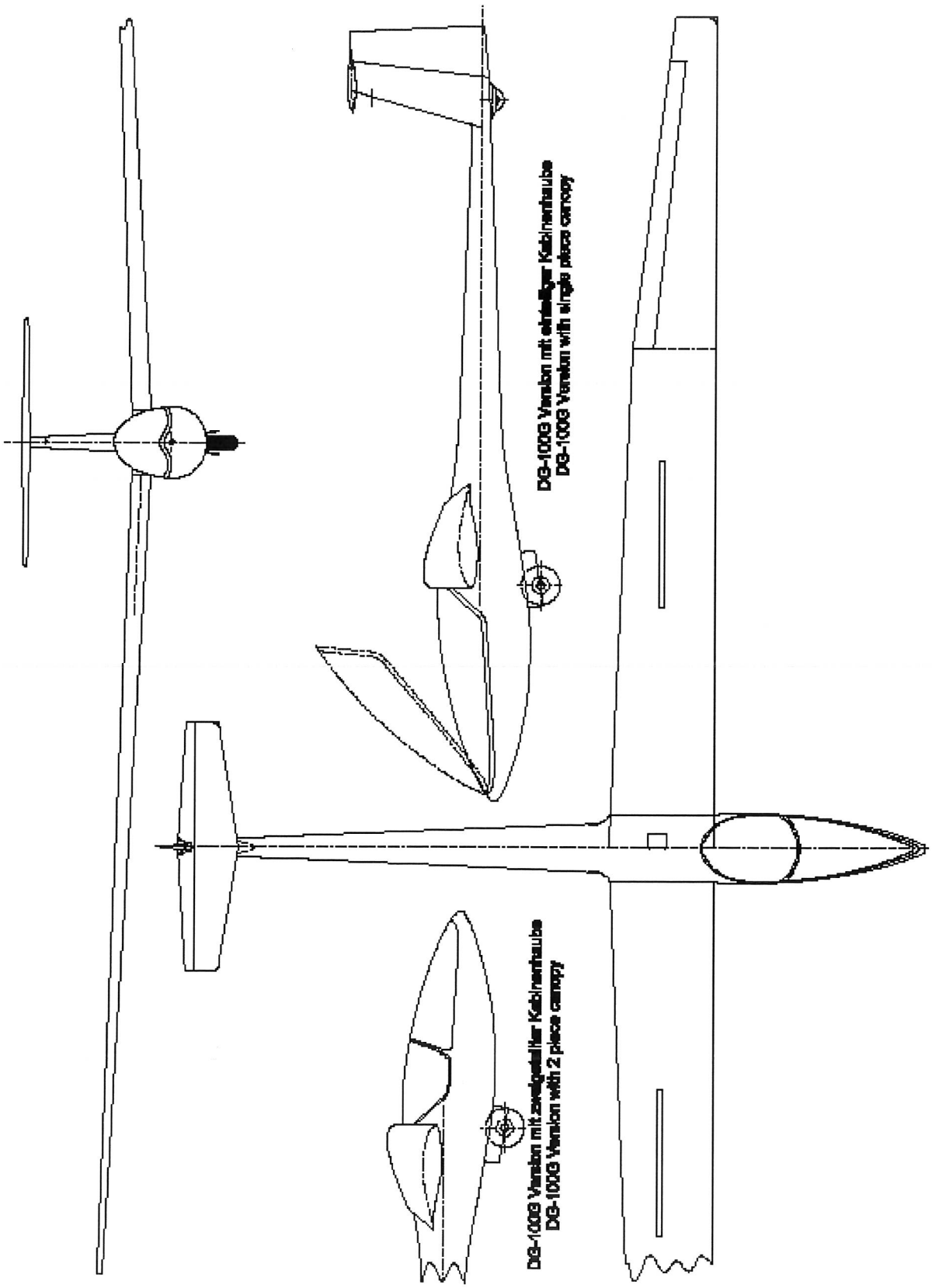
7.1 3-view drawing DG-100

diagram 1



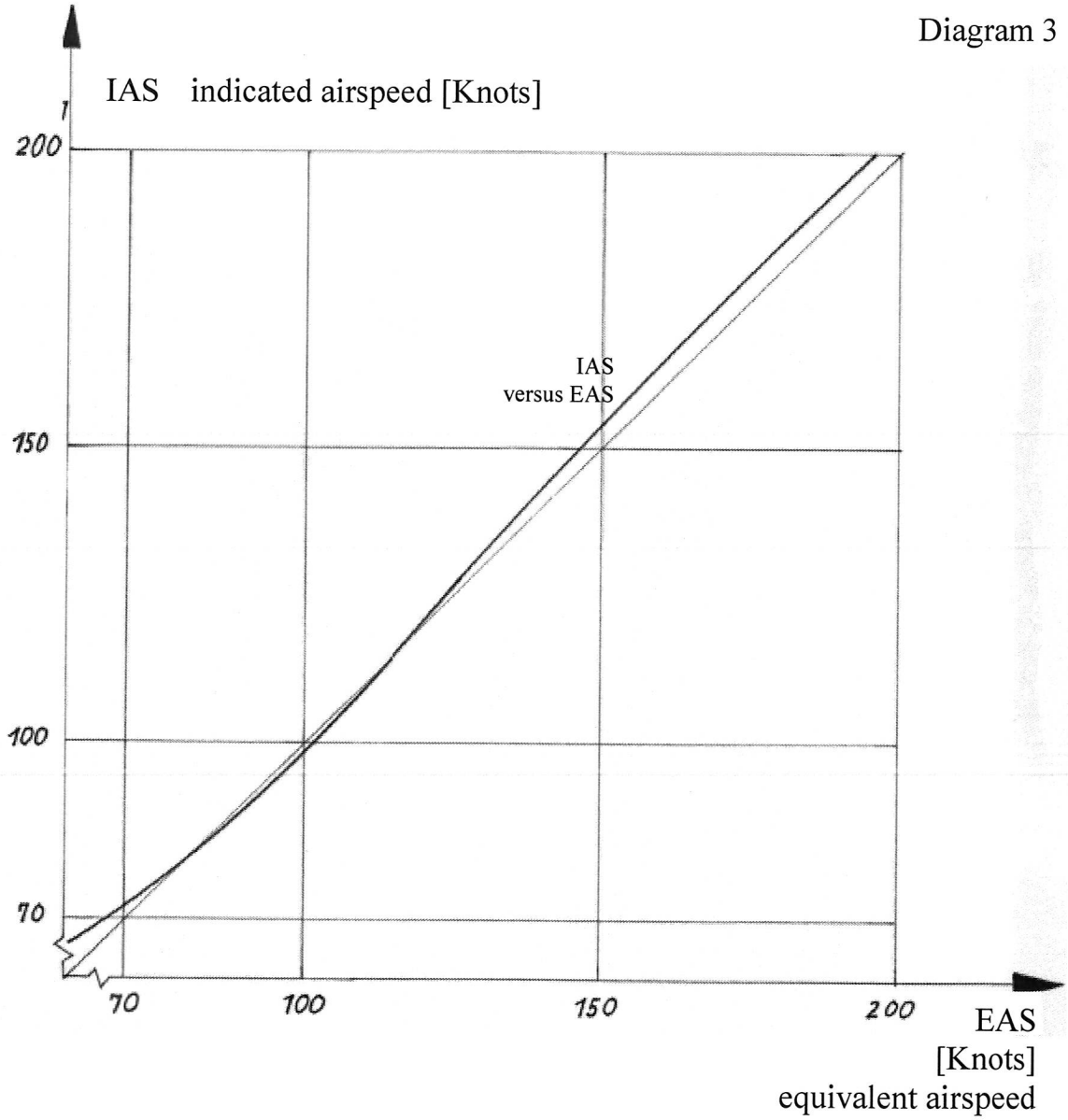
7.2 3-view drawing DG-100G

diagram 2



7.3 Airspeed calibration

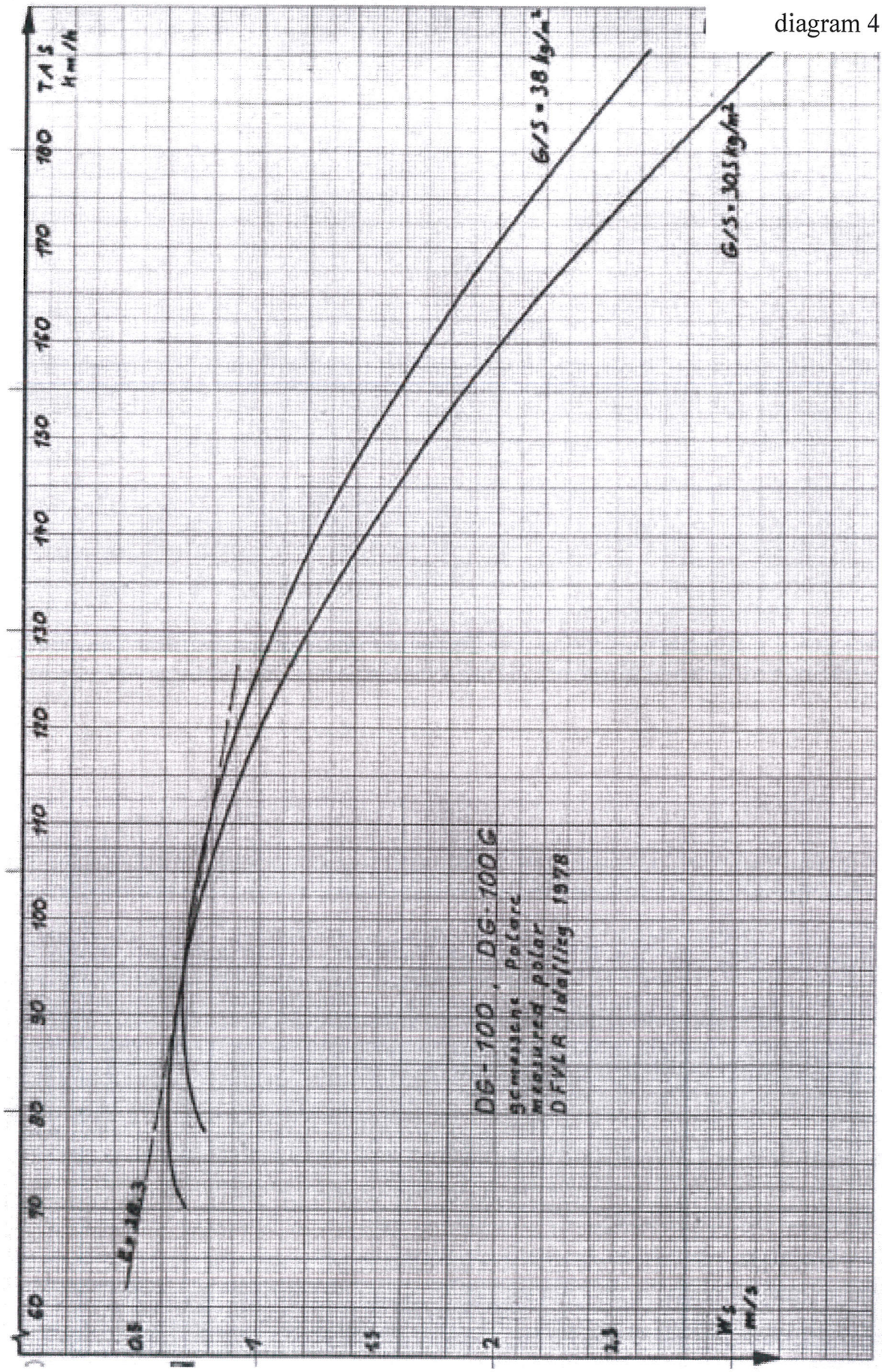
Diagram 3



The airspeed indicator utilizes the forward static ports.

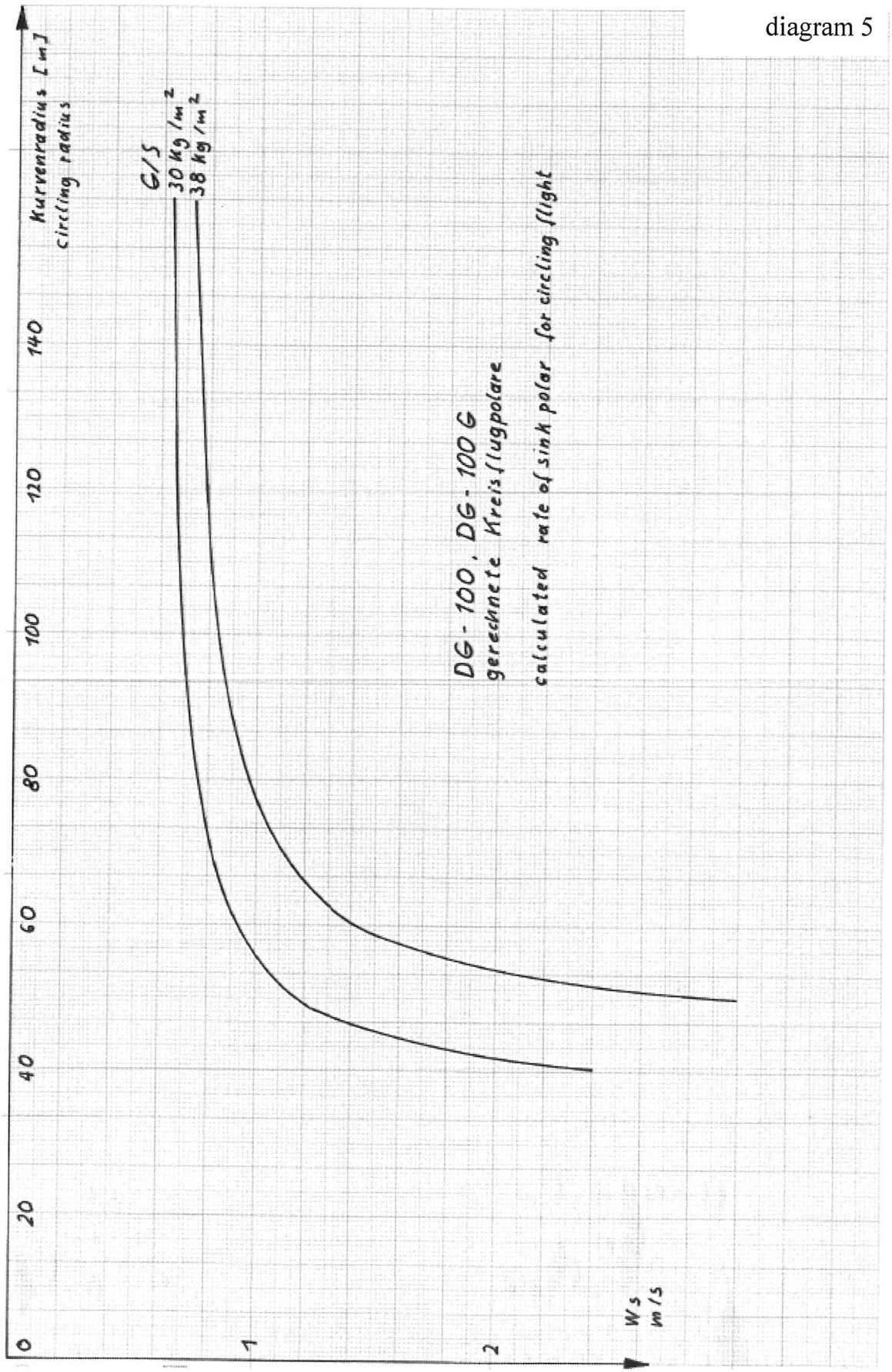
7.4 Measured polar

diagram 4



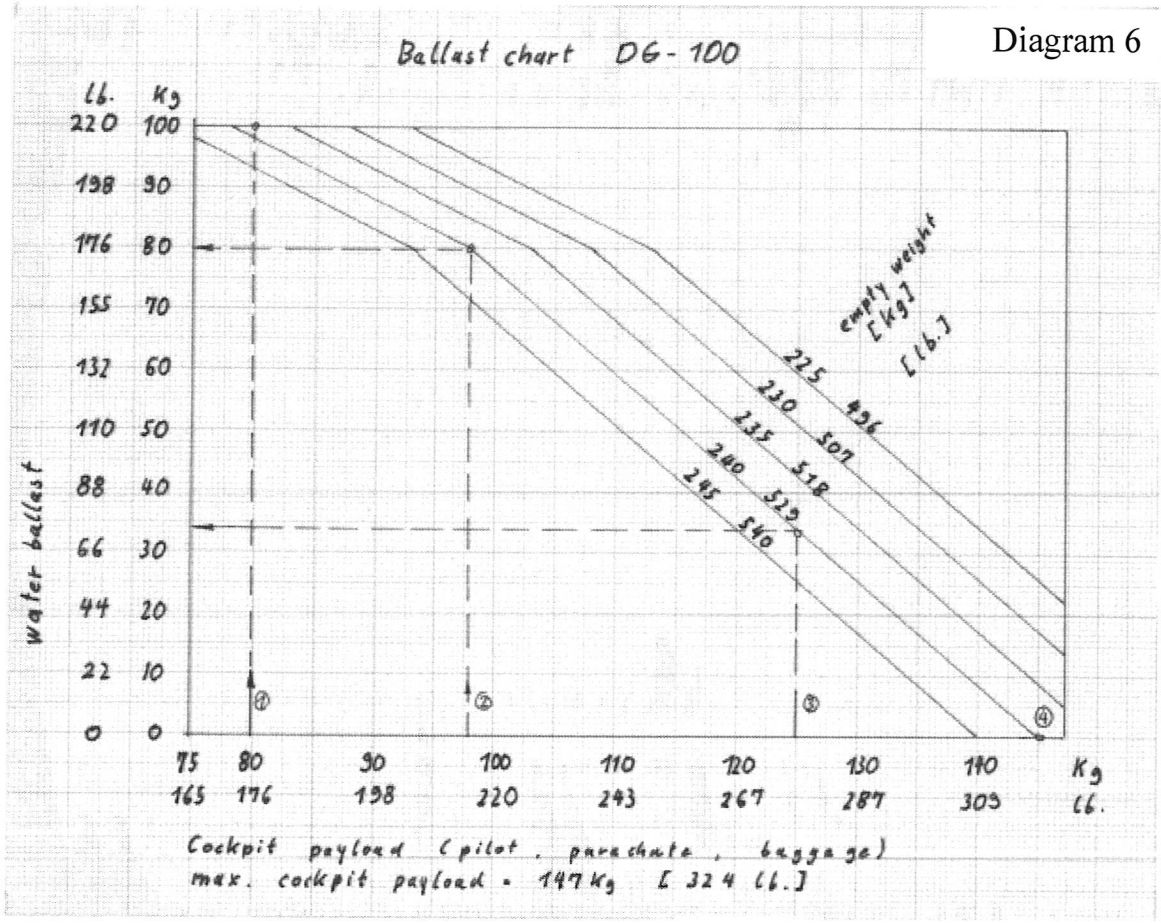
7.5 Circling rate of sink polar

diagram 5



7.6 Ballast chart

Diagram 6



Examples for calculating the water ballast:

Emptyweight (p. 4) -	kg (lb)	235 (518)	340 (529)	240 (529)	240 (529)
Pilot and parachute -	kg (lb)	75 (165)	90 (198,5)	105 (231,6)	115 (253,7)
Baggage ----------	kg (lb)	5 (11)	8 (17,6)	20 (44)	30 (66)
Water ballast	kg (lb)	100 (220)	80 (176,5)	34 (75)	– –
Take off weight	kg (lb)	415 (915)	418 (922)	399 (880)	385 (849)

max. take off weight
without water ballast ---------- 385 kg (849 lb)

max. take off weight
with min. 80 kg (176 lb) water ballast ---------- 418 kg (922 lb)