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# F L I G H T  M A N U A L

for the

## S A I L P L A N E

# DG-500 ELAN Trainer

Model: DG-500 ELAN TRAINER
German Data Sheet No.: 348

Factory Serial No.: _____

Registration No.: _____

Date of Issue: December 1990

Pages as indicated by "App." are approved by:

(Signature) _____

(Authority) Anerkannt durch Luftfahrt-Bundesamt

(Stamp) _____

(Original date of approval) 07. Dez. 1990

This sailplane is to be operated in compliance with information and limitations contained herein.
The original German Language edition of this manual has been approved as operating instruction according to "Paragraph 12(1) 2. of Luft-Ger Po".
Approval of translation has been done by best knowledge and judgement. In any case the original text in German language is authoritative.

## 0.1 **Record 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 left hand of the page.

| Rev. No. | Affected pages / section | Description | Issue Date | LBA Approval Date | Inserted Date Signature |
|---|---|---|---|---|---|
| 1 | 0.3,2.8, 2.9,4.8 | TN 348/1T | Mar. 92 | 31.03.92 | |
| 2 | 0.4,7.2 | TN 348/3T | Oct. 92 | 08.12.92 | |
| 3 | 0.3,1.2, 4.14 | TN 348/4T | Oct. 94 | 26.10.94 | |
| 4 | 0.3,0.4, 1.3,4.1, 4.2, 4.3, 5.2, 5.5, 5.6, 6.2, 6.4, 6.7, 7.1, 7.9, 7.10 | TN 348/9 | Oct. 97 | 26.11.97 | |
| 5 | 0.3, 0.4, 4.5, 7.7, 8.2 | TN 348/15 | Jan. 01 | 07.02.01 | |
| 6 | 0.4, 7.5, 7.5a | TN 348/16 Parking brake/ Piggott-hook | February 2004 | 25.02.04 | |
| Rev. No. | Affected pages / section | Description | Issue Date | EASA Approval Date | Inserted Date Signature |
| 7 | 0.3, 0.4, 2.6, 2.7 3.1-3.4, 4.1, 4.5, 4.11, 7.1, 7.7, 7.8 | TN 348/20 manual revision | May 2008 | August 1. 2008 | |
| 8 | 0.4, 9.1, 9.2 | Special equipment for very small pilots TN500/02 | May 2010 | 20.07. 2010 | |

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| Rev. No. | Affected Pages/ section | Description | Issue Date | LBA Approval Date | Inserted Date Signature |
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## 0.2 List of effective pages

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| | 0.3 | see record of revisions | | | |
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## 0.3 Table of contents

# Section 1

## 1.1 Introduction

The sailplane flight manual has been prepared to provide pilots and instructors with information for the safe and efficient operation of the DG-500 ELAN TRAINER sailplane.

This manual includes the material required to be furnished to the pilot by JAR Part 22. It also contains supplemental data supplied by the sailplane manufacturer.

## 1.2 Certification basis

This type of glider has been approved by the Luftfahrt-Bundesamt (LBA) in accordance with:

JAR Part 22 sailplanes and powered sailplanes Change 4, issued 7th May, 1987.

The Type Certificate No. 348 has been issued on December 7th 1990.

Category of Airworthiness: "Utility" or "Aerobatic" if equipped properly.

## 1.3 Warnings, cautions and notes

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

**Warning:** means that the non observation of the corresponding procedure leads to an immediate or important degradation of the flight safety.

**Caution:** means that the non observation of the corresponding procedure leads to a minor or to a more or less long term degradation of the flight safety.

**Note:** draws the attention on any special item not directly related to safety but which is important or unusual.

## 1.4 Descriptive data

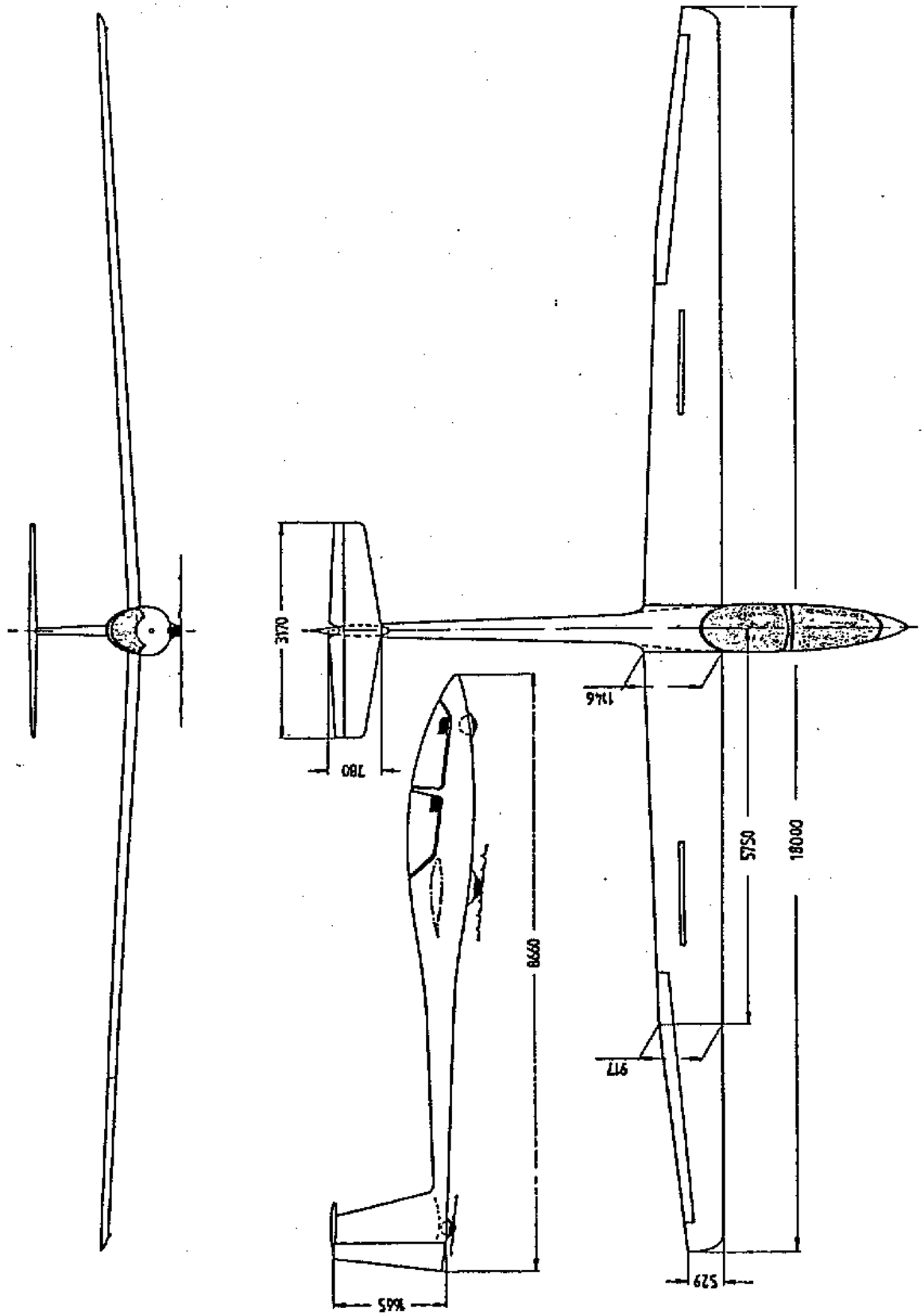
The DG-500 ELAN TRAINER is a twoplace high performance sailplane.

- automatic hook ups for **all** controls
- comfortable seating and modern cockpit design similar to the DG-single seaters - safety cockpit
- large 2 piece canopy for very good inflight visibility
- draught free canopy demist and 1 adjustable swivel air vent for each pilot
- sealed airbrake- and landing gear box
- complete set of controls in each cockpit
- a choise of retractable or fixed main wheel, both spring mounted
- nose wheel and tail wheel
- carbonfibre wings

**TECHNICAL DATA**

| | | | | | |
|---|---|---|---|---|---|
| wing span | | 18 | m | 59 | ft |
| wing surface | | 16.6 | $m^2$ | 179 | $ft^2$ |
| aspect ratio | | | 19.5 | | |
| length | | 8.66 | m | 28.4 | ft |
| fuselage width | | 0.73 | m | 2.4 | ft |
| fuselage height | | 1.00 | m | 3.3 | ft |
| horizontal tailplane span | | 3.17 | m | 10.4 | ft |
| empty weight | ca. | 390 | kg | 860 | lbs |
| max. TOW | | 615 | kg | 1356 | lbs |
| wing loading(payload 80 kg, 176 lbs) | ca. | 28.3 | $kg/m^2$ | 5.8 | $lbs/ft^2$ |
| wing loading max. | | 37 | $kg/m^2$ | 7.58 | $lbs/ft^2$ |

## 1.5 3 view drawing



# Section 2

2. Limitations

2.1 Introduction

2.2 Airspeed

2.3 Airspeed Indicator Markings

2.4 Section not effective

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## 2.1 Introduction

Section 2 includes operating limitations, instrument markings and basic placards necessary for safe operation of the sailplane, its standard systems and standard equipment.

The limitations included in this section have been approved by the LBA.

## 2.2 **Airspeed**

Airspeed limitations and their operational significance are shown below:

| | Speed | (IAS) km/h(kts) | Remarks |
|---|---|---|---|
| VNE | Never exceed speed flaps 0° up to -10° | 270 (146) | Do not exceed this speed in any operation and do not use more than 1/3 of control deflection. |
| VRA | Rough air speed | 205 (111) | Do not exceed this speed except in smooth air and then only with caution Rough air is in lee-wave rotor, thunderclouds etc. |
| VA | Manoeuvring speed | 205 (111) | Do not make full or abrupt control movement above this speed, because under certain condition the sailplane may be over-stressed by full control movement. |
| VW | Maximum winch-launching speed | 140 ( 76) | Do not exceed this speed during winch- or auto-tow-launching |
| VT | Maximum aero-towing speed | 205 (111) | Do not exceed this speed during aerotowing |
| VLO | Maximum landing gear operating speed | 205 (111) | Do not extend or retract the landing gear above this speed |

**Warning:** At higher altitudes the true airspeed is higher than the indicated airspeed, so VNE is reduced with altitude see sect. 4.5.9.

## 2.3 **Airspeed Indicator Markings**

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

| Marking | (IAS) value or range km/h (kts) | Significance |
|---|---|---|
| Green Arc | 80 - 205<br>(43 - 111) | **Normal Operating Range** (Lower limit is maximum weight 1.1 VS1 at most forward c.g. with flaps neutral. Upper limit is rough air speed.) |
| Yellow Arc | 205 - 270<br>(111 - 146) | Manoeuvres must be conducted with caution and only in smooth air. |
| Red Line | 270<br>(146) | Maximum speed for all operations. |
| Yellow Triangle | 100<br>( 54) | Approach speed at maximum weight |

## 2.7 Mass (weight)

Maximum Take-Off mass: 615 kg, 1356 lbs

Maximum landing mass: 615 kg, 1356 lbs

Maximum mass of all non lifting parts = 435 kg (959 lbs)
Maximum mass in baggage compartment = 15 kg( 33 lbs)

**Caution:** Heavy pieces of baggage must be secured to the baggage compartment floor (screwing to the floor or with belts). The max. mass secured on one half of the floor (left and right of fuselage centre line) should not exceed 7,5 kg (16.5 lbs).

**Warning:** Follow the loading procedures see sect. 6.

## 2.8 Center of gravity

Center of gravity range in flight is

185 mm (7.28 in.) up to 480 mm (18.9 in.) behind datum.

datum = wing leading edge at the rootrib

reference line = aft fuselage centre line horizontal
C.G. diagrams and loading chart see sect.6.

**Warning:** Flying is only allowed with the battery Z 07 installed in the fin as otherwise the forward C.G. limit may be exceeded.

## 2.9 Approved manoeuvres / Airworthiness category "Utility":

This sailplane is certified for normal gliding and simple aerobatics.
The following aerobatic manoeuvres are approved see sect. 4.5.12:

| Manoeuvre | recommended entry speed IAS | |
|---|---|---|
| | km/h | kts |
| Spins | / | / |
| Inside Loop | 200 | 108 |
| Stall Turn | 200 | 108 |
| Lazy Eight | 200 | 108 |
| Chandelle | 200 | 108 |

**Approved manoeuvres Category Aerobatic:**
All manoeuvres approved for category Utility and:

| | | |
|---|---|---|
| Inverted flight | recommended speed<br>140-200 km/h (76-108 kts.) | |
| | recommended entry speeds | |
| Slow roll | 180-200 km/h | (97-108 kts.) |
| Half roll and half loop | 170-180 km/h | (92-97 kts.) |
| Half loop and half roll | 220 km/h | (119 kts.) |

2.10 **Manoeuvring load factors**

The following load factors must not be exceeded:

| Airworthiness category: | | Utility | | Aerobatic | |
|---|---|---|---|---|---|
| at manoeuvring speed | VA | + 5.3 | -2.65 | +7.0 | -5.0 |
| at max. speed | VNE | + 4.0 | -1.5 | +7.0 | -5.0 |
| airbrakes extended | VNE + 3.5 | | | | |

2.11 **Flight crew**

a) single seated
max. load in the front seat 110 kg 242 lbs.
min. load in the front seat see placard in cockpit and weighing report page 6.5
b) two seated
max. cockpit load is 210 kg (463 lbs.) with a max. of 105 kg (231 lbs.) in the front seat or 110 kg (242 lbs.) in the front seat and 90 kg (198 lbs.) in the rear seat.
min. cockpit load in the front seat is the min. cockpit load see a) minus 40% of the load in the rear seat. This means that 10 kg (22 lbs.) in the rear seat replaces 4 kg (8.8 lbs.) missing cockpit load in the front seat.
With these loads, the C.G. range given under 2.8 will be kept in the limits if the empty weight C.G. is in its limits. see loading chart in sect. 6.
Either the front seat or the rear seat may designated as seat of the pilot in command.
If the rear seat is to be designated it must be assured that all necessary operating items and instruments are installed and that the pilot in command has sufficient training in flying safely from the rear seat.

**Caution:** With lower pilot weights lead ballast must be added to the seat. Ballast put on the seat (lead ballast cushion) must be fastened at the safety belt anchorage points. Installation for removable trim ballast see sect. 7.16.1.

**Note:** For Australia the lower limit for the min. load in the cockpit should not exceed 66 kg (146 lbs.). A provision for removable ballast see sect. 7.16.1 is mandatory.

2.12 **Kinds of operation**

- Flights according to VFR (daylight)
- Aerotow
- Winch- and auto-launching
- Cloud flying (daylight): permitted when properly instrumented (see below).
- Simple aerobatics see sect4.5.12. (Category Utility)
- Aerobatics see section 4.5.12. (Category Aerobatic) if the required equipment (see below ) is installed.

**Note:** Cloud flying is not permitted in the USA, Canada and Australia.

2.13 **Minimum equipment**

As minimum equipment only the instruments and equipment specified in the equipment list (see maintenance manual) are admissible.

**Note:** The actual equipment list is filed in the enclosures of the maintenance manual.

a) **Normal operation**

**Airspeed indicator**: Range: 0-300 km/h (0-165kts.); Speed range markings see sect. 2.3
**Altimeter:** Altimeter with fine range pointer, 1 turn max. 1000 m (3000 ft.)
**Magnetic compass** (compensated in the aircraft, only required for Canada)
**Four piece symmetrical safety harness**
**VHF - transceiver** (ready for operation)
**Battery Z07** or a ballast weight of 4,3 kg (9.5 lbs.) installed in the battery box in the fin
**Parachute** automatic or manual type or a suitable firm back cushion approximately 8 cm ( 3 in.) thick
**Required placards, check lists and this Flight manual.**

b) **In addition for cloud flying**

(Not permitted in the USA, Canada and Australia)
**Magnetic compass** (compensated in the aircraft)
**Variometer**
**Turn and bank indicator**
**Remark:** Experience has shown that the installed airspeed indicator system may be used for cloud flying.

c) **In addition for aerobatics** (Category Aerobatic)

**Accelerometer** capable of retaining max. and min. g-values with markings red radial lines at +7 g and -5 g.

## 2.14 Aerotow, winch and autotow launching

### 2.14.1 Weak links

10 000 N ± 10%
2 200 lbs ± 10%

### 2.14.2 Length of the towing cable

for aerotow 30-70 m (96 - 225 ft)
Material: hemp- or plastic fibres

### 2.14.3 Max. towing speeds

| | | |
|---|---|---|
| Aerotow | VT = 205 km/h, | 111 kts |
| Winch- and autotow | VW = 140 km/h, | 76 kts |

### 2.14.4 Tow Release

The C.G. tow release (installed in front of the main wheel) is suitable only for winch- and auto launching.

The nose hook is to be used only for aerotow.

## 2.15 Crosswinds

The maximum crosswind component according to the airworthiness requirements for take-off and landing is 15 km/h (8 kts).

## 2.16 Tyre Pressure

| | | | |
|---|---|---|---|
| Main wheel | 2.5 bar | 36 | psi |
| Nose wheel | 2.5 bar | 36 | psi |
| Tail wheel | 4 bar | 58 | psi |

## 2.19 Limitations placards

ELAN

Type: DG-500 ELAN Trainer Year of construction:

Serial No.: 5E T

| Maximum airspeeds | km/h | kts. |
|---|---|---|
| Winch launch | 140 | 75 |
| Aero-tow | 205 | 110 |
| Manoeuvring $V_A$ | 205 | 110 |
| Rough air | 205 | 110 |
| Landing gear operating | 205 | 110 |
| Maximum speed $V_{NE}$ | 270 | 146 |

Approved aerobatic manoeuvres (category utility U):
pos. Loop, Stall Turn, Chandelle, Spin
In addition category A:
half loop and half role, half roll and half loop, slow roll, inverted flight.

Maximum mass: 615 kg (1356 lbs.)

Loading chart
Cockpit load (parachute included)

| | front seat | | rear seat | |
|---|---|---|---|---|
| maximum | 110 kg | 242 lbs | 90 kg | 198 lbs |
| or maximum | 105 kg | 231 lbs | 105 kg | 231 lbs |
| minimum | kg | lbs | | |

Gepäck max. 15 kg
Baggage max. 33 lbs.

Cockpit Check
1. Lead ballast (for underweight pilot)?
2. Parachute worn properly?
3. Safety harness buckled?
4. Front seat: pedals adjusted?
   Rear seat: seat height adjusted?
5. All controls and knobs in reach?
6. Altimeter?
7. Dive brakes cycled and locked?
8. Positive control check?
   (One person at the control surfaces).
9. Trim?
10. Both canopies locked?

Reifendruck 2,5 bar
Tyre pressure 36 psi

nose wheel

| Alt. | m | 0-2000 | 3000 | 4000 | 5000 | 6000 |
|---|---|---|---|---|---|---|
| VNE | Km/h | 270 | 256 | 243 | 230 | 218 |
| Alt. | ft | 0-6600 | 10000 | 13000 | 16000 | 20000 |
| VNE | Kts | 146 | 138 | 131 | 124 | 117 |

Reifendruck 2,5 bar
Tyre pressure 36 psi

main wheel

Sollbruchstelle 10000 N
Rated load 2200 lbs.

Reifendruck 4 bar
Tyre pressure 58 psi

tail wheel

Other cockpit placards see sect. 7.

## 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 Recovery from unintentional cloud flying

3.8 Section not effective

3.9 Emergency wheel up landing

3.10 Ground loop

3.11 Emergency landing in water

## 3.1 Introduction

Section 3 provides a checklist and amplification for coping with emergencies that may occur. Emergency situations can be minimized by proper preflight inspections and maintenance.

**Caution:** Canopy jettison and bailing out should be trained several times on the ground before flying the aircraft.

## 3.2 Canopy jettison

To bail out the white-red canopy opening handle (left) has to be operated with your right hand. Open the canopy as far as possible.
If the canopy doesn't stay open (or is not blown away by the oncoming air), but is closed by the air pressure, you have to release the canopy in it's closed position by operating the red emergency release handle (right) with your left hand, then push the canopy upwards.

The retaining lines will tear off.

The gas struts (if installed) will disengage automatically

## 3.3 Bailing out

First jettison both canopies, then open the safety harness and bail out.
The low walls of the front cockpit allow for a quick push-off exit.

## 3.4 Stall recovery

Easing the stick forward and picking up a dropping wing with sufficient opposite rudder the glider can be recovered from the stall.
To recognize and prevent the stall, please refer to sect. 4.5.4.

## 3.5 Spin Recovery

Apply full opposite rudder against direction of the spin, pause.
Then ease stick forward until the rotation ceases, centralize the controls and carefully pull out of the dive.
The ailerons should be kept neutral during recovery.
**Caution:** To prevent unintentional spinning do not stall the sailplane. Fly with enough speed reserve especially in gusty conditions and in the landing pattern.
Intended spins with waterballast are not permitted.

| | | | |
|---|---|---|---|
| Height loss during recovery | up to. | 50 - 100 m | (160-330 ft) |
| max. speed during recovery | | 200 km/h | (108 kts.) |

3.6 **Spiral dive recovery**

Apply rudder and aileron in opposite direction and carefully pull out of the dive.
Spiral dive occurs only when spinning more than 2 turns with medium C.G. positions, see sect. 4.5.12.

To prevent spiral dives intentional spinning should only be executed at the C.G. positions specified in section 4.5.12.
Recovery from unintentional spinning should be done immediately.

3.7 **Recovery from unintentional cloud flying**

Spins are not to be used to loose altitude. In an emergency, pull out the dive brakes fully before exceeding a speed of 200 km/h and fly with max. 200 km/h (108 kts.) until leaving the cloud.
At higher speeds up to VNE, pull out the dive brakes very carefully because of high aerodynamic and g-loads.

3.8 Section not effective

3.9 **Emergency wheel up landing**

It is not recommended to execute a wheel up emergency landing, as the energy absorption capability of the fuselage is much smaller than that of the landing gear.
If the landing gear can't be extended touch down with small angle of attack.

3.10 **Emergency ground loop**

If there is the risk of overshooting the landing strip you have to decide at least 40 m (130 ft) before the end of the field to execute a controlled ground loop.
If possible turn into the wind, lift the tail by pushing the stick forward.

3.11 **Emergency landing on water**

From the experience with emergency water landing we know, that it is likely that the sailplane 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.

## Section 4

# 4. Normal procedures

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4.2 Rigging and derigging
4.2.1 Rigging
4.2.2 Section not effective
4.2.3 Section not effective
4.2.4 Derigging

4.3 Daily Inspection

4.4 Pre-flight Inspection

4.5 Normal procedures and recommended speeds
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4.5.2 Section not effective
4.5.3 Launch
4.5.4 Free flight
4.5.5 Section not effective
4.5.6 Section not effective
4.5.7 Approach and landing
4.5.8 Section not effective
4.5.9 Flight at high altitude and at low temperatures
4.5.10 Flight in rain and thunderstorms
4.5.11 Cloud flying
4.5.12 Aerobatics

## 4.1 Introduction

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

## 4.2 Rigging and derigging

### 4.2.1 Rigging

1. Open the rear canopy.

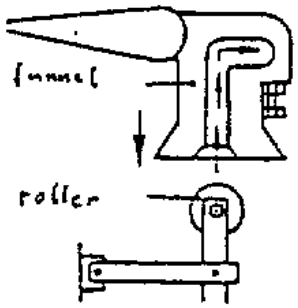
2. Clean and lube the pins, bushings and the control connections.

3. Rigging the inboard wing panels.
   All controls hook up automatically. Therefore set the wing flap handle into zero position and the airbrake handle to the forward stop. The airbrakes must be locked. Screw one of the rear wing securing pins on the tool W 38/2. Close the rear canopy. Push the right wing panel into place. Insert the rear securing pin with the tool at the rear attachment fitting. Push in the tool so far that the upper surface of the brass part of the tool is flush with the wing surface. Screw off the tool. Check if the locking device for the securing pin has engaged. Screw the other securing pin on to the tool. Open the rear canopy. Push in the left wing. Mount and check the left securing pin by the same method as the right side.
   Push in the two main pins as far as possible. Place the handles horizontal or upright. Release the wings. Finally screw in the securing screws in the main pins. When the screws are fastened press the handles of the screws into the clips at the main pin handles.

4. Rigging of the stabilizer
   Check if the battery is installed in the fin and is connected. Operating the glider without the battery or without a ballast weight of 4.3 kg (9.5 lbs.) is not permitted as the forward C.G. limit may be exceeded.
   Set the trim **nose down**.
   Screw the tool W 38/2 into the securing plate (near the top of the left surface of the fin). Pull out the securing plate with the tool, move It downwards to engage in the rigging position.

4. ff
   Set the stabilizer on, so that the roller at the fuselage side push rod is inserted into the funnel at the elevator.

   **Watch carefully the procedure.**




   When the stabilizer is set down and laying on the fin, push it aft. The roller will slide forward in the funnel if you hold the elevator in the pertinent position.

   Release the securing device by pulling out with the tool and engage the securing device by lifting the tool. The securing plate must be flush with the surface of the fin. Screw out the tool.

   Check for correct elevator connection by looking from the rear into the gap at the right hand side of the rudder.

5. Tape the gaps of the wing-fuselage junction.

6. Positive control check.

### 4.2.4 Derigging

Derigging follows the reverse of rigging.
Lock the airbrakes.
For disassembling the securing pins of the wings the tool W 38/2 must be screwed into the bolt completely.
The brass part of the tool will then disengage the securing of this bolt.
It is recommended to leave the securing bolt in the right wing as long as you derig the left wing.

## 4.3 Daily Inspection

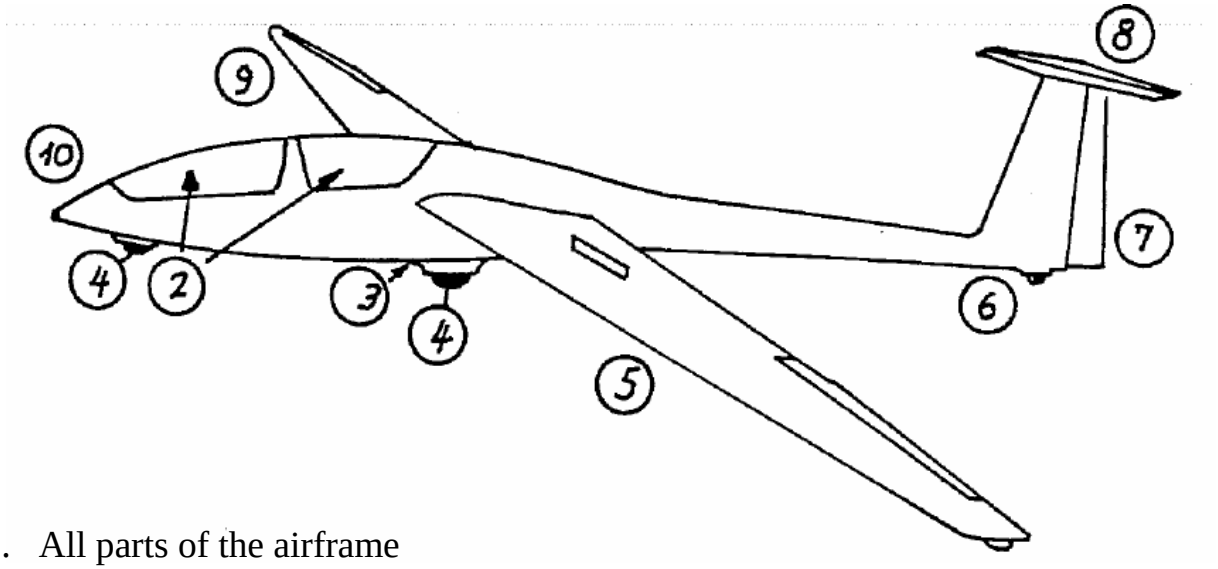
Please keep in mind the importance of the inspection after rigging the glider and respectively each day prior to the first take off. It is for your safety.

**Caution:** After a heavy landing or if other high loads have been subjected to your sailplane, you must execute a complete inspection refering to maintenance manual sect. 2.3 prior to the next take off. If you detect any damage, don't operate your aircraft before the damage is repaired. If the maintenance- and repair manual don't give adequate information, please contact the manufacturer.

**A Inspection prior to rigging**

1. Wing roots and spar ends
   a) check for cracks, delamination etc.
   b) check the bushes and their glued connection in root ribs and the spar ends for wear
   c) check the control hook ups at the rootrib for wear and corrosion
2. Fuselage at wing connection
   a) check the lift pins for wear and corrosion
   b) check the control hook ups including the water-dumpsystem for wear and corrosion
3. Top of the vertical fin
   a) check the mounting points of the horizontal tailplane and the elevator control hook up for wear and corrosion
   b) check if the battery is installed in the fin and connected
4. Horizontal tailplane
   check the mounting points and the elevator control hook up for wear and corrosion

## B Inspection after rigging
**Walk around the aircraft**




1. All parts of the airframe
   a) check for flaws such as bubbles, holes, bumps and cracks in the surface
   b) check leading and trailing edges of the wings and control surfaces for cracks
2. Cockpit area
   a) check the canopy locking mechanism
   b) check the canopy emergency release see sect. 7.15 (not each day, but min. every 3 month)
   c) check the main pin securing
      check the securing ropes of the headrest in the rear cockpit for wear, function and length: is it possible that the headrest interferes with the control stick?
   d) check all controls for wear and function, incl. positive control check
   e) check the tow release system for wear and function incl. cable release check
   f) check for foreign objects
   g) check the instrumentation and radio for wear and function
   h) check the radio and other electrical equipment for function. If there is no electric power it must be assumed, that the battery is not installed in the fin. **Flying is only allowed with the battery in the fin as otherwise the forward C.G. limit** may be exceeded.
   i) check the brake fluid level
3. C.G. Tow hook
   a) check the ring muzzle of the C.G. hook for wear and function
   b) check for cleanliness and corrosion
4. Main landing gear and nose wheel
   a) check the struts, the gear box, the gear doors and the tyre for wear; dirt in the struts can hinder the landing gear from locking over center the next time!

4.3 B ff

b) check the tyre pressure
mainwheel: 2.5 bar - 36 psi
nose wheel: 2.5 bar - 36 psi

c) check wheel brake and cable for wear and function

5. Left wing
   a) check the aileron for excessive free play
   b) check airbrake- and box and control rod for wear and free play. It must be possible to retract the airbrake, even if it is pressed in backward direction. If there is any water in the airbrake box this has to be removed.
   c) check the locking of the rear wing attachment pin
6. Tail wheel
   a) check for wear, free play and excessive dirt in the wheel box. Remove excessive dirt prior to take off!
   b) check tyre pressure: 4 bar -58 psi
7. Rear end of the fuselage
   a) check the lower rudder hinge and the connection of the rudder cables for wear, free play and correct securing
   b) check the bulkhead and fin trailing edge shear web for cracks and delamination
8. Fin - horizontal tail
   a) check the upper rudder hinge for wear and free play
   b) check the elevator for free play and correct control hook up, look from the rear into the gap at the right hand side of the rudder
   c) check the securing of the stabilizer
   d) check the horizontal tail for free play
   e) check the TE or Multiprobe for correct insertion
9. Right wing
   see detail 5.
10. Fuselage nose
    a) check the ports for the static pressure and the pitot pressure for cleanliness.
    b) if the sailplane was parked in rain, you have to empty the static ports by sucking out the water at the ports.
    c) check the nose hook for cleanness and corrosion

## 4.4 Preflight inspection

1. Lead ballast (for under weight pilot)?
2. Parachute worn properly?
3. Safety harness buckled?
4. Front seat: pedals adjusted?
   Rear seat: seating height adjusted?
5. All controls and knobs in reach?
6. Altimeter?
7. Dive brakes cycled and locked?
8. Positive control check? (One person at the control surfaces).
9. Trim?
10. Both canopies locked?

## 4.5 Normal procedures and and recommended speeds

### 4.5.3 Launch

Due to the towhook position being in the middle of the fuselage and the excellent effectiveness of the ailerons and rudder, the possibility of wing dropping or ground loops, even on a slow starting aerotow is reduced. Take-off with strong crosswind is possible.

**Aerotow**

a) Aerotow is permitted only using the nose tow release. Set trim to neutral for aerotow.

b) Pull the stick until the nose wheel lifts off from the ground. Then control the airplane so, that nose wheel and tail wheel don't touch the ground. Don't try to lift off before you reach an airspeed of 80 km/h (43 kts) (without ballast).
On a rough airfield hold the control stick tight. The undercarriage can be retracted at safety height during the tow.

Normal towing speed is 120-130 km/h (65 - 70 kts).

For a cross country tow up to 205 km/h (110 kts).

**Winch launch** (only allowed at the C.G. release)
Set the trim fully nose down for winch launch. To accomplish this, operate trimmer lever on the control column and push the control knob on the left cockpit wall to its forwardmost position.

**Caution:** During ground roll and initial take-off (especially when flying solo) push the control stick to its forwardmost position or fully nose-down to prevent excessive nose up pitching rotation during initial take-off.

After reaching safety altitude gradually pull back some on the stick, so that the glider will not pick up excessive speed. Don't pull too hard.

After reaching release altitude pull the tow release knob.
Recommended winch launch airspeed 100-120 km/h (54-65 kts).
**Caution:** Do not fly at less than 90 km/h (49kts) or not more than 140 km/h (76 kts).

### 4.5.4 **Free flight**

**Stalling characteristics** (level and turning flight)
When stalled the DG-500 ELAN TRAINER will continue to fly level with high sink rate and buffeting.
If the stick is pulled further the DG-500 ELAN TRAINER will drop the nose or drop one wing.
During the stall a large angle of attack will be reached.
At forward C.G. positions the DG-500 ELAN TRAINER can be flown in stall without wing or nose dropping.
When reaching the minimum speed, the angle of attack has to be increased significantly, before the DG-500 ELAN TRAINER stalls, so that the stalled flight is easy to recognize.
With stick forward and opposite rudder if required the DG-500 ELAN TRAINER can be recovered without much loss of height. Rain does not influence this behaviour noticeably. The loss of height is ca. 30 m. Stall airspeeds see sect. 5.2.2.

4.5.7 **Approach and landing**

Abeam the landing point extend the landing gear (Option).
In calm weather approach with approx.100 km/h (54 kts). With strong wind fly faster!

The very effective Schempp-Hirth dive brakes make a short landing possible. So a slip is not necessary as a landing technique.

**Caution:** While slipping, the rudder is sucked in its displaced position. So it is recommended to practice slipping at a higher altitude.

Strong crosswind offers no problem.
Do not approach too slowly with fully extended airbrakes otherwise the aircraft may drop during flare out.
When flaring out keep the airbrake setting you were using, opening them further may drop the sailplane.
Clean the landing gear and tow release after landing in an muddy field. Dirt in the front strut (Option retractable landing gear) can keep the landing gear from locking over center next time. Simply hosing with water is the best cleaning method.

**Landing with the landing gear retracted**
(Option retractable landing gear)
It is recommended to use this technique only on very short fields or if there are furrows in a cross direction in the field. After wheel up landing check the fuselage belly, the C.G. tow hook and the tow hook bulkheads for damage.

4.5.9 **Flight at high altitude and at low temperatures**

With temperatures below 0°C (32°F) for instance when wave flying or flying in winter, it is possible that the control circuits could become stiffer. Special care should be taken to ensure that there is no moisture on any section of the control circuits to minimize the possibility of freeze up. It could be advantageous to apply Vaseline along all the edges of the airbrake cover plates to minimize the possibility of freezing closed.

Apply the controls in short periods.

**Caution:**

1. At temperatures below -20°C (-4°F) there is the risk of cracking the gelcoat.
2. Attention must be paid to the fact that at higher altitudes the true airspeed is grater than the indicated airspeed.
   The max. speed VNE is reduced. See the following table:

| Altitude in Metres | 0-2000 | 3000 | 4000 | 5000 | 6000 |
|---|---|---|---|---|---|
| VNE IAS km/h | 270 | 256 | 243 | 230 | 218 |

| Altitude in ft. | 0-6600 | 10000 | 13000 | 16000 | 20000 |
|---|---|---|---|---|---|
| VNE IAS kts. | 146 | 138 | 131 | 124 | 117 |

3. Do not fly below 0°C (32°F) when your glider is wet (e.g. after rain).

4.5.10 **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 thunder storms should be avoided. Due to lightning discharge, carbon fibre structures may be destroyed.

4.5.11 **Cloud flying**

(only without waterballast)

Take care to fly smoothly and coordinated. It is prohibited to use a spin as a method for loosing altitude in the clouds. In case of emergency, pull out the dive brakes fully before exceeding a speed of 200 km/h and dive with max. 200 km/h (108 kts) to leave the cloud.

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

## 4.5.12 **Aerobatics** ("Utility" Category)

Execute only the approved manoeuvres.

**Approved manoeuvres**
(Utility Airworthiness Category)

| | | | |
|---|---|---|---|
| 1. Spins | | | |
| 2. Inside Loop | Entry Speed | 200 km/h | (108 kts) |
| 3. Stall turn | Entry Speed | 200 km/h | (108 kts) |
| 4. Chandelle | Entry Speed | 200 km/h | (108 kts) |
| 5. Lazy Eight | Entry Speed | 200 km/h | (108 kts) |

**Spins:**
**Caution:** Prolonged spinning is only possible at **aft C.G. positions**, this means single seated. It is not necessary to extend the dive brakes during spin recovery. The DG-500 ELAN TRAINER shows a very large nose down pitch after leaving the spin. So you have to flare out correspondingly. With **forward C.G. positions** prolonged spinning is not possible. The DG-500 ELAN TRAINER will terminate the spin by itself after a certain number of turns dependent on the C.G. position. The nose down pitch and speed will be high so with these C.G. positions not more than 1 turn spins should be executed, to avoid high g-loads.

With **medium** C.G. **positions** there is a tendency that the spin will turn into a spiral dive after 1 or 2 turns. Reaching this state you have to recover immediately.
Recover always with the ailerons neutral.

**Inducing the spin:** (Normal procedure)
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 the spin:**
Apply full opposite rudder against direction of the spin, pause, then ease the stick forward until the rotation ceases, centralize the controls and carefully pull out of the dive. The ailerons should be kept neutral during recovery.
Height loss during recovery is approx. 50-80 m (160-260 ft), the max. speed is max. 200 km/h (108 kts).

4.5.12 ff

**Stall turn:**

After reaching the entry speed of 200 km/h (108 kts) pull back the stick quickly but not abruptly. After reaching a vertical flight path return the stick to neutral.
When a speed of 130-140 km/h (70-75 kts) is attained, push the rudder quickly, but not abruptly, fully into the desired direction.

After the rotation starts slightly opposite aileron and stick forward gives best result.

When reaching the vertical dive you should flare out immediately to minimize speed increase and g-load.

**Warning:**

If the rudder is pushed too late and the rotation is insufficient, it could be that the glider tailslides (falls tailwards).
If this happens, it is important to hold all controlls strongly, preferable at one of the stops until the nose swings down and then flare out immediately.

**Aerobatics (Aerobatic Category)**
Execute only the approved manoeuvres.
Don't execute aerobatics below the safety altitude required by national law.
**Approved manoeuvres** (Aerobatic Category):
All manoeuvres approved for Utility category and:

| | |
|---|---|
| Inverted flight | recommended speed 130-200 km/h (70-108 kts) |
| Slow roll | entry speeds 180-200 km/h (97-108 kts) |
| Half roll and half loop | 150-170 km/h (80-92 kts) |
| Half loop and half roll | 220 km/h (119 kts) |

**Caution:** The DG-500 ELAN TRAINER is a high performance sailplane. Therefore the speed increase in the dive, especially in inverted flight is high. Therefore training aerobatics should only be executed after a rating with an experienced pilot or if you can master the manoeuvres on other sailplane types.
In any case don't try to execute the manoeuvres with entry speeds other than those listed above.

**Inverted flight:**
the speed in inverted flight should preferably be choosen between 130-200 km/h (70-108 kts). At speeds greater than 205 km/h (111 kts) no full control deflections are allowed.

**Warning:** When the speed is reduced below the minimum speed (depending on weight and c.g. position 105 - 125 km/h, 57-67 kts) the DG-500 ELAN TRAINER enters an inverted stationary stall with high sink-rate. This will be indicated by buffeting of the tailplane.
The aircraft nose may point far below the horizon and the airspeed may show 130 - 150 km /h (70 - 81 kts). The efficiency of the ailerons and rudder will be reduced considerably.

**Note:**
The inverted stalled flight must be recovered by neutralizing the stick until the buffeting of the tailplane stops. The airspeed will increase very quickly. As soon as this condition is reached, raise the glider nose above the horizon by gradually pushing the stick forward.
Regain normal flight by a half roll.

4.5.12 ff

**Half loop and half roll:**
After reaching the entry speed of 220 km/h (119 kts) pull the stick quickly, but not abruptly until reaching the inverted position, where the speed should still be 130 to 140 km/h (70-75 kts). Then return the stick to neutral and keep the nose slightly above the horizon. Then apply full aileron in the desired direction. After the wing passes the vertical position apply upper rudder to keep the nose above the horizon until normal flying position is reached.

**Note:**
If the nose is raised too much above the horizon or the inverted speed is too slow, a stall can occur when the wing reaches the vertical position and the glider finishes the rolling motion as a "flicked" roll into normal flying position.

**Half roll and half loop:**
After reaching the entry speed of 150-170 km/h (80-92 kts) the nose must be raised to 10 - 20° above the horizon. After returning the stick to neutral apply full aileron into the desired direction to start the half roll. After the wing passes vertical position the stick has to be pushed slightly (never abruptly) forward to keep the nose above the horizon. When reaching inverted flight the ailerons must be neutralized and the speed must be reduced to 120-130 km/h (65-70 kts) by pushing the stick forward before starting the half loop to level out.

**Note:**
If during the entry the nose is raised too high or the entry speed is too low, it could be that it is impossible to stop the rotation in the inverted position and the glider continues the roll into normal position.

4.5.12 ff

**Slow roll:**

After reaching the entry speed of 180 - 200 km/h (97-108 kts) the nose must be raised slightly above the horizon. After returning the stick to neutral, full aileron has to be applied in the desired direction. After the wing has passed the first vertical position the stick is to be pushed slightly (never abruptly) forward to keep the nose above the horizon. When the wing passes the second vertical position the rudder must be applied upwards to keep the nose above the horizon until normal flying position is reached.

**Note:**

If during the inverted flight, the nose is raised too high above the horizon and the speed is reduced too much a stall could occur when the wing reaches the second vertical positon and the roll is finished as a "flicked"

The stall is indicated by buffetting of the tailplane.

Section 5

# 5. Performance

5.1 Introduction

5.2 **Approved Data**

5.2.1 Airspeed indicator system calibration

5.2.2 Stall speeds

5.3. **Additional Information**

5.3.1 Demonstrated crosswind performance

5.3.2 Gliding performance

5.3.3 Flight Polar

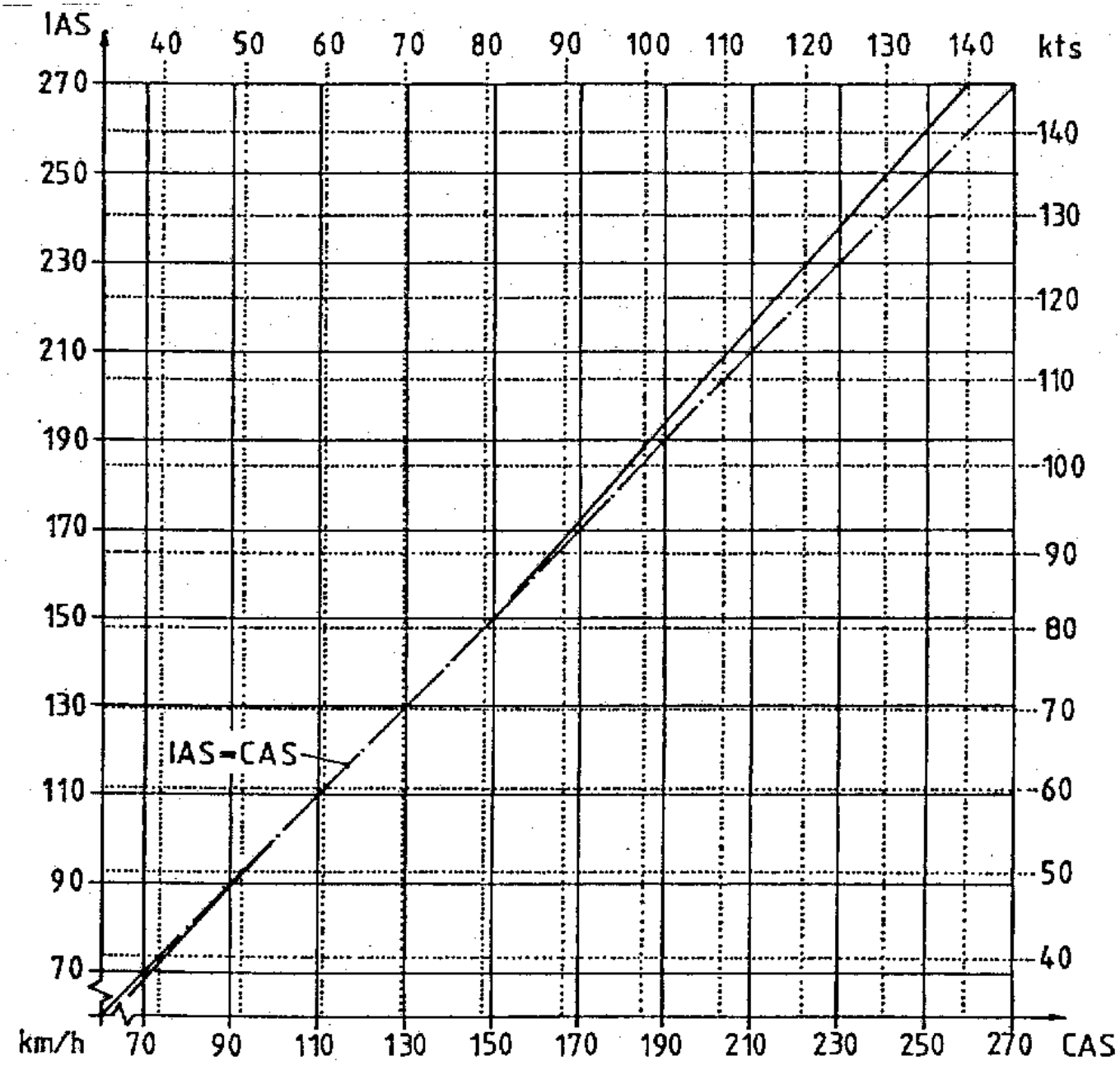
## 5.1 Introduction

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

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

## 5.2 Approved data

### 5.2.1 Airspeed indicator system calibration




IAS = indicated airspeed
CAS = calibrated airspeed

**Caution:** The airspeed indicator is to be connected to the static ports and pitot probe in the fuselage nose.

### 5.2.2 Stall speeds

Minimum airspeeds in level flight

**Airbrakes retracted**

| | | | | |
|---|---|---|---|---|
| Wing loading | 28 | 33 | 37 | kg/m² |
| | 5.7 | 6.8 | 7.6 | lbs/ft² |
| Stall speed | 63 | 68 | 72 | km/h |
| | 34 | 37 | 39 | kts |

**Airbrakes extended**

| | | | | |
|---|---|---|---|---|
| Wing loading | 28 | 33 | 37 | kg/m² |
| | 5.7 | 6.8 | 7.6 | lbs/ft² |
| Stall speed | 70 | 76 | 80 | km/m² |
| | 38 | 41 | 43 | kts |

| Flight mass | | Wing loading | |
|---|---|---|---|
| kg | lbs | kg/m² | lbs/ft² |
| 470 | 1036 | 28 | 5.7 |
| 500 | 1102 | 30 | 6.1 |
| 550 | 1213 | 33 | 6.8 |
| 600 | 1323 | 36 | 7.4 |
| 615 | 1356 | 37 | 7.6 |

The loss of height for stall recovery is approximately 30 m (100 ft) if recovered immediately.

## 5.3 Additional Information

### 5.3.1 Demonstrated crosswind performance

The demonstrated crosswind velocity is 15 km/h (8 kts) according to the airworthiness requirements.

### 5.3.2 Gliding performance

Performance data

| | | | | |
|---|---|---|---|---|
| Wing loading | kg/m² (lbs/ft²) | 28 (5.7) | 33 (6.8) | 37 (7.6) |
| Min. sink rate at V | m/s (ft/min) | 0.58 (100) | 0.62 (108) | 0.66 (116) |
| | km/h (kts) | 73 (39) | 79 (43) | 84 (45) |
| Best glide ratio at V | - | 39 | 39.5 | 40 |
| | km/h (kts) | 89 (48) | 97 (52) | 103 (56) |

A variation in speed by ± 10 km/h (5 kts) from the above will decrease the best glide angle by 0.5 glide points and increase the min. sink rate by 1 cm/sec. (2 ft/min).

The polar curves can be seen on the next page.

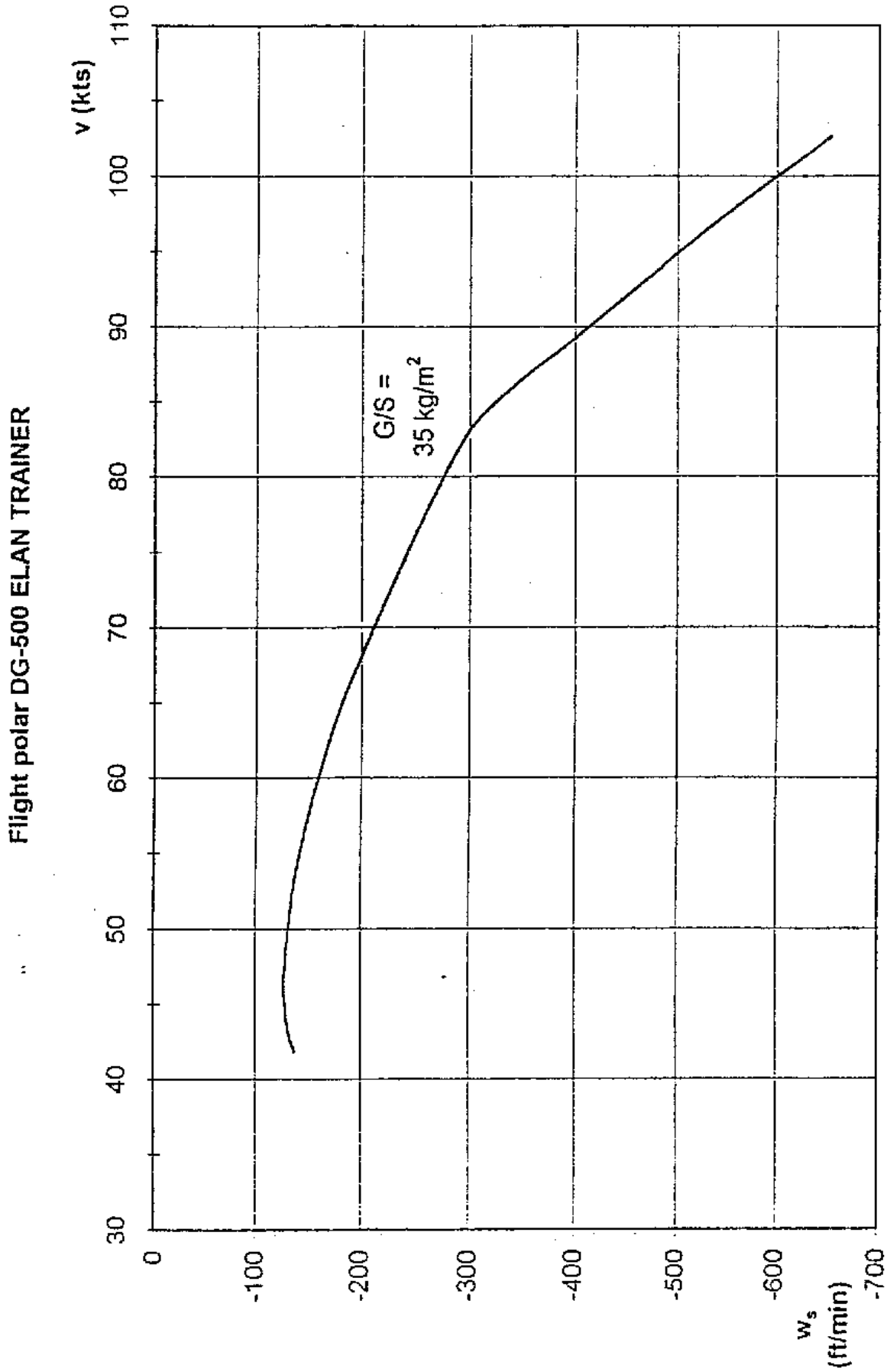
For optimum performance, the aircraft should be flown with a C.G. towards the rear of the allowable range. This especially improves thermaling performance.
However the aircraft will be more pitch sensitive.

The wing fuselage joint, wing parting and the tailplane fin joint should be taped up and the aircraft thoroughly cleaned to obtain maximum performance.

The polars apply to a "clean" aircraft.

With dirty wings or flight in rain, the performance drops accordingly.

## 5.3.3 Flight polar



# Section 6

6. Mass (weight) and balance

6.1 Introduction

6.2 Weighing procedures

6.3 Weighing record

6.4 Basic empty mass and C.G.

6.5 Mass of all non-lifting parts

6.6 Max. mass

6.7 Useful loads

6.8 Loading chart

6.9 C.G. calculation

6.1 **Introduction**
This section contains the payload range within the sailplane may be safely operated.
A procedure for calculating the inflight C.G. is also provided.

A comprehensive list of all equipment available for this sailplane is contained in the maintenance manual.

6.2 **Weighing procedures**
See maintenance manual DG-500 ELAN TRAINER.
Datum: Wing leading edge at the rootrib.
Reference line: aft fuselage centre line horizontal.
The weighing is to be executed with the engine retracted and all tanks emptied.

6.3 **Weighing record**
The result of each C.G. weighing is to be entered on page 6.5. If the min. cockpit load has changed this data is to be entered in the cockpit placard as well.
When altering the equipment, the new data can be gathered by a C.G. calculation.(see sect.6.9).
The actual equipment list is enclosed in the maintenance manual.

6.4 **Basic empty mass and C.G.**
Actual data see page 6.5.
With the empty weight C.G. and the cockpit loads in the limits of the diagram on page 6.6, the inflight C.G. limits will not be exceeded.

6.5 **Mass of all non-lifting parts (WNLP)**
The max. mass of all non-lifting parts is **435 kg (959 lbs)**.

WNLP is to be determined as follows:
WNLP = WNLP empty + cockpit load (pilot, parachute, baggage, barograph, cameras etc.).
WNLP empty = Total empty weight minus weight of the wings.

6.6 **Max. mass (weight)**
Max. weight without waterballast = WNLP + W wings
Max. weight = 615 kg (1356 lbs)

6.7 **Useful loads**
Max. load = max. weight - empty weight
The data is recorded on page 6.5.

## 6.8 Loading chart

**Cockpit load** see table on page 6.5.

a) single seated

| | | |
|---|---|---|
| max. load in the front seat | 110 kg | 242 lbs |
| min. load in the front seat | see placard in cockpit and weighing report page 6.5 | |

b) two seated

max. cockpit load is 210 kg (463 lbs) with a max. of 105 kg (231 lbs) in the front seat or 110 kg (242 lbs) in the front seat and 90 kg (198 lbs) in the rear seat.

min. cockpit load in the front seat is the min. cocpit load see a) minus 40% of the load in the rear seat.

With these loads, the C.G. range given under 2.8 will be kept in the limits if the empty weight C.G. is in its limits.

With lower pilot weight necessary ballast must be added in the seat. Ballast put on the seat (lead ballast cushion) must be fastened at the connections of the safety belts.

**Removable Ballast** (Option) see sect. 7.16.1.

**Baggage:** max. 15 kg (33 lbs)

Heavy pieces of baggage must be secured to the baggage compartment floor (screwing to the floor or with belts). The max. mass secured on one half of the floor (left and right of fuselage centre line) should not exceed 7,5 kg (16.5 lbs).

**Battery in the fin:**

Only the use of the factory supplied battery Z 07, (12 V, 10 Ah, Mass 4.3 kg, 9.5 lbs) is permitted.

**Warning:** Flying is only allowed with the battery in the fin as otherwise the forward C.G. limit may be exceeded.

**Weighing report** (for 6.3)
Distances in mm, masses in kg

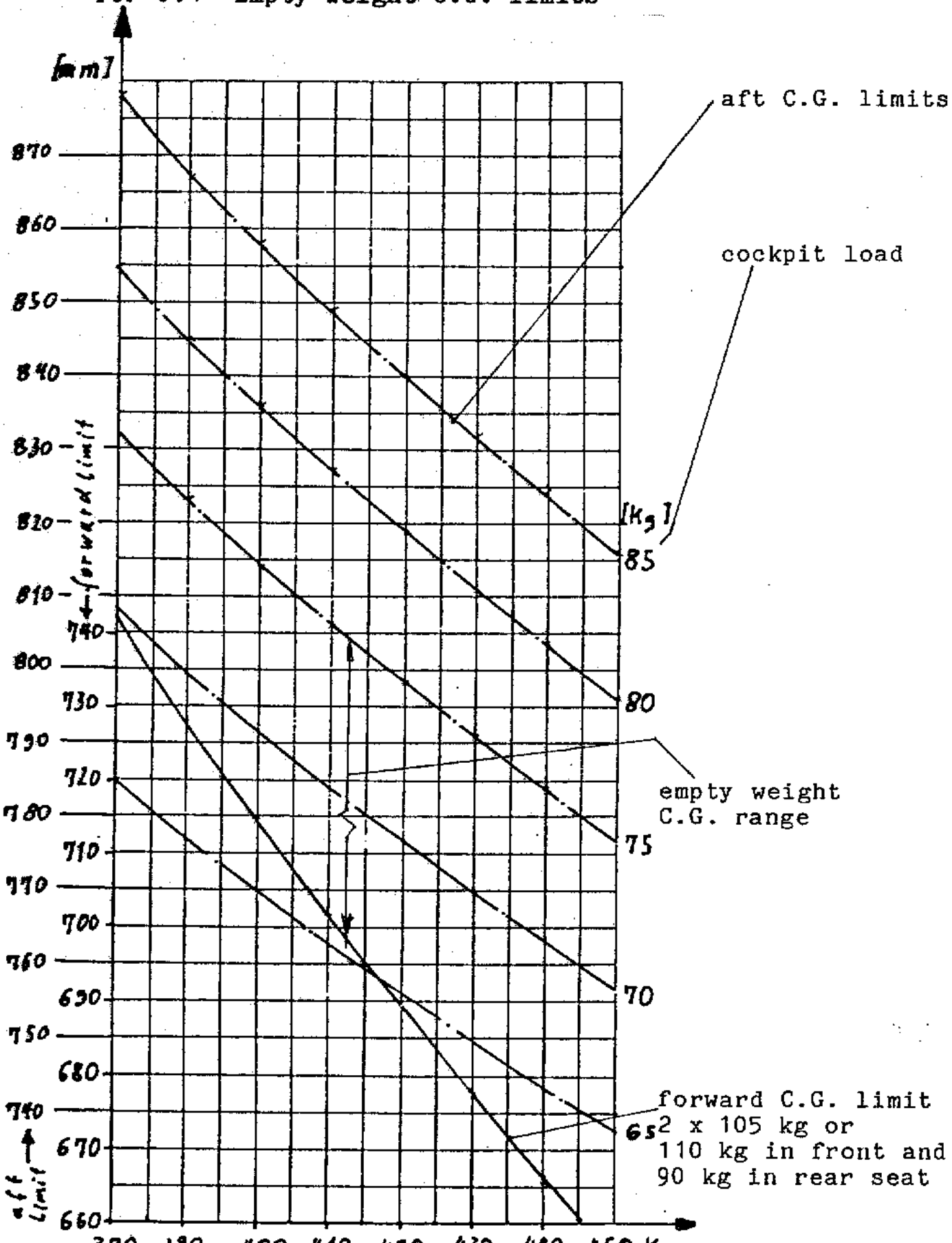
25.4 mm = 1 inch 1 kg = 2.2046 lbs.

| | | | | | |
|---|---|---|---|---|---|
| Date of weighing: | | | | | |
| Executed by: | | | | | |
| Date of equipment list: | | | | | |
| Tail wheel (see remarks) | Plastic/ brass | Plastic/ brass | Plastic/ brass | Plastic/ brass | Plastic/ brass |
| Empty mass | | | | | |
| Empty mass C.G. | | | | | |
| Max. mass | | | | | |
| Max. load | | | | | |
| Min. cockpit load in front seat | | | | | |
| Max. load in both seats | | | | | |
| Inspector Signture, Stamp | | | | | |

**Remarks:** 1. The weighing is to be executed with the battery (Z 07, mass 4.3 kg - 9.5 lbs) installed in the fin.

2. Weighing was done with a plastic/brass-hub (s. 7.16.4).
(Delete which is inapplicable)

for 6.4 **Empty weight** C.G. limits




25.4 mm = 1 in., 1 kg = 2.2046 lbs

## 6.9 C.G. calculation

The actual C.G. can be determined as follows:

For each item, the moment mass x C.G. has to be determined and to be added up and divided by the total mass. See the following example:

1 kg = 2.2046 lbs = .264 US gal.water  0.305 m = 1 ft

| Item | mass | C.G. behind datum | moment |
|---|---|---|---|
| | kg | m | m kg |
| aircraft empty | 380 | 0,74 | 281,2 |
| Pilot front | 75 | - 1,35 | - 101,25 |
| rear | 85 | - 0,27 | - 22,95 |
| Sum | **540** | XS=0,291 | **157,0** |
| | | CG=moment/mass | |

The limits of the inflight C.G. 0.185 m - 0.48 m should not be exceeded!

**The most important C.G. positions (behind datum):**

Pilot:
The C.G. position is dependent on the pilots shape, mass and thickness of the parachute. The pilot C.G. position can be determined by executing a weight and balance measurement with glider empty and equipped with the pilot etc. see maintenance manual. Please note, that the distance a has to be measured with both configurations, as it may change due to deflection of the landing gear.
The pilot C.G. can be determined by the following equation:

$$XP = (XSF \cdot MF - XSE \cdot ME)/MP$$

MF = flight mass  XSF = flight C.G.  MP = pilot mass
ME = empty mass  XSE = empty C.G.

If the actual pilot C.G. is not known, you have to take the values from the following table:

Flight: f = near the forward C.G.
r = near the aft C.G.

| Pilot mass [kg] | Pilot C.G. [m] Front cockpit | | Rear cockpit | |
|---|---|---|---|---|
| | f | r | f | R |
| 110 | -1,348 | -1,295 | -0,277 | -0,232 |
| 105 | -1,350 | -1,296 | -0,278 | -0,233 |
| 100 | -1,351 | -1,297 | -0,279 | -0,234 |
| 95 | -1,352 | -1,298 | -0,280 | -0,235 |
| 90 | -1,353 | -1,300 | -0,281 | -0,236 |
| 85 | -1,355 | -1,301 | -0,283 | -0,237 |
| 80 | -1,356 | -1,302 | -0,284 | -0,238 |
| 75 | -1,357 | -1,303 | -0,285 | -0,239 |
| 70 | -1,359 | -1,304 | -0,286 | -0,240 |
| 65 | -1,360 | -1,305 | -0,288 | -0,241 |
| 60 | -1,361 | -1,306 | -0,289 | -0,242 |
| 55 | -1,362 | -1,307 | -0,290 | -0,243 |

**Further C.G. positions:**

| | |
|---|---|
| Baggage or battery in baggage compartment: | 0,31 m |
| Instruments in front panel: | -1,870 m |
| Instruments in rear panel: | -0,7 m |
| Removeable ballast (Option see 7.16.1a): | -2,455 m |
| Removeable ballast (Option see 7.16.1b): | -1,920 m |
| Battery in fin (s.sect. 6.8) | 5,306 m |
| Tailwheel | 5,345 m |

Section 7

## 7.1 Introduction

This section provides description and operating of the sailplane and its systems.

Refer to section 9 "Supplements" for details of optional systems and equipment.

M.M. = Maintenance manual

## 7.2 Airframe

The DG-500 ELAN TRAINER is a twoseater high performance sailplane.

**Construction**

| | |
|---|---|
| **Wings,** | CFRP-foam-sandwich-shell<br>CFRP-Rovingspar caps |
| **Ailerons** | AFRP-foam-sandwich-shell |
| **Horizontal tailplane and rudder** | GFRP-foam-sandwich-shell |
| **Fuselage** | GFRP-shell, fuselage boom with Tubus core |

**Canopy**

Two canopies hinged at the right fuselage side. Canopy glass made from clear Plexiglas or Plexiglas GS green 2422 as option.

**Tailplane**

T-Tail with conventional stabilizer-elevator and spring trim.

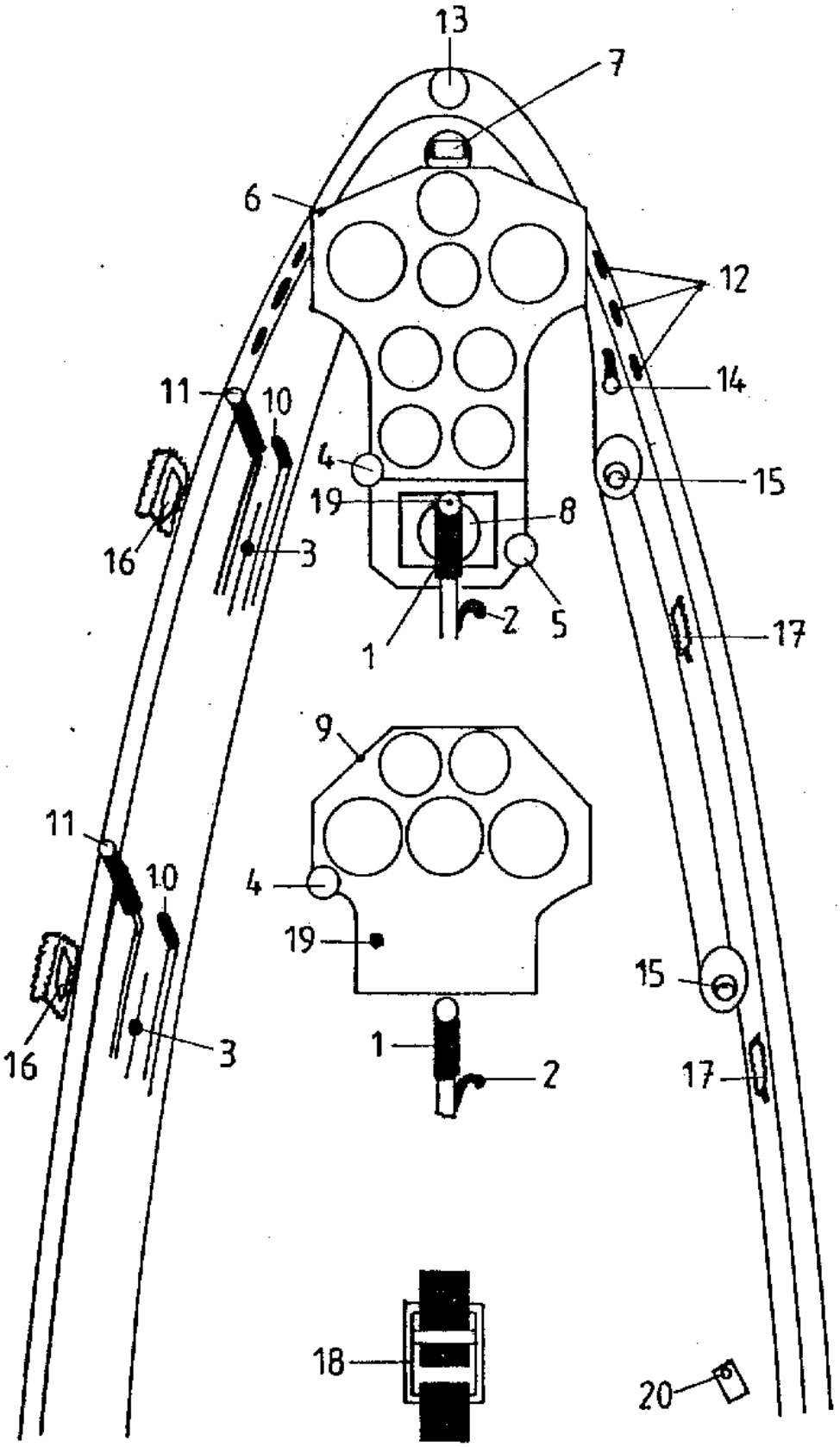
**Color** Airframe: white

registration numbers: grey RAL 7001

or red RAL 3000

or blue RAL 5012

## 7.3 Cockpit, cockpit controls and placards



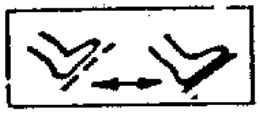
1) Control Column
The rear control stick is removable. Therefore open the snap shakle at the trim release lever and disengage the trim cable. Pull out the stick after opening the cap nut.

2) Release lever for the trim mechanism - green.
Operation see sect. 7.4 elevator control.

3) Trim position indicator and trim preselection lever

4) Tow release knob - yellow.

5) Rudder pedal adjustment knob - black
(only in front cockpit)



By pulling on the knob, the locking pin will be disengaged and the rudder pedals can be pulled back towards the pilot or pushed forward away from the pilot.

6) Front instrument Panel
After removing the side screws at the base 2 x M 6 and after removing the screws attaching the cover to the panel 6 x M 4, the cover can be removed towards the front. The panel remains in the aircraft.

7) Compass installation position.

8) Radio installation position.

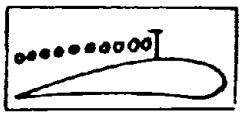
9) Rear Instrument Panel
After removing the side screws attaching the panel to the cover (4 x M 4) the panel can be hinged backwards into the cockpit (take out the control stick first!).

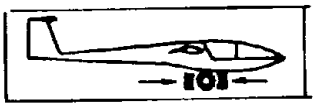
10) Undercarriage retraction - extension handle (Option) - black
forward - undercarriage down
back - undercarriage retracted

The undercarriage is locked in the extended position by an overcentre locking arrangement and an additional safety catch. The handle is to be turned towards the cockpit wall, so that the locking catch will engage.

11) Airbrake handle - blue

The wheel brake is operated at the end of the airbrake handle travel.





**Optional parking brake combined with an airbrake securing device (Piggott-hook):** Pull the airbrake handle back to actuate the wheelbrake and rotate the handle to the cockpit wall. A detent will engage in one of 4 notches to hold the system in this position.
In case the airbrakes mistakenly haven't been locked, a detent engages in one of several notches to avoid inadvertent deployment of the airbrakes. To open and to close the airbrakes the operating handle must be rotated into the cockpit so far that the detent passes the notches.

12) Constantly open de-misting air vents

13) Main air vent

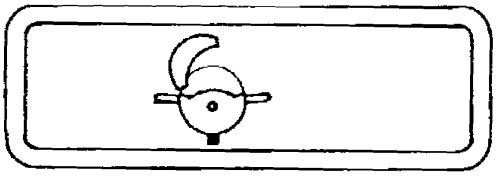
14) Main air vent operating knob

pushed to front = closed
pulled = open

15) Swivel air vents

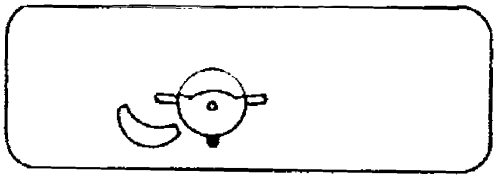
16) Canopy opening handle - white-red

towards the nose = closed
into cockpit = open



17) Canopy emergency release handle - red

towards the nose = closed
into cockpit = open



Emergency release procedure see sect. 3.2.

18) Adjustment strap for the rear seat shell (to be operated on the ground)

19) Push to talk button (Option)

20) 12 V socket for charging the batteries.

## 7.4 Flight controls

Rudder control:
Cable system with adjustable pedals in the front cockpit. See diagram 2 M.M.

Elevator control:
All pushrods slide in maintenance free nylon ball guides.
Automatic control hook up system.
Spring trimmer with release lever at the control stick and control knob at the left cockpit wall. See diagram 1 M.M.
To trim, you have to operate the release lever at the control stick and place the control knob to the desired position.

Aileron control:
Pushrods slide in maintenance free nylon ball guides.
Automatic control hook up system.
See diagram 3 and 4 M.M.

## 7.5 Airbrakes see diagram 3 and 4 M.M.

Double storey Schempp-Hirth type airbrakes on the upper wing surface.
The wheel brake is operated by the airbrake system.
Pushrods in the wings slide in maintenance free nylon ball guides.
Automatic control hook up system.

## 7.6 Landing gear see diagram 2 M.M.

a1) Main wheel: non retractable, spring mounted with steel compression springs, fully sealed landing gear box, drum brake,
tyre 380 x 150 GPR
diameter 380 mm (15.0 in.)
tyre pressure 2.5 bar (36 psi)

a2) Main wheel: (Option) retractable, assisted by a gas strut, spring mounted with steel compression springs, locked in retracted position by an overcentre locking device, fully sealed landing gear box, hydraulic disc brake.
tyre 380 x 150 6 PR
diameter 380 mm (15.0 in.)
tyre pressure 2.5 bar (36 psi)

7.6 **Landing gear cont.**

| | | |
|---|---|---|
| b) Tail wheel: Tyre | 200 x 50 2 PR | |
| | Diameter | 200 mm (7,87in.) |
| | Tyre pressure | 4 bar (58 psi) |
| c) Nose wheel: Tyre | 260 x 85 | |
| | Diameter | 260 mm (10,2 in) |
| | Tyre pressure | 2,5 bar (48 psi) |

7.7 **Tow hooks**

See diagram 5 M.M.
Safety release "Europa G 88" for winch launch installed near the C.G.
"nose release E 85" installed in the fuselage nose for aerotow.
Both hooks are operated by the same handles.

7.8 **Seats and safety harness**

The front seat is constructed as an integral inner shell.
The rear seat is height adjustable. The adjustment is by means of a strap similar to the shoulder harness.
As safety harness only symmetric 4-point harnesses fixed at the given fixing points are allowed.

7.9 **Baggage compartment**

Max. load 15 kg (33 lbs.).
Heavy pieces of baggage must be secured to the floor.

7.13 **Electrical system**

Battery in the fin.
For C.G. reasons the battery is installed in the fin. Only the use of the factory supplied battery Z07 (12 V, min. 10 Ah, mass 4.3 kg, 9.5 lbs.) is permitted.

The battery fuse is installed at the battery, type: G fuse 250 V with indicator 5 x 25 medium slow / 4 A.

After inserting the connector plug in the fin the battery is connected to the electrical system of the glider. If you want to charge the battery inside the glider this can be done via the socket see section 7.3 item 22).

**Warning:** Use only automatic chargers designed to charge sealed lead acid batteries. To charge the battery to its full capacity a charger with 14.4 V max. charging voltage is necessary (normal automatic chargers charge only up to 13.8V). Such a charger is available from DG Flugzeugbau code no. Z08.

All current - carrying wiring confirms to aeronautical specifications.

## 7.14 Pitot and static system

see diagram 8 M.M.

Pitot probe in fuselage nose, static ports a short distance behind fuselage nose. The airspeed indicator and the altimeter are to be connected to these ports and probe. Additional holder for a TE-probe or a Multiprobe in the fin is to operate variometer and flight computer systems. To preserve the sealings inside the holder, the end of the probe should be greased with e.g. Vaseline from time to time.

## 7.15 Canopies

To **jettison** the canopies in flight see section 3.2.

**Removing a canopy:**

Open the canopy, detach the restraining cable and if installed detach the gas strut from the front canopy. Then close the canopy and operate the red canopy emergency release handle (right) and the white-red canopy opening handle (left). Lift the canopy upwards.

**Reinstalling a canopy:**

Open emergency release and canopy locking levers. Place the canopy in vertical direction onto the fuselage. Close the emergency release. Open the canopy and snap in the retaining cable and the gas-strut (if installed).

**Checking the canopy emergency release system:**

a) check with open front canopy if the gas-struts (if installed) can be disengaged from their ball fittings (from canopy and from fuselage). Grease the ball fittings.
b) check with closed canopy if the emergency release handle can be operated and if the canopy can be removed easily, resp. if the canopy will be lifted by the gas-strut (if installed). Grease the locking pins.

## 7.16 Miscellaneous equipment (Options)

### 7.16.1 Removable ballast

a) Up to 4 ballast weights (code no. Z 10) of 2.16 kg (4.76 lbs) each can be fixed at the M 8 insert in front of the front rudder pedal mounting point. Each weight compensates a pilot mass of 3.7 kg. (8.16 lbs) in the front seat. The ballast weights must be fixed with an M 8 bolt which is min. 10 mm (.4 in.) longer than the thickness of all ballast weights.

b) For serial no. 5E140 and up:
The ballast box (option) at the right hand side of the instrument console underneath the carpet can accomodate 3 lead ballast weights of min 2.2 kg (4.85 lbs) each. Each weight compensates a pilot mass of 2.9 kg (6.4 lbs). With 3 weights 8.7 kg (19.2 lbs) missing pilot mass can be compensated. The lead ballast weights are to be fixed in the box with a M 8 wingnut.

### 7.16.2 Oxygen system

a) **Oxygen bottle installation**
Max. size of oxygen bottle is 7 l capacity with diameter 140 mm (5.5 in.)- If a bottle with less diameter is used, this bottle must be wrapped with plastic to come to the same diameter of 140 mm. The bottle must be fixed at its neck with a bracket Z 14 (available at DG-Flugzeugbau GmbH).

b) **Installation of the oxygen equipment**
To ensure a safe installation ask DG-Flugzeugbau GmbH for an installation instruction.
For the installation of the Dräger Höhenatmer E 20088 you will find an installation plan 5 EP 34 in the maintenance Mamual.

### 7.16.3 ELT Emergency Locator Transmitter

To ensure a safe installation ask DG-Flugzeugbau GmbH for an installation instruction.
For the Pointer Inc. ELT Model 3000 you will find an installation plan 5 EP 30 in the maintenance manual.

**Caution:** Concerning 7.16.2 and 7.16.3

The installation of such equiment has to be accomplished by the aircraft manufacturer or by an approved service station and to be inspected and entered in the aircraft log book by a licensed inspector.

7.16.4 **Heavy tailwheel**

Instead of the standard tailwheel with plastic hub a tailwheel with brass hub S 27/1 may be installed. The installation kit S 27/4 is available at DG-FLUGZEUGBAU GmbH.
The difference in mass between both hubs is 3.1 kg (6.84 lbs). With the brass hub, the min. front cockpit load is increased by 8.5 kg (18.74 lbs). This higher value must be entered in the cockpit data placards and on page 6.5. Even if the heavy tailwheel is installed only sometimes, the higher min. cockpit load must be entered.

# Section 8

## 8.1 Introduction

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

## 8.2 Inspection period, maintenance

The "Instructions for continued airworthiness (maintenance manual) for the DG-500 ELAN TRAINER have to be followed.

A Before each rigging all the connecting pins and bushes should be cleaned and greased. This includes the control connectors.

B The contact surfaces of the canopies to the fuselage are to be rubbed with colourless floor-polish (canopy and fuselage side) to reduce grating noise in flight. Polish at the beginning of the flight season and then every month.

C Once a year all the bearings and hinges should be cleaned and greased. See the greasing programme of the maintenance manual.
Each year the control surface displacements, adjustments and general condition must be checked. (See the maintenance manual).

## 8.3 Alterations or repairs

It is essential that the responsible airworthiness authority be contacted **prior to** any alterations on the airplane, to ensure that the airworthiness of the sailplane is not impaired. It is prohibited to execute the alteration without the approval of the airworthiness authority. The manufacturer will not be liable for the alteration or for damages resulting from changes in the characteristics of the aircraft due to alteration. So it is strongly recommended to execute no alternatives which are not approved by the aircraft manufacturer.
External loads such as external camera installations are to be regarded as alterations! Repair instructions can be found in the DG-500 ELAN TRAINER repair manual. No repairs should be carried out without referring to the manual.

## 8.4 Tie Down, Parking

To tie down the wings use the wing cradles of your trailer. The fuselage should be tied down just ahead of the fin. On sunny days the cockpit should be closed and covered.
**Note:** Longer parking with exposure to sun and humidity will cause premature aging of the skin of your sailplane.

## 8.5 Trailering

It is recommended to carry this valuable sailplane in a factory approved closed trailer.

Approved fitting points:
Wing panels:

1. Wing spar as close to wing rootrib as possible or a rootrib wing cradle.
2. A wing cradle at the taper change.

Stabilizer:
Cradles as desired.

Fuselage:

1. A felt lined fiberglass nose cap which does not extend over the canopy, secured to floor.
2. Fuselage dolly in front of the tow hook.
3. Tail wheel well in trailer floor. Secure fuselage with a belt in front of the fin or hold it down with the trailer top (soft foam in top).

All aircraft structures should not be subject to any unusual loads. With high temperatures that can occur inside trailers, these loads in time can warp any fibre reinforced plastic sailplane.

The trailer should be well ventilated so as to prevent moisture build up which could result in bubbles forming in the gelcoat.
A solar powered ventilator is recommended.

## 8.6 Towing on the ground

a) by towing from the nose hook using a rope with the standard double ring authorized for the release.

b) by using a tow bar which is fixed at the tail dolly and a wing tip wheel.

The tow bar and wing tip wheel may be ordered through the Glaser-Dirks factory.

## 8.7 Cleaning and Care

**Exterior surfaces of the fibrereinforced plastic parts**

The surfaces are coated by a UP-gelcoat. This gelcoat is protected by a hard wax coating which has been applied during production with a rotating disc ("schwabbel" procedure). Do not remove the wax, because this would lead to shading, swelling and cracking of the surface. In general, the wax coat is very resistant. As soon as the wax coat is damaged or worn, a new coat has to be applied (see maintenance manual sect. 3.1). If you store your aircraft often outside, this may be necessary every half year!

**Hints for care:**

- Wash the surface only with clear water using a sponge and chamois.

- The adhesive remains of tape may be removed with petroleum ether (pure petroleum spirit) which should be applied and removed immediately, otherwise this may lead to swelling of the gelcoat.

- More stubborn dirt which cannot be removed by washing may be cleaned off with siliconefree, wax containing car polishes (e.g. 1Z Extra, Meguiars in USA)

- Longterm dirt and shading can be removed by applying a new hard wax coat (see maintenance manual sect. 3.1).

8.7 ff

- Never use alcohol, acetone, thinner etc.. Do not use detergents for washing!

- Protect the surface from intense sunlight.

- Protect the aircraft from water and moisture. See sect. 8.4 and 8.5.

- Remove water that has entered and allow the aircraft to dry out.

- Never store your wet aircraft in a trailer.

**Plexiglas canopy:**

- Use clear water and a chamois for cleaning.

- Stubborn dirt and small scratches can be removed by use of the "schwabbel procedure" (see maintenance manual sect. 3.1).

**Metal parts:**

The pins and bushes for rigging the aircraft are not surface protected and must be covered with grease all the time.
The other metal parts, especially the control stick and all handles should be preserved with metal polishes occasionally.

## 9. Supplements



## 9.1 Introduction

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

## 9.2 List of inserted supplements

| Date of insertion | Document No. | Title of the inserted supplement |
|---|---|---|
| May 2010 | Section 9.3 | Special equipment for very small pilots TN500/02 |

### 9.3 Special equipment for very small pilots (TN500/02)

To facilitate the operation of the glider by very small pilots 3 different items have been developed, which may be used separately or together.

#### 9.3.1 Removable seat back for the front seat

a) Installation of the seat back: Install the seat back with 2 screws M6x16 DIN965 4.8 BIC with cup washers 15 x M6 MS NI NR4157 to the threads which have been installed according to working instruction No. 1 for TN500/02.
b) The seat back may be adjusted further to the front by part Z198. Fix the part to the Velcro straps installed at the rear of the seat back.
c) Remove the head rest from the seat (screwed connection) and install a head cushion 8R80/2 to the Velcro straps installed at the front of the seat back. When removing the seat back reinstall the headrest.

#### 9.3.2 Airbrake-pushrod with additional handle in front cockpit

For pilots with arms too short to lock the airbrakes an airbrake-pushrod with additional handle part 5St69/2 may be instead in the front cockpit according to working instruction No. 2 for TN500/02 instead of part 5St69.
This part may remain in the glider for normal operation.

#### 9.3.3 Rudder pedal plates for rear cockpit Z197

Pilots with very short legs may clip rudder pedal plates part no. Z197 on to the rudder pedals. Plates may be installed and removed as often as desired.