

Section 6

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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-500/22 ELAN.

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 460 kg (1014 lbs).

WNLP is to be determined as follows:

$WNLP = WNLP \text{ empty} + \text{cockpit load (pilot, parachute, baggage, barograph, cameras etc.)}$.

$WNLP \text{ empty} = \text{Total empty weight minus weight of the wings}$.

6.6 Max. mass (weight)

Max. weight without waterballast = WNLP + W wings

Max. weight with waterballast = 750 kg (1654 lbs)

6.7 Useful loads

Max. load **without** waterballast = max. weight
without waterballast - empty weight

Max. load **with** waterballast = max. weight
with waterballast - 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. cockpit 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).

Waterballast in the wing tanks:

The tanks have a capacity of 80 l (21.2 US gal) per wing.

The allowed amount of waterballast

is dependent on the empty weight and of the load in the fuselage and **can be determined from the diagram on page 6.7 "ballast chart"**.

It is only allowed to fly with symmetric wing ballast!

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 without W.B.					
Max. load without W.B					
Max. load with W.B.					
Min. cockpit load in front seat					
Max. load in both seats					
Inspector Signature, Stamp					

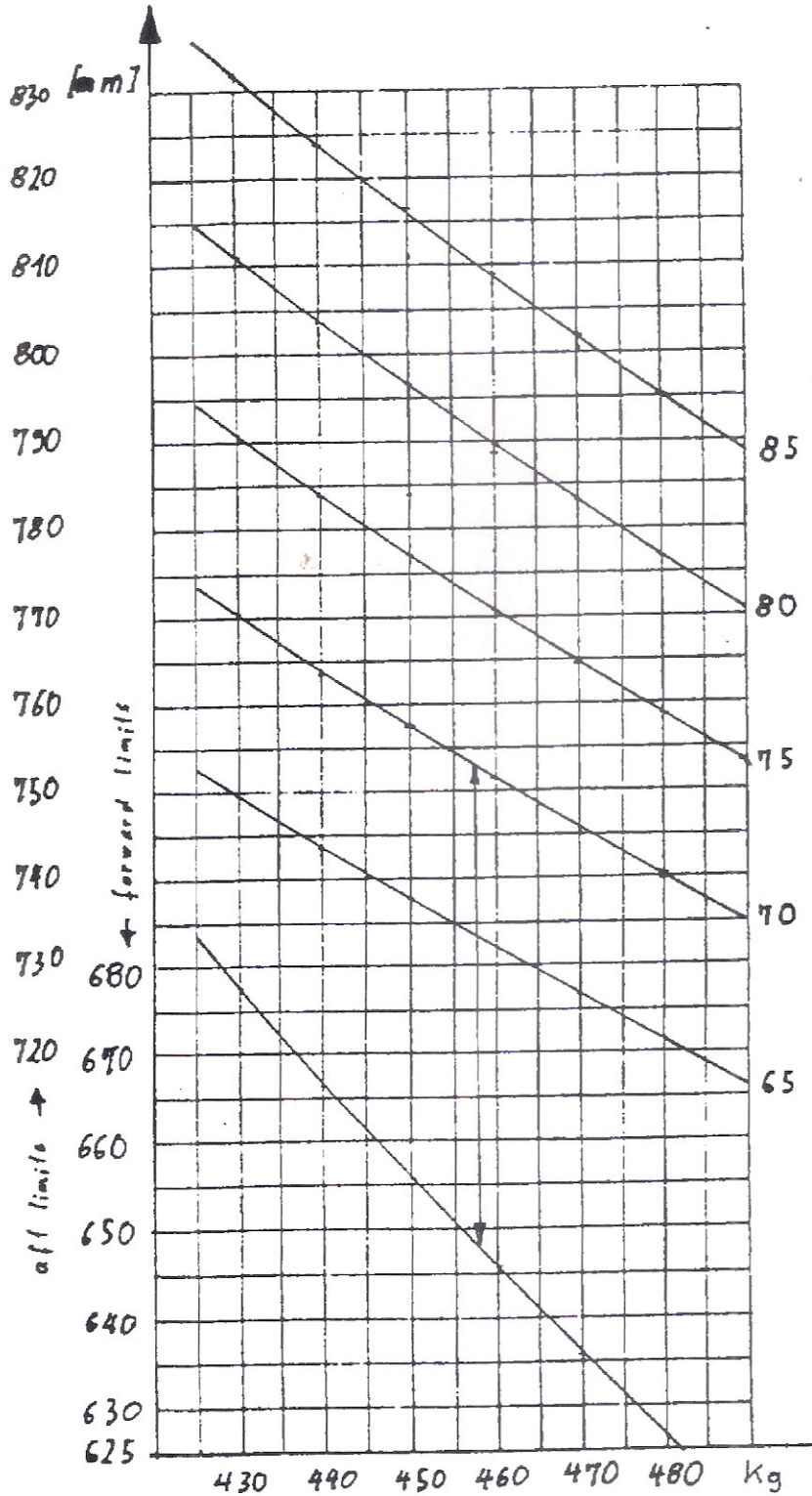
Remarks: 1. The weighing is to be executed with the battery (Z 07, mass 4.3 kg - 9.5 lbs) installed in the fin.

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

aft C.G. limits

cockpit load



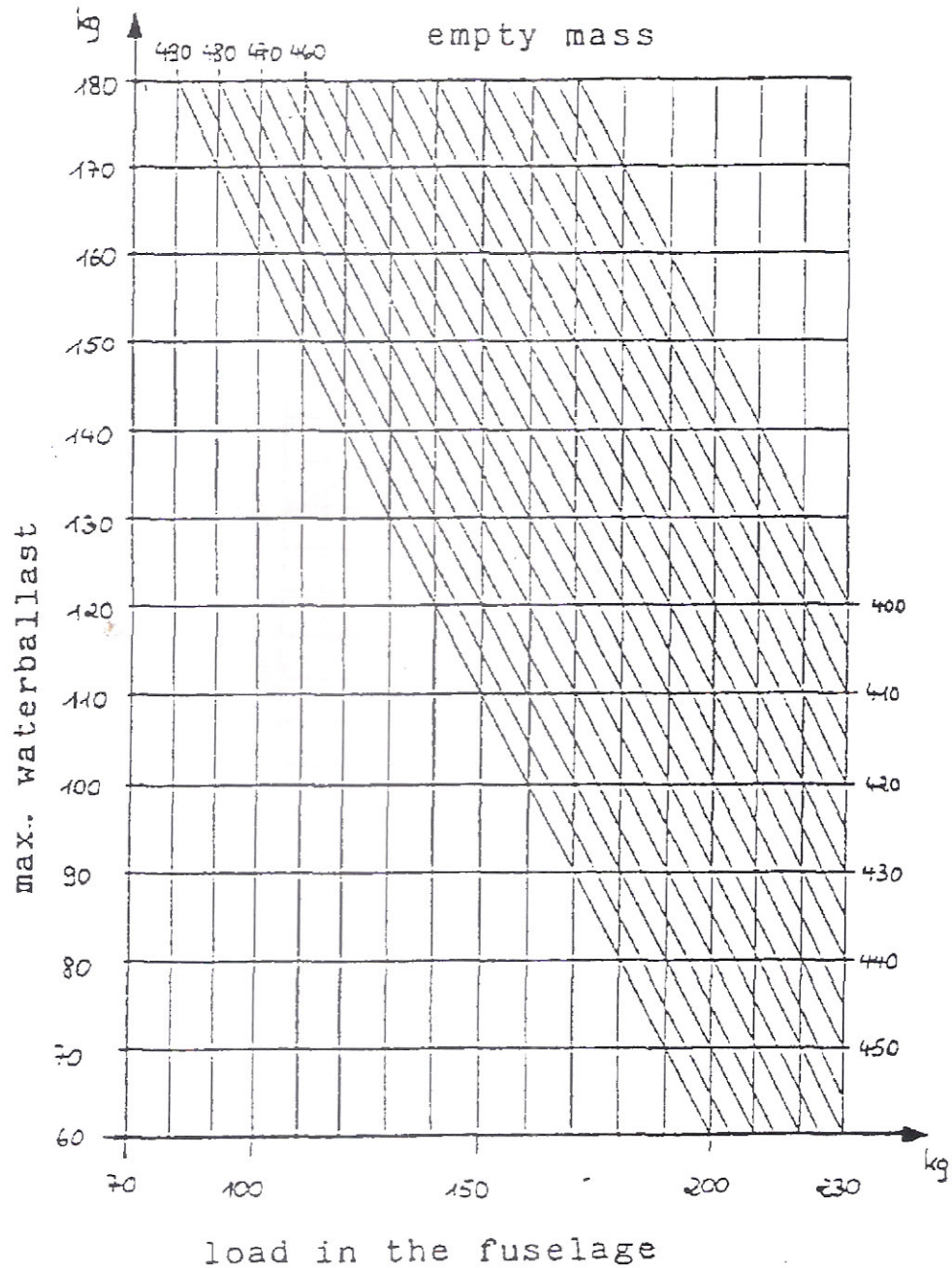
empty weight
C.G. range

forward C.G. limit
2 x 105 kg or
110 kg in front and
90 kg in rear seat

empty weight

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

DG-500/22 ELAN ballast chart (for 6.8)
 to determine the max. allowable waterballast in the
 wing tanks.



1 kg = 2.2046 lbs

3.785 kg (l) = 1 US gal.

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:

Item	mass kg	C.G. behind datum m	moment m kg
aircraft empty	440	0,74	325,6
Pilot front	75	- 1,35	- 101,25
rear	85	- 0,27	- 22,95
Waterballast in the wings	100	0,243	24,3
Sum	700	XS=0,322	225,7

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 C.G. [m]

Pilot mass [kg]	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	