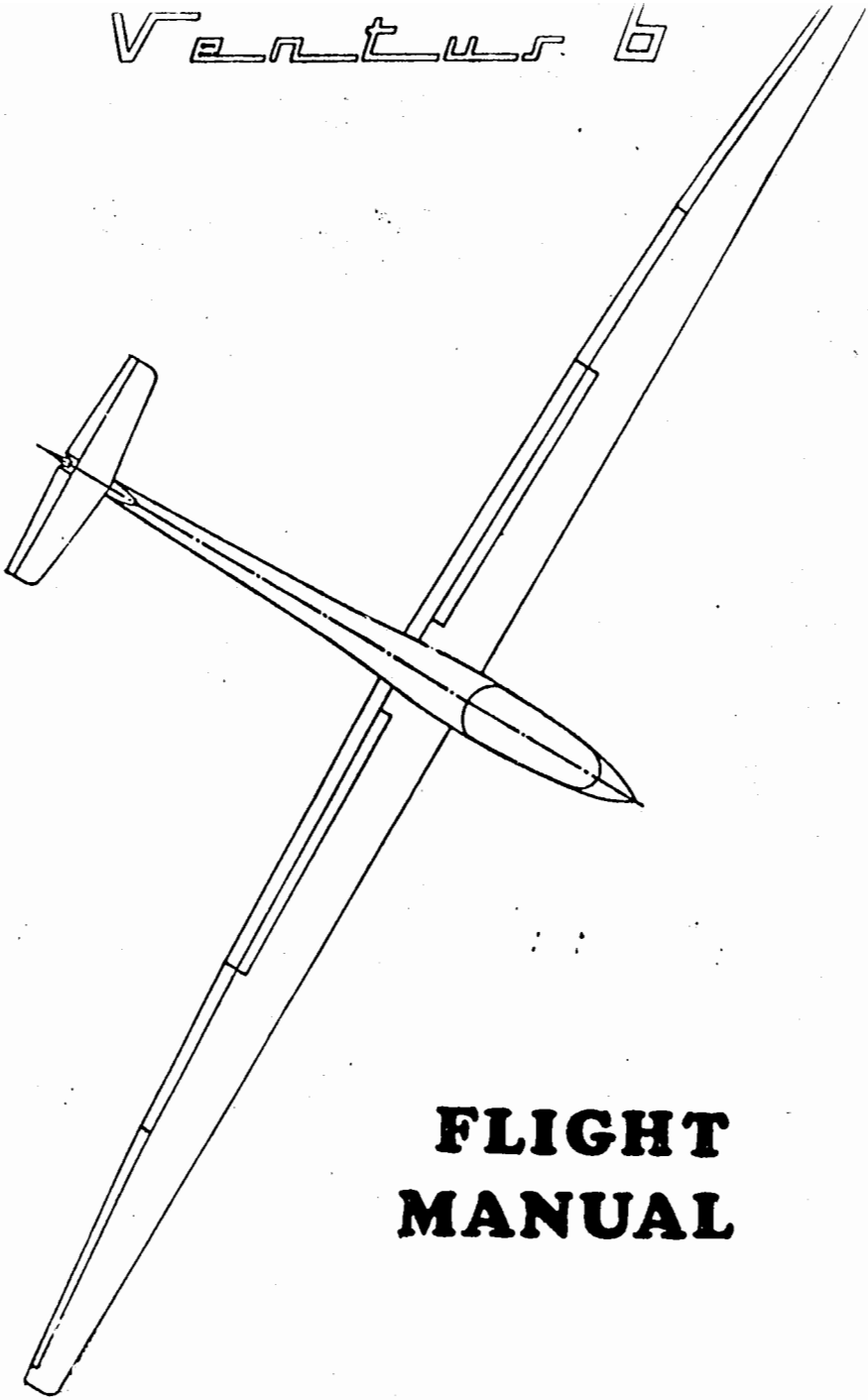
Ventus b



FLIGHT MANUAL

Ventus b FLIGHT MANUAL

Contents

1. General

1.1 General description

The "Ventus c" is a flap-equipped, single-seat CFRP/GFRP high-performance sailplane featuring a T-tail (fixed horiz. stabilizer and elevator). It can be flown in 15.0 m, [redacted]. [redacted] the standard size fuselage (version "b") is available.

Wings

The [redacted] two-piece (15.0 m) wings have a triple trapezoid planform and Schempp-Hirth Fowler airbrakes [redacted] Use of the flaps to act as additional full-span ailerons. Water ballast tanks are integral compartments in the wing nose, total capacity approx. 168 liters. Wing shells are of carbon fiber/foam-sandwich with spar flanges of carbon fiber rovings and shear webs of GFRP/foam sandwich.

Fuselage

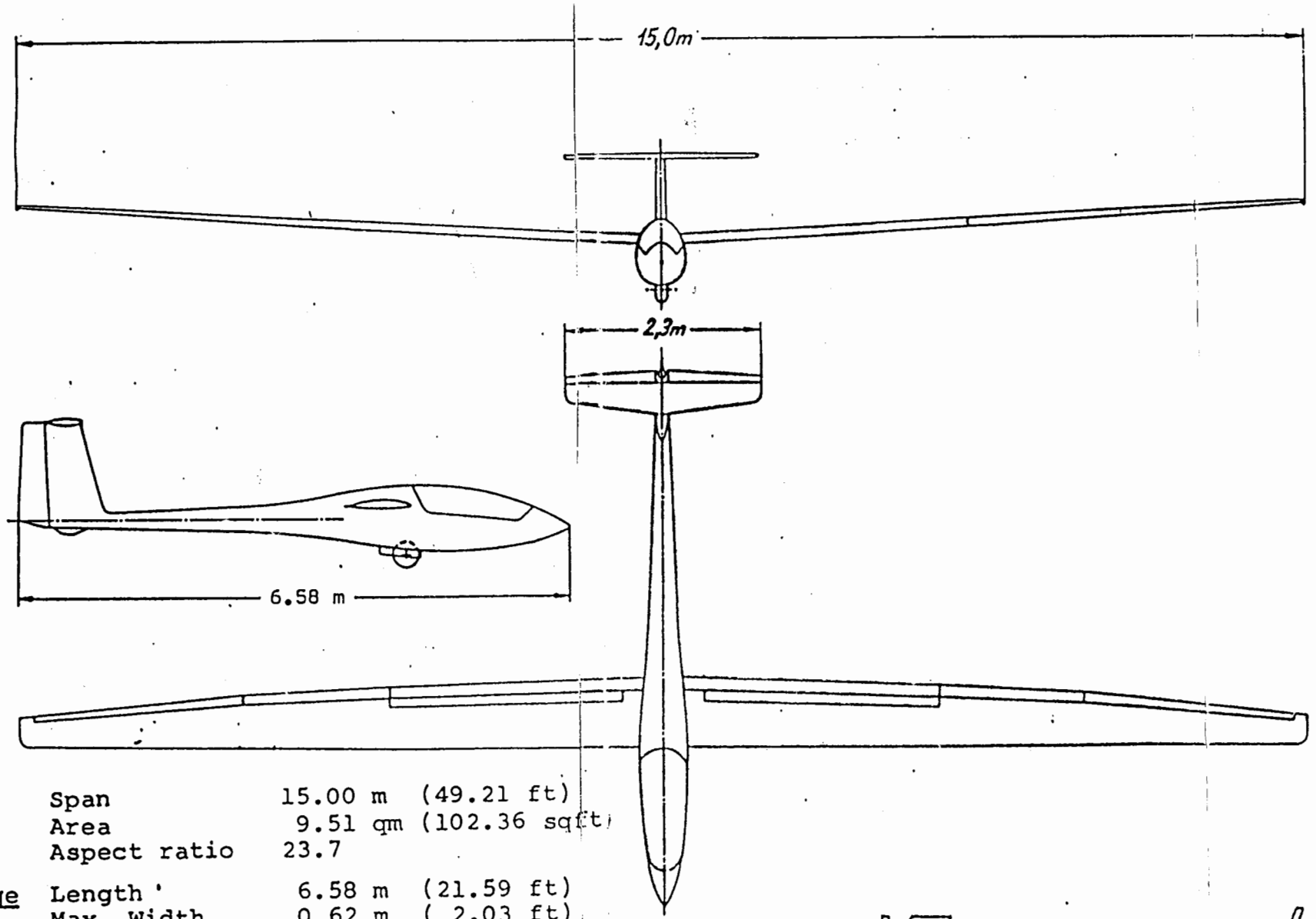
The pilot has a semi-reclining position. The cockpit is comfortable. A one-piece canopy hinges sideways. The fuselage shell is a pure fiberglass lay-up (without sandwich) and therefore is highly energy absorbing. It is stiffened towards the tail with GFRP/foam sandwich webs and the forward fuselage features a double shell on either side and on the bottom. The retractable undercarriage is fitted with a wheel brake.

Horizontal tailplane

The fixed stabilizer is built in GFRP/foam sandwich, the elevator halves are a pure fiberglass lay-up.

Vertical tail

Both fin and rudder are a GFRP sandwich construction.
The capacity of the integral water ballast tank in the fin is 5.0 ltr./kg (1.3 U.S. Gal./1.1 Imp. Gal.).



Wing	Span	15.00 m (49.21 ft)
	Area	9.51 qm (102.36 sqft)
	Aspect ratio	23.7
Fuselage	Length	6.58 m (21.59 ft)
	Max. Width	0.62 m (2.03 ft)
	Max. Height	0.81 m (2.65 ft)
Weights	Empty weight	220 kg (485 lb)
	Max. A.U.W.	500 kg (1102 lb)
	Wing loading	31 - 52.5 kg/qm (6.35 - 10.76 lb/sqft)

Ventur b

Technical Note No. 349-7 May 1983

2. Operating Limitations

2.1 Flight Speeds

Maximum speed Flap setting -1, -2, S	V_{NE}	= 135 knots
Maximum speed Flap setting L, +2, +1,0	V_{FE}	= 86 knots
Max. rough air speed	V_B	= 108 knots
Max. manoeuvring speed	V_A	= 108 knots
Max. aerotow speed	V_T	= 97 knots
Max. winch/auto launch	V_W	= 81 knots

It is important to remember that at altitude the equivalent airspeed (EAS) is greater than the indicated airspeed (IAS).
This difference does not affect the structural integrity or load factors, but to avoid any risk of flutter, the following indicated values should not be exceeded:

Height (ft)	IAS (knots)	Height (ft)	IAS (knots)
0	135	27,500	117
5,000	135	30,000	111
15,000	135	32,500	106
20,000	133	35,000	100
22,500	127	37,500	95
25,000	122	40,000	90

Air speed indicator system errors

Errors in indicated air speed caused by pitot-static pressure errors may be read off from the calibration chart below.

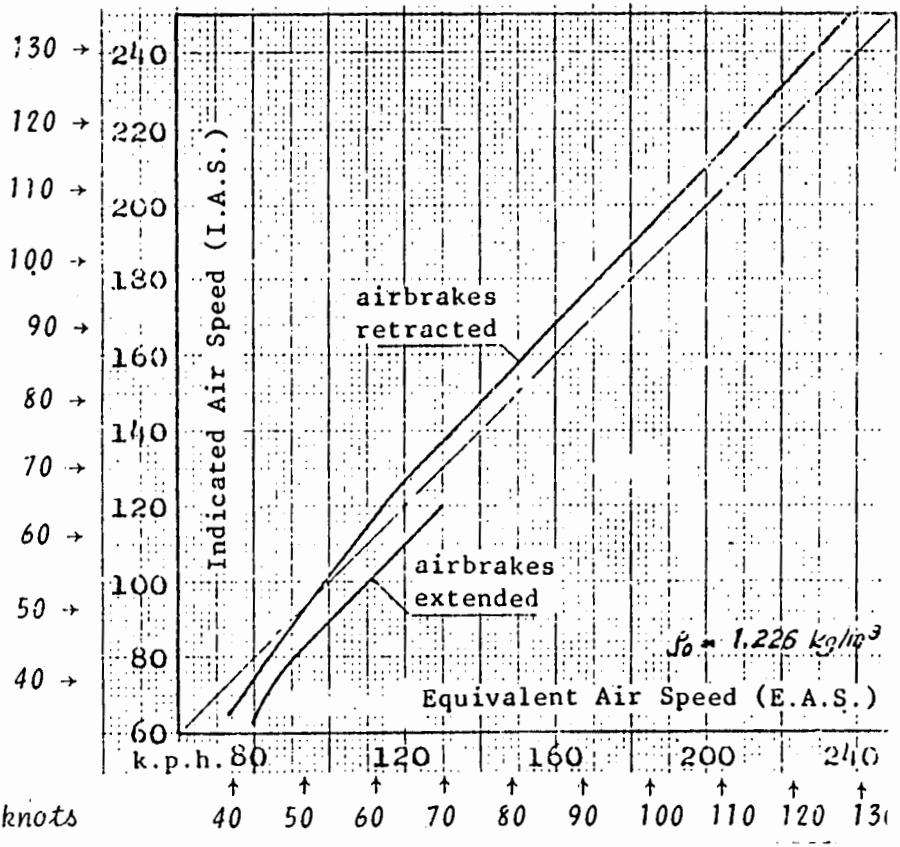
Pot pitot: Nose of fuselage.

Static vents:

Air speed indicator: On the sides of the fuselage, 150mm below mainspar cutout

Variometer: On the instrument panel and at the rear of the fuselage, 800mm in front of the base of the fin.

All flying speeds quoted in this Flight Manual are indicated air speed.
The calibration curve is also valid for winch launching and aerotow using the C.G. hook.



2.2 Airworthiness Category

Category U (Utility) ("LFSM" classification)

The glider may be operated VFR during the hours of daylight when equipped as per Section 2.9.

In accordance with the "LFSM" requirements full control movements may be used up to the manoeuvring speed V_A.

At higher speeds it would be possible for full control movements to cause the glider to be overstressed. For this reason full range control movements must not be used at speeds in excess of 108 knots. At V_{NE} (135 knots) aileron control and rudder pedals should only be used up to a maximum of one third of full travel.

The permitted range of elevator movement at V_{NE} is significantly less than one third and depends on permitted manoeuvring load factors.

In normal weather conditions the full speed range up to V_{NE} (135 knots) is available.

In strong turbulence, e.g. in wave rotor, cumulo nimbus, visible whirlwinds or when crossing mountain ridges, V_B (108 knots) must not be exceeded.

2.3 Maneuvering Loads

The following maneuvering load factors must not be exceeded:

at V_A (108 knots/200 km/h) :

n = + 5.3

n = - 2.65

at V_{NE} (135 knots/250 km/h) :

n = + 4.0

n = - 1.5

Airbrakes extended: Max. + 3.5

2.4 Weights

Empty weight:	approx. 485 lb (220 kg)
Max. A.U.W. :	1102 lb (500 kg)
Max. weight excluding lifting surfaces	463 lb (210 kg)

Permitted water ballast: See section 2.5

2.5 Loading plan

Cockpit load (Pilot and parachute):

Minimum load 70 kg (154 lb)

Maximum load 110 kg (242 lb)

Any deviation thereof should be noted. (See weight- and balance log sheet on page 14).

At less cockpit load, compensation with ballast is required.

1. The compensating ballast weight (lead- or sand cushion) is to be fastened onto the seat belt attachment fittings.
2. The ballast weights in form of lead sheets can be attached in the fuselage nose.
   One ballast weight of 2 kg (4.4 lb) compensates 5 kg (11 lb) pilot's weight.

   The attachment point is 1745 mm (68.7 in.) forward of datum (BE).

   Neither the maximum all-up weight of 500 kg (1102 lb) nor the maximum weight of non-lifting parts of 210 kg (463 lb) must be exceeded.

C.G. position of the pilot

(with parachute,or seat back cushion)

518 mm (20.39 in.) forward of datum (BE)

Datum (BE): Wing leading edge at root rib.

Water Ballast Chart

Max. A.U.W. with water ballast: 500 kg / 1102 lb

The weight of the water ballast permitted depends on the empty weight of the glider and the specific cockpit load:

Empty weight kg	Empty weight lb	Cockpit load kg/lb: kg 70	lb 154	kg 80	lb 176	kg 90	lb 198	kg 100	lb 220	kg 110	lb 242
220	485	168	370	168	370	168	370	168	370	168	370
230	507	168	370	168	370	168	370	168	370	160	353
240	529	168	370	168	370	168	370	160	353	150	331
250	551	168	370	168	370	160	353	150	331	140	309
		Water ballast kg/lb distributed evenly in both integral tanks									

Baggage compartment

The baggage compartment can be loaded with max. 2 kg/4.4 lb.
This load is to be considered when the max. permitted water ballast load is determined.

Lever arm of baggage:

845 mm (33.27 in.) aft of datum (BE).

2.6 Centre of Gravity

a) Flying weight Centre of Gravity

Attitude of glider: the top edge of a strip with 100:4.4 taper, placed on rear fuselage, to be horizonta

Datum plane: Wing leading edge at root ri

Max. forward C.G: 200 mm behind datum pla

Max. rearward C.G: 340 mm behind datum pla

It is extremely important that the maximum rearward C.G. position permitted is not exceeded: this requirement is met when the cockpit load (pilot & parachute) is not less than 70 kg (154 lbs). If require ballast must be carried to bring the cockpit load up to a permissible figure (see also Section 2.5, Cockpit Load.)

b) Empty Weight Centre of Gravity

The glider must be weighed at least once every four years and after any repairs, modifications of a major nature, after adding equipment and after respraying. It is important to ensure that the empty weight C.G. remains within the permitted limits. If necessary, ballast must be installed.

If the empty weight C.G. limits and the load chart are complied with, the flying weight centre of gravity will remain within the permitted limits.

Reference should be made to the manufacturer before any change be made to the load chart.

Loading table when using the fin tank

In order to shift the center of gravity close to its aft limit (favourable in terms of performance), water ballast may be carried in a fin tank (m_{FT}) to compensate for the nose heavy moment of water ballast in the wing (m_{WT}).

The determination of the ballast quantity is done with the aid of the diagram on page 18 C.

Example for the determination of the ballast quantity:

Total water ballast in both wing tanks (m_{WT}) = 70 kg/Ltr.

Resulting water ballast in fin tank (m_{FT}) as shown in the diagram on page 18 C = 2.3 kg/Ltr.

As the scale on the fin tank is graduated for full kilograms/Ltr. only, a quantity of

2.0 kg = 2.0 Ltr.

is filled in.

When determining the quantity of water ballast for the fin tank, bear in mind that the maximum permitted payload (see log chart, page ~~23~~ 14) must not be exceeded. Check as follows:

$$m_{pilot} + m_{FT} \leq$$

less or equal to the max. permitted payload shown on page ~~23~~. 14.

In order to avoid that the maximum permitted gross weight is exceeded, the ballast in the fin tank must also be considered when determining the maximum allowable water ballast for the wing tanks.

Caution:

The fin tank should never be used when there is the danger of the water ballast becoming frozen.

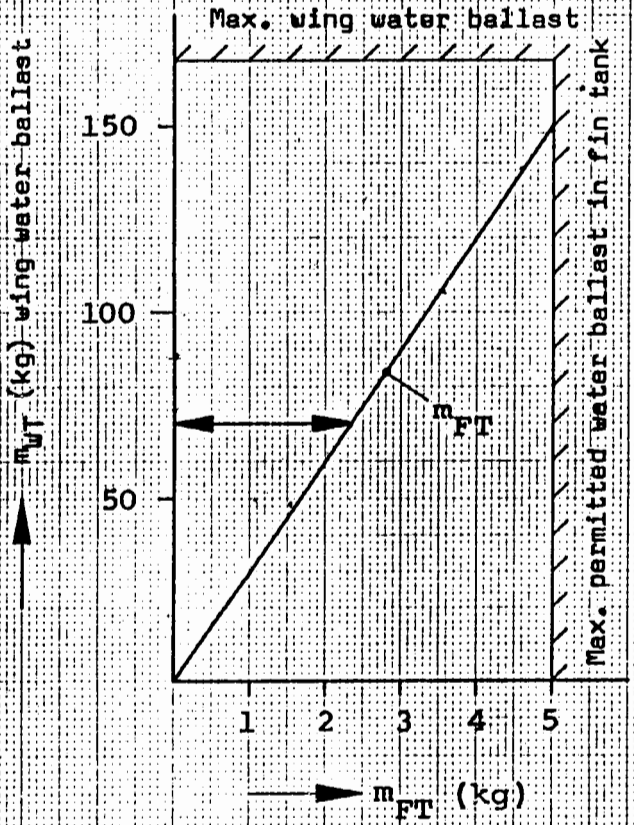
Flying conditions must conform with the following table:

Operating limits when fin tank is used:						
Maximum ground temperature	°C	13.5	17	24	31	38
	°F	56	63	75	88	100
Maximum absolute ceiling	m	1500	2000	3000	4000	5000
	ft	4900	6500	9800	13100	16400

Observe the outside air temperature indicator - the temperature must not drop below 2° C (36° F).

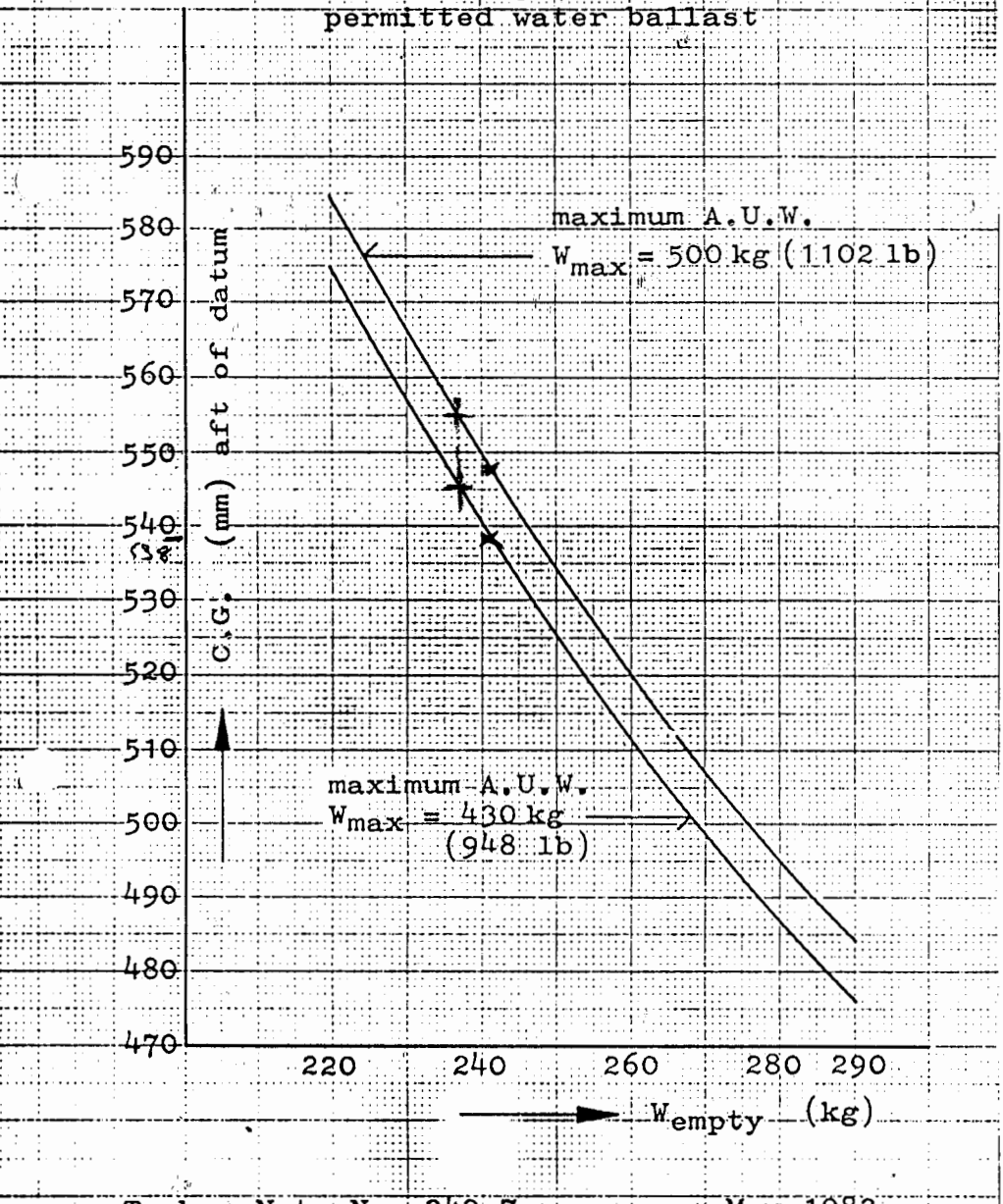
Water ballast in fin tank (m_{FT})

Lever arm of water ballast in fin tank:
4196 mm (13.77 ft) aft of datum

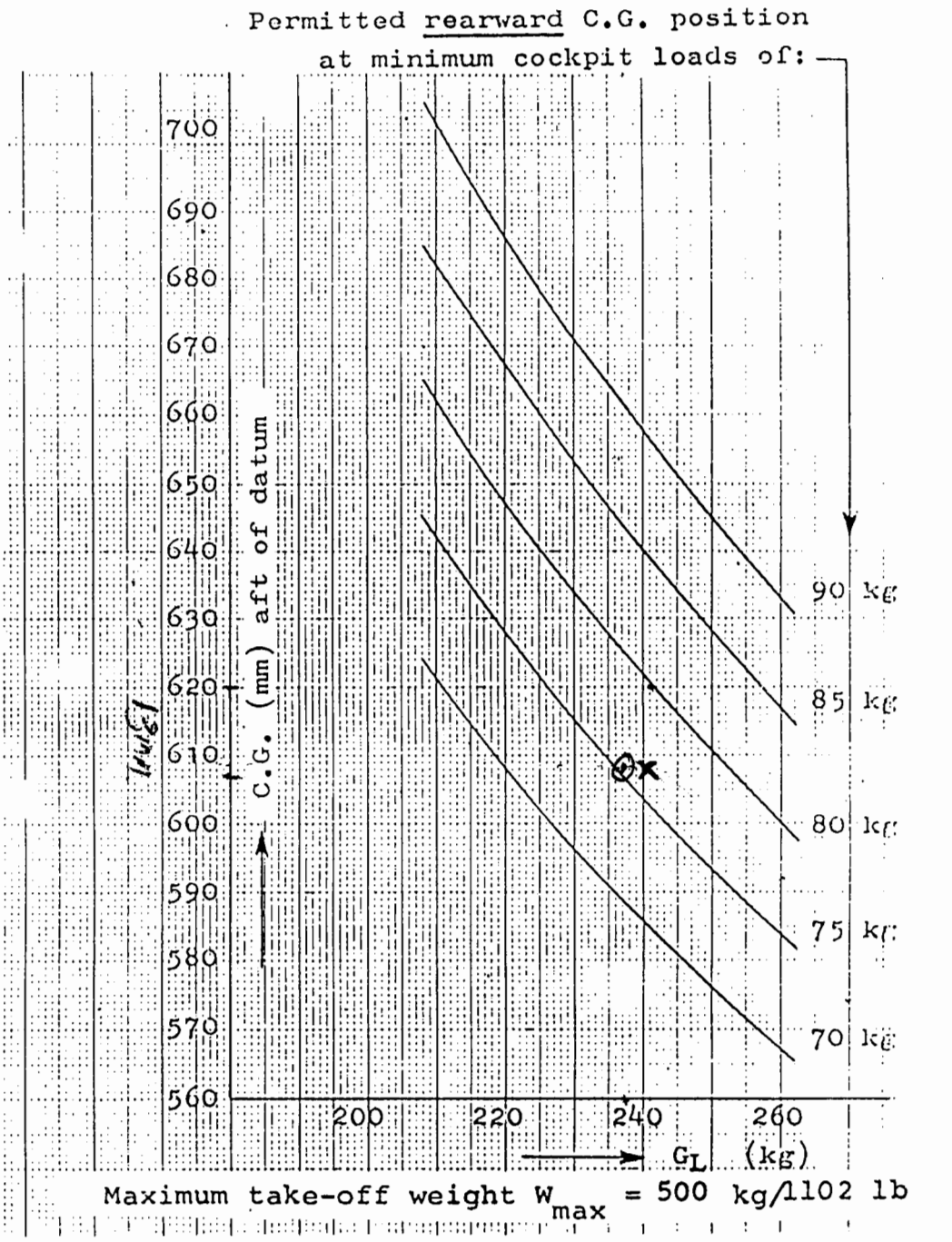


EMPTY WEIGHT C.G. RANGE

Permitted forward C.G. position at max. seat load of 110 kg (242,5 lb) and max. permitted water ballast



Empty weight C.G. range



Maximum take-off weight W_{max} = 500 kg/1102 lb

Date of Weighing		5/6/25	23/7/91		
Weighed by			R BOND & GARSMIER		
Empty Weight (kg/lbs)			241.1		
Equipment List dated:			23/7/91		
C.G. Position mm behind datum			340mm		
Max. Pilot Weight including 'chute (kg/lbs)	max.		94kg		
	min.		77kg		
Max. Disposable Load (kg/lbs)			16.9kg		
Permitted Water Ballast at Maximum A.U.W (kg/lbs)			185 LIT INCL F/TANK		

2.7 Weak Link in launching cable or rope

For both winch launching and aerotow the strength of the weak link should be

5000 N ± 10% (1100 lbs ± 10%)

2.8 Release Hook (C.G. Hook)

The S 72 (Special Hook) located in front of the mainwheel is used for winch launching.

Release Hook (Nose Hook)

The E 72 or the E 75 release hook located in the nose of the fuselage is used for aerotow.

2.9 Minimum Equipment

Instruments and other basic equipment must be of an approved type and should be selected from the list in the Maintenance Manual. (PAGE 24)

a) Normal Operations

1 Airspeed indicator, range 0-300 km/h (0-162 kt, 0-186 mph), with colour markings shown on page 25.17

1 Altimeter

1 Four-piece symmetrical seat-harness

1 Automatic or Manual parachute or a seat-back cushion (approx. 10 cm/4 in. thick when compressed)

1 Outside air temperature indicator with sensor (red line at 2° C / 36° F)

b) Cloud Flying

In addition to the equipment listed in a):

Turn & Slip indicator with slip ball

Magnetic compass

Variometer

VHF Transceiver

Note:
From experience gained to date it appears that the A.S.I. installation system remains fully operational when flying in clouds.

Recommended additional equipment:

Artificial horizon, clock, accelerometer (3 hands, resettable)

Note: For structural reasons the weight of the instrument panel and instruments must not exceed 10 kg (22 lb).

Note

For structural reasons the weight of the instrument panel and instruments must not exceed 10 kg (22 lbs).

Operating Instructions

See Flight Manual & Maintenance Manual.

Placards - pages 31-33 of Flight Manual.

Colour Coding on A.S.I.

Maximum speed	V_{NE} =	135 knots
Manoeuvring speed	V_A =	108 knots
1.1 x Stalling speed	1.1 x V_{sl} =	42 knots
White sector (flap settings L, +2, +1, 0)		38 to 86 knots
Green sector (normal range)		42 to 108 knots
Yellow sector (caution range)		108 to 135 knots
Red line (never exceed)	V_{NE} =	135 knots
Yellow arrow (approach speed)		54 knots

The stalling speed on which the A.S.I. markings are based assumes the following configuration:

a)	Flap setting	L
b)	Airbrakes	Retracted
c)	Maximum weight	430 kg (948 lbs)

2.10 Restricted Aerobatics

The following aerobatic manoeuvres are permitted:

a) Inside Loops

b) Spins

c) Stall Turns

d) Lazy Eight

It is recommended that in addition to the instrumentation recommended in 2.9 a) an accelerometer (3 hands, resettable) be installed.

Aerobatics are only permitted without water ballast.

Loose items should be removed before commencing aerobatics.

2.11 Rigging data

Rigging data and required control surface deflections may be found on the next page

Care should be taken to ensure that these measurements remain accurate within permitted tolerances after repairs.

3. Emergency Procedures

3.1 Spin Recovery

If the glider enters a spin inadvertently with a midway or rearward C.G. position, full opposite rudder should be applied immediately and the control column eased forwards.
When rotation stops, centralise the rudder and pull out of the dive gently.

3.2 Safety Considerations

On no account should a take-off (whether a winch launch or aerotow) be attempted from unmown grass. If a wing tip catches in the grass, release the cable immediately or a ground loop will ensue with the attendant risk of damage.

Should it be necessary to release the cable or aerotow rope when low, a speed of at least 43 to 49 knots must be maintained at 0 flap setting, the speed to be determined by the wing loading.

When circling, a higher flying speed is necessary, according to the angle of bank, so that an inadvertent - and perhaps unnoticed - stall does not occur. If there is slight vibration and the control feel sloppy it means that, despite an indicated airspeed of 37 to 44 knots when flying straight & level with 0 flap setting, the glider is stalled. Release the back pressure on the control column immediately if this occurs.

3.3 Emergency Canopy Jettison

The procedure for jettisoning the canopy is:

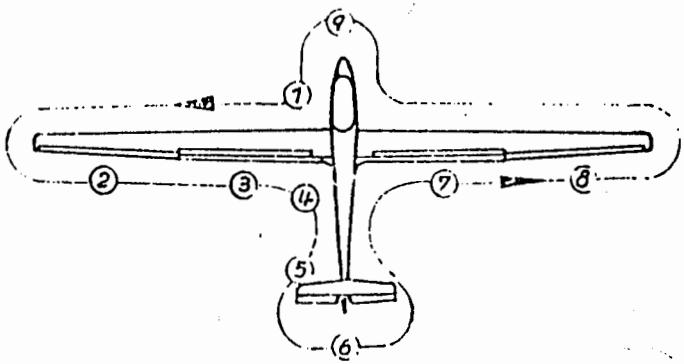
1. Push the red knob on the left of the canopy frame f o r w a r d s.
2. Push forward the red knob on the right side of the canopy (just below the canopy frame).
3. Thrust the canopy clear.

As the top edge of the fuselage around the cockpit is a strong reinforced frame free from sharp edges, the pilot can raise himself by grabbing it and use it as a support.

4. Normal Operations

4.1 Daily Inspection

The importance of inspecting the glider after rigging & before the start of each day's flying cannot be over-emphasized. Failure to carry out a full D.I. leads to accidents.



When inspecting the glider be on the lookout for paint cracks, dints and uneven surface features. In case of doubt obtain a qualified opinion.

(1) a. Open the canopy.

b. Check the main rigging bolt is secured.

c. Make a visual check of all the control circuits in the cockpit.

d. Check for full and free movement of the controls.

e. Check for the presence of foreign bodies.

(1) f. Check tyre pressure.
up to 330 kg (727 lb): 51 psi (3.5 bar)
over 330 kg (727 lb): 65 psi (4.5 bar)

g. Check condition and operation of release hook.

(2) a. Check upper and lower surfaces of wing for damage.

b. Check that the ailerons are in good condition and operate freely. Check for any unusual degree of play by gently shaking the trailing edge of the aileron. Check the bearings for damage.

(3) a. Check that the flaps are in good conditic and operate freely. Check for any unusua degree of play by gently shaking the trailing edge of the flap. Check the bearings for damage with the air brakes open.

b. With the flaps set at S with the air-brakes closed, check the gas strut in the control circuit in the fuselage. Do this by pushing the inboard end of the flap down to the L position and releasing it. The flap must return to the S setting immediately.

c. Check that the airbrakes are in good condition, fit well and lock closed.

(4) a. Check the fuselage for damage, especially the underside.

b. Check that the static vent holes under the wing roots and at the rear of the fuselage (800 mm forward of the leading edge of the fin) are clear.

4. b) Check that the static ports below the main spar cut-out and on the tail boom (80 cm / 31.5 in. forward of the leading edge of the fin) are clear.

5. a) Check condition of tail skid (or wheel - if installed, tire pressure 2.0 bar/28 psi).
Check that the drain hole of the fin tank is clear.

b) If a T.E. Compensation probe is used, mount it and check the line (when blowing gently into the probe, variometer should read "climb").

c) Check that the spill holes of the fin tank are clear.

d) Check ballast quantity in fin tank (in case of doubt dump water).

6. a) Check horizontal tailplane for correct attachment and locking.

b) Check elevator and rudder for free movement.

c) Check trailing edge of elevator and rudder for damage.

d) Check elevator and rudder for unusual play by gently shaking the trailing edge.

7. See (3)

8. See (2)

9. Check that the static pressure ports near the instrument panel and the Pitot tube in the fuselage nose are clear. When blowing gently into the Pitot tube the ASI should register.

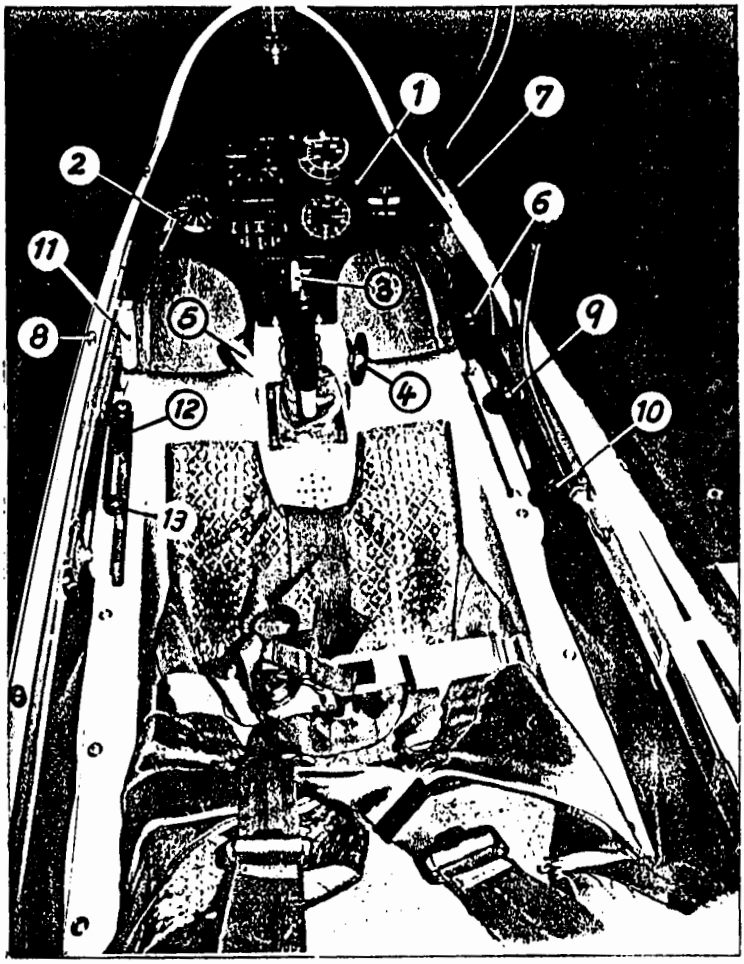
10. By removing the connectors behind the instrument panel, water may be drained from Pitot, Static and Total Energy Compensation lines.

After heavy landings or after the sailplane has been subjected to excessive g-loads, the resonant frequency of the wing should be checked (the exact figure of this serial number is shown in the last inspection report).

Check the entire sailplane thoroughly for surface cracks and other damage. For this purpose it should be de-rigged.

If damage is found (i.e. surface cracks in the fuselage tail boom, or tailplane, or if delamination is discovered at the wing roots or at the bearings in the root rib) the sailplane must be grounded until the damage has been repaired by a qualified person.

4.2 Cockpit Description



All instruments and controls are within easy reach of the pilot.

(1) Instrument Panel

The instrument panel cover is attached by four screws. The instrument panel is attached to the cockpit combing and is easy to detach.

(2) Ventilation

The small black knob on the left of the instrument panel controls ventilation.

Pull to close ventilator.

Push to open ventilator.

In addition, the d.v. window or the canopy ventilator can be opened for additional ventilation.

(3) Wheelbrake

The brake lever is on the control column.

(4) Rudder Pedal Adjustment

Adjustment is via a handle on the left at the bottom of the instrument panel.

Forward adjustment:
After releasing the locking device by pulling the handle, push the pedals to the desired position with your heels and let them locate.

Backward adjustment:
Pull the handle until the pedals have reached the desired position. Forward pressure with the heel (not the toe of the foot) will locate the pedals with an audible click.

The rudder pedals may be adjusted on the ground or in the air.

(5) Cable Release

Yellow handle on the left at the foot of the instrument panel console.

The cable is released by pulling the handle.

(6) Undercarriage

RETRACT: Unlock the black handle (on the right of the seat), pull it back and lock it in this position.

LOWER: Unlock the handle, push it forward and lock it.

(7) Canopy

The one piece perspex canopy hinges to starboard and has flush hinges. Care should be taken to check that the stay cord to restrain the open canopy is attached.

(8) Canopy Locking

Lever control with red knob on the left on the canopy frame.

Backward is locked.

To open the canopy, push the knob forward and raise it.

(9) Emergency Canopy Jettison

Red knob on the right side, on the glass fibre inner skin.

Backward is locked.

To jettison, first open the canopy, then push the jettison knob forward and push the canopy away.

(10) Water Ballast Dumping WING & FIN TANKS

Black knob on the starboard side of the cockpit in the middle of the glass fibre inner skin.

Forward - valves closed

Back - valves open

Turn the handle downwards to lock the valve open.

(11) Airbrake Lever

Blue lever projecting downwards on the left hand side of the cockpit.

Forward position - locked closed

Pulled approximately 40 mm - unlocked

Pulled right back - airbrakes and flaps fully extended

(12) Flap Control Lever

Move the black handle on the left of the seat pan support inwards and select flap position.

Forward - high speed range

Back - low speed range

(13) Trimmer

Green knurled knob is situated on the left on the flap linkage.

The spring operated trimmer may be adjusted by stages, by freeing the knurled knob, engaging the desired trim setting and tightening up the knurled knob again.

To increase flying speed: move control forwards

To reduce flying speed: move control backwards

Green marking on the edge of the cut-out is the normal trim position when flying at 0 flap setting.

(14) Parachute Fixed Line Anchorage

Red ring situated at the front of the steel fuselage-frame, left side.

Markings & Placards in the Cockpit

Manufacturer's Type Plate (fireproof)

Manufacturer:
SCHEMPP-HIRTH
Kirchheim-Teck

Type:

Serial No/Yr of Mfr

T.C. Number

Operating Limitations

Maximum A.U.Weight	500 kg	(1102 lb)
Maximum Speeds (I.A.S.)	**knots**	**km/h**
Flap settings -1, -2, S	135	250
Flap settings L, +2, +1, 0	86	160
Rough air	108	200
Maneuvering speed	108	200
Aerotow	97	180
Auto/Winch tow	81	150

Weak links:

Maximum 650 daN (1433 lb)

Tire pressure:

3.5 bar (50 psi) below 330 kg/727 lb
4.7 bar (67 psi) above 330 kg/727 lb

FIN TANK DATA ONLY.

Cockpit placards - operating data and miscellaneous

Identification plate (fire proof)

Operating limitations

Ventus c, fuselage version ....

Maximum permitted all-up weight:

Wing span 15.0 m : 1157 lb/525 kg
Wing span 16.6 m or 17.6 m: 1102 lb/500 kg

Max. permitted speeds (IAS):	kt	mph	km/h
Flap settings -1, -2,	146	168	270
Flap settings L, +2, +1, 0	86	99	160
in rough air	97	112	180
Maneuvering speed	97	112	180
Aerotow	97	112	180
Auto/Winch launch	81	93	150
for U/C extension	97	112	180

Operating limits when fin tank is used:

Maximum ground temperature	°C	13.5	17	24	31	38
	°F	56	63	75	88	100
Maximum absolute ceiling	m	1500	2000	3000	4000	5000
	ft	4900	6500	9800	13100	16400

Weak links for towing:

Maximum 680 daN (1499 lb)

Main wheel tire pressure:

up to 330 kg/728 lb = 3.5 bar (50 psi)
above 330 kg/728 lb = 4.7 bar (67 psi)

Load on pilot's seat
(pilot and parachute)

Maximum load 110 kg / 242.5 lb *

Minimum load 70 kg / 154.3 lb *

Pilot's weight of less than 70 kg/ 154.3 lb* must be raised by using trim ballast (see Flight Manual)

* As the actual minimum or maximum seat load of this sailplane to which this manual refers may differ from the above typical weights, the placard in the cockpit must show the actual weights which are also to be entered in the log sheet - see page 33.14

Check list before take-off

- Water in fin tank ?
- Loading charts checked ?
- Parachute securely fastened ?
- Safety belt secured and tight ?
- Back rest and pedals in comfortable position ?
- All controls and instruments accessible ?
- Airbrakes locked after function check ?
- All control surface movements checked with assistant ?
- Controls free ?
- Trim correctly adjusted ?
- Flaps in take-off position ?
- Canopy closed and locked ?

AEROBATICS: Without water ballast the following maneuvers are permitted:

(a) Inside Loops
(b) Stalled Turns
(c) Lazy Eight

Baggage compartment
Max. load: 2 kg/4.4 lb

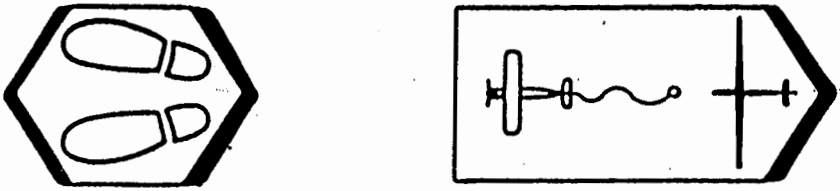
Locking pin flush with upper surface

Ventus ~~c~~ B

Operating handles and knobs

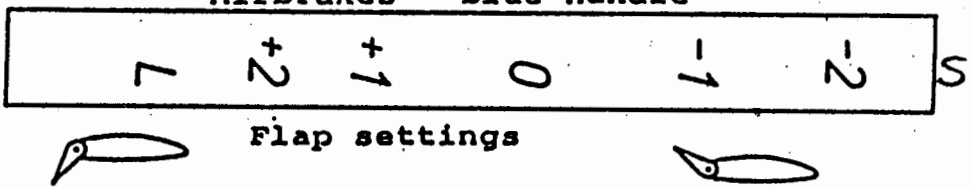
EXTEND - Undercarriage - RETRACT

Trim - knurled green knob

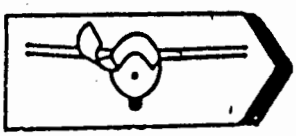


Pedal adjustment Yellow tow release grip

Airbrakes - blue handle

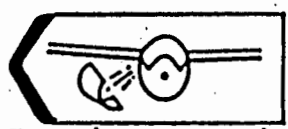


Flap settings



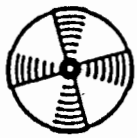
Left - Open

Canopy RED knobs



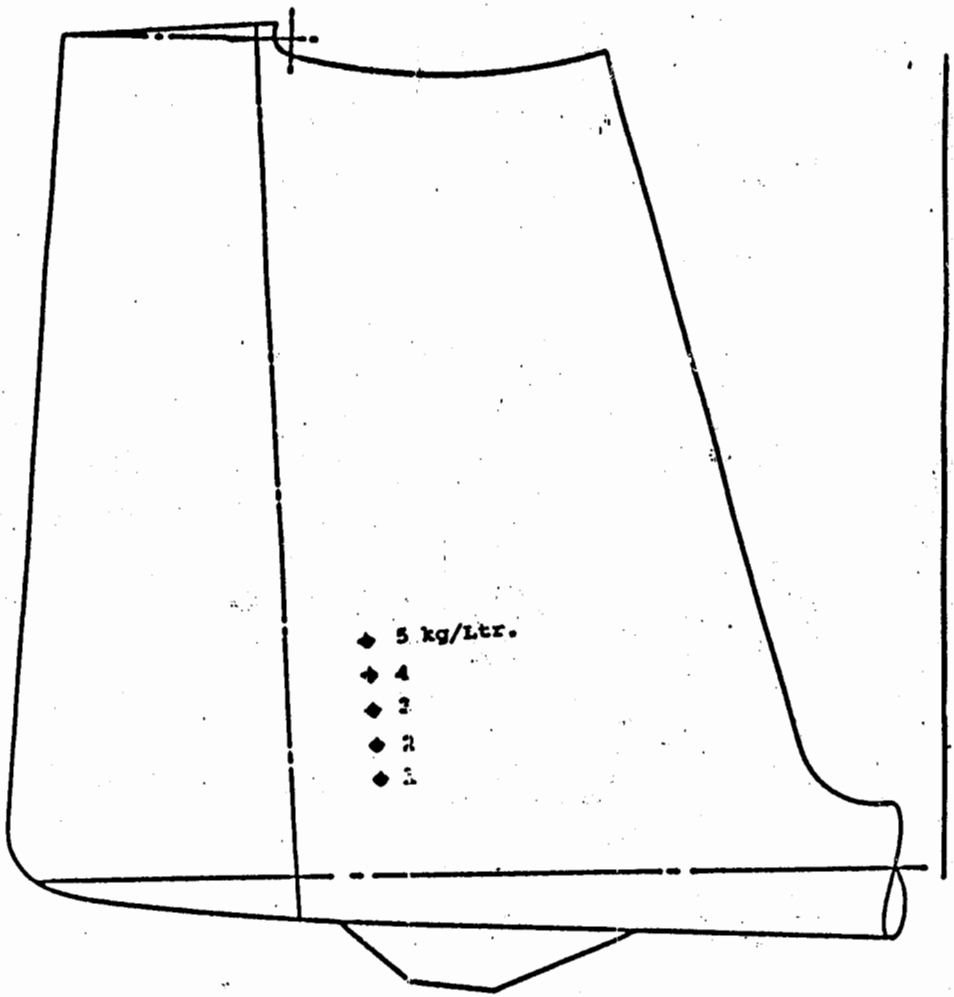
Jettison - Right

Ventilation



water ballast dumping knob

Fin tank label (r.h. side only)



4.3 Pre Take-off Checks

See placards in cockpit.

4.4 Take-off

Aerotow

Max. aerotow speed: V_T = 97 knots

Use the nose tow hook for aerotows.

The ventus has been aerotowed using hemp and nylon ropes of between 30 and 60 metres length.

For take-off the trimmer should be fully forwards and the flap setting -1. As the aerotow rope tightens apply the whee brake gently so that the glider does not overrun the aerotow rope.

With the C.G. in a normal or forward position, the elevator should be neutral for the ground run; in the case of rear C.G. positions it is recommended that down elevator is applied until the tail lifts.

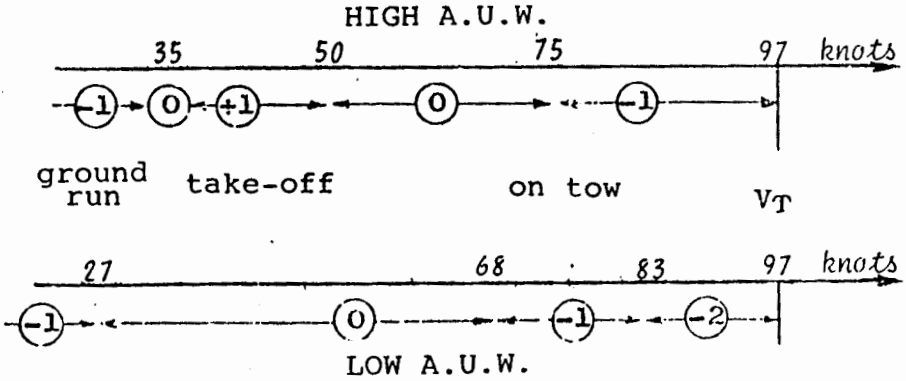
As the speed increases select flap settir 0. With normal and rear C.G. positions the glider leaves the ground at 0 flap setting, and in the case of forward C.G. positions or if the all-up weight is hig flap setting +1 should be selected to shorten the take-off run.

The control circuit geometry provides for greater aileron deflection during take of

Depending on the all-up weight and the flap setting the glider will lift off at between 38 and 48 knots and then the trimmer can be set for minimum control column loads. Normal aerotow speed is in the region of 55 to 65 knots with flap setting 0, and between about 65 and 75 knots when water ballast is carried.

At higher aerotow speeds i.e. above about 70 or 75 knots flap setting -1 should be selected. If the all-up weight is low, then flap setting -2 should be selected for speeds from about 85 knots to maximum aerotow speed (V_T).

This may be shown diagramatically:



Only small control movements are necessary to keep station behind the tug aircraft. In gusty conditions or if the glider is flown into the propellor slip stream of a powerful tug, correspondingly greater control column movements are necessary.

The undercarriage may be retracted during the aerotow; this is not, however, recommended at low altitude as changing hands on the control column could easily cause the glider to lose station behind the tug.

When releasing the rope, pull the yellow cable release handle fully several times and confirm that you have released successfully before turning.

Winch Launch

Maximum winch launch speed:

$$V_W = 81 \text{ knots}$$

The flaps are set at 0. The trimmer is normally at a mid-point position, though in the case of the glider with the C.G. position which is towards the aft limit, the trimmer should be set fully forwards (nose down).

As the cable tightens, apply the wheel brake gently, to prevent the glider overrunning the cable.

Ground run & take-off are normal: there is no tendency to veer off or climb excessively steeply on leaving the ground. At the moment of take-off the control column may be fully forwards (in the case of aft C.G. position) or slightly back (in the case of forward C.G. position). After climbing gently to a safe height the transition to a typical winch launch climbing attitude is effected by easing the control column back slightly. At normal flying weights without water ballast the launch speed should not be less than 49 knots and with ballast not less than 54 knots.

Normal launch speed is about 54 knots (about 62 knots with water ballast).

At the top of the launch the cable will normally back-release automatically. The cable release should, however, be pulled firmly several times to ensure that the cable has actually gone.

Note:

Winch launching at maximum permitted all-up weight of 500 kg/1102 lb should only be performed if an appropriately strong winch and a cable in perfect condition are available.
Furthermore, for the search of up-currents a winch launch makes not much sense if the release height gained is less than 400 m (1300 ft).

In case of doubt, reduce all-up weight to e.g. 430 kg/948 lb or less.

Winch launching with water ballast is not recommended if the head wind is less than 20 km/h (11 kt).

It is explicitly advised against winch launching with a tail wind.

High Performance Sailplane V e n t u s

with vortex inducer		Optimum Airspeeds in km/h			
Flight condition	Flap setting	W = 310 kg	W = 330 kg	W = 380 kg	W = 430 kg
Thermic flight (circling)	+ 2 (+ 1)	75 - 85	75 - 85	80 - 90	85 - 100
Best glide	0	85 - 115	90 - 120	95 - 130	100 - 140
Flight between thermals	- 1	115 - 135	120 - 140	130 - 150	140 - 160
	- 2	135 - 205	140 - 215	150 - 230	160 - 250
High speed	S	205 - 250	215 - 250	230 - 250	250

4.5 Handling Characteristics

This glider has pleasant handling characteristics and may be flown without undue effort at all speeds, weights (with or without water ballast), and C.G. positions.

As the trimmer is coupled to the flaps, it should be set so that there is no load on the control column at speeds of about 60 to 65 knots with 0 flap setting. The green knurled knob is then opposite the green marking on the edge of the cut-out. Then the aircraft is practically always well trimmed for the other flap settings in the optimal performance speed range. With a mid-point C.G. position the trimmer is effective from 35 knots (flap setting = L) to about 135 knots (flap setting = S).

Flying characteristics are pleasant and the controls are well balanced. Turn reversal from 45° to 45° is effected without any noticeable skidding. Ailerons and rudder may be used to the limit of their travel.

Flap setting	+2
Air speed	46 knots
Reversal time	3.5 seconds

Performance (at a wing loading of 33 kg/m^2

Stalling speed (flap setting +2): 33 knots

Min. sink (flap setting +2) at 40 knots:
0.58 m/sec

Max. LD (flap setting 0) at 54 knots:
43.5:1

Flaps

The flaps alter the wing section so that the laminar "bucket" is always well suited to the actual flying speed.

	Flap Setting	Optimal Speed W=310 kg (683 lbs)
Thermalling (Circling)	+2 (+1)	40 - 46 knots
Max LD	0	46 - 62 knots
Between Thermals	-1 -2	62 - 73 knots 73 - 110 knots
High speed	S	110 - 135 knots

The speeds quoted above are increased by up to approximately 15% when water ballast is carried. (N.B. V_{NE} = 135 knots.)

4.6 Low Speed Handling and Stall

It is good practice to become familiar with a glider by exploring low speed and stall characteristics at a safe height. This should be done using the various flap settings whilst flying straight ahead and also whilst in a 45° banked turn

The Stall

The following stall speeds are typical when flying straight ahead:

A.U.W.	305 kg (672 lbs)	430 kg (948 lbs)
C.G. Position	340 mm aft datum	200 mm aft datum
Airbrakes retracted		
Flap setting +2	32 knots	38 knots
Flap setting 0	35 knots	40 knots
Flap setting S	38 knots	47 knots
Airbrakes extended		
Flap setting L	≈ 27 - 30 kn	≈ 34 - 36 kn

Stall warning occurs a knot or three above stalling speed. It begins with a slight wallowing and there is vibration in the controls and these effects become more marked if the stick is pulled further back. The ailerons become less effective and the glider tends to hunt slightly in attitude.

In the case of aft C.G. positions the nose or a wing drop when the point of stall is reached.

With forward C.G. positions the glider continue to fly though mushing. After the stall the normal flying attitude is regained by immediately releasing the back pressure on the control column and if necessary applying opposite rudder and aileron. The height loss is in the order of 65 to 70 feet (130 to 140 feet if the brakes are extended).

Stall from a turn

Approaching a stall from a 45° banked turn will produce slight wallowing in the pitch plane which is however easy to control.
On stalling the aircraft rolls slightly into the turn but when the back pressure on the control column is released the nose goes down slightly and normal attitude can be regained. There is no overriding tendency to enter a spin If the centre of gravity is at a forward position, it is usually the case that the turn will continue in a mushed condition but withou the nose dropping.

In the case of an aft C.G. position, application of full rudder when the glider is stalled will produce a spin. The method for safe spin recovery follows the normal practice:

(a) Apply full opposite rudder (i.e. against the direction of spin).

(b) Pause.

(c) Release the back pressure on the stick, hold it in a neutral position until the rotation ceases and the air flow over the wings is restored.

(d) Centralise rudder and pull gently out of the resulting dive.

Usually a steady spinning motion is not possible. In some cases the sailplane recovers after one or two full rotations with heavy skidding and enters a dive. The spinning attitude can be very steep, and with a high rotation speed.

The loss of height during recovery from spin is approx. 50 to 100 m (165-330 ft). With water ballast up to 130 m (427 ft) are lost.

A safe recovery from spin is effected by following the standard method:

a) apply opposite rudder against direction of spin

b) short pause

c) ease the control column forward until rotation ceases and the airflow is restored

d) centralize rudder and pull gently out of the resulting dive.

4.7 High Speed Range

When flying first it is important to observe the various maximum speeds for the different flap settings. They are clearly visible on the air speed indicator colour coded.

Full deflections of control surfaces may only be used up to 108 knots (V_A).

At 135 knots (V_{NE}) only 1/3 controlled deflections are permitted. Avoid especially sudden elevator control movements.

In strong turbulence (e.g. wave rotors, cumulo nimbus clouds, visible whirlwinds or crossing mountain ridges) the rough air speed of 108 knots (V_B) must not be exceeded.

If the centre of gravity is at an aft position, the control column movement from the point of stall to maximum permissible speed is relatively small though the change in speed will be noticed through a perceptible change in control column loads.

The air brakes may be opened at any speed up to 135 knots (V_{NE}). They should only be used at such high speeds however in emergency or if the maximum speeds listed on page 5 are being exceeded inadvertently.

As the air brakes are extremely effective the deceleration forces are considerable if they are extended suddenly. Consequently it is wise to check in advance that the harness is tight and that the control column is not inadvertently thrown forwards when the brakes are extended. There should be no loose articles in the cockpit.

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It should also be noted that with airbrakes fully extended the sailplane should be pulled out less abruptly than with retracted airbrakes (see section 2.3, Maneuvering Loads).

In a 45° dive at maximum all-up weight of 500 kg/1102 lb (430 kg/948 lb) and with the airbrakes extended the speed is limited to approximately 124 knots/ 230 km/h (102 knots/190 km/h).

4.8 Flying with Water Ballast

The ballast tanks are integral containers in the wing nose.

Filling the ballast tanks

The tanks are filled through a round opening on the upper surface of the wing nose. The filler cap is fitted with a seal. The special tool is inserted in the 5 mm hole and the filler cap withdrawn. This 5 mm hole also serves as a vent and must therefore be kept clear. The tank is also vented by a tube which runs from the highest point of the tank through the wing to the underside of the wing tip.

Ballast dumping takes 4 minutes from full tanks.

The tank in each wing has a capacity of approximately 84 liters of water. When filling the tanks, bear in mind the weight of the pilot and ensure that the maximum all-up weight of 1102 lb/500 kg is not exceeded (see Water Ballast Chart, page 10).

Both tanks should always be filled with the same amount of water ballast so that the lateral stability of the glider is not adversely affected.

When taking off with partly full ballast tanks ensure that the wings are held horizontal so that the water is evenly distributed in the tank and both wings are balanced. Because of the extra weight in the wings the wing tip holder should continue running as long as possible during the launch.

Thanks to the integral bulk heads in the ballast tanks there is no perceptible movement of the water ballast when flying with partially full tanks.

Dumping Water

The water is jettisoned via an opening on the underside of the wing adjacent to the wing root.

The ballast jettison control connects automatically during the rigging process.

In the unlikely event of the tanks emptying unevenly or only one of them emptying, it would be advisable to fly somewhat faster to take into account the additional weight and also to avoid stalling the aircraft.

When landing subsequently, be prepared to veer off course as the heavier wing will touch down somewhat earlier.

Important

1. On long flights at air temperatures below freezing point it is essential that the water be dumped immediately.

Should the sailplane spin with a very flat longitudinal attitude, then full forward stick is required for recovery according to the standard method.
When landing, be prepared to veer off course as the heavier wing will touch down somewhat earlier.

Fin tank

The forward travel of the center of gravity, caused by water ballast in the wings, may be compensated by carrying water ballast in a fin tank, thus regaining optimum performance in circling flight.

For instructions how to use the fin tank refer to the following pages:

~~18A - 18C and 44A - 44C.~~
10A – 10C AND 44 – 44D

2. There is little point in using much water ballast if the average rate of climb expected does not exceed 1.5 m/sec. The same applies to flights in narrow thermals requiring high angles of bank.

3. If at all possible the water ballast should be dumped before a field landing.

4. On no account whatsoever must the glider ever be left after flying with full ballast tanks, because of the danger of them freezing up. Before leaving the aircraft drain off all water completely, remove the filler cap and allow the tanks to dry out completely.

5. If the drain valves drip when the tanks are full, the seals should be greased before the tanks are next filled.

The seals are accessible when pulling the valve cap downwards using the mounting bolt of the T-tail plane.

Ventus ~~c~~ b

Water ballast in the fin tank

The water tank is an integral compartment in the fin with a capacity of 5.0 kg/Ltr. (1.32 U.S. Gal., 1.1 Imp. Gal.).

The fin tank is filled by connecting one end of a flexible plastic tube (outer diameter: 8.0 mm/ 0.31 in.) to a water container, its other end is inserted into the filler tube (internal diameter: 10 mm/0.39 in.) protruding from the gap of the rudder on top of the fin. The filler tube is accessible with the horizontal tailplane in place or removed.

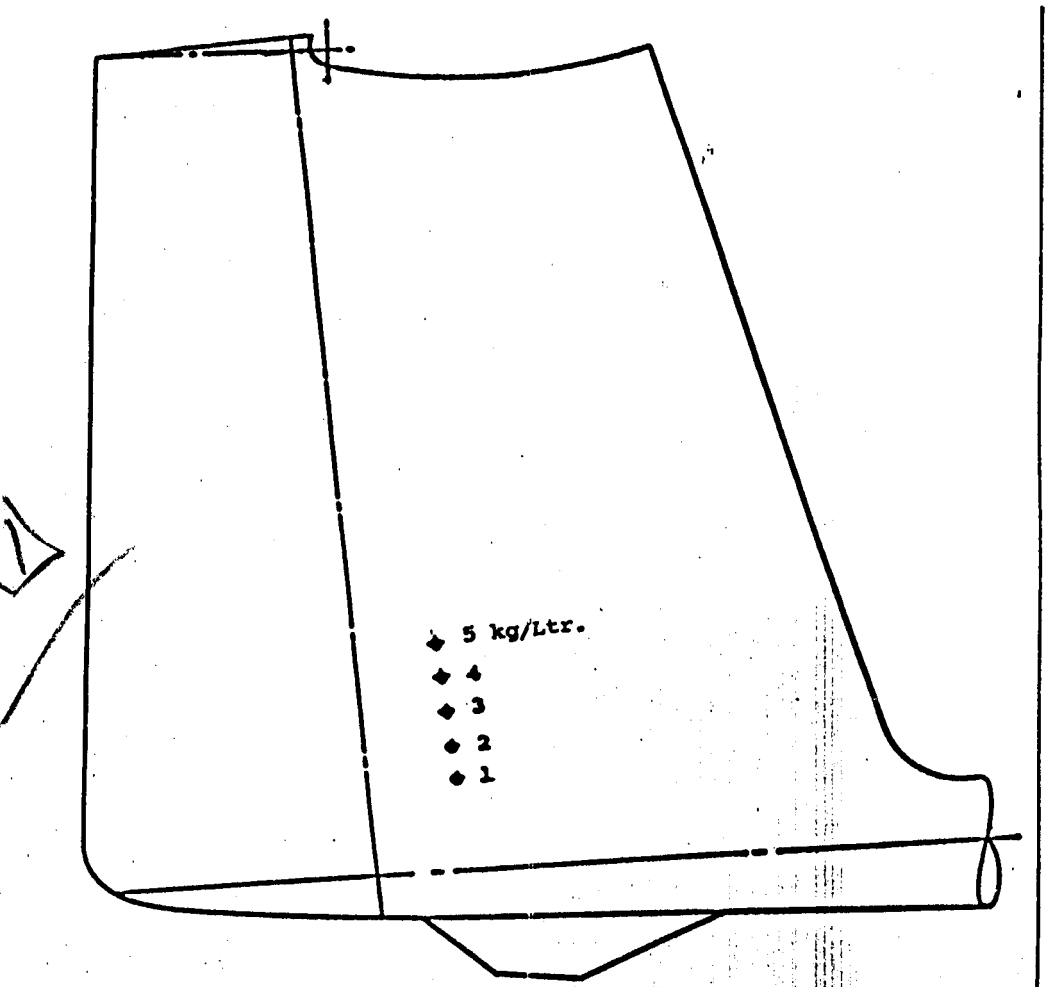
Five tank spill holes, one for each kg/Ltr. of ballast (maximum capacity 5.0 kg/Ltr.), all properly marked, are located on the r.h. side of the fin and indicate the water level. See accompanying sketch.

The number of spill holes to be taped closed before the tank is filled, depends on the weight of the ballast required to compensate for the water in the wing tanks - see loading chart "when fin tank is used".

Always tape closed one hole less than the weight required, measured in kg/Ltr.

If, for instance, a ballast weight of 3 kg/Ltr. is required, only the lower two holes are taped closed, any excessive water then escapes through the third hole.

Venting of the fin tank is through the uppermost 5.0 kg/Ltr. hole and through the filler tube.


5 kg/Ltr.
4
3
2
1

ctd.: Water ballast in the fin tank

Water ballast is dumped from the fin tank through an opening on the underside of the fuselage opposite to the rudder.

The fin tank dump valve is linked to the dumping mechanism of the wing tanks such that all three tanks always open simultaneously.

Dumping water ballast from a full fin tank takes about two minutes, i.e. less than half of the time required for the wing tanks.

Dumping water ballast from the fin tank therefore is always quicker than from wing tanks.

Important

1. On longer flights at temperatures near 0° C (32° F) water ballast must be dumped in any case when reaching a temperature of 2° C (36° F).

2. There is little point in using much water ballast if the average rate of climb expected does not exceed 1.5 m/s (295 fpm). The same applies to flights in narrow thermals requiring high angles of bank.

3. Before an off-field landing water ballast should always be dumped.

4. On no account whatsoever must the sailplane ever be parked with full ballast tanks, because of the danger of them freezing up. Before the sailplane is parked drain off all water completely, remove the filler caps and allow the tanks to dry out.

5. Before the water tanks are filled, check with the dump valves opened that both drain plugs open, move and close simultaneously. Leaking (dripping) dump valves are avoided by cleaning and greasing the valve seats and drain plugs (with the valves open), then, with the valves closed, the drain plugs are pulled in position with the threaded tool used to attach the tailplane.

6. Never pressurize the tanks, for instance by filling directly from the water hose; water should always be poured in.

7. Before the fin tank is filled, check that those spill holes not being taped closed are clear.

4.9 Cloud Flying

This glider is sufficiently robust and stable for cloud flying. It is simple to control and is stable in a turn.

Certain basic rules must be observed however. Under no circumstances may the speed limitations be exceeded.

It is recommended that the airbrakes be extended fully if the speed builds up to 70 knots or if more than 2 g are pulle

Equipment necessary for cloud flying is listed in Section 2.9, Page 16.

4.10 Flying at Temperatures Below Freezing Poi

When flying in temperatures below 0^{o} C. (e.g. in wave or during the winter months the control circuits may stiffen up somewhat. Ensure that all control surfac are free from moisture so that there is no danger of them freezing solid. This applies especially to the airbrakes.

It has been found beneficial to smear the mating surfaces of the air brakes wit vaseline along their full length so that they cannot freeze solid.

Operate wing flaps and other control surfaces at frequent intervals. Water ballast should be dumped in accordance with the instructions in 4.8.

4.11 Restricted Aerobatics

(only permissible without water ballast)

The Ventus b is permitted to carry out the following aerobatic manoeuvres:

(a) Inside loop (b) Stalled Turn
(c) Spin (d) Lazy Eight

Inside Loop

Enter the manoeuvre at 108 knots I.A.S., flap setting -2. At the top of the loop select flap setting 0. Speed during the recovery from the manoeuvre: 86 to 97 knots.

Stalled Turn

Enter the manoeuvre at an indicated air speed of between 97 and 108 knots at flap setting -2. Whilst climbing vertically let the wing which will be on the inside of the turn drag and then at about 75 knots apply rudder in the direction of the dragging wing in order to prevent a distorted manoeuvre.

Spins

Spins are only possible when the C.G. position is aft. Select flap setting 0. Enter the spin from a stall, applying full rudder and with ailerons neutral. Whilst spinning hold the stick hard back. Recover from the spin by relaxing the pressure on the control column holding the ailerons neutral, and at the same time applying opposite rudder. Recovery speed between 70 and 86 knots. If spun with the C.G. at the furthermost aft position spin will continue for approximately half a turn after recovery action has been initiated.

Lazy Eight

Enter the manoeuvre at an indicated speed o between 102 and 108 knots at flap setting - After pulling up in a 45° climb enter a tu at approximately 65 knots. Recovery speed between 86 and 97 knots.

4.12 Approach and Landing

The trailing edge brakes are a combin of spoiler and flap. They provide a effective approach aid and make possi steep and relatively slow approaches. With the flaps set at L pulling back air brake lever about 110 mm will sim extend the spoilers; they are simila in effect to normal Schempp-Hirth bra If they are extended suddenly the indicated air speed increases by abou 3 knots and the aircraft adopts a mor nose down attitude. Pulling the air brake lever further back causes the spoilers to engage the flaps; this d not alter the attitude of the glider does reduce the indicated air speed b approximately 5 knots.

Normal approach speed with brakes ful extended, flaps at setting L and with main wheel lowered is 43 to 49 knots at maximum all-up weight between 49 a 54 knots. In this configuration the glide angle is approximately 1:5.4.

Should it become necessary to stretch the glide when making a steep approac normal flying attitude should first be restored and only then (if it is still necessary) should the brakes be retrac

Touch down should always be with air-brakes fully extended since this configuration produces the lowest touch-down speed.

For a steep approach (e.g. if there is strong turbulence near the ground or if approaching over high obstacles) open the airbrakes fully and correct the glide angle with the elevator only. Excess height can then be dived off without picking up excessive speed.

Main wheel and tailskid touch down simultaneously.

The wheel brake (drum brake) is appropriately effective.

On the ground run always reset the flaps at 0 for improved aileron control.

To avoid a long ground run make sure that the glider touches down at the slowest possible air speed (32 to 35 knot A touch down at 48 knots instead of 35 knots effectively doubles the kinetic energy to be dissipated by braking and therefore increases the length of the ground run considerably.

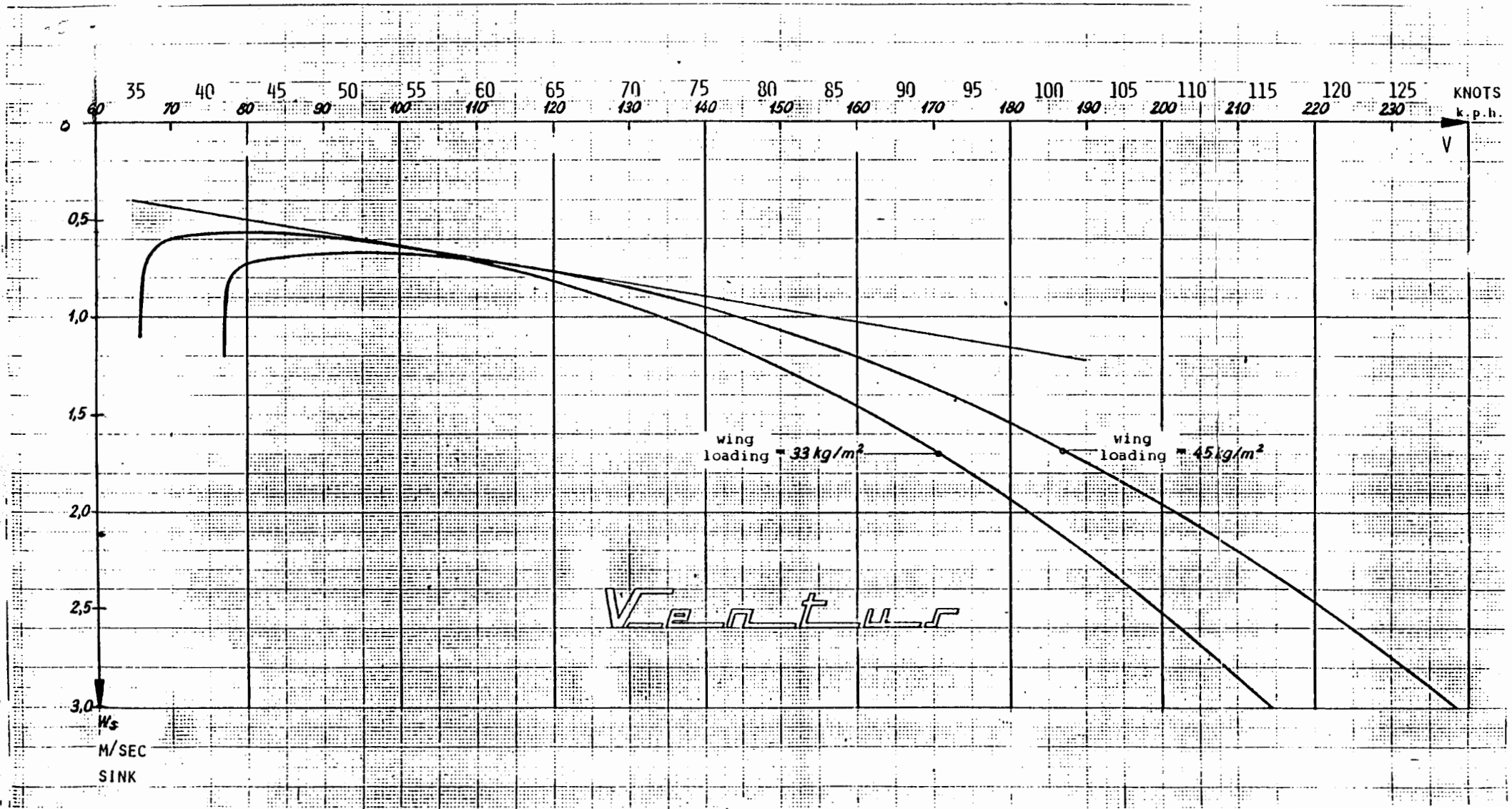
The undercarriage should always be extended for field landings.

Both the performance and the aerodynamic characteristics of the glider are affected adversely by rain or ice on the wings.

Caution

When landing with rain or ice on the wings increase the approach speed by at least 5 knots to 54 - 59 knots.

Ventus


35 40 45 50 55 60 65 70 75 80 85 90 95 100 105 110 115 120 125 KNOTS
60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 k.p.h.
V
0
0,5
1,0
1,5
2,0
2,5
3,0
Ws
M/SEC
SINK
wing loading = 33 kg/m²
wing loading = 45 kg/m²
Ventus