Schempp-Hirth Flugzeugbau GmbH

Kirchheim unter Teck

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

for the sailplane

Model	:	Nimbus-3D
Serial-No.	:	
Registr.-No.	:	
Date of Issue	:	November 1988

Pages as indicated by "LBA-app." are approved by

Skov	Signature
Luftfahrt-Bundesamt	Authority
	Stamp
20. Jan. 1989	Original date of approval

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

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 revisions of the present manual, except actual weighing data, must be recorded in the following table and in the case of approved sections be 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 left hand margin, and the Revision No. and the date will be shown on the bottom left hand of the page.

0.1 Record of revisions

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1	0	0.2.1 0.2.2 0.2.3 0.2.4 0.2.5.1 0.2.5.2 0.2.6 0.2.7 0.2.8 0.3.7	Febr. 90	MB 373-2	02.04.90		
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0.1 Erfassung der Berichtigungen / Record of revisions

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MB: Modification Bulletin - Änderungsblatt
TN: Technical Note - Technische Mitteilung

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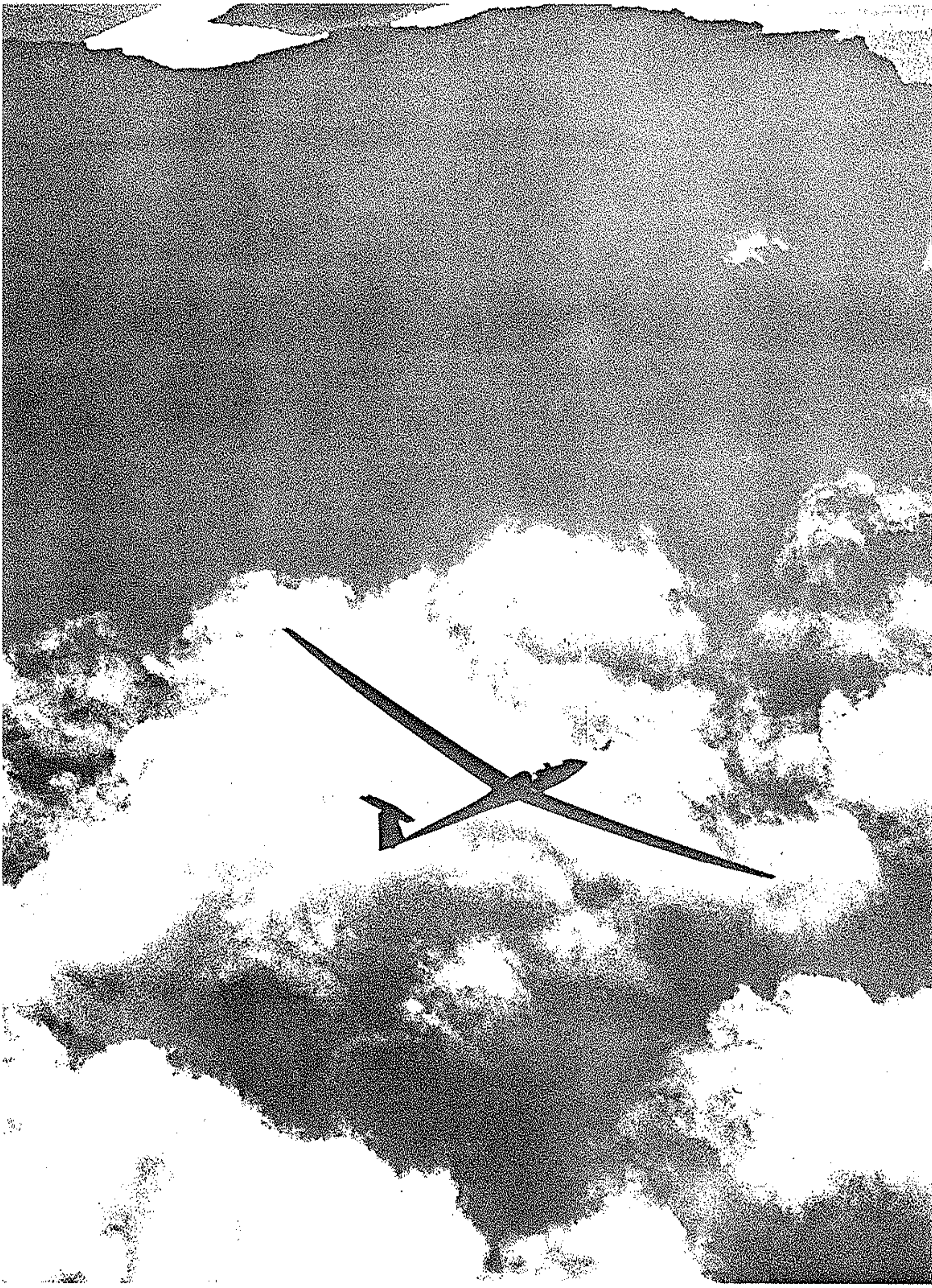


Section 1

1.1 Introduction

This sailplane flight manual has been prepared to provide pilots and instructors with information for the safe and efficient operation of the sailplane model "Nimbus-3D".

This manual includes the material required to be furnished to the pilot by "JAR", Part 22.

It also contains supplemental data supplied by the manufacturer of the sailplane.

1.2 Certification Basis

The sailplane model "Nimbus-3D" has been approved by the Luftfahrt Bundesamt (LBA) in compliance with the "Joint Airworthiness Requirements for Sailplanes and Powered Sailplanes" (JAR), Part 22, including amendments effective on October 22, 1986.

The LBA Type Certificate is No. 04.373.

Category of Airworthiness: UTILITY

1.3 Warnings, cautions and notes

The following definitions apply to warnings, cautions and notes used in this 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 Description and technical data

The "Nimbus-3D" is a high-performance two-seat sailplane, constructed from fiber reinforced plastics (FRP), featuring full-span camber-changing flaps and a T-tailplane with elevator.

The six-piece wing is four stage trapezoid in planform with Schempp-Hirth type airbrakes on the upper surface. Ailerons on outer wing portion are superimposed to the flaps and connected to wing tip spoilerons.

Water ballast tanks are integral compartments in the outboard wing panels.

The CFRP-fuselage features two seats in tandem, the cockpit area is reinforced by Aramid fibers (Kevlar) for high energy absorption. The cockpit is comfortable and is fitted with a one-piece, sideways hinged canopy.

The undercarriage is retractable, a hydraulic disc brake is standard.

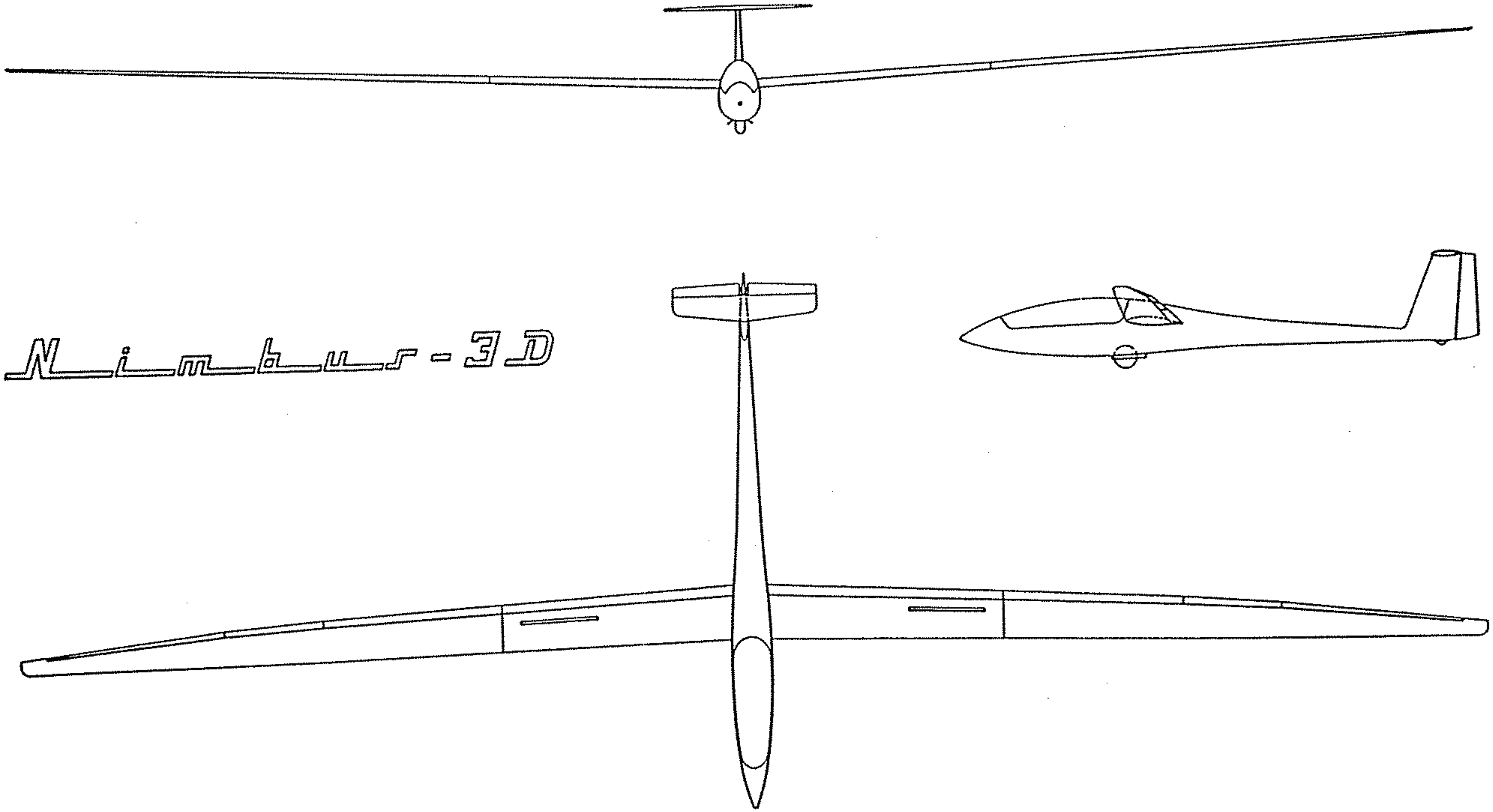
O P T I O N :

The integral water ballast tank in the fin has a capacity of 8.0 kg/Liter (2.11 US Gal., 1.76 IMP Gal.).

Technical Data

Wings	Span	24.60 m	80.71 ft
	Area	16.85 m^2	181.37 ft^2
	Aspect ratio	36	
	MAC	0.734 m	2.41 ft
Fuselage	Length	8.62 m	28.28 ft
	Width	0.71 m	2.33 ft
	Height	1.00 m	3.28 ft
Mass	Empty mass approx.	485 kg	1069 lb
	Maximum all-up mass	750 kg	1653 lb
	Wing loading	33.0 - 44.5 kg/m^2	
		6.8 - 9.1 lb/ft^2	

1.5 Three-view drawing



Section 2

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 and in section 9 have been approved by the Luftfahrt Bundesamt, Braunschweig.

2.2 Airspeed

Airspeed limitations and their operational significance are shown below:

	Speed	(IAS)	Remarks
V_{NE}	Never exceed speed Flaps set at "-1" or "-2"	km/h 275 kt 148 mph 171	Do not exceed this speed in any operation and do not use more than 1/3 of control deflection.
V_{RA}	Rough air speed	km/h 190 kt 103 mph 118	Do not exceed this speed except in smooth air, and then only with caution. Rough air are in lee-wave rotor, thunderclouds etc.
V_A	Maneuvering speed	km/h 190 kt 103 mph 118	Do not make full or abrupt control movement above this speed, because under certain condition the powered sailplane may be overstressed by full control movement
V_{FE}	Maximum Flap. Extended speed Flaps set at "+ 2", "+ 1", "0" Flaps set at "L"	 km/h 160 kt 86 mph 99 km/h 140 kt 76 mph 87	Do not exceed these speeds with the given flap setting
V_W	Maximum Winch-Launching speed	km/h 150 kt 81 mph 93	Do not exceed this speed during winch-launching
V_T	Maximum Aero-Towing speed	km/h 180 kt 97 mph 112	Do not exceed this speed during aerotowing
V_{LO}	Maximum Landing Gear Operating speed	km/h 180 kt 97 mph 112	Do not extend or retract the landing gear above this speed

2.3 Airspeed indicator markings

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

Marking	(IAS) Value or Range	Significance
White arc	km/h 89 - 160 kt 48 - 86 mph 55 - 99	Positive Flap Operating Range. (Lower limit is maximum weight 1.1 V_{S0} in landing configuration. Upper limit is maximum speed permissible with flaps extended positive).
Green arc	km/h 97 - 190 kt 52 - 103 mph 60 - 118	Normal Operating Range. (Lower limit is maximum weight 1.1 V_{S1} at most forward C.G. with flaps neutral ("-1"). Upper limit is rough air speed).
Yellow arc	km/h 190 - 275 kt 103 - 148 mph 118 - 171	Maneuvers must be conducted with caution and only in smooth air.
Red line	km/h 275 kt 148 mph 171	Maximum speed for all operations.
Yellow triangle	km/h 100 kt 54 mph 62	Approach speed at maximum weight without water ballast

2.4 <u>(reserved)</u>

2.5 (reserved)

2.6 Mass (weight)

Maximum take-off mass :	750 kg	(1653 lb)
Maximum landing mass :	750 kg	(1653 lb)
Maximum mass of all non-lifting parts :	450 kg	(992 lb)
Maximum mass in baggage compartment :	– –	– –

2.7 Center of Gravity

Center of gravity range for flight

Aircraft attitude: Tail jacked up such that a wedge-shaped block, 100 : 4.5, placed on the rear top fuselage, is horizontal along its upper edge.

Datum plane	:	Wing leading edge at root rib
Maximum forward C.G. Position	:	20 mm (0.79 in.) aft of datum plane
Maximum rearward C.G. Position	:	200 mm (7.87 in.) aft of datum plane

It is extremely important that the maximum rearward C.G. position permitted is not exceeded. This requirement is met when the minimum seat load is observed.
The minimum seat load is given in the loading table and is shown on a placard in the cockpit.
Less seat load must be compensated by ballast, see section 6.2 "Useful Loads".

2.8 Approved Maneuvers

This sailplane is certified in the category

U T I L I T Y .

Warning:

Aerobatic maneuvers and cloud flying not approved.

2.9 Maneuvering Load Factors

The following maneuvering load factors must not be exceeded

At V_A = 190 km/h (103 kt, 118 mph)

$n = +5.3$

$n = -2.65$

At V_{NE} = 275 km/h (148 kt, 171 mph)

$n = +4.0$

$n = -1.5$

with airbrakes closed.

With airbrakes extended, the maximum maneuvering load factor is

$n = +3.5$ at V_{NE}.

2.10 Flight Crew

When flown solo, the "Nimbus-3D" is controlled from the front seat.

The minimum front seat load must be observed. If required, ballast must be used to bring the load up to a permissible figure - see section 6.2 "Useful Loads".

2.11 Kinds of Operation

With the prescribed minimum equipment installed (see page 2.12), the "Nimbus-3D" is certified for VFR-flying in daytime.

2.12 Minimum Equipment

Instruments and other basic equipment must be of an approved type and should be selected from the list in the maintenance manual.

Normal Operations

2 Airspeed indicator (range up to 300 km/h, 162 kt, 186 mph) with colour markings according to page 2.3

2 Altimeter

1 Outside air temperature indicator (when flying with water ballast, red line at + 2° C (+ 36° F)

2 four-piece safety harnesses (symmetrical)

2 Automatic or manual parachutes or 2 back cushions (approx. 10 cm/3.9 in. thick when compressed)

Note:

The sensor for the OAT must be installed in the ventilation air intake.

For structural reasons the mass of the instrument panels with instruments must not exceed 10 kg (22 lb) each.

2.13 (reserved)

2.14 Aerotow and winch launching

Aerotow

Maximum towing speed	:		180 km/h 97 kt 112 mph
Weak link in tow rope	:	Maximum	660 daN 1455 lb
Minimum length of tow rope	:		30 m 98 ft

Winch launching

Maximum towing speed	:	150 km/h 81 kt 93 mph
Weak link in cable	:	800 - 1040 daN 1764 - 2293 lb

2.15 Other Limitations

N o n e

2.16 Limitations Placard

MAXIMUM PERMITTED ALL-UP MASS	750 kg / 1653 lb		
MAXIMUM PERMITTED SPEEDS (IAS)	km/h	kt	mph
Flap setting "-1", "-2"	275	148	171
Flap setting "+2", "+1", "0"	160	86	99
Flap setting "L"	140	76	87
Rough air speed	190	103	118
Maneuvering speed	190	103	118
Aerotowing speed	180	97	112
Winch launching speed	150	81	93
Landing gear operating speed	180	97	112

Load on the seats

(Crew including parachutes)

Seat load		two persons min.	two persons max.	one person min.	one person max.
front seat	kg	70*	110*	70*	110
	lb	154*	243*	154*	243
back seat	kg	--	110*	--	--
	lb		243*		

* As the actual minimum or maximum seat loads of this "Nimbus-3D" 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 chart - see page 6.2.3.

WEAK LINKS FOR TOWING

Aerotow	:	max. 660 daN	(1455 lb)
Winch launch	:	800 - 1040 daN	(1764-2293 lb)

TIRE PRESSURE

Main wheel	:	4.0 bar	(57 psi)
Tail wheel	:	3.0 bar	(43 psi)

Operating limits when fin tank is used: (if installed)

Minimum 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

Note:

For further placards refer to the "Nimbus-3D" Maintenance Manual.

Section 3

3. Emergency Procedures

3.1 Introduction

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

Emergency situations can be minimized by proper pre-flight inspections and maintenance.

3.2 Jettisoning the canopy

The canopy is jettisoned as follows:

1. P u l l b a c k red knob on the left of the canopy frame and raise canopy.

2. P u l l b a c k red handle on the right hand side below the canopy frame.

3. P u s h canopy away.

The cable restraining the canopy in open position is released when the red handle on the right below the canopy frame is pulled back.

3.3 Bailing out

The roomy and uncluttured cockpit of the "Nimbus-3D" ensures a quick and safe exit in the case of an emergency.

As the canopy coaming frame of the fuselage is a strong CFRP/Kevlar laminate free from sharp edges, the pilots can raise themselves by grabbing it and use it as a support.

Furthermore the person on the rear seat can raise himself by grabbing in the cut-outs on either side of the rear instrument panel.

3.4 Stall recovery

On stalling whilst flying straight ahead or in a banked turn, normal flying attitude is regained by firmly easing the stick forward and, if necessary, applying opposite rudder and aileron.

Caution:

If, on stalling, the vibration in the controls becomes more pronounced with the controls getting spongy, the back pressure on the stick should be released immediately and, if necessary, opposite rudder and aileron should be applied.

3.5 Spin recovery

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

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

b) Hold ailerons neutral.

c) Ease control stick forward until rotation ceases and the airflow is restored.

d) Centralize rudder and pull gently out of dive.

The loss of height, from the point at which recovery is initiated to the point at which horizontal flight is regained, is about 130 m (427 ft). Recovery speed is between 140 and 190 km/h (76-103 kt, 87-118 mph). If necessary, the flaps must be reset at "-1" so as to avoid exceeding their speed limits.

With the C.G. at the fully forward position, spins cannot be induced. However, depending on the use of controls, a spiral dive may develop, which is quickly terminated by applying normal opposite controls.

Water ballast in the outboard wings has no noticeable influence on the spinning behaviour.

Note:

Spinning may be safely avoided by following the recovery actions given in section 3.4.

3.6 Spiral dive recovery

Depending on c/g position, flap setting and use of controls, a spin may turn into a spiral dive which is indicated by a rapid increase in speed and acceleration.

Recovery from a spiral dive is by easing the stick forward and applying opposite rudder and aileron.

When pulling out of the dive, the limiting airspeeds for the various flap settings must be observed (if necessary, reset the flaps at "-1" or "-2").

3.7 (reserved)

3.8 Fire

Master switch - OFF

3.9 Other Emergencies

Flying with uneven water ballast

If, on dumping the water ballast, the tanks are emptying unevenly or only one of them is emptying, which is recognized at lower speeds by having to apply opposite aileron for a normal flying attitude, it must be avoided that the sailplane enters a stall.

When landing in this condition, the touch-down speed must be increased by 10 km/h (5 kt, 6 mph) and the pilot must be prepared to veer off course as the heavier wing tends to touch down somewhat earlier (opposite aileron).

Blocked elevator or flap control

With its flaps blocked, the "Nimbus-3D" becomes an aircraft having a fixed wing profile.

On the contrary, with its elevator control jammed, the pilot in an emergency may not always take into consideration that the sailplane is still controllable to at least some extent by using the flaps instead, allowing him to move into a more favourable bail-out area. By using the flaps, he probably may even prevent bailing out.

Emergency landing with the undercarriage retracted

Compared with the undercarriage, the potential energy absorption of the fuselage shell is much less. Therefore an emergency landing with the wheel retracted is not recommended.

Should the undercarriage fail to extend, the "Nimbus-3D" should be landed in a flat angle, with the flaps set at "L" and without pancaking.

Ground loop

If there is the danger of the sailplane over-shooting the boundary of the landing field selected, a decision whether or not to initiate a ground loop should be made at least 40 m (131 ft) away from the boundary.

- If possible, always turn into the wind.
- With the wing tip going down, the stick should be pushed forward simultaneously.

Emergency water landing

Landing a composite sailplane wheel up on water has been done in recent years. From experience gained on this occasion the crew must take into consideration that the entire cockpit might get forced under water.

Therefore an emergency landing on water should only be chosen as a last resort and the undercarriage should always be extended.

Section 4

4. Normal Operating Procedures

4.1 Introduction

Normal procedures associated with optional equipment are found in section 9.

This section provides check lists and amplified procedures for conducting the daily and pre-flight inspection.
Special attention must be paid to connections to be made in the control systems (assembly and inspection).
Furthermore this section includes normal operating procedures and recommended speeds.

4.2 Rigging and Derigging

Rigging

The "Nimbus-3D" can be rigged by two or three people if a wing stand or trestle is used under one wing tip.

Prior to rigging, all the wing and tailplane attachment pins and their corresponding bearings should be cleaned and greased.

Rigging should be done as follows:

Inboard wing panels

Keep main wing pin ready in the cockpit. Align airbrake interconnecting rods in the fuselage. Set water ballast jettison knob at "closed".

Insert left wing panel (with fork spar stubs) into the fuselage recess with the flap raised to its high speed setting (lift wing at flap) and push panel home (pins must be fully home in their corresponding bearings on the fuselage). Then the main wing pin is inserted about 30 to 40 mm (1.2 - 1.6 in.). The tip of the wing panel may now be placed on the stand - the fuselage no longer needs to be supported.

Insert right wing panel (with tongue spar stub) with the flap raised and push it in until its lift pins have just engaged in their bearings on the fuselage (fork stub pins are not yet inserted in bearings on the right wing root rib).
Then tilt the fuselage until the fork stub pins are correctly aligned with their corresponding bearings.
By moving it gently fore and aft, the panel is now pushed home (stub pins inserted in root rib bearings).
If it is difficult to push in the wing panel for the last 10 or 20 mm (0.39 - 0.79 in.), remove main wing pin again and draw the wings together with the rigging lever.

Finally push the main wing pin fully home and secure it by its handle with the cowling safety pin on the fuselage side.

Note:

Connecting the fuselage-to-wing controls is easier with the outboard panels in place.

Outboard wing panels

> **WARNING:** For rigging an outboard panel, a wing stand should be placed under the outer end of the adjacent inboard panel.

Slide outboard wing panel over the spar stub of the inboard panel, but leave a gap of about 40 mm (1.6 in.). Next raise the middle aileron and connect it, then raise the inner aileron and connect it also. The "L'Hotellier" quick connectors must be secured.
Then push the outboard wing panel fully home by gently moving it fore and aft. Finally raise the wing tip and insert the main pin with the aid of the 8 mm (0.3 in.) rigging pin. Secure main pin with a cowling safety pin.

Inboard wing panels - connection of controls

Nimbus-3DM: Extend power plant about one third.

Ailerons, flaps and airbrakes are to be connected behind the the spar stubs.
The "L'Hotellier" quick-connectors must be secured.

Connecting the airbrake actuating rods

Close the airbrakes on the wing. Unlock the airbrake lever in the cockpit and pull it back until a hole in the guide tube becomes visible, then insert into it the pin used to rig the outboard wing panels. This allows the connection of the "L'Hotellier" couplings on the airbrake actuating rods without any tension.

Note: A gas strut is pulling the airbrake actuating linkage in the direction of extending.

Finally reinsert the panel covering the control linkage and lock it.

Nimbus-3DT with upper (standard) fuel tank

After connection of the controls, the fuel tank may now be reinstalled (see page 4.2.10).

Nimbus-3DT with upper and lower fuel tank

If the aircraft is equipped with a fixed lower and an upper removable fuel tank, and if the latter is to be used, it may now be reinstalled. If only the lower tank is to be used, the vent lines to the upper tank must either be blocked or coupled in such a way, that the venting of the lower tank is not obstructed - see page 4.2.9).

Nimbus-3DM:

Connect quick-disconnect coupling on wing tank fuel hoses to fuselage tank.

Connecting the "L'Hotellier" control rod couplings, securing them with Schempp-Hirth safety clips

Prior to rigging the aircraft one should get familiar with the function of the "L'Hotellier" control rod couplings (quick-connectors).

Connecting the controls requires a fine touch and some practice.

Prior to connecting the control rods each coupling must be checked for the proper position of its safety clip (which is attached in such a way that it cannot be lost):

The free end of the clip must point to the narrow end of the locking slide - see sketch on page 4.2.5 - if not, rotate it upwards.

Make sure that each coupling socket is fully home over the ball end on the control rod whilst the locking slide is held open.

When the "L'Hotellier" coupling is correctly locked, its locking slide moves slightly back so that it protrudes an equal amount on either side of the coupling and the hole drilled through the narrow end of the locking slide becomes visible as shown in the sketch on page 4.2.5.

Now rotate the safety clip towards the locking slide, bend its free end slightly outwards and let it engage into the hole as shown in the sketch (page 4.2.5).

WARNING:

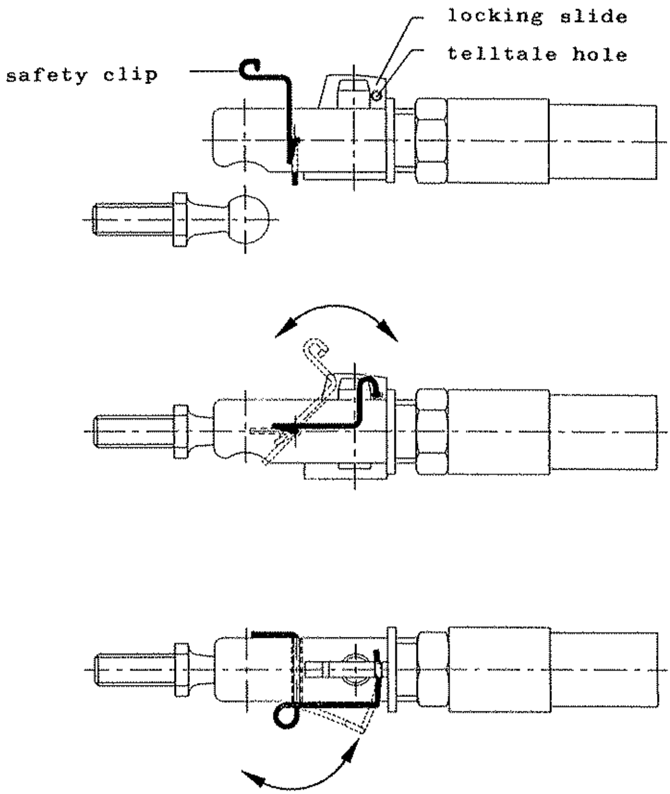
Each "L'Hotellier" ball and swivel joint must be checked after locking and securing.

Quick connectors, which are not properly secured, may open automatically in flight!

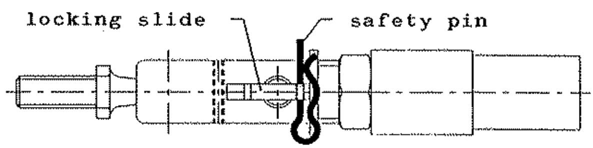
1.) Check coupling for proper connection by pulling crosswise with a hand force of about 5 daN (11 lb) in the direction of releasing.

2.) When depressing the locking slide, it may move slightly, but must then get stopped by the safety clip.

Securing the locking slide with a Schempp-Hirth safety clip



Securing the locking slide with a safety pin



> **W A R N I N G**
>
> DO NOT USE SAFETY PIN FOR OUTBOARD WING CONNECTIONS !

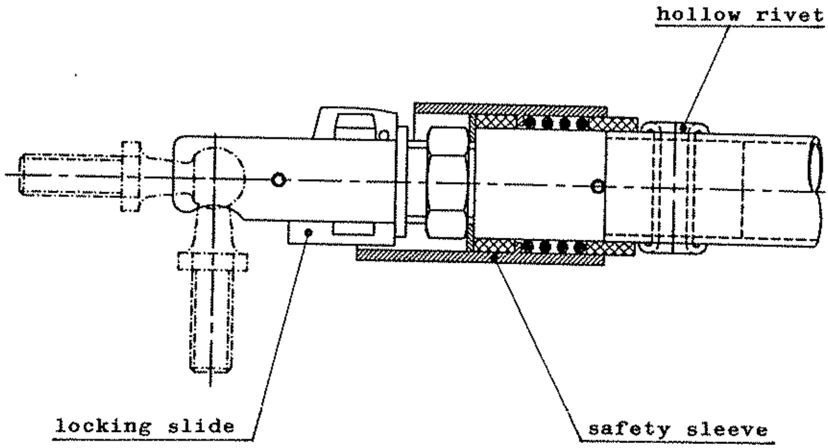
Connecting the L'Hotellier control rod couplings - securing them with a "Wedekind" safety sleeve

Pull back spring-loaded safety sleeve and push swivel joint fully home over the ball joint with the wedge-shaped locking slide held open.

When properly connected and locked, the wedge-shaped slide must have moved slightly back so that the "Wedekind" safety sleeve, once released, will be pushed over the wide end of the locking slide, thus preventing an unintentional disconnection.

Test

Check coupling(s) for proper connection by pulling crosswise with a hand force of about 5 daN (11 lb) in the direction of "releasing".



Wing tip extensions

Insert wing tip extension with the flaps set at "0" but leave a gap of about 40 to 50 mm (1.6-2.0 in.).

Raise aileron on tip extension and hook up the actuating cable of the outboard wing panel. Then push outermost aileron down until the cable is taut. Push tip extension fully home and take care that the coupling lap on the outermost aileron correctly slides over the adjacent aileron. Check that the locking pin for the tip extension has snapped up.
If this pin is not flush with the upper surface, it has to be pushed up from the lower side with the aid of the tailplane rigging screw (see placard).

Horizontal tailplane

Take the round-headed rigging tool (to be stored in the side pocket) and screw it into the front tailplane locating pin on the leading edge of the fin.
Slide the tailplane aft onto the two elevator actuating pins. Then pull the round-headed rigging tool and its pin forwards, seat the nose of the tailplane and push the locating pin home into the tailplane fitting. Remove rigging tool. The pin must not protrude in front of the leading edge of the fin.
Check whether the elevator actuating pins are really located by moving the elevator.

After Rigging

With the aid of a helper check the controls for full and free movement in the correct sense.

Use tape to seal off the wing/fuselage joint, the inspection hatch in the fuselage deck, the joint between inboard and outboard panels and the joint between outboard panels and wing tip extensions.

Caution: Do not seal off the gap between the aileron on the outboard panel and the aileron on the wing tip extension.

Seal off the opening for the front tailplane attachment pin and also the joint between fin and horizontal tailplane (only necessary if there is no rubber sealing on top of the fin).

Sealing with tape is beneficial in terms of performance and it also serves to reduce the noise level.

Derigging

Remove sealing tape from wings and tailplane.

Horizontal tailplane

Withdraw front attachment pin with rigging screw, lift stabilizer leading edge slightly and slide tailplane forwards and off.

Wings

Unlock airbrakes and insert rigging pin into the hole in the guide tube. Set water ballast valve control to "closed", disconnect control rods and remove cowling safety pin from main pin handle.

Outboard wing panels (with tip extension)

WARNING: When removing the first outboard panel, a wing stand should be placed under the tip of the inboard panel on the far side.

Pull back main pin. Pull out panel about 40 mm (1.6 in.), disconnect control rods and remove wing.

Inboard wing panels

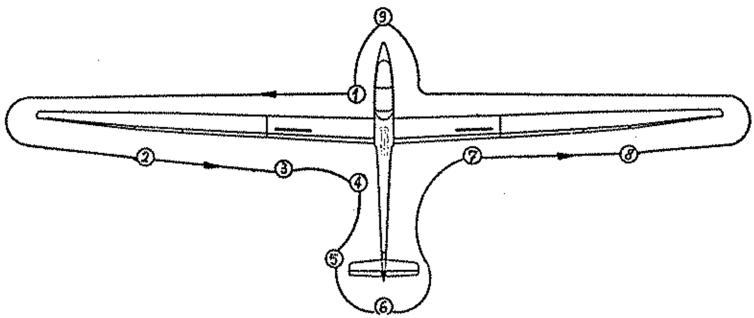
With a helper on each wing tip pull out main wing pin up to the last 20 or 30 mm (0.8 - 1.2 in.), then withdraw the right panel by gently rocking it backwards and forwards if necessary (wing may be held at the trailing edge by the flap). Next remove the main wing pin and withdraw the left wing panel.

Removing the wing tip extensions (if necessary)

Push locking pin down with rigging pin (Ø 6 mm/ 0.24 in.). Pull out tip extension with care about 40 to 50 mm (1.6 - 2.0 in.), disconnect aileron actuating cable and remove wing tip extension.

4.3 Daily Inspection

The importance of inspecting the sailplane after rigging and before commencing the day's flying cannot be over-emphasized, as accidents often occur when these daily inspections are neglected or carried-out carelessly.



When walking around the sailplane, check all surfaces for paint cracks, dents and unevenness. In case of doubt, ask an expert for his advice.

(1) a. Open the canopy

b. Check that the main wing pin is secured

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

d. Check all the controls for full and free movement

(1) e. Check for the presence of foreign objects

f. (reserved)

g. (reserved)

h. Check main wheel tire pressure: 4.0 bar (57 psi)

i. Check condition and function of towing hook(s)

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

b. Clean and grease water dump valves (if necessary)

c. Check connection of wing tip extensions (locking pin must be flush with the upper surface)

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

(3) a. Check flaps for proper condition and free movement. Check for any unusual play by gently shaking the trailing edge. Check hinges for damage

b. Check airbrakes for proper condition, fit and locking

(3) c. With the flaps set at "L" and with the airbrakes fully extended, check the gas strut in the airbrake control system for proper function. This is done by lifting the flap at its trailing edge near the drive and releasing it. Flap must return to its extreme setting

(4) a. Check fuselage for damage, especially on the lower side

b. Check that the static ports for the ASI on the tail boom are clear (1.02 m/3.3 ft forward of the base of the fin)

(5) a. Check condition of tailskid (or wheel, if installed. Tire pressure: 3.0 bar/43 psi). Check that the dump hole of the fin tank (if installed) in the skid (or wheel fairing) is clear

b. If a total energy compensation probe is used, mount it and check the line (when blowing gently into the probe, variometers connected should read "climb")

Ballast in fin tank (if installed):

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

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

(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 any unusual play by gently shaking the trailing edge

(7) See (3)

(8) See (2)

(9) Check that the Pitot tube in the fuselage nose is clear. Gently blowing into the tube should produce a reading on the ASI

After heavy landings or after the sailplane has been subjected to excessive loads, the resonant wing vibration frequency should be checked (its value to be extracted from the last inspection report for this serial number).

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

If damage is discovered (e.g. surface cracks in the fuselage tail boom or tailplane, or if delamination is found 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.

4.4 Preflight Inspection

Check list before take-off

- Water ballast in fin tank ?
- Loading table checked ?
- Parachute securely fastened ?
- Safety harness secured and tight ?
- Back rest and pedals in comfortable position ?
- All controls and instruments accessible ?
- Airbrakes checked and locked ?
- All control surfaces checked with assistant for full and free movement in correct sense ?
- Trimmer correctly set ?
- Flaps set for take-off ?
- Canopy closed and locked ?

4.5 Normal procedures and recommended speeds

4.5.1 Launching methods

Aerotow

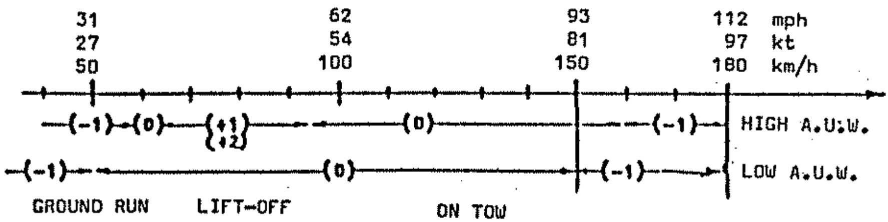
Maximum permitted towing speed:

$$V_T = 180 \text{ km/h (97 kt, 112 mph).}$$

For aerotowing the nose hook is used. The sailplane has been aerotowed using hemp and Nylon ropes of between 30 and 40 m (98–131 ft) length.

For take-off the trim should be slightly nose-heavy and the flaps set at "-1". As the tow rope tightens pull the stick-mounted wheel brake lever gently to prevent the sailplane from overrunning the tow rope.
In crosswind conditions the aileron control should be held towards the downwind wing, i.e. in winds from the left the stick should be displaced to the right. This is to counteract the lift increase on the right wing generated by the tug's prop wake which the crosswind forces to drift to the right.
For intermediate to forward C/G positions 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 during the take-off run the flaps are reset at "0".
With normal and rear C/G positions the sailplane lifts off at "0" flap setting, and in the case of forward C/G positions or a high all-up mass flap setting "+1" or even "+2" should be used to shorten the take-off run distance.

After lift-off, between about 80 to 90 km/h (43-49 kt, 50-56 mph), depending on wing loading and flap setting, the trim can be set for minimum control stick loads.
With flaps set at "0" normal towing speed is in the region of 110 to 130 km/h (59-70 kt, 68-81 mph) and between about 120 to 140 km/h (65-76 kt, 75-87 mph) when water ballast is carried.
At higher towing speeds, i.e. above about 150 to 160 km/h (81-86 kt, 93-99 mph), flap setting "-1" should be used. See diagram below:



Only small control surface deflections are necessary to keep station behind the tug.
In gusty conditions or when flying into the propeller slip stream of a powerful tug, correspondingly greater control stick movements are required. The undercarriage may be retracted during the aerotow; this is not, however, recommended at low altitude, as changing hands on the stick could easily cause the aircraft to lose station behind the tug.

When releasing the rope, pull the yellow T-shaped handle fully several times and turn only when definitely clear of rope.

<u>Note</u>: Owing to the location of the Pitot pressure tube the ASI reading in normal (high tow) station is approx. 10 to 13 km/h (5-7 kt, 6-8 mph) less than the actual towing speed. In low tow station this error is even larger.

Winch launching

Maximum permitted launching speed:

V_W = 150 km/h (81 kt, 93 mph).

For winch launching only the C/G hook must be used. For take-off the flaps should be set at "+1" and the trim normally at neutral. For rearward C/G positions the trim is set at 1/3 nose-heavy.
As the cable tightens, apply the wheel brake gently to prevent an overrunning of the cable.

Ground run and lift-off behaviour is normal, there is no tendency to veer off or to climb excessively steeply. On lift-off the control stick may be fully forward (with aft C/G positions) or slightly back (with forward C/G positions).

After climbing gently to a safe height, the transition to a typical winch launch climbing attitude is effected by pulling the control stick slightly further back.

At normal useful loads without water ballast the launching speed should not be less than 100 km/h (54 kt, 62 mph) and with water ballast not less than 110 km/h (59 kt, 68 mph).

Normal winch launch speed is about 110 km/h (59 kt, 68 mph) and about 120 km/h (65 kt, 75 mph) with water ballast.

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

Caution:

Winch launching at maximum permitted all-up mass of 750 kg (1653 lb) should only be done if there is an appropriately powerful winch and a cable in perfect condition available.

Furthermore there is not much point in launching by winch for a soaring flight, if the release height gained is less than 300 m (984 ft). In case of doubt, reduce the all-up mass to e.g. 700 kg (1543 lb) or less.

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

WARNING:

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

Note : The undercarriage should not be retracted during the launch.

Caution: Prior to winch launching it must be checked that the crew is properly seated and able to reach all control elements.

Particularly when using cushions it must be ensured that during the initial acceleration and while in the steep climbing attitude the occupants do not slide back and up.

4.5.2 (reserved)

4.5.3 Flight (Cruising/Cross country flying)

The "Nimbus-3D" has pleasant flight characteristics and can be flown effortlessly at all speeds, loading conditions (with or without water ballast), configurations and C.G. positions.

The spring type elevator trim is gradually adjustable.

With a mid-point c/g position the speed range covered by the trim is from about 75 km/h (40 kt, 47 mph) with flaps set at "L" to about 190 km/h (103 kt, 118 mph) with flap setting "-2".

Flying characteristics are pleasant and the controls are well harmonized.

Turn reversal from 45° to 45° bank is effected without any noticeable skidding. Ailerons and rudder may be used to the limits of their travel.

All-up mass	750 kg (1653 lb)
Flap setting	+2
Speed	111 km/h (60 kt, 69 mph)
Reversal time	4.4 seconds

High speed flying

When flying at high speeds, particular attention must be paid to the maximum speed limits associated with the various flap settings.
These speeds are clearly visible markings on the airspeed indicator in different colours.

Full deflections of control surfaces may only be applied up to V_A = 190 km/h (103 kt, 118 mph).

At V_{NE} = 275 km/h (148 kt, 171 mph) only 1/3 of the full deflection range is permissible. Avoid especially sudden elevator control movements.

In strong turbulence, i.e. in wave rotors, thunderclouds, visible whirl winds or when crossing mountain ridges, the speed in rough air V_{RA} = 190 km/h (103 kt, 118 mph) must not be exceeded.

With the C.G. at an aft position, the control stick 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 stick loads.
The airbrakes may be extended up to V_{NE} = 275 km/h (148 kt, 171 mph). However, they should only be used at such high speeds in emergency or if the maximum permitted speeds are being exceeded inadvertently.

When extending the airbrakes suddenly, the deceleration forces are perceptible.

Consequently it is wise to check in advance that the harness is tight and that the control stick is not inadvertently thrown forwards when the airbrakes are extended. There should be no loose objects in the cockpit.

It should also be noted that in a dive with the airbrakes extended, the "Nimbus-3D" should be pulled out less abruptly than with retracted brakes (see section 2.9 "Maneuvering load factors").

A dive with the airbrakes fully extended is limited to an angle to the horizon of slightly more than 30° at maximum permitted all-up mass at a speed of 275 km/h (148 kt, 171 mph).

Use of the wing flaps

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

Use of flaps for	OPTIMUM AIRSPEEDS in km/h, kt, mph			
	Flap setting	AUW = 650 kg/ 1433 lb	AUW = 750 kg/ 1653 lb	
Thermal flying	+1	85 - 95 46 - 51 53 - 59	90 - 105 49 - 57 56 - 65	km/h kt mph
(narrow thermals)	(+2)			
Best L/D	0	100 - 140 54 - 76 62 - 87	105 - 150 57 - 81 65 - 93	km/h kt mph
Flying between thermals	-1	140 - 160 76 - 86 87 - 99	150 - 170 81 - 92 93 - 106	km/h kt mph
High speed flying	-2	160 - 275 86 - 148 99 - 171	170 - 275 92 - 148 106 - 171	km/h kt mph

For a speed polar diagram refer to section 5.3.2.

Low speed flying and stall behaviour

In order to become familiar with the sailplane it is recommended to explore its 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.

Wings level stall

Stall warning occurs 3 to 5 km/h (2-3 kt/mph) above stalling speed. It begins with a slight rolling motion and vibration in the controls. If the stick is pulled further back, these effects become more pronounced, the ailerons get spongy and the sailplane sometimes tends to slight pitching motions.

In the case of aft C/G positions the sailplane drops a wing; with forward C/G positions and stick fully pulled back, it just stalls.

Normal flying attitude is regained by easing the stick forward immediately and, if necessary, by applying opposite rudder and aileron.

The loss of height from the beginning of the stall until regaining a normal level flight attitude is up to 50 m (164 ft).

Turning flight stalls

When stalled during a coordinated 45° banked turn, the aircraft rolls slightly into the turn and, when easing the stick forward, drops its nose, thereafter a normal flying attitude is regained by applying opposite rudder and aileron.
There is no uncontrollable tendency for the "Nimbus-3DT" to enter a spin.
The loss of height from the beginning of the stall until regaining a normal level flight attitude is approx. 30 to 40 m (98-131 ft).

Influence of water ballast:

Apart from the higher flight mass, water ballast has no aggravating influence on the stall characteristics.

4.5.4 Approach

At maximum all-up weight the normal approach speed with airbrakes fully extended, flaps set at "L" and landing gear lowered is 90 km/h (49 kt, 56 mph) when flown solo, or 100 km/h (54 kt, 62 mph) with two persons aboard. The L/D for the above configuration is approx. 6 : 1.

The airbrakes open smoothly and provide an effective landing aid thanks to an airbrake/flap interconnection which, at practically unchanged minimum speeds, automatically and steadily increases the positive deflection of the flaps as the airbrake lever is pulled back.

The moderately nose-heavy moment occuring helps to increase the nose down attitude required for maintaining the approach speed.

On approach the field of vision is excellent from either seat.

Both the performance and the aerodynamic characteristics of the "Nimbus-3D" are affected adversely by rain or ice on the wings.

Be cautious when landing!

Increase the approach speeds by at least 5 to 10 km/h (3-5 kt, 3-6 mph).

(reserved)

4.5.5 Landing

For off-field landings the undercarriage should always be extended.
Main wheel and tail skid (or wheel) should touch down simultaneously.
After touch down the flaps must be reset at "0" or "-1" for improved aileron control during the landing run.
To avoid a long ground run, make sure that the "Nimbus-3D" touches down at minimum speed (75 to 80 km/h, 40 to 43 kt, 47 to 50 mph).
A touch down at 90 km/h (49 kt, 56 mph) instead of 75 km/h (40 kt, 47 mph) means that the kinetic energy to be dissipated by braking is increased by a factor of 1.4 and therefore the ground run is lengthened considerably.

The hydraulic main wheel disc brake is actuated by the airbrake linkage with brakes almost fully extended. As the brake effectiveness is good, the landing run is considerably shortened (elevator control should be kept fully back).

When landing on soft grass fields, the brake pressure should be somewhat released to prevent the fuselage nose from contacting the ground.
For protection from damage, however, the nose section is featuring a small wheel fitted to a reinforcement plate.

4.5.6 Flying with water ballast

The water tanks are integral compartments in the nose section of the outboard wing panels.
The tanks are to be filled with clear water only through round openings in the upper wing surface featuring a strainer.
Tank openings are closed with plugged-in filler caps having a 6 mm (0.24 in.) female thread for lifting and venting.
Lifting is done by using the tailplane rigging pin.
As the cap hole also serves for venting, it always should be kept open. Additionally the tanks are vented by a plastic pipe running from the highest point in the tank through the wing to the underside of the outboard rib carrying the tip extensions.
The vent hole in the filler cap may therefore be taped tight when placing the tip of a full wing on the ground. Water will then stop escaping through the venting pipe as soon as an air pocket has formed at the highest point of the tank at the root rib.
The tape closing the vent hole in the filler cap must have been removed before take-off. This ensures an emptying of the tank within the shortest time. Furthermore no vacuum is generated inside the wing during the dumping process.

Dumping the water ballast takes about 5.5 minutes from full tanks.
Each wing tank has a capacity of 84 kg/ltr = 185 lb.

When filling the tanks - see page 6.2.5 - it must be ensured that the maximum permitted all-up mass is not exceeded.

Both tanks must be filled with the same amount of water to prevent lateral imbalance.

When taking off with partly full ballast tanks, ensure that the wings are held level to allow the water to be equally distributed so that the wings are balanced.

Because of the additional weight in the wings the wing tip runner should continue running for as long as possible during the launch.

Water ballast is dumped through a hole on the lower side near the root rib of the outboard wing panels.

The dump valves are automatically hooked up when the powered sailplane is rigged (water ballast control knob set at CLOSED).

Thanks to the integral bulkheads in the ballast tanks there is no perceptible movement of the water ballast when flying with partly full tanks.

When flying at maximum permitted all-up mass, the low speed and stall behaviour of the aircraft is slightly different from its flight characteristics without water ballast. Stalling speed increases with the higher mass and when correcting the flight attitude, larger control surface deflections are required. Also, for recovery from a stall, slightly more height is necessary to regain normal flying attitude.

Water ballast in fin tank (if installed)

For optimum performance in circling flight, the forward travel of the center of gravity, caused by the crew member on the aft seat, may be compensated by carrying water ballast in the fin tank. The flight behaviour then corresponds to a c/g position as if flown solo, but at a higher all-up mass.

The ballast tank is an integral compartment in the fin with a capacity of 8 kg/Liter (2.11 US Gal., 1.76 IMP Gal.).
The tank is filled as follows (with the horizontal tailplane in place or removed):

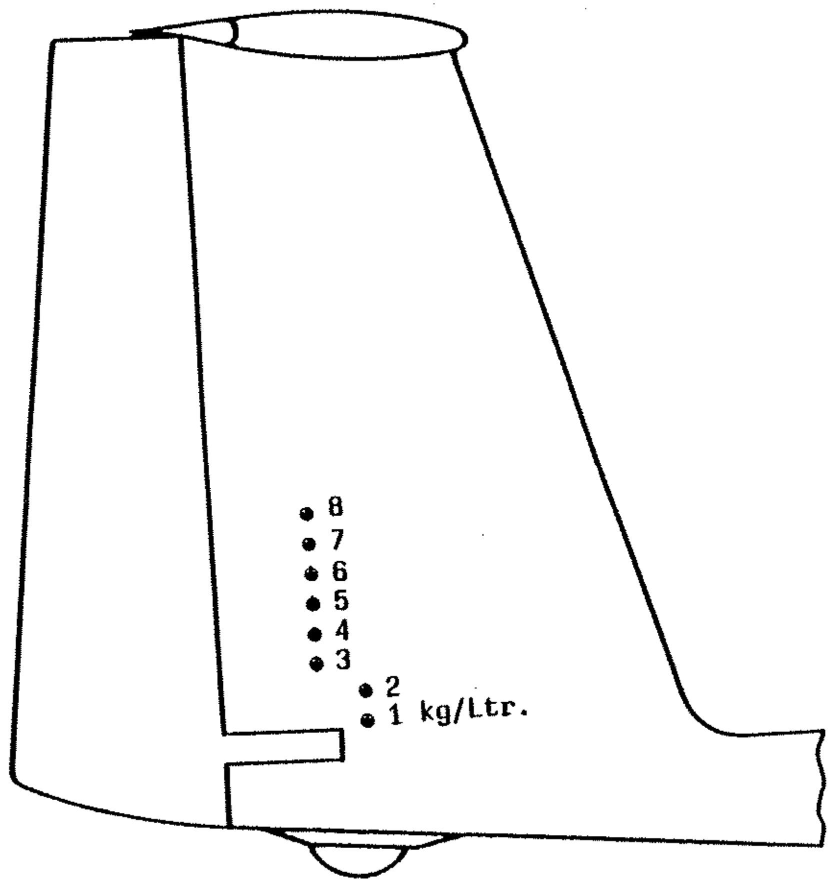
Lock the airbrakes and close the dump valve (located below the rudder drive) by pulling its operating lever, to which the release cable is attached, fully back with the aid of a wire hook. The lever is accessible through the gap with the rudder held to the port side.
Next insert one end of a flexible plastic hose (outer diameter 8 mm/0.31 in.) into the filler tube (internal diameter 10 mm/0.39 in.) protruding from the rudder/fin gap at the top. The other end is connected to a suitable container which is filled with the required amount of clear water.

The tank has seven spill holes, one for each kg/Ltr. ballast, plus an eighth for the maximum capacity (8 kg/Ltr.), all properly marked, on the right hand side of the fin - see accompanying sketch.
Venting of the fin tank is through the uppermost 8 kg/Ltr. spill hole and through the filler hose.

The number of spill holes to be taped closed before the tank is filled, depends on the weight of the ballast required to compensate the load on the aft seat - see loading table "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, thus avoiding overloading.

Water is dumped from the fin tank through an opening on the lower side of the fuselage adjacent to the rudder.
The dump valve of the tank is connected to the air-brake actuating mechanism in such a way that the ballast is dumped only once the airbrakes are fully opened. As the valve remains open, although the airbrakes are closed after landing, the fin tank must always be refilled before the next flight taking into account the load on the aft seat.

Dumping the ballast from a full tank takes about 2 minutes.



WARNING

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).

NOTE:

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 steep angles of bank.

3. If possible, the water ballast should be dumped before an off-field landing.

4. Before the wing water tanks are filled, it should be checked with the dump valves opened that both drain plugs open up equally. Leaking (dripping) valves are avoided by cleaning and greasing the plugs and their seats (with valves opened). Thereafter, with valves closed, the drain plugs are pulled home with the threaded tool used to attach the horizontal tailplane.

WARNING:

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

6. On no account whatsoever must the aircraft ever be parked with full ballast tanks if there is the danger of them freezing up. Even in normal temperatures the parking period with full tanks should not exceed several days. For parking normally all water ballast is completely drained off with the filler caps removed to allow the tanks to dry out.

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

4.5.7 High altitude flight

When flying at high altitude it should be noted that true airspeed (TAS) increases versus 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 (IAS) should not be exceeded:

Alttitude		V (IAS)			Altitude		V (IAS)		
m	ft	km/h	kt	mph	m	ft	km/h	kt	mph
0	0	275	148	171	6000	20000	224	121	139
1000	3300	275	148	171	7000	23000	212	114	132
2000	6500	275	148	171	8000	26000	200	108	124
3000	10000	263	142	163	9000	29500	188	102	117
4000	13000	249	134	155	10000	33000	177	96	110
5000	16500	236	127	146	12000	39500	154	83	96

Flying at temperatures below freezing point

When flying at temperatures below 0^{o} C (32^{o} F), as in wave or during the winter months, it is possible that the usual ease and smoothness of the control circuits is reduced.

Ensure that all control elements are free from moisture so that there is no danger of them freezing solid.
This applies especially to the airbrakes.

From experience gained to date, it has been found beneficial to cover the mating surfaces of the airbrakes with "Vaseline" along their full length so that they cannot freeze solid. Furthermore the control surfaces should be moved occasionally.

When flying with water ballast observe the instructions given in section 4.5.6.

Note:

The polyester coating on this powered sailplane is known from many years experience to become brittle at low temperatures.

Particularly when flying in wave at altitudes in excess of about 6000 m (approx. 20000ft), where temperatures of below -30° C (-22° F) may occur, the gel coat, depending on its thickness and the stressing of the aircraft's components, is prone to cracking.
Initially, cracks will only appear in the polyester coating, however, with time and changing environment, cracks can reach the Epoxy/glass matrix. Cracking is obviously enhanced by steep descents from high altitudes at associated very low temperatures.

Caution:

Therefore, for the preservation of a proper surface finish free from cracking, the manufacturer strongly advises against high altitude flights with associated temperatures of clearly below -20° C (-4° F).
A steep descent with the airbrakes extended should only be conducted in case of emergency (instead of the airbrakes, the pilot also may extend the undercarriage to increase the sink rate).

4.5.8 Flight in rain

When flying the "Nimbus-3D" with a wet surface or in rain, the size of the water drops adhering to the wings causes a deterioration of its performances which cannot be expressed in numerical values due to the difficulties involved with such measurements. Often the air mass containing the moisture is also descending so that - compared with a wet aircraft in calm air - the sink rates encountered are higher.

Despite a wet surface, stalling speeds and characteristics remain unchanged.

4.5.9 Aerobatics

Aerobatic maneuvers are not permissible !

Section 5

5.1 Introduction

This section provides approved data for airspeed calibration, stall speeds and non-approved additional information.

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

5.2 LBA-approved Data

5.2.1 Airspeed indicator system calibration

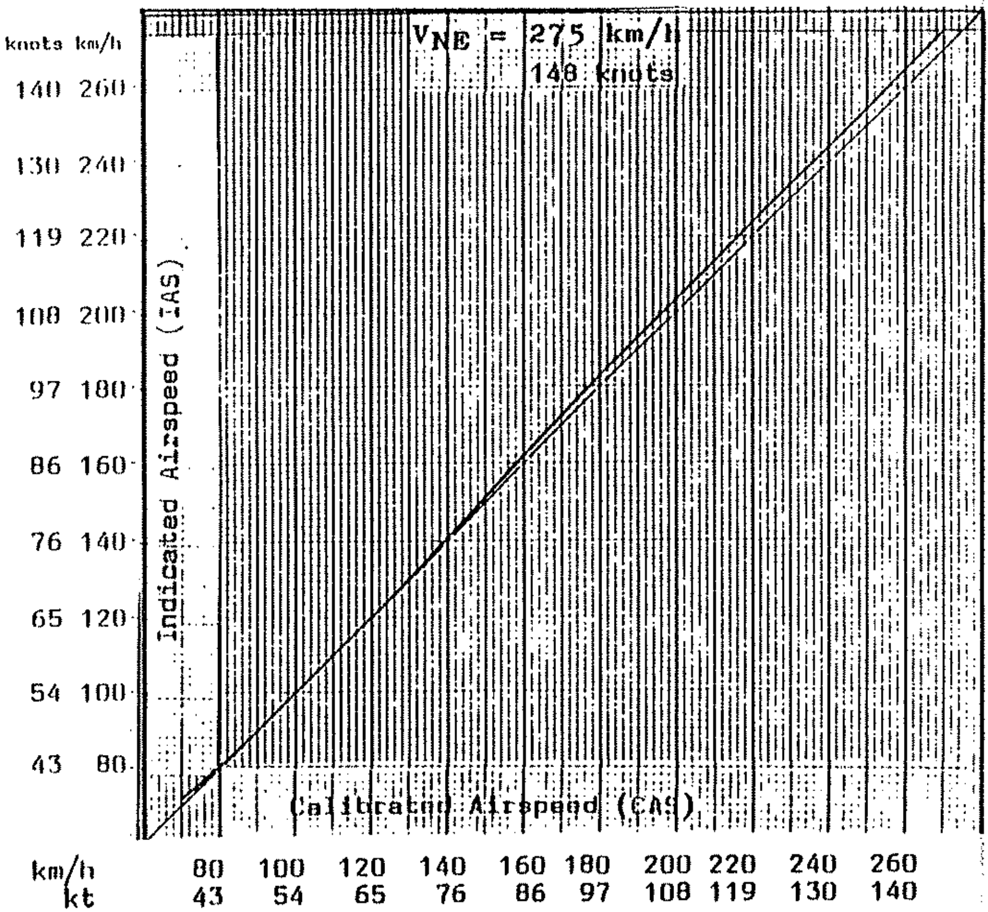
Errors in indicated airspeed caused by Pitot/ Static pressure errors may be read off from the calibration chart below.

Position of the pressure ports:

PITOT pressure : Fuselage nose cone

STATIC pressure: For the ASI the pressure ports are on the fuselage tail boom, approx. 1.02 m (3.3 ft) forward of the fin

All airspeeds shwon in this manual are indicated airspeeds (IAS) as registered by the ASI.



5.2.2 Stall speeds

The following stall speeds were determined in straight and level flight:

All-up mass	635 kg 1400 lb ①			750 kg 1653 lb ②		
C.G. position aft of datum	200 mm 7.87 in.			20 mm 0.79 in.		
Stall speeds, airbrakes closed,	km/h	kt	mph	km/h	kt	mph
flaps at "+2"	69	37	43	79	43	49
flaps at "0"	70	38	43	83	45	52
flaps at "-2"	73	39	45	87	47	54
airbrakes extended, flaps at "L"	68	37	42	80	43	50

① = without water ballast

② = with water ballast

The loss of height from the beginning of the stall until regaining a normal level flight attitude is up to 50 m (164 ft).

5.2.3 (reserved)

5.2.4 Additional Information

N o n e

5.3 Non-LBA-approved additional information

5.3.1 Demonstrated crosswind performance

The maximum crosswind velocity, at which take-offs and landings have been demonstrated, is

20 km/h (11 kt).

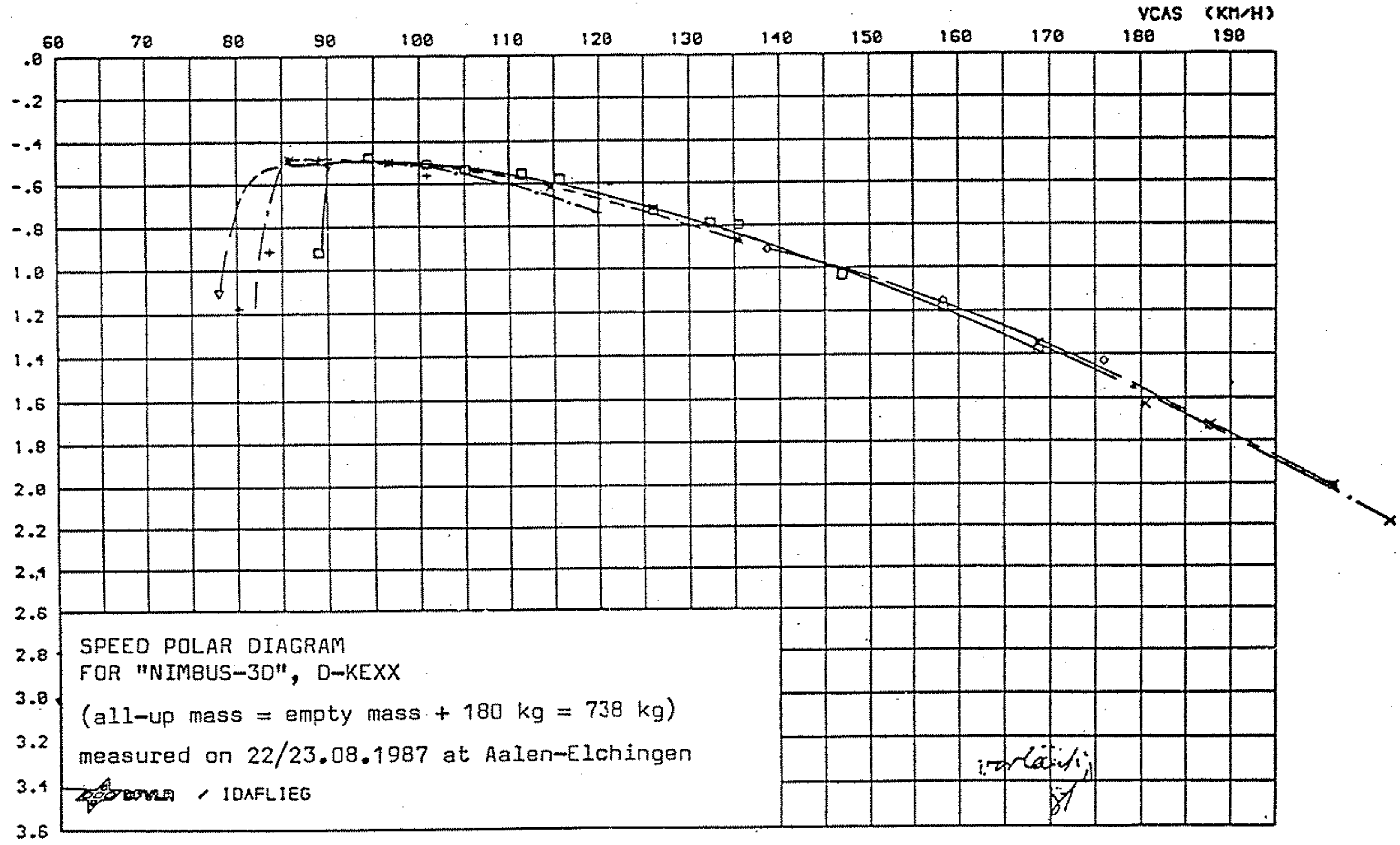
5.3.2 Flight Polar

Flight performances are based on an all-up mass of 738 kg (1627 lb).

Wing loading	43.6 kg/m^2	(8.9 lb/ft^2)
Minimum sink rate at a speed of 87 km/h (47 kt, 54 mph)	0.48 m/s	(94.5 fpm)
Best L/D at a speed of 105 km/h (57 kt, 65 mph)	57	

A speed polar diagram is shown on page 5.3.2.2.

SPEED POLAR DIAGRAM



Section 6

6.1 Introduction

This section contains the payload range within the "Nimbus-3D" may be safely operated.

Procedures for weighing the sailplane and the calculation method for establishing the permitted payload range and a comprehensive list of all equipment available and the installed equipment during the weighing of the sailplane are contained in the Maintenance Manual for the "Nimbus-3D".

6.2 Weight and Balance Record / Permitted Payload Range

The loading chart on page 6.2.3 shows the maximum and minimum load on either seat.

The chart is established with the aid of the last valid weighing report - the required data and diagrams are found in the Maintenance Manual for the "Nimbus-3D".

The loading chart is only valid for this particular sailplane, the serial number of which is shown on the title page.

A front seat load of less than the required minimum must be compensated by ballast:

1. Ballast (lead or sand cushion) must be securely held in place by attaching it to the front seat lap belt mounting brackets.

   Optional mounting provision(s) for trim ballast weights

2.a) Ballast by means of lead plates may be installed below the front instrument panel. Refer to page 6.2.2 for further details.

2.b) Additionally ballast by means of lead plates may be installed on the starboard side of the front GFRP stick mounting frame - see page 6.2.2 for further details.

Altering the seat load by trim ballast weights

Optional trim ballast mounting provision(s)

On request the "Nimbus-3D" is equipped with one or two mounting provisions for trim ballast, thus allowing a reduction of the placarded minimum front seat load (when flown solo) as shown in the table below.

a) Trim ballast mounting provision below the front instrument panel:

This tray holds up to three (3) lead plates with a weight of 3.5 kg/7.7 lb each. Plates are made to fit only into this tray.

Lever arm of trim ballast plates:

2210 mm (7.25 ft) ahead of datum

b) Trim ballast mounting provision on starboard side of front GFRP stick mounting frame:

This tray holds up to three (3) lead plates with a weight of 3.9 kg/8.6 lb each. Plates are made to fit only into this tray.

Lever arm of trim ballast plates:

1960 mm (6.43 ft) ahead of datum

WHEN FLOWN SOLO: Difference in seat load as compared with placarded front seat minimum:		Number of lead plates required:
up to 5 kg (11 lb) less	see a)	1
up to 10 kg (22 lb) less		2
up to 15 kg (33 lb) less		3
up to 20 kg (44 lb) less	see b)	4
up to 25 kg (55 lb) less		5
up to 30 kg (66 lb) less		6

WEIGHT and BALANCE LOG SHEET

valid for S/N

Date of weighing	Empty weight (kg)	Euipment list dated	Empty weight C/G position aft of datum (mm)	Load on the seats (crew including parachutes)						Max. payload (kg)	Max. water ballast at max. payload (kg)	Approved	
				Solo Flying		Dual Flying							
				Front seat load		Front seat load		Rear seat load					
				* Max. (kg)	Min. (kg)	* Max. (kg)	Min. (kg)	Max. (kg)	Min. (kg)			Date	Signed

* The maximum load on either seat must not exceed 110 kg (242.5 lb)

6.2 (reserved)

Maximum water ballast load

Maximum all-up mass including water ballast : 750 kg (1653 lb)

C/G position of water ballast :

24 mm (0.95 in.) aft of datum

Maximum water ballast load : 110 kg (243 lb)

Table of water ballast loads at various empty weights and seat loads:

Empty mass kg	lb	Load on the seats (kg/lb): kg 70, lb 154	kg 80, lb 176	kg 100, lb 220	kg 120, lb 265	kg 140, lb 309	kg 160, lb 353	kg 180, lb 397	kg 200, lb 441	kg 220, lb 485
480	1059	110 29.1 24.2	110 29.1 24.2	110 29.1 24.2	110 29.1 24.2	110 29.1 24.2	110 29.1 24.2	90 23.8 19.8	70 18.5 15.4	50 13.2 11.0
490	1080	110 29.1 24.2					100 26.4 22.0	80 21.1 17.6	60 15.9 13.2	40 10.6 8.8
500	1102	110 29.1 24.2				110 29.1 24.2	90 23.8 19.8	70 18.5 15.4	50 13.2 11.0	30 7.9 6.6
510	1124	110 29.1 24.2				100 26.4 22.0	80 21.1 17.6	60 15.9 13.2	40 10.6 8.8	20 5.3 4.4
520	1146	110 29.1 24.2			110 29.1 24.2	90 23.8 19.8	70 18.5 15.4	50 13.2 11.0	30 7.9 6.6	10 2.6 2.2
530	1168	110 29.1 24.2			100 26.4 22.0	80 21.1 17.6	60 15.9 13.2	40 10.6 8.8	20 5.3 4.4	– – –
540	1190	110 29.1 24.2		110 29.1 24.2	90 23.8 19.8	70 18.5 15.4	50 13.2 11.0	30 7.9 6.6	10 2.6 2.2	– – –
550	1213	110 29.1 24.2	110 29.1 24.2	100 26.4 22.0	80 21.1 17.6	60 15.9 13.2	40 10.6 8.8	20 5.3 4.4	– – –	– – –
		Liter US Gal. IMP Gal.	Liter US Gal. IMP Gal	Liter US Gal. IMP Gal.	Liter US Gal. IMP Gal.	Liter US Gal. IMP Gal.	Liter US Gal. IMP Gal.	Liter US Gal. IMP Gal.	Liter US Gal. IMP Gal.	Liter US Gal. IMP Gal.

all values
110.0 Liter
29.1 US Gal.
24.2 IMP Gal.

Water ballast in outboard wing tanks

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 the fin tank (m_{FT}) to compensate for the nose-heavy moment of the

load on the aft seat (m_{P2}).

The determination of the ballast quantity in the fin tank (m_{FT}) is done with the aid of the diagram on page 6.2.8.

Example for the determination of the ballast quantity:

Load on aft seat (m_{P2})	=	70 kg (154 lb)
Resulting water ballast in fin tank (m_{FT}) as shown in the diagram an page 6.2.8	=	3 kg (6.6 lb)

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

3 kg = 3 Liter

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 6.2.3 must not be exceeded - check as follows:

m_{P1} = front seat load

m_{P2} = aft seat load

m_{FT} = ballast in fin tank

$m_{P1} + m_{P2} + m_{FT} \leqq$ less or equal to maximum permitted payload shown on page 6.2.3

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

WARNING:

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

Flying conditions must conform with the following table:

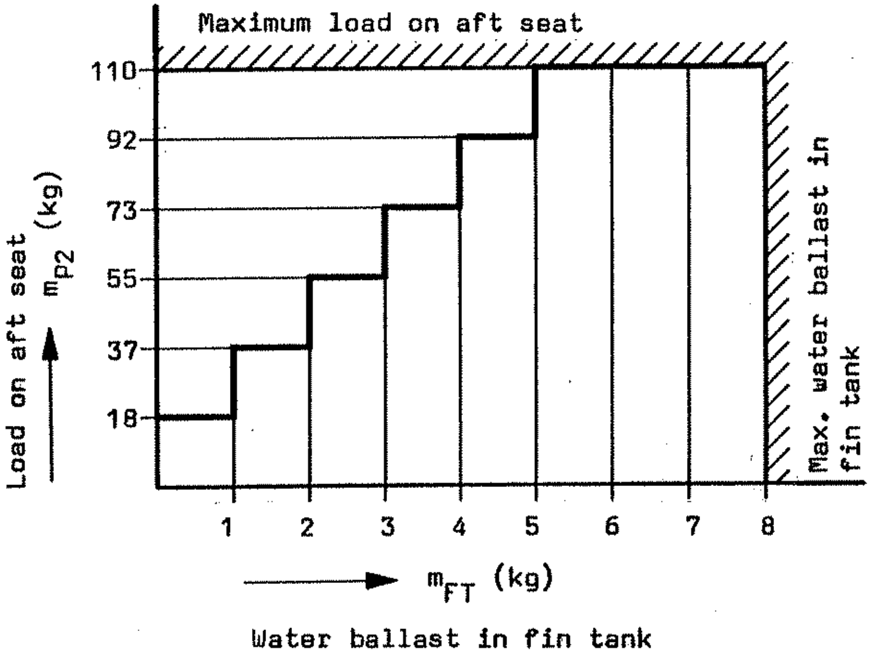
Operating limits when fin tank is used:

Minimum 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).

Lever arm of water ballast in fin tank (m_{FT}):

5290 mm (17.35 ft) aft of datum



Section 7

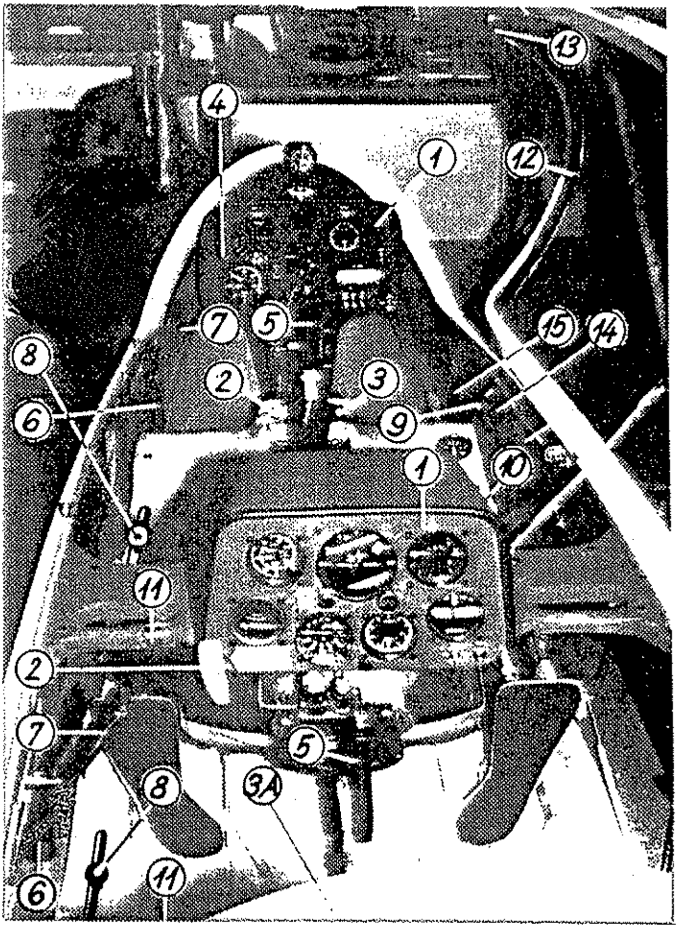
7.1 Introduction

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

For details concerning optional systems and equipment refer to section 9 "Supplements".

For further descriptions of components and systems of this sailplane refer to the Maintenance Manual for the "Nimbus-3D", section 1.

7.2 Cockpit description



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

(1) Instrument panels

With the canopy opened, the instruments are easily accessible. The front instrument panel is attached to the cockpit/canopy coaming frame and to the stick mounting frame. The rear panel is mounted to the steel tube frame between the seats.
Instrument panels and their covers are easily detached after removing the attachment bolts.

(2) Towing hook release handle

Front seat: Yellow T-shaped handle on the left near the base of the control stick

Rear seat : Yellow T-shaped handle on the lower left side of the instrument panel

The winch cable/aerotow rope is released by pulling the handle.

Seat back adjustment (not pictured)

Black grip in a guide rail on the right of the GFRP inner skin.

Adjustment: Depress grip, slide in desired position and let engage.

(3) Rudder pedal adjustment (front seat)

Black T-shaped handle on the right near the base of the control stick.

Forward adjustment : Release locking device by pulling the handle, push pedals to desired position with the heels and let them engage.

Backward adjustment : Pull handle back until the pedals have reached the desired position. Forward pressure with heels (not the toes) engages pedals in nearest notch with an audible click.

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

(3A) Rudder pedal adjustment (rear seat)

Locking device on pedal mounting structure on the cockpit floor.

Forward or backward adjustment : Pull up locking pin by its ring, slide pedal mounting frame in desired forward or backward position and push locking pin down into nearest recess.

Pedals may be adjusted on the ground or in the air.

(4) Ventilation

Small black knob on the left of the front instrument panel.

Pull to close ventilation
Push to open ventilation

In addition the clear vision panels and/or the airscoops in the panels may be opened for ventilation.

(5) Wheel brake

A wheel brake handle is mounted on either control stick. In addition the wheel brake is actuated with the airbrakes fully extended.

(6) Airbrake lever
Fin tank dump valve control (if installed)

Levers (with blue markings), projecting downwards, on the left hand side below the GFRP inner skin.

Forward position	=	Airbrakes closed and locked
Pulled back approx. 40 mm (1.6 in.)	=	Airbrakes unlocked
Pulled fully back	=	Airbrakes fully extended, wheel brake actuated, fin tank dump valve locked in open position.

(7) Flap lever

Black levers, projecting upwards, on the left hand side on the GFRP inner skin. Move lever inwards, select flap setting and let lever engage.

Forward position	=	High speed range
Backward position	=	Low speed range

(8) Elevator trim

Green knob (for either seat) on the left hand side at the seat pan mounting flange.

The spring operated elevator trim is gradually adjustable by moving the green knob slightly inwards, sliding it to the desired position and moving it outwards to lock.

Forward position	=	Nose-heavy
Backward position	=	Tail-heavy

(9) Water ballast dumping control

Black knob on the right hand side in the middle of the GFRP inner skin (for front seat only)

Forward position	=	Valves open
Backward position	=	Valves closed

The knob is locked in either position by swinging it downwards into the recess.

(10) (reserved)

(11) Rip cord anchorage

Front seat : Red marking on tubular frame between the seats

Rear seat : Red ring, situated at the front of the steel tube center frame, on the left hand side

(12) Canopy

The one-piece plexiglass canopy hinges sideways on flush fittings.
Take care that the cable restraining the open canopy is properly hooked up.

(13) Canopy locking

Red knob for either seat on the left on the canopy frame, mounted to a sliding locking rod.

Forward position = Canopy locked

To open the canopy, pull knob(s) back, then raise canopy.

(14) Canopy emergency jettisoning

Red grip for either seat on the right on the GFRP inner skin.

Forward position = Canopy locked

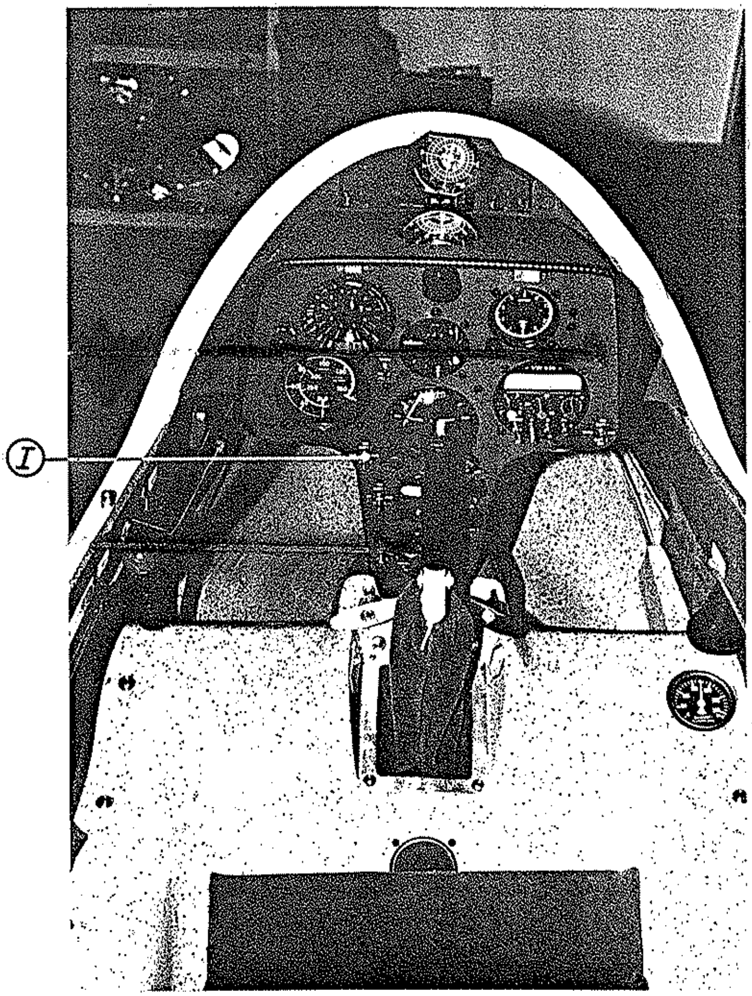
To jettison the canopy, pull grip(s) back with the canopy open and raised, then push canopy away.

(15) Undercarriage (actuating lever on front seat only)

Retracting = Disengage black handle on the right on the GFRP inner skin, pull it back and lock in rear recess.

Extending = Disengage lever, push it forward and lock in front recess.

7.3 Instrument panels



(I) Master switch (panel-mounted)

UP	-	ON
DOWN	-	OFF

7.4 Airbrake system

Airbrakes

Schempp-Hirth type airbrakes are employed on the upper wing surface.
On extending the airbrakes, an interconnection to the flaps on the inboard wing (by means of a gas strut) steadily increases their positive deflection, thus compensating the lift lost by the airbrakes and increasing the drag of the aircraft.

7.5 Baggage compartment

An enclosed baggage compartment does not exist.

7.6 Water Ballast System

Wing tanks

A steel cable connects the operating knob in the cockpit with a torsional drive in the fuselage center. On rigging, this torque tube is automatically hooked up to torsional drives inside the inboard and outboard wing panels.

The water dump valves, located on the lower side of the outboard panels, are also actuated by a torsional drive. Torque tubes in the wings are rotated to the "closed" position by spring force - see page 7.6.2.
The operating knob in the cockpit runs in a gate and can be locked at the extreme positions.

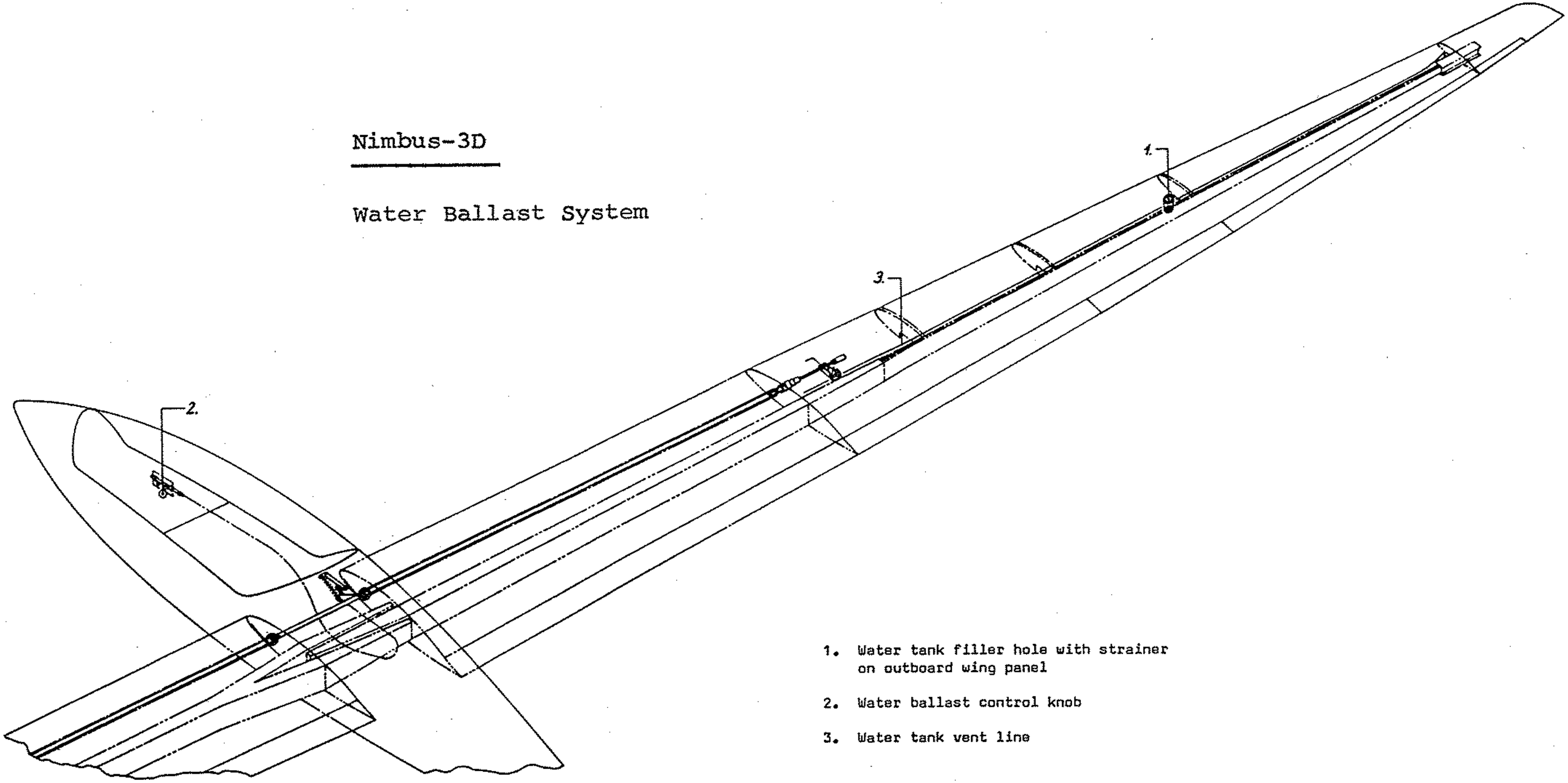
Fin tank (if installed)

A steel cable connects the airbrake linkage in the fuselage center with the dump valve actuating lever. On extending the airbrakes this lever forces the valve to open. Note that it remains locked opened even if the airbrakes are closed again.
A sketch of the system is shown on page 7.6.3.

With airbrakes locked, the dump valve may be pulled closed by hand using a wire hook.

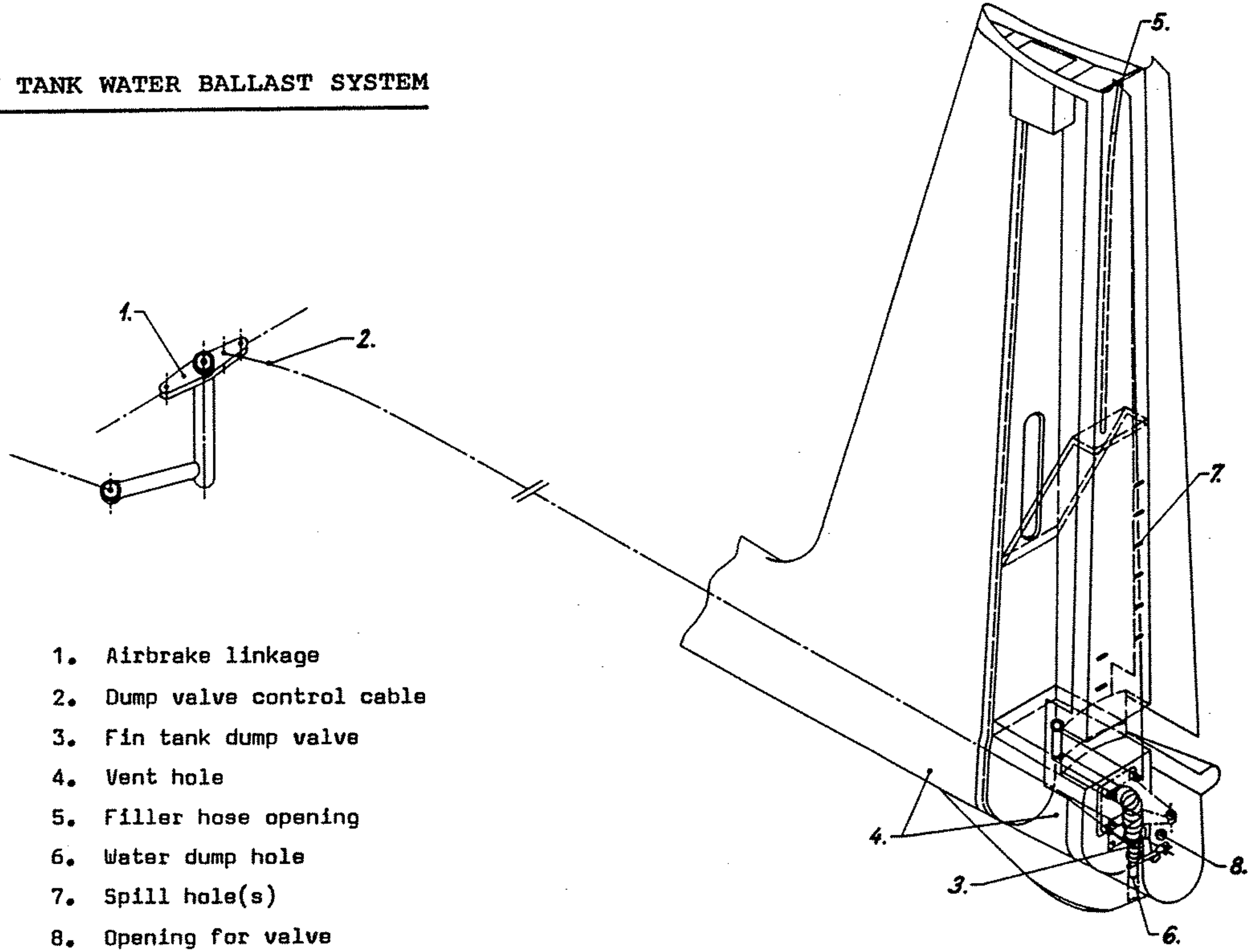
Nimbus-3D

Water Ballast System



1. Water tank filler hole with strainer on outboard wing panel
2. Water ballast control knob
3. Water tank vent line

FIN TANK WATER BALLAST SYSTEM



1. Airbrake linkage
2. Dump valve control cable
3. Fin tank dump valve
4. Vent hole
5. Filler hose opening
6. Water dump hole
7. Spill hole(s)
8. Opening for valve actuating lever

7.7 (reserved)

7.8 (reserved)

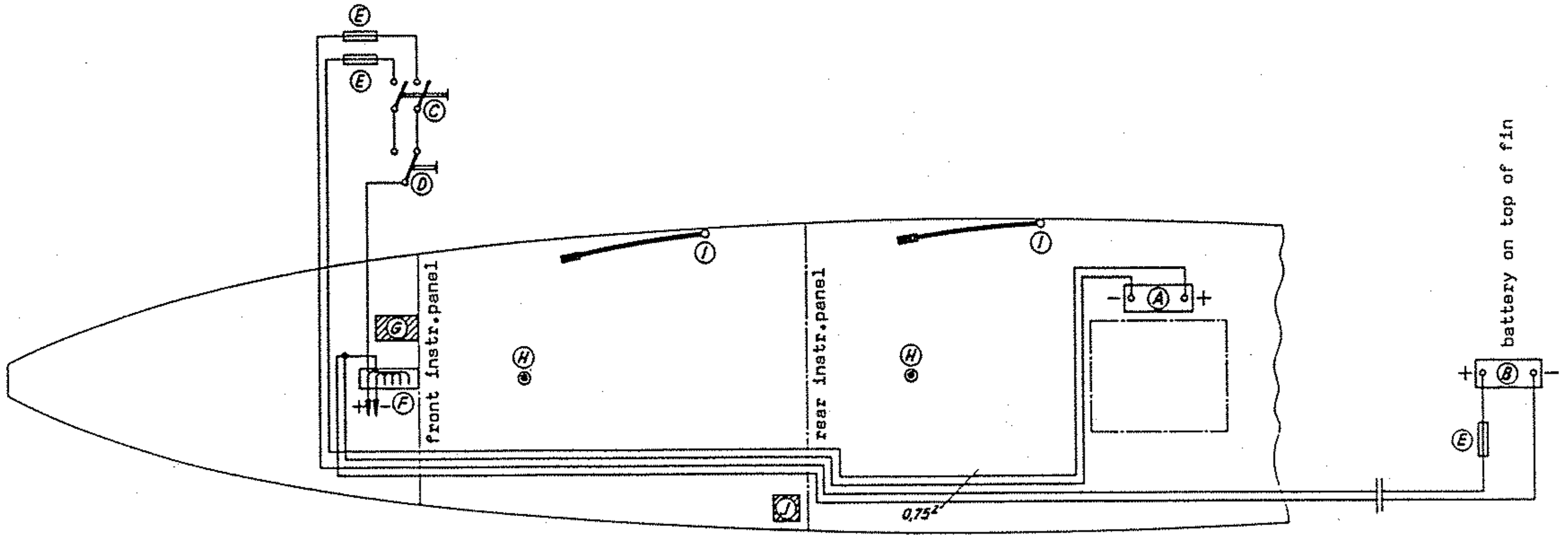
7.9 Electrical System

Gliding Avionics

The minimum equipment mandatory for the sailplane does not require an electrical power source.

Additional equipment is to be wired to a 12 V power supply in accordance with the "Cable Position View for Nimbus-3D" on page 7.9.2 and must comply with the manufacturer's instructions for the relevant instrument.

Power is supplied by a battery located in a compartment on top of the fin - a further battery may be installed near the wheel box.



Ⓐ 12 V/6.5 Ah battery near wheel box
Ⓑ 12 V/6.5 Ah battery on top of fin
Ⓒ Master switch
Ⓓ Selector switch
Ⓔ 4 A Fuse
Ⓕ Terminal (e.g. AMP plug board)
Ⓖ VHF Transceiver
Ⓗ PTT switch
Ⓘ Goose neck microphone
Ⓙ Speaker

Note: Wiring of radio and other equipment must comply with the manufacturer's instructions

L-373

Schempp-Hirth Flugzeugbau GmbH 7312 Kirchheim-Teck

1988 Tag 05.12

NIMBUS-3D

WIRING DIAGRAM AND CABLE POSITION VIEW

HS 12-10.180

7.10 Miscellaneous Equipment

Removable Ballast

On request a mounting provision for removable ballast (trim ballast weights) is installed below the front instrument panel on the stick mounting frame.
Trim ballast weights by means of lead plates are slid onto two studs and secured in place by nuts and cowling safety pins.

Refer to section 6.2 for the alteration in minimum seat load.

Oxygen Equipment

For the installation of an oxygen cylinder mounts are provided on the upper fuselage skin above the steel tube center frame on the right hand side (optional).
For the installation of an oxygen system drawings may be obtained from the manufacturer.

CAUTION:

After an oxygen system has been installed, it is necessary to re-establish the empty weight C/G position of the sailplane to ensure that the center of gravity is still within the permitted range.

A list of oxygen regulators, currently approved by the Luftfahrt Bundesamt (LBA), is found in the Maintenance Manual for the "Nimbus-3D".

Emergency Locator Transmitter

The ELT should be installed near the rear seat or near the fuselage steel tube center frame.

The installation must comply with the manufacturer's instructions.

A list of emergency locator transmitters, currently approved by the Luftfahrt Bundesamt (LBA), is found in the Maintenance Manual for the "Nimbus-3D".

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.

Caution:

It is wise to follow a planned schedule of lubrication and preventative maintenance based on climatic and flying conditions encountered.

8.2 Sailplane Inspection Period

Airframe Maintenance

Under normal operating conditions no airframe maintenance work is required between the annual surveys, except for the routine greasing of the spigots and bearings of the wing and tailplane attachment fittings.
Should the control system become heavy to operate, lubricate those places in the fuselage where plain bearings are used (elevator, flap and airbrake actuating rods, vertical aileron linkage).

Cleaning and greasing the wheel(s) and the towing hook(s) depends on the accumulation of dirt.

Rudder cables

After every 200 flying hours and at every annual survey, the rudder cables are to be inspected at the point where they feed through the S-shaped guides in the pedals, especially at the point of maximum pedal adjustment. If they are damaged, worn or corroded, they must be replaced.
It is permissible for individual strands of the cables to be worn up to 25 %.

8.3 Sailplane Alterations or Repairs

Alterations

It is essential that the responsible airworthiness authority be contacted prior to any alterations on the sailplane to ensure that its airworthiness is not compromised.

Repairs

Before every take-off and especially after the sailplane has not been used for a while, it should be checked on the ground as shown in section 4.3.

Check for any sign of a change in the condition of the aircraft, such as cracks in the surface, holes, delamination in the CFRP/GFRP structure etc.

If there is any uncertainty whatsoever regarding the significance of damage discovered, the sailplane should always be inspected by a CFRP/GFRP expert.
There is no objection to minor damage which does not affect airworthiness in any way being repaired on site.

Instruction for repairs are found in the Maintenance Manual.

Major repairs may only be conducted by a certified repair station having an appropriate authorization.

8.4 Ground Handling / Road Transport

The "Nimbus-3D" should always be hangared or kept in well ventilated conditions.
If it is kept in a closed trailer, there must be adequate ventilation.
The water ballast tanks must always be left completely empty.
The "Nimbus-3D" must not be subjected to loads whilst not in use, especially in the case of high ambient temperatures.

As the wings have a thin airfoil section, it is important that they are properly supported, i.e. leading edge down, with support at the spar stubs and at the outer portion in cradles of correct airfoil section.

The fuselage can rest on a broad cradle just forward of the c/g hook and on its tailskid or wheel.

The tailplane should be kept leading edge down in two cradles of correct airfoil section or be placed horizontally on a padded support.

On no account should the tailplane be supported by its fittings in the trailer.

In the case of sailplanes which remain rigged permanently, it is important that the maintenance program includes rust prevention for the fittings on the fuselage, wings and tailplane.

Dust covers should be regarded as essential for a high-performance sailplane.

When towing the "Nimbus-3D" behind a car, a tail dolly should always be used to avoid unnecessary tailplane vibration on the fittings.

If the sailplane is being pushed, it should not be pushed at its wing tips but as near to the fuselage as possible.

8.5 Cleaning and Care

Although the surface coating of a composite aircraft is robust and resistant, always take care of a perfect surface.

For cleaning and caring the following is recommended:

- Clean the surface (especially the leading edge of the wings, horiz. stabilizer and fin) with clear water, a spongue and a chamois leather.
- Do not use rinsing additives common in trade.
- Polish and polishing materials may be used.
- Petrol and alcohol may be used for a moment only, thinners of all kinds are not recommended.
- Never use chlorine hydrogen (i.e. Tri, Tetra, Per etc.).
- The best polishing method is the buffing of the surface by means of an edge buffing wheel, fitted to a drilling or polishing machine. Hard wax is applied to the rotating disc and distributed crosswise over the surface. To avoid a local overheating, move buffing wheel constantly.

- The canopy should be cleaned with a plexiglass cleaner (e.g. "Plexiklar", "Mirror Glaze" or similar) and only if necessary, with warm water.
  The canopy should be wiped down only with a clean soft chamois leather or a very soft material as used for gloves.

  Never rub the canopy when it is dry!

- The "Nimbus-3D" should always be protected from the wet. If water has found a way in, it should be stored in a dry environment and its components should be turned frequently to eliminate the water.

- The "Nimbus-3D" should not be exposed unnecessarily to intense sunlight or heat and should not be subjected to continual loads in a mechanical sense.

  All external portions of the sailplane exposed to sunlight must be painted white, except of the areas for the registration and anti-collision markings.

  Colours other than white can lead to the CFRP/GFRP overheating in direct sunlight, resulting in an insufficient strength.

Section 9

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 aircraft.

9.2 List of inserted supplements

Date	Section	Title of inserted supplement

ADDITIF AU MANUEL DE VOL DU PLANEUR

SCHEMPP HIRTH Nimbus 3D F-CFUJ Centre Vol Voile Montargis

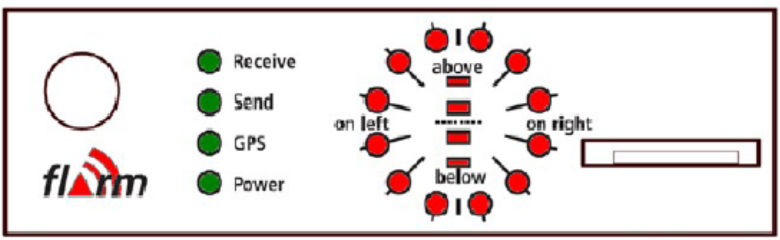
version 1 du 01 12 2023 PAGE : 1/1

ÉQUIPEMENT CONCERNÉ : FLARM CSTAN édition 4 n° CS-SC0051d

UTILITÉ : Anti collision
NOUVELLES LIMITES POUR LE PLANEUR : néant
NOUVELLES PROCÉDURES D'URGENCE : néant
NOUVELLES PROCÉDURES NORMALES : néant
NOUVELLES PERFORMANCES : néant
INFLUENCE SUR LA MASSE ET CENTRAGE : matériel présent lors de la pesée

Documentation : Le Flarm ou power flarm
https://www.flarm.com/support/manuals-documents/

Le flarm est branché sur l'interrupteur général



Push-button | 4 green LED (Status) | 12 LED (horizontal) 4 LED (vertical) all bicolor | microSD reader

ADDITIF AU MANUEL DE VOL DU PLANEUR

SCHEMPP HIRTH Nimbus 3D F-CFUJ Centre Vol Voile Montargis

version 1 du 01 12 2023 PAGE : 1/1

ÉQUIPEMENT CONCERNÉ : VHF 8,33 KRT2 S CSTAN édition 4 n° CS-SC001b

UTILITÉ : communication en fréquence 8,33
NOUVELLES LIMITES POUR LE PLANEUR : néant
NOUVELLES PROCÉDURES D'URGENCE : néant
NOUVELLES PROCÉDURES NORMALES : néant
NOUVELLES PERFORMANCES : néant
INFLUENCE SUR LA MASSE ET CENTRAGE : matériel présent lors de la pesée

La VHF 8,33 KRT2 :
https://www.tq-group.com/en/products/tq-aviation/krt2-radios/krt2-s/

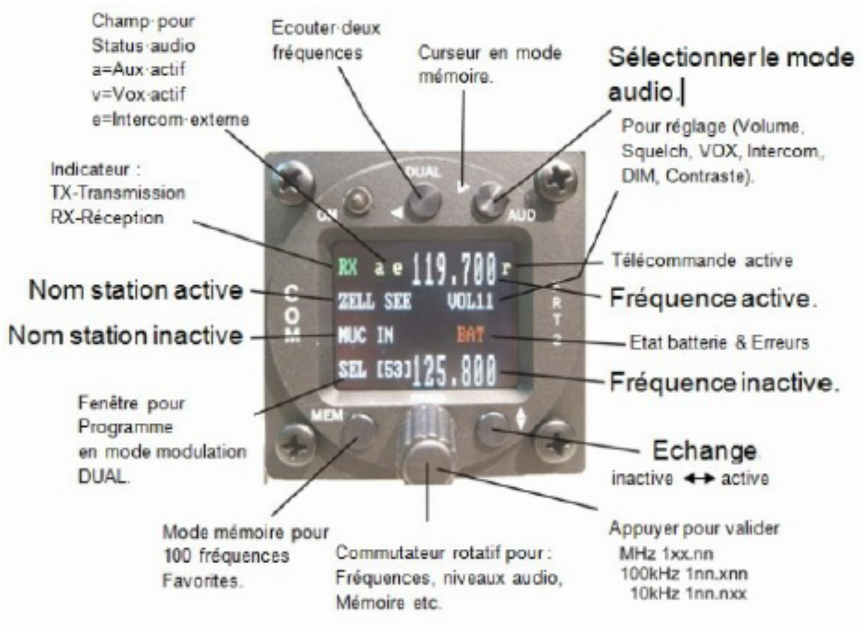


Figure 1: KRT2-S Vue de face