S E C T I O N 5

5.1 Introduction

This section provides all LBA-approved data for airspeed calibration, stall speeds and take-off performance as well as additional values and data which do not require approval.

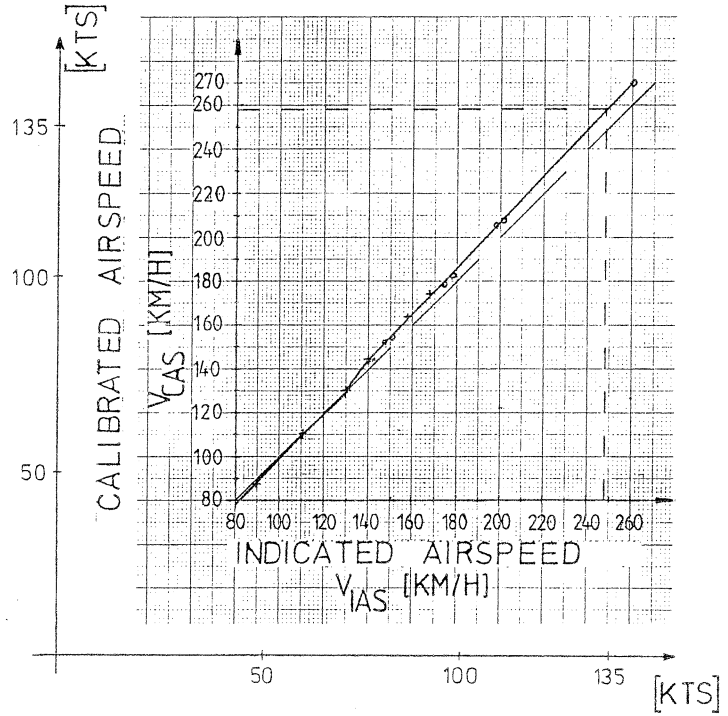
The data shown in the following charts has been determined by test flights with a powered sailplane and engine in good condition and using average piloting techniques.

5.2 LBA-Approved Data

5.2.1 Airspeed Indicator System Calibration

The diagram shows the airspeed indication errors induced by the design of the pitot-static system.

Note: Any **IAS** values mentioned in this Pilot's Operating Handbook are values displayed on the airspeed indicator when the airspeed indicator error is considered to be zero.



This diagram is valid for
- airbrakes extended and retracted
- forward and aft c.g. position
- low and high flying weight
- winch launching
- aerotow

5.2.2 Stall Speeds IAS (km/h / kts)

The following stall speeds (valid for gliding and powered flight) during level flight have been determined:

Flying weight c.g. position	560 kg (1234 lbs) aft		710 kg (1565 lbs) forward	
	km/h	kts	km/h	kts
Normal flight, airbrakes retracted	64	34	78	42
Start of stall warning	69	37	--	--
Normal flight, airbrakes extended	68	37	82	44
Start of stall warning	73	39	--	--

- These speeds are valid for an aircraft which is flown in an aerodynamically coordinated manner.
- The instrument error is considered zero.
- The start of the stall is indicated by tail buffeting.

Note: At max. weight and forward c.g. position there is no stall warning because elevator control deflection acts as an angle of attack limiter.

The loss of altitude from the stall to recovery to the normal flight attitude can be up to 50 m (164 ft) at sea level.

5.2.3 Take-Off Performance

Under the following conditions the aircraft requires a take-off run of 300 m (1000 ft) on a hard surface runway:

- Full throttle
- Engine at operating temperature
- Propeller at TAKE-OFF setting *)
- Flying weight 710 kg (1565 lbs), c.g. position 280 mm (11 in.)
- Lift-off speed 80 km/h IAS (43 kts)
- Sea level, + 15 °C, zero wind speed
- Good general condition
- Airbrakes retracted
- Magnetos BOTH
- Level runway (not according to AIP tolerance)
- Dry runway
- Non-turbulent air
- Climb speed 90 km/h IAS (48 kts)
- No precipitation

*) only for variable pitch propeller

The take-off distance to clear a 15 m (50 ft) obstacle is 500 m (1640 ft).

When calculating the required take-off distance, bear in mind that a slightly uphill sloping runway, damp and uneven ground and long grass etc., can lengthen the take-off run considerably.

A take-off should only then be carried out when there are safe possibilities for avoiding obstacles or for an off-field landing in the event of an engine failure or loss of power.

In case of doubt (also in strong turbulence or strong crosswind), a safe tow is preferable.

Because the take-off distance is considerably affected by the take-off weight, take-offs should be performed with as low a take-off weight as possible.

If a take-off is performed under conditions which deviate from those above, note the following points:

Take-off distance to clear obstacle	Increases with	Decreases with
	increasing altitude and/or temperature	reduced weight
	rain	
	tail wind	head wind
	uphill sloping runway or terrain	downhill sloping runway or terrain
	turbulence (negative)	turbulence (positive)
	soft runway surface	

Depending on the prevailing conditions, take-offs can be very short or very long. In unfavourable conditions a take-off is impossible.

Warning: Compared to a conventional aircraft, the take-off and climb performance of this powered sailplane is more sensitive. For this reason a certain braking distance must be available in the event of an aborted take-off (as a general guide, 200 m (660 ft) should be available if a take-off is aborted before lift-off). The climb-out path must be sufficiently free from obstacles, taking local atmospheric disturbances into consideration.

TAKE-OFF DISTANCES (HARD RUNWAYS)

Conditions :
- Full throttle
- Propeller TAKE-OFF setting*)
- Hard runway or very hard grass surface
- Mixture for max. power

*) only for variable pitch propeller

Example: (----->)
Pressure altitude : 1000 m (3281 ft)
Temperature : + 20 °C
Take-off weight : 600 kg (1323 lbs)
Slope : 0 %
(Head) wind : 30 km/h (16 kts)

Result : Take-off roll : 190 m (623 ft)
to clear obstacle : 320 m (1050 ft)

Takeoff Weight [kg]	[lbs]	Rotation speed [km/h] IAS	[kts]	Initial Climb Speed at 50 ft [km/h] IAS	[kts]
710	1565	78	42	90	49
650	1433	75	40	86	46
600	1323	72	39	83	44
550	1212	69	37	79	42

TAKE-OFF DISTANCES (GRASS RUNWAYS)

Conditions :
- Full throttle
- Propeller TAKE-OFF setting*)
- Good general conditions
- Grass strip in accordance with 30 % addition over hard runways at MSL
- Mixture for max. power
- non turbulent air

*) only for variable pitch propeller

For example see page 5.7

Takeoff Weight [kg]	[lbs]	Rotation speed [km/h] IAS	[kts]	Initial Climb Speed at 50 ft [km/h] IAS	[kts]
710	1565	78	42	90	49
650	1433	75	40	86	46
600	1323	72	39	83	44
550	1212	69	37	79	42

5.2.4 Flight Performance with Running Engine

Rate of Climb

At sea level and under normal atmospheric conditions, the aircraft has a rate of climb of 1.7 m/s (5.6 ft/s) at a climbing speed of V_Y = 90 km/h (48 kts).

Cruise

The cruise speed V_H for aircraft equipped with a variable pitch propeller is 140 km/h (75 kts) at full power with the propeller in the CRUISE setting. For aircraft with a fixed pitch propeller the cruising speed is 110 km/h (59 kts) at full power. The maximum speed with extended engine is 175 km/h (94 kts).

Range

- **With fuselage tank and wing tank (standard equipment only with variable pitch propeller)**

With completely full tanks, a useable fuel quantity of 78 liters (20.6 US gal / 17.15 imp. gal) is available. At the maximum fuel consumption of 22 liters/hour (5.8 US gal/hour / 4.8 imp. gal/hour), a flying time of 3.5 hours (full power flight) is possible. This is equivalent to a distance of 500 km (270 NM) (without the gliding reserve).

- **Only with fuselage tank (standard equipment only with fixed pitch propeller)**

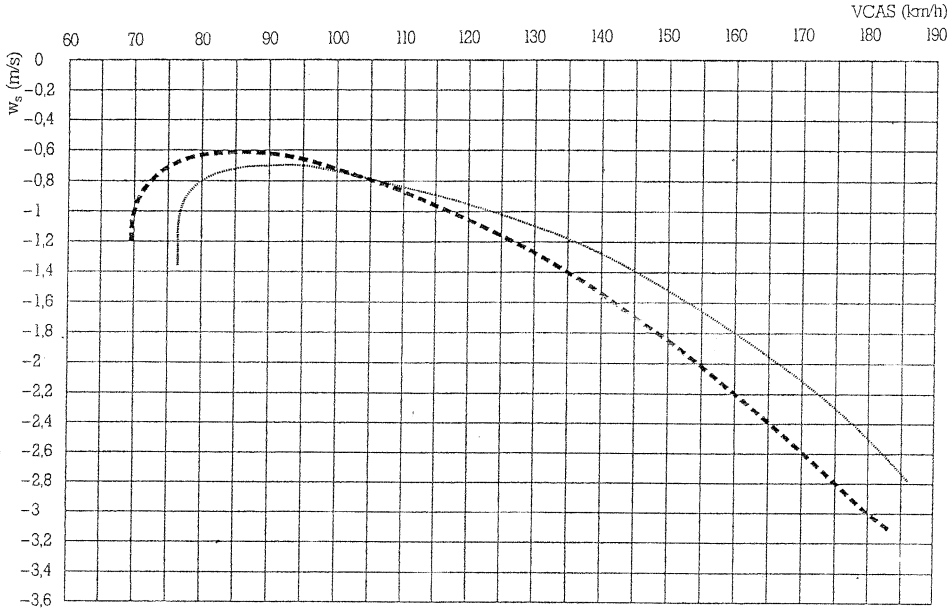
With the fuselage tank completely full, the useable fuel capacity is 31 liters (8.2 US gal / 6.8 imp. gal). At a maximum fuel consumption of 22 liters/hour (5.8 US gal/hour / 4.8 imp. gal/hour), a flight duration of approximately 1.5 hours (powered flight) is possible.

5.3 Further Information, not Subject to LBA Approval

5.3.1 Demonstrated Crosswind Performance

Winch-launching	20 km/h	(11 kts)
Aerotow	25 km/h	(13 kts)
Take-off	20 km/h	(11 kts)
Landing	30 km/h	(16 kts)

5.3.2 Flight Polar



-- Speed polars
TWIN III SL
Flying weight = 579 kg [1276.5 lbs]
(single pilot), based on polar
measurement on 15.8.1976
in Aalen-Elchingen

— Speed polars
TWIN III SL
Flying weight = 710 kg [1565.3 lbs]
(max. take-off weight),
measured polars extrapolated
to 710 kg [1565.3 lbs]

Glide performance (with retracted engine)

Optimum lift-drag ratio:	38 at 105 km/h (56 kts)
Lowest rate of descent:	0.7 m/sec at 89 km/h (2.30 ft/sec at 48 kts)

5.3.3 Noise Data

Noise measurements were carried out in accordance with Chapter VI of the "Lärmschutzforderungen für Luftfahrzeuge" (LSL) - Noise Protection Requirements for Aircraft - dated 1. 1. 1991.

The measured noise level was
- 62.9 dB(A) with variable pitch propeller MTV-24-M/158-16
- 63,5 dB(A) with fixed pitch propeller KS-1C-158-R-108

The current max. permissible noise level is 65.5 dB(A) (in the Federal Republic of Germany).

5.3.4 Circling Polar

m = 579 kg (1276 lbs)