2.3 Airspeed Indicator Markings

Airspeed indicator markings and their color-code significance are shown below.

Marking	IAS value or range	Significance
Green arc	**88 – 180 km/h** **48 – 97 kts** **55 – 112 mph**	Normal Operating Range
Yellow arc	**180 – 280 km/h** **97 – 151 kts** **112 – 174 mph**	Do not fly in this range with strong turbulence; and maneuvers must only be done with appropriate caution
Red line	**280 km/h** **151 kts** **174 mph**	Maximum speed for all operations.
Yellow triangle	**98 km/h** **53 kts** **61 mph**	Approach speed at maximum weight
Blue line	**100 km/h** **54 kts** **62 mph**	Best rate-of-climb speed[mg1]

2.4 Power-Plant

Engine manufacturer:	Diamond Aircraft Ind.
Engine:	IAE 50R-AA

Max. power:			
- take-off	37.3 kW	(3 minute limit)	7750 rpm
- continuous	35.8 kW		7100 rpm

Max. take-off revs:	7750 rpm
Max. continuous revs:	7100 rpm
Max. overspeed revs (20 sec.):	8000 rpm
Min. idle speed revs:	2800 rpm

Max. coolant temp., take-off:	90 °C (194°F)
Min. coolant temp., take-off:	40 °C (104°F)
Max. coolant temp., continuous:	100 °C (212°F)

Max. rotor cooling air temp., take-off (3 Min.): 130 °C (266°F)

Note: The above stated take-off performance refers to the minimum value as given in the engine data sheet. A nominal performance of 40 kW is typical on the other hand.

Lubricant:	Total loss oil lubrication at ratio:	1:60 approx.

Transmission: Toothed belt transmission with 1:2.68 reduction ratio.

The following types of propeller are approved:

Manufacturer:	Alexander Schleicher GmbH
Propeller:	AS2F1-1/R153-92-N1

3.7 Engine Failure

(1) Failure at Safe Altitude

- Fuel Valve: **OPEN**? (foremost position?)
- Ignition: **ON**? (upward position?)
- Power-Plant Main Switch: **ON**? (ILEC responding?)
- Master switch for engine battery: **ON**? (ILEC responding?)
- Fuel pump 2: **ON**?
- Fuel: **???** (Fuselage tank contents?)
- ILEC Change Over Switch: **Turned towards the pilot**?

If the above points check out correctly, the fault cannot be rectified in flight, the propeller should be retracted and the ASK 21 Mi should from then on be operated as a pure sailplane. Retract propeller in the normal manner in accordance with the check list.
If necessary, carry out a normal sailplane outlanding.

(2) Failure at Low Altitude

First check the points on the above check list.

- Fuel Valve: **SHUT**! (rearmost position)
- Ignition: **OFF**!
- Power-Plant Main Switch: **OFF**!
- Propeller Stop: **ENGAGED**! (bottom position)
- Leave the propeller extended
- Initiate outlanding

If the situation becomes so critical that a crash landing seems unavoidable because no landable terrain can be reached, the propeller stop should be engaged at a speed of about 90 km/h (49 kts) - even with the propeller still running. This will help to stop the propeller more quickly. Then retract the propeller at least to a "halfway in" position.

This action not only improves the gliding performance (perhaps now a more suitable field can be reached), but also reduces the risks in case of a crash landing. In this case the power-plant main switch must not be turned off until the propeller has reached at least its partially retracted position.

(3) Strong Buffeting of the Power-plant

Proceed as per check list. If no mistake can be found, shut off the power-plant in the normal manner and retract the propeller. The pilot must assume that the propeller is damaged and hence may be out of balance. Do not start the engine any more.

13) Air brake: check condition, free movement, alignment and locking.

14) Rear wing attachment pins pressed in and secured?

15) Check that static ports in the fuselage tail boom are unobstructed!

16) Check the condition of the Pitot tube and the Total Energy probe respectively! Are they firmly seated?

17) Rudder: check condition, free movement, and play!
Cable connections secured?

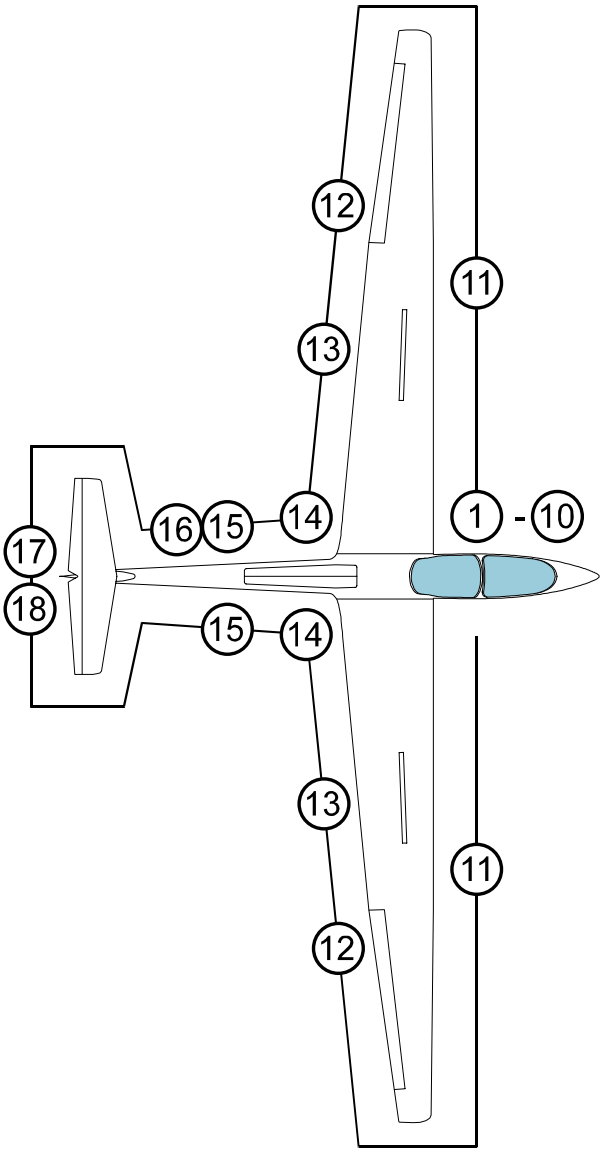
18) Check tailplane for correct assembly, and for correct engagement. Elevator and actuator: condition, free movement, and play!

19) Check control linkages of elevator, aileron, rudder and air brakes for free movement and for force-fit. Hold controls firmly at full deflection while loads are applied to stick, pedals and air brakes lever respectively.

20) Turn on master switch for engine battery. It can be left on for the day.

After rough landings or excessive flight stress the whole aircraft must be checked with the wings and tail unit removed. If any damage is found, a technical inspector must be called in. On no account one must take off again before the damage has been repaired.

Fig. 4.3-1 **Tour around the aircraft** (see Daily Inspection 4.3)



For a safe self-launch maximum engine revolutions should come up to 7000 RPM on the ground. With lower revolutions the pilot must face longer take-off distances than indicated in Section 5.2.3.

Warning: If maximum revolutions on the ground are below 7000 RPM, the aircraft must not take off. First a check must be done and a ground-test run. In case of doubt contact the manufacturer.

Warning: For the following reason it is prohibitive to switch over between the two ILEC control units during powered flight: If the ignition is set „OFF“ at the control unit to which the pilot wants to change, then the engine fails, as the ignition power supply switches off during change over.

For the acceleration run and actual lift-off, the following practices apply: Trim and elevator neutral. Take-off run first on both nose wheel and main wheel. When sufficient speed is gained continue on the main wheel and gently pull the stick until the aircraft lifts off.

(4) Climbing Flight

During climbing flight, the engine should be run at maximum 7750 rpm and at v_Y. Pay attention that this take-off power is only allowed during the 3 minute limit.

(5) Cruising Flight

This can be carried out either in a saw-tooth pattern (climb followed by straight glide with propeller retracted), or in horizontal flight at 7100 rpm and an air speed of 125 km/h (67.5 kts, 78 mph). Monitor fuel state.

Caution: Prior to flight check that the oil supply is sufficient for the whole intended fuel contents. Monitor oil warning light during powered flight!

A detailed description of the ILEC engine control unit is given under Section 7.7.

(6) Stopping the Power-Plant

Caution: To prevent damage to the propeller, the procedures described hereafter must be met!

Cooling run

With normal outside air and engine temperatures the flight testing has shown that there is no need for a longer cooling run. Only with very high engine and outside air temperatures it is actually necessary to do a longer cooling run of 1 to 2 minutes which must then be done in fast level flight. To do this the engine revs must be adjusted between 6400 and 6600 rpm at a speed of about 130 km/h (70 kts, 81 mph). Contrary to a cooling run with the engine idling, the cooling water pump and cooling air fan still operate efficiently at these RPMs; as the throttle setting of about 50 % results in less combustion heat inside the engine, while there is still a good heat transport to the outside.

A longer cooling flight at lower flight speeds and with the engine **idling** must **not** be done, because then the exhaust heats up strongly (the Venturi at the exhaust pipe does no longer supply sufficient cooling air through the outside fairing of the exhaust).

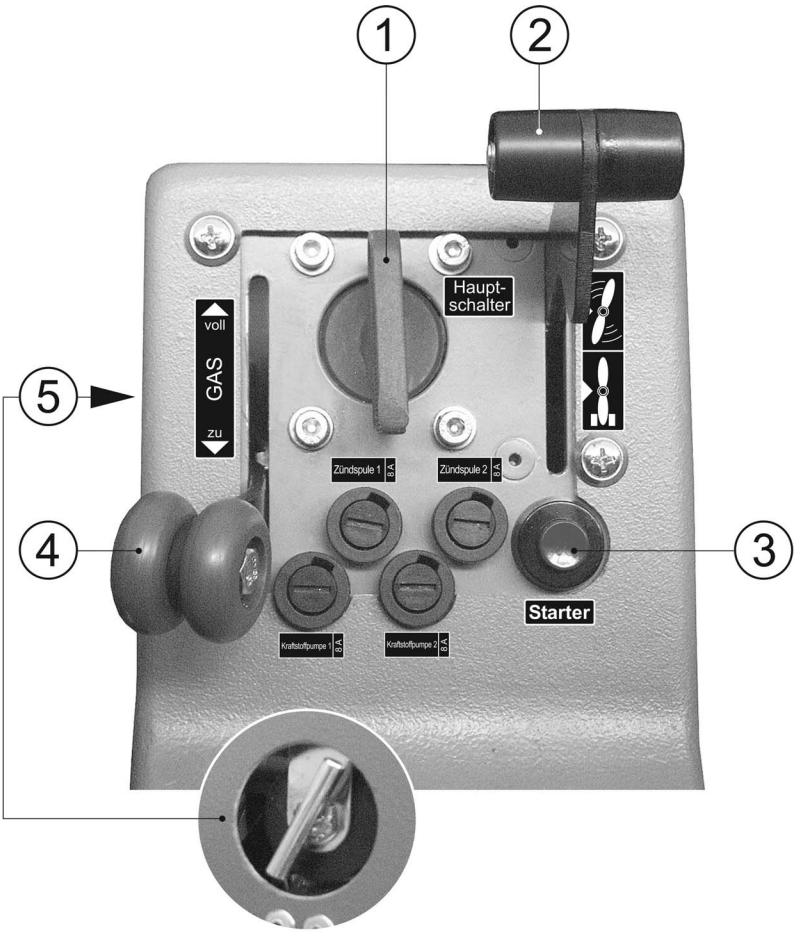
The higher temperature of the exhaust silencer does not mean a problem per se for the structure of the fuselage, but if after this cooling run the propeller is at once completely retracted without further waiting time, the hot air from the exhaust silencer may damage the propeller and reduce its service life.

Immediately before stopping

It is helpful for the care of the engine, when the engine may run for maximum a minute at 4000 to 5000 rpm immediately before stopping, because this gives the best oil supply.

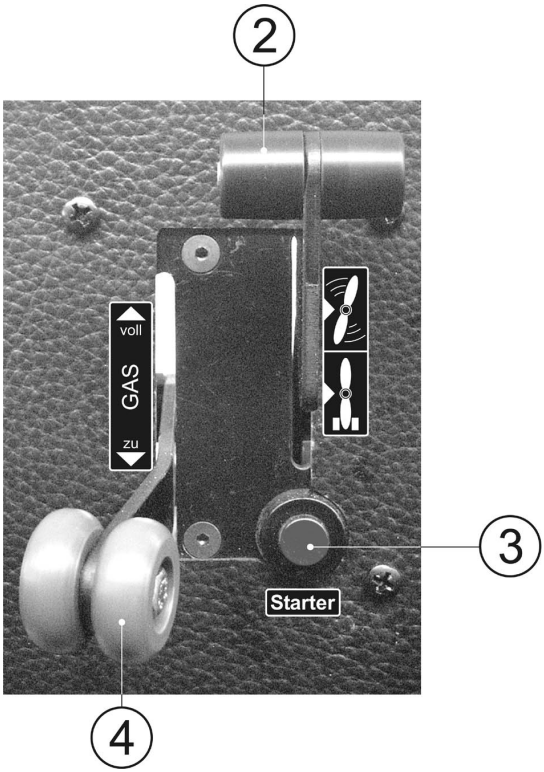
Empty Page

Fig. 7.7-2 Power-Plant Control Console, front



1. Master switch for engine battery
2. Propeller stop
3. Starter
4. Throttle
5. Adjusting twist knob for throttle friction brake

Fig. 7.7-3 Power-Plant Control Console, rear



2. Propeller stop
3. Starter
4. Throttle

Description of the power-plant control console:

The figures in braces refer to the numbering in the preceding control console views.

The Master switch for engine battery {1} cuts out the battery from the power-plant and avionics circuit

When the propeller stop lever {2} is moved downwards, a stop block is pivoted into the arc of the propeller. A tab at the stop lever {2} obstructs the access to the "Starter" button {3}.

The Throttle {4} is set idle in the bottom position. The upper position is full throttle.

The throttle friction brake is adjusted with the adjusting twist knob {5} at the front control console. The throttle cable is spring-loaded (if a throttle cable breaks the throttle valve goes to full throttle). The friction brake in its normal setting prevents that the spring resilience draws the throttle to full position.

Further power plant controls in the cockpit:

Fuel valve:

The fuel valve is next to each seat pan at the right cockpit wall for both pilots.

In the forward position the fuel valve is open.
Rear position is shut.

Caution: Prior to attempting to start the engine the position of the fuel valve must be checked and where necessary moved to its forward position.

Fuselage

Fuselage length	8.35 m	27.40 ft
Cockpit width, outer	0.70 m	2.30 ft
Cockpit height, outer	1.04 m	3.41 ft
Area, approx.	12.33 m²	132.72 ft²

Vertical tail unit

Height above fuselage center line	1.37 m	4.49 ft
Area	1.357 m²	14.61 ft²
Aspect ratio	1.383	
Chord (bottom / top)	1.17 m / 0.8 m	
	3.84 ft / 2.62 ft	
Airfoil	FX 71-L-150/30	

Rudder

Relative chord	31%	
Area	0.42 m²	4.52 ft²

Horizontal tail unit

Span	3.1 m	10.17 ft
Area	1.92 m²	20.67 ft²
Aspect ratio	5.005	
Chord (inner / outer)	0.8 m / 0.4 m	
	2.62 ft / 1.31 ft	
Airfoil	FX 71-L-150/30	

Elevator

Relative chord	30%	
Area	0.576 m²	6.20 ft²

Air brakes

Area (both)	0.326 m²	3.51 ft²
Distance from wing center line	2.9 – 4.3 m	
	9.51 – 14.11 ft	

Power-Plant

Engine:	IAE 50R-AA		
Max. power, take-off:	37.3 kW	(3 minute limit)	7750 rpm
Max. cont. power	35.8 kW		7100 rpm
Max. take-off revs:			7750 rpm
Max. continuous revs:			7100 rpm
Max. overspeed revs (20 sec.):			8000 rpm
Min. idle revs:			2800 rpm
Max. coolant temp., take-off:			90 °C (194°F)
Min. coolant temp., take-off:			40 °C (104°F)
Max. coolant temp., continuous:			100 °C (212°F)
Max. rotor cooling air temp., take-off (3 Min.):			130 °C (266°F)

Note: *The above stated take-off performance refers to the minimum value as given in the engine data sheet. A nominal performance of 40 kW is typical on the other hand.*

Lubricant:	Total loss oil lubrication at ratio:	1:60 approx.

Transmission: Toothed belt transmission with 1:2.68 reduction ratio.

The following types of propeller are approved:

Manufacturer:	Alexander Schleicher GmbH & Co.
Propeller:	AS2F1-1/R153-92-N1

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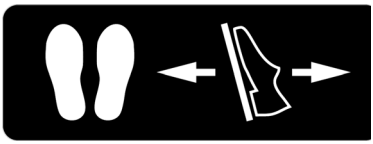

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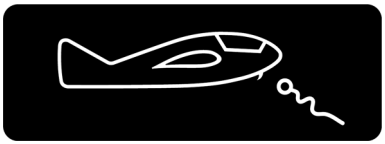

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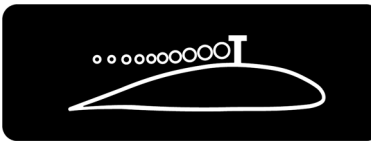

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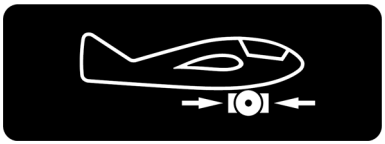

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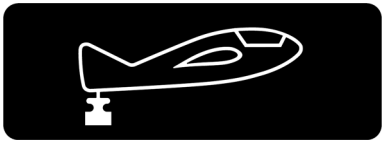

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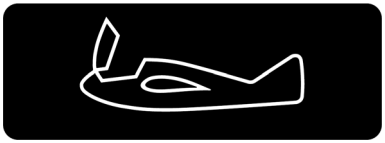

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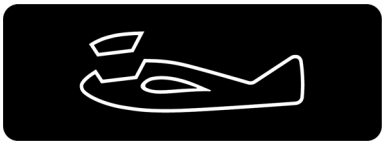

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13

Segelflugzeugbau Alexander Schleicher GmbH & Co. Poppenhausen

Model: **ASK 21 Mi** Serial-No.: **21**

DATA an LOADING PLACARD

Empty Mass (Weight):	lbs	kg
Max. Mass (Weight):	1554 lbs	705 kg
Min. Front Seat Load Solo:	lbs	kg
Max. Front Seat Load:	lbs	kg
Max. Rear Seat Load:	lbs	kg
Max. Total Combined Seat Load	lbs	kg

Tire Pressure

Main Wheel:	3,4 to 3,6 bar
Nose Wheel:	1,9 to 2,1 bar
Tail Wheel:	2,4 to 2,6 bar

Maximum Permissible Speeds
with retracted Power-Plant

Calm Air:	151 kts	280 km/h
Manoevering Speed:	97 kts	180 km/h
Winch and Autotow Launch:	81 kts	150 km/h
Aerotow A/T:	97 kts	180 km/h

with Power-Plant installed

To extend/retract Propeller:	min. 49 kts	90 km/h
	max. 65 kts	120 km/h
Propeller extended:	max. 86 kts	160 km/h

Weak Link

Winch Launch:	900 to 1100 daN (black)
Aerotow:	max 900 daN (brown)

9.2 Placards referring to Power-Plant

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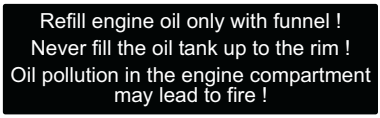

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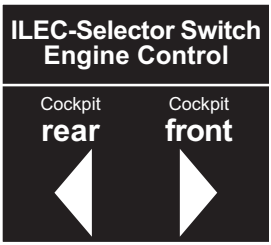

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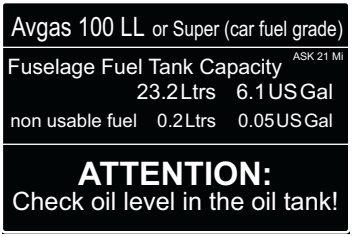

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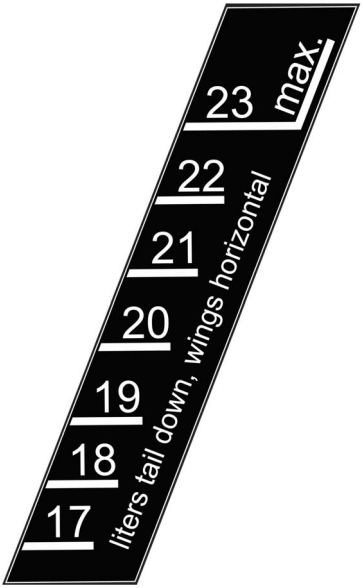
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max.
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liters tail down, wings horizontal

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Engine-Oil:
Silkolene Comp 2
Pre-mix
Castrol Aviation A545 or
Bardahl KGR Injection Oil
or Spectro Oils of America
"Golden Spectro"
Top up with each
refuelling !