

ALEXANDER SCHLEICHER SEGELFLUGZEUGBAU  
6416 Poppenhausen/ Wasserkuppe, West Germ

FLIGHT MANUAL  
for the sailplane model

ASK 21  
=====

This manual must always be carried on board !

It belongs to the sailplane ASK 21

Variant ..... Data Sheet no.339 -

Serial no.: 21544

Registration no.: N-216

Owner : Mid Georgia Sailing Association

Manufacturer : Alexander Schleicher  
Segelflugzeugbau  
6416 Poppenhausen/ Wasserkuppe  
West Germany

This manual is the translation of the German original which is approved by the LBA (Federal Office of Civil Aeronautics of the Fed.Rep. of Germany) as operating instructions according to paragraph (1) 2 of the German 'LuftGerPO' (Aviation Equipment Test Regulations).

The translation has been done by best knowledge and judgement. In any case the original text in German language is authoritative.

APRIL 1980 Edition

ASK 21 FLIGHT MANUAL

Check List / 1  
=====

Pre Flight Check

1. Main pins safetied ?
2. Rear wing attachment pins: is the safety lock visible above the pin ?
3. Horizontal tail unit pins safetied ? Is the spring retainer engaged ?
4. Elevator pushrod connected ?  
Safetied with a spring clip ?  
This is not applicable for gliders which use the automatic elevator connection !
5. Aileron pushrods connected ?  
Safetied with a spring clip ?  
Do not forget the sight control through the access hole cover !
6. Airbrake pushrods connected ?  
Safetied with a spring clip ?  
Do not forget the sight control through the access hole cover !
7. Check for foreign bodies !

Attention !

With all HOTELLIER quick-release joints one must be able to touch the ball pivot by feeling through the slot in the ball socket. Check the proper engagement of the safety lock by pushing it on to close !

TN-No.20 dated 16.10.87

## CHECK LIST / 2

=====

Pre take off check

1. Parachute connected to harness ?
2. Safety harness fastened ?
3. Airbrakes locked ?
4. Trim lever adjusted to a middle position ?
5. Altimeter adjusted ?
6. Canopies closed and locked ?  
Rear canopy !!
7. For flight with only one occupant remove  
rear back rest !!
8. Put your toes under the toe-straps !!  
Do not flatten the straps !!  
Danger of jamming the pedals !!

I.1 Amendments Record

o.	Title	PAGE	Date, signature
1	Weak link in towrope (TN no.6)	12	15.04.82 <i>M. J. J.</i>
2	Weak link in towrope (TN no.8)	12	16.05.83 <i>M. J. J.</i>
3	Automatic elevator connec- tion (TN no. 11)	36a, 36b Check- list/1	20.12.83 <i>M. J. J.</i>
4	Modification of the flight manual (TN no. 13)	10 b	23.02.84 <i>M. J. J.</i>
5	Amendment to the Flight Manual (TN no. 13 a)	10 c	June 84 <i>M. J. J.</i>
6	New canopy locking system (TN no. 15)	16a 17a 18a 19a	1983; 84 <i>M. J. J.</i>
7	Change/supplement to the Flight Manual (TN No. 20)	Check- list/1 21, 36a, 36b, 37	03.11.87 <i>P. W. J.</i>
8	TM Nr. 21, new production series tow release couplings for aerotow and winch launch	annex	17.08.90 <i>P. W. J.</i>
9	Checking and exchange of the parallel rocker at the ele- vator actuator rod. TN No. 22	36b, 37a, 37b	26.11.90 <i>P. W. J.</i>
0	Revision of the Flight Manual TN No. 23	13, 15, 25, 26	15.04.91 <i>P. W. J.</i>
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## I.3 DESCRIPTION

The ASK 21 is a two-seater sailplane with T-tail, fixed nose wheel and dive brakes on upper wing. The main landing gear is sprung.

The sailplane is built in FRP-sandwich-monocoque construction. It may be used for school and high performance flights as well as for aerobatics of the Airworthiness Category 'A'.

Technical Data

Span	17.00 m	( 55,74 ft)
Length	8,35 m	( 27,38 ft)
Height	1,55 m	( 5,08 ft)
Wing area	17,95 m <sup>2</sup>	(192,95 sq.ft)
Aspect ratio	16,1	
Max all-up weight	600 kg	(1320 lbs)
Max wing loading	33,4kg/M <sup>2</sup>	(6,84 lbs/sq.ft)

## II. OPERATING LIMITATIONS

## II.1 AIRWORTHINESS CATEGORY

Basis of the type-approval are the Airworthiness Requirements for Sailplanes and Powered Sailplanes (LFSM), issue Oct. 23, 1975, with the Airworthiness Category 'A' (Acrobatic).

## II.2 OPERATION RANGE CLASSES

The operation range classes approved for the particular sailplane are indicated by a data placard on the instrument panel (see Maintenance Manual page ). Depending on the respective equipment the sailplane may be licensed for traffic for the following operation range classes :

1. Airworthiness Category 'U' (UTILITY)
  - a. According to VFR (during daylight) - with equipment as per II.3 a.
  - b. Cloud flights - with equipment as per II.3 a and II.3 c.
  
2. Airworthiness Category 'A' (Acrobatic)
  - with equipment as per II.3 a and II.3 b or II.3 a; II.3 b and II.3 c -
  - for the following aerobatics :
  - Loop, Stall Turn, Split 'S', Immelmann, Slow Roll, Inverted Flights, Spin, Steep Climbing Turn, Lazy Eight, Chandelle.

## II.3 EQUIPMENT

a. Min. equipment

1. Airspeed indicator up to 300 km/h
2. Altimeter
3. Four-piece safety harness for front and rear seat
4. Seat cushions, at least 10cm thick when loaded, or parachutes (automatic or manual)
5. Weight and balance data placard (front and rear seat)
6. Data plate
7. Flight Manual

b. Equipment for aerobatics

For aerobatics the above min. equipment must be supplemented as follows :

1. Additional bottom strap for the safety harness
2. G-meter for front seat
3. Foot loops on rudder pedals
4. Parachute (automatic or manual)

c. Equipment for cloud flying

For cloud flying the above min. equipment must be supplemented as follows :

1. Variometer
2. Turn and bank indicator
3. Magnetic compass (compensated)
4. VHF transceiver radio

## III.4 SPEEDS

Max speed calm air	$V_{NE} = ^*)$ 280 km/h	(151 kts)
Max speed rough air	$V_B =$ 200 km/h	(108 kts)
Max maneuvering speed	$V_M =$ 180 km/h	( 97 ktg)
Max speed aerotow	$V_T =$ 180 km/h	( 97 kts)
Max speed winch tow	$V_W =$ 150 km/h	( 81 kts)

Rough air means turbulence found in wave-rotors, Cn-clouds, dust devils or when skimming mountain crests.

Maneuvering speed  $V_M$  is the highest speed at which full control deflections still may be applied.

With max speed  $V_{NE}$  only one third of the max possible deflections may be applied. One must also take into account that with increasing altitude the true airspeed is higher than the reading of the A.S.I. because of the decreasing air density.

True airspeed (TAS) is, however, relevant for safety against flutter.

\*) The max indicated  $V_{NE}$  is reduced as follows according to altitude :

Altitude (M)	0-2000	3000	4000	5000	6000
$V_{NE}$ indicated (km/h)	280	267	255	239	226

Altitude (ft)	5000	10000	15000	20000
$V_{NE}$ indicated (kts)	151	144	132	121

The airspeed indicator must show the following color codes :

Green arc	80-180 km/h	(43- 97 kts)
Yellow arc	180-280 km/h	(97-151 kts)
Red radial line	at 280 km/h	(at 151 kts)
Yellow triangle	at 90 km/h	(at 48,5 kts)

## II.5 LOAD FACTORS

The following load factors must not be exceeded :

at maneuvering speed $V_M$	+6,5	-4,0
at max speed $V_{NE}$	+5,3	-3,0
with airbrakes extended	+3,5	$\pm$ 0

G-meter markings :

- a. positive range  
 yellow arc +5,3 to +6,5  
 red radial line at +6,5
- b. negative range  
 yellow arc -3,0 to -4,0  
 red radial line at -4,0

## II.6 WEIGHTS

Empty weight	approx. 360kg	( 792 lbs)
Max all-up weight	600kg	(1320 lbs)
Max weight of non lift producing members	410kg	( 904 lbs)

*(fus + hor. tail)*

## II.7 IN FLIGHT C.G.

The in flight c.g. range is from 234mm to 469mm behind datum (9,21" to 18,46"); correspondingly 20,2 % up to 41,1 % of the mean aerodynamic chord,

$t_m = 1,121m$  (3'68") with  $a = .8m$  (0,32") behind wing leading edge; inner wing = datum point.

## II.8 WEIGHT AND BALANCE INFORMATION

Min payload front seat	70kg	(154 lbs)
Max payload front seat	110kg	(242 lbs)
Max payload rear seat	110kg	(242 lbs)
Baggage in wingroots max	2 x 10kg	(2 x 22 lbs)

Neither the all up weight of 600kg (1320 lbs) nor the max weight of non-lift producing members + occupants & baggage of 410kg (904 lbs) must be exceeded.

The weight limitations on the basis of the last weighing are to be found on page 11 !

With this loading the in flight c.g. is in the permissible range.

Low weight in the front seat must be compensated by fixed ballast.

II. WEIGHT & BALANCE INFORMATION

Max. payload front seat (pilot incl. parachute): 242 lbs = 110 kg

Min. payload front seat (pilot incl. parachute): 154 lbs = 70 kg

Caution: Short weight in the front seat must be compensated by ballast (installation of lead discs in the nose;

1 lead disc = 2,76 lbs pilot weight).

Number of lead discs	Min. payload front seat	
	kg	lbs
0	70,0	154,32
1	68,75	151,57
2	67,5	148,81
3	66,25	146,06
4	65,0	143,30
5	63,75	140,54
6	62,5	137,79
7	61,25	135,03
8	60,0	132,28
9	58,75	129,52
10	57,5	126,77
11	56,25	124,01
12	55,0	121,25

Max. payload rear seat (pilot incl. parachute): 242 lbs = 110 kg.

1 kg = 2,2046223 lbs

Signature of inspector, inspection stamp

Rear seat kg/lbs payload incl. chute min max

Front seat kg/lbs payload incl. chute min max

Empty weight c.g. (mm/in. behind datum)

Date of weight & balance

Depending on the position of the sun and the intensity of the radiation, the burning-glass effect of the canopies can cause a slow fire in the area of the instrument panel or the headrest respectively.

Therefore, if you have to store the glider outside, it is absolutely necessary always to close the canopies and to cover them with a white cloth.

#### V.4 ROAD TRANSPORT

The design of a glider trailer is another subject and cannot be discussed in all details here. Of course, a closed trailer is preferable. But also an open trailer may serve the purpose, the latter is generally simpler and lighter. It is important that all components are well fixed and have a large support surface.

Structural components survey drawing which can be used for the building of a trailer, can be obtained from ALEXANDER SCHLEICHER.

**WARNING:** In no case must the elevator actuator fitting be loaded. This fitting trades out of the upper end of the fin. Not even soft foam cushions are allowed.  
For the construction of the trailer for road transport the full freedom from any load must be carefully regarded.

*trans: nothing on top  
of vert. fin in tr*

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#### II.9 TOW RELEASES

For aerotow : nose release E 75

For winch tow : safety release Europa G 73

#### II.10 WEAK LINK IN TOW ROPE

Aerotow max. 600 ± 60 daN

Winch tow max. 1000 ± 100 daN

#### II.11 TIRE PRESSURE

Main wheel 5.00-5 : 2,7 bar

Nose wheel 4.00-4 : 2,0 bar

Tail wheel 210x65 : 2,5 bar

#### II.12 CROSSWIND

The permissible crosswind component is about 15 km/h (8 knots).



## III. EMERGENCY PROCEDURES

## III.1 RECOVERY FROM SPIN

According to the standard procedure spinning is terminated as follows:

1. Apply opposite rudder (i.e. apply rudder against the direction of rotation of the spin).
2. Short pause (hold control inputs for about 1/2 spin turn).

Warning: Disregarding the pause will result in slower recovery!

3. Release stick (i.e. give in to the pressure of the stick) until the rotation stops and sound airflow is established again.

Warning: Full forward stick may retard or even prevent the recovery!

4. Centralise rudder and allow sailplane to dive out.  
The altitude loss from the beginning of the recovery until the normal flight attitude is regained is about 80 meter (260 feet).

Note: During spins the ASK 21 oscillates in pitch. From a steep nose down spin recovery according to the standard procedure is up to 1 turn, from a flat spin less than 1 turn.

## III.2 CANOPY JETTISONING AND EMERGENCY BAIL OUT

- Front canopy:
- a. Move lever with red knob above the instrument panel to the left and push canopy upwards.
  - b. Open safety harness.
  - c. Get up and bail out.
  - d. With manual chute seize release grip and pull out entirely after 1 to 3 seconds.

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- Rear canopy :
- a. Pull back both canopy side locks and push canopy upwards.
  - b. Open safety harness.
  - c. Get up and bail out.
  - d. With manual chute seize release grip and pull out entirely after 1-3 seconds.

If circumstances allow, the front pilot should allow the rear pilot to bail out first.

## III.3 FLIGHTS IN THE RAIN

With wet or slightly iced wings or insect accumulation there will be no deterioration in flight characteristics.

However, one has to reckon with a rather considerable deterioration in flight performance. This must be taken into account especially on landing final approach !!

Add a safety margin of 10 km/h (5,4 knots) for approach speed !!

## III.4 WING DROPPING

The sailplane stalls extremely benign. Nevertheless one always has to face the possibility of wing dropping because of turbulence. In that case push stick forward immediately and apply opposite rudder against a noticeable turn at the same time to regain a normal flight attitude. If the rudder deflection against the turn is forgotten, a spin may occur even if the stick pressure is released.

## III.5 GROUND LOOPING

For normal conditions, smooth runway, short grass, one may take off with the wing on the ground without having to fear a change in the direction.

High grass and rough ground, however, may cause ground looping. In that case release the tow rope immediately.

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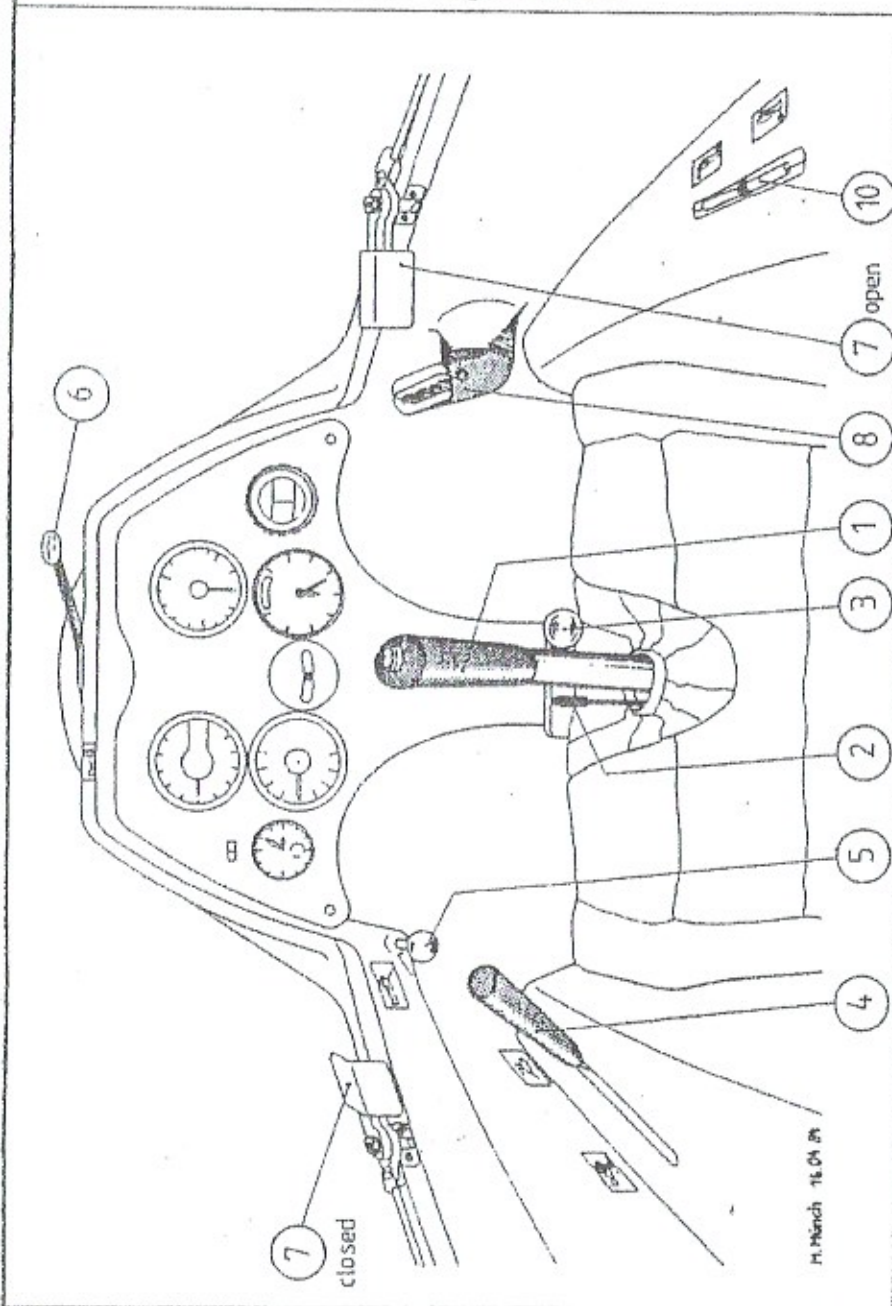
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## IV. NORMAL OPERATING PROCEDURES

## IV.1. COCKPIT LAYOUT AND CONTROLS

Front seat:

- No.1: Stick.
- No.2: Trim; flat lever with green knob LH of stick.
- No.3: Rudder pedal adjustment; grey knob at the console.
- No.4: Airbrakes with wheelbrake; blue lever in the left arm rest.
- No.5: Release cable; yellow knob on left cockpit wall below the canopy frame.
- No.6: Canopy emergency jettisoning; horizontal lever with red flat grip above the instrument panel cover; to the left = OPEN.
- No.7: Front canopy locking:  
White swivel levers on left and right canopy frame.  
To open canopy: pull back both levers.  
To lock canopy: push both levers forwards, parallel to the canopy frame.
- No.8: Ventilation nozzle; on right cockpit wall below the canopy frame; revolving and lockable.
- No.9: Back rest; the back rest is adjustable by tilting it from the bottom upwards and forwards (see sketch); in normal flight attitudes the back rest cannot shift by itself.  
Very tall pilots may fly without the back rest.
- No.10: Trim indicator; in the right arm rest behind the ventilation nozzle.



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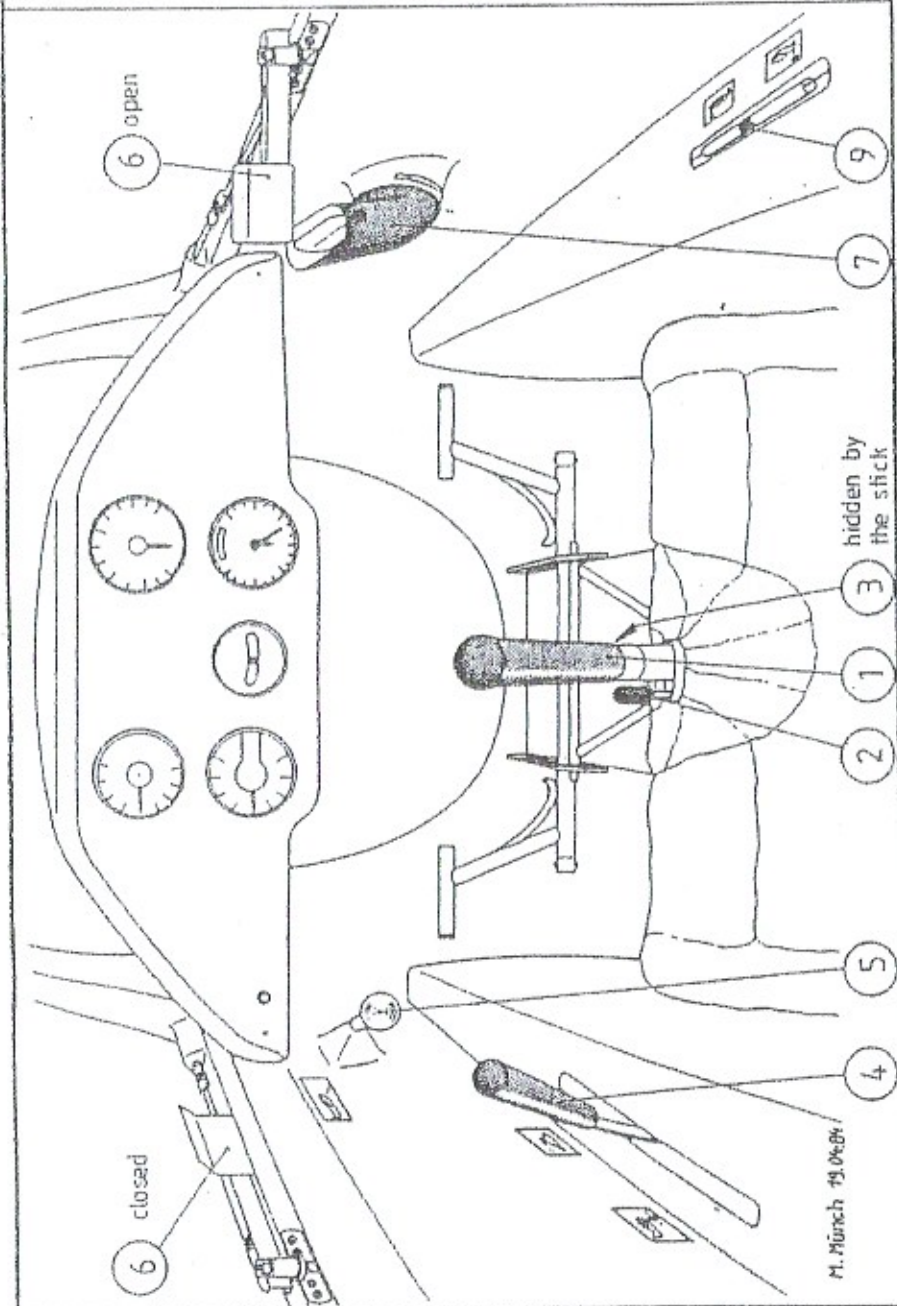
Rear seat:

- No.1: Stick.
- No.2: Trim; flat lever with green knob LH of stick.
- No.3: Rudder pedal adjustment with circular grip in front of stick.
- No.4: Airbrakes with wheelbrake; blue lever in the left arm rest.
- No.5: Release cable; yellow knob on left cockpit wall below the canopy frame.
- No.6: Rear canopy locking = Canopy emergency jettisoning; red swivel levers on left and right canopy frame.  
To open canopy: pull back both levers.  
To lock canopy: push both levers forwards, parallel to the canopy frame.
- No.7: Ventilation nozzle; on right cockpit wall below the canopy frame; revolving and lockable.
- No.8: Back rest; the back rest is adjustable by tilting it from the bottom upwards and forwards (see sketch); in normal flight attitudes the back rest cannot shift by itself.  
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- No.9: Trim indicator; in the right arm rest behind the ventilation nozzle.

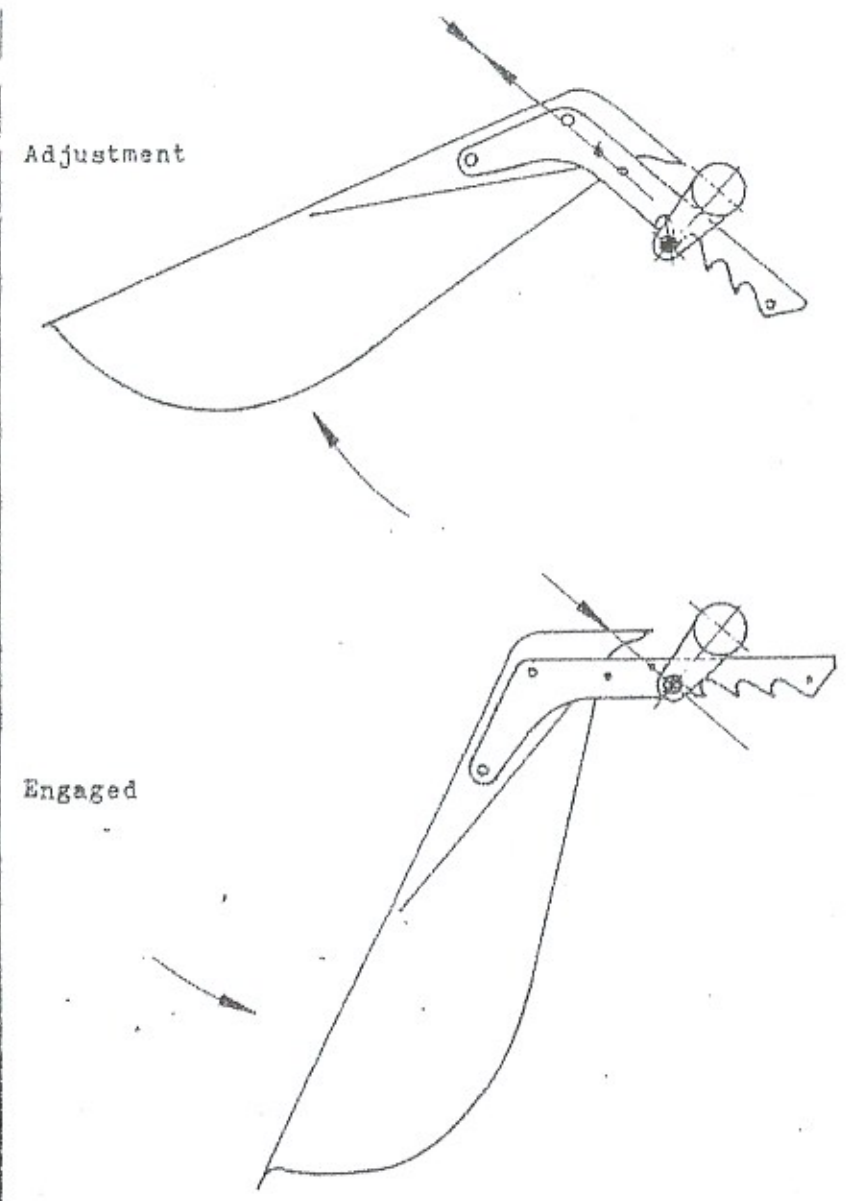
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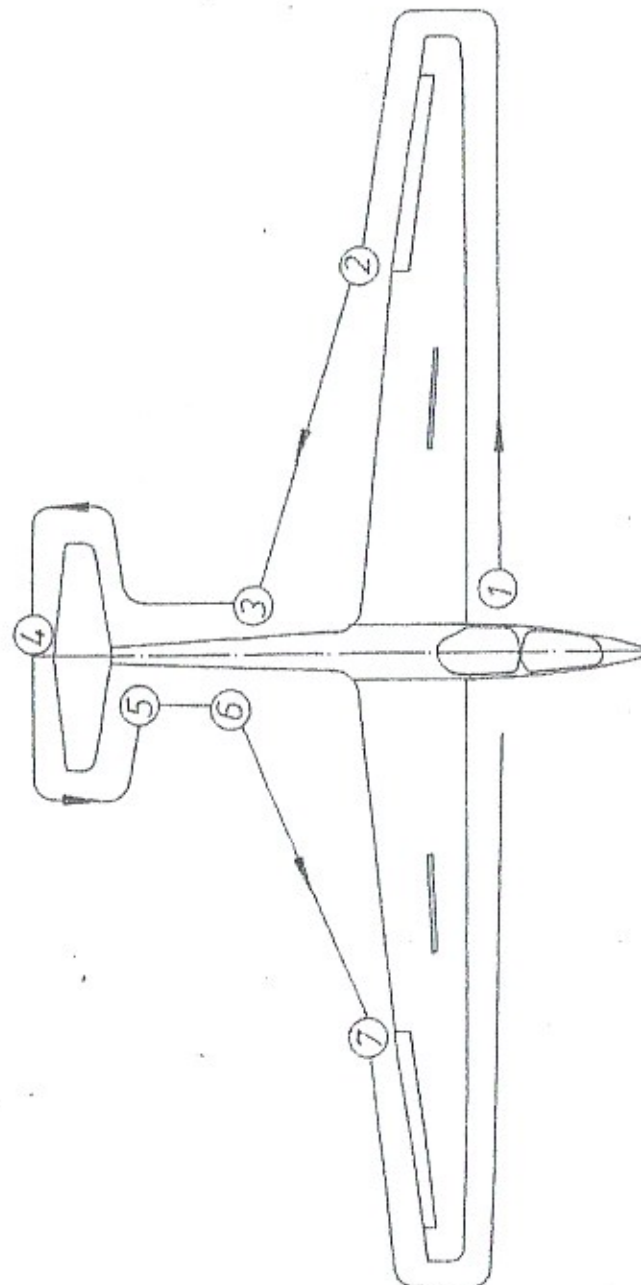


BACK REST ADJUSTMENT



IV.2 Daily Inspections

- 1.a) Open canopy! Check that the main pins are properly secured.
  - b) Check the proper connection of the ailerons and airbrakes through the access hole on the left side above the wing. Are the quick-release connectors secured with spring clips?
  - c) Check for foreign bodies!
  - d) Check the control circuits force and that all controls are free-moving. Apply full deflections and load the control circuits with fixed controls and airbrakes.  
Check the plastic tubes inside the S-shaped tubes of the rudder pedals for proper and tight fit.
  - e) Check tire pressure:  
Nose wheel 2,0 bar (28 psi)  
Main wheel 2,7 bar (38 psi)  
Tail wheel (If installed) 2,5 bar (35,6 psi).
  - f) The condition and function of the tow release mechanism is to be checked. Actuate the tow release: does it snap back freely? Engage and disengage the ring pair. Check the automatic release of the C.G. towing hook with the ring pair which must release automatically backwards.
  - g) Check the wheel brake. Pull the airbrake lever; at the end of its travel an elastic resistance must be felt.
- 2.a) Check upper and lower wing surface for damages!
  - b) Aileron: its condition, free-movingness and play is to be checked! Check also the pushrod connection.
  - c) Airbrake: its condition, fit and locking is to be checked.
- 3.) Check the fuselage for damages, in particular also the bottom side.
  - 4.) Check that the tailplane is properly assembled and secured. Check also the pushrod connection. Secured by spring clips?



DAILY CHECKS (see IV.2)

5. Check condition of tailskid, pitot tube and venturi tube !
6. Check static vents for cleanness !
7. See 2.

After rough landings or excessive flight stress the whole sailplane 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.

See also Maintenance Manual !!

#### IV.3 PRE TAKE OFF CHECK

1. Controls easy to operate ?? (Control circuits check done ??)
2. Airbrakes locked ??
3. Trim neutral ??
4. Canopy locked ?? Pay especially attention to the rear canopy !
5. Safety harness and parachute fastened ?? (Parachute static line engaged with automatic parachute ??)
6. Altimeter adjusted to field height or to zero ??
7. Radio "on" and adjusted to proper frequency ??

#### IV.4 TAKE OFF

##### Winch tow :

Trim neutral.

Max tow speed : 150 km/h (81 kts).

The sailplane features a tow release for winch tow in front of the main wheel.

The most favorable tow speed is 90 - 110 km/h (49 - 60 kts).

There is little pitch up tendency during the initial tow. In the upper third of the tow additional altitude may be gained by slight back pressure.

Tow release : pull the release knob to the stop several times.

##### Aero tow :

Aero tows only with the nose release in front of the nose wheel.

Recommended tow rope length : 30-60 m (98-197 ft); textile rope.

Trim neutral.

Max tow speed : 180 km/h (97 kts).

The most favorable tow speed during climb is 90 - 140 km/h (49 - 76 kts).

Take off may be done with the wingtip on the ground. Getting the wings level is no problem. However, the pilot is advised to be careful with high grass and very rough ground.

Take off takes place at about 75 km/h (40 kts).

## IV.5 FREE FLIGHT

The sailplane may be flown up to  $V_{FE} = 280$  km/h (151 kts), see p.8. Up to manoeuvring speed of 180 km/h (97 kts) full control deflections can be applied. At higher speeds the controls must be applied more carefully. At  $V_{FE}$  only 1/3 of the max. possible deflections must be applied.

## IV.6 LOW SPEED FLIGHT, WING DROPPING AND SPINS

With the stick back a distinct tail buffet is felt. The sailplane is very benign in low speed flight. By use of normal aileron deflections the wings may be kept level down to minimum speed, even with aft C.ofG.-positions.

With normal rudder deflections no wing dropping is found. Yaw angles of up to 5° have no significant influence on the wing dropping attitude.

Also rapid pulling up into 30° pitch does not cause wing dropping, but only a gentle nose drop. The same applies for stalling out of a 45° turn.

But one has to point out that even the most benign sailplane needs speed in order to be controllable.

In turbulence this is especially important when also a wing dropping may occur.

Spin development from wing dropping strongly depends on the C.ofG. position and also to some extent from the pilot reaction.

For C.ofG.positions forward of 315 mm aft of datum the ASK 21 does not spin at all. This configuration applies to 2 heavy pilots.

For C.ofG.-positions from 320 mm through 385 mm aft of datum, more incipient spin turns are possible followed by self recovery after 4 1/2 turns at most. Such C.ofG.-positions are possible in dual flight with a lightweight pilot in the front seat.

For C.ofG.-positions aft of 400 mm behind datum controllable sustained spins are possible. Such a C.ofG.-position is usually only possible with one lightweight pilot in the front seat.

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Note: During spins the ASK 21 oscillates in pitch. From a steep nose down spin recovery according to the standard procedure is up to 1 turn, from a flat spin less than 1 turn.

The speed at which the stall takes place depends on the payload. The following standard values are applicable:

Single: All up weight 470 kg (1034 lbs):  
without airbrakes 65 km/h (35 kts) IAS  
with airbrakes 68 km/h (37 kts) IAS

Dual: All up weight 600 kg (1320 lbs):  
without airbrakes 74 km/h (40 kts) IAS  
with airbrakes 77 km/h (42 kts) IAS

## IV.7 HIGH SPEED FLIGHT

The sailplane shows no flutter tendency within the permissible speed range.

With airbrakes extended in a 45° dive the speed remains below  $V_{FE} = 280$  km/h (151 kts); it goes up to 232 km/h (125 kts) at  $G = 600$  kg.

## IV.8 CLOUD FLYING

For min. equipment for cloud flying see II.3 a and II.3 c.

According to past experiences the airspeed indicator system is not exposed to the danger of icing-up. However with strong icing-up the pilot must be always take into account the possible failure of the airspeed indicator. When planning cloud flying, he must take this point into consideration.

Excessive speeds during cloud flying must be avoided in any case. The pilot should try to keep an average speed of about 100 km/h (54 kts) and with increasing speed above 130 km/h (70 kts) he should use the airbrakes in order to control the speed.

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**Attention !!**

Cloud flying must only be done by pilots having the necessary licence. The legal regulations with regard to airspace and the requirements for instruments have to be met.

**IV.9 AEROBATICS****Attention aerobatic flyers !!**

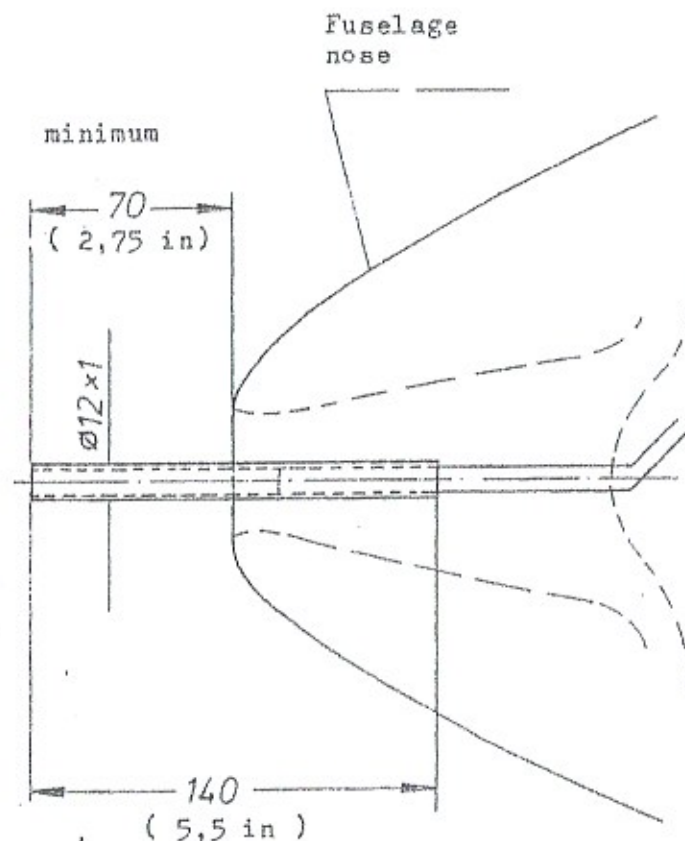
Even a sailplane which is approved for full aerobatics does not have infinite strength capacities. Most hazardous are aerobatics which get out of control or are badly executed, as they result in the high loads.

Therefore, it is urgently recommended to have oneself guided by an experienced flight instructor. The ASK 21 being an approved two-seater for full aerobatics offers this possibility.

Such guidance is even prescribed according to §69 (4) of the German 'LuftPersPO' (Aviation Personnel Test Regulations) dated January 9, 1976. Following §96 (3) of the said 'LuftPersPO' an adequate experience is required from flight instructors.

**Note !!**

The normal airspeed indicator system shows a large pressure error in inverted flight during which the airspeed indicator reads 40 km/h (22 kts) too low. When extending the pitot head by attaching a brass tube - 12 $\phi$  x 1; 140mm (5,5 in) in length -, this error disappears. The tube must project in the front at least 70mm (2,75 in). For normal flights this is not necessary. In order to avoid damage when parking the sailplane in the hangar, this tube should not be left on any longer than necessary.



Extension tube for total pressure head with inverted flight. Brass tube 140 mm (5,5 in) in length (12  $\phi$  x 1).

One may also use a suitable plastic tube provided that it is sufficiently stiff and straight.



For the aerobatics hereafter mentioned the following entrance speeds are recommended :

	Indicated Entrance speed	Max Acceleration
Loop upward	single : 155km/h (84 kts)	2 - 3 g
	dual : 170km/h (92 kts)	
Stall Turn	single : 165km/h (89 kts)	3 g
	dual : 180km/h (97 kts)	
Split 'S'	single : 170km/h (92 kts)	2 - 3 g
	dual : 180km/h (97 kts)	
Immelmann	single : 165km/h (89 kts)	2,5 - 3,5g
	dual : 180km/h (97 kts)	
Slow Roll	single : 150km/h (81 kts)	
	dual : 165km/h (89 kts)	
Steep Climbing)		
Turns and Lazy Eight	single : 140km/h (76 kts)	
	dual : 150km/h (81 kts)	
Chandelle	single : 160km/h (86 kts)	
	dual : 175km/h (95 kts)	

#### Permissible Indicated Speeds

Inverted flight without pitot head extension :

$V_{NE}$ single	65-240 km/h	(35-130 kts)
dual	70-240 km/h	(38-130 kts)

Indicated maneuvering speed  $V_M = 140$  km/h (76 kts)  
 Indicated max speed  $V_{NE} = 240$  km/h (130 kts)

Inverted flight with pitot head extension :

Indicated maneuvering speed  $V_M = 180$  km/h (97 kts)  
 Indicated max speed  $V_{NE} = 280$  km/h (151 kts)  
 Indicated stall speed = 87 km/h (47 kts)  
 with two occupants

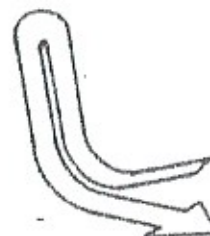
#### LOOP



Entrance speed :

single : 155 km/h  
 dual : 170 km/h  
 max. g = 2 - 3

#### STALL TURN



Entrance speed :

single : 165 km/h  
 dual : 180 km/h  
 max g = 3

## SPLIT 'S'



Pull-up at least  $30^\circ$  !

Altitude loss approx. 100 meter

Entrance speed :

single : 170 km/h

dual : 180 km/h

max. g = 2 - 3



## IMMELMANN

Entrance speed :

single : 165 km/h

dual : 180 km/h

max. g = 2,5 - 3,5

## SLOW ROLL



Entrance speed :

single : 150 km/h

dual : 165 km/h

## INVERTED FLIGHT



## HALF ROLL

## HALF LOOP

Note : with the inverted flight the fuselage nose will be unexpectedly high above the horizon.

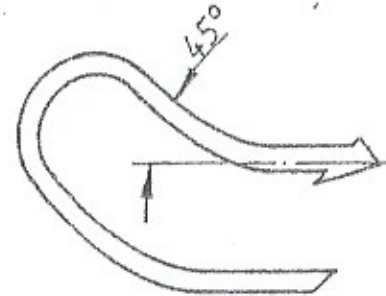


SPIN



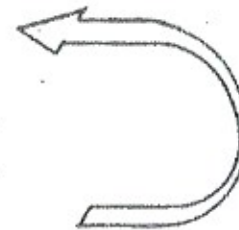
LAZY EIGHT

Entrance speed :  
 single : 140 km/h  
 dual : 150 km/h



STEEP CLIMBING TURN

Entrance speed :  
 single : 140 km/h  
 dual : 150 km/h



CHANDELLE

Entrance speed :  
 single : 160 km/h  
 dual : 175 km/h

Attention !!

Never release stick and rudder pedals when flying aerobatics.

With aerobatics instruction a reliable agreement must be made between instructor and student flyer with regard to the communication system for the mutual taking over of the controls.

Airbrakes must be extended as soon as the pilot loses the control of the sailplane or as the speed increases unvoluntarily too rapidly.

Exception : "Tail sliding" !!

The trim remains in the center position for aerobatic maneuvers. Don't ever change the trim when flying aerobatics !!

## PROHIBITED AEROBATICS :

All abrupt aerobatic maneuvers.

Loop forward.

Tail sliding.

## IV.10 APPROACH AND LANDING

The most favorable approach speed is about 90 km/h (49 kts). With turbulence it may be advisable to increase the approach speed slightly. Even steep approaches may be slowed down efficiently with the airbrakes. It is advisable to unlock the airbrakes at the beginning of the landing final approach.

Note : The airbrakes increase the stalling speed by about 3 km/h (1,6 knots).

Sideslipping is also suitable as an approach control.

With full rudder during sideslipping the rudder pressure decreases to zero; the rudder must be pushed back.

## V. RIGGING AND DE-RIGGING

## V.1 RIGGING

Rigging the ASK 21 can be carried out by four persons without mechanical assistance, and by three persons with the use of a fuselage stand or a wing support.

Prior to rigging, clean and grease all pins, bolts, bushings and control system connections !

1. Set up the fuselage and hold it horizontal.
2. Plug the spar fork of the left wing into the fuselage and - if available - place a wing support under the wing end.
3. Offer up the right wing and align the main pin fittings.
4. Press in the main pins and secure. Never insert the rear wing attachment pins prior to the main pins !
5. Press in the rear wing attachment pins; unscrew the T-tool and check whether the safety lock is engaged.
6. Connect and lock the aileron control linkages in the fuselage behind the spar tunnel. You must be able to touch the ball pivot by feeling through the slot in the socket. Also check the proper engagement of the safety lock by pushing it on to close ! Secure them with spring clips!
7. Connect and lock the airbrake control linkages in the fuselage behind the span tunnel. Secure them with spring clips!

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8. The tailplane is fitted onto the fin from the front (see Fig. V.2-1 and V.2-2). Now the Allan bolt at the leading edge is screwed in; this should be screwed in tightly until the spring-loaded safety pin snaps out over the screw head as far as the socket.

9. Connect the elevator and safety with ~~a spring clip~~ *none*.

Note, if your glider uses an automatic elevator connection: after cleaning and lightly greasing the plug-in elevator connections, the tailplane is fitted onto the fin from the front; both elevator panels must be fitted into their connectors simultaneously. Then the tailplane is pushed back until the Allan bolt at the leading edge can be screwed in; this should be screwed in tightly until the spring-loaded safety pin snaps out over the screw head as far as the socket.

10. Carry out a pre-flight check referring to the Check List.
11. The control circuits must be subjected to an operational test.
12. Check condition and function of the wheel brake; check the tire pressure.  
See also Section IV.2 Daily Inspections.

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## V.2 DE-RIGGING

De-rigging is carried out in the reverse sequence to that of rigging. It must be taken care that the rear wing attachment pins have to be removed prior to the main pins.

**WARNING:** For derigging the horizontal tail from the fin it has to be regarded that only the method according to Fig. V.2-2 is used.

Fig. V.2-1  
WRONG: Twist movement

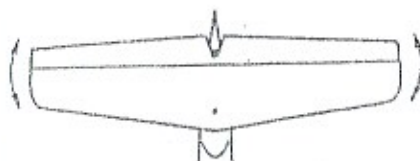


Fig. V.2-2  
RIGHT: Pitch movement



## V.3 PARKING

When parking the glider, the canopies have to be closed.

When an ASK 21 is parked on an airfield in the sunshine (this must also be observed during the waiting time until take-off when the pilots are already on board) the canopies must not be left open for some time.

## V.5 PREVENTIVE MAINTENANCE

The whole surface of the sailplane is painted with a weather resisting, white polyester coat. Impurities may be washed off with a mild cleansing agent. Heavy impurities may be removed with a polish.

For the paint maintenance only silicone-free agents are to be used (e.g. '1 2-special' cleansing agent-D2 from the company W.Sauer & Co., 5060 Bensberg, W. Germany, or the cleansing polish from the company 'Lasonal'). Though the sailplane is rather insensitive, it should be protected as much as possible into any component and humidity. If water has soaked into the sailplane, it has to be stored in a dry room and must be turned over frequently.

The canopy is best cleaned with a special plexiglass cleansing agent, in an emergency lukewarm water will do. Rewipe only with pure, soft leather or with glove cloth. Never wipe on dry plexiglass.

The safety harnesses must be regularly checked for damage and tears. The metal parts of the harnesses must be checked for corrosion.