

NOTE: AD 98-08-27

AS TN 20 & TN 23
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#410484

ALEXANDER SCHLEICHER SEGELFLUGZEUGBAU
D-6416 Poppenhausen /W. - West Germany
Phone 06658 - 225

FLIGHT MANUAL

SCHLEICHER ASK 21

FLY
COPY

This Manual must be carried on board at all times.

Registration : N.574K.S #7

Factory serial number : 21210

Owner : [Redacted]
FINGER LAKES
SOARING, INC.

This Flight Manual is FAA approved for U.S. registered gliders in accordance with the provisions of 14 CFR Section 21.29 and is required by FAA Type Certificate Data Sheet No. G 47 EU 1.10.83

German edition of this Manual is approved under § 12(1)2 LuftGerPO.

Published

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



[Signature]
- 9 März 1983

ASK 21 - Flight Manual

I.1 Amendments Record

No.	Title	PAGE	Date, signature
1	Weak link in towrope (TN no.6)	12	15.04.82 [Signature]
2	Weak link in towrope (TN no.8)	12	16.05.83 [Signature]
3	Automatic elevator connection (TN no. 11)	36a,36b Check-list/1	20.12.83 [Signature]
4	Modification of the flight manual (TN no. 13)	10 b	23.02.84 [Signature]
5	Amendment to the Flight Manual (TN no. 13 a)	10 c	June 84 [Signature]
6	New canopy locking system (TN no. 15)	16a 17a 18a 19a	19.08.84 [Signature]
7	Change/supplement to the Flight Manual (TN No. 20)	Check-list /1 21, 36a, 36b, 37	03.11.87 [Signature]
8	TM Nr. 21, new production series tow release couplings for aerotow and winch launch	annex	17.08.90 [Signature]
9	Checking and exchange of the parallel rocker at the elevator actuator rod, IN No. 22	36b, 37a, 37b	26.11.90 [Signature]
10	Revision of the Flight Manual TN No. 23	13, 15, 25, 26	15.04.91 [Signature]
2	April 1980		2

Check List / 1Pre 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

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(Beginning of JAR22-required and LBA-approved part.)

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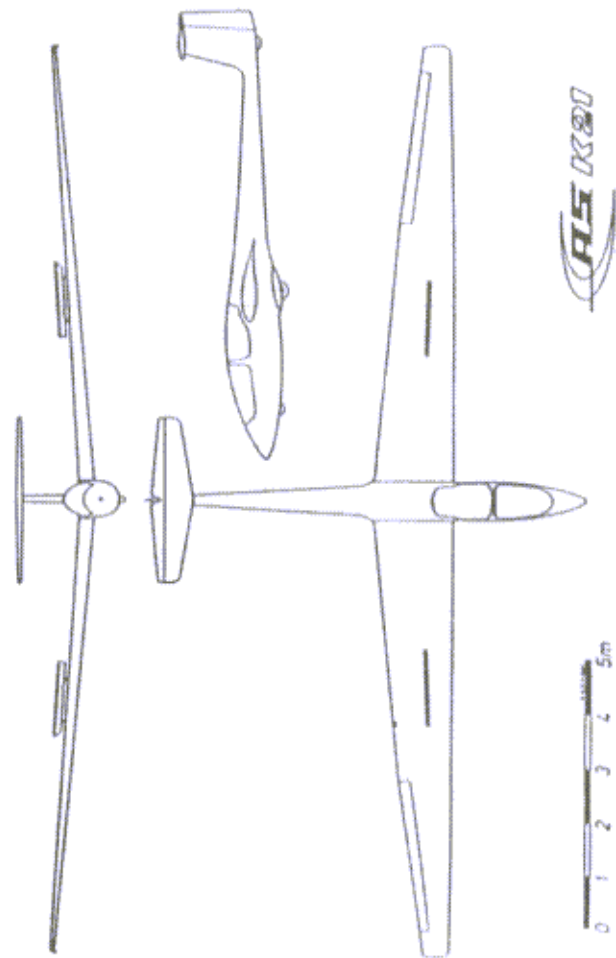
- V. Rigging and de-rigging
- V.1 Rigging
- V.2 De-rigging
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- VI. Center of gravity
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- VI.3 Weighing record
- VI.4 Calculation of the in flight C.G.

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- Flight polar
- Lubrication Scheme
- Rigging data (for adjustment of control surfaces, etc.)

1.4 THREE-SIDE-VIEW



DESCRIPTION

The ASK 21 is designed to meet the needs of modern gliding training. It has an all fiberglass sandwich structure.

Midwing with T-tail, tandem seat arrangement, airbrakes on upper wing only.

The glider is stressed for aerobatics (inverted flight included).

Technical Data

Span	17,00 m	=	55,74 ft
Length	8,35 m	=	27,4 ft
Height	1,53 m	=	5,02 ft
Aspect ratio	16,1		
Wing area	17,95 m ²	=	192,96 sqft
Max. all up weight	600 daN	=	1320 lbs
Max. wing loading	33,4 daN/m ²	=	6,84 lbs/sqft

Airfoil: Wortmann FX 502 196 (inner wing)
Wortmann FX 60 -126 (wing tip)

Winch Tows: Weak Link 1000 daN

Aero Tow : Weak Link 600 daN

II. OPERATING LIMITATIONS

II.1 AIRWORTHINESS CATEGORY

A (Aerobatics) according to LFSM.

Certification basis: Airworthiness Requirements for Sailplanes and Powered Sailplanes dated 1.11.1975.

II.2 PERMITTED OPERATIONS

The glider is certified for VFR flights during daytime (VFR day).

The approved operation class is indicated by a data placard on the instrument panel. Depending on the respective equipment the glider may be licensed for traffic for the following categories:

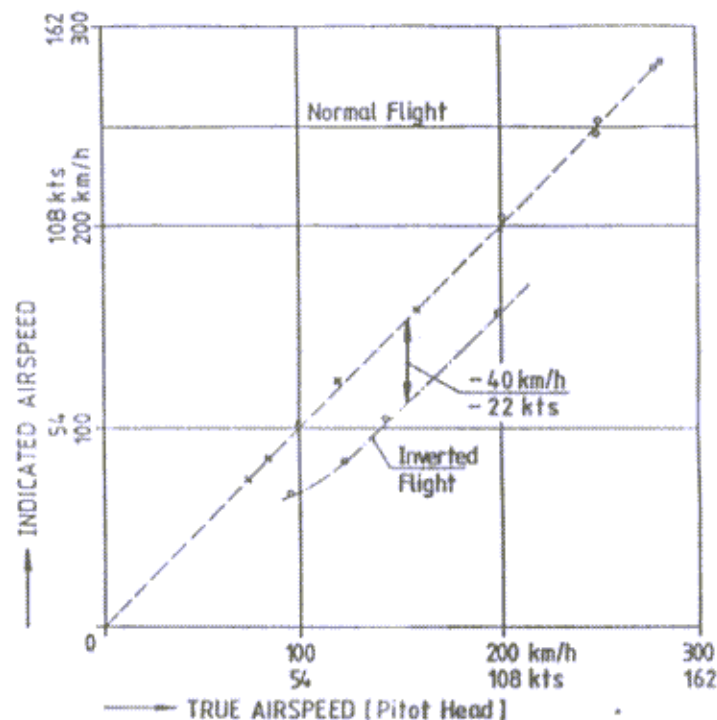
1. Airworthiness Category U (Utility), according to VFR with equipment as under II.3 a)
2. Airworthiness Category A (aerobatics), with equipment as under II.3 a) and II.3 b) for the following aerobatics :
Loop, Stall Turn, Split 'S',
Immelmann, Slow Roll, Inverted
Flights, Spin, Steep Climbing
Turn, Lazy Eight, Chandelle.

True airspeed (TAS) is, however, relevant for safety against flutter. Therefore, one must take into account that with increasing altitude the true airspeed is higher than the reading of the airspeed indicator because of the decreasing air density.

$$V_{NE} = 151 \text{ kts} \quad n = \begin{matrix} +5,3 \\ -3,0 \end{matrix}$$

V_{NE} at various altitudes

Altitude ft	V_{NE}	
	knots	mph
5000	151	174
10000	144	165
15000	132	152
20000	121	139



POSITION ERROR

With normal flights the position error of the airspeed indicator is negligible within the whole range up to 280 km/h (151 kts).

With inverted flights the airspeed indicator reads too low, i.e. up to -40 km/h (22 kts).

By attaching an extension tube this error may be eliminated. (see also pages 27/28).

The extension tube must project at least 70 mm (2,75 in) past the fuselage nose.

Airspeed indicator markings (IAS)

Red line (max. permissible airspeed):

151,2 kts = 174,0 mph = 280 km/h

Yellow arc (caution range):

97,2 - 151 kts = 112 - 174 mph = 180 - 280 km/h

Green arc (normal range):

43,0 - 97 kts = 50 - 112 mph = 80 - 180 km/h

Yellow triangle (approach speed):

49,0 kts = 56,0 mph = 90 km/h

CREW : 2 persons

Minimum crew : 1 person (min.weight 70 daN = 154 lbs)

Caution: Solo flights may only be conducted from the front seat !

WEIGHTS

Empty weight approx. 792 lbs = 360 daN

Max. all up weight 1320 lbs = 600 daN

Max. weight of non lift producing members 902 lbs = 410 daN.

11.7 IN FLIGHT CENTER OF GRAVITY RANGE

The approved in flight C.G. range is from 9,21 (234 mm) - 18,46 inches (469 mm) behind the datum line; equivalent to 20 % - 41,1 % of the MAC = 44,13 inches (1121 mm). With a 0,31 inches (8 mm) behind leading edge center part of the wing.

11.8 WEIGHT & BALANCE INFORMATION

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

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

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).

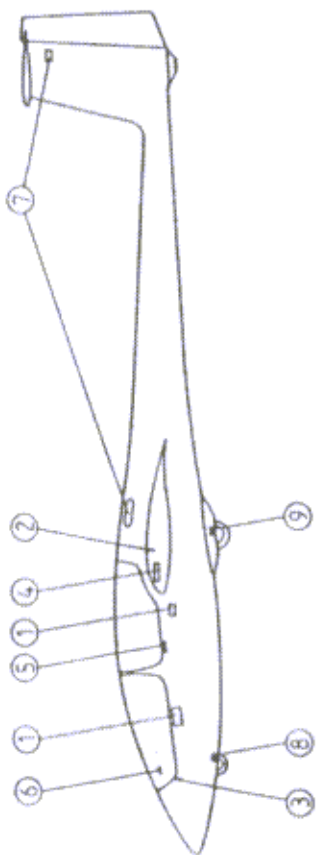
Number of lead discs	Min. payload front seat daN	Min. payload front seat kg	lbs
0	70,0		154,32
1	68,75		151,57
2	67,5		148,81
3	66,25		146,06
4	65,0		143,30
5	63,75		140,54
6	62,5		137,79
7	61,25		135,03
8	60,0		132,28
9	58,75		129,52
10	57,5		126,77
11	56,25		124,01
12	55,0		121,25

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

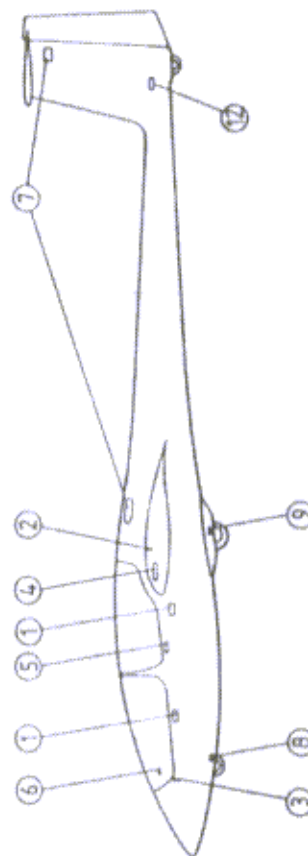
1 kg = 2,2046223 lbs

Setting of placards

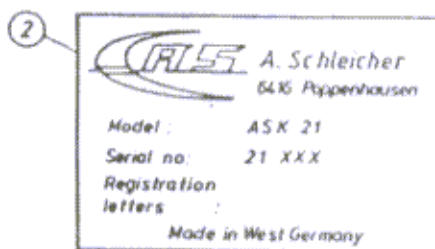
9



Setting of placards [Only with tail wheel]



- 5
off
rear
- Attention! Emergency bailout!**
- Pull back both canopy side-latches and push canopy upwards.
 - Undo safety harness.
 - Get up and bail out.
 - With manual chute seize release grip and pull out entirely after 1-3 sec



- 3
1 off
- Aerobatics prohibited!**
Equipment as under airworthiness category "U" (Utility)

For equipment without
g-meter and bottom strap.

- 3
1 off
- Aerobatics as per Flight Manual**
Equipment as under airworthiness category "A" (Acrobatic)

For equipment with
g-meter and bottom strap.

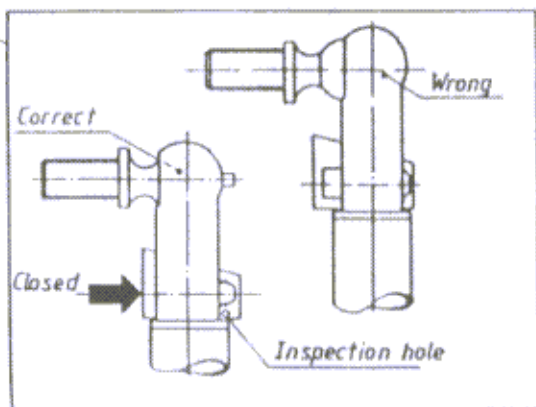
Segelflugzeugbau A. Schleicher Poppenhausen

Model	Serial no.
DATA PLACARD	
Approved for:	
Max speed for calm air	280 km/h
Max speed for rough air	200 km/h
Max maneuvering speed	V_M 180 km/h
Max aero tow speed	V_P 180 km/h
Max winch launch speed	V_W 150 km/h
WEIGHT AND BALANCE	
Min. payload front seat	kg
Max. payload front seat	kg
Max. payload rear seat	kg
Baggage in wingroots	max. 2 x 10 kg
Max. permissible all-up weight	kg

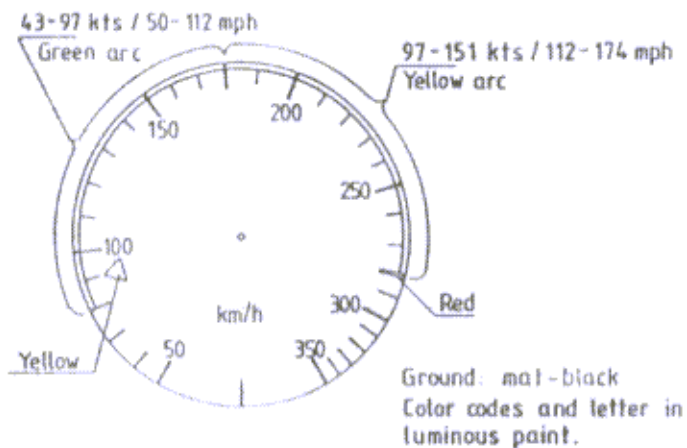
4
2 off

Loading of baggage compartment: max. 10 kg

- 6
1 off
- Pre Take Off Check:**
- Controls easy to operate?
 - Airbrakes locked?
 - Trim in the center position?
 - Parachute and safety harness fastened?
 - Altimeter adjusted to field height or to zero?
 - Radio "ON" and adjusted to proper frequency?
 - Both canopies locked?

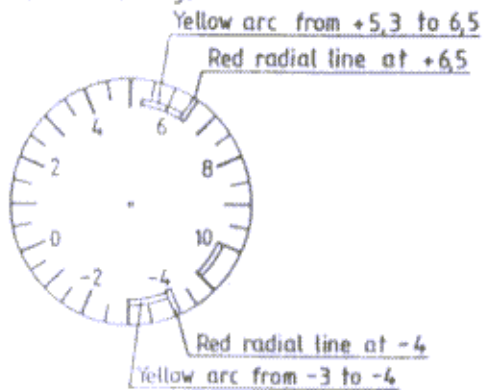


Airspeed indicator color codes



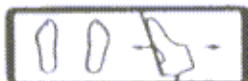
G-meter color codes

a) Positive range



b) Negative range

II.11 DESCRIPTION OF SYMBOLIC PLACARDS



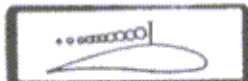
Rudder pedals adjustment: grey knob on RH side of the console.

To adjust pedals backwards:

Take your feet off the pedals and pull pedals backwards; then let go the grey knob and load the pedals in order to lock them.

To adjust pedals forwards:

Pull grey knob and push pedals forwards with your heels then let go the grey knob and load the pedals in order to lock them.



Airbrakes: blue lever in the LH arm rest; pull to extend airbrakes



Trim: noseheavy.



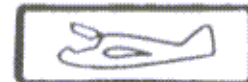
Trim: tailheavy.



Tow release: yellow knob LH below canopy frame.



To open canopy: pull back the white levers LH and RH on the canopy frame.



Canopy emergency jettisoning: push to the left the red flat knob above the instrument panel.



Ventilation

Prior to take off check the proper engagement of the canopy locks! forward:locked

This placard must be fitted in the front and rear cockpit in full view of the pilot.

III. EMERGENCY PROCEDURES

III.1 RECOVERY FROM SPIN

According to the standard procedure spinning is terminated as follows:

- a) Apply opposite rudder; i.e. apply rudder against the direction of rotation of the spin.
- b) Short pause.
- c) Release stick; i.e. give in to the pressure of the stick, until the rotation stops and sound airflow is established again.
- d) Centralise rudder and allow glider to dive out.

The altitude loss, from the beginning of the recovery until normal flight attitude is established, is about 260 ft = 80 m.

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 1-3 seconds.

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 THROUGH PRECIPITATION

With wet or slightly iced wings or with 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 5 knots = 10 km/h for approach speed !

4 WING DROPPING

The glider is extremely harmless. 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 until normal flight attitude is regained.

5 GROUND LOOPING

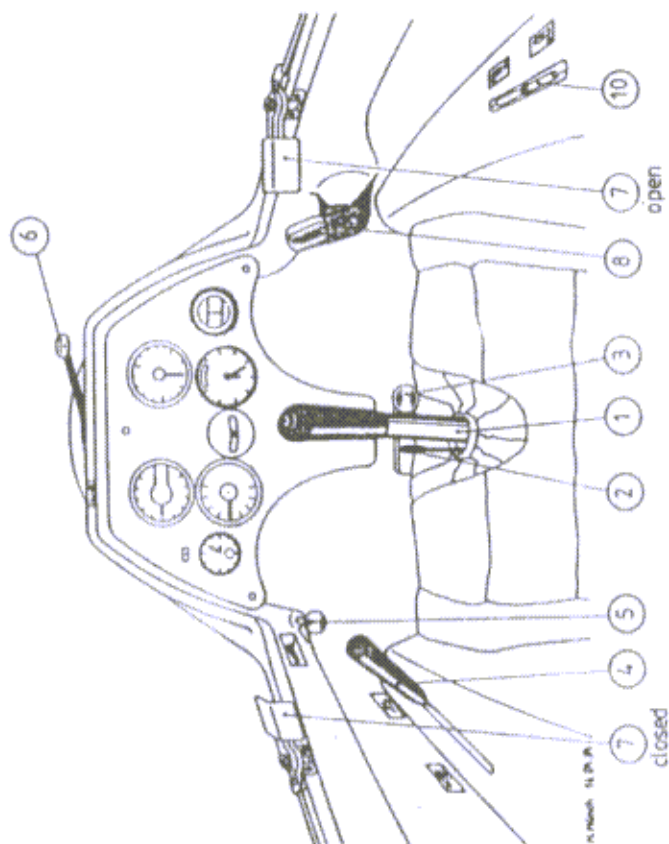
For normal conditions, smooth runway, short grass, one may take off with the wing on the ground without having to fear a change in direction. High grass and rough ground, however, may cause ground looping. In that case release tow rope immediately.

IV. NORMAL OPERATING PROCEDURES

IV.1. COCKPIT LAYOUT AND CONTROLS

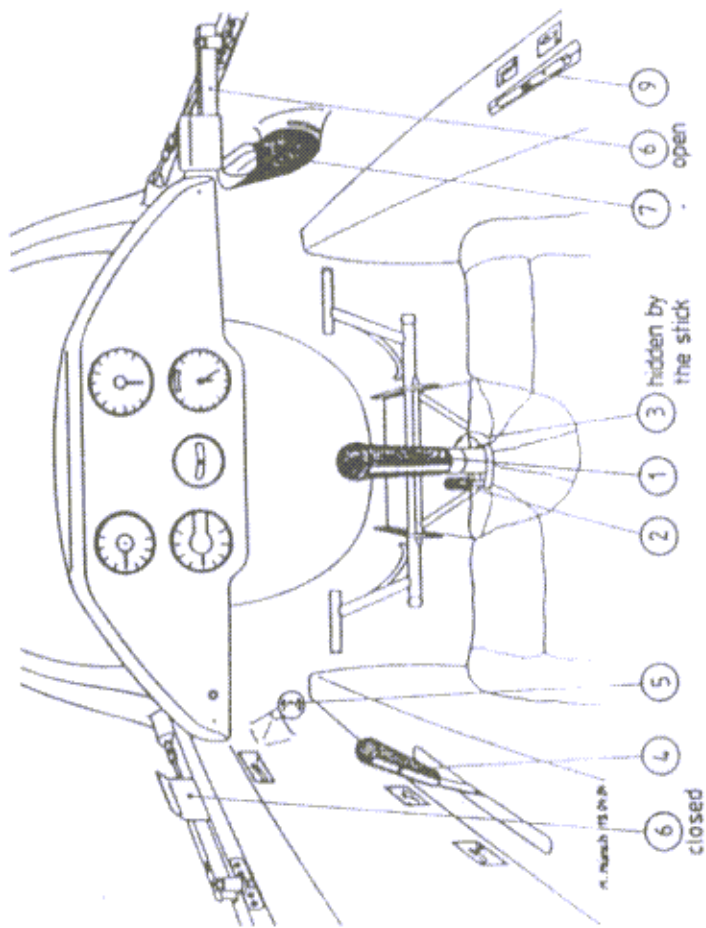
Front seat:

- 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.

Front seatRear seat:

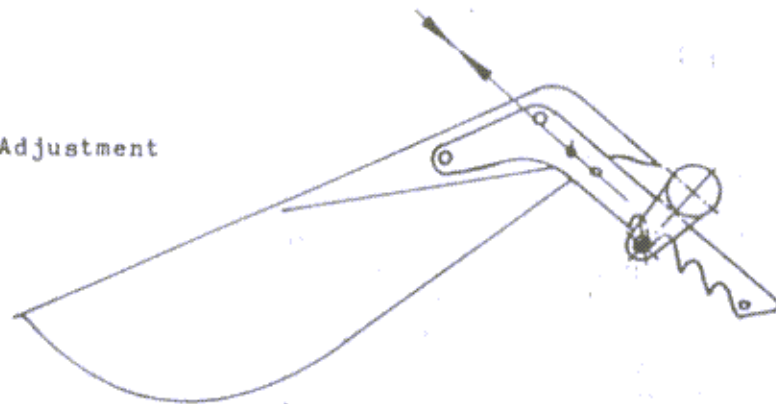
- No.1: Stick.
- No.2: Trim; flat lever with green knob LH of stick.
- No.3: Rudder pedal adjustment with circular grip in front of stick.
- No.4: Airbrakes with wheelbrake; blue lever in the left arm rest.
- No.5: Release cable; yellow knob on left cockpit wall below the canopy frame.
- No.6: Rear canopy 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.
Very tall pilots may fly without the back rest.
- No.9: Trim indicator; in the right arm rest behind the ventilation nozzle.

Rear seat

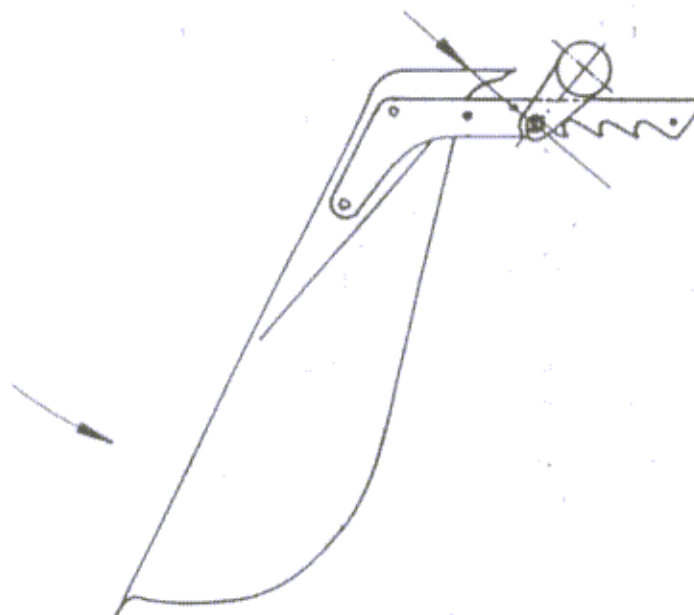


BACK REST ADJUSTMENT

Adjustment

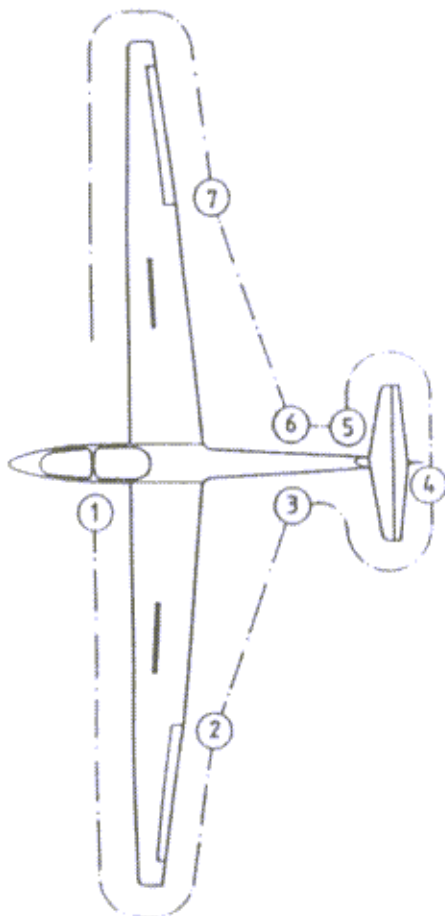


Engaged



DATE 16.10.87

DAILY CHECKS [see page 30 FM]



1983

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?

Check condition of tailskid, pitot tube and venturi tube.

Check static vents for cleanness !

After rough landings or excessive flight stress the whole sailplane must be checked with the wings and the tail unit being removed (see also point 2.11). If any damage is found, a technical aviation inspector must be called in. On no account one must take off again before such damage has been repaired. See also the Instructions For Continued Airworthiness !!

CHECKS PRIOR TO TAKE OFF

See the Check Lists in Section VII., p.43, of the Instructions For Continued Airworthiness !



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- 3. NOV. 1987

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 $V_{NE} = 280$ 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_{NE} 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 $V_{NE} = 280$ 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 - 120 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.

Permissible indicated speeds

Inverted flight without pitot head extension:

V_{NE} : Single 35-130 kts = 65-240 km/h.
Dual 38-130 kts = 70-240 km/h.

Indicated maneuvering speed 75 kts = 140 km/h
Indicated max. speed 130 kts = 240 km/h.

Inverted flight with pitot head extension:

Indicated maneuvering speed 97 kts = 180 km/h
Indicated max. speed 151 kts = 280 km/h
Indicated stall speed 47 kts = 87 km/h
with two occupants

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 glider or as the speed increases unvoluntarily too fast.

Exception: "Tail sliding" !!!

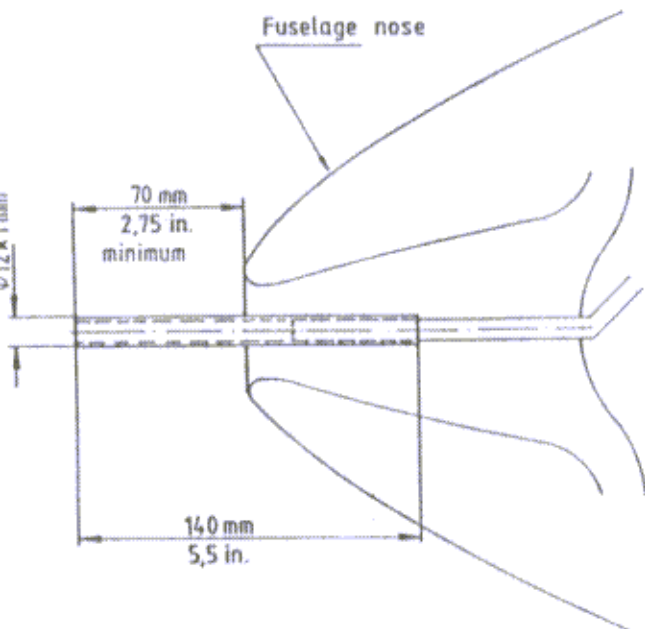
The trim remains in the center position for aerobatic maneuvers. Don't ever change the trim when flying aerobatics !!

PROHIBITED AEROBATICS

All abrupt aerobatic maneuvers
Loop forward
Tail sliding.

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extension tube for total pressure head with inverted
lights



Brass tube 5,5 in = 140 mm in length (12 Ø x 1).
One may also use a suitable plastic tube provided
that it is sufficiently stiff and straight.

Recommended entrance speeds for the following aerobatics

	Indicated entrance speed	Max. acceleration
Loop upward	Single: 84 kts = 155 km/h	2-3 g
	Dual: 92 kts = 170 km/h	
Stall Turn	Single: 89 kts = 165 km/h	3 g
	Dual: 97 kts = 180 km/h	
Split 'S'	Single: 92 kts = 170 km/h	2-3 g
	Dual: 97 kts = 180 km/h	
Immelmann	Single: 89 kts = 165 km/h	2,5-3,5 g
	Dual: 97 kts = 180 km/h	
Slow Roll	Single: 81 kts = 150 km/h	
	Dual: 89 kts = 165 km/h	
Steep Climbing Turns & Lazy Flight	Single: 76 kts = 140 km/h	
	Dual: 81 kts = 150 km/h	
Chandelle	Single: 86 kts = 160 km/h	
	Dual: 95 kts = 175 km/h	



L O O P

Entrance speed:

Single 84 kts = 155 km/h

Dual 92 kts = 170 km/h

Max. g = 2-3.



S T A L L T U R N

Entrance speed:

Single 89 kts = 165 km/h

Dual 97 kts = 180 km/h

Max. g = 3.



S P L I T 'S'

Pull up at least 30°!

Altitude loss approx. 328 ft = 100 m.

Entrance speed:

Single 92 kts = 170 km/h

Dual 97 kts = 180 km/h

Max. g = 2-3.



I M M E L M A N N

Entrance speed:

Single 89 kts = 165 km/h

Dual 97 kts = 180 km/h

Max. g = 2,5-3,5.



S L O W R O L L

Entrance speed:

Single 81 kts = 150 km/h

Dual 89 kts = 165 km/h.

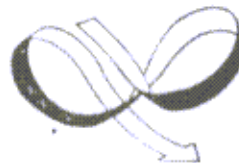


I N V E R T E D F L I G H T

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



S P I N



L A Z Y E I G H T

Entrance speed:

Single 76 kts = 140 km/h

Dual 81 kts = 150 km/h.

STEEP CLIMBING TURN



Entrance speed:

Single 76 kts = 140 km/h

Dual 81 kts = 150 km/h.

CHANDELLE



Entrance speed:

Single 86 kts = 160 km/h

Dual 95 kts = 175 km/h.

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 spar tunnel. Secure them with spring clips!

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!

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 (see Section VII, p.43, of the Instructions For Continued Airworthiness!
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 in this Manual.

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.

A 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.

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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

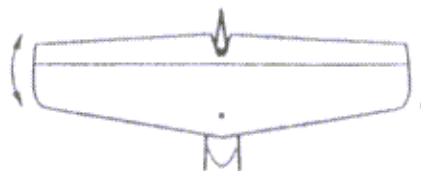


Fig. V.2-2
RIGHT: Pitch movement



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.

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.5 PREVENTIVE MAINTENANCE

The whole surface of the sailplane is painted with 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 Z-special cleansing agent-D2 from the company W.Sauer & Co., 5060 Bensberg, W. Germany, or the cleansing polish from the company Personal). Though the sailplane is rather insensitive, it should be protected as much as possible against moisture and humidity. If water has soaked into any components, these have 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.

VI. CENTER OF GRAVITY (CG)

VI.1 WEIGHING PROCEDURE OF CG AT EMPTY WEIGHT

Prior to determining the CG in flight the CG at empty weight has to be established by weighing the glider. For this procedure the glider must be put on two pair of scales (one at the nose wheel and one at the tail skid).

NOTE: the glider must be set on the two pairs of scales very carefully in order to prevent that the scales get misaligned; (this could lead to erroneous results).

The Datum Line (DL) is situated at the wing leading edge of the straight center part of the wing.

Levelling means: wedge on rear top edge of fuselage 1000 : 52 horizontal.

Empty weight CG :

Weight at the nose wheel:	lbs
Weight at the tailskid:	lbs
Support point nose wheel:	in
Support point tailskid:	in

NOTE: determination of empty weight and empty weight CG must be done without any additional balance weights (e.g. trim cushion).

Be careful not to exceed the maximum weight of non lift producing parts when using maximum payload. The total weight of non lift producing parts contains the individual weights of fuselage, elevator and maximum payload and must not exceed 410 daN = 920 lbs (the payload must be reduced accordingly).

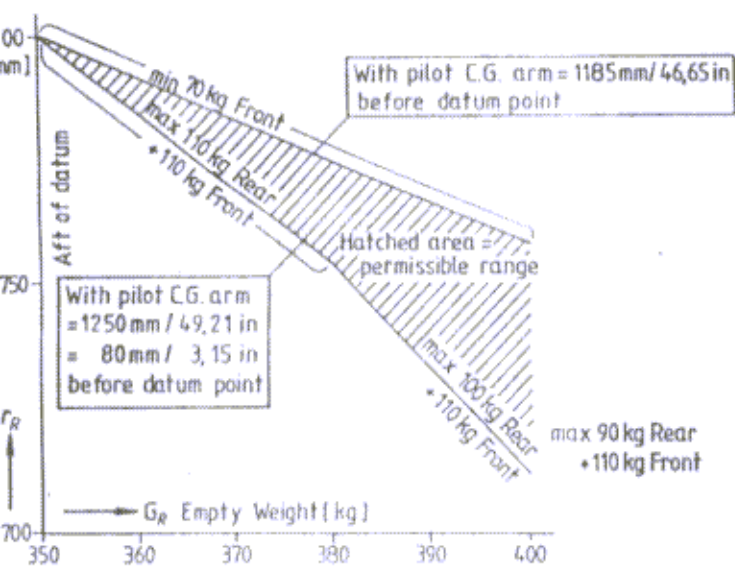
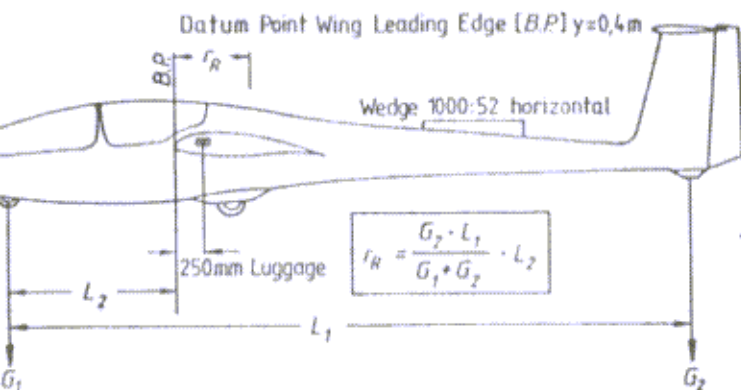
March 9, 1983

April 1980

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Weight and Balance Sheet



The CG should be recalculated after repair, repainting or installation of additional equipment, but not later than 4 years after the last weighing.

The empty weight, empty weight CG position and maximum load should be recorded after each weighing on page of the Flight Manual by a competent person.

VI.2 EMPTY WEIGHT CG POSITION

With the empty weight CG according to the below-mentioned limits and the pilot weights according to the load table the in flight CG will be within the approved range.

Empty weight		CG forward		CG aft	
daN	lbs	mm	in	mm	in
350	770	800	31,50	800	31,50
360	792	784	30,87	792	31,18
370	814	769	30,28	783	30,83
380	836	754	29,69	774	30,47
390	858	732	28,82	766	30,16
400	880	712	28,03	758	29,84

VI.3 WEIGHING RECORD

Date of weighing, carried out by	Equipment list used for weighing (date)	Empty weight kg (lbs)	Empty CG behind datum mm (in)	Empty weight momentum	Max. payload kg (lbs)	Sig-nature
0-4-92	0-4-92	5635 lbs.	-51.05		707.5	<i>[Signature]</i> 3275-40 APR

The empty weight momentum is necessary to calculate the in flight CG (load table).

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CAUTION : Incorrect loading can deteriorate glider handling qualities and can cause hazardous flight conditions. The pilot in command is responsible for correct loading.

Never fly the glider from the rear seat only !!

March 9, 1983

Calculation of CG at flight weight

	Weight [lbs]	x	arm [inch]	=	Momentum [lbs x inch]
Empty weight		x +		=	
Front pilot		x -	{ 46,65 49,21 } *	=	
Rear pilot		x -		=	
Baggage		x +		=	
Sum of weight					Sum of momentum

$$\text{Position of flight CG} = \frac{\text{Sum of momentum}}{\text{Sum of weight}} = \boxed{} \text{ CG Flight [inches]}$$

* Note: Tall persons shall use the shorter value and set the backrest on the rear position.

Small persons shall use the longer value and set the backrest at the forward position.

VI.4 Calculation of CG at flight weight [metric system]

	Weight [kg]	x	arm [mm]	=	Momentum [kg x mm]
Empty weight		x +		=	
Front pilot		x -	{ 1185 1250 } *	=	
Rear pilot		x -		=	
Baggage		x +		=	
Sum of weight					Sum of momentum

$$\text{Position of flight CG} = \frac{\text{Sum of momentum}}{\text{Sum of weight}} = \boxed{} \text{ CG Flight [mm]}$$

* Note: Tall persons shall use the shorter value and set the backrest on the rear position.

Small persons shall use the longer value and set the backrest at the forward position.

VI.4^a Calculation of CG at flight weight

EXAMPLE !

	Weight [lbs]	x	arm [inch]	=	Momentum [lbs x inch]
Empty weight	814	x +	30,55	=	+ 24869
Front pilot	187	x -	$\left\{ \begin{array}{l} 4,65 \\ 4,21 \end{array} \right\}^*$	=	- 8833,88
Rear pilot	165	x -	3,15	=	- 519,75
Baggage	22	x +	9,84	=	+ 216,48
Sum of weight	1188			Sum of momentum	15730,85

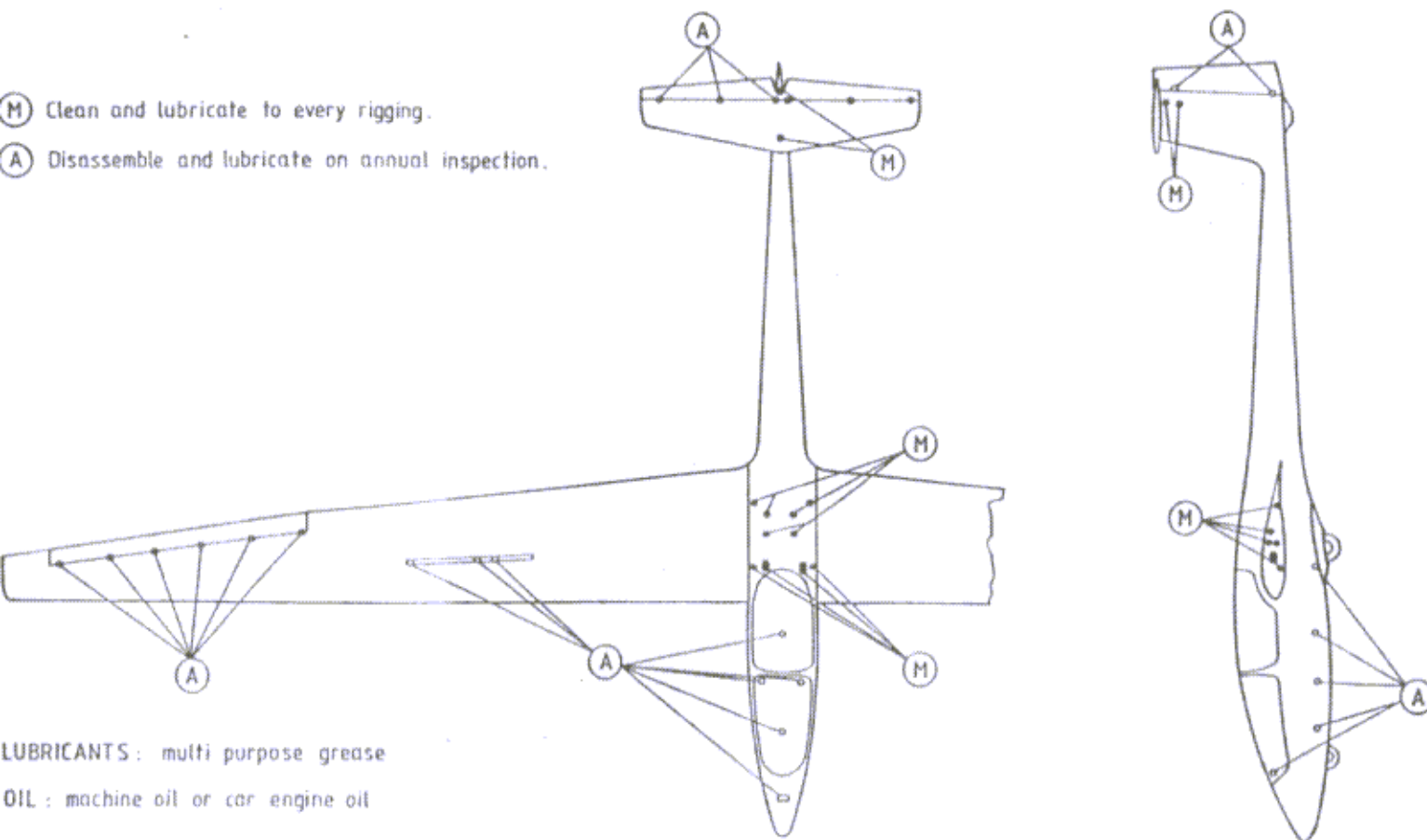
$$\text{Position of flight CG} = \frac{\text{Sum of momentum}}{\text{Sum of weight}} = \frac{15730,85}{1188} = 13,24 \text{ CG Flight [inches]}$$

- * Note: Tall persons shall use the shorter value and set the backrest on the rear position.
 Small persons shall use the longer value and set the backrest at the forward position.

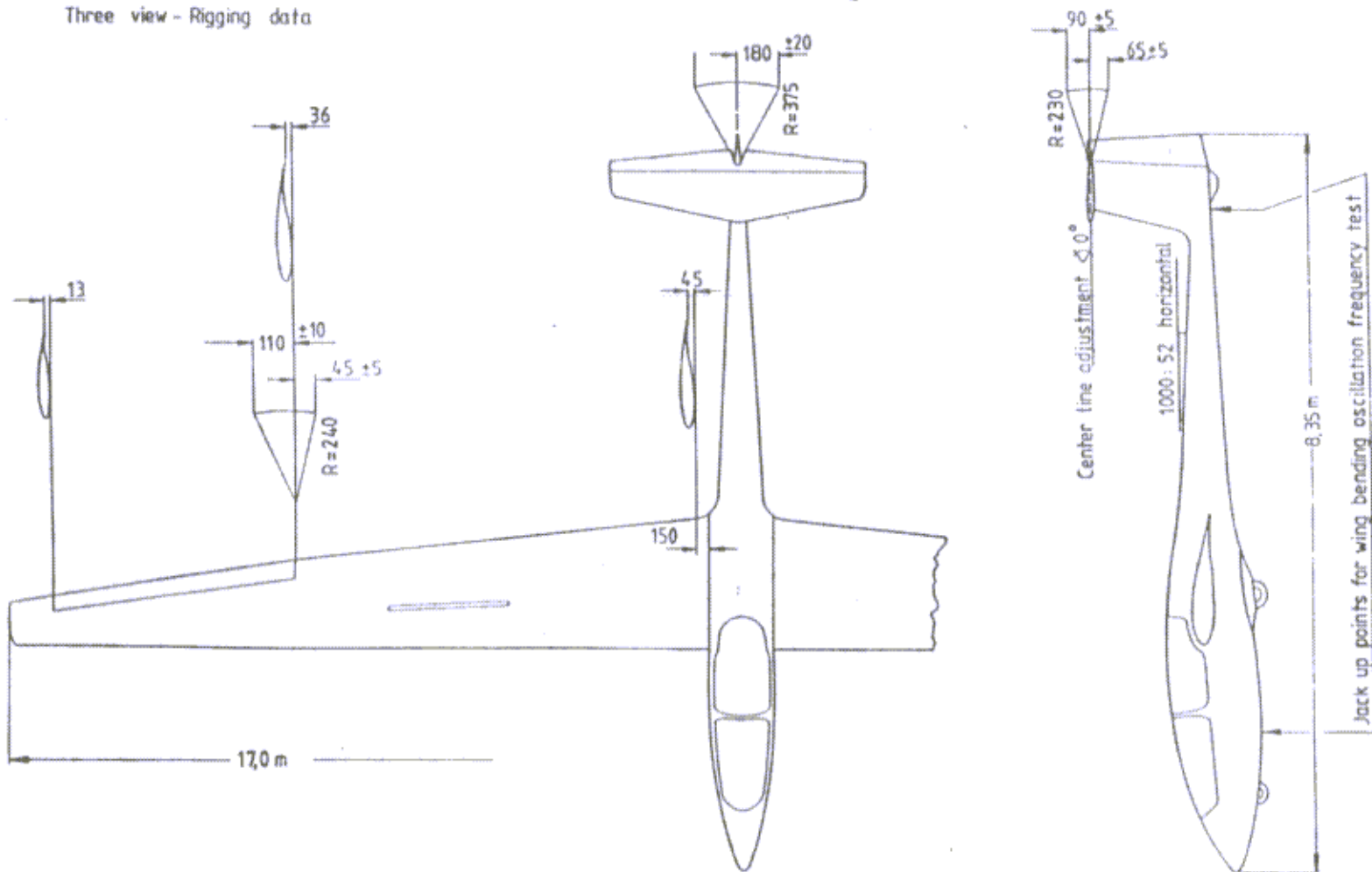
LUBRICATION SCHEME

(M) Clean and lubricate to every rigging.

(A) Disassemble and lubricate on annual inspection.



Three view - Rigging data



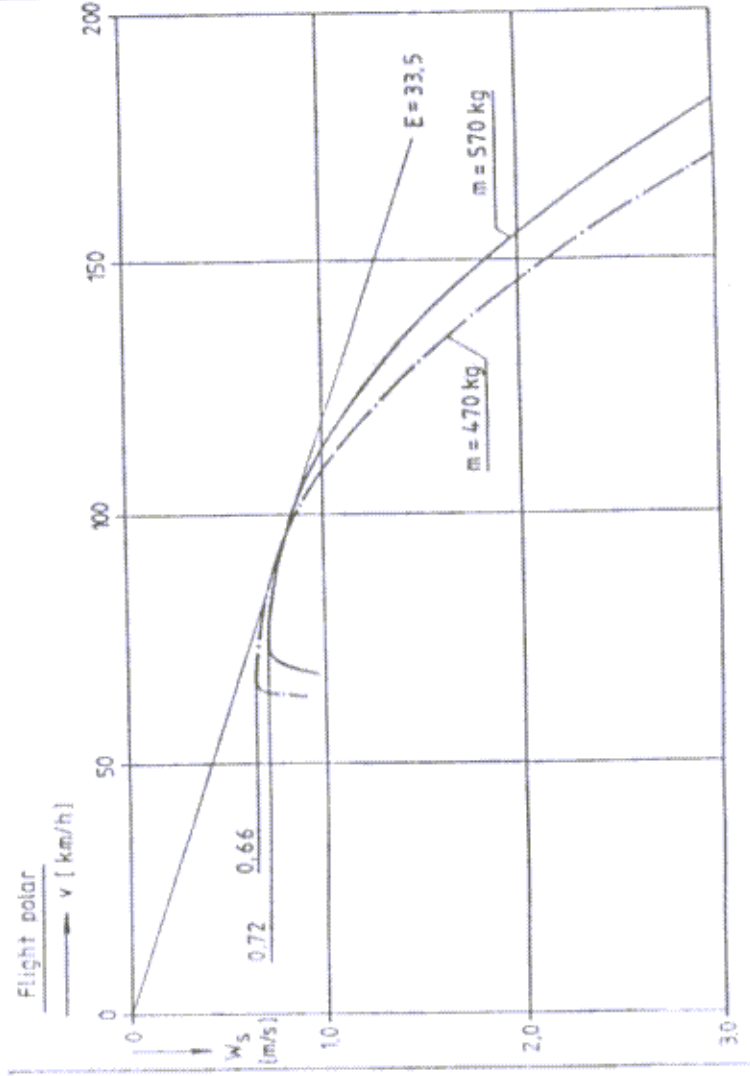


Figure 9, 1971

Amendments Record

No.	Title	Page	Date signature
1	Check of the release cable (TN No. 10)	43 a	10.10.1983 <i>[Signature]</i>
2	Automatic elevator connection (TN no. 11) Pages 47g and 48g are cancelled. Note: There are no pages 24 and 48 i	6a, 7a 11a, 40a, 46a, 47a	Dec. 20. 83 <i>[Signature]</i>
3	Amendment to the Manuals in English language (TN no. 14)	56 a	May 16, 1984 <i>[Signature]</i>
4	New canopy locking system (TN no. 15)	55a, 56b	Jun 3 8, 84 <i>[Signature]</i>

I. TECHNICAL DATA

Wing

Airfoil Wortmann FX 802 196 / 802 196 / 60-126
 Span $b = 17.0 \text{ m}$
 Wing area $F = 17.95 \text{ m}^2$
 Aspect ratio $b^2/F = 16.1$
 $t_i = 1.5 \text{ m}$ (inner chord)
 $t_k = 1.0 \text{ m}$ (chord at aileron)
 $t_a = 0.5 \text{ m}$ (outer chord)
 Angle of incidence at root $+2^\circ$
 Dihedral Wing center line $+4^\circ$
 Sweep of airfoil : Inner wing leading edge level.

Fuselage

Length 8.35 m
 Cockpit width outside 0.70 m
 Cockpit height outside 1.04 m
 Fuselage area $\text{app. } 12.33 \text{ m}^2$

Vertical tail unit

Height above fuselage center line $h = 1.37 \text{ m}$
 Area $F^s = 1.357 \text{ m}^2$
 Aspect ratio $s = 1.383$
 Lower chord 1.17 m
 Upper chord 0.80 m
 Airfoil Wortmann FX 71-L-150/30

Rudder

% of vertical tail unit chord : 31%
 $F = 0.42 \text{ m}^2$

VII. CHECK LISTS

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 objects

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 !

Pre Take Off Check

1. Parachute connected to harness ?
2. Safety harness fastened ?
3. Airbrakes locked ?
4. Trim neutral ?
5. Altimeter correctly set ?
6. Canopies closed and locked ? Rear Canopy !!
7. For flights with only one occupant remove the rear back rest !!
8. Leave your toes under the pedal toe-straps ! Never flatten the straps ! Danger of jamming the pedals !

3. Special checksAfter rough landings :

Check the landing gear suspension mount at the front main bulkhead !!
 Check the wheel fork for deformation; gear box !!
 Check the control shaft above the wheel for deformation !!
 Make sure that the rubber buffers have not come over the support discs !!
 Check spar tongue and fork for white areas !!
 Check the wing connections at the fuselage !!
 Check the cross tube at the front main bulkhead for compression deformations !!
 Determine wing bending oscillation frequency and compare with the value of the last inspection report. In case of differences by more than 5 % contact the Schleicher factory. (See survey drawing on page 29 of the Maintenance Manual for jack up points !).

After ground loops :

Inspect the fuselage tail cone at the transition to the fin and also the attachment of the horizontal tail unit to the fin !!
 Check wing connections at the fuselage !!
 Inspect horizontal shear web in the fuselage (between front and rear main bulkhead).

Checking and securing the L'HOTELLIER quick-release connectors in the control linkages

Securing

Test experience showed that the quick-release connectors in the brake, aileron and particularly in the elevator control linkages were incorrectly assembled or that their assembly was even completely forgotten (as of serial no. 21206 the aircraft was then supplied with an automatic elevator connection). A sticker (Fig.1) fixed to the fin and the access hole cover, serve to remind the pilot of the correct assembly. All quick-release connectors must be secured in addition by means of a spring clip (Fig.2). With the older type of connectors the check hole must be drilled to approx. 2 mm ϕ for this purpose.

Fig. 1

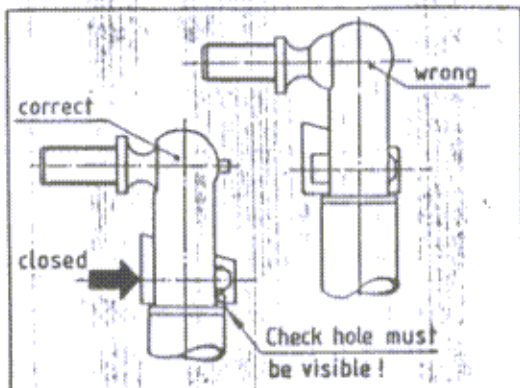
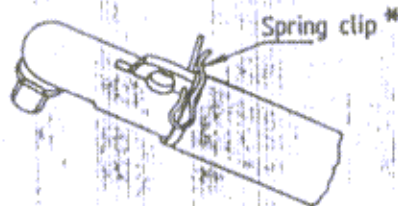


Fig. 2



Spring clip no.50030771 can be ordered from Alexander Schleicher or from the company A.Würth, P.O.Box 1261, D-7118 Künzelsau. (This part is also identical with the FORD brake securing spring clip).

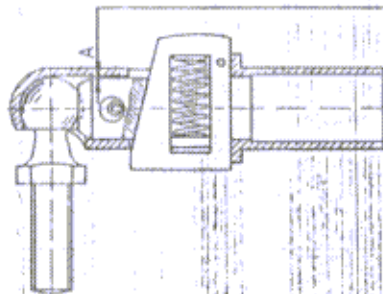
TN-No.20 dated 16.10.87

4. Check that there is no play in the fuselage/wing and fuselage/tailplane connections (see also above Point 2).
5. The condition of all accessible bearings, slittings, joints, stops in the control linkages, and especially the control cables and towing hook cables, must be checked. The plastic tubes inside the S-shaped rudder pedals tubes must be checked for proper and tight fit.
6. The controls, including the airbrakes, must be subjected to an operational test, and their control deflections measured.
7. If any control is not free moving over its entire range of movement, then the cause is to be established and eliminated.
8. The condition of the main landing gear and tailwheel (foam skid with wear plate or pneumatic tailwheel, respectively), including tire, brake linings and rubber shock absorber must be checked. See also that there is sufficient brake fluid in the tank.
9. The towing hooks must be inspected according to the manufacturer's "operations and maintenance instructions".
10. The pressure openings (pitot and static pressure ports) on the fuselage, including their flexible lines, are to be checked for blockages and leaks.
11. Condition and function - if applicable, maximum permissible operational time - of all instruments, VHF-transceiver unit, and other equipment are to be checked.
12. The wing bending frequency is to be measured and compared with the stated value in the latest inspection report. For this test the fuselage must be rigidly supported on two supports, in order to obtain comparable values, for the position of the supports see the Survey Drawing on page 29.
13. Check that the equipment and instrumentation are in accordance with the Equipment Inventory.
14. After repairs or alterations to the equipment the new empty weight and the C.G. position are to be found by calculation or weighing, and are to be recorded in a summary of weights.

TN-No.20 dated 16.10.87

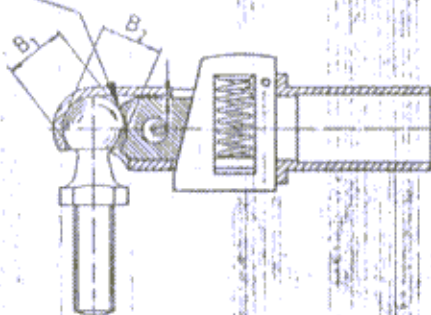
2. Inspection

As experience accumulated in Australia has shown, the condition of the L'HOTELLIER connectors must be checked on every annual inspection of the aircraft, especially when it has been operated frequently and from sandy airfields.

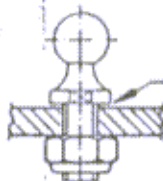


Clearance A must not exceed 0,15 mm (0,006 in); check this by using a wire of the above diameter!

Bad wedging effect causing wear of the ball.



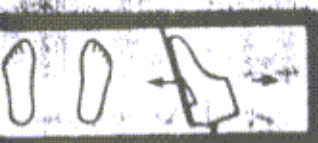
The greatest and smallest diameters B to be found must not differ by more than 0,1 mm (0,004 in).



The tight seat of the ball ends inside the fittings must be checked as loose ball ends are likely to break under bending loads in the thread area.

Gap generated by an unscrewed and incorrectly refitted ball end or owing to overloading /wear out of the lever part.

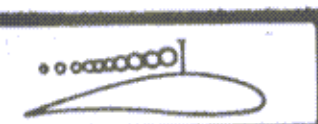
DESCRIPTION OF SYMBOLIC PLACARDS



Rudder pedals adjustment:
grey knob on the RH side of the console.

Adjust pedals backwards:
Put your feet off the pedals and pull pedals backwards. Then let go the grey knob and load the pedals in order to lock them.

Adjust pedals forwards:
Put your feet off the pedals and push pedals forwards with your feet. Then let go the grey knob and load the pedals in order to lock them.



Airbrakes:
blue lever in the LH arm rest. Pull to extend airbrakes.



Trim : noseheavy



Trim : tailheavy



Tow release :
Yellow knob LH below canopy frame



OPEN front canopy :
Move white levers LH and RH on canopy frame backwards.

XIV APPENDIX

XIV.1 Equipment List

Issue May 1980

Minimum equipment

1. Airspeed indicator
 - a. Winter GW 6005 50 - 350 km/h
 - b. PZL PS 08 50 - 350 km/h
2. Altimeter
 - a. Winter 4 HM 6
 - b. Winter 4 FGH 10
 - c. PZL W-12 8
3. Safety harness

Gdringer Bagu V-B/1
Schuga II-C/V
Bogu I-B/V front
Bogu I-A/V rear

Additional minimum equipment for aerobatics :

G-meter BM 770 L


Additional minimum equipment for cloud flying :

Turn & bank indicator Apparatebau Mauting WZ-402/31.


Compass : Ludolph FK 5
Ludolph FK 16
PZL BA-1
PZL B-13/KJ

VHF-transceiver

- a. Dittel FSG 15/25
- b. Dittel FSG 16/25
- c. Dittel FSG 40 8
- d. Becker AR 2008/25
- e. Becker AR 2009/25
- f. Avionic Dittel ATR 720



EMERGENCY JETTISONING of front canopy:
Push lever with red flat knob to the left.



OPEN rear canopy and/or EMERGENCY JETTISONING:
Move red levers LH and RH on canopy frame backwards.



Ventilation

This placard must be fitted in the front and rear cockpit in full view of the pilot.

Prior to take off check the proper engagement of the canopy locks! forward=locked

Placard no. 7

