ALEXANDER SCHLEICHER SEGELFLUGZEUGBAU
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M A I N T E N A N C E M A N U A L

for the sailplane model

A S K 2 1

This manual belongs to the sailplane ASK 21,

serial number 2 1 6 9 1

registration number I - I V W O

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 maintenance manual according to para 12 (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.

Edition 1980.

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Record of Revision

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1	Installation of tail weel, TN-No. 2	18 S, 47 S & 48 S	26.08.80
2	Modification release cable fairlead, TN-No. 10	43 a, 43 deleted	10.10.83
3	Automatic elevator Connection, TN-No. 11 Page 47 S and 48 S deleted, there are no pages 24 und 48 !	6 a, 7 a, 11 a, 40 a & 47 . 6, 7, 11, 40 & 47 deleted	09.03.84
4	Amendment to the Manuals in English language, TN-No. 14	56 a 56 deleted	28.05.84
5	New canopy locking system, TN-No. 15	55 a & 56 b, 55 & 56 a delet.	08.06.84
6	Change / supplement to the Maintenance Manual, TN-No. 20	40 a, 43 a, 43 b & 43 c	03.11.87
7	Amendment of the Maintenance Manual, Inspection program to increase the service life, TN-No. 24	21, 25, 31, 43 c to 43 f, 58 & Appendix	01.10.92
8	Rudder actuated by means of hand lever, TN-No. 25 (optional)	13 & 15	17.06.93
9	EXTENSION OF SERVICE LIFE BEYOND 12000 OPERATION HOURS TN-No 29	43e - 43f	2006/

I. TECHNICAL DATA

Wing

Airfoil Wortmann FX S02 196 / S02 196 / 60-126
Span b = 17.0 m
Wing area F = 17,95 m^2
Aspect ratio b^2/F = 16,1
ti = 1,5 m (inner chord)
tk = 1,0 m (chord at aileron)
ta = 0,5 m (outer chord)
Angle of incidence at root $+2^o$
Dihedral Wing center line $+4^o$
Sweep of airfoil : Inner wing leading edge level.

Fuselage

Length	8.35 m
Cockpit widht outside	0.70 m
Cockpit height outside	1.04 m
Fuselage area	app. 12.33 m^2

Vertical tail unit

Height above fuselage center line	h_s = 1,37 m
Area	F_s = 1,357 m^2
Aspect ratio	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 m^2

Horizontal tail unit

SPan	3,1 m
Area	1,92 m
Aspect ratio	5,005
Inner chord	0,8 m
Outer chord	0,4 m
Airfoil Wortmann FX 71-L-150/30	

Elevator

Area	0,576 m^2
% of horizontal tail unit chord :	30 %

Airbrakes

(Schempp-Hirth type on upper wing only)

Area (for both)	F_{BK} = 0,326 m^2
Distance from wing center line	2,9 - 4,3m

Weights

Empty weight	app. 360 kg
Payload	240 kg
Max payload front seat	110 kg
Max payload rear seat	70 kg
Max all up weight	600 kg
Payload in % all up weight	40 %
Wing loading	24 - 33,4kg/m^2
Max weight of non lift producing parts	410 kg

II. DESCRIPTION OF A/C ASSEMBLY & EQUIPMENT

II.1. CONTROL SYSTEMS

Elevator control system

Both control sticks are built as 2-armed levers and feature universal joints. The control sticks are linked together by a main steel tube torsion rod at the bottom. This torsion rod features at its front and rear end an adjustable stop for both control sticks. Another bent steel tube torsion rod leads from the rear control stick to a combined elevator/aileron rocker arm. From there a short aluminum pushrod leads to a 180° duralumin bellcrank which is linked up by a long aluminum pushrod which runs through 4 support bearings; the support bearings consist of a fiberglass bracket with 3 ball bearings. Via a 90° duralumin bellcrank, the control forces are lead upwards into the fin using a fiberglass plastic pushrod. Here connects a 180° duralumin bellcrank to a short aluminum pushrod which in turn connects to a M12.41/HOTELLIER joint which operates the elevator.

Elevator with automatic connection:

Instead of the aluminum pushrod, an actuating pushrod is installed, which is supported with a parallel rocker.

Trim

The trim is spring suspended and consists of 2 trim levers, 1 connecting pushrod and the 2 trim springs with slotted gate sheet metal. The trim levers are connected to the control sticks with a knurled nut at the control

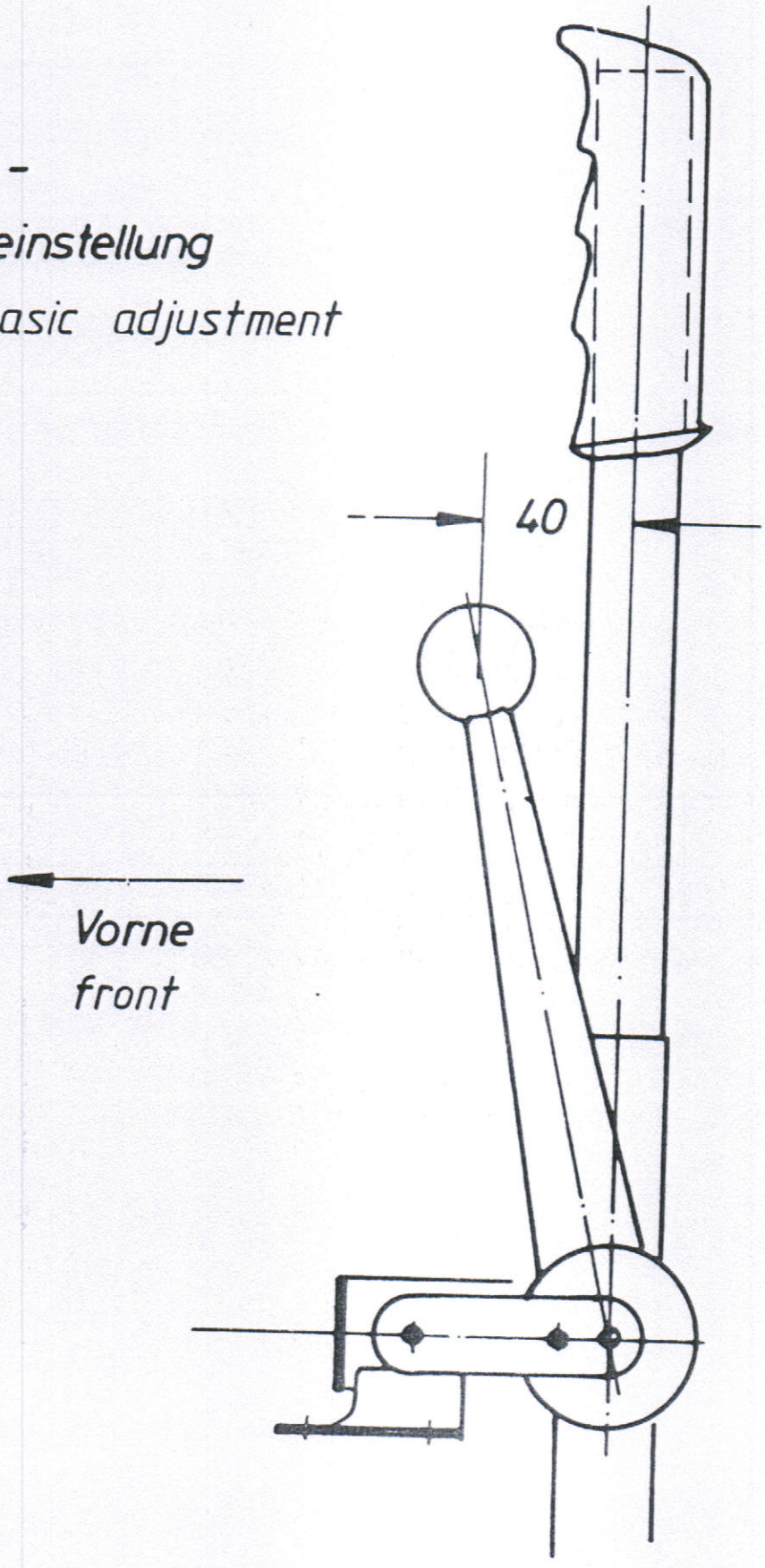
stick bearing bolt. A friction brake is tightened with this knurled nut at the control stick bearing bolt. The braking force should be distributed evenly between the front and rear brake. The brake should be tightened so strong that even with extremely opposed positions of stick and trim lever, the trim will not move. The trim connecting pushrod features a stop at its front and rear end. The springs with the adjusting plate between them, are suspended into the 2 rings of the front control shaft.
The adjusting plate itself is mounted to the bolt of the trim connecting pushrod; here the trim may be adjusted.
The trim should be adjusted such that with 1 pilot and the trim set full forward, a trimmed speed of 150-160 km/h (81-86,3 kts; 93,2-99,4 mph) is reached; then the trim lever is in a slightly forward position when the stick is free and in its center position (elevator connected).

To adjust the trim roughly to a trimmed speed of max. 160 km/h (86,3 kts; 99,4 mph):

1. Connect elevator.
   (This is inapplicable when your glider features the automatic elevator connection).

2. Adjust the trim spring such that the stick is set to the above-mentioned relative position to the trim lever.
   Friction must be balanced by "feeling for" the center position.

Trimm - Grundeinstellung
Trim basic adjustment

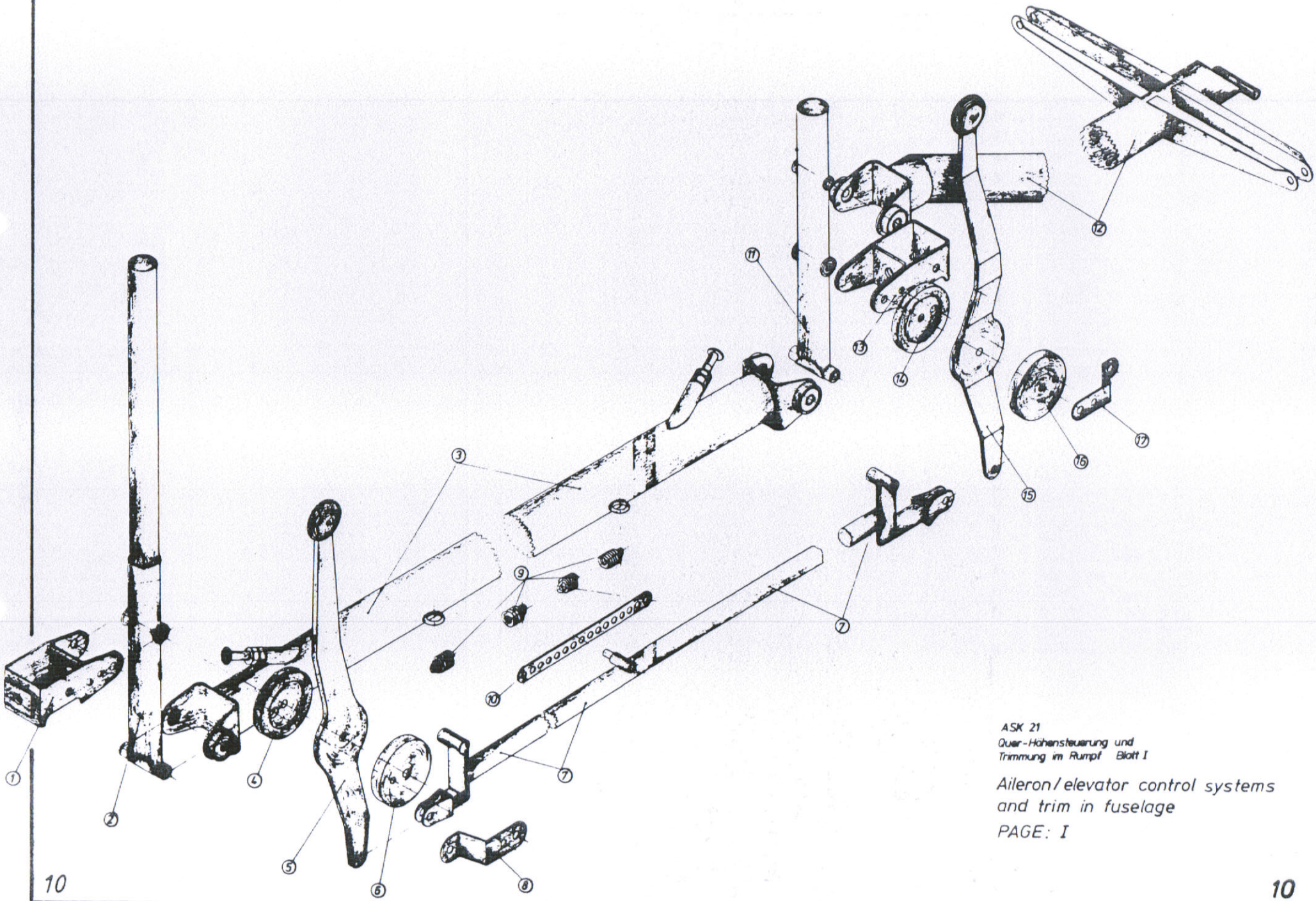


Trim indicator

In addition to the visible position of the trim lever the trim features a trim indicator. The trim indication should be in the center position when the trim lever is vertical to the glider's longitudinal axis. It can be adjusted by opening the clamp at the trim connecting pushrod and by displacing the Bowden cable. Then retighten the clamp.

Aileron control system

A short aluminum pushrod leads from the horizontal aileron control system lever at the rear elevator/aileron control system torsion rod upwards to a 90° duralumin bellcrank in the fuselage. By a Hotellier joint (M12.41) follows from here the long aluminum pushrod in the wing. This pushrod is supported altogether seven times in each three ball bearings. For the compensation of the bellcrank travels short steeltube pushrods are articulated by ballbearings (14C6) at both ends of the long pushrod. The inner short pushrod features the Hotellier connection with the adjusting screw. At the 90° duralumin bellcrank the aileron pushrod actuates the aileron through a Hirschmann-Unibal adjustable head (SMx CP6). The stops for the aileron are positioned in the pushrod box in front of the rear stick. These are two plywood blocks glued into the pushrod box and cut out such that they stop laterally the travel of the front torsion shaft.



ASK 21
Quer-Höhensteuerung und
Trimmung im Rumpf Blatt I

Aileron/elevator control systems and trim in fuselage
PAGE: I

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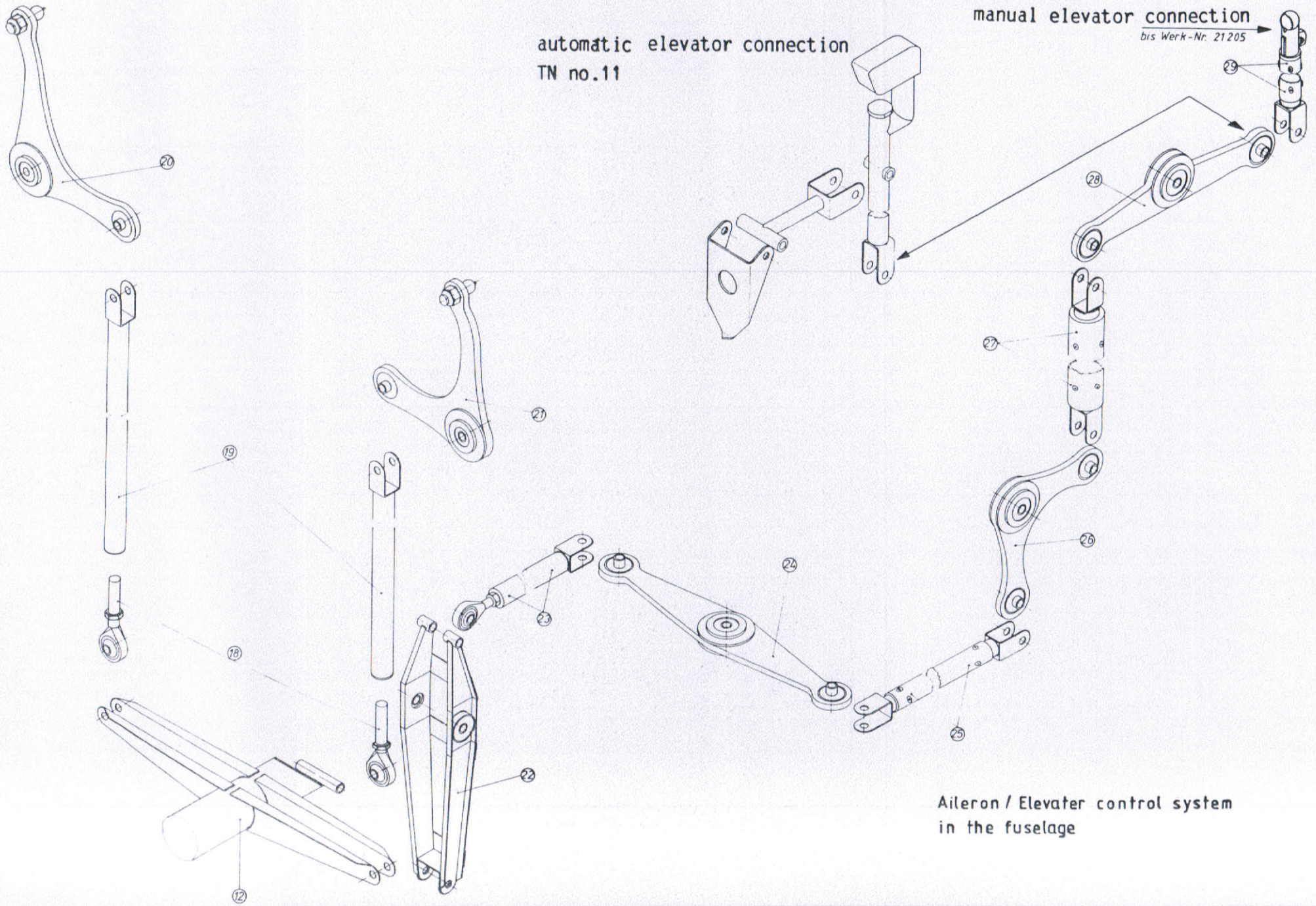
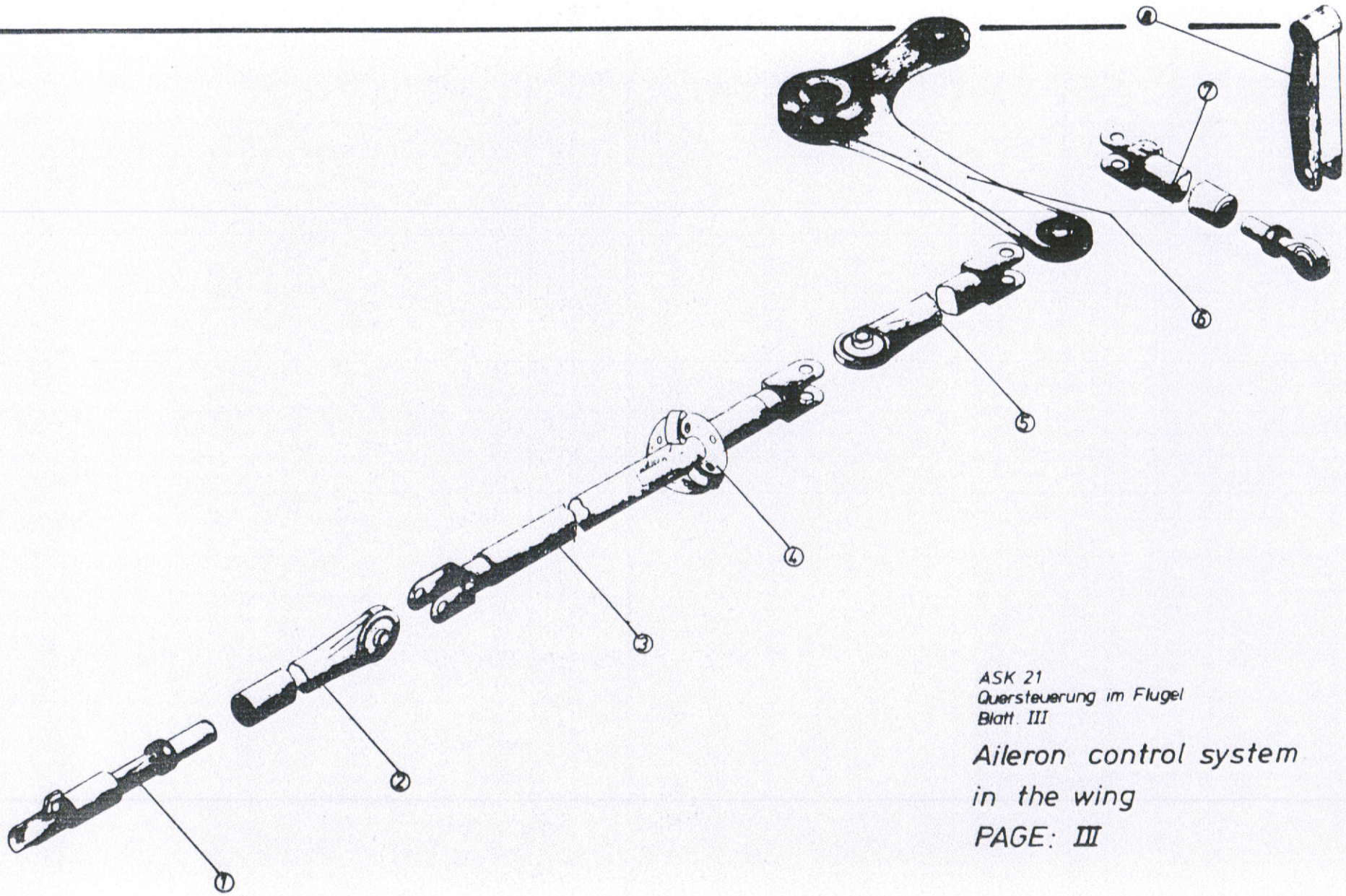


Aileron / Elevater control system
in the fuselage



ASK 21
Quersteuerung im Flugel
Blatt III

Aileron control system
in the wing
PAGE: III

Rudder control system

The rudder is actuated by cable (3,2 Ø LN 9374). Both front and rear pedals are adjustable.
The rudder cables are running from a fixed point through S-type pedal loops to an adjusting plate in the rear cockpit. Here are joined together the cables from the front and rear pedals. From the adjusting plate the cables run through nylon tubes to the rudder-actuating lever. At the adjusting plate slight inaccuracies in the cable length may be adjusted and also the pedal inclination. The cables are held taut by springs at the pedals; at the rear pedals this spring serves simultaneously for holding down the adjusting stop.
For the adjustment of the cables at the adjusting plate the rear seat must be removed.
The stop for the rudder is located in the back at the rudder.
The rudder lever strikes the stop at the bearing bracket.

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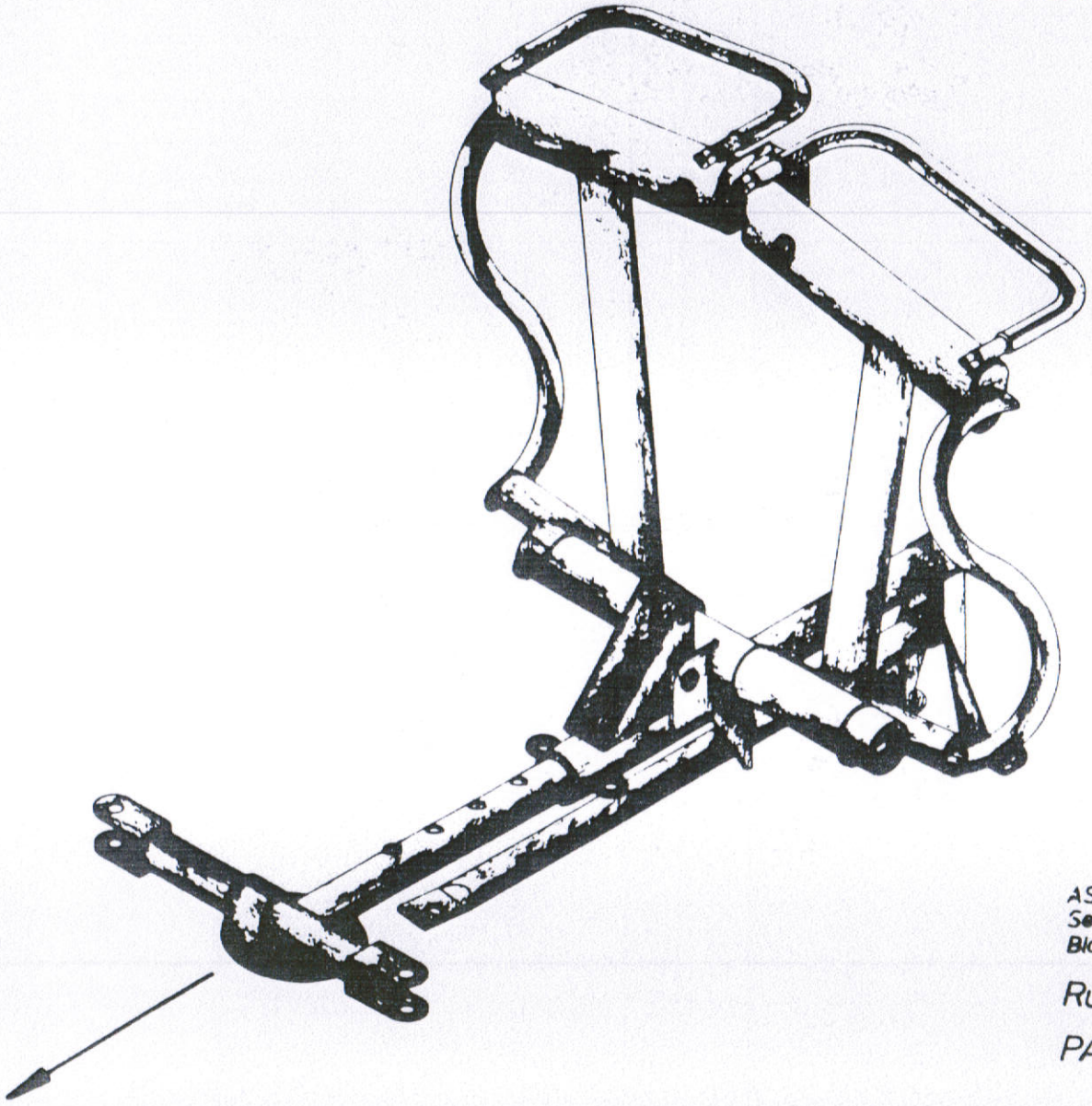

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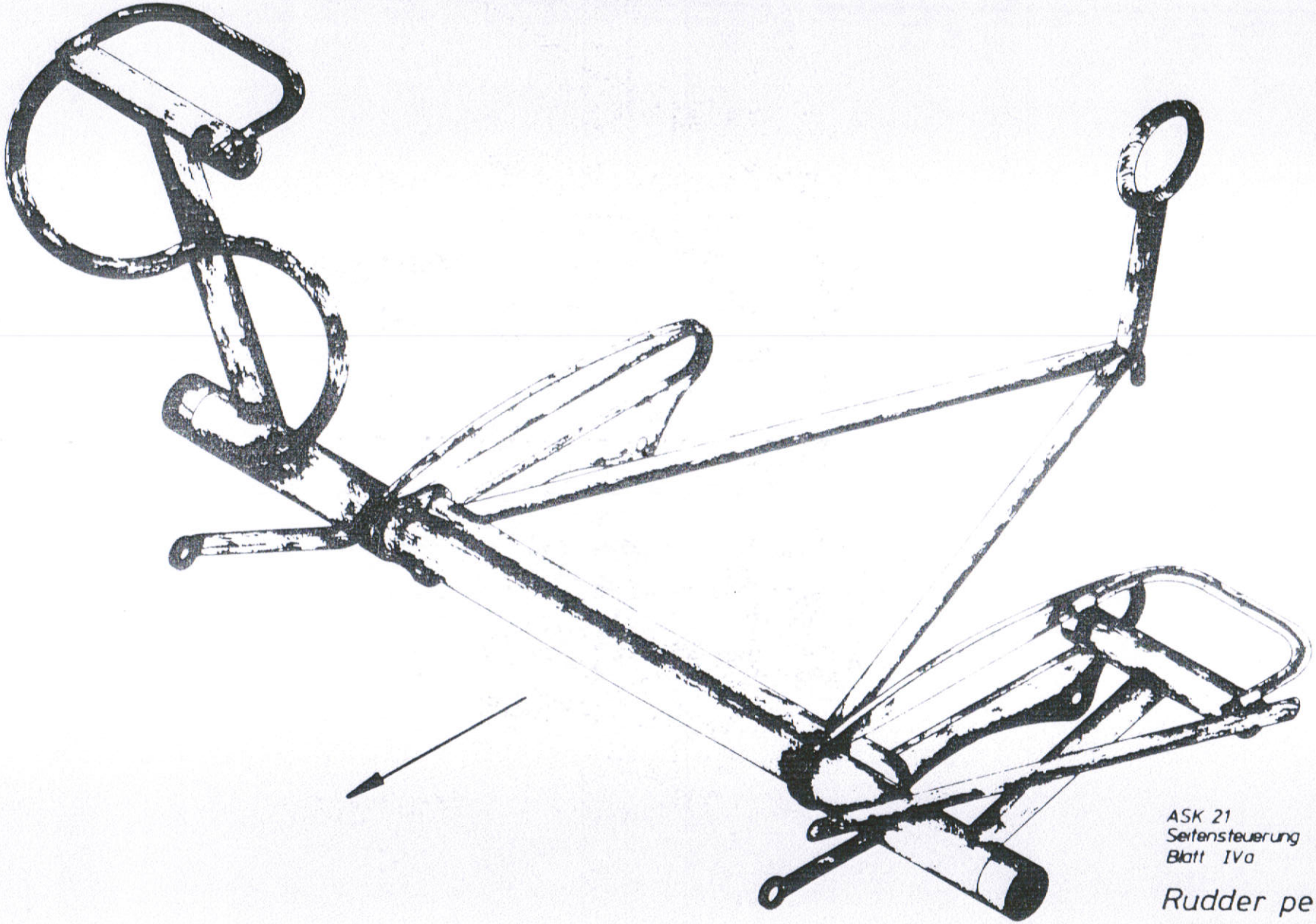
ASK 21
Seitensteuerung
Blatt IV

Rudder pedals front

PAGE: IV



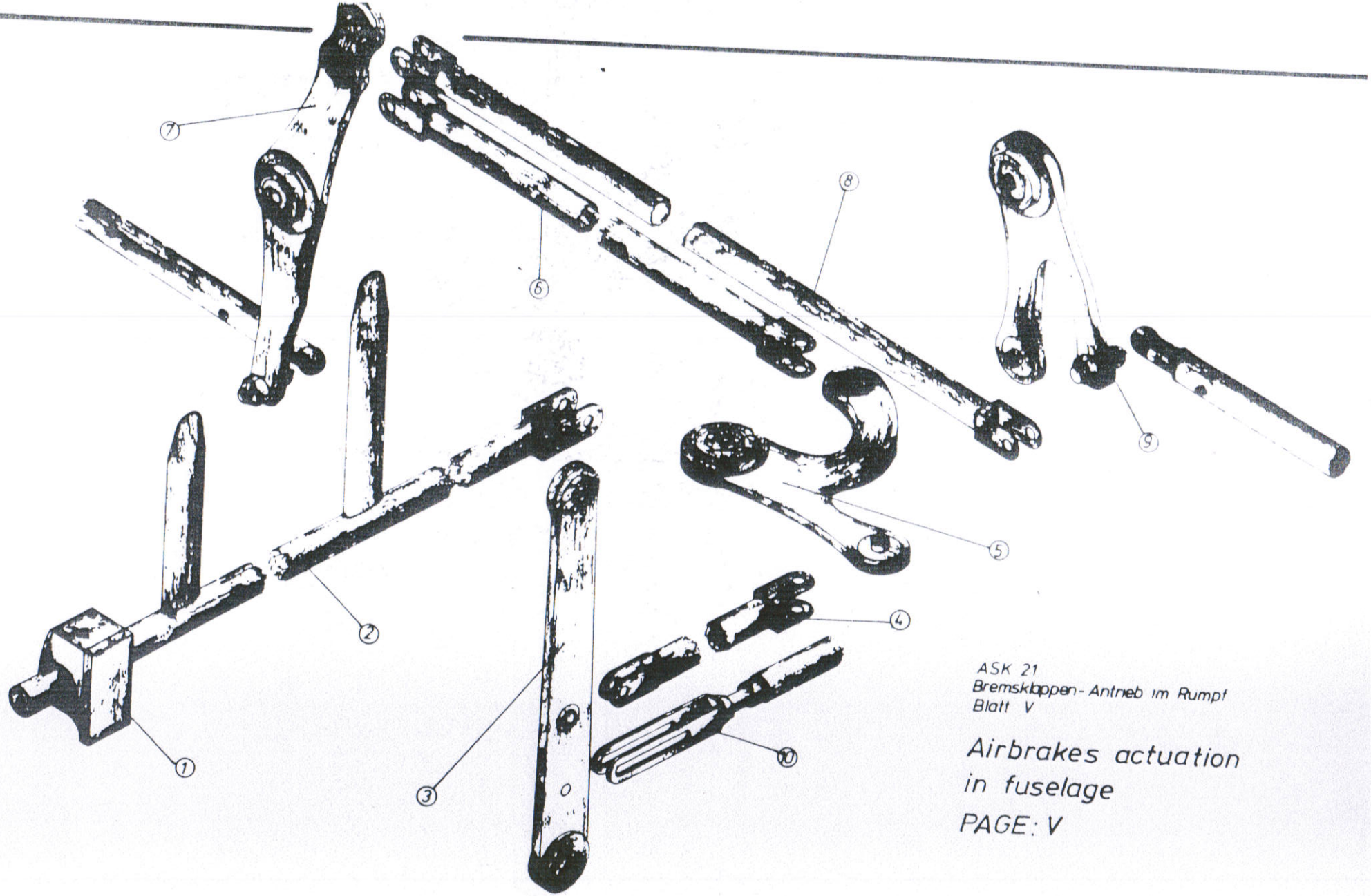
ASK 21
Seitensteuerung
Blatt IVa

Rudder pedals rear
PAGE: IVa

Airbrakes

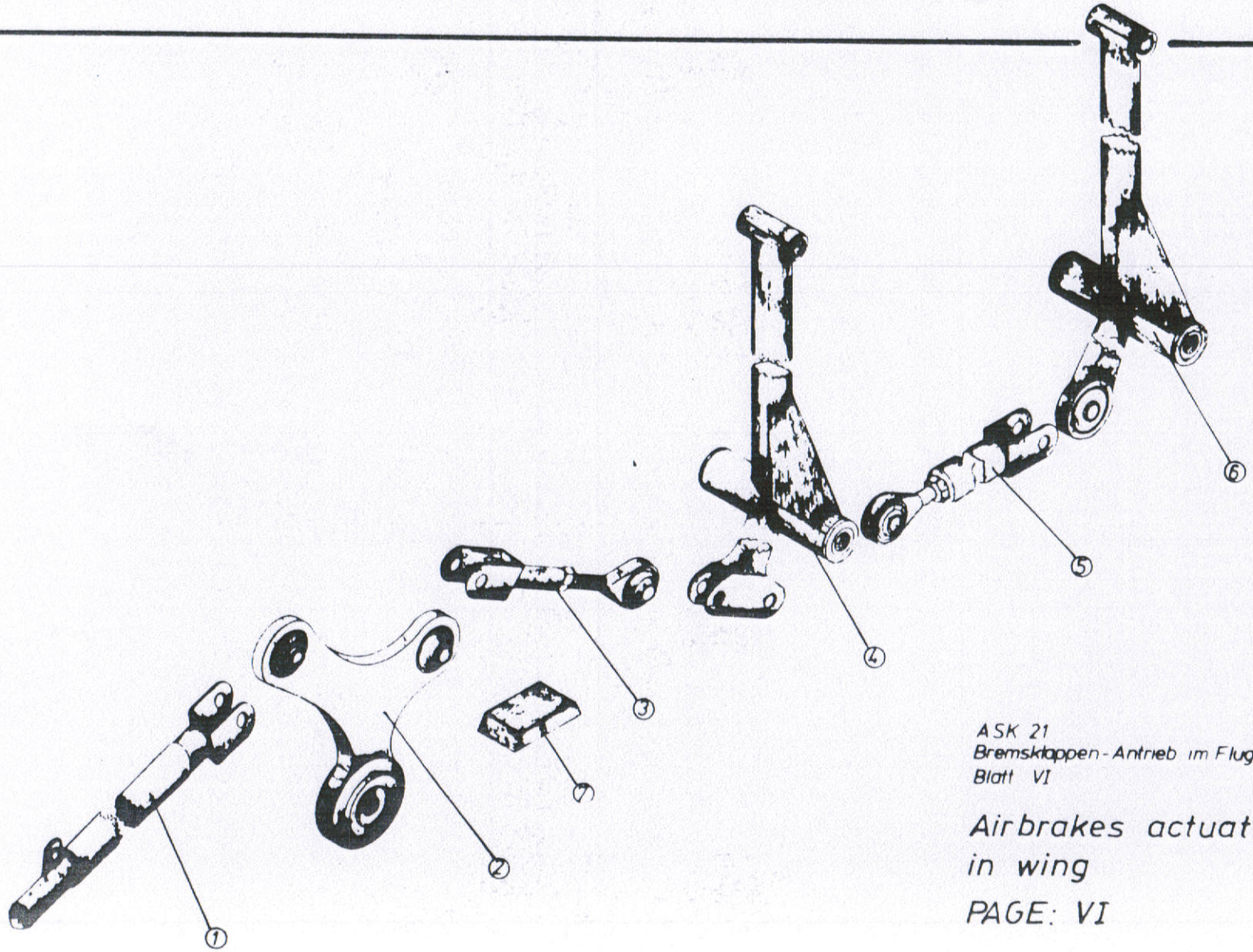
The airbrakes are actuated by pushrods. On the left cockpit wall runs a connecting rod with a handle each for the front and rear cockpit. In the front cockpit the rod is running in a nylon guide, in the rear cockpit it is supported by a duralumin rocker arm. From this arm another pushrod - placed under the arm - continues to a 90° duralumin bellcrank and runs below the rear spar tunnel wall.
The back of the spar tunnel wall features two rocker arms and the pushrod which produces the counterclockwise travel of the actuating levers. By a Hotellier joint (M12.41) the pushrods in the wing are connected to the actuating levers. They run through three ballbearing guides and lead to the airbrake toggle joint lever.
A short pushrod leads to the inner airbrake lever which on the other hand is connected to the outer airbrake lever by a pushrod so that synchronous movement is guaranteed.

Stop of the airbrake control : Brake cylinder.



ASK 21
Bremsklappen-Antrieb im Rumpf
Blatt V

Airbrakes actuation
in fuselage
PAGE: V



ASK 21
Bremsklappen-Antrieb im Flügel
Blatt VI

Airbrakes actuation
in wing
PAGE: VI

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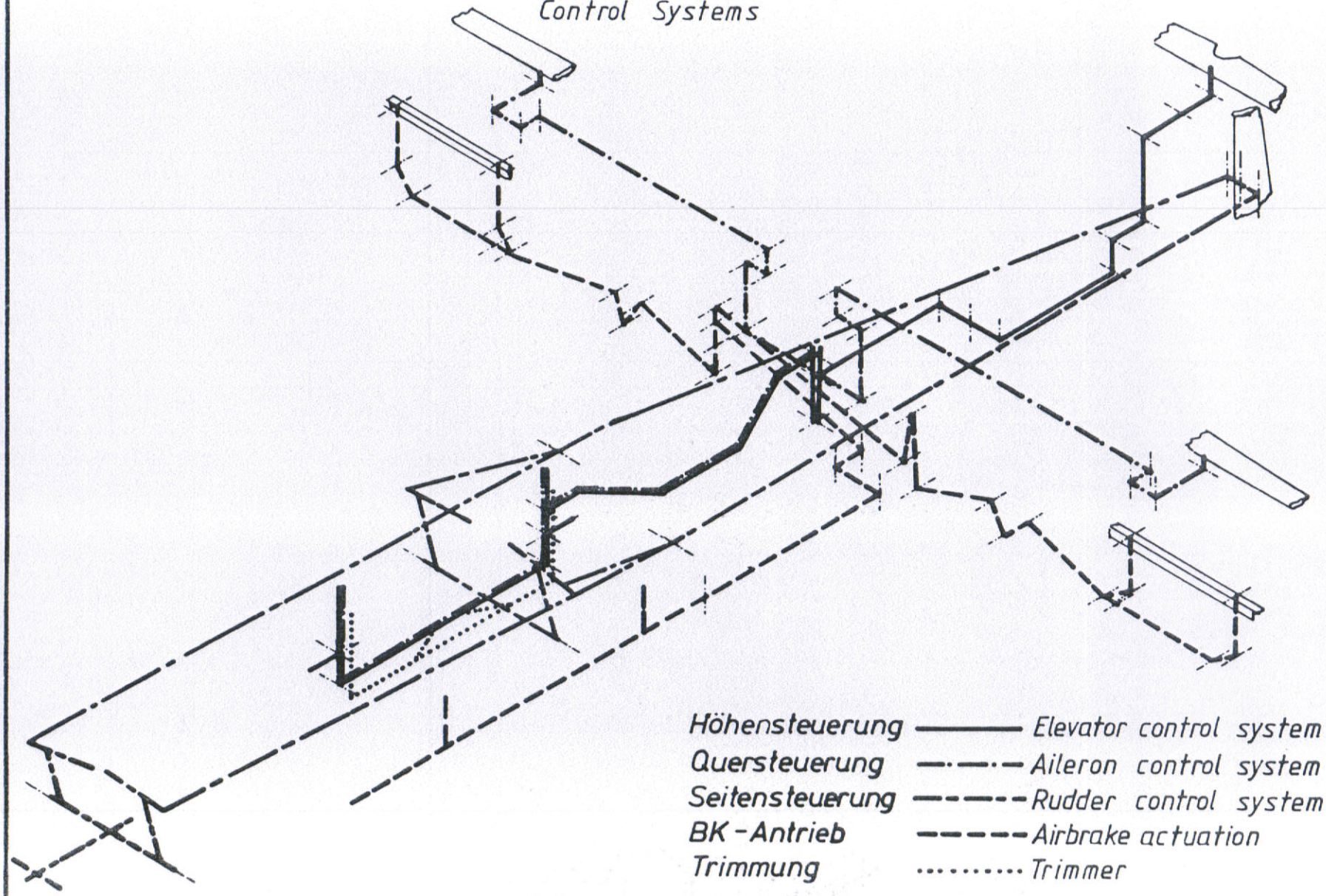
Steuerungs-System ASK 21
Control Systems



Höhensteuerung ——— Elevator control system
Quersteuerung —·—·— Aileron control system
Seitensteuerung — — — Rudder control system
BK-Antrieb — — — — Airbrake actuation
Trimmung ····· Trimmer

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II.2 LANDING GEAR

The landing gear consists of the sprung main wheel 5.00-5 and the unsprung nose wheel 4.00-4. The trailing boom main wheel uses two hollow-typ rubber springs (type KE 120/95 core A with mount- ing member, quality RTK 55).

The rim is a Cleveland wheel 40-78 (B), 5.00-5 TypeIII.
Brake : Cleveland brake assy 30-9.
Mainbrake cylinder : master cylinder 10-20.
Tank for brake fluid : below the rear seat pan on the LH side.
Main wheel : tire with tube 5.00-5, 6 ply ratin
Nose wheel : tire with tube 4.00-4, 4 ply ratin

Tire pressure : main wheel 2,7 bar;
nose wheel 2,0 bar;
tail wheel 2,5 bar

To fill up the brake :

Brake fluid : ESSO UNIVIS J-13 or AEROSHELL FLUID 4.
You absolutely have to observe that only brake fluid on a mineral oil basis is used. Car brake fluid on ester basis will destroy gas- kets and tubes in a very short time.

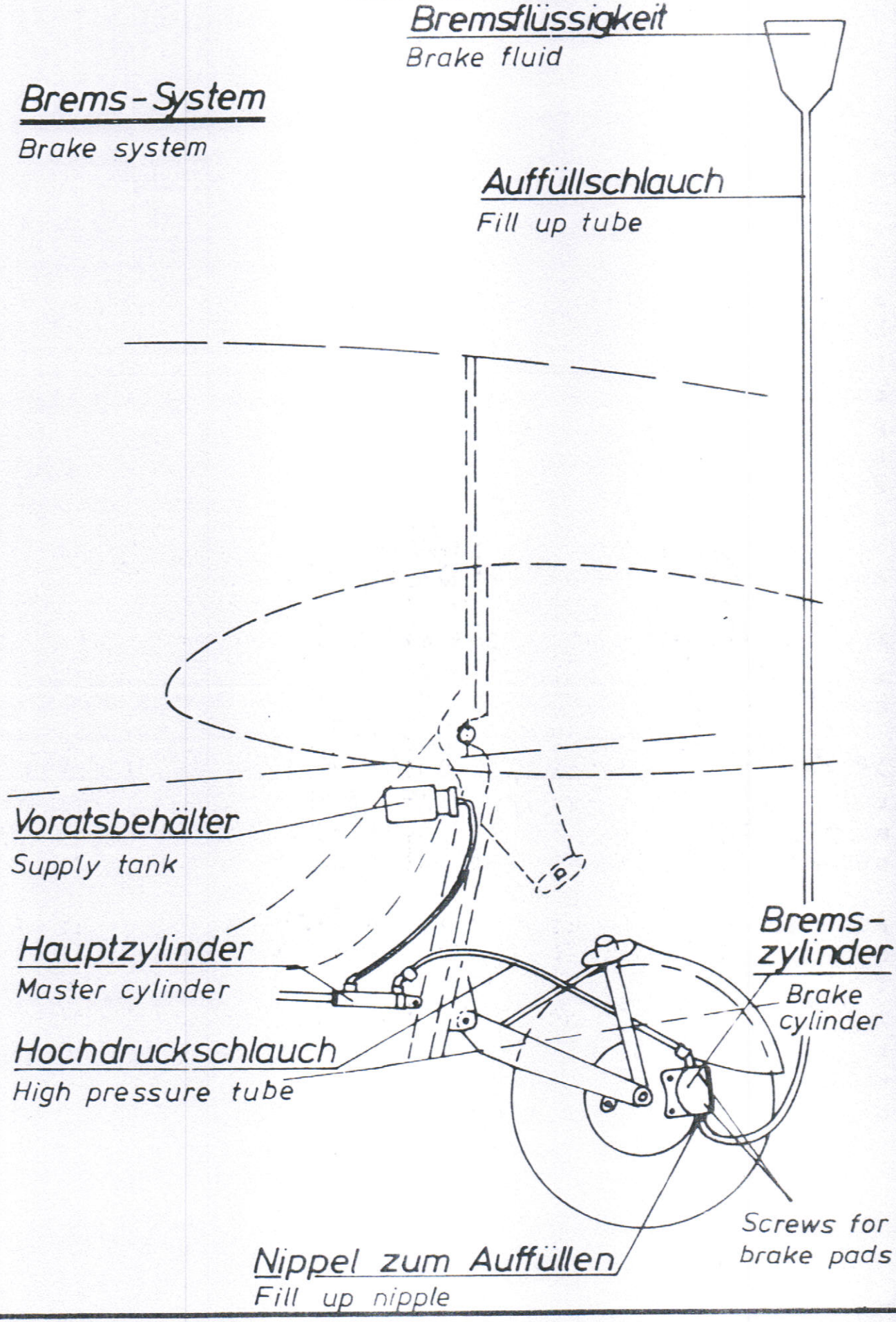
Brake fluid must be filled up from bottom to top in order to avoid air bubbles. For a simple fill up device you need instrument flexible tubing of about 2 m (6,56 ft) length and a funnel filled with approx. 1/4 ltr. of brake fluid at the upper end. The brake cylinder uses a fill up nipple at its bottom. The lower end of the cable must be slipped onto the nipple. When loosening the hexagonal head screw by one turn, a valve opens the nipple.
Hold up the funnel as high as possible so that the brake fluid may run in with pressure. You absolutely have to take care that no air bubbles get into the system. Therefore, always sufficient fluid must be also in the funnel.
Fill up until the fluid in the storage tank stands at 2/3.
Now retighten the nipple and remove the fill up device. Reattach the dust shield cap !!

For the refilling of brake fluid the small plastic tank is taken out of its support. Open it and refill brake fluid !

If the brake system has been emptied already to such an extent that air has penetrated between master cylinder and operating cylinder, filling up must be done again from bottom to top.

Air in the brake system will cause an extension of the actuating travel at the airbrake lever. In consideration of the flexibility of the flexible pipes etc. one may assume that there is no air in the system, if the flexible travel does not exceed 50mm (1,97 in) for an actuating force of 20 kg at the airbrake lever.

Brems-System
Brake system



Inspection and Replacement of Brake Linings

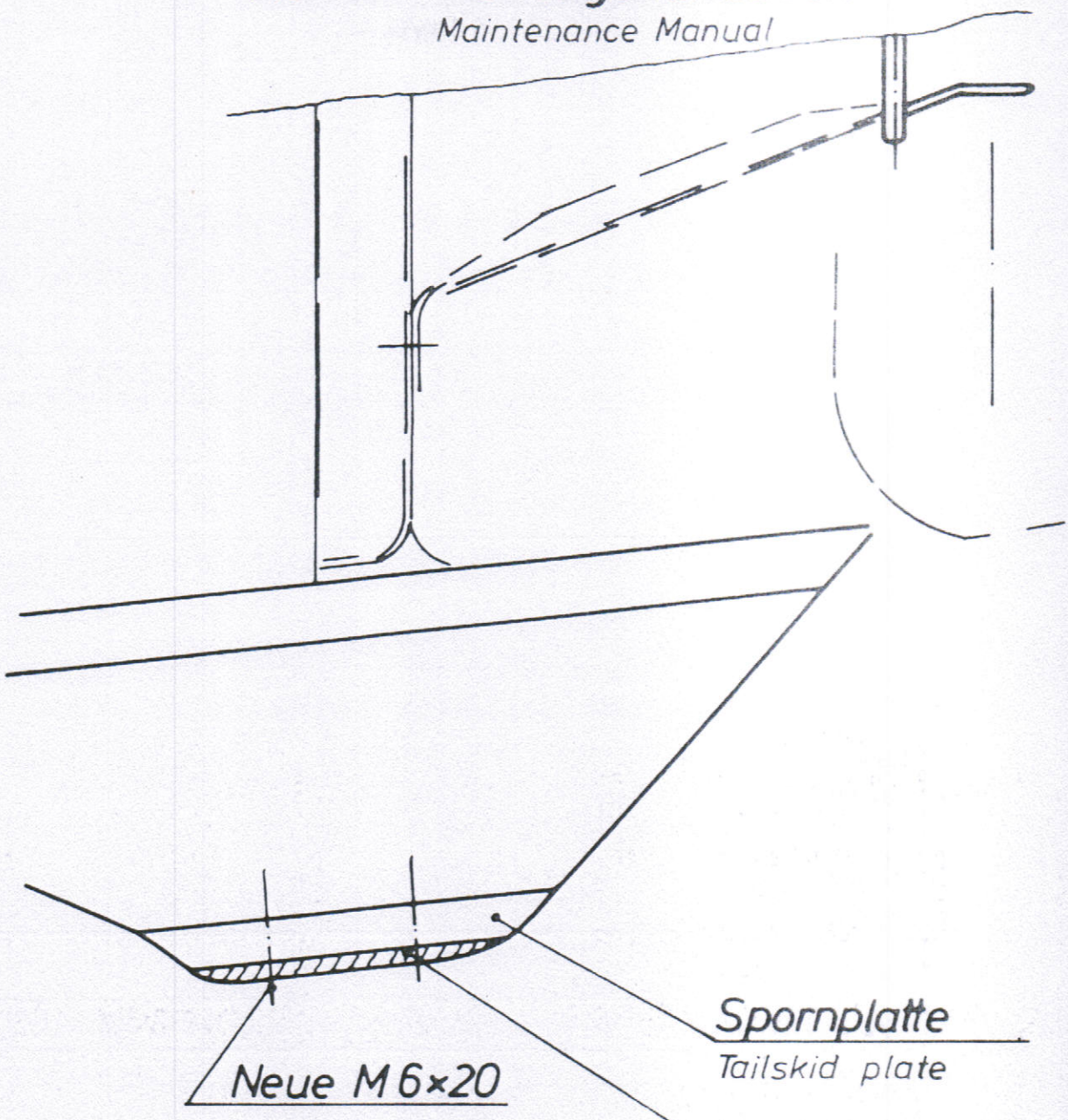
Minimum thickness of brake linings and brake disc:

The linings must be renewed at the minimum residual thickness of 2.54 mm = 0.10 in !
The brake disc must be renewed at the minimum residual thickness of 4.242 mm = 0.167 in !
Reference: WHEEL and BRAKE ASSEMBLIES CATALOG, Component Maintenance Manual, Appendix A, Fits and Clearances, A-1. Brake Lining Wear Limits, A-2. Brake Disc Minimum Thickness, from Messrs. Parker Hannifin Corporation, Avon, OH. USA.

1. Remove wheel fairing.
2. Loosen the two 1/4" screws which are safetied by wire. Do not unscrew the brake line hose!
3. Take out the brake shoes with linings. The linings must be renewed before they have been worn down as far as the rivets as otherwise the brake disc will be damaged and the braking effectiveness unacceptably reduced. To rivet the new linings in place it is best to use a riveting tool designed for the purpose. Alternatively, however, a hammer, centerpunch, and round punch of not less than ϕ 6 mm at the tip may be used.
4. Now replace brake shoes and tighten the two 1/4" screws and secure them with locking wire.
5. Remount wheel fairing.
   Brake linings and rivets to suit can be obtained from Messrs. Schleicher. Orders must specify brake linings suitable for the Cleveland 30-9 brake assy.

Tail Skid

Watch the wear of the tail skid metal plate and either reinforce it in time by welding on sheet metal, or replace it by a new one. Remove the tail skid plate for the welding job.
The rubber tail skid is designed so that it will shear away from the fuselage with strong lateral forces. It may be glued on again or be repaired using contact glue (Pattex). You must apply plasticised fabric adhesive tape over the gap (glue joint) between skid and fuselage in order to prevent long grass from being caught.



Verstärkung der Spornplatte

Reinforcement of the tailskid plate

II.3 RADIO EQUIPMENT

The front instrument panel is provided for the installation of the radio. For the installation the mounting accessories and cables of the radio manufacturer are to be used. For the layout of the instrument panel you have to consider that the radio must be clearly visible and easily accessible to the pilot in the flying position.

As to the clear visibility, however, priority must be given to the flight control instruments for the layout.

A suggestion for the instruments layout is given on the drawing of the instrument panels.

The BECKER radio may be installed both horizontally or vertically.

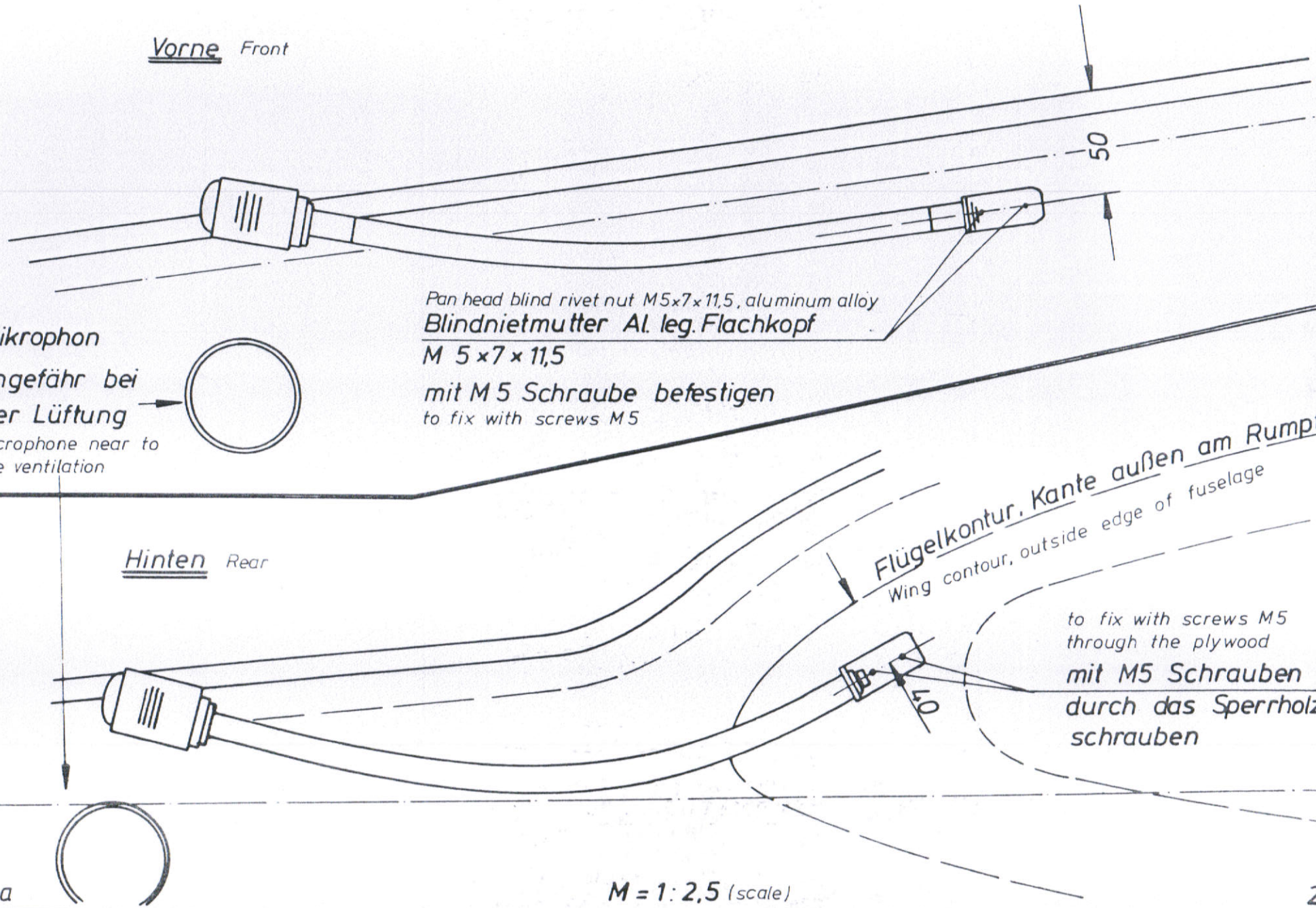
The loudspeaker may be fitted below the rear instrument panel cover on the LH side.

The boom microphone is to be fitted on the RH cockpit wall.

A support for a dryfit battery (12V, 6.5Ah) is provided in the luggage compartment of the left wingroot.

Einbau der Schwanenhalsmikrophone an der rechten Rumpfseitenwand

Installation of boom microphones on the RH cockpit wall



M = 1 : 2,5 (scale)

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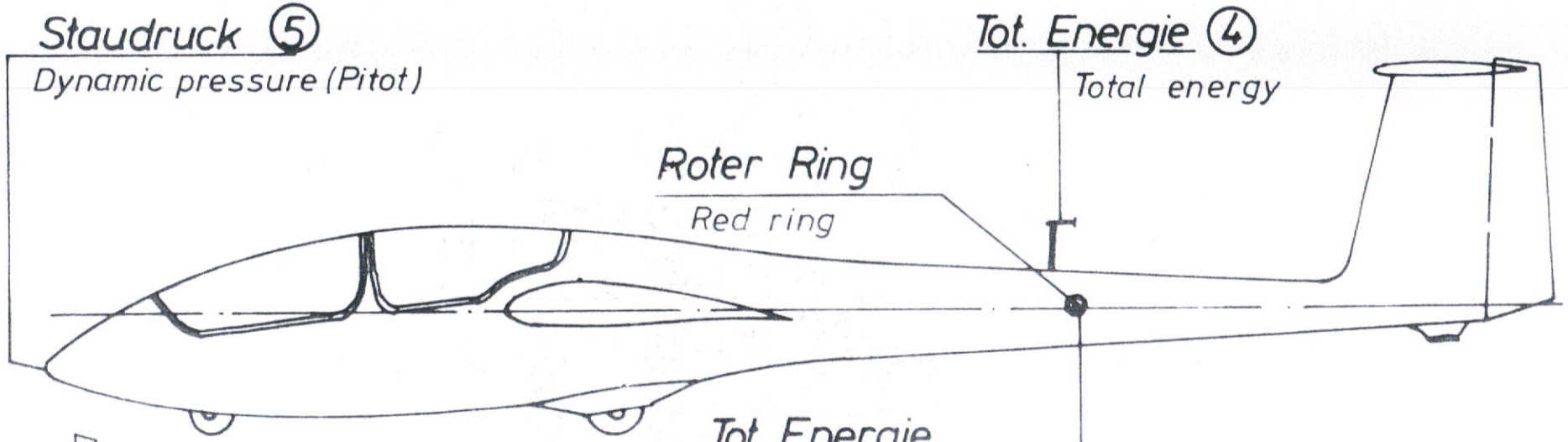
II.4 Oxygen Equipment

Suitable bottle fixing brackets for two 4 liter oxygen bottles of dia. 100 mm are available as an optional accessory from Messrs.SCHLEICHER.

When fitting the oxygen bottle(s), ensure that it is properly installed and securely anchored.

NOTE: Fitting of oxygen equipment causes only a minimal change in the empty--mass C.G. position ! However, it is necessary to re-weigh the glider and redetermine the empty mass C.G.

When flying at greater heights while using the oxygen system, it should be borne in mind that any particular system may only be suitable for a limited altitude range. The makers' instructions should be complied with.



Druckleitungen und Anschlüsse für die Instrumente

Pressure Ports And Connections For The Instruments

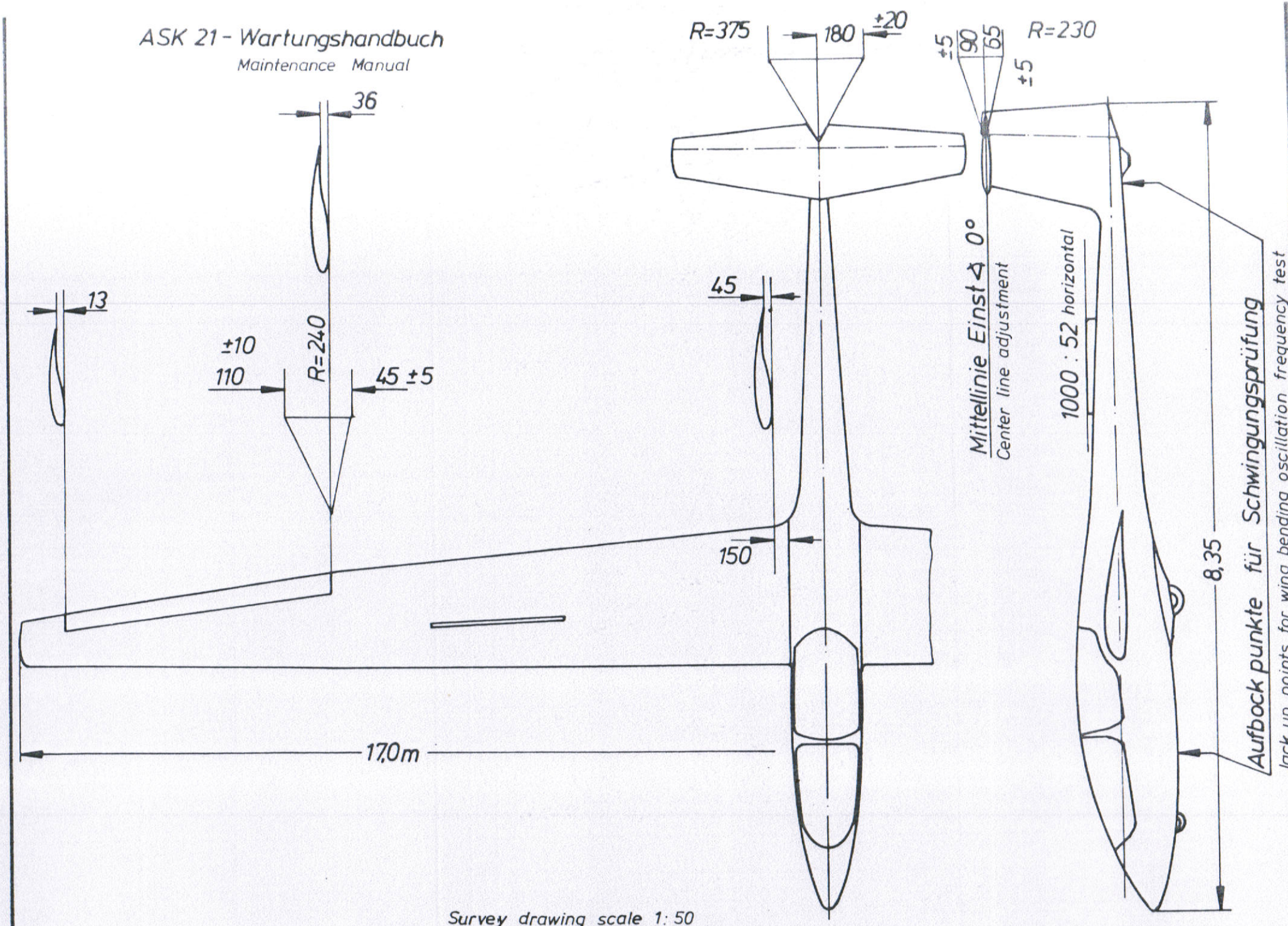
Color of flexible tubing

1. Pitot pressure : green.

2. Static pressure: transparent

3. Capacity bottle: blue

4. Total energy probe : red.



Survey drawing scale 1: 50

ASK 21 Übersicht M=1:50

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ADJUSTMENT

Basic adjustment :	Wedge on fuselage aft section 1000 : 52 horizontal		
Wing angle of incidence :	Distance from center line		Trailing edge higher than horizontal line applied from below.
	y = 0,52 m (1.7 ft)		50 ± 5
	y = 5,20 m (17.06 ft)		37 ± 5
	y = 8,00 m (26.25 ft)		16 ± 5
Wing dihedral :	Angle between upper wing center section and horizontal line		3,6°
Sweep of airfoil :	Wing center section leading edge		level
Stabilizer adjustment :	Airfoil center line		0°
Control deflections :	Upwards	Downwards	Measurement distance from center of rotation
Aileron	110 mm ± 10 (4,33 in ± 0,39)	45 mm ± 5 (1,77 in ± 0,2)	240 mm (9,45 in)
Elevator	90 mm ± 5 (3,54 in ± 0,2)	65 mm ± 5 (2,56 in ± 0,2)	230 mm (9,06 in)
Rudder	180 mm ± 20 (7,09 in ± 0,79)		375 mm (14,76 in)
Tow release :	Release force max 12kg (for both tow releases together)		
	Airbrake gap between airbrake and wing		25 - 35 mm (1 - 1,3 inches)

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IV. Equipment With Limited Operation Hours

Tow Release Couplings

The Tost tow release couplings, factory fitted, i.e. the C.G. Safety Tow Release "Europa G 72", or "G 73", or "G 88" respectively, and the front Nose Tow Release "E 72", or "E 75", or "E 85" respectively, have a limited service life (TBO) and must be returned to TOST for re-inspection in regular intervals. The service life is stated in the appertaining Manufacturer's Authorized Release Certificate. The instructions given in the TOST "Operating Manual" or in the "Operating and Maintenance Instructions" for the tow release couplings must be observed!

Instruments

The flight monitoring instruments are not normally subject to service life limitations. As a general rule, the makers' instructions should be complied with.

Oxygen Equipment

For oxygen systems fitted, the relevant section of the appertaining Manufacturer's Inspection Release Certificate states the overhaul time limit. Over and beyond this, the oxygen bottles must be re-inspected by a technical inspection institute every five years in accordance with pressure vessel regulations.

Special Servicing Procedures

At regular intervals of 6 years the brake line hose of the hydraulic wheel brake must be replaced. Should this hose be found to be in good condition, it need not be replaced, on condition that its condition is checked at least every 100 flying hours.

V WEIGHTS AND C.G. POSITIONS

V.1 On the WEIGHT AND BALANCE SHEET (see page 33) the min and max c.g. limits with regard to the glider empty weight are noted.

Min pilot weight for front seat = 70kg.
Max pilot weight for both seats = 110kg each.

Pilot weight means pilot + parachute. If the empty weight c.g. positions are within the permissible range, it is assured that also the in-flight c.g. is within the permissible range provided that the load limitations (pilot weights) have been observed.

The max all up weight of 600kg must not be exceeded. In the case that the empty weight comes to more than 380kg, the max permissible pilot weights have to be reduced accordingly.

V.2 WEIGHTS OF NON-LIFT PRODUCING MEMBERS

The weight of the non-lift producing members is composed of pilots' weights, fuselage, tail units, and equipment, - without the weight of the wings. The weight of 410kg for the non-lift producing members must not be exceeded.

After repairs, repaintings or the installation of additional equipment, at the latest however every 4 years the empty weight and the c.g. positions must be reestablished.

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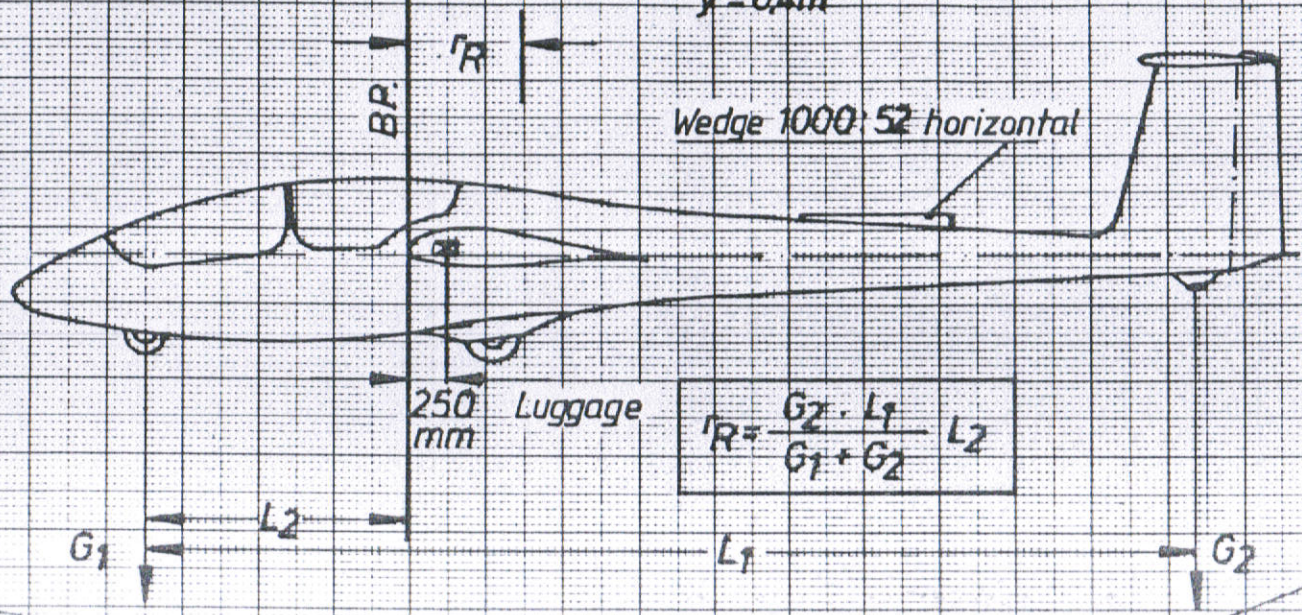
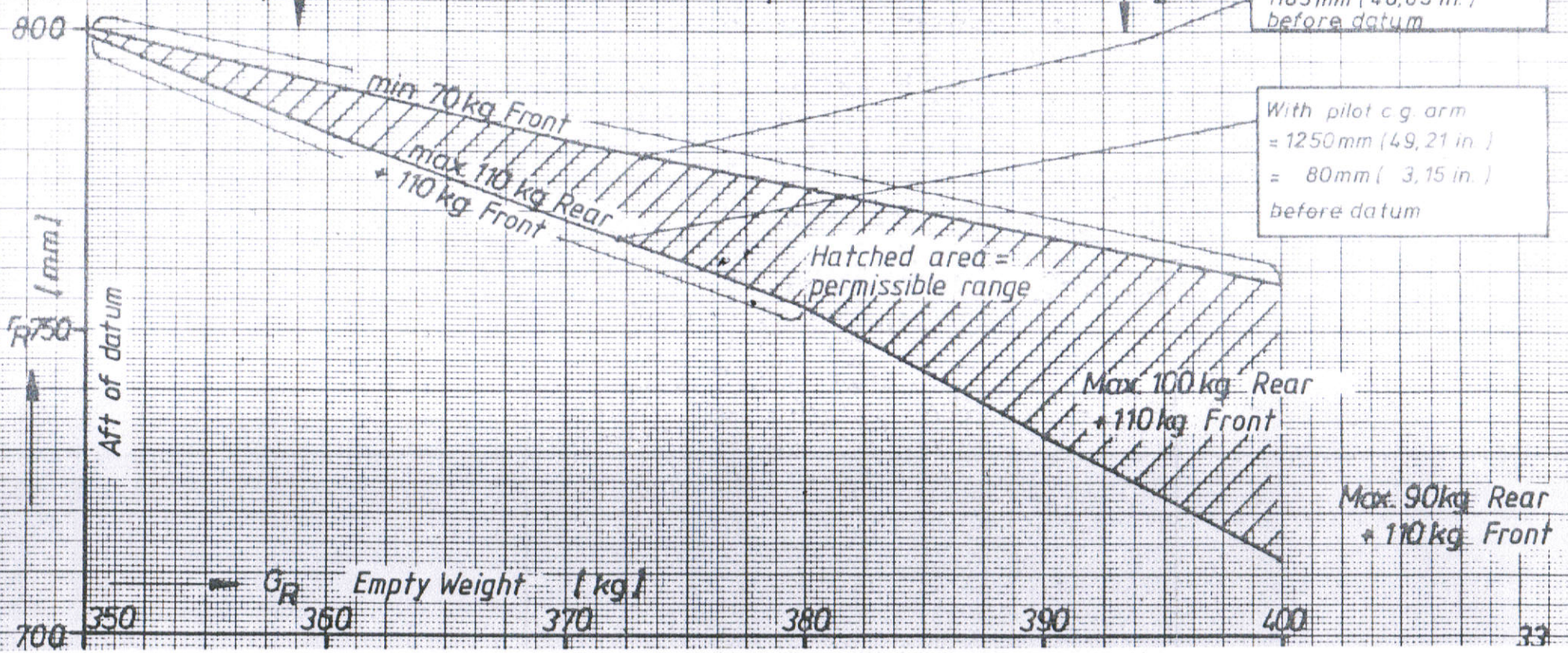
ASK 21 - Wägeblatt
Weight and Balance Sheet

Issue April 1980





Date of weight & balance	Empty weight c.g. (mm/in. behind datum)	Front seat kg/lbs payload incl. chute min	Front seat kg/lbs payload incl. chute max	Rear seat kg/lbs payload incl. chute min	Rear seat kg/lbs payload incl. chute max	Signature of inspector, inspection stamp
26.04.99	774	70	110	/	110	A SCHLEICHER
14.07.04	766	70	110	/	110	AeroService sr.
26/6/08	773 mm	70	110	/	110	AIRLAZO SERVICE

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Weight, empty weight c.g. and payload have to be certified by an inspector on page 11 of the Flight Manual and on page 34 of the Maintenance Manual.

It may be necessary to install ballast in the tail in order to get the empty weight c.g. within the permissible range.

Installation of ballast in the tail

1. The amount of the lead ballast which is required is established either by calculation or by a weight and balance procedure.

2. Suitable cast lead plates are available with the company Schleicher.

3. Remove the rudder.

4. By use of a knife remove the tailskid very carefully. Grind off glue residues and other impurities.

5. From below drill a hole of 8mm (o,3 in) in diameter : centrically to the lead plate. The long side of the lead plate must be placed next to the vertical tail unit spar so that the plate will not turn;

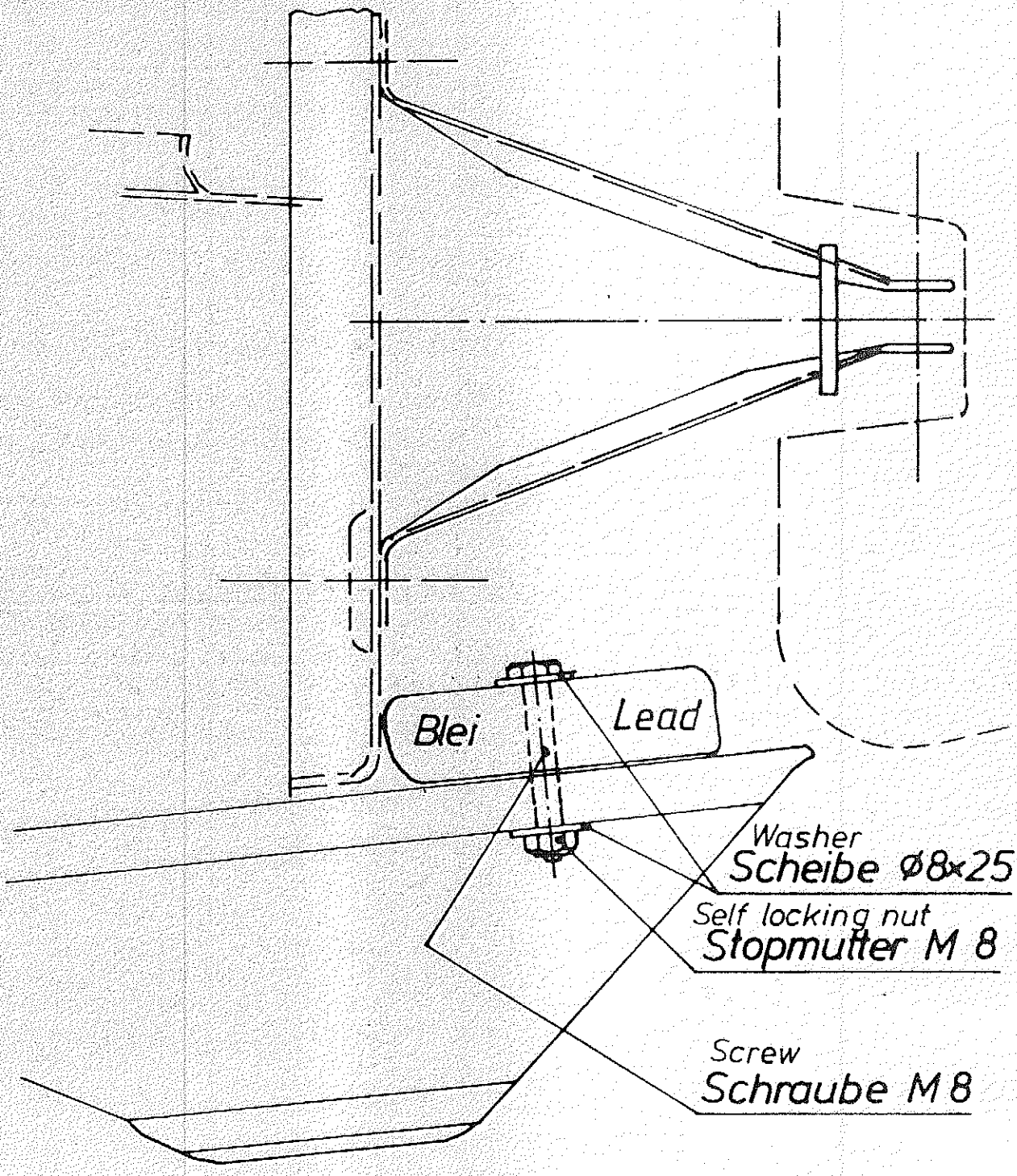
6. Shorten the M8 screws, screw them on and safety with a selflocking nut. A washer must be added on each side.

7. Reglue the rubber skid with contact cement.

8. After the hardening smooth the tailskid-fuselage gap and tape it in order to prevent the peeling off or catching of long grass.

9. Refit the rudder and safety duly with castellated nut and cotter pin.

Anbringen von Ballast im Rumpfheck
Installation of ballast in the tail



VI WEIGHTS AND TAILHEAVY STATIC BALANCE OF CONTROL SURFACES

After repairs or repaintings the weight of the control surfaces and their tailheavy static balance must be checked. For this job the control surfaces have to be removed. For the determination of the tailheavy static balance $M = P \cdot r$ the control surfaces must be seated in the fulcrum with as little friction as possible. If necessary suspend them in their bearings with thread. To measure P at the trailing edge it is best to use a spring balance of 1kg scale to which a small piece of tape is attached. If necessary, a letter balance will do, too.

If weights or tailheavy static balance moments are not within the approved tolerances, you should contact the company Schleicher.

Tolerances in weight and tailheavy static balance of control surfaces and tolerances in play (backlash) of control systems (controls fixed).

	Weight tolerance kg/lbs)	Tailheavy static balance tolerance cm/kp (in/lbs)	Tolerance in play (backlash) Degree	mm/in)
Rudder	1,75 - 2,59 (3,86 - 5,71)	17,1 - 22,3 (3,1 - 4,0)	0,672°	3,88 (0,15)
Elevator	3,15 - 4,1 (6,95 - 9,04)	13,9 - 18,4 (2,5 - 3,3)	0,92°	2,84 (0,11)
Aileron	2,85 - 3,75 (6,28 - 8,27)	17,4 - 22,9 (3,1 - 4,1)	0,864°	3,01 (0,12)

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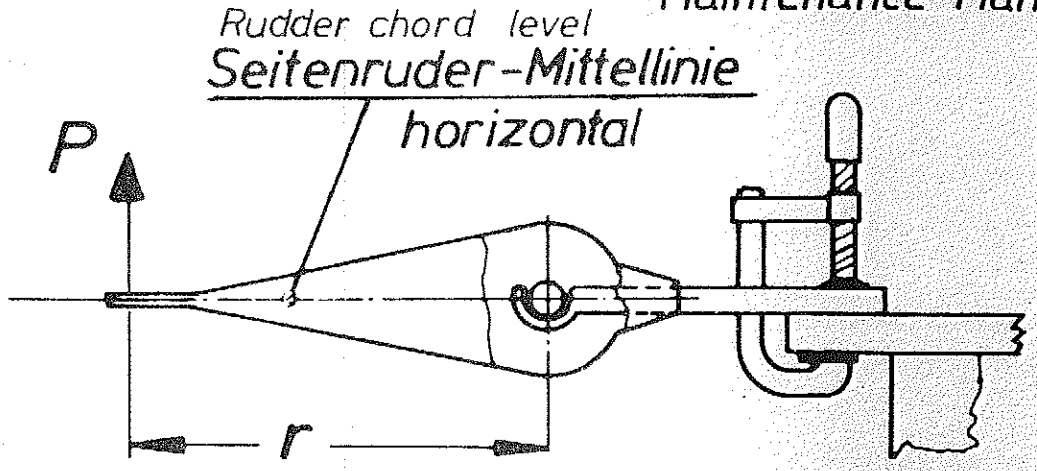
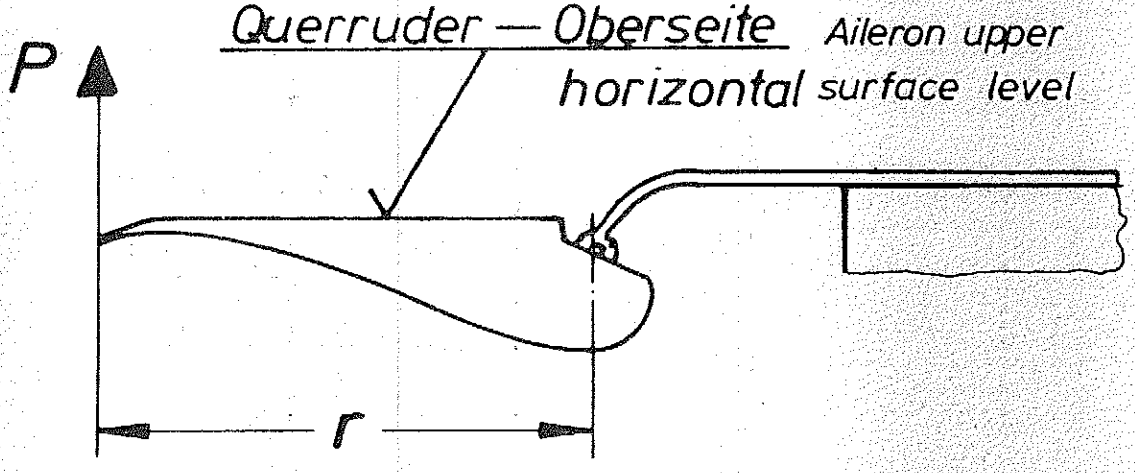
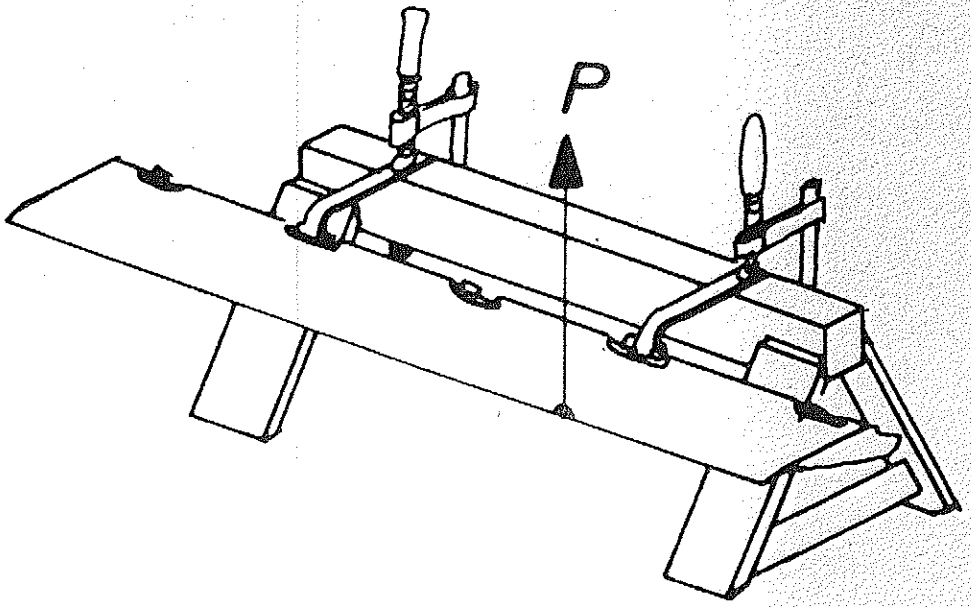


$M = P \cdot r \quad (kp \cdot cm)$

Messung von P mit Brief-oder Federwaage

Determination of 'P' by use of a spring balance or a letter balance





Tailheavy static balance measurement of controls

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 ROTELLIER 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 checks

After 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).

VIII PERIODICAL INSPECTIONS

The following maintenance checks have to be carried out periodically, however, imperatively at the latest annually :-

1. Check the whole glider - outside and inside where accessible - for cracks, holes, dents and white spots in the fiberglass.

2. The attachment hinges and pins must be checked for corrosion, tool marks and play. If the front shear pins of the wing-fuselage junction show too much lateral play due to ground loopings, thin metal washers must be added on these pins.
The spar pins must show some play, otherwise the wings possibly cannot be rigged at all with different temperatures. Besides here the bearing pressure is so low that there is no danger of wear out.
On the other hand the rear pins of the wing-fuselage junction require more attention. In the case of play (backlash) at these pins they have to be replaced in time against oversize pins. The play (backlash) at these pins should be within the tolerances H7/g6.
Good preventive maintenance will increase considerably the service life of all pins and fittings. Always clean and relubricate the pins prior to every rigging. Do not misalign the pins !!

3. Check all metal parts for corrosion and, if necessary, repaint them. As priming a zinc-chromate prime has to be used.

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, fittings, 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 tailskid (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.

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

1. **Securing**

Past experience showed that the quick-release connectors in the airbrake, 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. 1,2 mm ø for this purpose.

Fig. 1

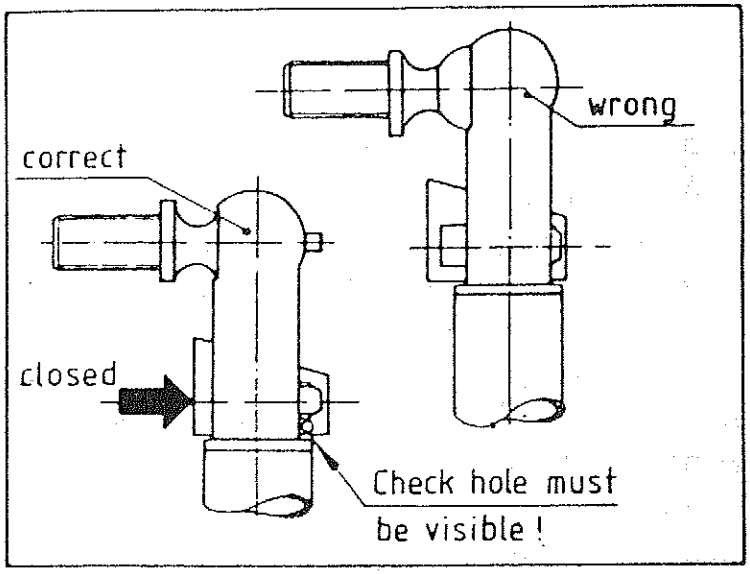
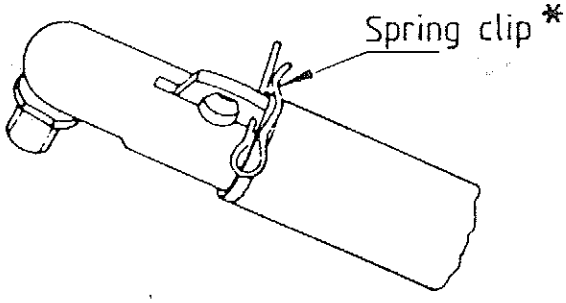


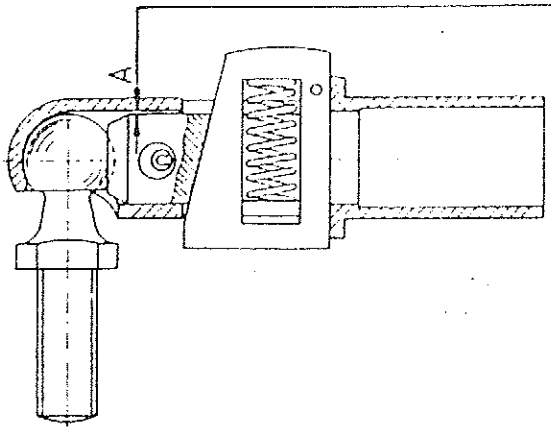
Fig. 2



* 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).

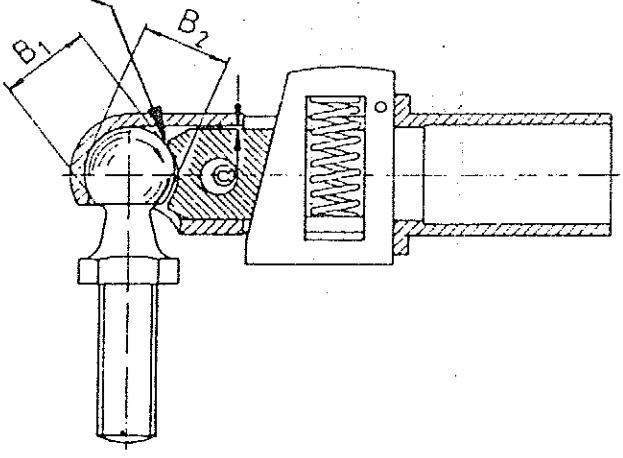
2. Inspection

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.

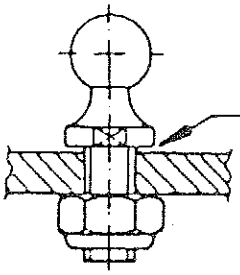


Clearance A must not exceed 0,15 mm (0,006 in); check this by using a wire of the above diameter!

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.

Inspecting the taping of the control surface gaps

For aerodynamic reasons the control surface gaps between wing and aileron and between stabilizer and elevator respectively are taped where the control surface hinges are located.

Should this adhesive tape come off or be damaged, this may lead to flutter! Therefore the sealing adhesive tape must be inspected in regular intervals and where necessary replaced.

If the adhesive tape needs to be removed for maintenance, or repair purposes, or because of aging please observe the following: as a replacement you must use only the Tesa tape no.46451, white, 25 or 38 mm wide, made by Beiersdorf AG, Hamburg.

Where other types of adhesive tape have been used, flutter cases have been repeatedly reported!

Where a plastic fairing tape (elastic lipseal) has been fixed at the control surface gaps, you have to observe MAINTENANCE INSTRUCTION C.

VIII.1 Inspection Program to extend Service Life

Introduction

Fatigue tests on GRP/CFRP wings and GRP/CFRP wing spars have shown that a service life expectancy of at least 18000 hours may be achieved for these components. However, as this test program did not examine an entire aircraft made of CFRP and GRP, this service life of 18000 hours can be achieved only if the long-term airworthiness of each individual glider is demonstrated in a special multi-stage inspection program (over and above the mandatory annual C of A inspections).

Time Limits

1st Stage:
When the sailplane has reached a service life of 3000 and 6000 hours respectively, tests must be carried out in accordance with the Inspection Program for the ASK 21, Issue 2 dated 28.04.92, as laid down by Messrs. Schleicher.

If the results of these tests are positive, or if any defects discovered have been correctly repaired, the service life of the sailplane will be increased after the 6000 hours-inspection by 3000 hours, i.e. to a total of 9000 hours.

2nd Stage:
When a service life of 9000 flight hours has been reached the above Inspection Program must be repeated. If the results are again positive, or any defects found have been correctly repaired, the service life may be increased to a total of 12000 flying hours.

3rd Stage:
Before reaching a service life of 12000 flight hours an inspection in accordance with TN no.29 must be accomplished. Depending on the results of this inspection, as well as on the history of the aircraft and the evidence of the percentage of aerobatics being below 12.5 % as compared to the total flight time, Messrs. Schleicher will decide on a release to service for up to 15000 hours.
The Inspection Program must then again be repeated and on the condition that the results are again positive, or any defects found have been correctly repaired, the aircraft may be approved for increase of service life up to 18000 hours.
It will be decided at a later date whether an extension of service life beyond 18000 hours may become possible. A research program which is intended to clear the preconditions of this aim, has already been started with the BMVBW (Federal Ministry of Transport).

Inspection Program
Please contact SCHLEICHER in order to obtain the Inspection Program for the ASK 21, Issue 2 dated 28.04.92, or any later issue effective.

The inspections must be carried out only by the manufacturer, or by an appropriately licensed aircraft repairer.

The results of the inspections must be entered into the Inspection Program which is at the same time the report of findings, where each item must be annotated with a comprehensive comment, as laid down.
If the inspections were carried out by a licensed aircraft repairer, a copy of the filled in Inspection Program (report of findings) which must be signed by the inspector, must be returned to SCHLEICHER for the purpose of evaluation.
On receipt and examination of such Inspection Program Report SCHLEICHER will issue an "Acknowledgement of Receipt" and send this back to the operator of the sailplane. Only on receipt of this "Acknowledgement" the inspector may certify the extension of the service life as laid down in the Inspection Program, into the logbook and the relevant sailplane's inspections papers.
The need for annual Certificate of Airworthiness inspections and overhauls (for German registered gliders § 27 (1) LuftGerPO applies*) is not affected by this rule.
*) LuftGerPO = Aeronautical Products Examination Order

IX LUBRICATION SCHEME

Ball bearings :

The slotted-sealed ball bearings are filled with a longlasting grease and capped off. So it is unnecessary to regrease this bearing.
The 14C6 self-aligning bearings in the pushrods and in the duralumin rocker arms are also greased and covered with felt seals so that they likewise do not need any regreasing for a long period of time.
The same applies to the ball bearings of the push-rod guides.
The grease nipples at the control stick and at the landing gear rocker arm should be lubricated at least annually.
The grease nipples of the control systems are accessible from the top when the seat cushions are removed.
The rear seat has to be removed in order to reach the grease nipples of the landing gear rocker arm.

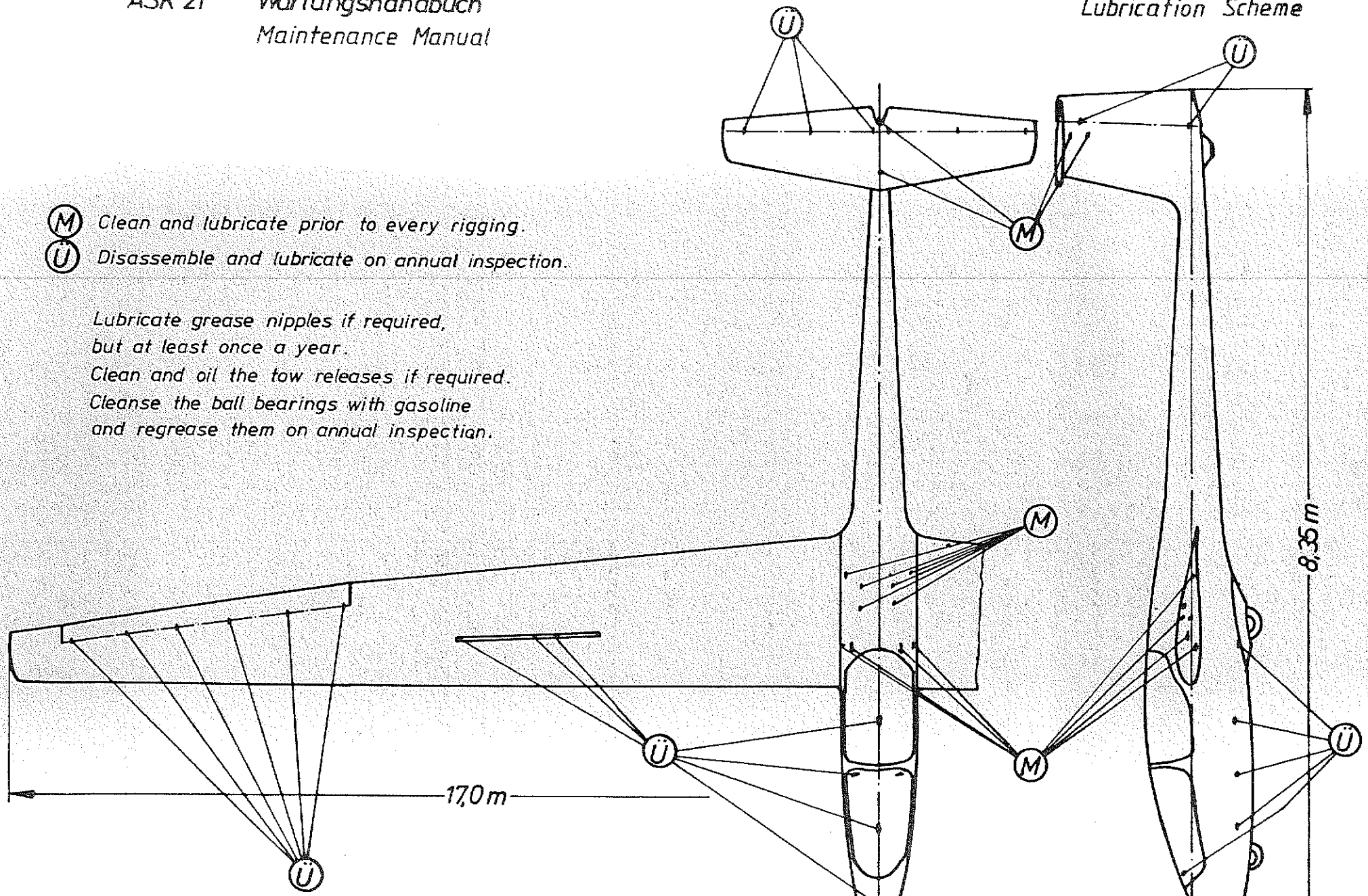
The canopy locks, and especially the emergency jettisoning device in the front cockpit, have to be kept well lubricated.

Dirty tow releases are cleaned best with compressed air, brush and through movement of the kinematics. Then regrease them with a spray oil or some similar agent.

Lubrication Scheme

(M) Clean and lubricate prior to every rigging.
(Ü) Disassemble and lubricate on annual inspection.

Lubricate grease nipples if required,
but at least once a year.
Clean and oil the tow releases if required.
Cleanse the ball bearings with gasoline
and regrease them on annual inspection.



LUBRICANTS: multi purpose grease.
OIL : machine oil or car engine oil.

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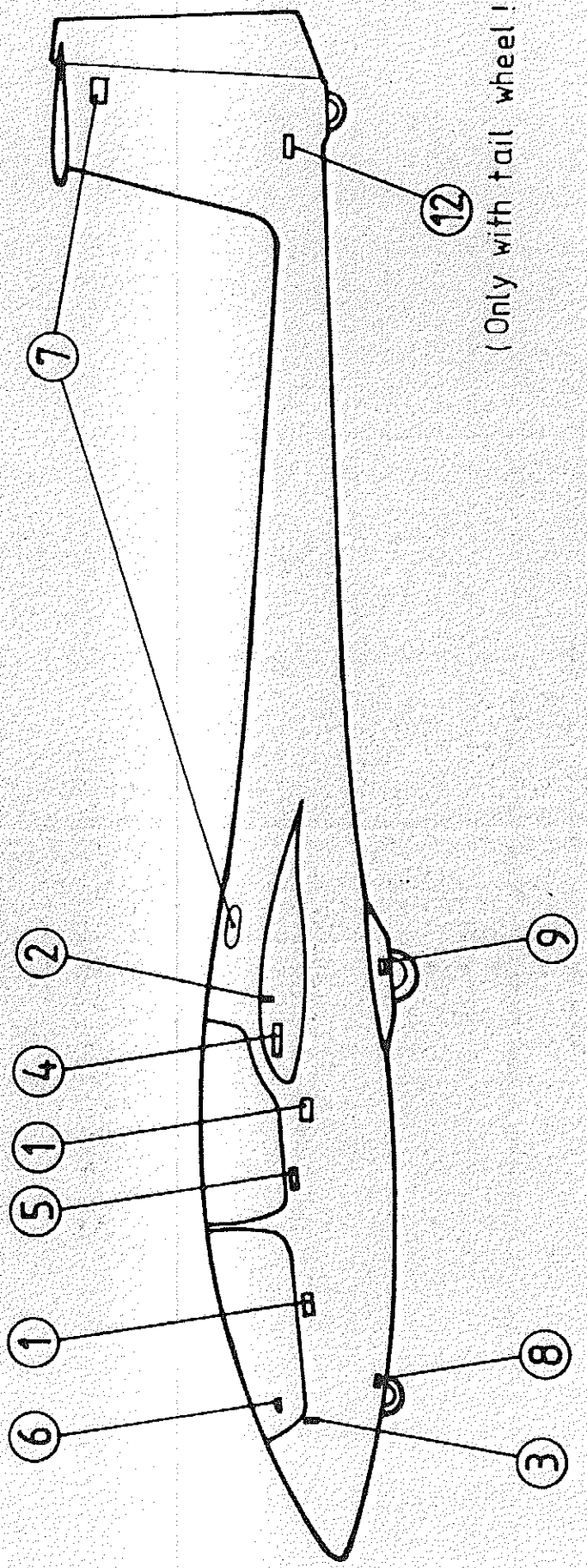
X. PLACARDS AND MARKINGS

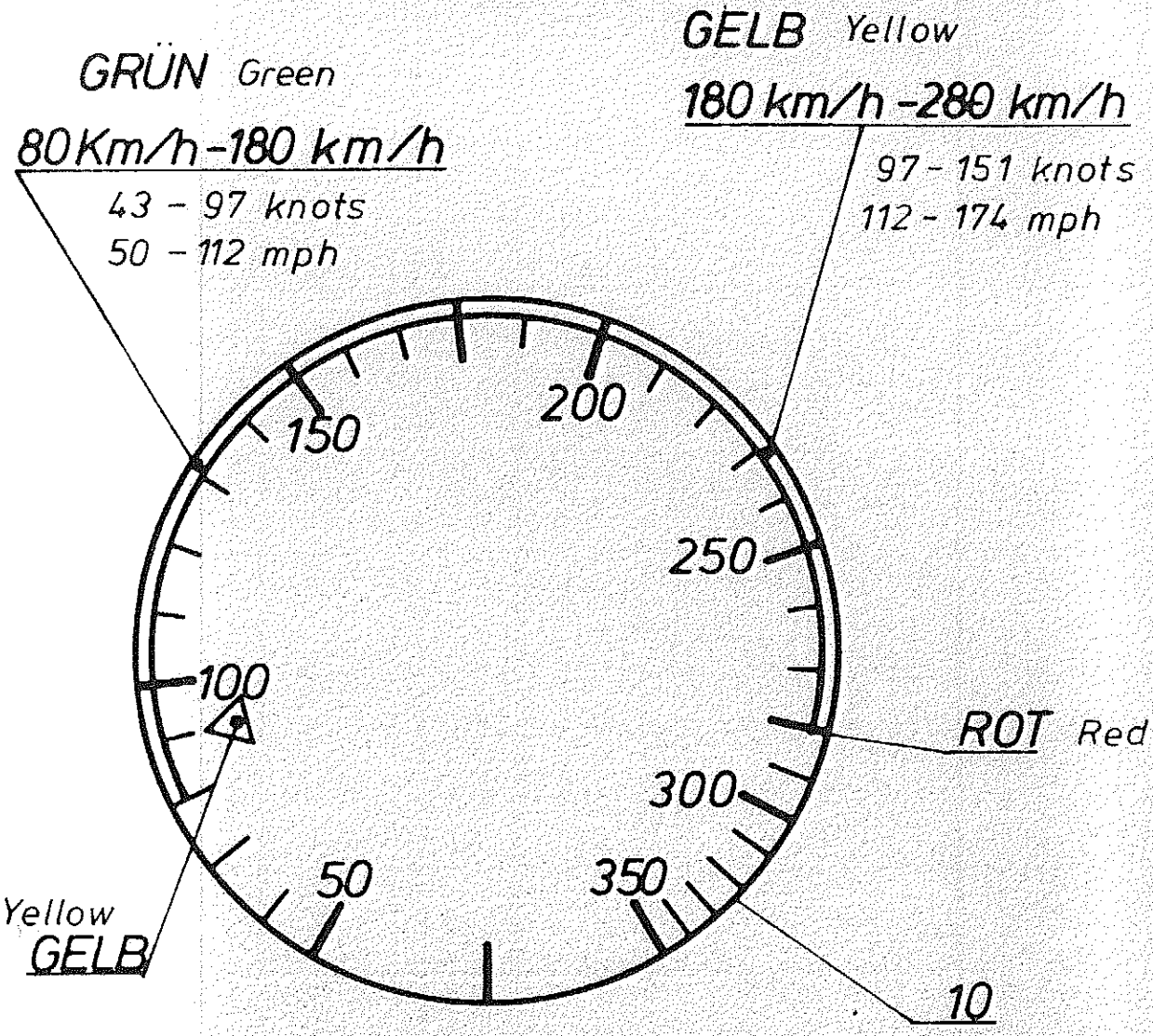
1. Data placard with weight & balance data;
   one placard each for the front and rear seat on the right cockpit wall.
2. Fire-proof type plate;
   right at the spar tunnel bottom.
3. Placard stating the approved Airworthiness Category;
   on the front instrument panel.
4. Max. baggage compartment loading;
   one placard each left and right on the rear cockpit wall close to the baggage compartment opening.
5. Placard on the rear instrument panel.
6. Placard for "Pre take off check";
   on the underside of the front instrument panel cover so that the placard is visible when the canopy is open.
7. Placard on left side of top of fin.
   Note: This placard is cancelled if your glider features the automatic elevator connection.
   Placard in the access hole cover !
8. Placard for tire pressure nose wheel:
   2,0 bar !
9. Placard for tire pressure main wheel:
   2,7 bar !
10. Airspeed indicator marking.
11. G-meter marking.

For gliders with pneumatic tailwheel only

12. Placard for tire pressure tail wheel (only when the pneumatic tailwheel is installed):
    2,5 bar !



Setting of placards



GRUND MATTSCHWARZ Ground mat-black

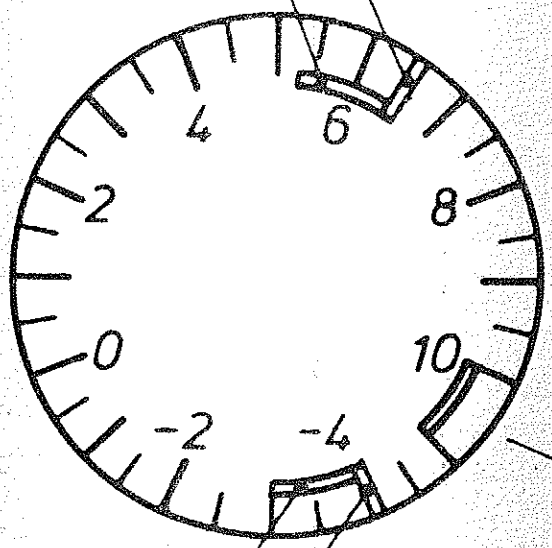
MARKIERUNG UND SCHRIFT LEUCHTFARBE Color codes and letters in luminous paint.

Airspeed indicator color codes
Fahrtmesser Markierung

49

Positive range
a.) positiver Bereich

Yellow arc from +5,3 to 6,5
Red radial line at +6,5



11

Negative range
b.) negativer Bereich

Yellow arc from -3 to -4
Red radial line at -4

G-meter color codes
G-Messer Markierung

XI REPAIRS

On principle repairs must only be made by the manufacturer or by a certified (licensed) technical aviation facility.

For exceptions see repair manual. In case of doubt contact the manufacturer !

XII MODIFICATIONS

Minor modification :

A modification to the aircraft, which has no influence on its airworthiness and is feasable by using standard working methods, may be done without prior notification to the Civil Aviation Authority if it is done in accordance with a technical note issued by the Civil Aviation Authority.

Major modification :

A modification to the aircraft, which has an influence on its airworthiness or requires a change of the operation instructions or of the operation limitations or is not feasable by using standard working methods, must only be done by a certified (licensed) technical aviation facility. The major modification must only be done in accordance with technical documentations which were subject of a supplementary type-approval under the test regulations for aircraft.

A supplementary type-approval is not necessary, if the major modification is restricted to only some single units. Prior to the carrying-out of the major modification the proof of the air-worthiness must be furnished in accordance with the test regulations for aircraft.

(5) 1 off Rear

Attention! Emergency bailout!

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

(1) 2 off

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_F	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

(2)

A. Schleicher
6416 Poppenhausen

Model : ASK 21
Serial no: 21 XXX
Registration letters :

Made in West Germany

(4) 2 off

Loading of baggage compartment: max. 10 kg

(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 epuipment with g-meter and bottom strap.

(6) 1 off

Pre Take Off Check:

1. Controls easy to operate ?
2. Airbrakes locked ?
3. Trim in the center position ?
4. Parachute and safety harness fastened ?
5. Altimeter adjusted to field height or to zero ?
6. Radio "ON" and adjusted to proper frequency ?
7. Both canopies locked ?

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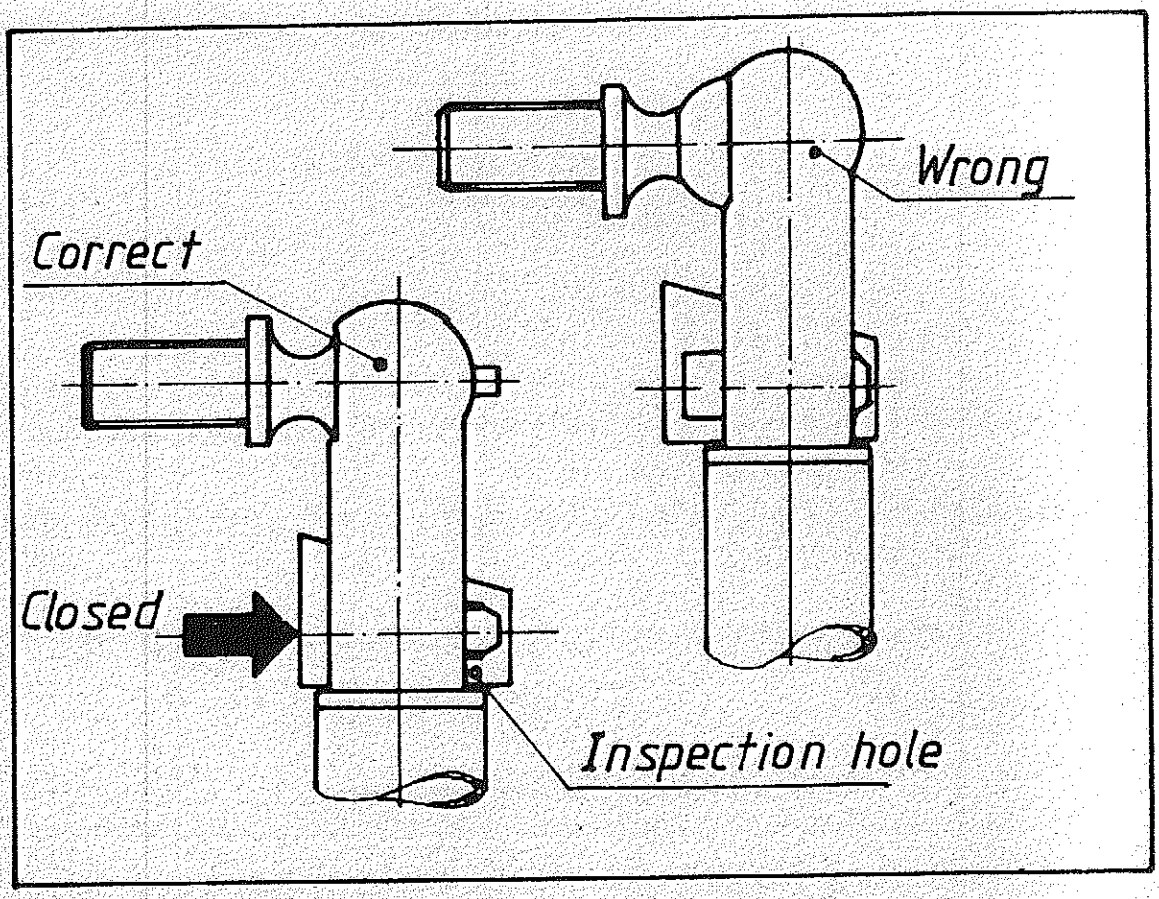
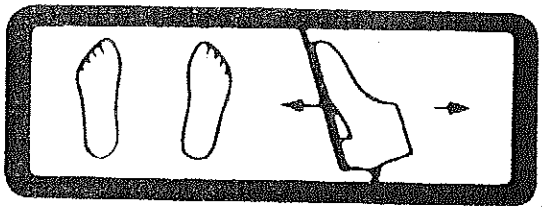
Placard no. 7



XIII DESCRIPTION OF SYMBOLIC PLACARDS

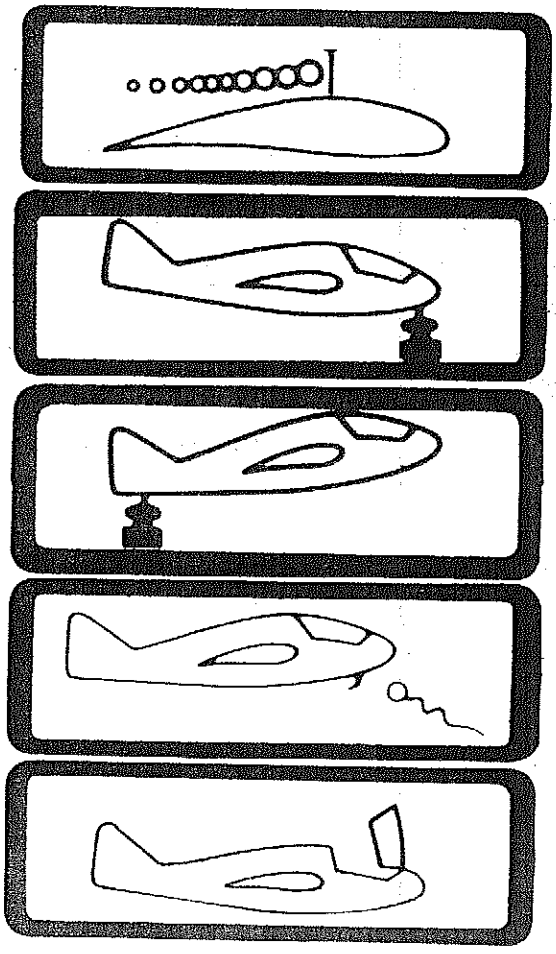


Rudder pedals adjustment:

grey knob on the 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.



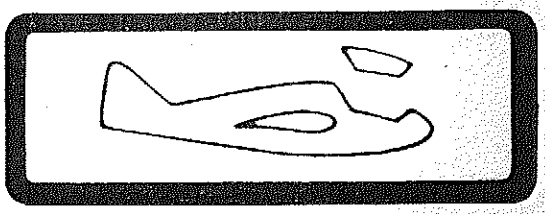
Airbrakes:
blue lever in the LH arm rest. Pull to extend airbrakes.

Trim : noseheavy

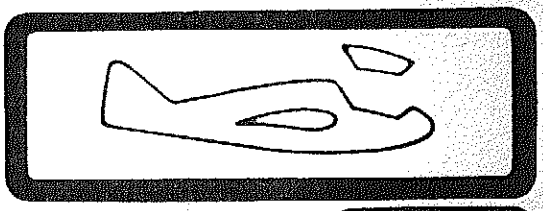
Trim : tailheavy

Tow release :
Yellow knob LH below canopy frame

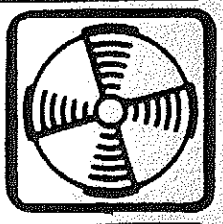
OPEN front canopy :
Move white levers LH and RH on canopy frame backwards.



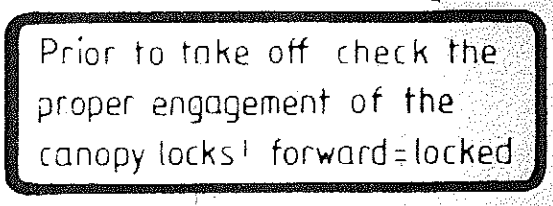
EMERGENCY JETTISONING of front canopy:
Push lever with red flat knob to the left.



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.

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 S

3. Safety harness

Gadringer Bagu V-B/1
Schugu 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 Gauting WZ-402/31.

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

VHF-transceiver

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

XIV.2 Maintenance Instructions

The following Maintenance Instructions are established from time to time as required, in accordance with experience accumulated in operating the ASK 21. The Maintenance Manual is to be supplemented in case of new issues of Maintenance Instructions.

The general "**Maintenance Instruction ALL FRP GLIDER MODELS dated June 19, 1986**" describes the removing of play between the sockets (= bushings) and bolts (= pins) of the wing-to-fuselage transition.

The general **Maintenance Instruction "PAINT CRACKS"** dated June 26, 1989, describes how to inspect, preserve, and repair the paint surface.

The **Maintenance Instruction A** for the ASK 21 (dated March 23, 1987) describes how to readjust the airbrakes.

The **Maintenance Instruction B** for the ASK 21 (dated July 4, 1990) describes how to install oversize drag pins (rear).

The **Maintenance Instruction C** for the ASK 21 (dated May 7, 1992) describes how to fix for the first time or how to replace the plastic fairing tape (elastic lipseal) at the control surface gaps.

SHEET: 1 of 4	Maintenance Instruction PAINT CRACKS	Alexander Schleicher GmbH & Co Segelflugzeugbau D-6416 Poppenhausen

Subject: Paint cracks on fiber composite gliders.

Types affected: ASW 12, ASW 15, ASW 17, ASW 19, ASW 20, ASK 21, ASW 22, ASK 23, ASW 24, ASH 25; ALL variants and all serial no.s.

Compliance:

1. If deep cracks which go down to the fiber composite structure, are found on the glider, the glider must be presented each year to the manufacturer or any other licensed aviation station, who upon examination of the glider decides whether the glider can be continued in service for 1 year more or whether the repair must be done at once (see point "Action A.").
2. If hairline cracks which run only in the paint surface, are found on the glider, the glider shall be presented at the latest after three years annually to the manufacturer or any other licensed aviation station, who upon examination of the glider decides whether the glider can be continued in service for 1 year more or whether the repair must be done at once (see point "Action B."). The 3 years extension applies only on the condition that the maintenance and care of the aircraft is no longer neglected during this period of time and that the gliders are no longer stored outside;

Reason:

The Flight and Maintenance Manuals for SCHLEICHER-gliders contain insistent notes concerning the detrimental influence of moisture and sun radiation on the aerodynamic paint surface quality standard. Herewith we point out emphatically once again that every owner is obliged to observe the flight and maintenance or operations manuals of his glider in all points, and this refers also to the relevant notes on the care and maintenance of the glider.

If these notes are contravened, the result will be sooner or later - depending on the climate - damage to the paint surface quality.

Influence of the two factors moisture and UV-radiation:

To begin with, generally an enlargement of the waviness of the finish develops - mainly on the wing and tail unit skins - caused by penetration of moisture. On the occasion of performance measurements (accomplished by P.Bickle, R.Johnson and the German DFVLR/Idaflieg) it has been demonstrated repeatedly that the larger waviness leads already to considerable performance loss which is all distinctly noticed in competitions. A competition

pilot will always be anxious to preserve or restore the performance of his glider to its full extent, but unfortunately owners of training and instruction gliders are generally of the opinion that they may accept such a performance loss with those gliders. This is regrettable in the view of the manufacturer because he makes all efforts to build and supply also these gliders with a clean aerodynamic surface. The valuable production time used to this end is then possibly uselessly provided.

Owing to the UV-radiation the gel coat of the paint surfaces grows brittle and shrinks; at the same time the UV-light destroys paint ingredients. So moisture (rain, dew) working in on long term will wash the decomposed paint ingredients out off the paint. The paint starts chalking and gets hairline cracks owing to the concurrence of embrittlement and shrinkage. Furthermore, these hairline cracks gather dirt which through its aggressive effect and its stronger heating-up from sun radiation further precipitates the degradation of the paint. Owing to this the intended protective effect for the fiber composite structure against moisture and UV-radiation is no longer granted.
Certainly a good care with hard wax can slow down the above process distinctly, but it cannot be stopped completely. For this reason a repainting of the aircraft will always become necessary at some point of time.

However, we point out explicitly that paint cracks - even deep cracks - do not represent damages to the aircraft structure if as of their first appearance immediate correct maintenance and care is given furthermore to the aircraft.
As all the outside skin of the aircraft is dimensioned for stiffness, there are no critical mechanical strength problems, even if some cracks have gone down into the fiber composite structure and have already attacked the resin matrix base.
The unknown ageing effects caused by the influence of moisture and UV on the unprotected fiber composite structure are more dangerous.

Those paint cracks as reported from customers in USA and Australia do not appear here in Europe or they develop so much more slowly that a paint crack repair has never yet been carried out here at our works. Accordingly we have no experience of our own with such repairs.
In this connexion we point out expressly that for the mentioned cases in the USA or Australia an absolute "zero" care of the gliders in question added to the "climate" factor; besides these gliders were exposed to the weather almost continuously and without any particular protection - very often day and night.

Maintenance Instruction
PAINT CRACKS

Alexander Schleicher
GmbH & Co.
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D-6416 Poppenhausen

Action:

To repair the paint cracks, these have to be removed generally by sanding them down to their ground. But in doing so, the fiber composite structure lieing under the gel coat should not be sanded on. Thus the sanding job is difficult and, therefore, relatively expensive.

A. If **deep cracks** are concerned which go down to or into the fiber composite structure (it is assumed that they result from large and rapid temperature changes as found e.g. with wave flights !), and if a repair is decided to be necessary, the paint material has to be sanded down to the fiber composite structure carefully and the area affected must be repaired.
In case that the resin matrix base of the fiber composite structure is already damaged, one should consider peeling off and replacing the damaged fiber composite layer. This work is possibly easier than the careful sanding job.

B. If **hairline cracks** are concerned which run only in the paint surface (and which presumably result from bad maintenance together with continuous UV-radiation - i.e. gliders left outside without any protection for a long period of time), we recommend to remove the paint material from all areas attacked by sanding on them down their end and to repaint these areas. The sooner this measure is taken, the less the work expenditure.

On the subject of rebuilding the paint system with materials available in the USA as well as on the subject of how to rebuild the profile (which is a must for high performance gliders which are to be flown in competitions) R.H.Johnson, Dallas Soaring Association, has written several articles published in SOARING magazine. We advise to consider in any case the repair experience accumulated in the USA.
For Europe we suggest to spray the sanded surfaces first with polyester fillers, to sand them again, and to respray them finally thinly with a white paint system on a Polyurethane basis which should be aircraft-approved.

Material & drawings:

See above point "Action".

Mass and C.G.:

It is necessary to redetermine the mass and C.G. data after repaintings.
After repainting of control surfaces and flaps special attention must be paid to their tailheavy balance

Maintenance Instruction
PAINT CRACKS

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moments; these data are given in the respective Maintenance (or Operations) Manuals of the gliders.
If in the case of older glider models such data are not contained in the manuals, then the mass of the control surfaces and their tailheavy static balance moment must be determined prior to the paint job and must be re-adjusted after the repainting by ± 5 %.

Notes:

1. The action as per this Maintenance Instruction must only by accomplished by the manufacturer or by a technical aviation service station holding an appropriate license.
2. The present Maintenance Instruction PAINT CRACKS dated June 26, 1989, supersedes the previous Maintenance Instruction dated 15.07.87.

Poppenhausen, den 26.06.89

ALEXANDER SCHLEICHER
GmbH & Co.

Gerhard Waibel.

The translation into English has been done by best knowledge and judgement; in any case of doubt the German original is controlling.

SHEET: 1 of 2	ASK 21 Maintenance Instruction A	Alexander Schleicher GmbH & Co. Segelflugzeugbau D - 6416 Poppenhausen

Subject: Re-adjusting the airbrakes.

Affecting: All ASK 21 serial no.s.

Compliance: As required.

Reason: It is important to check in regular intervals the locking of the airbrakes. Each airbrake has its own toggle in the wing. For this reason it must be checked that both airbrakes lock simultaneously and securely.

Action:

1. This is checked by connecting the brakes individually and marking the point on the operating lever gate in the cockpit at which the linkage's dead center occurs. Both dead points should be within 5 mm (0.2 in) of each other and, in the locked state, the individual brakes should still have 10 mm of free movement of the front lever forwards in the gate.

2. If you observe that the airbrakes do not have an even over-center lock, the toggle over dead center must be readjusted. This must be done with the airbrake pushrod disconnected from the HOTELLIER ball quick-disconnect.
   As shown in Fig.1 the short pushrod (1) is to be disconnected from the toggle crank (2); back off the lock-nut (3) and screw out the pushrod (1) by 1/2 to 1 turn. Re-connect in the reverse order and check again as described under point 1.).

3. If the airbrakes still do not have sufficient dead lock force, peel a little off the toggle stop block (4). Using a punch carefully remove some layers from the stop block (4); then again readjust the airbrakes as described under points 1.) and 2.).

Material: New safety nut NM 6, DIN 980-6, if needed.

Poppenhausen, March 23, 1987

ALEXANDER SCHLEICHER
GmbH & Co.

L.W. Jumtow.

The translation into English has been done by best knowledge and judgement; in any case of doubt the German original is controlling.

ASK 21
Maintenance Instruction A

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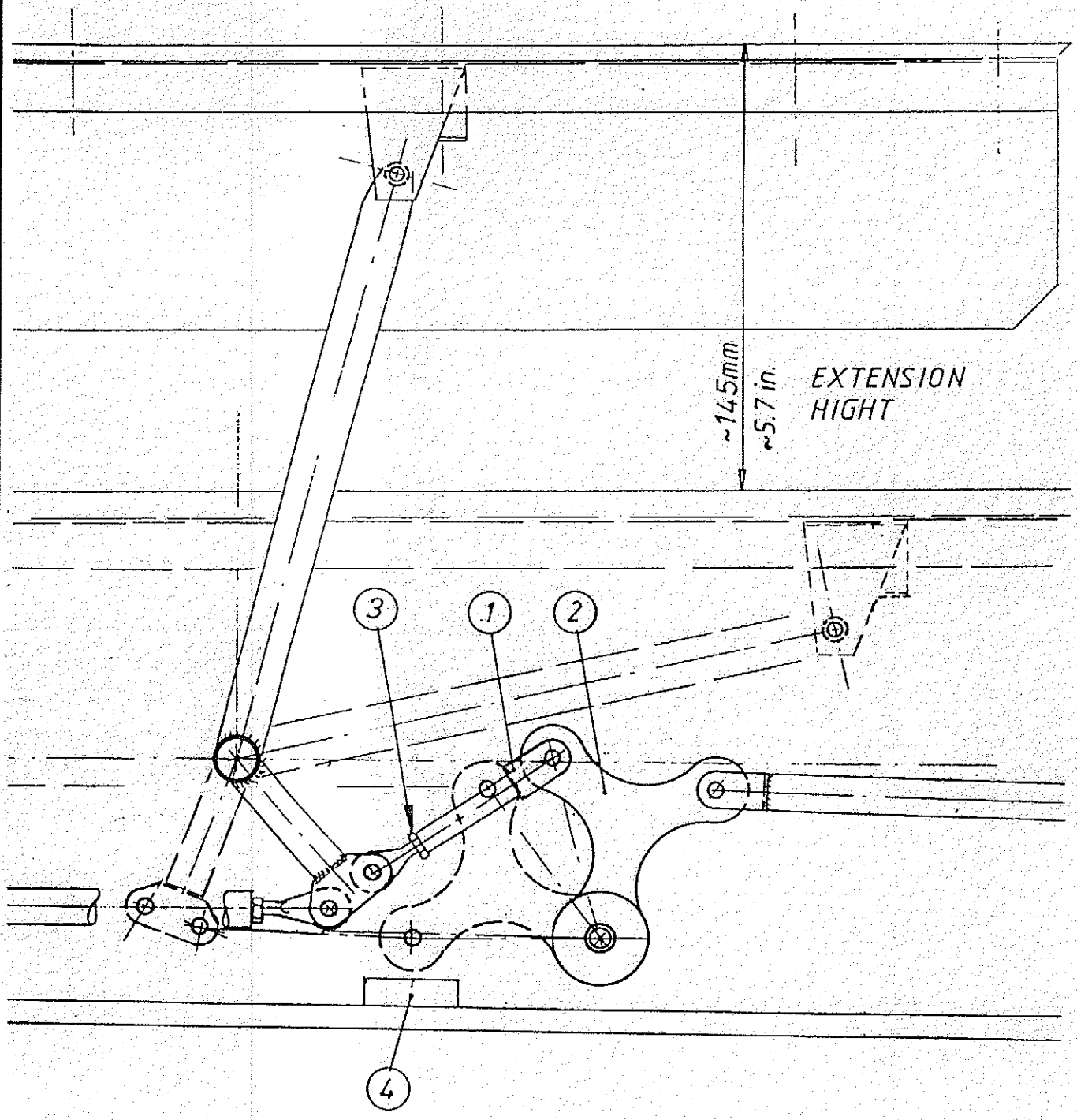
Fig.1



ASK 21
Maintenance Instruction B
Issue I

Alexander Schleicher
GmbH & Co.
Segelflugzeugbau
D-6416 Poppenhausen

Subject: Installation of oversize drag pins

Affecting: All serial no.s ASK 21.

Action:

1. Derig the glider.
2. To be able to safely ream the new holes the safety clips have to be removed at the root ribs
3. Then rig the glider as usual and support the wings by use of wing stands or equivalent (saw horses, trailer dollies) such that the drag pins can be easily removed and inserted.
4. Take one drag pin out, ream the oversize hole and insert new drag pin.
5. Do the same on the other side.
6. Derig the glider.
7. Fix the safety clips again at the new drag pins.

Note: The following pin diameters are available:
11.95 mm, 12.0 mm, 12.1 mm, 12.2 mm and 12.3 mm.

Poppenhausen, July 4, 1990

ALEXANDER SCHLEICHER
GmbH & Co.

Gerhard Waibel

Gerhard Waibel.

The translation into English has been done by best knowledge and judgement; in any case of doubt the German original is controlling.

ASK 21
Maintenance Instruction C
Issue I

Alexander Schleicher
GmbH & Co
Segelflugzeugbau
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Subject: Fixing for the first time or replacing the plastic fairing tape (elastic lipseal) at the control surface gaps of aileron, and horizontal and vertical tail.

Affecting: All ASK 21, Data Sheet no. L-339, as of serial no.21001, optional.

Reason: Performance measurements with various gliders have shown that drag can be considerably reduced by a continuous transition between wing and aileron and between stabilizer and elevator respectively.

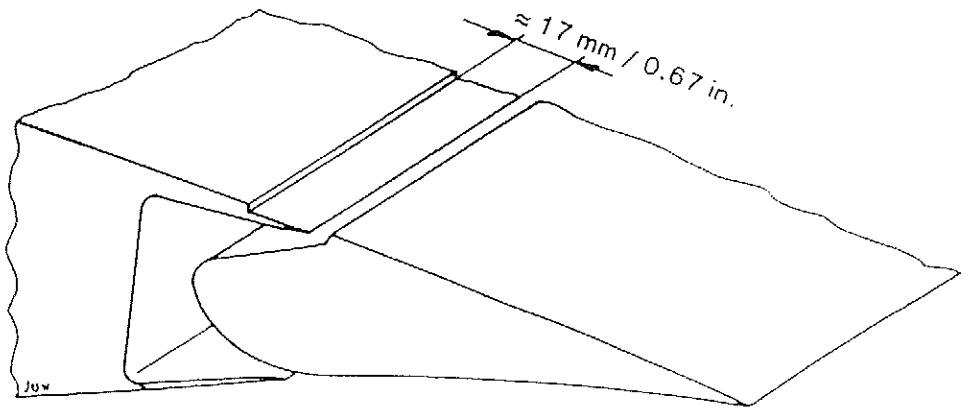
This continuous transition is achieved by means of an elastic lipseal which is applied to the wing, the stabilizer and the fin respectively in order to bridge the actual gap between wing & aileron, stabilizer & elevator, and fin & rudder, due to its curvature into which it is pre-formed to ensure tight seating on the control surfaces.
It is important to ensure that the seal underneath this bridging lipseal is 100 % airtight. The control surface gaps are sealed in addition by means of a Teflon sealing/slip tape, which at the same time serves to reduce the friction of the elastic lipseal on the aileron and elevator surfaces.
Should the elastic lipseal come off or be damaged, this may lead to flutter!

The additional aileron, elevator & rudder control friction generated is minimal and acceptable.

Action:

1. If the elastic lipseal was not fitted before to your glider, a step must first be rebated in the upper wing surface as illustrated in Fig.1.
   NOTE:
   Only the finish layer is carefully removed down as far as the outer FRP lamination without damaging the glass layer.

Fig.1 Upper Wing Surface



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2. If the elastic lipseal needs to be removed only for maintenance or repair purposes, please observe the following:

For disassembly of elevator or aileron:
The elastic lipseal and the sealing/slip tape need to be removed only on the upper surface (where the control surface hinges are located).

For disassembly of the rudder:
Here it is not necessary to remove the elastic lipseal at the fin.

2.1 The elastic lipseal must be removed very carefully so as to avoid any delaminations of the layers in this area. Remove any adhesive residue by means of synthetic resin thinners.

2.2 Accomplish any required inspection, maintenance or repair work at the control surfaces themselves and / or their hinges.

3. Fixing for the first time or replacing the plastic fairing tape (elastic lipseal)

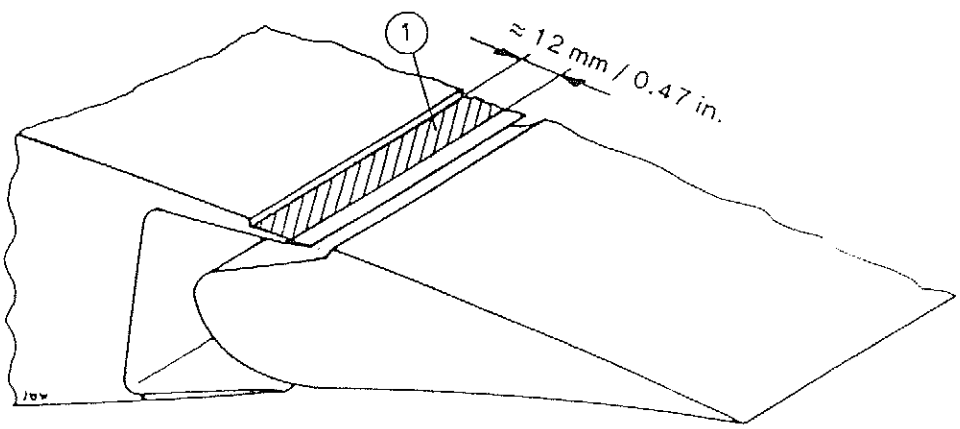
Notes:
All surfaces must be completely clean, dry and free from dust and grease!
This can best be tested by sticking a self adhesive tape to the cleaned surface and then pulling it off again to check that no further dust particles adhere to it.

Cut the new elastic plastic fairing tape and the sealing/slip tape into appropriate lengths (refer to the table under point "Material").

3.1 Upper Wing Surface

Apply a 12 mm wide temporary positioning tape (1) [e.g: 12 mm Tesafilm 104] abutting the front edge of the approx. 17 mm wide recessed step [Fig. 2].

Fig.2 Upper Wing Surface



Now apply the sealing/slip tape (2) [3M Scotch Teflon Tape 30 mm wide] abutting the rear edge of the temporary positioning tape (1) . Be careful that the sealing/slip tape lies slack over the gap.
Set the aileron to maximum positive deflection, so that later the Teflon sealing/slip tape is not stretched during normal full control deflections!
Apply full aileron several times so that the sealing/slip tape fits well into the gap.
Then the Teflon sealing/slip tape (2) must be firmly rubbed down on to the surface.

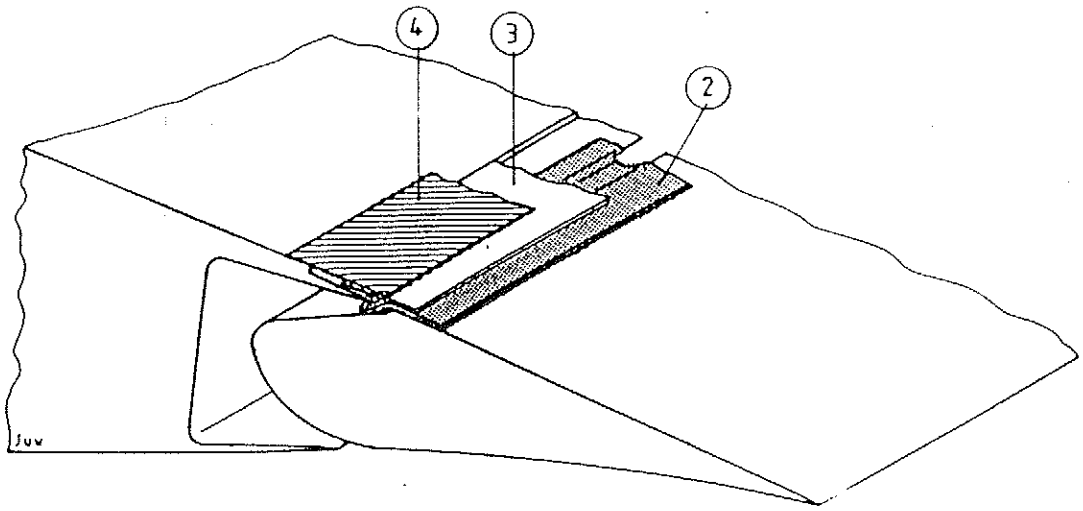
Then remove the temporary positioning tape (1) first applied.

Peel the protective backing from the plastic fairing strip (3) [Mylar foil, 30-15mm wide] and firmly stick it on abutting the front edge of the recessed step in the wing by means of its adhesive film layer [Fig.3].

Press the adhesive zones of the plastic fairing strip firmly down on the surface using a soft wooden block (e.g: Balsa) or a hard rubber roller.

Finally, a protective adhesive tape (4) is applied over the abutment of the front edge of the plastic fairing strip (3) and the step in the wing [Fig.3]. This tape should be as thin and moisture-proof as possible; an example of a suitable tape would be white Tesa film No.104, 25 mm wide.
This protective tape serves to prevent the detachment of the front edge of the plastic fairing strip (elastic lipseal) which might result in dangerous flight characteristics.

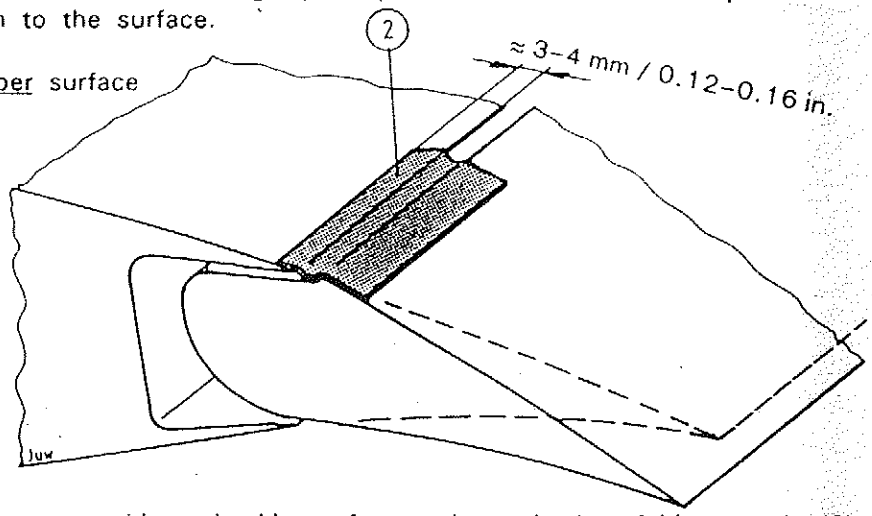
Fig.3 Upper Wing Surface



3.2 Horizont tail upper surface:

There is no recessed step at the stabilizer. As shown in Fig.4 the sealing/slip tape (2) [3M Scotch Teflon Tape 30 mm wide] is stuck on over the stabilizer-to-elevator gap. At the same time the elevator must be set to maximum positive deflection, so that later the Teflon sealing/slip tape is not stretched during normal full control deflections!
Be careful that the sealing/slip tape lies slack over the gap. Apply full elevator several times so that the sealing/slip tape fits well into the gap.
Then the Teflon sealing/slip tape (2) must be firmly rubbed down on to the surface.

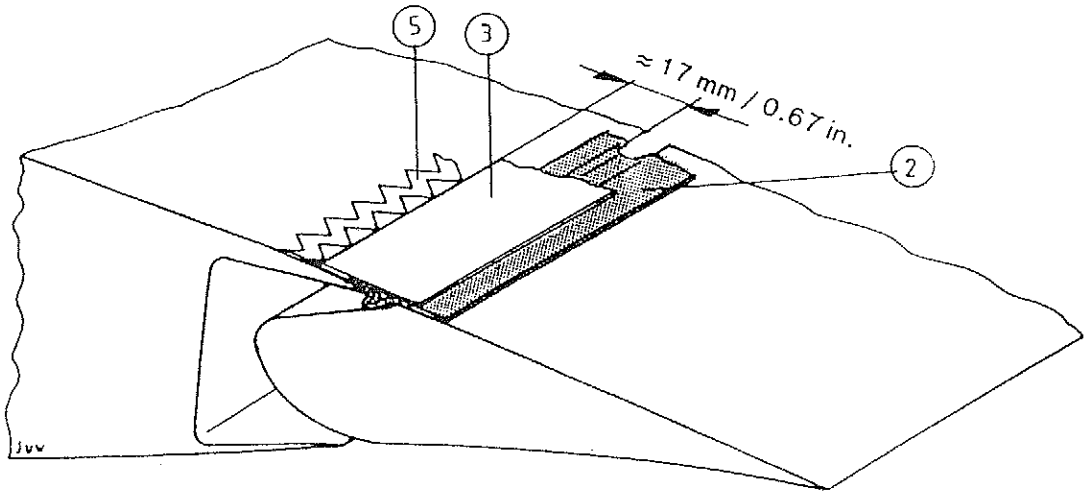
Fig.4 Horizont tail upper surface



Peel the protective backing from the plastic fairing strip (3) [Mylar foil, 30-15mm wide] and firmly stick it on to the stabilizer by means of its adhesive film layer [Fig.5].
Press the adhesive zones of the plastic fairing strip firmly down on the surface using a soft wooden block (e.g: Balsa) or a hard rubber roller.

The zig-zag-tape (5) is stuck on abutting the edge of the plastic fairing strip (3).
NOTE: The front teeth (in the direction of the flight) must not be flattened by pressing them too far down into the glue film, otherwise their turbulator effect will be reduced!

Fig.5 Horizont tail upper surface



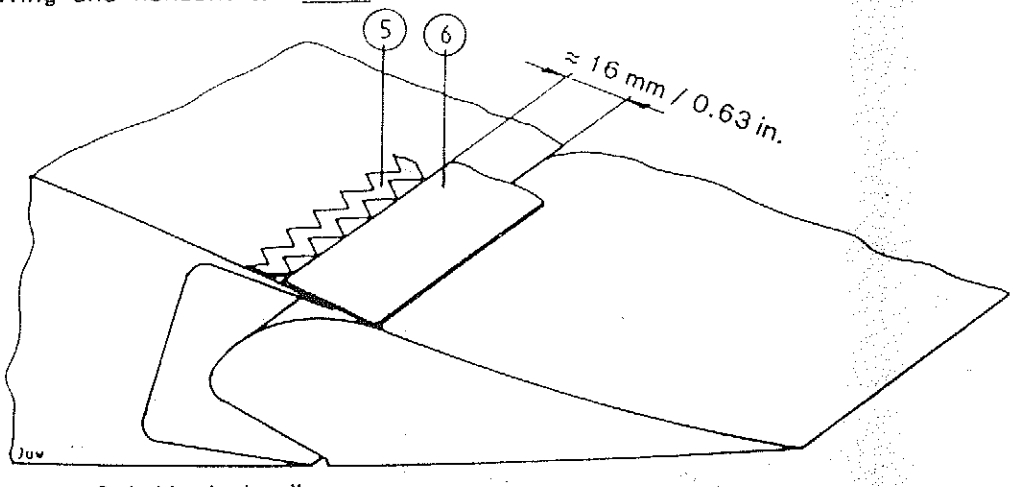
3.3 Wing and horizont tail lower surface:

Remove protective backing from plastic fairing strip (6) [Mylar foil 22-15 mm wide] and stick it on to the wing and horizontal tail lower surfaces, by means of its adhesive film layer [Fig.6].

Press the adhesive zones of the plastic fairing strip firmly down on the surface using a soft wooden block (e.g: Balsa), or a hard rubber roller!

Then the zig-zag-tape (5) is stuck on abutting the edge of the plastic fairing strip (6). [See the NOTE under point 3.2].

Fig.6 Wing and horizont tail lower surface

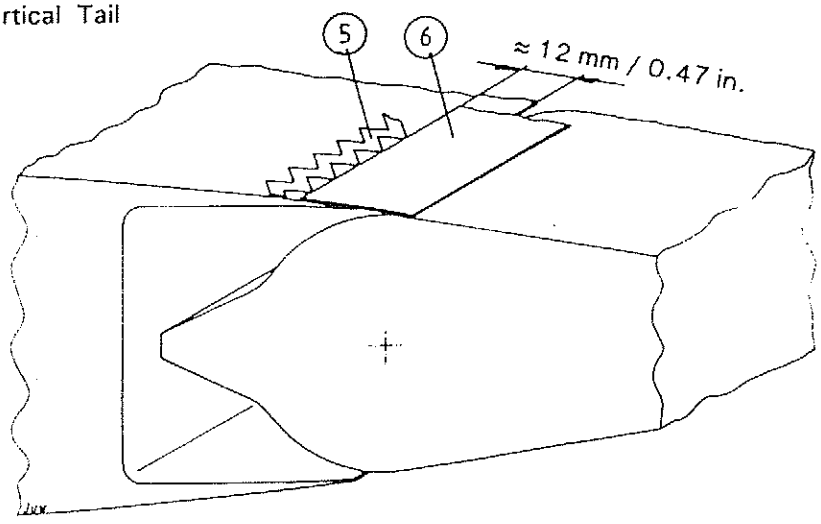


3.4 Vertical tail:

There are no recessed steps at the fin. As shown in Fig.7 the plastic fairing strip (6) [Mylar foil, 22-15 mm wide] is stuck on over the rudder-fin transition at the left and right side (with its adhesive film layer on the fin), then pressed firmly down on the surface.

Then the zig-zag-tape (5) is stuck on abutting the edge of the plastic fairing strip.

Fig.7 Vertical Tail



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Material:

	Wing Surfaces Upper	Wing Surfaces Lower	Horizontal Tail Sfce.s Upper	Horizontal Tail Sfce.s Lower	Vertical Tail Sfce.s L & R *
(1) Temporary positioning tape Tesafilm No. 104, 12 mm wide	2x 2.85 m				
(2) Sealing/slip tape 3M Scotch Teflon Tape, 30 mm wide	2x 2.85 m		1x 3.10 m		
(3) Plastic fairing tape Mylar foil, 30-15 mm wide	2x 2.85 m		1x 3.10 m		
(4) Protective adhesive tape Tesafilm No.104, white, 25 mm wide	2x 2.85 m				
(5) Zig-zag tape Mylar foil, 0.5mm thick;12 mm wide		2x 2.85 m	1x 3.10 m	2x 1.50 m	2x 1.25 m
(6) Plastic fairing tape Mylar foil, 22-15 mm wide		2x 2.85 m		2x 1.50 m	2x 1.25 m

Optional in the place of (5) and (6):

(7) Combi-Zig-zag/plastic fairing tape Mylar foil, 38-20 mm wide		2x 2.85 m		2x 1.50 m	2x 1.25 m

* = left and right

The materials required can be obtained from Messrs. Schleicher.

Notes:

1. This action can be accomplished by a competent person.
2. In the place of the plastic fairing tape (6) and the zig-zag-tape (5) optionally a combi-Zig-zag/plastic fairing tape (7) may be glued on.
3. Ensure that the elastic lipseal is in tight contact with the surfaces of the controls even when they are fully deflected.
   The secure and firm adhesion of the elastic lip must be checked.

Poppenhausen, May 7, 1992

ALEXANDER SCHLEICHER
GmbH & Co.

(Lutz-W. Jumtow)

The translation into English has been done by best knowledge and judgement; in any case of doubt the German original is controlling.

Sheet: 1 of 1	All FRP glider models Maintenance Instruction dated 19.06.86	Alexander Schleicher Segelflugzeugbau 6416 Poppenhausen

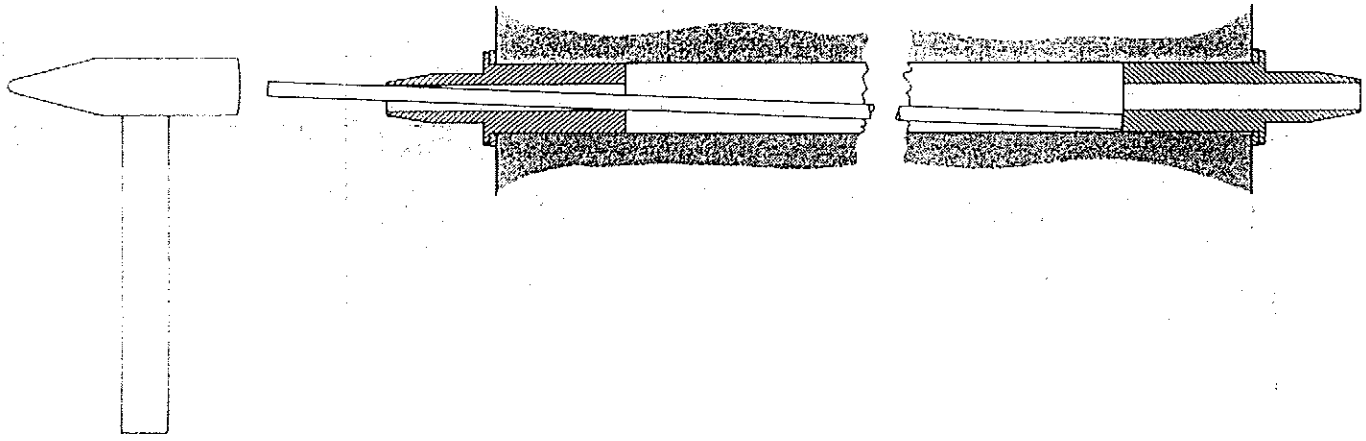
Removing play between the sockets and bolts of the wing-fuselage transition

1. Longitudinal play between the four sockets in the wings and the bolts on the fuselage (Note: for the ASK 21, only the socket/bolt connection front in the wing nose/fuselage transition) leads to disturbing click-click noises when the rudder is operated, and can result in unpleasant tail oscillations at high speeds.

2. The play is eliminated by fitting metal washers of Ø22,5/32-thickness according to the extent of the play. By testing, the play must be reduced such that the wings can be assembled still properly - this applies to a normal temperature of 20 °C. Depending on the extent of the play, the metal washers can be fitted under one or more bolts.

3. The bolts are slid out of the fuselage cross tubes by fitting a steel rod through the hole in the opposite bolt, and driving the bolt out from the inside with a hammer (see sketch below).

4. After fitting the metal washer(s), it should be possible to drive the bolt back in place, using only a 500 g (~ 1 lb) hammer and a few blows. If it returns too easily, then knurl the seating area slightly until a tight fit is obtained again.



Poppenhausen, June 19, 1986

ALEXANDER SCHLEICHER
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L.-W. Jumtow