SCHEMPP-HIRTH K.G., KIRCHHEIM-TECK
WEST GERMANY

Flight and Service Manual for the Sailplane

" J A N U S "

Translation of the German Manual
Issue: July 1975

This Manual should always be carried in the Sailplane

It belongs to the two-place Sailplane
J A N U S

Registration Marks : .....

Serial Number : .....

Manufacturer : .....

Owner : .....

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

31. Mai 1977

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10.	Technical Note No. 295-23 Safety clip for „L'Hotellier" ball and swivel joints	supplement. page	April 1993
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12.	Technical Note No. 295-28 Empty mass c/g positions for various minimum front seat loads -optional for all serial numbers-	5a, 18, 19, 19A, 19B, 19C, 20	July 1999
13.	Technical Note No. 295-29 Minimum front seat load with two occupants - optional for all serial numbers-	20	April 2000

1. Operating Data and Limitations

Airspeed limits	km/h	mph	knots
Glide or dive	220	137	119
Max. speed in rough air	220	137	119
Maneuvering speed	170	105	92
Airplane tow	170	105	92
Auto winch tow	120	75	65
Air brakes extended	220	137	119
Flap positions:			
L or +10 (down)	170	105	92
+6 (down), 0, -4 or -7 (up)	220	137	119

Note:
All airspeeds in this Manual are indicated airspeeds unless otherwise defined.

Weights

Empty weight, appr.	380 kg,	838 lb.
Maximum weight	620 kg,	1367 lb.
Max. weight of non-lifting parts	440 kg,	970 lb.

Approved for cloud flying YES

(See comments on page 16)

Approved for restricted acrobatic maneuvers YES

(See comments on page 15a)
Acrobatic maneuvers are permitted only without water ballast.

Category (according to LFS) NORMAL (N)

Weak links for towing max. 825 daN
max. 1819 lb

Frequency of flexural wing vibration appr. 127 / min.

C.G. position in flight

Datum: Wing leading edge at root rib

Leveling means: Slope of rear top surface of fuselage 100 to 4.5 tail down

C.G. range: 30 mm to 300 mm aft of datum (+ 1.18 in.) to (+ 11.81 in.) at all weights

Airspeed Indicator		km/h	mph	knots
Maximum speed	V_{NE}	220	137	119
Maneuvering speed	V_M	170	105	92
1.1x stall speed 1.1	V_{S_1}	75	46	40

Basic for the stall speed 1.1 V_{S_1} is the following configuration:

a) Wing flaps in position "L"

b) Air brakes "retracted"

c) Maximum weight "620 kg, 1367 lbs"

Marking of the Airspeed Indicator

	km/h	mph	knots
Red Radial	220	137	119
Yellow Arc	170 - 220	105 - 137	92 - 119
Green Arc	75 - 170	46 - 105	40 - 92
White Arc	75 - 170	46 - 105	40 - 92

(white arc marked with L and +10 at 170 km/h, 105 mph or 92 knots)

Data and Reference Placards

Identification plate (stainless steel)

Hersteller: SCHEMPP - HIRTH KIRCHHEIM-TECK	
Bau-Muster	
Werk-Nr.	
Type Cert.No.	

Operation Limits

Maximum weight	620 kg	1367 lbs.	
Airspeed limits	km/h	mph	knots
Glide or dive	220	137	119
In rough air	220	137	119
Maneuvering speed	170	105	92
Airplane tow	170	105	92
Auto winch tow	120	75	65
Air brakes extended	220	137	119
Flaps: L or +10	170	105	92
+6, 0, -4 or -7	220	137	119

Weak links for towing:
Max. 825 daN (1819 lb)

Landing wheel tire pressure: 3.5 bar 50 psi

Wing flaps

Position marks: L, +10, +6, 0, - 4, - 7

Cockpit load kg	Two-seat		single-seat	
	min.	max.	min.	max.
front seat	70 *	110*	70 *	110*
back seat	no limit	110*	--	--

* Note: As the actual minimum or maximum seat loads of this sailplane (to which this manual refers) may differ from the above typical weights, the seat load placard in the cockpit must always show the actual weights from the log chart on page 19 C.

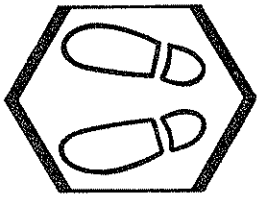
Check List before take-off

- o Parachute put on properly?
- o Strapped in safely?
- o Back rest and rudder pedals in comfortable position?
- o Operating handles and instruments well accessible?
- o Air brakes locked after having checked the function?
- o Movement of control surfaces checked?
- o Flight controls unrestricted?
- o Trim adjusted properly?
- o Wing flaps in take-off position?
- o Canopy closed and locked?
- o Handle of the tail drag chute locked in the rear recess?

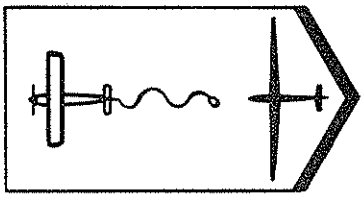
The following acrobatic maneuvers are permitted:

(a) Inside Loops
(b) Turns
(c) Spins
(d) Lazy Eights

Operating handles and knobs

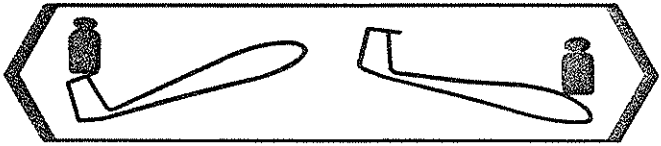


PEDAL ADJUSTMENT
front seat only
plastic T-handle



TOW RELEASE

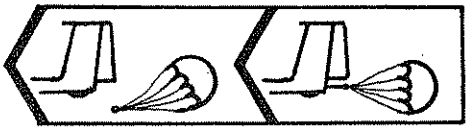
YELLOW plastic T-handles



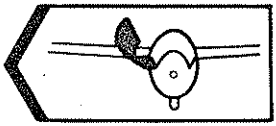
TRIMMING
GREEN knobs

AIR BRAKES
handles with BLUE marks

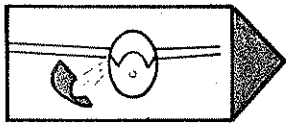
VENTILATION
small BLACK knobs



TAIL DRAG CHUTE
BLUE knobs



CANOPY
RED ball knobs



left side: OPENING right side: JETTISONING

2. Operating Instructions

Winch launching

Maximum tow speed:
120 km/h, 75 mph, 65 knots.

Wing flaps should be in positions +6° or +10°.

The sailplane has one tow release hook on the bottom of the fuselage, just in front of the main landing wheel.

Under normal conditions winch launchings are conducted without any difficulty. There is no tendency to ground loop.

With two heavy pilots the glider tends to stand on the nose and main wheel. Then the ground run should be started with stick fully pulled back until the nose wheel has ground clearance.
With the C.G. in normal positions the take-off run should be made with stick in neutral position.
When the glider is flown by very light pilots it is recommended to make the first launches with stick in forward position.

Instructions for the winch driver

Especially when using a strong winch care should be taken to avoid an excessively sharp start, due to the acceleration which presses the pilot back into the seat, by which he unintentionally may pull the stick aft.

Airplane tow

Maximum tow speed:
170 km/h, 105 mph, 92 knots.

Wing flaps should be in positions 0° or +6°.

There is no tendency for the glider to ground loop.

With the C.G. in forward position the nose wheel is in ground contact. The ground run should be started with stick fully pulled back. Then ease the stick slowly forward until the nose wheel has ground clearance and the glider is running on the main wheel.

With the C.G. in normal positions take-off should be made with stick in neutral position.

For pilots of light weight it is recommended to begin the ground run at the first launches with stick in forward position.

The glider pulls up very gently and does not show any tendency to oscillate.

The take-off speed is about 70 to 90 km/h, 44 to 56 mph, 38 to 48 knots.

Due to the T-type tail plane, avoid flying lower than the towing airplane, because flying in its wake causes an unpleasant beating of the control stick as a result of wake turbulence.

Tow release

Pull the release handle fully back. The tow release is operated by a cable with a yellow plastic T-handle, in the front seat at the left-hand side of the stick and in the back seat at the left-hand side of the instrument panel.

Adjustment of the front seat rudder pedals

The adjustment device is operated by a Bowdencable with a plastic T-handle at the right-hand side of the control stick.

Adjustment backward: Pull the handle and move the pedals into the desired backward position.

Give the pedals a slight forward push with the heels, not with the toes, until the locking pin engages self-acting with a clear clicking noise.

Adjustment forward: Pull the handle slightly back to unlock the mechanism and push the pedals with the heels into the desired forward position and lock as before.

Canopy

The one-piece plexiglass hood is attached by flush hinges at the right-hand side of the fuselage.

It is opened at the left-hand side of the cockpit. PULL BACK the red knob of the locking device on the canopy frame and lift the canopy with the free hand.
Take care that the cord which holds the opened canopy in place is attached.

The jettisoning device is mounted on the right-hand side of the cockpit, just under the canopy frame. For jettisoning open the canopy as described before, then PULL BACK the red knob at the right-hand side and push off the canopy.

Drag parachute

The operating handle with a blue knob is installed at the right-hand side of the cockpit where the molded seat is attached to the fuselage shell. It should be operated with the right hand.

To deploy the chute push the handle forward through the gide slot up to the center stop, where the slot is branched off.

Moving the handle further forward up to the front stop of the slot means jettisoning the chute.

Do not push the handle too far forward if the drag chute should be deployed unless it is desired to jettison the chute.

For normal landings the use of the drag parachute is not necessary, since the air brakes are very effective. Deploy the parachute only in emergency.

Pack the drag parachute very carefully, following the enclosed "Operation and Maintenance Instructions" of drag parachutes.

Water ballast

The water tanks are integral compartments in the wing nose.

Filling

The tanks are filled through a hole on the upper surface of the wing nose. It is closed by a plugged in cap which has a small 5 mm dia hole for pulling it out by means of the provided pin. The hole in the cap also serves as a vent hole and therefore should be kept open. The tanks have an additional vent by a plastic tube with outlet at the end rib of the wing at the outboard aileron root.
The tanks have a capacity of about 120 liter each. The quantity of water however to be filled into the tanks must be compensated with the respective pilots' weight. The permitted maximum weight of 620 kg, 1367 lb. must not be exceeded (see page 20a).
Both tanks must be filled with the same water quantity, otherwise the lateral stability would be detrimentally influenced. Due to the installed baffles no noticeable shifting of the water is observed.

Draining

The water is drained off through a hole in the lower wing surface at the root.
The connection of the draining off device of the wings to the fuselage is made automatically when attaching the wings.

The dump valve operating handle (knob) is installed at the right-hand side of the front cockpit. Pushing the handle forward opens the dump valve in the wings, moving the handle down locks it in that position.

In the improbable case that the water tanks should be unequally drained off or only one-side, the speed due to the higher weight

is to be increased. Stalls then should be avoided. During the landing run care is to be taken of the tendency for the glider to ground loop due to the earlier ground contact of the heavier wing.

Note 1

When flying at air temperatures lower than 0 degr. C (32 degr. F) drain off the water in any case, to avoid icing. Flying with water ballast requires the installation of a thermometer to measure the outer air temperature.

Note 2

If an average climbing speed of not more than 1.5 m/sec, 5 ft./sec. or 3 knots is expected, the use of water ballast is not recommended. Likewise water ballast is not worthwhile when flying in narrow thermals where highly banked circling is required.

Note 3

Drain off the water when off-field landings must be conducted.
The time required to drain off full water tanks in level flight is about 4 minutes. Water may be retained for landing on prepared runways.

Note 4

Never park the glider with filled water tanks at low temperatures, in order to avoid icing. Before storing the glider fully drain off the water, take off the cap of the filling holes and let the tanks dry.

Note 5

If the dump valve on the lower wing surface should leak when the tanks are full, the seals should be greased before the tanks are next filled.

Calibration of the Airspeed indicator

Dynamic Pressure intake

Pitot tube in the nose of the fuselage.

Static pressure intake

Airspeed indicator and Variometer : Cockpit frame, about 6 cm, 2 3/8" in front of the front instr. panel.

Altimeter : Rear fuselage, about 1.2 m, 47" in front of the vertical tail plane.

Equivalent airspeed : V (EAS)

Indicated airspeed : V' (IAS)

V(EAS) km/h	V'(IAS) km/h	V(EAS) mph	V'(IAS) mph	V(EAS) knots	V'(IAS) knots
70	69	45	44.7	38	37.8
80	80	50	50	40	40
90	90	60	60	50	50
100	100	70	68.3	60	59.4
110	108	80	78.3	70	68.6
120	117	90	88.8	80	78.8
140	138	100	98.8	90	88.7
160	158	110	108.1	100	98.4
180	177	120	118.3	110	108.8
200	198	130	128.6		

Air density ρ_o = 0.125 kgs^2/m^4

Flight Performances (two-seat)

W/S = 36.5 kp/m^2, 7.48 lb/ft^2

Stall speed (flaps +10) 70 km/h, 44 mph, 38 kts.

Minimum sink 0.7 m/sec, 2.3 ft/sec at 90 km/h, 56 mph, 49 knots

Best gliding ratio Max. L/D 39.5 at 110 km/h, 68 mph, 59 knots

Wing flaps

The flaps have the purpose to adapt the laminar bucket of the wing airfoil to the respective airspeed in the best way. Since the laminar buckets of the applied airfoil are covering eachother widely, the following flap positions can be accepted:

Normal flight four positions
Landing one position
High speed flight one position

Application	Flaps	Airspeed km/h	mph	knots
Approach and Landing	L	80-110	50-68	43-59
Thermal flight	+10°	80-100	50-62	43-54
Turbulent thermals	+6°	80-100	50-62	43-54
Best glide	0°	90-140	56-87	49-76
Flight between thermals	-4°	120-160	75-99	65-86
High speed	-7°	150-220	93-137	81-119

Due to excessive stressing the airspeed at the flap positions L and +10° (down) must not exceed V_M = 170 km/h, 105 mph or 92 knots.

Longitudinal trim

The spring-type trimming device (green knob) at the left-hand side of the cockpit, where the seat is supported, is gradually variable.

With the C.G. in a medium position the glider can be trimmed for steady flight at speeds of 75 to 170 km/h, 46 to 105 mph, 40 to 92 knots.

Circling flight

The increase of stick forces when pulling back during circling is clearly noticeable.
Opposite aileron is necessary only in turns with greater bank, due to the selected aileron differential.
The rudder is very effective and must be held almost in neutral position during the circling flight.
Full rudder and aileron is necessary to roll from a 45° banked turn through an angle of 90 degrees.
Time taken for this motion with flaps in position +6° is 5 seconds at a speed of 100 km/h, 62 mph, 54 knots.

Stalling characteristic

Stalls from straight flight:
Depending on the wing loading and wing flap position, stall warning occurs at speeds of 65 to 85 km/h, 40 to 53 mph, 35 to 46 knots by a slight oscillation of the horizontal tail plane and the ailerons become sloppy.

By pulling the stick gently back the glider stalls. When pulling the stick sharply back or under gusts the glider pitches down or, depending on the position of control surfaces, a wing may drop.
Speed is increasing very fast.

Stalls from turning flight:
Pulling the stick slowly back in a turning flight requires increasing opposite aileron and rudder control, i.e. against the direction of the turn.
In the fully stalled condition the glider pitches down by the lower wing. It recovers promptly from this attitude by easing the control stick forward. Normal unstalled flight is restored by opposite rudder and aileron.

Behaviour at high speeds

Neglecting the influence of the high flight loads the controls are easy to be handled at high speeds.
Excessive control movements however should be avoided.

When flying at high speeds in gusty air care is to be taken that the safety belts are firmly attached, due to the high acceleration which acts upon the pilot.
Hold the control stick well fixed!

In a flight with an inclination of the flight path of 45 degrees the air speed is set at V_{NE}= 220 km/h, 137 mph, 119 knots, air brakes extended and wing flaps in the position +6°.

Approach and Landing (Flap position L)

The approach is normally conducted at a speed of about 90 to 100 km/h, 56 to 62 mph, 48 to 54 knots, dependent on the wing loading.
The air brakes are extended smoothly and are very effective.
Sideslip is easily controlable and can be used as landing aid, also with air brakes extended.

The sideslip should be initiated or recovered with air brakes retracted to avoid the influence of turbulence on the horizontal tail surface.
The glider touches down on the landing wheel and tail skid simultaneously.
The wheel brake (drum brake) works well. It is operated by a handle on the sticks.
To avoid a long landing run it is advisable to touch down at a minimum speed of 70 to 80 km/h, 43 to 50 mph, 38 to 43 knots, dependent on the wing loading. Landing with a speed of 95 km/h, 59 mph, 51 knots instead means doubling the time to slow down the energy and considerably increases the running distance.

Emergencies

The sailplane can be held in a stalling position with fully pulled stick and necessary rudder control. Applying full rudder in a stall brings the glider into a spin.
Safe recovery from the spin is effected by the STANDARD METHOD, which is defined as:

a) apply opposite rudder (i.e. against the direction of the spin);

b) pause;

c) ease the control stick forward until rotation ceases and the glider becomes unstalled;

d) take the rudder into neutral position and allow the glider to dive out.

The loss of hight in one complete rotation of the spin is 80 to 100 meters.
After having initiated action for recovery from the spin the glider speeds up very fast,

therefore be cautious to bring the glider out of the dive promptly but gently.

Flying in rain or with iced-up wings means a considerable loss of performance and aerodynamic qualities. The minimum speed can increase about 15 km/h, 9 mph, 8 knots. Therefore be cautious when landing!
Come in at a speed of about 100 to 110 km/h, 62 to 68 mph, 54 to 59 knots.

Emergency exit

The roomy and well faired cockpits guarantee a quick and safe bailing out in emergency.

Jettisoning of the canopy

1. PULL BACK the red ball knob at the left-hand side of the canopy frame.
2. PULL BACK the red ball knob at the right-hand side of the cockpit.
3. Throw off the canopy.

The cord which holds the opened canopy in place is released when pulling back the knob of the jettisoning device at the right-hand side of the cockpit.

The canopy frame on the fuselage is built of strong fiber glass without sharp edges and is well suited as a support for the pilots to jump off.

Acrobatic maneuvers

The following acrobatic maneuvers are permitted:
Inside loops, Turns, Spins, Lazy eights.

In the following the parenthesized speeds refer to higher wing loading (two-seat).

Inside loops

Entry to the maneuver with flaps in position -7 at a speed of 180 (200) km/h.
In the medium part of the maneuver flap position 0° is preferable.
Pull-out speed: 160 (175) km/h.

Turns

Entry to the maneuver with flaps in position -7° at a speed of 180 (200) km/h.
Full rudder in the vertical climb at a speed about 140 km/h.

Spins

Possible only with the C.G. in an aft position.
Positive flap positions + 8°.
Entry to the spin from a sharp stall applying full rudder. The control stick should be pulled during the spin.
Recovery from the spin by the "Standard Method": Opposite rudder and control stick eased forward.
Pull-out speed: 140 to 160 km/h dependent on flap position and recovery method.

Lazy eights

Entry to the maneuver with flaps in position -7° at a speed of 180 to 200 km/h.
Climbing with 30° to 45° and entering the turn at 120 km/h.
Pull-out speed: 160 to 180 km/h.

Cloud Flying

The sailplane has sufficient strength and stability for cloud flying.
Nevertheless observe the following instructions:

a) Do avoide extreme airspeeds in any case. Make it a rule to extend the air brakes already at speeds about 150 km/h, 93 mph, 81 knots.

b) Cloud flying is permitted only when the following approved instruments are installed:

(1) Airspeed Indicator
(2) Altimeter
(3) Turn and Bank
(4) Variometer
(5) Magnetic Compass

The installation of an artificial horizon, a clock, an accelerometer and a radio is recommended.

c) Take care to follow the official regulations about cloud flying.

3. Minimum Equipment

a) Airspeed Indicator 250 km/h, 160 mph, 140 knots
Altimeter

Four-piece safety belt

Back cushion or parachute

b) Operating Instructions:

Flight and Service Manual

Placards indicating operation limits

4. Wing and tail setting
Control surface movements

Angle of wing setting 2.6°
Reference: Fuselage center line

Angle of tail setting -2.0°
Reference: Wing chord at root rib

For control surface movements see page 21.

Pay attention to the tolerances if repair work is necessary.

The travel of controls is limited by stops.

Rudder - Adjustable stops on the back side of the fuselage steel tube frame.
Firm stops at the lower rudder hinge.

Elevator - Adjustable stops on the sticks and their attachment bulkheads (setscrews).

Ailerons - Adjustable stops on the sticks, firm stops in the wing.

Wing flaps - Locking device in the cockpit.

Air brakes - Firm stops at the operation handles in the cockpit and on the fuselage steel tube frame.

5. C.G. positions

a) C.G. range in Flight (at all weights)

Leveling means: Slope of rear top surface of fuselage 100 to 4.5, tail down

Datum (BE): Wing leading edge at root rib

Max. forward C.G. : 30 mm (1.18 in.)

Max. rearward C.G. : 300 mm (11.81 in.)

behind of datum (BE)

It is very important that the maximum permitted rearward C.G. position is not exceeded, which is warranted when the minimum front seat load (pilot and parachute) is observed. Less front seat load be compensated by ballast, see also loading plan, page 20.

b) Empty weight C.G. positions

The sailplane must be weighed at least once every four years, after repairs of major nature, after additional equipment, after a new painting etc.
It is important to ensure that the empty weight C.G. is within the permitted limits. If necessary, compensating ballast weight must be installed.
If the empty weight C.G. limits and the loading plan are observed, the C.G. position in flight will be within the permitted range.

If a modification of the loading plan should be necessary, consult with the manufacturer.

The determination of the C.G. ranges as shown in the diagrams on page 19 A and 19 B is done with the following seat loads :

Forward C.G. positions: With a max. front seat load of 110 kg (242.5 lb) and a max. back seat load of 110 kg (242.5 lb)

Rearward C.G. positions: With various minimum front seat loads and 5 kg (11 lb) baggage compartment load

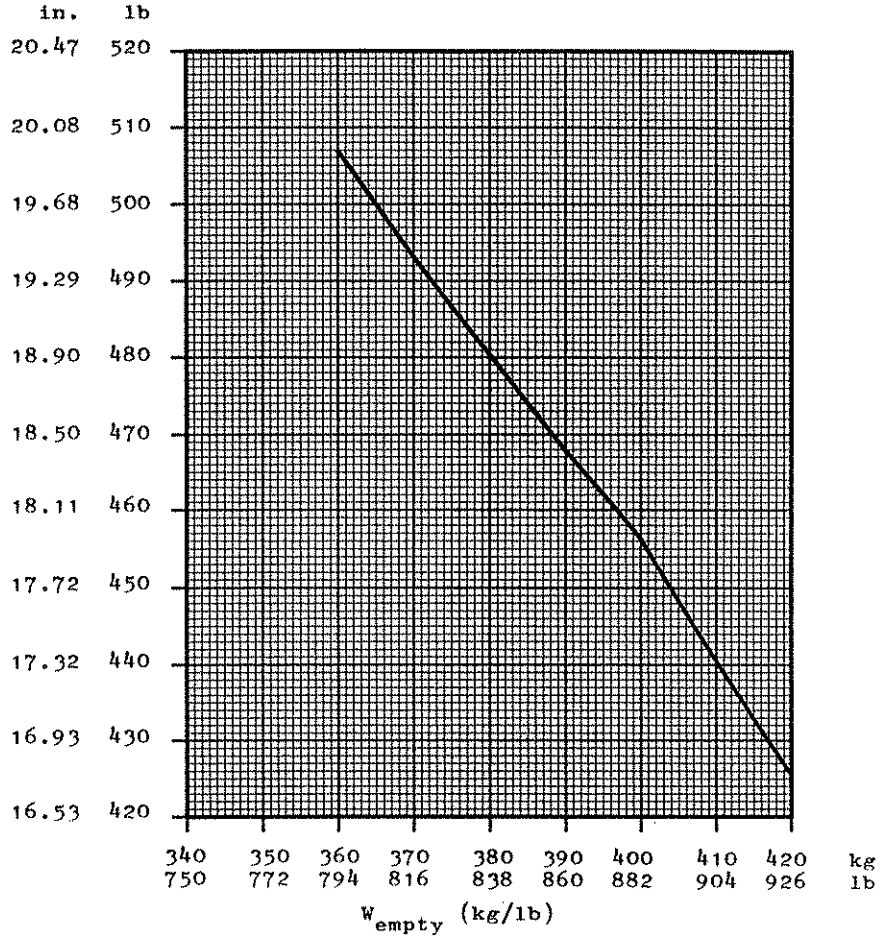
For easier determination of the "empty" weight C.G. position the table below shows at various empty weights the maximum permissible tail skid loads with various seat loads (with reference to the rearmost C.G. position).

Just determine the actual tail skid load with the sailplane in horizontal position (main wheel on the ground, tail skid jacked up approx. 42 cm above floor level, this is the position as described on page 18 , section 5 a). If the determined tail skid load is below the value shown in the table, the C.G. position is within the permitted range.

Empty weight		Tail skid load at a front seat load of :							
kg	lb	70 kg	154 lb	75 kg	165 lb	80 kg	176 lb	85 kg	187 lb
360	794	29.7	65.5	31.2	68.8	32.7	72.1	34.2	75.4
370	816	29.9	65.9	31.4	69.2	33.0	72.6	34.5	76.1
380	838	30.2	66.6	31.7	69.9	33.2	73.2	34.7	76.5
390	860	30.4	67.0	32.0	70.5	33.5	73.9	35.0	77.2
400	882	30.7	67.7	32.2	71.0	33.7	74.3	35.2	77.6
410	904	30.9	68.1	32.5	71.6	34.0	75.0	35.5	78.3
420	926	31.2	68.8	32.7	72.1	34.2	75.4	35.8	78.9

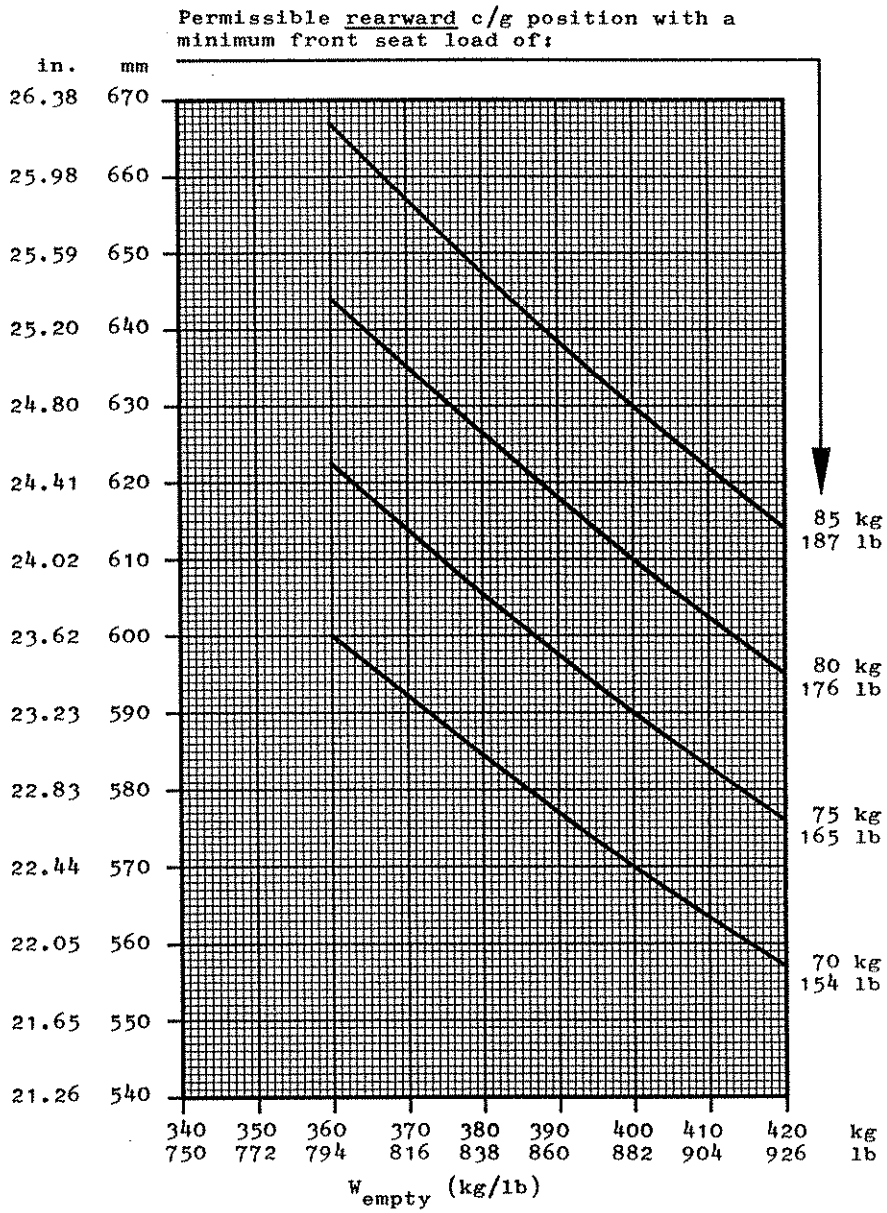
EMPTY MASS C/G RANGE

Permissible <u>forward</u> c/g position with a maximum seat load of 2 x 110 kg (2 x 242.5 lb):



Maximum permitted all-up mass = 620 kg (1367 lb)

EMPTY MASS C/G RANGE



Maximum permitted all-up mass = 620 kg (1367 lb)

Weight and Balance Log Sheet

Date of weighing						
Inspector Signature Stamp						
Empty weight						
Equipment List dated						
Empty weight C.G. position aft of datum						
Pilot & 'chute front seat	max.					
	min.					
Pilot & 'chute back seat	max.					
Maximum Payload						
Water ballast at maximum Payload						

Loading table

Seat load (Crew incl. parachutes)

Seat load		two persons		one person	
		min.	max.	min.	max.
front seat	kg	70 *	110 *	70 *	110*
	lbs	154	242	154	242
back seat	kg	no	110 *	---	---
	lbs	limit	242		

* Note: As the actual minimum or maximum seat load of this sailplane (to which this manual refers) may differ from the above typical weights, the seat load placard in the cockpit must always show the actual weights from the log chart on page 19 C.

At less cockpit load, compensating ballast on the front seat is required.
The ballast weight (lead or sand cushion) is to be securely fastened onto the front seat belt attachment fittings.

Neither the maximum A.U. weight nor the max. weight of the non-lifting parts must be exceeded.

C.G. position of the pilots
(with parachute or back cushion)

Front seat: 1300 mm (51.18 in.) ahead of datum
Back seat: 190 mm (7.48 in.) ahead of datum

Baggage compartment

A maximum equipment of 25 kg (55 lb) can be fastened onto the mounting panel over the main landing wheel.
The baggage compartment behind the wing spar stubs is suitable for installation of fixed equipment like oxygen cylinders or variometer flasks and/or for storage of light baggage like jackets etc.
For the determination of the rearward empty weight C.G. a removable baggage load of 5 kg (11 lb) maximum is considered.

Lever arm of the baggage:

1100 mm (43.3 in.) aft of datum

Note: With both seats occupied, the placarded minimum front seat load may be reduced by the nose-heavy moment of loads on the rear seat as follows:

Rear seat load (kg/lb) x 0.23 = load to be deducted from placarded minimum front seat load (kg/lb)

Example:

Load on:	Both seats occupied	Placarded minimum may be reduced by
Front seat	85 (placarded minimum)	70 x 0.23 = 16 kg
Rear seat	70	

Thus the minimum front seat load of this example is 69 kg.

The seat load placard in the cockpit, however, remains unchanged !

Loading instruction

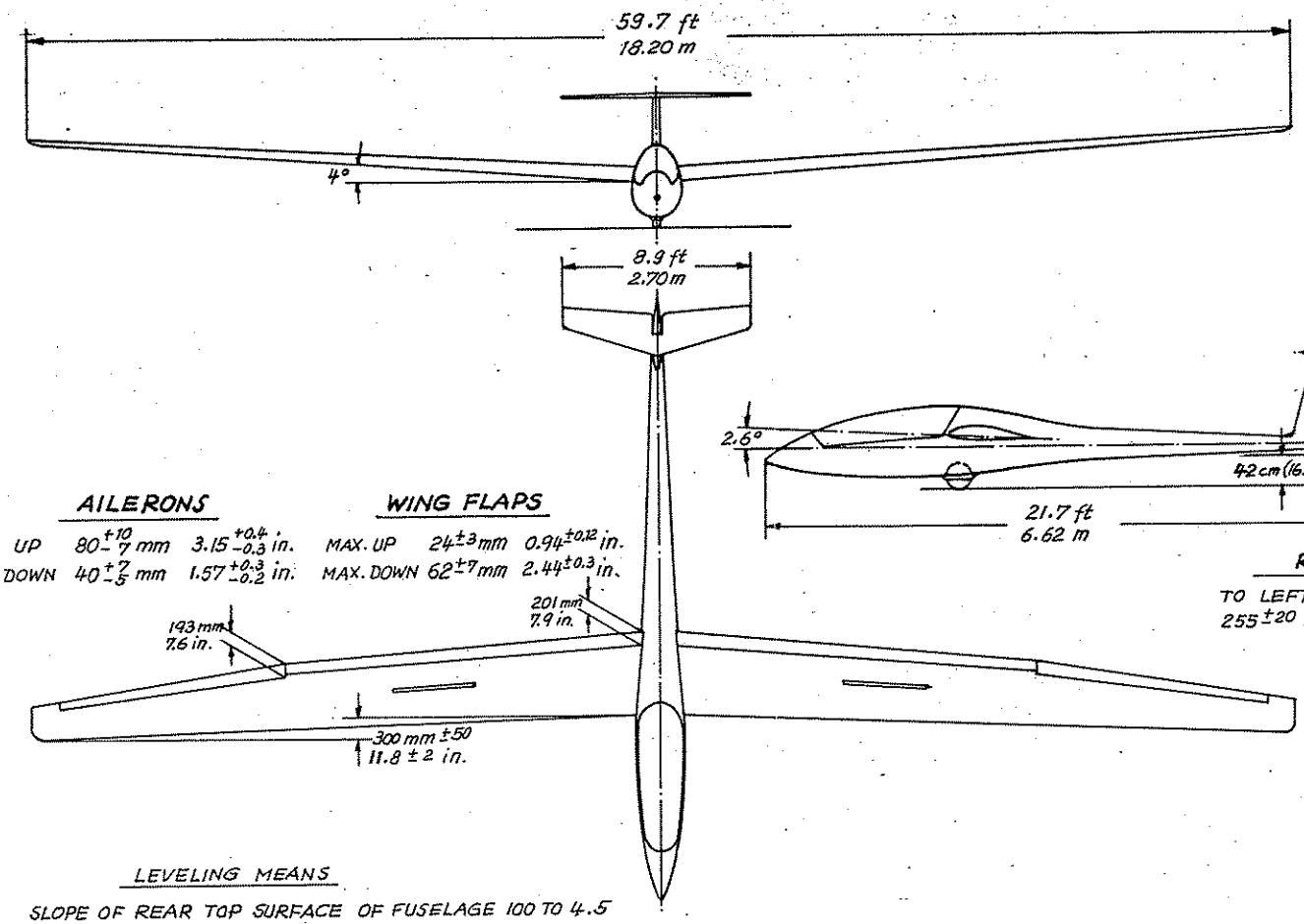
for the glider with water ballast.

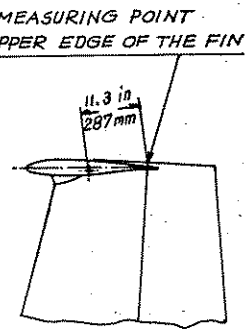
The permitted maximum weight with or without water ballast is 620 kg, 1367 lb.

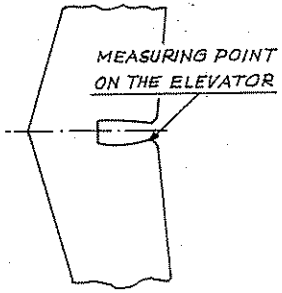
Weight of water ballast at different empty weights and cockpit loads, single or two-seat:

Empty weight (kg)	Cockpit load (kg)								
	70	80	100	120	140	160	180	200	220
	Water ballast (kg) - both tanks								
350	200	190	170	150	130	110	90	70	50
360	190	180	160	140	120	100	80	60	40
370	180	170	150	130	110	90	70	50	30
380	170	160	140	120	100	80	60	40	20
390	160	150	130	110	90	70	50	30	10
400	150	140	120	100	80	60	40	20	--
410	140	130	110	90	70	50	30	10	--

Empty weight (lb.)	Cockpit load (lb.)								
	154	180	220	260	300	350	400	450	485
	Water ballast (lb.) - both tanks								
780	433	407	367	327	287	237	187	137	102
800	413	387	347	307	267	217	167	117	82
820	393	367	327	287	247	197	147	97	62
840	373	347	307	267	227	177	127	77	42
860	353	327	287	247	207	157	107	57	22
880	333	307	267	227	187	137	87	37	2
900	313	287	247	207	167	117	67	17	--







AILERONS

UP	80^{+10}_{-7} mm	$3.15^{+0.4}_{-0.3}$ in.
DOWN	40^{+7}_{-5} mm	$1.57^{+0.3}_{-0.2}$ in.

WING FLAPS

MAX. UP	24 ± 3 mm	$0.94^{\pm 0.12}$ in.
MAX. DOWN	62 ± 7 mm	2.44 ± 0.3 in.

RUDDER

TO LEFT AND RIGHT

255 ± 20 mm 10 ± 0.8 in.

ELEVATOR

UP	47^{+10}_{-5} mm	$1.85^{+0.4}_{-0.2}$ in.
DOWN	72^{+10}_{-5} mm	$2.83^{+0.4}_{-0.2}$ in.

LEVELING MEANS

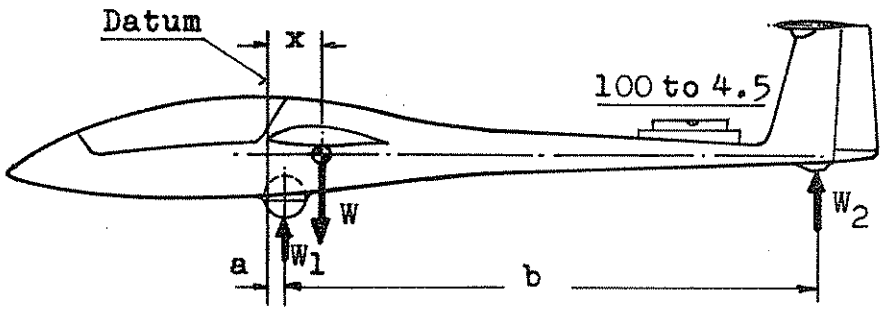
SLOPE OF REAR TOP SURFACE OF FUSELAGE 100 TO 4.5
i.e. FUSELAGE CENTER LINE HORIZONTAL.

MAIN LANDING WHEEL ON THE GROUND AND TAIL SKID JACKED UP ABOUT 42 cm (16.5 in.) FROM THE GROUND.

THREE-SIDES VIEW
CONTROL SURFACE MOVEMENTS

JANUS

Weight and Balance



Datum: Wing leading edge at root rib

Leveling means: Slope of rear top surface of fuselage 100 to 4.5

Weight at landing wheel W_1 = ...

Weight at tail skid W_2 = ...

Empty weight $W_1 + W_2$ = W = ...

Distance a = 164 mm / 6.45 in.

Distance b = 5290 mm / 208.27 in.

Empty weight C.G. position (aft of datum)

$$x = \frac{W_2 \cdot b}{W} + a = \frac{\qquad}{\qquad} = ...$$

Maximum cockpit load G_L = ...

Table of contents Page

AMENDMENT LIST
(log of revisions)

No.	Reference / short title	Page	Date
1.	Technical Note No. 295-6 Tail chute omitted	I	Januar 1978
2.	Technical Note No. 295-9 Optional additional nose tow release	27, 29, 29a, 30a, 34	July 1980
3.	Technical Note No. 295-11 Prescribed inspections Hinge moments and weights Extension of service time	I, 35, 36, 37, 38, 39 40, 41B 34, 41A, 42 43	April 1981 Februar 1991
4.	Technical Note No. 295-13 Hydraulic disc brake (optional) a) dual-actuated via handle on stick and air-brake lever b) via handle on stick only	31, 31a 31, 31a	April 1993 Dec. 1983
5.	Technical Note No. 295-15 Rudder control circuit (optional)	39	Febr. 1986
6.	Technical Note No. 295-20 Tow release „E 85“ and „G 88“	34	April 1990
7.	Supplement of equipment and instruments	1, I, 44, 45, 46, 47, 48	August 2007

A S S E M B L Y

The assembly of the JANUS can be done by three persons if a support for one wing is provided. Generally four persons will do the assembly.

W i n g s

Clean and lubricate the wing attachment bolts and their bearings on the fuselage. Put the main bolt into the cockpit within reach.

Align the central fuselage push rods of ailerons, wing flaps, and air brakes. Push the air brake operating handle up to its front stop.

Put the left wing (fork spar root) into the cut-out of the fuselage until the wing attachment bolts are fully inserted into their bearings on the fuselage. Insert the main bolt about 4 cm, 1.5 inches into the spar bushing. Push the 8 mm dia mounting pin through the bushing on the right-hand side of the fuselage and the corresponding bushing of the spar.
The wing now can be laid down on the support. The fuselage must not be held in place any longer.

Put in the right wing (tongue spar root) likewise into the fuselage, wing attachment bolts however only partly inserted into their bearings and fork spar bolts not yet contacting their bearings in the root rib. Lift the right wing until the fork spar bolts are aligned with their bearings in the root rib. Then push the wing further into the fuselage by moving it slightly up and down and let the bolts slide into the bearings. Now take out the main bolt and pull the wings fully together by the main bolt

bushings using the flat end of the provided lever bar. Push the main bolt fully through and secure its handle onto the fuselage shell by means of a safety cowling pin. Remove the 8mm mounting pin and put into the cockpit pocket.

The connection of the push rods of the flaps, ailerons, and air brakes must be made behind the spar. The connection by the ball-spring safety couplings requires some experience, therefore it is advisable to get familiar with before assembling the wings.

Connect ailerons first and flaps thereafter taking care that the flap handle is locked in position "L".

Each coupling should be checked after locking by pulling across with a force of about 5 kg, 11 lbs. in the direction of releasing. Additionally make a visual inspection!

Horizontal Tail Plane (See sketch on page 26)

The horizontal tail plane should be mounted by one person only.
Put the plane from the front onto the fin so that the front bolt bearing fitting (A) is just dipping into the upper opening of the movable glass-fiber fairing on the top of the fin.
Push the tail plane slightly down until its lower surface is fully sitting on the fairing.
Push the tail plane backwards until a clear audible "CLICK" indicates that the locking hooks (B) are engaged onto the axle (C).
Move the locking handle (D) using a mounting pin of 8 mm dia in order to lock the hooks tightly up to the rear stop.

When taking off the horizontal tail plane it is advisable to do it from the rear. Unlock the hooks (B) by pushing the locking handle (D) forward using the 8 mm dia pin. Push the plane simultaneously forward about some mm (one inch) whilst knocking against the trailing edge until the bolt is disengaged from the bearing fitting (A). Take off the plane.

After assembly

Check the function of the controls.

Seal the joints of the wing and fuselage with an adhesive tape. Seal also the access hole for the locking handle of the horizontal tail plane.

The sealing is very important to ensure good flight qualities.

Connecting the "L'Hotellier" control rod couplings, securing them with Schempp-Hirth safety clips

Prior to rigging the aircraft one should get familiar with the function of the "L'Hotellier" control rod couplings (quick-connectors).

Connecting the controls requires a fine touch and some practice.

Prior to connecting the control rods each coupling must be checked for the proper position of its safety clip (which is attached in such a way that it cannot be lost);

The free end of the clip must point to the narrow end of the locking slide - see sketch - if not, rotate it upwards.

Make sure that each coupling socket is fully home over the ball end whilst the locking slide is held open.

When the "L'Hotellier" coupling is correctly locked, its locking slide moves slightly back so that it protrudes an equal amount on either side if the coupling and the hole drilled through the narrow end of the locking slide becomes visible as shown in the sketch.

Now rotate the safety clip towards the locking slide, bend its free end slightly outwards and let it engage into the hole as shown in the sketch.

WARNING:

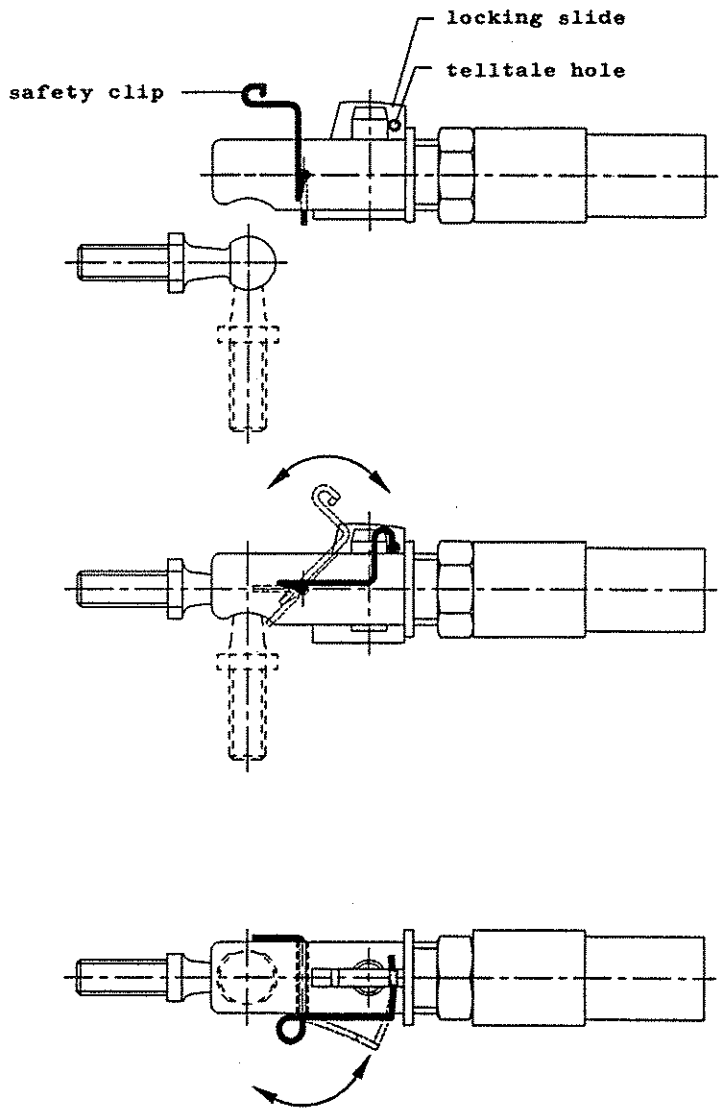
Each "L'Hotellier" ball and swivel joint must be checked after locking and securing.

Quick connectors, which are not properly secured, may open automatically in flight!

1.) Check coupling for proper connection by pulling cross-wise with a hand force of about 5 daN (11 lb) in the direction of releasing.

2.) When depressing the locking slide, it may move slightly, but must then get stopped by the safety clip.

Securing the locking slide with a Schempp-Hirth safety clip



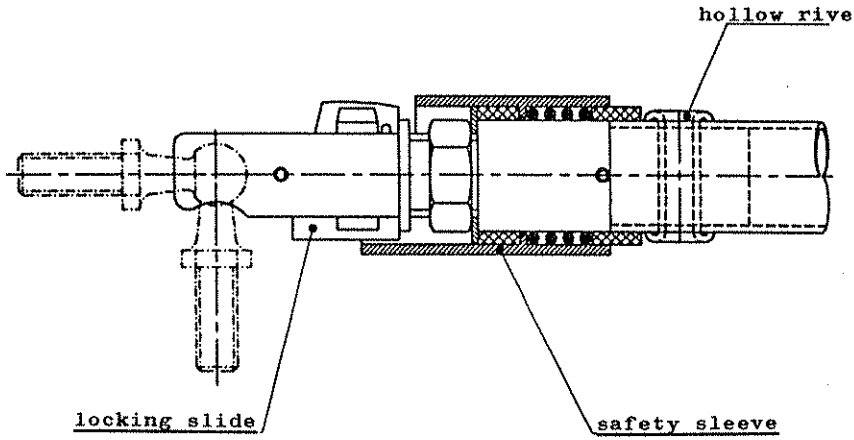
Connecting the L'Hotellier control rod couplings - securing them with a "Wedekind" safety sleeve

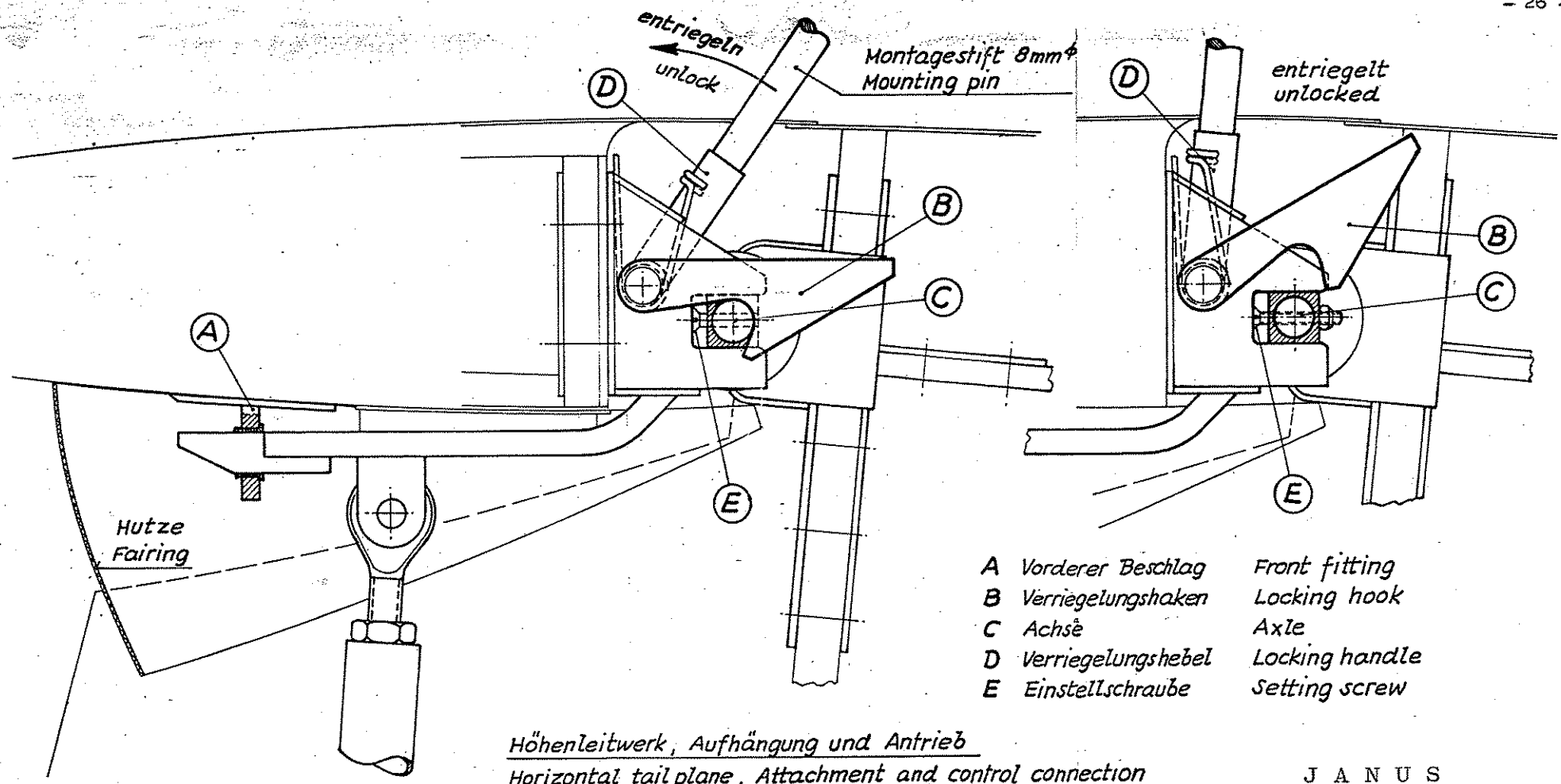
Pull back spring-loaded safety sleeve and push swivel joint fully home over the ball joint with the wedge-shaped locking slide held open.

When properly connected and locked, the wedge-shaped slide must have moved slightly back so that the "Wedekind" safety sleeve, once released, will be pushed over the wide end of the locking slide, thus preventing an unintentional disconnection.

Test

Check coupling(s) for proper connection by pulling crosswise with a hand force of about 5 daN (11 lb) in the direction of "releasing".





A	Vorderer Beschlag	Front fitting
B	Verriegelungshaken	Locking hook
C	Achse	Axle
D	Verriegelungshebel	Locking handle
E	Einstellschraube	Setting screw

Höhenleitwerk, Aufhängung und Antrieb
Horizontal tail plane, Attachment and control connection

C h e c k L i s t

A) After assembly

1. Is the handle of the main bolt secured to the fuselage by the safety cowling pin?
2. Are the push rods of the ailerons, flaps, and air brakes safely connected by their ball-spring couplings and checked?
3. Are the joints of the wing and fuselage and the hole for the locking handle of the horizontal tail plane sealed?
4. Does the tow release mechanism function properly?
5. Does the wheel brake function properly?
6. Is the tire pressure of the main landing wheel and nose wheel checked?
   Main landing wheel: 2.75 atm., 39 psi.
   Nose wheel fixed : 1.5 atm, 21 psi.
   Nose wheel retractable: 2.0 atm, 28 psi.
7. Is the horizontal tail plane safely attached. i.e. are the locking hooks tightly snapped onto the axle up to the rear stop?

B) Before Take-off

1. Check the function of the control surfaces. Do the controls reach the limit of their travel with sufficient ease and smoothness?
2. Do the air brakes operate properly? Make sure to lock them after checking.
3. Is the drag chute handle locked at the rear stop of the guide slot?

4. Is the flap position in the 0° or $+4^{\circ}$ position?
5. Is the canopy properly closed and locked? The red knobs at the left-and right-hand side must be in the front position.
6. Is the pilot's parachute properly attached?
7. Are the safety belts put on and secured?
8. Is the altimeter adjusted for the equivalent altitude or for NN?
9. Is the radio frequency adjusted for the airfield and/or for the air traffic control?

C) <u>After take-off</u>

Check the trim.

Maintenance

Take good care of the surface finish. Remove all contaminations such as dust, grass seeds, insects etc., using warm water and a soft sponge. Use mild soap if necessary. Use no polish which might attack the paint. It is recommended to polish the glider twice a year, using a buff and buffing wax. By this all contamination is removed and the surface becomes less sensitive to new dust.
Smooth all scratches carefully with resin filler.

Though the glider is not very affected, protect it from moisture.

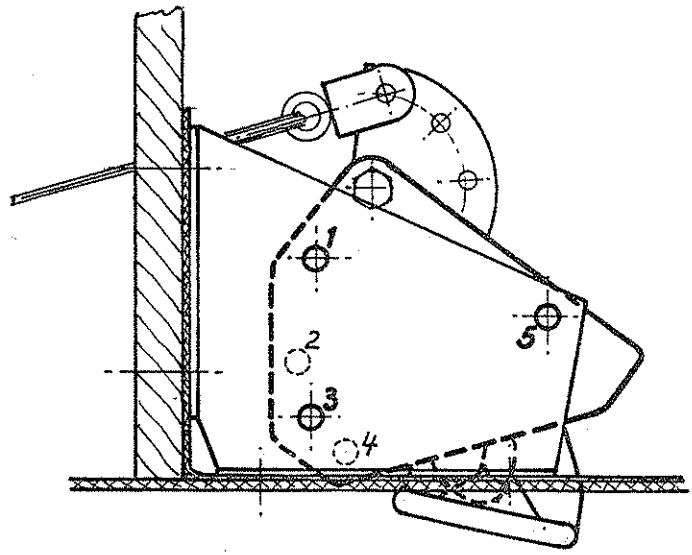
Never try to clean the plexiglass hood with a dry cloth. Use special plexiglass polish after cleaning with warm water and a soft clean chamois.

Check the safety belts frequently for cuts and stains; the metal parts for rust.

The tow release hook, mounted on the bottom of the fuselage just in front of the main landing wheel, is much exposed to dirt and must be checked quite often for damages. Keep it clean and lubricated.
It is easy to take off the tow release hook for inspection or repair. Remove the seat, disconnect the release cable and unscrew the three attachment bolts.
When mounting the tow release hook again take care to attach it onto the bracket as shown on the sketch, page 30.

Befestigung der Schleppkupplung

Attachment of the towing hook



Kupplung mit den Bohrungen Nr. 1, 3 und 5 am Beschlag befestigen.

Towing hook attached to the bracket by the bolt holes Nos. 1, 3 and 5.

The landing wheel has a drum brake which is operated by a handle on the control sticks. Its Bowden cable can be adjusted as usual by a setscrew on the wheel.

The inflation pressure of the main landing wheel should be 2.75 atm., 39 psi, that of the nose wheel should be for the fixed type 1.5 atm., 21 psi and for the retractable type 2.0 atm., 28 psi.

To take off the landing wheel for inspection, cleaning, and lubrication disconnect the Bowden cable. Remove the cotter pin and the castle nut on one side of the wheel axle and pull it out. Take off the wheel by pulling it slightly back and down in order to disengage the drum locking fitting from its guide pin on the fuselage steel tube frame. Take care that no washers, spacers, and bushings get lost.
Clean all parts and lubricate the bearings, bushings and the axle.

Lubricate the bearings when a complete overhaul is carried out, except for the bolts and bearings of the wing attachments, which must be cleaned and lubricated before every assembly.

If there is any larger repair work to be done, ask the manufacturer or his representative for advice.

If a new painting should be made, take care that the surfaces exposed to sunlight are painted white.

Backlash of the attachments

All attachments of a glider are wearing more or less with time. In the following the permitted tolerances and the provisions of repair are stated.

Wing

Tangential backlash (movement forth and back) can occur, due to the wear of the washers which are pressed onto the wing attachment bolts. If the movement at the wing tips exceeds 50 mm (1 - 31/32") additional washers of an inner diameter of 17.95 mm and about 0.3 up to 0.5 mm thick should be pressed onto the bolts until the backlash is eliminated.

Ailerons and wing flaps

A backlash of up to 5 mm (3/16") measured at the trailing edge of the inner aileron and flap roots is allowable as tested in flight. If the tolerances are exceeded ask the manufacturer for instructions.

Horizontal tail plane (see sketch on page 26)

If tangential backlash should be observed, i.e. if the tail plane can be moved at the tips excessively back and forth, the setting screws (E) must be adjusted.
Take off the tail plane. Screw out the setting screws little by little until the tail plane cannot be locked any longer. Then the setting screws are to be screwed in about a quarter turn. Tighten the lock nut using a 5.5 mm socket wrench. When mounting the plane thereafter the locking hooks (B) should snap tightly onto the axle (C).

It may be possible that the adjustment of one setting screw must be different from the other. This is the case if there is still a backlash existing though the locking mechanism has a very tight fit. The setting screws then must be adjusted gradually until both locking hooks are catching the axle with the same tight fit.

Rudder

Due to the continuous control cables no backlash of the rudder control occurs.

Prescribed inspections

Rudder cables

Every 200 flying hours and at every annual inspection, the rudder cables are to be inspected at the point where they feed through the S-shaped guides in the pedals, particularly at the point of maximum pedal adjustment. If they are damaged, worn or corroded, they must be replaced. It is permissible for individual strands of the cables to be worn up to 25 %.
The specification for new cables is Ø 3.2 mm LN 9374 (zinc plated c-steel). Control cable connections should be made with galvanized thimbles A3.5 DIN 6899 and Nicopress oval sleeves No. 18-3-M or No. 28-3-M. The tool to be used for this job is No. 51-M-850.
Making cable connections and checking them should be in accordance with the manufacturer's recommendations.

Tow releases

Inspections are to be carried out in accordance with the following instructions:

- LBA-approved Operating and Maintenance Instructions for the TOST safety tow release mechanism model "EUROPA G 72" and "EUROPA G 73", issue of May 1975 (or January 1989 for overhauled units).
- LBA-approved Operating Manual for the TOST safety tow release mechanism model "EUROPA G 88", issue of February 1989

If installed:

- LBA-approved Operating and Maintenance Instructions for the TOST nose tow release mechanism model "E 72" and "E 75", issue of May 1975 (or March 1989 for overhauled units)

Tow releases (ctd).

- LBA-approved Operating Manual for the TOST nose tow release mechanism model "E 85", issue of March 1989.

Instruments

In the case of all installed instruments and equipment the manufacturer's instructions should be followed.

L'Hotellier Ball and Swivel Joints

(control rod quick-disconnect couplings)

- Instructions for the Maintenance of L'Hotellier Ball and Swivel Joints No. IM.10.01A, Issue B 01/89

Supply sources

Schempp-Hirth Flugzeugbau GmbH
Krebenstrasse 25
7312 Kirchheim/Teck
(Thimbles, sleeves, cables, instructions)

R. Lindemann
Osterrade 12
2050 Hamburg 80
(Nicopress oval sleeves, hand tools)

TOST GmbH · Flugzeuggerätebau
Thalkirchnerstr. 62
8000 München 2
(tow releases)

Annual Inspections

Maintenance schedule

(See control system views on pages 37-39.

Accessibility of controls for inspection:

- o Wing controls

  Cut-outs for flap and aileron control rods in the rear wing spar (flaps and ailerons dismounted).
  Inspection window on the lower wing surface in the area of the outer aileron control connection.
  Cut-out for air brakes on the upper wing surface (air brakes extended).

- o Fuselage controls

  Accessible after removal of the seat panels.

- o Elevator control

  Accessible after removal of the horizontal tail plane.

- o Rudder control

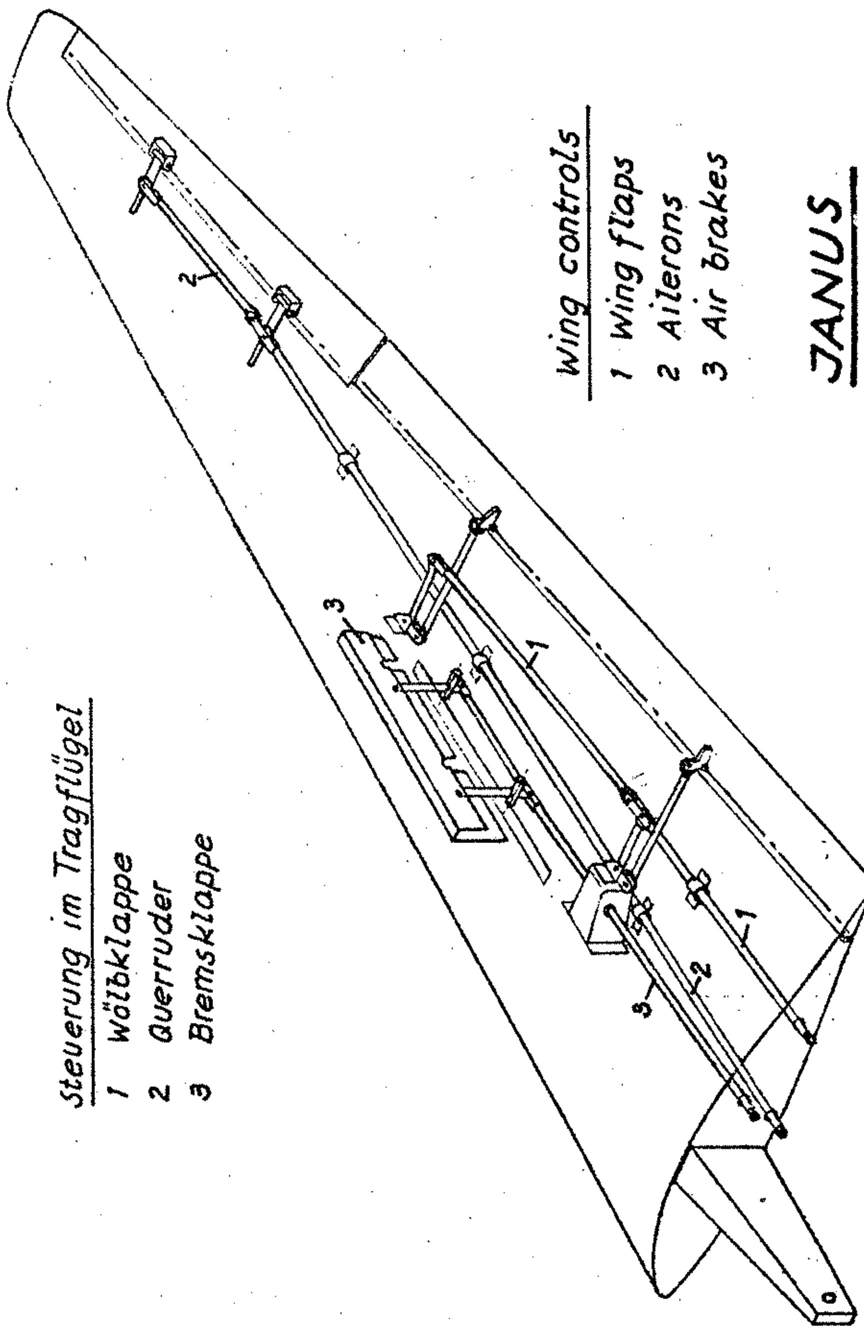
  Accessible at the lower control connection.

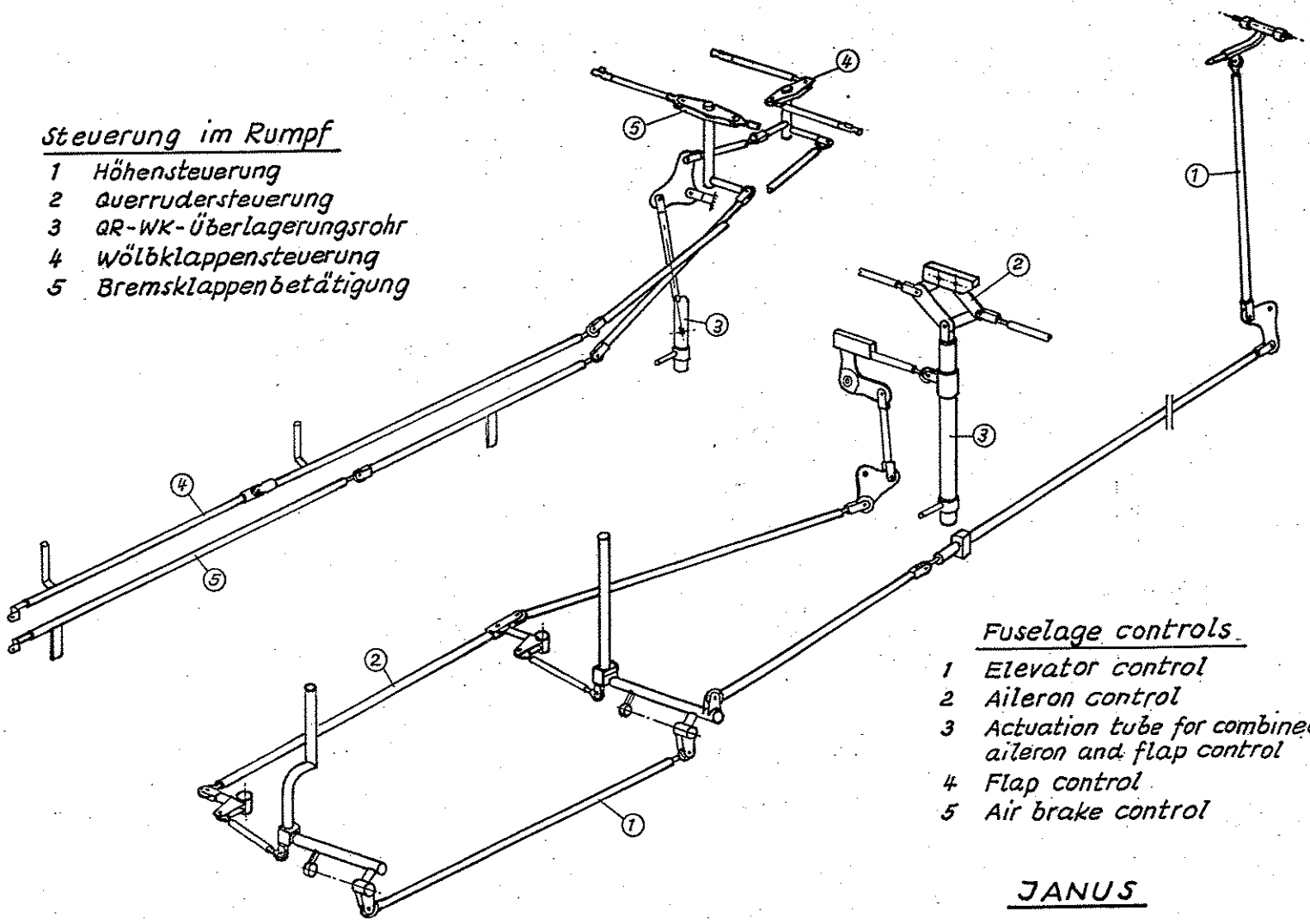
After having cleaned the glider proceed as follows:

- o Check all external surfaces for holes, tears, scratches, dents, and detached laminates. If the outer laminate of a sandwich shell is damaged also the inner glass cloth layer is to be inspected. It is advisable to ask an expert's advice.

- o Check all accessible metal parts for damage. As known from experience no damage occurs when operating the glider properly. If any repair should be necessary ask the advice of the manufacturer.

- o Check all accessible metal parts for corrosion. If necessary remove the rust and protect the surface again by a new painting. Corroded fittings, push rods, and levers should be thoroughly cleaned and consequently primed and painted, using a special primer (supplied by Schempp-Hirth) and Nitro paint.
- o If the controls cannot be operated with sufficient ease and smoothness, clean and lubricate the corresponding bearings or hinges.
- o Replace bearings which have an excessive radial clearance.
- o All fittings attached onto glass-fiber structure are to be checked for a tight fit. Check the glass-fiber structure for tears, white spots, and broken glass cloth laminate.
- o If a loss of the braking effect of the landing wheel is observed, clean the brake drum, inspect the brake lining, replace the lining if worn. Check the brake Bowden cable, adjust if necessary.
- o Inspect static and dynamic pressure intakes and the tubing for free air pass and tightness.
- o Assemble the glider and check the movement of the control surfaces and all controls for easy and smooth operation.
  Check the function of the tow release mechanism.
  Inspect the wings and control surfaces for excessive backlash of their attachments.
  (See pages 32 and 33 of this Service Manual).


Steuerung im Tragflügel
1 Wölbklappe
2 Querruder
3 Bremsklappe
Wing controls
1 Wing flaps
2 Ailerons
3 Air brakes
JANUS
1
2
3



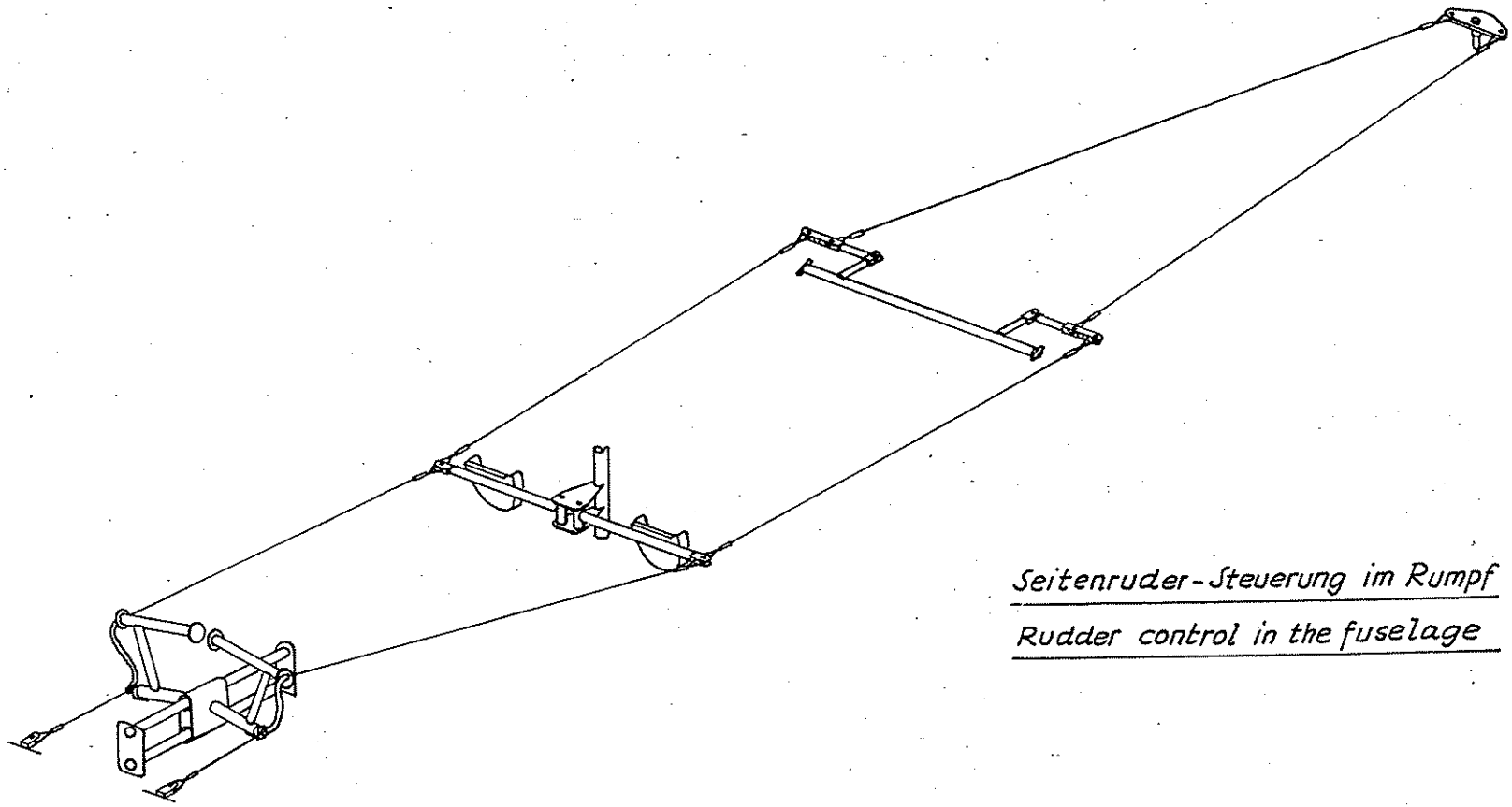
Steuerung im Rumpf

1 Höhensteuerung
2 Querrudersteuerung
3 QR-WK-Überlagerungsrohr
4 Wölbklappensteuerung
5 Bremsklappenbetätigung

Fuselage controls

1 Elevator control
2 Aileron control
3 Actuation tube for combined aileron and flap control
4 Flap control
5 Air brake control

JANUS



Seitenruder-Steuerung im Rumpf

Rudder control in the fuselage

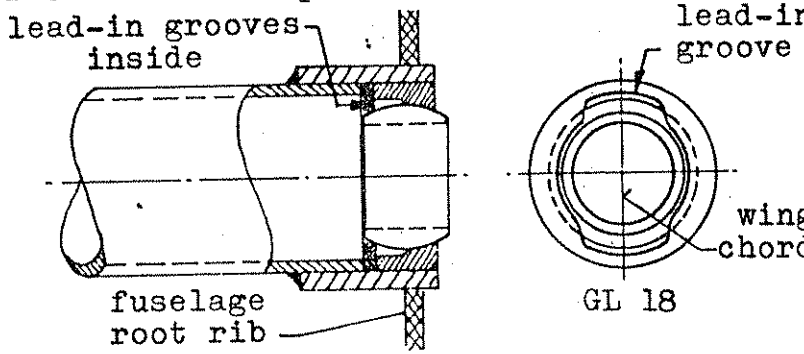
JANUS

Replacement of the ball bearings for wing attachment bolts on the fuselage

Four ball bearings (GL 18) are installed at the ends of the wing attachment tubes of the fuselage steel tube frame. These bearings are to be checked for cracks after heavy landings.

If a replacement of the bearings should be necessary, the repair is to be done as follows:

Turn the inner ball about 90° across and hammer the bearing out of its seat from the opposite side using a bar of about 15 to 18 mm diameter.
Insert a new ball bearing (GL 18) with the lead-in grooves to the inside in the direction of the wing chord.
Peen over or punch the outer bearing race at three spots.



Mount the wings and check the clearance of the wing attachments. If the backlash is exceeding the permitted tolerance, i.e. if the movement at the wing tips is exceeding 50 mm, follow the instructions on page 32.

Weights and hinge moments of control surfaces

After repair work or repainting, the hinge moments and weights of the components must not exceed the following values:

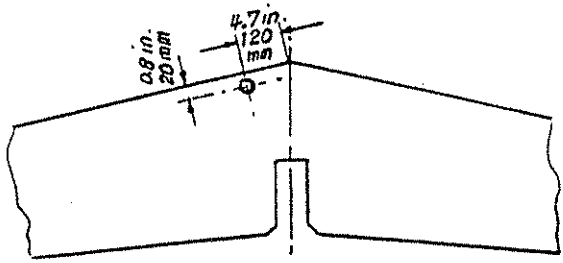
Component	Weight	Residual moments
Rudder with mass balance and with drogue chute	6.4 kg 14.11 lb	21.5 cm/kg 1.56 ft/lb
Rudder with mass balance but without drogue chute	6.4 kg 14.11 lb	8.0 cm/kg 0.58 ft/lb
Horizontal tail-plane	8.5 kg 18.74 lb	42.0 cm/kg 3.03 ft/lb
Flap	7.3 kg 16.09 lb	40.0 cm/kg 2.89 ft/lb
Aileron with mass balance	5.8 kg 12.79 lb	18.0 cm/kg 1.30 ft/lb

If these values are exceeded a mass balance must be installed in front of the hinge axis.

On the rudder lead strips are to be attached to the upper mass balance.

Mass balance on the elevator

Drill a 20 mm (13/16") dia hole into the lower surface, glue in with Epoxy resin granulated lead mixed with microballoons. Let dry and close the hole again following the repair instructions (see appendix).



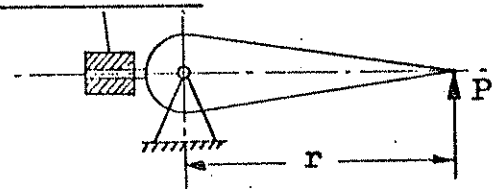
Mass balance on the aileron

If additional mass balance on the aileron should be necessary, attach a galvanized flat steel strip (10 mm thick and 30 mm wide) on the left or right from the already factory installed mass balance of the same material.

The hinge moments must be determined on the disassembled control surfaces.

$$M = P \cdot r$$

Mass balance



The control surfaces should be supported at their hinge axis.

The force P is to be measured by means of a letter or spring balance.

After the installation of an additional mass balance the control surfaces are to be checked for their free movement.

Service time

Inspection procedures for the extension of the service time

1. General

The results of fatigue tests subsequently carried out on wing spar sections have demonstrated that the service time of GFRP sailplanes and GFRP powered sailplanes may be extended to 12000 hours, if for each individual aircraft (in addition to the obligatory annual inspections) the airworthiness is demonstrated according to a special multi-step inspection program, particularly with regard to the service life.

2. Dates

When the sailplane (or the powered sailplane) has reached a service time of 3000 hours, an inspection must be done in accordance with the inspection program mentioned under section 3.

If the results of this inspection are satisfactory or if any defects found have been duly repaired, the service time of the sailplane (or powered sailplane) is extended by another 3000 hours to a total of 6000 hours (first step).

The inspection program mentioned under section 3.) must be repeated when the sailplane (or powered sailplane) has reached a service time of 6000 hours.

If the results of this inspection are satisfactory or if any defects found have been duly repaired, the service time may be extended by another 3000 hours to a total of 9000 hours (second step).

Thereafter the inspection program mentioned under section 3.) must be repeated every 1000 hours.

If the results of these inspections are satisfactory or if any defects found have been duly repaired, the service time may be extended by another 1000 hours to 10000 hours (third step), after a further 1000 hour inspection to 11000 hours (fourth step), and finally - after another 1000 hour inspection - to 12000 hours (fifth step).

3. The respective inspection program may be obtained from Schempp-Hirth Flugzeugbau GmbH.

4. The inspections may only be accomplished by the manufacturer or by a licensed repair station.

5. The results of the inspections are to be recorded in an inspection report, wherein comments are required for each inspection step.

   If the inspections are carried out by a licensed repair station, a copy of the records must be sent to the manufacturer for evaluation.

6. The mandatory annual inspection is not affected by this regulation.

Equipment list

A. Safety harnesses

Two (2) four-piece symmetrical safety harnesses are required for the Janus.

The following models are approved.

Lap belts

Type	Manufacturer	Data Sheet No.
Bagu 4502	Gadringer	40.070/16
Bagu IV-E/2	Gadringer	40.070/16
Bagu 5202	Gadringer	40.070/32
Bagu V-B/2	Gadringer	40.070/32
Bagu FAG-7F/0	Autoflug	40.070/30
4-01-1256	Schroth	40.073/11

Anchorage points:

Lap belts anchorage by the seat pan.

Shoulder straps

Type	Manufacturer	Data Sheet No.
Schugu 2300	Gadringer	40.071/05
Schugu 2700	Gadringer	40.071/05
Schugu II-C	Gadringer	40.071/05
Schugu II-C/V	Gadringer	40.071/05
Schugu FAG-7H/0	Autoflug	40.071/21
4-01-1256	Schroth	40.073/11

Anchorage points:

Front seat: Tubular cross strut between the seats

Rear seat: On the tube of the steel frame at the point where the GFRP cover is designed to accommodate them.

B. Instruments

The following instruments are available for the basic instrumentation of the Janus (see Flight Manual, section 2.9):

a) Normal operation

AIRSPEED INDICATOR
(Range: 50 – 250 km/h, 27 – 135 kt, 31 – 155 mph)
Manufacturer: Gebr. Winter, Jungingen

Model	Code No.			Data Sheet No.
	km/h	mph	kt	
6 FMS 4	6421	6422	6423	TS 10.210/15
7 FMS 4	7421	7422	7423	TS 10.210/19
6 FMS 5	6511	6512	6513	TS 10.210/16
7 FMS 5	7511	7512	7513	TS 10.210/20

ALTIMETER
Manufacturer: Gebr. Winter, Jungingen

Model	Code No.		Data-Sheet No.
	m	ft	
4 HM 6	4060	4200	TS 10.220/44
4 FGH 10	4110	4330	TS 10.220/46
4 FGH 20	4220	4440	TS 10.220/47
4 FGH 40		4550	TS 10.220/48

b) Additional equipment
(supplement equipment for normal operation a)

TURN & BANK INDICATOR with slip ball

Model	Manufacturer	Specif.-No.
WZ 402/31	Apparatebau Gauting	10-241/8
IFR 51-12-2	Instruments and Flight Research Wichita/USA.	TSO C 3 b

MAGNETIC COMPASS

Model	Manufacturer	Data-Sheet No.
FK 16 C 2300 C 2400	Ludolph Airpath Airpath	L-10.410.3

VARIOMETER
Manufacturer: Gebr. Winter, Jungingen

Model	Code-No.	Specif.-No.
5 St VL 5 St VLM 5 St V 5 St VM	all code numbers approved	TS 10.230/11 TS 10.230/12 TS 10.230/13 TS 10.230/14

VHF-TRANSCEIVERS

Model	Manufacturer	Data Sheet No.
FSG 40 S	W. Dittel GmbH.	10.911/45
FSG 50	W. Dittel GmbH.	10.911/71
FSG 60	W. Dittel GmbH.	10.911/72
FSG 70	W. Dittel GmbH.	10.911/81
FSG 71 M	W. Dittel GmbH.	10.911/81
FSG 90, 90H1	W. Dittel GmbH.	10.911/98JTS
FSG 2T	W. Dittel GmbH.	10.911/103JTSO
ATR 720	Avionic Dittel	10.911/70
ATR 720 A	Filser Electronic GmbH.	10.911/74
ATR 720 B	Filser Electronic GmbH.	10.911/80
ATR 720 C	Filser Electronic GmbH.	10.911/83
ATR 500	Filser Electronic GmbH.	O.10.911/113JTSO
ATR 600	Filser Electronic GmbH.	O.10.911/106JTSO
ATR 600R01	Filser Electronic GmbH.	O.10.911/115JTSO
ATR 833	Filser Electronic GmbH.	EASA.210.0193
M760	Microair	CAA LA301068
AR 3201	Becker	10.911/76
AR 3201-( )	Becker	10.911/76
AR 4201	Becker	10.911/87

DILUTER DEMAND OXYGEN SYSTEMS

Model	Manufacturer	Code-No.	Data Sheet No.
Höhenatmer HLa 758	Dräger	E 20088	40.110/1
Miniregler	Dräger	E 24902	40.110/19
Miniregler	Dräger	E 24903	40.110/19

EMERGENCY LOCATOR TRANSMITTER

Model	Manufacturer	Data-Sheet No.
EB-2 B (CD)	Mar Tech Division	10.915/2
ELT 10	Narco Avionics	10.915/3
ELT 8.1	Dorne & Margolin Inc.	10.915/5
3000	Pointer	10.915/6
ACK E01	ACK Technologies Inc.	10.915/9

VOR-LOC (Navigator Receiver)

Model	Manufacturer	Data-Sheet-No.
Nr 3301 S	Becker	10.922/79

Transponder Mode A/C

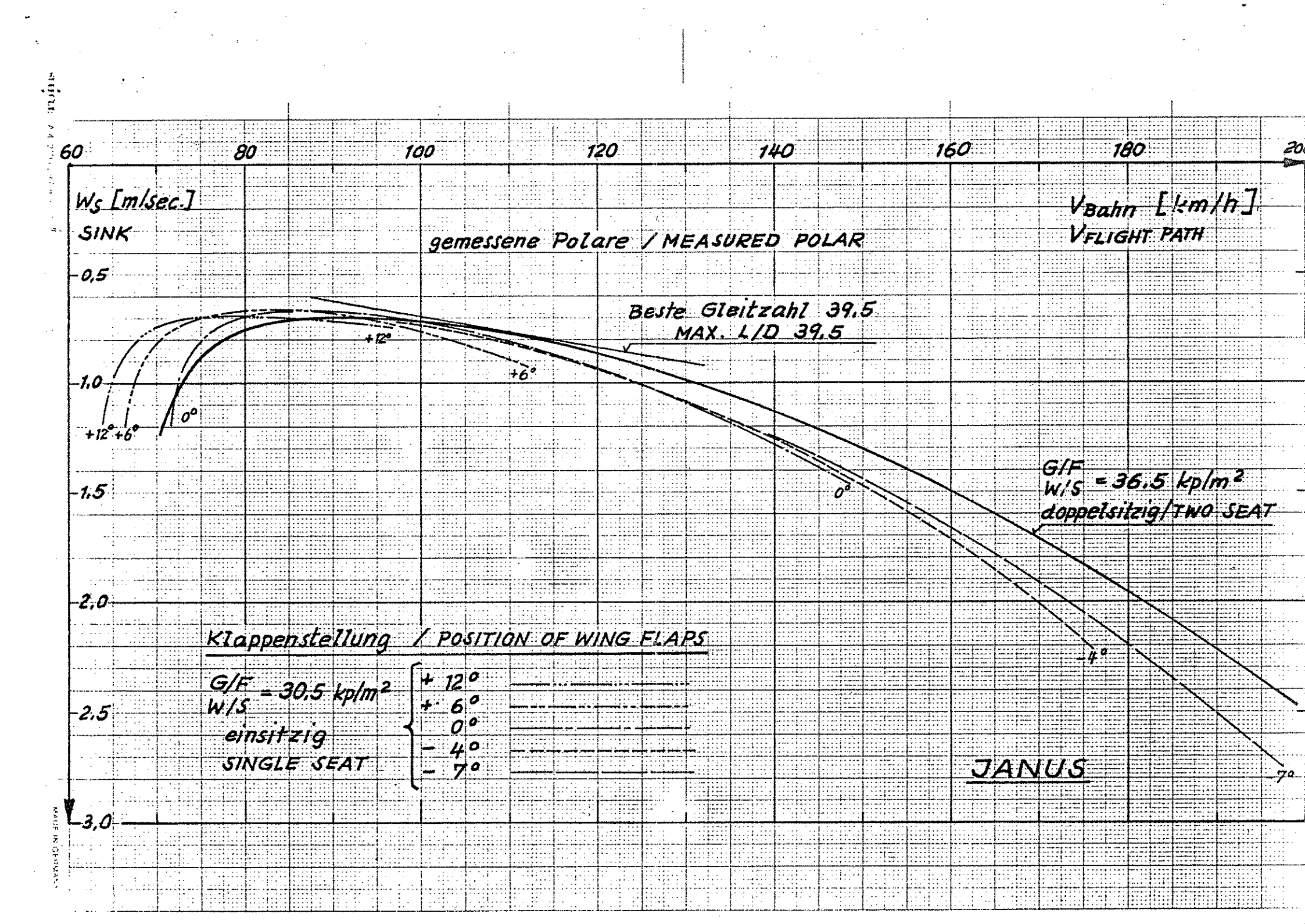
Model	Manufacturer	Data-Sheet-No.
ATC 2000-(3)-R(XX) (ATC 3401-1-R, CU 3400-1-(XX), CU 5401-1-(XXX)	Becker	LBA.0.10.930/54 JTSO
ATC 4401 (ATC4401-1-175, ATC4401-2-175, ATC441-1-250, ATC4401-2-250)	Becker	LBA.0.10.930/062 JTSO
T2000	Microair	LBA.10.930/066 JTSO
ACK A-30	ACK Technologies	TSO C-88a

Transponder Mode S

Model	Manufacturer	Data-Sheet-No.
BXP 6401-1-(01)+ BXP 6402-1R-(01) BXP 6401-2-(01)+ BXP 6402-2R-(01) AM 6400-1-(01) Address modul CU 6401-1-(01) Control unit	Becker	EASA.21O.322
BE 6400-01(01) Blind Encoder	Becker	EASA.21O.001174
ACK A-30	ACK Techno-logies INC.	TSO C-88a
TRT 600 TRT 800 TRT-800H	Filser	10.930/063 NTS EASA.21O.045 EASA.21O.269
VT-0101 VT-0102-070 VT-01 VT-0102-125 VT-0103-1	Garrecht	EASA.21O.384

Note: concerning the installation of further equipment:

The Luftfahrt-Bundesamt (LBA) will advise with regard to the suitability of equipment not listed herein.
(The installation of oxygen systems must also be approved and their overhaul times are to be observed).


60
80
100
120
140
160
180
W_S [m/sec.]
SINK
V_{Bahn} [km/h]
$V_{FLIGHT\ PATH}$
gemessene Polare / MEASURED POLAR
Beste Gleitzahl 39.5
MAX. L/D 39.5
0,5
1,0
1,5
2,0
2,5
3,0
+12°
+6°
0°
+12° +6°
-4°
-7°
G/F
W/S = 36.5 kp/m²
doppelsitzig/TWO SEAT
Klappenstellung / POSITION OF WING FLAPS
G/F = 30.5 kp/m²
W/S
einsitzig
SINGLE SEAT
+ 12°
+ 6°
0°
- 4°
- 7°
JANUS

1- PREVENTIVE AND SAFETY MAINTENANCE

The action of the ball within the swivel should be a drag load,due to minimum friction. To this end, the ball and swivel joint should be lubricated. Lubricant shall be applied after cleaning the parts, before their assembly, using non cold-setting grease.

e.g. : ESSO GENERAL PURPOSE SPRAY CONTAINING SILICONE ENRICHED OILS (recommended for units exposed to sand and grit).

After each installation make sure that the ball is safely engaged into the swivel. A pilot hole is provided in the lock plate to this end. When the connection is true, the hole can be seen and pin " B ", part reference L'H 140-31, or other items (integral only with the lock plate), may be fitted.

2- SCHEDULED INSPECTION

During yearly overhaul, or once every 500 flight hours, whichever comes first, check the balls and swivels. Proceed as follows :

2-1 Determine ball concentricity (See Fig. 1)

The maximum permissible deviation between ball shaft and sphere is 0.05mm. This check aims at detecting any buckling of drive rods.

2-2 Determine ball sphericity (See Fig. 2)

The variation between a number of spherical diameter readings shall not exeed 0.05mm. This check aims at detecting any abnormal ball fretting.

2-3 Check condition of threaded parts of ball

No thread should show any damage. On assembly, the collar should safely rest on its base. The ball shall be secured by an adequate locking device.

2-4 Visual inspection of swivel joint

The swivel should show no sign of distorsion or peening in the recess where the ball fits, or at the seat and locking system. The aim of such inspection is identical to that of § 2-1

2-5 Projection of lock plate bottom after fitting ball into swivel joint

(refer to drawing)

The projection shall exceed 2mm. The aim of this requirement is identical to that of § 2-2.

2-6 Check attachment of drive rod and swivel joint

When the swivel is adjustable, check that the attachment of drive rod and swivel is tight and secured by an adequate locking device.

2-7 Check the operation of swivel after assembly

There should be no binding of seat or lock plate due to oxidation or to any other reason.

Louis L'HOTELLIER S.A.
10, Rue de l'Abbé Glatz - 92270 Bois-Colombes FRANCE
Tél. 42.42.13.94

In case any of the above 7 checks is not within allowance, the ball and swivel joint shall be removed and replaced with a new unit. It is anyway recommended to replace ball and swivel joints once in 10 years, or after 3000 hours of flight.

IMPORTANT NOTE

Defective parts may be returned for TECHNICAL INVESTIGATION TO Ets Louis L'HOTELLIER

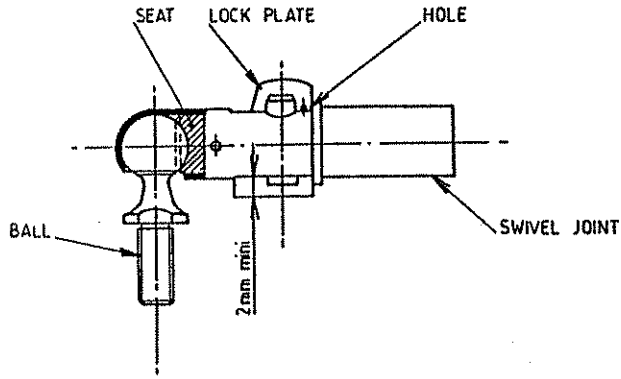


FIG.1

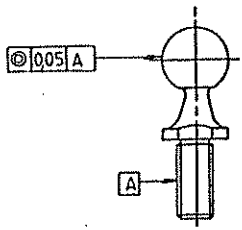
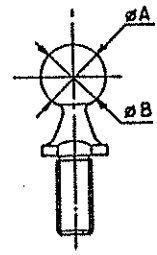


FIG.2



|A-B|<0,05

Repair Instructions for the " J A N U S "

The construction methods on the JANUS are almost the same as used on the OPEN CIRRUS. Therefore repairs can be performed in the same way as described in the enclosed instructions for the CIRRUS.

In the JANUS we find the following construction methods:

1. Wing and Horizontal Tail Plane

   Glass fiber-plastic foam sandwich, i.e. foam CONTICELL 60, 8 mm thick bonded on both sides with glass cloth.

2. Wing flaps and Ailerons

   Glass fiber-plastic foam sandwich, upper shell with CONTICELL 60, 6 mm thick, lower shell with STYROPOR, 2 mm thick, or CONTICELL 60, 4 mm thick.

3. Rudder

   Glass fiber-plastic foam sandwich, i.e. foam CONTICELL 60, 4 mm thick bonded on both sides with glass cloth.

4. Vertical Tail Plane (Fin)

   Glass fiber-plastic foam sandwich, i.e. foam CONTICELL 60, in the front of the spar - 6 mm thick, in the rear of the spar - 4 mm thick.

5. Fuselage

   Pure glass fiber-plastic layup.

If a fracture or damage occurs to the glider, you should first inspect the damaged area to determine exactly the type of construction and to find the appropriate repair method.

Schempp-Hirth KG. 7312 Kirchheim-Teck W.Germany

Repair Instructions for the Glass Fiber-Plastic Sailplane "CIRRUS"

Construction

In the CIRRUS sailplane we find three basically different construction methods. Repairs must for this reason be performed differently on the respective parts.

We differentiate

1. Wing and stabilizer
2. Rudder, elevator and ailerons
3. Fuselage

1.) Wings and stabilizer are built in a ribless glass fiber-plastic foam sandwich construction. This means in event of damage that we find a PVC rigid foam (5/16 inch thick, 3.7 lb./cu.ft.) bonded on both sides with a glass cloth laminate.

2.) The controls likewise consist of a sandwich construction. However here the supporting core is not PVC rigid foam but a 5/32 inch thick foamed polystyrene (Styropor) sheet with a specific weight of only one lb./cu.ft.

3.) The fuselage, in contrast to the above parts, is not in sandwich construction but in a pure approximately 1/16 to 3/32 in. thick glass fiber-plastic layup which is reinforced at two locations with bonded-in foam rings.

The following materials apply to all parts:

Resin	Shell Epikote 162
Hardener	BASF Laromin C 260
Mixing proportions by weight	100 resin to 38 hardener
by volume	2 resin to 1 hardener

After proportioning stir until striations disappear. Add filler after stirring.

Glass fibers and cloth

Use only alkali-free "E" glass cloth with Volan A or I-550 finish (INTERGLAS).

INTERGLAS Style	U.S. Style	Weave	Weight lb./sq.ft.	Application
91110	120	↑ Crosstwill	.022	Elevator & rudder
92110	---		.033	Fuselage, ailerons, stabilizer
92125	---		.058	Wings & fuselage
92140	152-150	↓ uni-directional	.082	Fuselage
92145	181-150		.044	Wings

Rovings

GEVETEX Type ES 10-40 x 60 K 43	Textilglas GmbH GEVETEX

Foams

PVC Rigid Foam Conticell 60 5/16 in. thick, 3.7 lb./cu.ft.	Continental AG
Styropor THERMOPETE Super 5/32 in. thick, 1 lb./cu.ft.	PORON Kunststoff Werke

Resin - Fillers

Microballoons, white	Union Carbide
Microballoons, brown	(Brenntag GmbH)
Aerosil	Degussa-Wolfgang
Styropor kernels 1/16 - 3/32 dia. (expanded polystyrene kernels)	BASF
Chopped cotton wool	

Lacquer — Lesonal-Werke

PE - Lackvorgelat, white (resin paint)	No. 3-6910
PE - Hardener	No. 7-2050

Mixing proportions by weight

100 parts Lackvorgelat to 10 parts hardener

PE - Thinner No. 6-3026

Repair

Should a fracture or damage occur to the sailplane, you should first inspect the damaged area to determine exactly the extent of damage and type of construction. The type and density of weave can usually be determined by sanding to the cloth. If this is not possible, break off a piece of the laminate and ignite it. After the resin is burned the type, density and direction of the weave will be evident.

I. Damage to Wing or Stabilizer

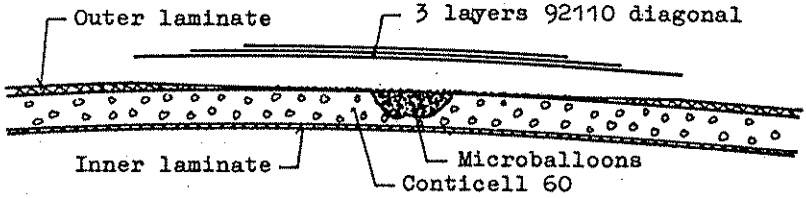
The damages which can be repaired by you fall into two groups.

a) Simple surface damage (only the outer glass fiber laminate damaged)

b) Destruction of the whole shell (also the inner glass fiber laminate destroyed)

a.) If the outer shell receives a puncture or a fracture, tap to determine the extent of delamination from the foam. Follow by removing the lacquer with a sanding disc or block and remove from the foam the portion of the shell which has become delaminated. Around the edge of the damaged area where the shell is still firmly bonded, scarf with an abrasive block or a plane blade at least 1-1/2 inches (for each cloth layer about 3/4 inch is necessary).
After scarfing the shell, blow out thoroughly the whole repair area including the pores of the foam and wash the scarf with carbon tetrachloride or acetone.

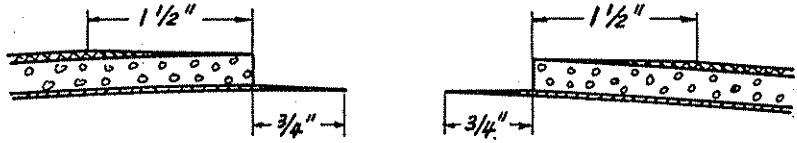
Now fill the hole in the foam with microballoons and simultaneously fill the pores of the exposed foam. Then lay three patches of the 92110 cloth with diagonal weave direction (stepwise largest patch first) over the damaged area. The applied cloth must be dry and dust free.



After hardening (appr. 8 hrs. at 20 deg. C. or 68 deg. F.) the damaged area should be smoothed, filled and painted. In smoothing take care that only the edges of the patches are sanded.

b.) If there is a through hole in the sandwich shell then the inner laminate must be repaired.

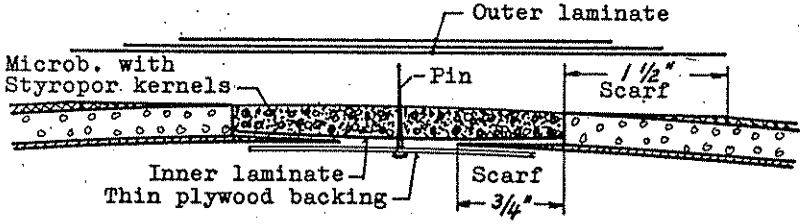
We remove the outer laminate in the region of the damage which is no longer bonded to the foam and enlarge the hole in the foam and inner laminate until good bonding to the foam is evidenced. Then the foam is further removed 3/4 inch around the hole in the inner laminate and the outer laminate scarfed as under paragraph a. Now the projecting inner laminate is cleaned of any foam and feathered.



If the hole in the foam is smaller than a fist then glue with Patex a thin plywood or polyester plate from the inside to the laminate, lay on the inner laminate (1 layer 92125 ✻ or 2 layers 92110 ✻) and fill the hole in the foam with microballoons mixed with Styropor kernels or crumbled Styropor.

If you are not hurried let it harden (8 hrs. at 68 deg. F.) sand and apply the outer patches.

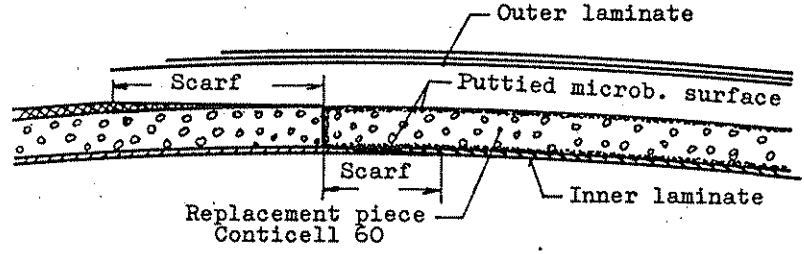
A tip on gluing the plywood plate - the hole in the inner laminate should always be a bit oblong so as to insert the plywood backing plate. Before inserting the plywood drive through the middle of the ply a pin or nail by which it can be drawn against the inner shell. With additional nails or pins it is in this manner possible to close very large holes to the proper contour to lay the cloth patch on.



Basically it is possible to repair also larger shell parts in the foregoing manner. Because of weight you should use a plug of foam in place of the microballoons and Styropor kernels.

In these cases proceed as follows: You cut or sand a plug of foam (Conticell 60) to fit the hole, spread the inner side thinly with microballoons (to close the pores) and lay on it the inner laminate. The inner laminate must harden before doing further work. If the hardening is complete or at least progressed so that the laminate does not separate from the foam, then glue the plug in the hole with thickened resin (chopped cotton wool, microballoons). The foam with laminate on one side is flexible so that it can be fitted to the wing contour (if necessary warm the foam with a hairdryer and bend). Once the foam is glued it can be smoothed, puttied with microballoons and the outer laminate applied.

Caution: Avoid strong heat, otherwise air bubbles form.



II. Damage to the Controls

Basically the same procedure can be used as on the wing. Only in place of the PVC foam a polystyrene foam layer, "Styropor Thermopete Super" 5/32 inch thick, is used. The Styropor piece need not be coated with microballoons, the cloth adheres very well with pure or slightly

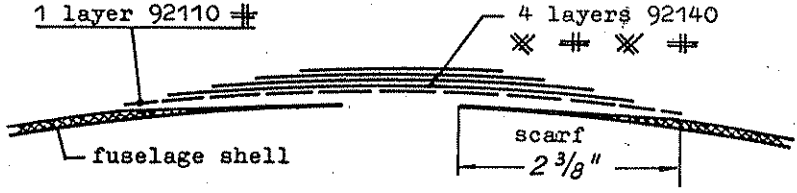
thickened resin which must not harden in any case before doing further work. However with larger replacement pieces you should let the laminate harden on one side and glue the foam thereto in order to keep the surface wave free.

Caution: Do not apply too much heat to freshly laid cloth otherwise it causes ugly blisters and you must start over.

Caution: On the controls minimize weight in the repair. The surface should require very little filling.

III. Damage to the Fuselage

In the repair of the fuselage we save the annoying replacement of the foam. We have here, as already mentioned, only to do with the simple glass laminate which in most places consists of five layers. Therefore we need larger scarfs. These should, for larger holes or cuts, never be less than 2-3/8 inches wide. With all fuselage shell repairs apply resin first to a layer of 92110 ╪ cloth following with four layers of 92140 cloth alternating the weave lengthwise and diagonally. Then you are always on the safe side. Each succeeding layer should be about 3/8 to 1/2 inch smaller than that under it.



For small holes or fractures the repair is no problem. You sand your scarf, clean well with carbon tetrachloride or acetone, lay on the cloth layers and, if the resin is dry, can finish the whole repair with microballoons after 2 or 3 hours.

Caution: If the room is cold or if you are hurried you should nonetheless not use a concentrated hot air stream. Better, make a large tent over the area from aluminum foil and heat the space from a safe distance. There is little likelihood of blisters but overheating can occur and the resin may become brown. If you do not have a source of hot air, put a sheet of foil over the applied cloth and use a heat pad or hot water bottle.

For larger holes in the tailcone not accessible from the inside, we must again fabricate a backing on which to contour the repair cloth. This can be retained as discussed previously with the aid of plywood, a nail and a little Patex. It cannot later fall out, the cloth being directly on the plywood and so is bonded thereto. After the plywood backing is secured proceed as previously discussed.

Lacquer Work

After sanding the edges of the patch or the area filled with microballoons until the original contour is attained the puttying can be abandoned and the lacquer (PE-Vorgelat or PE-Vorgelat and filler in 1 to 1 proportion) applied directly with a brush (not sprayed). After hardening sand the area and wet sand with 360 grit wet-or-dry paper. If at no place the weave shows then final sanding can be done with 600 grit wet-or-dry. Polish with rubbing compound. If the weave shows repaint with lacquer.

Repairs to Fittings

At the appearance of a damage to a fitting, the cause of which is not known, contact the factory.

Welding should be carried out only by an approved aircraft welder.

All weldments made by the factory are by the Argon-arc method using 1.7324.0 welding rod.

Larger Repairs

You should not attempt to make larger repairs of the following types:

If the wing, fuselage or controls are broken apart.

If the spar flanges are damaged.

If the main fittings at the root rib, fuselage or in the controls are broken out.

If in the area of the fittings the laminate shows white areas or cracks.

When you cannot guarantee the repair.

Kirchheim-Teck
26th March 1968
Schempp-Hirth K.G.

ss Klaus Holighaus

Translation by F. H. Matteson

Service and Maintenance Instructions for the Brake Parachutes on Sailplanes

Model ..... BS 1000
Model ..... BS 1300
Model ..... BS 1600

Date: November 1968

Manufacturer:
Walter Kostelezki KG
7987 Weingarten / Wuertt.
W. Germany

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1 Operation

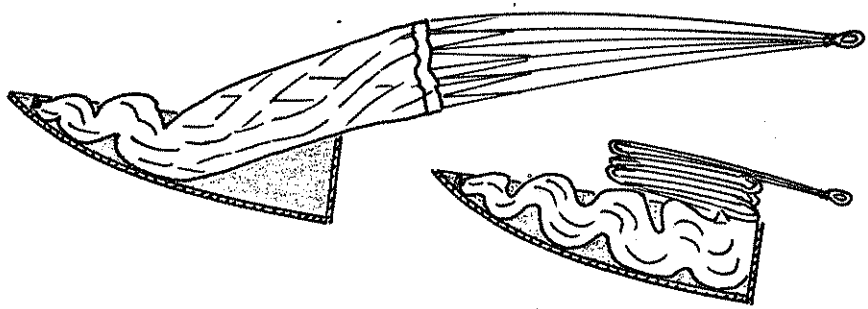
1.1 Follow the instructions of the Flight Manual " " concerning the use of the brake parachute during flight, approach, and landing.

1.2 Following instructions should be observed when putting the brake parachute into its box on the lower end of the rudder.

1.2.1 Do not put a wet parachute into the box. If necessary dry it before. (See 2.5).

1.2.2 The brake parachute, ribbons and cords, should not be entangled or twisted. Stretch the chute and check its proper shape. The two shroud lines, adjacent to the name plate on the canopy base, should run straight up to the attachment loop without being entangled with the other shroud lines. If necessary untangle the chute before putting it into the box.

1.2.3 Fold up the stretched parachute into the box in a S-shape manner, beginning at the top of the canopy. (See sketch).



2 Maintenance

2.1 Check the brake parachute always after having used it during flight or at landing.
Minor defects as small holes in the ribbons, little wears, soiling etc. do not affect the serviceability of the chute.
If the brake parachute shows greater damages as tearing off of more than 10% of the ribbons, spacers or shroud lines, it must be taken out of service and be repaired before further use.

2.2 Brake parachutes not in use must be reviewed in intervals of about 60 days.

2.3 The brake parachutes must be inspected at the end of 12 months after the manufacturing inspection of the sailplane and during the annual inspections thereafter.

2.4 Storage

Brake parachutes not in use should be stored in a dry and airy room at about 20°C (68°F) and 65% rel. humiditiy of the air. Protect them from vermins and do not store them together with food, chemicals (battery acids) etc.
Do not expose them to strong insolation which has a detrimental effect on the ribbon fabric.

2.5 Drying

Wet brake parachutes must be dried before further use. Hang them up for airing and drying. Avoid however temperatures exceeding 40°C (104°F) and strong insolation.

2.6 Cleaning

Clean the brake parachute only if it is absolutely necessary.
Clean with lukewarm water adding little of a mild washing agent as used for Nylon fabrics.
Do not scrub, rub, and wring.

2.7 Greater damages (see 2.1) must be repaired by the manufacturer.
Therefore send brake parachutes for repair only to the manufacturer of the chutes or to the manufacturer of the sailplane.

GEGENSTAND: Neues Epoxidharz-System für Glas-, Kohle- und Aramidfaser
SUBJECT: *New epoxy resin-system for glass, carbon and aramid fibres*

BETROFFEN: Siehe Liste aller betroffenen Muster und Baureihen auf Blatt 2 (Schempp-Hirth Segelflugzeuge und Motorsegler in Faserverbundbauweise)
AFFECTED: *See list of affected sailplanes and powered sailplanes on page 2 (Schempp-Hirth sailplanes and powered sailplanes of fibre composite construction)*

DRINGLICHKEIT: Keine
URGENCY: *None*

VORGANG: Die Firma Sika hat das Epoxidharz-System Biresin CR122 mit den Härtern Biresin CH122-3, CH122-5 und CH122-9 entwickelt und nach der vom Luftfahrtbundesamt vorgeschriebenen Prüfung (RHV) qualifiziert. Dieses Harzsystem ist dadurch für den Flugzeugbau zugelassen.
REASON: *The company Sika has developed the epoxy resin system Biresin CR122 with the hardeners CH122-3, CH122-5 and CH122-9. This epoxy resin system has been qualified according to the requirements (RHV) prescribed by the Luftfahrtbundesamt (LBA) and can therefore be used for the production of sailplanes and powered sailplanes.*

MASSNAHMEN: Alternativ zu den bisher verwendeten Epoxidharz-Systemen kann bei Neubau bzw. Reparaturen von Faserverbund-Bauteilen das Epoxidharz Biresin CR122 mit den Härtern Biresin CH122-3, CH122-5 und CH122-9 der Firma Sika verwendet werden.
Die Verarbeitung hat nach den Angaben auf dem Produktdatenblatt zu erfolgen. Es sind die Angaben zur Temperung zum Erreichen der LBA-RHV-Mindestanforderungen zu beachten

Diese Technische Mitteilung und das Datenblatt des Epoxidharz-System Biresin CR122 mit den Härtern Biresin CH122-3, CH122-5 und CH122-9 werden als Anhang in das Wartungshandbuch des jeweiligen Flugzeuges eingefügt.

ACTION: *As an alternative to the commonly used epoxy resin system the epoxy resin system Biresin CR 122 with the hardeners Biresin CH122-3, CH122-5 and CH122-9 can be used for the production and for the repair of fibre composite components.*
The processing of this epoxy resin system has to be done according to the specifications on the product data sheet.
The specification regarding the post-curing-process for reaching the LBA-RHV-minimum requirements have to be observed.

This technical Note and the product data sheet of the epoxy resin system Biresin CR122 with the hardener Biresin CH122-3, CH122-5 and CH122-9 are to be inserted in the respective maintenance manual as appendix.

HINWEIS: Das Epoxidharz-System Biresin CR122 kann unter folgender Adresse bezogen werden:
NOTE: *The epoxy resin system can be purchased at the following address:*

Schempp-Hirth Flugzeugbau GmbH
Krebenstr. 25
73230 Kirchheim unter Teck
Tel. 07021 – 7298-0 oder Fax: 07021 – 7298-199

Liste der von der Technischen Mitteilung Gen-4 betroffenen Muster mit Baureihen:
List of the types with variants affected by Technical Note Gen-4:

Kennblatt Nr. Type certificate data sheet no.	Muster type	Baureihe variant
LBA 265	Cirrus	Cirrus, Cirrus VTC
LBA 278	Standard Cirrus	Standard Cirrus, Standard Cirrus B, Standard Cirrus G, Standard Cirrus CS 11-75L
LBA 286	Nimbus 2	Nimbus-2, Nimbus-2B, Nimbus-2c, Nimbus-3, Nimbus-3/24.5
LBA 295	Janus	Janus, Janus B, Janus C, Janus Ce
LBA 328	Mini Nimbus	Mini Nimbus HS7, Mini Nimbus B, Mini Nimbus C
EASA.A.274	Ventus a	Ventus a, Ventus a/16.6, Ventus b, Ventus b/16.6, Ventus c Ventus-2a, Ventus-2b, Ventus-2c
EASA.A.049	Discus a	Discus a, Discus b, Discus-2a, Discus-2b, Discus-2c
LBA 373	Nimbus-3D	
LBA 380	Nimbus-4	Nimbus-4, Nimbus-4D
EASA.A.025	Duo Discus	Duo Discus, Duo Discus c
LBA 798	Nimbus-2M	
LBA 809	Janus CM	Janus CM, Janus CT
EASA.A.301	Ventus bT	Ventus bT, Ventus cT, Ventus cM, Ventus-2cT, Ventus-2cM
LBA 831	Nimbus-3T	
LBA 847	Nimbus-3DT	Nimbus-3DT Nimbus-3DM
EASA.A.050	Discus bT	Discus bT, Discus bM, Discus-2T, Discus-2cT
EASA.A.063	Nimbus-4M	Nimbus-4M, Nimbus-4T, Nimbus-4DT, Nimbus-4DM
EASA.A.074	Duo Discus T	
EASA.A.532	Arcus T	Arcus T

Kirchheim/Teck ausgestellt / *issued: 05.10.2012* C. Wannenmacher	Zugelassen durch die EASA am: *EASA approved on:* 14.12.2012 Mit Zulassungs-Nr.: 10042722 *under approval-No.:*

Tooling & Composites

Product Data Sheet
Version 06 / 2012

Biresin® CR122

Composite resin system

Areas of Application

- For wet lay-up, pultrusion and filament winding processing
- Specially for applications when higher temperature resistance is required
- **Biresin® CR122** with **Biresin® CH122-3** and **CH122-5** approved by Germanischer Lloyd for the production of components
- **Biresin® CR122** with **Biresin® CH122-3** and **CH122-5** approved by Luftfahrt-Bundesamt (German Aeronautics Federal Office) as resin system for GRP-, CRP- and SRP parts for glider and power glider

Product Benefits

- One resin with two hardeners with different reactivity
- Uniform mixing ratio of 100 : 30
  - the reactivity can be adapted by mixing the hardeners
- Because of optimized mixed viscosity good impregnation and good non draining properties
- Demoulding is possible already after RT curing
- Glass transition temperatures up to 120°C dependent on curing conditions

Description

- Basis: Two-component-epoxy-system
- Resin (A): **Biresin® CR122**, epoxy resin, tranlucent
- Hardener (B): **Biresin® CH122-3**, amine, colourless to brownish
- Hardener (B): **Biresin® CH122-5**, amine, colourless to brownish

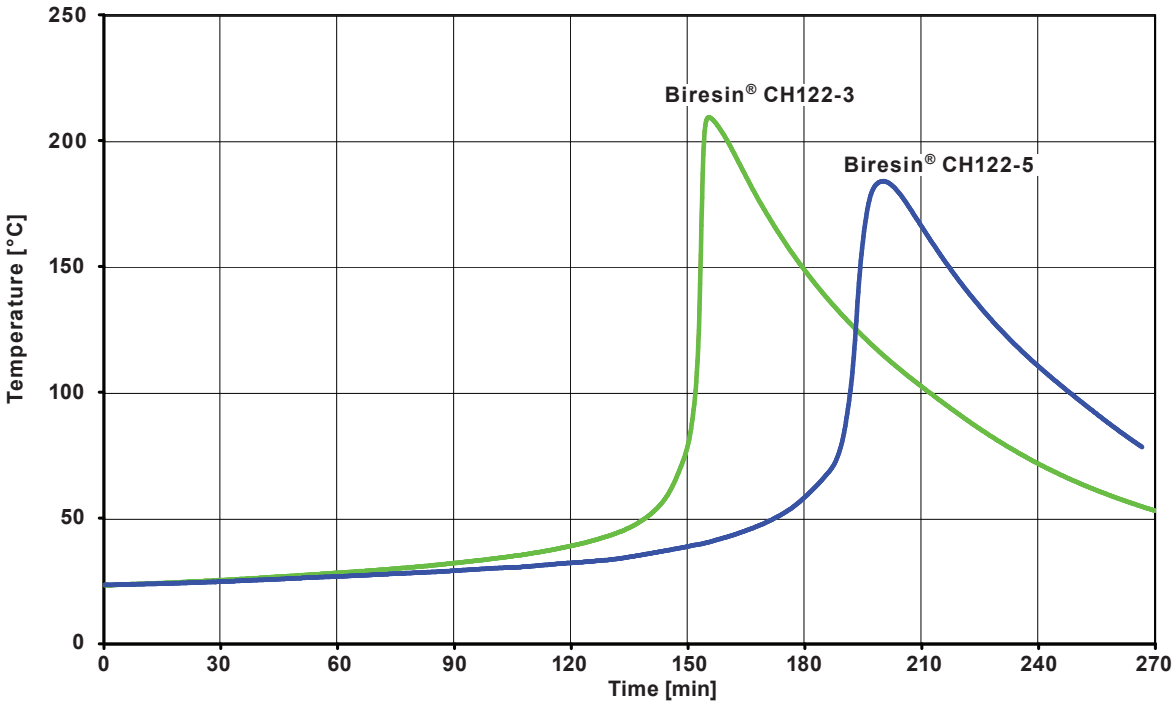
Physical Data			Resin (A)	Hardener (B)	
Individual Components			**Biresin® CR122**	**Biresin® CH122-3**	**Biresin® CH122-5**
Viscosity, 25°C		mPas	850	15	15
Density, 25°C		g/ml	1.17	0.94	0.93
Mixing ratio	in parts by weight		100	30	
				Mixture	
Potlife, 100 g / RT, approx. values		min		150	190
Mixed viscosity, 25°C, approx. values		mPas		370	380

Processing

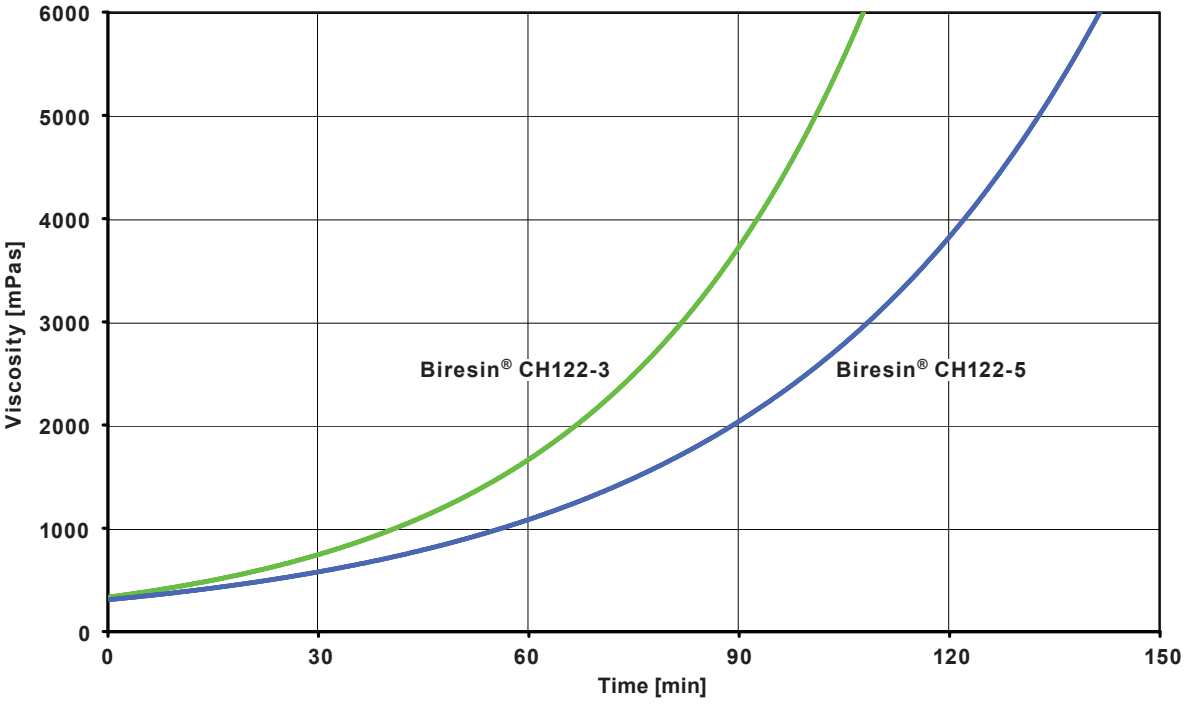
- The material and processing temperatures should be from 18 to 35°C.
- The option of room temperature precuring before demoulding is provided.
- Postcuring is recommended:
  - for achieving of GL minimum requirements: 16 h / 55°C plus 3 h / 70°C
  - for achieving of LBA-RHV minimum requirements with **Biresin® CH122-3**:
    carbon fibre: 12 h / RT plus 8 h / 55-60°C
    glass fibre: 12 h / RT plus 8 h / 60-65°C
  - for achieving of LBA-RHV minimum requirements with **Biresin® CH122-5**:
    carbon / glass fibre: 12 h / RT plus 12 h / 65°C

  With that curing conditions the system achieves the requirements for glider and power glider (temperature range of use -60 up to +54°C)
- To clean brushes or tools immediately Sika Reinigungsmittel 5 is recommended.
- Additional informations are available in “Processing Instructions for Composite Resins”.

Development of Exotherm of Biresin® CR122-Resin(A)-Hardener(B)-Mixtures, 100g / 23°C, insulated,



Development of Viscosity of Biresin® CR122-Resin(A)-Hardener(B)-Mixtures, 25°C



Test conditions: rotation viscosimeter, plate/plate, measuring gap 0,2 mm

Mechanical Data, neat resin specimen at different post curing conditions				
Part 1: approx. values after 16 h / 55°C (source: accredited testing institute)				
Biresin® CR122 resin (A)	with hardener (B)	**Biresin®**	**CH122-3**	**CH122-5**
Density	ISO 1183	g/cm³	1.17	1.17
Flexural E-Modulus	ISO 178	MPa	3,500	3,500
Tensile E-Modulus	ISO 527	MPa	3,300	3,400
Flexural strength	ISO 178	MPa	121	121
Elongation at maximum flexural strength	ISO 527	%	4.9	4.9
Tensile strength	ISO 527	MPa	70	70
Water absorption	ISO 175	%	0.32	0.33

Part 2: approx. values after 16 h / 55°C + 3 h / 70°C (source: accredited testing institute)				
Biresin® CR122 resin (A)	with hardener (B)	**Biresin®**	**CH122-3**	**CH122-5**
Density	ISO 1183	g/cm³	1.17	1.17
Flexural E-Modulus	ISO 178	MPa	3,400	3,400
Tensile E-Modulus	ISO 527	MPa	3,300	3,200
Flexural strength	ISO 178	MPa	122	120
Elongation at maximum flexural strength	ISO 527	%	5.4	5.3
Tensile strength	ISO 527	MPa	70	69
Water absorption	ISO 175	%	0.32	0.33

Part 3: approx. elongation values after post curing (source: accredited testing institute)				
Biresin® CR122 resin (A)	with hardener (B)	**Biresin®**	**CH122-3**	**CH122-5**
Post curing conditions		12 h RT +	8 h / 65°C	12 h / 65°C
Elongation at maximum tensile strength	ISO 527	%	5,1	6,0

Part 4: approx. values after 12 h / 120 °C (source: Sika internal)				
Biresin® CR122 resin (A)	with hardener (B)	**Biresin®**	**CH122-3**	**CH122-5**
Density	ISO 1183	g/cm³	1.17	1.16
Shore hardness	ISO 868	-	D 86	D 86
Flexural E-Modulus	ISO 178	MPa	2,700	2,700
Tensile E-Modulus	ISO 527	MPa	2,800	2,800
Flexural strength	ISO 178	MPa	128	125
Compressive strength	ISO 604	MPa	120	118
Tensile strength	ISO 527	MPa	84	84
Elongation at break	ISO 527	%	5.4	5.6
Impact resistance	ISO 179	kJ/m²	52	59

Thermal data of neat resin specimen at different post curing conditions						
Biresin® CR122 resin (A)	with hardener (B)	**Biresin®**			**CH122-3**	**CH122-5**
	Post curing conditions					
Heat distortion temperature	16 h / 55°C		ISO 75A	°C	68	67
	16 h / 55°C + 3 h / 70°C		ISO 75A	°C	75	73
	12 h / 120°C		ISO 75B	°C	118	120
Glass transition temperature	8 h / 55°C		ISO 11357	°C	78	79
	12 h / 60°C		ISO 11357	°C	82	84
	12 h / 120°C		ISO 11357	°C	114	119

Packaging

Individual components	**Biresin® CR122** resin (A)	1000 kg; 200 kg; 30 kg; 10 kg net
	Biresin® CH122-3 hardener (B)	180 kg; 25 kg; 3.0 kg net
	Biresin® CH122-5 hardener (B)	180 kg; 25 kg; 3.0 kg net

Storage

- Minimum shelf life of Biresin® CR122 resin (A) is 24 month and of Biresin® CH122-3 hardener (B) and CH122-5 hardener (B) is 12 month under room conditions (18 - 25°C), when stored in original unopened containers.
- After prolonged storage at low temperature, crystallisation of resin may occur. This is easily removed by warming up for a sufficient time to 50-60°C.
- Containers must be closed tightly immediately after use. The residual material needs to be used up as soon as possible.

Health and Safety Information

For information and advice on the safe handling and storage of products, users should refer to the current Safety Data Sheet containing physical, ecological, toxicological and other safety related data.

Disposal considerations

Product Recommendations: Must be disposed of in a special waste disposal unit in accordance with the corresponding regulations.
Packaging Recommendations: Completely emptied packagings can be given for recycling. Packaging that cannot be cleaned should be disposed of as product waste.

Value Bases

All technical data stated in this Product Data Sheet are based on laboratory tests. Actual measured data may vary due to circumstances beyond our control.

Legal Notice

Further information available at:

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Subsidiary Bad Urach
Stuttgarter Str. 139
D - 72574 Bad Urach
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Email: composites@de.sika.com
Internet: www.sika.com

Tooling & Composites

Product Data Sheet
Version 06 / 2012

Biresin® CR122 with Biresin® CH122-9 hardener
Composite resin system

Areas of Application

- For wet lay-up, pultrusion and filament winding processing
- Specially for applications when higher temperature resistance is required
- **Biresin® CR122** with **Biresin® CH122-9** approved by Luftfahrt-Bundesamt (German Aeronautics Federal Office) as resin system for GRP-, CRP- and SRP parts for glider and power glider

Product Benefits

- Because of optimized mixed viscosity good impregnation and good non draining properties

Description

- Basis: Two-component-epoxy-system
- Resin (A): **Biresin® CR122**, epoxy resin, tranlucent
- Hardener (B): **Biresin® CH122-9**, amine, colourless to brownish (also available in blue)

Physical Data		Resin (A)	Hardener (B)
Individual Components		**Biresin® CR122**	**Biresin® CH122-9**
Viscosity, 25°C	mPas	850	120
Density, 25°C	g/ml	1.17	0.94
Mixing ratio	in parts by weight	100	40
		Mixture	
Potlife, 100 g / RT, approx. values	min	330	
Mixed viscosity, 25°C, approx. values	mPas	680	

Mechanical Data, neat resin specimen			
approx. values after 8 h / 100°C (source: Sika internal)			
Biresin® CR122 resin (A)			with **Biresin® CH122-9** hardener (B)
Density	ISO 1183	g/cm³	1.14
Shore hardness	ISO 868	-	D 86
Flexural E-Modulus	ISO 178	MPa	2,600
Tensile E-Modulus	ISO 527	MPa	2,600
Flexural strength	ISO 178	MPa	119
Compressive strength	ISO 604	MPa	114
Tensile strength	ISO 527	MPa	87
Elongation at break	ISO 527	%	6,9
Impact resistance	ISO 179	kJ/m²	44

Processing

- The material and processing temperatures should be from 18 to 35°C.
- Postcuring is recommended:
  - for achieving of LBA-RHV minimum requirements with **Biresin® CH122-9**:
    carbon / glass fibre: 12 h / RT plus 12 h / 65°C
  With that curing conditions the system achieves the requirements for glider and power glider (temperature range of use -60 up to +54°C)
- To clean brushes or tools immediately Sika Reinigungsmittel 5 is recommended.
- Additional informations are available in “Processing Instructions for Composite Resins”.

Thermal data of neat resin specimen

Biresin® CR122 resin (A)			with **Biresin® CH122-9** hardener (B)
Heat distortion temperature	ISO 75A	°C	114*
	ISO 75B	°C	119*
	ISO 75C	°C	101*
Glass transition temperature	ISO 11357	°C	120*

* values after post curing: 8 h / 100°C

Packaging

Individual components	**Biresin® CR122** resin (A)	1000 kg; 200 kg; 30 kg; 10 kg net
	Biresin® CH122-9 hardener (blue) (B)	180 kg; 20 kg; 4 kg net

Storage

- Minimum shelf life of Biresin® CR122 resin (A) is 24 month and of Biresin® CH122-9 hardener (B) is 12 month under room conditions (18 - 25°C), when stored in original unopened containers.
- After prolonged storage at low temperature, crystallisation of resin may occur. This is easily removed by warming up for a sufficient time to a maximum of 80°C.
- Containers must be closed tightly immediately after use. The residual material needs to be used up as soon as possible.

Health and Safety Information

For information and advice on the safe handling and storage of products, users should refer to the current Safety Data Sheet containing physical, ecological, toxicological and other safety related data.

Disposal considerations

Product Recommendations: Must be disposed of in a special waste disposal unit in accordance with the corresponding regulations.
Packaging Recommendations: Completely emptied packagings can be given for recycling. Packaging that cannot be cleaned should be disposed of as product waste.

Value Bases

All technical data stated in this Product Data Sheet are based on laboratory tests. Actual measured data may vary due to circumstances beyond our control.

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Further information available at:

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