Flight Manual

Janus

VH-GWQ

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 tow-place Sailplane
J A N U S

Registration Marks : VH-GWQ

Serial Number : 24

Manufacturer : Schempp-Hirth Gmbh & Co. KG 7312 Kirchheim/Teck [illegible] Jakob

Owner : Cherokee Syndicate

LBA-approved: November 10, 1975

- JANUS - - Flight and Service Manual -

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Amendments

No.	Item	Page	Date

1. Operating Data and Limitations

Airspeed limits	km/h	m.p.h.	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
Wing flaps:			
Positions L or +10 (down)	170	105	92
Position +6 (down)	220	137	119
Positions 0, -4, -7 (up)	220	137	119

Weights

Empty weight, appr.	380 kg, 838 lbs.
Maximum weight	620 kg, 1367 lbs.
Max. weight of non-load carrying structure including payload	400 kg, 882 lbs.

Approved for cloud flying YES

(see comments on page 16)

Category Glider Utility

according to the German Glider Airworthiness Requirements (LFS)

Weak links for towing max. 600 kg
Max. 1320 lbs.

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
1.1 x 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)

Operation limits: Airspeed limits
Maximum weight

Cockpit load, front and back seat

Weak link for towing

Tire pressure of landing wheel and nose wheel

Wing flap positions

Symbols for operating handles or knobs:

Pedal adjustment (front seat only)

Tow release

Trimming control

Drag parachute, Deploy - Jettison

Canopy, Opening - Jettison

Ventilation

Air brakes

Colour marking of handles or knobs

Tow release	Yellow handle
Trimming control	Green knob
Air brakes	Blue mark
Drag chute	Blue knob
Canopy, Opening and Jettison	Red knobs

2. Operating Instructions

Winch launching

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

Wing flaps should be in positions 0° or $+6^{\circ}$.

The sailplane has ~~one~~ Two tow release hooks on the bottom of the fuselage (i) just in front of the main landing wheel. (ii) NOSE HOOK

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°.

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.

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_0 = 0.125 kgs^2/m^4

Flight Performances (two-seat)

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

Stall speed 70 km/h, 44 mph, 38 knots

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 $+6^{o}$.

Approach and Landing

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 height 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.

Cloud Flying

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

a) Do avoid 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. Weight and C.G. range

After repair work, installation of additional equipment, new painting etc. the empty weight C.G. position must be checked. If it should not be within the limits, compensating weight must be added. If the limits of the empty weight C.G. are followed, it is certain that the gross weight C.G. is also within the permitted range.

The following empty weight C.G. range aft of datum must be observed.

Datum: Wing leading edge at root rib.

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

Empty weight kg	C.G. range mm	Empty weight lbs.	C.G. range inches
370	490 - 602	830	19.0 - 23.52
375	484 - 598	840	18.8 - 23.38
380	478 - 594	850	18.6 - 23.24
385	472 - 591	860	18.4 - 23.11
390	467 - 587	870	18.2 - 22.98
395	461 - 583	880	18.0 - 22.85
400	456 - 580	890	17.3 - 22.73
405	448 - 576	900	16.6 - 22.61
410	440 - 573	910	15.8 - 22.49
415	432 - 569	920	15.1 - 22.37
420	425 - 566	930	14.4 - 22.26
425	418 - 563	940	13.7 - 22.15

C.G. range in flight (gross weight C.G.)

30 mm to 300 mm; 1.18 in. to 11.81 in.

aft of datum

Checking of the empty weight C.G. position

To facilitate the checking of the empty weight C.G. position by weighing the glider at the tail skid (with fuselage in horizontal position i.e. main landing wheel on the ground and tail skid jacked up about 42 cm, 16.5 in. from the ground), the following table shows the permitted maximum weight at the tail skid for different empty weights incl. equipment. If these tail weights, calculated for the corresponding limits of the extended aft empty weight C.G., are not exceeded it is certain that the empty weight C.G. position is within the limits.

W(e) - Empty weight incl. equipment
CG(a) - Extended aft empty weight C.G. (calculated for a min. front cockpit load of 70 kg, 154.3 lbs.)
W(t) - Permitted maximum weight at tail skid

W(e) kg	CG(a) mm	W(t) kg	W(e) lbs.	CG(a) inches	W(t) lbs.
370	602	30.6	830	23.52	68.0
375	598	30.7	840	23.38	68.2
380	594	30.8	850	23.24	68.5
385	591	31.0	860	23.11	68.8
390	587	31.1	870	22.98	69.0
395	583	31.2	880	22.85	69.3
400	580	31.4	890	22.73	69.5
405	576	31.5	900	22.61	69.8
410	573	31.6	910	22.49	70.0
415	569	31.7	920	22.37	70.3
420	566	31.9	930	22.26	70.5
425	563	32.0	940	22.15	70.8

6. Cockpit load

(Pilots incl. parachutes)

Cockpit load	two-place				single-place			
	min.		max.		min.		max.	
	kg	lbs.	kg	lbs.	kg	lbs.	kg	lbs.
front seat	70	154	110	243	70	154	110	243
back seat	not limited		110	243	--	--	--	--

Less weight than 70 kg, 154 lbs. in the front seat must be compensated with ballast. The ballast (lead or sand cushion is to be safely attached, e.g. onto the suspension of the seat belt.

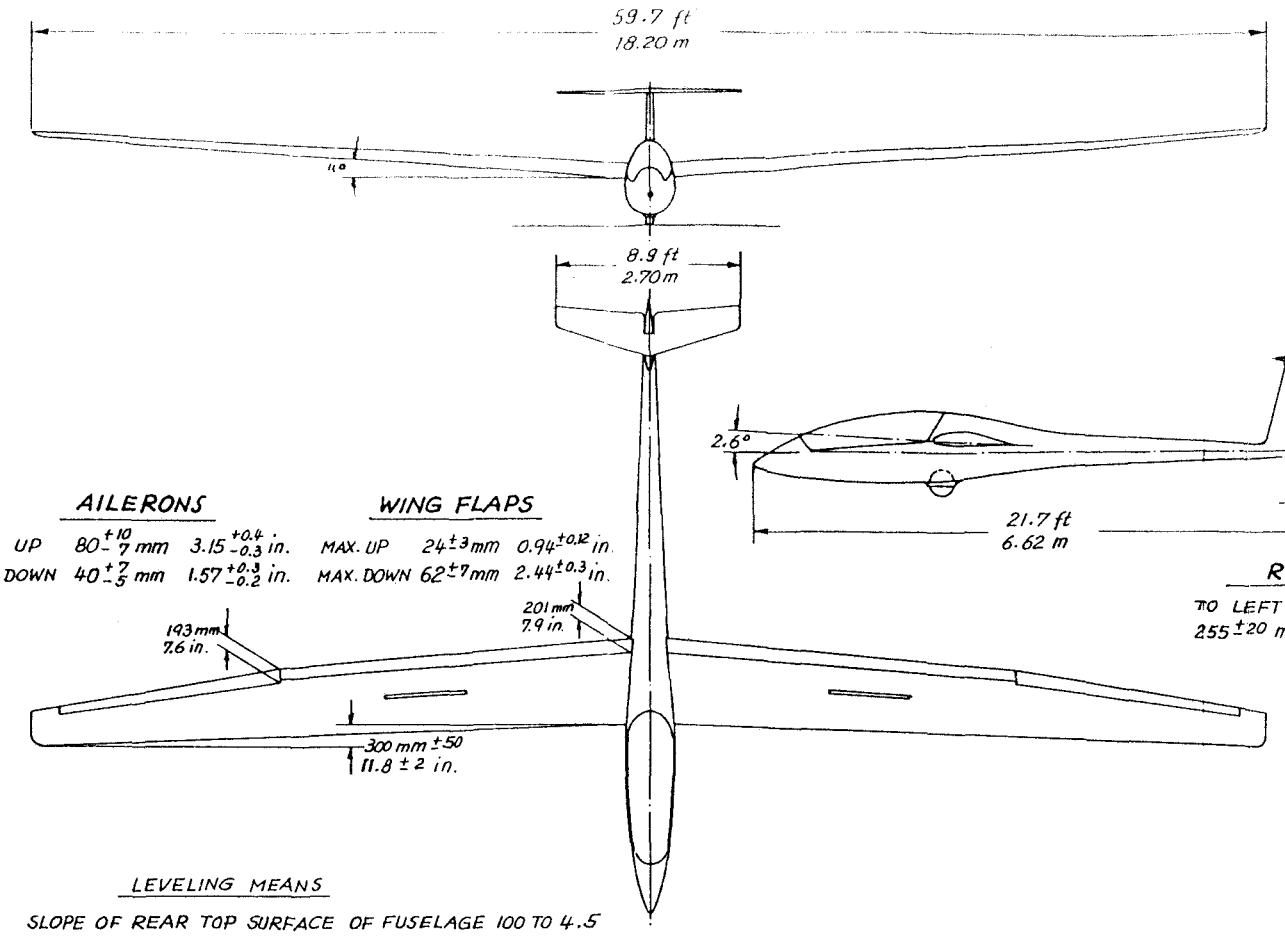
The maximum weight of 620 kg, 1367 lbs. must not be exceeded.

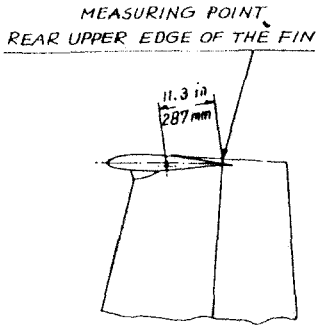
C.G. arm of the pilots incl. parachute or back cushion

front seat : 1300 mm, 51.18 inches

back seat : 190 mm, 7.48 inches

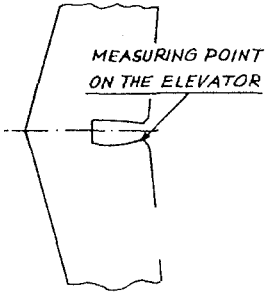
ahead of datum (negative moments)





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.



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 $2.44^{\pm 0.3}$ in.

RUDDER

TO LEFT AND RIGHT
255 ± 20 mm 10 ± 0.8 in.

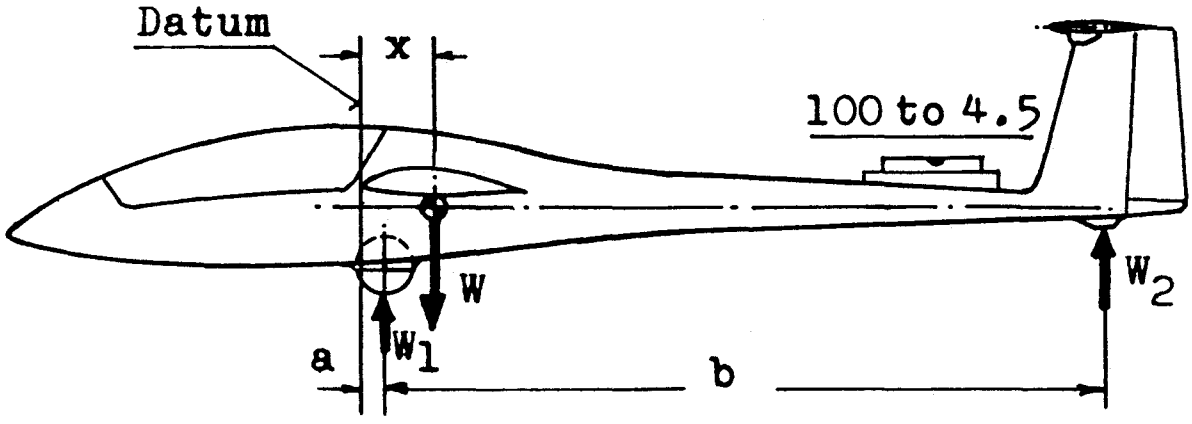
LEVELING MEANS

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

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

the figures 26-1-89

Weight at landing wheel W_1 = 359.6

Weight at tail skid W_2 = 31.4

Empty weight $W_1 + W_2 =$ W = 391

Distance a = 160 164 mm

Distance b = 5305 5290 mm

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

$$x = \frac{W_2 \cdot b}{W} + a = \text{\_\_\_\_\_} = 586$$

Maximum cockpit load G_L = ...

allowable range C of G 467 - 587

R i g g i n g

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

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.

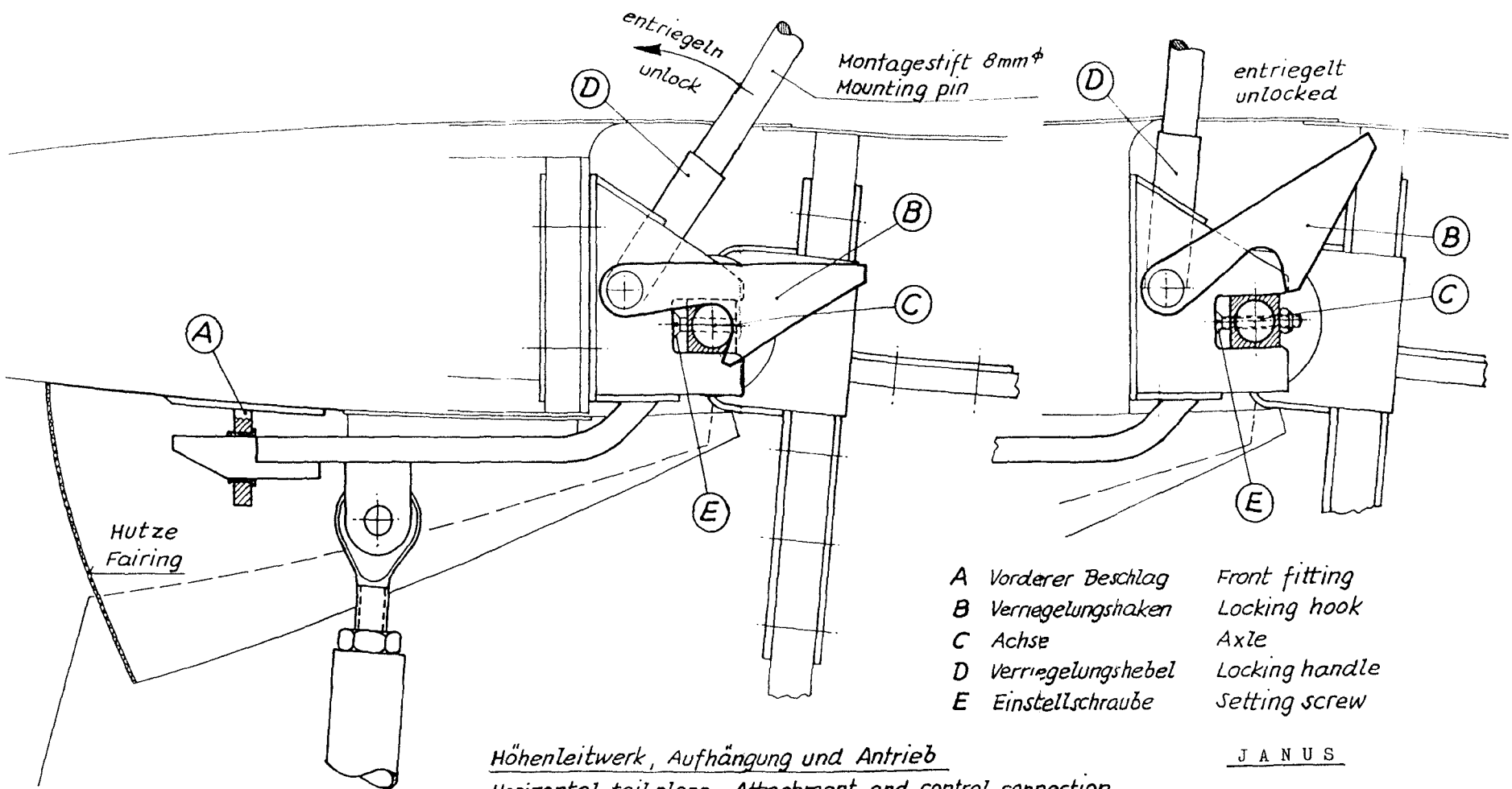
The connection of the push rods of the flaps, ailerons, and air brakes must be made behind the spar. The connection by the ball-spring safety couplings requires some experience, therefore it is advisable to get familiar with before rigging the wings.

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.



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

JANUS

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 rigging

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.

C h e c k L i s t

A) After rigging

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^{o} or $+4^{o}$ 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.

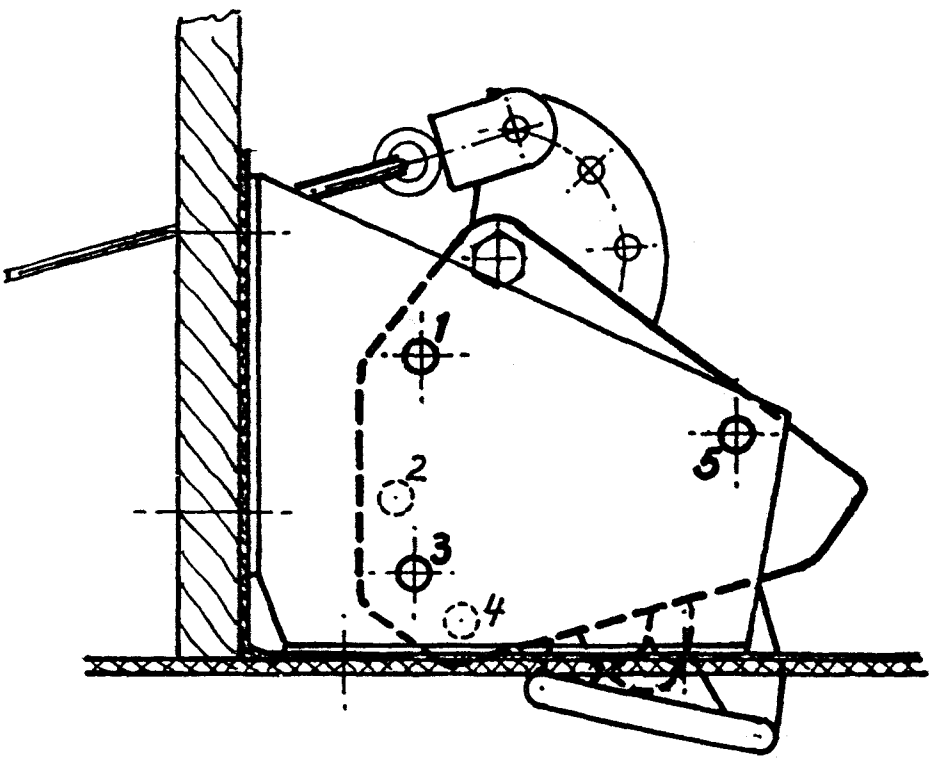
Never try to clean the plexiglass hood with a dry cloth. Use special plexiglass polish after cleaning with warm water and a soft clean chamois.

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 rigging.

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.

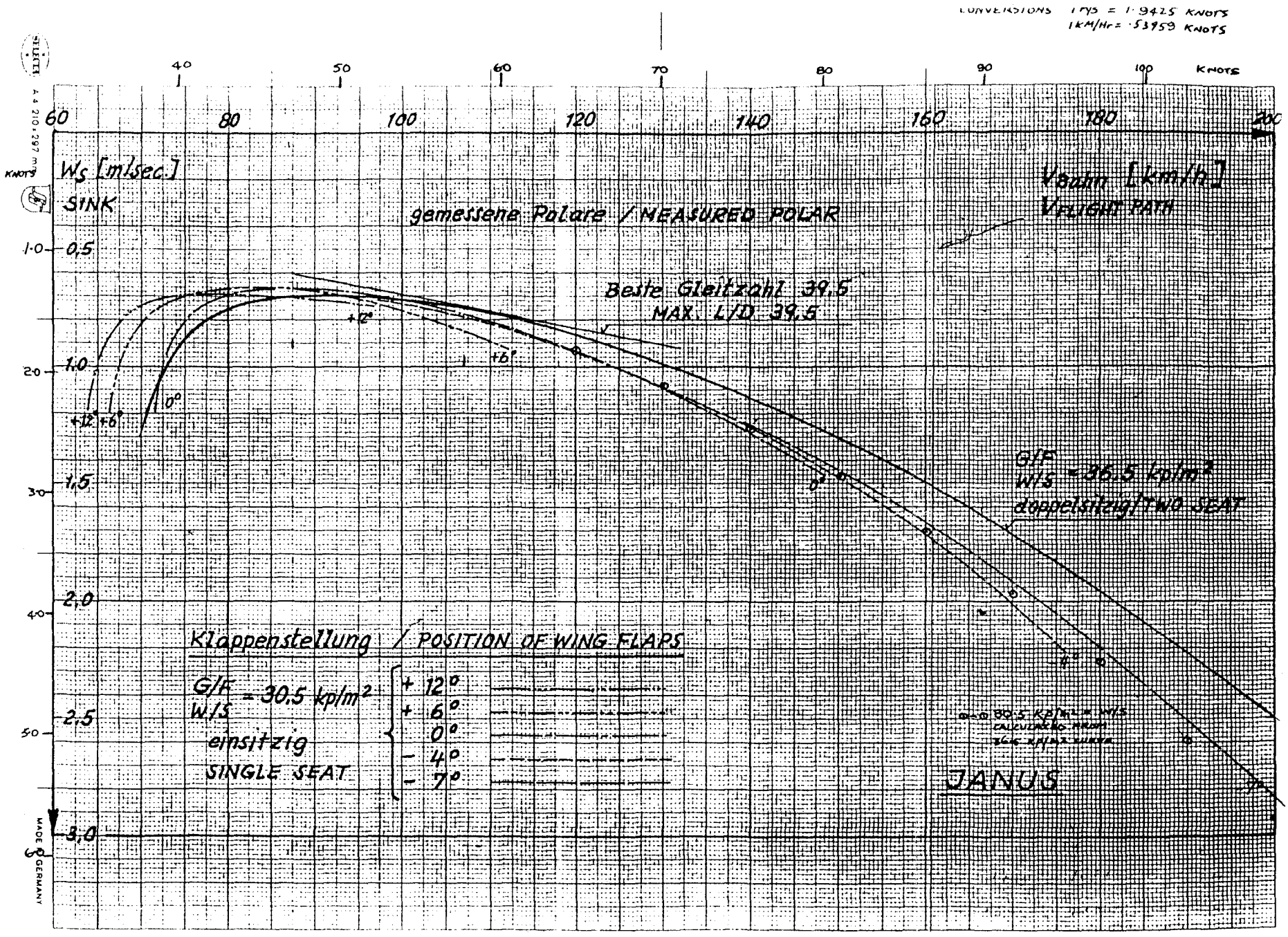
Horizontal tail plane (see sketch on page 26)

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.


CONVERSIONS 1 M/S = 1·9425 KNOTS
1 KM/Hr = ·53959 KNOTS
KNOTS
40 50 60 70 80 90 100
60 80 100 120 140 160 180 200
Ws [m/sec.]
SINK
KNOTS
0,5
1,0
1,5
2,0
2,5
3,0
gemessene Polare / MEASURED POLAR
Beste Gleitzahl 39,5
MAX. L/D 39,5
Vfahrt [km/h]
VFLIGHT PATH
+12°
+6°
0°
-2°
-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
MADE GERMANY

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, i.e. foam CONTICELL 60, 6 mm thick bonded on both sides with glass cloth.

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	---	↓ uni-directional	.058	Wings & fuselage
92140	152-150		.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 *or 7-2051 (100 to 1.5)*

Mixing proportions by weight

100 parts Lackvorgelat to 10 parts hardener

PE - Thinner	No. 6-3026
PE - Filler, white	No. ~~62507~~ *2-6915*
PE - Hardener	No. 7-2050 *or 7-2051 (100 to 1.5)*

Mixing proportions by weight

100 parts filler to 10 parts hardener

Resin paint "Lackvorgelat" and filler can be mixed in one-to-one or other proportions.

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

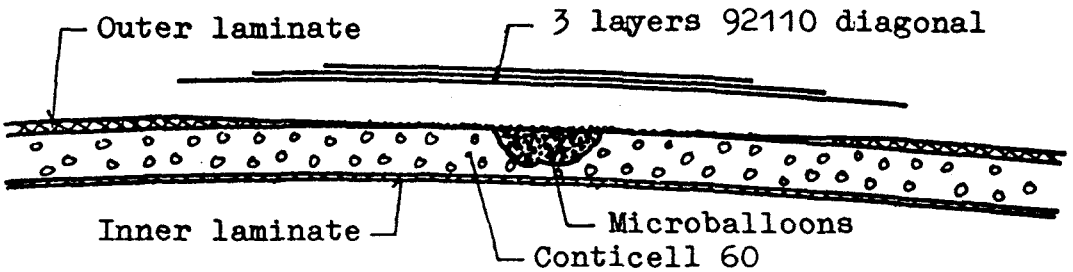
The damages which can be repaired by you fall into two groups.

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.

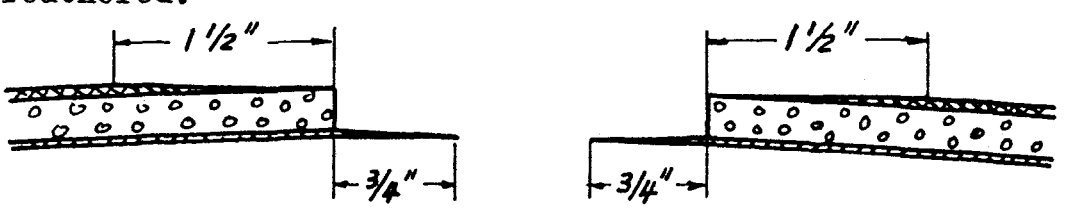
Now fill the hole in the foam with microballoons and simultaneously fill the pores of the exposed foam. Then lay three patches of the 92110 cloth with diagonal weave direction (stepwise largest patch first) over the damaged area. The applied cloth must be dry and dust free.



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.

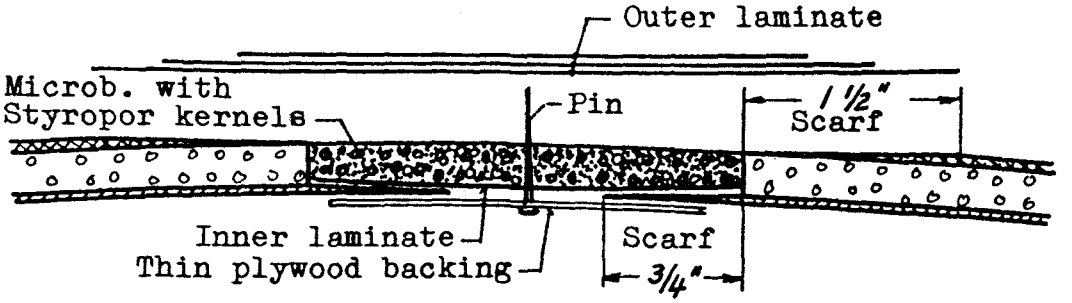
We remove the outer laminate in the region of the damage which is no longer bonded to the foam and enlarge the hole in the foam and inner laminate until good bonding to the foam is evidenced. Then the foam is further removed 3/4 inch around the hole in the inner laminate and the outer laminate scarfed 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.

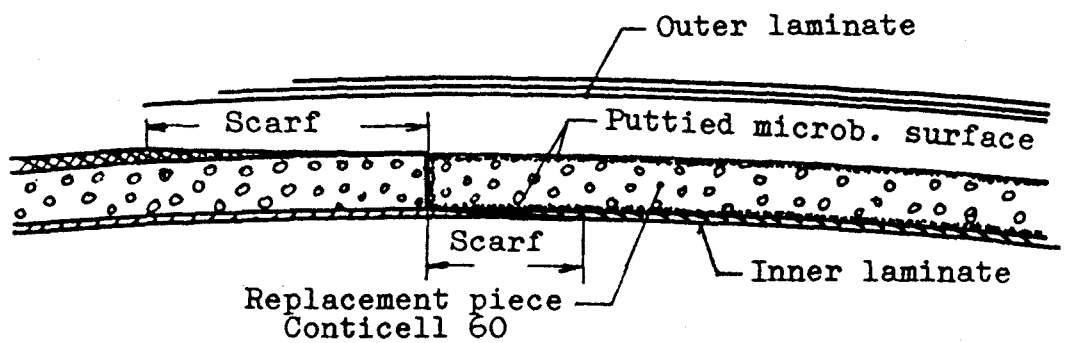
A tip on gluing the plywood plate - the hole in the inner laminate should always be a bit oblong so as to insert the plywood backing plate. Before inserting the plywood drive through the middle of the ply a pin or nail by which it can be drawn against the inner shell. With additional nails or pins it 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

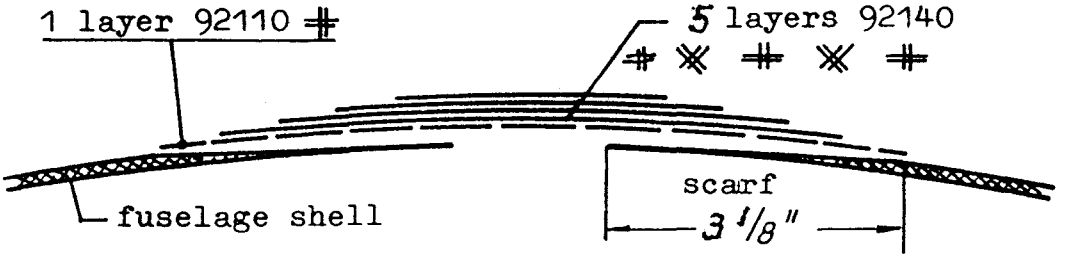
thickened resin which must not harden in any case before doing further work. However with larger replacement pieces you should let the laminate harden on one side and glue the foam thereto in order to keep the surface wave free.

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~~ 8 layers. Therefore we need larger scarfs. These should, for larger holes or cuts, never be less than 3-1/8 inches wide. With all fuselage shell repairs apply resin first to a layer of 92110 cloth following with ~~four~~ 5 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

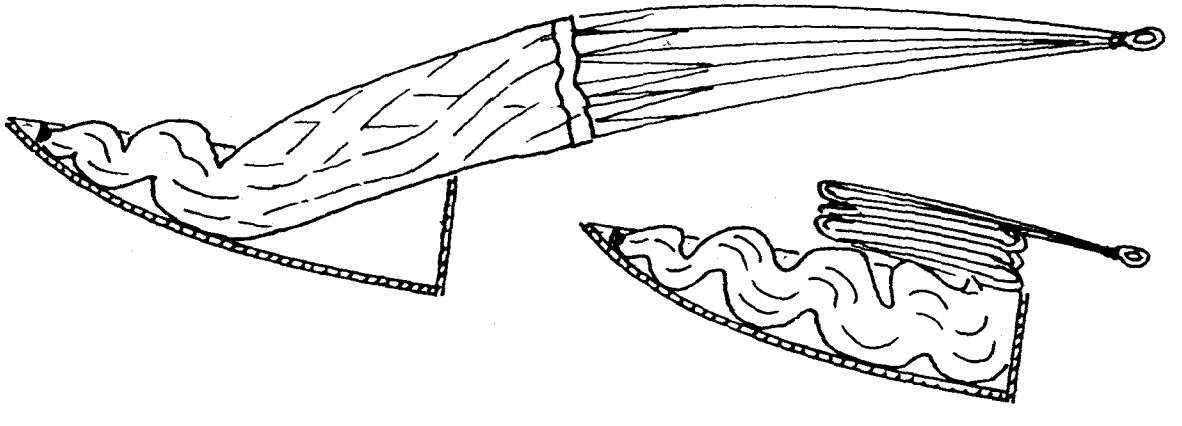
1.1 Follow the instructions of the Flight Manual " JANUS " concerning the use of the brake parachute during flight, approach, and landing.

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.
