- STANDARD CIRRUS -

SCHEMPP-HIRTH K.G., KIRCHHEIM-TECK

Flight and Service Manual for the Sailplane - STANDARD CIRRUS -

Translation of the German Manual

Issue: November 1969

This manual should always be carried in the sailplane.

It belongs to the Sailplane
STANDARD CIRRUS

Registration Marks : .....

Serial Number : .....

Manufacturer : .....

Owner : .....

Approved by the Luftfahrt-Bundesamt
March 16, 1970

- STANDARD CIRRUS - Flight and Service Manual

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3.	Appendix A - Flight with water ballast (Technical Note No. 278-3).	12a 12b	June 1971
4.	Increase of max. weight with water ballast from 330 to 390 kp, 728 to 860 lb. (Techn. Note No. 278-5).	3 12a 12b	June 1972
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11	Technical Note No. 278 - 5 (revised edition) Increase of the max. all-up weight from 330 to 390 kg - optional for all serial numbers	3 3 A 12 a 13	January 1986
12.	Technical Note No. 278 - 22 Use of the "Mini-Nimbus HS7" front fuselage section	3A 5	May 1986 Oct. 1977
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1. Operating data and limitations

Airspeed limits	km/h	m.p.h.	knots
Glide or dive	220	137	119
In rough air	220	137	119
Airplane tow	150	93	81
Auto-winch tow	120	75	65
Airbrakes extended	220	137	119
Maneuvring speed	170	105	92

Weights

Empty weight	approx. 210 kg	463 lb
Maximum permitted all-up weight	390 kg	860 lb
Maximum weight of non-lifting parts incl. payload	220 kg	485 lb

Cloud flying and restricted aerobatic maneuvers

without water ballast (max. all-up weight 330 kg/728 lb)	PERMITTED
with water ballast	PROHIBITED

(See comments on pages 11, 12)

Category Glider utility, High performanc according to the German Airworthiness Requirements (LFS).

C.G. range in flight

Datum: Wing leading edge at root rib

Leveling means: Slope of rear top edge of fuselage 100 to 5.1

250 mm to 400 mm, 9.8 inches to 15.7 inche aft of datum

Weak links in tow cable

Maximum : 500 kp, 1100 lbs.

Techn. Note No. 278-5 January 1986

Cockpit placards (in full view of the Pilot)

Maximum permitted all-up weight ..... 390 kg (860 lb)

Maximum permitted airspeeds (IAS)	km/h	mph	kts
Glide or dive	220	137	119
In rough air	220	137	119
Aerotow	150	93	81
Auto-winch tow	120	75	65
Airbrakes extended	220	137	119
Maneuvering speed	170	105	92

Cockpit load
(pilot and parachute)
maximum load: 110 kg, 242 lbs
minimum load: 70 kg, 154 lbs
A cockpit load of less than 70 kg, 154 lbs must be compensated by ballast

Weak links in the tow rope
max. 500 daN (1102 lb)
Landing wheel tire pressure
2.5 bar, 36 psi

on the left wheel well door

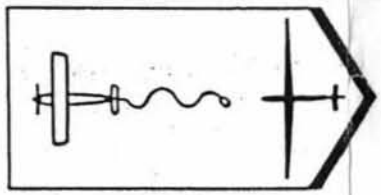
Airspeed Indicator colour markings

Green arc (normal range)	70 - 170 km/h	43 - 105 mph, 38 - 92 kts
Yellow arc (caution range)	170 - 220 km/h	105 - 137 mph, 92 - 119 kts
Radial red line (max. speed)	at 220 km/h	137 mph, 119 knots

Techn. Note No. 278 - 5 January 1986
Techn. Note No. 278 - 8 May 1986

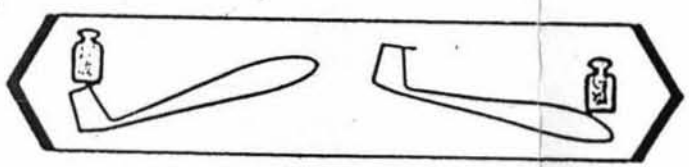
EXTENDED RETRACTED

LANDING GEAR
seat, right-hand side
guide slot of handle

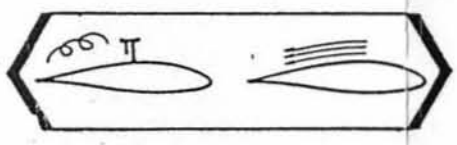


TOW RELEASE

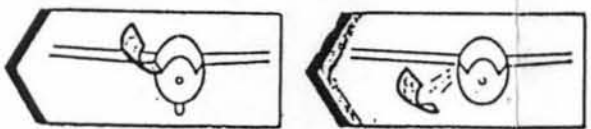
PEDAL ADJUSTMENT



TRIMMING
seat, left-hand sid
GREEN knob

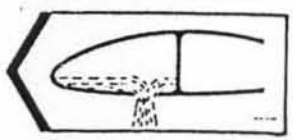


AIRBRAKES
cockpit, left-hand sid
handle with BLUE mark



CANOPY
left frame: OPENING
right frame: JETTISONI
RED ball knobs

VENTILATION
small BLACK knob
left-hand side
of instr. panel



WATER DRAIN
canopy frame
right-hand side

2. Flying operations

Winch launching

Max. tow speed: 120 km/h, 75 m.p.h., 65 knots.

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

Winch launchings are conducted without any difficulty. However care should be taken to take off with control stick slightly pushed forward. Do not make take-off run with stick pulled back.

When using a strong winch the winch driver should take care 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.

If a break of the tow rope or an excessive displacement of the glider should occur, release immediately.

Airplane tow

Max. tow speed: 150 km/h, 93 m.p.h., 81 knots.

In order to unload the tail skid and to increase the aileron efficiency the stick should be held slightly forward when starting the ground run. Since the aileron control becomes effective rather slowly due to the high wing taper, the take-off assistant at the wing tip should do a good run. Do not apply full aileron during the ground run.

The take-off speed is about 70 km/h, 43 m.p.h 38 knots.

When releasing the glider pull the release cable at the left-hand side of the stick (yellow plastic T-handle) fully back.

Adjustment of the rudder pedals

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

Pull the cable 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.

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

Parachute stowage recess

A shaped glass fiber support, serving as a stowage recess for automatic back-type parachutes, is attached onto the rear part of the seat by means of four screws. When using a short back-pack parachute it is advisable to take it off.

Canopy

The hinged, one-piece plexiglas hood 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 canopy frame at the right-hand side of the cockpit. For jettisoning open the canopy as described before, then push the red knob at the right-hand side forward.

Operation of the retractable landing gear

The retractable landing gear is operated by a push rod with a handle at the right-hand side of the cockpit. The handle is pulled resp. pushed through a guide slot with two locking recesses. The handle is retained in the forward locking recess by a spring to avoid unintentional unlocking on the ground.

Handle in forward position : EXTENDED

Handle in backward position : RETRACTED

Retraction

Swing the handle out of the front locking recess, pull it back through the slot and push it into the rear locking recess.

Extension

Swing the handle out of the rear locking recess, push it forward through the slot and into the front locking recess.

Caution

Do not operate the handle when the landing wheel is in ground contact.

Due to the separate mounting of the tow release hook (see page 4) the landing gear can be retracted during the tow.

Calibration of the Airspeed Indicator

Dynamic pressure intake

Pitot tube in the nose of the fuselage.

Separated static pressure intake

for ASI : Fuselage, below of the wings,

for Variometer: Cockpit frame, 5 cm, 2 in. in front of the instrument panel.

True airspeed : V (TAS)

Indicated airspeed : V' (IAS)

V(TAS) km/h	V'(IAS) km/h	V(TAS) MPH	V'(IAS) MPH	V(TAS) knots	V'(IAS) knots
60	60	60	60	50	50
80	80	70	70.5	60	60.3
100	100	80	81	70	70.8
120	121	90	91.5	80	81.3
140	141.5	100	102	90	92
160	163.5	110	113	100	102.5
180	185	120	124	110	114
200	207	130	134.5	120	125

Air density $\rho_o = 0.125\ kgs^2/m^4$

F r e e f l i g h t

Performances

(at a gross weight of 290 kp, 640 lbs.)

Stall speed	62 km/h, 38 m.p.h., 33 knots
Min. sink	0.57 m/sec., 1.87 ft./sec. at 70 km/h, 43 m.p.h., 38 knots
Max. L/D	38 at 85 km/h, 53 m.p.h., 46 knots

Longitudinal trim

The spring-type trimming device at the left-hand side of the cockpit (green ball knob) has a number of locking recesses and can be adjusted into the desired position.

With the C.G. in a medium position the glider can be trimmed for steady flight at speeds of 65 km/h to 170 km/h, 40 m.p.h. to 105 m.p.h., 35 knots to 92 knots.

Circling flight

The increase of stick forces during circling flight is clearly noticeable. Opposite aileron is necessary only in turns with greater bank. The rudder is very effective and must be held almost in neutral position during circling flight.
The glider takes about 3.5 seconds to roll from a 45° banked turn through an angle of 90°.

Stalling characteristic

Depending on the wing loading, stall warning occurs at speeds of 70 to 65 km/h, 43 to 40 m.p.h., 37 to 35 knots by a slight buffeting of the horizontal tail plane.
In the approach to the stall the aileron

control force becomes very small. The glider can be held in the stall by pulling the control stick gently to the limit of its backward travel. When pulling the stick sharply back the control is lost by nose dropping. The glider is building up speed immediately.
At a stall from turning flight the glider pitches down by the hanging wing gaining speed.
The bank however is still under control.

Behaviour at high speeds

In flights at high speeds all controls are effective and function normally. Excessive control movements however should be avoided.
The control surfaces do not show any tendency to flutter.
The airbrakes can be operated at all speeds up to the maximum permitted speed; normal forces are required.
In a flight with an inclination of the flight path of 45° the terminal velocity is about 200 km/h, 124 m.p.h., 108 knots, airbrakes and landing gear extended.

Approach and landing

The approach is normally conducted at a speed of about 80 km/h, 50 m.p.h., 43 knots.
The airbrakes function with ease and smoothness and are very effective.
Sideslip can be used as a landing aid without difficulty in control, also with airbrakes extended.
The sailplane touches down on the main wheel and the tail skid simultaneously.
The wheel brake, operated by a handle on the stick, is a drum brake and works very well.

Emergencies

The sailplane can be held in a stalling position with fully pulled stick and necessary rudder control.
Applying full rudder in a stall with the control stick pulled back 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 approximate loss of hight in one complete turn is about 70 meters, 230 feet.

After having initiated action for recovery the sailplane speeds up very fast, therefore be cautious to dive out gently and promptly.

In rain, snow or at icing the aerodynamic qualities of the sailplane are reduced and caution should be taken in landing.
Increase the landing speed at least about 10 km/h, 6 m.p.h., 5 knots.

Cloud flying

This sailplane has sufficient strength qualities for cloud flying. Nevertheless observe the following instructions:

a) Do avoid extreme airspeeds in any case. Make it a rule to extend the airbrakes already at speeds of about 150 km/h, 93 m.p.h., 81 knots.

b) Cloud flying is permitted only when the following approved instruments are installed:
Airspeed indicator, Altimeter, Turn and Bank, Variometer, Compass.

An artificial horizon, an accelerometer, and a clock are recommended.

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

Acrobatic maneuvers

The STANDARD CIRRUS is certificated for the following acrobatic maneuvers:

Inside loops, stall turns, tight turns, spins.

Due to the high wing loading the following speeds must be observed for the initiation of the maneuvers:

Inside loops	180 km/h,	112 m.p.h.,	97 knots
Stall turns	180 km/h,	112 m.p.h.,	97 knots
Tight turns	120 km/h,	75 m.p.h.,	65 knots

The sailplane enters into a spin from a sharp stall applying full rudder. The control stick should be pulled during the spin.

The action of recovery is initiated by easing the control stick forward and giving slight opposite rudder.
When diving out gently and promptly the speed must not be higher than 150 km/h, 93 m.p.h., 81 knots.
The loss of hight in one complete turn is about 70 meters, 230 feet.

The acrobatic maneuvers, as specified before, are to be executed by experienced pilots, who have an acrobatic flight license.

The permitted acrobatic maneuvers should not be executed in hights less than 400 meters, 1320 feet above ground, in order to have sufficient reserve in hight when failing the maneuver.
Spins should be recovered at least in that hight.

Other than the afore mentioned acrobatic maneuvers and maneuvers involving negative g are prohibited.

Appendix

Flight with water ballast

The water tanks are integral compartments in the nose of the wings with a C.G. position of about y = 1.5 m, 5 ft. from the root rib.

The tanks have a capacity of about 30 Liter each.

Filling

The tanks are filled through a hole on the upper wing surface. It is closed by a cone cap which has a small hole for vent.

After filling the cone cap is to be sealed by an adhesive patch. Take care to open the vent hole again after sealing by piercing a small hole in the tape.

Both tanks should be filled with the same water quantity for stability reasons.

Draining

The water is drained off through a hole in the lower wing surface in a distance of about 1 m, 3.3 ft. from the root rib.

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 (black knob) is installed at the right-hand side of the cockpit.

Pushing the handle forward opens the dump valves in the wings, moving the handle down locks it in that position.

ATTENTION:

With water ballast, cloud flying and aerobatic maneuvers are prohibited.
When flying with water ballast, an outside air temperature indicator is required.

3. Minimum equipment

a) Airspeed indicator 250 km/h, 160 m.p.h.

Altimeter

Four-piece safety belt (seat belt and shoulder straps)

Back cushion or parachute

b) Operating instructions:

Flight and service manual

Placards indicating operating limits

4. Wing and tail setting
Control surface movements

Angle of wing setting 1.5°
Reference line : fuselage center line

Angle of tail setting -1.5°
Reference line : wing chord at root rib

For control surface movements see page 16.

Pay attention to the tolerances if repair work is necessary.

The travel of the controls is limited by stops.

Rudder - Firm stops on the back side of the steel tube frame of fuselage.

Elevator
Aileron - Adjustable stops (setscrews) on the stick support.

Airbrakes - Front stop at the cockpit handle, rear stop on the steel tube frame of the fuselage.

5. Weight and C.G. range

After repair work, after having installed additional equipment, and after a new painting the empty weight C.G. is to be checked. If it should not be within the limits, equalizing weights must be added. If the limits of the empty weight C.G. are followed, it is certain that the C.G. in flight 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 edge of fuselage 100 to 5.1

E.weight kp	C.G.range mm	E.weight lbs.	C.G.range inches
200	630 - 694	441	24.80 - 27.32
205	621 - 686	452	24.44 - 27.00
210	612 - 680	463	24.09 - 26.77
215	603 - 673	474	23.74 - 26.49
220	595 - 667	485	23.42 - 26.25
225	572 - 661	496	22.51 - 26.02
230	550 - 655	507	21.65 - 25.78
235	529 - 650	518	20.82 - 25.59
240	509 - 645	529	20.03 - 25.39
245	489 - 640	540	19.25 - 25.19

C.G. range in flight (gross weight C.G.)
(aft of datum)

250 mm to 400 mm, 9.8 inches to 15.7 inches

Checking of the empty weight C.G. position

To facilitate the checking of the empty weight C.G. position of your STANDARD CIRRUS by weighing the glider at the tail skid only (with fuselage in horizontal position), the following table shows the permitted maximum weight at the tail skid for different empty weights incl. equipment.
If these specified weights, calculated for the backward limit of the 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(EB) - Backward limit of empty weight C.G.
W(T) - Permitted maximum weight at tail skid

W(E) kg	CG(EB) cm	W(T) kg	W(E) lbs.	CG(EB) inches	W(T) lbs.
210	68.0	29.5	460	26.83	64.8
212	67.7	29.6	465	26.71	65.2
214	67.4	29.7	470	26.59	65.5
216	67.2	29.9	475	26.48	65.9
218	67.0	30.1	480	26.37	66.3
220	66.7	30.2	485	26.25	66.6
222	66.5	30.3	490	26.14	66.9
224	66.2	30.4	495	26.04	67.3
226	66.0	30.6	500	25.94	67.7
228	65.8	30.8	505	25.84	68.0
230	65.5	30.9	510	25.74	68.3

C.G. positions aft of datum, based on a min. payload of 70 kg, 154 lbs.

6. Cockpit load

Permitted payload (pilot incl. parachute)

maximum : 110 kp, 242 lbs.

The maximum weight of 330 kp, 728 lbs. however must not be exceeded.

minimum : 70 kp, 154 lbs.

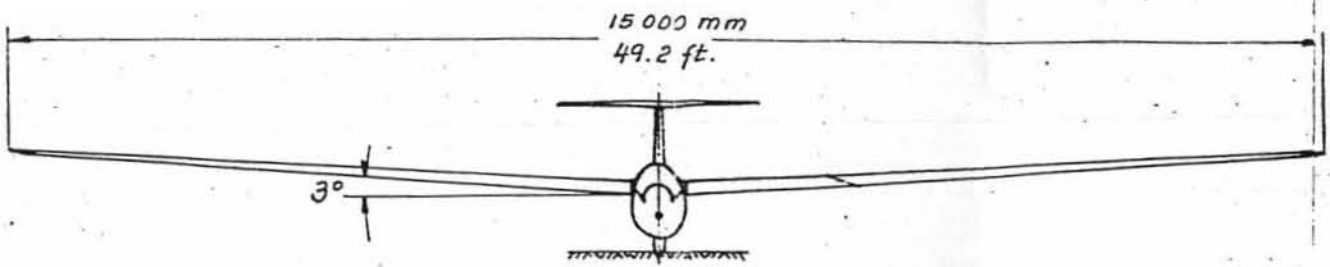
If the payload should be less than the minimum required, equalizing ballast (lead coushion) must be carried, safely attached on to the seat.

C.G. arm of the pilot incl. parachute

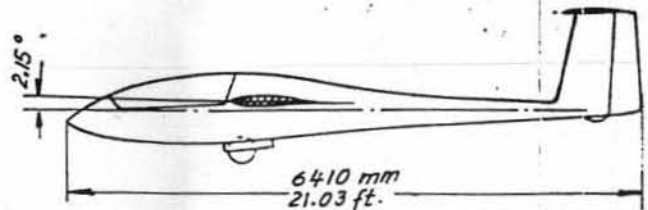
440 mm, 17.3 inches

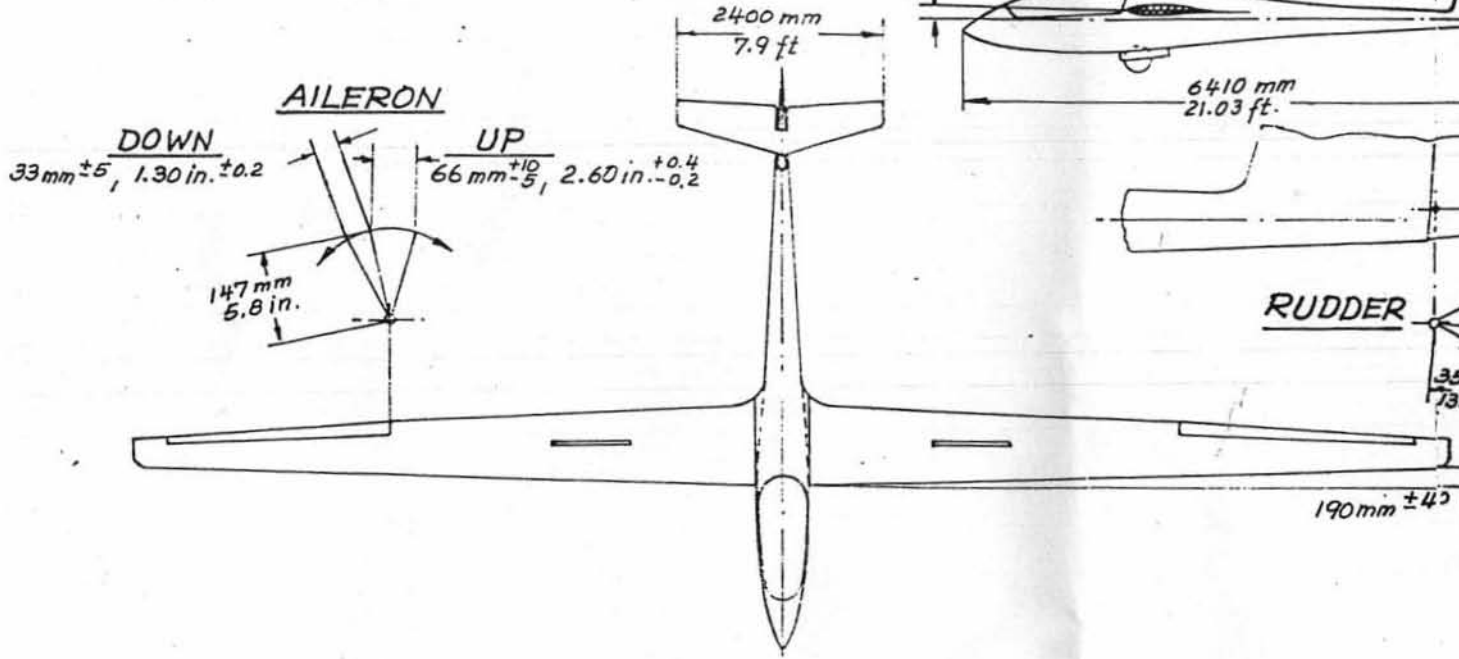
ahead of datum (i.e. wing leading edge at root rib)

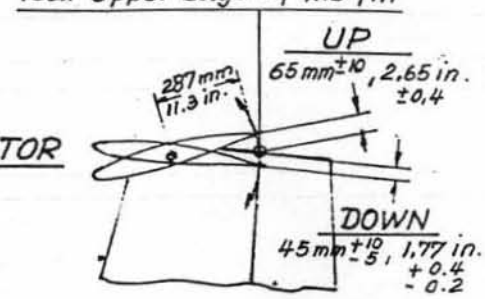
(Moment is negative)

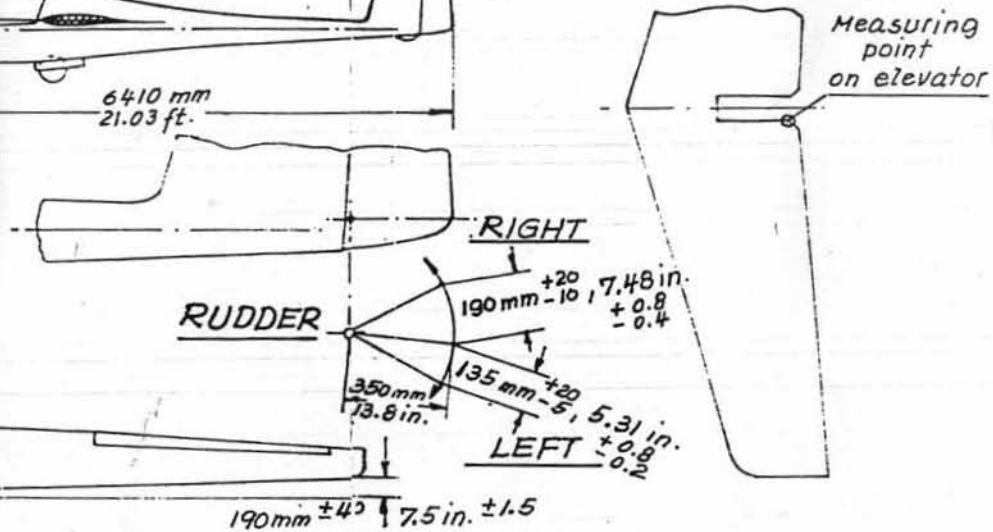


Leveling means
Slope of rear top edge of fuselage 100 to 5.1
(i.e. fuselage center line horizontal)





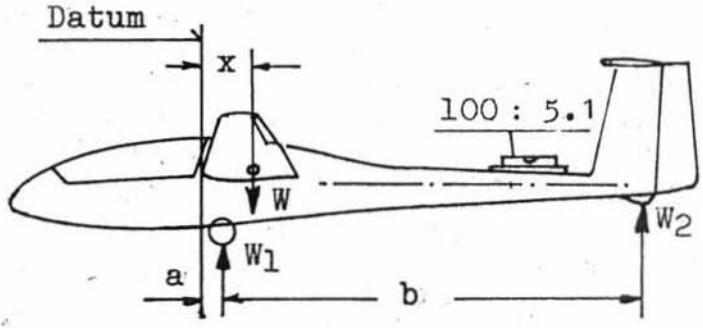




CONTROL SURFACE MOVEMENTS

STANDARD CIRRUS

Weight and Balance



Datum : Wing leading edge at root rib

Leveling means : Slope of rear top edge of fuselage 100 to 5.1

Determination of the empty weight and empty weight C.G. always without water ballast.

Weight at landing wheel W_1 = ...

Weight at tail skid W_2 = ...

Empty weight W = ...

Distance a = 122 mm .....

Distance b = 3960 mm .....

Empty weight C.G. position

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

x = ... aft of datum

A s s e m b l y

The sailplane can be assembled by two persons, when a wing support is used. Generally the rigging will be done by three persons in the following manner.

Wings - Clean and lubricate the wing attachment bolts and also the corresponding bearings on the fuselage.

Put the left wing (fork-type spar root) into the fuselage until the nose and rear attachment bolts are entirely inserted into their bearings on the fuselage.
Insert the main bolt into the front bushing of the fork (about 4 cm, 1.5 inches deep).
Put the right wing (tongue-type spar root) into the fuselage. The nose and rear attachment bolts should just gear a little into their bearings on the fuselage. Move the fuselage slightly back and forth (laterally) until the bolts on the fork end are in line with their bearings on the root rib of the right wing. Push the wing fully into the fuselage, moving it again slightly back and forth.
Push the main bolt completely through the spar bushings (the top edge of the tongue should be about 6 to 8 mm, 1/4" to 5/16" lower than the top edge of the fork. Attach the bolt handle onto the provided fitting on the fuselage shell and safety with the cowling pin.
The control connections of the ailerons and airbrakes are to be made in the back of the spar root. It is advisable to get familiar with the ball-spring safety couplings of the push rods before doing the wing assembly. Connect the aileron push rods first with the

right hand, holding the control stick in neutral position with the left hand. Then connect the push rods of the airbrakes in same way.

Horizontal tail plane (see sketch on page 20)

The 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 lying 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 (B) 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 (about 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 funktions of the control surfaces.

Seal the joints of the wings and fuselage and also the access hole of the locking handle on the top of the horizontal tail plane.

The sealing is very important to ensure good flight qualities.

Check List

A) After Assembly

1. Is the handle of the main bolt attached to the provided fitting on the fuselage shell and secured by the safety cowling pin?
2. Are the aileron and airbrake push rods connected by their ball-spring safety couplings?
3. Are the wing fillet slots and the access hole on top 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 landing wheel checked? The pressure should be 2.5 kg/cm^2 or 36 psi.
7. Is the horizontal tail plane safely locked, i.e. did the locking hooks snap tightly 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 airbrakes operate properly? Make sure to lock them after the check.
3. Is the landing gear handle locked, in its front (wheel extended) position?

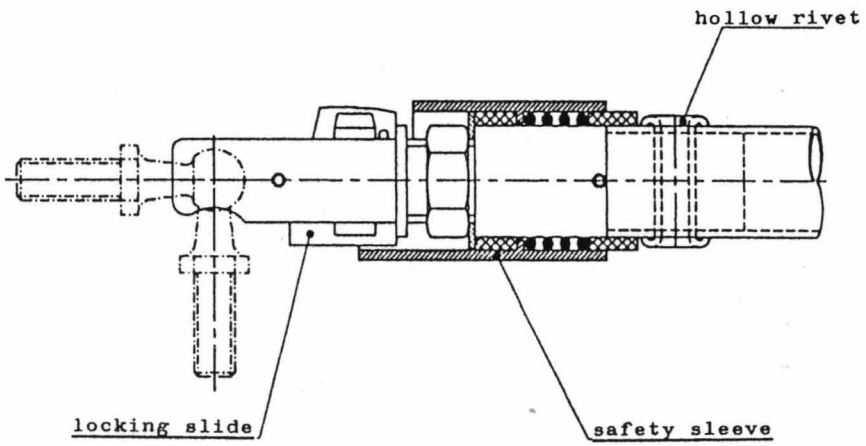
Connecting the L'Hotellier control rod couplings - securing them with a "Wedekind" safety sleeve

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".



4. Is the plexiglass canopy properly closed and locked ?
   The red ball knob at the left-hand side must be in its front, the red ball knob at right-hand side in its rear position.

5. Is the rescue parachute properly connected?

6. Are the safety belts put on and secured?

7. Is the altimeter adjusted for the equivalent altitude or for NN?

8. Is the radio frequency adjusted for the airfield and/or for the air traffic control?

C) After Take-off

1. Is the landing gear retracted and its handle locked in the rear position? (The wheel can be retracted during the tow).

2. Check the trim.

Maintenance

Take good care of the surface finish. Remove all contaminations as dust, grass seeds, insects etc. using warm water and a soft sponge. Add soft cleaning lotion if necessary. Use no polish which might attack the paint. Smooth all scratches carefully using a resin filler.
Though the sailplane is not much 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.

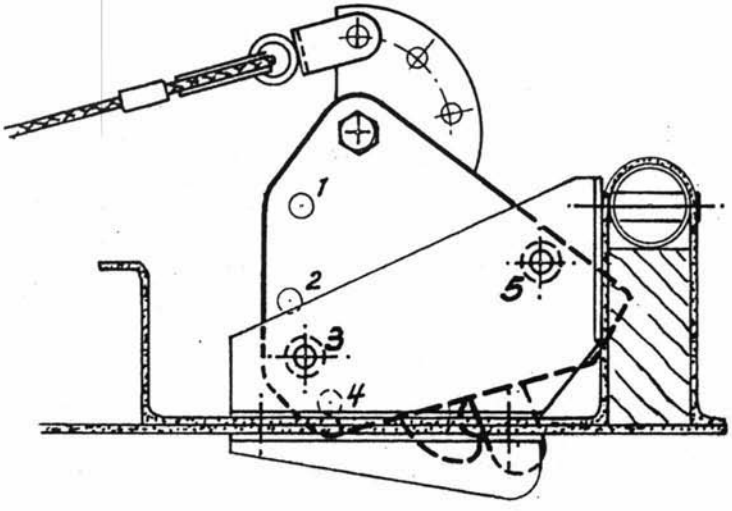
Check the safety belts frequently for cuts and stains; the metal parts for rust.

The tow hook, mounted on the bottom of the fuselage right in front of the lower cross bar of the welded steel tube frame, 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 hook for inspection or repair. Remove the seat, disconnect the cable, and unscrew the two attachment bolts.
In case of belly landings the tow hook is protected by two angular fittings which are bolted on to the attachment brackets of the hook. If these fittings show an abrasion up to the heads of the attachment bolts, they must be replaced.

The inflation pressure of the landing wheel should be 2.5 atü, 36 psi.

Befestigung der Schleppkupplung

Attachment of the towing hook



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

Towing hook attached to the bracket by the bolt holes No. 3 and 5.

The landing wheel has a drum brake which is operated by a handle on the control stick. Its Bowden cable can be adjusted as usual by a setscrew on the drum lock bracket.
To take the landing wheel off for inspection, cleaning, and lubrication disconnect the cable from the brake lever and the lock bracket.
Remove the cotter pin and the castle nut on one side of the wheel axle and pull out the axle. Take off the wheel by pulling it slightly back in order to disengage the drum lock fitting from its guide pin on the front landing gear strut.
Take care that no washers and bushings get lost.
Clean and lubricate all parts.

Lubricate the bearings at least once a year, except for the bearings and bolts of the wing and tail plane 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.

Ground handling

A tail dolly should be used for better ground handling. Never pull the glider at the wing tips, especially when handling without tail dolly, in order to avoid premature wear of the spacers on the wing attachment bolts due to high stresses.

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.

Wings

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 wing tip can be moved about 30 mm (about 1.2 in.), additional washers of 0.3 mm up to 0.5 mm thick with an inner diameter of 13.95 mm should be pressed onto the bolts until the backlash is eliminated.

Ailerons

Flight tests have shown that a backlash of 3 mm (about 1/8"), measured at the inner root rib of the aileron with control stick in neutral position, is allowable.
If the backlash is exceeding this tolerance ask the manufacturer for instructions.

Horizontal tail plane

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 (see page 20).

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 7 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 by steps until both locking hooks (B) are catching the axle (C) with the same tight fit.

Rudder

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

Adjustment of the air brakes

If the top of the air brakes should open at high speeds, check at first the wings for excessive tangential backlash and eliminate it if necessary. Adjust the air brake control rods thereafter.

Before the air brakes are fully retracted the spring-loaded top of both brakes must have the same distance to the upper wing surface to warrant an equal spring load acting on the top. If an adjustment of the distance to the wing surface should be necessary, turn the control rod connector of one wing about one rotation - turning in means extending the brake. If one rotation of the connector is changing the length of the rod too much, keep the connector in its original position and turn the tube using a pipe wrench until the correct distance to the wing surface is attained.

Adjust then the force required to lock the air brakes, i.e. to tighten their seating by equally changing the length of the control tubes of both wings, equally shortening

means a decrease and equally lengthening an increase of the locking force.

The locking force is correct if a pilot's effort of 15 kp to 20 kp is required to close the brakes, while the operating rod in the cockpit should overtravel the center lock about 10 mm. A shortening of the cockpit rod means a greater travel over the center lock.

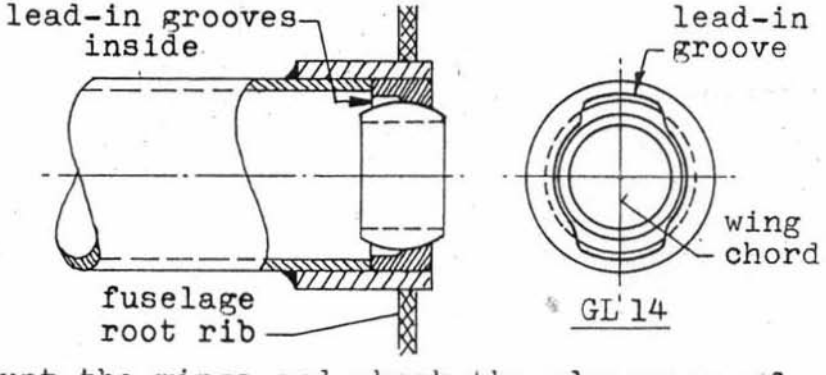
Never adjust the air brakes too tight by which in course of time a damage of the tube connector catches and the balls may occur.

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

Four ball bearings for the front and rear wing attachment bolts are installed on the fuselage steel tube frame protruding the fuselage root ribs. 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 made 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 12 to 14 mm diameter. Insert a new bearing (GL 14) taking care that the ball lead-in grooves are pointing to the inside in order to avoid the falling out of the ball.*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 tips is exceeding 30 mm, follow the instructions on page 25.

*Insert the bearings with the lead-in grooves in the direction of the wing chord.

Weights and hinge moments of the control surfaces

After repair or a new painting the weight and hinge moment of the control surfaces must not exceed the following values:

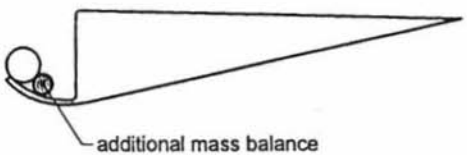
Control surfaces	max. Mass [kg]	[lb]		max. Hinge moment [m·kg]	[ft·lb]
Rudder	5.0	11.02	S/N 1 to 531 S/N 532 and up	0.175 0.120	1.27 0.87
Elevator	7.1	15.65		0.143	1.03
Aileron	2.1	4.63		0.096	0.69

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

If the installation of additional mass balance on the aileron should be necessary ask the manufacturer for instructions.

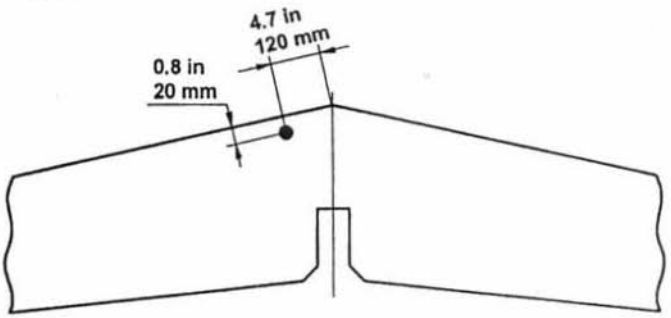
Mass balance on the rudder

Parallel to the already installed round bar a square or round bar of the required weight is to be glued onto the inside of the nose strip and covered with a glass cloth layer.



Mass balance on the elevator

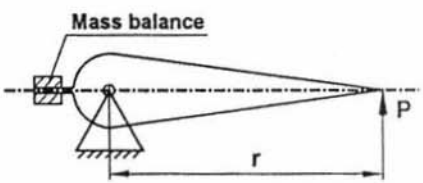
Drill a 20 mm (13/16") dia hole into the lower surface, glue in with Epoxy resin granulated lead mixed with micro-balloons.
Let dry and close the hole following the repair instructions (see appendix).



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

$$M = P \quad r$$

M = hinge moment
P = weight
r = lever arm



The control surface should be supported at its 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 surface movements are to be checked for their in-limited travel.

Prescribed periodic maintenance

Rudder control cables

After every 200 flight hours and at every annual inspection the rudder control cables are to be checked in the area of the S-shaped tubular guide on the pedals with pedals in the front and aft position.

The control cables should be replaced if injured, worn or corroded. A wear of single outer strands up to 25 % is permissible.

If a replacement of the cables should be necessary cables 3.2 mm (1/8") LN 9374 made of zinked carbon steel strands are to be used.

The thimble eye-splices are made with Nicopress Oval Sleeves No. 18-3-M or No. 28-3-M using a tool No. 51-M-850 and following the special instructions for making and checking the sleeves.

Ball joints

After every 500 flying hours the ball joints on the air brake drive lever in the fuselage are to be replaced by new ball joints No.

MS 961.150.150.L3
(961 S 150-150 L3)

Towing hook

Inspections are to be carried out in accord with the Operating and Maintenance Instructions for Special Towing Hooks "S 72 and SH 72", dated May 1975, LBA-approved.

Instruments

Follow the instructions of the respective manufacturers.

Suppliers

Cables, sleeves, main landing wheel.

Schempp-Hirth GmbH & Co KG
Krebenstrasse 25
7312 Kirchheim-Teck
West Germany

Nicopress sleeves and tools.

R. Lindemann
Osterrade 12
2050 Hamburg 80
West Germany

Towing hook.

TOST Flugzeuggerätebau
Thalkirchnerstr. 62
8000 München 2
West Germany

Inspection process for the extension of service life

1. General

The results of fatigue tests subsequently carried out on wing spar sections have demonstrated that the service time of GFRP/CFRP sailplanes and 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 afore-said inspection program 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).

The afore-said inspection program must be repeated when the sailplane (or powered sailplane) has reached a service time of 9000 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 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 relevant 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.