F L I G H T - and S E R V I C E M A N U A L

GLASFLÜGEL " M O S Q U I T O B "

Issue Oktober 1977

This manual should always be carried in the sailplane

It belongs to sailplane " M O S Q U I T O B "

Works No.:

Registration:

Manufacturer: G L A S F L Ü G E L
Deutsch-Brasilianische
Flugzeug-und Fahrzeugbau GmbH

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Owner:

The pages 10 - 34 are approved by the Luftfahrtbundesamt

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MAINTENANCE & SERVICE MANUAL

Amendment to Manual

No	Description	Page	Date	Signature
1.)	Manual amended for compliane with "B"-version	1,7,13 19,24, 31,43, 44a,50 57,58,		
	Extension of service life	63+64		
	Extension of service life	65+66		

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GENERAL INFORMATION

1. GENERAL INFORMATION

The "MOSQUITO" is a single seat 15m flapped sailplane in GLASFLÜGEL All Fiberglass Construction.

WING

The two-piece double trapezoidal wing is cantilever.
It is constructed as a FRP-Foam-Sandwich shell with spar caps of parallel glass fibers, extruded by a method developped by Hütter and Hänle, and shear webs of reinforced FRP-Foam-Sandwich. The trailing edge airbrakes are a combination of spoilers and flaps. The ailerons have internal drive.
Two internal water tanks carry a total of 115 liters.
= 30.38 US Gallons

FUSELAGE

The fuselage is slimmed out behind the wing, the faired-in one-piece canopy is hinged forward.
The fuselage shell is of FRP only without sandwich, therefore capable of large energy absorption. The fuselage shell is supported by FRP profile frames.
The pilot is seated in a semi-reclining position.
The landing gear is retractable.
A C.G. release is fitted as standard, and an Aerotow nose release can be fitted on request.

HORIZONTAL TAILPLANE

The horizontal tailplane has a stabilizer and elevators. Trimming is by means of a spring blade on the control column, activated by a knob on the handgrip of the control column. The stabilizer is of FRP-Foam-Sandwich construction.

VERTICAL TAILPLANE

The fin is similar to the wing of FRP-Foam-Sandwich-Shell construction, also the rudder, which features internal drive.

COCKPIT INTERIOR

The control column is of the anti-P.I.O. (Pilot induced oscillation) type, and is insensitive to gusts.
Back-rest and rudder pedals are adjustable in flight.
A seat cushion with inflatable knee supports is standard equipment.
The ventilation air is available from the fuselage inlet in the nose, and through the sliding window in the canopy.
A battery box and barograph tray are installed.
The water ballast system is integrated.

2

OPERATING LIMITS

2. OPERATING LIMITS

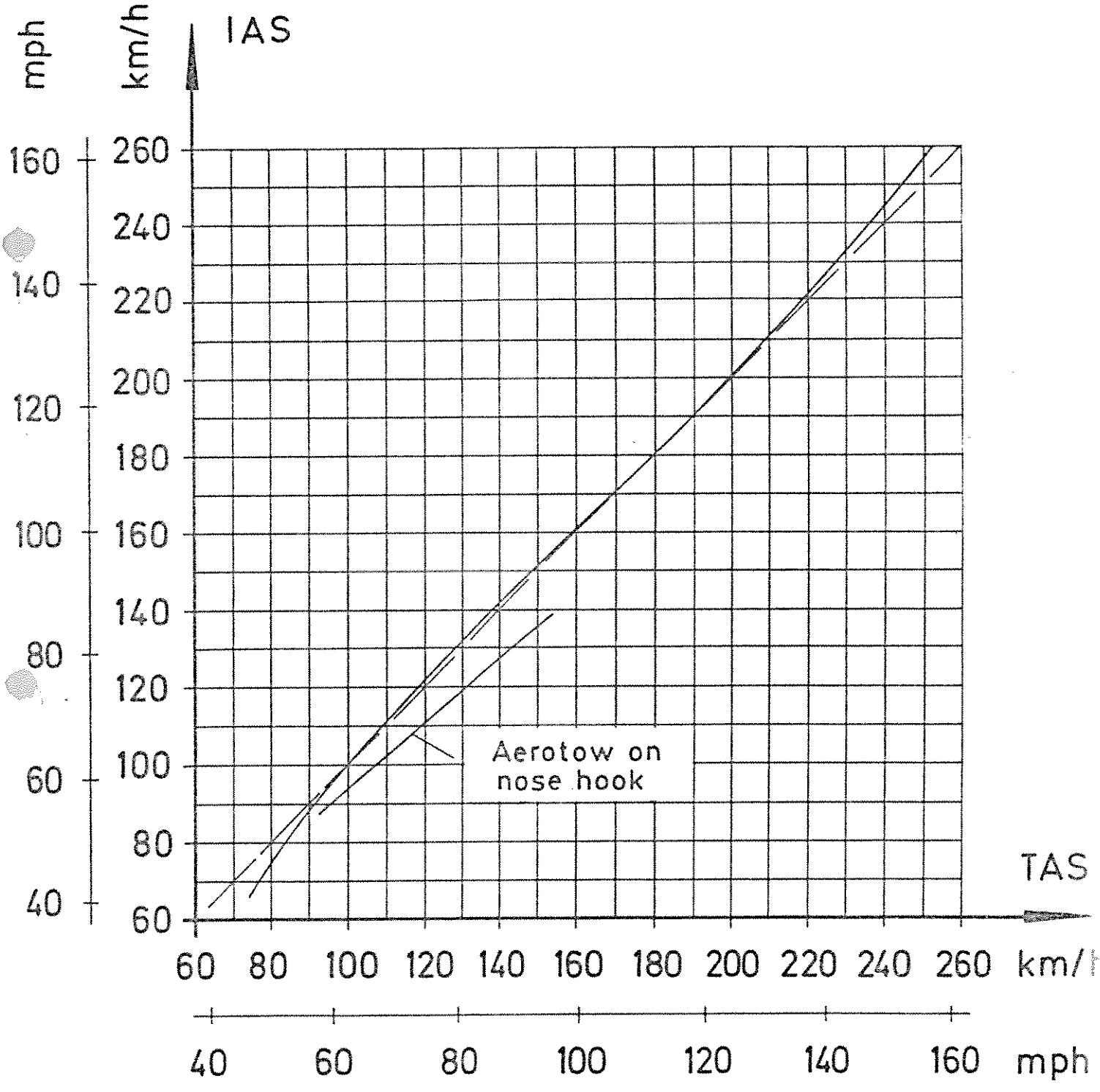
2.1 AIR SPEEDS (IAS)

Maximum permitted speed with flaps at 0, -1, -2	V_{NE}	= 250km/h	135kts	155mph
Maximum speed with flaps at +1, +2	V_{FE}	= 200km/h	108kts	124mph
Maximum speed in strong turbulence	V_B	= 200km/h	108kts	124mph
Manoeuvering speed	V_A	= 200km/h	108kts	124mph
Maximum speed on Aerotow	V_T	= 150km/h	81kts	93mph
Maximum speed on Auto or Winch tow	V_W	= 150km/h	81kts	93mph

Please note that at increasing altitudes the True Air Speed (TAS) is higher than the Indicated Air Speed (IAS) registered by the air speed indicator.
This has no influence on the strength or load factors of the sailplane, however, for reasons of flutter safety, the following Indicated Air Speeds should not be exceeded.

Height m	IAS km/h	IAS mph	IAS kts
0	250	155	135
1000	250	155	135
2000	250	155	135
3000	250	155	135
4000	250	155	135
5000	240	149	130
6000	226	140	122
7000	214	133	115
8000	202	125	109
9000	191	119	103
10 000	179	111	97
12 000	159	99	86

Air Speed Indicator (ASI) error (at MSL)



2.2 AIRWORTHINESS CATEGORY

N, Normal Category (LFSM 1975)

Based on the Airworthiness Requirements LFSM full control movements can be used up to the manoeuvering speed V_A. At higher speeds it is possible to overstress the sailplane structurally, therefore full movements are not permitted above 200km/h, 108kts, 124mph.
At the maximum permissable speed V_{NE} = 250km/h, 135kts, 155mph, only a maximum of 1/3rd of the full movement is permissable.
For the elevator, the permissable deflection at V_{NE} is considerably smaller, and is related to the permissable pull-out load factor.

This sailplane, can, under normal weather conditions, be safely flown up to V_{NE} = 250km/h, 135kts, 155mph.

In extreme turbulence, as encountered for instance in wave rotors, thunder clouds, visable up-currents, or when flying over mountain ranges, a speed of V_B = 200km/h, 108kts, 155mph should not be exceeded.

2.3 LOAD FACTORS

The following load factors should not be exceeded:

at 200km/h, 108kts, 124mph	+ 5.3/ - 2.65	Airbrakes
at 250km/h, 125kts, 155mph	+ 4.0/ - 1.5	Closed.
Airbrakes Extended	+ 3.5	

The safety factor is then j = 1.5

2.4 CLOUD FLYING

is approved with corresponding equipment.

2.5 WEIGHTS:

Maximum permitted weight (mass)..... 450kg, 992lbs
Maximum permitted weight (mass) of
non-lift carrying parts..... 240kg, 529lbs
maximum weight of water ballast to the following table:

Cockpit load	kg lbs 65 143	kg lbs 70 154	kg lbs 80 176	kg lbs 90 198	kg lbs 100 220	kg lbs 110 242
Empty weight kg lbs						
240 529	115	115	115	115	110	100
250 551	115	115	115	110	100	90
260 573	115	115	110	100	90	80*
270 595	115	110	100	90	80*	70*
280 617	105	100	90	80*	70*	60*

* Please note: Check if with load in the cockpit, the weight of the non-lift carrying parts has not been exceeded.
The luggage compartment may hold a max. of 10kg, 22lbs, of which only 5kg, 11lbs, may be classed as removeable ballast, but must be considered when establishing maximum water ballast.

2.6 CENTER OF GRAVITY (C.G.) POSITIONS

= 7.874 - 12.795 inches

The permissable CG positions (flight) are between 200mm and 325mm behind reference point (corresponds to 24,5%-42,8% mean cord).
Depending on the empty weight (see trim-plan), pilots including parachute, weighing below 70kg, 154lbs, must carry a lead cushion attached to the seat, so that the minimum load is equalled.
This lead cushion is available from Glasflügel.

Weighing date					
Carried out by					
Equipment list date					
C.G. position behind reference					
Minimum loading in cockpit					
Maximum loading in cockpit					

2.7 WEAK-LINKS

Winch tow	6400 N	(650 kg	1433 lbs.)
Aerotow	6400 N	(650 kg	1433 lbs.)

2.8 MINIMUM EQUIPMENT:

Air Speed Indicator with range from 50km/h (27kts) to 270km/h (146kts) with the following colour coding:

White arc	78-200 km/h	42-108 kts	48-124 mph
Green arc	94-200 km/h	51-108 kts	58-124 mph
Yellow arc	200-250 km/h	108-135 kts	124-155 mph
Red mark at	250 km/h	135 kts	155 mph
Yellow arrow at	85 km/h	46 kts	53 mph

Altimeter
4- piece safety harness.

Manual parachute, automatic parachute, otherwise back-cushion (compressed approx 10cm thick).

Placard with operating limits.
Placard "Cockpit check before take-off"
Flight & Service Manual.

for CLOUD FLYING in addition to the minimum equipment:

Compass
Turn & Bank Indicator,
VHF Transceiver.

Experience so far has shown that the installed Air Speed Indicator System is suitable for cloud flying.
The installed minimum equipment must be of an approved type.
Take note, the instrument panel weight should not exceed 10 kg. 22lbs

2.9 AEROBATICS:

With corresponding equipment, the MOSQUITO is approved for aerobatics:
Inside loops,
Spins,
Turns,
Lazy eight.

It is recommended to install a recording "G" meter in addition to the equipment listed under 2.8
Aerobatics are only approved without water ballast (max. weight 380 kg). = 838 lbs.

3. EMERGENCY:

3.1 TERMINATING OF SPINS

Should this sailplane, with medium to rear C.G. positions, unintentionally enter into a spin, the back pressure on the elevator should be released and the rotation stopped by applying opposite rudder. It is important to release the back pressure on the elevator to prevent this sailplane changing into an opposite rotation spin when applying opposite rudder.

3.2 INCIDENTS

Take-Off's on not mowed grass surfaces should be avoided for aerotow and winch tow.
Should a wingtip be caught in grass, release at once, delaying this will result in a ground-loop.
In the early take-off phase of a winch launch, the cable chute may open if the chute is of a too large a type, or if the climb is too shallow.
In this instance, release and land straight ahead.
A speed of 85-90km/h *), 46-49kts, 53-56mph, should be maintained after release at low height in straight and level flight; and in a turn, should be increased according to the angle of bank. With this, the unintentional and unnoticed stalled flight will be avoided.
Should you detect a slight vibration, with "spongy" controls in straight and level flight at speed indications of 65-85km/h *), 35-46kts, 40-53mph, the sailplane is stalled, and the control stick should be released forward.

*)With water ballast these speeds increase up to 15%.

3.3 CANOPY JETTISON:

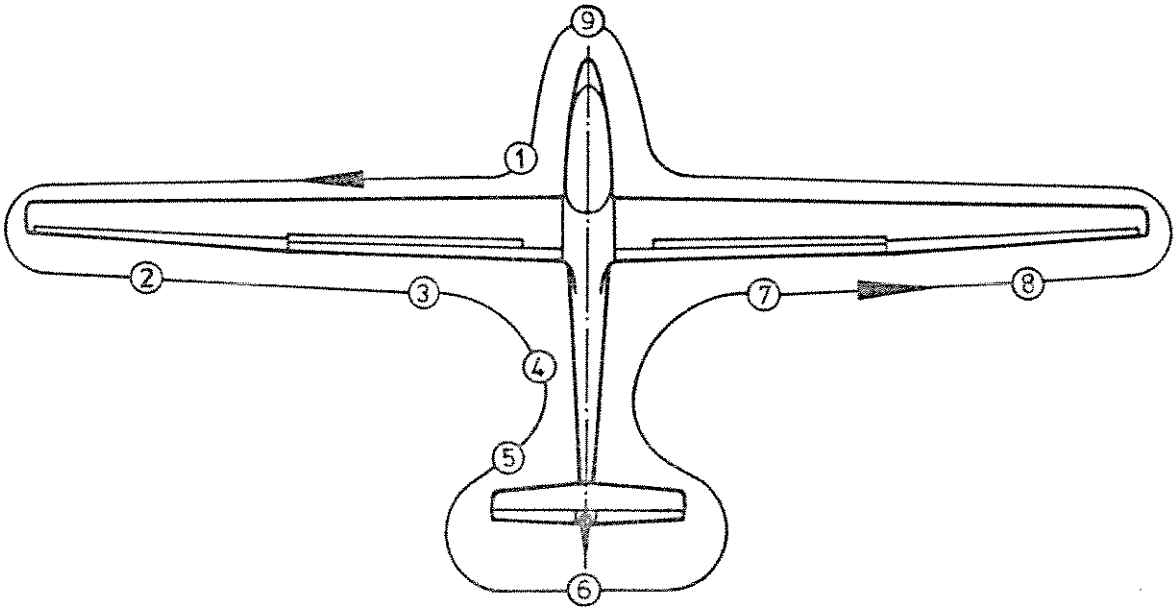
Pull back canopy grip on the port side and red knob on the stbd. side of the instrument panel.
Grasp both black knobs and pull canopy back so canopy is freed at front edge - then push forward and the air-stream will carry the canopy away.

Whenever the canopy emergency jettison knob is pulled and prior to each flight, if no locking thread is used, it should be ensured, that the Pip pins are fully pushed home, so that the locking balls are clear of and behind their fittings.

4
NORMAL OPERATION

4. NORMAL OPERATION

4.1 DAILY INSPECTION:



When inspecting the sailplane check for cracks in surface finish, blisters or uneven surface, and if in doubt, check with authorized, specialized personnel.

1. a) Open cockpit, check if the central wing pin is installed and locked.

   b) Visual cockpit control inspection.

   c) Remove foreign material from fuselage.

   d) Check tyre pressure in main wheel (see page 43).

   e) Check function of tow release, condition and spacing of cable deflector plates.

2. Check ailerons for free and full movement.

3. a) Check airbrakes for free movement and clean fit.

   b) Check aileron and flap trailing edges for damage. Lightly shake ailerons and flaps on the trailing edge to detect unusually large play in the system.

   c) With flaps at - 2 position, check gasspring in the control system - to do this, press flap at root-end down into the neutral position, - then release - flaps should return to previous position.

d) Check hinges for damage.

4. Check if the holes for static pressure on the fuselage shell are clear.

5. a) Check if the front stabilizer attachment bolt is engaged.

   b) Fit venturi and check line (when blowing into venturi, the connected variometer registers (climb).

   c) Check tyre pressure in tail wheel (see page 43).

6. a) Check elevator and rudder for free and full movement.

   b) Check elevator and rudder for damage, lightly shake by hand on trailing edge to check for unusually large play in system.

7. See under 3.

8. See under 2.

9. a) Check the function of the aerotow release.

   b) Check for blocked pitot, blow into pitot, ASI registers.

After a hard landing, or excessively high "G" loads, the sailplane should be carefully examined for any indications of damage.
Dismantle the sailplane and check surface finish for cracks. Look for white areas (that may indicate delamination) at the wing spar root ends, wing root rib fittings, landing gear attachments, tail fittings, and all areas of concentrated loads. Also inspect the central wing pin and tail attachments for distortion. If damage is found, the sailplane should be grounded until any repairs have been completed.

4.2 COCKPIT LAY-OUT

1. Instrument panel:

With the canopy in the open position, instruments are readily accessible. The instrument panel cover is attached to the canopy.
The instrument panel itself is mounted to the cockpit frame and is easily removeable.

2. Control Column:

The elevator is moved by a parallelogram system which prevents unintentional movements induced by gusts.
The following are mounted on the control column:

a) Radio button: press to transmit.
b) Spring trim button: depress with the little finger and release in any selected control column position.
c) Trim lever: can be adjusted manually when trim button is depressed.

Forward rotation = nose heavy.
Rearward rotation = tail heavy.

3. Wheel brake:
Press heels on pedal control.

4. Tow Release:
The yellow grip under the Port side of the instrument panel is activating both releases.

5. Airbrakes:
Open: Pull blue lever on the Port cockpit wall towards the rear.
Close: Push lever forward and lock.

6. Flaps:
Unlock grey lever outwards on the Port cockpit wall, and select flap setting.

High speed flight: Push lever forward and lock.
Slow speed flight: Pull lever backwards and lock.

This lever can be operated if the airbrake lever is locked.

7. Canopy Lock:

Closing: Rotate canopy backwards until it is nearly seated on the cockpit rim, then push forward on both black knobs so that it engages into the front groove, then press down at rear, while pushing canopy lever on the Port side forward. Note, the rear lock must be visably engaged.

Open: Pull red canopy grip on the Port side, then pull canopy slightly backwards on both black knobs until it disengages at the front, then push forward to its stop.

8. Landing gear:

Retract: Unlock black grip lever on the Starboard cockpit wall and pull backwards, then lock.

to lower gear:

Unlock and push black grip lever forward and lock.

9. Water Ballast:

Black actuator knob on the Starboard cockpit wall.
Lever at rear position: Valve closed.
Lever in forward position (locked): Valve open.

To fill: With wings horizontal, fill through openings on the upper surface of the wing at approx. inboard aileron position.

Depress plugs, lock with tape. The vent holes must be free.
Warning: Do not fill tanks under pressure.

10. Backrest:

Adjustment is possible during flight. Release black notch on Starboard cockpit wall. Release weight on backrest and pull: Backrest moves forward.

11. Rudder pedal adjustment:

By pulling the black grip under the instrument panel, the pedal adjustment is unlocked.
Forward adjustment: Pull black grip while pushing pedals forward with heels, release grip and let pedals lock into position.
Back adjustment: Pull pedals back with black grip.

12. Cockpit ventilation:

Pull blue knob below instrument panel: Ventilation closed. In addition, the sliding window in the Port side of the canopy may be opened, or the airscoop.

13. Knee Support cushion:
Adjustable by two air pumps.

14. Placards in cockpit:

PRE-FLIGHT COCKPIT CHECK

Parachute correctly fitted?
Safety harness correctly and firmly adjusted?
Backrest and pedals locked in comfortable position?
All controls and instruments within easy reach?
Airbrakes locked?
Control check?
Free, full and correct movements of controls?
Correct trim position?
Canopy locked?
Release check?
Towline on correct release - correct weak-link?
Set flap!
Set Altimeter!

GLASFLÜGEL "MOSQUITO" OPERATING LIMITS

Maximum permissable speed flap setting 0, -1, -2	V_{NE} =	250km/h	135kts	155mph
Maximum permissable speed flap setting +1, +2	V_{FE} =	200km/h	108kts	124mph
Maximum permissable speed in extreme turbulence	V_B =	200km/h	108kts	124mph
Manoeuvering speed	V_A =	200km/h	108kts	124mph
Maximum permissable speed Aerotow	V_T =	150km/h	81kts	93mph
Maximum permissable speed Auto & Winch tow	V_W =	150km/h	81kts	93mph
Maximum permissable A.U.W.		450kg		992lbs
Maximum permissable weight of non-lift carrying parts		240kg		529lbs
Loading on seat		-110kg		-242lbs

4.3 COCKPIT CHECK BEFORE TAKE-OFF
See placard in cockpit.

4.4 TAKE-OFF
Aerotow:

131 - 197 A

For aerotow, Perlon ropes of 40-60m lengths were tested.
Normal tow from C.G. Release. If the optional nose release is installed, we recommend to use this instead.
When commencing the take-off run, use wheel brake slightly to prevent rolling over tow rope.
Depending on the loading in the cockpit, the trim setting before take-off, should be "normal" for forward to center C.G. positions. For center to rear C.G. positions, trim "nose heavy". As a rule, take off with flap setting +1.
With rear C.G. positions, high take-off weights, or strong cross winds, commence the take-off run with flap setting -2, until sufficient aileron control is available, then move flap setting back to take-off position. After lift-off, at approx. 75-80 km/h *), 40-43 kts, 47-50 mph, retrim to reduce elevator loads.

The normal towing speed is 100-120 km/h *), 54-65 kts, 62-75 mph, with a maximum of 150 km/h, 81 kts, 93 mph IAS.
It is possible that the ASI will show a lower reading, caused by towrope interference (see page 11).
The main landing gear can be retracted during tow.
Should the sailplane be unintentionally displaced laterally, the wings should remain level while bringing the sailplane back into position by the rudder.
Should the sailplane be displaced vertically into a too high tow position during high tow, with danger of over-shooting the tow aircraft, the airbrakes should be opened.
To release:
Pull release right through and repeat, ensure that the cable has released before turning away.

*) with water ballast these speeds increase up to 15%.

Winch tow:

Winch tow should only be attempted on the C.G. release. Before take-off, the trim is set to "normal" for forward and medium C.G. positions, and "nose heavy" for medium to rear C.G. positions. The "normal" take-off position for the flap lever is +1.
When commencing the take-off run, use wheel brake slightly to prevent rolling over tow rope.
This sailplane does not have the tendency to enter into a steep climb after take-off, and therefore, depending on the trim-setting, only small correction with the elevator is necessary to prevent a very steep climb in the early take-off phase.

After a safety height of approx. 50m (150ft) is reached, the sailplane can be brought into a steeper climb by more back pressure on the control column. If too much back pressure is applied and porpoising occurs (elevator stall), release some of the back pressure.

Avoid rapid lift-off manoeuvres or low towing speeds.
The high wing loading of this sailplane requires to abort the take-off and release, if the towing speed drops below 95 km/h, 51 kts, 59 mph, (with water ballast 110 km/h, 59 kts, 68 mph).
Winches with low performance, engines with RPM limitations and other restrictions, as well as tail wind, calm air, filled water tanks etc., require special attention before take-off, to ensure that the winch is providing enough power in reserve to maintain the safe towing speeds.

If possible, use small cable chutes to prevent deploying at flat climb angles.

The normal minimum towing speed is	105km/h	57kts	65mph
with water ballast	120km/h	65kts	75mph
Max. towing speed	150km/h	81kts	93mph

At maximum towing height, the cable will release automatically, however, you should not neglect to pull the release knob several times.

4.5 FREE FLIGHT:

At a safe height, experiment with the airbrakes and note loss of height at different speeds.
Make yourself familiar with the operation of the flaps.
This sailplane has very good balanced flight characteristics and controls. The rate of roll from 45° bank at 1.4 x stalling speed and flap setting O is 3 to 3,5 secs. On the other hand, it is possible to fly "hands off" in straight and level or circling flight without the sailplane changing its attitude or speed. All control movements require only very low operating forces.

4.6 SLOW SPEED FLIGHT, STALL

For familiarization with this sailplane, we recommend to do stalling tests at different flap settings, from a straight and level flight, and from banked flight (approx. 45° bank) at safe heights.
The following stalling speeds were measured:

A.U.W.		350kg 772lbs	400kg 882lbs	450kg 992lbs
flap setting		Stalling speed with closed airbrakes		
	+2	68km/h, 37kts, 42mph	73km/h, 39kts, 45mph	77km/h, 42kts, 48mph
	O	75km/h, 40kts, 47mph	80km/h, 43kts, 50mph	85km/h, 46kts, 53mph
	-2	82km/h, 44kts, 51mph	88km/h, 47kts, 55mph	93km/h, 50kts, 58mph
		Stalling speed with airbrakes extended		
	+2	65km/h, 35kts, 40mph	70km/h, 38kts, 43mph	74km/h, 40kts, 46mph

With closed airbrakes, a stall warning occurs in the form of a light shudder and vibration, just prior to the stalling speed. If the airbrakes are employed, the airframe vibrates noticeably at approx. 5km/h, 2,5kts, 3mph, before the stalling speed is reached. If the control column is slowly pulled back further, the ASI reading may momentarily increase again. With the control column all the way back, this sailplane will usually drop a wing. The back pressure on the

control column should then be immediately released.
If the airbrakes are extended, the loss of height after wing drop may be approx. 50m (150 ft).

4.7 HIGH SPEED FLIGHT:

During high speed flight, pay attention to the maximum permissable speeds for the corresponding flap settings. Speeds are colour coded in different colours on the ASI and are easily visible (see 2.8).
Full control deflections are allowable up to
V_A = 200km/h, 108kts, 124mph, and at
V_{NE} = 250km/h, 135kts, 155mph, only 1/3rd of the full control movement is permissable.

Avoid sudden elevator movements.

During extreme turbulence, as it may occur for instance, in wave rotors, thunderclouds, visible up-currents, or while crossing mountain ranges, the gust speed
V_B = 200km/h, 108kts, 124mph should not be exceeded.
The necessary control column travel, in particular at rear C.G. positions, from the stalling speed to the maximum speed is relatively small, however any speed changes will be noticed by a change in the control forces.

The airbrakes can be opened up to V_{NE} = 250 km/h, 135kts, 155mph, this however, should only be done in an emergency, or when unintentionally exceeding the maximum permissable speeds listed an Page 8, as sudden decelerations of 2 "G" will occur.
For this reason, ensure that your harness is tight, and that you do not unintentionally move or jolt the control column while operating the airbrake lever.
Loose objects in the cockpit should be avoided.
Pay attention also to the fact, that recovery from dives with airbrakes employed, should be more gentle than with airbrakes not employed (see section 2.3 load factors).

Because of the quick acceleration at steeper angles retract the airbrakes at speeds not below 150km/h, 81kts, 93mph.

If the airbrakes are employed at higher speeds (above 150km/h, 81kts, 93mph) they should be opened smoothly. In particular, the operating lever should not be held near the locking position (slightly open).

4.8 FLYING WITH WATER BALLAST

At average climbing speeds of less than 1.5m/sec, 2,9kts, the use of water ballast is not of benefit.
This applies also for flights in tight thermals which require steep angles of bank.

Before water ballast is added, check the table in section 2.5 for the maximum weight of water ballast.
The capacity of the tanks in the wing total 120 liter. 31.70 US Gallons

Filling: Left wing tip down. Set cockpit lever to "dump". Insert factory supplied threaded coupling (mounted to a filling hose) into valve on lower wing surface near root rib. Fill bag as desired. Disengage coupling of actuator cross rod, valve closes automatically. Remove hose with coupling and insert in right wing valve - tip down. Repeat filling procedure as described before. When bag is filled as desired, set cockpit lever to "close". Remove hose and coupling. Both bags should be filled equally.

Dot not pressurize, for instance, directly from the water hose.

At temperatures below 0° C no water ballast should be carried because of freezing danger.

The water ballast should be jettisoned before landing.

The maximum landing weight of 380kg, 838lbs should not be exceeded.

It takes 4 minutes to jettison all water.

Never store the aircraft with full tanks. Always jettison the water and open the filler plugs to vent the water ballast cavity.

"When operating at high altitude without water ballast the water dump valve must always be kept open".

4.9 CLOUD FLYING

The spin should not be used as a safety escape as the sailplane may change over into a spiral dive.
It is rather recommended to open the airbrakes fully at IAS of 130km/h, 70kts, 81mph and load factors above 2 "G". At speeds above 150km/h, 81kts, 93mph the airbrakes should not be closed, as this sailplane, owing to its very steep glide path, may exceed the max. permissable speed.

Please note the additional required equipment for cloud flying (2.9).

4.10 FLIGHTS AT BELOW ZERO^{o}C (freezing point)

At temperatures below zero ^{o}C, as for instance during wave flights or during Winter, it is possible that control friction increases.
Ensure that all control elements are free of moisture to prevent freezing.
This, in particular, applies to the AIRBRAKES.
Experience so far, recommends to apply vaseline over the full span of the spoiler contact surface to avoid freezing. Continuously operate controls and airbrakes at short intervals. During flights with water ballast, note the recommendation under 4.8.

4.11 AEROBATICS

INSIDE LOOPS:

Speeds for entry not under 180km/h, 97kts, 112mph.
Recommended is 200km/h, 108kts, 124mph, and 180km/h, 97kts, 112mph, for recovery.

SPINS

Stationary spins are only possible at rear C.G. positions. With forward C.G. positions, this sailplane will enter a spiral dive. It should be terminated immediately by neutralizing all controls and recover.
To enter the spin, a dynamic stall has to be produced, and before nose drop, full rudder has to be applied into the direction of spin.

Entry speed:	60km/h,	32kts,	37mph
Recovery speed:	150-180km/h,	81-97kts,	93-112mph

The recovery from spin is achieved by neutralizing the elevator and applying rudder against the rotation.

TURN

Entry speed not below:	180km/h,	97kts,	112mph
Recommended speed:	200km/h,	108kts,	124mph
Recovery speed between:	180-200km/h,	97-108kts,	112-124mph

After the entry, full rudder is applied at 120km/h, 65kts, 75mph at the end of the vertical climb.

LAZY EIGHT

Entry speed approx:	180km/h,	97kts,	112mph

Following a climb between 30 and 45° a turn is initiated

at	120km/h,	65kts,	75mph
Recovery speed:	180km/h,	97kts,	112mph

In steep turns, the following speeds, depending on load factor, and degree of bank, should not be less than:

Load factor	Angle of bank	Speed		
+ 2,0	60°	110km/h,	59kts,	68mph
+ 2,5	65°	125km/h,	67kts,	78mph
+ 3,0	70°	135km/h,	73kts,	84mph
+ 3,5	73°	150km/h,	81kts,	93mph

Aerobatics should only be carried out without water ballast (Maximum weight 380kg). 838 lbs.

4.12 LANDINGS

The rotating trailing edge surface is a combination of spoiler and flap, and a very effective landing device, which makes possible, steep, as well as relatively slow approaches.
Lift is not notably decreased or increased.

The normal flap position during landing is +2.

For better aileron control during strong turbulence, the approach can be made with flap setting +1 or 0.
While pulling back the airbrake lever, up to a noticeable resistance, only the spoiler airbrake is extended, with which the approach can be controlled.
By pulling further back, the airbrakes (spoiler and flaps) are activated together.

For a landing weight of 380kg, 838lbs, with fully extended airbrakes, flaps at +2 and the landing gear extended, the normal approach speed is approx. 85-90km/h, 46-49kts, 53-56mph.
The corresponding glide angle is then approx. 1:4.5.
The minimum approach speed is 80km/h, 43kts, 50mph.
Below this speed, the airbrakes should not be retracted suddenly. Immediately before touch-down, the airbrakes should be always opened fully.

For steep approaches (i, e, strong ground turbulence or approaches over high obstacles) the airbrakes are fully extended, and the glide angle is controlled with the elevator.
Excessive height can thus be absorbed without increasing speed noticeably.

5

STORING, TRANSPORTATION, RIGGING

5.1 STORING, PARKING and GROUND TOWING

The sailplane should only be stored or parked in well vented areas. Closed trailers should be equipped with sufficiently large ventilation. Always park with empty water tanks.
Take note to store the sailplane without stresses. This is particularly important at elevated temperatures.

Because of their slim shape, it is particularly important to store the wings correctly. They should be stored with the L.E. pointing downwards and supported under the wing root spar at approx. 2.4m from the wingtip, in a profile true wing sling.

Fuselage is correctly stored in a wide fuselage mould, in front of the C.G. release, and supported by the tail wheel.

The Tailplane is stored in two profile true slings, seperated 1.5 - 2m and with the L.E. pointing downwards.

Under no circumstances attach the tailplane into the trailer by using the tailplane main attachment fittings.

Sailplanes which stay rigged for the whole year or longer periods, should be attended to, so that rigging elements on the fuselage, wing and tailplane do not corrode.
Dust covers should be used and are highly recommended.

The sailplane should not be parked in the open with the canopy in the open position, as this may act as a magnifying mirror, and depending on direction of sun-radiation, constitutes a fire hazard.

A tail dolly should always be used for ground-handling this sailplane, to prevent unnecessary vibration of the tailplane, and stresses and wear to its attachment fittings.

When ground-handling, do not push at wingtips, but rather close to the fuselage.

5.2 RIGGING

1) Clean and grease pins and bearings.
2) In the cockpit, the flap lever is set at high speed, the brake lever in the medium position, and the water ballast lever set in the closed position.
3) First rig Port wing with flaps in high speed position, temporarily lock with the main pin by engaging it only into the front spar fork bush.
   Pay attention that the bellcranks on the root rib are in their neutral position and are actually engaging into the opposing socket fittings on the fuselage.
4) Rig Starboard wing with the same lever and flap settings as Port wing, and pull together with rigging tool.
   Ensure correct engagement of control as with Port wing.
5) Momentarily remove main wing spar pin and push home when bushes line up, then lock.
6) Check aileron and airbrake functions.
7) Push tailplane onto the rigging - drive pins and pull out front connection pin with tool, push tailplane L.E. down and push front connection pin fully into position, remove tool.
   Check that the elevator rigging-drive pins are actually correctly engaged into their opposing elevator fittings. (move elevator)
8) Tape off gaps.

5.3 DE-RIGGING

1) Pull front tailplane connection pin out, with the help of the tool, and lift up tailplane.
2) Lift wingtips and remove main pin.
3) With the help of the rigging tool, or by pulling on the wingtips, separate the wings from the fuselage.

6

MAINTENANCE

6. MAINTENANCE

6.1 MANDATORY MAINTENANCE

After every 100 operating hours, and during every yearly inspection the rudder cables should be checked for damage and wear, and the gasspring installed in the control system, should be checked for proper function.
The cables should be checked in the areas of the S-shaped tube of the pedals in both the front and rear pedal adjusting positions. The cable should be replaced if wear, twist, corrosion or other damage can be detected.
A wear up to 40% of the single outer wires is still permissable.

Material: Steel wire cable B 3.2 LN 9389 of stainless steel or steel wire cable B 3.2 LN 9374 of galvanized carbon steel, in conjunction with Nicopress clamps No. 28-3-M and tool 51-M-850 or 63-V-XPM or 64-CGMP, whereby always the M-groove should be used.

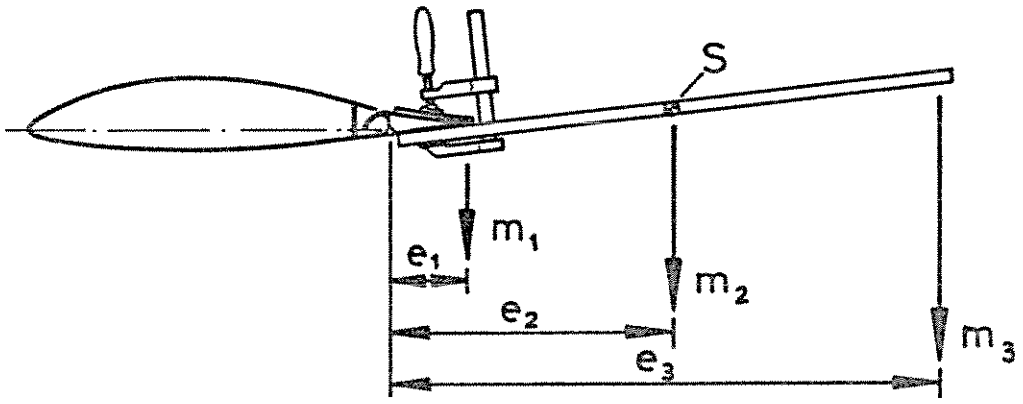
Only the correct tool should be used in conjunction with these clamps.
The works and inspection instructions corresponding to the tool should be adhered to.

The Gasspring is accessable by removing the left inspection lid behind the left (port) front wing attachment tube.
The piston tube should be cleaned and should show no sign of damage.
In the event of oil leaks under piston tube seal, the gasspring must be replaced.

The expansion power of the spring must be checked on the rigged sailplane with the flaps set at -2.
A flap moment of 23 - 26 Nm must be absorbed before the flap is moving down.

The Moment is applied via a 1m long piece of wood, which is attached by a small jig clamp, to the underside of the Port flap root rib, by using weights or a spring scale and is calculated as follows:

$$M = 9{,}81\ (m_1 \cdot e_1 + m_2 \cdot e_2 + m_3 \cdot e_3) \quad [Nm]$$



After every 200 operating hours , and during every yearly inspection the metal lip at the flap operating lever should be checked for wear. Lip should be replaced if wear is more than 1 mm.

The operating and maintenance instructions of May 1975 TOST-Flugzeuggerätebau, München, are applicable for the installed releases "SH 72" or "E 72" or "E 75".

For the installed instruments, and other equipment, instructions of the corresponding manufacturers are applicable.

Supplier:

GLASFLÜGEL, Holighaus & Hillenbrand GmbH & Co. KG
7318 Lenningen/Württ 1

(clamps, cable, gasspring, main and tail wheel).

R. Lindemann Osterrade 12, 2050 Hamburg 80
(Clamps and tools)

TOST Flugzeuggerätebau, Thalkirchnerstr. 62, 8000 München 2
(Tow release and main wheel)

6.2 REGULAR MAINTENANCE

Within the framework of the yearly inspection, the following maintenance should be carried out.

The controls (see page 44-47 G.A.) are accessable as follows:

1) Aileron control system within the wing is accessable through the open airbrakes and dismantled ailerons through pushrod openings in the false spar.
2) Airbrake control system within the wing is accessable through the pushrod openings in the false spar.
3) Control systems in the fuselage are accessable after removal of the inspection cover on the underside of the fuselage, after removal of the wheel box cover behind the back-rest, the removal of the four inspection covers in the wheel box, the upper wheel box cover, and after removing the seat tray.
4) Elevator drive after removal of the tailplane.
5) Rudder drive after removal of the rudder.

After cleaning the whole aircraft, proceed as follows:

Check FRP outside surface condition for holes, tears, cracks, paint cracks, indents, delaminations. If the outer layers of the sandwich are damaged, the inner layers should also be checked. Seek the help of an experienced person.

Check all metal parts for corrosion, and if necessary, clean up and preserve again (steel fittings, pushrods and levers should be primed with Zincromite and conserved with Nitro-lacquer).

In control runs with excessive friction, the bearings and joints should be cleaned and lubricated.

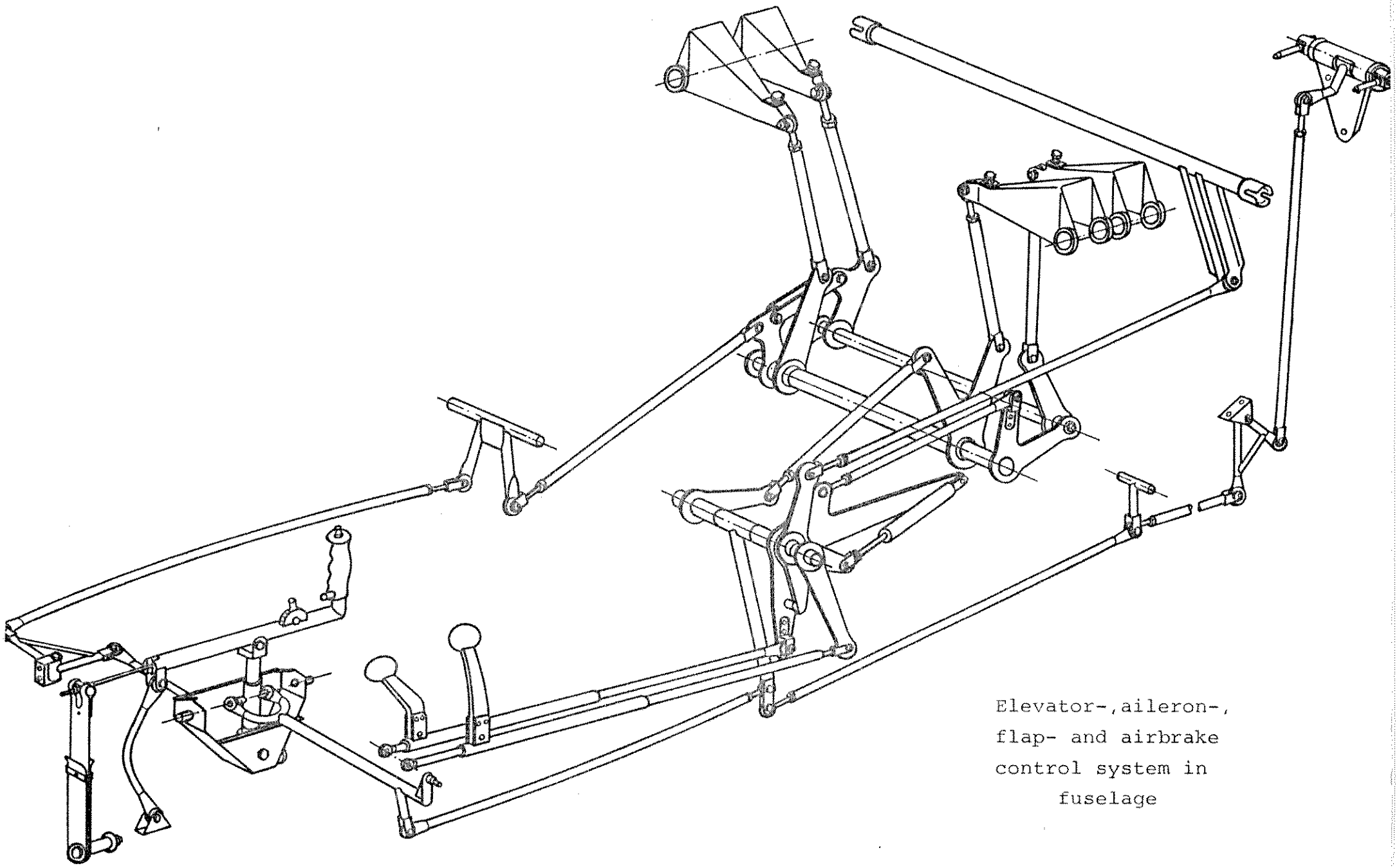
The permissable friction in the elevator controls can be checked in flight.
From a trimmed speed of 120km/h, 65kts, 75mph, and freed controls, the sailplane should be returning within ± 15km/h, ± 8 kts, ± 9 mph of the trimmed original speed.
Bearings and joints with excessive radial play should be replaced. The automatic "link-up" connection for ailerons and airbrakes between wing and fuselage can be adjusted free of play on the adjusting bolts of the four socket fittings on the fuselage.
The play in the controls and airbrake drive should be checked according to 6.6.
All fittings which are attached to FRP should be checked for firm adhesion.
Check the condition of the FRP near the fittings for cracks and white areas of delamination.
Landing Gear: Clean brake drum, check brake linings and if necessary renew. Check and adjust bowden cable or brake lever, check side play of the wheel hub.
In addition, observe the instructions of Fa. TOST.
Ensure that the wheel axle and the two landing gear hinge-tubes are not bent, and that the fiberglass bearings on the wheel box are not damaged.
Check pressure of main- and tail wheel.

Main wheel:

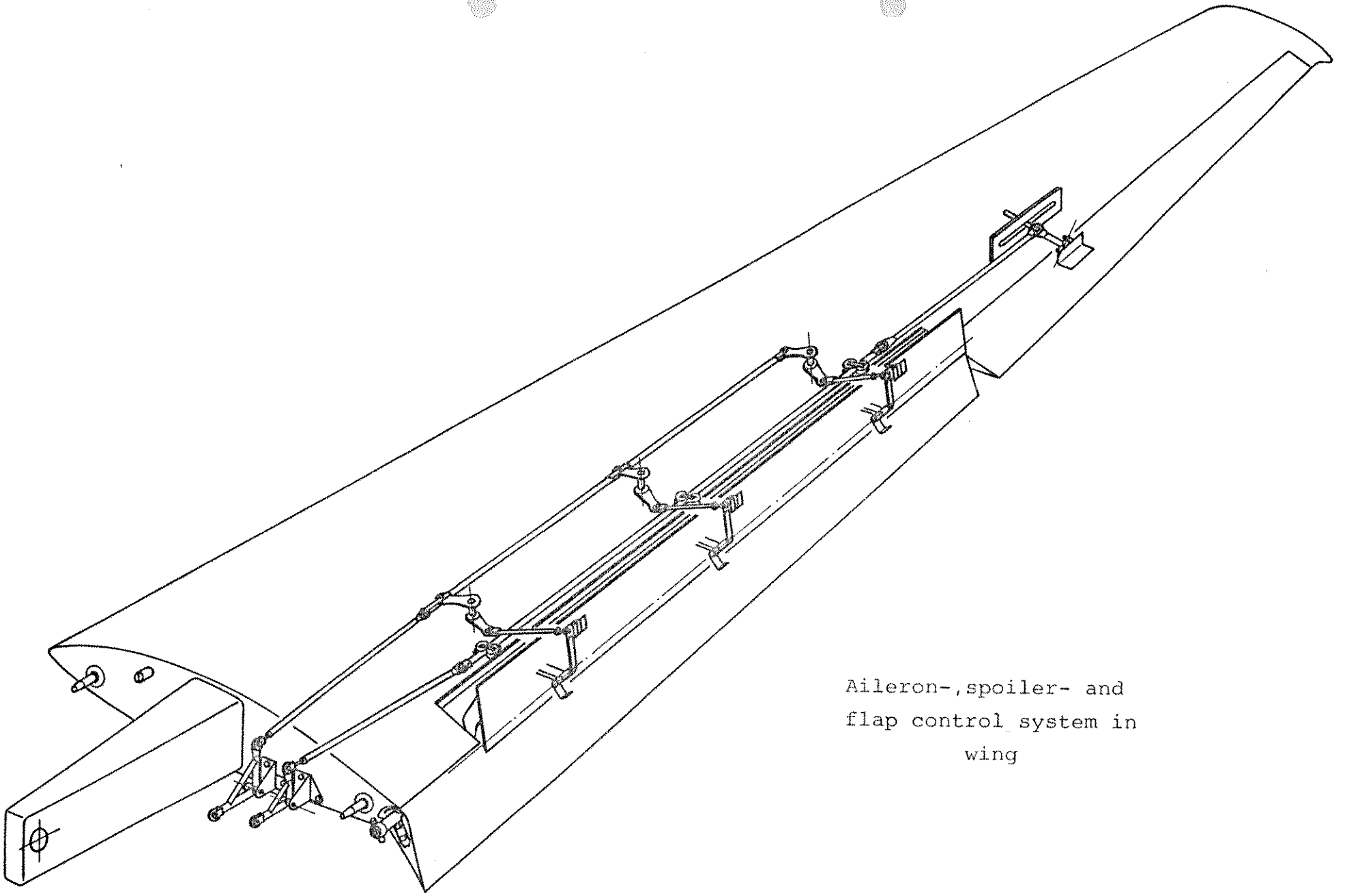
Flying weight [kg]	350 (772 lbs)	400 (882 lbs)	450 (992 lbs)	tire size
Δp [bar]	2,5 (36 psi)	3,0 (45 psi)	3,5 (51 psi)	5.00-5
	3,5 (51 psi)	4,0 (58 psi)	4,5 (65 psi)	4.00-4

Tail wheel: $\Delta p = 1,5$ [bar] = 22 psi

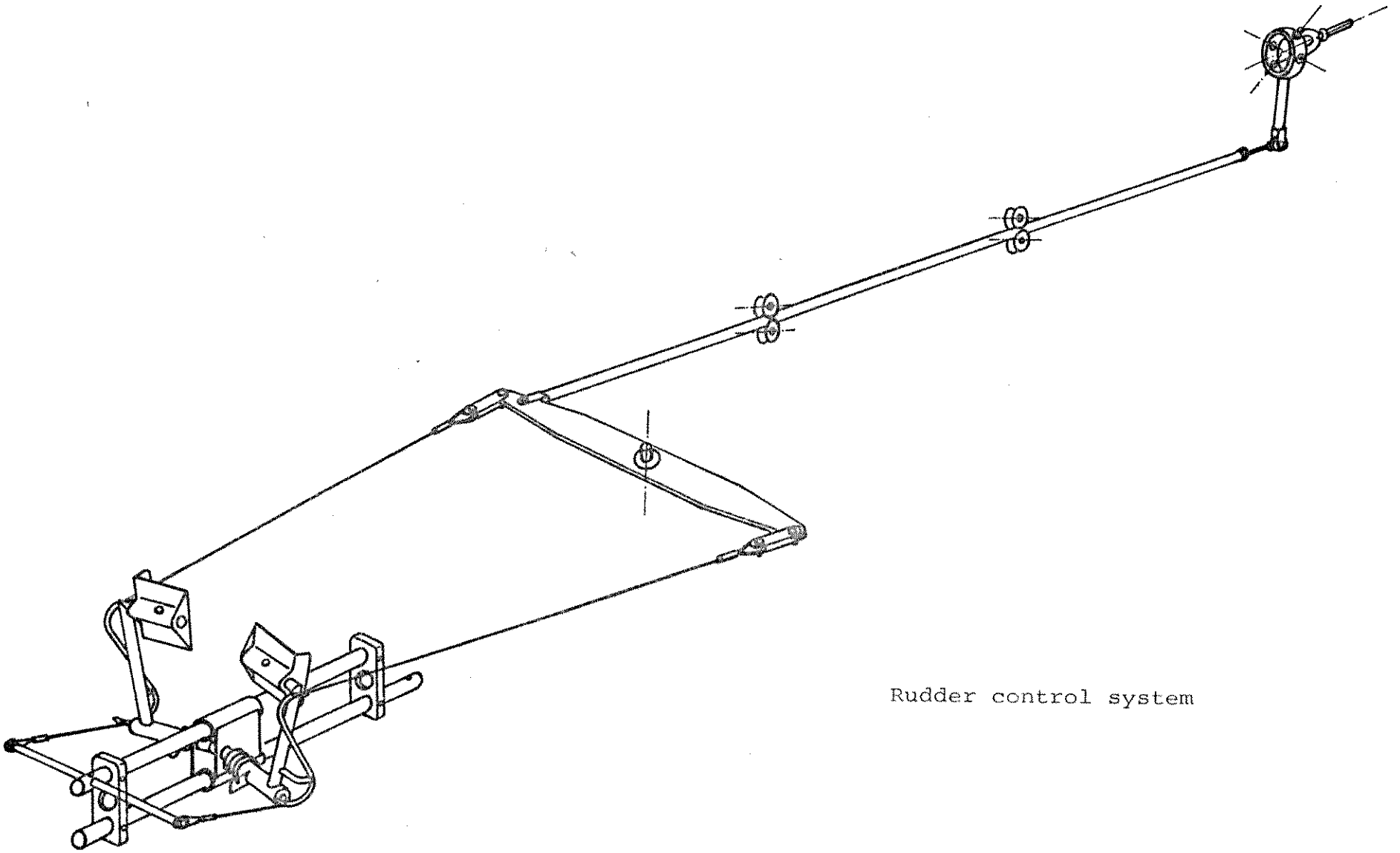
Check static and pitot inlets, lines, as well as line quick connectors for free flow and leak.
Ensure there are no loose instrument face glasses.
On the rigged aircraft, check control deflections and function of the control system and releases.
A gap of 4,5 mm minimum should be allowed between flaps and ailerons. .177 inch



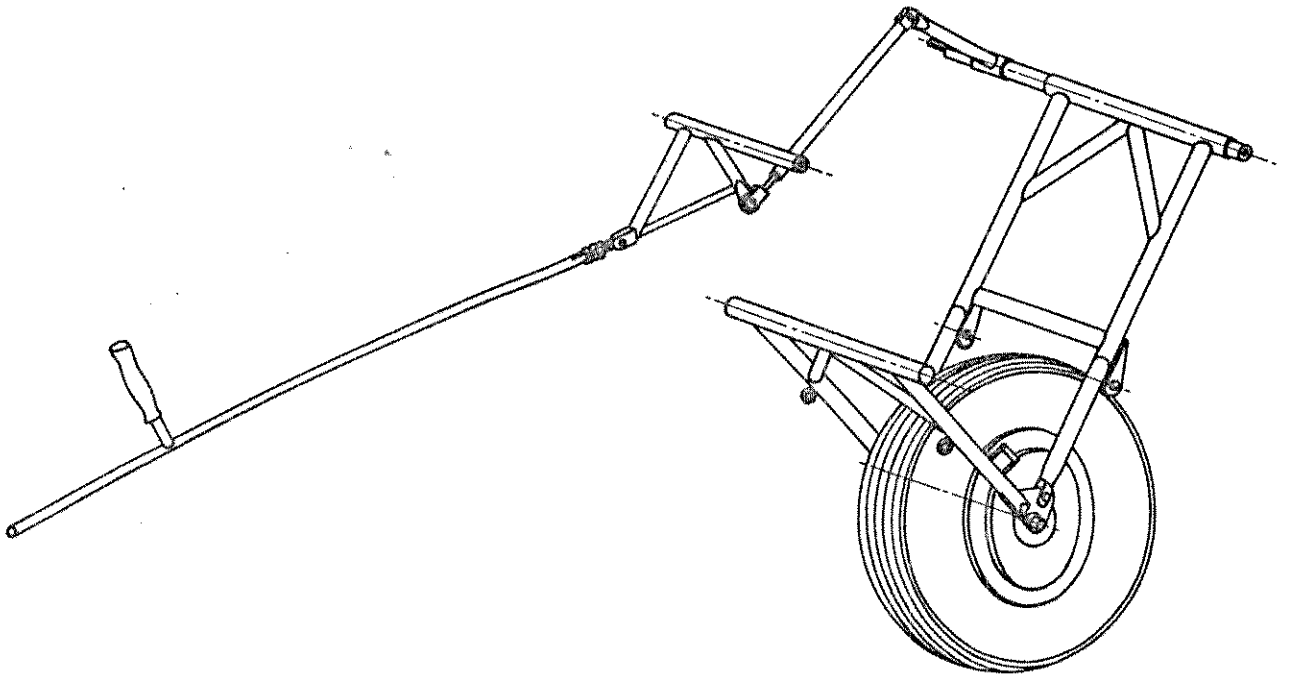
Elevator-, aileron-, flap- and airbrake control system in fuselage



Aileron-, spoiler- and flap control system in wing



Rudder control system



Landing gear system

6.3 FREE PLAY IN THE CONTROL CIRCUITS

With fixed controls, the following free play on the control surface should not be exceeded:

Aileron:	± 3mm (0,118 in), measured 136mm (5,354 in) behind control hinge line,
Elevator:	± 2mm (0,079 in), measured 138mm (5,433 in) behind control hinge line,
Rudder:	± 5mm (0,197 in), measured 270mm (10,630 in) behind control hinge line,
Flaps:	± 3mm (0,118 in), measured 141mm (5,551 in) behind hinge line,
Airbrakes:	± 2mm (0,079 in), measured 120mm (4,724 in) above surface hinge line, with full employed airbrakes.

6.4 FREE PLAY IN WING AND TAILPLANE ATTACHMENTS

Tangential play of ± 20 mm (0,787 in) at the wingtip is permissable. If this play is larger, washers of 0.2 to 0.3mm (0,00787 to 0,01181 in) thickness should be packed under the wing attachment bolts until the main spar rigging pin is firm. To add the washers under the wing pins, the pins are removed and tightened with washers in place.
Take note not to damage the pins.

Main wing spar pin and bushes may have a maximum play of 0.06mm (0,002363 in).

For the horizontal tailplane, a tangential play of ± 1.5mm (0,0591 in) and a play of ± 4mm (0,1575 in) around the longitudinal axis, both measured at the tailplane tip, is the maximum permissable.

The play at the forward stabilizer attachment point should not exceed 0.06mm (0,002362 in).

6.5 DAMAGE

Before take-off, and in particular after lengthy storage, an inspection should be carried out.
Check for small changes, such as holes, blisters or uneveness in the surface. This may be a signal that something is wrong.

It is best to consult an experienced person in FRP if stressed parts are in question.

Better still, to make available photographs of the damage to a specialized representative of the manufacturer, who will advise the correct procedure, therefore saving unnecessary repair attempts.

FRP parts are neither expensive nor difficult to repair, but a different technology, compared to sailplanes of other materials, is used.
One must know the procedure for the repairs.

Scratches and small cracks in the surface can be repaired by the owner.
Small repair kits with all necessary materials for minor repairs are available from Glasflügel.
After studying the "Plastic Plane Patch Primer" Repair Manual, these small repairs should present no great problems.

Major repairs must only be carried out by the manufacturer.

6.6 REMOVAL and RE-INSTALLATION of RELEASES

To remove the C.G. release, the hinge and adjusting cable (Port side) of the backrest has to be removed. Then remove the seat tray and wheel-box cover.
The release is now visible, and the bolted joint between release and the black link should be undone. After removal of the 8 bolts from the release bracket, which attaches the release to the fuselage and wheel-box, the release and the attachment brackets can now be pulled up.

Now remove the two bolts which hold together the release and release attachment brackets.

The re-installation is in opposite sequence, whereby attention should be paid that the correct bolts and pins are used, and that the earth cable is attached.

To dismantle the aerotow release, the instrument panel and rudder foot control is removed. For the latter, the bolt at the rear end of the lower guide tube is removed and the foot control is pulled back. Thereafter, the bolts of the diaphragm are removed. The diaphragm which is sealed off with a sealant is then carefully pulled away with a hook.

The pitot tube is pushed downward at the diaphragm bulkhead and pulled out.
After the release cable is detached only the 4 attachment bolts have to be removed and the release can be pulled back together with it's attachment brackets.

Release and attachment brackets are joined with two bolts.

When re-installing the release pay attention to the correct assembly of the pulley and attachment brackets. The recesses on the release for the rings should correspond with the recesses on the release brackets. Also take note of the different length bolts and the attachment of the earth cable.

6.7 CONTROL SURFACE MOMENT

After repairs or new paint work, the following control surface moments $M = P \times r$ should not be exceeded.

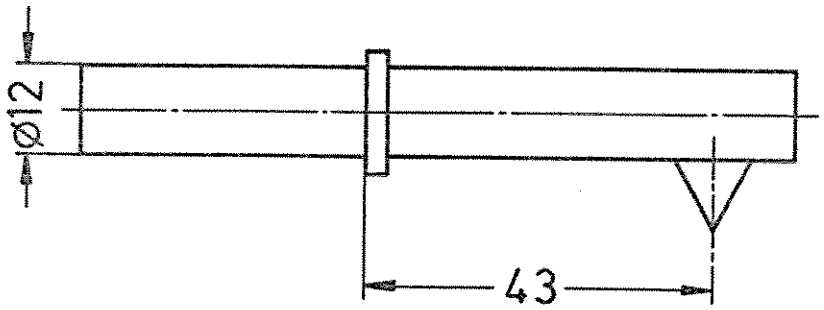
Aileron: 0.0765 kgm $\pm$ 12 %
Elevator: 0.0516 kgm
Rudder: 0.0550 kgm
Aileron mass 2,9 kg $\pm$ 12 %

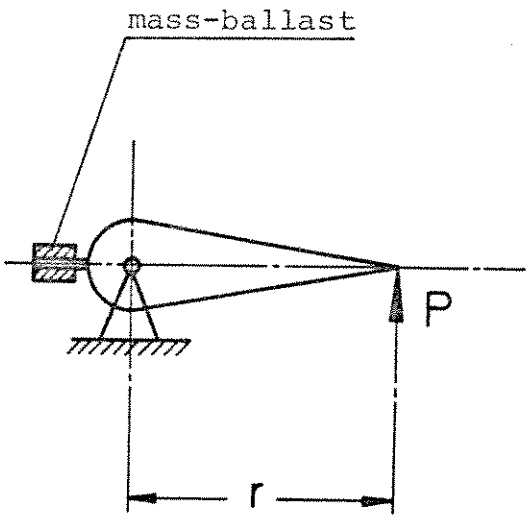
For installation of mass balance weight next page.

Should these values be exceeded, a mass ballast is to be attached to the control surfaces in front of the hinge line. This ballast should be distributed evenly over the whole length in the case of the elevator, and only in areas where ballast is attached already as in the case of the aileron and rudder. After installing additional lead strips, check that the control surface movement has not been restricted.

To measure the control surface moments, all control surfaces have to be removed. The two elevator halves are to be assembled with the U-shaped drive fitting, so that the moment for both the elevator halves including the drive fitting, is measured.

To measure the moment on the rudder, a jig is required which is fitted into the lower bore of the rudder against it's stop. The rudder is then bearing on it's upper hinge pin and on the wedge of the jig.



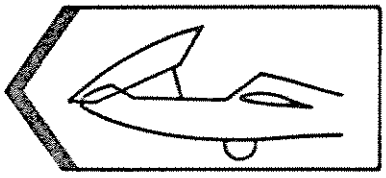


establishing the
control surface moment

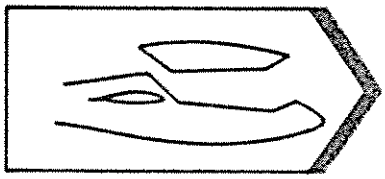
M = P x r

Control surface balancing
on hinge line
P is measured with the
aid of a postal scale.

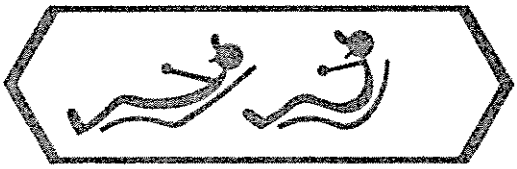
6.8 SYMBOLS



Canopy lock

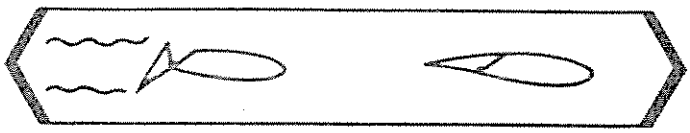


Canopy-jettison

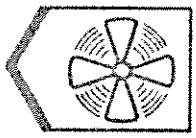


Back-rest adjustment

STORAGE COMPARTMENT
MAX. LOAD 10 KG
VARIABLE LOAD 5 KG

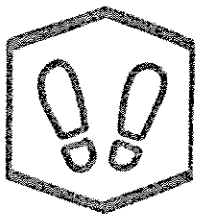


Airbrakes

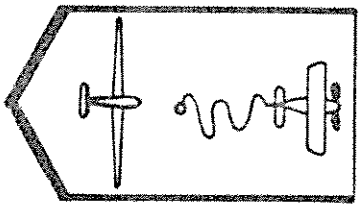


Ventilation

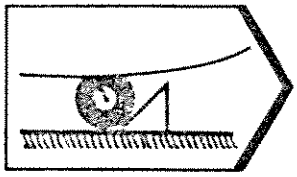
Flap-Setting



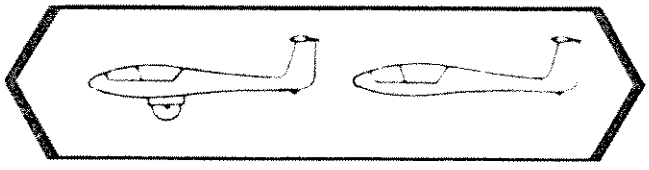
Rudder pedal adjustment



Tow-release



Wheel-Brake



Undercarriage

6.9 MAINTENANCE OF THE SURFACE FINISH

Wash the surface only with clean water, sponge and chamois.
Never use petrol, alcohol or thinners.
Soap additives in water should not be used too often.
Polish as often as you wish, but take care not to heat up the surface when using a polishing machine, as otherwise the surface quality will suffer.
Exposure to moisture should be avoided, as with all other sailplanes.
Protect from intensive sun-radiation (heat), and unnecessary continuous load.
Please note that the surface of all parts which are exposed to sun-radiation must be coloured white.
Colours other than white will increase the heat build-up in the FRP, so that insufficient strength will result.

6.10 SAFETY HARNESS

For the "MOSQUITO" a 4-piece harness is required.
The following types are approved.

LAP STRAPS: Maker:	GADRINGER Bagu IV - D or Bagu IV - E/2
Attachment points:	On FRP loops through seat tray
Maker:	AUTOFLUG Bagu FAG-75-O
Attachment points:	On FRP loops through seat tray
SHOULDER STRAPS:	
Maker:	GADRINGER Schugu II-C
Attachment points:	On forward wing attachment tube each between fuselage shell and wheel-box loop.

Maker: AUTOFLUG Schugu FAG-74-O

Attachment points: For right shoulder strap, on forward wing attachment tube between fuselage shell and loop on wheel box.

For left shoulder strap, on forward wing attachment tube between the two loops on the wheel box.

7

C.G. DETERMINATION

7. C.G. DETERMINATION

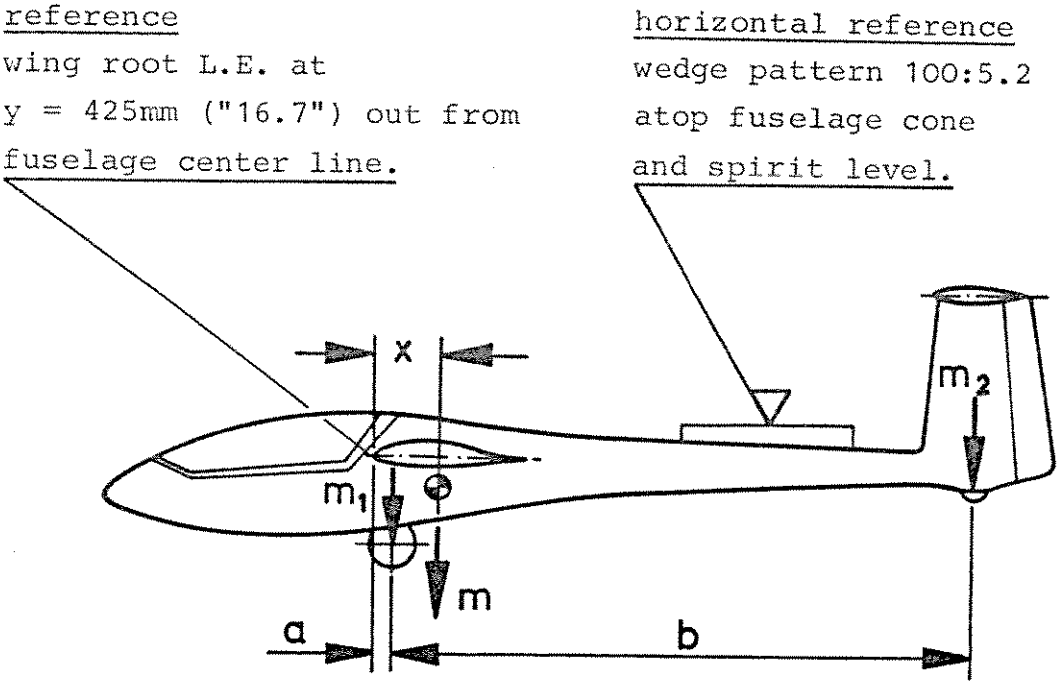
To establish the C.G., the sailplane is rigged with closed canopy. The tailwheel is placed on a scale in such a way that the rear fuselage cone is angled 29° down towards the rear (wedge pattern 100:5.2 atop rear fuselage cone, and spirit level).
The tail weight is now established at m_2 with the wings horizontal. The distance a and b are now measured with the help of plumbs, or are referred to in the last weight record.
The empty weight of the sailplane is established through weighing.

C.G. empty: $$X_{empty} = \frac{m_{2\ empty} \times b}{m_{empty}} + a$$

The aircraft is unoccupied without parachute but with the total fixed equipment included.

C.G. in flight: $$X_{flight} = \frac{m_{2\ flight} \times b}{m_{empty} + m_{loading}} + a$$

The aircraft is weighed with loading (pilot, parachute and total removeable equipment i.e. barograph, cushion, camera etc.).
Take note to correctly adjust pedals and backrest.



The C.G. of the empty sailplane with normal loading between 70 and 110kg (154-243lbs) should fall into the shaded area of the following diagram.

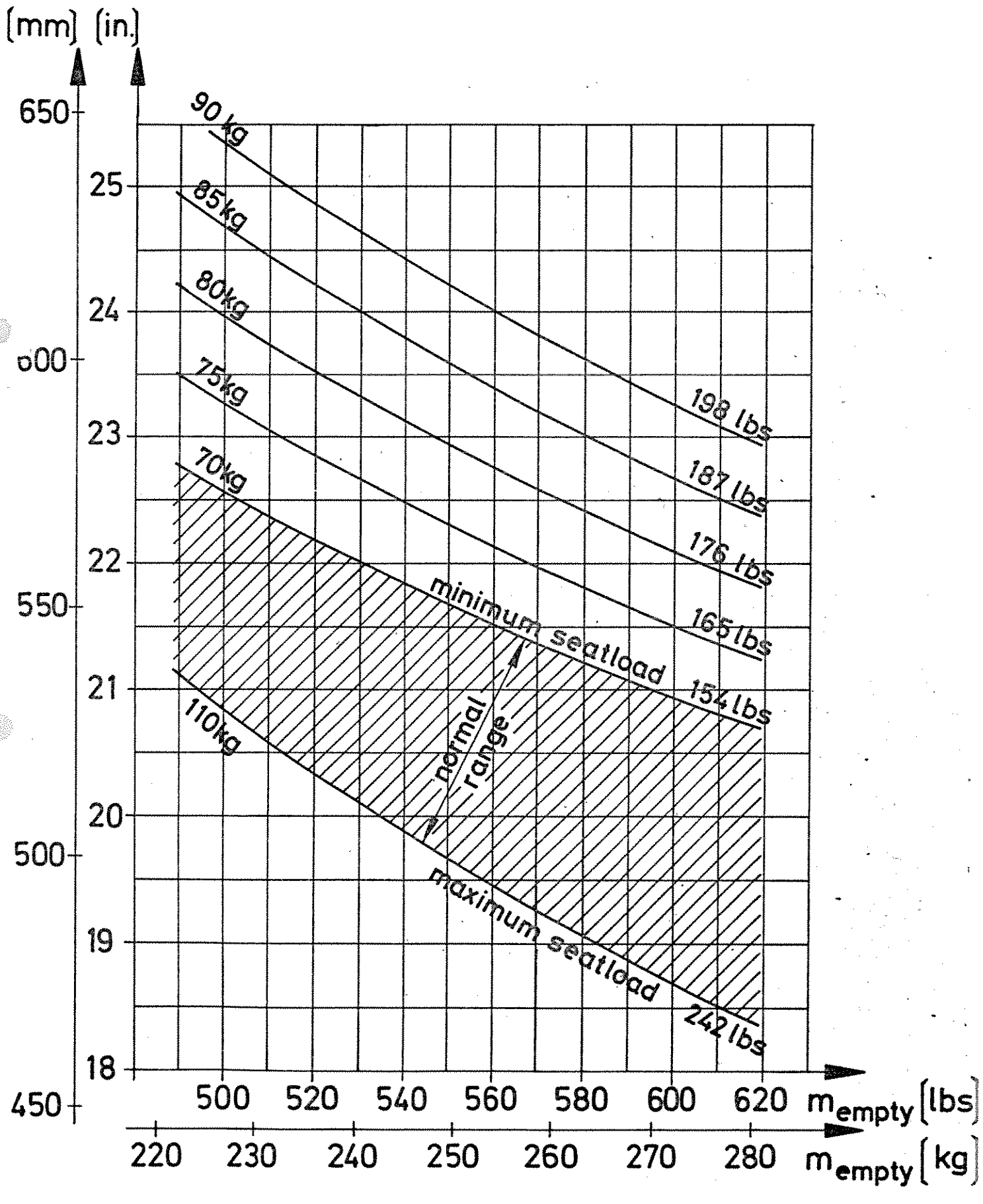
Should the sailplane, in particular cases, be trimmed so that the C.G. falls above or below the shaded area, and the maximum loading is lower than 110kg or the minimum loading is higher than the 70kg*, these loadings should be placarded in the cockpit. (i, e, minimum loading on seat 80kg). This modification should be certified into the operating documents by an approved inspector.

The establishment of the empty C.G. is necessary after installation of additional equipment, after repairs, new surface finishing or other modifications which may change the weight of the sailplane. Weights and C.G. should be entered into operating documents by an approved inspector with reference to the equipment list.

For high performance and competition flying, it is recommended to establish the flight C.G. for the individual pilots, as performance of the sailplane deteriorates outside the optimum C.G. range.
The optimum C.G. range is between 280 - 325mm behind reference point. 11.024 - 12.795 inches.

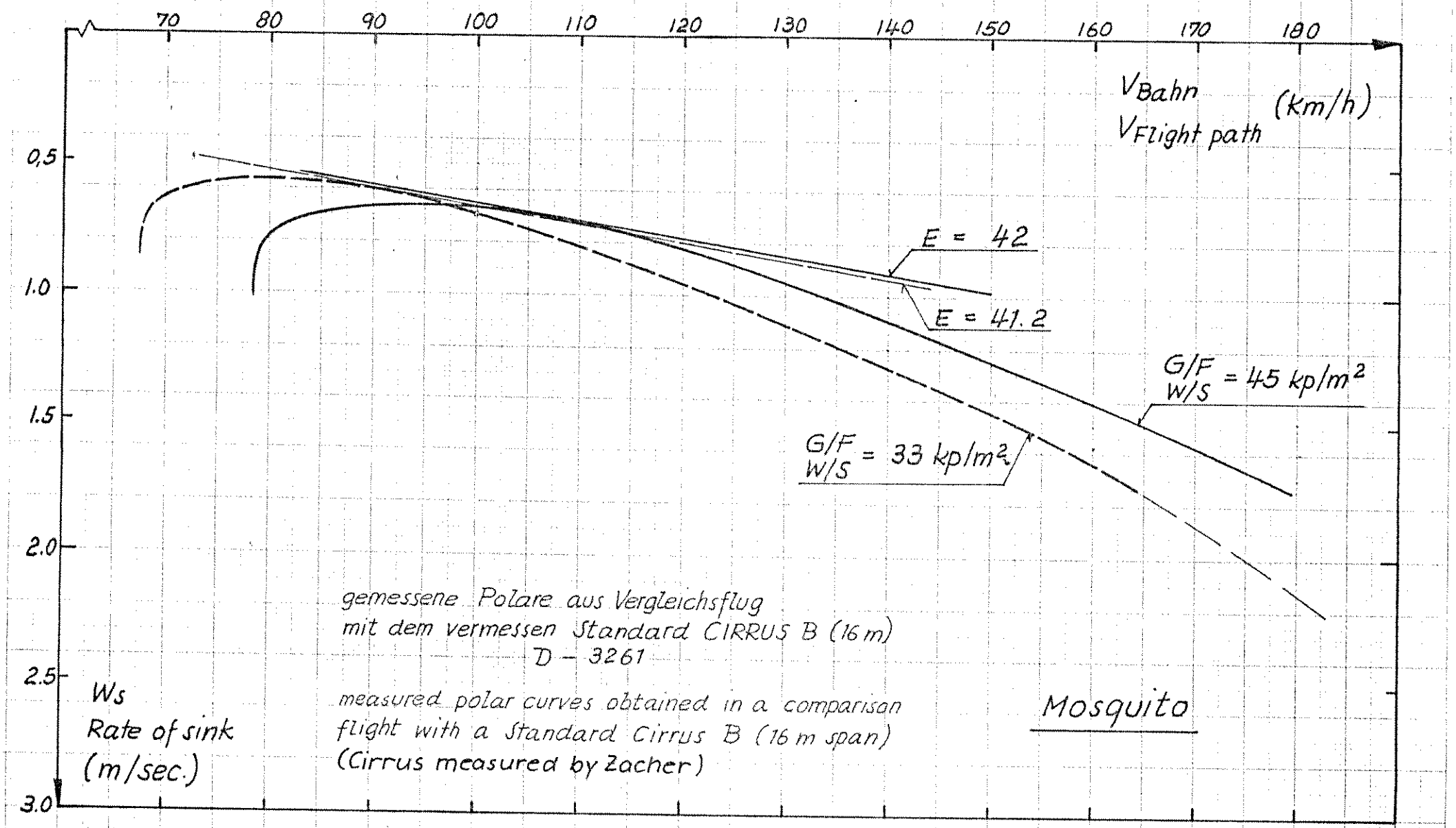
*(depending on the empty weight).

Trim plan "Mosquito B"



8

ANNEX


70
80
90
100
110
120
130
140
150
160
170
180
V_{Bahn} (km/h)
$V_{Flight\ path}$
0,5
1.0
1.5
2.0
2.5
3.0
E = 42
E = 41.2
G/F W/S = 45 kp/m²
G/F W/S = 33 kp/m²
gemessene Polare aus Vergleichsflug
mit dem vermessen Standard CIRRUS B (16 m)
D – 3261
measured polar curves obtained in a comparison
flight with a Standard Cirrus B (16 m span)
(Cirrus measured by Zacher)
Ws
Rate of sink
(m/sec.)
Mosquito

REPAIR INSTRUCTIONS FOR THE SAILPLANE

CONTENT

Available on request from :

Hansjörg Streiteneder
Glasfaser-Flugzeug-Service GmbH
LTB II-A 95 u. I-C 12

Hofener Weg, Tel. 07382-1032
72582 Grabenstetten

GLASFLÜGEL
Deutsch-Brasilianische Flugzeug- und Fahrzeugbau GmbH

GLASFLÜGEL
German-Brasilian Aircraft- and Vehicleproduction Ltd.

7318 Lenningen/Württ. 1
Telefon 07026/855

GLASFLÜGEL
Industria Teuto-Brasileira de Aviões e Veiculos Ltda.

Telex 7267785 GAFU-D

INSPECTION PROCEDURES FOR THE EXTENSION OF THE SERVICE LIFE

1. General

The results of cyclic loading tests subsequently carried out on wing spars justify the extension of the service life of FRP sailplanes and motor gliders to 6000 hours, provided that the airworthiness of each individual aircraft is evidenced once more by a special multi-stage inspection program under the aspects of the service life which exceeds the normal annual inspection.

2. Terms

When the sailplane has reached a service life of 3000 hours, an inspection is to be carried out following the inspection schedule as mentioned in section 4.

If the results of this inspection are positive or after proper repair of defects observed, the service life of the sailplane is extended by 1000 hours to a total of 4000 hours (first stage).

Once 4000 hours are reached, the inspection in accordance with the aforementioned schedule is to be repeated. If the results are positive or after proper repair of defects observed the service life may be extended to 5000 hours (second stage).

When the sailplane has reached a service life of 5000 hours it has to be re-inspected again in compliance with the prescribed schedule. If the results are positive or when defects observed are removed, the service life may be extended to 6000 hours (third stage).

29. Nov. 1988

For a service life exceeding 6000 hours further regulations will be published in due time.

3. The relevant inspections are to be carried out by the service station in charge of Glasflügel sailplanes or by a certified repair station.

4. For the case that an inspection is not carried out by the service station in charge, a current inspection schedule is to be requested from the repair station in charge of Glasflügel sailplanes

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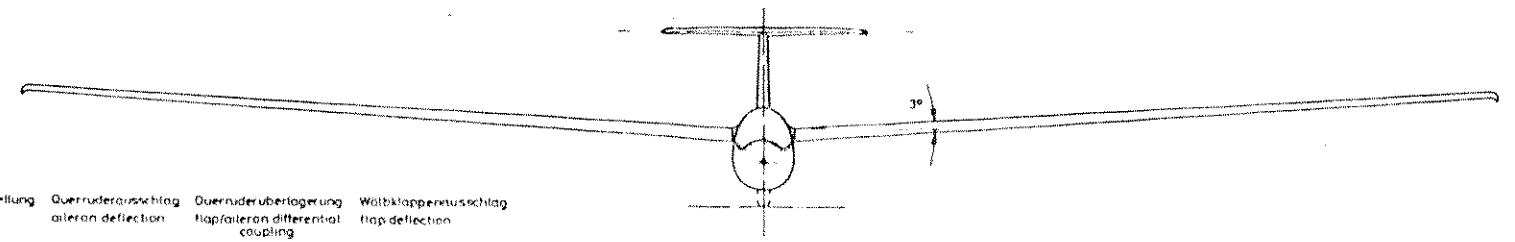
   for each individual inspection.
   The inspection is to be carried out not any later than three months after the inspection schedule was issued.

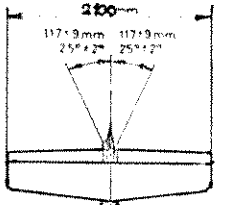
5. The results of the inspection are to be entered into the inspection schedule step by step.
   For the case that the inspection is not carried out by the repair station in charge, a copy of the completed inspection schedule must be supplied to the repair station in charge of Glasflügel sailplanes for evaluation.

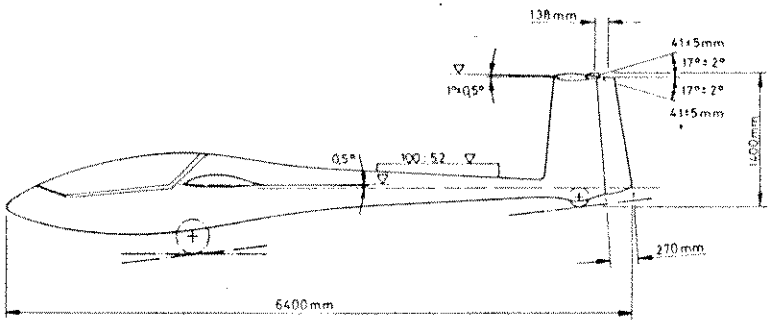
6. Obligatory periodic inspections (like the F.R.G. annual inspection according to § 27 (1) of the LuftGerPO) are not affected by this regulation.



Wölbklappenstellung flap setting	Querruderausschlag aileron deflection	Querruderüberlagerung flap/aileron differential coupling	Wölbklappenausschlag flap deflection
-2	81 mm 23° ± 2° 7° ± 1,5° 0° 10° ± 1,5° nach oben up 33 ± 3 mm nach unten down 14 ± 2 mm	10 ± 2 mm	8° ± 1° 28 ± 3,5 mm
0	23° ± 2° 10° ± 1,5° nach oben up 33 ± 3 mm nach unten down 14 ± 2 mm		220 mm
+2	23° ± 2° 0° 10° ± 1,5° 10,5° ± 2° nach oben up 33 ± 3 mm nach unten down 15 ± 3 mm	14 ± 2 mm	12° ± 1° 42 ± 3,5 mm

Bremsklappenausschlag – dive brake deflection





INSPECTION PROCEDURES FOR THE EXTENSION OF THE SERVICE LIFE

1. General

The results of cyclic loading tests subsequently carried out on wing spars justify the extension of the service life of FRP sailplanes and motor gliders to 12000 hours, provided that the airworthiness of each individual aircraft is evidenced once more by a special multi-stage inspection program under the aspects of the service life which exceeds the normal annual inspection.

2. Terms

When the sailplane has reached a service life of 6000 hours, an inspection is to be carried out following the inspection schedule as mentioned in section 4.

If the results of this inspection ar positive or after proper repair of defects observed, the service life of the sailplane is extended by 1000 hours to a total of 7000 hours (fourth stage).

Once 7000 hours are reached, the inspection in accordance with the aforementioned schedule is to be repeated. If the results are positiv or after proper repair of defects observed the service life may be extended to 8000 hours (fifth stage).

This procedure is repeated until the sailplane reaches a service life of 12000 hours. For a service exceeding 12000 hours further regulations will be published in due time.

3. The relevant inspections are to be carried out by the service station in charge of Glasflügel sailplanes or by a certified repair station.

4. For the case that an inspection is not carried out by the service station in charge, a current inspection schedule is to be requested from the repair station in charge of Glasflügel sailplanes

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for each individuel inspection.
The inspection is to be carried out not any later than three month after the inspection schedule was issued.

5. The results of the inspection are to be entered into the inspection schedule step by step.
For the case that the inspection is not carried out by the repair station in charge, a copy of the completed inspection schedule must be supplied to the repair station in charge of Glasflügel sailplanes for evaluation.

6. Obligatory periodic inspections (like the F.R.G. annual inspection according to **§ 15 (1)** of the **LuftGerPV** are not afffected by this regulation.