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M A I N T E N A N C E M A N U A L

for the sailplane model

VENTUS B/16.6

Edition: April 1983

This manual relates to the sailplane model

Ventus b/16.6

Registration No.:

Serial No. :

Manufacturer :

Owner :

This English edition of the
Ventus b/16.6 Maintenance Manual
has been translated with care,
and is accurate to the best of
our knowledge.

However, in all official matters
the original German text is the
authoritative and definite
document.

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Appendix: Polar Diagram
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Amendment List
(log of revisions)

No.	Reference / short title	Page	Date
1.	<u>Technical Note No. 349-7</u> Increase of the max. permitted all-up weight, increase of the max. weight of the non-lifting parts (optional)	11, 19	June 1983
2.	<u>Technical Note No. 349-8</u> Optional installation of a tail wheel (instead of standard skid)	15, 23	October 1986
3.	<u>Technical Note No. 349-14</u> Optional tilt up instrument panel	10A, 19A	Sept. 1987
4.	<u>Technical Note No. 349-12</u> Revisions for Italian Type Approval	12, 33A, 34A	Febr. 1988
5.	<u>Technical Note No. 349-15</u> Nose and c/g tow release mechanism	11, 19	April 1991
6.	<u>Technical Note No. 349-24</u> Inspection program for extending the service time to 12000 hours	30, 30A	October 1998
7.	Supplement of the equipment and instruments	25, 26, 27, 27A, 27B	December 2006

1. Storage, Transport and Rigging

1.1 Storage, Hangaring and Towing

The sailplane should always be hangared or kept in well ventilated conditions. If it is kept in closed weatherproof trailers there must be adequate ventilation. The water ballast tanks must always be left completely empty. The sailplane must not be subjected to loads when not in use, especially in the case of high ambient temperatures.

As the wings have a thin airfoil section it is important that they are well supported: Leading edge down, with support at the spar roots and approx. 2.5 m (8.2 ft) from the wing tip in wing cradles of correct airfoil section.

The fuselage can rest on a broad cradle just forward of the C.G. hook and on its tailskid.

The tailplane should be kept leading edge down in two wing boxes of correct airfoil section, about 1.7 m (5.6 ft) apart. On no account should the tailplane be supported by its fittings in the trailer.

In the case of sailplanes which remain rigged permanently it is important to ensure that the maintenance program includes rust prevention for the fittings of the fuselage, wings and tailplane.

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Dust covers should be regarded as essential for a high-performance-sailplane.

When pulling the Ventus b/16.6 behind a car, a tail dolly should always be used to avoid unnecessary tailplane vibrations on the fittings.

If the sailplane is being pushed it should not be pushed at the wing tips but as near to the fuselage as possible.

1.2 Rigging

The Ventus b/16.6 can be rigged by two persons if a trestle or support is used under one wing tip.

All wing and tailplane rigging fittings should be cleaned and greased.

Wings

Set the flap control at "S" and the water ballast jettison knob in the forward (closed) position.

Pull back the airbrake lever in the cockpit about 40 mm (1.6 in.) until a hole becomes visible and insert in it the pin for pulling out the water tank filler caps. This makes the connection of the airbrakes easier as it prevents the airbrake lever from returning to the locked position.

Insert the left wing with the flap raised to the high speed position "S". It is important that the wing tip holder should concentrate on lifting the trailing edge, so that the wing rear attachment pin does not force the fuselage socket down causing the flap itself to come into contact with the torsion tube drive in the fuselage.

Check that the spar stub is located correctly on the far side of the fuselage and tilt the fuselage or move the wing gently up or down to help it home if necessary.

Check that the flap control has located correctly on the torsion bar drive and that the angular levers at the root rib are properly inserted in the funnels on the fuselage.

Push in the main bolt approx. 30 mm (1.2 in.) so that the wing is prevented from sliding out by the FRP cover over the forward wing mounting tube.

The wing can now be placed on the support.

Insert the right wing with the flap in raised position. The procedure is the same as for the left wing.

If it is difficult to push in the wing for the last 10 or 20 mm (0.4 - 0.8 in.), remove the main bolt again and draw the wings together with the rigging lever.

Finally, push the main bolt fully home and secure it by its handle with the cowling safety pin on the fuselage side.

16.6 m Wing tip extensions

Insert tubular spar of the wing tip extension into the outboard root rib with the locking pin pushed down. With the aileron up push wing tip extension fully home taking care that the coupling lap of the outermost aileron correctly slides over the outboard aileron. Check that the locking pin at the spar has snapped up. In case that the locking pin is not flush with the upper wing surface, it has to be pushed up from the lower side with the tailplane assembly tool (see reference placard).

15 m Wing tips

When flying with 15 m wing span, small wing tips with a tubular spar are inserted into the outboard root rib instead of the 80 cm (2.6 ft) tip extensions.

Horizontal tailplane

Take the round-headed rigging tool from the cockpit pocket and screw it into the front tailplane locating pin on the leading edge of the fin.

Feed the tailplane onto the two elevator actuating pins. Then pull the round-headed rigging tool and its pin forward, seat the tailplane and push the pin fully home into the front tailplane fitting. Remove the rigging tool. The pin must not protrude in front of the leading edge of the fin. Check whether the elevator operating pins are really located by moving the elevator.

After rigging

With the aid of a helper check the controls for full and free movement in the correct sense.

Use tape to seal off the wing/fuselage joint, the opening for the front tailplane attachment pin, the joint between fin and tailplane and the gap between the wing and the wing tip extension (or the wing tip). Sealing with tape is beneficial in terms of performance and it also serves to reduce the noise level.

Caution!

Do not seal the gap between the outboard aileron and the aileron of the wing tip extension.

1.3 De-rigging

Remove sealing tapes before de-rigging.

Tailplane

Withdraw front pin with rigging tool, lift the leading edge of the tailplane slightly, slide tailplane forwards and off.

Wing tip extensions

Push the locking pin down using the 8 mm mounting pin and pull off the wing tip extension.

If required for trailering, mount wing tips.

Wings

Unlock the airbrakes, set the water ballast valve control to the closed position. Remove the safety pin from the handle of the main bolt.

With a helper on each wing tip, pull out the main bolt and withdraw the right wing, gently rocking it backwards and forwards if necessary.

The wing may be held at the trailing edge by the flap.

Then remove the left wing.

2. Maintenance

2.1 Prescribed maintenance checks

Rudder cables

Every 200 flying hours and at every annual inspection the rudder cables are to be inspected at the point where they feed through the S-shaped guides in the pedals, particularly at the point of maximum pedal adjustment. If they are damaged, worn or corroded, they must be replaced. It is permissible for individual strands of the cables to be worn up to 25%.

The specification for new cables is B 3.2 mm LN 9374 (zinc plated C-steel). Control cable connections should be made with galvanized thimbles A3.5 DIN 6899 and Nicopress oval sleeves number 18-3-M or number 28-3-M.

The tool to be used for this job is number 51-M-850.

Making cable connections and checking them should be in accordance with the manufacturer's recommendations.

Control cables

When replacing control cables the following cables should be used:

Control cable B 3.2 mm LN 9374

(equals MIL-W-1511 A (4) and takes into account AICMA recommendation No. 3310-1962 and ISO draft recommendation 2020-1971)

for the towing hook(s)

Control cable A 1.6 mm LN 9389

(equals MIL-W-5424 B and takes into account AICMA recommendation No. 3310-1962 and ISO draft recommendation 2020-1971)

for wheel brake, pedal adjustment

Cable connections should be made in accordance with the manual

"Aircraft Inspection and Repair
FAA AC 43.13-1A"

April 1983

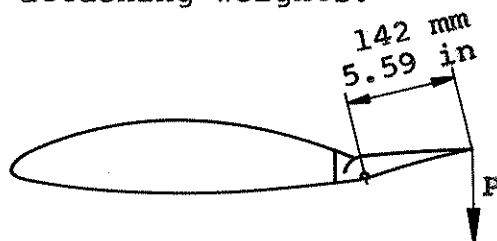
Gas struts

After removing the fiberglass panel from the top of the fuselage steel frame front tube the gas struts are accessible behind the wing forward location tube.

The piston rods must be perfectly clean and must not be damaged in any way whatsoever. If oil has escaped through the seal, the gas strut must be replaced.

With the sailplane rigged, the effectiveness of the gas strut is to be checked at negative flap setting.

The flaps should withstand a moment of 17 to 21 Nm (i.e. 1.7 to 2.1 mdaN) before the flap moves in a downward direction. This moment is applied by pulling downwards on the trailing edge of the flap at the wing root with a spring balance or by attaching weights.



The force or the weight should be between the values

$$P = 12 \text{ daN to } 15 \text{ daN} \\ (26.5 - 33.0 \text{ lb})$$

Instruments

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

Addresses for reference

Schempp-Hirth Flugzeugbau GmbH
Krebenstrasse 25, 7312 Kirchheim/Teck
(Thimbles, sleeves, cables, gas struts, main wheel)

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

Tost GmbH. Flugzeuggerätebau
Thalkirchner Str. 62, 8000 München 2
(Tow releases)

Tow release mechanism

Models eligible for installation are shown in the Flight Manual - see section 2.8 "Tow releases".

Installation and inspection of the relevant release to comply with the following operating instructions:

- Operating and Maintenance Instructions for the special c/g tow release mechanism model "S 72" and "SH 72", Issue of November 1977, LBA-approved
- Operating Manual for the special c/g tow release mechanism model "S 72" and "SH 72", Issue of July 1989, LBA-approved (for overhauled units only)
- Operating Manual for the safety tow release mechanism model "Europa G 88", Issue of February 1989, LBA-approved

If installed:

- Operating and Maintenance Instructions for the nose tow release mechanism model "E 72" and "E 75", Issue of May 1975, LBA-approved
- Operating Manual for the nose tow release mechanism model "E 72" and "E 75", Issue of March 1989, LBA-approved (for overhauled units only)
- Operating Manual for the nose tow release mechanism model "E 85", Issue of March 1989, LBA-approved.

Instruments

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

Addresses for reference

Schempp-Hirth Flugzeugbau GmbH
Krebenstrasse 25, 7312 Kirchheim/Teck
(Thimbles, sleeves, cables, gas struts, main wheel)

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Thalkirchner Str. 62, 8000 München 2
(Tow releases)

Tow release mechanism

Models eligible for installation are shown in the Flight Manual - see section 2.8 "Tow releases".

Installation and inspection of the relevant release to comply with the following operating instructions:

- Operating and Maintenance Instructions for the safety tow release mechanism model "Europa G 72" and "Europa G 73", Issue of May 1975, LBA-approved
- Operating Manual for the safety tow release mechanism model "Europa G 72" and "Europa G 73", Issue of January 1989, LBA-approved (for overhauled units only)
- Operating Manual for the safety tow release mechanism model "Europa G 88", Issue of February 1989, LBA-approved

If installed:

- Operating and Maintenance Instructions for the nose tow release mechanism model "E 72" and "E 75", Issue of May 1975, LBA-approved
- Operating Manual for the nose tow release mechanism model "E 72" and "E 75", Issue of March 1989, LBA-approved (for overhauled units only)
- Operating Manual for the nose tow release mechanism model "E 85", Issue of March 1989, LBA-approved.

2.2 Regular maintenance

The following maintenance is to be included before or during the annual survey inspection. Access to the control circuits (see drawings page 32 to 34) is as follows:

- o Control circuits in the wing

Aileron control (internal): Through inspection hatches on the underside of the wing.
Airbrakes: Accessible when airbrakes open.
Flaps: Accessible at root rib.

- o Control circuits in the fuselage

Control circuits in the fuselage are accessible after removing the seat pan, seat back and the rear access panel.

- o Elevator control circuit

Accessible after removing the tailplane.

- o Rudder control circuit

Accessible at the actuating rib.

After cleaning the whole sailplane the following checks should be made:

- o Check the whole sailplane externally for damage such as cracks, holes, scratches, buckling and delamination. If the outer layer of a component constructed as a sandwich has been damaged, then the inner surface must be checked as well.
We recommend that you call upon expert assistance.
- o Check all accessible metal parts for damage. It is generally found, however, that if the sailplane is operated correctly, no damage will have occurred.

If repairs are necessary then the manufacturer's recommendations should be followed.

- o In case of suspicion or proof of leaking water tanks the manufacturer should be contacted.
- o Check the effective valve lift of the water dump valves. The difference of the valve lift between the left and the right wing should not be more than 10 mm (0.4 in).
- o Check all accessible metal parts such as fittings, push rods and levers for corrosion. If necessary, remove the rust, clean thoroughly and apply fresh corrosion protection. The special primer and paint for this surface protection are available from Schempp-Hirth Flugzeugbau GmbH.
- o Recommended lubrication:

The sailplane may be lubricated with normal (acid-free) grease and oil.

Fuselage (see page 33-34)

Lubricate all accessible control circuits.

It is recommended that the guide tubes for the rudder pedal adjustment and the cables in the area of the S-shaped guides on the pedals are treated with Vaseline to ensure a smooth pedal adjustment. Lubricate the trimmer springs in the elevator circuit and the canopy opening and jettison mechanism.

Fin and tailplane

Lubricate rudder- and elevator hinges.

Wings (see page 32)

Lubricate all accessible points in the airbrake-, flap- and aileron circuits and also their hinges.

- o Hinges with excessive radial play must be replaced. Play in the control circuits should be checked in accordance with section 2.4.
- o All fittings which are mounted on carbon or glass fiber must be checked to confirm there has been no movement. Check also the carbon or glass fiber at the fittings for cracks or delaminations.

o Undercarriage

Whenever the effectiveness of the main wheel brake is reduced, clean the brake drum, check the brake linings and replace if necessary; check and if necessary adjust the Bowden cable or the brake lever, also check the side play in the wheel hub. Follow the recommendations of the hub manufacturers, Messrs. Tost.

Check that the axle runs true, that no struts are bent and that their mountings on the steel tube frame are not damaged. Check the tire pressure on the main wheel:

Up to an A.U.W. of 330 kg	: 3.5 bar
(727 lb)	: 50 psi
Above an A.U.W. of 330 kg	: 4.5 bar
(727 lb)	: 64 psi

When removing the main wheel to clean and grease it, it is necessary to undo the Bowden cable connection and detach the mudguard from the wheel hub, both of these being on the left side.

On the right side the axle is withdrawn after first removing the FRP cover and unscrewing the castellated nut.

Be careful not to lose any washers or bushes. Clean all components. Grease bearings, bushes and axle.

- o Check all instrumentation plumbing and pipe connectors for blockages and leakages. Check that the glass in the instruments is not loose.
- o The harness straps should be checked regularly for damage or stains. The metal harness fittings should be checked regularly for corrosion.
- o With the sailplane rigged, check the deflection of control surfaces with the aid of a helper and also check the action of control circuits and the release hook(s).

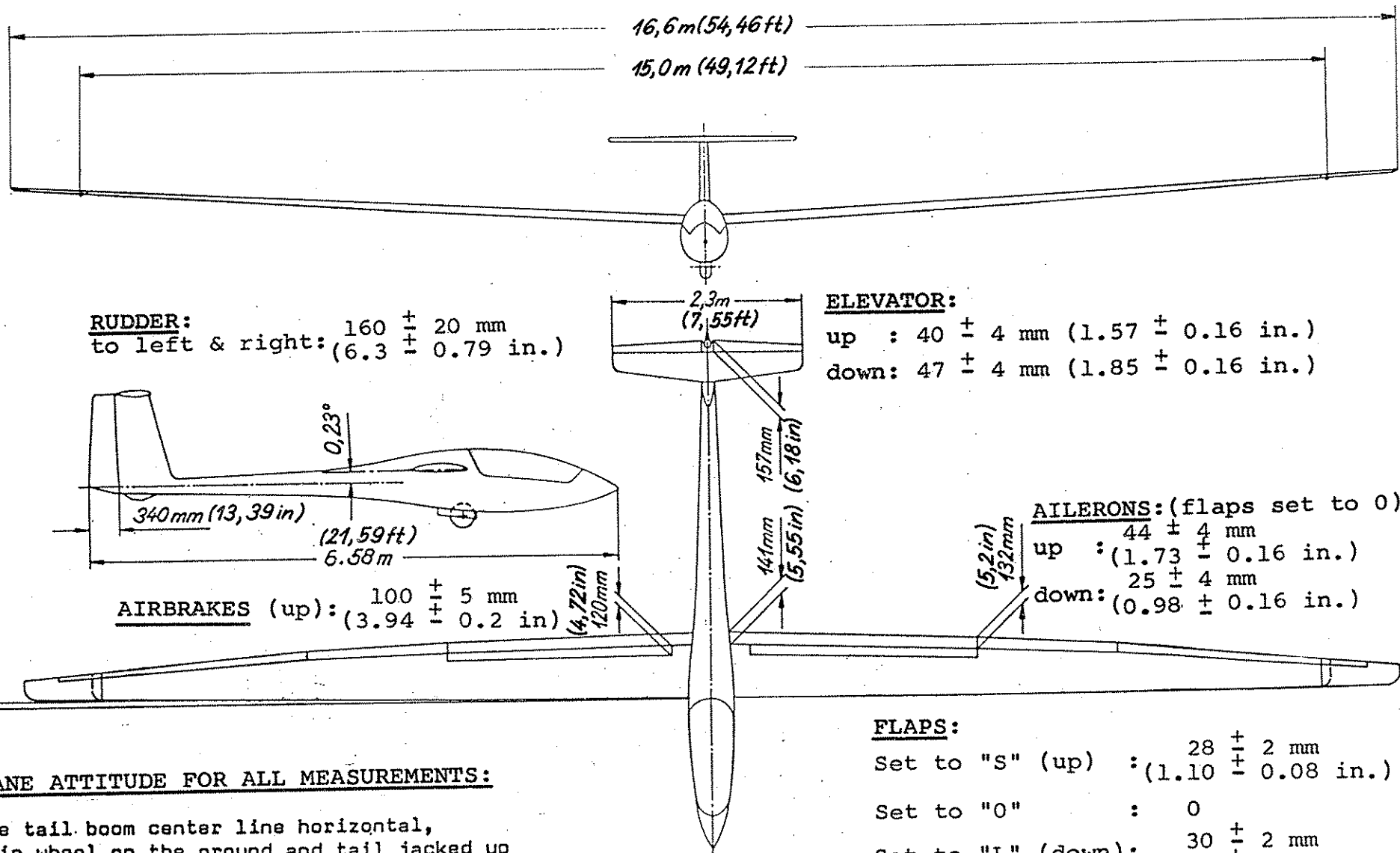
There must be a clearance of at least 2 mm (0.08 in.) between the flaps and the fuselage and between the flaps and the ailerons.

Check wing fittings and control circuit connections for excessive play (see section 2.4 and 2.5).

2.3 Adjustment data

Adjustment data and control surface deflections are shown on the drawing on page 15A.

After repairs it must be ensured that these data are within the permitted tolerances.



SAILPLANE ATTITUDE FOR ALL MEASUREMENTS:

Fuselage tail boom center line horizontal, i.e. main wheel on the ground and tail jacked up such that a wedge-shaped block, 100 : 4.4, placed on the rear top fuselage, is horizontal along its upper edge.

Ventur

TECHNICAL NOTE NO. 349 - 8

6 / 16.6

October 1986

2.4 Play in the control circuits

With the cockpit controls fixed the play at the control surfaces must not exceed the following values:

Ailerons: \pm 3 mm (0.12 in.) measured 132 mm
(5.20 in.) behind hinge

Flaps : \pm 3 mm (0.12 in.) measured 142 mm
(5.59 in.) behind hinge

Elevator: \pm 3 mm (0.12 in.) measured 157 mm
(6.18 in.) behind hinge

If there is excessive play in the hinge bearings and linkages they must be replaced or the manufacturers should be contacted regarding possible measures to reduce the play.

The rudder circuit is an open circuit, operated directly by cables and is therefore not subject to play.

2.5 Play in the wing attachment fittings

Tangential play (fore & aft movement) can occur through wear in the shims on the wing locating pins.

If the wing tips are free to move more than 30 mm (1.18 in.), further shims of thickness 0.3 mm (0.012 in.) to 0.5 mm (0.02 in.) with an internal diameter of

13.95 mm (0.55 in.) for inboard wings and

9.95 mm (0.39 in.) for wing tip extensions

should be added progressively up to the point where the wings rig well, but the play has been eliminated.

2.6 Damage

Before every take-off and especially after the sailplane has not been used for a while it should be inspected for damage (see Flight Manual, pages 30 to 33).

Check for any sign of a change in the condition of the sailplane, such as cracks in the surface, holes, delamination in the carbon or glass fibers etc.

If there is any uncertainty whatsoever regarding the significance of damage discovered, the sailplane should always be inspected by a qualified Inspector who is a FRP/CRP expert.

There is no objection to minor damage which does not affect airworthiness in any way being repaired on site.

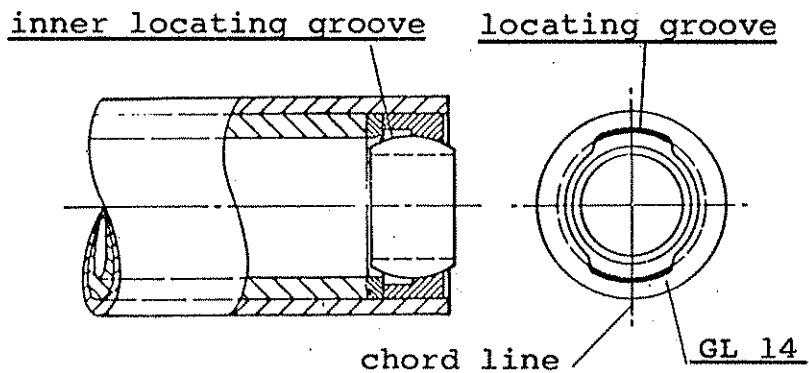
Instructions for repair are included in the appendix.

2.7 Replacing the wing locating bushes

The wings locate in four swivel bearings in the fuselage which should be checked for damage after heavy landings.

The procedure for replacing them, should it be necessary, is as follows:

Rotate the bush through 90° in a vertical plane and tap out the whole bearing from the other side with a drift of approx. 12 to 14 mm (0.47 to 0.55 in.) diameter. Fit a new bearing GL 14 and check that the locating groove for the bush is on the inside and aligned chordwise. The bearing should be caulked in three positions on the outer edge to lock it in position.



Rig the sailplane and check for play at the wing tips.

If the play is excessive (over 30 mm/ 1.18 in. play at the wing tip) follow the instructions on page 16.

2.7 Removal and re-installation of tow releases

a) C/G tow release mechanism

Being situated on the underside of the fuselage, the c/g tow release mechanism is vulnerable to the ingress of dirt.

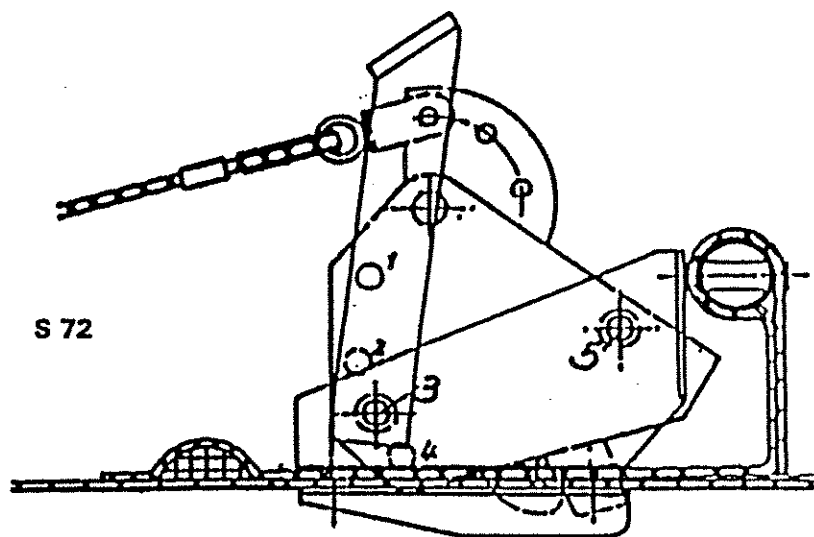
It must consequently be checked regularly for damage and also be cleaned and greased.

For the removal of the mechanism proceed as follows:

TOST SPECIAL TOW RELEASE MECHANISM MODEL "S 72"

First take out the seat pan. Now the release mechanism is easily removed by undoing its 2 mounting bolts, pulling off the seat pan deflector and disconnecting the release cable from the actuating segment.

The cable deflectors must be checked on each annual inspection. They must be replaced when they have worn down up to the heads of their mounting bolts.

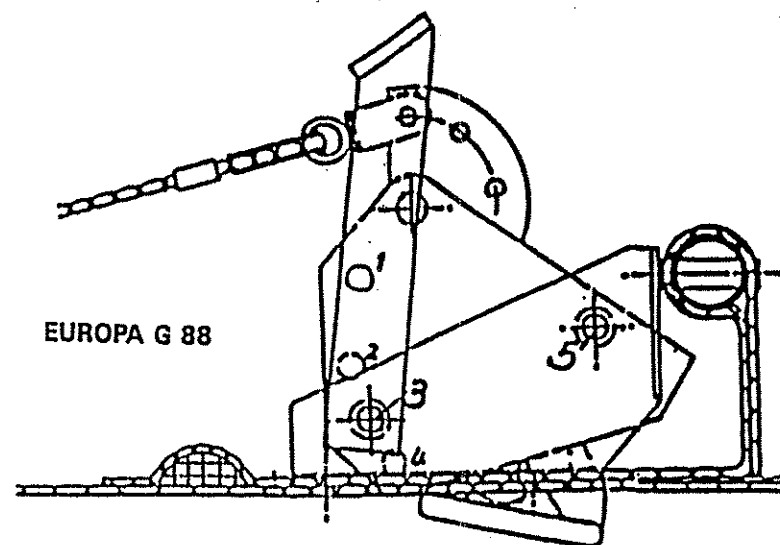


mechanism is anchored by bolts 3 and 5

TOST SAFETY TOW RELEASE MECHANISM MODEL

"EUROPA G 88"

First take out the seat pan. Now the mechanism is easily removed by undoing its 2 mounting bolts, pulling off the seat pan deflector and disconnecting the release cable from the actuating segment.



mechanism is anchored by bolts 3 and 5

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b) Installation and removal of the nose tow hook (if installed)

The nose tow hook is installed in the fuselage nose cone.

It must be checked regularly for damage and also be cleaned and greased.

The nose tow hook is easily dismounted after the ventilation bulkhead has been removed.

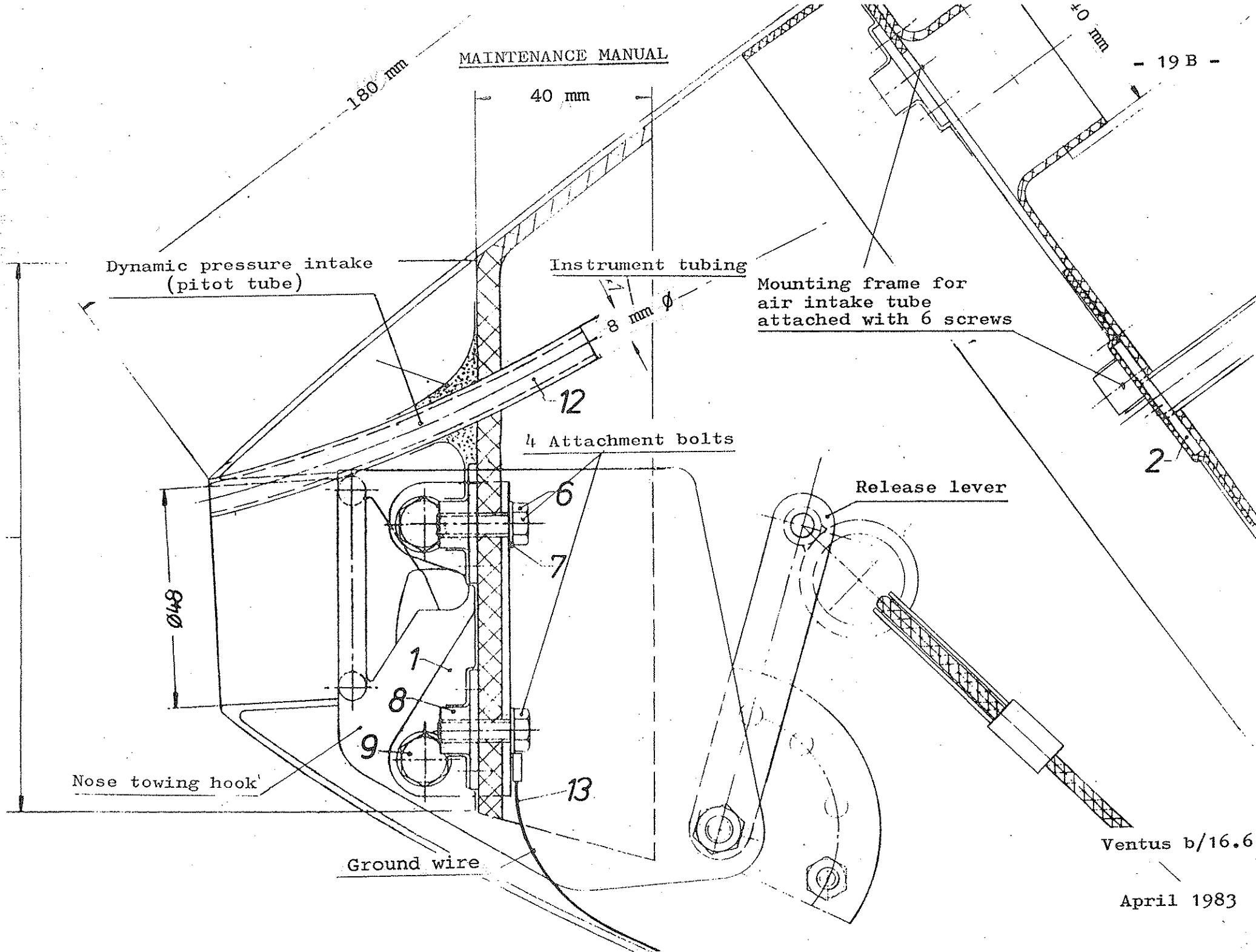
Disconnect the release cable from the actuating segment and undo the four mounting bolts, then pull off hook to the rear.

Take care that the earthing wire is re-connected when re-installing the nose tow hook.

(See sketch on page 19 B).

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- 19 B -



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2.9 Control surfaces

Weights and hinge moments

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

Control surface	Weight	Moment
Rudder, with a mass balance of approx. 2.45 kg (5.4 lb)	4.43- 4.97 kg 9.77-10.96 lb	3.5 - 4.9 cmkg 0.25- 0.35 ft.lb
1 Elevator, without fitting	0.67- 0.85 kg 1.48- 1.87 lb	2.6 - 3.3 cmkg 0.19- 0.24 ft.lb
Flap	2.31- 2.95 kg 5.09- 6.50 lb	9.7 -12.3 cmkg 0.70- 0.89 ft.lb
Aileron, inboard	1.10- 1.40 kg 2.43- 3.09 lb	4.3 - 5.5 cmkg 0.31- 0.40 ft.lb
Aileron, outboard	1.02- 1.30 kg 2.25- 2.87 lb	3.2 - 4.1 cmkg 0.23- 0.30 ft.lb
Aileron, on wing tip extension	0.14- 0.18 kg 0.31- 0.40 lb	0.3 - 0.4 cmkg 0.02- 0.03 ft.lb

If the values of the above table are exceeded it will be necessary to add an additional balance weight forward of the hinge line as follows:

1. After repair work in the area of the repair.
2. After refinishing in the refinished area distributed along its whole length (if possible).



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In case of all control surfaces the balance weight (strips of lead or steel, max. length of single pieces 1 m/3.28 ft) should be screwed (or bonded when round bars are used) to the leading edge forward of the hinge line.

Ailerons
and
Flaps

2 layers 92110 ✕



flat head screws M 5
every 100 mm/3.94 in.

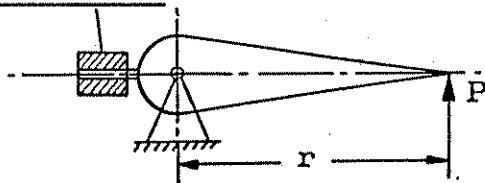
Elevator
and
Rudder



Control surfaces are removed from the sailplane to establish moments of inertia.

$$M = P \times r$$

mass balance



Control surface supported at hinge line.

Force P measured with a spring scale or letter balance.

After fitting additional mass balance weights it is important to check that the range of deflection of the control surfaces has not been restricted.

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2.10 Caring for the sailplane surface

For cleaning and caring it is recommended:

- o Water, with or without washing agents with usual additives, polish and polish materials.
- o Petrol and alcohol may be used for a short time only.
Not recommended are thinners of all kinds.
- o Never use chlorine hydrogen (i.e. Tri, Tetra, Per etc.).
- o The canopy should be cleaned with Plexiklar or with a similar perspex cleaner and only if necessary, with warm water. The canopy should be wiped down only with a clean soft chamois leather or a very soft material. Never rub the canopy when it is dry!
- o This sailplane, like any other, should be protected from the wet.
If water has found a way in, the sailplane should be stored in a dry environment and the components turned frequently to eliminate the water.
- o The sailplane should not be exposed unnecessarily to intense sunlight or heat and should not be subjected to continual loads in a mechanical sense. Please note that the surface of all components which are exposed to sunlight must be finished white. Colours other than white can lead to the glass- or carbon-fiber overheating in direct sunlight, resulting in a critical loss of strength.

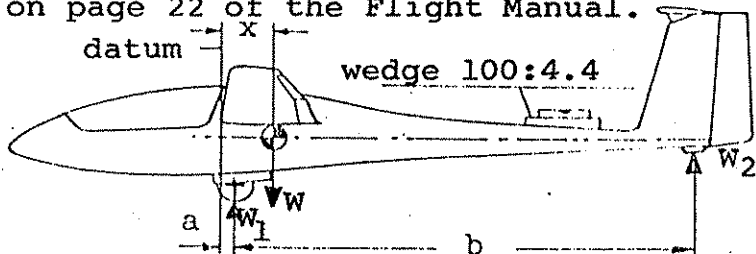
3. Procedure for determining the Center of Gravity

The determination of the C.G. position is done with a span of 15.00 m (49.21 ft). If, with 15 m span, the empty weight C.G. position is within the permitted range (see Flight Manual, page 21, 22A, 22B) then the 16.6 m (54.46 ft) version is within the limits too.

The tailskid is placed on a scale and jacked up approx. 44 cm (17.3 in.) above floor level so that a wedge-shaped block 100:4.4, placed on the rear top fuselage, is horizontal along its top edge.

The weight on the tailskid W_2 is now read off with the wings held level.

The distances a) and b) are measured with the aid of a plumb line or extracted from the last weighing report. The sailplane is weighed to establish its empty weight. The sailplane should be weighed without pilot, without parachute and always without water ballast, but including all fixed equipment. The empty weight C.G. position must lie within the range quoted on page 22 of the Flight Manual.



Datum (BE): Wing leading edge at root rib

Leveling means: Upper edge of 100:4.4 wedge on rear top fuselage horizontal

Distance main wheel: $a = 100 \text{ mm}/3.94 \text{ in.}$

Distance tail skid: $b = 4096 \text{ mm}/13.44 \text{ ft.}$

Empty weight C.G. Position:

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

It is always necessary to establish the empty weight C.G. of the sailplane on the following occasions:

After installing additional equipment, after repainting, after repairs or any modifications which could possibly affect the weight of the sailplane. It must in any case be weighed every four years.

An authorized inspector should fill in the weights and C.G. position on the weight chart on page 23 of the Flight Manual and notes should be made of the equipment installed at that time.

Procedure for determining the Flying weight C.G.

The sailplane is to be weighed fully equipped (including pilot, parachute, complete equipment including barograph, cushion, camera, etc.). The back rest and rudder pedals should be correctly adjusted for this purpose.

Flying weight C.G.:

$$x_{\text{flying weight}} = \frac{W_2 \text{ loaded} \cdot b}{W_{\text{empty}} + W_{\text{dispos.}}} + a$$

Remark: The determination of the C.G. position is done with a span of 15.0 m, see Maintenance Manual, page 23. When calculating the C.G. position for a span of 16.6 m, W_2 must be increased by 0.1 kg (0.22 lb). The empty weight is to be increased by the weight of the 16.6 m wing extensions less the weight of the 15 m wing tips (about 3.0 kg/6.6 lb).

4. Equipment List

A. Safety harnesses

A four-piece symmetrical safety harness is required for the sailplane.

The following restraint system may be used:

Lower Straps

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

Anchorage points:

Lap strap anchorages by the seat pan.

Shoulder straps

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

Anchorage points:

On the tube of the frame in each case at the point where the GRP cover is designed to accommodate them.

B. Instruments and equipment

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

a) Normal Flying

AIRSPEED INDICATOR

(Range: 50 – 300 km/h, 27 – 162 kt, 31 – 186 mph)

Manufacturer: Gebr. Winter, Jungingen

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

ALTIMETER

Manufacturer: Gebr. Winter, Jungingen

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

b) Additional equipment

OUTSIDE AIR TEMPERATURE (OAT) INDICATOR

(when flying with water ballast)

Model	Manufacturer	Specif.-No.
Temperature gauge TF 00-59K	Störk	01 59 042
Distance Thermometer Y-LE-TNF /-20 +60	Kobold	01 59 042

VARIOMETER

Manufacturer: Gebr. Winter, Jungingen

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

MAGNETIC COMPASS

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

TURN & BANK INDICATOR with slip ball

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

VHF-TRANSCEIVERS

The following models are to be used in exchange:

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

c) Additional equipment

DILUTER DEMAND OXYGEN SYSTEMS

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

EMERGENCY LOCATOR TRANSMITTER

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

Transponder Mode A/C

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

Transponder Mode S

Model	Manufacturer	Data-Sheet-No.
BXP 6401-1-(01)+ BXP 6402-1R-(01) BXP 6401-2-(01)+ BXP 6402-2R-(01) AM 6400-1-(01) Address modul CU 6401-1-(01) Control unit	Becker	EASA.21O.322
BE 6400-01(01) Blind Encoder	Becker	EASA.21O001174
ACK A-30	ACK Techno- logies INC.	TSO C-88a
TRT 600 TRT 800 TRT-800H	Filser	10.930/063 NTS EASA.21O.045 EASA.21O.269
VT-0101 VT-0102-070 VT-01 VT-0102-125 VT-0103-1	Garrecht	EASA.21O.384

Note: concerning the installation of further equipment:

The Luftfahrt-Bundesamt (LBA) will advise with regard to the suitability of equipment not listed herein.

(The installation of oxygen systems must also be approved and their overhaul times are to be observed).

Ventus b/16.6

MAINTENANCE MANUAL

5. Placards and symbols

(See Flight Manual, section 1.2).

Identification plate

(fire proof)

placing

attached to rear
cockpit side wall
fairing, right side

Reference placards

placing

Operating limitations

Loading table

Check list

Weak links /
Tire pressure

Baggage compartment,
useful load

} cockpit, upper
side wall fairing,
right side, in view
of the pilot

Flap use

cockpit, upper
side wall fairing,
left side

Locking pin, wing
tip extensions

outer root rib
of wings

Cockpit symbols

Undercarriage

seat pan support,
right side, near
guide slot

Trim

seat pan support,
left side, near
guide slot

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MAINTENANCE MANUAL

Cockpit symbols

placing

Pedal adjustment

base of instrument
console, right side

Tow release

base of instrument
console, left side

Airbrakes

left cockpit wall,
side fairing, near
operating lever

Flap settings

left seat pan
support, aligned
with notched guide
plate, "S" in front,
"L" in rear

Canopy lock

left cockpit wall,
side fairing, below
operating lever on
canopy frame

Canopy emergency
jettisoning

right cockpit wall,
side fairing, above
guide slot of
operating knob

Water ballast
jettisoning

right cockpit wall,
side fairing, above
guide slot of
operating knob

Ventilation

instrument panel,
upper left side
near operating knob

April 1983

6. Inspection program for the extension of the service time

1. General

The results of fatigue tests subsequently carried out on wing spar sections have demonstrated that the service time of GFRP/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 6000 hours, an inspection must be done in accordance with the inspection program mentioned under chapter 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 9000 hours (first step).

The afore-said inspection program must be repeated when the sailplane (or the 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 (second step), after a further 1000 hour inspection to 11000 hours (third step), and finally - after another 1000 hour inspection - to 12000 hours (fourth step).

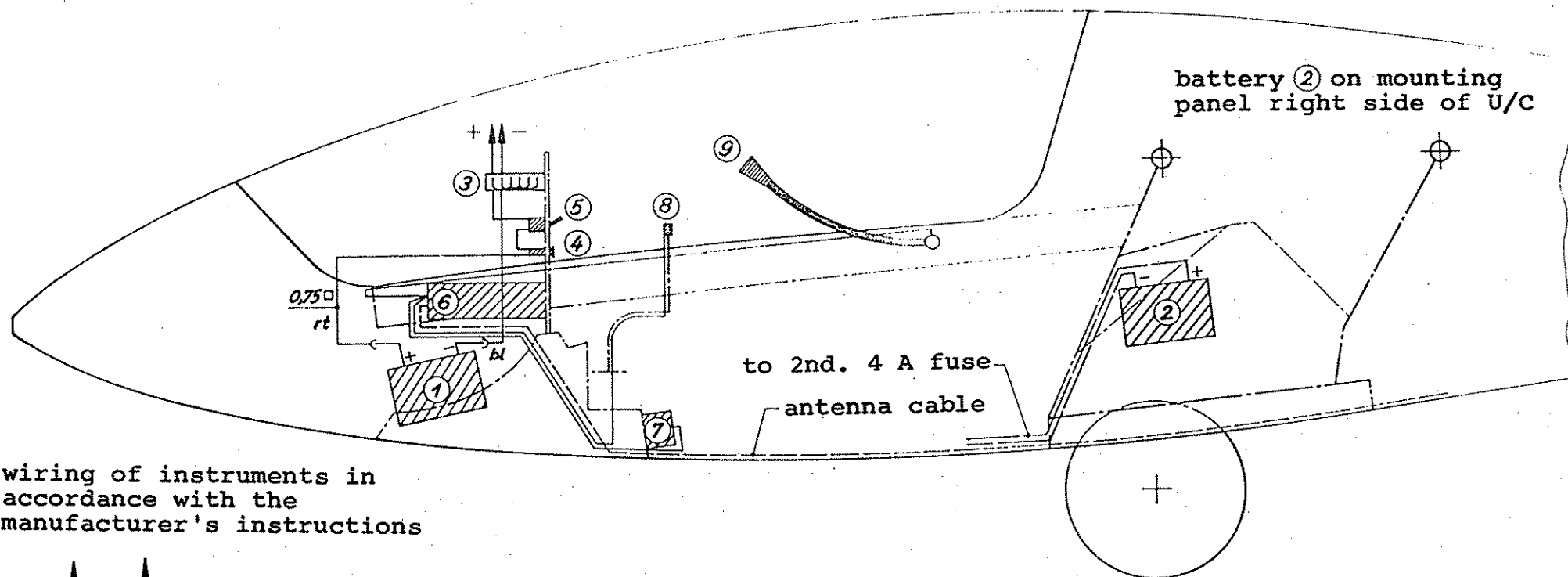
3. The respective inspection program may be obtained from Schempp-Hirth Flugzeugbau GmbH.
5. The inspections may only be accomplished by the manufacturer or by a certified repair station.

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

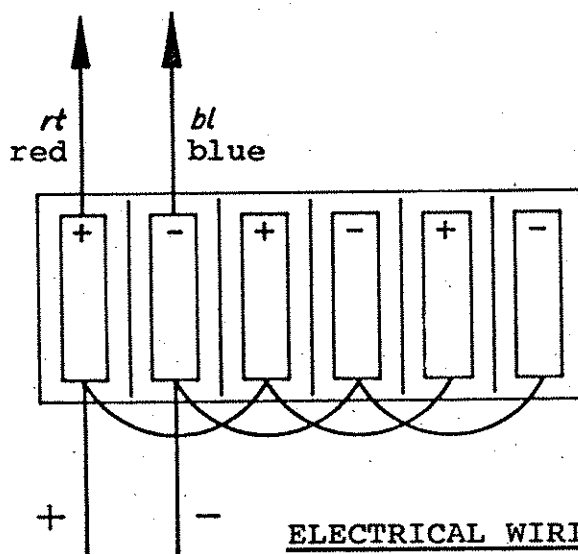
If the inspections are carried out by a certified repair station, a copy of the records must be sent to the manufacturer for evaluation.

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

Ventur 6/16.6



wiring of instruments in accordance with the manufacturer's instructions

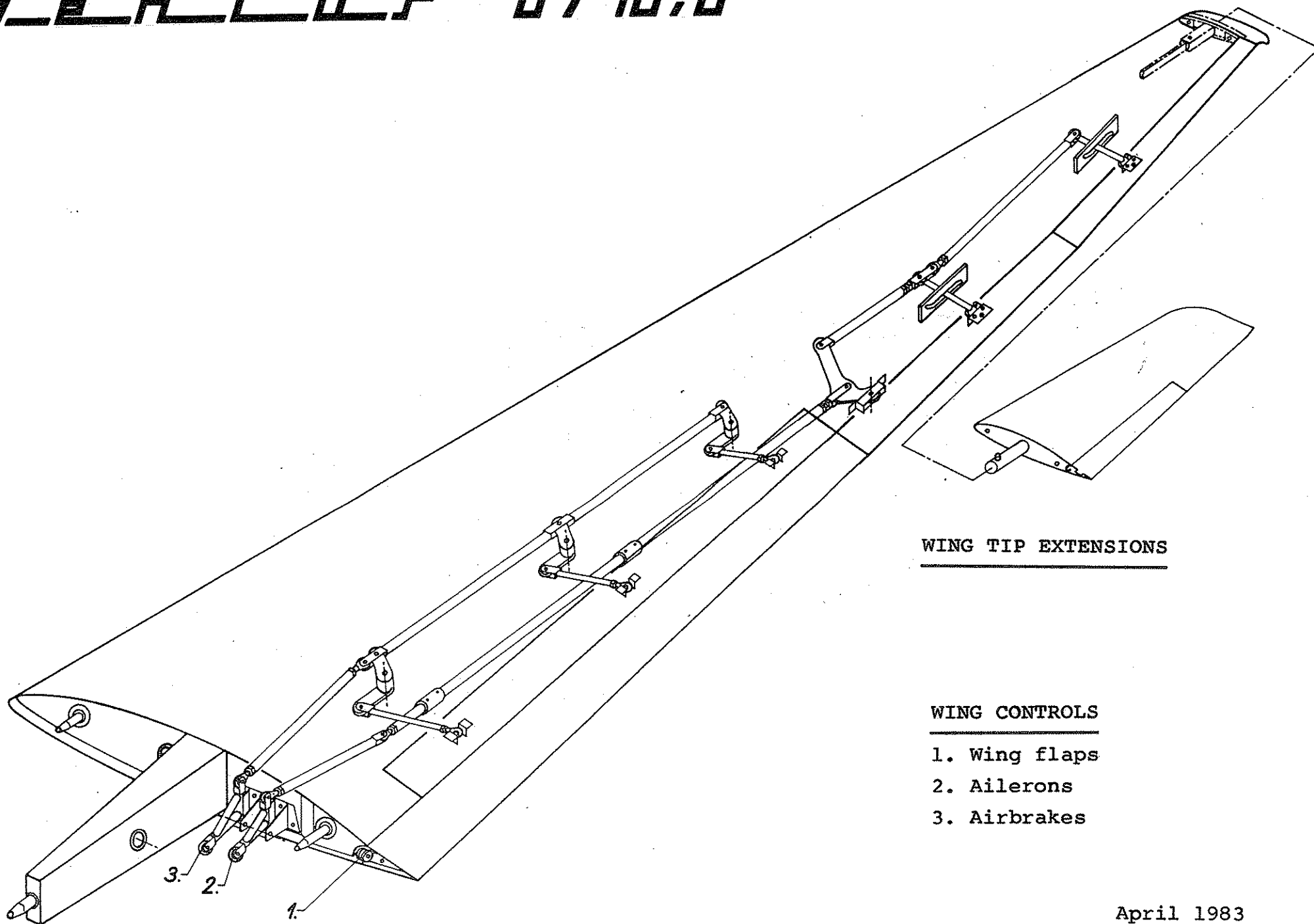


AMP plug board (3)
M1:1

ELECTRICAL WIRING DIAGRAM

(Optional installation by the manufacturer)

- (1) 12 V battery
- (2) 2nd. battery, wired to 2nd. 4 A fuse and selector switch
- (3) AMP plug board
- (4) 4 A fuse
- (5) Master switch
- (6) VHF-Transceiver
- (7) Speaker
- (8) Push-to-talk button
- (9) Goose neck microphone



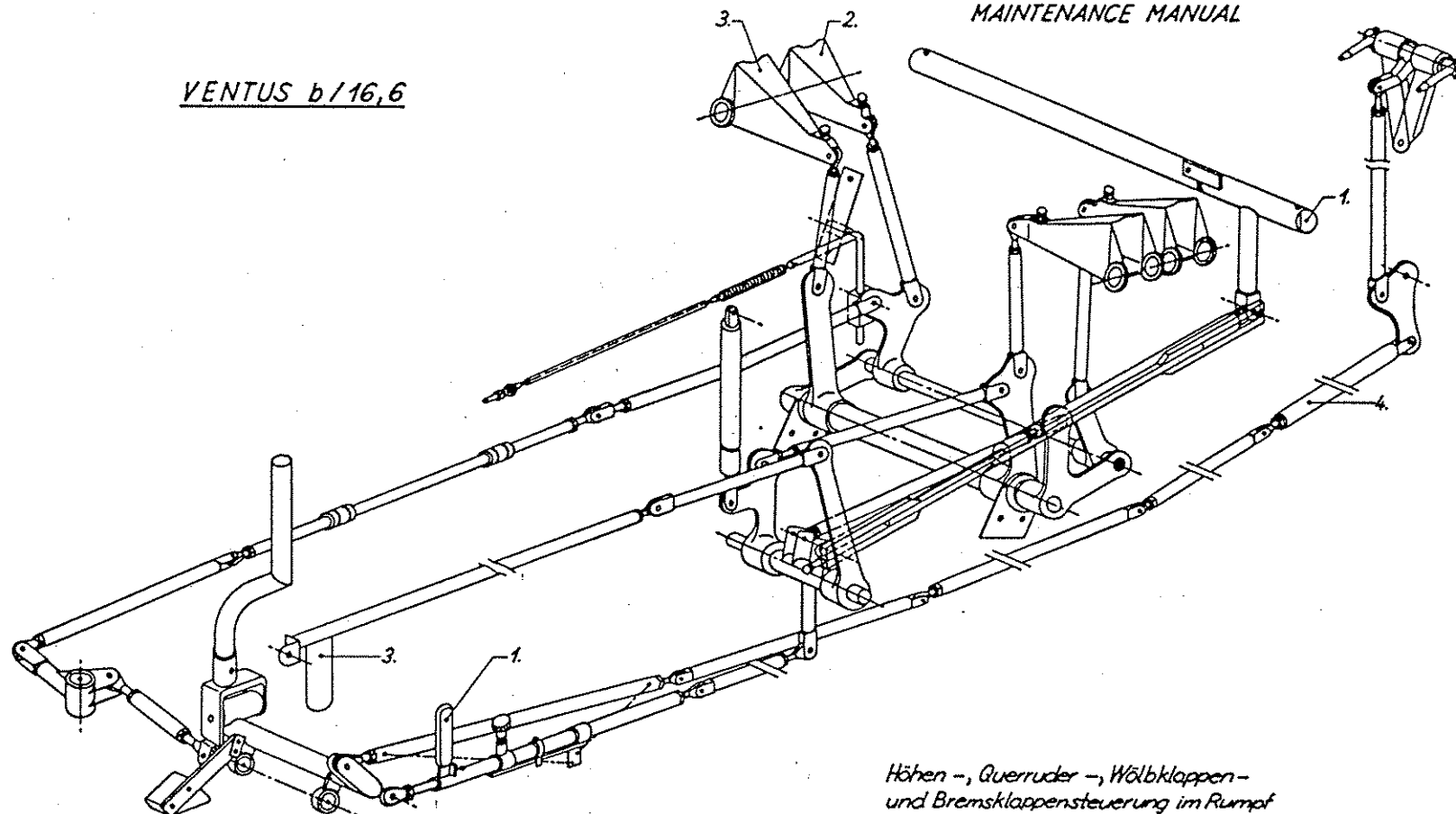
WING TIP EXTENSIONS

WING CONTROLS

1. Wing flaps
2. Ailerons
3. Airbrakes

VENTUS b/16,6

Wartungshandbuch
MAINTENANCE MANUAL



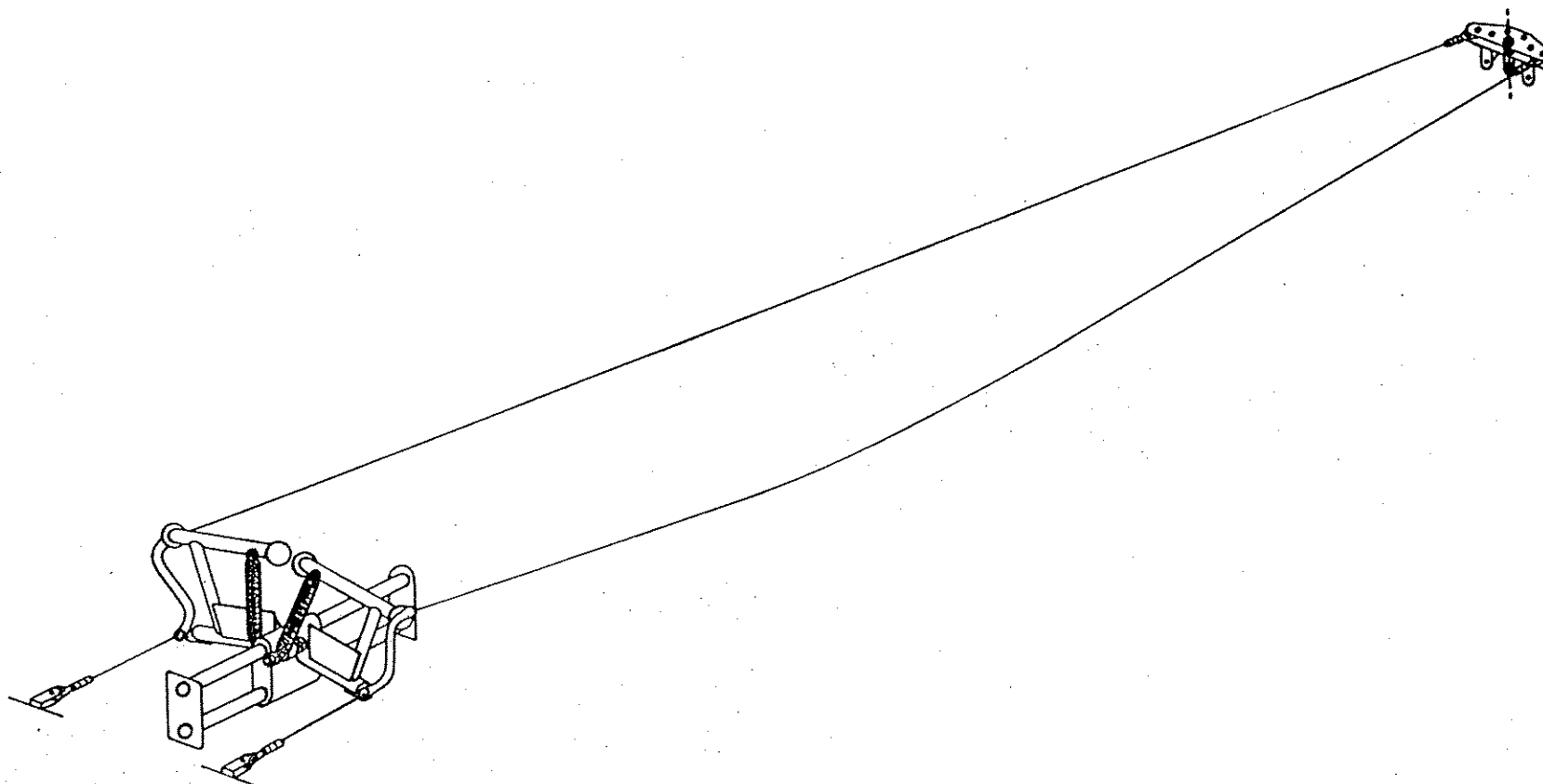
Höhen-, Querruder-, Wölbklappen-
und Bremsklappensteuerung im Rumpf

Fuselage Controls

- 1. Wing flaps
- 2. Ailerons
- 3. Airbrakes
- 4. Elevator

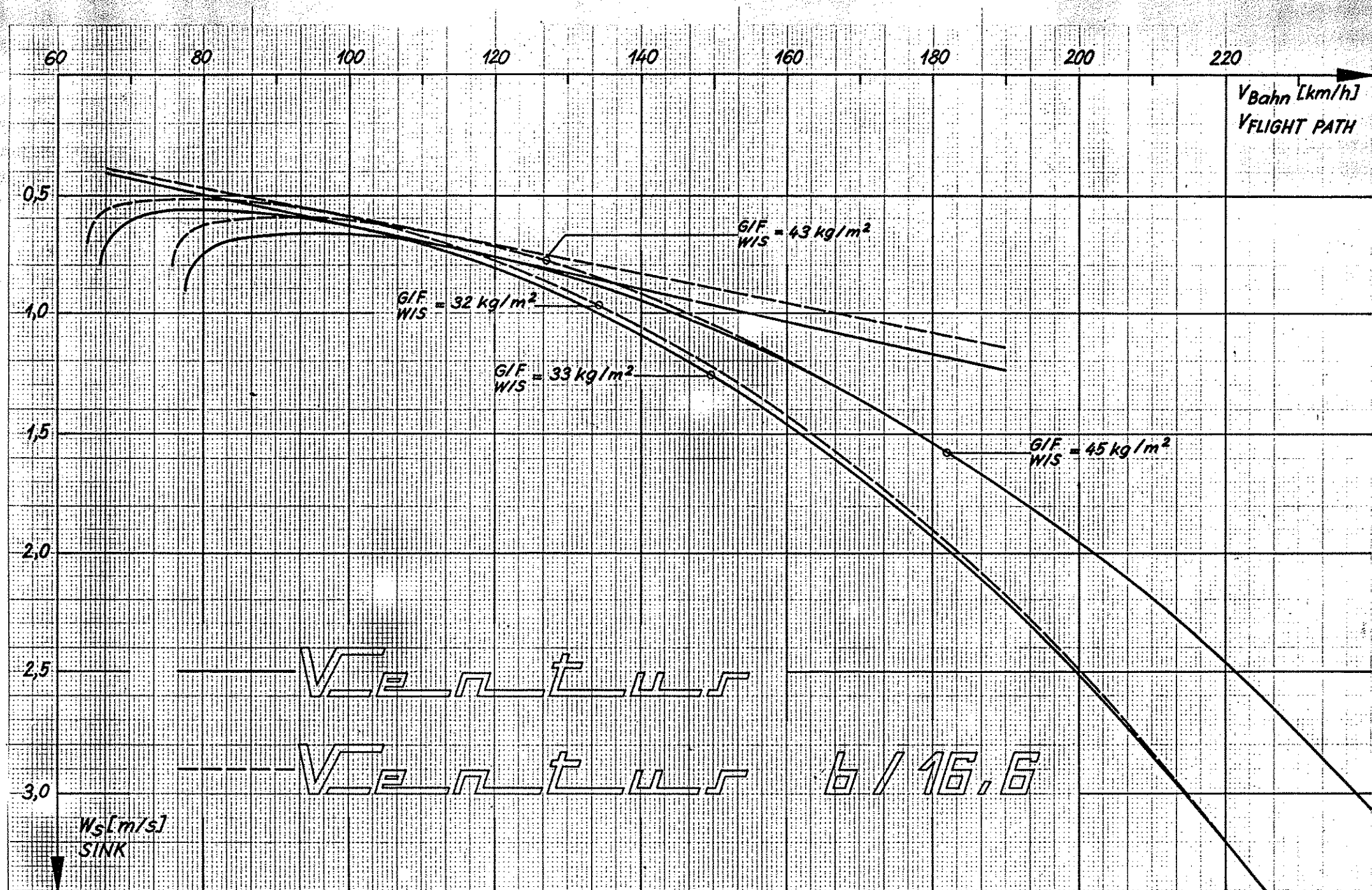
April 1983

Ventur 6/16.6



RUDDER CONTROL CIRCUIT
IN THE FUSELAGE

April 1983



REPAIR - PROCEDURES
for the CRP/FRP Sailplane
VENTUS B / 16.6

The components of the Ventus b/16.6 are constructed as follows:

1. Wings
CRP / foam sandwich,
with Conticell 60, 8 mm and 6 mm thick
2. Flaps
CRP / FRP / foam sandwich,
with Conticell 60, 4 mm thick
3. Ailerons
Pure CRP lower shell and
pure FRP/Kevlar upper shell
4. Fuselage
Pure FRP shell
5. Fin
FRP / foam sandwich,
with Conticell 60, 6 mm thick
6. Rudder
FRP / foam sandwich,
with Conticell 60, 4 mm thick
7. Horizontal tailplane
FRP / foam sandwich,
with Conticell 60, 6 mm thick
8. Elevator
Pure FRP shell

April 1983

/ 2

The first stage in carrying out repairs on GFRP components is to examine the construction of the component at the location in question and to proceed according to the relevant instructions (CIRRUS) in the following pages. The manufacturer should be approached for details concerning the repair of Carbon fiber/Kevlar components.

General considerations

For repairs on this sailplane only the following resin systems must be used:

1. For FRP components

Resin	Hardener	Mixing proportion by weight
XB 3052 A	XB 3052 B	100 : 38
GE 163	Laromin C 260 (Epicure 113)	100 : 38
Epikote 162 (GE 162)	Laromin C 260 (Epicure 113)	100 : 38
Curing: 15 hours at 50° C / 122° F		

2. For CRP / Kevlar components

Resin	Hardener	Mixing proportion by weight
XB 3052 A	XB 3052 B	100 : 38
Curing: 15 hours at 60° C / 140° F		
GE 163	Laromin C 260 (Epicure 113)	100 : 38
Curing: 15 hours at 55° C / 131° F		

Schempp-Hirth KG. 7312 Kirchheim-Teck W.Germany
Repair Instructions
for the Glass Fiber-Plastic Sailplane
"CIRRUS"

Construction

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

We differentiate

1. Wing and stabilizer
 2. Rudder, elevator and ailerons
 3. Fuselage
- 1.) Wings and stabilizer are built in a ribless glass fiber-plastic foam sandwich construction. This means in event of damage that we find a PVC rigid foam (5/16 inch thick, 3.7 lb./cu.ft.) bonded on both sides with a glass cloth laminate.
 - 2.) The controls likewise consist of a sandwich construction. However here the supporting core is not PVC rigid foam but a 5/32 inch thick foamed polystyrene (Styropor) sheet with a specific weight of only one lb./cu.ft.
 - 3.) The fuselage, in contrast to the above parts, is not in sandwich construction but in a pure approximately 1/16 to 3/32 in. thick glass fiber-plastic layup which is reinforced at two locations with bonded-in foam rings.

The following materials apply to all parts:

Resin

Shell Epikote 162

Hardener

BASF Laromin C 260

Mixing proportions

by weight

100 resin to 38 hardener

by volume

2 resin to 1 hardener

After proportioning stir until striations disappear.

Add filler after stirring.

Glass fibers and cloth

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

INTERGLAS Style	U.S. Style	Weave	Weight lb./sq.ft.	Application
91110	120	<div style="text-align: center;"> ↑ Crosstwill ↓ </div>	.022	Elevator & rudder
92110	---		.033	Fuselage, ailerons, stabilizer
92125	---		.058	Wings & fuselage
92140	152-150	<div style="text-align: center;"> uni- directional </div>	.082	Fuselage
92145	181-150		.044	Wings

Rovings

GEVETEX Type ES 10-40x60 K 43	Textilglas GmbH GEVETEX
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Foams

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

Resin - Fillers

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

Lacquer

Lesonal-Werke

PE - Lackvorgelat, white (resin paint)	No. 3-6910
PE - Hardener	No. 7-2050
Mixing proportions by weight	
100 parts Lackvorgelat to 10 parts hardener	
PE - Thinner	No. 6-3026
PE - Filler, white	No. 62 507
PE - Hardener	No. 7-2050
Mixing proportions by weight	
100 parts filler to 10 parts hardener	
Resin paint "Lackvorgelat" and filler can be mixed in one-to-one or other proportions.	

Repair

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

I. Damage to Wing or Stabilizer

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

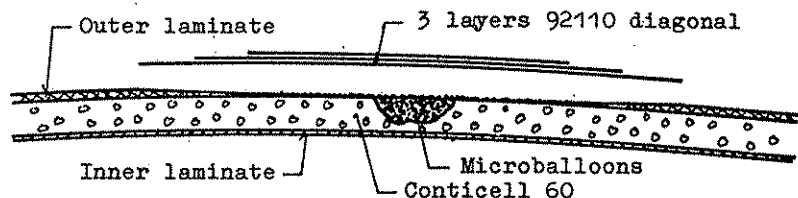
- a) Simple surface damage (only the outer glass fiber laminate damaged)

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

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

After scarfing the shell, blow out thoroughly the whole repair area including the pores of the foam and wash the scarf with carbon tetrachloride or acetone.

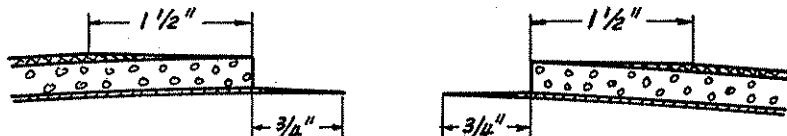
Now fill the hole in the foam with microballoons and simultaneously fill the pores of the exposed foam. Then lay three patches of the 92110 cloth with diagonal weave direction (stepwise largest patch first) over the damaged area. The applied cloth must be dry and dust free.



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

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

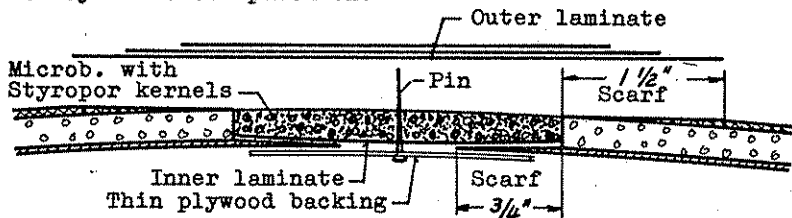
We remove the outer laminate in the region of the damage which is no longer bonded to the foam and enlarge the hole in the foam and inner laminate until good bonding to the foam is evidenced. Then the foam is further removed 3/4 inch around the hole in the inner laminate and the outer laminate scarfed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



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

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

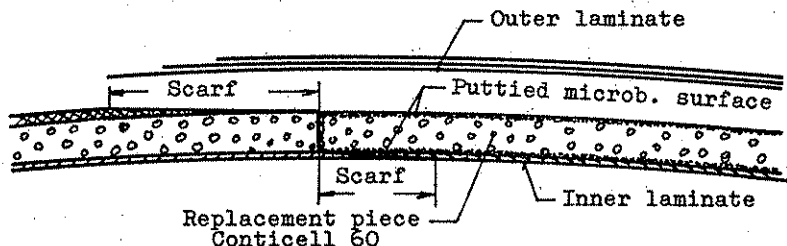
A tip on gluing the plywood plate - the hole in the inner laminate should always be a bit oblong so as to insert the plywood backing plate. Before inserting the plywood drive through the middle of the ply a pin or nail by which it can be drawn against the inner shell. With additional nails or pins it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



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

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

Caution: Avoid strong heat, otherwise air bubbles form.



II. Damage to the Controls

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

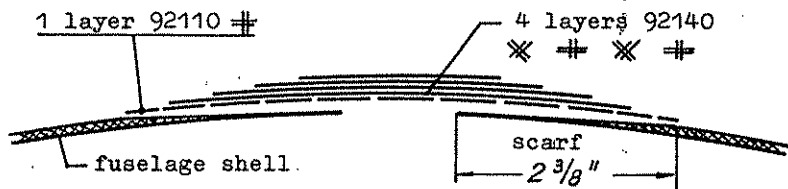
thickened resin which must not harden in any case before doing further work. However with larger replacement pieces you should let the laminate harden on one side and glue the foam thereto in order to keep the surface wave free.

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

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

III. Damage to the Fuselage

In the repair of the fuselage we do not have the annoying replacement of the foam. We have here only to do the glass laminate which in most places consists of five layers. Therefore we need larger scarfs. These should, for larger holes or cuts, never be less than 2-3/8 inches wide. With all fuselage shell repairs apply resin first to a layer of 92110 + cloth following with four layers of 92140 cloth alternating the weave lengthwise and diagonally. Then you are always on the safe side. Each succeeding layer should be about 3/8 to 1/2 inch smaller than that under it.



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

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

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

Lacquer Work

After sanding the edges of the patch or the area filled with microballoons until the original contour is attained the puttying can be abandoned and the lacquer (PE-Vorgelat or PE-Vorgelat and filler in 1 to 1 proportion) applied directly with a brush (not sprayed). After hardening, sand the area wet with 360 grit wet-or-dry paper. If the weave does not show then final sanding can be done with 600 grit wet-or-dry. Polish with rubbing compound. If the weave shows repaint with lacquer.

Repairs to Fittings

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

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

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

Larger Repairs

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

If the wing, fuselage or controls are broken apart.

If the spar flanges are damaged.

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

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

When you cannot guarantee the repair.

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

ss Klaus Holighaus

Translation by F. H. Matteson