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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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**AMENDMENT LIST**

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# 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.

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

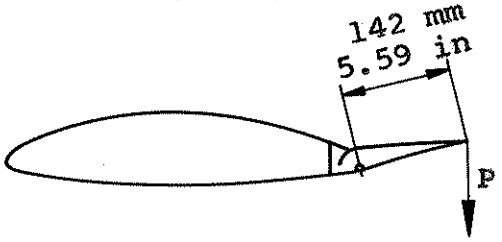
"Aircraft Inspection and Repair
FAA AC 43.13-1A"

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 daN to 15 daN
(26.5 - 33.0 lb)

Release hooks

Checks should be carried out in accordance with the "Betriebs- und Wartungsanweisung" (Operation- and Maintenance Instructions) of the release hook

Sonderkupplung "S 72" and "SH 72"

and, if installed, of the nose tow hook

Bugkupplung "E 75" or "E 72",

Issue May 1975, approved by the LBA.

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, main wheel, gas struts)

R. Lindemann, Osterrade 12, 2050 Hamburg 80

(Nicopress oval sleeves, hand tool)

R. Tost GmbH, Thalkirchnerstrasse 62, 8000 - München 2

( Release hooks )

## 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 occured.

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.

- Hinges with excessive radial play must be replaced. Play in the control circuits should be checked in accordance with section 2.4.

- 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.

- 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).

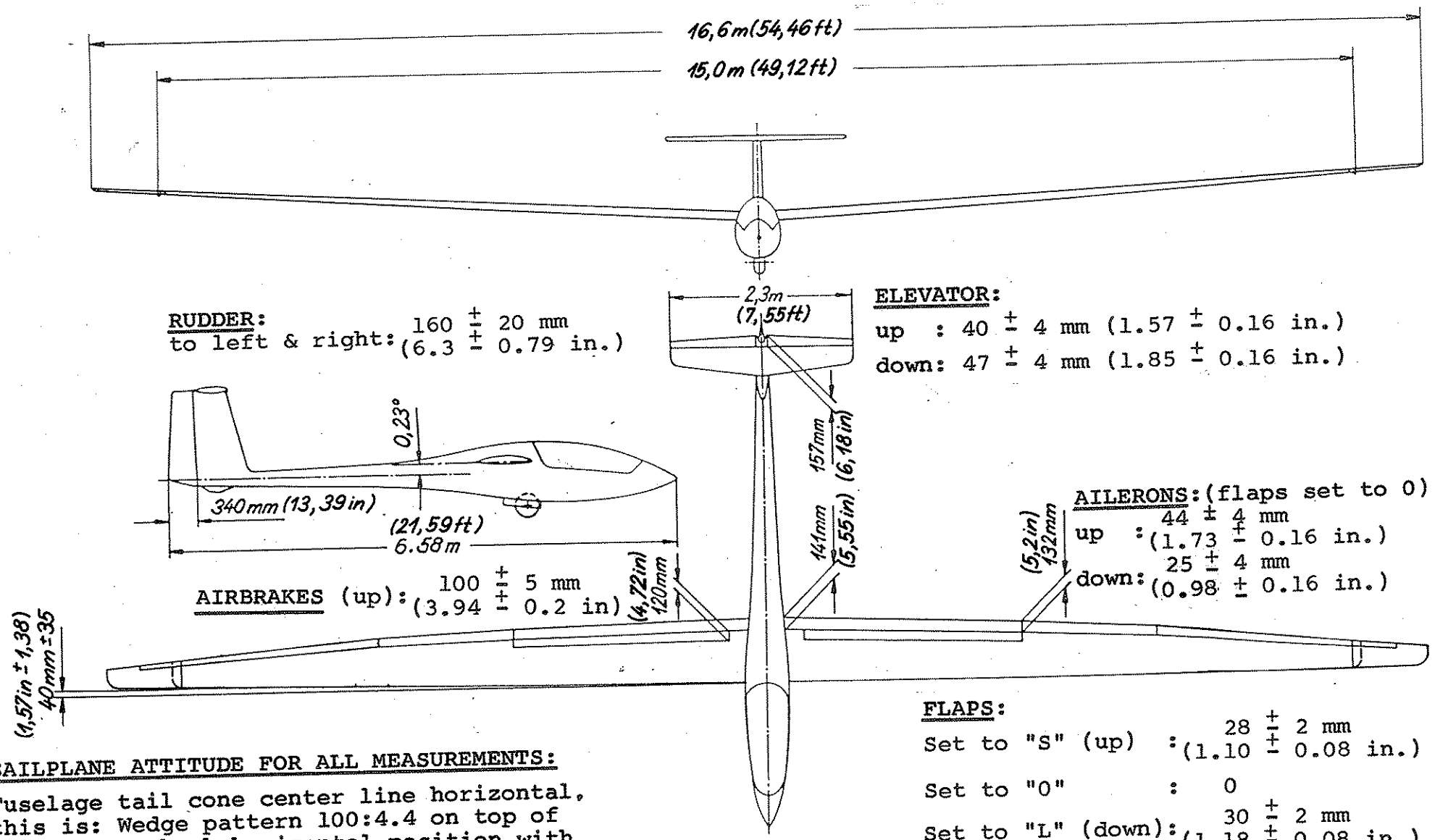
  There must be a clearance of at least 2 mm (0.08 in.) between the flaps and the fuselage and between the flaps and the ailerons.

  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.




**RUDDER:**
to left & right: 160 ± 20 mm (6.3 ± 0.79 in.)

**ELEVATOR:**
up : 40 ± 4 mm (1.57 ± 0.16 in.)
down: 47 ± 4 mm (1.85 ± 0.16 in.)

**AILERONS:** (flaps set to 0)
up : 44 ± 4 mm (1.73 ± 0.16 in.)
down: 25 ± 4 mm (0.98 ± 0.16 in.)

**AIRBRAKES** (up): 100 ± 5 mm (3.94 ± 0.2 in)

**FLAPS:**
Set to "S" (up) : 28 ± 2 mm (1.10 ± 0.08 in.)
Set to "0" : 0
Set to "L" (down): 30 ± 2 mm (1.18 ± 0.08 in.)

**SAILPLANE ATTITUDE FOR ALL MEASUREMENTS:**

Fuselage tail cone center line horizontal, this is: Wedge pattern 100:4.4 on top of tail cone; check horizontal position with spirit level (tailskid approx. 44 cm/17.33 in. above ground).

## 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: ± 3 mm (0.12 in.) measured 132 mm (5.20 in.) behind hinge

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

Elevator: ± 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.

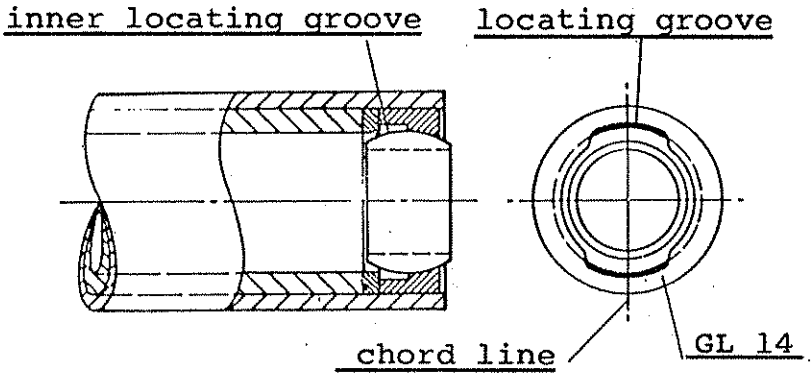
Instructions for repair are included in the appendix.

## 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.



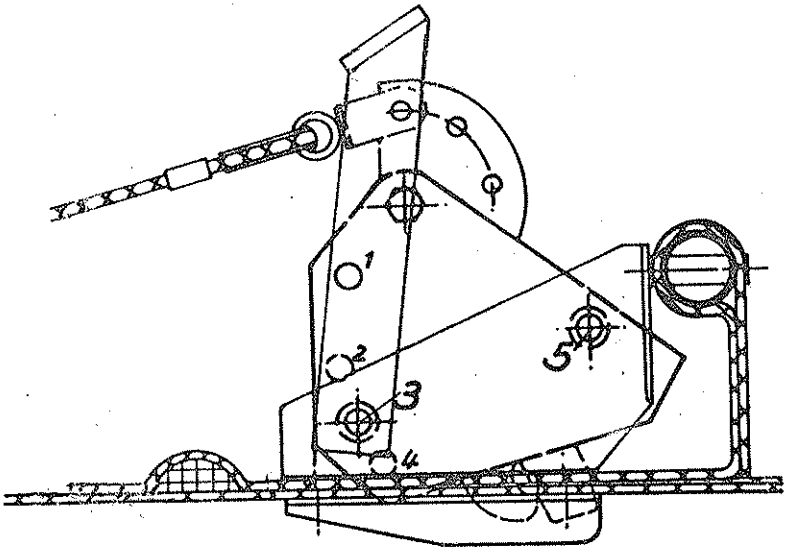

Rig the sailplane and check for play at the wing tips.
If the play is excessive (over 30 mm/ 1.18 in. play at the wing tip) follow the instructions on page 16.

## 2.8 Removal and installation of the towing hooks

### a) C.G. Towing hook

Being situated in the underside of the fuselage, the C.G. Release hook is vulnerable to the ingress of dirt. It must consequently be checked regularly for damage and also be cleaned and greased.

First remove the seat pan. The release hook is now easy to remove. Disconnect the cable from the actuating segment and undo the two mounting bolts, identified as 3 and 5 in the sketch below.
The cable deflectors must be checked at each C of A. They must be replaced when they have worn down to the heads of the mounting screws.




The release hook is anchored by bolts 3 and 5.

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

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

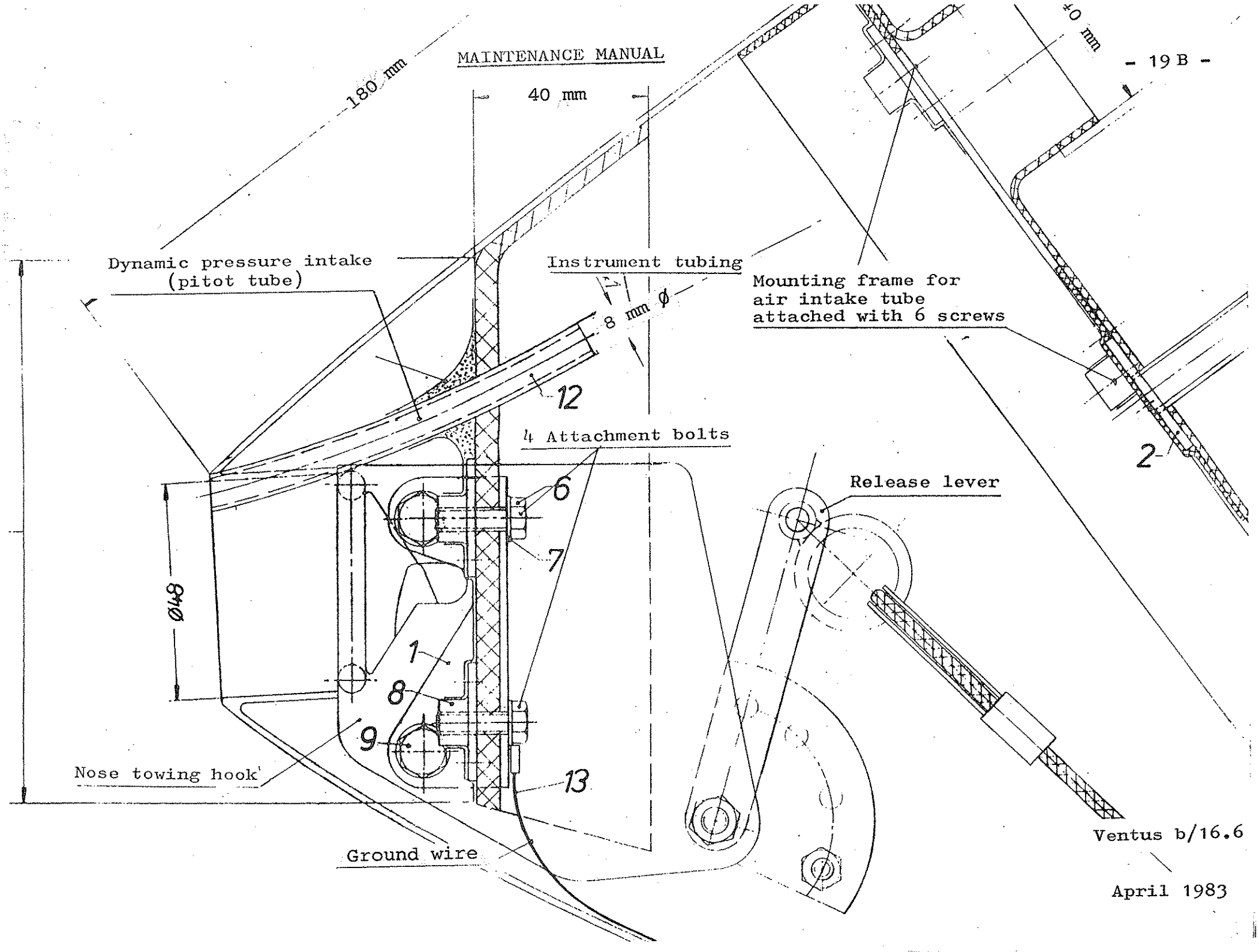
It must be checked regularly for damage and also be cleaned and greased.

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).


180 mm
40 mm
40 mm
Dynamic pressure intake
(pitot tube)
Instrument tubing
8 mm Ø
Mounting frame for
air intake tube
attached with 6 screws
12
4 Attachment bolts
2
6
7
Release lever
Ø48
1
8
9
13
Nose towing hook
Ground wire

## 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:

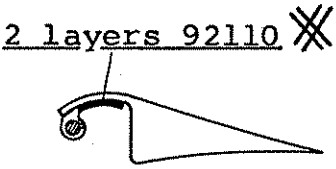
| Control surface | Weight | Moment |
|---|---|---|
| Rudder, with a mass balance of approx. 2.45 kg (5.4 lb) | 4.43- 4.97 kg<br>9.77-10.96 lb | 3.5 - 4.9 cmkg<br>0.25- 0.35 ft.lb |
| 1 Elevator, without fitting | 0.67- 0.85 kg<br>1.48- 1.87 lb | 2.6 - 3.3 cmkg<br>0.19- 0.24 ft.lb |
| Flap | 2.31- 2.95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

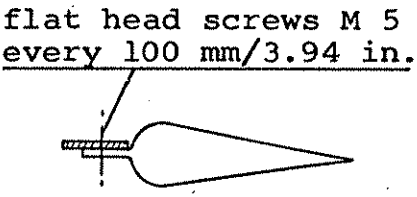
If the values of the above table are exceeded it will be necessary to add an additional balance weight forward of the hinge line as follows:

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

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

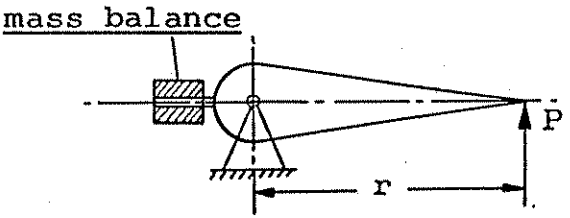



Elevator and Rudder

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

$$M = P \times r$$




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.

## 2.10 Caring for the sailplane surface

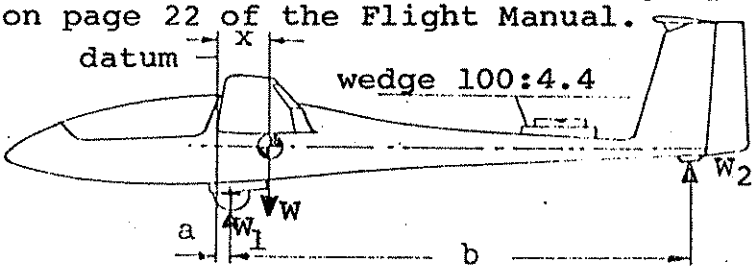
For cleaning and caring it is recommended:

- Water, with or without washing agents with usual additives, polish and polish materials.
- Petrol and alcohol may be used for a short time only.
  Not recommended are thinners of all kinds.
- Never use chlorine hydrogen (i.e. Tri, Tetra, Per etc.).
- 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!
- 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.
- 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 mm/3.94 in.
Distance tail skid : b = 4096 mm/13.44 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 harness

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

The following models are permissible:

Lap belts

| 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 |

Anchorage points:

Lap belts anchorage 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 |

Anchorage points:

On the tube of the steel frame in each case at the point where the FRP cover is designed to accomodate them.

## B. Instruments

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

### a) Minimum equipment

Airspeed indicator

(Minimum calibration range: 50 - 300 km/h)
27 - 162 kt
31 - 186 mph)

Manufacturer: Gebr. Winter, Jungingen

| Type | Code No. | Data Sheet No. |
|---|---|---|
| 6 FMS 4 | 6421 (km/h)<br>6422 (mph)<br>6423 (kt) | TS 10.210/15 |
| 6 FMS 5 | 6521 (km/h)<br>6522 (mph)<br>6523 (kt) | TS 10.210/16 |

Altimeter:

Manufacturer: Gebr. Winter, Jungingen

| Type | Code No. | Data Sheet No. |
|---|---|---|
| 4 HM 6 | 406 (m)<br>420 (ft) | TS 10.220/44 |
| 4 FGH 10 | 411 (m)<br>433 (ft) | TS 10.220/46 |

### b) Additional equipment

Turn and slip indicator with slip ball

| Type | Manufacturer | Data Sheet No. |
|---|---|---|
| WZ 402/31 | Apparatebau Gauting | 10.241/8 |

Magnetic compass

| Type | Manufacturer | Data Sheet No. |
|---|---|---|
| FK 16 | Ludolph | L-10.410/3 |
| C 2300 | Airpath | |

Variometer

Manufacturer: Gebr. Winter, Jungingen

| Type | Code No. | Data Sheet No. |
|---|---|---|
| 5 St VL | all code numbers | TS 10.230/11 |
| 5 St VLM | | TS 10.230/12 |
| 5 St V | | TS 10.230/13 |
| 5 St VM | | TS 10.230/14 |

VHF- Transceivers

| Type | Manufacturer | Data Sheet No. |
|---|---|---|
| FSG 40 S | Dittel | 10.911/45 |
| FSG 50 | Dittel | 10.911/71 |
| FSG 60 M | Dittel | 10.911/72 |
| ATR 720 | Avionic Dittel | 10.911/70 |
| AR 2008/25 | Becker | 10.911/48 |
| AR 2008/25A | " | " |
| AR 2008/25B | " | " |
| AR 3201-1 | Becker | 10.911/76 |
| AR 3201-2 | " | " |

Note: The Luftfahrtbundesamt will advise with regard to the suitability of equipment not listed above. ($O_2$ systems need to be approved as well)

5. Placards and symbols

(See Flight Manual, section 1.2).

| Identification plate | placing |
|---|---|
| (fire proof) | attached to rear cockpit side wall fairing, right side |

| Reference placards | placing |
|---|---|
| Operating limitations | cockpit, upper side wall fairing, right side, in view of the pilot |
| Loading table | |
| Check list | |
| Weak links / Tire pressure | |
| Baggage compartment, useful load | |
| 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 |

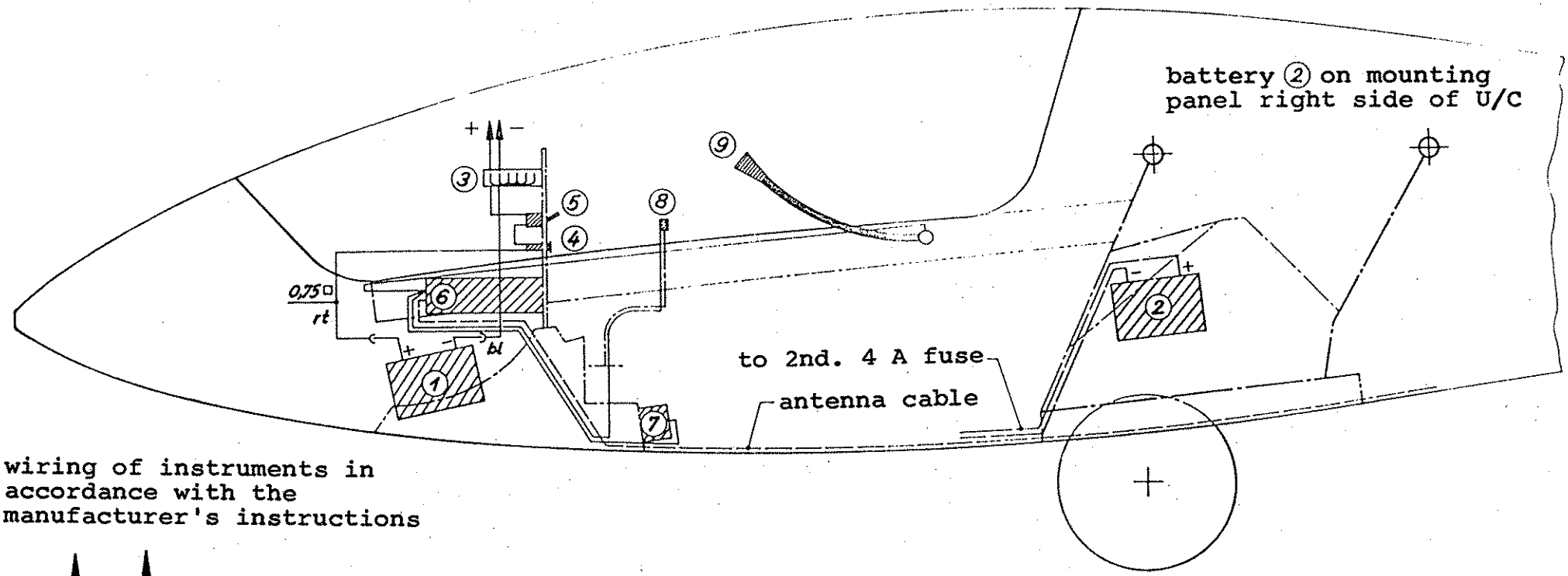
| Cockpit symbols | placing |
|---|---|
| Pedal adjustment | base of instrument console, right side |
| Tow release | base of instrument console, left side |
| Airbrakes | left cockpit wall, side fairing, near operating lever |
| Flap settings | left seat pan support, aligned with notched guide plate, "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 |

## 5. Operating time

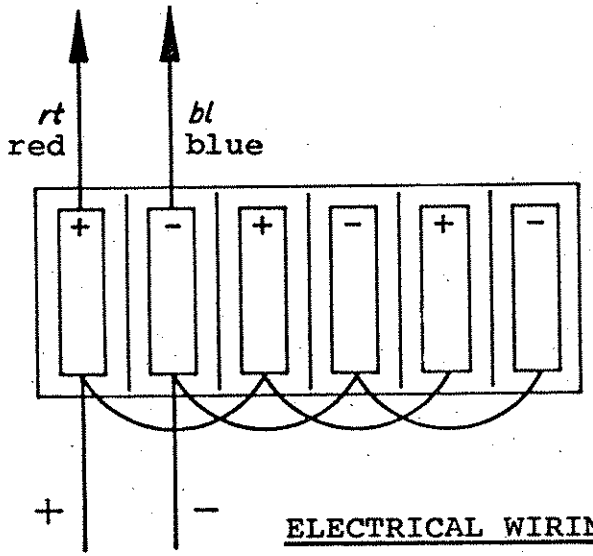
According to tests so far performed on CRP/FRP wings the maximum permitted operating time of this sailplane is for the present 6000 flying hours.

In order to maintain the airworthiness of the sailplane, all prescribed checks and regular maintenance inspections as per sections 2.1 and 2.2 must be carried out.

# 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

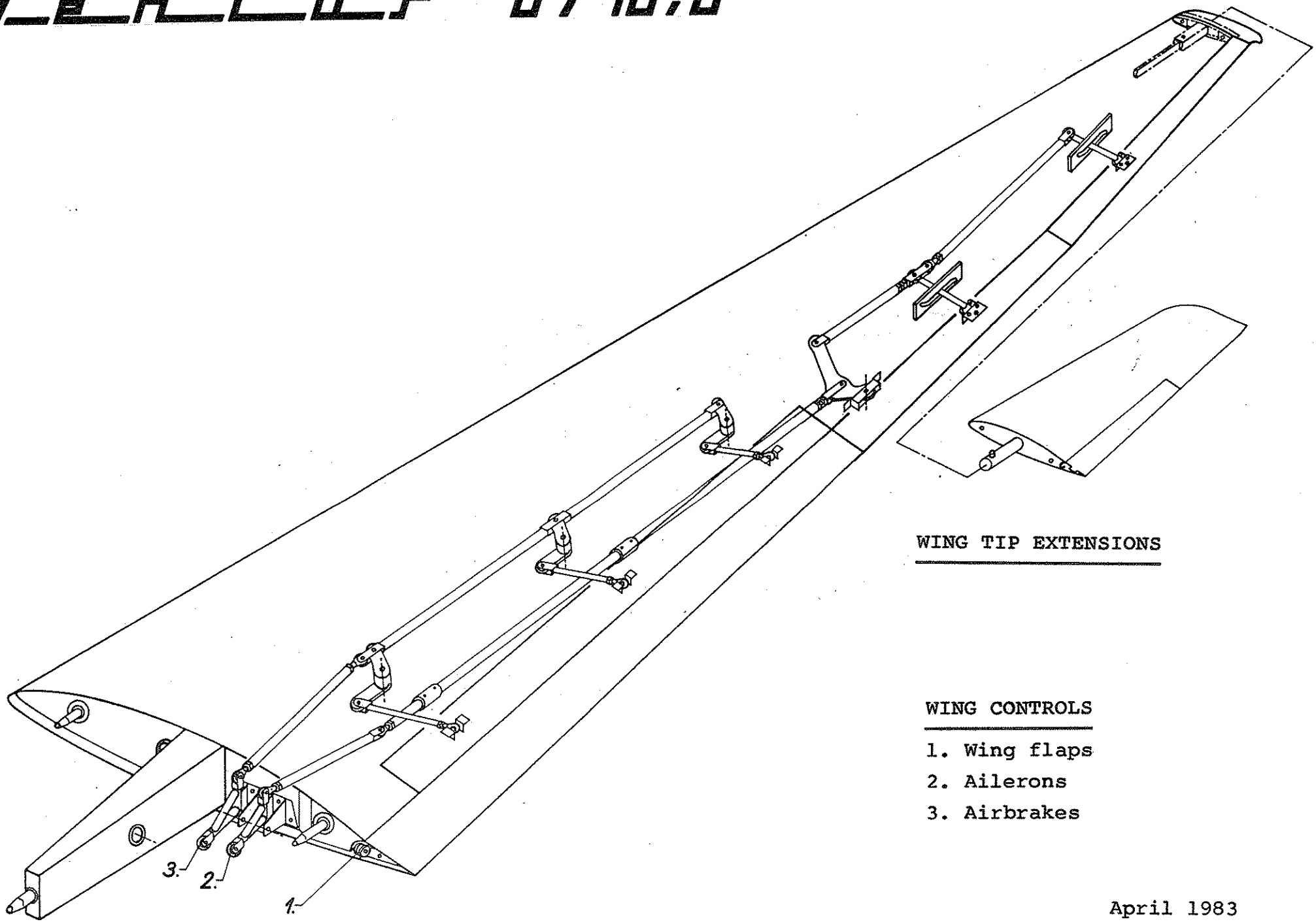
⑤ Master switch

⑥ VHF-Transceiver

⑦ Speaker

⑧ Push-to-talk button

⑨ Goose neck microphone



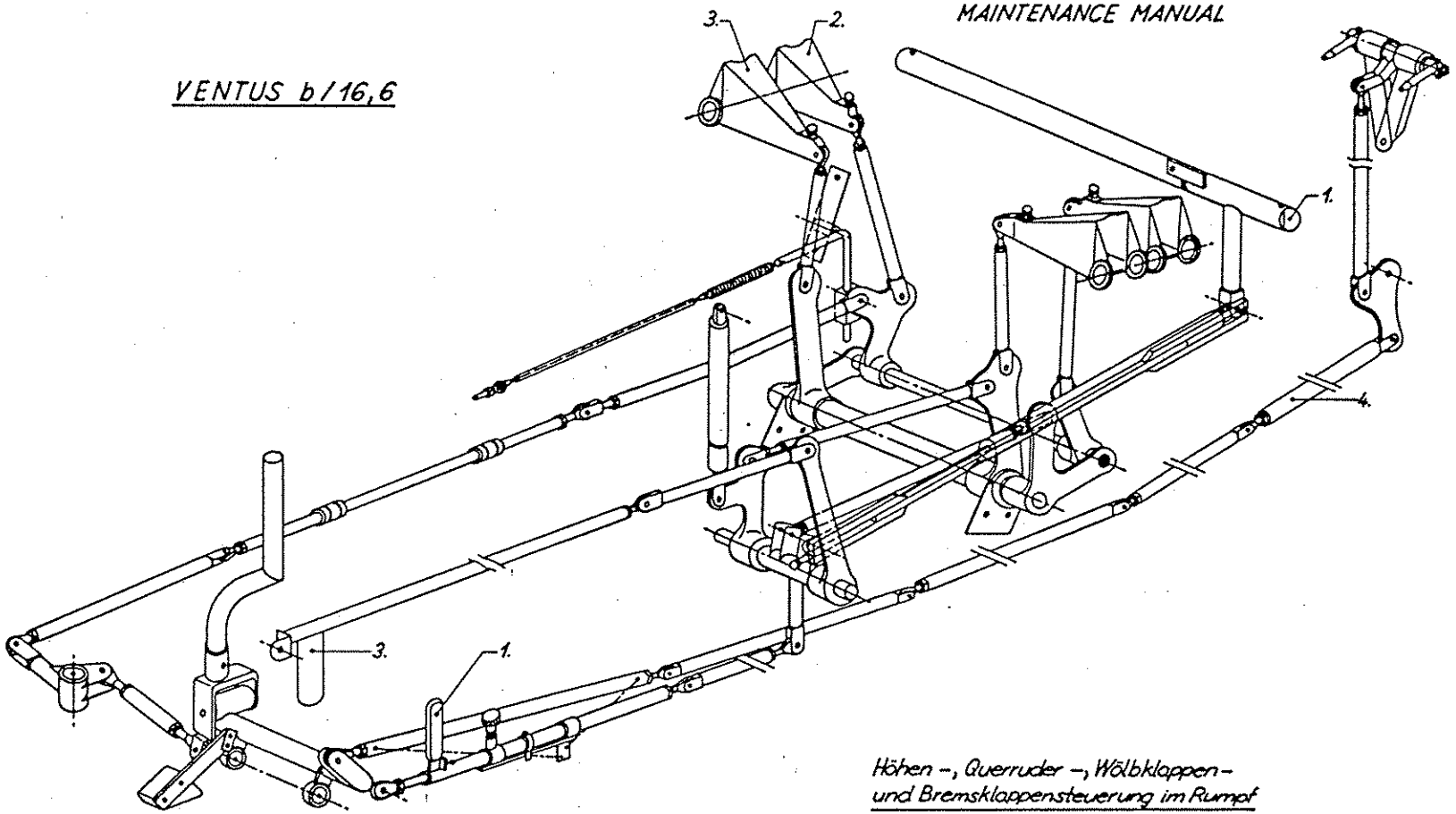

WING TIP EXTENSIONS

WING CONTROLS

1. Wing flaps
2. Ailerons
3. Airbrakes

April 1983

VENTUS b/16,6

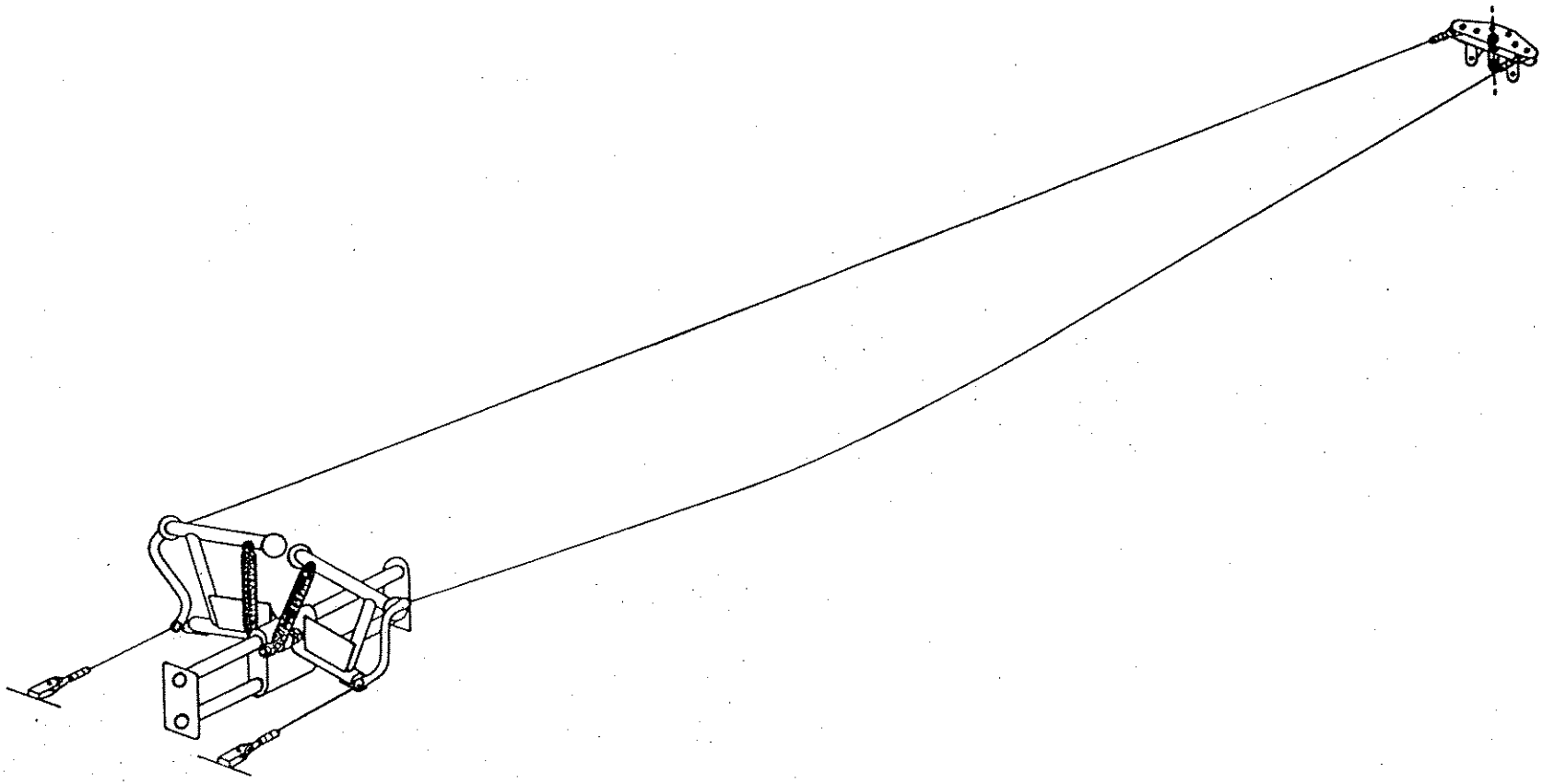



Höhen –, Querruder –, Wölbklappen – und Bremsklappensteuerung im Rumpf

Fuselage Controls

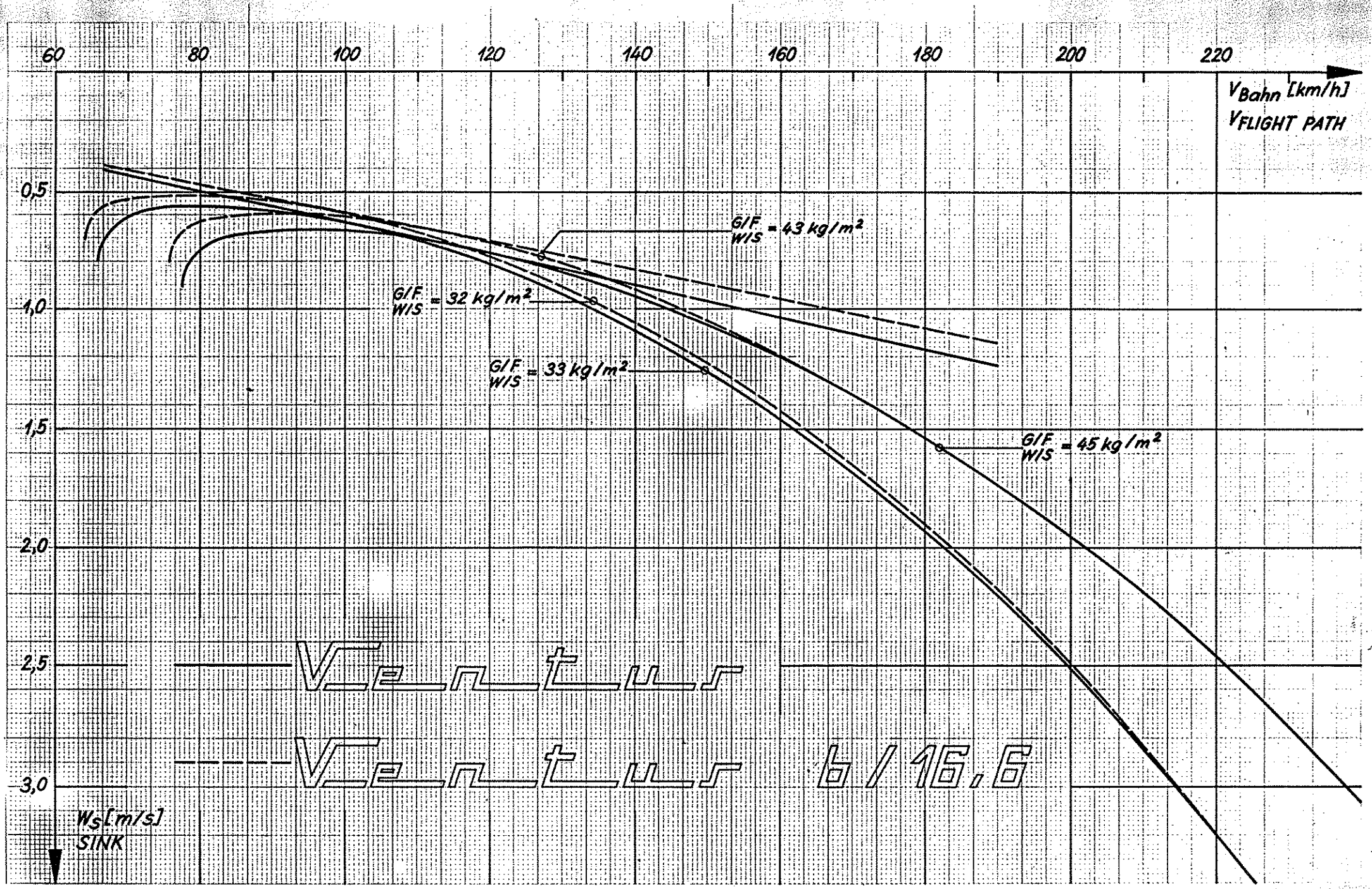
1. Wing flaps
2. Ailerons
3. Air brakes
4. Elevator

# Ventur 6/16.6



RUDDER CONTROL CIRCUIT
IN THE FUSELAGE

April 1983


60
80
100
120
140
160
180
200
220
$V_{Bahn}$ [km/h]
$V_{FLIGHT\ PATH}$
0,5
1,0
1,5
2,0
2,5
3,0
$W_S$ [m/s]
SINK
G/F
W/S = 43 kg/m²
G/F
W/S = 32 kg/m²
G/F
W/S = 33 kg/m²
G/F
W/S = 45 kg/m²
Ventur
Ventur b/16,6

# R E P A I R - P R O C E D U R E S

## 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 | ↑ Crosstwill ↓ | .022 | Elevator & rudder |
| 92110 | --- | | .033 | Fuselage, ailerons, stabilizer |
| 92125 | --- | | .058 | Wings & fuselage |
| 92140 | 152-150 | uni-directional | .082 | Fuselage |
| 92145 | 181-150 | | .044 | Wings |

Rovings

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

Foams

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

Resin - Fillers

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

Lacquer — Lesonal-Werke

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

PE - Hardener No. 7-2050

Mixing proportions by weight

100 parts Lackvorgelat to 10 parts hardener

PE - Thinner No. 6-3026

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

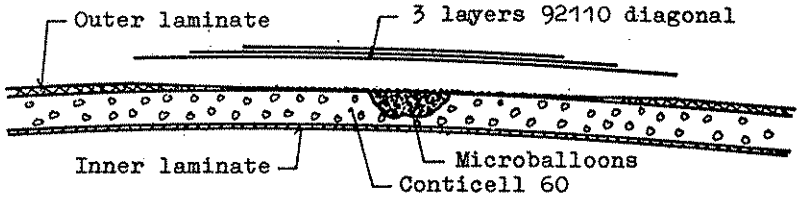
The damages which can be repaired by you fall into two groups:

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.

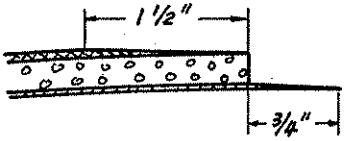
Now fill the hole in the foam with microballoons and simultaneously fill the pores of the exposed foam. Then lay three patches of the 92110 cloth with diagonal weave direction (stepwise largest patch first) over the damaged area. The applied cloth must be dry and dust free.

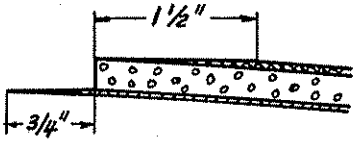



After hardening (appr. 8 hrs. at 20 deg. C. or 68 deg. F.) the damaged area should be smoothed, filled and painted. In smoothing take care that only the edges of the patches are sanded.

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.

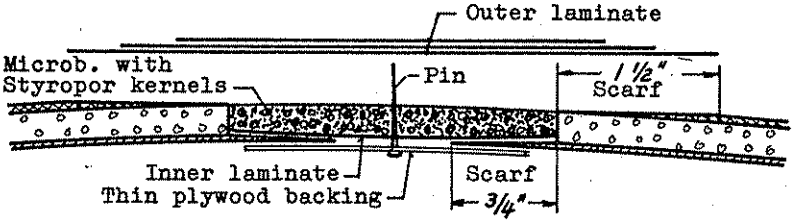



If the hole in the foam is smaller than a fist then glue with Patex a thin plywood or polyester plate from the inside to the laminate, lay on the inner laminate (1 layer 92125 ✻ or 2 layers 92110 ✻ ) and fill the hole in the foam with microballoons mixed with Styropor kernels or crumbled Styropor.

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

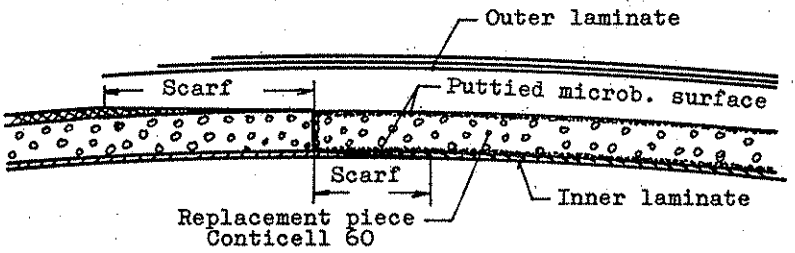
A tip on gluing the plywood plate - the hole in the inner laminate should always be a bit oblong so as to insert the plywood backing plate. Before inserting the plywood drive through the middle of the ply a pin or nail by which it can be drawn against the inner shell. With additional nails or pins it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

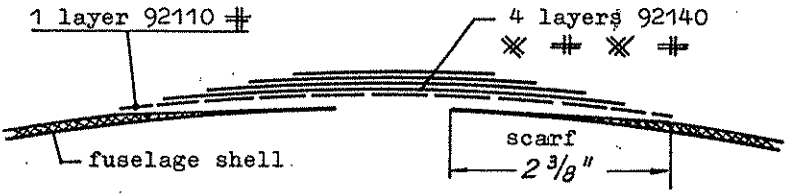
thickened resin which must not harden in any case before doing further work. However with larger replacement pieces you should let the laminate harden on one side and glue the foam thereto in order to keep the surface wave free.

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