This manual must be carried on board of the sailplane at all times.

This Flight manual is FAA approved for U.S. registered gliders in accordance with the provisions of 14 CFR Section 21.29, and is required by FAA Type Certificate Data Sheet No. G 39 EU.

Registration: .............. Factory Serial No.: ...
Owner: __________________________________________

German edition of operating instructions are approved under § 12 (1) 2. of LuftGerPO.
Published September 1981 LBA approved
Date 17th march 1982

Approval of translation has been done by best knowledge and judgement - in any case the original text in German language is authoritative.
## Log of Revisions

<table>
<thead>
<tr>
<th>Revision No.</th>
<th>Pages affected</th>
<th>Description</th>
<th>LBA approval signature</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1, 1a, B, 10, 12, 14, 17, 19</td>
<td>Modification of serial no. 2730 and subsequent</td>
<td>June 1982</td>
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<tr>
<td>2</td>
<td>1, 1a, 12, 21</td>
<td>Automatic connection of elevator and spring trimm system of serial no. 33879 and subsequent</td>
<td>26 Sept. 1984</td>
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All handbooks for GROB G 103 can be ordered at:
- Burkhart Grob of America, Inc.
  1070 Navajo Drive, Bluffton Airport Complex
  Bluffton, OH 45817 (419) 358-9015 or 9025
- Grob-Werke GmbH & Co. KG
  Unternehmensbereich Burkhart Grob Flugzeugbau
  8939 Mattsies, West-Germany
  (08268) 411

26th Sept. 1984 (AM 315-14/2) Approved by LSG
<table>
<thead>
<tr>
<th>No.</th>
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</thead>
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<td>26th sept. 84</td>
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<td>Sept. 81</td>
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<td>Sept. 81</td>
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<tr>
<td>6</td>
<td>17th march 82</td>
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<tr>
<td>7</td>
<td>17th march 82</td>
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<td>8</td>
<td>16th June 82</td>
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<td>26th sept. 84</td>
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<td>17th march 82</td>
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<tr>
<td>14</td>
<td>16th June 82</td>
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<td>17th march 82</td>
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<tr>
<td>16</td>
<td>17th march 82</td>
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<tr>
<td>17</td>
<td>16th June 82</td>
</tr>
<tr>
<td>18</td>
<td>17th march 82</td>
</tr>
<tr>
<td>19</td>
<td>16th June 82</td>
</tr>
<tr>
<td>20</td>
<td>17th march 82</td>
</tr>
<tr>
<td>21</td>
<td>26th sept. 84</td>
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<tr>
<td>22</td>
<td>Sept. 81</td>
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<tr>
<td>23</td>
<td>17th march 82</td>
</tr>
<tr>
<td>24</td>
<td>17th march 82</td>
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<tr>
<td>25</td>
<td>17th march 82</td>
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<tr>
<td>26</td>
<td>17th march 82</td>
</tr>
<tr>
<td>27</td>
<td>17th march 82</td>
</tr>
<tr>
<td>28</td>
<td>17th march 82</td>
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<tr>
<td>29</td>
<td>17th march 82</td>
</tr>
<tr>
<td>30</td>
<td>17th march 82</td>
</tr>
<tr>
<td>31</td>
<td>17th march 82</td>
</tr>
</tbody>
</table>

26th sept. 1984 (ÄM 315-14/2) Approved by LBA
1.2 Contents

I. General
   1. Log of revisions
   2. Contents (LBA approved pages: 1, 1a and 6 through 31, except 9 and 22)

II. Operating limitations
   1. Airworthiness Group
   2. Permitted operating conditions
   3. Minimum equipment
   4. Maximum Speeds
   5. Flight envelope
   6. Weight limits
   7. Centre of gravity position
   8. Load scheme, weighing report
   9. Tow hooks and cable length
   10. Weak link strength
   11. Tire pressure
   12. Crosswinds
   13. Placards, control markings and instrument markings

III. Emergency procedures
   1. Recovery from the spin
   2. Emergency canopy jettison and exit
   3. Miscellaneous (Rain, ice, groundloops)

September 1981
### IV. Normal Procedures

<table>
<thead>
<tr>
<th>IV.</th>
<th>Activity</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV. 1</td>
<td>Cockpit and controls (Picture)</td>
<td>17, 18, 19, 20</td>
</tr>
<tr>
<td>IV. 2</td>
<td>Daily preflight inspection</td>
<td>21, 22</td>
</tr>
<tr>
<td>IV. 3</td>
<td>Control checks before take off</td>
<td>23</td>
</tr>
<tr>
<td>IV. 4</td>
<td>Take off</td>
<td>23</td>
</tr>
<tr>
<td>IV. 5</td>
<td>Free Flight</td>
<td>24</td>
</tr>
<tr>
<td>IV. 6</td>
<td>Slow flying and stalls</td>
<td>24</td>
</tr>
<tr>
<td>IV. 7</td>
<td>High speed flight</td>
<td>24</td>
</tr>
<tr>
<td>IV. 8</td>
<td>Simple Aerobatics</td>
<td>25</td>
</tr>
<tr>
<td>IV. 9</td>
<td>Approach and landing</td>
<td>26</td>
</tr>
<tr>
<td>IV. 10</td>
<td>Storage</td>
<td>27</td>
</tr>
</tbody>
</table>

### V. Appendices

<table>
<thead>
<tr>
<th>V.</th>
<th>Activity</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>V. 1</td>
<td>Flight performance</td>
<td>28</td>
</tr>
<tr>
<td>V. 2</td>
<td>Determination of the center of gravity</td>
<td>29, 30, 31</td>
</tr>
</tbody>
</table>

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*September 1981*
I. 5 Description

The "TWIN II" is a high performance two seater sailplane with a T-tail, fitted with a non-retractable tandem undercarriage and upper surface airbrakes. This sailplane is manufactured using the latest techniques in industrial Glass fibre construction.

It is designed for training, high performance and simple aerobatic flying.

Technical Data:

<table>
<thead>
<tr>
<th>Span</th>
<th>17.5 m (57.4 ft.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length 6.18m (20.8 ft)</td>
<td></td>
</tr>
<tr>
<td>Height 1.55m (5.1 ft)</td>
<td></td>
</tr>
<tr>
<td>Max Flying Weight 580 kg (1279 lbs)</td>
<td></td>
</tr>
<tr>
<td>Aspect 17.1</td>
<td></td>
</tr>
</tbody>
</table>

II. Operating Limitations:

II. 1 Airworthiness Group

Certification Basis: 14 CFR Sections 21.23 and 21.29 effective 1 February 1965; and Joint Airworthiness Requirements for Sailplanes and Powered Sailplanes (JAR-22), dated 1 April 1980.

II. 2 Permitted Operating Conditions:

The plane is licensed for:

1. VFR Day
2. Simple Aerobatics (Loops, Stall turns, Lazy eight, Chaudelle and Spin).

II. 3 Minimum Equipment

1. 2 Airspeed Indicators reading to 300 km/hr (162 kts, 187 mph)
2. 2 Altimeters
3. Full harness Straps in front and back cockpit
4. Parachute or back cushion at least 7 cm (3 inch) thick for each occupant
5. Loading Limit plaque in front and back cockpit
6. Flight Limits plaque
7. Flight Manual

17th March 1982

17. Marz 1982
Conditions in rough air are similar to those encountered in rotors, clouds, whirlwinds and when overflying mountain ranges. Maneuvering speed is the maximum speed at which full control deflections may be used. At maximum speed (VNE) the control deflections should be restricted to 1/3 of the full range.

True airspeed is higher than indicated airspeed at altitude. VNE decreases according to following table.

<table>
<thead>
<tr>
<th>Altitude (ft)</th>
<th>VNE (indicated knots)</th>
<th>VNE (indicated km/h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-6500</td>
<td>135</td>
<td>250</td>
</tr>
<tr>
<td>10000</td>
<td>128</td>
<td>237</td>
</tr>
<tr>
<td>13000</td>
<td>121</td>
<td>225</td>
</tr>
<tr>
<td>16500</td>
<td>115</td>
<td>213</td>
</tr>
<tr>
<td>19000</td>
<td>105</td>
<td>200</td>
</tr>
</tbody>
</table>

Airspeed indicator markings:
- 77-170 km/h (48-105 mph) - Green arc (nominal range)
- 170-250 km/h (92-135 kts, 105-155 mph) - Yellow arc (caution range)
- at 250 km/h = 135 kts = 155 mph - Red line (max. Speed)
- at 95 km/h = 51 kts = 59 mph - Yellow triangle (recommended minimum appr. speed)

Installation Errors

The airspeed indicator must be connected to the following sources:
- Pilot head in the tail fin, static vents side of the fuselage between the two seats.

Using a calibrated ASI the position error is not greater than ±2 km/h or 1 kts or 1.2 mph. A calibration curve is therefore not necessary.

II. Flight Envelope

The sailplane design limit load factors are as follows:
- At maneuvering speed + 5.3 — 2.65
- At VNE + 4.0 — 1.5

(Brakes closed and calm air)
II. 6 Weight Limits

Empty weight . . . . about 380 kg (838 lbs)
Maximum flying weight . . 580 kg (1279 lbs)
Maximum permitted weight of non lifting parts 400 kg (882 lbs)

II. 7 Centre of gravity position

The approved range of centre of gravity positions during flight is 260 mm (10.24 inches) to 460 mm (18.11 inches) behind the datum line, equivalent to 24.7% to 43.6% of the M.A.C. of the wing.
A/c attitude: incidence board of 600 /2 angle.
The datum line is the front edge of the wing at the wing root.
The approved centre of gravity range does not get exceeded by the payload distribution specified in the loading plan II. 8.
The exact position of the centre of gravity at flying weight can be calculated according to VI. 5.

II. 8 Load scheme „TWIN II“

Minimum load in the front seat for all flight . . 70 kg (154 lbs)
Maximum load in the front seat . . . . 110 kg (242 lbs)
Maximum load in the back seat: . . . . 110 kg (242 lbs)
Maximum load in the baggage compartment . . 10 kg (22 lbs)

The maximum flying weight of 580 kg (1279 lbs) must not be exceeded.
Trim weights must be used at the suspensions in front of stick bulkhead to compensate if the front seat load is lower than 70 kg (154 lbs). See page 74.

16th June 1982
<table>
<thead>
<tr>
<th>Date of weighing: carried out by</th>
<th>Equipment list used for weighing (date)</th>
<th>Empty (Weight) kg/lbs</th>
<th>Position of cg empty behind reference mm/inches</th>
<th>Maximum total payload kg/lbs</th>
</tr>
</thead>
</table>

September 1981
II. 9 Tow hooks and cable length

For Aerotow: Nose hook "E 75" with modification I-77.

For Winch launch: Safety back release hook "C 72" or "C 77".

Minimum aerotow cable length: 40 m (130 ft)
Minimum launch cable length: 600 m (1970 ft)

II. 10 Week link strength

Winch launch and aerotow: max 754 daN, max 1662 lb

II. 11 Tire Pressure

<table>
<thead>
<tr>
<th>Wheel Type</th>
<th>Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>mainwheel</td>
<td>6.00-6</td>
</tr>
<tr>
<td>nosewheel</td>
<td>260x85</td>
</tr>
<tr>
<td>tailwheel</td>
<td>210x65</td>
</tr>
</tbody>
</table>

II. 12 Crosswinds

The maximum crosswind component approved for take off and landing is 20 km/h (11 kts, 12 mph).

16th June 1982
II.13. Placards, control markings and instrument markings

<table>
<thead>
<tr>
<th>Maximum flying weight</th>
<th>580kg 1280lbs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Airspeed limits</td>
<td>km/hr knots mph</td>
</tr>
<tr>
<td>Never exceed</td>
<td>$V_{NE}$ 250 135 155</td>
</tr>
<tr>
<td>In Rough Air</td>
<td>$V_B$ 170 92 105</td>
</tr>
<tr>
<td>On Aerotow</td>
<td>$V_T$ 170 92 105</td>
</tr>
<tr>
<td>On Winch or Auto Launch</td>
<td>$V_W$ 120 64 74</td>
</tr>
<tr>
<td>Airbrakes Open</td>
<td>$V_{DF}$ 250 135 155</td>
</tr>
<tr>
<td>Maneuvering</td>
<td>$V_A$ 170 92 105</td>
</tr>
</tbody>
</table>

both cockpits

Payload (Pilot and Parachute)

<table>
<thead>
<tr>
<th>Minimum in Front cockpit</th>
<th>70kg 154 lb</th>
</tr>
</thead>
<tbody>
<tr>
<td>for all flight</td>
<td></td>
</tr>
<tr>
<td>Less must be compensated with ballast secured in the seat</td>
<td></td>
</tr>
<tr>
<td>Maximum load front</td>
<td>110kg 242 lb</td>
</tr>
<tr>
<td>The maximum weight must not be exceeded</td>
<td></td>
</tr>
</tbody>
</table>

both cockpits

Simple aerobatics air speeds

<table>
<thead>
<tr>
<th>Recommended entry speed</th>
<th>km/hr</th>
<th>knots</th>
<th>mph</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loop</td>
<td>180</td>
<td>97</td>
<td>111</td>
</tr>
<tr>
<td>Stall turn</td>
<td>180</td>
<td>97</td>
<td>111</td>
</tr>
<tr>
<td>Spin</td>
<td>80</td>
<td>43</td>
<td>50</td>
</tr>
<tr>
<td>Chandelle</td>
<td>170</td>
<td>92</td>
<td>105</td>
</tr>
</tbody>
</table>

Required placards (front and back cockpit)

17th March 1982
<table>
<thead>
<tr>
<th>Altitude (ft)</th>
<th>0-6500</th>
<th>10,000</th>
<th>13,000</th>
<th>16,500</th>
<th>19,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>VNE (KIAS)</td>
<td>135</td>
<td>128</td>
<td>121</td>
<td>115</td>
<td>109</td>
</tr>
</tbody>
</table>

near speed ind.

both cockpits

Check before launch:
- Full and free movement of controls?
- Parachute secured?
- Straps tight and locked?
- Pedals adjusted and locked?
- Brakes closed and locked?
- Trim correctly adjusted?
- Altimeter adjusted?
- Canopy locked?
- Cable on correct hook?
- Beware: – Crosswind! – Cable break!

Front cockpit

Canopy Jettison and Emergency Exit:
- Pull red handles on right and left of canopy fully back together
- Push canopy up and away with the left hand
- Release safety harness
- Stand up and get out over left or right side depending on the attitude
- When using a manual parachute grip release and pull firmly to full extent after 1-3 seconds

By Canopy release front and back

Tire Pressure

36 PSI 2.5 atm

16th June 1982

mainwheel nosewheel tailwheel
Elevator quick lock connected
Markings notice
Rotating knob turned in
Tailplane secured (cover closed)

Markings notice
Rotating knob turned in
Tailplane secured (cover closed)

Baggage maximum
22 lbs 10 kg

Don't push or lift here

Total energy
compensation tube
(until s/n 3838)

near magnetic direction indicator

26th sept. 1984 (AM 315-14/2)  Approved by LBA
Canopy open
Canopy jettison

Trim

Airbrakes

Cable release

Pedal adjustment
Top right of front instrument panel

Air-vent
Top left of front instrument panel

17th March 1982
**TRIM WEIGHTS**

<table>
<thead>
<tr>
<th>Pilot's weight including parachute</th>
<th>kg</th>
<th>55-62.4</th>
<th>62.5-69.9</th>
<th>70-110</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

1. Marking controlling the correct rigging of the tailplane.
2. Label for the total energy tube.
3. Label for tailplane security
4. Label for tyre pressure
5. Label for tyre pressure
6. Red ring round the static pressure port
7. Marking to find the belly hook

16th June 1982

---

Labels and Markings outside of the fuselage

1. Marking controlling the correct rigging of the tailplane.
2. Label for the total energy tube.
3. Label for tailplane security
4. Label for tyre pressure
5. Label for tyre pressure
6. Red ring round the static pressure port
7. Marking to find the belly hook

16th June 1982
### ASI Markings

<table>
<thead>
<tr>
<th>Speed</th>
<th>Mark</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>48–105</td>
<td>42–92</td>
<td>Normal range of flying speed</td>
</tr>
<tr>
<td>105–155</td>
<td>92–135</td>
<td>Range of flying speeds to be used with care</td>
</tr>
<tr>
<td>at 155</td>
<td>135</td>
<td>Maximum Speed</td>
</tr>
<tr>
<td>at 59</td>
<td>51</td>
<td>Minimum recommended landing speed at full load</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>mph</th>
<th>knots</th>
<th>km/h</th>
<th>Mark</th>
<th>Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>48</td>
<td>42–92</td>
<td>77–170</td>
<td>Green Arc</td>
<td>48</td>
</tr>
<tr>
<td>105</td>
<td>92–135</td>
<td>170–250</td>
<td>Yellow Arc</td>
<td>155</td>
</tr>
<tr>
<td></td>
<td>135</td>
<td>250</td>
<td>Radial Red Line</td>
<td>155</td>
</tr>
<tr>
<td></td>
<td>51</td>
<td>95</td>
<td>Yellow Triangle</td>
<td>59</td>
</tr>
</tbody>
</table>
III. Emergency procedures

III. 1. Recovery from the spin

Recovery spin can be accomplished by the standard recovery procedure:
- Full opposite rudder
- Neutralize stick
- Ailerons should be neutral
- When rotation stops neutralize rudder and pull out gently.

III. 2. Emergency canopy jettison and exit

- Pull red handles on right and left of canopy full back simultaneously.
- Push canopy up and away with the left hand.
- Release safety harness.
- Stand up and get out over left or right side depending on the attitude.
- When using a manual parachute grip release and pull firmly to full extend after 1-3 seconds.

III. 3. Miscellaneous

Flying in rain, iced wings

There is a noticeable deterioration of flying characteristics by wet or lightly iced wings, which raises the stall speed by about 6 knots.
Increase take off and approach speed by 6 knots.

Wing dropping

If a wing drops in a turn or straight flight, leave the stick neutral and apply rudder against the direction of rotation.

Groundloops

The aircraft is not prone to ground loop in take off.
If one wing touches the ground or the aircraft changes direction by more than 15 degrees, release cable immediately.

17th March 1982
IV Normal procedures

VI 1 Cockpit and controls

Front Seat.

1 Stick
2 Rudder pedals
3 Airbrake lever and wheelbrake
4 Trim lever
5 Release knob
6 Canopy jettison

Ventilator top of instrument panel left side
Rudder pedal adjustment top of instrument panel right side

16th June 1982

25. Aug. 1982
Standard instrument positions (front panel)

1. Magnetic compass
2. Electrical vario indicator (optional)
3. Airspeed indicator
4. Variometer
5. Altimeter
6. Electrical vario control (optional)
7. G-Meter or variable
8. Ball
9. Temperature (outside) or variable
10. Radio

17th March 1982
Rear seat

1 Stick
2 Rudder pedals
3 Airbrake lever and wheelbrake
4 Trim lever
5 Release knob
6 Canopy jettison

16th June 1982

25. Aug. 1982
Standard instrument positions (rear panel)

1. Altimeter
2. Airspeed indicator
3. Variometer
4. Electrical vario (optional)
5. Ball
6. Variable

17th March 1982

17. März 1982
IV. 2 Daily preflight inspection

1. a) Open canopy.
   b) Check the 4 wing fastenings inside the fuselage if locked.
   c) Visually check all controls inside the cockpit.
   d) Check for foreign bodies.
   e) Test controls for full and free movement.
   f) Check tire pressure 2.5 - 2.8 atm. = 35.6 - 39.8 PSI
   g) Check condition of both hooks.
   h) Check functioning of releases and wheel brake.

2. a) Check top and bottom of wing for damage
   b) Check ailerons for condition, freedom of movement and play
   c) Check airbrakes for condition, locking and fit.

3. Check fuselage for damage especially on the underside including landing gear and undercarriage suspension.

4. Check tail unit for correct assembly and that safety lock is in position.

5. Check condition of the tail wheel.
   Check the pilot tube, total energy venturi and static vents are clean.

6. Repeat step 3 for right side of fuselage.

7. Repeat step 2 for right wing.

8. Check condition of the nose wheel.

After heavy landings or excessive flight loads the entire glider should be checked. The wings and tailplane should be removed for these checks and if any damage is found an inspector should be consulted. The plane should not be flown before any damage is repaired.

26th sept. 1984 (ÄM 315-14/2)  Approved by LBA
Preflight Inspection Checkpoints
compare IV.-2

September 1981
IV. 3 Control checks before take off

1. Check all controls for full and free movement.
2. Check that the ballast limitations are being adhered to.
3. Check safety straps and parachute are firmly fastened.
4. Check altimeter is adjusted to zero or airfield height.
5. Check that transmitter is switched on and set to airfield frequency.
6. Check trim is neutral.
7. Check canopy is closed and locked.
8. Check airbrakes are closed and locked.
9. Rudder-pedals adjusted correctly and locked.

IV. 4 Take off

Winch launch
Trim lever should be in central position.
Maximum winch launch speed is 120 km/h (65 kts, 74 mph).
The glider has a release hook in front of the mainwheel.
Winch launches cause no difficulties at all allowed centre of gravity positions and wing loadings.
The plane has no tendency to balloon up or to swing on the ground.
One should push forward slightly on the stick below about 100 metres (330 ft.) in the case of fast launches from a powerful winch. When the cable slackens, pull the release firmly to its limit.

Aerotow
Trim lever should be in central position.
Maximum aerotow speed is 170 km/h (92 kts, 105 mph).
Aerotow should preferably use the nose hook.
The recommended length of tow rope is 40 — 60 m (120 — 200 ft.).
The glider can be controlled with coordinated rudder and aileron using full movements if required.
There is no tendency to swing in a strong crosswind.
The glider can be lifted off at about 70 km/h (38 kts, 44 mph).
The glider lifts off without assistance at a speed of about 80 km/h (44 kts, 50 mph) if the stick is kept in the neutral position.

The yellow release handle is mounted on the instrument panel and must be pulled to its limit when releasing.

17th March 1982
IV. 5 Free flight

It is possible to fly the glider over the entire speed range in all attitudes.

Full control movements are only allowed up to the manoeuvring speed 170 km/h (92 kts, 105 mph). At higher speeds the controls should be used with the appropriate care.

IV. 6 Slow flying and stalls

The glider gives clear warning when about to stall by a distinct shaking of the elevator.

The stalling speed depends on the wing loading and the condition of the plane. The following are guidelines:

<table>
<thead>
<tr>
<th>Single seater</th>
<th>Double seater</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>Weight</td>
</tr>
<tr>
<td>470 kg - 1036 lbs</td>
<td>580 kg - 1279 lbs</td>
</tr>
<tr>
<td>Without Airbrakes</td>
<td>Without Airbrakes</td>
</tr>
<tr>
<td>68 km/h (36 kts, 41 mph)</td>
<td>75 km/h (40.5 kts, 47 mph)</td>
</tr>
<tr>
<td>With Airbrakes</td>
<td>With Airbrakes</td>
</tr>
<tr>
<td>75 km/h (40.5 kts, 47 mph)</td>
<td>85 km/h (46 kts, 53 mph)</td>
</tr>
</tbody>
</table>

If the stick is pulled back further the glider goes into a controllable high rate of sink during which rudder and aileron turns can be flown at up to 15 degrees of bank. When the stick is released the glider returns to a normal flying attitude immediately.

After the stick is pulled back quickly the glider pitches nose down and the bank can still be controlled with aileron.

IV. 7 High speed flight

There is no tendency for flutter to develop within the permitted speed range. Above 170 km/h (92 kts, 105 mph) control movements should be restricted to 1/3 of full range. The airbrakes limit the speed to under VNE in a 45° dive even at maximum flying weight.
IV.8 Simple Aerobatics

The glider is licenced for the following aerobatics

1. Loop

   Entry speed: 180 km h (97 kts, 111 mph)
   Maximum g: ca. 3 g
   Exit speed: ca. 180 km h (97 kts, 111 mph)

2. Stall turn

   Entry speed: 180 km h (97 kts, 111 mph)
   At 140 km h (76 kts, 87 mph) slowly apply rudder.
   Shortly before the top apply opposite aileron.
   Note: The stall turn is difficult to carry out because
   of the high moment of inertia. If a tailslide is acci-
   dently initiated during the climb hold all controls in
   the centred position firmly.

3. Spin (possible in aft C.G. positions only)

   Preparation: Decrease speed slowly to 80 km h (43 kts.
   50 mph) pull stick back and apply full rudder. Glider
   spins slowly. Rotation rate is one turn every 3 seconds
   with a height loss of about 30 m (100 ft.) per turn. The gilder has
   no tendency to turn into a spiral dive. Recovery: opposite rudder,
   neutralise stick and recover gently.

17 th march 1982

17. März 1982
4. Chandelle

**Entry speed** 170 km/h (92 kts, 105 mph)

Pull up to fly 90° bank turn. During turn decrease speed and exit from turn with rudder and aileron. Chandelle should be completed heading in opposite direction.

5. Lazy Eight

**Entry speed** 140 km/h (76 kts, 87 mph)

IV. 9 Approach and landing

Normal flying practice is to approach at 95 km/h = 51 kts. The airbrakes are sufficiently powerful for steep approaches. The use of brakes causes the glider to be slightly nose heavy, so that the glider holds the required speed by itself.

Caution note:

- Fully extended the airbrakes increase the stalling speed: do not extend the airbrakes fully during the roundout to avoid heavy landings. Don't use the airbrakes to full extension during touch-down due to strong effect of the wheel-brake.

If the nosewheel touches the ground the direction can be controlled by rudder until 40 km/h (22 kts, 25 mph).

The side-slip is quite controllable and, if needed, this manoeuvre can be used for steeper approaches. It is effective by using a 15 degrees angle of side-slip and should be finished of a safe height (98 km/h; 54 kts; 61 mph). Rudder effect reversal have not been observed.

17th March 1982
The temporary control force to overcome the force reversal or rudder lock is calculated approximately 5 to 6 daN (rudder pressure). The aileron does not change its force direction, rather it returns independently from the full deflected position.

Rudder lock can be relieved without pilot input on the rudder. After moving the aileron into neutral position, the Sailplane rolls out of the Slip into wing level position. Thereafter the rudder frees itself from the full deflected position and the force reversal is relieved. Using this method to end the Slip the Sailplane does not adopt unusual flight attitudes and deviates only slightly from its original flight course.

IV. 10 Storage

When the glider is stored the canopy should be locked. To tie down the wing, a rope can be pulled through the wing tip skids.

17th March 1982
V. Appendices

V. 1 Flight Performance

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flying weight</td>
<td>450 (992) 580 (1279) kg (lbs)</td>
</tr>
<tr>
<td>Wing loading</td>
<td>25.3 (5.7) 32.8 (7.0) kg/m² (lbs/ft²)</td>
</tr>
<tr>
<td>Best glide Angle</td>
<td>36.5 37.0</td>
</tr>
<tr>
<td>at a speed of</td>
<td>95 (51) 105 (57) km/h (kt a)</td>
</tr>
<tr>
<td>Minimum sink</td>
<td>0.64 (126) 0.70 (138) m/sec (ft/min)</td>
</tr>
<tr>
<td>at a speed of</td>
<td>80 (43) 85 (46) km/h (kt a)</td>
</tr>
</tbody>
</table>

FLUGGESCHWINDIGKEIT (VELOCITY)

GESCHWINDIGEITSPOLARE (FLIGHT POLAR)

17 th march 1982
V. 2 Determination of the Center of Gravity

The determination of the center of gravity is made with the glider supported on two scales at heights such that an incidence board of 600 : 24 angle is set horizontal on the back of the fuselage. (Position on the fuselage see sketch at page 23). The reference plane lies at the front of the wing at the root. The distances a and b are measured with the help of a plumb line. The empty weight is the sum of the two weights $G_1$ and $G_2$.

The Center of Gravity of the pilots is located:
1150 mm (45.3 inch) in front of the Datum Line (1. Seat)
40 mm (1.6 inch) behind the Datum Line (2. Seat)
Procedure for determining C. of G. empty

Datum Line: Front edge of the wing at the root rib.

Level Means: With a 600:24 Incidence Board set up horizontal on the top of the rear fuselage.

Weight on main-wheel \( G_1 \) = kg / lbs
Weight on tail-skid \( G_2 \) = kg / lbs
Empty Weight \( G_L = G_1 + G_2 \) = kg / lbs
Distance to main-wheel \( a \) = mm / inches
Distance to tail-skid \( b \) = mm / inches

Empty Weight C. of G.

\[ X = \frac{G_2 \times b}{G_L} + a - \frac{\text{mm / inches behind Datum Line}}{\text{Datum Line}} \]

The measurements to determine the empty weight, the empty weight C. of G. and the loading limitations must always be taken with the glider empty.

Conversion: from kg to lbs multiply with 2.2
Conversion: from mm to inches multiply with 0.0394

17th March 1982
If the limits of the empty weight C. of G. positions and the loading limitations chart are adhered to the C. of G. of the loaded glider will be within the permitted range.

<table>
<thead>
<tr>
<th>Empty Weight</th>
<th>Range of C. of G. behind Datum</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Forward</td>
</tr>
<tr>
<td>kg</td>
<td>lbs</td>
</tr>
<tr>
<td>360</td>
<td>794</td>
</tr>
<tr>
<td>365</td>
<td>805</td>
</tr>
<tr>
<td>370</td>
<td>816</td>
</tr>
<tr>
<td>375</td>
<td>827</td>
</tr>
<tr>
<td>380</td>
<td>838</td>
</tr>
<tr>
<td>385</td>
<td>849</td>
</tr>
<tr>
<td>390</td>
<td>860</td>
</tr>
<tr>
<td>395</td>
<td>871</td>
</tr>
<tr>
<td>400</td>
<td>882</td>
</tr>
</tbody>
</table>

It should be noted that to make use of the maximum load the maximum admissible load for non-lifting parts must not be exceeded.

The weight of the non-lifting parts is the sum of the fuselage, tailplane and maximum load in the fuselage and must not exceed 400 kgs (882 lbs). Otherwise the maximum load permitted in the fuselage must be correspondingly decreased.

The Centre of Gravity should be recalculated after repair, repainting, the installation of additional equipment or when a period of 4 years has elapsed after the last weighing.

The empty weight, empty weight C. of G. position and maximum load, should be recorded after each weighing on page 9 of the Flight Handbook.

17th March 1982

[Signature]