FLIGHT MANUAL
for the powered sailplane STEMME S10-V

Document No.: A40-10-111
Date of Issue: Sept. 06, 1994

Pages identified by "LBA approved" are approved by the
Luftfahrt-Bundesamt, Federal Republic of Germany.
These pages are printed on yellow and red paper. Red colour indicates the emergency procedures.

(Signature)

(Stamp)

(Original date of approval)

Translation of this document and conversion of technical data have been done by best knowledge and judgement.

Model: STEMME S10-V
Type Certification Data Sheet: LBA No. 846
Serial number: 14-
Registration:

This powered sailplane is to be operated in compliance with information and limitations contained in this manual.

Non-standard equipment or systems with effect to the contents of this manual, if installed, are entered in the table on page ii.
Deviations from the Basic Flight Manual for the Model S10-V:

The aircraft specified below is fitted, in accordance with the entries in the list, with equipment or systems installed as an alternative to the equipment of the standard version. Resulting additional text has been included in the Flight Manual, the text passages relating to the standard version have been crossed out.

The procedure of amending the Manual in the case of installation of alternative equipment is described in Section 9.2.

The inspector certifies by his signature that this Flight Manual complies with the particulars stated in the following table and with the associated aircraft.

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* mark it if applicable
# 0.1 Record of Amendments

Any revision of the present manual must be recorded in the following table. Exempted are:

- Updated weighing data (page 6-1),
- Data relating to the installation of alternative equipment (page ii)
- Data relating to the installation of supplemental or additional equipment (section 9.3)

The list of effective pages (page iv) is assigned to the serial number.

Revisions of approved sections must be endorsed in the following list by the Luftfahrt-Bundesamt, FRG. Information as to which amendments must be included in the present Manual can be seen from the current Record of Airworthiness Directives and Service Bulletins (see Maintenance Manual, Annex B).

The new or amended text will be marked on the revised page by a black vertical line on the right hand margin; and the Amendment Number and the date will be shown on the right hand side in the headline of the page. In text passages concerned by the installation of alternative equipment, the text for both versions is included in [ ]; the text not applicable to the serial number concerned must be crossed out or the standard page is substituted by a alternative page (page number is added with "a"). For further information please refer to Section 9.2.

The inspector certifies by his signature at the same time the correct transfer of the information specific to the serial number (deletion of inapplicable text passages) and if needed substitution of alternative pages.

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* Amendments 1 and 2 are invalid. They are included in amendment 5.

** Only after installation of alternative equipment: Insertion of alternative pages (see section 0.2: "List of effective pages" and page ii).
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** Only after installation of alternative equipment: Insertion of alternative pages (see section 0.2: "List of effective pages" and page ii).
### 0.2 List of Effective Pages

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0.3 Contents

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Section 2 - Limitations
Section 3 - Emergency Procedures
Section 4 - Normal Operating Procedures
Section 5 - Performance
Section 6 - Mass and Balance
Section 7 - Description of the powered Glider and its Systems and Equipment
Section 8 - Handling, Servicing and Maintenance
Section 9 - Supplements
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1.4 Description and Technical Data 1-2
1.1 Introduction

This flight manual was compiled to give pilots and instructors all necessary information for a safe, appropriate and performance-optimised operation of the motor glider.

The manual includes all the data required to be furnished to the pilot by JAR-22. It further contains a number of other data and operating hints which may be useful to the pilot from the manufacturer's point of view.

For the conversion of technical data the following factors have been used:

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<td>1 hp</td>
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1.2 Certification Basis

This powered sailplane with the works reference STEMME S10 has originally been approved by the Luftfahrt-Bundesamt in accordance with Joint Airworthiness Requirements for Sailplanes and Powered Sailplanes JAR-22, effective through change 4.

The Type Certification No. 846 has been issued on Dec. 31, 1990.

The model Stemme S10-V is derived from the base type Stemme S10.

The model STEMME S 10-V is optional equipped with the variable pitch propeller 10AP-V or with the fix pitch propeller 10AP-F, derived from the variable pitch propeller, which replaces the original fixed pitch propeller 10AP-N of the basic model STEMME S10, and can be folded-in and covered by the nose cone just as that.

The Type Certificate for the model STEMME S 10-V has been issued on Sept. 16, 1994.

Category of Airworthiness: "Utility".

Noise Certification Basis for the model S10-V:

equipped with variable pitch propeller 10AP-V:
"Lärmsschutzforderungen für Luftfahrzeuge (LSL)" (Noise Protection Requirements for Aircraft; German equivalent to and based on the ICAO, Annex 16), dated 1.1.1991, published in the "Bundesanzeiger Jahrgang 43, No. 54a, dated 19.03.1991" (Federal Gazette, year 43), certification chapter VI.

equipped with fix pitch propeller 10AP-F:
"Lärmsschutzforderungen für Luftfahrzeuge (LSL)" (Noise Protection Requirements for Aircraft; German equivalent to and based on the ICAO, Annex 16), dated 1.1.1991, published in the "Bundesanzeiger Jahrgang 43, No. 54a, dated 19.03.1991" (Federal Gazette, year 43), certification chapter X.

1.3 Warnings, Cautions and Notes

Remarks in the manual of particular importance to flight safety and handling have been specially marked by use of one of the following terms:

**Warning:** means that the non-observation of the corresponding procedure leads to an immediate or important degradation of the flight safety.

**Caution:** means that the non-observation of the corresponding procedure leads to a minor or to a more or less long-term degradation of the flight safety.

**Note:** draws attention on any special item not directly related to safety but which is important or unusual.
1.4 Description and Technical Data

The STEMME S10-V is a two-seat high performance motor glider with an innovative propulsion concept and highly finished aerodynamic shape. The seats are arranged side-by-side (forward of the wing) and are equipped with dual controls.

The wing is mounted to the fuselage in the upper third. It consists of an inner wing with flaps and Schempp-Hirth air brakes and two outer wings with continuous ailerons.

The tailplane is designed as a "T"-type.

The two-wheel main landing gear can be retracted electrically and contains hydraulic brakes.

The engine is mounted in the fuselage in a central steel tubing frame near the aircraft’s Centre of Gravity. Engine power is transmitted via a prop shaft made of composites and a reduction gearbox to the jointed propeller in the fuselage nose. The propeller is folded in during soaring flight and covered by the movable nose cone (propeller dome).

Electrical heatable expansion joints actuate the variable pitch propeller 10AP-V from the take-off position to the cruise position. The movement back to the take off position after propeller control switch-off is realized by spring forces.

The fix pitch propeller 10AP-F is directly derived from the variable pitch propeller, where the same propeller blades 10AP-VB are used. They are fixed in the take off position of the variable pitch propeller.

One fuel tank is placed in each of the two outer sections of the inner wing.

Technical data:

- Length of fuselage: 27.6 ft. (8.42 m)
- Height: 5.74 ft. (1.75 m)
- Wing span: 75.5 ft. (23.00 m)
- Wing area: 201.72 sqft. (18.74 m²)
- Aspect ratio: 28.22
- Mean aerodynamic wing chord: 2.86 ft. (0.873 m)
- Airfoil: HQ 41/14.35 (laminar profile)
- Max. weight: 1874 lb. (850 kg)
- Max. wing loading: 9.29 lb./sqft. (45.36 kg/m²)
- Engine: Limbach L 2400 EB1 AD
- Gear box ratio: i = 1.18
- Propeller:
  - Variable pitch propeller: STEMME 10AP-V
  - Optional fix pitch propeller: Stemme 10AP-F
- Propeller diameter: 5.35 ft ± 0.12 in (1630 mm ± 3 mm)
- Propeller pitch:
  - Take-off setting (only 10AP-V): 2.99 ft (91.4 cm)
  - Cruise setting (only 10AP-V): 4.51 ft (137.6 cm)
- Angle of incidence of prop. blades (β, versus plane of rotation):
  - Take-off setting (only 10AP-V): 14.6°
  - Cruise setting (only 10AP-V): 21°
- Angle of incidence prop. blades (inspection limit) (only 10AP-V): -3.3°/ +3.1°
Section 2 - Limitations

2.1 Introduction 2-1
2.2 Airspeed 2-1
2.3 Airspeed Indicator Markings 2-2
2.4 Power-Plant 2-3
2.5 Power-Plant Instrument Markings 2-3
2.6 Masses (Weights) 2-4
2.7 Centre of Gravity 2-4
2.8 Approved Manoeuvres 2-4
2.9 Manoeuvring Load Factors (Maximum G-loading) 2-4
2.10 Flight Crew 2-4
2.11 Kinds of Operation 2-4
2.12 Minimum Equipment List 2-4
2.13 Fuel 2-5
2.14 Other Limitations 2-5
2.15 Cabin Placards with Operation Limits 2-6
   2.15.1 Instrumenten Panel Layout 2-6
   2.15.2 Cabin Placards with Operation Limits 2-7
2.1 Introduction

This section includes operating limitations, instrument markings and the information signs which are necessary for the safe operation of the motorglider, its engine, standard systems and standard equipment.

The operating limitations included in this section and in section 9 have been approved by the LBA.

2.2 Airspeed

The airspeed limitations and their importance for the use of the aircraft are shown as follows:

<table>
<thead>
<tr>
<th>Speed</th>
<th>IAS</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>$V_{NE}$</td>
<td>Never exceed speed (maximum permissible airspeed in calm weather, with flap positions $0^\circ$, $-5^\circ$ and $-10^\circ$ only)</td>
<td>146 knots 168 mph 270 km/h This speed must not be exceeded and the control movement must be not more than $1/3_{rd}$.</td>
</tr>
<tr>
<td>$V_{RA}$</td>
<td>Maximum airspeed in rough air</td>
<td>97 knots 112 mph 180 km/h Do not exceed this speed except in smooth air and then only with caution. Examples of rough air are lee-wave rotors, thunderclouds etc.</td>
</tr>
<tr>
<td>$V_{A}$</td>
<td>Calculated manoeuvring speed</td>
<td>97 knots 112 mph 180 km/h Above this limit the controls must not be moved fully or abruptly because the motorglider structure could be overstressed under certain conditions.</td>
</tr>
<tr>
<td>$V_{FE}$</td>
<td>Permissible maximum airspeed for operation of flaps: $\bullet$ positive position $+5^\circ$, $+10^\circ$ $\bullet$ Landing position L ($+16^\circ$)</td>
<td>97 knots 112 mph 180 km/h 76 knots 87 mph 140 km/h These airspeeds may not be exceeded in the flap position indicated.</td>
</tr>
<tr>
<td>$V_{LO}$</td>
<td>Permissible maximum airspeed for the operation of the landing gear</td>
<td>76 knots 87 mph 140 km/h At airspeeds in excess of this airspeed the landing gear may not be lowered or raised.</td>
</tr>
</tbody>
</table>
# 2.3 Airspeed Indicator Markings

The following table gives the airspeed indicator markings and the meaning of the colours (AUW = all-up weight).

<table>
<thead>
<tr>
<th>Marking</th>
<th>IAS (Value or Range)</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>White arc</td>
<td>46-97 knots 53-112 mph 85-180 km/h</td>
<td>Positive flap operation range. (Lower limit is 1.1 V_S0 in landing configuration with maximum AUW. Upper limit is the maximum airspeed with positive flap position.)</td>
</tr>
<tr>
<td>Green arc</td>
<td>49-97 knots 56-112 mph 90-180 km/h</td>
<td>Normal operating range. (Lower limit is speed 1.1V_S1 at max. AUW and most forward C.G. position with flaps neutral; upper limit is rough air speed.)</td>
</tr>
<tr>
<td>Yellow arc</td>
<td>97-146 knots 112-168 mph 180-270 km/h</td>
<td>Manoeuvres must be conducted with caution and only in smooth air.</td>
</tr>
<tr>
<td>L</td>
<td>76 knots 87 mph 140 km/h</td>
<td>Max. permissible airspeed with flaps in landing position and for landing gear operation.</td>
</tr>
<tr>
<td>Red line</td>
<td>146 knots 168 mph 270 km/h</td>
<td>Max. airspeed for all operations.</td>
</tr>
<tr>
<td>Blue line</td>
<td>62 knots 71 mph 115 km/h</td>
<td>Best rate of climb speed V_Y.</td>
</tr>
<tr>
<td>Yellow triangle</td>
<td>59 knots 68 mph 110 km/h</td>
<td>Approach speed at max. AUW.</td>
</tr>
</tbody>
</table>
2.4 Power-Plant

Engine manufacturer: LIMBACH Flugmotoren GmbH & Co. KG, Kotthausener Straße 5, D-53639 Königswinter, Germany

Engine type: L 2400 EB1.AD

Take-off power: 92.5 hp / 69 kW

Take-off rpm, max. permissible for 5 min.: 3400 rpm

Continuous rpm, max. permissible: 3000 rpm

Cylinder head temperature, max. permissible: 482°F / 250°C

Oil temperature, max. permissible: 248°F / 120°C

Oil pressure, minimum: 14.5 p.s.i. / 1 bar

Oil pressure, max. permissible: 101.5 p.s.i. / 7 bar

Lubricants and all other engine related data: refer to "Operating and Maintenance Manual LIMBACH L 2400 and series".

Propeller manufacturer: STEMME

Propeller type: 10AP-V

2.5 Power-Plant Instrument Markings

The following table shows the markings of the engine instruments and the meaning of the colours used.

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Red line = Minimum limit</th>
<th>Green arc = Normal Operating Range</th>
<th>Yellow arc = Caution Range</th>
<th>Red line = Maximum Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tachometer1) [rpm]</td>
<td>-</td>
<td>1200...3000</td>
<td>3000...3400</td>
<td>3400</td>
</tr>
<tr>
<td>Oil temperature2) [deg. C]</td>
<td>-</td>
<td>50...120</td>
<td>...50</td>
<td>120</td>
</tr>
<tr>
<td></td>
<td>[deg. F]</td>
<td>122...248</td>
<td>...122</td>
<td>248</td>
</tr>
<tr>
<td>Cyl. head Temp.2) [deg. C]</td>
<td>-</td>
<td>150...250</td>
<td>...150</td>
<td>250</td>
</tr>
<tr>
<td></td>
<td>[deg. F]</td>
<td>302...482</td>
<td>...302</td>
<td>482</td>
</tr>
<tr>
<td>Oil pressure3) [bar]</td>
<td>1</td>
<td>1...7</td>
<td>-</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>[p.s.i.]</td>
<td>14.5</td>
<td>14.5...101.5</td>
<td>101.5</td>
</tr>
<tr>
<td>Fuel quantity gauge:</td>
<td>&quot;0&quot; at white line = empty</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes:
1) reading error ± 50rpm
2) display in [° C]
3) display in [bar]
2.4 Power-Plant

Engine manufacturer: LIMBACH Flugmotoren GmbH & Co. KG, Kotthausener Straße 5, D-53639 Königswinter, Germany

Engine type: L 2400 EB1.AD

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Continuous rpm, max. permissible: 3000 rpm

Cylinder head temperature, max. permissible: 482°F / 250°C

Oil temperature, max. permissible: 248°F / 120°C

Oil pressure, minimum: 14.5 p.s.i. / 1 bar

Oil pressure, max. permissible: 101.5 p.s.i. / 7 bar

Lubricants and all other engine related data: refer to "Operating and Maintenance Manual LIMBACH L 2400 and series".

Propeller manufacturer: STEMME

Propeller type: 10AP-F

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The following table shows the markings of the engine instruments and the meaning of the colours used.

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</thead>
<tbody>
<tr>
<td>Tachometer</td>
<td>-</td>
<td>1200--3000</td>
<td>3000--3400</td>
<td>3400</td>
</tr>
<tr>
<td>Oil temperature</td>
<td>-</td>
<td>50--120</td>
<td>...50</td>
<td>120</td>
</tr>
<tr>
<td>Cyl. head Temp.</td>
<td>-</td>
<td>150--250</td>
<td>...150</td>
<td>250</td>
</tr>
<tr>
<td>Oil pressure</td>
<td>1</td>
<td>1--7</td>
<td>-</td>
<td>7</td>
</tr>
</tbody>
</table>

Fuel quantity gauge:
"0" at white line = empty
Red point (beyond "full" mark) means: "no electrical connection"

Notes:
1) reading error ± 50rpm
2) display in [°C]
3) display in [bar]
2.6 Masses (Weights)

maximum permissible take-off weight: 1874 lb. / 850 kg
maximum permissible landing weight: 1874 lb. / 850 kg
maximum mass of all non-lifting parts: 1256.5 lb. / 570 kg
maximum mass in luggage compartment: 48.5 lb. / 22 kg

2.7 Centre of Gravity

The limits of the in-flight centre of gravity are:
• forward limit: 10 in. / 254 mm aft of reference plane
• rear limit: 16.5 in. / 420 mm aft of reference plane

In this the reference plane is the vertical reference plane which contains the leading edge of the inner wing at given angle of the longitudinal axis (refer to maintenance manual).

2.8 Approved Manoeuvres

The motorglider is certificated in the "Utility" category (normal soaring flight).

2.9 Manoeuvring Load Factors (Maximum G-loading)

The following manoeuvring load factors (g) must not be exceeded:
• up to manoeuvring speed 97 kts / 180 km/h: positive: 5.3 g; negative: 2.65 g.
• up to maximum airspeed 146 kts / 270 km/h: positive: 4.0 g; negative: 1.5 g.

2.10 Flight Crew

The crew of the S10 consists of 2 persons; the lowest crew number is one person.
(For solo operations): When operated solo, the left seat is for the pilot in charge.

2.11 Kinds of Operation

• Flights according to VFR by day.
• Flights in IFR and/or icing conditions are not permitted.
• Aerobatics and cloud flying are not permitted.
• For VFR-Night Flights a additional equipment is required within the provisions of the national law. Required base for VFR-Night Flights is the accomplishment of the Stemme SB A31-10-072.

Caution: Night flights are limited to the vicinity of active airfields that are approved for night flight operation (range of glide ratio).

2.12 Minimum Equipment List

1 Airspeed indicator
1 Altimeter
1 Stall warning system
1 Magnetic direction indicator
1 Tachometer
1 Take-off pitch position indicator (green light, indicating that the propeller blade pitch required for take-off is reached)
2.6 **Masses (Weights)**

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- maximum mass of all non-lifting parts: 1256.5 lb. / 570 kg
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2.12 **Minimum Equipment List**

1. Airspeed indicator
2. Altimeter
3. Stall warning system
4. Magnetic direction indicator
5. Tachometer
1 Engine elapsed time indicator
1 Oil pressure indicator
1 Oil temperature indicator
2 Fuel quantity indicators
1 Cylinder head temperature indicator
2 Four-element straps
1 Parachute or back-cushion (2.0 in / 50 mm compressed) per pilot
1 Starter Relay Warning Light (UK CAA requirement)

2.13 Fuel

Total capacity of fuel tanks (±5%):
1 [2 times 9.9 Imp. gal / 45.0 l] \(^1\)
2 [2 times 13.2 Imp. gal / 60.0 l] \(^3\)

Unusable fuel quantity
1 2 times 0.3 Imp. gal / 1.5 l

Permissible octane rating and fuel types:

- AVGAS 100 LL, aviation fuel
- MOGAS (or car fuel super grade, min. 96 OCT. (RON)

The engine manufacturer recommends that at temperatures in excess of 68°F / 20°C. only AVGAS 100LL is used.

When stowing the aircraft for longer than one month it is recommended to drain the tank if MOGAS has been used. MOGAS or car fuel have varying compositions, and it is not known how this might affect the long term service life of the tanks.

2.14 Other Limitations

As an upper limit for the operation of the variable pitch propeller a temperature of 100°F(+38°C) has been proved. The pitching mechanism is managed by heating or cooling of two thermo-elements and is influenced by OAT. It starts actuating at 131°F (55°C). For this reason the green blade position indicator is to be observed during take-off. Launching should not be attempted if the indicator is not illuminated.

The only permitted colour for the aircraft exterior painting is white due to the necessity of protecting the structure from high temperatures caused by sunlight (approved up to 129°F). For coloured warning paintings the areas of the propeller dome and the wing tips or optional installed winglets are to be used.

For the glazing of the canopy the use of material of an accepted type is permitted only. The luminous transmittance value of these materials may not be less than 70 per cent and colours may not be falsified. These characteristics may not be reduced by the use of tinted canopies.

The luggage load must not exceed 22 lb. (10 kg) in each of the compartments at the sides of the cabin and 4.4 lb. (2 kg) in the centre compartment. Single pieces weighing more than 1.1 lb. must be fastened securely and must load the bottom of the luggage compartment on a sufficient area.

\(^1\) (s) Standard, \(^a\) when equipped with enlarged fuel tanks according to Modification Bulletin A30-92-077. The text which does not apply to the specific A/C is to be struck out.
1 Engine elapsed time indicator
1 Oil pressure indicator
1 Oil temperature indicator
2 Fuel quantity indicators
1 Cylinder head temperature indicator
2 Four-element straps
1 Parachute or back-cushion (2.0 in / 50 mm compressed) per pilot
1 Starter Relay Warning Light (UK CAA requirement)

2.13 Fuel
Total capacity of fuel tanks (±5%): 
[2 times 9.9 Imp. gal / 45.0 l]\(^{1s}\)
[2 times 13.2 Imp. gal / 60.0 l]\(^{3a}\)

Unusable fuel quantity 2 times 0.3 Imp. gal / 1.5 l

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\(^{1s}\) Standard, \(^{3a}\) when equipped with enlarged fuel tanks according to Modification Bulletin A30-92-077. The text which does not apply to the specific A/C is to be struck out.
2.15 Instrumenten Panel Layout and Cabin Placards with Operation Limits

2.15.1 Instrumenten Panel Layout

This section provides a figure of the instrumenten panel displaying any fixed elements.

![Diagram of Instrument Panel]

Fig. 2—1 Arrangement of the instrumenten panel
2.15.2 Cabin Placards with Operation Limits

This section provides cabin placards with operation limits and their location in the cockpit.

Note: Other cabin placards see Maintenance Manual! (Doc.-No.: A40-10-121)

Fig. 2-2: Placards position in the cockpit
Manufacturer: STEMME GmbH & Co. KG
Type: STEMME S10 Model: S10-V
Serial No.: 14-
Year of Constr.: 

Certificated for:
Never exceed Speed: \( V_{NE} \) 146 kts
Manoeuvring Speed: \( V_A \) 97 kts
Rough Air Speed \( V_{RA} \) 97 kts
Flaps Extended Speed \( V_{FE} \) 97 kts
L Position (+16°) \( V_{LO} \) 76 kts

Empty Weight: \( \) kg
Max. Take-Off Weight: \( 850 \) kg
Min. Seat Load: \( \) kg, otherwise Ballast
Max. Load (both seats together): \( \) kg

Tyre inflation press. Main Wheel: \( 46,5 \) p.s.i.
Tyre inflation press. Tail Wheel: \( 41 \) p.s.i.

Preflight Check:
1. Pressure Probe mounted
2. Parachute fastened
3. Seat Belts fastened
4. Cowl Flaps open
5. Prop. Pitch Control TAKE-OFF
6. Altimeter set
7. Control Functions checked
8. Airbrakes closed and locked
9. Flaps in + 5° Position
10. Sufficient Amount of Fuel
11. Both Fuel Cocks open
12. Electr. Fuel Pump on
13. Canopy closed/locked (LH / RH /rear top)

Emergency Landing Gear Operation:
Pull T-Grips (rear top)
Sequence: 1 – 2

Emergency Landing Gear Operation:
Pull T-Grips (rear top)
Sequence: 1 – 2

1. On the Centre Console
2. Instrument panel (near Air speed indicator)
3. and 5 Baggage compartment (behind LH and RH Seat)
4. Baggage compartment (rear top)

\[ \begin{array}{|c|c|}
\hline
[ft MSL] & [kts] \\
\hline
10.000 & 139 \\
13.000 & 132 \\
16.500 & 125 \\
19.500 & 118 \\
26.000 & 105 \\
33.000 & 93 \\
39.500 & 81 \\
\hline
\end{array} \]

[ ]\( ^1a \)

\( (s) \) Standard, \( (a) \) if Wide Tyre installed. Not applicable text must be crossed out.

baggage
max. 10 kg

Baggage
Only light items
Total: max. 2 kg
Manufacturer: STEMME GmbH & Co. KG  
Type: STEMME S 10  
Model: S10-V  
Serial No.: 14-  
Year of Constr.:  

Certificated for:
Never exceed Speed: $V_{NE}$ 146 kts  
Manoeuvring Speed: $V_A$ 97 kts  
Rough Air Speed $V_{RA}$ 97 kts  
Flaps Extended Speed $V_{FE}$ 97 kts  
L Position (+16°) 76 kts  

Land. Gear Operation Speed $V_{LO}$ 76 kts  

Preflight Check:
1. Pressure Probe mounted  
2. Parachute fastened  
3. Seat Belts fastened  
4. Cowl Flaps open  
5. Altimeter set  
6. Control Functions checked  
7. Airbrakes closed and locked  
8. Flaps in + 5° Position  
9. Sufficient Amount of Fuel  
10. Both Fuel Cocks open  
11. Electr. Fuel Pump on  
12. Canopy closed/locked (LH / RH /rear top)  

Emergency Landing Gear Operation:
Pull T-Grips (rear top)  
Sequence: 1 – 2  

<table>
<thead>
<tr>
<th>[ft MSL]</th>
<th>[kts]</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.000</td>
<td>139</td>
</tr>
<tr>
<td>13.000</td>
<td>132</td>
</tr>
<tr>
<td>16.500</td>
<td>125</td>
</tr>
<tr>
<td>19.500</td>
<td>118</td>
</tr>
<tr>
<td>26.000</td>
<td>105</td>
</tr>
<tr>
<td>33.000</td>
<td>93</td>
</tr>
<tr>
<td>39.500</td>
<td>81</td>
</tr>
</tbody>
</table>

---

1s Instruments panel (near Air speed indicator)  
2 Baggage max. 10 kg  
3 and 5 Baggage compartment (behind LH and RH Seat)  
4 Baggage compartment (rear top)  

---

1(s) Standard, (a) if Wide Tyre installed. Not applicable text must be crossed out.
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3.7 Flight under Icing Conditions 3-2
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3.11 Emergency Landing 3-3
   3.11.1 Emergency Landing with Retracted Landing Gear 3-3
   3.11.2 Emergency Landing with only one Landing Gear Leg deployed 3-3
   3.11.3 Emergency Landing on Water (Ditching) 3-4
3.12 Systems Malfunctions 3-4
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   3.12.3 Fuel Pump Malfunctions 3-5
   3.12.4 Propeller Pitch Control Malfunctions 3-5
   3.12.5 Propeller Vibrations 3-6
   3.12.6 Landing Gear Malfunctions - Emergency Let-Down 3-6
   3.12.7 Main Electrical Supply Malfunction 3-6
   3.12.8 Generator Malfunctions 3-7
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3.8 Take-Off Interrupt 3-2a
3.9 deleted
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   3.12.4 deleted
   3.12.5 Propeller Vibrations 3-6a
   3.12.6 Landing Gear Malfunctions - Emergency Let-Down 3-6a
   3.12.7 Main Electrical Supply Malfunction 3-6a
   3.12.8 Generator Malfunctions 3-7a
3.1 Introduction

Section 3 provides checklists and amplified procedures for coping with emergencies that may occur.
Remark: The abbreviation **PPC** is used for **Propeller Pitch Control**.

3.2 Canopy Jettison

- **Canopy lock:** OPEN left and right levers (do not open the rear top one!)
- **Pull red emergency canopy release handle** (centre of instrument console)
- **The canopy will be pushed upwards by a gas spring. If necessary push manually.**

**Warning:** The rear canopy lock must be locked when the canopy is jettisoned! It functions such that the canopy is only lifted at the front and is torn away by wind forces.

3.3 Bailing out

- Release central lock of straps after canopy jettison.
- Bail out sideways, if possible pushing away from underneath wing to avoid collision with tail plane.

3.4 Stall Recovery

The occurrence of stall depends on the wing-flap setting and the take-off mass; be aware of stall effects beginning with 46 kts (53 mph / 85 km/h).

Beginning of stall (wings level as well as in turning flight) can be recognised by:
- During powered flight: acoustic signal by the electric stall warning device.
- During soaring flight: clearly distinguishable buffeting of the control stick.

If in a deep stall the stick is not moved forward and therefore the effective angle of attack continues to be increased, a rolling motion and, dependent on the C.G. position, spin can occur.

Method of stall recovery:
- Move stick forward and wait for speed increase
- Level the wings with ailerons and rudder.

3.5 Spin Recovery

Spin of the STEMME S10 is stopped by a standard recovery manoeuvre:
- Apply rudder opposite to the turn
- Move stick forward until turning stops
- Centralise rudder
- Pull out of dive with caution.

A maximum loss of height per spin-turn of 500 ft (150 m) must be considered.

Spinning with the flaps in "L" position is not allowed for structural reasons. If tendencies of spin occur in this configuration push flap lever to position (+10°) or further and stop spinning by standard spin recovery manoeuvre.

**Note:** With a rear C.G. position the spinning is accompanied by pitching movements.
3.6 Spiral Dive Recovery

In middle and forward C.G. positions the aircraft has tendencies to go directly or after some spinning-turns into a spiral dive.

Spiral dive is stopped by the following manoeuvre:
- stop the rotation with aileron and rudder together against turning direction;
- pull out of dive with caution (observe airspeed).

Warning: Do mind the never exceed airspeed $V_{NE} = 146$ kts (168 mph / 270 km/h) during pull out!

Note: If the aircraft stops spinning by itself, it can be in a spiral dive afterwards.

3.7 Flight under Icing Conditions

Flights under icing conditions are not recommended. Nevertheless if you find yourself without intention in atmospheric zones with icing conditions remember the following: Under icing conditions ice particles can accumulate on wing, empennage, control surfaces and propeller blades, especially on flights in high altitudes. Additionally the visibility can be seriously impaired by ice accumulation on the canopy surface.

It is recommended to start immediately an emergency descent to lower flight levels by the following actions:
- Engine IDLE
- Airbrakes EXTENDED
- Landing gear LOWERED (mind the speed limit: 75 kts / 87 mph / 140 km/h)

Warning: Ice accumulation can put up stall speeds and influence flutter behaviour.

3.8 Take-Off Interrupt

If a take-off interrupt is urgently required during rolling for technical or traffic control reasons, the following actions are recommended:
- Throttle CLOSED (pulled)
- Airbrakes EXTENDED
- Elevator control PULLED to lower the tail
- Wheel brakes ACTIVATED with caution

Warning: If the remaining runway is too short and not free of obstacles:
Shut fuel cocks and set ignition OFF.

3.9 Overshooting in Landing Configuration with Propeller in Cruise Position

If an overshooting in landing configuration for reasons of safety is necessary and the variable pitch propeller is not in position TAKE OFF as usually required (i.e. green pitch position indicator is not illuminated) set the following actions:
- Engine FULL POWER
- Airbrakes CLOSED and LOCKED
- Elevator control PULL moderately to change to a shallow climb angle
- Landing gear RETRACTED
- Flaps - change to position +5°
- PPC switch position TAKE-OFF

Recommended airspeed for overshooting with propeller in cruise position 64kts / 74mph / 120km/h.
3.6 Spiral Dive Recovery

In middle and forward C.G. positions the aircraft has tendencies to go directly or after some spinning-turns into a spiral dive.

Spiral dive is stopped by the following manoeuvre:
• stop the rotation with aileron and rudder together against turning direction;
• pull out of dive with caution (observe airspeed).

Warning: Do mind the never exceed airspeed $V_{NE}=146$ kts (168 mph / 270 km/h) during pull out!

Note: If the aircraft stops spinning by itself, it can be in a spiral dive afterwards.

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Flights under icing conditions are not recommended. Nevertheless if you find yourself without intention in atmospheric zones with icing conditions remember the following: Under icing conditions ice particles can accumulate on wing, empennage, control surfaces and propeller blades, especially on flights in high altitudes. Additionally the visibility can be seriously impaired by ice accumulation on the canopy surface.

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• Airbrakes EXTENDED
• Elevator control PULLED to lower the tail
• Wheel brakes ACTIVATED with caution

Warning: If the remaining runway is too short and not free of obstacles:
Shut fuel cocks and set ignition OFF.

3.9 deleted
3.10 Off-field Landing

If an off-field landing is necessary for technical or flight safety reasons, be careful in the choice of the landing field in respect to the conditions and load bearing capabilities of the ground.

If the load bearing capabilities of the ground are considered sufficient a landing in the sailplane configuration according to actions described in sections 4.5.4 and 4.5.5 is recommended.

A landing in deep ground with weak load bearing capabilities is associated with considerable risks; if the landing nevertheless is unavoidable a prior retraction of the landing gear is recommended to minimise the risks. (see section 3.11.1)

3.11 Emergency Landing

3.11.1 Emergency Landing with Retracted Landing Gear

In all cases in which serious landing gear malfunctions cannot be corrected by an emergency deployment, as well as in unavoidable off-field landings with deep ground, a landing with retracted landing gear is recommended in the following sequences:

- Fuel cocks SHUT
- Ignition OFF (if possible wait until carburettor reservoirs are empty)
- Wing flaps +10°
- Approach path shallow path angle, if possible without the use of airbrakes in the final stages.
- Elevator control pull moderately for a smooth pull-out to avoid stalling.

Warning: In a landing with retracted landing gear the energy absorption is a minimum compared to a normal landing, therefore in all cases allow a safety margin above minimum speeds to avoid stalling.

3.11.2 Emergency Landing with only one Landing Gear Leg deployed

Landings on only one wheel have been carried out several times without damage to pilot and aircraft.

In all cases in which serious landing gear malfunctions cannot be corrected and the landing gear position indicator lights show only one landing gear leg deployed, try to get confirmation on this status by a ground station or another aircraft.

For a one-wheel landing the following actions are recommended (landing in gliding configuration!):

- Fuel cocks SHUT
- Ignition OFF (if possible wait until carburettor reservoirs are empty)
- Propeller RETRACTED
- Wing flaps position L
- Elevator control pull moderately for a smooth pull-out
- Level horizon with aileron and rudder controls during rolling on the landing field.
- Be aware of wing-dropping and a turn in the final stage of rolling - allow sufficient space.
3.11.3 Emergency Landing on Water (Ditching)

An emergency landing on water is accompanied with risks and should only be undertaken as last possibility.

If a ditching is unavoidable, it is recommended to land in the sailplane configuration and, due to the special design of the landing gear, with the landing gear retracted.

Caution: Be aware that a sailplane has the tendency to dive into the water instead of gliding on its surface and that the cockpit is pressed shut under the water surface.

3.12 Systems Malfunctions

3.12.1 Engine Malfunctions

An engine malfunction due to carburettor icing has not been assessed up to now, because preheated induction air is taken directly from the engine compartment.

After an engine malfunction during cruise flight the following checks and actions are recommended:

• Fuel reserves: CHECKED
• Fuel cocks: both OPEN
• Electrical fuel pump: ON (filling of fuel lines takes up to 5 min.)
• Circuit breaker fuel pump: CHECKED
• Fuel Backup-System: ON (on the right side of panel, ventilation process takes up to 5 min.)
• Re-start engine with normal in-flight starting procedure (see sect. 4.5.3).
• Be prepared for off-field landing or landing on the next airfield, if re-start is not possible.

Caution: When re-starting engine in flight: Propeller may turn despite non-running engine because both are separated by the centrifugal clutch. Check the rev-counter for indicated engine revolutions.

If when trying to restart the engine in flight the starter does not work, this may be due to pilot error or to a malfunction of the engine master switch (which is coupled with the propeller dome locking mechanism).

Act as follows:

• Check if ignition switch is OFF. After an unsuccessful engine restart the ignition must be switched off for a short time (otherwise the starter will not operate).
• Check if propeller-dome actuation lever is locked in forward position. Try to push grip down. Correct position is confirmed if voltmeter indicates at least 12 V and red charging light is illuminated.
• If starter still does not respond the engine master switch may be by-passed by setting the engine bus back-up switch (on the very right hand side of the instrument panel). For this action the locking pin must be removed first.
• If it is still impossible to start engine prepare for an off-field landing.

3.12.2 Fire

If during operation of the aircraft smoke or smell of burning can be observed, the following procedure is recommended:

During flight:

• Fuel cocks: both CLOSED
• Main switch: OFF
• Engine: FULL THROTTLE (in order to empty fuel lines and carburettor reservoir)
• Emergency descent immediately introduced: Airbrakes deployed, Landing gear extended.
• Be prepared for off-field landing.

1 (a) fuel backup system installed according to SB A31-10-006. Not applicable text must be cross out.
(in US and France mandatory)
Burning of electrical wires in the cockpit:
- Main switch OFF
- Cockpit ventilation ON (open window and nozzle)
- Maintain engine shaft speed (will increase gradually due to propeller pitch alteration)
- Approach next airfield
- Landing gear EMERGENCY operating handle (mechanical)

Caution: By switching off the main switch radio communication as well as the function of all electrical driven instrumentation will be cut off. If there is no fire detected in the engine compartment the flight may be continued in powered configuration until the emergency landing field is reached. Be aware of the facts that the engine instruments (with exception of the cylinder head temperature gauge) will be out of action and the propeller will alter its pitch angle to take-off position automatically within 2 - 5 min. (this is also not indicated).

On ground:
- Fuel cocks both CLOSED
- Main switch OFF
- Engine FULL THROTTLE (in order to empty fuel lines and carburettor reservoir)
- Interrupt Take-off

3.12.3 Fuel Pump Malfunctions
A malfunction of one of the two fuel pumps causes an engine breakdown, if only one fuel cock is opened. In this case the procedure described in section 3.12.1 (Engine Malfunctions) is recommended:
- Fuel reserves CHECKED
- Fuel cocks both OPEN
- Electrical fuel pump ON (filling of fuel lines takes up to 5 min.)
- Circuit breaker fuel pump CHECKED
- Fuel Backup-System: ON (on the right side of panel, ventilation process takes up to 5 min.)
- Re-start engine with normal in-flight starting procedure (see sect. 4.5.3).
- Be prepared for off-field landing or landing on the next airfield, if re-start is not possible.

Caution: When re-starting engine in flight: Propeller may turn despite non-running engine because both are separated by the centrifugal clutch. Check the rev-counter for indicated engine revolutions.

3.12.4 Propeller Pitch Control Malfunctions
In case of a malfunction of the propeller pitch control the propeller blades go to take-off position, which is the lowest possible pitch position. No unsafe situation is caused by this failure, the following procedure is recommended:
- Check circuit breaker of propeller pitch control
- If necessary continue flight in take-off position

Caution: Cruise flight with propeller in take-off position reduces the flight speed and the range (Reconsider your filed flight plan).

---

1 (a) fuel backup system installed according to SB A31-10-006. Not applicable text must be cross out.
(in US and France mandatory)
Burning of electrical wires in the cockpit:
- Main switch \textbf{OFF}
- Cockpit ventilation \textbf{ON} (open window and nozzle)
- Maintain engine shaft speed (will increase gradually due to propeller pitch alteration)
- Approach next airfield
- Landing gear \textbf{EMERGENCY} operating handle (mechanical)

\textbf{Caution:} By switching off the main switch radio communication as well as the function of all electrical driven instrumentation will be cut off. If there is no fire detected in the engine compartment the flight may be continued in powered configuration until the emergency landing field is reached. Be aware of the facts that the engine instruments (with exception of the cylinder head temperature gauge) will be out of action.

On ground:
- Fuel cocks both \textbf{CLOSED}
- Main switch \textbf{OFF}
- Engine \textbf{FULL THROTTLE} (in order to empty fuel lines and carburettor reservoir)
- Interrupt Take-off

\textbf{3.12.3 Fuel Pump Malfunctions}
A malfunction of one of the two fuel pumps causes an engine breakdown, if only one fuel cock is opened. In this case the procedure described in section 3.12.1 (Engine Malfunctions) is recommended:
- Fuel reserves \textbf{CHECKED}
- Fuel cocks both \textbf{OPEN}
- Electrical fuel pump \textbf{ON} (filling of fuel lines takes up to 5 min.)
- Circuit breaker fuel pump \textbf{CHECKED}
- Fuel Backup-System: \textbf{ON} (on the right side of panel, ventilation process takes up to 5 min.)
- Re-start engine with normal in-flight starting procedure (see sect. 4.5.3).
- Be prepared for off-field landing or landing on the next airfield, if re-start is not possible.

\textbf{Caution:} When re-starting engine in flight: Propeller may turn despite non-running engine because both are separated by the centrifugal clutch. Check the rev-counter for indicated engine revolutions.

\textbf{3.12.4 deleted}

\footnote{\textsuperscript{1} (a) fuel backup system installed according to SB A31-10-006. Not applicable text must be cross out. (in \textbf{US} and \textbf{France} mandatory)}
3.12.5 Propeller Vibrations
Excessive vibrations of the propeller can be caused by a local damage of the propeller or an unsteady rotation of the engine. It is recommended immediately to reduce the rotational speed of the engine. If the vibration still continues, the following procedure is recommended:

- Engine IDLE
- Ignition OFF
- Airspeed reduce to about 62 kts / 71 mph / 115 km/h
- Propeller pull brake, position propeller, pull back and lock propeller dome
- Be prepared for off-field landing or landing on the next airfield.

3.12.6 Landing Gear Malfunctions - Emergency Let-Down
The landing gear down condition is confirmed by "GREEN" on both landing gear indicators. If this is not the case after a usual time for gear lowering of up to max. 45 sec., the following procedure is recommended.

- check circuit breaker (next to switch) and push if necessary. If this is not successful:
- Operate LANDING GEAR EMERGENCY RELEASE. For this purpose two handles are found on the cockpit rear wall between the pilot's heads (T-grips labelled 1 and 2).

Caution: For an unimpeded emergency lowering the following sequence has to be adhered to strictly!

- Main landing gear lever NEUTRAL
- pull T-grip No. 1 forcefully (RH in direction of flight); wait for locking kick - right landing gear leg is lowered.
- pull T-grip No. 2 forcefully (LH in direction of flight); wait for locking kick - left landing gear leg is lowered.
- The lowered condition is to be confirmed by observers on the ground.
- If the landing gear is not fully deployable, even manually, an emergency landing according to section 3.11.1 or 3.11.2 is to be carried out.

Caution: Re-retracting of the landing gear is not possible after an emergency deployment.

3.12.7 Main Electrical Supply Malfunction
A malfunction of the main electrical supply can be caused by short circuit in one of the different system circuits. In this case the radio communication and all electrical driven instruments except of the cylinder head temperature gauge are cut off. The supply for the electrically driven propeller pitch control is interrupted and the propeller blades move automatically into take-off position. However the take-off pitch position will not be indicated. The following procedure is recommended:

- Main circuit breaker CHECK (pull and push the breaker)
- Engine rotational speed OBSERVE (rpm increases gradually due to change in propeller pitch)
- Be prepared for a landing on the next airfield
- Landing gear lower by operating mechanical EMERGENCY GRIPS

Caution: Information about engine shaft speed will be available only acoustically or by the relation of IAS to throttle setting (depending on pilot's experience). Avoid engine overspeeding!
3.12.5 Propeller Vibrations

Excessive vibrations of the propeller can be caused by a local damage of the propeller or an unsteady rotation of the engine. It is recommended immediately to reduce the rotational speed of the engine. If the vibration still continues, the following procedure is recommended:

- Engine IDLE
- Ignition OFF
- Airspeed reduce to about 62 kts / 71 mph / 115 km/h
- Propeller pull brake, position propeller, pull back and lock propeller dome
- Be prepared for off-field landing or landing on the next airfield.

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The landing gear down condition is confirmed by “GREEN” on both landing gear indicators. If this is not the case after a usual time for gear lowering of up to max. 45 sec., the following procedure is recommended.

- check circuit breaker (next to switch) and push if necessary. If this is not successful:
- Operate LANDING GEAR EMERGENCY RELEASE. For this purpose two handles are found on the cockpit rear wall between the pilot's heads (T-grips labelled 1 and 2).

Caution: For an unimpeded emergency lowering the following sequence has to be adhered to strictly!

- Main landing gear lever NEUTRAL
- pull T-grip No. 1 forcefully (RH in direction of flight); wait for locking kick - right landing gear leg is lowered.
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- The lowered condition is to be confirmed by observers on the ground.
- If the landing gear is not fully deployable, even manually, an emergency landing according to section 3.11.1 or 3.11.2 is to be carried out.

Caution: Re-retracting of the landing gear is not possible after an emergency deployment.

3.12.7 Main Electrical Supply Malfunction

A malfunction of the main electrical supply can be caused by short circuit in one of the different system circuits. In this case the radio communication and all electrical driven instruments except of the cylinder head temperature gauge are cut off.

The following procedure is recommended:

- Main circuit breaker CHECK (pull and push the breaker)
- Engine rotational speed OBSERVE
- Be prepared for a landing on the next airfield
- Landing gear lower by operating mechanical EMERGENCY GRIPS

Caution: Information about engine shaft speed will be available only acoustically or by the relation of IAS to throttle setting (depending on pilot’s experience). Avoid engine overspeeding!
3.12.8 Generator Malfunctions

A malfunction of the generator is indicated by illumination of the red charge indicator light during engine operation. This causes a gradual battery discharge which is delayed by switching off electrical consumers that have a minor priority or a high energy consumption. The propeller pitch control will be switched off by an installed protection device and will move to take-off position automatically within 2-5 min. (observe indicator light). The propeller pitch control switch will not work! In this case the following procedure is recommended:

- Generator circuit-breaker CHECK - push if released
- Electrical circuits not necessary for flight OFF
- Be prepared for landing on the next airfield.

Caution: Cruise flight with propeller in take-off position reduces the flight speed and the range (Reconsider your filed flight plan!). Generator failure has no effect on engine operation.
3.12.8 Generator Malfunctions

A malfunction of the generator is indicated by illumination of the red charge indicator light during engine operation. This causes a gradual battery discharge which is delayed by switching off electrical consumers that have a minor priority or a high energy consumption. The propeller pitch control will be switched off by an installed protection device and will move to take-off position automatically within 2-5 min. (observe indicator light). The propeller pitch control switch will not work! In this case the following procedure is recommended:

- Generator circuit-breaker CHECK - push if released
- Electrical circuits not necessary for flight OFF
- Be prepared for landing on the next airfield.

Caution: Generator failure has no effect on engine operation.
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4.1 Introduction

This section provides a checklist as well as a description of the normal operating procedures. For normal operating procedures in connection with supplemental or additional equipment please refer to section 9.

Remark: The abbreviation PPC is used for Propeller Pitch Control.

4.2 Rigging and De-Rigging

4.2.1 Fuselage

- clean and grease all bolts and bushings as well as the control connections.
- Place fuselage on lowered landing gear. Examine locking of folding struts of the landing gear legs.
- Put flap lever in position "L".
- Remove side cowlings and the cover between the wings.

4.2.2 Wing

- Rest inner wing on the fuselage. Take care not to jam fuel lines and connecting cables.
- Insert wing pins with operating lever (on-board tools) against the stop in the bushings of the inner wing and secure.
- Connect the operating rods for flaps, aileron and air brake on both sides and secure push-wedges of the quick connectors with spring pin through the control pinholes.
- Connect wing tank quick connectors to the fuselage mounted fuel lines. To guarantee good sealing, the connecting elements must be clean.

Caution: Pay attention to correct (i.e. audible) engagement of the connection. Pull to test for secure fit!

- Insert plug for the electrical connector of the fuel sender unit into the bushing in the wing root rib; lock bayonet connector.
- Push left wing into the spar pocket of the inner wing leaving 40 mm. disengaged.
- Connect aileron push rods and secure the push wedge of the quick connector with a spring pin through the control pinhole. If position lights are fitted, plug in connectors.
- Push outer wing in further and observe the engagement of the wing pin in the bushings of the inner wing. When bolts are snugly fitted to the bushings, insert the main bolt fore-aft using the rigging tool and push until the safety pin is in line with the opening in the main bolt. Extract the rigging tool. The safety pin, which is sticking out on the upper side of the wing will then insert itself under spring load and fits flush with the upper side of the wing to secure the main bolt of the outer wing.

Caution: The main bolt of the wing connection is secured by a safety pin, that immerses completely in the contour of the upper surface of the wing in the secured position. The safety pin must not protrude above the surface!

- Proceed in same manner when rigging right outer wing.

4.2.3 Horizontal Tail

- The elevator is provided with an automatic connector. It is pushed from the front on to the fuselage centring bolts until the front fitting tongue fits into the receptacle slot. Then unlock the receptacle with the on-board rigging tool, push the tailplane downwards into the fitting until the spring bolt is freed. The spring bolt must engage. It must not stick out beyond the leading edge of the fin. Only then the connection is secure.
- Additionally the correct fitting of the tailplane is to be checked by pushing the leading edge upwards.
4.2.4 Fuselage

- Fit cowlings. Following this, engage the bowden cables for the cooling air intakes.
  
  **Note:** Carry out daily inspection according to sect. 4.3.1 and 4.3.2 before fitting cowlings.

4.3 Daily Inspection

Before commencing flight duties the responsible pilot has to carry out a visual inspection of the motorglider in the following order (switch off ignition and main switch beforehand):

4.3.1 Engine

- check oil contents (min: lower mark, maxi: upper mark), on flights in excess of 8 hours at least middle position;
- remove upper and both lateral portions of the cowling;
- refill oil, if necessary (please refer to the engine operating manual for the oil grade);
- visual inspection of the engine - inspect cooling air ducts for foreign bodies,
- inspection of all fuel lines of engine and wing connection area for leakage. The check shall be performed with fuel pressure. For the test switch ON Master switch (with Ignition switch OFF, landing gear DOWN), electrical fuel pump (RH fuel tank) ON, Check with fuel cocks LH and RH tanks OPEN and CLOSED.
- refit lateral portions of the cowling;
- cooling air flaps: check for proper function by operating the Propeller dome (move forwards and backwards several times);
- cooling air flap control: check for proper function by operating several times;
- fuel tank vent opening unobstructed (underside of outer wing connection);
- visual inspection of fuel contents through fuel cap;
- drain fuel system by pressing both drainers in the landing gear well: remove as much fuel as is necessary to make sure that possible dirt and water has been removed. For this both main cocks must be opened.
- drained fuel is to be collected in a vessel and examined for water and dirt.

**Caution:** For complete drainage of the tanks the aircraft must be kept level for a few hours before and during the drainage.

  Check that drainers close properly again and do not leak. If they leak the reason could be dirt in the fuel.

  Draining of fuel increases the danger of fire. Make sure before engine start up that immediate fire risk does not exist.

4.3.2 Wing connector area

- Wing pins secured (Fokker needles)
- controls connected and safety pins fitted for ailerons, flaps and air brakes
- controls free of obstructions
- fuel lines and electrics connected
- foreign body inspection
- re-fit upper cowling

4.3.3 Propeller / Propeller Dome

- Check engine master switch for proper functioning: Are engine electrics switched off (red generator light extinguished and voltmeter reading “0”), when propeller dome operation handle is unlocked in the forward position of dome (and vice versa)?
- Visual inspection of propeller assembly. Check for loose connections and local damages;
- Propeller blades free of damage, protecting strip on leading edge in good condition?
- Propeller blades can be moved freely from inner stop to outer stop?
• Check pitch control mechanism for ease of movability by extending one blade up to approx. 90° and pull blade tip in flight direction (induce force into the outer third of blade and give a slight support to blade root hinge). Doing so, the blade suspension is subject to a torque around its longitudinal axis and the control mechanism is forced to move the complete working travel. It must return easily to the initial position when the blade tip is released.

• Check clearance in power transmission path of pitch control mechanism by pushing blade tip (in 90° position) slightly in and counter flight direction. There must be no significant rotation of the suspension forks before the control mechanism is set going. Check both blades one after the other.

• Extend blades successively into fully deployed position and check play of articulation needle bearing - in and counter flight direction, as well as in pitch direction (torsion around the longitudinal axis of the blade). A total of 4 mm play at the blade tips is acceptable, in pitch direction the play must be nearly zero.

• Fold propeller. Push blade mounting at the hinge back and forward with moderate force. By doing so observe (a) the variable pitch bearing and (b) the bearing in the gear. There must be no significant clearance in either of these bearings.

Note: The described simple checks may be useful to detect sudden, rough changes. Since the gearbox is able to move as a whole due its flexible suspension (shockmounts), exact results cannot be expected with these methods. For further information please refer to the Maintenance Manual.

4.3.4 Landing gear

• Air pressure: main wheels [46.5 ±1.5 p.s.i. (3.2 ±0.1 bar)] 1s [37.7 ±1.5 p.s.i. (2.6 ±0.1 bar)] 1a
  
• Tailwheel 36 ±3 p.s.i. (2.5 ±0.2 bar)

• Check tyre slip marks and tread

• Both landing gear indicators “GREEN”?

• Examine elements for emergency landing gear release. Check attachment of spindles to radius struts. Locking plate attaching spring in correct position? Are cables drawn downward completely (min. 30mm overhang)? Are cable coverings unobstructed, able to move and not jammed or blocked?

• Examine position switches for foreign bodies and dirt. Position switch for gear deployed/locked is located placed on the radius strut and the one for gear retracted at the support plate on the forward frame strut.

• Brake fluid: Check quantity. Brake fluid reservoir is located in the landing-gear bay, cabin rear wall.

4.3.5 Wings

• Check aileron, flaps and air brakes for condition, unobstructed movement and play (axial and radial; limits see maintenance manual).

• Check inner-to-outboard wing connection - safety bolt must be flush with wing surface.

4.3.6 Empennage

• Check tail plane for proper rigging - front arresting bolt (coloured red) must not protrude from leading edge of the vertical fin.

• Examine rudder and elevator for unobstructed movement and damage.

4.3.7 Fuselage

• Examine for damage.

• Check statics on both sides of tail boom (and, if installed, at the left and right cockpit walls).

• Check pressure sender units of stall warning system on propeller dome below pitot-static probe.

4.3.8 Cockpit

• Canopy emergency release locked (arresting bolt on central canopy mounting in marked position?)

• Clean canopy with care. Examine cockpit for foreign bodies.

1 (s) Standard, (a) with wide tyre landing gear. The text which does not apply to the specific A/C is to be struck out.
4.3.4 Landing gear

- Air pressure: main wheels [46.5 ±1.5 p.s.i. (3.2 ±0.1 bar)]\(^{(a)}\) [37.7 ±1.5 p.s.i. (2.6 ±0.1 bar)]\(^{(a)}\)
- Tailwheel 36 ±3 p.s.i. (2.5 ±0.2 bar)
- Check tyre slip marks and tread
- Both landing gear indicators “GREEN”?
- Examine elements for emergency landing gear release. Check attachment of spindles to radius struts. Locking plate attaching spring in correct position? Are cables drawn downward completely (min. 30mm overhang)? Are cable coverings unobstructed, able to move and not jammed or blocked?
- Examine position switches for foreign bodies and dirt. Position switch for gear deployed/locked is located placed on the radius strut and the one for gear retracted at the support plate on the forward frame strut.
- Brake fluid: Check quantity. Brake fluid reservoir is located in the landing-gear bay, cabin rear wall.

4.3.5 Wings

- Check aileron, flaps and air brakes for condition, unobstructed movement and play (axial and radial; limits see maintenance manual).
- Check inner-to-outboard wing connection - safety bolt must be flush with wing surface.

4.3.6 Empennage

- Check tail plane for proper rigging - front arresting bolt (coloured red) must not protrude from leading edge of the vertical fin.
- Examine rudder and elevator for unobstructed movement and damage.

4.3.7 Fuselage

- Examine for damage.
- Check statics on both sides of tail boom (and, if installed, at the left and right cockpit walls).
- Check pressure sender units of stall warning system on propeller dome below pitot-static probe.

4.3.8 Cockpit

- Canopy emergency release locked (arresting bolt on central canopy mounting in marked position?)
- Clean canopy with care. Examine cockpit for foreign bodies.

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\(^{(a)}\) Standard, \((a)\) with wide tyre landing gear. The text which does not apply to the specific A/C is to be struck out.
4.4 Pre-Flight Inspection

4.4.1 Checks before getting on board

- Has daily inspection been carried out?
- Check oil content and replenish if necessary.
- Check fuel content: With wings in horizontal position insert dip stick (appr. 8 in.) into tank to the bottom. If both tanks indicate a readout of appr. 0.4 in, fuel content is sufficient for take-off and a minimum cruise time of 30 min.
- Fit pitot tube into the opening of the nose cone, twisting it slightly.
- Grease the opening from time to time with a thin coating of Vaseline (to seal systems from each other).

**Note:** It is recommended to secure the pitot tube with adhesive tape or with a suitable plastic sleeve of about 1 in. / 25 mm length.

**Warning:** If the pitot tube is missing, the air speed indicator will under-read substantially when below 54 kts / 100 km/h (indicating error up to 50%)!

4.4.2 Checks before engine start up

- Rudder pedals and seat back adjusted to pilot size.
- Parachutes properly fitted (if available), shoulder and lap belts secured.
- Canopy locked (left, right and top rear).
- Propeller dome pushed forward and locked.
- Cooling air flaps OPEN (T-handle in most forward position).
- PPC switch TAKE-OFF.
- Fuel cocks LH and RH tank "OPEN".
- Fuel contents gauges: LH and RH fuel tank must both indicate a sufficient amount. If a fuel gauge is not connected, the indicator will deflect full-scale (on red marking, beyond 4/4).
- Control check.
- Altimeter adjusted.
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- Fuel contents gauges: LH and RH fuel tank must both indicate a sufficient amount. If a fuel gauge is not connected, the indicator will deflect full-scale (on red marking, beyond \( \frac{3}{4} \)).
- Control check.
- Altimeter adjusted.
4.5 Normal Operating Procedures and Recommended Airspeeds

4.5.1 Engine Starting, Warming-up and Taxiing Procedures

Starting Up

• With cold engine - Choke ON
• Throttle position IDLE (pulled).
• Propeller area free of persons and obstacles.
• Master switch ON
• PPC switch TAKE-OFF
• Electrical fuel pump (RH fuel tank) ON. Pump noise OK (clicking with reducing frequency if fuel cock OPEN)
• Operate starter push button until propeller blades are folded out and turn regularly. Only then:
  • Ignition switch ON.
  • As soon as engine fires, release starter switch. If engine has not fired after 10 seconds, ignition OFF and repeat operation. Without switching off ignition first, engine starting is impossible.

Caution: Switching the ignition ON before the propeller blades are deployed completely results in unnecessary loading of the propulsion system (in particular of propeller blades) and should be really avoided.

• Adjust engine revolutions to between 1,500 and 2,000 rpm (reduce choke until engine runs smoothly, then choke OFF).
• Check oil pressure (GREEN arc, minimum 14.5 p.s.i. (1 bar); with cold engine at low rpm a value of 44 to 73 p.s.i. (3 to 5 bar is normal).

Warning: If the lowest required engine oil pressure is not indicated within 10 seconds, stop engine immediately!

• Check extinguishing of alternator charging light

If the engine does not fire up after operating the starter five times, there is a possibility of too much petrol in the cylinders. In this case Choke OFF, throttle fully forward and operate starter. When blades are folded out, ignition switch ON and operate starter until engine fires. Stop this procedure after 15 seconds the latest, wait one minute and repeat start up attempt.

Should this method be without success, remove the sparking plugs to dry out.

Note: The construction of the propulsion system does not permit turning over of the engine by hand.

A warm engine is to be started without choke and with some throttle.

Warming up and Power Check

• Operate wheel brakes and pull elevator up to stop.
• Check engine fuel pump: electrical fuel pump (right hand tank) OFF and right fuel cock OFF. After 2 to 3 minutes there should be no drop in engine rpm.
• Warm up engine with 1500 - 2000 rpm.
• Wait for oil temperature to reach 122°F / 50°C.
• Check engine revolutions at full throttle (3000 ±100 rpm);
  PPC switch position: TAKE-OFF.
• Check cylinder head temperatures (switch over) and oil pressure - GREEN range?
• Electrical fuel pump ON and right fuel cock ON.
4.5. Normal Operating Procedures and Recommended Airspeeds

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• With cold engine - Choke ON
• Throttle position IDLE (pulled).
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• Electrical fuel pump (RH fuel tank) ON. Pump noise OK (clicking with reducing frequency if fuel cock OPEN)
• Operate starter push button until propeller blades are folded out and turn regularly. **Only then:**
• Ignition switch ON.
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• Wait for oil temperature to reach 122°F / 50°C.
• Check engine revolutions at full throttle (3000 ±100 rpm).
• Check cylinder head temperatures (switch over) and oil pressure - GREEN range?
• Electrical fuel pump ON and right fuel cock ON.
Taxiing

- Observe taxiing area.
- Seating position as well as wing geometry do not allow the crew to observe the outer wing further than to the leading edge sweep-back. This blind spot must be considered absolutely during taxiing.
- When taxiing slowly, operate wheel brakes carefully.
- Depending on surface conditions and because of the large moment of inertia the function of the tailwheel steering is delayed.
- To avoid damaging the propeller, taxi on surfaces with loose stones and gravel using low revolutions.

4.5.2 Take-off and Climb

Checks before take off

- Full throttle check: attained engine rotational speed with PPC switch in TAKE-OFF position: 3000 ±100 rpm.
- Choke: OFF
- Canopy: LOCKED (LH, RH, rear)
- Trim: NEUTRAL
- Fuel cocks: both OPEN
- Electrical fuel pump: ON
- Check engine control instruments
- PPC switch: TAKE-OFF (Indicator GREEN)
- Cooling air flaps: OPEN
- Flaps position: +5°
- Air brakes: LOCKED

Warning: If engine rotational speed under full throttle is below 2900 rpm, there is either an engine malfunction (if propeller pitch indicator shines GREEN) or propeller is not in take-off position (indicator extinguished). However there is a serious defect. Do not take-off.

Warning: It is urged with emphasis not to take-off during rain or with wet wings! (See also Section 4.5.8)

Caution: Always check open fuel cocks carefully. When fuel cocks are closed, the engine will run on for about 1 - 3 minutes. Closed fuel cocks may lead to a loss of engine power in the take-off phase.

Caution: Because of the design of the fuel system both fuel tanks must contain a fuel quantity sufficient for take-off.

Caution: Before taxiing from taxi-hold position to take off position, pay attention that the parking brake is deactivated (lever is in OFF position respectively parking brake unlocked). The parking brake shall not be used on the runway anymore.
To release the parking brake turn rotary handle to OFF position respectively unlock the brake lever, use brake lever simultaneously if required.
Taxiing

- Observe taxiing area.
- Seating position as well as wing geometry do not allow the crew to observe the outer wing further than to the leading edge sweep-back. This blind spot must be considered absolutely during taxiing.
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- Full throttle check: attained engine rotational speed: 3000 ±100 rpm.
- Choke OFF
- Canopy LOCKED (LH, RH, rear)
- Trim NEUTRAL
- Fuel cocks both OPEN
- Electrical fuel pump ON
- Check engine control instruments
  - Cooling air flaps OPEN
  - Flaps position +5°
  - Air brakes LOCKED

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To release the parking brake turn rotary handle to OFF position respectively unlock the brake lever, use brake lever simultaneously if required.
Take-off and Climb

- Line up aircraft with runway. Operate throttle smoothly and not jerkily. Keep elevator pulled to neutral position at this stage. If on rough runways pitch oscillations occur, keep the elevator steady in a neutral position. In general no counter-measures should be made.

- Lift tailwheel at about 40 kts / 75 km/h by slight pushing. Lift off at 46 kts / 85 km/h. Gain airspeed in horizontal flight up to appr. 62 kts / 115 km/h and initiate transition to climb and maintain speed.

- The **best rate of climb** is at 62 kts / 71 mph / 115 km/h.

**Note:** On short airfields or such with obstacles in the departure area the initial climb phase can be managed at $V_X = 56$ kts (65 mph, 104 km/h; **best angle of climb**). Regarding take-off distance this method leads to an improved altitude gain. The data of the take-off distance table (see sect. 5.2.3) are valid for this case. Regarding safety no lower airspeeds should be selected, however there are no advantages in take-off distance at lower speeds.

**Caution:** Observe oil and cylinder head temperature during climb. To reduce unnecessary engine loads, airspeed should be increased as soon as possible, but at the latest when temperature limits are reached (248° F and 482° F / 120° C and 250° C).

- Retract landing gear at a safe height. During retraction of landing gear the two lights, each related to one gear, flash RED (first left one, then right one). The left-hand landing gear door gets closed by the right-hand gear.

- The landing gear is retracted when both lights are extinguished. Check automatic circuit breaker (on left-hand side of landing gear switch), press button if necessary. Main landing gear lever in position “Retract”.

**Caution:** If the automatic circuit breaker of the landing gear releases during retraction, a not properly retracted position of the gear will not be indicated due to both lights darkening. On trying to deploy the landing gear, this might be noticed too late and could lead to a crash-landing.

4.5.3 Cruise and cross-country flight

**Horizontal and cruising flight**

- PPC switch position CRUISE. The complete change-over takes between 2 and 5 minutes, depending on OAT. Cruise position is not indicated.

- Cooling air flaps on CRUISE. This reduces the maximum air inlet opening to avoid excess cooling at low revolutions and high airspeeds. There are three positions available, the middle of which guarantees optimum engine temperatures under any normal conditions. The other positions are provided for extreme OAT conditions.

- Recommended cruising RPM 2.000 - 3.000 rpm

- Cruising speeds, fuel consumption and range values are given in section 5.3.1.

- Fuel can continue to be drawn from both fuel tanks or either the left or right hand tank. When fuel is taken from both tanks it is to be noted that the fuel is not drawn evenly. When switching over to the left hand fuel tank the fuel pump should be switched off, because this tank is serviced by the mechanical engine fuel pump. When switching over to the right hand fuel tank, switch on the fuel pump.

**Warning:** If the electrical fuel pump is not switched on during fuel consumption out of the RH tank only, the engine will stop immediately.
Take-off and Climb

- Line up aircraft with runway. Operate throttle smoothly and not jerkily. Keep elevator pulled to neutral position at this stage. If on rough runways pitch oscillations occur, keep the elevator steady in a neutral position. In general no counter-measures should be made.
- Lift tailwheel at about 40 kts / 75 km/h by slight pushing. Lift off at 46 kts / 85 km/h. Gain airspeed in horizontal flight up to appr. 62 kts / 115 km/h and initiate transition to climb and maintain speed.
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**Caution:** Observe oil and cylinder head temperature during climb. To reduce unnecessary engine loads, airspeed should be increased as soon as possible, but at the latest when temperature limits are reached (248°F and 482°F / 120°C and 250°C).

- Retract landing gear at a safe height. During retraction of landing gear the two lights, each related to one gear, flash RED (first left one, then right one). The left-hand landing gear door gets closed by the right-hand gear.
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### 4.5.3 Cruise and cross-country flight

**Horizontal and cruising flight (powered flight)**

- Close the cowl flaps. This reduces the maximum air inlet opening to avoid excess cooling at low revolutions and high airspeeds. There are three positions available, the middle of which guarantees optimum engine temperatures under any normal conditions. The other positions are provided for extreme OAT conditions.
- Recommended cruising RPM 2,000 - 3,000 rpm
- Cruising speeds, fuel consumption and range values are given in section 5.3.1.
- Fuel can continue to be drawn from both fuel tanks or either the left or right hand tank. When fuel is taken from both tanks it is to be noted that the fuel is not drawn evenly. When switching over to the left hand fuel tank the fuel pump should be switched off, because this tank is serviced by the mechanical engine fuel pump. When switching over to the right hand fuel tank, switch on the fuel pump.

**Warning:** If the electrical fuel pump is not switched on during fuel consumption out of the RH tank only, the engine will stop immediately.
4.5.4 Change-over of flight conditions (powered or gliding flight)

General

Because of the special propulsion concept the flight characteristics of the STEMME S10 alter only slightly when the configuration is changed from powered to gliding flight or vice-versa.

Regardless of the high reliability, one should not depend solely on the propulsion system. Principally the aircraft should be flown during gliding flight with the same safety strategy with regard to outlandings as if no propulsion system were available.

Change-over from powered flight to gliding flight

- reduce air speed approx. 49 kts / 56 mph / 90 km/h
- ignition OFF
- pull propeller brake within 1 minute after ignition OFF until propeller stops

Warning: Long windmilling of the propeller will overheat and damage the clutch. While windmilling the airspeed should never exceed 76 kts / 87 mph / 140 km/h.

- Position propeller: after the automatic folding-in action of the propeller, pull the positioning handle smoothly but not too fast. The propeller is positioned when handle has been pulled fully to the stop.
- When the positioning handle is pulled too fast the propeller may turn beyond the permissible position. The propeller dome cannot then be retracted. In this case repeat positioning operation.

Caution: If in doubt do not pull the propeller dome hard because this might damage the propeller blades. Instead, ensure the dome is fully forward then reposition the propeller slowly.

- Pull back and lock propeller dome.
- PPC switch TAKE-OFF.
- Cooling air flaps OPEN (in preparation of re-starting engine, on a fresh opening of the dome the cooling air flaps will move to fully opened position)
- Switch off unused electrical consumers.
- Switch avionics to additional battery (if fitted).

Caution: Particularly on long gliding flights it is important to keep only absolutely necessary electrical consumers. When the main battery is exhausted, the landing gear may not be lowered electrically and an engine re-start is not possible.

Change-over from gliding flight to powered flight

- Airspeed less than 76 kts / 87 mph / 140 km/h
- Open and lock propeller dome
- Cooling air flaps OPEN
- Master switch ON
- With cold engine choke ON
- Throttle position IDLING (pulled)
- Fuel cock OPEN
- When selecting RH tank, electrical fuel pump ON
- Operate starter push button until propeller blades are extended completely and turn evenly. Only then:
  - Ignition ON
- As soon as engine fires, release ignition switch. If engine has not fired after 10 seconds, ignition OFF and repeat procedure. Without switching off ignition first, engine starting is impossible.

Caution: If the engine has been shut down for more than 5 minutes, the propeller blades will be in take-off position after re-start, irrespective of the
4.5.4 Change-over of flight conditions (powered or gliding flight)

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- When the positioning handle is pulled too fast the propeller may turn beyond the permissible position. The propeller dome cannot then be retracted. In this case repeat positioning operation.
- Caution: If in doubt do not pull the propeller dome hard because this might damage the propeller blades. Instead, ensure the dome is fully forward then reposition the propeller slowly.
- Pull back and lock propeller dome.
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- Operate starter push button until propeller blades are extended completely and turn evenly. Only then:
  - Ignition ON
  - As soon as engine fires, release ignition switch. If engine has not fired after 10 seconds, ignition OFF and repeat procedure. Without switching off ignition first, engine starting is impossible.
position of the pitch control selector. If CRUISE position is selected, pitch variation begins with engine starting.

Caution: If starter fails during re-starting attempt, refer to emergency procedures, section 3.12.1.

Caution: After the engine has fired up, check cylinder head temperatures (max. 250°C) after a time with reference to the power setting. In case the opening of the cooling air flaps fails, there is the danger that the engine will overheat with subsequent failure.

4.5.5 Approach

The landing can be done either in gliding or in powered configuration. The following approach procedure applies for landing in powered configuration. Please ignore the engine related items (printed in italics) for landings in gliding configuration.

- **PPC switch position:** TAKE-OFF
  
  **Caution:** The change-over of propeller pitch can take up to 5 min, therefore the propeller pitch control has to be activated in time. If, in case of an overshooting, the propeller is not in take-off position, be aware of a considerably reduced rate of climb.

- **Cooling air flaps** OPEN
- **Throttle** IDLING
- **Tanks** both OPEN (Electric Fuel Pump ON)
- The approach must be set up in such a manner that the runway can be reached without engine power.
- Lower the landing gear on the downwind leg (takes about 30 seconds) and wait for GREEN of the check lights. During lowering the two landing gear lights flash RED (first right one, then left one).

**Warning:** Before landing check parking brake lever to be in OFF position respectively brake lever to be unlocked. A landing with parking brake set results in uncontrollable braking and in worst case in a locking of the wheels.

**Caution:** In case of lacking indication after operating the landing gear switch check automatic circuit breaker (left hand of switch) and push button if necessary. If both indicator lights are not GREEN after up to 45 seconds, operate emergency let-down (refer 3.12.6).

**Note:** When the airbrakes are deployed, a horn can be heard and both check lights flash RED if the landing gear is not completely lowered.

- **Flap position** L (+16°)
- **Approach speed** 59 kts / 68 mph / 110 km/h.
- **Propeller pitch indicator** GREEN
- **If take-off pitch position is not indicated within an adequate time (i.e. up to 5 minutes) check propeller pitch position as follows:**
  
  Airspeed: 59 kts / 110 km/h
  Throttle: full power

  If the engine revolution comes in the range 3200 ±100 rpm, TAKE-OFF position has been reached.

**Warning:** If the rotational speed of the engine in the full-throttle check does not reach the defined value the propeller is not in TAKE-OFF position. In case of an overshooting, be aware of a considerably reduced rate of climb (refer to sect. 5.3.2). In this case it is recommended to do another circuit and to check the position of the propeller pitch control switch and circuit breaker.

**Warning:** In rain increase approach speed by 10%! (see section 4.5.8).

**Caution:** In turbulent conditions and strong wind approach with flap position +10° or +5° to achieve better effectiveness of the ailerons. Increase approach speed by 10%.
Caution: If starter fails during re-starting attempt, refer to emergency procedures, section 3.12.1.

Caution: After the engine has fired up, check cylinder head temperatures (max. 250°C) after a time with reference to the power setting. In case the opening of the cooling air flaps fails, there is the danger that the engine will overheat with subsequent failure.

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Warning: Before landing check parking brake lever to be in OFF position respectively brake lever to be unlocked. A landing with parking brake set results in uncontrollable braking and in worst case in a locking of the wheels.

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Caution: In turbulent conditions and strong wind approach with flap position +10° or +5° to achieve better effectiveness of the ailerons. Increase approach speed by 10%.
4.5.6 Landing

- Control angle of glide with airbrakes.
- Do not round out too low (high landing gear). Reduce airspeed in horizontal flight to the minimum flying speed, pull the stick and put down with main landing gear and tail wheel simultaneously.
- Hold stick pulled after ground contact. Leave airbrakes extended. Operate wheel brakes according to situation. Operate rudder with caution.

After reaching the parking position:

- Parking brake SET (turn lever to ON position and operate brake afterwards) respectively LOCK brake lever
- Avionics switch OFF
- Engine (for cooling down) IDLE for about 1 min.
- Ignition OFF
- Electrical fuel pump OFF
- Engine master switch OFF
- Master switch OFF
- When parking for longer periods on inclined ground use wheel chocks.

**Caution:** In the case of an off-field landing the pilot may choose, depending on the condition of the ground, either to land with deployed or with retracted landing gear. Landings on a smooth ground surface with a retracted landing gear have been performed without injuring the crew or damaging the motorglider (crew was fastened by seat-belts).

4.5.7 High Altitude Flight

Justification of flutter behaviour of the type STEMME S10 has been performed at altitudes of 2000 m MSL (6500 ft) and above. Based on these tests the maximum airspeed $V_{NE}$ has been established as indicated airspeed (IAS) between 0 and 6500 ft MSL with 146 kts (168 mph / 270 km/h; IAS = TAS at 6500 ft MSL).

In order to avoid exceeding of the maximum permissible true airspeed above 6500 ft MSL the maximum permissible indicated airspeed is reduced with increasing altitude. This is due to the installed airspeed indicator system, the reading of which depends on the pitot/static air pressure and thus also on the air density which decreases with increasing altitude. Based on the ICAO-Standard Atmosphere (ISA) reduction - deviating from the ASI marking - is established in the following steps:

| from 6500 ft / 2.000 m MSL up to | $V_{NE}$ (TAS) = 146 kts (168 mph / 270 km/h) corresponds to |
|-----------------|-----------------|-----------------|-----------------|
| [ft MSL] | [m MSL] | [kts (IAS)] | [mph (IAS)] | [km/h (IAS)] |
| 10.000 | 3.000 | 139 | 159 | 257 |
| 13.000 | 4.000 | 132 | 151 | 244 |
| 16.500 | 5.000 | 125 | 144 | 231 |
| 19.500 | 6.000 | 118 | 136 | 219 |
| 26.000 | 8.000 | 105 | 121 | 195 |
| 33.000 | 10.000 | 93 | 107 | 173 |
| 39.500 | 12.000 | 81 | 93 | 150 |

The above speed limits are to be observed with special care since freedom of flutter for the type STEMME S10 can be guaranteed only up to these values.
4.5.8 Flight in Rain

Rain, hoarfrost and ice on wing and control surfaces change the flight aerodynamics of the aircraft, therefore the following procedures for unintended flight in rain are recommended:

• Increase flight speed to at least 10% above any given minimum speed limits.
• Be aware that the climb rate decreases by up to 50%.
• Be aware that the maximum cruise speed decreases by up to 30% with consequences to maximum range and flight planning (re-consider your filed flight plan!).

Warning: The take-off run increases by up to 50% of the normal take-off run, therefore it is urged with emphasis, not to take off with wet wings and during rain.

4.5.9 Aerobatics

Aerobatics are not permitted.

4.5.10 Flight in strong Turbulence

Remember the maximum flight speed for strong turbulence when crossing zones of strong turbulence and in flights along cloudbanks and reduce your flight speed within the GREEN ARC of your airspeed indicator. Air brakes can be used up to $V_{NE}$ until a reduction of speed to lower than 97 kts / 112 mph / 180 km/h is completed.

4.5.11 Flight with one Fuel Tank empty

Flying with one fuel tank empty causes an asymmetric distribution of the masses around the roll axis. Its influence on flight characteristics and controllability was regarded as small during the flight tests due to the position of the fuel tanks in the inner wing.

As a supplemental aspect of safety a margin of 6 kts (6mph / 10 km/h) with reference to the normal minimum airspeeds is recommended during flight in this configuration.

Warning: Taking-off with one empty fuel tank should be avoided with regard to the special features of the fuel system. In this case there will be no safety resources if one fuel pump fails. In addition, the fuel flow could be interrupted if the wing is not kept level.
Section 5 - Performance

5.1 Introduction 5-1

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5.1 Introduction

Section 5 provides approved data for airspeed calibration, stall speeds and take-off performance, as well as other data and additional information which do not require LBA approval.

The data in the charts has been computed from actual flight tests with the powered sailplane and engine in good condition and using average piloting techniques.

5.2 Approved Data

5.2.1 Airspeed Indicator System Calibration

![Airspeed Indicator System Calibration Graph]

During powered flight there are only minimal changes.

\[ V_{\text{IAS}} = \text{Indicated Air Speed (airspeed shown on the installed ASI)} \]

\[ V_{\text{CAS}} = \text{Calibrated Air Speed (airspeed shown on a calibrated system)} \]
5.2.2 Stall Speeds

The stall speeds of the STEMME S 10 depend on its present configuration: engine ON/OFF, engine revolutions, flap position, landing gear UP/DOWN, total all-up weight (AUW) - therefore a variety of factors which can be combined.

With wing flap positions neutral or positive and with 1874 lb. / 850 kg AUW the stall speeds are found in-between the following limits (IAS):

- 42 kts (48 mph / 77 km/h) - engine switched off, propeller covered
  - wing flap in position L
  - landing gear lowered
  - air brakes closed

- 47 kts (54 mph / 87 km/h) - engine idling
  - flap position neutral (0)
  - landing gear lowered
  - air brakes open

Caution: The STEMME S 10 is equipped with an acoustic stall warning system which operates only during powered flight. During gliding flight the stall is indicated by aerodynamic characteristics of the aircraft.

Warning: If the electrical voltage falls below 11.5 V, through a battery charging defect, the stall warning will not work correctly. In this case the airspeed must be monitored and the flight terminated immediately.

5.2.3 Take-Off Performance

The following table lists take-off runs and take-off distances to 50 feet altitude for dry, hard surface with the parameters pressure altitude and OAT. The recorded distance values are based on the take-off procedure as defined in sect. 4.5.2 (best angle of climb, $V_X = 104$ km/h) and further on the following parameters:

- Take-off mass: 850 kg,
- Zero wind,
- Hard, dry runway surface,
- Runway slope 0°.

For runways with other than hard, dry surface the following additions have to be calculated:

- Grass surface (level, hard and dry, short grass) +20%
- Wet grass additional +10%
- High grass (max. 3 inch) additional +20%
- Weak, deep surface additional +50%
- Snow and Water surface additional +30%

Warning: It is strongly urged not to take off during rain or with wet wings! See also section 4.5.8.
Take-off run and take-off distance (up to 15 m/50 ft) on hard, dry and level surface:

<table>
<thead>
<tr>
<th>Pressure altitude above MSL</th>
<th>OAT</th>
<th>Take-off run</th>
<th>Take-off distance (15 m / 50 ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>[m]</td>
<td>[ft]</td>
<td>[° C]</td>
<td>[° F]</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>-15</td>
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<td>0</td>
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<td>15</td>
<td>59</td>
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<td>86</td>
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<td>38</td>
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<td>86</td>
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<td></td>
<td>38</td>
<td>100</td>
</tr>
</tbody>
</table>
5.3 Additional Information (non-approved)

5.3.1 Performance in Powered Flight

Cruising performance, Fuel flow, Range

Following table may be filled by the holder/operator for the individual powered glider, based on sufficient statistical operation data. However, this table remains without obligation.

The following configuration will be recommended:
- Full opened cowl flaps (unfavourable setting),
- Landing gear UP,
- Flaps: –10°

### Fuel Consumption and Endurance Table for STEMME S10-V

<table>
<thead>
<tr>
<th>S/N: 14-</th>
<th>maximum usable fuel quantity:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Density alt. ft / m</td>
<td>RPM [1/min]</td>
</tr>
<tr>
<td>3300 / 1000</td>
<td></td>
</tr>
<tr>
<td>3300 / 1000</td>
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<td>3300 / 1000</td>
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<td>9900 / 3000</td>
<td></td>
</tr>
<tr>
<td>9900 / 3000</td>
<td></td>
</tr>
</tbody>
</table>

$^1$ Maximum endurance (without reserve fuel) for a max. usable fuel quantity (see also section 2.4.1). The max. usable fuel quantity has to be measured for each individual powered glider because due to the FRP-built fuel tanks and due to not exactly horizontal levelled wings during refueling there may occur differences in the max. fuel quantity by ±5%.

If tanks are not full, flight time available may be estimated:

flight time available $= \text{max. flight time (refer to table/diagram)} \times \text{fuel available} / \text{max. usable fuel quantity}

Range without reserve fuel can be estimated with flight time available and true airspeed:

Range $\approx \text{flight time available} \times v_{TAS}$ (refer to table/diagram)
5.3.2 Climbing performance

Data are based on maximum take-off mass, maximum take-off power and a flight speed of 62 kts / 71 mph / 115 km/h.

**Propeller pitch position: TAKE-OFF (Variable pitch propeller and fix pitch propeller):**

<table>
<thead>
<tr>
<th>Pressure altitude [ft]</th>
<th>MSL 1640</th>
<th>500</th>
<th>3280</th>
<th>1000</th>
<th>6560</th>
<th>2000</th>
<th>9840</th>
<th>3000</th>
<th>13120</th>
<th>4000</th>
<th>16400</th>
<th>5000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rate of climb [fpm / m/s]</td>
<td>610 / 3.1</td>
<td>592 / 3.0</td>
<td>552 / 2.8</td>
<td>493 / 2.5</td>
<td>394 / 2.0</td>
<td>256 / 1.3</td>
<td>138 / 0.7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The service ceiling is 17,400 ft (5300 m). [Remaining climb rate = 100 ft/min (0,5 m/s)]

**Propeller pitch position: CRUISE (Variable pitch propeller):**

<table>
<thead>
<tr>
<th>Pressure altitude [ft]</th>
<th>MSL 1640</th>
<th>500</th>
<th>3280</th>
<th>1000</th>
<th>6560</th>
<th>2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rate of climb [fpm / m/s]</td>
<td>197 / 1.0</td>
<td>157 / 0.8</td>
<td>98 / 0.5</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5.3.3 Demonstrated Crosswind Performance

Taxiing, take-off and landing have been demonstrated up to a cross wind component of 16 kts (30 km/h).

5.3.4 Flight Polar

![Fig. 5-1: Speed polars for wing loadings 7.8 and 9.3 lb/sqft (38 and 45 kg/m²)](image)

5.3.5 Noise Data

Fly-over noise measurements according to the "Laermenschutzforderungen fuer Luftfahrzeuge (LSL)" (Noise Protection Requirements for Aircraft; German equivalent to and based on the ICAO, Annex 16), dated 1.1.1991, published in the "Bundesanzeiger Jahrgang 43, Nr. 54a, dated 19.03.1991" (Federal Gazette, year 43). Additionally the measurement and evaluation has been carried out according to the standards of FAR 36.

Measured noise level according to chapter IV: 59.3 dB(A). [Limit value LSL: 67.3 dB(A), ICAO: 71.3 dB(A)]

Measured noise level according to chapter X: 66.9 dB(A). [Limit value LSL: 73.9 dB(A), ICAO: 80.9 dB(A)]

Measured noise level according to FAR 36: 64.9 dB(A). [Limit value: 76.3 dB(A)]
5.3.2 Climbing performance

Data are based on maximum take-off mass, maximum take-off power and a flight speed of 62 kts / 71 mph / 115 km/h.

<table>
<thead>
<tr>
<th>Pressure altitude [ft]</th>
<th>MSL 500</th>
<th>1640</th>
<th>3280</th>
<th>6560</th>
<th>9840</th>
<th>13120</th>
<th>16400</th>
</tr>
</thead>
<tbody>
<tr>
<td>[m]</td>
<td></td>
<td>500</td>
<td>1000</td>
<td>2000</td>
<td>3000</td>
<td>4000</td>
<td>5000</td>
</tr>
<tr>
<td>Rate of climb [fpm / m/s]</td>
<td>610 / 3.1</td>
<td>592 / 3.0</td>
<td>552 / 2.8</td>
<td>493 / 2.5</td>
<td>394 / 2.0</td>
<td>256 / 1.3</td>
<td>138 / 0.7</td>
</tr>
</tbody>
</table>

The service ceiling is 17,400 ft (5300 m). [Remaining climb rate = 100 ft/min (0.5 m/s)]

5.3.3 Demonstrated Crosswind Performance

Taxiing, take-off and landing have been demonstrated up to a cross wind component of 16 kts (30 km/h).

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Fig. 5-1: Speed polars for wing loadings 7.8 and 9.3 lb./sqft. (38 and 45 kg/m²)

5.3.5 Noise Data

Fly-over noise measurements according to the "Laermsschutzforderungen fuer Luftfahrzeuge (LSL)" (Noise Protection Requirements for Aircraft; German equivalent to and based on the ICAO, Annex 16), dated 1.1.1991, published in the "Bundesanzeiger Jahrgang 43, Nr. 54a, dated 19.03.1991" (Federal Gazette, year 43).

Measured noise level according to chapter X: 66.8 dB(A). [Limit value LSL: 73.9 dB(A), ICAO: 80.9 dB(A)]
Section 6 - Mass and Balance

6.1 Introduction 6-1
6.2 Mass and Balance Record / permitted payload range 6-1
6.1 Introduction

This section contains the payload range within which the aircraft may be safely operated.

Procedures for weighing the motorglider and the calculation method for establishing the permitted payload range and a comprehensive list of all mandatory equipment available for this aircraft are contained in the Maintenance Manual Sect. 6.3 (Doc. No. A40-10-121).

For the individual aircraft to which this manual pertains, the list of equipment installed at the time of the last weighing, and the original equipment list and weighing record, are contained in the same Maintenance Manual, Appendix C (service records).

6.2 Weight and Balance Report / permitted Payload Range

The following table shows the maximum and minimum payload in the cockpit and the permissible total payload. The difference between the two values is the permissible fuel mass. As far as the permitted load ranges are not exceeded, no pre-flight C.G. calculation is to be performed.

The data contained in the table are calculated on the basis of the most recent weighing report.

<table>
<thead>
<tr>
<th>Valid for Serial No. 14-</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date of most recent weighing report</td>
</tr>
<tr>
<td>------------------------</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

1) With pilot weights (including parachute) between 121.5 lb. (55 kg) and the minimum cockpit payload stated above the ballast weight specified by the manufacturer must be fitted on the right hand rudder pedal in the foremost position. Items of 6.6 lb. / 3 kg are available, each compensating a lack of 16.5 lb. (7.5 kg) of cockpit load at the pilot's position.

2) Calculated each time during weighing according to the calculating rule of the maintenance manual. In each case max. pilot mass 396 lb. / 180 kg and not in excess of 242 lb. (110 kg) per seat (including parachute).

3) This is cockpit payload plus mass of fuel. Calculated each time during weighing according to the calculating rule of the maintenance manual.

4) Please enter the value with the correct unit.
Section 7 - Description of the powered Glider and its Systems and Equipment

7.1 Introduction 7-1
7.2 Cockpit Controls 7-1
7.3 Instrumentation 7-1
7.4 Air-Brakes 7-1
7.5 Baggage Compartment 7-2
7.6 Power-Plant 7-2
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7.2 Cockpit Controls 7-1a
7.3 Instrumentation 7-1a
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7.5 Baggage Compartment 7-2a
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7.9 Fix Pitch Propeller 10AP-F 7-5a
  7.9.1 General 7-5a
  7.9.2 Operational Principles 7-5a
  7.9.3 Construction 7-6a
  7.9.4 deleted
  7.9.5 Technical Data and Operation Limits 7-7a
  7.9.6 deleted
7.1 Introduction

This section provides description and operation advice of the motorglider and its systems and equipment. Refer to section 9, Supplements, for details of optional systems and equipment.

7.2 Cockpit Controls

Each seat has a control stick and rudder pedals, and a brake and flap lever on the left hand side.

Canopy lock: One operating lever on left and one on right side of the canopy frame, as well as one at rear top (whose function is the retention of the canopy for the first phase of the emergency canopy release).

Emergency canopy jettison: in addition to the side locking levers there is a pull handle (red T-grip) in the control segment of the instrument panel (centre face lower portion).

The brake for the main landing gear brake is operated with the hand lever fitted to the LH control stick. Separate lever/rotary handle for parking brake valve on the floor panel console in front of the LH control stick respectively lock LH brake lever with a pin to set parking brake. The same system for the RH stick is available as an option.

The tail wheel is steered by the rudder pedals.

Trim, throttle and choke lever, and the PPC (Propeller Pitch Control) switch are placed on a console between the seats.

The fuel cocks are fitted next to each other on a console between the seat backs.

The operating elements for retraction and deployment of the propeller are combined in the lower middle area (foot) of the instrument panel:
- handle to open, lock and close the propeller dome,
- handle to brake the propeller after switching off the engine (T-grip),
- handle to position the propeller so that it fits under the propeller dome (T-grip).

The handle for cooling air flap operation (to reduce engine cooling in cruise condition, 3 settings are available) can be found on the left of the propeller position handle.

Ventilation:
- Cabin: ventilation nozzle in the lower middle area (foot) of the instrument panel.
- Canopy: knob in the control segment of the instrument panel.

7.3 Instrumentation

The instrument panel is divided into three faces:
- in the left face the flight control instruments are fitted: ASI with indicating range of minimum 27 kts (31 mph / 50 km/h) up to 162 kts (186 mph / 300 km/h), altimeter, magnetic compass and supplemental and optional equipment.
- the centre face is used for radio and navigational instrumentation and for further optional equipment.
- in the right face the instruments for engine monitoring and on-board electrical system are fitted.

7.4 Air-Brakes

Double paddle Schempp-Hirth air brakes are fitted on the upper surface of the inner wing.

The over-centre-lock for the operating mechanism is found in the fuselage centre section.
7.5 Baggage Compartment

- Lower left and lower right baggage compartment behind seat back: load max. 22 lb. / 10 kg each compartment.
- Upper baggage compartment: load max. 4.4 lb. / 2 kg. No hard items and no loose items exceeding a weight of 1.1 lb. / 0.5 kg unless they are secured.

7.6 Power-Plant

The engine is a "Limbach" L 2400 EB1.AD: 4-cylinder opposed, four stroke, single magneto ignition, twin carburettor. Viewed from the engine power take off, the propulsion system consists of:

- freewheel clutch with centrifugal effect and overload protection,
- highly elastic clutch, splined sliding joint, propeller shaft, flexible disk coupling,
- one-step fivefold high performance vee-belt reduction gearbox, i = 1.18,
- retractable variable pitch propeller STEMME 10 AP-V.

![Image of propulsion system engine - propeller](image)

**Fig. 7-1: Propulsion System Engine - Propeller**

1. **Retractable v. p. propeller**
   Diameter in operating position: 5.35 ft. (1.63 m). Extending by centrifugal forces, retracting by centring springs; pitch control actuated by electrically heated dilation elements, the central body (hub and blade suspension) and the pitch control mechanism are of aluminium alloy, blades are of fibre composite.

2. **Gear**
   Fivefold high-performance V-belt, gear reduction: 1.18; quiet operation, fail-safe.

3. **Flexible disk**
   for compensation of angle errors and angular movements.

4. **Drive shaft**
   Carbon fibre composite, mass: 2 kg, diameter: 65 mm, length: 1.9 m, first critical bending frequency at > 5,200 RPM.

5. **Splined sliding joint**
   for compensation of axial movements.

6. **Highly elastic clutch**
   for damping of torque oscillations and for reducing the torsional natural frequencies.

7. **Bivalent centrifugal clutch**
   with servo effects. It damps starting shocks which could be critical for the extension of the propeller, protects against overload, and allows a decoupled slow down of the retractive propeller after turning off the engine.

8. **Engine**
   4 cylinders, 4 stroke flat engine, single magneto ignition, cooled by ram air.
7.7 Fuel System

The fuel system consists of two independent fuel tank systems with one container at each outer area of the inner wing, both have a fuel cock, water separator and filter. These have been constructed and fitted in such a way that fuel delivery and pressure are available for the proper working of the engine in all normal operating conditions. The left hand fuel tank is operated by the mechanical engine fuel pump and the right hand tank by the electrical fuel pump.

Each fuel pump can only supply fuel out of the fuel tank it is connected to. When both systems are in operation, the drawing down of fuel is not evenly balanced.

![Diagram of fuel system]

Fig. 7-2: Diagram of fuel system
7.8 Electrical System

The electrical system is supplied by a master battery and a generator. The master battery is placed in the forward end of the tail boom, behind the engine.

A backup battery, which is available as an option, is fitted in the vertical fin below the stabilizer (also possible in the left footwell, depending on mass distribution of the S/N). It is provided for electrical supply of the avionics, in particular during gliding flight. If the main circuit breaker is released, the avionics bus is automatically switched over to the backup battery (if fitted).

Current circuits of all electrical consumers are protected by automatic circuit breakers. The primary circuits of the relays are protected by fuses located under the instrument panel covering.

In addition to the following descriptions of the switching functions, refer to section 2.15 (Instrument Panel Design and Cabin Placards).

**Master Switch:** Disconnects all power supply from the main bus bar.

**Lesser Ranking Switches:**

- **Engine bus master switch:** Switches the electrical engine equipment (starter, propeller pitch control, engine instruments etc.) on master battery and generator ON / OFF. This switch is coupled with the propeller dome lock in such a manner that, with the propeller dome in the OPEN position, it is automatically operated when the propeller dome operating handle is unlocked (OFF) or locked (ON).

- **Engine bus back-up switch:** Enables to restart the engine in flight in case of a malfunction of the engine master switch. It provides a mechanical operation catch.

- **Starter:** Push button for the electric engine starter. Button is cut off, if ignition is switched on before starter operation. After an unsuccessful re-starting attempt, ignition must be switched off before a new starter operation.

- **Ignition:** ON / OFF
  
  The Ignition switch connects aircraft ground to the magneto which is principally independent from the master or engine master switch. The second level kills the starter relay circuit (when operated), to prevent engine and propeller from damage due to false start-up procedure.

- **PPC switch:** TAKE-OFF / CRUISE (propeller pitch control);

  In CRUISE position there is current flow of varying quantity (current regulator). In TAKE-OFF position, or when the landing gear is deployed, or when the engine is stopped, the line is killed (propeller goes to TAKE-OFF position within 5 minutes max.). When the propeller blades have reached the allowable pitch range for take-off, this (not the switch position!) is indicated by an illuminated green light next to the corresponding switch position, if master switch and engine master switch are ON.

- **Avionics:** Switches any electrically operated flight control and navigation equipment ON / OFF. During starter operation, the avionics are switched off (or switched over to the backup battery, if fitted).

- **Avionics supply:** Switches avionics bus from main battery to back-up battery. Tip:

  - Powered flight: Position main battery
  - Gliding flight: Position back-up battery
Landing gear switch:  
– Upper position: RETRACT  
– Lower position: LOWER  
– Centre position: Circuit disconnected from electrical system.

ACL (optional):  
ON / OFF - only operative with engine master switch ON  
(Anti-Collision Light).

Position lights (optional):  
ON / OFF - only operative with engine master switch ON.

Back-up battery (optional):  
• Mounting position: top of vertical fin below the stabiliser or in the left footwell (depending on trim requirements)
• Function: Supplies the avionics bus instead of the master battery.
• Use: preferred during gliding flight. With this, unintentional discharging of the master battery during gliding flight is prevented and the charge is secured for engine re-start.
• Switching: by switch-over from master to back-up battery with switch labelled "AVIONICS SUPPLY". Or automatically during starter operation, or when the main circuit breaker pops out.
• Charging: through generator or externally (max. charge voltage 14.7 V).

Note: At low proportions of powered flight in total flight time the back-up battery is not charged adequately by the generator. During external charging only the main battery is charged, for technical reasons charging of the back-up battery is not possible. In this case it must be charged separately (max. charge voltage 14.7 V).

Warning: Do not fly if the back-up battery is removed while still recorded in the equipment list. The corresponding CG calculations and Weight & Balance documentation will be invalid and the motorglider will not be airworthy. Unless the equipment list is corrected and new weight and balance documents are prepared, flying is not permitted.

7.9 Variable Pitch Propeller

7.9.1 General
The two-blade variable pitch propeller 10AP-V for the model S10-V has two operating positions: TAKE-OFF and CRUISE. Once rotation has stopped the blades fold inwards and, whatever the present pitch angle, can be enclosed by retraction of the nose-cone exactly as the fixed pitch propeller version. In this configuration the STEMME S10-V is prepared for high-performance gliding flight.

In both operating positions TAKE-OFF (low pitch) and CRUISE (high pitch), the pitch of the blades is set for the different flight speeds and therefore optimised performance for take-off, climb and cruise is achieved.

7.9.2 Operational Principles
The principle of the folding mechanism is very similar to the one of the fixed pitch propeller. The propeller folds, z-shaped, in the plane of rotation and can then be covered by closing the propeller dome. In addition, the blade suspension - two forks made of specially treated aluminium alloy - are pivoted in the propeller hub.

The shifting of the blade suspension forks by 6.4° from take-off to cruise position is performed electrically. The electric power (8 Amp.) is transferred by a pair of slip rings and heats up two thermo-elements which expand above a certain temperature. They then actuate a piston and a mechanism to turn the propeller
blades which are geared together by a synchronisation ring. The high pitch position (CRUISE) is sustained by a position-dependent two-point regulator for the heating circuit and is supported by two fly-weights, the force of which increases with propeller rpm. The temperature corresponding to the cruise position is about 158°F (70°C), limited to 185°F (85°C) by means of a protection circuit.

The turnback of the blades after switching to TAKE-OFF commences with cooling down of the thermo-elements and terminates at 131°F (55°C); it needs a bout 1 to 4 minutes depending on OAT and propeller rpm. It is achieved by springs, supported by the aerodynamic forces which always try to turn the blades to low pitch, the stronger the higher the rotational speed. This way there is always a balance of forces with a bias towards the low pitch direction, and only a relatively small operating force is needed to shift and sustain the cruise position.

The heating circuit is disconnected by the PPC switch or by one of two limit switches, indicating either "landing gear deployed" or "propeller dome open but not locked". This way it is guaranteed that the propeller always is in take-off position when required, independent of the actual PPC switch position.

The maximum time required for full change in pitch position in each direction in an OAT range between -22°F and +100°F (-30°C and +38°C) remains below 5 min. Experience in service showed under all normal atmospheric conditions a mean time for the full pitch travel of 2½ min. with only little divergence.

7.9.3 Construction
The propeller hub and the blade suspension forks and, for the most part, the pitch control unit, are made of aluminium alloys. Protection against corrosion is achieved by anodization. The blades are suspended in full needle bearings, the fork pivot bearing for the blade pitch rotation is a combination of two grooved full ball bearings for the shear forces and an axial needle bearing.

The propeller blades are made of fibre reinforced plastic (FRP), constructed of two composite shells. Shear forces, centrifugal forces and bending moments are transferred by a double-spar to the suspension eye at the blade root. The spar flanges are of carbon rovings and are integral part of the shells, the four webs are of GFRP. In the root area the spar rovings are looped around the eye bushing for best transition of the forces from the blade to the suspension hub. Protection against erosion is achieved by means of an impact resistant resin coating at the leading edge (the gluing is made of the same material) and, additionally, a PU-tape on the leading edge of the blade. Ventilation is provided by a small opening in the blade tip.

Retraction of the blades is accomplished by a coupling lever and torque springs, located in the hinge axis. The required bias of the springs is achieved by twisting the axis before final fastening.

The entire pitch control mechanism is located in front of the plane of the blades. Attachment to the blades is achieved by two couplings which allow fine adjustment of the pitch angle and thus ensure synchronisation of the two blades.

7.9.4 Special Remarks on Operation
The change in propeller pitch from TAKE-OFF to CRUISE and back is controlled by heating (or cooling down respectively) of two thermo-elements. Characteristics of the thermo-elements are inevitably influenced by OAT. The external heat isolation is optimised so that the time required for the full change in pitch for each direction and under any OAT within the specified limits of -22°F to +100°F (-30°C to +38°C) does not exceed 5 minutes.

Times required for the change in pitch in both directions on a standard day (+60°F / +15°C) have been found on repeated tests to be around 2½ min.

To avoid an overshoot in the landing configuration but with the propeller in cruise position, the propeller pitch control is to be switched to TAKE-OFF at least 5 minutes before entering the airfield traffic pattern. The green take-off position indicator light should be illuminated before penetration of the airfield traffic pattern.

Additionally the procedures described in sections 3 and 4 must be followed.
7.9.5 Technical Data and Operation Limits

- Max. rotational speed propeller 2881 rpm
- according to maxi. rot. engine speed 3400 rpm
- Range of pitch angle 6.4°
- Voltage min. 12 V, max. 14.7 V
- Current input max. 10 Amp.
- Circuit breaker 15 Amp.

7.9.6 Protective Circuits

Protection of discharge of the main battery: The current supply for the heating circuit is monitored by a power relay which is actuated by D_F (regulator circuit) of the generator, i.e. under the most probable malfunctions of the charging circuit it is not possible to operate the propeller in cruise position, in order to prevent the battery from discharging.

Protection against overheating: The maximum temperature of the thermo element is limited to 185°F (85°C) by means of a protective circuit with an NTC-Resistor integrated in the actuation element.

Protection of the main bus: Electrical consumer circuits with a high current input (e.g. landing lights) are disconnected from the main bus in the cruise position of the propeller pitch control switch.

Protection against radio interference: Radio interference which may be caused by the commutator is prevented by an interference suppressor condenser.

Test circuit: A test circuit can be activated by pressing a push button at the front bulkhead. Doing so, the propeller pitch control is operated on the ground and with the engine stopped in order to verify the correct functioning of the variable pitch propeller.
7.1 Introduction

This section provides description and operation advice of the motorglider and its systems and equipment. Refer to section 9, Supplements, for details of optional systems and equipment.

7.2 Cockpit Controls

Each seat has a control stick and rudder pedals, and a brake and flap lever on the left hand side.

Canopy lock: One operating lever on left and one on right side of the canopy frame, as well as one at rear top (whose function is the retention of the canopy for the first phase of the emergency canopy release).

Emergency canopy jettison: in addition to the side locking levers there is a pull handle (red T-grip) in the control segment of the instrument panel (centre face lower portion).

The brake for the main landing gear brake is operated with the hand lever fitted to the LH control stick. Separate lever/rotary handle for parking brake valve on the floor panel console in front of the LH control stick respectively lock LH brake lever with a pin to set parking brake. The same system for the RH stick is available as an option.

The tail wheel is steered by the rudder pedals.

Trim, throttle and choke lever are placed on a console between the seats.

The fuel cocks are fitted next to each other on a console between the seat backs.

The operating elements for retraction and deployment of the propeller are combined in the lower middle area (foot) of the instrument panel:

- handle to open, lock and close the propeller dome,
- handle to brake the propeller after switching off the engine (T-grip),
- handle to position the propeller so that it fits under the propeller dome (T-grip).

The handle for cooling air flap operation (to reduce engine cooling in cruise condition, 3 settings are available) can be found on the left of the propeller position handle.

Ventilation:

- Cabin: ventilation nozzle in the lower middle area (foot) of the instrument panel.
- Canopy: knob in the control segment of the instrument panel.

7.3 Instrumentation

The instrument panel is divided into three faces:

- in the left face the flight control instruments are fitted: ASI with indicating range of minimum 27 kts (31 mph / 50 km/h) up to 162 kts (186 mph / 300 km/h), altimeter, magnetic compass and supplemental and optional equipment.
- the centre face is used for radio and navigational instrumentation and for further optional equipment.
- in the right face the instruments for engine monitoring and on-board electrical system are fitted.

7.4 Air-Brakes

Double paddle Schempp-Hirth air brakes are fitted on the upper surface of the inner wing.

The over-centre-lock for the operating mechanism is found in the fuselage centre section.
7.5 Baggage Compartment

- Lower left and lower right baggage compartment behind seat back: load max. 22 lb. / 10 kg each compartment.
- Upper baggage compartment: load max. 4.4 lb. / 2 kg. No hard items and no loose items exceeding a weight of 1.1 lb. / 0.5 kg unless they are secured.

7.6 Power-Plant

The engine is a "Limbach" L 2400 EB1.AD: 4-cylinder opposed, four stroke, single magneto ignition, twin carburettor. Viewed from the engine power take off, the propulsion system consists of:

- freewheel clutch with centrifugal effect and overload protection,
- highly elastic clutch, splined sliding joint, propeller shaft, flexible disk coupling,
- one-step fivefold high performance vee-belt reduction gearbox, \( i = 1.18 \),
- retractable fix pitch propeller STEMME 10 AP-F.

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1. Retractable f. p. propeller
   Diameter in operating position: 5.35 ft. (1.63 m). Extending by centrifugal forces, retracting by centring springs; the central body is of aluminium alloy, blades are of fibre composite.

2. Gear
   Fivefold high-performance V-belt, gear reduction: 1.18; quiet operation, fail-safe.

3. Flexible disk
   for compensation of angle errors and angular movements.

4. Drive shaft
   Carbon fibre composite, mass: 2 kg, diameter: 65 mm, length: 1.9 m, first critical bending frequency at > 5,200 RPM.

5. Splined sliding joint
   for compensation of axial movements.

6. Highly elastic clutch
   for damping of torque oscillations and for reducing the torsional natural frequencies.

7. Bivalent centrifugal clutch
   with servo effects. It damps starting shocks which could be critical for the extension of the propeller, protects against overload, and allows a decoupled slow down of the retractive propeller after turning off the engine.

8. Engine
   4 cylinders, 4 stroke flat engine, single magneto ignition, cooled by ram air.
7.7 Fuel System

The fuel system consists of two independent fuel tank systems with one container at each outer area of the inner wing, both have a fuel cock, water separator and filter. These have been constructed and fitted in such a way that fuel delivery and pressure are available for the proper working of the engine in all normal operating conditions. The left hand fuel tank is operated by the mechanical engine fuel pump and the right hand tank by the electrical fuel pump.

Each fuel pump can only supply fuel out of the fuel tank it is connected to. When both systems are in operation, the drawing down of fuel is not evenly balanced.

One backup fuel pump (electrically driven) is located parallel to each of the two main pumps. They are operated with one common switch labeled „Backup Fuel Pump“ located on the right face of the instrument panel. The circuit breaker (10 Amp.) is found directly above the switch.

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Fig. 7-2: Diagram of fuel system (4 pumps)
7.8 Electrical System

The electrical system is supplied by a master battery and a generator. The master battery is placed in the forward end of the tail boom, behind the engine.

A backup battery, which is available as an option, is fitted in the vertical fin below the stabilizer (also possible in the left footwell, depending on mass distribution of the S/N). It is provided for electrical supply of the avionics, in particular during gliding flight. If the main circuit breaker is released, the avionics bus is automatically switched over to the backup battery (if fitted).

Current circuits of all electrical consumers are protected by automatic circuit breakers. The primary circuits of the relays are protected by fuses located under the instrument panel covering.

In addition to the following descriptions of the switching functions, refer to section 2.15 (Instrument Panel Design and Cabin Placards).

**Master Switch:** Disconnects all power supply from the main bus bar.

**Lesser Ranking Switches:**

- **Engine bus master switch:** Switches the electrical engine equipment (starter, engine instruments etc.) on master battery and generator ON / OFF. This switch is coupled with the propeller dome lock in such a manner that, with the propeller dome in the OPEN position, it is automatically operated when the propeller dome operating handle is unlocked (OFF) or locked (ON).

- **Engine bus back-up switch:** Enables to restart the engine in flight in case of a malfunction of the engine master switch. It provides a mechanical operation catch.

- **Starter:** Push button for the electric engine starter. Button is cut off, if ignition is switched on before starter operation. After an unsuccessful re-starting attempt, ignition must be switched off before a new starter operation.

- **Ignition:** ON / OFF
  
  The Ignition switch connects aircraft ground to the magneto which is principally independent from the master or engine master switch. The second level kills the starter relay circuit (when operated), to prevent engine and propeller from damage due to false start-up procedure.

- **Avionics:** Switches any electrically operated flight control and navigation equipment ON / OFF. During starter operation, the avionics are switched off (or switched over to the backup battery, if fitted).

- **Avionics supply:** Switches avionics bus from main battery to back-up battery. Tip:
  - Powered flight: Position main battery
  - Gliding flight: Position back-up battery
Landing gear switch:
- Upper position: RETRACT
- Lower position: LOWER
- Centre position: Circuit disconnected from electrical system.

ACL (optional): ON / OFF - only operative with engine master switch ON (Anti-Collision Light).

Position lights (optional): ON / OFF - only operative with engine master switch ON.

**Back-up battery (optional):**
- Mounting position: top of vertical fin below the stabiliser or in the left footwell (depending on trim requirements)
- Function: Supplies the avionics bus instead of the master battery.
- Use: preferred during gliding flight. With this, unintentional discharging of the master battery during gliding flight is prevented and the charge is secured for engine re-start.
- Switching: by switch-over from master to back-up battery with switch labelled "AVIONICS SUPPLY". Or automatically during starter operation, or when the main circuit breaker pops out.
- Charging: through generator or externally (max. charge voltage 14.7 V).

**Note:** At low proportions of powered flight in total flight time the back-up battery is not charged adequately by the generator. During external charging only the main battery is charged, for technical reasons charging of the back-up battery is not possible. In this case it must be charged separately (max. charge voltage 14.7 V).

**Warning:** Do not fly if the back-up battery is removed while still recorded in the equipment list. The corresponding CG calculations and Weight & Balance documentation will be invalid and the motorglider will not be airworthy. Unless the equipment list is corrected and new weight and balance documents are prepared, flying is not permitted.

### 7.9 Fix Pitch Propeller

#### 7.9.1 General

The propeller is designed as a “FIX-PITCH-Propeller. It means the propeller blades are fixed in one position. The fix pitch propeller is derived from the variable pitch propeller 10AP-V. The propeller blades 10AP-VB are used, but they are fixed in the take-off position. The performance parameters of the variable pitch propeller in take-off position can be achieved.

Once rotation has stopped the blades fold inwards and can be enclosed by retraction of the nose-cone. In this configuration the STEMME S10-V is prepared for high-performance gliding flight.

#### 7.9.2 Operational Principles

The principle of the folding mechanism is very similar to the one of the variable pitch propeller 10AP-V. The propeller folds, z-shaped, in the plane of rotation and can then be covered by closing the propeller dome.
7.9.3 Construction

The propeller central part with integrated blade suspension is made of aluminium alloys. Protection against corrosion is achieved by anodization. The blades are suspended in full needle bearings.

The propeller blades are made of fibre reinforced plastic (FRP), constructed of two composite shells. Shear forces, centrifugal forces and bending moments are transferred by a double-spar to the suspension eye at the blade root. The spar flanges are of carbon rovings and are integral part of the shells, the four webs are of GFRP. In the root area the spar rovings are looped around the eye bushing for best transition of the forces from the blade to the suspension hub. Protection against erosion is achieved by means of an impact resistant resin coating at the leading edge (the gluing is made of the same material) and, additionally, a PU-tape on the leading edge of the blade. Ventilation is provided by a small opening in the blade tip.

Retraction of the blades is accomplished by a coupling lever and torque springs, located in the hinge axis. The required bias of the springs is achieved by twisting the axis before final fastening.

7.9.4 deleted
7.9.5 Technical Data and Operation Limits

- Max. rotational speed propeller 2881 rpm
- according to maxi. rot. engine speed 3400 rpm

7.9.6 deleted
Section 8 - Handling, Servicing and Maintenance

8.1 Introduction 8-1
8.2 Powered Sailplane Inspection Periods 8-1
8.3 Alterations or Repairs to the Powered Sailplane 8-1
8.4 Ground Handling / Road Transport 8-1
8.5 Cleaning and Care 8-1
8.1 Introduction

This section deals with manufacturer's recommended procedures for proper ground handling and servicing of the powered sailplane. It also identifies certain inspection and maintenance requirements which must be followed if the motorglider is to retain that new-plane performance and dependability. It is wise to follow a planned schedule of lubrication and preventive maintenance based on climatic and flying conditions encountered.

8.2 Powered Sailplane Inspection Periods

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<tr>
<td>Engine</td>
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<td>Drivetrain System</td>
<td>shortest interval: 50h</td>
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<tr>
<td>Propeller</td>
<td>shortest interval: 50h</td>
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For UK: in addition, all requirements of the Light Aircraft Maintenance Schedule (LAMS) issued by the CAA are to be completed for 50 hour, 150 hour and Annual Checks.

Note the prescribed inspection after the first 25 h of operation (refer to maintenance manual STEMME S10-V for the extent of inspection - Document No A40 - 10 - 121 ).

8.3 Alterations or Repairs to the Powered Sailplane

For standard maintenance and minor repairs please refer to the Maintenance Manual, Doc. No. A40-10-121. The manufacturer must be contacted concerning major repairs.

8.4 Ground Handling / Road Transport

- Parking: SET parking brake (turn lever to ON position and operate brake afterwards) respectively LOCK pin at brake lever with brake activated (on LH stick, optionally also RH).
  Pay attention to the wings being levelled when fuel tanks are full; otherwise there is some leakage through the tank vents.
- Tie down: screw eyelet into the thread on the bottom surface of the inner wing ends and tie down vertically.
- Pushing backwards: guide on fin and only push on inner wing.
- Road transport: see manual for trailer.

8.5 Cleaning and Care

It is suggested not to leave the aircraft outside unnecessarily, since even after a few short weeks the polyester paint can become brittle and crack due to the UV radiation.

The surface and other parts require regular servicing. Detailed suggestions are found in the maintenance manual.
Section 9 - Supplements

9.1 Introduction 9-1
9.2 Alternative Equipment 9-1
9.3 Supplemental and Additional Equipment, List of inserted Supplements 9-2
9.1 Introduction

This section contains the appropriate supplements if various items of optional equipment and systems that are not part of the standard version are installed in the individual aircraft to which this Flight Manual relates. With these supplements, the pilot is provided with the additional information and instructions required for safe and efficient operation.

The installation of optional equipment is always based on a Service Bulletin. The pertinent supplemental information will be issued in the form of alternative pages or Flight Manual insert and in the case of a retrofit will be supplied together with the retrofit kit. Alternative pages must be inserted instead of standard pages. The insert (Doc.-No.: A36-SB-No.) is to be filed following page 9-2 (cover page of Section 9.3).

For information on amendments or supplements to the Manuals in the case of optional equipment or systems please refer also to the Service Bulletin A31-10-008.

The accomplishment of any SB having an effect on the Flight Manual is to be certified prior to the next flight in the aircraft’s log book and in the record of accomplished SBs/ADs by an approved holder of an Inspection Authorisation. This signature also covers a review of the Flight Manual.

9.2 Alternative Equipment

Special attention is to be paid to the case of equipment and systems which are not installed in addition to but as an alternative to the standard version and thus have an influence on the standard text of the Flight Manual (Sections 1 to 8). Here the rule applies that associated instructions and information are added to the corresponding passage of the standard text, with the original text (if any) and the amended text each appearing in square brackets. A superscript following the closed bracket is identical with the current revision number, the letter following the superscript indicates whether the text passage applies to the standard version (“s”) or to the alternative version (“a”) (example: [...]1a).

All text passages in brackets that do not correspond to the aircraft’s design configuration described on page ii (standard version, if no entries) must be deleted.

If this procedure cannot or shall not be applied (Section 3/Emergency Procedures and amendments to illustrations), the STEMME Company will keep ready “Alternative Pages” of the pages concerned. The insertion of alternative pages will be identified by strike out of standard pages (pages without “a”) in the “List of Effective Pages” (see section 0.2). This procedure is applicable for installation of supplemental or additional equipment ex work or later installation.
9.3 Supplemental and Additional Equipment, List of inserted Supplements

Supplemental and additional equipment have no influence on the contents of Sections 1 through 8 of the Flight Manual. They may, however, require additional instructions, which have been inserted in the present Flight Manual following this page and entered in the list below.


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