Flight Manual for the Motorglider STEMME TSA-M

This motorglider Flight Manual is FAA approved for U.S. registered motorgliders in accordance with the provisions of FAR 14 CFR Section 21.29, and is required by the FAA Type Certification Data Sheet No. G23CE.

07. FEB. 2011

This Flight Manual is approved by EASA.

Variant: S6

Serial number: __________

Specification: FAA G23CE

Registration: __________

Doc.-No.: P400-006.000 FAA
Date of Issue: 20. December 2010

Page: i
Revision: ---
Date of Rev.: --.--.----
This motorglider may only be operated in correspondence to the instructions and operating limitations specified in this Flight Manual.
0.0 Documentation of Revisions

All revisions to this Flight Manual must be documented in the following table. Exceptions to this are:

- current values needed for the determination of the aircraft’s center-of-gravity (CG) (chapter 6.3)
- update of the installed equipment list (chapter 6.5)
- updates in the list of supplements (chapter 9.2)

A revision of the Flight Manual is approved on basis of accomplished validation process stating the FAA project number or the revision is countersigned directly by Design Organization DOA EASA.21J.250.

In the continuing table only the last approved revision is countersigned.

New or corrected text sections of the revised page(s) will be marked by a vertical line on the outer side of the page. The newest revision number of all revisions on the page is mentioned in the footnote-section of the page, along with the date of the newest revision.

Compliance with the new revisions to the operations manual and the corresponding aircraft is documented by the signature of the correcting person in the table below.

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P062- Service Bulletin
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0.1 List of Effective Pages and Chapters

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## Chap. 7

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Chapter 2 – Operating Limitations
Chapter 3 – Emergency Procedures
Chapter 4 – Normal Operating Procedures
Chapter 5 – Flight Performance
Chapter 6 – Mass and Balance
Chapter 7 – Description of the Motorglider and its Systems and Equipment
Chapter 8 – Handling, Servicing and Maintenance
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1.1 Introduction

This Flight Manual has been created to provide pilots and flight instructors with all information necessary for safe, practical and optimized operations of the motorglider Stemme S6, equipment option “S6-T” (Fix Landing Gear).

The Flight Manual contains all information for the pilot required by CS-22. Additionally, it contains further data and details considered by the manufacturer to be useful to the pilot.

The operating instructions for the engine - model ROTAX 914 F2- and for the propeller - model MTV-7-A/170-051 – are available in separate manuals.
1.2 Basis for Certification

The motorglider variant STEMME S6 is based on the type STEMME TSA-M, which has been type certified (type certificate nr. EASA.A.143) by EASA on November 22, 2008, in Cologne, Germany.

The variant STEMME S6 has been certified in correspondence to the „Certification Specifications for Sailplanes and Powered Sailplanes CS-22“ of EASA, published as EASA Decision ED 2003/13/RM on November 14, 2003.

Airworthiness has been certified in the „utility“ category.

The noise certification is based on ICAO Annex 16 – Chapter X – propeller-driven aircraft.
1.3 Warnings, Cautions and Notes

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

**Warning:** implies that non-observation of corresponding procedure leads to immediate or significant degradation of flight safety.

**Caution:** implies that non-observation of the corresponding procedure leads to a minor – yet possibly long-term – degradation of flight safety.

**Note:** draws attention to any special item not directly related to safety but which is important or unusual.
# 1.4 Dimensions and Specifications

## Specifications

| Fuselage | Design | Front section: carbon-fiber composites  
Mid-section: steel-tube framework with glass-fiber composite fairing  
Rear section with integrated vertical fin: carbon-fiber composites |
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>27.95 ft / 8.52 m</td>
<td></td>
</tr>
<tr>
<td>Height</td>
<td>8.04 ft / 2.45 m</td>
<td></td>
</tr>
<tr>
<td>Width</td>
<td>3.97 ft / 1.21 m</td>
<td></td>
</tr>
</tbody>
</table>
| Wings | Design | threepart,  
Spar: carbon-fiber composites  
Shell: carbon-fiber composites sandwich-structure |
<p>| Span | 59.05 ft / 18.00 m |
| Wing Area | 187.51 ft² / 17.42 m² |
| Aspect Ratio | 18.62 |
| Dihedral | 2° |
| Wing Airfoil | DU (changes with wingspan) |
| Air-brakes | Design | Schempp-Hirth-style Air-brakes at outer wing |
| Length | 4.905 ft / 1.495 m |
| Horizontal Stabilizer | Design | Carbon-fiber composite bars and sandwich-structure |
| Stabilizer Span | 10.73 ft / 3.20 m |
| Stabilizer Area | 18.73 ft² / 1.74 m² |
| Airfoil | DU |
| Masses | Max. Take-off Mass (MTOM) | 1874 lbs / 850 kg |
| Max. Wing Loading | 10 lbs/ft² / 48.79 kg/m² |
| Max. Weight of non-lifting Parts | 1367 lbs / 620 kg |
| Acceptable Range of in-flight CG-Location | 8.82 in to 16.10 in / 224 mm to 409 mm |</p>
<table>
<thead>
<tr>
<th>Engine</th>
<th>Design</th>
<th>4-Cylinder 4-Stroke Otto-engine in opposed-cylinder design, Turbocharger with electronic Manifold-Air-Pressure (MAP) control, integrated reduction gear</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Model</td>
<td>Rotax 914 F2</td>
</tr>
<tr>
<td>Max. Take-off Power</td>
<td>113.3 HP / 84.5 kW at 5800 RPM (Takeoff RPM limited to 5600 RPM)</td>
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</tr>
<tr>
<td>Max. Continuous Power</td>
<td>98.4 HP / 73.4 kW at 5500 RPM</td>
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<tr>
<td>Fuel Consumption at Max. Continuous Power (100%)</td>
<td>7.0 US gal/h / 26.6 l/h</td>
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</tr>
<tr>
<td>Fuel Consumption at 75% Power</td>
<td>5.4 US gal/h / 20.4 l/h</td>
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<tr>
<td>Fuel Consumption at 55% Power</td>
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<tr>
<td>Transmission-Ratio of Reduction-Gear</td>
<td>i=2.428</td>
<td></td>
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<tr>
<td>Propeller</td>
<td>Design</td>
<td>Electrically-adjustable 3-Blade Constant-Speed Propeller</td>
</tr>
<tr>
<td></td>
<td>Model</td>
<td>MTV-7-A/170-051 with Constant-Speed Control-Unit</td>
</tr>
<tr>
<td></td>
<td>Diameter</td>
<td>5.58 ft / 1.70 m</td>
</tr>
<tr>
<td>Front-Drive</td>
<td>Design</td>
<td>Gear in Magnesium-Casing, mounted elastically on rubber elements</td>
</tr>
<tr>
<td></td>
<td>Model</td>
<td>STEMME 050.251</td>
</tr>
<tr>
<td></td>
<td>Transmission-Ratio</td>
<td>i=1.100</td>
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<tr>
<td>Fuel-Tanks</td>
<td>Design</td>
<td>Integral-tanks located in the forward section of the inner-wing</td>
</tr>
<tr>
<td></td>
<td>Capacity</td>
<td>17.2 US gal / 65 l in right-hand inner-wing (optionally 17.2 US gal / 65 l in left-hand inner-wing)</td>
</tr>
<tr>
<td></td>
<td>Non-useable Fuel</td>
<td>0.55 US gal / 2.1l in right-hand wing-tank (optionally 0.3 US gal/ 1l in left-hand wing-tank)</td>
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1.5 Three-View Drawing

Illustration 1-1: Threeview-Drawing of STEMME S6 Version „S6-T“
1.6 Terminology and Abbreviations

1.6.1 Speeds

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<th>Description</th>
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<tr>
<td>IAS</td>
<td>Indicated Air-Speed</td>
</tr>
<tr>
<td>TAS</td>
<td>True Air-Speed</td>
</tr>
<tr>
<td>CAS</td>
<td>Calibrated Air-Speed, corrected for installation and instrument errors</td>
</tr>
<tr>
<td>$V_A$</td>
<td>Maneuvering Speed, no full or sudden deflection of the flight controls is allowed above this speed</td>
</tr>
<tr>
<td>$V_C$</td>
<td>Design Cruising Speed, only in calm air</td>
</tr>
<tr>
<td>$V_{FE}$</td>
<td>Maximum Flaps-Extended Speed</td>
</tr>
<tr>
<td>$V_H$</td>
<td>Maximum Cruise Speed</td>
</tr>
<tr>
<td>$V_{NE}$</td>
<td>Never-Exceed Speed</td>
</tr>
<tr>
<td>$V_{RA}$</td>
<td>Maximum Speed in Rough Air</td>
</tr>
<tr>
<td>$V_{S0}$</td>
<td>Stalling Speed in landing configuration</td>
</tr>
<tr>
<td>$V_{S1}$</td>
<td>Stalling Speed in given configuration</td>
</tr>
<tr>
<td>$V_x$</td>
<td>Speed for best angle-of-climb</td>
</tr>
<tr>
<td>$V_y$</td>
<td>Speed for best rate-of-climb</td>
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1.6.2 Meteorological Terminology

<table>
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<th>Abbreviation</th>
<th>Description</th>
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<td>ISA</td>
<td>International Standard Atmosphere</td>
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<tr>
<td></td>
<td>Temperature at MSL: 59°F / 15°C</td>
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<tr>
<td></td>
<td>Air Pressure at MSL: 29.92 inHg / 1013.25 hPa</td>
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<tr>
<td></td>
<td>Temperature gradient in Troposphere:</td>
</tr>
<tr>
<td></td>
<td>-0.36°F/100ft / -0.65°C/100m</td>
</tr>
<tr>
<td>OAT</td>
<td>Outside Air Temperature</td>
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<tr>
<td>MSL</td>
<td>Mean Sea Level</td>
</tr>
<tr>
<td>QNH</td>
<td>Air Pressure corrected to MSL using ISA</td>
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<tr>
<td>QFE</td>
<td>Air Pressure at Reference Airfield</td>
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</table>
1.6.3  **Mass and Balance**

RP  Reference Plane, an imaginary vertical plane which forms the origin for all center-of-gravity calculations

MAC  Mean Aerodynamic Chord

MTOM  Maximum Take-Off Mass (cf. MTOW)

Empty Mass  Mass of the Airplane including non-useable fuel, all operating-fluids and max. amount of oil. It does not contain payload and trip-fuel and fuel-reserves.

Center-of-Gravity  Imaginary point, at which gravity acts on the aircraft

Lever  Horizontal distance between the center-of-gravity of a body and the reference plane

Moment  Product of Mass and Lever of a body

Non-useable Fuel  Fuel which remains in the tank and is not available for the flight

Useable Fuel  Amount of fuel which is available for the flight

Payload  Difference between empty-mass and take-off-mass

NLP  Non Lifting Parts

1.6.4  **Abbreviations for Aircraft and Powerplant**

A/C  Aircraft

XPDR  Transponder

MCP  Maximum Continuous Power

MTOP  Maximum Take-Off Power

CD  Constant Depression

TCU  Turbo Control-Unit

CHT  Cylinder-Head Temperature

S/N  Serial Number

MAP  Manifold Air Pressure
1.6.5 Miscellaneous

FCOM Flight Crew Operation Manual
AC Alternating Current
DC Direct Current
RWY Runway
STBY Stand-by
COM Communication
GFC Glass-fiber composites
CFC Carbon-fiber composites
VFR Visual Flight Rules
NVFR Night-time Visual Flight Rules
EASA European Aviation Safety Agency
SB Service Bulletin
LBA German Aviation Authority („Luftfahrt-Bundesamt“)
CS Certification Specification / Constant Speed (Propeller)
MOGAS Regular higher-octane car-gasoline (Motor Gasoline)
LDG Landing
T/O Take-off
AVGAS Gasoline for Aircraft (Aviation Gasoline)
# 1.7 Units and Conversion Factors

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<td>1 [ft]</td>
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<td></td>
<td>1 [NM]</td>
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<tr>
<td><strong>Speed</strong></td>
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<td>1 [fpm]</td>
</tr>
<tr>
<td></td>
<td>1 [mph]</td>
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<tr>
<td><strong>Mass</strong></td>
<td>1 [lbs]</td>
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<tr>
<td><strong>Volume</strong></td>
<td>1 [US gal]</td>
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<td></td>
<td>1 [qts]</td>
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<tr>
<td><strong>Temperature</strong></td>
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<td><strong>Pressure</strong></td>
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<td></td>
<td>1 [inHg]</td>
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<tr>
<td><strong>Force</strong></td>
<td>1 [lbf]</td>
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1.8 References

The following list of references mentions documents and manuals which have been used to gain information from aircraft components from other manufacturers.

However, the information presented in this Flight Crew Operation Manual is obligatory.

Engine and Engine Instruments:

Manufacturer: BRP-Rotax GmbH & Co. KG
Welser Strasse 32
A – 4623 Gunskirchen
Austria

Telefone: 43-(0)7246 601-0
Fax: 43-(0)7246 6370
Internet: www.rotax-aircraft-engines.com

Constant-Speed-Propeller:

Manufacturer: mt-Propeller Entwicklung GmbH
Aiport Straubing-Wallmuehle
D – 94348 Atting
Germany

Telefone: 49-(0)9429-9409-0
Fax: 49-(0)9429-8432
Internet: www.mt-propeller.com
Chapter 2 – Operating Limitations

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2.1 Introduction

This chapter describes the operating limitations, instrument markings and placards. These need to be followed for a safe operation of the motorglider, its engine and its standard equipment.
2.2 **Air-Speeds**

The air-speed limitations and their importance to flight operations are listed below:

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<th>(IAS)</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>( V_{NE} )</td>
<td>Never-Exceed Speed (maximum speed) in calm weather conditions</td>
<td>145 kts / 270km/h</td>
</tr>
<tr>
<td>( V_{A} )</td>
<td>Maneuvering Speed and Maximum Speed in Rough Air (Strong Turbulence)</td>
<td>102 kts / 190km/h</td>
</tr>
<tr>
<td>( V_{RA} )</td>
<td>Maximum Speed for Operation of the flaps:</td>
<td></td>
</tr>
<tr>
<td>▪ Flap setting: TO / LDG 1</td>
<td>102 kts / 190km/h</td>
<td>These speeds must not be exceeded with the flaps extended to the given setting.</td>
</tr>
<tr>
<td>▪ Flap setting: LDG 2</td>
<td>75 kts / 140km/h</td>
<td></td>
</tr>
</tbody>
</table>
## 2.3 Air-Speed-Indicator Markings

The following table defines the air-speed-indicator markings and their meaning.

<table>
<thead>
<tr>
<th>Marking</th>
<th>IAS (Value/Range)</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>White Arc</td>
<td>45 to 102 kts / 85 to 190 km/h</td>
<td>Operating range for positive flap settings. (The lower limit is $1.1V_{S0}$ at MTOM in landing-configuration (LDG 2). The upper limit is the maximum speed for flaps set to TO / LDG 1.)</td>
</tr>
<tr>
<td>Green Arc</td>
<td>52 to 102 kts / 96 to 190 km/h</td>
<td>Normal operating range. (The lower limit is $1.1V_{S1}$ at MTOM and most forward CG-location with flaps set in the neutral position. The upper limit is the maximum air-speed in strong turbulence.)</td>
</tr>
<tr>
<td>Yellow Arc</td>
<td>102 to 145 kts / 190 to 270 km/h</td>
<td>The airplane may not be flown in this range in strong turbulence. Maneuvers may only be flown carefully.</td>
</tr>
<tr>
<td>Red Line</td>
<td>145 kts / 270 km/h</td>
<td>Maximum speed for all permitted modes of operation</td>
</tr>
<tr>
<td>Blue Line</td>
<td>62 kts / 115 km/h</td>
<td>Air-speed for best rate-of-climb ($V_Y$)</td>
</tr>
<tr>
<td>Yellow Triangle</td>
<td>60 kts / 110 km/h</td>
<td>Approach Speed at MTOM</td>
</tr>
<tr>
<td>White Triangle to the outside</td>
<td>75 kts / 140 km/h</td>
<td>Maximum speed for flaps set to LDG 2</td>
</tr>
<tr>
<td>and Letter „L“</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


## 2.4 Limitations for Propulsion System and Operating Fluids

### 2.4.1 Engine Limitations

**Engine**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Engine Manufacturer</td>
<td>BRP-Rotax GmbH &amp; Co. KG Gunskirchen, Austria</td>
</tr>
<tr>
<td>b) Engine Model</td>
<td>ROTAX 914 F2</td>
</tr>
<tr>
<td>c) Maximum RPM during T/O (max. for 5 minutes):</td>
<td>5600 RPM (5800 RPM allowed for max. 1 min)</td>
</tr>
<tr>
<td>d) Maximum Continuous RPM</td>
<td>5500 RPM</td>
</tr>
<tr>
<td>e) Idle RPM:</td>
<td>1200 to 1400 RPM</td>
</tr>
<tr>
<td>f) Max. T/O-Power (ISA):</td>
<td>113.3 HP / 84.5 kW at 5800 RPM (Takeoff RPM limited to 5600 RPM by const. speed propeller control)</td>
</tr>
<tr>
<td>g) Max. Continuous Power:</td>
<td>98.4 HP / 73.4 kW at 5500 RPM</td>
</tr>
<tr>
<td>h) Max. Altitude with Constant Power:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>T/O-Power</td>
</tr>
<tr>
<td></td>
<td>Continuous Power</td>
</tr>
<tr>
<td>i) Max. Cylinder-Head Temperature (CHT):</td>
<td></td>
</tr>
<tr>
<td></td>
<td>minimum</td>
</tr>
<tr>
<td></td>
<td>maximum</td>
</tr>
<tr>
<td>j) Fuel Pressure:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>minimum</td>
</tr>
<tr>
<td></td>
<td>normal</td>
</tr>
<tr>
<td></td>
<td>maximum</td>
</tr>
<tr>
<td></td>
<td>minimum</td>
</tr>
</tbody>
</table>

### Propeller

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Propeller Manufacturer:</td>
<td>MT-Propeller Gerd Muehlbauer GmbH D-94348 Atting, Germany</td>
</tr>
<tr>
<td>b) Propeller Model:</td>
<td>MTV-7-A/170-51</td>
</tr>
<tr>
<td>c) Control Unit:</td>
<td>P120-A</td>
</tr>
<tr>
<td>d) Type Certificate:</td>
<td>LBA TC: 32.130/84 R.3</td>
</tr>
</tbody>
</table>
2.4.2 Operating Fluids

Fuel

| a) Type of Fuel | MOGAS (unleaded higher-octane gasoline), or else AVGAS 100LL |

Lubricants

<table>
<thead>
<tr>
<th>a) Oil Temperature</th>
<th>minimum</th>
<th>maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>122°F / 50°C</td>
<td>266°F / 130°C</td>
</tr>
<tr>
<td>b) Oil Pressure</td>
<td>minimum</td>
<td>maximum</td>
</tr>
<tr>
<td></td>
<td>44.3 inHg / 1.5 bar</td>
<td>206.7 inHg / 7.0 bar (only briefly allowed, when starting cold engine)</td>
</tr>
<tr>
<td></td>
<td>normal</td>
<td></td>
</tr>
<tr>
<td></td>
<td>44.3 inHg to 147.7 inHg / 1.5 to 5.0 bar</td>
<td></td>
</tr>
<tr>
<td>c) Amount of Oil</td>
<td>minimum</td>
<td>maximum</td>
</tr>
<tr>
<td></td>
<td>0.5 US gal / 2 l</td>
<td>0.8 US gal / 3 l</td>
</tr>
<tr>
<td>max. permitted. Oil Consumption</td>
<td>0.02 US gal/h / 0.06 l/h</td>
<td></td>
</tr>
</tbody>
</table>

Coolant

| a) Coolant | Conventional coolant on the basis of ethylene-glycol-mixtures (mixture of 50% water, 50% ethylene-glycol). For recommended coolants refer to Service Instruction SI-914-019 by ROTAX |
| b) Amount of Coolant | minimum | maximum |
|                     | 0.63 US gal / 2.4 l | 0.66 US gal / 2.5 l |
## 2.5 Engine Instrument Markings

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Red Line (Lower Limit)</th>
<th>Green Arc (Normal Operating Range)</th>
<th>Yellow Arc (Upper Warning Range)</th>
<th>Red Line (Upper Limit)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tachometer [RPM]</td>
<td>-</td>
<td>1400-5500</td>
<td>5500 - 5600 *</td>
<td>5600 *</td>
</tr>
<tr>
<td>Oil Temperature [°F]</td>
<td>122</td>
<td>122-266</td>
<td>-</td>
<td>266</td>
</tr>
<tr>
<td>[°C]</td>
<td>50</td>
<td>50-130</td>
<td>-</td>
<td>130</td>
</tr>
<tr>
<td>CHT [°F]</td>
<td>-</td>
<td>122-275</td>
<td>-</td>
<td>275</td>
</tr>
<tr>
<td>[°C]</td>
<td>-</td>
<td>50-135</td>
<td>-</td>
<td>135</td>
</tr>
<tr>
<td>Oil Pressure [inHg]</td>
<td>-</td>
<td>44.3-147.7</td>
<td>147.7-206.7</td>
<td>206.7</td>
</tr>
<tr>
<td>[bar]</td>
<td>-</td>
<td>1.5-5</td>
<td>5-7</td>
<td>7</td>
</tr>
<tr>
<td>Manifold Air-Pressure</td>
<td>-</td>
<td>-</td>
<td>36.0 – 40.5</td>
<td>40.5</td>
</tr>
<tr>
<td>[inHg]</td>
<td>-</td>
<td>-</td>
<td>1.22 – 1.37</td>
<td>1.37</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* A short time overspeed up to max. 5800 RPM (max. allowed engine RPM of engine manufacturer) is allowed for max. 1 minute.
## 2.6 Markings on other Instruments

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Red Line (Lower Limit)</th>
<th>Green Arc (Normal Operating Range)</th>
<th>Yellow Arc (Upper Warning Range)</th>
<th>Red Line (Upper Limit)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltmeter [V]</td>
<td>11.5</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Amperemeter [A]</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
2.7 Masses

- Maximum Take-Off Mass: 1874 lbs / 850 kg
- Maximum Landing Mass: 1874 lbs / 850 kg
- Maximum Payload in Rear Baggage Compartment: 44 lbs / 20 kg

**Warning**: Exceeding the mass limits can cause the A/C to be overstressed and might cause a significant reduction in flight performance and flight qualities!
2.8 Center-of-Gravity (CG)

More details for determining the CG in the empty configuration are described in chapter 6 of this operation manual. They can also be found in the maintenance manual of the STEMME S6.

All distances need for determining the CG are measured from the reference plane (RP). This plane is vertical to the wing leading-edge near the wing root. For orientation of the plane, see chapter 6.

Location-Limits for the Center-of-Gravity

The in-flight CG must be kept within the following limits when flying:

1. Most forward in-flight CG-Limit:
   • \( x = 8.82 \text{ in} / 224 \text{ mm} \) behind RP
2. Most rearward in-flight CG-Limit:
   • \( x = 16.10 \text{ in} / 409 \text{ mm} \) behind RP

**Warning:** Operating the motorglider outside the permitted limits for the CG reduces the aircraft’s stability or controllability. This is NOT permitted!

How to properly determine the CG-location for flight is described in chapter 6.
2.9 Permitted Maneuvers

The STEMME S6 motorglider is certified according to CS-22 in the „Utility“-category.

This certification includes the following maneuvers:

1. All regular, non-aerobatic maneuvers
2. Maneuvers with a maximum bank-angle of 60°

**Caution:** Aerobatics, including intentional spins and flights in clouds are NOT permitted.
2.10 Maneuver Load-Factors

When flying the permitted maneuvers, the following maximum load factors are only allowed:

<table>
<thead>
<tr>
<th></th>
<th>at $V_A$</th>
<th>at $V_{NE}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive</td>
<td>5.3</td>
<td>4.0</td>
</tr>
<tr>
<td>Negative</td>
<td>-2.65</td>
<td>-1.5</td>
</tr>
</tbody>
</table>

**Warning:** Increasing the maneuver load-factors past the allowed limits causes the aircraft-structure to be overloaded!

**Caution:** Maneuvers with an intentional negative load are not permitted!
2.11 Operating Altitude

The maximum demonstrated operating-altitude with the engine running is at 16000 ft / 4875 m MSL. At higher altitudes an unproblematic restart of the engine cannot be guaranteed.
2.12 Flight Crew

Maximum Number of Crew Members: 2
Minimum Number of Crew Members: 1 Pilot – If the A/C has all necessary equipment (additional air-speed-indicator and wheel-brake on the right-hand side) it may be flown from the left seat or the right seat.

Caution: Keep the minimum load in mind. It may be needed to carry ballast mass in the aircraft to reach the minimum load (see also page 2.22).
2.13 Permitted Modes of Operation

Permitted modes of operation are:

1. VFR-flights in day-time only
2. No Aerobatics, no maneuvers with negative load factors

**Caution:** Flights into known icing conditions or into thunderstorm conditions are not permitted!

**Note:** Aerotow and winch launching are not permitted.
2.14 Minimum Equipment

The following table lists the aircraft’s minimum equipment which is required by CS-22 and by operational considerations. This minimum equipment must be functioning properly.

**Minimum Equipment: Flight and Navigational Instruments**
- Altimeter 0 - 20000 ft / 0 - 5000 m
- Air-Speed-Indicator 0 - 200kts / 0 - 350 km/h
- Magnetic Compass
- Electric Trim-Indicator

**Minimum Equipment: Engine Instruments**
- Fuel-Gauge
- Oil-Temperature-Gauge
- Fuel-Pressure-Warning-Light
- Oil-Pressure-Gauge
- Cylinder-Head-Temperature (CHT)-Gauge
- Manifold-Air-Pressure (MAP)-Gauge
- Amperemeter
- Voltmeter
- Tachometer
- Generator-Caution-Light
- Engine-Hours-Meter

**additional operational minimum equipment:**
- Safety-belts for each seat
- Flight Manual
- Stall Warning
- Fire-Warning

**Note:** Additional minimum equipment might be required by different nations, depending on the mode of operation. This might, for example, vary with the route of a flight.

The permitted equipment is listed in Chapter 6.
2.15 Fuel

- Fuel to be used: MOGAS
  (unleaded gasoline according to
  EN 228, min. RON 95)
  or AVGAS 100LL

- Standard tank, with auxiliary tank (integral tanks in left and right wing)
  - Tank Capacity (right): 17.2 US gal / 65 l
  - Tank Capacity (left, optional): 17.2 US gal / 65 l
  - Non-useable Fuel (right): 0.55 US gal / 2.1 l
  - Non-useable Fuel (left): 0.3 US gal / 1 l

AVGAS contains lead, which deposits at the valve lip and in the combustion chamber. According to ROTAX, AVGAS may only be used when vapor bubbles form or when other fuel is not available (refer to ROTAX SI-914-019, latest Revision).

Caution: Only use fuels which are appropriate for the local climate conditions.
2.16 Lubricant and Coolant

2.16.1 Lubricant
To lubricate the engine and the attached gears, use only regular automotive-oils with additives for gears. Do NOT use alloyed or un-alloyed aircraft-engine oil!

**Caution:** If AVGAS is used, do NOT use fully synthetic oil!

**Note:** Only use oils according to the API-specifications. Only oils of the type „SF“ or „SG“ with gear additives „GL4“ or „GL5“ are permitted!

**Note:** Because it is stable in high temperatures and causes little residue, partially synthetic and fully synthetic oils are preferred. These should be for 4-stroke high-performance engines.

Select the viscosity of the lubricating oil with the table presented below. Take into account the local climatic conditions. The use of multi-grade oils is recommended because of the lesser influence of temperature.
Illustration 2-1: Table of Lubricants

Oil Capacity:
- maximum Oil Capacity: 0.8 US gal / 3 l
- minimum Oil Capacity: 0.5 US gal / 2 l
- max. permitted Oil Consumption: 0.02 US gal /h / 0.06 l/h

2.16.2 Coolant

The manufacturer recommends conventional coolants on the basis of a ethylene-glycol-mixture. For recommended coolants refer to latest Revision of Service Instruction “Selection of suitable Operating Fluids for ROTAX Engine Type 912 and 914 (Series)”, SI-914-019 by ROTAX. The coolant should be used with a mixture ratio of 1:1.

Waterless coolants are NOT recommended by the manufacturer. With the same operating conditions they cause higher engine temperatures.

Warning: High risk of being burned! Do NOT open the lid of the cooling system’s filling jar when the motor is warm. The system is pressurized. There is a high risk of being burned by boiling splashes of water!
Caution: Low-grade coolant or contaminated coolant can cause deposits in the cooling system. This might lead to bad cooling performance!

Caution: Because of the possible deposits and the fire danger do NOT use pure anti-freeze concentrate. Pure anti-freeze solidifies at $-18^\circ$C!

Coolant Capacity:
- maximum Coolant Capacity: 0.66 US gal / 2.5 l
- minimum Coolant Capacity: 0.63 US gal / 2.4 l
- max. Capacity of Expansion Reservoir: 0.05 US gal / 0.2 l
- min. Capacity of Expansion Reservoir: 0.03 US gal / 0.1 l
2.17 Additional Limitations

2.17.1 Maximum demonstrated Crosswind-Component

The maximum demonstrated crosswind-component is:

- 16 kts / 30 km/h

**Warning:** Take-offs and landings in conditions with higher crosswind-components may cause uncontrollable flight conditions.

2.17.2 Electronic Equipment

Do NOT use or turn on other electronic equipment except the equipment which is installed in the airplane. Other equipment may cause interference with the aircraft's avionics.

Examples of non-allowed equipment are:

- Mobile phones
- Radio remote controls
- Devices using cathode ray tubes or similar equipment

2.17.3 Smoking in the Aircraft

Smoking is NOT allowed in the aircraft!
2.18 Placards for Operating Limitations

The following section describes placards for operating limitations and their position in the cockpit.

**Note:** Additional placards and their positions are mentioned in the maintenance manual.

Illustration 2-2: Position of Placards on the Instrument Panel and Canopy Frame
Manufacturer: **STEMME AG**  
Type: **TSA-M**  
Model: **S6T**  
Serial no.:  
Year of Constr.:  

**Certificated for:**  
Never exceed Speed: \( V_{NE} \) 145 kts  
Manoeuvring Speed: \( V_{A} \) 102 kts  
Maximum Speeds  
- Rough Air: \( V_{RA} \) 102 kts  
- Flaps extended  
  pos. Flaps: TO / LDG 1: \( V_{FE} \) 102 kts  
  LDG 2: \( V_{FE} \) 75 kts  
Empty Weight:  
Max. Take-Off Weight: 1874 lbs  
Min. Seat Load: lbs, otherwise ballast  
Max. Cockpit Load: lbs  
Permitted Flight Figures: - None -  

**Note:** Check Load before every flight!  

**Change in the cockpit load with load in the baggage compartment:**  
\[ L_{MCL\, New} = L_{MCL} + L \times 2.2 \]  
\[ L_{MCL\, New} \quad \text{increased min. cockpit load} \]  
\[ L_{MCL} \quad \text{min. cockpit load} \]  
\[ L \quad \text{baggage weight} \]  

<table>
<thead>
<tr>
<th>baggage weight [lbs]</th>
<th>Increase of min. cockpit load by: [lbs]</th>
</tr>
</thead>
<tbody>
<tr>
<td>44 (max.)</td>
<td>97</td>
</tr>
<tr>
<td>33</td>
<td>73</td>
</tr>
<tr>
<td>22</td>
<td>49</td>
</tr>
<tr>
<td>11</td>
<td>24</td>
</tr>
</tbody>
</table>

1. On the left Canopy frame (arranged side by side)  

**Illustration 2-3: Placards 1**
Flight Manual STEMME S6

### Baggage

<table>
<thead>
<tr>
<th>Baggage (lbs)</th>
<th>Increase in Cockpit minimum load (lbs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>44 (maximum)</td>
<td>97</td>
</tr>
<tr>
<td>33</td>
<td>73</td>
</tr>
<tr>
<td>22</td>
<td>49</td>
</tr>
<tr>
<td>11</td>
<td>24</td>
</tr>
</tbody>
</table>

2. Mounted on the inside of the hatch to the rear fuselage section

3. Mounted on the instrument panel
   (near the air-speed-indicator, not required if these markings are on the air-speed-indicator)

### V_{NE} (IAS)

<table>
<thead>
<tr>
<th>[ft MSL]</th>
<th>[kts]</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>145</td>
</tr>
<tr>
<td>6500</td>
<td>145</td>
</tr>
<tr>
<td>10000</td>
<td>138</td>
</tr>
<tr>
<td>13000</td>
<td>132</td>
</tr>
<tr>
<td>16500</td>
<td>124</td>
</tr>
<tr>
<td>19500</td>
<td>119</td>
</tr>
<tr>
<td>26000</td>
<td>105</td>
</tr>
<tr>
<td>33000</td>
<td>92</td>
</tr>
<tr>
<td>39500</td>
<td>81</td>
</tr>
</tbody>
</table>

### V_{NE} (IAS)

<table>
<thead>
<tr>
<th>[ft MSL]</th>
<th>[mph]</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>168</td>
</tr>
<tr>
<td>6500</td>
<td>168</td>
</tr>
<tr>
<td>10000</td>
<td>159</td>
</tr>
<tr>
<td>13000</td>
<td>152</td>
</tr>
<tr>
<td>16500</td>
<td>143</td>
</tr>
<tr>
<td>19500</td>
<td>137</td>
</tr>
<tr>
<td>26000</td>
<td>121</td>
</tr>
<tr>
<td>33000</td>
<td>106</td>
</tr>
<tr>
<td>39500</td>
<td>93</td>
</tr>
</tbody>
</table>

### Fuel Diff Pressure

2.5 +/- 1.0

4. Mounted on the instrument panel next to the Fuel-Pressure-Difference-Gauge

### AUX: MAIN:

| AUX: 16.9 US gal | MAIN: 16.6 US gal |

5. Mounted below the fuel gauges left / right

Illustration 2-4: Placards 2
# Chapter 3 – Emergency Procedures

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
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<td>3.1</td>
<td>Introduction</td>
<td>3-2</td>
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<td>3.2</td>
<td>Defined Airspeeds for Emergency Procedures</td>
<td>3-3</td>
</tr>
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<td>3.3</td>
<td>Canopy Jettison</td>
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<td>Bail-Out</td>
<td>3-5</td>
</tr>
<tr>
<td>3.5</td>
<td>Stall Recovery</td>
<td>3-6</td>
</tr>
<tr>
<td>3.5.1</td>
<td>Powered-Configuration</td>
<td>3-6</td>
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<td>3.5.2</td>
<td>Glider-Configuration</td>
<td>3-7</td>
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<td>Spin Recovery</td>
<td>3-8</td>
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<tr>
<td>3.7</td>
<td>Recovery from Spiral-Dive</td>
<td>3-9</td>
</tr>
<tr>
<td>3.8</td>
<td>Engine-Failure</td>
<td>3-10</td>
</tr>
<tr>
<td>3.8.1</td>
<td>Engine-Malfunction on Ground</td>
<td>3-10</td>
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<td>3.8.2</td>
<td>Engine-Failure during Take-Off</td>
<td>3-11</td>
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<td>3.8.3</td>
<td>Engine-Failure during Flight</td>
<td>3-12</td>
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<tr>
<td>3.8.4</td>
<td>Drive-Section-Failure</td>
<td>3-14</td>
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<tr>
<td>3.8.5</td>
<td>Failure of Engine-Starter</td>
<td>3-14</td>
</tr>
<tr>
<td>3.9</td>
<td>Fire</td>
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3.1 Introduction

This chapter provides checklists and recommended procedures to manage emergencies that may occur. When all mandatory procedures for pre-flight checks and maintenance are observed, a malfunction of the engine or important equipment is very unlikely.

To manage an occurring problem, the emergency procedures described here are recommended.

It is not possible to incorporate all types and combinations of possible emergencies into this Flight Manual, therefore a good knowledge of the design and handling of the aircraft and experience of solving problems are essential.
## 3.2 Defined Airspeeds for Emergency Procedures

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3.3 Canopy Jettison

Jettison the canopy as follows:

1. Red emergency-handle PULL strongly (center of instrument-console)

2. The canopy is pushed upwards by a gas-spring. If necessary, push by hand.

**Warning:** The *rear-canopy-lock must remain engaged* when the canopy is jettisoned! This causes the canopy to be lifted only at the front end and to be torn away by the air-stream.
3.4 Bail-Out

**After the canopy is jettisoned:**

1. Central-lock of the safety-belts **OPEN**
2. Bail-out over the side **Drop below the wing** to avoid collision with the tail-unit.

**Note:** The fixed side-parts of the cockpit are made of a strong structure without sharp edges. Use the side-parts to pull out and brace.
3.5 Stall Recovery

3.5.1 Powered-Configuration

Stall speed depends on flap-setting and actual weight and may occur in unaccelerated level-flight below 52 kts / 96 km/h (worst for flaps set to CRUISE at maximum weight). Stalls will occur in turns at higher speeds depending on g-force. In powered flight an acoustic signal gives warning of a stall.

If the angle-of-attack is increased when the acoustic stall-warning is activated – or if a turn is then flown – a wing-drop may occur. Depending on the CG-position, afterwards the A/C may spin.

Stall Recovery in powered-configuration:

1. Elevator: RELEASE back-pressure, PUSH forward.
2. Throttle: FULL POWER
3. Air-speed: WAIT for increase.
4. Attitude: CORRECT to normal flight attitude.

**Warning:** When recovering from a stall in horizontal flight, an altitude-loss of 100 ft / 30 m is possible. In turning flight, an altitude-loss of 130 ft / 40 m is possible. If the pilot reactions are delayed, the altitude-loss may be more than 200ft / 60 m.
3.5.2 Glider-Configuration

Stall speed depends on flap-setting and actual weight and may occur in unaccelerated level-flight below 52 kts / 96 km/h (worst for flaps set to CRUISE at maximum weight). Stalls will occur in turns at higher speeds depending on g-force. In soaring-flight an aerodynamic buffeting warns against the stall.

If the angle-of-attack is increased while aerodynamic buffeting occurs – or if a turn is then flown – a wing-drop may occur. Depending on the CG-position, afterwards the A/C may spin.

Stall Recovery in glider configuration:

1. Elevator
   RELEASE back-pressure, PUSH forward.
2. Air-speed
   WAIT for increase.
3. Attitude
   CORRECT to normal flight attitude.

Warning: When recovering from a stall in horizontal flight, an altitude-loss of 100 ft / 30 m is possible. In turning flight, an altitude-loss of 130 ft / 40 m is possible. If the pilot reactions are delayed, the altitude-loss may be more than 200ft / 60 m.
3.6 Spin Recovery

If the motorglider spins unintentionally, the following procedures are recommended (for both glider-configuration and powered-configuration):

1. Rudder DEFLECT in the direction opposite to the spin
2. Ailerons NEUTRAL
3. Elevator RELEASE back-pressure or PUSH slightly forward
4. Throttle IDLE
5. End of spin and end of stall WAIT
6. Rudder NEUTRAL (as soon as the spin has stopped)
7. A/C with elevator PULL-OUT of dive with caution

**Warning:** Altitude-loss from start of the spin-recovery to level-flight may be **330 ft / 100 m**

**Warning:** Recovery from the spin with flaps in landing-configuration can cause structural damage. If the A/C spins with flaps in landing-configuration, retract flaps to NEUTRAL and use standard procedure of spin-recovery.

**Caution:** If the A/C spins with a running engine, set the throttle to IDLE.

**Caution:** With a forward CG-position, the spin can start a spiral-dive. Recover from spiral-dive using the standard procedures.

**Note:** With a rear CG-position, the spin is accompanied by periodical pitch movements with about one oscillation per turn.
3.7 Recovery from Spiral-Dive

**Caution:** With middle and forward CG-positions, the spinning A/C has the tendency to start a spiral-dive after some spinning-turns. During a spiral-dive, the air-speed and g-forces will increase in a short time.

**Spiral-dive Recovery:**

1. **Rudder and Aileron**
   
   STOP ROTATION (Deflect in the direction opposite to the turn)

2. **Elevator**
   
   PULL OUT of the dive with caution

**Warning:** Do not exceed $V_{NE} = 145$ kts / 270 km/h during the recovery.

**Note:** If the A/C stops the spin by itself, it can start a spiral-dive.
3.8 Engine-Failure

3.8.1 Engine-Malfunction on Ground

1. Throttle IDLE
2. Brakes as required

**Warning:** Do NOT fly the A/C if a malfunction is not completely repaired!

**Caution:** If the oil-pressure is in the red range, turn OFF the engine immediately.
3.8.2 Engine-Failure during Take-Off

In the case of an engine-failure, or when not enough power is available, perform the following procedure:

1. If RWY is long enough, land straight ahead.
2. If RWY is NOT LONG enough, the pilot has to decide how to proceed, depending on altitude, position and terrain.
3. Air-speed 60 kts / 110 km/h
4. Approach procedure DEFINE
5. Fuel-shut-off-valve CLOSE
6. Ignition OFF

Depending on the situation, it is possible to increase the glide-ratio by setting the propeller to the feathered position:

7. left Propeller-switch MANU
8. right Propeller-switch FEATHER

Caution: Final position is reached not until 90 sec!

In either case:

9. Master-switch OFF

Caution: If possible, turn OFF the master-switch just before landing. The master-switch also turns OFF the electric trim, propeller speed control and COM equipment.

Caution: If the engine is not running, the additional drag is greater for a windmilling propeller than for a feathered propeller. After an engine-failure it is recommended to switch the propeller to FEATHER.
### 3.8.3 Engine-Failure during Flight

An engine-failure is possible in all flight-phases and must be considered in flight-planning. Existing experience with the engine shows, that certain engine-failure-situations are more likely than others. The relevant emergency procedures are described in the following section.

Engine-failure due to carburator-icing was not observed, because the carburator-air is heated by the turbocharger.

In the case of a total electrical failure, the engine does not stop. The ignition-circuit is separated from the electrical-system (for example, if the engine-master-switch at the panel fails).

In most cases the propeller windmills in the airstream. In this case the engine-starter does not need to be operated to restart the engine.

After engine-failure in flight, the following restart-procedure is recommended:

1. **Air-speed**
   - 55 kts - 75 kts / 100 km/h - 140 km/h

2. **Fuel-shut-off-valve**
   - OPEN

3. **Auxiliary-fuel-pump**
   - ON (green lamp ON)

4. **Master Switch (battery)**
   - CHECK if ON

5. **Engine Master Switch**
   - CHECK if ON

6. **Master-circuit-breaker**
   - CHECK

7. **Engine-Bus-circuit-breaker**
   - CHECK

8. **Low-fuel-caution-light**
   - CHECK (yellow LED = ON?)

9. **Fuel-pressure**
   - CHECK 2.5 ±1.0 x 10⁻¹ bar / 3.6 ±1.5 psi (LCD Display in panel, see section 3.12.1.1)

10. **Fuel-Quantity**
    - CHECK (Fuel-gauge on right side)

11. **Fuel-Transfer-Pump**
    - ON (if optional left auxiliary-tank is installed)

12. **Propeller**
    - CHECK position.

    For restart, the propeller must NOT be in the FEATHER position.

13. **Choke**
    - CLOSED

14. **Throttle**
    - IDLE (max. 10% power)
15. Ignition          BOTH
16. Starter          START (if necessary)

**If the restart of the engine fails:**

17. Prepare for an off-field-landing or a landing on next suitable airfield.

**Caution:** Within 10 seconds after engine-restart, the oil-pressure must be in the green range. If not, a major engine-problem may exist.

**Note:** With very low fuel it is possible to use the last remaining fuel by rocking the wings.

**More instructions for engine-restart in flight, see 4.7.3.5**
3.8.4 Drive-Section-Failure

In the case of a failure of the drive-section the power-transmission from the engine to the propeller is destroyed. The cause could be a failure of the gear, the drive-shaft, their adapters or couplings. This is indicated by the smell of fire or noise from the power-transmission-system. The failure of the drive-section is most critical in case of applied engine load. The engine can exceed the maximum RPM or vibrations can cause structural damage.

After drive-section-failure, the following procedure is recommended:

1. Throttle immediately to IDLE
2. Air-speed ~ 60kts / 110km/h
3. Engine OFF if essential
4. Prepare for an off-field-landing or a landing on next suitable airfield.

3.8.5 Failure of Engine-Starter

If the engine-ignition-switch fails, the engine-starter will not work for an in-flight engine-restart. A failure of the engine-ignition-switch may be the cause.

The following procedure is recommended:

1. Master-circuit-breaker: CHECK
2. Engine-Bus-circuit-breaker: CHECK
3. Master-switch: ON (Voltmeter must show operating voltage >10V)
4. Engine-master-switch: ON
5. Engine-instrumentation and control-lights CHECK (especially YELLOW and RED lights of the TCU during self-check)

If a restart of the engine is not possible:

6. Depending on altitude:
   Engine-restart-procedure with windmilling propeller.
   Or prepare for an engine-off-landing on next suitable airfield.
3.9 Fire

3.9.1 Fire in the Engine-Compartment

If the red Fire-Warning light comes on and an alarm signal buzzes or if there is smell of fire or smoke in flight, the following procedure is recommended:

In flight:

instantly:
1. Fuel-shut-off-valve  CLOSE (rotate)
2. Throttle  FULL POWER (to drain fuel-lines and float-chambers)

When the engine has stopped:
3. Ignition  OFF
4. Air-speed  55 kts - 65 kts / 100 km/h - 120 km/h
5. left Propeller-switch  MANU
6. right Propeller-switch  FEATHER
   Caution: Final position is reached not until 90 sec!
7. Engine-master-switch  OFF
8. Cabin-ventilation (side-window and/or nozzle)  OPEN in case of smoke in cockpit
9. Emergency-descent  INITIATE as soon as possible. EXTEND air-brakes to perform.
10. Off-field-landing  PREPARE for next suitable terrain.

**Warning:** When the master-switch is OFF, the COM and all electrical equipment is turned OFF (including elevator-trim and propeller-feathering). It is possible to manually override the trim.

**Caution:** The propeller and engine will normally continue to rotate. The only indication that the engine is not running is the display on the manifold-pressure-gauge.
3.9.2 Electrical Fire

**Electrical fire in flight:**

1. Master-switch \( \text{OFF} \)
2. Cabin-ventilation \( \text{OPEN} \)
   (side-window and/or nozzle)
3. Throttle \( \text{REDUCE for level-flight} \)
   
   approx. \( v_y = 62 \text{ kts} / 115 \text{ km/h} \)
4. Off-field-landing \( \text{PREPARE for next suitable terrain} \)

**Warning:** When the **master-switch** is **OFF**, the COM and **all electrical equipment** is turned **OFF** (including elevator-trim and propeller-feathering).

If there is no open fire (especially in the engine-compartment), an emergency-landing can be done with engine-power. The engine-ignition and electrical main fuel-pump are independent from the master-switch.

Keep in mind, that the engine-instrumentation (except manifold-air-pressure, cylinder-head-temperature-gauge) and the propeller-feathering will **NOT** work. The propeller will work only with a fixed pitch. The electrical auxiliary-fuel-pumps will **NOT** work.

**Electrical fire on the ground:**

1. Master-switch \( \text{OFF} \)
2. Fuel-shut-off-valve \( \text{CLOSE} \)
3. Throttle \( \text{FULL POWER} \)
4. Ignition \( \text{OFF} \)
   
   After the engine has stopped
5. Take-Off \( \text{ABORT, if necessary. (See section 3.10.1)} \)
3.10 Emergency-Procedures during Take-Off

3.10.1 Aborted Take-Off

If the take-off-run needs to be aborted (due to a technical malfunction or for flight-safety-reasons), the following procedures are recommended:

1. Throttle IDLE
2. Air-brakes EXTEND
3. Elevator PULL carefully to reduce load on front-wheel
4. Wheel-brakes ACTIVATE

If the take-off needs to be aborted just after lift-off, establish a stable attitude and enough airspeed. Then make a normal landing and use the wheel-brakes with elevator pulled carefully.

1. Throttle IDLE
2. Air-speed > 60 kts / 110 km/h
3. Air-brakes EXTEND
4. Landing normal FLARE and TOUCH-DOWN
5. Elevator (on ground) PULL carefully to reduce load on front-wheel
6. Wheel-brakes ACTIVATE

In addition if the runway is too short or if there are obstacles:

7. Fuel-shut-off-valve CLOSE
8. Ignition OFF
9. Master-switch OFF
10. Anti-collision-maneuver If needed, do a ground-loop to stop the A/C
3.11 Emergency-Landing-Procedure

3.11.1 Off-Field-Landing

For an off-field-landing, select the landing-area carefully. Pay great attention to the character of the surface-material in respect of the wheel-load. Landing on soft ground with not enough load-carrying-capacity is connected with a great risk. For off-field-landing always check:

1. Loose Items STOW and SECURE
2. Seat-belts TIGHTEN

3.11.2 Emergency-Landing

3.11.2.1 Emergency-Landing on Soft Ground

When landing on soft ground which does not carry the A/C well, the following procedure is recommended:

For landing at the selected area with soft ground, change to glider-configuration:

1. Fuel-shut-off-valve CLOSE
2. Ignition OFF (drain float-chamber, if possible)
3. left Propeller-switch MANU
4. right Propeller-switch FEATHER Caution: Final position is reached not until 90 sec!

Before touch-down

5. Loose Items STOW and SECURE
6. Seat-belts TIGHTEN
7. Flaps LDG 2
8. Engine-master-switch OFF
9. Master-switch OFF
10. Final approach: FLAT flight-path
11. Landing

Touchdown with MINIMUM AIRSPEED. Do not use full air-brakes and be aware of the risk of flipping over.

Caution: With its long landing-gear, the S6 has a tendency to flip-over when landing on soft ground. It is recommended to touchdown with MINIMUM AIRSPEED and to pull the elevator full up until standstill.

3.11.2.2 Landing with Damaged Tire

When a tire is actually or possibly damaged after take-off, the following procedure is recommended:

**Damaged Main-wheel:**

1. Flaps TO / LDG 1
2. Land the A/C at the runway-side of the undamaged wheel. Then there is enough space for direction-changes.
3. Land the A/C with the wing low on the side of the undamaged wheel.
4. Taxi with aileron fully deflected to the side of the undamaged wheel to support the damaged wheel.
5. Activate brakes CAREFULLY

**Damaged Nose-wheel:**

1. Flaps TO / LDG 1
2. Landing Touchdown with MINIMUM AIR-SPEED
3. Elevator PULL to reduce load on NOSE-WHEEL as long as possible.
4. Rudder Maintain direction
3.11.2.3 Landing with Damaged Wheel-Brakes

1. Try to land on a grass surface to shorten the ground-roll-distance with roll-resistance.

3.11.2.4 Emergency Landing on water

An emergency landing on water has high risks and should be used only as the last option. If an emergency landing on water is necessary, land in the glider-configuration. Before landing close the cabin-ventilation and the emergency-window:

Approach and Landing:

1. Approach
   GLIDER-CONFIGURATION
2. Cabin-ventilation and emergency-window
   CLOSED
3. Touch-down
   with MINIMUM AIR-SPEED

If the A/C is under water after touch-down, open the cabin-ventilation and emergency-window to equalize the pressure between the cockpit and the water. This is needed to open the canopy. If necessary pull the canopy-jettison-handle (see also section 3.3 Canopy Jettison).

4. Canopy-jettison-handle
   PULL (red handle on the panel)
5. Rear-canopy-hook
   UNLOCK
6. Cabin-ventilation and emergency-window
   OPEN to equalize pressure
**Warning:** Aircraft with nose-wheels tend to **flip-over** when landing on water. With the cockpit under water it is almost impossible to open the canopy without pressure-equalization by opening the cabin-ventilation and emergency-window.

### 3.11.2.5 Landing with Ground-Loop

If a collision is not avoidable during the final part of the landing, initiate a ground-loop with enough distance from the obstacle.

1. Wheel-brakes
   
   **At the same time:**

2. Rudder
   
   DEFLECT FULL in one direction

3. Aileron
   
   DEFLECT FULL in the same direction

**Caution:** The nose-wheel is only steerable when it is loaded. Without load, the nose-wheel is aligned straight-ahead.
3.12 Other Emergencies

3.12.1 System Malfunctions

**Warning** When a system behaves not normally - make checks as in section 3.12.1.1 through 3.12.1.19. **Before the next flight** find and eliminate the cause of the system malfunction according to the Maintenance Manual. If necessary, contact the manufacturer.

3.12.1.1 Fuel-Pressure-Gauge

**a) Fuel-pressure below 1.5:**

If the fuel-pressure-gauge is below 1.5, the fuel-pressure is below the allowable limit of 150 mbar / 2.1 psi. There can also be a malfunction of the gauge or sensor-system.

The low fuel-pressure can cause an engine-malfunction. The cause could be:

- no fuel-supply to engine
- engine malfunction
- fuel-system malfunction

The following procedure is recommended:

1. **Fuel-shut-off-valve** OPEN
2. **Auxiliary-fuel-pump** ON (green light is ON)
3. **Fuel-amount of the feeder-tank** CHECK, if the yellow low-fuel-caution-light of the feeder-tank is ON continuously
   If the yellow low-fuel-caution-light is ON proceed acc. to 3.12.1.3
4. **Fuel-quantity** CHECK (fuel-gauges left and right)
   If necessary transfer fuel from the left auxiliary tank to the right main tank by switching ON the transfer pump
5. When little fuel is available
   If necessary reduce power-setting and air-speed. Fly without bank-angle or sideslip.

6. If the engine has stopped
   Do normal airstart-procedure (see section 4.7.3.4)

If the fuel-pressure is normal again when using of the auxiliary-fuel-pump (but drops when the auxiliary-fuel-pump were set to OFF) most likely there is a malfunction of the main-fuel-pump or a malfunction of the internal generator. The flight can be completed with auxiliary-fuel-pump continuously ON. But there is a risk of engine-failure.

If it is not possible to restore the normal fuel-pressure, prepare to land on the next suitable airfield. A sudden engine-failure must be expected at anytime.

b) Fuel-pressure above 3.5:
If the fuel-pressure-indicator is above 3.5, the fuel-pressure is above the allowable limit. There can also be a malfunction of the gauge or sensor-system.

The high fuel-pressure can cause an engine-failure. The reason for this can be a malfunction of the fuel-pressure-control-unit or a malfunction of the fuel-pump.

If the main-fuel-pump and the auxiliary-fuel-pump are working at the same time, set the auxiliary-fuel-pump to OFF to check if the fuel-pressure will fall to below 3.5.

Prepare to land on the next suitable airfield. A sudden engine-failure must be expected at anytime.

Caution: Use the auxiliary-fuel-pump when landing, even if the fuel-pressure is too high.
3.12.1.2 Green Light for Operation of Auxiliary-Fuel-Pump

If the green light for the auxiliary-fuel-pump is ON, this is not an emergency. It shows that the auxiliary-fuel-pump is running.

If the auxiliary-fuel-pump is set to ON, but with no green light, this can be a malfunction of the auxiliary-fuel-pump or a malfunction of the indication-light. This is not a flight-critical-item, as long as the main-fuel-pump is running normally and the fuel-pressure is normal (see section 3.12.1.1).

1. Fuel-pressure MONITOR

3.12.1.3 Yellow Low-Fuel-Caution-Light is continuously ON

If the yellow low-fuel-caution-light is continuously ON there is only 1.3-1.9 US gal / 5-7 l of fuel in the main-tank-feeder-compartment. This can also be a malfunction of the sensor-system. A blinking low-fuel-caution-light may be triggered by sloshing fuel.

Lack of fuel will cause an engine-failure. The reason for not enough fuel can be a malfunction of the fuel-system. The following procedure is recommended:

1. Auxiliary-fuel-pump ON (green light is ON)
2. Fuel-transfer-pump ON, CHECK if yellow low-fuel-caution-light goes OFF after a short time (max. a few minutes)
   (with optional left auxiliary tank)
3. Fuel-quantity CHECK (fuel-quantity-gauge left and right)

With low fuel in the right tank, there is commonly no malfunction. Transfer fuel from the left auxiliary tank (when installed) to the nearly empty right main tank by switching the transfer-pump ON.
4. Fuel Transfer Pump
   (low fuel in the right main tank)
   ON until the yellow Low-Fuel-Caution-Light goes OFF and adequate fuel has been transferred into the main-tank.

If there is adequate fuel in the right main tank AND the yellow Low-Fuel-Caution-Light is ON again after the transfer pump has been switched OFF, there is probably a malfunction of the fuel-circulation-pump (transferring fuel from the right main tank to the related feeder tank. In this case the remaining fuel in the right main tank is NOT available anymore (except from the fuel in the feeder tank). To prevent fuel flowing from the left auxiliary tank to the right main tank (where it could not be used) the following procedure is recommended:

5. Fuel Transfer Pump
   (If a malfunction of the fuel-circulation-pump is suspected)
   ON until the yellow Low-Fuel-Caution-Light goes OFF. Then OFF until the yellow Low-Fuel-Caution-Light comes ON again. Repeat until landing.

If there is NO MALFUNCTION and the yellow Low-fuel-Caution-Light is ON indicating low fuel in the right main tank and the left auxiliary tank (when installed) is empty, the following procedure is recommended:

6. With low fuel
   If necessary REDUCE power and speed. Fly with wings leveled and without bank-angle.

In either case:

7. If necessary execute a normal air-start of the engine (see chapt. 4.7.3.5).

If the low fuel in the feeder-tank can not be corrected, prepare for a landing on the next suitable airfield. An engine failure must be expected at every time.
3.12.1.4 Red MAP-Warning-Light is ON or FLASHING

Red MAP-warning-light is continuously ON:
The manifold-air-pressure is higher than maximum allowed limit:

1. The manifold-air-pressure is not automatically controlled. In this case, THROTTLE BACK. Control the manifold-air-pressure with throttle (MAP-warning-light must go OFF).

   **Recommended operating limits: ≤ 75% MCP (MAP : ≤ 31 inHg, engine speed ≤ 5000 RPM)**

2. Lower engine-power has to be expected, the MAP-control is not running correctly.

   **Caution:** If the allowed engine-limits are exceeded, this must be documented by the pilot in the A/C-logbook with details like: nature of incident, date, duration and the degree of exceeding.

Red MAP-warning-light is FLASHING:

   **Take-off-power was used for more than 5 minutes:**

1. Throttle REDUCE (to maximum continuous-power 100% or less)

   **Caution:** The manifold-air-pressure is not automatically reduced.

   **Caution:** If the allowed time for take-off-power is exceeded, this must be documented by the pilot in the A/C-logbook with details like: nature of incident, date, duration and the degree of exceeding.
3.12.1.5 Yellow TCU-Caution-Light of Manifold-Air-Pressure-Control is FLASHING

A malfunction of the following systems is possible:
- sensors
- sensor-lines
- Turbo-Control-Unit
- Leakage of airbox

1. CONTROL the RPM and manifold-air-pressure with THROTTLE (red MAP-warning-light must be OFF).
   **Recommended operating limits: \( \leq 75\% \) MCP**
   \( \text{(MAP : \( \leq 31 \text{ inHg}, \text{engine speed} \leq 5000 \text{ RPM} \)} \)

2. Turn OFF waste-gate-actuator with TCU-isolation-switch (the red safety-switch is UP), if manual control is not satisfactory.

3. Lower engine-power has to be expected, when the manifold-air-pressure-control is not operating correctly.

4. Run up to maximum RPM.

**Caution:** If the yellow TCU-caution-light is flashing, this must be documented by the pilot in the A/C-logbook with details like: nature of incident, date, duration and the degree of exceeding.
3.12.1.6 Red External-Alternator-Warning-Light is ON

If the red external-alternator-warning-light is ON, this shows that the alternator (with engine-master-switch ON) is not generating electrical power. This is normal if the engine is not running.

If the external-alternator-warning-light is ON when the engine is running, this could be a malfunction. The following procedure is recommended:

1. Voltmeter/Amperemeter CHECK; whether there is an alternator malfunction
2. Circuit-breaker for the external-alternator CHECK (if necessary push in)

   **If there is an alternator malfunction:**

3. External-alternator-switch OFF
4. Electrical-equipment not needed OFF
5. Prepare to land on the next suitable airfield.

In the case of a failed alternator, the battery will be discharged constantly. To save energy, switch OFF all electrical-equipment that is not needed.

3.12.1.7 Yellow Internal-Generator-Caution-Light is ON

If the engine is running, the yellow internal-generator-caution-light ON shows a malfunction of the internal-generator. This is not a critical situation. The internal-generator-bus is supplied with energy from the main-bus (battery and external-generator). The following procedure is recommended:

1. Continue flight with special attention to the red external-generator-warning-light.

**Warning:** If the yellow internal-generator-caution-light is ON and also the red external-generator-warning-light is ON (see section 3.12.1.6), the TCU and the fuel-pumps are supplied only by the battery. The battery will not be re-charged. If the battery is dis-charged the engine can fail. Prepare to land on the next suitable airfield. If the battery is well charged, it has energy for 20 – 30 minutes of flight-time.
3.12.1.8 Total Electrical Failure

A total electrical failure can have several reasons. In any case, the COM and all electrical equipment are not available, including:

- elevator-trim,
- propeller pitch control
- engine-instrumentation, incl. Turbocharger-Control-Unit (TCU)

(except manifold-air-pressure-gauge). Also the electrical auxiliary-fuel-pump and the TCU will fail. The manifold-air-pressure has to be controlled by hand within the allowed limits. The RPM should be as low as possible to do not exceed the maximum RPM. The following procedure is recommended:

1. Master-switch OFF (not the engine-ignition-switch)
2. All electrical systems OFF (Generator, Avionics)
3. All system circuit-breakers CHECK
do not push in popped-out circuit-breakers
4. Master-circuit-breaker CHECK (PULL and then PUSH)
5. Master-switch ON

When the electrical-system is available again (the voltmeter shows normal voltage), try to switch ON individual systems. If possible avoid to switch ON systems with circuit-breakes that popped-out.

If it is not possible to repair the electrical-system, the following procedure is recommended:

1. Throttle REDUCE for level-flight to approx. \( v_y = 62 \text{ kts} / 115 \text{ km/h} \)
2. Prepare for a safety-landing on the next suitable airfield.

**Warning:** The tachometer is not working. The engine-RPM can only be controlled by hearing. Do not overspeed the engine. Therefore (and because the TCU may fail), the recommended power-setting is for level-flight with approx. \( v_y = 62 \text{ kts} / 115 \text{ km/h} \).
3.12.1.9 Loss of Electrical Energy for the Turbo-Control-Unit (TCU)

When the TCU has no energy, because of
- master-switch OFF
- engine-master-switch OFF
- or the corresponding circuit-breakers have popped-out.

the following procedure is recommended:

1. Turn OFF the waste-gate-actuator with TCU-isolation-switch in the ACTIVATED position (the switch is UP).
2. Restore electrical-power-supply to the TCU (master-switch ON, engine-master-switch ON, CHECK the corresponding circuit-breakers)
3. WAIT for about 10 seconds (TCU-self-test)
4. Turn ON the waste-gate-actuator with TCU-isolation-switch in the DEACTIVATED position (the switch is DOWN).
5. If it is not possible to restore the electric-power-supply, the RPM and manifold-air-pressure must be controlled by hand.

**Recommended operating limits:** \( \leq 75\% \) MCP
(MAP : \( \leq 31 \) inHg, engine speed \( \leq 5000 \) RPM).

Lower engine-power must be expected.

---

**Caution:** Switch the waste-gate-actuator OFF before restoring the electrical-power-supply. Otherwise the waste-gate-actuator will also perform the TCU-self-test.

---

**Caution:** If the allowed engine-limits are exceeded, this must be documented by the pilot in the A/C-logbook with details like: nature of incident, date, duration and the degree of exceeding.
3.12.1.10 Sudden Drop of Manifold-Air-Pressure MAP and RPM

If the MAP and RPM suddenly drop, together with high noise or a bang, it is most likely that the turbocharger is damaged:

1. SHUT-DOWN the engine as soon as possible. Change to glider-configuration and look for a safe landing-area.

2. Limited engine-operation might be possible, if there is no safe landing-area. (MONITOR engine-instruments, especially oil-pressure)

If the MAP and RPM suddenly drop and the yellow TCU-caution-light is FLASHING at the same time, a malfunction of the turbocharger-control is most likely:

3. The waste-gate possibly will not close. Lower engine-power must be expected. (With the waste-gate open the engine-power is limited to approx. 89 HP / 66 kW).

**Caution:** If the allowed engine-limits are exceeded and/or the TCU-caution-light flashes, this must be documented by the pilot in the A/C-logbook with details like: nature of incident, date, duration and the degree of exceeding.
3.12.1.11 Sudden Rise of Manifold-Air-Pressure MAP and RPM

If the MAP and RPM suddenly rise and the yellow TCU-caution-light is FLASHING, a malfunction of the turbocharger-control-unit is most likely:

1. Control RPM and MAP with throttle (red MAP-warning-light must be OFF)
   
   **Recommended operating limits:** ≤ 75% MCP  
   (MAP : ≤ 31 inHg, engine speed ≤ 5000 RPM)

2. The waste-gate is possibly closed. Lower engine-power must be expected. With the waste-gate closed, MAP-control is only possible with the throttle.

If the MAP and RPM suddenly rise and the power can not be reduced with the throttle, the throttle-cable is most likely broken. The power-setting rises by spring-load to 115% full-throttle.

It is recommended to climb to a safe altitude for changing to the glider-configuration and landing on a suitable airfield. Then TURN OFF the engine:

3. Air-speed ~ 62 kts / 115 km/h

4. At safety-altitude: fuel-shut-off-valve CLOSE

5. After engine stops: Ignition OFF

6. After the engine has cooled down: change to glider-configuration (see section 4.7.3.2) and land in glider-configuration.

**Warning:** If the engine is restarted with the carburators set to full-power, the drive-section might be severely damaged.

**Caution:** If allowed engine-limits are exceeded, when the red MAP-warning-light is ON or FLASHING, or when the yellow TCU-caution-light is flashing, this must be documented by the pilot in the A/C-logbook with details like: nature of incident, date, duration and the degree of exceeding.
3.12.1.12 Repeating Increase and Decrease of Manifold-Air-Pressure MAP and RPM

A periodic increase and decrease of MAP and RPM is most likely caused by oscillations of the manifold-air-pressure-control (while the yellow TCU-caution-light is not flashing). The following procedure is recommended:

1. TCU-isolation-switch
   Switch to ACTIVATED position (the switch is UP) to isolate waste-gate-actuator

2. after max. 5 seconds
   TCU-isolation-switch to DEACTIVATED position (the switch is DOWN) to re-activate waste-gate-actuator

If the system is not operating normally:

3. TCU-isolation-switch
   to ACTIVATED position (the switch is UP) to isolate the waste-gate-actuator permanently

4. Manifold-air-pressure is not controlled automatically anymore. Control MAP (red MAP-warning-light must remain OFF) with the throttle.
   Recommended operating limits: ≤ 75% MCP  
   (MAP : ≤ 31 inHg, engine speed ≤ 5000 RPM)

Caution: If the waste-gate-actuator is switched OFF (TCU-isolation-switch is ACTIVATED), lower engine-power has to be expected. The manifold-air-pressure-control is only possible with the throttle.

Caution: A exceeding of the allowed engine-limits and/or deactivation of the waste-gate-actuator must be documented by the pilot in the A/C-logbook with details like: nature of incident, date, duration and the degree of exceeding.
3.12.1.13 Exceeding the Maximum Cylinder-Head-Temperature CHT

If the maximum CHT is exceeded, the following procedure is recommended:

1. Cowl-flaps fully OPEN
2. Throttle REDUCE as necessary for safe flight
3. If the CHT does not decrease below maximum, change to glider-configuration and prepare to land on the next suitable airfield
4. Liquid-cooling-system CHECK before next flight

**Caution:** If the maximum cylinder-head-temperature CHT is exceeded, this must be documented by the pilot in the A/C-logbook with details like: nature of incident, date, duration and the degree of exceeding.

3.12.1.14 Exceeding the Maximum Oil-Temperature

If the maximum allowed oil-temperature is exceeded, the following procedure is recommended:

1. Cowl-flaps fully OPEN
2. Throttle REDUCE as necessary for safe flight
3. If the oil-temperature does not decrease below maximum, change to glider-configuration and prepare to land on the next suitable airfield
4. Oil-system CHECK before next flight

**Caution:** If the maximum oil-temperature is exceeded, this must be documented by the pilot in the A/C-logbook with details like: nature of incident, date, duration and the degree of exceeding.
3.12.1.15 Oil-Pressure below Minimum during Flight

If the oil-pressure is below minimum during flight, the following procedure is recommended:

1. If a safe landing can be done in glider-configuration, change to glider-configuration (see section 4.7.3.2)
2. Otherwise REDUCE throttle to the minimum required for a safe flight. An engine-failure must be expected at anytime.
3. Prepare to land on the next suitable airfield
4. Oil-system CHECK before next flight

Caution: If the oil-pressure drops below minimum, this must be documented by the pilot in the A/C-logbook with details like: nature of incident, date, duration and the degree of exceeding.

3.12.1.16 Oil-Pressure below Minimum on Ground

If the oil-pressure is below minimum on ground, the following procedure is recommended:

1. Engine SHUTDOWN immediately
2. Oil-quantity CHECK
3. Type of oil in use CHECK
4. Oil-system and/or engine CHECK

3.12.1.17 Exceeding of the Maximum Allowed Engine-RPM

If the maximum engine-RPM is exceeded, REDUCE THROTTLE immediately. This may be a malfunction of the propeller-pitch-control (see section 3.12.1.18).

Caution: If the maximum allowed RPM is exceeded, this must be documented by the pilot in the A/C-logbook with details like: nature of incident, date, duration and the degree of exceeding.
3.12.1.18 Loss of Propeller-Pitch-Control

During flight, the pilot must check the RPM continuously. If the RPM changes unintentionally (during flight over a strong electro-magnetic-transmitter or by a malfunction of the pitch-control), the following procedure is recommended:

Unintentional pitch-changes, RPM-variation in the „AUTO“-position or malfunction of the automatic pitch-control:

1. REDUCE THROTTLE immediately to avoid exceeding maximum allowed RPM.
2. Set left propeller-switch to MANU - the Constant-Speed-Control is not working now, control the propeller manually.
3. Control the RPM with the right propeller-switch:
   HIGH RPM (START) = low pitch / high RPM
   STOP = constant pitch / constant RPM
   FEATHER = high pitch / low RPM

**Warning:** With the Constant-Speed-Control not working the RPM changes with the airspeed. Correct the propeller-pitch manually when changing the airspeed.

When changing to higher airspeed, there is the danger of exceeding the maximum allowed RPM, when not correcting the propeller-pitch in the FEATHER direction to the desired RPM.

4. For LANDING set the right propeller-switch to HIGH-RPM. The propeller changes to the START position (green propeller-start-indicator-light goes ON). If the propeller does not change to the START position (green propeller-start-indicator-light is OFF), reduced power and rate-of-climb for a go-around must be expected.

If the propeller can be properly controlled manually after a malfunction of the Constant-Speed-Control, the flight can be completed with manual propeller control. The malfunction of the Constant-Speed-Control must be repaired before the next flight.
If the propeller-pitch can NOT be controlled by setting the Constant-Speed-Control to AUTO or to MANU - or when set to MANU the propeller-pitch or the RPM changes without command, the Constant-Speed-Control failed totally. The Constant-Speed-Control must be deactivated:

5. Activate the circuit-breaker of the Constant-Speed-Control (Prop CTRL)
6. Control MAP and RPM with the THROTTLE to stay within the allowed range. MAP and RPM can only be controlled combined. The A/C behaves like having a fixed-pitch-propeller. Range and cruise-speed can be significantly reduced, because propeller and engine are not working under proper conditions.
7. Before LANDING - CHECK at 115 km/h / 62 kts airspeed if the Start-RPM is reached when executing a carefully THROTTLE UP. Avoid exceeding the maximum allowed RPM.
   - If the Start-RPM is reached the propeller is near the START-pitch. Landing can be executed normally.
   - If the Start-RPM is NOT reached the propeller is near the CRUISE-pitch, the pitch is too high for Take-Off and Landing. Reduced performance and rate-of-climb must be expected in the case of a go-around.

**Caution:** Cruise-flight with propeller in the take-off-position will reduce the airspeed and shorten the range (revise flight-plan if necessary!). During cruise with propeller in fixed take-off-position even in low altitudes the engines-RPM may be too high, even with power-settings below 100%. REDUCE throttle, to reduce engine-RPM below 5500 RPM (maximum continuous RPM).
3.12.1.19 Other Malfunctions of the Propeller-Pitch-Control

**Green take-off position indicator light on the propeller control unit does not come ON:**

The propeller is not in start-position or the green control-light failed.

1. During „before take-off“-check: Eliminate the cause!

2. Before LANDING - CHECK at 115 km/h / 62 kts airspeed if the Start-RPM is reached when executing a carefully THROTTLE UP. Avoid exceeding the maximum allowed RPM.
   - If the Start-RPM is reached the propeller is near the START-pitch. Landing can be executed normally. The control-light may have failed.
   - If the Start-RPM is NOT reached the propeller is near the CRUISE-pitch, the pitch is too high for Take-Off and Landing. Reduced performance and rate-of-climb must be expected in the case of a go-around.

**The yellow light comes ON for more than 1 second:**

1. Notify manufacturer. After consultation with the manufacturer and some tests of the propeller-pitch a ferry-flight may be possible. CHECK if voltage of electrical system is less than 11.5V (normal operating voltage is 12V).

**Both lights (green and yellow) are FLASHING at the same time:**

1. If the yellow light does not go OFF with normal voltage of electrical system, contact the manufacturer.

**Circuit-breaker pops out several times:**

1. Leave the circuit-breaker OPEN! PROCEED with flight with fixed propeller-pitch. Contact manufacturer of propeller or of A/C after landing.
3.12.2 Vibrations caused by the propeller or the propulsion system

Reasons for abnormal vibrations may be a local propeller-damage or a malfunction of the engine or the drive system. It is recommended to REDUCE the engine-RPM immediately. If the vibrations are not clearly reduced, the following procedure is recommended:

1. Throttle IDLE
2. Ignition OFF
3. Fuel-shut-off-valve CLOSE
4. Change to glider-configuration (see section 4.7.3.3)
5. Prepare for an off-field-landing or landing on the next suitable airfield.

3.12.3 Flights in Icing-Conditions

Flights into icing-conditions are not allowed. If icing-conditions are met unintentionally, ice can build-up on:

- Wings
- Tail-surfaces
- Flight-controls
- Propeller.

The risk of ice is greater at high altitudes. Additionally, ice on the cockpit-canopy can reduce the visibility.

It is recommended to initiate an emergency-descent immediately to reach a lower altitude:

1. Throttle IDLE
2. Cowl-flaps OPEN (to avoid freezing locked in the CLOSED position)
3. Air-brakes EXTEND
4. Flight-controls MOVE (to avoid freezing locked)

**Warning:** Ice on wings can increase the stall-speed remarkably and can change flutter-behavior. The minimum-speed is also increased by the additional weight.
3.12.4 **Lightning-Strike or possible Lightning-Strike**

1. REDUCE air-speed to LESS than maneuvering-speed $v_A = 102$ kts / $190$ km/h. Reduce further as required.
2. CHECK if all flight-controls react as intended
3. Afterwards, immediately LAND on next suitable airfield.

**Caution:** After a lightning-strike, all electrical-systems will most likely have malfunctions or be completely inoperational. Communication and Transponder will be the first systems to fail after lightning-strike.

**Warning** An A/C made of composite-materials is more easily damaged by lightning-strikes than an A/C made of metal. Avoid flights in or near thunderstorms!
Chapter 4 – Normal Operating Procedures

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4.1 Introduction

This chapter provides the normal operating procedures for the STEMME S6 motorglider in the „S6-T“-variant with the following equipment:

- fixed landing-gear
- ROTAX 914F engine
- 17.2 US gal / 65 l main-tank + optional 17.2 US gal / 65 l auxiliary-tank

The following subitems provide checklists for the normal operations. The STEMME S6 uses the following flap-settings:

| CRUISE | the most negative position for fast cruise, permitted up to $V_{NE} = 145$ kts / 270 km/h |
| NEUTRAL | neutral position for slow cruise, also intended for flights between regions of lift in glider-configuration, permitted up to $V_{NE} = 145$ kts / 270 km/h |
| TO/LDG 1 | positive position for T/O, approach, landing, thermalling in glider-configuration, permitted up to $V_F = 102$ kts / 190 km/h |
| LDG 2 | Landing position for final approach and landing, permitted up to $V_{FL} = 75$ kts / 140 km/h |

For power-setting with throttle and propeller-RPM (see chapter 7.11.2.1), use the following table:

<table>
<thead>
<tr>
<th></th>
<th>Throttle</th>
<th>Manifold air-pressure</th>
<th>Propeller RPM</th>
<th>Engine RPM</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>$inHg$</td>
<td>$\pm 50$</td>
<td>$\pm 200$</td>
</tr>
<tr>
<td>T/O</td>
<td>115%</td>
<td>39</td>
<td>2100</td>
<td>5600</td>
</tr>
<tr>
<td>Continuous (MCP)</td>
<td>100%</td>
<td>35</td>
<td>2000</td>
<td>5300</td>
</tr>
<tr>
<td>75% MCP</td>
<td>75%</td>
<td>31</td>
<td>1825</td>
<td>4800</td>
</tr>
<tr>
<td>65% MCP</td>
<td>65%</td>
<td>29</td>
<td>1750</td>
<td>4600</td>
</tr>
<tr>
<td>55% MCP</td>
<td>55%</td>
<td>28</td>
<td>1550</td>
<td>4100</td>
</tr>
</tbody>
</table>

**RPM-Table for power-settings and propeller-settings**
4.2 **Air-Speeds for Normal Operation**

All air-speeds for normal flight operation are given as IAS.

<table>
<thead>
<tr>
<th>Take-Off</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Lift-off-speed (Flaps set to „TO / LDG 1“)</td>
<td>43 kts / 80 km/h</td>
</tr>
<tr>
<td>Air-speed for initial climb over 50 ft / 15 m obstacle (Flaps set to „TO / LDG 1“)</td>
<td>60 kts / 110 km/h</td>
</tr>
<tr>
<td>Air-speed for best angle-of-climb $v_x$ at MSL (Flaps set to „TO / LDG 1“)</td>
<td>46 kts / 85 km/h</td>
</tr>
<tr>
<td>Air-speed for best rate-of-climb $v_y$ at MSL (Flaps set to „NEUTRAL“)</td>
<td>62 kts / 115 km/h</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Landing</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Approach-speed for normal landing (Flaps set to „TO / LDG 1“ or „LDG 2“)</td>
<td>60 kts / 110 km/h</td>
</tr>
<tr>
<td>Minimum air-speed for go-around (Flaps set to „TO / LDG 1“ or „LDG 2“)</td>
<td>49 kts / 90 km/h</td>
</tr>
<tr>
<td>Max. crosswind-component for T/O and landing (Flaps set to „TO / LDG 1“)</td>
<td>16 kts / 30 km/h</td>
</tr>
</tbody>
</table>
4.3 Rigging and Derigging

Before rigging, clean and grease any connecting-points of the fuselage, wings, empennage and controls.

Derigging is done in the reverse sequence of rigging.

**Warning:** Before rigging or de-rigging of the A/C always CHECK:
- both ignition-circuits must be OFF
- master-switch must be OFF
- ignition-key must be REMOVED
- parking-brake must be APPLIED

**Caution:** Only rotate the propeller in direction of rotation of propeller and engine!

4.3.1 Fuselage

1. Position the fuselage and prevent it from rolling away with parking-brake and chocks.
2. Master-switch MUST be OFF, ignition-key MUST be REMOVED.
3. Close the canopy.
4. Rotate 3-blade-propeller by hand into Y-position (one blade vertically down).
5. Remove side-fairings and upper-fairing.

4.3.2 Wing

**Inner wing (IW)**

1. Preparation
   - Rotate 3-blade-propeller by hand into Y-position
   - prepare all push-rod connections between fuselage and wing
   - prepare tools and grease all 4 wing bolts
   - remove cowlings from the fuselage-sides
2. Lift the inner-wing over the propeller and canopy move rearwards over the center-frame. Do NOT scratch the canopy with the wing’s main-brackets.
3. Place it on the fuselage. Do NOT jam fuel-lines or connecting-cables. Incline the wing a little bit with the rear down. First place the rear joints then the forward joints onto the frame.

4. Start with the rear wing bolts. Insert the 2 bolts fully into the connectors between the fuselage and inner-wing. If needed extra force can be applied to push the bolts forward using appropriate tools. Secure the 2 bolts with Fokker-needles.

5. Insert the 2 forward wing bolts fully into the connectors in forward direction by using the on-board tool-set. Note - the cotter-pins must pass through the hole in the bolts.

6. Secure the 2 forward wing bolts with the cotter-pins.

7. Connect the two fuel-lines (out and backflow) of the wing-tank with the fuel lines of the fuselage. Use the quick-disconnect-fittings of the fuel-lines by reaching from the cockpit through the opening in the rear bulkhead. To guarantee good sealing of the fittings, they must be clean.

Caution: Pay attention to correct (audible!) engagement of the quick-disconnect-fittings. Pull to test for secure fit!

8. Connect the plug for the electrical-connections and the fuel-sensor.

9. Install the cover at the cockpit’s rear wall.

10. Connect the 2 plugs for the pressure-tubes at the left side of the center-frame with quick-disconnect-fittings.

11. Connect the 3 push-rods with red quick-disconnect-fittings. Start from front with air-brakes, then flaps and the ailerons. Secure all quick-disconnect-fittings with cotter-pins.

Outer wing (OW)

12. Preparation of left outer-wing:
   - cockpit: Set the flap-lever to maximum positive deflection LDG2!
   - cockpit: Set the air-brake-lever to the forward position
   - prepare all quick-connect-fittings from the push-rods of the inner-wing
   - grease the main-bolts
   - use the T-handle-tool to insert the main-bolt into the bushing of the inner-wing, do not insert it fully
   Insert the spar of the left outer-wing into the spar-opening of the inner-wing. Do not cant the outer-wing with the inner-wing. Leave a gap of approx. 8 in / 20 cm to allow for the connection of the flight-controls.

13. Insert the spar of the left outer-wing into the spar-opening of the inner-wing. Do not cant the outer-wing relative the inner-wing. Leave a gap of approx. 8 in / 20 cm to allow for the connection of the flight-controls.
14. Extend the air-brake at the outer-wings by moving the deflection-lever by hand. Secure the air-brake with the other hand.

15. Push the outer-wing into the inner-wing leaving a gap of approx. 4 in / 10 cm.

16. Starting at the front, connect the 3 control-rods to the deflection-levers of the air-brake, outer aileron, and inner aileron. Secure the 3 quick-connectors with cotter-pins. The quick-connectors must be inserted into the push-rods from above. The cotter-pins must be inserted bottom-up.

17. Connect the Avionic-plugs forward of the main-spar. Plugs or cable must not protrude from the wing's contour.

18. Insert the outer-wing fully into the inner-wing. Pay attention to the engagement outer-wing-shear-bolts into the sockets of the inner-wing. Maximum allowed gap between inner- and outer-wing is 2 mm / 0.08 in.

19. It could be helpful to lift the outer-wing at its tip to ease the insertion of the main-bolt. Use the T-handle-tool to insert the main-bolt fully, rotate the bolt for easy movement. Unscrew and remove the tool. The main-bolt is inserted correctly, when the outer contour of the axial safety-mechanism fits smoothly to the contour of the wing-surface.

20. Mount the right outer-wing in the same manner as described above.

Winglet

21. Insert the spar of the winglet into the main-spar of the outer-wing. Use the T-handle to insert the winglet-bolt.

22. Connect the Avionic-plugs.

23. Insert the winglet fully.

24. Use the T-handle-tool to insert the main-bolt fully. Remove the tool. The main-bolt is inserted correctly, when it does not protrude from the outer contour of the wing.

4.3.3 Horizontal-Tail-Unit

1. The elevator is connected automatically to the elevator-control-rod.

2. Pull the horizontal-tail-unit's forward tension-screw fully out. Place the horizontal-tail-unit onto the vertical-stabilizer. Ensure that the reel of the elevator-deflection-lever fits into the bracket of the vertical stabilizer. Then move the horizontal tail rearwards, so that the mounting-bolts fit completely into the sockets. All 3 mounting-bolts must engage properly into the sockets.

3. Tighten the tension-screw with a box-wrench (wrench-size: 8 mm).
4. The forward vertical-edge of the horizontal-tail-unit-flange must be flush with the leading-edge of the vertical-stabilizer. Only then the connection is properly secured.

5. Check correct installation of the horizontal-tail-unit by pushing the leading-edge upwards.

4.3.4 Fuselage-Fairings

1. Install the upper-fairing.

2. Install side-fairings. They must overlap the upper-fairing at the rear.

**Note:** Before installing the fairings, perform checks according to section 4.5 („Daily Inspection“).
4.4 Fueling of the Aircraft

Fuel is filled into the wing-tanks through the filler-caps in the outer area of the inner-wing-section (right side = main-tank, left side = optional auxiliary-tank). Open the filler-caps by pushing and turning the slotted-screw in a counterclockwise-direction with a screwdriver. Close the filler-cap by pushing the screw and turning it in a clockwise-direction. Check for correct position of the gasket when re-installing the filler-cap!

**Note:** The filling-holes end close to the upper-brim of the tanks. Therefore the wings must be leveled when fueling and when opening the filler-caps. This is to prevent fuel from leaking.

**Note:** Do not fill the tanks completely at high temperatures. Otherwise fuel might leak from the fuel-tank-vents (at the wing-joint) due to thermal-expansion.

**Note:** Check for correct grounding of the fueling-system! For example, this can be done by grounding the exhaust-pipe.

**Note:** The wing’s finish can be damaged by contact with fuel.
4.5 Daily Inspection

The pilot-in-command has to perform an accurate visual inspection of the motorglider before commencing of flight-operations.

**Warning:** Flight-readiness must be checked accurately after the A/C has been rigged or prior to the first flight of the day. Not performing this check, or doing the check carelessly, could result in major accidents!

The daily inspection of the entire motorglider should be performed as a walk-around.

**Caution:** During the visual inspection, check for: mechanical damage, cracks, delamination, freedom-from-play, transmission of forces, correct mounting, contaminations, foreign objects and the general condition. Additionally, control-surfaces must be checked for mobility.

Additionally to the mentioned checks, the motorglider must be inspected for cracks in the finish, deformations and roughness of surfaces. If there is any doubt about any results or findings, consult a specialist.

During walk-around check any drainage-holes and ventilation-openings and clean them, if necessary (see maintenance-manual).

Perform the following checks during the walk-around. The checks are listed in a system-oriented manner (Before beginning, turn OFF the ignition-switch AND the master-switch!).

I. Engine

1. Upper-fairing and side-fairings of engine  REMOVE
2. firewall-covers  REMOVE
3. Visual inspection of engine  CHECK for foreign objects and leaks
4. Oil-system, liquid-cooling-system and fuel-system  CHECK VISUALLY for leaks
5. Level of coolant in expansion-tank and overflow-bottle  CHECK when the engine is cold (coolant level expansion-tank: Max. coolant level overflow-bottle: between min. and max. marks). If necessary, REFILL.
**Warning:** Before turning the propeller by hand, turn OFF both ignition-circuits AND the master-switch! Activate the wheel-brakes. The cockpit should be occupied by an experienced person.

**Caution:** When refilling coolant in the overflow-bottle and tightening the cap afterwards make sure that the plugged vent hose remains untwisted.

6. Oil-reservoir
   OPEN the cap.

7. Oil
   Rotate the engine for several revolutions by hand (Rotate the propeller in the normal-operating-direction). This pumps oil from the engine to the oil-reservoir (according to ROTAX). Rotate the propeller until a flushing sounds can be heard at the oil-reservoir.

8. Oil-level
   CHECK (min. lower mark, max. upper mark) For flights-durations of more than 8 hours, the oil-level should be at least half way between the min. and max. marks. If necessary, REFILL oil.

9. Oil-reservoir
   CLOSE the cap.

10. Movement of throttle and choke
    CHECK for mobility.

11. Lateral firewall-covers
    REINSTALL

12. Cowl-flaps and exhaust-flaps
    CHECK function

13. Both fuel-vents
    CLEAR (lower right side of wing at wing-joint, optionally also at lower left side of wing at wing-joint)

14. Amount of fuel
    VISUAL INSPECTION through corresponding fuel-port

15. Drainage of fuel-system
    Press the two drainage-valves of the right fuel-tank *(and the drainage-valve of the left fuel-tank, if optionally installed)*. Drain fuel into a glass and inspect for contamination and water. Drain as much fuel as needed to ensure that all contaminations and water are removed.
Caution: The A/C must have been parked with the wings leveled for a sufficient time (several hours) before draining. CHECK if drainage-valves close again correctly after operation. If they do not close correctly, there might be dirt in the fuel. While draining fuel there is an increased risk of fire. Before starting the engine, make sure that there is no imminent danger of fire.

II. Area of Wing-Joint
1. All 4 wing bolts SECURED with Fokker-needles at the rear
   SECURED with cotter-pins at the front
2. Flight-controls CONNECTED and SECURED with cotter-pins - one connector each for ailerons, flaps and air-brakes
3. Flight-controls CHECK for mobility
4. Fuel-lines CONNECTED and NO LEAKAGE
5. Connectors for electric elements in wings CONNECTED
6. Pressure-tubes from static-port and pitot-tube CONNECTED (red/red; blue/blue)
7. Check for foreign objects PERFORM
8. Upper-fairing and side- -fairings REINSTALL

III. Propeller and Front-Drive
1. Fairing of front-drive REMOVE
2. Propeller-pitch function CHECK: Master-switch ON, left propeller switch to MANU. Set the right propeller-switch to FEATHER and then back to HIGH RPM to check the complete range of propeller-pitch to the feathered position and back into the T/O-position. Check if the green indication-light is ON, when the propeller is in the T/O-position (HIGH RPM). Left switch AUTO, right STOP, master-switch OFF
3. Propeller-blades
VISUAL INSPECTION for damage. Check condition of blades and spinner. Movement of blade-tips up to 0.1 in / 3 mm tolerable (jiggle tips slightly). Movement of pitch-angle up to 2° tolerable. No unacceptable cracks and no loose edge-guards. PU-strips must be existent and without damage, otherwise replace within 10 operating-hours after last inspection.

4. Front-drive
VISUAL INSPECTION for wear through side opening.

IV. Landing-Gear

1. Tire-pressure
Main-wheels: 51 ± 1.5 psi / 3.5 ± 0.1 bar
Nose-wheel: 51 ± 3.0 psi / 3.5 ± 0.2 bar

2. Slip-marks and tread-pattern
CHECK

3. Brakes
CHECK effectiveness of brakes by pulling the brake levers (pilot-side, and optionally co-pilot side). There must be a clear resistance.

V. Empenage

1. Check horizontal-tail-unit for correct rigging
The forward vertical-edge of the horizontal-tail-unit-flange must be flush with the leading-edge of the vertical-stabilizer. The reel of the elevator-deflection-lever must fit into the bracket of the vertical stabilizer.

2. Check rudder for correct rigging
The lower bolt of the rudder must be inserted into the correct socket and must be secured with nut and cotter-pin.

3. Control-surfaces
CHECK for mobility and for excessive play or damage.
VI. Wing
1. Control-surfaces  CHECK for clearance and too much play
     VISUALY CHECK for damage.
2. Tank-filler caps, drainer and vents  VISUALY CHECK for leakage (see section I and chapt. 4.4)
3. Winglets & connection  Check for correct mounting
4. IW/OW-bolts  Check for correct mounting of the main-bolts.
     The safety-pins must smoothly fit to the contour of the wing-surface
5. Static-pressure port  CHECK during pre-flight-inspection (see chapt. 4.6.1)
6. Stall-warning  CHECK during pre-flight-inspection (see chapt. 4.6.1)

VII. Cockpit
1. Canopy  Sufficient visibility
2. Cockpit-Area and seats  CHECK for foreign objects
3. Behind seats  CHECK for foreign objects
4. Check of Engine-master-switch  Master-switch ON, Engine-master-switch ON, TCU must perform self-test and main-fuel-pump must be running. Then, engine-master-switch OFF.
4.6 Pre-Flight-Inspection

4.6.1 Exterior Inspection

The external inspection of the entire A/C should be performed as a walk-around. Check the following items:

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<td>5.</td>
<td>Amount of coolant</td>
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<td>6.</td>
<td>Amount of fuel (right/left)</td>
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<td>7.</td>
<td>Fuel-flow-gauge (optional)</td>
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<td>8.</td>
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<td>9.</td>
<td>Pitot-tube and static-ports on pressure-probe</td>
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<tr>
<td>10.</td>
<td>Dynamic-pressure and vertical-speed-indicators / variometers</td>
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<tr>
<td>11.</td>
<td>Stall-warning</td>
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<tr>
<td>12.</td>
<td>Foreign objects</td>
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**CHECK flight-controls** (an assisting person is needed)

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<td>17.</td>
<td>Rudder</td>
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<td>18.</td>
<td>Right flap</td>
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</table>
19. Right aileron at flap-setting „NEUTRAL“
   CHECK for transmission of force, maximum deflection and play

20. Right air-brake
   CHECK for transmission of force, maximum deflection and play

**Constant-Speed Propeller**

21. CS-Propeller
   CHECK function

### 4.6.2 Interior Inspection

**CHECK before engine-start**

1. Parachutes (optional) worn correctly
2. Safety-belts worn correctly by all occupants
3. Canopy CLOSED and LATCHED (left, right and top)
4. Rebound-strap REMOVED
5. Seat-position and rudder-pedals CHECK for comfortable position and fixation
6. Control-elements and Panel easily reached
7. Flight-controls FREE movement (ailerons, elevator, rudder, flaps, air-brakes, cowl-flaps)
8. Master-switch (Battery) ON
9. Trim CHECK trim-function and trim-indicator over the complete range of trim
10. Fire-Warning CHECK function of push-button:
    Push button, red light has to come on and alarm signal has to sound
4.7 Normal Operating Procedures and recommended Airspeeds

Do not operate the throttle abruptly, but always **gradually**. When the throttle is operated abruptly, the propeller-pitch does not adjust as quickly as the engine-power changes. There is the risk of briefly exceeding the maximum allowed RPM, before the variable-pitch-propeller has adjusted the RPM back to normal.

4.7.1 Start of Engine / Warm-Up and Taxiing

4.7.1.1 Start of Engine / Warm-Up

1. Fuel-shut-off-valve OPEN
2. Cowl-flaps OPEN (fully In)
3. Parking-brake SET
4. Electrical-master-switch (Battery) ON
5. Engine-master-switch ON
6. TCU-self-test CHECK if red MAP-warning-light and yellow TCU-caution-light are ON for approx. 1 to 2 seconds and then OFF again
7. Propeller-switch CHECK function.
   SET left propeller-switch to MANU and right propeller switch to FEATHER. Also CHECK if green indication-light goes OFF. Then SET right propeller-switch to HIGH RPM and CHECK if green indication-light goes back ON (once the propeller reaches its high-RPM-position). Finally, SET left propeller-switch back to AUTO.
8. Propeller-RPM SET propeller-RPM to **2100 RPM**.
9. Fuel quantity CHECK fuel-gauges
10. Fuel counter ADJUST to actual fuel quantity
11. Fuel pressure CHECK if red fuel-pressure-warning-light is OFF, fuel-pressure-gauge 2.5 ±1.0 (250 ± 100 hPa) / 3.6 ± 1.5 psi.
12. Auxiliary-fuel-pump
   ACTIVATE briefly to check function.
   CHECK for operating-noise, fuel-pressure-gauge still 2.5 ± 1.0
   (250 ± 100 hPa) / 3.6 ± 1.5 psi.

13. Fuel-transfer-pump
    (only with optional auxiliary-tank)
    ACTIVATE briefly to check function.
    CHECK for operating-noise.

14. Choke
    fully OPEN if engine is cold (oil-temp. < approx. 120°F / 50°C)
    fully CLOSED if engine is warm (oil-temp. > approx. 120°F / 50°C)

15. Throttle
    IDLE if engine is cold (oil-temp. < approx. 120°F / 50°C)
    **Throttle approx. 10%** if engine is
    warm (oil-temp. > approx. 120°F / 50°C)

16. Flaps
    SET to NEUTRAL

17. Propeller Area
    CHECK CLEAR

18. Ignition-switch
    ACTIVATE (START) until engine is
    running (RPM in the green range),
    then set to BOTH

**Note:** The ignition is activated only approx. 2 seconds after
operating the ignition-switch. Do not activate the engine-starter for more than 10 seconds, then allow a 2 minute
break.

19. Oil-pressure
    CHECK if in the green range. If
    performing cold-start, it is allowed to
    be in the yellow range at first.

20. External alternator
    turn ON and CHECK, red external-
    alternator-warning-light must go OFF

21. Internal generator
    CHECK, yellow internal-generator-
    caution-light must go OFF

22. Choke
    fully CLOSED (If performing cold-
    start, set to CLOSED after approx. 1
    minute. At the same time INCREASE
    throttle slightly.)

**Note:** The engine can take more than 10% throttle, only if the
choke is fully CLOSED.
23. Warm-up

SET engine-RPM to approx. **2200 RPM** until oil-temperature and CHT are in the green range. This is faster if the cowl-flaps are closed for the time of the warm-up.

### 4.7.1.2 Taxiing

1. Avionic-main-switch
   - ON

2. COM/NAV/XPDR
   - ON and SET (XPDR to STBY)

3. Parking-brake
   - RELEASE

4. Directional control
   - with RUDDER-PEDALS

5. Brakes
   - Activate with BRAKE-LEVER at the control-stick

### 4.7.2 Take-Off and Climb

#### 4.7.2.1 Before-Take-Off-Check (at Taxi-Hold-Position)

1. Parking-brake
   - ACTIVATE

2. Fuel-shut-off-valve
   - OPEN

3. Cowl-flaps
   - fully OPEN

4. Air-Brake Lever
   - IN and LOCKED

5. Flaps
   - SET to „TO / LDG 1“

6. Choke
   - fully CLOSED

7. Propeller-switch
   - AUTO

8. Propeller-RPM
   - SET propeller-RPM to **2100 RPM**

9. Magneto-check R/L
   - SET engine-RPM to **4200 ±100 RPM** with throttle.
   - CHECK **right and left ignition-circuit** with ignition-lock: maximum engine-RPM-loss < 300 RPM, maximum difference between
10. **Take-off-power**

   R/L < 120 RPM. Afterwards, set back to **BOTH**.
   
   **CHECK:** gradually increase throttle to 115%, then set propeller-RPM to **2100 RPM**. Engine-RPM should be $6500_{\pm200}$ RPM and manifold-air-pressure (MAP) should be **39 inHg**. At the same time, **CHECK wheel-brakes**. The a/c may not move.

**Warning:** THROTTLE UP too fast can result in exceeding the engines maximum allowed RPM. This can be avoided by using the throttle carefully.

**Note:** Depending on the air density (airfield elevation or temperature) the green start-control-light can go OFF before reaching FULL POWER. This is NOT a malfunction. The Constant-Speed-Control has limited the RPM under the given circumstances.

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11. **All Circuit-breakers and fuses** CHECK
12. **Voltmeter** CHECK (12V to 14V)
13. **Ampmeter** POSITIVE
14. **Oil-pressure, oil-temperature, CHT** CHECK, must be in the green range
15. **All caution-lights and warning-lights** OFF (only the green indication-lights may be ON)
16. **Trim** SET to NEUTRAL for T/O
   
   According to the c.g.-position from
   
   NEUTRAL up to halfway tail-heavy
   
   SET to QNH (field elevation)
17. **Altimeter** ON
18. **Auxiliary-fuel-pump** ON
19. **Fuel-transfer-pump (only with optional auxiliary-tank)** ON
20. **XPDR** ALT (MODE C)
21. **Controls** FREE movement (ailerons, elevator,
22. Canopy  
   CLOSED (right, left, top)
23. Seatbelts  
   FASTENED
24. Wind-conditions  
   CHECK
25. Parking-brake  
   RELEASE when ready for take-off
26. Wings  
   CHECK if dry or wet.  
   Mind higher lift-off-speed and  
   longer take-off run with wet wings!

4.7.2.2 Take-Off

1. Motorglider  
   ALIGN on RWY
2. Brakes  
   SET
3. Propeller  
   CHECK settings: must be left switch 
   AUTO and right switch STOP, 2100 RPM, 
   green indication-light ON
4. Throttle  
   Increase gradually to FULL 
   POWER. (Move to forward stop, 
   past detent for MCP)

**Warning:** THROTTLE UP too fast can result in exceeding the engines 
maximum allowed RPM. This can be avoided by using the 
throttle carefully.

**Note:** Depending on the air density (airfield elevation or 
temperature) the green start-control-light can go OFF before 
reaching FULL POWER. This is NOT a malfunction. The 
Constant-Speed-Control has limited the RPM under the 
given circumstances.

5. T/O-RPM / manifold-air-pressure  
   CHECK:
   engine-RPM 5600 ±200 RPM with 
   39 inHg MAP (a short overshooting 
of MAP for 2 seconds is possible)
6. Fuel-pressure
   CHECK: red caution-light OFF, pressure 2.5 ±1.0 (250 ± 100 hPa) / 3.6 ± 1.5 psi.

7. All caution-lights and warning-lights
   OFF (only the green indication-lights may be ON)

8. Brakes
   RELEASE

9. Take-off-run

10. Rotation and take-off
    The A/C takes off by itself from all three wheels at approx. 43 kts / 80 km/h, if flaps are set to „TO / LDG 1“

4.7.2.3 Climb

1. Climb-speed
   (at MTOM)
   best rate-of-climb: \( v_y = 62 \) kts / 115 km/h, flaps set to „NEUTRAL“.
   best angle-of-climb: \( v_x = 46 \) kts / 85 km/h, flaps set to „TO / LDG 1“

2. after reaching safety-altitude
   Auxiliary-fuel-pump OFF (green control-light goes OFF).
   If necessary, ADJUST trim

3. Oil-temp. / CHT
   MONITOR. Before exceeding allowable ranges, REDUCE throttle.

4. Throttle
   REDUCE THROTTLE after maximum of 5 min. to MCP or less (detent at throttle)

5. Propeller-RPM
   ADJUST according to manifold-air-pressure-gauge --> see RPM-chart in section 4.1
4.7.3 Cruise / Cross-Country-Flying

4.7.3.1 Cruise (Powered)

1. Throttle
   SET cruise-power according to MAP

2. Propeller-RPM
   ADJUST according to manifold-air-pressure-gauge ==> see RPM-table in section 4.1

3. Flaps
   Set to „CRUISE“ for fast cruise.
   Set to „NEUTRAL“ for normal cruise

4. Trim
   SET according to air-speed

5. Cowl-flaps
   REDUCE according to throttle, altitude, air-temperature and similar

6. Oil-temp. / CHT
   MONITOR continuously. If necessary adjust cowl-flaps.
   Recommended oil-temp. and CHT for cruise is 194-212°F / 90-100°C

7. Fuel-management
   (with optional left tank installed)
   MONITOR

4.7.3.2 Fuel-Management

The integral-fuel-tanks are located in the inner-wing-section with automatic fuel-extraction. The only way to control the fuel-extraction is by using the fuel-shut-off-valve to interrupt the fuel-flow or the auxiliary-fuel-pump (which assists the main-fuel-pump). The correct extraction of fuel can be monitored with the two fuel-gauges and one low-fuel-caution-light.

The fuel-tank-system consists of one main-tank with a feeder-compartment in the right wing. An auxiliary-tank in the left wing may be installed optionally.

If the engine is running, the feeder-compartment is filled automatically from the main-tank by a pump. If the feeder-compartment is completely filled, then fuel flows back into the right main-tank. The fuel-transfer-pump of the optional auxiliary-tank also transports fuel into the feeder-compartment. Fuel is only taken from the optional auxiliary-tank if less than 2/3 - 3/4 of the maximum amount of fuel remains in the main tank and the fuel-transfer-pump is switched ON.
Note: The low-fuel-caution-light (yellow LED) indicates a malfunction of the pumps. When the light goes ON permanently, the amount of fuel in the feeder-compartment is below the critical amount. The remaining fuel in the feeder-compartment then is 1.3-1.9 US gal / 5-7 l.

A short blinking of the low-fuel-caution-light during maneuvers or in gusty air indicates no malfunction. It is triggered by fuel sloshing in the feeder-compartment.

If the optional left auxiliary tank is installed, and the fuel transfer pump is ON, the amount of fuel in the right tank may never drop below 2/3 - 3/4 UNTIL the left tank is completely empty. If this does happen, then there is a malfunction of the fuel-transfer-pump (from the left tank to the feeder-compartment). Flight planning must then take into account that only the remaining amount of fuel in the right tank is available.

Note: After a shut-down of the engine the low-fuel-caution-light (yellow LED) can go ON. After setting the engine-switch to ON it should go OFF after a short time - when the circulation-pump has refilled the feeder-compartment.

4.7.3.3 Engine-Shut-Down (Transition to Glider-Configuration)

1. Throttle REDUCE to IDLE
2. Air-speed REDUCE to approx. 50 – 55 kts / 90-100 km/h
3. Engine cool-down WAIT until oil-temp. and CHT are < 212°F / 100°C
4. Propeller-RPM SET propeller-RPM to 2100 RPM
5. Ignition switch OFF
6. Propeller-switch Left MANU, right FEATHER
7. Engine-master-switch OFF when propeller has reached final pitch visibly
8. Cowl-flaps CLOSE
4.7.3.4 Soaring

1. Flaps
   Circling in thermals: „TO / LDG 1“
   Flight between thermals: „NEUTRAL“

**Warning:** The voltage must not fall below the minimum of 11.5V during soaring flight. If the minimum voltage is reached the engine has to be restarted with windmilling immediately.

**Note:** Best glide-ratio occurs with flaps set to „NEUTRAL“, lowest sink-rate with flaps set to „TO / LDG 1“.

4.7.3.5 Engine- Restart (Transition to Powered-Configuration)

**Warning:** When restarting the engine in flight with a windmilling propeller and at high air-speed, the THROTTLE must be set to IDLE. Otherwise the engine can exceed its maximum RPM immediately after restarting.

**Warning:** If the engine is running (windmilling) do NOT use the starter. The engine could be damaged.

**Caution:** With low battery voltage near minimum value of 11.5V the engine restart is only possible with windmilling.

**Note:** During engine air-start, the altitude-loss is minimum 690 ft / 210 m, depending on meteorological sink-rate.

Normal airstart: appr. 100 m / 330 ft (for 90 s propeller pitch)  
Windmilling: appr. 210 m / 690 ft (with acceleration to 150 km/h / 81 kts)
1. Engine-master-switch: ON
2. Propeller-RPM: SET propeller-RPM to 2100 RPM
3. Propeller-switch: left switch MANU, right switch HIGH RPM
   Note: propeller reaches full pitch after 90 seconds
5. TCU-self-test: CHECK if red MAP-warning-light and yellow TCU-caution-light go ON for approx. 1 -2 seconds and then go OFF again
6. Cowl-flaps: fully OPEN
7. Fuel-gauges: CHECK
8. Fuel-pressure: CHECK if red warning-light is OFF, fuel-pressure-gauge 2.5 ±1.0 (250 ± 100 hPa) / 3.6 ± 1.5 psi. If necessary, ACTIVATE auxiliary-fuel-pump
9. Choke: fully OPEN if engine is cold (oil-temp. < approx. 120°F / 50°C)
   fully CLOSED if engine is warm (oil-temp. > approx. 120°F / 50°C)
10. Throttle: IDLE if engine is cold
    approx. 10% THROTTLE if engine is warm
    (oil-temp. > approx. 120°F / 50°C)
11. Indication-light of propeller-T/O- position: WAIT for green LIGHT is ON, then left propeller switch AUTO, right propeller switch STOP propeller speed 2100 RPM
12. Ignition-switch: a) Windmilling propeller: only BOTH
    b) Propeller has stopped: START until engine starts to run, then BOTH,

Note: The ignition is activated only approx. 2 seconds after operating the ignition-switch. Do not activate the engine-starter for more than 10 seconds, then allow a 2 minute break.
**Note:** The engine can be started if the propeller has pitched halfway (after approx. 30 seconds). Throttle-up only when the propeller is fully pitched to the T/O-position. (green indication-light is ON).

**Note:** The stopped propeller (in the T/O-position) begins to windmill above approx. 80 kts / 150 km/h. This means that the engine can be started without the starter at any time, if the airspeed is high enough.

13. Oil-pressure
   CHECK if in the green range. If performing cold-start, it is allowed to be in the yellow range at first.

14. External-alternator
   CHECK if red external-alternator-warning-light goes OFF

15. Internal-generator
   CHECK if yellow internal-generator-caution-light goes OFF

16. Voltmeter
   CHECK

17. Ampmeter
   POSITIVE

18. Choke
   fully CLOSED (If performing cold-start, set back to CLOSED after approx. 1 minute. At the same time INCREASE throttle slightly.

**Note:** The engine can take more than 10% throttle, only if the choke is fully CLOSED.

19. Warm-up
   SET engine-RPM to approx. 2200 RPM until oil-temperature and CHT are in the green range. (The warm-up is quicker if the cowl-flaps are CLOSED.)
4.7.4 Landing in Powered-Configuration

If the optional left auxiliary-tank is installed, it is recommended to turn ON the fuel-transfer-pump. This makes certain that the feeder-compartment is completely filled.

If the fuel-transfer-pump is OFF during the approach and the yellow low-fuel-caution-light goes ON, then the fuel-transfer-pump must be turned ON.

4.7.4.1 Glideslope-Control with Air-Brakes (Throttle in IDLE)

1. Approach-speed 60 kts / 110 km/h (recommended for MTOM)
   keep constant until beginning of flare
2. Trim
   SET according to approach-speed
3. Flaps
   SET to „TO / LDG 1“
4. Cowl-flaps
   fully OPEN
5. Auxiliary-fuel-pump
   ON
6. Propeller-switch
   AUTO
7. Propeller-RPM
   SET propeller-RPM to 2100 RPM
8. Throttle
   IDLE
9. All caution-lights and warning-lights
   OFF (only green indication-lights may be ON)
10. Air-brakes
    control glideslope by OPERATING air-brakes accordingly during final approach
11. Flare and touch-down
    If enough airspeed is available, set the air-brakes to approx. the half-extended position and flare carefully with the elevator. Let the A/C touch-down on the main-gear. After touch-down, quickly EXTEND the air-brakes.
12. Wheel-brake
    ACTIVATE as necessary after touch-down.

**Note:** The approach and landing can alternatively be flown with the flaps set to „LDG 2“. However, it is recommended to set this flap-setting only during final approach.
4.7.4.2 Glideslope-Control with Low Engine-Power

1. Approach-speed 60 kts / 110 km/h (recommended for MTOM) keep constant until beginning of flare

2. Trim SET according to approach-speed

3. Flaps SET to „TO / LDG 1“

4. Cowl-flaps fully OPEN

5. Auxiliary-fuel-pump ON

6. Propeller-switch AUTO

7. Propeller-RPM SET propeller-RPM to 2100 RPM

8. All caution-lights and warning-lights OFF (only green indication-lights may be ON)


10. Throttle OPERATE as required for glideslope-control

11. Flare and touch-down Set THROTTLE to IDLE at beginning of flare. Flare carefully with the elevator. Let the A/C touch-down on the main-gear.

12. Wheel-brake ACTIVATE as necessary after touch-down.

4.7.4.3 Go-Around (with or without Touch-Down)

According to the selected approach-procedure - glideslope-control with air-brakes (==> sect. 4.7.4.1) or with low engine-power (sect. 4.7.4.2) – different procedures for a go-around are recommended.

The main-principle during a go-around is: First operate the lever with which the glideslope is controlled.

After approach with air-brakes extended:

1. Air-brakes carefully RETRACT and LOCK
Note: If the air-brakes are retracted too quickly when the A/C is on the ground, the A/C may lift off again if it has enough speed.

2. Throttle carefully FULL POWER

Warning: THROTTLE UP too fast can result in exceeding the engines maximum allowed RPM. This can be avoided by using the throttle carefully.

3. Flaps once the safety-altitude (approx. 50 ft / 15 m) is reached, carefully set to „TO / LDG 1“ (if flaps were set to „LDG 2“ before)

Warning: Setting the flaps from „LDG 2“ to „TO / LDG 1“ too quickly can cause the A/C to plunge down unintentionally.

4. Climb according to section 4.7.2.3

After approach with low engine-power:

1. Throttle FULL POWER

Warning: THROTTLE UP to fast can result in exceeding the engines maximum allowed RPM. This can be avoided by using the throttle carefully.

Note: If the A/C has enough speed, it will lift-off immediately after increasing the throttle-setting. This might mean the air-brakes have to be retracted AFTER the A/C has lifted off again. If the air-brakes are in the „CENTER“-position for a low engine-power landing and the propeller-RPM is set to 2100 RPM, the A/C still has enough power for a shallow climb.
2. Air-brakes
   RETRACT and LOCK
3. Flaps
   once the safety-altitude (approx. 50 ft / 15 m) is reached, carefully set to „TO / LDG 1“ (if flaps were set to „LDG 2“ before).

**Warning:** Setting the flaps from „LDG 2“ to „TO / LDG 1“ too quickly can cause the A/C to plunge down unintentionally.

4. Climb
   according to section 4.7.2.3

### 4.7.5 Landing in Glider-Configuration

#### 4.7.5.1 Approach to Landing in Glider-Configuration

1. Approach-speed
   60 kts / 110 km/h (recommended for MTOM)
   keep constant until beginning of flare
2. Trim
   SET according to approach-speed
3. Propeller-Switch
   left MANU, right FEATHER
4. Flaps
   SET to „TO / LDG 1“
5. Air-brakes
   control glideslope by OPERATING air-brakes accordingly during final approach
6. Flare and touch-down
   If enough airspeed is available, set the air-brakes to approx. the half-extended position and flare carefully with the elevator. Let the A/C touch-down on the main-gear. After touch-down, quickly EXTEND the air-brakes.
7. Wheel-brake
   ACTIVATE as necessary after touch-down.
8. Start of engine and taxiing
   ==> according to sections 4.7.1.1 and 4.7.1.2
Note: The approach and landing can alternatively be flown with the flaps set to „LDG 2“. However, it is recommended to set this flap-setting only during final approach.

4.7.6 After Landing and Parking

4.7.6.1 After Landing

1. Flaps SET to „NEUTRAL“
2. Air-brakes RETRACT and LOCK
3. Auxiliary-fuel-pump OFF
4. XPDR STBY / OFF
5. Throttle use setting adequate for taxiing
6. Directional Control OPERATE rudder-pedals
7. Braking OPERATE brake-lever at control-stick

4.7.6.2 Parking

1. Throttle REDUCE to IDLE
2. Parking-brake SET
3. Engine cool-down WAIT until oil-temp and CHT are < 212°F / 100°C
4. COM/NAV/XPDR OFF
5. Avionic-switch OFF
6. Ignition switch OFF
7. Engine-master-switch OFF
8. Electrical-master-switch (Battery) OFF
9. Cowl-flaps CLOSE
10. Fuel-shut-off-valve CLOSE
11. Rebound-strap CONNECT
12. Canopy OPEN (right, left, top)
4.7.7 Flights at High Altitude

The actual air-speed (TAS) at high altitudes is above the indicated air-speed (IAS). There is no restriction to the allowed flight-envelope below FL65 (2000m). Above this altitude, the never-exceed speed $V_{NE}$ is decreased according to the decrease in air-density. This is shown in the following tables:

<table>
<thead>
<tr>
<th>Flight Level (ft MSL)</th>
<th>Flight Level (m MSL)</th>
<th>Never-Exceed Speed $V_{NE}$ (kts / km/h (IAS))</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>146 kts / 270 km/h</td>
</tr>
<tr>
<td>3300</td>
<td>1000</td>
<td>146 kts / 270 km/h</td>
</tr>
<tr>
<td>6500</td>
<td>2000</td>
<td>146 kts / 270 km/h</td>
</tr>
<tr>
<td>10000</td>
<td>3000</td>
<td>138 kts / 255 km/h</td>
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<tr>
<td>13000</td>
<td>4000</td>
<td>132 kts / 245 km/h</td>
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<tr>
<td>16500</td>
<td>5000</td>
<td>124 kts / 230 km/h</td>
</tr>
<tr>
<td>19500</td>
<td>6000</td>
<td>119 kts / 220 km/h</td>
</tr>
<tr>
<td>26000</td>
<td>8000</td>
<td>105 kts / 195 km/h</td>
</tr>
<tr>
<td>33000</td>
<td>10000</td>
<td>92 kts / 170 km/h</td>
</tr>
<tr>
<td>39500</td>
<td>12000</td>
<td>81 kts / 150 km/h</td>
</tr>
</tbody>
</table>

Always keep the air-speed below the never-exceed speeds given above. Only then can it be guaranteed that the motorglider will not flutter.

Due to the extremely low outside-air-temperatures (OAT) at high altitude it is possible that the capacity of the battery is reduced significantly. This might prevent the engine from being started with the electric starter. Starting the engine might only be possible once lower altitudes are reached and the battery has been allowed to warm up again. The engine-manufacturer mentions a minimum temperature of the battery of $-13°F / -25°C$. Starting the engine by windmilling the propeller should be possible. However, this has not been tried in flight tests. The above restrictions should be considered in flight-planning.

At high altitudes ice can form on the inside of the canopy due to freezing breath. This can significantly reduce the visibility. If necessary, sink to a lower altitude with higher temperatures and/or lower humidity. If needed, open the emergency-window.
Flying at high altitude can cause ice to form on the airframe. This can cause significant disadvantages in the aerodynamic behavior, aircraft mass and CG-position. A considerable decline of flight performance and behavior is possible. Flights in icing-conditions are not allowed and must be avoided.

4.7.8 Flights in Rain

Rain influences the air-flow around the A/C. Flight performance and behavior will change. When flying in rain, the following is recommended:

1. Increase all recommended speeds for take-off and landing by at least + 6kts / 10 km/h. This should also be done for all other minimum air-speeds.
2. The climb-rate will decrease (up to 50%) and the cruise-speed will decrease (up to 30%). These reductions have to be taken into account when flight-planning. Also take into account the decreases in maximum range and endurance.
3. For flying in rain, no important changes of trim have been observed. However, changes in the trim-speed should be expected.

4.7.9 Take-Off and Landing with Crosswind

For stronger crosswind the following is recommended:

1. Take-off with FLAPS set to NEUTRAL. The A/C has no tendency to lift-off automatically and should intentionally be rotated at 49 kts / 90 km/h by PULLING slowly at the control-stick. The landing-gear’s directional-stability reduces the A/C’s sensitivity to crosswind until rotating.

Note: The stall-speed with flaps set to NEUTRAL is 3 kts / 6 km/h higher than with flaps set to TO / LDG 1.
2. **Land** with FLAPS set to NEUTRAL. The A/C has the tendency to float longer than normal and touch-down with a higher speed. The landing-gear’s directional-stability reduces the A/C’s sensitivity to crosswind during the ground-roll.

Due to the change in stall-speed, it is recommended to INCREASE the approach-speed from normally 60 kts / 110 km/h by 4 kts / 8 km/h to 64 kts / 118 km/h with the FLAPS set to NEUTRAL.

In crosswind-conditions, two different APPROACHPROCEDURES are possible. These can be combined as necessary:

3. **Approach with** longitudinal-axis of the fuselage aligned with the RWY. Move the aircraft into a slip by **lowering the upwind wing**. This is the steady-heading-sideslip-procedure recommended for powered A/C. It has the advantage, that the attitude usually does not need to be changed until touch-down. This procedure has been demonstrated for crosswind-components of up to 16 kts / 30 km/h. The wing-tip still has enough ground-clearance.

4. **Approach with** a crab-angle against the wind and keep the wings **level**. This is the procedure recommended for gliders. It has the advantage that both wing-tips have the greatest possible ground-clearance. The disadvantage of this procedure is that the fuselage needs to be aligned with the RWY by using a well-controlled movement of the rudder. This is necessary to prevent the wheels from skidding when touching down.

**Crosswind-landings** have been **demonstrated** with crosswind-components of up to 16 kts / 30 km/h.

---

4.7.10 **Flights in Strong Turbulence**

1. Air-speed REDUCE to max. \( V_{RA}=102 \text{ kts / 190 km/h} \)
4.7.11 Flights in Icing-Conditions

Ice and hoar-frost significantly influence the air-flow around the A/C. The mass will increase and flight performance and behavior will decrease significantly.

1. Avoid flights in icing-conditions.
2. In the case of an unintended flight into an area of icing-conditions, leave the area immediately by turning around or reducing altitude.
3. Increase all recommended speeds for take-off and landing by at least + 6kts / 10 km/h. This should also be done for all other minimum air-speeds.
4. The climb-rate will decrease (up to 50%) and the cruise-speed will decrease (up to 30%).

4.7.12 Flights near Thunderstorms

1. Avoid flights near or into a thunderstorm. Strong turbulences, ice, strong rain or hail can be expected. The motorglider also has no adequate lightning-protection.
2. In the case of an unintended flight into an area of thunderstorms, leave the area immediately.

**Warning:** If it is suspected that lightning struck the A/C, immediately follow the procedures of section 3.12.4.

**Caution:** A/C made of composite-materials are more susceptible to lighting-strikes than A/C made of metals.
4.7.13 Aerobatics

Aerobatics are not allowed!
4.7.14  Spins

Intentional Spins are not allowed!

If the aircraft spins unintentionally, follow the emergency procedures according to chap. 3.6.
Chapter 5 – Flight Performance

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5.2 Usage of Performance Tables and Diagrams ......................................................... 5-3
5.3 Performance Tables and Diagrams ......................................................................... 5-4
   5.3.1 Corrections of Air-Speed-Indicator / Indication-Error ................................. 5-4
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   5.3.4 Stall Speed and Minimum Air-Speeds ............................................................ 5-7
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5.1 Introduction

This chapter contains data about the flight performance which can be expected of the STEMME S6 motorglider in the „S6-T“-version. This data is approved by the appropriate authorities. Also, additional data is given which does not need to be approved. This collection of data is good for pre-flight planning purposes.

The performance data given in the tables and diagrams was determined in flight tests with a motorglider and engine in serial configuration. It has been corrected to the conditions of the international standard atmosphere (ISA: 59°F / 15°C, 29.92 inHg / 1013.25 hPa, MSL).

The values were gained with average piloting skill, using the procedures of this operating manual.

A bad maintenance condition, different levels of pilot experience and meteorological influences will change these values.
5.2 Usage of Performance Tables and Diagrams

The influence of the different variables on the flight performance is shown in the tables and diagrams. This allows for good flight planning when the pilot knows all outside influences and available information.

Good flight planning, good maintenance of the motorglider and good pilot experience will cause the actual performance values to be near to the values given in this operating manual.

When planning a flight, always estimate the values from the tables and diagrams to the safe side. This way unknown influences (slightly different aircraft configuration, turbulence, or other influences) can be considered.
5.3 Performance Tables and Diagrams

5.3.1 Corrections of Air-Speed-Indicator / Indication-Error

The following air-speed-indicator-correction takes into account the installation error. It does NOT take into account the instrument error of the air-speed-indicator. All air-speed values in this Flight Manual are indicated air-speeds (IAS).
Illustration 5-1: Corrections of Air-Speed-Indicator

This airspeed calibration is valid for powered as well as unpowered flight and also for all flap settings.
5.3.2 Pressure Altitude and Density Altitude

The flight performance of the aircraft depends on the air density or density altitude. To determine the density altitude, the following diagram can be used. (This may be needed to determine the engine power.) If the QNH is known (this can be read from the altimeter), the density altitude can be calculated with the temperature.

Diagram for converting pressure altitude and density altitude:

**Illustration 5-2: Conversion of Pressure Altitude and Density Altitude**

**Note:** The current pressure altitude is shown on the altimeter if it is set to 29.92 in Hg / 1013.25 hPa.
5.3.3 ISA (International Standard Atmosphere)

Illustration 5-3: International Standard Atmosphere

5.3.4 Stall Speed and Minimum Air-Speeds

The stall speed and lowest flying speed of the motorglider depends on the configuration of the aircraft and the mode of operation.

The stall speed is the speed at which a stalled flight state is reached. The minimum air-speed is lowest stationary speed that is controllable (reaching of the control-stops).

**Warning:** When recovering from a stall in horizontal flight, an altitude-loss of 100 ft / 30 m is possible. In turning flight, an altitude-loss of 130 ft / 40 m is possible. If the pilot reactions are delayed, the altitude-loss may be more than 200 ft / 60 m.
**Caution:** Stall speed increases with weight and g-load. In turns stall speed depends on bank angle and corresponding g-load.

### 5.3.4.1 Stall Speed and Minimum Air-Speed in Powered Flight

**Configuration:**
- Most Forward CG-Location: 8.86 in / 225 mm behind RP
- Take-off Mass: 1874 lbs / 850 kg
- Propeller: HIGH RPM

<table>
<thead>
<tr>
<th>Configuration</th>
<th>Stall Speed [IAS]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Bank angle</td>
</tr>
<tr>
<td></td>
<td>0°</td>
</tr>
<tr>
<td><strong>T/O Flaps TO / LDG 1</strong></td>
<td>Flaps set to „TO/LDG 1“, Engine 115% power, Air-brakes LOCKED</td>
</tr>
<tr>
<td><strong>T/O Flaps NEUTRAL</strong></td>
<td>Flaps set to „NEUTRAL“, Engine 100% power, Air-brakes LOCKED</td>
</tr>
<tr>
<td><strong>Landing Flaps LDG 2</strong></td>
<td>Flaps set to „LDG 2“, Engine IDLE, Air-brakes LOCKED</td>
</tr>
<tr>
<td><strong>Landing Flaps TO / LDG 1</strong></td>
<td>Flaps set to „TO/LDG 1“, Engine IDLE, Air-brakes FULLY EXTENDED</td>
</tr>
<tr>
<td><strong>Landing Flaps NEUTRAL</strong></td>
<td>Flaps set to „NEUTRAL“, Engine IDLE, Air-brakes FULLY EXTENDED</td>
</tr>
<tr>
<td><strong>Cruise Flaps CRUISE</strong></td>
<td>Flaps set to “CRUISE“, Engine 90% power, Air-brakes LOCKED</td>
</tr>
</tbody>
</table>
**Caution:** The motorglider is equipped with an acoustic stall warning. It only works if the engine is running and if the electrical system is operational. The stall warning activates about 3 to 4 kts / 5 to 8 km/h above the stall.

**Note:** If the throttle is set to IDLE and the CG-location is far aft, then slightly lower stall speeds might be reached. The aircraft might drop a wing, even if the flight controls are not against the aft stop.

### 5.3.4.2 Stall Speed and Minimum Air-Speed in Soaring Flight

#### Configuration:
- Most Forward CG-Location 8.86 in / 225 mm behind RP
- Take-off Mass 1874 lbs / 850 kg
- Engine OFF
- Propeller left MANU, right FEATHER

<table>
<thead>
<tr>
<th>Configuration</th>
<th>Stall Speed [IAS]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Bank angle</td>
</tr>
<tr>
<td></td>
<td>0°</td>
</tr>
<tr>
<td><strong>Landing</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Flaps</strong></td>
<td></td>
</tr>
<tr>
<td><strong>LDG 2</strong></td>
<td></td>
</tr>
<tr>
<td>Flaps set to ,,LDG 2,, Air-brakes LOCKED</td>
<td>$V_{S0}$ kts / km/h</td>
</tr>
<tr>
<td><strong>Landing</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Flaps TO /</strong></td>
<td></td>
</tr>
<tr>
<td><strong>LDG 1</strong></td>
<td></td>
</tr>
<tr>
<td>Flaps set to ,,TO / LDG 1,, Air-brakes FULLY EXTENDED</td>
<td>$V_{S1}$ kts / km/h</td>
</tr>
<tr>
<td><strong>Landing</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Flaps</strong></td>
<td></td>
</tr>
<tr>
<td><strong>NEUTRAL</strong></td>
<td></td>
</tr>
<tr>
<td>Flaps set to ,,NEUTRAL,, Air-brakes FULLY EXTENDED</td>
<td>$V_{S1}$ kts / km/h</td>
</tr>
<tr>
<td><strong>Thermalling</strong></td>
<td></td>
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<tr>
<td><strong>Flaps TO /</strong></td>
<td></td>
</tr>
<tr>
<td><strong>LDG 1</strong></td>
<td></td>
</tr>
<tr>
<td>Flaps set to ,,TO / LDG 1,, Air-brakes LOCKED</td>
<td>$V_{S1}$ kts / km/h</td>
</tr>
</tbody>
</table>
**Warning:** When recovering from a stall in horizontal flight, an **altitude-loss** of 100 ft / 30 m is possible. In **turning flight**, an **altitude-loss** of 130 ft / 40 m is possible. If the pilot reactions are **delayed**, the **altitude-loss** may be more than 200 ft / 60 m.

**Caution:** In the glider-configuration stall warning for the pilot is ONLY through aerodynamic buffeting. The onset of buffeting begins about 3 to 4 kts / 5 to 8 km/h above the stall.

**Note:** If the CG-location is far aft, then slightly lower stall speeds might be reached. The aircraft might drop a wing downwards, even if the flight controls are not against the aft stop.

5.3.5 **Wind-Components**

- The maximum demonstrated crosswind-component for taxi, take-off and landing is: 16 kts / 30 km/h
5.3.6 T/O-Ground-Roll and T/O-Distance at MTOM

Conditions:
- Throttle: FULL POWER / MTOP (115%)
- Flaps: "TO / LDG 1"
- Rotating Speed (IAS): \( v_R = 43 \text{ kts} / 80 \text{ km/h} \) at 1874 lbs / 850 kg
- Air-Speed in 15m (IAS): \( v_y = 62 \text{ kts} / 115 \text{ km/h} \) at 1874 lbs / 850 kg
- RWY-Surface: paved, horizontally leveled and dry

Data given for MSL, ICAO standard atmosphere

T/O-ground-roll: 770 ft / 235 m
T/O-distance: 1120 ft / 340 m (over 50ft / 15m obstacle)

**Caution:** The T/O-ground-roll can increase significantly when flying from grass runways. Expect at least a 25% increase in the T/O-ground-roll on grass runways. Bad maintenance, not following the given procedures, bad meteorological conditions (moisture, snow and similar) and bad local conditions (rough surfaces and similar) can increase the T/O-distance significantly.

**Caution:** A RWY-uphill-slope of 2% (altitude change of 2 ft over 100 ft horizontal distance) increases the T/O-distance by about 10%. The change in T/O-ground-roll will be even higher.
<table>
<thead>
<tr>
<th>Pressure Alt above MSL</th>
<th>Temperature</th>
<th>T/O-Ground-Roll</th>
<th>T/O-Distance (50 ft / 15m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>[ft] [m]</td>
<td>[°F]</td>
<td>[°C]</td>
<td>[ft]</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>5</td>
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<tr>
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<tr>
<td>100</td>
<td>38</td>
<td>2518</td>
<td>768</td>
</tr>
</tbody>
</table>
5.3.7 Climb Performance

Conditions:  
- Throttle: FULL POWER / MTOP (115%)
- Flaps: „NEUTRAL“
- Air-speed, best rate-of-climb (IAS): \( v_y = 62 \text{ kts} / 115 \text{ km/h at 1874 lbs / 850 kg} \)
- Altitude: 0 - 16400 ft / 0 – 5000 m pressure altitude

Maximum rate-of-climb: \( v_y = 790 \text{ ft/min} / 4 \text{ m/s} \)

5.3.8 Power-Settings in Cruise Flight

Conditions:  
- Throttle: As given in Graph / Table
- Flaps: „CRUISE“
- A/C-mass: 1874 lbs / 850 kg

Maximum cruise-speed: \( v_H = 116\text{kts} / 215\text{km/h} \)

5.3.9 Climb-Gradient during Go-Around

Conditions:  
- Throttle: FULL POWER / MTOP(115%)
- Flaps: „TO / LDG 1“
- Air-speed (IAS): \( v = 49 \text{ kts} / 90 \text{ km/h at 1874 lbs / 850 kg} \)
- Climb-rate \( v_v \): 790 ft/min / 4 m/s
5.3.10 Landing-Distance

Conditions:
- Throttle: IDLE
- Engine-RPM: 2000 RPM
- Flaps: „TO / LDG 1“
- Approach-speed (IAS): v = 60 kts / 110 km/h at 1874 lbs / 850 kg
- Propeller: low pitch, left MANU, right HIGH RPM (Start)
- RWY: paved, horizontally leveled and dry
- Brakes after complete touch-down: As much as possible

Landing-ground-roll: 640 ft / 195 m
Landing-distance (over 50 ft / 15 m obstacle): 1329 ft / 405 m

Caution: The landing-distance can increase significantly when flying from grass runways. Bad maintenance, not following the given procedures, bad meteorological conditions (rain, high temperatures, unfavorable wind and similar) and bad local conditions can increase the landing-distance significantly.

Caution: A RWY-downhill-slope of 2% (altitude change of 2ft over 100ft horizontal distance) increases the landing-distance by about 10%.

Note: A higher approach speed will cause significantly higher landing-distances.
5.3.11 Maximum Endurance and Range

Conditions:
- Throttle: 75%
- Flaps: „NEUTRAL“
- Speed: 97kts / 180 km/h
- A/C-Mass: 1874 lbs / 850 kg
- Fuel-consumption: 5.4 gal/h / 20.4 l/h
- Useable-fuel: 17.2 US gal / 65 l (standard)
  33.5 US gal / 127 l (with optional left wing-tank)

The maximum endurance (without reserves) is only valid for the useable fuel (depending on A/C-equipment) and when the aircraft is fuelled optimally.

When making errors while fueling the A/C (for example: A/C is not horizontal, A/C is parked on a sloped surface, or similar) changes of up to ±5% in the maximum amount of fuel can occur.

The minimum non-useable fuel in the right wing-tank (standard) is 0.55 US gal / 2.1 l. In the left wing-tank (optional) it is 0.3 US gal / 1 l.

To determine the approximate endurance with tanks completely filled (without reserve), follow this method:

Standard: 16.6 gal / 63 l: 5.4 gal/h / 20.4 l/h = 3.08 h
With optional tank: 33.5 gal / 127 l: 5.4 gal/h / 20.4 l/h = 6.22 h

Available flight-time ≈ max. flight-time (from table or graph) multiplied with amount of useable fuel divided by max. amount of useable fuel.

Calculate the range without reserves approximately by using the available endurance and the true air-speed.

Standard: 3.08 h x 97kts / 180km/h = 300 nm / 554.4 km
With optional tank: 6.22 h x 97kts / 180km/h = 604.5 nm / 1119.6 km

5.3.12 Approved Noise Level


For approved Noise Level refer to EASA Type Certificate Data Sheet for Noise, TCDSN No. EASA.A.143, latest approved Revision.
# Chapter 6 – Mass and Balance / Equipment

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<th>Title</th>
<th>Page</th>
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<td>Equipment List</td>
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</table>
6.1 Introduction

The motorglider will only reach the flight performance and handling characteristics described in this operations manual if it is operated in the safe limits for loading and for the center-of-gravity (CG).

The pilot-in-command is responsible for the correct loading of the aircraft within the loading-limits and CG-limits. The movement of the CG due to fuel-consumption must always be considered.

This chapter presents information for weighing the aircraft and determining the empty-CG-location properly. Also, the measurement of the empty-mass-moment - as measured from the reference-plane (RP) - is given.

A list of all equipment installed in the motorglider during weighing (installed equipment list) - as well as a list of all approved equipment for this motorglider (equipment list) – is given in chapter 6.5.

The weight, empty-CG-location and empty-mass-moment for the aircraft are determined during the pre-delivery-inspection. This data is then noted in the logsheet for report of the empty-mass and the CG-location (section 6.3.1).

Repeat the weighing of the aircraft in the intervals required by law (generally every 4 years).

**Note:** The empty mass, empty-CG-location and empty-mass-moment need to be calculated or measured when making changes to the installed equipment. This data must be determined and recorded in accordance with the aeronautical regulations.

**Note:** The empty mass, empty-CG-location and empty-mass-moment need to be measured when repairs have been made or when the aircraft has been painted new.

**Note:** The empty mass, empty-CG-location and empty-mass-moment need to be confirmed on the logsheet (section 6.3.1) by certified personnel.
6.2 Aircraft Weights

If ANY changes to the delivery-configuration of the aircraft are made, the empty-mass must be determined again. This is needed for all of the following calculations.

The state of the aircraft and its equipment when weighing must be defined precisely.

More information about weighing the aircraft is given in the maintenance manual (STEMME Doc.-No.: P500-006.000).

6.2.1 State during Weighing

- Installed equipment according to the current equipment list
- No loose ballast
- Aircraft dry, including operating-fluids:
  
  Brake-fluid
  
  Amount of engine-oil (0.5 – 0.8 US gal / 2 – 3 liters)
  
  Coolant (0.63 – 0.66 US gal / 2.4 – 2.5 liters)
  
  Non-useable fuel (0.55 US gal / 2.1 liters + 0.3 US gal / 1 liter, optional)

The aircraft’s empty-mass and empty-CG-location are determined using the following method. Every wheel of the landing-gear is placed in a weighing scale (left main-gear: \( m_L \), right main-gear: \( m_R \), front gear: \( m_F \)). The aircraft’s longitudinal-axis will be aligned in the manner described by the following diagram.

![Illustration 6-1: Aircraft alignment during weighing](image-url)
The reference plane (RP) is located at the leading-edge of the inner-wing at the wing-root. It is aligned vertically to the longitudinal-axis. This plane creates a reference line on the ground.

Longitudinal-inclination: Place a wedge 1000:42 (2,4° = 2°26’) on the rear fuselage-section. Align the top of the wedge horizontally.

Keep in mind that the lateral-axis must be almost horizontal.

When the aircraft is aligned properly, reference points are projected vertically down onto the ground from the root leading-edge of the left and right wings. This generates a vertical plane. The connecting line between the two reference points is the reference line. From this reference line, the distance to the front landing-gear (distance b) and main landing-gear (distance a) is measured. (See Illustration 6-1: Aircraft alignment during weighing)

The following formulas are used to calculate the empty-mass, the empty-mass-moment and the empty-CG-location:

Empty-Mass \( m_{\text{Empty}} \) [kg]:

\[
m_{\text{Empty}} = m_L + m_R + m_B
\]

Empty-Mass-Moment \( M_{\text{Empty}} \) [kgm]:

\[
M_{\text{Empty}} = m_L \cdot a + m_R \cdot a - m_B \cdot b
\]

Empty-CG_Location from the reference plane \( D_{SL} \) [m]:

\[
x = \frac{M_{\text{Empty}}}{m_{\text{Empty}}}
\]
6.3 Empty-Mass and CG-Location

The current empty mass and empty-CG-location must be documented chronologically in a report of empty-mass and CG-location (section 6.3.1).

Every change in the empty-mass or empty-CG-location (which might be caused by changes in equipment, repainting, repairs or similar) must be documented in this report.

If the cause of the changes is precisely known (mass and lever must be known; for example, when changes in equipment are made), then new empty-mass and empty-CG-location can be determined through calculations. If the cause of the changes is NOT precisely known (For example, when making repairs), the aircraft must be weighted again.

6.3.1 Logsheet for Report of Empty-Mass and CG-Location

The following logsheet describes the chronological changes in the aircraft's empty mass and CG-location. (The logsheet can be reused for subsequent reports.) These changes might be caused by changes in equipment and / or structural parts (for example: repairs). All levers refer to the reference plane (RP). (behind RP: positive lever, in front of RP: negative lever).

The first entries are the values determined during the pre-delivery-inspection.
## Report of Empty-Mass and CG-Location

(continuous report of changes to the aircraft structure and/or equipment)

<table>
<thead>
<tr>
<th>Con. No.</th>
<th>Date</th>
<th>Description of Action taken</th>
<th>Mass [lbs]</th>
<th>Lever to RP [ft]</th>
<th>Moment [ft lb]</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td>Weighing at delivery</td>
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</tbody>
</table>

Cleared by Authorized Personnel
6.4 Operating-Mass and Operating-CG

Only operate the aircraft within the loading-limits and limits for the CG-location. The current operating-mass and operating-CG can only be calculated by determining the payload for the planned flight.

To determine the operating-mass and operating-CG graphically and/or through calculations, use the tables and diagrams given in the following sections:

- 6.4.1 Mass-Moments and Payload: Loading-diagram
- 6.4.2 Calculation of the proper loading for flight

Perform the following steps:

1. Take the empty-mass $m_{\text{Empty}}$ and the empty-mass-moment $M_{\text{Empty}}$ from the current weighing report or from the weighing logsheet. Place these values in the corresponding columns, row 1 of the table 6.4.2 „Calculation of the proper loading for flight“.

2. Determine the total mass in the cockpit – including the mass of the pilot, copilot and payload carried in the cockpit. From this data, determine the corresponding mass-moments by using Diagram 6.4.1 „Mass-Moments and Payload: Loading-diagram“ or calculate the mass-moments more precisely: mass $\times$ corresponding lever. Keep the negative value of the lever in mind, if a location is infront of the RP. Use separate columns in row 2 for the left and right seat in table 6.4.2 „Calculation of the proper loading for flight“.

3. Determine the payload carried in the rear baggage-compartment by using the same methods as in point 2. Place these values in the corresponding columns of row 3 of the table. Here, the lever always has a positive value.

4. Add all masses and moments from row 1 to row 3 of the table. Place these total values in row 4 of the table. These results represent the aircraft with empty tanks.

5. Divide the results from row 4 to determine the lever of the operating-CG. This must be within the allowed limits. If this is not the case, the payload must be adjusted.

6. Finally the fuel-payload must be determined precisely. Calculate the corresponding mass-moment by using the same methods as in point 2. Place these values in the corresponding columns of row 6 of the table. The lever of the fuel-mass changes with changes in the amount of fuel. Due to this, ONLY use diagram 6.4.1 for this.

7. Now calculate the total-mass and total-moment from row 4 and row 6 of the table. Place these values in row 7. This represents the aircraft in its T/O-configuration with fuel.
8. Divide the results from row 7 to determine the lever of the CG in the T/O-configuration. These values must be within the allowed limits. If this is not the case, payload and fuel must be adjusted.

All mentioned and used levers give the distance from the corresponding CG to the reference plane (RP)!

**Warning:** The CG must always stay within the allowed limits. If this is not the case, unstable aircraft behavior might result!
6.4.1 Mass-Moments and Payload

[Diagram of loading diagram with annotations indicating pilot/copilot, fuel, baggage, and load conditions.]
### 6.4.2 Calculation of Proper Loading for Flight

<table>
<thead>
<tr>
<th>Calculation of the proper loading for flight</th>
<th>STEMME S6</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Reg.-No.: ..........</td>
</tr>
<tr>
<td></td>
<td>Mass [lbs]</td>
</tr>
</tbody>
</table>

   - Lever: [value] ft
   - Example: 1486 lbs
   - Example: 2213 ft lb

2. **Pilot and Copilot**
   - Lever (mean value): [value] ft
   - Example: 176 lbs
   - Example: -259 ft lb (mean value)
   - left
   - Example: -- lbs
   - Example: -- ft lb
   - right

3. **Rear Baggage-Compartment**
   - Lever: 5,5741 ft
   - Example: 40 lbs
   - Example: 223 ft lb

4. **Operating-Mass and Total-Mass-Moment, without Fuel (Sum 1. through 3.)**
   - Example: 1702 lbs
   - Example: 2177 ft lb

5. **CG-Location (mm RP):**
   - \[
   \frac{\text{Moment [ft lb]}}{\text{Mass [lbs]}} = 12 \text{ in / ft} 
   \]
   - Example: 15.3 in
   - [value] in (behind RP)
   - Allowed: 8,82 in to 16,10 in

6. **Fuel-Payload:**
   - Useable Fuel (0.744kg/l)
   - Lever: 0.3642 ft
   - [value]
   - (17.8 US gal)
   - Example: 110 lbs
   - 40 ft lb
   - see Diagram 6.4.1

7. **Total-Operating-Mass and Total-Mass-Moment with Fuel (Sum 4. and 6.)**
   - Example: 1812 lbs
   - 2217 ft lb

8. **CG-Location (mm RP):**
   - \[
   \frac{\text{Moment [ft lb]}}{\text{Mass [lbs]}} = 12 \text{ in / ft} 
   \]
   - Example: 14.7 in
   - [value] in (behind RP)
   - Allowed: 8,82 in to 16,10 in
Note: When calculating the CG-position without including the change of fuel-weight during flight, the CG must be within the following limits:

8,82 (+ 1,26) in to 16,10 (- 1,30) in / (behind RP).

224 (+ 32) mm to 409 (- 33) mm
6.5 Equipment List and Installed Equipment List

The equipment list is a list of all certified equipment which can be installed in the STEMME S6.

The installed equipment list is a list of all equipment which is actually installed in the aircraft. All equipment items actually installed in the aircraft are marked with “X” in the column “Inst.” (Installed).

**Note:** The installation of additional equipment must be performed in correspondence with the Maintenance Manual.

The given equipment list contains the following information for a better overview:

The column „Con. No.“ includes a continuing number and a character for specification with the meaning:

- **I** Instruments
- **A** Avionics
- **M** Miscellaneous Equipment Items

The columns „Mass“ and „Lever“ give the mass and the effective lever relative to the reference plane (RP) of the equipment item listed in the column.

- **Positive Levers** are displacements behind RP
- **Negative Levers** are displacements in front of RP
## 6.5.1 Equipment List

<table>
<thead>
<tr>
<th>Con No.</th>
<th>Description</th>
<th>Manufacturer</th>
<th>Type</th>
<th>Spec. No.</th>
<th>Mass [lbs]</th>
<th>Lever [ft] + or -</th>
</tr>
</thead>
<tbody>
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<td>Altimeter</td>
<td>Winter</td>
<td>4FGH40</td>
<td></td>
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<tr>
<td>I 2</td>
<td>Altimeter</td>
<td>Unit. Instr.</td>
<td>5934 Ser.</td>
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<tr>
<td>I 3</td>
<td>Air Speed Indicator</td>
<td>Winter</td>
<td>7FMS443</td>
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<tr>
<td>I 4</td>
<td>Compass</td>
<td>Airpath</td>
<td>C2400</td>
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<tr>
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<td>5STVM5-2</td>
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<td>Soaring Computer incl. Electr.</td>
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<td>Navigation</td>
<td>LX 166</td>
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<td>GI-106A</td>
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<tr>
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<tr>
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7.1 Introduction

This chapter of the Flight Manual contains a technical description of the motorglider and its systems and components. There are also user-notes for each system.

The description of installed non-standard systems is given in chapter 9.

Additional explanations of the components and systems of the Stemme S6 are given in the maintenance manual (Stemme Doc.-No.: P500-006.000).
7.2 Airframe

7.2.1 Fuselage

The front section of the fuselage – including the cockpit – is constructed from carbon-fiber-composites. For additional stiffness and a decrease in mass, it is reinforced with longitudinal-stringers and circular-frames. The mid-section is made of a steel-tube-framework with fairings made of carbon-fiber-composites. The rear section with integrated vertical fin is also made of carbon-fiber-composites. The force transmission between the separate fuselage-sections is realised with pin joints.

For reasons of fire-containment, the engine is completely encased in fire-resistant walls. Certain elements can easily be removed for maintenance.

7.2.2 Wing-System

The complete wing-system has a span of 59 ft / 18 m and is made of 5 separate sections. These are one inner-wing, left and right outer-wings and two winglets.

An integral-tank for fuel is located in the forward area of the right inner-wing (an optional second tank can be installed in the left inner-wing). The air-brakes are located in the inner section of the outer-wing.

The wing-spars of all wing-sections are made completely of carbon-fiber-composites. The wing-shells are made of CFC-Sandwich-elements.

The connection between the inner-wing and the fuselage is realised by four pins which attache the wings to the steel-tube-framework.

The outer-wings are connected to the inner-wing by one socket-pin at each wing-joint and two shear-force-fittings at each wing-root. Additional details can be taken from chapter 4 „Normal Operating Procedures“.

7.2.3 Empennage

The T-shaped tail is also made of spars and sandwich-shells made of carbon-fiber-composites. This set-up is similar to the wing-system. The horizontal-stabilizer can easily be removed from the vertical-stabilizer. It is connected by a removable three-point-mounting. To protect the tail against unwanted tail-strikes (when rotating or in ground operations), it is equipped with a tail-skid.
7.3 Flight-Controls

The control-forces are transmitted to the flight-controls with control-rods or control-cables. Control-brackets – made of rust-proof coated steel – are laminated into each flight-control. The bearings are prepared for easy movement at all times.

The connections of the three control-elements integrated into each wing (aileron, flap and air-brake) to the control-rods are located in the mid-section of the fuselage. These connections are disconnectable. Additional connections of the flight-controls between the inner-wing and the outer-wing are designed as secured quick-connectors (non-automatic).

7.3.1 Ailerons

Design: CFC-Sandwich, 2-part Aileron across the span of the outer-wing.

Mounting: Inner-aileron: 9 joints and 1 control-connector each
Outer-aileron: 7 joints and 1 control-connector each
Axial fixations near the control-connectors

Operation: Operated with control-rods
Aileron-differential realized by parted ailerons. Outer-aileron deflects more than inner-aileron. Flap deflection is also overlayed.
Movement by sideways-deflection of control-stick.

7.3.2 Elevator

Design: CFC-Sandwich

Mounting: 3 joints on each elevator-side, 1 centralized automatic control-connector

Operation: Operated with control-rods (which are located in the front section, mid-section and rear section of the fuselage).
Removable horizontal stabilizer mounted by screwing the self-securing connection-bolt.
Movement by push and pull on control-stick

The electric trim is moved with a toggle-switch on the control-stick.
7.3.3 Rudder and Nose-Wheel-Steering

Design: CFC-Sandwich
Mounting: Rudder mounted on top and bottom, 1 control-connector on bottom
Operation: The rudder-movement is transmitted in the front section and mid-section of the fuselage by control-cables. In the rear section this changes to control-rods.

The rudder is operated by the rudder-pedals. When on the ground, the nose-wheel-steering is also connected to the rudder-pedals. The steerable nosewheel is operated by control-cables.

7.3.4 Flaps

Design: CFC-Sandwich
Mounting: 6 joints and 1 control-connector each
Operation: Operated with push-rods, flap-deflection is effective across whole wing-span (inner-wing and outer-wing)

The flaps are set by using the flap-lever with detents. Setting-indicator is located near the flap-lever.

The flap-deflection is overlaid over the aileron-deflection at the outer-wing.

Unlock the flap-lever by pushing it to the right. It automatically detents through the use of a spring.

Possible flap-settings:

- **Cruise-Flight (CRUISE):** - 4.0°
- **Neutral (NEUTRAL):** + 5°
- **T/O / Landing (TO / LDG 1):** + 18.5°
- **Landing (LDG 2):** + 25°
7.3.5  Adjustable Rudder-Pedals

The position of the rudder-pedals can be adjusted. This allows for a safe and comfortable operation of the rudder-pedals, even if the seating position and size of the pilot changes.

**Note:** The rudder-pedals must be locked properly after they have been adjusted!

The rudder-pedals are unlocked by pulling the black handle forward of the control-stick.

**Moving the pedals forward:**
To move the pedals forward, pull the handle and push onto the pedals with your feet. Keep the handle pulled until the pedals have reached the position you want. Afterwards, release the handle and lock the pedals.

**Moving the pedals rearward:**
To move the pedals rearward, pull them back with the handle. Afterwards, release the handle and lock the pedals.
## 7.4 Air-Brakes

The Schempp-Hirth -style air-brakes are located at the inner-section of the outer-wing.

**Design:** Air-brake designed as aluminum-section, sealing-plates made of CFC, placed at top ends of air-brakes

**Mounting:** 2 rotational-shafts in each air-brake-box

**Operation:** Operated with control-rods, the air-brakes lock at the wing-joint. The air-brakes are operated by moving the blue air-brake-lever.
7.5 Operating-Elements

This section is an overview of all control-elements in the cockpit. More detailed descriptions of each element are given in each relevant section of this Flight Crew Operation Manual as well as in the maintenance manual.

For operation instructions of the installed equipment refer to the maintenance manual of the STEMME S6 (STEMME Doc.-No.: P500-006.000) and to the operation manuals of the manufacturer provided for the installed equipment.
Illustration 7-1: Overview of the Control-Elements in the Cockpit
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<tr>
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<tbody>
<tr>
<td>(1)</td>
<td>Canopy-Locks</td>
<td>White handles on left and right side of canopy-frame (additional rear-canopy-hook at upper rear middle of canopy-end)</td>
</tr>
<tr>
<td>(2)</td>
<td>Air-Brake-Lever</td>
<td>Blue lever on left cockpit-wall and on left side of center-console</td>
</tr>
<tr>
<td>(3)</td>
<td>Cabin-Ventilation</td>
<td>Black pull-button, one at each seat to control cabin-ventilation</td>
</tr>
<tr>
<td>(4)</td>
<td>Control-Stick</td>
<td>Dual-controls, centered forward of each seat</td>
</tr>
<tr>
<td>(5)</td>
<td>Wheel-Brake-Lever</td>
<td>Black lever at control-stick, when parking lock lever with pin</td>
</tr>
<tr>
<td>(6)</td>
<td>Choke-Lever</td>
<td>Black lever on forward center-console on the left side. The adjustment of the Choke-Lever is realised by pre-defined clamping.</td>
</tr>
<tr>
<td>(7)</td>
<td>Canopy-Jettison</td>
<td>Red handle on top of the forward center-console, below the instrument-panel</td>
</tr>
<tr>
<td>(8)</td>
<td>Cowl-Flaps-Lever</td>
<td>Black handle on top of the forward center-console below Canopy-Jettison handle (to operate the inlets and outlets of the engine-cowling). The lever is unlocked by pushing a push-button and locked again by releasing the button.</td>
</tr>
<tr>
<td>(9)</td>
<td>Rudder-Pedals</td>
<td>One pair for each seat in the foot-area.</td>
</tr>
<tr>
<td>(10)</td>
<td>Flap-Lever</td>
<td>Black lever on the right side of the center-console. To unlock push to the right.</td>
</tr>
<tr>
<td>(11)</td>
<td>Throttle</td>
<td>Black lever, centered on the center-console.</td>
</tr>
<tr>
<td>(12)</td>
<td>Rudder-Pedal-Handle</td>
<td>One for each seat, in front of the control-stick. Pull to unlock</td>
</tr>
<tr>
<td>(13)</td>
<td>Seat-Back-Adjustment</td>
<td>For each seat, located at the left and right on the bottom end of the backrest. Release to adjust the backrest at its lower attachment by pulling the slider to the inside</td>
</tr>
</tbody>
</table>
7.6 Instrument-Panel

7.6.1 Layout of the Instrument-Panel

The illustration shows the layout and position of the most important control-elements and instruments on the instrument-panel in the standard-configuration.

Illustration 7-2: Standard Layout of the Instrument-Panel
## Instruments and indicators on the instrument-panel:

<table>
<thead>
<tr>
<th>No.</th>
<th>Instrument Description</th>
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<tbody>
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<td>Air-Speed-Indicator</td>
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<tr>
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<td>Winter 7FMS443</td>
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<tr>
<td>2</td>
<td>Spare (opt. Soaring-Computer)</td>
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<td>3</td>
<td>Electronic-Flight-Information-System (EFIS) Dyonon D-10A</td>
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<td>4</td>
<td>VOR/ILS Indicator (CDI)</td>
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<td>Garmin GI-106A</td>
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<td>5</td>
<td>Vertical-Speed-Indicator / Varioimeter Winter 5STVM5-2</td>
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<td>6</td>
<td>Altimeter Winter 4FGH40</td>
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<td>7</td>
<td>Electronic Varioimeter</td>
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<td>Trim-Indicator</td>
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<td>Audio Panel Garmin GMA 340</td>
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<td>Transponder Garmin GTX 330</td>
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<td>Tachometer of Engine</td>
</tr>
<tr>
<td>15</td>
<td>Manifold-Air-Pressure-Gauge</td>
</tr>
<tr>
<td>16</td>
<td>ASI (optional Fuel-Flow-Indicator)</td>
</tr>
<tr>
<td>17</td>
<td>Fire Warning</td>
</tr>
<tr>
<td>18</td>
<td>Oil-Temperature-Gauge</td>
</tr>
<tr>
<td>19</td>
<td>Cylinder-Head-Temperature, left</td>
</tr>
<tr>
<td>20</td>
<td>Fuel-Gauge, left Tank (option)</td>
</tr>
<tr>
<td>21</td>
<td>Voltmeter</td>
</tr>
<tr>
<td>22</td>
<td>Oil-Pressure-Gauge</td>
</tr>
<tr>
<td>23</td>
<td>Cylinder-Head-Temperature, right</td>
</tr>
<tr>
<td>24</td>
<td>Fuel-Gauge, right Tank (option)</td>
</tr>
<tr>
<td>25</td>
<td>Ampèremeter</td>
</tr>
<tr>
<td>26</td>
<td>Engine-Hours-Meter</td>
</tr>
<tr>
<td>27</td>
<td>Spare</td>
</tr>
</tbody>
</table>

## Annunciator-panel on the instrument-panel:

<table>
<thead>
<tr>
<th>No.</th>
<th>Annunciator Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1</td>
<td>Low-Fuel-Caution-Light (yellow)</td>
</tr>
<tr>
<td>L2</td>
<td>Indication-Light of the Auxillary-Fuel-Pump (green)</td>
</tr>
<tr>
<td>L3</td>
<td>TCU-Caution-Light (Turbo Control Unit) (yellow)</td>
</tr>
<tr>
<td>L4</td>
<td>MAP-Warning-Light (red)</td>
</tr>
<tr>
<td>L5</td>
<td>Internal-Generator-Caution-Light (yellow)</td>
</tr>
<tr>
<td>L6</td>
<td>External-Alternator-Warning-Light (red)</td>
</tr>
</tbody>
</table>

## Circuit-breakers for avionics:

<table>
<thead>
<tr>
<th>No.</th>
<th>Circuit Breaker Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>Alt Field</td>
</tr>
<tr>
<td>A2</td>
<td>Voltmeter</td>
</tr>
<tr>
<td>A3</td>
<td>Pitch-Control for Propeller</td>
</tr>
<tr>
<td>A4</td>
<td>Spare</td>
</tr>
<tr>
<td>A5</td>
<td>Trim</td>
</tr>
<tr>
<td>A6</td>
<td>Stall Warning</td>
</tr>
<tr>
<td>A7</td>
<td>Engine-Bus</td>
</tr>
<tr>
<td>A8</td>
<td>Audio Panel</td>
</tr>
<tr>
<td>A9</td>
<td>ELT</td>
</tr>
<tr>
<td>A10</td>
<td>Spare (opt. Soaring Computer)</td>
</tr>
<tr>
<td>A11</td>
<td>NAV/GPS</td>
</tr>
<tr>
<td>A12</td>
<td>EFIS (not certified as a primary instrumentation)</td>
</tr>
<tr>
<td>A13</td>
<td>XPDR</td>
</tr>
<tr>
<td>A14</td>
<td>COM-Radio</td>
</tr>
</tbody>
</table>
7.6.2 Control-Elements of the Instrument-Panel

The following illustration shows the layout of the additional control-elements of the instrument-panel in the standard-configuration.

Illustration 7-3: Control-Elements of the Instrument-Panel

Control-elements of the instrument-panel:

| (1) Master-Switch (Batt) and Switch for Engine-Bus | (5) TCU-Isolation-Switch (red safety-switch) |
| (2) Control-Unit for Propeller-Pitch | (6) Main Circuit-Breaker 50A |
| (3) Ignition-Switch | (7) Circuit-Breaker for External-Alternator 50A (see also 7.13.4 Electrical Consumers and Circuit-Breaker-System) |
| (4) Fuel-Pressure-Difference-Gauge | |

Circuit-breakers switches of the instrument-panel:

| (S1) Auxiliary-Fuel-Pump | (S5) NAV-Lights |
| (S2) Fuel-Transfer-Pump (for optional left tank) | (S6) Landing-Light |
| (S3) Instrument Light | (S7) Avionics-Master-Switch |
| (S4) Anti-Collision-Light | |
7.7 Landing-Gear

The landing-gear is a non-retractable tricycle-configuration with steerable nose-wheel. To reduce drag and noise, all struts and wheels have aerodynamic fairings.

7.7.1 Nose-Gear and Steering

The nose-gear is made of a steel-strut which is stiff to torque. It is attached to the forward fuselage-section at an attachment-plate by screws. The shock-strut is dampened by the use of elastomers and has a maximum spring-travel of approx. 4 inch / 100mm.

The nose-wheel is steered by rotating the nose-wheel-fork, which is attached to the shock-strut. This rotation is performed with several levers. When the nose-gear is loaded, it connects automatically to the rudder-controls. In the un-loaded position, it is automatically disconnected from the rudder-controls and locks in the direction of the longitudinal-axis.

7.7.2 Main-Gear and Brakes

The struts of the main-landing-gear are welded tubes, which are stiff to torque. They are connected to the central steel-tube-framework of the mid-section of the fuselage.

The elastically mounted main-wheels are located at the end of rockers, which in turn are supported by elastomer-dampened springs. The maximum spring-travel of the main-gear is approx. 6 inch / 150mm.

The main-wheel-brakes are hydraulically actuated and designed as dual-piston disk-brakes. The brakes are activated by operating the brake-lever at the control-stick. The main-brake-cylinder is located at the brake-lever. The expansion-reservoir is located at the left-hand brake-lever. To prevent the brakes from locking, the brake-circuit is equipped with an anti-lock-regulator which is mounted in the mid-section of the fuselage.

To lock the wheels for parking (hydraulic parking-brake), push in the locking-pin at the side of the left-hand brake-lever.
7.8 Seats and Safety-Belts

The seats are made of cushioned seat-pan, which are integrated into the cockpit-floor. Their positions are adjustable at the top and bottom (optional), so that they can be positioned ergonomically. The upper sections of each backrest are designed as head-rests.

Optionally, the backrest can also be adjusted at the bottom. The adjustment has to be done before flight by moving the backrest along the lower mounting rails. By pulling the adjusting rail left and right to the inside at the same time the backrest is unlocked and can be moved to the desired position. Pay attention to even move of left and right rail to avoid wedge of adjustment. After adjustment lock the rails in the nearest position.

Also, the slope of the backrest can be adjusted. This allows the backrest to be positioned by placing a small lever in one of several detents near the mounting of the seat-belts.

Every seat is equipped with a four-point-safety-harness and a central lock. The abdominal-belts are mounted at mounting-positions at the left and right sides of the seat-pan. The shoulder belts are mounted at the crossbar located above and behind the seatbacks.

Permitted safety-belts are documented in chapter 6.5 of this flight manual.

Attachment points for automatic parachutes are NOT provided. Due to this, only use parachutes that are operated by hand.
7.9 **Baggage-Compartment**

The baggage-compartment is located at the front of the tail-boom, just behind the connector-frame between the mid-section and rear section of the fuselage. A maximum payload of 44 lbs / 20 kg may be loaded into the compartment. It can be loaded through a forward-opening door at the top of the fuselage. The locks are engaged with quick-closing push-buttons at the rear of the door.

**Caution:** Do NOT place rigid or sharp objects in the baggage-compartment without strapping them down!
7.10 Canopy and Cockpit

7.10.1 Canopy

The canopy is made of plexiglas and framed by a thin canopy-frame made of CFC. This setup allows for good all-round-visibility. The canopy is hinged at the front of the cockpit and opens in a forward direction. A convenient entry is therefore possible. The opening of the canopy is supported by two gas-pressurized springs at the front. When on the ground, it is secured against being opened by gusts with a rebound-strap.

The canopy is locked with two ergonomically-located white levers, at the left and right side of the cockpit frame. At the rear it is also locked by a rear canopy-hook. (This so called „Roeger-hook“ hook is designed to hold the rear of the canopy down at the beginning of the canopy-jettison-procedure and causes it to rotate upwards and be torn away.)

**Warning:** For canopy-jettison, ONLY pull the canopy-jettison-handle. The rear canopy-hook („Roeger-hook“) MUST remain engaged.

**Caution:** Disconnect the rebound-strap of the canopy before T/O. In case of canopy-jettison, the rebound-strap might prevent the canopy from being torn away.

Locks for the side-windows can be ordered optionally. This prevents unauthorized personnel from having access to the aircraft.

**Caution:** The side-windows may NOT be locked during flight. In case of an emergency, this would make rescue attempts more difficult.
7.10.2 Entry

The method of entry varies individually and depends on the size and agility of the pilot.

The following procedure is a convenient and comfortable method of entering the aircraft:

- Stand with your back facing the cockpit.
- Place one hand on the leading-edge of the wing near the wing-root. Place the other hand on the cockpit frame.
- Raise yourself off the ground with both arms and jumping slightly upwards. Move to sit on the cockpit-frame at the lowest spot.
- Recover your balance and support yourself on the center console in the cockpit. Then move legs-first into the cockpit.

7.10.3 Cabin-Ventilation

The ventilation of the cabin occurs individually for each seat and the canopy. The air for the cabin-ventilation flows from the free-airflow beneath propeller-spinner into two air-inlets. From there it is lead into a centralized air-distribution-system, where the airflow splits to the separate vents.

The canopy-vents are located near the canopy-hinge. They are operated with a Bowden-cable installed at the center top of the instrument-panel.

Each seat for the pilot and copilot has one vent in the leg-room and two vents in the seating-area which supply the flight crew with fresh air. Ventilation can be controlled individually for each seat at the vents near the knees.

Operation of all vent-controls follows the same principal:

If the vent-control is fully PULLED rearward, the corresponding vent is fully OPEN. Otherwise, if the vent-control is fully PUSHED forward, the corresponding vents are fully CLOSED.

Additional ventilation can be obtained by opening the side-windows of the canopy.
7.11 Propulsion-System and Engine

### 7.11.1 Engine and General Information

The installed engine is a model ROTAX 914 F2:

- 4-cylinder 4-stroke Otto-engine in opposed-cylinder design including turbocharger with electronic manifold-air-pressure (MAP) control and integrated reduction-gear
- Liquid-cooled cylinder-heads and ram-air-cooled cylinders
- Electronic dual magneto-capacitor-ignition
- Two CD-carburetor, one on each engine-side
- Flanged reduction-gear and overload-clutch

The engine is mounted in the mid-section of the fuselage with the engine-suspension connecting it to the steel-tube-framework. There, the engine causes low noise-emissions for the cabin and the aircraft's surroundings.

**Specifications of the ROTAX 914 F2:**

- **Max. T/O-power (MTOP):** 113 HP / 84.5 kW at 5800 RPM (Takeoff RPM limited to 5600 RPM by const. speed propeller control)
- **Max. continuous power (MCP):** 98 HP / 73.4 kW at 5500 RPM
- **Engine-displacement:** 73.9 in³ / 1211 cm³
- **Transmission-ratio of engine-gear** i=2.428
- **Compression-ratio:** 9.0 : 1

**Fuel and fuel-consumption:**

- **Fuel to be used:** MOGAS (unleaded gasoline according to EN 228, min. ROZ 95)
  or AVGAS 100LL
- **Fuel Consumption at MCP (100%)** 7.0 US gal/h / 26.6 l/h
- **Fuel Consumption at 75% Power** 5.4 US gal/h / 20.4 l/h
- **Fuel Consumption at 55% Power** 3.4 US gal/h / 13 l/h
7.11.2 Propeller

The installed propeller is a model MTV 7-A / 170-51 with constant-speed-control-unit.

- Electrically-adjustable 3-Blade Constant-Speed Propeller, continuously adjustable from T/O-setting to glider-setting, electronic constant-speed control, control unit: P120-A (DB)
- Forged/milled hub made of light-alloys. Blasted and anodized surface-finish
- Blades made of wood-composites with a liner made of fiber-composites, edge-guard at the outer edges of the propeller made of stainless-steel, acrylic finish, coated with PU-film on the remaining surfaces
- Spinner with baseplate and commutator-ring or with commutator-ring and starter-disk

The propeller-pitch is continuously adjustable from the T/O-setting to the cruise-setting or glider-setting, depending on the mode of operation. A direct-current-motor is controlled by the automatic propeller-control-unit, which selects the corresponding propeller-pitch according to the power-setting and air-speed.

7.11.2.1 Propeller-Pitch-Control

The automatic propeller-control-unit P-120-A is operated with the control-elements located in the lower center area of the instrument-panel.

To adjust the control-unit use the two flip-switches and the rotary-switch. The left flip-switch can be set to the „AUTO“ and „MANU“ (manual) positions. At "MANU" the right flip-switch can be set to „HIGH RPM" and „FEATHER“. Select the propeller-RPM with the rotary-switch.
Illustration 7-4: Control-Elements for the Propeller-Control-Unit (Illustration by mt-Propeller)

The standard position of the left flip-switch is „AUTO“, for the right flip-switch it is „STOP“. The propeller-RPM set with the rotary-switch will be held constant during the flight.

If the left flip-switch is set to „MANU“ and the right flip-switch is set to „HIGH RPM“ (T/O-setting), then the propeller will remain in flat pitch. The green indication-light indicates that the propeller is in the T/O-setting (flattest pitch).

To change the propeller-pitch to the glide-setting, set the left flip-switch to „MANU“ and the right flip-switch to „FEATHER“. To leave the glide-position, set the left flip-switch to „MANU“ and then set the right flip-switch to „HIGH RPM“ (T/O-setting). The propeller reaches the final pitch after 90 s. After the propeller has moved out of the glide-setting (a green indication-light will go ON and the propeller starts to windmill) and after re-start of the engine, set the left flip-switch to „AUTO“ and the right flip-switch to „STOP“. Now select the desired propeller-RPM with the rotary-switch.

The installed control-unit will perform a self-test once it is supplied with electric power from the electrical-system. The unit can be used once the yellow and green indication-lights FLASH for several seconds.

If the yellow indication-light flashes during operation, or other indications of malfunctions are given, follow the procedures of section 3.12.1.18 and contact the manufacturer.
**Warning:** Before rotating the propeller by hand (for example to pump oil through the engine before a cold-start), REMOVE the ignition-key and set the master-switch to OFF!

**Warning:** Do NOT turn the propeller against its regular direction of motion!

**Caution:** Avoid high propeller-RPM on the ground. This could lead to stone-chippings on the propeller-blades. Due to this, perform engine-runs only on appropriate surfaces.

Also always follow the procedures described in chapters 3 and 4.

### 7.11.3 Operation of the Engine

#### 7.11.3.1 Throttle

The throttle is located on the center console between the seats. It is equipped with a forward detent for 100% power (maximum continuous power, MCP) and a forward stop for 115% power (maximum take-off power, MTOP). A spring pulls the throttle into the „FULL POWER“ position.

**Warning:** The maximum take-off power of 115% must not be used for more than 5 minutes. Otherwise, the engine may be damaged!


**Caution:**  The throttle settings of 100% and 115% power can be set without looking at the throttle. 100% power is set once the first detent is reached. To set 115% power, the throttle needs to be pushed past the first detent and against the forward stop.

### 7.11.3.2 Choke

Operate the choke of the two carburetors with the black lever on the center console, to the left of the throttle lever. At the carburetors a spring pulls the bowden cable to the CHOKE CLOSED position.

For adjustment the choke lever can be set continuously to the required position between CHOKE ON (lever rearward) and CHOKE OFF (lever forward).

A preset clamping avoids unintended displacement of choke setting.

When operating the choke, the combustion-mixture is enriched in the starter-carburetor with additional fuel. This is needed for a cold-start of the engine. The starter-carburetor is only operational if the throttle is set to IDLE.

**Caution:** Only use the choke briefly when performing a cold-start. Before T/O it must be set to the CLOSED position again.

**Note:** During the daily-check, check to see if the starter-carburetor reaches the stop-position. Also check the operation of the butterfly-valve on the carburetor.

### 7.11.4 Turbo-Charger and Control-System

The ROTAX 914 F2 engine is equipped with a turbo-charger. It uses the energy of the exhaust-gas-stream to increase the manifold-air-pressure (MAP). The air-pressure in the air-box is set with the waste-gate of the turbo-charger-turbine. The turbo-charger-turbine is controlled by the turbo-control-unit (TCU). The target-MAP is determined by the setting of the butterfly-valve on the carburetor.

The induction of the air is performed through a NACA-inlet on the lower engine-cowling.
The inducted air is compressed (and warmed to some extent) in the turbocharger. Therefore, a carburator-heat-system is not necessary because ice will not form in any flight-conditions.

**Warning:** Just before reaching the setting for take-off-power (between 108% and 110% power), the target-MAP will rise in a step. Setting the engine-power precisely is not possible anymore. Instead, periodic oscillations of the control-unit and the engine-RPM might occur. Avoid the range between 100% - 115% engine-power and move through it quickly, when the throttle is set.

To avoid damage to the engine, the MAP is reduced when the engine-RPM is too high or when the inducted air is too warm.

To monitor the turbo-control-unit, use the red MAP-warning-light and the yellow TCU-caution-light. When turning ON the electrical system, both lights will go ON for approx. 1 to 2 sec. during a self-test.

**Caution:** If the self-test fails, do not start the engine!

**Yellow TCU-Caution-Light**

<table>
<thead>
<tr>
<th>Status</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>TCU is operational</td>
</tr>
<tr>
<td>FLASHING</td>
<td>TCU is NOT operational, for procedures see chapter 3 „Emergency Procedures“</td>
</tr>
</tbody>
</table>
Red MAP-Warning-Light

**OFF**  Engine is operated within allowed limits

**ON**  Operation above maximum-MAP, for procedures see chapter 3 „Emergency Procedures“

**FLASHING**  Take-off-Power has been set for more than 5 minutes, for procedures see chapter 3 „Emergency Procedures“

| Caution: | If the red MAP-warning-light is ON, IMMEDIATELY reduce power! |

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### 7.11.5 Fire-Warning

The engine compartment of the STEMME S6 is equipped with a fire detecting system which in case of an engine fire gives a clear warning signal by a red warning light in combination with an acoustic alarm signal.

For fire detection 2 thermal sensors are mounted on the outside of the engine fire wall above the carburetors and another 2 sensors are mounted on the left and right containment of the fire wall outlet and exhaust shaft.

The system is designed fail-safe, that means a possible cable break to the sensors causes a fire-warning signal.

**Red Fire-Warning light (Push-button)**

- **Function**: In case of thermal sensors activation a fire-warning occurs by permanent red light and acoustic alarm signal
- **Test**: Push the fire-warning button to check function, with pushing the button the red light and the acoustic alarm signal has to work
7.11.6 Engine-Cooling-System

The heat dissipation of the liquid-cooling-system for the cylinder-heads occurs in a aluminum-gill-radiator. An oil-cooler for the lubrication-circuit is placed below the aluminum-gill-radiator. Both coolers are placed below the engine and are supplied with ram-air from the central NACA-inlet between the main-landing-gear-legs on the bottom of the fuselage.

The ram-air for cooling the cylinders is inducted through an inlet which is located to the right of the water-cooler. It then is lead through a hose and an air-distributor made of glass-fiber-composites (GFC) to the cylinders.

The used cooling-air is discharged through two outlets. The first is an adjustable gill-outlet on the lower side of the fuselage, whereas the second is the outlet of the exhaust-gas-system on top of the fuselage between the wings.

Depending on the value of the operating-temperature of the engine, the position of the gill-outlet and of the cowl-flaps can be adjusted with a bowden-cable.

Operation of the cowl-flaps:

The cowl-flaps of the inlets and outlets are manually operated with a self-locking black T-handle at the center-console below the instrument-panel.

If the handle is positioned fully forward this causes the cowl-flaps to be fully OPEN. When pulling on the handle, the flaps can be closed up to a minimum position. To pull the cowl-flap-handle, it needs to be unlocked by pushing an unlock-button. Lock the cowl-flap-handle in the desired position by simply releasing the unlock-button.

If the engine is cold or when in the glider-configuration (engine not running), keep the inlets and outlets closed. This minimizes the warm-up-time for the running engine or reduces the aerodynamic drag in the glider-configuration.

**Note:** The cooling-system is very powerful. Because of this, it needs to be regulated in all phases of the flight (T/O, cruise, and others)!
Information about the Liquid-Cooling-System:
The following illustration shows the schematics of the liquid-cooling-system:

Illustration 7-5: Schematics of the Liquid-Cooling-System
(Illustration by ROTAX)

1. **Expansion-Tank**
The expansion-tank (1) is located at the top of the engine. It has a overpressure-valve and breather-valve which lead to the overflow-bottle (4). The coolant level in the expansion-tank has to be checked with every Daily Inspection and refilled up to max. amount (up to top of tank) if necessary.

2. **Radiator**
The radiator (2) is located at the bottom of the central steel-tube-framework. It is supplied with ram-air through the lower center NACA-cooling-inlet.

3. **Filling-Hole**
The filling-hole (3) for the expansion-tank (1) is located on top of the expansion-tank (1). It is covered with a lid which closes the hole in a pressure-resistant manner. This is where the cooling-system is filled and refilled if necessary.

4. **Overflow-Bottle**
The overflow-bottle (4) is located at the left side behind the engine, near the rear engine-suspension. It is designed as a fluid-buffer when the coolant expands. The coolant level at the overflow-bottle (4) is checked before every flight. If necessary, refill coolant until coolant-level at overflow-bottle is between „min. “ and „max. “ again.
The coolant-circuit is a closed system. A camshaft-driven water-pump circulates the coolant through the system. To allow coolant to escape into the overflow-bottle when warming up, an overpressure-valve is installed. When the coolant contracts again during the cool-down-phase, coolant is sucked into the circuit again. Air is automatically bled from the circuit.

**Caution:** Do NOT open the lid of the expansion-tank if the engine is warm. The engine-cooling-system is pressurized! There is a severe risk of being burnt by boiling splash-water!

**Caution:** When refilling coolant in the overflow-reservoir and tightening the cap afterwards make sure that the plugged vent hose remains untwisted.

**Note:** The system has an overpressure-valve. Because of this, coolant needed in the overflow-bottle (4) can NOT be refilled at the expansion-tank (1).
7.11.7 Lubrication-System

The ROTAX 914 F2 is lubricated by a pressurized dry-sump lubrication-system. Its main-oil-pump has an integrated pressure-control-mechanism. Additionally, a suction-pump is installed. Both oil-pumps are driven by the camshaft.

Illustration 7-6: Schematics of the Engine’s Lubrication-System
(Illustration by ROTAX)

1. Oil-tank with filler-neck and integrated dip-stick
2. Oil-cooler (located below the radiator)
3. Oil-pipe for the turbo-charger
4. Return-pipe for the turbo-charger
5. Breather-pipe

The main-oil-pump transports the oil from the oil-tank through separate oil-cooler and oil-filter to the lubricating-points. Escaping oil is returned through the crank-case.

The turbo-charger is supplied through a separate oil-pipe by the main-oil-pump. There, the oil is suctioned by a separate pump and returned directly to the oil-tank.

At the flange of the oil-pump, a temperature-sensor is installed, which measures the oil-intake-temperature. A dipstick allows the amount of oil to be measured.
Caution: Before checking the amount of oil, rotate the propeller by hand in the standard direction-of-rotation. Rotate it until you hear a „flushing“ sound. This is to assure that the oil has been moved from the sump of the engine back to the oil-tank.

7.11.8 Load-Transmission and Transmissions

7.11.8.1 Front-Drive

The RPM of the long-shaft is reduced to the propeller-RPM with the front-drive, which is located in the nose of the A/C. The drive-shaft of the front-drive is screwed to the propeller-hub. The drive is a belt-drive (model: STEMME 050.251), which is encased in cast-magnesium. The gear-belt-discs are made of aluminum and have a transmission-ratio of i = 1.100.

The drive-suspension is screwed onto the load-transmission-frame (drive-frame) with elastomer-elements. It transmits the propeller-thrust into the aircraft’s structure with low vibration.

Note: Check the gear-belt of the drive according to section 4.5 „Daily Check“ and according to the maintenance-manual.
7.11.8.2 Long-Shaft

The power-transmission between the engine and the front-drive is realized with a long-shaft made of carbon-fiber-composites (CFC). It runs from the front-end of the fuselage through a tunnel in the center-console to the output-gear of the engine. The engine-shaft-flange is connected to the long-shaft with a spline-shaft-connector, which allows for axial motion of the long-shaft. A flexible-disk on each side of the long-shaft compensates angle-errors and angular motion. In case of a failure of the long-shaft, it is contained in a protective tunnel made of aramid-fiber-composites. This contains the shaft and sharp fragments in case of shaft-rupture. The following illustration shows the concept of the load-transmission.

**Illustration 7-7: Concept of the Power-Transmission-System**

1. mt-Constant-Speed-Propeller
2. Front-Drive STEMME 050.251
3. Flexible-Disks
4. Long-Shaft made of CFC
5. ROTAX-Engine
7.12 Fuel-System

7.12.1 Design of the Fuel-System

The main-tank is the integral-tank in the front area of the right wing. It has a fuel-capacity of 17.2 US gal / 65 l, of which 2.1 US gal / 8 l are designed as a separate feeder-compartment.

Contaminated fuel (water, particles and similar) can be drained through the sumps of each compartment of the right tank. These drain-valves are located at the bottom of the right wing.

The fuel is moved from the main-compartment to the feeder-compartment by a continuously-running pump. If the feeder-compartment is completely filled, then the fuel flows back to the main-compartment through an opening in the divider.

The amount of fuel in the feeder-compartment is monitored by the low-fuel-caution-light.

The feeder-compartment supplies the engine with fuel. A coarse-filter and fine-filter are integrated into the feeder-pipe to the engine.

Both, the feeder-pipe and the return-pipe, are connected with the fuel-system (which is installed in the fuselage) through quick-connectors.

The fuel flows from the quick-connectors to the fuel-pumps (main-fuel-pump and auxiliary-fuel-pump). From there, it continues to the fuel-shut-off-valve in the cockpit and then to the pressure-regulator in front of the carburetors.

A return-pipe leads from the pressure-regulator through a quick-connector back to the feeder-compartment.

Optionally, an additional integral-tank can be installed in the left inner-wing. This is designed as a completely external tank. Contaminated fuel (water, particles and similar) can be drained through the sumps of the left tank. These drain-valves are located at the bottom of the left wing.

The tank’s maximum fuel-capacity of 17.2 US gal / 65 l can be moved to the main-tank with a transfer-pump.

The transfer of fuel is automatically regulated. This automatic regulator can be activated and de-activated by the pilot with the switch "Transfer-pump". This transfer begins if the main-tank is filled to less than 2/3 - 3/4 of its capacity or the main-tank is filled below the reaction point of the fuel-sensor. It ends once the amount of fuel in the main-tank has reached approx. 2/3 - 3/4 of its capacity again. Monitor the operation of the system with the fuel-gauge for the main-tank.
Caution: Keep the aircraft leveled during fueling! Also, do NOT fill the tanks to the top-edge in warm weather-conditions (keep in mind the thermal-expansion of the fuel). Else fuel might leak through the fuel-tank-vents.

The fuel-tank-vents end at the wing-joints between the inner-wing and outer-wings. The fuel-filler-necks are located at the upper outer side of the inner-wings.

7.12.2 Control-Elements and Gauges in the Cockpit

The following control-elements and gauges are located in the cockpit:

- **Fuel-Shut-Off-Valve**
  on the rear center-console near the head of the pilot, separates the engine from the fuel-supply

- **Fuel-Transfer-Pump-Switch**
  at the switch-panel of the instrument-panel, settings „ON“ and „OFF“

- **Low-Fuel-Caution-Light (yellow)**
  Indication-light for remaining fuel less than 1.3-1.9 US gal / 5-7 l in feeder-compartment

- **Indication-Light of Auxiliary-Fuel-Pump (green)**
  Status-indicator, is goes ON if the auxiliary-fuel-pump(s) are running

- **Fuel-Gauge right and left (optional)**
  On the instrument-panel, shows the amount of fuel in the left and right integral-tanks

- **Fuel-Flow-Gauge (optional)**
  On the instrument-panel, shows the current fuel-flow to the engine

7.12.3 Circuit-Logic and Operation of the Fuel-Pumps

During normal operations, only the **main-fuel-pump** and the **fuel-circulation-pump** for the feeder compartment of the right tank are running. The auxiliary-fuel-pump is not running in this case. They are supplied by the electric circuit of the internal-generator (internal-generator or main-battery). To operate the pumps, the master-switch and the engine-bus must be turned ON.

If the Aux.-Pump-switch is ON, for example during T/O and landing, then the **auxiliary-fuel-pump** is also running.
If the optional left fuel-tank is installed, then fuel can be moved from the left auxiliary-tank to the right main-tank by operating the fuel-transfer-pump.

Operation of the fuel-transfer-pump is monitored by the amount of fuel in the right tank (automatic fuel-transfer):

- If the amount of fuel in the right tank is more than 2/3 - 3/4 of its maximum capacity and is above the low-fuel-warning, then no fuel is transferred. This prevents the right tank from becoming overfilled.

- If the amount of fuel in the right is below 2/3 - 3/4 of its maximum capacity or below the level, the fuel-sensor could sense, the transfer of fuel begins automatically if this is activated.

The transfer of fuel can be interrupted at any time by hand (independent of the amount of fuel in the right tank) by operating the fuel-transfer-pump-switch.

7.12.4 Measurement of the Amount of Fuel

The amount of fuel in each tank is measured with capacitive sensors. This data is then displayed on one fuel-gauge for each installed tank, mounted on the instrument-panel.

An additional optical sensor is mounted in the feeder-compartment. It signals, that less than approx. 1.3-1.9 US gal / 5-7 l of fuel remain in the feeder compartment.
7.13 Electrical-System

7.13.1 Power-Supply and Battery-System

The rated-voltage of the electrical-system is 12V.

The starter-battery is designed as a maintenance-free lead-battery with AGM-technology. The required minimum-capacity is 16Ah. The battery-mounting is located in the rear area of the engine-compartment, outside of the fire-wall.

If the engine is running, the electrical system is supplied by a 600W-alternator. This alternator is flanged to the engine and is driven by a V-belt. An additional generator is integrated into the engine and only supplies the main-fuel-pump and the TCU.

The electrical-circuits of all electric consumers are protected by fuses or circuit-breakers.

7.13.2 Ignition-System

The ROTAX 914 F2 engine is equipped with a dual non-contacting capacitor-ignition-system. This ignition system is supplied by an integrated generator. The ignition-system is maintenance-free and requires no external power-supply.

Two independent charging-coils are mounted on the crankshaft-case. Each coil supplies one of the two independent ignition-circuits. The electrical energy is stored in the capacitors of the electronics-modules. At the ignition-point, 2 of the 4 external probes discharge the capacitors through the primary-coils of the dual-ignition-transformers. The order of ignition is: 1-4-2-3.

7.13.3 Electrical Circuits

The electrical-system is divided into 4 main-electrical-circuits. They are supplied by 4 busses:

*Main-Bus:* supplies all consumers needed with a running or non-running engine (powered-configuration or glider-configuration). It is turned ON with the master-switch-level „Main“. The main-bus is made up of the circuit-breakers A1 – A3 and A11 – A-14 (see ill. 7-2) as well as by the fuses S3 – S7 (see ill. 7-3).

*Engine-Bus:* supplies all consumers only required in the powered-configuration. The engine-bus is connected to the main-bus with a relay. It is turned ON with the master-switch-level „Engine“. Turning OFF the engine-bus in the glider-configuration drains less energy from the battery. The engine-bus is designed as a distribution-box with fuses and is located behind the right side of the instrument-panel.
Avionics-Bus: supplies all avionics and is connected to the main-bus with the „Avionics“-isolation-switch. The avionics-bus is made up of the circuit-breakers A4 – A10 (III. 7-2).

Internal-Generator-Bus: supplies the TCU and the main-fuel-pump independently from the remaining electrical system. The internal-generator-bus is designed as a distribution-box with fuses and is located on the control-board in the engine-compartment (at the rear of the fire-wall).

7.13.4 Electrical Consumers and Circuit-Breaker-System

<table>
<thead>
<tr>
<th>Circuit</th>
<th>Circuit-Breaker (A)</th>
<th>Fuse (A)</th>
<th>Isolation-Switch (A)</th>
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<td>Master-Circuit-Breaker</td>
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<tr>
<td>Circuit-Breaker for the Alternator</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Stall-Warning</td>
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<td></td>
</tr>
<tr>
<td>Electrical Trim</td>
<td>5</td>
<td></td>
<td></td>
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<tr>
<td>Propeller-Pitch-Control</td>
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<tr>
<td>Voltmeter</td>
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</tr>
<tr>
<td>External-Alternator</td>
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<tr>
<td>Instrument-Lighting</td>
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</tr>
<tr>
<td>Anti-Collision-Light</td>
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<td>Landing-Light</td>
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<td>Avionics-Isolation-Switch</td>
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<tr>
<td>Fire-Warning</td>
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</table>

Engine-Bus

<table>
<thead>
<tr>
<th>Circuit</th>
<th></th>
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<tbody>
<tr>
<td>External-Alternator-Warning-Light</td>
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<tr>
<td>Starter-Relay</td>
<td>3</td>
</tr>
<tr>
<td>Oil-Press. / CHT L</td>
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</tr>
<tr>
<td>Oil-Temp. / CHT R</td>
<td>1</td>
</tr>
<tr>
<td>Low-Fuel-Caution-Light</td>
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</tr>
<tr>
<td>Cons. int. Generator</td>
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<tr>
<td>---------------------</td>
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<tr>
<td>Fuel-Pressure-Difference-Gauge</td>
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<td>Tachometer</td>
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<tr>
<td>Ignition-Delay</td>
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<tr>
<td>Fuel-Flow-Gauge</td>
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<td>Fuel-Gauge L</td>
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<tr>
<td>Fuel-Gauge R</td>
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<tr>
<td>Fuel-Transfer-Pump</td>
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<tr>
<td>Auxiliary-Fuel-Pump</td>
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</tbody>
</table>

**Avionics-Bus**

The ratings of the circuit-breakers used depend on the information given by the manufacturers of the installed equipment.

<table>
<thead>
<tr>
<th>Internal-Generator-Bus</th>
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<tbody>
<tr>
<td>Main-Fuel-Pump</td>
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<tr>
<td>Fuel-Circulation-Pump</td>
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<tr>
<td>Feed-In</td>
<td>15</td>
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<tr>
<td>Internal-Generator-Caution-Light</td>
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</tr>
<tr>
<td>TCU</td>
<td>3</td>
</tr>
</tbody>
</table>

### 7.13.5 Control-Elements

In the following section, the different settings of important control-elements of the electrical-system are explained (also see the section about instrument-panel-layout).

**Master-Switch:** Separates all power-sources from the main-bus

**Subordinated Switches:**

**Engine-Master-Switch:** Turns ON or OFF all electrical devices needed for engine-operation (starter, propeller-pitch-control, engine-instruments and similar) by connecting them to the battery or external-alternator. This switch is mechanically coupled to the „Batt“-Master-Switch. To turn ON the engine-bus with the „Gen“-master-switch,
the „Batt“-master-switch also needs to be turned ON. To turn OFF the „Batt“-master-switch, the engine-bus also needs to be turned OFF. This makes certain, that the external-alternator is only turned ON, when the battery is also turned ON.

**Ignition-Switch:** The key-switch can be set to „OFF“, „RIGHT“, „LEFT“ and „BOTH“. It operates the ignition-circuits and the electrical engine-starter.

**TCU-Isolation-Switch:** This switch separates the waste-gate-actuator from the turbo-control-unit when necessary. The switch is protected against accidental activation because it only needs to be operated in the event of a TCU-malfunction. The normal operating position is the DOWN (protected) setting. To disconnect the actuator, set the switch to the UP position.

**Avionics-Master-Switch:** activates the avionics-bus. It is designed as a 20A-circuit-breaker.

**Auxiliary-Fuel-Pump(s):** The auxiliary-fuel-pump is turned ON and OFF with this switch when needed. The aux.-fuel-pump runs at the same time as the main-fuel-pump. If the switch is set to ON, then the green indication-light on the annunciator-panel will go ON.

**Fuel-Transfer-Pump:** activates the automatic control for fuel transfer from the left wing-tank (when installed) to the right wing (=automatic fuel-transfer) (see section about the fuel-system).

**Propeller-Pitch-Control:** Rotary-switch for adjusting the propeller’s pitch (see section about the propeller)

**Fire-Warning** Warning light with push-button for alarm indication of fire in the engine compartment by red light and acoustic alarm signal, push to check function (see section 7.11.5)

### 7.13.6 Gauges and Indicator-Lights

**Voltmeter** indicates the voltage at the main-bus

**Ampèremeter** indicates the electric-current drawn from the battery (discharge) or flowing into the battery (charge)

**Internal-Generator-Caution-Light (yellow)** The yellow light goes ON if the output-voltage of the generator-controller is below the battery-voltage (failure of the controller or the generator).

**External-Alternator-Warning-Light (red)** The red light goes ON if the output-voltage of the belt-driven external-alternator falls below the battery-voltage (failure of the external-alternator).
7.14 Static-Pressure- and Dynamic-Pressure-System

A tubular probe measures the total-pressure, static-pressure and total-energy-compensated-pressure (TEC-pressure). It is located at the left wing-joint between the inner-wing and outer-wing. The pressure-sensing-lines lead to the center of the wing. There, they need to be connected to the adapters of the mid-section of the fuselage. From there, the lines are lead to the rear side of the instrument-panel.

All tubes of the pressure-system in the forward area of the cockpit are equipped with filters against moisture and dust.

The assignment of the pressure-ports of different instruments (standard instruments and optional instruments) to the pressure-system can be taken from the maintenance manual.
7.15 Stall-Warning

If the air-speed drops to less than 1.1 times the stall-speed at any flap-setting, then stall-horn will sound. The horn is installed in the instrument-panel. The stall-warning-system is designed as a small wind-vane with a trigger-switch. It is mounted at the leading-edge of the left wing, near the wing-joint.
Chapter 8 – Handling, Servicing and Maintenance

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8.1 Introduction

This section describes procedures recommended for the correct handling of the motorglider on the ground as well as for the servicing of the motorglider. Certain check-regulations and maintenance-regulations are mentioned. They need to be observed if the motorglider is to retain the performance and reliability of a new aircraft.

Additional information is given in the maintenance-manual.

| Caution | Keep to the lubrication-chart in the maintenance-manual. Depending on the climatic-conditions and operating-conditions, preventive maintenance needs to be done. If the operating-conditions are very unfavorable, the maintenance-intervals need to be reduced. |
8.2 Maintenance-Intervals of the Motorglider

More detailed information about the maintenance and checklists is given in the maintenance-manual of the STEMME S6 (STEMME Doc.-No.: P500-006.000).

One-time-maintenance needs to be done after the first 25h of operation for a new aircraft and for a new or remanufactured engine. Afterwards, observe the following maintenance-intervals:

- **Structure** (see maintenance-manual STEMME S6):
  lowest interval: 100 h

- **Engine** (see maintenance-manual STEMME S6):
  lowest interval: 50 h

To retain the airworthiness of the A/C, an ANNUAL check (see maintenance-manual S6) must be performed at least once per year. This is independent of the operating-hours of the A/C.

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**Caution:** Unscheduled maintenance is necessary after: hard landings, abrupt stop of the engine or propeller, engine-fire, lightning-strike and other malfunctions or damage.

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**Caution:** When running the engine with AVGAS, the necessary interval for oil-changes is reduced to 50h.
8.3 Changes or Repairs

Changes
Changes which may affect the airworthiness of the certified aircraft-model need to be authorized by the appropriate authorities. A statement from the manufacturer must be obtained. This is to ensure the continuing airworthiness of the motorglider. Changes to the approved sections of the Flight Crew Operation Manual or the maintenance-manual need to be approved by the appropriate aviation authorities.

Repairs
Repairs of the aircraft must only be conducted with generally accepted maintenance-procedures or specially developed maintenance-procedures by authorized personnel.

If the „Daily Check“ reveals minor damage – which do not affect the airworthiness of the aircraft – they may be repaired directly. If the importance of detected damage is not directly obvious, a knowledgeable person in the area of fiber-composite-structures needs to be consulted.

Warning: Repairs or changes to the surfaces of any control-surface might influence the airworthiness. This is the case if the control-surface-masses and remaining-moment (see maintenance-manual) are not within the required limits.
8.4 Ground-Handling and Road-Transport

8.4.1 Taxiing and Towing on the Ground

When towing the motorglider behind a car, a person must be seated at the pilot's seat. Otherwise, the front-wheel-steering will not be engaged. Only drive with walking-speed. Do not make tight turns. This prevents unnecessary loads on the landing gear and collisions with the propeller.

It is recommended to connect the tow-bar in an area of the nose-gear which is not covered with fairings. To rotate the A/C on the spot, press the rear fuselage-section downwards to lift-up the nose-gear.

- Moving rearwards: Steer the airplane at the vertical stabilizer and only push at the inner-wing.

**Caution:** Do NOT lift or push on the control-surfaces or flaps.

8.4.2 Parking

- For parking, lock the hand-brake-lever with the locking-pin or place chocks at the wheels.
- Align against the wind, set flaps to „NEUTRAL“
- When parking the motorglider for a longer time outside or when the weather-developments are uncertain, strap-down the aircraft. (Hangaring it is an even better option). Remove the pitot-tube and pressure-probe and store them in the cockpit. Cover the exhaust-gas-opening of the upper cowling.
- It is recommended to hangar the aircraft.

**Caution:** Avoid parking the aircraft with a bank-angle. (Keep the wings horizontal). Else, fuel might leak from the fuel-tank-vents.
8.4.3 Storage/Hangaring

The motorglider should only be parked or stored in well-ventilated rooms. Closed and weather-proof transport-trailers need to be equipped with adequate ventilation-openings. Keep in mind, that the motorglider and its components should be stored in a tension-free manner.

- Unlock air-brakes (to relax the air-brake-control-rods)
- Release wheel-brake and secure A/C with chocks (do this when hangaring or when parking for a longer period of time)
- Use of dust-covers, if possible.

8.4.4 Road-Transport

Road-transport of the motorglider can be conducted on open or closed trailers. Derig the motorglider (remove outer-wings, inner-wing, horizontal stabilizer and loose items) before transporting it.

Only use broad belts for strapping-down and securing the motorglider. Place carpet, felt or foamed rubber on all areas of contact.

Preparations for road-transport

Fuselage:

- Park the fuselage safely on the main-gears and nose-gear.
- Secure the fuselage against shifting or rolling by strapping it down with belts. Cushion the areas of contact between A/C and belts well.
- Keep space clear for the propeller.
- Do not transport loose items (head-sets, parachutes or similar) in the cockpit. Lock seat-belts.

Wings:

- Drain all fuel and store it in containers which are approved for road-transport.
- Special care needs to be taken when storing the inner-wing. It is very heavy.
- There are two possibilities for storing the inner-wing for transport. The first method is to place it on the leading edge. Here, it needs to be placed on the large, cushioned areas of contact which match the contours of the leading edge. The other method is to lay the wing down flat. In this case, the inner-wing needs to be supported at each outer edge with a large, cushioned area of contact. The mid-section of the inner-wing (Connection between wing and fuselage) may NOT touch the ground.
The outer-wings should be transported standing on their leading-edges. Use the method previously described for the inner wing. Make sure each outer-wing is placed on two large, cushioned areas of contact.

- All parts must be secured against shifting and rotation.

**Caution:** Do NOT strap the aircraft-components down with belts over control-surfaces, flaps or brackets.

**Horizontal Stabilizer:**

- It is recommended to store the horizontal stabilizer in a molding, standing on its leading edge or laying down flat.

- All molding should be cushioned (use carpet, felt or similar). This protects the surface and distributes the loads better.

The road-transport is conducted according to the requirements of the transport-trailer and used truck.
8.5 Cleaning and Care

Even though the surfaces of composite-aircraft are robust and tough, they should be cared for. Keep the following information about the cleaning and care of the A/C in mind (see the maintenance-manual of the S6 for additional information):

If the motorglider will be operated year-round, then it must be cared in such a manner that no rust will form on the connecting elements of the fuselage, wings and horizontal stabilizer.

**Warning:** All structural components made of fiber-composites should have a white surface. (Exceptions are areas for the registration-number and for caution-marks.) Very dark colors can cause the surface to warm up to critical temperatures. An unnoticed loss of structural integrity might result.

**Caution:** Strong contamination of the surfaces will reduce flight performance and will cause light surfaces to heat up when exposed to sunlight.

8.5.1 Finished Surfaces

The entire surface of the motorglider is finished with a weather-resistant white two-component-finish. However, the aircraft should still be protected from moisture. It should also not be exposed to direct sunlight (heat) and continuous UV-light for longer than necessary.

- Remove water which has reached the interior of components by storing the components dryly and rotating them several times.
- Clean and wash the surfaces regularly with clear water, a sponge and a leather-rag. Give special attention to the leading edges of the wings and stabilizers. To remove bugs and dirt (which may caused by the propeller), the use of a bug-sponge is recommended.
Keep the static-pressure-ports and dynamic-pressure-ports free of dirt and water. Check regularly.

Use commercial rinsing-agents or soap-suds only rarely to remove tough dirt.

Benzines and alcohols may be used briefly (for example to remove contamination at the exhaust-gas-outlet). NEVER use chlorinated hydrocarbons (tri-, tetra, per- or similar)!

For finish-care and conservation, use silicone-free polishes without abrasives.

Polishing:

- Clean the surface with fresh water and a sponge. Let it dry afterwards.
- Spread a small amount of polish of the type „Rapid Grade G6“ and fresh water onto the surface. Afterwards buff the surface with a grind-applicator of the type „G-Mop M14“ at approx. 1500 RPM.
- After removing the scatches caused by the sandpaper and the grind-applicator, clean the surface with fresh water. The continue the process with polish of the type „Regular Grade G3“.
- To reach the highest-quality finish (optional), clean the surface and grind-applicator again with fresh water. The continue the process with polish of the type „Extra Fine Grade G10“.
- Clean the surface with fresh water, a sponge and a bit of acetone (if necessary). Afterwards, let it dry.

After polishing, the surface must not be dull. Otherwise, the polishing-process must be repeated again.

8.5.2 Canopy

- To wash the canopy, use a soft, clean and scratch-free sponge or rag.
- Clean the cabin-canopy with plexiglass-cleaners, if available. Else use clear water. To dry, use a clean leather-rag. Never rub on dry plexiglas!
- To remove small scratches, special plexiglas-polishes are available. Never use solvents!
- Interior and exterior surfaces of the canopy should be treated in the same manner.
8.5.3 Propeller

Damage to the propeller and operational malfunctions need to be inspected by a knowledgeable person.

- The surface (PU-finish and acrylic-finish) can be cleaned using commercial cleaning-agents and preserving-agents intended for cars.
- Prevent moisture from reaching the wooden core. When in doubt, let the propeller be inspected by an examiner.
- For additional information, see "operating-instructions and installation-instructions" ATA 61-01-18 (E-118) by mt-Propeller (the manufacturer).

8.5.4 Engine

The cleaning of the engine is performed during regular maintenance, according to the directions of the manufacturer’s (ROTAX) maintenance-manual. ("Maintenance-Manual (Line-Maintenance) for ROTAX engine model 914 Series")

8.5.5 Interior, Seats and Fairings

Dirt in the interior, when possible, should be removed using a vacuum-cleaner. Loose or lost items should be removed or stored in an appropriate manner.

- Clean composite-surfaces with a lint-free and slightly moistened rag.
- The instruments should be cleaned with with a dry, soft and scratch-free rag.
8.6 Trouble-Shooting of the Engine

**Warning:** Maintenance and servicing must only be performed by qualified technicians who have received specific training for this engine-model. If the following procedures are not successful, contact an authorized business. The engine must NOT be operated again until the malfunction is fixed!

**Engine will not start:**

**Possible cause:**
- fuel-shut-off-valve closed?
- no fuel?
- starter-RPM too low?
- starter-RPM too low, problems when performing cold-start?

**Troubleshooting:**
- OPEN fuel-shut-off-valve
- REFUEL A/C
- CHECK battery.
- USE fuel-efficient-engine-oil of high quality, hot E-starter will lose power quickly, let it COOL DOWN for a sufficient period. Pre-heat the engine.

**Engine runs rough after having warmed up, exhaust-gas is sooty:**
- choke open

**Troubleshooting:**
- CLOSE choke, check pull-button.

**Oil-pressure to low:**
- not enough oil in oil-tank

**Troubleshooting:**
- CHECK amount of oil. REFILL, if needed.

**Engine is dieseling:**
- engine too hot

**Troubleshooting:**
- let engine COOL DOWN with approx. 2200 RPM.

**Engine knocks when loaded:**
- wrong type of fuel

**Troubleshooting:**
- USE fuel with higher knock-resistance (higher octane-number).
Difficulties in cold weather:

- idle-RPM too low: PRE-HEAT engine
- battery-power too low: INSTALL fully-charged battery, PERFORM jump-start.
- high oil-pressure: When performing a cold-start oil-pressure up to 102 psi / 7 bar is not an indication of engine-problems. If necessary, perform oil-change.
- oil-pressure too low after cold-start: Viscosity of oil too high at oil-suction-pipe. TURN OFF engine and PRE-HEAT oil.
Chapter 9 – Supplements

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9.2 List of Supplemental and Alternative Equipment .........................................................9-3
9.1 Introduction

This section gives supplemental information about supplemental or alternative equipment installed in the motorglider, which has not been covered in the previous text of the Flight Manual (chapters 1 through 8). This information is also needed for a safe operation of the A/C. Pilots are provided with all information and instructions necessary for safe and efficient operation of the motorglider.

The supplements added in this section refer to the installed components. It must only be included the supplements according to the aircraft configuration.

The installation of supplemental or alternative equipment or accessories is based on a service bulletin (SB) if equipment is not already installed at delivery. The necessary supplemental information is provided in the form of Flight Manual Supplements. These inserts are shipped together with the parts-kit for later installation. The inserts should be placed behind the cover sheet of section 9.2.

The compliance with every SB with effect to the Flight Manual must be certified by an examiner on the SB/AD-compliance-record in the aircraft's logbook before the next flight. This certification also includes an examination of the Flight Manual.
9.2 List of Supplemental and Alternative Equipment

The following list contains all approved supplements that in the case of installation of equipment and systems in addition or as an alternative to the standard configuration are valid. These supplements contain additional information and instructions on the content of the basic Flight Manual (chapters 1 through 8) or replace them if necessary.

The currently installed supplemental or alternative equipment of the motorglider has to be marked in the table below with date and check-note. This applies to alternative equipment already installed at delivery as well as for equipment later installed.

This directory serves as a table of contents for chapter 9.

<table>
<thead>
<tr>
<th>Supplements Stemme TSA-M, variant S6</th>
<th>Serial-No.: ..........</th>
<th>Registration: ..........</th>
</tr>
</thead>
<tbody>
<tr>
<td>No.</td>
<td>Title</td>
<td>Pages</td>
</tr>
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<td>-------</td>
</tr>
<tr>
<td>S01</td>
<td>Equipment with Advanced-Line Avionics</td>
<td>S01-1 to 11</td>
</tr>
<tr>
<td>S02</td>
<td>Equipment with Cabin Heating</td>
<td>S02-1 to 11</td>
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<tr>
<td>S03</td>
<td>Aerotow</td>
<td>S03-1 to 27</td>
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<tr>
<td>S04</td>
<td>Equipment with Solar Panel</td>
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</tr>
<tr>
<td>S05</td>
<td>Wing Folding Device</td>
<td>S05-1 to 21</td>
</tr>
</tbody>
</table>

* mark as appropriate