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.

Rev. No.	Section	No. of Pages	Date of Revision	Pertaining to:	Note and Date of Approval	Date of incorporation	Signature
1	0, 1, 2, 5, 7	iii, v, vii, viii, 1-6, 2-5 to 2-7, 5-1, 5-11,5-13, 5-16, 7-26	01.10.2012	P061-2012-094	06 MAY 2013 FAA Project AT00644CE-G EASA.21J.250		

P061- Notification of Change
P062- Service Bulletin

Rev. No.	Section	No. of Pages	Date of Revision	Pertaining to:	Note and Date of Approval	Date of incorporation	Signature

P061- Notification of Change
P062- Service Bulletin

0.1 List of Effective Pages and Chapters

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1.4 Dimensions and Specifications

Specifications

Fuselage	Design	front section: carbon fiber composites Midsection: steel tube framework with glass fiber composite fairing Rear section with integrated vertical fin: carbon fiber composites
	Length	27.95 ft / 8.52 m
	Height	8.04 ft / 2.45 m
	Width	3.97 ft / 1.21 m
Wings	Design	threepart, Spar: carbon fiber composites Shell: carbon fiber composites sandwich structure
	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)
Landing Gear	Type	Retractable tricycle Landing Gear with doors, operated hydraulically, front wheel steering
	Wheel track	6.20 ft / 1,89 m
	Wheel base	6.46 ft / 1,97 m
Airbrakes	Design	Schempp-Hirth-style Airbrakes 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. Takeoff Mass (MTOM)	1984 lb / 900 kg
	Max. Wing Loading	10.6 lb/ft² / 51.66 kg/m²
	Max. Mass of non-lifting Parts	1367 lb / 620 kg

	Acceptable Range of in-flight CG-Location	8.82 in to 16.10 in / 224 mm to 409 mm
Engine	Design	4-Cylinder 4-Stroke Otto-engine in opposed cylinder design, Turbocharger with electronic Manifold Air Pressure (MAP) control, integrated reduction gear
	Model	Rotax 914 F2
	Max. Takeoff Power	113.3 HP / 84.5 kW at 5800 RPM (Takeoff RPM limited to 5600 RPM)
	Max. Continuous Power	98.4 HP / 73.4 kW at 5500 RPM
	Fuel Consumption at Max. Continuous Power (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 / 13.0 l/h
	Transmission Ratio of Reduction Gear	i=2.428
Propeller	Design	Electrically adjustable 3-Blade Constant Speed Propeller
	Model	MTV-7-A/170-051 with Constant Speed Control Unit
	Diameter	5.58 ft / 1.70 m
Front Drive	Design	Gear in Magnesium-Casing, mounted elastically on rubber elements
	Model	STEMME 050.251
	Transmission Ratio	i=1.100
Fuel Tanks	Design	Integral tanks located in the forward section of the inner wing
	Capacity	17.2 US gal / 65 l in right-hand inner-wing (optionally 17.2 US gal / 65 l in left-hand inner-wing)
	Unusable Fuel	0.55 US gal / 2.1 l in right-hand wing-tank (optionally 0.3 US gal/ 1 l in left-hand wing-tank)

2.4 Limitations for Propulsion System and Operating Fluids

2.4.1 Engine Limitations

Engine

a)	Engine Manufacturer	BRP-Powertrain GmbH & Co. KG Gunskirchen, Austria
b)	Engine Model	ROTAX 914 F2
c)	Type Certificate	FAA E00058NE of 18.December 2003
d)	Maximum RPM during T/O (max. for 5 minutes):	5600 RPM (5800 RPM allowed for max. 1 min)
e)	Maximum Continuous RPM	5500 RPM
f)	Idle RPM:	1200 to 1400 RPM
g)	Max. T/O-Power (ISA):	113.3 HP / 84.5 kW at 5800 RPM (Takeoff RPM limited to 5600 RPM by const. speed propeller control)
h)	Max. Continuous Power:	98.4 HP / 73.4 kW at 5500 RPM
i)	Max. altitude with Constant Power: • T/O-Power • Continuous Power	 to max. 8000 ft / 2450 m MSL to max. 16000 ft / 4875 m MSL
j)	Max. Cylinder Head Temperature (CHT): minimum maximum	 122 °F / 50 °C 275 °F / 135 °C
k)	Fuel Pressure: minimum normal maximum	Air Box Pressure + 1.5 x 10^{-1} bar / 2.1 psi + 2.5 x 10^{-1} bar / 3.6 psi + 3.5 x 10^{-1} bar / 5.1 psi
l)	Manifold Air Pressure: max. T/O-Power max. Continuous Power	 40.5 inHg / 1.37 bar (acc. to ROTAX) 36.0 inHg / 1.22 bar (acc. to ROTAX)

Propeller

a)	Propeller Manufacturer:	MT-Propeller Gerd Muehlbauer GmbH D-94348 Atting, Germany
b)	Propeller Model:	MTV-7-A/170-51
c)	Control Unit:	P120-A

d) Type Certificate:	LBA TC: 32.130/84 R.3
e) Propeller Diameter:	5.58 ft / 1700 mm

2.4.2 Operating Fluids

Fuel

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

Lubricants

a) Oil Temperature	minimum	122 °F / 50 °C
	maximum	266 °F / 130 °C
b) Oil Pressure	minimum	1.5 bar / 21.8 psi
	maximum	7.0 bar / 101.5 psi (only briefly allowed, when starting cold engine)
	normal	1.5 to 5.0 bar / 21.8 to 72.5 psi
c) Amount of Oil	minimum	0.5 US gal / 2 l
	maximum	0.8 US gal / 3 l
max. permitted Oil Consumption		0.02 US gal/h / 0.06 l/h

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	0.63 US gal / 2.4 l
	maximum	0.66 US gal / 2.5 l

2.5 Engine Instrument Markings

Instrument	Indicating Range			
	Red Line (Lower Limit)	Green Arc (Normal Operating Range)	Yellow Arc (Upper Warning Range)	Red Line (Upper Limit)
Tachometer [RPM]	-	1400 - 5500	5500 - 5600 *	5600 *
Oil Temperature [°F] [°C]	122 50	122 - 266 50 - 130	- -	266 130
CHT [°F] [°C]	- -	122 - 275 50 - 135	- -	275 135
Oil Pressure [bar] [psi]	- -	1.5 – 5 21.8 – 72.5	5 - 7 72.5 – 101.5	7 101.5
Manifold Air Pressure [inHg] [bar]	- -	- -	36.0 - 40.5 1.22 - 1.37	40.5 1.37

* 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

Instrument	Indicating Range			
	Red Line (Lower Limit)	Green Arc (Normal Operating Range)	Yellow Arc (Upper Warning Range)	Red Line (Upper Limit)
Voltmeter [V]	11.5	-	-	-
Ammeter [A]	-	-	-	-

Section 5 – Flight Performance

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5.1 Introduction

This section contains data about the flight performance which can be expected of the STEMME TSA-M, model “S6-RT“. 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 an aircraft 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.

5.3.6 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 kts / 80 km/h at 1984 lbs / 900 kg
	• Airspeed in 15 m (IAS)	v_y = 60 kts / 110 km/h at 1984 lbs / 900 kg
	• RWY Surface	paved, horizontally leveled and dry
	• Landing Gear	EXTENDED over complete T/O-Distance

Data given for MSL, ICAO standard atmosphere

T/O ground roll:	804 ft / 245 m
T/O distance:	1509 ft / 460 m (over 50 ft / 15 m 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.

Pressure Alt above MSL		Temperature		T/O Ground Roll		T/O Distance (50 ft / 15m)	
[ft]	*[m]*	*[°F]*	*[°C]*	*[ft]*	*[m]*	*[ft]*	*[m]*
0	0	5	-15	599	183	1123	342
		32	0	698	213	1306	398
		59	**15**	**804**	**245**	**1509**	**460**
		86	30	922	281	1730	528
		100	38	986	301	1853	565
1640	500	5	-15	704	215	1322	403
		32	0	820	250	1536	468
		59	15	944	288	1772	540
		86	30	1082	330	2028	618
		100	38	1159	353	2173	663
3280	1000	8	-15	829	253	1555	474
		32	0	964	294	1807	551
		59	15	1111	339	2086	636
		86	30	1271	388	2384	727
		100	38	1361	415	2555	779
4920	1500	5	-15	976	298	1833	559
		32	0	1133	346	2128	649
		59	15	1306	398	2452	748
		86	30	1495	456	2804	855
		100	38	1601	488	3006	917
6560	2000	5	-15	1153	351	2162	659
		32	0	1338	408	2510	765
		59	15	1540	470	2892	882
		86	30	1761	537	3304	1007
		100	38	1886	575	3537	1078
8200	2500	5	-15	1361	415	2555	779
		32	0	1578	481	2976	907
		59	15	1819	554	3411	1040
		86	30	2078	633	3896	1188
		100	38	2222	677	4171	1272
9840	3000	5	-15	1610	491	3021	921
		32	0	1867	569	3507	1069
		59	15	2148	655	4034	1230
		86	30	2452	748	4603	1403
		100	38	2625	800	4927	1502

5.3.7 Climb Performance

Conditions:	• Throttle	max. Continuous / MCP (100%)
	• Flaps	"NEUTRAL"
	• Landing Gear	RETRACTED
	• Airspeed, best rate of climb (IAS)	v_y = 68 kts / 125 km/h at 1984 lbs / 900 kg
	• Altitude	MSL

Maximum rate of climb: **v_V = 925 ft/min / 4.7 m/s**

5.3.8 Power Settings in Cruise Flight

Conditions:	• Throttle	max. Continuous / MCP (100%)
	• Flaps	"CRUISE"
	• Landing Gear	RETRACTED
	• A/C-mass	1984 lbs / 900 kg

Maximum cruise-speed: **v_H = 135 kts / 250 km/h**

5.3.9 Climb Gradient during Go-Around

Conditions:	• Throttle	FULL POWER / MTOP (115%)
	• Flaps	"TO / LDG 1"
	• Landing Gear	EXTENDED
	• Airspeed (IAS)	v_x = 60 kts / 110 km/h at 1984 lbs / 900 kg
	• Climb rate v_V	1000 ft/min / 5.1 m/s

5.3.10 Landing Distance

The landing distance is clearly shorter than the takeoff distance at MTOM.

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 2 ft over 100 ft 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

Caution: The given performance data were measured with a technically and aerodynamically efficient working aircraft. The values may vary depending on the condition of the aircraft.

Conditions:		
	• Throttle	75%
	• Flaps	"NEUTRAL"
	• Landing Gear	RETRACTED
	• Speed	122 kts / 227 km/h
	• A/C-Mass	1984 lbs / 900 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 unusable 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 airspeed.

Standard	3.08 h x 122 kts / 227 km/h = 377.5 nm / 699.1 km
With optional tank	6.22 h x 122 kts / 227 km/h = 762.4 nm / 1411.9 km

5.3.12 Approved Noise Level

Determination of Noise Level by measurement according to ICAO Annex 16, Vol. I, Chapter X, 5th Edition, Amdt. 9.

For approved Noise Level refer to EASA Type Certificate Data Sheet for Noise, TCDSN No. EASA.A.143, latest approved Revision.

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 capacitator ignition
- Two CD-carburetor, one on each engine side
- Flanged reduction-gear and overload clutch

The engine is mounted in the midsection 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 in^3 / 1211 cm^3
• 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. RON 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