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• Strike out if not applicable. For built in alternative equipment see section 9.2 (page 9-1).

2.4 Propulsion System and Fluids

2.4.1 Engine, Propeller, Fuel

Engine		
Manufacturer	BRP-Powertrain GmbH & Co. KG Gunskirchen, Austria	
Engine modification	STEMME AG, Strausberg, Germany	
Engine / Model	ROTAX 914 F2/S1	
Max. T/O RPM for 5 minutes	5800 RPM	
Max. cont. RPM	5500 RPM	
Idle RPM	1400 ... 1600 RPM	
T/O power (ISA)	113,2 hp / 84,5 kW at 5800 RPM, 1300 hPa (38,4 in HG)	
Max. cont. power (ISA)	98,4 hp / 73,4 kW at 5500 RPM, 1150 hPa (34,0 in HG)	
Altitude band for const. power:	T/O power:	up to max. 8000 ft / 2450 m MSL
	MCP (max. cont. power):	up to max. 16000 ft / 4500 m MSL
Max. cylinder head temperature:	135°C / 275°F	
Oil temperature	maximum:	130°C / 266°F
	minimum:	50°C / 122°F
Temperatures for engine start-up	maximum:	50°C / 122°F
	minimum:	-25°C / -13°F
Oil pressure	minimum:	22 psi / 1,5 bar
	maximum pressure:	101,5 psi / 7,0 bar (peak press. for cold eng. start)
	Normal:	22-72,5 psi / 1,5 - 5,0 bar
Fuel pressure	maximum:	Airboxpressure + 5,08 psi / + 0,35 bar
	minimum:	Airboxpressure + 2,18 psi / + 0,15 bar
	normal:	Airboxpressure + 3,63 psi / 0,25 bar
Propeller		
Propeller-manufacturer	STEMME AG, Strausberg, Germany	
Propeller-type	11 AP-V	
Data sheet-No.	32.100/3	
Fuel System		
Maximum volume	2x11,9 US gal. / 2x9,9 imp.gal / 2x45 l (±5%) in wing tanks	
Max available fuel quantity	22,99 US gal / 19,14 imp.gal / 87 l (±5%)	
Unusable fuel	0,79 US gal / 0,66 imp. gal. / 3 l	

4.2.1.3 Horizontal Tail

The elevator is provided with an automatic connector. It is pushed from the front to the fuselage centring bolts until the front fitting tongue fits into the receptacle slot. Then unlock the receptacle with the on-board rigging tool, push the tailplane downwards into the fitting until the spring bolt is freed. The spring bolt must engage.

- The interlocking bolt must not stick out beyond the leading edge of the fin. Only then the connection is properly secured.
- Check correct fitting of the horizontal tailplane by pushing the leading edge upwards.

4.2.1.4 Fuselage Fairings

- Install side and upper fairings. Following this, engage the two bowden cables for the cowl flaps.

NOTE: Before installing fairings, the Daily Inspection (→ 4.3.1 and 4.3.2) has to be completed.

4.2.2 Fuelling

Fuel is filled into the wing tanks via the filler caps in the outer area of the centre wing. To open the tank caps the slotted screw is pushed in and turned to the left with a screw-driver; to close the cap, push and turn right the screw simultaneously.

Certified fuels see section 2.4.2 "Fluids", maximum fuel volume see section 2.4.1 "Engine, Propeller, Fuel".

WARNING: There must be **sufficient fuel in both tanks** for take-off. Do not perform a take-off when there is fuel in only one tank.

CAUTION: The S10-VT tends to slightly lower its right wing during fast cruise at high power settings, which makes the fuel supply from the right wing tank more difficult (→ 4.5.3.2 a)). For refuelling please consider that **the left tank should be at least as full as the right tank**.

NOTE: Fuel tank inlets are close to the upper part of the tanks; therefore wings must be level before opening the caps or when fuelling to avoid an overflow of fuel overboard.

NOTE: At high temperatures or when high temperatures have to be expected, tanks should not be filled completely to allow for temperature expansion and to avoid overflow through the ventilation tube.

4.3 Daily Inspection

Before commencing flight duties the pilot responsible has to carry out a visual inspection of the a/c.

It is highly important to have the a/c properly checked following each rigging or working on the a/c or its systems. The daily check prior to the first flight of a day is obvious, many accidents could have been avoided, if a proper check would have been performed.

A first walk-around is to check the surfaces for cracks in coating, for local bucklings and for roughness. If something seems unusual ask a specialist. During walk-around check any drainage and ventilation holes and pick clean if necessary (see Maintenance Manual section 6.7).

Sequence for visual check (Ignition and master switch check OFF!):

4.3.1 Engine

- remove upper and both lateral portions of the cowling;
- visual inspection of the engine - inspect cooling air ducts for foreign objects,
- check oil-, liquid cooling and fuel systems for leakage's (together with fuel supply lines from wing tank LH/RH, wing connection area, refer to 4.3.2);
- check level of cooling fluid in overflow reservoir when the system is cold; quantity should be between min and max marking; fill up if necessary; for details see section 2.4.2.2 "Coolant Fluid".
- check oil quantity between min and max marking and refill if necessary; for flight-times of more than 8 hours oil level should at least indicate middle between min and max marking; for details see section 2.4.2.3 Lubrication Fluids.
- reinstall side parts of engine cowling and secure;
- cooling air flaps: check for proper function by operating the Propeller dome (move forwards and backwards several times);

- cowl-flaps: check for proper function by operating several times;
- check both fuel vent outlets: open and unobstructed (located at the lower side of the wing between inner and outer wing section);
- visual inspection of fuel contents through fuel cap;
- drain fuel system by pressing both drainers in the landing gear well. Drain into a suitable container as much fuel as is necessary to make sure that possible dirt and water has been removed, Collect drained fuel in a vessel and examine for water and dirt.
- check throttle and choke mechanisms for clearance and proper operation.

CAUTION: The a/c must have been parked wings level for sufficient time (some hours) before draining.

CAUTION: After having pushed the drain valves, check them for closed position and no leakage. A leakage could mean contaminated fuel.

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

NOTE: The check for leakage of fuel lines shall be performed with fuel pressure. Therefore switch ON Master switch (CHECK landing gear lever DOWN and ignition OFF before), Fuel selector switch BOTH tanks and auxiliary fuel pumps ON (green status lamp ON). Perform inspection with fuel cock OPEN and CLOSED. There must not be any leakages.
After inspection switch OFF auxiliary fuel pumps and set Master switch OFF !

4.3.2 Wing connecting area

- Wing pins (4) properly secured (Fokker needles);
- flight controls connected secured by safety spring-pins - two connectors for ailerons, flaps and air-brakes;
- flight controls check for free movement;
- both fuel supply lines (right and left wing tank) connected and no leakage. Inspection for leakage according instruction under Note 4.3.1.
- both connectors for fuel quantity transmitters attached and secured;

CAUTION: In case that the fuel line of only one wing tank is properly connected, while the other is still disconnected, this might not be recognised before the disconnected tank is selected.

CAUTION: If a fuel quantity transmitter is not properly connected, the indicator points to the red mark above "full" mark meaning, the system is inop (not "overfilled"!)

- check for foreign objects
- re-install upper engine-cowling and check oil filler cap properly closed.

4.3.3 Propeller, Propeller Dome and Front Gear

- Check engine master switch for proper functioning: Are engine electrics switched off (read generator light extinguished and voltmeter reading "0"), when propeller dome operating handle is unlocked in the forward position of dome (and vice versa)?
- Visual inspection of propeller - central part and pitch control unit. Check for loose connections and local damages;
- Propeller blades can be moved freely from inner stop to outer stop?
- Propeller blades free of damage, protecting strip on leading edge in good condition?
- Check pitch control mechanism for ease of movability by extending one blade up to approx. 90° and pull blade tip in flight direction (induce force into the outer third of blade and give a slight support to blade root hinge). Doing so, the blade suspension is subject to a torque around its longitudinal axis and the control mechanism is forced to move the complete working travel. It must return easily to the initial position when the blade tip is released.
- Check clearance in power transmission path of pitch control mechanism by pushing blade tip (in 90° position) slightly in and opposite to flight direction. There must be no significant rotation of the suspension forks before the control mechanism starts moving. Check both blades one after the other.

- Extend blades successively into fully deployed position and check play of articulation needle bearing - in and against flight direction, as well as in pitch direction (check for torsion around longitudinal axis of blades). This is to check for unusual high abrasion of the blade hinge bearings. A total of 0,16 in. / 4 mm free motion at the blade tips is acceptable, in pitch direction the play must be nearly zero.
- Fold propeller. Push blade mounting at the hinge backward and forward with moderate force. By doing so observe (a) the variable pitch bearing and (b) the bearing in the gear. There must not be significant play in either of these bearings.
- Check front gear housing for leaks. A light film of oil on housing due to oil fume passing the circumferential joint is acceptable.
- Check oil quantity in front gear: oil quantity, wings level, must show between min and max marking. Fill up oil if required (specification see section 2.4.2 "Fluids").

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

WARNING: The Front gear never may use more oil than what could have passed as oil fume from the circumferential joint. Reasons for a higher oil consumption during short operation time must be investigated and must be eliminated before continuing a/c-operation. In any case, the manufacturer must be informed.

4.3.4 Landing gear

- Air pressure: main wheels 46.5 ± 1.5 p.s.i. / 3.2 ± 0.1 bar
- tailwheel 40.6 ± 3.0 p.s.i. / 2.8 ± 0.2 bar
- Check tire slip marks and tread
- Check master switch ON, landing gear lever DOWN and both landing gear indicators "GREEN"
- Examine elements for emergency landing gear release: Check attachment of spindles to radius struts, locking plate attaching spring in correct position, cables drawn downward completely (min. 1,2 in. / 30 mm overhang), cable coverings unobstructed and free to move and not jammed or blocked.
- Examine position switches for foreign bodies and dirt. Position switch for gear down & locked is located on the radius strut and the one for gear retracted at the support plate on the forward frame strut.
- Check quantity of brake fluid. Brake fluid reservoir is located in the landing-gear bay, cabin rear wall.
- Check movement of both LG doors, specially condition and proper installation of cables, pulleys, strut and spring of the LH gear door.

4.3.5 Wings

- Check aileron, flaps and air brakes for condition, unobstructed movement and play (axial and radial; limits see maintenance manual section 7.3).
- Check inner-to-outboard wing connection - safety bolt must be flush with wing surface.

4.3.6 Empennage

- Check horizontal tail plane for proper rigging - front arresting bolt (coloured red) must not protrude from leading edge of the vertical fin.
- Examine rudder and elevator for unobstructed movement, play (maintenance manual section 7.3) and damage.

4.3.7 Fuselage

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

4.3.8 Cockpit

- Canopy emergency release locked (arresting bolt on central canopy mounting must be in marked position)
- Clean canopy with care. Examine cockpit for foreign objects and loose items.

4.5 Normal Operating Procedures and Recommended Airspeeds

4.5.1 Engine Start, Warm-up and Taxi Procedures

4.5.1.1 Engine start

- Parking brake SET (turn lever to ON position and operate brake afterwards)
- All switches OFF
- Engine back-up switch OFF (guarded position)
- TCU-isolation switch OFF (guarded position)
- Landing gear lever DOWN
- Master switch ON, (normal voltage indication, green gear lights ON)
- Propeller-dome handle OPEN and LOCKED, (TCU performs self-test, main fuel pump cycles, engine instruments are activated, red battery charge control lamp ON)

CAUTION: When the TCU is energised (master switch ON and propeller-dome OPEN and LOCKED), the TCU-warning and -caution lamps are automatically activated for about 1-2 seconds, then they extinguish again. If this is not observed, the TCU may have a malfunction.

- Cowling flaps fully OPEN
- Fire-warning TEST by pressing indicator (notice acoustic and optical warning)
- Propeller switch T/O position, check green position lamp ON
- Fuel-cock OPEN in vertical position
- Fuel selector switch BOTH tanks
- Auxiliary fuel pumps ON, green status lamp ON
- With cold engine - Choke ON

NOTE: If the engine is warm, do not use choke.

- Throttle IDLE (max 10%)
- Propeller area FREE of persons and obstacles
- Starter START (for a minimum of three seconds)
- As soon as the engine fires up, release starter key to disconnect the starter motor. If the engine does not fire after 10 seconds of starter operation, stop and wait for at least 2 minutes for starter to cool-down, then try again.

CAUTION: An automatic electronic device adds the ignition with a time delay of three seconds after the starter is actuated, which means that the starter must always be operated for at least three seconds. The time delay allows the propeller blades to be fully deployed before the engine starts, and consequently reduces the loads for the propeller blades and their corresponding stops. In case that the propeller blades are not fully unfolded after two seconds, the engine start-up should be aborted before the ignition comes on. In case of repeated problems to unfold the propeller blades in time, make sure that the spring load of the propeller blades is correct, and that the blades can be easily moved and folded (→ aircraft maintenance manual).

CAUTION: If the engine fires before the expected time delay of three seconds is over, i.e. in case of a malfunctioning electronic device, the following checks must be performed before the intended flight in accordance with the aircraft maintenance manual: → AMM section 5.3.13 item 5 for the retarder module, and → AMM section 5.3.15 items 3 through 5 for the propeller.

CAUTION: During a cold engine start-up, the power lever should be fully pulled back into position "power idle". In case of a warm engine start-up, it is possible to open the throttle slightly (add up to 10% power) to improve the engine start-up behaviour.

- Engine RPM SET approx. 2000 RPM
- Oil pressure GREEN arc after 10 seconds

NOTE: Minimum oil pressure 22 psi / 1,5 bar; with cold engine at low RPM, up to 102 psi / 7 bar are normal.

WARNING: If the minimum oil pressure is not indicated within 10 seconds, stop engine immediately!

- Generator switch ON (red battery charge control lamp OFF)
- Auxiliary fuel pumps OFF (green status lamp OFF)
- Warnings and Cautions CHECK all OFF
- COM, NAV, gyros ON
- Choke OFF with increasing engine temperature (1-2 minutes should be sufficient)

4.5.1.2 Engine warm-up

- Cooling-air flaps CLOSE as required (position 1-5) for engine warm-up

NOTE: Only with cold OAT is it recommended to close cooling-air flaps; they should be opened at the latest when oil temperature attains 50°C / 122°F or CHT 10 0°C / 212°F /.

- Parking brake ON (lever in position ON and brake operated)
- Throttle 2500 RPM (after about 2 minutes 2000 RPM)
- Oil pressure GREEN ARC
- Engine temperatures WAIT for green range

CAUTION: To avoid engine damage, engine has to be warmed-up until minimum temperatures attained, before engine power is increased and RPM selected above values for the warm-up period.

CAUTION: To avoid engine and systems (in engine bay) overheat, extended ground runs with high power should not be performed, because sufficient cooling for extended high power settings is only achieved in flight.

NOTE: In case that the fuel line of only one wing tank is properly connected, while the other is still disconnected, this might not be recognised before the disconnected tank is selected. The proper function of the fuel system can already be checked during the warm-up or during taxiing by selecting the left and the right wing tanks separately (at least 2 minutes for each tank).

4.5.1.3 Taxiing

- Cowl flaps FULLY OPEN
- Parking brake RELEASE (turn lever to OFF position, use brake lever simultaneously if required)
- Directional control with RUDDER
- Taxi area OBSERVE
- Throttle AS REQUIRED
- Brakes AS REQUIRED

CAUTION: Seating position as well as wing span do not allow the crew to observe the outer wing outside of the leading edge sweep-back. This must always be considered during taxiing.

CAUTION: When taxiing slowly, operate wheel brakes with caution.

CAUTION: Depending on surface conditions and because of the large moment of inertia the function of the tailwheel steering is delayed.

CAUTION: To avoid damaging the propeller, taxi on surfaces with loose stones and gravel using low propeller RPM.

4.5.2 Take-off and Climb

WARNING: It is highly advised against T/O with wet wing or during rain (see section 4.5.7)!

4.5.2.1 Checks before take off

In run-up area:

- Parking brake SET (turn lever to ON position and operate brake afterwards)
 - Choke OFF (pushed in)
 - Elevator PULL to stop and hold
 - Engine indications CHECK green ranges
 - Throttle FULL POWER (115%), for high field elevation see remarks below
 - Engine RPM CHECK 5200 + 60 RPM per 1000 ft elevation¹⁾ ± 200 RPM tolerance
- ¹⁾ 5200 + 200 RPM per 1000 m, respectively

CAUTION: Because of the manually controlled two-position propeller in combination with the turbocharged engine, a significant increase of RPM with altitude at constant power-setting has to be considered (about 60 RPM per 1000 ft / 200 RPM per 1000 m). This rule-of-thumb is valid for ISA. **If actual temperature differs noticeably from ISA, at high field elevations > 6600 ft / 2000 m and if uncertain, refer to diagrams for 115% and 110% power settings in section 5.2.3.1.**

WARNING: At very high field elevations take care not to exceed max T/O RPM of 5800 RPM. Therefore it is recommended to **set 100%** (throttle on soft stop) for engine run-up on airfields **above about 6600 ft / 2000 m**. The RPM observed may not differ more than +/-200 RPM from the value, taken from second diagram in section 5.2.3.1, valid for 100% power setting.

CAUTION: The a/c should be **directed into the wind** for run-up and magneto-check to have a good airflow in the cowl flap area. In crosswind or tailwind conditions there is an inadequate cooling and engine temperatures can steadily increase.

CAUTION: Run-ups with high power settings should be reduced to a minimum. The S10-VT cooling system is designed for airborne operation, not for extended ground-runs with T/O or max continuous power setting.

- Magneto check SET 4150 RPM (mag switch position BOTH)
- Separate magnetos CHECK RPM drop of rotational speed < 300 RPM
difference between M₁ and M₂ < 120 RPM

NOTE: For correct magneto check wait until RPM with both magnetos is stabilized. Select left magneto and wait until RPM is stabilized before reading indicator. Select both and wait for stabilized RPM. Select right magneto and again let RPM stabilize before reading indicator.

WARNING: If RPM's during run-up or magneto check differ more than the limits given, T/O is not allowed, malfunction of engine or propeller must be expected.

- Canopy LOCKED (LH, RH, rear)
- Flap position CHECK +5°
- Air-brakes IN and LOCKED
- Cowl flaps OPEN
- Trim for climbspeed Vy NEUTRAL, depending on load, slightly nose-up
- Warnings and cautions CHECK OFF
- Landing gear lever EXTEND (both green lamps ON)
- Engine instruments CHECK GREEN range
- Propeller position T/O (green lamp ON)
- Fuel quantity CHECK (sufficient fuel in **both** tanks)

WARNING: There must be **sufficient fuel in both tanks** for take-off. Do not perform a take-off when there is fuel in only one tank.

- Fuel-cock OPEN

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

- Fuel selector switch BOTH tanks
- Auxiliary fuel pumps ON (green lamp ON)
- Ignition switch BOTH
- Decide on **T/O procedure** due to conditions and **check field length** available and required.
- Parking brake RELEASE (turn lever to OFF position, use brake lever simultaneously if required)

CAUTION: Before taxiing from taxi-hold position to take off position, pay attention that the parking brake lever is in OFF position. The parking brake shall not be used on the runway anymore.

Because the S10-VT has no constant speed propeller control and only the T/O-position of the propeller is to be used for takeoff, the power of the turbocharged engine, which is independent of density over a wide range, results in an increase of RPM vs. altitude at constant indicated speeds. To avoid engine overspeeds in T/O without active control of the power lever by the pilot, **three T/O-procedures** have been established for special pressure altitude ranges, which avoid engine overspeeding up to a safety altitude of about 500 ft / 150 m AGL while climbing with $v_y = 62 \text{ kts} / 115 \text{ km/h IAS}$.

The Decision on the T/O-procedure can be made with the **RPM observed while checking engine at 115% full power:**

static RPM at 115%	T/O procedure	Power setting for T/O
< 5500	No. 1	115% power setting
5500 - 5600	No. 2	100% power setting
> 5600 RPM	No. 3	T/O with reduced power for static 5400 RPM

4.5.3.5 Flying in strong turbulence

When encountering areas with strong turbulence or crossing strong thermals airspeed must be reduced to below $V_{RA} = 97$ kts / 180 km/h.

4.5.3.6 Cold weather operation

Before operating the a/c in cold areas, an inspection is recommended. Specially cooling fluid and lubrication fluid must be checked (refer to section 2.4.2 "Fluids").

Engine starting at low OAT:

- Start engine with throttle IDLE (max 10%) and with choke ON (open throttle renders starting carb ineffective!)
- Be aware, no spark below crankshaft speed of 220 RPM!
- as performance of electric starter is greatly reduced when hot and the battery capacity is low at cold temperatures, limit starting to periods not much longer than 10 seconds. With a well charged battery, adding a second battery will not improve cold starts.

CAUTION: If water is in the fuel system, it will descend to the lowest areas of the fuel system and freeze at low temperatures. This can block fuel pipes, filters and orifices. Therefore it is highly important to drain the fuel system properly to remove contained water specially when low OAT must be expected. Refer to section 4.3 "Daily Inspection".

WARNING: If OAT is extremely low, i.e. at high altitudes or in cold areas, battery capacity might be too low to turn the engine with more than 220 RPM for ignition. Successful engine restart might only be possible at higher temperatures and lower altitudes. This must be taken into account for flight and route planning.

4.5.4 Approach

Landing can be done either in gliding or in powered configuration.

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

a) *Approach in powered-configuration*

- PPC switch position TAKE-OFF

CAUTION: The change-over of propeller-blade pitch can take up to 5 minutes, therefore PPC has to be activated in time. If, in case of a go-around, the propeller is not in T/O position, be aware of a considerably reduced rate of climb.

Landing pattern should be arranged so, that landing could be performed with idle power. On downwind:

- Fuel cock OPEN
- Cowl flaps FULLY OPEN
- Wing flaps +5°
- Fuel selector switch BOTH tanks
- Auxiliary fuel pumps ON (green lamp ON)
- Throttle REDUCE as required
- Airspeed 59 kts / 110 km/h (yellow triangle on airspeed indicator scale)
- Landing gear selector DOWN (extension time about 30 seconds)
- Landing gear indicator CHECK 2 GREEN lamps
- Parking brake CHECK in OFF position

CAUTION: During gear extension the two landing gear lights flash RED (right first, then left). In case of lacking indication after selecting landing gear switch down, check CB (left side of switch) and push if necessary. If both indicator lights are not on and green after max 45 seconds, operate emergency gear extension (refer to 3.9.4.19).

NOTE: If airbrake handle is unlocked prior to gear-down indication, gear warning horn will sound and both gear warning lamps will flash RED until the landing gear is down and locked.

On final approach:

- Wing flaps L (+16°)
- Throttle IDLE
- Approach speed 59 kts / 110 km/h (yellow triangle on airspeed indicator scale)
- Propeller pitch indicator GREEN for T/O position
- Airbrakes AS REQUIRED

NOTE: It is recommended to arrange the approach so, that touch-down area can be reached with engine in idle. In this case flight path corrections are only done by applying airbrakes.

CAUTION: If propeller T/O-position is not indicated within an adequate time (max 5 minutes) by green lamp, propeller pitch position can be checked as follows:

- Airspeed 110 km/h / 59 kts
- Throttle FULL POWER but max 5500 RPM
- If 5400 RPM or more are attained, T/O blade-position most probably is reached.

WARNING: If propeller blades are not in T/O position, a considerably reduced rate of climb rate must be expected. In this case it is recommended to perform another pattern and to check PPC switch position and CB.

WARNING: If the a/c is wet and in rain increase approach speed by 10 %! (refer to section 4.5.7).

CAUTION: If strong turbulence or strong wind are encountered, select flap position +10° or +5° to achieve better effectiveness of lateral control. Increase approach speed by 10%.

b) Approach in glider-configuration

Landing pattern must be arranged so, that landing area can be reached in a safe flight path.

- Wing flaps +5°
- Airspeed 59 kts / 110 km/h (yellow triangle on airspeed indicator scale)
- Landing gear switch DOWN (extension time is about 30 seconds)
- Landing gear indicator both GREEN for down and locked
- Parking brake CHECK in OFF position

CAUTION: During gear extension the two landing gear lights flash RED (right first, then left). In case of lacking indication after selecting landing gear switch down, check CB (left side of switch) and push if necessary. If both indicator lights are not on and green after max 45 seconds, operate emergency gear extension (refer to 3.9.4.19).

NOTE: If airbrake handle is unlocked prior to gear-down indication, gear warning horn will sound and both gear warning lamps will flash RED until the landing gear is down and locked.

On final approach:

- Wing flaps L (+16°)
- Approach speed 59 kts / 110 km/h (yellow triangle on airspeed indicator scale)
- Airbrakes AS REQUIRED

NOTE: With airbrakes fully extended, propeller dome closed and 59 kts / 110 km/h glide ratio is about 1:7

WARNING: If raining increase approach speed by 10%! (refer to section 4.5.7 "Flight in Rain").

CAUTION: If strong turbulence or strong wind are encountered, select flap position +10° or +5° to achieve better effectiveness of lateral control. Increase approach speed by 10%.

4.5.5 Landing, Taxi and parking

4.5.5.1 Landing

On short final:

- Airbrakes AS REQUIRED
- Attitude maintain WINGS LEVEL
- Directional control stay on centre-line
- Elevator APPLY for touch-down in three-point attitude

CAUTION: Do not flare too low (high landing gear)! Close to the ground maintain wings level and use rudder only for directional control. Reduce speed to the minimum until touch-down with main landing gear and tail wheel simultaneously in three-point attitude.

Roll out after touch-down:

- Airbrakes FULLY EXTENDED and HOLD
- Elevator HOLD on aft stop
- Wheel brakes AS REQUIRED with caution

CAUTION: During roll out apply rudder cautiously, sensitivity is increased because pedals actuate rudder and tailwheel.

CAUTION: Off-field landing: It is the pilot's decision on whether to land with landing gear up or down; decision depends on surface and status of selected area. Several landings wheels-up were performed on dry, solid, level and flat ground without any harm to the crew or damage to the a/c (crew had seat belts well fastened and tightened).

4.5.5.2 Taxi and ground operation:

If a/c was landed in glider-configuration, engine may be restarted to taxi to parking position:

- Fuel-cock OPEN
- propeller-dome OPEN and LOCK
- Cowl-flaps FULLY OPEN
- Fuel selector switch BOTH tanks
- Auxiliary fuel pumps ON
- Choke ON for cold engine
- Throttle IDLE (max 10%)
- Ignition START
- Oil pressure GREEN
- Auxiliary fuel pumps OFF

4.5.5.3 Parking and Shut-down

On park position:

- Parking brake SET (turn lever to ON position and operate brake afterwards)
- Throttle SET about 2200 RPM
- Cowl-flaps FULLY OPEN
- Engine cool-down WAIT for CHT and oil temperature < 100°C / 212°F

CAUTION: Engine cool-down: Shut-off the engine after engine temperatures are below 100°C / 212°F (CHT and OIL temperature), but maximum after 5 minutes; for cool-down set 2000 - 2500 RPM and open cooling air flaps fully. Normally, the engine is cooled-down during approach and taxi.

CAUTION: During cool-down run the a/c should be **directed into the wind** to have a good airflow in the cowl-flap area. In crosswind or tailwind conditions cooling is inadequate and engine temperatures can steadily increase. If at high OAT's or poor wind conditions the engine temperatures do not decrease to below 100°C / 212°F the engine may be s hut-down after 5 minutes cool-down run.

WARNING: If the engine is operated under load during shut-down, a sudden engine-stop may result in overheating and damaging turbocharger.

CAUTION: If the engine is shut-down without a sufficient cool-down period prior to shut-down, this can result in local overheat of the engine and cooling fluid can overflow.

- COM and NAV OFF
- Generator switch OFF
- Ignition OFF
- Fuel-cock CLOSE
- If parking area is not even WHEEL CHOCKS as required
- Cooling of engine bay WAIT for 10 minutes
- Propeller-dome CLOSE
- Airbrakes UNLOCK (in case of need)

CAUTION: Propeller-dome and with it cooling air flaps should be closed about 10 minutes after engine shut-down to avoid heat accumulation and local overheat.

7.1 Introduction

This section provides description and operation advice of the powered glider and its systems and equipment. Section 9 includes flight manual supplements, if required, related to non-standard systems and equipment. For more information about components and systems see maintenance manual.

7.2 Cockpit Controls

a) Cockpit controls at the airframe

Following overview includes the controls at the airframe.

1.	Control Stick	Middle in front of each seat.
2.	Rudder Pedals	For each seat and adjustable. The pedals also steer the tail wheel, which is coupled to the rudder via spring device.
3.	Airbrake Lever	For each seat LH side. Blue lever at LH cockpit side and on the centre console between seats.
4.	Flap Lever	For each seat LH side. Black lever at LH cockpit side and on the centre console. Indication of settings (-10, -5, 0, +5, +10, L) in centre console. Unlocking is by moving lever to the right against a spring force which locks the flap positions.
5.	Pedal Adjustment Handle	In front of each seat. Unlocking is by pulling the handle.
6.	Canopy Locks	Two white handles with red coloured ring, one on left and one on right side of the canopy frame, to open and lock the canopy, and one white handle at rear top, which keeps hold of the rear canopy at the first moment of emergency canopy jettison ("Röger-Hook").
7.	Brake Lever	Lever on LH control stick, on RH stick optional. Separate lever for parking brake valve on the floor panel console in front of the LH control stick.
8.	Trim Lever	One green lever on centre console between seats. To trim push down (unlock) and shift lever forward or aft. Locking is by a spring device.
9.	Throttle Lever	One black lever on centre console with two forward stops (for max. continuous and max. T/O-power). It is coupled with a spring acting forward in direction FULL POWER. Its position is fixed by friction discs, which can be adjusted with a milled-nut on LH side of the centre console.
10.	Choke Lever	Black lever on centre console, RH side of the throttle lever. It is coupled with a spring acting rearward in direction CHOKE OFF. Its position is fixed by friction discs, which can be adjusted with a milled-nut on RH side of the centre console.
11.	Propeller Pitch Control	Switch on centre console. The forward position is the TAKE-OFF position. A green light next to the switch indicates, if propeller pitch (not switch) is in T/O-position.
12.	Fuel Cock	Red handle on the rear console between the seat back rests. Turning the handle into it's horizontal position (fuel cock CLOSED) cuts off the fuel supply for the engine.

CAUTION: Throttle positions for 115% and 100% can be selected by feeling. The first stop is the 100% throttle position. To select 115% the throttle lever must be moved through a throttle gate to the left and then pushed to the next stop.

7.4 Landing Gear

The landing gear (L/G) consists of a tail wheel and two retractable main landing gear legs, hinged at the centre fuselage frame with the hinge axis in flight direction and locked in the extended position by means of an over-centre locking strut ("elbow lever") for each leg. The wheel is mounted on a trailing arm that is supported against the leg's frame by a pre-loaded elastomeric spring for shock absorption purposes.

Retracting of the L/G legs and doors is managed by an electrically driven linear actuator for each leg that is built up around a high precision ball screw. Each of the linear actuators is hinged with the top end at the fuselage frame; the bottom end is coupled to the respective elbow strut by means of a locking mechanism which can be released for an emergency let-down by pulling a T-handle in the cockpit (one for each of the legs) and via a bowden cable. In case of an emergency let-down the two legs have to be released in succession (order is proposed, wrong order not critical), they then come out by gravitational force. Secure locking in the extended position is achieved by a spring that forces the elbow lever into its over-centre position.

The actuators are controlled by stop switches, the switches for EXTENDED being integrated in the elbow struts and detecting the over-centre position, those for RETRACTED mounted at the fuselage frame and detecting the top position of each L/G leg. All these switches are in duplicate, the second one giving the signal for the indication and warning system, which is processed by a TTL-logic and displayed by focused green and red LED's on the right face of the instrument panel (ref. to the Flight Manual).

Both LG doors are actuated by the landing gear legs. The RH landing gear door is coupled directly to the RH landing gear leg via a spring device. The LH door is controlled by a cable mechanism. During retraction, the LH landing gear leg starts closing the LH door by means of a cable so far as to allow retraction of the RH landing gear leg. The RH landing gear leg effects complete closing of the door via the cable during the last portion of its retracting. Opening of the LH door is by a spring loaded roller strut, which rolls on the LH door. It pushes the door to the outside against the cable to keep the door from waving, and is blocked with the landing gear retracted, thus locking the door. In closed position the doors are additionally locked at the rear by means of magnets.

The disk brakes on the main L/G wheels are operated hydraulically. The main cylinder for both the left and right wheel is located on the LH control stick, on RH stick optional. The pressure line from the main brake cylinder to the brake callipers of the wheel brake in the center fuselage are designed as metal-shielded brake hoses. Brake fluid reservoir is located in the landing-gear bay, cabin rear wall.

The parking brake valve to set and to release the parking brake is located on the floor panel console in front of the LH control stick. The parking brake valve is operated by a lever respectively rotary handle.

The tail wheel is without springing and guided in a trailing fork that is pivoted at its bottom in a thin section ball bearing, and at its top in a combined radial/axial sleeve bearing. The journal is constructed so that a certain friction damping is produced at the axial sleeve surfaces when loaded in axial direction in order to avoid tail wheel flutter whilst taxiing. For steering on the ground the tail wheel fork is coupled with the rudder by means of two pre-tensioned tensile springs.

7.5 Seats and Seat Belts

The seats are recessed into the bottom fuselage secondary structure (integrated seating) and have multiple adjustable back rests made of GFP.

Each seat is equipped with 4-point seatbelts and a central harness. The lap straps are supported at the sides of each seat. The shoulder harness is fastened to a tube behind each back rest.

Certified seat belts are indicated in the maintenance manual, section 9.1.

8.4 Ground Handling / Road Transport

a) Towing / Pushing

Due to the big wing span, it is recommended to have a person for checking clearance of wing tips.

If the S10-VT is towed by car, only use properly fixed and suitable towing equipment, move slowly and do not make tight turns to reduce loads on tail wheel and aircraft structure. If the S10-VT is towed by rope, it is recommended to fix it on both landing gear struts and to have someone prepared to decelerate and stop the a/c.

- Pushing backwards: Directional control at rudder and push only at inner wing.

b) Storing:

The S10-VT should only be stored in well ventilated rooms. A closed, weatherproof trailer or container must be provided with sufficient ventilation ports or facilities. Take care for stress-free support of the a/c and components.

c) Parking

If the a/c is not derigged for a year, connection bolts, nuts and elements at fuselage, wing and empennage have to be properly protected for corrosion. Dust covers should be commonplace for high quality surfaces and materials like at the S10-VT. When parked outside, the a/c should be securely tightened to ground or sufficient ballast.

- Tightening: Insert eye-bolts in inlets under the ends of the inner wing.
- Parking: SET parking brake (turn lever to ON position and operate brake afterwards).
- Hangaring: Unlock airbrakes (for relieving the airbrake push rods); unlock parking brake and fix the powered glider with wheel brake blocks (when parking will last longer proceed like with hangaring).

CAUTION: Wings should be level for parking; otherwise there may be some leakage through tank vents.

d) Preparation for Transportation on Road

Especially the one-piece inner wing must be carefully supported in a trailer because of its high weight. If the inner wing is transported upright, supported on nose, at least three wide supporting areas well adapted to wing section shape are recommended. Fuel from wing tanks must be drained for transportation on road and filled into approved fuel containers (refer to relevant regulations). The best way to empty wing tanks is with an optional device (available from STEMME) for the quick release coupling.

If the fuselage is transported with wheels retracted, it must be supported in a wide-area, well shaped supports below cockpit rear frame and also close to the tail wheel.

It is recommended to transport the horizontal tail surface in well shaped supports.

All supports should be covered by soft material (i.e. carpet) to protect the high quality a/c surfaces and components.

- Road transport: see manual for trailer.

9.1 Introduction

This section contains appropriate supplements required, if various items of optional equipment are installed in the individual powered glider, that are not part of flight manual (section 1 to 8). With these supplements, the pilot is provided with additional information and instructions required for safe and efficient operation.

The installation of alternative, supplemental or additional equipment is normally based on a Service Bulletin (SB). The pertinent supplemental information will be issued in the form of a flight manual insert and in the case of a retrofit will be supplied together with the retrofit kit. The supplement is to be filed following the cover page of Section 9.3.

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

9.2 Installation of Alternative Equipment

A special case is the installation of equipment and systems alternative to the standard build version which affects parts of the flight manual (section 1 to 8) and where the installation is not based on a Service Bulletin. In such cases, approved alternative pages are inserted into the individual flight manual to replace the corresponding original pages. Thus the flight manual represents the precise build specification of each individual STEMME S10-VT.

The page numbers of the alternative pages are designated by the suffix 'a' and are part of the whole approved flight manual document.

The following table records the build specification and hence the applicable 'suffix a' pages. The installed alternative equipment has to be ticked and countersigned by an approved inspector and the List of Effective Pages (section 0.2, page ii) has to be updated. This procedure must be done ex works as well as on subsequent installation.

Alternative Equipment of STEMME S10-VT, S/N 11-				
*	Description	Alternative Page	Date	Signature of Inspector
	2 x 60 litre fuel wing tanks (instead of standard 2 x 45 litre)	2-3a		
	Wide Wheel/Tyre 6.00-5 (instead of standard 5.00-5)	2-10a, 4-4a		
	Auxiliary Battery for soaring within vertical tail fin	4-16a		
	Hydromechanical Brake system (former design, not for retrofitting)	4-7a ... 4-10a, 4-18a ... 4-21a, 7-1a, 7-5a, 8-2a		

* please tick pertinent items