

**Flight Design CT-LSA  
Flight Training Supplement  
CTSW**

(CTSW / CTSW-2006 / CTSW Classic / CTSW Advanced)



**SERIAL NUMBER:** \_\_\_\_\_

## Revisions

The Revisions pages are updated by Flight Design each time revision is issued. They contain a list of all revisions made to the Flight Training Supplement since its original issue.

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		Flying the Flight Design CT	2-1	
		"Propeller is free" to "propeller is clean"	3-1	
		24 mph to 39 km/h	3-3	
		"with flaps from -6° to 15° flaps, 13-16 kts" to "with 0° flaps 16 kts (30 km/h)"	5-1	
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This document is provided to supplement the information provided in the Pilot Operating Handbook (POH) but does not replace it. Specific information on operation of the engine and systems are provided in the POH. Specific information on maintenance is contained in the Flight Design CT Maintenance Manual provided with each aircraft.

## 1 GENERAL

### **Read this before your first training flight.**

Every pilot has to understand the limitations and specifications of this Light Sport Aircraft. The Flight manual must be read thoroughly as well. Please pay attention to the pre-flight check and maintenance instructions for the aircraft, the Rotax ® engine and the BRS emergency parachute system, if equipped and the manuals for other installed equipment.

The Flight Design CTSW (hereafter referred to as the CT) is equipped with non-certified engines that meet Practice F 2339. Unless otherwise specified the data are common for both configurations. Flying the CT must always be done with the possibility of a safe landing due to the loss of the engine power.

The Flight Design CT is a VFR aircraft only. Because of the high cruising speed and range of the CT, flight into vastly different weather patterns and meteorological conditions can occur. The entry into bad weather with IFR conditions by VFR pilots and aircraft is extremely dangerous. As the owner or operator of an aircraft you are responsible for the safety of your passenger and yourself. Do not attempt to operate the CT in any manner that would endanger the aircraft, the occupants or persons on the ground.

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## **2 FLYING THE FLIGHT DESIGN CT**

The CTSW is conventional aircraft that have conventional characteristics and procedures. The aircraft are aerodynamically very clean and pilots being transitioned to the CT need to be trained to manage their airspeed carefully.

The rapid acceleration to takeoff and the angle of climb is different from conventional aircraft. Attention to not exceeding the flap limitation speeds is needed during climbing flight.

Landing the CT requires attention to controlling and reducing airspeed in the pattern and final approach to landing. After practice, the CT can be landed in very small areas safely.

### 3 NORMAL PROCEDURES

#### Daily flight check:

At the start of every new flying day the CT should be checked thoroughly.

An accidental engine start is very dangerous, that is why you must always ensure that the ignition and main switch are turned off!

- Make sure that the throttle and choke controls are free from friction and binding.
- Check the coolant level on the Rotax overflow bottle and add more if needed.
- Check the oil level and add more if needed. The oil level should be between the two markings – max/min – of the oil dipstick and should not be lower than the minimum mark in any case. Before a long-term engine operation the oil level should be in the middle of two marks at least.
- Carefully examine the oil, cooling and fuel system for leaks.
- In case of the any in-operative equipment, the engine should not be started before proper maintenance is performed.
- Check that all visible bolts are fastened and secured.
- In case of cracks or scratches on the paint finish their cause must be determined. Repair if necessary.

#### Pre-flight checklist:

- Check the fuel in both tanks using the dipstick. Are the tank vents clear?
- Make sure both tank caps are closed tightly.
- Move the fuel valve lever to on. This exposes the starting key switch.
- Remove possible water from fuel system and ensure fuel flow by draining the fuel gascolator.
- Is there any contamination in the fuel? Drain until fuel is clear.
- Make certain the control stick and rudder pedals are free.
- Check the flaps. Run the flaps to the -6 to +40 degree limit - watch that the LED flap indicator light does not blink after arriving at a selected flap setting and limit switches are working at the limits, -6 and +40 (listen for a “click” – when the drive motor stops).
- Check that the main spar bolts are secure.
- Check that the trim system is functioning.
- Check that all the hinge points are free.
- Are all the wing control surfaces secure and free?
- Check the stabilizer attach bolts for security
- Check that the servo/trim tab is bolted and the spring pin is secured.
- Is the Pitot tube cover removed? Check that the Pitot tube is clear.
- Check the conditions of the tires. Is the tire air pressure correct 28 PSI (1.97 kg/m<sup>2</sup>). Check that the wheel pants and fairings are secure.
- Check that the air intakes for the oil cooler, water radiator and cylinder air cooling are clear.
- Check that the propeller is clean and without nicks or defects.
- Check the spinner attachment.
- In case baggage is carried: Is it properly fastened? Follow the weight and balance loading plan!

- Solo flight: Are the passenger side harness and door closed and fastened?

### Checklist before engine start:

- Did you complete the Pre-flight checklist?
- Are the baggage doors closed?
- Are the pilot and the passenger harnesses fastened correctly?
- Is the emergency parachute system ready for operation? Is the safety pin removed?
- Is the elevator trim tab set?
- Is the altimeter set?
- Is the wind direction known?
- Are the doors closed and secured (Door lever is forward and latch pins visible)?
- Is the radio and other equipment switched off before starting the airplane?
- Is the immediate area around the airplane clear of persons and obstacles – **especially around the propeller?**

### Engine start:

- |                                                            |               |
|------------------------------------------------------------|---------------|
| • Fuel valve                                               | open          |
| • Choke (with cold engine) pull backwards                  | on            |
| • Throttle level                                           | idle position |
| • Carburetor heat                                          | off           |
| • Main safety devices (Parachute, ELT if equipped)         | on            |
| • All electrical equipment , for example, radio equipment  | off           |
| • Pull the brake lever backwards, put the parking brake on |               |
| • Ignition – both circuits                                 | on            |
| • Ignition key turn to start position                      | on            |

Crank the engine for a maximum of 10 sec. Allow the starter to cool for two minutes if the engine does not start. As soon as the engine starts, set the throttle level in such a way that the engine runs smoothly at minimum RPM.

- Check the oil pressure immediately (it should increase during 10 sec.)
- Move the choke forward to close
- Run the engine until warm at a middle RPM, 2 min 2000 1/min, then 2500 1/min until the oil temperature rises to 124 F (51 C)
- Switch on additional instruments, for example, radio, strobe light, position lights, GPS, ELT.
- Perform a “Mag” check on both of the ignition circuits at 4000 RPM, the maximum allowable drop in RPM is 300 and 120 RPM difference between the two circuits.
- If the airplane rolls and cannot be stopped with the brakes, the engine should be stopped immediately. The airplane tends to roll more easily on asphalt or with a tail wind, even with the engine at idle.
- The nose wheel is directly linked to the rudder pedals for taxiing, takeoff and all maneuvers on the ground.
- After practice, the airplane can be taxied in crosswinds up to 17 kts (31.5 km/h).

## Before takeoff:

- Make certain the oil temperature at least 124 F (51 C).
- Confirm again both doors are secured.
- Confirm the pilot and the passenger harnesses are properly fastened.
- Check that the controls are free and correct.
- Confirm the main switch and the ignition “on” (both circuits).
- Choke “closed”.
- Alternator warning light out? Do not take off with the red light on.
- Set the flaps to 0°-15°.
- Confirm the trim lever is set for takeoff.
- Is the radio frequency and the squelch set?
- Are the runway and taxiways clear?
- Are the brakes off?
- Make certain the clear takeoff distance is sufficient.

## Take-off:

If the runway and approach to the runway are clear. Roll out to the take-off position.

- Confirm the nose wheel is centered.
- Controls in proper position for takeoff.
- Apply the throttle smoothly to fully open (forward).
- Engine speed: 4400 –4900 RPM
- Flaps: 15° (0° is fine on longer runways)
- If it is possible, take-off directly into the wind.
- The maximum direct crosswind component at take-off is 14 kts (26 km/h) (See Item 2 of Performance Limitations).
- As soon as the airplane accelerates, gently pull back on control stick – keep the nose wheel slightly elevated until the airplane takes off.
- After take-off, release the back pressure on the stick slowly as airspeed builds to 59 kts. (110 km/h). Climb to a minimum height of 600 ft. in straight ahead flight at 59 kts. (110 km/h) before attempting to turn the aircraft.
- Do not reduce the flaps to below 0° with less than 59 kts (110 km/h) airspeed.

## Climb

- Slowly decrease the flaps max. up - increase the climb max speed. Make certain to not exceed the flap speed limitations during climbs.

## Limitations (for a complete list of limitations please refer to the POH):

The CT is not certified for aerobatics.

Flights are only to be made under VFR conditions.

Night flights require special optional equipment.

Flights in icing conditions not allowed. Steep turns beyond 60 Degrees should not be performed.

**In gusty wind or wind speed more than 21 kts (39 km/h) flight operations should be stopped.**



### **Cruising flight**

During cruising flight, an RPM of 4200 – 5500 RPM should be used (redline is 5800 RPM). The maximum permissible speed of 145 kts. (269 km/h) should not be exceeded. During cruising flight, monitor your fuel consumption and total fuel on board for flight planning. Fuel consumption at cruising flight is about 4.7 gallons (18 L) per hour.

In case of possible carburetor icing, pull on the carburetor heat (immediately after icing clears, push it back in again).

For normal cruising flight, bring the airplane to the desired cruising speed in level flight by observing the VSI or the altimeter. Adjust the throttle and trim to hold altitude.

### **Banked turn:**

Each of turn should be made with the coordinated use of the aileron and rudder. Steep turns in excess of 60 degrees are not recommended. At lower speeds in tight turns, the airplane loses altitude quickly. Banked turns with more than 30° of banking should not be carried out less than 54 kts. (100 km/h) If the airplane enters an inadvertent spin, push the rudder opposite the spin direction. Position the control stick in neutral position for recovery. After the spin rotation stops, recover to level flight carefully to not exceed Vne, or the load limits of the aircraft.

### **Stalls:**

The CT is very docile in stalls. The loss in altitude during stalls is approx. 165 ft, with a maximum pitch down of 25°. The aircraft is resistant to stalling in clean-cruise configuration. During stalls with flaps a tendency for the aircraft to roll can occur and is easily countered by use of the rudder.

The stall speed is 39 kts. (73 km/h) at 1320 lbs. gross weight with 40° flaps, 42 kts.(78km/h) at 0° flaps, 44 kts. (82 km/h). at -6° flaps 45 kts (85 km/h). The stall is noted through light buffeting. At 2 kts (4 km/h) above the stall speed, the rudder becomes “soft”. When flying close to stall speed, only the rudder and elevator are fully controllable. The ailerons have less effectiveness in very slow flight. The airplane loses about 165 ft (50 m) in altitude during a stall. Close to the ground, do not fly slower than a minimum speed of about 62 kts. (115 km/h).

In the case of a stall-spin entered through crossed controls:

Oppose a spin with opposite rudder input. Center the ailerons and elevator until the rotation stops, then level out the airplane gently.

If the attempt to level out the airplane fail or leveling out is doubtful because of too low altitude the emergency parachute system (if equipped) should be actuated.



## 4 EMERGENCY PROCEDURES

### Engine failure:

At an altitude of less than 330 ft.(100 m), no attempt to re-start the engine should be made.

Below an altitude of 820 ft (250 m), no attempt to return to the runway should be made. Choose a landing spot without trees or obstacles and with sufficient length.

Below an altitude of 165 ft (50 m) any turns are to be avoided because of increased loss of in altitude and/or control.

Keep a minimum speed of 54 kts. (100 km/h) until final approach.

In case of landing on a field with crops or in a forest:

- Look for a flat spot in the plants, treetops or bushes.
- For final approach, the flap position should be 40 degrees and airspeed should be 43 kts. (80 km/h) on short final.
- The final flare for landing should be carried out at a height of about 1.5 ft (0.46 m) over the chosen spot.
- Ignition should be turned off.
- The elevator control should be fully pulled back.

### Optional BRS Parachute system:

The data and directions in the *BRS 1350 LSA* parachute Manual concerning the emergency parachute system should be followed.

The *BRS* parachute system has shown the ability to be used for low altitudes as well. In an emergency, the parachute system should be activated even if at a very low altitude.

Before activating, if it is possible, stop the engine and tighten the pilot and passenger harnesses. The parachute system handle is located above the central console between the seats. To activate the system, the handle has to be pulled to the stop.

### Overturn on land:

- Carefully unfasten the seat belts and lower yourself first, then your passenger.
- Be careful of any spilled fuel – there may be a fire hazard!

Leave the airplane immediately.

## 5 PERFORMANCE OF THE CTSW

### Airspeeds:

Minimum speed: flaps -6°	V <sub>S1</sub>	44 kts.	(81.5 km/h)	IAS
flaps 0°	V <sub>S1</sub>	42 kts.	(78 km/h)	IAS
flaps 40°	V <sub>SO</sub>	39 kts.	(72 km/h)	IAS
Maximum in gusty conditions	V <sub>RA</sub>	120 kts.	(222 km/h)	IAS
Maximal speed in horizontal flight with Maximum continuous power of engine	V <sub>H</sub>	119 kts.	(220 km/h)	IAS
Maneuvering speed	V <sub>A</sub>	98.6 kts.	(183 km/h)	IAS
Never exceed speed	V <sub>NE</sub>	145 kts.	(268.5 km/h)	IAS
Maximum permissible speed V <sub>FE</sub> for flight with flaps extended to				
		0° - 100kts	(185 km/h)	IAS;
		15° - 80kts	(148 km/h)	IAS;
		30° - 62kts	(115 km/h)	IAS;
		40° - 62kts	(72 km/h)	IAS.

Maximum direct cross wind component for takeoff and landing  
 with 0° flaps 16 kts (30 km/h)  
 with 40° flaps 11 kts (20 km/h)

Taking off and landing in strong cross winds requires skill and judgment. Do not attempt to flying in strong wind conditions without adequate training and practice.

### Flight characteristic of the CTSW:

912 ULS Neuform TXR2-65

Take-off range over 50 Ft. (15 m) obstacle with MTOW=1320lb., 912 ULS engine, and Neuform TXR2-65 propeller on an asphalt Runway, flaps at 15°	762ft	(232 m)
liftoff speed with 15° of flaps:	40 kts.	(74 km/h)
best climb speed:	78 kts.	(144.5 km/h)
at	5100 RPM	
at	0° flaps position	
at that climb	885 FPM	
Maximum cruising speed at 75%:	112 kts.	(207 km/h)
max. range ability with 1320 Lbs (600 Kg):	783 nm.	(900 Miles)

### Attention:

The performance figures stated above are for Sea level and standard meteorological (59F(15C)) conditions. Operations at higher altitudes and temperatures will reduce takeoff and climb performance.