

4.0

NORMAL OPERATION

4.1. INTRODUCTION

Chapter 3 of this Flight Manual deals with normale operating procedures and contains checklists and descriptions how to operate the aircraft.

4.2. AIRSPEEDS FOR NORMAL FLIGHT OPERATION

Unless stated otherwise, the following table contains the applicable airspeeds for maximum take-off and landing weight. The airspeeds may also be used for lower flight weights.

TAKE-OFF	VIAS		
	kts	mph	km/h
Climb Speed during normal take-off for 15 m (50 ft) obstacle	57	66	106
Best Rate-of-Climb speed at sea level v_y (Wing Flaps T/O)	65	75	120
Best Angle-of-Climb speed at sea level v_x (Wing Flaps T/O)	57	66	106

LANDING	VIAS		
	kts	mph	km/h
Approach speed for normal landing (Wing Flaps LDG)	57	66	106
Balked landing climb speed (Wing Flaps LDG)	57	66	106
Max. demonstrated crosswind speed during take-off and landing	15	17	27

CRUISE	VIAS		
	kts	mph	km/h
Max. permissible speed in rough air V_{no}	118	135	218
Max. permissible speed with full control surface deflections V_A	104	120	193
Maximum permissible speed with Wing Flaps extended V_{FE}	81	93	150

4.3. STRUCTURAL TEMPERATURE INDICATOR

A structural temperature indicator, installed on the spar bridge, indicates when the structural temperature limitation is exceeded. The indicator need only be checked if the OAT exceeds 38° C (100° F).

The indicator is accessed by lifting the flap between the two seatback cushions. The indicator is visible through the cut out in the seat shell backs.

At temperatures below the 55° C (131° F) limit, the indicator appears all red with a faint indication of "55" (° C). At temperatures exceeding the 55° C (131° F) limit, the indicator displays a clearly contrasting red "55" (° C) on a black background.



NOTE:

- At temperatures approaching the limit, the background will progressively darken prior to turning black; this indicates acceptable temperatures.



Red "55" on black background indicates that structural temperature limit is exceeded. Flight is prohibited.



All red indicates that structural temperature is below limit. Flight is permitted.



FSX OPERATION:

- The temperature sensor is accessed by clicking on the lower area between the two seatback cushions.

4.4. NORMAL OPERATION CHECKLIST

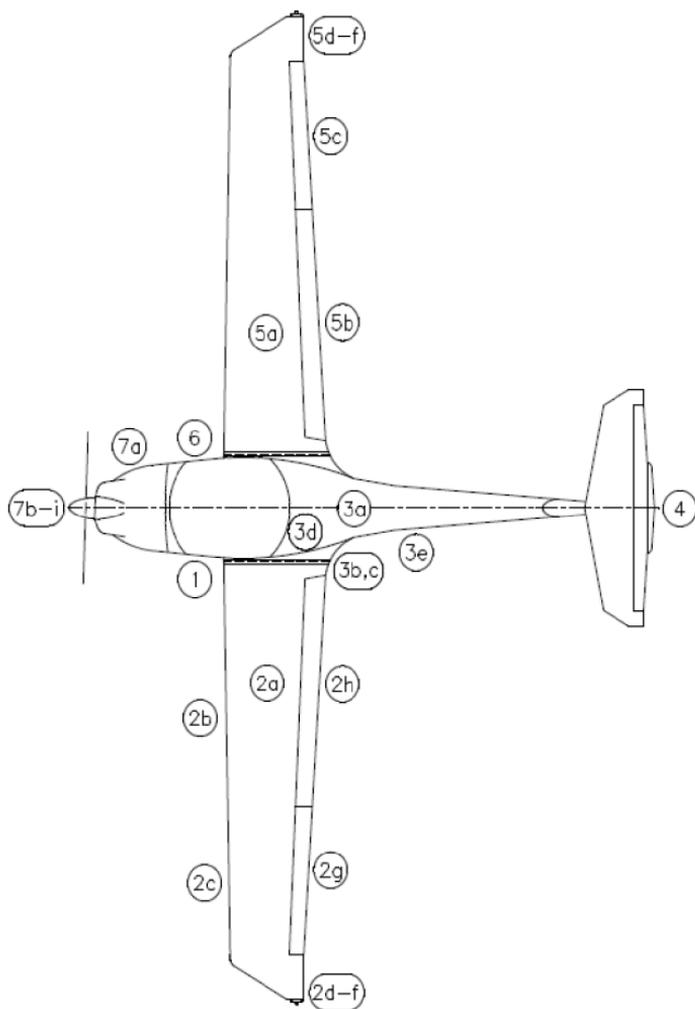
4.4.1 PREFLIGHT INSPECTION

I. In-Cabin Check

- | | | |
|-----|---|---|
| 1. | Structural Temperature Indicator if OAT exceeds 38°C (100° F) | check that Structural Temp. does not exceed 55° C (131°F) |
| 2. | Airplane Documents | check |
| 3. | Flight Control Lock | removed |
| 4. | Flight Controls | check for proper direction of movement |
| 5. | Ignition Key | pulled out |
| 6. | Carburetor Heat | free, OFF |
| 7. | Cabin Heat | free |
| 8. | Choke | free, self-resetting |
| 9. | Parking Brake | free |
| 10. | Throttle | free, IDLE |
| 11. | Propeller Speed Control Lever | free, max. RPM |
| 12. | Master Switch (Battery) | ON |
| 13. | Warning Lights (Gen., Fuel Press., and Canopy) | illuminated |
| 14. | Fuel Quantity | sufficient |
| 15. | Engine Gauges, Ammeter and Voltmeter | check |
| 16. | Circuit Breakers | pressed in |
| 17. | Map Light | operational |
| 18. | Instrument Lights | operational and dimmable |

19.	Trim	NEUTRAL
20.	Wing Flaps (Indicator- and Flap Actuation)	check, extend and retract fully
21.	Trim and Flap Indicator Lights	operational and dimmable
22.	Exterior Lights	operational as required
23.	Master Switch (Battery)	OFF
24.	Foreign Object Inspection	done
25.	Emergency Locator Transmitter (ELT):	
	EBC Model 502	ARM
	EBC Model 102A	OFF
26.	Fire Extinguisher	check
27.	Baggage	stowed, baggage net attached
28.	Canopy	clean, undamaged

II. Walk Around Check and Visual Inspection



**CAUTION:**

Visually inspect for the following conditions: Defects, contamination, cracks, delaminations, excessive play, insecure or improper mounting and general condition. Additionally, check the control surfaces for freedom of movement.

**CAUTION:**

Set PARKING brake prior to removing wheel chocks

1. Left Main Landing Gear

- | | | |
|----|----------------------------------|-------------------|
| a) | Landing Gear Strut | visual inspection |
| b) | Wheel Fairing | visual inspection |
| c) | Tire Pressure (33 psi / 2.3 bar) | check |
| d) | Tire, Wheel, Brake | visual inspection |
| e) | Wheel Chocks | remove |

2. Left Wing

- | | | |
|----|--------------------------------------|-------------------------|
| a) | Entire Wing | visual inspection |
| b) | Stall Warning | check (suck on opening) |
| c) | Pitot-Static Probe | clean, holes open |
| d) | Tie down | remove |
| e) | Taxi and Landing Lights | visual inspection |
| f) | Wing Tip, Position Lights and Strobe | visual inspection |
| g) | Aileron Balancing Weight | visual inspection |
| h) | Aileron including Inspection Panel | visual inspection |
| i) | Wing Flap including Inspection Panel | visual inspection |

3. Fuselage

- | | |
|------------------|---|
| a) Skin | visual inspection |
| b) Tank Vent | check |
| c) Tank Drain | drain water |
| d) Fuel Quantity | visual inspection
(use fuel pipette) |
| e) Antennas | visual inspection |

4. Empennage

- | | |
|-------------------------------------|-------------------|
| a) Stabilizers and Control Surfaces | visual inspection |
| b) Tie down | remove |
| c) Trim Tabs | visual inspection |

5. Right Wing

- | | |
|---|-------------------|
| a) Entire Wing | visual inspection |
| b) Wing Flap including Inspection Panel | visual inspection |
| c) Aileron including Inspection Panel | visual inspection |
| d) Aileron Balancing Weight | visual inspection |
| e) Wing Tip, Position Lights and Strobe | visual inspection |
| f) Tie down | remove |

6. Right Main Landing Gear

- | | | |
|----|----------------------------------|-------------------|
| a) | Landing Gear Strut | visual inspection |
| b) | Wheel Fairing | visual inspection |
| c) | Tire Pressure (33 psi / 2.3 bar) | check |
| d) | Tire, Wheel, Brake | visual inspection |
| e) | Wheel Chocks | remove |

7. Nose

- | | | |
|----|----------------------------------|---|
| a) | Oil | check level by using dipstick. min / max range is indicated by flat area of stick |
| | Coolant | Level must be between dip-stick markings, refill if required. |
| b) | Cowling | visual inspection |
| c) | Air Intakes (five) | free |
| d) | Propeller | visual inspection, Ground Clearance; minimum: approx. 25 cm (10 in). |
| e) | Propeller Blades | perform Pitch Check by Hand |
| f) | Spinner | visual inspection |
| g) | Nose Gear | visual inspection |
| h) | Wheel Fairing | visual inspection, towbar removed |
| i) | Tire Pressure (26 psi / 1.8 bar) | check |
| j) | Tire and Wheel | visual inspection |
| k) | Wheel Chocks | remove |

4.4.2 BEFORE ENGINE STARTING

1.	Preflight Inspection	performed
2.	Pedals	adjust, lock
3.	Passenger Briefing	performed
4.	Safety Belts	fasten
5.	Parking Brake	set
6.	Controls	free
7.	Fuel Shut-off Valve	OPEN
8.	Carburetor Heat	OFF
9.	Throttle	IDLE
10.	Propeller Speed Control Lever	max. RPM
11.	Friction Device of Throttle Quadrant	adjust
12.	Avionics Master Switch	OFF
13.	Master Switch (Battery/Generator)	ON
14.	Generator Warning Light	illuminated
15.	Fuel Pressure Warning Light	illuminated
16.	Exterior Lights	as required
17.	Instrument Panel Lighting	as required
18.	Canopy	Close and Secure
19.	Canopy Locking Warning Light	OFF



NOTE:

Under certain circumstances, activation of the fuel pressure warning light might take as long as 10 minutes after shutting down the engine or switching off the electric fuel pump.

4.4.3 STARTING ENGINE



NOTE:

Extreme low temperatures require that the engine be preheated prior to engine start. Satisfactory engine starts have been demonstrated at -31°F (-35°C) OAT after a 2 hour preheat with the Tannis TAS100-27 preheat system.

- | | | |
|----|-----------------------------|-------------------------------|
| 1. | Electric Fuel Pump | ON (noise of pump audible) |
| 2. | Fuel Pressure Warning Light | OFF |
| 3. | Throttle Cold Start | IDLE |
| | Warm Start | approx. 3/4 in (2 cm) forward |
| 4. | Choke Cold Start | ON, fully pulled and hold |
| | Warm Start | OFF |
| 5. | Toe Brakes | Hold |
| 6. | Propeller Area | Clear |



WARNING:

Ensure that propeller area is clear!

- | | | |
|----|--------------|-------|
| 7. | Ignition Key | START |
|----|--------------|-------|



NOTE:

During extreme cold weather starts, hold the choke on until the engine starts to warm up.

- | | | |
|-----|--------------|--|
| 8. | Choke | OFF |
| 9. | Throttle | maximum 1500 RPM |
| 10. | Oil Pressure | within green range after maximum of 10 seconds |

**CAUTION:**

If Oil Pressure is below 12 psi (0.8 bar) shut down engine immediately (max. 10 seconds delay).

**NOTE:**

Oil Pressure may advance to the yellow arc until Oil Temp. reaches normal operating temperatures.

**NOTE:**

Activate starter for max. 10 sec. only, followed by a cooling period of 2 min.

- | | | |
|-----|-------------------------|-------------|
| 11. | Generator Warning Light | OFF |
| 12. | Exterior Lights | as required |
| 13. | Electric Fuel Pump | OFF |

4.4.4 BEFORE TAXIING

- | | | |
|----|---|---|
| 1. | Avionics Master Switch | ON |
| 2. | Flight Instruments and Avionics | set |
| 3. | Engine Gauges | check |
| 4. | Voltmeter | check, ensure needle is in the green arc. Increase RPM to achieve or turn OFF non-flight essential electrical consumers |
| 5. | Warning Lights
(Gen., Fuel Press., Canopy) | push to test |
| 6. | Parking Brake | release |

**CAUTION:**

Warm-up engine to a minimum Oil Temperature of 122° F (50° C) at 1100 to 1500 RPM (also possible during taxi).

4.4.5 TAXIING

- | | | |
|----|---------------------------------|-------|
| 1. | Brake | check |
| 2. | Direction Control | check |
| 3. | Flight Instruments and Avionics | check |
| 4. | Compass | check |



CAUTION:

At high Propeller RPM the propeller may be damaged by loose sand, gravel or water.

4.4.6 BEFORE TAKE-OFF (ENGINE RUN-UP)



NOTE:

For OAT's less than -5° F (-20° C) turn cabin heat on for at least 10 minutes prior to take-off.

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|----|-----------------------------|--|
| 1. | Toe Brakes | hold |
| 2. | Safety Belts | fastened |
| 3. | Canopy | closed and locked |
| 4. | Fuel Pressure Warning Light | OFF (If light illuminates, maintenance action is required and flight should not be initiated) |
| 5. | Fuel Shut-off Valve | check OPEN |
| 6. | Fuel Quantity Indicator | check |
| 7. | Engine Gauges | within green range |
| 8. | Trim | NEUTRAL |
| 9. | Controls | free |

10.	Throttle	1700-1800 RPM
11.	Propeller Speed Control Lever	Cycle 3 times (RPM drop: 50 - 250 RPM)
12.	Ignition Switch	Cycle L - BOTH - R - BOTH Max. RPM drop: 150 RPM Max. RPM diff. (L/R): 50 RPM Min. RPM diff. (L/R): none, but RPM drop must be noticeable
13.	Throttle	1500 RPM
14.	Carburetor Heat	ON RPM drop: max. 50 RPM;
15.	Throttle	IDLE
16.	Carburetor Heat	OFF
17.	Circuit Breakers	check pressed IN
18.	Electric Fuel Pump	ON
19.	Wing Flaps	T/O
20.	Parking Brake	release

4.4.7 TAKE-OFF

1.	Electric Fuel Pump	check ON
2.	Master Switch (Battery/Generator)	check ON
3.	Ignition Switch	check BOTH
4.	Carburetor Heat	check OFF
5.	Wing Flaps	check T/O
6.	Propeller Speed Control Lever	check max. RPM
7.	Throttle Check RPM	FULL 2260 RPM to 2385 RPM

- | | | |
|----|------------------------------------|----------------------|
| 8. | Elevator - at beginning of rolling | NEUTRAL |
| 9. | Directional Control | maintain with rudder |

**NOTE:**

In crosswind conditions, directional control can be enhanced by using the single wheelbrakes. Note that using the brakes for directional control increases the take-off roll distance.

- | | | |
|-----|---------------------------|----------------------------|
| 10. | Rotate (V_{IAS}) | 51 kts / 59 mph / 95 km/h |
| 11. | Climb Speed (V_{IAS}) | 57 kts / 66 mph / 106 km/h |

**CAUTION:**

For the shortest possible take-off distance to clear a 15 m (50 ft) obstacle:

Lift-off Speed (V_{IAS})	54 kts / 62 mph / 100 km/h
Climb Speed (V_{IAS})	57 kts / 66 mph / 106 km/h

- | | | |
|-----|-------------------------------|--|
| 12. | Propeller Speed Control Lever | 2260 RPM
(after reaching safe height) |
| 13. | Electric Fuel Pump | OFF |

**NOTE:**

In order to avoid excessive noise, the propeller speed should be reduced to 2260 RPM as soon as a safe flight altitude has been reached.

4.4.8 CLIMB

- | | | |
|----|-------------------------------|----------------------------|
| 1. | Propeller Speed Control Lever | 2260 RPM |
| 2. | Throttle | FULL |
| 3. | Engine Gauges | within green range |
| 4. | Wing Flaps | T/O |
| 5. | Airspeed | 65 kts / 75 mph / 120 km/h |
| 6. | Trim | adjust |



NOTE:

The best rate of climb speed decreases with increasing altitude.



NOTE:

Electric fuel pump ON above 13000 ft..

ALTITUDE (feet)	Speeds V _{IAS}					
	Flaps T/O			Flaps UP		
	kts	mph	km/h	kts	mph	km/h
0 - 4000	65	75	120	69	79	128
4000 - 7000	63	73	117	65	75	120
7000 -10000	62	71	115	-	-	-
7000 -10000	59	68	110	-	-	-

4.4.9 CRUISE

- | | | |
|----|-------------------------------|-----------------|
| 1. | Throttle | as required |
| 2. | Propeller Speed Control Lever | 1700 - 2260 RPM |



NOTE:

For favorable manifold pressure/RPM combinations refer to Chapter 5.



NOTE:

Electric fuel pump ON above 13000 ft.

- | | | |
|----|---------------|-------------|
| 3. | Wing Flaps | UP |
| 4. | Trim | as required |
| 5. | Engine Gauges | check |

4.4.10 DESCENT

- | | | |
|----|---------------------------------|-----------------|
| 1. | Flight Instruments and Avionics | adjust |
| 2. | Throttle | as required |
| 3. | Propeller Speed Control Lever | 1700 - 2260 RPM |
| 4. | Carburetor Heat | as required |



NOTE:

To achieve a fast descent:

Propeller Speed Control Lever	2260 RPM
Throttle	IDLE
Carburetor Heat	ON

**NOTE:**

If RPM drops and then rises, suspect carburetor icing and leave Carb Heat ON. Otherwise turn Carb Heat OFF.

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|----|------------|------------------------------|
| 5. | Wing Flaps | UP |
| 6. | Airspeed | 118 kts / 135 mph / 218 km/h |

4.4.11 LANDING APPROACH

- | | | |
|----|-----------------------------------|-------------|
| 1. | Seat Belts | fastened |
| 2. | Electric Fuel Pump | ON |
| 3. | Lights | as required |
| 4. | Master Switch (Battery/Generator) | check ON |
| 5. | Ignition Switch | check BOTH |
| 6. | Carburetor Heat | ON |

**NOTE:**

If RPM drops and then rises, suspect carburetor icing and leave Carb Heat ON. Otherwise turn Carb Heat OFF.

- | | | |
|-----|-------------------------------|---------------------------------|
| 7. | Throttle | as required |
| 8. | Airspeed | max. 81 kts / 93 mph / 150 km/h |
| 9. | Wing Flaps | T/O |
| 10. | Trim | as required |
| 11. | Propeller Speed Control Lever | max. RPM |
| 12. | Wing Flaps | LDG |
| 13. | Approach Speed | 57 kts / 66 mph / 106 km/h |

**CAUTION:**

For strong headwind, crosswind, danger of wind-shear or turbulence, a higher approach speed should be selected.

4.4.12 BALKED LANDING

- | | | |
|----|-------------------------------|----------------------------|
| 1. | Propeller Speed Control Lever | max. RPM |
| 2. | Throttle | FULL |
| 3. | Carburetor Heat | OFF |
| 4. | Wing Flaps | T/O |
| 5. | Airspeed | 57 kts / 66 mph / 106 km/h |

4.4.13 AFTER LANDING

- | | | |
|----|--------------------|-------------|
| 1. | Throttle | as required |
| 2. | Wing Flaps | UP |
| 3. | Carburetor Heat | OFF |
| 4. | Exterior Lights | as required |
| 5. | Electric Fuel Pump | OFF |

4.4.14 ENGINE SHUT-DOWN

- | | | |
|----|---------------|--|
| 1. | Throttle | IDLE |
| 2. | Parking Brake | UP |
| 3. | ELT | Check (by listening to 121.5 MHZ for signal) |

- | | | |
|----|----------------------------|-------------|
| 4. | Avionics Master Switch | OFF |
| 5. | Electric Consumers | OFF |
| 6. | Ignition Switch | OFF |
| 7. | Instrument Panel Lighting | OFF |
| 8. | Master Switch (Battery) | OFF |
| 9. | Tie Downs and Wheel Chocks | as required |

**NOTE:**

In case of post ignition due to hot weather conditions, the ignition should be switched on, choke pulled and after approximately 3 seconds, ignition should be turned off again.

4.4.15 Flight in Rain

**NOTE:**

Flight performance might be reduced, especially for the T/O-distance and the maximum horizontal air speed. The influence on flight characteristics of the airplane is negligible. Flights through heavy rain should be avoided due to the reduced visibility.

4.4.16 SPINNING

a) Spin Entry

- | | | |
|-----|----------------------------|--|
| 1. | Loose Items | stowed |
| 2. | Seat Belts | fastened |
| 3. | Altitude and Airspace | check |
| 4. | Electric Fuel Pump | OFF |
| 5. | Wing Flaps | UP |
| 6. | Carburetor Heat | ON |
| 7. | Throttle | IDLE |
| 8. | Entry Speed | trim to 65 kts / 75 mph / 120 km/h |
| 9. | Reduce speed with elevator | speed reduction rate 2-3 kts / sec |
| 10. | When stall warning sounds | apply simultaneously, full aft stick and full rudder |



CAUTION:

Intentional spinning is only permitted with flaps in UP position.



CAUTION:

Depending on CG and spin entry technique, attempts to enter spins may develop into spiral dives.



NOTE:

Spins with aft CG may oscillate in yaw rate and pitch attitude. This has no effect on recovery procedure or recovery time.

b) Recovery from Spinning

- | | | |
|----|---------------|--|
| 1. | Throttle | IDLE |
| 2. | Rudder | fully applied in opposite to direction of spin |
| 3. | Control Stick | ease stick forward until spinning stops |
| 4. | Rudder | neutral, immediately after rotation has stopped. |
| 5. | Wing Flaps | check UP |
| 6. | Control Stick | ease stick backward cautiously |

Bring airplane from descent into level flight position. Do not exceed maximum permissible speed (V_{NE})