4.0 NORMAL OPERATION

4.1. INTRODUCTION

Chapter 3 of this Flight Manual deals with normal 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.

	V_{IAS}		
TAKE-OFF	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

	V_{IAS}		
LANDING	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

	V_{IAS}		
CRUISE	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

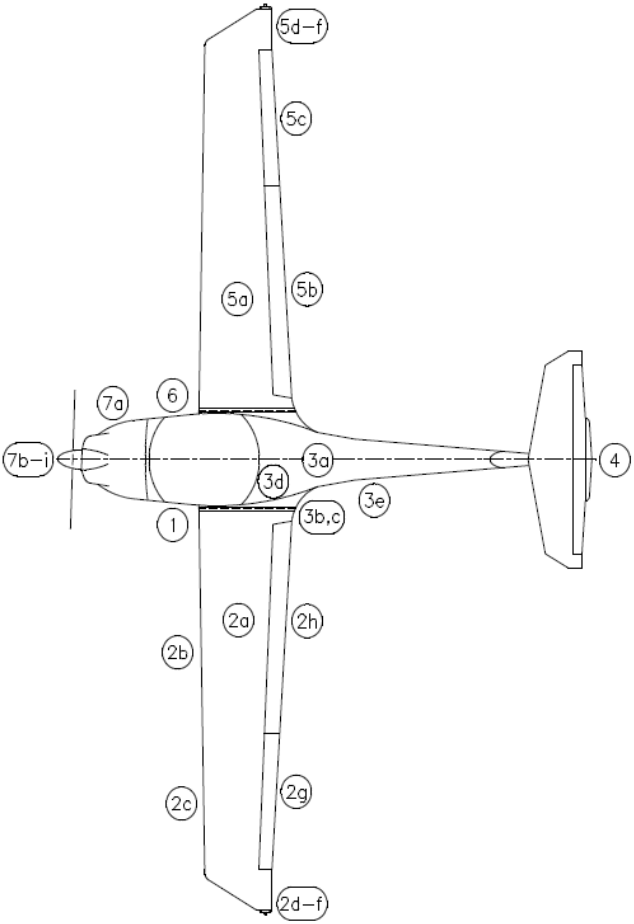
4.4.1 PREFLIGHT INSPECTION

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 dip-stick. 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:
Extremely low temperatures require that the engine be preheated prior to engine start. Satisfactory engine starts have been demonstrated at -31ºF (-35ºC) 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 extremely 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 -5º F (-20º C) turn cabin heat on for at least 10 minutes prior to take-off.

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 13,000 ft.

	Speeds VIAS					
	Flaps T/O			Flaps UP		
ALTITUDE (feet)	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 -10,000	62	71	115	-	-	-
7000 -10,000	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 13,000 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.

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 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 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})