P-750 XSTOL

User Guide

Thank you for purchasing the Orbx P-750 XSTOL!

The Pacific Aerospace P-750 XSTOL is a single engine turboprop utility aircraft with excellent short field take-off and landing performance. The P-750 was designed in Hamilton, New Zealand, making its first flight in 2001. It was certified by the FAA to begin operations in 2004. Only a relatively small number of these aircraft have been produced – less than 200, however the P-750 XSTOL can be found worldwide.

The Orbx P-750 XSTOL comes with 4 variants – passenger, cargo, skydiving and agricultural. Each variant has unique features which are outlined later in this chapter. Powered by the renowned Pratt & Whitney PT6-A engine and a 3-blade fully reversible propeller, the aircraft is one of the best in its class for overall utility and configurability. The unique wing design, with the thick cross section and upward raking of the outboard wing, provides high amounts of lift affording incredible short-field capability for an aircraft with a 7,500-pound maximum take-off weight.

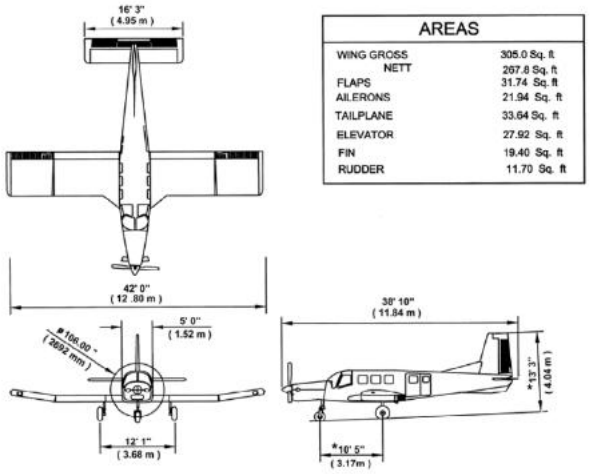

Figure 1-1

THREE VIEW DRAWING

The P-750 XSTOL is regarded as a very easy to fly aeroplane, with docile handling characteristics and fantastic low-speed

handling. Due to the aircraft's DNA being rooted in agricultural and skydive operations, much attention was placed on how well the PAC P-750 performs in the slow speed, high angle of attack regime. Orbx has gone into great effort and detail to faithfully replicate the handling of the aircraft in a custom tuned flight model.

Orbx has aimed to showcase the onboard systems of the PAC P-750, with many custom coded systems to ensure users can fly the aircraft in every way it was designed. Custom avionics and features include but are not limited to:

- Custom S-Tec 55X Autopilot
- Custom electronic HSI
- Optional TDS GTNXi integration
- Optional PMS50 GTN750 integration
- Almost all circuit breakers are functional
- Custom coded engine and fuel system indicators unique to the P-750
- Tablet for changing aircraft settings

This manual will provide explanations of the features and performance data of the Orbx P-750 XSTOL. Whether you want to get in and go or explore the systems, the aircraft is designed to suit both types of pilots. The layout of the manual matches a real pilot operating handbook and contains everything you need to know to fly the aircraft to the best of your ability. Procedures and performance have taken real-world data and adapted to use in the flight simulator, with this manual being written from scratch by a real-world flight instructor and flight simulation subject matter expert.

We hope you enjoy deep diving into this wonderful aircraft platform. The team at Orbx wishes CAVOK days and happy landings.

THE DEVELOPMENT TEAM

Project Lead	Mitchell Williamson
Model and Texturing	Igor Yermolenko
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WITH THANKS TO

Beta Testers	Matt McGee, Rob Abernathy, John Burgess, John Dow Darryl Wightman, James Eden, Ross Casey
Reference Material	Blake Gilmour, Tim Hetherington, Mike Smith, Andrew Hogarth, Jimbo Burgess

Section 1 – General

1.0 Variants Overview

Orbx have created 4 unique variants of the P-750 XSTOL.

Passenger	
Cargo	
Skydive	
Agriculture	

1.1 Passenger Variant

The passenger variant contains seating for 8 passengers and the ability to store cargo in both the belly cargo pod and within the rear cabin cargo bay.

1.2 Cargo Variant

The cargo variant contains the ability to store payload within the cabin, belly cargo pod and rear cabin cargo bay.

1.3 Skydive Variant

The skydive variant contains bench seating, a cabin and crew oxygen supply and roller door.

JUMP LIGHTS

The skydive jump lights can be controlled by enabling the JUMP LT switch and then moving the Jump Light rotary switch to either NO JUMP (Red), ON (Yellow) or JUMP (Green).

ROLLER DOOR

This variant uses a roller-style door instead of the traditional cabin door found on other variants. This door can be opened or closed via the red handle on the door itself, or via the green PULL TO CLOSE ROLLER DOOR handle on the cockpit roof.

1.4 Agriculture Variant

The agriculture variant contains a hopper within the cabin and equipment for distributing fertilizer on the belly of the aircraft.

HOPPER HATCH

The hatch can be operated using the overhead green handle on the cockpit roof, or by using the Tablet.

1.5 Quick Reference Sheet and Checklist

P-750 QUICK REFERENCE SHEET

VATSIM Navigation Equipment Code: /G

AIRPLANE WEIGHTS

Basic Empty Weight.....3100 lbs
Maximum Takeoff Weight.....7500 lbs
Maximum Useful Load.....4400 lbs
Maximum Landing Weight.....7125 lbs

FUEL CAPACITY

TANK	USABLE FUEL
FRONT LEFT TANK	274 litres, 481 lbs 72 US Gallons
FRONT RIGHT TANK	283 litres, 497 lbs 74 US Gallons
REAR LEFT TANK	142 litres, 249 lbs 37.5 US Gallons
REAR RIGHT TANK	142 litres, 249 lbs 37.5 US Gallons
TOTAL	841 litres, 1476 lbs 221 US Gallons

AIRSPEEDS

Never Exceed Speed.....170 KIAS
Max Structural Cruising Speed.....140 KIAS
Maneuvering Speed MTOW.....131 KIAS
Rotate Speed.....61 KIAS
Initial Climb.....74 KIAS
Best Angle Climb.....85 KIAS
Best Rate of Climb.....91 KIAS
Max Flap Ext 20°.....130 KIAS
Max Flap Ext 40°.....120 KIAS
Planned Cruise TAS.....155 KIAS
Initial Approach Speed.....85 KIAS
Final Approach Speed.....75 KIAS

Best Glide Speed MTOW.....100 KIAS

SIMPLE CRUISE PERFORMANCE

Power.....85% Np 1870RPM

Fuel Flow.....185L/hr

Torque.....45 psi

TAS.....156 KTAS

STARTER DUTY CYCLES

30 seconds ON → 60 seconds OFF

30 seconds ON → 60 seconds OFF

30 seconds ON → 30 minutes OFF

POWERPLANT LIMITATIONS

TORQUE

Take-off.....64.5 psi (5 min)
Maximum Continuous.....54 psi
Maximum Cruise.....64.5 psi (5 min)
54 psi (cont.)
Transient.....68.4 psi (20 seconds)

ITT

Take-off.....790°C
Maximum Continuous.....740°C
Maximum Cruise.....740°C
Transient.....850°C (2 seconds)
Starting.....1090°C (2 seconds)

GAS GENERATOR RPM

All Operations.....101.6% Ng
Idle.....52-54% Ng

PROP RPM

Normal Operations.....91.2% / 2006 RPM
Maximum Reverse.....86% / 1892 RPM
Transient.....100% / 2200 RPM

P-750 ABBREVIATED CHECKLIST

MEMORY ITEMS

BEFORE STARTING ENGINE

Preflight Inspection.....COMPLETE
PAX Briefing.....COMPLETE
Cabin Doors.....LOCKED
Crew Entry Doors.....LOCKED
Harnesses.....SECURE
Fuel Shutoff Valve.....ON
Parking Brake.....ON
Power Lever.....CHECK TRAVEL, BETA STOP

Caution: Do not move power lever back into beta range as damages to the control linkages will occur

Propeller Lever.....CHECK TRAVEL
Condition Lever.....CHECK TRAVEL
Flap Lever.....UP
Battery Master Switch.....ON
Generator Master Switch.....OFF
Fuel Switch.....AUTO
Ignition Switch.....AUTO
Start Switch.....OFF
Avionics Master Switch 1 & 2.....OFF
Nav Lights.....ON
External Lights.....OFF
Internal Lights.....AS REQD
Pitot Heat.....OFF
Inertial Separator (IPS).....NORM
Oil Cooler Heater.....NORM
Circuit Breakers.....CHECKED IN
Warning and Caution Panel.....TEST
Annunciator Lights.....CHECKED
Fuel.....SUFFICIENT
ELT.....ARMED
Voltmeter/Ammeter.....MIN 24V

STARTING ENGINE

Power Lever.....IDLE
Propeller Lever.....FEATHER
Condition Lever.....CUT OFF
Area.....CLEAR
Start Switch.....START FOR 1 SEC
Condition Lever.....AT 13-15% Ng - GROUND IDLE
ITT.....MONITOR (MAX 1090°)

AFTER START

Starter Engergised Light.....OFF
Aux Fuel Pump Light.....OFF
Ignition Light.....OFF
ITT.....WITHIN LIMITS
Oil Pressure.....MIN 40 PSI
Oil Temperature.....WITHIN LIMITS
External Power.....DISCONNECTED
Propeller Lever.....FULL FORWARD
Generator Master Switch.....ON, CHARGING
Avionics 1 & 2.....ON
Radios and Navaids.....ON, SET
Inertial Separator.....CHECKED AND SET

BEFORE TAXI

Brakes/Park Brake.....RELEASED
Flight Instruments.....CHECKED

BEFORE TAKEOFF

Trims.....SET FOR TAKEOFF
Flight Instruments.....SET
Propeller.....FEATHER THEN FULL FORWARD
Flaps.....SET FOR TAKEOFF
Fuel.....AUTO/SUFFICIENT/LIGHTS EXT
Engine Instruments.....CHECKED NORMAL
Avionics.....SET
External Lights.....AS REQ
Pitot Heat.....ON/LIGHT OUT
Doors/Harnesses.....SECURE
Annunciator Lights.....ALL EXTINGUISHED
Flight Controls.....FULL, FREE AND CORRECT
Takeoff Safety Brief.....DELIVERED

TAKEOFF

Compass/DI.....ALIGNED
Fuel Condition Lever.....FLIGHT IDLE
Governor Overspeed.....CHECKED
(First flight of the day only)
Brakes.....RELEASED

P-750 ABBREVIATED CHECKLIST

MEMORY ITEMS

AFTER TAKEOFF

Flaps.....RETRACTED
Engine Instruments.....WITHIN LIMITS
Landing Lights.....AS REQUIRED
Climb Speed.....91 KIAS

CRUISE

Power.....SET
45 PSI | 85% Np | 1850RPM
Engine Instruments.....MONITOR
Above 16,000ft (ISA +30°).....FUEL SWITCH MAN

DESCENT

Altimeter.....SET
Power Lever.....AS REQUIRED FOR ROD
Approach Brief.....COMPLETE

BEFORE LANDING

Brakes.....OFF
Propeller Lever.....FULL FORWARD
Condition Lever.....FLIGHT IDLE
Fuel.....INDICATING
Landing Light.....AS REQUIRED
Flaps.....AS REQUIRED
Harnesses.....SECURE

LANDING

Flaps.....40°
Speed.....75 KIAS
Touchdown.....MAIN WHEELS FIRST
Stick.....FULL BACK
Brakes.....APPLY

AFTER LANDING

Flaps.....RETRACT
Landing Lights.....OFF
Pitot Heat.....OFF
Condition Lever.....GROUND IDLE

SHUTDOWN

Inertial Separator.....NORM
Power Lever.....IDLE
Park Brake.....ON
Propeller Lever.....FEATHER
Fuel Condition Lever.....CUT-OFF
Lights.....OFF
Avionics Master Switches.....OFF
Engine Switches.....OFF
Generator Master Switch.....OFF
Battery Master Switch.....OFF

SECURING AIRCRAFT

Control Lock.....FITTED
Doors.....CLOSED
Wheel Chocks.....IN PLACE
Pitot Cover.....FITTED
Exhaust Covers.....FITTED
Air Inlet Cover.....FITTED

AIRSPEEDS FOR EMERGENCY OPERATIONS

EFATO (Based on 7500lbs)
Flaps Up.....95 KIAS
Flaps 20°.....80 KIAS

MAXIMUM GLIDE SPEEDS
7500 lbs.....100 KIAS
6500 lbs.....93 KIAS
5500 lbs.....86 KIAS
4500 lbs.....78 KIAS

MANEUVERING SPEEDS
7500 lbs.....131 KIAS
6500 lbs.....122 KIAS
5500 lbs.....112 KIAS
4500 lbs.....101 KIAS

Section 2 – Limitations

AIRCRAFT LIMITATIONS

The Orbx P-750 XSTOL is equipped for VFR, night VFR and IFR (category A) operations.

STARTER DUTY CYCLES: The starter is limited to the following time limits to prevent overheating and damage:

30 seconds ON	60 seconds OFF
30 seconds ON	60 seconds OFF
30 seconds ON	30 minutes OFF

POWERPLANT LIMITATIONS:

POWER SETTING	TORQUE psi	MAX. ITT °C	GAS GEN. RPM % Ng	PROP RPM % Np (RPM)	OIL PRESS psi	OIL TEMP. °C	SHAFT HORSE-POWER
Takeoff	64.5 (2)	790	101.6	91.2 (2006)	85-105	10-99	750 (31 °C)
Maximum Continuous	54	740	101.6	91.2 (2006)	85-105	10-99	633
Maximum Climb	54	740	101.6	91.2 (2006)	85-105	0-99	633
Maximum Cruise	64.5 (2) 54	790 740	101.6 101.6	91.2 (2006) 91.2 (2006)	85-105 85-105	0-99 0-99	750 633
Idle	-	685	52-54	-	40	-40-99	-
Maximum Reverse	64.5 (2)	790	101.6	86 (1892)	85-105	0-99	-
Transient	68.4 (5)	850 (3)	102.6 (3)	100 (2200)	85-105	0-99	-
Starting	-	1090 (3) (4)	-	-	-	-40	-

(1) All limits are based on sea level
(2) 5 minute time limit
(3) These values are limited to two (2) seconds
(4) Starting temperatures above 850^{0}C should be investigated for cause
(5) Time limited to 20 seconds

FUEL LIMITATIONS:

TANK	TOTAL CAPACITY	UNUSABLE FUEL	USABLE FUEL
FRONT LEFT TANK	284* litres, 499 lbs 75* US Gallons	10 litres, 18 lbs 3 US Gallons	274 litres, 481 lbs 72 US Gallons
FRONT RIGHT TANK	293 litres, 515 lbs 77 US Gallons	10 litres, 18 lbs 3 US Gallons	283 litres, 497 lbs 74 US Gallons
REAR LEFT TANK	142 litres, 249 lbs 37.5 US Gallons	0	142 litres, 249 lbs 37.5 US Gallons
REAR RIGHT TANK	142 litres, 249 lbs 37.5 US Gallons	0	142 litres, 249 lbs 37.5 US Gallons
TOTAL	861 litres, 1512 lbs 227 US Gallons	20 litres, 36 lbs 6 US Gallons	841 litres, 1476 lbs 221 US Gallons

*Includes 26 litres (6.8 US Gallons) of fuel in collector tank

MAXIMUM OPERATING ALTITUDE LIMIT: 20000ft

FLAP LIMITATIONS:

TAKEOFF FLAP 20°

LANDING FLAP 40°

Refer to section 4 Normal Procedures for recommended flap operating speeds.

WEIGHT LIMITS:

MAXIMUM TAKEOFF 7500 lbs

MAXIMUM LANDING 7125 lbs

BASIC EMPTY WEIGHT: 3100 lbs

MAXIMUM USEFUL LOAD: 4400 lbs

Section 3 – Emergency Procedures

This section contains abbreviated procedures relevant to the Orbx P-750 XSTOL and provide general information for emergencies within the scope of the flight model and simulator limitations.

ENGINE FAILURE AFTER TAKEOFF

Speeds based on MTOW but may be used at lesser weights

Flaps Up: 95 KIAS

Flaps 20°: 80 KIAS

MAXIMUM GLIDE SPEEDS		MANEUVERING SPEEDS	
7500 lbs:	100 KIAS	7500 lbs:	131 KIAS
6500 lbs:	93 KIAS	6500 lbs:	122 KIAS
5500 lbs:	86 KIAS	5500 lbs:	112 KIAS
4500 lbs:	78 KIAS	4500 lbs:	101 KIAS

The PAC P-750 XSTOL will glide approximately 1.7 nautical miles for every 1000ft of altitude loss.

ENGINE FAILURE DURING TAKEOFF

Power Lever	IDLE
Brakes	MAXIMUM BRAKING

IF UNABLE TO STOP ON REMAINING RUNWAY

Flaps	UP
Propeller Lever	FEATHER
Fuel Condition Lever	CUT OFF
Fuel Shutoff Valve	OFF
Radio	DISTRESS CALL
Battery and GEN Master	OFF

Section 4 – Normal Procedures

4.0 Introduction

This section outlines procedures for normal operations and have been modified to align with operations in the flight simulation environment. For this reason, procedures involving the external inspection of the aircraft have been deliberately omitted.

4.1 Before Engine Start

Pre-Flight Inspection	COMPLETE
Weight and Balance	COMPLETE
Cabin Door	CLOSED AND LOCKED
Flight Controls	FULL, FREE AND CORRECT SENSE
Lighting Dimmers	OFF
Fuel Shut Off Valve	ON
Parking Brake	ON
Power Lever	CHECK TRAVEL, BETA STOP FREE OPERATION

Caution: do not move power lever back into the beta range with the engine not running, as damage to the control linkages will occur.

Propeller Lever	CHECK TRAVEL
Fuel Condition Lever	CHECK TRAVEL
Flap Lever	UP POSITION
Battery Master Switch	ON
Generator Master Switch	OFF
Fuel Switch	AUTO
Ignition Switch	AUTO
Start Switch	OFF
Avionics Master Switch 1	OFF
Avionics Master Switch 2	OFF
Navigation Lights	AS REQUIRED

Landing Lights	OFF
Strobe Lights	OFF
Cabin Lights	AS REQUIRED
Map Lights	AS REQUIRED
Jump Light	OFF
Instrument Lights	AS REQUIRED
Pitot Heat	OFF
Inertial Separator (IPS)	NORM/NORMAL
Oil Cooler Heater	NORM/NORMAL
Circuit Breakers (Left Panel)	ALL IN
Governor Overspeed Test Button	CHECK CONDITION
Warning and Caution Panel	PRESS TO TEST (ensure all lights operating, release), SET TO DAY/NIGHT AS REQUIRED
Annunciator Lights	CHECK (Confirm correct light illumination)
Fuel Contents Indicator Front	CHECK LEFT/RIGHT AND SUFFICIENT FUEL
Fuel Contents Indicator Rear	CHECK LEFT/RIGHT AND SUFFICIENT FUEL
ELT	ARMED
Trim/Flap Position Indicators	CHECKED
Voltmeter	MINIMUM 24 VOLTS
Circuit Breakers (Right Panel)	ALL IN
Crew Doors	CLOSED AND LOCKED

4.2 Use of External Power

Battery Master Switch	OFF
External Power Supply	CONNECT
Battery Master Switch	ON
Volts	MINIMUM 24 VOLTS

4.3 Engine Starting

Power Lever	IDLE
Propeller Lever	FEATHER
Fuel Condition Lever	CUT OFF
Area	CLEAR
Start Switch	SELECT START

CAUTION

Ensure the fuel condition lever is in the CUT OFF position (fully aft) before start otherwise an over temperature condition will result during engine start.

Fuel Condition Lever	AT 13-15% Ng MOVE FUEL CONDITION LEVER FORWARD TO GROUND IDLE POSITION

CAUTION

If ITT increases rapidly towards 1090°C be prepared to return the Fuel Condition Lever to CUT OFF

CAUTION

Do not exceed starter time limits detailed in Section 2 – Limitations

CAUTION

If the engine fails to start within 10 seconds after moving the fuel condition lever to the GROUND IDLE position move the fuel condition lever to the CUT OFF position. Allow a 30 second fuel draining period followed by a 15 second dry motoring run before attempting another start.

CAUTION

If for any reason a start is discontinued, allow the engine to come to a complete stop and then complete a dry motoring run.

CAUTION

After completing a dry motoring run ensure the entire starting sequence is completed.

Starter Energised Light	CHECK OFF
Aux Fuel Pump Light	CHECK OFF
Ignition Light	CHECK OFF
Oil Pressure	CHECK 40 PSI MINIMUM
ITT	INDICATING, CHECK WITHIN LIMITS
Oil Temperature	CHECK WITHIN LIMITS
External Power	DISCONNECT (IF USED)
Propeller Lever	FULLY FORWARD Np CHECK 52-54%
Generator Master Switch	ON, CHECK CHARGING, AMPS DECREASING

4.4 Dry Motoring Run

Ignition Switch	OFF
Start Switch	SELECT START
Start Switch	SELECT OFF AFTER 30 SECONDS

4.5 Before Taxi

Avionics Master Switch 1	ON
Avionics Master Switch 2	ON
Radios and Nav Aids	ON AND SET
Flaps	CHECK NORMAL OPERATION AND RETRACT
Inertial Separator (IPS)	CHECK OPERATION, SELECT “BYPASS”, CHECK “ENGINE ANTI ICE/BYPASS” ANNUNCIATOR LIGHT ON. RETURN TO NORM/NORMAL IF NOT REQUIRED. LEAVE IN “BYPASS” IF THERE IS A POSSIBILITY OF INGESTING FOREIGN MATERIAL INTO THE ENGINE

4.6 Taxiing

Parking Brake	RELEASED
Brakes	CHECK OPERATION
Flight Instruments	CHECK

4.7 Before Take-off

Trims	SET TAKEOFF POSITION (ELEVATORS AS REQUIRED FOR WEIGHT AND BALANCE), RUDDER AND AILERON TRIMS NEUTRAL
Propeller	FEATHER, THEN FULLY FORWARD MAX RPM
Flap	SET FOR TAKEOFF (20° RECOMMENDED FOR NORMAL OPERATION)
Fuel	VALVE ON, FUEL SWITCH AUTO, CONTENTS SUFFICIENT, PRESSURE IN LIMITS, FUEL ANNUNCIATOR LIGHTS EXTINGUISHED
Engine Instruments	TEMPERATURES AND PRESSURES WITHIN LIMITS
Flight Instruments	ALTIMETER SET, AH SET
Avionics	ON AND SET
Pitot Heat	ON
Lighting	EXTERNAL LIGHTS AS REQUIRED
Inertial Separator (IPS)	NORM/NORMAL OR BYPASS AS REQUIRED
Annunciator Lights	ALL EXTINGUISHED
Doors	CLOSED AND LOCKED
Flight Controls	AILERON AND ELEVATOR FULL AND FREE MOVEMENT (*Avoid testing rudder on ground as damage to nose-wheel steering can occur)*
Departure Briefing	COMPLETE

4.8 Normal Take-off and Climb

Lined Up on Runway	CHECK COMPASS ALIGNED WITH RUNWAY
Fuel Condition Lever	FLIGHT IDLE
Brakes	HOLD
Power Lever	SMOOTHLY ADVANCE TO TAKEOFF POWER, OBSERVE ITT AND ENGINE LIMITS
Engine Instruments	WITHIN LIMITS
Brakes	RELEASE
Rotation	61 KIAS
Initial Climb	74 KIAS
Clear of Obstacles	ACCELERATE TO 91 KIAS
Flaps	RETRACT AT SAFE ALTITUDE
Altimeter	SET 1013/29.92 PASSING TRANSITION ALTITUDE

4.9 Cruise

Cruise Power	SET AS REQUIRED (SEE SECTION 5)
Engine Instruments	MONITOR TORQUE AND ITT LIMITS

4.9 Descent

Destination Altimeter	SET
Power Lever	SET AS REQUIRED FOR DESIRED RATE OF DESCENT

4.10 Before Landing

Power Lever	AS REQUIRED
Propeller Lever	MAX RPM
Fuel Condition Lever	FLIGHT IDLE
Flaps	AS REQUIRED
Landing Light	ON
Brakes/Parking Brake	OFF

4.11 Landing

Flaps	40°
Speed	75 KIAS
Landing	MAIN WHEELS FIRST
Power Lever	IDLE STOP
Brakes	APPLY AS REQUIRED
Power Lever	BETA (OPTIONAL)

4.12 Balked Landing

Power Lever	SET TAKEOFF POWER
Flaps	RETRACT TO 20°
Climb Speed	MINIMUM 75 KIAS
Clear of Obstacles	ACCELERATE TO 91 KIAS
Flaps	RETRACT TO 0° AT A SAFE HEIGHT

4.13 After Landing

Flaps	RETRACT
Landing Lights	OFF
Pitot Heat	OFF
Fuel Condition Lever	GROUND IDLE

4.14 Shutdown

Inertial Separator (IPS)	NORM/NORMAL
Power Lever	IDLE
Park Brake	SET ON
Propeller Lever	FEATHER
Fuel Condition Lever	CUT OFF AFTER MINIMUM 1 MINUTE WITH POWER LEVER AT IDLE, CHECK FOR ITT DECREASE

CAUTION

On engine shutdown observe ITT and Ng indications to observe immediate fuel cut off. If immediate fuel cut off not evident close the fuel valve.

Oil Cooler Heater	NORM/NORMAL
Internal and External Lights	OFF
Avionics Master Switch 1	OFF
Avionics Master Switch 2	OFF
Start Switch	OFF
Ignition Switch	OFF
Generator Master Switch	OFF
Battery Master Switch	OFF
Fuel Shut Off Valve	OFF

Section 5 – Performance

The Orbx P-750 XSTOL has used real-world data to construct a flight model that is as accurate as possible within reasonable limitations of the simulator. The performance data provided in this section has been taken from the real aircraft however simplified for ease of use. It Is sufficient for use in general simulator flying.

5.1 Take-off Distance

Take-off distance required is calculated off the below conditions:

NORMAL TAKEOFF TECHNIQUE

Conditions:

Power:	Take-off power set before brake release
Flap:	20°
Propeller:	91.2% Np (2006 RPM)
Inertial Separator:	Normal (increase distances by 3% when IPS BYPASS)
Runway:	Paved, level, dry surface

TAKEOFF DISTANCE REQUIRED

Take-off Weight (lbs)	Take-off Speed KNOTS (IAS)		Pressure Altitude (ft)	ISA		ISA +30°C	
	Rotate Speed	Speed at 50ft		Ground Roll (ft)	Total to Clear 50ft (ft)	Ground Roll (ft)	Total to Clear 50ft (ft)
7500	61	76	Sea Level 6,000	1244 1724	1695 2345	1603 2341	2250 3457

1. Decrease distances by 7% for each 5 knots headwind
2. Increase distances by 12.5% for each 2.5 knots tailwind UP TO 10 KNOTS
3. Grass surfaces increase distances by 15%

5.2 Climb Performance

Rate of climb will vary day to day however the following baseline data can be used for planning purposes:

7500 lbs (MTOW)		**Rate of Climb (feet per minute)**	
Altitude (ft)	*KIAS*	*ISA*	*ISA +30°C*
0	91	1,067	1,026
4,000	91	1,015	908
8,000	91	951	689
12,000	91	823	495
16,000	91	515	148
20,000	91	338	5

5.3 Time, Fuel and Distance to Climb

The below table is data taken from the PAC 750 POH, using an ISA day at Maximum Take-off Weight. Times are cumulative and calculated *from* sea level. For example, climbing from 12,000 to 16,000ft will take 6 minutes and will use 20 litres of fuel.

TIME FUEL AND DISTANCE TO CLIMB AT MAXIMUM TAKEOFF WEIGHT

Press. Alt ft	Speed	Time min	Distance NM	Fuel Litres (lbs)
Sea Level	-----	-----	----	----
4000	91 KIAS	4	6	15 (27)
8000	91 KIAS	8	13	31 (55)
12000	91 KIAS	12	21	47 (83)
16000	91 KIAS	18	33	67 (118)
20000	91 KIAS	28	52	95 (168)

5.4 Cruise Performance

For simulator operations, the following data will provide a good balance between range, endurance, and speed.

Simplified data as follows:

PWR	85% Np 1870RPM	**F/F**	185L/hr	**RANGE**	657NM
TQ	45 psi	**TAS**	156 KTAS	**END**	~ 4hrs

5.5 Time, Fuel and Distance to Descend

Pressure Altitude (ft)	Time (min)	Distance (nm)	Fuel litres (lbs)
20,000	25	71	64 (113)
16,000	20	55	51 (90)
12,000	15	40	39 (69)
8,000	10	26	26 (46)
4,000	5	13	13 (23)
Sea Level	0	0	0 (0)

5.6 Landing Distance

Landing distance is calculated off the following conditions:

NORMAL LANDING TECHNIQUE

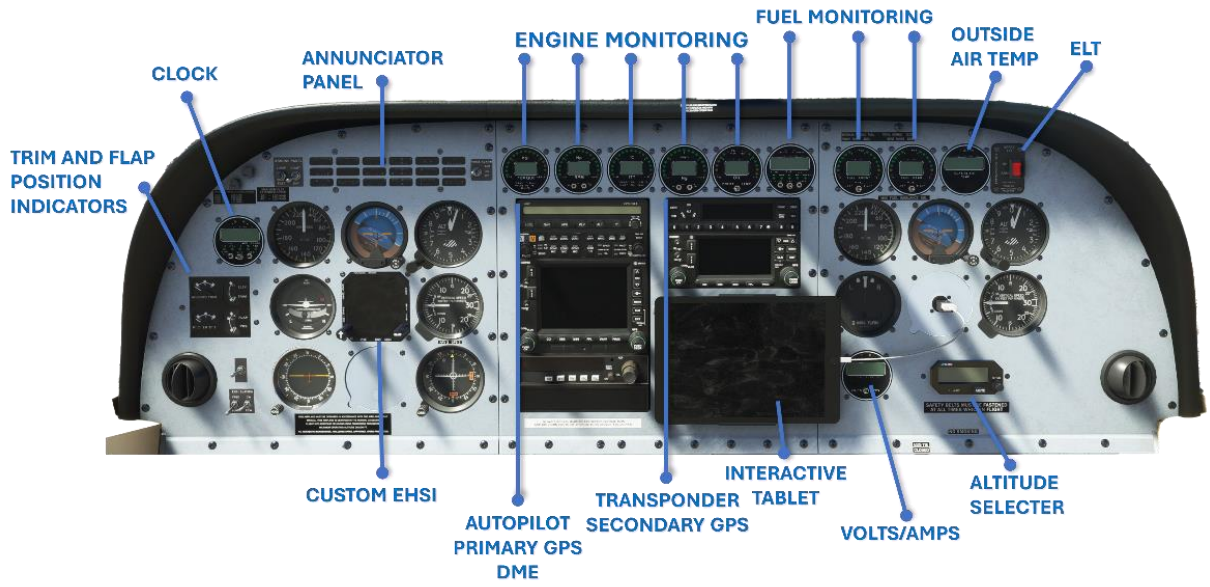
Conditions:

Power: To maintain 3° approach path
Flap: 40°
Propeller: Maximum RPM
Airspeed: 1.3 Vso to 50ft then reducing
Braking: Maximum wheel braking
Surface: Paved, level, dry runway

Landing Weight (lbs)	Landing Speed KNOTS (IAS)		Pressure Altitude (ft)	ISA		ISA +30°C	
	Approach	Threshold		Ground Roll (ft)	Total to Clear 50ft (ft)	Ground Roll (ft)	Total to Clear 50ft (ft)
7,125 and all lesser weights	75	1.3x Vso to 50ft then reducing	Sea Level	866	2075	911	2164
			6,000	1024	2390	1137	2618

1. Decrease distances by 7% for each 5 knots headwind
2. Up to 10 knots tailwind increase distances by 12% for each 2.5 knots of tailwind
3. For grass runways, increase distances by 15%
4. Use of beta and reverse thrust can reduce ground roll distance by 5%

Section 6 – Systems



6.1 Annunciator Panel

The annunciator panel is in the pilot's forward line of sight at the top of the instrument panel. There are 4 colours of light displayed to the pilot:

Green Light	Indicates a condition that is safe and normal
Blue Light	Indicates the operation of a piece of equipment not normally used during normal operations
Amber Light	Indicates a cautionary condition that may or may not require immediate corrective action
Red Light	Indicates an emergency condition and requires immediate corrective action

Figure 1X: Location of annunciator panel

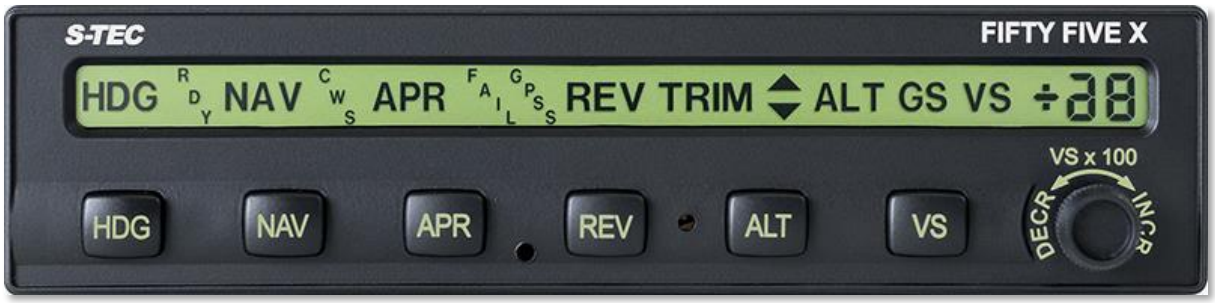
The **LAMP TEST** button illuminates all annunciator globes when pressed and extinguish when released. **NIGHT** dims annunciators to 50% brightness other than red annunciators.

DESCRIPTION OF ANNUNICATOR LIGHTS

ANNUNCIATOR	MEANING	ACTIONS
OIL PRESS LOW	Engine oil pressure below 25 psi	*Refer to Low Oil Pressure emergency checklist*
GENERATOR OFF	Generator offline	*Proceed as for Generator Failure emergency checklist*
LOW FUEL LEVEL	1. Check fuel contents, if indicating zero fuel there is a maximum of 24 litres (6.3 U.S. gallons, 42 lbs) of fuel remaining for flight. 2. Check fuel contents, if indicating that there is fuel in the tanks a fuel tank jet pump failure has occurred.	*Refer Low Fuel Level Light Illuminates emergency checklist*
FUEL FILTER BYPASS	Airframe fuel filter has been bypassed	*Refer to Fuel filter Bypass emergency checklist*
BETA	Propeller is set in beta range	*Nil*
ENGINE ANTI-ICE	Inertial separator door lowered	*Vacate icing conditions*
DOOR UNSAFE	Cargo door unlocked	*Refer to Inadvertent Opening of Airplane Doors In Flight emergency checklist*
CHIP DETECTOR	Engine reduction gearbox contamination	*Refer to Engine Gear Box Contamination emergency checklist*
BUS FAULT	Power failure to one of the two electrical buses.	*Refer Electrical Bus Failure emergency checklist*
STARTER ENERGISED	Starter in operation	*If light remains on after start and attaining 52% Ng select start interrupt.*
IGNITION ON	Igniters are operating	*Deselect when finished using igniters*
EXTERNAL PWR	External power connected	*Ensure external power disconnected and light out prior to taxi*
HEATER HOT	The temperature sensor under the instrument panel has reached 100ºC	*Shut off the heater. Pull the Diffuser Air fully ON. Pull the Cockpit Air control fully ON*

FLAP FAULT	The flap asymmetry switches have sensed a fault and isolated the flap motor.	*No corrective action possible. Continue flight with flaps at failed position.*
PITOT STATIC HEAT INOP	Pitot heat is either selected off, or if selected on the heating element in the pitot heat is defective.	*Avoid moisture and icing conditions*
FUEL PRESS LOW	Mechanical fuel pump pressure has decreased below 6 psi. Light will extinguish when pressure from the electric fuel pump increases system pressure to 9 psi.	*Refer Engine Driven Pump Failure emergency checklist*
AUX FUEL PUMP ON	Electric fuel pump operating	*Refer Engine Driven Pump Failure emergency checklist*

6.2 S-Tec 55X Autopilot



GENERAL AUTOPILOT FUNCTIONALITY

The S-Tec 55X is a 2-axis autopilot and has the standard lateral and vertical guidance modes found in most modern autopilots.

HDG	Heading hold – autopilot will hold the heading selected on the EHSI.
ALT	Altitude hold – autopilot will hold the altitude selected in the altitude selector on the lower-right side of the main panel
NAV	Lateral navigation – Autopilot will maintain lateral guidance via the navigation source selected on the EHSI. In GPS mode, autopilot will follow the GPS flight plan. In NAV mode, autopilot will hold the selected VOR or LOC radial. Desired course is set with the CRS rotary knob on the EHSI.
VS	Vertical Speed mode – autopilot will maintain a set rate of climb or descent selected using the rotary knob on the right-hand side of the autopilot module.
APR	Approach mode – autopilot will provide lateral approach guidance. Vertical guidance only available with ILS approaches.

SA-200 ALTITUDE PRE-SELECT

The SA-200 altitude pre-select is located on the bottom-right side of the main instrument panel. It is used to select a desired altitude for autopilot capture and will warn the pilot upon approaching the selected altitude (1000ft above and below). Alerts can be muted by pressing the MUTE button on the unit. Altitude selection is made in 100ft increments. The selector is barometrically corrected to ensure accurate altitude capture with current altimeter setting.

6.3 Clock

The digital clock located on the upper-left side of the main panel is an Electronics International SC-5. The clock has 5 display modes, indicated by the LED, and changed with the STEP switch.

When the airplane BATTERY MASTER is turned on, the clock will perform a self-diagnostic test, display “88:88” and flash the yellow warning LEDs.

CLOCK MODES

PAGE	NAME	FUNCTION
	LOCAL CLOCK	*Clock will display local time*
	ZULU CLOCK	*Clock will display Zulu (UTC) time*
	UP TIMER	*This timer counts up and can be reset. It starts automatically when the BATTERY MASTER switch is turned on.*

	DOWN TIMER	*This timer counts down from a pilot selectable interval. The DN warning LED will flash when the clock reaches 0.* ***Currently only able to count down from 30 minutes.***
	ENGINE TIME	*This mode the clock records the total time the generator is online. This timer cannot be reset. It will display time in hours, tenths, and hundredths of an hour by pressing the RESET button.* *Current time mode will be indicated in the top right of the LCD screen.*

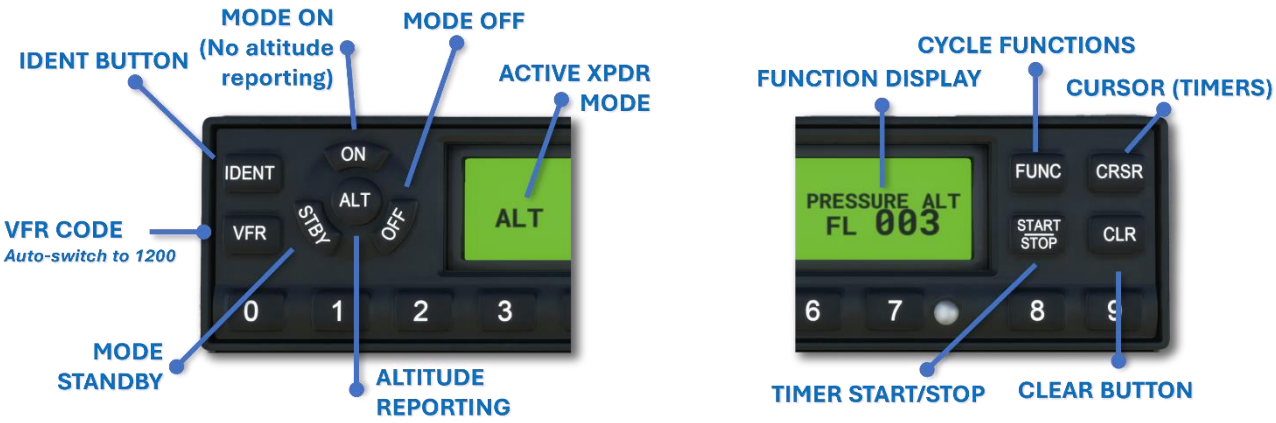
CLOCK FUNCTIONS

6.4 Garmin GTX330 Transponder

The Garmin GTX330 is an IFR certified transponder. Its ICAO code is **H**.

The GTX330 also has multiple functions, which appear on the right-hand side of the LCD display. They are operated using the buttons on the right-hand side of the unit. By default, the PRESSURE ALT function will load on unit startup.

GTX330 FUNCTIONALITY



The bottom number pad is used to enter a squawk code or count-down timer start. The active transponder code is shown in the middle of the LCD screen.

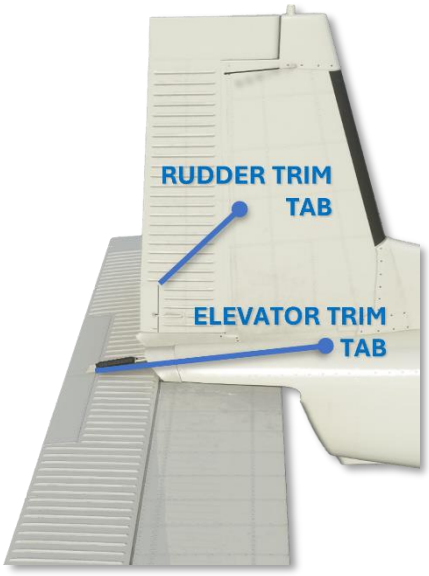
GTX330 FUNCTION PAGES

DISPLAY	FUNCTION	DISPLAY	FUNCTION
PRESSURE ALT FL 003	Displays pressure altitude detected by the unit	OAT 15°C DALT 325ft	Outside air temperature and current density altitude
COUNT DOWN 00:00:00	Count down timer, select time using the **CRSR** and number keys. Press START/STOP to control.	COUNT UP 00:00:00	Count up timer. Press **START|STOP** to control.
FLIGHT TIME 00:00:00	Flight time timer. Starts when aircraft airborne.		

6.5 Trim and Flaps

TRIM

The P-750 XSTOL has trimmable elevators, ailerons, and rudder.



An electric trim tab is fitted on the trailing edge of the elevator and left-hand aileron and is controlled by the use of the trim switch located on the control column. Fore and aft movement control the elevator trim tab. Left and right movement control the aileron trim tab. A manual override is provided for both trim tabs as a handle above the pilot's seating position.

Rudder trim is manually operated through the use of a crank handle located above the pilot's seating position.

The cockpit indications for elevator, aileron and rudder trim are located on the left-hand side of the main instrument panel.

These indicators will not show actual tab position if there is no electrical power being supplied to the aircraft.

FLAPS

The PAC 750XL is equipped with single slotted flaps, with a range of travel between 0° and 40°. They are operated with the flap lever (pictured right).

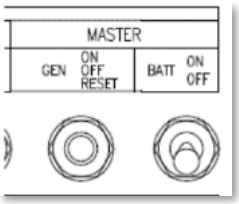
Flap travel is indicated on the panel shown above. The flaps are electrically driven, protected by 2 circuit breakers, labelled FLAP PWR and FLAP CON on the right circuit breaker panel. A red warning light marked FLAP FAULT will illuminate on the annunciator panel when electrical supply to the flaps fails.

There is a microswitch in the flap system to detect asymmetry, and this will automatically disable the flap motor if an asymmetry is detected.

6.6 Electrical System

The electrical system is a 28-volt DC system powered by 2 internal sources. The generator system, powered by the engine, is the main power source under normal conditions. When generator power is unavailable, the battery provides power to the electrical busses.

Control of the electrical power is by the battery and generator master switches, labelled BATT and GEN (pictured right). These switches are located next to each other on the far right of the switch panel directly in front of the pilot. Monitoring of the electrical system is through the combined voltmeter/ammeter on the lower right-hand side of the instrument panel.



Ammeter readout

Voltmeter readout

BATTERY

The battery is a 24-volt system wired to Bus 1 and Bus 2. The system supplies power for engine start and operation of the electrical system when the generator is not running or has failed. The battery is isolated from the bus bars by the master relays when the BATT switch is OFF.

GENERATOR

The generator system comprises a starter/generator, a Generator Control Unit (GCU), a relay, a GENERATOR MASTER switch (marked GEN), 2 circuit breakers (GCU and GEN) and associated warning annunciator lights.

One the engine is running and above a power setting of **50-55% Ng**, the generator switch may be placed in the ON position and will be the primary source of electrical power for the aircraft. The GCU provides protection from over voltage and reverse current situations.

START SWITCH

The START switch is a spring-loaded toggle switch with three positions, START, OFF and INTER/INTERRUPT. The start switch energises the ignition and engine starting circuits. Selecting INTER will de-energise the ignition and engine starting circuits.

IGNITION SWITCH

The ignition switch labelled IGN has three positions, AUTO, CONT/CONTINUOUS and OFF. The AUTO position arms ignition so that ignition will be obtained when the starter switch is activated. This position is used during all ground starts. The CONT position is always used in flight.

CIRCUIT BREAKERS

The Orbx P-750 XSTOL has simulated the circuit breaker system according to the below table, extracted from data from the real aircraft. The amps column details the amperage at which the circuit breaker will trip.

CIRCUIT BREAKER LABEL	AFFECTED EQUIPMENT/SERVICE	AMPS
PORT T & B	Pilot's turn and slip	5
PORT DG	Pilot's directional gyro	5
PORT AH	Pilot's artificial horizon	5
MISC	Stall warning vane	5
ITT	ITT indicator	3
AUDIO	Audio panel	3
BUS 1	Bus Bar 1	50
AV 1	COM/NAV1, DME	20
AV1-AV2 BUS LINK	Bus link	25
AV 2	Transponder, COM 2, ADF	20
BUS 2	Bus bar 2	50
FLAP PWR	Flap drive motor	35
FLAP CON	Flap control	5
FLAPS	Flap system	10
ANN PANEL	Annunciator panel	3
TQ IND	Torque indicator	3
P3 HEAT	Engine P3 heat	5
TRIMS	Trim indicator	5
DME	DME	5
REM GYRO	Remote compass system gyro	3
AV FAN	Avionics cooling fan	3
NAV 1, GPS NAV 1	Navigation/GPS 1	5
GPS COM 1, COM TX 1	COM 1 transmitter	10
NAV 2	GPS 2	5
GPS COM 2	GPS COM 2	10
TXPDR	Transponder	5
ENCODE/ENCODER	Altitude encoder	3
ADF	ADF	3
AMPLIFIER/SPKR	Amplifier	5
CD/STEREO	CD/Stereo player	5
STBD T & B	Right-hand turn and slip	5
STBD DG	Right-hand directional gyro	5
STBD AH	Right-hand artificial horizon	5
GCU	Generator Control Unit	10
IPS/INERTIAL SEPARATOR	Inertial separator	5
PITOT	Pitot heater	10
START	Start switch	10

IGN	Ignition	5
FUEL/FUEL PUMP	Electric fuel pump	5
GEN	Generator	5
DEMIST*	Windscreen demist	5
OIL COOL	Oil cooler heater	5
INST LT*	Instrument lights	5
JUMP LT*	Jump lights	5
CAB LT*	Cabin lights	5
STROBE*	Jump lights	5
LDG LT*	Landing lights	10
NAV LT*	Navigation lights	5
DIGITAL INST 1	Ng indicator, clock, fuel quantity indicator rear tanks, fuel system indicator, volt/ammeter	3
DIGITAL INST 2	Np indicator, fuel quantity indicator front tanks, oil temperature/pressure indicator, OAT indicator	3

**Switch/circuit breaker*

6.7 Fuel System

The fuel system on the P-750 XSTOL consists of 2 tanks (front and rear) per wing in both wings. Total usable fuel capacity with all 4 tanks full is **841 litres**. Fuel is delivered under constant pressure to the engine when the fuel shutoff valve and electric fuel pump are both ON.

Warning: do not fill the rear tanks unless the front fuel tanks are full.

FUEL TANK CAPACITIES

TANK	TOTAL CAPACITY	UNUSABLE FUEL	USABLE FUEL
FRONT LEFT TANK	284* litres, 499 lbs 75* US Gallons	10 litres, 18 lbs 3 US Gallons	274 litres, 481 lbs 72 US Gallons
FRONT RIGHT TANK	293 litres, 515 lbs 77 US Gallons	10 litres, 18 lbs 3 US Gallons	283 litres, 497 lbs 74 US Gallons
REAR LEFT TANK	142 litres, 249 lbs 37.5 US Gallons	0	142 litres, 249 lbs 37.5 US Gallons
REAR RIGHT TANK	142 litres, 249 lbs 37.5 US Gallons	0	142 litres, 249 lbs 37.5 US Gallons
TOTAL	861 litres, 1512 lbs 227 US Gallons	20 litres, 36 lbs 6 US Gallons	841 litres, 1476 lbs 221 US Gallons

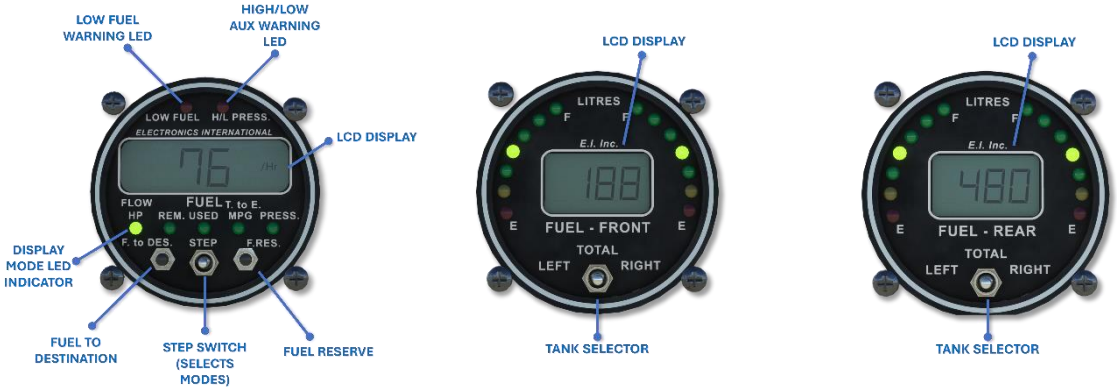
*Includes 26 litres (6.8 US Gallons) of fuel in collector tank

AUXILLARY FUEL PUMP

The AUX FUEL PUMP switch has 3 positions – AUTO, OFF, and MAN (MANUAL). In normal circumstances, the pump runs during engine start and normal operations. During start and normal operation, the switch should be set to AUTO.

If the engine driven fuel pump fails, with the auxiliary fuel pump switch in AUTO, the pump will automatically come online to provide enough fuel to the engine.

FUEL INDICATING INSTRUMENTS



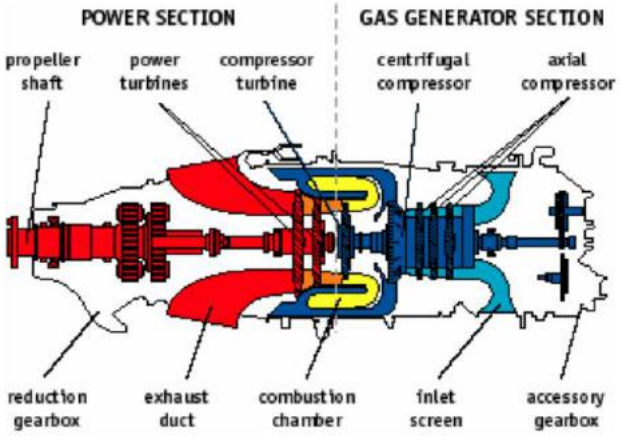
FUEL SYSTEM INDICATOR

PAGE	NAME	FUNCTION
	FLOW	*Displays fuel flow in litres per hour*
	REM	*Total fuel remaining in litres*
	USED	*Displays fuel used in litres since last reset*
	T to E	*Time to empty in minutes*
	PRESS	*Displays fuel pressure in psi*

6.8 Engine

GENERAL DESCRIPTION

The P-750 XSTOL is powered by a Pratt & Whitney Canada PT6A-34 750 shaft horsepower free turbine engine, utilizing two independent turbine sections: one driving the compressor in the gas generator section and the second driving the propeller shaft through a reduction gearbox.



Engine schematic (POH extract)

The PT6 is a reverse-flow turbine engine, with air entering the rear of the engine through an air intake on the bottom of the cowling and exiting the engine through an exhaust duct at the front of the engine just behind the propeller.

INERTIAL SEPARATOR

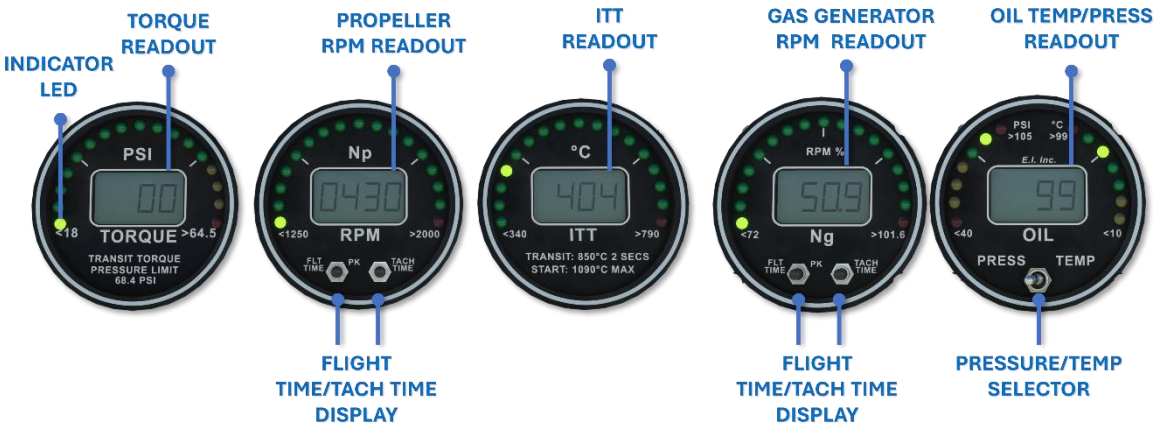
An inertial separator is fitted in the engine inlet duct. The purpose of the inertial separator (IPS), when selected to BYPASS is to minimise the possibility of ingesting undesirable material into the engine such as ice, snow, dust, and sand. The inertial separator (IPS), when selected to BYPASS, creates an airflow path which makes it difficult for solid particles to follow and they are directed overboard. Use of the inertial separator is permitted for all phases of flight including take-off and landing.

The inertial separator (IPS) when in BYPASS does not allow the most efficient flow of air into the engine so there is some performance degradation. Refer to Section 5 for performance data with inertial separator (IPS) selected to BYPASS.

It is recommended that the inertial particle separator (IPS) is selected to the BYPASS position in the following conditions:

> When airplane operations require the use of contaminated runway surfaces (e.g. surface water, snow) and when encountering visible moisture below +5°C.

ENGINE INDICATING SYSTEMS AND INSTRUMENTS



TORQUE INDICATOR

The indicator measures the engine torque in pounds per square inch (psi) and comprises of a digital and analogue display. The analogue display contains green lights, signalling normal operating range, yellow lights signifying that the torque is above the maximum continuous limit and one red light indicating torque has exceeded the maximum limit. The digital display provides a precise measurement at a refresh rate of 2 Hz (twice per second).

PROPELLER RPM (Np) INDICATOR

The Np indicator measures the speed of rotation of the propeller, expressed in revolutions per minute. The analogue display contains green lights, signalling normal operating range and the red light indicates that maximum RPM has been reached or exceeded.

Tach Timer

The tach timer keeps a running total of time the engine is above 45% Np or 990 rpm. It is stored in the instrument's memory for the life of the instrument.

Flight Timer and Peak RPM

The indicator includes an automatic timer. When Np meets or exceeds 65% or 1430 rpm for 10 seconds, the timer will start timing in one-minute increments. The timer will continue to count until the Np drops below 65% or 1430 rpm for 10 seconds.

INTER TURBINE TEMPERATURE (ITT) INDICATOR

The ITT indicator measures the temperature in °C of the operating temperature between the compressor turbine and the power turbine stator.

The analogue display contains green lights, signalling normal operating range and the red light indicates that 790°C has been exceeded. The digital display provides ITT indications in 1°C increments at a refresh rate of 2 Hz.

GAS GENERATOR RPM (Ng) INDICATOR

The gas generator indicating system measures the rotational speed of the gas generator turbine expressed as a percentage of maximum speed (100%). The analogue display contains green lights, signalling normal operating range and the red light displays when maximum speed has been reached. The digital display shows percentage to one decimal place and will display readings beyond the maximum limit.

Tach Timer

The tach timer keeps a running total of the time the engine is above 45% Ng. It is stored in the timer's memory for the life of the instrument.

Flight Timer and Peak RPM

This timer is automatic. When Ng reaches 65% or higher for 10 seconds, the flight timer will reset and start timing in one-minute increments. The peak Ng register will also reset. The flight timer will continue to count until Ng drops below 65% for 10 seconds. At this point the flight time and peak Ng will be stored in the instrument's memory.

OIL TEMPERATURE AND PRESSURE INDICATOR

The oil T&P instrument provides an indication to the pilot of the current oil temperature and pressure on the pressurised line feeding the propeller governor and reduction gearbox.

The analogue display incorporates green (normal operating range), yellow (caution range) and red (maximum limit) lights. At a glance the pilot can get a relative idea of where in the range the engine is operating and how close this is to the limits.

The digital display provides indications to 1 psi or 1°C. Digital indication is changed with the rocker switch in the lower-middle of the unit.

Section 7 – Supplements and Appendix

7.1 Electronic Horizontal Situation Indicator (EHSI)

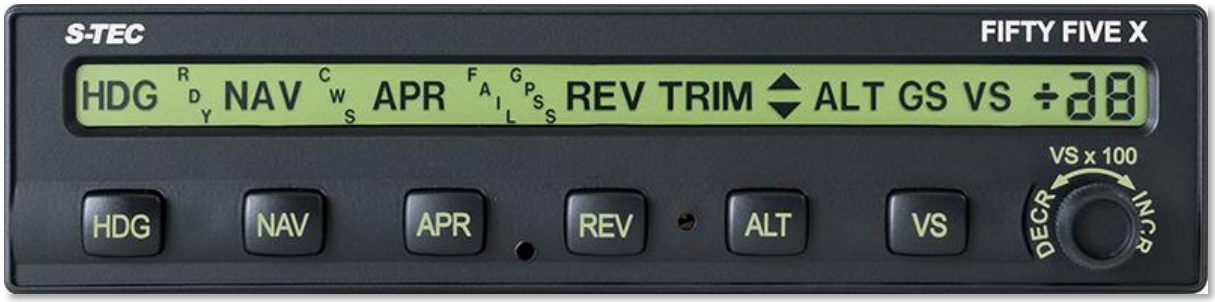
The EHSI display fitted to the Orbx P-750 XSTOL is a multi-modal system with GPS and VLOC navigation capability. The VLOC function is slaved to **NAV1** and the GNSS function is slaved to the **primary GNSS device.**

Current SN3500 Functionality

Nav Source	Allows switching between navigation equipment on the aircraft (VOR/GPS/LOC) to be displayed on the EHSI and for autopilot guidance
RANGE UP	Increases map range (zoom out)
RANGE DN	Decreases map range (zoom in)

Map, traffic, weather, and the menus are not yet simulated.

7.2 S-tec 55X Autopilot



This section contains supplementary information on the operation of the S-Tec Autopilot fitted to the Orbx P-750 XSTOL.

The autopilot closely represents the functionality of the real unit and as such operates in integration with other onboard systems.

Commanding a heading or course for the aircraft to fly in either HDG or NAV mode (with VOR1 selected as the navigation source on the EHSI) is done using the rotary knobs at the bottom of the Sandel SN3500.

7.3 Tablet

The Orbx P-750 XSTOL includes a tablet that allows the configuration of various aircraft features, connection of external power and the opening/closing of doors.

AVIONICS CUSTOMIZATION

The Orbx P-750 XSTOL provides support for three different navigation systems.

- Asobo GNS530/GNS430 (default)
- TDS GTNXi
- PMS50 GTN750

These can be toggled within the tablet and your preference will be saved between flights.

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