



Written by Stephen W. Van Norden Copyright 2012

Flight Information Manual

This manual is to be used with the X-Plane Simulator only and not to be used for an actual airplane

2D BEECHCRAFT SUPER KING AIR 300

(N2974AM)

This manual is written in detail for those who may not be pilots or may not have full understanding of the X-Plane simulator. For those who need only reference material, the table of contents will easily make it possible to hit only the high spots

For X-Plane Simulator Vs 9.70

AUTHOR'S COMMENT

Although I am a commercial Instrument pilot I have no piloting experience in an SKA 300. In my work I was a passenger with many hours in the right seat of both a B200 and a Conquest II. Therefore, my theory of design and operation of this model is based on my life experience with other aircraft, and research done to build this model. Again, I have no experience in an SKA 300 as pilot or passenger. This work is my personal conclusion after much research and other practical experience. I do not guarantee or imply in any way that my conclusions are absolutely correct.

Work began on this model in early 2011 and the work was part time. My intention is to furnish a V10 model later and if it should happen I learn how to generate a 3D model I will do so without charge.



N2974AM

N2974AM is a fictitious aircraft relative to the registration number and the type of engines installed. This aircraft has been assigned a tail number in the X-Plane simulator that does not exist in the registry. The aircraft model

is equipped with two Pratt and Whitney PT6A-67P engines. The -67P engines were certified in September of 2007 for the next generation of Pilatus PC12 aircraft and no evidence has been discovered during the making of this simulator aircraft that would show a -67P has ever been installed on a civilian SKA 300.

The original engine for the SKA 300 is a -60A which is a 1,050 shaft horsepower engine. The military version of the SKA 300 that is designated as RC-12Q-S is equipped with PT6A-67 engines. The -67 engine develops 1,200 shaft horsepower and is 1888.5 mm long with a weight of 237.7 lbs. The -67P is 1921.5 mm long and weighs 261 lbs. The difference in length then is 33 mm or 1.3 inches. Both engines are the same diameter.

The true benefit of the -67P is demonstrated when it operates at the maximum altitude of an SKA 300 or 35,000 ft. The -67P is approved for continuous operation at an ITT temperature of 840° C, while the -60A and -67 are only approved for 800° C.

The -67 provides the best of both worlds relative to SHP and ITT limits. At 100% throttle on a standard day, the -67P will never reach 850° C which is allowed for five minutes at take-off. This allows the full measure of 100% SHP to be available for take-off making gross weight take off and climb out a relatively effortless task.

It is common knowledge that turbine engines have an increased ITT temperature with higher altitudes and so power must be reduced to compensate and control the ITT to be within limits as altitude increases. Higher allowable ITT temperatures translate into increased power at the higher altitude. The allowable +35,000 feet max altitude is great for passing over weather and the -67P will get you there faster.

Depending on air density and OAT, at an altitude of 35,000 feet with an ITT of 840° C the -67P develops between 900 and 1,025 SHP and uses 400 to 450 lbs/hr of fuel or 55 to 62 gallons of fuel per hour. This extraordinary performance above and beyond the -60 is the reason for the engine modification produced in this simulator model that makes this model my dream airplane (fictitious).

It is true that the Pilatus will fly almost as fast as the SKA 300 and use half the fuel and it is also true it has better avionics and is all around a safer airplane for the novice (due to the complexity of the aircraft) and less cost per hour. However, The SKA will deliver more Payload at a higher altitude which does allow the decision to go, more often in bad weather because of the additional max altitude. The Pilatus is rated at 30,000 max altitude.

With the -67P the pilot has a choice of whether to opt for range or speed. Keeping the ITT at maximum gives maximum speed and managing the fuel flow to be around 395 Lbs/hr to 400 Lbs/hr gives maximum range.

I hope you will enjoy flying this model as much as I have!

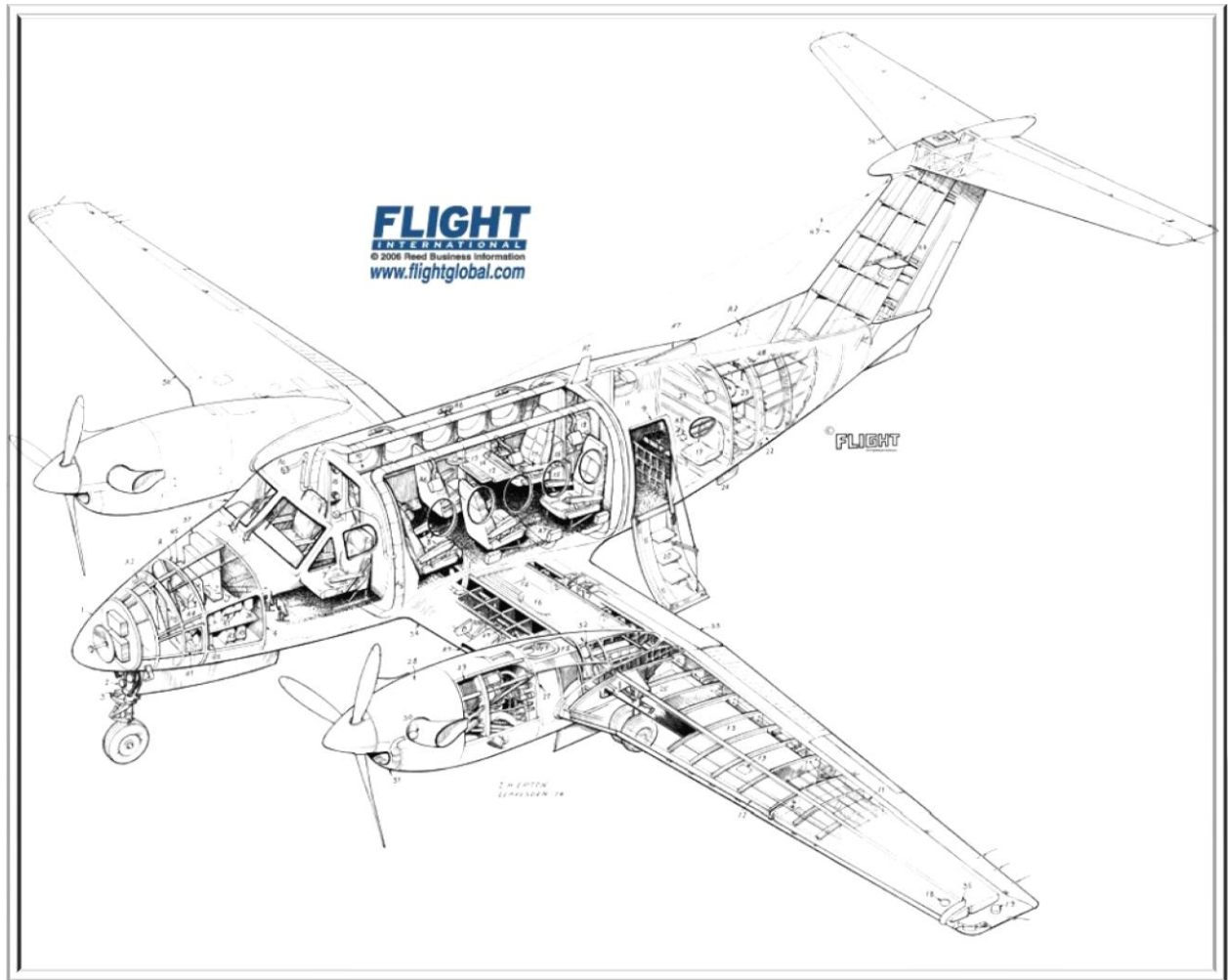
NOTE

For the user to achieve the best results from this model the simulator must be set up to allow approximately 25 frames per second. (See the X-Plane official manual) In addition the model works best when screen resolution is 1680X1050.

When installing the aircraft in the simulator copy and paste the airfoil in the aircraft file to the master airfoils folder in the simulator or the simulator may not be able to load the aircraft file. This flight model will operate in V10 however, not without placing the airfoil file from the aircraft file into the master V10 airfoil file. Use of this model in V10 is not predictable although it will load.

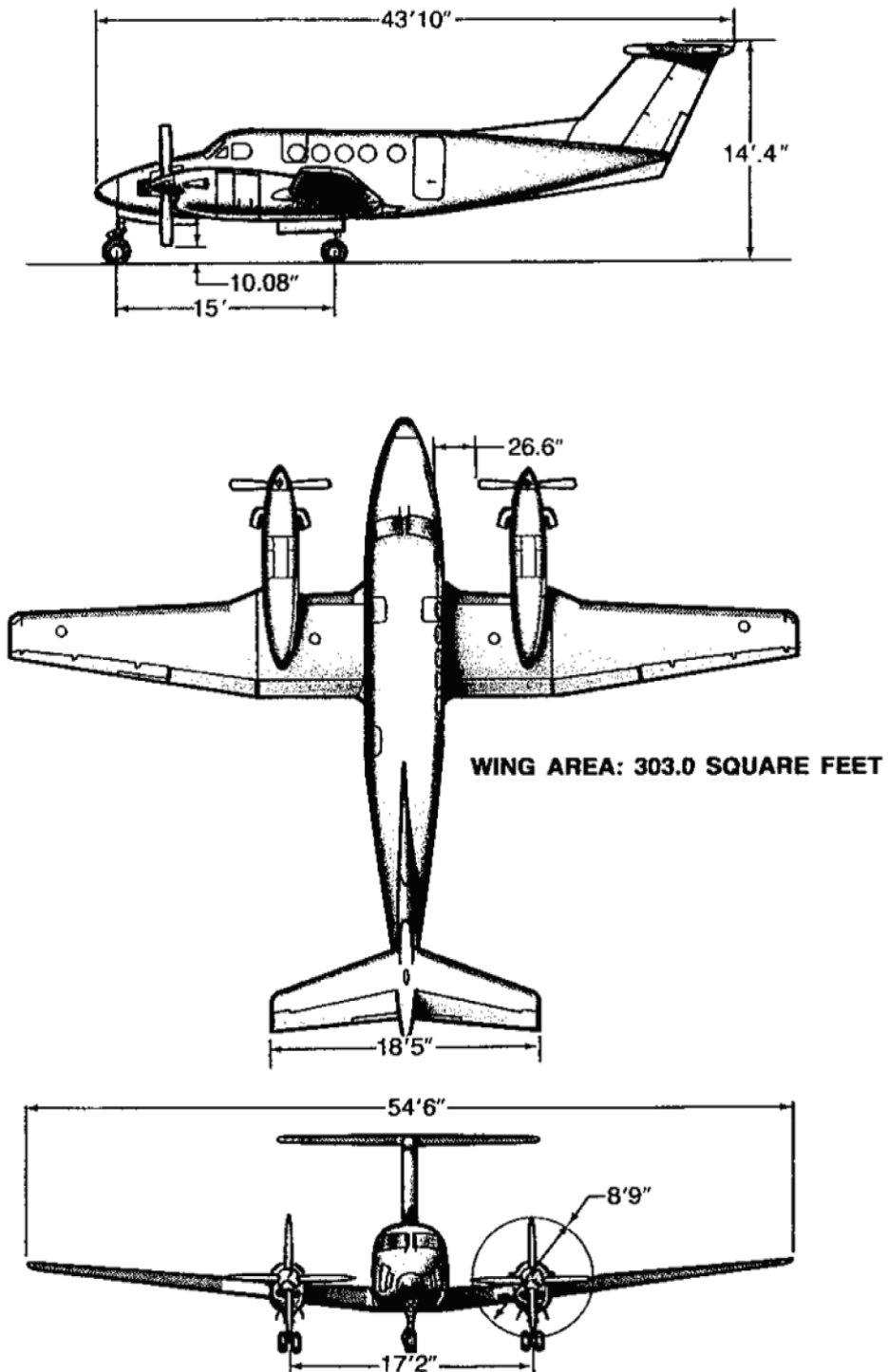
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This cut-away is not the SKA 300 however it is a good representation.

Super King Air 300 3-View



Manufacturers Specifications

Specifications - Super King Air 300

Crew - FAA Certificated	1 or 2
Passengers - Max. FAA Cert. (incl. crew)	15
Passengers - Normal Executive Configuration	8 or 9
Engines - P & W Turboprop	2 PT6A-60A
Propellers - 4 Blade, Reversible	2 Hartzell
Landing Gear - Retractable, Tricycle	
Dual Main Wheels	Hydraulic
Wing Area	303.0 sq. ft.

Maximum Certificated Weights

Maximum Ramp Weight	14,100 pounds
Maximum Takeoff Weight	14,000 pounds
Maximum Landing Weight	14,000 pounds
Maximum Zero Fuel Weight	11,500 pounds
Maximum Weight in Baggage Compartment:	
When Equipped with Fold-up Seats	510 pounds
When Not Equipped with Fold-up Seats	550 pounds

Cabin and Entry Dimensions

Cabin Width (Maximum)	54 inches
Cabin Length (Maximum between pressure bulkheads)	22 feet
Cabin Height (Maximum)	57 inches
Airstair Entrance Door Width (Minimum)	26.75 inches
Airstair Entrance Door Height (Minimum)	51.5 inches
Pressure Vessel Volume	393 cubic feet
Potential Cargo Area Volume	253 cubic feet

Specific Loadings

Wing Loading: 46.2 pounds per square foot
Power Loading: 6.7 pounds per shaft horsepower

Performance

Operating Speeds

The Beechcraft Super King Air 300 qualifies as one of the most maneuverable corporate airplanes in the world. Insistence on handling ease in all flight regimes and tough construction techniques contribute to the following figures (calculated at Maximum Takeoff Weight - 14,000 lbs.):

Maximum Operating Speed (V _{MO})	259 kts.
Maneuvering Speed (V _A) (14,000 lbs.)	181 kts.
Maximum Landing Gear Operating Speed (V _{LO})	
Extension/Extended	181 kts.
Retraction	163 kts.
Maximum Flap Extension/Extended (V _{FE})	
Approach	200 kts.
Full Down	157 kts.
Stall (100% Flaps: Power Off)	80 kts.
Air Minimum Control (VMCA)	
Flaps Up	92 kts.
Flaps Approach	86 kts.

Rates-of-Climb

The Super King Air 300 delivers an extra margin of confidence through the powerful PT6A-60A turboprop engines. The following figures are calculated at full gross weight:

Two Engines (Sea Level, Standard Day)	2,850 fpm
One Engine (Sea Level, Standard Day)	880 fpm
One Engine (5,000 ft. Elevation, Standard Day)	660 fpm

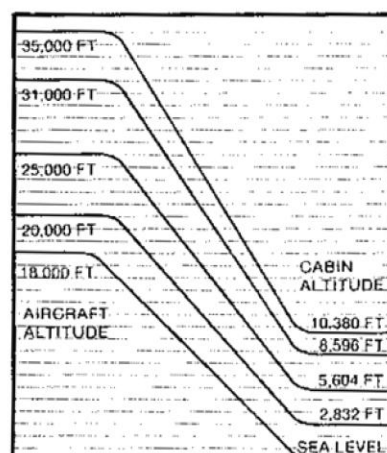
Service Ceiling

At maximum takeoff weight, over-the-weather capabilities and greater mission dependability are possible with the Super King Air 300.

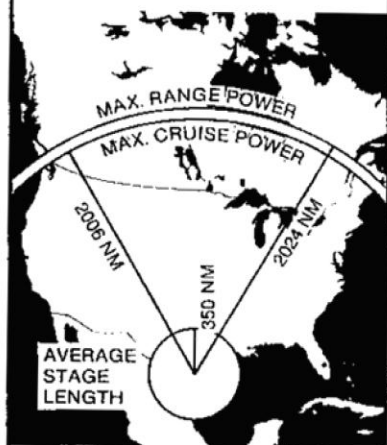
Two Engines	above 35,000 ft.
One Engine	31,000 ft.
Cabin Pressurization	6.6 psi

Range

The average stage length of most corporate flights is approximately 350 nautical miles. The Super King Air 300 can handle four such stage lengths, at maximum cruise power and with six passengers on board, without refueling. You may never need the 2,256-mile range of the SKA 300, but it will help save time between stages by cutting turnaround time to only minutes. The SKA 300 can easily fly coast-to-coast with only one stop.



Cabin Altitude Chart



Range Diagram

Engine Information PT6A-67P

Certification Date	20 December 2007
Overall Length	1921.5 mm
Overall Diameter	466.1 mm
Dry Spec. Weight	261.0 kg
Maximum Continuous Power	895 kW ITT 840° C
Take-Off Power (5 minutes)	895 kW ITT 850° C
Starting ITT Maximum	1000° C Ground and Air
Gas Generator rpm (N1) max	39,000
Power Turbine Module Output (N2)	1700
Power Turbine Module Output Max	1870 20 seconds max
Maximum Torque Continuous	3708 ft/lbs (3708 is 100% Torque)
Maximum Transient Torque	5100 ft/lbs 20 seconds max (137%)

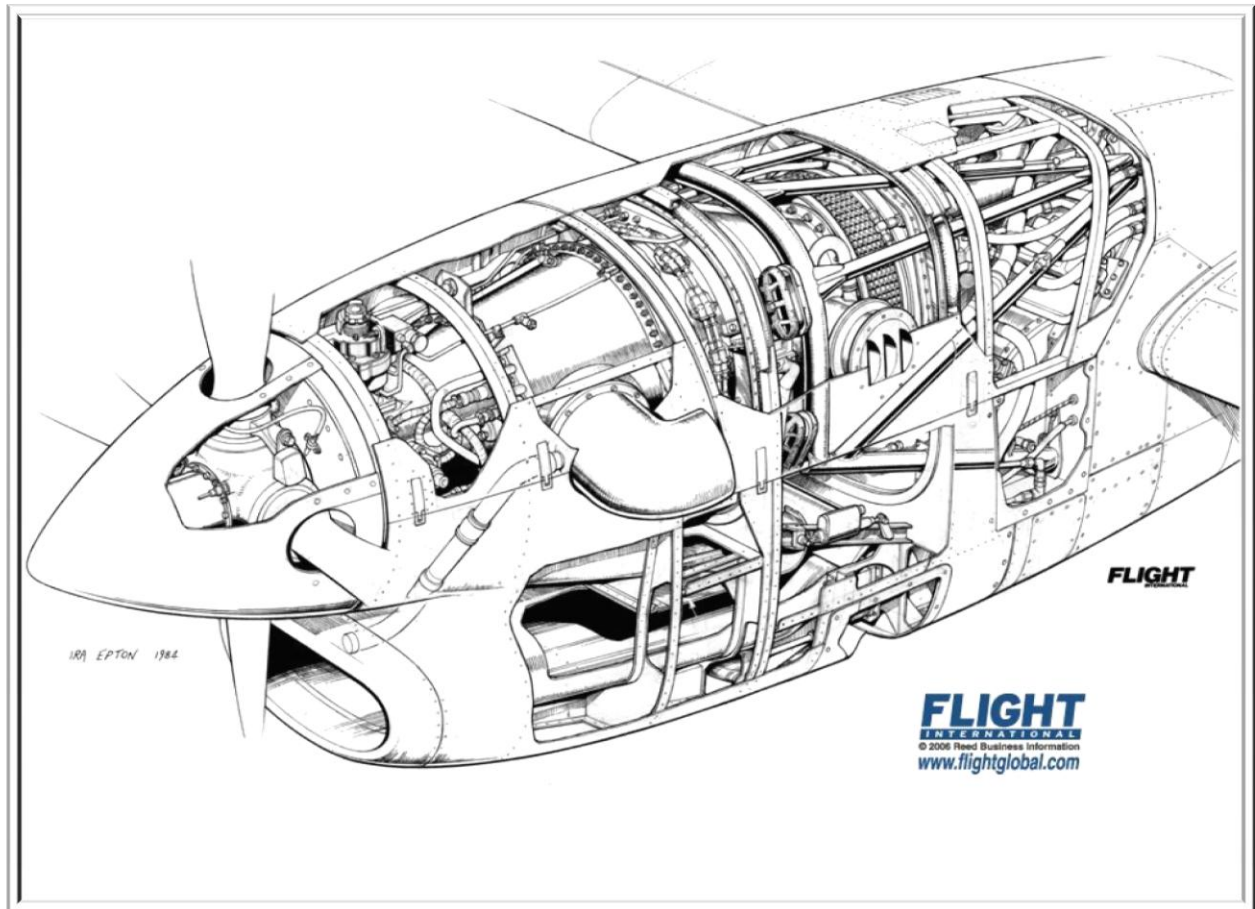
The simulator Fadec will limit applied power to 100% torque maximum.

ENGINE TERMS

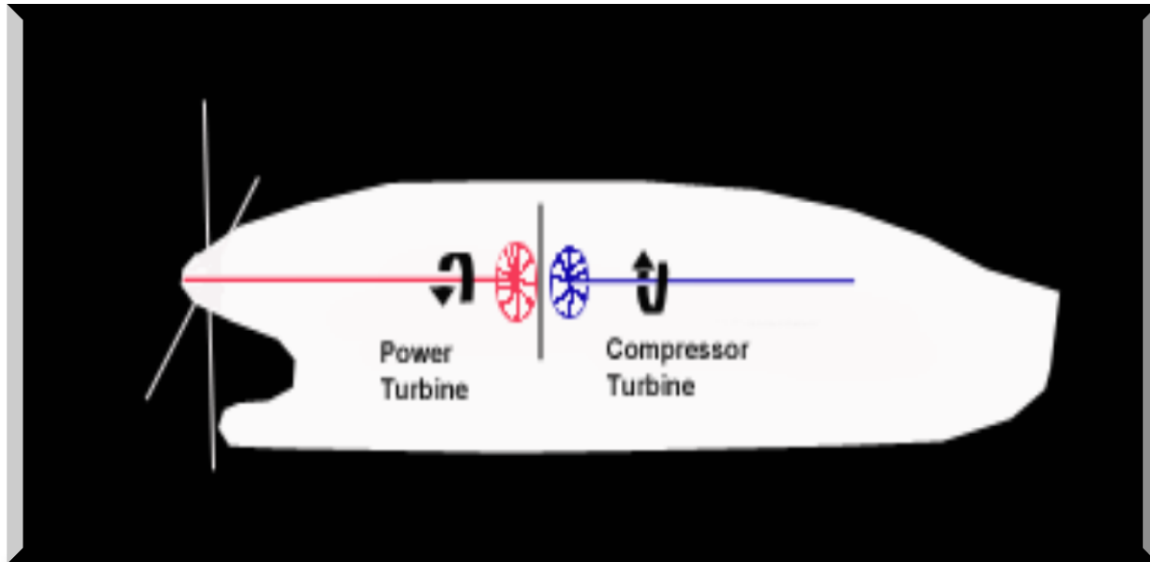
To properly understand the operation of the PT6A series engines, there are several basic terms you should know:

- N1 or Ng – Gas generator rpm is percent of turbine speed
- N2 or Np – Propeller rpm
- N Power turbine rpm (not indicated on engine instruments)
- P3 – Air pressure at station 3 (the source of bleed air)

- ITT or T5 – Inter-stage Turbine Temperature in degrees of temperature at station 5.



FREE – TURBINE REVERSE – FLOW PRINCIPLE



The Pratt and Whitney PT6 family of engines consists basically of free-turbine, reverse-flow engines driving a propeller through planetary gearing. The term “free-turbine” refers to the design of the turbine sections of the engine. There are two turbine sections; one, called the compressor turbine, which drives the engine compressor and accessories; and the other, consisting of a single power turbine, which drives the power section and propeller. The power turbine section has no physical connection at all to the compressor turbine. These turbines are mounted on separate shafts and are driven in opposite directions by the gas flow across them. The term “reverse flow” refers to airflow through the engine. *(Please excuse my non professional graphics, but it does illustrate the point.)*

ENGINE AIR FLOW

Inlet air enters the engine through an annular plenum chamber, formed by the compressor inlet case, where it is directed forward to the compressor. The compressor consists of three axial stages combined with a single centrifugal stage, assembled as an integral (separate by itself) unit.

A row of stator vanes, located between each stage of compression, diffuses the air, raises its static pressure, and directs it to the next stage of compression. The compressed air passes through diffuser tubes, which turn the air through 90° in direction and convert velocity to static pressure. The diffused air then passes through straightening vanes to the annulus

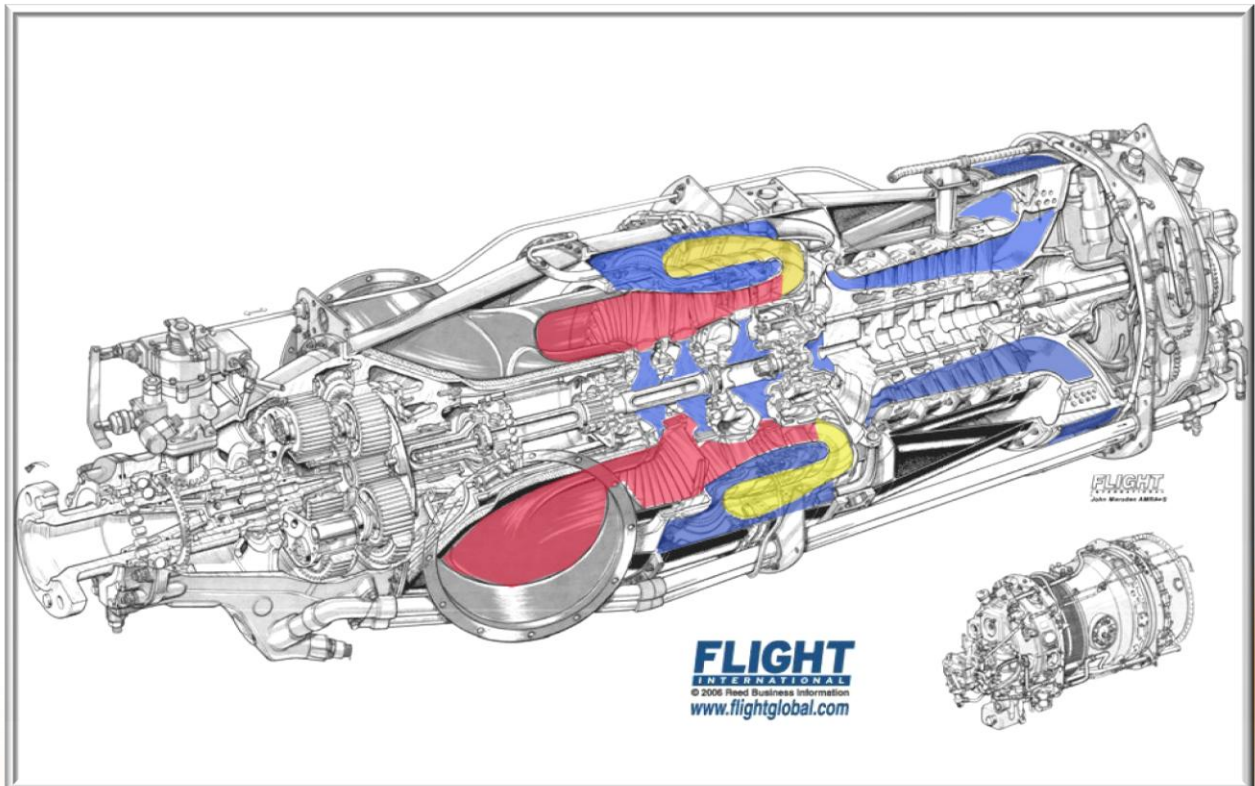
surrounding the combustion chamber liner. The combustion chamber liner has varying size perforations which allow entry of compressor delivery air. Approximately 25% of the air mixes with fuel to support combustion. The remaining 75% centers the flame in the combustion chamber and provides internal cooling for the engine. As it enters the combustion area and mixes with fuel, the flow of air changes direction 180°. The fuel/air mixture is ignited, and the resultant expanding gases are directed through the turbines and out the exhaust port. The location of the liner eliminates the need for a long shaft between the compressor and compressor turbine, thus reducing the overall length and weight of the engine.

ENGINE MODULAR CONCEPT

With the modular free-turbine design, the engine is basically divided into two modules; a gas generator section and a power section. The gas generator section includes the compressor and the combustion section. Its job is to draw air into the engine, add energy to it in the form of burning fuel, and produce the gases necessary to drive the compressor and power turbines. The Power section's job is to convert the gas flow from the gas generator section into mechanical action to drive the propeller. This is done through an integral planetary gearbox, which converts the high speed and low torque of the power turbine to the low speed and high torque required at the propeller. The reduction ratio from power turbine shaft rpm to propeller rpm is approximately 15:1.

These modules can be separated for maintenance and only the module that needs repair or overhaul needs to be worked on. To save time

modules can be exchanged for rebuilt or new and immediately installed.

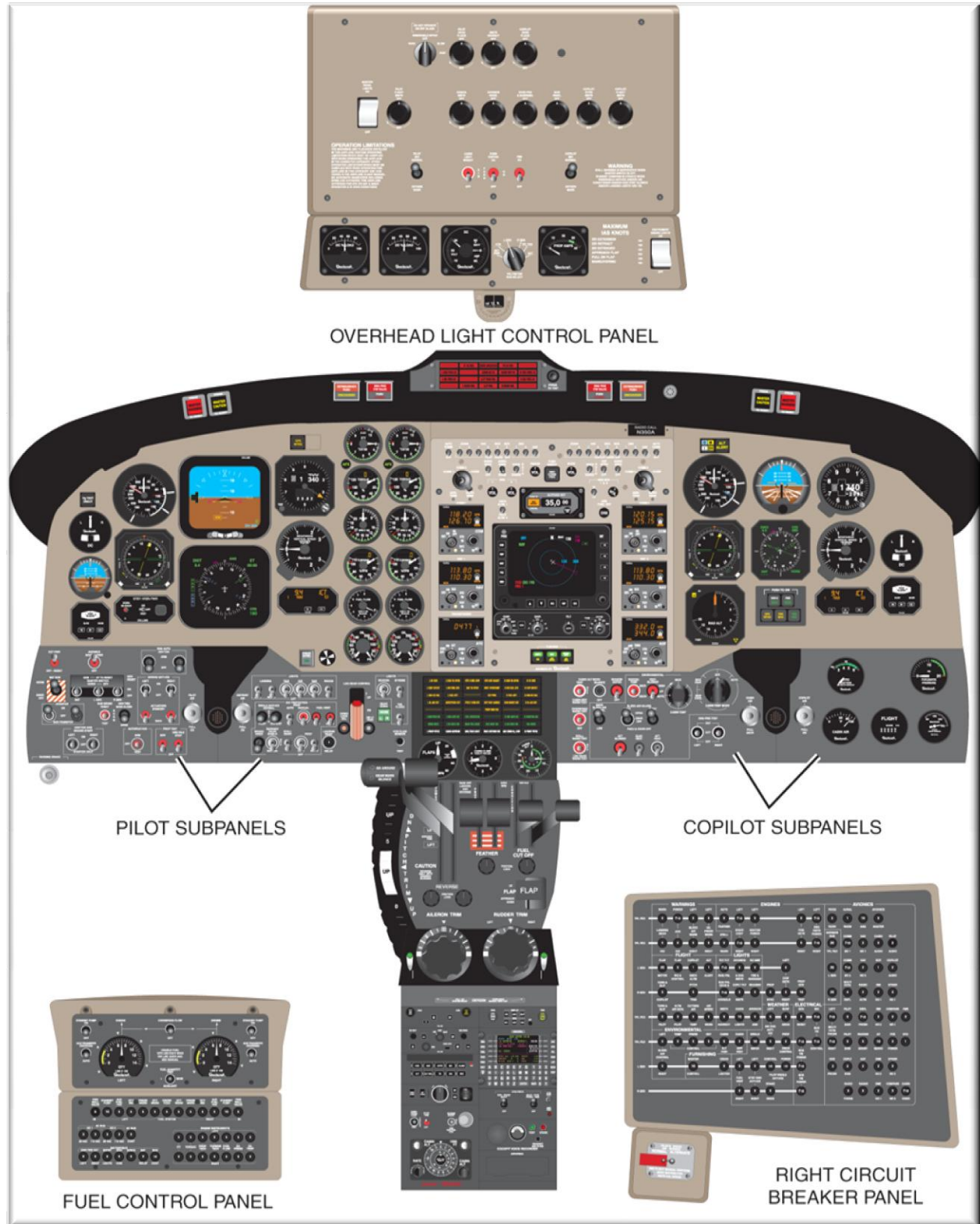


Propeller

The propeller is a four blade aluminum hydraulic controlled, constant speed, fully reversible product manufactured by Hartzell.

The hydraulic power required for blade angle control is furnished by a hydraulic pump and control system driven by the gearbox between the prop and the engine. The constant speed feature simply means that for any setting of the prop levers, the prop will maintain N2 rpm by adjusting blade angle as required to maintain the setting. The reverse thrust feature is produced with negative blade angle and corresponding reduced engine power. Propellers require blade maintenance and overhaul the same as maintenance requirements for engines based on hours of operation.

Training SKA-300 Instrument Panel Poster



Simulator Instrument Panel Description for SKA-300



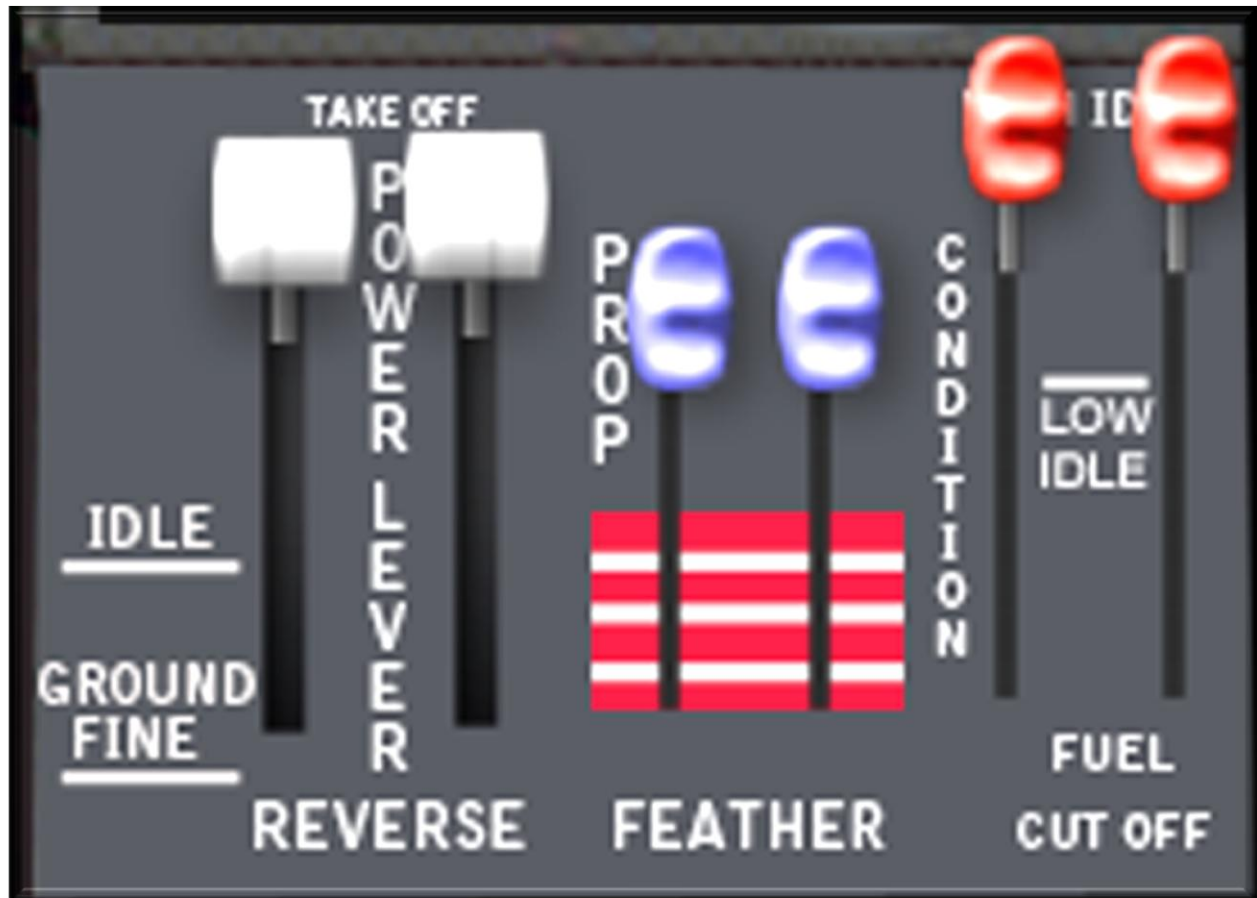
Illustrated above is the entire instrument panel including upper and lower panels, as shown in the airplane simulator file. All operable controls have mouse regions. The optimum operation of this panel can be achieved with a combination of joystick, mouse and keyboard. Where there is no mouse region there is no control available. Illustrated below is the entire instrument panel labeled.

Power Plant Management



Illustrated above are the areas of the instrument panel that are considered Power Plant Management items. The power Plant Start / Stop controls are part of that consideration however the engines may be shut down also by placing the condition lever in fuel cut off position. Placing the propeller controls in the feather position will feather the prop however; the **engine will continue to run**. This is possible because the PT6A engine free wheels. In other words it is not directly tied to the propeller by a solid shaft. When the prop is feathered in the actual airplane the propeller has brakes

that apply below a certain rpm to prevent the prop from wind-milling in flight. It may be difficult to reproduce this feature in the simulator; however it can be done in a fashion by retarding the conditioning levers until the engine is near cut off. Feathering a propeller will not cut off fuel to the engine. Moving the condition lever(s) to fuel cut off will in fact cut fuel to the engine and feather the corresponding propeller. When feathering is done in this model in flight wind milling will occur.



The engine starters are electric so aircraft battery is generally used to power start up. If the battery will not start the engines a portable power unit can be used. Traditionally the right engine will be started first. The starter switches are located on the pilot's lower panel.

Inter- Stage Turbine Temperature



The ITT indicator is graduated in degrees Centigrade and is monitored for the purpose of -67P engine limits on station five temperature. The maximum continuous temperature is 840° C. 850° C. is allowed for five minutes during take-off. This rarely occurs. Maximum inlet air temperature for rated power (Takeoff 5 min) is 122° F. Maximum air inlet air temperature for rated power (Alternate Takeoff 10 min) is 111° F. The air inlet temperature is outside air. Climbing to higher altitude will generally reduce inlet temperature.

Torquemeter



The torquemeter is the second engine monitoring indicator to monitor torque. The meter is graduated in percent. For the -67P 100% is 3708 ft/lbs of twisting moment allowed on a continuous basis. The top of the green arc on the meter is 100%. Transient torque is more or less a surge of increased momentary torque. This could be caused by moving the prop levers too quickly or increasing the power levers too quickly. The maximum allowed transient torque is 5100 ft/lbs for 20 seconds. 5100 ft/lbs of torque is 137.5% of the allowed 3708 ft/lbs of torque. The meter redline is 120%. Older aircraft had torquemeters calibrated in 100 X indication ft/lbs. 120% is 4450 ft/lbs which is a good surge. Care should be taken when moving engine or prop controls not to move in such a way as to cause any surging.

Propeller RPM N2



Maximum propeller rpm for the -67P is 1700 rpm used for take-off and climb. At cruise rpm can be reduced to 1500 for fuel savings. At lower altitudes reducing propeller speed will cause a significant rise in torque and ITT temperature. As with all engine and prop control moves, monitoring engine instruments during and after is very smart!

Propeller Synchronizer



Once airborne and in cruise mode moving the prop sync switch to on, will make both engines run the same speed if they are close before hand. When moving the throttles for descent, while on the ground or for other purposes while in flight the sync switch should be off to avoid the system trying to follow the changes.

Gas Turbine RPM N1



The gas turbine rpm indicator is graduated in percent of max continuous rpm with 100% equal to 39,000 rpm.

Fuel Flow Meter



The fuel flow indicates lbs/hr of fuel being used (burn rate). During start up the fuel flow meter will show an indication when fuel is introduced to the engine.

Oil Temperature and Oil Pressure Combination Indicator



The left side of the indicator is for Oil Temperature. The green arc represents normal temperature which is 0° C (32° F) to 100° C (212° F).

The right side of the indicator is for Oil Pressure. The green arc represents normal pressure in psi. Normal pressure is from 90 psi to 120 psi.

Shaft Horsepower SHP



The actual airplane does not have the SHP indicators however, on my dream airplane I can add the SHP meters at no cost and always see how much shaft horse power my wonderful pair of -67Ps are developing or not. The -67P is flat rated for 1200 shaft horsepower.

Overhead Instrument Panel



The overhead instrument panel provides indicators for each of the two generators, battery amps, battery volts and propeller de-ice amps. The cabin flood control and instrument brightness rheostats are located on this panel. The gear and flap speeds are also located on this panel (in the real airplane as well). Though it cannot be read the panel also includes the compass correction chart.

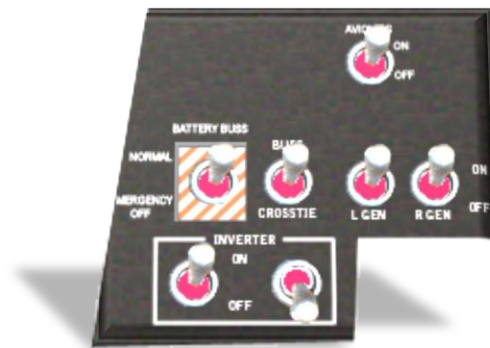
Fuel System Panel



The fuel system panel provides a quantity indicator for all wing tanks together on each side left and right. The panel also includes the fuel tank pump switches, fuel transfer control and fuel selector switch. The tanks need to remain evenly filled during the flight for weight and balance purposes. Should the fuel load become uneven the fuel transfer switch is used to move fuel to make the tank systems equal. There is no provision for fuel dumping.

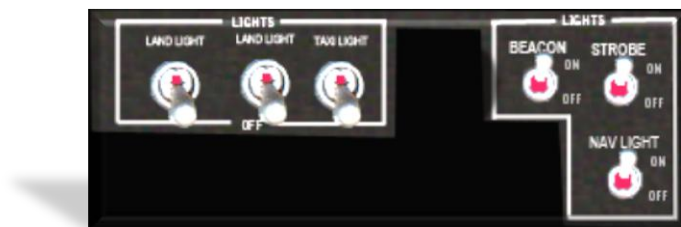
ELECTRICAL SYSTEMS

Electrical panel



Power panel Prop and Condition lever setting for starting engines, Power levers should be at Ground fine position.

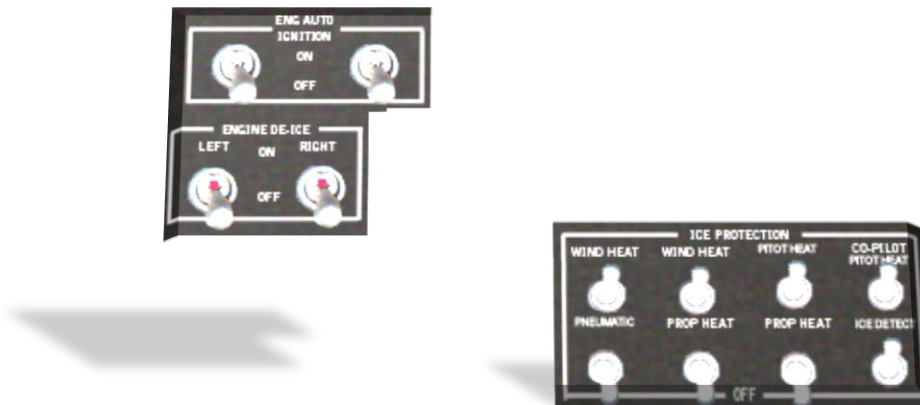
Exterior Lighting Panel



The exterior lighting switches, located on the pilots lower panel all have mouse regions and can be operated by mouse click. Beacon lights should be on while at taxi and strobe lighting should be used after reaching the active runway for take-off and turned off upon leaving the active runway after landing. Taxi lights provide a beam of light down the runway; Landing lights are directed at a negative (down) heading to light up the landing zone while in the landing configuration. Landing lights are generally not used for

taxi. In the simulator there is no visible distinction between Landing lights and Taxi lights except for position. Taxi lights are generally found on the light bar attached to the nose wheel on most retractable general aviation aircraft.

Deicing Panels



The Ice detect, windshield heat and Pitot heat should be on during flight. They should be turned on shortly before take-off and turned off shortly after landing. When the airplane is not flying this equipment should be off to avoid equipment damage. When the Ice detect light is lit or in-flight temperature conditions dictate, the engine De-Ice, auto ignition, pneumatic and prop heat switches should be on. The prop De-Ice amps are found on the overhead panel. The auto ignition lights illuminate when the throttle is reduced to approximately 20% torque even though the auto ignition switches are off. When in icing conditions or rain the auto ignition switches should be on.

The free air temperature indicator can be found in two locations. Either on the Pilot's side panel below the fuel panel or on the Co-Pilot's sub panel. (can be viewed in the pressurization section next) It indicates air temperature outside of the aircraft. It is calibrated in degrees centigrade. Icing can occur between 0° and -40° depending on the type of weather. Icing below -20° C usually occurs in rain and drizzle or certain types of clouds. Always try to avoid icing if possible and if not, start looking for a way out of icing immediately. Changing course or altitude or both are possibilities for a solution.

Master Caution and Master Warning Lights



The warning lights activate if there is a change in one or more of the aircraft systems. If the master caution light is blinking the master warning light will be on solid and one or more of the lights in the warning panel will be on. Scan the panel for any lights that may also be on before re-setting the master caution light. Reset can be done by mouse clicking the master warning light. Push the “ANN TEST” button with mouse click to check all warning lamps. These indicators are located on the glare shield, one pair on the left and one pair on the right.

Lower Annunciator Panel



The lower annunciator Panel is a picture from the training poster. I have no ability to write script which is what I would have to do in order to fill the lower annunciator panel with meaningful warning annunciators that are not furnished by Plane Maker. The only item furnished for this panel is prop blade angle and Plane Maker furnishes it for only one propeller. Therefore the blade angle seen in the LED is for #1 propeller only.

Chronometer



The Chronometer has the capability to maintain the time of day in digital form for Zulu or Local time. It also has an elapsed time stop watch. Clicking the left blue button will change the time or bring up the stop watch. The right button will start the timer. The easier way for timer use is just to click the right button the first time and it will display and begin timing. Pushing the right button twice more will stop the timer zero the timer and hold at zero. Pushing the right button a third time will start the timer. The timer can be used to time take-off for the purpose of not exceeding engine limits if that is a factor.

Ground Proximity Warning System

The GPWS light will warn the pilot along with audio that the aircraft is approaching the ground in a way that could impact the airplane. The warning could happen if descent is too steep, if approaching high ground while straight and level or if climb rate is insufficient after T/O with the landing gear raised.

Pressurization Control Panel



Cabin altitude setting should be set before take-off. Before take-Off the “dump all” selector should be in the “off” position and the bleed air switch should be on. Upon landing the “dump all” selector should be set to on before opening any aircraft doors or windows. The cabin VVI rheostat is used to set cabin altitude rate of increase /decrease. In the real airplane pressurization is turned on while on the ground.



The indicator on the left indicates the Feet per minute of altitude change in the cabin. The indicator on the right indicates the cabin altitude setting and actual altitude.

CONTROL SURFACES AND RELATED EQUIPMENT

Flight Surface Trim



The user should consider setting these items up for buttons on the joystick. Rather than using the hat button for views, it is recommended to use the hat button for trim and the Q,W, and E key for inside view and A to look at the aircraft from outside and move around with the direction and +- keys. Using the manual trim will disconnect the autopilot.

Wing Flaps Position Indicator



The Wing Flaps Position Indicator does just what the name implies, it indicates position of the Wing Flaps. The important thing to remember is there are only two notches of flaps, Approach and Landing. Approach flaps which is the solid white box on the indicator can be applied at 200 Kts indicated. Full down or landing flaps must be operated within the speed limits shown on the airspeed indicator designated by the thin white arc. The flap switch is located on the right of the condition levers.

Landing Gear Actuator Handle



The gear actuator handle lowers or raises the landing gear. Lever up, Gear up. The light indicators are just to the right of the handle just above the emergency flap pump. I could never get the emergency flap pump to work however, if the gear actuator fails, with the handle down, pushing the emergency gear button three times will lower the landing gear and lock.

AVIONICS

Separate Distance Measuring Equipment



The DME on the Pilot's panel is separate from other DME features in other equipment. Other equipment will automatically give DME from NAV Approach or FMS that has been selected for landing or navigation. This unit will allow the pilot to measure distance from any separate navigation source he may choose. These sources may be found on the X-Plane maps.

Audio Control Panel and Autopilot



With the amount of avionics that may be operating at the same time there must be some way to control which equipment is being monitored by the pilot and which is not. Also the pilot does not want all frequencies he is tuned into to be transmitting every time the microphone is keyed. The ACP allows management of these functions. The altitude set instrument found between the pilot and Co-Pilot audio is part of the aircraft autopilot found

just above the ACP. More information about the X-Plane autopilot can be found in the X-Plane manual.

Master Flight Data (MFD) and Radios



The radios consist of two communications radios, two navigation radios one dual channel transponder and one two channel ADF receiver. The MFD provides horizontal positioning with maps and checkpoints, VOR indicator and weather radar. The range can be set from 1 mile to 160 miles and the different functions of the unit can be set with the VOR/Map switch. Also included is systems status, equipment failures, and fuel status. The red line shown in the screen will appear anytime a NAV, ADF, or GPS source is set up for use with the autopilot.

Flight Management System



The FMS is also known as the GPS system. The FMS allows multiple legs of a flight to be programmed into the computer in advance and the FMS will keep continual information of the entire trip. This helps with fuel management and time management.

The following steps, using the mouse will achieve an FMS flight plan:

1. Click on INIT then AIRP, this will clear the menu and the system is ready for the first airport code to be entered. Or Click CLR and then AIRP.
2. The airport code can be found in the X-Plane Location menu. Select global airport page. Type in the name of the town or the airport and

determine if the destination may be included in the X-Plane program. The codes can be obtained from the internet or from authentic air navigation charts.

3. The code for major airports will be a four letter code. Smaller airports will use a combination of letters and numbers for a 3 digit code. Enter the code using the keyboard on the FMS.
4. Once the code is entered you will notice a red course line appearing in the MFD map page illustrating the course.
5. If there are multiple airports involved push the NEXT key and continue entering codes.
6. When finished entering code(s) the next step will occur during preflight. The heading will be set to match the red course line on the MFD. In actual operation the controller would direct the aircraft outside the control area and the pilot would then intercept the GPS course.
7. Once airborne and out of the control space, select GPS with the source selector on the DCP. Engage the LOC button on the autopilot.
8. Returning to the FMS push the button that has an arrow through the letter D (this is the direct course button) next to the CLR button on the top row of buttons. This will couple the FMS to the autopilot and the aircraft will turn to the GPS course. Each time the direct button is pushed it will renew the red course line, for example if the aircraft flies beyond the destination

EADI – Electronic Attitude Director Indicator



The EADI electrically operated and has a functional artificial horizon, glideslope, localizer, decision height indicator, radar altimeter, indicated airspeed, ground speed, slip indicator, vertical speed indicator, autopilot indicators and an indicator that shows either GPS navigation or VOR navigation. This is the main flight guidance instrument for the pilot.

EHSI – Electronic Horizontal Situation Indicator



The EHSI is electrically powered and used to show the horizontal situation of the aircraft. It includes a compass rose with VOR and ILS indication, Nautical miles to the station, ground speed, distance measuring, wind direction and speed indicator and finally it indicates the course selection and DME of the localizer both 1 and 2. The EHSI completes the total requirement for aircraft flight guidance as it is teamed with the EADI.

Back up Instruments

Magnetic Compass



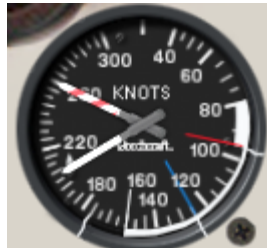
The magnetic compass is not adjustable and will always be manipulated by magnetic north. In the real aircraft a compass correction card is provided to allow the compass to be used correctly. The simulator does not provide a readable compass correction card but assumes the compass is always correct.

Horizontal Situation Indicator (HSI)



The HSI is on the co-pilot's panel. It is a back up to the EHSI. The HIS uses an electric powered gyro to drive the compass and the other features such as localizer and glideslope, course and DME indications are electric.

Airspeed Indicator



The airspeed indicator indicates the speed of the aircraft by calculating the pressure in the pitot tube pushing through the air thereby creating pressure in the tube. This pressure is translated into the airspeed reading. The indicator is a back up instrument to the electric digital instruments.

Altimeter



The altimeter converts barometric pressure to an altitude reading. The instrument is adjustable by millibars or barometric pressure. The instrument displays with a sweep hand and with an analog digital read out. This altimeter is also a back up to the other instruments.

Vertical speed indicator



The vertical speed indicator is a backup instrument. It indicates the vertical speed of the aircraft in feet per minute.

Emergency Locator Transmitter

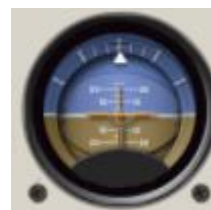
Although the switch is shown on the right co-pilot's side panel it is not operational. The actual airplane has a control that places the Transmitter in standby so if there is an impact it will begin to transmit. The switch can also be used to activate the locator manually.

Radio compass



The radio compass is a gyro driven compass. It has the capability of indicating both VOR and ADF direction to the station and uses the nav radios for frequency of the station. The red pointer at the top is always indicated heading of the aircraft.

Vacuum Driven Artificial Horizon Indicator



This indicator is a backup aircraft attitude instrument, driven by vacuum, It is to be used to prove the EADI during normal operation. This instrument is on the pilot's panel



The larger vacuum driven artificial Horizon is found on the co-pilot's panel.

Needle and ball



The needle and ball has been a basic reference for many years of aviation history. It indicates yaw and roll.

Separate Radar Altimeter



The separate radar altimeter is located on the copilot's panel. It is separate from all other elevation measuring instruments on the aircraft.

X-Plane

After Start up procedures pushing ENTER on the keyboard will bring up a menu simulating control traffic. The traffic can be answered by choosing a response with the mouse.

ATIS, AWOS, VFR and IFR plans can be entered and the system will respond with instructions. VFR flight plans may not exceed an altitude above 18,000 Ft. MSL without filing an IFR flight plan. All flights above 18,000 Ft. MSL are in controlled air space and IFR.

The Check lists will assume the user has no knowledge of the X-Plane system except for gathering flight weather information, Airport information and general help. The Check Lists will assume all navigation without X-Plane. The reason for this is to help those that may be learning to fly the simulator and need to learn to fly the airplane before taking on flight rules and controlled flight.

The following Check Lists will also be a separate TXT document in the airplane file. Inside the X-Plane program under the “Special” menu, a check list can be opened located in the airplane file and toggled. It can be loaded under this menu to see the full document or choose the menu for line by line in the simulator as you fly. Both can be loaded up and used. Check it out!

The check lists in this document will be under the title Checklists.TXT and in the airplane file so it may be found and used for the function just described.

For those who are not pilots and wish to be as close to reality as possible, find FAA part 91 General Operating and Flight Rules under title 14 on the internet. Par 91.1 through 91.223.

If there is any interest in understanding pilot qualifications read FAA part 61

GUMPS

Gumps is a universal mental checklist for fixed wing pilots to remind them before landing to check

G – Gas - Are the fuel selectors on tanks that have fuel?

U – Undercarriage – Are the wing flaps correct and landing gear down?

M – Mixture - set to rich? (for reciprocating normally aspirated engines)

P – Prop(s) – set to high RPM?

S – Seatbelts and switches – Seatbelts on and all switches correct

Check Lists

Ramp Start

1. Place master switch (Battery Buss) in the on position
2. Place bus crosstie switch in the on position
3. Place the power lever in Ground Fine position.
4. Move Prop levers out of feather (fully forward)
5. Move the right condition lever out of fuel cut off to high idle.
6. Turn fuel selector on the fuel panel to both.
7. Fuel transfer switch to off.
8. Right Tank fuel pump to on
9. Avionics switch on
10. Inverter switch on (leave one inverter off)
11. Hold the start switch for the right engine in “start” and monitor the engine panel, first for rotation and oil pressure, secondly a rise in the ITT temp (not to go above 1000° C during ground or air start). When fuel enters the engine there will be a noticeable increase temperature indication in the ITT indicator. When turbine speed reaches about 18% release the switch to run and let the engine continue to full start. Place right generator on line. **Repeat for the left engine.**
12. Set cabin altitude value on pressurization panel
13. Bleed air switch on
14. Pressurization dump switch to Off
15. Nav, taxi lights and beacon to on
16. yaw damper on

Caution – The cabin pressurization system will not operate with the bleed air switch in the off position. In the actual airplane cabin pressurization is started on the ground, however in the simulator, if the option is selected the pressurization cannot be started until the aircraft is 1,000 MSL so the function cannot be started until after take-off. Currently the option chosen allows pressurization on the ground.

Pre-Taxi

1. Obtain Flight or determine flight information
2. Audio Control Panel Set
3. Enter Trip Leg(s) into FMS
4. Brakes As Needed
5. Place Transponder in Standby
6. Altimeter Set
7. Enter Transponder Code
8. Enter Com Frequencies if needed
9. EHSI set to Rose or Arc
10. Flight director set on
11. Nav Selector set to NAV or GPS
12. Landing Lights On
13. Altitude Set
14. MFD and HSI Set
15. Heading Set to Intercept GPS
16. Speed set 170Kts
17. Altitude Set Flight level 25 works
18. Trim Rudder, Aileron Center
19. Elevator trim nose up 25%

Pre Take Off

1. Strobe Light On
2. Ice Detect, windshield heat and Pitot Heat on
3. Flaps up

Take Off

1. Throttle Open 100%
2. V1 – 100Kt
3. Vr – 110Kt
4. V2 - 120Kt
5. When Positive Climb established – Gear up
6. manually maintain runway heading until initial altitude is achieved
7. flight director Auto
8. HEADING on
9. LOC on
10. ALTITUDE FLCH on
11. V/S Establish 2200 3500 fpm Climb by adjusting speed setting
12. When turn to GPS heading is completed assure heading will intercept FMS
If direct path is desired, On the FMS, mouse click the button on the top right beside CLR
The label is an Arrow through a "D" pushing this button will align the aircraft on path and
LOC will be green
13. Transponder set ALT

Climb out

1. Landing and taxi lights off
2. slow props to 1600 RPM Leave throttle at 100%
3. Monitor Engines Max ITT 850C for five minutes 840C continuous reduce throttle for cooling
4. Prop sync on

5. above 18,000 feet MSL change altimeter setting to 29.92 this can be done by mouse clicking the settings knob

Cruise

Monitor all systems, Engines, Weather, Fuel consumption, Estimated Arrival, Pressurization and Icing. upon arrival at assigned flight level reduce prop rpm to 1500

Descent

1. Between 60 and 80 miles from the destination begin planning the descent (Suggested) Reduce altitude setting to 10,000 Ft.
2. Push FLCH and set speed to achieve desired vertical speed 1500 to 2500 fpm
3. Monitor vertical speed and reduce lateral speed as required to maintain vertical speed (use the throttle for this purpose)
4. Adjust MFD range to see the station
5. Set MFD selector to VOR to help line up with the runway.

Know weather conditions at the destination and plan accordingly. (The following will be a Cat 1 App) Below Flight level 18 enter the barometric pressure (altimeter setting) into the altimeter with the BARO knob located at the bottom of the PFD.

Upon arriving at 10,000 MSL speed should be no more than 250 Kts indicated airspeed before further descent.

To intercept the ILS and be set up with plenty of space the descent will need to cease at a DME of 10 to 12 miles from the destination. The aircraft should be at an altitude of roughly 3,000 Ft.MSL. with a course close to the runway heading. Use the VOR setting on the MFD to line up with the destination runway or use the X-Plane map. At this distance and altitude the ILS can be captured easily.

Obtain active runway, frequencies and headings for the Landing. Fly to the needles to capture.

Pre-Landing (from 10 to 20 miles from the runway threshold)

1. Adjust heading bug to line up with GPS Course Push HDG On
2. Select Nav 1 or 2 enter the ILS frequency
3. Set OBS 1 or 2 to Active runway heading – this will help you realize your position in relation to the runway
4. Push APP On
5. steer with heading bug to place the aircraft in a position that is 10-12 miles from the end of the runway to be used and on a heading that will intercept the centerline of the runway (localizer). At about 10 miles out the glideslope should be close to centered. adjust altitude accordingly. cross ILS signal and capture, ideally the glideslope should show the aircraft low at ten miles for capture. (Assuming ILS is captured)
6. Landing Lights On
7. If icing conditions exist turn on de-icing features
8. Maintain 110-120 kts for the approach when 2 miles out do this with throttle

Final Approach (Within 7 miles from the threshold with ILS captured and centered)

1. First notch of flaps can be added below 200Kt
2. At about 4 miles DME from the station begin slowing to 180 Kt.
3. Gear down, slow to 160 if second notch of flaps are needed
4. Glide slope and Localizer on Path centered
5. Airspeed under 180 Kts
6. Prop sync off
7. Props high rpm
8. Landing Gear DOWN
9. Flaps one notch down

GUMPS, GUMPS, GUMPS

Landing (At Decision Height)

1. Speed 110-120 Kts
2. Autopilot Disconnect
3. Maintain flight attitude and speed until touch down
4. Touchdown and Steer to stay in the center of the runway
5. Brakes On Maximum
6. Reverse Thrust On
7. Throttles 100% reverse
8. When slow enough, Reduce throttles, and braking, move power lever to Idle
9. Turn off active runway at first intersection.

Taxi to the Ramp

1. Transponder Standby
2. Strobe Light Off
3. Landing lights off
4. Flaps Up
5. Ice detect, Pitot Heat and other de-icing equipment Off

Ramp Arrival (aircraft motion stopped and Parking Brake set)

1. Allow one minute for engines to idle
2. Taxi and Landing lights Off
3. Beacon Off
4. All engine generators Off Line
5. Engines Off Condition levers to fuel cut off, prop levers to feather
6. AP (autopilot) and YD (yaw damper) Off

Shutdown

1. Avionics and Inverter Off
2. Nav Lights Off
3. Fuel pumps off
4. Bleed air off
5. Battery Master Switch Off

The End

