X-Plane
Piper PA18 Super Cub

Pilot's Operating Manual

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Contents

The Piper PA-18 Super Cub 4

Piper PA-18-150 Super Cub Specifications 5

The X-Plane PA-18 Super Cub 6

Views and Controls 7

Creating “Quick Look” views 8

Operating the controls 11

Assigning peripheral devices 13

A Tour of the Cockpit 15

Overhead 15

Fuel Gauges 15

Electrical Panel 15

Control Stick 16

Rudder Pedals 16

Brake Pedals 16

Flap Lever 16

Throttle 17

Magnetos (Rotary) Switch 17

Carburetor Heater 17

Pitch Trim (Rotary) Handle 17

Fuel Selector (Rotary) Switch 18

Primary Instrument Panel 19

Airspeed Indicator 19

Attitude Indicator (EADI) 20

Heading Indicator (Directional Gyro) 20

Turn Coordinator 20

Altimeter 21

Vertical Speed Indicator 21

Propeller RPM and Hobbs Meter 21

VOR1 / ILS Receiver 22

Oil Temperature and Pressure 22

Vacuum Pressure 22

Cylinder Head Temperature 23

Engine Starter Button 23
Mixture Control 23
Radios 25
Transponder 27
Weight & Balance 28
Checklists 29
Pre-Flight Exterior Inspection 29
Cold and Dark to Engine Start 31
Before Taxi 36
Run Up 37
Takeoff 39
After Takeoff 42
Cruise 43
Before Landing 44
Landing 46
After Landing 47
Parking 48
Operating-Speeds 50

The Piper PA-18 Super Cub

The Piper PA18 Super Cub is a single-engined two-seater ‘Light-Utility’ General Aviation aircraft that was built by Piper Aircraft intermittently between 1949 and 1995. During the production years, over 10,000 were built. Many of these aircraft are still operational and are most commonly used for bush flying.

The design of the PA18 is based on the earlier Piper J-3 Cub that was built between 1938 and 1947. The J-3 was extremely popular due to its simple lightweight construction, excellent low-speed handling and short-field capability. The J-3 was the most produced model in the history of Piper Aircraft, with over 20,000 sold.

Both the J-3 and PA18 utilize fabric stretched over a steel frame. The Super Cub added flaps, dual fuel tanks and was initially available with a Lycoming O-235 engine, developing 108hp. Takeoff roll was as little as 400 feet, and landing roll only 300 feet with flaps deployed. Later models were fitted with a Lycoming O-320 developing 150hp.

The PA18 Super Cub is renowned for its bush-flying capabilities, and many modifications are available to further enhance this. The most visible of these is the addition of soft, low-pressure ‘balloon’ tires which can absorb large impacts, and resist sinking into soft terrain. Other modifications include additional baggage compartments, luggage pods, fuel pods, and racks for carrying heavy materials. Some aircraft feature a third passenger seat located in the luggage area.

A number of military variants have been produced, and sold to the Air Force of Argentina, Austria, Germany, Iran, Israel, Netherlands, Nicaragua, Norway, Portugal, Switzerland, and United States. Military variants have also been acquired by the Armies of Belgium, Greece, Italy, Japan (GSDF), Portugal, Sweden, Turkey, and United States, and the Navy of Uruguay

Although Piper ceased production in 1995, new aircraft can be acquired from CubCrafters.Inc. This company is based in Washington State and started refurbishing original Cubs in the 1980s. They now manufacture brand-new copies of the Super Cub, under the model name ‘Top Cub’. Improvements to the original design are ongoing.

Piper PA-18-150 Super Cub Specifications

Engines:

Model	--	1 × Lycoming O-320 piston-engine
Power	--	150 hp (112 kW)

Fuel:

Capacity	--	36 U.S. gallons (136 Liters)
Type	--	Avgas (minimum 80 octane)
Burn (cruise)*	--	9 US gallons (34 liters) per hour

Weights and Capacities:

Max. Takeoff Weight	--	1,750 lbs. / 794 kg.
Basic Empty Weight	--	800 lbs. / 364 kg.
Useful Payload	--	700 lbs. / 318 kg.
Maximum Persons	--	3

Performance:

Max. Cruise Speed	--	96 KIAS
Stall Speed	--	33 KIAS (full flap)
Never Exceed Speed	--	120 KIAS
Service Ceiling	--	16000 ft. / 4,877 m
Rate of Climb	--	960 ft. per min / 293 m per min
Range	--	400 nm

Dimensions:

Wingspan	--	35 ft. / 10.7 m
Length	--	23 ft. / 7 m
Height	--	7 ft. / 2.1 m

- *Representative value depending on conditions*

The X-Plane PA-18 Super Cub

Unlike other flight simulators, X-Plane employs a technique called “Blade Element Theory”. This utilizes the actual shape of the aircraft (as modeled in the simulator) and breaks down the forces on each part separately. The force of the “air” acting on each component of the model is individually calculated, and combined, to produce extremely realistic flight.

When you “fly” an airplane in X-Plane, there are no artificial rules in place to govern how the aircraft behaves. Your control inputs move the control surfaces of the aircraft, and these interact with the virtual flow of air around it. As such, you may consider that you are really flying the aircraft.

Due to the use of “Blade Element Theory” in X-Plane, an aircraft must be modeled with great accuracy, in order that it behaves like its real-life counterpart. This means the fuselage, wings and tail surfaces must be the right size and shape, the center of lift and center of gravity must be in the right places, and the engine(s) must develop the right amount of power. In fact, there are a great many properties that must be modeled correctly to achieve a high-fidelity flight model.

The aircraft featured in X-Plane is the PA18-150 variant and has been modeled by our design team with a degree of accuracy that ensures its flight characteristics are like the real aircraft. However, despite this, some differences will be apparent, because even the smallest factor plays into the ultimate behavior of the aircraft in reality, and in X-Plane. The systems modeling of this aircraft involves some compromise too, because of the degree of complexity present in a real aircraft. However, in many cases, the actual PA-18 procedures could be followed when operating the X-Plane version. Checklists are presented later in this document (with modifications to suit this specific simulation platform and model). It is recommended that X-Plane pilots follow those procedures when operating the aircraft.

Views and Controls

The X-Plane PA-18 Super Cub features a detailed 3-D cockpit with many of the primary controls and systems modeled, including: Flight controls (control stick, rudder pedals, throttle), electrical systems, pneumatic systems, navigation aids, radios, interior and exterior lighting, and fuel systems.

Creating "Quick Look" views

Before discussing the controls, we suggest that the pilot establish a series of "Quick Look" views that will be helpful later when interacting with this particular aircraft. If you are not familiar with this technique, more information is available in the [X-Plane Desktop Manual].

The following "Quick Look" views are recommended for the X-Plane PA-18 Super Cub, where the pilot is not using a Virtual Reality (VR) headset, or a head tracking device. To some degree, these correspond (on the keyboard Number Pad) with their physical locations in the cockpit - and are therefore logical and easy to recall later.

Magnetos

Carb Heat

Cabin Heat

Pitch Trim

Fuel Selector

Flap Lever

Throttle

25

Radios

Transponder

Door Handle

Mixture

Pilot View and Primary Instrument Panel

Fuel System Primer

Starter Button

Left Glance View

Circuit Breaker Panel

Right Glance View

Operating the controls

This section covers the control manipulators used in X-Plane. The specific illustrations in THIS chapter may differ from YOUR aircraft.

Toggle and Rocker switches are operated with a single click of the mouse. Place the mouse pointer slightly above, or below, the center point of the switch, depending on the direction you intend to move it. A small white arrow is displayed to confirm the intended direction. Click the mouse button to complete the operation.

Levers are operated by assigning a peripheral device to the necessary axes in X-Plane (throttle, prop, mixture etc.). More information is available in the X-Plane Desktop Manual.

Levers may also be operated by clicking and dragging the mouse pointer.

Radio and Navigation frequency rotary dials are grouped together as “twin concentric knobs”. Here, the larger rotary is used to tune the integer portion of the frequency, and the smaller rotary is used to tune the decimal portion. Each works independently, using the same technique, as described above.

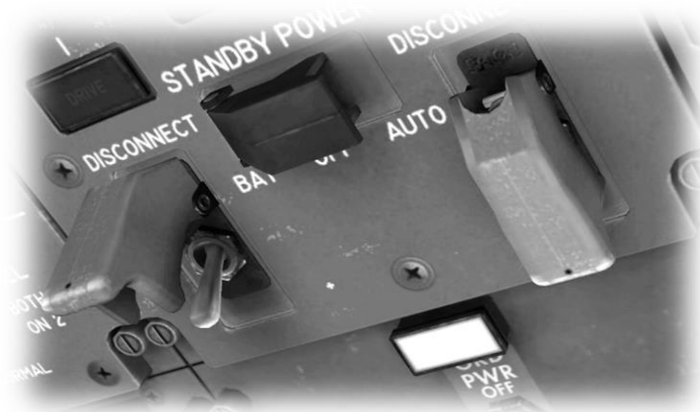
Some rotary dials are operated by positioning the mouse pointer on top of the control, and then a click and drag to the right, or to the left. The same can be accomplished using the mouse wheel - if one is present on your device.

Other rotary controls require finer precision. When the mouse pointer is positioned slightly to the left of such a control, a counter-clockwise arrow appears. This indicates that you are ready to rotate the control counter-clockwise. Correspondingly, a clockwise arrow indicates that you are ready to rotate the control clockwise. After positioning the mouse pointer, changing the frequency in the desired direction is accomplished in two ways:

i) By rolling the mouse wheel forwards, or backwards

ii) By clicking (dragging is not supported here)

Push buttons are operated by pointing and clicking with the mouse.



Guarded switches are used in situations where accidental activation of the switch must be prevented. To operate a guarded switch, the guard must first be opened. Do this by positioning the mouse pointer over the switch until the two vertical white arrows are displayed. Click once. If the switch is currently closed, it will open, and vice-versa. After the guard has been opened, the switch may be operated like a toggle and rocker switch (see earlier in this section).

- Illustration not taken from this aircraft

The Side Stick is operated by assigning a peripheral device to the “roll” and “pitch” axes in X-Plane. This is discussed in greater detail later in the guide.

The Rudder Pedals are operated by assigning a peripheral device to the “yaw” axis in X-Plane. If your rudders also support toe braking, create additional assignments to the “left toe brake” and “right toe brake” axes in X-Plane. This is discussed in greater detail later in the guide.

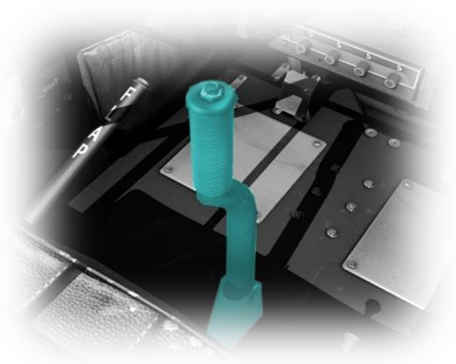
Note that you may also assign keys on your keyboard, or buttons on your external peripheral to move the rudder to the left or right, or to center the rudder.

- Illustration not taken from this aircraft

Assigning peripheral devices

This section of the manual deals with an “ideal” scenario, in terms of the assignment of external computer peripherals to operate the X-Plane PA18 with the highest degree of realism. If you are missing some of these external peripherals, you may elect to choose a different configuration that better suits your hardware.

More information is available in the X-Plane Desktop Manual.

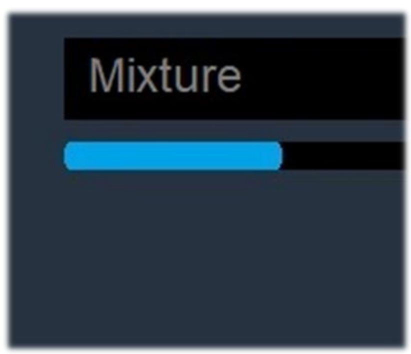


This aircraft is equipped with a control stick, for roll and pitch control.

Assign the lateral axis of your joystick (or yoke) to the “Roll” command in X-Plane, and the vertical axis to the “Pitch” command.

This aircraft is equipped with a single throttle – which controls the torque (power) output by the engine.

Assign the throttle lever on your quadrant to the “Throttle” property in X-Plane.



This aircraft is equipped with a single mixture lever which controls the ratio of fuel to air entering the engine’s combustion chambers.

Assign the throttle lever on your quadrant to the “Mixture” property in X-Plane.

This aircraft is equipped with a Flap lever, which controls the deployment of the flaps.

Assign a peripheral lever to the “Flaps” property in X-Plane.
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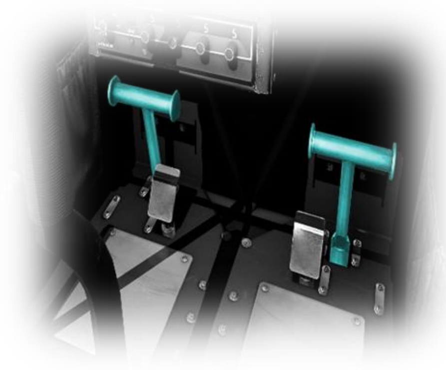
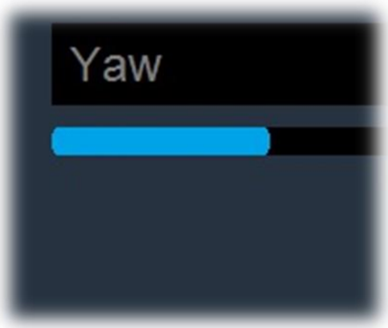




This aircraft has conventional rudder controls, actuated by the rudder pedals.

Assign the yaw axis of your pedals peripheral device (or a joystick axis) to the “yaw” property in X-Plane.

This aircraft has a left and right brake pedal that is separate from the adjacent rudder pedal.

Assign the brake “toe-tipping” motion of each peripheral pedal (or a joystick axis) to the “left toe brake” and “right toe brake” property in X-Plane.

Note: The parking brake lever is not modeled in this aircraft. Map a peripheral button or keyboard key to toggle this on/off.

A Tour of the Cockpit

In this section of the manual, the cockpit will be broken down into distinct functional areas, and the controls that are featured in those areas will be identified and described. This will assist in locating the necessary instruments and controls later, when working through the aircraft check lists, and flying the aircraft.

Overhead

Fuel Gauges	This aircraft is equipped with sight gauges to provide the pilot with an approximate fuel level indication. Fuel passes through these gauges and lifts a float. The accuracy of these gauges is limited, especially when the fuel tanks are below ¼ full.
Electrical Panel	**This panel features the following:** Master Electrical Bus Switch Avionics Bus Switch Beacon Switch Navigation Lights Switch Landing Lights Switch Taxi Lights Switch Alternator Meter This meter shows the current (in amps) flowing from the alternator to the battery (when the engine is running). The alternator keeps the battery charged.

Primary Flight Controls

Control Stick	Controls pitch and roll.	Actuates the ailerons that are built into the wings. Control sticks often feature in older General Aviation aircraft, military trainers, and aerobatic aircraft. More recently yokes and sidesticks have become favored.
Rudder Pedals	Controls Yaw.	Actuates the rudder that is built into the tail assembly.
Brake Pedals	Actuates the left and right wheel brakes.	This aircraft features dedicated brake pedals that are separate from the rudder pedals. These actuate the left and right brakes built into the respective wheel assemblies. Use the brake pedals individually to steer on the ground at low speed. Use the brake pedals together to slow or stop.
Flap Lever	Actuates the flaps built into the wings.	The flap lever can be set in three positions: No Flap (Normal Flight) Half Flap (Reduces takeoff distance) Full Flap (For landing)

Cockpit Left-Side Panel

Throttle	Controls the engine power output, and propeller RPM.	Throttle
Magnetos (Rotary) Switch	Selects Left, Right or Both Magnetos. This control operates as a Rotary Control.	Magnetos generate electrical sparks for the engine. This aircraft is equipped with twin magnetos for redundancy. Both magnetos are used for normal operations. However, the engine is capable of operating on just a single magneto.
Carburetor Heater	Directs warm air to the carburetor intake to prevent icing.	Routes unfiltered air that's been heated by the exhaust manifold into the carburetor, preventing ice accumulation. Heat is usually applied when engine RPMs are low, and when icing conditions are present, or suspected.
Pitch Trim (Rotary) Handle	Use to select a nose-up or nose-down pitch. This handle operates the trim tabs on the elevators.	Pitch trim alleviates the need for the pilot to maintain backward, or forward pressure on the yoke. Trim is also used to set the desired airspeed in this aircraft. Trim up for reduced airspeed, and down for increased airspeed.

Fuel Selector (Rotary) Switch	Used to select the desired fuel tank(s) supplying fuel to the engine. Options are: - Both (tanks) - Right (tank) - Left (tank)	Normal operating procedure is to utilize both tanks simultaneously. However, there may be a need to select a single tank, in the event there is an uneven weight distribution of fuel between the two tanks, or when fueling the aircraft on uneven ground.

Primary Instrument Panel

Airspeed Indicator

This instrument displays the speed of the aircraft (in knots) relative to the air moving past it (and not relative to the ground).

The green arc (85 to 120 knots) indicates the normal operating range.

The yellow arc (120 to 154 knots) indicates the smooth-air operating range. Do not operate in this range when in turbulent air.

The white arc (42 to 85 knots) indicates full flap operating range.

Attitude Indicator (EADI)

This instrument displays the attitude of the aircraft relative to the horizon. This informs the pilot whether the aircraft is flying straight, or turning, and whether the aircraft is climbing, or descending. This information is crucial in "instrument conditions" - when the outside horizon is not visible.

Heading Indicator (Directional Gyro)

This instrument displays the aircraft's (magnetic) heading. This is accomplished using a gyroscope, which is calibrated at the start of the flight, and periodically during the flight, (using the magnetic compass as a reference).

This instrument uses a gyroscope to maintain the correct heading, and must be calibrated at the start of the flight by setting the heading to that indicated by the magnetic compass. Use the rotary control at the lower-left (labeled 'Push') to accomplish this. Because gyroscopes tend to 'precess' over time, the heading should be periodically reset – again using the magnetic compass, when in level flight.

The rotary control at the lower-right corner is used to set the 'Heading Bug'. This is used in conjunction with the autopilot (see later) to maintain the desired heading.

Turn Coordinator

This instrument informs the pilot of both the rate of turn, and whether the aircraft is slipping sideways during a turn.

The "L" (left) and "R" (right) indicators at the four and eight o-clock locations on the dial correspond with a "two-minute turn", which is considered ideal when maneuvering an aircraft in instrument conditions. When the wings of the white aircraft in the center of the dial intersect with these markings (during a turn), it will take exactly 2 minutes for the aircraft to make a 360 degree turn back to its original course.

The floating ball is used to assist the pilot in making a "coordinated turn", so the aircraft does not slip to the side, but instead follows the desired course. If the ball moves to the right, depress the right (rudder) pedal, until the ball is centered again. Correspondingly, if the ball moves to the left, depress the left (rudder) pedal, until the ball is centered again. When the ball is centered, the aircraft is making a coordinated turn.

Altimeter

The altimeter displays the altitude above sea level (not the altitude above the ground). This model uses a clock analogy – the 'hour' hand displays the altitude in thousands of feet, and the 'minute' hand in hundreds of feet. In the example to the left, the altitude is 300 feet.

Altimeters use barometric pressure to determine altitude. As such, they must be calibrated at the start of the flight, and periodically re-calibrated during the flight, to account for the current local conditions. To calibrate this instrument, the pilot must set the published barometric pressure at his current location. This setting is also displayed here, both in millibars, and inches of mercury.

Vertical Speed Indicator

This instrument informs the pilot of the rate of climb, or the rate of descent, in hundreds of feet per minute.

Propeller RPM and Hobbs Meter

This instrument displays the RPM of the propeller, which is controlled by the throttle. The green band is the recommended operating range.

The Hobbs meter indicates the cumulative time the engine has been running. This is needed for the engine maintenance schedule.

VOR1 / ILS Receiver

This instrument displays the course deviation from the desired radial of a VOR transmitter, or ILS (Instrument Landing System). This is selected via the VLOC1 frequency of the Garmin G530 device.

In the case of the VOR, the desired radial is selected using the OBS rotary control. The lateral course deflection is then displayed, providing the pilot with the direction in which he needs to steer to intercept that radial. The “To/From” indicator informs the pilot if he is flying towards, or away from, the VOR transmitter.

In the case of an ILS, both the lateral and vertical course deflection is displayed, providing the pilot with the direction to steer to intercept the localizer, and if the aircraft is above, or below, the glideslope.

Oil Temperature and Pressure

Oil temperature is measured in degrees Fahrenheit. Normal operating range is between 120 and 245 degrees. When the temperature is below this range, excess wear or damage to the engine may occur at high RPM. If the temperature is above this range, damage to the engine is likely imminent if continued operation occurs.

Oil pressure is measured in PSI (pounds per square inch). Normal operating range is 60 to 86 PSI. A low oil pressure indicates insufficient oil, and may be the result of a leak, or under-filling. A high oil pressure usually occurs in cold temperatures, or with thick oil. Excessive wear, or damage to the engine, may occur if the oil pressure is not in the normal operating range.

Vacuum Pressure

Gyro pressure gauge, vacuum gauge, or suction gauge are all terms for the same gauge - used to monitor the vacuum available to actuate the air driven gyroscopic flight instruments. When the vacuum pressure is outside the normal operating range, one or more of the primary flight instruments may become inoperable.

Cylinder Head Temperature

Indicates the temperature at the top of the engine cylinders, where combustion is occurring. This gauge is commonly used with air-cooled engines. Lycoming recommends keeping the temperature below 225 degrees Celsius for maximum engine life. Cylinder head temperature rises as the engine works harder, and also with a leaner fuel mixture. The pilot may elect to richen the mixture if the temperature climbs beyond the recommended range.

Engine Starter Button

Depress this button to engage the engine starter motor.

The engine will start if the battery is sufficiently charged, there is fuel present in the tanks, the fuel selector is in the Left, Right or Both positions, with the mixture is not at the cut-off position.

Mixture Control

Alters the ratio of fuel and air entering the engine.

Pull backwards to lean the mixture.

Push forwards to richen the mixture.

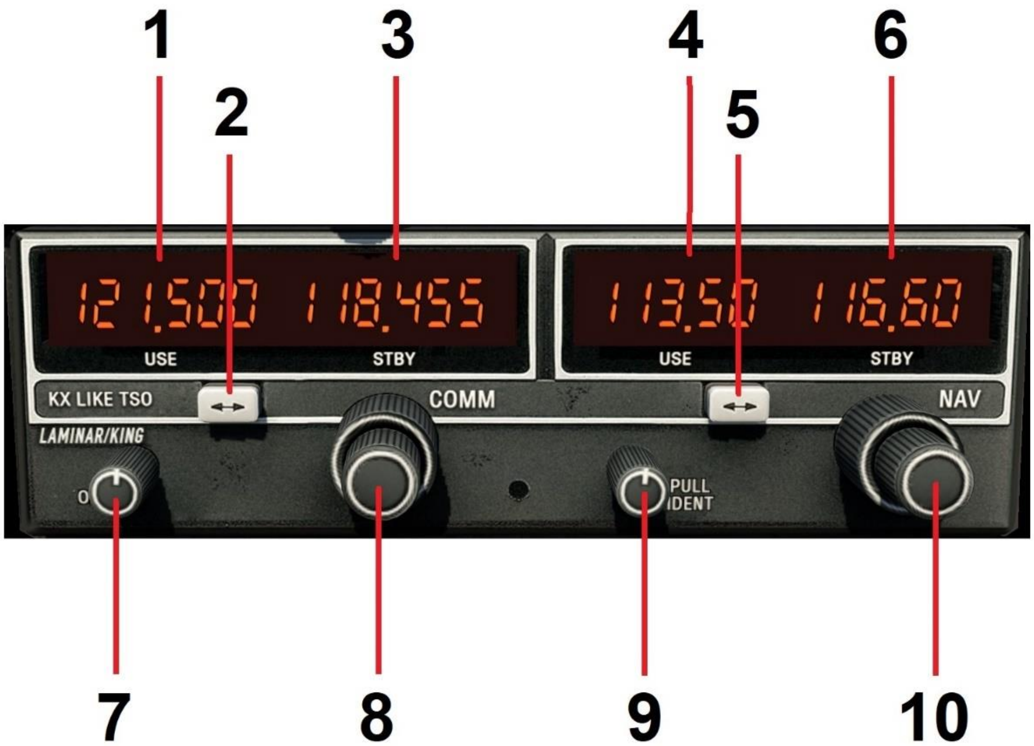
As altitude increases, the pilot leans the mixture to compensate for the decrease in air-density. Mixture also affects the cylinder head temperature, and fuel consumption.

(See also the Cylinder Head Temperature).

Fuel System Primer

Used to pump extra fuel directly into the cylinder intake port or induction system prior to starting the engine. This lever is manually actuated by the pilot. Fuel must be present in the tanks. The fuel selector should be in the Left, Right or Both positions, with the mixture set to rich.

Radios

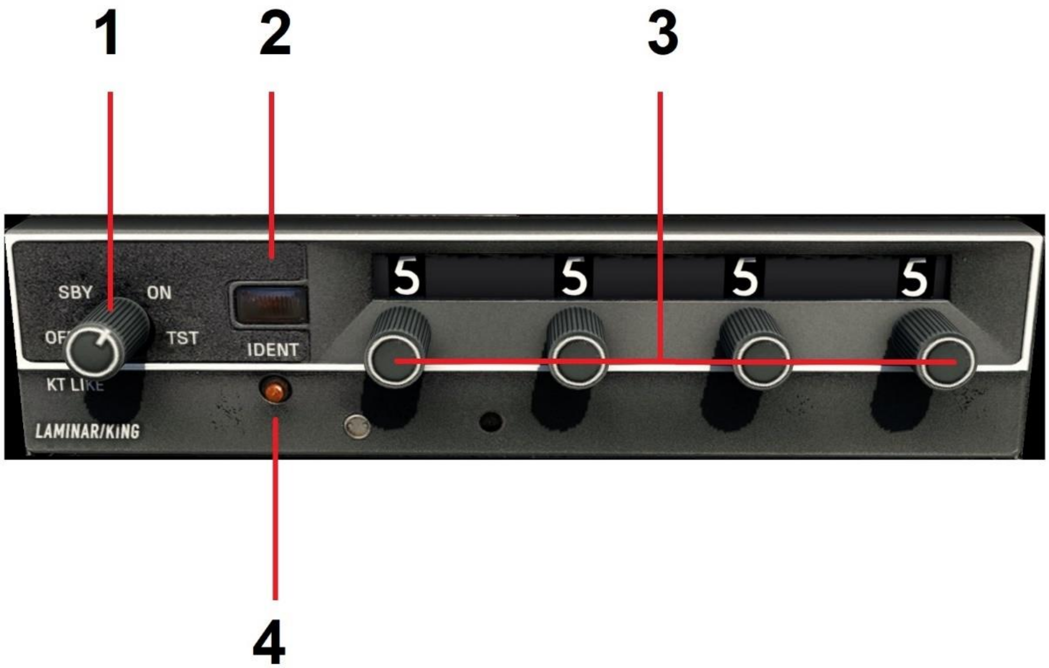


1	**Active Communication (voice) Frequency**	This is the frequency the pilot is communicating and receiving voice transmissions
2	**Communication Frequency Toggle Button**	Toggles the active and standby communication frequency
3	**Standby Communication (voice) Frequency**	This is the frequency the pilot expects to use next for communicating and receiving voice transmissions
4	**Active Navigation Aid Frequency**	This is the frequency of the current navigation aid in use by the pilot
5	**Navigation Aid Frequency Toggle Button**	Toggles the active and standby navigation aid frequency
6	**Standby Navigation Aid Frequency**	This is the navigation aid frequency the pilot expects to use next

7	**Communication (voice) Radio Power Rotary**	
8	**Standby Communication (voice) Frequency Tuning Rotary**	Use the outer rotary to change the integer component of the frequency. Use the inner rotary to change the decimal component of the frequency.
9	**Navigation Aid Radio Power Rotary**	
10	**Standby Navigation Aid Frequency Tuning Rotary**	Use the outer rotary to change the integer component of the frequency. Use the inner rotary to change the decimal component of the frequency.

Transponder

The transponder works in conjunction with ATC radar, to identify the aircraft to controllers. When operating in controlled airspace, each aircraft is provided with a unique transponder code to accomplish this.



1	**Function Selector Rotary**	**SBY (Standby Mode):** Transponder is powered-up but 'silent'. **ON:** Transponder will reply to ATC radar interrogation with selected transponder code. **TST:** Used when servicing the device and not during flight operations.
2	**Reply Lamp**	Illuminates when the transponder has been interrogated by ATC radar.
3	**Transponder Code Rotaries**	Used to set the transponder code assigned to this flight by ATC .
4	**Ident button / Light**	Click this button to highlight your aircraft's location on the ATC controllers radar screen. The light illuminates to indicate this (self-cancelling) mode is active.

Weight & Balance

THIS CHAPTER IS DELIBERATELY LEFT BLANK PENDING REVISIONS TO WEIGHT AND BALANCE UI EXPECTED IN XP12.

Checklists

The following check lists are designed with the convenience of the simulation pilot in mind and customized to the X-Plane Piper PA18 Super Cub. These differ from those of the real aircraft.

Pre-Flight Exterior Inspection

A Pre-Flight Inspection should always precede flight in any aircraft. The purpose of this inspection is to ensure the aircraft is in a state of readiness for the upcoming flight.

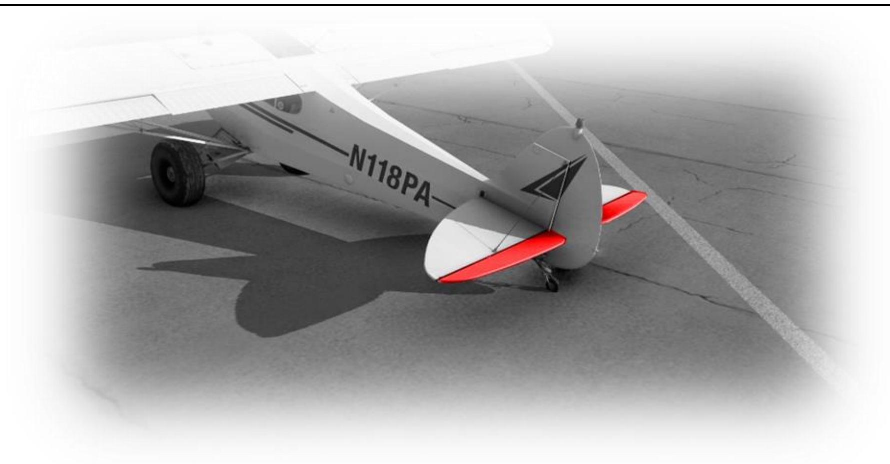
In X-Plane, a pre-flight inspection is not merely undertaken to simulate reality, but does in fact have real purpose, because the control surfaces of the aircraft interact directly with the airflow over and around them, just as in real life. As such, correct movement of all control surfaces is necessary for normal flight.

Hold roll axis at full deflection.

Visually check corresponding movement of ailerons.

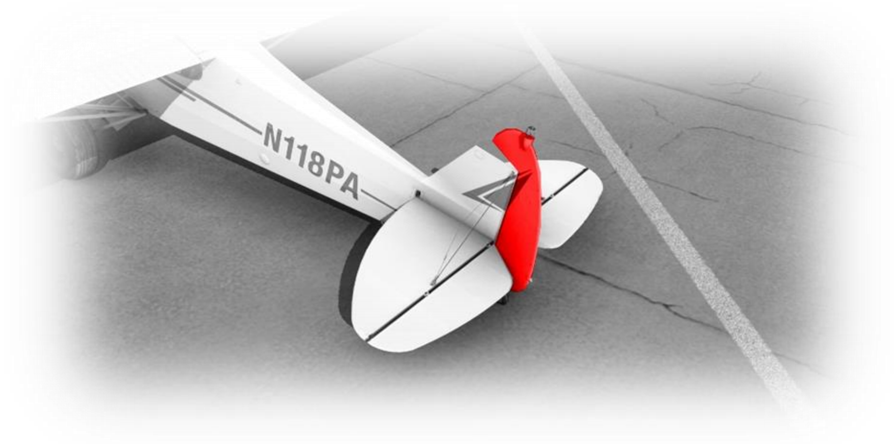
Hold pitch axis at full deflection.

Visually check corresponding movement of elevators.



Hold yaw axis at full deflection.

Visually check corresponding movement of rudder.



Cold and Dark to Engine Start

The following check list is a sub-set of the real procedures, and includes only the essential steps leading to engine start:

CABIN DOOR – CLOSED

(WINDOW OPTIONAL)

Hint: When inside aircraft, use click-spots on interior door handle and window above to open or close. Click-spots are also present on the outside of the door and window.

PARKING BRAKE – CHECK ON

Note: The parking brake lever is not modeled in this aircraft. Map a peripheral button or keyboard key to toggle this on/off. When starting a new flight, the brake will be ON by default.

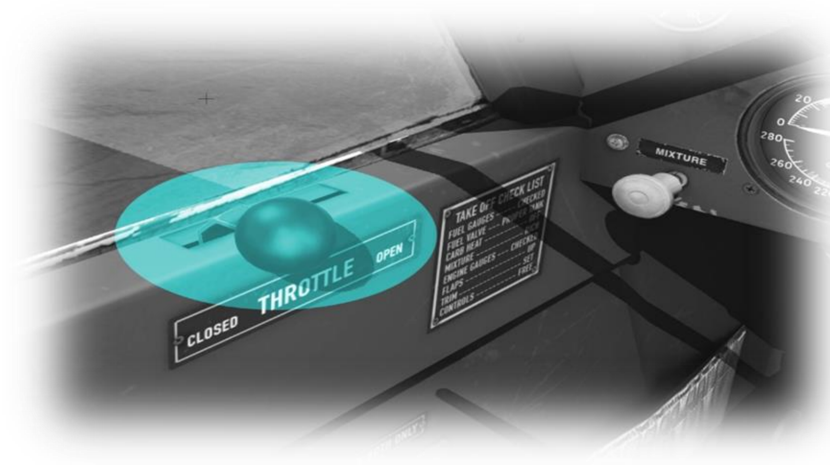
FUEL SELECTOR – BOTH

MASTER (BATTERY) – ON

MIXTURE – FULL RICH

CARBURETOR HEAT - OFF

THROTTLE - IDLE



FUEL PRIMER – 3 CYCLES

(COLD WEATHER ONLY)

STARTER BUTTON – PUSH

(PUSH AND RELEASE TO START)

FUEL QUANTITY - CHECK

25

OIL PRESSURE – CHECK

(WITHIN GREEN ARC)

AMMETER – CHECK

(CHARGING)

AVIONICS - ON

TRANSPONDER – STANDBY

Before Taxi

FLIGHT CONTROLS – CHECKED

(Pitch / Roll / Yaw)

See: [Assigning peripheral devices]

DIRECTIONAL GYRO – SET

(FROM MAGNETIC COMPASS)

TRANSPONDER – ON

PARKING BRAKE – OFF

Note: The parking brake lever is not modeled in this aircraft. Map a peripheral button or keyboard key to toggle this on/off.

Run Up

PARKING BRAKE – ON

Note: The parking brake lever is not modeled in this aircraft. Map a peripheral button or keyboard key to toggle this on/off.

OIL TEMP & PRESSURE – CHECK

THROTTLE – 1800 RPM

MAGNETOS – TEST

(RPM DROP)

CARBURETOR HEAT – TEST

(RPM DROP)

AMMETER – CHECK

THROTTLE – IDLE

PARKING BRAKE – OFF

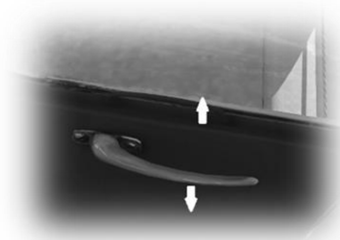
Note: The parking brake lever is not modeled in this aircraft. Map a peripheral button or keyboard key to toggle this on/off.

Takeoff

CABIN DOOR – CHECK CLOSED

WINDOW - CLOSED

Hint: When inside aircraft, use click-spots on interior door handle and window above to open or close. Click-spots are also present on the outside of the door and window.



MIXTURE – CHECK FULL RICH

25

CARBURETOR HEAT – CHECK OFF

ELEVATOR TRIM – SET

Hint: With one notch of flap, trim the aircraft slightly nose-down prior to take-off.

FLAPS – SET

(ONE NOTCH)

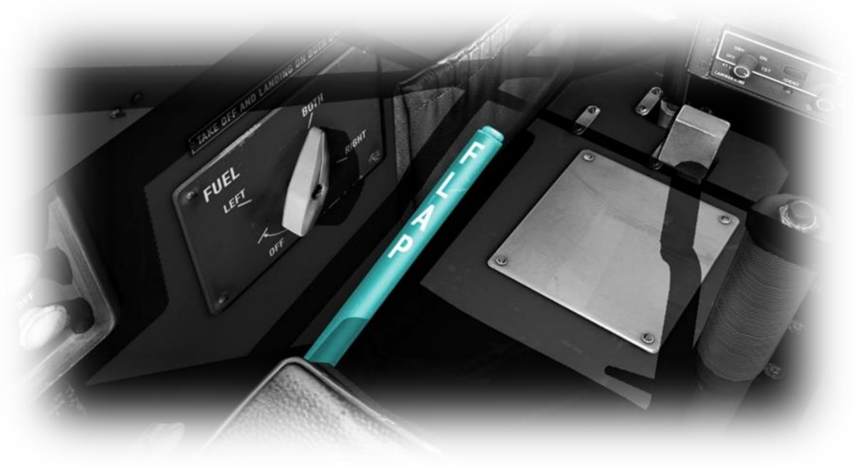
ALTIMETER - SET

25

MAGNETOS – BOTH

After Takeoff

FLAPS – RETRACTED



THROTTLE – SET AS REQUIRED

Cruise

MIXTURE – LEAN AS REQUIRED

ALTIMETER - SET

Before Landing

ALTIMETER - SET

25

CARBURETOR HEAT – AS REQUIRED

MIXTURE – FULL RICH

FLAPS – AS REQUIRED

Landing

FLAPS – FULL	

After Landing

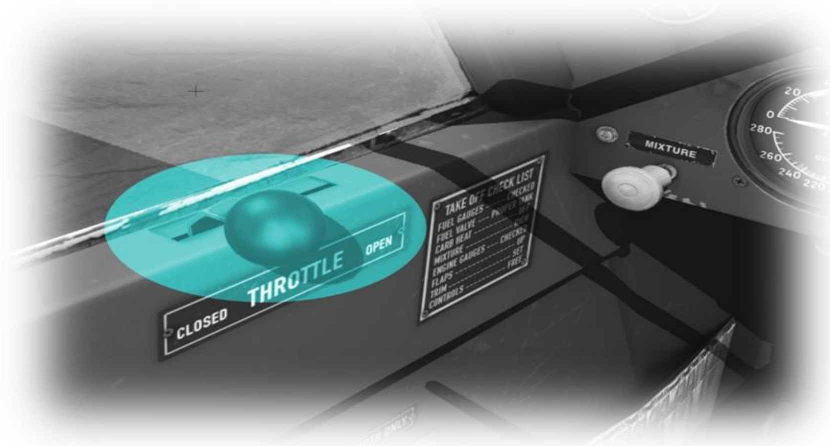
FLAPS – RETRACTED

25

CARBURETOR HEAT – OFF

Parking

THROTTLE - IDLE



PARKING BRAKE – ON

Note: The parking brake lever is not modeled in this aircraft. Map a peripheral button or keyboard key to toggle this on/off.

TRANSPONDER – OFF

MIXTURE – CUT OFF

FUEL SELECTOR – OFF

AVIONICS - OFF

MASTER (BATTERY) – OFF

Operating-Speeds

Rotate Speed *	Vr	40 KIAS
Stall Speed, Flaps 100%, Power Off	Vso	33 KIAS
Stall Speed, Clean	Vso	41 KIAS
Minimum Controllable Speed	Vs	45 KIAS
Best Angle of Climb	Vx	55 KIAS
Best Rate of Climb	Vy	60 KIAS
Best Glide Speed	Vbg	60 KIAS
Maximum flaps Extended Speed	Vfe	85 KIAS
Maximum Maneuvering Speed	Va	96 KIAS
Maximum Structural Speed	Vno	96 KIAS
Never Exceed Speed	Vne	120 KIAS
Maximum Demonstrated Crosswind		10 KNOTS

- *Representative value depending on conditions*