AEROSOFT

Piper Super Cub

it is fun to fly low and slow

Index

Introduction

Why the Piper Super Cub became such a popular aircraft is not obvious when you get close to one for the first time. It looks absolutely like a lot of spare parts bolted together. You see fasteners, bolts and bits of wire everywhere. The wings seem to be bolted to the windows and it seems impossible it will carry the aircraft. When you open the 'door' things don't get a lot better as there is no door, just a bit of fuselage that folds down and a bit of window that folds upwards (and often won't stay up).

Now you are faced with the Piper Dance, certainly when you are a bit long it seems impossible that you'll ever get in. Everything you see has a NO STEP label on it and looked to flimsy to hold your feet anyway. But somehow most people manage and they find themselves on a rather uncomfortable narrow seat. You perform the last cockpit checks and fire up the engine. That engine now seems to leap closer, the sound is deafening and the special effects department has opened all registers, the aircraft seems to jump around, and you are sure most bits will fall off due to the vibration. But as the engine smoothens out you'll notice that all seems okay, you warm up and taxi to the runway. When you get there you will know how the rudder works as you really have to zigzag to be able to see in front of you.

Take-off is nothing short of amazing, with the 150Hp engine the aircraft seems to accelerate like a Ferrari and it jumps in the air with a willingness that is rare for aircraft. And in seconds you'll know why this aircraft is rebuilt, refitted and loved by its owners. It's not nostalgia, it's because this is one heck of a nice flying machine. It loves to fly, it loves to show you what it can do, and it loves to show you that you don't need a lot of aircraft.

Of course, it all started with the PiperJ3- Cub around 1937 and at $2.000 they were dirt cheap. Aviation in those days was seen as a hobby for the rich kids and the aircraft were made like the expensive cars of those days. But William T. Piper decided that there was a market for a utilitarian small aircraft. Thousands of Cubs later, history proved him right. The aircraft was soon made in many versions and sales were strong from the start. But the start of WW II saw the L-2 Cub in a different role, a workhorse that would be used for everything, from recognizance to transporting generals and could land anywhere. Clearly the aircraft needed a larger engine then the 65Hp offered, but this was war and flown right, the aircraft just did what it was asked.

After the war development of the Cub stagnated a bit but when bush pilots demanded a cub with a larger engine in the late sixties, the Super Cub was build and the Cub got a new lease of life. Now powerful enough to get out of small fields, bolt on huge tundra tires or operate with floats, the Cub was the small aircraft that flown side by side with the DHC-2 Beaver and unlocked the remote regions of the world.

The Older cubs retired at flying schools and taught many generations of pilots to fly. Being a taildragger and very responsive it still is a preferred aircraft for many instructors. A Cub will very quickly tell you if things are not perfect but even when things are really going bad the very low speed will make it easy to correct. You CAN crash a Piper Cub but with a stall speed of 39 knots and a landing speed of 45 knots chances of surviving are as good as possible.

By now the Super Cub is as alive as ever. Even when the Piper company stopped building them in 1994 development did not stop. You can get all kinds of add-ons for this aircraft, there are Cubs with slats, wingtip extensions, and full digital cockpits and if you search real well you'll even find a twin engine Cub. Some owners like to get the best low speed handling and modify the wings, others buy a 225Hp engines and seem to jump from a standing start into air. That engine won't help a lot with the top speed however; the Cub does not like to go fast.

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With special thanks to the team of people that supported us in the beta. They are cool folks. Very special thanks go out to Dag, what he done goes way beyond the call of duty. Way beyond as he is in fact the designer of some of the liveries you see. For the update to 1.10 we got to mention Hywel Philips and Jeff Greth, they have been MORE then helpful debugging the issues we just could not see.

System requirements

- Pentium 1.6 GHz
- 512 Mb RAM
- 400 Mb of free available SPACE on the hard disk
- Sound card
- Microsoft Flight Simulator 2004 (NOT compatible with older versions)
- Windows 98, Windows 98 SE, Windows ME, Windows 2000, Windows XP, Windows 2003
- Adobe Acrobat® Reader 5 minimal to read and print the manual (1)

(1) Available for free, download at:
http://www.adobe.com/prodindex/acrobat/readstep.html

Contact support

Support for this product is done by Aerosoft. We prefer to do support on the support forum for one simple reason, it is fast and efficient and because customers help customers when we are sleeping.

Aerosoft forums: http://forum.aerosoft-shop.com

We feel strong about support. Buying one of our products gives you the right to waste our time with questions you feel might be silly. They are not. Please note that our online products are supported in English only.

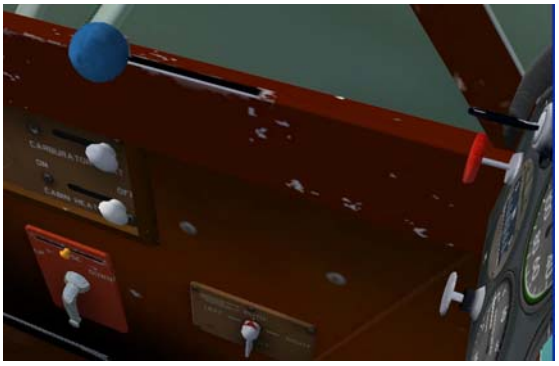
Construction

The Piper Super Cub is constructed with a strong tubular frame construction covered with linen. The engine is bolted to the fuselage with 4 bolts, mounted in vibration damping rubber. The wings are connected directly to the fuselage but supported by struts on both sides. The wing is constructed as the fuselage but strengthened by wires. Rudder, ailerons, elevator and flaps are all made with a light metal frame and covered with fabric. The landing gear is strong and supports the fuselage with two V struts that are hinged at the fuselage connection. Shocks are absorbed by hydraulic dampers. The gear supports can be covered or bare structures.

The instruments in FS2004

There are a lot of small things in the panels of this aircraft that will help you operate the Super Cub as realistic as possible. First of all the aircraft is designed so it can be fully flown from the Virtual cockpit. In a small and narrow aircraft as this one it seems this is by far the most realistic way. Apart from the circuit breakers all elements of the aircraft can be operated from the VC. Even if you did not like it before, try it again in this aircraft.

The next thing that will help you a lot is the fact that EVERY instrument can be zoomed to its full resolution of 512 by 512 pixels when you click on the center of the gauge. When you do so the gauge will zoom to full size in the lower right of the screen but it can be moved to another location. Clicking the center of the zoomed or the default instrument will close the zoomed version. It is possible to open as many zoomed gauges as you like. This will also fully function in the VC, but it will there open the gauge in a separate window. You can always undock any gauge and drag it to a separate window. Because of all this we based this panel for non maximized display. FS2004 is a lot more flexible non maximized and on almost all systems will give better performance.



There are a lot of controls located on the left side of the cabin. These are not done in 2d panels as there is no way you can see them straight on. They will all work in the virtual cockpit of course. Of these controls, the carburetor heater is copied to the Cabin Heater control on the front panel, the pitch trim and the throttle are of course also controlled by the default FS2004 controls.

Main Front Panel (SHIFT-1)
Contains all main flight instruments

Narco Transponder (SHIFT-3)

Narco Transceiver (SHIFT-4)

Left Wing Root (SHIFT-5)
Contains the light switches, fuel gauge and the volt and ampere gauge.

Right Wing Root (SHIFT-6)
Contains the right fuel Gauge, battery switch and the circuit breakers. In the amphibian version also the gear controls.

Oil Level Control (SHIFT-2)

Environmental Sound Control

In the lower right corner of the 2D main panel you will find a small panel switcher.

Equipment & Avionics

The Super Cub we sell you is based on the Super Cub of Katy Bergman. Katy is the only daughter of Fritz, the previous manager of the ever famous Emma Field. She learned to fly before she learned to ride her bicycle. Even when she was very young she was begging the pilots of the Emma Field Flying Club to take here up. The older members will never forget that she landed a floater cub on the wet grass of the glider section of the airport when it needed to be refit with wheels. Daddy Fritz almost lost it when he walked towards the aircraft shouting words that we can not reprint here, and saw his 16 year old daughter climb out, looking very smug.

Well Katy is back. She is now a lawyer in Seattle and uses her own Piper to travel to her friends that still live in the rural areas of Washington State. When she bought the Cub she had it overhauled completely and because she uses it for travel more then entertainment she made sure a bit of weather does not make it impossible to reach her destinations.

She had the whole instruments and avionics overhauled. The old ADF receiver was replaced by a second refurbished Narco Avionics Nav 122D. This is a self-contained 200 Channel NAV Receiver, 40 Channel Glideslope Receiver, VOR, Localizer and Glideslope Indicator all packaged to fit into a 3.0" instrument hole. Operation is simple and the instrument has a proven reliability.

The old 1970 coms radio has been replaced by a simple Narco COM 810 Transceiver. This study unit also serves as an intercom and features an Active and Standby Frequency Display and Flip-Flop Display Transfer.

As the aircraft is now very close to being IFR capable, Katy looked for a cheap transponder and found one on eBay. It was checked over by a local company and is mounted just as the transceiver under the panel. It means that oversized people have a problem when they apply full rudder, but she is smallish and a gadget geek. Her iPod is mounted on the wing root, but still needs to be hooked up to the intercom. A girl got to have her tunes, right?

Keep in mind that the availability of these instruments does not mean the aircraft is really IFR capable. In many countries the instrumentation would allow it to fly IFR, but with just the base instrumentation it is just not a good idea to shoot an ILS on a main airport in reduced visibility. See the advanced avionics as a backup of your VFR navigation. If you like to read the actual manuals for the Narco avionics, just look at the Manuals & Pinouts section of Narco-avionics.com.

Flight Instruments

The basic set of instruments will not really cause you any problems if you are know the aircraft of FS2004. Two instruments are a bit more advanced then what FS offers in its default aircraft and these are explained here in more detail.

There are two compasses in the Super Cub, one is a standard magnetic compass and the second is a vacuum driven gyrocompass (direction indicator). The standard compass will be enough for most occasions, but when you bank or change speed it will show an incorrect heading. As a first for FS2004 the compass is also made more realistic by including the deviation caused by the metal mass of the aircraft (the big chunk of metal of the engine for example) and the electrical currents that are all around. To compensate for this every compass has a 'deviation card' that will tell you what the deviation should be. These cards are normally near the compass, but in FS that is hard to do. To steer by the magnetic compass, just make sure the aircraft is stable and not changing speed and look at the chart below. If you need to fly 150° degrees, steer 147° on the compass.

N	30	60	**E**	120	150
001	033	060	086	116	147
S	210	240	**W**	301	330
182	216	244	273	303	330

The gyrocompass does not suffer from deviation and showing the wrong heading when you accelerate or decelerate. Driven by the vacuum system of the aircraft it is nothing more then a gyroscope that will resist any movement. The big problem is that it does not know what is North or South. The moment the vacuum system is running and the gyrocompass is running you have to set it with the small knob to the magnetic compass setting. Make sure you keep the deviation in mind! Most pilots will try to get the aircraft pointed towards a known heading, if possible at the heading that gives the least deviation (that would be just west of north, say 340° or 350° in our Cub) when they do so. If you know the exact runway heading it is easiest to line up on the runway and set the runway heading. This also gives you a chance to check if both the magnetic compass and the gyrocompass are fully functional.

Systems

Electrical System

The Super Cub has a 12 volts electrical system that is being powered by an engine driven generator that starts to generate electricity at 1300 rpm. The generator charges a battery that provides power with the engine off. In flight the battery is not needed for ignition. The main systems that draw power on your aircraft are the lighting, avionics (radio, transponder and VOR receiver), flight instruments and the engine starter. The Main Switch on the right wing root connects or disconnects the whole system from the battery/generator.

The large set of instruments installed in this aircraft draw rather a lot of power and the battery is still original 30 amps while a 40 amps model would be rather more appropriate. Do take care not to draw to much power when your engine is off and look at the amps meter to see if you are generating or drawing power. When the needle is in the plus region you are generating electricity and most probably charging the battery. The volt meter gives you an indication of the state of the battery. If it drops below 12 volts your battery is discharged and you have a electrical problem.

There are 5 circuit breakers that protect your systems. When a circuit breaker is overloaded it will 'pop' and you will see the fuse stick out of the fuse holder. When that happens, click on the fuse to push it back, perhaps the problem is just temporary. When you have an electrical problem, for example a system using far too much power, emitting smoke or even flames, pop the circuit breaker to remove the system from the electrical circuit. If you wonder why the turn coordinator has its own circuit breaker, it's because in old fashioned cubs, that is the only instrument that needed electricity.

Lighting

There are 4 separate lighting circuits on this aircraft.

- Instrument lights, which will light up inside of the cabin.
- Landing lights, there are TWO landing lights mounted on the right wing. The landing lights are known to overheat in hot conditions and when the aircraft is not moving.
- Navigation lights, our aircraft is equipped with a full IFR navigation light system
- Strobe lights, mounted on the tail this flashing light is seen from long distances

The light switches are located on the left wing root panel and you will have no problems operating them. Due to the way FS uses light you will see that some switches are linked, but if one has moved that you did not select you can toggle it again.

Fuel System

The Super Cub has two fuel tanks of 18 gallons (67 liters) each located in the wings and two smaller auxiliary tanks in the fuselage. Fuel feed is gravity based and the main tanks feed the smaller auxiliary tanks that prevent the fuel flow to be interrupted when the aircraft is not flying level. But even with these, extended flights with excessive nose up or nose down can drain the auxiliary tanks and can lead to engine fuel starvation. The auxiliary tanks do not have separate fuel gauges and should be considered to be part of the fuel lines, not as fuel tanks. From the auxiliary tanks the fuel is fed to carburetor and the fuel boost pump.

Between the two auxiliary tanks and the engine is the Fuel Selector switch. This switches between Right tank, Left tank, Both tanks and Off. Normal operation is done on Both as this will drain equal amounts of fuel from each tank. The gauge is only seen in the Virtual cockpit and has 4 settings. When the red pointer is UP, both tanks are used, when it is DOWN the fuel lines are closed. Left and right, well, you'll understand won't you? Operating is simply, put you mouse cursor on it and drag left/right.

The amount of fuel left in the tanks is measured by the fuel gauges, located on both wing roots. These simple glass tubes are mounted on the same level as the fuel tanks and will show the fuel level. There are TWO levels indicated, one for level flight and one for the aircraft with the tail wheel on the ground. It is strongly advised not to mix them up. Please note that the fuel gauges in the Virtual Cockpit are fully usable, but will always show the actual fuel left, no matter what the attitude of the aircraft.

Engine and Propeller

In this product we include three engine options but all is based on the 135 Hp Lycoming 0-290 D2. The other engines operate basically the same but provide a bit more power.

The Lycoming 0-290 D2 is a 4 cylinder air-cooled engine with the cylinders placed horizontally. The crankshaft is directly connected to the propeller so the propeller RPM is identical to the engine RPM. The fixed pitch propeller simulated is a Sensesich M76-AM-2. This creates a light, reasonable efficient and highly reliable combination.

	Lycoming 0-290-D2	Lycoming 0-320-A3C	Lycoming 0-320-D2C
cylinder_displacement	72.25	79.95	79.95
compression_ratio	7.5:1	7.00:1	8.50:1
number_of_cylinders	4	4	4
max_rated_rpm	2600	2700	2700
max_rated_hp	135	150	160
fuel_metering_type	Gravity Carburetor	Gravity Carburetor	Gravity Carburetor
Max RPM	2600	2700	2700
Eco Cruise	2250	2450	2450
Perf Cruise	2350	2550	2550

CHT/EGT

The Cylinder Head Temperature / Exhaust Gas Temperature help you determine if the fuel/air ratio is correct. The CHT measures the temperature of the sparkplug and the EGT measures the temperature a few inches from the cylinder. Thus the EGT will always be a bit faster in changing as there is no mass to warm or cool.

Almost all engines operate most efficient at setting just below peak EGT. Peak EGT indicates that the maximum amount of energy that is in the fuel is transformed to heat (=power). If the mixture is too rich not all fuel will combust and will cool the exhaust gasses. If the mixture is too lean the excessive air will cool the exhaust gasses. At peak EGT the mixture is just right, fuel economy is best and spark plug fouling not likely to happen. **For every Lycoming engine leaning past the peak is not recommended.** If you want the best Power Mixture (the mixture that provides the best indicated airspeed), set the EGT at 100 F° plus of peak EGT.

The smaller, low compression air cooled engines on Cubs normally are not very susceptible to overheating cylinders, but the moment you see an abnormal high temperature you have to take action. Reducing power and enriching the mixture will lower the temperature. What is abnormally high is something that is not easy to say as it depends on the operation and temperature. But anything over 500 F° is too high. Expect 350 to 435 F° in climb or full power operation. The minimum in-flight CHT should be 150 F°. In general, keeping it below 400 F° is a good guideline.

If you like more detailed information on how to interpret the engine instruments, visit the Lycoming website. There are some amazing detailed documents available on this page;
www.lycoming.textron.com/main.jsp?bodyPage=/support/publications/keyReprints/operation.html

RPM

There are a lot of pilots who do not fully understand the operation of direct drive, fixed pitch, normally aspirated engines. When they climb to thinner air they tend to see the RPM climb get close to the take-off RPM and are tempted not to lean the mixture to reduce RPM. But because of the fixed pitch propeller and the thinner air you will NEED those high RPM to get your cruise power. Do not fear high RPM as long as you stay under the maximum allowed RPM. One more reason to stay low!

The Hours Indication shows the amount of hours the engine has been operating. This variable is shared between all Super Cubs in this product and is stored when you close this panel.

Manifold Pressure

The Manifold pressure gauge displays the pressure in the air inlet section of engine. When the engine is off it will display the external air pressure as it is basically a barometer. The higher the pressure the better your engine will be able to perform, but when you see the manifold pressure drop the engine is not getting enough air. This could be because you are too high for the current engine settings.

Vacuum system en Suction Gauge

The vacuum system drives the Gyro Compass (Direction Indicator) and the Artificial Horizon (Attitude Indicator). The low pressure is generated by en engine driven pump and you will be able to monitor the pressure on the Suction Gauge. Normally you will see pressures around 5. When lower values are indicated the vacuum driven instruments will not function reliable. A probably cause is most probably a leaking flexible hose or blocked inlet filter.

Ignition System

The Lycoming engine has two sparkplugs per cylinder these are controlled by the two magnetos. Each magneto controls the upper sparkplugs on one side of the engine and the lower spark plugs on the other side to ensure reliable backup. Normal operation is on Both during all conditions. When set to a single magneto the RPM will drop between 1250 and 1750 RPM, but the difference between the two magnetos's can not be more then 50 RPM. Ignition order of the cylinders is 1-3-2-4.
When you are starting the starter motor will turn the crankshaft. The starter motor draws a large amount of electricity and when temperature is low it is advised to switch off all other electrical equipment. Do NOT operate the starter button for more then 10 seconds. When the engine does not start a 5 minute waiting period should be observed.

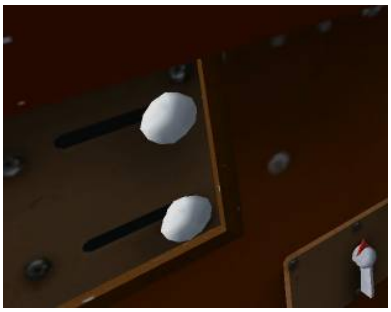
Primer

The primer knob will pump a bit of fuel in the cylinders when you pull it backwards and a spring will pull it forwards when you release it. If the engine is cold it will need 3 to 5 pulls (after you opened the fuel line) before you can start, a warm engine does not need any priming but if the engine does not start a single pull could help. If you think the engine has 'flooded' (too much fuel in the cylinders), you can remedy that by switching the magneto's off, throttle a inch open and turning the propeller counter rotation 10 times.

Carburetor and Carburetor Heater

In the carburetor as in this Piper Super Cub (we modeled the Marvel-Schebler carburetor) the air is mixed with the fuel to form a combustible mixture. Part of the functions are automated but the basic air / fuel mixture is under full control of the pilot. With the throttle the amount of fuel and the amount of air that can flow into the cylinders is controlled. The Mixture knob controls the precise amount of fuel so the mixture is correct. The higher you get the leaner the mixture will need to be.

One inherent problem of the design of the carburetor is that it is highly susceptible to icing as the low pressure inside the carburetor condenses the water vapor that can freeze inside the carburetor. Using the carburetor heater avoids this, but it also will make the engine less efficient (or less powerful) so it is to be used wisely. Standard the carburetor heater control is placed near your left hip, on the side of the aircraft. The top slider you find there controls the carburetor heater. The lower is not simulated as it controls part of the heating / ventilation system. However, as you will need this control a lot and it is not found on a 2D panel, we decided to use the Cabin Heater control on the main panel for carburetor heating as well. The Super Cub normally has a variable carburetor heater, this is not possible in FS however. Not a limitation as it is actually rather dangerous in a Super Cub to fly with half heating.



Carburetor heating is needed in any condition that either could cause icing or where a loss of engine power would be highly dangerous. Icing is always a danger when temperature is below or close to the 0° Celsius, but also at flights at very low altitudes (below 500 feet) at temperatures up to 15° Celsius! Carburetor heating is also always needed when the throttle is idle for more then a few seconds. Operation on the ground is not advised as the air flowing into the engine is passed by the air filter.

Oil System

The wet sump oil system in the Super Cub contains 7,5 liters of oil that is pumped by the oil pump, via an intercooler to the parts that need lubrication. The short stroke and wide cylinders of the Lycoming engine combined with the wide temperature range the engine operates in, will cause the oil use to be higher then in a similar sized car engine. Expect to use between 0.4 and 0.6 liters per hour (0.15 gallon).

The oil pump will pressurize the oil system and the pressure is indicated by the oil pressure gauge. Oil pressure should be between 60 and 85 PSI and this has to be achieved in 30 seconds after engine start. Oil temperature is also indicated by the same gauge and should be between 100°F and 240°F. Please note that the Super Cub has no warning lights for oil pressure, you will need to keep track of it.

Refilling the oil system

When you left click on center of the Oil Pressure / Temperature you will normally see the enlarged gauge. However if you do so with the parking brakes on you will be seeing the engine and can check and refill the oil system. Failing to do so will cause the engine to overheat and seize up.

> The oil level is stored on your system (and shared by all the Super Cubs in our product) and when you load any of the Super Cubs the oil level you ended up at with at last flight will be loaded. So reloading the aircraft does NOT refill the oil level.

Checking the oil level

When you are looking at the engine, click on the dip stick. You will see the dip stick and can see what the oil level is. When you think it is too low for your flight, click on the oil canister and the oil level will be refilled. Of course we take care to select the correct kind of oil for summer and winter use.

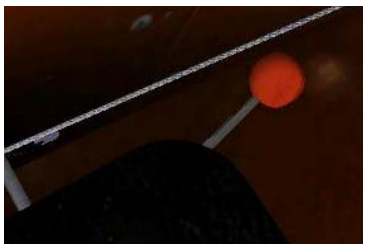
When you do forget to fill the oil or an oil leak starts you should expect the oil temperature to rise, oil pressure to drop and engine temperature to be higher then normal. Apart from reducing power and diverting to the nearest airport there is little that can be done. The engine needs oil to operate. Now will you take the pre flight checklists serious?

Brake System

The Super Cub has a simple non pressurized hydraulic brake system with a separate system for each of the two wheels. The Parking Brakes are included in this system and are operated by depressing the parking brake pedals (one for each wheel). This pressurizes the brake system and prevents it from depressurizing by pulling a cord. Releasing it is simply a matter of applying brake force. As this system is clearly near impossible to simulate in FS (there is only one parking brake available) we decided to stick with the default parking brake in FS. You will see the brakes pedals animated when the parking brakes are set.

Trim and Flaps

On the left side of the cabin (located so it can be used from both seats) is a trim wheel that trims the pitch. There is no rudder or elevator trim. The orange tip will show the setting of the trim, for take off set it roughly in the center. In the VC it is easy to control the trim, just put the mouse pointer on the handle and drag up and down. Of course the standard trim controls of FS will work as well.



The flaps are controlled by a lever in the cabin and have three settings, IN (0%), HALF (20%) and FULL (50%), when set to the IN setting the flaps are held in place by a spring. Please note that NOT all Super Cubs have flaps, certainly the models bought as to pull gliders often do not have flaps to save weight. The flaps are manually extended, not hydraulic or electric. This means they extend as fast as you can pull the handle and that you will not hear any electrical motor extending it. Experienced pilots will start the take-off

without flaps and pull hard on the flaps handle when they want to lift off. The aircraft will JUMP from the ground when you do that. Expect a serious change in pitch using flaps.

Gear and Water rudder

In the Floater and Amphibian version your will have to operate the water rudder as well. In line with the simple operation of the aircraft the water rudder is operated by a simple cord that you will find just behind your seat on the left side of the cockpit. When you pull the cord up and attach it to the small hook, the water rudder will be up (flight mode). When you release the cable and attach it to a lower hook the water rudder will be down and you can steer the aircraft in the water. Normal operation is simple. As soon as you are lined up for take-off retract the water rudder and steer with the rudder. Do not land with the water rudder down!

The amphibian has an electrical gear retraction system. This makes the amphibian the heaviest of the Super Cubs and even with the 160 Hp engines you will get less then superb performance. On the right wing root panel you will find the gear switch with the control lights. The bilge pumps are fully automatic and will pump out any water that is in the floats every time the gear is operated. Gear Operation is straight forward, either click on the handle or use the default FS2004 command.

Avionics

Our aircrafts are upgrade with a simple set of Narco Avionics. These instruments are recreated with a high degree of accuracy, if you prefer you can use the PDF formatted manuals for them that can be downloaded from the site of Narco-Avionics.

NARCO AVIONICS COM 811+

This is a transceiver that features an Active and Standby frequency and Flip-Flop display transfer. The Memory mode of the actual instrument is not simulated as it makes little sense for us flight simmers that fly all over the world. Operation is simple and straightforward, the only thing that makes it different from the standard King radio is the fact you can set both the ACTIVE and the STANDBY frequency.

OFF / VOL / PULL TEST

OFF Counterclockwise rotation (click on the knob) switches the instrument OFF.
VOL Clockwise rotation to the VOL setting switches. The PULL TEST function is not simulated.

MHz/KHz channel selector

The big selector changes the MHz at a rate of 1MHz per detent; the smaller KHz knob sets the KHz at a rate of 25 KHz per detent.

AIMER SWITCH

The AIMER switch controls if the ACTIVE or STANDBY frequency is set with the channel selector. When you click on the switch a small arrow (><) will show on either the ACTIVE or STANDBY frequency. Keep in mind that only the ACTIVE frequency is used for transmitting and receiving.

TRANSFER SWITCH

Clicking the Transfer switch will exchange the ACTIVE and STANDBY frequencies. If you know that you will have to change to another frequency it is easier to set that in the STANDBY before things get busy. When the time comes to switch you only have to click the TRANSFER switch to talk to the next controller.

NARCO AVIONICS AT155 TSO Transponder

When the owner of our aircraft had the new radio and the 122D navigation system installer, the only thing that was missing was a transponder. But his wife would not hear of it so he could not order a new one. But he found on eBay and bought it for $250. It was not fully functional, but a buddy at the flying club fixed it for him for a bottle of booze. So his Cub is now full of nice toys. The AT155 is an old transponder but does all that it needs to do. Operation is simple (but that suits the aircraft very well).

FUNCTION SELECTOR SWITCH

OFF Turns off all power to the transponder
SBY not simulated
ON Switches the transponder to Mode A, the aircraft identification mode
ALT switches the transponder to Mode C and sending altitude data to the ground station. (In FS the ON and ALT mode are identical.)
TST injects a test signal in the system; the IDENT light will be lit on full brilliance to indicate the instrument is fully functional.

IDENT/DIM

When there is a ground station in range the IDENT/DIM button will blink. When you depress the light it will send an IDENT SPIP (Special Position Identification Pulse) that will highlight your blip on the controllers screen. The IDENT/DIM button will glow constant for 20 seconds when the SPIP is send.

CODE SELECTORS

The four eight position switches allow you to set any of the 4096 possible codes. Click on the left side to decrease and the right side to increase. If you are under ATC control you always use the code given by the controller; otherwise you use any of these codes;

- 1200: VFR flight, this is the standard squawk code used in US airspace when no other has been assigned.
- 7000: VFR standard squawk code for most of European airspace.
- 0021: VFR squawk code for German airspace (5000 feet and below).
- 0022: VFR squawk code for German airspace (above 5000 feet).
- 7700: Flight emergency code.
- 7600: No radio. This code lets controllers know that a radio failure has occurred on the plane.
- 7500: hijack code. A plane squawking this code will be given any assistance requested. If the plane alternates between 7500 and 7700 rapidly, it means a request for immediate, armed intervention in the hijacking.
- 0000: military escort.

If you fly online do not mess up the codes, your controllers need them.

NARCO AVIONICS NAV 122D

The NAV 122D is a very compact VOR / LOC / GLIDE SLOPE receiver and it is the favorite instrument of the owner of the aircraft. Even if he flies in perfect visibility with some of the biggest VFR landmarks in view, you will find the receiver tuned to a VOR and the needle centered. The model used is the version without the link to a GPS receiver. The actual use of this instrument is identical to the VOR receivers in FS2004. We could explain it all here, but the information you will find in the Learning Center of FS2004 is excellent and I doubt we could do it better here. Look for “Key Topics, Navigation, What you need to know about VOR” Highly recommended .

OFF / VOL / IDENT

Clicking on this control will toggle the instrument ON/OFF. When you pull the knob (or in our model, switch it to the third position) you will hear the navigations IDENT code.

OBS

With the Omni Bearing Selection knob you can set a omni bearing, indicated by the rotating Omni Bearing Card.

RECEIVE FREQUENCY CHANNELING

The frequency used by the instrument is set with this selector. The larger section of the knob sets the whole megahertz frequencies while the smaller inner ring sets the fractional megahertz frequencies.

NAV / TO / FROM FLAG

A NAV flag will show if the instrument is not receiving an adequate signal levels or a loss of signal. A TO or FROM flag indicates whether the selected course takes the aircraft TO or FROM the station.

GS FLAG

A red GS flag will alert the pilot to loss of signal or inadequate signal level.

Models

There are 5 different versions of Super Cub in this product. The flight models for each version are different. Not only because the weights are different, but also because the drag and pitch of the aircraft will be different.

Standard wheels

It has rather large wheels so it can operate on soft ground. All figures are based on this model.

Tundra Wheels

When the ground is really soft or muddy this is your best option. The oversized wheels don't sink into the soft ground. They also work well when you land on a field that has snow in some spots. The wheels are rather soft and you might be surprised about the fact the aircraft bounces a lot on landing. The bigger wheels add some drag and some weight. So you will see your speeds a bit lower. When you taxi you will notice the aircraft tends to bank more in turns and a bit of care is needed.

Floats

Floats are big and heavy and you'll have to adapt your cruise. Reckon with at least 12 knots less then the wheel version. The good thing…. You can even land this one on snow!

On takeoff you will need to pull the aircraft off the ground with the stick because it does not have the same nose up attitude as the standard version. You can lower the water rudder with the [SHIFT]-[W] command. Normally you would raise the rudder on your take-off run to reduce drag and lower it only after your speed is below 25 knots after landing.

Amphibian (floats with built in wheels)

The most versatile model, but also the heaviest. On water it behaves like the floater models, but landing on a runway is different because it is not a tail dragger but it has two 'nose' wheels. As the gear is not nearly as strong as the standard gear you need to land softly. Certainly the ***forward*** wheels are fragile. On landing do not have a serious nose up attitude because the tail of the floats will hit the runway. Like the floater model, you loose speed in cruise and because of the higher weight you need to allow for some more runway.

On takeoff you will need to pull the aircraft off the ground with the stick because it does not have the same nose up attitude as the standard version. You lower the gear with the standard gear command but there is also a switch provided on the panel. You can lower the water rudder with the [SHIFT]-[W] command. Normally you would raise the rudder on your take-off run to reduce drag and lower it only after your speed is below 25 knots after landing. Please note that driving from water to land and vise versa is not easy in FS. The 'bump' you will feel is unavoidable.

Skis (still has wheels)

This version has a set of skis that are normally raised above the wheels. When you want to land on snow you lower them below the wheels. The ski's are operated with the water rudder command.

If you are landing on any ground that is not fully covered with snow you will need to keep the skis up. When the aircraft gets into snow banks the ski will still function, but you do not want to hit tarmac on your skis!

Water operations

The Piper will feel fine on the water, but for many pilots operating on water is not something they've done a lot of. So here's a more elaborate guide than for the other operations. Appendix A: Has some images that help you with some of the details.

Turn/maneuver in high wind conditions

In windy conditions, if you need to move in any direction other than into the wind, you can use the aircraft as a sailboat. Let the floatplane weathercock into the wind, then—with the engine at idle—let the wind blow you backwards. You can lower the flaps to increase the area affected by the wind. It is actually rather much fun to fully control this.

To sail backwards to the left:

- Retract the water rudders.
- Press the right rudder pedal.
- Move the yoke all the way to the left.

To sail backwards to the right:

- Retract the water rudders.
- Press the left rudder pedal.
- Move the yoke all the way to the right.

To sail sideways across the wind

- Use slight engine power to prevent the floatplane from drifting backward.
- Point the nose a few degrees in the direction you want to go.
  The wind will strike only one side of the fuselage and push the plane sideways.

Taxi

There are three ways to taxi;

1. Displacement taxi where you keep your speed down, your water rudders in the water (note you steer with the rudders at that moment). The aircraft behaves like a boat. You keep the stick all the way back to keep the propeller as high as possible (water will damage the prop). If there is a strong wind from behind you keep the stick fully forward! If there is moderate or strong wind you use your ailerons to prevent capsizing. The rule is simple; keep the yoke into the wind (wind from left, yoke to left)
2. Plowing taxi where you apply some more power and the nose of the floats will be raised (keep the stick back). This will help you turn. Small burst of power, with full rudder will make you turn really fast.
3. Step taxi is just like being in a powerboat. On the initial takeoff run when you first add full power, you are holding the stick back in your lap. Once the nose doesn't rise any higher, you relax the backpressure and let the nose start to "settle" into a more level attitude. As it comes onto the step, you are not plowing nearly so much through the water but rather starting to ride up on top of it, so your acceleration starts to increase quite dramatically. Once on the step you need to hold a tad of backpressure on the stick to keep the nose of the floats from digging in, but with practice, you really get a "feel" for where the exact correct attitude is. Relax backpressure a bit too much and you'll feel the nose starting to dig in a bit, and hold a bit too much pressure

and the heels will dig in a bit (much safer than the former, but will slow your takeoff run just as much). When the attitude is exactly right, only the 1/3 portion of the float from the step forward is in the water. The bows and sterns of the floats are out of it (although it's pretty hard to see that when beside the aircraft due to the spray). Now, if you are light, the step comes easy and fast, and is easy to hold. When heavy, it's much slower getting onto the step, and there is a much more gradual transition to the step. This is because there is more float sitting in the water for a longer period of time until the wing develops enough lift to actually get the float fully on the step. (thanks to Glenn!)

Takeoff

1. Do your run-up and pre-takeoff checklists.
2. Select the lane you are going to use and make sure it is clear of traffic or floating objects.
3. Lower the flaps to takeoff setting.
4. Get ‘on the step’ (see the taxi procedures for this).
5. Apply takeoff power
6. Right after lift off lower the nose to gain some speed.

Landing

1. Do your pre-landing checklist.
2. Scan your landing area carefully, warn boats and swimmers by flying low in both directions over the lane you intend to land on.
3. Fly a standard traffic pattern
4. Check that water rudders/landing gear is up.
5. On final check the altitude by looking at the shoreline.
6. Do not perform a power off landing because it is not easy to judge your actual altitude.
7. The moment the floats touch the water, gently pull the stick to counter the sudden drag.

From water to land

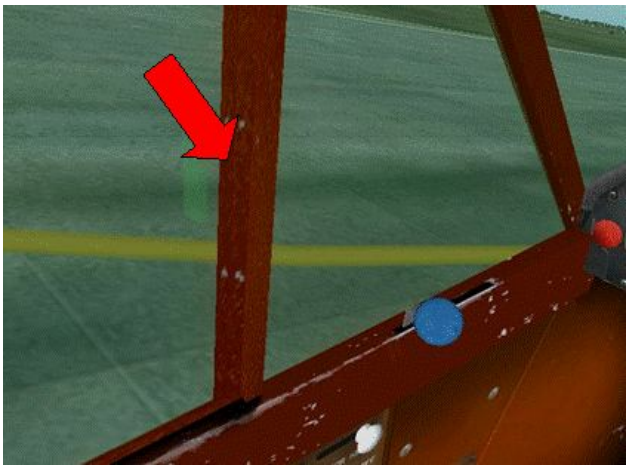
If you want to taxi from the water to ground you can lower the gears on the amphibian models. Only do so at very low speed and expect the aircraft to decrease speed when the gear is in the water (so keep an eye on the wind, with reduced speed you loose a lot of the maneuverability).

Ski operations

Although ski operations are a lot like normal wheel operations the most obvious differences is that you lack the strong wheel brakes or the strong drag of the floats in the water. So you need to plan for that. There is also less directional control and when the snow is iced over your aircraft can start to behave as if it were on floats. As snow operations are often done at higher altitude, density altitude becomes a serious factor (although the inherent low temperatures do help).

Animations

There are several interesting animations in this product.



Window

The wheel and tundra wheel aircraft can open the left window. You can open it by clicking on the window frame (see the image for the location) or by using the default water rudder command [shift]-[w].

Parking Brake

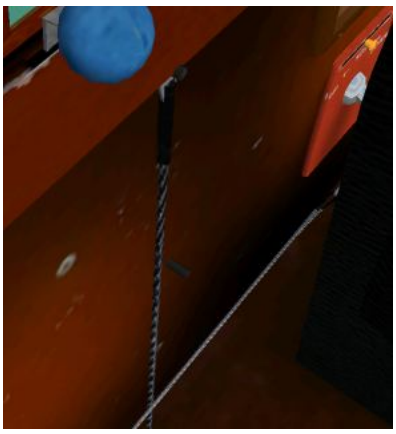
When you se the parking brakes you will see chocks appear under the wheels.

Engine Cowl

You can open the engine cowl with the default spoiler command [/].

Door

Opening the door in a Super Cub is rather complex affair with the top section that always threatens to fall down and the bottom section that is hard to catch while you have the stick in your hand. In Fs it is a lot easier, press the default door open command [shift][e]-[1].



Many other elements in the VC will move and can be manipulated. For example, the cord that keeps the water rudders up is animated. Clicking on it will drop them. The flaps and all other more standard controls will work as you expect them to work. In the VC keep the left mouse key pressed and move the mouse to manipulate the control.

Flying

Nobody will ever claim that the Piper Super Cub is hard to fly, but personally I seen a pilot with over 5000 (!) ours in flight ground loop one and wreck a prop and do some engine damage. He was just taking the aircraft for granted and lost it right after touch down when one wheel gripped a bit more then the other. Damage to the aircraft was moderate, damage to his ego was catastrophic. The Super Cub will do what you ask but you will need to keep control as she will run away from you. The best way to learn you to fly is to run the whole checklists and expand it with a lot of other information. We'll be using a 135 Hp version, calm weather.

The flight model used is one directly aimed at the beginning pilot, it is stable and responds very well when you reduce the level of realism.

Weather

The Super Cub is a very light aircraft and not well suited to fly in moderate or bad weather. Gusting winds will make the aircraft unstable and it will be dangerous to land. Flying in rain is just highly uncomfortable as the window on the left and the door on the right always leak.

1. PREFLIGHT

A. GENERAL

Aircraft Documents..... Check
Aircraft ..... General Overview
Fuel Drain ..... According to Note
NOTE: Fuel drain operation is performed during maintenance and there are no fuel quick drains available for preflight inspection or DI.

Of course, for your flight simulator flight all of this is not really important.
Before we can make the walk around the aircraft we need to make sure the aircraft won't move and all is off, so we open the door and lean in to check the following items. Ignore the musty smell, old aircraft need to smell like that to fly.

B. COCKPIT

Cockpit ..... General Overview, Clean and No Loose Items
Flight Controls ..... Release Restraints
Magnetos ..... OFF
Elec. Equipment ..... OFF
Fuel Level ..... Check Enough
Flight Controls and Trim ..... Check Full Movement
Engine Controls ..... Check Full Movement
Seats and Harness ..... Check
Condition Windows ..... Check Clean
Parking Brake ..... set ON

Okay, all done, we now take our trip around the aircraft. Got to outside view and use the hat switch of your joystick to slew around.

C. RIGHT WING

Surface Condition..... Check
Aileron and Hinges ..... Check
Wing Tip ..... Check
Lights..... Check
Wing Struts..... Check
Landing Gear and Tire..... Check
Brake ..... Check

Next we get to an important part, the engine. This is what prevents you from becoming a glider. Press the Spoiler command (default is [/] to open the engine cover.

D. NOSE SECTION

General Condition..... Check
Propeller and Spinner ..... Check
Air Inlets..... Clear
Engine Compartment ..... Check
Oil ..... Check quantity

Press [shift]-[2] to open the oil panel and follow the instructions. If you don't you will be in problems, the aircraft needs oil just as it needs petrol. If you don't believe us, try flying without.

Dipstick ..... Properly Seated
Cowling ..... Close and Secure
Windshield ..... Clean
Wind Milling Alternator..... Check

E. LEFT WING

Fuel Cap ..... Open
Fuel Quantity and Color..... Check
Fuel Vent ..... Check Open
Fuel Cap ..... Close and Secure
Pitot Tube ..... Unobstructed
Remaining check as right wing.

F. FUSELAGE RIGHT SIDE

General Condition..... Check
Antennas ..... Check

G. EMPENNAGE

General Condition..... Check
Hinges and Attachments .... Check
Tail Wheel..... Check
Tie Down ..... Removed

H. FUSELAGE LEFT SIDE

Check as right side.

Okay, that is the outside, time to get in.

I. COCKPIT

Aircraft Documents..... On Board and Signed
Baggage ..... Stowed Properly and Secured
Passengers..... Brief Emergencies

2. BEFORE STARTING

Preflight..... Completed/Signed
Seats ..... Adjust/Lock
Harness ..... Adjust/Prepare
Brakes..... Set
Instruments ..... Check

Check if all radios and all other instruments and lights are OFF and the Battery switch is ON.

Electrical Equipment ..... OFF
Battery ..... ON
Circuit Breakers ..... Check
Fire Extinguisher ..... Present

Okay, we are ready for startup. Make sure the area is clear (also behind you). If your passenger has never flown a Cub tell him/her not to worry. The sounds, smoke and vibrations are all normal. Check AGAIN if the area is clear, that little kid on her tricycle could be underneath your nose. Ignoring the checklist, add a little bit of throttle before starting

3. STARTING

Carburetor Heat ..... As Required (winter)
Fuel Level ..... Check Enough
Fuel Selector ..... BOTH
Mixture..... FULL RICH
Throttle ..... IDLE
Prime ..... As Required According to Note
Magnetos..... BOTH
Propeller Area..... Check Clear
Ignition..... START
Oil Press (30 sec) ..... Check

NOTE Prime 4 strokes if engine is cold and turn propeller one stroke after each prime in order to load the cylinders and avoid flooding the carburetor. Priming normally not required if engine is warm.

Okay, we got ignition (and noise and vibration). If this is the first flight of the day spend good attention to the next steps. Warming up the engine correctly will help your flight and make the mechanics happy. The first thing and very important is to rev up to 1100 rpm, any lower and the generator will not charge the battery and you oil pressure will be low. In the few minutes needed for this perform the other checks and tell yourself that you can fly Kitty.

4. WARM-UP

Throttle ..... 1000-1200 RPM
Seats ..... Adjust/Lock
Harness ..... Fasten
Doors ..... Latch
Engine Instruments ..... Check
Master Switch ..... ON
Radio Equipment ..... ON
Flight Controls ..... Check
Elevator Trim ..... Check Travel-T/O Pos.
External Lights ..... As Required

Set the trim to neutral after you done this, if you are on your own set it slightly forwards if you got a passenger tell him/her again that the vibration and shaking at 1100 rpm is fully normal. When the temperatures stabilize we are set for taxi.

Now the Super Cub is a light tail wheeled aircraft. There is very little weight on the tail wheel and that tail wheel is normally as slippery as ice, has limited movement and is connected by springs to the rudders. Add to this the fact you simply can not see in front of you and you end up with an aircraft that just hates to taxi.
As the aircraft is light we need to make sure the aircraft stays under control in the wind.

- No wind/Headwind – Stick fully back
- Tailwind – neutral or even bit front
- From front/side – Stick back and into the wind
- From back/side – Stick front and against the wind

If you taxi in VC you will have to do it the real way, zigzag your way forwards to have some forward vision. If you prefer the 2D panel, press [control]-[enter] to lower the view.

5. TAXIING

Altimeter ..... Set
Parking brake ..... RELEASE
Taxi Area ..... Clear

As soon as you got some speed test the brakes, better as know as possible if there is a problem!

Brakes ..... Check
Tail Wheel Steering ..... Check
Turn-Bank indicators ..... Check

When we get to the runway we got to make sure the aircraft is really ready and warmed up. On some airports you do this is a special area. Do check behind you before going to 1800 RPM.

6. GROUND CHECK

Brakes..... Apply
Area..... Check Clear
Carburetor Heat..... Check OFF
Throttle ..... 1800 RPM
Engine Instr ..... Check
Magnetos..... Max.Drop 100 RPM
Carburetor Heat..... Check
Throttle ..... Retard Slowly to IDLE Check 550-600 RPM
Throttle ..... 1000 RPM

Okay, so far so good, the engine is now checked. While we taxi to the runway we do some checks.

7. BEFORE TAKEOFF

Doors/Windows..... Latched
Harness ..... Fastened
Elevator Trim..... Check T/O Position
Magnetos..... Check BOTH
Fuel Selector ..... Check ON
Mixture..... Check FULL RICH
Primer ..... Check Locked
Engine Instruments..... Check
Flight Instruments..... Check
T/O Emergency..... Prepare
Compass..... Check Runway Alignment
Time ..... Note

Take off is not complex although you might be surprised you need to 'pull' the aircraft from runway. Just make sure you get the tail up as soon as possible, give right rudder to counter the torque and allow the aircraft to roll until you are sure to get good lift. If you Piper has flaps, keep them in until you get close to rotation speed and then deploy them. When needed full flaps can be used, but you better have good speed before you do that. On the 135Hp version try to stay under 2500 RPM, in the 150 and 160Hp versions 2600 is okay.

8. TAKEOFF

Power..... Apply FULL
Power Output Static..... Check min.2200 RPM
If Power Output is too low .. Abort

If you are in 2D panel and had your view panned down, press [space] to center the view the moment the tail lifts. RPM goes down to 2350 RPM in climb on the 135 Hp version and 2400 on the high power version. Trim the aircraft, flaps in, carburetor heater on Cold. You will loose about 30 RPM per 100 feet.

9. CLIMB

At 500 ft
Engine Instruments ..... Check

When you are at altitude (generally as low as you are allowed or as low as you dare to fly in a Super Cub). Reduce RPM. In the 135Hp a normal cruising RPM would be around 2000, in the 150 and 160Hp versions 2200. You will find the Super Cub easy to trim, but the lack of an aileron or rudder trim means that you will have to keep you hands on the stick.

9. INFLIGHT OPERATIONS

A. CRUISE

Power Settings at Standard Temperature:
SL Max Cruise Power (75%) 2275 RPM
Mixture ..... Lean According to Note

NOTE:
For maximum power lean above 5000 ft at any throttle setting to obtain maximum rpm. Below 5000 ft maintain full rich.

B. BEFORE STALL/SLOW FLIGHT
Loose Items ..... Stow
Fuel Selector ..... Check ON
Mixture ..... FULL RICH
Engine Instruments ..... Check
Harness ..... Check Fastened
Terrain ..... Check Obstacles / Emergency Field
Populated Area ..... Avoid
Minimum Altitude ..... Determine
Clearance Turn ..... Performed

When it is time for a coffee we find the airport and decent. Do not forget to power up every 500ft!

10. DESCENT

A.POWER-OFF DESCENT

Airspeed ..... 60 KIAS
Open Throttle Every 500 ft

CAUTION
Avoid high airspeed at low power setting since this will cause to rapid cooling of the engine.

B. POWERED DESCENT

Typical Power Setting ..... 1800-1900 RPM

Typical Airspeed..... 80-95 KIAS

My flying instructor told me the biggest danger in landing the Piper Cub I learned to fly in was to be run over by other aircraft because you're so slow. We'll the Super Cub is a bit faster but still slow compared to the Cessna's that could be in the circuit as well. So it is good practice to fly the circuit as fast as possible, reducing to 60 knots only on final. Landing at stall speeds is fun, but there is no real need to do so. The Super Cub handles a lot better at 60 knots and the gear will have no problem handling it.

11. BEFORE LANDING DOWNWIND:

Wind ..... Check Direction/X-Wind Limits
Magnetos..... Check BOTH
Fuel Selector ..... Check ON
Mixture..... FULL RICH
Primer ..... Check Locked Loose
Items ..... Check Stowed
Harness..... Check Fastened

KEYPOINT:
Carburetor Heat..... ON
Approach Speed..... 60 KIAS

12. ABORTED LANDING

Power..... Apply FULL
Carburetor Heat..... OFF
Proceed as Normal T/O Procedure

13. TOUCH AND GO

Carburetor Heat..... OFF
Elevator Trim..... T/O Position
Power..... Apply FULL
Power Output ..... Check
If Power Output is too low .. Abort

14. AFTER LANDING

Carburetor Heat..... OFF
Time ..... Note

15. SHUTDOWN

Throttle ..... 1000 RPM
Radio / Electrical Equipment OFF

When the engine cooled down a bit reduce throttle. Note that we never actually go to full idle in any stage of the flight!

Throttle ..... 800 RPM

Toggling the magneto's off for a moment cleans them.

Magnetos ..... OFF Momentarily

Throttle up when you switch off the engine.

Throttle ..... 1000 RPM
Mixture ..... IDLE CUT-OFF
Magnetos ..... OFF
Fuel Selector ..... OFF
Battery Switch ..... OFF

Tuning

There are several options you can change on your Piper.

Tinted Windows / Not Tinted Windows

The windows on many Super cubs have been coated to reflect the sun. If you prefer non tinted windows you can insert the texture PA18_texure04.bmp you will find in the FS2004MainDir\Aerosoft\SuperCub folder, into all texture folders of the aircraft you like to change the windows from.

Visible / Invisible Propeller

As the propeller on the Super Cub is large and rather wide it is well visible from the cockpit when it spins on lower revs. If this irritates you, insert the texture prop.bmp will find in the FS2004MainDir\Aerosoft\SuperCub folder, into all texture folders of the aircraft you like to change the prop from.

Loading

The default models come with only Katy behind the stick. But when you like you can use the standard loading module of FS to add a passenger (it will not be visible) or even some luggage. Use the Aircraft | Fuel & Payload option. Ignore the strange looking CoG.