

RESTRICTED



**PILOT TRAINING
MANUAL FOR THE**

C-47

V3.14 BETA

RESTRICTED

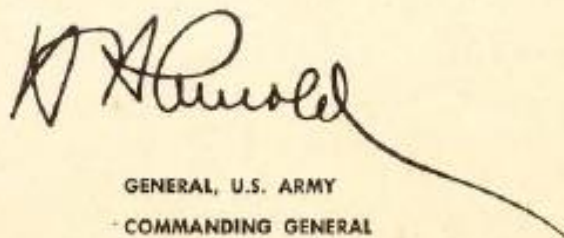
Foreword

This manual is the text for your training as a C-47 pilot and airplane commander.

The Air Forces' most experienced training and supervisory personnel have collaborated to make it a complete exposition of what your pilot duties are, how each duty will be performed, and why it must be performed in the manner prescribed.

The techniques and procedures described in this book are standard and mandatory. In this respect the manual serves the dual purpose of a training checklist and a working handbook. Use it to make sure that you learn everything described herein. Use it to study and review the essential facts concerning everything taught. Such additional self-study and review will not only advance your training, but will alleviate the burden of your already overburdened instructors.

This training manual does not replace the Technical Orders for the airplane, which will always be your primary source of information concerning the C-47 so long as you fly it. This is essentially the textbook of the C-47. Used properly, it will enable you to utilize the pertinent Technical Orders to even greater advantage.



GENERAL, U.S. ARMY
COMMANDING GENERAL
ARMY AIR FORCES



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CREDITS

This C-47 v3.14 (DC-3) is an FSX/P3D project by:

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Skip King (Captain’s voice)

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INTRODUCTION

Welcome to the Douglas C-47 V3.14 Beta for FSX/P3D. There are a number of changes and new features in this update; this guide will familiarize you with both normal operations and these unique features.

This new version offers UV and red cockpit night lighting in the faithfully modeled virtual cockpit; realistic auto-rich / auto-lean mixture controls, improved interactive checklist, working marker beacon lights and audio switch, numerous tweaks to navigation and engine instruments, and a unique customizable 'cutie' on the panel so you can take your favorite pinup with you on every flight. Be sure to study the readme.txt file for details on these and other features in this release.

Numerous wonderful resources for C-47/DC-3 flight simulation are available on the web, including [DC-3 Airways Virtual Airline](#) and [The DC-3 Hangar](#). Here is a brief history of the DC-3 from The DC-3 Hangar written in 2001*:

The 17th of December 1935 was a day that made history. It was the day the first DC-3 Airliner took its maiden flight, thus inaugurating aircraft operations that made a profit simply by carrying nothing but passengers from one place to another.

American Airlines was the first to use the DC-3 commercially and on June 25th 1936 the first regular route from New York to Chicago was established.

With the advent of WW2, orders came pouring in both from the military and from commercial airlines leading Douglas to ramp up production to almost 600 DC-3/C-47's a month. Between 1935 and 1947 Douglas built a total of 10,654 of the type and over 65 years later there are still almost 1,000 in flying condition. Because of its continuing role in aviation, and its unique qualities, it is still competitive in specialized operations even in the modern jet era. The DC-3 still has no true replacement, and it has become an iconic aircraft in the history of modern aviation.

Today, the DC-3 is still finding its greatest use in specialized roles within some third-world military forces and is commercially useful in some back country and bush areas, particularly because of its economic operating costs and its ability to operate from rough fields with low maintenance. These are virtues that make it competitive with modern designs. So long as the airframes remain strong-- and the DC-3 has never been faulted for its structural integrity--there is no reason why this bird will not continue to fly well into the 21st Century.

*Adapted with permission



THE COCKPIT

Most instruments on the main panels should be familiar to the steam-gauge-era pilot. Instrument and systems specific to this C-47/DC-3 are detailed below.

RADIO ALTIMETER



The aircraft has an operating radio altimeter. You turn it on or off with the bottom left knob and select range with the top right knob. The dial to the right allows the pilot to set the altitude at which he wants to be alerted between 0-300 feet or 0-3000 feet depending on the range selected on the radio altimeter.

In the event of a night dual engine failure emergency the radar altimeter can be especially useful as a ground proximity warning. At such time as it sounds the crew should turn on the landing lights. If a suitable landing site is not visible, turn the lights off.

FUEL QUANTITY



Selecting each of the four fuel tanks with the switch will give a readout for each tank on the quantity gauge.

OVERHEAD PANELS

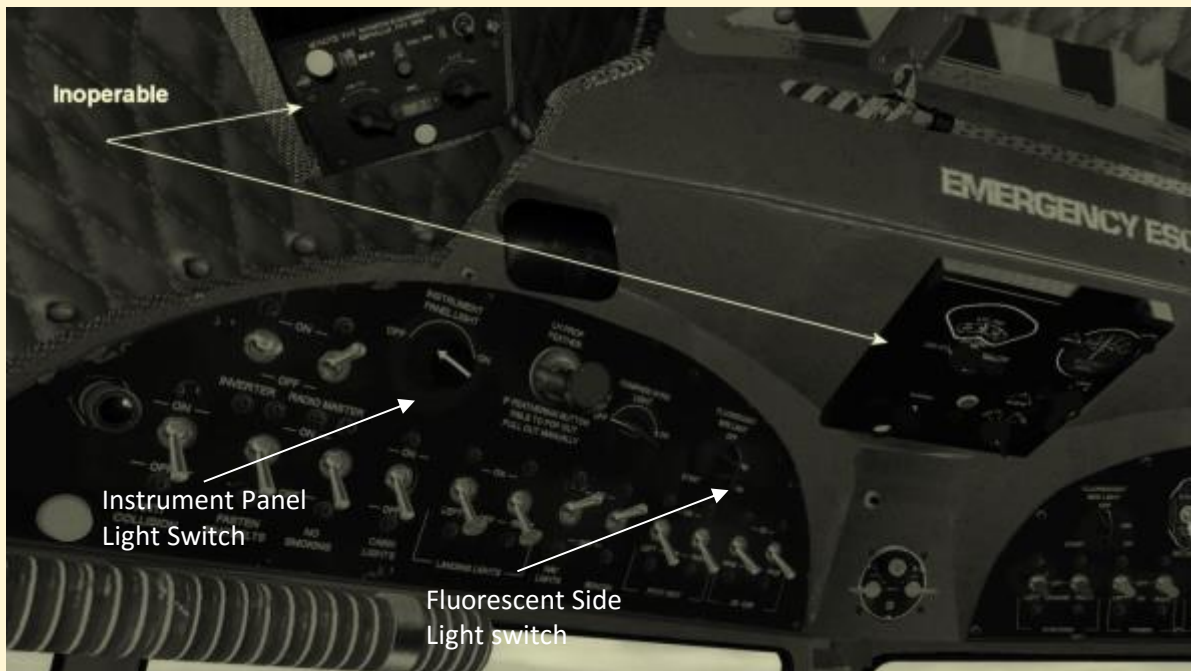
The overhead panel has two subsections:

- Pilot (Left): Light switches/Anti-icing
- Co-pilot (Right): Start switches/Electrical/Fuel pumps

Controls for propeller feathering are separated on each panel (left prop on left panel, right prop on right panel). Most, but not all, switches are operable. A few switches can be operated but are not presently functional.

NOTE: In general, dials and switches that can be clicked, such as fuel tank selectors and cowl switches, will operate logically - clockwise with a right click, counter-clockwise with a left click - and may also be operated by scrolling the middle mouse wheel.

PILOT OVERHEAD PANEL



The Instrument Panel and Fluorescent Side Light switches now work and provide cockpit lighting at night. Red ambient cockpit light and UV lights illuminate the Main Panels, Overhead Panels and Gauges, UV Lighting consists of various UV lamps situated on the left and right cockpit walls, roof and throttle quadrant. The gauges' dials and needles are painted with 'radioluminescent' paint that glows in the dark.

Red ambient light can be switched On/Off with Instrument Panel light switch on the Captain's Overhead Panel.

UV lights can be switched On/Off with three knobs. One is situated on the Captain's overhead panel, a second one on the Co-Pilot's panel and a third one on top of the Throttle Quadrant. The UV switch is unique in its operation. Click the switch and it will move to 'Start', and in a second or two the UV light will come on. Once it does, the knob will automatically turn to 'On'. Click the knob again and it will move to 'Off'

COPILOT OVERHEAD PANEL

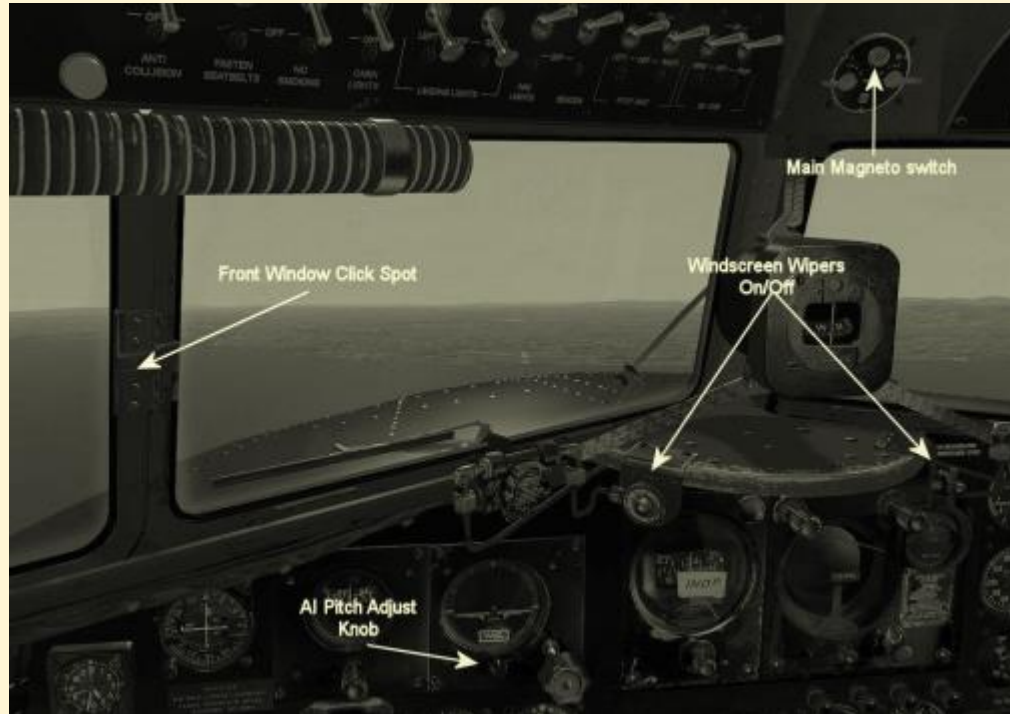


The checklist will call for the ignition master switch to be pushed in. It is located above the magneto switches.

The battery is selected with a three-way switch:

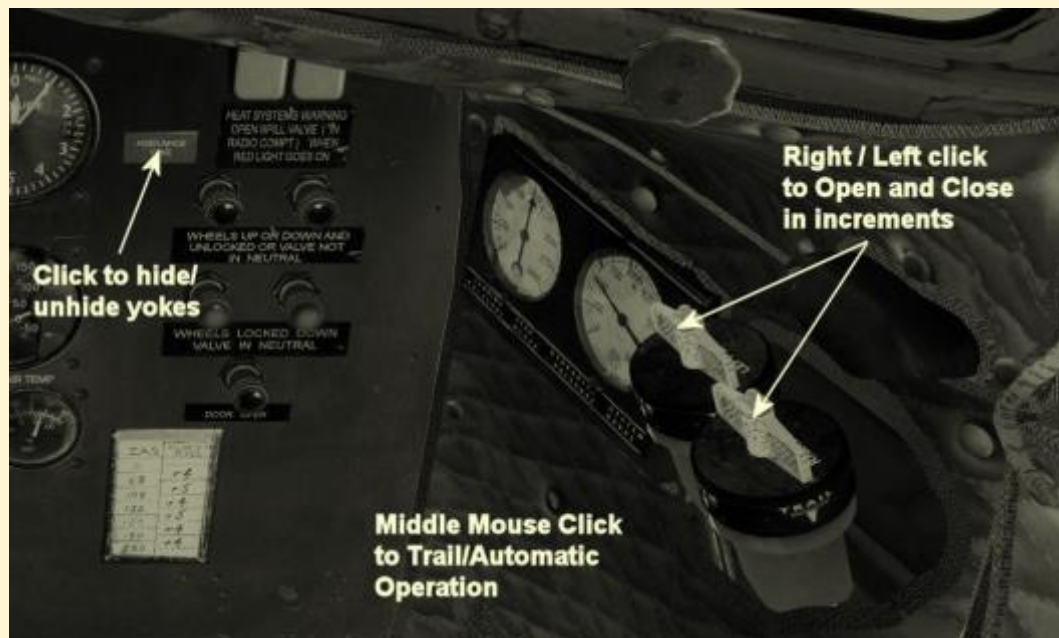
- Top = External Power
- Middle = Off
- Bottom = Battery Power (sufficient charge for starting the aircraft without ground power.)

WINDOWS



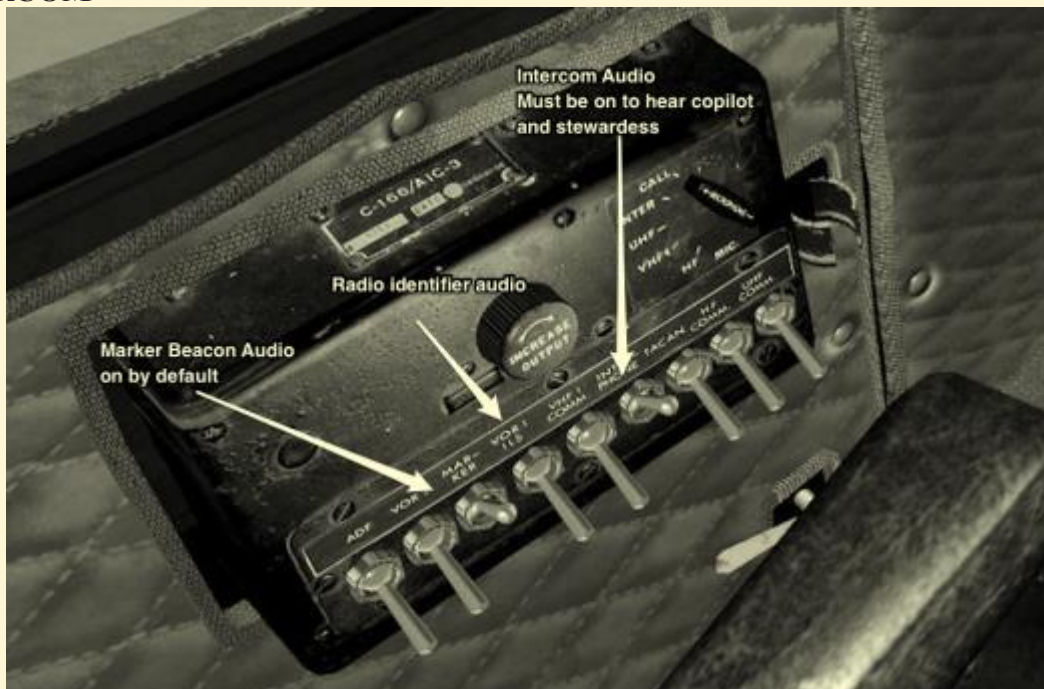
Both side and front windows can be opened as can the more typical side windows. Wipers work nicely. Take a moment to appreciate the wonderful 3D rivets on the nose cowling.

COWL FLAPS



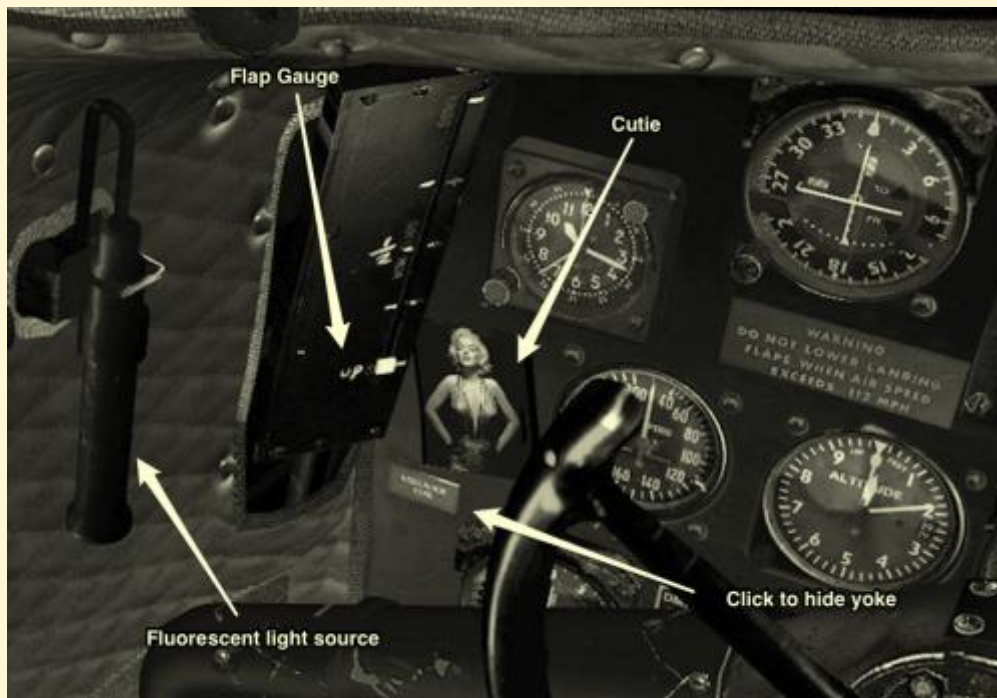
Cowl flaps, on the copilot's side panel, should be set to full open during ground operation. They can be controlled manually, or set to trail (automatic) by middle clicking each switch, and they will be adjusted as necessary to control temps automatically.

INTERCOM



The intercom and radio ID tone switches are on the left side, by the pilot. The intercom switch should be on in order to hear the Copilot and Stewardess voices. All other switches will eventually be operable.

FLAPS



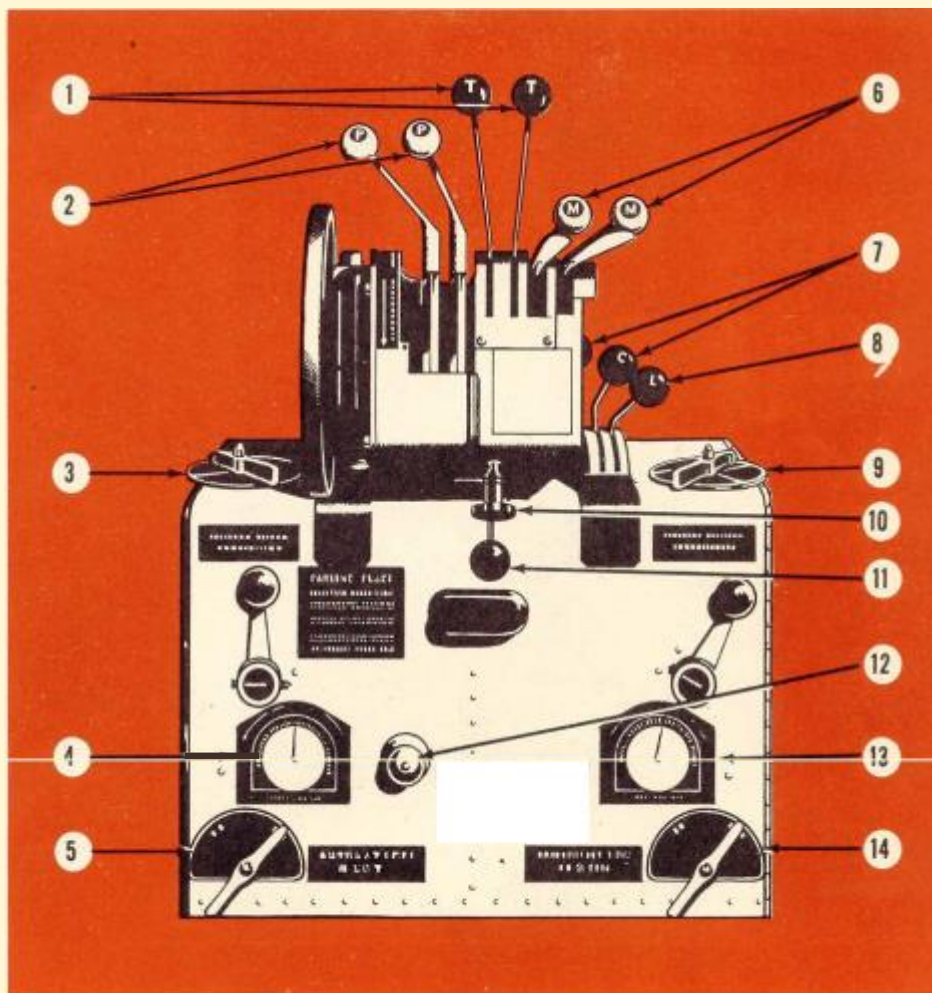
The flap indicator is also on the left front by the pilot. Note that the indicator shows flap position in reverse (when the flaps are full down the white indicator is full up.) The lever between the seats actuates the flaps. Left click to lower, right click to raise.

CUTIE

Four default cutie images are included. Right click to select your favorite. You can change some or all of them using the instructions in the readme.txt file.



THROTTLE QUADRANT



- 1 Throttles
- 2 Propeller controls
- 3 Left engine fuel tank selector valve control
- 4 Rudder trim tab control
- 5 Automatic pilot servo units ON-OFF control (not implemented)
- 6 Carburetor mixture controls
- 7 Carburetor air temperature controls
- 8 Carburetor air temperature control lock (not implemented)
- 9 Right engine fuel tank selector valve control
- 10 Throttle friction lock (not implemented)
- 11 Tailwheel lock
- 12 Parking brake
- 13 Aileron trim tab control
- 14 Crossfeed control (not implemented)

NOTE: For an unobstructed view of pedestal, click the armrests to stow them. You can also stow the yokes by clicking on the small red placard located on the pilot's and copilot's panel.

AUTO-MIXTURE

The pilot has two main choices: (a) controlling the mixture manually as in V 3.12 or (b) using the new realistic C-47 Auto-mixture system.

To use the Auto-mixture system, the FSX/P3D "automixture" settings must be checked OFF in Realism Options. It is best turned OFF for manual mode, too. (In manual mode, a "mixture set best" setting is available via default key Ctrl-X.)

CAUTION: Never use Ctrl-X when in C-47 Auto-mixture mode because this will lead to a simulation 'flooding' loop, in this case an endless sequence of MIXTURE commands. Usually, you can stop the flooding by briefly changing over to manual mode, and then turning Auto-mixture on again.

When loading a flight, the C-47 Auto-mixture mode will be ON by default. You can toggle it manually either by right clicking a mixture lever or by clicking Shift+4 Monitor > Engines > Mixture (which also provides a readout of the current setting).

Unlike manual mode, Auto-mixture mode restricts lever movement to the following stops or detents:

- EMERGENCY (full rich, 100%),
- Auto-Rich (AR, target fuel/air ratio is 0.080),
- Auto-Lean (AL, fuel/air ratio 0.074),
- Idle cutoff (ICOF).

In C-47 Auto-mixture mode the cockpit mixture levers will snap to the placarded positions. In manual mode they move continuously.

To set a C-47 Auto-mixture use any of the following:

- VC levers: drag or mouse wheel
- Monitor > Engines > Mixture: click L/R or wheel up/dn on the value hotspot (L=less, R=more)
- FSX/P3D default keys Shift+Ctrl-F1 (idle cutoff), Shift+Ctrl-F2 (decrease), Shift+Ctrl-F3 (increase), Shift+Ctrl-F4 (EMRG/full rich)
- Mixture hardware levers if fitted (range intentionally restricted to AR/AL only)
- Any mixture item on the Shift+5 Checklist

Once a setting has been changed, the mixture will slowly adjust to reach the expected fuel/air ratio. This shouldn't take more than a few seconds. If you see continuous mixture adjustments over a longer period of time ("flooding") turn Auto-mixture OFF and adjust mixture manually.

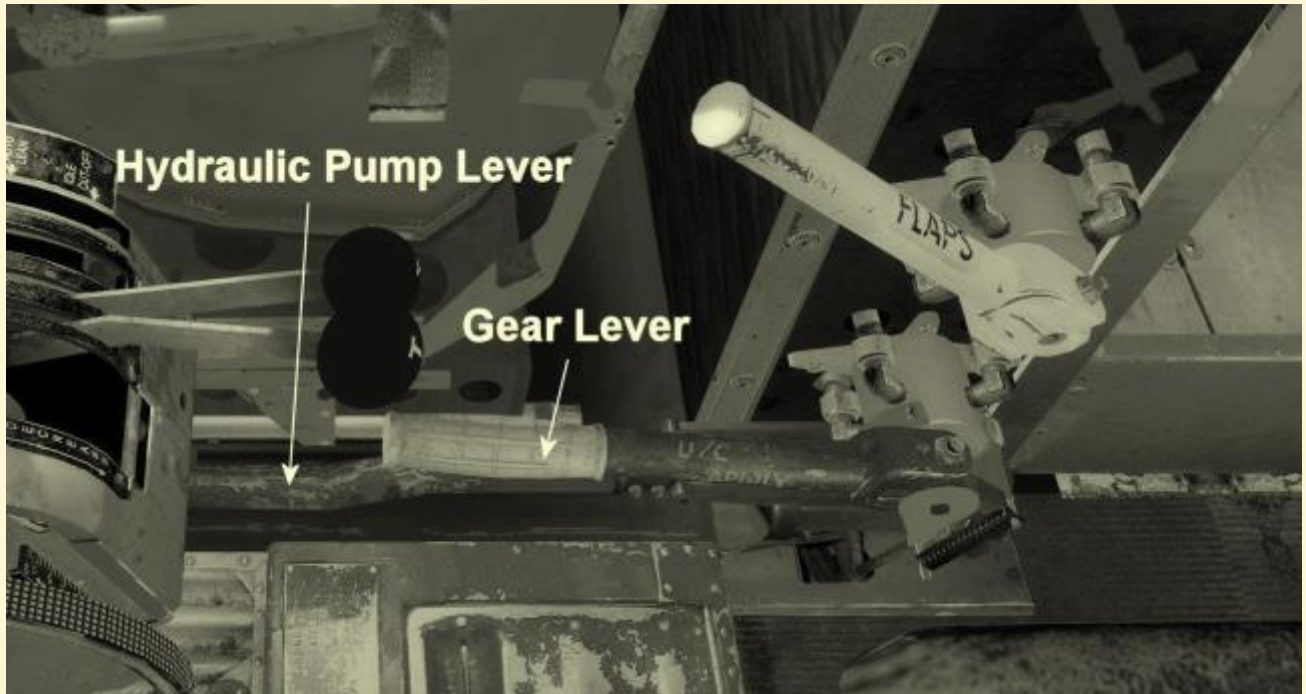
Note -- Given the variety of options currently present, any report of an issue is best accompanied by a screenshot showing the readouts of the Shift+3 Control and Shift+4 Monitor panel window.

AUTOPILOT

There is no vintage autopilot (so far). Switching on the autopilot with the pedestal switch will allow the user to set altitude and heading hold via the usual FSX/P3D simulator controls. Autopilot functions are available as well in the Autopilot section of the Monitor Panel (see below).

LANDING GEAR

The gear, flaps, and emergency hydraulic pump levers are located in the hydraulics control area between the pilot and co-pilot.



2D CONTROL PANELS

There are several control panels that can help you monitor and control the aircraft and its systems. These are accessed via the usual shift+number key combinations.

NOTE: In all control panels, hovering the mouse over any entry will reveal a hand icon whenever that entry may be changed in the panel. A tooltip will appear that explains what adjustments are possible and how to select them. Often, a middle mouse click will change the information displayed over a range of relevant data and formats.

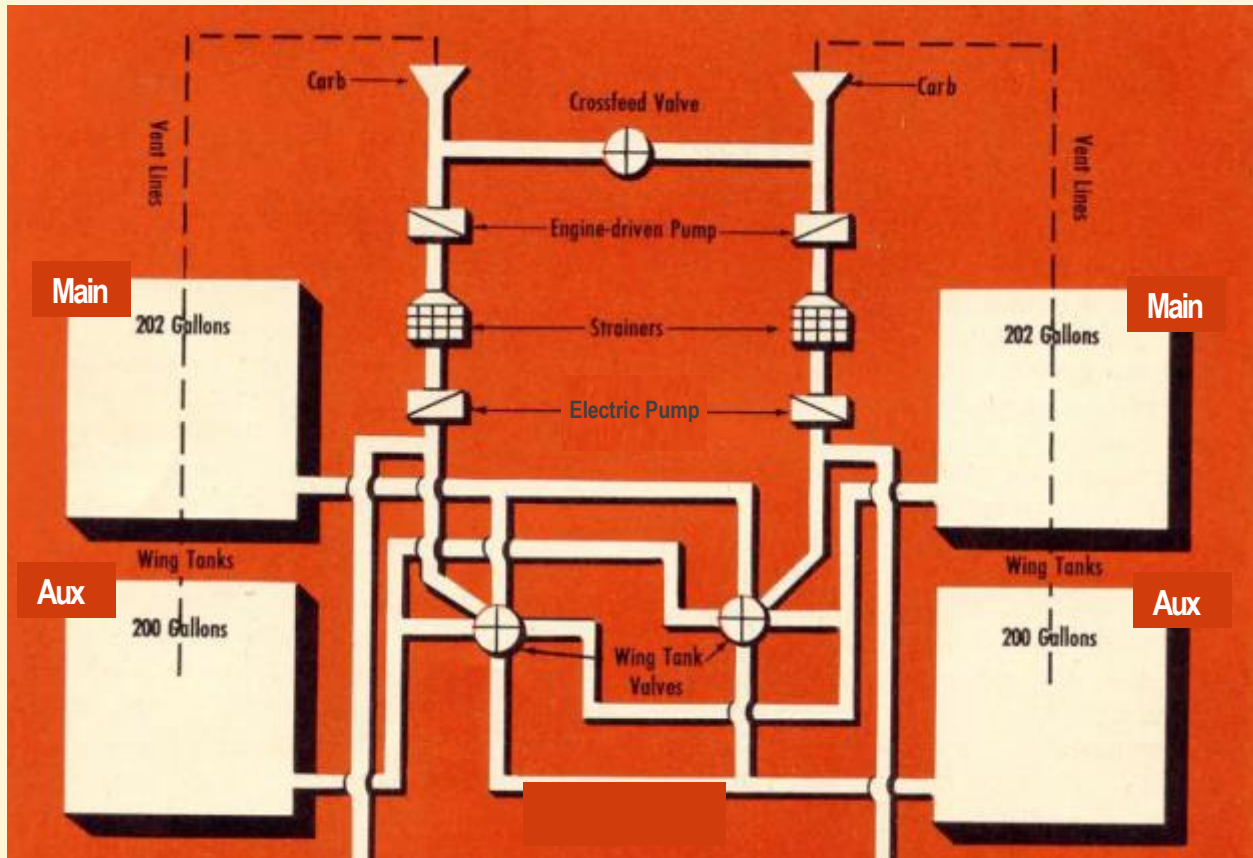


WEIGHT AND FUEL STATUS PANEL (SHIFT+2)

Status [Shift-2]	
Empty weight:	17860 lbs
Left Main:	1212 lbs
Right Main:	1212 lbs
Left Aux:	1200 lbs
Right Aux:	1200 lbs
=SET PUMPS. PB. BATTERY FOR LOADING=	
Total fuel:	4824 lbs
Pilot:	170 lbs
Co-Pilot:	170 lbs
Forward Luggage:	1050 lbs
Pax Row 1-2:	1320 lbs
Pax Row 3-4-5:	1980 lbs
Pax Row 6-7:	1320 lbs
Rear Cargo:	450 lbs
Total payload:	6460 lbs
Total weight (CG: 24.5%):	29144 lbs
Max gross (Land: 25346):	31000 lbs
Trim (TO: +0.2°):	+0.0°
10:33:14	

Middle clicking the mouse over any fuel tank entry in this panel will switch between showing fuel weight, gallons, percentage of tank, or miles possible to fly on current fuel in tank. Trim may be adjusted with left and right clicks, or zeroed with a middle mouse click. The clock in both the Weight and Fuel and the Control Status panel can be changed to a timer with a middle mouse click, and started and stopped or zeroed with regular mouse clicks.

With aircraft stopped on ground (parking brake set), it is possible to change the fuel and payload weights by left/right-clicking into the weight numbers (in 50 pound increments). The pilot's weight cannot be changed, but by clicking on the copilot weight he can be removed completely—a feature many captains would have enjoyed in real life.



While it is possible to change the content of each tank separately by clicking into the fuel quantity in the Status (Shift+2) Panel, it also is possible to apply predefined fuel configurations by repeatedly clicking with left mouse button into the "Total fuel" field. When clicked, the field temporarily changes to "Select fuel" in blue and allows selecting one of the following four predefined fuel configurations (displayed on the right):

- NORMAL (medium fuel load for more payload capacity)
- MAX (all tanks filled 100%, 804 gallons)
- PATTERN (50% fuel in RM and LM)
- EMPTY (remove all fuel)

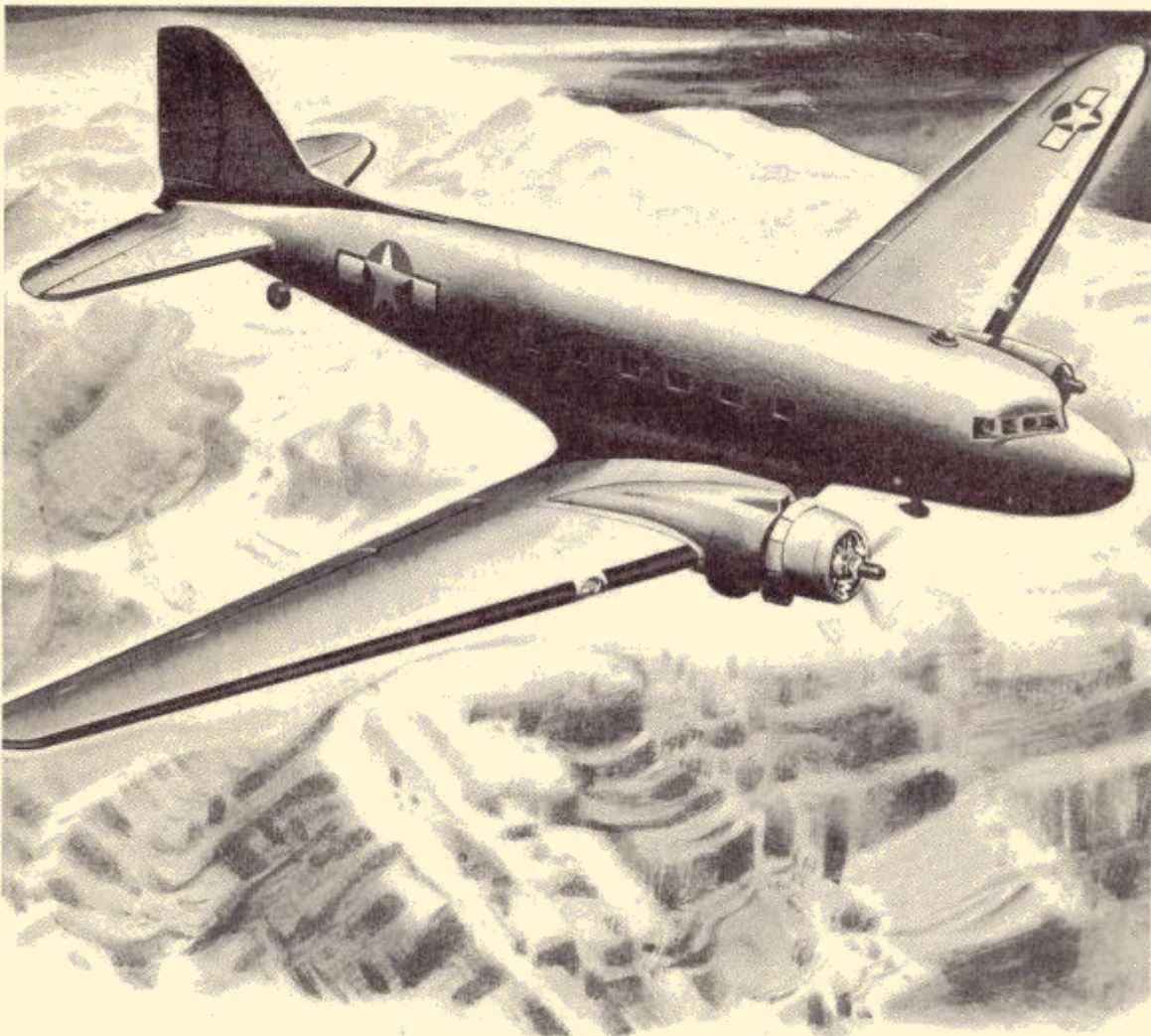
A right-click while an option is displayed in blue chooses the selected configuration.

Similar to the predefined fuel configurations, you can also choose one of six predefined payload configuration:

- NORMAL
- PASSENGER
- CARGO
- HEAVY
- LIGHT
- EMPTY

When the "Total payload" field is clicked, the field changes to a blue "Select payload." Further clicking cycles through the configurations listed above. Right-click "Select payload" while it is still in blue to select the desired configuration. If NORMAL is selected, all payload weights are set exactly as specified in the AIRCRAFT.CFG file, equivalent to the default configuration when the aircraft has been loaded from the FSX aircraft menu.

The total weight figure (shown below the total payload weight) is displayed in red if maximum gross weight is exceeded. As long as the lettering is black, total weight is below the maximum gross weight.



CONTROL PANEL (SHIFT+3)

Control

[Shift-3]

batt	ext	amp	radio	nav	land	pnl
OFF	OFF	0	OFF	OFF	OFF	OFF
	vac	wiper	static	deice	p-ice	stby1
	OFF	OFF	OFF	OFF	OFF	OFF
	carb	mags	gen	pump		
#1	OFF	BTH	OFF	OFF		
#2	OFF	BTH	OFF	OFF		
	tank	lbs	pph	fuPr	f/a	mix
#1	OFF	0	0	0	0.000	0.0%
#2	OFF	0	0	0	0.000	0.0%
	rpm	map	oilPr	cht	prop	throt
#1	0	29.8"	0	61°	0.0%	0.0%
#2	0	29.8"	0	61°	0.0%	0.0%
hydP	hand	tail	park	left	right	flaps
0	OFF	FREE	0%	DN	DN	UP
pitot	oat	ktas	kias	alt	vsi	hdq
OFF	+21°	0	0	179	+0	342°
suc	aoa	pitch	trim			
0.0	+0.0°	20°	+0.0°			

14:53:32

As with the other panels, many items can be cycled to show alternate readings or information by means of middle mouse clicks. This panel offers a quick and convenient glance at all important readouts and system conditions.

Notice that the colors of important data change to indicate condition, green for within norms, yellow for warning, and red for critical. In addition, the mixture ratio is shown (Emergency (full rich) Auto-Rich, Auto-Lean, and Idle Cutoff) to allow the pilot to fine tune performance if manual control is checked. (Manual control is not possible in the real aircraft, but is available in this simulation if you prefer to use it).

The popup is divided into eight sections:

- ELECTRICS
- SYSTEMS
- START CONDITIONS
- FUEL
- ENGINES STATUS
- HYDRAULICS
- SPEED/POSITION DATA
- ATTITUDE

Each section consists of a header, followed by one or two data lines usually referring to the two engines.

Often, a column field in the headline can be *middle*-clicked to change the associated data value in the column below into a different unit of measurement (i.e., fuel flow: *PPH* - *GPH*), or to display other figures (i.e., *AMPS* - *VOLTS*) in the data field. Many data fields can be clicked (with left or right mouse button or mouse wheel) for various modifications related to the currently displayed data value. As a general rule, a field is clickable if the mouse arrow shows a *tooltip* when pointing into that field. Usually, the action initiated by a click is similar to operating the corresponding switch or handle in the VC (i.e., *left*-click = move switch down, *right*-click = move up).

MONITOR PANEL (SHIFT+4)



This panel has too many features to fully list, and it is recommended that pilots explore it thoroughly on their own. Each sub-panel has a Help clickspot in the top left corner.

In general, when hovering the mouse over each item tooltips appear that explain the use and adjustment of that item. Settings can be changed up and down with left and right mouse clicks. Some items can be engaged with middle mouse clicks.

For example: When the “Cowl” (cowl flap) setting is clicked with the middle mouse wheel, or when the green ascending aircraft icon is clicked, the current cowl setting will appear brighter to indicate it is in auto mode and can no longer be adjusted with left and right clicks. Clicking on the bright icon with the middle mouse wheel will return to manual mode. Many

features of the Monitor Panel work in this fashion.

You will note that on the FLIGHT sub-panel, you can call up a speed limit placard, set takeoff trim, toggle the copilot callouts (he will read checklists and advise on conditions during flight), and increase (*) or reduce ([X]) the number of panels showing.

On the ENGINES panel, you can select and control individual engines, show a power settings placard, set cruise power (75% throttle/75% prop pitch), and set cowl flaps for takeoff.

On the AUTOPILOT panel, you can set the usual autopilot controls, such as Altitude hold, Heading hold, or NAV/GPS navigation hold.

On the MISC panel, you can call up ATC, a GPS, the map, checklist and other items, and set lights, chocks, and doors. Each panel can be hidden individually.

AUDIBLE CHECKLIST PANEL (SHIFT+5)



The checklist can be used with or without Captain, Copilot and Stewardess voices. (Note: Intercom must be ON in the audio panel to hear your crewmembers.)

Call up the Checklist either via Shift+5 or by clicking any of the checklist icons in Shift+4 Monitor Panel Misc. section

When you pick a Checklist item, the line will be highlighted. If the item is already set and checked, the cursor will proceed to the next line. It will wait for a click when it comes to an item that has no checkmark.

To set a value via the checklist Left-click the line again. On pages 1 and 2 (Before Starting, and Engine Start. Right-click removes or undoes the current setting (if possible). This comes in handy as a learning mode for identifying the location and operation of switches.

Page navigation is bottom left for previous, bottom middle for exit, and bottom right for next page. There are some occasional hotspots for items such as "Cold and Dark" on p.1, "Power Settings" pop-up on p. 4 etc.

If you want the Checklist to be accompanied by voice callouts from the pilots remember to turn on the callouts option via the Title page of the Checklist, or the interphone switch on the left of the pilot's seat.

GETTING AIRBORNE

The default load is a crew of two pilots, a maximum of 15 troops or 21 passengers are standard plus 1500 lbs of cargo/luggage). The total payload is then calculated as 6460 lbs. With a full load of fuel in the main tanks (202 gallons each) and auxiliary tanks (200 gallons each) you will have 804 gallons total, which will put you just over 29,000 pounds, or 2000 pounds under gross weight of 31,000. Passenger and cargo weight can be adjusted in the normal FSX payload and fuel window or through the Shift+2 Control Panel while on the ground with parking brake set.

ENGINE START PROCEDURE

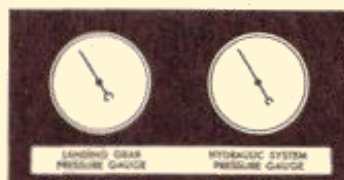
We assume you have done your proper flight planning, filled the tanks with the required fuel quantities, have passengers and cargo secured, and all doors are closed. (A more detailed checklist is available in the Appendix E.)

- Set parking brakes
- Battery ON
- NAV lights and Beacon ON
- Ignition Master ON (pushed in)
- Mixture IDLE/CUT-OFF
- Throttle cracked 10%
- Propellers FULL FORWARD
- Check area clear
- Generator ON
- Fuel pump ON
- Engage STARTER
- Count through at least 9-15 blades and then set magnetos to ON
- Advance Mixture to Auto Rich
- Prime repeatedly or keep pressed until engine starts

After the engine has started, stabilize the RPM at about 1000 for warming up. Once warmed up, throttles can be left at idle. Repeat procedure for second engine. (Engines can also be started with the Monitor Panel and with Autostart = CTRL+E.)

BEFORE TAXIING

Crew and Passengers Aboard and Door Secured
Warm engines. While warming up, keep engines below 1000 rpm until engine instruments indicate within safe operating limits. While warming engines make the following checks:



Hydraulic Pressure...
850-900 PSI



Radio...
On and Checked
Call the tower to see
that your radio is
working properly.



Altimeters...Set



Clock...Set



Gyros...
Set and Uncaged



Flight Controls...
Free



Taxi Clearance
from
Control Tower

TAXI

The C-47 does not have a steerable tailwheel. Turning is accomplished with differential braking and differential power. Make sure that the tail wheel is unlocked before you start taxiing. Advance the throttles slowly and let the aircraft start rolling before applying left or right brakes for initiating turns. At low speed (<40 KIAS) the rudder is not sufficient to control direction. Do not exceed 10 knots on taxiways as it will be difficult to control the aircraft, especially in crosswind conditions.

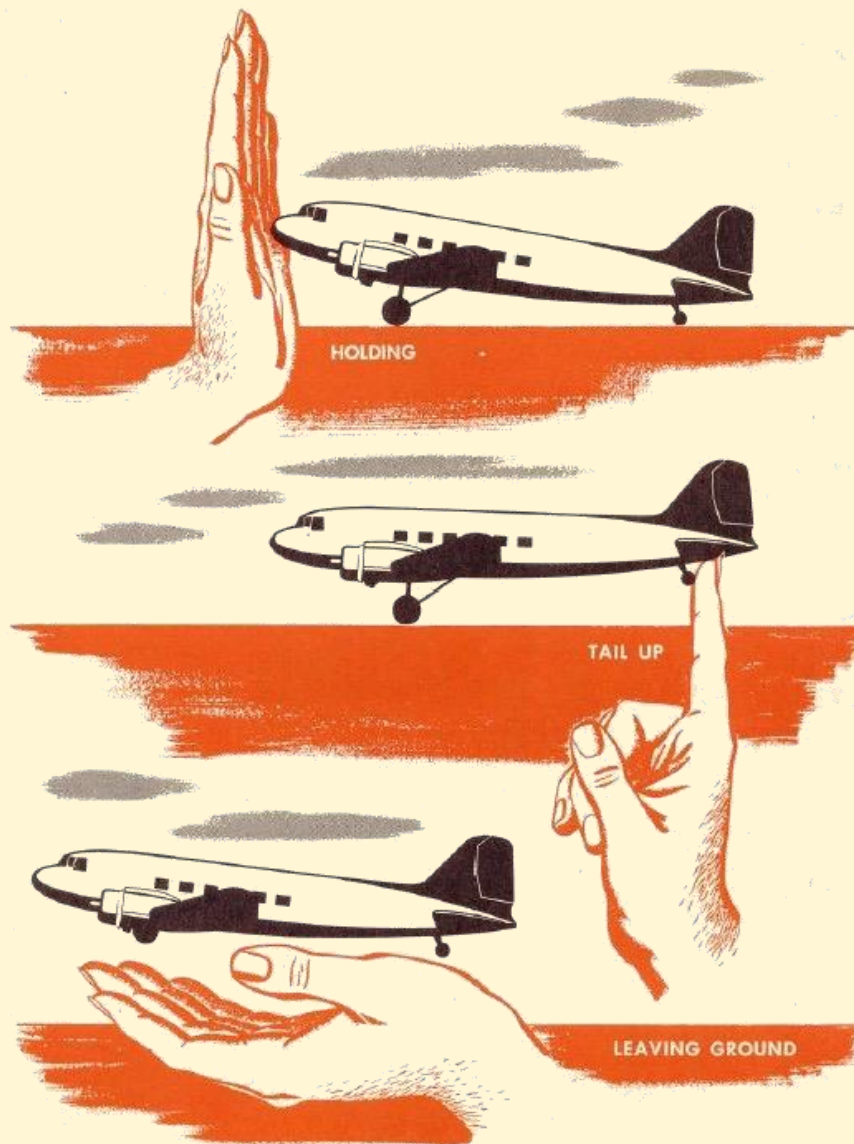
To activate rudder steering see the readme.txt file.

Execute the "Taxi Checks." Remember to check brakes upon start of roll, and keep an eye on the oil pressure and temps (everything in the green range). Long or slow taxis in hot conditions can create overheat conditions.



TAKE-OFF

After proper alignment with the runway, lock the tail wheel and after assurance that you are “ready-to-go” advance power slowly with the brakes still firmly engaged. Only when the engines are running evenly at 30” MAP release the brakes and control initial steering with differential braking. Push the power levers slowly forward to above 42” but not beyond the red line on manifold pressure. At about 40 KIAS the rudder will assist directional control. At about 60 KIAS – depending on load – the tail will come up (you may push the nose forward above 40 KIAS to assist) but keep the wheels on the runway to accelerate to 85 KIAS. At rotation speed, pull lightly on the yoke so that the aircraft becomes airborne.



With positive rate of climb, raise the gear while maintaining a bit of back pressure on the yoke and once the gear is retracted let the aircraft accelerate to 95 KIAS (and then retract

the flaps if used). Maintain 1000 feet/min climb rate to accelerate further and once you exceed 115 KIAS maintain speed, pulling back power to between 36-42" MAP and 2400 RPM max. Maintain 115 to 120 KIAS for initial climb.

Now it is time to do the "After Take-off Checks." Fuel pumps may be turned off. Typical extended climb settings = 36" MAP/2350 RPM.

Continue monitoring engine gauges to ensure operation within the green range. Adjust cowl flaps as necessary (or set to trail/automatic). Continuous climb out at high power settings will require higher cowl flap settings to ensure sufficient cooling. Switch off landing lights when passing 10,000 ft.

CRUISE

The C-47 does not have a pressurized cabin. This limits the flight altitude to 10,000 feet without using oxygen. Although the C-47 is capable of flying higher, higher than 15,000 feet is not recommended. Watch the distribution of fuel in the tanks during cruise and switch fuel tanks to maintain balance. In general, take off on the main tanks, switch to auxiliary tanks after an hour (until almost empty) and then fly on the main tanks. If you planned your fuel correctly, when you start your descent the main tanks should be the fullest tanks.

The C-47 has a wide range of power settings available for cruise, and she can fly fast as long as attention is paid to cowl flaps and controlling heat. Typical economy cruise power setting is 30"/2050 RPM, which should give you a speed between 140-150 KIAS.

Cowl flaps may be closed or mostly closed, or set into the trail/automatic condition.

DESCENT

Calculate your Top of Descent (TOD) with about -1000 feet/min vertical speed. Assuming 180 KIAS as average during the descent, you fly about 3 NM/min. So you need to calculate 3 NM distance for your TOD for every 1000 feet of altitude plus about 5 Nm for deceleration to 100 KIAS entry speed when reaching the airport proximity.

Typical descent power setting is 20"/2000 RPM. Never fly with RPM lower than MP except in the landing flare otherwise the props will drive the engine which puts high inertial loads on the master rod bearings.

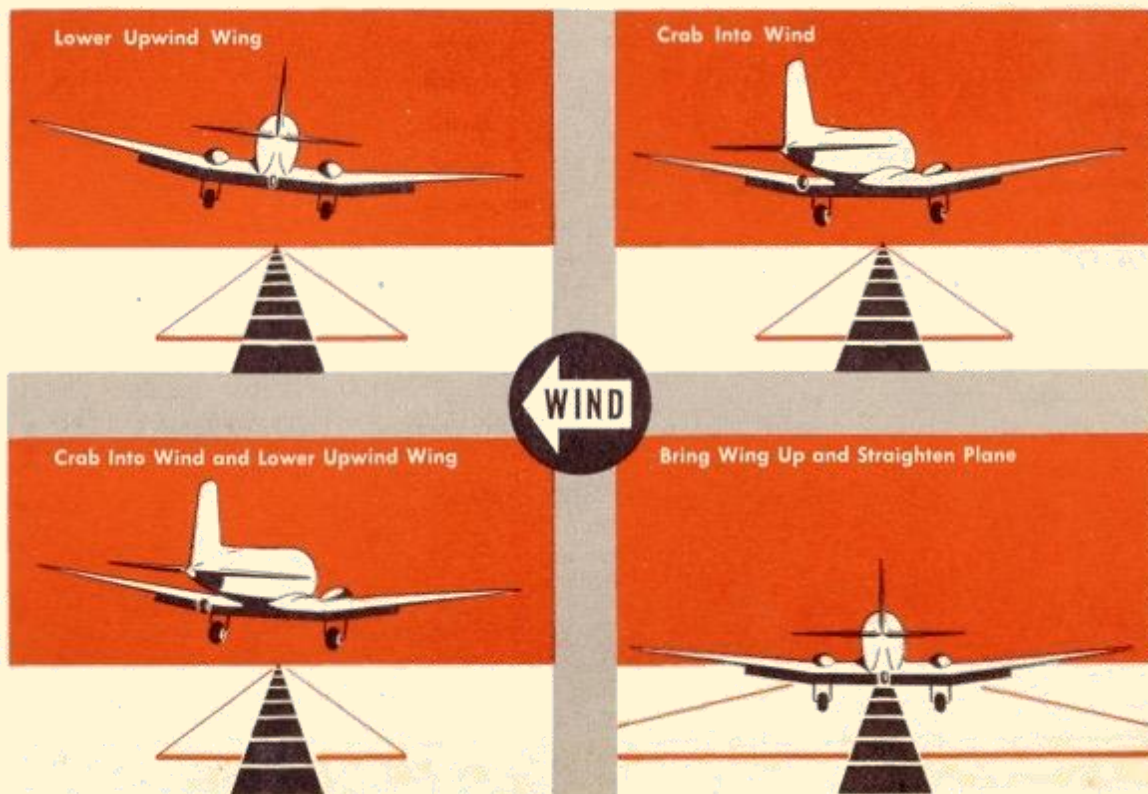
Switch on your landing lights when descending through 10,000 ft. Do not forget to adjust your barometric pressure on the altimeters.

APPROACH AND LANDING

Reduce altitude and speed as you approach the airport. Set mixture to AUTO-RICH as you approach the airport or pattern.

Once below 135 KIAS and on extended approach or downwind in the pattern, lower landing gear. Once below 120 KIAS, add in one notch of flaps. Then maintain 100 until you start your final descent and set flaps ½ to keep speed constant. Having the runway in sight, slow down by setting flaps full and maintain 85 KIAS as your final approach speed. You need

to quickly add some power to compensate for the flaps drag and increase RPM to maximum (this is needed in the event you have to abort your approach).

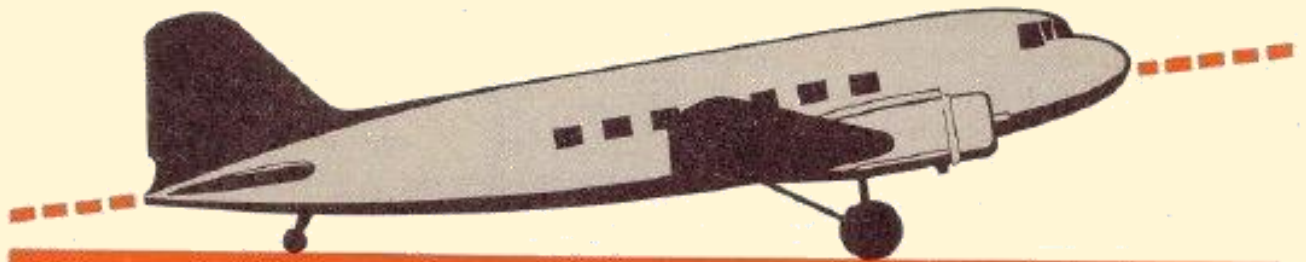


You should fly your approach pattern with about 100 KIAS and your final approach speed at about 1.3x stall speed. 80-90 KIAS is a good general target figure, depending on load and wind conditions. If you go slower or faster than that, the copilot will warn you.

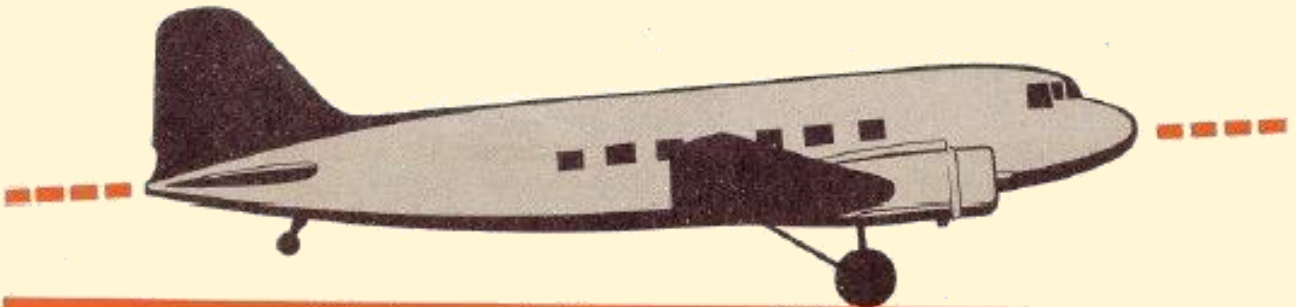
Now it is time to do the “Landing Checks”:

- Gear DOWN – 2 lights
- Flaps FULL (or as desired below 95 kts)
- Engines Final
- Power (maintain speed with pitch and descent rate with throttle)
- Descent rate / speed Normal (700 ft/min @ 85 KIAS)
- Instruments in the green
- Landing lights ON

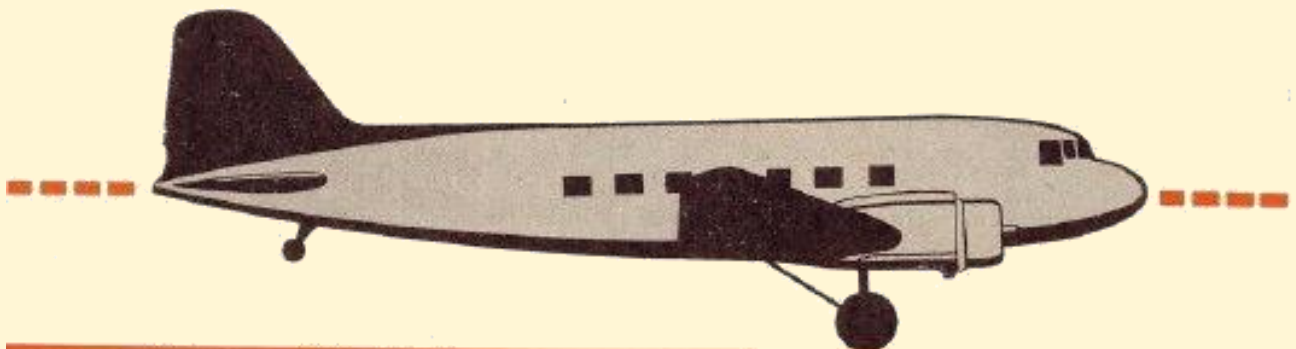
Typically, you need some throttle to maintain a stable approach down to the runway. Once you are over the fence, pull the throttles to idle and flare the aircraft to a horizontal attitude for touch down on the main wheels. Pull back on the yoke and brake gently.



3-POINT LANDING



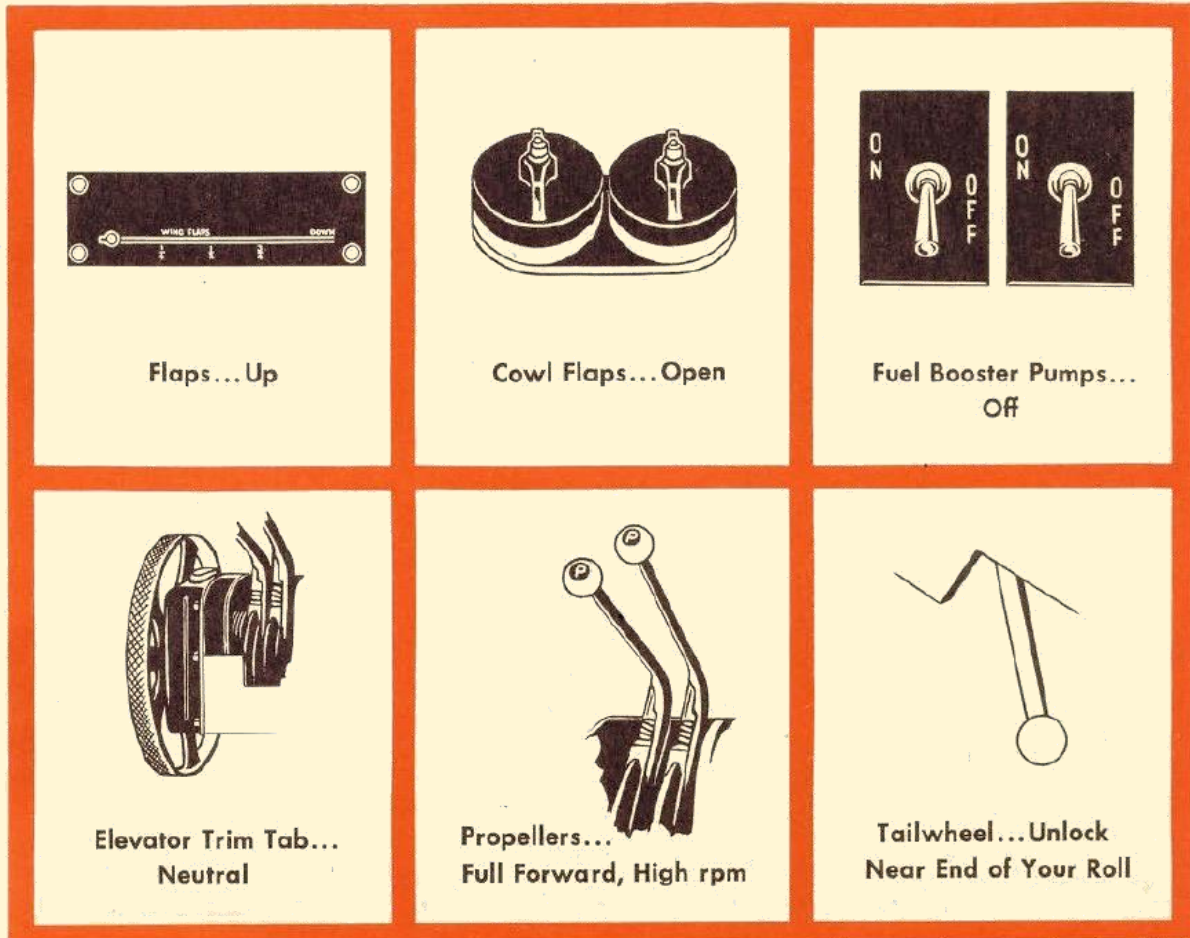
TAIL-LOW LANDING



WHEEL LANDING

Once down, raise flaps, cowl flaps open, fuel pumps off, trim neutral, props full up, unlock the tail wheel, taxi to parking, shut down the engines, shut off the radios and electrical system.

AFTER LANDING



Job well done, Captain!

APPENDIX A: SYSTEMS

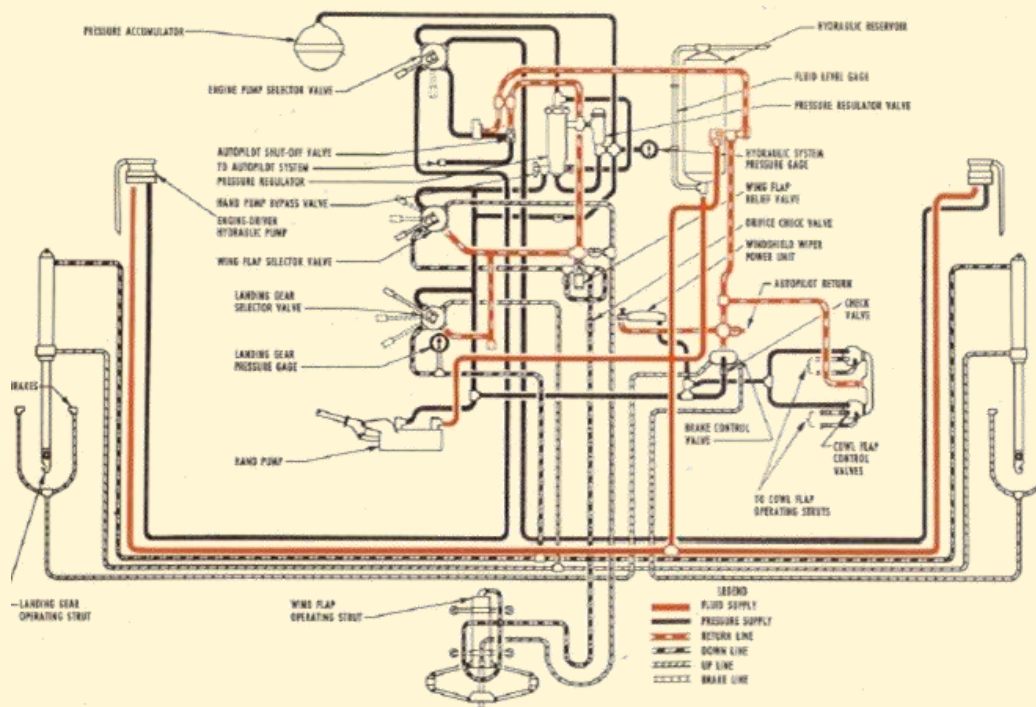
ELECTRICAL SYSTEM

The electrical system is of four-bus type (left and right generator, main and avionics bus). Ship battery voltage is 24V. Setting the external power switch to position ON connects the aircraft to a ground power source, but only if the parking brake is set.

NOTE (FSX): External power is only available with installed *FSX Acceleration Pack* or *FSX Gold Edition*. With any other installation (FSX RTM, FSX SP1, or FSX SP2), the external power switch will have no effect.

In the case where electrics are on battery power only (without generators or ground power), the battery is discharging at least 70% slower than the FSX default effect. Therefore, it is no problem to start the engines with a fully charged battery without ground power. However, a discharged battery can be charged at any time by *middle-clicking* the battery switch.

HYDRAULIC SYSTEM



Hydraulic pressure is supplied by two engine-driven variable displacement pumps. Normal system pressure is 900 psi. A minimum pressure of 600 psi is needed for successful operation of gear, wing flaps, and brakes. In case of failure of both engine-driven hydraulic pumps, a hand pump is used to provide emergency pressure for the hydraulic system, i.e. for lowering flaps, gear extension or braking).

EMERGENCY EXTENSION OF THE LANDING GEAR

Even with failed engine pumps, gear may still be pumped down using the hydraulic hand pump. For this to work, the gear lever must be in **DOWN** position. The hand pump must be moved (*left-click* on the lever to activate, click again to stop) until the gear lights turn on indicating that the gear is fully down and locked.

NOTE: Do not extend gear above 126 KIAS.

WING FLAPS

Wing flaps are hydraulically actuated and can be lowered and raised in steps: UP, 25%, 50%, 75%, and DOWN.

Airspeed limits are:

Flaps 25 - 135 KIAS

Flaps 50 - 99 KIAS

Flaps 75, 100 - 97 KIAS

NOTE (FSX): In case FSX toggles a complete hydraulic failure event, the emergency hand pump will have no effect except that the gear may still be lowered with the emergency procedure described above (this will then take several minutes). However, without hydraulic failure event, but low hydraulic pressure, the emergency hand pump allows operation of flaps, brakes and gear retraction.

FUEL SYSTEM

The C-47 is equipped with four standard fuel tanks for a maximum fuel capacity of 804 gal or 5387 lbs, where 1 gallon = 6.7 pounds (see system diagram page 16).

Two Main tanks, 202 gal (1353 lbs) ea.

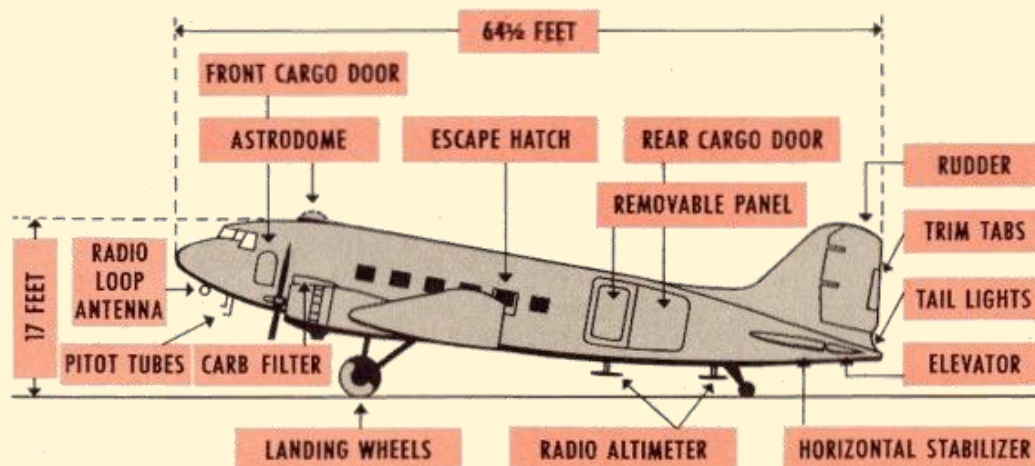
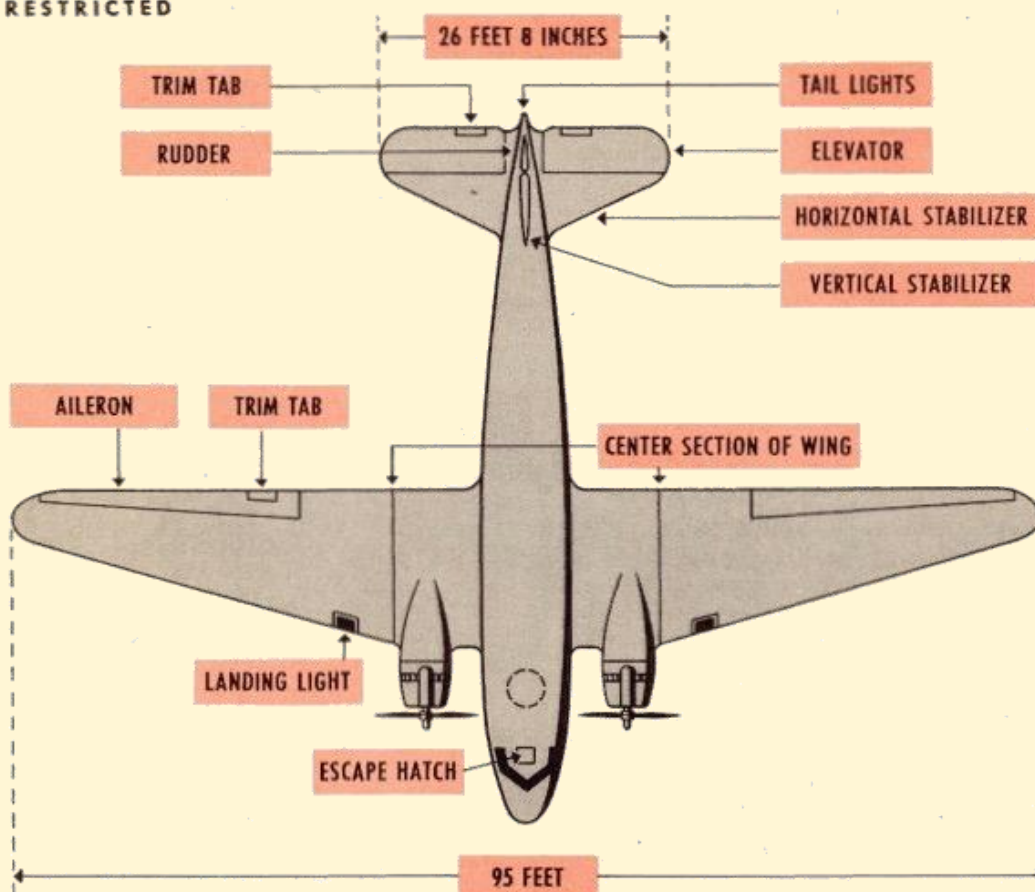
Two Auxiliary tanks, 200 gal (1340 lbs) ea.

There are two electric fuel pumps. The pumps should be on during takeoff and landing, and during engine start-up. In the present version, only the main fuel pumps are functional.

DE-ICING EQUIPMENT

The C-47 has a propeller and engine air inlet de-icing systems as well as pitot heat system. De-icing switches for propellers, engine anti-ice, and pitot heat are located on the left front overhead panel.

RESTRICTED



APPENDIX B: LIMITS

Max Gross Weight	31,000 pounds
Max Landing Weight	25,346 pounds
Vne–Never Exceed Speed	228 KIAS
Vno-Max speed Normal Operations	180 KIAS
Vle-Max Landing gear Extended speed	166 KIAS
Vlo-Max Landing gear Operation speed	126 KIAS
Vfe-Max Flap Extended speed	97 KIAS (yellow line)
V2-Takeoff safety speed (single engine climb)	100 KIAS at MTOW
Vr-Rotation speed	87 KIAS at MTOW
V1-Takeoff decision speed	75 KIAS at MTOW
Vref-Landing reference speed	80 KIAS at MTOW
Vmc-Minimum Control speed	71 KIAS
Propeller	2700 RPM (maximum for Takeoff)
Fuel pressure	5 min, 19 max PSI
Oil pressure	60 min - 100 max PSI
Oil temperature	115°C (max)
Hydraulic pressure	600 min - 1000 max PSI
Starter Motor	20V (min)
Fuel Pumps	20V (min)
Avionics	22V (min)



APPENDIX C: AIRBORNE PARATROOP OPERATIONS



AIRBORNE OPERATIONS

Operation With Paratroops

The C-47 is equipped to carry 28 paratroops, including the jumpmaster. However, the number of paratroops can vary, depending upon type and length of mission, equipment carried, gliders in tow (one or two) and the number of paratroops carried in gliders.

Normally paratroopers jump at an altitude of 800 feet. Again, this altitude can vary, depending upon terrain, weather and combat conditions.

Except for procedures detailed in this section, operation with paratroops is the same as normal operational technique.

AIRPLANE CHECK IN PARATROOP OPERATION

Besides the normal checks, outlined here, the pilot makes additional checks when operating with paratroops. These additional checks are made together by pilot and jump master. But bear in mind that, as commander of your airplane, you as well as the jumpmaster are responsible for seeing that paratroop equipment is in order.

OUTSIDE CHECK

1. Aircraft fittings and external projections in the vicinity of the exit (cargo) door are completely masked.

INSIDE CHECK

1. The red(caution)and green (jump)lights are in working order.
2. Emergency bell is in working order.
3. The static line is not frayed or defective in any way.
4. Matting around the exit (cargo) door is unwrinkled and fastened securely to the floor.
5. All loose equipment is stowed so that it does not interfere with paratroops during the jump.
6. Each seat and safety belt is in correct working order.(Pilot's responsibility alone:)
7. Sufficient buckets are in the aircraft.

PROCEDURE BEFORE PARATROOP DROP

Before paratroop drop, you must:

1. Alert the jumpmaster 10 minutes before arrival at drop zone by ringing a predetermined signal on the alert (emergency) bell.
2. Flash red caution light ("Stand to the door" signal) approximately 2 minutes before reaching drop zone.
3. Flash green jump light ("Go"signal) when the airplane is at the proper speed and proper altitude, on the prescribed course, and over the assigned drop zone.

PROCEDURE DURING DROP

During paratroop drop, you must:

1. Maintain an indicated airspeed of 110 mph, with wheels and flaps up.
2. Maintain airplane in jumping attitude (level to slightly tail-low position) and take particular care to maintain a constant altitude and gyro heading.
3. Throttle back left engine to approximately 12" to 13"Hg. to avoid severe shock to

jumpers from propeller blast.

4. Advance right engine throttle to maintain jump attitude.

Note: During combined operations with paratroops and glider tow, drop tow line before paratroops jump.

TO ENABLE PARATROOP OPERATION

1. Open Paratroop door (Door 04) while on the ground (from Monitor Panel or with keyboard) and leave it open the entire flight.
2. Leave Paratrooper lights OFF. These replace the "Seat Belt" and "No Smoking" lights in the special Paratrooper model with Red Light and Green Light.
3. Climb to a minimum of 800 ft above ground.
4. About 2 minutes before arriving at drop area, turn Red Light ON. You will hear the Paratroop leader shouting "Red light! - Stand up." The troop will respond "Stand up..." Then you will hear "1 minute!"
5. After 1 minute or so, turn Green Light ON. You'll hear the Paratroopers exiting the plane.
6. You cannot re-start this sequence again in the air. You must land before each new drop.

Note: Paratroopers in P3D don't look quite right when they jump (it's not their grease paint and heavy load, it's a P3D thing), but otherwise everything works as described.



APPENDIX D: TIPS AND TRICKS

The VC throttle, propeller, and mixture levers can be linked and unlinked by middle-clicking any one of them. When linked, each pair of levers will move simultaneously.

A depleted battery can be charged at any time by middle-clicking the battery tab in the CONTROL STATUS PANEL (SHIFT+3).

External power is available only on ground with aircraft stopped and parking brake set.

Fuel and payload weight changes from within the WEIGHT & FUEL STATUS PANEL (SHIFT+2) are only possible on the ground with the aircraft stopped (parking brake must be activated).

Starting Problems: If starting from the cockpit (or any other method) and you find yourself unable to start an engine, you can open the CONTROL STATUS PANEL (SHIFT+3) to check engine status.

If you note that an engine is listed with a yellow “FAIL,” you can reset engines by briefly switching the Battery OFF and then ON again.

The key to good starts is proper use of primer. Once all conditions for starting are met (fuel on, throttle cracked at 10%, props full forward, mixture at 50%+, fuel pump on, MAG on and Ignition switch pushed in, starter engaged), then applying sufficient primer for conditions will get the engine to turn over and start.

To get the full effect of flying with copilot, hostess and captain, follow these steps:

- Start a new cold & dark flight.
- Open Checklist panel (SHIFT+5).
- Select voices you wish to hear.

APPENDIX E: CHECKLIST

DOUGLAS C-47 CHECKLIST

SIMULATOR CONTROLS

Status Panel..... SHIFT+2
Control Panel SHIFT+3
Monitor Panel..... SHIFT+4
Checklist SHIFT+5
Pax door SHIFT+E
Cargo door.....SHIFT+E+2
Para door.....SHIFT+E+4
Steps Auto with door
Chocks Monitor > Misc
Hide Pilots Avionics OFF

BEFORE START CHECKLIST

Parking Brake..... SET
Doors.....CLOSED
Battery ON
..... (GPU to recharge)
Ground Power GPU Disconnected
Generators.....ON
Nav Lights/BeaconAS RQD
Cabin signs.....ON
Ignition masterON (Pushed in)
MagnetosOFF
..... (ON for hot start - oil temp >40°)
Fuel Quantity CHECKED
Fuel Selectors.....LM, RM
Carb heat..... COLD
Trim..... ZERO
Cowl FlapsOPEN
Mixture IDLE/CUT-OFF
ThrottleCracked (10%)
Propeller Control FULL INCREASE
Flight Controls..... FREE

ENGINE START (COCKPIT)

Standard sequence is Right-Left (2-1)

RIGHT ENGINE

Fuel Pumps.....ON
ThrottleCRACKED 10%-15%
Mixture IDLE CUTOFF
Propeller ControlFULL FORWARD
Starter..... ENGAGE (count blades)
Magnetos BOTH
Mixtureadvance to 50+
Primer press repeatedly
.....(or keep pressed until engine fires)
Mixture (engine running)AUTO RICH
Throttle 800-1000 RPM to Warm up

(Repeat procedure for left engine.)

ALTERNATE STARTUP

Auto start bothCTRL+E

BEFORE TAXI CHECKLIST

Inverters.....ON
Avionics.....ON
Magnetos CHECK "BTH"
Fuel Pumps..... OFF
Tailwheel.....UNLOCKED
Flaps..... UP
MixtureAUTO RICH
BrakesChecked

BEFORE TAKEOFF CHECKLIST

Mixture AUTO RICH
Propeller Control FULL INCREASE
Trim..... SET FOR TAKEOFF
Flaps..... UP
..... (1/4 FOR SHORT FIELD)
Cowl FlapsTRAIL
Landing LightsON
Pitot HeatON
Fuel PumpsON
Tailwheel LOCKED

TAKEOFF (sea level)

Power..... SET MAX T/O
40+ KIASLift tail
85 KIAS Rotate
Gear UP
Flaps..... UP

AFTER TAKEOFF CHECKLIST (Passing 1000 ft AGL)

Climb Throttle..... 40 MAP
Climb Prop Pitch 2350 RPM
Climb Airspeed..... 120-130 KIAS
Mixture Adjust as needed
Fuel PumpsOFF
Landing lights.....OFF

CRUISE

ThrottleGREEN MP
Propeller Control GREEN RPM
MixtureAUTO LEAN
Cowl FlapsTRAIL

BEFORE LANDING CHECKLIST

Mixture Full RICH
Propeller Control 2150 RPM
Cowl Flaps OPEN/TRAIL
Fuel Pumps.....ON
Landing Lights.....ON
Cabin signsON
Flaps..... ¼ DOWN (121 KIAS)
Gear DOWN
Tail WheelLOCKED
Airspeed at Threshold 85

AFTER LANDING CHECKLIST

Tailwheel.....UNLOCKED
Cowl Flaps OPEN
Flaps..... UP
Landing Lights..... OFF
Pitot Heat OFF
Fuel Pumps..... OFF
TrimZERO

SHUT-DOWN CHECKLIST

Mixture IDLE CUTOFF
Magnetos Master OFF
Parking Brakes SET
Chocks..... SET
Lights OFF
Inverter OFF
Avionics..... OFF
Generators OFF
Battery OFF

NOTE: Checklist modified for use only
with Flight Simulator.

APPENDIX F: LONG RANGE CRUISE

Extreme Alternate Gross Weight		31,000 to 29,000	29,000 to 27,000	27,000 to 25,000	25,000 to 23,000	23,000 to 19,000	Extreme Range Figures		
							T-O Wght	Range/Mi	Hrs-Mins
14,000 to 16,000 feet	IAS	137	136	135	133	128	31,000	2411	13:37
	rpm	2350	2200	2100	2000	1900	29,000	2668	15:13
	Hg.	26.5	25.0	25.0	24.0	23.0	27,000	2823	16:23
	Fuel { lbs. per hr.	657	529	488	447	410	*25,000	2420	14:14
	gals. per hr.	109	88	81	75	68	*23,000	1640	9:45
	Range, hours	3:03	3:47	4:06	4:29	4:53			
	Range, miles	550	676	733	780	820			
12,000 to 14,000	IAS	139	138	137	135	129	31,000	2515	14:26
	rpm	2200	2100	2000	1900	1800	29,000	2705	15:45
	Hg.	26.5	26.0	25.5	25.0	24.0	27,000	2848	16:50
	Fuel { lbs. per hr.	566	511	473	435	401	*25,000	2448	14:36
	gals. per hr.	94	85	79	73	67	*23,000	1660	10:00
	Range, hours	3:32	3:55	4:14	4:36	5:00			
	Range, miles	622	689	736	782	830			
10,000 to 12,000	IAS	141	140	138	136	130	31,000	2551	14:58
	rpm	2000	2000	1900	1800	1700	29,000	2701	16:07
	Hg.	28.5	27.0	27.0	26.0	25.5	27,000	2835	17:13
	Fuel { lbs. per hr.	530	497	459	427	392	*25,000	2418	14:53
	gals. per hr.	88	83	76	71	66	*23,000	1640	10:12
	Range, hours	3:47	4:01	4:22	4:41	5:07			
	Range, miles	654	690	742	778	823			
8,000 to 10,000	IAS	143	141	139	136	131	31,000	2552	15:27
	rpm	1950	1850	1800	1700	1700	29,000	2700	16:42
	Hg.	29.5	29.0	28.0	27.5	25.0	27,000	2825	17:49
	Fuel { lbs. per hr.	519	482	447	412	381	*25,000	2408	15:22
	gals. per hr.	87	81	74	69	64	*23,000	1630	10:30
	Range, hours	3:51	4:09	4:32	4:52	5:15			
	Range, miles	651	692	742	778	813			
6,000 to 8,000	IAS	145	143	140	137	132	31,000	2557	15:49
	rpm	1900	1800	1750	1700	1700	29,000	2707	17:05
	Hg.	30.0	29.5	28.5	27.5	25.5	27,000	2822	18:09
	Fuel { lbs. per hr.	508	467	436	402	374	*25,000	2406	15:41
	gals. per hr.	85	78	73	67	63	*23,000	1625	10:42
	Range, hours	3:56	4:18	4:36	4:59	5:21			
	Range, miles	648	700	740	781	813			
4,000 to 6,000	IAS	146	144	141	138	133	31,000	2556	16:06
	rpm	1900	1800	1750	1700	1700	29,000	2697	17:20
	Hg.	30.0	29.5	29.0	27.5	25.5	27,000	2812	18:25
	Fuel { lbs. per hr.	495	460	430	396	369	*25,000	2395	15:55
	gals. per hr.	83	77	72	66	62	*23,000	1615	10:51
	Range, hours	4:03	4:21	4:40	5:04	5:26			
	Range, miles	656	696	737	780	810			
2,000 to 4,000	IAS	147	145	142	139	134	31,000	2528	16:17
	rpm	1900	1800	1700	1700	1700	29,000	2659	17:31
	Hg.	30.5	30.0	29.5	28.5	27.0	27,000	2761	18:35
	Fuel { lbs. per hr.	489	456	423	392	366	*25,000	2347	15:02
	gals. per hr.	82	76	71	65	61	*23,000	1582	10:56
	Range, hours	4:06	4:24	4:44	5:06	5:28			
	Range, miles	652	690	728	765	792			
S - L to 2,000	IAS	149	147	144	140	135	31,000	2501	16:31
	rpm	1900	1800	1700	1700	1700	29,000	2828	17:44
	Hg.	30.5	30.5	30.0	28.0	26.0	27,000	2747	18:55
	Fuel { lbs. per hr.	476	456	416	385	360	*25,000	2313	16:19
	gals. per hr.	79	76	69	64	60	*23,000	1550	11:07
	Range, hours	4:12	4:23	4:49	5:12	5:34			
	Range, miles	651	670	722	763	790			
Maximum Endurance IAS		137	136	132	126	120 (Min.)			