C-46

"COMMANDO"

COCKPIT GUIDE & FLIGHT MANUAL

Portions of this manual contain passages and text adapted from original wartime pilot training manuals.

GET TO KNOW THE C-46

The C-46 is not a particularly difficult aeroplane to fly. It is worth remembering however, that the aircraft is quite large. Much bigger than a C-47 for example, the "Commando" needs more room, more power and more effort to fly smoothly.

This manual will guide you through the cockpit and illustrate some of the features in this simulation. We also include some flying notes and checklists.

Autostart and Auto shutdown.

Due to how the simulator implements Auto-start and Auto-shutdown there are a few minor glitches that will happen if you decide to use an auto start/shutdown method and then decide to manually start/shutdown later.

The 2 options are to reset/reload the flight after an auto start/shutdown or read the following guide.

Auto Start :

If you start the engines using autostart (Cntrl/E) the following items will need to then be set manually if you later want to start/stop the engines manually.

1. Magneto switches should be set to Both.
2. Mixture levers set to auto-rich
3. Fuel tank levers will be using the ALL function if you use Ctrl+E. Set to any tank that actually has fuel.

Auto shutdown :

If you have started the engines manually but use auto shutdown you will need to reset the following items:

1. The magneto switches. They will indicate on but they aren't actually on. Either set to off or to the position ready for a manual start.
2. The mixture levers. They will be locked in the position that you had left them in . They will actually be off. Either set to off or to the position ready for a manual start.
3. Fuel tank selectors. They will be indicating the position that you had left them in. They will actually be off. Either set to off or the position ready for a manual start.

IMPORTANT!

If starting manually remember that the Energise and Mesh switches return to their OFF position AUTOMATICALLY once and engine has started.

INTRODUCTION

Penned in 1937 by George A Page Jnr. Chief Designer at Curtiss-Wright, the design was first called the CW20.

Designed to compete with the DC-4, the Curtiss design incorporated the "double-bubble" cross-section fuselage which could withstand the pressure differential at altitude.

Another benefit was the ability to pass the wing spar through the fuselage beneath the passenger compartment thus creating more room and a level floor for passengers and freight.

Originally designed with twin vertical tails and for four engines, many modifications were made following test flights. The twin tails were replaced by a single large fin and twin Wright Cyclone radials were used instead of the intended four.

It was General Henry "Hap" Arnold who could see the potential in the aeroplane for use as a military transport and in 1940 an order was placed by the US Army Air Forces.

More changes followed including the incorporation of large cargo doors. Perhaps the most critical improvement was the adoption of the more powerful Pratt & Whitney R-2800 Double Wasp engine producing 2,000HP. This was the engine that powered several of the current batch of fighters and ground attack machines in front-line duty in WW2.

The big radials gave the now renamed "C-46 Commando" the power to haul large amounts of cargo and troops over long distances. It could fly well on one engine and near empty could even climb on one engine at a rate of 200-300ft per minute.

Unfortunately the design was plagued by maintenance problems and in-flight engine fires were not uncommon.

The "Commando" was flown into battle dropping Airborne troops during "Operation Varsity" the push to cross the Rhine in 1945. Not fitted with self-sealing fuel tanks, the C-46s suffered at the hands of anti-aircraft batteries and many were lost.

As a result, the C-46 was never again used in combat but continued to render exemplary service as a military transport.

The C-46's major claim to fame was its wartime career in the Pacific Theatre on the China/Burma/India route hauling major loads from Indian bases, over the Himalayas to relieve troops in China. Nicknamed "The Hump", the route was extremely challenging for both men and aircraft but despite this, the C-46 did the job well – able to carry more freight higher and farther than any other allied transport aircraft.

Post-war, the C-46 continued to fly commercial routes as a dual passenger and freight hauler in the hands of many smaller air carriers and carried out covert operations for the CIA .

The "Commando" served in the Korean and Vietnam conflicts and was the last fixed-wing aircraft to be flown out of Vietnam at the end of hostilities.

The Republic of China operated the C-46 up until 1982 and several private ventures continue to operate airworthy examples.

DIMENSIONS

Length.....23.27m (76ft. 4 in.)
Wingspan.....32.91m (108ft.)
Height.....6.62m (21ft. 9 in.)
Wing Area.....126.3 sqM (1360 sq ft.)
Landing gear tread .....25 feet, 11 inches
Wingloading (48,000 lbs.) ....35.29 lbs. per sq.ft.

WEIGHT

Empty Weight.....14,700kg (30,669lb)
Maximum T/O weight...22,679kg (50,000lb)

PERFORMANCE

Maximum speed.....235 knots (270 mph)
Cruise Speed.....150 knots (173 mph)
Range.....2,739 nm (3,150 miles)
Rate of climb.....1,175 ft/min

CAPACITIES

Total cargo capacity .....2640 cubic feet
Main cargo compartment .....2300 cubic feet
Lower forward compartment.....133 cubic feet
Lower aft compartment.....207 cubic feet
Normal fuel capacity.....1400 gallons

THE COCKPIT

Everything in the C-46 cockpit is laid out in a logical manner. The Main Panel contains all the instrumentation necessary to fly and navigate, manage the health of the engines and communicate with the ground.

The "heart" of the cockpit is the centrally mounted Pedestal. Here you will find all the engine controls, propeller controls, control surface trimming controls and other vital switches and levers In the real aircraft, the CoPilot would operate most of the Pedestal. However, for the single pilot, everything falls to hand quite easily.

Make a point of studying the layout of the Pedestal, locating all the major components like landing gear and flaps controls, the trimmers and of course, the engine controls. Special camera views in the simulator will assist with locating everything so again, learn what these are and use them to your advantage.

You can toggle the yokes on and off to give a clearer view of the instrument panels. Use the switches on the Main Panel **(45)**

The Overhead Panel contains important switches and controls for engine starting and also has a special "Cold/Dark Start" switch **(68)** which will shut everything down and prepare the aircraft for a manual start procedure. Be warned, if you use this switch you will literally be starting from scratch with a totally dead cockpit. Follow the checklists to bring your "Commando" to life.

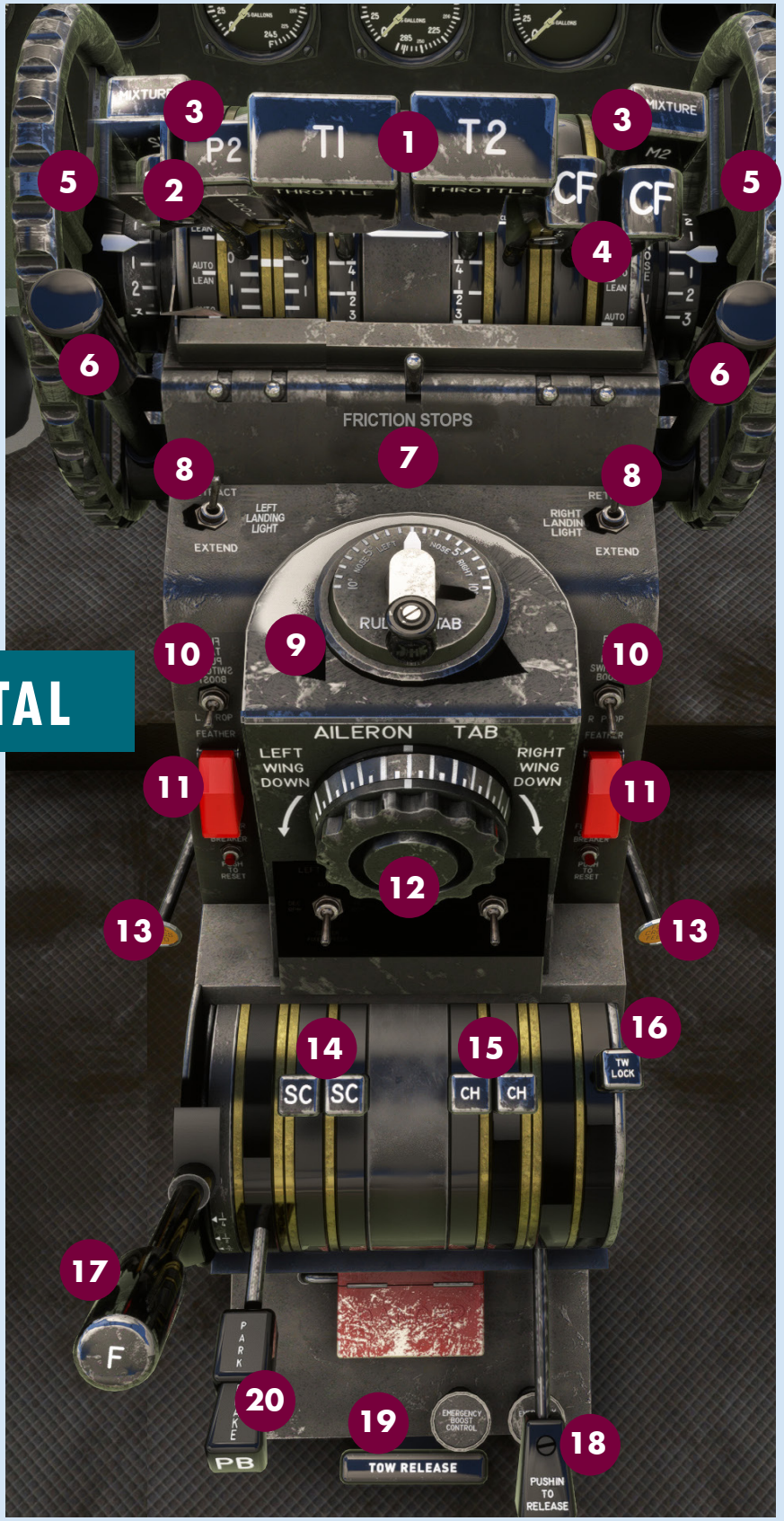
NOTE: A SPECIAL "SECURE AIRCRAFT" SWITCH (71) HAS BEEN INCORPORATED IN THE OHP. THIS SWITCH TOGGLES ON (AND OFF) THE WHEEL CHOCKS, PRE-FLIGHT FLAGS AND BOARDING STEPS.

THE RADIOS

The radio suite in the C-46 Commando is quite basic and very simple to operate. The suite is composed of a Comms receiver (COM1), a Navigation Receiver (VOR), an ADF Receiver (ADF1) and a Transponder. There is no autopilot as such. The Sperry Gyropilot is as close as you will get to an autopilot but even then it is no way like a modern autopilot which can follow a course or set up approaches etc. Remember this aeroplane is pure 1940's and requires knowlege of basic navigation procedures to get around!

Each receiver has a knob for high and low frequency setting and a switch to swap from Standby to Active when frequencies have been tuned. Wherever one is available, an NDB (ADF) frequency can be entered in the ADF receiver and the ADF needles used to direct the pilot to that NDB location. Remember to switch on the Master Avionics Switch on the Overhead Panel **(73)** before using the radios.

THE PEDESTAL



1. Throttles
2. Propeller controls
3. Mixture controls
4. Cowl Flap controls
5. Elevator Trim controls
6. Oil Cooler Door controls
7. Co-Pilot toggle
8. Landing Light switches
9. Rudder trim adjuster
10. Fuel Booster Pump switches
11. Propeller Feather switches
12. Aileron trim control
13. Fuel tank cross-feed controls
14. Supercharger controls
15. Carb. Heat controls
16. Tail Wheel Lock
17. Flaps lever
18. Landing Gear lever
19. Glider Tow Release
20. Parking Brake lever

THE MAIN PANEL

1. Magnetic Compass
2. Com1 Radio
3. Nav1 Radio
4. Transponder
5. Chronometer (24hr)
6. Pilot's Airspeed Indicator
7. Gyro Compass
8. Artifical Horizon Indicator
9. Marker Lights
10. Pilot's Altimeter
11. Radio Compass (ADF)
12. Pilot's VSI
13. CDI/Glideslope Indicator
14. Pilot's RMI (VOR/ADF)
15. CoPilot's Airspeed Indicator
16. Oil Temp Gauge
17. Carb Air Temp Gauge
18. Ambient Air Temp Gauge
19. Cylinder Temp Gauges
20. Fuel Pressure dual gauge
21. Oil Pressure dual gauge
22. CoPilot's Altimeter
23. Chronometer
24. Fire Extinguisher Pulls
25. Tachometer dual gauge
26. Manifold Pressure dual gauge
27. CoPilot's RMI (VOR/ADF)
28. Cabin Temp Gauge
29. Suction Gauge (Vacuum)
30. Pilot's Oxygen Control
31. Pilot's Oxygen Blinker
32. Pilot's Oxygen Pressure
33. Oil Quantity Gauge
34. De-Icing Pressure Gauge
35. Front Fuel Tanks Contents
36. Center Fuel Tanks Contents
37. Rear Fuel Tanks Contents
38. Flaps Position Indicator
39. Hydraulic System Pressure Gauge
40. Engine1 Hydraulic Pressure Gauge
41. Engine2 Hydraulic Pressure Gauge
42. Volt Meter
43. Left and Right Ameters
44. CoPilot's VSI
45. Control Yoke Hiders (toggle on and off)
46. CoPilot's Oxygen Blinker
47. CoPilot's Oxygen Pressure
48. CoPilot's Oxygen Control

THE SPERRY GYROPILOT

When you are flying long distances you can keep your airplane in straight-and-level flight by means of the Automatic Pilot. It detects flight deviations the instant they occur and corrects them immediately and with precision. Use this Automatic pilot only in ordinary weather conditions and never in extremely turbulent air. To set the automatic pilot in operation, trim your airplane then

1. Align the adjustable index card with the gyro card in the directional gyro
2. Align the bank and climb indicators with those in your AHI instrument.
3. Check Suction. It should read between 3.75" and 4.25" Hg.
4. Turn the shut-off valve control on the hydraulic panel to the ON position.
5. Turn the ON/OFF control on the Sperry to ON or turn the automatic pilot control on the pedestal base to ON.

With the airplane trimmed for level flight and the automatic pilot is ON, the airplane will be held in this flight position unless adjusted, using the Sperry controls.

If you wish to enter a climb under automatic pilot or if you need to adjust the pitch angle of the nose, use the knob marked "ELEV" which will adjust the pitch reference . The orange horizon bar will move to maintain its position in the center of the pitch reference bar and the aircraft's nose will rise (or fall). If you wish to alter your heading while under automatic pilot control, turn the knob marked "RUD" to adjust the index (upper) card in the gyro. The aircraft will turn to the new heading and the index and gyro cards will align again, to show your new heading.

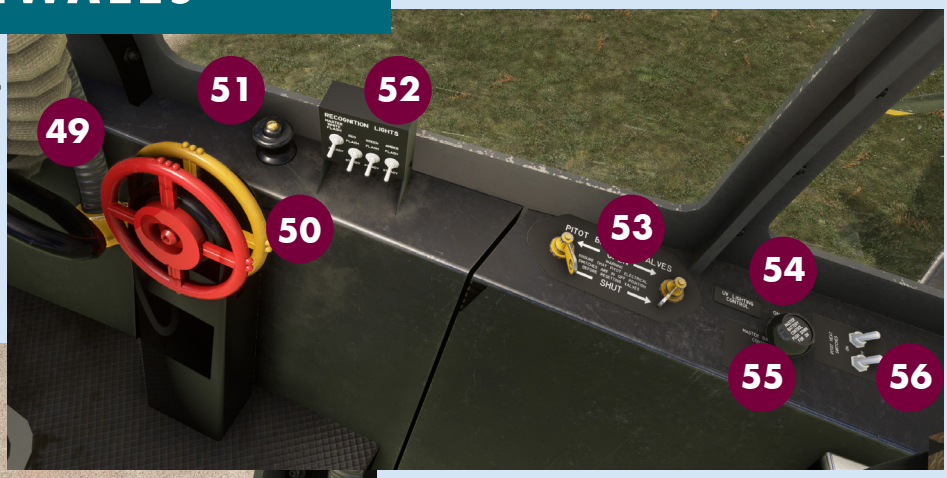
NOTE: The servo controls (speed valves) are INOP in this simulation.

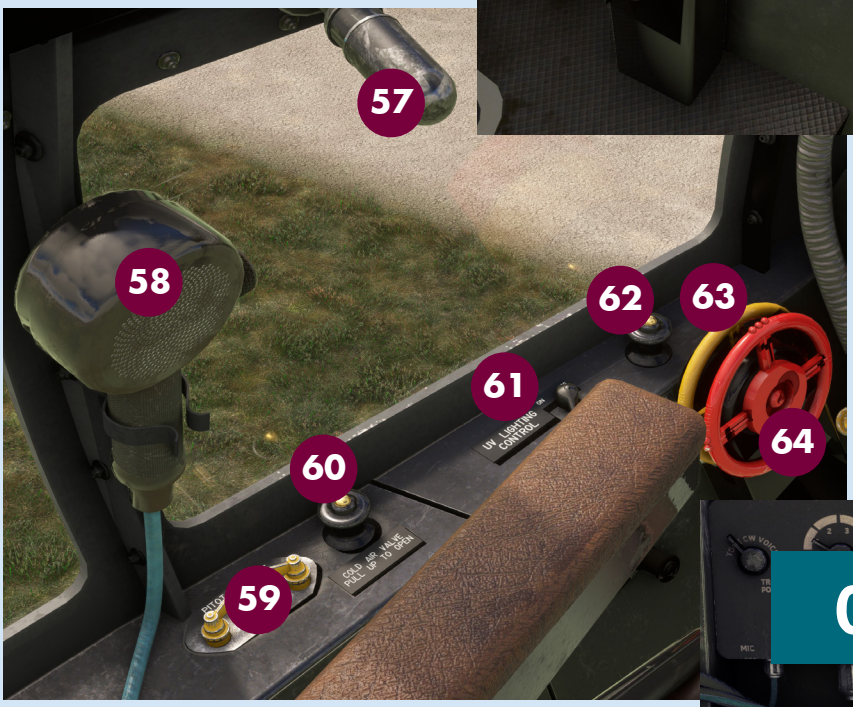
1. Index and Gyro cards
2. Gyro Cage (push plate)
3. Heading Adjust
4. Bank Adjust
5. Pitch Adjust
6. Bank indicator
7. Pitch Reference (white)
8. Horizon Bar (orange)
9. Suction Gauge
10. On/Off control

Note The Sperry Gyro Pilot is NOT the same as the more modern autopilots you will be used to in flight simulators. It was designed in the late 1930's as a device to maintain an aircraft's flight attitude - that is level flight and direction, once these are set by trimming.

COCKPIT SIDEWALLS

CoPILOT
49. Starboard Fuel Tanks Selector
50. Port Fuel Tanks Selector
51. CoPilot's Wiper Control
52. Recognition Lights Panel
53. Pitot Blowout Switches
54. UV Lighting Control
55. Master Battery Switch
56. Pitot Heat Switches

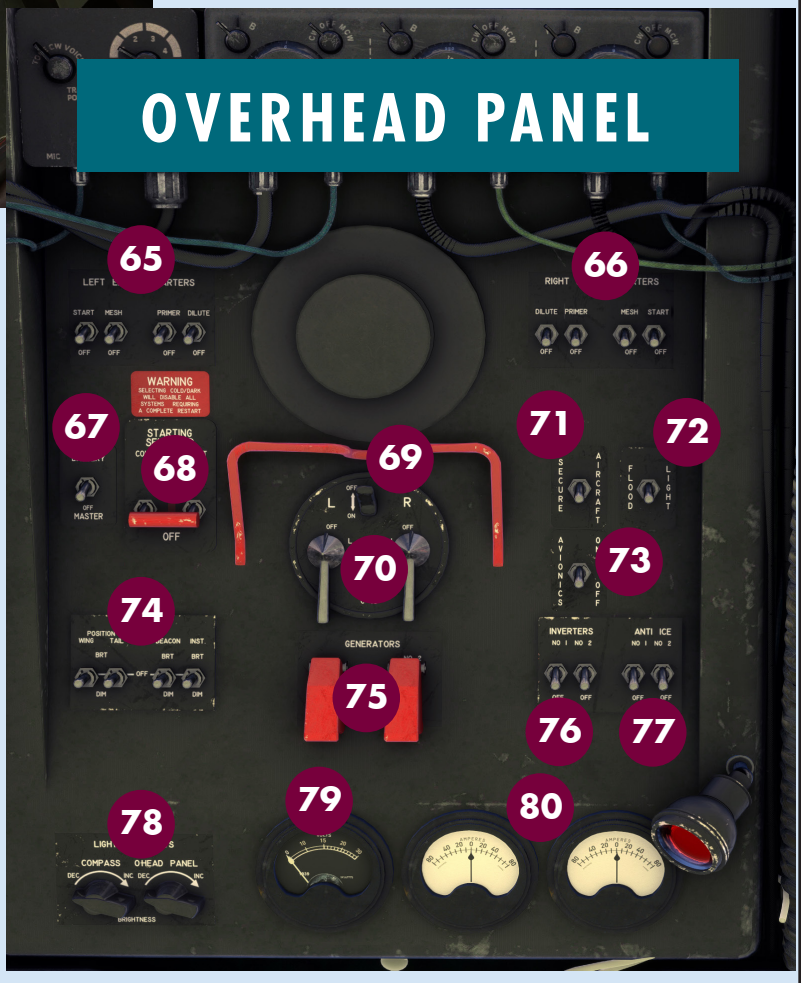




PILOT
57. Cockpit Light
58. Crew Intercom Microphone
59. Pitot Anti-Ice Switches
60. Cold Air Vent Valve (INOP)
61. UV Lighting Control
62. Pilot's Wiper Control
63. Port Fuel Tanks Selector
64. Starboard Fuel Tanks Selector

OVERHEAD PANEL

OVERHEAD PANEL
65. Left Engine Starters
66. Right Engine Starters
67. Battery Switch
68. ColdDarkStart Switch
69. Master Ignition Switch
70. Engine Magnetos
71. Security Switch
72. Flood Lights Switch
73. Master Avionics Switch
74. Lighting Switches
75. Generator Switches
76. Inverter Switches
77. Anti-Ice Switches
78. Lighting Rheostats
79. Volt Meter
80. Left and Right Ameters



FLYING THE C-46 "COMMANDO"

This aeroplane has a reputation for being a challenge to fly. However in the hands of a competent pilot, the C-46 is a very capable performer IF one follows the correct procedures.

You can, of course, just hit Cntrl/E and go flying but you will derive a much higher level of satisfaction if you follow the real-life procedures for starting and handling your C-46 Commando.

Not officially installed in real aircraft, we have incorporated a special "COLD,DARK.START" selection switch in the OVERHEAD panel. If you use this switch, the aircraft will be placed in a "cold, dark" state – that is, everything off, all levers shut, no power, no fuel, no nothing. THIS IS A ONE-SHOT SWITCH. You will have to reset the flight if subsequent starts fail.

Let's assume you have decided to go the "real" way and have used the cold-dark switch.

What follows is a condensed version of the real-world guide to the C-46, issued by the United-States Army Air Force when the aircraft was first delivered.

FUEL TANKS

First up you need to set up the tanks to feed fuel to each engine. Each engine has its own pair of selectors. These are the red (RH) and yellow (LH) wheels either side of the cockpit. Right click to turn each wheel to the desired tank, FRONT, CENTER OR REAR.

STARTING ENGINES

Here's the procedure for Starting (each engine in turn) Full CHECKLISTS are included at the end of this manual.

1. Master ignition switch.....ON
2. Battery switches.....ON
3. Generators.....ON
4 Inverters.....ON
5. Fuel gauges.....FULL
6. Booster pumps.....ON
7. Mixture levers.....full forward RICH
8. Propeller levers.....100% Pitch
9. Engine starter (energiser)switch.....ON
10. Engine mesh switch.....ON

Wait 5-8 seconds or count 15 prop blades as the prop rotates.

11. Primer Switch.....ON

NOTE: It is vital to make sure you "mesh" the engine whilst the "start" switch remains ON. The "start" switch is on a timer and will shut OFF after about 45 seconds or so preventing you from meshing the engine again.

Once the engine is running, idle at 800 to 1000 rpm. Watch the oil pressure gauge. If pressure does not register within 30 seconds, shut off the engine and investigate.

Repeat the procedure for the other engine.

After engines are running switch OFF the BOOSTER PUMPS.

TAXYING

Like most other heavy aircraft, the C-46 gives little or no response to rudder or aileron action in taxying. The principal controls are: engines, brakes, and tail-wheel. Use throttles for directional control whenever possible and directional braking if necessary.

TURNS

Never start a turn from a parked or stopped position. Let the aeroplane roll a few feet forward first. Pivoting on one wheel wears out the tire and puts a severe strain on the entire landing gear. For the same reason, don't make your turns too short. Make slow, easy turns with both wheels moving throughout the turn.

Start turns by leading with one throttle well before you reach the turning point. Remember, it takes time for the engine to bring the ship into the turn. In the same manner, anticipate with the other throttle well before the turn is completed so that you can straighten out with a minimum use of brakes. Use your brakes when necessary, but use them sparingly.

Return the inside throttle to the closed position so that you can make the turn with the least power possible. Do not ram throttles forward suddenly. Large engines are not built to take sudden applications of power.

TAIL-WHEEL LOCK

The tail-wheel lock is a most important aid to taxiing the C-46. The locked tail-wheel helps keep the plane straight, reducing the use of brakes for directional control. Locking the tail-wheel is a must in crosswind taxying. Let the aeroplane roll straight forward for a few feet before locking the tail-wheel.

Before beginning a turn, unlock the tail-wheel. Keep your speed down. A heavy aeroplane like the C-46 builds up a lot of momentum, even at low speeds. Excessive speed is not only dangerous, but necessitates continuous use of brakes.

Remember that the C-46 has a wingspan of 108 feet. When taxiing close to other aircraft or obstructions, it is difficult to estimate your clearance.

CROSS-WIND TAXYING

Because of the large fuselage and tail section of the C-46 there is a definite tendency to weathercock in wind as low as 5 mph. Taxying in a stiff wind of 20 mph or more presents a major problem. The locked tail-wheel helps materially in keeping the aeroplane straight in a crosswind. So, keep it locked at all times except when making turns. Lead with the upwind throttle, sufficient to hold the plane straight.

ENGINE RUN-UP

Like the "before-start" check-list, the run-up procedure is a directional one. You work upward on the pedestal checking the various controls for proper engine operation.

Before starting run-up, make sure that you have a minimum cylinder-head temperature of 120°C and minimum oil temperature of 40°C, and that all controls are set properly according to the check-list Run up each engine separately.

1. Advance throttle to 1400 rpm.
2. Shift into HIGH blower.
3. Place carburettor heat full on.
4. Advance throttle to 2000 rpm.
5. Note rise in carburettor intake air temperature, and then place heat control off.
6. Return to LOW blower. Manifold pressure should drop 1" to 2".
7. Check engine gauges for proper readings.
8. Pull the prop control back until the rpm drops 200.

At this setting the governor should hold the engine at a steady speed without surging. Return the prop control to full forward position and note the increase of rpm.

9. Perform the power check. Advance the throttle until you obtain 2500 rpm. You will need about 36.5" Hg. at sea level with an outside air temperature of 25 C (77 F) .
Allowing a tolerance of 2.5" Hg. for instrument errors, the maximum permissible manifold pressure is 39" Hg.
10. Reduce power to 30" Hg. Check magneto operation from BOTH to LEFT and BOTH to RIGHT and return to BOTH. Normal loss in rpm when running on one magneto is 50 to 75 rpm.
Maximum allowable loss is 100 rpm.

Reduce power to idling speed and repeat the run-up with the other engine.

Before returning power to idling speed on the second engine, check the flaps by full extension and retraction.

TAKEOFF

After you have performed your "before-take-off" check and are cleared by the tower, you are ready to line up on the runway and proceed with the take-off.

Let the plane roll forward a few feet, then LOCK THE TAIL WHEEL.

Don't let anybody tell you the C-46 takes off "just like a big Cub." It requires constant attention and concentration from the time you start the take-off run until you complete the take-off.

Rudder control does not come in until you reach a speed of 50 to 60 mph. The critical period in the take-off run comes just before you reach this speed. At this time it is extremely easy to veer off the runway or even to ground loop the aeroplane.

In the first part of the take-off run, before you gain rudder control, you must depend on the throttles for directional control. Advance throttles smoothly and not too abruptly. Be ready to correct yawing immediately by rolling ailerons in the direction of the yaw and by leading with the proper throttle. You can usually attain rudder control more quickly by applying full take-off power early in the run.

When you attain a speed of about 80 mph (dependent on weight), the tail starts to come up of its own accord. A little forward pressure on the wheel or rolling the elevator trim wheel forward helps the tail off the ground.

When you have reached a speed of 96 mph, depending on load and take-off conditions, back pressure on the wheel produces a clean break from the ground. Use elevator trim at this point to relieve the strain of pulling the wheel back. You can use trim as the principal means of flying the ship off. Apply trim slowly and don't spin the wheel. Properly balanced, the C-46 will lift off by itself but be sure to be ready to correct any yaw or roll tendency.

After you are definitely airborne -10 to 15 feet off the ground, apply brake to stop the wheels from spinning and raise the gear. **NOTE:** The landing gear lever in a C-46 has an intermediate "Neutral" position. ALWAYS leave the lever in this position once either raised or extended. **NEVER** taxi however, with the lever in "Neutral"

Hold the aeroplane to a minimum climb to attain safe single-engine speed of 120 mph. Climb at take-off power to a safe altitude, 300 feet if necessary, not exceeding 125 mph. This ensures that the aeroplane is not flying back into the ground, a frequent cause of take-off accidents.

Reduce power to intermediate settings and climb to 1000 feet. At this altitude reduce to normal climb settings and continue the climb at 130 to 140 mph.

HEAVILY-LOADED TAKEOFF

In training, you make most of your take-offs with empty or lightly loaded aircraft and on hard-surface runways. In operational flying you will be confronted at times with heavily loaded ships, and also soft runways, high altitude fields, and excessively high outside air temperatures.

Each of these factors adds length to your take-off run, and obviously a combination of two or more greatly increases the take-off run. Vary your take-off technique to meet these conditions.

1. **Use maximum allowable take-off power- 2700 rpm and as much manifold pressure as you can pull, up to 52" Hg.**
2. **Advance throttles to take-off power rapidly but smoothly.**
3. **Hold the ship on the ground until you get ample flying speed. This may be as high as 87 knots under some conditions.**

After you have lifted the aeroplane off the ground, the remainder of the take-off is normal.

CROSS-WIND TAKEOFF

Crosswind take-offs in the C-46 require plenty of technique. This aeroplane has a definite tendency to weather into the wind because of the large fuselage and tail surface areas. Keep the tail on the ground until rudder control comes in. The locked tail-wheel is a big help in keeping the ship straight. As soon as the tail comes up, use rudder immediately to correct for side thrust.

Lead with the upwind throttle and roll upwind aileron to correct for the wind. After you have attained rudder control and the tail is up, advance the retarded throttle to match the other for desired take-off power. Leave the ground with throttles even.

Hold the ship on the ground until you can make a clean break. If you bounce back in a crosswind take-off the side thrust on the landing gear is likely to damage it.

POWER SETTINGS FOR TAKE-OFF AND CLIMB

TAKEOFF (maximum)

Manifold Pressure.....52" Hg. RPM 2700

INTERMEDIATE
Manifold Pressure.....41" Hg. RPM 2400

CLIMB
Manifold Pressure.....35" Hg. RPM 2300

CLIMB AND CRUISE

To climb the C-46, trim the ship for hands off flight and hit an indicated airspeed (IAS) of approximately 130 mph.

Recommended power setting is 2300 rpm and 35" Hg. at sea level.

Unless you need maximum performance, climb in LOW blower as long as sufficient power is obtainable.

Maximum desired cylinder-head temperature for climb is 232 C maximum permissible,260 C.

Desired oil temperature is 70 C maximum permissible, 90 C.

Start taking corrective measures at the first sign of overheating. The temperature rise may be extremely rapid, and it is usually difficult to reduce temperatures to normal limits. The most effective means of reducing operating temperatures is to increase the IAS. You can add 10 to 20 mph to airspeed without much loss in rate of climb. Open cowl flaps for more effective cooling.

GET ON THE STEP

Continue your climb to 300-500 feet above your desired cruising altitude. Then let down gradually, at the same time reducing power to cruising settings. In this way you put the ship up on its aerodynamic step. Establishing the aerodynamic step is vital for best performance of the C-46. You can lose as much as 20 mph IAS in a heavily loaded aeroplane by not keeping on the step.

Give the engines a chance to cool off before closing the cowl flaps and changing mixtures to AUTO LEAN.

TRIMMING

In any aeroplane, every change of attitude, power setting, or airspeed changes the control pressures required. Unless you apply trim promptly to help you you'll find yourself overworked in a very short time. This is particularly true of the C-46, because of the size of the aeroplane and the heaviness of the controls.

The aeroplane is easy to trim and keep trimmed properly, because it is sensitive to the trim tab controls. Even a slight movement of the elevator trim tab wheel produces a definite change of attitude.

LANDING

The recommended normal landing for a C-46 is power-on, with power gradually reduced throughout the approach until it is dissipated entirely by the time you complete the round-out and just before you reach stalling speed. Make power reductions smoothly and gradually. An abrupt reduction of even 5" Hg. causes an appreciable change of attitude. Use elevator trim tab constantly throughout the pattern and approach.

Start your before-landing check soon after entering the downwind leg. Complete the check before you begin the turn onto the base leg.

Fly the pattern at approximately 128 mph until you complete the turn onto the final approach. Final approach speed with a medium loaded aeroplane is about 109 mph. Bring the aeroplane over the fence at a speed of about 100 mph. It stalls out at about 75 mph with full flaps and power off.

USING THE FLAPS

Normally you lower flaps after completing the turn onto final approach. Do not lower them with an airspeed of more than 135 mph. For average-length runways, use from ½ to full flaps. You can vary your glide path as needed by varying the amount of flaps and the points at which they are used.

FLARE

The flare, or round-out, requires plenty of room to complete with the C-46_ Begin the flare well back of the field so that you have time to perform it gradually and smoothly. Dissipate your remaining power gradually throughout the flare so that power is full off when you complete it. Give constant attention to the trim throughout the flare to provide smooth and easy handling.

Make a tail-low wheel landing. You can make a full-stall 3-point landing, but it is not recommended until you have perfected your landing technique. The weight of this aeroplane places too much strain on the structure, even in short drops.

Tail-high wheel landings can be made very smoothly, but they are necessarily faster and take more runway.

THE LANDING ROLL

This is one plane that you don't stop flying until it comes to a dead stop. When airspeed drops below 44 knots, you lose rudder control. A violent swerve or even a ground loop can easily result at that point if you are not careful. Be ready to correct immediately with aileron and throttle action.

If runway length permits, do not use brakes to slow down the aeroplane. Slow the plane down by intermittent application of brakes if necessary.

PERFORMANCE AND LIMITATIONS

The handling characteristics of the C-46 are normal in all attitudes and under all ordinary flight conditions. Directional and longitudinal stability are normal, as long as the centre of gravity (CG) remains within limits. In cruising flight, however, there is usually a "vertical hunting" tendency.

The aeroplane is sensitive to trim tabs and is easy to keep in proper trim. Always start take-off with the trim tabs in the zero position.

Airspeed Limitations

Glide .....270 mph
Level flight .....240 mph
Wheels down .....150 mph
Flaps down .....135 mph
Cowl flaps open .....165 mph
Landing lights extended .....150 mph

STALLS

The stall characteristics of the C-46 are excellent under all conditions. Normal recovery procedures apply. Stall recovery is normal, and you lose little altitude if you apply power immediately after the stall begins. Aileron has little effect until you regain flying speed. The following stalling speeds have been observed (40,000 lbs. gross):

Flaps up, gear up, power off.....89 mph
Flaps up, gear up, power on.....81 mph
Flaps down 35 , gear down, power off.....76 mph
Flaps down 35 , gear down, power on.....67 mph

These stall speeds will vary depending on flight conditions, wind and aircraft weights distribution.

EFFECT OF BANK

In banked turns, centrifugal force increases the wing-loading and thereby increases the stalling speed.

Loops, rolls, spins, dives, and inverted flight are prohibited for the C-46. Do not exceed 270 mph in glides. Do not let this aeroplane get into a spin. A spin can result in structural failure. If you inadvertently enter a spin, use normal recovery procedures.

SINGLE ENGINE PERFORMANCE

A thorough knowledge of single engine performance and limitations is essential for the safe operation of the C-46. The necessity of knowing what to do when an engine fails, how to manoeuvre the aeroplane, and how to make single engine landings is obvious. In addition, on long flights, the knowledge of proper single engine operation for cruising may be the determining factor in bringing you home safely.

With normal loads the C-46 gives excellent single engine performance. You can maintain safe airspeed at low altitudes at power settings only slightly above normal cruising. Heavier loads necessarily require higher power settings.

Tests show that a 45,000 lb. aeroplane can maintain an altitude of 9,000 ft. at 115 mph IAS, which is safe single engine speed. This requires maximum allowable continuous horsepower for this altitude- 2400 rpm and full throttle in LOW blower.

The aeroplane has exceptionally good directional stability and requires a minimum of rudder trim for single engine operation under most flight conditions. At low speeds the yaw is naturally greater than at cruising speed. Trim the ship for hands-off flight. You must re-trim after each change of power because of the unequal thrust forces created. The use of a little aileron to hold the good engine down allows better coordination in directional control and reduces the amount of rudder trim needed.

Minimum Speeds. Critical single engine speed is the lowest speed at which the rudder has a safe margin of control over the maximum unbalanced thrust of the good engine. This speed is a variable, depending upon load and flight attitude. With a normal load, when the stalling speed is 80 to 86 mph, the critical single engine speed is approximately 104 mph.

Safe airspeed must be your first consideration in single engine operation. Just critical single engine speed is not enough, as it leaves you little safety margin. To get and maintain safe single engine speed, pull all the power you need from the good engine- even full military power for an interval not to exceed 15 minutes.

Climbing. There is no "best" airspeed for climbing with one engine. Desirable airspeed is that which gives good performance without using dangerously excessive power. This airspeed varies with different loads and flight conditions. If you are climbing above 128 mph IAS, with a medium power setting, use lower cowl flap settings as long as cylinder-head temperatures stay within maximum limits. This reduces drag.

Cruising. Trim the ship for straight and level flight. In general, use the least power you can to maintain proper airspeed.

Watch your fuel flow meter. Compute your fuel consumption for your proposed flight and see if your available fuel supply will allow you to make it. Prepare to use the cross feed to transfer fuel to the good engine when needed.

Make all manoeuvres and power changes with the utmost smoothness. Upsetting the balance of trim causes a higher stalling speed, and in the case of turns usually results in loss of altitude.

It is safe to make turns into the dead engine as long as you keep airspeed reasonably above the stalling speed for the degree of bank. Stay above 125 mph in a normally loaded aeroplane and don't exceed a 30° bank. If you must make a bank of more than 30°, don't turn into the dead engine. With heavy loads, turns into good engine are best

Landing. Hold 127 mph and don't exceed 30° bank when turning into dead engine.Because of the weight of this aeroplane it is imperative that you keep adequate airspeed with sufficient power until you are absolutely sure of reaching the field. Recovery from undershooting is precarious.

Establish your base leg as in a normal approach. Drop the landing gear on the base leg if you have sufficient speed and altitude and are sure that you can get into the field with gear down. Otherwise, let your gear down after you have turned onto final approach.

When you are close to the field, you may drop part flaps. Keep part in reserve; you may need them. Maintain plenty of airspeed. This allows a power-off landing with time to re-trim rudder, or permits going around if necessary.

Cut power and perform a normal power-off landing. The aeroplane settles quickly without power.

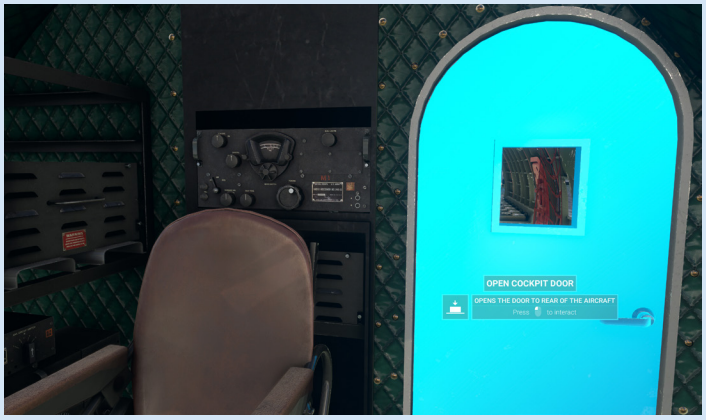
Cross-wind landings. If you must make a cross-wind landing, choose a runway where the wind is blowing from the side of your good engine. In this way you can use power to offset the tendency of the ship to weather into the wind.

Go-around-If necessary to go around, maintain airspeed at all times above 120 mph. Raise the gear immediately and apply full power. Raise flaps at any speed over 120 mph and re-trim for change of attitude. Don't spare the horses!

ADDITIONAL FEATURES

CO-PILOT

We have added a co-pilot to the cockpit. If you'd rather not have him there, just use the center pedestal switch "FRICTION STOPS" **(7)** which toggles him on and off.



COCKPIT DOORS

Opening the cockpit door will reveal a viw of the cargo area.

Clicking once more on the cargo clickspot will open the cargo door at the aft of the aircraft.

Clicking on the seal around the crew door will open it, placing the forward ladder and a crewman outside.

Checklists

NOTE: These checklists are for simulation purposes ONLY. In no way are they intended for real-world aviation use.

WEIGHT AND BALANCE

It is important to make sure that the configuration of the airplane selected matches the fuel/payload data listed in the simulator drop-down menu. The simulation will react to any changes in the data that you make or enter.

Once you have established your intended flight and have fuel and payload data available, enter these values in the boxes provided. Adjust the payload fore and aft to achieve a good Center-of-Gravity balance as indicated on the plane graphic of the drop-down. Doing this will decrease the amount of time required to trim the aircraft for level and balanced flight.

BEFORE STARTING ENGINES

SECURE FRONT CREW DOOR
RETRACT LADDER

Parking brake.....ON
Superchargers.....LOW blower
Carburettor heat.....COLD
Landing gear handle.....DOWN and latched
Wing flaps.....UP
Tail-wheel.....LOCKED
Feather switches.....NORMAL
Aileron tabs.....NEUTRAL
Rudder tabs.....NEUTRAL
Elevator tabs.....NEUTRAL
Mixture controls.....FULL RICH
Prop levers.....Full forward (high rpm)
Throttles.....Cracked
Cowl flaps.....OPEN

Now on the pilot's windowsill:

Fuel Tanks Selectors.....as desired

On the instrument panel:
Gyropilot.....OFF
Radios.....OFF

On the copilot's windowsill:
Pitot heat switches.....OFF

On the overhead panel:
Light switches.....OFF
Anti-icer switches.....OFF

STARTING ENGINES

Battery switches.....ON
Master and ignition switches.....ON
Inverters.....ON
Generators.....ON
Fuel gauges.....Check quantity
Booster pumps.....ON
Engine Starter (energise).....ON
Engine Mesh.....ON

WAIT 4-5 SECS OR COUNT 15 BLADES

Engine Primer.....ON

AFTER ENGINES ARE RUNNING
Booster pumps.....OFF
Battery switches.....ON
Lights.....As desired

BEFORE TAXYING

Hydraulic pressures:
Booster system.....750-1050 psi
Main system.....1050-1350 psi
Radios.....ON
Altimeter.....Set
Clock.....Set
Gyros.....Set
Flight controls.....Free
Chocks(SECURITY).....Removed
Parking brake.....OFF
Tail-wheel LOCK.....As desired

ENGINE RUN-UP

Parking brake.....ON
Tail-wheel.....LOCKED (If straight)
Fuel booster pumps.....OFF
Mixtures.....AUTO RICH
Cowl flaps.....OPEN
Fuel selector valves.....Take-off tanks
Engine gauges.....CHECK
Superchargers.....HIGH then return to LOW
Carburettor heat....HOT then return to COLD
Generators.....ON
Manual prop controls.....CHECK
Magnetos.....CHECK
Pitot heaters.....ON
Suction gage.....CHECK

BEFORE TAKEOFF

Booster pumps.....ON
Trim tabs.....Neutral
Mixtures.....AUTO RICH
Prop controls.....Full forward (high rpm)
Cowl flaps.....AS REQUIRED
Fuel selector valves.....Take-off tanks
Gyro instruments.....Set and uncaged
Engine instruments.....Normal readings

When lined up:

Tail-wheel.....LOCKED
Flight controls.....Free

AFTER TAKEOFF

Gear.....UP
Brakes.....ON

Power reductions:
Intermediate.....41″ Hg. and 2400 rpm
Climb.....35″ Hg. and 2300 rpm
Airspeed.....120 to 128 mph
Booster pumps.....OFF (at safe altitude)

CRUISE

Power.....Reduced to cruise setting
Mixtures.....AUTO LEAN
Cowl flaps.....CLOSED
when temperatures are below 200 C.
Tanks.....Use front tanks for 30 minutes

BEFORE LANDING

Prop levers.....2300 rpm
Slow plane to.....150 mph
Gear.....DOWN – locked in Neutral
Mixtures.....AUTO RICH
Fuel selector valves.....Proper tanks
Booster pumps.....ON
Gear checked.....DOWN
Parking brake.....OFF
Superchargers.....LOW
Carburettor heat.....COLD
Tail-wheel.....LOCKED
Gyropilot.....OFF
De-icers.....OFF
Brake pressure.....1050 to 1350 psi
Flaps.....As required

AFTER LANDING

Flaps.....UP
Cowl flaps.....OPEN
Props.....Full forward (high rpm)
Booster pumps.....OFF
Trim tabs.....Neutral
Tail-wheel.....UNLOCKED
(Not above 10 mph)

STOPPING ENGINES

Mixtures.....IDLE CUT-OFF
Throttles.....Full OPEN
All switches.....OFF
Wheel chocks(SECURITY).....in place
Brakes.....OFF (if hot)
Fuel selector valves.....OFF

BEFORE LEAVING AIRCRAFT

Parking Brake.....ON
Cowl Flaps.....as desired
Tailwheel.....Locked
Mixtures.....Idle cut-off
Fuel Selectors.....OFF
Ignition.....OFF
Radios.....OFF
Battery Switch.....OFF
Landing Gear Handle.....Down
Flap Handle.....UP