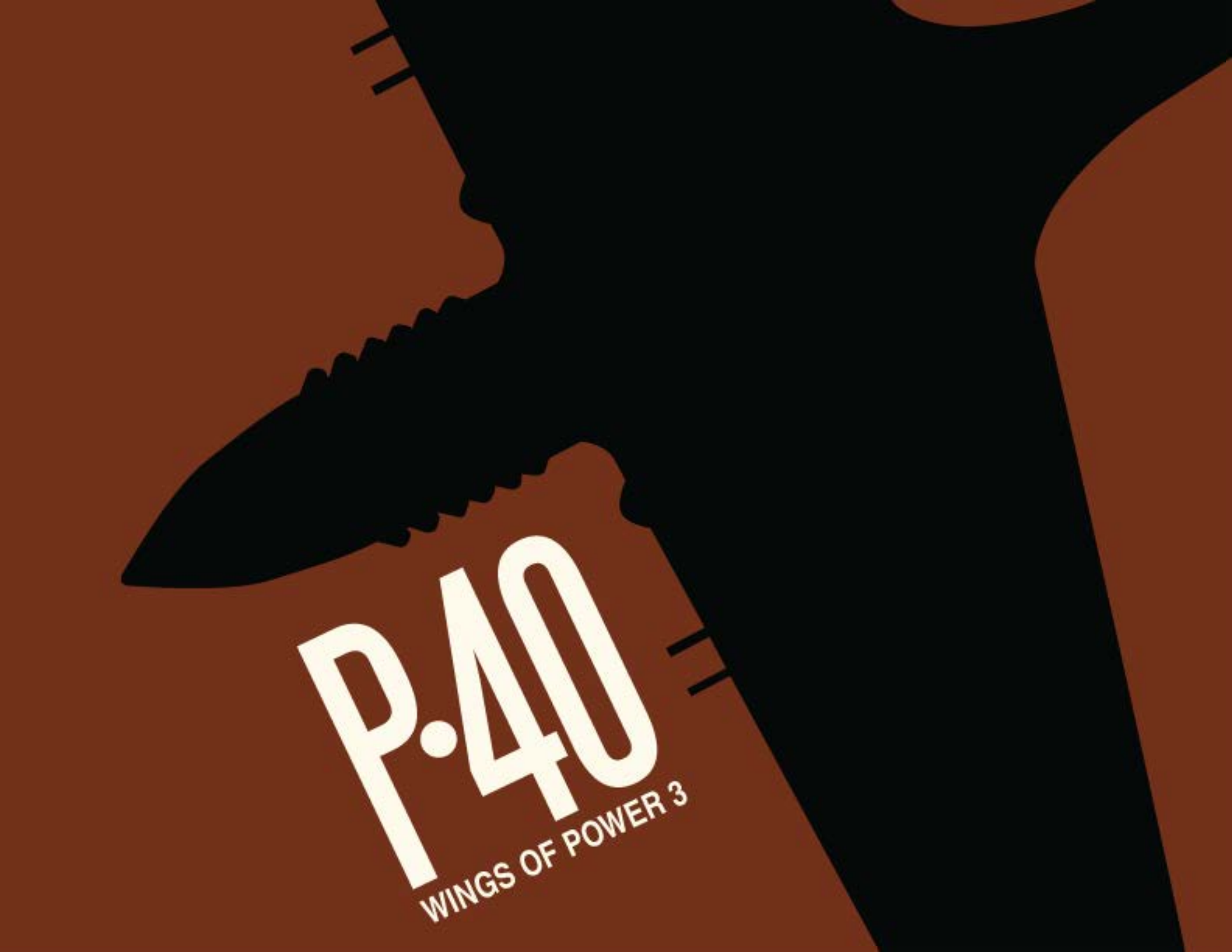
P·40
WINGS OF POWER 3

WINGS OF POWER III “P-40”

ATTENTION!

Wings of Power, including sounds, aircraft, and all content is under strict, and enforceable copyright law. If you suspect anyone has pirated any part of Wings of Power, please contact piracy@a2asimulations.com

RISKS & SIDE EFFECTS

ERGONOMIC ADVICE

1. Always maintain a distance of at least 45 cm to the screen to avoid straining your eyes.
2. Sit upright and adjust the height of your chair so that your legs are at a right angle. The angle between your upper and forearm should be larger than 90 degrees.
3. The top edge of your screen should be at eye level or below, and the monitor should be tilted slightly backwards, to prevent strains to your cervical spine.
4. Reduce your screen’s brightness to lower the contrast and use a flicker-free, low-radiation monitor.
5. Make sure the room you play in is well lit.
6. Avoid playing when tired or worn out and take a break (every hour), even if it’s hard…

EPILEPSY WARNING

Some people experience epileptic seizures when viewing flashing lights or patterns in our daily environment. Consult your doctor before playing computer games if you, or someone of your family, have an epileptic condition.

Immediately stop the game, should you experience any of the following symptoms during play: dizziness, altered vision, eye or muscle twitching, mental confusion, loss of awareness of your surroundings, involuntary movements and/or convulsions.

Wings of POWER 3

"We put you in the cockpit of some of the worlds most exciting aircraft."

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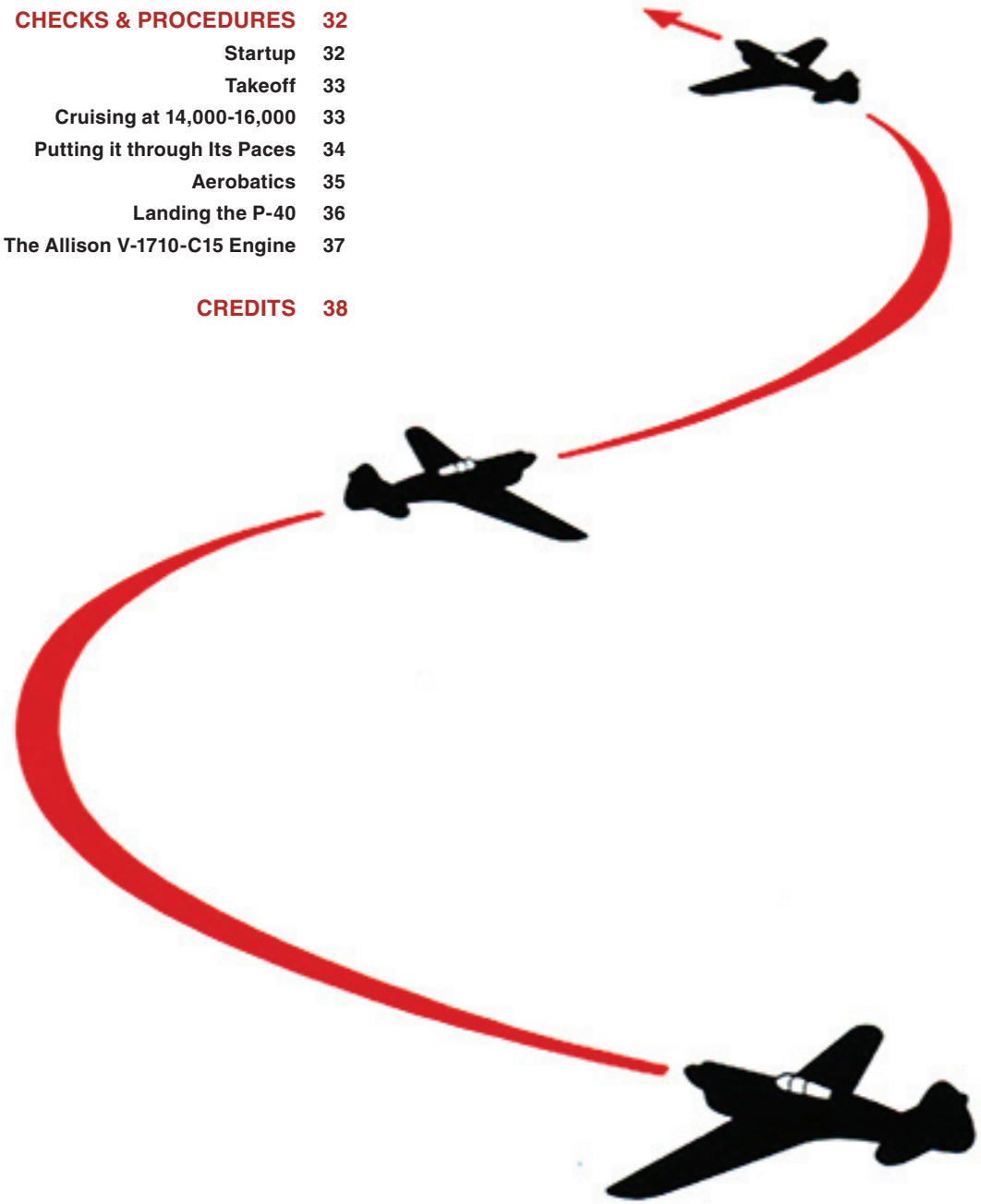
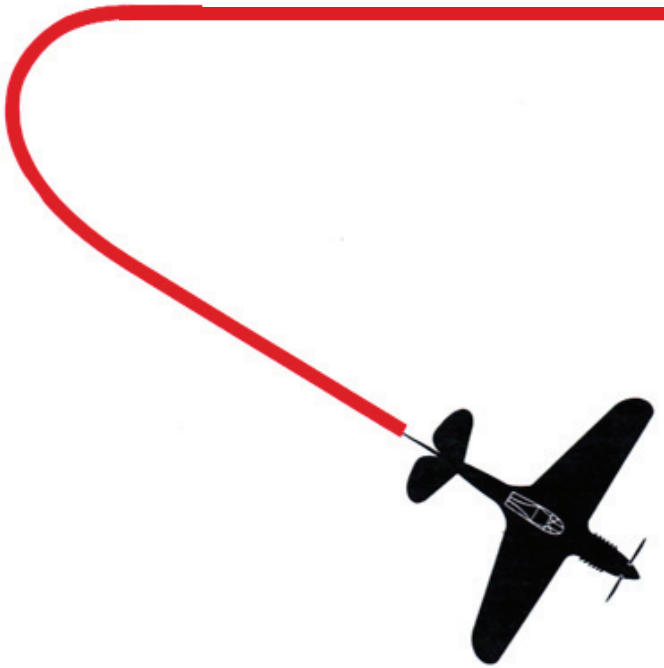




When we decided to develop Wings of Power, the agreed upon goal was to create the most complete flying experience. This means building aircraft that not only look beautiful, but also fly and function authentically.

Some flyers live for complex gauges and realistic cockpit environments, while others simply admire watching their new aircraft fly through their favorite places around the world. It is our belief that while soaring through the skies, even the casual flyer will appreciate that there is a world of detail and history in every dial and switch. It is the same feeling you get when you sit in the cockpit of a real airplane. The difference is, in a simulated world, you can have it all.

Wings of Power sets new standards in many areas, probably the most notable are the 3D cockpit environments. While they are beautiful to look at, they represent the top layer of an amazing world that lies beneath. The more you fly these aircraft, the more you discover.

Like the entire Wings of Power series, the flight model was very carefully researched. We used some rare, authentic flight test reports and the actual pilot's training manual and technical orders to ensure our procedures and performance matched the real thing as closely as possible.

We are passionate about our work and are proud to be the makers of Wings of Power. We think you will have many hours of enjoyment with it.

The Wings of Power Team

P-40

FEATURES

Flying the P-40 in Lockheed Martin Prepar3D is an extremely enjoyable experience. The air-craft has such beautiful lines, a genuine Allison sound, and feels just right to fly. Perhaps much of this enjoyment comes from the meaningful place the P-40 holds in the hearts of so many.

Here are some little details you may appreciate while flying the P-40:

- Rugged, fast, and maneuverable.
- As with every A2A aircraft, it is gorgeously constructed, inside and out, down to the last rivet.
- Designed and built to be flown “By The Book”.
- Custom Cockpit Systems and Gauges.
- Visual Real-Time Load Manager, with the ability to load fuel and stores in real-time.
- Naturally animated pilot.
- 3D Lights ‘M’ (built directly into the model) with under-wing landing light than can be turned on, deployed, and retracted and fully functional recognition lights.
- Pure3D Instrumentation now with natural 3D appearance with exceptional performance.
- Sound engineered by A2A sound professionals.
- Oil pressure system models oil viscosity (oil thickness).
- Authentically modeled hydraulic system.
- In cockpit pilot’s map for handy in-flight navigation.
- Auto-Mixture that actually performs as intended. Now you can set for “auto-rich” or “auto-lean” and the aircraft fuel-to-air ratio will be automatically determined and set by the carburetor based upon various factors, such as altitude.
- Five different models, P-40B, P-40C, AVG model, RAF Tomahawk, and Russian Tomahawk.
- Internal Supercharger modeled with accurate behavior.
- Fuel delivery system simulated.
- All models include A2A specialized materials with authentic metal.
- Pilot’s Notes pop-up 2D panel keeps important information easily available.

P-40

QUICK START GUIDE

Chances are, if you are reading this manual, you have properly installed the A2A Wings of Power 3: P-40. However, in the interest of customer support, here is a brief description of the setup process, system requirements, and a quick start guide to get you up quickly and efficiently in your new aircraft.

SYSTEM REQUIREMENTS

The A2A Simulations Wings of Power P-40 requires the following to run:

- Requires licensed copy of Lockheed Martin Prepar3Dv4

OPERATING SYSTEM:

- Windows 7
- Windows 8 & 8.1
- Windows 10

PROCESSOR:

2.0 GHz single core processor (3.0 GHz and/or multiple core processor or better recommended)

HARD DRIVE:

250MB of hard drive space or better

VIDEO CARD:

DirectX 9 compliant video card with at least 128 MB video ram (512 MB or more recommended)

OTHER:

DirectX 9 hardware compatibility and audio card with speakers and/or headphones

INSTALLATION

Included in your downloaded zipped (.zip) file, which you should have been given a link to download after purchase, is an executable (.exe) file which, when accessed, contains the automatic installer for the software.

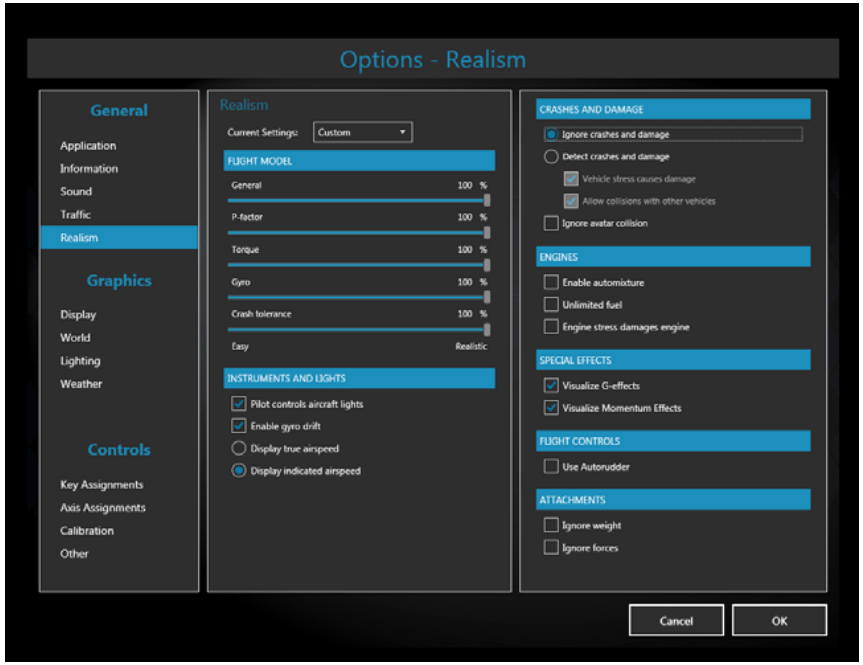
To install, double click on the executable and follow the steps provided in the installer software. Once complete, you will be prompted that installation is fin-ished.

IMPORTANT:
If you have Microsoft Security Essentials installed, be sure to make an exception for Lockheed Martin Prepar3D and install path for both the program and addons.

REALISM SETTINGS

The A2A Simulations Wings of Power 3 P-40 was built to a very high degree of realism and accuracy. Because of this, it was developed using the highest realism settings available in Lockheed Martin Prepar3D.

The following settings are recommended to provide the most accurate depiction of the flight model. Without these settings, certain features may not work correctly and the flight model will not perform accurately. The figure below depicts the recommended realism settings for the A2A Wings of Power 3 P-40.



FLIGHT MODEL

To achieve the highest degree of realism, move all sliders to the right. The model was developed in this manner, thus we cannot attest to the accuracy of the model if these sliders are not set as shown below.

INSTRUMENTS AND LIGHTS Enable "Pilot controls aircraft lights" as the name implies for proper control of lighting. Check "Enable gyro drift" toover time.

"Display indicated airspeed" should be checked to pro-vide a more realistic simulation of the airspeed instruments.

ENGINES

Ensure "Enable automixture" is NOT checked.

FLIGHT CONTROLS

It is recommended you have "Auto-rudder" turned off if you have a means of controlling the rudder input, either via side swivel/twist on your specific joystick or rudder pedals.

ENGINE STRESS DAMAGES ENGINE

It is recommended you have this UNCHECKED.

DISPLAY SETTINGS

Texture resolution should be set to "Ultra 4096x4096" for best visual quality.

NOTE: It is recommended that the aircraft is NOT set as the default aircraft/flight in P3D.

SUPPORT AND QUESTIONS?

Please visit us and post directly to the A2A support and commu-nity forums; https://a2asimulations.com/forum/index.php

QUICK FLYING TIPS

- For the most realism, map an available button on your controller to the hydraulic pump. You will need to press and hold this to operate flaps or landing gear. If this is too complicated, open your CONTROLS 2D panel (SHIFT-3) and select "Auto Hyd Pump."

- The "G" key selects GEAR UP or GEAR DOWN, however, it is recommended to map a GEAR UP and GEAR DOWN using the Input Configurator.

- To Change Views Press A or SHIFT-A.

- Left-click the primer to turn left and unlock, left-click to prime, right-click to turn right and lock.

- Get airborne fast. These large piston aircraft like a nice flow of air from flight, and do not like idling on the ground for long periods of time. Plan your flight, start your engine, do a quick run-up, and get off the ground.

- Keep the engine at or above 800 rpm. Failure to do so may cause spark plug fouling. If your plugs do foul (the engine will sound rough), try running the engine at a higher rpm. You have a good chance of blowing them clear within a few seconds by doing so. If that doesn't work, you may have to shut down and visit the maintenance hangar (Accu-sim required).

- REDUCE POWER after take-off. This is standard procedure with high performance aircraft.

- Use AUTO-RICH mixture for TAKEOFF / CLIMB and AUTO-LEAN (Weak) mixture for CRUISE.

- DO NOT lower gear when going over 160mph IAS.

- On landing, raise your flaps once you touch down to settle the aircraft, pull back on the stick for additional elevator braking while you use your wheel brakes.

- Be careful with high-speed dives, as you can lose control of your aircraft if you exceed the max allowable speed.

- For landings, take the time to line up and plan your approach. Don't use the landing gear or flaps as brakes. Keep your eye on the speed at all times.

- Using a Simulation Rate higher than 4× may cause odd system behavior.

- Keep throttle above ⅓ when flying at high rpm to avoid fouling plugs (Accu-sim required).

- A quick way to warm your engines is to re-load your aircraft while running.

P-40

HISTORY

The P-40 was one of the most important fighters of World War II. Not because of it's raw performance, but because it was widely available and served it's role well and it remained a favorite aircraft to the pilots that knew it best.

The P-40 was a very cost-effective aircraft to produce, and over a 5-year period, almost 14,000 P-40 aircraft were produced. The P-40 flew in Africa, Asia, and Europe and is probably most remembered for being used by the Flying Tigers AVG (American Volunteer Group), with its famous shark-toothed paint scheme.

The P-40 roots are from the Curtiss Hawk 75. With the impending war, Curtiss built on the Hawk's proven airframe and equipped it with the Allison V-1710 engine.

P-40

INCLUDED MODELS

Curtiss P-40 AVG - Robert T. Smith

Hawk 81-a2 Number '77' flown by 3rd Squadron Flight Leader R.T. Smith, Kunming, China, January 1942. Robert Tharp (R.T.) Smith, born in York, Nebraska on 23 February 1918, joined the Army Air Corps as an aviation cadet in 1939. Graduating with Class 40-C at Randolph on 21 June 1940, he remained there as a flight instructor until July 1941 when he was allowed to resign his commission to join the American Volunteer Group, then forming in Burma. Flying as part of the AVG's Third Pursuit Squadron, Smith was credited with one–and-one-half Sally bombers destroyed, another probably destroyed and four damaged in the first air raid on Rangoon, Burma on 23 December. Two days later, on Christmas Day, he downed two more bombers and an Oscar in a repeat raid on the Burmese capital. Moving to Loiwing, China he became an ace on 8 April 1942 with the destruction of two Oscars over the AVG base. He downed another Oscar two days later and completed his scoring with the AVG on 28 April with a final Oscar south of Hsipaw.

Curtiss P-40B White 155

2nd Lt. Kenneth Taylor was stationed at Pearl Harbor during the Japanese attack on December 7, 1941. Along with his fellow pilot George Welch, they drove from Wheeler Field to Haleiwa Auxiliary air field where eighteen P-40B fighters were located. Taylor flew two flights during the course of the attack and shot down four Japanese dive bombers. Taylor was injured during his second flight and received several awards for his heroism, including the Distinguished Service Cross and the Purple Heart.

DIFFERENCES BETWEEN THE INCLUDED MODELS

Fuel Setup

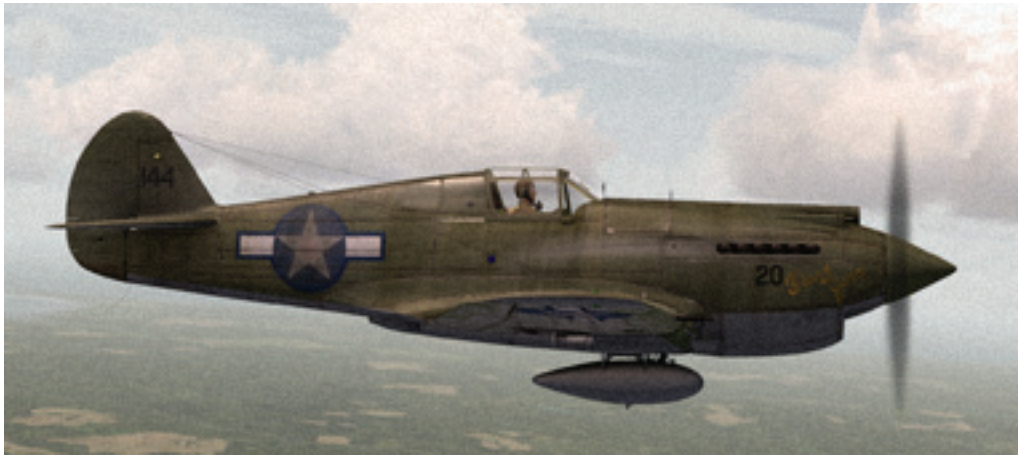
- Fuel selectors and fuel gauges
- AVG and Tomahawks use imperial gallons
- US models use gallons
- Tomahawks have the drop tank
- Fuel capacity differs (the self-sealing tanks in Tomahawks decreased fuel quantity, which is why they carry a drop tank)

Gun Sight

- AVG and US versions use a floor-mounted, N-3A
- The Tomahawks use British GM-2 Mk2 gunsights

Curtiss P-40C 33rd FS

Curtiss P-40C, Black 127, 33rd Fighter Squadron, Iceland 1942. From Aug 1941 until May 1945 the 33rd Fighter Squadron were tasked with air defence duties over Iceland. On 14 August 1942 A 33rd FS P-40C, similar to the one depicted here along with a P-38F, intercepted and destroyed a Focke-Wulf Fw 200C-3 that overflew the USAAF base at Reykjavík. This was the first confirmed USAAF victory over a German aircraft in WWII.



Curtiss P-40C 1944

Curtiss P-40C, Black 20, 33rd Pursuit Squadron, Iceland 1944. P-40C "Daisy June" was still on charge with the Iceland Base Command in 1944 where it was pictured in a Life magazine article. It sported a very unique underside disruptive camouflage.

Tomahawk IIB - Alexei S. Khlobystov

Tomahawk MkIIB "White 58" 20th GIAP, flown by Lieutenant Alexei Khlobystov. Alexei Khlobystov was born on 23 February 1918 in Vtoroe Zakharovo in the Ryazan region and learned to fly at the Ustomi aeroclub during 1938. In 1939 he joined the army and attended Kacha Military Air Collage where he won his wings in 1941. Alexei Khlobystov's had a flair for taran attacks, three of his eight victories were by this method. On 13 December 1943, by which time he was leading an eskardrilya in the 20 GIAP, he was killed in action. At the time of his death Khlobystov had claimed 8 destroyed and 24 shared victories in 335 sorties.

P-40 SPECIFICATIONS

Length	31.71 ft
Wing Span	37.29 ft
Basic Weight	6190 lbs
Max Power	1040 Hp
Max speed	360 mph @ 16000 ft
Climb rate	2800 ft/min
Powerplant	Allison V-1710

Fuel Capacities

P-40B	
total	159 US Gallons
fuselage	57.28
wing	61.25
res	40.35
P-40B AVG	
total	130 Imp. Gallons
fuselage	47
wing	50
res	33
Tomahawk IIB	
total	155.8 Imp. Gallons
fuselage	40
wing	45
res	27.5
droptank	43.3

Tomahawk IIB - AK402 - 112 Sqn

After successfully completing his flight training Neville Duke was posted to 92 squadron RAF in April 1941. He scored two victories flying the Spitfire Mk V over France before being posted to 112 Squdron, North Africa in Oct 1941 where he flew Tomahawks and Kittyhawks. He went on to score six victories with 112 Squadron before returning to 92 Squadron who had deployed to North Africa in Nov 1942. Duke added 14 more victories to his tally in just a couple of months. Duke finished the war with 28 victories and went on to be chief test pilot with the Hawker aircraft company.

P-40

FLYING THE P-40

The P-40 for all of its shortcomings was a very stable gun platform. It's greatest strength was its heaviness and ability to out-dive all of it's German and Japanese counterparts. In a dive you can hold the pipper on a target and maintain that view through 460 mph firing as you go, and even in this heavy airframe have the ability to pull out of the dive with sufficient airspace underneath you to climb quickly into another firing position. Of course because it is heavy and fast in a dive you can reach the speed of compressibility and be unable to pull out of a dive even in the heavier air. While compressibility is hard to model in a flight simulator, we incorporated the overstress factor when that point is reached. The American Volunteer Group used this diving from high altitude tactic over and over again to gain air superiority over their enemies and the A2A aircraft exhibits that same stability in a power dive.

At altitude below 14,000 feet, the aircraft is fairly agile and able to maneuver sufficiently to dogfight pretty much anything that comes at it. I was told by David Lee "Tex" Hill at a book signing that contrary to popular opinion and myth, that a well maintained P-40 could, in fact, turn with most aircraft in a dogfight at lower altitudes, where most combat actually occurs anyway. There were of course some exceptions with much lighter aircraft. The British historians of that era have stated that in the hands of competent pilots the P-40 proved effective against even the best of the Luftwaffe and Regia Aeronautica. Considered markedly superior to the older Hurricane which it replaced as the primary fighter of the Desert Air Force, the P-40 Tomahawk was deadly against Axis bombers in the North African theater, as well as the Bf 110 and early Italian fighter types, such as the Fiat G.50 and the Macchi C.200, though

the Bf 109 proved a greater challenge, particularly the later F and G variants. The P-40 was superior to the Bf 109 in maneuverability and structural strength, and was roughly equal to it in firepower, but was inferior in speed and rate of climb.

The P-40 was an aircraft with a heavy nose, due in part to the weight of the 1100 horsepower v12 1710-C15 Allison engine that propelled it. This becomes quite obvious when you apply flaps at landing. The nose immediately begins to drop and is modeled very well. The P-40 Tomahawk could not climb with most of the opposing aircraft as its rate of climb was about 2100-2800 ft/min(11m/s) and could only reach speeds of 340 mph or 300 knots at 14,000 ft depending on the model of aircraft.

HYDRAULIC SYSTEM

The hydraulic system is controlled by an electrically driven hydraulic pump which operates the retractable landing gear tailwheel and flaps. There is a hand-operated hydraulic pump attached to the floor of the cockpit on the right side. There is an additional hand-operated hydraulic pump in-board of the main hydraulic pump. This is an emergency pump, not an auxiliary pump. Use it only in an emergency. Operate by removing the pump handle from regular or outboard pump and attaching it to the emergency or inboard pump.

To check the functioning of the hydraulic system on the ground:

1. Place the flap handle DOWN. This allows the flaps to drop 10° to 15°.
2. Put the flap handle in UP and pump up the flaps with the hand hydraulic pump until you build up a solid pressure.

Landing Gear

The hydraulically operated landing gear is controlled by a selector handle on the left side of the cockpit. The selector handle has three positions: UP, NEUTRAL, DOWN.

To Retract The Landing Gear

1. Apply pressure to brake the wheels.
2. Move the locking pin on the selector handle forward and place the selector handle in the UP position.
3. Depress the toggle switch on the control stick.
4. Observe the movement of the wheel indicators. It requires approximately 20 seconds to retract the wheels completely. When the wheels fully retract you can usually hear the pump working harder.
5. Try to move the hydraulic hand pump backward and forward when the indicators show the landing gear is fully retracted. If the wheels are all the way up, you wont be able to move the hand pump after a few strokes. Continue the action with the hand pump until it won't move.
6. Return the selector handle to NEUTRAL.

To Lower Landing Gear

1. Slow the airplane to an indicated airspeed (IAS) of 160mph or less.
2. Move the selector handle to DOWN.
3. Depress the toggle switch on the stick
4. Observe the movement of the indicators. It requires approximately 20 seconds to extend the wheels.
5. When movement of the indicators ceases, leave the handle in the DOWN position, and check the hand hydraulic pump for stiffness. Be sure that you check the hand pump both backward and forward. Be sure, also, that you leave the handle in the DOWN position while making this check.
6. Momentarily retard the throttle to see that the horn does not blow. Remember that your hand hydraulic pump is the only accurate check you have. The horn may be out, the indicators out, and other checks may be inaccurate, but if the hand hydraulic pump can't be moved after a stroke or two, you know that your wheels are down and locked

NOTE: Do not move selector handle up past the NEUTRAL position while on the ground, because the tailwheel retracts.

Manual Operation

You can extend or retract the gear if the electric motor fails by pumping with the hand hydraulic pump.

Emergency Operation

If the electric and manual operation fail and your airplane has the emergency hydraulic system, you extend the main gear as follows:

1. Move the selector handle DOWN
2. Open the left emergency valve on the cockpit floor
3. Open the right emergency valve on the cockpit floor (this valve is tied to the right valve in the simulator since the right valve is not readily visible being under the seat)
4. Move the hand pump lever to the emergency pump (click on the red emergency pump)
5. Pump the wheels down. The tailwheel does not come down; consequently, land wheels first and hold the tailwheel up as long as possible. You cannot retract the wheels with the emergency system.

Wheel Indicators

There is an electric wheel and flap indicator on the instrument panel. Three tabs in the indicator show the relative position of the main landing gear and the tailwheel. (A pointer indicator shows the position of the flaps.)

Flaps

The flap controls have three positions- DOWN, NEUTRAL and UP. The flaps are operated hydraulically by an electric toggle switch on the forward side of the stick. When you want to move your flaps up or down, put the flap control into the UP or DOWN position and depress the toggle switch (You operate them manually by using the hand hydraulic pump). The position of the flaps is shown by a pointer on the wheel and flap indicator on the instrument panel.

Brakes

The brakes are single-shoe expansion type. The usual toe action on the rudder pedals controls each brake independently. Test your brakes when you taxi out to the takeoff position.

Never apply brakes suddenly; you may nose over the airplane. Take it easy on your brakes when you taxi. Don't ride them. Riding makes them heat rapidly, and the heat may glaze the brake drum. Control the airplane with the steerable tailwheel as much as possible. If either or both brakes fail, stop the airplane by cutting off the engine immediately.

Parking Brake Handle

The parking brake handle is on the left-hand side of the instrument panel.

To set the brakes:

1. Depress the rudder brake pedals.
2. Pull the parking brake handle out
3. Release the pedal pressure.
4. Release the parking brake handle.

To release the parking brakes- simply push down on the rudder brake pedal.

PROPELLER

Instead of the Hamilton Standard constant-speed propeller you may be familiar with, you now use a 3-bladed Curtis Metric propeller. To maintain a constant engine speed, the angle of the blades in the Curtiss Electric is varied through an arc of 30° (from 24.5° to 54.5°) by a propeller governor and electric motor. The current for operating the propeller governor and the electric motor comes from the battery and generator through propeller switches on the cockpit switch panel to the propeller control system.

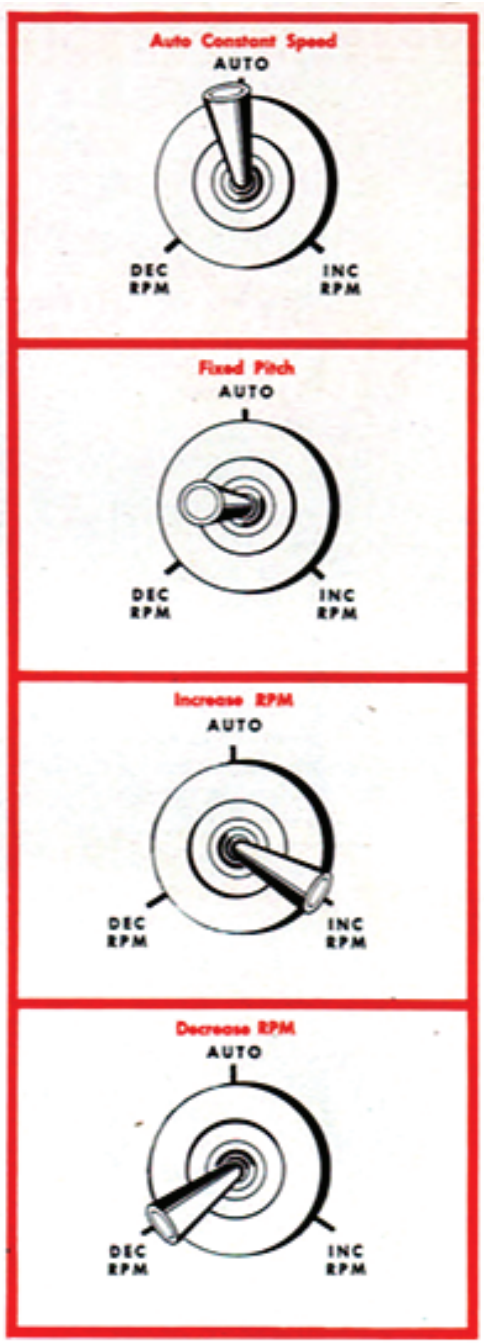
You can operate the propeller automatically or manually. For all ordinary purposes you use automatic operation. Manual, or FIXED PITCH, operation is for emergencies. When you operate the propeller automatically, the desired engine speed is held constant by a governor which is set by the propeller control on the throttle quadrant. When you operate it manually the blade angle is varied by means of a dashboard selector switch which is independent of the governor.

Propeller Control

The propeller is controlled by a breaker switch and a selector switch.

Breaker Switch:

The breaker switch is an overload switch with ON and OFF positions. For all normal operations, use the ON position.



Selector Switch:

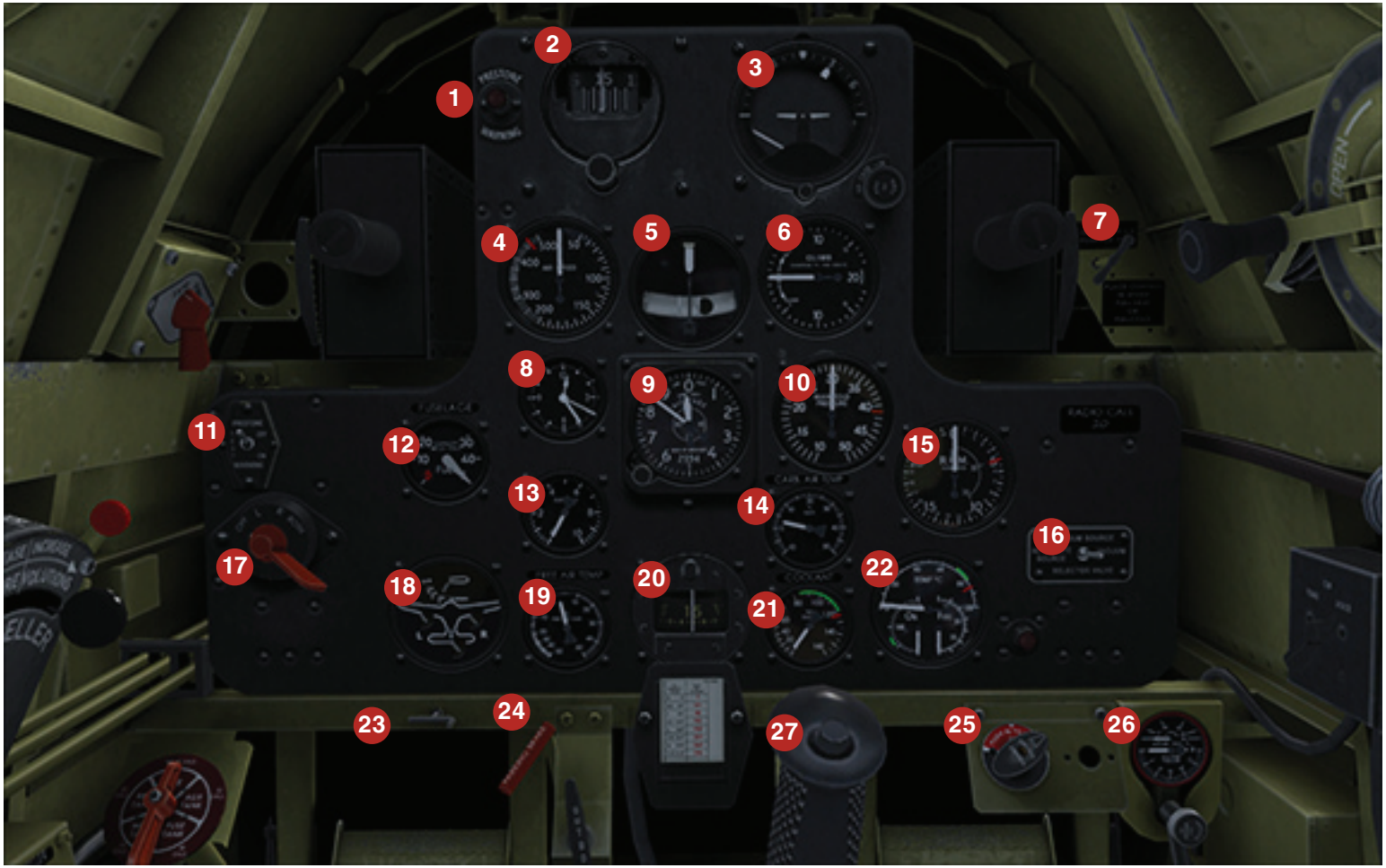
The selector switch has four positions:

A. Auto Constant Speed: When the switch is in this position, constant engine speed is maintained and the propeller blade angle is automatically varied by the propeller governor. This is your normal operating position.

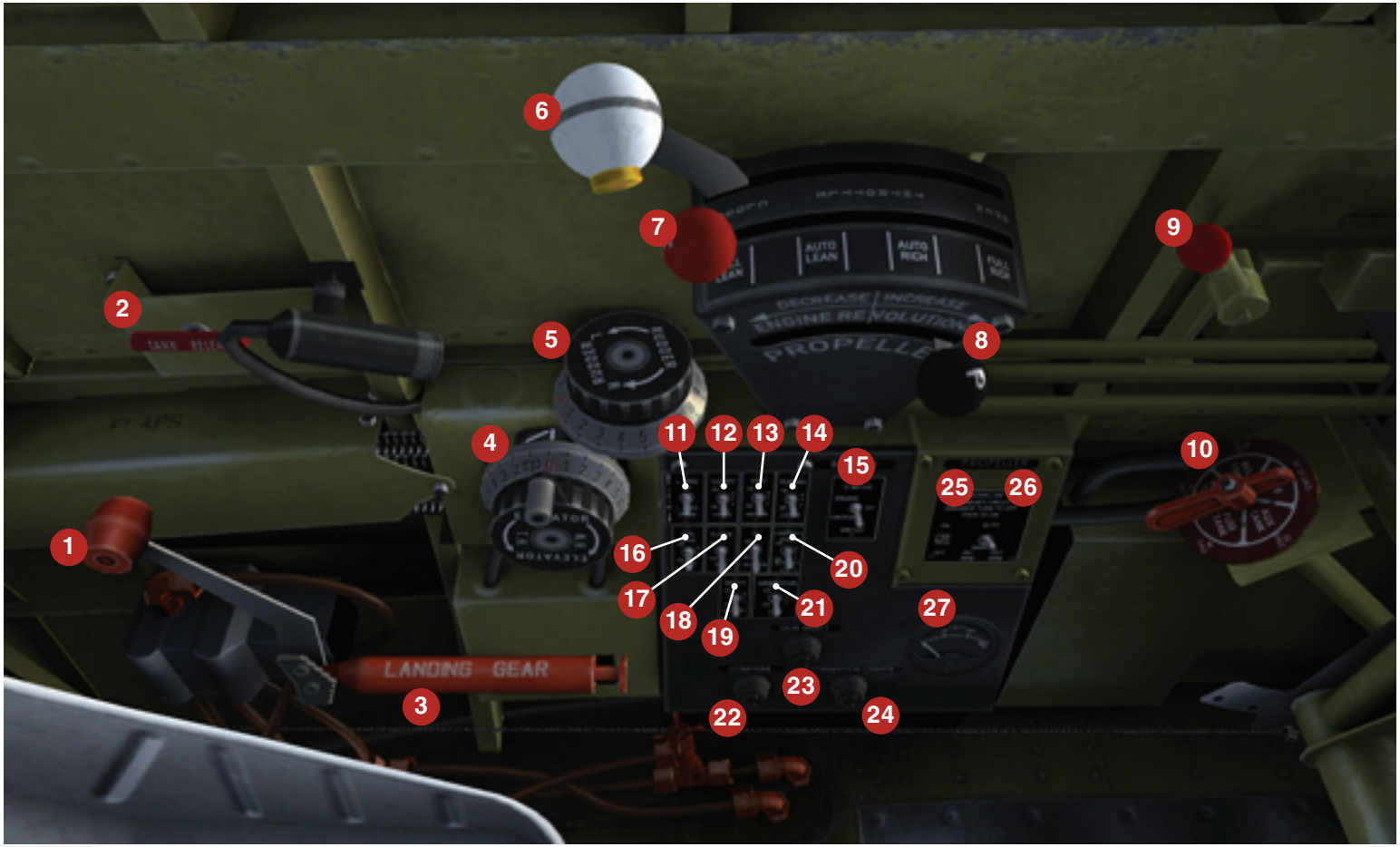
B. Fixed Pitch: With the switch in this position the electrical circuits of the propeller are open and the propeller operates as a fixed-pitch propeller.

C. Inc rpm/Dec rpm: To vary the angle of the blades when the propeller is in FIXED PITCH, move the selector switch to INC rpm or to DEC rpm and hold it there until desired rpm is reached. When you release it, it snaps back to FIXED PITCH. The INC rpm and DEC rpm positions are your only means of varying blade angle when the propeller is in FIXED PITCH. When the propeller is in AUTO CONSTANT SPEED you use the propeller control lever on the throttle quadrant to increase or decrease rpm.

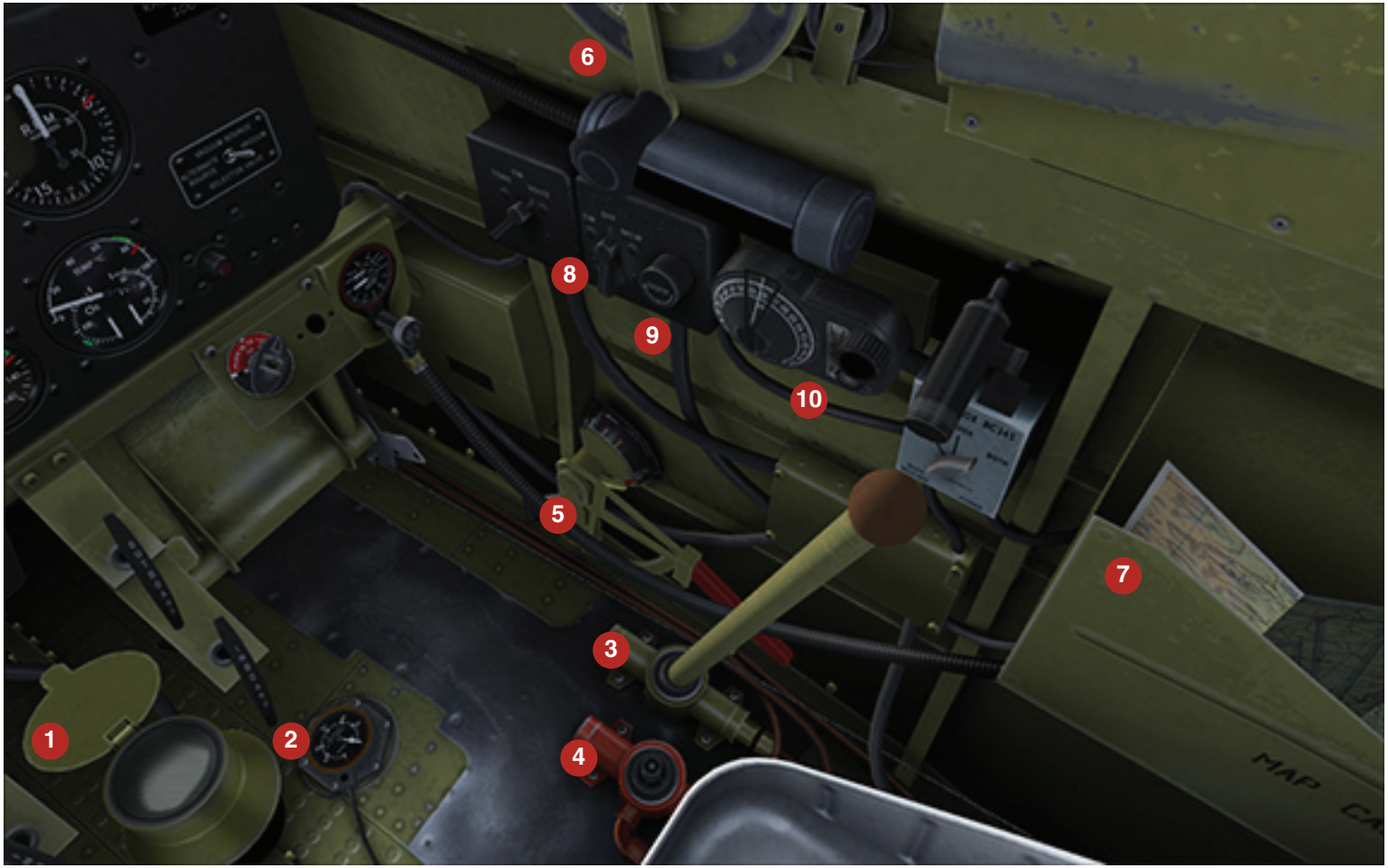
THE VIRTUAL COCKPIT



1. Coolant Warning
2. Gyro Compass
3. Attitude
4. Airspeed
5. Turn Coordinator
6. Vertical Airspeed
7. Carb Heat
8. Clock
9. Altimeter
10. Manifold Pressure
11. Coolant Warning Test
12. Fuel (fuselage)
13. Suction
14. Carb Temp.
15. Tachometer
16. Air Selector
17. Magnetos
18. Gear/Flaps Indicator
19. Outside Temp.
20. Compass
21. Coolant Temp.
22. Oil/Fuel Press. & Oil Temp.
23. Cockpit Ventilation
24. Parking Brake
25. Primer
26. Oxygen Regulator
27. Hydraulic Pump Switch



1. Flaps
2. Drop Tank Release
3. Landing Gear
4. Elevator Trim
5. Rudder Trim
6. Throttle
7. Mixture
8. Prop Pitch
9. Fuel Pump
10. Fuel Selector
11. Aileron Trim
12. Cockpit Light
13. Pitot Heat
14. Nav Lights
15. Starter
16. Fuel Gauge Light
17. Klaxon Test
18. Oil Dilution
19. Master Battery
20. Landing Lights
21. Generator
22. Compass Light
23. Gun Sight
24. Formation Lights
25. Propeller Control Reset
26. Propeller Control
27. Ammeter



1. Lens Cover
2. Fuel (wing)
3. Hydraulic Hand Pump
4. Emergency Hydraulic Hand Pump
5. Cowl Flaps
6. Canopy
7. Map Case
8. Radio On/Off Switch
9. Volume
10. Tuner

P-40

2D PANELS

PERIPHERAL VISION

Peripheral Vision (SHIFT-1). We created this panel to better simulate a pilot's ability to see key gauges that are out of direct sight down in the cockpit. In a real aircraft, for example, to lower the gear, you would reach your left arm down and grab the gear handle, moving it either up or down. If you flew the aircraft enough, you may not even have to glance down to find it. But, just as importantly, if you ever want to know if your gear handle is in the up, neutral, or down position, you could use your peripheral vision, or at most, a quick glance to confirm its position.

What we have done to simulate this is allow you to have your landing gear, landing flaps, and cowl flaps to always be in your peripheral vision for added realism.

PILOT'S NOTES

Pilot's Notes (SHIFT-2): Important information is readily available with the Pilot's Notes screen.

Ground Speed is the actual speed your aircraft is moving over the ground surface.

Endurance is the amount of time your aircraft can fly at the current rate of fuel consumption. Take into account, as you are climbing to your cruise altitude, this estimated endurance will be less than once you level off, throttle back, and settle into a cruise.

Range is the distance your aircraft will fly at the current speed and rate of fuel consumption. Again, take into account this will change based on climb, cruise, and descent operations.

Fuel Economy is the current rate of fuel consumption in gallons per hour (gph).

High Temp Warning will display if your engine temperatures get close to maximum allowed. This becomes vital information if you install the Accu-Sim P-40 Expansion Pack as high temperatures can damage your engine.

Power Settings represent your clipboard showing you important info to quickly establish a proper takeoff, climb, and cruise.

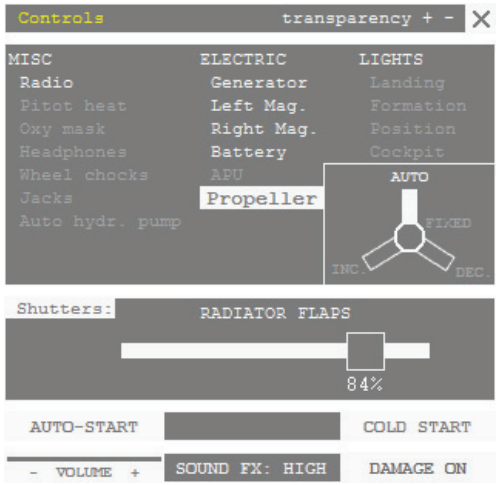
Notes appear below along with abbreviated checklists for takeoffs, landings, etc. Click the arrows at the bottom to browse through the available pages.

CONTROLS

Controls (SHIFT-3): This control panel was initially created to allow you to operate and watch systems like lights and engine flaps while in the external view. It soon became a nice little place where we could put anything we wanted to have quick access to.

You can:

- Attach your battery cart trolley accessory for extra power for startups
- Put your aircraft up on Jacks
- Adjust various switches and levers including your radiator flap, lights, etc.
- Set the aircraft to a cold-start state
- Set throttle gate to match your joystick detent
- Adjust your radiator flaps
- Adjust your electric propeller
- Additionally, Accu-Sim users can:
- Enable or disable damage modeling
- Adjust the volume of the Accu-Sim sound system
- Use headphones

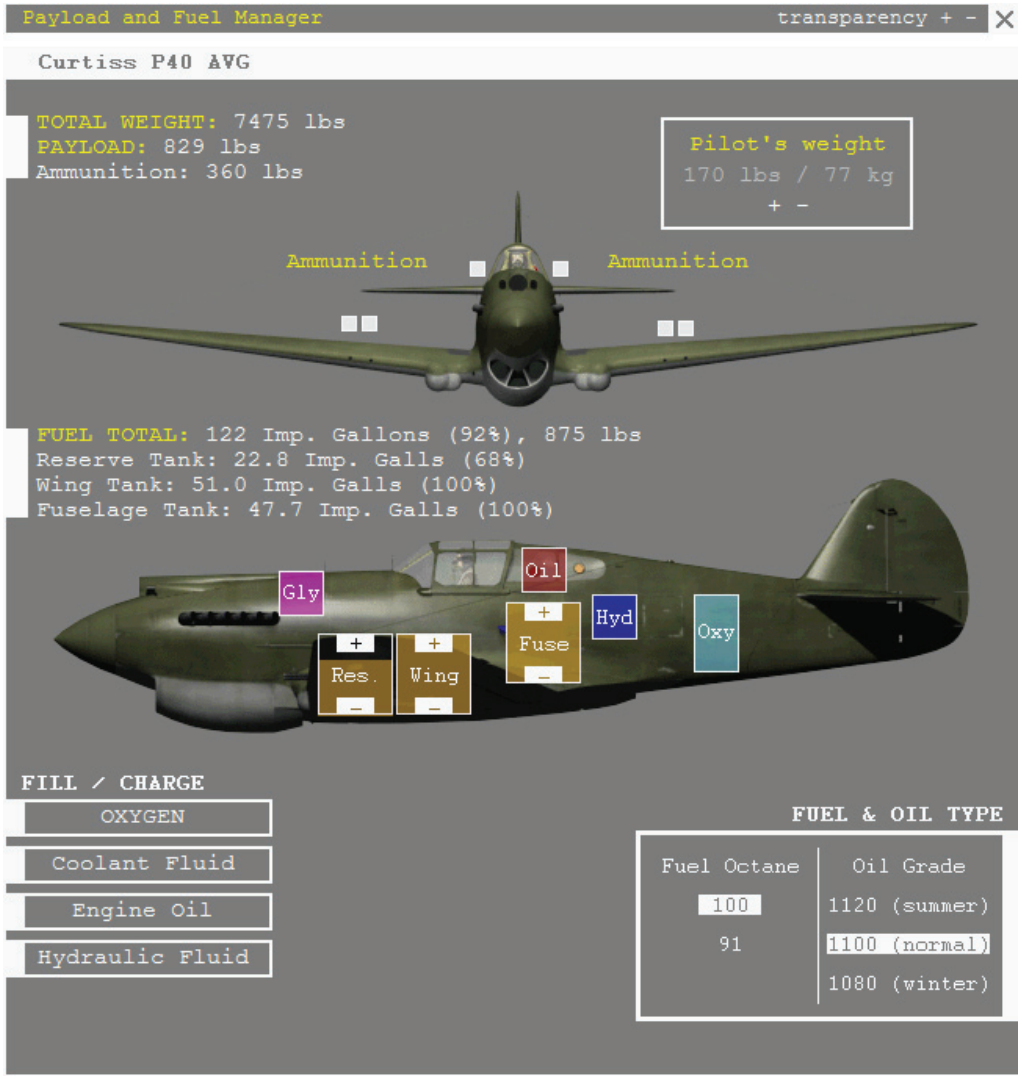


PAYLOAD AND FUEL MANAGER

Payload And Fuel Manager (SHIFT-4): This real-time payload and fuel manager allows you to visually click and load your aircraft. You can service:

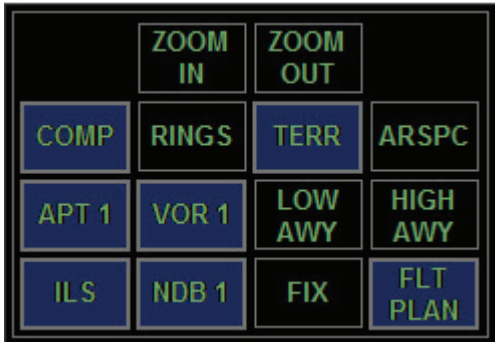
- Fuel
- Pilot's weight
- Ammunition
- Oxygen
- Coolant fluid
- Engine oil
- Hydraulic fluid
- Change fuel grade
- Change oil grade

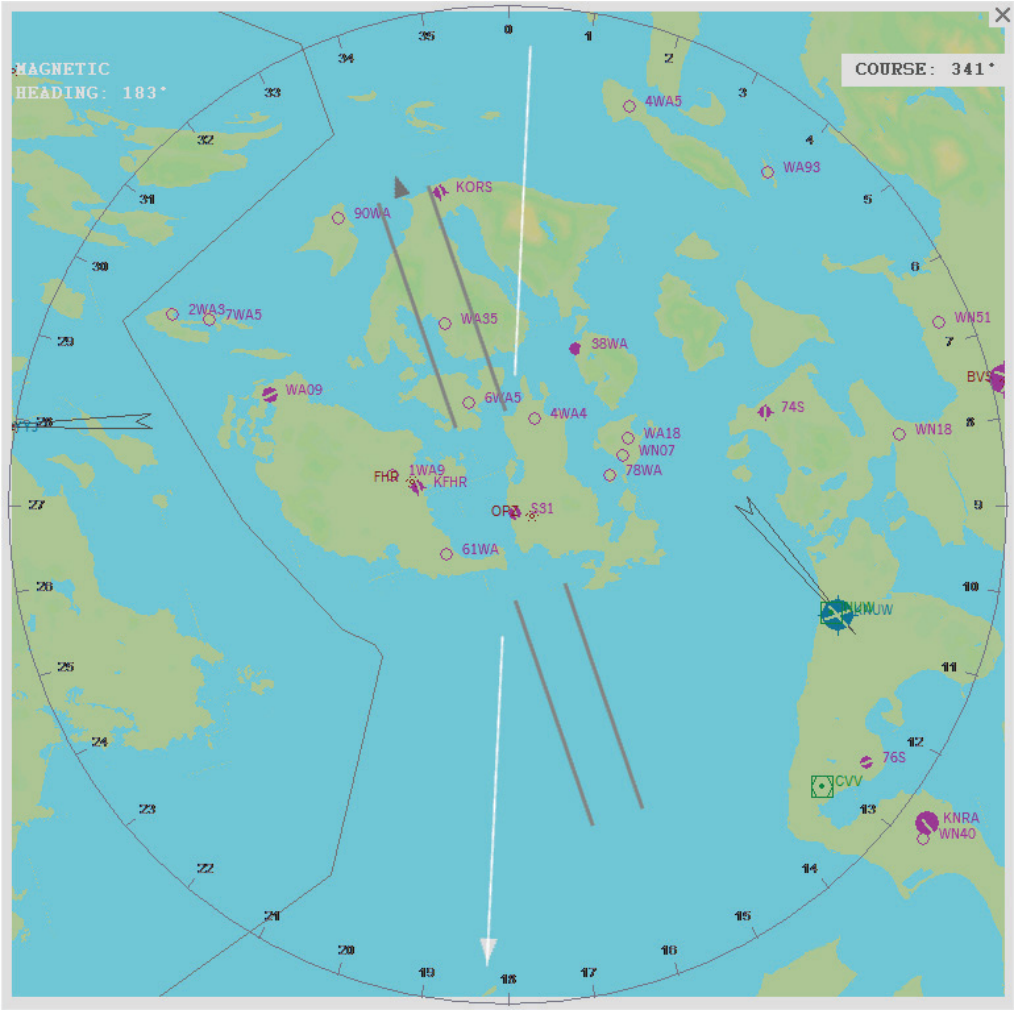
The aircraft initially is prepared for a standard flight with ammunition loaded and the oxygen tank emptied.



PILOT'S MAP

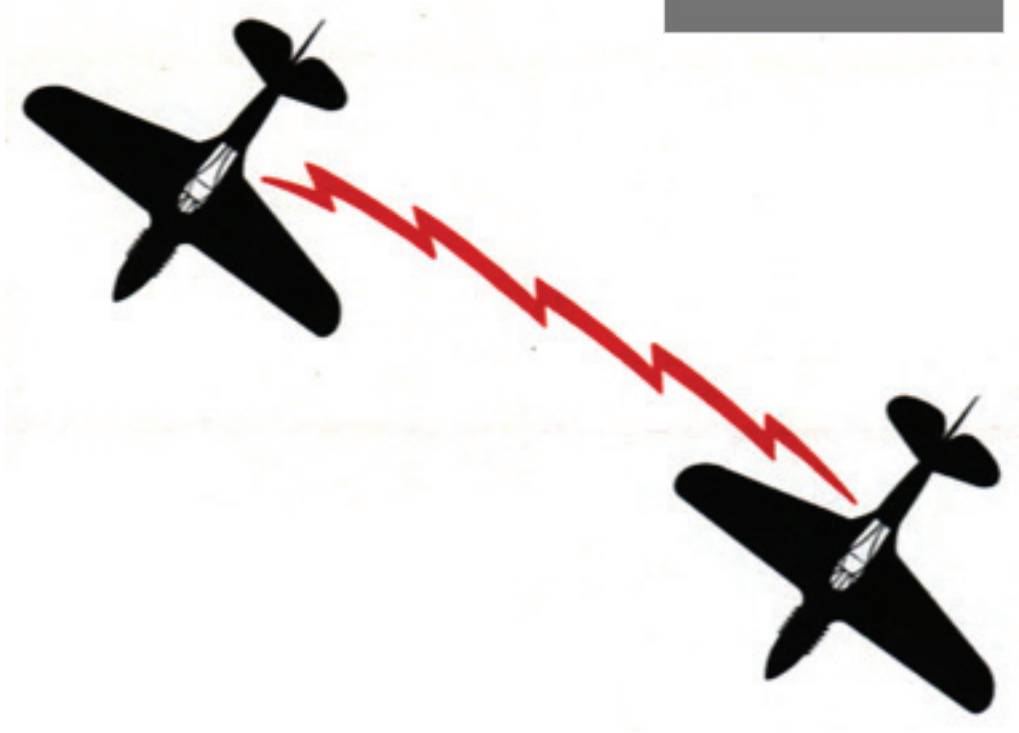
Pilot's Map (SHIFT-5). The pilot's map gives full access to similar information that may be found on real maps and allows this information to be easily accessed rather than have to use the default map from the upper menus. This is a period aircraft, so we tried to create this in the true light of a pilot needing to still use visualization or VOR to know precisely where the aircraft is over the map, hence, we did not include the little aircraft icon in the middle. You can access this map by clicking on the map box in the lower right area of the cockpit.





RADIOS

Radio Selector (SHIFT-6): The 2D radio selector panel allows you to set the frequency of the radio. You can use the 2D panel for ease of access inside or outside the aircraft.



MAINTENANCE HANGAR

Maintenance Hangar (SHIFT-7): Please note, while the maintenance hangar is accessible for non-Accu-Sim installations, engine damage, wear, and advanced systems modeling is part of the Accu-Sim expansion pack.

The Maintenance Hangar is where you can get a review of how your aircraft engine and major systems are functioning.

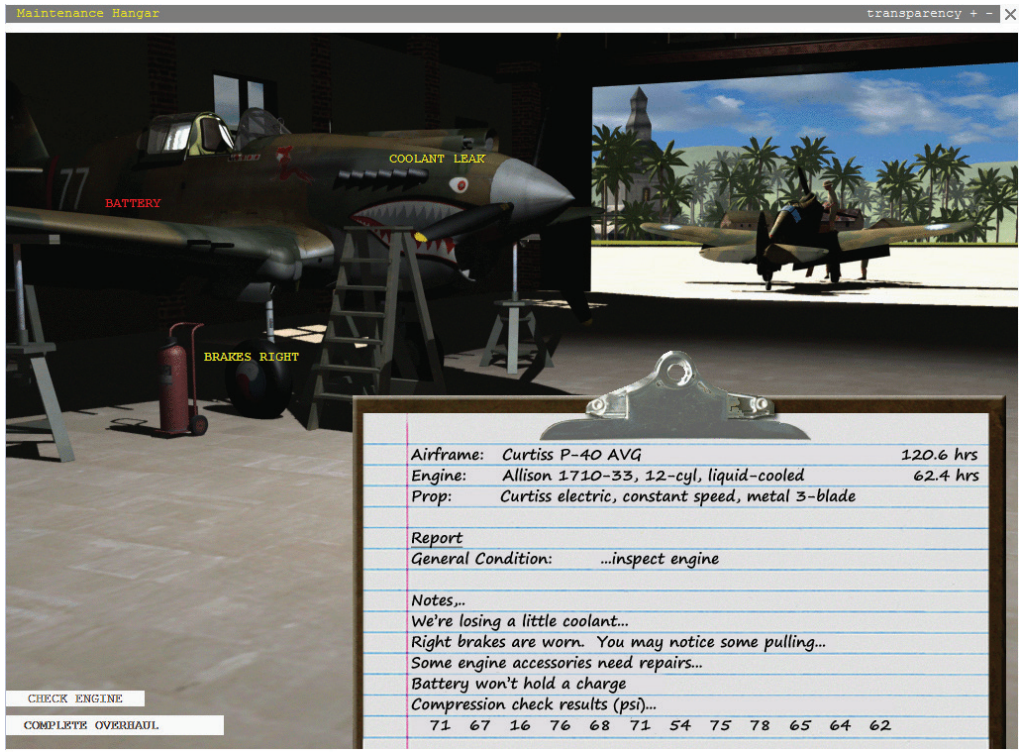
You can both see and read your crew chief's report stating:

- A summary of your airframe, engine, and propeller
- Hours on airframe and engine since last major overhaul
- General condition of the engine
- Notes

You can also perform a COMPLETE OVERHAUL by clicking on the OVERHAUL button. This overhauls the engine and replaces any parts that show any wear with new or re-conditioned ones.

In the above example, your crew chief has reported some coolant leaks, worn right brake, and a dead battery. To repair each one, simply click on the yellow or red highlighted area over your aircraft.

You also notice your mechanic has mentioned that some engine accessories need repairs. To look further into the engine condition, click on the CHECK ENGINE on the lower left.



Clicking on the CHECK ENGINE button pulls up a detailed cutaway of your engine.

Color Codes

Green: OK
Yellow: Watch
Red: Must fix or replace

In the example below, our engine appears to be in pretty good shape with the exception of a failed electrical generator and a dirty oil filter. Each system will wear based on various conditions. Your mechanic's inspection picked up this wear, and it is shown here. A yellow condition means it is recommended that you replace or repair this item, but it is not mandatory. You can choose to keep a close eye on this part and continue flying.

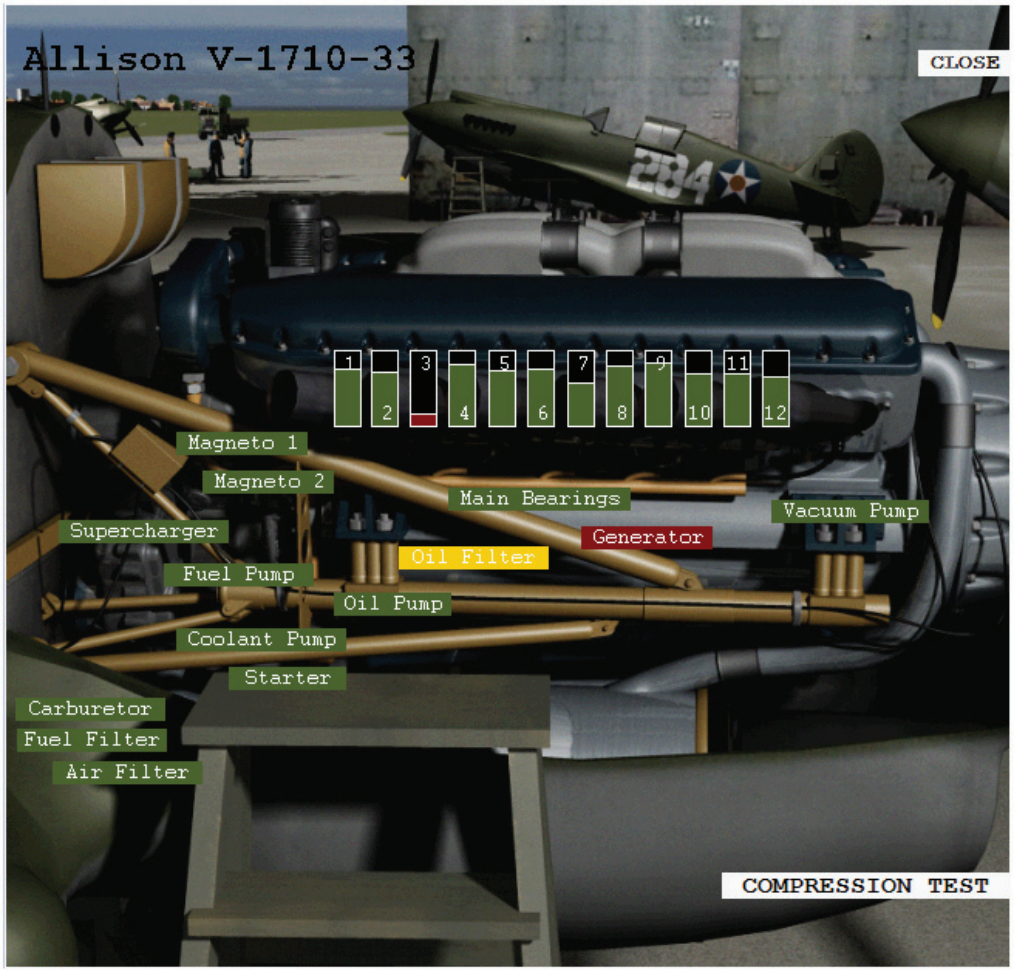
Heavy wear or failure would highlight the part in red.

At the lower right is a “Compression Test” button, which tells your mechanic to run a high-pressure air test on the engine cylinders, checking for leaks past the cylinder rings. A civilian may choose to replace a cylinder that is only showing modest wear, perhaps in the 50-60psi range, whereas the military could allow a plane to fly with a cylinder as low as 30 psi.

Low compression on a cylinder isn’t necessarily a terrible thing, because as the engine picks up in speed, the worn cylinder becomes productive. It is mostly noticed at lower rpm’s where the cylinder may have trouble firing, and also a marked increase in oil consumption may also occur (sometimes with an accompanying blue smoke out of that cylinder during flight).

However, note that this is a reading of the general condition of the cylinders, and lower condition does bring additional risks of failure, or even engine fires.

Also note, after performing a compression test, your mechanic writes down the exact numbers in his notes.



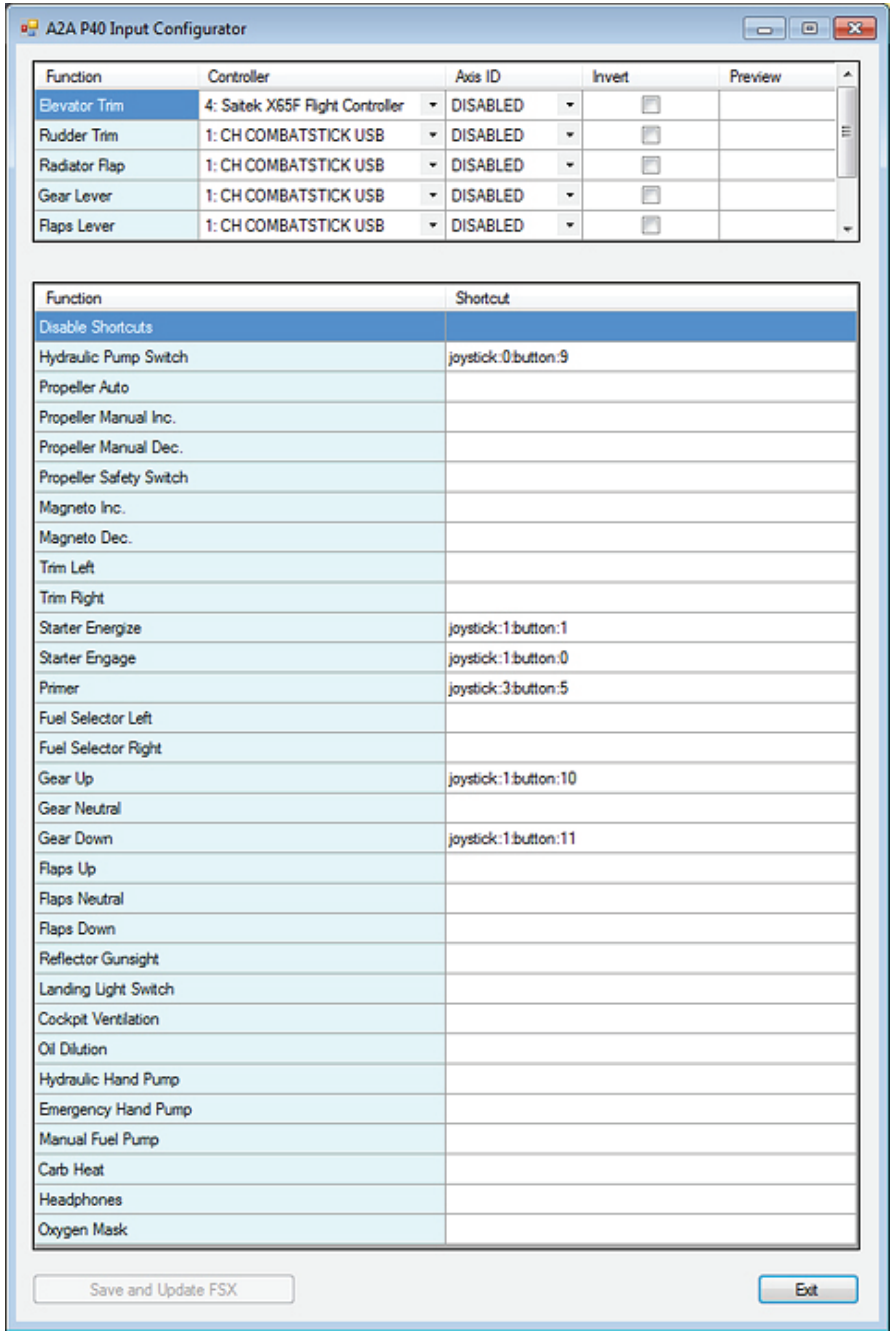
INPUT CONFIGURATOR

The Input Configurator allows users to assign keyboard or joystick mappings to many custom functions that can't be found in Prepar3D controls assignments menu. It can be found in the A2A/P-40/Tools folder inside your Prepar3D installation directory.

The upper table is the axis assignment menu. From the drop down list, select joystick and axis you want to assign to each function and verify its operation in the 'preview' column. Mark the 'invert' check box if needed.

The lower table is the shortcuts menu. Hover over a function name to bring up a tooltip with additional information. To make a new shortcut, double click on a selected row to bring up the assignment window. Then press keyboard key or joystick button you want to assign to this function. For keyboard it's also possible to use modifier keys (Ctrl, Shift, Alt).

When done with the assignments, press "Save and update Prepar3D" button. This will instantly update shortcuts for the aircraft. There is no need to restart Prepar3D or even reset your flight for the changes to take effect, you can adjust shortcuts on the fly.



P-40

CHECKS & PROCEDURES

STARTUP

- Ignition should be off, flaps to neutral (left side cockpit next to seat), set your parking brake (lower left center of panel).
- Do your visual inspection outside of your aircraft, check ailerons, elevator, and rudder.
- Set propellor to manual low pitch (left side cockpit below mixture).
- Set your fuel tank to RESERVE (left side of cockpit-lower panel).
- Turn on switches (left lower side of cockpit-battery switch on, generator on, prop safety switch on, propeller control switch to auto), (right side of cockpit avionics on, set cowl flaps to SHUT). Check Ammeter at left side cockpit lower-should read 45 amps.
- If cold start, make sure carb heat is set to COLD (upper right side cockpit).
- Move your magneto switch to BOTH.
- Set throttle one inch.
- Depress primer two to four times.
- Engage starter (wait), engage.
- Prime if necessary, Mixture to AUTO-RICH.
- Rev to 800 to 1000 rpms.
- Check oil temp (s/b 40-60°C).
- Check Oil pressure 60-80 lbs.
- Radiator temp for run up to 80°C.
- Set prop switch (lower left cockpit) to MANUAL.
- Check magneto function left and right at 2200 rpm and watch tachometer for differences, no more than 26 inches of Mercury showing on your Manifold Pressure gauge.
- Set magneto to BOTH and reset prop switch back to AUTOMATIC.

TAKEOFF

(Exact duplication of flight)

- Open your canopy to taxi and turn on your lights and taxi into position. As the P-40 has no wild inclination to veer left still a little right rudder should be applied.

- Make sure your attitude gyro is uncaged (the knob is on the panel high right next to the attitude indicator gauge). Check your Prestone warning by toggling the warning test switch on the lower left side of your cockpit panel.

- Set your mixture to AUTO RICH.

- Set pitot (left side cockpit on lights panel) and check your engine oil pressure, oil temp, coolant temp, and vacuum. If engine is running too warm from a long idle open up your cowl flaps (right side of cockpit) to ¾.

- Ease your throttle to no more than 41 inches of Mercury as shown on the Manifold Pressure Gauge, you may have to apply a little brake until the tail gets sufficient airflow to the rudder.

- Set your elevator trim tabs for take-off and rotate at 110 mph.

- Raise you landing gear and ease off the flaps as you get a positive climb and wheels are securely in the wheel well.

- As you climb, set your throttle back to 35 inches of mercury showing on your Manifold Pressure Gauge. Your best climb rate to 16,000 is at 150-160 mph at 35 inches MP or 2600 rpm.

- Ease your mixture to between auto rich and auto lean at 5000 ft AGL. Set your trim to approx 5.8° or 43 to 45%. This should allow you to climb at 2100 ft/min at 140 mph. At 10,000 feet set your mixture to 35% for best climb and maintain 2600 rpm and 35 inches of MP. Turn on your oxygen flow and don your mask.

CRUISING AT 14,000-16,000

- For high speed cruise, set to 2600 rpm, manifold pressure at 35 in.

- For normal cruising the prop revolutions should be set to 2280 rpms with manifold pressure at 27.9, mixture set to auto rich.

- Economy, set prop to 2190 rpm, manifold at 25.2 inches, switch the propeller control from AUTO to MANUAL and ease off the mixture until you see a drop of 40-50 rpms, then switch propeller control back to AUTO.

PUTTING IT THROUGH ITS PACES

The aircraft tends to yaw to the right so left rudder trim is needed to maintain straight flight.

Stalls

- (clean, wheels up, flaps up) tail buffeted at 68 kts, stall and spin at 58kts.
- (flaps down, wheels up) tail buffet at 62 kts and stall, no spin at 53 kts, recovery was automatic.
- (wheels down, flaps up) tail buffet at 58 kts and stall at 53 kts. Recovery was difficult with opposite rudder and reduced power. Aircraft fell from 14,000 to 3,580 before recovering, many spins.
- (wheels down, flaps down 5,000 ft AGL) tail buffet at 58kts and stall at 53 kts, one spin, easy recovery, lost 1,000 feet.

Rolls

- 12,000 feet 250 kts IAS, mixture at 35% throttle at full- very responsive, loss of 120 feet.
- 20,000 feet 250 kts IAS, mixture at 21%, full throttle- somewhat sluggish and mushy.
- 29,000 feet 212 kts IAS, mixture at 18%, full throttle, 23 in MP, 3,000 rpms quick roll resulted in a stall and spin to 22,000 feet.

Turns

- 29,000 feet AGL, 212 kts IAS, mixture 18%, full throttle- combat turn was somewhat sluggish and resulted in tail buffet and black-out if turning too tightly.
- 20,000 feet AGL, 220 kts IAS, 360 degree tight turn, reasonably quick, no buffeting or blackout.
- 12,000 feet AGL, 220 kts IAS, 360 degree tight combat turn, full black-out but quick recovery, tail buffeting when black-out started, let up on stick just enough to return to full recover while continuing my turn.

Dives

29,000 feet-15,000 feet AGL, 200kts at start of dive, dive goes into overspeed at 368 kts IAS. According to the manual the maximum permissible is 470 mph, beyond that speed you would experience compressibility, and in this aircraft you will receive your overspeed warning followed by a break-up. At 470 mph IAS your true airspeed is 658 mph. At this speed your controls become useless.

Note:

- Flaps must never be used in an attempt to reduce diving speed.
- As the speed of the dive increases you will notice a tendency for the aircraft to yaw right, before it reaches a critical point you will want to add a bit of left rudder.
- Before you begin your dive, you should put your prop into a course pitch, and crack your throttle only slight. Do not attempt to dive with full throttle.

AEROBATICS

Aerobatics may be carried out on this aircraft. Due to the controls being powerful and moderately light the aerobatic qualities are good, but great care must be exercised to see that all aerobatics are carried out at sufficient height to enable the pilot to recover from a dive, spin, or stall without exerting excessive loads on the aircraft. Care should also be taken to ensure that speed is maintained during aerobatics in the looping plane.

Loops

New P-40 pilots sometimes have trouble with loops. They apply too little back pressure on the stick at the beginning of the loop and too much back pressure at the top of the loop. You will find loops easy if you:

1. Enter the loop at about 275 mph.
2. Greatly increase the back pressure on the stick until the airplane passes beyond the vertical position and you can see the horizon behind you.
3. Release the back pressure on the stick and allow the airplane to fly itself around the top of the loop.

Immelmanns

Start your Immelmann precisely as you start your loop. When rolling out of the top of the Immelmann be sure to give enough right rudder pressure to keep the nose of the airplane from turning left.

Barrel Rolls And Slow Rolls

Perform barrel rolls and slow rolls between cruising speed and 285 mph-not over 285 mph.

Aerobatics In String Formation

When performing aerobatics in string formation, be sure to observe these rules:

1. Keep about 300 feet (or the length of ten P-40s between airplanes).
2. Keep the man in front of you in view at all times.
3. Start a maneuver at the exact instant that the man in front of you does. Don't hesitate, waiting to see what he is going to do. If you are alert, you'll have no doubt about his intentions.

LANDING THE P-40

- Begin your decent 8-10 km out at an altitude of 3000 feet AGL.
- First make sure your fuel selector is set to fuselage.
- Set your mixture to FULL RICH.
- Set your cowl flaps to ½ (lower right cockpit handle).
- Turn on your carb heat (right side of panel upper).
- Open your canopy.
- Lower your landing gear (Lower it at speeds under 160 mph).
- At 140 mph add flaps and hold the nose of the aircraft up until a speed of 120 mph is reached (Do not lower your flaps at speeds of over 140 mph IAS). Be prepared to compensate for the extreme nose drop once flaps are applied.
- Maintain 95 to 100 mph as your landing will be engine assisted, not a glide.
- Center up on the runway, better to come in a little high so as to give you a good view of the runway centerline.
- Lower your speed accordingly and flare using your engine, let the aircraft land on the main wheels and fall back to the tail wheel, with practice you can grease a three point landing pretty easily, just make sure you don't hit tail wheel first!
- Raise your flaps and open your cowl flaps full.
- Turn carb heat off.
- That's it. You have just taken your first flight in this legendary aircraft.

THE ALLISON V-1710-C15 ENGINE

(Using 100 Octane Fuel)

LIMITED OPERATIONAL CONDITIONS

Take-off

Max rpm	3000
Max boost at S.L.	41.0 in.Hg.
above 2600 ft	38.9 in.Hg.

Climb

Maximum rpm	2600
Maximum boost	35.0 in.Hg.

Note:
For take-off and climbs of short duration (not exceeding 5 min.) from sea level, the throttle should be adjusted to give 41 in.Hg. and left in this position until the boost falls to 38.9 in.Hg. This boost should then be maintained by adjustment of the throttle. For climbs of longer duration the boost should be adjusted to 35 in.Hg.

Maximum cruising rpm and boost
2600 35 in.Hg.

Maximum level rpm and boost
3000 38.9 in.Hg.

Maximum dive rpm and boost
3120 38.9 in.Hg.

Oil Pressure

Normal	60-65 lb./sq.in
Minimum	50 lb./sq.in

Oil inlet temperatures

Minimum for take-off	40°C
Normal	70-80°C
Maximum	85°C

Coolant Temperature

Maximum	125°C
Min for take-off	85°C

FUEL CAPACITY AND CONSUMPTIONS

Fuel capacity (in Imp./US gallons)

P-40B & AVG:

Wing	33.6 / 40.3
Fuselage	51.0 / 61.3
Reserve	47.7 / 57.3
Total:	132.0 / 159.0

P-40C & Tomahawk IIb:

Wing	45.0 / 54.0
Fuselage	40.0 / 48.0
Reserve	27.5 / 33.0
Droptank	43.0 / 52.0
Total:	156.0 / 187.0

Fuel consumptions (in Imperial/US gallons per hour)
Approximate consumptions at 12,000 feet are as follows:

Climbing:

2600 rpm/35 in.Hg.	84 /105

Cruising:

2600 rpm/35 in.Hg.	84 / 105
2280 rpm/29.2 in.Hg.	52 / 65
2280 rpm/27.9 in.Hg.	50 / 62.5
2190 rpm/25.2 in.Hg.	42 / 52.5

Note:
It is possible to improve on the last cruising consumption by weakening the mixture

P-40

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Special Thanks to:

- Those WWII air combat veterans who risked their lives in this aircraft, pushing them beyond their limits, and to those who took the time to share their experiences with us.
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- The Cavanaugh Flight Museum in Dallas Texas for granting full access to their flyable P-40.
- Steven Hinton, President of the Planes of Fame air museum, for his detailed explanations of specific systems in the P-40 that is only known by those who fly them.
- Graham White, author of "Allied Aircraft Piston Engines of World War II" for his engaging discussions about behaviors of these engines and helping us to uncover some widely unknown characteristics

Very Special Thanks to our friends and families who stuck by us and worked hard to support our efforts