

## **PILOT'S NOTES**

Expansion for Flight Simulator X Steam Edition

## CONTENTS

INSTALLATION	6
INCLUDED AIRCRAFT	7
Grumman F4F-3	7
Grumman F4F-4	
Grumman Martlet Mkl	
Grumman Martlet MkIV	
GETTING TO KNOW THE AIRCRAFT	
COCKPIT GUIDE	
FLYING THE WILDCAT	
CARRIER OPERATIONS	
BASIC CONTROLS AND FUNCTIONS	
CREDITS	
COPYRIGHT	
SOFTWARE PIRACY	

## INTRODUCTION

This simulation is actually about four different aircraft - the Grumman F4F-3 and F4F-4 Wildcats and also the Martlets, the British name given to the F4F-3 and F4F-4-based aircraft which were supplied to Britain from the earliest days of WWII.

No US aircraft other than the Wildcat fought throughout WWII, all the way from 1940 to VJ Day in 1945; the Wildcat was there when the US Navy and Marines entered the Pacific theatre and when the atomic bomb was dropped to put an end to hostilities. Apart from service in the North Atlantic, British Martlets saw combat in warmer climes too such as Malta, North Africa and alongside their American counterparts throughout the Pacific.

The Wildcat could well be considered the US Navy's 'Spitfire', performing heroically against considerable odds in often difficult conditions in the defining battles of the Coral Sea and Midway and later in the dark days of the early Pacific islands campaigns at infamous locations such as Guadalcanal and Rabaul.

It is a testament to the success of this rugged little fighter that the design remained basically unchanged until the end of the war, and the last Wildcat to roll off the General Motors production lines in 1945.

Let's take a brief look at the heritage of the F4 series and how the aircraft changed over time.

Before the Second World War, the US Army and US Navy front line fighters included the venerable Grumman F3F, a tubby little bi-plane that was fast and strong and easy to fly. A throwback to WWI days, the little fighter was equipped with machine guns firing through the arc of the propeller and sighted through a long tubular sight poking through the windscreen.

A development of the F3F was another bi-plane design, the XF4F1, which inherited all the characteristics of its predecessor but was powered by the new Pratt &Whitney twin-row radial engine or the Wright Cyclone of similar power. The XF4F2's upper wing was later dispensed with, and thus the basic configuration of the F4F-3 was born.

The design inherited much from the F3F, including the complex retracting undercarriage which tucked itself into deep wells sunk into the ample fuselage sides. This unique design never changed throughout the life of the Wildcat.

There are many excellent reference books written about the F4F series of fighters and we do not intend to rewrite any of them here, but here are some notes on the aircraft.

The British ordered the F4F-3 for its Royal Navy as did France before the country fell in the early years of the War. In fact the F3s initially bound for France were diverted when the country was overrun and were eventually delivered to the Royal Navy. F3s were powered by Pratt & Whitney 1830 twin row, 14-cylinder radials for the US market and Wright Cyclone 9-cylinder radials for the British. Early aircraft had fixed wings and two 0.50 calibre machine guns in each wing.

The British dubbed their F4F-3s 'Martlets' and the early aircraft were taken on strength as Martlet MkIs. In 1940, two years before the US entered the fray, a Royal Navy Martlet pilot scored the first aerial victory by an F4F in WWII, off the Orkneys in Scotland.



The first US Navy F4F-3s were delivered to units aboard USS Ranger and USS Wasp. These were finished in pre-war colours with bright yellow wings, colourful unit insignia and bright carrier identification colours on the tail. This was a time of flamboyant confidence in US aviation and camouflage was considered unnecessary!



Wildcats were also flown by units of the US Marines, and many famous Marines became aces while holding the stick of a Wildcat in the years to come.

The basic design changed little in the type's life, the major change coming in the shape of folding wings; these were manually operated by crewmen using crank handles in special sockets in the wings, before the aircraft were stowed in the cramped storage facilities of the lower decks.

The F4F-4 also received two extra machine guns. This 'improvement' was actually frowned upon by many pilots because it made the aircraft heavier and therefore less agile.

With the introduction of the faster and more powerful Hellcat, the Wildcat was withdrawn from many front line duties, but remained a potent ground attack and support machine, flying from smaller support carriers and forward bases throughout the Pacific.

Production was now handled by the Eastern Aircraft Division of General Motors, while Grumman focused on F6F Hellcat production.

Apart from service in the North Atlantic, British Martlets also saw combat in warmer climes such as Malta and North Africa and, of course, alongside their American counterparts throughout the Pacific.

The Wildcat could well be considered the US Navy's Spitfire, given that it performed heroically against considerable odds in often difficult conditions. It was in Wildcats that combat aces drew first blood in the defining battles of the Coral Sea and Midway

and later in the dark days of the early Pacific islands campaigns at such infamous places as Guadalcanal and Rabaul.

It is a testament to the success of this rugged little fighter that the design remained basically unchanged right up to the end of the war, and the last Wildcat rolled off the General Motors production lines in 1945.



## INSTALLATION

Installation is handled by Steam after purchase of the product. After purchasing the product the files will be downloaded and installation into the Scenery Library will be automatic.

#### Accessing the aircraft

Go to FREE FLIGHT, look at the CURRENT AIRCRAFT box and press the CHANGE button. The aircraft manufacturer is 'Grumman', the publisher is 'Just Flight Ltd' and the aircraft type is 'Single Engine Fighter'. Ensure you tick the 'Show all variations' tick box at the bottom of the page.

#### Updates

Updates to the product will automatically be deployed, downloaded and installed via Steam to all users who own the product.

#### **Technical Support**

To obtain technical support (in English) please visit the Support pages at www.justflight.com. As a Just Flight customer you can obtain free technical support for any Just Flight or Just Trains product.

For support specifically on the Steam version of the add-on please contact Dovetail Games.

https://dovetailgames.kayako.com/

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## **INCLUDED AIRCRAFT**

## Grumman F4F-3 F4F-3 data

Engine: Pratt & Whitney R-1830-76

Normal HP/ RPM / Alt: 1,100 / 2,550 / Sea level

Take-off HP / RPM: 1,000 HP @ 2,550 RPM, 1,200 HP / 2,700 RPM

**Propeller:** Curtiss C5315 (S)

Propeller type: Three- blade, constant speed

Propeller diameter: 9 ft 9 in

Wing area: 260 sq ft

Weight empty: 5,293 lbs

Combat gross weight: 7,467 pounds

Power loading (lbs/HP): 6.2

Maximum speed at sea level: 278 MPH

Max Speed at critical altitude: 330 MPH at 22,000 ft

Cruise speed: 185 MPH

Landing speed: 75 MPH

Maximum rate of climb: 2,050 ft / min

Take-off distance (25 kt wind): 228 ft

Range (at maximum speed): 280 miles

Range (at cruise speed): 1,800 miles

Maximum endurance: 9.4 hours

Ceiling (absolute): 32,600 feet

Ceiling (service): 31,000 feet

Fuel (internal): 147 gallons
Fuel (external): 2 x 58 gallon tanks
Armament: Four x .50 calibre machine guns
Bombs: Two x 100 lb

First flight: February 1940

#### Aircraft in this simulation



**F4F-3 F-15** - flown by Lieutenant Commander Edward 'Butch' O'Hare, perhaps the Wildcat's most famous ace. O'Hare was, in fact, the US Navy's first aerial ace and was flying this machine when he shot down five Japanese bombers in one engagement in 1942, 400 miles from Rabaul. The action earned him the first military Congressional Medal of Honor. O'Hare was killed just one year later in a Grumman Hellcat during the battle for the Gilbert Islands - ironically, by friendly fire.



**F4F-3 3-F-9** – belonged to Fighting Squadron VF-3 flying from USS Saratoga in the Spring of 1941. Overall light grey paint scheme.



**F4F-3 MF-1** – This was the mount of Major Robert E. Galer, who totalled 13 confirmed victories and was a recipient of the Medal of Honor. Galer's Marines unit, VMF-224, took part in the heroic struggles at Guadalcanal in 1942, repaying some of the awful losses suffered by US land forces in recapturing the airfield there against impossible odds and in atrocious conditions.

## Grumman F4F-4

#### F4F-4 data

Engine: Pratt & Whitney R-1830-86 Normal HP / RPM: 1,100 HP / 3,500 RPM Take-off HP / RPM: 1,000 HP @ 2,550 RPM / 1,200 HP @ 2,700 RPM **Propeller:** Curtiss C5315 (S) Propeller type: three-blade, constant speed Propeller diameter: 9 ft 9 in Wing area: 260 sq ft Weight empty: 5,766 lb **Combat gross weight:** 7,964 pounds Power loading (lbs/HP): 6.2 Maximum speed at sea level: 274 MPH Maximum speed at critical altitude: 318 MPH @ 19,400 ft Cruise speed: 185 MPH Landing speed: 75 MPH Maximum rate of climb: 2,190 ft / min Take-off distance (25 kt wind): 228 ft Range (at maximum speed): 830 miles Range (at cruise speed): 1,275 miles Maximum endurance: 9.4 hours Ceiling (absolute): 32,600 feet Ceiling (service): 33,700 feet Fuel (internal): 144 gallons

Fuel (external): 2 x 58 gallon tanks

Armament: 6 x .50 caliber machine guns

**Bombs:** 2 x 100 lb

First flight: April 1941

#### Aircraft in this simulation



**F4F-4 'White 18'** - flown by AP/1c Howard Stanton Packard of VF-6, USS Enterprise, August 1942. Enterprise was the most decorated ship of the US Navy in WWII; it was at Midway with the Yorktown and was the departure base for the famous Doolittle raid in retaliation for Pearl Harbor.



**F4F-4 BuNo 5093** / 'White 23' - flown by Lt Cdr John S Thach, Officer Commanding VF-3, USS Yorktown, Midway, 4 June 1942. The battle of Midway, although resulting in the loss of the Yorktown, succeeded in pushing back the Japanese advance and prompted the US Navy's decision to retake the island groups of the Pacific.



**F4F-4 22-F-1** - displays the later tri-colour scheme adopted by all US naval aircraft in the Pacific Campaign. The machine was on board USS Independence in April of 1943, flying with Fighting Squadron VF-22.

## **Grumman Martlet Mkl**

The British Martlet MkI was basically identical to the US F4F-3, other than that it was equipped with a Wright Cyclone 9-cylinder engine and a Hamilton constant speed propeller. This required a slightly shorter cowling over the power plant and the aircraft had no cowl flaps.

An extra strengthening bar was fitted to the windscreen quarterlights.

The Martlet performed much like the F4F-3 from which it was derived.

#### Aircraft in this simulation



**Martlet MkI EJ569 'F'** – flown by Sub Lt Parke, RNVR, when he, along with another Martlet pilot, scored the very first aerial victory for the F4F series in WWII. The action took place near the Orkney Islands in Scotland early in 1940 and the result was one Ju 88 destroyed.



**Martlet Mkl 'French 2'** – an F4F-3 ordered by the French AeroNavale, prior to the fall of France in 1940. Originally France had ordered 81 aircraft from the Grumman plant, fitted with the Wright Cyclone engine. Seven had been built by the time of the French capitulation. The British took over the order when France fell and these, plus the remaining ordered aircraft, were delivered as Martlet MkIs to the Royal Navy.

## **Grumman Martlet MkIV**

The British Martlet MkIV was basically identical to the US F4F-4, other than that it was equipped with a Wright Cyclone 9-cylinder engine and a Hamilton constant speed three-blade propeller. Two long cowl flaps were installed in the upper half of the engine cowling.

Performance figures and specifications can be considered either identical or very close to those of the F4F-4.



#### Aircraft in this simulation

**Martlet MkIV 'That Old Thing'** – Nose art of any type was usually strictly frowned upon by Naval 'brass' but this Martlet flew from HMS Tracker during Operation Overlord, D-Day and the invasion of France in June1944. From this point onwards the broad invasion stripes were painted on all Allied aircraft for recognition purposes in the busy skies over Europe.



**Martlet MkIV '9Z'** – an 893 Squadron machine at the time of Operation Torch, the joint allied invasion of French North Africa. In a rather confused fashion many aircraft carried "dual nationality" in the shape of both US and British insignia and markings. Note the US star insignia on this aircraft.

# **GETTING TO KNOW THE AIRCRAFT**

#### Simulator set-up

To enjoy this simulation to the full, we strongly recommend that you set up your host simulator in the following way:

Load up your desired aircraft, airport or carrier, time of day and so on in the usual way.

Position your aircraft on a concrete apron, grass area or in a parking bay aboard a carrier.

Enter the VC cockpit mode and turn everything off – battery, magnetos, fuel selectors etc. Also pull all levers such as propeller and throttle to their zero limits.

You should now have what is called a 'cold and dark cockpit'.

In the outside view, press Shift-E to open the canopy and your chosen keystroke to fold the wings on the F4F-4 and Martlet IV.

You are now ready to get acquainted with the aeroplane.

#### Walkaround

In Spot view rotate your view around the aircraft slowly, from the front.



The first thing you notice about the Wildcat/Martlet is that extraordinary piece of engineering design – the undercarriage. Although it looks quite delicate, it is in fact, very strong and can easily withstand the enormous pressures of landing on pitching aircraft carrier decks. The undercarriage is actually operated by hand, using a crank handle in the cockpit – more on that later.



Wildcat Legends of Flight 18 If you have chosen to fly the F4F series US aircraft, you will immediately be aware of the Pratt & Whitney twin-row, 14-cylinder radial engine which dominates the nose of the aircraft. Grumman designers favoured the use of the big radial power plant that was also fitted to a wide selection of other US aircraft of the period.



In contrast, British Martlets were powered by a 9-cylinder single-row Wright Cyclone radial



On US aircraft the propeller was a Curtiss, with electric power for the pitch control. On British Martlets you find the more slender Hamilton propeller which carried no streamlining 'cuffs'.

The fuselage is quite tubby – a throwback to the aircraft's F3F bi-plane heritage. It is, however, quite aerodynamic and its appearance does not hamper performance!

If you have selected the F4F-3 or Martlet 1, you will notice the non-folding wings with two machine guns apiece. This was actually favoured over the F4F-4 wing's six gun layout, as the latter was heavier and affected performance, as well as carrying less ammunition per gun.



Wildcat Legends of Flight 20 Both designs carried external stores such as fuel tanks, extending the range of the fighter. Our models are fitted with these.

On the F4F-4/MartletIV the folding wings were operated by the ground crew or deckhands using a crank handle inserted near the fold point of each wing. Once folded back, the wings were locked in this position and retained by braces attached between the wing and horizontal tailplanes.



At the extreme tail of the aircraft you can see the tail hook used for carrier landings. This is extended by a control in the cockpit (or chosen keystroke) and is used to trap the landing wires on the carrier deck. More on this later, but if you are flying off a carrier it can be a most entertaining and challenging operation!

The design has large split flaps running under both wings, in one large and one small configuration. The flap depression angle is quite shallow at just 43 degrees, but it gets the job done.

The wings are fitted with various navigation and formation lights and a retractable landing light.



- 1. Formation lights (on both wings)
- 2. White recognition light
- 3. Retractable landing light
- 4. White tail light
- 5. Navigation lights (on both wings)

Now it's time to clamber into the cockpit...

# **COCKPIT GUIDE**

These images are of the F4F-4 cockpit, which is very similar to the Martlet MkIV cockpit.

While the cockpits are in fact very similar, and familiarity with one aircraft should let you fly the others without any problem, there are a few differences between these cockpits and those found in the F4F-3 and Martlet MkI aircraft – we have noted the significant differences in the 'Cockpit variations' section on Page 27.

#### Main panel



- 1. Oil temperature
- 2. Magnetos
- 3. Checklist selector
- 4. Clock
- 5. Low fuel warning lamp
- 6. Gunsight reticle control
- 7. Fuel pump switch
- 8. Propeller control switch
- 9. Propeller control

Wildcat Legends of Flight 23

- 10. Carburettor air control
- 11. Altimeter
- 12. Airspeed Indicator
- 13. Turn and slip indicator
- 14. Vertical Speed Indicator
- 15. Manifold pressure
- 16. Tachometer
- 17. Artificial Horizon Indicator
- 18. Electrical gunsight
- 19. Gyro direction indicator
- 20. Compass
- 21. Cowl flaps control lever
- 22. Engine primer pump handle
- 23. Oil dilution switch
- 24. Engine triple gauge
- 25. Outside air temperature
- 26. Fuel contents
- 27. Oxygen gauges

#### Left side



- 1. Fuel tank pressure relief cock
- 2. Landing gear warning horn
- 3. Fuel tank selector
- 4. Flaps control
- 5. Supercharger control
- 6. Elevator trim tab control lever
- 7. Rudder trim control
- 8. Aileron trim control
- 9. Throttle lever
- 10. Mixture control lever
- 11. Tail wheel lock control
- 12. Recognition lights panel
- 13. Ordnance and tank controls
- 14. Tail hook control knob

#### **Right side**



- 1. Launch bar (for carrier operations)
- 2. Starter switch (lift cover)
- 3. Pitot heater switch
- 4. Battery master switch
- 5. Catapult gear switch
- 6. Panel lights switch
- 7. Navigation lights switch
- 8. Recognition/formation lights switch
- 9. Gun selector switches (inoperative)
- 10. Landing gear crank handle
- 11. Landing gear indicator

#### **Cockpit variations**

The F4F-3 and Martlet MkI cockpits differ slightly from those found in the F4F-4 and Martlet IV:

- 1. The turn and slip indicator is positioned between the compass and artificial horizon indicator.
- 2. The Martlet MkI cockpit does not feature a cowl flap control lever, as moveable cowl flaps were not present on this variant.
- 3. These cockpits have a fire extinguisher switch (non-functional visual only)
- 4. The Martlet MkI cockpit contains a P8 compass (see below). This can also be found in the Martlet MkIV cockpit.
- 5. A fuel transfer (wobble) pump replaces the fuel pump switch.
- 6. The engine triple gauge is located directly in front of the pilot, in between the VSI and the manifold pressure gauges.



#### **Gun Chargers**

The F4F series is fitted with gun chargers for the wing armament. The levers are positioned low down on either side of the pilot's seat. There are three for the F4F-4 and Martlet MkIV and two for the F4F-3 and Martlet 1.

'Charging' the guns loads a shell into the breach of each gun after re-arming. Pulling the lever and returning it to its original position places the shell in position. Before test-firing the guns, make sure you use this procedure (for realism purposes only – the gun effect is visual only).



#### P8 compass fitted to Martlets

This compass operates differently to other forms of compass.

To set the desired course:

1) Turn the bezel so that the desired course is sitting beneath the white mark on the 'lubber line' (the small, white-tipped rod pointing fore/aft above the bezel glass).



2) When flying, turn the aircraft so that the small white cross end of the compass needle is positioned opposite the North mark (red square) of the compass bezel ring and the needle is lying within the faint T-shaped lines engraved on the bezel glass.



By keeping the compass needle in this position you will fly the desired course.

## **FLYING THE WILDCAT** PLEASE ALSO READ THE GUIDE FOR CARRIER OPERATIONS ON PAGE 39.

Begin with a cold, dark cockpit (or just hit Ctrl-E and take off!)

#### **Pre-start**

Open the cockpit canopy (Shift-E or use handle).

Using Shift-E+3, close the dinghy access doors in the aft fuselage.



If you are in the F4F-4 or Martlet IV, the ground crew unfold the wings (use the wing fold keystroke of your choice)



Check that the undercarriage is locked down and that the gear indicator is showing 'down'.

Master battery switch to ON.

Pitot heater switch to ON.

Fuel tank selector to MAIN.

Check fuel contents.

Test for free movement of flying controls.

Propeller control switch to AUTO/ADJUST (up position).

Ensure the parking brake is ON (both pedals forward and locked).

Tail wheel lock to UNLOCK.

Check the tail hook is UP and locked (lever fully forward).

Check instruments and compass.

Wildcat Legends of Flight 32

## Starting

Magnetos OFF.

Crack throttle open one inch.

Propeller control to 100%.

Mixture lever to full rich 100%.

Emergency fuel pump switch to ON (pump audible). Use the wobble pump in F4F-3 and Martlet MkI).

Cowl flaps open (Martlet MkI has no cowl flaps).

Prime engine with a few strokes of the priming handle (Unlock and push in to pump).

Switch magnetos to BOTH.

Lift cover and push up the starter switch.

Check oil and fuel pressures.



#### Warm-up and taxi

Check oil pressure, fuel pressure and temperature gauges for normal operation.

If you have drop tanks, switch the selector to these now.

**Note:** The emergency fuel pump should be turned on when changing tanks to ensure proper flow from the new tank.

Check flaps operation.

Close cowl flaps if open.

Check ignition by switching to LEFT, RIGHT and back again quickly.

Check electrical systems, lighting and all lamps and switches.

Ensure the supercharger lever is locked in either high or low position.

*Important:* The propeller control can be locked in position by switching to the 'fixed' position on the switch panel. This will effectively lock the control and prevents any adjustment. If adjustment of the propeller is required, make sure you have 'unlocked' this switch and it is in the AUTO/ADJUST position.

Turn the rudder trim wheel, 2.5 marks clockwise.

Lower flaps as required.

Release the parking brake and open throttle slowly to start moving. Use a weaving motion when taxiing to get a better view where you are heading. Switch to 'Approach' view (cycle through the views using the A key until you are at 'Approach').

*Warning:* The big radial ahead of you is very powerful and needs only a slight throttle adjustment to get the aeroplane moving. Apply the brakes carefully to avoid any risk of nose-over.



Wildcat Legends of Flight 34

#### Pre-take-off

Parking brake set.

Elevator and aileron trim wheels at neutral.

Propeller control to 100%.

Mixture to full rich 100%.

Flaps as required.

Fuel pump OFF.

Tail wheel to 'locked' (NB: For carrier operations leave the tail wheel unlocked)

#### Take-off

Release the brakes (opening up to full throttle with the brakes on is dangerous as the F4F will tend to nose over, resulting in a ground loop).

Open the throttle steadily to maximum take-off power.

As you accelerate, apply rudder to counteract swing.

The tail will lift first and at around 70-75 MPH a small amount of back pressure on the stick will see you airborne.



Allow the climb to reach 100 feet before retracting the undercarriage.

Retract flaps if deployed.

Once at altitude, re-trim the controls for neutral handling.



**Warning:** The trimming controls in an F4F are very powerful and it is easy to start 'chasing the needles' by overuse of the trimming controls. Adjust carefully and slowly to achieve the correct hands-off condition. NEVER trim the aeroplane using the VSI. Use the trim position gauge and AHI for visual reference but it is usual practice to align the horizon using those other important instruments – your eyes.

#### **Stall speeds**

The stall speeds of the F4F series are as follows:

Flaps and gear down, power on: 61.5 MPH Flaps and Gear down, power off: 69 MPH

Flaps and gear up, power on: 81.5 MPH Flaps and gear up, power off: 82.5 MPH

#### Approach and land (land-based operations)

Reduce speed to 90 MPH.

Open the canopy.

Propeller to 100%.

Mixture to full rich 100%.

Undercarriage DOWN.

Flaps DOWN.

Emergency fuel pump ON (F4F-4 and Martlet MkIV).

On finals, reduce speed to 75 MPH with full flaps.

Aim to reach the landing strip threshold at around 70 MPH.

Balance the aircraft with trim and throttle to arrive at the strip in a three-point attitude, closing the throttle.

Due to risk of ground looping, touch down and apply brakes CAREFULLY, once the tail wheel is firmly on the ground. Hold the stick back firmly when on the ground to ensure this.

For taxiing, unlock the tail wheel.

**Note:** The Views control, when cycled, will present various views of the aircraft from close quarters. The Approach view is especially helpful for approach and landing, and it is highly recommended that pilots use this view when landing.



#### Shut down and park

Raise the flaps and switch off the fuel pump.
Open the cowl flaps.
Idle the engine for one minute and close throttle.
Turn off the fuel pump.
Cut the mixture control and allow the engine to come to a stop.
Turn off all switches.
Master Battery switch to OFF.
Crew to fold wings (if going below on a carrier)
Exit the aircraft and make a visual check of the airframe and flying surfaces.

## **CARRIER OPERATIONS**



If you are using a catapult launch, deploy the launch bar by using Shift-U. The switch in the cockpit is permanently on.

Taxi SLOWLY towards the catapult position.

As you arrive at the catapult 'square', use Shift-I to activate the catapult snag.



Do not apply the parking brake, but allow the catapult snag to hold you in position.

#### Pre-take-off

Elevator and aileron trim wheels at neutral.

Propeller control to 100%.

Mixture to full rich 100%.

Flaps as required (modern catapults will not require flaps).

Fuel pump OFF.

Tailwheel UNLOCKED

#### Take-off

Open the throttle steadily to maximum take-off power.

Release the catapult using Shift-Spacebar

Raise the landing gear and flaps and enter a climbing turn away from the carrier to clear the launch area for the next aircraft.

Once at altitude, re-trim the controls for neutral handling.





Wildcat Legends of Flight 40



#### Approach and land



Reduce speed to 90 MPH.

Open the canopy.

Propeller to 100%.

Mixture to full rich 100%.

Undercarriage DOWN.

Flaps DOWN.

Tail hook DOWN (DO NOT FORGET!)

Tail wheel UNLOCKED

Emergency fuel pump ON (F4F-4 and Martlet MkIV).

On finals, reduce speed to 75 MPH with full flaps.

Aim to reach the deck threshold at around 70 MPH. (A headwind and the forward motion of the carrier will require judicious use of throttle to adjust your approach speed.)

Balance the aircraft with trim and throttle to arrive at the stern of the deck in a threepoint attitude.

Just before touching down, close the throttle and allow the aeroplane to trap the wire with its hook.

**Warning:** Do not brake! This will result in a catastrophic nose-over. The landing officer will inform you of a successful trap or the need to go around.



# **BASIC CONTROLS AND FUNCTIONS**

Open canopy – Shift-E Open dinghy storage – Shift-E+3 Activate launch bar – Shift-U Activate catapult snag – Shift-I Activate catapult launch – Shift-Spacebar Wing fold – keystroke assigned to your preference in the settings menu

## CREDITS

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Tail hook – keystroke assigned to your preference in the settings menu

# Our special thanks for Barry Bromley at Aeroplane Heaven for his untiring dedication beyond the call of duty!

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Don't be fooled by a load of old tosh about file 'sharing'. The sites that host these 'shared' files are multi-million dollar operations that cover their backsides with the excuse that they are simply a 'gateway' to the files. In fact, they actively encourage piracy and are often funded by advertising. Most of them are illegal money-laundering operations by another name.

The people who really suffer from game piracy are the artists, programmers and other committed game development staff. Piracy and theft directly affects people, and their families. Loss of revenue to the games industry through piracy means many are losing their jobs due to cut-backs that have to be made to ensure developers and publishers survive. The logical outcome of this is that eventually the supply of flight simulation programs will dry up because developers think it is not worth the hassle.

It's not just copying software that is against the law, owning copied software also constitutes a criminal offence; so anyone buying or downloading from these people is also at risk of arrest and prosecution.

To find out more about the implications of piracy please click on the Piracy link on our website at www.justflight.com.