F6F-5 Pilot Handbook

BY FLYINGIRON SIMULATIONS

For Microsoft Flight Simulator

FLYINGIRON SIMULATIONS | WWW.FLYINGIRONSIMULATIONS.COM

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Foreword

Greetings Pilots!

Firstly, from all of us here at FlyingIron, thank you for purchasing the F6F Hellcat! Your support means everything to us; it's thanks to people such as you that we are able to continue working on our passion and developing more aircraft simulations. Thank you!

Working on the Hellcat has been an absolute joy for all of us - it truly is a beautiful aircraft, with a monstrous engine worthy of your respect. As you will come to discover, the aircraft has many quirks and requires some delicate handling to get the best out of it. We hope that in flying the Hellcat in MSFS you will get to experience the same thrill, awe and challenges experienced by the brave pilots of WWII.

Just as it was true for real world pilots, the same applies here - practice makes perfect!

This user manual has been written to help guide you through your first few flights in the Hellcat and learn the ins & outs of how she flies. Whilst we have covered everything you need to know to get flying, the aircraft is incredibly intricate and perfecting it will require some study and some practice. We have developed & modelled the aircraft based on real world F6F Hellcat pilot manuals & procedures; therefore for more in-depth study of the aircraft, we recommend getting yourself a copy of the real Pilots Manual and having a read through. Almost all the same procedures from the real manual apply to our sim, so you can effectively train using real world training material.

Finally, we sincerely hope you enjoy your time with the F6F. As with all our aircraft, we will be releasing a steady stream of updates to constantly improve the F6F. We hope you enjoy flying the F6F as much as we did developing it!

Sincerely,
Dan, Alex & Raimond
FlyingIron Simulations

About Us

FlyingIron Simulations is an Australian Flight Simulator development team, based in Sydney, Australia. FlyingIron was founded in 2018 by two brothers, Alex & Daniel Kassabian, the team has since expanded internationally with Raimond (GotGravel) joining the team in 2021 and becoming an invaluable member ever since, bringing with him extensive MSFS development experience. FlyingIron creates military & civilian aircraft simulations for Flight Simulator platforms, with a specialty in historic warbirds and military aircraft.

FlyingIron initially started developing for the X-plane 11 platform, with 4 aircraft releases between 2018-2020. Each aircraft was highly regarded by the community, with quality continuing to improve with every release and even featuring in several print magazines.

As of 2020, FlyingIron Simulations moved to the MSFS platform, beginning with the release of the Spitfire MkIX and followed by the P-38 Lightning, officially licensed by Lockheed Martin. The F6F Hellcat marks FlyingIrons 3rd aircraft release for Microsoft Flight Simulator; the culmination of 4 years of development experience and learning.

Simultaneously in 2020, FlyingIron was officially licensed by Eagle Dynamics to develop the A-7E Corsair II for the prestigious DCS world, marking the teams first foray into military jets and study-level simulation. Work on the Corsair continues going strong and is highly anticipated by the DCS community.

FlyingIron currently has 4 valued members:

Alex Kassabian - Cofounder of FlyingIron & lead 3D Artist
Daniel Kassabian - Cofounder of FlyingIron & lead programmer, sound engineer
Raimond (GotGravel) - Lead MSFS Flight Model engineer & programmer
Iakov - 3D Modeller

Installation & Update Procedure

You can install the aircraft by extracting the download into your Community folder.

1. Open the downloaded .zip file with your Zip tool of choice (the default Windows ZIP tool will do, or else an up-to-date 7-Zip app for example).
2. Drag the “flyingiron-f6f” folder into the MSFS Community folder.
3. Restart Microsoft Flight Simulator.

How to find your MSFS Community folder

Default Location for Windows Store MSFS Installations

```
C:\Users\[ComputerName]\AppData\Local\Packages\Microsoft.FlightSimulator_8wekyb3d8bbwe\LocalCache\Packages\Community
```

Default Location for Steam MSFS Installations

```
C:\Users\[Computer Name]\AppData\Local\Packages\
Microsoft.FlightDashboard_8wekyb3d8bbwe\LocalCache\Packages\Community
```

Non-Default Locations

Please read our guide if you cannot find your Community folder: [MSFS Where is the Community folder? : FlyingIron Simulations]

Quick Start Notes

Eager to try your new F6F Hellcat but want to read this beautiful manual later? Here are some quick pointers to get you set up for a great first experience:

- CTRL-E (**AUTO START ENGINE** keybind) will start your engine nicely as you would expect it to.
- Prefer Cold & Dark? Follow the MSFS Interactive Checklist in your Toolbar menu. You will also find the same checklists in the FlyingIron Tablet and this manual.
- Don't prime too long (overpriming) or too short (underpriming). Your current prime level is visible as a mouseover tooltip on the primer switch as well as in your tablet's Live Data page. Overprimed? Quickly de-prime as you would in a real engine: set magnetos or fuel selector to off, open throttle wide, and "start"...the blades will spin and excess fumes will be forced to escape from the cylinders.
- Your 2000HP Pratt & Whitney R-2800 Double Wasp radial engine needs to keep its head cool or she'll blow after stuttering and complaining (don't ignore that). She's got in-depth thermodynamic modelling to make it happen. Want to skip that goodness for now? Simply disable "Dynamic Engine Stresses" in the tablet's Settings page and you will have the most reliable engine in aviation history.
- The Hellcat has War Emergency Power through water injection (up to 5 minutes water supply), giving you another 250HP on top of the already impressive 2000. Use the cockpit switch for it or the MSFS **WAR EMERGENCY POWER** keybind.
- We have coded a custom Taildragger Ground Handling module as we wanted to give you a true-to-life taildragger experience (which is not what MSFS offers out of the box). Expect your Hellcat to behave as such! This means amongst other things you will need airflow over that rudder (ground speed, propwash and wind all provide this) to get her to steer, and/or use differential braking using your rudder pedals. It's the real deal now, ground loops included. Don't have rudder pedal brakes? Go to your Tablet's Settings page and enable "Simplified Groundhandling" which will link your rudder deflection to your differential braking. Spend a few minutes on the ground. Once you're used to it, she's a great joy!

History & Design of the F6F-5 Hellcat

The Grumman F6F Hellcat is an American carrier-based fighter aircraft of World War II. Designed to replace the earlier F4F Wildcat and to counter the Japanese Mitsubishi A6M Zero, it was the United States Navy's dominant fighter in the second half of the Pacific War. In gaining that role, it prevailed over its faster competitor, the Vought F4U Corsair, which had problems with visibility and carrier landings.

Powered by a 2,000 hp (1,500 kW) Pratt & Whitney R-2800 Double Wasp, the same power plant used for both the Corsair and the United States Army Air Forces (USAAF) Republic P-47 Thunderbolt fighters, the F6F was an entirely new design, but it still resembled the Wildcat in many ways. Some military observers tagged the Hellcat as the "Wildcat's big brother".

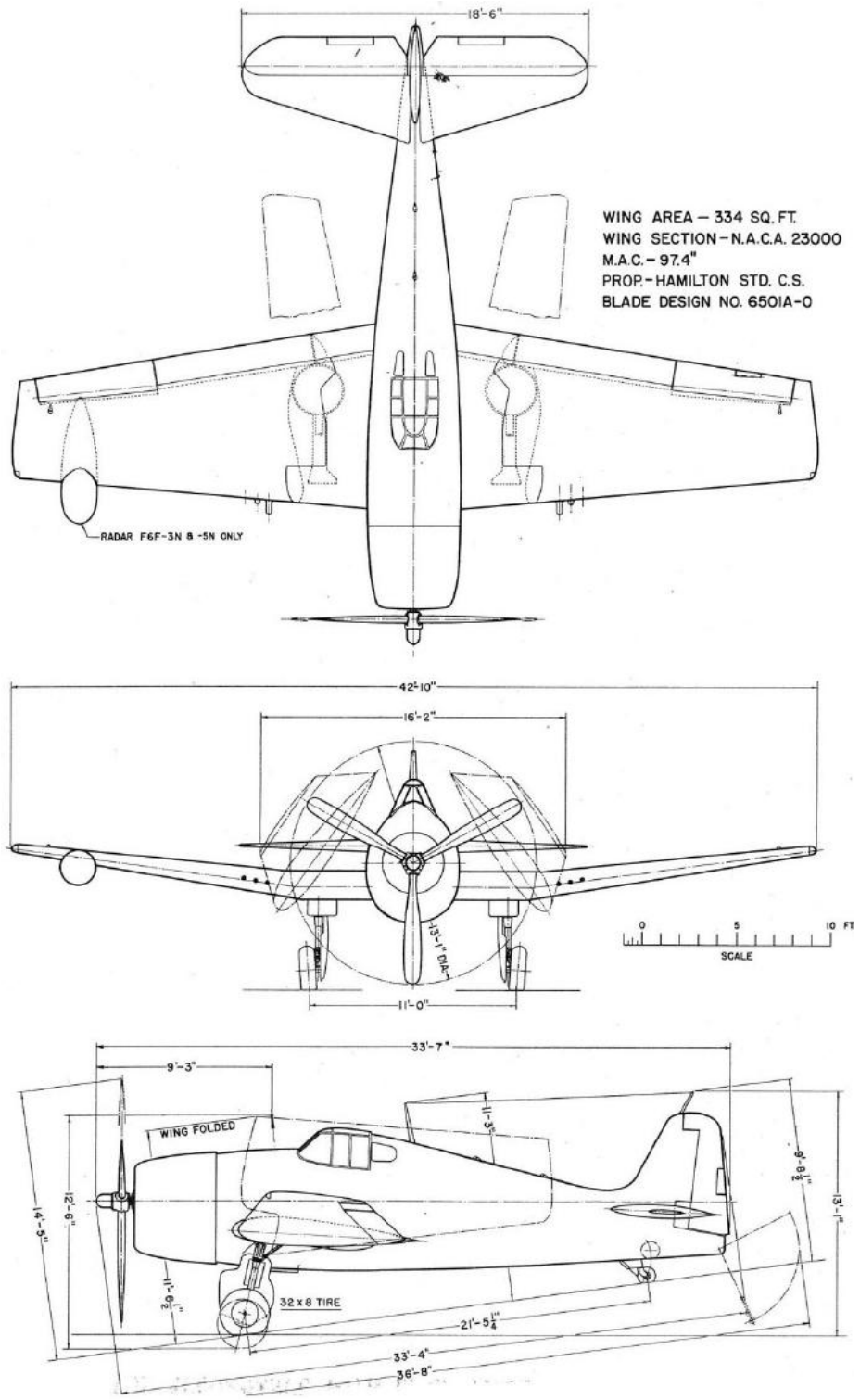
The F6F made its combat debut in September 1943, and was best known for its role as a rugged, well-designed carrier fighter, which was able to outperform the A6M Zero and help secure air superiority over the Pacific theatre. In total, 12,275 were built in just over two years.

Hellcats were credited with destroying a total of 5,223 enemy aircraft while in service with the U.S. Navy, U.S. Marine Corps, and Royal Navy Fleet Air Arm (FAA). This was more than any other Allied naval aircraft. After the war, Hellcats were phased out of front-line service in the US, but radar-equipped F6F-5Ns remained in service as late as 1954 as night fighters.

Source: Wikipedia

Aircraft Dimensions

The Hellcat was, by all accounts, a very large fighter. The propeller alone is massive, able to self-launch the aircraft from a carrier without a catapult. At 9,238 lbs empty it is nearly 60% heavier than a Spitfire, or more than 20% heavier than a P-51 Mustang.



Location of Armour Plating and Fuel Tanks

The F6F pilot was well protected by a combination of heavy armour plating (200 pounds) and self-sealing fuel tanks, earning it the well-deserved nickname “flying tank”. It was not uncommon for a Zero to pump it full of lead, yet the Hellcat kept going. Thanks to this sturdy design, many bullet-riddled Hellcats brought their pilot back to their carrier, a near-certain doom in any other aircraft at that time.

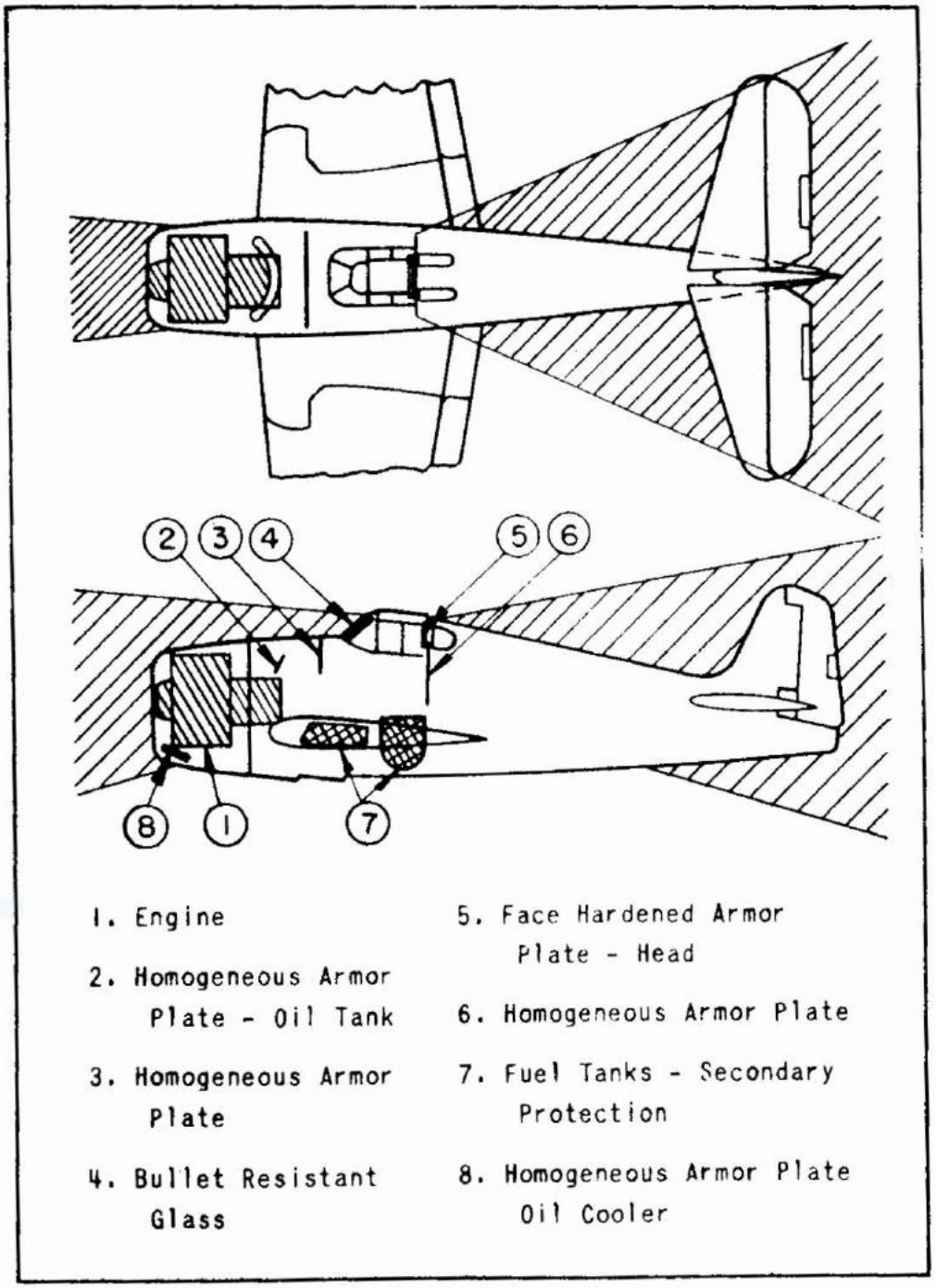


Figure 44 - Pilot Protection from Gunfire

Cockpit Familiarisation

Main Instrument Panel

1. Ignition Switch (Magnetos)
2. Clock (with adjustment knob)
3. Directional Gyro (with adjustment knob)
4. Compass (with adjustment knob)
5. Artificial Horizon Indicator (with adjustment knob)
6. Caging Knob
7. Tachometer
8. Carburetor Heat Alert
9. Carburetor Protected Air Control
10. Chartboard
11. Altimeter (with baro knob)
12. Airspeed Indicator
13. Bank and Turn Indicator
14. Rate of Climb Indicator
15. Manifold Pressure Gage

Gunsight or GNS530

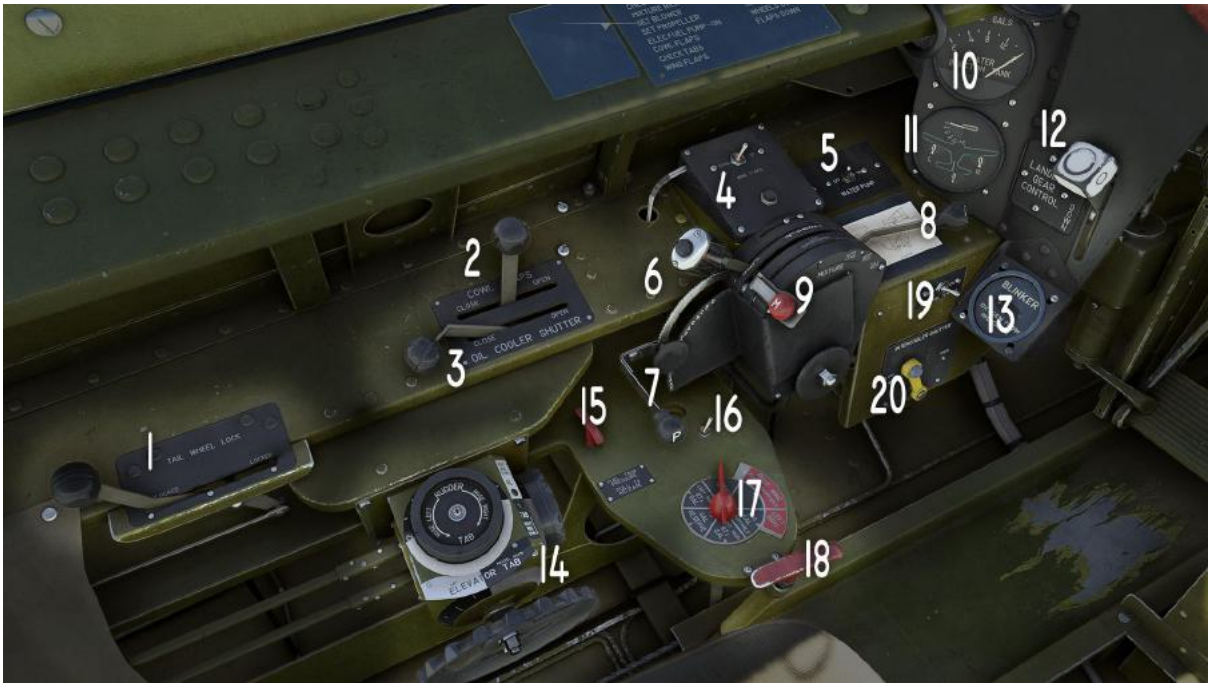
On the tablet's settings page ("*Gunsight or GPS toggle*") you will be able to toggle between the gunsight or the GNS530.
Note: due to space restrictions inside the cockpit it is not possible to have both at the same time.

- The **gunsight** has a functional targeting reticle, which can be turned on or off. You can also adjust its brightness, using cockpit controls in the bottom right panel (see the *Circuit Breakers and Weapon Switches* section a few pages below this).
- The **GNS530** is a fully functional GPS system. If you load a flight plan in MSFS, it will be visible in this unit as well.

Centre Console

1. Landing Gear Emergency Control
2. G-Force Indicator (with max/min needles reset knob)
3. Wing Folding Safety Lock Control
4. Gun Chargers (inop)
5. Heat Control (inop)
6. Fresh Air Control (windshield de-ice in MSFS)

Left Side



1. Tail Wheel Lock Control
2. Cowl Flaps Control
3. Oil Cooler Shutter Control
4. Wing Flap Electrical Switch
5. Injection Water Pump Switch
6. Throttle Control
7. Propeller Pitch Control
8. Supercharger Control
9. Mixture Control
10. Water Injection Tank Quantity
11. Flaps and Gear Indicator
12. Landing Gear Control
13. Oxygen Flow Blinker
14. Trim Tab Controls (3 axis)
15. Fuel Tank Pressurizing Control
16. Oil Dilution Switch
17. Fuel Tank Selector Valve
18. Release Drop Tank
19. Auxiliary Electric Fuel Pump Switch
20. Intercooler Shutter

Right Side - Electrical Panel

1. Volt-Ammeter
2. Battery Switch
3. Pitot Tube Heat Switch
4. Chartboard Rheostat
5. Cockpit Rheostat
6. Instrument Lights Rheostat
7. Arresting Hook State Indicator
8. Arresting Hook Switch (Keybind: **TOGGLE TAIL HOOK HANDLE**)
9. Primer
10. Engine Starter Switch
11. Radio Master Switch
12. Section Light Switches
13. Running Light Switches
14. Formation Lights Switches
15. Exterior Lights Switch
16. Recognition Lights Panel

Right Side - Engine Monitoring Panel and Hood Control

1. Cylinder Head Temperature Gage
2. Oil Pressure Gage
3. Oil-In Temperature Gage
4. Fuel Pressure Gage
5. Fuel Quantity Gages
6. Cockpit Sliding Hood Control

Right Side - Circuit Breakers and Weapon Switches

1. Circuit Breakers x 20 (functional)
2. Outboard Guns (Keybind: **TOGGLE LAUNCH BAR SWITCH** for catapult launch with 3 second delay)
3. Mid Guns (inop)
4. Inboard Guns (inop)
5. Master Arm Guard and Switch (inop)
6. Drop Left Release Switch (inop)
7. Drop Right Release Switch (inop)
8. Bombs Fuse/Safe Switch (inop)
9. Gunsight Brightness
10. Gunsight Switch
11. Inop

Right Side - Rear Panel

1. Hand Pump Selector Valve (inop)
2. Radio Destruction Switch (inop)
3. Main Hydraulic Pressure
4. Gear Hydraulic Pressure
5. Wing Locking Control

FlyingIron Tablet

The FlyingIron Tablet provides additional information and features to your aircraft and flight experience. It has 8 pages available to you: Checklists & Power Settings, V-Speeds, Stats, Loadout, Autopilot, Workshop and Settings. By default it is stowed on the right side in the cockpit, next to your seat, and can be accessed by clicking on it.

Alternatively, you may use the convenient click spot (metal plate with 4 rivets) in front of the cockpit, to the right.

Once unstowed it will hover in front of you. Press the HOME button to stow it again.

The tablet also will tell you if an aircraft update is available. You will find the message “Update Available” in the top left if this is the case.

We encourage you to take some time and explore what this useful tablet has to offer:

Checklists

As it says on the tin, but also offers a convenient list of the most common power settings for your aircraft.

V-Speeds

Know your aircraft, and how fast she should be flown at each stage of flight.

Live Data

Live and accurate digital feedback of the various internal aircraft systems and environment.

Stats

Graphical chart display of a select few data streams over a 10 minute period.

Loadout

One-button pre-configured fuel loadouts for a short, medium or long flight. Only adds the external drop tank when needed (it does at drag).

Auto Pilot

The simplified but oh-so-handy FlyingIron Autopilot for those moments you want your hands free.

Workshop

This simulates true-to-life wear and tear (based on careful research and actual experience from warbird pilots) as well as actual inspection cycles of your aircraft. It will matter for example, for tires, how many miles you ride on the ground. For cylinders, how much you run them too hot, and for brakes, how often you use them.

The idea is to add a new dimension to realism and your role play, should you want it. It currently does not fail any systems or hinders your flight in any way. Tab an item for repair, replacement, overhaul or inspection (depending).

Settings

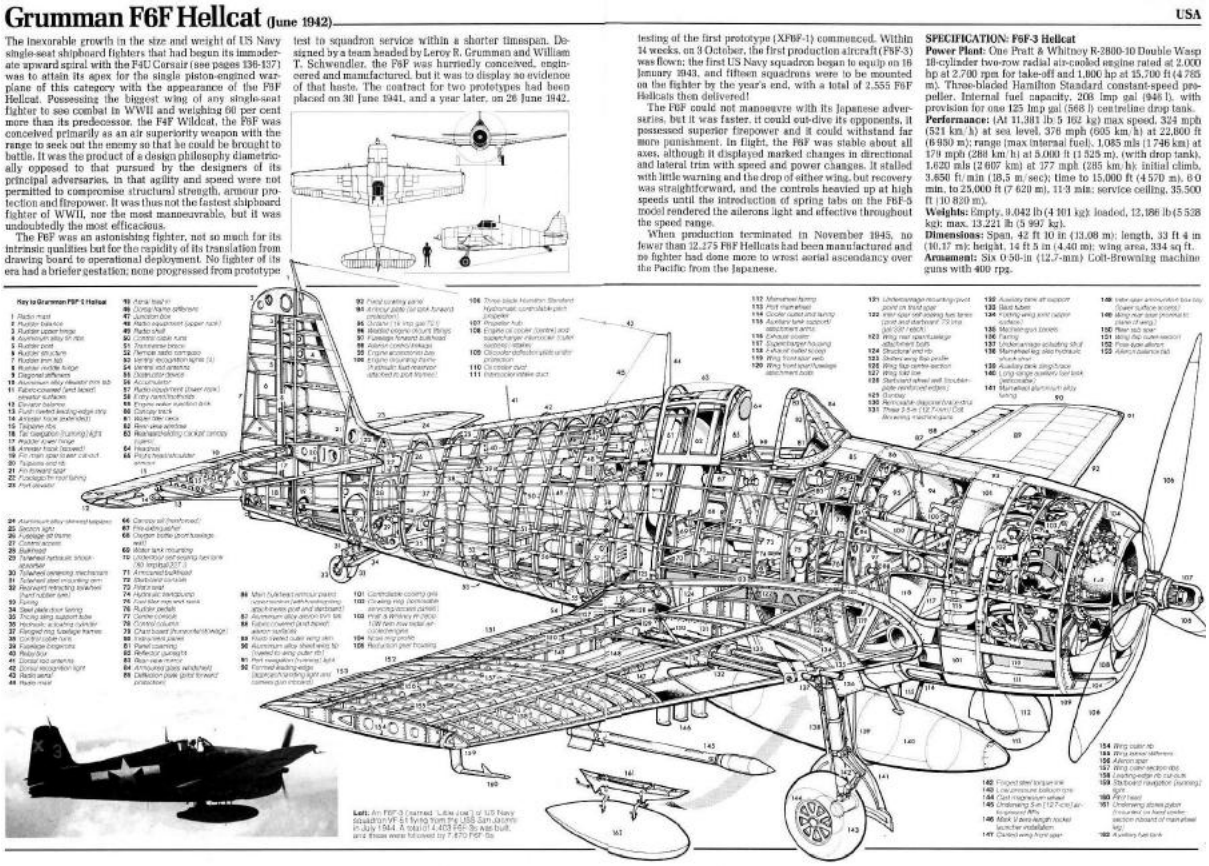
This is where you can toggle between your gunsight and GNS530, enable or disable Dynamic Engine Stresses, see what your various engine stresses currently are (or did you blow it entirely), adjust the tablet's brightness and quite a bit more.

Note: to reset a failed engine, toggle the Dynamic Engine Stresses off and on.

Also worth noting is that this is where you can enable *Simplified Groundhandling*, effectively linking your rudder input to differential brakes, making turning easier (recommended if you don't have rudder pedals). You will still be experiencing the custom FlyingIron Taildragger Physics (this is **always** active and cannot be "turned off"), which is a highly realistic simulation of how a taildragger truly behaves on the ground, vastly different from the (incorrect) ground behaviour that MSFS offers out of the box.

Aircraft Systems and Operations

This chapter contains some texts from the original F6F-5 Pilot Handbook



Grumman F6F Hellcat (June 1942) USA

The inexorable growth in the size and weight of US Navy single-seat shipboard fighters that had begun its immoderate upward spiral with the F4U Corsair (see pages 136-137) was to attain its apex for the single piston-engined warplane of this category with the appearance of the F6F Hellcat. Possessing the biggest wing of any single-seat fighter to see combat in WWII and weighing 60 per cent more than its predecessor, the F4F Wildcat, the F6F was conceived primarily as an air superiority weapon with the range to seek out the enemy so that he could be brought to battle. It was the product of a design philosophy diametrically opposed to that pursued by the designers of its principal adversaries, in that agility and speed were not permitted to compromise structural strength, armour protection and firepower. It was thus not the fastest shipboard fighter of WWII, nor the most manoeuvrable, but it was undoubtedly the most efficacious.

The F6F was an astonishing fighter, not so much for its intrinsic qualities but for the rapidity of its translation from drawing board to operational deployment. No fighter of its era had a briefer gestation; none progressed from prototype test to squadron service within a shorter timespan. Designed by a team headed by Leroy R. Grumman and William T. Schwendler, the F6F was hurriedly conceived, engineered and manufactured, but it was to display no evidence of that haste. The contract for two prototypes had been placed on 30 June 1941, and a year later, on 26 June 1942, testing of the first prototype (XF6F-1) commenced. Within 14 weeks, on 3 October, the first production aircraft (F6F-3) was flown; the first US Navy squadron began to equip on 16 January 1943, and fifteen squadrons were to be mounted on the fighter by the year's end, with a total of 2,555 F6F Hellcats then delivered!

The F6F could not manoeuvre with its Japanese adversaries, but it was faster, it could out-dive its opponents, it possessed superior firepower and it could withstand far more punishment. In flight, the F6F was stable about all axes, although it displayed marked changes in directional and lateral trim with speed and power changes. It stalled with little warning and the drop of either wing, but recovery was straightforward, and the controls heavied up at high speeds until the introduction of spring tabs on the F6F-5 model rendered the ailerons light and effective throughout the speed range.

When production terminated in November 1945, no fewer than 12,275 F6F Hellcats had been manufactured and no fighter had done more to wrest aerial ascendancy over the Pacific from the Japanese.

SPECIFICATION: F6F-3 Hellcat

Power Plant: One Pratt & Whitney R-2800-10 Double Wasp 18-cylinder two-row radial air-cooled engine rated at 2,000 hp at 2,700 rpm for take-off and 1,800 hp at 15,700 ft (4 785 m). Three-bladed Hamilton Standard constant-speed propeller. Internal fuel capacity, 205 Imp gal (946 l), with provision for one 125 Imp gal (568 l) centreline drop tank.

Performance: (At 31,381 lb (5 162 kg) max speed, 324 mph (521 km/h) at sea level, 376 mph (605 km/h) at 22,800 ft (6 930 m); range (max internal fuel), 1,085 mls (1 746 km) at 171 mph (280 km/h) at 5,000 ft (1 525 m), (with drop tank), 1,620 mls (2 607 km) at 177 mph (285 km/h); initial climb, 3,650 ft/min (18.5 m/sec); time to 15,000 ft (4 570 m), 6·0 min, to 25,000 ft (7 620 m), 11·3 min; service ceiling, 35,500 ft (10 820 m).

Weights: Empty, 9,042 lb (4 101 kg); loaded, 12,186 lb (5 528 kg); max, 13,221 lb (5 997 kg).

Dimensions: Span, 42 ft 10 in (13.08 m); length, 33 ft 4 in (10.17 m); height, 14 ft 5 in (4.40 m); wing area, 334 sq ft.

Armament: Six 0·50-in (12.7-mm) Colt-Browning machine guns with 400 rpg.

Flying Controls

Ailerons, Elevator and Rudder

All main control surfaces are controlled by a standard type stick using manual forces only. Ailerons are assisted with spring tabs, enabling slightly faster roll rates on the F6F-5 than was possible on the F6F-3.

Brake Control

The hydraulic brakes are operated by pressing on the upper part of the rudder pedals. Available hydraulic brake pressure can be read on the right side of the cockpit, but should at all times be more than sufficient.

Tab Control Unit

Tab Controls for the Aileron, Elevators and Rudder are installed on the Tab Control Unit located on the left hand side of the cockpit.

Each control knob or wheel is accompanied by a rotating disc that will indicate the amount of trim applied between -2 and 2. Note these are not degrees, merely a reference of how much deflection there is.

Aileron Trimming Tab
The Aileron Trimming Tab is installed on the left wing only. Control is affected by the handwheel on the forward side of the Tab Control Unit. Rotate outboard (counterclockwise) to lower the left wing.

Elevator Trimming Tabs
The Elevator has 2 very large and effective trimming tabs. Control is affected by the handwheel on the inboard side of the Tab Control Unit. Rotate clockwise to lower the nose.

Rudder Trimming Tab
Control is affected by the handwheel on the top of the Tab Control Unit. Rotate clockwise for nose right.

Flaps

The Wing Flaps, of the low drag type, are actuated by four hydraulic cylinders controlled from the pilot's cockpit. Two cylinders are installed in each wing, one inboard and one outboard. The Flap Hydraulic Control Valve governing the cylinders is operated by an electric servo motor controlled by a Toggle Switch on the left-hand shelf of the cockpit.

The flaps on the F6F use a unique design that allows blowback of the flaps at higher speed by air pressure. This has 2 distinct advantages:

1) The flaps cannot be damaged by flying above their speed limits as they would be fully blown back.
2) It reduced the pilot's workload during carrier approaches as flaps simply could be actuated in advance at an opportune time.

Flaps are fully deployed at their maximum angle of 50 degrees between 0 and 93 knots. They are at about 15 degrees when flying at 150 knots, and the flaps will not come down at all at speeds in excess of 170 knots.

The position of the Wing Flaps is shown on the combined Landing Gear and Flap Indicator on the left hand instrument panel.

Landing Gear Controls

The airplane is equipped with hydraulically operated Main and Tail Wheels which are retracted or extended by double-acting hydraulic cylinders.

Normal Operation

The Main and Tail Wheels are normally retracted or extended by manual operation of the two-position Square Knob Control Lever located on the left-hand instrument panel.

This Square Knob Lever is distinct in appearance from any other control, being designed to prevent inadvertent retraction or extension of the Landing Gear.

Auxiliary Operation

In the event that the engine driven hydraulic pump is not operating, the Main and Tail Wheels may be dropped by gravity by using the Landing Gear Emergency Control in the centre console.

Tail Wheel Lock

The Tail Wheel can and should be locked for all landbased take-offs and landings, but never for aircraft carrier operations. The Tail Wheel Control is on your right hand side.

FlyingIron Taildragger Ground Handling Physics

Your Hellcat comes with custom coded true-to-life free-castering taildragger ground physics. We were never satisfied with what MSFS supplied out-of-the-box (it's not even close to what reality is like) and decided to spend good time and effort to bring the real thing to you. Want to master a taildragger? Now you can. Tested extensively by experienced taildragger pilots.

Note: the default MSFS physics for ground handling have been completely replaced and cannot be "turned on" in the Hellcat. You will always be using the FlyingIron ground physics instead.

A free-castering tailwheel cannot be steered with rudder input. Like in the real F6F (or as it should be in any other free-castering taildragger), you will now steer with:

1) Lateral thrust created by air flowing over your rudder. This airflow can come from propwash, ground speed and wind.
2) Differential braking. Brake only left or right and you can steer quite effectively once you have a little speed.

Groundloops and other forces like p-factor are all simulated as well. We recommend you spend a few minutes on the ground the first time trying to taxi, unlearning what MSFS has taught you so far, and relearning how the real Hellcat pilots did it. Use no more than 1,000 RPM in the Hellcat for taxi operations. Once you move, a jab of rudder steers you nicely, add some left or right brake for sharper turns.

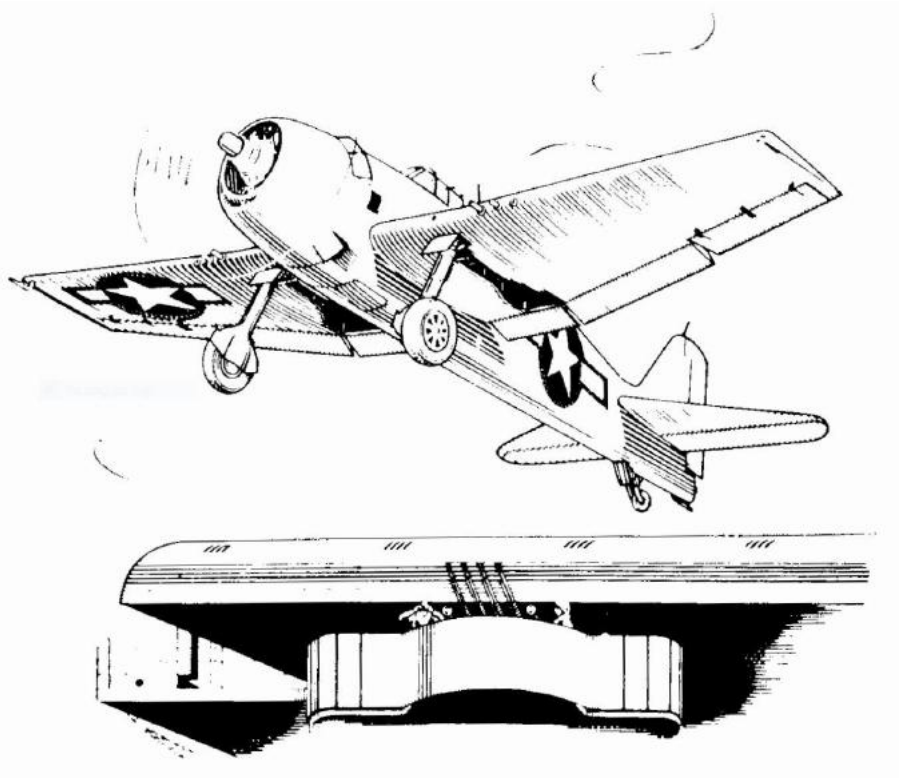
You'll be a master in no time, it's a great reward! It's actually not even that hard (realistic physics rarely are, they are more natural and predictable).

Due to this new level of realism we highly recommend using rudder pedals. Don't have them? Open the FlyingIron Tablet's Settings page and enable "Simplified Groundhandling" which will link your rudder to your differential braking.

Carrier Operations

The Hellcat is born for carrier operations, and it shows. She's got a rugged airframe, tough gear, folding wings, a few layers of paint from all the time out at sea, and broad wings for slower approaches. Achieving a landing on a moving carrier is a reward that is hard to beat in aviation!

To make it work in MSFS, we have written our own code for catapult launches and arresting hook landings as support in MSFS otherwise would have been too limiting to your experience.
Our carrier code, built into the Hellcat, simply works on any solid surface when you use it. Easy as that! There is nothing stopping you from practising your take-offs and approaches on a large runway before you attempt the real thing. A tip: head to Wallops Flight Facility Airport (KWAL) as it has a "Carrier Deck" painted on runway 28.



Catapult Launches

The easy one! Hold brakes, flaps up, a little over 2000 RPM (not too much or she'll go nose over), and hit the **TOGGLE LAUNCH BAR SWITCH** keybind in MSFS. An invisible 3 second countdown will start, with 1 second left release brakes, go full throttle, and into the blue you go!
Instead of a keybind you may also use the Outboard Guns switch on the right bottom weapons panel.

Arresting Hook Landings

Practice, practice, practice. Extend your arresting hook using the switch on the right panel, or simply use the **TOGGLE TAIL HOOK HANDLE** keybind in MSFS (the switch will move as well). The hook will then extend, actuated by an electric motor, and is visible from external view. When you land you will simply come to a very quick stop, followed by a brief pull back caused by cable tension. There will be no visible arrestor cables.

Folding Wings

The wings are folded and spread manually, and locked in the spread position by hydraulically operated locking pins controlled from the pilot's cockpit. These pins are visible on each wing once in the unlocked position.
The unique fold/swing operation in real life took about 7 seconds per wing.

To fold or unfold the wings, follow these steps:

- Flaps up
- Parked on ground
- Operate locking pins using the Wing Folding Safety Lock Control (centre panel)
- Fold or unfold using the Wing Locking Control (right side, behind)

Engine Management

The *Pratt & Whitney R-2800-10W Double Wasp* is an American twin-row, 18-cylinder, air-cooled radial aircraft engine with a displacement of 2,800 cu in (46 L), and is part of the long-lived Wasp family of engines.

The R-2800 saw widespread use in many important American aircraft during and after World War II. During the war years, Pratt & Whitney continued to develop new ideas to upgrade the engine, including water injection for takeoff in cargo and passenger planes and to give emergency power in combat.

Besides watching your Manifold Pressure and War Emergency Power use, the engine requires the pilot to operate 3 different cooler shutter systems to manage the powerplant well. Have a good look at the checklists to see what settings are recommended for the various stages of flight.

*Note: managing the Hellcat's heating and cooling will only truly have an impact if you have the **Dynamic Engine Stresses** toggle enabled in the Tablet's Settings page. When this setting is off, you can go full throttle as much as you like.*

Manifold Pressure

For recommended manifold pressure, RPM and mixture combinations, reference the Power Settings table in the **Specifications and Reference Data** chapter of this manual.
When you set your throttle, be careful not to exceed the following operational manufacturer limits:

- Up to 44 MP (max continuous) - no limit
- 54 MP - 30 minutes
- 60 MP (WEP) - 5 minutes

Supercharger

The Double Wasp has a two-speed, two-stage supercharger. There is no turbo. The settings are Neutral, Low and High. You will notice the kick, especially on the Manifold Pressure gauge, once a gear shifts. Prepare to adjust your MP as needed when that happens.

- Neutral - Technically not a gear, and is active below 12,000 feet
- Low - 1st of the two gears, engages at 12,000 feet
- High - 2nd of the two gears, engages at 25,000 feet

Note: due to limited core MSFS abilities for supercharger setups this gear currently cannot be manually selected and is fully automatic. Once MSFS supports manual supercharger gear shifts we will add this in an update.

War Emergency Power

The "W" in "R-2800-10W" stands for water, meaning the Hellcat's power plant has water injection available, giving it War Emergency Power for a short period of time.

To engage WEP, use either the Injection Water Pump Switch on the left panel or the MSFS **WAR EMERGENCY POWER** keybind.

When at maximum throttle of 54 MP (altitude and supercharger gear depending) WEP will boost your manifold to 60 MP giving you an additional 250 HP.
You carry a total water supply of 16 US Gallons, equalling about 5 minutes of WEP. You can monitor your water supply on the Water Injection Tank Quantity gauge.

Your water tank will automatically top-up whenever you're parked on the ground.

When using WEP, always keep an eye on your engine's temperature and pressure limits!

Air Cooling

For air cooling always keep in mind the factors that matter as they would in a real plane (all are accurately simulated in the custom thermo dynamics model):

- Airspeed
- Propwash
- Altitude (air is much thinner at high altitudes meaning fewer air molecules to cool the engine)
- Ambient temperature

All 3 cooler shutter systems are hydraulically operated, meaning they will not move when the engine is off even if you move the appropriate controls in the cockpit. All shutters also add drag so use them wisely. Wide-open cowling shutters for example can easily cost you 10mph down from your top speed.
Therefore, unless needed, you would typically cruise with all shutters closed.

1. Cowl Flaps
2. Oil Cooler Shutters
3. Intercooler Shutter

Cowl Flaps (1)

The cowl flaps largely serve to cool the engine itself, with the Cylinder Head Temperature (CHT) being measured with a corresponding gauge available in the engine monitoring panel to your right.
Use the Cowl Flaps Control (left side of cockpit) to operate them.

The desired temperature for normal cruise operations is between 190 and 200°C, and try to keep it below 232°C at all times. For take-off and combat emergencies the absolute maximum is 260°C for short periods of time.

As you will mostly be operating the Cowl Flaps to manage the engine, we have for your convenience linked the Cowl Flaps Control to the MSFS **SPOILERS AXIS** keybind.

Cooling the CHT will also have some impact on the oil as the engine itself would be less hot.

Tip: when your engine gets too hot at high altitudes, despite the freezing cold, the solution may be to speed up not to slow down. You very well may have too little air-cooling due to the thin air, which easily can be up to 6x less at 30,000 feet or so.

Oil Cooler Shutters (2)

The Hellcat is pretty good at keeping the oil cool so this will be an easier task. Still, you'll need to monitor it for its minima and maxima!

The minimum temperature for oil is 40°C, so this will be your static warm up. Takes a few minutes. The desired operational range is between 60 and 85°C, with 95°C as the maximum (for 15 min). You could go as far as 105°C but within 5 minutes your engine would be out of commission and your job description changes from fighter to glider pilot.

Cooling your oil will also have some impact on the engine, and therefore the CHT, as well.

Intercooler (3)

The Intercooler Flap serves to control your carburetor air. There is no gauge for this but there is a Carburetor Heat Light that goes on when you exceed 43°C. When that happens immediately open your Intercooler Flap.

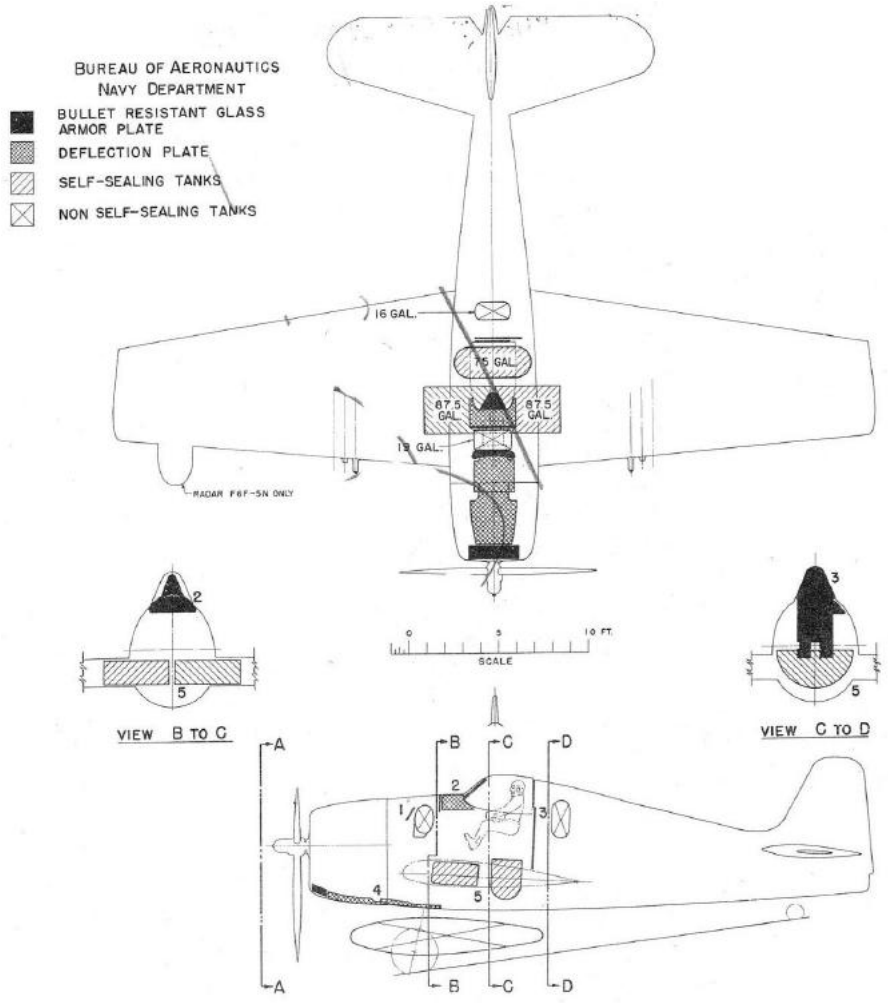
Fuel Tanks

The FlyingIron F6F Hellcat is equipped with 3 internal self-sealing fuel tanks and, if the mission demands it, one optional external drop tank can be mounted below the fuselage.

You can select which tank to draw from using the Fuel Selector Valve, as well as drop the external tank by pulling the Release Drop Tank lever. The external fuel tank will add drag and slow you down a bit.

When all tanks are fitted you have a total capacity of 403 US gal (1,526 litres).
Without the drop tank it is 150 US gal less.

All in all you have 4 tanks to select from. The two main tanks left and right (87.5 US gal each), inside the wings at the root, the reserve centre tank (78 US gal) below the pilot and the drop tank (150 US gal).
You should always start a flight with the right main tank selected, as excess carburetor fumes will be routed into this tank. When there is enough space (7 US gal used or so) you can empty your drop tank if fitted, or alternate between your main tanks. The last tank you use will be your reserve tank. For landings, select the best tank you have available at the time.



Light Systems

Compared to many contemporary WWII aircraft, the Hellcat has an abundance of lighting systems. Partially this is due to carrier operations requirements.

All lights are controlled from the right electrical panel. Like for everything else electrical, circuit breakers also will have an impact on lights.

Internal Lights

Three rheostat knobs allow the pilot to adjust the various cockpit lights to suit conditions. In addition, the main instruments are all radium coated so they will glow a light green in the dark.

External Lights

The Hellcat comes installed with a full suite of external lights. Section Lights, Wing Running Lights, Tail Running Lights, Formation Lights and Recognition lights. All of these have multiple states like flash or steady, bright or dim, or both. The recognition lights (installed in the belly) allow for a combination of three colours which will help ground crew identify if you are a friendly cat, or a captured cat.

There is even a dedicated External Lights switch so you can “go dark” at a moment’s notice. This excludes the blue dim formation lights on the wingtip tops.

Canopy

The canopy, also called the Sliding Hood in the Hellcat, is operated using the Cockpit Sliding Hood Control on your right.

Oxygen

Oxygen is currently supplied by default and is always on. We may code in the valve functionality (behind the pilot chair) in a future update.

Electrical System

The Hellcat is powered by a 28 Volt system. Power comes from 3 sources:

- A 24V, 11 Amp Hour battery
- A 28V generator that kicks in at around 1300 engine RPM, also charging the battery
- The engine itself, supplying volts as long as it is spinning

The system uses 2 buses, one of which is dedicated to all external lights so you could go “dark” at a moment’s notice by flipping one switch (Ext Lights).
A combined Volts/Ammeter is available and should be monitored at regular intervals.

Circuit Breakers

All 20 circuit breakers on the Hellcat are fully functional and can be used to enable or disable their related systems.

Checklists

For your convenience, checklists can be found in 3 places, all identical:

1. The Pilot Handbook (this one)
2. The MSFS Toolbar Checklists (interactive)
3. The FlyingIron Tablet (handy in VR)

Engine Start

- Cowl Flaps: Full Open
- Throttle: 1/5 Open
- Mixture: Auto Lean
- Supercharger: Neutral (lever is automatic)
- Battery: On
- Fuel Selector: Right Main
- Fuel Pump: On
- Fuel Pressure: 8 psi
- Primer: 3 to 5 seconds
- Ignition: On Both
- Starter: On
- Mixture: Auto Rich
- Max 1,000 RPM: Until Oil > 40°C

Taxi

- Cowl Flaps: Full Open
- Tail Wheel: Unlocked
- Lights: As required
- RPM for taxi: Low and steady preferred

Run-up Check

- Wings: Spread and Locked
- Engine: Rev to clear
- Cowl Flaps: Half Open
- Oil Cooler Shutter: Full Open
- Intercooler Shutters: Closed
- Propeller: Full Increase
- Mixture: Auto Rich
- Fuel Selector: Right Main
- Carburetor Protected Air: Full In
- Fuel Pressure: 16 to 18.5 psi
- Cabin Hood: Open

- Rudder Tab: Two marks right
- Elevator Tab: Neutral
- Aileron Tab: Neutral

Take-Off

- Wing Flaps: As Required
- Tail Wheel: Locked
- Throttle: 44 Normal, 54 Max, 60 WEP
- Take-Off: 90 to 100 kts
- Landing Gear: Raise as soon as possible
- Throttle: 52.5 MP, 130 kts best speed
- Trim: As necessary
- Instruments: Check all
- Fuel Pump: Off at safe altitude
- Cowl Flaps: Closed
- Oil Cooler Shutter: Closed

Approach & Landing

- Descent: 150+ kts, 1,300 RPM, 15+ MP
- Cabin Hood: Open
- Fuel Selector: Best Tank
- Mixture: Auto Rich
- Supercharger: Neutral (lever is automatic)
- Cowl Flaps: Half Open
- Arresting Hook: Extended (carrier landing)
- Oil Cooler Shutter: Closed
- Intercooler Shutters: Closed
- Landing Gear: Down
- Tail Wheel: Locked (unlocked for carrier)
- Wing Flaps: Lower

After Landing

- Wing Flaps: Raise
- Tail Wheel: Unlock before taxiing
- Cowl Flaps: Full Open
- Oil Cooler Shutter: As Required
- Intercooler Shutters: As Required

Specifications and Reference Data

General Data

Max Gross Weight	12,598 lbs / 5,714 kg
Empty Weight	9,238 lbs / 4,190 kg
CG Limits	25% forward to 30% aft of root chord
Pax	1
Total Fuel Capacity	403 US gal / 1,526 litres
Left Main Tank	87.5 US gal / 331 litres
Right Main Tank	87.5 US gal / 331 litres
Reserve Tank (centre)	78 US gal / 295 litres
Drop Tank	150 US gal / 568 litres
Wingspan	42.83 feet / 13.05 metres
Wing area	334.00 sqft / 31.03 sqm
Wing root chord	9.95 feet / 3.03 metres
Wing dihedral	7.5°
Wing incidence	3.0°
Wing sweep	5.0°
Length	33.50 feet / 10.21 metres
Trim availability	Pitch, rudder and aileron
Flaps (auto: air pressure push back)	0° (above 170kts) to 50° (below 90kts)
G Limits	+7 (flaps up) / +4 (flaps down) to -2.5
Critical Altitude	21,000 feet / 6,400 metres
Service Ceiling	37,000 feet / 11,278 metres
Folding Wings	Manual
Arrestor hook	Electric motor

Engine

Brand	Pratt & Whitney
Model	R-2800-10W Double Wasp
Configuration	Radial (2 rows)
War Emergency Power	Water Injection (16 Gal tank for 5 min)
Horsepower	2,000 (2,250 with WEP)
Displacement	2,804.4 cu Inch / 46 litres
Cylinders	18
Turbo	No
Supercharger	Neutral, Medium and High settings
Cooling	Air (with individually pilot controlled shutters for cowling, oil and intercooler)
Fuel System	Aerobatic carburetor
Negative G	Capable

Propeller

Brand	Hamilton Standard
Model	6501A-0 (hydromatic)
Blades	3
Diameter	13’1” / 3.99 metres
Type	Constant speed
Max RPM	3,000 rpm +
Feathering	No
Beta min	22°
Beta cruise	45°
Beta max	65°

V-Speeds

Code	Description	Speed (IAS)	
		mph	*knots*
VBG	Best glide	155	135
VC	Cruise speed	275	239
VD	Design diving speed	450	391
VFE	Max flaps extended (50°)	196	170
VLO	Max gear extended	155	135
VNE	Never exceed speed	495	430
VNO	Normal operating speed	290	252
VR	Rotation speed	74	64
VREF	Landing reference/approach/threshold speed	92	80
VS	Stall speed in cruise configuration	71	62
VS0	Stall speed in landing configuration	61	53
VTO	Take-off speed	74	64
VX	Best angle of climb speed	150	130
VY	Best rate of climb speed	161	140
—	Carrier approach speed	86	75

Power Settings

Power	Setting
Idle	550 (Rich)
Starting and Warm-Up	800 (Rich)
Taxi	1,000 (Rich)
War Emergency Power (combat emergency)	2,700 (60mp, Rich) 5 min max
Take-Off	2,700 (54mp, Rich) 30 min max
Military Power (non-combat emergency)	2,700 (52.5mp, Lean) 30 min max
Normal Rated Power	2,550 (44, Lean)
Maximum Cruise	2,200 (37, Lean)
Economy Cruise	2,050 (34, Lean)
Dive (Max)	3,060 (20-45, Lean)
Landing Approach	1,300 (15, Rich)

Note: the supercharger is automatic due to current MSFS limitations

Max Speeds

Power	Altitude (feet)	Speed (TAS) with 250 US Gal	
		mph	*knots*
War Emergency Power	Sea level	340	295
War Emergency Power	18,800	391	340
Military Power	Sea level	332	289
Military Power	22,800	382	332
Normal Rated Power	Sea level	311	270
Normal Rated Power	23,800	380	330

Roll Rates

Altitude (feet)	**Speed (IAS)**		**Degrees per second**	
	mph	*knots*	*Ailerons only*	*Rudder added*
10,000	160	139	51	66
10,000	239	208	70	91
10,000	368	320	72	94

Fuel Burn

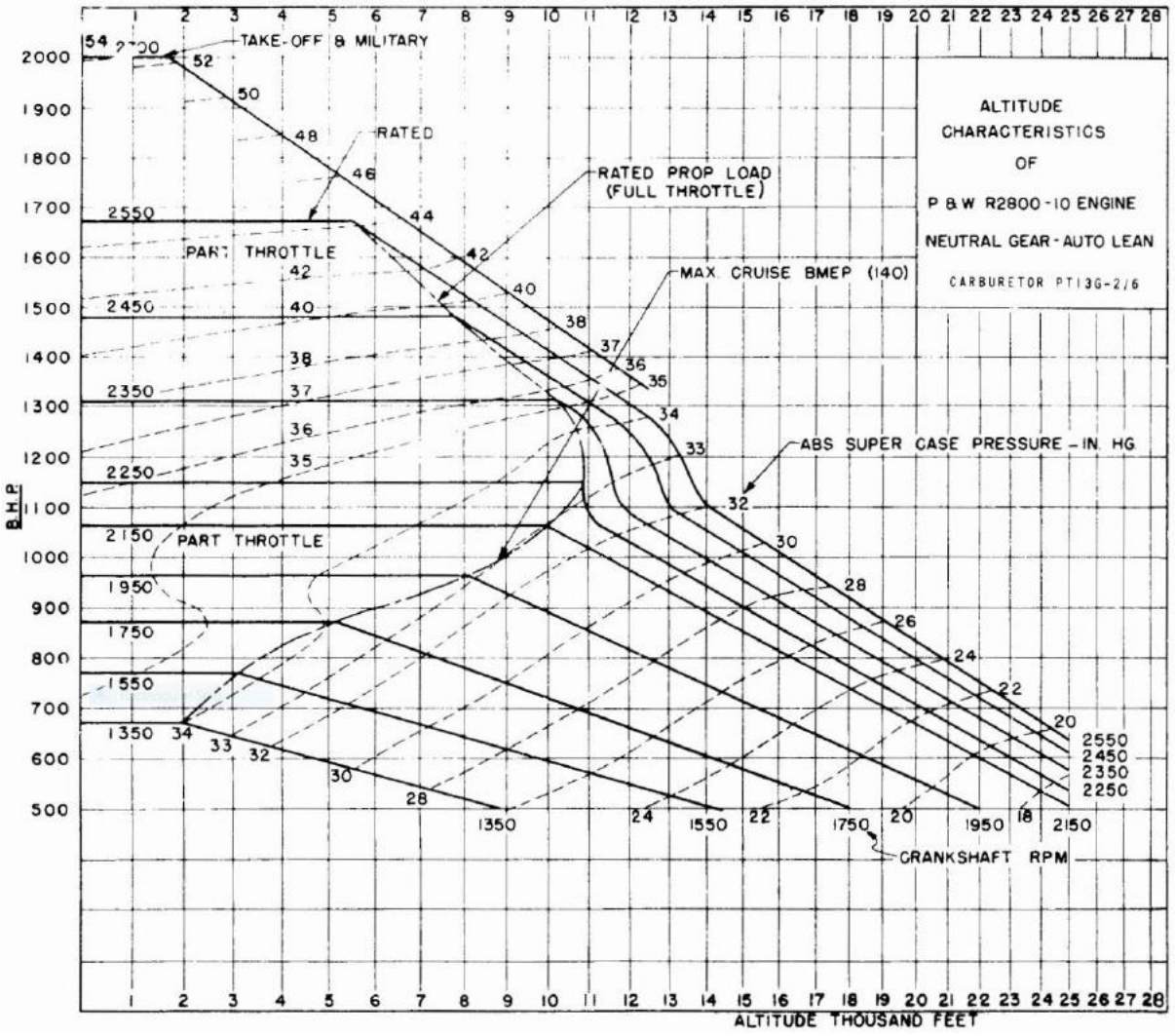
Power	**Fuel Consumption (sea level)**	
	US Gal/Min	*US Gal/Hr*
War Emergency Power (5 min)	4.3	260
Military Power (30 min)	3.7	224
Normal Rated Power (LEAN)		140
Maximum Cruise (LEAN)		110

Note: consumption is slightly different in reality as MSFS has very limited means to adjust consumption for various power settings. Until this is addressed in MSFS, the above fuel burn applies.

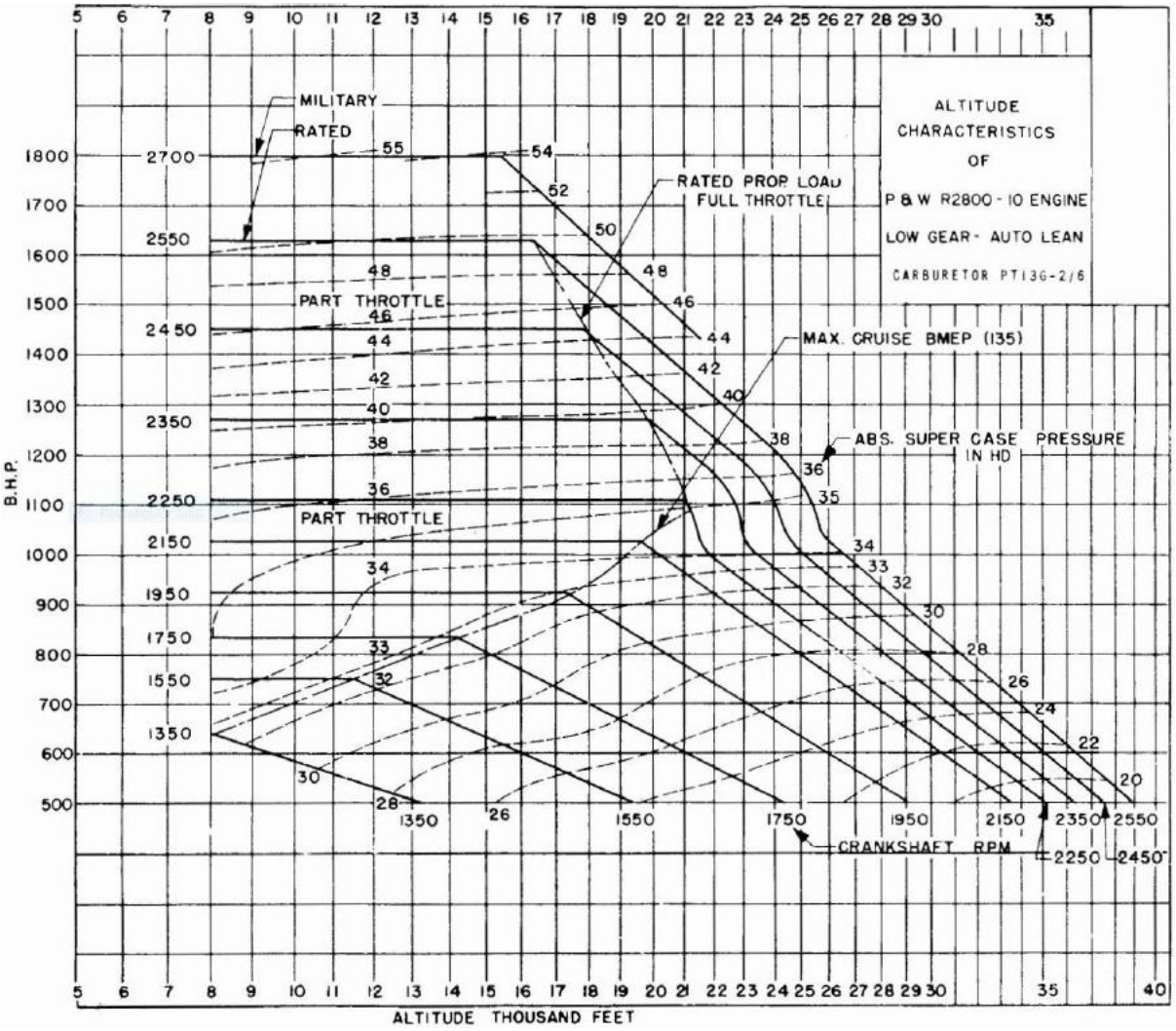
Reference Charts

This chapter contains charts from the original F6F-5 Pilot Handbook

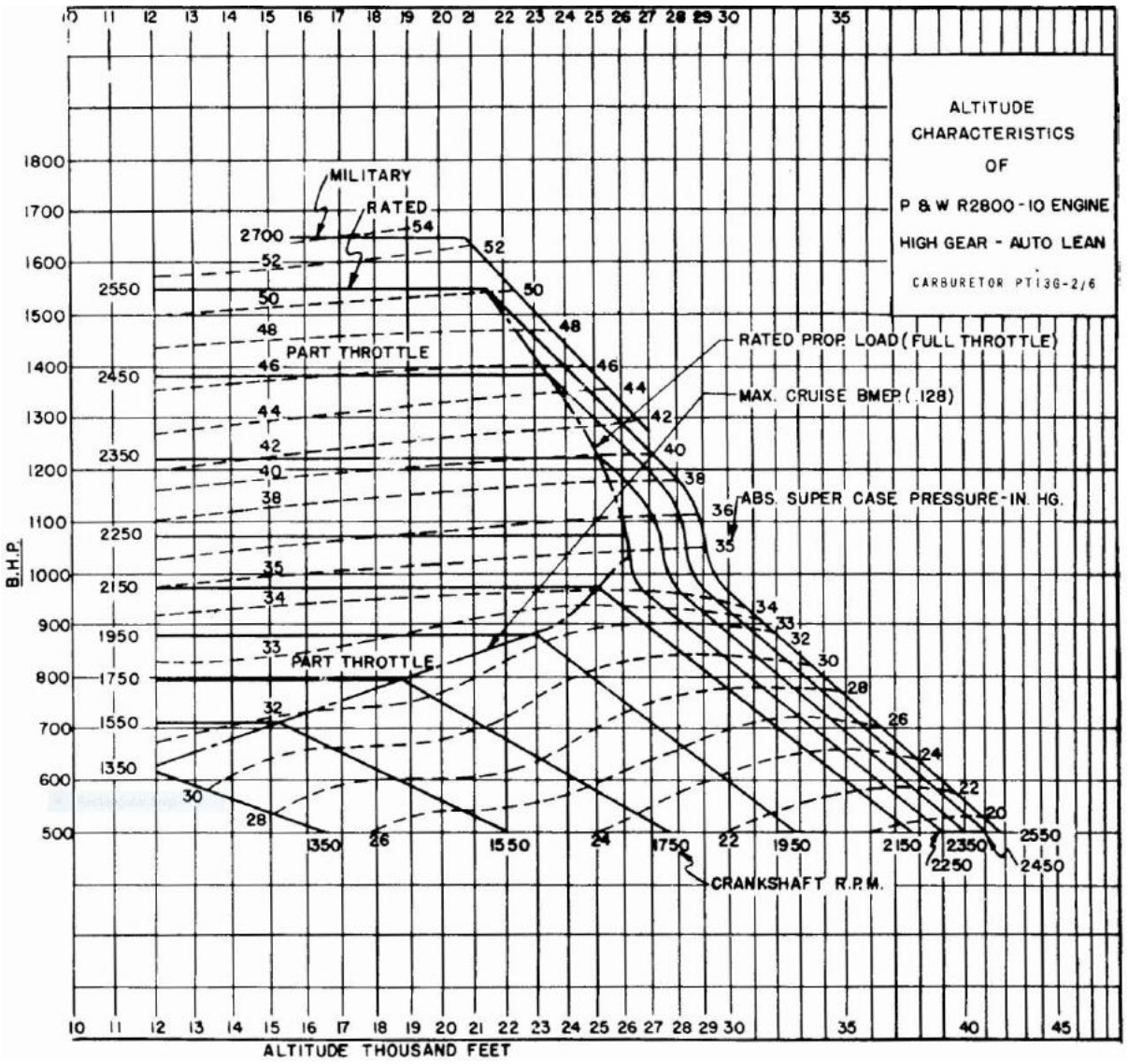
Engine Performance at Neutral Supercharger Gear



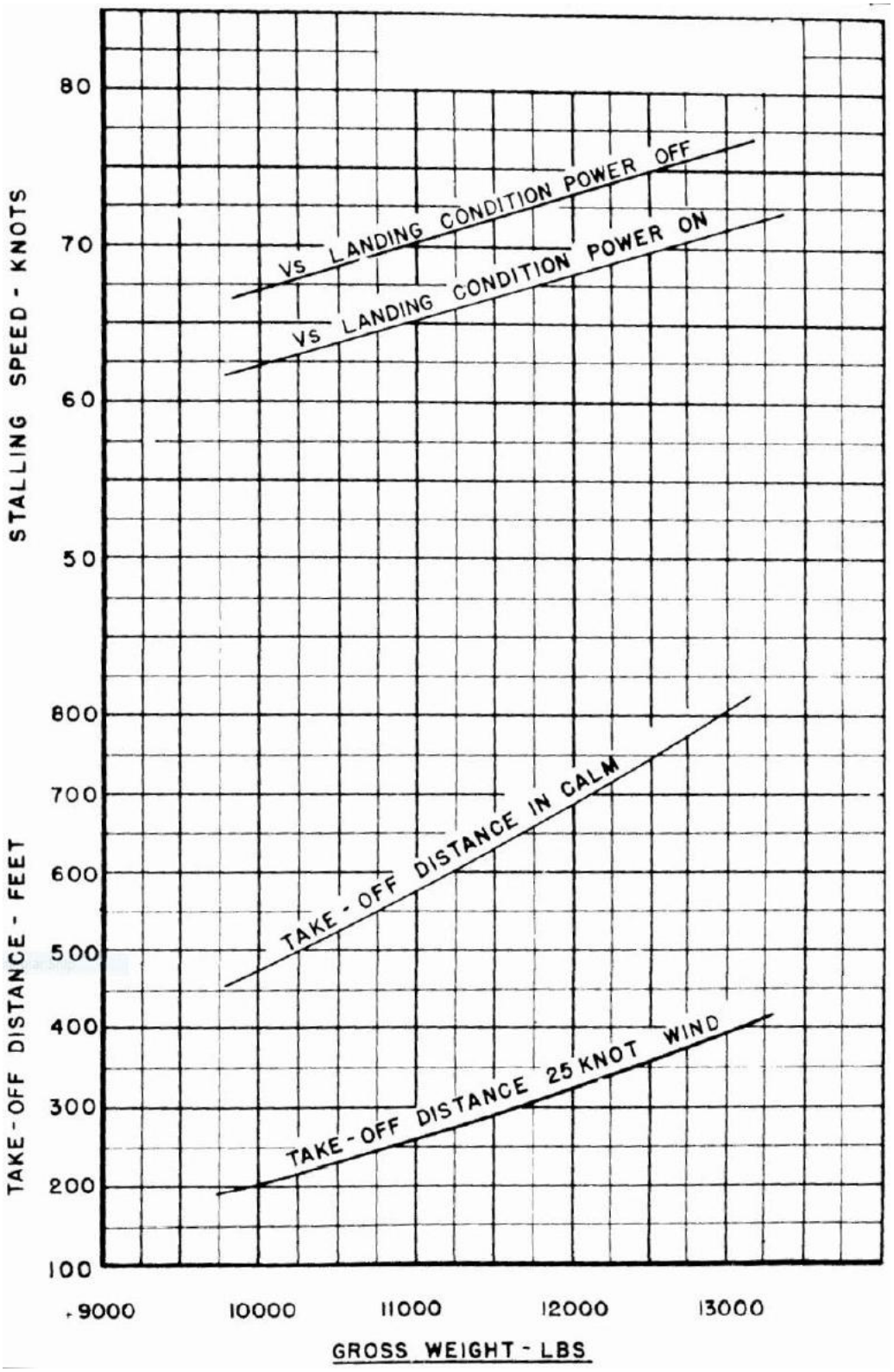
Engine Performance at Low Supercharger Gear



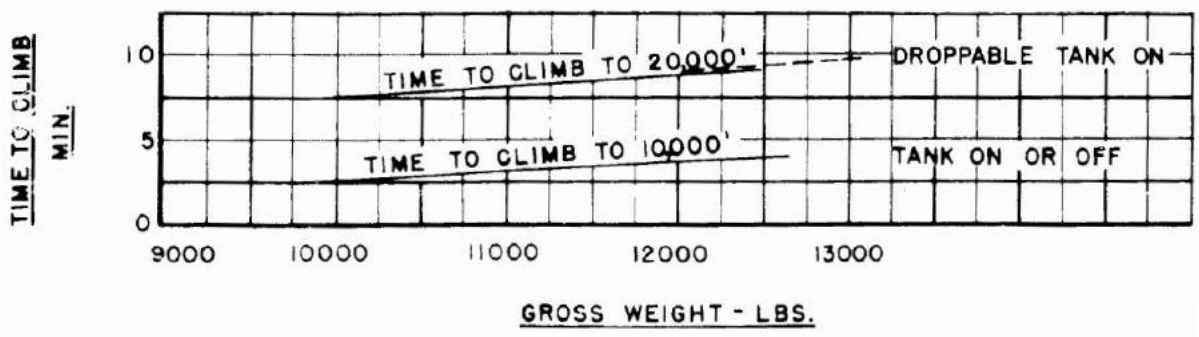
Engine Performance at High Supercharger Gear



Take-Off and Landing Distances



Time to Climb



Unit Conversion Tables

Distance

Nautical Miles (nm)	Miles (m)	Kilometres (km)
50	58	93
100	115	185
200	230	370
300	345	556
400	460	741
500	575	926
750	863	1,389
1,000	1,151	1,852

Speed

Knots (kts)	Miles per hour (mph)	Kilometres per hour (kph)
50	58	93
100	115	185
150	173	278
200	230	370
250	288	463
300	345	556
350	403	648
400	460	741

Intake Pressure

Manifold Pressure (MP, inHg)	Boost	Atmospheric Pressure (ATA)
United States	*England*	*Germany*
10	-9.8	0.35
20	-4.9	0.69
(29.92) 30	0.0	1.04
40	+4.8	1.38
45	+7.4	1.55
50	+9.8	1.66
55	+12.3	1.73
60	+14.7	2.07

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Thank you for your purchase & supporting FlyingIron Simulations; we hope you thoroughly enjoy flying this aircraft, as much as we enjoyed making it.

Warmest Regards,
Alex, Dan & Raimond (GotGravel)
FlyingIron Simulations

Special Thanks

FlyingIron Beta Team

Barry
CptSpitfire
Curthard89
DragoB
Eight_of_Dragons
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Slingers
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Previews

Into the Blue Simulations (Into the Blue Simulations - YouTube)
TwoToneMurphy (MSFS | F6F Hellcat | Exclusive First Look Preview - YouTube)

Official Trailer

Maple (Maple Sim Films - YouTube)


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