

# SC DESIGNS F5 TIGER II

## OPERATIONS MANUAL



Welcome to the *SC Designs* F-5E Tiger II. This manual will guide you through the operation of the aircraft, and ensure that you enjoy flying the airplane.

It should be noted that although this rendition of the F-5E Tiger II is not “*study-level*”, it is sufficiently complex to require some training to master the airplane. To get the best out of the F-5E Tiger II, it is required to read this manual in full.

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## GENERAL PERFORMANCE TABLE

- **Crew:** 1
- **Length:** 48 ft 2.25 in (14.6876 m)
- **Wingspan:** 26 ft 8 in (8.13 m)
  - **Height:** 13 ft 4.5 in (4.077 m)
  - **Wing area:** 186 sq ft (17.3 m<sup>2</sup>)
  - **Aspect ratio:** 3.86
  - **Empty weight:** 9,583 lb (4,347 kg)
  - **Gross weight:** 15,745 lb (7,142 kg) clean
  - **Max takeoff weight:** 24,675 lb (11,192 kg)
  - **Fuel capacity:**
    - **Internal fuel:** 677 US gal (564 imp gal; 2,560 L)
    - **External fuel:** up to 3x 275 US gal (229 imp gal; 1,040 L) drop-tanks
  - **Powerplant:** 2 × General Electric J85-GE-21 afterburning turbojet engines, 3,500 lbf (16 kN) thrust each dry, 5,000 lbf (22 kN) with afterburner

### Performance

- **Maximum speed:** Mach 1.63 (1,741 km/h; 1,082 mph) at 36,000 ft (11,000 m)
- **Maximum cruise speed:** Mach 0.98 (1,050 km/h; 650 mph) at 36,000 ft (11,000 m)
- **Economical cruise speed:** Mach 0.8 (850 km/h; 530 mph) at 36,000 ft (11,000 m)
- **Stall speed:** 124 kn (143 mph, 230 km/h) 50% internal fuel, flaps and wheels extended
- **Never exceed speed:** 710 kn (820 mph, 1,310 km/h) IAS
- **Range:** 481 nmi (554 mi, 891 km) clean
- **Combat radius (20 min reserve):** 120 nmi (140 mi; 220 km) with 2x Sidewinders + 5,200 lb (2,400 kg) ordnance, with 5 minutes combat at max power at sea level
- **Ferry range:** 2,010 nmi (2,310 mi, 3,720 km) [\[254\]](#)
- **Ferry range (20 min reserve):** 1,385 nmi (1,594 mi; 2,565 km) drop tanks retained
- **Ferry range (20 min reserve):** 1,590 nmi (1,830 mi; 2,940 km) drop tanks jettisoned
- **Service ceiling:** 51,800 ft (15,800 m)
- **Service ceiling one engine out:** 41,000 ft (12,000 m)
- **Rate of climb:** 34,500 ft/min (175 m/s)
- **Lift-to-drag:** 10:1
- **Wing loading:** 133 lb/sq ft (650 kg/m<sup>2</sup>) maximum

The F-5E Tiger II is one of the most famous aircraft in the world, with a service life that has now exceeded 60 years around the world. Originally developed as an advanced trainer, the airplane was eventually adapted for use in a multitude of rolls.



**Note:** Weapons are only available on versions of this aircraft purchased *outside* of the Marketplace, i.e, from third-party stores. This is due to Microsoft Terms and Conditions for sale on the in-game Marketplace.





## AIRCRAFT FAMILIARISATION

The F-5E Tiger II package by SC Designs is a detailed rendition of this famous aircraft. The Tiger's lines are instantly recognisable to both aviation fans and also to movie goers, with the type having been made famous playing the "MiG-28" in the Paramount Pictures movie *"Top Gun"*.

The aircraft is capable of supersonic airspeeds, powered by a pair of afterburning engines producing a maximum of around 10,000lbs of static thrust combined. Although this gives the Tiger a thrust to weight ratio of around 0.5, rising to 0.8 at higher Mach numbers, the aircraft's slender fuselage, paper-thin wings and sleek styling produce a very energy-efficient fighter that can punch well above its weight. Even today, in the world of fifth-generation fighters, the F-5E is still used as an "aggressor" fighter, teaching the pilots of our most modern aircraft how to dogfight against other types in dissimilar air combat training.





The cockpit of the F-5E Tiger II is devoid of many of today's familiar digital displays. The glass "HUD" is in fact a reflector gunsight only. The radar screen has several different modes and will track both air and ground targets within MSFS multiplayer.

The vast majority of displays and instruments are analogue in nature, and there is no fly-by-wire system nor autopilot in the F-5E Tiger. Everything is "old school", requiring greater airmanship on the part of the pilot to get the best out of the aircraft.







## FLYING THE F-5E TIGER II



The SC Designs F-5E Tiger II is not designed to be “*study level*”. However, it is intended to be as accurate in terms of aerodynamics as we can make them in MSFS. We also like to include the “*quirks*” of any aircraft we build, in order to try to give the user some idea of what it might be like to fly these aircraft in real life. To this end, the F-5E has been tested by a former United States Air Force pilot with over 1,500 hours on the T-38 Talon, a close cousin of the F-5E Tiger II. The flight model itself was created by the expert team at *PropAir*, all of whom are private or commercially licensed pilots.

A more detailed briefing of the flight model work performed is included with this manual in the aircraft’s “Documents” folder, including detailed performance charts, fuel and hydraulic systems, testing schedule and flights, as well as comments from John, who flew the T-38 Talon as an instructor with the United States Air Force.

For general flying and aerobatics, the aircraft will like the real F-5E develop initial wing-rock at around 15 degrees Angle of Attack. Thus, the 15-20 degrees AoA region is clearly marked on the AoA indicator in the cockpit, as an aid to pilot awareness. As an energy fighter, it prefers to be manoeuvred at airspeeds above 300 knots, with corner velocity



somewhere in the 420-450 knots region depending on altitude and aircraft weight. Minimum radius turns are best conducted at 290 knots but with a close eye on AoA to avoid further energy loss. At angles of attack beyond 20 degrees the aircraft can, like the real F-5E, maintain good control authority, but can also see control surfaces reduced in effectiveness. The best solution to control loss at high AoA is to “unload” the aircraft, pushing to 0 G in order to remove the aerodynamic stall and allow the aircraft to regain energy and thus recover manoeuvrability.

Flown correctly the F-5E is a highly capable dogfighter. A recent interview with a member of the famous “*Saints*”, the F-5E Aggressor unit, related a tale where the F-5E Instructor went head to head with the much larger and more powerful F-14B Tomcat. The Tomcat driver, confident in his power advantage, went through the merge and into the vertical. The F-5E Instructor went up with him, and they merged again over the top. The Tomcat driver rolled upright and went up and over again in a Double-Immelman, sure that the F-5E could not follow him up again.

The F-5E successfully did complete a Double-Immelman, and, in the instructor’s own words, *“put the F-14B pilot off his game for the rest of the hop. He just wasn’t prepared for that kind of an opponent.”*

Flown carefully, the SC Designs F-5E Tiger II can also Double-Immelman, matching the performance of the real aircraft. Just keep an eye on that AoA indicator!



## CHECKLISTS & WEIGHT / BALANCE

The F-5E Tiger II comes with a comprehensive Interactive Checklist inside the simulator, which you can use to ensure the proper start-up procedure. Just move your mouse up to the top of the screen and select the “Checklist” option. Be certain to check your fuel quantity to make sure you have enough for your flight. The checklist will also highlight many of the secondary switches that have important functions, ensuring that you will know where everything is in the cockpit prior to your flight.

Aircraft weight is something that is important to *all* aircraft. All aircraft have a *maximum take-off weight*, which if exceeded can cause the airplane to fly poorly or, at worst, not fly at all and crash. For this reason, it is advised that you select both fuel and ordnance individually and not using the menu’s “payload” slider, as this can easily put the aircraft beyond its maximum take-off weight.

If you select a full load of ordnance on the F-5E Tiger II, you must then sacrifice fuel-load to keep the weight below the maximum take-off weight.



Here, the pilot has selected two 190lbs AIM-9 missiles, and a centreline fuel tank





The F-5E Tiger II had a switch to the left of the throttles which extended the nose-gear for take-off. The reason for this was to provide extra lift due to the small size and high wing-loading of the aircraft. This extension has been modelled in MSFS, however, to do so massively reduces nose wheel control in the early stages of the take-off. It is not advised to use this function when encountering high crosswinds.

Further, the switch must be manually retracted after take-off to ensure gear retraction due to limitations within the simulator.

We are hoping to refine this function over time, but for now it should be considered merely for aesthetics rather than a functional lift-generating device. The F-5E in MSFS takes off perfectly well without the extension deployed.

## PILOT NAVIGATION



**Modes:** ATT, HDG, SELECTED, TACAN, NAV, VOR1 and VOR2

The F-5E Tiger II contains only the same basic navigation and communication avionics as the real airplane does. UHF Comms are available, while VOR navigation is controlled via the selector for mode and the NAV MHz / KHz controls on the pilot's left side panel. TACAN is selected using the controls below the comms radio beneath the radar.

There is no approach mode or ILS available in this aircraft, nor GPS or autopilot, although it may be possible to assign controls via the sim's own menu. In the same way, there is no Parking Brake on the F-5E Tiger – however, slaving the Parking Brake command to a controller button will allow you to apply it. We have added an annunciator light on the warning panel on the right-hand side of the cockpit to ensure users can see when the brake is applied.



## INTERNAL LIGHTING

The F-5E Tiger II cockpit comes with full night-lighting options, which can be dimmed using the control knobs on the pilot's right-side panel.



## LANDING THE F-5E TIGER II



A recovery to the airbase is conducted with the aircraft entering the overhead pattern on the active runway heading, at 1,000ft and 350 knots. At mid-field, the aircraft conducts a 4G break into the downwind, slowing to 220 knots while lowering gear and full flaps. The pilot should check fuel and also calculate aircraft weight to ensure the F-5E Tiger II is not too heavy to land, and trim the aircraft to be light on the stick at 170 knots.

Rely upon the AoA indicator to ensure correct glideslope – a green circle is what you're looking for. At this AoA, the aircraft's airspeed will take care of itself, based upon the All Up Weight at landing. Thus, there is no specific landing airspeed – it is variable with weight. AoA is all that matters.

A curved, descending finals approach is conducted, with the aircraft rolling out onto the final at the correct airspeed and angle-of-attack. Over the threshold the power is cut to idle, and the F-5E Tiger II allowed to sink before touchdown at around 160 knots. Apply braking once all wheels are down.





As with all of our products, if a user wishes their aircraft to fly correctly, they must learn to fly that aircraft correctly. This rendition of the Tiger seeks to replicate that difficulty, but without removing the unique enjoyment of flying this remarkable aircraft in Microsoft Flight Simulator.

## DEVELOPER NOTES

As time progresses, this and our other products will be continuously updated to match further advancements of MSFS. The new simulator has, we hope, many successful future years ahead of it, and as more features come on-line we will be keen to ensure that the Tiger remain at the cutting edge of what's possible for fighter aircraft. As with all launches by SC Designs, expect this rendition of the F-5E Tiger II to get ever better as Microsoft Flight Simulator becomes more established at the forefront of flight simulation software.

# CREDITS

## SC Designs F-5E Tiger II

Models and code	Dean Crawford
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Flight dynamics	PropAir, Dean Crawford
Textures	Dean Crawford, Novawing24
Sounds	Big Radials ( W Wise )
HTML code	CodenameJack447
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## SOFTWARE PIRACY

This software is copy protected.

Recently, two commercial flight simulation developers purchased a clean computer and used it to download their own products from well-known piracy sites, so that they could see what had been done to them. Unsurprisingly, all of the products were bloated with malware – Trojans, data-mining software and others, some quite advanced and well-hidden from anti-virus software. Everybody who has ever downloaded pirated software



from such sites now has those infections on their home computers. Anybody who thinks otherwise, that piracy site owners create and pay for these sites out of the kindness of their hearts, is incredibly gullible.

A pirate, otherwise known as a thief, makes a profit from the sale of other people's hard work. In some cases he makes more profit than the publishers and developers make from the sale of an original title. Piracy is not just the domain of the casual domestic user in his or her back room, but is also a multi-million-pound business conducted by criminals often associated with the illegal drugs trade. Buying or downloading pirated copies of programs directly support these illegal operations.

Don't be fooled by a load of old tosh about file 'sharing'. The sites that host these 'shared' files 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 affect 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.