

F-16 C, D & I FIGHTING FALCON

OPERATIONS MANUAL



Welcome to the SC Designs F-16C, D and I Fighting Falcons. 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-16 Fighting Falcons is not “study-level”, it is sufficiently complex to require some training to master the airplane. To get the best out of the F-16, it is required to read this manual in full.

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GENERAL PERFORMANCE TABLE

- Crew = 1
- Length = 49 ft 5 in (15.06 m)
- Wingspan = 32 ft 8 in
- Height = 16ft
- Wing area = 300 sq ft
- Empty weight = 18,900 lbs
- Max take-off weight = 26,500 lbs
- Fuel capacity = 7,000 lbs internal
- Engines = GE-F110 afterburning turbofan (23,400lbs max-thrust at sea level)
- Maximum airspeed = Mach 2.05 (at high altitude) – Mach 1.2 at low altitude
- Range = 2,277 nautical miles with external tanks
- Combat Range = 295 nautical miles
- G-limits = +9.0 G, -3G

The F-16 Fighting Falcon is one of the most recognisable aircraft in the world, incorporating the classic, sleek lines of a fighter and utilising some of the latest advances in computer-controlled aerodynamics. The aircraft is considered to be one of the most difficult opponents to beat in air-to-air combat, combining a relatively small size with an enormously powerful engine and perfect all-round visibility for the pilot.

Developed for the United States Air Force as an air-superiority fighter, it has since evolved into a highly capable multi-role aircraft in service with twenty-five air forces around the world. More than 4,600 Fighting Falcons have been built. Equipped with a fly-by-wire control system, teardrop canopy for high visibility and pilot situational awareness, and with a unique slanted ejection seat to help the pilot cope with high G-forces, the fighter's lightweight, small size and huge single engine give it an unbeatable performance in close air-combat that keeps the F-16 competitive even against today's most capable fifth-generation fighter aircraft.

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

Although the Falcon was designed as a lightweight fighter aircraft with export potential, it has undergone several transformations during its lifetime, in the form of Block releases that have added extra features, avionics, weapons and enhanced radar. One additional feature common to many variants are conformal fuel tanks mounted upon the upper fuselage flanks, giving extra range for Combat Air Patrols.

This rendition of the F-16s does not focus specifically on any one “Block” production aircraft. The Falcon’s high agility and thrust-to-weight ratio make it a capable dogfighter, and as such it has seen further service as an “Aggressor” aircraft for both the United States Air Force and the United States Navy, with the famous Fighter Weapons School, “Top Gun”, at NAS Fallon, Nevada

The vast majority of displays and instruments are analogue in nature, and there is no fly-by-wire system in the F4 Phantoms. Everything is “old school”, requiring greater airmanship on the part of the pilot to get the best out of the aircraft.

PANEL LAYOUT



The cockpit of the F-16A Fighting Falcon is a mixture of Multi-Function-Displays common to many modern aircraft, and analogue gauges reminiscent of the aircraft's design era, the 1970s. The cockpit is surprisingly small compared to many fighter aircraft as a result of weight-saving considerations during its design, and the pilot sits quite high above the canopy sill, increasing visibility further through the large teardrop-shaped canopy. The aircraft contains a full navigation suite as well as a full autopilot system, as well as analogue flight instruments and a Heads-Up Display mounted directly in the pilot's line of sight, to relay vital flight information.

The twin-seat F-16D trainer version has a copy of the front cockpit that contains the same instrumentation with a slightly different layout, and the MFD screens contain information relayed from the front seat position.

(Note: Although all of the buttons and switches in the F-16's cockpit are operable, those marked as INOP in MSFS do not have an active function assigned at this time, as the simulator does not support it).

MAIN PANEL



The main panel contains all of the principal flight instruments, along with the Up Front Control Panel, which can be used to input flight information into the navigation computer. The wheels either side of the UFCP control the brightness of display screens and also the visibility of the Head-Mounted-Display.

The Airspeed / Mach indicator displays primarily airspeed in knots indicated, while the inner display reads the current Mach number.

The Horizontal Situation Indicator displays currently selected navigation beacon, with both range and bearing indicator drums in the upper corners. The two knobs on each lower corner allow headings and bearings to be altered, depending on what kind of navigation device is selected.

HEADS UP DISPLAY



The Heads Up Display projects essential flight information directly into the pilot's line of sight, allowing them to fly the aircraft while keeping their head up and out of the cockpit, ready to spot enemy aircraft.

The HUD display changes dynamically depending on flight attitude and settings, with slightly differing displays for each. To the left of the HUD is an Angle of Attack indicator that alerts the pilot to the required AoA for landing. In flight, it also will alert the pilot when the angle of attack reaches 25 degrees, upon which the Fly by Wire system will prevent further loadings to protect the aircraft from stalling or departing controlled flight.

To the right of the HUD is an indicator for air-to-air refuelling. This will indicate when the refuelling door is open, and when fuel is flowing. Just below the HUD at the top of the UFCP are the selector buttons for controlling the flight computer's main menu.

LEFT SIDE PANEL



From the left side, OBOGs and BIT controls, Fly By Wire controls and trim wheels, Fuel dump, IFF, Lighting Panels, EPU, ELEC and Comms panels, Mains Power and ADF panels, NAV and Transponder Panels.

The throttle in this image is hidden using the small “Threat” warning volume knob, just forward of the COMMS display.

The large yellow handle to top-right is the canopy switch cover. Due to the difficulty in seeing the switch behind the cover from the normal camera position, the yellow handle itself opens and closes the canopy.

The Ejection Seat arming lever is visible to the lower right of the image.

RIGHT SIDE PANEL



From the left side, Whiskey compass, Fuel display, hydraulic pressures, Oxygen contents, cabin alt and analogue clock, Warning Annunciator panel, control column, display selector switches, internal lighting knobs, oxygen switches, engine and windscreen de-ice panel, Covers / Chocks / Ladder panel, INS panel.

The control column can be hidden by selecting the Warning Annunciator panel and clicking once.

REAR COCKPIT MAIN PANEL



The rear seat position of the F-16D Fighting Falcon is most commonly used by instructors when training new pilots as they learn to fly the F-16. The HUD and Multi-Function Displays are repeaters from the front cockpit. The analogue instruments, warning panel and all flight instruments are fully operational, allowing for instructional flights.



In all versions of the Viper, it is possible to display in a “tablet” form, the main digital navigation computer. Simply select the air vent between the pilot’s legs and the display will appear, allowing you to enter more complex flight plans and other navigational data.

FLYING THE F-16C FIGHTING FALCON



The SC Designs F-16 Fighting Falcons are not designed to be “study level”. However, they are 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. It is required that you learn the limitations and systems of this rendition of the aircraft in order to master it. The flight model has been tested by a serving F-16C pilot and is considered a very good rendition of the aircraft’s performance within Microsoft Flight Simulator.

While we have kept the essential systems and quirks to a minimum in order to preserve as much “fun” in the flying as we can, the Fighting Falcon would not be a Fighting Falcon without them. A handy tip for newcomers is that although the F-16 is famous for its ability to perform 9G manoeuvres, simply pulling hard on the stick and expecting the airplane to “turn on a dime” will likely result in disappointment, a dramatic loss of airspeed and an impending argument with the ground below that you’re unlikely to win.



If you're starting from cold-and-dark, on the apron, you will find that the aircraft will have its chocks and covers deployed. The F-16 Fighting Falcon is fitted with an Auxiliary Power Unit, so engine-start is a fairly straight-forward procedure with no ground power option required.

Start by using the checklists, detailed on the next page.

CHECKLISTS



The INTERACTIVE CHECKLIST is an essential tool in MSFS, in order to find your way around the cockpit and learn how to start up and shut down the aircraft. This will show you where everything is, without the need for complex lists in this manual.

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-16 Fighting Falcon, you must then sacrifice fuel-load to keep the weight below the maximum of 42,300lbs. F-16 Fighting Falcons can take-off with external tanks, the required ordnance for the mission, and a low fuel-load before then going to join with a tanker to air-to-air refuel. Once airborne, the aircraft could then fill up with fuel. You can do the same after taking off and climbing out, by extending the refuel probe – doing so will gradually increase your total fuel load.



The PAYLOAD MANAGER is used to arrange your fuel load and ordnance once you have started your flight in the simulator, whether at the apron or on the runway. Simply fill in the values for your weapons to show (AIM-9s on the wingtips here) and also fill up with the desired amount of fuel.

During take-off, the F-16C Fighting Falcon rotates at around 120 knots, with the nose up at ten degrees and held there until the aircraft “unsticks” itself from the runway. Gear retraction should be brisk as the aircraft will accelerate rapidly in full afterburner. Ensure before rolling that your elevator trim is set to about 20% UP, and then *leave it there*, even after take-off.

The aircraft’s auto-trim system will engage above 185 knots to assist the pilot in precision control, while the flaps and slats will retract automatically. Cruising airspeed for the F-16 is anywhere between 350 and 450 knots depending on mission profile. When on Combat Air Patrol, the Fighting Falcon can “loiter” on station at 250 knots to conserve fuel.

FIGHTING IN THE F-16 FIGHTING FALCON



The F-16 was designed as a born-and-bred air-combat platform, and its handling characteristics reflect that. Being rough with the controls or just pulling on the stick and expecting to get 9Gs everywhere, will get you nowhere. In real life, as per this rendition of the F-16 Fighting Falcon, the aircraft is limited in performance in certain areas of the flight envelope. Above certain weights, the Fighting Falcon is limited to 7G, for instance. In addition, the aircraft is Angle-of-Attack limited to 25 degrees AoA. Attempting to exceed this limit will result in the Fly by Wire system arresting control of the aircraft until the AoA is below 25 degrees.

These limitations are maintained via the aircraft's internal systems, which control manoeuvring performance based on factors such as weight and airspeed.

AUDIO WARNING TONES (BITCHIN' BETTY)

A series of automated warning tones are designed to alert the crew of the F-16 when conditions of flight are encountered that can threaten the safety of the aircraft.

1. **Compressor stall warning.** This warning will sound when the engine is nearing compressor-stall conditions.
2. **Low altitude warning.** This warning will sound when the aircraft is descending through 10,000ft, and is designed to alert the crew to ground proximity (given the F-16's high velocities)
3. **Landing gear warning.** If the Fighting Falcon slows to landing airspeeds when below 10,000ft, this warning emits a continuous tone until the undercarriage is lowered.

LANDING THE F-16C



Always lower your undercarriage at about 250 knots indicated, then extend the airbrakes and slow down gradually to a circuit airspeed of around 180 knots. Manual trim will be required to balance the aircraft, but if you have left it alone during the flight as you should have, it should already be in the right position for most of the circuit.

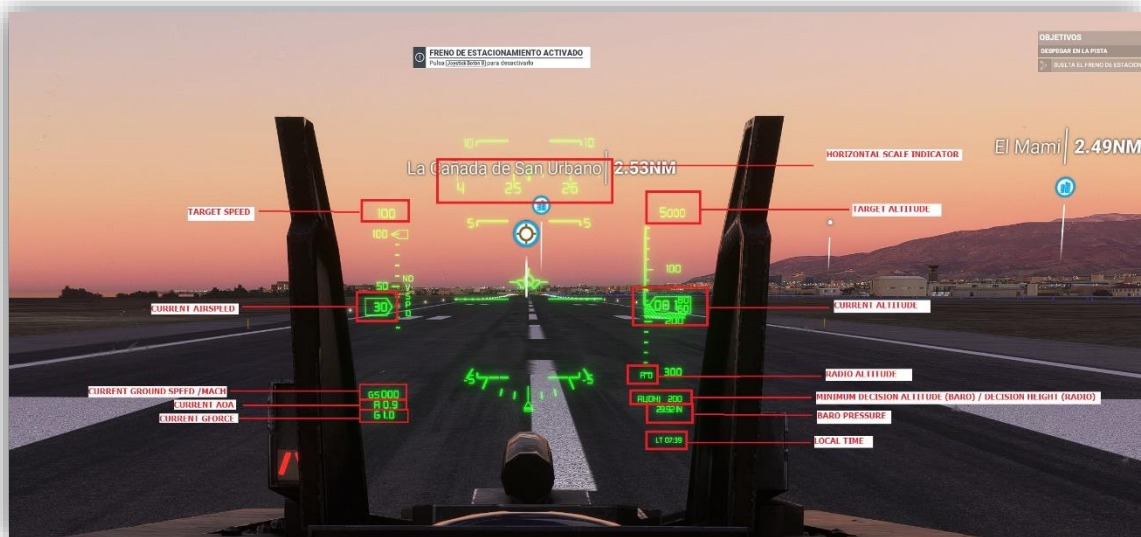
The F-16 prefers to land with between 9 and 12 degrees Angle-of-Attack. When on the correct AoA, the AoA indicator to the left of the HUD will display a green circle. The F-16C has a high wing loading and a narrow undercarriage and therefore is difficult to land, especially in crosswinds.

Airspeed will take care of itself as long as AoA remains consistent within this range, as landing airspeed is itself dependent upon aircraft weight, wind direction, air temperature and density and other factors. The Velocity Vector here is parallel with the glideslope ladder's centre, yielding a descent rate of 500 fpm and a three-degree glideslope.

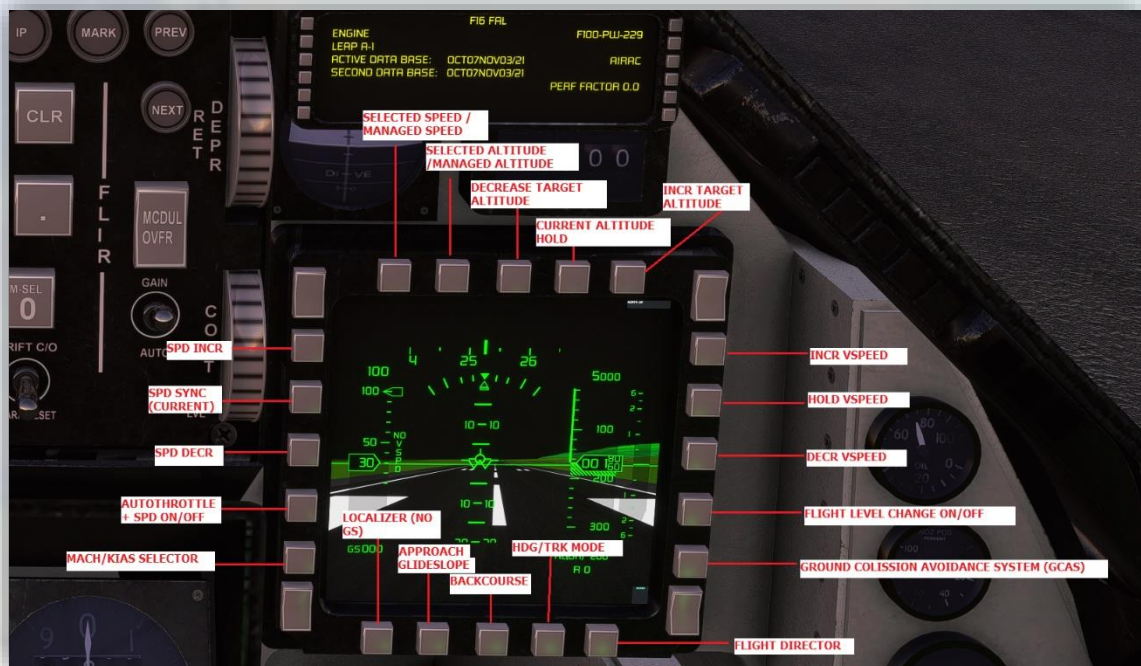
A manual flare at around 50ft altitude from the runway, and cutting the throttle to idle power, will allow the F-16 to settle upon the runway.

THE F-16C AUTOPILOT

HUD SYMBOLOGY:



AUTOPILOT BUTTONS AND KEYS:



1. **SEL/MNG SPEED TOGGLE:** allows you to select between managed or selected speeds for use with autothrottle. Default mode is “selected airspeed”, allowing to increase / decrease the speed manually by using the spd + spd- keys. Managed speeds will handle the predefined speeds through the different flight phases as long as there is a flight plan (take off, climb, cruise, descent and approach). Avoid using managed speed during free flight. Requires ATHR enabled.

2. **SEL/MNG ALTITUDE TOGGLE:** allows you to select between managed or selected altitude for use with Autopilot. Default mode is “selected altitude”, allowing to increase / decrease the Altitude manually by using the alt + alt- keys. Managed altitude will handle the predefined altitudes through the different waypoints as long as there is a flight plan (is important that a flight plan has the waypoint altitudes well defined, so the aircraft will climb or descend according the next waypoint altitude, otherwise use selected altitude to manually correct, or the aircraft will maintain the previous WP altitude). Avoid using managed altitude during free flight or in landings since it won't work like approach mode following a glideslope (use Approach + GS instead). Requires ALT HOLD enabled.

3. **DECR TARGET ALTITUDE:** Allows you to decrease a target altitude and the aircraft to reach it as long as the autopilot is on and using the ALT, VS or FLC modes. **Once the current altitude reaches the target altitude, alt hold will be activated.**

4. **ALT HOLD:** Activates the current altitude hold mode when AP is ON. It can be deactivated if the altitude entered is 0. Otherwise, pressing this button will synchronize the current altitude and deactivate the VS or FLC or ATT modes if they were previously activated.

5. **INCR TARGET ALTITUDE:** Allows you to increase a target altitude and the aircraft to reach it as long as the autopilot is on and during use of ALT, VS or FLC modes. **Once the current altitude reaches the target altitude, alt hold will be activated.**

6. **INCR VSPEED:** allows you to increase the vertical speed or flight path angle, when the autopilot is on, VS Hold is activated, and a target altitude has been defined that differs from the current altitude.

7. **VSPEED HOLD:** Allows you to activate the vertical speed mode when the autopilot is on. If a target altitude is defined and this mode is activated, it will be possible to control the vertical speed ascent or descent rate in Feet per minute using vs + and vs-. During TRACK mode the Vertical Speed will switch to FPA (Flight path angle, in Degrees). **Once the current altitude reaches the target altitude, alt hold will be activated.**

8. **DECR VSPEED:** allows you to increase the vertical speed or flight path angle, when the autopilot is on, VS Hold is activated, and a target altitude has been defined that differs from the current altitude.

9. **FLIGHT LEVEL CHANGE (FLC):** If a target altitude is defined, the aircraft will establish a variable vertical speed depending on the current speed or target speed. In other words, the plane will ascend or descend maintaining a fixed speed. This speed can be managed with ATHR or manually with the throttle. Using this mode requires practice and understanding whether it is handled with an autothrottle or manually, since not used correctly the plane can acquire a great vertical speed or none at all. **Once the current altitude reaches the target altitude, alt hold will be activated.** Note: By default, during a flight plan using Managed Speed in conjunction with Managed Altitude and Managed Heading will base altitude changes using FLC mode along the different flight phases, but can be overridden with the other modes.

10. **GACS:** This is the so-called GROUND COLLISION AVOIDANCE system used by some combat aircraft such as the F-16 and its implementation is experimental. This system by default is deactivated, but its function is to avoid collisions with the surface in occasions in which the pilot loses consciousness or it is necessary to correct a horizontal trajectory when autopilot + alt hold is enabled and when a terrain elevation is detected in the horizon. The aircraft will climb to a minimum safe altitude of 3000 feet from radio altitude.

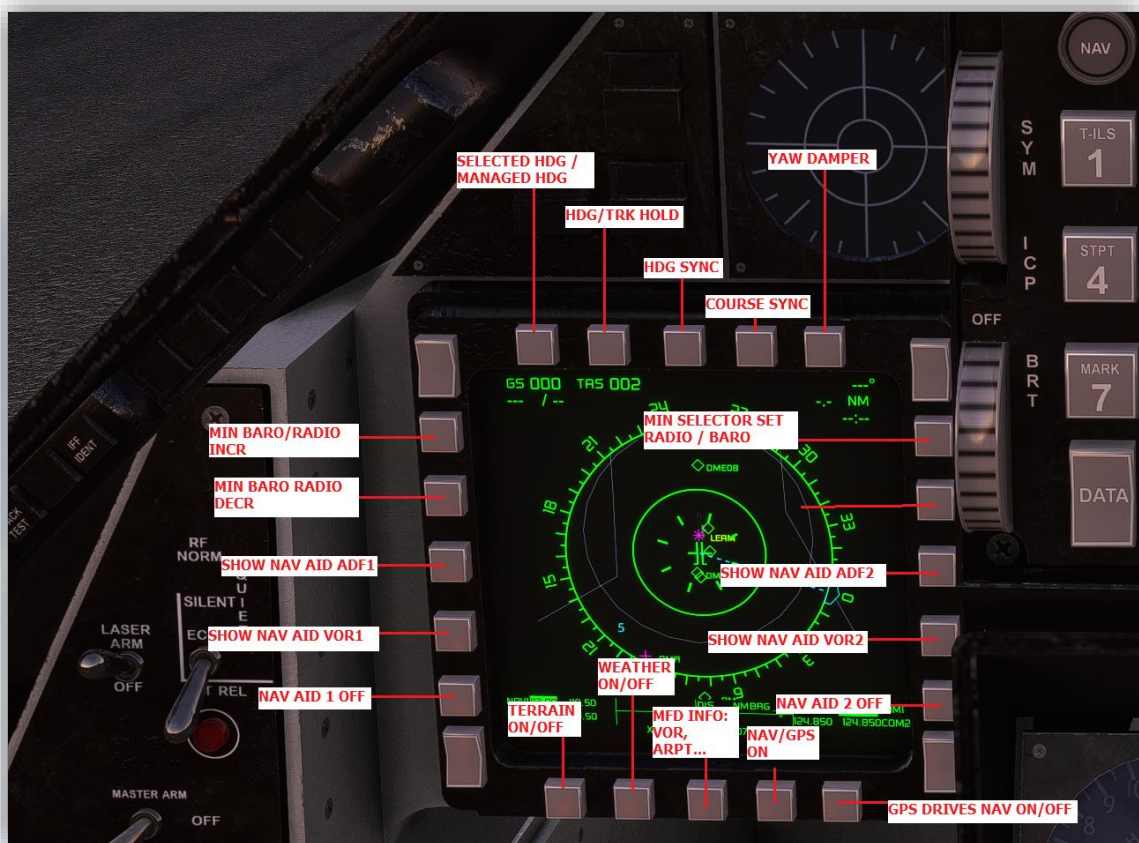
11. **SPD INCR:** Allows you to increase a target selected speed (Air calibrated speed or Mach) when Autothrottle is on. It won't by any means work in managed speed mode, only during selected speed.

12. **SPD SYNC:** It allows to synchronize the current speed (Air calibrated speed or Mach) before and during the use of autothrottle.

13. **SPD DCRS:** Allows you to decrease a target selected speed (Air calibrated speed or Mach) when Autothrottle is on. It won't by any means work in managed speed mode, only during selected speed.

14. **AUTOTHROTTLE:** It allows the activation / deactivation of autotrottle + speed mode. As a precaution, during the approach mode enabled for ILS or RNAV landings, at a radio altitude lower than 80 feet, it will automatically disconnect itself to allow you to brake the aircraft in ground. Otherwise, deactivation must be manual by pressing this button.

15. **MACH/KIAS SELECTOR:** used with autothrottle on, it will allow you to select the target speed in mach or kias during use with spd + or spd - buttons



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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.