FS FALCON

Lago
LOOKING AHEAD

INDEX

INTRODUCTION

Everything you can say about the F-16 has been said. As this aircraft gets close to the end of it's useful life, it is as alive as ever. As I write this the F-16's are fighting over Iraq in the second Gulf War, doing what it was designed for, dominating the sky. The familiar shape of the sleek F-16 will be with us for a long time and when it no longer flies it should be like the Spitfire, something that generations after us will see as a small miracle. Old pilots will tell young pilots about an aircraft that was flown by wires and the pilot. An aircraft that seemed to know where the pilot wanted to go. If there has ever been a 'pilots' aircraft, this one is it.

And that's why we decided to make one for FS2002 (and CFS3). The main problem, during development was that we had so much fun that we could not stop flying the moment we had a model in the air. Forget about airways, navigational aids, rules and regulations. This is one aircraft to have fun with.

This product is dedicated to Glenn Johnson, who died shortly before we could complete it. Every time we hear the roar of the engine, we know it is his work.

Mathijs Kok
LAGO

(Please note the manual was written for the FS2002 version, but most will apply for the CFS version as well.)

Please note down your serial number, name used for registration and the date. You need those for ANY update and when you want to re-install. We will send out codes that are lost, but those requests have a very low priority.

Serial number .....

Your name.....

Date you received your Registration .....

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FSUIPC	Pete Dowson (this is a freeware module, not copyrighted by LAGO)

SYSTEM REQUIREMENTS

- Pentium II 700
- 128 Mb RAM
- 40 Mb of free available space on the hard disk
- Sound card
- Microsoft Flight Simulator 2002 (Standard or Professional edition) or Microsoft Combat Flight Simulator 3
- Microsoft Windows 98 (SE), Windows ME, Windows 2000, or Windows XP operating system (Windows 95 'might' work but we do not support it any more as MS also stopped supporting it, Windows NT will NOT work).
- Adobe Acrobat® Reader 5 to read and print the manual ([1])
- A 3D video board with at least 32Mb RAM, 256 Mb RAM internal memory and a Pentium III 600+ are highly recommended.

(1) Available for free, download at:
http://www.adobe.com/prodindex/acrobat/readstep.html

CONVENTIONS USED IN THIS MANUAL

- All references to file names, extensions and directories are shown as follows:
- FILENAME.EXT, .EXT, \DIRECTORY
- The FS2002 main folder (that is standard C:\PROGRAM FILES\MICROSOFT GAMES\FS2002 but can be different on your installation) is given as [fsmaindir] in the manual.
- If you have to type some text with the keyboard, the text is shown in Courier:

```
text typed by you
```

- If you have to press a key, that key will be represented within square brackets. For example:
- [B] means that you must press the B key on the keyboard.
- [ALT]+[F4] means you should press [F4] key while holding down the [ALT] key at the same time.
- All references to menu (and submenu) items are shown as follow: "Option | Preferences..."
- Buttons are shown as follows: <Cancel>
- When percentages are used 0% is always bad, 100% is always okay.

HOW TO CONTACT TECHNICAL SUPPORT

Before contacting technical support, be sure to visit **both** the FAQ and Download pages; you will find a link to both pages at:

WWW.LAGOONLINE.COM

There you will find the latest version and/or patch for this product. Moreover, in the FAQ (Frequently Asked Questions) page, you will find a list of general problems and solutions. Print the FAQ page and read it carefully: **it may already include the answer that you are looking for!**

For person-to-person help visit the "Sky Expert" section of our website or use the support forum on www.lagoonline.com.

Describe your problem in as much detail as you can. Our Support Officers must be able to follow your instructions step-by-step in order to recreate the same problem on their PCs!

NOTE: Technical support is available in English only!

INSTALLATION

Depending on the method you used to get the FALC_***_ENG.zip file – most probably by downloading it from the Internet – you should now have it located on your hard disk. Unpack this zipped file to any directory on your hard disk.

BE SURE TO CLOSE ANY OTHER APPLICATION BEFORE PROCEEDING!

- Double click on the FALC_***_FS2002_ENG.EXE file icon.
- Follow on-line instructions.

NOTE: If you need to reinstall FS Falcon be sure to uninstall it first.

(1) The installation file name reflects the version number of the product. For example FALC_100_FS2002_ENG.EXE is the initial release of the product (version 1.00). The [ENG] part in the file name represents the language.

DE-INSTALLATION

DO NOT MANUALLY REMOVE THIS PRODUCT !!!

To uninstall FS Falcon for FS2002:

1. Exit FS2002.
2. Open the “Control Panel”.
3. Double-click on <Install applications> and select “LAGO FS Falcon for FS2002”.
4. Click on <Add/Remove...>.
   You will be asked to confirm the operation: click on <Yes>.

At the end of the uninstall procedure, you may be told that one or more files/directories cannot be removed, these are all files you have created by yourself in the original FS Falcon directories. We feel that it is better if you manually remove these files/directories after the uninstall procedure is complete to avoid removing your own data!

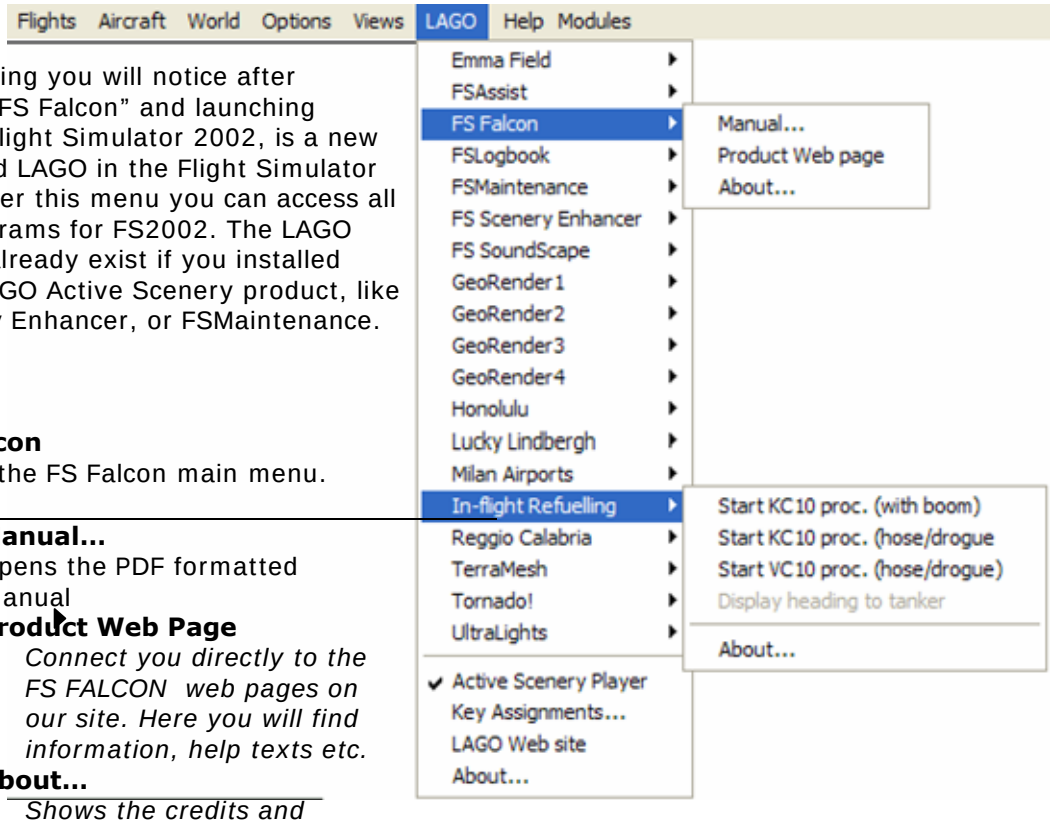
If you do not have ANY other LAGO product and would like to remove the LAGO dropdown menu, simply remove the ViMaCore.DLL from the [fsmaindir]\Modules folder.

To uninstall FS Falcon for CFS3:

1. Exit CFS3.
2. Open the “Control Panel”.
3. Double-click on <Install applications> and select “LAGO FS Falcon for CFS3”.
4. Click on <Add/Remove...>.
   You will be asked to confirm the operation: click on <Yes>.

At the end of the uninstall procedure, you may be told that one or more files/directories cannot be removed, these are all files you have created by yourself in the original Tornado directories. We feel that it is better if you manually remove these files/directories after the uninstall procedure is complete to avoid removing your own data!

THE LAGO MENU (FS2002 ONLY)



The first thing you will notice after Installing "FS Falcon" and launching Microsoft Flight Simulator 2002, is a new entry called LAGO in the Flight Simulator menu. Under this menu you can access all LAGO programs for FS2002. The LAGO entry will already exist if you installed another LAGO Active Scenery product, like FS Scenery Enhancer, or FSMaintenance.

LAGO ▶

FS Falcon
This is the FS Falcon main menu.

Manual...
Opens the PDF formatted manual

Product Web Page
Connect you directly to the FS FALCON web pages on our site. Here you will find information, help texts etc.

About...
Shows the credits and version number of FS Falcon.

In-flight Refueling ►
Opens the In flight Refueling module.
You will find all information on this menu item in the chapter near the end of this manual.

√ Active Scenery Player
To use any of our Active Scenery products this menu item should be active.

Key Assignments...
When some of our modules need special keys they can be changed here. The Refueling module does use some keys.

LAGO Web site
Links to the www.lagoonline.com *web site.*

About...
Shows the credits and version number of ViMaCore.dll, the file that creates the link between our products and FS2002.

ANIMATIONS

There are many small and large animations in this product, but there two that are very special and you really should use them. Pressing [SHIFT]-[E] will make the canopy open and [CONTROL]-[W] will make the pilot(s) take off their visors. Also check out the animation of the engine nozzle that will expand and contract depending on the throttle setting.

FIRING THE GUN

When you are in the air and squeeze the joystick trigger you will hear the Gatlin gun file and you will see tracer rounds shooting out. If you use an outside view you will also see the smoke created by the gun firing at an astounding 6000 rpm. Due to some Fs2004 specific limitations there might be some conflicts between the different sounds (like the gun sounds and the Bitching Betty warnings as “pull up”). Please note that the F-16 gun takes a moment to spool up (it rotates) so it takes up to 0.5 seconds before it starts to fire.

FSUIPC

The famous FSUIPC module made by Pete Dowson is needed for the radar gauge. It will be installed automatically. We strongly advise you to read the documentation you will be able to find on **www.schiratti.com/dowson.html** as this module does way more then just help run the radar gauge! FSUIPC is not a freeware module, but the we paid for the rights to get the TCAS data so even the unregistered version will be enough to get full functionality in the LAGO FSFalcon.

USE AS AI TRAFFIC

The F-16 is optimized to be used as AI traffic aircraft as it includes a simplified LOD model, so seen from a distance the aircraft will have a very low impact on frame rates.

HOW TO FIND THE AIRCRAFT IN FS2002

You might be surprised by this, but you will find the A and B models under the manufacturer **General Dynamics** and the C and D models under **Lockheed Martin**. This is because General Dynamics was bought in December 1992 by Lockheed. So take care not to miss half the aircraft!

THE CFS3 VERSION OF THIS AIRCRAFT

The CFS3 version of this product is far less complex and extended as the FS2002 version. This is mostly due to the limited options of CFS and partly because we see the CFS version as a ‘extra’ and not the main product. It only has 3 models (you will find all of them in under the USA tab) but it has an extensive weapons set. Of course guided weapons are not possible in CFS, just as the radar and the refuelling options. But it IS fun to fly and be able to drop your weapons and shoot some other aircraft.

The installers for both versions are 100% independent (two separate files) but the serial code you received works for both versions.

F-16 FALCON HISTORY

Started as a project to construct a small high maneuverable light fighter, and at lower costs than ever before the Tactical Fighter Requirements Division of Air Force Headquarters funded a study in the early seventies for the preliminary design and analysis of several configurations for a lightweight fighter.
What they wanted was amongst others low wing loading and high thrust loading; knowing that this was very difficult because of the contradistinction: low wing loading means larger wings thus more weight and more drag and high thrust loading (thus more powerful engines) means higher fuel consumption and thus short range. The Air Force needed a lower-cost alternative to the F-15 in modernizing and expanding its air force and the due to the political and economic situation at this time (oil crisis!!) the United States needed a low cost fighter for export to replace a large number of aging aircraft of NATO member countries.

PROGRAM

General Dynamics and Northrop were the finalists out of the ten competitors for the competition in April 1972. They received each about $40 million to create two prototypes. General Dynamics had the first one, Model 401, completed in December 1973 in Fort Worth and it was transported to Edwards AFB, California, on 8 January 1974. Phil Oestricher, the test pilot Of General Dynamics flew the YF-16 on January 20 1974 for its maiden flight, continued by its first official flight at February 2nd.

Northop rolled out the P-600 in April 1974 at Hawthorne, California and named the YF-17 it made its first flight at Edwards Air Force Base on Mat 9th.
December 1974 ended the competition and in 1975, on January the 13th the Secretary of the Air Force John McLucas assigned the YF-16 from General Dynamics as the winner: “The airplane with the best performance at the lowest cost.” (Secretary of Defense James Schlesinger).

TECHNOLOGY

Compared with the YF-17 the YF-16 had a mission radius advantage of 200 nautical miles; a sustained turn rate advantage of 0.5 degree/second at Mach 1.2 at 30.000 feet, a fifteen second accelerating advantage from Mach 0.9 to Mach 1.2 at 30.000 feet and a ferry range advantage of 350 nautical miles.

The most important piece of the YF-16 that has been made is the Electronic Flight Control System. For the first time ever an aircraft was not flown by cables linking the stick to the flight control surfaces, but the complete system was electronic and used servos to control the rudder, ailerons etc. This fly-by-wire flight controls allow much more precise control of the aircraft than the heavy and more complex hydro mechanical flight control system. Not only the flying qualities improved, but safety as well, because it imposes g limits to keep the pilot from overstressing the airframe and angle of attack limits to prevent stall and departing. The aircraft will (try to) protect the pilot from dangerous commands. In this day and age of digital aircrafts (most obviously the Airbus aircraft that were designed from the ground up with this in mind) it is hard to imagine what a revolution fly-by wire was. For example as gun firing normally influences the flight behavior of the aircraft this system automatically compensates these forces. It is designed so well that there is even no mechanical back-up needed.

Conventional aircraft require constant downward loads on the horizontal tail to maintain flight level, the F-16 FCS however is designed with “relaxed static stability”: high speed computers (compared to the machine you run the simulator on they seem incredibly slow however) stabilize the aircraft at any desired cruise speed or maneuver condition by making quick, small adjustments to the control

surfaces so controlled flight is maintained. Without the computer the aircraft can not be flown. Even the best pilot would not be fast enough to react.

MODELS AND PRODUCTION

In 1975 when the U.S. Air Force started its production, Belgium, The Netherlands Denmark and Norway followed with their orders a few months later, bringing the initial program to 998 aircraft. Ten years later, 17 air forces in 16 nations had ordered more than 3,000 F-16s. In 1983 the 1000th aircraft was delivered, the 2000th in 1988, the 3000th in 1991 and the 4000th in 2000. During its production time the F-16 had of course extensive changes, i.e. choice of engines, night attack capabilities etc. The MLU (Mid-Life Update) started in 1991, modernizing the avionics with the latest technologies, cockpit and the latest weapons and added 'over the horizon' capability. Nowadays more than 4,200 F-16's to 19 countries have been delivered.

F-16 are notoriously difficult to divide into models and variants. 'Blocks' and 'models' are intertwined into a bewildering list. But here are the most important variations.

Block 1,**Block 5 and Block 10** for USAF and the first European countries.
Block 15 two hardpoints added to the chin of the inlet, larger horizontal tails, wide-angle Head-Up-Display, system for 'over the horizon' weapons
Block 20 increased maximum weight for 9 g maneuvers, MLU cockpit, avionics and other provisions
Block 25 First F-16C/D models, increased multi role capacity
Block 30/32 two new engines: F110-GE-100 and F100-PW-220. computer memory expansion and seal-bonded fuselage fuel tanks
Block 40/42 Various modifications/product improvements include the chaff/flare dispenser and the advanced radar warning receiver.
Block 50/52 Capable of using the Lockheed Martin low-altitude navigation and targeting for night (LANTIRN) system**.**
Block 60 larger fuel tanks for greater range, new cockpit displays, an internal sensor suite, a new mission computer and other advanced features including a new agile beam radar.
Block 60/62 Projected development, subject to customer demand. No firm configuration, specifically designed for the United Arab Emirates.

F-16A Pratt & Whitney F100-PW-200 turbofan, rated at 12,240 lb.s.t. dry, 14,670 lb.s.t. full military, and 23,830 lb.s.t. with afterburning.
Maximum speed: Mach 2.05 at 40,000 feet. Service ceiling 55,000 feet. Maximum range 2400 miles. Initial climb rate 62,000 feet per minute.
Dimensions: wingspan 32 feet 9 1/2 inches, length 49 feet 3 1/2 inches, height 16 feet 8 1/2 inches, wing area 300 square feet.
F-16B Standard tandem two-seat version of F-16A; fully operational both cockpits; fuselage length unaltered; reduced fuel.
F-16C Current production version, capable of all-weather operations and compatible with Beyond Visible Range (BVR) missiles.
F-16D Standard tandem two-seat version of F-16C.
F-16 Mid-Life Update (MLU) provides the A and B models with new radar, cockpit and computer, which makes it possible to fly night and day missions and all weather conditions. Also capable of carrying modern weapon systems.

In it's complete development the external model hardly changed at all. Because of the excellent aerodynamic and structural design of the original F-16, the external lines never needed serious change. The F-16's growth potential, however, has been fully utilized. The aircraft has undergone six major block changes incorporating four generations of core avionics, five engine versions, five radar versions, five electronic warfare suites and two generations of most other subsystems.

FUTURE PLANS

As there are already unmanned aircrafts, the so-called Uninhabited Combat Air Vehicles (UCAV), Lockheed Martin is researching a demonstration type of an unmanned F-16 to prove autonomous vehicle control, up-link command technologies, and to develop operational requirements. But also there are studies to modify the F-16 in a remotely piloted drone: the aircraft could be piloted from the ground or from the cockpit.

Another idea, the F16 UCAV has a sixty-foot wingspan and 22,100 pounds of internal fuel capacity. The configuration could maintain an un-refueled, eight-hour presence on a nominal combat air patrol mission. A prototype could be built and flying in less than two years.

The Joint Strike Fighter of Lockheed-Martin and the EuroFighter, build by a consortium of Germany, Italy, Spain and the UK, is chosen by most NATO countries to take over from the F-16 in the next decade. Many feel these aircraft will be last manned fighter aircraft. In that whole history the F-16 holds a very special place, it's the only aircraft that has NEVER been beaten when opposing similar numbers. It never lost a head to head combat situation.

SPECIFICATIONS, DESIGN CHARACTERISTICS

GENERAL DESIGN

The F-16 was designed as a compact air superiority fighter with the main role to take control over the sky and to make sure enemy aircraft can not use that airspace. The high maneuverability, long range and high speed potential make it an ideal aircraft for all weather operations. It also was designed to have more thrust then weight, meaning it could climb vertical for a limited duration. It's even today the best aircraft to have if the combat situation has a high degree of vertical distances (where the enemy is higher then yourself). It has however taken on many roles by now and is also a formidable ground attack aircraft, the maneuverability making the dropping of 'dumb' bombs very accurate. Using smart weapons it is a good tank killer.

COCKPIT AND SYSTEMS

The cockpit of the F-16 is remarkable: the pilot has a **full** 360 degree view at eye level and above and a downward view of 15 degrees over the nose and of 40 degrees to either side. This bubble canopy is made of polycarbonate advanced materials. Some models have canopy coatings of gold film to dissipate radar energy. Together with radar-absorbing materials in the air intake this reduces frontal radar signature by 40 per cent. It is not a stealthy aircraft by design but it has a rather small radar cross section, certainly seen from the front.

The seat is inclined 30 degrees aft and the pilots knees and legs are raised in order to provide some extra physiological tolerance to high-g maneuvers. Because of the side mounted stick (first time this was ever done) and throttle control there is more space for the flat liquid crystal multifunction display instrument panels. The stick provide also more precise control under high-g maneuvers.

Advanced equipment like digital terrain system, modular mission computer, color video camera to record the pilot's view of the HUD is also being fitted. This head-up display from GEC-Marconi, combined with ergonomically located switches on the stick and throttle controllers (so called HOTAS, Hand On Throttle And Stick, system), allow the pilot to concentrate on combat instead of searching for cockpit switches or display screens.

The rocket powered ejection seat of McDonnell Douglas ACES II (Advanced Concept Ejection Seat), equipped with a vectored-thrust pitch control system is cleared for use up to a height of 50,000 feet and a speed of 600 (!) knots but can also be used when the aircraft is stationary on the runway.

WEAPON SYSTEMS

The F-16 can be equipped with just about any weapon that is in the NATO inventory, from dumb bombs to the most advanced bunker busters. Although designed as a air superiority fighter the aircraft has proven to be highly reliable as a close support ground attack aircraft that is maneuverable enough to drop very close to friendly troops. Although certainly not a strategic bomber many models are even capable of dropping nuclear bombs.

The best known weapons for the F-16 are without a doubt the AIM-9L Sidewinder for medium to close air combat. This all aspect missile (meaning it does not have to be fired from behind the enemy) is a very lethal weapon and highly cost effective.

For long range engagement the AIM-120 AMRAAM is the best option. With a range of over 20 miles and with its own radar it is capable of attacking most aircraft without getting in range of it's weapons. It is a very expensive but effective weapon.

The internal gun (although not used a lot anymore) is a M61A1 20mm cannon, firing over 6000 rounds per minute. For ground attacks there is a huge choice of weapons, from dumb (but large) bombs to the most modern bombs.

SPECIFICATION

Manufacturer:	Lockheed Martin Tactical Aircraft Systems Fort Worth, Texas
Wingspan:	31 feet 0 inches without tip-mounted AAMs 32 feet 9.75 inches with tip-mounted AAMs
Wing Aspect Ratio:	3.20 : 1
Fuselage Length:	49 feet 4 inches
Overall Height:	16 feet 8.5 inches
Tail plane Span:	18 feet 3.75 inches
Wheel Track:	7 feet 9 inches
Wheel Base:	13 feet 1.5 inches
Wing Gross Area:	300.0 sq feet
Flapperons (total):	31.32 sq feet
Leading Edge Flaps :	36.72 sq feet
Fin:	43.10 sq feet
Rudder:	11.65 sq feet
Tail Surfaces:	63.70 sq feet (GE Variant)
No. Engines:	One
Eng Manufacturer:	General Electric
Engine Designation:	F110-GE-100 turbofan
Engine Power:	27,600-lbs with afterburning (P&W Variant)
OR	
Engine Manufacturer:	Pratt & Whitney
Engine Designation:	F100-P-220 turbofan
Engine Power:	23,450-lbs with afterburning
Empty Weight:	18,238-lbs with F100-PW-200 turbofan 19,020-lbs with F110-GE-100 turbofan
Max External Load: 1	2,000-lbs
Max Comb Takeoff Weight:	23,765-lbs with the F110-GE-100 turbofan
Maximum Takeoff Weight:	27,185-lbs (F-16C with a F110-GE-100) for an air-to-air mission without drop tanks 37,500-lbs (F-16C Block 30/32) with maximum external load 42,300-lbs (F-16C Block 40/42) with maximum external load
Wing Loading:	95.0-lb/sq ft at 28,500-lbs AUW 141.0-lb/sq ft at 42,300-lbs AUW
Thrust/Weight Ratio (cln):	1.1 to 1
Combat Takeoff Weight:	23,765-lbs with the F110-GE-100 turbofan
Maximum Internal Fuel:	6,846-lbs
Maximum External Fuel:	6,760-lbs
Maximum Ordnance:	20,450-lbs for a 5-g maneuver 11,950-lbs for a 9-g maneuver
Maximum Level Speed:	Above Mach 2.0 at 40,000 feet
Service Ceiling:	More than 50,000 feet
Radius of Action:	852-miles on a hi-lo-lo-hi mission with two 2,000-lb bombs, two Sidewinders, 1,040 US gallons external

	fuel, tanks dropped when empty 392-miles on a hi-lo-lo-hi mission with four 2,000-lb bombs, two Sidewinders, 300 US gallons of external fuel, tanks retained 230-miles on 2 hour 10 min CAP mission with two Sparrows and two Sidewinders, 1,040 US gallons of external fuel 818-miles on a point intercept mission with two Sparrows and two Sidewinders, 1,040 US gallons of external fuel
Ferry Range:	2,417 miles with drop tanks
Symmetrical g-Limits:	+9 with full internal fuel
Maximum Climb Rate:	50,000 feet per minute at sea level
Typical Take-Off Run:	2,500 feet at MTOW
Typical Landing Run:	2,500 feet at normal landing weight
Cannon:	One internal 20-mm M61A1 Vulcan cannon with 511 rounds
AAMs:	Wingtip launch rails for AIM-9L/M/P Sidewinder missiles Alternatives to Sidewinder are MATRA Magic 2 or Rafael Python 3
Pylons:	Centerline pylon stressed for 2,200-lbs at 5.5-g load; 1,200-lbs at 9-g load Inboard wing pylons stressed to 4,500-lbs at 5.5-g load; 2,500-lbs at 9-g load Center wing pylons stressed to 3,500-lbs at 5.5-g load; 2,000-lbs at 9-g load Outboard wing pylons, usually used for additional AIM-9 carriage, stressed to 700-lbs at 5.5-g load; 450-lbs at 9-g load
Unguided Bombs:	Most unguided weaponry is authorized for carriage, including Mk 82 bombs and cluster munitions on triple-ejector racks, or Mk 84 bombs carried singly on wing pylons.
Guided Bombs:	AGM-65 Maverick anti-armor missile and Penguin anti-ship missile (Norway). Pakistani aircraft equipped with ATLIS laser-designator and Paveway LGBs One internal 20-mm M61A1 Vulcan cannon with 511 rounds
Smart Weapons:	The F-16C/D is basically similar to the F-16A/B, but with greater accent on "smart" weapons. Block 50/52 aircraft have full AGM-88 HJARM capability, while LANTIRN-equipped aircraft can autonomously launch GBU-10 and GBU-12 laser-guided bombs.

CONSOLE LAYOUT & PANEL NAVIGATION

We decided to give you a complete tour of the cockpit of a modern F-16, so we'll even show and explain the systems we didn't or couldn't simulate.

The F-16, being designed in the seventies, does not have many integrated systems and has a lot of switches and buttons. To allow the pilot the optimal view (the eyes of the pilot are still the best detection system) all these systems are located left and right of the pilot at the level of his seat. We decided to show all these panels in full detail, so we included 8 (!) full screen panels. Some parts slightly overlap and it might be that a function you need is on another panel. On each panel there is a simple graphics switching mechanism that allows you to jump to any other panel. The most bright section shows the panel you are currently on. Selecting one will always close the currently open panel. The side panels have been rotated so they appear as they would appear to the pilot. To open the panel switcher, click on the small red triangle in the lower right corner. Clicking on the top part (the HUD) will toggle the HUD on/off.

Main Front View (default)

This is the default view, showing all main instruments and a good bit of the world.

Main Front Instrument View

Now we have our heads down, we see the MFD in detail and can control all major flight and navigation instruments.

Right Aux Console

Looking right/front we have the Right Aux Console with some more gauges that show how your systems are doing and the main warning panel.

Left Aux Console

Left/front the Left Aux Console, the gear and auto pilot are the main instruments.

Right Forward Console

Looking directly right (under our wrist) the Right Forward Console actually has few systems that we can use, but the Air Condition is a vital system as it also controls cabin pressure.

Left Forward Console

Under out left wrist is the Left Forward Console. Here we can find the internal light, a lot of audio stuff, engine starter and the fuel selectors.

Right Aft Console

At your right elbow the Right Aft Console holds the anti ice systems and the avionics power panel.

Left Aft Console

At your left elbow the trims, the external lights and some test systems are located.

CONSOLE LAYOUT IN GRAPHICS

Main Forward

Main Front
Instrument View

Left Aux Panel

Right Aux Panel

Left Forward
Console Panel

Right Forward
Console Panel

Left Aft
Console Panel

Right Aft
Console Panel

SYSTEMS DESCRIPTION

We decided to combine a detailed description of the systems and the cockpit gauges and panels into one major Systems Description section. It is compiled in alphabetical order.

There are many systems we cannot even try simulate in FS2002 (and even less in CFS3). For starters the whole militairy communications with encryption etc., then there is the complete weapons system. But also less complex equipment as oxygen masks etc. When needed for checklists these systems will even be animated, meaning you can click the buttons and switch the switches even if there is no FS2002 function related to the switch. Some other panels are not simulated and not animated, they are just bitmaps. Sections that are documented but not active *are marked like this.* Some systems and panels have slightly altered functionality, for example because the switches for that function are not available (on the stick or throttle). These are *marked like this*. In some cases we also changed the bitmap to show the new function (like in the ICP) in some other cases we decided not to (like in the HUD Control Panel).

AIRSPEED INDICATOR (Center Console)

The airspeed indicator shows the current Indicated Airspeed. Please note that the extreme angles of attack and high G loads will influence the indicated airspeed to some degree. The speedometer of the F-16 is complex with a separate MACH readout. You'll probably find it much easier to use the speed readout in the HUD.

ALTIMETER (Center Console)

The Altimeter is a standard instrument similar to any you have come across in aircraft. It depends on barometric pressure and thus will only show the correct altitude if set to the correct pressure. Do not forget to set local pressure before you use it. The easiest way to do this is to press [B].

ANALOG CLOCK (Right Aux Console)

The analog clock, there is also a digital clock on the DED, is a simple mechanical clock that works completely independent of the aircrafts systems. It will probably not be running when you get into the cabin because it is not wound up. Use the right large knob to wind it up and to set it to the correct time (click and keep pressed down for 3 seconds in the simulation) if you listen carefully (and no other systems are running), you will hear the tic-tac of the mechanical clock. The small knob on the right top starts, stops and resets the stopwatch.

CABIN PRESSURE INDICATOR (Right Aux Console)

The cabin pressure indicator shows the current pressure in the cockpit. As the aircraft flies higher the pressure is slowly reduced to prevent a big difference between inside and outside pressure. At any indication over 10.000 feet the oxygen mask should be worn but it normally is worn from take-off to avoid oxygen deprivation. After any fast ascend or descend it is a good idea to check the instrument to make sure the internal and external pressures are not to far apart. Before you open the cockpit the pressure must be equalized with the outside pressure to prevent problems. (see Right Console – Air Conditioning panel to learn how to equalize the pressure).

AIR CONDITIONING PANEL (Right Front Console)

The Air Conditioning panel controls (aka Environmental Control panel) regulates the temperature in the cockpit and the pressure difference between the cockpit and the outside. They also regulate the pressure inside the external droptanks.

The Temp regulator controls the air conditioning on (AUTO / MANUAL) or off (OFF). If the engines are off you'll probably hear the airflow. The AIR SOURCE switch selects the source of the air conditioning. If set in OFF or in RAM the system is off, if set in NORM it is the standard setting for complete automatic temperature and pressure setting. If set in DUMP the system equalizes external and internal pressure. Depending on the pressure in the cockpit you will hear the air being pressurized. Sometimes this is rather annoying on your ears as well.

ANGLE OF ATTACK INDICATOR (Center Console)

The angle between the chord line and the direction of flight is called the angle of attack. Angle of attack has a major effect on the lift generated by a wing. In the F-16 it is a very important instrument. Not only because of the rather extreme AOA during landing (13 degrees) where the whole aircraft is used as an airbrake by keeping the nose up even when the main wheels are on the tarmac, but also because the flight model allows extreme AOA during flight.

ANTI G PANEL (Left Aft Console)

The Anti G panel allows the pilot to test the G-suit and Counter Pressure Vest. Pressing this button will inflate the G-pants and you will hear this.

ANTI ICE / ANTENNA SELECTOR PANEL (Right Aft Console)

The anti ice panel controls the ice prevention systems and switches on all the de-icing systems the F-16 has. The setting AUTO and ON both switch the system on, the Setting OFF switches it off. Anti ice systems include electrical heaters and the use of seventh stage bleed air for the nose cone, stabilizer and inlet structures (pitot tube).

The antenna Selector panel allows the pilot to select if the upper or lower IFF and UHF antennas should be used. In the NORM setting the antenna that receives the strongest signal is selected. This allows the transmitters and receivers to optimize communications.

The Antenna Selector system is not simulated.

AOA AND REFUEL / NWS INDEXER LIGHTS (Center Console)

The Angle of Attack (AOA) is the angle between the wings and the airflow. When the AOA is high there will be a large amount of lift. But if it becomes too high a stall situation can develop. On the other end of the scale, when the AOA is very small the aircraft will have a small frontal area and the air resistance will be low. So AOA big = loose speed, gain lift, AOA small = reduce drag, loose lift. It's a vital instrument during landing as the aircraft is landed with a serious pitch up attitude that must be maintained steady during the final approach.

On the left side of the HUD the Angle Of Attack lights will only be lit when the gear is down and locked and will help you reach the correct attitude. If the AOA is too high (>15 degrees) it will be red, if the AOA is correct (11> <15 degrees) it will have the green circle lit. When the AOA is too low (<11 degrees) it will burn yellow.

On the right side of the HUD the AR/NWS light will be lit if the aircraft has the Nose Wheel Steering active. Over 80 knots the NWS is switched off and the aircrafts direction is controlled with the rudder. The other two lights are used in in-flight refueling and cannot be simulated in FS2002 (even with our in flight refueling module!)

ATTITUDE DIRECTION INDICATOR (Center Console)

The Attitude Direction Indicator shows the pilot where the horizon is even when the horizon is not visible. The simple rule of keeping the brown parts below the horizon will help you to avoid crashing into the ground.

AUDIO 1 AND AUDIO 2 PANEL (Left Front Console)

Audio panel 1 and 2 control the volume of the selected communication channels.

As this system cannot be simulated in FS2002 the panel is not active.

AUDIOVISUAL TAPE RECORDER (Left Front Console)

The Audiovisual Tape Recorder (AVTR) records video captures of the internal gun camera.

As this system cannot be simulated in FS2002 the panel is not active.

AUTO PILOT PANEL (Center Console)

The AutoPilot panel allows you to set the (rather simple) auto pilot functions. All functions are controlled with just two buttons and the way they interact is not very logical, you will need to look at the schedule below to understand how they interact. Pitch and Roll axis can be switched independently from each other. The Terrain Following Mode that is installed on some models is not implemented in this aircraft.

The diagram below shows the combinations possible.

POSITION	FUNCTION
ROLL UP	*Fly HDG set by HIS bug*
ROLL CENTER	*Wing Leveler*
ROLL DOWN	In NAV mode: Fly VOR Radial Hold In TCN mode: Fly next GPS waypoint

POSITION	FUNCTION
PITCH UP	*Keep current altitude*
ROLL CENTER	*AP OFF*
ROLL DOWN	Keep current attitude (pitch hold)

AUXILIARY COMMUNICATION PANEL (Left Aft Console)

The Auxiliary Communication Panel controls the TACAN (Tactical Air Navigation) and IFF (Identify Friend and Foe) systems.
As none of these systems can be simulated in FS2002 the panel is not active.

ATTITUDE (BACKUP) DIRECTION INDICATOR (Center Console)

The Backup Attitude Direction Finder is a simple backup of the standard ADI. It runs completely independent of the main ADI and as such is supposed to stay usable even when major parts of the systems fail.

AVIONICS POWER PANEL (Right Aft Console)

The Avionic Power Panel switches the current on and off of any Single System. The Main Power Supply Switch is on the ELEC Panel on the Left Console

MMC *Not simulated*	MMC	Power on the Modular Mission Computer
	OFF	Power off the Modular Mission Computer
ST STA *Not simulated*	SMS	Power on the Stores Station System (ST STA)
	OFF	Power off the Stores Station System (ST STA)
MFD	MFD	Power on the Multi Function Displays
	OFF	Power off the Multi Function Displays
UFC *Not simulated*	UFC	Power on the Up Front Controls (UFC=DED)
	OFF	Power off the Up Front Controls (UFC)
INS *Not simulated*	OFF	Power off the Internal Navigation System
	STOR HDG	?
	NORM	?
	NAV	?
	CAL	?
	IN FLT ALIGN	After a total power loss in flight or switch the INS to OFF, turn to this position.
	ATT	?
GPS	GPS	Power on the Global Position System, in the simulator it opens the default FS2002 GPS.
	OFF	Power off the Global Position System, in the simulator it closes the default FS2002 GPS.
DL *Not simulated*	DL	Power on the Datalink (DL)
	OFF	Power off the Datalink (DL)

CHAFF / FLARE PANEL (Left Aux Console)

The Chaff / Flare panel belongs, together with the Threat Warning Prime, the Threat Warning Aux and the RWR (Radar Warning Receiver) to the EWS (Electronic Warfare System).
FS2002 is not able to animate any of these systems, so they are not simulated.

COMPASS (Right Aux Panel)

The compass on the Right Aux panel is a simple liquid alcohol magnetic compass that serves as a backup to the other compass systems. Please note that this makes the compass susceptible to deviations during acceleration and deceleration maneuvers and should not be used as guide except in level, steady flight. Pressing [B] in the simulation will align ALL compass systems on board to the correct heading. The heading indication on the HUD (that can be switched between magnetic and true heading) is of course your first source for heading information.

CAUTION PANEL (Right Aux Console)

This panel with 32 warning lights that light up when there is a problem in some system. Any light in this panel also lights up the MASTER CAUTION light. In the list below a green line indicates the warning is actually of some use in the simulator. Red lines indicate that the warning cannot be simulated or used in the simulator. This can be because the system is not part of FS (like the ejection seat) or that FS does not allow us to fail the system (like the Radar Altimeter).

FLCS FAULT *Not simulated*	Problem with Flight Control System
ENGINE FAULT *Not simulated*	A loss of valid Mach data to the engine
AVIONICS FAULT	Indicates a general fault with the system avionics
SEAT NOT ARMED *Not simulated*	ACES-II Seat is not armed
ELEC SYS	Problem with the any electric bus
SEC	Engine prob, normal that it lights briefly on startup.
EQUIP HOT	Systems overheating because cooling is failing.
NWS FAIL	The nose wheel steering system has failed
PROBE HEAT	Probe heating has failed
FUEL OIL HOT	Fuel or oil too hot
RADAR ALT	Malfunction of the radar altimeter
ANTI SKID *Not simulated*	Anti Skid system failed.
CADC	Problem with Central Air Data Computer
INLET ICING *Not simulated*	Ice on wings or on engine inlet
IFF *Not simulated*	Other aircraft will not be able to identify you as friend or foe
HOOK *Not simulated*	Hook is not up and locked
STORES CONFIG *Not simulated*	Stores conf and CAT I/III switch are in conflict
OVERHEAT	Engine overheat condition
NUCLEAR *Not simulated*	Classified.
OXY LOW	Liquid oxygen is too low
CABIN PRESS	Problem with cabin pressure
FWD FUEL LOW	Forward fuel tank too low
BUC	Backup Fuel Control failing
AFT FUEL LOW	Afterwards fuel tank too low

DATA TRANSFER UNIT (Right Aft Console)

Before the flight they put a Data Transfer Cartridge (DTC) in the Data Transfer Unit (DTU). It contains all necessary information about the navigation points and all other information about the mission. The DTC is being fed by the AFMSS (Air Force Mission Support Station). Once the DTC is put in the DTU the pilot can upload a specific file from the MFD into the internal Avionics Subsystem. *The system is not simulated.*

DATA ENTRY DISPLAY (Center Console)

The Data Entry Display is a small but very vital part of the main console. It is the readout for numerous instruments. In our simulation is should be considered mainly as the display of the ICP.

There are 4 modes of the DED implemented. In each mode the top/left items shows the name of the mode. The bottom/left item is the scratch pad used to enter the data. To switch modes in the DED you click the Mode Select button on the ICP to cycle through the 4 modes.

COMS MODE

COMS	COM1	COM2
	NAV1	*NAV2
* *	ADF	XPNDR

The COMS mode shows the frequencies set in all 6 transmitter/receivers known on Fs2002. To set a frequency click on the correct button on the ICP (a * will appear in front of the item that your are working on, in our example NAV2) and then enter the frequency, without any point or comma (so 12220 for 122.20) using the numerical buttons of the ICP. The digits will appear in the scratch pad of the DED, lower left corner indicated with * *. Pressing [ENT] in the ICP will copy the frequency from the scratch pad to the correct field.

NAV MODE

NAV	HDG to next waypnt	DIST to next waypnt
	Time to next waypnt	IAS
* *	Mag Wind Direction	Wind Speed

The NAV mode will help you follow the flight plan set in the standard FS2002 flight planner. We choose to use this flight plan as the mission planning software used by the real aircraft is classified. This software runs on a PC btw and the flight plan is transported to the aircraft in a solid-state memory module.
This mode will use a standard FS2002 flight plan and will give you the heading, distance and remaining time to the next waypoint in the flight plan. To help you navigate you will also see the Indicated Airspeed,

GPS MODE

GPS	LAT	LON
	ALT	TEMP
* *	HDG	CRS

The GPS mode will give you a quick list of the major data needed for your navigation. It also includes the temperature of the outside air.

ILS MODE

ILS	DIST	ALT
	HDG	CRS
* *	IAS	AOA

When switched to ILS mode you will get a quick run down of information that will help you make a correct ILS landing. All information can also be found on other gauges but in the DED the information is condensed and it's easy to check the parameters in a single glance. This mode is automatically selected when you select an active ILS frequency (meaning it will become active the moment you receive the ILS data).

ELEC. COUNTERMEASURES PANEL (Left Front Console)

The ECS, also known as "Jammer", activates the Electronic Countermeasures.
As this system cannot be simulated in FS2002 the panel is no active.

ELECTRONIC POWER PANEL (Left Front Console)

The Electronic Panel supplies the internal power for all the systems of the aircraft. It can be supplied by the main engine, (main or standby generator), the EPU or the internal battery. In battery mode it will supply only minimal energy to the most important systems, like in the standby mode. With an active main generator all the systems will be supplied.

MAIN PWR	MAIN PWR	Engine generator connected to main busses
	BATT	Battery connected to main busses
	OFF	No power to the main busses.
CAUT RESET *not simulated*	-	Resets ELEC SYS caution light and clears MASTER CAUTION light for future indications
Status light *not simulated*	FLCS PMG	Flight: FLCS PMG is not supplying power to any FLCS branch. Ground: FLCS PMG power is not available at one or more FLCS branches
	MAIN GEN	Indicates that external power or main generator not connected to one or both nonessential ac buses.
Status light *not simulated*	STBY GEN	Indicates standby generator power is not available
Status light *not simulated*	EPU GEN	Indicates the EPU has been commanded on but the EPU generator is not providing power to both essential ac buses.
	EPU PMG	Indicates the EPU has been commanded on but EPU PMG power is not available to all branches of the FLCS.
ACFT BATT	TO FLCS	Indicates battery bus is supplying one or more FLCS branches and voltage is 25V or less.
	FAIL	*not simulated*
FLCS BATT *not simulated*	C	Indicate the FLCS battery C is discharging.
	A	Indicate the FLCS battery A is discharging.
	D	Indicate the FLCS battery D is discharging.
	B	Indicate the FLCS battery B is discharging.

EMERGENCY POWER UNIT (Left Front Console)

In case of an engine failure in the air, the EPU can be started and will keep the primary hydraulic system (A) pressurized for approx. 10 minutes. Secondary hydraulic system (B) will not be pressurized (see also EPU Fuel Indicator on the Right Aux Console). The system is not automatically started because the pilot will probably try and 'air start' first.

When the EPU System is switched off or runs out of fuel the aircraft is uncontrollable and should be abandoned.

EPU	ON	Start the EPU manual
	NORMAL (Safe)	EPU will start and run automatically, when engines are off in flight. This system will provide power to the systems.
	OFF	EPU off
Status light		Always green when EPU runs, off when EPU is off
Status light	HYDRAZN	Always amber when EPU runs, off when EPU is off
	AIR	Always amber when EPU runs, off when EPU is off

ENGINE / JET STARTER PANEL (Left Front Console)

The Starter Panel is used to start the engine. Use the checklists to get up the engine to run.

FAN TURBINE INLET TEMP INDICATOR (Center Console)

The temperature of some section in the engine will give you a good indication of the health of the engine. When pushed to the limits the fan temperature will go up and when too high this will cause problems. Remember, ANYTHING can melt if you apply enough heat. Even the super high-grade materials in the engine of aircraft like this.

The FTIT shows the temperature in degreed Celsius in the first stage of the turbine.

FUEL FLOW INDICATOR (Center Console)

This simple gauge shows the amount of fuel that is being used by the engine in pounds per hour. It is there to give you a quick update on how much time you have with your current load. It's interesting that you can actually hear this instrument ticking if you take off your helmet!

FLIGHT CONTROL PANEL (Left Aft Console)

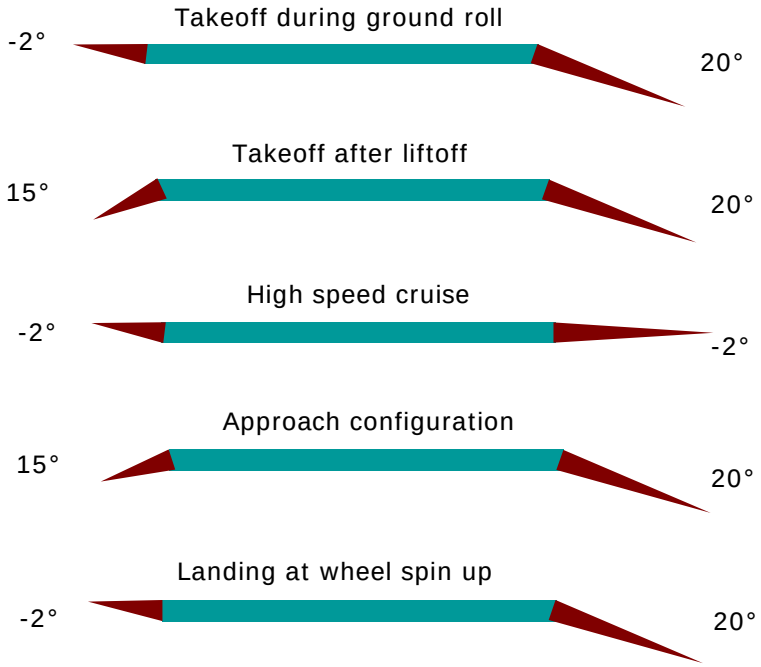
The Flight Control Panel controls the setup of the Flight Control System (FLCS) and allows manual control of some of the flight control surfaces.

The F-16 has Trailing Edge Flaps (TEF) and Leading Edge Flaps (LEF) that are normally completely controlled by the Flight Control Computer (see image how the are positioned during each stage of the flight. If you have the ALT FLAPS in the EXTEND setting and the LE FLAPS in the LOCK setting the flaps will be 100% manual and will use the standard FS2002 commands.

The Max Maneuver mode has been removed because FS2002 is not able to simulate flaps used for anything else then increasing drag and lift.

DIGITAL *not simulated*	BACKUP	Selects backup software of the FLCS.
	OFF	Normal position.
ALT FLAPS	EXTEND	Extends the Trailing Edge Flaps manually.
	NORM	Trailing Edge Flaps controlled by FLCS.
MANUAL TF FLYUP *not simulated*	DISABLE	Fly-up protection not available in manual trailing flaps.
	ENABLE	Fly-up protection available in manual Trailing Edge Flaps (TF) for detected failure.
Status light	RUN	FLCS controls Trailing Edge Flaps.
	FAIL	Manual Control of Trailing Edge Flaps selected.
LE FLAPS	LOCK	Manually locks Leading Edge Flaps (LEF) in present position and illuminates the FLCS warning light.
	AUTO	Leading Edge Flaps (LEF) are automatically controlled as a function of mach number, altitude and AOA.
FLCS	RESET	Resets FLCS (sets all FS2002 trims to neutral).
	OFF	Normal position
BIT *not simulated*	BIT	Commands build in test (BIT) if weight is on main LG and wheel speed is less than 28 knots ground speed.
	OFF	Normal position

FLAPS SETTINGS DIAGRAM



FUEL QUANTITY INDICATOR (Right Aux Console)

This indicator shows the amount of fuel depending on the Fuel Quantity Selector (center console). There are two arrows, one for AFT and one for FWR systems. The indication is in LBS x 100. The forward arrow has a red indicator and the digital readout always shows the total of the two arrows. The fuel system in the F-16 is rather automated.

FUEL PANEL (Left Aft Console)

The Fuel Panel together with the Fuel Quantity Select Panel and the Air Source Panel provides the fuel control of the aircraft.

FUEL MASTER	MASTER (Safe)	Opens engine fuel shutoff valve which then opens the EEC (electronic engine control) fuel shutoff valve
	OFF	Closes engine fuel shutoff valve which then closes the EEC fuel shutoff valve
TANK INERTING *not simulated*	TANK INERTING	Opens valve at Halon reservoir.
	OFF	Closes valve at Halon reservoir.
ENG FEED	OFF	De-energizes all electric-driven pumps. Engine supplied by FFP (fuel flow proportioner).
	NORM	Energizes all pumps. CG (center of gravity) maintained automatically.
	AFT	Energizes pumps in aft tanks and opens crossfeed valve. Fuel is transferred from aft tank to the engine and forward tank. CG moves forward.
	FWD	Energizes pumps in forward tanks and opens crossfeed valve. Fuel is transferred from forward tank to the engine and aft tank. CG moves aft.
AIR REFUEL *not simulated*	OPEN	Opens aerial refueling door.
	CLOSE	Closes the aerial refueling door.

FUEL QUANTITY SELECTOR PANEL (Center Console)

Using the Fuel Quantity Selector you choose what is displayed in the Fuel Gauge. Before you look at the fuel gauge make sure you know what you are seeing as it is rather easy to make a mistake. In our simulation we always feed the engines from all tanks at he same time as it is not possible in FS2002 to drop a external fuel tank.

FUEL QTY SEL	TEST	Test the display, digits should show 6000 lbs of fuel, and both dial indicators should point to 2000 lbs
	NORM	One gauge indicates the F/R amount, and the other the L/A quantity of internal fuel
	RSVR	Show the amounts in the Fwd/Aft reservoirs
	INT WING	Shows the amount of fuel in the right/left internal wing tanks
	EXT WING	Shows the amount of fuel stored in any external wing tanks
	EXT CENTER	Shows the amount of fuel stored in any centerline tank
EXT FUEL TRANS *not simulated*	NORM	Fuel transfer from centerline tank first, then from the external wing tanks
	WING FIRST	Fuel transfer from external wing tanks first, than from the centerline tank

Location	Gallons	LBS JP-4	LBS JP-8	Liters
Left Wing	*87.9*	*571.5*	*598*	*332.7*
Right Wing	*87.9*	*571.5*	*598*	*332.7*
Front-1 Tank	*296.5*	*1927*	*2016*	*1122*
Front-2 Tank	*105.2*	*684*	*715*	*398.2*
Fwd Res	*68*	*442*	*462*	*257.4*
Aft Res	*68*	*442*	*462*	*257.4*
A-1 Tank	*335.7*	*2312*	*2419*	*1346*
Fuel lines / Eng.feed	*3.3*	*22*	*22.4*	*12.5*

Note: The Front-1 and Front-2 tanks are seen as one tank to the system. The Reserve tanks are not seen as separate tanks and are switched on automatically. The external tanks are never used in our models (although visually there) because that would force us to use multiple aircraft.cfg files, something we tried to avoid.

HORIZONTAL SITUATION INDICATOR (Center Console)

The Horizontal Situation Indicator is a navigational instrument that shows the position in relation to heading and navigational beacons. The instrument is used in combination with the switch panel directly to the left of it, where the source can be switched between TACAN and NAV mode. *TACAN mode is not simulated because FS does not know TACAN beacons.*

HYDRAULIC PRESS A AND B INDICATOR (Right Aux Console)

These two indicators show the pressure in the two hydraulic systems. System A (Primary) and B (Secondary) are both pressured by engine driven pumps and that is why the EPU can provide power to system A for a period of 10 minutes. If pressure is low the HYD/OIL PRESS light will also be lit. Pressure is indicated in PSI x 100.

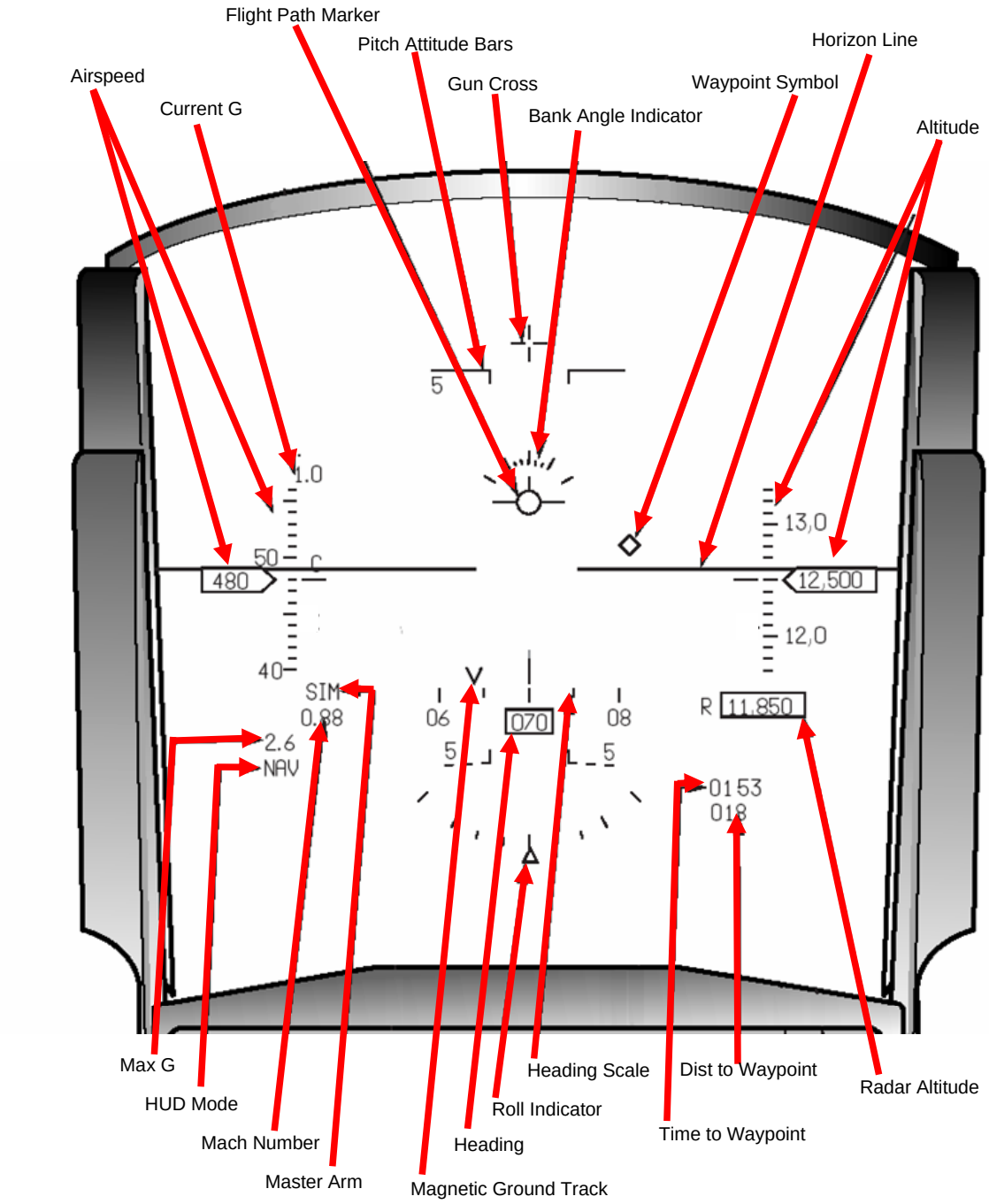
HUD REMOTE CONTROL PANEL (Right Console)

Using the Head Up Display (HUD) Control Panel it is possible to choose several kinds of information of the Flight- and Navigation parameters to show on the HUD.

VV VAH *Not simulated*	VV VAH	Display vertical velocity, velocity, altitude, heading
	VAH	Display velocity, altitude and heading
	OFF	Show digital readouts
ATT/FPM	ATT/FPM	Display Flight Path Marker and Pitch Ladder
	FPM	Display the Flight Path Marker (FPM)
	OFF	No Flight Path Marker (FPM) and pitch ladder
DED DATA *Different use in simulation*	DED DATA *NAV Mode*	Display the DED data in the lower HUD *In the simulation it switches to NAV mode*
	OFF *ILS Mode*	Display no DED data *In the simulation it switches to ILS mode*
DEPR RET *Not simulated*	STBY	Display depressible reticule
	PRI	Display depressible reticule to primary
	OFF	No display depressible reticule
CAS	CAS	Display calibrated airspeed
	TAS	Display true airspeed
	GND SPD	Display ground airspeed
ALT RADAR	ALT RADAR	Display radar altitude above ground level
	BARO	Display barometric altitude above sea level
	AUTO	Radar altitude while below 1500 ft AGL/MSL Barometric altitude above 1500 ft AGL/<SL
DAY	DAY	Turns on full brightness
	AUTO BRT Not simulated	Automatic to night when night starts
	NIGHT	Sets half brightness
TEST STEP *Not simulated*	TEST STEP	Test the HUD-display step by step with test pattern

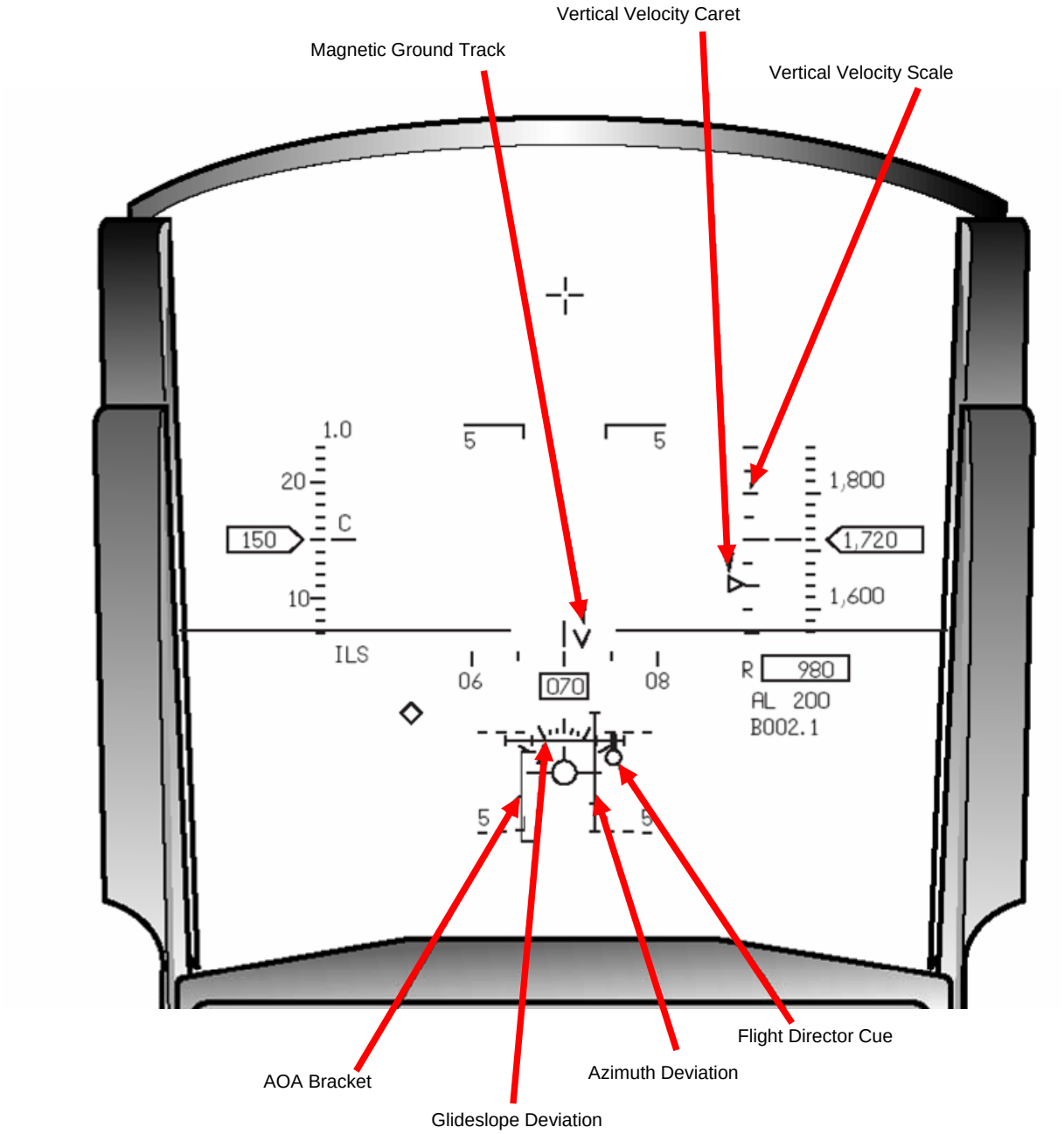
HUD NAV MODE (Center Console)

The HUD in Nav MODE will be the mode most used. It will give a large amount of information on all aspects of navigation. The waypoint marker and distance information will only be shown if a flight plan is loaded in the standard FS2002 flightplan mode. *This mode is selected with the DED DATA switch (DED DATA setting), a different use then in reality for this switch.*



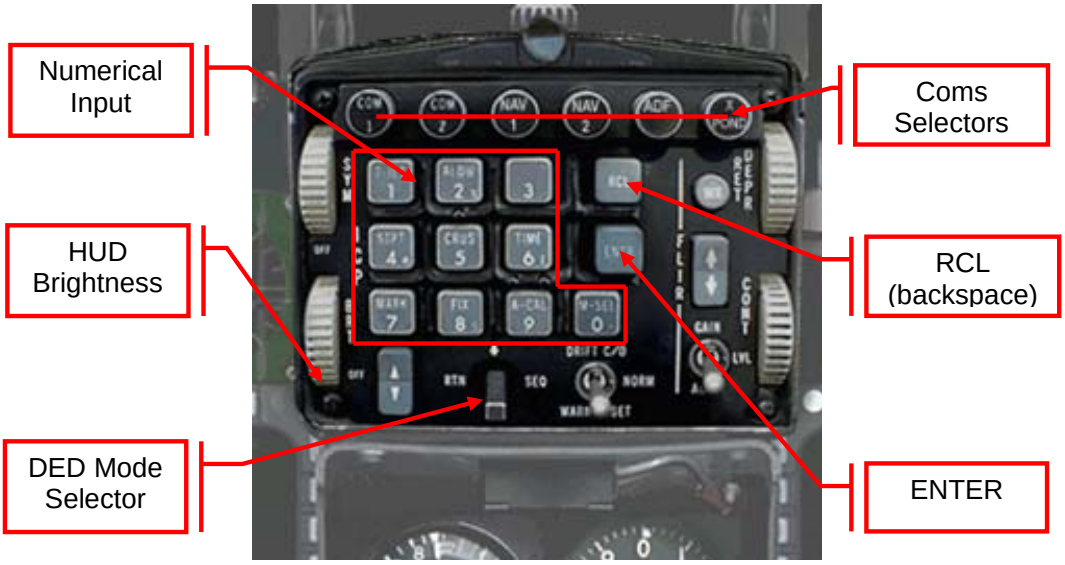
HUD ILS MODE (Center Console)

In the ILS mode the HUD is decluttered to allow a better visibility on the runway. The information given is more specific useable for landing the aircraft. Most items on this HUD will speak for itself but the AOA bracket needs some explanation. It bracket displays angle of attack between -4 degrees and +22 degrees AOA to help the pilot achieve the optimal AOA of 13 degrees during finals stages of landing. Keep the aircraft symbol in the center of the bracket for best performance.



INTEGRATED CONTROL PANEL (Center Console)

The ICP is the one of the main interfaces between pilot and the computers / systems on the F-16. In reality it is a very complex instruments that we simplified (one of the few areas we actually did that) somewhat. *In our simulation it is mostly used to select the DED modes and to enter data*. It should always be seen in relation with to the DED.



COMS SELECTORS

*The top six buttons are used to select any of the 6 receivers/transmitters to set a new frequency (or in case of the Transponder a new setting). Pressing any of these buttons will automatically switch the DED to COMS mode and will put a * in front of the setting you are working on.* This is a different use of these buttons then they are used for in the real aircraft!

NUMERICAL INPUT PANEL

Using these buttons you can enter a frequency (or in case of the Transponder a setting). Use the RCL key as a backspace key and the ENT key to enter the code. What you type will be displayed on the 'scratch pad' of the DED and only after clicking ENT will it be transported to the field you wanted to change.

DED MODE SELECTOR

The DED mode Selector allows to rotate through the 4 DED modes. Press the button to advance, backwards scrolling is not possible.

HUD BRIGHTNESS

Clicking on the HUD Brightness will toggle through off, dim, normal and bright HUD settings. Dim is advised in dark conditions, bright when flying towards the sun.

INSTRUMENT MODE PANEL (Center Console)

The Instrument Mode Panel allows you to switch the HIS between TACAN and NAV mode. The HDG rotating button allows the calibration of the compass rose.

LANDING GEAR PANEL ADDITIONAL (Left Aux Console)

HOOK - Lowers the hook for the emergency landing. *This part of the system is not simulated*

EMERGENCY STORE JETTISON – Jettisons all selected stores. *This part of the system is not simulated*

PARKING BRAKE – Toggles the parking brakes on/off.

BRAKES - Toggles the brake system to channel 1 / 2. This part of the system is not simulated

GND JETT – Toggles jettison while on ground enable on/off. *This part of the system is not simulated*

LANDING LIGHTS – Switches the landing lights (up) or taxi lights (down) on or off.

HORN SILENCER – Turns off the low speed warning horn.

STORES CONFIG – Switches between Cat I (> 6G) and Cat III (max 6G) loading configuration. *This part of the system is not simulated*

LANDING GEAR (ALTERNATE) SYSTEM (Left Aux Console)

In case of an emergency the pilot can lower the gear by using this lever. With this system the gear is lowered by gravity and not the hydraulic system. A positive G maneuver will help the extension and lock the gear.
Check for green gear lights after using the system.

LEFT EYEBROW BUTTONS (Center Console)

The four Left Eyebrow buttons control functions that cannot be simulated in FS2002.

F-ACK *Not simulated*	View system faults to PFD
-	-
-	-
IFF IDENT *Not simulated*	This button provides the primary method of initiating the identification of position function (I/P) of the IFF system. Pushing the button momentarily causes the I/P timer to energize for 15-30 seconds. If a mode 1 (Security identity), 2 (Personal identity) or 3A (Traffic identity) interrogation is recognized within this 15-30 second period, I/P replies are made.

LIGHTNING (EXTERNAL) PANEL (Left Aft Console)

The Exterior Lightning Panel allows you to toggle the external lights of the aircraft.

ANTI COLLISION	On	Anti collision light on
	Off	Anti collision light off
POSITION LIGHT	FLASH	Position light flash
	STEADY	Position light steady
WING TRAIL	BRT	Wing trail light brightness
	OFF	Wing trail light off
	DIM	Wing trail light dim
FUSELAGE	BRT	Fuselage light brightness
	OFF	Fuselage light off
	DIM	Fuselage light dim
FORM *not simulated*	0 - BRT	Set the brightness of anti collision and position lights
MASTER	NORM	External lights possible
	OFF	All external lights off
AERIAL REFUELING *not simulated*	0 - BRT	Set the brightness of aerial refueling lights

LIGHTING (INTERIOR) PANEL (Right Front Console)

The Pilot can adjust his individual preference of the cockpit lightning

CONSOLES (Primary) *not simulated*	0 - BRT	Dimmer control for brightness the console
INST PNL (Primary) *not simulated*	0 - BRT	Dimmer control for brightness the instrument panels
DATA ENTRY DISPLAY *not simulated*	0 - BRT	Dimmer control for brightness the DED
CONSOLES (Flood)	OFF - HIGH INT	Dimmer control for brightness the console over floodlights, FS2002 Panel Lights.
INST PNL (Flood) *not simulated*	0 - BRT	Dimmer control for brightness the instrument panels over floodlights
MAL & IND LTS *not simulated*	BRT	Malfunction and indexer lights to max
	Center	-
	DIM	Dimmer malfunction and indexer lights
INDV LTG CONT *not simulated*	BRT Left Arrow DIM NVIS	- Controls individual brightness of ICP, Airspeed, Altimeter, AOA, ADI, VVI,
NVIS *not simulated*	NORMAL	- All cockpit lighting available - Hands-On Blackout switch inop - HOBO switch is operative and will toggle Non-NVIS lighting off and on - Caution, warning and acknowledge annunciators set to Dim - Primary console lighting and instrument panel floodlights off - CMFD's backlighting on to NVIS

MANUAL PITCH OVERRIDE (Left Front Console)

The Manual Pitch Override switches between two modes: NORM where the computer controls maximum pitch (to avoid stall) or OVRD where the computer will allow extreme pitch movements. In the simulator that will partly function, when on NORM the systems will try to prevent stall by pitching the aircraft down as soon as stall is near.

In OVRD mode this will not happen.

MANUAL TRIM PANEL (Left Aft Console)

The Manual Trim allows the pilot to set the roll, yaw and pitch trim.
The trim AP/DISC is not simulated.

You can also use trim on the stick:

MAP & DATA STOWAGE COMPARTMENT (Right Aft Console)

Not an instrument but a container where maps and sandwiches are stored. It also holds the folder where all maintenance is logged and a small bottle that is used to take a oil sample after each flight. *The system is not simulated.*

MISCELLANIES ARMAMENT PANEL (Center Console)

The Miscellanies Armament Panel controls the main weapons systems. The Master Arm is a very important switch that should always be in OFF when you are not in a combat situation. Failure to do so is one of the few mistakes that a fighter pilot only makes once. Not a second time because he will not be fighter pilot anymore.

MULTI FUNCTION DISPLAY (Center Console)

The Multi Function Displays are used to show graphical data created by radar, imaging systems and Integrated Combat systems (combining information from many sources). Much of these systems cannot be simulated in FS2002, but we implemented the Radar Mode on the left MFD. The right MFD will always show the current HUD mode so even when you have your head down you will be able to see the flight attitude of the aircraft.

NOZZLE POSITION INDICATOR (Center Console)

The hydraulically controlled nozzle of the F-16 will change its diameter depending on the thrust setting. From fully open it will slowly close when power is increased but will open fully when reheat (after burner) is selected. The nozzle is a extremely ‘agile’ mechanism that actually moves as fast as it does in our model. Now consider it does the same under the incredible pressures of the engine on full thrust and this becomes even more impressive.

OIL PRESSURE INDICATOR (Center Console)

Oil pressure is vital to a jet engine, the moment your oil pressure goes down you are in immediate danger of loosing the engine (and hydraulics and thus any controllability). So this is an gauge you need to check with some regularity in your standard scan of the gauges.

OXYGEN REGULATOR PANEL (Right Aft Console)

This panel regulates the oxygen flow to the Pilot. When system is active the flow indicator shows a green field and a red field when it is empty. White is shown during testing (*testing is not simulated*). The only switch active in this panel is the ON/OFF switch.
Make sure that the oxygen flow is switched on above 10.000 feet otherwise you will suffer from oxygen deprivation, unless cockpit pressure is kept at a reasonable level.

OXYGEN QUANTITY INDICATOR (Right Aux Console)

This indicator shows the amount of oxygen left in the LOX tank. Indicator is in liters and when it is empty flights above 10.000 feet are not possible.

The oxygen will last for about 6 hours and the bottle will be replaced after each flight.

PILOT FAULT DISPLAY (Right Aux Console)

The Pilot Fault Display (PFD) shows the status of systems and when systems are failed information can be found in this display. You select the type of information with the F-ACK button on the center panel.

RADAR (Center Console)

Included in this package is a remodeled (made more realistic) radar gauge by Eric Mariano. This radar will always be shown in the left MDF. The buttons above the MFD will switch modes and will switch range. If you click on any of the aircraft symbols you will be give all available information about this target.

You can use these 'targets' to practice you interceptions but make sure you do not get into view of the passengers because they tend to get alarmed when they see a armed fighter appear over the wing.

More instructions on the use of the radar can be found on the left kneepad that you see if you look down at your instruments.

RADAR WARNING RECEIVER (Center Console)

The radar-warning receiver displays any radar transmitting station. As FS does not know this we simulate this gauge by showing random signal sources, they will move as the aircraft moves and will also move location as you turn the aircraft.

SENSOR POWER MANAGEMENT PANEL (Right Front Console)

The Sensor Power Management Panel regulates the current for sensors like the weapon pylons, radar altitude measurement etc.

LEFT HDPT toggles power to the left fuselage hard points, which normally holds the targeting or navigation pods *(not simulated)*

RIGHT HDPT toggles power to the right fuselage hard points, which normally holds the targeting or navigation pods *(not simulated)*

FCR powers up the Fire Control Radar System (FCR) *(not simulated)*

RDR ALT power on the radar altimeter, the simulator uses only on (RDR ALT / STBY) and off (OFF)

TEST PANEL (Left Aft Console)

The Test Panel tests the cockpit system of the aircraft.

The system cannot be simulated.

THREAT WARNING AUXILIARY / SPEED BRAKES (Left Aux Console)

The Threat Warning Auxiliary Panel belongs together with the Thread Warning Prime Panel, the RWR and the Chaff / Flare Panel to the EWS (Electronic Warfare System) of the F-16. In this simulation we choose the US layout.

The Speed Brake Indicator shows the position of the speed brakes. It will show black diagonal lines on a white background when closed and black dots on a white back ground when fully open.

SEARCH *not simulated*	On (green)	Activate search spikes on RWR
	Off	Deactivate search spikes on RWR
ACTIVITY ACT/PWR POWER *not simulated*	On (green)	Radar activity on is detected
	Off	No radar activity detected
LOW ALTITUDE LOW *not simulated*	On (green)	Priority to dangerous threats if you are low altitude
	Off	Priority to dangerous threats if you are higher altitude
SYSTEM POWER POWER	On (green)	Activates the Thread Warning System
	Off	Deactivates the Thread Warning System
DIM *not simulated*	0 - ...	Dimmer control for brightness the TWA status lights
3 AMP *not simulated*		Connector, maximum 3 ampere

RPM INDICATOR (Center Console)

The RPM (Revolutions Per Minute) simply shows how fast the main engine shaft is rotating. Together with the Oil temperature and Fan temperature it shows the stress on the engine. Although an engine like this can be forced to run at above normal (>100%) setting this is something that cannot be maintained for long periods of time. This being a fighter the heath of the engine is not as important as the health of the pilot so when needed the aircraft can be pushed closed to destruction for prolonged periods of time. In fact, this is where the aircraft seems to be most happy.

VERTICAL VELOCITY INDICATOR (Center Console)

The vertical Velocity Indicator will show the vertical speed of the aircraft.

ZEROIZE/VOICE INHIBIT PANEL (Right Front Console)

This panel makes it possible to flush internal classified data from the MMC, AIFF, CARAPACE, DTE, EWMS, RECCE and Secure Voice systems. This system is also triggered when the ejection seat is used.

In the simulator clicking on the 3-way switch sets all parameters of the sim to a startup position, all systems off, trims neutral etc..

FLYING THE F-16

When we decided to start on this project we decided to focus on a couple areas of this remarkable aircraft. One was the tremendous enjoyment F-16 pilots get in flying this aircraft. It is the ultimate pilots aircraft in every sense of the word. It has tremendous power (and phenomenal acceleration) and when not loaded to heavy it has the ability to go into a vertical climb as pounds of thrust exceed pounds of aircraft.

When we asked a couple of pilots to describe flying the F-16 they all seemed to come back to the same thing. You don't fly the aircraft, you 'think' it. The same moment you decide to turn left the aircraft seemed to have captured your idea and has started it. One of the main reasons the aircraft is able to do so is the special stick. It only moves a few millimeters but rather measures the force the pilot applies to it. You don't move the stick, you push or pull it (very much like the little rubber pointers you find on portables).

Another thing that is rather special is that it feels like a simplified flight model in Flight simulator. Strange as it may sound, it actually makes sense. Even after minutes in a nice big F-16 simulator as we did during development (it's a tough job but somebody has to do it), you learn one thing. If you point the aircraft it will go where the nose is pointed. You want to fly to that landmark, simply point the nose, feed in the power and the aircraft will almost magically go where you point it. Not counting the behavior when you get very close to the edge of the flight envelope or the landings that can be tricky, flying the F1-6 feels like a flying a 1980's arcade flight simulator. Of course the main reason for this is the fact that not the pilot, but the computers are flying the aircraft. When it was launched the aircraft had nicknames like "The Atari Jet" or "Electric Jet" indicating it was the first fly-by-wire aircraft. In this day and age where even economical business jets are fly-by-wire it seems to be not very special, but when the F-16 started to fly it was even highly controversial.

The computers will do their best to prevent the aircraft from getting into trouble. Our systems will try to mimic that behavior but it is not always possible.

So how do you fly the F-16? Well, we soon go into details like speeds and angles but there are some general rules that will help you get more fun out of this aircraft.

First, HAVE fun. Don't fly the aircraft like it is 747 loaded with Japanese tourists that will complain about the smallest bump. When you have enough airspeed (and that is seconds after leaving the ground) this aircraft will fly where you want it and just as easy upside down as it will with the bottom pointed downward.

Go to any region with a lot of traffic and start to intercept the AI Traffic. Always think of them as potentially hostile and use you speed and agility to get behind them. When you close to 1 mile directly astern, give yourself a pat on the back to afterburner yourself to the next target. NEVER get close to the aircraft in any other position then behind it as the Japanese tourists will see the fighter and start to complain. So when you speed off make sure you stay out of sight. The inter office record is the interception of 12 aircraft in 20 minutes. The regions above KSFO, KLAX or EGLL, LFPO in Europe are very suitable for this.

Find a low flying area (or pretend you found one) and fly as low as you dare to go. Don't go too fast because that ruin part of the fun, accelerating from 300 knots to 600 knots with 10 meters of flame from your tail is what makes it fun. Try to get yourself in problems to see how brute power can safe you from almost anything.

A good way to learn how to fly the F-16 is to give yourself a speed and try to stay at that speed while you perform loops, climbs and dives. The F-16 is flown with one hand on the stick and the other on the throttle. Keep on working the throttle to keep your speed the same. When you go too fast use a bit of air brakes to loose speed.

When you think you can fly the aircraft, go up and get some fuel from our tanker. That's the ultimate test for any pilot.

But above all, remember this is NOT a B737 or a Cessna but an aircraft that likes to be pushed to the limit. It craves for G-load and it just loves to get through a complete fuel load in 12 minutes. Where a B737 has to be flown by the numbers, a fighter like the F-16 feels happy at a huge speed range and at almost any altitude. Perhaps the only thing to keep in mind is the air density. If you really want to go fast you will need to do it above 30.000 feet where the air is thin and cold. Going fast at low altitude will drain your tanks really fast. For general cruising stay under Mach .90 and above 30.000 feet. Slowing down to Mach .85 will give you better range.

Perhaps the most difficult part of flying the F-16 is the landing. First off all the aircraft is so sleek that it is hard to keep the speed down. Also at very low speeds the aircraft tends to wallow about a bit. That's why you always have to have a very high Angle of Attack. The increased frontal surface will slow down and the nose up attitude will help to control the aircraft better. You might like to get your view panned down a bit to have a better view of the runway.

As soon as you make your last turn to final get your nose up to 10 degrees (and increase that to 13 degrees just before landing). Get your speed brakes out and they normally stay out during the landing. Now don't use your stick to stay on your glide slope, use the throttle! Your airspeed should not go below 130 knots, and with some external stores you might feel a bit better at 140 or even 150 knots. The moment your main wheels touch, keep the nose up, don't let it sink until you can't hold it up any longer, the aircraft will be it's own spoiler!. Then bring it down and as soon as you 80 knots hit the brakes. Keep the stick full back.

But if you can't grease it down each time, don't worry, even experienced pilots find it hard to get the same smooth landing every time. In the design of aircrafts like the F-16 smooth landings where not exactly high on the list of design characteristics.

Keep in mind that adding an FS2002 flight plan to your flight will add a lot of functionality to your panel!

There is a very good series of articles on flying the F-16 to be found on the Code One web pages, a publication from Lockheed Martin, start at: www.codeonemagazine.com/archives/1993/semper_viper.html

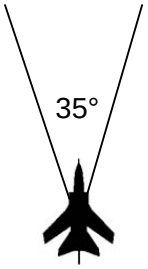
IN FLIGHT REFUELING

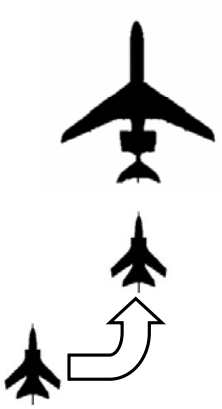
Fuel (or rather the lack of it), has always been a problem for fighters. A fighter needs to be light to be fast and agile but you need to get to and from the area of engagement. And even worse, using the reheat (afterburner) uses up an incredible amount of fuel. It is a very, very ineffective way to gain a truckload of additional thrust. So from early days people have tried to carry more fuel without making the aircraft bigger or heavier. One way to do it is to carry the fuel in external tanks that you can drain first and then drop them when you get into the fight. This is ideal for aircraft that have to fly a long way and do not use up too much fuel. Perhaps the best example is the Mustang P51 that could defense the Allied bombers all the way to the center of Europe using disposable (carton!) drop tanks. Most modern aircraft still use these external tanks, but they are often not dropped when emptied. But that still makes the aircraft bigger and heavier. A much better way is to refuel in the air.

Did you know the 'barnstormers" in the 1930's already did this? They carried jerry cans of fuel while they stepped from one aircraft to the other. Even the famous Charles Lindbergh did it! Of course nowadays this is all a lot more perfected and air to air refueling is standard practice for most air forces in the world. The F-16 has a mechanism that can be extended from the right side of the aircraft (or the left on some models) and is used with a tanker that has a hose /drogue system. The LAGO F-16 has this system and it can be used with the refueling module. You can actually refuel in air! The actual procedure is very 'stylized' (as in the real procedure) and a real test to your skills. We divided the procedures into several steps.

We are including a KC10 with the boom and a KC10 with a hose/drogue system. In principle you can refuel any aircraft with this module, it is not limited to the LAGO F-16 aircraft. The F-16 can only refuel on the hose/drogue system, while aircraft like the F16 use the boom system. In all cases you will see a fighter flying in formation with the tanker, it's there to protect the tanker. The sound files are identical for all types of tankers, but will look for the texture name of the aircraft loaded to determine what pilot voice to use, it now knows German, Italian and English accents and will look for texture names that start with (after that it is irrelevant) GE, IT and UK. When the tanker clears you at the right ("Clear join on the right") and the tanker only has a boom system simply accept this to be cleared to the single fuel point.

A Tornado comes to get a load of fuel while a F-16 flies guard.

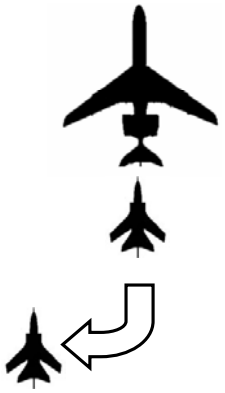
Step	Situation	Tanker Radio	Fighter	Display
1	Start of procedure by using menu item “LAGO | In-Flight Refueling” and selecting the tanker type and system. The tanker is now placed 20.4 miles due east (magnetic) of aircraft position. And flies a 1 minute east west circuit (magnetic heading!) while waiting for you to get close. It’s much easier to fly to 15.000 feet and due east before starting this procedure!		*“Oscar two-three, this is Apex-two, looking for some fuel”*	Same as radio
		“Apex-two, this is Oscar two-three, we are 20 miles due east of your current position, flightlevel 150, and are receiving in RV Golf procedure.”		Same as radio
2	F-16 flies towards the tanker with tanker inside radar cone (see image). The ‘Judy” call indicates the F-16 has the tanker on the radar and the tanker acknowledges and thus hands over approach procedures to the F-16 in this stage.  You can use the “LAGO | In-Flight Refueling | Display Heading to tanker” menu item to display the heading to the tanker (or the [CONTROL]-[SHIFT]-[H] shortcut key). The information will be updated every half a second. If you fly more then 30 miles away from the tanker it is removed.		*“Judy”*	Same as radio
		“Oscar two-three, copies Judy”		Same as radio

3	The tanker will now stop flying the circuit as soon as you get within 5.5 miles and will fly either due east or due west, depending on what heading it had when you came into visible range. When F-16 is within 2 mile the F-16 will notify the Tanker that he has the tanker in visual range. Now the tanker will tell him to move to the RIGHT side of the tanker and start to fly in formation. Adjust your altitude to 15.000 feet and you speed to 315 indicated knots! When you feel secure, slowly move towards a position directly in line with the drogue but behind it. When you are there, slowly advance towards it. 		*"Visual"*	Same as radio
		"Clear join on the right"		Same as radio
			"Roger"	Same as radio

4	When the F-16 is very close to the refueling drogue the tanker will give permission to connect.	*"Clear contact on the right"*		Same as radio
			"Roger"	Same as radio

5	When the F-16 is in position the tanker will tell the F-16 to stay where he is and that fuel is starting to flow. Fuel flow is 3630 Kg/min (8000 lb/min). Stay in the correct position.	*"Stabilize"*		Same as radio
			"Roger"	Same as radio
		"Passing fuel"		Same as radio

6	When the tanks are full, the tanker will tell the aircraft to move to a position behind and left of the tanker.	*"Disconnect, go echelon left"*		Same as radio
			"Roger"	Same as radio

	 The tanker will now state the amount of fuel that is passed (check this) and will tell the pilot that he is cleared to leave the formation.			"We have passed xx pounds"
		"We'll be around when you need us, clear to leave."		Same as radio
			"Copy that, leaving to the left, thanks."	Same as radio

A	If the F-16 breaks formation before the refueling is complete, the tanker will order the F-16 away. The pilot will normally state that it was some external cause that caused the problem (pilots do not make mistakes) and the procedure will start again.	*"Breakaway, Breakway, Breakaway"*		Same as radio
			"Roger, some turbulence "	Same as radio
		"Don't sweat it sir, let's try it again, clear and join on the right"		Same as radio
			"Affirmative"	Same as radio

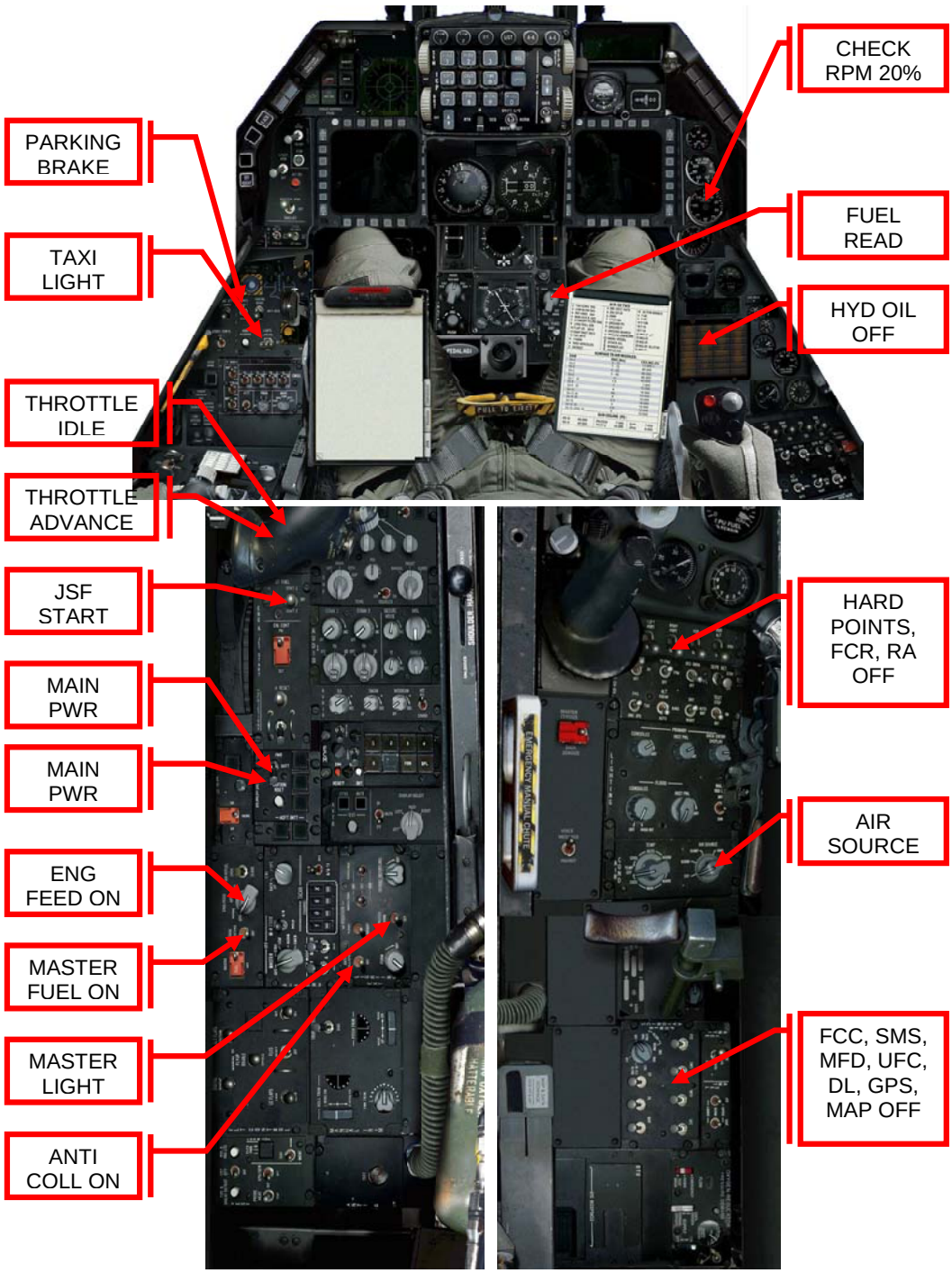
NOTES AND LIMITATIONS OF REFUELING

It was impossible to make the hose drogue system 'link' with the fighter so it will be static, but the region where fuel is flowing is larger then the drogue alone. You can modify the regions we use (making it easier or harder (but much better looking)) in the [fs2002maindir]\LAGO\Refuel\Refuel.CFG file. This is a documented configuration file that let's you change the position of the NearBox (cube around the nozzle where the tanker will give you permission to connect) and the FuelBox (where fuel is actually flowing). These boxes are offset from the center of the tanker and the module checks if the center of your aircraft is in the correct position. The smaller the FuelBox is, the more precise the nozzle will need to be inside the drogue.

Quick tip…. A very easy way to find the tanker is to stabilize at 315 knots, 15.000 feet, due east and starting the procedure. If your heading and speed is correct, after 4 minutes the aircraft will be right in front of you and very close.

APPENDIX A : STARTUP CHECKLIST GRAPHICAL

To let you get acquainted with the cockpit we demonstrate the Engine Startup Procedure completely graphically. If you not only click the buttons but also try to understand the panels a bit in this stage you soon get to grips with the not too complex systems of the F-16.



APPENDIX B, CHECKLISTS

These checklists are formatted so they can be printed and used in the cockpit

BEFORE ENGINE START

PARKING BRAKE ..... SET
MASTER LIGHT ..... NORM
ANTI-COLLISION LIGHT ..... ON
MASTER FUEL ..... ON
ENG FEED ..... NORM
FUEL READOUT ..... NORM
AIR SOURCE..... NORM
AVIONICS ..... All OFF
SENSORS..... All OFF
MAIN PWR..... BATT
MAIN PWR..... MAIN
FLCS RELAY..... CHECK OFF
WRNG: ELEC SYS ..... CHECK ON
WRNG: SEC..... CHECK ON
HYD OIL..... CHECK ON

ENGINE START

THROTTLE..... IDLE
JFS..... START
RPM ..... CHECK 20%
THROTTLE..... ADVANCE
RPM ..... CHECK IDLE
HYD OIL LIGHT ..... CHECK OFF

AFTER ENGINE START

GPS ..... ON
DED ..... ON
MFD ..... ON
FCC..... ON
LEFT/RIGHT HARDPOINTS..... ON
RALT ..... STANDBY PWR ON
HUD..... ON
TRIM..... SET NEUTRAL

ENGINE CHECK

FUEL FLOW ..... 500 - 1500 PPM
RPM ..... 60 – 70%
FTIT..... < 575°
HYD OIL ..... CHECK OFF
ENGINE GAUGES ..... ALL GREEN

FUEL CHECK

TOTAL ..... CHECK WITH FLIGHTPLAN
NORM..... A/L: 3200 F/R: 3700 LBS
TEST ..... TOT: 6000 LBS

AVIONICS

EWMS/EWS/EWMS ..... ON
DED/TWA/MFD ..... ON
COMMS ..... SET

BEFORE TAXI

MASTER MODE..... NAV
MASTER ARM..... SAFE
RADAR..... CHECK OFF
ECM ..... CHECK OFF
GEAR..... CHECK DOWN, LOCKED,
LANDING LIGHTS ..... ON
EJECTION SEAT ..... ARM
CAUTION PANEL..... CHECK ALL OFF
FLIGHT CONTROLS ..... CHECK FREE
RADIO TOWER..... REQUEST TAXI

TAXI OUT

NOSEWHEEL STEERING..... ENGAGE
AIRCRAFT LIGHTS ..... SET AS REQUIRED
PARKING BRAKE ..... RELEASE
SPEEDBRAKE..... CHECK CLOSED
SPEED ..... 20 KTS MAX
FUEL FLOW..... CHECK CORRECT
ENGINE GAUGES..... CHECK ALL GREEN
WHEELBRAKES ..... TEST
RUNWAY ..... HOLD SHORT

BEFORE TAKE OFF

AIRPORT ELEVATION ..... CHECK
HUD ..... CHECK
TRIM ..... SET T/O
SEAT ..... CHECK ARMED
DEPARTURE CLEARANCE ..... RECEIVED
RADAR ALTIMETER..... SET ON

NORMAL TAKE OFF

POWER..... FULL MIL (AB WHEN REQUIRED)
ENGINE ..... CHECK GREEN
AIRSPEED 150 KTS ..... ROTATE
POSITIVE CLIMB ..... 10 DEGREES POSITIVE

AIRBORNE

SPEED..... KEEP ABOVE 200 KTS
TAXI LIGHT..... OFF
ENGINE ..... CHECK GREEN
RADIO..... CALL AIRBORNE
DED ..... NAV MODE

REFUELLING

RADIO ..... REQUEST REFUELLING
ALTITUDE 15.000
ASK HEADING..... [CONTROL][SHIFT][H]
MASTER ARM..... OFF
SENSORS..... CHECK NOSE COLD
REFUELLING DOOR..... OPEN
PRE-CONTACT ..... CHECK LIGHTS ON
BOOM OPERATOR..... FOLLOW INSTRUCTIONS
REFUELLING..... HOLD POSITION
FUEL ..... CHECK AMOUNT
DISC/ REFUELLING DOOR ..... CLOSE

NOTE: TANKER OVERTAKE SPEED
>1NM : 100 KTS OVERTAKE
6000 FT : 60KTS
5000 FT : 50KTS
4000 FT : 40 KTS
3000 FT : 30 KTS
2000 FT : 20 KTS
< 1000 FT : 10 KTS (DO NOT EXCEED)

APPROACH

RADIO TOWER (20NM OUT)..... CALL INBOUND
DED / HUD MODE ..... ILS
MASTER ARM..... OFF
FUEL ..... CHECK

BEFORE LANDING

RADIO TOWER (5NM OUT) ..... REQUEST CLEARANCE
DED ..... CHECK ILS
HIS..... SET FOR ILS
A/C LDG/TAXI LIGHTS ..... ON
SPEED..... BELOW 250 KTS
GEAR ..... DOWN, LOCKED, CHECK 3 GREEN
SPEED BRAKE..... FULLY DEPLOY

FINAL APPROACH

SPEED BRAKE..... EXTEND
GEAR ..... CHECK DOWN
SPEED..... BELOW 150 KTS
AOA ..... GREEN 13°

AFTER LANDING

SPEED ..... DECREASING
AOA ..... AERODYNAMIC BRAKING
SPEED 80 KTS ..... ENGAGE
SPEED 30 KTS ..... VACATE RUNWAY
DED ..... ILS MODE OFF
WARNING PANEL..... CHECK NO WARNINGS
SPEED BRAKE..... CLOSE
LANDING/ TAXI LIGHTS ..... OFF
RADAR ALT..... OFF

SHUTDOWN

PARKING BRAKES..... SET
DUMP AIR ..... DONE
EJECTION SEAT ..... SAFE
HUD/RWR/JMR/ PWR/GPS ..... OFF
L/R HARDPOINTS ..... OFF
HUD/FCR/FCC/SMS/MFD ..... OFF
EPU..... OFF
THROTTLE..... IDLE
FUEL PUMPS..... ALL OFF
RPM ..... CHECK DECREASING
MASTER LIGHT SWITCH ..... OFF
AIR SOURCE..... OFF
MASTER FUEL SWITCH..... OFF
MAIN POWER..... OFF

BEFORE EXITING

CHECK RAYBAN..... ON
CHECK COOLNESS..... ICY

APPENDIX C, COUNTRIES USING THE F-16

Belgium
2nd Tactical Wing, Florennes AB
1st Squadron; Thistle
2nd Squadron; Comet
350th Squadron; Red Ambiorix
10th Tactical Wing, Kleine Brogel AB
23rd Squadron; Devil
31st Squadron; Tiger
349th Squadron; Crossed Maces

Denmark
Aalborg AB
Esk 723; Falcon
Esk 726; Three Claws
Skrydstrup AB
Esk 727; Hammer
Esk 730; Bull

Greece
111th Combat Wing, Nea Anhialos AB
330th MPK; Keraunos
346th MPK; Iason
341st MPK; Assos
347th MPK; Perseas

Netherlands
Leeuwarden AB
322 RF Squadron; Polly Grey
323 TACTES Squadron; Goddess Diana
Twenthe AB
313 Squadron; Tiger
315 Squadron; Lion
Volkel AB
306 Training Squadron; Eagle
311 Squadron; Eagle
312 Squadron; Swords

Norway
Rygge AB
332nd Squadron; Axe
Ørland AB
338th Squadron; Bow and Arrow
Bodö AB
331st Squadron; Sword
334th Squadron; Polar Bear

Portugal
Base 5, Monte Real AB
201st Squadron; Falcon

Turkey
4th Main Jet Base, Akinci-Ankara
141 Wolf
143 Oncel

5th Main Jet Base, Merzifon
151 Bronze
152 Raider
6th Main Jet Base, Bandirma
161 "Kartal" (Eagle)
162 "Zipkin" (Harpoon)
8th Main Jet Base, Diyarbakir
181 "Pars" (Leopard)
182. "Atmaca (Hawk)
9th Main Jet Base, Balikesir
191 "Kobra" (Cobra)
192 "Kaplan" (Tiger)

Bahrain
1st FW, Shaikh Isa AB
1st FS; Falcon
2nd FS;TBD

Egypt
232nd Regiment, An Shas AB
72nd FS; no mascot
74th FS; no mascot
242nd Regiment, Beni Suef AB
68th FS; no mascot
70th FS; no mascot
262nd Regiment, Abu Suwayr AB
60th FS; no mascot
64th FS; no mascot
272nd Regiment, Genaklis AB
75th FS; no mascot
77th FS; no mascot

Israel
Barak or Lightning
No further information available.

Jordan
Muafaq Al-Salti AB
Squadron No. 2;

Indonesia
3rd Squadron; Ishwahyudi AB, Madiun, Java; no mascot
Blue Eagles Demonstration Team (part of 3rd Squadron)

Japan
35th FW, Misawa AB
13th FS; Panther
14th FS; Fighting Samurai

Pakistan
38th Tactical Wing, Sarghoda AB
9th FS; Griffin
11th FS; Arrow

South Korea
19th FW, Jungwon AB
155th Fighter Squadron; Rhino

161st Fighter Squadron; Boramae (mythical bird of prey)
162nd Fighter Squadron; Black Eagle
8th FW, Kunsan AB
35th FS; Panton
80th FS; Headhunter
51st FW, Osan Air Base
36th FS; Flying Fiend

Singapore
140th Squadron; Tengah AB

Thailand
Wing 1, Korat AB
103rd Squadron; Lightning
Wing 4, Takhli AB
403rd Squadron; Night Falcon

Venezuela
Grupo de Caza no. 16, El Libertador AB, Palo Negro
Esc 161; Caribes (Indian)
Esc 162; Gavilanes (Sparrow Hawk)

USA Alabama
187th FW, Dannelly Field, Montgomery
160th FS; Snake

USA Alaska
354th FW, Eielson AFB, Fairbanks
18th FS; Blue Fox

USA Arizona
56th FW, Luke AFB, Phoenix
21st FS; Gamblers
61st FS; Top Dog
62nd FS; Spike
63rd FS; Panther
308th FS; Emerald Knight
309th FS; Wild Duck
310th FS; Tophat
425th FS; Black Widow
944th FW, Luke AFB, Phoenix
302nd FS; Sun Devil
162nd FW, Tucson International AP
148th FS; Kickin' Ass
152nd FS; Tiger
195th FS; Warhawk

USA Arkansas
188th FW, Fort Smith Municipal AP (Ebing Field)
184th FS; Flying Razorback

USA California
Edwards AFB, Lancaster
412th Test Wing
416th FTS; no mascot
NASA Dryden Flight Research Center, Lancaster
F-16XL No. 2 (laminar flow experiments; loaned to NASA from USAF)
F-16XL No. 1 (digital flight controls)
AFTI/F-16 (USAF aircraft located at NASA)

144th FW, Fresno Air Terminal
194th FS; Griffin; air-defense mission

USA Colorado
140th FW, Buckley ANGB, Denver
120th FS; Colorado Cougar
482nd FW, Homestead AFB, Homestead
93rd FS; Florida Mako
Eglin AFB, Fort Walton Beach
46th TW
39th FTS; no mascot
53rd Wing
49th TEG
85th TES; no mascot

USA Idaho
366th WG, Mountain Home AFB
389th FS; Thunderbolt

USA Illinois
183rd FW, Capital AP, Springfield
170th FS; Fly'n Illini

USA Indiana
122nd FW, Fort Wayne Municipal AP
163rd FS; The Blacksnakes
181st FW, Hulman Field, Terre Haute
113th FS; Racer

USA Iowa
132nd FW, Des Moines Municipal AP
124th FS; Hawkeye
185th FW, Sioux Gateway AP, Sioux City
174th FS; Bat

USA Maryland
113th Wing, Andrews AFB
121st FS; Falcon Fighter

USA Michigan
127th Wing, Selfridge ANGB
107th FS; Michigan Wolf

USA Minnesota
148th FW, Duluth International AP
179th FS; Bulldog

USA Montana
120th FW, Great Falls International AP
186th FS; Charlie Chicken

USA Nevada
57th Wing, Nellis AFB, Las Vegas
USAFWS; no mascot
414th CTS; Aggressors
422 TES; Green Bat (test and evaluation squadron
USAF Demonstration Squadron, Nellis AFB
Thunderbird

USA New Jersey
177th FW, Atlantic City International AP
119th FS; Jersey Devil; air-defense mission

USA New Mexico
27th FW, Cannon AFB, Clovis
522nd FS; Fireball
523rd FS; Crusader
524th FS; Hound
150th FW, Kirtland AFB, Albuquerque
188th FS; The Tacos

USA New York
174th FW, Hancock Field, Syracuse
138th FS; no mascot

USA North Dakota
119th FW, Hector Field, Fargo
178th FS; Happy Hooligan

USA Ohio
178th FW, Springfield-Beckley Municipal AP
162nd FS; Saber
180th FW, Toledo Express AP
112th FS; Stinger

USA Oklahoma
138th FW, Tulsa International AP
125th FS; Tulsa Viper

USA South Carolina
20th FW, Shaw AFB, Sumter
77th FS; Gambler
78th FS; Bushmaster
79th FS; Tiger
169th FW, McEntire ANGB, Columbia
157th FS; Swamp Fox

USA South Dakota
114th FW, Joe Foss Field, Sioux Falls
175th FS; Lobo

USA Texas
301st FW, NAS Fort Worth JRB (Carswell Field)
457th FS; Spad
147th FW, Ellington AFB, Houston
111th FS; Texans; air-defense mission
149th FW, Kelly AFB, San Antonio
182nd FS; Valor Honor
82nd TW, Sheppard AFB, Wichita Falls
396th TTG; no mascot
Lockheed Martin TAS, Fort Worth Texas
301st FW, NAS Fort Worth JRB (Carswell Field)
457th FS; Spad
147th FW, Ellington AFB, Houston
111th FS; Texans; air-defense mission
149th FW, Kelly AFB, San Antonio
182nd FS; Valor Honor

82nd TW, Sheppard AFB, Wichita Falls
396th TTG; no mascot

USA Utah
388th FW, Hill AFB, Ogden
4th FS; Fightin' Fuujin
34th FS; Ram
421st FS; Black Widow
419th FW, Hill AFB
466th FS; DiamondBack

USA Vermont
158th FW, Burlington International AP
134th FS; The Green Mountain Boys; air-defense mission

USA Virginia
192nd FW, Byrd International AP, Richmond
149th FS; no mascot (also a recce mission)

USA Wisconsin
115th FW, Dane County Regional AP, Truax
176th FS; Badger Air Militia

APPENDIX D, LIVERIES

In version 1.10 of FS Falcon there are 29 different liveries included:

Belgium
BAF 31 SQN "Tiger Meet 1985" General Dynamics F-16A/MLU
BAF 31 SQN "Tiger Meet 2001" General Dynamics F-16A/MLU
BAF FA-62 General Dynamics F-16A/MLU Falcon
BAF 31 SQN "Tiger Meet 1991" General Dynamics F-16A/MLU
BAF FA-14 General Dynamics F-16B/MLU Falcon

Greece
HAF 111 Fighter Wing General Dynamics F-16B/MLU Falcon
HAF 111 Fighter Wing General Dynamics F-16A/MLU Falcon

Israel
IAF VIPER Lockheed Martin F-16A Falcon
IAF VIPER General Dynamics F-16B/MLU Falcon

The Netherlands
KLU 322 SQN "POLLY" General Dynamics F-16A/MLU Falcon
KLU 323 SQN "Dirty Dana" General Dynamics F-16A/MLU Falcon
KTU MLU Flight Test General Dynamics F-16B/MLU Falcon

Pakistan
PAF 84715 Lockheed Martin F-16C Falcon

Norway
RNOAF 332 SQN General Dynamics F-16BM
RNoAF 331 SQN General Dynamics F-16BM
RNoAF 331 SQN "60 Year Anniversary" General Dynamics F-16AM

USA
USAF South Carolina Air National Guard Lockheed Martin F-16C
USAF Arizona Air National Guard Lockheed Martin F-16C Falcon
USAF Texas Air National Guard Lockheed Martin F-16C Falcon
USAF Edwards Air Force Base Lockheed Martin F-16D Falcon
USAF Thunderbirds Lockheed Martin F-16C Falcon
USAF Florida Air National Guard Lockheed Martin F-16C Falcon
USAF RedFlag Lockheed Martin F-16C Falcon
USAF Colorado Air National Guard Lockheed Martin F-16C Falcon
USAF Air Force Flight Test Center Lockheed Martin F-16C Falcon
USAF Alabama Air National Guard Lockheed Martin F-16C Falcon
USAF Thunderbirds Lockheed Martin F-16D Falcon
USAF Edwards Air Force Base Lockheed Martin F-16C Falcon
USAF Air Force Flight Test Center Lockheed Martin F-16D Falcon

APPENDIX E, CUSTOMIZING THE FALCON

EXTERNAL HARD POINTS

One of the most exiting things in FS Falcon is that you can modify the load out to some degree. Unfortunately this is only possible by modifying the aircraft.cfg. But it is not too complex. If you open the aircraft.cfg in a text editor (like Notepad, don't use MS Word for this) you will find these sections;

```
[fltsim.1]
title=USAF Air Force Flight Test Center Lockheed Martin F-16C Falcon
sim=F-16
model=0
panel=
sound=
texture=AFFTC
```

Now look at the fourth line, that's where the model is indicated. You can change that number to anything between 0 and 8. So there are 9 different loadouts, from totally clean to fully loaded. Of course not fit any loadout to any F-16 type (A,B,C or D), but you do have a number of options. In the first line you will find the type and using the table below you will find what loadout is available for what type. So for example, for the aircraft shown above (type C) you will have 3 loadout options (model 0,1,2), from a squeaky clean aircraft to one that has a long range with three drop tanks and 4 sidewinders. We fully understand that even this flexibility will not allow every possible possibility.

Type	Model	Station 1 Wingtip	Station 2	Station 3	Station 4	Station 5 Centerline	Station 6	Station 7	Station 8	Station 9 Wingtip
A	**4**	1 Sidewinder	1 Sidewinder	-	-	-	-	-	1 Sidewinder	1 Sidewinder
A	**5**	1 Sidewinder	1 Sidewinder	-	1 Drop tank	-	1 Drop tank	-	1 Sidewinder	1 Sidewinder
B	**6**	1 Sidewinder	1 Sidewinder	3 500lbs GBU 12	1 Drop tank		1 Drop tank	3 500lbs GBU 12	1 Sidewinder	1 Sidewinder
B	**8**	1 Amraam	1 Sidewinder	-	1 Drop tank	1 Drop tank	1 Drop tank	-	1 Sidewinder	1 Amraam
C	**0**	-	-	-	-	-	-	-		
C	**1**	1 Sidewinder	1 Sidewinder	-	1 Drop tank	1 Drop tank	1 Drop tank	-	1 Sidewinder	1 Sidewinder
C	**2**	1 Sidewinder	1 Sidewinder	-	-	-	-	-	1 Sidewinder	1 Sidewinder
D	**3**	-	-	-	-	-	-	-	-	-

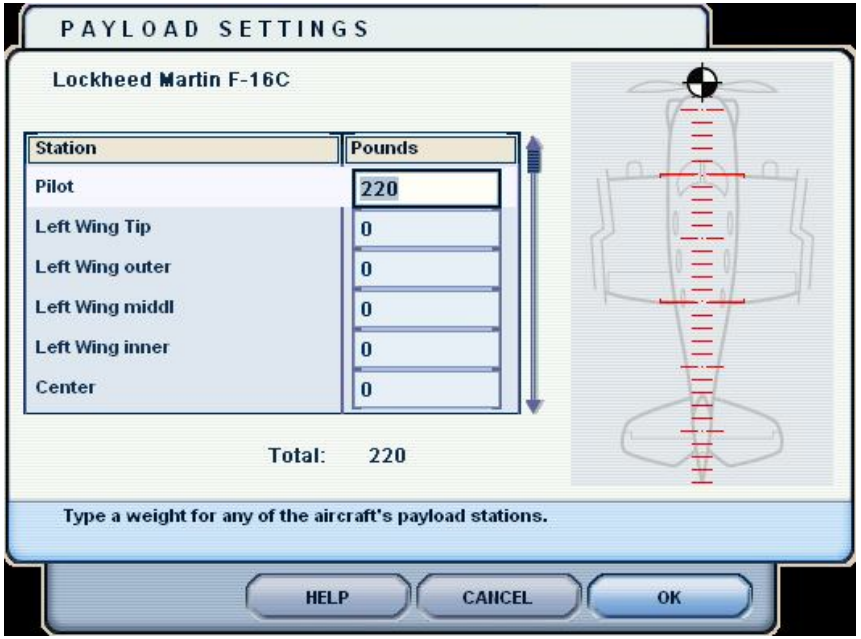
USING THE PAYLOAD MODULE

The flight models are not adapted but the default Fs2004 payload module allows you to add the weight to the stations. This will give you all flexibility to make the aircraft as heavy or as agile as you like. Use this table to find out the correct weight of each store.

Sidewinder	164 lbs
300 gallon drop tank	2500 lbs (use 1200 lbs to simulate a half full tank)
GBU 12	500 lbs
Amraam	335 lbs

The CoG (center of gravity) icon will always show way above the allowed limits. But that is a result of the way we modeled the high agility flight model and is NOT a problem. Just ignore it.

It has to be stated that using a fully loaded F-16 is like loading a ton of bricks in a Ferrari. It'll probably drive but it's not much fun.



TAIL NUMBERS

In FS2004 it is possible to add your own tail numbers in the correct font and size. We added the font during installation and using the ATC name option (available when you select an aircraft) you can change the tail number on some aircraft. If there is NO tail number inserted in this dialog, press [CANCEL]. If you do add something FS will not allow you to remove it (you will have to edit the aircraft.cfg file) and it will not look good.