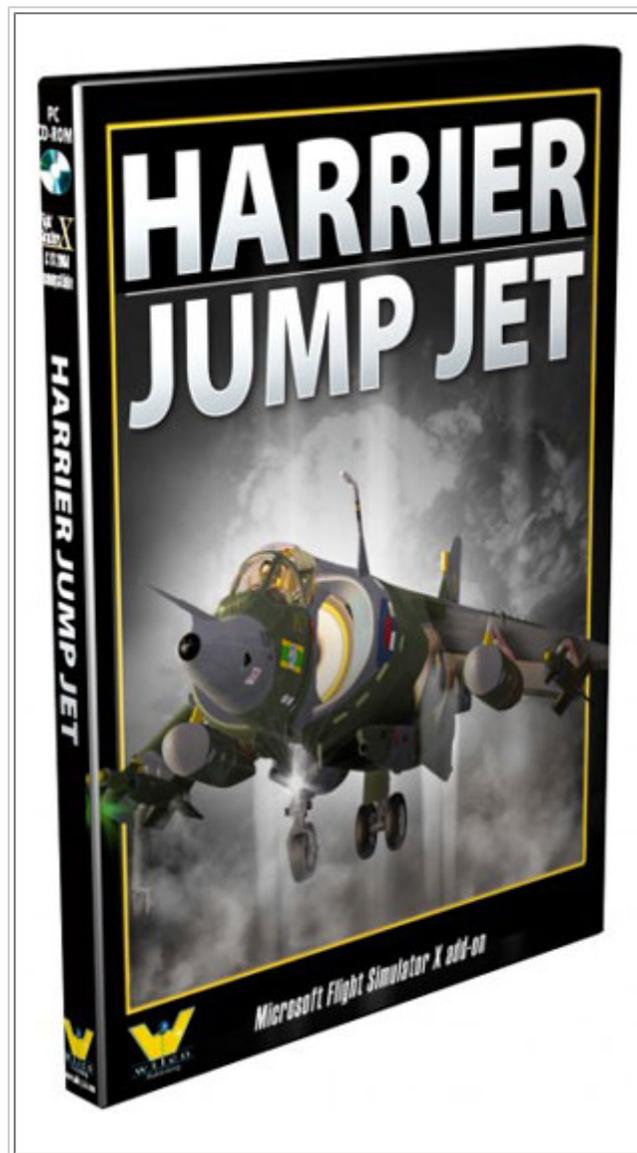


## AVSIM Commercial FSX Aircraft Review

# *Harrier Jump Jet (v2.0)*



### Product Information

**Publishers:** [Wilco](#)

**Description:** V/STOL military aircraft with highly detailed aircraft model, animations and flight model to simulate the complex characteristics of this unique aircraft.

**Download Size:**  
45.7 MB

**Format:**  
Download/DVD

**Simulation Type:**  
FSX

**Reviewed by:** [Drew Sikora](#) AVSIM Staff Reviewer - March 6, 2012

### Introduction

There's no doubt that the Harrier is a unique aircraft. Its vectored nozzles allowed it to take off and land over extremely short distances or even vertically. During flight the nozzles were often used in combat to slow the Harrier impossibly fast compared to other jet fighters. These capabilities, well outside the normal operating range for the vast majority of aircraft, are what make the Harrier an especially challenging project to take on for a simulator geared largely towards conventional flight. Wilco and the developers have taken on this challenge and the result is the Harrier Jump Jet product for Flight Simulator X.

This product aims to recreate some of the first-generation Harrier models, the GR3 and the FRS1. These models went into service back in the late-1960's and have since been replaced with various model upgrades and a second generation of Harrier entering service in the mid-1980's. Some fleets have already been retired, like the RAF's GR9s which flew their last sortie at the end of 2010, and more are facing retirement as the new F-35 Lightning II aircraft comes into service with its STOVL variant.

You can learn more about the Harrier's decorated history [over at Wikipedia](#).

Since its release early in 2011, Harrier Jump Jet has seen a new version update. Here is what was added to Version 2.0:

- Auxiliary air intake doors now operate more realistically (gravity reactive when engine off, air pressure reactive when operational)
- HUD "collimation" improved for Track IR users
- Revised, easier to operate autopilot in the VC
- Revised and improved VTOL gauge with pointers for Nozzles, STO lever, Flaps and wind direction. Readouts for Wind speed, Radio Height and Pitch angle
- More accurate "g" meter
- Reduced reflectivity in VC glass
- Revised textures for DX10 preview at night
- Numerous minor improvements throughout.

## Installation and Documentation

### Default Installation

The installation process is quick and easy - you agree to the Terms, enter in your serial number, select the destination folder and the installer carries out the online activation and then installs the Jump Jet. It will also add a Wilco Publishing folder in the Start Menu containing links to the product manual, registration and the product uninstaller. Once the installation is complete it gives you the option to launch the manual, which is something I always like to do after installing a new product and it's nice to have the installer launch it for me rather than having to go find it afterwards myself.

There were a few issues I feel are worth mentioning however. For one thing there's a screen that states:



### **WINDOWS VISTA / 7 USERS**

Please refer to our website - SUPPORT page -  
For a successful installation

There is a link at the bottom to the Wilco main site but it would have been nicer to have been able to jump straight to the support page in question. Furthermore, when I got there I realized it was information on setting up Windows 7 user account privileges and that wasn't an issue for me. I wish the warning had been phrased more along the lines of "if you have a problem, see our support page" rather than making it sound like I was guaranteed to encounter installation problems on my Windows 7 system.

One time I was unable to contact the Wilco servers to activate the product and the installer simply shut down after informing me of this. It would have been nice to go check my internet settings and try again without having to restart the installation process.

Once the product is done transferring files a message box pops up informing you that you will be asked to approve the

use of modules in FSX for this aircraft. Again though the wording made it sound to me like the installer was about to auto-run a separate program that was going to install a module, when I clicked "Ok" and nothing happened and I was a bit confused.

## Custom Installation

This product installs several files to the main FSX folder outside of the SimObjects aircraft folder, so if you want to install this aircraft outside the main FSX folder then you will have to copy some files into it anyways. My suggestion would be to let the installer put everything in the main FSX folder and then you can simply move the aircraft folder to wherever you stash your external/add-on sim objects. Just remember that unless you move it back prior to running the uninstall program you will have to delete it manually.

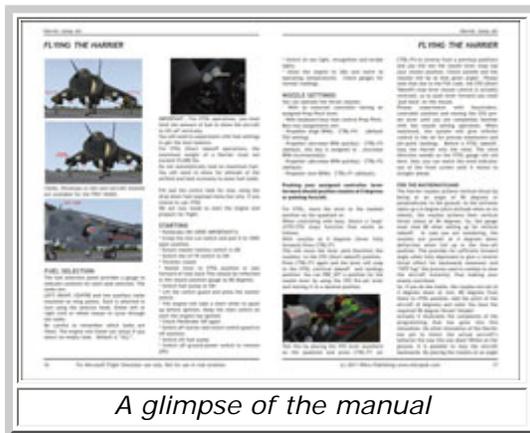
## Uninstallation

You have the option of using the link from the Start Menu folder or going into your Control Panel to remove the Harrier Jump Jet. Again, it installs files outside the aircraft folder so simply deleting that yourself won't completely remove the product from your hard drive.

The uninstaller is straight forward - after you confirm your decision to remove the product it sweeps everything off your system and closes. If you have other Wilco products you will probably still have a Wilco Publishing folder in your Start Menu otherwise it will be removed as well. Any files you have modified (by changing their names, not their contents) or have opened at the time the uninstaller runs will also be left behind for you to delete manually.

## Documentation

The product comes with a PDF manual, an HTML checklist and reference sheets for use in a web browser or your FSX kneeboard.



*A glimpse of the manual*

The 22 page manual is well laid-out and gives a good overview of the Harrier's service history, specifically the models represented by the product. It even discusses the background of some of the liveries included for the aircraft. The manual does suffer a bit from being a discussion of the aircraft and its use rather than a defined set of sections or chapters detailing various aspects. By this I mean that it can be a bit difficult sometimes to reference information when you look back for specific things, fortunately it's not large enough for this to be a huge detriment and I do like the way it talks you through the walk around, systems, startup, flight and landing.

The images and figures included in the manual are all well-labeled and designed. The panel guide makes use of a number index to identify features, which I personally think is much cleaner than filling the page with lines pointing to each instrument. There are several issues with the panel guide

however:

There is no index number for the landing light switches, although they are stated earlier in the manual as being situated on the left panel by the throttle column.

- Again, although they are spoken of in the overview text on the left panel earlier in the manual, the brake PSI gauge and other functional gauges on that panel are not identified in the panel guide.
- Panel item #5 is listed as "AHI (Artificial Horizon Indicator) setting knob" - really it is the Altimeter Calibration Knob (which isn't listed)
- Panel item #50 is listed as "Recognition Light Switch" when it's actually the switch for the pitot heat (pressing the keystroke for pitot heat does indeed toggle this switch). There doesn't seem to be a panel switch for recognition lights at all.

Other than these issues (some which may be the results of the manual appearing to be v1.0 while the aircraft is now v2.0) there are several minor spelling and grammar mistakes but nothing that gets in the way of understanding the content of the manual.

## Aircraft Selection

Once you have the aircraft installed and have given the manual a once-over to familiarize yourself with the aircraft, it's time to fire up the simulator and check it out. Note that this is where you will be prompted to approve some modules for use by the sim - be sure to say yes to these messages *and* to FSX asking you to add these to the approved list so it doesn't bother you about this again.

Once in the aircraft selection screen you can find the Harrier by selecting "BAe" for the manufacturer, "Wilco" for the publisher or "Legacy" for the type.



*Searching for the Harrier in your hangar*

*Viewing a specific livery, with no real description*

Selecting a single livery will bring up the details box but unfortunately the only thing you will find listed for details is the maximum speed for the aircraft. I always find it a bit lazy when the developer fails to fill this box properly. Especially in this case, when they put so much info about each livery in the manual - why not add that information here as well?

Then there's also the issue of the aircraft call signs, which are all created for this product and have no equivalent entry in the default FSX voice pack, which means when you contact ATC you will give your flight number and that's it. You won't say "Royal Navy" or "Royal Air Force" or "Indian Navy". I'll admit I don't consider the developer responsible for providing these files given you require an additional 3rd party tool (Edit Voicepack) to install them but it would be nice if the product documentation would mention this for users who are unaware.

Additionally one of the aircraft's flight number does not match its tail number like the rest do and the Indian Navy aircraft is labeled "IAF07" which would suggest it's actually an Indian Air Force aircraft.

I've made up some voice packs for the call signs and added proper descriptions and performance text along with some more aircraft.cfg tweaks you can find in my [review addendum](#).

Once you select an aircraft livery you'll be asked once more for some module/gauge approvals and that will be the end of that.

## **Exterior Model**

Time to do a walk around and check out the model built to represent the Harrier Jump Jet. There are two models included to illustrate the slight (visual) differences in the FRS1 SHAR (Sea Harrier) versus the GR3, mainly in the nose. Here are the 7 different liveries across 2 models, various hard point load outs and external features:



*FAA 899 Squadron FRS1, no hard points, GPU, refuel probe, open canopy and security gear*



*1 Squadron RAF GR3, no hard points, GPU, refuel probe, open canopy and security gear*



*3 Squadron RAF GR3, fuel tanks and rockets loaded to hard points*



*233 Operational Conversion Unit GR3, fuel tanks and PaveLow loaded to hard points*



*3 Squadron RAF GR3 "war" textures, fuel tanks only loaded to hard points*



*FAA 801 Squadron FRS1, fuel tanks and missiles loaded to hard points*



*Indian Navy FRS1, fuel tanks and PaveLows loaded to hard points*

In the first two images you'll see the security items (ladder, intake muffs, and probe cover) and Ground Power Unit details that can be toggled from within the cockpit. Both are purely cosmetic - you can start the plane without the GPU and you can enable the intake muffs while the engine is still running - but they add a nice touch of realism if you choose to simulate their functions properly yourself.

The model and textures are all very well done, which is good because not only does this aircraft have unique flight dynamics it also has a rather unique profile with its 6° pitched up nose, huge fan intake and swept down wings. The textures aren't high-resolution and you won't be reading some of the smaller warning labels but larger ones are perfectly legible and on a whole the textures have a nice smooth look to them.

In some places they are actually very detailed like the nozzles and the outrigger gear. Although you'll see the fan blades spinning at a slower rate when you start up or shut down the aircraft, they don't ever come to a smooth stop or begin to spin at a slow rate like how you see aircraft 3D propeller blades wind up or down when starting or stopping the engine. Although it would have been a nice touch, this isn't a huge deal since you never see the fan blades unless you're outside the cockpit looking at them.



*You can see the heat effect on the metal of the thrust nozzles*



*The fan blades stopped after shutdown*



*Pitted wear on the outrigger wheel spats*

The pilot of the FRS1 will sit there and simply stare out the front but the GR3 pilot will move his head about. Neither pilot model can be seen reacting to your control inputs. When the aircraft is shut down there's also no way to remove the pilot model from the cockpit.

All the animations are smooth and well done, from the landing gear to the flaps to the speed brake to the intake doors to the nozzles and the general control surfaces, although you won't see any trim tabs or control surfaces responding to trim settings. One problem I did come across however was the canopy, which does not seem to be able to stay open when the engine is switched off. It will open, or partially open and then close again.



*The "Exit open" status message is displayed even though by now the canopy has already shut itself.*

The switch controlling it from the cockpit will not reset, so you flick it up to open the cockpit canopy; the canopy snaps closed and you flick it down to try and open the canopy again, still without success. What's strange is I encountered this issue for a while and then all of a sudden one day it was fine. I have as yet no idea what I did to fix it.

Let's not forget that this baby is packing an Aden cannon that fires out of two pods on the Harrier's underbelly. This is done either with a button on the virtual cockpit's joystick or (as noted in the manual) via the "H" key. However the manual should have really told users that the "Carb Heat" function is used to fire the cannon. If a user happened to re-map the Carb Heat control to a different keystroke the "H" key would not work for them!

When you fire the cannon red tracers shoot out into the distance from both sides and bullet casings will fall down. If you fire while on the ground you will see the casings bounce under the plane as they land. Unfortunately I was unable to sustain gun fire - it would intermittently fire single shots or short bursts while I held down the key but never a steady stream of rounds. Again, not really a huge deal since the bullets don't actually *do* anything but a little unsatisfying I can't stream rounds of death out in front of me from my unlimited stores of ammunition.



*Pew! Pew! Pew!*

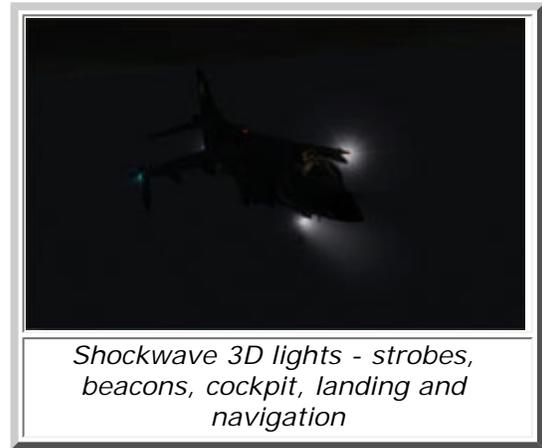


*The bullets are affected by wind (15-18kts here)*

Lighting-wise the Harrier has the usual red, green and white navigation lights, a beacon above and below the fuselage and three strobe lights - two on the wings and one on the underbelly. For some reason the developers have the white navigation light tied into the same circuit as the beacons. I also was unable to get either the landing lights or the taxi

lights to show up. I would enable the cockpit switches (and tried the keystrokes) with the master battery on but to no avail.

However, it was shown to me [on the AVSIM forums](#) that the landing light does work fine for others - it must be some tweak of my FSX setup that is causing this issue. Also there are two switches for landing lights in the cockpit and yet there is only one light on the nose wheel. There are logo lights on the tail of the aircraft but they are tied into the same circuit as the panel lights. The exterior model will show any internal lighting you have on, whether it be the cockpit light, panel lights or both. I modified the aircraft.cfg to use [Shockwave 3D lights](#) (and fixed the navigation "beacon" light and lack of landing light) - you can get the settings from my [review addendum](#).



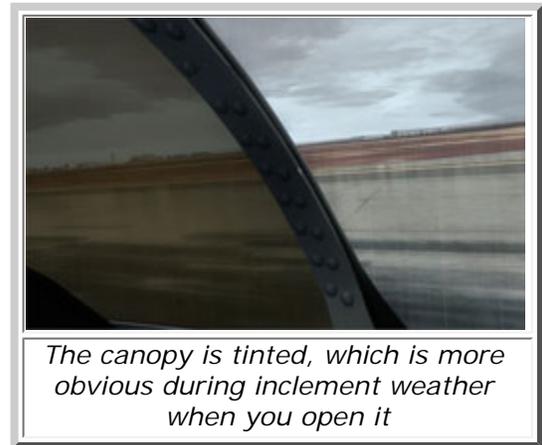
### **Interior Model**

Alright, time to climb up the ladder and drop into the cockpit, which like any fighter airplane is a very cramped and busy space! One of the coolest things about flying a fighter jet in my opinion is learning to use all the hardware surrounding you. There are 51 (some non-individual) items covered by the manual's panel guide and as I already pointed out even they missed a few things. So we're going to break this section down into the various main cockpit areas.



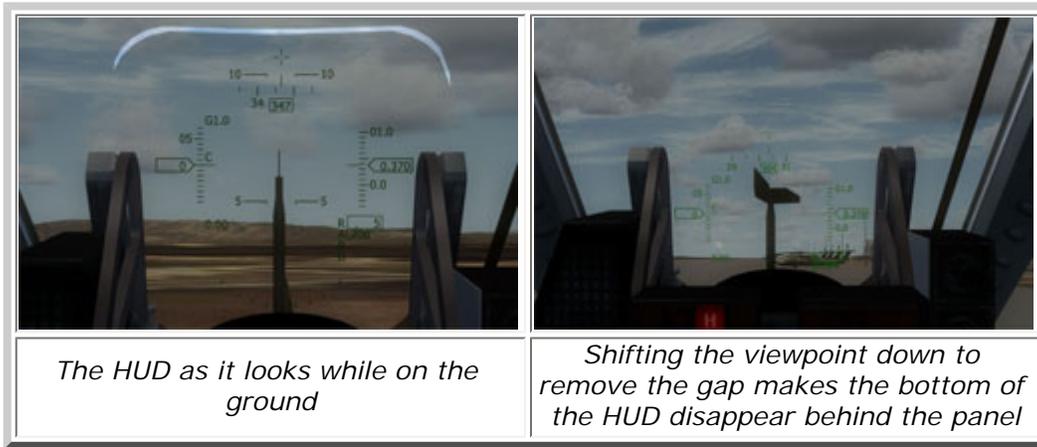
Let's start with a general impression though. First it's important to remember that the manual makes note of the fact that this cockpit layout is a bit of a hybrid and customized affair and not an exact replica given that the FRS1 and GR3 sported slightly different cockpit layouts. Wilco did say they might consider developing accurate separate cockpit models in the future, however for now they've combined the two as best as possible.

Looking around the cockpit from my normal view point of .70 zoom I can read all the important instruments without any problems. The textures are well done with plenty of wear evident around the cockpit to give it that used and worn-in feel. At night when you switch on the panel lights you're greeted with a nicely-illuminated panel with soft green backlighting. The white needles and numbers of some of the gauges seem a bit too bright but overall it looks great.



### **HUD and Wiper**

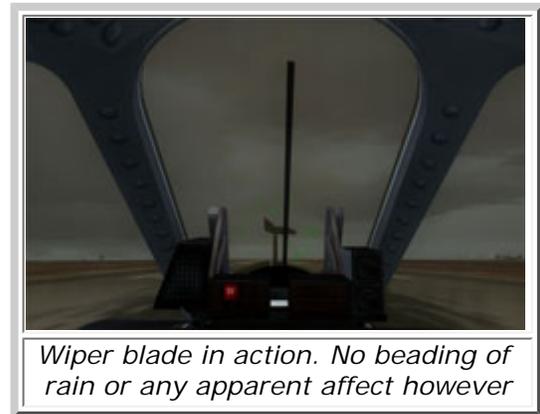
The heads up display is one of the more well-known aspects to a fighter jet cockpit and is always a "cool factor" when dealing with such aircraft. The manual does not cover the HUD display and operation in full detail but if you're a HUD newbie like myself and familiar enough with flying, the majority of the display is self-explanatory with speed, altimeter, heading, bank indicator and the pitch "ladder" all performing their functions as you fly. There's also a display for G-force, your mach number and the current reading of the radar altimeter. I have no idea what the "C" is next to the airspeed or the "AL200" under the radar altimeter or the "B" and "D" below that.



One of the problems with the HUD however is that to view it properly creates a "cut out" section of the canopy above the display. I actually think it looks like the edge of the cantilevered piece of glass the HUD is projected on so it doesn't bother me a whole lot, but if you want to make it go away you have to shift your view point down and this hides the bottom of the display behind the panel, which hides your bank indicator.

Two knobs on the right of the display column control the brightness and contrast of the HUD display, but I found their click spots are a bit tough to find given the relatively huge space available for them. The "Decrease HUD Brightness" click spot shows up with a + hand, although it still works properly. I generally use the mouse scroll wheel to adjust after I find a click spot.

To the right of the HUD is a vertical wiper blade that can be activated with a cockpit switch when the bad weather moves in. The features list on the [Jump Jet website](#) says "Animated windshield wiper is controlled from cockpit and interacts with real time weather conditions." I don't know exactly what they mean by that and the manual didn't specify either, but the only interaction I notice is not with the wiper blade itself but the annunciator panel lighting up a "W" under conditions where you should turn on the wiper.



Having the wiper on does not increase visibility and seems to be another aspect you can choose to simulate should you want to. It's a bit annoying though that the wiper animation never starts smoothly when you turn it on - it either jumps to the left and starts wiping smoothly back and forth or jumps to the middle and starts animating. Likewise, it doesn't finish when you turn it off and it simply pops back over to the right.

## Main Panel

The main panel in front of you houses all the critical flight instruments like the altimeter, vertical speed indicator, artificial horizon, G-force, etc. Once you get familiar with where everything is it's easy to work up a scan pattern and the more important gauges are near the top so you can still see them as you are looking out through the HUD.



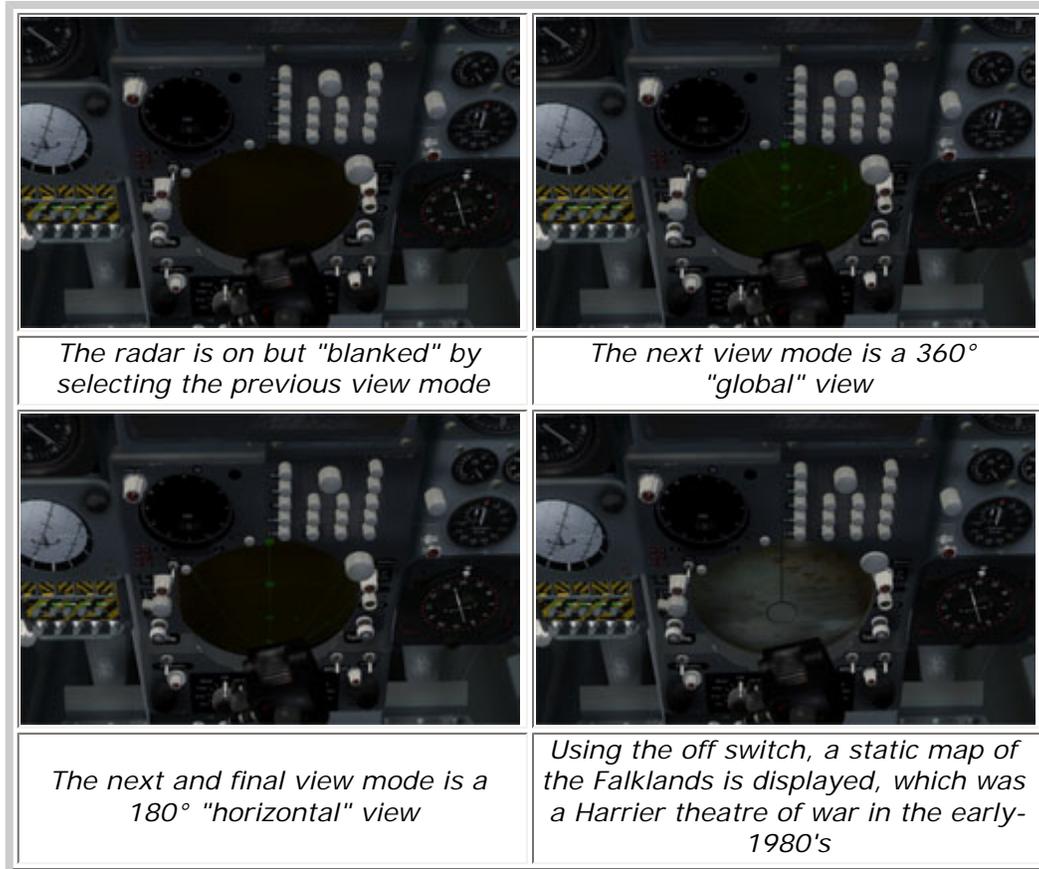
It would have been nice if the cockpit featured items that could be shown/hidden like some aircraft that have yokes you can hide. In particular for this panel the big piece of padding I assume is there to help protect your head from smashing into the panel during extreme deceleration or impact is actually blocking two instruments that, while not vital, are nice features I wish were easier to see without having to move my viewpoint down and look up at them.

The big radar screen in the middle of the panel down by the joystick is a really nifty feature. You can set it to see 360° around you or 180° in front of you. It will pick up all AI traffic within a 40nm radius and you can zoom in as close as 5nm in radius. Traffic will show as vectored symbols like on an ATC screen to let you get an idea of its height and direction of travel relative to you. Clicking on a symbol will "target" the aircraft and at the top of the radar

screen you'll see its distance in nautical miles and at the bottom (slightly hidden by the joystick in neutral position) you'll see its altitude.

On the HUD a targeting box will show up when you are pointing towards the target. This is great for running intercept scenarios where you are sent up to check on a suspicious aircraft.

The controls for the radar differed a bit from the manual, perhaps as a result of the v2 "minor improvements", but nothing was missing that detracted from the functionality of the radar screen.



## Left Panel

Over on the left panel you have the external light switches, the throttle/nozzle levers, gear and trim status indicators, speed brake and fuel switches. Just from playing around with the controls reveals several issues however.

One issue that may actually be accurate are switches that toggle down for "on" and up for "off". I can't verify if this is indeed how these switches operate but I can find it mildly annoying given that not all the switches in the cockpit behave in this manner, and you have to remember which switch is "on" when up and which switch is "off" when up, and vice-versa. All the engine switches (fuel pump, cutoff and fuel dump) are up in their "off" position, as well as the switch to toggle the fuel probe - up hides the probe while down shows the probe. This seems backwards to me.

Then there's the speed brake, which if you move down past 20% while on the ground the brake will deploy the rest of the way and you will be unable to raise it unless you blip the throttle. So it's never really an issue since as soon as you push the throttle forward to taxi or takeoff the brake will respond properly but chalk it up as "weird" behavior nonetheless. Perhaps it needs that extra boost of hydraulic power from the engines to rise back up?

While messing around with nozzle settings on the ground you will hear the flaps move and see the flaps gauge next to the gear status lights react. However when you deflect the nozzles rearwards past 50° something weird happens to the flaps down light. You hear the flaps move but the flaps gauge needle is already at its max deployment of 5. Instead the green light for the flaps down light rises up off the instrument panel (it appears that many of the cockpit status lights are bright 3D objects that rise up to cover the darker 3D object to give the illusion of a lit bulb. Interesting technique).



*The flaps Down light raises up off the panel*

Finally you look at the switches lining the top of the left panel and realize that you can read the labels there, and none of them match up to the function of the switch. One label reads "Chaff Flare Off" and it toggles the strobe lights. Another reads "P.T.T Switch" and it toggles the pitot heat (hey maybe that's an accurate label though - Pitot Tube Thermal?). Another reads "Tac Display" and it toggles the taxi lights.

Now I realize they said they took liberties with this cockpit but I don't see the point of leaving a label present in the pursuit of realism (assuming these are the real labels for these switches) when the switch doesn't perform the function its labeled for. Why not just remove the labels? Not all the switches in that row are labeled. Or just label the switches as they function in the simulator?

## Right Panel

Turning our head to the other side of the cockpit we find ourselves looking at the avionics, some more engine readouts, the autopilot and the engine, power and internal light switches. Immediately apparent is the fact that we can't really see the avionics stack at all. This would have been another situation where being able to remove a panel from view (namely the engine gauges) would have been convenient.

As it is you're forced to either bring up the 2D radio panel or switch to a pre-set cockpit camera view that lets you see the avionics stack clearly. The 2D panel is the easiest solution unless you delete the rest of the cameras from the aircraft.cfg or shuffle the avionics camera to the top so you don't have to cycle through them to get to the stack and back to the default cockpit view. Looking at some real life Harrier cockpit photos online I definitely think this part of the cockpit could have been designed better.



*Incorrectly labeled switches or incorrectly functioning switches?*



*Looking at the avionics from the default cockpit view*



*Looking at the avionics from another cockpit camera view*

Another strange thing I noticed looking at the right panel was the amps meter for the generator. It was spiked well past the maximum amperage labeled on the gauge. I experimented with flipping various switches around the cockpit and found that the avionics, pitot heat, strobe light, navigation light, cabin light and landing light switches as well as firing the Aden cannon would all have an effect on amperage. When most were on, the dial would swing well past the numbers and pin itself. Interestingly though I saw no effect on the meter when toggling the fuel pump, taxi light, radar or panel light switches while the needle was unspinned.

Some additional issues include the inability to toggle on the cabin lighting. The switch refuses to stay on - it flips up and immediately flips down again (and registers a blip on the amps gauge). I tested it both day and night - same result. I finally ended up modifying the aircraft.cfg file to tie a cabin light to the taxi light circuit since that switch wasn't doing anything anyways. See my [review addendum](#) for further details on that.



*We seem to be a little over-juiced on the amperage! (needle is swung to the right, not the left)*

The panel light knob operates just fine but for some reason whenever I toggle it with the mouse the navigation light switch is also toggled. It doesn't work the other way around though so I can toggle on the navigation lights, toggle on the panel lights and the navigation lights will turn off. Then I'll turn off the panel lights and the navigation lights will turn back on. Even weirder is that if I use the keystroke instead of clicking the knob, the panel light knob will turn but it won't affect the navigation light switch!

And speaking of keystrokes affecting switches and knobs, if I use the keystroke for opening the canopy the switch will not toggle. So if I flick the switch up the canopy will open. Then if I press the keystroke the canopy will close. Then I flick the switch down and the canopy will open. Flick the switch up and the canopy will close, effectively reversing the switch.

One cool feature found over on this panel is the clock, which is an analogue time piece that lets you set the red hour and minute hands for timing purposes. It's a great throwback and reminds you that this is a vintage aircraft by today's standards. Strangely though the knobs that control the hour and minute timer hands can only be set by clicking and dragging the mouse, you can't use the scroll wheel. This is unfortunate because it does take a bit of preciseness out of its operation. Whereas one click on the scroll wheel could correspond to one minute movement of the minute hand dragging is a bit more imprecise.



*Analogue clock is a cool throwback*

**Controls**

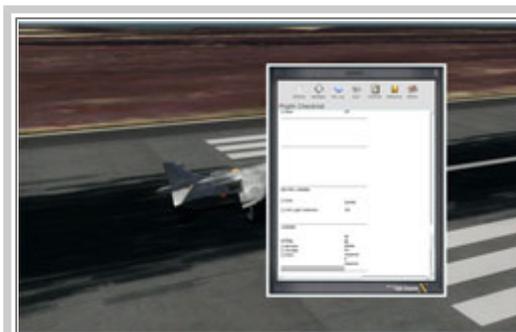
Let's check the operation of the stick, rudder, nozzle and throttle levers. You can slide the two latter controls with the mouse cursor if needed, and both smoothly animate when controlled by a joystick axis (the nozzles are controlled by the prop pitch axis).

The stick properly shows freedom of movement as you angle it about. You can click on one of the buttons with the mouse to fire the cannon in lieu of pressing the keystroke. The click spot comes up as "Rate of climb/descent indicator" though in the tool tips.

The rudder pedals properly animate forwards and back as you steer the rudder if you have rudder pedals attached or are using a twist joystick. Apparently the harrier has differential braking (there is even a brake gauge with two needles that react to each pedal brake), so if your rudder pedals have tips you can press you can use them although the pedals in the cockpit will show no sign of this movement.

**Checklists and Reference**

Now that we've become situated with our environment it's time to whip out the checklists and give our procedures a once-over so we get an idea of what to expect while operating the aircraft. Unfortunately the checklist provided is a bit of a joke and I'm seriously wondering if whomever wrote it actually ever used it or if it was simply included because it was something the developers felt was required but didn't really care about.



*The checklist is overly narrow and has some ugly formatting issues towards the end*



*The reference sheet is better, with useful figures and a key for the annunciator panel at the bottom*

Let's just look at the Before Starting Engines and Starting Engines checklists (the first two procedures listed) as these are really the two that have the most problems:

<b>Before Starting Engines</b>	
Gear	CHECK DOWN
GPU switch	ON
GEN switch	OFF
JETMIX SWITCH	100%
LF/W switch	ON
Fuel Quantity	SET AND CHECKED
Aircraft Lighting	OFF
Parking Brake	SET
Aircraft Lighting	ON AS REQUIRED
Altimeters	SET
Standby Instruments	SET
Avionics Master Switch	ON
Avionics	SET
Nozzles	SET to 80 on gauge
Payload	SELECTED

Besides things like having the Jetmix switch set to 100% being absolutely *wrong* (we'll get to that later) why are we turning off lights to turn them on two steps later? What are standby instruments? If they mean things like the standby frequencies of the comm and nav units well doing that is impossible since we don't switch on the avionics until the next step. Speaking of turning on the avionics, how do the avionics work if we haven't yet turned on the master battery?

<b>Starting Engines</b>	
Fuel pump switch	ON
Throttle	CLOSED
LIFT GUARD+press STARTER	ON
Fuel Flow	CHECK
RPM	CHECK
Oil Pressure	CHECK
Engine Instruments	CHECK NORMAL
Annunciator Panel	CHECK NORMAL
Generator Switch	ON

There are obvious problems with this list like the fact that it tells us to turn the fuel pump and starter switch on and then never tells us to turn them off (the manual, when it walks you through the start up sequence, does). Furthermore, I scoured the panel guide and the cockpit itself and was unable to find anything that looked like an oil pressure gauge.

The checklist asks you to check for normal operation of the engine instruments but the manual never specifies operating ranges for these instruments and none of them have any sort of colored arcs (with exception to the turbine temperature gauge) that give you an idea as to what these normal operating ranges might be. You're then asked to check for a normal annunciator panel *before* you turn on the generator, which will leave a light on indicating the generator is out. Then once you have the generator on it forgets to tell you that you should switch off the GPU.

There are also no after landing or shut down procedures (here or in the manual), which is a bit frustrating considering the manual walks you through a cold and dark startup sequence you can't do until you figure out how to shut the craft down on your own, or load up a flight with another aircraft you have cold and dark and then switch to the Harrier.

I ended up creating my own checklists to properly start up, operate and shut down the Harrier - you can find them in my [review addendum](#).

## **Flight Model**

Time to kick the tires and light the fires!!

Unless otherwise specified, all flying with the Harrier Jump Jet was carried out under full realism settings. Controls initially used were the Saitek X52 HOTAS but I then graduated myself up to using only the stick from the X52 coupled with the throttle quadrant from the Saitek Pro Flight Yoke to lend a more realistic feel to the engine/nozzle controls.

Flights carried out were mostly taking off and landing in the pattern around Vandenberg AFB on the coast of California. I worked conventional take offs and landings then went with short takeoffs and landings and then finally carried out vertical take offs and landings. Once competent in each on the ground I moved offshore with the [USS Nimitz](#) to do STOL and VTOL operations off the carrier, stationary and then moving.

Finally, I did a cross country flight navigating by VOR and VFR down the California coast from Vandenberg AFB to Miramar MCAS and back again, starting and ending cold and dark. Other than that, there was lots of random taxiing and flying about aimlessly to test various things.

### Load and Balance

The first thing we need to do before taking the aircraft anywhere is ensure it is properly loaded for the operations you have planned. The Harrier is capable of VTOL and STOL operations only under certain weight loads (listed in both the manual and reference), so it's important to keep this in mind. You may, for example, have to begin your flight with a conventional or short take off because you are too heavy but can land with a STOL or VTOL after you have burned fuel or dropped some ordnance to make you lighter.



*Realism settings used during testing. Gyro drift disabled due to lack of magnetic compass in cockpit*

*Main screen with default load out figures*

*Default fuel load out*

*Default payload load out*

Looking at the main screen we can already spot a discrepancy - the empty weight for the Harrier is listed as 15,000 lbs. The manual specifies this weight as being 12,200 lbs ([Wikipedia](#) agrees). It should probably be worth noting here that although two models of Harrier are represented in this product, only one flight model is used for both, so even if this figure in the payload screen was correct at 12,200 lbs, it would technically be wrong again if you were to hop into one of the FRS1 models, as they have a different empty weight than the GR3 figure specified in the manual.

The default weight for the Pilot payload station is also rather suspect. Even with flight gear it's hard to imagine a pilot weighing that much, especially when you consider the fact that fighter jet cockpits are not the best place for people who are generally large enough to weigh in above 280lbs (allowing 20lbs for flight gear - this is an estimate I couldn't find any useful information online regarding this). In fact, the United States Air Force has strict [height and weight restrictions](#) and [they state](#) that to fly for them you need a standing height between 64-77 inches. This means at most a pilot for them will weight 231 lbs, and this is for flying in general - fighter jet restrictions are probably more severe in terms of height requirements.

A much bigger problem however is made apparent when you view the Fuel Settings window and realize that this aircraft only has 4 fuel stations. According to the manual you are supposed to be able to load up fuel for a Left, Right,

Center and an auxiliary tank on each wing. Presumably this meant you had two internal fuel tanks (Left and Right) and when you selected the external tanks for a payload you could simulate them by filling up the Center tank that attaches to your underbelly and the auxiliary tanks that appear on each wing pylon. With the tanks available however I've decided to treat them as Center being the main internal tank, Left and Right being the wing-mounted tanks and Center2 being the underbelly tank.

Since this product isn't like the VRS Superbug in being able to model hard point load outs dynamically, if you do decide to carry payload you should remember to modify the Fuel and Payload settings accordingly (and as accurately as you wish - like looking up weights for Pavelows or Sidewinder missiles or just guessing how much they might weigh). Don't forget that you should add a couple extra pounds to the wing payload stations even while carrying just fuel tanks for the empty weight of the tanks themselves.

## Preflight

Time to get our cold and dark cockpit up and running. Unfortunately due to limitations in either the model or the sim (or both) it's impossible to save the aircraft in a completely "shut down" state - you will always reload that saved flight with the radar on, the security switch off, the engine cutoff switch set for operation and the canopy closed. Other controls switched off stay as they are however.

As you flick on the master battery switch several dark or dormant instruments spring to life. There is no way to turn the beacon lights on or off from within the cockpit but I personally always leave them on to go on and off with the master battery switch so for me that's not a huge issue. If you need to turn them on though it will have to be through a keystroke.

Next comes the avionics switch, which will light up the avionics stack and the autopilot. Again, seeing the virtual cockpit avionics stack is awkward thanks to the design of the cockpit but at least during preflight you don't have to worry about flying the plane as you preset any frequencies you'll be needing for the NAV and COM units, and there is still the 2D panel. If you like to use keystrokes (or keystrokes assigned to joystick buttons) to cycle through the various radios to set you'll be happy to know that the numbers do highlight so you can tell where you are in the cycle.



*Fuel tank gauge and selection switches*

Once the AP and avionics are ready to go, we need to check and ensure we have enough fuel to start the engine and carry out our mission. We also have to ensure that we have the proper tank selected, if not all tanks are filled with gas. Here is where I usually choose a hard point load out if any and go into the Fuel and Payload screen to set my weight. The fuel gauge can only show the capacity of one tank at a time, and you use a knob to select tanks from Center->Center2->Left->Right (I had to find this out from trial and error - the tooltip for this knob, unlike the other knob, does not tell you what tank you've selected and you can only see two labels on the panel). Each tank selected will make the needle jump (not swing, which I think would have looked better) to that tank's current fuel level. The knob above that selects the tank you are currently drawing fuel from.

By default when the aircraft is loaded the knob is set to All. Once you click it over though it goes All->Left->Center->Right->Aux Left. If you move it back it will go Aux Left->Right->Center->Left->Aux Right. Not only are Aux Left/Right non-existent tanks (that will cut the engine if you select them) and not only are they for some reason situated opposite the Left/Right tanks there is no selection for Center 2 and there is no way to go back to drawing from all tanks at once. Also I can't figure out what unit of measurement is being used to determine the number in the fuel gauge, which would help in calculating fuel consumption rates.

Loading 100% fuel in all tanks displays 7,920 on the gauge. The fuel weight is 8,040 lbs, so that's not it. Convert pounds to kilograms you get roughly 3,647 so that's not it. The total fuel in gallons is 1,200 so that's not it either. Convert the gallons to liters and you have 4,542 so that's still not it. At least when it reads 0 you are in fact in big trouble!

Once you load up on fuel and decide whether you want the ability to draw from all tanks or select specific tanks (and lose the ability to use the Center 2 tank), it's time to start up the Rolls Royce Pegasus 11 Mk 101 Vectored thrust turbo fan jet engine - which when you think about it is situated directly behind you! If you follow the instructions given to you by the checklist or the manual you're going to run into a problem - when the engine lights up the aircraft will lurch forward and travel for several feet before coming to a stop, even if you have your feet held down on the toe brakes and even with the nozzles set to 80° (straight down).

The parking brake is set to automatically disengage at just over 40% RPM and following the start procedures outlined in the manual will cause the RPM to spike upwards past 60% so the parking brake will release and you won't be able to immediately reset it until the RPM drops.

I accidentally discovered the solution to this problem when I went to start one time without referencing my checklist just to get the bird running to test something and forgot to enrich the Jetmix prior to engaging the starter. When the engine didn't ignite after spooling up I realized this and added some mixture. To my surprise the RPM only jumped to just over 40% and the jet moved forward much less than in my previous start ups. I quickly shut down and retried this procedure of letting the engine spool up before enriching the mixture, this time holding the brakes down, and when the engine lit up I didn't move forward at all. This modified start up sequence is part of the revised checklist included in my [review addendum](#).



*Starter switch/cover, GPU switch (not APU as it's labeled), mixture switch and master battery switch. Note the mixture switch is at 100% in this image - another one of those "backwards" switches.*

Once the engine is lit you'll notice the Harrier likes to "hop" a little bit as it sits on the tarmac. No matter which way I vectored the thrust nozzles I could not get this behavior to go away. The only solution is to either engage the parking brake or begin to taxi at which point the aircraft either sits still or travels smoothly. However "still" isn't really the term to use when sitting on the tarmac and not taxiing. If the parking brake is off the aircraft will travel backwards very slowly but still noticeably regardless of nozzle direction (other than full-forward). If the parking brake is on the aircraft will crawl forward at the same pace, again regardless of thrust nozzle position. So if you're sitting in your cockpit for an extended period of time after starting up the engines make sure there's nothing in your immediate vicinity if you have crash detection enabled.

## Taxi

When it comes time to pull off the ramp and head for the active it's important to remember you're strapped to a very large and very powerful jet engine. If you're used to driving single or twin props then you'll probably be taxiing at 50 kts within a few seconds without even realizing you pushed the throttle over that far, because it doesn't take a lot of travel to get there! I used both my Saitek X52 throttle and the throttle quadrant from my Saitek Pro Flight Yoke and I found the yoke quadrant gave me an easier time since it had a larger range of travel and thus set much finer RPM levels to control my speed better.

With the X52 I was literally adding/removing *pressure* from the throttle rather than really moving it to speed up and slow down. Remember though that you have thrust nozzles! If you find your throttle is too sensitive to control your taxi speed then bring the nozzles into play to add finer control over your speed. You'll have an easier time controlling acceleration thrust with the nozzles at 60° compared to 20° but understand you'll be burning slightly more fuel on taxi to do so.

Speaking of thrust nozzles it's possible, with the throttle cut, to move the nozzles to 0° (full-forward) and begin to move because your engine is still idling at around 35% RPM and it's putting out some thrust. However using this to taxi the aircraft is not recommended as your speed will continue to build well past safe taxi limits. Under the default load out weight and given enough flat distance to travel, the Harrier can accelerate up to 55kts. So you'll be braking often to keep your speed down and although I'm not sure if the sim takes this wear into account when simulating a brake failure (if you have failures enabled) why take the chance?



The turning capability of the Harrier is very, very loose in comparison to other aircraft I've driven. While you can taxi comfortably at 20kts in a straight line as soon as you have to turn I would recommend dropping down to 10-12kts or even slower to give yourself more time and room. It takes a bit when you initiate the rudder turn to actually see the aircraft respond and when you straighten out the pedals it takes even longer for the aircraft to stop turning, so you need to get used to its responsiveness to straighten out after turning and point where you want to be going without having to make too many corrections because you'll find yourself over-correcting a lot otherwise. I definitely do not enjoy taxiing in this aircraft, which makes it nice to be able to just lift off and go.

*Throttle cut and nozzles full-forward,  
tooling along at 55kts!*

One thing that *is* cool however is that if you vector the thrust nozzles all the way around backwards you can taxi in reverse!

## Take Off

Okay we've made our way out to the active and it's finally time to take to the sky! There are several options at your disposal for leaving the ground in the Harrier and I've covered all of them in the sections below. I would suggest putting in land pattern practice for all three of these to get the hang of the aircraft before bothering to take it out to an aircraft carrier.

## Normal

Even though the aircraft didn't come with any procedures for a conventional take off, I figured I'd give it a shot to see what would happen. After a few flights I found that the general behavior of the Harrier in a conventional take off is similar in some ways to that of a tail dragger. Once you push the nozzles to full-forward (the nozzles are always spoken of in direction of thrust) and increase the throttle you'll find as you gain speed the rear of the aircraft will lift up and you'll be rolling along the ground on the nose wheel only until you achieve sufficient speed for lift off, which will depend on your weight. You can either pull back on the stick as you come up on your nose wheel or set the elevator trim one notch up. Once off the ground you simply climb like a normal aircraft. I loaded up just a few dozen pounds under Max Gross Weight and was able to take off conventionally.

Note though that a "normal" take off in the Harrier should really still be done with STO settings. You can certainly take off over STO weight limits with the nozzles at 60° STO setting, you simply won't leave the ground within the distance required for it to be called a short takeoff, as I explain further in the next section.

## STO

Short Take Off is something you don't want to try if you happen to load yourself up over 25,000 lbs. According to Wikipedia STOL is [roughly defined](#) as being able to take off and land while clearing a 50 foot obstacle within 1,500 feet. To test this out with the Jump Jet I modified the runway at Vandenberg to be only 1,500 feet long, a mere postage stamp compared to its normal 15,000 feet. I then set the weight of my craft to just over 25,000 lbs and placed it at the very end of the runway. Setting my nozzles to the 60° STO position I applied full thrust and started down the runway. Pulling back hard on the stick the whole way I finally leapt upwards off the runway at the very end but my climb rate was abysmal and I would have not felt comfortable about clearing a 50 foot obstacle. So lesson of the day: pay attention to your performance envelope!

Even when you are under the weight limit for STO operations it's important to realize that you will need varying distances to take off depending on how heavy you are. The manual tells you to pull back on the stick gently at "around 40-45 knots" but this is only applicable to whatever weight load they had at the time. The jet *will not* come off the runway no matter how hard you pull back on the stick until it has built up enough thrust. For example, loaded out to 23,340 lbs (the default weight load out) you will need to accelerate to over 50 kts before you can pull the aircraft off the runway. If you're lighter like say 17,879 lbs you can leave the stick alone and the aircraft will raise itself up off the ground after only rolling up to around 20 kts. The distance you travel will depend on how fast you advance the thrust lever, so if you want to reduce travel shove that throttle forward as fast as you can.



*The tiny STOL landing pad I created  
at KVBG*

It would have been better if the manual had given you some figures by which to calculate the roll distance you would need to achieve enough thrust to lift off given your current weight.

Once you've lifted off get your gear stowed and then advance the nozzles forward as you maintain back pressure on the stick to counter the slight sink you'll get as you transition into conventional flight.

## VTO

Taking off vertically is another situation where it's important to watch your weight. The maximum VTO weight is listed

at 21,000 lbs but this is a conservative safety limit, I was able to transition into forward flight at just under 22,000 lbs (with no obstacles). However it's important to recognize that the transition to regular flight is the real hard part when it comes to vertical take off. You can even get the Harrier up off the ground and hovering at just over 23,000 lbs however you won't get it very high and you certainly won't get it flying normally without dropping it into the ground in the process.



*Hovering low to the ground you'll kick up some dust, which is a nice effect. Incidentally, this is as high as you'll get weighing in at just over 23,000 lbs*

Once you set your thrust nozzles to 80° for VTO you'll need your left hand on both the throttle and the nozzles at the same time to effect a perfectly vertical takeoff. For my Saitek X52 this is easy when you assign the lower thumb roller axis to control the nozzles. The throttle quadrant from the Saitek Pro Flight Yoke is slightly more challenging since it more accurately recreates the separation between the throttle and nozzle levers.

You need to slowly advance the throttle so you can tweak the position of the nozzles slightly to keep yourself from traveling too far forwards or backwards. Eventually you will lift up off the ground, again when this happens depends on your weight. Reducing the throttle slightly will bring you into a hover and you can use the rudder pedals to steer your nose and the wings to bank and slide left or right. Using the rudder to turn will cause you to bank slightly so be prepared to compensate. You will need to continue to make very small corrections with the thrust nozzles to maintain your position. It does take some practice but it helps that if you are moving forward you simply pull the thrust nozzle lever back a bit, and when you find yourself drifting backwards you push the nozzle lever forward - so it's very intuitive.

To be honest I feel way too stable while in a hover. I understand that the aircraft has small "puffer" jets in the wings and tail to help stabilize it and assist in small maneuvers but still it feels like you constantly have a "hover control" autopilot engaged. It's definitely *extremely* easier to hover than even the default FSX helicopters. Given what I've generally heard about Harriers over the years it shouldn't really be this easy in my opinion. Not ever having flown the real thing, I'm afraid that's about all I can say on this. However [here's a little extra opinion](#) from a Harrier mechanic who logged a bit of Harrier trainer sim time.

Once you're ready to complete the take off make sure you have the throttle at full and the gear raised then pitch the nose down slightly to start moving forward. Bring the nose back up as you start to move the nozzles forward to counteract the slight sink you'll get as you transition to conventional flight.

## Carrier Operations

When taking off either STO or VTO from an aircraft carrier everything pretty much remains the same with a few exceptions. For STO you have a well-defined limited amount of deck space to use, so make double sure you have the distance needed to take off given your weight if you're too heavy for a VTO. For VTO the only thing to keep in mind is whether the carrier is in motion when you lift off, since as soon as you leave the deck vertically it will start to move under you as the ship continues to steam on at 30 kts or so. Just remember to be ready to match movement as you continue to lift in case there are any obstacles close to you.

## Cruise

Once you're in the air the Harrier handles like a normal jet fighter. Keep the throttle open and point the nose skyward to get a taste of the aircraft's 16,510 ft. per min. climb rate. High-G turns, rolls and loops are all fun to pull off, just make sure you keep a sharp eye on that G-Force gauge or the G readout on your HUD as it's easy to overstress the aircraft pulling high-G maneuvers at full throttle. Also don't forget you *will* start to black out in sustained high-G maneuvers.

When you're ready to settle in for a long haul, the aircraft trims out nicely - it sports trim for the ailerons, rudder and elevators however I only ever needed to use elevator trim to keep the nose level when flying without the autopilot. Although if you simulate the dropping of ordnance by modifying the payload weight you will find yourself a bit "tipsy" until you even out by dropping payload from both sides - at this point rudder/aileron trim is useful. If you're used to smaller aircraft you'll also notice you'll be using the rudder a lot more even in shallow banks to keep the jet from skidding through the air thanks to its high speed.



*Trimmed out and cruising over Santa Cruz Island off the California coast*

A lot more problems with the Harrier became apparent while up flying around however. We'll start with the heads up display. When you raise the landing gear the heading indicator at the top of the HUD will reposition itself at the bottom. When you lower the gear the heading indicator will return to the top. This wouldn't be a real issue if not for the next problem, which is that the wind vane *behind* the HUD blocks the display of the HUD. Thankfully while in flight the wind vane itself is pointing straight ahead and presents a narrow profile however the base of the wind vane is wide enough to almost entirely block the current heading reading.

Another issue with the HUD I thought for a long time was a bug was the fact that I would be in level flight with the autopilot engaged

and yet the "pip" or reticule on the HUD would be skewed off to one side. The only reason it should be like that is if I needed corrective rudder to keep from skidding through the air but I was in straight and level flight - why would my aircraft not travel in a straight line? Then one day I had an epiphany and realized the only thing that would keep my aircraft from flying straight when in level flight is *wind*. Good lord it seems so obvious now but again being new to HUD displays I didn't grasp the meaning at first. I wish once more the manual had gone into more detail about the HUD display and operation, it would have saved me some confusion.



*Here the gear is raised and the heading indicator has moved to the bottom of the HUD and is hidden by the wind vane base*

The last HUD feature I checked out was the "lock on" ability to select an aircraft on the radar screen and track it via a targeting box on your HUD. When you initially lock on an aircraft the HUD doesn't do a good job of placing the target box at the edge of the display showing you which way to turn to head for the target, instead I have to look down at my radar screen as I turn to see the target line up in front of me, then I can look up at my HUD and spot the box. From more than a few nautical miles out however the box does a bad job of staying over the target and jumps to the edge of the screen intermittently. When you're closer the box stays focused on the target but the closer you get the less accurate the box becomes - but that's not so bad since by then you are within visual range.



*Heading 90° from the 20 kts wind has the HUD showing my plane getting blown to the left*



*Same aircraft and wind heading, but wind speed has been reduced to 8 kts. Less drift now*



*Wind speed back up to 20 kts, but am now flying directly into the wind*

Intercepting a small aircraft is pretty challenging when you're in a jet capable of traveling 5x faster at least! Speed brake, reverse thrusters and throttle control are all required - I even lower my landing gear to help keep the plane flying slow. Intercepting an aircraft is a great challenge to set for yourself.



*Close to the aircraft the target box isn't very accurate but at least by then you are in visual range even during the daytime*

*Doing an inspection of a Piper - was not able to hold this position for long. Flying on the wing of AI aircraft is tough!*

After realizing how hard it was to slow down for most GA aircraft I decided to intercept an airliner flying faster so I went up to FL35 and this is where I ran into another problem. At full throttle I found myself creeping very slowly up behind a commercial airliner at 288 kts. I understand the air up there is thinner and I'm only sitting in front of a single engine but still - it seemed a bit slow to me. So I checked the reference sheet and noted I should be cruising at 486 kts @ 20,000 feet and my maximum speed should be 634 kts @ sea level. So I brought the Harrier down to FL20 and ran her flat out throttle wide open at 411 kts. Then I dropped her down to the deck with the throttle still wide open and achieved a mere 601 kts. Dipping the nose down I managed to break 610 kts but got an overspeed warning for it. For some reason it seems that this flight model is underpowered. I tried dumping all the weight I could and still was unable to reach FL20 cruise speed or sea level maximum speed.



*FL20, thrust nozzles forward, throttle at full, gear up, speed brake up and traveling only 411 kts*

*500 feet off the deck, same configuration as the previous image and unable to achieve max speed of 634 kts*

There is one theory I have that may be responsible for this lack of speed, although all work I've done to prove it has been ineffectual. I noticed at one point that the flaps gauge above the gear status lights never reads 0, ever. This is despite the fact that the flaps visually appear to be raised on the model and the S/VTOL gauge that gives you a needle for flaps position does show 0 flaps when you're traveling fast enough. But perhaps in the flight dynamics code the lack of the gauge being able to register 0 is having an effect on the speed of the aircraft. Again I couldn't find a way to prove this but other than the flight model simply being flawed (the overspeed warning at 610 kts is the evidence for this theory) I can't think of any other explanation.

Now it's time to look at the many navigational/avionics issues and quirks I discovered over the course of my cross country flights. First up, you only have a single ADF gauge to use to navigate VOR stations from both NAV radios, which is a bit of a joke. ADF gauges are more commonly used for NDB navigation, especially when you have another gauge like an HSI available in the cockpit to let you take advantage of the radial tracking capabilities of VORs. However the Jump Jet HSI gauge doesn't do squat except spin around uselessly when you set the OBI knob, the CDI needles are just painted onto the gauge. On the ADF gauge you have a blue needle with a red tip that points to the NAV1 VOR station and a green needle with a green line in the middle of one end (that's hard to see zoomed out) that points to the NAV2

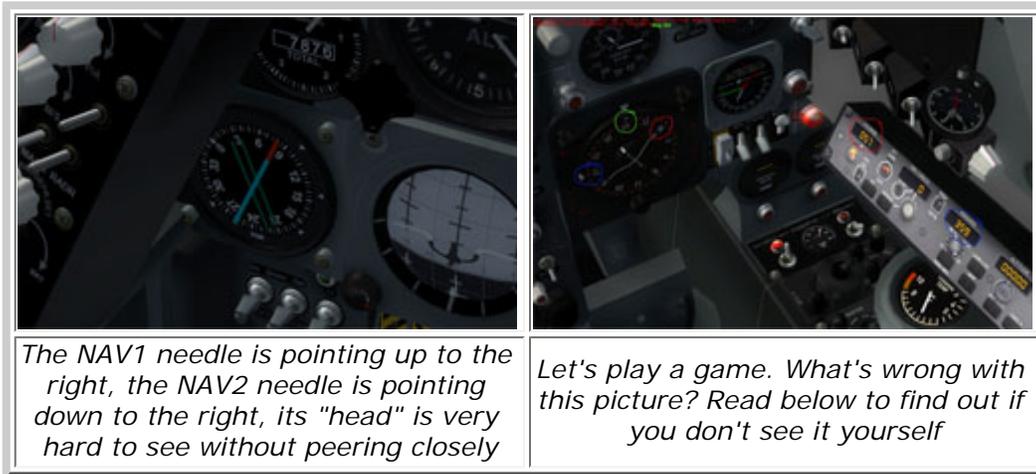


VOR. It'll get you around, if crudely.

The shenanigans continue. Expand your view of the image above to the right. Let's start with the compass card heading (green), which is correct at 304° and not a problem in this image but the other two color-matched figures are and the problem is related to the compass heading.

*Here you can see the S/VTOL gauge registering the flaps (white needle) as fully raised yet the panel gauge says they are at 2.5 and the Flaps Up light is not lit*

The blue circles surround the autopilot heading setting and the linked heading bug on the compass card that repositions itself to match the heading set via the autopilot. However you'll realize in this image the heading bug is at 269° whereas the autopilot heading is set for 359°. The bug *is* accurate up to 180° but then travels another 180° in the span of 90° and then jumps back up to the top of the compass card at 0°. You'll also notice it doesn't actually care which direction the aircraft is pointing - the top of the gauge is always North.



*The NAV1 needle is pointing up to the right, the NAV2 needle is pointing down to the right, its "head" is very hard to see without peering closely*

*Let's play a game. What's wrong with this picture? Read below to find out if you don't see it yourself*

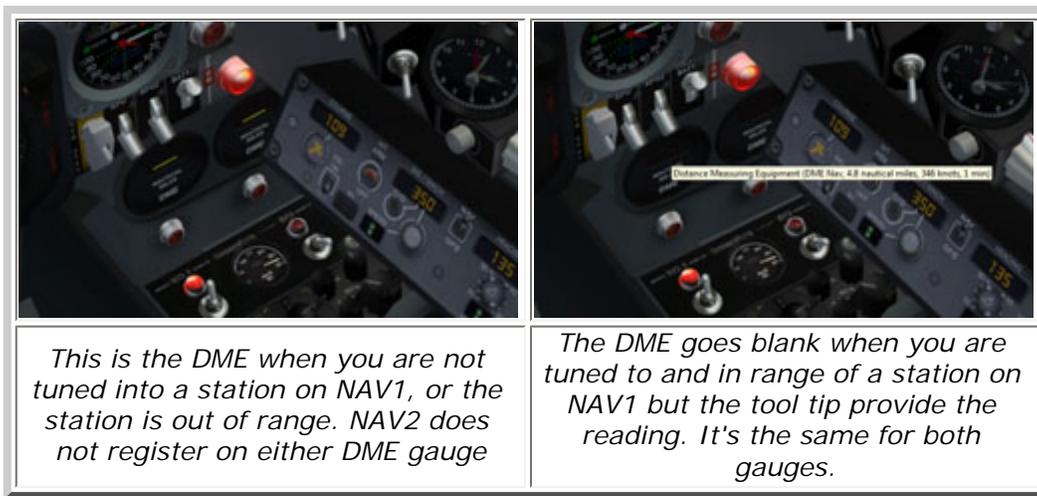
The OBI selector and gauge readout (both in red) has a similar problem. Note how the OBI is set to 57° on the autopilot unit and yet it's pointing North on the compass card. Guess where the needle would point at 0°? You got it, straight up. Not that this is a real problem I supposed since the HSI gauge is useless anyways. Well okay not *entirely* useless as its compass card does in fact point in the proper direction, which is better than the rest of the instruments you have showing heading:



*Enlarge this image and read on below*

Every other compass indicator in the cockpit (circled red) is either non-functional (the artificial horizon) or *backwards*. When you are pointing North the ADF and the compass card down by the stick will point South. If you fly with gyro drift or forget adjusting the compass cards - there's a knob that does adjust all three compass cards in the image above however as soon as you switch on the master battery the knob becomes non functional, the HSI compass card locks to your current heading and the other two snap opposite that, no matter what you had the cards set to beforehand. Speaking of gyro drift did the real life Harrier really not come equipped with a magnetic compass? Or is the magnetic compass supposed to be the nonfunctional compass on the artificial horizon?

Our troubles have not ended yet I'm afraid. Let's have a look at the DME indicators, of which there are two. This is nice as you can see the distance to both VORs at once without having to toggle between them. At least, this would be nice if the DME gauges showed distance for both NAV radios instead of just NAV1. It would also be nice if the DME gauges showed *anything at all* when you are tuned into a VOR and/or DME station. Fortunately the tool tip will tell you what the gauge cannot but that's only a minor comfort and still requires you to place the cursor properly to see it rather than being able to just glance at the gauge.



*This is the DME when you are not tuned into a station on NAV1, or the station is out of range. NAV2 does not register on either DME gauge*

*The DME goes blank when you are tuned to and in range of a station on NAV1 but the tool tip provide the reading. It's the same for both gauges.*

That's thankfully the last of the major instrument issues. There are still a few odd quirks however that are worth mentioning but do not get in the way of navigation or instrument function. Several of these oddities can be found on the virtual cockpit avionics panel.

Referencing the image below you'll see a light off for the NAV1 radio and a light on for the NAV2 radio. When you flick the switch in between the Active and Standby frequencies to the left, the light will come on and the frequencies will swap. When you flick it to the right the light will go off and again the frequencies will swap. The thing is you can have a valid station frequency in the Active window when the switch is to the right and the light is off, so what does the light even mean?



*This closer view of the avionics stack is set up to demonstrate the issues listed in the above paragraph*

I think perhaps the switch is supposed to function as a toggle switch that when clicked moves left to swap frequencies but then snaps back on its own to point right - this is the behavior exhibited by the COM1/2 frequency swap switches lower down on the panel and makes more sense (maybe it's also accidentally the type of switch used for the cockpit lights?). However, the light for COM1 never comes on even when tuned to a frequency in use and the light for COM2 never turns off despite selecting an unused frequency.

Finally, the ADF radio has a switch next to it with a tool tip that lists frequencies for *two* ADF radios, yet clicking on the switch doesn't move the switch or do anything to change the number display and you only change the frequency of ADF1 (not a huge deal as there is no cockpit gauge for reading an NDB signal). Also, none of the frequency swap switches respond to using a keystroke to swap the frequencies.

The final bug is coupled not with the avionics stack but the autopilot. Supposedly when you engage the autopilot a light on the annunciator panel is supposed to light up. This does not happen - see the image below for the circled autopilot switch and its dark respective annunciator light. The autopilot itself functions as it should, and you can set it to maintain your heading, speed, and altitude (with setting for vertical climb/descent rate when adjusting altitude). It's important to note that as soon as you move the thrust nozzles off 0° the autopilot will automatically disengage and you will not be able to re-engage it until the nozzles are back at full-forward thrust (another one of the many things the manual failed to mention).



*Autopilot is on but the annunciator panel does not acknowledge this*

## Landing

Whether you've reached your destination or are running low on fuel at some point it's time to bring the bird back down to roost. As with take off, I worked patterns for all three types of landings on the ground at Vandenberg before taking the Harrier out to try STOL and VTOL on a carrier.

As you make your approach to land the only thing worth noting is that the Jump Jet will not allow you to lower your gear until you are traveling slower than 310 kts. You can pull the gear knob above this speed and it will pop up and

you'll see and hear the flaps lower a notch but the gear will not extend. (As an aside, when only the flaps lower, the aircraft does not react or slow down until the gear itself extends, which I believe is further evidence for my earlier theory of the flaps gauge affecting the flight model) If you don't push the knob back in and slow to under 310 kts the gear will extend by itself. Given that your approach speed is noted in the manual and checklists as being 150 kts this should never really be an issue. I just found it interesting the aircraft had a safety interlock that didn't allow you to extend your gear at speeds that would damage it.

## Normal

According to [Wikipedia](#), the Harrier never really performed conventional landings due to the nature of its undercarriage and operationally always landed near-vertical. However for the sake of completeness I decided to give it a shot, landing with nozzles in full-forward thrust. It wasn't that difficult, just maintain your approach speed down to the runway and cut throttle over the threshold, letting the plane sink down. Your typical nose-up attitude for a flare will land you on all the wheels at once like some tail draggers. You can reverse thrust the nozzles to help you slow down however due the speed you'll still be traveling at when you touch down there's a good chance doing so will bounce you back up into the air again, even without applying any extra throttle, so wait until you've braked or slowed down to below 70 kts or so (weight dependent) before twisting the nozzles around.

## STOL

This will be your most common type of landing given this operation will support more of a weight load than VTOL and unless you have to hit a postage stamp landing pad it's far simpler than a VTOL which makes it more attractive. The hard part of an STOL (and VTOL) landing that really isn't well defined in the manual is judging when to cut in the thrust nozzles and transition out of conventional flight.

You'll be approaching the landing area in a conventional manner at around 150 kts and should be higher than a normal glide slope since when you swing the nozzles down you'll want to be able to nose down and take a steep approach angle to help keep your speed up, otherwise you will crawl the remaining distance. It will just take practice to get the feel for when to turn the nozzles down, and be ready when you do because the flaps will immediately lower and swing your nose up high if you don't compensate as you move the thrust nozzles. Once stable in your glide with nozzles at 60° it's all throttle control like a conventional landing.

As you reach your touchdown point nose up and let off the throttle to settle onto the ground and immediately cut throttle, apply brakes and reverse thrusters. Once you get the hang of it you can land the Harrier within the length of standard runway threshold stripes, or shorter.



*The rollout distance (no brakes or reverse thrusters) after performing an STOL touchdown at the start of the runway threshold stripes*

## VTOL

The nice thing about landing is that you're always lighter than when you took off. So if you were forced to STO at the beginning of your flight there's always a chance you can land vertically at the end of it if your weight has dropped enough thanks to fuel burn and/or dropped ordnance.

The manual's instructions for VTOL landings work just as well as their guidance for STOL landings - again with some practice, mainly in the form of learning how best to manage your approach and transition into a hover. I generally do an STOL approach and then transition into a hover as I come near my landing point. Remember to pitch up to 6° as you settle into the hover so you land properly on all the gear.

This can be difficult to do sometimes though because the HUD does have a tendency to skew out of sight off to the side so you can't see your pitch ladder. Because this nose-high attitude will make seeing the ground hard, it's best to land like you would on a carrier by pulling up alongside your landing target so you can see it easily out the side canopy and then sidling on over it and dropping the last few dozen feet to the ground. Once down you're going to roll so be ready on the brakes.

## Carrier Operations

If you've never heard stories about what it's like to land (most pilots say



*Sitting pretty on the deck of the USS Nimitz after a vertical landing*

"controlled crash") on a carrier deck you might be in for a surprise. If you *have* heard stories about what it's like to land on a carrier deck but have never tried it in the sim well, you're still probably in for a surprise! It's quite intense when you realize just how little room for error you really have.

Furthermore, while you might consider STOL to be easier than VTOL, doing a short landing on the carrier is rife with danger since the Harrier does not have a tail hook and if you run long on touchdown there's a chance you won't have enough room or power to pull a bolter (go-around). Landing vertically on a carrier may be more challenging but it's ultimately the safer way to go. It's also an extremely satisfying feeling to pull up alongside the deck, match speed (if the carrier is moving), sidle over and set her down. That said, this is a sim so most certainly give STOL a shot, I only crashed into the back of the ship on the first try then I was good :)

## Shutdown

Once you've pulled back up to the ramp it's time to put the baby to sleep. There were no shut down procedures supplied so I had to work up my own, but shutting off the engine is as simple as hitting the cutoff switch and you'll hear the turbine start to spin down. From that point on it's just toggling off the various controls and lights to get the cockpit back to cold and dark - although as mentioned back in the Preflight section some of the switches and controls you'll be turning off won't stay off for the next time you load up the flight. Stuff like the annunciator panel, the radar, the panel lights and the gear status lights and some switch lights won't turn off with the master battery switch either.

Time to climb out of the cockpit and down the ladder, give the old girl a pat on the nose and walk away for now.

## Sounds

Overall I found the sounds to be fine. I was surprised that the cockpit got so quiet if you slowed the aircraft down under 130 kts or so and the wind dies down and you barely hear any difference in engine noise even at full throttle. But then I realized I'm just used to having my engine in front of me rather than behind me :)

There were some missing sounds though. I like being able to hear when I interact with virtual cockpit objects, mainly switches. It's nice to hear a switch give off a soft "click" when you toggle it. Opening and closing the canopy likewise does not produce any sort of sound so I just copied the open/close sound from the default F/A-18 to use and that worked well. I also was unable to hear the cannons firing from either inside or outside the cockpit.

One of the more annoying sound problems was a distinctive skip to the engine audio that would cut in before it looped. I went into the Sound folder and listened to all the clips and found three that skipped at the very end. I contacted Wilco support by going to their website and filling out the support form that would send them an email. I requested that they send me the original files thinking mine had become corrupted during install (trying to re-install did not help however).

I got a prompt response the next day saying they weren't aware of any such issue and could not send me individual files. So I uploaded the sound clips in question to my server and provided them a link to download and listen for themselves. I got a response the next day saying they had forwarded me on to the technical staff to look into it. A week later I sent them to more emails asking for updates and when I didn't get a reply the following week I sent another support form request through their website.

The response was next-day again but only to say my earlier message had been passed on and was awaiting word from the technical team. As of this review being published I still have not heard from this technical team.

Another annoying sound issue was when I shut down the aircraft I noticed that there was still a low-level wind-like background noise playing although the jet was completely dark and I had no wind set for the weather. Still, I went into the aircraft's sound.cfg and deleted the entries for wind noise and moved the wind noise WAV files out of the Sound folder and when I reloaded the flight I still heard the noise.

It really did sound like wind noise so I was stumped until one day I was having sound issues with FSX (most likely due to all my testing stressing the sim after running for a long period of time and not related to the Jump Jet in particular) and the engine noise for the Harrier cut out as I was rolling down the runway. I lifted off and... silence, until the wind

noise kicked up as my speed increased. That's when I realized it was a ground noise. After some more sound.cfg tweaking I was able to make the ground roll noise quiet when I wasn't moving. For this tweak and the canopy door addition see my [review addendum](#).

## Performance

On my system the Harrier Jump Jet didn't make the slightest dent in my frame rates from either the inside or the outside, even when flying at my standard 3.5GHz clock speed. The only performance issue I ran across during testing wasn't directly related to the Jump Jet. Due to the speed at which this aircraft can travel FSX did have bad and frequent stutters while flying.

Sometimes the sim would lock up for 3-5 seconds. Other times it would purr along smooth as silk for many minutes before another stutter as I entered a new scenery area. This was simply due to my system being tweaked for low and slow general aviation flying. Zooming around at 500 kts puts a much greater demand on the ground scenery to stay caught up with your aircraft. This is something to keep in mind if you are also more suited towards flying slower aircraft.

## Conclusion

Simply put, Harrier Jump Jet is a product that works hard to capture what makes this aircraft such a unique piece of hardware to fly, and does so admirably. I just wish the developers had been as equally focused on making the rest of the aircraft functional rather than solely aiming to provide people the chance to experience taking off and landing vertically and in short distances.

While you will certainly get a lot of fun and challenge out of mastering the Harrier's S/VTOL operations, when it comes time to actually use the aircraft for conventional flight operations you don't find a lot of support in the product. The fact that it's been out for a year and these issues still remain in the product leads me to believe Wilco isn't interested in offering that support either, or has not received enough demand from its customers to do so. In my opinion however a commercial product should have this kind of basic support in it regardless.

I find it quite unfortunate that despite the S/VTOL capabilities of this aircraft being cool and fun, it's the only reason I would ever want to come back and fly this product. I've never considered a commercial aircraft product to be a "toy" before, but since I crave the full-operational experience when it comes to flying an aircraft, the Jump Jet is more of a fun fling to hop into and take for a spin every now and then.

But, that's certainly more than enough for many people to want to own this product and despite my numerous complaints on various aspects of the Jump Jet I recognize that not everyone is as demanding as I am in regards to the operation of the aircraft I fly. I do, however, want to make sure you are well-informed of these issues.

I'm also dissatisfied with the product support I got from Wilco. I have still not resolved the engine noise issue with them (I edited the files down on my own but that's not the point) and with that lack of response I never even bothered to bring up the myriad other issues I uncovered while reviewing the Jump Jet.

I'm done emailing them for a response, but if I do hear back from them on the sound file issue I will update this review accordingly.

Test System
MSI P67A-GD65 Intel i5 2500K @ 4.5GHz Corsair 8GB DDR3 1600 Radeon HD 5870 1GB Catalyst 11.12 WD VelociRaptor 10k RPM SATA 150GB Windows 7 x64 FSX Acceleration Saitek X52, Pro Flight Yoke, Pro Flight Rudder Pedals <b>Screenshots enhanced with</b> REX, ENB, Shade
<b>Flying Time:</b> 16 hours

## What I Like About The Harrier Jump Jet

- Challenging & fun S/VTOL flight model, especially when flown with stick & throttle quadrant
- Operational/livery history in manual
- Great cockpit night lighting
- Radar "lock-on" capability
- Well textured and modeled

### **What I Don't Like About The Harrier Jump Jet**

- Conventional flight model flaws
- Numerous quirks, errors and functional flaws in panel instruments, switches and HUD
- Lack of proper navigational instrumentation
- Missing/incorrect fuel tanks
- Missing/incorrect sounds
- Improper/incomplete checklist procedures
- VC cockpit design obstructing avionics panel
- Incomplete/incorrect Aircraft Details window text with un-voiced call signs

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**[Harrier Jump Jet \(v2.0\)](#)**

[\(adobe acrobat required\)](#)

### **Comments?**

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