

To recap: the craft should be at 250 knots, on the green line, lined up with the runway. It should be facing half red, half white glideslope lights with the flashing strobes by them. This approach configuration should be held until the craft is pretty close to the ground (3° glideslope to the runway), then the descent should be leveled and the gear put down (using the ‘g’ key or the mouse). Pull the nose up for a flare as the runway approaches, causing the Orbiter to touch down smoothly. Lower the nose then and hit the parachute and even the brakes if the craft will be allowed to roll out.

Now, if you can just repeat that process another hundred times in a row without a single hitch, you will be as good as NASA.

Special thanks to Sandy Padilla for most of the Shuttle re-entry information!

8.5 Flying the X-15

The North American X-15 is a rocket-powered speed demon. With a top speed of Mach 6.72 (4520 miles per hour), it is the fastest manned aircraft in the world. To begin flight, this craft is dropped, uniquely, from the B-52 “mothership.” Its top speed is over double that of the SR-71 (the world’s fastest jet airplane), and its maximum altitude of over 50 miles qualifies its pilots for astronaut status.

The craft’s absurdly high top speed requires a blast shield to be installed over one side of the windshield—without it, the windows would burn up. The X-15 pilots would fly the high speed portion of the mission with the shield on the right side, looking out the left side only. After the craft slowed down (and the left window was sufficiently charred), the pilot would jettison the blast shield and move to the right window in order to land.

To open the X-15, open the Aircraft menu and click Aircraft & Situations. In the dialog box that appears, click the **Air Drop from B-52** button. X-Plane will load up both the X-15 and its drop ship (by default, the B-52). When you are ready, press the space bar to release the rocket from the drop ship. Give it full throttle, with no flaps, and watch your airspeed “rocket”—that is, until it gains enough altitude, at which point its *indicated* airspeed will drop to maybe 15 knots, while it is actually moving at Mach 6.

8.6 Simulating Combat in X-Plane

X-Plane is not intended to be a combat simulator. Therefore, while combat functionality exists in the form of guns and missiles, damage from weapons is not simulated realistically—getting hit will simply cause your engines to die, allowing you to glide to the ground.

Simulating combat in X-Plane involves four steps:

- configuring your controls,
- adding enemy aircraft,
- equipping your own aircraft with guns and/or missiles, and
- dogfighting.

8.6.1 Configuring Your Controls

In order to use your flight controls to control your weapons, either to fire them or to cycle through the currently armed weapons, open the Settings menu and click Joystick & Equipment. There, go to the Buttons: Basic tab and configure the buttons as you desire. Remember to *first* press the button on the joystick that you intend to assign, *then* select its function.

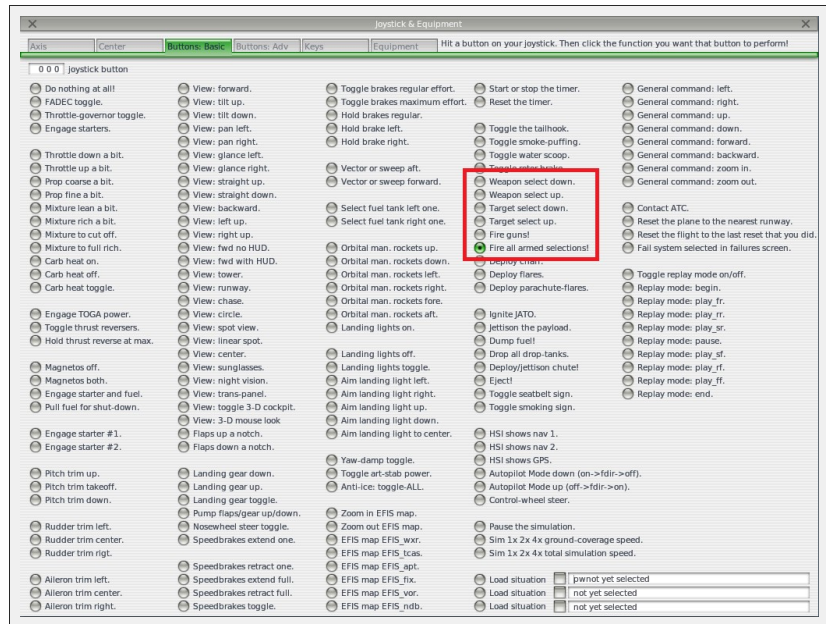


Figure 8.1: The weapon controls found in the Buttons: Basic tab [Full size →]

You can also assign weapons controls in the Buttons: Adv tab or the Keys tab. The “weapons/” category contains the relevant settings there.

Note that assigning joystick controls is especially important if your aircraft does not have controls in the instrument panel for arming weapons. If you intend to use missiles, you must assign buttons to select targets, using the “target select up” and “target select down” functions.

8.6.2 Adding Enemy Aircraft

To set up a combat situation, first open the Aircraft menu and click Aircraft and Situations. The bottom panel, labeled Other Aircraft Selection, is the one we’re interested in. Set the number of aircraft (in the upper left of the box) to 2 or more. Boxes will appear below corresponding to the other aircraft, as seen in Figure 8.2.

Clicking the box to the left of an aircraft file name will open a standard “Load Aircraft” dialog box; use these boxes to load the aircraft you would like to battle.

To the right of each aircraft file is the plane’s “team color.” Aircraft which have the same color will be teammates, and all other colors will be enemies. In Figure 8.2, “your plane” is on the red team, while the three other aircraft are on the green team. In this case, all three enemy aircraft will target you alone.

Having selected the enemy aircraft to fly against, you can choose their skill level, ranging from very easy to very hard, using the drop down box near the top of the Other Aircraft Selection portion of the window.

Finally, you can choose to either save the aircraft you have selected to your preferences or have them randomized at each load using the radio buttons next to the number of aircraft setting. Having set up the combatants, you can close the Aircraft and Situations window.

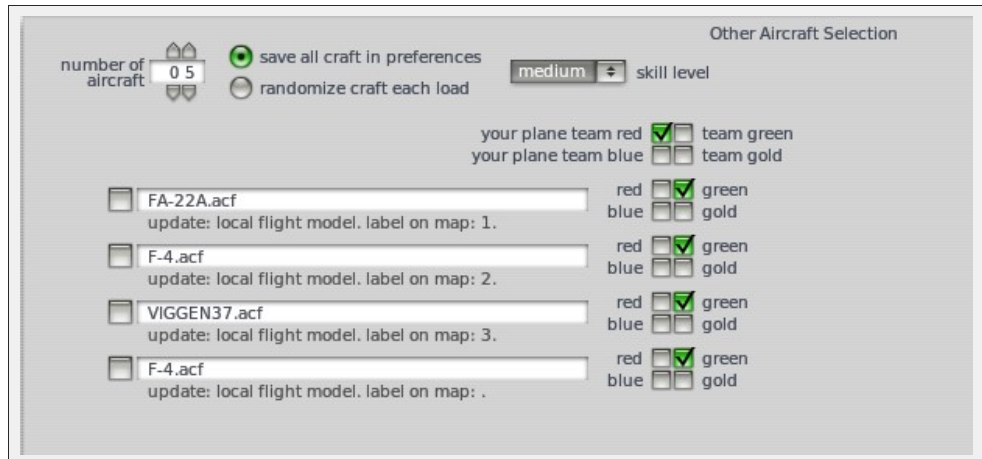


Figure 8.2: Adding enemy aircraft using the Aircraft and Situations window [Full size →]

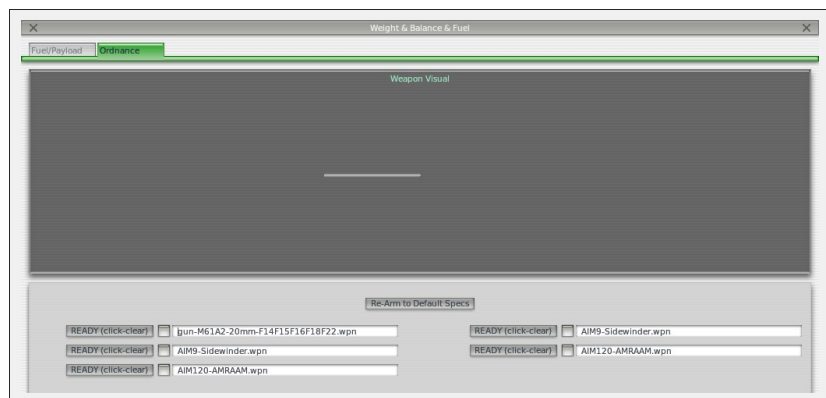


Figure 8.3: Adding weapons using the Weight and Fuel window [Full size →]

8.6.3 Equipping Your Aircraft

Many military craft, such as the F-22 Raptor, F-4 Phantom II, and Saab JA 37 Viggen come equipped with guns and missiles by default. If your aircraft does not have weapons, or if you would like to change the loadout, you can do so using the Weight and Fuel window, launched from the Aircraft menu. There, the Ordnance tab can be used to add a weapon to the aircraft's hardpoints (or weapon stations).

Clicking the small squares to the left of each weapon slot will bring up a dialog box to load a weapon. Opening the Weapons folder (found in the main X-Plane directory) will display a number of weapon options. For instance, in Figure 8.4, a GAU-8 Avenger 30mm gun is selected.

Clicking Open will arm the weapon you chose.

8.6.4 Arming Weapons and Fighting

With enemy aircraft in the sky, weapons equipped to your aircraft, and your joystick or yoke configured for weapons, it's time to dogfight. If your aircraft was designed with combat in mind, it will have a toggle for arming a weapon, and potentially a weapon rate of fire control as well. For instance, Figure 8.5 shows the weapons controls in the F-22 Raptor. The Raptor's gun is currently

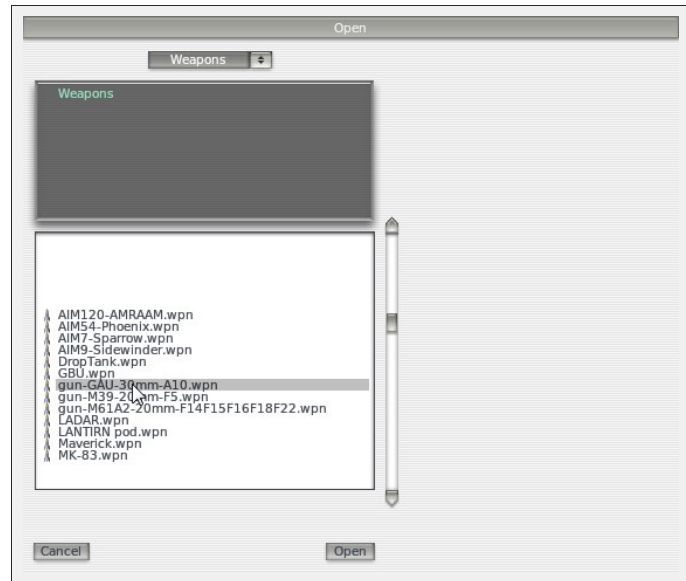


Figure 8.4: Selecting a gun [Full size →]



Figure 8.5: The weapon controls in the panel of the F-22 Raptor [Full size →]

selected, with its rate of fire set to the maximum. Similar controls appear in the F-4 Phantom II, seen in Figure 8.6.

With your weapon selected, whether guns or missiles, all it takes to fire is to press the button on your joystick assigned to fire weapons.

8.6.4.1 Targeting Enemy Aircraft and Using Missiles

In order to lock on to a target using missiles, you must have a joystick or key assigned to the “target select up” and/or “target select down” functions, as described in the section “Configuring Your Controls” above. In order to usefully target, the aircraft must have either a head-up display (HUD) or moving map, and preferably both.

When enemy aircraft are nearby, you can use the target select controls to assign targets for your missiles to seek out. With a target which is not currently visible selected, the HUD will show an arrow pointing in the direction of the target, as the image on the left in Figure 8.7. If the active



Figure 8.6: The weapon controls in the panel of the F-4 Phantom II [Full size →]

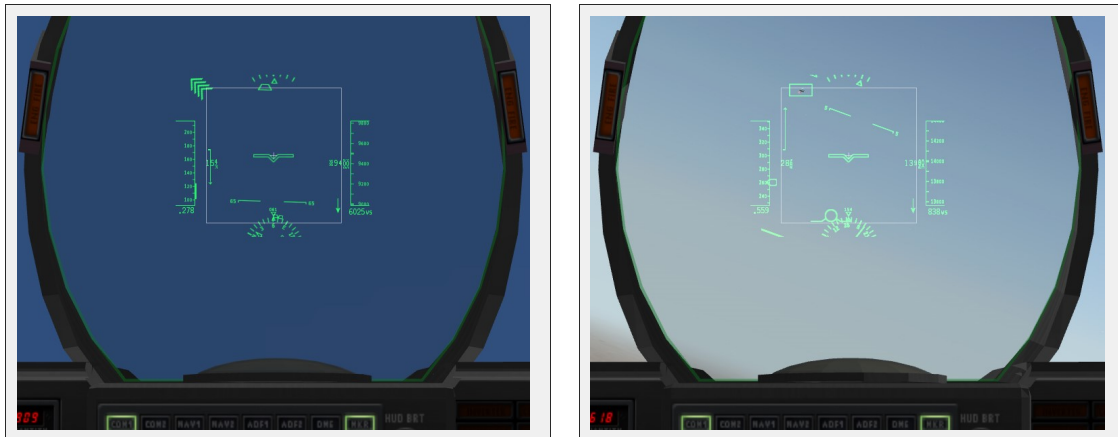


Figure 8.7: Two HUD views; on the left, a target is high and to the left, off screen, while on the right, the target is in view. [Full size 1 →] [Full size 2 →]

target is visible on screen within the HUD, however, a targeting reticle will appear around the aircraft, as in the image on the right in Figure 8.7.

In aircraft with a moving map display, there is often much more data visible than what is relevant in a dogfight. Therefore, by pressing the green buttons beneath the standard EFIS moving map, you can turn off all but the TCAS (traffic collision avoidance system) indicators—that is, the indicators for other aircraft. For instance, compare the two displays in Figure 8.8.

With only the other aircraft displayed on the map, it is much easier to see the location of enemy fighters and to distinguish the active target. For instance, in Figure 8.9, the aircraft approximately 30° to the right was selected as the target, so it is highlighted in red on the display.

Additionally, note that the dial above the moving map labeled TFC (traffic) controls the radar system's range. Moving the dial clockwise will increase the range, and turning it counterclockwise will decrease it. At low ranges, finer detail is available on the EFIS display.



Figure 8.8: Two moving map displays; the display on the left is showing all available data, whereas the one on the right is showing only other aircraft [Full size 1 →] [Full size 2 →]

8.6.5 Strategy

The key to winning a dogfight lies in creating a situation where *your* aircraft's strengths are emphasized and an opponent's weaknesses are exploited. This means trying to force a tight, up-close battle when flying a more maneuverable fighter than the enemy, or aiming for dive-bombs and other tactics requiring speed and weight when flying a faster, larger craft.

Additionally, do not underestimate the value of quick combat maneuvers, such as:

- corkscrews—rolling your craft left or right while continuously varying its pitch
- feints—rolling to one side as though to go into a banked turn (i.e., a turn with the craft on its side, while pulling back on the controls in order to pull “in” to the turn), but pushing the nose forward instead
- barrel rolls—often described as “a cross between a roll and a loop” (see Figure 8.10)

For more information on combat tactics, see the Dicta Boelcke, a list of tactics developed by World War I ace Oswald Boelcke.

8.7 Performing Carrier Operations

To begin carrier operations, select the aircraft you will use. The F-22 Raptor or the JA 37 Viggen (both found in the Fighters folder, in the Aircraft directory) are good choices. Then, open the Aircraft & Situations window and press the **Carrier Catshot** or **Aircraft Carrier Approach** buttons to set up a catapult launch from a carrier or a final approach to one, respectively.



Figure 8.9: The moving map display with a target selected, located about 30 degrees to the right, in front of the aircraft and travelling at 393 kts [Full size →]

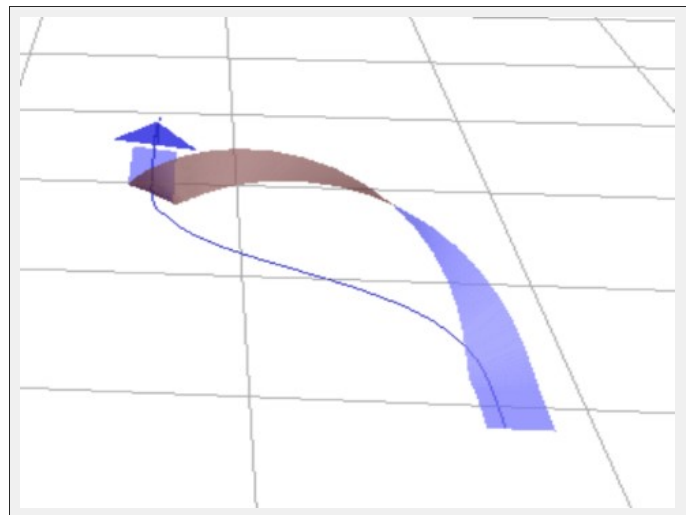


Figure 8.10: Diagram of a barrel roll. Thanks to released MioUzaki for releasing this image into the public domain. [Full size →]

To take off from a carrier, a few things must be done in quick succession. First, give the aircraft full throttle, and pull in about half flaps. Release the brakes (using the ‘b’ key by default) to activate the catapult propelling your aircraft off the deck. From there, simply guide the craft down the flight deck and, once clear, pull the nose up. When you’re safely in the air, bring the gear up (using the ‘g’ key by default) and you’re off.

Landing on the carrier is a bit more difficult. First, be sure you have an aircraft with an arresting hook, such as the default fighters in X-Plane.

To set up an approach to a modern carrier, such as the USS Nimitz included with X-Plane 10, bear in mind that the landing runway is angled 30° to the port (left) side—it is not straight down the flight deck like in older carriers. This change was made in order to prevent the all-too-common overruns that occurred in WWII when a landing plane crashed into the stacked line of planes at the far end of the carrier. A pilot landing on such a carrier must correct for this angling. With your ADF tuned to the carrier, then, you must wait until the ADF is pointing either 15 or 60° to the right before turning in for a landing.

When approaching the flight deck to land, a glidepath of about 3.5° is standard. At this time, the tail hook should be lowered by tapping the HOOK button, turning it green. This will allow the tail of the aircraft to catch the arresting wires on the deck. These wires will accelerate the craft from well over 100 knots down to zero in little more than a second.

Unlike in a conventional landing, there should be no “flare” before touching down on the carrier. Whereas, say, an airliner would raise its nose up just before touching the runway (thereby ensuring a smooth landing), a carrier approach should maintain a constant glideslope until the craft hits the deck.

Also, rather counter-intuitively, a real fighter pilot must slam the throttle to full the instant that the aircraft touches the deck. This is because, even when the pilot has done everything right, the craft’s tail hook can bounce over the arresting wires in what is called a “bolter.” When this happens, the pilot must be ready to get off the deck safely and come around for another try. Don’t worry—even when the throttle revs up like this, the arresting wires will still pull the craft down to zero velocity.

8.8 Flying a Boeing 747 with the Piggybacking Space Shuttle

The piggybacking Space Shuttle situation in X-Plane 10 was inspired by the following email, which was circulated by United Technologies corporate. It is a “trip report” from the pilot of the 747 that flew the Shuttle back to Florida after the Hubble repair flight.

Well, it’s been 48 hours since I landed the 747 with the shuttle Atlantis on top and I am still buzzing from the experience. I have to say that my whole mind, body and soul went into the professional mode just before engine start in Mississippi, and stayed there, where it all needed to be, until well after the flight... in fact, I am not sure if it is all back to normal as I type this email. The experience was surreal. Seeing that “thing” on top of an already overly huge aircraft boggles my mind. The whole mission from takeoff to engine shutdown was unlike anything I had ever done. It was like a dream... someone else’s dream.

We took off from Columbus AFB on their 12,000 foot runway, of which I used 11,999 1/2 feet to get the wheels off the ground. We were at 3,500 feet left to go of the runway, throttles full power, nose wheels still hugging the ground, copilot calling out decision speeds, the weight of Atlantis now screaming through my fingers clinched tightly on the