



- *Introduction*

The F-22 Raptor will become the replacement for the F-15 Eagle air-superiority fighter. It combines a stealth design with highly maneuverable, supersonic speed, with air-to-air and air-to-ground capabilities.

The YF-22A is capable of carrying existing and planned weapons in internal bays. These will include six radar-guided AIM-120C AMRAAMs, and two heat seeking, short range AIM-9M Sidewinders. The production F/A-22 will also have an internal M61A2 20mm cannon, an advanced version of the M61 Gatling gun. Additionally it will have a ground attack capability, and it can carry two 1,000 lb. GBU-32 Joint Direct Attack Munitions (JDAM) internally.

The DSB YF-22A Raptor product provides you with an awesome flight model, superb textures and numerous external configurations to suit your flying needs as well as a fully functioning 3D virtual cockpit.

Featuring the latest in graphic effects and XML gauge technology, we are sure that the Raptor will provide you with hours of enjoyable flying.

If you have any requests or questions regarding the DSB Design YF-22A Raptor, or other products available from DSB Design, please drop us an e-mail at support@dsbdesign.com

Max Monroe
CEO - DSBdesign
<http://www.dsbdesign.com>

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- *Credits*

Project Manager	_____	Max Monroe
Visual Models	_____	Darren Taylor
Aircraft Textures	_____	David Brice
Gauges Programming	_____	David Brice
Panel Textures	_____	Chris Sanders
Flight Dynamics	_____	Max Monroe
Manual	_____	David Brice

Lockheed-Martin YF-22A Raptor

F-22 Raptor Origins

* The F-22 Raptor was developed in response to USAF studies conducted through the 1970s on new fighter concepts. By the early 1980s, following several generations of paper studies conducted by aerospace contractors, the USAF had decided to focus on development of an "Advanced Tactical Fighter (ATF)" and issued a request for proposals for such an aircraft in May 1983.

The ATF was intended to be a next-generation air superiority fighter, designed to stay ahead of advanced Soviet aircraft and missile designs then presumed to be in development. The USAF requirements asked for the tidy integration of a wide range of new technologies in an aircraft that was relatively inexpensive to operate and easy to maintain.

New technologies considered included advanced cockpit automation and sensors; built-in test and support equipment; high reliability and low maintenance to ensure combat availability; stealth features; and "vectored thrust", meaning an engine with a moving nozzle to permit improved maneuverability and shorter takeoffs.

One particularly important requirement was for a "supercruise" engine, capable of flying the aircraft at sustained supersonic speeds without afterburner. Supercruise would allow rapid movement into a target area to ensure quick combat reaction times; fast exit from the target area as a means of defense; and higher launch velocities for munitions, making the ATF "faster on the draw" and improving the range of the munitions.

From seven contenders, the choice for the company to build the ATF was finally narrowed down to two contenders: Lockheed, partnering with Boeing and General Dynamics; and Northrop, partnering with McDonnell Douglas. Each team was awarded a \$691 million USD contract on 31 October 1986, initiating a 50-month "demonstration and validation (dem/val)" phase.

During dem/val, the two companies were to build two prototypes each. Lockheed designated their aircraft the "YF-22A", while Northrop designated theirs the "YF-23A". The two examples for each prototype were to have different engine fits, one powered by a pair of Pratt & Whitney (P&W) F119 engines, and the other by a pair of General Electric (GE) F120 engines. Both the P&W and GE engine types were specifically designed for the competition in a parallel "Joint Advanced Fighter Engine (JAFE)" effort.

The USAF wanted to buy a total of 750 ATFs. The US Navy also considered the type as the "Naval ATF (NATF)", and at one time estimated they would need 550 such aircraft, but presently changed their minds on the NATF. The Navy was committed to the development of the advanced F/A-18E/F Hornet fighter, and

feared that involvement with the F-22 would be a diversion of effort that could lead to political confusion, putting the F/A-18E/F program at risk.

The Northrop contender for the ATF contract, the "YF-23A", was formally rolled out first, on 22 June 1990, and made its initial flight on 27 August 1990. The aircraft was informally named the "Black Widow II", in memory of Northrop's P-61 Black Widow night fighter of World War II.

The YF-23A was unorthodox in appearance. The YF-23A was obviously a "stealth" design, with a diamond-shaped wing, a wide and flattened vee tail, engine exhausts hidden from view from below, a sawtooth rear fuselage across the tail and exhausts, and blended contours. The engine air intakes were underneath the wings, with the two engines buried well back from the inlets to keep them from reflecting radar signals. Air-to-air missiles (AAMs), such as the advanced AIM-9X Sidewinder and the AIM-120 Advanced Medium-Range Air-to-Air Missile (AMRAAM), were to be carried in internal weapons bays, not externally. Such a design was clearly meant to give enemy radars very little to lock onto.

The YF-23A was 20.6 meters (67.4 feet) long, had a 13.3 meter (43.6 foot) wingspan, and a height of 4.27 meters (14 feet). The aircraft had a top speed of at least Mach 2.0 and supersonic cruise at about Mach 1.5. The YF-23A featured a "Vehicle Management System (VMS)" to keep it in the air. The VMS handled the YF-23A's flight control surfaces, including all-moving tailplanes and flaps on both the leading and trailing edges of the wings. The VMS could also monitor the aircraft's hydraulic systems, detecting and isolating damage to keep the fighter airborne.

The Lockheed design, the "YF-22A", was rolled out on 29 August 1990, and first flew on 29 September. The aircraft was given the informal name of "Lightning II", after the famous Lockheed P-38 Lightning of World War II, but the name didn't stick.

The YF-22A had a more conventional configuration than the YF-23A, similar in general plan to the current F-15 fighter: high-set cockpit, air intakes behind either side of the cockpit and extending to engines on either side of the fuselage, and twin vertical tailplanes.

The YF-22A was less stealthy than the YF-23A, though more stealthy than the F-15. The YF-22A design was more optimized for maneuverability, featuring design elements such as thrust-vectoring engine exhausts that swiveled in the vertical plane.

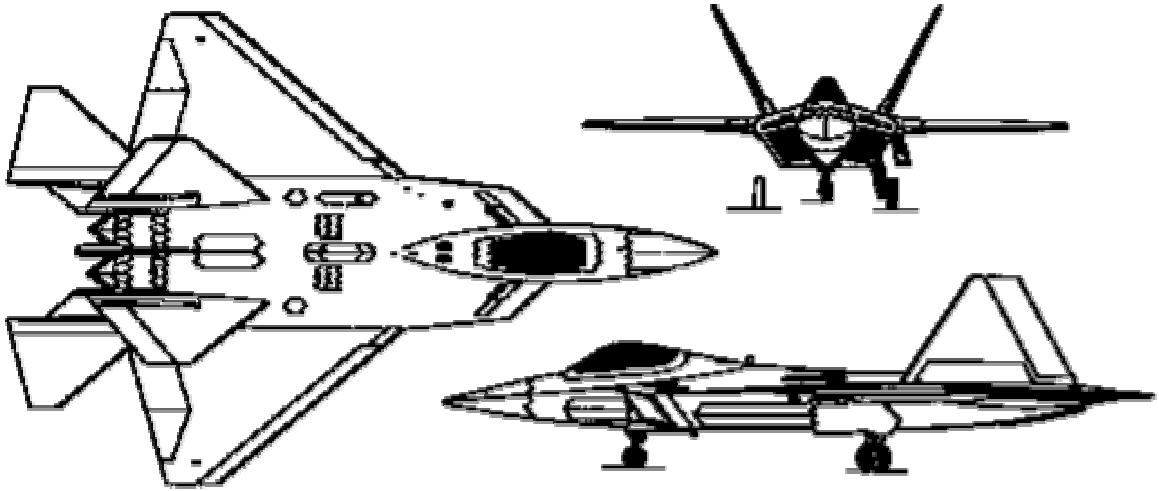
The YF-23A met USAF requirements for survivability, supersonic cruise, stealth, and ease of maintenance. However, the YF-22A was more maneuverable than the YF-23A, and won the competition in April 1991. Another factor was that the YF-22A was also seen as more adaptable to the Navy's NATF, though as it turned out the Navy abandoned NATF a few months later.

The engine selected for the winning YF-22A was the P&W F119, which was judged a lower-risk path. The contract specified that Lockheed provide seven single-seat F-22As, two tandem-seat dual-control F-22Bs, and two nonflying test examples. First flight of a true F-22 was scheduled for 1996, with operational introduction in 2003.

The second YF-22A prototype, powered by the P&W F119, quickly followed the first into the air. Although the first prototype was powered by two GE F120s, it was quickly modified to take the P&W F119. Flight tests of the two YF-22A prototypes were augmented by avionics tests using a Boeing 757 configured as a flying laboratory.

The flight tests went well until 1991, when one of the prototypes suffered a landing accident and was badly burned. The other prototype had been relegated to ground tests by that time, and neither of the two initial prototypes ever flew again.

- *Aircraft Specifications*



Crew: One

Dimensions: Length 19.56m; Height 6.41m; Wing Span 13.11m;

Engines: two Pratt&Whitney F-119-PW-100 turbofans (35,000 lb. Class)

Weights: Empty Equipped 13,600 kg; Maximum Take-off 28,000kg

Armament: 6 AIM-120 AMRAAM's and 4 AIM-9 Sidewinders mounted in internal bays.

Performance: Maximum level speed Mach 2.20 at 36,000 Feet; Sustained cruise velocity Mach 1.4 - 1.5 at 36,000 feet; Service ceiling 65,000 ft;

System Specifications

- Pentium II 500
- 128 Mb RAM
- 100 Mb of free available hard disk space
- Sound Card
- Microsoft Flight Simulator 2004
- Microsoft Windows 98(SE), Windows ME, Windows 2000 or Windows XP
- Adobe Acrobat Reader to view and print this manual*
- Video Card with at least 32mb on board RAM

*Adobe Acrobat Reader is available for free from

<http://www.adobe.com/products/acrobat/readstep2.html>

YF-22A Raptor Cockpit

The DSB Design YF-22A Raptor comes with a custom made Multi Function Displays in an extensive Virtual Cockpit for an immersive experience.

The following section details the DSB Multi Function Displays and panel.



YF-22A Raptor Cockpit

The Main View consists primarily of a three Multi Function Displays and other glass cockpit controls. They are as follows; (from left to right, top to bottom)

1. Head Up Display
2. Autopilot Control Console
3. Autopilot Display unit.
4. Engine 1 & 2 Status Lights
5. Landing Gear Lights
6. RMI MFD
7. Engine and Fuel Management MFD
8. Primary Flight Display MFD
9. Flap Position Display
10. Weapons Bay Status
11. Canopy Status
12. Checklist Toggle
13. GPS Window Toggle
14. ATC Window Toggle
15. Centre Pedestal Toggle

Multi Function Displays



RMI Screen on Pilot's MFD

The RMI shown above is similar to that of most FS aircraft. The four numerical values at the top show aircraft heading, altitude, speed and distance from dialed in VOR/TACAN on NAV1.

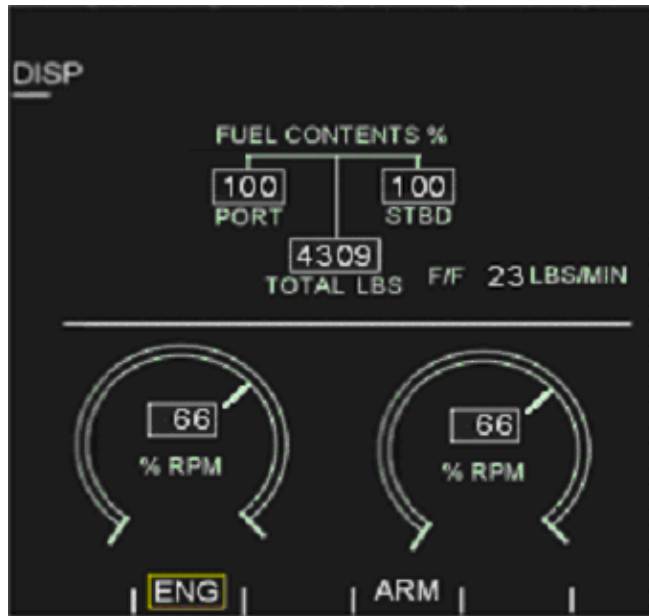
The three arrows on the compass dial indicate the following; A - ADF, T - TACAN/NAV1, V2 - NAV2

The yellow stripe and boxes display the current autoheading.



Primary Flight Display

The F-15 Primary Flight Display or PFD displays a full digital attitude indicator including ILS display. The upper section of the PFD displays aircraft heading, speed, altitude and distance from current NAV1 DME. The bottom section displays autopilot preset IAS, autopilot heading, and selected autopilot altitude per 100 feet.

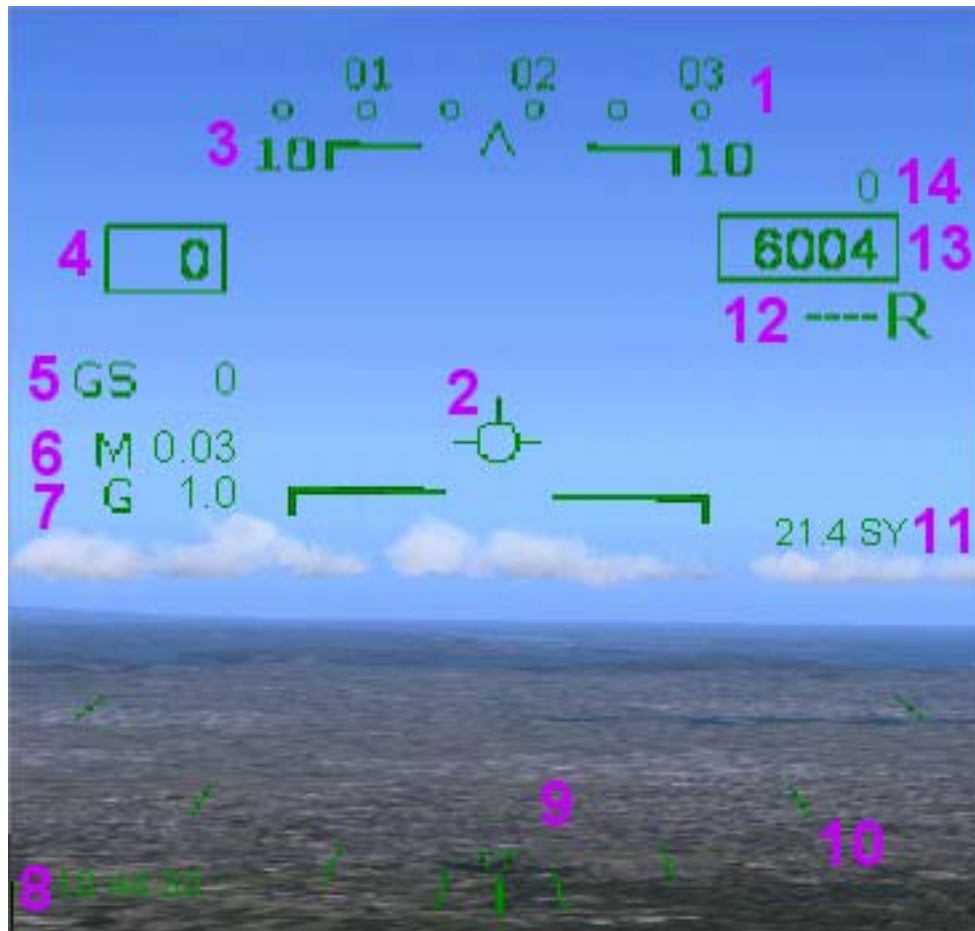


Engine Status Screen

The Engine Status screen displays the fuel contents of each fuel tank in a percentage form, plus total capacity in lbs and fuel flow in lbs per minute.

The bottom section displays Engine RPM in both dial and numerical values.

Head Up Display in Detail



YF-22A Raptor Head Up Display

The HUD contains a variety of functions as outlined below;

1. Compass displaying aircraft current heading.
2. Static velocity vector.
3. Pitch and roll ladder in 10 degree increments.
4. Indicated Airspeed.
5. Current Groundspeed.
6. Current Velocity (in Mach value).
7. Current G Load on airframe.
8. Current GPS Local Time
9. Aircraft roll marker
10. Aircraft roll marker reference points
11. Distance from current NAV1 DME station.
12. Radar Altimeter value. (active under 5,000ft AGL)
13. Altimeter value above sea level.
14. Vertical Speed Indicator value.
15. **STALL** - Displays in the centre of the HUD when under stall conditions.
16. **BINGO** - Displays in the Centre of the HUD when fuel is low.