

# F-15 Eagle



An F-15 executing a [zoom-climb](#) takeoff in [afterburner](#)

The [Boeing](#) (formerly [McDonnell Douglas](#)) **F-15 Eagle** is an American-built all-weather tactical [fighter](#) designed to gain and maintain [air superiority](#) in aerial combat. It entered service in July of [1972](#).

A derivative of the aircraft is the [F-15E Strike Eagle](#), a highly successful all-weather strike fighter which entered service in [1988](#).

## Design



Five F-15E Strike Eagles from Seymour Johnson AFB, NC

The F-15's maneuverability is derived from low [wing loading](#) (weight to wing area ratio) with a high thrust-to-weight ratio enabling the aircraft to turn tightly without losing airspeed. The weapons and flight control systems are designed so one person can safely and effectively perform air-to-air combat.

A multimission avionics system includes a [Head-Up Display](#), advanced [radar](#), inertial navigation system, flight instruments, [ultra high frequency](#) communications, tactical navigation system and [Instrument Landing System](#). It also has an internally mounted, tactical electronic-warfare system, ["identification friend or foe"](#) system, electronic countermeasures set and a central digital computer.

The head-up display projects through a combiner, all essential flight information gathered by the integrated avionics system. This display, visible in any light condition, provides the pilot information necessary to track and destroy an enemy aircraft without having to look down at cockpit instruments.

The F-15's versatile [APG-63/70](#) pulse-Doppler radar system can look up at high-flying targets and down at low-flying targets without being confused by ground clutter. It can detect and track aircraft and small high-speed targets at distances beyond visual range down to close range, and at altitudes down to treetop level. The radar feeds target information into the central computer for effective weapons delivery. For close-in dogfights, the radar automatically acquires enemy aircraft, and this information is projected on the head-up display. The F-15's electronic warfare system provides both threat warning and automatic countermeasures against selected threats. Because of the advanced electronics deployed on the F-15, the aircraft was given the nickname "Starship" by users.

A variety of air-to-air weaponry can be carried by the F-15. An automated weapon system enables the pilot to perform aerial combat safely and effectively, using the head-up display and the avionics and weapons controls located on the engine throttles or control stick. When the pilot changes from one weapon system to another, visual guidance for the required weapon automatically appears on the head-up display.



Two F-15 Eagles

The Eagle can be armed with combinations of four different air-to-air weapons: [AIM-7F/M Sparrow](#) missiles or [AIM-120 AMRAAM](#) advanced medium range air-to-air missiles on its lower fuselage corners, [AIM-9L/M Sidewinder](#) or AIM-120 missiles on two pylons under the wings, and an internal 20 mm Gatling gun in the right wing root.

Low-drag, [Conformal Fuel Tanks](#) were especially developed for the F-15C and D models. Conformal fuel tanks can be attached to the sides of the engine air intake trunks under each wing and are designed to the same load factors and airspeed limits as the basic aircraft. Each conformal fuel tank contains about 114 cu. ft. (3,200 L) of usable space. These tanks reduce the need for [in-flight refueling](#) on global missions and increase time in the combat area. All external stations for munitions remain available with the tanks in use. Sparrow or AMRAAM missiles, moreover, can be attached to the corners of the conformal fuel tanks. Because the CFTs degrade performance (although not as much as normal external tanks), and cannot be jettisoned in-flight (unlike normal external tanks) air combat F-15s (A/B/C/D) typically fly without them, while the F-15E typically flies with them.

The [F-15E Strike Eagle](#) is a two-seat, dual-role, totally integrated fighter for all-weather, air-to-air and deep interdiction missions. The rear cockpit is upgraded to include four multi-purpose CRT displays for aircraft systems and weapons management. The digital, triple-redundant Lear Siegler flight control system permits coupled automatic terrain following, enhanced by a ring-laser gyro inertial navigation system.

For low-altitude, high-speed penetration and precision attack on tactical targets at night or in adverse weather, the F-15E carries a high-resolution [APG-70](#) radar and low-altitude navigation and targeting infrared for night pods.

## Service history

The original and largest operator of the F-15 is the [United States Air Force](#).



F-15D from the 325 Fighter Wing based in Tyndall AFB, FL releasing flares

The first **F-15A** flight was made in [July 1972](#), and the first flight of the two-seat **F-15B** (formerly **TF-15A**) trainer was made in [July 1973](#). The first Eagle (F-15B) was delivered in [November 1974](#). In January [1976](#), the first Eagle destined for a combat squadron was delivered. These initial aircraft carried the [Hughes Aircraft](#) (now [Raytheon](#)) [APG-63](#) radar.

The single-seat **F-15C** and two-seat **F-15D** models entered the Air Force inventory beginning in [1979](#). These new models have Production Eagle Package (PEP 2000) improvements, including 2,000 lb (900 kg) of additional internal fuel, provision for carrying exterior conformal fuel tanks and increased maximum takeoff weight of up to 68,000 lb (30,600 kg).

The F-15 Multistage Improvement Program was initiated in [February 1983](#), with the first production MSIP F-15C produced in [1985](#). Improvements included an upgraded central computer; a Programmable Armament Control Set, allowing for advanced versions of the AIM-7, AIM-9, and AIM-120A missiles; and an expanded Tactical Electronic Warfare System that provides improvements to the ALR-56C radar warning receiver and ALQ-135 countermeasure set. The final 43 included the enhanced-capability Hughes APG-70 radar which was carried forward into the F-15E. The earlier MSIP F-15C's with the APG-63 were later upgraded to the APG-63(V)1, which significantly improves reliability and maintainability while providing performance similar to the APG-70. A limited number of F-15C aircraft have also been fitted with the APG-63(V)2 [AESA](#) radar.

F-15A and B models were utilized by Israel during the [Bekaa Valley](#) operation.

F-15C, D, and E models were deployed to the Persian Gulf in 1991 in support of Operation [Desert Storm](#) where they accounted for 36 of the 39 Air Force air-to-air victories. F-15Es were operated mainly at night, hunting SCUD missile launchers and artillery sites using the LANTIRN system.

They have since been deployed to support Operation Southern Watch, the patrolling of the [No-Fly Zone](#) in Southern Iraq; Operation Provide Comfort in Turkey; in support of NATO operations in Bosnia, and recent air expeditionary force deployments.

## Inventory

The USAF has an active force of 396 aircraft, with a further 126 in the [Air National Guard](#).

[\[edit\]](#)

## Users

The F-15 is also operated by [Israel](#) (F-15 and F15I Thunder), [Japan](#) (F-15J) and [Saudi Arabia](#) (F-15C, F-15S). In [May 2005](#), [Singapore](#) made the decision of replacing its fleet of outdated A-4 Skyhawks with the [F-15SG](#). Negotiations for contract signing are still underway. A special version of the F-15E, the F-15K has been ordered by [South Korea](#), with final assembly of the first example beginning in [June, 2004](#). It will be the first to sport engines from GE. All previous F-15s had engines from Pratt and Whitney.

## Controversy

Some members of the military, most famously the 'Fighter Mafia', a group of strategists that formed in response to early losses in the air-battles of [Vietnam](#), felt that the F-15 was merely an updated version of the [F-4](#), a plane that suffered losses dogfighting in Vietnam.

Criticisms of the F-15's close combat maneuverability, large size and cost led to the development of the [F-16](#), an airplane that complements the F-15 by having strengths in those areas listed.

## Other Aircraft named F-15

During the Second World War, Northrop built an unarmed version of the [P-61 Black Widow](#) called the F-15 Reporter (F under the Army Air Force system in use until the formation of the United States Air Force in 1947 stood for Photo Reconnaissance).

## Kill record

As of 2005, the F-15 in all air forces has a combined kill record of 104 kills to zero (confirmed) losses in air combat (exluding the case of a Japanese F-15J that shot down another F-15J in 1995 due to an AIM-9 Sidewinder safety malfunction during air-to-air combat training with live weapons). To date, the air superiority version of the F-15 (F-15A/B/C/D models) has never been shot down by an enemy aircraft, although some F-15s have been claimed by the Syrian Air Force (however, most sources say that, to date, no F-15s have been shot down in [air-to-air combat](#)).

Over half of the F-15's kills were made by [Israeli Air Force](#) pilots during the [1982 Lebanon War](#). The Israeli Air Force shutdown dozens of Syrian-piloted Russian [MiG-21s](#) (the reported figure varies from 80-92) and several [MiG-25s](#). A substantial fraction of these MiGs were shot down by F-15s.

Royal Saudi Air Force F-15 pilots shot down two [F-4 Phantoms](#) flown by the Iranian Air Force in a border skirmish in 1984, and shot down two Iraqi Mirage F1 during the [Gulf War](#).

Thirty-four aircraft kills were by USAF F-15Cs in the 1991 Gulf War, mostly by missile fire. After F-15s shot down all of the top Iraqi pilots in the first 3 days of the conflict, many of the later kills were reportedly of Iraqi aircraft fleeing, rather than actively trying to engage US planes. The single-seat F-15C was used for air superiority, and the F-15E was heavily used in air-to-ground attacks.

An F-15E achieved an aerial kill of an Iraqi helicopter using a laser-guided bomb during the air war. The F-15E sustained two losses to ground fire in the Gulf War in 1991. One F-15E was lost in the [2003 Invasion of Iraq](#), likely due to crew error, but possibly ground fire.

USAF F-15Cs also scored several Serbian MiG-29 kills during NATO's [Operation Allied Force](#) in 1999, again without the loss of an F-15C.

### One wing is enough?

On [May 1, 1983](#) during an [Israeli Air Force](#) training dogfight, an F-15D collided with an [A-4 Skyhawk](#). The right wing of the Eagle was torn off roughly two feet (0.6 m) from the body. The pilot disobeyed his instructor's command to eject and managed to land the crippled aircraft successfully. The aircraft was able to land because of the large horizontal surface area of the tail and the amount of lift generated by the engine intake and body. [\[1\]](#)

### Future

The F-15C/D model is being replaced by the [F-22](#) Raptor. The fate of the F-15E is yet unknown but as the airframes are relatively recent, will likely remain in the U.S. inventory for some years to come. Some USAF F-15Cs have been retrofitted with Electronically Scanned Array (ESA) radars and are expected to remain in service with the USAF well past 2020. The Royal Saudi Air Force has purchased several squadrons of long-range F-15S models, the Republic of Korea is purchasing upgraded F-15Ks, and Singapore is purchasing F-15SGs as well.

### Specifications (F-15 Eagle)

#### General characteristics

- **Crew:** 1 (A/C), 2 (B/D/E)
- **Length:** 63.8 ft (19.44 m)
- **Wingspan:** 42.8 ft (13 m)
- **Height:** 18.5 ft (5.6 m)
- **Wing area:** 608 ft<sup>2</sup> (56.5 m<sup>2</sup>)
- **Empty:** 28,000 lb (12,700 kg)
- **Loaded (C variant):** 44,500 lb (20,200 kg)
- **Maximum takeoff:**
  - **C/D:** 68,000 lb (30,844 kg)
  - **E:** 81,000 lb (36,700 kg)
- **Powerplant:** Engines
  - **F-15C/E:** 2x [Pratt & Whitney F100](#)-229 afterburning turbofans, 29,000 lbf (129 kN) thrust each
- **Radar:** [Raytheon AN/APG-63](#) or [AN/APG-70](#)

- **Countermeasures:** AN/APX-76 IFF interrogator, AN/ALQ-128 radar warning suite, AN/ALR-56 radar warning receiver, ALQ-135 internal countermeasures system, AN/ALE-45 chaff/flare dispensers
- **Unit cost(FY\$98):** \$43 million (F-15C/D), approximately \$55 million (F-15E/F)

## Performance

- **Maximum speed:** 1,875 mph (3000 km/h) (Mach 2.5)
- **Range:** 3,450 km ferry range (approx. 2156 miles)
- **Service ceiling:**
  - **A/B/C/D:** 65,000 ft (19,812 m)
  - **E:** 50,000 ft (15,000 m)
- **Rate of climb:** 50,000 ft/min (15,240 m/min)

## Armament

- 6 wing, 4 fuselage, and 1 centerline hardpoint (The F-15E strike version has 4 additional fuselage hardpoints) for a total of 16,000 lb (7,300 kg) ordinance, including:
  - **Guns:** 1x [M61 Vulcan](#) 20 mm [Gatling gun](#) with 940 rounds (A/B/C/D), 500 rounds (E)
  - **Missiles:** Combination of [AIM-7F Sparrows](#), [AIM-120 AMRAAMs](#), and [AIM-9 Sidewinders](#) on 4 wing and 4 fuselage pylons, plus a total ordinance load of 16,000 lb (7,300 kg) on two wing stations and one centerline station
  - **Bombs:** The F-15E model is capable of carrying almost every air to ground bomb in the USAF inventory, including free fall nuclear bombs and the 4,500 lb (2000 kg) GBU-28 bunker penetration bomb.

## External links

- [USAF fact sheet](#)
- [F-15 Eagle official website from Boeing](#)
- <http://www.geocities.com/CapeCanaveral/Hangar/2848/f15.htm>
- <http://www.airtoaircombat.com/background.asp?id=11&bg=21>
- [http://www.faqs.org/docs/air/avf15\\_2.html](http://www.faqs.org/docs/air/avf15_2.html)

## F-15 in fiction

As an iconic [heavy fighter](#) of modern air power, the F-15 often finds itself fictionalized.

- In the hit cartoon [The Transformers](#), the [Decepticons Starscream](#), [Skywarp](#), and [Thundercracker](#) could transform into F-15s.
- The character Air Raid, of the [Aerialbots](#), is also an F-15, as is [Leader-1](#) in the [Challenge of the GoBots](#).
- A flight of F-15s protects the president from [Russian MiG-29s](#) when his plane is hijacked in the movie [Air Force One](#), starring [Harrison Ford](#), and also tries to protect the president in the fourth season of the TV-series [24 \(television\)](#), starring [Kiefer Sutherland](#).
- In the comic strip [Calvin and Hobbes](#), there is a Sunday comic where Calvin pilots an F-15 loaded with missiles in order to bombard his school.
- In the 2005 movie [War of the Worlds](#), a wing of F15Es are clearly seen attacking the alien tripods with AIM-9 Sidewinder missiles, without much effect.

- The F-15 is the unique unit for the Americans in the [turn-based strategy game Sid Meier's Civilization III](#)
- The F-15 is also featured in the [Namco](#) games, [Air Combat](#), [Ace Combat 2](#), [Ace Combat 3: Electrosphere](#), [Ace Combat 4: Shattered Skies](#) and [Ace Combat 5: The Unsung War](#).
- In the computer game Empire Earth, the F-15 is the fighter for all nations in the Modern Age.