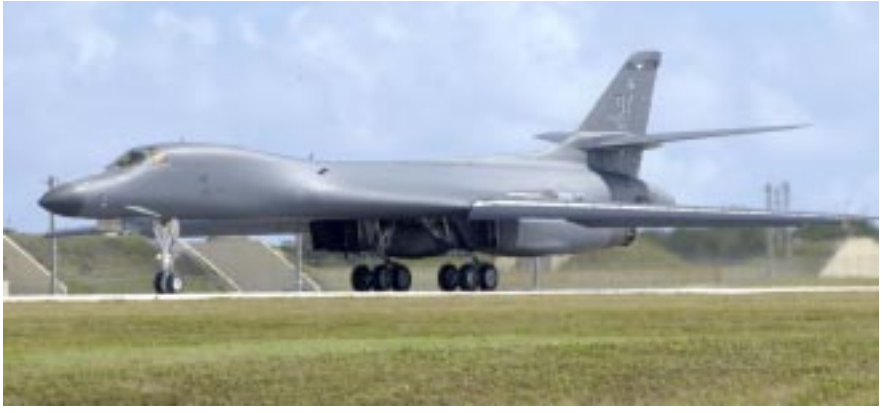
Gallery of USAF Weapons

2003 USAF Almanac

By Susan H.H. Young

Note: Inventory numbers are Total Active Inventory figures as of Sept. 30, 2002.



***B-1B** Lancer* (SrA. Christina M. Rumsey)

Bombers

B-1 Lancer

Brief: A long-range, air refuelable multirole bomber capable of flying missions over intercontinental range, then penetrating enemy defenses with a heavy load of ordnance.

Function: Long-range conventional bomber.

Operator: ACC.

First Flight: Dec. 23, 1974 (B-1A); Oct. 18, 1984 (B-1B).

Delivered: June 1985–May 1988.

IOC: Oct. 1, 1986, Dyess AFB, Tex. (B-1B).

Production: 104.

Inventory: 78.

Unit Location: Active: Dyess AFB, Tex., Ellsworth AFB, S.D.

Contractor: Boeing; AIL Systems; General Electric.

Power Plant: four General Electric F101-GE-102 turbofans, each 30,780 lb thrust.

Accommodation: four, pilot, copilot, and two systems officers (offensive and defensive), on zero/zero ejection seats.

Dimensions: span spread 137 ft, swept aft 79 ft, length 146 ft, height 34 ft.

Weights: empty equipped 192,000 lb, max operating weight 477,000 lb.

Ceiling: more than 30,000 ft.

Performance: max speed at low level high subsonic; 900+ mph (Mach 1.2 at S/L); range intercontinental.

Armament: three internal weapons bays capable of accommodating a wide range of weapons incl up to 84 Mk 82 (500-lb) bombs or Mk 62 naval mines; up to 30 CBU-87/89 cluster munitions and CBU-97 Sensor Fuzed Weapons (SFWs), to be fitted with the Wind-Corrected Munitions Dispenser (WCMD) kits in 2003 and up to 24 GBU-31 (2,000 lb) Joint Direct Attack Munitions (JDAMs); AGM-54 Joint Standoff Weapon (JSOW) and AGM-158 Joint Air-to-Surface Standoff Missile (JASSM) from 2004.

COMMENTARY

Of blended wing/body configuration, the B-1's variable-geometry design and turbofan engines combine to provide greater range and high speed at low level, with enhanced survivability. Unswept wing settings provide for maximum range during high-altitude cruise. The fully swept position is used in supersonic flight and for high subsonic, low-altitude penetration.

The bomber's offensive avionics include synthetic aperture radar (SAR), ground moving target indicator (GMTI), ground moving target track (GMTT), and terrain-following radar (TFR), an extremely accurate Global Positioning System/inertial navigation system (GPS/INS), computer-driven avionics, and a strategic Doppler radar, enabling aircrews to navigate, update target coordinates in flight, and precision bomb.

The current defensive avionics package, built around the ALQ-161 electronic countermeasures (ECM) system, is supplemented by the ALE-50 towed decoy and chaff and flares to protect against radar-guided and heat-seeking missiles. Aircraft structure and radar-absorption materials reduce the aircraft's radar signature to approximately one percent that of a B-52. The ALE-50 provides greater protection against RF threats.

B-1A. USAF acquired four prototype flight-test models of this new strategic bomber in the 1970s, but the program was canceled in 1977. Flight-test of the four B-1A models continued through 1981.

B-1B. Initiated in 1981, the first production model of the improved variant B-1 flew in October 1984. USAF produced a total of 100. The B-1 was first used in combat in support of operations against Iraq during Desert Fox in December 1998. USAF began implementing the planned reduction of its B-1B inventory from 93 to 60 aircraft in August 2002, with fleet consolidation at Dyess AFB, Tex., and Ellsworth AFB, N.D. Cost savings in operations and maintenance are to fund upgrades and spares for the remaining fleet.

B-1B's speed, superior handling qualities, and large payload make it a key element of any joint/composite strike force, with the flexibility to deliver a wide range of weapons or to carry additional fuel, as required. Integration of the 2,000-lb GPS–guided GBU-31 JDAM was completed in FY02.

An ongoing conventional mission upgrade program (CMUP) is significantly enhancing B-1B lethality and survivability through the integration of precision and standoff weapons and a robust ECM suite. CMUP includes GPS receivers, a MIL-STD-1760 weapon interface, secure interoperable radios, and improved computers to support precision weapons, initially the GBU-31 JDAM, with follow-on computer and software upgrades permitting simultaneous carriage of mixed guided and unguided weapons.

In December 2002, USAF canceled the defensive system upgrade program, incorporating the ALE-55 fiber-optic towed decoy, ALR-56M radar warning receiver (RWR), and ALQ-214 receiver/processor, because of escalating cost growth and schedule delays. Officials announced plans to fund other B-1 modernization programs, including upgrading its existing ALQ-161 ECM system.

B-2 Spirit

Brief: Stealthy, long-range multirole bomber that can deliver conventional and nuclear munitions anywhere on the globe by flying through previously impenetrable defenses.

Function: Long-range heavy bomber.

Operator: ACC.

First Flight: July 17, 1989.

Delivered: Dec. 11, 1993–present.

IOC: April 1997, Whiteman AFB, Mo.

Production: 21.

Inventory: 21.

Unit Location: Whiteman AFB, Mo.

Contractor: Northrop Grumman; Boeing; LTV.

Power Plant: four General Electric F118-GE-100 turbofans, each 17,300 lb thrust.

Accommodation: two, mission commander and pilot, on zero/zero ejection seats.

Dimensions: span 172 ft, length 69 ft, height 17 ft.

Weight: empty 125,000–153,700 lb, typical T-O weight 336,500 lb.

Ceiling: 50,000 ft.

Performance: minimum approach speed 140 mph, typical estimated unrefueled range for a hi-lo-hi mission with 16 B61 nuclear free-fall bombs 5,000 miles, with one aerial refueling more than 10,000 miles.

Armament: in a nuclear role: up to 16 nuclear weapons (B61, B61 Mod II, B83). In a conventional role: up to 16 GBU-31 (2,000-lb) JDAMs or a penetration version of a BLU-109, or 16 Mk 84 2,000-lb bombs; up to eight 4,700-lb GBU-37 (GAM-113) near-precision guided weapons. JASSM and JSOW are being added to B-2 Block 30 aircraft through FY03.

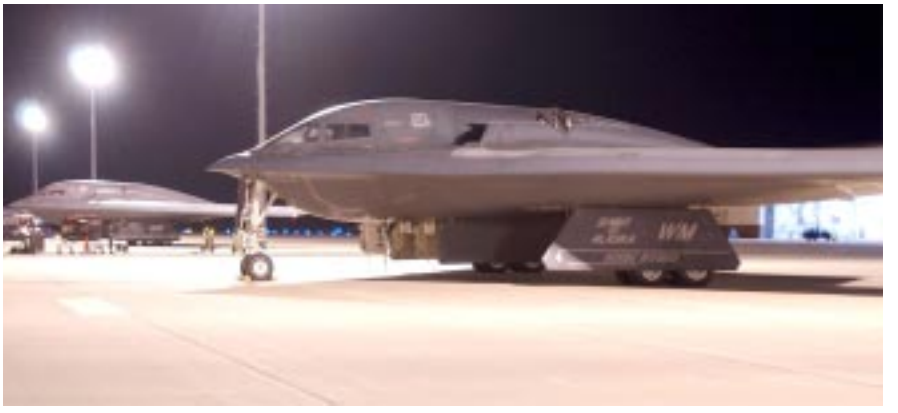
COMMENTARY

The B-2 bomber is a unique, highly advanced system, combining sophisticated technologies, notably low observable (LO) stealth design, with high aerodynamic efficiency, enabling it to attack heavily defended targets and neutralize enemy defenses and, thereby, making way for less stealthy systems to operate.

Based on the flying wing concept, the B-2 has no vertical tail surfaces. The smoothly blended "fuselage" section accommodates two flight crew and two large weapons bays side by side in the lower centerbody. These bays contain rotary launchers or bomb rack assemblies capable of carrying a total weapons load of 40,000 lb.

Four nonafterburning turbofan engines are mounted in pairs within the wing structure, with scalloped overwing intake ducts and shielded over-wing trailing-edge nozzles. The aircraft has a quadruple-redundant fly-by-wire digital flight-control system, actuating moving surfaces at the wing trailing edges that combine aileron, elevator, and rudder functions. A landing gear track of 40 ft enables the B-2 to use any runway that can handle a Boeing 727 airliner.

B-2A. B-2 production represents three successive blocks of capability. Block 10 aircraft carried B83 nuclear bombs or 16 Mk 84 2,000-lb conventional munitions. Block 20 aircraft additionally carried the B61/7 and B61/11 nuclear gravity bombs, as well as two types of GPS–aided munitions (GAMs), the GBU-37 and GBU-36B, on two rotary launcher assemblies, providing an interim, near-precision strike capability. All Block 10 and 20 aircraft have now been upgraded to Block 30.



***B-2** Spirit* (TSgt. Michael R. Nixon)

(The last original Block 20 B-2, used as a test aircraft at Edwards AFB, Calif., was refurbished as an operational bomber and entered operational service in September 2002.)

Block 30 configuration retains weapons capability introduced in Block 10 and 20 and adds significant new capability. Using the rotary launcher assembly, all B-2s are capable of employing 16 Mk 84 JDAMs, 16 JSOWs, or eight GAM-113s (to be replaced by EGBU-28), with JASSM capability slated for 2004. All B-2s are also capable of substituting bomb-rack assemblies in place of the rotary launchers, providing the capability to employ 80 500-lb Mk 82s, 36 750-lb M117s, 34 tactical munitions dispensers, or 80 Mk 62 sea mines. Modifications to the bomb racks will allow carriage of 80 independently targeted Mk 82 (500-lb) JDAMs in 2004. Future capability is expected to include the 250-lb Small Diameter Bomb (SDB). Other Block 30 enhancements include fully operational defensive and offensive avionics, a more sophisticated mission planning system, and additional operating modes for the SAR.

Beyond Block 30, USAF plans to add UHF and EHF satellite communications systems and Link 16 digital data sharing capability and to replace the current mechanically scanned phased-array antenna with an active electronically scanned array (AESA).

The first use of B-2s in combat took place March 24, 1999, against Serb targets in Allied Force, with two aircraft each dropping 16 JDAMs. USAF deployed B-2s to Diego Garcia in the Indian Ocean for Gulf War II.

B-52 Stratofortress

Brief: A long-range, heavy multirole bomber that can carry nuclear or conventional ordnance or Air Launched Cruise Missiles (ALCMs), with worldwide precision navigation capability.

Function: Long-range heavy bomber.

Operator: ACC, AFRC.

First Flight: April 15, 1952 (YB-52 prototype).

Delivered: November 1955–October 1962.

IOC: June 19, 1955.

Production: 744.

Inventory: 93.

Unit Location: Barksdale AFB, La. (ACC, AFRC), Minot AFB, N.D.

Contractor: Boeing.

Power Plant: eight Pratt & Whitney TF33-P-3 turbofans, each 17,000 lb thrust.

Accommodation: two pilots, side by side, plus navigator, radar navigator, and electronic warfare officer.

Dimensions: span 185 ft, length 159.3 ft, height 40.7 ft.

Weight: empty approx 188,000 lb, gross 488,000 lb.

Ceiling: 50,000 ft.

Performance (approx): max level speed 449 mph, range more than 10,000 miles.

Armament: 12 AGM-86B ALCMs or AGM-129A Advanced Cruise Missiles (ACMs) externally, with provision for eight more ALCMs or gravity weapons internally. Conventional weapons incl AGM-86C/D Conventional ALCMs (CALCMs), bombs up to 2,000 lb, CBU 87/89/97 cluster munitions, WCMDs, GBU-31 JDAMs, JSOWs, JASSMs in 2003, and on some aircraft, three to four AGM-142A Have Nap missiles or eight AGM-84 Harpoons in under-wing clusters.

COMMENTARY

The B-52's still-expanding weapons capability reflects its continuing ability to perform a wide range of missions including show of force, maritime operations, long-range precision strikes, offensive counterair, air interdiction, and defense suppression. USAF is considering using some B-52s as jamming electronic warfare platforms.

Equipment includes an electro-optical (EO) viewing system that uses forward-looking infrared (FLIR) and high-resolution low-light-level television (LLLTV) sensors to augment the targeting, battle assessment, flight safety, and terrain avoidance systems, thus improving combat ability and low-level flight capability. Pilots have night vision goggles (NVGs) to further enhance night operation. The B-52's ECM suite uses a combination of electronic detection, jamming, and infrared (IR) countermeasures to protect against hostile air defense systems. The aircraft can also detect and counter missile attack from the rear.

Several versions of the Stratofortress were produced, including:

B-52A. Initial production version, with J57-P-1W engines and provision for in-flight refueling. First flown Aug. 5, 1954, the three aircraft built were used by Boeing for technical development purposes. Delivered to SAC November 1957. Finally retired 1969.

B-52B. First operational version, 23 of which were built. Also, 27 RB-52B dual-role bomber/reconnaissance variants. First flown January 1955, with deliveries between June 1955–August 1956; powered by J57-P-1W, -19W, -29W, or -29WA engines. Retired in the mid–1960s.

B-52C. Multimission version with increased gross weight and larger under-wing tanks. Powered by J57-P-19W or -29WA engines. First flown March 1956; 35 were delivered June–December 1956. Majority retired 1971.

B-52D. Long-range bomber version, first flown June 1956. Total of 170 built, with deliveries beginning late 1956. Retired 1982–83.

B-52E. Version with improved bombing, navigation, and electronics systems. First flown October 1957. One hundred delivered October 1957–June 1958. Retired 1969–70.

B-52F. Version with uprated J57-P-43WA engines, first flown in May 1958. Eighty-nine delivered June 1958–February 1959. Retired 1978.

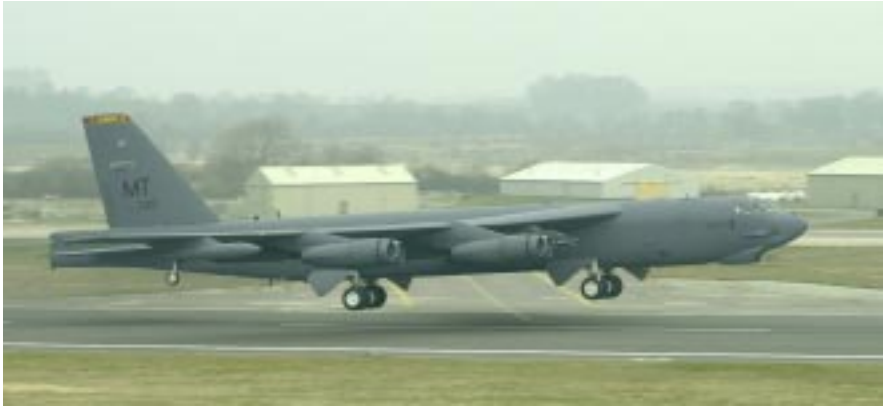
B-52G. Introduced important design changes, including a redesigned wing containing integral fuel tanks for increased range, fixed under-wing external tanks, a shorter tail fin of greater chord, and a remotely controlled tail gun turret that allowed the gunner to be repositioned with the rest of the crew. Initial flight August 1958, with the first of 193 aircraft entering service in February 1959. Withdrawn 1994.

B-52H. The only version still in service, the H introduced TF33 turbofans, providing increased unrefueled range, and improved defensive armament. First flown July 1960, 102 were built, with deliveries between May 1961 and October 1962.

Following deployment of the B-1 and B-2 the primary role of the B-52 changed to cruise missile carrier with, typically, multiple cruise missile launches at high altitude, often followed by B-52 low-level descent to attack additional targets using gravity weapons.

Ongoing modernization of its conventional capabilities is extending the B-52's service life well into this century, with the ability to provide massive firepower in low- to mid-threat environments supplemented by a standoff attack capability. Upgrades include the installation of GPS, ARC-210 radios, Have Quick II antijam radio, KY-100 secure radio, and MIL-STD-1760 interfaces; improved weapons capability includes naval mines, precision guided weapons, and advanced weapons, such as JDAM, JSOW, JASSM, and WCMD. Modification of heavy stores adapter beams will enable aircraft to carry all B-52–certified munitions. Avionics improvements include the avionics midlife improvement (AMI) program, which replaces the current system processors and data transfer cartridges. Electronic attack improvements include the situational awareness defensive improvement (SADI) panoramic threat receiver and the ECM improvement upgrade to the ALQ-172 set. Recently installed Link 16 data link provides updated targeting information.

Current plans encompass a force of 76 aircraft.



***B-52H** Stratofortress* (MSgt. Andrew E. Lynch)

Fighter and Attack Aircraft

A-10 Thunderbolt II

Brief: A simple, effective, and survivable twin-engine aircraft specifically designed for close air support (CAS) of ground forces and which can be used against all ground targets, including tanks and other armored vehicles.

Function: Attack aircraft.

Operator: ACC, AFMC, PACAF, USAFE, ANG, AFRC.

First Flight: Feb. 15, 1975 (preproduction).

Delivered: November 1975–March 1984.

IOC: October 1977.

Production: 713.

Inventory: 362.

Unit Location: Active: Davis–Monthan AFB, Ariz., Eglin AFB, Fla.; Eielson AFB, Alaska, Nellis AFB, Nev., Osan AB, South Korea, Pope AFB, N.C., Spangdahlem AB, Germany. ANG: Barnes Arpt., Mass., Boise Air Terminal, Idaho, Bradley Arpt., Conn., Martin State Arpt., Md., W.K. Kellogg Arpt., Mich., Willow Grove ARS, Pa. AFRC: Barksdale AFB, La., NAS JRB New Orleans, La., Whiteman AFB, Mo.

Contractor: Fairchild Republic; now Lockheed Martin.

Power Plant: two General Electric TF34-GE-100 turbofans, each 9,065 lb thrust.

Accommodation: pilot only, on zero-height/518 mph–zero-speed ejection seat.

Dimensions: span 57.5 ft, length 53.3 ft, height 14.7 ft.

Weight: empty 28,000 lb, max gross 51,000 lb.

Ceiling: 37,000 ft.

Performance: speed 518 mph, combat range with 9,500 lb of weapons and 1.7 hr loiter, 20 min reserve, 288 miles.

Armament: one 30 mm, seven-barrel GAU-8 Gatling gun with accuracy beyond 30,000 ft.; eight under-wing

hardpoints and three under fuselage for up to 16,000 lb of ordnance, incl various types of free-fall or guided bombs, combined effects munition (CEM) dispensers, gun pods, up to six AGM-65 Maverick missiles, up to four AIM-9 Sidewinder missiles, and jammer pods. Chaff and flares carried internally to counter radar-directed or IR-directed threats. The centerline pylon and the two flanking fuselage pylons cannot be occupied simultaneously.

COMMENTARY

Supporting the CAS mission, the A-10 combines large military load, long loiter, and wide combat radius with the ability to operate under 1,000-ft ceilings, with 1.5-mile visibility, and in darkness with NVGs. In a typical anti-armor mission, the A-10, nicknamed Warthog, can fly 150 miles and remain on station for an hour. The 30 mm GAU-8 gun provides a cost-effective weapon with which to defeat the whole array of ground targets, including tanks. The large bubble canopy provides all-around vision for the pilot, and the cockpit is protected with titanium armor, capable of withstanding projectiles up to 23 mm. An A-10 structural enhancement is strengthening the wing center section and outer panels. Used extensively in Desert Storm (Iraq) and recently in Enduring Freedom (Afghanistan) and Iraqi Freedom (Iraq), the A-10 is projected to serve well into the 2020s.

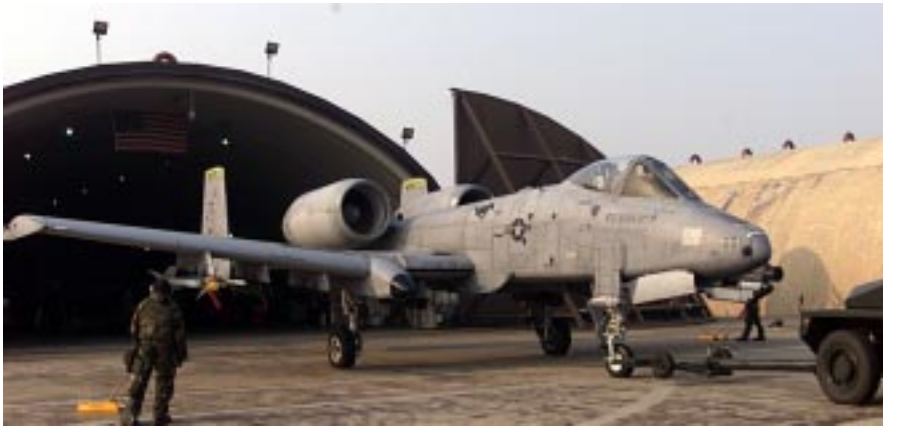
A-10A equipment includes an enhanced GPS/INS (EGI), head-up display (HUD), NVGs, the low-altitude safety and targeting enhancement (LASTE) system for ground collision avoidance, Pave Penny laser target identification pod, ECM, target penetration aids, self-protection systems, and AGM-65 Maverick and AIM-9 Sidewinder missiles. A precision engagement upgrade will provide the A-10 with new cockpit displays, a digital stores management system, a Joint Tactical Radio System (JTRS) data link and integration of the JDAM and WCMD. A targeting pod is also planned. Low-rate initial production (LRIP) of upgrade kits is scheduled to begin in 2004. Additionally, an upgraded automated chaff and flare system is planned for all aircraft by 2008.

OA-10A. Redesignated A-10s, used for forward air control of fighter aircraft, combat escort, search and rescue, and visual reconnaissance. The 30 mm GAU-8/A gun is retained, but under-wing stores are normally restricted to canisters of white phosphorous rockets for target marking. The first OA-10 unit reached initial operational capability (IOC) in October 1987.

AC-130 Gunship

Brief: Heavily armed aircraft using side-firing weapons integrated with sophisticated sensor, navigation, and fire-control systems to provide precise firepower or area saturation for long periods, at night and in adverse weather.

Function: Attack aircraft.
Operator: AFSOC.
First Flight: 1967.
Delivered: 1968–95.
IOC: 1972 (AC-130H); 1995 (AC-130U).
Production: 39; one further C-130 conversion recently contracted.
Inventory: 8 (AC-130H); 13 (AC-130U).
Unit Location: Hurlburt Field, Fla.
Contractor: Lockheed Martin (airframe); Boeing (AC-130H); Rockwell (AC-130U).
Power Plant: four Allison T56-A-15 turboprops, each 4,910 shp.
Accommodation: AC-130H crew of 14; AC-130U crew of 13.
Dimensions: span 132.6 ft, length 99 ft, height 38.5 ft.
Weight: gross 155,000 lb.
Ceiling: 25,000 ft.



***A-10A** Thunderbolt II* (SSgt. Johnny Saldivar)

Performance: speed 289 mph, range 1,500 miles, with air refueling unlimited.

Armament: two 20 mm Vulcan cannons with 3,000 rd (AC-130H); one 25 mm Gatling gun (AC-130U); one 40 mm Bofors cannon with 256 rd, and one 105 mm Howitzer with 100 rd.

COMMENTARY

The AC-130 is a C-130 modified with gun systems, electronic and EO sensors, fire-control systems, enhanced navigation systems, sophisticated communications, defensive systems, and in-flight refueling capability. These systems give the gunship crew the capability to acquire and identify targets day or night, coordinate with ground forces and command and control (C2) agencies, and deliver surgical firepower in support of both conventional and special operations missions. During operations in Afghanistan the AC-130 Spectre has worked in conjunction with the RQ-1 Predator, the latter providing live video and target referencing information.

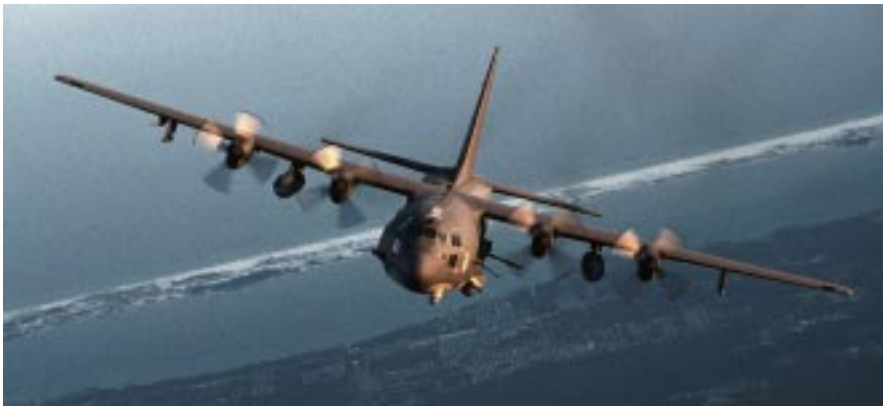
AC-130A was the initial version, deployed in Vietnam 1968–69. Eighteen produced.

AC-130E, an improved version, of which eight were built. Converted to H standard after service in Vietnam.

AC-130H Spectres serve with the 16th SOW. The unit has eight, each equipped with a digital fire-control computer. They employ EO sensors and target-acquisition systems, including FLIR and LLLTV, and are capable of in-flight refueling. Fire-control computers, navigation, communications, and sensor suites have been upgraded; an infrared suppression system (IRSS) overhaul is under way. In addition, USAF is to evaluate wingtip tanks as replacements for the existing underwing tanks as a means of improving performance.

AC-130U Spookys are the most recent gunship conversions, converted by Rockwell, of which 13 were delivered to the 16th SOW's 4th SOS in 1994–95. These aircraft have greater altitude capability and combine increased firepower, reliability, and superior accuracy with the latest methods of target location. The two 20 mm cannon of the H model are replaced with one trainable 25 mm Gatling gun. All weapons can be subordinated to the APQ-180 digital fire-control radar, FLIR, or all-light-level television (ALLTV) for adverse weather attack operations.

Although the AC-130H Spectre and AC-130U Spooky gunships use dissimilar avionics and other systems, fire support to troops on the ground is generally comparable. The AC-130U will not be required for most fire support missions but provides benefits under certain circumstances (weather, dual target attack, and defensive avionics).



***AC-130U** Spooky*

F-15 Eagle

Brief: A supersonic, all-weather, highly maneuverable tactical fighter designed to permit USAF to swiftly gain and maintain air superiority in aerial combat.

Function: Air superiority fighter.
Operator: ACC, AETC, AFMC, PACAF, USAFE, ANG.
First Flight: July 27, 1972.
Delivered: November 1974–85.
IOC: September 1975.
Production: 874.
Inventory: 518.
Unit Location: Active: Eglin AFB, Fla., Elmendorf AFB, Alaska, Kadena AB, Japan, Langley AFB, Va., Mountain Home AFB, Idaho, Nellis AFB, Nev., RAF Lakenheath, UK, Robins AFB, Ga., Tyndall AFB, Fla. ANG: Hickam AFB, Hawaii, Jacksonville Arpt., Fla., Kingsley Field, Ore., Lambert–St. Louis Arpt., Mo., NAS JRB New Orleans, La., Otis ANGB, Mass., Portland Arpt., Ore.
Contractor: McDonnell Douglas (now Boeing); Raytheon.
Power Plant: F-15C: two Pratt & Whitney F100-PW-220 turbofans, each 25,000 lb thrust, with max afterburner.
Accommodation: pilot only in F-15A/C; two seats in F-15B/D.
Dimensions: span 42.8 ft, length 63.8 ft, height 18.7 ft.
Weight: empty 28,600 lb, gross 68,000 lb.
Ceiling: 65,000 ft.
Performance: F-15C: max speed Mach 2.5, T-O run 900 ft, landing run without braking parachute 3,500 ft, ferry range with external fuel tanks more than 2,878 miles.
Armament: one internally mounted M61A1 20 mm six-barrel cannon; up to four AIM-9L/M Sidewinder and up to four AIM-7 Sparrow air-to-air missiles, or up to eight AIM-120 Advanced Medium-Range Air-to-Air Missiles (AMRAAMs), carried externally. Future weapons incl AIM-9X.

COMMENTARY

Superior maneuverability and acceleration, range, weapons, and avionics enable the F-15 to penetrate hostile defenses and establish air superiority over enemy systems. F-15 fighters deployed to the Persian Gulf for Desert Storm accounted for 34 of the 37 USAF air-to-air victories.

F-15A (single-seat) and **F-15B** (two-seat) fighters became USAF's front-line fighter immediately upon introduction in the mid–1970s. A multimission avionics system includes APG-63 pulse–Doppler radar for long-range detection and tracking of small high-speed objects down to treetop level and effective weapons delivery, a HUD for close-in combat, identification, friend or foe (IFF), and INS. A/Bs now serve with ANG.

F-15C (single-seat) and **F-15D** (two-seat) models followed in June 1979. Improvements include 2,000 lb of additional internal fuel and provision for carrying conformal fuel tanks (CFTs), reducing in-flight refueling requirements and increasing time in the combat zone. Since 1983 tactical capabilities have been enhanced extensively through the multistaged improvement program (MSIP), an ongoing program of installation of new or modification of existing avionics equipment, allowing for the carriage of more advanced weapons, and increased self-protection. The last 43 aircraft included improved APG-70 radar, and additional F-15C/Ds are receiving an APG-63 upgrade, the APG-63(V)1. One squadron in Alaska has received the later APG-63(V)2, featuring an advanced

***F-15C** Eagle* (Guy Aceto)

AESA radar antenna. F-15C/D aircraft are also to be modified with the Joint Helmet Mounted Cueing System (JHMCS), a "look and shoot" head-mounted system that significantly enhances lethality in close-range aerial combat. Other modifications include improved engines and GPS equipment. All types are being equipped with Link 16 fighter data link.

F-15E Strike Eagle

Brief: A heavily modified, two-seat, dual-role variant of the original F-15, with weapons systems totally integrated for all-weather deep interdiction missions as well as air-to-air combat.

Function: Dual-role fighter.

Operator: ACC, AFMC, PACAF, USAFE.

First Flight: Dec. 11, 1986.

Delivered: April 1988–2004.

IOC: May 1989.

Production: 236 scheduled.

Inventory: 217.

Unit Location: Eglin AFB, Fla., Elmendorf AFB, Alaska, Mountain Home AFB, Idaho, Nellis AFB, Nev., RAF Lakenheath, UK, Robins AFB, Ga., Seymour Johnson AFB, N.C.

Contractor: McDonnell Douglas (now Boeing); Raytheon.

Power Plant: two Pratt & Whitney F100-PW-220, each 25,000 lb thrust; or F100-PW-229 turbofans, each 29,000 lb thrust with max afterburner.

Accommodation: crew of two, on zero/zero ejection seats.

Dimensions: span 42.8 ft, length 63.8 ft, height 18.5 ft.

Weight: empty 45,000 lb, gross 81,000 lb.

Ceiling: 50,000 ft.

Performance: max level speed at altitude Mach 2.5, ferry range with CFTs 3,000 miles.

Armament: one internally mounted M61A1 20 mm six-barrel cannon; up to four AIM-9 Sidewinder and up to four AIM-7 Sparrow air-to-air missiles, or up to eight AIM-120 AMRAAMs; up to six AGM-65 Maverick air-to-surface missiles; AGM-130; EGBU-15 and GBU 10/12/15/24/28 guided munitions; CBU 87/89/97 cluster munitions; unguided munitions; and nuclear weapons. JSOW, JDAM, and WCMD capability from FY03.

COMMENTARY

F-15E has a strengthened airframe for increased gross weight at takeoff and maneuver at nine Gs throughout the flight envelope. Cockpit controls and displays are improved, and a wide-field-of-view (WFOV) HUD is included.

For low-altitude, high-speed penetration and precision attack on tactical targets at night and in adverse weather, the F-15E carries a high-resolution APG-70 SAR and LANTIRN (Low-Altitude Navigation and Targeting Infrared for Night) pods, with wide-field FLIR. The APG-70 gives the F-15E, with its AMRAAM, AIM-7, and AIM-9 load, a true multirole capability with the inherent air-to-air capability of the F-15C. The triple-redundant digital flight-control system, in combination with the LANTIRN navigation pod and the WFOV HUD, permits automatic terrain following. Other improvements include an EGI and Link 16 data link. Strike capability will be enhanced with the addition of the JHMCS. Smart weapon (JSOW, JDAM, and WCMD) capability is added from 2003. In addition, USAF has equipped some F-15E aircraft with Litening targeting pods for improved precision attack capability. External CFTs, adapted to carry ordnance tangentially, can be fitted to reduce drag while increasing combat range.

During Desert Storm, 48 USAF F-15Es were deployed to the Persian Gulf where they operated mainly at night, hunting Scud missile launchers and artillery sites using the LANTIRN system. They also operated successfully with Joint STARS radar aircraft.

Congress authorized 10 additional aircraft with deliveries beginning in FY02 through FY04. These new F-15Es include upgraded programmable armament control (PAC) and software for compatibility with JDAM, JSOW, and WCMD, as well as an enhanced night vision capability.

F-16 Fighting Falcon

Brief: A compact, versatile, and low-cost multirole fighter aircraft that is highly maneuverable and has repeatedly proved itself in air-to-air combat and air-to-surface attack.

Function: Multirole fighter.

Operator: ACC, AETC, AFMC, PACAF, USAFE, ANG, AFRC.

First Flight: Dec. 8, 1976 (full-scale development).

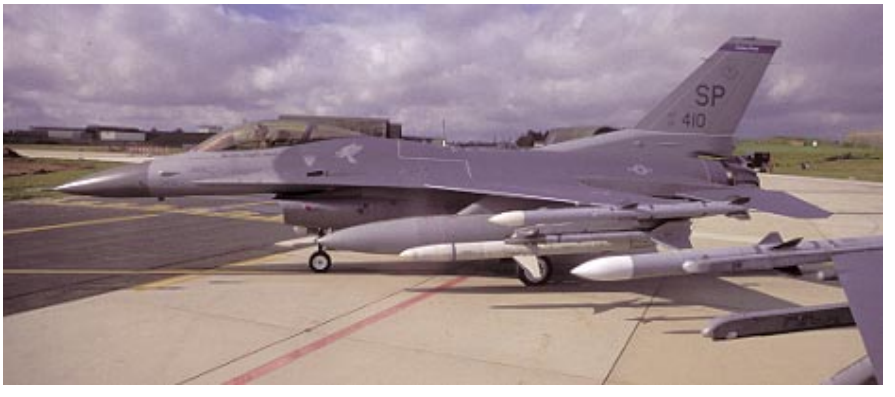
Delivered: August 1978–2007 (planned).

IOC: October 1980, Hill AFB, Utah.

Production: 2,206.

Inventory: 1,391.

Unit Location: 13 active wings, 27 ANG, and four AFRC units (one Associate).



***Block 50 F-16CJ** Fighting Falcon* (Guy Aceto)

Contractor: Lockheed Martin; Northrop Grumman.

Power Plant: one augmented turbofan. General Electric F110-GE-100 (27,600 lb thrust) and Pratt & Whitney F100-PW-220 (23,450 lb thrust) are alternative standard engines. Increased performance engines (IPEs) in aircraft delivered from late 1991: Block 50: F110-GE-129 (29,000 lb thrust); Block 52: F100-PW-229 (29,100 lb thrust).

Accommodation: pilot only, on zero/zero ejection seat.

Dimensions: wingspan with missiles 32.7 ft, length overall 49.4 ft, height 16.7 ft.

Weight: (F-16C) empty (F100-PW-229) 18,591 lb, (F110-GE-129) 18,917 lb; gross, with external load (Block 40/42) 42,000 lb.

Ceiling: 50,000 ft.

Performance: max speed Mach 2, radius of action: Block 40 with two 2,000-lb bombs, two AIM-9 missiles, and external fuel, hi-lo-lo-hi 852 miles; combat range 575 miles.

Armament: one M61A1 20 mm multibarrel cannon, with 511 rd, mounted in fuselage; wingtip-mounted missiles; seven other external stores stations for fuel tanks and a range of air-to-air and air-to-surface munitions.

COMMENTARY

The F-16 is the workhorse of the USAF fighter fleet. The 200+ USAF F-16 multimission fighters deployed to the Persian Gulf Theater flew more sorties than any other type during Desert Storm, with 13,500 missions.

F-16A (single-seat) and **F-16B** (two-seat) versions, which entered service with the 388th TFW, Hill AFB, Utah, incorporated advanced technologies from the start, making these aircraft two of the most maneuverable fighters built. Equipment includes a multimode radar with a clutter-free look-down capability, advanced RWR, HUD, internal chaff/flare dispensers, and a 500-rd 20 mm internal gun.

Production of the F-16A and B for USAF ended in 1985. Most now belong to ANG. USAF and NATO operators have cooperated in an operational capabilities upgrade. Under this midlife update program, the radar, fire-control computer, stores-management computer, and avionics software are improved, giving F-16A/Bs the ability to use next generation air-to-air and air-to-surface weapons.

Reliability and maintainability improvements include a ring-laser gyro INS and installation of the upgraded F100-PW-220E turbofan.

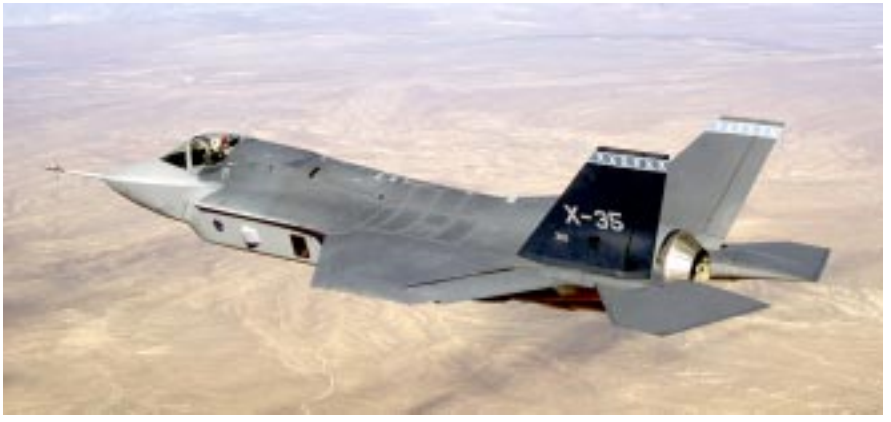
The Multinational Staged Improvement Program, implemented in 1980, ensured the aircraft could accept systems under development, thereby minimizing retrofit costs. All F-16s delivered since November 1981 have had built-in structural and wiring provisions and systems architecture that expand the single-seater's multirole flexibility to perform precision strike, night attack, and beyond-visual-range intercept missions.

F-16C (single-seat) and **F-16D** (two-seat) aircraft were introduced at production Block 25 with MSIP II improvements in the cockpit, airframe, and core avionics and an increased-range APG-68 radar. Deliveries began in 1984. With the exception of AFMC, all of the active and many of the Guard and Reserve units have since converted to F-16C/Ds.

Block 40/42 F-16s specialize in night attack operations with precision guided weapons. Follow-on improvements include ALE-47 improved defensive countermeasures, ALR-56M advanced RWR (Block 40 only), Very High Speed Integrated Circuit (VHSIC) technology in the APG-68(V5) fire-control radar, a ring-laser gyro INS, a LANTIRN nav/attack system, and IPEs. System improvements also introduced at Block 40/42 include core avionics hardware, installation of a LANTIRN nav/attack system, GPS, enhanced-envelope gunsight, digital flight controls, automatic terrain following, increased takeoff weight and maneuvering limits, an 8,000-hour airframe, and expanded envelope nine–G capability.

Block 50/52 F-16CJs have MSIP Stage III improvements, which also show up in selected retrofits of earlier F-16 blocks. These aircraft incorporate the latest cockpit control and display technology, including a wide-angle HUD. Weapons improvements include multishot AMRAAM compatibility, AGM-154 JSOW, and WCMD. ANG and AFRC Block 25/30 F-16s are being upgraded under the combat upgrade plan integration details (CUPID) program to near Block 50 standard. Improvements include EGI, situation awareness data link (SADL), and an ECM management system. Advanced IFF will also be retrofitted to Block 25/30 aircraft.

In another program, Block 50/52 USAF F-16C/Ds, followed by Block 40/42 from 2005, are being retrofitted with a new modular mission computer being developed under an F-16 common configuration implementation program (CCIP), aimed at extending operational flexibility. This effort includes the participating European governments of the F-16 Multinational Fighter Program. Other improvements to be incorporated include color displays, Sniper XR targeting pod, JHMCS,



***X-35A** Lockheed Martin Joint Strike Fighter concept demonstrator* (Tom Reynolds)

AIM-9X, Link 16 data link, and improved weapons capabilities. First delivery made January 2002. The Block 50/52 aircraft will have dual/alternate carriage of High-speed Anti-Radiation Missile (HARM) targeting system (HTS)/smart targeting and identification via networked geolocation (STING) and advanced targeting pods (ATP) in Fiscal 2006.

F-16CG designated aircraft are equipped with LANTIRN for precision day or night attack.

F-16CJ/DJ designated Block 50 aircraft are equipped with the HTS for suppression of enemy air defenses (SEAD).

F-35 Joint Strike Fighter

Brief: An affordable, highly common family of next generation strike aircraft.

Function: Multirole fighter.

Operator: ACC for USAF.

First Flight: Oct. 24, 2000 (concept demonstrator).

Delivery: 2008 (anticipated first production aircraft).

IOC: 2011 (USAF).

Production: planned: 1,763 F-35A (USAF), 480 F-35B (USMC), 609 F-35C (USN), 150 (UK).

Inventory: TBD.

Unit Location: TBD.

Contractor: Lockheed Martin, with Northrop Grumman and BAE Systems; Pratt & Whitney is primary propulsion contractor; General Electric is alternate engine contractor.

Power Plant: one Pratt & Whitney F135 or General Electric F136 turbofan (production), in 35,000-lb thrust class.

Accommodation: pilot only, on zero/zero ejection seat.

Dimensions: TBD.

Weight: TBD.

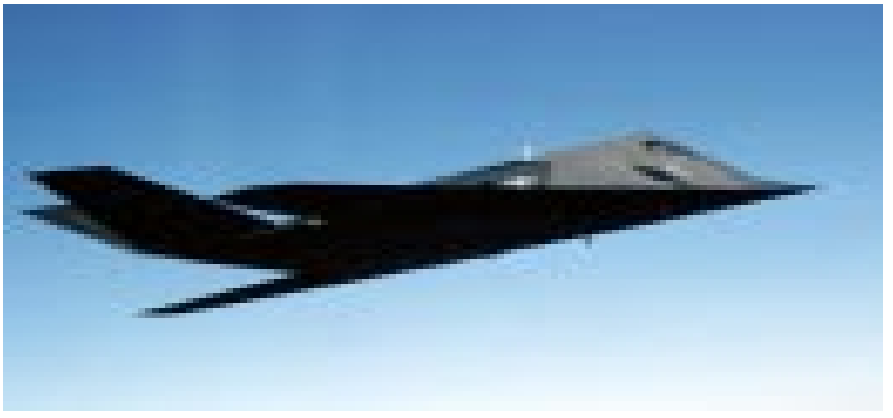
Ceiling: TBD.

Performance (design targets): max level speed at S/L 724.5 miles calibrated airspeed for Navy and short takeoff and vertical landing (STOVL) variants, Mach 1 for USAF variant, combat radius more than 590 miles for USAF variant, 600 miles for Navy variant, and 450 miles for STOVL variant.

Armament: (main weapons bay): USAF variant: one internal gun, two AMRAAMs, and two 2,000-lb JDAMs. USN variant: two AMRAAMs and two 2,000-lb JDAMs. STOVL variant: two AMRAAMs and two 1,000-lb JDAMs. External carriage will also be available. (Note: Numerous other weapons capabilities will be added as system development continues.)

COMMENTARY: The Joint Strike Fighter (JSF) is a multinational cooperative development program that will develop and field an affordable, highly common family of next generation strike fighters. USAF is developing the JSF to replace its current force of F-16 and A-10 aircraft with a stealthy multirole fighter that will comprise the bulk of USAF's fighter fleet for up to 50 years. This advanced multimission fighter is designed to penetrate high-threat enemy airspace and engage all enemy targets in any conflict. In addition to its advanced stealth design, the JSF incorporates maneuverability, long range, and highly advanced avionics to accomplish the bulk of USAF missions. Its fully integrated avionics and weapons systems will permit simultaneous engagement of multiple targets in enemy airspace.

The concept demonstration phase (CDP) of the program commenced November 1996, with competitive contract awards to Lockheed Martin (X-35A) and Boeing (X-32A). CDP concluded in fall 2001 with Lockheed Martin declared the winner. The system development and demonstration (SDD) phase, begun in October 2001, focuses on system development, test and evaluation, logistics support, and LRIP. Flight testing is projected to begin in August 2005. The JSF is powered by a derivative of the Pratt & Whitney F119 engine, called the F135. General Electric is to develop an alternative power plant, the F136, for competitive production.



***F-117** Nighthawk* (SSgt. Andy Dunaway)

F-117 Nighthawk

Brief: World's first operational aircraft designed to exploit low observable (LO) stealth technology to expand the range of heavily defended strategic targets that can be attacked.

Function: Attack aircraft.

Operator: ACC, AFMC.

First Flight: June 18, 1981.

Delivered: 1982–summer 1990.

IOC: October 1983.

Production: 59.

Inventory: 55 (52 F-117A; 3 YF-117).

Unit Location: Eglin AFB, Fla., Holloman AFB, N.M.

Contractor: Lockheed Martin; Raytheon.

Power Plant: two General Electric F404-GE-F1D2 nonafterburning turbojets, each 9,040 lb thrust.

Accommodation: pilot only, on zero/zero ejection seat.

Dimensions: span 43.3 ft, length 65.9 ft, height 12.4 ft.

Weight: empty (estimated) 29,500 lb, max gross 52,500 lb.

Ceiling: 35,000 ft.

Performance: high subsonic, top speed 646 mph (0.9 Mach), mission radius, unrefueled (5,000-lb weapons load) 656 miles.

Armament: full internal carriage of a variety of tactical weapons, incl laser- and GPS–guided 2,000-lb munitions, unguided general-purpose bombs, and cluster munitions.

COMMENTARY

F-117 is the Air Force's primary strategic attack aircraft for penetrating high-threat target areas with precision weapons and is the only stealthy, true precision capability currently in the Global Strike Task Force. Its small radar signature and LO technologies allow the aircraft to penetrate dense threat environments and to deliver precision weapons against highly defended, high-value targets with pinpoint accuracy. Primary missions include strategic attack, air interdiction, SEAD, and special operations.

Acknowledged publicly in November 1988, the F-117's first operational deployment was to Panama in 1989 for Just Cause. During Gulf War I in 1991, a fleet of more than 40 F-117As undertook 1,270 missions. No aircraft were lost or damaged by hostile fire. Twenty-four F-117s participated extensively in combat operations during Allied Force. One F-117 was lost March 27, 1999, during that conflict.

F-117A development and manufacture began simultaneously in November 1978 within a highly classified environment, using many parts either transferred or modified from existing aircraft. The F-117As were deployed with the 4450th Tactical Group (redesignated 37th Tactical Fighter Wing in 1989) at Tonopah Test Range Airfield, Nev., up until 1992 where operations were restricted mainly to night flying to maintain secrecy.

To achieve the aircraft's minimal radar signature, the skin panels of the arrowhead-shaped airframe are divided into many small, perfectly flat surfaces (facets), which deflect at a variety of angles all signals from probing hostile ground or airborne radars. In addition, much of the aircraft's external surface is made of composites and radar-absorbent materials. The F-117A's dull black finish reflects little light, and the engine air intakes and exhaust nozzles are above the wings and rear fuselage, respectively, to shield them from IR seekers below. The two nonafterburning turbofans give the aircraft low noise signature and high subsonic performance.

Key features include a state-of-the-art digital avionics suite integrating sophisticated navigation and attack systems, complemented by a specially developed automated mission-planning system. A high-precision INS coupled to GPS is installed. An upgraded dual-turret IR targeting system, combined with boresight laser designators and autotracker, ensures precision attack.

Other improvements since 1989 have included upgraded cockpit display and instrumentation and adverse weather capability via advanced weapons. Current modification aims at providing a single, optimal LO configuration, adverse weather capability via additional advanced weapons, and maintaining the fleet through its service life. The F-117 is expected to remain in USAF service into the 2020s.

F/A-22 Raptor

Brief: High-technology follow-on for the F-15C. An all-weather, multirole fighter that combines an extremely maneuverable airframe with stealth technologies, supercruise, and integrated avionics to help it penetrate through advanced anti-air threats and achieve air dominance.

Function: Fighter.

Operator: ACC, AETC, AFMC.

First Flight: Sept. 7, 1997.

Delivery: 2001 (first production representative aircraft)–2013 (planned).

IOC: December 2005.

Production: TBD.

Inventory: eight.

Unit Location: Langley AFB, Va. (first operational location); Nellis AFB, Nev.; Tyndall AFB, Fla. (fighter training unit), with deliveries from July 2003.

Contractor: Lockheed Martin; Boeing.

Power Plant: two Pratt & Whitney F119-PW-100 turbofans, each in 35,000-lb thrust class.

Accommodation: pilot only, on zero/zero ejection seat.

Dimensions: span 44.5 ft, length 62 ft, height 16.6 ft.

Weight: gross 50,000 lb.

Ceiling: 50,000 ft.

Performance (design target): max level speed at S/L 900+ mph, range more than 2,000 miles.

Armament: (projected) one internal M61A2 20 mm gun, two AIM-9 Sidewinders stored internally in the side weapons bays; six AIM-120 AMRAAMs in the main weapons bay; approx eight SDBs internally; for ground attack, two 1,000-lb JDAMs replace four AMRAAMs internally.

COMMENTARY

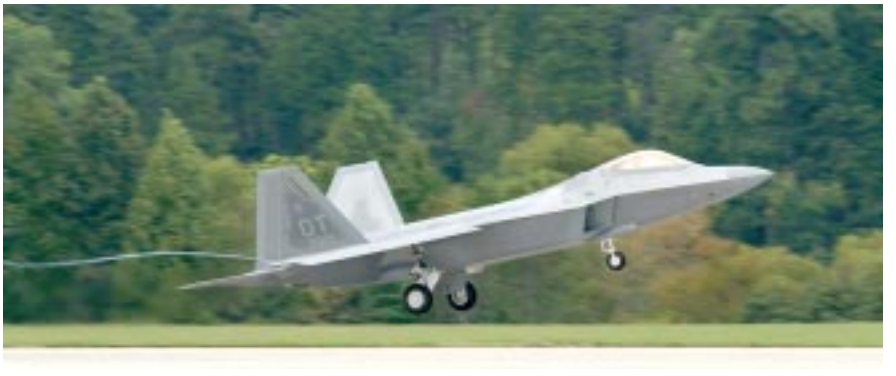
The recent redesignation from F-22 to F/A-22 reflects increased emphasis on high-speed attack, in addition to rapidly achieving air dominance. The F/A-22 will counter multiple anti-access threats, such as advanced integrated air defense system (IADS), fighters, cruise missiles, theater ballistic missile (TBM) sites, and weapons of mass destruction through the application of unmatched air-to-air capabilities coupled with inherent air-to-ground capability. The F/A-22's unique combination of stealth, supercruise (ability to cruise at supersonic speed without using its afterburners), maneuverability, and integrated avionics leads USAF's initial "kick down the door" force, enabling 24-hour stealth operations across the spectrum of missions. Its fully integrated avionics and weapons systems will permit simultaneous engagement of multiple targets. Advanced maneuverability is achieved through the combination of the avionics system, structural strength, and thrust vectoring nozzles. A Raytheon common integrated processor ties together various avionics functions.

Two prototypes were built for competitive evaluation with Northrop/McDonnell Douglas YF-23 prototypes. First flight was Sept. 29, 1990, with the **YF-22** selected as winner in April 1991.

F/A-22A. Production-configured version entered engineering and manufacturing development (EMD) phase in August 1991. USAF is receiving nine single-seat F/A-22As, three without avionics to explore flight characteristics, flutter, loads, propulsion, and envelope expansion and six as avionics test beds. Under EMD, USAF also received one static test and one fatigue test airframe.

F/A-22 EMD flight test continues as the F/A-22 expands the flight envelope and tests the evolutionary integrated avionics. Development flight testing is in preparation for entry into dedicated initial operational test and evaluation (DIOT&E) this year. The F/A-22 was approved for LRIP on Aug. 14, 2001, with 10 aircraft subsequently ordered. A second LRIP decision has contracted for 13 aircraft. USAF has plans for a fleet of 339 F/A-22s, but states a requirement for at least 381.

USAF has asked Lockheed Martin to do minimal preliminary design of a dedicated attack variant, tentatively called **FB-22.** The aircraft would be longer than the F/A-22, with much larger wings and greater fuel and weapons capacity, with three times the range of the baseline aircraft. While still stealthy, the FB-22 would lack thrust vectoring and other features necessary for dogfighting. The FB-22 could be 80 percent common with the standard F/A-22.



***F/A-22** Raptor* (Lockheed)

X-45 UCAV

Brief: A concept demonstrator for a stealthy unmanned combat air vehicle (UCAV) that will be capable of carrying a large weapons payload for the SEAD mission. The system may be stored in "smart boxes" until required, then reassembled and made mission-ready within a very short period. The UCAV may also be made air refuelable for self-deployment.

Function: Concept demonstrator UCAV for the SEAD mission.

First Flight: May 22, 2002

Contractor: Boeing.

Inventory: two.

Power Plant: Honeywell F124 turbofan.

Dimensions: span around 34 ft, length 27 ft.

COMMENTARY

A USAF/Defense Advanced Research Projects Agency (DARPA) program to develop UCAV technology for the SEAD mission. The Boeing **X-45A** concept demonstrator is a Y–shaped airplane, designed for stealth and able to carry two tons of ordnance, including GPS–guided munitions. Equipment will include an EW suite and SAR. Work on a longer range **X-45C** version is under way, replacing the now-canceled X-45B.

YAL-1A Attack Airborne Laser

Brief: The prototype YAL-1A, using a modified 747-400F platform, will be the world's first operational airborne high-energy laser weapon system. It will employ a Chemical-Oxygen Iodine Laser (COIL) system, running down the interior of the aircraft. Laser fire will emerge through a large ball turret in the nose. Intended targets are TBMs in their boost, or very earliest, phase of flight. The system will track TBMs and maintain laser focus on their skin, which, when sufficiently heated, will cause the pressurized fuel within to explode. The Airborne Laser (ABL) can target TBMs hundreds of miles away and thus can remain over friendly territory to kill TBMs as they are launched.

Function: Airborne laser.

Operator: ACC.

First Flight: July 18, 2002 (Block 2004 test bed).

Delivered: First aircraft in flight test, undergoing installation of laser system.

IOC: FY12 (planned).

Production: TBD.

Inventory: TBD.

Unit Location: TBD.

Contractor: Boeing (ABL platform; battle management (BM) system), TRW (COIL and subsystems), Lockheed Martin (beam control system).

Power Plant: four GE CF6-80 turbofans, each 61,500 lb thrust.

Accommodation: flight crew of two, plus four mission specialists.

Dimensions: span 211.4 ft, length 228.8 ft, height 63.7 ft.

Weight: empty 423,882 lb, gross 800,000 lb.

Ceiling: 45,000 ft.

Performance: max operating speed Mach 0.83, max laser weapon range hundreds of miles, unrefueled endurance at 40,000 ft with operational laser weapon load approx six hr. Chemical fuel carried on board will enable more than 20 shots.

COMMENTARY

The Airborne Laser will become the first directed energy weapon in the US arsenal. The Missile Defense Agency (MDA) assumed overall direction and budget authority for the program in summer 2001. USAF continues to man and develop the program through its Airborne Laser System Program Office at Kirtland AFB, N.M.

Air Combat Command will have operational responsibility and currently plans to base the attack laser in CONUS but could deploy the ABL with minimal airlift support to any region of the world. It will arrive in theater with its crew, laser fuel, and initial spares ready to fight. Operational concepts call for ABLs to fly continuous patrols over deployed US forces, at an altitude of 40,000 feet. The aircraft will detect and shoot down any TBMs launched at US forces or nearby allied nations. The ABL will also have the capability of determining hostile launch locations and passing that information to other US assets. As US forces achieve air superiority, ABL will be able to move closer to enemy territory. ABLs represent the only near-term boost-phase missile defense. Once the decision is made to proceed with full production, USAF's acquisition community will assume responsibility for procurement; fleet size has not been determined.

The attack laser's main armament is a lightweight, megawatt-class COIL. This laser technology can deliver high energy over a great distance largely because of its IR wavelength. In addition to the COIL, the ABL house three other lasers: the active ranger system which provides preliminary tracking data; the track illuminator laser, which produces more refined data; and the beacon illuminator laser, which measures atmospheric disturbance.

Following a two-year structural modification, the ABL platform's first flight took place July 18, 2002, from Boeing's Wichita, Kan., facility. A 10-month laser module test was completed in 2002, and, in late 2002, the platform was flown to Edwards AFB, Calif., where system components will be installed and tested. A test destruction of a boosting ballistic missile is projected for early 2005.

The test aircraft will offer limited operational capability; this aircraft will eventually be converted to a fully operational model.

Reconnaissance and Surveillance Aircraft

E-3 Sentry

Brief: Modified Boeing 707, fitted with a rotating radar dome 30 ft wide and 6 ft thick, which provides all-weather air surveillance and C3 for tactical and air defense forces.

Function: Airborne early warning, BM, C3 aircraft.

Operator: ACC, PACAF, AFRC (Assoc.).

First Flight: Oct. 31, 1975 (full avionics).

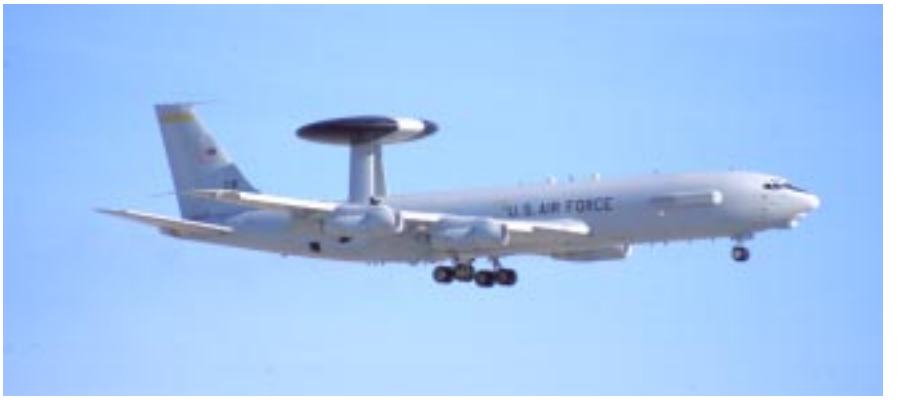
Delivered: March 1977–84.

IOC: 1977.

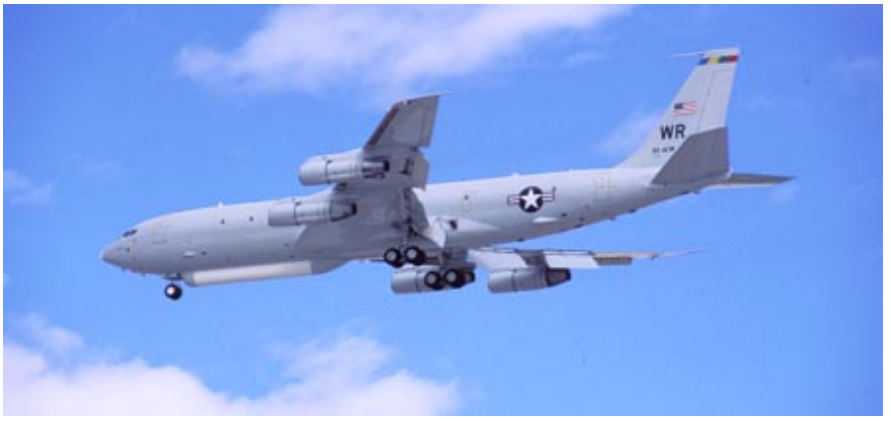
Production: 34.

Inventory: 31.

Unit Location: Elmendorf AFB, Alaska, Kadena AB, Japan, Tinker AFB, Okla.



***E-3C** Sentry* (Ted Carlson)



***E-8C** Joint STARS* (Ted Carlson)

Contractor: Boeing; Northrop Grumman (radar); Lockheed Martin (computer).
Power Plant: four Pratt & Whitney TF33-PW-100/100A turbofans, each 21,000 lb thrust.
Accommodation: flight crew of four; 13–19 mission specialists.
Dimensions: span 145.8 ft, length 152.9 ft, height 41.5 ft.
Weight: gross 347,000 lb.
Ceiling: 38,000 ft.
Performance: optimum cruise Mach 0.78, endurance eight hr unrefueled.
COMMENTARY
The E-3 Airborne Warning and Control System (AWACS) aircraft is capable of surveillance from Earth's surface up to the stratosphere, over land or water, at more than 200 miles.
E-3A. Of the 24 built for USAF in standard production configuration, 22 were later upgraded.
An improved US/NATO Standard E-3A configuration was initiated with the 25th USAF Sentry, delivered in December 1981, with a larger-memory computer and a maritime detection capability. Nine were built new for USAF, and one of the original E-3As was upgraded.
E-3B is the upgraded earliest version E-3A. Twenty-two production models and two prototypes were produced. Improvements include much-enhanced computer capabilities, jam-resistant communications, austere maritime surveillance capability, additional radio communications, and five additional display consoles.
E-3C is an upgrade to the original 10 US/NATO Standard E-3A aircraft, with additional radio, console, and radar capabilities. Redelivered 1984.
A series of major sustainability, reliability, and availability upgrades for USAF E-3s has been undertaken. Mission system upgrades include new passive detection systems, known as electronic support measures (ESM), that complement the active beaming radar, enabling the aircraft to detect signals emitted by both hostile and friendly targets. Additional enhancements include upgrade of the Joint Tactical Information Distribution System (JTIDS), jam-resistant communications, increased computer capacity, and GPS capability. Radar system improvements permit AWACS aircraft operating in the pulse–Doppler mode to detect smaller, stealthier targets. Future improvement and management support are being handled within a single, long-term contract awarded May 2001.

E-8 Joint STARS
Brief: A modified Boeing 707 equipped with a large, canoe-shaped radome mounted under the forward part of the fuselage, housing long-range, air-to-ground radar capable of locating, classifying, and tracking vehicles moving on Earth's surface out to distances in excess of 124 miles. Such data are then transmitted via data link to ground stations or other aircraft.
Function: Ground surveillance, BM, C2 aircraft.
Operator: ACC, ANG.
First Flight: December 1988.
Delivered: May 1996–present
IOC: Dec. 18, 1997.
Production: 17 planned.
Inventory: 14.
Unit Location: Robins AFB, Ga.
Contractor: Northrop Grumman; Motorola; Cubic; Raytheon.
Power Plant: four Pratt & Whitney TF33-102C turbojets, each 19,200 lb thrust.
Accommodation: mission crew of 21 Air Force/Army operators (can be augmented to 34).
Dimensions: span 145.8 ft, length 152.9 ft, height 42.5 ft.
Weight: gross 336,000 lb.
Ceiling: 42,000 ft.
Performance: max operating speed Mach 0.84, endurance with one in-flight refueling 20 hr.
COMMENTARY
Joint STARS (Surveillance Target Attack Radar System) is a BM platform capable of providing theater commanders with C2 of air-to-ground forces and simultaneous near-real-time wide area surveillance as well as downlink of targeting information to air and ground commanders. Joint STARS battle managers, in combination with a robust communications suite, conduct C2 of air operations to engage enemy forces in day, night, and adverse weather conditions. Joint STARS also conducts near-real-time surveillance and reporting for use by air and ground forces. The radar subsystem features a multimode, side-looking, phased-array radar that provides interleaved moving target indicator (MTI), SAR, and fixed target indicator (FTI) imagery. Joint STARS downlinks via a secure, jam-resistant digital data link. Multiple receivers are in use, predominantly the US Army's Common Ground Station and Joint Services Work Station.
As part of their operational test and evaluation, Joint STARS aircraft flew more than 150 operational missions during Desert Storm (with two E-8A development aircraft) and Joint Endeavor (with one E-8A and one test bed E-8C).
E-8A. Prototype version, with specialized equipment installed aboard two specially modified 707-300 airframes. One was converted to an in-flight pilot trainer in 1997, and the second has been placed in long-term storage.
E-8C. Production version, based on former commercial 707-300 airframes. Equipped with 18 operations and control consoles, two of which double as communications stations. The first E-8C flew in March 1994 and served as the preproduction test bed. The last seven production aircraft will feature more advanced computer systems, which will be retrofitted on the 10 earlier aircraft. Planned improvements include Link 16 upgrade for data transmission to attack aircraft; enhanced SAR; new satellite radios; upgrades to allow Joint STARS to assume the Airborne Battlefield Command and Control Center (ABCCC) mission of attack support to ground force commanders; and global air traffic management (GATM) upgrades to permit use of optimum altitudes and flight routes in European airspace.

MQ-1 Predator A
Brief: A medium-altitude, long-endurance unmanned aerial vehicle (UAV), flown remotely. Joint force commander multimission asset, combining imagery sensors with strike capability.
Function: Unmanned reconnaissance aircraft.
Operator: ACC.
First Flight: July 1994.
Delivered: July 1994 (USAF from 1996)–present.
IOC: 2003.
Production: 100 air vehicles (planned).
Inventory: eight air vehicles.
Unit Location: Indian Springs AFAF, Nev.
Contractor: General Atomics Aeronautical Systems.
Power Plant: one Rotax 914 turbocharged engine.
Accommodation: unmanned system.
Dimensions: length 27 ft, height 7.2 ft, span 48.7 ft.
Weight: empty 950 lb, gross 2,250 lb.
Ceiling: 25,000 ft.
Performance: cruise speed 80 mph, up to 138 mph, endurance 24 hours (460 miles with 16 hours on station).
Armament: Two Hellfire missiles on multispectral targeting system (MTS)–equipped vehicles.
COMMENTARY
USAF has activated three Predator squadrons, the 11th, 15th, and 17th RS. The 11th conducts mission qualification training, as well as operational deployments. The Predator system includes four air vehicles, a ground control station, satellite link, and about 55 personnel for 24-hour operations. The Predator crew comprises a pilot and two sensor operators.
DOD first used the advanced concept technology demonstration (ACTD) Predator in 1995 to support Provide Promise. In 1997, DOD named USAF to take over the Predator program. In 1999, while the UAV was still in development, USAF began to deploy the system operationally for surveillance missions over Bosnia and Iraq. In July 2001, USAF successfully experimented with Predators armed with Hellfire missiles. In Enduring Freedom, Predators provided live video feeds directly to AC-130 gunships, and Hellfire–armed Predators struck time sensitive targets. USAF changed the designation for Predator A to MQ-1 to denote its multimission capability for both reconnaissance and strike.
MQ-1 designates the weaponized Predator A. It carries an MTS sensor ball supplied by Raytheon in place of the Wescam sensor ball. The MTS provides a laser target designator with EO/IR sensors in a single package, where, previously one video camera had to be removed to house a laser designator. The SAR is removed to make room for some of the laser designator equipment. The MQ-1 can carry two Hellfire antitank missiles.
RQ-1A designates the ACTD version of Predator A, all of which are slated to retire soon.
RQ-1B, the reconnaissance-only version of Predator A, has an internal 450-lb surveillance payload that includes two EO and one IR video cameras carried in a ball-shaped turret under the nose and produced by Wescam. The internal sensor payload also includes a SAR still imagery camera for a day/night, all-weather reconnaissance capability. USAF is retrofitting most RQ-1Bs to MQ-1 status.

MQ-9 Predator B
Brief: A high-altitude, long-endurance UAV, flown remotely. Joint force commander multimission asset combining imagery sensors with expanded strike capability.
Function: Unmanned reconnaissance aircraft.
Operator: ACC.
First Flight: February 2001.
Delivered: November 2003 (planned).

***RQ-1A** Predator* (TSgt. Scott Reed)

IOC: TBD.
Production: Nine (planned).
Inventory: TBD.
Unit Location: Indian Springs AFAF, Nev.
Contractor: General Atomics Aeronautical Systems.
Power Plant: one Honeywell TPE-331-10T turboprop engine or Williams FJ44-2A turbojet engine.
Accommodation: unmanned system.
Dimensions: length 36.2 ft, span 64 ft.
Weight: empty 6,000 lb, gross 10,000 lb.
Ceiling: 50,000+ ft.
Performance: cruise speed 172 mph, up to 230 mph, endurance 30+ hours.
Armament: 10 AGM-114 Hellfire missiles.
COMMENTARY

Predator B, an enhanced version of the Predator A, was developed jointly, in 2000, by NASA and General Atomics Aeronautical Systems for high-altitude research. In October 2001, USAF acquired both prototypes to evaluate the UAV's capability as a weapons platform and to carry an increased sensor payload. In December 2002, USAF issued a contract for two Predator Bs, with the designation **MQ-9.** Current funding plans call for purchase of nine MQ-9s.

***RQ-4** Global Hawk* (TSgt. Jack Braden)

***MQ-9** Predator B* (General Atomics Aeronautical Systems)

The MQ-9 hunter–killer UAV flies higher, faster, and has 50 percent greater payload capacity than the MQ-1. With its 800-lb internal sensor payload capacity, the MQ-9 will be able to carry simultaneously numerous payloads, such as a larger, more capable camera system, SAR, MTS, and other detection systems. Its 3,000-lb external payload capacity will enable it to carry up to 10 Hellfire missiles. USAF is exploring other weapons and a possible air-to-air role.

OC-135 Open Skies
Brief: A modified C-135 aircraft that flies unarmed observation and verification flights over nations that are parties to the 1992 Open Skies Treaty.
Function: Reconnaissance aircraft.
Operator: ACC.
First Flight: June 1993.
Delivered: October 1993–96.
IOC: October 1993.
Production: three.
Inventory: two.
Unit Location: Offutt AFB, Neb.
Contractor: Boeing.
Power Plant: four Pratt & Whitney TF33-P-5 turbofans, each 16,050 lb thrust.
Accommodation: seating for 38.
Dimensions: span 131 ft, length 135 ft, height 42 ft.
Weight: gross 297,000 lb.
Ceiling: 50,000 ft (basic C-135).
Performance: speed: 500+ mph, unrefueled range 3,900 miles.
COMMENTARY

A modified version of the WC-135, used for specialized reconnaissance with an IR linescanner, SAR, and forward- and vertical-looking video cameras installed in the rear of the aircraft.

OC-135B modifications include one vertical and two oblique KS-87 framing cameras, used for low-altitude photography approximately 3,000 ft above the ground, and one KA-91 pan camera, which pans from side to side to provide a wide sweep for each picture, used for high-altitude photography at approximately 35,000 ft. Data is processed and recorded by the Miletus camera annotation system.

RC-135
Brief: Specially configured variant of the Boeing C-135 Stratolifter, having an elongated nose and cheeks containing highly advanced electronic signal collection systems. Used to acquire real-time electronic intelligence (Elint) data for theater and tactical commanders.
Function: Electronic reconnaissance aircraft.
Operator: ACC.
First Flight: not available.
Delivered: circa 1973–99.
IOC: circa 1973 (Rivet Joint).
Production: (converted).
Inventory: 21.
Unit Location: Offutt AFB, Neb.
Contractor: Boeing (airframe); Raytheon; Textron.
Power Plant: four Pratt & Whitney TF33-P-5/9 turbofans, each 18,000 lb thrust. (Replaced with CFM International CFM-56s in one W version.)
Accommodation: flight crew of four; 25–35 mission crew.
Dimensions: (Cobra Ball) span 131 ft, length 140 ft, height 42 ft; (Cobra Sent) span 135 ft, length 136 ft; (Rivet Joint) height 38 ft.
Weight: max gross 299,000 lb.
Ceiling: 35,000 ft.
Performance: speed 500 mph plus, range, with air refueling, unlimited.
COMMENTARY

The 55th Wing at Offutt AFB, Neb., operates a highly specialized fleet for worldwide reconnaissance missions. All are due to be re-engined and are subject to ongoing modernization, with upgrade of avionics and primary mission equipment to expand capability and maintain effectiveness.

RC-135S Cobra Ball. Three aircraft are measurement and signature intelligence (MASINT) collection platforms. The Cobra Ball can deploy anywhere in the world in 24 hours and provide on-scene EO reconnaissance for treaty verification and TBM proliferation. Equipment includes wide-area IR sensors, long-range optical cameras, and an advanced communications suite.

RC-135U Combat Sent. Two aircraft with precision signals intelligence (Sigint) reconnaissance gear and a larger tailcone and fin fairing, used for measuring and analyzing foreign electronic and IR equipment. Combat Sent can deploy anywhere in the world within 24 hours and provide on-scene precision measurement of potential threat emitters. IOC 1967.

RC-135 V/W Rivet Joint. Used for electronic surveillance. RC-135 Rivet Joints loiter near battlefields and provide near-real-time data updates on enemy defensive and offensive activities to warfighters via secure voice and data link networks. The aircraft's recon systems are continuously upgraded to keep pace with new threats.

TC-135S/W. Used for training purposes.

RQ-4 Global Hawk
Brief: A high-altitude, long-range, long-endurance UAV.
Function: Unmanned reconnaissance aircraft.
Operator: ACC.
First Flight: Feb. 28, 1998.
Delivered: five.
IOC: currently in EMD; used operationally in Afghanistan.
Production: LRIP. (Initial plans call for 30 air vehicles, incl 12 image intelligence (Imint) and 12 Sigint. Requirements exist for up to 51 aircraft through 2030.)
Inventory: three air vehicles.
Unit Location: Beale AFB, Calif.
Contractor: Northrop Grumman (prime); Raytheon.
Power Plant: one Rolls Royce–Allison AE 3007H turbofan, 7,600 lb thrust.
Accommodation: unmanned system.
Dimensions: length 44 ft, height 15.2 ft, span 116 ft.
Weight: empty 9,200 lb, gross 25,600 lb.
Ceiling: 65,000+ ft.
Performance: design goals incl endurance of up to 40 hr at a cruise speed of 400 mph and at an altitude of 65,000 ft. This would allow loiter on station 1,380 miles from base for 24 hr. Combat range 15,525 miles.
Armament: none.
COMMENTARY

A high-altitude endurance UAV carrying a 1,960-lb payload, incorporating EO/IR and SAR sensors that permit switching among radar, IR, and visible wavelengths as required. Objective system will add Sigint and improved GMTI capability. Navigation is by GPS/INS. Global Hawk flies autonomously from takeoff to landing, providing near-real-time imagery products for tactical and theater commanders. Vehicle ground track and mission plan can be updated in real time to respond to changing air traffic control needs and/or mission collection needs.

Global Hawk began as an advanced concept technology demonstrator. The No. 2 aircraft crashed March 29, 1999. Vehicle No. 3 was damaged Dec. 6, 1999, after a test flight. Vehicle No. 1 resumed test flights March 11, 2000, after a precautionary stand-down. During test it completed more than 100 flights and flew in excess of 66,000 ft altitude and 31 hours endurance, and accumulated more than 1,300 hours total flight time. Global Hawk flew over water to Alaska, completing the first transoceanic crossing to Portugal and back. In spring 2001, Global Hawk flew to Australia for six weeks of demonstrations. In March 2001 it entered into EMD. Although still a development system, Global Hawk first deployed operationally to support Enduring Freedom in November 2001.

Global Hawk provides continuous, all-weather, day/night, wide area surveillance. It will operate in low-to-moderate air defense threat environments with the ability to fly above or stand off from enemy defenses. It is considered the likely successor to the U-2 aircraft. The Navy is also considering purchase of Global Hawk.

Total buy TBD.

U-2 Dragon Lady
Brief: Single-seat, single-engine, high-altitude endurance reconnaissance aircraft carrying a wide variety of sensors and cameras, providing continuous day or night, high-altitude, all-weather area surveillance in direct support of US forces.

Function: High-altitude reconnaissance.
Operator: ACC, USAFE.
First Flight: August 1955 (U-2); 1967 (U-2R); October 1994 (U-2S).
Delivered: 1955–October 1989.
IOC: circa 1956.
Production: 35 (U-2S/ST).
Inventory: 35.
Unit Location: Aviano AB, Italy, Beale AFB, Calif.
Contractor: Lockheed Martin.
Power Plant: F118-GE-101 turbojet.
Accommodation: one (two for trainer).
Dimensions: span 103 ft, length 63 ft, height 16 ft.
Weight: gross 40,000 lb.
Ceiling: above 70,000 ft.
Performance: speed 475 mph; range more than 4,500 miles; max endurance 10+ hr.
COMMENTARY
The U-2 remains the Air Force's premier high-altitude reconnaissance platform, capable of carrying Imint and Elint sensors simultaneously.

More than $1.5 billion has been invested in the U-2 since 1994. Completed or ongoing improvements include a new GE F118-101 engine, a complete electrical system replacement, a new glass cockpit utilizing up-front controls and multifunction displays (MFDs), and a new EW system. Sensors upgrades include the ASARS-2A radar sensor, which provides enhanced imaging modes and improves geo-location accuracy; the SYERS-2 EO imagery system, which provides multispectral and IR capability; enhanced RF-intelligence capability; and new data links enabling the U-2 to connect in near real time with network-centric hubs as well as line-of-sight ground stations, airborne data relays, and beyond-line-of-sight satellite data relays.

U-2R (single-seat) and **U-2RT** (two-seat) aircraft, derived from the original version that had a key role in the Cuban Missile Crisis of 1962, were significantly larger and more capable than the earlier aircraft. The last U-2R aircraft were delivered to USAF in October 1989. In 1992, all existing U-2s and tactical TR-1s were consolidated under the designation U-2R.

U-2S (single-seat) and **U-2ST** (two-seat) are the current designations of all 35 aircraft (30 U-2S mission aircraft, five U-2ST trainers) in the inventory, having completed conversion to S model configuration with the new GE F118 engine, incorporating significant improvements in reliability and performance over the U-2R. The Air Force accepted the first U-2S in October 1994. NASA has two ER-2 versions of the U-2 for high-altitude scientific and atmospheric research.

WC-130 Hercules
Brief: A high-wing, medium-range aircraft flown by AFRC for weather reconnaissance missions. It flies into the eye of tropical cyclones or hurricanes, collecting weather data from within the storm's environment.
Function: Weather reconnaissance aircraft.
Operator: AFRC.
First Flight: circa 1959.
Delivered: October 1999–2002.
IOC: 1959 (B model), 1962 (E), 1964 (H).
Production: (no new-build WC-130H); 10 WC-130J.
Inventory: 10 (H); 6 (J).
Unit Location: Keesler AFB, Miss.
Contractor: Lockheed Martin.
Power Plant: four Allison T56-A-15 turboprops, each 4,910 shp.
Accommodation: six.
Dimensions: span 132.5 ft, length 99.3 ft, height 38.5 ft.
Weight: gross 155,000 lb.
Ceiling: 33,000 ft at 100,000 lb gross T-O weight.
Performance: speed 374 mph at 20,000 ft, range 4,000 miles.
COMMENTARY
The WC-130 is flown by AFRC organizations known as the Hurricane Hunters. The hurricane reconnaissance area includes the Atlantic Ocean, Caribbean Sea, Gulf of Mexico, and central Pacific Ocean areas.

WC-130B/E. Earlier version C-130 modifications used for weather reconnaissance. Now retired.

WC-130H. Improved version, currently operated by the 53rd WRS for weather reconnaissance duties, including penetration of tropical storms, to obtain data for forecasting storm movements. It is equipped with two external 1,400-gallon fuel tanks, an internal 1,800-gallon fuel tank, and uprated engines. An average weather reconnaissance mission might last 11 hours and cover almost 3,500 miles while the crew collects and reports weather data every minute. Results are transmitted via satellite to the National Hurricane Center, Miami. WC-130H aircraft will be converted to HC-130Ps.

WC-130J. Weather-reconnaissance version of the latest C-130 model, powered by four Allison AE2100D3 turboprops. First of 10 aircraft replacing the WC-130H was delivered Oct. 12, 1999.

***EC-130E** Commando Solo* (MSgt. David Hawkins)

Special Duty Aircraft

E-4B National Airborne Operations Center
Brief: A four-engine, swept-wing, long-range, high-altitude airplane providing a modern, highly survivable C3 center allowing national/defense leaders to direct US forces, execute emergency war orders, and coordinate actions by civil authorities.
Function: Airborne operations center.
Operator: ACC.
First Flight: June 13, 1973 (E-4A); June 10, 1978 (E-4B).
Delivered: December 1974–85.
IOC: December 1974 (E-4A); January 1980 (E-4B).
Production: four.
Inventory: four.
Unit Location: Offutt AFB, Neb.
Contractor: Boeing; Rockwell; Raytheon E-Systems.
Power Plant: four General Electric CF6-50E2 turbofans, each 52,500 lb thrust.
Accommodation: up to 114 (63 crew/battle staff; 51 passengers.
Dimensions: span 195.7 ft, length 231.3 ft, height 63.4 ft.
Weight: gross 800,000 lb.
Ceiling: above 40,000 ft.
Performance: 6,900+ miles; unrefueled endurance in excess of 12 hr; with aerial refueling up to 72 hr.
COMMENTARY
A militarized version of the Boeing 747-200, E-4B aircraft perform the National Airborne Operations Center (NAOC) mission. The E-4B fleet provides a survivable C3 platform throughout the full threat spectrum, including sustained operations in a nuclear environment. First operational mission was flown in March 1980.

E-4Bs are hardened against the effects of nuclear explosions, including electromagnetic pulse, and have in-flight refueling capability. A 1,200-kVA electrical system supports advanced system electronics as well as state-of-the-art communications and data processing equipment such as EHF Milstar satellite terminals and six-channel International Maritime Satellite (INMARSAT). A triband radome also houses the E-4B's super high frequency (SHF) frequency demand multiple access (FDMA) communications antenna, the only such system on an airborne platform.

The E-4B system is capable of linking with commercial telephone and radio networks and could be used for radio broadcasts to the general population. E-4Bs also support the Federal Emergency Management Agency (FEMA).

In early 2000, the E-4B entered the SDD phase of a modernization program aimed at updating the electronic infrastructure supporting the aircraft's primary mission equipment and increasing the bandwidth of external communications and onboard data transfer. These updates, along with programmed changes to the aircraft's interior configuration, internal noise reduction modifications, BM improvements, and GATM avionics modifications, will ensure the E-4B aircraft can effectively execute its NAOC mission, providing C3 in the homeland security environment and beyond for the foreseeable future.

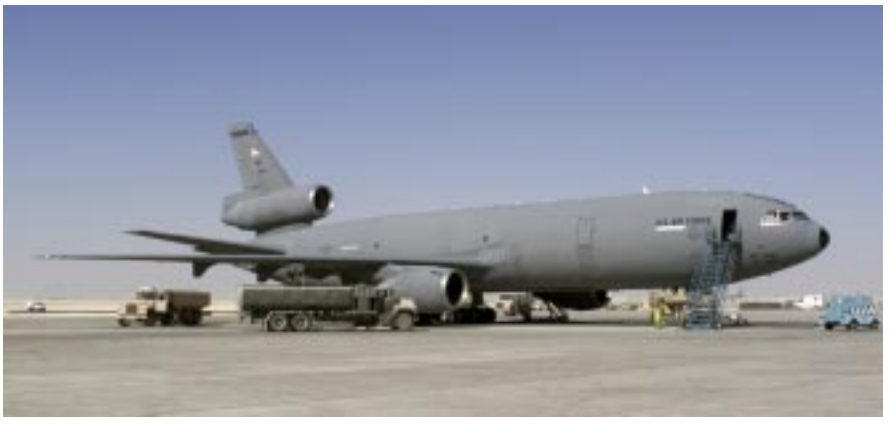
EC-18
Brief: A heavily modified Boeing 707 used as a flexible airborne telemetry and other data recording and relay station in tests of aircraft, spacecraft, and missiles.
Function: Electronic surveillance.
Operator: AFMC.
First Flight: February 1985.
Delivered: January 1986.
IOC: January 1986.
Production: six.
Inventory: two.
Unit Location: Edwards AFB, Calif.
Contractor: Boeing.
Power Plant: four Pratt & Whitney TF33 turbofans, each 18,000 lb thrust.
Accommodation: 16–24 in EC-18B.
Dimensions: span 145.8 ft, length 152.9 ft, height 42.4 ft.
Weight: gross 326,000 lb.
Ceiling: 42,000 ft.
Performance: max cruise speed 470 mph, range 7,610 miles.
COMMENTARY
EC-18B Advanced Range Instrumentation Aircraft (ARIA). Retired 2001.

EC-18D Cruise Missile Mission Control Aircraft (CMMCA) are Boeing 707s, modified by Chrysler, to include an AN/APG-63 surveillance radar, telemetry receiver, and weather radar. Operated by the 452nd FTS, the two aircraft support USAF and USN missile testing and are also capable of monitoring and controlling UAVs. To retire in FY03.

EC-130E/J
Brief: A heavily modified C-130 with variants used for battlefield command, EW, and electronic combat.
Function: C2; psychological warfare.
Operator: ACC, ANG.
First Flight: January 1990.
Delivered: March 1990.
IOC: December 1990.
Production: (no USAF new-build EC-130Es); five (J).
Inventory: eight (E); five (J).
Unit Location: ANG: Harrisburg Arpt., Pa.
Contractor: Lockheed Martin; Raytheon; General Dynamics.
Power Plant: four Allison T56-A-15 turboprops, each 4,910 shp; (EC-130E) T-56-A-1S turboprops, each 4,200 shp; (EC-130J) four Rolls Royce–Allison AE2100D turboprops, each 4,591 shp.
Accommodation: four flight crew, 15 mission personnel.
Dimensions: span 132.6 ft, length 99 ft, height 38 ft.
Weight: gross 155,000 lb; (C-130J) 175,000 lb.
Ceiling: 20,000 ft; (C-130J) 30,560 ft.
Performance: speed 299 mph, range in excess of 2,100 miles; (C-130J) 393 mph, range 4,140 miles.
COMMENTARY
EC-130E ABCCC Airborne Battlefield Command and Control Center. Seven aircraft were updated by Unisys to ABCCC III standard. The advanced JTIDS received data transmitted by AWACS aircraft and other systems, enabling the crew to see a real-time picture of air operations over a combat area. Now retired.

EC-130E Commando Solo. Version used by the ANG as a broadcasting station for psychological warfare operations. Specialized modifications include enhanced navigation systems, self-protection equipment, and worldwide color television configuration. Commando Solo aircraft have been used in numerous military operations. They also have a role in civil emergencies. Secondary mission is electronic attack in the military frequency spectrum. Five flight crew, six mission.

EC-130J Commando Solo II. Five specialist versions of the latest C-130 aircraft, ordered to replace aging Es, with current mission equipment transferred



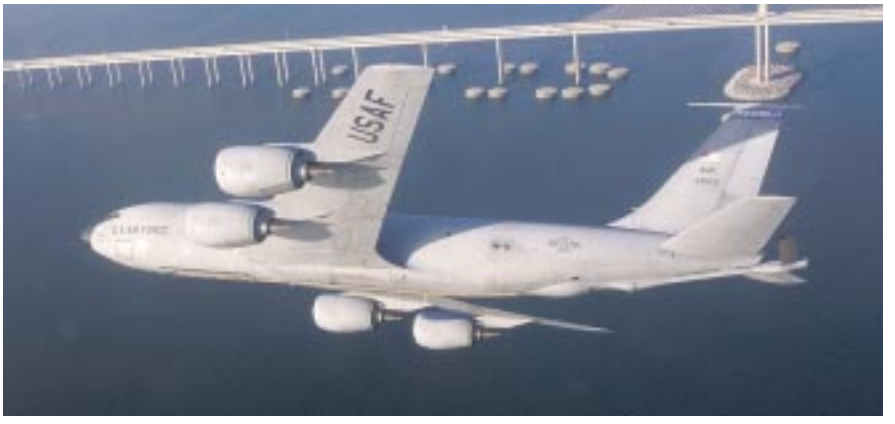
***KC-10** Extender* (SSgt. Michael Gaddis)

from the older aircraft. Entered service mid–2001 with the 193rd Special Operations Wing (ANG), Harrisburg.

EC-130H Compass Call
Brief: A heavily modified C-130 for electronic combat.
Function: Electronic Warfare.
Operator: ACC.
First Flight: 1981.
Delivered: 1982.
IOC: 1983; (Block 30) February 1999.
Production: (converted).
Inventory: 14.
Unit Location: Davis–Monthan AFB, Ariz.
Contractor: Lockheed Martin.
Power Plant: four Allison T56-A-15 turboprops, each 4,910 shp.
Accommodation: standard crew 13.
Dimensions: span 132.6 ft, length 99 ft, height 38 ft.
Weight: 155,000 lb.
Ceiling: 25,000 ft.
Performance: speed 374 mph at 20,000 ft.
COMMENTARY
A variant used as an airborne communications jamming and information warfare platform. Modifications include ECM system and air refueling capability. Further upgrades, including an updated receiver subsystem, will improve reliability and expand the EC-130H's offensive counterinformation (OCI) capability against modern C2 systems. Completion expected FY07.

Tanker Aircraft

HC-130N/P King
Brief: An extended-range, combat search and rescue (CSAR)–configured C-130 that extends the range of rescue helicopters through in-flight refueling and performs tactical delivery of pararescue jumper (PJ) specialists and/or equipment in hostile environments.
Function: Aerial refueling/transport.
Operator: ACC, ANG, AFRC.
First Flight: Dec. 8, 1964 (as HC-130H).
Delivered: from 1965.
IOC: 1986.
Production: (converted).
Inventory: 32.
Unit Location: Active: Moody AFB, Ga.; ANG: Davis–Monthan AFB, Ariz.; Francis S. Gabreski Arpt., N.Y., Kulis ANGB, Alaska; AFRC: Patrick AFB, Fla., Portland Arpt., Ore.
Contractor: Lockheed (now Lockheed Martin).
Power Plant: four Allison T56-A-15 turboprops, each 4,910 shp.
Accommodation: four flight crew, plus mission crew.
Dimensions: span 132.6 ft, length 98.8 ft, height 38.5 ft.
Weight: gross 155,000 lb.
Ceiling: 33,000 ft.
Performance: speed 289 mph, range more than 4,000 miles.
COMMENTARY
The HC-130 can perform extended visual/electronic searches over land or water and operate from unimproved airfields. A three-man PJ team, trained in emergency trauma medicine, harsh environment survival, and assisted evasion, is part of the normal mission crew complement.
Combat air forces' HC-130 aircraft are equipped with an integrated GPS/INS navigation package, radar/missile warning receivers, and chaff/flare countermeasures dispensers. Some aircraft have FLIR systems and personnel locating systems (PLS) compatible with aircrew survival radios. Ongoing modifications include an improved digital low-power color radar, integrated satellite communications radio, NVG–compatible interior/exterior lighting, and cockpit armor. The C-130 avionics modernization program (AMP) provides for complete update of the HC-130 avionics. USAF plans to convert four recently retired EC-130E ABCCC aircraft to HC-130 standard.



***KC-135R** Stratotanker* (MSgt. Keith Reed)

KC-10 Extender
Brief: A modified McDonnell Douglas DC-10 that combines in a single aircraft the operations of aerial refueling and long-range cargo transport.
Function: Aerial refueling/transport.
Operator: AMC, AFRC (Assoc.).
First Flight: April 1980.
Delivered: March 1981–April 1990.
IOC: August 1982.
Production: 60.
Inventory: 59.
Unit Location: McGuire AFB, N.J., Travis AFB, Calif.
Contractor: McDonnell Douglas (now Boeing).
Power Plant: three General Electric CF6-50C2 turbofans, each 52,500 lb thrust.
Accommodation: crew of four; additional seating possible for up to 75 persons with 17 pallets; max 27 pallets; max cargo payload 169,409 lb.
Dimensions: span 165.4 ft, length 181.6 ft, height 58.1 ft.
Weight: gross 593,000 lb.
Ceiling: 42,000 ft.
Performance: cruising speed Mach 0.825, range with max cargo 4,400 miles.
COMMENTARY
The KC-10 combines the tasks of tanker and cargo aircraft in a single unit, enabling it to support worldwide fighter deployments, strategic airlift, strategic reconnaissance, and conventional operations.
The KC-10 can be air refueled by a KC-135 or another KC-10, increasing its range and diminishing the need for forward bases, leaving vital fuel supplies in the theater of operations untouched.
KC-10A is a DC-10 Series 30CF, modified to include fuselage fuel cells, an air refueling operator's station, aerial refueling boom and integral hose reel/drogue unit, a receiver refueling receptacle, and military avionics. More recently installed wing-mounted pods have enhanced the aircraft's capabilities. Other modifications include the addition of communications, navigation, and surveillance equipment to meet civil air traffic control requirements.
Because it has both types of tanker refueling equipment installed, the KC-10A can service USAF, USN, USMC, and allied aircraft on the same mission. Special lighting permits night operations.

KC-135 Stratotanker
Brief: A short- to medium-range tanker aircraft, meeting the air refueling needs of USAF bomber, fighter, cargo, and reconnaissance forces. It also supports USN, USMC, and allied aircraft.
Function: Aerial refueling/airlift.
Operator: AETC, AFMC, AMC, PACAF, USAFE, ANG, AFRC.
First Flight: August 1956.
Delivered: January 1957–66.
IOC: June 1957, Castle AFB, Calif.
Production: 732.
Inventory: 546.
Unit Location: Altus AFB, Okla., Aviano AB, Italy, Fairchild AFB, Wash., Grand Forks AFB, N.D., Kadena AB, Japan, MacDill AFB, Fla., McConnell AFB, Kan., RAF Mildenhall, UK, Robins AFB, Ga. ANG: 20 units. AFRC: seven units.
Contractor: Boeing.
Power Plant: KC-135R/T: four CFM International F108-CF-100 turbofans, each 22,224 lb thrust; KC-135E: four Pratt & Whitney TF33-PW-102 turbofans, each 18,000 lb thrust.
Accommodation: crew of four; up to 80 passengers.
Dimensions: span 130.8 ft, length 136.2 ft, height 38.3 ft.
Weight: empty 119,231 lb, gross 322,500 lb (KC-135E 301,600 lb).
Ceiling: 50,000 ft.
Performance: max speed at 30,000 ft 610 mph, range with max fuel 11,015 miles.
COMMENTARY
Mainstay of the USAF tanker fleet, the long-serving KC-135 is similar in size and appearance to commercial 707 aircraft but was designed to military specifications, incorporating different structural details and materials. The KC-135 fuel tanks are located in the "wet wings" and in fuel tanks below the floor in the fuselage.
KC-135A. Original version with J57 turbojets. USAF built 732, since modified to other standards.
KC-135E. The JT3D re-engining program upgraded 161 AFRC and ANG KC-135As to KC-135E standard with JT3D turbofans removed from surplus commercial 707s; fuel carrying capacity is increased by 20 percent.
KC-135R/T. Designation of re-engined KC-135As with CFM56 turbofans. They embody modifications to 25 major systems and subsystems and not only carry more fuel farther but have reduced maintenance costs, are able to use shorter runways, and meet Stage III requirements. The first KC-135R flight was in October 1982, and redeliveries began in July 1984. KC-135T aircraft (formerly KC-135Q) were capable of refueling the now-retired SR-71s.
Ongoing modifications are extending the capability and operational utility of the KC-135 well into this century. Renewal of the lower wing skin added 27,000 flying hours to the aircraft. The Pacer CRAG avionics modernization program concluded Oct. 1, 2002. The six-year upgrade program included installation of a new compass, radar, and GPS navigation systems, a

traffic alert and collision avoidance system (TCAS), and new digital multifunctional cockpit displays. Reduced vertical separation minima and GATM upgrades are also planned for the entire fleet.

Forty-five KC-135Rs are being fitted with wing-mounted hose-and-drogue refueling pods to enhance interoperability and support to the USN, USMC, NATO, and other allied receiver aircraft. IOC February 2000.

MC-130P Combat Shadow

Brief: Aircraft that flies clandestine or low-visibility, low-level missions into denied areas to provide air refueling for Special Operations Forces (SOF) helicopters or to air-drop small special operations teams, small bundles, and zodiac and combat rubber raiding craft.

Function: Air refueling for SOF helicopters/airdrop.
Operator: AETC, AFSOC, ANG, AFRC.
First Flight: Dec. 8, 1964 (as HC-130H).
Delivered: from 1965.
IOC: 1986.
Production: (converted).
Inventory: 27.
Unit Location: Active: Eglin AFB, Fla., Kadena AB, Japan, Kirtland AFB, N.M., RAF Mildenhall, UK. ANG: Kulis ANGB, Alaska. AFRC: Duke Field, Fla.
Contractor: Lockheed Martin (airframe); Boeing.
Power Plant: four Allison T56-A-15 turboprops, each 4,910 shp.
Accommodation: four flight crew, plus four mission crew.
Dimensions: span 132.6 ft, length 98.8 ft, height 38.5 ft.
Weight: gross 155,000 lb.
Ceiling: 33,000 ft.
Performance: speed 289 mph, range more than 4,000 miles.

COMMENTARY

MC-130P Combat Shadow aircraft are currently tasked with clandestine formation or single-ship intrusion of hostile territory to provide aerial refueling of special operations helicopters and the infiltration, exfiltration, and resupply of SOF by airdrop or air-land operations. To perform these missions, depending upon the enemy threat, crews navigate using both visual and electronic means or visual means only. Primary emphasis is on NVG operations.

Modifications include improved secure communications, advanced integrated navigation equipment, including digital scan radar, ring-laser gyro INS, FLIR, GPS, and dual nav stations, as well as new missile warning systems and countermeasures for refueling missions in hostile environments. Some aircraft have been modified with an inflight refueling system allowing them to be air refuelable.

Strategic Transports

C-5 Galaxy

Brief: A heavy-lift, air refuelable cargo transport for massive strategic airlift over long ranges, including outsize cargo. Supports special operations missions.

Function: Cargo and troop transport.
Operator: AETC, AFMC, AMC, ANG, AFRC.
First Flight: June 30, 1968.
Delivered: October 1969–April 1989.
IOC: September 1970.
Production: 131.
Inventory: 126.
Unit Location: Active: Altus AFB, Okla., Dover AFB, Del., Travis AFB, Calif. ANG: Stewart Arpt., N.Y. AFRC: Dover AFB, Del., Lackland AFB, Tex., Travis AFB, Calif., Westover ARB, Mass.
Contractor: Lockheed.
Power Plant: four General Electric TF39-GE-1C turbofans, each 41,000 lb thrust.
Accommodation: normal crew of six (two pilots, two engineers, and two loadmasters), plus rest area for 15 (relief crew, etc.) and seating for 73. There is no piece of Army combat equipment the C-5 can't carry. Possible loads: six Apache helicopters, two M1 main battle tanks (each weighing 135,400 lb), six Bradley vehicles, three CH-47 helicopters, the 74-ton mobile bridge, a quarter-million pounds of relief supplies, or a maximum of 340 passengers in an airbus configuration. Airdrop capability for single platforms weighing up to 42,000 lb.
Dimensions: span 222.8 ft, length 247.9 ft, height 65.1 ft.
Weight: empty 374,000 lb, gross 769,000 (wartime 840,000) lb.
Ceiling: 45,000 ft.
Performance: max speed at 25,000 ft 571 mph, 35,750 ft, T-O run at S/L 8,300 ft, landing run, max landing weight at S/L 2,380 ft, range with max payload 3,434 miles, range with max fuel 7,245 miles. Normal cruising speed at altitude 518 mph (Mach 0.77), unlimited range with in-flight air refueling.

COMMENTARY

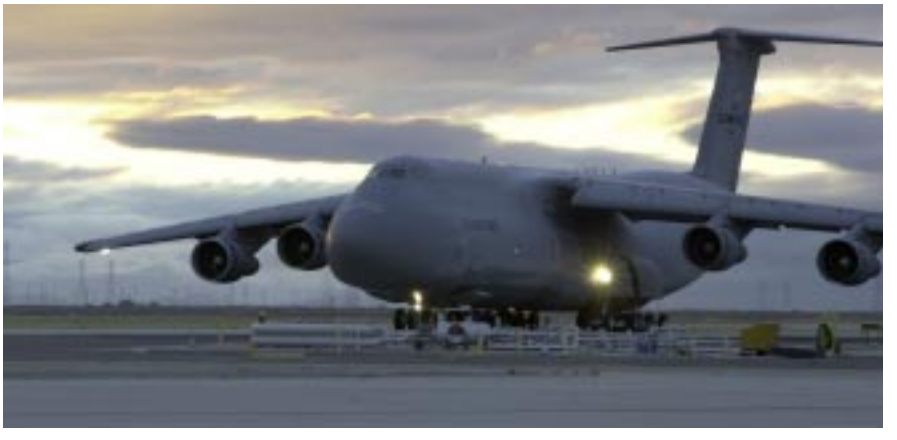
One of the world's largest aircraft, the C-5 is able to carry unusually large and heavy cargo for intercontinental ranges at jet speeds. It can take off and land in relatively short distances and taxi on substandard surfaces during emergency operations. Front and rear cargo openings permit simultaneous drive-through loading and off-loading.

C-5A. USAF took delivery of 81 of these basic models between December 1969 and May 1973. A major wing modification was subsequently undertaken, extending the aircraft's service life by 30,000 flight hours. Additionally, the avionics subsystems developed for the C-5B have been incorporated into the C-5A fleet. One ANG and two AFRC squadrons are C-5A–equipped. The reliability and maintainability of the C-5A version have been the focus of numerous AMC studies.

C-5B. Generally similar to the C-5A but embodies all the improvements introduced since completion of C-5A production, including the strengthened wings, improved turbofans, and updated avionics, with color weather radar and triple INS. The first C-5B flew for the first time in September 1985 and was delivered to Altus AFB, Okla., in January 1986.

C-5C. Two C-5As assigned to Travis AFB, Calif., were modified to carry outsize space cargo for NASA by extending the cargo bay and modifying the aft doors.

All USAF Galaxys are undergoing a complete AMP that will install a state-of-the-art cockpit and ensure global access navigation safety compliance by the end of 2006; first upgraded aircraft flew December 2002. Additionally, the Air Force has contracted an SDD for a reliability enhancement and re-engining program for C-5A/B aircraft to take advantage of an estimated service life through 2040. Prototypes to be completed in 2006. To enhance force protection, a number of C-5s have been equipped with a missile defense system.



***C-5** Galaxy* (MSgt. Richard Loomis)

C-17 Globemaster III

Brief: A heavy-lift, air refuelable cargo transport for intertheater (strategic) and intratheater (tactical) direct delivery airlift of all classes of military cargo, including outsize items.

Function: Cargo and troop transport.
Operator: AETC, AFMC, AMC, AFRC.
First Flight: Sept. 15, 1991.
Delivered: June 1993–July 2008 (planned).
IOC: Jan. 17, 1995.
Production: 180 (planned).
Inventory: 92.
Unit Location: Altus AFB, Okla., Charleston AFB, S.C., McChord AFB, Wash., McGuire AFB, N.J. AFRC: Charleston AFB, S.C., McChord AFB, Wash., Allen C. Thompson Field, Miss. Planned: Dover AFB, Del., Travis AFB, Calif., AFRC: March ARB Calif., AFRC (Assoc.) Elmendorf AFB, Alaska; ANG (Assoc.) Hickam AFB, Hawaii.
Contractor: Boeing.
Power Plant: four Pratt & Whitney F117-PW-100 turbofans, each 40,440 lb thrust.
Accommodation: normal flight crew of three (two pilots plus loadmaster); additional pilot may be carried. Provisions for full range of military airlift missions, incl capacity for up to 102 passengers/paratroops or 36 litters; range of military cargo incl tanks and up to three AH-64A helicopters; three Bradley vehicles; one M1 main battle tank with other equipment; airdrop capability for single platforms weighing up to 60,000 lb.
Dimensions: span over winglet tips 169.8 ft, length 173.9 ft, height 55.1 ft.
Weight: empty 277,000 lb, max payload 170,900 lb, gross 585,000 lb.
Ceiling: 45,000 ft.
Performance: normal cruising speed 484 mph at 35,000 ft or 518 mph (Mach .77) at 28,000 ft, unrefueled range with 160,000-lb payload 2,760 miles, additional 690 miles with extended-range fuel containment system (ERFCS), unlimited with refueling.

COMMENTARY

Developed to meet US force projection requirements, the C-17 is able to operate routinely into small, austere airfields (3,000 ft x 90 ft) previously restricted to C-130s and provides the first capability to air-land or airdrop outsize cargo in the tactical environment.

C-17A is the first military transport to feature a full digital fly-by-wire control system and two-person cockpit, with two full-time, all-function HUDs and four multifunction electronic displays. Block 12 air-

***C-17** Globemaster III* (TSgt. Cary Humphries)

***C-141** Starlifter* (John Sidoriak)

craft, delivered from 2001, have the ERFCS upgrade, also to be retrofitted on earlier aircraft. Other C-17 improvements include a terrain awareness warning system (TAWS) and video integrated processor (VIP). A laser-jamming system to counter the IR–homing missile threat is planned from FY03, supplanting the current self-defense system, with the first 12 aircraft receiving an accelerated interim capability by March 2004. In October 2002, the C-17 assumed the special operations low level (SOLL) mission previously supported by the C-141. Enhancements include SOLL II communications suites and carry-on radio suites. C-17s have flown numerous operational and humanitarian missions since entering operational service, including peacekeeping operations in Bosnia, where the C-17 was the only aircraft capable of delivering outsize cargo.

C-135 Stratolifter

Brief: A version of the KC-135 tanker, without refueling equipment, produced for nontanker duties.

Function: Passenger and cargo airlifter.

Operator: PACAF.

First Flight: May 1961.

Delivered: 1961–62.

IOC: circa 1961.

Production: 48, plus five WC/TC-135s.

Inventory: three.

Unit Location: Hickam AFB, Hawaii.

Contractor: Boeing.

Power Plant: (C-135B) four Pratt & Whitney TF33-P-5 turbofans, each 18,000 lb thrust.

Accommodation (C-135B): 60 passengers.

Dimensions: span 130.8 ft, length 134.5 ft, height 38.3 ft.

Weights (C-135B): operating weight empty 102,300 lb, gross 275,500 lb.

Ceiling: 50,000 ft.

Performance (C-135B): max speed 600 mph, range with 54,000 lb payload 4,625 miles.

COMMENTARY

A few C-135 transports and variants, without the KC-135's refueling equipment, remain operational within USAF. They were ordered originally to serve as interim jet passenger or cargo transports, pending delivery of C-141s. Three converted KC-135s were followed by 45 production Stratolifters in two versions.

C-135A. The first 15 aircraft were equipped with J57-P-59W turbojets.

C-135B. The next version included upgraded Pratt & Whitney turbofans. USAF retrofitted 11 Bs with revised interior for VIP transportation.

C-135E. C-135As re-engined with Pratt & Whitney engines.

C-141 Starlifter

Brief: Workhorse of the US airlift force for many years, the Starlifter can project combat forces over long distances, inject those forces and their equipment either by air-land or airdrop, resupply these employed forces, and extract the sick and wounded from the hostile area to advanced medical facilities. Primary strategic special operations and airdrop platform.

Function: Long-range, air refuelable troop and cargo airlift.

Operator: ANG, AFRC.

First Flight: Dec. 17, 1963.

Delivered: October 1964–June 1982.

IOC: May 1965.

Production: 285.

Inventory: 76.

Unit Location: ANG: Allen C. Thompson Field, Miss., Memphis Arpt., Tenn. AFRC: Andrews AFB, Md., March ARB, Calif., McGuire AFB, N.J., Wright–Patterson AFB, Ohio.

Contractor: Lockheed Martin.

Power Plant: four Pratt & Whitney TF33-P-7 turbofans, each 21,000 lb thrust.

Accommodation: crew of five; cargo on 13 standard 463L pallets. Alternative freight or vehicle payloads, 200 fully equipped troops, 155 paratroops, or 103 litter patients plus attendants.

Dimensions: span 159.9 ft, length 168.3 ft, height 39.2 ft.

Weight: operating payload 38,000 lb; max payload 68,725 lb normal, 89,000 lb emergency war planning; gross 325,000 lb normal, 344,000 lb emergency war planning.

Ceiling: 45,000 ft.

Performance: max cruising speed 466 mph, range 5,290 miles without air refueling.

COMMENTARY

Longtime mainstay of USAF's airlift fleet, the C-141 was the first jet aircraft designed to meet military standards as a troop and cargo carrier. However, with the continuing deployment of C-17 aircraft, all C-141s in active units were to be retired by FY03. USAF also announced plans to retire older C-141s in reserve units earlier than scheduled. All were to retire by 2006.

C-141A entered service with MAC in April 1965; 285 were built, some of which were structurally modified to accommodate the Minuteman ICBM.

C-141B is a stretched C-141A with in-flight refueling capability. All C-141As (except four AFMC aircraft used for test purposes) were lengthened by 23 ft 4 in to expand lift capacity. First C-141B flew March 1977 and redeliveries took place between December 1979 and June 1982. The modification gave USAF the equivalent of 90 additional C-141A aircraft. Subsequent improvements include structural upgrades, a state-of-the-art autopilot and all-weather landing system, and improved airdrop systems. Modification of 13 C-141Bs is aimed at increasing their SOLL capability and survivability.

C-141C is a C-141B modified with computerized glass-cockpit instrumentation and digital flight-management system, with integrated GPS data for navigation and modern navigation safety equipment. The first version, which rolled out at Warner Robins ALC, Ga., Oct. 1, 1997, was assigned to AFRC's 452nd Air Mobility Wing, March ARB, Calif.

Theater and Special Use Transports

C-9 Nightingale

Brief: A twin-engine, medium-range, swept-wing jet aircraft used primarily for the aeromedical evacuation mission. A modified version of the DC-9, it is the only USAF aircraft specifically designed for the movement of litter and ambulatory patients.

Function: Aeromedical evacuation.

Operator: AMC, PACAF, USAFE, AFRC.

First Flight: August 1968.

Delivered: August 1968–February 1975.

IOC: circa 1968.

Production: 24.

Inventory: 23.

Unit Location: Andrews AFB, Md., Chievres, Belgium, Ramstein AB, Germany, Scott AFB, Ill., Yokota AB, Japan.

Contractor: Boeing (McDonnell Douglas).

Power Plant: two Pratt & Whitney JT8D-9A turbofans, each 14,500 lb thrust.

Accommodation: crew of three; 40 litter patients or 40 ambulatory patients, or a combination of both, plus five medical staff.

Dimensions: span 93.2 ft, length 119.2 ft, height 27.4 ft.

Weight: gross 108,000 lb.

Ceiling: 35,000 ft.

Performance: max cruising speed at 25,000 ft 565 mph, range 2,500 miles.

COMMENTARY

C-9A transport is a derivative of the DC-9 Series 30 commercial airliner, modified to include a special-care compartment with separate atmospheric and ventilation controls. One C-9A also provides distinguished visitor (DV) airlift in Europe. Because of the critical nature of its mission, the aircraft carries a flight mechanic and a small supply of spares.

C-9C. Three specially configured C-9s were delivered to Andrews AFB, Md., in 1975 for the special air mission supporting the President and other US government officials. Upgrades include improvements to the passenger communications equipment, GATM, TAWS, and vertical separation equipment.

C-12 Huron

Brief: Aircraft to provide airlift support for attache and military advisory groups worldwide.

Function: Special airlift.

Operator: AETC, AFMC, PACAF.

First Flight: Oct. 27, 1972 (Super King Air 200).

Delivered: 1974–late 1980s.

IOC: circa 1974.

Production: 88.

Inventory: 27.

Unit Location: Elmendorf AFB, Alaska, Osan AB, South Korea, various overseas embassies.

Contractor: Beech.

Power Plant: (C-12J) two Pratt & Whitney Canada PT6A-65B turboprops, each 1,100 shp.

Accommodation: crew of two; C-12C: up to eight passengers; C-12J: up to 19 passengers.

Dimensions: (C-12J) span 54.5 ft, length 43.8 ft, height 15 ft.

Weight: (C-12J) empty 9,850 lb, gross 16,600 lb.

Ceiling: (C-12J) 25,000 ft.

Performance: (C-12J) max cruising speed at 16,000 ft 307 mph, range with 10 passengers 1,806 miles.

***C-20** Gulfstream* (SSgt. J.R. Ruark)

C-32A (Boeing)

COMMENTARY

C-12C. Re-engined C-12As, with PT6A-41 turboprops, deployed to overseas embassies.

C-12D. Similar to C model and also deployed to overseas embassies.

C-12F. With uprated PT6A-42 engines, can support medical airlift.

C-12J. A military version of the larger Beechcraft Model 1900, operated by PACAF.

C-20 Gulfstream

Brief: A twin-engine turbofan aircraft acquired to provide airlift for high-ranking government and DOD officials.

Function: Operational support airlift; special air missions.

Operator: AMC, USAFE.

First Flight: December 1979.

Delivered: September 1983–1989.

IOC: circa 1983.

Production: not available.

Inventory: 12.

Unit Location: Andrews AFB, Md., Ramstein AB, Germany.

Contractor: Gulfstream.

Power Plant: C-20A/B: two Rolls Royce–Spey MK511-8 turbofans, each 11,400 lb thrust; C-20H: two Rolls Royce–Tay MK611-8 turbofans, each 13,850 lb thrust.

Accommodation: crew of five; 12 passengers.

Dimensions: span 77.8 ft; length (C-20A/B) 83.1 ft, (C-20H) 88.3 ft; height 24.3 ft.

Weight: C-20A/B gross 69,700 lb; C-20H gross 74,600 lb.

Ceiling: 45,000 ft.

Performance: max cruising speed 576 mph, range 4,800 miles.

COMMENTARY

C-20A. Three Gulfstream III transports were acquired to replace aging C-140B aircraft. They provided USAFE's operational support airlift fleet with intercontinental range and ability to operate from short runways. Retired in September 2002.

C-20B. Seven C-20B versions, with advanced mission communications equipment and revised interior, were acquired in the late 1980s. Two C-20B aircraft have been retired.

C-20H. Two Gulfstream IV SP aircraft, with advanced-technology flight-management systems and upgraded Rolls Royce engines, were acquired by USAF to meet expanding special air mission requirements. The two C-20H aircraft were reassigned to USAFE to replace retired C-20As.

Upgrade for C-20A/B/H aircraft includes GPS, vertical separation equipment, GATM, and TCAS.

C-21

Brief: Aircraft designed to provide cargo and passenger airlift and transport litters during medical evacuations.

Function: Pilot seasoning, passenger and cargo airlift.

Operator: AETC, AMC, PACAF, USAFE, ANG.

First Flight: January 1973.

Delivered: April 1984–October 1985.

IOC: April 1984.

Production: 84.

Inventory: 78.

Unit Location: Andrews AFB, Md., Keesler AFB, Miss., Langley AFB, Va., Maxwell AFB, Ala., Offutt AFB, Neb., Peterson AFB, Colo., Ramstein AB, Germany, Randolph AFB, Tex., Scott AFB, Ill., Stuttgart, Germany, Wright–Patterson AFB, Ohio, Yokota AB, Japan.

Contractor: Gates Learjet.

Power Plant: two AlliedSignal TFE731-2 turbofans, each 3,500 lb thrust.

Accommodation: crew of two and up to eight passengers or 3,153 lb cargo. Convertible to aeromedical evacuation configuration.

Dimensions: span 39.5 ft, length 48.6 ft, height 12.2 ft.

Weight: empty, equipped 10,119 lb, gross 18,300 lb.

Ceiling: 51,000 ft.

Performance: max level speed at 25,000 ft 542 mph, range with max passenger load 2,306 miles, with max cargo load 1,653 miles.

COMMENTARY

C-21A aircraft provide operational support airlift for time-sensitive movement of people and cargo throughout the US and the Pacific and European Theaters, including aeromedical missions if required. Upgrades to include GATM and TCAS.

C-22

Brief: A Boeing 727-100 used by ANG as its primary medium-range aircraft for airlift of personnel.

Function: Passenger transportation.

Operator: ANG.

First Flight: February 1963 (commercial).

Delivered: 1984.

IOC: circa 1984.

Production: four.

Inventory: two.

Unit Location: Andrews AFB, Md.

Contractor: Boeing.

Power Plant: three JTD8D-7 turbofans, each 14,000 lb thrust.

Accommodation: flight crew of four, plus three or four cabin crew; up to 89 passengers.

Dimensions: span 108 ft, length 133.1 ft, height 34 ft.

Weight: gross 170,000 lb.

Ceiling: 37,400 ft.

Performance: max speed 630 mph, range 2,000 miles, 5.5 hr endurance.

COMMENTARY

C-22B. Boeing 727-100 commercial transports purchased and modified as C-22Bs for use by ANG on operational support airlift missions. Two were further modified to accommodate an additional 1,100 gallons of fuel and landing gear rated for 170,000 lb gross landing weight. The last C-22B retired at end of 2002. C-22Bs were replaced by the C-40C, a Boeing 737-700.

C-32

Brief: A modified Boeing 757-200 used to provide transportation for the vice president, Cabinet, Congressional members, and other high-ranking US and foreign officials.

Function: VIP air transport.

Operator: AMC.

First Flight: Feb. 19, 1982 (USAF Feb. 11, 1998).

Delivery: June–December 1998.

IOC: 1998.

Production: four.

Inventory: four.

Unit Location: Andrews AFB, Md.

Contractor: Boeing.

Power Plant: two Pratt & Whitney PW2040 turbofans, each 41,700 lb thrust.

Accommodation: 16 crew and 45 passengers.

Dimensions: span 124.8 ft, length 155.2 ft, height 44.5 ft.

Weight: empty 127,800 lb, gross 255,000 lb.

Ceiling: 41,000 ft.

Performance: cruise speed Mach 0.8–0.86 (530 mph), range 5,750 miles.

COMMENTARY

A military version of the commercial Boeing 757-200, four new C-32As were purchased as replacements for C-137B/C aircraft. The commercial DV interior includes a crew rest area, DV stateroom, conference area, and general passenger area. The passenger communications system provides worldwide clear and secure voice and data communications. Modern flight deck avionics allow operations to any suitable airfield in the world and provide an upgrade path as new capabilities become available. Upgrades include installation of a digital communications management system and broadband data transmit and receive, providing an office-in-the-sky capability.

C-37A

Brief: A modified Gulfstream V utilized as part of the executive fleet, providing transportation for the vice president, Cabinet, Congressional members, Secretary of Defense, Service Secretaries, and other prominent US and foreign officials.

Function: VIP air transport.

Operator: AMC.

First Flight: USAF October 1998.

Delivery: October 1998–present.

IOC: Dec. 9, 1998.

Production: 10.

Inventory: Nine.

Unit Location: Andrews AFB, Md.; Chievres, Belgium; Hickam AFB, Hawaii, MacDill AFB, Fla.

Contractor: Gulfstream.

Power Plant: two BMW–Rolls Royce BR710A1-10 turbofans, each 14,750 lb thrust.

Accommodation: five crew and 12 passengers.

Dimensions: span 93.5 ft, length 96.4 ft, height 25.8 ft.

Weight: empty 47,601 lb, gross 90,500 lb.

Ceiling: 51,000 ft.

Performance: cruise speed Mach 0.8 (530 mph), range 6,095 miles.

COMMENTARY

The C-37A is a military version of the Gulfstream V. Two C-37As, along with the C-32s, were purchased as replacements for the VC-137B/C aircraft. The interior includes separate DV and passenger areas and a communications system capable of worldwide clear and secure voice and data. Aircraft are capable of operations at any suitable civilian or military airfield worldwide. A third C-37A was purchased for combatant commander support airlift and was based at Chievres, Belgium. It has since been reassigned to Andrews AFB, Md. Two more C-37s were purchased for crisis response support. Five C-37As are being leased from Gulfstream Aerospace as combatant commander support aircraft; three are assigned to MacDill AFB, Fla.; one to Chievres; and one to Hickam AFB, Hawaii. Upgrades include GATM and continuing passenger communications system upgrades to the Andrews–based aircraft.

C-38A

Brief: A twin-engine transcontinental aircraft used to provide transportation for DVs, such as Congressional or high-ranking military members. It can also be configured for medevac and a wide range of special missions including C3 in time of war.

Function: VIP air transport and operational support.

Operator: ANG.

First Flight: 1998.

Delivered: April–May 1998.

IOC: 1998.

Production: two.

Inventory: two.

Unit Location: Andrews AFB, Md.

Contractor: Tracor (Israel Aircraft Industries Ltd).

Power Plant: two AlliedSignal TFE731-40R-200G, each 4,250 lb thrust.

Accommodation: typically two crew and eight passengers. In medevac role: two Spectrum 500 Life Support Units and two medical attendants. All seats removable for cargo.

Dimensions: span 54.6 ft, length 55.6 ft, height 18.2 ft.

Weight: gross 24,800 lb.

Ceiling: cruise, 33,000 ft.

Performance: cruise speed Mach 0.87.

COMMENTARY

The C-38A is a military version of the Astra SPX produced by IAI and supported worldwide by Galaxy Aerospace. Two aircraft are operated by ANG's 201st AS replacing Learjet C-21As. Equipment includes the most up-to-date navigation, communication, vertical separation, and safety equipment as well as state-of-the-art avionics. The contract includes an option for two additional aircraft.

C-40

Brief: A Boeing 727-700 used by ANG as its primary medium-range aircraft for airlift of personnel.

Function: Passenger transportation.

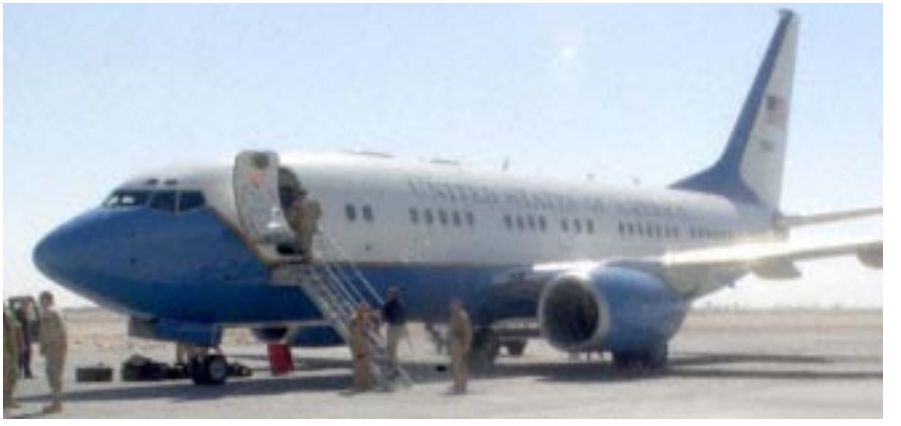
Operator: ANG.

First Flight: USN C-40A: April 14, 1999.

Delivered: 2002.

Production: seven planned.

Inventory: two.
Unit Location: Andrews AFB, Md., Hickam AFB, Hawaii.
Contractor: Boeing.
Power Plant: two General Electric CFM56-7 turbofans, each 24,000 lb thrust.
Accommodation: flight crew of four, plus three or four cabin crew; up to 89 passengers.
Dimensions: span 112 ft 7 in, length 110 ft 4 in, height 41 ft 2 in.
Weight: gross 171,000 lb.
Ceiling: 41,000 ft.
Performance: cruise speed 0.78–0.82 Mach, range 3,450 miles.
COMMENTARY
The C-40 is the military version of the commercial Boeing 737-700 increased gross weight aircraft. C-40s are used for SAM and support of combatant commanders.
C-40B. The B model is equipped with a DV suite, staff work area, conference area, and worldwide secure communications and data capability. USAF purchased two C-40Bs for delivery to Andrews AFB, Md., and Hickam AFB, Hawaii, in FY03 to support combatant commanders. One additional C-40B has been purchased for SAM and is assigned to Andrews. A further C-40B will be leased for the SAM mission, operating from Andrews, in 2004.
C-40C. The C model has a DV seating area, general passenger seating area, and secure communications capability. Two C-40Cs have been leased for ANG to replace recently retired C-22Bs at Andrews. Another aircraft will be leased for delivery in 2004 in support of airlift missions.

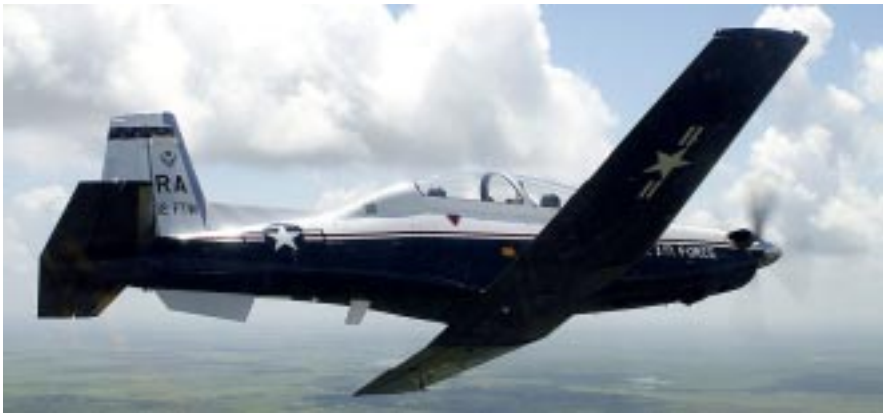


C-40 (MSgt. Terry L. Blevins)

C-130 Hercules
Brief: A rugged aircraft capable of operating from rough dirt strips to provide theater airlift and paradropping of troops and equipment into hostile areas.
Function: Inter- and intratheater airlift.
Operator: AETC, AFMC, AMC, PACAF, USAFE, ANG, AFRC.
First Flight: August 1954 (C-130A).
Delivered: December 1956–present (C-130J).
IOC: circa 1958.
Production: more than 2,200; (C/CC-130J) 168 planned.
Inventory: 522: 218 (E), 287 (H), 17 (J).
Unit Location: Active: Dyess AFB, Tex., Elmendorf AFB, Alaska, Little Rock AFB, Ark., Pope AFB, N.C., Ramstein AB, Germany, Yokota AB, Japan. ANG: 24 units. AFRC: nine units.
Contractor: Lockheed Martin.
Power Plant: (C-130H) four Rolls Royce–Allison T56-A-15 turboprops, each 4,300 shp. (C-130J) four Rolls Royce–Allison AE2100D3 turboprops, each 4,591 shp.
Accommodation: (C-130H) crew of five; up to 92 ground troops, 64 paratroops, 74 litter patients plus attendants, 54 passengers on palletized seating, or up to five 463L standard freight pallets, etc.; max load, 45,000 lb.
Dimensions: span 132.6 ft, length 97.8 ft, height 38.1 ft.
Weight: (C-130H) empty 81,000 lb, fuel/cargo max gross 155,000 lb.
Ceiling: 33,000 ft at 100,000 lb T-O weight.
Performance: (C-130H) max cruising speed 430 mph, T-O run 3,585 ft, landing run (at 130,000 lb) 1,700 ft, range with 40,000-lb payload 2,240 miles; range 3,450 miles.
COMMENTARY
First flown 48 years ago, the C-130 Hercules transport continues in production and has been delivered to more than 60 countries. Basic and specialized versions operate throughout USAF, performing diverse roles in both peace and war situations, including airlift support, Arctic ice cap resupply, aeromedical missions, aerial spray missions (AFRC), fire-fighting duties (AFRC and ANG) for the US Forest Service, and natural disaster and humanitarian relief missions.
C-130A, B, and D. Early versions, now retired. The initial production C-130A had four Allison T56-A-11 or -9 turboprop engines. USAF ordered a total of 219. The C-130B had improved range and higher weights and introduced Allison T56-A-7 turboprops; 134 were produced, with delivery from April 1959. Twelve were modified beginning 1961 as **JC-130B**s for air-snatch satellite recovery together with three early H models. Twelve C-130Ds were modified As for Arctic operations.
C-130E is an extended-range development of the C-130B, with large under-wing fuel tanks; 389 were ordered, with deliveries beginning in April 1962. A wing modification to correct fatigue and corrosion extended the life of the aircraft well into this century. Other modifications include a self-contained navigation system, with an integrated communications/navigation management suite, GPS capability, and a state-of-the-art autopilot that incorporates a ground collision avoidance system.
C-130H is generally similar to the E model but has updated turboprops, a redesigned outer wing, and improved pneumatic systems; delivery began in July 1974. Subsequent improvements include updated avionics, improved low-power color radar, and other minor modifications. Night vision instrumentation system was introduced from 1993, TCAS II in new aircraft from 1994. ANG and AFRC **LC-130H/R** aircraft are modified with wheel-ski gear to support Arctic and Antarctic operations. Two **DC-130H**s were modified for UAV control duties.
Boeing is undertaking a major AMP for the C-130E/H. Improvements include digital displays, flight-management systems, multifunction radar, new communication systems, and a single air data computer. Work is expected to begin in 2005, with planned completion 2014.
C-130J. This newest model features a three-crew flight operation system, 6,000 shp Rolls Royce–Allison AE2100D engines, all composite six-blade Dowty Aerospace R391 propeller system, digital avionics, and mission computers. Compared to earlier production C-130Es, its speed is up 21 percent, cruising altitude is 40 percent higher, and range 40 percent longer. The J also features improved reliability and maintainability. ANG and AFRC units began receiving J models in 1999.
CC-130J. USAF is acquiring a stretched version of the C-130J, with an additional 15 ft to the fuselage, capable of carrying up to 128 ground troops or 92 paratroops, to replace its oldest 1960s–vintage C-130Es. ANG received three in 2001 and two in 2002. Of five on contract for 2004 delivery, active duty will receive one; ANG, three; AFRC, one. USAF entered a 67-aircraft (43 USAF, 24 USMC) multiyear contract in 2002 with deliveries from 2005–09. Of the 43, active units will get 26; ANG, nine; AFRC, eight.

***VC-25** Air Force One* (Boeing)

CV-22
Brief: A tilt-rotor, multimission transport aircraft designed to have the maneuverability and lift capability of a helicopter and the speed of a fixed-wing aircraft.
Function: Multimission airlift.
Operator: AFSOC.
First Flight: March 19, 1989 (V-22).
Delivery: 2006 (planned).
IOC: 2009 (planned).
Production: 50 (planned).
Inventory: 50 (planned).
Unit Location: Hurlburt Field, Fla., Kirtland AFB, N.M.
Contractor: Bell Boeing; Raytheon.
Power Plant: two Rolls Royce–Allison AE1107C turboshafts, each 6,200 shp.
Accommodation: four (two pilots, two flight engineers), up to 18 troops or 8,000 lb internal cargo.
Dimensions: proprotor diameter 38 ft, width, rotors turning 84.6 ft, fuselage length 57.3 ft, height 22 ft.
Weight: gross weight 34,900 lb, max VTO 52,870 lb; STO 57,000 lb, self-deploy T-O 60,500 lb.
Ceiling: 26,000 ft.
Performance: typically will carry troops or cargo over a 500-mile combat radius at 265 mph. Self-deployment range with one air refueling 2,417 miles.
COMMENTARY
CV-22 is the designation for the US Special Operations Command variant of the V-22 Osprey. Combined testing resumed at Edwards AFB, Calif. in September 2002 following a protracted grounding. It is a tilt-rotor, vertical/short takeoff and landing (V/STOL) aircraft capable of operations in austere environments from remote bases or air capable ships. The CV-22's mission is long-range clandestine penetration of denied areas in adverse weather and low visibility to infiltrate, exfiltrate, and resupply SOF. Capable of air-to-air refueling, its range is limited only by crew endurance.
CV-22 avionics include a fully integrated precision navigation suite, with GPS and INS; a digital cockpit management system oriented around four multifunction displays (MFDs); FLIR; an integrated NVG HUD; terrain-following/terrain-avoidance (TF/TA) radar; and digital map system. The CV-22 also incorporates an extensive defensive countermeasures suite. Components of this system include a RWR, missile warning system, laser detection system, radar missile jammer, IR missile jammer, and a countermeasures dispensing system. The communications suite will include secure UHF, VHF (AM and FM), and satellite communications (SATCOM) radios.
The first CV-22 is planned to begin initial operational test and evaluation in spring 2006. Initial training capability is scheduled for late 2003 at Kirtland AFB, N.M., and IOC for early 2009 at Hurlburt Field, Fla. USAF may place detachments of CV-22s in EUCOM and PACOM theaters.



***T-6** Texan II* (MSgt. Greg Kobashigawa)

MC-130E/H Combat Talon
Brief: A modified C-130 able to provide global, day, night, and adverse weather capability to air-drop personnel and to deliver personnel and equipment to support US and allied SOF.
Function: SOF infiltration, exfiltration, and resupply.
Operator: AETC, AFSOC, AFRC.
First Flight: circa 1965 (E); January 1990 (H).
Delivered: initially 1966.
IOC: 1966 (E); June 1991 (H).
Production: 24 (new-build Hs).
Inventory: 14 (E); 22 (H).
Unit Location: Active (Assoc.) and AFRC MC-130Es at Duke Field, Fla. Active MC-130H at Hurlburt Field, Fla.; MC-130H at Kadena AB, Japan, Kirtland AFB, N.M., RAF Mildenhall, UK.
Contractor: Lockheed Martin (airframe); Boeing integrated weapons system support.
Power Plant: four Allison T56-A-15 turboprops, each 4,910 shp.
Accommodation: E: crew of nine; 53 troops or 26 paratroops; H: crew of seven; 77 troops, 52 paratroops, or 57 litters.
Dimensions: span 132.6 ft, height 38.5 ft, length 100.8 ft (E), 99.8 ft (H).
Weight: empty 72,892 lb, gross 155,000 lb.
Ceiling: 30,000 ft.
Performance: max speed 289 mph, range 3,110 miles, unlimited with refueling.
COMMENTARY
MC-130 Combat Talon aircraft are equipped with in-flight refueling equipment, TF/TA radar, INS/GPS, ECM, and a high-speed aerial delivery system, enabling them to conduct infiltration, exfiltration, resupply, psychological operations, and aerial reconnaissance into hostile or denied territory. Combat Talons are able to deliver or air-drop personnel or equipment on austere, marked and unmarked landing zones/drop zones. They can conduct overt, clandestine, and low-visibility operations.
MC-130E Combat Talon I. Fourteen modified C-130E aircraft are equipped to air refuel helicopters. During Desert Storm, MC-130Es played a vital role performing psychological operations, with a secondary mission in CSAR.
MC-130H Combat Talon II. Twenty-four new-build MC-130Hs were acquired to supplement the Talon I. They include an integrated glass cockpit compatible with NVGs and improved IR and electronic defensive countermeasures. The 1st, 7th, and 15th SOSs employ the Combat Talon II, supporting unconventional warfare units from their bases in Japan, Europe, and CONUS, respectively. The 58th SOW at Kirtland AFB, N.M., is responsible for MC-130H mission qualification training.

VC-25 Air Force One
Brief: A specially configured Boeing 747-200B used for air transport of the President and his entourage. When the President is aboard, it has the radio call sign "Air Force One."
Function: Air transport of the President.
Operator: AMC.
First Flight: First flown as Air Force One Sept. 6, 1990.
Delivered: August–December 1990.
IOC: circa 1990.
Production: two.
Inventory: two.
Unit Location: Andrews AFB, Md.
Contractor: Boeing.
Power Plant: four General Electric CF6 turbofans, each 56,700 lb thrust.
Accommodation: crew of 26; up to 76 passengers.
Performance: max speed at 27,000 ft 538 mph, range 2,400 miles.
COMMENTARY
The T-1A Jayhawk is used to train pilots who will go on to fly transports such as the C-5 and C-17 or to tankers such as the KC-10 and KC-135.
T-1A. The swept-wing T-1A is a military version of the Beech 400A used for Joint Specialized Undergraduate Pilot Training (JSUPT). Special mission equipment includes an electronic flight instrument system (EFIS) avionics system, a single-point refueling system with increased capacity, and increased bird-strike protection in the windshield and leading edges for sustained low-level operation. A GPS retrofit program has been completed.

T-6A Texan II
Brief: A single-engine turboprop aircraft used for training student pilots, navigators, and naval flight officers in fundamentals of aircraft handling and instrument, formation, and night flying.
Function: Primary trainer.
Operator: AETC, AFRC (Assoc.), USN.
First Flight: July 15, 1998.

***T-38** Talon* (Guy Aceto)

Dimensions: span 195.7 ft, length 231.8 ft, height 63.4 ft.
Weight: long-range mission T-O weight 803,700 lb., gross 833,000 lb.
Ceiling: 45,000 ft.
Performance: speed 630 mph (Mach 0.92), normal cruising speed Mach 0.84, unrefueled range 7,820 miles.
COMMENTARY
Based on the Boeing 747-200B airframe, two VC-25As assigned to Andrews AFB, Md., support the President. Aircraft are equipped with staff work areas, a conference room, a general seating area, and an executive office. Communications capability includes worldwide secure and clear communications equipment. Upgrades include GATM and installation of a broadband data transmit and receive capability to provide video teleconferencing and office-in-the-sky capability.

Trainer Aircraft

T-1 Jayhawk
Brief: A medium-range, twin-engine jet trainer version of the Beechcraft 400A. It is used by the Air Force to train student pilots to fly airlift, tanker, and bomber aircraft.
Function: Advanced pilot training.
Operator: AETC, AFRC (Assoc.).
First Flight: Sept. 22, 1989 (Beechcraft 400A).
Delivered: Jan. 17, 1992–July 1997.
IOC: January 1993.
Production: 180.
Inventory: 180.
Unit Location: Columbus AFB, Miss., Laughlin and Randolph AFBs, Tex., Vance AFB, Okla.
Contractor: Raytheon.
Power Plant: two Pratt & Whitney Canada JT15D-5B turbofans, each 2,900 lb thrust.
Accommodation: two, side by side, and one to the rear; rails are fitted to accommodate an extra four seats to permit transport of maintenance teams.
Dimensions: span 43.5 ft, length 48.4 ft, height 13.9 ft.
Weight: empty 5,200 lb, gross 16,100 lb.
Ceiling: 41,000 ft.
Delivery: May 2000–present (operational aircraft).
IOC: November 2001.
Production: USAF 372 (ordered), USN 328 (planned).
Inventory: 81 (USAF).
Unit Location: planned: USAF: Columbus AFB, Miss., Laughlin, Randolph, and Sheppard AFBs, Tex., Moody AFB, Ga., Vance AFB, Okla. Navy: NAS Corpus Christi, Tex., NASs Pensacola and Whiting, Fla.
Contractor: Raytheon.
Power Plant: one Pratt & Whitney Canada PT6A-68 turboprop, 1,100 shp.
Accommodation: two, in tandem, on zero/zero ejection seats.
Dimensions: span 33.5 ft, length 33.4 ft, height 10.7 ft.
Weight: empty (approx) 4,707 lb; gross 6,500 lb.
Ceiling: 31,000 ft.
Performance: max speed 368 mph, range 920 miles.
COMMENTARY
The Joint Primary Aircraft Training System (JPATS) **T-6A** Texan II is based on the Swiss Pilatus PC-9 aircraft, modified to include a strengthened fuselage, zero/zero ejection seats, increased aircrew accommodation, upgraded engine, increased fuel capacity, pressurized cockpit, larger, bird-resistant canopy, and new digital avionics. The JPATS is replacing USAF's T-37Bs and USN's T-34Cs in primary pilot training, as well as supporting undergraduate naval flight officer and USAF navigator training. Pilot training began at Moody AFB, Ga., in October 2001.

T-37 Tweet
Brief: A twin-engine jet used for training undergraduate pilots and undergraduate navigator and tactical navigator students in fundamentals of aircraft handling and instrument, navigation, formation, and night flying.
Function: Primary trainer.
Operator: AETC, AFRC.
First Flight: September 1955.
Delivered: December 1956–1968.
IOC: 1957.
Production: 985.
Inventory: 404.
Unit Location: Columbus AFB, Miss., Laughlin, Randolph, and Sheppard AFBs, Tex., Vance AFB, Okla.
Contractor: Cessna.

Power Plant: two Continental J69-T-25 turbojets, each 1,025 lb thrust.
Accommodation: two, side by side, on ejection seats.
Dimensions: span 33.7 ft, length 29.2 ft, height 9.1 ft.
Weight: empty 3,870 lb, gross 6,625 lb.
Ceiling: 35,000 ft.
Performance: max speed at S/L 315 mph, range 460 miles.
COMMENTARY
USAF's first purpose-built jet trainer, the T-37 has been AETC's standard two-seat primary trainer. A distinctive blue-and-white finish is intended to help formation training and ease maintenance.
T-37A, with J69-T-9 turbojets; all have been modified to T-37B standards.
T-37B. The original T-37A was superseded in November 1959 by the T-37B, with improved radio navigational equipment, UHF radio, and upgraded instruments. All A models were later converted to B standard. Kits were subsequently produced to extend the capability of the T-37 by modifying or replacing critical structural components. AETC began replacing the T-37B with the T-6A Texan II in 2000.

T-38 Talon
Brief: A twin-engine, high-altitude, supersonic jet trainer used in a variety of roles, primarily for undergraduate pilot and pilot instructor training.
Function: Trainer.
Operator: ACC, AETC, AFMC, AFRC.
First Flight: April 1959.
Delivered: 1961–72.
IOC: March 1961.
Production: more than 1,100.
Inventory: 458.
Unit Location: Beale and Edwards AFBs, Calif., Columbus AFB, Miss., Holloman AFB, N.M., Laughlin, Randolph, and Sheppard AFBs, Tex., Moody AFB, Ga., Vance AFB, Okla., Whiteman AFB, Mo.
Contractor: Northrop Grumman.
Power Plant: two General Electric J85-GE-5A turbojets, each 2,680 lb thrust dry, 2,900 lb thrust with afterburning.
Accommodation: two, in tandem, on ejection seats.
Dimensions: span 25.3 ft, length 46.3 ft, height 12.8 ft.
Weight: empty 7,164 lb, gross 12,500 lb.
Ceiling: above 55,000 ft.
Performance: max level speed 812 mph, range 1,000 miles.
COMMENTARY
Most of the T-38s in service are used by AETC for advanced bomber–fighter training track in JSUPT. Capabilities are being enhanced through an ongoing program of modifications and structural renewal, including a full avionics upgrade with a HUD and integrated GPS/INS, and a propulsion modernization. As a result of the reduction in the T-38's workload through introduction of the T-1A and JSUPT, the service life of the T-38s should extend well beyond 2020.
T-38A. Close in structure to the F-5A export tactical fighter, the T-38A was the world's first supersonic trainer aircraft. It is used to teach supersonic techniques, aerobatics, formation, night and instrument flying, and cross-country and low-level navigation. Also used to train test pilots and flight engineers at Edwards AFB, Calif., by AFMC to test experimental equipment, and by ACC to maintain pilot proficiency.
AT-38B. A slightly different version, with a gunsight and practice bomb dispenser, used by AETC for Introduction to Fighter Fundamentals.
T-38C. All T-38A and AT-38B airframes will be redesignated as C models upon modification of the avionics systems, begun in 2000; first TC-38C was received late summer 2002; planned completion 2009.

T-43
Brief: A medium-range, swept-wing jet aircraft equipped with navigation and communications equipment to train navigators for strategic and tactical aircraft.
Function: Navigation trainer.
Operator: AETC.
First Flight: April 1973.
Delivered: September 1973–July 1974.
IOC: 1974.
Production: 19.
Inventory: 10.
Unit Location: Randolph AFB, Tex.
Contractor: Boeing.
Power Plant: two Pratt & Whitney JT8D-9 turbofans, each 14,500 lb thrust.
Accommodation: crew of two; 12 students and six instructors.
Dimensions: span 93 ft, length 100 ft, height 37 ft.
Weight: gross 115,500 lb.
Ceiling: 37,000 ft.
Performance: econ cruising speed 535 mph (Mach 0.7), operational range 2,995 miles.
COMMENTARY
T-43A. The T-43A was derived from the commercial Boeing Model 737-200 and was equipped with the same onboard avionics as most USAF operational aircraft, including mapping radar, VHF omnidirectional radio and Tacan radio systems, INS, radar altimeter, all required communications equipment, and celestial navigation capability.
A number of T-43s are configured for passengers and provide operational support to assigned commands.

T-41 Mescalero
Brief: Short-range, high-wing trainer used primarily for aerodynamic and navigation courses.
Function: Training, support.
Operator: USAFA.
Delivered: 1969.
Inventory: four.
Unit Location: USAFA, Colo.
Contractor: Cessna.
Power Plant: one Continental IO-360-DB piston engine, 210 hp thrust.
Accommodation: two, side by side.
Dimensions: span 36.1 ft, length 26.5 ft, height 8.9 ft.
Weight: gross 2,550 lb.
Ceiling: 16,000 ft.
Performance: speed 182 mph, range 690 miles.
COMMENTARY
The **T-41D,** a military version of the Cessna 172, is an all-metal, strut-braced high-wing monoplane. The aircraft is equipped with modern avionics, GPS, and other equipment appropriate to its mission. It is used for Aero 456 flight testing, USAFA flying team support, and orientation flights.

TG-3A
Brief: Single-seat, medium-performance sailplane used for cross-country and spin training.
Function: Cross-country and spin trainer.
Operator: USAFA.
Delivered: circa 1960.
IOC: circa 1960.
Production: not available.
Inventory: three.
Unit Location: USAFA, Colo.
Contractor: Schweizer Aircraft.
Accommodation: one pilot.
Dimensions: span 40 ft, length 21.6 ft, height 7.2 ft.
Weight: 700 lb.
Ceiling: Flight Level (FL) 250 ft.
Performance: speed 114 mph, glide ratio 23:1, range dependent on soaring conditions.
COMMENTARY
The **TG-3A** is a medium-performance sailplane that allows students to master basic flight maneuvers while solo before progressing to a more advanced sailplane. With the exception of the fabric covered horizontal stabilizer and control surfaces, the aircraft is all-metal construction. It is primarily used for cross-country training and high-altitude wave flight with up to six-hour flight duration.

TG-4A
Brief: Conventional two-place tandem basic training sailplane used to introduce all USAFA cadets to flight.
Function: Flight introduction.
Operator: USAFA.
Delivered: October 1984.
IOC: not available.
Production: not available.
Inventory: 14.
Unit Location: USAFA, Colo.
Contractor: Schweizer Aircraft.
Accommodation: two (student pilot and instructor).
Dimensions: span 51 ft, length 25.8 ft, height 9.3 ft.
Weight: gross 1,040 lb.
Ceiling: 14,000 ft.
Performance: speed 98 mph, glide ratio 23:1.
COMMENTARY
The **TG-4A** has an all-metal airframe with aluminum covering on wings and vertical tail and a one-piece canopy for increased visibility. USAFA introduces all cadets to flight through the Soar-for-All program using the TG-4A. It can perform aerotow, stall recovery, slow flight, steep turn, and rectangular traffic pattern maneuvers.

TG-7A
Brief: A conventional two-place, side-by-side, fixed-gear, low-wing motorized glider that is equipped with spoilers and used to simulate the flight characteristics of the TG-4A and reduce the number of sorties needed to solo.
Function: Trainer.
Operator: USAFA.
Delivered: 1984.
IOC: not available.
Production: not available.
Inventory: nine.
Unit Location: USAFA, Colo.
Contractor: Schweizer Aircraft.
Power Plant: one Lycoming 0-235-L2C 4-cylinder engine, 112 hp.
Accommodation: two (student pilot and instructor).
Dimensions: span 59.5 ft, length 27.5 ft, height 7.7 ft.
Weight: gross 1,850 lb.
Ceiling: 14,000 ft.
Performance: speed 136 mph, range 230 miles.
COMMENTARY
The **TG-7A** motor glider is a single-engine, fixed-gear, conventional configuration, low-wing monoplane of all-metal construction with side-by-side seating. Students use it to practice multiple pattern, aerial maneuvers, and landing procedures, reducing by half the number of sorties needed to achieve a solo flight.

TG-9A
Brief: Medium-performance sailplane with tandem seating used for spins, aerobatics, and cross-country soaring.
Function: Trainer.
Operator: USAFA.
Delivered: October 1984.
IOC: not available.
Production: not available.
Inventory: four.
Unit Location: USAFA, Colo.
Contractor: Schleicher GmbH, Germany.
Accommodation: two, tandem.
Dimensions: span 55.8 ft, length 27.4 ft, height 5 ft.
Weight: gross 1,320 lb.
Ceiling: FL 250 ft.
Performance: speed 150 mph, glide ratio 34:1, range dependent on soaring conditions.
COMMENTARY
The **TG-9A** (ASK-21) sailplane has a midwing configuration with a T-tail and air brakes on the upper wing surface. It is used primarily for spin training and aerobatic demonstrations. It is used at the regional and national level for cross-country and aerobatic competition.

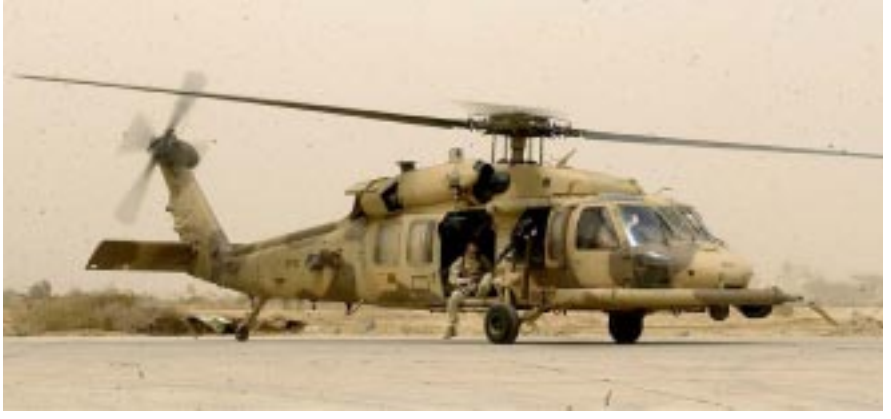
TG-10B
Brief: Two-seat medium-performance sailplane used for introductory glider training, instructor upgrade training, spin training, and basic cross-country soaring training.

TG-10C

Function: Trainer.
Operator: USAFA.
Delivered: spring 2002.
IOC: December 2002.
Production: 12.
Inventory: nine.
Unit Location: USAFA, Colo.
Contractor: Blanik.
Accommodation: two.
Dimensions: span 53.1 ft, length 27.9 ft, height 6.2 ft.
Weight: 1,124 lb.
Performance: speed 142.6 mph, glide ratio 28:1.
COMMENTARY
The **TG-10B** is an L-23 Super Blanik sailplane produced in the Czech Republic.

TG-10C
Brief: Two-seat medium-performance sailplane used for instructor spin upgrade, aerobatic demonstrations, and aerobatic competition.
Function: Trainer.
Operator: USAFA.
Delivered: spring 2002.
IOC: December 2002.

***MH-53J** Pave Low III* (TSgt. Scott Reed)



***HH-60G** Pave Hawk* (SSgt. Shane A. Cuomo)

Production: five.
Inventory: two.
Unit Location: USAFA, Colo.
Contractor: Blanik.
Accommodation: two.
Dimensions: span 46.3 ft, length 27.6 ft, height 6.8 ft.
Weight: 1,103 lb.
Performance: speed 146.1 mph, glide ratio 26:1.
COMMENTARY
The **TG-10C** is an L-13AC Blanik sailplane produced in the Czech Republic.

TG-10D
Brief: Single-seat medium-performance sailplane used for cross-country soaring training and competition.
Function: Trainer.
Operator: USAFA.
Delivered: spring 2002.
IOC: December 2002.
Production: four.
Inventory: four.
Unit Location: USAFA, Colo.
Contractor: Blanik.
Accommodation: single.
Dimensions: span 46.3 ft, length 21.7 ft, height 4.7 ft.
Weight: 750 lb.
Performance: speed 149.5 mph, glide ratio 33:1.
COMMENTARY
The **TG-10D** is an L-33 Solo Blanik sailplane produced in the Czech Republic.

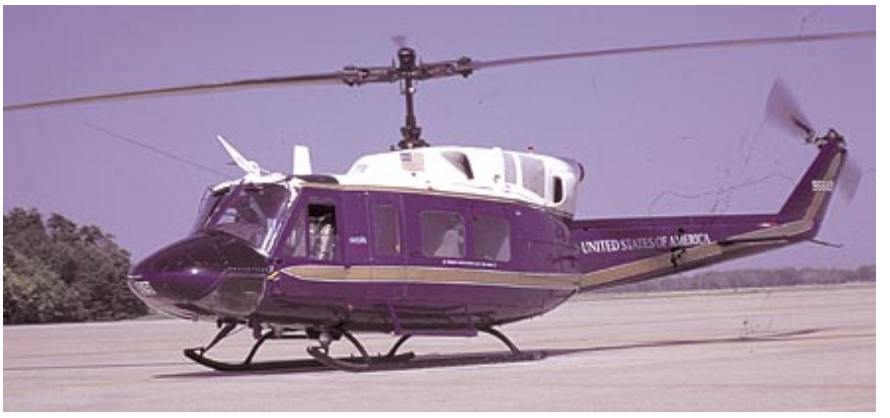
TG-11A
Brief: Conventional two-place, side-by-side, self-launched high-performance sailplane used for cross-country training.
Function: Trainer.
Operator: USAFA.
Delivered: summer 1995.
IOC: not available.
Production: not available.
Inventory: two.
Unit Location: USAFA, Colo.
Contractor: Stemme GmbH, Germany.
Power Plant: one Limbach L-2400 EB1.AD four-cylinder engine, T-O 93 hp at 3,400 rpm, cruise 80 hp at 3,000 rpm (S/L).
Accommodation: two, side by side.
Dimensions: span 75.5 ft, length 27.6 ft, height 5.7 ft.
Weight: gross 1,874 lb.
Ceiling: 17,450 ft powered cruise, FL 250 ft.
Performance: speed 168 mph, 138 mph powered cruise, glide ratio 50:1, range 860 miles powered.
COMMENTARY
The **TG-11A** self-launched high-performance sailplane has a folding propeller that is stored behind a retractable propeller dome on the aircraft nose during soaring flight. It is used primarily for dual cross-country training, field selection, and advanced sailplane training.

TG-14
Brief: A two-place, side-by-side motorized glider for use by USAFA in its Introductory Flight Training Program (IFTP) flight screening/primary training program.
Function: Trainer.
Operator: USAFA.
Delivered: from June 2002.
IOC: December 2002.
Production: 14 (planned).
Inventory: five.
Unit Location: USAFA, Colo.
Contractor: Grupo Aeromot, Brazil.
Power Plant: one Rotax 912A, 81 hp engine.
Accommodation: two, side by side.
Dimensions: span 57.3 ft, length 26.4 ft, height 6.3 ft.
Weight: gross 1,874 lb.
Performance: cruise speed 110 mph, glide ratio 31:1, range 690 miles at high-speed cruise, max endurance seven hr.
COMMENTARY
A military version of the AMT-200S Sport Grupo Aeromot selected for use in USAFA's IFTP, replacing the Enhanced Flight Screening Program performed by civilian flying schools since the grounding of the T-3A Firefly in 1997. Cockpit and avionics are modified for military use.

UV-18 Twin Otter
Brief: Modified utility transport used for parachute jump training.
Function: Paradrop.
Operator: USAFA.
First Flight: May 1965 (commercial version).
Delivered: 1977.
IOC: 1977.
Production: three.
Inventory: three.
Unit Location: USAFA, Colo.
Contractor: de Havilland Aircraft of Canada.
Power Plant: two Pratt & Whitney Canada PT6A-27 turboprops, each 620 ehp.
Accommodation: crew of two and up to 20 passengers.
Dimensions: span 65 ft, length 51.8 ft, height 19.5 ft.
Weight: gross 12,500 lb.
Ceiling: 26,700 ft.
Performance: max cruising speed 210 mph, range with 2,500 lb payload 806 miles.
COMMENTARY
The UV-18B is a military version of the DHC-6 Twin Otter STOL utility transport used for parachute jump training at USAFA.

Helicopters

HH-60G Pave Hawk
Brief: Specially modified helicopters used for SAR and support missions.
Function: SOF heavy-lift helicopter.
Operator: ACC, AETC, AFMC, PACAF, ANG, AFRC.
First Flight: October 1974.
Delivered: 1982–present.
IOC: circa 1982.
Production: 105.
Inventory: 105.
Unit Location: Kadena AB, Japan, Kirtland AFB, N.M., Moody AFB, Ga., NAS Keflavik, Iceland, Nellis AFB, Nev., Robins AFB, Ga. ANG: Francis S. Gabreski Arpt., N.Y., Moffett Federal Airfield, Calif. AFRC: Davis–Monthan AFB, Ariz., Patrick AFB, Fla., Portland Arpt., Ore.
Contractor: Sikorsky.
Power Plant: two General Electric T700-GE-700/701C turboshafts, each 1,620 (continuous) shp.
Accommodation: crew of three or four; 11–14 troops, up to six litters, or internal or external cargo.
Dimensions: rotor diameter 53.6 ft, length of fuselage 64.7 ft, height 16.7 ft.
Weight: empty 12,330 lb, max gross 22,000 lb.
Ceiling: 14,200 ft.
Performance: max speed 173 mph, max range 373 miles (internal fuel), 500 miles (auxiliary tank).
Armament: two 7.62 mm miniguns, with provision for two .50 caliber machine guns in cabin doors.
COMMENTARY
One hundred five Black Hawk helicopters were modified to **HH-60G** Pave Hawk configuration for use by active duty, ANG, and AFRC air rescue units for CSAR and various mission-support activities worldwide. The Pave Hawk is a highly modified version of the Army Black Hawk helicopter, featuring an upgraded communications/navigation suite that includes INS/GPS/Doppler navigation systems, SATCOM, secure/antijam communications, and a PLS that provides range/steering data to compatible survivor radios.
Further modifications include an automatic flight-control system, NVG lighting, FLIR, color weather radar, engine/rotor blade anti-ice system, retractable in-flight refueling probe, internal auxiliary fuel tanks, and an integral rescue hoist. Combat enhancements include RWR, IR jammer, flare and chaff countermea-



***UH-1N** Iroquois* (Guy Aceto)

sures dispensing system, and two 7.62 mm or .50-caliber machine guns.

MH-53 Pave Low

Brief: Specially outfitted heavy-lift helicopters used by Air Force Special Operations Forces for infiltration/exfiltration as well as CSAR missions.

Function: SOF heavy-lift helicopter.

Operator: AETC, AFSOC.

First Flight: March 1967.

Delivered: from July 1987 (MH-53J).

IOC: 1988 (MH-53J).

Production: not available.

Inventory: 36.

Unit Location: AETC: Kirtland AFB, N.M. AFSOC: Hurlburt Field, Fla., Osan AB, South Korea, RAF Mildenhall, UK.

Contractor: Sikorsky; Texas Instruments.

Power Plant: two General Electric T64-GE-100 turboshafts, each 4,330 shp.

Accommodation: crew of six; up to 38 troops.

Dimensions: rotor diameter 72.2 ft, length of fuselage (without refueling probe) 67.2 ft, height 25 ft.

Weight: gross 50,000 lb.

Ceiling: 16,000 ft.

Performance: speed 164 mph, max range 630 miles, unlimited with air refueling.

Armament: mounts for any combination of three 7.62 miniguns and .50-caliber machine guns.

COMMENTARY

MH-53H. Older version of the helicopter, all of which, together with all HH/CH-53B/Cs, were upgraded to MH-53J Pave Low III "Enhanced" standard from 1986.

MH-53J. A long-range deep penetration helicopter, adverse weather capable and equipped for extended operations when air refueled. Equipped with a nose-mounted FLIR, an integrated digital avionics suite that includes TF/TA radar, Kalman filtered navigation suite (GPS, INS, Doppler), projected map display, secure UHF, VHF, FM, HF communications, PLS, SATCOM, hover coupler, rescue hoist, mission commander's C2 panel, armor plating, and an ECM suite with radar and IR missile jammers, flare/chaff dispensers, RWR, and missile launch detectors.

A service life extension program (SLEP) upgraded the aircraft's hydraulics, wiring, and basic airframe structure for increased gross weight, and an automated blade/pylon fold system optimized for shipboard compatibility. All aircraft modified to support aircrew eye/respiratory protection system.

MH-53M. MH-53J helicopters upgraded to Pave Low IV standard, delivered from 1999. Upgrades include the interactive defensive avionics suite/multimission advanced tactical terminal capability which integrates onboard EW systems with off-board, over-the-horizon, near-real-time intelligence, and mission software improvements. Cockpit modifications include three MFDs, integrated digital map, and mission commander situation awareness panel in the cabin area.

TH-53A. Six TH-53As (modified USMC CH-53As) are used by the 58th SOW, Kirtland AFB, N.M., as basic qualification trainers. Modifications include the installation of General Electric T64-GE-100 engines, air refueling probe, and standard USAF avionics and communications equipment.

UH-1 Iroquois

Brief: Modified Bell helicopter used to support Air Force ICBM facilities and for administrative airlift.

Function: Utility helicopter.

Operator: AETC, AFMC, AFSPC, AMC, PACAF.

First Flight: circa 1956.

Delivered: from September 1970.

IOC: circa 1970.

Production: 79.

Inventory: 62.

Unit Location: Fairchild AFB, Wash., F.E. Warren AFB, Wyo., Kirtland AFB, N.M., Malmstrom AFB, Mont., Minot AFB, N.D., Robins AFB, Ga., Vandenberg AFB, Calif., Yokota AB, Japan.

Contractor: Bell.

Power Plant: Pratt & Whitney Canada T400-CP-400 Turbo "Twin-Pac," 1,290 shp.

Accommodation: two pilots and 14 passengers or cargo, or external load of 4,000 lb.

Dimensions: rotor diameter (with tracking tips) 48.1 ft, fuselage length 42.3 ft, height 14.3 ft.

Weight: gross and mission weight 11,200 lb.

Ceiling: 13,000 ft.

Performance: max cruising speed at S/L 115 mph, max range, no reserves, 261 miles.

Armament: (optional) two General Electric 7.62 mm miniguns or two 40 mm grenade launchers; two seven-tube 2.75-in rocket launchers.

COMMENTARY

UH-1N is a twin-engine version of the UH-1 utility helicopter (Bell Model 212), most of which are allocated for AFSPC missile site support and for administrative/DV airlift. The UH-1N is also used by AETC's 58th SOW, Kirtland AFB, N.M., for training purposes and by the 336th TG, Fairchild AFB, Wash., for aircrew survival training. Two UH-1N helicopters are maintained by AFSOC for aviation advisory aircrew flight proficiency.

Strategic Missiles

AGM-86 Air Launched Cruise Missile

Brief: A small, subsonic, winged air vehicle, deployed on B-52H aircraft, which can be equipped with either a nuclear or conventional warhead and can be used to help dilute air defenses and complicate an enemy's air defense task.

Function: Strategic air-to-surface cruise missile.

Operator: ACC.

First Flight: June 1979 (full-scale development).

Delivered: from 1981.

IOC: December 1982, Griffiss AFB, N.Y.

Production: 1,700+.

Unit Location: Barksdale AFB, La., Minot AFB, N.D.

Contractor: Boeing.

Power Plant: Williams/Teledyne CAE F107-WR-10 turbofan, 600 lb thrust.

Guidance: AGM-86B: inertial plus Terrain Contour Matching (TERCOM); AGM-86C: inertial plus GPS.

Warhead: AGM-86B: W80-1 nuclear; AGM-86C: blast/fragmentation conventional; AGM-86D: hard target penetrating warhead.

Dimensions: length 20.8 ft, body diameter 2 ft, wingspan 12 ft.

Weight: 3,150 lb (B), 3,277 lb (C).

Performance (approx): speed 550 mph (Mach 0.6), range 1,500+ miles (AGM-86B).

COMMENTARY

AGM-86A. A prototype cruise missile, developed in the mid–1970s. Slightly smaller than the later versions, it never entered production.

AGM-86B. First production version, the B is programmed for strategic attack on surface targets. Small radar signature and low-level flight capability enhance the missile's effectiveness. The last of 1,715 production models was delivered in October 1986. Undergoing SLEP to extend life to FY30.

AGM-86C. A conventional warhead version, developed from June 1986, the Conventional Air Launched Cruise Missile (CALCM) was first used operationally during Gulf War I and has since been widely used in combat operations. CALCM provides the warfighter with an adverse weather, day/night, air-to-surface, accurate, standoff outside theater defenses strike capability, with a range greater than 500 miles and a 3,000-lb class warhead. CALCM is equally effective for stand-alone, clandestine/punitive strikes and fully integrated theater warfare. Since 1986, Boeing converted 622 Bs to the conventional configuration, the first of which was delivered in December 1987. Of the 322 most recent conversions, 132 feature new Block 1A enhancements with improved accuracy and increased immunity to electronic jamming.

AGM-86D. CALCM penetrator version with a Lockheed Martin AUP-3(M) warhead. The last 50 of the 322 CALCM conversions are to AGM-86D configuration. The CALCM penetrator provides the warfighter with a cost-effective, standoff outside theater defenses capability against a wide range of hardened, deeply buried targets.

AGM-129 Advanced Cruise Missile

Brief: A stealthy, long-range, winged air vehicle equipped with a nuclear warhead and designed to evade enemy air and ground-based defenses in order to strike hard, heavily defended targets at standoff distances.

Function: Strategic air-to-surface cruise missile.

Operator: ACC.

First Flight: July 1985.

Delivered: June 1990–August 1993.

IOC: circa 1991.

Production: 461.

Unit Location: Barksdale AFB, La., Minot AFB, N.D.

Contractor: General Dynamics; Boeing (McDonnell Douglas).

Power Plant: Williams International F112-WR-100 turbofan.

Guidance: inertial, with TERCOM update.

Warhead: W80-1 nuclear.

Dimensions: length 20.8 ft, body width 2.2 ft, wingspan 10.2 ft.

Weight: 3,700 lb.

***LGM-30G** Minuteman III in its silo* (Guy Aceto)

Performance (approx): range 2,300+ miles, speed 550 mph.

COMMENTARY

AGM-129A. Embodying stealth technology, the AGM-129A has improved range, accuracy, survivability, and targeting flexibility, compared with the AGM-86B. Developed by General Dynamics, McDonnell Douglas was certified as second source for this advanced system, which is deployed on B-52H aircraft.

LG-118 Peacekeeper

Brief: A solid-fuel ICBM capable of delivering a thermonuclear payload of 10 warheads with high accuracy over great distances.

Function: Strategic surface-to-surface ballistic missile.

Operator: AFSPC.

First Flight: June 17, 1983.

Delivered: June 1986–December 1988.

IOC: December 1986, F.E. Warren AFB, Wyo.

Production: 50.

Inventory: 49, as of Oct. 3, 2002.

Unit Location: F.E. Warren AFB, Wyo.

Contractor: Lockheed Martin.

Power Plant: first three stages: solid propellant; fourth stage: storable liquid; by Thiokol, Aerojet, Hercules, and Rocketdyne, respectively.

Guidance: inertial guidance system.

Warheads: 10 Avco Mk 21 MIRVs.

Dimensions: length 71 ft, diameter 7.7 ft.

Weight: approx 195,000 lb.

COMMENTARY

LG-118A. Developed initially in response to an increased Soviet strategic threat, deployment was capped at 50 in FY90 in response to the changing international political climate.

Housed in converted Minuteman III silos, Peacekeeper is a four-stage ICBM that carries up to 10 independently targetable re-entry vehicles. It is more accurate and has a greater payload and range than the Minuteman III. Its greater resistance to nuclear effects and its more capable guidance system provide a greatly improved ability to destroy very hard targets. These attributes, combined with its prompt response, provide a decisive deterrent.

USAF began its deactivation of Peacekeeper ICBMs, scheduled for retirement under nuclear force structure reductions, on Oct. 3, 2002. Dismantlement of all 50 missiles will take about three years.

LGM-30 Minuteman

Brief: A solid-fuel ICBM capable of being fired from silo launchers and delivering a thermonuclear payload of one to three warheads with high accuracy over great distances.

Function: Strategic surface-to-surface ballistic missile.

Operator: AFSPC.

First Flight: February 1961.

Delivered: 1962–December 1978.

IOC: December 1962, Malmstrom AFB, Mont.

Production: 1,800.

Inventory: 500.

Unit Location: F.E. Warren AFB, Wyo., Malmstrom AFB, Mont., Minot AFB, N.D.

Contractor: Boeing.

Power Plant: stage 1: Thiokol M-55 solid-propellant motor, 210,000 lb thrust; stage 2: Aerojet–General SR19-AJ-1 solid-propellant motor, 60,300 lb thrust; stage 3: Thiokol SR73-AJ-1 solid-propellant motor, 34,400 lb thrust.

Guidance: inertial guidance system.

Warheads: one–three Mk 12/12A MIRVs (downloaded to one).

Dimensions: length 59.8 ft, diameter of first stage 5.5 ft.

Weight: launch weight (approx) 78,000 lb.

Performance: speed at burnout more than 15,000 mph, highest point of trajectory approx 700 miles, range with max operational load more than 6,000 miles.

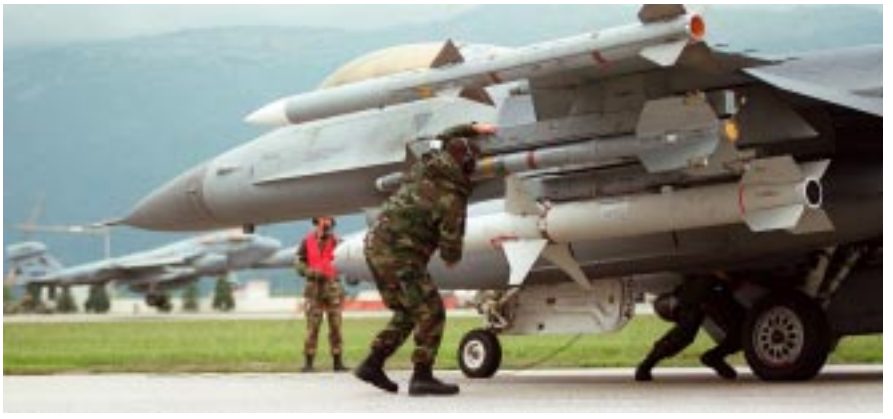
COMMENTARY

A key element in the US strategic deterrent posture, Minuteman is a three-stage, solid-propellant ICBM, housed in an underground silo.

LGM-30A/B. Minuteman I version deployed in the early 1960s. The last Minuteman I missile was removed from its silo at Malmstrom AFB, Mont., in February 1969. USAF had deployed 150 A and 650 B models in 16 squadrons.

LGM-30F. Minuteman II version incorporated a larger second stage, an improved guidance package, greater range and payload capability, and hardening against the effects of nuclear blast. IOC was reached in October 1965 at Grand Forks AFB, N.D. USAF deployed 450 in nine squadrons.

LGM-30G. The Minuteman III became operational in June 1970, providing improved range, rapid retargeting, and the capability to place three multiple independently targetable re-entry vehicles (MIRVs) on three targets with a high degree of accuracy. USAF initially deployed 550 in 11 squadrons.



***AIM-120** AMRAAM* (top), ***AIM-9** Sidewinder,* ***AGM-88** HARM* (bottom) (SrA. Stan Parker)

A single re-entry vehicle configuration has been demonstrated, planned for, and is being worked in accordance with strategic arms control negotiations. Currently a total of 500 Minuteman IIIs are based at Minot AFB, N.D.; F.E. Warren AFB, Wyo.; and Malmstrom.

An extensive life extension program is ensuring Minuteman's viability to 2020. Major upgrades include refurbishment of liquid propulsion post-boost rocket engine, remanufacture of the solid-propellant rocket motors, replacement of the environmental control system, repair of launch facilities, installation of updated, survivable communications equipment, and a C2 sustainment program.

Tactical Missiles and Weapons

AIM-7 Sparrow

Brief: A supersonic, medium-range, semiactive radar–guided air-to-air missile with all-weather, all-altitude, and all-aspect offensive capability and a high-explosive warhead, carried by fighter aircraft.

Function: Air-to-air guided missile.

First Flight: December 1983 (AIM-7M).

Delivered: from 1956.

IOC: April 1976 (AIM-7F).

Production: sustainment phase.

Inventory: classified.

Contractor: Raytheon (Hughes); General Dynamics.

Power Plant: Hercules Mk 58 Mod 0 4.5 sec boost–11 sec. sustain rocket motor.

Guidance: AIM-7M: monopulse semiactive radar.

Warhead: high-explosive, blast fragmentation, weighing 86 lb.

Dimensions: length 12 ft, body diameter 8 in, wingspan 3.3 ft.

Weight: launch weight 504 lb.

Performance (estimated): max speed more than 2,660 mph (Mach 3.5), range more than 34 miles.

COMMENTARY

Early versions. Production of Sparrow has been under way for more than 40 years. Approximately 34,000 early models (AIM-7A/B/C/D/E) were produced. Compared to the earlier versions, the advanced solid-state AIM-7F, introduced into USAF service in 1976, had a larger motor, Doppler guidance, improved ECM, and better capability over both medium and "dogfight" ranges. USAF produced approximately 5,000, but none are now in USAF service.

AIM-7M, a joint Navy–USAF project to produce a monopulse version of Sparrow aimed at reducing cost and improving performance in the ECM and look-down clutter regions. It began operational service in FY83. This version provides all-weather, all-altitude, all-aspect capability and equips USAF F-15s and F-16s (ADF) and Navy F-14s and F-18s.

AIM-7P. Block 1 retrofit to AIM-7M guidance and control sections (GCSs), providing low-altitude guidance and fuzing capability. Block 2 provides new-build for AIM-7P GCSs.

AIM-9 Sidewinder

Brief: A supersonic, short-range, IR–guided air-to-air missile carried by fighter aircraft, having a high-explosive warhead.

Function: Air-to-air missile.

First Flight: September 1953.

Delivered: 1983–present. First production AIM-9X delivered May 1, 2002.

IOC: circa 1983 (AIM-9M).

Production: sustainment phase (AIM-9M); LRIP from November 2000 (AIM-9X).

Inventory: classified.

Contractor: Raytheon; Loral.

Power Plant: Thiokol Mk 36 Mod 11 solid-propellant rocket motor.

Guidance: solid-state IR homing guidance.

Warhead: high-explosive, weighing 20.8 lb.

Dimensions: length 9.4 ft, body diameter 5 in, finspan 2.1 ft.

Weight: launch weight 190 lb.

Performance: max speed Mach 2+, range 10+ miles.

COMMENTARY

Early versions. AIM-9A was the prototype version. The AIM-9B, initial production version, entered the inventory in 1957 and was effective only at close range during day. These shortcomings were eliminated on subsequent AIM-9E/H/J/P versions. The third generation Sidewinder, AIM-9L, added a more powerful solid-propellant rocket motor as well as tracking maneuvering ability. Production and delivery began in 1976; production ended in 1981.

AIM-9M, a joint Navy–USAF project aimed at producing an improved version of AIM-9L with all-altitude, all-aspect, launch-and-leave intercept capability. Carriage options include: A-10, F-14, F-15, F-16, F-16 ADF, and F-18. This version has increased infrared counter-countermeasures (IRCCM) capability, improved background discrimination, and a reduced-smoke rocket motor. First flight of prototype was in February 1978. Full production began in FY81.

AIM-9M-9. A recently completed modification to improve IRCCM capability of early missiles.

AIM-9X is the result of a Navy–Air Force program, derived from a jointly funded demonstration and validation contract. Raytheon is the EMD contractor. The AIM-9X entered LRIP from November 2000. The flight-test program has completed 19 live guided-missile firings with 11 kills of QF-4 target drones. USAF plans to buy 5,097 missiles.

The AIM-9X incorporates advanced technologies such as a focal plane array imaging seeker, high off-boresight sensor (HOBS), and a highly maneuverable jet-vane control system. The missile utilizes the existing AIM-9M rocket motor, warhead, and fuze. It will be integrated with the JHMCS to maximize its HOBS capability. It will be employed on F-15, F-16, F-35, F/A-18, and F/A-22 aircraft.

AIM-120 AMRAAM

Brief: A new generation supersonic, medium-range, active radar–guided air-to-air missile with a high-explosive warhead.

Function: Air-to-air guided missile.

First Flight: December 1984.

Delivered: 1988–July 2010 (planned).

IOC: September 1991.

Production: 10,917+ planned for USAF/USN.

Inventory: classified.

Contractor: Raytheon.

Power Plant: Alliant boost-sustain solid-propellant rocket motor.

Guidance: inertial/command, inertial with active radar terminal homing.

Warhead: high-explosive directed fragmentation weighing 48 lb.

Dimensions: (A/B models) length 12 ft, body diameter 7 in, span of tail control fins 2.1 ft.

Weight: 335 lb.

Performance: cruising speed approx Mach 4, range more than 23 miles.

COMMENTARY

A joint project between the Navy and USAF, the

AIM-120 Advanced Medium-Range Air-to-Air Missile (AMRAAM) is a replacement for the AIM-7 Sparrow. The AIM-120 equips F-15, F-16, F/A-18, and F/A-22 fighters. (The F/A-22 will only carry the C model.) Inertial and command inertial guidance and active radar terminal homing provide launch-and-maneuver capability. Significant improvements in operational effectiveness over the AIM-7 include increased average velocity, reduced miss distance, improved fuzing, increased warhead lethality, multiple target engagement capability, improved clutter rejection in low-altitude environments, enhanced electronic protection capability, increased maximum launch range, a reduced-smoke motor, and improved maintenance and handling.

AIM-120A was the first production version, delivered by Hughes in 1988 to the 33rd TFW at Eglin AFB, Fla.

AIM-120B/C are upgraded, reprogrammable variants of the AIM-120. The AIM-120C currently in production has smaller, clipped control surfaces to provide for internal carriage capability in the F/A-22, with HOBS launch capability.

AGM-65 Maverick

Brief: A tactical, TV– or imaging-infrared (IIR)–guided air-to-surface missile carried by fighters and designed for use in CAS, interdiction, and defense suppression missions, having standoff capability and high probability of strike against a wide range of targets.

Function: Air-to-surface guided missile.

First Flight: August 1969.

Delivered: from August 1972.

IOC: February 1973.

Production: sustainment phase.

Inventory: 7,300 AGM-65A/B/H/K (EO guidance); 15,000 AGM-65D/G (IR guidance).

Contractor: Raytheon.

Power Plant: Thiokol TX-481 solid-propellant rocket motor.

Guidance: self-homing, EO guidance system (IIR on D and G models).

Warhead: AGM-65A/B/D/H 125-lb high-explosive, shaped charge; AGM-65G/K 298-lb blast fragmentation.

Dimensions: length 8.2 ft, body diameter 1 ft, wingspan 2.3 ft.

Weight: launch weight (AGM-65A) 462 lb, (AGM-65G) 670 lb.

Performance: range about 9.2 miles.

COMMENTARY

Maverick missiles have a long and distinguished combat record. They were first employed by USAF in Vietnam and were used extensively during Gulf War I. They currently equip A-10, F-15E, and F-16 aircraft for use against tanks and columns of vehicles and in the SEAD role.

AGM-65A. The basic Maverick is a launch-and-leave, TV–guided air-to-surface missile that enables the pilot of the launch aircraft to seek other targets or leave the target area once the missile has been launched. Production was initiated in 1971, following successful test launches over distances ranging from a few thousand feet to many miles and from high altitudes to treetop level.

AGM-65B. A version with a "scene magnification" TV seeker that enables the pilot to identify and lock on to smaller or more distant targets.

AGM-65D. System developed to overcome limitations of the TV Maverick, which can be used only in daylight and clear-weather conditions. This version has an IIR seeker as well as a lower-smoke motor. IIR Maverick became operational on A-10s in February 1986.

AGM-65G. Uses the IIR seeker with an alternate 298-lb blast fragmentation warhead for use against hardened targets. Software has been modified to include options for targeting ships and large land targets as well as mobile armor. This version also has a digital autopilot and a pneumatic, rather than hydraulic, actuation system. USAF received its first G model in 1989.

AGM-65H. AGM-65B modified with an upgraded TV seeker providing significant reliability, maintainability, and performance improvements over the AGM-65B seeker and double the standoff range.

AGM-65K. AGM-65G modified with the same upgraded TV seeker as in the AGM-65H to provide a TV–guided version of the Maverick with the 298-lb blast fragmentation warhead.

AGM-84 Harpoon

Brief: An adverse weather capable, sea-skimming, active radar–guided, antiship cruise missile system capable of being fired from B-52H aircraft, ships, and submarines.

Function: Air-to-surface antiship missile.

First Flight: March 1974 (for USN).

Delivered: from 1977 (USN).

IOC: circa 1985 (USAF).

Production: sustainment phase.

Contractor: Boeing (McDonnell Douglas).

Power Plant: Teledyne CAE J402-CA-400 turbojet, 660 lb thrust.

*F-15E releasing an **AGM-130*** (SrA. Jeff Fitch)

Guidance: sea-skimming cruise monitored by radar altimeter, active radar terminal homing.

Warhead: penetration high-explosive blast type, weighing 500 lb.

Dimensions: length 12.6 ft, body diameter 1.1 ft, wingspan 3 ft.

Weight: 1,172 lb.

Performance: speed high subsonic, range more than 57 miles.

COMMENTARY

Harpoon and its launch control equipment provide USAF the capability to interdict ships at ranges well beyond those of other aircraft. Originally acquired to equip two squadrons of now-retired B-52G aircraft for maritime antisurface operations, the Harpoon all-weather antiship missile currently arms conventional-mission B-52Hs.

AGM-84D is a variant of the USN Harpoon that has been adapted for use on B-52 bombers, which can carry eight missiles.

AGM-88 HARM

Brief: An air-to-surface tactical missile designed to seek and destroy enemy radar-equipped air defense systems, using an advanced guidance system that senses and homes in on enemy radar emissions.

Function: Air-to-surface antiradiation missile.

First Flight: April 1979.

Delivered: 1982–98.

IOC: circa 1984.

Production: sustainment phase.

Contractor: Raytheon.

Power Plant: Thiokol smokeless, dual-thrust, solid-propellant rocket motor.

Guidance: passive homing guidance system, using seeker head that homes on enemy radar emissions.

Warhead: high-explosive fragmentation, weighing 145 lb.

Dimensions: length 13.7 ft, body diameter 10 in, wingspan 3.7 ft.

Weight: 795 lb.

Performance: cruising speed supersonic, altitude limits S/L to 40,000 ft, range more than 10 miles.

COMMENTARY

The High-speed Anti-Radiation Missile (HARM) exhibits great velocity along with an ability to cover a wide range of frequency spectrums through the use of programmable digital processors in both the carrier aircraft's avionics equipment and in the missile. The combination gives this second generation antiradiation missile greatly improved capability over first-generation Shrikes and Standards. The AGM-88 proved highly effective against enemy ground radar during the 1991 Persian Gulf War and continues in use in current operations. HARMs equip F-16 Block 50/52s (F-16CJ) dedicated to the SEAD mission.

AGM-88A. A factory-programmed version used to equip the now-retired F-4G Wild Weasel to increase its lethality in electronic combat.

AGM-88B. Older versions of the AGM-88B are being upgraded with the enhanced capability guidance seeker currently equipping the C version.

AGM-88C. This current production version has a more lethal warhead, containing tungsten alloy cubes, rather than steel, and the enhanced-capability AGM-88C-1 guidance head.

Erasable electronically programmable read-only memory has been retrofitted on ACC, PACAF, and USAFE HARMs, permitting changes to missile memory in the field. Upgrade initiatives are aimed at increasing capability of both B and C versions against target shutdown, blanking, and blinking and at reducing potential damage to friendly radars in the target area; home-on jamming capability will be added to the C. Further planned upgrades include GPS precision navigation capability.

AGM-130

Brief: A powered TV– or IIR–guided air-to-surface missile, carried by the F-15E and designed for high- and low-altitude strikes at standoff ranges against heavily defended targets.

Function: Air-to-surface guided and powered bomb.

First Flight: 1984.

Delivered: November 1992–FY00.

IOC: 1994.

Production: sustainment phase.

Contractor: Boeing.

Guidance: TV or IIR seeker, or DME transponder.

Warhead: Mk 84 bomb (2,000-lb unitary) or BLU-109.

Dimensions: length 12.8 ft, body diameter 1.5 ft, wingspan 4.9 ft.

Weight: launch weight 2,917 lb.

Performance: cruising speed subsonic, ceiling in excess of 30,000 ft, range greater than 34.5 miles, circular error probable (CEP) about 10 ft.

COMMENTARY

AGM-130 is a product improvement to the GBU-15 glide bomb, with a guidance system designed to give pinpoint accuracy from low or medium altitudes. The AGM-130 adds a rocket motor, radar altimeter, and digital control system, providing it with double the standoff range of the GBU-15.

Upgrades include a new solid-state TV seeker, an improved IR seeker, and INS/GPS guidance that permit operation in adverse weather and improve target acquisition.

AGM-130s have been used extensively in recent operations.

AGM-130A, with the Mk 84 warhead.

AGM-130C, with the BLU-109/B penetrating warhead.

AGM-142 Have Nap

Brief: A medium-range standoff attack missile that is carried by USAF B-52Hs to provide this long-range aircraft with a conventional precision strike capability.

Function: Air-to-surface guided missile.

First Flight: 1990.

Delivered: 1992.

IOC: June 1992.

Production: 240.

Contractor: Rafael; Lockheed Martin.

Power Plant: solid-propellant rocket motor.

Guidance: inertial, with data link, TV, or IIR homing.

Warhead: high-explosive, 750-lb blast/fragmentation or 800-lb penetrator.

Dimensions: length 15.9 ft, body diameter 1.8 ft, wingspan 5.8 ft.

Weight: 3,000 lb.

Performance: range greater than 57.5 miles.

COMMENTARY

The AGM-142 missile system provides a conventional, precision, standoff hard target penetrator weapon for the B-52H. The system consists of a standoff, air-to-ground precision guided missile, weapon data link pod, and associated support and training equipment. Initial operational test and evaluation launches were completed in May 1990. There are six variants of the AGM-142.

AGM-142A. TV seeker with 750-lb blast/frag warhead.

AGM-142B. IIR seeker with 750-lb blast/frag warhead.

AGM-142B-1. IIR-Z seeker with 750-lb blast/frag warhead.

AGM-142C. TV seeker with 800-lb penetrator warhead.

AGM-142D. IIR seeker with 800-lb penetrator warhead.

AGM-142D-1. IIR-Z improved seeker with 800-lb penetrator warhead.

AGM-154 Joint Standoff Weapon

Brief: First in a joint USAF and Navy family of low-cost, highly lethal glide weapons with a standoff capability, usable against heavily defended targets.

Function: Air-to-surface guided missile.

First Flight: December 1994.

Delivered: 2000–FY13 (planned).

IOC: 2000 (USAF).

Production: 6,114 (planned).

Inventory: 148.

Contractor: Raytheon.

Guidance: INS/GPS.

Dimensions: length 13.3 ft.

Weight: 1,065–1,500 lb.

Performance: range: low-altitude launch 17 miles, high-altitude launch 40+ miles.

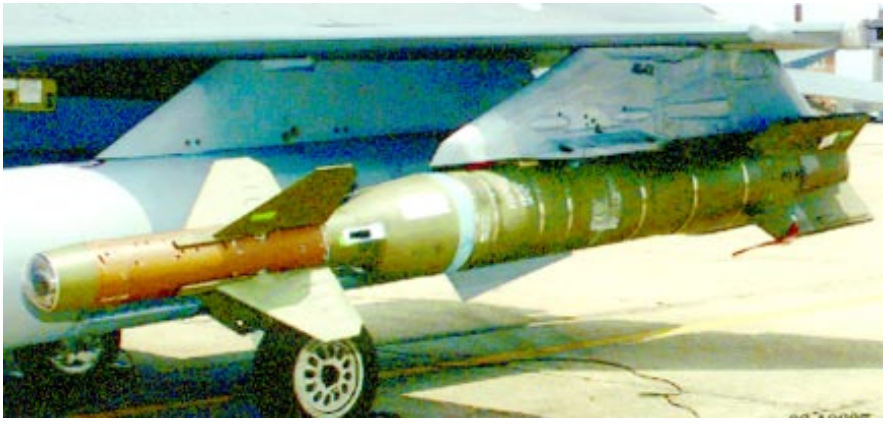
COMMENTARY

A medium-range, INS/GPS–guided, standoff air-to-ground weapon designed to attack a variety of soft and armored area targets (fixed, relocatable, and mobile) during day/night/adverse weather conditions. JSOW enhances aircraft survivability, as compared to current interdiction weapon systems, by providing the capability for launch aircraft to stand off outside the range of enemy point defenses. JSOW accuracy and launch-and-leave capability will allow several target kills per aircraft sortie. Integration of JSOW is currently on F-16 Block 50 and B-2 aircraft, with follow-on capability on B-52 and F-15E in FY03, B-1B and F-16 Block 30/40.

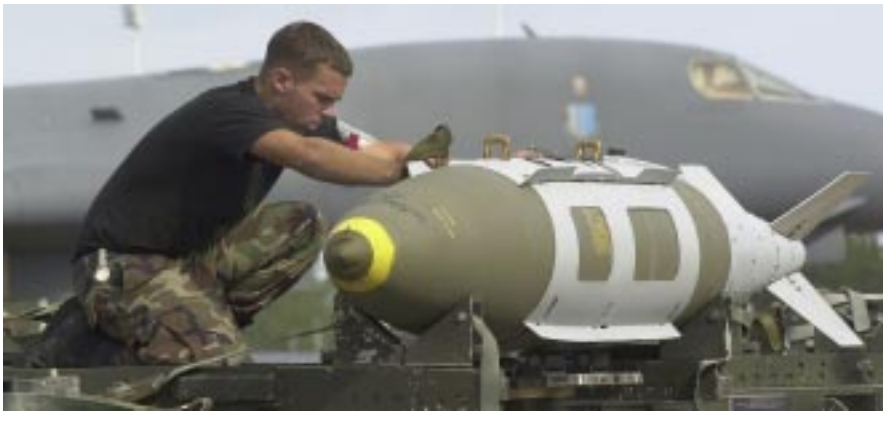
AGM-154A. The baseline BLU-97 variant for use against area targets; in full-rate production.

AGM-154B. The BLU-108 variant providing anti-armor capability; began production in FY99. Now canceled.

AGM-154C. The third variant (used by Navy only), JSOW/Unitary integrates an IIR terminal seeker and a 500-lb unitary warhead.



GBU-27 (SrA. Jeff Fitch)



GBU-31 *Joint Direct Attack Munition* (SSgt. Shane A. Cuomo)

AGM-158A Joint Air-to-Surface Standoff Missile

Brief: An advanced weapon designed to attack heavily defended targets with high precision at great standoff range.

Function: Air-to-surface guided weapon.

First Flight: April 8, 1999.

Delivered: first of 76 LRIP missiles due April 2003; through FY17 (planned).

IOC: FY03 (planned).

Production: 3,700 (USAF planned); 450 (Navy).

Inventory: TBD.

Contractor: Lockheed Martin; Raytheon; Honeywell.

Guidance: INS, GPS, and IIR terminal seeker.

Power Plant: Teledyne Continental Motors.

Dimensions: length 14 ft.

Weight: 2,250 lb.

Performance: 1,000-lb class penetrator and blast-fragmentation warheads; standoff range greater than 230 miles.

COMMENTARY

JASSM is a next generation missile that will enable Air Force and Navy fighters and bombers to destroy the enemy's war-sustaining capabilities from outside the ranges of enemy air defenses. JASSM has INS/GPS guidance with an IIR terminal seeker. It has an LO airframe and a rocket motor for survivability and standoff beyond area defenses. This autonomous precision strike weapon will attack both fixed and relocatable targets, ranging from nonhardened above ground to moderately hardened buried targets. The system will also offer low operational support costs. Threshold aircraft are B-52H and F-16. Objective aircraft include B-1B, B-2, F-15E, F-117, F/A-18E/F, and P-3C. An extended-range version (JASSM-ER), with a range of more than 575 miles, starts development in FY03 and will begin production in FY07.

CBU-87/103 Combined Effects Munition

Brief: The CBU-87 CEM is an area cluster munition effective against light armor, materiel, and personnel and used by USAF and Navy fighters and bombers for interdiction.

Function: Area cluster munition.

Production: sustainment phase.

Contractor: Aerojet General; Honeywell; Alliant Tech.

Guidance: none (CBU-87).

Dimensions: length 7.7 ft; diameter 1.3 ft.

Weight: 949 lb.

Performance: dispenses 202 BLU-97 combined effects bomblets over an area roughly 800 ft by 400 ft.

COMMENTARY

The CBU-87 Combined Effects Munition dispenses 202 BLU-97 shaped charge antipersonnel/antimateriel fragmentary/incendiary bomblets over the target in a rectangular pattern. It is currently delivered by USAF and Navy aircraft as an unguided gravity weapon. Density and size of the area covered depends on release parameters and spin rates.

CBU-103. USAF is retrofitting its inventory of CEMs with the WCMD tail kit. The WCMD will improve the munitions delivery accuracy when released from medium to high altitude. Tail kit purchases are based on available funding.

CBU-89/104 Gator

Brief: The CBU-89 Gator is an anti-armor/antipersonnel mine dispenser used by USAF and Navy fighters and bombers for interdiction.

Function: Scatterable mines.

Production: sustainment phase.

Inventory: classified (CBU-104).

Contractor: Honeywell; Aerojet General; Olan; Alliant Tech.

Guidance: none (CBU-89).

Dimensions: length 7.7 ft; diameter 1.3 ft.

Weight: 705 lb.

Performance: dispenses 72 BLU-91 anti-armor and 22 BLU-92 antipersonnel mines.

COMMENTARY

The CBU-89 Gator dispenser holds 94 mines, of which 72 are antitank and 22 are antipersonnel. The mines are dispersed over the target in a rectangular pattern. The antitank mines, which can be fuzed for up to a 72-hour delay, have a magnetic influence fuze to sense armor.

CBU-104. USAF is retrofitting its inventory of Gators with the WCMD tail kit, which will improve the munitions delivery accuracy when released from medium to high altitude. Tail kit purchases are based on available funding.

CBU-97/105 Sensor Fuzed Weapon

Brief: The CBU-97 SFW is an anti-armor cluster munition used by fighters and bombers for multiple kills per pass against moving and stationary land combat vehicles.

Function: Wide-area cluster munition.

First Flight: circa 1990.

Delivered: 1994–2007 (planned).

IOC: 1997.

Production: 3,937 (planned).

Inventory: classified.

Contractor: Textron Systems.

Guidance: IR sensors in each warhead search for targets, then detonate over them.

Dimensions: length 7.7 ft; diameter 1.3 ft.

Weight: 920 lb.

Performance: delivers 40 lethal projectiles over an area of about 500 ft by 1,200 ft.

COMMENTARY

The **CBU-97** Sensor Fuzed Weapon comprises an SUU-66/B tactical munitions dispenser with an FZU-39 fuze and a payload of 10 BLU-108/B submunitions. Each tactical munitions dispenser contains 10 BLU-108/B submunitions, and each submunition contains four "skeet" projectiles that, upon being thrown out, seek out their target and deliver an explosively formed penetrator. Each SFW can deliver a total of 40 lethal projectiles. The skeet IR sensors can detect a vehicle's IR signature; if no target is detected, the warhead detonates after a preset time. The SFW's primary targets are massed tanks, armored personnel carriers, and propelled targets. It also provides direct attack capability and interdiction against C2 centers.

The SFW is currently delivered as an unguided gravity weapon from the A-10, B-1, B-2, B-52H, F-15E, and F-16. A preplanned product improvement SFW variant is in full-scale production, incorporating improvements such as an active laser sensor, multimission warhead, and increased footprint.

CBU-105. Designation of a CBU-97 equipped with a WCMD tail kit. The CBU-105 can be accurately delivered from high altitude and in adverse weather from the B-1, B-2, B-52H, F-15E, and F-16.

GBU-10 Paveway II

Brief: An unpowered laser guided bomb (LGB) used to destroy high-value enemy targets from short standoff distances.

Function: Air-to-surface guided munition.

First Flight: early 1970s.

Delivered: from 1976.

IOC: 1976

Production: 10,000; continuing.

Inventory: not available.

Contractor: Lockheed Martin; Raytheon.

Guidance: semiactive laser.

Warhead: GBU-10C/D/E/F: Mk 84 bomb (2,000-lb unitary); GBU-10G/H/J: BLU-109.

Dimensions: length GBU-10C/D/E/F: 14 .1 ft; GBU-10G/H/J: 14 ft, body diameter GBU-10C/D/E/F: 1.5 ft; GBU-10G/H/J: 1.2 ft, wingspan 5.5 ft.
Weight: 1,985 lb.
Performance: CEP 29.7 ft; range 9.2 miles.
COMMENTARY
Folding-wing Paveway II weapons are improved versions of the earlier fixed-wing Paveway I. The GBU-10 is used primarily for precision bombing against nonhardened targets but is capable of greater penetration than previous version. It can operate in cloud ceilings down to 2,500 ft. GBU-10 platforms include A-10, B-52, F-15E, F-16, and F-117 aircraft.

GBU-12 Paveway II
Brief: An unpowered LGB used to destroy high-value enemy targets from short standoff distances.
Function: Air-to-surface guided munition.
First Flight: early 1970s.
IOC: 1976.
Production: about 30,000; continuing.
Inventory: not available.
Contractor: Lockheed Martin; Raytheon.
Guidance: semiactive laser.
Warhead: Mk 82 (500 lb) blast/fragmentation bomb.
Dimensions: length 10.9 ft, body diameter 10.7 in, wingspan 4.4 ft.
Weight: 603 lb.
Performance: CEP 29.7 ft; range about 6 miles.
COMMENTARY
Folding-wing Paveway II weapons are improved versions of the earlier fixed-wing Paveway I. The LGB is used primarily to strike fixed armor. It can operate in cloud ceilings down to 2,500 ft. GBU-12 platforms include A-10, B-52, F-15E, F-16, and F-117 aircraft.

GBU-15
Brief: An unpowered bomb carried by the F-15E and used to destroy high-value enemy targets from short standoff distances.
Function: Air-to-surface guided munition.
First Flight: 1975.
Delivered: 1983–complete.
IOC: 1983.
Production: more than 2,000.
Inventory: 1,650.
Contractor: Boeing; Raytheon.
Guidance: TV or IIR seeker.
Warhead: Mk 84 bomb (2,000-lb unitary) or BLU-109.
Dimensions: length 12.8 ft, body diameter 1.5 ft, wingspan 4.9 ft.
Weight: 2,500 lb.
Performance: cruising speed subsonic; range about 17 miles; CEP about 10 ft.
COMMENTARY
GBU-15 is an air-launched, cruciform-wing glide bomb fitted with a guidance system designed to give it pinpoint accuracy from low or medium altitudes. It also has a standoff capability. Development began in 1974, based on experience gained in Vietnam with the earlier Pave Strike GBU-8 modular weapon program. The GBU-15 is intended for tactical use to suppress enemy defenses and to destroy heavily defended targets. The target-detecting device is carried on the front of the warhead. The control module, with autopilot and data link module, attaches to the rear.
The weapon has two modes of attack. In direct attack, the weapon is locked on to the target before launch and flies a near line-of-sight profile to impact. In the indirect mode, the seeker can be locked on to the target after launch, or the operator can fly the weapon manually to impact, using guidance updates provided through the data link. A "buddy" system may be operated whereby the weapon is launched from one aircraft and controlled by another. The GBU-15 is deployed with the F-15E.
GBU-15(V)1/B. A TV–guided variant, qualified for operational service in 1983 (production complete).
GBU-15(V)2/B. IIR version entered service in 1987.
GBU-15-I. Combines accuracy of GBU-15 with the penetration capability of the improved 2,000-lb BLU-109/B penetrator bomb.
EGBU-15. GPS–guided variant, allowing pilot to select either TV, IR, or GPS guidance over the target, depending on weather and/or threat conditions. USAF had 100 initially produced for Allied Force, with field-level upgrade of over 1,200 existing GBU-15s.

GBU-16 Paveway II
Brief: An unpowered LGB used to destroy high-value enemy targets from short standoff distances.
Function: Air-to-surface glide munition.
First Flight: early 1970s.
IOC: 1976.
Production: not available.
Inventory: not available.
Contractor: Lockheed Martin; Raytheon.
Guidance: semiactive laser.
Warhead: Mk 83 (1,000 lb) bomb.
Dimensions: length 12.1 ft, body diameter 1.2 ft, wingspan 5.5 ft.
Weight: approx 1,000 lb.
Performance: CEP about 29 ft; range 9.2 miles.
COMMENTARY
Folding-wing Paveway II weapons are improved versions of the earlier fixed-wing Paveway I. The GBU-16 LGB is used primarily to strike fixed armor. Its platforms include A-10, F-15E, and F-16 aircraft.

GBU-24 Paveway III
Brief: A precise air-to-ground low-level LGB (LLLGB) equipped with an advanced guidance kit.
Function: Air-to-surface penetrating glide bomb.
First Flight: GBU-24A/B (USAF) in service May 1985; GBU-24B/B (Navy) June 1992.
Delivered: from 1986.
IOC: 1986.
Production: USAF 14,000; Navy 12,000.
Inventory: classified.
Contractor: Raytheon.
Guidance: semiactive laser.
Dimensions: length 14.2 ft.
Weight: 2,350 lb.
Performance: range more than 11.5 miles.
COMMENTARY
GBU-24A/B. An air-to-ground weapon equipped with the third generation Paveway III guidance kit, integrated with a BLU-109 penetrating warhead. The kit consists of an advanced guidance section and high-lift airframe. It is extremely precise and highly effective against a broad range of high-value hard targets. The system can be employed from low, medium, and high altitudes, providing operational flexibility through the use of an adaptive digital autopilot and large field-of-regard, highly sensitive scanning seeker. The GBU-24A/B was highly successful during Desert Storm.
The GBU-24 adapts to conditions of release, flies an appropriate midcourse, and provides trajectory shaping for enhanced warhead effectiveness. The weapon is deployed on USAF F-15E and F-16 and Navy F-14 and F/A-18.

GBU-27
Brief: A precise air-to-ground penetrating LGB equipped with an advanced guidance kit.
Function: Air-to-surface guided glide bomb.
First Flight: not available.
Delivered: from 1988.
IOC: 1988 (unconfirmed).
Production: approx 3,000.
Inventory: classified.
Contractor: Raytheon.
Guidance: semiactive laser.
Dimensions: span 5.5 ft, length 13.9 ft.
Weight: 2,170 lb.
Performance: range more than 11.5 miles.
COMMENTARY
To meet the unique requirements of the F-117A, the GBU-24A/B was adapted to GBU-27 standard, incorporating specific guidance features to accomplish this mission. The GBU-27 is extremely precise and was used to great effect in Desert Storm.
EGBU-27. Integrates GPS/INS guidance into the existing GBU-27 laser seeker to provide adverse weather capability and improved target location. Entered production in FY98. First operational use was in Gulf War II.

GBU-28
Brief: A large 5,000-lb class air-to-ground penetrating LGB equipped with an advanced laser guidance kit, used for striking and destroying hard underground targets.
Function: Air-to-surface guided glide bomb.
First Flight: February 1991.
Delivered: circa 1991.
IOC: 1991.
Production: approx. 500.
Inventory: classified.
Contractor: Raytheon.
Dimensions: length 19.2 ft, diameter 1.2 ft.
Weight: 4,676 lb.
Performance: range more than 5.75 miles.
COMMENTARY
Under USAF's rapid-response program, the GBU-28 bunker-busting LGB was developed for Desert Storm for use against deeply buried, hardened C2 facilities. Four of the GBU-28 weapons were used during the war: two for testing and two by F-111Fs against a bunker complex Feb. 27, 1991. Guidance is by a modified GBU-27 system.
EGBU-28. Integrates GPS/INS guidance into the existing GBU-28 guidance control unit to provide adverse weather capability and improved target location. Entered production in FY99.

GBU-31/32/38 Joint Direct Attack Munition
Brief: A joint USAF–Navy INS/GPS–guided weapon, carried by fighters and bombers, that provides highly accurate, autonomous, all-weather conventional bombing capability.
Function: Air-to-surface guided bomb.
First Flight: Oct. 22, 1996.
Delivered: 1998–FY08 (planned).
IOC: 1998.
Production: USAF 143,495; USN 72,246 (planned).
Inventory: 3,870.
Contractor: Boeing; Textron; Honeywell.
Dimensions: Mk 84 with JDAM 12.8 ft; BLU-109 with JDAM 12.4 ft; Mk 83 with JDAM 10 ft.
Weight: Mk 84 2,036/2,056 (USAF/USN); BLU-109 2,115/2,135; Mk 83 1,013/1,028.
Performance: range up to 17 miles, CEP with GPS 42.9 ft; CEP with INS only 99 ft.
COMMENTARY
JDAM upgrades the existing inventory of general-purpose bombs by integrating them with a GPS/INS guidance kit to provide accurate all-weather attack from medium/high altitudes. While still aboard the launch aircraft, JDAM is passed target information through the aircraft's avionics system. Once released, the inertial guidance kit takes over and, with periodic GPS updates to the INS, guides the weapon to its target. Threshold aircraft are B-1 and B-52; objective aircraft include AV-8B, B-2, F-14, F-15E, F-16, F-35, F-117A, F/A-18C/D/E/F, and F/A-22.
GBU-31. Variant that adds an INS/GPS guidance kit to the 2,000-lb general-purpose Mk 84 bomb or the 2,000-lb BLU-109 penetrator. First used in combat March 24, 1999.
GBU-32. Variant that adds an INS/GPS guidance kit to the 1,000-lb general-purpose Mk 83 bomb or the 1,000-lb BLU-110 penetrator.
GBU-38. Variant that adds an INS/GPS guidance kit to the 500-lb general-purpose Mk 82 bomb. First production deliveries, slated for the B-2, expected 2004.
Planned upgrades include an antispoofing GPS receiver and low-cost antijam antenna.

Massive Ordnance Air Blast (MOAB) Bomb
Brief: A massive precision guided munition designed to be dropped by B-1, B-2, or B-52 bombers.
Function: Massive bomb.
Guidance: GPS/INS.
Warhead: 18,000 lb, high explosive.
Dimensions: length 30 ft, diameter 3.3 ft.
Weight: 21,500 lb.
COMMENTARY
On March 11, 2003, USAF live-tested the largest PGM developed to date. Unlike the earlier "Daisy Cutter," the MOAB does not require a parachute.

Small Diameter Bomb
Brief: An air-to-surface miniaturized munition with accurate and precision standoff characteristics for both current and future fighter and bomber aircraft.
Function: Miniaturized bomb.
First Flight: TBD.
Delivered: TBD.
IOC: FY06.
Production: 24,000 (planned).
Inventory: TBD.
Contractor: TBD.
Guidance: GPS/INS.
Dimensions: TBD.
Weight: 250-lb class.
Performance: Near precision capability against fixed and relocatable targets in all weather.
COMMENTARY
The Small Diameter Bomb (SDB) is a 250-lb class weapon that increases loadout (number of weapons an aircraft can carry), thus maximizing the number of kills per sortie. It will use a common MIL-STD 1760 carriage system carrying four weapons. The SDB will provide fighter and bomber aircraft with an air-to-surface standoff capability from outside of point defenses against fixed targets. The SDB will use GPS/INS for guidance. Threshold aircraft for SDB is the F-15E. Objective aircraft include the A-10, B-1, B-2, F-16, F-35, F-117, F/A-22, and UCAV. The SDB weapons system will be interoperable with the information exchange requirements of the air operations theater C2 and intelligence, surveillance, and reconnaissance (ISR) architecture.
Two-year competitive design and development contracts were awarded to Boeing and Lockheed Martin. USAF plans to select the winner in September 2003.

Wind-Corrected Munitions Dispenser
Brief: A tail kit to be fitted to CBU 87/89/97 dispenser weapons. When dropped from high altitude, its inertial guidance system corrects for launch transients and wind effects to enhance accuracy.
Function: Guidance tail kit.
First Flight: February 1996.
Delivered: From 2000.
IOC: FY00.
Production: 31,165 (planned).
Inventory: 8,236 (tail kits delivered as of Sept. 30, 2002).
Contractor: Lockheed Martin.
Dimensions: length 1.4 ft, diameter 1.3 ft.

Weight: 100 lb.
Performance: range about eight miles.
COMMENTARY
USAF is to modify standard tactical munition dispensers with guidance kits to compensate for wind drift on downward flight from high altitudes. WCMD kits each have an INS guidance unit, movable tail fins that pop out in flight, and a signal processor. A WCMD tail kit is fitted on inventory cluster weapons: CEM (CBU-103), Gator (CBU-104), and SFW (CBU-105). Successful flight testing began in February 1996; WCMDs are now operational on F-16 and B-52 aircraft. Objective aircraft are B-1 (2003), F-15E, F-117, and F/A-22.

Satellite Systems

Defense Meteorological Satellite Program
Brief: Satellites that collect air, land, sea, and space environmental data to support worldwide strategic and tactical military operations.
Function: Environmental monitoring satellite.
Operator: National Polar-orbiting Operational Environmental Satellite System (NPOESS) program office.
First Launch: circa 1960s (classified until 1973).
IOC: classified but in use during Vietnam War.
Constellation/on-orbit: two.
Design Life: 48 months (Block 5D-2); 54 months (Block 5D-3).
Launch Vehicle: Titan II.
Unit Location: Suitland, Md.
Orbit Altitude: approx 500 miles.
Contractor: Lockheed Martin; Aerojet General; Northrop Grumman.
Power Plant: solar arrays generating 500–600 watts.
Dimensions: length 20.2 ft (with array deployed), width 4 ft.
Weight: 1,750 lb.
Performance: DMSP satellites orbit Earth at about 500 miles altitude and scan an area 1,800 miles wide. Each system covers the Earth in about 12 hr.
COMMENTARY
For the last 40 years, the DMSP constellation has provided high-quality, timely weather information to strategic and tactical warfighters worldwide. In addition, DMSP satellites provide critical land, sea, and space environment data required by US forces across the globe. The DMSP constellation will be replaced by the tri-agency NPOESS late in this decade.
Block 5D-2. Two operational DMSP Block 5D-2 satellites survey the entire Earth four times a day. The last of the Block 5D-2 satellites was launched in December 1999. The Block 5D-2 spacecraft "sees" visible and IR cloud-cover imagery to analyze cloud patterns with the operational linescan system. Secondary instruments include microwave imagers and sounders and a suite of space environment sensors.
Block 5D-3. DMSP F-16, the first Block 5D-3 satellite, is now scheduled for launch in May 2003. (DMSP F-15, with a 5D-3 satellite bus but 5D-2 sensors, was launched Dec. 12, 1999, and is credited as the first 5D-3 launch.) Block 5D-3 satellites have an improved spacecraft bus and sensors that provide for longer and more capable missions. Successful flyout of the DMSP Block 5D-3 satellites will help ensure a seamless transition to the NPOESS program for DOD.

Defense Satellite Communications System
Brief: A spacecraft traveling in geosynchronous orbit used to transmit SHF high-priority C2 communication.
Function: Communications satellite.
Operator: AFSPC.
First Launch: 1971 (DSCS II); 1982 (DSCS III); 2000 (DSCS III/SLEP).
IOC: Dec. 13, 1978 (DSCS II).
Constellation: five (III).
Design Life: 10 yr (III).
Launch Vehicle: Atlas II.
Unit Location: Schriever AFB, Colo.
Orbit Altitude: 22,000+ miles in geosynchronous orbit.
Contractor: Lockheed Martin.
Power Plant: solar arrays generating 1,269 watts, decreasing to 980 watts after 10 yr; 1,500 watts (SLEP).
Dimensions: rectangular body 6 ft x 6 ft x 7 ft; 38-ft span with solar arrays deployed.
Weight: 2,580 lb; 2,716 lb (SLEP).
COMMENTARY
DSCS III. The Defense Satellite Communications System provides worldwide, high-bandwidth satellite communications supporting strategic and tactical C3I requirements. Users include national/defense leaders, Defense Information System Network (DISN), Diplomatic Telecommunications Service (DTS), White House Communications Agency, and ground mobile forces of all services. The constellation consists of five primary and five residual geosynchronous DSCS III satellites and supports communications services at SHF (X-band). DSCS satellites provide full Earth, narrow regional, and shaped coverage, are nuclear hardened, have an antijam capability, and host the AFSATCOM package (single channel transponder) for dissemination of protected emergency action messages. The modernization of satellite communications will continue with the deployment of the Wideband Gap-filler Satellites (WGS) and the Advanced Wideband System (AWS).
DSCS III/SLEP. The last four DSCS satellites underwent a SLEP. These provide approximately twice the bandwidth of the original DSCS III satellites. The first SLEP satellite was launched in FY00.

Defense Support Program
Brief: An early warning spacecraft that travels in geosynchronous orbit and provides alert of possible ballistic missile attack on US forces or homeland.
Function: Strategic and tactical launch detection system.
Operator: AFSPC
First Launch: November 1970.
IOC: circa 1972.
Constellation: classified.
Design Life: three yr.
Launch Vehicle: Titan IV IUS.
Unit Location: Peterson AFB, Colo.
Orbit Altitude: 22,000+ miles in geosynchronous orbit.
Contractor: TRW; Aerojet.
Power Plant: solar arrays generating 1,485 watts.
Dimensions: diameter 22 ft, height 32.8 ft, with solar paddles deployed.
Weight: 5,000 lb (approx).
Performance: orbits at approx 22,000 miles altitude in geosynchronous orbit; uses IR sensors to sense heat from missile and booster plumes against Earth's background.
COMMENTARY
The incredibly flexible Defense Support Program **(DSP)** satellite system was used extensively in Desert Storm to detect theater missile launches against coalition forces. Though not designed to spot and track smaller missiles, the system was highly successful in detecting launches enabling timely warnings of Iraqi Scud attacks. Using existing sensors and data collection sources, global data related to TMD is transmitted to the Attack and Launch Early Reporting to Theater (ALERT) and Shield systems centrally located at the National Test Facility (NTF). ALERT is a high-confidence operational system that provides assured theater missile warning to warfighters worldwide. Shield is a research and development effort that evaluates and demonstrates the potential benefits of using multiple data sources and novel techniques in support of TMD.
DSP satellites are a key part of the North American and theater early warning systems, capable of detecting missile launches and nuclear detonations. Warning data are fed to NORAD and US Strategic Command early warning centers at Cheyenne Mountain AFS, Colo. Since the first launch, DSP satellites have provided an uninterrupted early warning capability to the US, with 21 launched by 2002. America's early warning capability will be modernized with the introduction of the new Space Based Infrared System to be phased in beginning in FY07.

Global Positioning System
Brief: A constellation of orbiting space vehicles that provides highly precise and reliable navigation data, 24 hours a day, to military and civilian users around the world. Signals permit calculation of location within less than 100 ft.
Function: Worldwide navigation satellite.
Operator: AFSPC.
First Launch: Feb. 22, 1978.
IOC: Dec. 9, 1993.
Constellation: 28.
Design Life: six yr (II/IIA); 7.5 yr (IIR).
Launch Vehicle: Delta II.
Unit Location: Schriever AFB, Colo.
Orbit Altitude: 12,636 miles (IIA); 12,532 miles (IIR).
Contractor: Boeing; Lockheed Martin.
Power Plant: solar arrays generating 700 watts (II/IIA); 1,136 watts (IIR).
Dimensions: II/IIA: body 8 ft x 8 ft x 12 ft, incl solar arrays 11 ft x 19 ft; IIR: body 8 ft x 6 ft x 10 ft, span incl solar arrays 37 ft.
Weight: 2,174 lb (IIA); 2,370 lb (IIR) on orbit.
Performance: GPS satellites orbit the Earth every 12 hr, emitting continuous navigation signals. The signals are so accurate that time can be figured to within one-millionth of a second, velocity within a fraction of a mile per hour, and location to within a few feet. Receivers are used in aircraft, ships, and land vehicles and can also be handheld.
COMMENTARY
Worldwide military operations, such as precision bombing, CSAR, mapping, and rendezvous are successful in part due to the 24-hour, worldwide navigation service provided by the Global Positioning System **(GPS)** navigation satellite constellation. Accurate three-dimensional (latitude, longitude, and altitude) position, velocity, and precise time are provided continuously in real time to support an unlimited number of users around the globe, both civilian and military. Concern over potential enemy denial of GPS is being addressed under GPS modernization efforts. Future GPS satellites will have two jam-resistant channels for military-only use plus a third civilian channel. Block IIF satellites are expected to enter service in early 2005.

Milstar Satellite Communications System
Brief: A satellite communications system that provides secure, jam-resistant worldwide C2 communications for tactical and strategic forces in all levels of conflict, linking command authorities to ground forces, ships, submarines, and aircraft.
Function: Communications satellite.
Operator: AFSPC.
First Launch: Feb. 7, 1994.
IOC: July 1997 (Milstar I).
Constellation: four (three spares).
Design Life: 10 yr.
Launch Vehicle: Titan IV/Centaur.
Unit Location: Schriever AFB, Colo.
Orbit Altitude: 22,300 miles.
Contractor: Lockheed Martin; Boeing; TRW.
Power Plant: solar arrays generating almost 5,000 watts.
Dimensions: length 51 ft, width 116 ft (with full solar array extension).
Weight: 10,000 lb.
Performance: The constellation consists of three satellites in low-inclined geosynchronous orbit, providing worldwide coverage between 65° north and 65° south latitude.
COMMENTARY
The backbone of strategic–tactical communications, Milstar is a joint service communications system that provides secure, jam-resistant EHF communications. Worldwide operations are made possible by this 24-hour, all-weather capability, ready to support any deployment at a moment's notice. The Milstar inventory was to be fully deployed by the beginning of 2003, and modernization of satellite communications will continue with the Advanced EHF (AEHF) constellation deployments. The first AEHF launch is scheduled for 2007.

Polar MILSATCOM
Brief: Satellite that provides secure, survivable communications, supporting peacetime, contingency, and wartime operations in the North Pole region, above 65° north latitude.
Function: Communications satellite.
Operator: USN.
First Launch: late 1997.
IOC: 1997.
Constellation: three.
Design Life: host satellite dependent.
Launch Vehicle: not available.
Unit Location: Schriever AFB, Colo.
Orbit Altitude: 25,300 miles.
Contractor: classified.
Power Plant: 410 watts consumed by payload (power from host solar array).
Dimensions: numerous items integrated throughout host.
Weight: 470 lb (payload).
COMMENTARY
Augmenting the Milstar constellation, the Polar MILSATCOM payload is a cost-effective means of providing secure communications for the northern polar region. Like Milstar, the system enables worldwide operations by linking strategic and tactical forces with secure, jam-resistant EHF communication links.

Space Based Infrared System High
Brief: Advanced surveillance system for missile warning, missile defense, battlespace characterization, and technical intelligence. System includes satellites in geosynchronous Earth orbit (GEO) and highly elliptical orbit.
Function: IR space surveillance.
Operator: AFSPC.
First Launch: (planned) High GEO: FY07.
IOC: TBD.
Constellation: High: four GEO sats, two highly elliptical orbit sensors.
Design Life: not available.
Launch Vehicle: Evolved Expendable Launch Vehicle (EELV) Heavy.
Unit Location: Buckley AFB, Colo.
Orbit Altitude: High at approx 22,300 miles.
Contractor: Lockheed Martin.

Power Plant: not available.
Dimensions: not available.
Weight: not available.
COMMENTARY
The follow-on to the DSP is the Space Based Infrared System **(SBIRS) High.** SBIRS High is an integrated "system of systems" including satellites in GEO, sensors hosted on satellites in highly elliptical orbits, and ground assets.
SBIRS is being fielded incrementally. Increment 1 consolidated all DSP ground processing in one CONUS master control station at Buckley AFB, Colo. IOC was declared Dec. 18, 2001. Increment 2 will field the space and ground assets. SBIRS High is in the EMD phase led by a Lockheed Martin team. The system will integrate the Space Tracking and Surveillance (STSS) capabilities as they become available.

Space Tracking and Surveillance System
Brief: Advanced surveillance system with IR and visible sensors for detecting and tracking ballistic missiles. STSS (formerly SBIRS Low) will have satellites in low Earth orbit (LEO) that work in concert with SBIRS High and other missile defense systems.
Function: Space surveillance.
Operator: AFSPC.
First Launch: TBD.
IOC: TBD.
Constellation: TBD (from nine up to 30 under consideration).
Design Life: not available.
Launch Vehicle: TBD.
Unit Location: TBD.
Orbit Altitude: 60–300 miles.
Contractor: Northrop Grumman (completion and launch of two R&D satellites).
Power Plant: not available.
Dimensions: not available.
Weight: not available.
COMMENTARY
The Missile Defense Agency manages the Space Tracking and Surveillance System **(STSS),** which, in December 2002, replaced the program known as SBIRS Low. In April 2002, MDA ended the SBIRS Low program definition and risk reduction competition and named TRW (purchased by Northrop Grumman) as prime contractor for a redefined space-based sensor R&D element of MDA's integrated Ballistic Missile Defense System (BMDS). The initial STSS contract calls for completion and launch of two LEO satellites in FY06–07 under Block 2006. New technologies will be inserted into subsequent R&D satellites under Block 2008 and beyond, leading to an operational system.

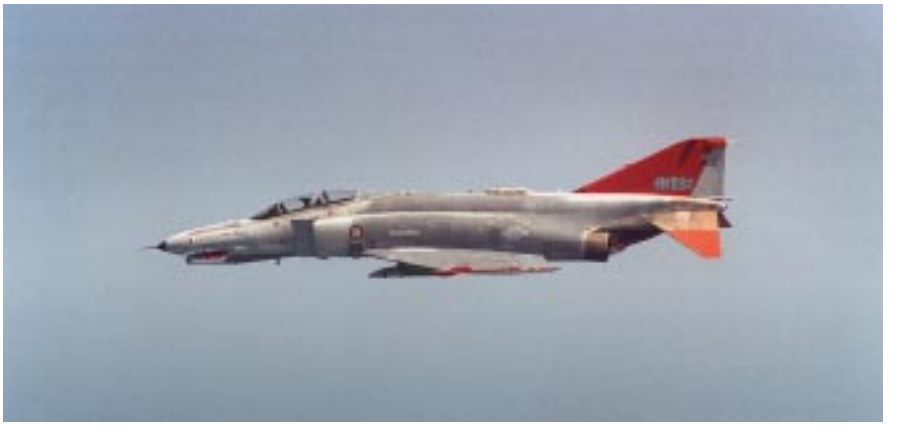
Wideband Gap-filler Satellite (WGS)
Brief: WGS will provide the wideband communications needed for information superiority to deployed tactical forces to include air and space expeditionary forces, Army Digital Corps, and Navy battle groups.
Function: Worldwide satellite communications.
Operator: AFSPC.
First Launch: January 2004 (planned).
IOC: October 2004 (planned).
Constellation: three satellites.
Design Life: 14 years.
Launch Vehicle: EELV.
Unit Location: Schriever AFB, Colo.
Orbit Altitude: GEO.
Contractor: Boeing.
Dimensions: TBD.
Weight: 13,000 lb.
Performance: approx 12 times the capability of a DSCS satellite.
COMMENTARY
The WGS program is designed to fill the gap between current DSCS and Global Broadcast System (GBS) and an advanced wideband system. It will provide two-way services for national leaders, DTS, DISN, and all service ground mobile users. In addition it will provide direct broadcast of digital multimedia, high-bandwidth imagery, and video information directly from global and theater sites to deployed warfighters. The satellites will have X-band (DSCS III–like), Ka-band broadcast (GBS Phase 2–like), and two-way Ka-band services.

Aerial Targets

MQM-107 Streaker
Brief: A jet-powered, variable speed, recoverable target drone.
Function: Aerial target.
Operator: ACC.
First Flight: not available.
Delivered: from 1984 (B).
IOC: 1987.
Production: 70 (B); 221 (D); 78 (E).
Unit Location: Tyndall AFB, Fla.
Contractor: Raytheon (D model); Marconi (formerly Tracor) (E model).
Power Plant: initially on D model, one Teledyne CAE 373-8 engine, 950 lb thrust; MQM-107Ds delivered since 1989 have 950 lb thrust TRI 60-5 turbojets. Microturbo TRI 60-5 engine, 1,061 lb thrust or TCAE 373-8B (E model).
Guidance and Control: analog or digital, for both ground control and preprogrammed flight (D model); high–G autopilot provisions; digital autopilot and remote control by the Gulf Range Drone Control Upgrade System (GRDCUS), a multifunction C2 multilateration system (E model).
Dimensions: length 18.1 ft, body diameter 1.3 ft, span 9.8 ft.
Weight: max launch weight (excl booster) 1,460 lb.
Performance: operating speed 207–630 mph, operating height 50–40,000 ft, endurance 2 hr 15 min.
COMMENTARY
MQM-107D. A third generation version of the MQM-107 Streaker, it is a recoverable, variable-speed target drone used for research, development, test, and evaluation and the Weapon System Evaluation Program.
MQM-107E. Improved performance follow-on to the MQM-107D. In operational service, it replaces the MQM-107D and expands the flight envelope.

BQM-34 Firebee
Brief: A jet-powered, variable speed, recoverable target drone.
Function: Aerial target.
Operator: ACC.
First Flight: 1951; 1958 (BQM-34A).
Delivered: from 1951.
IOC: circa 1951.
Production: 1,800+.
Inventory: 33.
Unit Location: Tyndall AFB, Fla.
Contractor: Teledyne Ryan.
Power Plant: one General Electric J85-GE-100 turbojet, 2,850 lb thrust.
Guidance and Control: remote-control methods incl choice of radar, radio, active seeker, and automatic navigator developed by Teledyne Ryan; the current model of the BQM-34A is configured to accommodate the GRDCUS, which allows multiple targets to be flown simultaneously.
Dimensions: length 22.9 ft, body diameter 3.1 ft, span 12.9 ft.
Weight: launch weight 2,500 lb.
Performance: max level speed at 6,500 ft 690 mph, operating height range 10 ft to more than 60,000 ft, max range 796 miles, endurance (typical configuration) 30 min.
COMMENTARY
Current BQM-34As, with an upgraded General Electric J85-100 engine that provides a thrust-to-weight ratio of 1:1, offers higher climb rates and six–G maneuvering capability. A new microprocessor flight-control system provides a prelaunch and in-flight self-test capability. BQM-34s are used for research, development, test, and evaluation and the Weapon System Evaluation Program.

QF-4
Brief: A converted, remotely piloted F-4 Phantom fighter used for full-scale training or testing.
Function: Aerial target.
Operator: ACC.
First Flight: August 1993.
Inventory: 54.
IOC: not available.
Unit Location: Tyndall AFB, Fla. (detachment at Holloman AFB, N.M.)
Contractor: Marconi (formerly Tracor).
Power Plant: two General Electric J79-GE-17 turbojets, each with approx 17,000 lb thrust with afterburning.
Guidance and Control: remote-control methods incl the GRDCUS (Tyndall) and the Drone Formation and Control System (Holloman); will also accommodate the triservice Target Control System currently under development.
Dimensions: length 16 ft, height 6 ft, wingspan 38.4 ft.
Weight: mission operational weight 49,500 lb.
Performance: max speed Mach 2+, ceiling 55,000 ft, range (approx) 500 miles.
COMMENTARY
The QF-4 replaced the QF-106 Full-Scale Aerial Target (FSAT) in 1998 when the F-106 inventory was depleted. The QF-4 provides for a larger operational performance envelope (maneuvering) and greater payload capability compared with its predecessors.
More than 125 F-4 surplus aircraft have been converted to QF-4 FSATS since 1995. QF-4s are used for research, development, test and evaluation and the Weapon System Evaluation Program. ■



QF-4E (USAF photo)