Bombers

B-1 Lancer
Brief: A long-range, air refuelable multrole 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, ANG.
First Flight: Dec. 23, 1974 (B-1A); Oct. 18, 1984 (B-1B).
IOC: Oct. 1, 1986, Dyess AFB, Tex. (B-1B).
Production: 104.
Inventory: 93 (B-1B).
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 137 ft, swept aft 78 ft, length 147 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; ceiling 40,000 ft; range 7,500 miles.
Armament: four General Electric F110-GE-102 turbofans, each 17,300 lb thrust.

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.
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 commanders and pilots, 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 16,000-lb GBU-38/B (GPS–Aided Munition); or up to eight 4,700-lb GBU-37 (GAM-113) near-precision guided weapons. Various other conventional weapons incl the Mk 82 500-lb bomb, M117 750-lb bomb, Mk 62 500-lb naval mine, and up to 32 GBU-87/89 cluster bombs. JASSM and JSOW are presently being added to B-2 Block 20 aircraft through FY03.
COMMENTARY
The B-2 is a bomber with 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 scalled-over wing intake ducts and shielded over-wing trailing-edge nozzles. The aircraft has a quadruple-redundant fly-by-wire digital flight-control system, actually 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. 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 64 JDAMs, 16 JSOWs, or eight GAM-113S (to be replaced by EGBU-28), with JASSM capability slated for 2004. All of these weapons are individually targeted, giving the B-2 multiple kills-per-pass capability. 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. Modernizations to the bomb racks will allow carriage of 80 independently targeted Mk 82 JDAMs in 2004. Future capability is expected to include the 500-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 Synthetic Aperture Radar (SAR).

The last original Block 20 B-2, used as a test aircraft at Edwards AFB, Calif., is being refurbished as an operational bomber and will enter operational service in September 2002. 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.

B-52 Stratofortress

Block 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).


IOC June 19, 1955.

Production 744.

Inventory 94.

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 max level speed 449 mph, range 11,000 miles.

Armament 12 AGM-86B Air Launched Cruise Missiles (ALCMs) or AGM-129A Advanced Cruise Missiles (ACMs) externally provisioned for eight more ALCMs or gravity weapons internally. Conventional weapons incl AGM-84D Conventional ALCMs (CALCMs), bombs, 20 Mk 82, 20 Mk 84, 24 500-lb GBU-8/10/40/61/87/88/97 cluster munitions, WCMOs, GBU-31 JDAMs, JSOWs from 2002, JASSMs in 2003, and on some aircraft, three to four AGM-142A Have Nop missiles or eight AGM-84 Harpoons in under-wing clusters.

COMMENTARY Fifty years since the first prototype flight, the B-52 retains its key role within USAF’s manned strategic bomber force. The bomber’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.

The bomber is equipped with an Electro-Optical (EO) viewing system that uses Forward-Looking Infrared (FLIR) and high-resolution Low-Light-Level Television (LTLTV) 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 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. Fully 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 Multi-mission 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-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 improvements include the Avionics Midlife Improvement program, which replaces the current system processors and data transfer cartridges. Electronic attack improvements include the Situational Awareness Defensive Improvement program. The electronic combat modernization improvement upgrade to the ALQ-172 Electronic Countermeasures set. Recently installed Link 16 data link provides updated targeting information.

Current plans encompass a force of around 76 aircraft.

B-52H Stratofortress

Ted Carlson


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

Deployment of the B-1 and B-2 led to a change in the primary role of the B-52 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-threat environments supplemented by a stand-off attack capability. Upgrades include the installation of GPS, ARC-210 radios, Have Quick II anti-jam 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 standardize aircraft to carry all B-52–certified munitions. Avionics

A-10 Thunderbolt II

Brief A simple, effective, and survivable vehicle–engine aircraft specifically designed for Close Air Support of ground forces and which can be used against all ground targets, including tanks and other armored vehicles.

Function Attack aircraft.

Operator ACC, PACAF, USAFE, ANG, AFRC.

First Flight Feb. 15, 1975 (preproduction).


IOC October 1977.

Production 713.

Inventory 366.


Contractor Fairchild Republic.

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

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

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

Weight: empty approx. 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 GAU-8/A gun; 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 infrared-directed threats. The centerline pylons and the two flanking fuselage pylons cannot be occupied simultaneously.

COMMENTARY
Supporting the demands of the Close Air Support (CAS) mission, the A-10 combines large military load, long loiter, and wide combat radius with the ability to perform a CAS mission, the A-10, nicknamed “Warthog,” can fly 150 miles and remain on station for an hour. The 30 mm GAU-8/A 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 projecting tiles up to 23 mm. An A-10 structural enhancement is strengthening the wing center section and outer panels. Used extensively during the Persian Gulf War, the A-10 is projected to serve well into the 2020s.

A-10A equipment includes EGL, an Enhanced GPS/Inertial Navigation System (INS), 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 situational awareness data link and integration of the JDAM and WCDM. A targeting pod, not yet selected, is also planned. Low-Rate Initial Production (LRIP) of upgrade kits is scheduled to begin in 2006. Additionally, an upgraded automated chaff and flare system is planned for all aircraft by 2005.

OA-10A. Redesignated A-10As, 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 Operating Capability (IOC) in October 1987.

AC-130 Gunship

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

Function: Attack aircraft.

Armament:

Performance:

Ceiling:

Accommodation:

Function:

Unit Location:

Activation:


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

Weight: gross 155,000 lb.

Ceiling: 25,000 ft.

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 Howitzer with 100 rd.

COMMENTS
The AC-130 is a C-130 modified with gun systems, electronic and Electro-Optical (EO) sensors, fire-control systems, enhanced navigation systems, sophisticated communications, defensive systems, and 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 RO-1 Predator, the latter providing live video and target referencing information.

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

AC-130U Spooky is one of the most recent gunship conversions, converted by Rockwell, of which 13 were delivered to the 16th SOW’s 4th SOS in 1984–85. 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 substituted to the ACM-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 ground parties 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).

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, ARNG, PACAF, USAFE, ANG.


Delivered: November 1974–85.

IOC: September 1975.

Production: 874.

Unit Location: 320.

AC-130U Spooky

Weight: 40,000 lb.

Ceiling: 65,000 ft.

Performance: 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 0.50 cal or AGM-88 High-Low Altitude Anti-Radiation Missiles (HARMs) and four in-external stores bays.

COMMENTS
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 29 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 radars 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 Foie (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 Multi-Staged Improvement Program (MSIP), an ongoing program of installation or modification of new or 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(V1). One squadron has received the later APG-63(V2), featuring an advanced active electronically scanned array (AESA).
scanned array radar antenna. F-15C/D aircraft will also 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 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:** 227.

**Inventory:** 217.

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

**Contractor:** McDonnell Douglas (now Boeing); Raytheon.

**Power Plant:** two Pratt & Whitney F100-PW-220, with max afterburner.

**Ceiling:** 50,000 ft.

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

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

**F-15E has a strengthened airframe for increased limits, an 8,000-hour airframe, and expanded envelope following, increased takeoff weight and maneuvering limits, a new modular mission computer being developed, and 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 more capable fire control system and installation of the upgraded F-150-PW-220 turbofan.

**Commentary:**

The Multinational Staged Improvement Program (MSIP), implemented in 1990, ensured the aircraft would 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 attacks, 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, 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), VHF High Speed Data Link/Combat Net (VHSD/CCN) 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 enroute gunnery, digital flight controls, automatic terrain following, increased takeoff weight and maneuvering limits, an 8,000-hour airframe, and expanded envelope nickel/iron capability.

Block 50/52 F-16C/Ds 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 systems improvements include a hot-shot AMRAAM compatibility, AGM-154 JSOW, and WCMC, 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 embedded GPS/INS, Situation Awareness Data Link (SADL), and a countermeasures management system.

In another program, Block 50/52 USAF F-16C/Ds, followed by Block 40/42 from 2005, are being retrofit 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 target pod, JHMCS, AIM-9X, Link 16 data link, and improved engines and GPS equipment. All types are being equipped with Link 16 data link.

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

**Power Plant:** one augmented turbofan. General Electric F110-GE-100 (27,600 lb thrust) and Pratt & Whitney F100-PPW-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-PPW-229 (29,100 lb thrust).

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

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

**Weight:** F-16C empty (F100-PPW-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 4 with two 2,000-lb bombs, two AIM-9 missiles, and external fuel, hi-lo-to-hi 852 miles; combat range 575 miles.

**Armament:** one M61A1 20 mm multimuzzle 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.
ics to help it penetrate enemy airspace and achieve air superiority in aerial combat. Function: Fighter.
Operator: AFMC, ACC.
Production: Up to 339 planned.
Inventory: seven test aircraft (as of January 2002).
Unit Location: Langley AFB, Va. (first operational location).
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 2,500 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; four CM-112s; two 2,000-lb JDAMs replace four AMRAAMs internally.

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

COMMENTARY:
This ultrasophisticated multimission air superiority fighter aircraft is designed to penetrate high-threat enemy airspace and achieve air superiority with a first-strike, first-kill capability against multiple targets. It will cruise at supersonic speed without using its afterburners (supersonic cruise), its fully integrated avionics and weapon 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 Processing System provides an integrated avionics suite and various avionics functions. Two prototypes were built for competitive evaluation with Northrop/Donnell Douglas YF-23 prototypes. First flight was Sept. 29, 1990. YF-22 selected as winner in April 1991.

F-22A. Production-configured version entered Engineering and Manufacturing Development (EMD) phase in August 1991. USAF is receiving nine single-seat F-22As, three without avionics to explore flight characteristics, flutter, loads, propulsion, and envelope expansion and six as avionics test beds. It is also testing one static test and one fatigue test airframe.
F-22 EMD flight test continues as the F-22 expands the flight envelope and tests the evolutionary integrated avionics. On Sept. 21, 2001, the F-22 accomplished a successful guided launch of an AIM-120 AMRAAM. Development flight testing will continue in preparation for entry into Dedicated Initial Operational Test and Evaluation (DIO&E) in 2003. The F-22 was approved for LRIP on Aug. 14, 2001, with 10 aircraft subsequently ordered. Eight Production Representative Test Vehicles (PRTVs) are currently in production. A second LRIP decision has contracted for 13 aircraft.

F-35 Joint Strike Fighter
Operator: ACC for USAF.
Delivery: 2008 (anticipated first production aircraft).
IOC: 2010 (USA).
Production: planned: 1,763 (USAF), 480 (USN), 605 (USMC), 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 a 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 630 knots calibrated airspeed for Navy and Short Takeoff and Vertical Landing (STOVL) variants, Mach 1 for USAF variant, combat radius more than 678.5 miles for USAF variant, 690 miles for Navy variant, and 517.5 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 LO design, the JSF incorporates stealth, 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. 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 production.

F-117 Nighthawk
Brief: World’s first operational aircraft designed to exploit Low Observable (LO) stealth technology to exploit the range of heavily defended strategic targets that can be attacked.
Function: Attack aircraft.
Operator: ACC, AFMC.
First Flight: June 18, 1981.
IOC: October 1983.
Production: 59.
Inventory: 55.
Unit Location: Eglin AFB, Fla., Holloman AFB, N.M., Edwards AFB, Calif.
Contractor: Lockheed Martin; Raytheon.
Power Plant: two General Electric F404-GE-F102 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. The System missions include strategic attack, air interdiction, SEAD, and special operations.
Aircraft: The F-117A will become the first directed energy weapon in the US arsenal. Management of the program was transferred to Ballistic Missile Defense Organization (now Missile Defense Agency, MDA) in summer 2001.

Air Combat Command plans to base the Attack Laser in CONUS, but it has the ability to deploy 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. Typical deployment would include five aircraft to establish two near continuous combat air patrols as directed by the joint force commander. The aircraft will fly above the clouds and typically operate at an altitude of approx 40,000 ft, initially located some 50 miles from the enemy but able to be moved forward as US forces gain air superiority. Information on the hostile launch location can also be determined by the ABL and passed on to attack aircraft.

The X-45A’s main armament is a lightweight, megawatt-class Chemical Oxygen–Iodine Laser (COIL). The laser weapon contains 14 COIL modules and sufficient chert fuel for 20–40 TBM kills. An optical system transports the laser beam up to the aircraft nose, where a 4.5-ft-diameter mirror in a ball at turret points the beam at the target. The optical system contains low-power lasers, sensors, steering mirrors, and adaptive optics (deformable mirrors) to precisely track targets and correct atmospheric distortions, thereby increasing the high-energy laser beam’s inten-
sity on target and the system’s lethal range. 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**
- **Function:** Battle management, BM, C2 aircraft
- **Operator:** ACC
- **First Flight:** December 1988
- **Delivered:** May 1996–February 2003 (planned)
- **IOC:** Dec. 18, 1997
- **Inventory:** 11
- **Unit Location:** Robins AFB, Ga.
- **Contractor:** Northrop Grumman; Motorola; Cubic; Raytheon
- **Power Plant:** four Pratt & Whitney TF33-102C turbojets, 12,190 lb thrust
- **Accommodation:** mission crew of 21 Air Force/Air National Guard, or Army operators (can be augmented to 34)
- **Dimensions:** span 145.8 ft, length 152.9 ft, height 41.5 ft
- **Performance:** max operating speed Mach 0.84, endurance 2 hours, max range 3,747,000 lb
- **Weight:** gross 347,000 lb
- **Ceiling:** 38,000 ft
- **Commentary:** of the 24 built for USN in standard production configuration, 22 were later upgraded.

**E-3A**
- **Function:** Ground surveillance, BM, C2 aircraft
- **Operator:** ACC
- **First Flight:** December 1988
- **Delivered:** May 1996–February 2003 (planned)
- **IOC:** Dec. 18, 1997
- **Inventory:** 11
- **Unit Location:** Robins AFB, Ga.
- **Contractor:** Northrop Grumman; Motorola; Cubic; Raytheon
- **Power Plant:** four Pratt & Whitney TF33-102C turbojets, 12,190 lb thrust
- **Accommodation:** mission crew of 21 Air Force/Air National Guard, or Army operators (can be augmented to 34)
- **Dimensions:** span 145.8 ft, length 152.9 ft, height 41.5 ft
- **Performance:** max operating speed Mach 0.84, endurance 2 hours, max range 3,747,000 lb
- **Weight:** gross 347,000 lb
- **Ceiling:** 38,000 ft
- **Commentary:** optimum cruise Mach 0.78, endurance 8 hours unrefueled.

**E-3B**
- **Function:** Ground surveillance, BM, C2 aircraft
- **Operator:** ACC
- **First Flight:** December 1988
- **Delivered:** May 1996–February 2003 (planned)
- **IOC:** Dec. 18, 1997
- **Inventory:** 11
- **Unit Location:** Robins AFB, Ga.
- **Contractor:** Northrop Grumman; Motorola; Cubic; Raytheon
- **Power Plant:** four Pratt & Whitney TF33-102C turbojets, 12,190 lb thrust
- **Accommodation:** mission crew of 21 Air Force/Air National Guard, or Army operators (can be augmented to 34)
- **Dimensions:** span 145.8 ft, length 152.9 ft, height 41.5 ft
- **Performance:** max operating speed Mach 0.84, endurance 2 hours, max range 3,747,000 lb
- **Weight:** gross 347,000 lb
- **Ceiling:** 38,000 ft
- **Commentary:** optimum cruise Mach 0.78, endurance 8 hours unrefueled.
Joint STARS also conducts near-real-time surveillance and reports 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. Two E-8C aircraft and Joint Endeavor (with one E-8A and one STARS aircraft flew more than 150 operational missions in 1992 and 1993. E-8A and E-8B development aircraft and Joint Endeavor (with one E-8A and one test bed E-8C).

As part of their operational test and evaluation, Joint STARS aircraft flew more than 150 operational missions in 1992 and 1993, using the two E-8A development aircraft and Joint Endeavor (with one E-8A and one test bed E-8C). E-8A. Preproduction version, with specialized equipment installed aboard a specially modified 707-300 airframes. One was converted into 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 six production aircraft will feature more advanced computer systems, which will be retrofitted on the 10 earlier production aircraft. All are due to be re-engined and are subject to missions with Predators armed with Hellfire missiles in addition to the sensors. Experiments with Predators armed with Hellfire missiles have been used to test the UAV potential for the attack mission. USAF is also contemplating an 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 287,000 lb.

**Ceiling:** 50,000 ft (basic C-135).

**Performance:** speed: 500 mph, unrefueled range 3,000 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, to monitor nuclear test activities.

**OC-135B**

Modifications center around four cameras installed in the rear of the aircraft. Cameras installed 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 Miletx 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 data for theater and tactical commanders.

**Function:** Electronic reconnaissance aircraft.

**Operator:** ACC.

**First Flight:** not available.


**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 CFI Intercontinental CMO-56s in one W version.)

**Accommodation:** flight crew of four; 25–35 mission crew.

**Dimensions:** (Cobra Ball) span 131 ft, height 38 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 used for ballistic missile tracking. Equipment includes wide-area IR sensors, long-range optical telescopes, and an advanced communications suite that can locate a missile more than 250 miles away and calculate its trajectory and impact point.

**RC-135U Combat Sent**

Two aircraft with larger tailcone and fin fairing, used for measuring and analyzing foreign electronic and IR equipment. IOC: March 1996.

**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 through the Tactical Information Broadcast System and JTIDS to crews of F-16CJ HTS aircraft. The aircraft’s reconnaissance systems are continuously upgraded to keep pace with new threats.

**TC-135S/W**

Used for training purposes.

**RQ-1 Predator**

**Brief:** A medium-altitude, long-endurance Unmanned Aerial Vehicle (UAV), flown remotely. Joint force commander asset with multiple imagery sensors.

**Function:** Unmanned reconnaissance aircraft.

**Operator:** ACC.

**First Flight:** July 1994.

**Delivered:** July 1994 (USAF from July 1996)–present. IOC: TBD.

**Production:** 12 systems planned (system typically consists of four air vehicles, one ground control station, and one Trojan Spirit II satellite communications suite). Sixty vehicles total ordered.

**Inventory:** Eight systems.

**Unit Location:** Indian Springs AFAF, Nev.

**Contractor:** General Atomics Aeronautical Systems; Northrop Grumman; Electro Space 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, continuous coverage on station with multiple air vehicles and relief on station, 460 miles from base at altitude of 25,000 ft, endurance 24 hours at operational radius of 575 miles.

**COMMENTARY**

USAF has three Predator squadrons, the 11th, 15th, and 17th RS. The 11th conducts mission qualification training, as well as operational deployments. The designations RQ-1A and RQ-1B (upgraded, larger version) refer to the system; the air vehicles are designated RQ-1K and RQ-1L, respectively. Predators demonstrated its operational capability, while still in the development stage, during surveillance missions over Bosnia and Iraq. It has since deployed to Enduring Freedom, operating in conjunction with AC-130 Spectres. Navigation is by GPS/INS. EO/IR and SAR sensors with C-band line of sight and Ku-band satellite data link allow near-real-time transmissions of video images to the ground control station. System upgrades aimed at expanding capability include laser designators in addition to the sensors. Experiments with Predators armed with Hellfire missiles have been used to test the UAV potential for the attack mission. USAF is also contemplating an air-to-air role.

**RQ-4 Global Hawk**

**Brief:** A high-altitude, long-range, long-endurance Unmanned Aerial Vehicle.

**Function:** Unmanned reconnaissance aircraft.

**Operator:** ACC.

**First Flight:** Feb. 28, 1998.

**Delivered:** five.

**IOC:** TBD.

**Production:** MSII/LRIP decision expected in FY01. IOC: TBD.

**Unit Location:** Beale AFB, Calif.

**Contractor:** Northrop Grumman; Raytheon.

**Power Plant:** one Rolls Royce AE 3007 turbofan, 7,600 lb thrust.

**Dimensions:** length 27 ft, height 7.2 ft, span 48.7 ft.

**Weight:** empty 9,200 lb, gross 25,600 lb.

**Ceiling:** 67,300 ft.
completed over 100 flights, flown in excess of 66,000 ft altitude and 31 hours endurance, and accumulated more than 1,300 hours total flight time. Global Hawk participated in several joint/NATO exercises, to include flying over water to Alaska and completing the first transatlantic crossing to Portugal and back. In spring 2001, Global Hawk flew to Australia for six weeks of demonstrations, including support to Exercise Tandem Thrust. Although still a development system, Global Hawk first deployed operationally in support of Enduring Freedom in November 2001.

The Air Force is currently evaluating options to field operational Global Hawks, with upgraded sensor capabilities, power, and payloads. Projected procurement is 51 air vehicles. Two LRIP UAVs are scheduled for delivery in September and December 2003, with a third vehicle proposed in the recent budget. Projected Primary Aircraft Inventory (PAI) is 18 Imager intelligence (Imint) and 12 Sigint aircraft. Total buy TBD.

U-2 Dragon Lady (SSgt. Sean M. Worrell) completed over 100 flights, flown in excess of 66,000 ft altitude and 31 hours endurance, and accumulated more than 1,300 hours total flight time. Global Hawk participated in several joint/NATO exercises, to include flying over water to Alaska and completing the first transatlantic crossing to Portugal and back. In spring 2001, Global Hawk flew to Australia for six weeks of demonstrations, including support to Exercise Tandem Thrust. Although still a development system, Global Hawk first deployed operationally in support of Enduring Freedom in November 2001.

The Air Force is currently evaluating options to field operational Global Hawks, with upgraded sensor capabilities, power, and payloads. Projected procurement is 51 air vehicles. Two LRIP UAVs are scheduled for delivery in September and December 2003, with a third vehicle proposed in the recent budget. Projected Primary Aircraft Inventory (PAI) is 18 Imager intelligence (Imint) and 12 Sigint aircraft. Total buy TBD.

U-2 Dragon Lady

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

Function: High-altitude reconnaissance.

Operator: ACC.

First Flight: August 1955 (U-2); 1967 (U-2R); October 1994 (U-2S).


IOC: circa 1956.


Inventory: 31.

Unit Location: Beale AFB, Calif.

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 is the Air Force’s premier high-altitude reconnaissance system, capable of carrying Imint and Elint sensors simultaneously.

First delivery of the new ASARS-2A SAR was made August 2001. An upgrade of the U-2’s high-resolution reconnaissance system, ASARS-2A has an all-weather, day/night, and GMTI capability. A new mission planning system is also scheduled.

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 (31 U-2S mission aircraft, four 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.

WC-130 Hercules

Brief: A high-wing, medium-range aircraft flown by AFRIC for weather reconnaissance missions. It flies into the eye of tropical cyclones or hurricanes, collecting weather data within the storm’s environment.

Function: Weather reconnaissance aircraft.

Operator: AFRIC.

First Flight: circa 1959.

Delivered: C-130J: October 1999–present.

IOC: 1959 (B model), 1962 (E), 1964 (H).

Production: (no new-build WC-130H); eight WC-130J (on contract).

Inventory: 10 (WC-130H); four (WC-130J).

Unit Location: Keesler AFB, Miss.

Contractor: Lockheed Martin.


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 AFRIC 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 improved 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, Fla.

WC-130J. Weather-capable versions of the latest C-130 model, powered by four Allison AE2100D3 turboprops. First of 10 aircraft that will replace the WC-130H was delivered Oct. 12, 1999.

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 C2 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).


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; unre fleu ed endurance in excess of 12 hr; with aerial refueling up to 72 hr.

COMMENTARY: E-4 aircraft are used to execute the National Airborne Operations Center (NAOC), previously the National Emergency Airborne Command Post (NEACP), mission. The E-4B fleet provides a survivable C2 platform throughout the full threat spectrum, including sustained operations in a nuclear environment. A militarized version of the Boeing 747-200, the first B model was delivered to the Air Force in January 1980. Four have been produced, of which three are converted E-4As. The first operational mission was flown in March 1980. They 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 systems, including electronic warfare as well as secure communications and data processing equipment such as EHF Militar 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) communica-

AIR FORCE Magazine / May 2002 141

RQ-4 Global Hawk (TSgt. Jack Braden)
These updates, along with programmed changes to the external communications and onboard data transfer, will ensure the E-4B aircraft can effectively execute its NAOC and FEMA missions for the foreseeable future.

**EC-18**

**Role:** 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 1965.

**Delivered:** January 1966.

**IOC:** January 1966.

**Production:** six.

**Inventory:** two.

**Unit Location:** Edwards AFB, Calif.

**Contractor:** Boeing.

**Power Plant:** four Pratt & Whitney TF33 turbolons, each 18,000 lb thrust.

**Accommodation:** 16–24 in EC-18B.

**Dimensions:** span 145 ft, length 152.9 ft, height 42 ft.

**Weight:** gross 326,000 lb.

**Ceiling:** 42,000 ft.

**Performance:** max cruise speed 470 mph, range 7,610 miles.

**COMMENTARY**

**EC-18** Advanced Range Instrumentation Aircraft (ARIA). Retired 2001 and aircraft transferred to the E-8C Joint STARS program.

**EC-18D** Cruise Missile Mission Control Aircraft (CMCCA) 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.

**EC-130J**

**Brief:** A heavily modified C-130 which, in its several variants, is used to carry out battlefield command, EW, and electronic combat.

**Function:** C2, psychological warfare.

**Operator:** ACC, ANG.

**First Flight:** January 1990.

**Delivered:** March 1990.

**Production:** (no USAF new-build EC-130Es); four EC-130J ordered.

**Inventory:** 15.

**Unit Location:** Active: Davis–Monthan AFB, Ariz. ANG: Harrisburg Arpt., Pa.

**Contractor:** Lockheed Martin; Raytheon; General Dynamics.

**Power Plant:** four Allison T56-A-15 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.

**EC-130E ABCCC**

**EC-130E Commando Solo.** ANG uses this version 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.** Four specialist versions of the latest C-130 aircraft, ordered to replace E models. First was expected to enter operational service mid–2001 with the 193rd Special Operations Wing (ANG), Harrisburg.

**Performance:**

**Ceiling:** 25,000 ft.

**Weight:** 155,000 lb.

**Dimensions:** span 132.6 ft, length 99 ft, height 38 ft.

**Weight:** ARIA gross 300,500 lb.

**Ceiling:** ARIA 33,000 ft.

**Performance:** ARIA max cruise speed 490 mph, operational radius 2,675 miles.

**COMMENTARY**

Several KC-135A tanker aircraft were modified for use as airborne command posts during the 1960s.

**EC-135/G/L**

**EC-135**

**EC-135A/G/L**

**EC-135A**

**EC-135B**

**EC-135C**

**EC-135D**

**EC-135E**

**EC-135F**

**EC-135G**

**EC-135H**

**EC-135J/P**

**EC-135K**

**EC-135M**

**EC-135N/P**

**EC-135N/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, AFRIC.

**First Flight:** Dec. 8, 1964 (as HC-130H).

**Delivered:** from 1965.

**IOC:** 1986.

**Production:** (converted).

**Inventory:** 31.


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

**Performance:** speed 289 mph, range more than 4,000 miles.

**COMMENTARY**

The KC-10 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’ KC-10 aircraft are equipped with an integrated GPS/INS navigation package, radar/mis- sile warning receivers, and chaff/flare countermeasures and dispensers. Some aircraft have FLIR systems and Personnel Locating Systems compatible with aircrew surveillance radars. 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 provides for complete update of the HC-130 avionics.

**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 (Associate).

**First Flight:** April 1980.

**Delivered:** March 1981–April 1990.

**IOC:** August 1982.

**Production:** 60.

**Unit Location:** 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 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 KC-10 with series 30CF, modified to include fuselage fuel cells, an air refueling operator’s station, aerial refueling boom and integral hose/drogue unit, a receiver refueling receptacle, and military avionics. Wing-mounted air refueling pods have been added subsequently to increase capability. Ongoing modifications include the addition of communications, navigation, and surveillance equipment to meet future 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 refueling F-15Gs (MSgt. Marvin Krause)**

**Operator:** ACC, 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.; Fairchild AFB, Wash.; Grand Forks AFB, N.D.; Kadena AB, Japan; MacDill AFB, Fla.; McConnell AFB, Kan.; Mountain Home AFB, Idaho, RAF Mildenhall, UK, Robins AFB, Ga.; ANG: 19 units. AFRC: seven units.

**Contractor:** Boeing

**Power Plant:** KC-135R/T: four CFM International F108-CF-100 turbosfans, each 22,224 lb thrust; KC-135E: four Pratt & Whitney TF33-PW-102 turbosfans, 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 com- mercial 707 aircraft but was designed to military specifici- fications, 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 turbosfans. USAF built 732, since modified to other standards.

KC-135E. The JT3D re-engining program upgraded 163 AFRC and ANG KC-135As to KC-135E standard with JT3D turbosfans removed from surplus commercial 707s; fuel carrying capacity is increased by 20 percent.

KC-135R/T. Designation of re-engined KC-135As with CFM56 turbosfans. 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 require- ments. The first KC-135R flight was in October 1982, and deliveries began in July 1984. KC-135T aircraft (formerly KC-135Q) were capable of refueling the now- retired SR-71. The program continues.

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 permits operation by a three- person flight crew, with avionics upgrades under way that will significantly improve systems reliability and maintainability. The entire fleet will be fitted with im- proved cockpit and navigation suites, including color weather radar, and integrated INS/GPS. Reduced ver- tical separation minima and GATM upgrades are also planned for the entire fleet. A number of KC-135Rs have been fitted with wing-mounted hose-and-drogue refueling pods to enhance interoperability and support to the USN, USMC, NATO, and other allied receiver aircraft.

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 airdrop small special operations teams, small bundles, and zodiac and combat rubber raiding craft.

**Function:** Air refueling for SOF helicopters/airdrop.

**Operator:** AETC, AFSC, ANG, AFRC.

**First Flight:** Dec. 8, 1964 (as HC-130H).

**Delivered:** from 1965.

**IOC:** 1986.

**Production:** (converted).

**Inventory:** 28.

**Unit Location:** Active: Osan AFB, Fla.; Kadena AB, Japan. Ritidian AB, Guam; RAF Mildenhall, UK; ANG, Moffett Federal Airfield, Calif. 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:** 30,000 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 Special Operations Forces 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 communica- tions, advanced integrated navigation equipment, in- cluding 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 in-flight refueling system allowing them to be air refuelable.

C-5 Galaxy

**Brief:** A heavy-lift, air refuelable cargo transport for

**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 specifica- tions, 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 turbosfans. USAF built 732, since modified to other standards.

KC-135E. The JT3D re-engining program upgraded 163 AFRC and ANG KC-135As to KC-135E standard with JT3D turbosfans removed from surplus commercial 707s; fuel carrying capacity is increased by 20 percent.

KC-135R/T. Designation of re-engined KC-135As with CFM56 turbosfans. 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 require- ments. The first KC-135R flight was in October 1982, and deliveries began in July 1984. KC-135T aircraft (formerly KC-135Q) were capable of refueling the now- retired SR-71. The program continues.
massive strategic airlift over long ranges, including outsize cargo. Supports special operations missions.  
**Function:** Cargo and troop transport.  
**Operator:** AETC, AMC, ANG, AFRIC.  
**First Flight:** June 30, 1969.  
**Delivered:** October 1969–April 1989.  
**IOC:** September 1970.  
**Reliability:** Each.  
**Inventory:** 126.  
**Unit Location:** Active: Altus AFB, Okla., Dover AFB, Deli., Travis AFB, Calif. ANG: Stewart Arpt., N.Y. AFRIC: Dover AFB, Del., Kelly Field, Tex., Travis AFB, Calif., Ramstein AFB, N.Y., Osan AB, N.Y.  
**Contractor:** Lockheed.  
**Power Plant:** four General Electric TF39-GE-1C turbofans.  
**C-5C.** Two C-5As assist.  
**Accommodation:** normal crew of six (two pilots, two engineers, and two loadmasters), plus rest area for 15 (relief crew, etc.) and sealing 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 1,468 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 846,400) lb.  
**Ceiling:** 45,000 ft.  
**Performance:** maximum 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 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 load-unloading 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 sub-systems developed for the C-5B have been incorporated into the C-5 fleet. One ANG and two AFRIC 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 dual nose nitrogen systems. 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 cargo space for NASA by extending the cargo bay and modifying the aft doors. All USAF C-5s are on contract to undergo a complete avionics modernization program that will install a state-of-the-art cockpit and ensure global access to an international civil aviation safety compliance by the end of 2000. To baseline this modification, all C-5s have had their service life by 30,000 flight hours. Conversely, the C-17s have been procured to deliver outsize cargo.  
**C-17A.** 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 multi-function electronic displays. Lot 12 aircraft, 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-jammer system to counter the IR-homing missile threat is planned for FY03, supplanting the current self-defense system. In October 2002, the C-17 will assume the Special Operations Low Level (SOLL) mission currently being 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 non-tanker duties.  
**Function:** Passenger and cargo airlifter.  
**Operator:** AFMC, PACAF.  
**First Flight:** May 1961.  
**Delivered:** 1961–62.  
**IOC:** circa 1961.  
**Production:** 48, plus five WC-135s.  
**Inventory:** three.  
**Unit Location:** Edwards AFB, Calif., Hickam AFB, Hawaii.  
**Contractor:** Boeing.  
**Power Plant:** (C-135) 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 4,725 miles.  
**Commentary:** A few C-135s 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 the C-141s. Three converted KC-135s were followed by 45 production Stratolifters in two versions.  
**C-135A.** The first 15 aircraft were equipped with JSTP-7 P-5 Turbojet engines.  
**C-135B.** The next version included upgraded Pratt & Whitney turboprops. 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, the Starlifter can project combat forces over long distances, inject those forces and their equipment either by air-laird and airdrop, resupply those employed forces, and extract the equipment and personnel from the hostile area to advanced medical facilities. Primary strategic special operations and airdrop platform.  
**Function:** Long range, air-refuelable cargo and troop airlift.  
**Operator:** AETC, AMC, ANG, AFRIC.  
**First Flight:** Dec. 17, 1963.  
**Delivered:** October 1964–June 1982.  
**IOC:** May 1965.  
**Production:** 285.  
**Inventory:** 102.  
**Unit Location:** Active: Altus AFB, Okla., Charleston, Edwards AFB, Calif., Hickam AFB, Hawaii.
**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 USASF 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, Mannheim 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 27.9 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-9s are transports and 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 Presidential and other USG operational duties.
- Upgrades to improve flight planning and situational awareness include ATM, TAWS, and vertical separation management.
- C-12 Huron
- **Brief:** Aircraft to provide airlift support for attaches and military advisory groups worldwide.
- **Function:** Special airlift.
- **Operator:** AETC, AFMC, PACAF.
- **First Flight:** Oct. 27, 1972 (Super King Air 200).
- **Delivered:** 1974–late 1986s.
- **IOC:** circa 1974.
- **Production:** 88.
- **Inventory:** 27.
- **Unit Location:** Elmdorf AFB, Alaska, Osan AB, South Korea, various overseas embassies.
- **Contractor:** Boeing.
- **Power Plant:**
  - (C-12J) two Pratt & Whitney Canada PT6A-55 turboprops, each 1,100 shp.
  - (C-12J) max level speed at 25,000 ft 542 mph, 5.5 hr endurance.
  - **Weight:** empty, equipped 10,119 lb, gross 18,300 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.

**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 turboprop 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:** 15.
- **Unit Location:** Andrews AFB, MD., Ramstein AB, Germany.
- **Performance:**
  - (C-20A/B) max cruising speed 74,600 lb.; (C-20H) max cruising speed 74,600 lb.
  - (C-20A/B) max vertical speed at 100,000 ft 5,500 mph.
  - (C-20H) max vertical speed at 45,000 ft 5,500 mph.

**Operator:** 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:** gross 69,700 lb.; (C-20H) gross 74,600 lb.
  - **Ceiling:** 45,000 ft.
  - **Performance:** max cruising speed 567 mph, range 4,800 miles.

**COMMENTARY**
- C-20A Three Gulfstream III transports were acquired to replace aging C-140B aircraft. They provide USAF’s operational support airlift fleet with intercontinental range and ability to operate from short runways.
- 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-20C Three special missions aircraft, with hardened strategic communications equipment.
- 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.
- Upgrade for C-20A/B aircraft includes GPS, vertical separation equipment, GMT, and Traffic and Collision Avoidance System (TCAS).

**C-21**
- **Brief:** Aircraft designed to provide cargo and passenger airlift and transport litter during medical evacuations.
- **Function:** Pilot seasoning, passenger and cargo airlift.
- **Operator:** AETC, AMC, PACAF, USAFE, ANG.
- **First Flight:** January 1973.
- **Delivered:** August 1984–October 1985.
- **IOC:** April 1984.
- **Production:** 84.
- **Inventory:** 76.
- **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 81 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 1,053 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 GMT and TCAS.

**C-22**
- **Brief:** A Boeing 727-100 used by ANG as its primary medium-range aeromedical evacuation aircraft.
- **Function:** Passenger transportation.
- **Operator:** ANG.
- **First Flight:** February 1963 (commercial).
- **Delivered:** 1984.
- **IOC:** circa 1984.
- **Production:** four.
- **Inventory:** three.
- **Unit Location:** Andrews AFB, MD.
- **Contractor:** Boeing.
- **Power Plant:** three JT8D-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 1,110 gallons of fuel and landing gear rated for 170,000 lb gross landing weight.

**C-32**
- **Brief:** A modified Boeing 757-200 used to provide
transportation for the vice president, Cabinet, Congress, military members, and other high-ranking US and foreign officials.

**Function:** VIP air transport.

**Operator:** AMC.


**Delivery:** June–December 1998.

**IOC:** 1998.

**Production:** four.

**Inventory:** more than 2,200; (C-130J/J-30) 168.

**Operator:** Andrews AFB, Md.

**Contractor:** Boeing.

**Power Plant:** Two Rolls Royce AE2100D3 turboprops, each 4,591 lb thrust.

**Accommodation:** (C-130H) crew of five; up to 92 passengers. (C-130J/J-30) 168.

**Dimensions:** span 42.4 ft (C-137C).

**Performance:** cruise speed Mach 0.8 (350 mph), range 6,900 miles.

**COMMENTARY**

The C-37A is a military version of the commercial Boeing 757-200. Four new C-32As were purchased as replacements for the C-137B/C aircraft. The commercial DC-130H/131H interior includes a crew rest area, DVT stateoom, conference area, and general passenger area. The passenger communications system provides worldwide clear and secure voice and data communications. Modern flight deck avionics allows operations to any suitable airfield in the world and provide an upgrade path as new capabilities, including Internet, become available.

**C-32A (Boeing)**

**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 officials.

**Function:** VIP air transport.

**Operator:** AMC.

**First Flight:** October 1998.

**Delivery:** October 1998–present.

**IOC:** Dec. 9, 1998.

**Production:** 10 planned.

**Inventory:** six.

**Unit Location:** Andrews AFB, Md.

**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 41,200 lb, gross 45,000 lb.

**Performance:** cruise speed Mach 0.8 (350 mph), range 6,900 miles.

**COMMENTARY**

The C-32A is a military version of the commercial Boeing 757-200. Four new C-32As were purchased as replacements for the C-137B/C aircraft. The commercial DC-130H/131H interior includes a crew rest area, DVT stateoom, conference area, and general passenger area. The passenger communications system provides worldwide clear and secure voice and data communications. Modern flight deck avionics allows operations to any suitable airfield in the world and provide an upgrade path as new capabilities, including Internet, become available.
UNITED STATES OF AMERICA

VC-25 Air Force One (Boeing)

Production: 24 (new-build Hs).
Inventory: 14 (E); 24 (H).

Unit Location: Active (Associate) 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 (IWS).

Power Plant: four Allison T6-6-15 turboprops, each 4,910 shp.

Accommodation: E: crew of nine; 53 troops or 26 para troops; H: crew of seven; 77 troops, 52 para troops, or 57/57 puppies.

Dimensions: span 132.6 ft, height 38.5 ft, length 201.6 ft, height 72 ft.

Weight: gross 34,900 lb, max VTO 52,870 lb; STO 57,000 lb, self-deploy T-O 60,500 lb.

Ceiling: 19,000 ft.

Performance: max speed 350 mph, range 2,400 miles.

Remarks: the VC-25 is a special mission application of the C-17.

COMMENTS

The VC-25 was developed specifically for presidential transport duties.

Valuation:

The VC-25s are planned for service on Air Force One.

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 (Associate).

First Flight: Sept. 22, 1989 (Beechcraft 400A).


Inventory: 180.

Production:

First Flight: 1957.

Unit Location: Columbus AFB, Miss., Laughlin and Randolph AFBs, Tex., Vance AFB, Okla.

Power Plant: two Pratt & Whitney Canada PT6A-66 turboprop, each 2,800 shp.

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.

Remarks: top speed max speed 27,000 ft 538 mph, range 2,400 miles.

COMMENTS

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

Brief: The 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.

T-6A Texan II

Brief: An advanced single-engine turboprop aircraft is 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 (Associate), USN.

First Flight: circa 1965 (E); January 1990 (H).


Accommodation: 2 to 8, 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 6,550 lb.

Ceiling: 31,000 ft.

Performance: max speed 368 mph, range 920 miles.

COMMENTS

The 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, laminar, and bird-resistant canopy, and new digital avionics. The JPATS will replace USAFs T-37Bs and USNs T-4CQs in primary pilot training, as well as support undergraduate naval flight officer and USASF navigator training. Pilot training began at Moody AFB, Ga., in November 2001.

T-37 Tweet

Brief: A twin-engine jet used for training under-graduate 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.


Inventory: 985.

Production: 415.
T-6 Texan II (USAF photo)

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 5,870 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 is currently 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 new 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.
IOC: March 1961.
Production: more than 1,100.
Inventory: 490.
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.
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 speed at S/L 535 mph (Mach 0.7), operational range 2,995 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.
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.
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 115,550 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, VOR and Tacan radio systems, INS, radar altimeter, all required communications equipment, and celestial navigation capability.
Several T-43s are configured for passengers and provide operational support to assigned commands.
C-150
Brief: Commercial Cessna 150 used by the US Air Force Academy flying team as a primary competition aircraft.
Function: Competition aircraft.
Operator: USAFA.
First Flight: September 1957.
Inventory: three.

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.
IOC: 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.

T-38 Talon (Guy Aceto)
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.
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 mono- plane 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: A medium-performance sailplane with tandem seating used for spins, aerobatics, and cross-country soaring.

Function: Trainer.
Operator: USAFA.
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.

Function: Trainer.
Operator: USAFA.
IOC: December 2002 (planned).
Production: one (planned).
Inventory: none.
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 Czech Republic.

TG-10C
Brief: Two-seat medium-performance sailplane used for instructor spin upgrade, aerobatic demonstrations, and cross-country competition.

Function: Trainer.
Operator: USAFA.
IOC: December 2002 (planned).
Production: four (planned).
Inventory: TBD.
Unit Location: TBD.
Contractor: Blanik.
Accommodation: two.
Dimensions: span 46.3 ft, length 27.6 ft, height 6.8 ft.
Weight: 1,146 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.
IOC: December 2002 (planned).
Production: three (planned).
Inventory: TBD.
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.
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 (planned).
IOC: December 2002 (planned).
Production: 14 (planned).
Inventory: five expected by summer 2002.
Unit Location: USAFA, Colo.
Contractor: Grupo Aeromot, Brazil.
Power Plant: one Rotax 912A, 81 hp engine.
Accommodation: two, side by side.
Dimensions: span 55.8 ft, length 26.4 ft, height 6.3 ft.
Weight: gross 1,875 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-2005 Sport Glider 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: Parachute.
Operator: USAFA.
First Flight: May 1965 (commercial version).
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 shp.
Accommodation: crew of two and up to 20 passengers.
Dimensions: span 66 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.
Production: 105.
Inventory: 105.
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 50 caliber machine guns in cabin doors.

COMMENTARY

One hundred four Black Hawk helicopters were modified to HH-60G Pave Hawk configuration for use by Air Force Special Operations Forces for infiltration/exfiltration as well as CSAR missions.

Function: SOF heavy-lift helicopter.

Operator: AETC, AFSOC.


Production: not available.

Inventory: 38.

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

Contractor: Sikorsky; Texas Instruments.

Power Plant: two General Electric T64-GE-100 turbo-shafts, 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.

MH-53J 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, AFSCOG.


Production: not available.

Inventory: 38.

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

Contractor: Sikorsky; Texas Instruments.

Power Plant: two General Electric T64-GE-100 turbo-shafts, 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.

MH-53M

Brief: 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.

Dimensions: twin T64-GE-100 engines, air refueling probe, and standard USAF avionics and communications equipment.

Armament: two .50 caliber miniguns, with provision for 50 caliber machine guns.

UH-I Iroquois (Guy Aceto)

Brief: Modified 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 aerial survival training. Two UH-1N helicopters are maintained by AFSCOG for aviation advisory airlift flight proficiency.

UH-1N Iroquois

Brief: Modified 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 aerial survival training. Two UH-1N helicopters are maintained by AFSCOG for aviation advisory airlift flight proficiency.

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

Strategic Missiles

AGM-86 Air Launched Cruise Missile

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

Function: Strategic air-to-surface cruise missile.

Operator: AETC.

First Flight: June 1979 (FSD).

Delivered: from 1981.

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

Production: 1,715.

Inventory: 1,600.

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

Contractor: Boeing.

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

Guidance: AGM-86B: inertial plus Terrain Contour Matching (TERCOM); AGM-86C: inertial plus GPS; AGM-86D: inertial plus laser (LPS-3)

Range: AGM-86B: 1,500+ miles; AGM-86D: 3,000+ miles

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

AGM-88A. 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 the Persian Gulf War 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 capability against a wide range of hardened, adverse weather capable and equipped for extended operations when air refueled. Equipped with a nose-mounted FLIR, an integrated digital map suite that includes TF/TA radar, Kalman filtered navigation suite (GPS, INS, Doppler), Projected Map Display, secure UHF, VHF, FM, HF communications, LPS, SATCOM, hover coupler, rescue hoist, mission commander’s C2 pad, rotor 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.
deeply buried targets. Final delivery was scheduled to November 2001.

**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.

**Inventory:** currently 410.

**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:** WB-1 nuclear.

**Dimensions:** length 29.8 ft, body width 2.2 ft, wing-span 19.2 ft.

**Weight:** 3,700 lb.

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

**COMMENTS**

**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 intercontinental-range ballistic missile 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:** 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 15.5 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.

**COMMENTS**

**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, 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 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 15.5 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.

**COMMENTS**

**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 lighter aircraft.

**Function:** Air-to-air guided missile.

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

**IOC:** 1986 (AIM-7M).

**Production:** 461.

**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, wing-span 3.3 ft.

**Weight:** launch weight 504 lb.

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

**COMMENTS**

**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 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 15.5 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.

**COMMENTS**

**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 lighter aircraft.

**Function:** Air-to-air guided missile.

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

**IOC:** 1986 (AIM-7M).

**Production:** 461.

**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, wing-span 3.3 ft.

**Weight:** launch weight 504 lb.

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

**COMMENTS**

**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.
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 (AIM-9M current operational variant).


**Production:** A joint project between Navy and USAF, the AIM-9M entered service with the AIM-7 Sparrow and is a replacement for the AIM-7 Sparrow.

**AIM-9M:**
- **Dimensions:** length 9.4 ft, body diameter 5 in, span 2.1 ft.
- **Weight:** launch weight 190 lb.
- **Performance:** max speed above Mach 2, range 10+ miles.

**AIM-9M-9:** A new-generation supersonic, medium-range, all-weather, all-aspect, launch-and-leave intercept capable, high-off-boresight capable, high-explosive directed fragmentation warhead.

**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, wing span 2.3 ft.

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

**Performance:** range about 9.2 miles.

**AIM-9M-9A:**
- **Dimensions:** length 9.4 ft, body diameter 5 in, span 2.1 ft.
- **Weight:** launch weight 190 lb.
- **Performance:** max speed above Mach 2, range 10+ miles.

**AIM-120 AMRAAM:**
- **Function:** A new-generation supersonic, medium-range, all-weather, all-aspect, launch-and-leave intercept capable, high-off-boresight capable, high-explosive directed fragmentation warhead.

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

**Weight:** launch weight 190 lb.

**Performance:** cruising speed approx Mach 4, range 20+ miles.

**AIM-120 AMRAAM (top), AIM-9 Sidewinder, AGM-88 HARM (bottom) (SrA. Stan Parker)**
Erasable electronically programmable read-only memory has been retrofitted on ACC, PACAF, and USAF HARMs, permitting changes to missile memory in the field. Current upgrade initiatives are aimed at increasing capability of both B and C versions against target shutdown, blanking, and blinding and at reducing initial damage to friendly radars in the target area; home-on-jamming capability will be added to the C. Further upgrades under development will introduce GPS precision navigation capability.

**AGM-130 Brief:** A powered TV- or IR-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.

**Inventory:** 490 (as of Sept. 30, 2000).

**Contractor:** Boeing.

**Guidance:** TV or IR seeker, or DME transponder.

**Wingload:** 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.

**Remarks:** 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 the ability to absorb the severe wind conditions of the AGM-154. This upgrade introduces a rocket motor for a longer range of the AGM-130, providing AGM-130s with the ability to absorb the severe wind conditions of the AGM-154.

**AGM-130 Brief:** AGM-130c has been used extensively in recent operations.

**Function:** Air-to-surface guided missile.

**First Flight:** 1990.

**Delivered:** 1992.

**IOC:** June 1992.

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

**Weight:** 3,010 lb.

**Performance:** range greater than 57.5 miles.

**Remarks:** AGM-130c has the ability to absorb the severe wind conditions of the AGM-130.

**AGM-142 Have Nap Brief:** A medium-range standoff attack missile that is capable of using AGM-129s to provide this long-range aircraft with a conventional precision strike capability.

**Function:** Air-to-surface guided missile.

**First Flight:** 1982.

**IOC:** 1992.

**Dimensions:** Inventory: 117.

**Contractor:** Rafael; Lockheed Martin.

**Power Plant:** solid-propellant rocket motor.

**Guidance:** inertial, with data link, TV, or IR homing.

**Warhead:** high-explosive, 750 lb, blast/fragmentation or 400 lb penetrator.

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

**Weight:** 3,010 lb.

**Performance:** range greater than 57.5 miles.

**Remarks:** AGM-142c can provide the AGM-130c with the ability to absorb the severe wind conditions of the AGM-130.

**AGM-154C Brief:** AGM-154c is a product improvement to the AGM-154, providing AGM-130s with the ability to absorb the severe wind conditions of the AGM-130.

**Function:** Air-to-surface guided weapon.

**First Flight:** 1994.

**IOC:** 2000 (planned).

**Dimensions:** Inventory: 240.

**Contractor:** Lockheed; Raytheon; Honeywell.

**Power Plant:** Teledyne Continental Motors.

**Guidance:** TV or IIR seeker, or DME transponder.

**Warhead:** high-explosive, 750 lb, blast/fragmentation.

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

**Weight:** 3,010 lb.

**Performance:** range greater than 57.5 miles.

**Remarks:** AGM-154c can provide the AGM-130c with the ability to absorb the severe wind conditions of the AGM-130.

**AGM-154D Brief:** AGM-154d is a product improvement to the AGM-154, providing AGM-130s with the ability to absorb the severe wind conditions of the AGM-130.

**Function:** Air-to-surface guided weapon.

**First Flight:** 1994.

**IOC:** 2000 (planned).

**Dimensions:** Inventory: 60 (as of Sept. 30, 2000).

**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 49+ miles.

**Remarks:** AGM-154d is a product improvement to the AGM-154, providing AGM-130s with the ability to absorb the severe wind conditions of the AGM-130.

**CBU-87/90 Sensor Fuzed Weapon Brief:** The CBU-97 Gator is an anti-armor/anti-personnel mine dispenser used by USAF and Navy fighters and bombers for interdiction.

**Function:** Scalable/adjustable.

**Production:** Sustainment phase.

**Inventory:** 9,236 (CBU-89); 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:** disperses 72 BLU-91 anti-armor and 22 BLU-92 anti-personnel mines.

**Remarks:** CBU-89/104 Gator Brief:

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

**Production:** Sustainment phase.

**Inventory:** 5,000 (planned).

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

**Guidance:** none (CBU-89).

**Dimensions:** length 7.7 ft; diameter 1.3 ft.

**Weight:** 705 lb.

**Performance:** disperses 72 BLU-91 anti-armor and 22 BLU-92 anti-personnel mines.

**Remarks:** CBU-87/90 Sensor Fuzed Weapon Brief:

**Function:** Scalable/adjustable.

**Production:** Sustainment phase.

**Inventory:** 5,000 (planned).

**Contractor:** Textron Systems.

**Guidance:** IR sensors in each warhead search for targets and detonate over them.

**Dimensions:** length 7.7 ft; diameter 1.3 ft.

**Weight:** 920 lb.

**Remarks:** CBU-89/104 delivers 40 lethal projectiles over an area of about 500 ft by 1,200 ft.

**Remarks:** CBU-97 Sensor Fuzed Weapon Brief:

**Function:** 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.

**Production:** Wide-area cluster munition.

**First Flight:** circa 1990.

**Delivered:** 1994–2007 (planned).

**IOC:** 1997.

**Production:** 5,000 (planned).

**Inventory:** classified.

**Contractor:** Textron Systems.

**Guidance:** IR sensors in each warhead search for targets and detonate over them.

**Dimensions:** length 7.7 ft; diameter 1.3 ft.

**Weight:** 920 lb.

**Remarks:** CBU-89/104 delivers 40 lethal projectiles over an area of about 500 ft by 1,200 ft.
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. The Air Force has started full-rate production of a preplanned product improvement SFW variant. It incorporates improvements such as an active laser sensor, multimission warhead, and increased footprint.

**GBU-105**

Designation of a CBU-97 equipped with a WCMD tail kit. The GBU-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-15**

Brief: An unpowered glide weapon carried by the F-15 and used to destroy high-value enemy targets from short standoff distances.

Function: Air-to-surface guided munition.

First Flight: 1975.


Production: 1,583.

Production: more than 2,000.

**GBU-27**

(SrA. Jeff Fitch)

Brief: A large 5,000-lb class air-to-ground penetrating glide bomb equipped with an advanced laser guidance kit, used for striking and destroying hard underground targets.

Function: Air-to-surface guided bomb.


Production: approx 500.

Inventory: classified.

Contractor: Raytheon.

Dimensions: length 19.2 ft, diameter 1.2 ft.

Weight: 4,676 lb.

Performance: classified.

**COMMENTARY**

Under USAF’s rapid-response program, the GBU-28 laser-guided bunker-busting weapon was developed to support 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.

**GBU-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 bomb capability.

Function: Air-to-surface guided bomb.


Production: USAF 62,000; USN 25,496 (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 88 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 able to deliver the 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. JDAM is intended for use on a variety of aircraft, including the AV-8B, B-1B, B-2, B-52, F-14, F-15E, F-16, F-22, F-117A, F/A-18C/D/E/F, and JSF.

**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. Under development.

**Small Diameter Bomb**

Brief: An air-to-surface miniaturized munition with weather capability and improved target location. En-
Satellite Systems

Defense Meteorological Satellite Program 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 300 feet.

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 military and civil. 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 two new civilian channels.

Militar Satellite Communications System Brief: A satellite communications system that provides secure, jam-resistant worldwide C' communications for tactical and strategic forces in all levels of conflict, linking command authorities to ground forces, ships, submarines, and aircraft.

COMMENTARY

The backbone of strategic-tactical communications, Milstar is a joint-service communications system that provides secure, jam-resistant EHF communications. Worldwide satellite links are highly unstable and provide an all-weather capability, ready to support any deployed military force.

Defense Support Program (DSP) satellites are a key part of North America’s early warning system, capable of detecting missile launches and nuclear detonations. Warning data are fed to NORAD and US Space Command early warning centers at Cheyenne Mountain and Vandenberg Air Force Base. Since the 1960’s launch, DSP satellites have provided an uninterrupted early warning capability to the US. To date, 21 DSP satellites have been launched by Boeing since America's initial DSP was modernized with the introduction of the new Space Based Infrared System to be phased in as DSP assets reach the end of their useful life.

Global Positioning System (GPS) 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 300 feet.

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 military and civil. 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 two new civilian channels.

Militar Satellite Communications System Brief: A satellite communications system that provides secure, jam-resistant worldwide C' communications for tactical and strategic forces in all levels of conflict, linking command authorities to ground forces, ships, submarines, and aircraft.

COMMENTARY

The backbone of strategic-tactical communications, Milstar is a joint-service communications system that provides secure, jam-resistant EHF communications. Worldwide satellite links are highly unstable and provide an all-weather capability, ready to support any deployed military force.

Defense Support Program (DSP) satellites are a key part of North America’s early warning system, capable of detecting missile launches and nuclear detonations. Warning data are fed to NORAD and US Space Command early warning centers at Cheyenne Mountain and Vandenberg Air Force Base. Since the 1960’s launch, DSP satellites have provided an uninterrupted early warning capability to the US. To date, 21 DSP satellites have been launched by Boeing since America's initial DSP was modernized with the introduction of the new Space Based Infrared System to be phased in as DSP assets reach the end of their useful life.

Global Positioning System (GPS) 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 300 feet.

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 military and civil. 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 two new civilian channels.

Militar Satellite Communications System Brief: A satellite communications system that provides secure, jam-resistant worldwide C' communications for tactical and strategic forces in all levels of conflict, linking command authorities to ground forces, ships, submarines, and aircraft.

COMMENTARY

The backbone of strategic-tactical communications, Milstar is a joint-service communications system that provides secure, jam-resistant EHF communications. Worldwide satellite links are highly unstable and provide an all-weather capability, ready to support any deployed military force.

Defense Support Program (DSP) satellites are a key part of North America’s early warning system, capable of detecting missile launches and nuclear detonations. Warning data are fed to NORAD and US Space Command early warning centers at Cheyenne Mountain and Vandenberg Air Force Base. Since the 1960’s launch, DSP satellites have provided an uninterrupted early warning capability to the US. To date, 21 DSP satellites have been launched by Boeing since America's initial DSP was modernized with the introduction of the new Space Based Infrared System to be phased in as DSP assets reach the end of their useful life.

Global Positioning System (GPS) 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 300 feet.

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 military and civil. 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 two new civilian channels.

Militar Satellite Communications System Brief: A satellite communications system that provides secure, jam-resistant worldwide C' communications for tactical and strategic forces in all levels of conflict, linking command authorities to ground forces, ships, submarines, and aircraft.

COMMENTARY

The backbone of strategic-tactical communications, Milstar is a joint-service communications system that provides secure, jam-resistant EHF communications. Worldwide satellite links are highly unstable and provide an all-weather capability, ready to support any deployed military force.

Defense Support Program (DSP) satellites are a key part of North America’s early warning system, capable of detecting missile launches and nuclear detonations. Warning data are fed to NORAD and US Space Command early warning centers at Cheyenne Mountain and Vandenberg Air Force Base. Since the 1960’s launch, DSP satellites have provided an uninterrupted early warning capability to the US. To date, 21 DSP satellites have been launched by Boeing since America's initial DSP was modernized with the introduction of the new Space Based Infrared System to be phased in as DSP assets reach the end of their useful life.

Global Positioning System (GPS) 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 300 feet.

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 military and civil. 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 two new civilian channels.

Militar Satellite Communications System Brief: A satellite communications system that provides secure, jam-resistant worldwide C' communications for tactical and strategic forces in all levels of conflict, linking command authorities to ground forces, ships, submarines, and aircraft.

COMMENTARY

The backbone of strategic-tactical communications, Milstar is a joint-service communications system that provides secure, jam-resistant EHF communications. Worldwide satellite links are highly unstable and provide an all-weather capability, ready to support any deployed military force.

Defense Support Program (DSP) satellites are a key part of North America’s early warning system, capable of detecting missile launches and nuclear detonations. Warning data are fed to NORAD and US Space Command early warning centers at Cheyenne Mountain and Vandenberg Air Force Base. Since the 1960’s launch, DSP satellites have provided an uninterrupted early warning capability to the US. To date, 21 DSP satellites have been launched by Boeing since America's initial DSP was modernized with the introduction of the new Space Based Infrared System to be phased in as DSP assets reach the end of their useful life.

Global Positioning System (GPS) 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 300 feet.

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 military and civil. 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 two new civilian channels.

Militar Satellite Communications System Brief: A satellite communications system that provides secure, jam-resistant worldwide C' communications for tactical and strategic forces in all levels of conflict, linking command authorities to ground forces, ships, submarines, and aircraft.

COMMENTARY

The backbone of strategic-tactical communications, Milstar is a joint-service communications system that provides secure, jam-resistant EHF communications. Worldwide satellite links are highly unstable and provide an all-weather capability, ready to support any deployed military force.
will be fully deployed by the end of 2002, and modernization of satellite communications will continue with the Advanced EHF constellation deployments.

**Polar MILSATCOM**

**Brief:** Satellite that provides secure, survivable communications, supporting peacekeeping, contingency, and wartime operations in the North Pole region.

**Function:** Communications satellite.

**Operator:** AFSPC.

**First Launch:** late 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**

Although the Mislatar constellation, the Polar MILSATCOM payload is a cost-effective means of providing secure communications for the northern polar region. Like Mislatar, the system enables worldwide operations by linking strategic and tactical forces with secure, jam-resistant EHF communication links.

**Space Based Infrared System**

**Brief:** Advanced surveillance system for missile warning, missile defense, battlespace characterization, and technical intelligence. System includes two main components: High with satellites in Geosynchronous Earth Orbit (GEO) and highly elliptical orbit; and Low with satellites in Low Earth Orbit (LEO).

**Function:** Infrared space surveillance.

**Operator:** AFSPC.

**First Launch:** (planned) High GEO: FY04; Low: FY06.

** IOC:** TBD.

**Constellation:** High: four GEO sats, two highly elliptical orbit sensors; Low: 27 LEO sats (incl three spares).

**Launch Vehicle:** TBD.

**Unit Location:** Buckley AFB, Colo.

**Orbit Altitude:** High at approx. 22,300 miles; Low at 60–300 miles.

**Contractor:** Lockheed Martin (High); TRW and Spectrotron Astor for preliminary system designs (Low).

**Power Plant:** not available.

**Dimensions:** not available.

**Weight:** not available.

** COMMENTARY**

SBIRS is an integrated system (SIBRS), SIBRS is an integrated “system of systems” including a High component (satellites in GEO and sensors hosted on two satellites in highly elliptical orbit) and a Low component (satellites in LEO), as well as ground assets. SBIRS is being fielded in four increments. Increment 1 consolidates all DSP ground processing in one CONUS master control station at Buckley AFB, Colo. IOC was declared Jul. 1, 2001. Increment 2 fields the High component, i.e. space and ground assets, and increment 3 fields the Low component. Increment 4 will optimize the entire system and define requirements for further deployment. The High component is in the EMD phase of development led by a Lockheed Martin team. FY02, SIBRS Low management was assumed by BMDO (now the MDA). SIBRS Low is currently in the program definition and risk reduction phase involving competition between TRW- and Spectrotron Astor-led teams.

**Wideband Gap-filler Satellite (WGS)**

**Brief:** WGS will provide the wideband communications needed for information superiority to deployed tactical forces to include Aerospace Expeditionary Forces, Army Digital Corps, and Navy battle groups.

**Function:** Wideband satellite communications.

**Operator:** AFSPC.

**First Launch:** January 2004 (planned).

** IOC:** October 2004 (planned).

**Constellation:** three satellites.

**Design Life:** 14 years.

**Launch Vehicle:** Evolved Expendable Launch Vehicle.

**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) systems 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 system includes GEO satellites, 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).

** Production:** 70 (B); 221 (D); 78 (E).

**Inventory:** 44 (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-B engine, 950 lb thrust; one Teledyne C-105DS delivered since 1989 have 950 lb thrust TR-65 jetboots. Microturbo TR-65 engine, 1,061 lb thrust or TCAE 373-6B (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 multilateralation 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 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:** August 1993.

** 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 63 ft, height 16.5 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 MQM-107 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)