Gallery of USAF Weapons

Note: Inventory numbers are total active inventory figures as of Sept. 30, 2014.

By Aaron M. U. Church, Associate Editor

2015 USAF Almanac

BOMBER AIRCRAFT

B-1 Lancer
Brief: A long-range bomber capable of penetrating enemy defenses and delivering the largest weapon load of any aircraft in the inventory.
COMMENTARY
The B-1A was initially proposed as replacement for the B-52, and four prototypes were developed and tested in 1970s before program cancellation in 1977. The program was revived in 1981 as B-1B. The vastly upgraded aircraft added 74,000 lb of usable payload, improved radar, and reduced radar cross section, but cut maximum speed to Mach 1.2. The B-1B first saw combat in Iraq during Desert Fox in December 1998. Its three internal weapons bays accommodate a substantial payload of weapons, including a mix of different weapons in each bay. Lancer production totaled 100 aircraft. The bomber's blended wing/body configuration, variable-geometry design, and turbofan engines provide long range and loiter time. The B-1B has been upgraded with GPS, smart weapons, and mission systems. Offensive avionics include SAR for tracking, targeting, and engaging moving vehicles and terrain following. GPS-aided INS lets aircrews autonomously navigate without ground-based navigation aids and precisely engage targets. Sniper pod was added in 2008. Ongoing mods include Vertical Situation Display Upgrade, Central Integrated Test System, and Fully Integrated Data Link (FIDL). FIDL includes Link 16 and Joint Range Extension data link, enabling permanent secure LOS/BLOS/C2. Adding secure voice communications is considered an urgent operation need. FIDL adds Ethernet to enable rapid airborne retargeting.
Extant Variant(s)
• B-1B. Upgraded production version of the canceled B-1A.
Function: Long-range conventional bomber.
Operator: ACC, AFMC.
First Flight: Dec. 23, 1974 (B-1A); Oct. 18, 1984 (B-1B).
Delivered: June 1985-May 1988.
IOC: Oct. 1, 1986, Dyess AFB, Texas (B-1B).
Production: 104.
Inventory: 63.
Aircraft Location: Dyess AFB, Texas; Edwards AFB, Calif.; Eglin AFB, Fla.; Ellsworth AFB, S.D.
Contractor: Boeing (formerly Rockwell), AIL Systems, General Electric.
Power Plant: four General Electric F101-GE-102 turbofans, each 30,780 lb thrust.
Accommodation: pilot, copilot, and two WSOs (offensive and defensive), on zero/zero ACES II ejection seats.
Dimensions: span 137 ft (spread forward) to 79 ft (swept aft), length 146 ft, height 34 ft.
Weight: max T-O 477,000 lb.
Ceiling: more than 30,000 ft.
Performance: speed 900+ mph at S-L, range intercontinental.
Armament: 84 Mk 82 (500-lb) or 24 Mk 84 (2,000-lb) general-purpose bombs; 84 Mk 62 (500-lb) or 8 Mk 65 (2,000-lb) Quick Strike naval mines; 30 CBU-87/89 cluster bombs or 30 CBU-103/104/105 WCMDs; 24 GBU-31 or 15 GBU-38 JDAMs/GBU-54 LJDAM; 24 AGM-158A JASSM or JASSM-ER.

B-2 Spirit
Brief: Stealthy, long-range bomber capable of nuclear and conventional weapon delivery worldwide.
COMMENTARY
The B-2 is a flying wing that combines LO stealth design with high aerodynamic efficiency. Spirit was first used in combat against Serb targets during Allied Force on March 24, 1999. B-2 production was completed in three successive capability blocks and all aircraft were upgraded to Block 30 standards with AESA radar. AESA paves the way for future advanced weapons integration including Long-Range Standoff (LRSO) missile and B61-12 bomb. The aircraft's smoothly blended "fuselage" holds two weapons bays capable of carrying nearly 60,000 lb of weapons in various combinations. The B-2 lacks a vertical tail surface, and quadruple-redundant digital fly-by-wire flight controls actuate trailing edge surfaces that combine aileron, elevator, and rudder functions. New EHF satcom and high-speed computer upgrade recently entered full production. Both are part of the Defensive Management System-Modernization (DMS-M). Efforts are underway to develop a new VLF receiver for alternative comms. Weapons integration includes the improved GBU-57 Massive Ordnance Penetrator and JASSM-ER and future weapons such as GBU-53 SDB II, GBU-56 Laser JDAM, JDAM-5000, and LRSO. Flexible Strike Package mods will feed GPS data to the weapons bays to allow weapons to be guided before release, to thwart jamming. It also will move stores management to a new integrated processor. Phase 2 will allow nuclear and conventional weapons to be carried simultaneously to increase flexibility. The Air Force is looking to equip the bomber with wide-band nuclear C2 under the Family of Advanced Beyond Line of Sight Terminals (FAB-T) program.
Extant Variant(s)
• B-2A. Production aircraft upgraded to Block 30 standards.
Function: Long-range heavy bomber.
Operator: AFGSC, AFMC, ANG.
First Flight: July 17, 1989.
Delivered: from Dec. 17, 1993.
IOC: April 1997, Whiteman AFB, Mo.
Production: 21.
Inventory: 20.
Aircraft Location: Edwards AFB, Calif., Whiteman AFB, Mo.
Contractor: Northrop Grumman, Boeing, Vought.
Power Plant: four General Electric F118-GE-100 turbofans, each 17,300 lb thrust.
Accommodation: two pilots, on zero/zero ACES II ejection seats.
Dimensions: span 172 ft, length 69 ft, height 17 ft.
Weight: max T-O 336,500 lb.
Ceiling: 50,000 ft.
Performance: speed high subsonic, estimated unrefueled range 5,000 miles.
Armament: Nuclear: 16 B61-7 or B83, or 8 B61-11 bombs (on rotary launchers). Conventional: 80 Mk 62 (500-lb) sea mines, 80 Mk 82 (500-lb) bombs, 80 GBU-38 JDAMs, or 34 CBU-87/89 munitions (on rack assemblies); or 16 GBU-31 JDAMs, 16 Mk 84 (2,000-lb) bombs, 16 AGM-154 JSOWs, 16 AGM-158 JASSMs, or eight GBU-28 LGBs.

B-52 Stratofortress
Brief: Long-range bomber capable of free-fall nuclear or conventional weapon delivery or cruise missile carriage.
COMMENTARY
The B-52H is the last serving variant of the Stratofortress. The B-52H first flew in 1960, and 102 were delivered between May 1961 and October 1962. The aircraft is USAF's only nuclear cruise missile carrier. Its multimission capability includes long-range precision strike, CAS, air interdiction, defense suppression, and maritime surveillance. The B-52H can carry targeting pods

B-52H Stratofortress (TSgt. Jason Robertson)

and employ GPS/INS guided weapons, which it did for the first time during Operation Iraqi Freedom in 2003. The Internal Weapons Bay Upgrade will enable smart weapons to be carried internally. A test aircraft was retrofitted with the new Conventional Rotary Launcher for the first time in 2014. The upgrade will roughly double smart weapon capacity while reducing drag to increase range. Future weapons integration includes the GBU-54 Laser JDAM, AGM-158B JASSM-ER, MALD, and MALD-J jammer variant. The B-52's ECM suite combines electronic detection, jamming, and IR countermeasures to defeat air defenses. The overall B-52 System Improvements project is replacing key obsolescent components. The Combat Network Communications Technology (CONECT) program is replacing the aircraft's old cockpit displays and communications and enabling functions such as machine-to-machine retasking and retargeting. CONECT recently delivered its first upgraded airframe. Communications Navigation Surveillance/Air Traffic Management (CNS/ATM) replaces the B-52's analog systems with globally compatible digital systems. Several B-52s are being modified to conventional-only capability to comply with New START nuclear arms reduction agreement. AFGSC recently tested a podded AESA radar to enhance the aircraft's all-weather/contested-airspace operations.

Extant Variant(s)

• B-52H. Last serving variant of the dual-capable nuclear and conventional bomber.

Function: Long-range heavy bomber.
Operator: AFGSC, AFMC, AFRC.
First Flight: April 15, 1952 (YB-52 prototype).
Delivered: 1955-October 1962.
IOC: June 19, 1955.
Production: 744.
Inventory: 76.
Aircraft Location: Barksdale AFB, La.; Edwards AFB, Calif.; 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 EWO.
Dimensions: span 185 ft, length 159.3 ft, height 40.7 ft.
Weight: max T-O 488,000 lb.
Ceiling: 50,000 ft.
Performance: speed 650 mph, range 10,000+ miles.
Armament: Nuclear: 12 AGM-86B ALCMs externally, and eight ALCMs or gravity weapons internally. Conventional: AGM-86C/D CALCMs, Mk 62 sea mines, Mk 82/84 bombs, CBU-87/89 cluster bombs, CBU-103/104/105 WCMDs, GBU-31/38 JDAMs, AGM-158A JASSMs, and GBU-10/12/28 LGBs.

FIGHTER AND ATTACK AIRCRAFT

A-10 Thunderbolt II

Brief: Twin-engine aircraft designed for CAS against a wide range of ground targets, including tanks and armored vehicles.

COMMENTARY

The A-10C is an A-10A with precision engagement modifications, including color cockpit MFDs, hands-on throttle and stick, digital stores management, improved fire-control system, GPS guided weapons, Litening/Sniper pods, advanced data links, and integrated sensors. A-10C reached IOC and deployed to combat for the first time in 2007. It combines a large and diverse weapons payload, long loiter times, austere airfield capability, maneuverability, and wide combat radius. Using night vision and targeting pods, it is capable of operating under 1,000-ft ceilings in darkness. The aircraft has 11 hardpoints for up to 16,000 lb of ordnance. Its 30 mm gun can destroy heavy armor, and its titanium cockpit tub protects the pilot. Current upgrades include advanced IFF and open-architecture software to allow quick integration of future weapons and sensors. Although fleetwide wing replacements are ongoing, USAF is seeking to divest the fleet. Congress barred retiring the jets, but permitted the service to place 36 in backup flying or inventory status for the duration of FY15 to ease budget constraints.

Extant Variant(s)

• A-10C. Upgraded version of the A-10A ground attack aircraft.

Function: Attack.
Operator: ACC, AFMC, PACAF, ANG, AFRC.
First Flight: Feb. 15, 1975 (preproduction).
Delivered: October 1975-March 1984.
IOC: October 1977.
Production: 713.
Inventory: 297.
Aircraft Location: Barksdale AFB, La.; Boise Air Terminal, Idaho; Davis-Monthan AFB, Ariz.; Eglin AFB, Fla.; Fort Wayne Arpt., Ind.; Martin State Arpt., Md.; Moody AFB, Ga.; Nellis AFB, Nev.; Osan AB, South Korea; Selfridge ANGB, Mich.; Whiteman AFB, Mo.
Contractor: Fairchild Republic, now Lockheed Martin.
Power Plant: two General Electric TF34-GE-100 turbofans, each 9,065 lb thrust.
Accommodation: pilot.
Dimensions: span 57.5 ft, length 53.3 ft, height 14.7 ft.
Weight: max T-O 51,000 lb.
Ceiling: 45,000 ft.
Performance: speed 518 mph, range 800 miles.
Armament: one 30 mm, seven-barrel GAU-8/A Gatling gun (1,174 rd), straight HEI, or anti-armor HE/armor-piercing incendiary (API). Combat mix incl various types of free-fall or guided bombs such as Mk 82, Mk 84, GBU-10/12/38, CBU-87, various WCMDs, illumination rockets/flares, AGM-65 Mavericks, and AIM-9 Sidewinders.

A-10C Thunderbolt II (SrA. Brett Clashman)

F-15 Eagle

Brief: Supersonic, highly maneuverable, all-weather tactical fighter designed to swiftly gain and maintain combat air superiority.

COMMENTARY

The F-15 was the world's dominant air superiority fighter for more than 30 years. F-15C/Ds began replacing F-15A/B in 1979 and combined superior maneuverability and acceleration, range, weapons, and avionics. The aircraft accounted for 34 of the 37 USAF air-to-air kills during its first combat employment, in

Acronyms

ACTD	Advanced Concept Technology Demonstration
AE	aeromedical evacuation
AEHF	Advanced Extremely High Frequency
AESA	active electronically scanned array
AFDW	Air Force District of Washington
AGM	air-to-ground missile
AIM	air intercept missile
ALCM	Air Launched Cruise Missile
AMRAAM	Advanced Medium-Range Air-to-Air Missile
ATP	advanced targeting pod
AvFID	Aviation Foreign Internal Defense
BLOS	beyond line of sight
BLU	bomb live unit
BM	battle management
C2	command and control
C3	command, control, & communications
CALCM	Conventional Air Launched Cruise Missile
CAS	close air support
CBU	cluster bomb unit
CEM	combined effects munition
CEP	circular error probable
CFT	conformal fuel tank
COTS	commercial off the shelf
CSAR	combat search and rescue
CSO	combat systems officer
DARPA	Defense Advanced Research Projects Agency
EA	electronic attack
ECM	electronic countermeasures
EELV	Evolved Expendable Launch Vehicle
EHF	extremely high frequency
Elint	electronic intelligence
EO	electro-optical
ER	extended range
EW	electronic warfare
EWO	electronic warfare officer
FAB-T	Family of Advanced Beyond Line of Sight Terminals
FLIR	forward-looking infrared
FMV	full-motion video
FYDP	Future Years Defense Program
GATM	Global Air Traffic Management
GBU	guided bomb unit
GCS	ground control station
GPS	Global Positioning System
HARM	High-speed Anti-Radiation Missile
HE	high-explosive
HUD	head-up display
IFF	identification, friend or foe
IIR	imaging infrared

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the 1991 Gulf War. The aircraft includes internal EW countermeasures suite, additional 2,000 lb of internal fuel, and provision for CFTs. Tactical capabilities were enhanced with the initiation of the Multistage Improvement Program. The final 43 production aircraft received the F-15E-designed APG-70 radar. Ongoing F-15C/D mods include AESA radar and a new mission computer slated for LRIP in FY15. The Talon Hate program deploys four F-15 developmental jam-proof data link pods to PACOM for uncompromised data-relay in high-end threat areas. Due to budget pressure, USAF clipped FY15 funding from the Eagle Passive/Active Warning Survivability System (EPAWSS). EPAWSS is considered crucial to future operations in highly contested environments. USAF plans to retire 51 aircraft over the FYDP, sustaining the remaining aircraft through at least 2035. Future upgrades include developing new digital cockpit displays. Nellis was to cease F-15 operations in March 2015.

Extant Variant(s)

• F-15C/D. Upgraded version of the original F-15A/B air superiority fighter.

Function: Air superiority fighter.
Operator: ACC, AFMC, PACAF, USAFE-AFAFRICA, ANG.
First Flight: July 27, 1972.
Delivered: November 1974-85.
IOC: September 1975.
Production: 874.
Inventory: 213 (F-15C); 36 (F-15D).
Aircraft Location: Barnes Arpt., Mass.; Eglin AFB, Fla.; Fresno ANGB, Calif., Jacksonville Arpt., Fla.; Kadena AB, Japan; Kingsley Field (Klamath Falls), Ore.; NAS JRB New Orleans, La.; Nellis AFB, Nev.; Portland Arpt., Ore.; RAF Lakenheath, UK.
Contractor: McDonnell Douglas (now Boeing), Raytheon.
Power Plant: Two Pratt & Whitney F100-PW-220 turbofan engines, each 23,450 lb thrust; or two P&W F100-PW-229 turbofan engines with afterburners, each 29,000 lb thrust.
Accommodation: pilot (C); two pilots (D).
Dimensions: span 42.8 ft, length 63.8 ft, height 18.7 ft.
Weight: max T-O 68,000 lb.
Ceiling: 60,000 ft.
Performance: F-15C: speed Mach 2.5, ferry range 2,878 miles (3,450 miles with CFTs and three external tanks).
Armament: one internally mounted M61A1 20 mm six-barrel cannon (940 rd); four AIM-9 Sidewinders and four AIM-120 AMRAAMs or eight AIM-120s, carried externally.

F-15E Strike Eagle

Brief: Heavily modified two-seat dual-role F-15 designed for all-weather deep interdiction and weapons delivery as well as air-to-air combat.

COMMENTARY

F-15E is an upgraded heavyweight, multirole F-15. It saw combat for the first time during Desert Storm in 1991. The F-15E can maneuver at nine Gs throughout the flight envelope. Its advanced cockpit controls and displays include a wide-field-of-view HUD, and its avionics permit all-weather day/night engagement. The F-15E carries LANTIRN, Sniper, and Litening ATPs on dedicated pylons. A SAR pod provides surveillance and reconnaissance capability. The F-15E's large, varied ordnance load of precision weapons and 20 mm cannon gives it potent ground attack capability. Radar guided and IR-homing missiles give it an additional air-to-air capability. Aircraft are equipped with Link 16 and ARC-210 BLOS satcom. Ongoing upgrades include AESA radar, more capable mission computer, and helmet mounted cockpit cueing. EPAWSS mods have been slowed. USAF expects to complete fatigue testing in 2016 to determine SLEP requirements to reach 2035 or beyond. The Air Force launched development of passive IR Search and Track (IRST) in FY15.

Extant Variant(s)

• F-15E. Multirole fighter aircraft based on the F-15 air superiority fighter.

Function: Multirole fighter.
Operator: ACC, AFMC, USAFE-AFAFRICA.
First Flight: Dec. 11, 1986.
Delivered: April 1988-2004.
IOC: September 1989.
Production: 236.
Inventory: 220.

***F-15E** Strike Eagle* (A1C Trevor T. McBride)

Aircraft Location: Eglin AFB, Fla.; 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, each 23,450 lb thrust; or two F100-PW-229 turbofans with afterburners, each 29,000 lb thrust.
Accommodation: pilot and WSO.
Dimensions: span 42.8 ft, length 63.8 ft, height 18.5 ft.
Weight: max T-O 81,000 lb.
Ceiling: 50,000 ft.
Performance: speed Mach 2.5, ferry range 2,400 miles with CFTs and three external tanks.
Armament: one internally mounted M61A1 20 mm six-barrel cannon (500 rd); four AIM-9 Sidewinders and four AIM-120 AMRAAMs or eight AIM-120s; most air-to-surface weapons in USAF inventory (nuclear and conventional).

F-16 Fighting Falcon

Brief: Highly maneuverable multirole fighter proven in air-to-air combat, SEAD, and air-to-surface attack.

COMMENTARY

The F-16 is the workhorse of USAF's fighter fleet and among the most maneuverable fighters ever built. It is a lightweight fighter capable of carrying the majority of PGMs. The F-16 flew in combat for the first time in the 1991 Gulf War, flying more sorties than any other type. The F-16C/D was introduced in 1984, at F-16 production Block 25. It featured Multinational Staged Improvement Program (MSIP) II cockpit, airframe, and core avionics upgrades and added the increased-range APG-68 radar. Block 25s added AMRAAM as a baseline weapon, and Block 30/32 added MSIP III mods, new engines, and additional weapons including HARM. Block 40/42 was first delivered in 1988 and introduced the LANTIRN pod, enabling automatic terrain following for high-speed night and all-weather penetration and attack with PGMs. It also included wide-angle HUD and featured increased takeoff weight, expanded flight envelope, and higher G limits. Block 50/52 was first delivered in 1991 and is optimized for SEAD, employing HARM and a longer range fire-control radar. It also added the uprated F110-GE-129 and F100-PW-229 engines and upgradable cockpit controls and displays. Weapons improvements included Sniper and Litening ATPs and ROVER downlink to coordinate with joint terminal attack controllers (JTACs) on the ground. All Block 40/42 and 50/52 F-16s received the Common Configuration Implementation Program (CCIP), standardizing the cockpit configurations with color MFDs, modular mission computer, helmet mounted cueing, and Link 16. The Air Force is evaluating both blocks for a SLEP due to airframe fatigue. All F-16Ds were briefly grounded after canopy-sill cracking was discovered during 2014. SLEP would include structural mods to extend the service life of 300 aircraft by six to eight years. The Air Force canceled the Combat Avionics Programmed Extension Suite (CAPES) due to budget cuts. CAPES would have added AESA radar, new cockpit display, data link enhancements, and improved defensive suite considered essential against emergent threats. Newly fielded ground collision avoidance equipment aims to cut the leading cause of aircraft and crew loss.

Extant Variant(s)

• F-16C/D Block 30. MSIP II upgraded with new engines, flown by ANG and AFRC.
• F-16CG Block 40/42. Aircraft optimized for night and all-weather attack.
• F-16CJ Block 50/52. Aircraft optimized for SEAD with new long-range radar, engines, and weapons.

Function: Multirole fighter.
Operator: ACC, AETC, AFMC, PACAF, USAFE-AFAFRICA, ANG, AFRC.
First Flight: Dec. 8, 1976 (full-scale development).
Delivered: January 1979-2005.
IOC: October 1980, Hill AFB, Utah.
Production: 2,206.
Inventory: 814 (F-16C); 157 (F-16D).
Aircraft Location: Aviano AB, Italy; Edwards AFB, Calif.; Eglin AFB, Fla.; Eielson AFB, Alaska; Hill AFB, Utah; Holloman AFB, N.M.; Homestead ARB, Fla.; Kunsan AB, South Korea; Luke AFB, Ariz.; Misawa AB, Japan; NAS JRB Fort Worth, Texas; Nellis AFB, Nev.; Osan AB, South Korea; Shaw AFB, S.C.; Spangdahlem AB, Germany; and ANG in Alabama, Arizona, Colorado, District of Columbia (flying out of Maryland), Minnesota, New Jersey, Ohio, Oklahoma, South Carolina, South Dakota, Texas, Vermont, Wisconsin.
Contractor: Lockheed Martin, Northrop Grumman.
Power Plant: Block 40: one General Electric F110-GE-100 (29,000 lb thrust); Block 42: one Pratt & Whitney F100-PW-220 (24,000 lb thrust); Block 50: one F110-GE-129 (29,000 lb thrust); Block 52: one F100-PW-229 (29,000 lb thrust).
Accommodation: pilot.
Dimensions: span 32.8 ft, length 49.3 ft, height 16.7 ft.
Weight: F-16C: empty (F100-PW-229) 18,591 lb, (F110-GE-129) 18,917 lb; gross, with external load (Block 40/42) 42,000 lb.
Ceiling: 50,000 ft.
Performance: speed Mach 2, ferry range 2,002+ miles.
Armament: one M61A1 20 mm cannon (500 rd); up to six air-to-air missiles, AGMs, and ECM pods externally.

F-22 Raptor

Brief: Fifth generation, multirole fighter designed to penetrate advanced anti-air threats and achieve air dominance.

COMMENTARY

The F-22 is USAF's newest operational fighter, built for day, night, and adverse weather full-spectrum operations. Features include six LCD color cockpit displays, APG-77 radar, EW system with RWR and missile launch

***F-22A** Raptor* (SSgt. Vernon Young Jr.)

detector, JTIDS, IFF system, laser gyroscope inertial reference, and GPS. The Raptor flew its first operational sortie during Noble Eagle in 2006 and debuted in combat during Inherent Resolve over Iraq and Syria in 2014. Four aircraft successfully employed 1,000-lb JDAMs against ISIS militant ground targets on the aircraft's first combat sortie on Sept. 22, 2014. It combines stealth, supercruise, high maneuverability, and integrated avionics to counter anti-access threats. Its integrated avionics and data links permit simultaneous multitarget engagement. Advanced flight controls and thrust vectoring high-performance engines lend great maneuverability. Ongoing Reliability, Availability, and Maintainability Maturation Program (RAMMP) develops and integrates Increment 3.1 mods for retrofit to combat-coded F-22s, enhancing ground attack capabilities. RAMMP includes upgraded SAR ground mapping, threat geolocation, EA capability, and integration of SDB I. Increment 3.2 will enter operational testing in FY15 and add AIM-120D AMRAAM and AIM-9X.

Extant Variant(s)

• F-22A. Upgraded production model fifth generation air dominance fighter.

Function: Multirole air superiority fighter.
Operator: ACC, AETC, AFMC, PACAF, ANG, AFRC.
First Flight: Sept. 7, 1997.
Delivered: 2002 (first production representative aircraft).
IOC: Dec. 15, 2005.
Production: 195.
Inventory: 187.
Aircraft Location: Edwards AFB, Calif.; JB Elmendorf-Richardson, Alaska; JB Langley-Eustis, Va.; JB Pearl Harbor-Hickam, Hawaii; Nellis AFB, Nev.; Tyndall AFB, Fla.
Contractor: Lockheed Martin, Boeing.
Power Plant: two Pratt & Whitney F119-PW-100 turbofans, each 35,000 lb thrust.
Accommodation: pilot.
Dimensions: span 44.5 ft, length 62 ft, height 16.6 ft.
Weight: max T-O 83,500 lb.
Ceiling: above 50,000 ft.
Performance: speed Mach 2 with supercruise capability, ferry range 1,850+ miles with two external wing fuel tanks.
Armament: one internal M61A2 20 mm gun (480 rds); two AIM-9 Sidewinders stored inside internal weapons bays; six AIM-120 AMRAAMs (air-to-air loadout) or two AIM-120s and two GBU-32 JDAMs (air-to-ground loadout) in main internal weapons bay.

F-35 Lightning II

Brief: Stealthy, next generation, joint service strike aircraft.

COMMENTARY

The F-35 is a joint and multinational program aimed at developing and fielding an affordable, highly common family of next generation strike fighters. USAF's F-35A will replace F-16 and A-10 fleets with a stealthy multirole fighter designed to enter heavily defended enemy airspace and engage targets in any environment. The F-35A can carry up to 18,000 lb of weapons on 10 stations including four internal bays for maximum stealth, and three additional hard points on each wing. A USAF test pilot first flew the F-35 in 2008, and the service received its first production aircraft—AF-7—on Jan. 30, 2008, as part of LRIP Lot 1. The joint schoolhouse at Eglin received its first F-35A in 2011 and was cleared to begin flight operations in early 2012. Nellis launched its first operational test mission in 2013, and the first of 144 F-35As slated to train USAF and international pilots arrived at Luke on March 11, 2014. The FY16 budget would procure another 44 F-35As. The fleet was briefly grounded in 2014 following an engine fire traced to compressor component friction. Aircraft were cleared for limited flight as fixes were being implemented through the end of 2014. Initial operational capability planned for August 2016 is threatened by maintenance personnel shortage. All variants are still in development and testing. Development is scheduled for completion in 2017.

Extant Variant(s)

• F-35A. Conventional takeoff and landing (CTOL) variant for the Air Force.

Acronyms, Continued

Imint	imagery intelligence
INS	inertial navigation system
IOC	initial operational capability
IP	Internet protocol
IR	infrared
ISR	intelligence, surveillance, & reconnaissance
JASSM	Joint Air-to-Surface Standoff Missile
JDAM	Joint Direct Attack Munition
JSOW	Joint Standoff Weapon
JSUPT	Joint Specialized Undergraduate Pilot Training
JTIDS	Joint Tactical Information Distribution System
LANTIRN	Low-Altitude Navigation & Targeting Infrared for Night
LCD	liquid crystal display
LGB	laser guided bomb
LJDAM	Laser Joint Direct Attack Munition
LO	low observable
LOS	line of sight
LRIP	low-rate initial production
LRSO	Long-Range Standoff missile
MALD	Miniature Air Launched Decoy
Masint	measurement & signature intelligence
MFD	multifunction display
MTI	military training instructor
n/a	not available
NSAv	nonstandard aviation
NVG	night vision goggles
PGM	precision guided munition
PSP	Precision Strike Package
ROVER	Remotely Operated Video Enhanced Receiver
RPA	remotely piloted aircraft
RWR	radar warning receiver
SAR	synthetic aperture radar
satcom	satellite communications
SDB	Small Diameter Bomb
SEAD	suppression of enemy air defenses
SHF	super high frequency
shp	shaft horsepower
Sigint	signals intelligence
S-L	sea level
SLEP	service life extension program
SOF	special operations forces
STOL	short takeoff and landing
TACAN	tactical air navigation
TBD	to be determined
TF/TA	terrain-following/terrain-avoidance
T-O	takeoff
USAFA	US Air Force Academy
VLF	very low frequency
WCMD	Wind-Corrected Munitions Dispenser
WSO	weapon systems officer

• F-35B. Short takeoff and vertical landing (STOVL) variant for USMC.
• F-35C. Carrier-capable variant for USN.

Function: Multirole fighter.
Operator: AETC, AFMC. Planned: ACC, PACAF, USAFE-AFAFRICA, ANG.
First Flight: Dec. 15, 2006 (F-35A prototype).
Delivered: April 2011 (first production aircraft).
IOC: 2016 (USAF).
Production: planned: 1,763 USAF (F-35A); 680 Navy and Marine Corps (F-

***F-35A** Lightning II* (SSgt. Joely Santiago)

35B&C); unspecified number to Britain, seven other development partners, and foreign military sales customers.
Inventory: 38 (USAF).
Aircraft Location: Edwards AFB, Calif.; Eglin AFB, Fla.; Luke AFB, Ariz.; Nellis AFB, Nev.; future locations include Burlington ANGS, Vt.; Hill AFB, Utah; RAF Lakenheath, UK; others TBD.
Contractor: Lockheed Martin, with BAE Systems, Northrop Grumman, Pratt & Whitney.
Power Plant: F-35A: one Pratt & Whitney F135-PW-100, 40,000 lb thrust.
Accommodation: pilot.
Dimensions: span 35 ft, length 51.4 ft, height 14.4 ft.
Weight: max T-O 70,000 lb.
Ceiling: 50,000 ft.
Performance: speed Mach 1.6 with full internal weapons load, range 1,380 miles.
Armament: F-35A: one exterior mounted 25 mm GAU-22/A cannon; standard internal loadout: two AIM-120 AMRAAMs and two GBU-31 JDAMs.

SPECIAL OPERATIONS AIRCRAFT

AC-130U Spectre
Brief: Modified C-130H armed with side-firing weapons and sensors optimized for precision night and all weather CAS, long-endurance interdiction, and armed reconnaissance.
COMMENTARY
Gunship modified with gun systems, electronic and EO sensors, fire-control systems, enhanced navigation systems, sophisticated communications, defensive systems, in-flight refueling capability. AFSOC retired the last AC-130H from the 27th Special Operations Wing at Cannon AFB, N.M., in January 2014 and plans a phased drawdown of the AC-130U fleet as next generation AC-130Js are delivered. The AC-130U serves with 1st SOW, Hurlburt Field, Fla. AC-130Us were initially converted from C-130H airframes by Rockwell and delivered to 4th SOS in 1994-95. Thirteen aircraft were modified by Rockwell, and four conversions were done by Boeing in recent years. All AC-130U weapons can be subordinated to the APQ-180 digital fire-control radar, FLIR, or all-light-level television (ALLTV) for adverse weather attack operations.
Extant Variant(s)
• AC-130H Spectre. Second generation gunship converted from AC-130E/C-130H.
• AC-130U Spooky. Third generation gunship based on C-130H.
Function: Attack.
Operator: AFSOC.
First Flight: 1967.
Delivered: 1968-present.
IOC: 1996.
Production: 43; incl four more recent conversions.
Inventory: six AC-130H; 17 AC-130U.
Aircraft Location: Hurlburt Field, Fla.
Contractor: Lockheed Martin (airframe); Boeing (formerly Rockwell).
Power Plant: four Allison T56-A-15 turboprops, each 4,910 shp.
Accommodation: two pilots, navigator, fire-control officer, EWO; flight engineer, TV operator, IR detection set operator, loadmaster, four aerial gunners.
Dimensions: span 132.6 ft, length 97.8 ft, height 38.5 ft.
Weight: gross 155,000 lb.
Ceiling: 25,000 ft.
Performance: speed 300 mph, range 1,300 miles.
Armament: one 25 mm Gatling gun, plus one 40 mm and one 105 mm cannon.

AC-130J Ghostrider
Brief: Modified MC-130J armed with side-firing weapons, low-yield PGMs, and sensors optimized for CAS and air interdiction, specifically suited to urban operations.
COMMENTARY
A next generation gunship based on a significantly modified C-130J including fully integrated digital avionics cockpit, GPS/INS, integrated defensive systems and color weather radar, and Precision Strike Package. PSP includes a mission management console, robust communications suite, two EO/IR sensors, advanced fire-control equipment, PGM delivery capability, and trainable cannons. Designed to provide ground forces with a persistent direct-fire platform suited to urban operations and to deliver precision low-yield munitions. The prototype flew its first post-conversion flight from Eglin AFB, Fla., in January 2014. Airframes will be delivered as MC-130Js for postdelivery modification. FY15 funding supports conversion of two additional gunships, but weapon and sensor integration problems have delayed operational test and evaluation to the end of 2015. Future upgrades include adding a 105 mm gun starting with the third aircraft and integrate laser guided SDB and laser guided Hellfire missiles. Aircrew will grow from seven to nine.
Extant Variant(s)
• AC-130J Ghostrider. Next generation gunship based on the MC-130J.
Function: Attack.
Operator: AFSOC.
First Flight: April 5, 1996 (basic C-130J).
Delivered: from 2014 (prototype)
IOC: 2017 (planned).
Production: 32 (to be converted from new-build MC-130Js).
Inventory: one.
Aircraft Location: Cannon AFB, N.M. (initial).

AC-130W Stinger II (A1C Ericka Engblom)

Contractor: Lockheed Martin.
Power Plant: four Rolls Royce AE 2100D3 turboprops, each 4,591 shp.
Accommodation: two pilots, two CSOs, three gunners.
Dimensions: span 132.6 ft, length 97.7 ft, height 38.8 ft.
Weight: max T-O 164,000 lb.
Ceiling: 28,000 ft., 42,000 lb payload.
Performance: speed 416 mph, range 3,000 miles.
Armament: 30 mm GAU-23/A cannon; 105 mm cannon; PGMs.

AC-130W Stinger II
Brief: Modified C-130H variant primarily designed for armed overwatch and reconnaissance, as well as direct ordnance delivery to support ground troops.
COMMENTARY
The AC-130W is a C-130H significantly modified to include improved navigation, threat detection, countermeasures, communications suites, and a standoff Precision Strike Package. PSP mod includes a mission management console, communications suite, and flight deck hardware. The airframes were originally modified as MC-130W Combat Spear variants, tasked with infiltration/exfiltration and in-flight refueling of SOF helicopters. In November 2010 USAF introduced the roll on/roll off PSP, changing the name to Dragon Spear, to meet a new USSOCOM requirement for additional gunships. The aircraft performs armed overwatch and CAS reconnaissance over friendly positions for threat prevention. AC-130Ws maintain a limited mobility capability, but also provide strike coordination, nontraditional ISR, and C2. USAF changed the aircraft's designation to AC-130W Stinger II in 2012, after adding further enhancements, including an improved PSP. Plans call for the new-build C-130J gunships to replace AC-130Ws, which on average are more than 24 years old. SDB capability was deployed in 2012.
Extant Variant(s)
• AC-130W Stinger II. Converted MC-130W armed with PSP and PGMs.
Function: Attack, armed reconnaissance.
Operator: AFSOC.
First Flight: circa 2006 (Combat Spear).
Delivered: November 2010 (Dragon Spear).
IOC: 2010 (Dragon Spear).
Production: 12 (converted).
Inventory: 12.
Aircraft Location: Cannon AFB, N.M.
Contractor: Lockheed Martin.
Power Plant: four Allison T56-A-15 turboprops, each 4,910 shp.
Accommodation: two pilots, two CSOs, flight engineer, two special mission aviators.
Dimensions: span 132.6 ft, length 98.8 ft, height 38.5 ft.
Weight: max T-O 155,000 lb.
Ceiling: 28,000 ft.
Performance: speed 300 mph, range 2,875 miles.
Armament: 30 mm GAU-23/A Bushmaster II chain gun; PGMs, incl GBU-39 SDB and AGM-176A Griffin.

C-145 Skytruck
Brief: Militarized STOL multipurpose utility aircraft used for foreign internal defense and light SOF mobility missions.
COMMENTARY
The C-145 is a Polish-built PZL Mielec M-28 Skytruck high-wing STOL aircraft with nonretractable landing gear capable of austere operations. USSOCOM assets are operated by AFSOC as a nonstandard fleet initially supporting small combat teams. The aircraft first deployed in 2011 to Afghanistan. It is reconfigurable for 2,400 lb of cargo airdrop, casualty evacuation, CSAR, and humanitarian missions. C-145As later shifted to partnership capacity building missions. The fleet is operated by the 6th SOS combat aviation advisors and AFRC's 711th SOS (classic associate) at Duke Field, Fla. FY15 plans call for fleet reduction from 16 to five airframes.
Extant Variant(s)
• C-145A. Militarized civilian M-28 Skytruck used for SOF support and training.
Function: Foreign training and light mobility.

Operator: AFSOC, AFRC (classic associate).
First Flight: July 1993 (PZL M-28).
Delivered: from 2009.
IOC: n/a.
Production: 16.
Inventory: USSOCOM-owned.
Aircraft Location: Duke Field, Fla.
Contractor: PZL Mielec (Sikorsky subsidiary)
Power Plant: two Pratt & Whitney PT6A-65B turboprops, 1,100 shp.
Accommodation: crew: two pilots, one loadmaster. Load: 16 passengers or 10 paratroopers; up to four litters; max cargo 5,000 lb.
Dimensions: span 72.3 ft, length 43 ft, height 16.1 ft.
Weight: max T-O 16,534 lb.
Ceiling: 25,000 ft.
Performance: speed 256.5 mph, range 1,161.5 miles.

C-146 Wolfhound
Brief: Militarized commuter airliner that provides flexible and responsive mobility support to SOF worldwide.
COMMENTARY
The German-built Dornier 328 was purchased by USSOCOM, modified by Sierra Nevada Corp., and designated C-146. The aircraft are operated by AFSOC as a nonstandard fleet providing direct support to SOF teams worldwide, often from semiprepared airfields. Modifications include ARC-231, PRC-117, and Iridium communications suite, troop/cargo-capable cabin, casualty evacuation capability, NVG compatibility, and STOL austere operations enhancements. The aircraft first deployed in support of USAFRICOM operations in 2011.
Extant Variant(s)
• C-146A. Preowned civil Dornier 328 modified for SOF airlift.
Function: Multimission mobility.
Operator: AFSOC.
First Flight: December 1991 (Do 328).
Delivered: from 2011.
IOC: n/a.
Production: 17 (converted).
Inventory: USSOCOM-owned.
Aircraft Location: Cannon AFB, N.M.
Contractor: Fairchild-Dornier; Sierra Nevada Corp.
Power Plant: two Pratt & Whitney 119C turboprops, 2,150 shp.
Accommodation: crew: two pilots, one loadmaster. Load: 27 passengers; up to four litters; max cargo 6,000 lb.
Dimensions: span 69.6 ft, length 68.8 ft, height 23.8 ft.
Weight: max T-O 30,843 lb.
Ceiling: 31,000 ft.
Performance: speed 335 mph, range 2,070 miles (2,000 lb cargo).

CV-22 Osprey
Brief: Long-range, multimission tilt-rotor designed to combine the lifting capability of a helicopter with the speed of a fixed wing aircraft.
COMMENTARY
The V-22 is a medium-lift vertical takeoff and landing (VTOL) tilt-rotor operated by the Air Force and Marine Corps. Air Force CV-22Bs operated by AFSOC are equipped with a fully integrated precision navigation suite, a digital cockpit management system, FLIR, integrated NVG HUD, TF/TA radar, digital map system, robust self-defense avionics, and secure anti-jam communications. The CV-22 deployed for the first time to Africa in November 2008 and saw combat for the first time in Iraq in 2009. Its primary mission is clandestine long-range, all-weather penetration of denied areas to infiltrate, exfiltrate, and resupply SOF. The CV-22 is designed to operate from land bases, austere forward operating locations, and air-capable ships without reconfiguration. It is also fully equipped to operate under nuclear, biological, and chemical (NBC) warfare conditions. The 10 Europe-based CV-22s will shift to an as yet unnamed base in Germany with the planned closure of RAF Mildenhall, UK. FY15 budget was to fund CV-22 production line shutdown and Pacific region squadron standup.

***CV-22B** Osprey* (A1C Hayden K. Hyatt)

***MC-130P** Combat Shadow* (MSgt. Michael Farris)

Extant Variant(s)
• CV-22B. Air Force special operations variant of the V-22 Osprey.
Function: Multimission lift.
Operator: AETC, AFSOC.
First Flight: March 19, 1989 (V-22).
Delivered: from 2006.
IOC: 2009.
Production: 50 planned (CV-22; incl two replacements).
Inventory: 41.
Aircraft Location: Hurlburt Field, Fla.; Kirtland AFB, N.M.; RAF Mildenhall, UK.
Contractor: Boeing, Bell Helicopter Textron.
Power Plant: two Rolls Royce-Allison AE1107C turboshafts, each 6,200 shp.
Accommodation: crew: two pilots; two flight engineers. Load: 24 troops seated, 32 troops on floor, or 10,000 lb cargo.
Dimensions: span 84.6 ft, length 57.3 ft, height 22.1 ft, rotor diameter 38 ft.
Weight: max vertical T-O 52,870 lb; max rolling T-O 60,500 lb.
Ceiling: 25,000 ft.
Performance: cruise speed 277 mph, combat radius 575 miles with one internal auxiliary fuel tank, self-deploy 2,100 miles with one in-flight refueling.
Armament: one .50-caliber machine gun on ramp.

MC-130P/H Combat Shadow/Combat Talon
Brief: Modified C-130 tasked with day, night, and adverse weather special operations force insertion and air-drop resupply, and rotary wing aerial refueling.
COMMENTARY
The MC-130 is a special operations mobility aircraft, primarily used to conduct infiltration, resupply, and exfiltration of SOF. MC-130E/Hs are equipped with TF/TA radars, precision navigation systems using INS/GPS, and electronic and IR countermeasures for self-protection. All models capable of aerial refueling as a receiver and tanker. The aircraft are capable of airdrop, using Joint Precision Airdrop System, and operating from austere and unmarked strips. Fourteen MC-130E were converted from C-130Es. MC-130H were converted from base-model C-130H to supplement the existing Combat Talon I and Combat Shadow fleets in the late 1980s and early 1990s. MC-130Hs have integrated glass cockpit and a state-of-the-art pod-based aerial refueling system. MC-130Ps (previously HC-130N/P) are a specialized aerial refueling version designed to support SOF and were delivered in the mid-1980s. Mods include fully integrated INS/GPS system, NVG-compatible interior and exterior lighting, FLIR, radar and missile warning receivers, chaff/flare dispensers, and satellite and data-burst communications. The last MC-130E retired in 2014, and plans call for retiring MC-130Ps in 2015.
Extant Variant(s)
• MC-130P Combat Shadow. SOF support and aerial refueling tanker fielded in 1986.
• MC-130H Combat Talon II. SOF support and aerial refueling tanker fielded in 1991.
Function: Special operations airlift/aerial refueling.
Operator: AETC, AFSOC, ANG, AFRC.
First Flight: circa 1965 MC-130E; 1984 MC-130H.
Delivered: initially 1966.
IOC: 1986 MC-130P; 1991 MC-130H.
Production: 22 new-build MC-130Hs.
Inventory: 16 MC-130P; 20 MC-130H.
Aircraft Location: Duke Field and Hurlburt Field, Fla.; Kadena AB, Japan; Kirtland AFB, N.M.; Moffett Field, Calif.
Contractor: Lockheed Martin (airframe), Boeing.
Power Plant: four Allison T56-A-15 turboprops, each 4,910 shp.
Accommodation: MC-130H crew: two pilots, navigator, EWO; flight engineer, two loadmasters. MC-130H load: 77 troops, 52 paratroops, or 57 litters.
Dimensions: span 132.6 ft, height 38.5 ft, length 99.8 ft.
Weight: max T-O 155,000 lb.
Ceiling: 33,000 ft.
Performance: speed 290 mph, range 4,000+ miles (MC-130P); speed 300 mph, range 3,105 miles (MC-130H).

MC-130J Commando II
Brief: Modified C-130J optimized for low-level clandestine operations, aerial refueling of rotary wing aircraft, and resupply of special operations forces.
COMMENTARY
MC-130J is a specialized tanker variant of the C-130J, designed for clandestine formation or single-ship intrusion of hostile territory missions to provide air refueling of special operations forces vertical-lift and tilt-rotor assets. It also enables infiltration, exfiltration, and resupply of SOF by airdrop or air-land operations. Mods include fully integrated INS/GPS systems, color LCDs, NVG lighting, HUDs, integrated defensive systems, digital moving map display, EO/IR system, dual satcom for voice/data, enhanced cargo handling system, and enhanced service life wing. MC-130Js have a secondary mission of leaflets airdrop. The aircraft has fully populated CSO and auxiliary flight deck stations. Improvements over MC-130P reduce crew size, leaving the CSO to handle helicopter refueling process, normally run by the flight engineer. MC-130J loadmasters handle other flight engineer and communications operator functions. USAF officially changed the name from Combat Shadow II to Commando II in March 2012. The aircraft is replacing legacy MC-130E and MC-130P tankers. MC-130Js fully replaced Europe-based legacy MC-130s at RAF Mildenhall, UK, in 2014 and were in the process of replacing legacy Pacific-based airframes at Kadena AB, Japan. FY15 funding supports procurement of seven airframes.
Extant variant(s):
• MC-130J. New-build aircraft based on the standard-length fuselage C-130J.
Function: Special operations airlift/aerial refueling.
Operator: AETC, AFSOC.
First Flight: April 20, 2011.
Delivered: September 2011.
IOC: 2011.
Production: 37 (planned).
Inventory: 20.
Aircraft Location: Cannon AFB, N.M.; Kirtland AFB, N.M.; RAF Mildenhall, UK.
Contractor: Lockheed Martin (airframe), Boeing.
Power Plant: four Rolls Royce AE2100D3 turboprops, each 4,591 shp.
Accommodation: crew: two pilots, CSO; two loadmasters. Load: n/a.
Dimensions: span 132.6 ft, length 97.8 ft, height 38.8 ft.
Weight: max T-O 164,000 lb.
Ceiling: 28,000 ft with 42,000 lb payload.
Performance: speed 416 mph, range 3,000 miles.

U-28A
Brief: A militarized single-engine turboprop used for tactical airborne ISR support to special operations teams.
COMMENTARY
The U-28A is a modified Pilatus PC-12 aircraft employed on worldwide special operations missions. Mission specific mods include advanced radio-communications suite, aircraft survivability equipment, EO sensors, and advanced navigation systems. The USSOCOM-owned aircraft are operated by AFSOC as a nonstandard fleet. AFSOC first employed the aircraft during Enduring Freedom and Iraqi Freedom. AFRC provides associate instructors for flight training. USSOCOM planned to replace the U-28 fleet with MC-12s divested by ACC in FY15, but was prohibited by Congress.
Extant Variant(s)
• U-28A. Special operations variant of the civilian Pilatus PC-12.
Function: Tactical reconnaissance.
Operator: AFSOC, AFRC.
First Flight: circa 1994 (PC-12).
Delivered: 2006.
IOC: n/a.
Production: 36 (converted).
Inventory: USSOCOM-owned.
Aircraft Location: Cannon AFB, N.M.; Hurlburt Field, Fla.
Contractor: Pilatus Aircraft Ltd.
Power Plant: single Pratt & Whitney PT6A-67B, 1,200 shp.

***E-4B** National Airborne Operations Center* (USAF photo)

Accommodation: two pilots, one CSO, one tactical systems officer.
Dimensions: span 53.3 ft, length 47.3 ft, height 14 ft.
Weight: max T-O 10,935 lb.
Ceiling: 30,000 ft.
Performance: speed 253 mph, range 1,725 miles.

ISR/BM/C3 AIRCRAFT

E-3 Sentry
Brief: Heavily modified Boeing 707-320B used to provide all-weather air surveillance, command, and control.
COMMENTARY
The E-3 is a battle management airborne warning and control system (AWACS), capable of surveillance over land or water from the Earth's surface to the stratosphere, at a range exceeding 200 miles. It is capable of simultaneously coordinating the movement of hundreds of strike, support, and cargo aircraft and integrates C2, BM, target detection, and target tracking on a single platform. The aircraft operate in direct subordination to joint or combined air operations centers. E-3Bs were upgraded in 1994 with greatly enhanced computing capabilities, jam-resistant communications, austere maritime surveillance capability, upgraded radios, and five additional mission consoles. They also received Block 30/35 mods completed in 2001. The Air Force is installing interim next generation IFF capability to ensure Block 30/35 aircraft meet new IFF requirements until the entire fleet is upgraded to Block 40/45 standards in 2020. The Block 40/45 upgrade is the most comprehensive rework in the aircraft's history, and upgraded airframes are designated E-3Gs. Block 40/45 enhances tracking and identification, mission effectiveness, system reliability, and lowers the aircraft's life-cycle cost. Modifications include new open architecture mission computers, automated processes to reduce operator workload, new operator consoles, improved electronic support measures (ESM), passive surveillance capability, and full next generation IFF. Six airframes are undergoing Block 40/45 modification under LRIP. The first aircraft was redelivered in July 2014, and USAF is upgrading another 18 airframes under full-rate production. USAF was barred from divesting seven airframes in FY15.
Extant Variant(s)
• E-3B. Block 30/35 upgraded aircraft.
• E-3C. Block 30/35 upgraded aircraft with additional advanced capabilities.
• E-3G. Block 40/45 upgraded aircraft.
Function: Battle management/early warning/C2.
Operator: ACC, PACAF, AFRC.
First Flight: Oct. 31, 1975 (full avionics).
Delivered: March 1977-84.
IOC: 1977.
Production: 31.
Inventory: 21 E-3B; five E-3C; five E-3G.
Aircraft Location: JB Elmendorf-Richardson, Alaska; Kadena AB, Japan; Tinker AFB, Okla.
Contractor: Boeing, Northrop Grumman (radar), Lockheed Martin (computer).
Power Plant: four Pratt & Whitney TF33-PW-100A turbofans, each 21,000 lb thrust.
Accommodation: four flight crew, 13-19 mission specialists.
Dimensions: span 145.8 ft, length 152.9 ft, height 41.8 ft.
Weight: max T-O 335,000 lb.
Ceiling: above 35,000 ft.
Performance: speed 360 mph, range 5,000+ miles.

E-4 National Airborne Operations Center
Brief: Militarized Boeing 747 modified as airborne operations and nuclear command and control center.
COMMENTARY
The E-4B is a highly survivable flying C3 center from which national leaders can direct US nuclear and conventional forces, execute emergency war orders, and coordinate actions by civil authorities. The aircraft is hardened against the effects of nuclear explosions, including electromagnetic pulse (EMP). It has state-of-the-art communications and data processing equipment including EHF Milstar satellite terminals and six-channel International Maritime Satellite terminals. A triband radome houses SHF communications antenna. All aircraft have undergone Modernization Block 1 upgrades, enhancing electronic and communications infrastructure with COTS hardware and software. Ongoing development includes replacing Milstar-based data links with AEHF compatible FAB-T. The Air Force plans to begin testing an upgraded prototype aircraft in FY16. Other important development activities include a replacement for the E-4's VLF transmitter and modernized navigation and air traffic management systems.
Extant Variant(s)
• E-4B. Modified Boeing 747-200 equipped as a NAOC.
Function: Nuclear command and control.
Operator: ACC.
First Flight: June 13, 1973 (E-4A); June 10, 1978 (E-4B).
Delivered: December 1974-85.
IOC: December 1974 E-4A; January 1980 E-4B.
Production: four.
Inventory: four.
Aircraft Location: Offutt AFB, Neb.
Contractor: Boeing, Rockwell, Raytheon.
Power Plant: four General Electric CF6-50E2 turbofans, each 52,500 lb thrust.

***E-8C** JSTARS* (Northrop Grumman photo)

Accommodation: up to 112 flight crew and mission crew.
Dimensions: span 195.7 ft, length 231.3 ft, height 63.4 ft.
Weight: max T-O 800,000 lb.
Ceiling: above 30,000 ft.
Performance: speed 602 mph, range 7,130 miles.

E-8 JSTARS
Brief: Modified Boeing 707 used to locate, classify, and track moving ground targets.
COMMENTARY
The E-8C is used to provide theater ground and air commanders with surveillance data to support attack operations. The E-8 evolved from the Army and Air Force Joint Surveillance Target Attack Radar System program. The first two aircraft deployed for Desert Storm while still undergoing development in 1991. Production aircraft were delivered from 1996 to 2005, and earlier airframes were retrofitted to Block 20 final production standard, featuring more powerful computers, an Internet protocol local area network, and BLOS connectivity. JSTARS is equipped with a canoe-shaped radome under the forward fuselage housing a 24-ft-long side-looking phased array antenna. It is capable of locating, classifying, and tracking vehicles on the ground at distances in excess of 124 miles, and recent refinements also allow tracking of dismounted human targets. Data gathered by the aircraft is transmitted via data link to ground stations or other aircraft. USAF retired a damaged airframe and plans to retire the JSTARS integration and test aircraft in 2015. FY15 funding supports Air Force efforts to seek JSTARS replacement with a more affordable commercially available business-class airframe by 2022, reaching full operational capability by 2025.
Extant Variant(s)
• E-8C. Block 20 upgraded JSTARS platform based on the Boeing 707-300.
• TE-8A. Crew training aircraft based on the E-8.
Function: Ground surveillance/battle management/C2.
Operator: ACC (active associate) and ANG.
First Flight: December 1988.
Delivered: May 1996-2005.
IOC: Dec. 18, 1997.
Production: 18.
Inventory: 16 E-8C; one TE-8.
Aircraft Location: Robins AFB, Ga.
Contractor: Northrop Grumman, Motorola, Cubic, Raytheon.
Power Plant: four Pratt & Whitney TF33-102C turbojets, each 19,200 lb thrust.
Accommodation: flight crew: four; mission crew: 15 Air Force and three Army operators (can be augmented according to mission).
Dimensions: span 145.8 ft, length 152.9 ft, height 42.5 ft.
Weight: max T-O 336,000 lb.

***E-9A** Widget* (MSgt. Michael Ammons)

Ceiling: 42,000 ft.
Performance: speed 584 mph (optimal orbit), range 9 hr normal endurance, longer with air refueling.

E-9A Widget
Brief: Modified commuter airliner employed to track test weapons and aerial targets and clear overwater test ranges.
COMMENTARY
The E-9A provides air-to-air telemetry support to weapons testing and target drone operations conducted over the Gulf of Mexico sea ranges. It replaced the UV-18 as a cheaper and more advanced alternative to existing surveillance platforms. Upgrades include AN/APS-143(V) airborne sea surveillance radar, UHF telemetry, and signal relay systems. The E-9 is able to track flying targets and relay telemetry data in support of weapons testing, in addition to surface targets. It can detect small watercraft at ranges up to 25 miles and alert range safety personnel to clear ranges before live-fire testing. The aircraft is also capable of remotely initiating destruction of damaged or malfunctioning aerial target drones.
Extant Variant(s)
• E-9A. Military surveillance version of the DHC-8 commuter airliner.
Function: Range control.
Operator: ACC
First Flight: June 1983 (De Havilland-Canada Dash 8).
Delivered: 1988.
IOC: June 1988.
Production: two.
Inventory: two.
Aircraft Location: Tyndall AFB, Fla.
Contractor: De Havilland Canada, now Bombardier (airframe); Sierra Research (conversion).
Power Plant: two Pratt & Whitney PW-120A turboprop engines, each 1,800 shp.
Accommodation: crew: two pilots; two mission operators. Load: 697 lb equipment.
Dimensions: span 39.5 ft, length 48.6 ft, height 12.2 ft.
Weight: max T-O 34,500 lb.
Ceiling: 30,000 ft.
Performance: speed 280 mph, range 1,000 miles.

E-11A Battlefield Airborne Communications Node
Brief: Modified business jet equipped as a tactical communications and data-relay platform to aid ground forces in rugged terrain.
COMMENTARY
The E-11A is a modified Bombardier Global Express 6000/BD-700-1A10 business jet equipped with specialized communications relay equipment to translate between tactical data links, provide joint range extension, BLOS C2, and IP-based data transfer between dissimilar systems. It was fielded to meet an urgent operational need for BLOS communications relay capability to ground troops and other airborne platforms in Afghanistan in 2008. The Battlefield Airborne Communications Node (BACN) payload is integrated on a mixed fleet of manned E-11As and unmanned EQ-4B Global Hawks. The aircraft are maintained by contractor logistics support and operated by the 430th Expeditionary Electronic Combat Squadron at Kandahar Airfield, Afghanistan. The combined BACN fleet has provided near-constant coverage in theater since deployment in 2008.
Extant Variant(s)
• E-11A. Modified Bombardier BD-700 equipped with the BACN payload.
Function: Communications relay.
Operator: ACC.
First Flight: Oct. 6, 2003 (BD-700).
Delivered: December 2008.
IOC: n/a.
Production: four.
Inventory: four.
Aircraft Location: Kandahar Airfield, Afghanistan.
Contractor: Northrop Grumman, Bombardier.
Power Plant: two Rolls Royce BR710A2-20 turbofans, each 14,750 lb thrust.
Accommodation: flight crew: two; mission crew: n/a.
Dimensions: span 94 ft, length 99 ft 5 in, height 25 ft 6 in.
Weight: max T-O 99,500 lb.
Ceiling: 51,000 ft.
Performance: speed Mach 0.88, range 6,900 miles.

EC-130H Compass Call
Brief: Heavily modified C-130H used for electronic warfare missions.
COMMENTARY
The EC-130H is a modified C-130H designed to disrupt enemy C3 and limit adversary coordination essential for enemy force management. All aircraft have been retrofitted to Block 35 standards. EC-130s are aerially refuelable. The aircraft was designed to be easily updated and modified, and mission equipment upgrades, such as new IR countermeasures and modernized comms, occur about every three years to ensure continued protection against evolving threats. USAF is replacing the center wing box to meet wing service life expiration. Ongoing development includes counter-radar and counter-satellite navigation, and digital glass cockpit efforts. The Air Force plans to retire seven airframes in FY16 and is evaluating follow-on capability options.
Extant Variant(s)
• EC-130H. Electronic attack variant of the C-130H.

***EC-130J** Commando Solo* (SSgt. Tia Schroeder)

• TC-130H. Aircrew trainer stripped of mission equipment.
Function: EW.
Operator: ACC.
First Flight: 1981.
Delivered: 1982.
IOC: 1983; Block 30 from February 1999.
Production: (converted).
Inventory: 14.
Aircraft Location: Davis-Monthan AFB, Ariz.
Contractor: Lockheed Martin.
Power Plant: four Allison T56-A-15 turboprops, each 4,910 shp.
Accommodation: two pilots, navigator, two EWOs; flight engineer, mission crew supervisor (cryptologic experienced), four cryptologic linguists, acquisition operator, and airborne maintenance technician.
Dimensions: span 132.6 ft, length 99 ft, height 38 ft.
Weight: max T-O 155,000 lb.
Ceiling: 25,000 ft.
Performance: speed 300 mph at 20,000 ft.

EC-130J Commando Solo/Super J
Brief: Modified C-130 designed for psychological warfare, radio and television broadcast, or SOF mobility, depending on variant.
COMMENTARY
The EC-130 is the Air Force's primary psychological warfare platform, providing military information support operation (MISO) and civil affairs broadcasts. Legacy Commando Solo aircraft conducted psychological operations in almost every US war or contingency operation since 1980. The EC-130J Commando Solo is equipped with radio and color television broadcasting equipment for psychological warfare operations, enhanced navigation, self-protection, and an aerial refueling receptacle. With the transition to the EC-130J, USAF added a new, secondary mission resulting in a second variant. Three heavily modified EC-130J Commando Solo aircraft are equipped as a standard broadcasting station for psychological warfare operations. An additional four EC-130Js, dubbed Super J, are planned to perform secondary, low-cost EA role on top of their special operations mobility (SOFFLEX) mission. SOFFLEX missions including personnel and cargo airdrop, combat offload, and infiltration/exfiltration. Super J employs a future roll on/roll off (RORO) broadcast package—possibly the Army's Fly-Away Broadcast System—to supplement Commando Solo. All variants are operated by the ANG's 193rd SOW. First Commando Solo entered service in 2004, with deployed contingency operations beginning in 2005.
Extant Variant(s)
• EC-130J Commando Solo. Modified C-130J used for broadcast and psyops.
• EC-130J Super J. Modified C-130J used for SOF mobility and psyops.
Function: Psychological warfare/special operations airlift.

***OC-135B** Open Skies* (Josh Plueger)

Operator: ANG.
First Flight: April 5, 1996 (C-130J).
Delivered: March 1980 (J model from 2003).
IOC: December 1980 (EC-130E).
Production: seven.
Inventory: seven (three Commando Solo, four Super J).
Aircraft Location: Harrisburg Arpt., Pa.
Contractor: Lockheed Martin, Raytheon.
Power Plant: four Rolls Royce-Allison AE2100D3 turboprops, each 4,637 shp.
Accommodation: two pilots, flight systems officer, mission systems officer; two loadmasters, five electronic communications systems (CS) operators.
Dimensions: span 132.6 ft, length 97.8 ft, height 38.8 ft.
Weight: max T-O 164,000 lb.
Ceiling: 28,000 ft.
Performance: speed 335 mph cruise, range 2,645 miles.

MC-12W Liberty
Brief: Militarized commercial twin-engine turboprop modified for medium- to low-altitude, manned ISR.
COMMENTARY
MC-12s are a mix of Beechcraft King Air 350s and 350ER modified with ISR, Sigint, and targeting equipment including FMV, laser designation, various sensors, BLOS connectivity, and Satcom. The sensor-equipped C-12s were acquired to augment RPA systems operating in Southwest Asia and began operations in Iraq in June 2009 and in Afghanistan in December 2009. The MC-12W is capable of complete ISR collection, processing, analysis, and dissemination. The aircraft provides ground forces with targeting data and other tactical ISR. An initial seven used King Air 350s were modified with FMV, a ROVER compatible LOS satcom data link, limited Sigint, and basic BLOS connectivity. An additional 30 extended-range King Air 350s were modified to include enhanced FMV with laser designator, more robust Sigint, and increased bandwidth BLOS. Five aircraft began Phase 3 modifications to incorporate high-definition EO/IR, enhanced communications, digital intercom control, and TACAN. ACC planned to transfer 33 MC-12s to USSOCOM and a further eight to the Army in FY15. Plans called for AFSOC and ANG to operate a combined 43 MC-12s on behalf of SOCOM, replacing the current U-28A fleet. Congress, however, blocked transfers to USSOCOM pending analysis and justification of the plan. The hold does not apply to the transfer of 13 aircraft to the ANG.
Extant Variant(s)
• MC-12W. Modified Beechcraft King Air equipped for battlefield ISR and targeting.
Function: Tactical reconnaissance.
Operator: ACC, ANG.
First Flight: April 2009.
Delivered: from April 2009.
IOC: June 2009.
Production: 42 (planned).
Inventory: 41.
Aircraft Location: Beale AFB, Calif.; Key Field, Miss. (initial weapon systems training).
Contractor: Beechcraft, L3 Communications.
Power Plant: two Pratt & Whitney Canada PT6A-60A turboprops, each 1,050 shp.
Accommodation: two pilots and two sensor operators.
Dimensions: span 57.9 ft, length 46.7 ft, height 14.3 ft.
Weight: max T-O 15,000 lb (350) and 16,500 lb (350ER).
Ceiling: 35,000 ft.
Performance: speed 359 mph, range 1,725 miles (350) and 2,760 miles (350ER).

OC-135 Open Skies
Brief: C-135 variant used for unarmed observation and arms control treaty verification flights.
COMMENTARY
The OC-135 is a modified WC-135B used for specialized arms control treaty observation and imagery collection missions over nations that are parties to the 1992 Open Skies Treaty. Specialized mission equipment includes framing and panoramic optical cameras installed in the rear of the aircraft. Two oblique KS-87E framing cameras permit photography from approximately 3,000 ft altitude, and one KA-91C panoramic allows for wide sweep photography from approximately 35,000 ft. The data annotation and recording system notes position, altitude, time, roll angle, and other data for each photo.
Extant Variant(s)
• OC-135B. Modified C-135 equipped for photo reconnaissance/treaty verification.
Function: Observation.
Operator: ACC.
First Flight: 1993.
Delivered: 1993-96.
IOC: October 1993.
Production: three.
Inventory: two.
Aircraft Location: Offutt AFB, Neb.
Contractor: Boeing.
Power Plant: four Pratt & Whitney TF33-P-5 turbofans, each 16,050 lb thrust.
Accommodation: flight crew: two pilots, two navigators, and two sensor maintenance technicians; Defense Threat Reduction Agency mission crew: mission commander, deputy, two sensor operators, and one flight follower; total seating: 35, incl space for foreign country representatives.
Dimensions: span 131 ft, length 135 ft, height 42 ft.

RC-26B Condor (SSgt. Shelley Gill)

Weight: max T-O 297,000 lb.
Ceiling: 50,000 ft (basic C-135).
Performance: speed 500+ mph, range 3,900 miles.

RC-26 Condor
Brief: Modified commuter airliner optimized for counternarcotics with specialized surveillance and communications equipment.
COMMENTARY
The RC-26 is a Modified Fairchild Metro 23 with specialized digital cameras, IR video, and communications equipment, primarily used for domestic and international anti-trafficking operations. The aircraft has a secondary role providing real-time video streaming to disaster relief personnel following hurricanes, wildfires, and other disasters. An extensive communications suite allows communications from 29 to 960 MHz, including provisions for plugging in 800 MHz handheld radios, and air phone capabilities. ANG is seeking funding to reconfigure Block 25 aircraft, which no longer meet either combatant commander or domestic requirements because of outdated and problematic mission management system, EO/IR sensor, and communications suite. The Air Force originally planned to divest the fleet in FY15, but is funding continued operations through 2015.
Extant Variant(s)
• RC-26B. Surveillance version of Fairchild C-26.
Function: Counternarcotics/surveillance/C2.
Operator: ANG.
First Flight: 1990.
Delivered: C-26 first delivered 1989.
IOC: n/a.
Production: 11.
Inventory: 11.
Aircraft Location: Ellington Field, Texas; Fairchild AFB, Wash.; Fresno Yosemite Arpt., Calif.; Hancock Field, N.Y.; Jacksonville Arpt., Fla.; Key Field, Miss.; Kirtland AFB, N.M.; Montgomery Regional Arpt., Ala.; Truax Field, Wis.; Tucson Arpt., Ariz.; Yeager Arpt., W.Va.
Contractor: Fairchild (airframe).
Power Plant: two Garrett TPE331-12UAR-701 turboprops, each 1,100 shp.
Accommodation: two pilots, one navigator-mission systems operator.
Dimensions: span 57 ft, length 59.5 ft, height 16.6 ft.
Weight: max T-O 16,500 lb.
Ceiling: 25,000 ft.
Performance: speed 334 mph, range 2,070 miles.

RC-135S Cobra Ball
Brief: Specially equipped C-135 used to gather measurement and signature intelligence (Masint) on ballistic missile flights.
COMMENTARY
The RC-135S monitors missile-associated signatures and tracks missiles during boost and re-entry phases to provide reconnaissance for treaty verification and theater ballistic missile nonproliferation. Its specialized equipment includes wide-area IR sensors, long-range optical cameras, and an advanced communications suite. Cobra Ball provides the capability to collect optical and electronic data on ballistic missile-associated activity. It can deploy anywhere in the world in 24 hours and provide on-scene EO reconnaissance.
Extant Variant(s)
• RC-135S Cobra Ball. Modified C-135 equipped for Masint/treaty verification.
Function: Electronic reconnaissance.
Operator: ACC.
First Flight: n/a.
Delivered: circa 1969-99.
IOC: circa 1972.
Production: converted.
Inventory: three.
Aircraft Location: Offutt AFB, Neb.
Contractor: Boeing (original airframe), L3 Communications.
Power Plant: four CFM International F108-CF-201 turbofans, each 21,600 lb thrust.
Accommodation: flight crew: two pilots, navigator. Mission crew: three EWOs; two airborne systems engineers, two airborne mission specialists.
Dimensions: span 131 ft, length 135 ft, height 42 ft.
Weight: max T-O 297,000 lb.
Ceiling: 45,000 ft.
Performance: speed 500+ mph, range 3,900 miles.

RC-135U Combat Sent
Brief: Specially equipped C-135 used to gather technical intelligence (Techint) on adversary radar emitter systems.
COMMENTARY
The RC-135U collects and examines data on airborne, land, and naval radar systems, providing strategic analysis for National Command Authorities and combatant forces. Its distinctive antennae arrays on the chin and wing tips, large cheek fairings, and extended tail contain specialized Sigint suites to collect scientific and technical Elint data against air-, land-, and sea-based emitter systems. Each airframe has slightly unique reconnaissance equipment. Combat Sent is critical to effective design, programming, and reprogramming of RWRs as well as jammers, decoys, and anti-radiation missiles and to the development of effective threat simulators.
Extant Variant(s)
• RC-135U Combat Sent. Modified C-135 equipped for radar emissions analysis.
Function: Electronic reconnaissance.
Operator: ACC.
First Flight: n/a.
Delivered: circa 1970-78.
IOC: circa 1970s.
Production: converted.
Inventory: two.
Aircraft Location: Offutt AFB, Neb.
Contractor: Boeing (original airframe), L3 Communications, Textron.
Power Plant: four CFM International F108-CF-201 turbofans, each 21,600 lb thrust.
Accommodation: flight crew: two pilots, two navigators, two airborne systems engineers; mission crew: 10 EW officers, six or more electronic, technical, mission area specialists.
Dimensions: span 135 ft, length 140 ft, height 42 ft.
Weight: max T-O 299,000 lb.
Ceiling: 35,000 ft.
Performance: speed 500+ mph, range unlimited with air refueling.

RC-135V/W Rivet Joint
Brief: Specially equipped C-135 used to gather real-time electronic and signals intelligence for theater and tactical-level commanders.
COMMENTARY
The RC-135V/W is an extensively modified C-135, performing worldwide reconnaissance missions to detect, identify, and geolocate signals throughout the electromagnetic spectrum. Rivet Joint is mostly used to exploit electronic battlefield intelligence and deliver near-real-time ISR information to tactical forces, combatant commanders, and National Command Authorities. Onboard capabilities encompass rapid search, detection, measurement, identification, demodulation, geolocation, and fusion of data from potentially thousands of electronic emitters. Current development efforts include new Sigint signal sets and capability upgrades. Planned mods include sensor and mission planning system upgrades. L-3 Communications is converting three aircraft to RC-135W standards for the Royal Air Force. The first airframe was delivered in 2013.
Extant Variant(s)
• RC-135V/W Rivet Joint. Self-contained standoff airborne Sigint variant of the C-135.
• TC-135W. Training version of the operational aircraft.
• NC-135W. Rivet Joint systems integration testbed operated by AFMC.
Function: Electronic reconnaissance.
Operator: ACC, AFMC.
First Flight: n/a.
Delivered: circa 1973-99. Continuous equipment updates.
IOC: circa 1973.
Production: converted.
Inventory: eight RC-135V; nine RC-135W; three TC-135W; one NC-135W.
Aircraft Location: Offutt AFB, Neb.; Kadena AB, Japan; RAF Mildenhall, UK.
Contractor: Boeing (original airframe), L3 Communications.
Power Plant: four CFM International F108-CF-201 turbofans, each 21,600 lb thrust.
Accommodation: flight crew: three pilots, two navigators; mission crew: three EW officers, 14 intelligence operators, four airborne maintenance technicians, and up to six more, depending on mission.
Dimensions: span 131 ft, length 135 ft, height 42 ft.
Weight: max T-O 297,000 lb.
Ceiling: 50,000 ft.
Performance: speed 500+ mph, range 3,900 miles.

U-2 Dragon Lady
Brief: Single-seat, single-engine, high-altitude enduring reconnaissance aircraft carrying a wide variety of sensors and cameras.
COMMENTARY
The U-2 is the Air Force's premier high-altitude reconnaissance platform, capable of carrying multiple intelligence sensors simultaneously. It can carry a wide variety of advanced optical, multispectral EO/IR, SAR, Sigint, and other payloads. Although the U-2 was designed initially in the 1950s, current aircraft were produced primarily in the 1980s, when the production

line was reopened to produce the TR-1, a significantly larger and more capable version of the aircraft. Conversion to S model configuration began in October 1994. Each current operational U-2 is in Block 20 configuration, featuring a new glass cockpit using MFDs, a digital autopilot, a new EW system, and new data links. Sensor upgrades include the ASARS-2A SAR sensor; SYERS-2A multispectral EO/IR imagery system; and enhanced radio frequency-intelligence capability. Optical bar camera is also still in use, providing broad-area synoptic imagery coverage. USAF plans to modify several RQ-4 Global Hawk Airborne Sigint Payload (ASIP) for employment on the U-2. USAF planned to retire the U-2 fleet beginning in FY16, but was barred from spending FY15 funds to do so.

Extant Variant(s)

• U-2S. Current variant of the U-2/TR-1.
• TU-2ST. A two-seat trainer aircraft.

Function: High-altitude reconnaissance.
Operator: ACC.
First Flight: Aug. 4, 1955 (U-2); 1967 (U-2R); October 1994 (U-2S).
Delivered: 1955-October 1989.
IOC: circa 1956.
Production: 35 (U-2S/ST).
Inventory: 27 U-2; five TU-2 trainers.
Aircraft Location: Beale AFB, Calif.; operational detachments worldwide.
Contractor: Lockheed Martin.
Power Plant: General Electric F118-GE-101 turbojet.
Accommodation: one (two for trainer).
Dimensions: span 105 ft, length 63 ft, height 16 ft.
Weight: max T-O 40,000 lb.
Ceiling: above 70,000 ft.
Performance: speed 410 mph, range 7,000+ miles.

WC-135 Constant Phoenix

Brief: Modified C-135 that samples particulate and gaseous atmospheric debris to verify international nuclear test ban treaty compliance.

COMMENTARY

The WC-135 is either a modified C-135B or EC-135C (former Looking Glass aircraft) equipped with air sampling and collection equipment. The original air sampling program was commissioned by Gen. Dwight D. Eisenhower on Sept. 16, 1947, using modified B-29 aircraft. In September 1949, a WB-29 flying between Alaska and Japan detected nuclear debris from the Soviet Union's first atomic test, much earlier than anticipated. Today, the air-sampling mission supports the Limited Nuclear Test Ban Treaty of 1963. WC-135's collection suite allows mission crew to detect radioactive "clouds" in real time. The aircraft has external flow-through devices to collect particulates on filter paper and a compressor system for sample holding. Cockpit crews are assigned from 45th RS, and special equipment operators from Det. 1, Air Force Technical Applications Center, both at Offutt AFB, Neb.

Extant Variant(s)

• WC-135C/W. Modified C-135 equipped for radiological monitoring and air sampling.

Function: Air sampling and collection.
Operator: ACC.
First Flight: 1965
Delivered: 1965-96.
IOC: December 1965.
Production: converted.
Inventory: two.
Aircraft Location: Offutt AFB, Neb.
Contractor: Boeing.
Power Plant: four Pratt & Whitney TF33-P-5 turbofans, each 16,050 lb thrust.
Accommodation: seating for 33, incl cockpit crew.
Dimensions: span 131 ft, length 140 ft, height 42 ft.
Weight: max T-O 300,500 lb.
Ceiling: 40,000 ft.
Performance: speed 403 mph, range 4,600 miles.

TANKER AIRCRAFT

HC-130N/P King

Brief: Extended-range C-130H tanker variant converted for personnel recovery in hostile environments, deploying pararescue (PJ), and rescue helicopter in-flight refueling.

COMMENTARY

The HC-130N/P conducts operations to austere airfields and denied territory for expeditionary, all-weather personnel recovery operations, including air-drop, air-land, helicopter air-to-air refueling and forward area refueling point missions. Secondary roles include humanitarian assistance, disaster response, security cooperation/aviation advisory, emergency medical evacuation, non-combatant evacuation, and spaceflight support for NASA. Features include integrated GPS/INS navigation package, NVG lighting, FLIR, radar/missile warning receivers, chaff/flare dispensers, and data-burst communications. Both models are being replaced by HC-130J.

Extant Variant(s)

• HC-130N. C-130H model modified with C-130E radome, new center wing, and aerial refueling capability.
• HC-130P. C-130H modified for CSAR and aerial refueling.

Function: Aerial refueling/airlift.
Operator: ACC, AETC, ANG, AFRC.

***HC-130P** King refuels an **HH-60G** Pave Hawk.* (TSgt. Rob Jensen)

First Flight: Dec. 8, 1964 (as HC-130H).
Delivered: from 1965.
IOC: 1986.
Production: 33 converted N/P models.
Inventory: nine HC-130N; 18 HC-130P.
Aircraft Location: Davis-Monthan AFB, Ariz.; Francis S. Gabreski Arpt., N.Y.; Kirtland AFB, N.M.; JB Elmendorf-Richardson, Alaska; Moody AFB, Ga.; Patrick AFB, Fla.
Contractor: Lockheed Martin.
Power Plant: four Allison T56-A-15 turboprops, each 4,910 shp.
Accommodation: two pilots, navigator; flight engineer, airborne comm specialist, two loadmasters, three PJs.
Dimensions: span 132.6 ft, length 98.8 ft, height 38.5 ft.
Weight: max T-O 155,000 lb.
Ceiling: 33,000 ft.
Performance: speed 289 mph at S-L, range 4,000+ miles.

HC-130J Combat King II

Brief: Extended-range C-130J tanker variant designed for personnel recovery in hostile environments, C2, and rescue helicopter in-flight refueling.

COMMENTARY

The HC-130J aircraft replaces legacy HC-130N/Ps, and is based on the USMC KC-130J tanker with enhanced service life wing and cargo handling system, refueling receptacle, EO/IR sensor, flight deck CSO console, and dual satcom. Features include INS/GPS, NVG-compatible lighting, FLIR, radar/missile warning receivers, and chaff/flare dispensers. The first ACC aircraft was delivered to 79th RQS at Davis-Monthan AFB, Ariz., and the first training aircraft delivered to 58th SOW at Kirtland AFB, N.M., in 2011. Plans would add the Lightweight Airborne Radio System V12 to speed locating personnel and add the ALQ 213 EW management system to automate/integrate defensive systems. USAF expects to complete recapitalization and conversion efforts in 2023, and FY15 funding supported procurement of four HC-130Js.

Extant Variant(s)

• HC-130J. C-130J modified for CSAR and aerial refueling.

Function: Aerial refueling/airlift.
Operator: ACC, AETC, ANG, AFRC.
First Flight: July 29, 2010.
Delivered: from 2010.
IOC: 2013.
Production: 37 planned.
Inventory: 11.
Aircraft Location: Davis-Monthan AFB, Ariz.; Kirtland AFB, N.M. Planned: Francis S. Gabreski Arpt., N.Y.; JB Elmendorf-Richardson, Alaska; Moody AFB, Ga.; Patrick AFB, Fla.
Contractor: Lockheed Martin.
Power Plant: four Rolls Royce AE2100D3 turboprops, each 4,591 shp.
Accommodation: flight crew: two pilots, CSO, two loadmasters.
Dimensions: span 132.6 ft, length 97.8 ft, height 38.8 ft.
Weight: max T-O 164,000 lb.
Ceiling: 33,000 ft.
Performance: speed 363.4 mph at S-L, range 4,000+ miles.

KC-10 Extender

Brief: Modified McDonnell Douglas DC-10 that combines fixed wing aerial refueling and simultaneous passenger, cargo, or aeromedical transport.

COMMENTARY

The KC-10 is a modified McDonnell Douglas DC-10-30CF and USAF's largest air refueling aircraft. It is simultaneously capable of both tanker and cargo roles, enabling it to support worldwide fighter deployments. The aircraft employs an advanced aerial refueling boom and hose and drogue system, allowing it to refuel a wide variety of US and allied aircraft within the same mission. It is itself refuelable by boom-equipped tankers. The aircraft has three large fuel tanks under the cargo floor, an air refueling operator's station, aerial refueling boom and integral hose reel/drogue unit, a receiver refueling receptacle, and military avionics. Ongoing mods include modernized navigation, surveillance,

and air traffic management. Advanced IFF development begins in FY15. Service life expected through 2045.
Extant Variant(s)
• KC-10A. Modified McDonnell Douglas DC-10 designed as a multirole cargo-tanker.
Function: Aerial refueling/airlift.
Operator: AMC, AFRC (classic associate).
First Flight: April 1980.
Delivered: March 1981-April 1990.
IOC: August 1982.
Production: 60.
Inventory: 59.
Aircraft Location: JB McGuire-Dix-Lakehurst, 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: two pilots, flight engineer, boom operator; AE crew: two flight nurses, three medical technicians; other crew depending on mission. **Load**: up to 75 people and 17 pallets or 27 pallets—a total of nearly 170,000 lb.
Dimensions: span 165.4 ft, length 181.6 ft, height 58 ft.
Weight: max T-O 590,000 lb.
Ceiling: 42,000 ft.
Performance: speed 619 mph, range 11,500 miles, or 4,400 miles with max cargo.

KC-46 Pegasus
Brief: Next generation cargo-tanker that will provide fixed wing aerial refueling and simultaneous passenger, cargo, or aeromedical transport.
COMMENTARY
The KC-46A is a modified Boeing 767-200ER multirole cargo-tanker equipped with flying boom and probe-and-drogue refueling capability to replace some of the legacy KC-135 fleet. Boeing awarded contract for 179 KC-46A tankers, the first increment (KC-X) toward replacing USAF's KC-135R fleet, in 2011. Compared to the 50-year-old KC-135, the KC-46A will have enhanced refueling capabilities, including more fuel capacity, improved efficiency, and enhanced cargo and AE capability. Like the KC-10, it will employ both an advanced refueling boom and independently operating hose and drogue system. The program's provisioned 767-2C prototype (without refueling boom) flew in late 2014, and the first flight of a full-up KC-46A is planned for mid-2015. Operational testing scheduled to begin in late FY16 will likely be delayed by a year due to ongoing development issues. LRIP of seven aircraft, slated to begin in FY15, was trimmed to six aircraft to free funding for other priorities.
Extant Variant(s)
• KC-46A. Modified Boeing 767 designed as a multirole cargo-tanker.
Function: Aerial refueling/airlift.
Operator: AMC.
First Flight: Dec. 28, 2014 (provisioned 767-2C prototype).
Delivered: from 2017 (planned).
IOC: TBD.
Production: 179 (planned).
Inventory: zero.
Aircraft Location: Planned: Altus AFB, Okla.; McConnell AFB, Kan.; Pease ANGB, N.H.; others TBD.
Contractor: Boeing.
Power Plant: two Pratt & Whitney 4062, each 62,000 lb thrust.
Accommodation: 15 crew seats, incl AE crew. Passenger load: 58 or up to 114 for contingency operations. AE load: 58 patients (24 litters and 34 ambulatory). Cargo load: 18 pallet positions, max 65,000 lb.
Dimensions: span 157.7 ft, length 165.5 ft, height 52.8 ft.
Weight: max T-O 415,000 lb.
Ceiling: 43,000 ft (767).
Performance: (767) cruise speed 530 mph, range 6,500 miles.

KC-135 Stratotanker
Brief: Medium-range tanker aircraft capable of refueling US and allied fixed wing aircraft and providing AE support.

***KC-46A** Pegasus* (Boeing illustration)

COMMENTARY
The KC-135 has been the mainstay of the USAF tanker fleet for some 50 years. It is similar in size and appearance to commercial 707 aircraft but designed to military specifications. The current KC-135R variant first flew in October 1982 and deliveries began in July 1984. Twenty were modified with the Multipoint Refueling System (MPRS), allowing the use of hose-and-drogue pods on each wing to simultaneously refuel two NATO or US Navy aircraft. Non-MPRS modified KC-135s use a single drogue adapter attached to the boom. Upgrades modernized digital flight deck. Safety mods were finished in 2002, and new global air traffic management was completed in 2011. Link 16 capability was also added to a limited number. KC-135Ts are upgraded and sustained alongside the KC-135R fleet under common programs. Fleet service life is projected out to 2045.
Extant Variant(s)
• KC-135R. Re-engined KC-135As fitted with CFM turbofan engines.
• KC-135T. Formerly KC-135Qs, capable of carrying different fuels in the wing and fuselage tanks.
Function: Aerial refueling/airlift.
Operator: AETC, AFMC, AMC, PACAF, USAFE-AFAFRICA, ANG, AFRC.
First Flight: August 1956.
Delivered: January 1957-65.
IOC: June 1957, Castle AFB, Calif.
Production: 732.
Inventory: 346 KC-135R; 54 KC-135T.
Aircraft Location: Altus AFB, Okla.; Fairchild AFB, Wash.; Grissom ARB, Ind.; JB Andrews, Md.; Kadena AB, Japan; MacDill AFB, Fla.; March ARB, Calif.; McConnell AFB, Kan.; RAF Mildenhall, UK; Seymour Johnson AFB, N.C.; Tinker AFB, Okla.; and ANG in Alabama, Arizona, Illinois, Iowa, Kansas, Maine, Michigan, Mississippi, Nebraska, New Hampshire, New Jersey, Ohio, Oklahoma, Pennsylvania, Tennessee, Utah, Washington, Wisconsin.
Contractor: Boeing.
Power Plant: four CFM International CFM56-2 (USAF designation F108) turbofans, each 21,634 lb thrust.
Accommodation: flight crew: two pilots, boom operator, plus navigator, depending on mission; AE crew: two flight nurses, three medical technicians (adjusted for patient needs). Load: 37 passengers, six cargo pallets, max 83,000 lb.
Dimensions: span 130.8 ft, length 136.3 ft, height 41.7 ft.
Weight: max T-O 322,500 lb.
Ceiling: 50,000 ft.
Performance: speed 530 mph, range 1,500 miles with 150,000 lb transfer fuel, up to 11,015 miles for ferry mission.

AIRLIFT AIRCRAFT

C-5 Galaxy
Brief: Air refuelable long-range strategic cargo transport for massive and oversize cargo.
COMMENTARY
The C-5 is USAF's largest airlifter and one of world's largest aircraft. It can carry unusually heavy cargo over intercontinental ranges. It can take off and land in relatively short distances and taxi on substandard surfaces in emergencies. The Galaxy's front and rear cargo doors permit simultaneous drive-through loading and unloading. A total of 81 C-5As were delivered and underwent major wing modifications to extend their service lives, but are now being retired. The C-5B first flew in 1985 and embodies all C-5A improvements, including improved turbofans, color weather radar, and triple INS. The first C-5B was delivered in January 1986, and some are equipped with a defensive system. Two C-5As were modified to carry outsize space cargo and redesignated C-5Cs. USAF is upgrading the C-5 fleet through a combination of the Avionics Modernization Program (AMP) and Reliability Enhancement and Re-engining Program (RERP). Upgraded aircraft are designated C-5M Super Galaxy and incorporate new GE CF6-80C2 (F138-GE-100) turbofans, with 200 percent increased thrust, along with the avionics and structural reliability fixes. USAF plans to modernize 52 C-5s to C-5M standards, including 49 B models and two C models. A single C-5A was converted. AMP was completed in 2011, and RERP is ongoing. New mods supported in FY15 include Core Mission Computer (CMC) and weather radar replacement.
Extant Variant(s)
• C-5A. Basic model delivered between 1969 and 1973.
• C-5B. Improved aircraft with strengthened wings and improved engines and avionics.
• C-5C. Modified C-5As capable of carry outsize NASA space cargo.
• C-5M. Super Galaxy, including AMP and RERP modified legacy C-5s.
Function: Strategic airlift.
Operator: AMC, ANG, AFRC.
First Flight: June 30, 1968 (C-5A); June 6, 2006 (C-5M).
Delivered: October 1969-April 1989.
IOC: September 1970.
Production: 131.
Inventory: 22 C-5A; 24 C-5B; one C-5C; 18 C-5M.
Aircraft Location: Dover AFB, Del.; Eastern West Virginia Arpt., W.Va.; JBSA-Lackland, Texas; Memphis Arpt., Tenn.; Stewart ANGB, N.Y.; Travis AFB, Calif.; Westover ARB, Mass.
Contractor: Lockheed Martin.
Power Plant: four General Electric TF39-GE-1C turbofans, each 43,000 lb thrust; (C-5M) four General Electric F138-GE-100 turbofans.
Accommodation: crew: two pilots, two flight engineers, three loadmasters.

Load: 81 troops and 36 standard pallets, max 270,000 lb. There is no piece of Army combat equipment the C-5 can't carry.
Dimensions: span 222.9 ft, length 247.1 ft, height 65.1 ft.
Weight: max T-O 840,000 lb.
Ceiling: 45,000 ft.
Performance: speed 518 mph, range 2,473 miles with max payload (plus additional 575 miles after offload).

C-12 Huron
Brief: Military version of civil twin-engine turboprops used for diplomatic and special duty support, light passenger/cargo airlift, and test support.
COMMENTARY
The C-12 is a series of military versions of the Beechcraft King Air A200 and 1900C aircraft. Flight decks and cabins are pressurized for high-altitude flight. The most common variant incorporates a cargo door with an integral airstair. Both C-12C and C-12D aircraft are deployed to US embassies worldwide. The C-12J is a completely different aircraft, based on the Beechcraft 1900C commuter airliner. C-12Js are operated by PACAF and can transport two litters or 10 ambulatory patients in the AE role. C-12Js incorporate extensive avionics upgrade, including three MFDs, integrated GPS, flight management systems, autopilot, VHF/UHF radios, and weather radar.
Extant Variant(s)
• C-12C. C-12As retrofit with PT6A-41 engines.
• C-12D. C-12 with enlarged cargo doors and strengthened wings.
• C-12F. C-12 with uprated PT6A-42 engines, eight passenger capacity, and AE litter accommodation.
• C-12J. Military version of the Beechcraft Model 1900C commuter airliner.
Function: Light airlift.
Operator: AFMC, PACAF.
First Flight: Oct. 27, 1972 (Super King Air 200).
Delivered: 1974-late 1980s.
IOC: circa 1974.
Production: 88.
Inventory: 16 C-12C; six C-12D; two C-12F; four C-12J.
Aircraft Location: Edwards AFB, Calif.; Holloman AFB, N.M.; JB Elmendorf-Richardson, Alaska; Yokota AB, Japan; various US embassies.
Contractor: Beech.
Power Plant: (C-12J) two Pratt & Whitney Canada PT6A-65B turboprops, each 1,173 shp.
Accommodation: crew: two pilots; load: (C-12J) up to 19 passengers or 3,500 lb cargo.
Dimensions: (C-12J) span 54.5 ft, length 57 ft, height 15 ft.
Weight: (C-12J) max T-O 16,710 lb.
Ceiling: (C-12J) 25,000 ft.
Performance: (C-12J) speed 284 mph, range 1,669 miles.

C-17 Globemaster III
Brief: Heavy-lift, air refuelable cargo aircraft capable of both strategic airlift and direct tactical delivery of all classes of military cargo.
COMMENTARY
The C-17 is the core airlifter of the US military. It is able to operate on small, austere airfields (3,500 ft by 90 ft) previously limited to C-130s. The Globemaster III is the only aircraft able to directly air-land or air-drop outsize cargo into a tactical environment. It is the first military transport to feature full digital fly-by-wire control. Ongoing modernization of original aircraft through Block 17 includes open-system communications architecture, new weather radar, all-weather formation flying system, NVG lighting, and high frequency data link. Fleetwide Block 17 retrofit is scheduled for completion by FY15. Additional planned mods include an advanced IFF system and other software upgrades to meet new operational requirements. Boeing delivered the 223rd aircraft to USAF on Sept. 12, 2013, and expects to end production in September 2015, after completing its final international order. The Air Force will stand down two C-17 squadrons and place 16 aircraft into backup status as a cost-cutting measure over FY15 and FY16.

***C-17A** Globemaster III* (MSgt. Jeremy Lock)

Extant Variant(s)
• C-17A. Medium- to long-range swing role airlifter.
Function: Tactical/strategic airlift.
Operator: AETC, AMC, PACAF, ANG, AFRC.
First Flight: Sept. 15, 1991.
Delivered: June 1993-September 2013.
IOC: Jan. 17, 1995.
Production: 223.
Inventory: 222.
Aircraft Location: Allen C. Thompson Field, Miss.; Altus AFB, Okla.; Dover AFB, Del.; Eastern West Virginia Arpt., W.Va.; JB Charleston, S.C.; JB Elmendorf-Richardson, Alaska; JB Lewis-McChord, Wash.; JB McGuire-Dix-Lakehurst, N.J.; JB Pearl Harbor-Hickam, Hawaii; March ARB, Calif.; Travis AFB, Calif.; Wright-Patterson AFB, Ohio.
Contractor: Boeing.
Power Plant: four Pratt & Whitney F117-PW-100 turbofans, each 40,440 lb thrust.
Accommodation: flight crew: two pilots, loadmaster; AE crew: two flight nurses, three medical technicians (altered as required). Load: 102 troops/paratroops; 36 litter and 54 ambulatory patients; 18 pallet positions; max payload 170,900 lb.
Dimensions: span 169.8 ft, length 174 ft, height 55.1 ft.
Weight: max T-O 585,000 lb.
Ceiling: 45,000 ft.
Performance: speed 518 mph at 25,000 ft, range 2,760 miles with 169,000 lb payload.

C-20 Gulfstream
Brief: Twin-engine executive airlift asset for transporting high-ranking government officials.
COMMENTARY
C-20A/B models were initially acquired to replace C-140B Jetstar aircraft, transporting DOD and other government officials worldwide. The C-20B, delivered in 1988, is fit with specialized mission communications equipment and a revised interior. The C-20H, equipped with advanced technology flight management systems and upgraded Rolls Royce engines, was acquired in 1992. Specialized features include GPS, vertical separation equipment, GATM, and traffic collision avoidance system (TCAS). The Air Force planned to divest its seven C-20B and C-20H aircraft in FY15 due to the limited average service life remaining on the airframes.
Extant Variant(s)
• C-20B. Modified and upgraded Gulfstream III aircraft.
• C-20H. Modified Gulfstream IV SP aircraft.
• C-20K. Modified Gulfstream III comm integration testbed.
Function: VIP transport.
Operator: AMC, USAFE-AFAFRICA.
First Flight: December 1979.
Delivered: September 1983-89.
IOC: circa 1983.
Production: n/a.
Inventory: five C-20B; two C-20H; one C-20K.
Aircraft Location: JB Andrews, Md.; Ramstein AB, Germany.
Contractor: Gulfstream.
Power Plant: two Rolls Royce Spey MK511-8 turbofans (C-20B), each 11,400 lb thrust; two Rolls Royce Tay MK611-8 turbofans (C-20H), each 13,850 lb thrust.
Accommodation: crew: two pilots, flight engineer, communications system operator, flight attendant. Load: 12 passengers.
Dimensions: span 77.8 ft, length 83.1 ft (B), 88.3 ft (H), height 24.5 ft.
Weight: max T-O 69,700 lb (B), 74,600 lb (H).
Ceiling: 45,000 ft.
Performance: speed 576 mph, range 4,250 miles (B), 4,850 miles (H).

C-21 Learjet
Brief: Light airlift asset capable of cargo, passenger, and aeromedical transport.
COMMENTARY
The C-21 is a militarized Learjet 35 equipped with color weather radar, TACAN, and HF/VHF/UHF radios. It provides operational support for time-sensitive movement of people and cargo throughout the US and European Theater, including AE missions if required.
Extant Variant(s)
• C-21A. Military version of the Learjet 35A.
Function: Light airlift.
Operator: AMC, USAFE-AFAFRICA, ANG.
First Flight: January 1973.
Delivered: April 1984-October 1985.
IOC: April 1984.
Production: 84.
Inventory: 36.
Aircraft Location: JB Andrews, Md.; Peterson AFB, Colo.; Ramstein AB, Germany; Scott AFB, Ill.
Contractor: Gates Learjet.
Power Plant: two AlliedSignal TFE731-2 turbofans, each 3,500 lb thrust.
Accommodation: crew: two pilots; AE crew: flight nurse, two medical technicians (adjusted as required). Load: eight passengers and 3,153 lb cargo; one litter or five ambulatory patients.
Dimensions: span 39.5 ft, length 48.6 ft, height 12.2 ft.
Weight: max T-O 18,300 lb.

***C-32A** Air Force Two* (Sam Meyer)

Ceiling: 45,000 ft.
Performance: speed 530 mph at 41,000 ft, range 2,306 miles.

C-32 Air Force Two
Brief: Commercial aircraft used for dedicated vice presidential, cabinet, and high-ranking US and foreign official airlift.
COMMENTARY
The C-32A was acquired as a commercial Boeing 757 and delivered in less than two years from the contract date. The C-32A's cabin is divided into four sections: forward, with communications center, galley, lavatory, 10 business-class seats; second, fully enclosed stateroom with private lavatory, two first-class swivel seats, convertible divan; third, conference and staff area with eight business-class seats; and rear, 32 business-class seats, galley, two lavatories. Its communications system provides worldwide clear and secure voice and data communications. The aircraft's modern flight deck avionics are upgradeable, and new development includes nitrogen fuel-tank inerting, and commercial wideband satcom mods.
Extant Variant(s)
• C-32A. Presidential support-configured commercial Boeing 757-200 airliner.
• C-32B. Discrete airlift-configured commercial Boeing 757-200 airliner.
Function: VIP transport.
Operator: AMC, ANG.
First Flight: Feb. 19, 1982 (USAF Feb. 11, 1998).
Delivered: June-December 1998.
IOC: 1998.
Production: six.
Inventory: four C-32A; two C-32B.
Aircraft Location: JB Andrews, Md.; JB McGuire-Dix-Lakehurst, N.J.
Contractor: Boeing.
Power Plant: two Pratt & Whitney PW2040 turbofans, each 41,700 lb thrust.
Accommodation: crew: 16 (varies with mission). Load: up to 45 passengers.
Dimensions: span 124.6 ft, length 155.2 ft, height 44.5 ft.
Weight: max T-O 255,000 lb.
Ceiling: 42,000 ft.
Performance: speed 530 mph, range 6,325 miles.

C-37 Gulfstream V
Brief: Modified business jet used for worldwide special air missions for high-ranking government and DOD officials.
COMMENTARY
The C-37 family are military versions of ultra-long-range Gulfstream business aircraft. The C-37A is based on the Gulfstream V and equipped with separate VIP and passenger areas, secure global voice and data communications suites, enhanced weather radar, autopilot, and advanced HUD. The C-37B is a version of the Gulfstream 550 modified for VIP duties with directional IR countermeasures system. It also incorporates the Honeywell Plane-View flight deck. New FY15 mods to the fleet include commercial wideband Satcom to ensure senior leaders access to secure data and voice networks, replacing legacy equipment.
Extant Variant(s)
• C-37A. Military version of the Gulfstream V.
• C-37B. Military version of the Gulfstream G550.
Function: VIP transport.
Operator: AMC, PACAF, USAFE-AFAFRICA.
First Flight: USAF October 1998.
Delivered: from October 1998.
IOC: Dec. 9, 1998.
Production: 10 C-37A; three C-37B.
Inventory: nine C-37A; three C-37B.
Aircraft Location: Chievres, Belgium; JB Andrews, Md.; JB Pearl Harbor-Hickam, Hawaii; MacDill AFB, Fla.
Contractor: Gulfstream.
Power Plant: two BMW/Rolls Royce BR710A1-10 turbofans, each 14,750 lb thrust.
Accommodation: crew: five. Load: up to 12 passengers.
Dimensions: span 93.5 ft, length 96.4 ft, height 25.8 ft.
Weight: max T-O 90,500 lb.
Ceiling: 51,000 ft.
Performance: speed 600 mph, range 6,300 miles.

C-38 Astra/Courier
Brief: A twin-engine transcontinental aircraft used for VIP transportation.
COMMENTARY
The C-38A is the military version of Astra SPX produced by Israel Aircraft Industries Ltd. and supported worldwide by Galaxy Aerospace. It was acquired in 1998 and is equipped with modern avionics, navigation, communication, military auxiliary power unit, vertical separation, and safety equipment. The aircraft is solely operated by the District of Columbia ANG's 201st Airlift Squadron. The Guard plans to retire the aircraft in FY15 and replace it with a more standardized and capable platform.
Extant Variant(s)
• C-38A. Modified version of the IAI Astra SPX.
Function: VIP transport.
Operator: ANG.
First Flight: 1998.
Delivered: April-May 1998.
IOC: 1998.
Production: two.
Inventory: two.
Aircraft Location: JB Andrews, Md.
Contractor: Tracor (Israel Aircraft Industries Ltd).
Power Plant: two AlliedSignal TFE731-40R-200G, each 4,250 lb thrust.
Accommodation: crew: two pilots. Load: up to eight passengers or, for AE role, two life support units and two medical attendants; all seats removable for cargo.
Dimensions: span 54.6 ft, length 55.6 ft, height 18.2 ft.
Weight: max T-O 24,800 lb.
Ceiling: 33,000 ft.
Performance: speed 662 mph, range 3,000 miles.

C-40 Clipper
Brief: Commercial-based aircraft used primarily for medium-range airlift of senior military commanders, Cabinet officials, and members of Congress.
COMMENTARY
The C-40, which added winglets to the commercial Boeing 737-700, transports VIPs and performs other operational support missions. C-40Bs are equipped with an office-in-the-sky arrangement, including clear and secure voice/data communication and broadband data/video. C-40Cs lack the advanced communications suite and are VIP configured with sleep accommodations and reconfigurable to carry 42 to 111 passengers. Both versions have modern avionics, integrated GPS and flight management system/electronic flight instrument system, and HUD. Each one has auxiliary fuel tanks and managed passenger communications. FY15 new-start mods include nitrogen fuel tank inerting, and commercial wideband Satcom for the combined fleet.
Extant Variant(s)
• C-40B. Military version of the Boeing 737-700.
• C-40C. VIP configured Boeing 737-700 without advanced comms.
Function: VIP transport.
Operator: AMC, PACAF, USAFE-AFAFRICA, ANG, AFRC.
First Flight: USN C-40A: April 14, 1999.
Delivered: 2002.
IOC: n/a.
Production: 11.
Inventory: four C-40B; seven C-40C.
Aircraft Location: JB Andrews, Md.; JB Pearl Harbor-Hickam, Hawaii; Ramstein AB, Germany; Scott AFB, Ill.
Contractor: Boeing.
Power Plant: two General Electric CFM56-7 turbofans, each 27,000 lb thrust.
Accommodation: crew: 10 (varies with model and mission). Load: up to 89 passengers (C-40B); up to 111 (C-40C).
Dimensions: span 117.4 ft, length 110.3 ft, height 41.2 ft.
Weight: max T-O 171,000 lb.
Ceiling: 41,000 ft.
Performance: speed 530 mph, range 5,750 miles.

C-130 Hercules
Brief: Medium-range tactical airlifter capable of operating from unimproved airstrips as well as providing intertheater support.
COMMENTARY
The C-130 is an all-purpose theater transport that performs diverse roles. Missions include tactical and intertheater airlift and airdrop support, Arctic resupply, AE, aerial spraying, aerial firefighting, and humanitarian missions. The limited number of C-130Es still in service are extended-range version of the original design and first delivered in 1962. Delivery of the C-130H model began in 1974. Improvement included uprated engines, redesigned outer wing, improved pneumatic systems, new avionics, improved radar, and NVG lighting. The small New York ANG fleet of LC-130H Antarctic support aircraft have been upgraded with digital displays, flight management systems, multifunction radar, new communications systems, and a single air data computer, as well as new eight-bladed propellers. The C-130J Super Hercules is the newest and current-production variant. It features three-crew flight operations system, more powerful engines, composite six-blade propeller system, digital avionics, and mission computers. J models fly faster, higher, and farther than earlier C-130s. ANG and AFRC units began receiving J models in 1999, Active units in 2004. ANG began receiving stretched J-30 models in 2001, followed by Active Duty and AFRC

***C-130J-30** Hercules* (Jim Dunn)

units in 2004. WC-130Js are operated by AFRC's "Hurricane Hunters" at Keesler AFB, Miss., and WC-130Hs are operated by the Puerto Rico ANG. The fleets are equipped with palletized mission equipment for tropical and winter storm data collection. FY15 budget requires the Air Force to reverse its FY13 cancellation of the C-130H Avionics Modernization Program, but permits additional safety of flight modifications such as communication, surveillance, and air traffic management upgrades.

Extant Variant(s)

• C-130E Hercules. Early extended-range version.
• C-130H Hercules. Updated legacy C-130 version.
• LC-130H Skibird. Arctic support variant with wheel-ski gear.
• WC-130H. Weather reconnaissance version of C-130H.
• C-130J Super Hercules. Current production version.
• C-130J-30 Super Hercules. Stretched version capable of larger payloads.
• WC-130J. Weather reconnaissance version of C-130J.

Function: Tactical airlift.
Operator: AETC, AMC, PACAF, USAFE-AFAFRICA, ANG, AFRC.
First Flight: August 1954 (C-130A).
Delivered: December 1956-present (C-130J).
IOC: circa 1958.
Production: more than 2,200.
Inventory: two C-130E; 259 C-130H; 10 LC-130H; eight WC-130H; 100 C-130J; 10 WC-130J.
Aircraft Location: Dobbins ARB, Ga.; Dyess AFB, Texas; Keesler AFB, Miss.; Little Rock AFB, Ark.; Maxwell AFB, Ala.; Minneapolis-St. Paul Arpt./ARS, Minn.; Niagara Falls Arpt., N.Y.; Peterson AFB, Colo.; Pittsburgh Arpt., Pa.; Pope Field, N.C.; Ramstein AB, Germany; Yokota AB, Japan; Youngstown ARS, Ohio; and ANG in Alaska, Arkansas, California, Connecticut, Delaware, Georgia, Hawaii, Illinois, Kentucky, Minnesota, Missouri, Montana, Nevada, New York, North Carolina, Ohio, Puerto Rico, Rhode Island, Tennessee, Texas, West Virginia, Wyoming. Planned: Martin State Arpt., Md. (C-130J).
Contractor: Lockheed Martin.
Power Plant: four Allison T56-A-7 turboprops (C-130E), 4,200 shp; four Allison T56-A-15 turboprops (C-130H), each 4,591 shp; four Rolls Royce AE2100D3 turboprops (C-130J), each 4,700 shp.
Accommodation: E/H crew: two pilots, navigator, flight engineer, loadmaster. J/J-30 crew: two pilots, loadmaster. E/H/J load: up to 92 combat troops or 64 paratroopers or 74 litters or six cargo pallets or 16 Container Delivery System (CDS) bundles or any combination of these up to max weight for each version. J-30 load: 128 combat troops or 92 paratroopers or 97 litters or eight pallets or 24 CDS bundles or any combination of these up to max weight.
Dimensions: span 132.6 ft, length 97.8 ft, height 38.8 ft.; J-30 length 112.8 ft.
Weight: max T-O 155,000 lb (E/H/J), 164,000 lb (J-30); max payload 42,000 lb (E/H/J), 44,000 lb (J-30).
Ceiling: with max payload, 19,000 ft (E), 23,000 ft (H), 26,000 ft (J), 28,000 (J-30).
Performance: speed 345 mph (E), 366 mph (H), 417 mph (J), 410 mph (J-30); range with 35,000 lb payload 1,438 miles (E), 1,496 miles (H), 1,841 miles (J), 2,417 miles (J-30).

VC-25 Air Force One
Brief: Modified Boeing 747 used for presidential air transport.
COMMENTARY
The VC-25 is a specially configured Boeing 747-200B equipped to carry the President and his entourage. When the President is aboard, the VC-25's radio reporting call sign is Air Force One. Aircraft are equipped with staff work areas, a conference room, a general seating area, and an executive office. Communications capability includes worldwide secure and clear communications, data links, and a full self-defensive suite. The fleet is operated by the Presidential Airlift Group at the 89th Airlift Wing. FY15 budget request supported ongoing modifications to extend service life beyond the approximately five years remaining. New development includes nitrogen fuel tank inerting and commercial wideband satcom mods. The Air Force announced plans in 2014 to replace current VC-25s with a modified version of Boeing's latest 747-8 Intercontinental.

Extant Variant(s)

• VC-25A. Specially configured presidential support version of the Boeing 747-200B.

Function: Presidential airlift.
Operator: AMC.
First Flight: first flown as Air Force One Sept. 6, 1990.
Delivered: August-December 1990.
IOC: circa 1990.
Production: two.
Inventory: two.
Aircraft Location: JB Andrews, Md.
Contractor: Boeing.
Power Plant: four General Electric CF6-80C2B1 turbofans, each 56,700 lb thrust.
Accommodation: crew: 26; load: up to 76 passengers.
Dimensions: span 195.7 ft, length 231.8 ft, height 63.4 ft.
Weight: max T-O 833,000 lb.
Ceiling: 45,100 ft.
Performance: speed 630 mph, range 7,800 miles.

HELICOPTERS

HH-60 Pave Hawk
Brief: Armed CSAR variant of the UH-60 Black Hawk capable of medevac, disaster and humanitarian response, and other support missions.
COMMENTARY
The HH-60G is a highly modified Black Hawk helicopter. USAF acquired the HH-60G in the early 1980s. It has been in continuous use by Active Duty, ANG, and AFRC air rescue units since. Pave Hawk is equipped with an advanced INS/GPS/Doppler navigation systems, satcom, and secure/anti-jam communications. It is fitted with a precision landing system (PLS) that aids location of survivor's radio. It includes automatic flight control, NVG lighting, FLIR, color weather radar, engine/rotor blade anti-ice system, in-flight refueling probe, additional fuel tanks, and an integral rescue hoist. Combat enhancements include a full self-defensive suite and two miniguns or .50-caliber guns. The Air Force announced plans to replace the fleet with the new HH-60W. The more powerful helicopter will incorporate improved hot/high-altitude performance, an enlarged cabin, and longer range. Delivery of up to 112 new-build helicopters is planned starting in FY19. Only 98 of the original 112 HH-60Gs remain in service, and USAF is in the process of converting 21 Army surplus UH-60Ls as loss replacements.

Extant Variant(s)

• HH-60G. Modified UH-60 helicopter equipped for CSAR.
• HH-60U. Converted surplus UH-60L.

Function: Personnel recovery/medium lift.
Operator: ACC, AETC, AFMC, PACAF, USAFE-AFAFRICA, ANG, AFRC.
First Flight: October 1974.
Delivered: from 1982.
IOC: circa 1982.
Production: 112.
Inventory: 98 HH-60G; three HH-60U.
Aircraft Location: Davis-Monthan AFB, Ariz.; Eglin AFB, Fla.; Francis S. Gabreski Arpt., N.Y.; JB Elmendorf-Richardson, Alaska; Kadena AB, Japan; Kirtland AFB, N.M.; Moffett Field, Calif.; Moody AFB, Ga.; Nellis AFB, Nev.; Patrick AFB, Fla.; RAF Lakenheath, UK.
Contractor: United Technologies/Sikorsky.
Power Plant: two General Electric T700-GE-700/701C turboshafts, each 1,560-1,940 shp.
Accommodation: crew: two pilots, flight engineer, gunner. Load: mission dependent.
Dimensions: rotor diameter 53.6 ft, overall length 64.7 ft, height 16.7 ft.
Weight: max T-O 22,000 lb.
Ceiling: 14,000 ft.
Performance: speed 184 mph; range 580 miles.
Armament: two 7.62 mm miniguns or two .50-caliber machine guns.

***HH-60G** Pave Hawk* (TSgt. Matt Hecht)

UH-1 Iroquois
Brief: Utility helicopter used for ICBM missile field security and support, pilot training, and executive airlift.
COMMENTARY
The UH-1N aircraft initially provided search and rescue capabilities before replacing UH-1Hs in the ICBM field security and support roles. UH-1Ns currently provide administrative lift to the US National Capital Region and PACAF officials at Yokota AB, Japan, as well as supporting aircrew survival training at Fairchild AFB, Wash. The TH-1H fleet provides Air Force helicopter pilot training at Fort Rucker, Ala. With termination of the Common Vertical Lift Support Program (CVLSP), USAF may fly the 40-year-old UH-1N for at least another 10 years. USAF converted all single-engine UH-1H models to twin-engine TH-1H variants, extending their service lives at least 20 years. In light of CVLSP cancellation, AFGSC is modifying its UH-1N with NVG-capable cockpit, upgraded sensors, and safety and sustainment improvements.
Extant Variant(s)
• TH-1H. Modified twin-engine version of UH-1H used for flight training.
• UH-1N. Military version of the Bell 212 used for utility support and light lift.
Function: Light-lift/training.
Operator: AETC, AFDW, AFGSC, AFMC, PACAF.
First Flight: 1956.
Delivered: from September 1970 (UH-1N).
IOC: circa 1970.
Production: 28 TH-1H; 79 UH-1N.
Inventory: 28 TH-1H; 62 UH-1N.
Aircraft Location: Eglin AFB, Fla.; Fairchild AFB, Wash.; F. E. Warren AFB, Wyo.; Fort Rucker, Ala.; JB Andrews, Md.; Kirtland AFB, N.M.; Malmstrom AFB, Mont.; Minot AFB, N.D.; Yokota AB, Japan.
Contractor: Bell, Lockheed Martin (TH-1H prime).
Power Plant: TH-1H: one Honeywell T53-L-703 turboshaft, 1,800 shp. UH-1H: one Lycoming T53-L-13B turboshaft, 1,400 shp. UH-1N: two Pratt & Whitney Canada T400-CP-400 turboshafts, 1,290 shp.
Accommodation: UH-1N crew: two pilots, flight engineer; load: up to 13 passengers (depending on fuel and atmospheric conditions) or up to six litters or, without seats, bulky, oversize cargo.
Dimensions: TH-1H: rotor diameter 48 ft, length 57 ft, height 13 ft. UH-1N: rotor diameter 48 ft, length 57.1 ft, height 12.8 ft.
Weight: max gross 10,500 lb.
Ceiling: 15,000 ft (10,000 ft with 10,000+ lb).
Performance: (UH-1N) speed 149 mph, range 300+ miles.
Armament: (optional) two General Electric 7.62 mm miniguns or two 40 mm grenade launchers; two seven-tube 2.75-in rocket launchers.

TRAINER AIRCRAFT

T-1 Jayhawk
Brief: Medium-range, twin-engine jet trainer used for pilot and CSO training.
COMMENTARY
The T-1A is a military version of Beech 400A used in the advanced phase of JSUPT for students selected to fly tanker or transport aircraft and also used to train student CSOs. Cockpit seats an instructor and two students. Mods include UHF/VHF radios, INS, TACAN, airborne detection finder, increased bird-strike resistance, and an additional fuselage fuel tank. CSO training aircraft also have GPS-driven SAR and simulated RWR and have a second student and second instructor station. Planned upgrades are MFD and terrain collision avoidance modernization, with the possibility of complete avionics suite replacement starting in FY16.
Extant Variant(s)
• T-1A. Military trainer version of Beechcraft 400A.
Function: Advanced trainer.
Operator: AETC.
First Flight: Sept. 22, 1989 (Beechcraft 400A).
Delivered: Jan. 17, 1992-July 1997.
IOC: January 1993.
Production: 180.
Inventory: 178.
Aircraft Location: Columbus AFB, Miss.; Laughlin AFB and JBSA-Randolph, Texas; Vance AFB, Okla.; NAS Pensacola, Fla.
Contractor: Beechcraft.
Power Plant: two Pratt & Whitney Canada JT15D-5B turbofans, each 2,900 lb thrust.
Accommodation: three pilots, two side by side, one to the rear.
Dimensions: span 43.5 ft, length 48.4 ft, height 13.9 ft.
Weight: max T-O 16,100 lb.
Ceiling: 41,000 ft.
Performance: speed 538 mph, range 2,555 miles.

T-6 Texan II
Brief: Single-engine turboprop used for Air Force and Navy primary pilot training.
COMMENTARY
The T-6 is an Air Force and Navy trainer developed under the Joint Primary Aircraft Training System program and based on Swiss Pilatus PC-9. Mods include a strengthened fuselage, zero/zero ejection seats, upgraded engine, increased fuel capacity, pressurized cockpit, bird-resistant canopy, and digital avionics with sunlight readable LCDs. USAF aircraft replaced the T-37. The tandem student and instructor positions are interchangeable, including single-pilot operation from either seat. Aircraft is fully aerobatic and features an anti-G system. USAF production completed in 2010, with an expected service life of 21 years. FY15 funds support modifications to prevent avionics obsolescence, structural improvements, canopy fracturing system, and Onboard Oxygen Generation Systems (OBOGS) concentrator.
Extant Variant(s)
• T-6A. Joint service primary training aircraft, based on the Pilatus PC-9.
• T-6B. Navy-only variant.
Function: Primary trainer.
Operator: AETC, USN.
First Flight: July 15, 1998.
Delivered: from May 2000 (operational aircraft).
IOC: November 2001.
Production: Planned: 452 (USAF); 315 (USN).
Inventory: 445 (USAF).
Aircraft Location: USAF: Columbus AFB, Miss.; Laughlin AFB, JBSA-Randolph, and Sheppard AFB, Texas; Vance AFB, Okla. USN: NAS Corpus Christi, Texas; NAS Whiting, Fla.; NAS Pensacola, Fla.
Contractor: Beechcraft (formerly Raytheon).
Power Plant: one Pratt & Whitney Canada PT6A-68 turboprop, 1,100 shp.
Accommodation: two pilots, in tandem, on zero/zero ejection seats.
Dimensions: span 33.5 ft, length 33.4 ft, height 10.7 ft.
Weight: basic 6,500 lb.
Ceiling: 31,000 ft.
Performance: speed 320 mph, range 1,035 miles.

***T-38A** Talon (foreground) and **B-2** Spirit.* (SSgt. Jonathan Snyder)

T-38 Talon
Brief: A twin-engine, high-altitude, supersonic jet trainer used primarily for pilot and instructor training and training support for advanced-aircraft fleets.
COMMENTARY
The T-38 was the first supersonic trainer aircraft and is primarily used by AETC for advanced bomber-fighter training track in JSUPT and Introduction to Fighter Fundamentals training. The aircraft is used to teach supersonic techniques, aerobatics, formation, night and instrument flying, and cross-country and low-level navigation. The T-38 is also used by the USAF Test Pilot School to train test pilots and flight-test engineers and by ACC and AFGSC as a companion trainer to maintain pilot proficiency. ACC uses regenerated T-38s as dedicated aggressor aircraft for F-22 training. T-38As underwent structural renewal during Pacer Classic I and II mods begun in 1984, to extend service life. T-38Bs are equipped with a gunsight and centerline hard point for mounting external stores such as an ECM pod or practice bomb dispenser. Aircraft were redesignated T-38Cs after undergoing avionics modernization to add glass cockpits with HUD, color MFDs, mission computer, and INS/GPS. T-38Cs were delivered from 2002 to 2007. Sustainment measures include replacement of major engine components to improve reliability and maintainability. Ongoing upgrades include Pacer Classic III, the latest structural renewal effort. It will replace major longerons, bulkheads/formers, intakes, internal skins, and structural floors. Service life is expected to 2029.
Extant Variant(s)
• T-38A. Upgraded version with Pacer Classic I and II mods.
• AT-38B. Armed weapons training version.
• T-38C. Modernized airframes incorporating glass cockpits and upgraded engines.
Function: Advanced trainer.
Operator: ACC, AETC, AFGSC, AFMC, AFRC.
First Flight: April 1959.
Delivered: 1961-72.
IOC: March 1961.
Production: more than 1,100.
Inventory: 54 T-38A; six AT-38B; 447 T-38C.
Aircraft Location: Beale AFB and Edwards AFB, Calif.; Columbus AFB, Miss.; Holloman AFB, N.M.; JB Langley-Eustis, Va.; JBSA-Randolph and Sheppard AFB, Texas; Tyndall AFB, Fla.; Vance AFB, Okla.; Whiteman AFB, Mo.

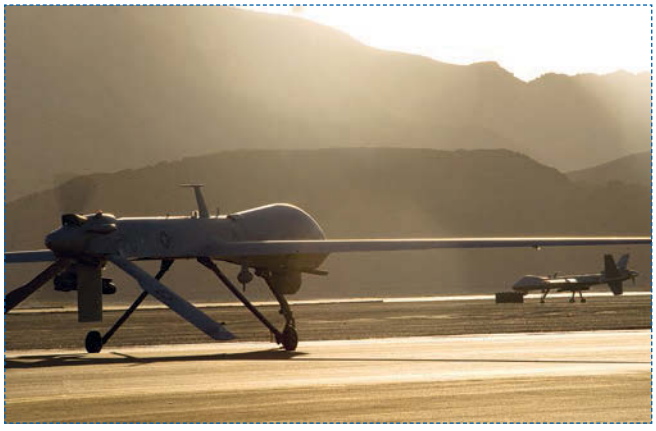
Contractor: Northrop Grumman.
Power Plant: two General Electric J85-GE-5 turbojets, each 2,900 lb thrust with afterburning.
Accommodation: two pilots in tandem ejection seats.
Dimensions: span 25.3 ft, length 46.3 ft, height 12.8 ft.
Weight: max T-O 12,093 lb.
Ceiling: above 55,000 ft.
Performance: speed 812 mph, range 1,093 miles.

T-53
Brief: Military designated sport aircraft.
COMMENTARY
The T-53 is the military designated civilian Cirrus SR20, primarily used by USAFA's Powered Flight Program. It is an all-composite monoplane with advanced avionics and safety features that include GPS, Cirrus Airframe Parachute System, integrated fuselage roll cage, cuffed wing design, and other active and passive safety systems and features that are standard on Cirrus aircraft.
Extant Variant(s)
• T-53A. Military designated Cirrus SR20.
Function: Trainer.
Operator: AETC.
Delivered: 2012.
Inventory: 25.
Aircraft Location: USAFA, Colo.
Contractor: Cirrus.
Power Plant: one Continental IO-360-ES six-cylinder, fuel-injected, air-cooled engine, 200 hp.
Accommodation: two, side by side, plus three passengers.
Dimensions: span 38.3 ft, length 26 ft, height 8.9 ft.
Weight: max T-O 3,050 lb.
Ceiling: 17,500 ft.
Performance: speed 178 mph, range 690 miles.

UV-18 Twin Otter
Brief: Modified utility transport used for parachute jump training.
COMMENTARY
The UV-18 is a military variant of the civilian De Havilland DHC-6 Twin Otter. It is used at USAFA to support various parachuting activities and perform general utility missions. Special use includes supporting the Air Force Parachute Team, The Wings of Blue.
Extant Variant(s)
• UV-18B. Military variant of the DHC-6 Twin Otter.
Function: Utility.
Operator: AETC.
First Flight: May 1965 (commercial version).
Delivered: 1977 (two); 1982 (one).
IOC: 1977.
Production: three.
Inventory: three.
Aircraft Location: USAFA, Colo.
Contractor: De Havilland Canada.
Power Plant: two Pratt & Whitney Canada PT6A-27 turboprops, each 620 ehp.
Accommodation: crew: two pilots; load: up to 20 passengers.
Dimensions: span 65 ft, length 51.9 ft, height 18.7 ft.
Weight: max T-O 12,500 lb.
Ceiling: 25,000 ft.
Performance: speed 210 mph, range 806 miles.

REMOTELY PILOTED AIRCRAFT

MQ-1 Predator
Brief: Medium-altitude, long-endurance RPA, with ISR and strike capability.
COMMENTARY
The MQ-1 is a multimission weaponized RPA with near real-time FMV, packaged multispectral targeting system including laser designator/illuminator and EO/IR sensors. The fully operational system comprises four air vehicles, GCS, satellite link, and about 55 personnel for 24-hour operations. Became a fully USAF system in 1996. Systems armed with two Hellfire missiles since 2002, at which time designation changed from RQ-1 to MQ-1 to denote multimission capability. USAF forward deploys launch and recovery element (LRE) systems and support personnel for takeoff and landing operations, while the CONUS-based GCS conducts the mission via extended BLOS satcom data link. USAF received its last MQ-1B in March 2011, but continues to fund GCS and airframe mods. Congress barred USAF from retiring any nondamaged airframes in FY15.
Extant Variant(s)
• MQ-1B. Armed version of the General Atomics Predator.
Function: Armed reconnaissance/target acquisition.
Operator: ACC, AFMC, AFSOC, ANG.
First Flight: July 1994.
Delivered: July 1994 (USAF from 1996)-2011.
IOC: 2005.
Production: 268 air vehicles.
Inventory: 152.
GCS Location: Cannon AFB, N.M.; Creech AFB, Nev.; Davis-Monthan AFB, Ariz.; Ellington Field, Texas; Hector Arpt., N.D.; Holloman AFB, N.M.; March ARB, Calif.; Nellis AFB, Nev.; Springfield-Beckley Arpt., Ohio.; Whiteman AFB, Mo.
Aircraft Location: Cannon AFB, N.M.; Creech AFB, Nev.; Fort Polk Airfield, La.; Fort Huachuca, Ariz.; Grand Forks AFB, N.D.; Holloman AFB, N.M.; March ARB, Calif.; Whiteman AFB, Mo.
Contractor: General Atomics Aeronautical Systems.
Power Plant: one Rotax 914F turbo engine.
Accommodation: GCS: pilot, sensor operator.
Dimensions: span 55 ft, length 27 ft, height 6.9 ft.
Weight: max T-O 2,250 lb.
Ceiling: 25,000 ft.
Performance: speed 84-135 mph, range 770 miles, max endurance 40 hr.
Armament: Two AGM-114 Hellfire missiles.



***MQ-1B** Predator and **MQ-9** Reaper (in back)* (A1C Christian Clausen)

MQ-9 Reaper
Brief: Medium-to-high altitude, long-endurance RPA with persistent hunter-killer role.
COMMENTARY
The MQ-9B variant has been operational in Afghanistan since 2007. The RPA is capable of various mission profiles by combining various weapons and sensors payloads. The MQ-9B Reaper system comprises several aircraft, GCS, a Predator Primary Satellite Link (PPSL), and spare equipment and operations and maintenance crews for deployed 24-hour operations. The RPA is equipped with Multispectral Targeting System-B (MTS-B), integrating an EO/IR sensor, color/monochrome daylight TV camera, image-intensified TV camera, and laser designator/illuminator. Its MTS-B provides FMV as separate video streams or fused together, and the MQ-9 employs SAR for GBU-38 JDAM targeting. Extended-range/payload upgrades are converting aircraft with new wings, winglets, and fuel tanks and heavyweight undercarriage to enable higher takeoff weights. Development is underway to incorporate automatic takeoff and landing capability, Counter-Improvised Explosive Device (C-IED), Dismount Detection Radar (DDR), missile defense, and other sensor and weapons upgrades. Gorgon Stare was deployed operationally for the first time to Afghanistan in 2014.
Extant Variant(s)
• MQ-9B Reaper. Air Force version of the General Atomics Predator B.
Function: Attack/armed reconnaissance.
Operator: ACC, AFSOC, AFMC, ANG.
First Flight: February 2001.
Delivered: November 2003.
IOC: October 2007.
Production: 346 (planned).
Inventory: 154.
GCS Location: Cannon AFB, N.M.; Creech AFB, Nev.; Ellsworth AFB, S.D.; Hancock Field, N.Y.; Holloman AFB, N.M.
Aircraft Location: Cannon AFB, N.M.; Creech AFB, Nev.; Eglin AFB, Fla.; Fort Drum, N.Y.; Hancock Field, N.Y.; Holloman AFB, N.M.; Nellis AFB, Nev.
Contractor: General Atomics Aeronautical Systems; L3 Communications; Raytheon.
Power Plant: one Honeywell TPE331-10GD turboprop, max 900 shp.
Accommodation: GCS: pilot, sensor operator.
Dimensions: span 66 ft, length 36 ft, height 12.5 ft.
Weight: max T-O 10,500 lb.
Ceiling: 50,000 ft.
Performance: cruise speed 230 mph, range 1,150 miles, endurance 14+ hr.
Armament: combination of AGM-114 Hellfires, GBU-12/49 Paveway IIs, and GBU-38 JDAMs.

RQ-4 Global Hawk
Brief: A high-altitude, long-range, long-endurance RPA sensor platform.
COMMENTARY
The Global Hawk system consists of an aircraft with an integrated sensor suite, launch and recovery element (LRE), mission control element (MCE), and communications and mission planning equipment. (ACTD system used in Afghanistan and Iraq.) Block 20 aircraft were initially delivered as an Imint platform incorporating the Enhanced Integrated Sensor Suite (EISS).

Three airframes were subsequently converted to EQ-4B communications relay platforms with the Battlefield Airborne Communications Node (BACN). The Block 30 variant is a multi-intelligence platform equipped with EO/IR, SAR, as well as Sigint sensors and has supported combat operations in Afghanistan, Iraq, and Libya. Eighteen Block 30s are supporting operations worldwide. The Block 40 ground surveillance platform is equipped with the Multiplatform Radar Technology Insertion Program (MP-RTIP) sensor suite that incorporates AESA and SAR to simultaneously gather stationary target imagery and intelligence and detect and track moving ground targets and cruise missiles.

Extant Variant(s)

• Block 20. Imint and communications relay platforms.
• Block 30. Multi-intelligence platform equipped with EO/IR and SAR sensors.
• Block 40. AESA and SAR equipped ground moving target indication (GMTI) and battlefield ISR platform.

Function: High-altitude reconnaissance.
Operator: ACC, AFMC.
First Flight: Feb. 28, 1998.
Delivered: from 1995 (ACTD versions).
IOC: Block 30 August 2011; Block 40 FY15 (planned).
Production: TBD.
Inventory: 30.
Aircraft Location: Beale AFB, Calif.; Grand Forks AFB, N.D.; Andersen AFB, Guam. Planned: two other forward operating bases.
Contractor: Northrop Grumman, Raytheon, L3 Communications.
Power Plant: one Rolls Royce-North American F137-RR-100 turbofan, 7,600 lb thrust.
Accommodation: one LRE pilot, one MCE pilot, one MCE sensor operator.
Dimensions: span 130.9 ft, length 47.6 ft, height 15.3 ft.
Weight: max T-O 32,500 lb.
Ceiling: 60,000 ft.
Performance: speed 356.5 mph, range 10,000 miles.

RQ-170 Sentinel

Brief: Low-observable RPA in development and testing that has already flown in combat.

COMMENTARY

Although the RQ-170 is still under development and test, USAF has employed it in Southwest Asia for Enduring Freedom. The RPA was developed in response to DOD's call for additional RPA support for combatant commanders. USAF publicly acknowledged the aircraft, after photos appeared in foreign news media of operations over Afghanistan in 2009. An RQ-170 strayed into Iranian airspace, crashed, and was captured during a mission in 2011.

Extant Variant(s)

• RQ-170. No data available.

Function: Unmanned surveillance and reconnaissance.
Operator: ACC.
Aircraft Location: Tonopah Test Range, Nev. GCS: Creech AFB, Nev.; Eglin AFB, Fla.; detachments worldwide.
Contractor: Lockheed Martin.

FULL-SCALE AERIAL TARGETS

QF-4 Phantom II

Brief: Regenerated F-4 Phantom IIs converted as optionally manned aerial targets primarily to support missile and weapon systems development.

COMMENTARY

The QF-4 aircraft supplanted the QF-106 as the Air Force's Full-scale Aerial Target (FSAT) system in 1997 and is primarily used to support missile and weapon systems development, testing, and evaluation. The majority of flights are conducted with a safety pilot in the cockpit to facilitate air combat training and evaluation. For live-shot weapons tests or training, QF-4s fly in the "not under live local operator" (NULLO) control configuration, equipped with explosive charges to terminate flight if damaged, and 16 to 20 kills are conducted annually. Retired F/RF-4 airframes were refurbished and converted to drone configuration by BAE Systems, with installation of drone specific equipment including remote control, missile telemetry and scoring, and safe flight-termination systems. QF-4s are assigned to the 82nd Aerial Targets Squadron operating from Tyndall AFB, Fla., utilizing the Gulf Range Drone Control System, and Holloman AFB, N.M., utilizing the White Sands Integrated Target System. The final QF-4 was converted from an RF-4C and delivered in November 2013. QF-16s will begin replacing QF-4s from FY15.

Extant Variant(s)

• QF-4E. Converted from F-4E stocks, delivered starting in 2000 to 2008.
• QF-4G. Converted from retired F-4G airframes, delivered 1997 to 2000.
• QRF-4C. Converted from RF-4C stocks, delivered 2008 to 2013.

Function: Full-scale aerial target.
Operator: ACC.
First Flight: June 30, 1967 (F-4E).
Delivered: 1997.
IOC: 1997.
Production: 314.
Inventory: 60.
Aircraft Location: Holloman AFB, N.M.; Tyndall AFB, Fla.
Contractor: Boeing (previously McDonnell Douglas), BAE Systems.
Power Plant: two General Electric J79-GE-17G afterburning turbojets, each 17,900 lb thrust.
Accommodation: flight crew: one pilot safety (optionally unmanned).
Dimensions: span 38 ft 15 in, length 63 ft 1 in, height 16 ft 6 in.
Weight: max T-O 62,000 lb.
Ceiling: 60,000 ft.
Performance: speed 1,600 mph, range 1,300 miles.

QF-16 Falcon

Brief: Regenerated F-16 Falcons converted as optionally manned aerial targets primarily to support missile and weapon systems development.

COMMENTARY

The QF-16 is replacing the dwindling and obsolescent QF-4 Full-scale Aerial Target (FSAT) system stock, starting in FY15. Aircraft will primarily support missile and weapon systems development, testing, and evaluation. QF-16s are capable of manned or "not under live local operator" (NULLO) control operations. Boeing completed six conversions to support testing. QF-16 completed developmental testing in October 2013 and initial operational testing in September 2014, culminating in an AIM-9X live operational test shot to validate the QF-16's missile scoring system. A full rate production decision is planned for early FY15. The first QF-16 was delivered to Tyndall AFB, Fla., in February 2015, and full operational capability is planned for 2017.

Extant Variant(s)

• QF-16A/B. Converted from retired stocks F-16A/B Block 15.
• QF-16C/D. Converted from retired F-16C/D Block 25 and Block 30.

Function: Full-scale aerial target.
Operator: ACC.
First Flight: May 4, 2012.
Delivered: February 2015.
IOC: 2016 (planned).
Production: 126 (planned).
Inventory: one.
Aircraft Location: Holloman AFB, N.M.; Tyndall AFB, Fla.
Contractor: Lockheed Martin (previously General Dynamics), Boeing.
Power Plant: Block 15: one Pratt & Whitney F100-PW-200 turbofan, 23,830 lb thrust. Block 25: one Pratt & Whitney F100-PW-220 turbofan, 23,830 lb thrust. Block 30: one General Electric F110-GE-100 turbofan, 28,984 lb thrust.
Accommodation: flight crew: one safety pilot (optionally unmanned).
Dimensions: span 32.8 ft, length 49.3 ft, height 16.7 ft.
Weight: F-16A: empty (F100-PW-200) 16,285 lb; F-16C: empty (F110-GE-100) 18,238 lb.
Ceiling: 50,000 ft.
Performance: speed Mach 2, ferry range 2,002+ miles.

***QF-16C** Falcon* (MSgt. J. Scott Wilcox)

STRATEGIC MISSILES

AGM-86 Air Launched Cruise Missile

Brief: Small, air launched, subsonic winged air vehicle carrying either a nuclear or conventional warhead.

COMMENTARY

ALCM is programmed to conduct strategic attack—nuclear or conventional—on surface targets. Its small radar signature and low-level flight capability enhance the missile's effectiveness. The nuclear AGM-86B was the first production version. A total of 1,715 were delivered through 1986. USAF to cut inventory to 528 and consolidate at Minot AFB, N.D. The conventional AGM-86C, called CALCM, was first delivered in 1987, and few remain in the inventory. It was operationally employed for the first time in Desert Storm and widely used in subsequent operations. CALCM is capable of adverse weather, day/night, air-to-surface, accurate, standoff strike capability at ranges greater than 500 miles. Block 1A enhancements offer improved accuracy and increased immunity to electronic jamming. The AGM-86D is CALCM's Block II penetrator version with AUP-3(M) warhead. It provides standoff capability against hardened, deeply buried targets and was successfully used in

Afghanistan. ALCM is undergoing a SLEP to stretch its in-service life to 2030 to allow for planned replacement by the Long-Range Standoff (LRSO) missile. LRSO development has been delayed three years, but USAF plans to field a nuclear missile by 2020, possibly followed by a conventional derivative thereafter. FY15 funds support LRSO concept refinement and engineering studies.

Extant Variant(s)
• AGM-86B. Nuclear ALCM variant.
• AGM-86C. Conventional CALCM variant.
• AGM-86D. Penetrating CALCM Block II variant.
Function: Strategic air-to-surface cruise missile.
Operator: AFGSC.
First Flight: June 1979 (full-scale development).
Delivered: from 1981.
IOC: December 1982, Griffiss AFB, N.Y.
Production: 1,715.
Unit Location: Andersen AFB, Guam (conventional only); Barksdale AFB, La.; Minot AFB, N.D.
Contractor: Boeing.
Power Plant: Williams/Teledyne CAE F107-WR-10 turbofan, 600 lb thrust.
Guidance: inertial plus Terrain Contour Matching (B); inertial plus GPS (C/D).
Warhead: W80-1 nuclear (B), blast/fragmentation conventional (C), hard target penetrating warhead (D).
Dimensions: span 12 ft, length 20.8 ft, body diameter 2 ft.
Weight: 3,150 lb.
Performance: speed 550 mph (B), high subsonic (C/D); range 1,500+ miles (B), 690 miles (C/D).

LGM-30 Minuteman
Brief: Silo-launched, solid-fuel ICBM capable of delivering one to three thermonuclear warheads with high accuracy over great distances.
COMMENTARY
Minuteman is a three-stage, solid-propellant ICBM housed in underground silos. Minuteman III became operational in 1970, providing improved range, rapid retargeting, and the capability to place three re-entry vehicles on three targets with a high accuracy. It is the sole remaining US land-based ICBM. Major life extension program ensures viability to 2020. Ongoing mods, including updated warhead fuzes and start of guidance and propulsion mod programs, would extend that to 2030. USAF initially deployed 550, later reducing to 500 based at Malmstrom AFB, Mont., Minot AFB, N.D., and F. E. Warren AFB, Wyo. Deactivation of a further 50 was completed in July 2008. AFGSC completed reducing its deployed ICBMs to a single warhead in 2014, under limits imposed by the New START arms reduction agreement.
Extant Variant(s)
• LGM-30G. Current Minuteman III variant.
Function: Strategic surface-to-surface ballistic missile.
Operator: AFGSC.
First Flight: February 1961.
Delivered: 1962-December 1978.
IOC: December 1962, Malmstrom AFB, Mont.
Production: 1,800.
Inventory: 449 deployed; 57 nondeployed.
Unit Location: F. E. Warren AFB, Wyo.; Malmstrom AFB, Mont.; Minot AFB, N.D.
Contractor: Boeing.
Propulsion: stage 1: Thiokol M-55 solid-propellant motor, 202,600 lb thrust; stage 2: Aerojet General SR19-AJ-1 solid-propellant motor, 60,721 lb thrust; stage 3: Thiokol SR73-AJ-1 solid-propellant motor, 34,400 lb thrust.
Guidance: inertial guidance system.
Warhead: one Mk 21 RV or one-three Mk 12/12A MIRVs.
Dimensions: length 59.9 ft, diameter 5.5 ft.
Weight: 79,432 lb.
Performance: speed at burnout approx 15,000 mph, range 6,000+ miles.

***AIM-9** Sidewinder* (A1C Aubrey Robinson)

LONG-RANGE STANDOFF WEAPONS

ADM-160 Miniature Air Launched Decoy
Brief: Air launched programmable electronic warfare platform designed to thwart enemy integrated air defense systems (IADS).
COMMENTARY
MALD is a low-cost, state-of-the-art, modular, autonomous, and programmable flight vehicle that mimics US or allied aircraft to enemy IADS. MALD was initiated as an ACTD by DARPA in response to an ACC SEAD mission needs statement. MALD-J adds radar jamming capability to the basic decoy platform and can operate alone or in concert with other EW platforms. The jammer version is designed as an expendable, close-in jammer to degrade and deny an early warning or acquisition radar's ability to establish a track on strike aircraft. It also maintains the ability to fulfill the basic decoy mission. F-16 or B-52 are lead employment aircraft for MALD. USAF capped procurement in FY12, converting Lot 4 to the MALD-J variant. Plans call for 3,000, with 2,400 in the jammer version. USAF demonstrated a new data link in 2014 to potentially enable in-flight retargeting.
Extant Variant(s)
• ADM-160B. MALD base decoy variant.
• ADM-160C. MALD-J jammer/decoy variant.
Function: Aircraft decoy; close-in radar jammer.
First Flight: 1999 (MALD); 2009 (MALD-J).
Delivered: from September 2012 (MALD-J).
IOC: n/a.
Contractor: Raytheon.
Guidance: GPS/INS.
Dimensions: span 5.6 ft (extended), length 9.3 ft
Weight: less than 300 lb.
Performance: range up to 575 miles, endurance 90 minutes (50 minutes on-station loiter).

AGM-154 Joint Standoff Weapon
Brief: Low-cost glide weapons with a standoff capability.
COMMENTARY
JSOW is a joint USAF and Navy family of medium-range, GPS/INS guided, standoff air-to-ground weapons. They are used to attack a variety of soft and armored area targets during day and night and adverse weather conditions. The baseline BLU-97 CEM variant is used against soft and area targets. The BLU-108 variant provides anti-armor capability.
Extant Variant(s)
• AGM-154A. Baseline BLU-97 CEM variant for soft/area targets.
• AGM-154B. The BLU-108 variant for anti-armor.
Function: Air-to-surface guided missile.
First Flight: December 1994.
Delivered: 2000-05 (USAF).
IOC: 2000 (USAF).
Contractor: Raytheon.
Guidance: GPS/INS.
Warhead: (see variants above).
Dimensions: length 13.3 ft, diameter 13 in.
Performance: range 13.8 miles low altitude, 73 miles high altitude.

AGM-158 Joint Air-to-Surface Standoff Missile
Brief: Advanced weapon designed to precisely attack heavily defended targets at extended, standoff range.
COMMENTARY
JASSM is a joint USAF-Navy autonomous precision strike weapon. It can attack both fixed and relocatable targets, including moderately hardened buried targets. The base variant is a stealthy low-cost airframe equipped with GPS/INS guidance, IIR terminal seeker. The base variant currently integrated on the B-52H, F-16 Block 50, B-1B, B-2, and F-15E. Planned integration includes F-16 Block 40 and F-35A. The JASSM-Extended Range (JASSM-ER) version utilizes same baseline body, but new engine and fuel system that increases range to more than 500 miles. The ER variant is only integrated on the B-1B. Full rate production begins in FY15.
Extant Variant(s)
• AGM-158A JASSM. Base variant.
• AGM-158B JASSM-ER. Extended-range variant.
Function: Air-to-surface guided weapon.
First Flight: April 8, 1999.
Delivered: through FY19 (planned).
IOC: September 2003.
Contractor: Lockheed Martin, Raytheon, Honeywell.
Power Plant: Teledyne Continental Motors turbojet (baseline); Williams Intl. turbofan (ER).
Guidance: GPS/INS and IIR terminal seeker.
Warhead: 1,000-lb class penetrator.
Dimensions: length 14 ft.
Performance: 1,000-lb dual mode penetrator/blast-fragmentation warheads; range 200+ miles (baseline), 500+ miles (ER).

AIR-TO-AIR MISSILES

AIM-9 Sidewinder
Brief: Short-range, supersonic, IR guided air-to-air missile with HE warhead, carried by fighter aircraft.

COMMENTARY
Sidewinder was developed by the Navy for fleet air defense and adapted by USAF for fighter aircraft use. Early versions were used extensively in the Vietnam War. The AIM-9M is a joint Navy-USAF, all-altitude, all-aspect, launch-and-leave intercept missile. It has improved defense against IR countermeasures, background discrimination, and reduced-smoke rocket motor. It first flew in 1978. AIM-9M improved anti-countermeasure capabilities. AIM-9X is the newest jointly funded variant. It employs passive IR tracking, jet-vane steering for increased maneuverability, and Joint Helmet-Mounted Cueing System (JHMCS) compatibility. FY15 budget funding begins full rate AIM-9X production.
Extant Variant(s)
• AIM-9M. Early variant.
• AIM-9M-9. Expanded anti-countermeasure capability variant.
• AIM-9X. Newest, highly maneuverable, JHMCS compatible variant.
Function: Air-to-air missile.
First Flight: September 1953.
Delivered: 1957-present. AIM-9M deliveries began 1983; AIM-9X May 2002.
IOC: circa 1983 (9M); 2003 (9X).
Contractor: Raytheon, Loral.
Propulsion: Thiokol Hercules and Bermite Mk 36 Mod 11 solid-propellant rocket motor.
Guidance: solid-state IR homing guidance.
Warhead: annular blast fragmentation.
Dimensions: span 2.1 ft, length 9.4 ft, diameter 5 in.
Performance: speed Mach 2+, range 10+ miles.

AIM-120 AMRAAM
Brief: Supersonic, medium-range, active radar guided air-to-air missile with HE warhead.
COMMENTARY
AMRAAM is a joint USAF-Navy follow-on to the AIM-7 Sparrow with launch-and-maneuver capability. The AIM-120B is an upgraded, reprogrammable variant of the original missile. The AIM-120C incorporated smaller control surfaces for internal carriage on F-22 and F-35 and a high-angle off-boresight (HOBS) launch capability. AIM-120D is in operational testing, which resumed in 2013, following resolution of earlier software and hardware problems. It will add a future electronic protection suite, two-way data link, improved HOBS, GPS-aided navigation, and increased range.
Extant Variant(s)
• AIM-120B. Upgraded, reprogrammable variant of AIM-120A.
• AIM-120C. Production variant optimized for the F-22/F-35.
• AIM-120D. Developmental variant.
Function: Air-to-air guided missile.
First Flight: December 1984.
Delivered: from 1988.
IOC: September 1991.
Contractor: Raytheon.
Propulsion: Alliant boost-sustain solid-propellant rocket motor.
Guidance: active radar terminal/inertial midcourse.
Warhead: blast fragmentation.
Dimensions: span 1.7 ft, length 12 ft, diameter 7 in.
Performance: speed supersonic, range 20+ miles.

AIR-TO-GROUND WEAPONS

AGM-65 Maverick
Brief: A tactical, TV-, IIR-, or laser-guided standoff air-to-surface missile designed for CAS, interdiction, and defense suppression missions.
COMMENTARY
Maverick was first employed during the Vietnam War and was used extensively in Desert Storm and Iraqi Freedom. It is integrated on the A-10 and F-16 for use against tanks and columns of vehicles and in the SEAD role. AGM-65B is a launch-and-leave, EO TV guided missile, equipped with a "scene magnification" TV seeker allowing pilot to identify and lock on to smaller or distant targets. The AGM-65D employs an IIR seeker to overcome daylight-only, adverse weather limits of B variant and became operational in 1986 on the A-10. The AGM-65E is a laser guided version with a heavyweight penetrator warhead. The AGM-65G uses an IIR seeker with software mods to track larger targets. It employs a heavyweight penetrator warhead, digital autopilot, and a pneumatic actuation system. It was fielded in 1989. The AGM-65H is an upgraded B variant with increased capability that recently completed a tracker upgrade. The AGM-65K is a modified G variant, replacing IR guidance system with EO TV guided seeker. It is also undergoing a tracker upgrade. The AGM-65L is the newest laser Maverick, designed to strike high-speed moving targets, using an EO TV seeker with new semi-active laser (SAL) components.
Extant Variant(s)
• AGM-65B. A launch-and-leave EO TV seeker variant.
• AGM-65D. Adverse weather B variant.
• AGM-65E. Laser guided version heavyweight penetrator variant.
• AGM-65G. IIR seeker heavyweight penetrator variant.
• AGM-65H. Upgraded B variant.
• AGM-65K. Modified EO TV seeker G variant.
• AGM-65L. Laser guided EO TV seeker variant for fast moving targets.
Function: Air-to-surface guided missile.
First Flight: August 1969.
Delivered: from August 1972.

***AGM-65** Maverick* (Capt. Amber House)

IOC: February 1973.
Contractor: Raytheon.
Propulsion: Thiokol TX-481 solid-propellant rocket motor.
Guidance: EO TV guidance system (B/H/K); IIR seeker (D/G); laser seeker (E).
Warhead: 125-lb cone-shaped (B/D/H); 300-lb delayed-fuse penetrator (E/G/K).
Dimensions: span 2.3 ft, length 8.2 ft, diameter 12 in.
Performance: classified.

AGM-88 HARM
Brief: Tactical air-to-surface missile designed to home in on enemy radar emissions to destroy radar-equipped air defense sites.
COMMENTARY
HARM is a joint USAF-Navy weapon. It attains great velocity and is able to cover wide range of frequencies with use of programmable digital processors in carrier aircraft's avionics and missile. It is highly effective against enemy ground radar and is carried by USAF F-16CJ Block 50/52s dedicated to SEAD mission. AGM-88B is equipped with erasable and electronically programmable read-only memory, permitting in-field changes to missile memory. The AGM-88C is the current production model with a more lethal warhead. Raytheon began HARM Control Section Mod (HCSM) in 2013, to convert current models to more precise AGM-88Fs that limit collateral damage.
Extant Variant(s)
• AGM-88B. Early production variant.
• AGM-88C. Current production variant.
• AGM-88F. Upgraded variant with greater accuracy and precision.
Function: Air-to-surface anti-radiation missile.
First Flight: April 1979.
Delivered: 1982-98.
IOC: circa 1984.
Contractor: Raytheon.
Propulsion: Thiokol dual-thrust, solid-propellant rocket motor.
Guidance: proportional with fixed antenna and seeker head in missile nose.
Warhead: HE fragmentation.
Dimensions: span 3.7 ft, length 13.7 ft, diameter 10 in.
Performance: speed supersonic, range 30+ miles.

AGM-114 Hellfire
Brief: Laser guided air-to-ground missile capable of low-collateral anti-armor and anti-personnel attack.
COMMENTARY
Hellfire is a precision, low-collateral air-to-ground missile utilizing semi-active laser guidance. Missiles are used on the MQ-1 Predator and MQ-9 Reaper, and AFSOC has looked at integrating the weapons onto its AC-130W gunships. Hellfire is procured through the Army, and numerous variants are utilized based on overseas contingency demands. An MQ-1 Predator successfully fired an AGM-114 for the first time in February 2000. It was employed in combat for the first time in Afghanistan on Oct. 7, 2001.
Extant Variant(s)
• AGM-114. Numerous subvariants, depending on target and mission requirements.
Function: Air-to-surface guided missile.
First Flight: USAF Feb. 16, 2000.
Delivered: September 2001.
IOC: n/a.
Contractor: Boeing, Lockheed Martin.
Propulsion: solid-propellant rocket motor.
Guidance: EO TV guidance system (B/H/K); IIR seeker (D/G); laser seeker (E).
Warhead: shaped charge and blast fragmentation.
Dimensions: span 28 in, length 5.33 ft, diameter 17 in.
Performance: subsonic.

AGM-176 Griffin
Brief: GPS and inertial guided air-to-ground missile with semi-active laser seeker for highly accurate, low-collateral attack.
COMMENTARY
Griffin is a light, low cost, multiservice air-launched weapon with GPS-aided

inertial guidance and semi-active laser seeker. The AGM-176A forms part of the PSP employed on AFSOC's AC-130W Dragon Spear and planned for the AC-130J Ghostrider. The AGB-176B is employable on RPAs.
Extant Variant(s)
• AGM-176A. Aft-ejecting missile employed as part of the PSP.
• AGM-176B. Forward-firing variant optimized for light aircraft/RPAs.
Function: Air-to-surface guided missile.
First Flight: USAF Feb. 16, 2000.
Delivered: September 2001.
IOC: n/a.

CBU-87/89/104 (SMSgt. John S. Chapman)

CBU-87/103 Combined Effects Munition
Brief: Area munition effective against light armor, materiel, and personnel, utilized for interdiction.
COMMENTARY
CEM is a cluster-bomb family of weapons that can be delivered as a low-accuracy free-fall weapon or with near precision, given installation of a simple tail kit. It is employed by both USAF and Navy fighters and bombers. CBU-87 is an unguided gravity weapon that dispenses BLU-97 shaped-charge anti-personnel/anti-materiel fragmentary/incendiary bomblets over the target in rectangular pattern. CBU-103 incorporates a Wind-Corrected Munitions Dispenser (WCMD) tail kit to increase accuracy when released from medium to high altitude.
Extant Variant(s)
• CBU-87. Anti-personnel/anti-materiel cluster bomb.
• CBU-103. Variant with WCMD tail kit.
Function: Area munition.
Contractor: Aerojet General, Honeywell, Alliant Tech.
Guidance: none (CBU-87).
Dimensions: length 7.7 ft, diameter 15 in.
Performance: dispenses 202 BLU-97 combined effects bomblets over an area roughly 800 ft x 400 ft.

CBU-89/104 Gator
Brief: Anti-armor/anti-personnel mine dispenser deployed for interdiction.
COMMENTARY
The Gator weapons system provides low-cost means to rapidly seed a battlefield with mines delivered from high speed by USAF and Navy fighters and bombers. It is able to destroy armor. The CBU-89 gravity weapon dispenses 72 anti-tank and 22 anti-personnel mines over target in a circular pattern. Anti-tank mines can be time-fuzed for three different delays. Magnetic fuzing is also incorporated. The CBU-104 adds a WCMD tail kit for increased accuracy when released from medium to high altitude.
Extant Variant(s)
• CBU-89. Anti-armor/anti-personnel mine dispensing weapon.
• CBU-104. Variant with WCMD tail kit.
Function: Scatterable mines.
Contractor: Honeywell, Aerojet General, Olan, Alliant Tech.
Guidance: none (CBU-89).
Dimensions: length 7.7 ft, diameter 15 in.
Performance: dispenses 72 BLU-91 anti-armor and 22 BLU-92 anti-personnel mines.

CBU-105 Sensor Fuzed Weapon
Brief: Anti-armor munition capable of destroying multiple moving and stationary land combat vehicles per pass.
COMMENTARY
Sensor Fuzed Weapon (SFW) is a tactical munitions dispenser with a payload of 10 BLU-108 submunitions, each containing four skeet projectiles, totaling 40 lethal, target-seeking projectiles. The skeet's active laser and passive IR sensors can detect a vehicle's shape and IR signature; if no target is detected, the warhead detonates at preset time. Primary targets are massed tanks, armored personnel carriers, and self-propelled targets. CBU-105 is a basic gravity-type 1,000-lb SFW with a WCMD tail kit. It can be delivered from high altitude and in adverse weather. It debuted in combat in Iraq in 2003.
Extant Variant(s)
• CBU-105. CBU-97 with WCMD tail kit.
Function: Wide-area munition.
First Flight: circa 1990.
IOC: 1997.
Contractor: Textron Systems.
Guidance: IR sensors in each warhead search for targets, then detonate over them.
Dimensions: length 7.7 ft, diameter 15 in.
Performance: delivers 40 lethal projectiles over an area of about 500 ft x 1,200 ft.

CBU-107 Passive Attack Weapon
Brief: Area munition used to inflict minimal collateral and environmental damage attacking nonhardened surface targets.
COMMENTARY
Passive Attack Weapon glides toward its target after release. Before impact, its inner chamber begins to rotate, and the projectiles are ejected in rapid succession by centrifugal force, penetrating targets within a 200-ft radius. The weapon contains various-size, penetrating projectiles but no explosive. Full production was completed in six months. The weapon was used during Iraqi Freedom.
Extant Variant(s)
• CBU-107A. Centrifugally dispersed, armor-penetrating weapon.
Function: Wide-area munition.
First Flight: 2002.
IOC: December 2002.
Contractor: General Dynamics, kinetic energy penetrator payload and canister; Lockheed Martin, WCMD; Textron, tactical munition dispenser kit.
Guidance: via WCMD.
Dimensions: length 7.7 ft, diameter 15 in.
Performance: delivers a high-speed volley of nearly 4,000 metal projectiles in three sizes from a single canister; projectiles: 15 in rods (350), 7 in rods (1,000), and small-nail size (2,400).

GBU-10/12/49 Paveway II
Brief: Laser guided free-fall bomb used for targets at short standoff range.
COMMENTARY
The Paveway II kit is a folding wing version of the earlier, fixed wing Paveway I, with seeker and reliability improvements. GBU-10 is the Paveway II seeker and tail kit mounted on a 2,000-lb general-purpose bomb and primarily used against nonhardened targets. It is, however, capable of penetration. The GBU-12 uses a 500-lb bomb body and is primarily used against stationary armored targets. GBU-49 is also a 500-lb body, but adds GPS guidance for all-weather precision delivery. The weapons can be employed from under 2,500 ft and from up to 40,000 ft.
Extant Variant(s)
• GBU-10. Laser/GPS guided 2,000-lb bomb.
• GBU-12. Laser guided 500-lb bomb.
• GBU-49. Laser/GPS guided 500-lb bomb.
Function: Air-to-surface guided munition.
First Flight: early 1970s.
IOC: 1976.
Contractor: Lockheed Martin, Raytheon.
Guidance: semi-active laser.
Warhead: Mk 84 bomb 2,000 lb (GBU-10); Mk 82 500-lb blast/fragmentation bomb (GBU-12/49).
Dimensions: span 5.5 ft, length approx 14.8 ft, diameter 18 in (GBU-10); span 4.4 ft, length 10.8 ft, diameter 11-18 in (GBU-12/49).
Performance: CEP 29.7 ft, range 9.2 miles (GBU-10); CEP 29.7 ft, range about six miles (GBU-12/49).

GBU-10 Paveway II (via USAF)

GBU-24/28 Paveway III
Brief: Advanced laser guided free-fall bomb used against high-value targets from medium standoff range and any altitude.
COMMENTARY
Paveway III is the third generation laser guided seeker/tail kit package. Its advanced guidance enables greater precision over Paveway II, and its high-lift

airframe enables longer glide slopes for greater standoff employment. It can be dropped from low, medium, or high altitude and is effective against a broad range of high-value targets. GBU-24 is fitted to a 2,000-lb bomb body, with a BLU-109 penetrating warhead. GBU-28 variants are large 5,000-lb class air-to-ground penetrating warhead developed for use against Iraq's deeply buried, hardened C2 facilities, used for the first time in 1991 during Desert Storm. The GBU-28B adds GPS/INS guidance to the existing laser seeker for all-weather targeting and entered production in 1999. The GBU-28C adds a more powerful penetrating BLU-122 warhead in addition to the enhanced guidance package and entered production in 2005.

Extant Variant(s)

• GBU-24. Laser guided 2,000-lb penetrating bomb.
• GBU-28B/B. Laser/GPS/INS guided 5,000-lb penetrating bomb.
• GBU-28C/B. Laser/GPS/INS guided 5,000-lb improved penetrating bomb.

Function: Air-to-surface penetrating glide bomb.
First Flight: GBU-24 in service May 1985.
IOC: 1986 (GBU-24); 1991 (GBU-28).
Contractor: Raytheon.
Guidance: semi-active laser.
Warhead: BLU-109 2,000-lb bomb (GBU-24); BLU-113 or BLU-122 5,000-lb bombs (GBU-28).
Dimensions: span 6.7 ft, length 14.4 ft, diameter 18 in (GBU-24); length approx 20 ft, diameter 15 in (GBU-28).
Performance: range more than 11 miles (GBU-24); range more than 5.75 miles (GBU-28).

GBU-31/32/38 Joint Direct Attack Munition (JDAM)
Brief: GPS/INS guided family of weapons designed for highly accurate, autonomous, all-weather conventional attack.
COMMENTARY
JDAM is a joint USAF-Navy program that 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. The weapons acquire targeting information from the aircraft's avionics system. After release, an inertial guidance kit directs the weapon, aided by periodic GPS updates. FY15 budget would continue production at low rate. GBU-31 debuted in 1999. JDAM seeker/tail kits can be mounted on general-purpose (GP) or penetrating warheads in each weight class.

Extant Variant(s)

• GBU-31. GPS/INS guided 2,000-lb GP, or BLU-109 penetrating weapon.
• GBU-32. GPS/INS guided 1,000-lb GP, or BLU-110 penetrating weapon.
• GBU-38. GPS/INS guided 500-lb GP or BLU-111 penetrating weapon.

Function: Air-to-surface guided bomb.
First Flight: Oct. 22, 1996.
IOC: 1998.
Contractor: Boeing, Textron, Honeywell.
Guidance: GPS/INS.
Warhead: 2,000-lb Mk 84/BLU-109 (GBU-31), 1,000-lb Mk 83/BLU-110 (GBU-32), 500-lb Mk 82/BLU-111 (GBU-38).
Dimensions: span 25 in (GBU-31), 19.6 in (GBU-32), 14 in (GBU-38); length (with JDAM and warhead) approx 12 ft (GBU-31), 10 ft (GBU-32), 7.8 ft (GBU-38).
Performance: range up to 15 miles, CEP with GPS 16.4 ft, CEP with INS only 98 ft.

GBU-39 Small Diameter Bomb I/II
Brief: Limited-yield, standoff precision guided munition.
COMMENTARY
SDB is a low-yield, all-weather, precision guided munition designed to limit collateral damage and strike targets from up to 46 miles away. Its size allows it to be carried in fighters' and bombers' internal weapons bays or to increase overall loadout to enable more independent strikes per sortie. SDB I employs an advanced anti-jam GPS/INS, and acquires target coordinates before release. Several SDBs can be simultaneously released against multiple targets. The weapon was first employed in combat by an F-15E over Iraq in 2006. SDB II is a joint USAF-Navy developmental program designed to provide the capability to attack moving targets as well, from standoff range, in all weather. SDB II adds a millimeter-wave radar, uncooled IIR, and semi-active laser packaged into a tri-mode seeker to track moving targets. The bomb is retargetable after release. Improvements include reduced susceptibility to countermeasures and network-enabled capability through Link 16 and UHF data links. Raytheon won a competition for SDB II in 2010, and the weapon completed testing required to enter LRIP in 2014.

Extant Variant(s)

• GBU-39B SDB I. GPS/INS guided 250-lb low-yield bomb.
• GBU-53/B SDB II. Tri-mode guided 250-lb low-yield bomb.

First Flight: May 23, 2003 (guided SDB I); 2012 (SDB II).
IOC: Oct. 2, 2006.
Production: 24,000 (planned) (SDB I); 12,000 (planned) (SDB II).
Contractor: Boeing.
Guidance: GPS/INS (SDB I); Tri-mode seeker millimeter-wave radar, uncooled IIR, and digital semi-active laser (SDB II).
Warhead: 250-lb class penetrating blast fragmentation munition.
Dimensions: bomb: length 6 ft, width 7.5 in; BRU-61/A carriage (four bombs) length 12 ft, width 16 in, height 16 in.
Performance: near-precision capability at standoff range up to 46 miles.

GBU-43 Massive Ordnance Air Blast (MOAB) Bomb
Brief: Massive weapon designed to destroy large area or buried targets.
COMMENTARY
MOAB is the largest satellite guided, air-delivered weapon ever employed. The conventional HE bomb is GPS guided, with fins and inertial gyro for pitch and roll. It was developed in only nine weeks to be available for the 2003 Iraq campaign and given name Massive Ordnance Air Blast (MOAB) but unofficially known as "Mother of All Bombs." The weapon is designed for deployment from the ramp of a C-130 without a parachute. It provides power to attack large area targets or enemy hidden in tunnels or caves. A total of 18,700 lb of the weapon's 21,000-lb weight is attributed to BLU-120/B warhead.

Extant Variant(s)

• GBU-43/B. GPS guided 18,000-lb bomb.

Function: Massive guided bomb.
Guidance: GPS/INS.
Warhead: BLU-120/B 18,000-lb HE.
Dimensions: length 30 ft, diameter 3.3 ft.

GBU-54 Laser JDAM
Brief: GPS/INS guided weapon equipped with additional laser seeker and designed for highly accurate, autonomous, all-weather conventional attack against fixed and moving targets.
COMMENTARY
LJDAM is a joint USAF-Navy development that combines a laser guidance kit with the GPS/INS-based navigation of existing GBU-38 JDAM. The current LJDAM is a dual mode 500-lb guided weapon capable of attacking moving targets with precision. It was developed as an urgent operational need, and testing was completed in less than 17 months. It was first delivered in May 2008 and deployed in combat in Iraq three months later. FY15 budget would continue production at low rate. Boeing is also developing GBU-31 and GBU-32 variants.

Extant Variant(s)

• GBU-54 Laser JDAM. Laser/GPS/INS guided 500-lb bomb.

Function: Air-to-surface guided bomb.
First Flight: 2005.
IOC: 2008.
Contractor: Boeing.
Guidance: GPS/INS with laser.
Warhead: Mk 82 500-lb munition.
Dimensions: length (with JDAM and warhead) approx 8 ft.
Performance: range up to 15 miles.

GBU-57 Massive Ordnance Penetrator
Brief: Massive GPS guided, earth-penetrating weapon used against hard and deeply buried targets.
COMMENTARY
MOP was developed and tested through a USAF and Defense Threat Reduction Agency partnership in 2004. Flight testing was conducted from 2008 to 2010, when the program transitioned to USAF. Boeing received contract in 2009 for B-2A bomber integration, which was completed in June 2011. A B-2 successfully test-dropped the GBU-57 at White Sands Missile Range, N.M., in 2014.

Extant Variant(s)

• GBU-57B. GPS guided 5,300-lb penetrating weapon.

Function: Massive PGM.
Guidance: GPS.
Warhead: 5,300-lb HE.
Dimensions: length 20.5 ft, diameter 31.5 in.

SATELLITE SYSTEMS

Advanced Extremely High Frequency (AEHF) Satellite System
Brief: Satcom constellation providing global, secure, protected, and jam-resistant military communication.
COMMENTARY
AEHF is replacing existing Milstar satellites and operates at much higher capacity and data rate. It offers secure, anti-jam tactical and strategic communications around the world. AEHF uses cross-linked satellites, eliminating

AEHF Satellite (USAF illustration)

the need for ground relay stations. The program is a collaboration with Canada, the Netherlands, and the United Kingdom. An anomaly with the propulsion system of the first satellite, SV-1, delayed its arrival in operational orbit until October 2011. It completed on-orbit testing February 2012, ahead of the launch of the second vehicle, SV-2, in May 2012. SV-3 was launched in September 2013, reached its assigned orbit in January 2014, and completed on-orbit testing in June 2014. SV-4 is scheduled to launch in 2017, paving the way for the constellation's full operational capability.

Extant Systems

• AEHF SV-1. Launched in 2010, on orbit and operational.
• AEHF SV-2. Launched in 2012, on orbit and operational.
• AEHF SV-3. Launched in 2013, on orbit and operational.
• AEHF SV-4. Planned for launch in 2017.

Function: Communications.
Operator: AFSPC.
First Launch: August 2010.
IOC: 2017 (planned).
Constellation: four.
Design Life: 14 years.
Launch Vehicle: Atlas V.
Operational Location: Schriever AFB, Colo.
Orbit Altitude: Geosynchronous at 22,000+ miles.
Contractor: Lockheed Martin, Northrop Grumman.
Power: solar arrays generating 20,000 watts.
Dimensions: length 31 ft, width 98 ft (with full solar array extension).
Weight: 13,400 lb.
Performance: 24-hr low, medium, and extended data rate connectivity from 65 north to 65 south latitude worldwide.

Defense Meteorological Satellite Program (DMSP)

Brief: Satellite constellation used to collect air, land, sea, and space environmental data in support of worldwide military operations.

COMMENTARY

DMSP provides timely and high-quality weather information to strategic and tactical combat units worldwide. It uses operational linescan sensor to image cloud cover in visible and thermal IR and analyze cloud patterns. It is equipped with microwave imagers and sounders and a suite of space environment sensors that provide critical land, sea, and space environment data. Block 5D-3 improved spacecraft bus and sensors for longer and more capable missions. Six operational DMSP satellites now survey the entire Earth four times a day. The last was launched in 2014. One spacecraft (DMSP-20) remains to be launched after DMSP-19 was successfully launched into orbit on April 3, 2014. USAF is considering requirements for a follow-on system.

Extant Variant(s)

• Block 5D-3. Improved spacecraft bus and sensors for longer, more capable missions.

Function: Space and Earth environmental data collection.
Operator: National Oceanic and Atmospheric Administration (NOAA).
First Launch: May 23, 1962.
IOC: 1965.
Constellation: two low Earth orbit (LEO).
Design Life: 48 months.
Launch Vehicle: Delta IV; Atlas V.
Operational Location: NOAA Satellite Operations Facility, Suitland, Md.
Orbit Altitude: approx 527 miles.
Contractor: Lockheed Martin, Northrop Grumman.
Power: solar arrays generating 1,200-1,300 watts.
Dimensions: length 25 ft (with array deployed), width 4 ft.
Weight: 2,545 lb, incl 772-lb sensor; 2,270 lb with 592-lb sensor payload.
Performance: polar orbits, cover Earth in about 6 hr, primary sensor scans 1,800-mile-wide area.

Defense Satellite Communications System (DSCS)

Brief: Joint service satellite system providing high-capacity communications for deployed air, land, and sea forces.

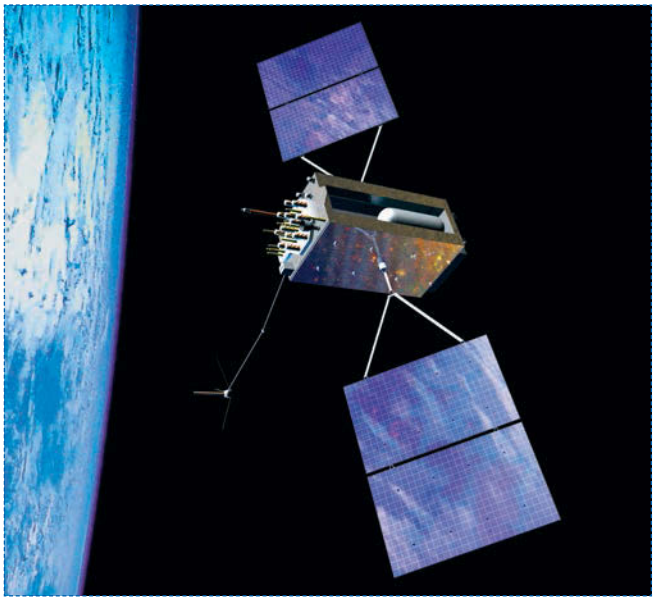
COMMENTARY

DSCS is the workhorse of US military's SHF communications system. It provides military communications to troops in the field and commanders worldwide. The last of 14 DSCS IIIs launched in 2003. AFSPC deactivated the oldest DSCS satellite (B-12) after 22 years on orbit, on July 30, 2014. B-12 exceeded its designed lifespan by 12 years. The final four DSCS satellites received SLEP before launch, providing higher power amplifiers, more sensitive receivers, and increased antenna connection options. The satellites also carry a single channel transponder to disseminate emergency action and force direction messages to nuclear-capable forces.

Extant Variant(s)

• DSCS III. Current base on orbit variant.
• DSCS III. SLEP. Upgrade configuration of last four satellites launched.

Function: Communications.
Operator: AFSPC.
First Launch: DSCS II 1971; DSCS III 1982; DSCS III/SLEP 2000.
IOC: Dec. 13, 1978 (DSCS II).
Constellation: five (III); 14 deployed/seven currently operational.
Design Life: 10 yr (III).
Launch Vehicle: Atlas II and EELV.
Operational Location: Schriever AFB, Colo.
Orbit Altitude: 22,000+ miles in geosynchronous orbit.
Contractor: Lockheed Martin.



GPS III (Lockheed Martin illustration)

Power: solar arrays generating 1,269 watts, decreasing to 980 watts after 10 yr; 1,500 watts (SLEP).
Dimensions: rectangular body 6 x 6 x 7 ft, 38-ft span with solar arrays deployed.
Weight: 2,580 lb; 2,716 lb (SLEP).
Performance: employ six independent SHF transponder channels for secure voice and high-rate data communications.

Defense Support Program (DSP)

Brief: Ballistic missile early warning spacecraft in geosynchronous orbit, guarding US forces and the US homeland against attack.

COMMENTARY

DSP is a key part of North American and theater early warning systems. It is capable of detecting missile launches and nuclear detonations and was originally aimed at the Soviet military. It was used extensively in 1991 Gulf War to detect Iraqi theater missile launches against coalition forces and allies in the region. The 23rd and final DSP satellite launched in December 2007. Block 5 is the latest variant and is more survivable than predecessors. It includes a medium wavelength IR sensor for more mission utility and accommodates 6,000 detectors. Nine Block 5 satellites were deployed between 1989 and 2007.

Extant Variant(s)

• Block 5. Most current on-orbit version.

Function: Strategic and tactical launch detection.
Operator: AFSPC.
First Launch: November 1970.
IOC: circa 1972.
Constellation: classified.
Design Life: three-yr requirement and five-yr goal.
Launch Vehicle: Titan IV with inertial upper stage; Delta IV Heavy EELV.
Operational Location: Buckley AFB, Colo.; Schriever AFB, Colo.
Orbit Altitude: geosynchronous at 22,000+ miles.
Contractor: TRW (now Northrop Grumman), Aerojet.
Power: solar arrays generating 1,485 watts.
Dimensions: diameter 22 ft, height 32.8 ft, with solar paddles deployed.
Weight: approx 5,200 lb.
Performance: uses IR sensors to sense heat from missile and booster plumes against Earth's background.

Global Positioning System (GPS)

Brief: Space-based radio-positioning constellation providing highly accurate worldwide location, velocity, and timing services to military and civilian users.

COMMENTARY

GPS is a fundamental contribution to precision bombing, CSAR, mapping, and rendezvous. Provides accurate 3-D (latitude, longitude, and altitude) position, velocity, and time data in an uninterrupted way. GPS Block IIA first launched in 1990. The current constellation includes three IIAs, launched to replace original GPS Block I series. GPS Block IIR and IIR-M (modernized) included 21 vehicles launched between 2005 and 2009. Modernization upgrades included two new signals, enhanced encryption, anti-jamming capabilities, and a second civil signal. GPS Block IIF is a follow-on to IIR-M. Upgrades include extended design life, faster processors, and improved anti-jam and accuracy, with a new military signal and a second and third dedicated civil signal. Eight satellites were launched between 2010 and 2014. The most recent was launched on Oct. 29, 2014. Four are still in storage or awaiting completion. GPS Block IIIA is the future generation expected to provide improved accuracy, availability, integrity, and resistance to jamming. It is in production. Lockheed Martin and Raytheon completed the first launch readiness exercise in September 2013. First launch was pushed back from 2014 to a tentative 2017 target.

Extant Variant(s)
• GPS Block IIA. Launched 1990 to 1997; three active.
• GPS Block IIR. Launched 1997 to 2004; 12 active.
• GPS Block IIR-M. Launched in 2005 to 2009; seven active.
• GPS Block IIF. Launched in 2010 to present; eight active, four stored.
• GPS Block IIIA. Future generation expected to launch in 2017.
Function: Worldwide navigation, timing, and velocity data.
Operator: AFSPC.
First Launch: Feb. 22, 1978.
IOC: Dec. 9, 1993.
Constellation: 31 spacecraft.
Design Life: 7.5 yr (II/IIA); 7.5 yr (IIR/IIR-M); 12 yr (IIF); 15 yr (IIIA).
Launch Vehicle: Delta II, Delta IV.
Operational Location: Schriever AFB, Colo.
Orbit Altitude: 10,988 miles.
Contractor: Boeing (II, IIA, IIF), Lockheed Martin (IIR, IIR-M, IIIA).
Power: solar panels generating 700 watts (II/IIA); 1,136 watts (IIR/IIR-M); up to 2,900 watts (IIF).
Dimensions: (IIR/IIR-M) 5 x 6.3 x 6.25 ft, span incl solar panels 38 ft; (IIF) 9.6 x 6.5 x 12.9 ft, span incl solar panels 43.1 ft.
Weight: on orbit, 2,370 lb (IIR/IIR-M); 3,439 lb (IIF).
Performance: orbits the Earth every 12 hr, emitting continuous signals, providing time to within one-millionth of a second, velocity within a fraction of a mile per hour, and location to within a few feet.

Milstar Satellite Communications System (Milstar)
Brief: Joint service satcom constellation that provides global, secure, protected, and jam-resistant military communications.
COMMENTARY
Milstar is the backbone of strategic-tactical DOD communications. It provides secure, anti-jam communications around the world and uses cross-linked satellites, eliminating the need for ground relay stations. Offers 24-hours-a-day capability. The last of six satellites launched in 2003. AEHF will eventually replace Milstar as the DOD's primary satcom.
Extant Variant(s)
• Block I. Two Milstar I satellites launched 1994-95 and still active.
• Block II. Four Milstar II satellites launched in period 1999-2003. First one was placed in nonusable orbit; three still active.
Function: Communications.
Operator: AFSPC.
First Launch: Feb. 7, 1994.
IOC: July 1997 (Milstar I).
Constellation: five.
Design Life: 10 yr.
Launch Vehicle: Titan IV/Centaur.
Operational Location: Schriever AFB, Colo.
Orbit Altitude: geosynchronous at 22,000+ miles.
Contractor: Lockheed Martin, Boeing, TRW (now Northrop Grumman).
Power: solar arrays generating 8,000 watts.
Dimensions: length 51 ft, width 116 ft with full solar array extension.
Weight: 10,000 lb.
Performance: Milstar I sats have low data rate (LDR) payload, transmitting 75 to 2,500 bps of data over 192 channels in EHF range; Milstar II sats have both LDR and medium data rate (MDR) payloads, transmitting 4,800 bps to 1.5 Mbps over 32 channels.

Space Based Infrared System (SBIRS)
Brief: Advanced space surveillance and missile warning system, capable of battlespace characterization and technical intelligence gathering.
COMMENTARY
SBIRS is the follow-on to the Defense Support Program satellite. The system includes IR sensor payloads on host satellites in highly elliptical orbit (HEO), two IR sensors each on dedicated satellites in geosynchronous Earth orbit (GEO), and ground assets. HEO sensor detects launch of submarine-launched ballistic missiles (SLBMs) from the North Pole region and can be tasked for other IR detection missions. GEO scanning IR sensor performs strategic missile warning mission, global technical intelligence, and initial phase for the strategic missile defense mission, providing two times the revisit rate and three times the sensitivity of DSP. HEO-1 and HEO-2 went operational in 2008 and 2009, respectively. HEO-3 was delivered to the host for incorporation in 2013, and HEO-4 is expected to be delivered in May 2015. USAF launched the GEO-1 satellite in 2011, and officials say the quality of its data is exceeding performance expectations. GEO-2 launched in March 2013 and was accepted for operations. Delivery of GEO-3 is slated for September 2015, with GEO-4 following in September 2016.
Extant Systems
• SBIRS HEO-1. Payload operational in 2008; currently active.
• SBIRS HEO-2. Payload operational in 2009; currently active.
• SBIRS GEO-1. Launched in 2011; currently active.
• SBIRS GEO-2. Launched in 2013; currently active.
Function: space surveillance.
Operator: AFSPC.
First Launch: GEO 1, May 2011.
IOC: HEO 1, Dec. 5, 2008. (Increment 1, Dec. 8, 2001)
Constellation: four GEO sats, two HEO sensors (hosted).
Design Life: n/a.
Launch Vehicle: GEO, Atlas V.
Operational Location: Buckley AFB, Colo.; Schriever AFB, Colo.
Orbit Altitude: geosynchronous and high elliptical.
Contractor: Lockheed Martin, Northrop Grumman.
Power: solar array, 2,435 watts (GEO).
Dimensions: GEO 7 x 6.3 x 19.7 ft.
Weight: 5,603 lb (GEO on orbit).

SBIRS (Erik Simonsen illustration)

Space Based Surveillance System (SBSS)
Brief: Satellite constellation used to track, characterize, and measure orbital vehicles and hazardous orbital debris.
COMMENTARY
SBSS is designed to track and collect optical signatures of Earth-orbiting objects, including space debris, from a space-based platform. The first operational satellite (SBSS Block 10) was launched in September 2010. In March 2011, USAF announced satellite control authority had transferred to 1st Space Operations Squadron at Schriever AFB, Colo., culminating the on-orbit initialization, checkout, calibration, and system characterization process. AFSPC is working to extend SBSS service life to cover a potential four-year gap in coverage before it can launch a follow-on spacecraft in 2021—the earliest date based on projected funding.
Extant Systems
• SBSS Block 10. Launched in 2010; currently active.
Function: Space surveillance and object identification.
Operator: AFSPC.
First Launch: Sept. 25, 2010.
IOC: Aug. 17, 2012.
Constellation: one LEO satellite.
Design Life: seven years.
Launch Vehicle: Minotaur IV.
Operational Location: Schriever AFB, Colo.
Orbit Altitude: 390 miles, sun-synchronous orbit.
Contractor: Boeing (system integration, ground segment, operations and sustainment); Ball Aerospace (satellite).
Power: solar arrays and batteries generating 750 watts.
Dimensions: height approx 10 ft; 10 x 3.2 ft, plus solar panels.
Weight: approx 2,273 lb.

Wideband Global SATCOM (WGS) Satellite
Brief: Satellites providing high-capacity communications for deployed air, land, and sea forces.
COMMENTARY
WGS is designed to provide worldwide communications coverage for tactical and fixed users and to augment and then replace DSCS X-band frequency service. Also augments the one-way Global Broadcast Service Joint Program Ka-band frequency capabilities. WGS satellites also provide a new high-capacity two-way Ka-band frequency service. Block I includes: SV-1 (Pacific region), SV-2 (Middle East), and SV-3 (Europe and Africa). Block II satellites are modified to better support the airborne ISR mission and include: SV-4 (Indian Ocean) and SV-5 and SV-6, purchased by Australia in 2013. The US is partnering with Canada, Denmark, Luxembourg, the Netherlands, and New Zealand on Block II follow-on sats, SV-7 to SV-10. They are expected to launch over FY15 to FY18 and be operational by 2019.
Extant Variant(s)
• Block I. Satellites SV-1 to SV-3; launched 2007 to 2009; currently active.
• Block II. Satellites SV-4 to SV-6; launched 2009 to 2013; currently active.
Function: Communications.
Operator: AFSPC.
First Launch: October 2007.
IOC: April 16, 2008.
Constellation: six satellites.
Design Life: 14 years.
Launch Vehicle: Atlas V, Delta IV.
Operational Location: Schriever AFB, Colo.
Orbit Altitude: geosynchronous at 22,000+ miles.
Contractor: Boeing.
Power: solar arrays generating 9,934 watts.
Dimensions: based on Boeing 702 Bus.
Weight: 13,000 lb at launch.
Performance: approx 10 times the capability of a DSCS satellite. ✪