Chapter 14 MILITARY AIRCRAFT

It was during World War II that aircraft became an important part of military strategy. The airplane dominated all aspects of warfare, from bombardment to invasion and even naval battles. Since World War II, this has become even more evident. The Korean War, the Vietnam conflict and Desert Storm have proven that control of the air is a prerequisite to winning on the ground.

The US military aircraft in this chapter were developed to deter a major nuclear war and to win a conventional war, if necessary. We will divide these aircraft into combat (bombers and fighters) and noncombat (reconnaissance and observation aircraft, transports, tankers and trainers). Combat aircraft are specifically designed for a combat role. Noncombat aircraft are designed for support roles. However, many noncombat aircraft become involved in combat action while performing their support roles.

Objectives

Describe the functions of the major categories of military aviation.
Identify at least two aircraft in each of the major categories of military aviation.
State what the letter designation of specific military aircraft means.

Combat Aircraft

The cost of modern-day combat aircraft has become so high that the trend is toward building a single aircraft that can perform several roles. For example, the *F*-14 was originally designed as a fighter, but has been modified as an attack and reconnaissance aircraft.

Many military people feel that if you try to design an aircraft to perform several different missions, it will not be able to do any of them well. They feel a fighter should be designed to function only as a fighter and an attack aircraft only for that role. On the other side are the people who have to get the most airplane they can for the money spent. They would like to have one aircraft that could perform every type of combat mission. The result is that a new combat aircraft is designed to perform one mission well and then changed to perform other tasks.

Bombers

Bombers are large, long-range aircraft with a mission to reach into the enemy's homeland and destroy the ability to wage war. The targets are the factories where the enemy's weapons are produced, military bases and population centers. They can also attack troops along a battlefront. A bomber

usually is able to carry either nuclear or conventional bombs. The United States has three bombers in its inventory— the Boeing *B*-52, the *B*-1 and the *B*-2.

***B*-52.** The *B*-52 bomber was designed by the Boeing Company in the late 1940s, and the prototype first flew in April 1952. It has gone through eight model changes, and the *B*-52*H* is currently in the inventory. A total of 744 *B*-52s were built with the newest being completed in October 1962. Currently, only the *B*-52*H* remains operational.

The *B*-52*H* is powered by eight turbofan engines that provide a speed of about 660 mph and a range of up to 10,000 miles. With aerial refueling, the *B*-52*H* can extend its range as much as necessary. The crew consists of a pilot, copilot, navigator, radar navigator and electronic countermeasure operator. It can carry nuclear or conventional bombs, and/or short-range attack missiles (SRAM) and air-launched cruise missiles (ALCM).

Boeing *B*-52 *(EAA)*

***B*-l.** In June 1977, President Jimmy Carter stopped production of the Rockwell *B*-1*A* supersonic bomber. In his decision, he called for a continuation of the *B*-1 research and development program. The Air Force wanted 244 of the *B*-l*A*s as replacements for the *B*-52s. Their argument was that the *B*-52s were old and that the *B*-1 aircraft could penetrate enemy defenses better than the *B*-52. Opponents said the *B*-ls were too expensive (about $250 million each) and they were not needed because missiles could do the job better.

Rockwell International *B*-l*B*

The *B*-1*B*, approved by President Ronald Reagan in October 1981, is about the size of a *Boeing* 707 airliner, weighs about 477,000 pounds and carries a crew of four. As originally designed, the *B*-l*A* was to have a maximum speed of Mach 2.1 (1,400 mph) at 50,000 feet and a range of 6,100 miles without refueling.

There is very little external difference between the original *B*-1*A* and the new *B*-1*B*. The major

changes are internal and include strengthening the structure to increase the gross (total) takeoff weight from 395,000 to 477,000 pounds. The *B*-1*B* can carry a variety of conventional weapons.

The *B*-1*B* is flown as a subsonic bomber at low altitudes, but can travel supersonically at high altitudes. It has a low-altitude penetration capability using terrain-following radar and is equipped with the latest in electronic countermeasure equipment. New technology has also been used to reduce the ability of enemy radars to track the *B*-1*B* or for enemy missiles to shoot it down. The first *B*-1*B* was delivered in December 1984, and final delivery of the 100 production models was made in early 1988.

***B*-2.** The United States developed a new Advanced Technology Bomber (ATB) which is designated the *B*-2 and often called the "stealth" bomber. This aircraft has very high priority by the Department of Defense and has been kept very secret. Northrop Aircraft, with Boeing, builds the *B*-2. The *B*-2 is using the latest technology to make it invisible to enemy radar and infrared detectors, hence the name "stealth." It was developed to eventually replace the aging *B*-52 and compliment the *B*-1. It can carry a variety of conventional and nuclear weapons. The aircraft has a crew of two pilots. They share the workload with one pilot responsible for flying, while the other is bombing. An extremely capable and advanced aircraft, it is equipped with the latest in electronics technology. It was developed in almost complete secrecy and many of its advanced capabilities remain classified.

Northrop *B*-2 *(Boeing Photo)*

Fighters

Fighter aircraft have much in common regardless of which country builds them. Their basic mission is to destroy other aircraft and this dictates their design. They must be fast and maneuverable. They also carry various types of weapons. Most modern fighters are equipped with air-to-air missiles for use in long-range combat, bombs, machine guns and cannons for close-range combat.

As the speed of fighters increased after World War II, it became impossible for the pilot to fly the aircraft, aim the guns and navigate without assistance. This led to more electronic aids to accomplish these tasks. Today's fighters are equipped with so much electronic equipment that a second crew member sometimes is required to operate it.

Adding all of these systems and the additional crewmember adds weight to the aircraft. In the United States, we also add weight in the form of armor to protect the crew and the vital parts of the

aircraft. Weight is important because it affects speed, range and maneuverability. Lighter aircraft are faster and more maneuverable than heavy ones.

US fighters have traditionally been heavier than the enemy's aircraft. They have also been safer and more rugged. To make up for the disadvantage of weight, US pilots have better training and technology. This training and technology paid off. In the Korean War, US pilots shot down 14 enemy aircraft for every one we lost. Israeli pilots flying US aircraft in the Yom Kippur War of 1973 shot down 55 Arab aircraft for every aircraft they lost.

Technology and training played a big role in keeping American aircraft superior to those of the enemy. However, as technology changes, the aircraft must change to make use of it. This led to the so-called "arms race" and explains why aircraft that are suitable today may not be suitable in the future.

***A*-l0.** Although not a true fighter in the classic sense, the *A*-10 is a twin-engine, single seat, close-support aircraft. The *A*-10 carries up to 16,000 pounds of external armament and a 30-mm multibarrel cannon internally. The engines are mounted high up in the fuselage to protect them from hostile fire. The *A*-10 is heavily armored to help it survive, and its large fuel load allows it to remain in the battle area for a long time (up to 2 hours).

The United States has over 275 *A*-10 aircraft in its inventory. It carries a large variety of weapons. It is used primarily in support of ground forces and can defend itself with air-to-air missiles. Although slow, it is highly maneuverable and able to operate at extremely low altitudes.

***F*-15 *Eagle*.** The *F*-15 *Eagle* is an all-weather, extremely maneuverable, tactical fighter designed to gain and maintain air superiority in aerial combat. The *Eagle's* air superiority is achieved through a mixture of unprecedented maneuverability, acceleration, range, weapons and avionics. It can penetrate enemy defenses and outperform and outfight any current or projected enemy aircraft. The *F*-15 has electronic systems and weaponry to detect, acquire, track and attack enemy aircraft while operating in friendly or enemy-controlled airspace. Its weapons and flight control systems are designed so one person can safely and effectively perform air-to-air combat.

F*-15*E *(Boeing Photo)*

The *F*-15's superior maneuverability and acceleration are achieved through high engine thrust-to-weight ratio and low-wing loading. Low-wing loading (the ratio of aircraft weight to its wing area) is a vital factor in maneuverability and, combined with the high thrust-to-weight ratio, enables the aircraft to turn tightly without losing airspeed.

The *F*-15 *Eagle* employs an advanced-technology engine (improved turbofan). It

has a speed of more than Mach 2 and a range of more than 2,000 miles. Its twin turbofan engines develop 50,000 pounds of thrust and the combat-loaded *Eagle* weighs about 40,000 pounds.

The *F*-15 was designed specifically as an all-weather, air-superiority fighter, but it also has the ability to attack ground targets. It is armed with one 20-mm multi-barrel gun and with advanced air-to-air missiles. The ground attack version also carries a wide variety of precision and nonprecision weapons.

This single-seat aircraft first flew in July 1972. Its electronic equipment includes a lightweight radar system for long-range detection and tracking of small high-speed objects, such as enemy missiles. This system also ensures effective delivery of the *F*-15's weapon payload. The McDonnell-Douglas Company builds it. The *F*-15*D* is a two-seat trainer version of the *F*-15*C*. The *F*-15*E* is a two-seat, ground-attack version.

***F*-16 Fighting Falcon.** The *F*-16 is a US Air Force lightweight fighter which entered service in 1978. The US Air Force purchased a total of 2,699 F-16s. More than 1,100 have been purchased by 16 foreign countries.

The *F*-16 is a reversal of the US Air Force trend to produce large, heavy fighters. It weighs only 15,000 pounds empty compared to the *F*-15's empty weight of about 30,000 pounds. The *F*-16 is a Mach 2 aircraft with a range of 2,200 miles. In an air combat role, the *F*-16's maneuverability and combat radius (distance it can fly to enter air combat, stay, fight and return) exceed that of all potential threat fighter aircraft. It locates targets in all weather conditions and detects low-flying aircraft in radar ground clutter. In an air-to-surface role, the *F*-16 can fly more than 500 miles, deliver its weapons with superior accuracy, defend itself against enemy aircraft and return to its starting point. An all-weather capability allows it to accurately deliver ordnance during non-visual bombing conditions.

***F*-16 Fighting Falcon** *(EAA Photo)*

The *F*-16 is being built under an unusual agreement creating a consortium between the United States and four NATO countries: Belgium, Denmark, the Netherlands and Norway. These countries jointly produced with the United States an initial 348 *F*-16s for their air forces. Final airframe assembly lines were located in Belgium and the Netherlands. The consortium's *F*-16s are assembled from components manufactured in all five countries. Belgium also provides final assembly of the *F*-100 engine used in the European *F*-16s. The long-term benefits of this program will be technology transfer among the nations producing the *F*-16 and a common-use aircraft for NATO nations. This program increases the supply and availability of repair parts in Europe and improves the *F*-16's combat readiness.

***F*-117.** The *F*-117*A Nighthawk* is the world's first operational aircraft designed to exploit low-observable stealth technology. The unique design of the single-seat *F*-117*A* provides exceptional combat

capabilities. About the size of an *F*-15 *Eagle*, the twin-engine aircraft is powered by two General Electric F404 turbofan engines and has sophisticated fly-by-wire flight controls.

The *F*-117*A* employs a variety of weapons and is equipped with navigation and attack systems integrated into a state-of-the-art digital avionics suite that increases mission effectiveness and reduces pilot workload. Detailed planning for missions into highly defended target areas is accomplished by an automated mission planning system developed, specifically, to take advantage of the unique capabilities of the *F*-117*A*.

The first *F*-117*A* was delivered in 1982, and the last delivery was in the summer of 1990. The *F*-117*A* production decision was made in 1978 with a contract awarded to Lockheed Advanced Development Projects, the "Skunk Works," in Burbank, California.

F*-117 *Blackjet *(EAA)*

***F*-14.** The *F*-14 *Tomcat* is a supersonic, twin-engine, variable sweep wing, two-place fighter designed to attack and destroy enemy aircraft at night and in all weather conditions. Based on an aircraft carrier during normal patrols, it provides long-range air defense for the carrier battle group. The *F*-14 tracks up to 24 targets simultaneously with its advanced weapons control system and attacks six with *Phoenix AIM*-54*A* missiles while continuing to scan the airspace. Armament also includes a mix of other air-to-air missiles, rockets and bombs. The *F*-14 is able to achieve Mach 2 and climb to an altitude of over 50,000 feet.

F*-14 *Tomcat *(EAA)*

***F/A*-18.** The *F/A*-18 is an all-weather fighter and attack aircraft. The single-seat *F/A*-18 *Hornet* is the nation's first strike-fighter. It was designed for traditional strike applications such as interdiction and close air support without compromising its fighter capabilities. With its excellent fighter and self-defense capabilities, the *F/A*-18 at the same time increases strike mission survivability and supplements the *F*-14 in fleet air defense.

F/A*-18 *Hornet *(Boeing Photo)*

F/A-18 *Hornets* are currently operating in 37 tactical squadrons from air stations worldwide, and from 10 aircraft carriers. In its fighter mode, the *F/A*-18 is used primarily as a fighter escort and for fleet air defense; in its attack mode, it is used for force projection, interdiction, and close and deep air support.

The *F/A*-18 *Hornet* was developed jointly by McDonnell-Douglas and Northrop Aviation. It is a lightweight carrier-based fighter with flight characteristics similar to the *F*-16 and capable of speeds of Mach 1.7. It entered service in 1982. Canada also flies the *Hornet* which they designate the *CF*-18*A*.

F-22. Lockheed developed a new air-superiority fighter to replace the *F*-15. It is called the *F*-22, the Advanced Tactical Fighter. The *F*-22 incorporates the latest in technology. It borrows from the research done in stealth, avionics and engines. The *F*-22 is unique in that it is the only aircraft in the world able to travel greater than Mach 1 without the use of afterburners. This flight regime has been named supercruise. The *F*-22 is scheduled for incorporation in the USAF inventory in 2005.

***YF*-22*A* Raptor**

Noncombatant Aircraft

The term noncombat is used to describe aircraft that were not designed specifically to participate in combat as were the bombers and fighters. Many of these noncombat aircraft, however, are fired upon while performing their support missions. The aircraft we will discuss in this section are grouped as reconnaissance and observation aircraft, transports and tankers, trainers and utility aircraft.

Reconnaissance and Observation Aircraft

These aircraft are used by the military to watch an enemy or potential enemy in order to keep track of what they are doing. These aircraft are called observation, patrol or reconnaissance aircraft depending on what they are watching.

We will discuss five of the US Air Force aircraft, which are classified as reconnaissance aircraft. These are the *TR*-1/*U*-2, *SR*-71, *E*-3*A*, *E*-4*B* and *E*-8.

***TR*-1/*U*-2.** This high-flying aircraft was built in the 1950s as a top-secret spy plane. It is essentially a powered glider and can fly at extremely high altitudes (90,000 feet). At this altitude, it is out of range of enemy interceptors and antiaircraft. In 1960, a *U*-2 piloted by Francis Gary Powers was shot down over Russia causing an embarrassing international incident. The *U*-2 cruises at about 500 mph and has a range of about 4,000 miles. The newest tactical reconnaissance version of the *U*-2 is the *TR*-1.

***SR*-71 *Blackbird*.** This is the world's highest flying and fastest aircraft. It is powered by two jet engines and operates at altitudes of 80,000 to 100,000 feet at a speed in excess of Mach 3 (2,000 mph). In 1974, an *SR*-71 flew from New York to London in 1 hour 55 minutes 32 seconds. This was nearly 3 hours faster than the previous record. Highly sophisticated cameras are used to take photographs from high altitudes. The *Blackbird* can photograph 60,000 square miles in 1 hour with three cameras. It is now retired from Air Force service, but continues to fly for NASA as a research aircraft.

***E*-3*A*.** The *E*-3*A* AWACS (Airborne Warning and Control System) is based on the *Boeing* 707. It has a 30-foot radar dome on top of the fuselage and is loaded with electronic equipment. AWACS serves as an airborne command and control center. Its radar allows it to see what's flying in the battle area. It coordinates and controls the total air effort over this airspace. This includes fighter cover, attack aircraft, airlift and transport into and out of the battle zone, and reconnaissance.

SR*-71 *Blackbird

***E*-8 J-STARS.** The Joint Surveillance Target Attack Radar

***E*-3A AWACS**
(Boeing Photo)

E-4B. This is a version of the Boeing 747 jumbo jet. the E-4B serves as the National Airborne Operations Center for the National Command Authorities. In case of a national emergency, the aircraft provides a modern, highly survivable, command, control and communications center to direct US forces.
System (J-STARS) is an airborne platform equipped with a long-range, air-ground surveillance system designed to locate, classify and track ground targets in all weather conditions. Its capabilities make J-STARS effective for dealing with any contingency, whether actual or impending military aggression, international treaty verification or border violation. The US Navy classifies its aircraft according to their specific jobs, such as antisubmarine patrol and surveillance.

Noncombatant Navy Aircraft

For antisubmarine patrol, the US Navy uses the *P*-3*C Orion* and the *S*-3*A*. The *Orion* is a land-based aircraft and is used to search for submarines up to about 500 miles from shore. Beyond this range, the jet-powered *Viking* takes over. The *Viking* is a carrier-based antisubmarine aircraft. Both aircraft carry electronic equipment to detect the submarines and the weapons to destroy them.

Surveillance aircraft are carrier-based airplanes that fly ahead or around a task force keeping an electronic lookout for enemy ships or aircraft. The *E*2*C Hawkeye* carries a large radar, which not only spots enemy aircraft, but directs fighters to as many as 70 at a time. The *Hawkeye* carries a crew of five and its twin turboprop engines propel it at nearly 400 mph.

Noncombatant Army Aircraft

Observation is the locating of enemy troops and the calling for air or artillery strikes on their positions. Some observation aircraft are armed so they can provide support until attack aircraft arrive. We will discuss *OV*-10A used by the US Air Force, Navy and Marines.

***OV*-10*A* Bronco.** This aircraft was specially designed as a forward-air-control and quick-response aircraft. It is heavily armed with four machine guns and up to 3,600 pounds of bombs. The Bronco provides a strong ground support until the attack aircraft arrives. If the enemy troop concentration is small, the *OV*-10A may neutralize it without calling in an air strike.

Transports and Tankers

The combat aircraft (fighters, attack aircraft and bombers) may be the glamour planes, but they could not operate without the support of transports and tankers. The mission of the transport aircraft is to airlift personnel and materiel to wherever they are needed. They also evacuate the wounded from the battle area. Airlift is generally broken down into either strategic or tactical airlift. Strategic airlift is transportation of personnel or cargo between theaters of operation. Tactical airlift is transportation within a theater of operation. Using the war in Southwest Asia as an example, strategic airlift was between the United States and Persian Gulf, and tactical airlift was within Saudia Arabia, Kuwait, Oman or Bahrain.

Transport planes are not generally considered combat planes because they are usually unarmed. Tactical airlift often involves delivering cargo directly into a battle zone. They often land to deliver their cargo and/or to pick up wounded while under hostile fire.

C-5. The US Air Forces' largest aircraft, the *C*-5 *Galaxy* was built primarily to provide massive strategic (intercontinental) airlift for combat supplies. It can haul 265,000 pounds of cargo and virtually any piece of army equipment, including tanks and helicopters. The capabilities of this aircraft became obvious to the world during its service in Southeast Asia and especially during the Yom Kippur War in the Middle East in 1973. Using the *C*-5, the United States was able to resupply Israeli forces very quickly after their initial losses of aircraft, tanks and other equipment, thereby enabling the Israelis to launch successful counterattacks.

The *C*-5*B* is officially known as the *Galaxy*, but pilot's call it "*Fred.*"

The *C*-5 is massive; nearly 248 feet long with a wingspan of more than 222 feet. When empty, it weighs more than 520,000 pounds and when fully loaded, it weighs 764,500 pounds. Powered by four, huge turbofan engines, each developing 41,000 pounds of thrust, the *C*-5 can carry 49,000 gallons of usable fuel. When fully loaded, it can travel 5,500 miles at speeds up to 471 mph.

The *C*-5, built by Lockheed, won a series of design competitions with the Boeing and Douglas aircraft companies. The *C*-5 first flew in 1968, and the first operational deliveries to the US Air Force took place in 1969.

In 1982, the US Congress authorized production of 50 *C*-5*B*s, an advanced version of the *Galaxy.* The first delivery was made in 1986, and the final aircraft was delivered in early 1989.

The *C*-5 has a basic crew of five and is capable of in-flight refueling. Although it can carry troops, it is primarily a cargo hauler. The *C*-5's big-load delivery role is shared by the *C*-141 *Starlifter.*

***C*-141*B* Starlifter.** The *Starlifter* has been the backbone of our strategic airlift. Although the *Starlifter* is smaller than the *Galaxy*, it is by no means a small aircraft. It can carry 45 tons of cargo and has a range of up to 6,000 miles. Beginning in 1976, Lockheed began modifying all of the *C*-141*A*s to*C*-141*B*s. The project was completed in 1982. This modification consisted of stretching the fuselage by 23 feet and adding an in-flight refueling capability. It will enter retirement in the year 2005.

***C*-130 Hercules.** Like the *C*-5 and the *C*-141, the *Hercules* is built by the Lockheed-Georgia Company. The *Hercules* is much smaller than the *C*-5 or the *C*-141 and is turboprop-powered rather than turbojet-powered. However, the *C*-130 has to be considered one of the most successful aircraft of all times. The *C*-130 is also one of the most highly modified of all airplanes. Over thirty models have been produced and are used by 52 foreign countries and by the US Air Force, Navy, Marine Corps and Coast Guard. It is used as a transport, a tanker, a gunship, a reconnaissance aircraft, for search and rescue, for communications, for weather observation and to launch drones (unmanned aircraft). The *C*-130 has a cruising speed of about 350 mph and can carry up to 92 troops or 45,000 pounds of cargo.

Lockheed *C*-130 *Hercules*

VC*-25*A*, the President's airplane is also known as *"Air Force One!"

MILITARY AIRCRAFT LETTER AND NUMBER DESIGNATIONS

The letters and numbers that designate military aircraft, such as *B*-52*H*, are easy to read once you know the system. The prefix letter or letters indicate the mission or type of aircraft. The numerals indicate the specific make and model. The suffix letter indicates major design changes in series. Thus, *B*-52*H* means bomber, model 52, seventh major design change (after A). In this case, the H model differs from the G model in that it has turbofan engines rather than turbojet engines - a change considered important enough to rate a new suffix letter.

Sometimes, there are two or even three prefix letters to be read in combination. These are arranged in a certain order (explained below along with examples). First, let us list prefix letters. The following list is not complete, but covers the military aircraft mentioned in this chapter. The same system is used for aircraft of all US military services.

A Attack (for use against enemy ground targets only)
B Bomber
C Cargo or passenger
E Electronic (special surveillance equipment such as early-warning radar)
F Fighter (air-to-air capability).
H Helicopter (single or final prefix only); search and rescue or other air rescue service mission (first prefix only)
K Tanker
O Observation
P Patrol; Applied to shore-based US Navy reconnaissance and antisubmarine warfare aircraft
R Reconnaissance (photographic or electronic)
S Search; applied to carrier-based reconnaissance and antisubmarine warfare aircraft
S Strategic (unique case of *SR*-71)
T Trainer
U Utility (usually a small aircraft; miscellaneous uses)
V Staff (aircraft with interior furnished for staff or key-personnel transportation–first prefix letter only)
V Nonrotary VTOL or STOL aircraft (final prefix letter only)
W Weather (aircraft with meteorological equipment permanently installed)
X Experimental
Y Prototype (aircraft procured in limited quantities to develop the potentialities of the design)

COMBINATION PREFIXES

The prefixes listed above are the three types: (1) current status (examples are X and Y), (2) modified mission - meaning purpose for which the aircraft is now used if converted from some other use, (3) basic type, original mission (or intended mission if preceded by X or Y). When combination prefixes occur, they are arranged in the above order. Even three-letter prefixes are sometimes used. An example is YAT which means a prototype of an attack aircraft converted from a trainer. The following examples should help clarify the prefixes:

EC-121 Electronic (early-warning) aircraft modified from C-121 cargo aircraft
HC-130 Search and rescue aircraft modified from C-130 cargo aircraft
WC-130 Weather airplane, also modified from C-130
HH-3 Search and rescue helicopter
OV-10 Observation airplane with STOL capability
VC-137 Staff aircraft modified from cargo or passenger aircraft (NOTE: the combination CV would mean some thing different–a cargo plane with STOL or nonrotary capability, the designation CV-2 was formerly used for what is now the *C*-7 *Caribou*)
YF-12A Prototype of a fighter
F-12 Same as YF-12A (short informal designations like this are often used instead of full designation)
XB-70 Experimental intended as bomber
X-19 Experimental (no specific intended mission)

KC-135. The military version of the *Boeing* 707 is the *C*-135. The *C*-135 has been produced in several models. The *KC*-135 tanker and the *WC*-135 weather aircraft are the best known. They are used for aerial refueling of bombers, fighters and attack aircraft. The *KC*-135 can carry about 120,000 pounds of transfer fuel. The crew consists of two pilots, one navigator and a boom operator, who is enlisted and actually refuels the aircraft. The *KC*-135 also carries a wide variety of cargo. They transport passengers, cargo and still refuel aircraft on a single mission. Most *KC*-135s have been reengined with new, high-bypass turbofan engines. They are designated *KC*-135R. This significantly increased their efficiency and range. As the *C*-141 has been slowly phased out, the *KC*-135 has been filling in the gap for cargo transport.

KC*-10 *Extender

KC*-10*A* *Extender. This advanced tanker/cargo aircraft was selected as an eventual replacement for some of the older *KC*-135 tankers. It is a modified McDonnell-Douglas *DC*-10 series 30*CF*. Bladder fuel cells were added in the lower cargo compartments, which can hold 193,000 pounds of fuel. The aircraft can also be used as a cargo aircraft with a maximum cargo payload of 169,000 pounds. The combined tanker/cargo capability has been used in deployment of fighter squadrons overseas. The *Extender* is able to refuel the fighters while en route and also carry the support equipment and personnel. The first *KC*-10*A* was delivered to the US Air Force in March 1980.

***C*-9.** The McDonnell-Douglas *DC*-9 commercial jetliner has been modified into two models for the military, the Air Force *C*-9*A Nightingale* and the Navy *C*-9*B Skytrain*. The *Nightingale* is a medical airlift transport, which can carry 30 to 40 litter patients or more than 40 walking patients. The crew consists of the flight crew plus two nurses and three aeromedical technicians.

The *C*-9*B Skytrain* is used as a personnel transport. It is outfitted like the *DC*-9 airliner and has the same flight characteristics.

***C*-17 *Globemaster* III** *(Boeing Photo)*

C-17. The *C*-17 *Globemaster* III is the newest, most flexible cargo aircraft to enter the airlift force. The *C*-17 is capable of rapid delivery of troops and all types of cargo. It can deliver the cargo directly to forward bases on unimproved fields. The *C*-17 has a crew of three and entered Air Force service in 1993. It will replace the aging *C*-141*B*.

Trainers

All pilots, regardless of the type of aircraft they fly, must first go through flight training. After pilots learn to fly, they must continue their training. Every time pilots change from one type of aircraft to another, there is training involved. In this section, we will deal only with the trainers used in learning to fly.

Some Air Force pilots receive their initial flight training in the Cessna *T*-3 *Firefly*. Graduating from the *T*-3, the student will move to the Cessna *T*-37*B*. The *T*-37 is a subsonic jet that seats a student and an instructor side by side. Following instruction in the *T*-37, the student goes into advanced training in the supersonic *T*-38 *Talon* or the *T*-1 *Jayhawk*. The *Talon* can fly at Mach 1.2 and carries the student and instructor seated in tandem (one behind the other). It is used for fighter pilot specific training. The *T*-1 is used for pilots who will be flying bomber or transport aircraft.

T*-34 *Mentor

T*-37 *"Tweet" *(EAA)*

Navy pilots receive their basic training in the *T*-34*C Turbo Mentor.* This high-performance trainer is built by Beech Aircraft and carries an instructor and student in tandem. It is powered by a 550 horsepower turboprop engine and can fly over 300 mph. After basic training, the Navy pilot moves up to the jet-powered *T*-45 *Goshawk*. This primary jet training aircraft can fly at about 650 mph and is used to teach gunnery, bombing and how to operate from an aircraft carrier.

Utility Aircraft

***C*-12A.** This is the civilian version of the *Beechcraft Super King Air* 200. It carries a crew of two and eight passengers. It can be quickly converted for cargo missions. The *C*-12*A* is a twin turboprop, which cruises from 240 to 275 mph.

***C*-20.** The Air Force has 11 of these *C*-20s, also known as the civilian *Gulfstream*. They are used for airlifting very important people (VIP). The aircraft carries a crew of five and 14-18 passengers and cruises at over 550 mph.

***C*-21*A*.** This military version of the *Learjet* 35*A* is used for operational support airlift from 16 USAF bases. With a crew of two, the *C*-21*A* can carry eight passengers or 3,100 pounds of cargo.

***C*-22*B*.** This is the military version of the *Boeing* 727. Four of these aircraft are being operated by the Air National Guard on operational-support airlift missions.

In this section, we have seen that we cannot limit our idea of military aircraft just to fighters and bombers. If we do, we are leaving out a great deal of the actual military aviation picture. The noncombat aircraft are vital to the accomplishment of the military mission.

We have not included all military airplanes. In fact, we haven't included all of the military airplanes in any particular class. However, we have discussed the aircraft that are representative of military aircraft worldwide. In the next section, we will look at some special-use aircraft that do not fit into any of our categories.

Beechcraft UC-12B *(Beechcraft Photo)*

Key Terms and Concepts

- combat aircraft
- noncombat aircraft
- fighters
- bombers
- close support aircraft
- reconnaissance aircraft
- Airborne Warning and Control System (AWACS)
- National Airborne Operations Center (NAOC)
- Joint Surveillance Target Attack Radar System (J-STARS)
- transport
- tankers
- strategic airlift
- trainers
- utility aircraft

? Test Your Knowledge ?

SELECT THE CORRECT ANSWER

1. *US fighters have traditionally been* **(heavier/lighter/slower)** *than the enemy's fighters.*
2. *The* **(A-*10*/F-*14*/F-*22*)** *is used primarily in support of ground forces, but can defend itself with air-to-air missiles.*
3. *The* **(F-*117*A/B-*2*A)** *was the world's first operational aircraft designed to exploit low-observable stealth technology.*
4. *The* **(E-3/E-4/E-8)** *is distinguishable by the 30-foot radar dome perched on its fuselage.*
5. *The Navy's* **(P-*3*C/S-*3*A/F-*14*F)** *is a carrier-based aircraft used in antisubmarine warfare.*
6. *The* **(C-9A/C-9B)** *is used as a medical airlift transport by the US Air Force.*

MULTIPLE CHOICE

7. *Which of the following does not apply to the bombers?*
   a. *Large, long-range aircraft*
   b. *Designed to destroy the enemy's ability to wage war*
   c. *Due to munitions limitations, can't be used to attack troops on the frontlines*
   d. *Air-refueling extends their range as much as necessary*
8. *Which of the following USAF bombers is no longer operational?*
   a. *B-52H Stratofortress*
   b. *B-58A Hustler*
   c. *B-1*B Lancer
   d. *B-2 Spirit*
9. *Which of the following is not true of the* F-*15?*
   a. *Designed as an all-weather, air-superiority fighter*
   b. *Manufactured by McDonnell-Douglas*
   c. *Comes in an* F-*15*E *version for ground attack*
   d. *Weighs about the same as the* F-*16*

10. *Which of the following is not true of airlift aircraft?*
    a. *Designed to airlift personnel & materiel wherever they are needed*
    b. *Combat aircraft could not operate without them*
    c. *They are designated by the A- for airlift*
    d. *They can evacuate the wounded*

FILL IN THE BLANKS

11. _____*aircraft are specifically designed for an attack role while* _____ *aircraft are designed for a support role, although they may become involved in* _____ *action while performing their supporting role.*

12. _____ *airlift is transportation of cargo or personnel between theaters of operation, while* _____ *airlift transports them within the theater of operation.*

13. *The* _____ *is the newest cargo aircraft to enter the inventory, capable of delivery of troops or cargo to forward bases on unimproved airfields.*

14. *What type of aircraft are the following?*

B-*17*	C-*22*
EA-*6B*	RF-*4*
EF-*111*	KC-*97*
XB-*70*	

15. *To make up for the disadvantage of weight, US pilots have better*_____ *and better* _____ .

TRUE OR FALSE

16. *The US entered a consortium with NATO Allies to produce the* F-*15 jointly.*
17. *All the primary US cargo aircraft (*C-*5,* C-*141,* C-*130,* C-*17) are turbo-jet propelled.*
18. *The* SR-*71 is the world's highest flying and fastest aircraft.*
19. *The* F-*22 is the only aircraft in the world that can fly faster than Mach 1 without using afterburners.*
20. *When configured for a refueling mission, the* KC-*135 is unable to carry any additional cargo or passengers.*

SHORT ANSWER

21. *What are the advantages of consortium manufacturing for the United States and NATO?*
22. *Why is military airpower so important?*