Firefighting Aircraft

Recognition Guide

CAL FIRE Aircraft Contact Frequency 122.925
CDF Air to Ground 151.2200 Tone 16
CDF Air to Ground 159.2625 Tone 16
CDF Air to Ground 159.3675 Tone 16

www.fire.ca.gov

History

The CAL FIRE Air Program has long been the premier firefighting aviation program in the world. CAL FIRE's fleet of over 50 fixed wing and rotary wing, make it the largest department owned fleet of aerial firefighting equipment in the world. CAL FIRE's aircraft are strategically located throughout the state at CAL FIRE 's 12 airbases and 10 helicopter bases.

Airtanker Program

CAL FIRE first began using airtankers in the 1950s when agriculture spraying planes were used to drop water on fires. In 1958, CAL FIRE, then CDF, contracted with a private airtanker service for the use of their converted World War II aircraft. By 1970 the department began to evaluate the use of former military Grumman S-2 aircraft. Over the next ten years CAL FIRE continued to build up its fleet of S-2A airtankers.

In 1987, CAL FIRE began the process of upgrading the engines to turbine driven. By 2005 all of CAL FIRE's airtanker fleet had been converted to S-2T airtankers. The department once again made history in 2006 when it contracted with the first "Very Large Air Tanker", a converted DC-10.

Air Tactical Aircraft

In the mid 1970s the department found that the contractor-owned air attack planes did not provide the airspeed and safety needed for the new airtanker program. In 1974, the department acquired 20 Cessna O-2 aircraft from the United States Air Force, which had been used in Vietnam.

In 1993, CAL FIRE obtained 16 North American OV-10A aircraft from the Department of Defense. The OV-10s replaced the O-2s that had served the department well for more than 20 years. The OV-10s turbine-powered twin-engines helped meet the needs for the next-generation Air Attack platform. The current fleet of operational OV-10s consists of 14 "A" models and one "D" model for a total of 15.

Helicopter Program

CAL FIRE began using contractor-owned helicopters for fire control in the mid 1960s. In 1981, CAL FIRE obtained 12 Bell UH-1F series helicopters from the Air Force. In the late 1980s CAL FIRE began to phase out the "F" model and upgrade to newer, larger UH-1H helicopters. The UH-1H aircraft were significantly modified to meet the department's specialized needs. The modified helicopters were designated as "Super Huey's". The current fleet of Helicopters is 10 assigned helicopters and two fully operational spares.

Information Facts and Photos
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This Guidebook has been assembled for those who want information on firefighting aircraft used by the local, state and federal agencies. The guide provides the most current facts, specifications and reference photos in four categories; air tactical, fixed-wing, rotor-wing and military aircraft.

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OV-10A "Bronco"
Air Tactical Aircraft

Specifications:

Cruise Speed:	258 mph
Gallon Capacity:	not applicable

Manufacturer
North American-Rockwell, Columbus, Ohio.

Crew
Pilot and Air Tactical Group Supervisor

Original Owner
U.S. Navy/Marines, 1968-1993. The OV-10A was used as a counter-insurgency (military intelligence) aircraft and close air-support to military ground forces.

Acquired by CAL FIRE
In 1993, CAL FIRE acquired 16 OV-10As from the Department of Defense. Fourteen of those have been converted and are available for use as air attack planes. The OV-10s replaced the original cessna 0-2As that CAL FIRE had been using for air attack. The OV-10s are newer, larger, and faster, provide a larger field of vision for the crew and are more maneuverable than the older O-2As. In 2011 one OV-10D was added to the fleet.

Mission
CAL FIRE uses OV-10As as aerial command and control of aircraft on wildland fires. The crew provides tactical coordination with the incident commander on the ground, providing information on the movement and spread of the fire. The OV- 10A crew then directs CAL FIRE's airtanker and helicopter pilots where to make their retardant and water drops. They can also be used as an Aerial Supervision Module (ASM) when staffed with a qualified ASM crew.

Beechcraft King Air 200

Air Tactical Aircraft

Specifications:

Cruise Speed:	333 mph
Gallon Capacity:	not applicable

Manufacturer

Hawker Beechcraft

Crew

Lead Plane Pilot and Air Tactical Group Supervisor

Mission

The King Air 200 is part of a line of twin-turboprop aircraft produced by the Beechcraft Division of Hawker Beechcraft. It is used by the U.S. Forest Service and BLM as an Aerial Supervisory Module, which can perform low level Airtanker leading. The U.S. Army, U.S. Air Force, U.S. Navy, and the U.S. Marine Corps all fly versions of the King Air 200 today.

CAL FIRE operates two King Air 200's as Air Tactical Group Supervisor (ATGS) training platforms.

AH-1 Firewatch "Cobra"

Air Tactical Aircraft

Specifications:

Cruise Speed:	172 mph
Gallon Capacity:	not applicable

Manufacturer

Bell Helicopters, Fort Worth, Texas

Crew

Pilot and Air Tactical Group Supervisor

Acquired by USFS

In 2003, the U.S. Forest Service acquired 25 retired AH-1Fs from the U.S. Army. These have been designated Bell 209s and are being converted into Firewatch Cobras with infrared and low light sensors and systems for real time fire monitoring. The Florida Department of Forestry has also acquired 3 AH-1Ps from the U.S. Army. These are called Bell 209 "Firesnakes" and are equipped to carry a water/fire retardant system.

Mission

The Vietnam-era army attack helicopters have been striped of their weapons and lasers. Cameras and infrared sensors have been added to convert them to Cobra Firewatch Helicopters.

In 1996, the U.S. Army retired 25 of its Cobra helicopters, which are able to reach speeds of 160 mph. The U.S. Forest Service eagerly accepted the hand-me-downs and refitted them with an arsenal of high-tech gadgets. The new Cobras don't extinguish fires by themselves. Their main purpose is to relay information to ground crews about the direction and strength of a blaze and to help larger planes make more accurate water or fire-retardant drops.

The Firewatch's infrared thermal imager can detect the heat of a wildfire even through thick smoke. Its low-light and color cameras can pick up fine resolution images of the fire, and then its transmission equipment can send those images—in real time—to firefighting crews up to 30 miles away. Also, the Cobra can direct larger water haulers by providing precise GPS coordinates.

DC-10
Very Large Air Tanker

Specifications:

Cruise Speed: 485 mph

Gallon Capacity: 9,400

Manufacturer
McDonnell Douglas

Pilot, Co-pilot and Flight Engineer

Original Owner
Originally delivered as a civil passenger plane to National Airlines in 1975, it subsequently flew for Pan Am, American Airlines, Hawaiian Airlines and Omni International.

Acquiring/Contracting
In 2006, the aircraft was operated on a limited evaluation contract from the State of California. In 2006, it was offered on a "call-when-needed" basis. Governor Schwarzenegger authorized a contract for exclusive use of the aircraft for the 2007-2009 fire seasons.

Mission
The aircraft, operated by 10 Tanker Air Carrier, is used for fighting wildfires, typically in rural settings. The turbofan-powered craft carries up to 9,600 gallons of fire retardant in an exterior belly-mounted tank, which can be released in eight seconds. This aircraft will not be used on all fires, and will typically not be used on initial attack. It is utilized in extended attack fires as it is limited in time effectiveness for reloading fire retardant as well as its need to reload and refuel at an appropriately equipped aerial firefighting base (currently McClellan, Castle, San Bernardino and Santa Maria are the only bases in California serviceable for this large an aircraft). One drop for the DC-10 is equivalent to 12 drops of an S2-T or a line of retardant that is 300 feet wide by one mile in length.

Crew

Boeing 747
Very Large Air Tanker

Specifications:

Cruise Speed:	565 mph
Gallon Capacity:	19,200

Manufacturer
Boeing Aircraft

Crew
Pilot, Co-pilot and Flight Engineer

Mission
The Global Supertanker has a pressurized system that can disperse retardant under high pressure, or drop retardant equivalent to the speed of falling rain. This system allows the aircraft to operate within its design criteria. Using the pressurized system, the aircraft can deliver retardant to the scene of a fire while flying at a height of 400 to 800 ft, at approximately 140 kts, configured as if it were on approach for landing.

The Global Supertanker's tank system can be configured for segmented drops, allowing the contents of the tank to be released at multiple intervals while in flight.

Lockheed C-130 Hercules

Type I Airtanker

Specifications:

Cruise Speed:	360 mph
Gallon Capacity:	4,000 Conventional

Manufacturer

Lockheed Martin

Crew

Pilot, Co-pilot , Flight Engineer

Mission

The Lockheed C-130 Hercules is a four–engine turboprop military transport aircraft designed and built originally by Lockheed (now Lockheed Martin). The C-130 entered service with the U.S. in the 1950s and is still in production today. The U.S. Forest Service developed the Modular Airborne FireFighting System for the C-130 in the 1970s. A recent development of a C-130–based airtanker is the Retardant Aerial Delivery System (RADS) developed by Coulson Aviation USA which currently has a capacity of 4,000 gallons.

L188 Electra
Type I Airtanker

Specifications:

Cruise Speed:	380 mph
Gallon Capacity:	3,000

Manufacturer
Lockheed Corporation

Original Owner
Originally delivered to Eastern Airlines as a civil passenger plane in 1957. It was also flown by American Airlines, Braniff Airways and Northwest Airlines.

Acquiring/Contracting
Since 2013 the aircraft has operated on a "call-when-needed" contract with the State of California.

Mission
The L188, of which 170 were produced, is a turboprop airliner produced from 1957-1961. It was the first large turboprop airliner built in the United States. These aircraft are powered by Allison 501-D13 constant speed axial flow gas turbine engine. The Electra eventually developed into the P-3 Orion. The approximately 14 remaining in service are utilized in cargo and wildfire control roles.

British Aerospace Bae 146/ Avro RJ85
Type I Airtanker

Specifications:

Cruise Speed:	380 mph
Gallon Capacity:	3,000

Manufacturer
British Aerospace / Avro

Crew
Pilot, Co-pilot

Mission
The British Aerospace 146 (also BAe 146) is a short-haul airliner and a regional airliner that was manufactured in the United Kingdom by British Aerospace, later part of BAE Systems. Production ran from 1983 until 2002. Manufacture of an improved version known as the Avro RJ began in 1992. With 387 aircraft produced, the Avro RJ/BAe 146 is the most successful British civil jet airliner program.

The BAe 146 is powered by four Avco Lycoming ALF 502 turbofan engines, which are fixed on pylons underneath the aircraft's high wing. The AVRO RJ85 is powered by 4 LF 507 Turbofan engines.

McDonnell Douglas MD-87
Type I Airtanker

Specifications:

Cruise Speed:	400 mph
Gallon Capacity:	3,000

Manufacturer
McDonnell Douglas

Crew
Pilot, Co-pilot

Mission
McDonnell Douglas launched development of the MD-87 on January 3 1985, following the placement of launch orders from Finnair and Austrian in December 1984. First flight took place on December 4 1986 and US FAA certification was granted on October 21 1987. The MD-87 is a shortened version of its predecessors. Recent changes to the approved STC has reduced the capacity of this aircraft from 3,700 gallons to 3,000 gallons.

Douglas DC-7
Type I Airtanker

Specifications:

Cruise Speed:	300 mph
Gallon Capacity:	3,000

Manufacturer
Douglas Aircraft Company

Crew
Pilot, Co-pilot and Flight Engineer

Mission
The DC-7 is an American transport aircraft built from 1953 to 1958 and was the last major piston engine powered transport made by the Douglas Aircraft Company.

Three hundred forty-eight DC-7s were produced and about 40 are still in service today flying cargo, military, and wildfire control roles.

CL-215/ Bombardier 415 "Superscooper"

Type II Airtanker

Specifications:

Cruise Speed:	189/233 mph
Gallon Capacity:	1300/1621

Manufacturer

Canadair / Bombardier, Canada

Crew

Pilot and Co-pilot

Contracting

These aircraft have been leased for use during fire season in numerous counties including Los Angeles and San Diego. The U.S. Forest Service also has some of these aircraft on Exclusive use contracts.

Mission

Both the CL-215 and Bombardier 415 are Canadian aircraft built specifically for fire suppression and are known in the U.S. as Superscoopers. CL-215 and the Bombardier 415 are amphibious aircraft, which can operate on land and water. The CL-215 was first built in 1969 and was later replaced by the Bombardier 415 in 1994. These turbine aircraft scoop water from lakes and reservoirs which can be dropped as regular water or be mixed with a foam retardant. The aircraft can also be utilized for maritime search and rescue.

Lockheed P-2 Neptune
Type II Airtanker

Specifications:

Cruise Speed:	280 mph
Gallon Capacity:	2,450

Manufacturer
Lockheed Corporation

Crew
Pilot, Co-pilot and Flight Engineer

Mission
The P-2V Neptune was a naval patrol bomber and anti-submarine warfare aircraft for the United States Navy. The P-2 Neptune replaced the PV-1 Ventura and PV-2 Harpoon and is being replaced, in turn, with the P-3 Orion.

The P2V aircraft were rebuilt and converted into aerial tankers with a maximum fire retardant capacity of 2,450 gallons with six door retardant dispensing tanks. Over 8 P2Vs are currently employed in aerial firefighting roles by operators such as Aero Union and Neptune Aviation Services.

Grumman S-2T
Type III Airtanker

Specifications:

Cruise Speed:	270 mph
Gallon Capacity:	1,200

Manufacturer
Grumman Aerospace, Bethpage, New York

Crew
Pilot

Original Owner
U.S. Navy, 1954-1972. The S-2E/G was used as a carrier-based anti-submarine warfare airplane.

Acquired by CAL FIRE
In 1996, CAL FIRE acquired 26 S-2E/G planes from the Department of Defense. CAL FIRE had the aircraft converted for fire-fighting configuration and fitting them with modern, powerful turboprop engines. The completely reconditioned S-2Ts are faster, safer, and more maneuverable. They can carry a larger retardant payload than the older S-2A air tanker CAL FIRE utilized since the 1970's. The S-2T air tanker is part of CAL FIRE's air program modernization efforts that will result in the safest and most efficient mix of aircraft to carry out the fire fighting mission. CAL FIRE currently has 23 S-2Ts that are utilized statewide.

Mission
CAL FIRE utilizes the S-2T air tankers for fast initial attack delivery of fire retardant on wildland fires.

Air Tractor AT-802A
Type III Airtanker

Specifications:

Cruise Speed:	180 mph
Gallon Capacity:	800

Manufacturer
Air Tractor, Inc. Olney, TX, USA

Crew
Pilot

Mission
Used by sub-contractors a fast initial attack aircraft for water, phosphate based retardant, gel, and foam fire retardants. Sub-contractors supply field service vehicles which allow the aircraft to be operated from remote bases. Aircraft can be dispatched in groups to allow for larger coordinated drops.

Air Tractor AT-802A "FireBoss"
Type III Airtanker

Specifications:

Cruise Speed:	**170 mph**
Gallon Capacity:	**800 lbs.**

Manufacturer
Air Tractor, Inc. Olney, TX, USA

Crew
Pilot

Mission
Used by sub-contractors a fast initial attack aircraft for water, phosphate based retardant, gel, and foam fire retardants. Aircraft can be used as a land based or a water scooping aircraft. The FireBoss aircraft's capability to operate either as wheeled to floated operations allowed the aircraft to be dispatched from an airport to a river or lake for multiple water drops on one fuel cycle. Sub-contractors supply field service vehicles which allow the aircraft to be operated from remote bases. Aircraft can be dispatched in groups to allow for larger coordinated drops.

C-23A Sherpa (SD3-30)

U.S. Forest Service Smokejumper aircraft

Specifications:

Cruise Speed: 230 mph

Payload: 4,500 lbs.

Manufacturer

Short Brothers

Acquiring/Contracting:

USFS agency owned.

Crew

Pilot, Co-pilot

Mission

The Shorts C-23A Sherpa is a twin engine turboprop aircraft built for the U.S. Department of Defense, by Short Brothers in Belfast, Ireland. In its current configuration, it flies an initial attack load of 10 smokejumpers plus cargo with an endurance of 3 hours. From Redding, the Sherpa has the ability to I.A. all North Ops forests and some of the more northerly South Ops forests without a fuel stop.

The aircraft is also available for Paracargo only missions, with up to 4500 pounds of cargo deliverable via parachute or delivery to a suitable airport.

Dornier Do-228

U.S. Forest Service Smokejumper aircraft

Specifications:

Cruise Speed: 250 mph

Payload: 3,500 lbs.

Manufacturer

Dornier GmbH

Crew

Pilot

Acquiring/Contracting:

Contract aircraft operated by Bighorn Airways of Sheridan, Wyoming. Typical contract starts June 1st and ends September 30th.

Mission

The Dornier Do-228 built by Dornier GmbH is a twin engine turboprop aircraft built in Germany. It is configured to deliver an initial attack load of 8 smokejumpers plus cargo with an endurance of 3 hours. From Redding, the Dornier has the ability to I.A. all North Ops forests and some of the more northerly South Ops forests without a fuel stop. However, the Dornier is often positioned in Porterville (PTV) for a majority of the summer.

The aircraft is also available for Paracargo only missions, with up to 3500 pounds of cargo deliverable via parachute or delivery to a suitable airport.

Sikorsky S-61
Type I Helicopter

Specifications:

Cruise Speed:	154 mph
Gallon Capacity:	1,000

Manufacturer
Sikorsky Aircraft Corp

Crew
Pilot and Co-pilot

Sikorsky S-61
This aircraft is used primarily for external cargo and water bucket operations. In the late 1950s and early 1960s the U.S. Navy worked with Sikorsky Aircraft to create a very high performance helicopter with the latest technologies. The aircraft uses two large twin turbine engines and a boat-type hull with retractable landing gear. The S-61 requires a two-person crew to fly it, but can carry a large number of passengers. Today the S-61 is used extensively for logging operations in the commercial sector.

Sikorsky S-64 "Skycrane"

Type I Heavy Lift Helicopter

Specifications:

Cruise Speed:	105 mph
Gallon Capacity:	2,650

Manufacturer

Sikorsky Aircraft Corp / Erickson Air-Crane

Crew

Pilot and Co-pilot

Sikorsky S-64

The S-64 "Skycrane" was originally designed for the military and had interchangeable pods that fit underneath for troop transport and cargo movement. The S-64 has six rotor blades and two turbine powered jet engines, which allows it to carry heavy loads. In 1992 Erickson Air Crane purchased the manufacturing rights to the S-64 and modified it to carry a 2,650 gallon tank. The tank can be filled by a draft hose in less than one minute, while the helicopter is hovering. The S-64 requires a pilot and co-pilot to fly it and typically has a 6 to 8 person support crew.

Sikorsky S-70 "CAL FIRE Hawk"

Type I Helicopter

Specifications:

Cruise Speed:	183 mph
Gallon Capacity:	1,000

Manufacturer

Sikorsky Aircraft Corp

Crew

Pilot and possibly a Co-pilot

Sikorsky S -70 "Firehawk"

The Firehawk is the civilian version of the U.S. Army's popular Blackhawk or UH-60 and the U.S. Navy's Seahawk. The UH-60 was originally designed for the U.S. Army in the 1970s as a light transport helicopter used for air assault and as a military medievac helicopter. The aircraft is a four bladed, twin engine helicopter. For water or retardant delivery, the S-70 can have a large tank mounted on the bottom or can carry a bucket.

Eurocopter AS332L "Super Puma"
Type I Helicopter

Specifications:

Cruise Speed:	156 mph
Gallon Capacity:	2,000

Manufacturer
Aerospatiale / Eurocopter

Crew
Pilot and Co-pilot

Eurocopter AS-332L
The AS332L "Super Puma" is a twin engine medium-weight helicopter that has a large cabin which works well for passenger transport. The AS332L first flew in 1978 and flown for both civilian and military use. The aircraft is often used by oil companies to ferry personnel and equipment to and from oil platforms. In 2000 the U.S. Forest Service in California used this aircraft for initial attack with a "Heli-Shot" crew. These aircraft are not very common on California wildfires.

Boeing-Vertol 107 "Vertol"

Type I Heavy Lift Helicopter

Specifications:

Cruise Speed: 140 mph

Gallon Capacity: 1,100/bucket

Manufacturer

Boeing Company / Vertol Aircraft Company

Crew

Pilot and Co-pilot

Boeing-Vertol BV 107

The Boeing-Vertol (BV)107, often referred to as the "Vertol", is the civilian version of the U.S. Marine Corps' CH-46 "Sea Knight". The aircraft was originally designed by the Vertol Aircraft Company in the late 50s. The company was purchased by Boeing in 1960. The BV 107 was designed to be a medium-lift helicopter, and is primarily used to transport cargo. Both the BV 107 and the BV 234 are used for timber harvesting in the commercial sector. The BV 107 has a little less than half the lifting capability as compared to the BV 234. The BV 107 (CH-46) and the BV-234 are most recognizable by their tandem rotors.

Boeing 234 "Chinook"

Type I Heavy Lift Helicopter

Specifications:

Cruise Speed:	137 mph
Gallon Capacity:	3,000/bucket

Manufacturer

Boeing Company / Vertol Aircraft Company

Crew

Pilot and Co-pilot

Boeing 234

The Boeing 234 is the civilian version of the U.S. Army's CH-47 "Chinook". The aircraft was originally designed by the Boeing Company in the early 60s, to be a medium-lift helicopter to transport cargo and military personnel. Both the BV 107 and the 234 are used for timber harvesting in the commercial sector. The Boeing 234 (CH-47) and the BV-107 (CH-46) are most recognizable by their tandem rotors. The 234 has almost twice the lifting capability (between 15,000-25,000 pounds) of the smaller BV-107, which allows it to operate with a larger water bucket for fire suppression.

Kaman "K-Max"

Type I Heavy Lift Helicopter

Specifications:

Cruise Speed: 91 mph

Gallon Capacity: 660

Manufacturer

Boeing Company / Vertol Aircraft Company

Crew

Pilot

Kaman "K-Max"

The K-MAX, also called the "Air Tractor," is designed specifically as a heavy lift helicopter. The aircraft, which is built for a pilot only, has a tandem, counter rotating, intermeshing rotor system.

The K-MAX can fly a variety of different missions ranging from logging and thinning to firefighting.

Bell 212
Type II Helicopter

Specifications:

Cruise Speed:	115 mph
Gallon Capacity:	360

Manufacturer
Bell Helicopter

Crew
Pilot and Co-pilot

Bell 212
The Bell 212 was introduced by Bell Helicopter in 1968. The 212 aircraft is used for passenger transport and cargo movement, both internal and external. This aircraft has twin engines and two rotor blades. The 212 is one of the most popular Type 2 helicopter on the national call-when-needed helicopter contract. The Bell 212 is the civilian version of the UH-1N "Twin Huey". Many local fire departments use the Bell 212.

UH-1H "Super Huey"
Type II Helicopter

Specifications:

Cruise Speed: 126 mph

Gallon Capacity: 360 plus 324/bucket

Manufacturer
Bell Helicopters, Fort Worth, Texas

Crew
Pilot , two Fire Captains and eight Firefighters

Original Owner
U.S. Army, 1963 to 1975. The UH-1H was used as a troop and cargo transport and specialized operations.

Acquired by CAL FIRE
In 1981, CAL FIRE acquired 12 helicopters from the Department of Defense. They were heavily modified by CAL FIRE for firefighting use and went into service in 1989. CAL FIRE has 9 helicopters available state-wide with two reserve helicopters available from CAL FIRE's Aviation Management Unit (AMU) in Sacramento to fill in behind scheduled maintenance.

Mission
CAL FIRE utilizes the Super Hueys for fast initial-attack on wildland fires. The copters are able to quickly deliver a nine- person fire crew wherever needed as well as battle fires with water/foam drops. The copters are also utilized for medical evacuations, backfiring operations, (internal and external loads), infra-red mapping of incidents and numerous non-fire emergency missions. CAL FIRE helicopter crews are highly trained for "short-haul" rescues. A short-haul involves a crew-member being lowered from a hovering helicopter to an injured or trapped person below. Once hooked to a harness or stokes basket, the victim and crew-member are then carried a short distance to safety.

Bell 205 A++
Type II Helicopter

Specifications:

Cruise Speed:	125 mph
Gallon Capacity:	360 plus 324/bucket

Manufacturer
Bell Helicopters, Fort Worth, Texas

Crew
Pilot and nine Firefighters

Mission
The Bell 205 is the civilian version of the UH-1H that CAL FIRE uses for its helicopter fleet. Their missions are identical. In San Diego County, CAL FIRE jointly staffs a Bell 205-A1++ with the sheriff's department. The 205-A1++ has an improved rotor system and more powerful engine than the original 205. With seating for up to 9 passengers, this aircraft can be used for initial-attack fire missions as well as crew transport. A tank can be equipped on the belly of the aircraft that can hold 375 gallons.

Bell 412
Type II Helicopter

Specifications:

Cruise Speed:	140 mph
Gallon Capacity:	360

Manufacturer
Bell Helicopter

Crew
Pilot

Bell 412
The Bell 412 was developed in the late 1970s and is essentially a Bell 212 with a four bladed rotor system. It can perform slightly better than the 212 at higher altitudes. This aircraft can also carry passengers, cargo, and do long line work. Many local fire departments use the Bell 412 for fire suppression. The Bell 412 can have a large tank mounted on the bottom or can carry a bucket.

Bell 407
Type III Helicopter

Specifications:

Cruise Speed:	152 mph
Gallon Capacity:	180

Manufacturer
Bell Helicopter

Crew
Pilot

Bell 407
The Bell 407 is one the newest additions to the Jet Ranger family. The 407 is based on the older Bell 206L-3. The aircraft has some major modifications from older models including a four bladed main rotor system, increased engine performance and slightly expanded inside cabin area. Passenger seating is the same as the Bell Long Ranger, providing seating for a total of six passengers excluding the pilot. As with most light helicopters, they have the ability to take-off and land in relatively small areas.

The Bell 407 can be used for a variety of activities including aerial reconnaissance and aerial ignition. For wildland fire use, it is becoming the light helicopter of choice at many bases. The helicopter's increased speed, lifting capability and improved density altitude performance makes this helicopter ideal for wildland fire initial attack.

Bell 206B "JetRanger"
Type III Helicopter

Specifications:

Cruise Speed: 115 mph

Gallon Capacity: 120/bucket

Manufacturer
Bell Helicopter

Crew
Pilot

Bell Jet Ranger 206B

The Bell 206B, also known as the "JetRanger", was designed in the 1960s for the U.S. Army. After the original Bell 206 was developed it did not win the Army's contract. Bell completed modifications, which made the series one of the most popular helicopter manufactured. The Bell 206B is also one of the first light helicopters built using a turbine engine power plant. This series is one of the most dependable helicopters ever built.

As with most light helicopters, the 206B has the ability to take-off and land in relatively small areas. The aircraft are used for a variety of activities: aerial reconnaissance and aerial ignition. The helicopter has passenger seating for five including the pilot. The Jet Ranger has a cargo compartment in the tail boom and no cargo baskets. The 206B does not perform as well when temperature and elevation increases. The Jet Ranger is normally not the helicopter to use for take-off and landings at altitudes of 9,000 feet or greater.

Bell 206L-III "LongRanger"
Type III Helicopter

Specifications:

Cruise Speed:	120 mph
Gallon Capacity:	120

Manufacturer
Bell Helicopter

Crew
Pilot

Bell Jet Ranger 206 L-III

The Bell 206L-III was built on the same platform as the 206B "JetRanger", but has more room to carry passengers. Two seats were added providing seating for a total of six passengers, one in the front and five in the rear. In addition, they added a larger engine, increasing performance. As with most light helicopters, they have the ability to take-off and land in relatively small areas.

The Bell206L-III can be used for a variety of activities including aerial reconnaissance, aerial ignition, and wildland fire suppression. The easiest way to identify the Long Ranger is by the center window, which extends the appearance from the side. The larger engine also has a rectangular, instead of round turbine tailpipe. Another identifier is the vertical wings attached to the horizontal stabilizer on the tail section.

Eurocopter AS350 AStar
Type III Helicopter

Specifications:

Cruise Speed:	161 mph
Gallon Capacity:	180

Manufacturer
Aérospatiale / Eurocopter Group

Crew
Pilot

Eurocopter AS350 AStar
The AStar series was originally designed by the French manufacturer, Aerospatiale, to compete with Bell Helicopter's JetRanger. It was the first helicopter to be predominantly constructed of composite materials. It is one of the quietest helicopters manufactured. It's worth noting that the main rotor blades on French made helicopters turn counter clock-wise, the opposite direction as American made helicopters.

As with most light helicopters, The AS350s have the ability to take-off and land in relatively small areas. They are used for a variety of activities: aerial reconnaissance, aerial ignition, and fire suppression. The AS350 B3 has increased speed, lifting capability and improved density altitude performance making this helicopter ideal for wildland fire initial attack. The helicopter has passenger seating for four, one in the front and three in the back. It has a cargo compartment in the tail boom. Some AStars may have cargo baskets to provide additional space for cargo.

MD 500D
Type III Helicopter

Specifications:

Cruise Speed: 144 mph

Gallon Capacity: 120

Manufacturer
Hughes Helicopters / McDonnell Douglas

Crew
Pilot

MD 500D
The 500D was originally manufactured by Hughes Helicopters, which is now owned by McDonnell Douglas Corporation. The civilian Model 500 is a direct descendent of the U.S. Army's OH-6A, originally designed as an observation helicopter during the Vietnam conflict. The egg shape design provided excellent crash survival characteristics. The 500 model is very maneuverable. They are used for a variety of activities such as aerial reconnaissance, aerial ignition, and wildland fire suppression.

There are several unique features of this aircraft. The engine exhaust pipe is directly under the tailboom. Seating in the 500D is extremely cramped. There are three seats in the back, but they can actually accommodate only two. Front seat passenger sits on the right side instead of the left.

Aérospatiale SA 315B "Lama"
Type III Helicopter

Specifications:

Cruise Speed:	115 mph
Gallon Capacity:	180

Manufacturer
Aérospatiale

Crew
Pilot

Aérospatiale SA 315B "Lama"
The Lama is a French helicopter originally designed in the late 60s for high altitude work. It holds the altitude record for helicopters, reaching an altitude of 40,820 feet. It is a virtual workhorse for its size and weight. It is one of few helicopters that can actually lift its own weight.

The helicopter has outstanding visibility for observation and reconnaissance. They are used for a variety of activities: aerial reconnaissance, aerial ignition, and wildland fire suppression.

Passenger seating is limited to one in the front and three in the rear. The helicopter has a cargo basket on each side.

Alouette 316B
Type III Helicopter

Specifications:

Cruise Speed:	115 mph
Gallon Capacity:	180

Manufacturer
Aérospatiale

Crew
Pilot

Alouette 316B
The Alouette III is a French helicopter that has the same power plant and rotor system as the "Lama", but unlike the Lama, the Alouette has wheels instead of skids for landing gear. The helicopter has good visibility for observation and reconnaissance. They are used for a variety of activities such as aerial reconnaissance, aerial ignition, and wildland fire suppression.

Unfortunately, the Alouette III has limitations similar to the Lama. Because of older technology the helicopter is maintenance intensive and extremely noisy. It is slow compared to other helicopters and burns about one gallon of fuel per minute. Due to main rotor blade design, the main rotors have a low droop at the front of the aircraft. Passenger seating is limited to one in the front and three in the rear. The helicopter has a cargo basket on each side.

Lockheed C-130

Type I Airtanker - Modular Airborne Firefighting System

Specifications:

Cruise Speed: 275 mph

Gallon Capacity: 3,000

Original Owner

U.S. Air Force
Air National Guard
Air Force Reserve

Crew

Pilot, Co-pilot and Flight Engineer

Mission

A MAFFS (Modular Airborne FireFighting System) unit is a 3,000 gallon pressurized tank installed on a military Lockheed C-130 cargo/utility aircraft. Retardant or water is dropped out of the tank in under five seconds through two tubes at the rear of the plane or through one tube out of the side in the newer models. The retardant dropped can cover an area of one quarter mile long and 60 feet wide to act as a fire barrier. The objective of the MAFFS program is to provide additional emergency aircraft to supplement the existing airtankers during major fire sieges. The MAFFS is not used for initial attack.

History

Congress established the MAFFS program after the 1970 Laguna Fire overwhelmed the existing aviation firefighting resources. The U.S. Forest Service was directed to develop a program in cooperation with the Air National Guard and Air Force Reserve to produce the equipment, training and operational procedures to integrate military air tankers into the national response system. In 2009 the MAFFS 2 was unveiled as the next-generation portable retardant dispersal system. The MAFFS 2 is more efficient and effective in its retardant dropping capabilities.

UH -60 "Blackhawk"
Military Helicopter

Specifications:

Cruise Speed:	183 mph
Gallon Capacity:	780/bucket

Manufacturer
Sikorsky Aircraft Corp

Crew
Pilot, Co-pilot and a Military Helicopter Manager

UH -60 "Blackhawk"
The UH-60 was originally designed for the U.S. Army in the 1970s as a light transport helicopter, air assault and a military medievac helicopter. The aircraft is a four bladed, twin engine helicopter. The popular UH-60 has a civilian version called a S-70 "Firehawk". Today CAL FIRE and other fire agencies train with members of the California and Nevada National Guard to use their aircraft as surge capacity during major wildfire events.

Boeing CH-46 "Sea Knight"
Military Helicopter

Specifications:

Cruise Speed: 140 mph

Gallon Capacity: 224/bucket

Manufacturer
Boeing Company /
Vertol Aircraft Company

Crew
Pilot , Co-pilot and
a Military Helicopter Manager

Boeing CH-46 "Sea Knight"
The Boeing CH-46, known as the "Sea Knight", is the military version of the Boeing-Vertol 107. The CH-46 was designed in the late 50s for the U.S. Marine Corps to be a medium-lift helicopter, and is primarily used to transport cargo. The aircraft is able to provide all-weather, day-or-night assault transport of combat troops, supplies and equipment. Assault Support is its primary function, and the movement of supplies and equipment is secondary. Additional tasks include combat support, search and rescue, support for forward refueling and rearming points. The CH-46 and the CH-47 are most recognizable by their tandem rotors.

CH-47 "Chinook"
Military Helicopter

Specifications:

Cruise Speed: 137 mph

Gallon Capacity: 2,000/bucket

Manufacturer
Boeing Company /
Vertol Aircraft Company

Crew
Pilot , Co-pilot and
a Military Helicopter Manager

CH -47 "Chinook"
The Boeing CH-47 "Chinook" has tandem rotors, and twin turbine engines. The Chinook is powered by two turboshaft engines, mounted on either side of the helicopter's rear end and connected to the rotors by driveshafts. The counter-rotating rotors eliminate the need for an anti-torque vertical rotor, allowing all power to be used for lift and thrust. If one engine fails, the other can drive both rotors. It was originally designed for the U.S. Army in the late 50's as a heavy lift helicopter and was used extensively in Vietnam. The civilian version of the CH-47 is the Boeing 234.

The Chinook is a multi-mission, heavy-lift transport helicopter. Its primary mission is to move troops, artillery, ammunition, fuel, water, barrier materials, supplies and equipment on the battlefield. Its secondary missions include medical evacuation, disaster relief, search and rescue, aircraft recovery, fire fighting, parachute drops, heavy construction and civil development.

The CH-47s provide the ability to carry heavy loads and operate with a large water bucket for wildland fire suppression. The lifting capability is between 15,000-26,000 pounds, depending upon temperature and elevation. The helicopter has excellent lifting capability for external and internal loads.

CH-53E "Super Stallion"
United States Marine Firefighting Aircraft

Specifications:

Cruise Speed: 173 mph

Gallon Capacity: 2,000/bucket

Manufacturer
Sikorsky Aircraft Corp.

Crew
Pilot , Co-pilot and
a Military Helicopter Manager

Sikorsky CH-53E "Super Stallion" (Sikorsky S-80E)
The Sikorsky CH-53E, known as the Super Stallion, is the largest and heaviest helicopter used by the U.S. Marine Corps and Navy. It is one of the few helicopters in the world that uses three turbine engines and can be refueled in flight. The aircraft is used to transport personnel and equipment, and lift heavy loads. The CH53E is capable of lifting 16 tons, transporting the load 50 miles and then returning. The aircraft is a shipboard helicopter configured especially for caring cargo back and forth from military ships. The CH-53E is designated the model S-80 by Sikorsky. During major firestorms, the CH-53E can be used to augment CALFIRE's own air fleet for fire suppression.

Fire Suppressant/Retardant Chemicals

Use of Fire Suppressant/Retardant Chemicals to Aid in Control of Wildfires

- CAL FIRE uses a variety of fire Suppressant/Retardant chemicals in controlling wildfires.
- The Department's use of these materials, to enhance its fire fighting capabilities in protecting life and property, is a foreseeable occurrence.
- CAL FIRE's use of fire Suppressant/Retardant chemicals is a discretionary action subject to the California Environmental Quality Act (CEQA).
- CAL FIRE has adopted a mitigated negative declaration that described the Department's use of these chemicals and analyzed the potential of these chemicals to cause environmental impacts. This analysis identified particular situations where these chemicals have the potential to cause impacts to biological resources and water quality. The Department adopted seven (7) mitigation measures that substantially reduce the potential for these impacts to occur. Those mitigation measures have been incorporated into the Department's Wildland Fire Chemical Policies and firefighter training.

Summary of Mitigation Measures

1. CAL FIRE will limit the use of fire suppressant/retardant chemical mixtures in areas adjacent to waterways.
2. Proper protective clothing shall be worn while mixing and loading long term retardants.
3. All airbases which mix and load fire suppressant/retardant chemicals will be designed to contain any accidental spills of fire suppressant/retardant chemicals.
4. Mobile mixing plants deployed at major fires will be located away from waterways.
5. CAL FIRE will establish jettison areas nearby air retardant bases to minimize potential for contamination.
6. CAL FIRE shall notify the Department of Fish and Game and regional water quality control boards when accidental contamination has occurred that may result in harm to fish or wildlife.
7. CAL FIRE uses only retardants which are approved for use by the USFS WFCS.

Fire Suppressant/Retardant Chemicals and the Enviroment

There are no known adverse effects to domestic or farm animals which eat small amounts of foliage covered with retardant; however reactions of animals may vary by species. A veterinarian should be contacted if your animals eat significant amounts or fire suppression/ retardantcoated vegetation.

Like fertilizer, retardants which are not removed from vegetation, may cause the foliage to turn brown and plant to wither. After rain, how ever, the plant should return to normal and growth may be enhanced due to the added plant nutrients.

Retardants have been tested for toxicity to fish and water dwelling invertebrates. The result, presented in the MSDS, indicate a relatively low order of acute toxicity to these organisms. This indicates that runoff from the application of retardants is unlikely to pose a serious threat to aquatic life. However, the free ammonia present in all fire suppression/retardantsolutions can be quite toxic to aquatic life when directly applied. Care is recommended, and is exercise by the using agencies during applicationof the retardant, to minimize introduction into streams, ponds, and the like.

How Are Retardant Solutions Removed?

Wildland fire retardants are generally quite water soluble and can be removed with little effort prior to drying. When allowed to dry, however, the gum thickener can form films which tend to hold the dried retardant component rather tightly to that on which it lands. This is desirable when it lands on wildland fuels. It is less desirable, how ever, when trying to remove it from other areas. Retardant residues should consequently be removed as soon as possible. After drying, some scrubbing or power washing of structures and equipment may be required. A mild surfactant may assist in removal.

Solutions in general can increase the slipperiness of most surfaces. Retardant solutions are not exceptions and care should be taken when working in and around spilled or applied retardant. Spills should be cleaned up as soon as possible to avoid possible falls. Care needs to be taken by personnel working in areas treated with wildland fire retardants.

Glossary

Firefighting Aircraft means support of the firefighters on the ground from aircraft in the air. Aircraft can access steep, rocky or unsafe areas before ground forces are able to gain entry. CAL FIRE has the largest state owned firefighting air fleet including 23 airtankers, 12 helicopters and 17 air attack aircraft.

Air Attack or Air Tactical Aircraft is an airplane that flies over an incident, providing tactical coordination with the incident commander on the ground, and directing airtankers and helicopters to critical areas of a fire for retardant and water drops. CAL FIRE uses OV-10As and King Air A200s for its air attack missions.

Airtanker is a fixed-wing aircraft that can carry fire retardant or water and drop it on or in front of a fire to help slow the fire down. CAL FIRE uses Grumman S-2T airtankers for fast initial attack delivery of fire retardant on wildland fires. The S-2T carries 1,200 gallons of retardant and has a crew of one – the pilot.

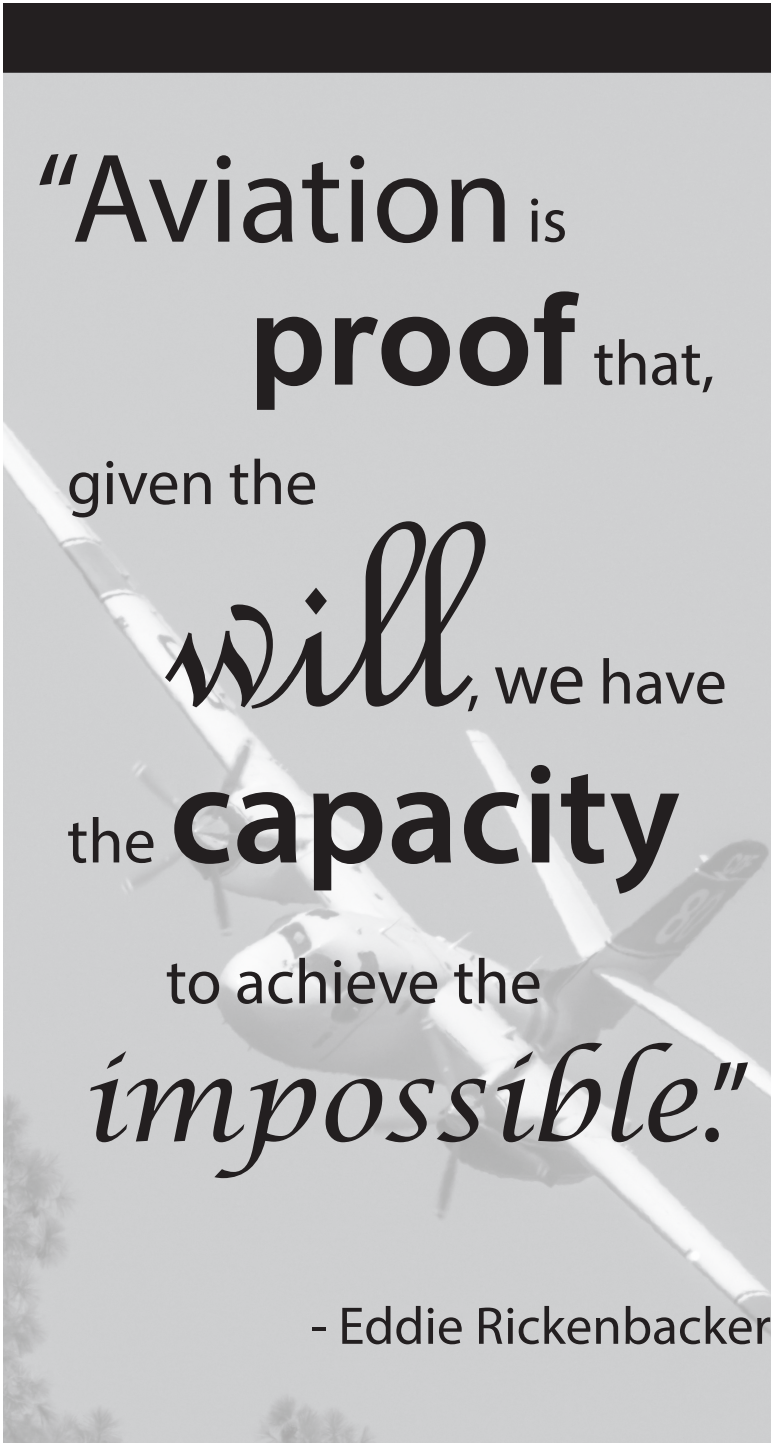
Helicopter is a rotary-wing aircraft that can be fitted with a tank or carry a bucket with water or fire retardant. The tanks or buckets can be filled on the ground by siphoning water from lakes, rivers or other water sources. CAL FIRE uses UH-1H Super Huey helicopters for fast initial attack on wildfires. CAL FIRE's copters are able to quickly deliver a nine-person fire crew wherever needed as well as battle fires with water/foam drops.

Fire Retardant is a slurry mix consisting of a chemical salt compound, water, clay or a gum- thickening agent, and a coloring agent. The retardant is used to slow or retard the spread of a fire. At nine pounds per gallon, an S-2T can carry 10,800 pounds.

Military Helicopter Manager is a trained firefighter that flies aboard military helicopters when they are called to assist during major wildfires. The Military Helicopter Manager helps guide and coordinate military pilots, while communicating with the air tactical supervisor. This position ensures that military aircraft are used safely and efficiently during emergencies.

Initial Attack means the first attack on the fire. The number of resources sent on the first dispatch to a wildfire depends upon the location of the fire, the fuels in the area (vegetation, timber, homes, etc) and current weather conditions. Municipal fire departments would call this the first alarm. Most fires are caught within the first burn period (the first two hours). Therefore, the vast majority of the fires CAL FIRE responds to are considered initial attack fires.

Extended Attack means that the fire has burned beyond the area of origin, and beyond the initial attack phase, and additional resources are called. If the fire cannot be confined in the area of origin even with a substantial addition of resources, and a long-term resource commitment and logistical support will be required, then it is considered a major attack or a major fire.


"Aviation is
proof that,
given the
will, we have
the capacity
to achieve the
impossible."
- Eddie Rickenbacker

On October 7th, 2014, Dyncorp Pilot Geoffrey "Craig" Hunt was involved in a fatal crash while flying a CAL FIRE Airtanker (Tanker 81) over the Dog Rock Fire burning near Yosemite's Arch Rock. We continue to honor him for his service, and have retired #81.
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