



# **FIREFIGHTING AIRCRAFT RECOGNITION GUIDE**



**C**AL FIRE's world-renowned aviation program responds to thousands of wildland fires across California annually. The operational fleet includes Grumman S-2T and C-130 Hercules airtankers, Bell UH-1H Super Hueys, Sikorsky S-70i FIREHAWK® helicopters, King Air A200 training and intelligence platforms, and OV-10 Bronco tactical aircraft. These assets, along with highly skilled crew members, pilots, and support staff, are strategically positioned at one airtanker base, 13 air attack bases and 11 CAL FIRE helitack bases. This distribution allows aircraft to reach even the most remote State Responsibility Area (SRA) fires within approximately 20 minutes, supporting the goal of keeping 95% of all fires to 10 acres or less. With over 70 fixed and rotary-wing aircraft, CAL FIRE operates the largest aerial firefighting fleet in the world.

## Airtanker Program

Aircraft were first proposed for fighting California's wildland fires in 1931, and again in the late 1940s after World War II. CAL FIRE used several small airtankers on a Call-When-Needed basis between 1954-1957, and in 1958, the Department contracted with private aviation companies for airtanker services. The air program expanded until the early 1970s, when CAL FIRE owned and operated 14 turboprop air tactical aircraft and seven multi-engine retardant/water dropping aircraft. Early aircraft included SOCATA TBMs, Grumman F7Fs, Consolidated PBVs, and a Boeing B-17.

By the late 1970s, CAL FIRE made the Grumman S-2 its primary airtanker. In 1987, the Department began upgrading to turbine-driven engines and, by 2005, all airtankers had been converted to the Grumman S-2T model. In 2006, CAL FIRE placed the first Very Large Air Tanker on contract, a converted McDonnell Douglas DC-10, further enhancing initial and extended attack capabilities.

In July 2018, California obtained approval for the acquisition of seven C-130H aircraft for CAL FIRE to further improve firefighting capabilities. The 2019 National Defense Authorization Act allowed for the transfer of the planes from the United States Coast Guard to California, following modifications by the United States Air Force, including the replacement of center wing boxes and outer wings. The C-130Hs became response-ready in 2024 after retardant delivery system installation.

## Air Tactical Aircraft

In 1974, CAL FIRE acquired 20 Cessna O-2 aircraft from the US Air Force, previously used during the Vietnam War, for use as an Air Attack platform to direct airtankers, helicopters, and provide incident updates to ground resources.

In 1993 the Department replaced the aging O-2 platform with 16 North American OV-10A aircraft, which were obtained from the Department of Defense. The OV-10s were equipped with turbine-powered twin engines and served as the next-generation Air Attack platform.

## Helicopter Program

In 1981, CAL FIRE took a significant step towards strengthening its fleet by acquiring 12 Bell UH-1F series helicopters from the United States Air Force. These helicopters were a valuable addition to the Department's operations as they provided exceptional agility and maneuverability during firefighting operations.

In the late 1980s, CAL FIRE phased out the "F" model in favor of the larger UH-1H helicopters. These UH-1H aircraft were significantly modified and designated as Super Hueys, a name that perfectly reflected their superior performance and exceptional capabilities. The modifications included upgraded engines, advanced communication systems and specialized equipment for fire suppression and rescue operations. These helicopters provided enhanced maneuverability, greater lift capacity and faster response times.

In 2018, CAL FIRE embarked on a mission to modernize and bolster its aerial firefighting capabilities by seeking approval from the Governor's Office to purchase up to 12 new Sikorsky S70i helicopters. The approval was granted, and by the spring of 2023, 12 of these state-of-the-art helicopters had been acquired and were performing fire and rescue emergency missions.

In the 2022-2023 fiscal year, the Governor's Office provided additional funding for the purchase of 4 more CAL FIRE HAWK helicopters. These additional helicopters increase surge capacity and ensure operational readiness during mandatory maintenance cycles.

With improved flight safety features, higher payload capacity, increased power margins and the ability to operate at night, these state-of-the-art helicopters enable CAL FIRE to respond to emergency situations day and night, providing a greater degree of safety for firefighters and the community.



**T**his 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.





★ **AMU**

McClellan - MCC-CDF

OV-10A A-651 (N403DF)

A-200 CI-641 (N461DF)

S-2T T-100 (N441DF)

OV-10A A-652 (N407DF)

A-200 A-657 (N416DF)

G58 Baron (N457DF)

A-200 A-658 (N463DF)

**C-130H Fleet**

- T-116 (N464DF)
- T-117 (N465DF)
- T-118 (N466DF)
- T-119 (N468DF)
- T-120 (N567DF)
- T-121 (N460DF)
- T-122 (N462DF)

**S701 Fleet**

- |                |                |                |                |
|----------------|----------------|----------------|----------------|
| C-601 (N482DF) | C-605 (N478DF) | C-609 (N484DF) | C-613 (N451DF) |
| C-602 (N479DF) | C-606 (N485DF) | C-610 (N480DF) | C-614 (N452DF) |
| C-603 (N487DF) | C-607 (N486DF) | C-611 (N483DF) | C-615 (N453DF) |
| C-604 (N477DF) | C-608 (N476DF) | C-612 (N492DF) | C-616 (N454DF) |



**Federal Air Attack Bases**

- Siskiyou - SIY-SKU
- Chester-O05-LMU
- Santa Maria - SMX-SBC
- Fox Field - WJF-LAC
- San Bernardino - SBD-BDU



**Helicopter Bases**

- Kneeland - KNE-HUU  
S701
- Bieber - BBR-LMU  
S-701
- Vina - VNA-TGU  
S701
- Howard Forest - HFS-MEU  
S701
- Boggs Mountain - BGS-LNU  
S701
- Alma - ALM-SCU  
S701
- Columbia - CBA-TCU  
S701
- Hollister - CVH-BEU  
S701
- Prado - PDO-BDU  
S701
- Hemet Ryan - HMT-RRU  
S701
- Ramona - RNM-SDU  
S701
- Gilgespie Field - SEE-SDU  
San Diego Co. Sheriff  
Aircraft & Pilots



**CALFIRE Air Attack Bases**

- McClellan Air Tanker Base - AEU  
OV-10D A-655 (N470DF)  
C-130H

**Rohnerville - FOT-HUF**

- OV-10A A-120 (N413DF)
- S-2T T-96 (N440DF)

**Chico - CIC-BTU**

- OV-10A A-210 (N402DF)
- S-2T T-93 (N450DF)
- C-130H

**Ukiah - UKI-MEU**

- OV-10A A-110 (N410DF)
- S-2T T-90 (N434DF)
- S-2T T-91 (N428DF)

**Sonoma - STS-LNU**

- OV-10A A-140 (N414DF)
- S-2T T-85 (N438DF)
- S-2T T-86 (N433DF)

**Ramona - RNM-SDU**

- OV-10A A-330 (N409DF)
- S-2T T-70 (N427DF)
- S-2T T-71 (N432DF)
- C-130H

**Columbia - O22-TCU**

- OV-10A A-440 (N401DF)
- S-2T T-82 (N422DF)
- S-2T T-83 (N424DF)

**Hollister - CVH-BEU**

- OV-10A A-460 (N415DF)
- S-2T T-79 (N458DF)
- S-2T T-80 (N445DF)

**Paso Robles - PRB-SLU**

- OV-10A A-340 (N418DF)
- S-2T T-74 (N439DF)
- S-2T T-75 (N444DF)
- C-130H

**Hemet Ryan - HMT-RRU**

- OV-10A A-310 (N429DF)
- S-2T T-72 (N435DF)
- S-2T T-73 (N437DF)



**Joint Air Attack Bases**

**Redding - RDD-SHU**

- OV-10A A-240 (N421DF)
- S-2T T-84 (N442DF)
- S-2T T-85 (N448DF)

**Grass Valley - GOO-NEU**

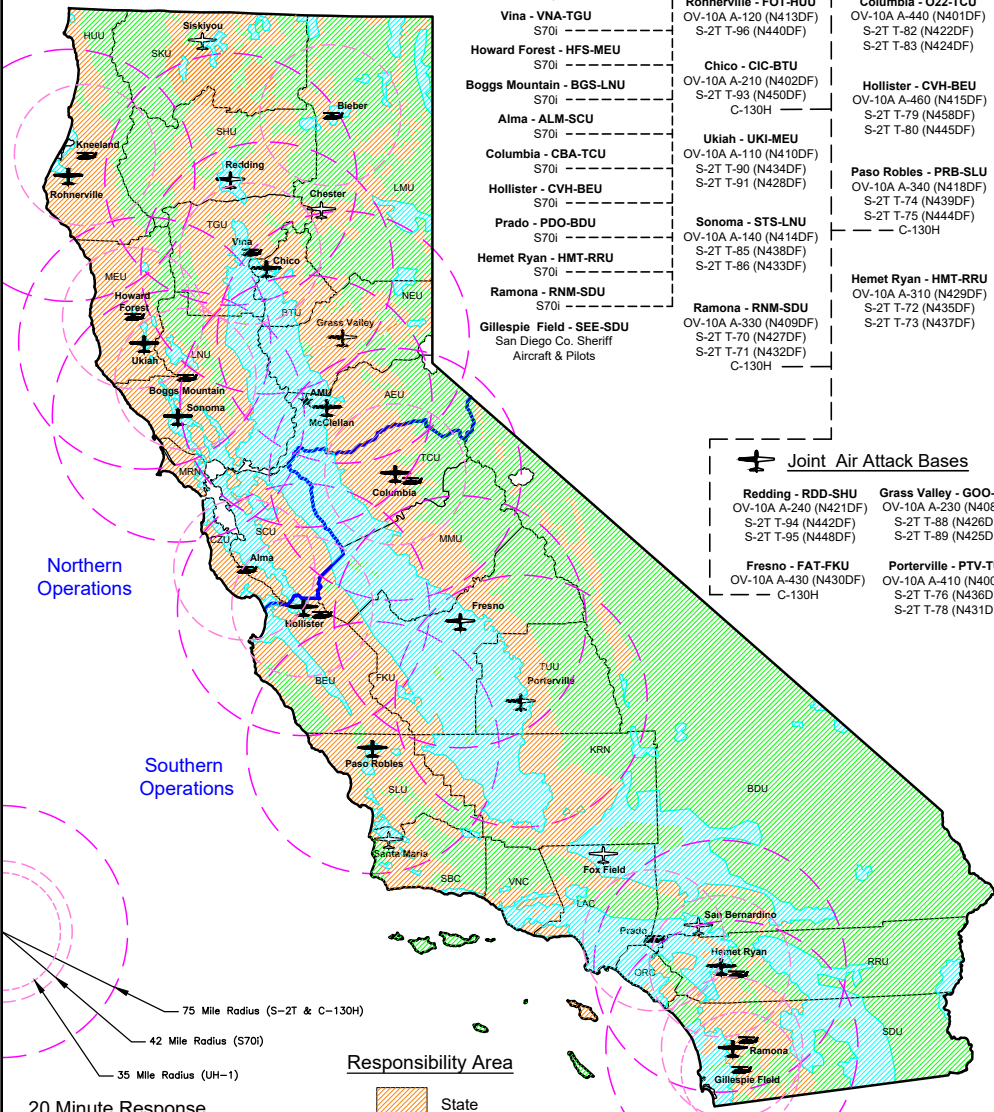
- OV-10A A-230 (N408DF)
- S-2T T-86 (N426DF)
- S-2T T-89 (N425DF)

**Fresno - FAT-FKU**

- OV-10A A-430 (N430DF)
- C-130H

**Porterville - PTV-TUU**

- OV-10A A-410 (N400DF)
- S-2T T-76 (N436DF)
- S-2T T-78 (N431DF)



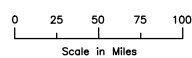
Northern Operations

Southern Operations

**Responsibility Area**

- State
- Federal
- Local

**20 Minute Response**



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## SPECIFICATIONS:

### Cruise Speed:

258 mph

### Gallon Capacity:

not applicable

### Manufacturer

North American-Rockwell,  
Columbus, Ohio.

### Crew

Pilot and observer (Chief  
Officer or Fire Captain).



## Original Owner

United States Navy/Marines, 1968-1993. The OV-10 was used as a counterinsurgency aircraft and close air-support to military ground forces.

## Acquired by CAL FIRE

In 1993, CAL FIRE acquired 15 OV-10As from the Federal Excess Personal Property (FEPP) program. These have since been converted for use as air attack platforms replacing the original Cessna O-2As that CAL FIRE had been using. The OV-10As are newer, larger, faster, provide a larger field of vision for the pilot and air attack officer and are more maneuverable than the older O-2As. In 2009, CAL FIRE also acquired three OV-10Ds, of which one has been converted and is in use.

## Mission

CAL FIRE uses the OV-10s as the primary command and control platform on wildland incidents. The air attack officer, a highly trained and experienced fire officer, coordinates with the incident commander on the ground, providing a unique aerial perspective on fire conditions, anticipated resource needs and potential threats to life and property.

The Air Attack Officer is also responsible for the safe coordination of all aerial resources on an incident and where to make retardant and water drops based upon the Incident Commander's control objectives. The OV-10 can be utilized as a lead plane, for Very Large Air Tankers (VLAT) when not assigned as a command and control platform.



## Original Owner

United States Army

## Acquired by CAL FIRE

In service operationally for CAL FIRE 2010

## 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.

## SPECIFICATIONS:

### Cruise Speed:

333 mph

### Gallon Capacity:

not applicable

### Manufacturer

Hawker Beechcraft

### Crew

Pilot and Air Tactical Group Supervisor





## SPECIFICATIONS:

### Cruise Speed:

485 mph

### Gallon Capacity:

9,400

### Manufacturer

McDonnell Douglas

### Crew

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. 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.





### Original owner

United States Coast Guard, 1985-present (USCG HC-130H)

### Acquired by CAL FIRE

In July 2018, California secured approval to acquire seven C-130H aircraft for CAL FIRE. This addition to the firefighting fleet was solidified in December 2023 with the passage of the National Defense Authorization Act (NDAA) by Congress. Signed into law by President Biden later that month, the NDAA authorized the transfer of these C-130Hs from the United States Coast Guard to California.

Since 2018, the United States Air Force and the United States Coast Guard played a pivotal role in maintaining the aircraft including the replacement of the inner and outer wing boxes, paint and providing spare provisions.

The first CAL FIRE C-130H went into service on Monday August 26, 2024.

### Mission

The C-130Hs are used for rapid initial attack delivery of fire retardant on wildland fires. These 7 airtankers are located at air attack bases strategically located throughout California.

### SPECIFICATIONS:

#### Cruise Speed:

360 mph

#### Gallon Capacity:

4,000 gallons long-term fire retardant

#### Manufacturer

Lockheed Martin, Marietta Georgia

#### Crew

Three-person crew; pilot, co-pilot, and flight engineer





## SPECIFICATIONS:

### Cruise Speed:

380 mph

### Gallon Capacity:

3,000

### Manufacturer

British Aerospace / Avro

### Crew

Pilot, Co-pilot

## Original Owner

The British Aerospace 146 (also BAe 146) is a short-haul and regional airliner that was manufactured in the United Kingdom by British Aerospace, production ran from 1983 until 2002. The 146 was introduced into Royal Air Force service in 1986 as a VIP transport and is operated by 32 (The Royal) Squadron. Manufacture of an improved version known as the Avro RJ began in 1992.

## Mission

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 four LF 507 Turbofan engines. The aircraft is equipped with the Retardant Aerial Delivery System II "RADS II" and the system is internal to the aircraft. The RADS II tank is scale-able to any size or type of aircraft, enabling it to be installed in aircraft ranging in size from the BAE146 to the C-130.



PHOTO © JEREMY ULLOA

## Original Owner

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.

## Mission

This aircraft can operate from most existing Airtanker Bases with little or no impact. Large Air Tankers (LATs), like the MD-87 can be used in challenging terrain. The MD-87 is relatively agile for its size and requires some planning by the supervising aircraft to provide a stabilized path for delivery. Flight paths for pattern speeds of 130 to 140 knots on final should be planned.

## SPECIFICATIONS:

### Cruise Speed:

400 mph

### Gallon Capacity:

3,000

### Manufacturer

McDonnell Douglas

### Crew

Pilot, Co-pilot





## SPECIFICATIONS:

### Cruise Speed:

517 mph

### Gallon Capacity:

4,000

### Manufacturer:

Boeing

### Crew:

Pilot and Co-pilot

## Original Owner

The Boeing 737 is a narrow-body aircraft produced by Boeing Commercial Airplanes at its Renton Factory in Washington. Developed to supplement the Boeing 727 on short and thin routes, the twinjet retains the 707-fuselage cross-section and nose with two underwing turbofans. Envisioned in 1964, the initial 737-100 made its first flight in April 1967 and entered service in February 1968 with Lufthansa. The lengthened 737-200 entered service in April 1968. It evolved through four generations, offering several variants for 85 to 215 passengers.

## Mission

The newest addition to the firefighting fleet are the Coulson 737 FIRELINER's. Coulson Aviation is the first in the world to convert Boeing's 737 commercial airliners into FIRELINER's. Coulson has six 737's in line for conversation, each receiving 43,000+ technician hours to become fully compliant and operational. The FIRELINER is the only multi-use Large Air Tanker in the world and can carry retardant and up to 72 passengers without re-configuring the airplane.





## Original Owner

Both the CL-215 and Bombardier 415 are Canadian aircraft built specifically for fire suppression and are known in the U.S. as Super Scoopers. 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.

## Mission

These turbine aircraft scoop water from oceans, 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. 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.

## SPECIFICATIONS:

### Cruise Speed:

189/233 mph

### Gallon Capacity:

1,300/1,621

### Manufacturer

Canadair / Bombardier,  
Canada

### Crew

Pilot and Co-pilot





PHOTO © JEREMY ULLOA

## SPECIFICATIONS:

### Cruise Speed:

270 mph

### Gallon Capacity:

1,200 gallons long-term fire retardant

### Manufacturer

Grumman Aerospace,  
Bethpage, New York

### Crew

One pilot



### Original Owner

United States Navy, 1958-1975; The S-2E/G carrier-based anti-submarine warfare airplane.

### Acquired by CAL FIRE

In 1996, CAL FIRE acquired 26 S-2E/G planes from the Federal Excess Personal Property (FEPP) program. Marsh Aviation converted the planes to a firefighting configuration and were retrofitted with modern, powerful turboprop engines. The completely reconditioned S-2Ts are faster, safer, more maneuverable, and carry a larger retardant payload than the original S-2A airtankers CAL FIRE had used since the 1970s. The final three S-2Ts were completed and delivered in 2005. CAL FIRE has 23 S-2T one of which is in Sacramento at CAL FIRE's Aviation Management Unit (AMU) as maintenance relief.

### Mission

The S-2T airtankers are used for rapid initial attack delivery of fire retardant on wildland fires. These airtankers are strategically located throughout California responding to the most remote State Responsibility Areas (SRA) within approximately 20 minutes.



## Original Owner

The Air Tractor AT-802 is an agricultural aircraft that may also be adapted into fire-fighting or armed versions. It first flew in the United States in October 1990 and is manufactured by Air Tractor Inc. The AT-802 carries a chemical hopper between the engine firewall and the cockpit. In the U.S., it is considered a Type III SEAT, or Single Engine Air Tanker.

## 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

## SPECIFICATIONS:

### Cruise Speed:

180 mph

### Gallon Capacity:

800

### Manufacturer

Air Tractor, Inc. Olney, TX,  
USA

### Crew

Pilot





## SPECIFICATIONS:

### Cruise Speed:

170 mph

### Gallon Capacity:

800 lbs.

### Manufacturer

Air Tractor, Inc. Olney, TX,  
USA

### Crew

Pilot

## Original Owner

The Air Tractor AT-802 is an agricultural aircraft that may also be adapted into fire-fighting or armed versions. It first flew in the United States in October 1990 and is manufactured by Air Tractor Inc. The AT-802 carries a chemical hopper between the engine firewall and the cockpit. In the U.S., it is considered a Type III SEAT, or Single Engine Air Tanker.

## 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.





## Original Owner

The Short C-23 Sherpa is a twin-engine turboprop aircraft a small military transport aircraft built by Short Brothers in Belfast, Ireland. It was designed to operate from unpaved runways and make short takeoff and landings. It features a large squared fuselage with a full-width rear cargo door/ramp. It was produced from 1984 to 1990.

## Mission

In its current configuration, it flies an initial attack load of 10 smokejumper plus cargo with an endurance of 3 hours. From Redding, the Sherpa has the ability to initial attack all North Ops forests and some of the more northerly South Ops forests without a fuel stop. The aircraft is also available for Para-cargo missions, with up to 4,500 pounds of cargo deliverable via parachute or delivery to a suitable airport.

## SPECIFICATIONS:

### Cruise Speed:

230 mph

### Payload

4,500 lbs.

### Manufacturer

Short Brothers

### Crew

Pilot, Co-pilot





## SPECIFICATIONS:

### Cruise Speed:

250 mph

### Payload:

3,500 lbs.

### Manufacturer

Dornier GmbH

### Crew

Pilot and Co-pilot

### Original Owner

The Dornier Do-228 is a twin-turboprop STOL utility aircraft, designed and first manufactured by Dornier GmbH (later DASA Dornier, Fairchild-Dornier) from 1981 until 1998, 245 were built in Oberpfaffenhofen, Germany.

### Mission

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 initial attack 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 Para-cargo only missions, with up to 3,500 pounds of cargo deliverable via parachute or delivery to a suitable airport.





## 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.

### SPECIFICATIONS:

#### Cruise Speed:

154 mph

#### Gallon Capacity:

1,000

#### Manufacturer

Sikorsky Aircraft Corp

#### Crew

Pilot and Co-pilot





## SPECIFICATIONS:

### Cruise Speed:

160 mph

### Gallon Capacity:

Fixed tank - 1000 gallons of water/foam with pilot controlled drop volumes.

### Manufacturer

Sikorsky Aircraft, Stratford, Connecticut (Built in Mielec, Poland)

### Crew

One pilot, two Helitack Captains, an operations supervisor, and up to nine personnel.



### Original Owner

CAL FIRE, 2019

### Acquired By CAL FIRE

In 2018 funding was secured for the purchase of 12 Sikorsky S70i helicopters. S70i CAL FIRE HAWKS bring enhanced capabilities including flight safety, higher payloads, increased power margins and night flying capabilities.

In Fiscal Year 2022-2023 additional funding was approved to purchase four additional S70i Fire Hawk Helicopters to increase surge capacity and to maintain operational capabilities during required maintenance cycles.

### Mission

The CAL FIRE HAWK has night mission capabilities and performs fire suppression and rescue missions. When responding to wildfires, the helicopter can quickly deliver up to a 9-person Helitack Crew for ground firefighting, which supports with water drops.

The helicopters are deployed for a variety of tasks including transporting cargo, firing operations, mapping, medical evacuations and other emergency missions not related to fires.

CAL FIRE HAWKS are equipped with external hoists, enabling the crew to conduct complex hoist rescue operations. Highly skilled crewmembers are deployed from the hovering aircraft to reach individuals in areas inaccessible by ground crews. After securing the patient in a specialized rescue device, both the crewmember and the rescued person are hoisted back into the helicopter for transport to a designated landing zone for medical care.



## 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.

### SPECIFICATIONS:

#### Cruise Speed:

140 mph

#### Gallon Capacity:

1,100/bucket

#### Manufacturer

Boeing Company / Vertol  
Aircraft Company

#### Crew

Pilot and Co-pilot





## 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.





## 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.

### SPECIFICATIONS:

#### Cruise Speed:

91 mph

#### Gallon Capacity:

660

#### Manufacturer

Boeing Company / Vertol  
Aircraft Company

#### Crew

Pilot





## 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.





## Original Owner

United States Army, 1963 to 1975. The UH-1H was used as a troop/cargo transport and for specialized operations.

## Acquired By CAL FIRE

In 1981, CAL FIRE acquired 12 UH-1H helicopters through the Federal Excess Personal Property (FEPP) program. In 1990 they were replaced by newer, highly modified, Vietnam-era UH-1H helicopters referred to as the Super Huey.

## Mission

The CAL FIRE Super Hueys perform fire suppression and rescue missions. When responding to wildfires, the helicopter can quickly deliver a Helitack Crew for ground firefighting which it supports with water drops.

The helicopters are also used for firing operations using either a Helitorch or a Plastic Spherical Dispenser (PSD) on wildland fires or prescribed burns, transporting internal cargo loads, mapping, medical evacuations and other non-fire emergency missions.

In 1997, CAL FIRE personnel were trained to do "short haul" rescues. Since 2011 CAL FIRE has moved away from the Short Haul program and started utilizing the Hoist program. This specialized rescue technique involves highly trained firefighters being lowered from a hovering helicopter to an injured or trapped person below. Once secured to a rescue device, both the victim and rescuer are then hoisted into the helicopter and flown to a landing zone.

## SPECIFICATIONS:

### Cruise Speed:

126 mph

### Gallon Capacity:

Bucket operations: 324 gallons of water/foam

Fixed tank: 360 gallons of water/foam with pilot controlled drop volumes

### Manufacturer

Bell Helicopters, Fort Worth, Texas

### Crew

One pilot, two Helitack Captains, and eight personnel.





## SPECIFICATIONS:

### Cruise Speed:

115 mph

### Gallon Capacity:

360

### Manufacturer

Bell Helicopter

### Crew

Pilot, two Fire Captains and eight Firefighters

## 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.





## 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.

### SPECIFICATIONS:

#### Cruise Speed:

140 mph

#### Gallon Capacity:

360

#### Manufacturer

Bell Helicopter

#### Crew

Pilot





## 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 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.

### SPECIFICATIONS:

#### Cruise Speed:

115 mph

#### Gallon Capacity:

120/bucket

#### Manufacturer

Bell Helicopter

#### Crew

Pilot





PHOTO BY STEVE WHITBY  
PHOTOGRAPHY

## SPECIFICATIONS:

### Cruise Speed:

152 mph

### Gallon Capacity:

180

### Manufacturer

Bell Helicopter

### Crew

Pilot

## Bell 407

The Bell 407 is one of 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.





## 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 ASStars may have cargo baskets to provide additional space for cargo.

### SPECIFICATIONS:

#### Cruise Speed:

161 mph

#### Gallon Capacity:

180

#### Manufacturer

Aérospatiale / Eurocopter  
Group

#### Crew

Pilot





## 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.





## 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.

### SPECIFICATIONS:

#### Cruise Speed:

144 mph

#### Gallon Capacity:

120

#### Manufacturer

Hughes Helicopters /  
McDonnell Douglas

#### Crew

Pilot





PHOTO © JEREMY ULLOA

### 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.



## 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.

### SPECIFICATIONS:

#### Cruise Speed:

140 mph

#### Gallon Capacity:

224/bucket

#### Manufacturer

Boeing Company /  
Vertol Aircraft Company

#### Crew

Pilot, Co-pilot and a Military  
Helicopter Manager



**SPECIFICATIONS:****Cruise Speed:**

183 mph

**Gallon Capacity:**

780/bucket

**Manufacturer**

Sikorsky Aircraft Corp

**Crew**Pilot, Co-pilot and a Military  
Helicopter Manager**Sikorsky UH-60 Black Hawk**

The Sikorsky UH-60 was originally designed for the U.S. Army in the 1970s as a light transport helicopter, air assault and a military medevac helicopter. The aircraft is a four bladed, twin engine helicopter. The popular Sikorsky 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.





## 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.

### 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





### **SPECIFICATIONS:**

## **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.

### **Cruise Speed:**

173 mph

### **Gallon Capacity:**

2,000/bucket

### **Manufacturer**

Sikorsky Aircraft Corp.

### **Crew**

Pilot, Co-pilot and  
a Military Helicopter  
Manager



**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.



## 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 Environment

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.

*“Aviation is  
proof that,  
given the  
will, we have  
the capacity to  
achieve the impossible.”*

*- Eddie Rickenbacker*

