

Backpack helicopter



Artist's depiction of a helibackpack with counter-rotating twin rotors

A **backpack helicopter** or **helibackpack** is a [helicopter](#) motor and [rotor](#) and controls assembly that can be strapped to a man's back, so that he can walk about on the ground wearing it, and can use it to fly. Its [harness](#), like a [parachute](#) harness should have a strap between the legs, so that the pilot does not fall out of the harness during flight.

Related are devices like a backpack helicopter which also include a seat and leg supports and are actually very small open-topped ordinary helicopters.

(See also [jetpack](#).)

Several inventors have tried to make backpack helicopters, with mixed results.

In theory, a helicopter would be more efficient than a [rocket pack](#) or [jetpack](#), possessing a greater [specific impulse](#), and being more suited to hovering due to the smaller velocities of the propelled gases.

Examples which are pure backpack:-

- <http://english.pravda.ru/main/2002/06/11/30172.html> describes a Russian backpack helicopter.
- The [Heliofly](#) was a make which was designed in [Germany](#) in 1941 onwards. See [\[1\]](#) and [\[2\]](#). Or search for *Heliofly* in <http://www.altavista.com> .
- [Pentecost HX-1 Hoppi-Copter](#)
- [Rhyme](#) (made in Japan)

Examples which have a seat:-

- [SoloTrek XFV](#) (Exo-skeleton Flying Vehicle).
- See <http://www.vortechonline.com> for various models which have seats. They formerly also made a pure backpack model with two very long rotor blades driven by a little propane-powered jet motor at the end of each blade.
- [GenH4](#)

Backpack helicopters occur sometimes in fiction. All real backpack helicopters are flown with its pilot's body vertical, but there are some in fiction (for example, occasionally in the [Dan Dare comics](#)) which are flown with its pilot's body horizontal.

Balloon helicopter

A **balloon helicopter** is a toy helicopter comprised of a latex [balloon](#) and a plastic [propeller](#). The propeller is driven by the [pneumatic](#) action of [air](#) escaping from the balloon, traveling through nozzles embedded within the center of the propeller. The propeller's rate of rotation increases as air continues to leave the balloon, creating [lift](#) and causing the device to [fly](#) in an upward direction.

A typical balloon helicopter, at full capacity, can fly for approximately 20 seconds and can attain a height of approximately 12 meters (40 feet).

Helicopters Bell 206



The [Bell Model 206 JetRanger](#) is one of the most successful helicopter designs in the world. The design originated in the mid-1960s as an entry in a [US Army](#) competition for a light observation (scout) helicopter. Although Bell lost the contract, the Model 206 "JetRanger" entered the civilian market in 1967. Although the Model 206 has been overhauled three times, the basic shape and design are unchanged since 1967. The JetRanger is popular with news media for traffic and news reporting. The [US Army](#), [US Navy](#), [Marines](#), and [Coast Guard](#) use 206 variants known as the TH-57 "Sea Ranger" in the Navy and Marines and the TH-67 Creek in the Army as a trainer for helicopter students.

The Bell 206 is a two-rotor, turbine powered helicopter with a conventional, two-bladed tail rotor. The aircraft uses hydraulic flight controls. The Model **206-B3** is the "original" five-seat model, while the **206-L4** is the "stretch" seven-seat version (a.k.a., "LongRanger"). Both versions have two individual seats up front and a three seat bench in the back; the LongRanger adds two rear-facing seats in between the front and rear seats. The model 206s is typically flown by a single pilot, who sits in the front right seat.

The Model 206 design has yielded a number of derivative aircraft, including the [407](#) and military [OH-58 Kiowa](#). The 407 and [OH-58D](#) use a newer, 4-bladed [articulated rotor system](#) that offers improved performance while reducing vibration and noise.

The [ICAO](#) designator for both the JetRanger and the LongRanger as used in [flight plans](#) is B06.

Specifications (206-B3)

General Characteristics

- **Crew:** 1
- **Capacity:** 4 (206-B3)
- **Length:** 39 ft 1 in (11.9 m)
- **Main rotor diameter:** 33 ft 4 in (10.16 m)
- **Height:** 2.83 m (9 ft 4in)
- **Main rotor area:** 872 ft² (81.1 m²)
- **Empty:** 1,632 lb (742 kg)
- **Loaded:** 3,200 lb (1,452 kg)
- **Maximum takeoff:** 3,350 lb (1,520 kg)
- **Powerplant:** 1x [Allison 250](#)-C20J, 420 shp (313 kW)

Performance

- **Maximum speed:** 139 mph (224 km/h)
- **Range:** 437 miles (704 km)
- **Service ceiling:** 13,500 ft (4,115 m)
- **Rate of climb:** 1,280 ft/min (390 m/min)
- **Main rotor loading:** 4 lb/ft² (18 kg/m²)
- **Power/Mass:** 0.26 hp/lb (0.42 kW/kg)



CHC Bell 206 JetRanger



Bell 206 L4



Bell 206 B3



Universal Helicopters Bell 206

Universal Helicopters is a commercial helicopter company located in [Newfoundland and Labrador, Canada](#). Universal Helicopters currently operates a fleet of:

- 2 [Bell 407](#)
- 10 [Bell 206 LR](#)
- 1 [Bell 206 L4](#)
- 2 [Eurocopter AS350 BA](#)
- 1 [Eurocopter AS350 B](#)

Universal Helicopters is a 100% owned Newfoundland Company. While operating primarily in [Newfoundland](#) and [Labrador](#) with operations sometimes extending into the [Ungava Peninsula](#) and the [Arctic](#), Universal Helicopters holds an International Operating Certificate and has completed several contracts in [Greenland](#).

Universal Helicopters corporate head office, main stores and accounting services are situated in Goose Bay, Labrador with other bases situated at St. John's, Pasadena and Gander. Each location has permanent base personnel and hangar support facilities for year round operations and maintenance.



Canadian Helicopters Bell 206 JetRanger



Bell 212



Bell 212 (C-FOKV) registered to [Canadian Helicopters](#) at [Cambridge Bay Airport](#), [Nunavut](#), Canada



UH-1N's lifting from a field outside Baghdad on April 10, 2003

The **Bell 212** (also known as the Twin Two-Twelve and Twin Huey) is a medium military/civilian [helicopter](#) that first flew in 1968. The 212 has a fifteen seat configuration, with one pilot and fourteen passengers. In cargo configuration the 212 has an internal capacity of 6.23 m³ (220 ft³). An external load of 2,268 kg (5,000 lb) can be carried by the civilian model and 1,534 kg (3,383 lb) by the [United States military](#) version.

Based on the stretched fuselage [205](#), the 212 was originally developed for the [Canadian Armed Forces](#) under the designation UH-1 which later became **CH-135**. The original order for the Canadian Armed Forces was 50 with an option for a further 20. At the same time the United States military services ordered 141 212's under the designation **UH-1N**.

By 1971 the 212 had been developed for commercial applications. Amongst the earliest uses of the 212 in civil aviation was by [Helikopter Service AS](#) of Norway to be used in support of offshore oil rigs. Today the 212 can be found used in logging operations, maritime rescue and resupply in the Arctic on the [Distant Early Warning Line](#) or [North Warning System](#).

The 212's main rotor is powered by a PT6T-3 Turbo Twin Pac made up of two [Pratt & Whitney Canada PT6T](#) turboshaft engines. They are capable of producing up to 1,342 kW (1,800 shp). Should one engine fail the remaining engine can deliver 671 kW (900 shp) for 30 minutes or 571 kW (765 shp) enabling the 212 to maintain cruise performance at maximum weight.

On the 6th March 1972 [Hendrick V. Gorick](#) of the US Navy Antarctic Development Squadron Six jumped at an altitude of 6,248 m (20,500 ft) from a UH-1N helicopter. In doing so he set a record for parachute jumping over the Antarctic continent.

In 1979, with the purchase of eight by the Civil Air Authority, the 212 became the first U.S. helicopter sold in [PRC](#).

The [ICAO](#) designator for this aircraft as used in a [flight plan](#) is B212.

Specifications civil version



UH-1N on the ground at Camp Fallujah, Iraq in July of 2004

General characteristics

- **Crew:** 1
- **Capacity:** 14
- **Length:** overall including main rotor 17.46 m (57 ft 3 1/4 in)
- **Length:** fuselage 12.92 m (42 ft 4 3/4 in)
- **Main rotor diameter:** 14.69 m (48 ft 2 1/4 in)
- **Height:** 4.39 m (14 ft 4 3/4; in)
- **Main rotor area:** 169.5 m² (1,825 ft²)
- **Empty:** 2,517 kg (5,549 lb)
- **Maximum takeoff:** 5,080 kg (11,200 lb)
- **Powerplant:** 1x [Pratt & Whitney Canada](#) PT6T-3 Turbo Twin Pac 1,342 kW (1,800 shp)

Performance

- **Maximum speed:** 203 km/h (109 knots) at sea level
- **Range:** 439 km (237 nautical miles) at sea level with no reserves
- **Service ceiling:** 5,305 m (17,400 ft)
- **Rate of climb:** 532 m/min (1,745 ft/min)

Bell 222



A Bell 222



Bell 222U

The **Bell 222** is a [helicopter](#) built by [Bell Helicopter Textron](#). Similar in size to the [UH-1 Huey](#), it was designed for purely civilian use. It has twin [turboshaft engines](#), a [streamlined](#) shape, and is available with a retractable [undercarriage](#), though the utility-oriented **222U** features fixed skids.

Trivia

The Bell 222 was made famous by the television show [Airwolf](#) where the series' main character is a helicopter based on the 222 with fictional high-tech modifications such as powerful weapons and jet engines making it capable of [supersonic](#) speeds.

Specifications (222B)

General Characteristics

- **Crew:** 1-2
- **Capacity:** 7-8
- **Length:** 42 ft 2 in (12.85 m)
- **Main rotor diameter:** 42 ft 0 in (12.8 m)
- **Height:** 3.51m (11.6 ft)
- **Main rotor area:** 1,384 ft² (129 m²)
- **Empty:** 4,900 lb (2,223 kg)
- **Loaded:** 8,250 lb (3,742 kg)
- **Maximum takeoff:** 8,400 lb (3,818 kg)
- **Powerplant:** 2x [Avco Lycoming LTS 101-650C-2](#), 684 shp (510 kW) each

Performance

- **Maximum speed:** 174 mph (279 km/h)

- **Range:** 333 miles (532 km)
- **Service ceiling:** 15,800 ft (4,815 m)
- **Rate of climb:** 1730 ft/min (521 m/min)
- **Main rotor loading:** 6 lb/ft² (29 kg/m²)
- **Power/Mass:** 0.17 hp/lb (0.27 kW/kg)

Related content

Designation sequence:

[210](#) - [212](#) - [214](#) - [222](#) - [230](#) - [407](#) - [412](#) - [427](#)

Related development:

- **Bell 230**
- [Bell 430](#)

Similar aircraft:

- [Bell 212](#)
- [Sikorsky S-76](#)
- [Agusta A109](#)
- [Airwolf](#)

External links:

- [Airliners.net: Bell 222 & 230](#)
- [RTH.info: Bell 222 in aeromedical services](#) (in english and german)

Bell 407



Bell 407 at [Airport Niederrhein](#), Germany

The **Bell Model 407** is a civil utility helicopter, a derivative of the Bell [Model 206-L4](#) "LongRanger". The 407 uses a 4-bladed rotor system with a rigid, composite rotor hub instead of the 2-bladed conventional rotor of the Model 206. The basic systems of the 407 are nearly identical to those in the 206-L4.

Purposes which Bell 407 helicopters are frequently used for are for example:

- Tasks of police helicopters
- Duties in EMS services as aeromedical helicopter
- Sightseeing flights for tourists etc.
- Movie filming

Specifications

General Characteristics



Bell 407 at [Hamburg](#) / harbour temporary heliport, Germany

- **Crew:** one pilot
- **Capacity:** six passengers
- **Length (with main rotor):** 41 ft 8 in (12.70 m)
- **Main rotor diameter:** 35 ft 0 in (10.67 m)
- **Height:** 11 ft 8 in (3.56 m)
- **Main rotor area:** 962 ft² (89 m²)
- **Empty:** 2,598 lb (1,178 kg)
- **Loaded:** 2268kg (5000lb)
- **Maximum takeoff:** 5,000 lb (2,495 kg)
- **Powerplant:** 1x [Allison 250-C47 turboshaft](#), 520 kW (700 shp)

Performance

- **Maximum speed at Sea Level:** 237km/h (128kt)
- **Maximum speed at 4,000 feet:** 243km/h (131kt)
- **Range:** 360 miles (577 km)
- **Service ceiling:** 18,690 ft (5,698 m)
- **Rate of climb:** ft/min (m/min)
- **Main rotor loading:** lb/ft² (kg/m²)
- **Power/Mass:** hp/lb (kW/kg)

External link

- [Bell 407 on manufacturer's site](#)

Related development: [Bell 206](#)

Comparable aircraft:

Designation sequence: [309](#) - [400](#) - [406](#) - [407](#) - [409](#) - [412](#) - [427](#)

Bell 412



Bell 412 (VH-NSP) of [Fire and Emergency Services Authority of Western Australia](#) operated by [CHC Helicopter](#)



Norwegian Bell 412SP helicopters taking part in the NATO exercise Strong Resolve 2000

The **Bell 412** is an utility helicopter manufactured by [Bell Helicopter Textron](#). It is a further development of the [Bell 212](#) model, the major difference being the composite four-blade main rotor.

The development began in the late 1970s and a converted Bell 212 flew first time in August 1979. The initial model was certified in January 1981 with the deliveries commencing in the same month. It was followed by the **412SP** (Special Performance) version featuring larger fuel capacity, higher takeoff weight and more optional seating arrangement. In 1991 **412HP** (High Performance) variant with improved transmission replaced the former version. The current production version, **412EP** (Enhanced Performance), is equipped with a dual digital automatic flight control system.

Specifications (412HP)

General Characteristics

- **Crew:** 1
- **Capacity:** 14
- **Length:** 12.7 m (41 ft 9 in)
- **Main rotor diameter:** 14.02 m (46 ft 0 in)
- **Height:** 4.57 m (15 ft 0in)
- **Main rotor area:** 154.4 m² (1662 ft²)
- **Empty:** 3,066 kg (6,759 lb)

- **Loaded:** kg (lb)
- **Maximum Take-Off Weight:** 5,397 kg (11,900 lb)
- **Powerplant:** 1x [Pratt & Whitney Canada PT6T3BE Turbo Twin-Pac](#), 1,342 kW (1,800 shp)

Performance

- **Maximum speed:** 241 km/h (150 mph)
- **Range:** 745 km (463 miles)
- **Service ceiling:** m (ft)
- **Rate of climb:** m/min (ft/min)
- **Main rotor loading:** kg/m² (lb/ft²)
- **Power/Mass:** kW/kg (hp/lb)

Bell 427

The [Bell Model 427](#) is a twin-engine civil utility [helicopter](#), a derivative of the Bell [Model 206-L4](#) "LongRanger" and [Model 407](#). Like the 407, the 427 uses a 4-bladed rotor system with a rigid, composite rotor hub instead of the 2-bladed conventional rotor of the Model 206. The major difference between the 427 and 407 is the twin engine configuration, versus the single engine of the 407. The 427 offers 8-place seating (two individual seats in the front and a two 3-place bench seats in a club configuration in back) and has systems nearly identical to the 407.

The 427 was replaced by the improved [429](#)

Specifications

General Characteristics

- **Crew:** one pilot
- **Capacity:** seven passengers
- **Length (with main rotor):** 42 ft 6 in (13.0 m)
- **Main rotor diameter:** 37 ft 0 in (12.1 m)
- **Height:** 10 ft 8 in (3.26 m)
- **Main rotor area:** 962 ft² (89 m²)
- **Empty:** 3,875 lb (1,758 kg)
- **Loaded:** lb (kg)
- **Maximum takeoff:** 6,500 lb (2,971 kg)
- **Powerplant:** 2x [Pratt & Whitney Canada PW207D turboshafts](#), 550 shp (410 kW) (MCP)

Performance

- **Maximum speed:** 136 mph (251 km/h)
- **Range:** 387 miles (716 km)
- **Service ceiling:** 10,000 ft (3,048 m) [ISA](#)
- **Rate of climb:** ft/min (m/min)
- **Main rotor loading:** lb/ft² (kg/m²)
- **Power/Mass:** hp/lb (kW/kg)

External link

[Bell 427 on manufacturer's site](#)

Related development: [Bell 206](#) - [Bell 407](#) - [Bell 429](#)

Comparable aircraft:

Designation sequence: [407](#) - [409](#) - [412](#) - [427](#) - [429](#) - [430](#) - [533](#)

Bell 47



Bell 47G



Bell 47J



Bell 47G in M*A*S*H paint scheme.

The **Bell 47** (military H-13 Sioux) was the first [helicopter](#) to be certified for civil use, in May [1946](#). It was largely designed by [Arthur M. Young](#) who assigned his helicopter patents to, and joined [Bell Helicopter](#) in 1941. Over 5,600 were produced through 1974, including 1200 under license in [Italy](#), 239 in [Japan](#), and 239 in the [UK](#). Early models had open [cockpits](#) or [sheet metal](#) cabins, but the most common model, the **47G**, introduced in 1953, can be recognized by the full bubble [canopy](#), exposed welded-tube tail boom, and saddle [fuel tanks](#). Later **H** and **J** models had a regular cabin with full

cowling and [monocoque](#) tail boom. [Engines](#) were [Franklin](#) or [Lycoming](#) horizontally-opposed [piston engines](#) of 200 to 305 [HP](#) (150 to 230 [kW](#)). Seating varied from 2 to 4.

This was the helicopter popularized in the 1957–59 television series *[The Whirlybirds](#)*, and later the movie and television series *[M*A*S*H](#)*. A design, as well as a utilitarian, success, it was added to the permanent collection of the [Museum of Modern Art](#) of [New York](#) in [1984](#). Many are still in use as [trainers](#) and in [agriculture](#) (as of 2005).

Specifications (Bell 47G)

General

- **Crew:** 1
- **Capacity:** 3
- **Length:** 9.63 m (31.6 ft)
- **Height:** 2.83 m (9.28 ft)
- **Rotor diameter:** 11.32 m (37.2 ft)
- **Main rotor disk area:** 100.8 m² (1085 ft²)
- **Empty:** 858 kg (1893 lb)
- **Maximum takeoff:** 1340 kg (2950 lb)
- **Powerplant:** one Lycoming TVO-435-F1A flat six piston engine, 210 kW (280 hp)

Performance

- **Maximum speed:** 169 km/h (105 mi/h, 91 kt)
- **Cruise speed:** 135 km/h (84 mi/h, 73 kt) at 1,525 m (5,000 ft)
- **Range:** 395 km (245 mi, 214 nm) at 1,830 m (6,000 ft)
- **Hover ceiling:** 5,400 m [IGE](#); 3900 m OGE (17,700 IGE; 12,700 OGE ft)
- **Rate of climb:** 262 m/min (860 ft/min)
- Story of [Arthur M. Young](#) and the development of the Model 47 ([PDF](#) file with photographs)
- [Bell 47](#) enthusiast site attempts to cover all aspects of the Model 47
- [Model 47G](#) museum site
- [Model 47G specs](#) from *The International Directory of Civil Aircraft* by Gerard Frawley

[Bell](#) UH-1F

The [Bell UH-1F](#) was a variant of the [UH-1 Huey](#) military utility helicopter. It was designed in response to a [United States Air Force](#) specification for a support helicopter for use on its missile bases.

Development

In 1962, the USAF asked Bell to develop a special version of the UH-1D using the General Electric T-58 turboshaft as a powerplant (the same engine in the Sikorsky S-61 Sea King). This engine was capable of 1,250 hp (932 kW) rather than the UH-1D's Lycoming 1,100 hp (820 kW) T53-L11.

Bell proposed a developed version of the Bell model 204 which had been used by the US Army as the **UH-1B**. Bell proposed to use the shorter cabin of the model **204B** but with the longer tail boom

and rotor-transmission of the Bell model 205. As a result, Bell had to put the T-58 engine backwards in order to connect with the rotor system (opposite to the the original S-61 position where the engine is located in front of the rotor system and above of the main cabin). In addition bell had to develop a side exhaust that goes parallel of the engine´s block and turn to the right side. The UH-1F was introduced in 1963 in the US Air Force, who ordered 25. Externally, the only visible differences from UH-1B were the engine exhaust, which exited to the right side of the engine, and the longer tail boom.

The last UH-1F was retired from the USAF in the early 1980s, probably in 1982

Total production of the UH-1F was 150 units. In Italy, Agusta produced a similar model by re-engining the 204B with the 1,225 hp (914 kW) Rolls-Royce Gnome turboshaft, later the UH-1F's General Electric engine. The Italian version was exported to the military of the Netherlands, Denmark, Austria, and Switzerland. It had a rescue hoist located at the right side of the cabin.

Operational history

At the outbreak of the Vietnam War, the 20th Special Operations Squadron USAF|20th and 21st Special Operations Squadron USAF 21st Special Operations Squadrons were deployed there equipped with the Bell UH-1F, becoming known as the "Green Hornets". At the beginning they played transport and communications roles, but by late 1960s, when the CIA discovered that the Viet Cong was infiltrating South Vietnam through Cambodia and Laos, the Green Hornets started to fly secret missions to infiltrate and extract agents and commandos in the "Communist sanctuaries" of Cambodia and Laos. These were risky missions since the UH-1F didn't have night equipment and or any kind of weather radar.

UH-1P



HU-1P [U.S. Air Force photo](#)

Around [1969](#) a number of UH-1Fs were modified for a [still-classified psychological warfare](#) role and redesignated **UH-1P**. The "P" version was the only armed version of the UH-1F, carrying [machine guns](#) and [rocket launchers](#). Even unarmed, they can be distinguished from standard UH-1Fs by their two [UHF](#) antennas (the F carried only one)

Markings

The UH-1Fs in Vietnam were painted in 4 tone-camouflage that consisted in dark and medium green and dark tan on the upper surfaces and light gray was used under the lower surface. No national insignia were carried, only a serial number on the tail and a black hornet on the middle of the tail boom.

The UH-1Fs used at the same time in the United States were painted in light gray overall with black "United States Air Force" painted along the tail boom and a yellow band with black borders at the end of the boom with a "Danger" marking. A typical black serial was painted on the tail. Other UH-1Fs used the same colors but with the roof painted in gloss white. At least one aircraft was painted in overall gloss blue, with "U.S. AIR FORCE" painted on the boom in white, and the tail serial in the same color.

Characteristics

- Producer: Bell Textron, [Fort Worth, Texas](#) US
- Powerplant: 1 General Electric T-58-GE-3 with 1,225 hp (914 kW).
- Max speed: 137 mph (220 km/h)
- Cruise speed: 75 mph (120 km/h)
- Crew: 2 (and 8 troops)

References

- *UH-1 in Action* by Lou Drendel, Squadron Signal Publishers. [ISBN 0897471792](#)
- *UH-1 Huey in Colors* Squadron Signal publishers. [ISBN 0897472799](#)

Bensen X-25



X-25A in flight

The **Bensen X-25** was a [gyrocopter](#) developed as a test vehicle as part of the [U.S. Air Force's Discretionary Descent Vehicle](#) (DDV) program.

Development

The X-25 was planned to replace combat aircraft [ejection seats](#) to allow downed pilots more control over their post-ejection landing spot. Three [Bensen B-8](#) gyrocopters were ordered and modified.

Operational History

The X-25 was a completely unpowered [autogyro](#). No known piloted tests of this vehicle were performed. The **X-25A** was equipped with a motor while the **X-25B** was unpowered. Both aircraft were used to evaluate the piloting and training requirements of the autogyros. No full-scale operational tests were ever performed. The X-25A was first flown on [June 5, 1968](#). The U.S. Air Force stopped funding the DDV program with the end of the [Vietnam War](#).

The X-25A is now on display in the [National Museum of the United States Air Force](#) at [Wright-Patterson Air Force Base](#) near [Dayton, Ohio](#) and the X-25B is now on display at the [AFFTC Museum](#).

Specifications

General characteristics

- **Crew:** 1
- **Length:** 11 ft 3 in (3.43 m)
- **Rotorspan:** 22 ft 8 in (6.91 m)
- **Height:** 6 ft 3 in (1.91 m)
- **Empty:** 247 lb (112 kg)
- **Loaded:** 550 lb (250 kg)
- **Powerplant:** 1 [McCulloch 4318](#) piston engine 72 hp (54 kW)

Performance

- **Maximum speed:** 95 mph (153 km/h)
- **Range:** 84 miles (137 km)
- **Service ceiling:** 15,000 ft (4,600 m)
- **Rate of climb:**
- **Power/mass:**

References

[American X-Vehicles](#) (.pdf)

Comparable aircraft: [Benson BM-8](#)

Designation sequence: [X-22](#) - [X-23](#) - [X-24](#) - **X-25** - [X-26](#) - [X-27](#) - [X-28](#)

See also: [List of experimental aircraft](#)

Bell Eagle Eye



The [Bell Eagle Eye](#) is a [tiltrotor unmanned aerial vehicle](#) which will enter service in the [U.S. Coast Guard](#) as part of [Project Deepwater](#). It may also enter service with the [U.S. Navy](#) and [U.S. Marine Corps](#).

Development

In 1993, government flight tests moved to the [Yuma Proving Grounds](#), and were very successful. Phase 1, or land-based operations testing, was completed in April 1998. Phase 2 (sea-based testing) started shortly after that, and was scheduled to be completed towards the end of Fiscal Year 1999.



Specifications

General characteristics

- **Crew:** none
- **Capacity:** 200 lb (91 kg) payload
- **Length:** 17 ft 11 in (5.46 m)
- **Wing span:** 15 ft 2 in (4.63 m)
- **Main rotor diameter:** 10 ft 0 in (3.05 m)
- **Main rotor area:** 157 ft² (14.6 m²)
- **Maximum takeoff:** 2,250 lb (1,023 kg)
- **Powerplant:** 1 × [Allison 250-C20B](#), 375 shp (280 kW)
- **Endurance:** 8 hours
- **Maximum Speed:** 200 knots.



Performance

- **Maximum speed:** 225 mph (360 km/h)
- **Service ceiling:** 14,500 ft (4,420 m)

Related content

Related development:

Comparable aircraft:

Designation sequence:

Bell/Agusta BA609

The **Bell/Agusta BA609** is a civil twin-engined [tiltrotor VTOL](#) aircraft with a configuration similar to the [Bell Helicopter Textron/Boeing V-22 Osprey](#). It is being developed by [Bell/Agusta Aerospace Company](#) (BAAC), a [joint venture](#) between Bell and [AgustaWestland](#).

History

The first ground tests of the BA609 began [December 6 2002](#). The first flight took place on [March 6 2003](#) in [Arlington \(Texas/USA\)](#) with [Roy Hopkins](#) and [Dwayne Williams](#) at the controls. In June 2005 it performed the "Return to flight", expanding the flight envelope and tilting the nacelles. The aircraft is laid out for 1-2 crew members and up to 9 passengers. BAAC officials claim that 65 airplanes were ordered (as of July 2004). On [July 22, 2005](#), the BA609 performed its first conversion to airplane mode in flight being the first civil aircraft in history to perform this feat.

General Characteristics

- Propulsion: 2 × [Pratt & Whitney Canada PT6C-67A](#) @ 1447 kW
- Dimension:
 - Length: 13.31 m
 - Height: 4.5 m
 - Wingspan: 10 m
 - Rotor diameter: 7.93 m
- Weight:
 - Empty: 4765 kg
 - Payload: 2500 kg
 - Max: 7260 kg
- Max cruise speed: 510 km/h
- Service ceiling: 7625 m
- Range: 1390 km

- Cost: 10 Mio USD
- Operating cost: 875 USD/h

[Bell/Agusta BA609 Official Website](#)

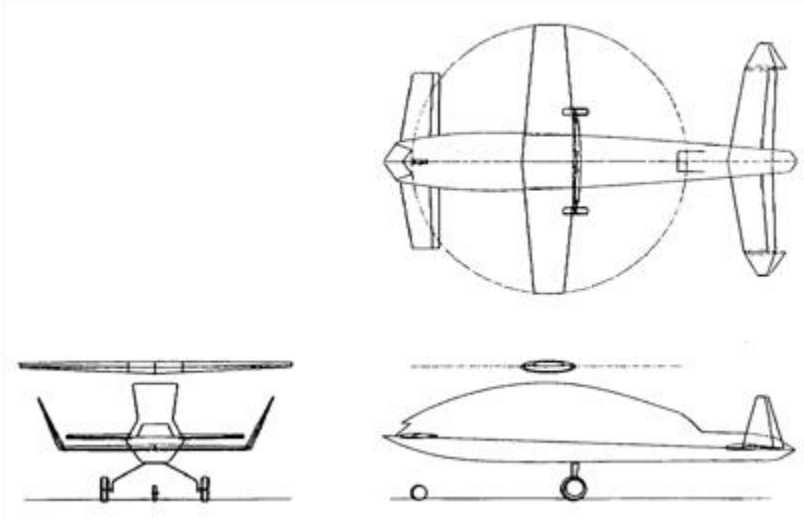
Boeing X-50



First flight of the Boeing X-50A

The **Boeing X-50A** Dragonfly, formerly known as the [Canard Rotor/Wing](#) Demonstrator, is a [UAV](#) being developed by [Boeing](#) and [DARPA](#) to demonstrate the principle that a helicopter's [rotor](#) can be stopped in flight and act as a fixed wing. The X-50A builds upon the work of the [Sikorsky X-Wing](#)

program of the 1980's by designing the vehicle as a multi-mode aircraft from the ground up. The X-50A is powered by a single conventional [turbofan](#) engine, the exhaust of which is directed to the tips of the blades for rotary wing flight, the rear nozzle for fixed wing flight, and mixed for transition between the two.



External links

- [Boeing press release](#)
- [Boeing press release 2](#)
- [Large image of the X-50A](#)
- [Technical information](#)

Related content

Related development: [Sikorsky X-Wing](#)

Comparable aircraft:

Designation sequence: [X-45](#) - [X-46](#) - [X-47 Pegasus](#) - [X-48](#) - [X-49](#) - [X-50 Dragonfly](#)

Bristol Belvedere

The **Bristol Type 192 Belvedere** is a twin-engined, twin-rotor [helicopter](#) designed for a variety of transport roles including troop transport, supply dropping and casualty evacuation. It was operated by the [Royal Air Force](#) from 1961 to 1969.

The aircraft design is based on the [Bristol Type 173](#) which first flew on [3 January](#) 1952 as a 10-seat civil helicopter. When the project was cancelled in 1956 the RAF expressed an interest in the aircraft and the Type 192 Belvedere was created. 26 Belvedere were built.

Belvedere HC Mark 1

The Belvedere were originally designed for naval use but were later adapted to carry eighteen fully equipped troops with a total load capacity of 6000lb. The two rotors were synchronised through a shaft allowing the aircraft to operate through only one engine in the event of an emergency.

Pre-production and Prototypes

The first Type 192 prototype (XG447) flew on [5 July](#) 1958 with tandem wooden rotor blades, a completely manual control system and a castored, fixed quadricycle undercarriage. From the fifth prototype, the rotors fitted were all-metal, 4 bladed units. Production model controls and instruments allowed night operations.

Production and Service History

The first prototype Belvedere went on to join [66 Sqn](#) in 1961 and saw service in [Europe](#), [Africa](#), [South Arabia](#) and [Borneo](#). XG447 was broken up at Boscombe Down on [7 August](#) 1966.

The type was used by the RAF until 1969, despite engine starter problems which caused trouble early on. Belvedere were used by [26](#), [66](#) and [72](#) Sqns.

Specifications

General characteristics

- **Crew:** 3
- **Capacity:** 6000lb
 - 30 Seated passengers
 - 18 Fully-equipped troops
 - 2270kg Internal Cargo
 - Underslung Cargo
- **Length:** 16.56 m (54 ft 4 in)
- **Rotor diameter:** ()
- **Height:** 5.18 m (17 ft)
- **Disc area:** m² (ft²)
- **Empty weight:** 5,028 kg (11,085 lb)
- **Loaded weight:** kg (lb)
- **Maximum gross takeoff weight:** 8618 kg (19,000 lb)
- **Powerplant:** 2× [Napier Gazelle Turboshaft](#), 1092 kW (1465 hp) each

Performance

- **Maximum speed:** 222 km/h (138 mph)
- **Range:** 716 km (445 miles)
- **Service ceiling:** m (ft)
- **Maximum rate of climb:** m/s (ft/min)
- **Disc loading:** ()
- **Thrust/weight:** :1

Preserved in Britain

The following Bristol Belvedere have been preserved and are either on display or currently undergoing restoration.

Type 173:

- - XF785 on display at [Bristol Aero Collection, Kemble](#)

Belvedere HC.1:

- - XG452 undergoing restoration at [The Helicopter Museum, Weston-Super-Mare](#)
 - XG454 on display at [Museum of Science and Industry, Manchester](#)
 - XG474 on display at [Royal Air Force Museum, Hendon](#)
 - XG462 (Nose section only) [The Helicopter Museum, Weston-Super-Mare](#)

[Belvedere](#)Bristol Sycamore



The Bristol Sycamore

The **Bristol Sycamore** was the first [British](#) designed [helicopter](#) to serve with the [Royal Air Force](#). Created by the [Bristol Aeroplane Company](#), it was used for [search and rescue](#) and [anti-submarine warfare](#).

The Sycamore also has the distinction of being the second helicopter type to be used by the [Australian Defence Forces](#).

General characteristics

- First flight: [27 July 1947](#)
- Powerplant: [Alvis Leonides](#) 550 hp (410 kW)
- Rotor diameter: 48 ft 7 in (14.8 m)
- Length: 42 ft (12.8 m)
- Height: 14 ft 7 in (4.4 m)
- Empty weight: 3,810 lb (1728 kg)
- All-up weight: 5,600 lb (2540 kg)
- Maximum cruising speed: 132 mph (212 km/h)
- Cruise range: 330 miles (531 km)
- Endurance: 3½ hours
- Crew: Two, plus accommodation for three passengers

External links

- [RAF Museum page on the Bristol Sycamore](#)
- [British Aircraft Directory page on the Bristol Sycamore](#)

CH-113 Labrador



A CH-113 *Labrador* practising an airlift from a [Canadian Coast Guard](#) cutter.

The **CH-113 Labrador** was a twin-engine, twin-rotor, [Canadian search and rescue](#) (SAR) [helicopter](#) used in air-marine rescue operations from [1962](#) until [2004](#).

In addition to the CH-113 SAR version acquired by the [Royal Canadian Air Force](#), the [Canadian Army](#) acquired the CH-113A *Voyageur* model for use as a transport helicopter. Following the unification of the [Canadian Forces](#) and creation of [Air Command](#) in [1975](#), the [CH-47 Chinook](#) was selected as a transport helicopter with the *Voyageur* fleet converted to *Labrador* specifications to supplement the SAR fleet.

The *Labrador* had a watertight hull for marine landings, a rescue hoist, 1,110 kilometer flying range, 5,000 kilogram cargo hook, emergency medical equipment and an 18 person passenger capacity. By the [1990s](#) the heavy use and hostile weather conditions of air-marine rescue were taking their toll on the *Labrador* fleet, resulting in increased maintenance costs.

In [1992](#) it was announced that the *Labradors* were to be replaced by a version of the [AgustaWestland EH101](#) to be called the CH-149 *Chimo*, with 15 on order. This was subsequently cancelled by a different government in [1993](#), resulting in cancellation penalties, as well as the prospect of another decade of service for the *Labrador* fleet.

In [1998](#) a CH-113 from [CFB Greenwood](#) tragically crashed on Quebec's [Gaspé Peninsula](#) while returning from a SAR mission, resulting in the deaths of all crewmembers onboard. It was very evident that the fleet required replacing, therefore the same government, under extraordinary political pressure, returned to the EH101 manufacturers and placed an order for 15 aircraft to be called the [CH-149 Cormorant](#).

CH-146 Griffon



CH-146 Griffon

Canadian Forces Utility Tactical Transport Helicopter (UTTH) CH146 (AKA The Griffon) is the Canadian designation of the [Bell 412HP](#), a multi-use Light Utility [helicopter](#) used for aerial firepower, reconnaissance and mobility tasks. The aircraft is also being used as a Search and Rescue platform temporarily.

Armament: 7.62 mm [C6](#) door guns

Specifications:

- Length: 17.1 m
- Rotorspan: 14 m
- Height: 4.6 m
- Weight: 5,355 kg
- Power: Pratt & Whitney's PT6T-3D engine
- Speed: 220 km/h (cruise) up to 260 km/h (maximum speed)
- Range: 656 km (with full tanks)
- Passengers: 8 + 3 crew
- Crew: Two pilots, one flight engineer
- Ballistic protection: removable armour able to protect crew and cabin area occupants from small arms weapons and shrapnel.
- Litter capacity: 6 stretchers
- Thermal imagery: WESCAM 16TD-A Thermal Imaging System (TIS) stabilized camera system
- Night vision: Crew equipped with Generation III Image Intensification (II)
- Transport: minor disassembly permits transport of the Griffon by CC130 Hercules cargo aircraft for long-distance deployment.
- Year(s) procured: 1995 to 1997
- Number in service: 86

See also

- [List of Canadian Air Force Equipment](#)

External links

- [The Canadian Army - Equipment - Griffon Helicopter \(CH146\)](#)

- [Canadian Air Force - Aircraft - CH146 Griffon](#)

CH-21 Shawnee

The **H-21 Shawnee** was the fourth of a line of tandem rotor helicopters designed and built by [Piasecki](#) (later [Boeing Vertol](#)). Commonly called the "flying banana", it was a multi-mission helicopter, utilizing wheels, skis, or floats. It was used for [Arctic](#) rescue because it performed so well at low temperatures. The CH-21 served with the [United States Army](#) from [1949](#) to [1964](#), and also with the [U.S. Air Force](#) (as the **H-21 Workhorse**), the [French Navy](#), the [Royal Canadian Air Force](#) and the [West German Air Force](#). The [French](#) used an armed version of the CH-21 in [Algeria](#), mounting guns in the door ways and on the skids.



[USAF](#) CH-21B at the [National Museum of the United States Air Force](#)



Shawnees in formation over [South Viet Nam](#) in [1962](#)

The **CH-21B** assault helicopter could carry 22 fully-equipped troops, or 12 stretchers, plus space for two medical attendants, in the MedEvac role. The CH-21B was first deployed to [Viet Nam](#) in [December 1961](#) with the Army's 8th and 57th Transportation Companies, in support of ARVN (Army Vietnam) troops. The CH-21B/CH-21C Shawnee could be armed with 7.62 mm (.308 in) or 12.7 mm (.50 in) door guns. The CH-21 was relatively slow. Its cables and fuel lines were so vulnerable to small arms fire it was even rumored that a CH-21 had been downed by a [Viet Cong](#) spear. The Shawnee was the "Workhorse" of Vietnam until it was replaced with the fielding of the [UH-1 Huey](#), and the later fielding of the [CH-47 Chinook](#) in the mid-1960s. The Shawnee had two tandem fully-articulated three-bladed counter-rotating rotors. The CH-21 was powered by one Curtis-Wright R1820-103 Cyclone supercharged 1150 hp [piston engine](#). The CH-21B was equipped with an updated 1425 shaft [horsepower](#) (1063 kW) engine. The CH-21 had a top speed of 128 mph (111 knots).

Specifications (CH-21C)



A Shawnee over rice paddies in [Viet Nam](#)

General characteristics

- **Crew:** two pilots
- **Capacity:** 22 troops or 12 stretchers
- **Length:** 52 ft 6 in (16.00 m)
- **Main rotor diameter:** 2x 44 ft 0 in (13.40 m)
- **Height:** 15 ft 9 in (4.80 m)
- **Main rotor area:** 3,041 ft² (282.7 m²)
- **Empty:** 8,950 lb (4,058 kg)
- **Loaded:** 15,200 lb (6,893 kg)
- **Maximum takeoff:** lb (kg)
- **Powerplant:** 1 x [Wright R-1820](#)-103 radial engine, 1,425 hp (1,063 kW)

Performance

- **Maximum speed:** 127 mph (204 km/h)
- **Range:** 265 miles (426 km)
- **Service ceiling:** 9,450 ft (2,880 m)
- **Rate of climb:** ft/min (m/min)
- **Main rotor loading:** 5 lb/ft² (24 kg/m²)
- **Power/mass:** 0.09 hp/lb (150 W/kg)

Armament

Varying, but usually twin or quad [.50](#) (12.7 mm) [machine guns](#) mounted in various places

Related development: [HRP-2 Rescuer](#)

Designation sequence: [UH-19](#) - [XH-20](#) - [YH-18](#) - **CH-21** - [YH-22](#) - [OH-23](#) - [YH-24](#)

CH-37 Mojave



CH-37 Mojave attempting to lift a crashed [CH-21 Shawnee](#).

Description

Role	Medium cargo helicopter	
Crew	3	

Dimensions

Length	88 ft	
Rotor diameter	72 ft 1 in	
Height		

Weights

Empty		
Loaded		
Maximum take-off	21,000 lb	9,500 kg

Powerplant

Engines	2 Pratt & Whitney R-2800-54 Double Wasp radials	
Power	2100 hp each	1566 kW each

Performance

Maximum speed	131 mph	211 km/h
Combat range	247 mi	
Ferry range		
Service ceiling		
Rate of climb		

The [Sikorsky S-56](#), called the **CH-37 Mojave** by the [US Army](#) and **HR2S-1** by the [US Marine Corps](#), was a large heavy-lift [helicopter](#) by the standards of the [1950s](#). It came into being as an assault transport for the USMC, with a capacity of 26 fully-equipped troops; the order was placed in [1951](#), the first prototype flew in [1953](#), and production deliveries began in July [1956](#) to [Marine Corps Squadron HMX-1](#), sixty aircraft in total being produced.

The US Army evaluated the prototype in [1954](#) and ordered 94 examples as the **CH-37A**, the first being delivered also in summer 1956. All Marine and Army examples were delivered by mid-[1960](#). Army examples were all upgraded to **CH-37B** status in the early [1960s](#), being given Lear auto-stabilization equipment and the ability to load and unload while hovering. In the [1962](#) unification of US military aircraft designations, USMC examples became **CH-37C**.

At the time of delivery, the CH-37 was the largest helicopter in the Western world, and it was Sikorsky's first twin-engined helicopter. Two [Pratt & Whitney Double Wasps](#) were mounted in outboard pods that also contained the retractable [landing gear](#). This left the fuselage free for cargo, which could be loaded and unloaded through large clamshell doors in the nose. The single main rotor was five-bladed, and designed to function with one blade shot away in combat.

The CH-37 was one of the last heavy helicopters to use [piston engines](#), which were larger, heavier and less powerful than the [turboshafts](#) subsequently employed. This accounted for the type's fairly short service life, all being [withdrawn](#) from service by the late 1960s, replaced in Army service by the [CH-54 Tarhe](#).

Four CH-37Bs were deployed to [Vietnam](#) in [1963](#) to assist in the recovery of downed US aircraft. They were very successful at this role, recovering over \$7.5 million dollars' worth of equipment, some of which was recovered from behind enemy lines.

CH-46 Sea Knight



April 1, 2004: Sailors from [USS Saipan \(LHA-2\)](#) rush out to unchain a CH-46 Sea Knight.



Marines load a simulated casualty onto a CH-46E Sea Knight helicopter while conducting convoy operations training at Camp Dawson, West Virginia

The **CH-46D Sea Knight** [helicopter](#) is a medium lift assault helicopter, used by the [United States Navy](#) for shipboard delivery of cargo, personnel, and search & rescue. The **CH-46E** is used by the [United States Marine Corps](#) 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 may be assigned, such as combat support, search and rescue, support for forward refueling and rearming points, aeromedic evacuation of casualties from the field, and recovery of [aircraft](#) and personnel.

The CH-46 Sea Knight was first procured in [1960](#) under the old designation of **HRB-1** to meet the medium-lift requirements of the [United States Marine Corps](#) in all combat and peacetime environments since that time. The Sea Knight fleet is currently being maintained until a suitable replacement is approved.

On [September 24, 2004](#) the USN retired the type, seeing it replaced by the [MH-60 Knighthawk](#). The USMC is replacing its CH-46's with the V-22 Osprey. The first V-22 squadron, HMM-263, will be stood up in 2006 and the replacement process is expected to continue through the other medium helicopter squadrons, into 2014.

General characteristics

- Contractor: Boeing Vertol Company Introduction date: January [1978](#)

CH-47 Chinook



A [field artillery](#) section slingloading a M-198 howitzer for airlift by a CH-47 Chinook RAF Chinook .

Role	Medium transport helicopter	
Crew	3 (pilot, copilot, crew chief/combat commander)	
First flight	September 21, 1961	
Entered service		
Manufacturer	Boeing Integrated Defense Systems	
Dimensions		
Length	98 ft 9 in	30.1 m
Rotor diameter	60 ft 0 in	18.3 m
Height	18 ft 8 in	5.7 m
Weights		
Empty	22,450 lb	10,185 kg
Loaded	26,680 lb	12,100 kg
Maximum takeoff	50,000 lb	22,680 kg
Capacity	30 troops or 24 litters and 2 attendants	
Powerplant		
Engines	2 Avco Lycoming T55-L-714 turboshafts	
Power	2 x 3,750 hp	2 x 2,800 kW

Performance

Maximum speed	183 mph	295 km/h
Combat range	miles	km
Ferry range	1,280 miles	2,060 km
Service ceiling	8,500 ft	2,590 m
Rate of climb	1,980 ft/min	605 m/min

Avionics

Avionics

Armament

Guns	2 x M-60 machine guns
Bombs	
Missiles	
Rockets	
Other	

The **CH-47 Chinook** is a versatile, twin-engine, twin-rotor heavy-lift [helicopter](#). The contra-rotating rotors eliminate the need for a rear vertical rotor, allowing all power to be used for lift and thrust, giving a top speed of 173 mph (150 knots, 278 km/h). Its primary roles include troop movement, artillery emplacement, and battlefield resupply. Chinooks have been sold to 16 nations, the largest users of which are the [US Army](#) and the [Royal Air Force](#) (see [RAF Chinook](#)). A commercial model, the Boeing 234 Chinook, is used worldwide for logging, construction, fighting forest fires, and supporting petroleum exploration operations.

Variants

CH-47A

The [Boeing Vertol](#) (model 114) YCH-1B/YCH-47A made its initial hovering flight on [September 21, 1961](#). The all-weather medium-lift CH-47A Chinook entered service in [Vietnam](#) about [1966](#). The CH-47A was powered by either [AlliedSignal](#) Engines T55-L-5 2200 shp (1,640 kW) or T55-L-7 2650 shp (1,980 kW) engines.

A/ACH-47A/ACH-47A

Originally known as the Armed/Armored CH-47A (or A/ACH-47A), four CH-47A helicopters were converted to gunships by Boeing Vertol in late 1965. The four aircraft were denoted 64-13145 "Cost of Living," 64-13149 "Easy Money," 64-13151 "Stump Jumper," and 64-13154 "Birth Control." Three were assigned to the 53rd Aviation Detachment in South Vietnam for testing, with the remaining one retained in the U.S. for weapons testing. By 1966, the 53rd was redesignated the 1st Aviation Detachment (Provisional) and attached to the 228th Aviation Support Helicopter Battalion of the 1st Air Cavalry Division. By 1968, only one gunship remained, and logistical concerns prevented more conversions. It was returned to the United States, and the program stopped.

The ACH-47A carried five [M60D](#) 7.62x51mm machine guns or [M2HB](#) .50 caliber machine guns, provided by the [XM32](#) and [XM33](#) armament subsystems, two [M24A1](#) 20 mm cannons, two [XM159B/XM159C](#) 19-Tube 2.75" rocket launchers or sometimes two [M18/M18A1](#) 7.62x51 mm gun pods, and a single [M75](#) 40 mm grenade launcher in the [XM5/M5](#) armament subsystem.

The surviving aircraft, Easy Money, has been restored and is on display at the [U.S. Army Aviation and Missile Command](#), near [Huntsville, Alabama](#).

CH-47B

CH-47B was powered by two AlliedSignal Engines T55-L-7C 2850 shp (2,130 kW) engines. The CH-47B featured a blunted rear rotor pylon, redesigned rotor blades, and strakes along the rear ramp and fuselage to improve flying characteristics. The CH-47B was the standard troop transport used by the [1st Cavalry Division](#) in Vietnam. The Chinook could be equipped with two door-mounted M60D [7.62 mm NATO machine guns](#) on the M24 armament subsystem and a ramp-mounted M60D using the M41 armament subsystem. Some CH-47 "Bombers" were equipped to drop riot control gas or [napalm](#) onto [Viet Cong](#) bunkers from the rear cargo ramp. The CH-47 could be equipped with a hoist and cargo hook. The Chinook proved especially valuable in "Pipe Smoke" aircraft recovery missions. The "Hook" recovered about 12,000 aircraft valued at over \$3 billion during the war.

CH-47C

The Boeing Vertol (model 234) CH-47C had a strengthened transmission, AlliedSignal Engines T55-L-11C 3750 shp (2,800 kW) engines, and increased range. The CH-47C could carry up to 44 troops or 24 litters plus two medical attendants. The RAF's [Chinook HC.1](#), introduced in [1980](#), is comparable to the CH-47C.

A later "Super-C" configuration included up-rated Lycoming T55-L-712 engines and wide-chord fiberglass rotor blades, which had a wider chord than the old metal blades, and an angled, rather than squared-off root-end.

All three models saw wide use during the Vietnam war. They replaced the [H-21 Shawnee](#) in the combat assault role.

CH-47D

The CH-47D was originally powered by two T55-GA-712 engines, but most are now fitted with T55-GA-714s. Models CH-47A, CH-47B, and CH-47C, all used the same airframe, but later models featured upgraded engines. With its triple-hook cargo system, the CH-47D can carry heavy payloads -- for example, bulldozers and 40-foot containers -- at speeds over 155 mph (250 km/h). In air assault operations, it often serves as the principal mover of the 155 mm [M198 howitzer](#), 30 rounds of ammunition, and an 11-man crew. Like most [US Army](#) helicopters, the Chinook has advanced avionics and electronics, including the [Global Positioning System](#).

The CH-47D, which can carry more weight than any other U.S. Army helicopter, saw wide use in [Operation Enduring Freedom](#) in [Afghanistan](#) and [Operation Iraqi Freedom](#) in [Iraq](#). The Chinook was used in [air assault](#) missions, inserting troops into [fire bases](#) and later bringing food, water, and ammunition. It is typically escorted by attack helicopters such as the [Apache](#) for protection. The CH-47D was particularly useful in the mountainous terrain of Afghanistan where high altitudes and temperatures limited the use of the [Black Hawk](#).

The RAF versions of the CH-47D are the [Chinook HC.2](#) and HC.2A.

CH-47F

The CH-47F, an upgraded D model, first flew in [2001](#)



A U.S. military Chinook helicopter stands ready to receive medical supplies and whooping cough vaccine donated by the World Health Organization in Feyzabad, Afghanistan

MH-47

The MH-47 variants are intended for [special forces](#) operations and have in-flight refueling, a fast-rope rappelling system and other upgrades. The current model being used is the MH-47E. The MH-47G is in development.

The RAF ordered eight [Chinook HC.3s](#) in [1995](#) for the special forces operations role. At a total cost of £259 million these were effectively low-cost equivalents to the MH-47G. This has proved to be a false economy as the helicopters were due to enter service in [1998](#), but in [2004](#) have yet to be cleared for anything other than training flights. An additional £130 million is required to make them suitable for their mission.

The H-47 is now sold by [Boeing Integrated Defense Systems](#).

Units using the Chinook

See main article, [Deployment of the Chinook helicopter](#)

Chinook is used by:

- The [United States Army](#) and their [reserves](#)
- [U.S. Army National Guard](#)
- [United Kingdom Royal Air Force](#) (see [RAF Chinook](#))
- [Italian army](#)
- [Royal Netherlands Air Force](#)
- [Australian Army](#)
- [Republic of Singapore Air Force](#)
- [Islamic Republic of Iran Air Force](#)
- [Japanese Ground-Self Defense Force](#)
- [Royal Saudi Air Force](#)

Problems with Chinook

See main article, [Chinook crash on Mull of Kintyre](#)

In [June 1994](#) a [Royal Air Force](#) Chinook crashed into the [Mull of Kintyre](#), killing 29. This was initially dismissed as [pilot error](#), but an investigation by [Computer Weekly](#) uncovered evidence sufficient to convince a [House of Lords](#) enquiry that it may have been caused by a [software bug](#) in the aircraft's [FADEC](#). [\[1\]](#) [\[2\]](#)

Reputation in the RAF

See also: [RAF Chinook](#)

Whilst Britain's [Royal Air Force](#) has many types of helicopters in active service, the Chinook has proven itself one of the most effective. One particular Chinook, registered ZA718 with the Royal Air Force and known by its original callsign 'Bravo November', has seen action in every major operation the RAF has been deployed to in the helicopter's 25-year service life. Bravo November started out spearheading the British landings on the [Falkland Islands](#) in [1982](#) and was being transported aboard the container ship Atlantic Conveyor along with three other Chinooks. However, the [Argentine Air Force](#) chose the [Atlantic Conveyor](#) as a target for their deadly Exocet sea-skimming anti-ship missiles. By a stroke of pure luck, however, Bravo November was airborne on an engineering test flight at the time. Having survived the destruction of the ship it was being carried on, Bravo November managed to make it to safety on the [aircraft carrier](#) HMS Hermes. Unfortunately, ZA718 ran into trouble during a night mission transporting guns to the [SAS](#) when pilot Dick Langworthy, unable to see clearly through a thick snow shower, allowed Bravo November to descend and hit the sea at around 100 knots (139 km/h), throwing up spray and flooding the engine intakes. However, Dick and his copilot managed to get the helicopter back in the air. With the radio damaged and unable to navigate, Bravo November returned to [San Carlos](#) and after a quick inspection revealed the impact had caused little more than dents to the fuselage and radio systems.

ZA718 Bravo November went on to serve in [Lebanon](#), [Germany](#), [Northern Ireland](#), [Kurdistan](#) and [Iraq](#), being the first British helicopter to land [Royal Marines](#) ashore in Iraq.

Two pilots have been awarded the [Distinguished Flying Cross](#) at the controls of ZA718.

See also

- [U.S. Army Aviation and Missile Command](#)
- [chinook-helicopter.com](#)
- [Bravo November in the Falklands](#)
- [British Chinooks](#)

CH-53 Sea Stallion



German CH-53G presented in Laage



MH-53M In Iraq, Summer 2004

The [Sikorsky S-65](#) is a heavy transport [helicopter](#) originally developed for use by the [United States Marine Corps](#), who designated it the **CH-53 Sea Stallion**.

The [US Air Force](#) ordered HH-53B and HH-53C variants for [search and rescue](#) work, and use the [MH-53J Pave Low](#) version for long-range troop transport.

The [CH-53E Super Stallion](#) is a larger version with three engines, first delivered in [1981](#).

On special forces missions they often work alongside a MC-130 (a converted C-130 Hercules) that provides [C3](#) and inflight refueling.

Due to its large size and troop capacity, aerial accidents that involve CH-53 helicopters were the [deadliest helicopter accidents](#) ever. In "The Helicopter Catastrophe" [\[1\]](#), that happened on [4 February 1997](#) in [Israel](#), the death toll was 73 people from 2 CH-53 helicopters. On [10 May 1977](#), 54 people were killed in a similar accident, also in Israel. On Jan. 26, 2005, a CH-53 went down in bad weather in western Iraq, killing 31 U.S. service members.

Variants



[MH-53 Pave Low III](#)

- **YCH-53A** - two prototypes
- **CH-53A** - initial production for USMC, 139 built
- **RH-53A** - mine countermeasures versions, 15 built
- **TH-53A** - stripped CH-53As used for training
- **HH-53B** - CH-53A type for USAF search and rescue
- **CH-53C** - heavy-lift version for USAF, 22 built
- **HH-53C** - "Super Jolly Green Giant", improved HH-53B for USAF
- **S-65C-2 (S-65o)** - export version for Austria, later to Israel
- **S-65-C3** - export version for Israel
- **CH-53D** - CH-53A with improved transmission, 124 built
- **RH-53D** - improved anti-mine version
- **VH-53D** - two CH-53Ds for USMC VIP transport
- **VH-53F** - six unbuilt VIP helicopters for the US Air Force
- **CH-53G** - 110 built by VFW under license
- **YHH-53H** - prototype Pave Low I craft
- **HH-53H** - Pave Low III night infiltrator
- **MH-53H** - redesignation of HH-53H
- **MH-53J** - "Pave Low III" Enhanced, HH-53B, HH-53C, et. al. types converted
- **MH-53M** - "Pave Low IV" IDAS/MATT, Upgraded version of MH-53J
- **CH-53D Yas'ur 2000** - CH-53D upgraded and improved by the [IAI](#) to extend life span beyond the year 2000.
- **CH-53G / CH-53GS** - versions for the German Army Aviation. The GS Version has an additional ECM-system and two additional fuel tanks.

CH-53E Super Stallion



A CH-53E Super Stallion taking off from the deck of the [USS Saipan](#)

Description

Role	Heavy lift helicopter
Crew	3 (2 pilots, crew chief) + 55 troops

Dimensions

Length	99 ft 1.2 in	30.2 m
	(overall)	m
Width (Fuselage)	73 ft 4 in	23.55 m
	(fuselage)	m
Height	27 ft 9 in	8.46 m
Rotor diameter	79 ft	24.1 m

Weights

Empty	33,226 lb	15,071 kg
Loaded		
Maximum take-off	69,750 lb	31,640 kg
	(internal)	kg
	73,500 lb	33,340 kg
	(external)	kg

Powerplant		
Engines	3 General Electric T64-GE-416 turboshaft	
Power	4,380 shp (each)	3270 kW
Performance		
Maximum speed	196 mph	315 km/h
Combat range	115 mi	185 km
Ferry range		
Service ceiling	18,500 ft	5,640 m
Rate of climb	2,500 ft/min	762 m/min
Armament		
Two window mounted M2 .50 caliber (12.7 mm) machine guns Chaff and flare dispensers		

Designated S-80E internally by the [Sikorsky Aircraft Corporation](#), the [Marine CH-53E Super Stallion](#), and the [Navy MH-53E Sea Dragon](#) are the largest and heaviest [helicopters](#) in the [United States](#) military. The base model CH-53E serves both the Navy and Marines in the heavy lift transport role. It is capable of lifting heavy equipment including the 8 wheeled [LAV-25](#) Light Armored Vehicle (but not the U.S. Army [Stryker](#), which is too heavy), the [M198](#) 155mm Howitzer with ammunition and crew, and can recover all other Marine corps aircraft except for the [KC-130](#). The less common MH-53E fills the Navy's need for long range mine sweeping missions. It features enlarged side mounted fuel sponsons and is rigged for towing its mine sweeping "sled" from high above the dangerous [naval mines](#). Currently under development is the CH-53X, or more correctly, the HLR or Heavy Lift Replacement, which will be equipped with three 6000 shp-class turboshaft engines.

Although dimensionally similar, the three engined S-80E is a much more powerful aircraft than the original Sikorsky "S-65" twin engined [CH-53A](#). Variants of the original Sea Stallion include the CH-53D, [MH-53 Pave Low](#), CH-53G, HH-53C, and the MH-53J PAVE LOW III. The CH-53D added more powerful engines and external fuel tanks. The RH-53A was used by the Navy for mine sweeping. The CH-53G was produced in [West Germany](#) for the [German Army](#). The [Air Force](#)'s HH-53B and HH-53C "Super Jolly Green Giant" was first deployed during the [Vietnam War](#) for special operations and combat rescue. The Air Force's CH-53J PAVE LOW III was the last of the twin engined CH-53's and is equipped with extensive avionics for all weather operation.

The Super Stallion variation first entered service in [1981](#) with the creation of Heavy Marine Helicopter Squadron 464 [HMH-464](#) in New River [North Carolina](#). Two more squadrons were created in [Tustin, California](#) over the next several years, the [HMH-465](#) and [HMH-466](#). In addition, one west coast training squadron, [HMT-301](#), was given several Super Stallions. Since then, other Marine Heavy lift squadrons have retired their CH-53A's and D's, replacing them with E's. Currently about 100 CH-53E helicopters are in service with the Marines and another 15 MH-53Es are in service with the U.S Navy. Additionally, a number of MH-53 helicopters have been exported to [Japan](#) as the S-80-M-1 as part of the [Japan Maritime Self-Defense Force](#) (JMSDF).

Some of the roles fulfilled by the Marines' older CH-53D's and [CH-46 Sea Knights](#) will be transferred to the [V-22 Osprey](#), but ongoing problems with the Osprey project have extended the longevity of the older aircraft.

CH-53 helicopters arrived to the [Israeli Air Force](#) in [August 1968](#) and were given the Hebrew name: **Yas'ur** ([Petrel](#)). Since then, they are the main cargo helicopters of the IAF, carrying both troops and heavy equipment. During the [1980's](#) the [Israeli Aircraft Industries](#), along with military high-tech firm [Elbit](#), upgraded and improved the IAF Yas'ur fleet. The project - which ended only in [1997](#) improved the CH-53 avionics, robustness and extended its life span by at least two decades.

Combat experience

The CH-53 saw vast combat experience, especially with the American armed forces and the [Israeli Air Force](#).

In [1970](#), during the [War of Attrition](#), an IAF [Yas'ur](#) CH-53 landed in [Egypt](#) and lifted an advanced [Soviet radar](#) and carried it back to [Israel](#), for examination by Israeli scientists and engineers.

The Yas'ur played a major part in [1973 Yom Kippur War](#), moving [artillery](#) batteries around the fronts, evacuating wounded soldiers and rescuing pilots from behind enemy lines. In one event, a Yas'ur was hit by [MiG-21](#) guns but managed to return safely to base.

Since then the Yas'urs was used by the IDF to land [Sayeret](#) commandoes for deep covert raids into [Lebanon](#) and [Syria](#), and to rescue them (the few times they were detected).

In [1989](#), Yas'urs were used to fight a huge blaze on [Mount Carmel](#). They dumped 700 tons of water on the fire's centers, and succeeded in dousing it after carrying out dozens of low flyovers into the smoke and flames.

During [Operation Desert Storm](#), MH-53E Sea Dragons were used for mine clearing operations in the [Persian Gulf](#) off [Kuwait](#). Several CH-53Es also assisted in other special operations during the operation.

In [1991](#), several CH-53Es along with several CH-46 Sea Knight helicopters were sent to [Mogadishu, Somalia](#) to evacuate U.S. and foreign nationals from the U.S. embassy during the [Somalian Civil War](#).

In the early morning hours of [January 26th, 2005](#) a CH-53E used in the transport of 30 [Marines](#) from the [1st Marine Division](#) and 1 [sailor](#) for election purposes crashed in [Rutbah, Iraq](#), killing all on board. A [sandstorm](#) has been determined as the cause of the accident. This incident was the main fatal event in the single bloodiest day for the U.S. military since an explosion ripped through a gun [turret](#) on the [USS Iowa](#) during a training exercise in the [Caribbean](#) in [April 1989](#), killing 47 sailors.

CH-54 Tarhe



CH-54 Tarhe carrying an [M551 Sheridan](#) tank on a sling mount in Vietnam.

Initial work on the [Sikorsky](#) heavy-lift 'sky-crane' [helicopter](#) began in [1958](#), with the S-60. The S-60 was a [piston-engined prototype](#) that was equipped with an [autopilot](#) for stable hover, and featured a [skeletal fuselage](#) with a crew cockpit; the [copilot](#) could swivel his seat to face both fore and aft, and control it from either position. The skeletal nature of the helicopter allowed it to carry customizable, underslung 'modules' - nearly 100 [troops](#), a medical outpost, a [radar](#) structure, etc.

The first flight of the [turboshaft](#)-powered **S-64 "Skycrane"** was May 9, [1962](#), with the [U.S. Army](#) eventually purchasing 105. Used in [Vietnam](#) for transport and downed-aircraft retrieval, it was highly successful, but the 'adaptable' nature of the module system was in fact a limitation: it could be a transport or a skycrane, but not both at the same time. The [Boeing CH-47 Chinook](#) gradually supplemented it in combat, although Skycranes remained in [U.S. National Guard](#) service until the early [1990s](#).

The Sikorsky S-65 ([CH-53](#) series) Stallions were designed with multimission capabilities in mind, having learned from the CH-54's lessons, and were much more successful.

Today, [Erickson Air-Crane](#), Central Point, Oregon, USA, operates the largest fleet of S-64 helicopters in the world, which can be equipped with water-bombing equipment for [firefighting](#) duties worldwide. After obtaining the type certificate and manufacturing rights in 1992, Erickson remains the manufacturer and world's largest operator of S-64s. It is traditional to give each S-64 an individual name, such as *Andy's Pride* in the adjoining picture. One S-64 nicknamed "Olga" was used to lift the top section of the [CN Tower](#) into place.


Specifications



Erickson S-64, *Andy's Pride*, owned by Siller Bros. Inc.

- Rotor Diameter: 21.95 m (72 ft)
- Length: 26.97 m (88 ft 6 in) rotors turning
- Height: 7.75 m (25 ft 5 in)
- Weight: maximum take-off 21,319 kg (47,000 lb)
- Powerplant: two 3,356 kW (4,500 shp) Pratt & Whitney T73-P-1 turboshaft engines CH-54A Model, two 3,579 kW (4,800 shp) Pratt & Whitney T73-P-700 turboshaft engines CH-54B Model
- Max Speed: 169 km/h (105 mph)
- Max Range: 370 km (230 miles)
- Climb rate: 1,330 ft/min (405 m/min)
- Ceiling: 18,330 ft (5,600 m)
- Lift capacity: 20,000 pounds (Model S-64E); 25,000 pounds (Model S-64F)

CHC Helicopter

CHC Helicopter Corporation	
	
Type	Public (FLI)
Founded	St. John's, Newfoundland (1984)
Location	St. John's, Newfoundland
Key people	Craig Dobbin, Chairman & CEO
Industry	Transportation
Products	Helicopter Services
Revenue	▲\$903 million CAN (2005)
Employees	3,500 (2005)
Website	www.chc.ca/



CHC listed on the NYSE

CHC Helicopter Corporation [TSX: FLY.SV.A](#) [TSX: FLY.MV.B](#) [NYSE: FLI](#) is the world's largest global commercial helicopter operator. CHC has a fleet of 215 helicopters and has been providing helicopter services for more than 50 years and currently operates in over 30 countries, on all seven continents and in most of the major offshore oil and gas producing regions of the world. CHC's major operating units are based in the [United Kingdom](#), [Norway](#), the [Netherlands](#), [South Africa](#), [Australia](#) and [Canada](#).

CHC's Global Headquarters is located in [Richmond, British Columbia, Canada](#). Its core business is providing helicopter services to offshore oil and gas companies around the world. CHC also provides emergency medical services (EMS), infrastructure maintenance, utilities, forestry, mining, and construction services.

CHC Helicopter Corporation is one of only two global providers of helicopter transportation services to the offshore oil and gas industry and claims to be the most experienced helicopter operator in the world. CHC pilots are qualified for IFR, over-water and all-weather missions. CHC also has capabilities in precision flying techniques and technical support.

CHC has long-term working relationships with most of the major oil and gas companies, including the operating subsidiaries of [BP](#), [ExxonMobil](#), [ConocoPhillips](#), [Royal Dutch Shell](#), [Statoil](#), [Norsk Hydro](#), [Total](#), [Chevron Corporation](#), [Maersk](#) and [Unocal Corporation](#). CHC operates the marine [search and rescue](#) service for the [Irish Coast Guard](#) at [Shannon](#), [Waterford](#) and [Dublin](#) airports. CHC also provides helicopter services for the [Fire and Emergency Services Authority of Western Australia](#).

Divisions



CHC Eurocopter Super Puma



CHC Bell 206 JetRanger

CHC manages its global operations through 8 distinct divisions:

- CHC Scotia ([United Kingdom](#) and [Ireland](#))
- CHC Helikopter Service ([Norway](#))
- Astec Helicopter Services ([Norway](#))
- CHC Helicopters International ([Vancouver, Canada](#))
- CHC Helicopters ([Australia](#))
- CHC Helicopters ([Africa](#))
- CHC Composites ([Gander, Newfoundland](#))
- Canadian Helicopters ([Canada](#))

Fleet

[Eurocopter Group](#)

- 18 - [Eurocopter Super Puma](#) AS 332L2
- 30 - [Eurocopter Super Puma](#) AS 332L1
- 31 - [Eurocopter Dauphin](#) AS 365N2
- 1 - [Eurocopter Ecureuil](#) AS 350
- 1 - [Eurocopter Ecureuil](#) AS 355

[Sikorsky Aircraft Corporation](#)

- 2 - [Sikorsky S-92](#)
- 26 - [Sikorsky S-61N](#)
- 59 - [Sikorsky S-76](#) (S-76A, 76A+, 76A++)

[Bell Helicopter Textron](#)

- 6 - [Bell 206](#) 206JR, 206LR, 206TR
- 12 - [Bell 212](#)
- 12 - [Bell 214](#)
- 12 - [Bell 412](#)

Gallery



CHC Eurocopter Dauphin



CHC Eurocopter Dauphin



CHC Eurocopter Ecureuil



CHC Eurocopter Ecureuil



CHC Sikorsky S-92



CHC Sikorsky S-92



CHC Sikorsky S-61N



CHC Sikorsky S-61N



CHC Sikorsky S-76



CHC Sikorsky S-76



CHC Bell 206 LongRanger



CHC Bell 206 JetRanger



CHC Bell 212



CHC Bell 212



CHC Bell 412



CHC Bell 412

External links

- [CHC Helicopter](#)

Cougar Helicopters

Cougar Helicopters Incorporated



Type [Corporation](#)

Founded [Halifax](#), [Nova Scotia](#)

Location [St. John's](#), [Newfoundland](#)

Industry Transportation

Products Helicopter Services

Website www.cougar.ca/



Cougar Super Puma helicopters

Cougar Helicopters is a commercial helicopter company servicing offshore oil and gas fields off the coast of [Newfoundland](#) and [Nova Scotia](#). Cougar has permanent facilities in [St. John's](#) and [Halifax](#).

Services

Cougar Helicopters currently services:

- [Newfoundland](#)
 - [Hibernia Field](#)
 - [Terra Nova Field](#)
 - [White Rose Field](#)
 - [Hebron-Ben Nevis Field](#)
- [Nova Scotia](#)
 - [Sable Offshore Energy Project](#)

Fleet

Cougar Helicopters currently operates a fleet of:

- [Eurocopter Super Puma](#)
- [Sikorsky S-92](#)
- [Sikorsky S-61N](#)
- [Sikorsky S-76](#)

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- [Cougar Helicopters](#)

