

ARCHIVED REPORT

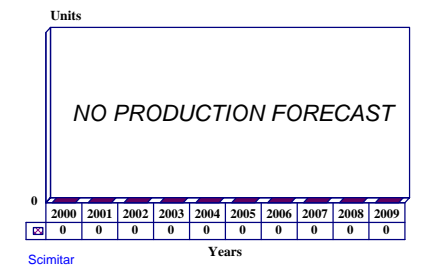
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Bell 406/OH-58 - Archived 11/2001

Outlook

- Last of 412 OH-58D upgrades delivered in 1999
- No further export sales foreseen
- Major safety improvements planned, but no further aircraft production to take place

10 Year Unit Production Forecast
2000-2009



Orientation

Description. Single-main-rotor, single turboshaft powered, light military helicopter.

Sponsor. US Army Aviation Systems Command, St. Louis, Missouri.

Contractors. Bell Helicopter Textron, Fort Worth, Texas.

Status. Production of upgrade kits and conversion of existing OH-58C/D aircraft.

Total Produced. Bell built five prototype Model 406s; first flight occurred in 1984. US Army funded 412

OH-58D conversions through FY96; all delivered through 1999. Seventeen 406CSs produced through 1990, plus 26 OH-58D conversions for export.

Application. Reconnaissance, observation/scout, surveillance, target acquisition and designation, special operations forces anti-tank, anti-surface vessel, and troop assault gunship.

Price Range. Armed OH-58D unit cost is approximately \$6.7 million in FY96 dollars. Armed AHIP conversion unit costs (less missiles and guns) \$1.34 million in FY95 dollars.

Technical Data

(OH-58D/406CS)

Design Features. The same airframe and drive train, based upon the original OH-58A/Model 206, are shared by the OH-58D and 406CS. Current models have four-blade main rotors with composite blades. On the OH-58D, blades are foldable and the vertical fin is tiltable, allowing stowage and conversion to flight status

within 10 minutes of unloading from a C-130. Transmissions are rated 510 shp maximum continuous, with Armed AHIPS having 575-hp transmission capability. Landing gear is fixed-skid type. Armed AHIPs have squatting skid gear.

	<u>Metric</u>	<u>US</u>
Dimensions		
Main rotor diameter	10.67 m	35 ft
Tail rotor diameter	1.65 m	5.413 ft
Fuselage length	10.31 m	33.825 ft

	<u>Metric</u>	<u>US</u>
Fuselage width	1.97 m	6.46 ft
Height to rotor head	2.59 m	8.5 ft
Overall height	3.9/2.59 m	12.8/8.5 ft
Weight		
Empty weight	1,281/1,028 kg	2,824/2,266 lb
Maximum take-off	2,041/2,041 kg	5,000/5,000 lb
Fuel load	321/367 kg	708/810 lb
Performance		
Maximum level speed	237/230 km/h	128/124 kt
Maximum cruise speed	222/222 km/h	120/120 kt
HIGE	3,660+/6,035 m	12,008+/19,800 ft
HOGE	3,415/5,210 m	11,204/17,093 ft
Range, maximum fuel, no reserves (est)	556/740 km	300/400 nm

Propulsion

OH-58D AHIP	(1)	GM Allison Gas Turbine Div T703-A-700 (Model 250-C30R) two-shaft, free turbine turboshaft engine rated a maximum 484 kW (650 shp).
406CS	(1)	Allison Gas Turbine Div Model 250-C30U turboshaft engine rated 485 kW (650 shp).

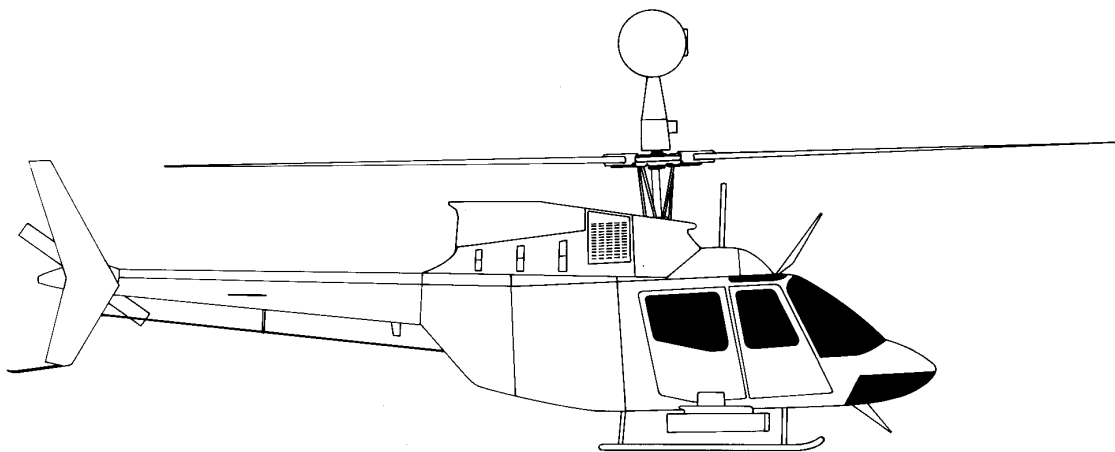
Armament

Armed OH-58D Kiowa Warrior - Pylon-mounted weapons include up to four Stinger, four HELLFIRE or four TOW anti-tank missiles; .50-inch machine guns with 1,000 rounds; 20 mm cannon with 360 rounds; 14 rounds of 2.75 inch rockets.

406CS - 2 x Giat 20 mm M621 gun pods, each firing 180 rounds; four TOW 2 or HELLFIRE missiles; or a mix of Stinger air-air missiles, 70 mm rockets, and .50-inch or 7.62 mm machine guns.

Accommodation

Pilot and copilot forward, side by side.



BELL OH-58D

Source: Forecast International

Variants/Upgrades

OH-58A. Initial military version of the Model 206 family purchased beginning in 1968; 2,200 produced. Powered by Allison T63-A-700 turboshaft rated 317 shp. The first was delivered to the US Army in May 1969. Canadian versions are designated CH-136.

OH-58B. Improved version of the OH-58A; also designated 206B-1 Kiowa, 12 of which were delivered to the Australian government. A total of 56 were produced.

OH-58C. 275 OH-58As were converted to OH-58C configuration beginning March 1978. Changes included a new instrument panel, vulnerability improvements, CONUS navigation equipment, daytime optics, improved avionics and maintainability items, and a 420 shp Allison T63-A-720 engine.

OH-58D. Further improved variant, conversions of OH-58A/C helicopters, called AHIP. The Model 406 forms the basis for this derivative, having been selected in 1981 as winner of the Army Helicopter Improvement Program. The Army's current requirement is estimated at 507 aircraft. The Bush administration halved this number but Congress subsequently provided unrequested funding, resulting in the authorization of 351 conversions through FY93, inclusive. The first of five prototypes flew in October 1983 and deliveries began in 1985.

OH/AH-58D Kiowa Warrior. OH-58Ds, armed with Stinger, Hellfire, TOW missiles, and various ordnance, were developed under the program Prime Chance. Work was begun in September 1987, in order to deploy to the Persian Gulf in the Kuwaiti tanker re-flagging exercise. The US Navy conducted operations from floating barges and destroyers against Iranian gunboats. Eighty-one armed AHIPs are currently planned, with the entire fleet of 280 expected to be so configured. This helicopter, sometimes designated AH-58D, incorporates a modified Allison Model 250-C30X with improved altitude power output and a 550 horsepower transmission, and has a gross weight of 5,500 pounds. Equipment associated with the weapon systems fit includes an overhead reflector sight for the pilot, steering indicator for the pilot flight display, expansion

of central computer memory capacity to accommodate infrared (IR) and laser jammers, multitarget acquisition, a video tape recorder, a helmet-mounted display slaved to the night vision goggles, SINCGARS radio, NBC masks, electro-magnetic pulse protection, and a windowless rear door.

OH-58X/UH-58E. Bell proposed this, and its UH-1H and 212, for the US Army's UH-1 replacement program. The UH-58E is essentially an OH-58D with an extended nose section, no mast-mounted sight or associated avionics black boxes, five seats including three in the rear of the cabin where OH-58D avionics systems were located, six external passenger positions, and a one-ton cargo hook.

Bell converted an OH-58D to Light Utility Variant standard and announced details of the design, now designated OH-58X, in April 1992. This model would carry a unit flyaway cost of \$6.7 million and would feature an inertial nav system with an imbedded GPS receiver, a ring laser gyro, a Collins ARC-217 HF radio and a pilot night vision system to complement the pilot's ANVIS night vision goggles.

Multi-Purpose Light Helicopter (MPLH). The US Army's 82nd Airborne Division has a requirement for a modified helicopter that will perform rapid deployment functions and forced entry missions. It is basically an armed OH-58D with three external troop positions per side, or two litters per side, and a one-ton cargo hook. Two such helicopters would be transported by a Lockheed C-130 and could be flying within 15 minutes of off-loading. These modifications are identical to those of the proposed UH-58E but with all OH-58D electronic systems in place. The Army's current requirement is for 81 MPLHs. All OH-58Ds are expected to be fitted with provisions for accepting these kits.

406CS. The Combat Scout is a simplified version of the OH-58D, using the same airframe and dynamic systems but without the Mast-Mounted Sight, AHIP specialized avionics, or integrated multiplex cockpit. Fifteen new-production aircraft were ordered by Saudi Arabia.

Program Review

Background. The OH-58 family was launched in the early 1960s, following Bell's loss in a competition to fill an Army requirement for a light observation helicopter. Hughes Helicopters won the initial contract with its OH-6/Model 369 rotorcraft. Bell proposed the

OH-4. Soon after that 1964 loss, Bell launched the civil Model 206 JetRanger. In 1968, the Army selected the OH-58A, the militarized scout version of the JetRanger, for a follow-on scout helicopter. Since that time, the OH-58 has been upgraded several times, with

significant improvements in speed, range, altitude, climb rate, mission capability, and weapons fit.

Army Helicopter Improvement Program. In an effort to acquire a scout helicopter to operate in conjunction with AH-64A attack helicopters, the US Army decided in 1980 to forgo development of the Advanced Scout Helicopter and instead equip 578 inventory OH-58s with mast-mounted sights. In January 1981, the Army issued a Request for Proposals for the retrofit and sent copies to Bell, McDonnell Douglas Helicopter Co (Hughes), Agusta and MBB. A short time later, Bell and McDonnell Douglas Helicopter Co (Hughes) were selected as finalists. Bell subsequently contracted with McDonnell Douglas Astronautics to design and develop the mast-mounted sight, and Hughes Helicopters chose Hughes Aircraft for the same work. The two AHIP competitors submitted technical and cost proposals in May for the Army's review. Subsequently, the Army selected Bell Helicopter as the winner, and awarded the manufacturer a multiyear, \$148 million contract for design, modification and testing of five AHIP (Bell Model 406) helicopters. The first of these flew in September 1983, with the first prototype delivered to the Army for operational evaluation in July 1984.

AHIP Technical Improvements. AHIP provides extensive modifications and additions to the OH-58A helicopter airframe. Though the superstructure of the current OH-58A remains unchanged, its rotor system, engine, power transmission system, and avionics components have been replaced with much more capable subsystems. Approximately 44 percent of the aircraft weight represents all-new hardware. Major modifications include:

- Mast-mounted sight above the main rotor
- Control display system which displays necessary target, navigation, and flight information
- Four-blade fiberglass composite main rotor and composite main rotor hub
- Up-rated drive system with a 324 kW (435 hp) main transmission (now 510 shp)

- Up-rated 82 kW (110 hp) tail rotor drive system
- Vibration isolation pylon mounting system
- One new Allison 250-C30R 484 kW (650 shp) gas turbine
- Provision for mounting the multipurpose, light-weight missile
- Improved nap-of-the-earth communications and navigation avionics
- Survivability equipment, including a radar warning receiver and infrared suppressor

At the heart of the AHIP is the McDonnell Douglas Astronautics Company's Mast-Mounted Sight (with Northrop Corp Electro-Mechanical Division as principal subcontractor to MDAC on MMS electro-optical hardware); Honeywell/Sperry's control/display system, Litton Industries Guidance & Control Systems Division's Doppler inertial navigation system and Attitude Heading Reference System (AHRS); and Canadian Marconi Company's vertical scale instruments. Northrop delivered the first MMS in November 1983. The new tail rotor allows directional control to be maintained in a hover in 64.8 km/h (35 kt) wind conditions. Other equipment fitted to or provided for use on AHIP includes Lockheed/Sanders' ALQ-144 infrared jammer, Hughes Danbury-Optical's (Perkin-Elmer) AVR-2 laser warning receiver, ITT SINCGARS, Tracor chaff/flare dispensers, MMS laser hardening, and M43 Chem/Bio masks for crew members.

Armed/AH-58 Version. Once shrouded in secrecy, this effort is intended to involve all planned OH-58D AHIP aircraft. Eighty-one is the provisional plan. These are modified to accommodate the laser-guided Rockwell HELLFIRE anti-tank missile and the General Dynamics Stinger air-to-air missile. Airframe modifications began in September 1987 and the first AH-58D was reportedly handed over to the Army that December. Fifteen were transferred to the US Navy for use aboard ships and floating barges in the Persian Gulf to support the tanker-escort/protection mission outlined by President Bush. Those 15 aircraft were delivered by February 1988.

Funding

Recent and planned funding for AHIP is as follows:

	US FUNDING							
	<u>FY98</u>		<u>FY99</u>		<u>FY00</u>		<u>FY01 (Req)</u>	
	<u>QTY</u>	<u>AMT</u>	<u>QTY</u>	<u>AMT</u>	<u>QTY</u>	<u>AMT</u>	<u>QTY</u>	<u>AMT</u>
Kiowa Warrior		53.7		48.7		41.9		41.8
US Army Mods		0.7		0.1		0.5		0.5
Total		54.4		48.8		42.4		42.3

All \$ are in millions.

Recent Contracts

None noted.

Timetable

(OH-58D/406CS)

<u>Month</u>	<u>Year</u>	<u>Major Development</u>
Sep	1981	Full-scale engineering development contract awarded
Jul	1983	Bell receives \$17.9 million contract
Oct	1983	First flight with operational mast-mounted sight
Mar	1984	Contract let for 16 units (\$58 million)
Jul	1984	Bell delivers first AHIP prototype
Sep	1984	Government operational testing begun
Oct	1984	Bell awarded \$89.1 million contract for 16 units
Jan	1985	Government operational testing completed
Apr	1985	FSED production decision
Dec	1985	Initial AHIP production deliveries
Jun	1986	AHIP IOC
Nov	1986	Army announces plans to halt program at 135 units
Apr	1988	Army announces plans to fund 477 AHIP modifications
Spring	1988	Contract placed for 15 406CS helicopters for Saudi Arabia
Jun	1990	Bell delivers first 406CS to Saudi Arabia
Late	1999	Final deliveries of OH-58D conversions to US Army

Worldwide Distribution

(As of July 15, 2000)

Austria Air Force	11	OH-58B
Saudi Arabia Army	15	406CS
Spain Army	11	OH-58A
Taiwan Army	26	OH-58D
US Army	345	OH-58D
	253	OH-58A/C

Forecast Rationale

The US Army received the last of 412 helicopters (upgraded from OH-58A to D) in late 1999 and, although the service's originally stated requirement was for 507 aircraft, the Army has made it clear it simply does not have the funds for that inventory goal.

The US Army has initiated a System/Safety Enhancement Program (S/SEP) aimed at updating about 310 Kiowa Warriors with new avionics, radio communications systems, and retrofit with the Allison

C30R/3 engine. This project was initiated in FY00 and is slated for completion in 2006.

A small number of OH-58/406 scouts have been sold abroad (see **Worldwide Distribution** entry), but we believe that further international orders would be filled by the upgrading of US Army surplus OH-58A/C models.

No further production or major airframe conversions are forecast.

Ten-Year Outlook

ESTIMATED CALENDAR YEAR PRODUCTION

Aircraft	(Engine)	thru 99	High Confidence Level				Good Confidence Level				Speculative		Total 00-09	
			00	01	02	03	04	05	06	07	08	09		
BELL HELICOPTER TEXTRON														
406CS	250-C30U	17	0	0	0	0	0	0	0	0	0	0	0	0
OH-58A	T63-A-700	2202	0	0	0	0	0	0	0	0	0	0	0	0
OH-58B	250-C20B	50	0	0	0	0	0	0	0	0	0	0	0	0
OH-58D (EXPORT MODS)	T703-A-700	26	0	0	0	0	0	0	0	0	0	0	0	0
OH-58D (MOD)(a)	T703-A-700/-C30R/3	412	0	0	0	0	0	0	0	0	0	0	0	0
Total Production		2707	0	0	0	0	0	0	0	0	0	0	0	0

(a)MOD Program - not new production aircraft.