# Introduction to The Official Helicopter Blue Book®

## About Specifications

The tab detailing helicopter performance and physical specifications include both English and metric forms of measurement and contain well over 100 "facts" about each helicopter. Each set of specifications are given for the most recent variant of that model.

The English system was used to develop all numbers for U.S.-built helicopters and then converted to appropriate metric equivalents. Metric measurements were the first choice for European helicopters, and these were converted to the English system.

The information is divided into 12 major categories and every effort is made to provide "apples to apples" comparability; when this is not possible, boldface footnotes are inserted to indicate otherwise or to add to the basic data presented. The definitions for each category are presented in the section marked "Specification Definitions," which immediately follows this section.

## Specification Definitions

**ENGINE**: First to be listed is the name of the manufacturer and then the model designation of the powerplant itself. In the case of twins, the word "two" precedes the model number. Engine dry weight is presented in both pounds (lbs) and kilograms (kg) and is rounded to the nearest whole number. Dimensions for a single powerplant are offered in inches (in) and centimeters (cm) for its maximum length, width, and height.

**POWER RATINGS**: These are the engine manufacturer's published maximum limits for takeoff and for maximum continuous operation, where available and applicable for a single powerplant. They are listed in terms of shaft horsepower (shp) and kilowatts (kW) for turbine engines, and horsepower (hp) and kilowatts (kW) for reciprocating engines. Where the information is not available or not applicable for this or any other entry, the abbreviation NA is used.

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**TRANSMISSION RATINGS**: These are the airframe manufacturer's published maximum ratings for takeoff and maximum continuous operation. They are listed in terms of shaft horsepower (shp) and kilowatts (kW) for turbine engines, and horsepower (hp) and kilowatts (kW) for reciprocating engines. For multi-engine helicopters, three additional values are listed for one-engine inoperative (OEI) conditions and are indicated as OEI followed by "2½ min" and "30 min" for these specific time limitations and "cont" to indicate continuous operation.

**PERFORMANCE**: As with range, we've attempted to provide comparability by stipulating that all helicopters are presented at their maximum gross weight at sea level and on a standard day, unless otherwise noted.

For multi-engine aircraft, the service ceiling (S/C) when operating OEI on the standard day (ISA or International Standard Atmosphere, which at sea level is 59° Fahrenheit, or 15° Celsius) is given as well as the so-called "hot and high" conditions of "ISA + 20° C," or an increase in the sea-level standard temperatures to 95° Fahrenheit, or 35° Celsius. Because the limitations imposed as these higher temperatures can raise density altitudes beyond a helicopter's capabilities, a dash ("–") instead of the term NA is used to indicate that the ship is simply not capable of attaining an OEI ceiling at any density altitude above sea level, or cannot hover under the given conditions, or establish a positive rate of climb.

Hover in ground effect (HIGE) capabilities are first given for the standard-day temperatures noted above and then for the hotter ISA + 20° C conditions, hover out of ground effect (HOGE) capabilities follow the same pattern.

"ROC, oblique" indicates the helicopter's rate of climb in feet per minute (fpm) and meters per minute (m/min) while in forward flight. "ROC, vertical" presents the ship's rate of climb, if any, straight up with no forward motion. "ROC, OEI" tells how a multi-engine helicopter will climb fully loaded with only one engine operating.

"Econ cruise, S/L" or economy cruise at sea level, is the indicated airspeed in knots (kts), and kilometers per hour (km/hr), that will provide the best compromise of fuel conservation with adequate speed. Vne (velocity, never exceed) is that indicated airspeed that represents the maximum allowable speed at sea level and at full gross weight on a standard day.

**ROTOR SYSTEM**: This section has two columns listing data: one for the main rotor and one for the tail rotor. First are the number of blades, followed by their construction (whether manufactured primarily or exclusively of metal or fiberglass or another composite material),

and their normal speed in revolutions per minute. Diameter (the area described by each rotor disk) is presented in feet (ft) and meters (m) and so is an individual blade's chord, the straight-line measurement from leading edge to trailing edge.

Disk area is listed in square feet (ft2) and square meters (m2) and disk loading is calculated by dividing the helicopter's normal gross weight by its main rotor's disk area, with the results being given as pounds per square foot (lbs/ft2) and kilograms per square meter (kg/m2). Power loading is calculated by dividing normal gross weight by the maximum engine power available (the takeoff rating times the number of engines), with the results being pounds per shaft horsepower (lbs/shp), or per horsepower in the case of recips, and kilograms per kilowatt (kg/kW). These values refer to the main rotor only (or to both rotors of tandem-rotor ships).

The ability to fold the rotors is indicated by a simple yes or no.

**WEIGHTS**: Using the familiar pounds and kilograms, weights are presented in descending order, which allows the helicopter's empty weight to be subtracted from its maximum gross weight to determine its useful load or payload. The ship's empty weight is for a standard aircraft in normal configuration for the make and model, including engine oil and undrainable fuel.

Next, its standard full fuel load is subtracted from its useful load to reveal how much of a payload in terms of people or cargo it can carry when its tank or tanks are topped off; the weight of auxiliary or ferry fuel is not calculated here. External load refers to the maximum weight of any sling load or material suspended from the helicopter's cargo hook. In some instances a helicopter's gross weight when carrying external cargo may be allowed to exceed its normal gross weight, and this will be apparent in the final weight category, gross with external (ext) load.

**EXTERNAL DIMENSIONS**: All dimensions are given in feet and meters. The first one is the fuselage length, from nose to tail (but not including any pitot tubes or antennas); portions of the vertical stabilizer and sometimes the tail-rotor guard may be included. The next two measures of length include the rotors and are expressed as length with the tail rotor turning to bed by its arc, and then with both main and tail rotors turning to include the arc described by the main rotor and tail rotor.

Three widths come next: The maximum presented by the fuselage, followed by the widest point as determined by any fuselage structure, which is often the horizontal stabilizer, and then the width of the landing gear of the fully loaded helicopter when sitting on the ground.

Heights are measured from the ground level to the top of the main-rotor hub, to the top of the vertical stabilizer (tail fin) if any, and to the top of the arc described by the tail rotor.

Ground clearance is measured from the lowest part of the fuselage and from the bottom of the tail-rotor arc, or in some instances, the tail-rotor guard.

These dimensions are for helicopters with normal-height skids.

**INTERNAL DIMENSIONS**: This section comprises two parts, the cabin and the baggage compartment, and gives maximum length, width, and height expressed in feet and meters and volume in cubic feet (ft3) and cubic meters (m3). The cabin is generally considered the main passenger compartment. Dimensions given for space allowed for baggage are totals and represent the maximum allowable, and the sum of all spaces where volume is concerned.

**ACCOMMODATION**: "Standard seating" means as normally equipped and "high density" refers to the absolute maximum permitted for utility missions. One, two, three, four or more numbers separated by plus signs will normally be given; these indicate the number of seats placed side by side, from forward to aft, or from the cockpit to the rear of the passenger compartment. In larger cabin-class aircraft, this practice becomes cumbersome, and seating is listed as so many seats in the cockpit (usually just two) plus so many in the cabin.

**FUEL CAPACITY**: Fuel loads are presented in U.S. gallons and liters and also, because weight is frequently a critical consideration, in terms of pounds and kilograms. We calculated the weight of turbine fuel at 6.7 pounds per gallon and aviation gasoline at 6.0 pounds per gallon. The first line lists the aircraft's standard fuel capacity and the lines below that account for fuel, if any, that may be carried in auxiliary or ferry tanks; these are presented in descending order simply as a matter of convenience and it should be noted that a helicopter's most frequently selected auxiliary tank may not be the one with the largest capacity.

**AVERAGE FUEL CONSUMPTION**: Gallons Per Hour (GPH) and Liters Per Hour (LPH) are measures of fuel used by the helicopter, relative to power settings at cruise speed. Each figure is a direct measure of the total number of gallons or liters burned in an hour of flight time by the total number of engines installed.

**AVERAGE FUEL ECONOMY**: GPH/LPH Per Seat is a measure of fuel used as it relates to the number of passenger seats in the helicopter. It is obtained by dividing the gallons (liters) per

hour (in the Average Fuel Consumption paragraph) by the maximum number of seats in the aircraft in its standard configuration.

GPH Per Lb (LPH Per Kg) is a measure of fuel consumption as it relates to the number of pounds (kilograms) the aircraft can lift. It is obtained by dividing the gallons (liters) per hour (in the Average Fuel Consumption paragraph) by the maximum gross weight of the helicopter.

**RANGE**: Distances are given in nautical miles (nm) and kilometers (km). The first set of figures are for distance at maximum gross weight with a full fuel load, but no auxiliary fuel, at sea level on a standard day, which is 59° Fahrenheit, or 15° Celsius. Range with maximum payload refers to conditions that may require offloading of some fuel to accommodate a full load of people or cargo. Next comes the distance capable when carrying auxiliary fuel and with no fuel reserves (res) calculated. Finally endurance, the maximum time the helicopter can stay aloft at its economy-cruise speed, is given in hours (hrs).

**SUMMARY**: This section provides information about the helicopter such as its Common Uses, Nearest Competitive Models, Total Production-All variants, Most Recent Variant and Differences from the previous model.

**MILESTONES**: This data is intended to provide a measure of historical perspective. The definition of "initial development" means many things to many people but is often thought of as the time when some sort of top level decision was made to commit to designing and building a prototype for the helicopter involved. Accordingly, these dates are frequently difficult to pin down and may be given as a year rather than a specific date or a month and year.

First flight indicates the date the prototype aircraft successfully left the ground under its own power, even if only for a few moments and restricted to a hover, although a number of first flights explored the envelope more adventurously. (In the case of a few aircraft, first flights extend back a generation or two to the progenitor aircraft.)

The date of Federal Aviation Administration (FAA) approval for operation under Visual Flight Rules (VFR) is listed first, followed by the date of approval, if any, for operation under Instrument Meteorological Conditions (IMC) (commonly called Instrument Flight Rules (IFR)).

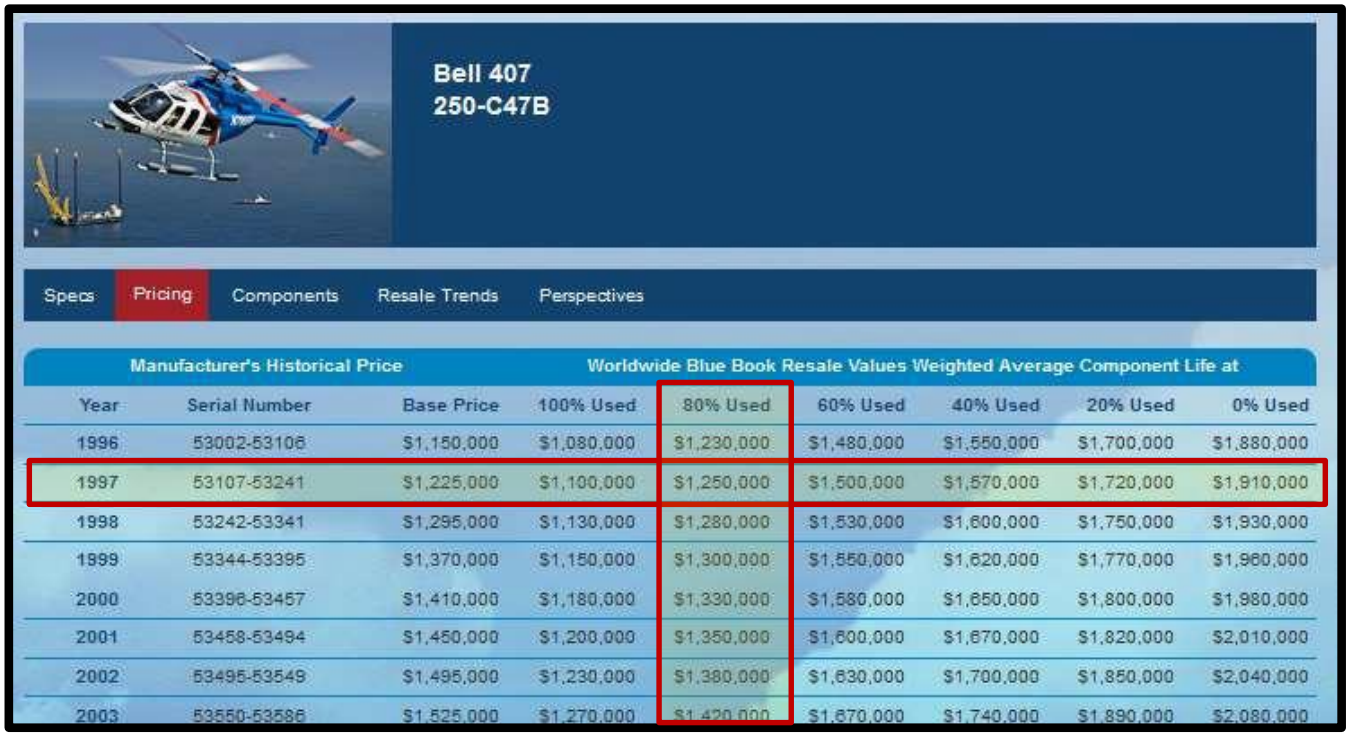
Our final comment regarding specifications is a simple caution. The data presented are subject to change and will be updated periodically, but most important, they are not intended to

substitute for any helicopter manufacturer's appropriately authorized flight or maintenance manuals.

## Pricing Page

The pricing tab displays the Manufacturers Historical Price and Current Worldwide Resale Values based on average component life. At the top of this page subscribers also have the ability to download a searchable PDF copy of the full **Blue Book** and **Specification Book** in English or Metric as well as **Perspectives: A Helicopter Resale History ®.**

Let's look at the pricing page example below. On the left, we see that a 1997 Bell 407 had a base price of $1,225,000 in 1997. Historical base prices are always listed in that year's dollar. On the right, we see that a 1997 Bell 407 with 80% average component life ***currently*** has an average resale value of $1,250,000.



**Bell 407**
**250-C47B**

Specs | Pricing | Components | Resale Trends | Perspectives

| Manufacturer's Historical Price | | | Worldwide Blue Book Resale Values Weighted Average Component Life at | | | | | |
|---|---|---|---|---|---|---|---|---|
| Year | Serial Number | Base Price | 100% Used | 80% Used | 60% Used | 40% Used | 20% Used | 0% Used |
| 1996 | 53002-53106 | $1,150,000 | $1,080,000 | $1,230,000 | $1,480,000 | $1,550,000 | $1,700,000 | $1,880,000 |
| 1997 | 53107-53241 | $1,225,000 | $1,100,000 | $1,250,000 | $1,500,000 | $1,570,000 | $1,720,000 | $1,910,000 |
| 1998 | 53242-53341 | $1,295,000 | $1,130,000 | $1,280,000 | $1,530,000 | $1,600,000 | $1,750,000 | $1,930,000 |
| 1999 | 53344-53395 | $1,370,000 | $1,150,000 | $1,300,000 | $1,550,000 | $1,620,000 | $1,770,000 | $1,960,000 |
| 2000 | 53396-53457 | $1,410,000 | $1,180,000 | $1,330,000 | $1,580,000 | $1,650,000 | $1,800,000 | $1,980,000 |
| 2001 | 53458-53494 | $1,450,000 | $1,200,000 | $1,350,000 | $1,600,000 | $1,670,000 | $1,820,000 | $2,010,000 |
| 2002 | 53495-53549 | $1,495,000 | $1,230,000 | $1,380,000 | $1,630,000 | $1,700,000 | $1,850,000 | $2,040,000 |
| 2003 | 53550-53586 | $1,525,000 | $1,270,000 | $1,420,000 | $1,670,000 | $1,740,000 | $1,890,000 | $2,080,000 |

***If there are N/A notations for a year of manufacture, it means there has not been sufficient trade activity to list resale values***.

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## Aircraft Options

The Aircraft Options of each *Blue Book* page shows what amount is normally added or subtracted from a helicopter's value if the item is, or is not, installed. The value amounts in the "Options" box may not have a direct relationship to what the item might cost when it was purchased new, or if it was installed in a "used-serviceable" condition. The options' values are added to (or subtracted from) any of the helicopters' value ranges despite the age of the option, the value of the helicopter, or its components' service life status. The options block may not list every option available for the helicopter consult HeliValue$ for more details.

## Resale Trends

The Resale Trends is a graph illustrating past resales based on the components' weighted average component life. Each line represents the weighted used average at 0%, 20%, 40%, 60%, 80% and 100%. The specific year is selected to show the trend of the resale market for the last 24 months.

Each value line represents a "generic" resale. It doesn't take into consideration the appearance or maintenance status. The helicopter is considered to be "standard/average equipped" without additions or deletions for extra options.

## Perspectives

The charts are the heart of Perspectives. They show the resale value ranges for each model as of the first calendar quarter of each year from 1979 to the present, as applicable. To keep the charts readable, each point represents the mean for the first calendar quarter of each year, regardless of the helicopter's year of manufacture. Compared to the components' service-life used, the age of the aircraft has little impact on its value. The values given do not include variables such as shipping or storage costs, maintenance or insurance, taxes or duties. No adjustments have been made for inflation: 1979 values are given in 1979 dollars, 1989 values in 1989 dollars, and so on through the present. All values are given in US dollars and are net retail prices.

The three lines represent the Low Time value, Mid Time value and High Time value as indicated in the key. A Low Time machine has roughly less than 20% time used, Mid Time is 50%, and High Time is 20% or less remaining time on major components.

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Price spreads shown are based on the realities of then-current market scenarios. There are two major facts which become apparent: 1) Helicopters have very extended economic and mechanical useful lives, and 2) Even in depressed economic times helicopters can resell for strong prices.

"Wholesale" values are not applicable to the helicopter market for two reasons: First, most new helicopters are sold by the manufacturers through their own sales representatives. As a result, there are few independent distributors to affect price variations. Second is the fact that, unlike used cars or used fixed-wing aircraft, there are few occasions where any quantity of helicopters have been bought, stored, and resold on a purely speculative basis. Since there are no dealer-to-dealer "wholesale" trades regularly made which fix reduced amounts to the resale prices and no "dealer" network, a pricing structure does not exist for traceable "wholesale" values.

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