



505 single improves on the 206's legacy

by Alexa Rexroth

In mid-January, 20-degree temperatures in Texas coupled with substantial wind gusts and the threat of snow almost placed me directly in the right seat of a Bell 505 simulator instead of the real helicopter. But with conditions improving upon my arrival at Bell's Fort Worth, Texas factory, it was announced, with great relief to me, that the flight in Bell's 505 Jet Ranger X would take place as planned.

Championed by Bell as the most advanced light single in the market, the 505 Jet Ranger X offers first-in-class features including a dual-channel Fadec and fully integrated Garmin G1000H flight deck. Designed to echo the storied career of the B206-series JetRanger while advancing its class's legacy into the future, the 505 is suitable for utility, corporate, parapublic, and training mission profiles.

Bell is working on utility options for the 505 and expects to certify a cargo hook later this year. With commercial deliveries continuing to climb along with letters of intent, the helicopter is retaining its welcomed entrance into the market.



During the pre-flight briefing session, I engaged with Tim Otteson, who would be the demo pilot for the day, and Chase Hawkins, who serves as Bell's maintenance coordinator for the demo fleet. The exceptional knowledge base of Otteson and Hawkins became immediately evident as we began discussing the 505. I was particularly interested in how it fared in comparison to the 206 series.

"The flight characteristics of the 505 are very similar to [those of] the 206," said Otteson. "It has the same teetering-style underslung rotor system that you'll find on a 206L4. The tail rotor drive shaft is a little bit longer on the 505 and the tail rotor has a lot more authority. The transmission is mounted to the fuselage in a different manner than [on] the 206 with liquid inertia vibration-eliminating mounts. You'll find the 505 to have a much smoother ride than a typical 206."

With a higher gross weight, full-fuel payload, and useful load compared to the 206, the 505 also features 504 takeoff shp compared to the 420 shp of the 206. Priced at approximately \$1 million, the 505 has a max range of 360 nm. The 505 is powered by the Safran Helicopter Engines Arrius 2R, controlled by a dual-channel Fadec. "It is a much more powerful, responsive, and modern engine," Otteson said. "It's a lot more powerful than what you're used to in a 206."

Avionics

I asked Otteson about the learning curve associated with stepping from a 206 into the 505, and he explained that the most immediate challenge pilots face is adjusting to the G1000H avionics. "Once you get used to the Garmin screens and where your eyes need to go to find the information, it becomes very easy and intuitive," he said. "Additionally, the initial flight training course at the [Bell] academy here is more than enough to get someone comfortable with the helicopter."

With the briefing completed, we walked over to the ramp where N505FW, dressed in a red, black, and white paint scheme, was ready for preflight. Unaffected by the brisk temperature, Otteson walked me around the aircraft while detailing its components and notable characteristics.

I was curious about the lack of circuit breakers in the cockpit. Otteson directed me to the pilot (right) side of the aircraft to open an avionics hatch where the circuit breaker panel is located above the power unit. The decision to eliminate breakers in the cockpit stemmed from Bell's intention to eliminate the tendency of pilots incorrectly resetting breakers and not using them for their intended purpose.

"If pilots can't troubleshoot and mitigate the problem through the Garmin system, they probably don't need to be doing it in flight," explained Otteson.



Below the circuit breaker panel, I saw the True Blue Lithium-ion smart battery, much lighter and more powerful than traditional lead-acid or nickel-cadmium batteries. “This is Bell’s first foray into smart battery technology,” he said. “It can sense if it’s cold and will run its own battery heating cycle and generate a message through the Garmin avionics indicating the battery is heating. It lets us know if it has any problems and will generate a fault or failure code in the cockpit.”

The baggage compartment, also accessible from the pilot side, can hold multiple golf bags, passenger seats from the main cabin, or up to four standard suitcases, and it boasts a usable volume of 18 cu ft. The flat floor of the 505’s cabin is adaptable for changing mission demands, with an overall cabin volume of 99 cu ft.



In the past, at a not-so-staggering 5 feet, 2 inches, I have found myself having to employ creative gymnastics to successfully climb into cockpits. Getting into the 505, however, came without the need for any contortionist skills. The crew seats are mounted on in-line tracks and are equipped with a double strap shoulder harness and inertia reel. Clamshell cabin doors on the copilot side open up to 55 inches, allowing passengers to more easily enter and exit. The passenger seats are forward-facing, bulkhead-mounted seats, and these can easily be disconnected and stowed in the baggage compartment.

Much to my usual vertical deficiency-related chagrin, and even after adjusting the pedals, I was given a cushion to place behind my back for good measure to ensure full extension. Once I was fully situated, the impressive windscreen and substantial cabin size made the 505 feel noticeably roomier than the 206. Even more apparent than the increase in headroom, and certainly different from the typical 206 instrument panel, was the clean presence of the G1000H avionics.

After switching the battery on, Otteson entered our combined weights through simple inputs into the flight deck's MFD weight-and-balance display. The G1000H can be upgraded to include Garmin's Helicopter Synthetic Vision Technology and has two SD card slots, for data updates and downloads. The aircraft systems are completely integrated with the G1000H system, and Otteson defined the safety importance of that relationship by explaining, "With the integrated Garmin, you are going to literally have hundreds of different advisories, cautions, and warnings that will populate on the screen, letting you know exactly what's going on with the transmission [and helicopter]."

Engine Start and Flight

I examined the collective to find the throttle switches to transition between IDLE and FLY modes. "The dual-channel Fadec is all about safety, safety, safety," said Otteson. "You can maneuver and transition between IDLE and FLY and demand a lot out of the engine without having to worry about drooping the rotor, because that Fadec is going to take care of it for you."

The Fadec also incorporates an auxiliary control unit, which acts as a back-up for the hydro-mechanical unit if it fails. Surge and flame-out protection and other safety features make operating the engine much simpler. Bell's goal of reducing pilot workload through upgraded avionics and simplified engine management became readily apparent to me as we began the start-up process.

With the throttle switch set to IDLE, the START/RUN button was pushed and the Fadec took over while we monitored start limitations. For run-up, we switched to FLY mode, and with



Bell 505 Jet Ranger X Specifications and Performance

Price (typically completed and equipped)	\$1.00 million
Engine	Safran Helicopter Engines Arrius 2R, 505 shp TO (475 max cont.)
Avionics	Garmin G1000H
Passengers (typical)	1 crew + 4 pax
Range (4,000 ft, ISA, no reserve)	355 nm
Long-range cruise speed	113 ktas
Fuel capacity	84.85 gal
Ceiling (service)	20,000 ft
IGE hovering ceiling (gross weight, ISA)	14,450 ft
OGE hovering ceiling (gross weight, ISA)	10,460 ft
Gross weight (internal)	3,680 lbs
Gross weight (external load)	4,475 lbs
Maximum external load (cargo hook limit)	1,500 lbs
Cabin volume (total)	99 cu ft
Cabin volume (rear)	61 cu ft
Baggage capacity	18 cu ft



both N_R and N_P needles indicating 104 percent, we were ready to pick up into a hover. This was an exceptionally simple start-up process, and I understood how it could be immensely attractive to pilots who may be intimidated by transitioning to a turbine.

“The people I have shown the 505 to, including quite a few private owners that entered the market in smaller piston helicopters and were ready to make the progression to turbine, were really looking for a safer, proven rotor system with Fadec and upgraded avionics,” said Otteson.

The pickup into a hover felt extremely light and gave me the first indication of the 505’s power. With a takeoff rating of 504 shp and maximum continuous rating of 457 shp, we pulled straight up into a max performance takeoff with plenty of power to spare. A dedicated, albeit presumably chilly Bell employee, captured our takeoff on video from the ramp. The resulting footage, while impressive, did not do justice to how powerful the takeoff felt from inside the cockpit.

As we flew away from the ramp, Otteson encouraged me to experiment with banks and turns. I worked on maintaining coordinated flight and scanning the G1000H, when Otteson reminded me to keep the aircraft in trim. The primary flight display indicated our attitude, airspeed, altitude, and vertical speed, plus showed an HSI display, while Bell’s Power Situation Indicator depicted our power limits and indications. As we continued in flight, the intuitive layout of the G1000H became increasingly easier to scan and understand.

Otteson took the controls and demonstrated maneuvers he often shows to law enforcement pilots. He maintained a tight orbit over a fixed location on the ground and then gave the controls back to me to try an out-of-ground-effect hover. Holding the OGE hover felt extremely stable and steady, and I could absolutely understand the appeal to those involved in parapublic operations.

With the hydraulics turned off, I felt that the 505 was much easier to fly than the 206 under the same conditions. With the hydraulics back on, we proceeded to a designated training field. The sight picture offered by the 505 presents a different, but more expansive view than the 206 because of the enlarged windscreen. After shooting a normal approach to the training field, I set the 505 down in the grass. Initially nervous about the set-down and my non-refined understanding of the skid height, I was surprised when the maneuver actually went very smoothly and without hesitation.

Picking back up into the hover, I asked Otteson if I could try sideward hovering and pedal turns. In an attempt to quell my excitement and fear of having my flying skills judged by the extremely proficient Otteson, I carefully began engaging in my requested maneuvers. I could tell that I was starting to have a death-grip on the controls and as soon as I reminded myself to relax, the sideward hovering and pedal turns felt much more manageable.

Moving into quick stops across the field, Otteson allowed me to execute the maneuver as I began



to feel more comfortable with the 505's handling. I then requested to follow along on a power recovery autorotation. With the throttle switch set to IDLE on both collectives, we entered the maneuver. It felt very similar to the high-inertia autos typical in the 206, and after recovering, we transitioned back into a climb to normal flight.

Back at straight-and-level flight, Otteson showed me Garmin's highway-in-the-sky function. Otteson explained, "You can set the helicopter up if, heaven forbid, you end up in inadvertent IMC, [by loading]

an instrument approach with the highway-in-the-sky [function] from where you are to a runway threshold." The G1000H can also be upgraded with helicopter terrain avoidance warning system (H-TAWS) and traffic advisory system.

I soon made the disappointing realization that we were headed back to the ramp and my demo flight was coming to a close. I wanted to stay buckled into that seat all day and knew it was going to be difficult to pry myself out of the 505 upon landing. My set-down on the ramp was definitely not as smooth as my set down in the grass, as I began to "stir the pot" and question the height of the skids. Otteson, with the comfortingly calm voice of an experienced instructor, guided me through the set-down, and I silently hoped that not a single soul at Bell had seen my performance. Putting my shame aside momentarily, we flipped the throttle switch to IDLE and shut the 505 down.

Just like the start-up procedure, the shutdown was simple and uneventful. Finally realizing that I would have to eventually actually exit the 505, I unbuckled the harness and stepped out onto the ramp. I felt a rush of jealousy when I saw the next group waiting for their demo flight.

In the debriefing room, I was given the opportunity to discuss the flight with Otteson before heading over for a tour of Bell's Training Academy. In search of Bell fan gear to take home with me, I discovered both gift shops were closed for the day. But knew I was taking home the best souvenir; an extremely memorable logbook entry. ■



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