PILOT FLIGHT CHECK:

The HUGHES 500C Helicopter

by ROBERT W. SWEAZEY / AOPA 387609

■■ In 1964, while charging around the skies at 80 knots in a helicopter furnished by an uncle, and wearing a uniform furnished by that same uncle, I was very much aware of a game of one-upmanship that was going on. The main cast of characters consisted of helicopters from three different manufacturers, undergoing rigorous evaluation by the U.S. Army to determine the winner of a light observation helicopter (LOH) design competition.

It was not until recently that I had the chance to try an updated version of the original winner of this competition on for size. I hadn't known what I was missing. I used to be content to think of 80 to 90 knots as cruising speed for a helicopter. Not any more—how about 130 knots (150 mph)! The Hughes 500C is faster than many airplanes of a comparable gross weight—in fact, one of the thrills of conducting the flight check was cruising along the coast of Southern California and passing several airplanes that happened to be going the same way. Since I've put up with considerable razzing from my fixed-wing-only friends about how slow helicopters were, it was a moment of sheer pleasure.

Newest of the breed from Hughes Helicopters, Culver City, Calif., the Hughes 500C still holds many of the 23 world records it has established.

The 500C is type certificated under the designation Hughes 369HS and follows its extremely popular predecessor, the Hughes 269-300. As has been the custom with Hughes, the model number—500—denotes a five-place configuration, just as 300 indicated a three-place capability in the 269 series.

On the morning of my flight check, I met Hughes representative Bob Parrish (AOPA 259647) at Santa Monica (Calif.) Airport. It was a perfectly marvelous day: skies clear, visibility unlimited, wind 260° at five knots, and the temperature about 72°F.

In addition to Bob Parrish, Bob Ferry, chief experimental test pilot for Hughes, was there with the flight test aircraft, N9150F, a shiny red-and-white bird with about five hours' total time. After a few appropriate oohs and ahhs from me, Bob Ferry explained the preflight. It's extremely easy except for the rotor-head check, which requires opening the rear passenger door and standing on the floor in order to get a closer look. Actually, this isn't any real chore, and it does allow for detailed visual inspection.

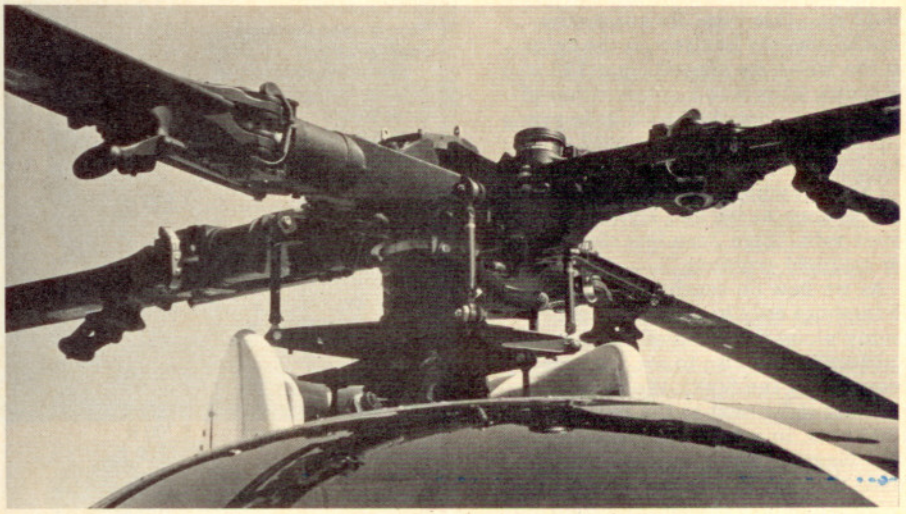
All liquid levels are easily checked without having to open any cowling or access panels—a real time-saving feature.

The starting procedure was "duck soup": throttle closed; push starter until 12% N_1; open throttle to ground-idle position while continuing to hold starter until N_1 reaches 58%; release the starter and the engine con-

Noise-abatement requirements at Santa Monica gave N150F a good chance to show off its climb characteristics. By the time it reached the airport boundary, the helicopter had attained an altitude of 900 feet and was indicating 60 knots.

Faster than many airplanes of comparable gross weight, Hughes's new whirlybird is a versatile performer in a multitude of roles

Main rotor head as it looks to the pilot on preflight. Rotor clears the ground by 7 feet and has a 26.3-foot diameter.



tinues to accelerate—and that's all. Needless to say, the customary check to assure that the oil pressure comes up is made as soon as the starting sequence is completed. Of course, monitoring the turbine outlet temperature (i.e., exhaust gas temperature) during the starting is good practice with any turbine engine.

The tower furnished takeoff instructions—"Cross the airport boundary southbound at 700 feet or above" (noise-abatement requirement)—that provided Bob Ferry the excuse he needed to show off the climb characteristics of the 500C. Since we were parked on the south side, only a few hundred yards from the airport boundary, we were going to need a fairly steep climb gradient. But it was no problem at all—in fact, we were at about 900 feet crossing the boundary line, and were indicating 60 knots to boot.

Right off the bat, I liked the airspeed indicator. Your next question is, What's so different about an airspeed indicator? This one has both miles per hour and knots calibrated on the face, but the feature I like is that the outer ring is the scale for knots, as opposed to the more customary method of putting the miles-per-hour scale on the outside. Since all the performance specifications are based on knots, it's very easy to apply book figures to actual performance.

As the flight test progressed, we flew south just a few miles to where the Hughes airport complex is sandwiched between Santa Monica and LAX airports. There Bob Ferry began a series of demonstration maneuvers that gave me quite a bit of insight into two different areas: (1) the machine and (2) Bob Ferry.

Bob, who has been with Hughes Helicopters since he retired from the Air Force as a test pilot, was now making this bird do things that are almost unheard of. For instance, he did hovering autorotations, and just before ground contact and with the rotor rpm very low, he applied full power for a power recovery. Then I watched as the rotor rpm responded very rapidly and came right back to normal. Because of complete tail-rotor control, we did not change heading at all during the entire maneuver, even during the high-torque, low-rpm period of the power recovery.

As Bob Ferry continued to demonstrate the 500C, it was obvious that he knows the machine as probably no other person does. He was involved in all the original experimental flight testing of the prototype, the U.S. Army LOH flight testing, the FAA type certification test flying, and the ongoing experimental flight testing. As a result of his test work, he probably has more flight time outside the green arcs than most people have in the normal operating areas.

continued

After I had observed Bob's handiwork with the 500C, he indicated it was my turn. This was what I'd been waiting for.

After some hovering and a couple of trips around the pattern, I was feeling quite at home. I was surprised how quickly the feeling of flying a strange machine changed into a feeling of familiarity that usually comes only after many hours of flying.

With Bob Parrish already aboard, we picked up another Hughes representative who needed a ride to the Hughes production flight test facility at Palomar Airport in Carlsbad. We were now only one person short of a full load in the helicopter, which had a five-place executive seating arrangement.

As we proceeded southbound, LAX approach control directed us for a midfield crossing of Los Angeles International at 1,000 feet agl. We were heading "full bore" in that direction at 130 knots. At about the time we crossed the northern edge of the airport, the tower told us to hold over the control tower.

Once again, Bob Ferry had an excuse to demonstrate what the 500C could do—this time, its quick-stop capabilities. As he drew in the reins on the 500C, we slowed from 130 to 35 knots. This was a deceleration of almost 100 knots in just a little over a quarter of a mile. All I could say was "Wow!"

(You may have already guessed that as soon as we had slowed, the tower said, "Five Zero Fox cleared for midfield crossing.")

As we flew on southward, I had a chance not only to do some sightseeing along the coast of Southern California, but also to see the speed potential of the 500C. We were cruising right next to the redline of 130 knots, in a very comfortable ride. Nearing San Clemente, we made the required detour around the "Western White House" and then headed over the hill to Palomar Airport.

After a lunch break with Palomar flight facility plant manager R.E. Fletcher (AOPA 258225), we were airborne again for some closed-pattern work. Normal and steep approaches seemed to present almost no challenge whatsover. The helicopter felt very stable, especially during addition of power at the termination of an approach. Directional control was very good throughout, with no tendency toward overcontrol.

While hovering, we rolled the throttle out of its governor-control position into the manual operations mode and then started reducing the rpm. The objective was to see how low the rpm could go before we were no longer able to hover. The normal operating range of the rotor with power on is 484 to 489 rpm, so when we were still airborne at just above 350 rpm, I was quite impressed.

Next on the agenda were autorotations. This was another area where Bob Ferry was more than just proficient in the 500C. He demonstrated a straight-in autorotation and then said, "Want to try one?" He knew the answer without asking; of course I did.

In order to get the feel of the pitch-pull technique, I decided a couple of hovering autorotations were in order. The helicopter's stability and lack of tendency to overrespond during the autorotation were very much appreciated. Both the cyclic and tail-rotor response were good. The amount of collective pitch increase needed for the landing was rather small compared with some other helicopters.

The hovering autorotations went so well that any apprehension I had regarding the 500C's autorotational characteristics was dispelled. With the hovering "autos" complete, it was time for some straight-in autorotations.

Entering final about 700 feet above the airport, I lowered the collec-

HUGHES 369HS-500C

Specifications

Engine	Allison 250-C20 gas turbine rated @ 400 eshp, derated to 278 eshp max continuous
Length	30.3 ft
Height	8.2 ft
Rotor diameter	26.3 ft
Rotor ground clearance	7.0 ft
Seating capacity	
Executive configuration	5
Utility configuration	7
Gross Weight	
With internal load	2,550 lb
With external load	3,000 lb
Empty weight (approximate)	1,100 lb

Performance

Never-exceed speed (sea level)	130 kt
Max cruise speed (sea level)	125 kt
Hover ceiling	
In ground effect, standard temperature	12,900 ft
Out of ground effect	6,700 ft
Service ceiling	14,500 ft
Range	345 mi
Endurance	3.4 hr
Basic price	$129,000

N150F at Palomar Airport, Carlsbad, Calif., where Hughes maintains a production flight-test facility.

Author, left (in right seat), and Hughes Helicopters' chief experimental test pilot, Bob Ferry, ready for takeoff.

tive and rolled the throttle off to establish the autorotation. This was done about the time we crossed the near end of the runway. It immediately became obvious that we were not going to land where I thought; at 60 knots, the helicopter was gliding much farther than I had anticipated. The autorotational descent angle had been much shallower than expected. The flare and pitch pull went just as they should. The whole maneuver had been very comfortable.

After I had made several more straight-in autorotations, Bob Ferry indicated that he wanted to show me something. This time Bob's traffic pattern was much larger, more of an airplane size. As we turned from downwind to base, Bob rolled the throttle off. He then pulled in a little collective pitch while maintaining about 85 knots. The resultant glide angle was nearly that of an airplane. In fact, we glided in on base, turned final over the near end of the runway, glided to the far end of the runway and landed. Since we had entered the autorotation at an altitude of only 700 feet, the glide rate had been exceedingly good.

The distinguishing feature of the 500C, as compared with the 500, is the Allison 250-C20 engine, which is capable of producing 400 hp but is derated to 317 hp for takeoff, 278 hp max continuous. (The model 500 had the smaller Allison 250-C18 engine.) This provides an enormous power reserve.

Wanting to see what all this power would do, I left the traffic pattern to make a rate-of-climb check. Entering the climb from level flight at 60 knots, I added "up" collective until we were at max continuous power. One minute later, we were 1,400 feet higher. We were still at 60 knots, and at no time had I raised the nose. Not bad, I thought.

After landing back at Palomar, I wanted to make another rate-of-climb check. This time I would start the climb from a standing start and use maximum takeoff power. One minute after leaving the ground, we were 2,500 feet above the surface with 60 knots airspeed. The results of this second test spoke well for the flight characteristics of the helicopter and the power reserve of the engine.

If I had to pick the one thing I found objectionable about the 500C, it would be the lack of visibility from the pilot's seat when he looks to the opposite side and aft. A vertical structural member of the helicopter somewhat separates the front pilot and copilot seats from the three rear passenger seats and restricts the rearward visibility on the opposite side from the pilot.

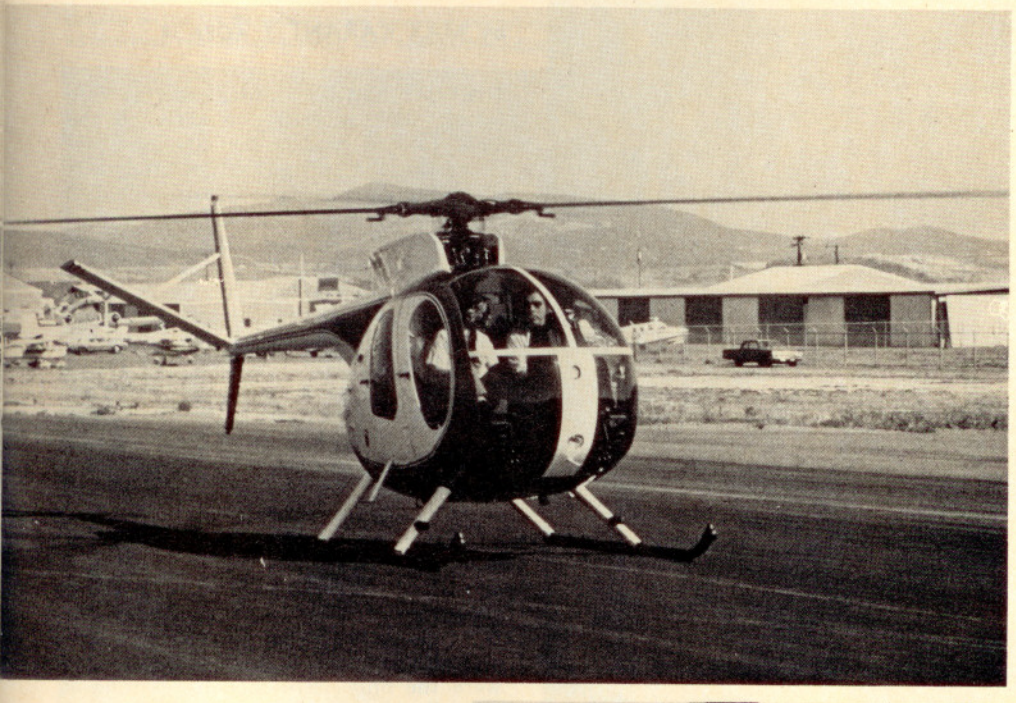
It must be said, though, that this same structural member greatly enhances the rigidity of the cabin. In the event of accidental upset, it would make a marked difference in maintaining cabin integrity.

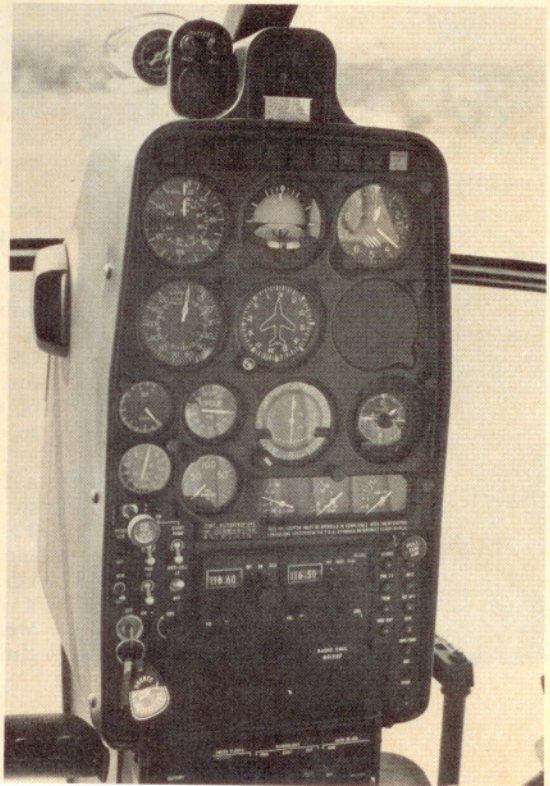
Though the basic price of the 500C is $129,000, the average delivered helicopter, equipped with avionics and other optional extras, approaches $140,000. Hughes officials indicate that approximately 800 units have been delivered—about 300 to the military and 500 to civilian customers.

The 500C can be found performing in many different roles. Traffic patrol, rescue, executive transportation, and offshore exploration are only a few of its multitude of assigned tasks.

Altogether, my flight check took just over four hours. During this period, I was able to become quite comfortable in the bird. My overall impression was very good, with the one noted exception.

The aircraft has an empty weight (depending on installed equipment) of about 1,100 pounds and a gross weight of 2,550 pounds. This large useful load, coupled with the hot-day reserve performance of the Allison 250-C20 engine, should make a very workable helicopter. □





Functional layout of the 500C's panel makes for easy scanning.