

Pave Low III Rotorcraft: The USAF's Night Stalkers

Under cover of darkness, Special Ops helicopters fly unknown skies toward known dangers. Equipped with night vision, Pave Low III crews can lighten their shadowy missions.

By David Harvey

Reporting from Hurlburt Field, Fla.

BANANA RIDGE, near Anniston, Ala., looks threatening in the small hours from a helicopter cockpit. Thickly wooded hills shimmer in ghostlike fashion on a forward-looking infrared (FLIR) system as Cowboy 84, a USAF Sikorsky MH-53H Pave Low III, lurches slightly in a downdraft and the pilot prepares to turn down the ridge.

"Ridgeline coming up right, we'll turn right, it'll be off our left nose," calls the pilot, Capt. Sam Houston. "OK to turn right and clear," says Staff Sgt. Jeff Morrison, looking out an open window. "Turning right and clear on the left," echoes Staff Sgt. Ramon Acosta on the left. "And OK to the rear," chimes in Sgt. Ishmael Gonzalez, seated on the open ramp in the big tail.

All that completed, Houston is clear to make his turn.

This is just a small example of the coordination used by Pave Low III crews during night flying. The syn-copation rose in intensity when, say, the aircraft was coming in for a formation landing in a remote zone, and it lessened when the job was to simply cruise along at 120 knots at 100 feet. But it never stopped.

Teamwork now includes every Pave Low III crewmember, thanks to the arrival of the ANVIS-6 night-vision-goggle (NVG) system, made by ITT Electro-Optical Products. With the NVGs providing image enhancement, each observer becomes an important sensor, vital in the tricky business of maneuvering the helicopter into tight spaces.

Those kinds of missions are part of the rapidly developing helicopter capability of the force's Special Operations Command. The history of Cowboy 84's 20th Special Operations Squadron, based at Hurlburt Field, Fla., and its parent agency, the 23rd Air Force, began after the failed Iran rescue mission (Desert One) in 1980.

It became clear then that the nation's long-range, night-helicopter penetration force was lacking necessary elements. Within two weeks of Desert One, the Air Force was working to convert Super Jolly Green rescue helicopters into machines that could have done the job.

The force now comprises only seven aircraft, but it is expanding (see sidebar). Already the USAF has learned a lot about night helicopter warfare and the use of integrated avionics. About 70% of MH-53H flying is at night; a lot is conducted over water; and a lot features aerial refueling

equipped guys, and the pilot will never need to look up from the radar display. Unfortunately, tonight is just a kind of routine checkride, but we've chosen something representative for you."

Pave Low workings

To conduct its covert missions, Pave Low III uses an integrated radar/FLIR (forward-looking infrared) and moving-map avionics, combined with night-vision-goggle (NVG) capability of the full operating crew. The system relies a lot on a unique USAF helicopter crewman, the flight engineer.

Positioned between the two pilots, he works the navigation and communications. He acts as a tactical navigator and orchestrator of the helicopter's electronic countermeasures (infrared jamming and flares, and chaff). Pave Lows carry two flight engineers so they can take time out on long missions.

For night flying, the pilot has a TV-sized FLIR display and a smaller radar display, on each side of the panel. In the middle, on the console, is a back-lit positional moving-map display based on 35mm film. It is selectable to two scales, 1:250,000 or 1:1 million.

Data from the terrain-following/terrain-avoidance (TF/TA) radar is fed to the FLIR screen in the form of command symbology. A box-shaped symbol can be preset to maintain 100-, 150-, 200-, 300- or 500-foot altitudes. A radar altimeter is nearby. The attitude director is also equipped with cue bars that can provide terrain-clearance information. All this is tied together by one IBM computer in a rack on the left side of the fuselage.

It should be noted that Pave Low IIIs are old birds with less than state-of-the-art avionics. The computer, for instance, has only a 32K memory. This makes loading the inertial navigation system (INS) a bit of a chore, since it must be done fresh each time. The system can store up to 60 waypoints, but the demands of a long and tricky mission can exceed this.

During flight, Pave Low's Canadian Mar-



Much of the U.S. Air Force's Sikorsky MH-53H Pave Low III flying is conducted over water.

(with HC-130 tankers), insertion tactics for commandos and SEAL teams, firepower support, and who knows what else.

To look at a routine training schedule, R&WI was extended a rare invitation to fly aboard Cowboy 84.

"What we want you to see," said Maj. Rich Corner, the 20th's assistant operations officer, "is how this machine can fly anywhere on the face of the earth in any weather you care to name. We can hover right over a pre-selected spot—we did it within 20 feet in a recent mission—land, unload 34 fully

coni Doppler radar updates the INS and the moving map. "The systems work well together," says Comer, "which is great considering they were purchased off-the-shelf at the time we were scrambling to build up this kind of capability." Comer explains that the map is "out of the A-7 fighter, the INS from the B-52, and the radar from the MC-130."

The INS/Doppler combination is good over water, too, he says. But Pave Low pilots dislike over-water operations, where they must rely totally on the systems. Even wearing NVGs, it is impossible to tell where sky stops and water begins.

Goggles on

Just before takeoff, this R&WI reporter was handed his ANVIS-6. For \$18,000 per set, it seems a humble bundle—a set of small binoculars similar to those in a hunter's catalog. A battery pack with switches is velcroed to the back of the flight helmet, providing a counterweight to the goggles, which fit into a small receptacle on the front.

Once clicked on the helmet, the goggles can be flipped up and down at will. There are various focusing knobs, a diopter adjustment, and—most useful of all—a halcyard that fits round the neck and stops \$18,000 of taxpayer's equipment from being lost.

After turning the NVGs on, the world is transformed. The view is best described as a landscape at dusk after a heavy snowfall—with a green tinge. The details needed for safely guiding a helicopter are all there. Bright lights flare up slightly, and the overall display has just a hint of small sparkling specks. Focus can be changed from infinity down to about three feet, which makes the goggles useful for looking inside the helicopter.

Cowboy 84 launched into a coolish and slightly hazy night for the five-hour mission. A sister ship, Cowboy 82, is in the formation for takeoff, but leaves us for aerial refueling. As we slipped over the darkened ground below, it was fascinating to flip between NVG and the naked eye. The ability to see ground details at will on a dark night imparts a feeling of voyeuristic power.

Up front, the pilots settled down to fly at 100 feet. Every so often, the INS was updated over a known position. Maj. Jeff Walls, the aircraft commander, explained that he likes to get the INS working "as tightly" as possible. It is not necessary, however, to fly over every checkpoint. The system can accommodate a close flyby, an important consideration when you want to save fuel.

Houston, the handling pilot on this leg, set up the NVGs so he could look ahead out the cockpit windows, and then glance downward to his displays using ordinary vision. This is standard procedure when the weather is good, as it generally was this night. Only when it gets to IMC (instrument meteorological conditions) is flying done head down.

The NVGs seemed to this reporter to be performing better than the AAQ-10 FLIR. While the latter displayed the horizon in a usable manner, the goggles showed much more detail. But Walls said FLIR and NVGs are regarded as about the same. "There are times when one works better than the other."

After flying in the hills for a time—an exciting experience given the low altitude,

And the force grows

Amid a fighter-pilot crowd, the Air Force's SOF helicopter numbers are poised to jump. According to plan, the MH-53 community will expand this year from seven H models to 41 J model Pave Low III(Es). About 20 will remain at Hurlburt Field, and the rest will be split between Woodbridge in England, and a yet-to-be-decided location with the Pacific Air Force.

"We have a worldwide mission," says Col. Byron Hooten, 1SOW wing vice commander. "What that means is we hope to be there first." This emphasis on world events and special missions does cause a bit of a controversy.

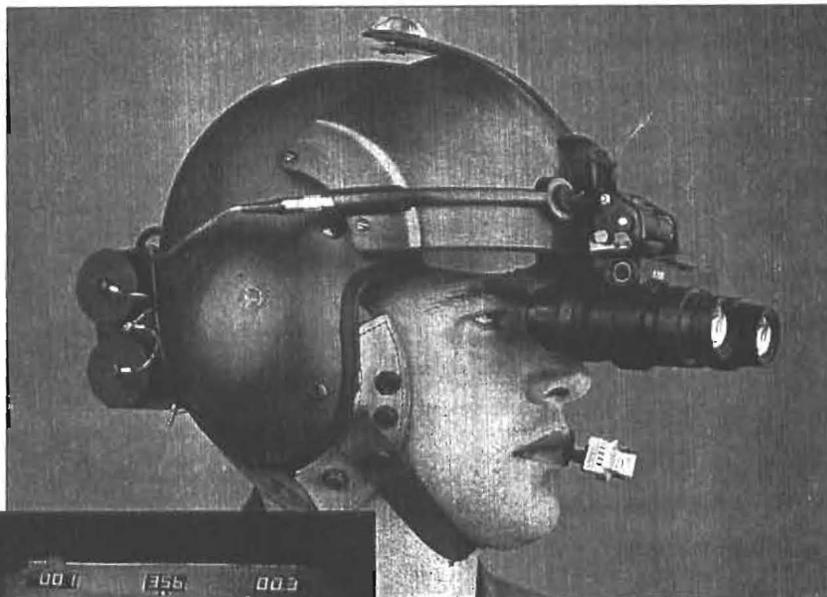
To get the MH-53Js ordered by Congress, the Air Force is taking HH-53B/C Super Jolly Green Giants out of rescue service, and converting them to combine rescue and special operations. "It is a pragmatic way of looking at the world,"

says Hooten. "It's a multirole world."

At Hurlburt, the job now is to accommodate the needs of rapid growth. Crews will expand from the present 12 to 60. A new simulator training program has to be put in place. There will be more of everything, particularly helicopters as H models are traded in for modified J models at the Navy's Naval Airwork Facility (NARF) in nearby Pensacola, Fla.

The J model, which will cut maintenance time by 25%, will be heavily modified (hydraulics, electrics, and skins) and the mission avionics upgraded in many ways. Satellite navigation will be one.

The mission computer will be expanded, and there will be a new FLIR and terrain following/avoidance radar. Deliveries are to be at the rate of five aircraft a month this year. Six J models are already at Hurlburt, and being used for tests.



Teamwork now includes every Pave Low III crewmember since the arrival of ITT Electro-Optical Products' ANVIS-6 night-vision-goggle system (above). The crew also uses its AAQ-10 FLIR system, here shown displaying a farm scene (left).

120-knot airspeed, and open windows and ramp—Cowboy 84 rejoined its partner and headed south.

Night vs. NVG

Walls had changed seats with another instructor pilot, Capt. Jim Shaffer, who needed a check-out on procedures. The syn-

chronized crew work rose to a high pitch. Cowboy 84 was downwind in a tight base turn. Somewhere, about two rotor diameters away, the other MH-53H was landing ahead of us.

With my NVGs off, I strained to see in the night but to no avail. We landed in what seemed like a tiny wooded clearing. On with the NVGs. There was our partner, only 100 yards away.

For safety during night work, USAF SOF helicopters use rotor-tip lights (dubbed slime
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The Air Force's special operations include rescues with an external hoist.

lights by pilots) that cannot be seen from below the helicopter. With the NVGs off, I catch sight of them during the second landing as Cowboy 82 swings in behind and below us. Switching the NVGs back on, I now see the operation as if it was lit by a flare.

There is a feeling of amazement at these two behemoth helicopters on the ground in total darkness in the middle of nowhere. Scenarios of covert operations in these birds unreel in the mind.

As the mission passes the four-hour mark, Houston demonstrates an approach to hover and automatic hover over a spot selected from the INS waypoint library.

He flies this with the NVGs on (for safety) but is, in effect, practicing his—and Flight Engineer Sgt. Charles Gutshall's—skill at working the ultimate combination of the Pave Low's automatic system capability.

The MH-53H is fitted with a small side-

Helicopter ratings going up?

The first thing you notice on a visit to the 20th Special Operations Squadron at Hurlburt Field, Fla., is not the squadron's Green Hornet mascot over the door, but the red tabs on the flight suits.

"They came from joint operations [J-CATCH] mixing helicopters with fighters a few years ago," explains Maj. Rick Comer, the assistant operations officer. "We chopper pilots did so well we started stripping off the fighter guy's scarves and putting them on. They had red scarves, so now we have the red tabs to show we're as good as they are."

J-CATCH may have given USAF helicopter pilots the attention they notably lacked, yet the status question goes much further. "It's really an issue of percentages," says Col. Carl Anderson of 1st Special Operations Wing. "But it means it'll be a long time before a rotary-winged officer sits at the Air Force's top table."

However, Anderson thinks things are beginning to roll for the Air Force's rotary-wing pilots. "The advent of V/STOL will tend to change things. There's also the CV-22 to be considered. These things inevitably will melt the dividing line between the two communities." (Senior officers in the wing light up with enthusiasm when the conversation turns to the tiltrotor.)

Officers, in fact, have noticed a swing in recruitment toward rotary-wing specialization, and applications from Air Force Academy graduates are reportedly outrunning the number of slots available.

Perhaps Comer sums the question of "status" best. "We are the future," he says. "It works both ways. At the moment we're left to get on with the job. What will happen when we get more attention from the powers that be? That's the question, but right now we like it as it is."



An MH-53H crewman fires a .50-caliber weapon from the aircraft's open door.

stick which is used to override about 10% of the cyclic's authority. As the helicopter comes to an automatic hover (at the preset radar altitude), the pilot must use the sidestick to counteract drift. If it "runs out" of authority, the pilot not flying is ready to add his weight through the primary cyclic control. Shaffer,

in fact, jumps in at one point to lend a little antidrift.

As Houston steadies, Gutshall leans forward and works a thumb wheel on the automatic stability system. Cowboy 84 lowers its considerable bulk to the ground. Each turn of the wheel is ticked off by the radar altimeter readout on the right side of the FLIR screen. With NVGs off to better appreciate what's happening, this reporter sees nothing until the bump of touchdown is complete. That done, it is time to go home to Hurlburt Field.

The successful mission is added to the score of 12,000-plus NVG operations racked up by the 20th over the past few years.

"Night operations are a way of life around here, so what you've just seen was just routine. Tomorrow night, we'll be out doing weapons practice and begin laying down fire from our 7.62 miniguns or the .50 caliber. After that we'll be doing work with boats and the hoist out over the water," Walls says.

The squadron has thus far refined these and other night tactics without a single collision loss, though two Class A accidents at night involved ground contact, but no injuries.

This performance is also a testimony to the success of the avionics integration, plus the arduous task of maintaining readiness. About 50 man hours of maintenance go into each MH-53H flight hour. The MH-53J version—to be Pave Low III (E)—is expected to make about a 25% dent in this figure.

In the meantime, the intensity of night-flying practice continues. The confidence level of these crews—despite the age of their helicopters and the cobbled-together nature of its electronics—appears extraordinarily high.

When the Pave Low fleet expands from seven to 41, as it is scheduled to do this year, the U.S. Special Operations' long-range rotary-wing capability will, it seems, be a force to be reckoned with. ■

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