

# LOFT

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DESIGN ISSUE

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# The End of Night

THE COLOMBIAN AIR FORCE HAS ADAPTED NEW TECHNOLOGY FROM THE US MILITARY, LEAVING GUERRILLAS AND NARCS NO WHERE TO HIDE

BY ANGELA POSADA-SWAFFORD

No clouds. No moon on this hot night at the Colombian Air Force base in Melgar, a town two hours outside Bogotá. The rotors of two Bell-212 Rapaz helicopters whirl like the wings of a giant dragonfly, about to take off.

Sitting next to the artillery, I carefully examine my harness; I'd rather not be thrown from this doorless helicopter in the middle of the night.

"Don't use this until we are far from the bright lights. And please, don't drop it!" Captain Javier Jimenez commands as he places a heavy helmet on

my head. With a pair of what look like binoculars protruding from my forehead, I look like a creature from a science fiction movie.

Naturally the first thing I do is lower the "binoculars" to eye level. The lights from the other helicopter beside us immediately blind me. I close my eyes while our chopper takes off, following a sharp arc to the left behind the leader.

When I open my eyes again, I let out a gasp of surprise that is lost in the roar of the wind and the motor. Beneath my feet, I see a landscape of forests, hills, cliffs, highways, and rivers beneath

my feet in exquisite 3-D, bathed in a rich palette of high-resolution blacks and greens.

I hold onto the helmet tight and look down. It's like wearing green sunglasses on the brightest day of the year. But it's eleven at night and I can see the shadows of the trees lit by the faint light of a handful of stars. Turning toward the cabin, I can clearly distinguish the instrument panel, whose lights would be extremely dim were I not wearing the helmet. Now I understand why I nearly burned my retina looking at the lights on the airstrip: this device amplifies the faintest light thousands of times.

I'm wearing an ANVIS-9 49F, a very late generation pair of night vision goggles. Forty years ago, night vision was grainy at best, but amazing technological advances since then have radically changed the way armed forces around the world spend the night.

"The advance in resolution represented by the ANVIS-9 is critical for distinguishing between enemy and friend," says Larry Curfiss, vice president of ITT/Litton, the U.S.-based manufacturer of these goggles. Indeed the history of the Colombian Air Force can be divided into the period before the adoption of this technology in 1992, and after.

"That's when we put to rest the myth that we could not fly at night," says John Hincapié (alias "Malon"), director of the Night Vision Laboratory and a pioneer of night vision in Colombia. Located in the CACOM-4 Air Base in Melgar, the Lab is the first of its kind in the country and the most complete in Latin America. Guided by military personnel from the United States and experts from ITT, Hincapié and his team initiated an ambitious maintenance program for the goggles acquired by the Air Force. In the process, Hincapié figured out how to adapt the material and the tools to the Colombian conflict by modifying the lenses and mounts. This is

Night vision goggles changed the face of the Colombian Air Force



the only ITT-authorized lab of its kind.

"Over the past ten years this lab has performed some 8,900 inspections of night vision lenses, which has allowed the Air Force to fly night missions totaling 15,000 hours without an accident," Hincapié boasts.

Tonight's exercise is a demonstration of what kind of military operations are possible. The spectacular session keeps pilots from getting out of the practice flying at night.

Observed through the ANVIS-9, the training exercise looks very *Star Wars*. Machine gun fire draws green lines in the air that look like laser rays, pointing to the target with mathematic precision. Soon the visors will include information about the

**"A**ccording to a U.S. Marine official, the Colombian-designed Arpiás III "got people talking. They've even been used in Iraq."

Major Javier Delgado, an Arpia helicopter pilot assigned to the Rionegro Air Base, was in charge of rotating troops. "It wasn't easy because it was a stormy night and not all of the pilots had goggles," he recalls. "So they had

## The Birth of a Witch

Nestled among the mountains outside Medellín, the Rionegro Air Base is literally an eagle's nest. Here sleep the powerful UH60 Black Hawks, converted by the Colombian Air Force ten years ago into Arpiás, a species of armored bird made to meet Colombian needs.

"The Arpia was named for the eagle, but nicknamed 'The Witch' by the enemy. We needed an armored helicopter that could protect other helicopters during transport operations," says Colonel Nestor Guerrero, commander of Combat Group 5. "The Bell-212 Rapaz was too slow and heavy for the job. And since the Cobra and Apache helicopters were too expensive, we decided to clone our own



A fleet of Bell 212 helicopters on the tarmac at Melgar's Airbase (left). Four pilots in the Colombian Air Force log thousands of miles

shots on the ground that will allow the pilot to pull the trigger without shifting his gaze.

The first major operation the Colombian Air Force undertook using the goggles was the capture of the city of Mitú in 1998, in the south of the country, which had been occupied by the FARC (the Revolutionary Armed Forces of Colombia, a major guerrilla group). At that time, the public had little knowledge of what the Colombian Air Force could do.

to wait for a flash of lightning to see what was in front of them and keep flying."

There were only seven helicopters on the operation and they had no means of communicating with each other. The pilots did not even know the exact location of the enemy. Yet in less than 24 hours, they killed 500 guys from the other side and retook the city.

"That was the turning point," says Delgado.

helicopter, gearing up Black Hawks that weren't originally designed to carry arms."

The hardest trick turned out to be adapting the complex electrical system. "We counted on two electrical geniuses: technicians Carlos Roso and Montenegro Ruiz," says Guerrero, who was the first to fly an Arpia in 1996.

"They had to take the tubes off the original fuel tank to accommodate the new cables and they had to design special control boxes for the



## Black Hawk Rundown

The Black Hawk, a helicopter invented by the Russian Igor Sikorsky and manufactured by the company he founded in the United States, is one of the best known and most popular choppers in the world. Nicknamed the American Helicopter, the UH 60L Black Hawk is a favorite for transporting troops and a veteran of conflicts around the globe.

More than 1,500 Black Hawks currently serve the U.S. military at international bases around the world. The chopper can fly anywhere: over desert, jungle, or mountain. A workhorse, the Black Hawk carries jeeps and can even transport other helicopters. Plus it can carry food and artillery, evacuate the injured, and even engage in battle.

In case of a collision, the Black Hawk has a self-repairing fuel system as well as multiple electrical systems and controls protected from a violent crash. The latest model can fly at 6,500 meters and when the air temperature is close to 20 degrees Celsius, it can hit speeds of 159 knots.

Angela Posada-Swofford pictured above with an Arpia III



machine guns, so they could fire at the same time or independently."

That first flight was unforgettable. "You could really feel the fire power," Guerrero recalls. "I felt like a fish in water. I never imagined it would have such tremendous impact." Afterwards, he says, every one wanted to learn to fly; that's how he ended up as an instructor.

The Arpia I gave way to the Arpia II, with weapons that can fire from higher altitudes (which is safer for the troops) without sacrificing efficiency. Then came the spectacular III, equipped with four Gav .50 machine guns whose three canons spin as they fire, as well as two M261 rocket launchers, and two additional fuel tanks that allow the choppers to cover longer distances without stops.

"After that we had to adjust the sights, realigning them so that the rockets would fall precisely on the terrain," Guerrero points out. "Here we need precision rather than the saturation of the field of vision that had been originally built into the design by the Israeli contractor;"

The Colombian Air Force contracted with Sikorsky, the company that makes Black Hawks, to make twelve Arpias III to exact specifications, with the adaptations for arms designed in Colombia installed directly in the United States. This most recent fleet arrived in Colombia a few years ago.





The Colombian Air Force has turned the art of helicopter maintenance into a science (above, opposite)

Although Sikorsky is quiet on the topic, an official with the U.S. Marines admitted to me, while I was on a visit to the USS Enterprise aircraft carrier in Fort Lauderdale, that the Colombian-designed Arpías III "got people talking. They've even been used in Iraq."

With so much invested and so much at stake, the Colombian Air Force took on another helicopter challenge: maintenance. The Colombian Air Force has one of the highest "readiness" percentages in the world, a measure of the number of planes ready for take off at any given moment.

"Sikorsky does the 500 flight-hour inspection in 45 days," observes Colonel Gabriel Sanchez, head of operations and maintenance in Rionegro. "Here we do it in 15. A Sikorski instructor came here to do an inspection and he was amazed." The key, Sanchez says, pointing toward three half-disassembled helicopters in one of the hangars, is to stay a step ahead of the flow of parts and "to make the unexpected predictable."

Eighty percent of the Arpías' structural and electrical defects are repaired on site at Rionegro, with specially designed tools. Once a chopper arrived with 87 hits in the fuselage and the propellers, and was sent back into battle from the base.

Pilots say that in the future they would like to see helicopters capable of firing from a minimum

of 4,000 meters and able to access difficult terrain such as deserts and snow drifts. At present only the Hughes 500 can reach the thin air at 6,000 meters for rescue missions.

### Intense Training

Night visors and helicopters may give the Colombian Air Force an edge over its enemies, but the most important resource is still human beings.

Unlike soldiers in other parts of the world, the pilots and technical personnel of the Colombian Air Force do not train in isolated practice camps. They learn their trade in the thick of battle, constantly exposed to real life conflict. Every training foray is in fact a military mission. Their fascination with the helicopters that take them there is obvious.

I try to understand the chopper's appeal beside the infinitely patient Captain Dagoberto Blanco in the mobile helicopter simulator at the UH-1H Air Base in Melgar, one of only two in Latin America. Piloting the sensitive simulator, I quickly realize that I have to throw out everything I learned about flying fixed-wing aircraft. The physics of flight is completely different and exquisitely delicate. A sudden failure of the rotor followed by a loss of electricity sends me crashing to the ground. I guess it's going to be a while before they let me fly a chopper wearing a night visor. **L**



### How Night Vision Works

The latest generation of night goggles makes it possible to see a person standing 200 meters away on a foggy night with no moon, in the green hues typical of night vision. The visors amplify the image. In other words, they collect small quantities of light, including infrared light from the farthest end of the spectrum that might not be visible to the naked. The visors then amplify that light to make the image visible.

A conventional lens captures ambient light, no matter how scarce, from the stars, distant lights, wherever. That light is then transferred to a tube where it is intensified by a 5,000 volt current. Two things happen inside the tube: first, a photo-cathode converts light particles into electrical current that passes through millions of minuscule canals in a small glass disk, setting off a chain reaction. At the end of the intensifier tube, the particles crash into a phosphorescent screen that reproduces the image with a green glow.

Nightvision photos by John Hincapié.

All other images by Angela Posada-Swafford.