

# EMERGENCY SOFTWARE

LAST AUTUMN, A HELICOPTER crew from the Flight Research Lab at NRC's Institute for Aerospace Research in Ottawa flew along the rocky shores of the roaring Gatineau River in Quebec on a simulated emergency search-and-rescue mission. The NRC's Bell 412 Advanced Systems Research Aircraft (ASRA) had an emergency approach ready within 10 minutes as it moved toward the simulated accident along an escarpment with nearby hilly terrain at an elevation of about 1,000 feet. The goal is to better that approach by five minutes, and the test crew expects to reach that target in the last phase of testing this summer.

ASRA test pilots are flying with new navigational software that combines GPS with automatic digital terrain mapping and a graphic display system to prepare a TERPS-compliant instrument procedure within minutes for SAR pilots approaching an ELT. Tentatively known as Operational Instrument Approach Capability for SAR Rotorcraft, the software was created by Air Navigation Data. In 2001 the Ottawa-based software company began working with the NRC's Institute for Aerospace Research and the Department of National Defence's helicopter SAR program. The federal New SAR Initiatives Fund of the National Search and Rescue Secretariat (NSS) provided \$250,000 for the project.

The test software is a derivative of Air Navigation Data's instrument procedure software application called Final Approach, which allows aeronautical chart makers to build a regulated instrument procedure within minutes for airport approaches. What's different about the company's SAR test software is that the instrument procedure changes while the helicopter is in motion. Pilots can fly over the location of an ELT and initiate the approach design.



NRC Bell 206 on approach to Flight Research Lab.

"Then Air Navigation Data's software takes over, creates the approach and displays it so the pilot can drop from the flying altitude," said Lorenzo Auriti, the project manager at NRC's Flight Research Lab. "This allows us to create approaches that are normally made to airports – but to create them while we are flying to an SAR situation so we can get down to the people who need help and to a much lower altitude so we can possibly land or assess the situation better."

NRC flight trials began last summer over the Gatineau region, across the Ottawa River from Ottawa. The area is characterized by hills, valleys and lakes and the Gatineau River winding from the north. The hills are low, 500 to 1,000 feet in elevation, but the area proved a perfect testing ground because of the wide variation in terrain.

Air Navigation Data's software is a Geographic Information System (GIS) used to display data and quickly builds a map of the surrounding terrain, taking into account regulated clearance from obstacles and aircraft capability. "What we wanted to test was how low the software could get us in mountainous or hilly terrain," said Auriti. "That was the real test of the system."

A key goal was also to gauge how

quickly helicopter test pilots could design an emergency approach with software which is a derivative of Air Navigation Data's Final Approach. The team devised three different approaches in landscape of varied complexity with a target of close to five minutes. The most difficult approach was the escarpment. Auriti, who went up with the ASRA, timed the approaches and assessed post-flight with a questionnaire.

Before flight testing, pilots conducted extensive bench testing of the software program by creating approaches. After pilot assessment, the software was streamlined for smoother use. More flights are scheduled for the summer with better-automated software. Auriti said the final demonstration will be made to the NSS. He believes the five-minute mark is within reach on another run along the escarpment. The NRC's Flight Research Lab is also considering test flights in the Laurentians, particularly along Mont Tremblant, about 120 kilometres northwest of Montreal. Base elevation at Tremblant is about 870 feet; summit elevation 3,000 feet.

"The system could be used anywhere in the world where you need to get to a location and are hampered by bad weather," said John C. Ainsworth, president and CEO of Air Navigation Data. Ainsworth is also a pilot.

Air Navigation Data's customers are civil aviation authorities, aviation regulators and military organizations. Transport Canada uses Final Approach to ensure performance standards are met by Nav Canada, for example. Final Approach includes digital terrain data in both 2D and 3D models with aeronautical information such as runway position and man-made obstructions. It also provides instrument procedure design based on both ICAO's PANS-OPS and the FAA's TERPS criteria.