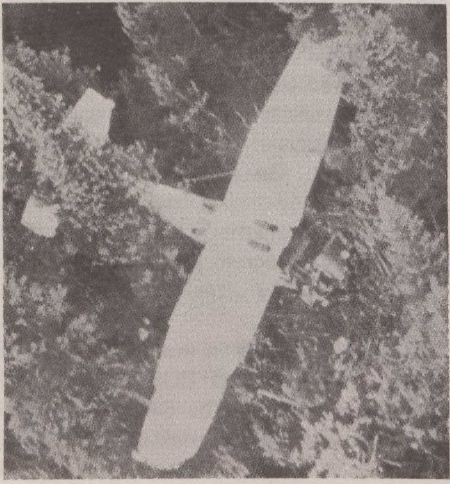
In the summer of 1982, the Soviet satellite COSPAS was launched into a polar orbit around the Earth, equipped to relay distress signals on an international frequency of 121.5 MHz. The satellite circles the Earth in 100 minutes at an altitude of 1 000 kilometres. With the launching last March of the American satellite TIROS-N, all areas of the world are now monitored twice as often.

Canadian ground stations

There is now a growing number of ground stations throughout the world capable of receiving signals relayed by the SARSAT-COSPAS satellites. Canada's Department of National Defence, responsible for Canadian rescue operations, has a ground station at Shirley Bay near Ottawa; there are four others in the United States and one in France. All six stations were designed and built by a high technology company in Ottawa, Canadian Astronautics Limited, which specializes in systems engineering and real-time digital processing of signals.

The stations are equipped with a 3-metre parabolic antenna which tracks the satellite as soon as it appears. Travelling at an altitude of 1 000 kilometres, the COSPAS satellite takes only about 20 minutes to cross the sky. During this passage, the station can receive distress signals from both sides of the satellite's path, covering a total width of 4 000 kilometres. Ten minutes after the satellite has crossed over Canada, the computers at the Ottawa ground station have finished processing the data received, and can calculate the origin of any distress signal within a few kilometres.

James Taylor, president of Canadian Astronautics Limited, explains that, while sophisticated computers are needed to process the huge quantities of complex data, the method used to pinpoint distress signals within the SARSAT network is based on a principle that has been known to physicists for a long time – the Doppler effect. The classic Doppler example known to all science students is the changing tone of a train's whistle, which has a high pitch as the train approaches, and fades to a low pitch as the train moves away. The same effect applies to the frequency of a radiobeacon signal from an aircraft or ship in relation to an orbiting satellite. Because ground-based computers know the frequency of the signal sent from the distress site, they can compute the Doppler shift in the signal received by the satellite. This, in conjunction with precise data on the spacecraft's orbit, allows the ground station to locate the distress signal's origin with great accuracy. The computer can provide the co-ordinates of an accident site with a margin of error of eight to 30 kilometres. The accident in British Columbia was pinpointed to within 22 kilometres.


Canadian Forces

It is not easy to spot a downed aircraft in the mountains of British Columbia.

In the past, many airplane radio beacons for sending distress signals were either destroyed during impact, buried under wreckage, or lost under water. To get around this problem, Ottawa engineer Harry Stevinson, formerly of National Research Council's (NRC) National Aeronautical Establishment, came up with a way of ensuring that such a beacon would escape destruction during a crash.

Mr. Stevenson's device, called a Crash Position Indicator (CPI)) has no moving parts; it is attached to the body of an aircraft by a spring latch, or it can be fitted into the fuselage. At the moment of impact, it is hurtled away from a crashing aircraft, its streamlined shape allowing it to land safely a short distance away; immediately, it starts to transmit a distress signal, no matter what its orientation (upside down, sideways, whatever). Mr. Stevenson, who designed the airfoil and its escape mechanism, worked in collaboration with NRC's W.A. (Bill) Cumming, who designed the antenna, and David Makow, who built the radio beacon.

Used by air forces in many countries, including Canada, the CPI is built by Leigh Instruments Ltd. of Carleton Place, Ontario. The device can also be equipped with a flight recorder, an electronic instrument which records an aircraft's manoeuvres in flight as well as the performance of its systems. This information is vital in determining the cause of an accident and avoiding its reoccurrence.

Once the co-ordinates of an accident site are received at Shirley Bay, they are transmitted to the Canadian Rescue Operations Co-ordinating Centre at Trenton, Ontario, which contacts the Canadian Forces base closest to the site, and a rescue mission is dispatched.

Since the first rescue operation in British Columbia, the SARSAT-COSPAS satellite search and rescue system has been used successfully dozens of times, and countries such as Brazil and Australia are now interested in participating. The future thus looks very bright for Canadian Astronautics Limited, as well as for other Canadian companies, such as SED Systems in Saskatoon and Spar Aerospace in Montreal, which manufacture special electronic equipment for the SARSAT program.

Almost 9 000 rescue missions are organized each year in Canada for distressed ships and aircraft, at a cost of almost $100 million. With SARSAT, costs should be greatly reduced and rescue operations made much more efficient.

(Article from Science Dimension.)

Canada pledges food aid

Agriculture Minister Eugene Whelan has announced a $310-million grant in international food aid for 1985 and 1986, making Canada the world's second-largest food donor after the United States.

Canada's aid package, which includes cash and $250 million in Canadian farm products, is expected to represent about 20 per cent of total United Nations aid to the world's hungry. The new commitment is $30 million more than Ottawa currently contributes to the UN World Food Program and International Emergency Food Reserve.

Much of Africa is suffering the worst drought in memory, and famine there is believed to be worse than during the crisis years of the early 1970s, when a hastily called conference resulted in the creation of the World Food Council. The United Nations estimates that Ethiopia alone requires 200 000 tonnes of food to prevent mass starvation.