

Technology:

Canada pioneers in space communication

A disadvantage of living in the north of Canada (though some might consider it an advantage) was, until recently, that there was no television. Surface systems for relaying television are simply not feasible there. But all this has changed over the past year since television pictures and sound began bouncing off a couple of space satellites 23,000 miles above the Equator.

The two satellites, called Anik I and Anik II (*anik* is the Eskimo word for "brother") belong to Canada's national satellite communications system – the world's first domestic commercial space venture. Financed partly by the government, partly by industry, Telesat Canada (as the system is called) has been relaying signals from coast to coast on a commercial basis since the launching of Anik I at the beginning of 1973. Anik II went up later and drifted into its orbital parking spot over Medicine Hat, Alberta, in May, by which time the Americans were negotiating to hire some of its channels until they could get up a satellite system of their own.

Canada in space race

The success of Anik has put Canada firmly in the commercial space race, since the gold-plated electronic brain that does the work on board each Anik satellite was pioneered by the Canadian firm of Northern Electric, a subsidiary of Bell Canada (the telephone people). The electronic brains were produced in a small, purpose-built plant at Lucerne, Quebec, just across the river from Ottawa. The plant is now working on Anik-type satellites for two American firms, the American Satellite Corporation (Amersat) and Western Union.

Northern Electric are also getting ready to launch Canada's third and last Anik (according to present plans) in 1975. A rocket and launching pad have already been reserved for this purpose at Cape Kennedy at a cost of over \$7m. But the plan is fluid: Anik III may possibly be launched at that time to provide more communications facilities for new customers, but it is thought more likely that the third satellite will be held in reserve as a back-up in case one of the existing Aniks should break down.

The Anik communications systems were produced by Northern Electric under sub-contract from Hughes Aircraft Company of El Segundo, California, who construct the actual satellites which carry them in orbit. Following the success of Anik, Hughes Aircraft now have contracts for a further \$150m worth of new domestic satellites to

serve the United States continent, Alaska, Hawaii and Puerto Rico. They say this represents the largest single injection of private capital into the space industry and that it is "a turning point in the development of a substantial non-government market". Northern Electric expects to get a large share of that order.

The sudden demand for commercial satellites has been a welcome surprise to Northern Electric, for when the first order came, they were already in the process of cutting back their skilled work force as the Anik programme for Canada neared completion. Previously only the Russians had tried running a domestic satellite system, which is reported to have been far from successful. But the Canadian enterprise has set other countries thinking on these lines. It is now thought that it could prove a spearhead for a world revolution in communications.

As Telesat brought north Canada in from the cold, in terms of human contact, so other satellite systems could extend communications into other remote parts of the world, such as the widely scattered villages of India, isolated communities in the jungles of South America and the widely-spaced islands of Malaysia. Northern Electric, having got in on the ground floor with Anik forsee millions of dollars worth of contracts through the 1970s – "a real coup for Canada".

Promising future

They were predicting a future full of extraordinary developments: for example, educational programmes in different dialects beamed down to remote villages; oil pipelines in the inaccessible Arctic monitored and checked for leaks from a satellite; snowstorms and other disturbances tracked by satellite – maybe even mosquito density. In due course, they say, satellite communication could link the remotest corners of the world.

Mr. Maurice Beresford, manager of the Lucerne plant, foresees that eventually, "We will go to the ultimate when every home-owner has a receiving 'dish' on his house." (The "dish" is a specially designed antenna to pick up voice and picture transmission from satellites.) "Every school will have a small receiving dish, every train, every ship will have one."

Once a satellite is launched, it costs relatively little to build earth stations to pick up its signal. The cost of a station to serve a small town is now about \$50,000. Mr.

Beresford says this could be reduced by half with expanded production. "For every \$10m in the air" – the cost of a space satellite – "you can service \$100m worth of space stations on the ground."

Why not wheat?

The Canadian system at present has 33 earth stations; 25 in the north and eight in the south. A Canadian Engineering firm, SED System Limited, has been set up at Saskatoon on the prairies to produce equipment for these ground stations – an address which has caused some problems, since it is in the middle of wheat farming country. Because all the important work in this field so far has been done in the United States or in Ontario, the firm has had some difficulty convincing people of its seriousness. Its president, Alex Kavadas, a former physics professor said recently: "We always get this reaction of surprise and suspicion. We usually have to prove ourselves two or three times to get contracts. We applied once for a grant under the Programme for the Advancement of Industrial Technology and you know what they told us? They said, 'If you're in Saskatoon, you should be doing agricultural research on wheat.' And they turned us down."

In Lucerne, when the Northern Electric plant has completed work on a new electronic brain, the populace is treated to a slow procession as the very delicate equipment is carried to a waiting aircraft in a padded steel box, inside a truck, with a police escort. The latter is a necessary precaution, since even a slight traffic collision could result in \$1.5m worth of damage.

New electronic brain

The actual construction of the equipment is so exacting that welding, soldering and assembly are done under microscopes and large magnifying glasses. Mr. William Barrie, the firm's marketing manager for satellite communication, explains: "If we get one extra drop of solder on the wire, they would not be able to launch the satellite because of the weight."

The work is done in a "clean room" and visitors are expected to dust off their shoes and wear gowns and gauze caps to guard against contaminating the equipment.

The wiring has to be exactly balanced and secured to withstand a satellite spinning 100 times a second in orbit – if it isn't,