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THE SATELLITE

by Gary Whiteford

On October 4, 1957, a small round object was sent into earth orbit by the Soviet Union and thus began the satellite era. Today almost 23 years after Sputnik, there are some 5,000 objects up there in orbit and more than 6,000 have already fallen back to earth. Cosmos 954 and Skylab are names of 2 satellites that are common to most people.

These satellites come in all shapes and sizes, containing sophisticated cameras, instruments and electronic equipment. To mention just a few of the names requires a yearly update: Aerosat (aeronautical communications and navigation); Climatsat (climatic studies); Magsat (magnetic field studies); Metsat (meteorology); Navsat (navigation); Sarsat (search and rescue); Seasat (ocean observations); Solsat (solar energy); Sursat (surveillance); Stereosat (geological studies).

Canada became the third country on the planet to physically enter the space age with the placing of the Alouette Satellite into earth orbit on September 29, 1962. The launch of anik (Eskimo for "brother") in 1972 inaugurated the planet's first domestic geostationary satellite communications system.

The most powerful telecommunications satellite orbiting earth today, Hermes, is Canadian. Through long-range planning and applications of space satellite for direct broadcasting, weather forecasting, remote sensing and aeronautical and marine transmissions, Canada has become the model. This country is an international leader in the development and use of domestic satellite communications systems, and in earth resources satellite receiving stations and data processing.

Eight months passed before Queen Isabella learned that her investment in Columbus had paid a dividend. But it took only 1.3 seconds, via satellite, for Neil Armstrong to take his great leap for mankind on the moon. The worldwide consortium of communications satellites, called Intelsat, has grown enormously. It started with 5 members in 1965 and now serves some 120 nations on six continents using 10 satellites. It is simply a matter of time before direct-to-home satellite broadcasting will be in operation. When a small TV antenna, about the

size of a small portable TV, is placed on a window ledge signals are received directly from the satellite, some 22,000 miles out in space. In some parts of the country, it is already operational and some sales catalogues are offering receiving equipment for some \$15,000.

A government analysis last year estimated that a satellite observations of the earth's atmosphere and surface are saving industries and government agencies over \$170 million a year. The findings were based on reported use of information provided by geosynchronous and polar orbiting satellites built and launched by NASA throughout the 1970's.

The GOES (geostationary) and TIROS class (polar orbiting) spacecraft make up the two meteorological satellite systems and their mere presence helped man in a variety of ways. In Florida a temperature map is produced every 30 minutes that shows the southward progress of crop-killing frost during the winter nights. This information allows citrus growers when or if they should start the costly effort of heating their groves. The Hawaiian sugar can industry uses satellite data in its crop management to decide when to burn sugar can fields before harvesting the crop.

Before the availability of satellite data, the Great Lakes were usually closed

to shipping for about two months each winter because of ice. After aircraft using side-looking radar and satellite data showing ice location became available 3 years ago, the 1976-77 season was extended by a month. During the 1977-78 season, shipping on the lakes never came to a complete halt.

Satellite data has been used to locate the ever-changing positions of the Gulf Stream and the Gulf Loop Current. In 1975, seven Exxon Corporation oil tankers used satellite data to ride the north bound currents of the Gulf Stream axis on northward transits and to avoid the current on southward trips. The oil company is now using satellite information to help guide all of its vessels navigating along the east coast.

For the last four years, fishermen in the Pacific Ocean have been using satellite derived information for the location of thermal boundaries in the ocean where salmon and albacore tend to congregate because of the high nutrient levels of the waters.

Satellite pictures, showing poor weather conditions at the time missing aircraft were last located, permit searchers to focus their efforts in very selected areas. This can reduce by as much as 60 per cent the average number of hours flown per rescue mission.

One satellite positioned over the equator keeps a

continuous watch over weather conditions in the western hemisphere. Every hour, 24 hours a day, it sends two pictures showing cloud formations. One picture is almost three-dimensional, allowing meteorologists to determine cloud heights, temperature and other factors. Since this information has become available, pilots can now fly around storms. Whenever possible, pilots also take advantage of the storms to get a free ride on the wind. The Nicaraguan Airline frequently uses the satellite information to advise stewards about the best time for serving meals!

The International Ultraviolet explorer satellite, launched in 1978, has provided scientists from 17 countries with more than 9,000 images of astronomical objects that could not be obtained by ground-based instruments. The satellite is in a geosynchronous orbit - that is, it stays nearly stationary over a point on the equator, and enables astronomers to interact with the satellite much as they would with a ground based telescope. The satellite will look at hot stars and the outer atmosphere of cool stars that are similar to the sun. Above the obscuring layer of the earth's atmosphere, the satellite will be able to determine these star's temperatures, densities and chemical compositions.

LANDSAT first launched in

1972 gives man the ability to view portions of the earth's surface in the infrared part of the electromagnetic spectrum. Every 9 days, LANDSAT 2 and 3 produce images that are used for a variety of purposes: to search for geological indicators of oil and mineral deposits; to inventory crops and forests; to assess and predict fresh water conditions; to improve mapping; to assist in land use and urban planning.

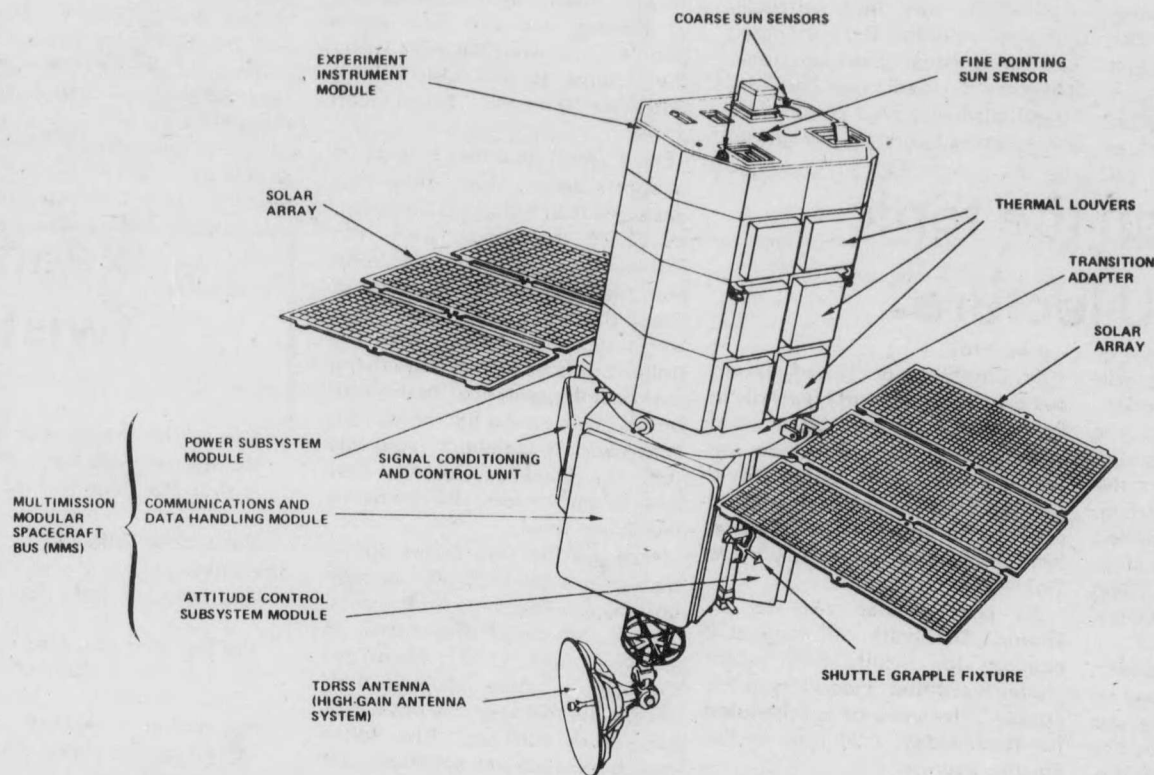
Perhaps the most dramatic example of LANDSAT studies involved causes of a drought and desert spread. A LANDSAT image showed a perfectly straight line separating a dark region of the Negev area in Israel from a lighter region of the Sinai to the south. The reason was that a fence separated grazing goats and sheep. In the Sinai, the animals were allowed to overgraze, changing the way in which the land surface reflected the sun's radiation. In the Negev, the grazing was controlled, and the surface was not denuded of vegetation.

In this decade, the solar powered satellite will be operational. It will be carried into space by the Shuttle and placed in orbit above the equator. Electricity generated by the solar cells would be sent to earth in the form of microwaves by a dish antenna in the centre of the satellite. The microwave beam would be focused on a receiving antenna built near large

cities or offshore. It has been calculated that a satellite would produce perhaps 1 million KW hours a day, enough to supply half of New York City and equally the large nuclear power. Moreover, the satellite would be a competitive clear power station.

Another excitement coming will be the launch of infrared astronomy. It is expected perhaps 1 million invisible infrared. As one observer said, "Come back here from now, after I have flown and we have its data. I will be disappointed if we don't see about the same things we are talking about today. We are revolutionizing the field."

No longer are satellites considered pie in the sky. It is becoming evident that the games in this decade will not be played on the moon but will be a future one's satellite can and the wise and of such capabilities. The future of satellite course, must depend on the goodwill and of all nations to share the future that will be better than the past. As an observer noted: "I don't think about the future you cannot have a



Solar Maximum Mission Satellite—NASA's latest.