Scientists Seek Computer To Edit 'Gabby' Satellites

By JOSEPH L. MYLER
United Press International

WASHINGTON (UPI) —Satellites are too gabby.

So scientists are looking for some way to make them talk only when they have something worth saying.

A single overly articulate satellite can transmit enough data to earth to keep magnetic tape recorders busy 24 hours a day.

Such gabbiness means waste of time, talent and money. Moreover, since the radio spectrum is finite, it puts an intolerable burden on the limited communication links between spacecraft and earth.

What is wanted, and what engineers are trying to develop, is a space-borne editor to screen out repetitious chit - chat and idle gossip before they are transmitted.

The editor will have to be a light-weight, long - lived, high-speed computer possessing great powers of discrimination and judgment.

It may take five years to perfect a compact computer for such vital executive work, but engineers say it is both possible and necessary.

Use Numbers Code

Information - gathering satellites use a numerical code in making their radio reports. They talk, so to speak, in "data points." A data point in satellite language is expressed in three decimal digits—anything from 000 to 999. It can best be explained for the layman by analogy.

Imagine a man who for some reason is obsessed by temperature radings. Every hour on the hour he leaps from his chair to see what the outside thermometer says. He is operating at the rate of one data point per hour.

But a gifted satellite, like the geophysical observatory to be put in orbit late next year, can transmit 10,000 data points per second if not curbed in some way. Actually, ground stations simply refuse to listen to much more than a tenth of what such a satellite has to say.

Much Is Useless

In that tenth, however is a lot of stuff conveying no useful meaning. Much of it is mere repetition. Go back to the man who is so interested in the outside temperature. As long as the reading is around 72 degrees, say, he is satisfied and makes no notes in his record book.

But if on one of his hourly visits to the window he saw the thermometer reading had jumped to 85 degrees, he would be concerned and would record the change.

That suggests one way in which the space-going editor might function — it would instruct experimental devices aboard the satellite to report only the changes in whatever conditions they were observing. That alone would eliminate a lot of monotonous repetition.

To understand the magnitude of the job of processing and analyzing satellite reports it is necessary to understand that data and information are not necessarily equivalent. Miles of magnetic tape may contain only inches of meaningful data.

Engineers at the Goddard Space Flight Center of the National Aeronautics and Space Administration (NASA) have calculated for some years into the future the volume of data traffic to be recorded from scientific satellites alone.

Toward the end of 1963, with relatively few scientific satellites in orbit, this traffic amounted to seven million data points per day. NASA plans in the next four years to launch about 63 more scientific satellites.

In 1967, the engineers figured, the radio traffic will average some 350 million data points a day. Just to store that much data on the ground would take 70 reels, or 35 miles, of magnetic tape.

If it were printed on business machine sheets, the paper pile in less than 10 days would tower as high as the Washington Monument.

So clearly something has to be done. Engineers estimate that on-board computers could reduce needful satellite transmissions to a tenth or a hundredth of the calculated 1967 volume.

Must Store Data

But the computers can't be given too much authority to throw data away. This is because experimenters are looking for the unknown and never know when or how it will show up. So some provision must be made aboard satellites to store, for periods of perhaps weeks, data to which the computers had attached little significance.

Thus if an experimenter found a fact that needed to be put in context it would be possible to tell the satellite to cough up amplifying data from its electronic memory units.

This necessity would not arise in the case of so-called application satellites which are put in orbit for specific and well-anticipated purposes.

Weather satellites of the future, for example, may carry computers capable of recognizing cloud patterns of interest to meteorologists and ignoring the rest. Satellites so governed would not send all photographs made of the earth's weather but only those which showed hurricanes or other storms in various phases of development.

Can Self Train

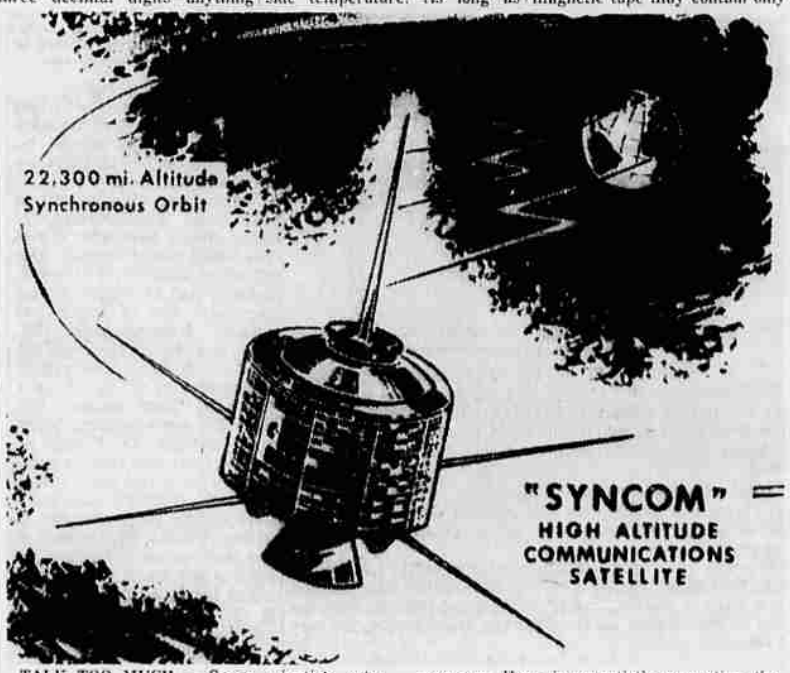
This presupposes that computers can be made which are capable of self-training. According to scientists of NASA's office of advanced research and technology, this has been proved feasible.

In ground experiments, a computer was exposed to a large number of photographs taken by the Tiros weather satellites. It quickly learned to recognize whether hurricanes were or were not depicted.

Engineers expect to perfect satellites with much longer useful lifetimes than those now flying. The computers used to compress and control their transmissions must have equally long lifetimes.

In the simplest case of self-repair, if one circuit goes out, the computer re-routes its operations through other circuits.

For the long future, scientists foresee satellite control computers capable of operating with complete trustworthiness, unattended and without failures, for dozens of years.



TALK TOO MUCH — Space scientists, who maintain that satellites talk too much, are trying to develop a computer that will keep them from giving repetitious or unimportant messages. Here, in an artist's conception, the "Syncom" high altitude communications satellite beams some of its voluminous data back to earth. (UPI)

Oregon State Research May Aid in Making Safe Pesticides

CORVALLIS — Research at Oregon State University on how insects protect themselves from poison sprays may soon aid science in reaching a long-time goal of making selective pesticides safe to man and wildlife, livestock and beneficial insects, but effective against harmful insects.

A recent grant to OSU of almost $150,000 over the next five years from the U.S. Public Health Service will allow the biochemistry research team of Leon Terriere, Robert Schonbrod, William Philleo and Richard Boose to continue the study started in 1958 of the detoxication mechanisms in insects.

The problem, according to Dr. Terriere, is to discover how insects change poisonous substances into harmless materials. The research team has been searching for the "defense mechanism" within insects which help make them immune to certain potent insecticides.

A Detoxication Process

OSU scientists found that the insects's defense is a detoxication process which transforms chemically toxic, water insoluble compounds into non-toxic water soluble compounds which are able to pass from the body. The molecules of a toxic substance are modified into a different non-toxic structure, according to Terriere.

Research to date on how insects resist chemical sprays has resulted in several important discoveries, Terriere said.

Using house flies as experimental subjects, OSU scientists have been able to locate the smallest particles yet discovered in the cells. These tiny fragments, called microsomes, can be seen only with an electron microscope. They are separated from cell particles and other tissues by using speed centrifuge which produces more than 100,000 times the forces of gravity.

With these active tissues, scientists are now able to study detoxication within test tubes instead of using live insects.

Detoxication has been studied for more than 100 years, Dr. Terriere said, but it has been only within the last 15 years that the public has been increasingly concerned with the effects of vast numbers of chemicals to which man and animals have been exposed.

Much of the Oregon State University study of the detoxication mechanisms in insects has been with house flies. Dr. Terriere explained that house flies were used because they have about as many defense mechanisms against poisonous materials as does man. Also, flies are easily reared under laboratory conditions and they have been one of man's persistent pests.

The research team fed the house flies napthalene — the common mothball chemical. Napthalene was chosen because it could be made radioactive cheaply for study within the fly, because scientists have previous experience tracing napthalene and its reactions in rats and rabbits, and because it represents several kinds of insecticides.

Flies injected with radioactive napthalene neutralize and excrete the toxicant a few hours after injection. OSU scientists also found that the house fly was able to neutralize the napthalene in a way similar to the higher animals.

Other insects have shown a remarkable ability to build up resistance to certain chamicals, Terriere said. Insect resistance to DDT shows how chamical science has kept only a few paces ahead of pests before the insects' defense mechanisms adjust and neutralize the chemical.

Dr. Terriere said that in "an environment contaminated by insecticides, the insect with the best detoxication process will survive, pass this inheritable trait to his offspring, and start a process where detoxication methods are concentrated. The resulting populations are thus able to detoxify lethal amounts of insecticides."

He pointed out that the detoxication process in man, animals and insects is not always a guarantee of protection against poisons. Detoxication capacities vary, the OSU scientist stated, from species to species, individual to individual and even to sex and age.

Your Money's Worth

By SYLVIA PORTER
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SHOULD WE 'GO METRIC'?

(This Is the Last in a Series of Three Columns)

Should we, in the United States, abandon our "tangled spaghetti" system of measurements in pounds and ounces, feet and inches, fathoms and fractions and convert to the sleek, beautifully simple Metric System, now used in 88 countries containing more than 90 per cent of the world's population?

The odds are the best in years that a bill to lay the base for the historic conversion will pass in the next session of Congress. At the convention of the American Assn. for the Advancement of Science in Cleveland this Saturday, leaders of science, industry and education will urge the changeover as soon as feasible.

Top scientists maintain that our system of measurements is outrageously obsolete, unwieldy and breeds disastrous errors. Top industrialists emphasize the towering difficulties and unnecessary costs involved in conducting international trade in two separate languages — "Metric" and "English." Top educators almost unanimously feel that the confusion of our system makes learning it an arithmetic ordeal for school children — whereas the entire Metric System can be learned in less than an hour.

But, as reported Tuesday, a changeover here would pose terrifyingly formidable obstacles. Opponents emphasize these three:

Cost: General Motors estimates conversion would cost $26 billion. General Electric estimates the cost to it alone would run to $200 million. A confidential survey by the Stanford Research Institute puts the cost of a changeover to the nation at $11 billion. "The cost of a shift would be astronomical," says an automobile industry spokesman. "It would court economic disaster."

Confusion: Most U.S. corporations are firmly wedded to our traditional weights and measurements. To change all these would require industries to keep double inventories of products and parts for decades in both Metric and English measures.

Re-education: All of us would have to re-learn measurements of distances, weights and volumes in the now unfamiliar terms of meters, grams and liters. The task of re-educating engineers and machinists would be staggering, the auto industry (a main opponent to conversion) argues.

Why, then, is pressure mounting so relentlessly for conversion?

A key retort made by boosters of the Metric System is that the obstacles are being grossly exaggerated because any changeover would NOT take place overnight but would instead be spread over decades.

During the prolonged period of conversion, industries could wait for equipment to wear out before substituting Metric scale equipment. While surveys indicate 75 to 90 per cent of scientific and industrial concerns would welcome the changeover, all industries would not be compelled to convert — particularly if it meant crippling costs.

As for costs, the Stanford Research Institute concludes that its own estimate of an $11 billion cost to the nation would be more than covered over a period by increased business and productivity. Savings — both tangible and intangible — would come from faster calculations by engineers and scientists, better understanding among businessmen and scientists everywhere, reduction of expensive errors during conversions from one system to another. Engineers in certain fields spend six hours each month just converting English to Metric measures and back. Some industries — notably the pharmaceutical industry — are so impatient that they already have made the conversion. The time-saving in schools would be immense.

In addition to the advantages of precision, efficiency and simplicity at home, the Metric System would enhance our position in world trade markets, for nations on the Metric System understandably prefer to shop in nations offering goods in metric measurements.

The fact that Russia is on the Metric System is an enormous trade advantage to the Soviets, will be an increasing handicap to us.

Eventually, we will go Metric. Then, in the words of the Civil Engineering magazine, "Such monstrosities as proper fractions, improper fractions, least common denominators and greatest common divisors could be laid to rest with the celluloid collar and the oxcart."

Firemen Called to Plane Fire Today

A small fire broke out in the engineers compartment of a private plane at the Medford Airport this morning, but no damage was reported.

The Medford Fire Department was called out at 11:08 o'clock this morning. Firemen said an oil leak was the cause of the fire, which was noticed as the craft was preparing to take off. The plane belonged to Bob Rude of Seattle, Wash.

Girl Falls Off Sled; Killed by Dad's Car

DUNDEE, N.Y. (UPI)—Ralph Hollendeck ran over and killed his 11-year-old daughter, Rhonda, Wednesday night during a Christmas sledding party.

Police said the girl fell off her sled while sliding down a hill and her father, following in a car, was unable to stop in time to avoid hitting her.