RADIO ASTRONOMY

Listen In On Other Suns

Radio astronomers are listening for intelligent radio signals from neighboring solar systems. Universal laws of nature have told scientists about what to expect.

By GLORIA BALL

"BEEP . . . beep beep . . . beep beep beep . . . beep beep beep beep . . . . . beep . . . beep beep . . ."

These sounds, similar to Morse code, could be the first evidence of intelligent beings outside the solar system. Converted into visible signals on a graph, the sounds would look like so many humps on a camel's back.

Until about the middle of May, astronomers at the National Radio Astronomy Observatory in Green Bank, W. Va., will be checking their instruments and listening six hours a day, seven days a week, for possible radio signals from intelligent civilizations in neighboring planetary systems.

The Green Bank observatory, a facility of the National Science Foundation, is the first to launch such a program. At best it is a long shot. But success—actual contact with other beings—could bring about unforeseen revolutions in scientific and philosophical thinking.

The program is largely the brain-child of Dr. Frank Drake, a young radio astronomer who will direct the listening operations. He has named the project "Ozma" after the legendary Land of Oz, a faraway place inhabited by strange and mysterious beings. But the places that Dr. Drake will study for signs of intelligent life are very real. They are Tau Ceti and Epsilon Eridani, two stars in our Milky Way Galaxy.

Each of these stars is about 11 light years away, and each is a twin to our sun (a single star, about as hot as our sun and may have planets). Whether planets and life, particularly intelligent life, actually exist, no one knows.

Sending and Receiving

There is no indication, Dr. Drake said, that anyone has been trying to contact us, but until now our instruments were not sensitive enough to detect such weak signals.

How, then, will Project Ozma find out if the signals are really there?

An 85-foot radio telescope picks up radio noise and signals from either star and any planets it may have. Most of the static noises originating on earth and in outer space are filtered out electronically. Remaining signals, if any, are fed into an amplifier which boosts the sounds into the audible range or converts them into visible waves traced on a graph.

For the time being, Dr. Drake is using the tracing method in order to have a permanent record for study.

Since it is highly unlikely that other beings would use Morse code with the same meaning of dots and dashes we know, how will they communicate and what will they say?

Mathematics is the most nearly universal language. A likely message is some simple repetition of prime numbers, simple sums, multiples or even consecutive numbers, such as "one . . . two . . . three . . . four . . . . . one . . . two . . ." These would come in as so many pulses or beeps, Dr. Drake says.

Other universal facts have helped radio astronomers choose 1,420 megacycles (21-centimeter wavelength) as the frequency most likely to yield purposeful signals.

In outer space a considerable amount of energy is radiated at this frequency by hydrogen atoms. This frequency is unique throughout the universe.

In addition, it is in the range of minimum interference due to radiation noise in the earth's atmosphere and in outer space.

Thus, 1,420 megacycles is more or less the natural frequency for sending and receiving long range signals. Other civilizations would come to the same conclusion, radio astronomers reason.

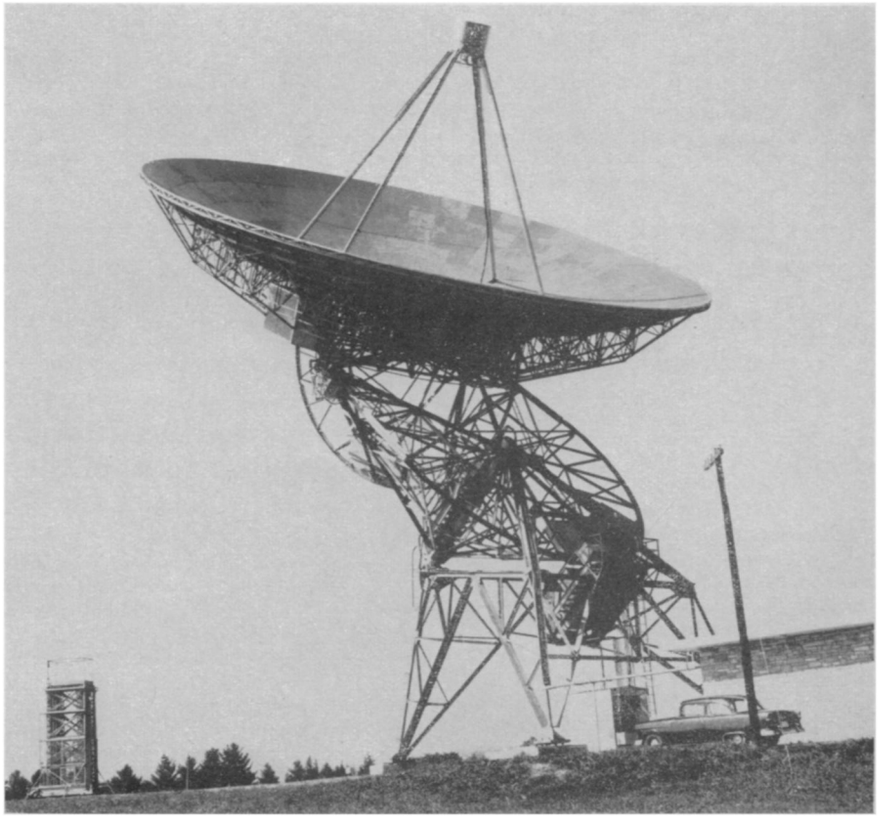
At the present time there are about 15 radio telescopes throughout the world observing 1,420 megacycle outer space radiation on a 24-hour basis. But none of them are equipped to screen any intentional signals out of all the interfering noise. Not that the extra equipment is expensive. Far from it. Project Ozma has cost so little that the National Science Foundation has not set aside special funds for it.

Maser Does the Job

Most of the money spent on Ozma has gone into building a radiometer full of electronic devices primarily intended to filter out static. But the main gadget that does the job is the low-noise maser amplifier component.

Based on principles of solid state physics, the maser was invented in 1956 and came into practical use in 1959. At that time Dr. Drake began planning for the Big Listen. The maser's ability to increase receiver sensitivity to a maximum is the technological trick that makes Project Ozma possible.

And now that all the machinery has been set in motion, is there actually a beep or



THE BIG EAR—This 85-foot radio telescope at the National Radio Astronomy Observatory in Green Bank, W. Va., is listening for signals from Tau Ceti and Epsilon Eridani, two stars that may have planets with life.

a camel-humped signal? Not yet. Dr. Drake is still calibrating the instruments, and the first real listening will begin when that job is finished.

Basing his statement on astronomical probabilities, Dr. Otto Struve, director of the observatory at Green Bank, believes that almost certainly there are planets other than those in our own sun's realm. Life probably does exist on some of them, As to whether that life is intelligent, "we have no answer to that question," he said.

The probability of getting intelligent signals at this time cannot be definitely calculated, but it is very small.

But the Green Bank radio astronomers are going ahead in spite of being a bit embarrassed by insinuations that the project is so improbable that it smacks of science fiction.

"We realize that our chances of success are extremely small," Dr. Drake said, "but we wish to proceed—for the experience—so we will be able to build optimum systems when the chances become appreciably larger."

What will happen if a signal does come through?

The first step is decoding the message, which could be more complex than numerical repetition. At the same time, the electronic apparatus would be hooked up to a larger telescope to get a stronger signal. The 140-foot ear, now under construction at Green Bank, will be used even if no sounds come through the 85-footer.

Dr. Drake makes no guesses about how advanced the sending civilization may be. Certainly it will have to be advanced enough to build a transmitter capable of sending a signal this far. It may be at our own civilization's level or millions of years ahead of ours, he said.

Will we try to send an answer back or return the signal?

No plans have been made for sending. As one worker associated with Ozma put it, "this project is still worrying about its ears. It has not even thought about a mouth yet."

A one-megawatt transmitter would furnish power enough to send a signal back to Tau Ceti or Epsilon Eridani, Dr. Drake calculates. We have that ability and could answer.

To pessimists who believe that we should not answer because we may be a marvelous beef animal for the other civilization, Dr. Drake replies, "Nonsense."

Although it would take 22 years to get an answer, the far-off Wizards of Ozma might be able to tell us how to cure cancer or how to live in peace.

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Do You Know

Rheumatic fever and resultant heart disease is the fifth leading cause of death among children of ages 5 to 14.

The treponematosis of *yaws*, similar to syphilis but transmitted by simple contact, is mainly a disease of poverty and faulty hygiene.

ROCKETS AND MISSILES

Optical Inspector Probes Hard-to-Get-at Interiors

AN OPTICAL inspection device designed to give a detailed interior view of the grain bore for solid rocket motors has been developed.

It may also be used, in a portable version, to probe pipes, tanks, airplane wings, boilers, or any type of irregular enclosure presenting hard-to-get-at interiors.

Developed by Aerojet-General Corporation, Azusa, Calif., the optical grain checker can inspect an opening down to two inches in diameter. It features a safe external light source, a mirror that is driven along a slotted optical tube, and a specially designed telescope that magnifies the image of the grain reflected by the mirror.

The checker can be fitted with a camera for detailed photographs of possible cracks.

Science News Letter, April 30, 1960

SURGERY

Snipped Ear "Springs" Beautify Appearance

PERSONS with bat wing-like or cupped ears can now have beautiful and normal ears by undergoing a simple surgical procedure that snips the "springs" in the ear shell, a reconstruction surgeon of New York reported.

The "springs" are actually sections of cartilage in the ear's shell. There are four such distinct springs, Dr. Louis Joel Feit reported at a meeting of the American Otorhinologic Society for Plastic Surgery, Miami, Fla.

He said his studies of the physiology and mechanical action of the ear have shown that there are three springs with "leaflet" action like the leaf springs in an automobile, all in the outer shell, and with a torque action like a coiled wire, directed into the ear. Two of the leaflet springs run up and down the ear, the other runs horizontally.

The surgeon's method is to break one or more of these springs surgically, depending upon the deformity. He emphasized that the result is not only an ear in the correct position but a beautiful ear with all the natural "landmarks" or folds. In the past, ears were merely pinned back surgically, so they would not be seen.

Science News Letter, April 30, 1960

Questions

GENERAL SCIENCE—How many high school students will come to the National Science Fair-International as finalists? p. 278.

MEDICINE—What dose is given of the new polio vaccine? p. 277.

RADIO ASTRONOMY—Why was the frequency of 1,420 megacycles chosen for sending signals on the Ozma project? p. 282.

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