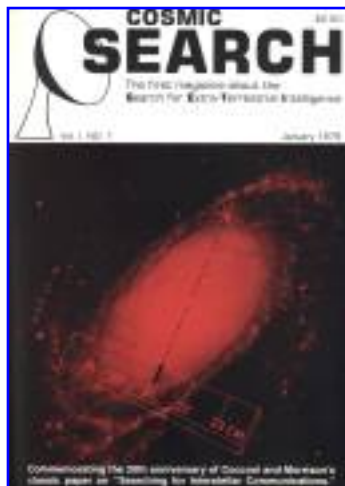




North American AstroPhysical Observatory (NAAPO)



Cosmic Search: Issue 1
(Volume 1 Number 1; January 1979)
[Article in magazine started on page 25]

The SEntInel (SETI News)

By: The Editors

- SETI is Exploration
 - More Stars Apt to Have Planets Says Abt
 - Intelligent Life Near the Earth Unlikely; Man's Mission is to Colonize Says Shklovsky
 - SETI Funding Ups-and-Downs
 - United Nations Agency Promotes SETI
 - Protection of SETI Frequency Bands in Jeopardy
 - Bracewell Proposes Spinning Infrared Interferometer for Detection of Planets
 - Holography or 3-Dimensional Mapping of Entire Universe Possible with Bold Soviet Concept for Space Telescope
 - Davies Suggests That a Civilization Might Live Longer by Harnessing a Black Hole
 - Space Solar Power Stations and SETI
-

SETI Is Exploration

Recently space probes, SETI and colonies in space have come in for criticism by a few senators, columnists and others as a waste of money which should better be spent on "more productive" things.

This attitude is not new. Explorers — those who have extended mankind's horizons — have all had their share of criticism. Columbus' expensive expedition drew censure in 1492, so did Magellan's venture of 1519 and the Lewis and Clark expedition of 1803, which opened up the American northwest, was ridiculed because the area they planned to explore was nothing but a wasteland of rock and ice and much too far from Boston to be of any possible consequence.

Fortunately not everyone is myopic. Those who can see a little way ahead recognize (1) that our space activities are an extension of mankind, relating him to

his total environment, the universe, (2) that these enterprises are non-military and have a unifying effect on all mankind as a joint endeavor, and (3) that money spent on such activities is spent right here on earth, providing many jobs that will lead to new horizons and even more jobs.

More Stars Apt to Have Planets Says Abt

Dr. Helmut A. Abt and Saul G. Levy of the Kitt Peak National Observatory have reported evidence that "the number of stars in the Milky Way galaxy (our own galaxy) that can have habitable planets circling them is much greater than previously believed." They said their finding could mean that life similar to that on earth might be much more probable among nearby stars. (This view differs from that expressed by Josef Shklovsky as reported elsewhere in the SEnTinel in this issue of COSMIC SEARCH.)

Dr. Abt said that they had found evidence that hot stars, as well as cooler stars like our sun, have companions orbiting them which must be planets.

The astronomers are trying to find out what fraction of different type stars have companions. In a 1976 study, they concentrated their efforts on stars that are like the Sun. Using the telescope at the Kitt Peak National Observatory, the scientists surveyed 123 stars to look for orbital motions, an indication that they are being affected by the gravitational force of an unseen companion. They found that one tenth of the 123 stars had companions that were too small to be other stars yet large enough to cause orbital motions. They concluded that these companions must be planets.

In their most recent survey, just completed, the scientists used the same technique to search for companions of hot stars. They found that of 42 star systems studied, seven — or about 16 percent — may have planets circling them.

"These results imply that for most types of stars, companions of some sort are present in most or all cases and that these companions may be planets in 10 to 20 percent of the cases," Dr. Abt said. "Other companions could be other stars. From here we need to conduct intensive searches with new ultra-sensitive equipment to

measure small Doppler shifts or to listen with radio telescopes for radio signals from planets around candidate stars."

Dr. Abt estimated that of the approximately 100 billion stars in the Milky Way, probably 10 billion could have planets orbiting them. "But," he added, "we don't know what fraction of these are habitable."

Also since hot stars are not as long-lived as cooler ones, higher forms of life may not have time to evolve on any planets associated with them.



Intelligent Life Near the Earth Unlikely; Man's Mission Is to Colonize Says Shklovsky

Professor Josef Shklovsky of the Soviet Academy of Sciences believes that the chances of finding extraterrestrial intelligent life are extremely remote. Writing in a recent issue of "Social Sciences" he expressed the opinion that the sun with its planets is a rare exception in the stellar world, and that the nearest extraterrestrial civilization is probably at least 10,000 light years distant. He argues that the apparent absence of intelligent life within the

earth's vicinity should not discourage, but rather spur, the conquest of space. He contends that expansion into space by mankind is inevitable and will provide a long-term solution to mankind's population and environmental problems. He foresees artificial biospheres in space capable of supporting billions of people within several hundred years.

Almost 100 years ago the Russian writer Konstantin Tsiolkovsky proposed manned space stations with artificial gravity and a closed ecological system. Over the years others, including Herman Noordung, Wehrner von Braun, Arthur C. Clarke, Darrell

Romick, J. D. Bernal and Freeman Dyson, have elaborated and expanded on the concept. Recent proposals similar to Shklovsky's have been made by Professor Gerard K. O'Neill of Princeton University who regards space as mankind's "high-frontier". ("The High Frontier" is the title of Professor O'Neill's new book on the subject.)

SETI Funding Ups-and-Downs

Included in the NASA space budget for Fiscal Year 1979 was a \$2 million request for multi-channel SETI receivers and their application by the Jet Propulsion Laboratory of the California Institute of Technology. On May 4, 1978, a U.S. House of Representatives appropriations subcommittee recommended that the \$2 million be reduced to \$600,000. The \$2 million F.Y. 1979 request was part of a \$15 million NASA SETI proposal for the next 7 years. This proposal had been chosen instead of an earlier more limited one from the NASA-Ames Research Center for about \$6 million over a 7 year period.

Subsequently, the amount was reduced to zero by a Senate committee. The magazine SCIENCE, published weekly by the American Association for the Advancement of Science, commented in the June 2, 1978 issue that the setback of the SETI plans is a "sharp example of scientists failing when it comes to imbuing legislators with their own enthusiasm. Support for the (SETI) project is remarkably widespread among astronomers as well as other scientists who consider the investment tiny in view of the potential gains".

But the SETI proposals are not alone in being slated for cuts. NASA's Space Telescope which could provide man's clearest view of the universe may be in for a very substantial cut and the Galileo Mission to Jupiter may also receive reduced funding. These cuts are manifestations of a general decline in research and development efforts by the United States in recent years while such efforts continue to rise in other countries notably the U.S.S.R., Japan and West Germany according to a report by the National Science Board issued by the National Science Foundation. The number of persons engaged in research and development in the U. S.S.R. is now double that in the U.S.

United Nations Agency Promotes SETI

May 17, 1978, was "World Telecommunications Day" as designated by the International Telecommunications Union (I.T.U.), a Geneva-based agency of the United Nations.

In a New York Times article, "U.N. Agency Promoting Search for Civilizations on Far Worlds", Walter Sullivan wrote,

"Many astronomers and other scientists believe that civilizations more advanced than that on the earth may live on the planets of other stars. In promoting the search for evidence of such technologies, the Telecommunications Union cited a report which assessed the extent to which the earth's own television signals might be detectable by civilizations with equipment no more sensitive than that on this planet.

"It was concluded that such detection was possible if the antennas were on any planet orbiting one of the 300 nearest stars. Such reasoning has led radio astronomers to propose looking for similar signals."

In dedicating this day to promoting the search for extraterrestrial life, the Telecommunications Union summarized American, Canadian and Soviet detection efforts. It reported that astronomers of its member countries, using "the largest and most sophisticated modern radio telescopes" had failed to pick up any signals.

"This may mean that either nobody is out there or that perhaps the astronomers are listening on the wrong frequency", it suggested.

"Many astronomers engaged in the search for extraterrestrial intelligence" the I.T. U. statement said, "argue that the exchange of scientific and technical information would be of inestimable benefit both to us and them."

Proponents of the search, it continued "argue that it has a sound scientific base, pointing out that it is just as ridiculous to assume there is nothing out there as it is to state, without proof, that the universe is teeming with life."

The statement cited the debate on whether detection of signals should be kept secret to avoid public panic and whether any reply should be withheld to avoid attack from afar.

"A much more positive approach," it said, "would be to consider the spiritual and philosophical benefits that would result from such an exchange of knowledge, leading to a new respect and humility if we found that man was not alone in the universe."

INTERSTELLAR MOLECULES

Dozens of molecules have been detected by radio telescopes in the almost but not quite empty space between the stars of our galaxy. Their complex structure suggests that outer space may contain even more complex types, including forms basic to life. In many cases the amounts found are enormous. A few interstellar molecules are listed in the table.

Molecule	Formula	Wavelength (millimeters)
Hydroxyl radical	OH	180
Water	H ₂ O	2 and 14
Ammonia	NH ₃	13
Carbon monoxide	CO	2.6
Hydrogen sulphide	H ₂ S	1.8
Formaldehyde	H ₂ CO	62
Hydrogen cyanide	HCN	3.4
Methyl alcohol	CH ₃ OH	3.5
Silicon monoxide	SiO	2.3, 3.4 and 6.9

Data after G. Winnewisser, *Naturwissenschaften*, 1975, page 200.

Protection of SETI Frequency Bands in Jeopardy

The Federal Communications Commission (FCC) issued a Notice of Inquiry (NOI) No. 8 in May requesting comment on the proposed United States negotiating position for the 1979 World Administrative Radio Conference (WARC). The conference meets every 20 years so member nations, numbering 150, can decide on the allocation of channels throughout the radio spectrum.

Dr. Frank D. Drake of Cornell University has urged radio astronomers and others around the world to write their governments requesting that the 1400 to 1727 megahertz band be allocated to SETI. The band is now shared by radio astronomy with taxis, fire engines, ships, aircraft and satellites.

The NOI includes a footnote (No. 351) which states in part, "Administrators should bear in mind that passive (SETI research) is being conducted in various parts of the spectrum . . . with particular emphasis on the band from 1400 to 1727 megahertz when searching nearby stars. Reason: They may help us."

In a letter to the FCC dated June 13, 1978, Dr. Mark Stull, a California radio-astronomy attorney, pointed out that the footnote is insufficient since it carries with it no mandatory protection of the 1400 to 1727 megahertz band. The band extends between the hydrogen and hydroxyl frequencies and is often called the "water hole" band. It is the opinion of many scientists that this band is likely to be used by extraterrestrial civilizations to attract the attention of emerging technological societies such as our own.

Our transmitters may make extraterrestrial civilizations aware of us but if we have no clear channels on which to listen we will never be aware of them.

Stull maintains that the public interest in SETI is so strong that the band should be protected by regulating any transmitters using the band and by the complete prohibition of all satellite transmitters from the band because receivers on the ground are extremely vulnerable to a transmitter in the sky. However, Stull notes that many low power uses of the band are compatible with SETI provided the transmitters are not in satellites.

Scientists and others interested in SETI will, no doubt, agree with Drake and Stull. If hearings are held SETI supporters can help by writing the FCC.

Bracewell Proposes Spinning Infrared Interferometer for Detection of Planets

In a recent report Professor Ronald Bracewell of Stanford University has proposed using an interferometer operating at infrared wavelengths so deployed that a null of its response pattern would be held on a target star while the interferometer rotated, allowing its response pattern to sweep the regions around the star for planets. Although stars with planetary systems may be common in the galaxy there is no incontrovertible evidence yet of any planetary systems save our own.

The interferometer might consist of two one-meter mirrors with a separation or baseline of about 8 meters.

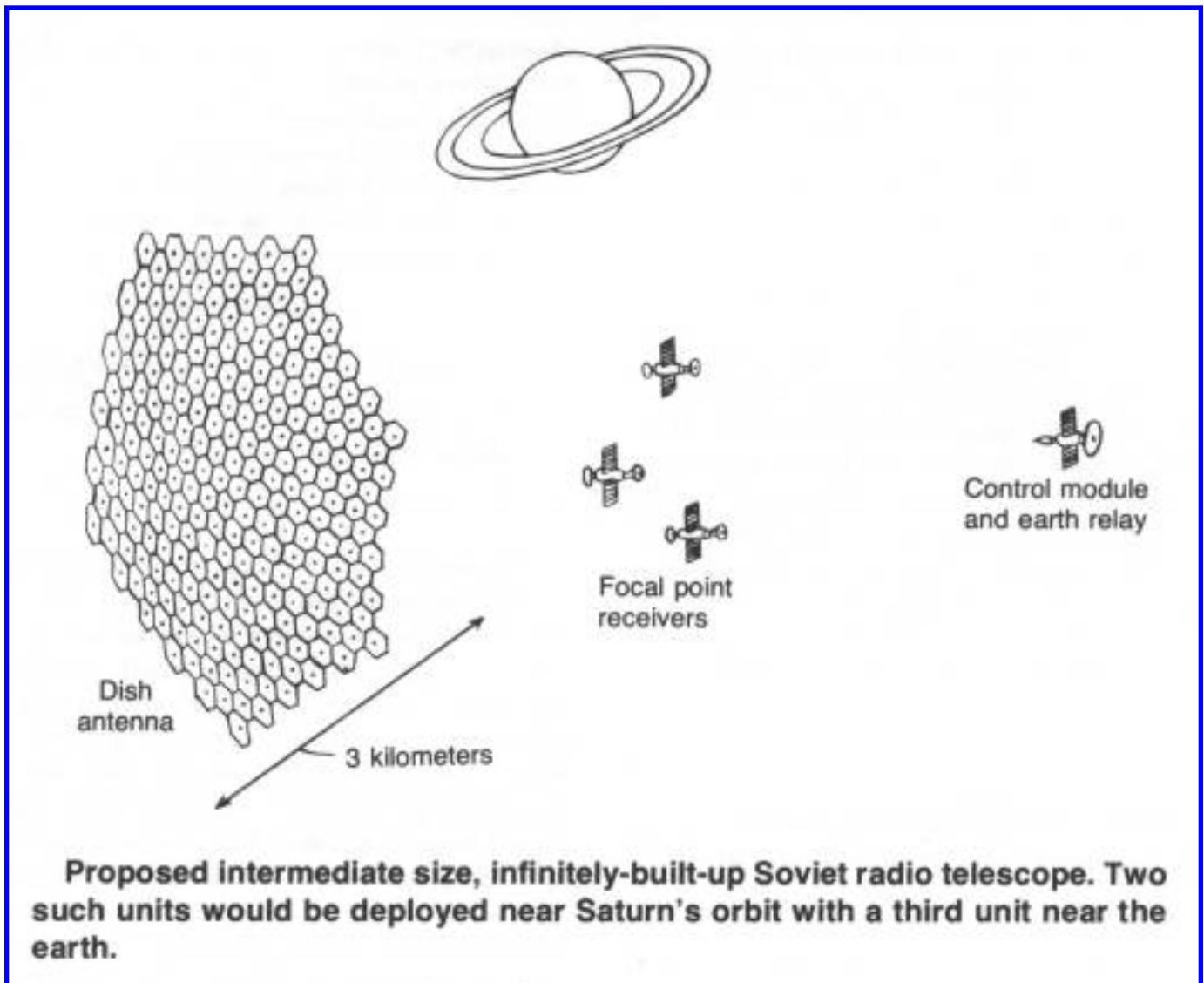
A basic problem in detecting a planet is that the star it is orbiting will be enormously brighter. It's like trying to see a firefly next to an automobile headlight from a distance of several kilometers. Bracewell's proposal enhances the probability of detecting a planet because (1) the planet, being cooler than the star, is relatively stronger in the infrared than in visible light and (2) the star's effect is minimized by placing it in a null or blind spot of the interferometer.

Holography or 3-Dimensional Mapping of Entire Universe Possible with Bold Soviet Concept for Space Telescope

In a recent report of the Academy of Sciences of the USSR's Space Research Institute, 23 Soviet scientists including N.S. Kardashev and I.S. Shklovsky, have proposed a radio telescope of remarkable characteristics. The report entitled the "Infinitely Built-Up Space Radio Telescope" envisions telescopes up to 10 kilometers in diameter assembled from many smaller modules of 200 meter diameter. The problems of delivering, assembling and aligning the modules in orbit are discussed. It is further proposed that two or more such telescopes be arrayed as

an interferometer with a 20 astronomical unit baseline. This would involve placing the telescopes at approximately the orbit of Saturn. With such an interferometer operating at wavelengths of a few centimeters the entire universe lies within what is called the "near-field" or "Fresnel zone" of the antenna. What this means is that, in principle, it would be possible to determine the distance, size and shape of every observable object in the universe, producing holographic or 3-dimensional figures of the entire cosmos. This proposal is a bold concept which indicates that radio astronomers are still far from the end of their tether.

The authors of the report point out that such a system could also be used to advantage for the detection of extraterrestrial civilizations (SETI). For example, planets the size of the earth could be detected from their thermal radiation alone at distances of 100 light years and planets like Jupiter at 1000 light years. Artificial radiation might be detected at much greater distances, possibly bringing millions of planets within range.



Davies Suggests That Civilizations Might Live Longer by Harnessing a Black Hole

In a recent book "The Runaway Universe," Dr. Paul Davies of King's College, London, considers how a super-technology might "tame" a black hole to supply the energy needed to extend its lifetime over periods much longer than enjoyed by the stars. In fact, "the epoch of the stars may come to be regarded by these extraordinary inhabitants of the future as merely a primeval phase — a brief interlude at the dawn of history."

Space Solar Power Stations and SETI

To harness the sun's power it has been proposed that space stations with huge solar panels be placed in orbit. Far above the earth's atmosphere, they could gather energy regardless of cloud conditions. The energy collected would be converted into microwaves, beamed to the earth, gathered by big antennas, reconverted to ordinary 60 hertz electrical power and fed into existing power distribution systems. The orbiting collecting panels of a space station might be many square miles in area with even larger receiving antennas covering hundreds of square miles on the earth.

Opponents of the system point out that, aside from the enormous cost running into tens of billions of dollars, the scheme would make our already big, centralized bureaucratic power system even more unwieldy and even more vulnerable to massive disruptions from mechanical or electrical failures, sabotage or enemy action. How much atmospheric heating would the microwave beam produce and would this heating have undesirable effects? Would plant and animal (including human) life at or in the vicinity of the earth antennas be adversely affected? And might a whole city get fried if the microwave beam were accidentally misdirected? Quantitative answers are needed to these questions.

Radio astronomers and SETI observers are concerned because all satellite transmitters are potential sources of interference of the worst kind since they can beam directly down into the super-sensitive earth-based telescopes. It is bad enough to have transmitters of 1, 10 or even 100 watts power on such satellites but the millions and billions of watts from a space power station could be devastating.

An alternative approach to harnessing the sun's power is to have large numbers of moderate-sized ground based solar and wind collectors associated with single factories, buildings and individual homes resulting in a highly decentralized arrangement. This approach would be much less vulnerable overall because it would be ground-based, power transmission over long distances would be reduced or eliminated and collecting units would be widely dispersed. It is argued that the decentralized approach could result in the development of many new businesses and a stimulus for older ones over a wide spectrum of technologies. It is pointed out that solar power is already distributed world wide to everyone's doorstep free at the level of 4 million watts per acre (perpendicular to the sun). Efficient collection

and storage are considered no greater problems than the collection, conversion to microwaves, transmission of microwaves, their collection, reconversion and further transmission in the case of the space collector concept.

The space collector approach is being promoted by the Sunsat Energy Council, representing a group of aerospace firms and other organizations. Hearings were held before a U.S. House of Representatives science subcommittee in May, 1978 on a bill to authorize the expenditure of \$25 million on the concept during the next fiscal year.

Quote from Eric Burgess (*Space Age Review*)

"If we do find extraterrestrial civilizations we will find that they have probably broken away from all our traditional ways of doing things if they have managed to survive through the nuclear age.

"If we don't break with our traditions, we are not going to survive. We are coming to a very critical point in our development where we either do something or perish." Eric Burgess in *Space Age Review*.

[HOME](#)

Copyright © 1979-2005 Big Ear Radio Observatory, North American AstroPhysical Observatory (NAAPO), and Cosmic Quest, Inc.

Designed by Jerry Ehman.

Last modified: August 31, 2005.