SearchLites

Vol. 5 No. 3, Summer 1999

The Quarterly Journal of The SETI League, Inc.

Offices:
433 Liberty Street
PO Box 555
Little Ferry NJ
07643 USA

Phone:
(201) 641-1770

Facsimile:
(201) 641-1771

Email:
info@setileague.org

Web:
www.setileague.org

Introducing: Our 1999 Bruno Award Winner

At its Annual Membership Meeting in March, The SETI League, Inc. awarded its highest honor to an Australian radio ham who has been a pioneer in the amateur search for intelligent life in space. Noel Cedric Welstead, callsign VK4AYW, received the coveted Giordano Bruno Memorial Award for contributions to amateur radio astronomy.

Welstead is credited with building the first amateur SETI observatory in Australia (and probably the first such station in the Southern Hemisphere). He volunteered early on to serve as The SETI League's regional coordinator for eastern Australia. In that capacity he has given numerous radio, television and newspaper interviews, spoken about SETI at civic organizations, and hosted a SETI League wine-and-cheese reception at the January 1998 "SETI in the 21st Century" Conference at the University of Western Sydney, Macarthur. He also most generously hosted The SETI League's executive director, who visited Australia to present an invited paper at that Conference.

Noel was the first amateur radio astronomer to observe and report the phenomenon which Project Phoenix scientist Dr. Jill Tarter has dubbed "wigglers," and was the leader of The SETI League team which first traced their origin to computer-generated radio frequency interference. He founded the SETI Research and Community Development Institute, an Australian nonprofit corporation dedicated to coordinating amateur SETI activity in his region, and has developed a most impressive Australian SETI website, at http://www.seti.org.au. One of that organization's first accomplishments was to secure the donation from the Commonwealth Scientific & Industrial Research Organization (CSIRO) of a surplus sixty-foot radio telescope, which is now being prepared for amateur SETI use.

The SETI League established its annual achievement award in memory of Giordano Bruno, the Italian monk burned at the stake in 1600 for postulating the multiplicity of inhabited worlds. This award was first suggested by sociologist Donald Tarter, at a SETI dinner held at the American Association for the Advancement of Science meetings in Atlanta on Feb. 17, 1995 (coincidentally the 395th anniversary of Bruno's death). Previous Bruno recipients include Dr. D. Kent Cullers (WA6TWX), Daniel Boyd Fox (KF9ET), Trevor Unsworth (G0ECP), and Ken Chattenton (G4KIR). Nominations for the next Bruno award are due at SETI League headquarters by 31 December 1999. ❖

Dr. SETI Visits Vancouver

SETI League executive director Dr. H. Paul Shuch, popularly known as Dr. SETI, is traveling to British Columbia, Canada, this month to help launch a new exhibit at Science World, 1455 Quebec Street, Vancouver BC V6A 3Z7. His 18 May 1999 presentation "Searching for Life Among the Stars" will kick off *The Why Files*, Science World's summer exhibit exploring the fact and fantasy behind our fascination with extra-terrestrial life.

"Science World is pleased to present both a speculative exhibition about the investigation of the unknown and mysterious, and Dr. Shuch's factual presentation on how science is searching for evidence of other civilizations," states Dr. Sandra Eix, the curator of *The Why Files*.

In addition to various activities scheduled exclusively for the science centre's members, Science World will host a regional SETI League meeting from 7 to 9 PM on 17 May 1999. Planned primarily for SETI League members and their guests, this meeting is also open to all interested print, web, and broadcast journalists. Additionally, Dr. Shuch will be available for press interviews throughout the 17th and 18th of May . Media contacts are being coordinated by Gillian Lunde, Science World's Manager for Marketing and Communications. She can be reached by telephone at (604) 443-7470, or by email to glunde@scienceworld.bc.ca. ❖

Guest Editorial:

Might Dinosaurs Have Achieved Space Travel?

by Bruce Cornet, Ph.D.
(bcornet@monmouth.com)

There has been much speculation within the SETI community as to whether dinosaurs might have evolved into a space-faring civilization, had they not been (in the words of SETI League member Al Aburto) "flattened by a stray mountain that Jupiter failed to grab in time."

As an evolutionary biologist who has studied both plant evolution (paleobotany) and animal evolution (vertebrate paleontology) for most of his professional career (25 years), I have followed closely those paleontologists who are interested in dinosaurian evolution. I have watched various scientists debate whether the dinosaurs walked upright or walked like crocodiles; whether they were cold-blooded or warm-blooded, or something in between; and whether or not birds evolved from dinosaurs. Until recent discoveries in Spain and China, there was insufficient evidence to support the nay sayers or the yea sayers regarding the avian/dinosaurian connection. The new discoveries are discussed in a well-illustrated article in National Geographic (July, 1998), called "Dinosaurs take wing, the origin of birds." The new discoveries do a lot for the skeptics, who must now eat humble pie. They also teach us the perils of speculation and skepticism based on too little data.

On the subject of whether or not the dinosaurs would have been 20 million years ahead of us in space exploration, had they evolved into sentient intelligent technological beings such as ourselves, it is noteworthy that the dinosaurs are not extinct, they are not as advanced as us, and they are feathered! That does not mean that our favorite giants such as Tyrannosaurus survived in feathered disguise (although some paleontologists think that close relatives may have), but rather that some members of the Dinosauria did things differently.

The fossil record is very fickle in yielding up its secrets. After their big brothers became extinct, the winged survivors successfully competed with mammals over the past 65 million years. What may have led us to learn how to fly using technology was them, because they were ahead of us in that skill. What prevented them from evolving into highly intelligent animals may have been limitations imposed on evolution due to specializations for flight. Flight gave them a convenient escape from predators, but flight also limited brain development through weight constraints, as well as tool use by the specialization of their front two appendages (however, there are some birds quite adept at using their feet to hold objects, and some of them have learned how to use sticks as tools). Land-dwelling mammals, on the other hand, had to outsmart their adversaries to survive, which placed evolutionary pressure on brain development.

Evolution is a funny thing. You can never predict its outcome, only its possible options given a set of environmental conditions and challenges. Had there survived bipedal dinosaurs which had not evolved feathers and flight capability, perhaps things would have been different. But in order for similar creatures to evolve on other planets, conditions probably would have to be very Earth-like. ❖

Standards of Proof for the Detection of Extra-Terrestrial Intelligence

by H. Paul Shuch, Ph.D. (email n6tx@setileague.org)
Executive Director, The SETI League, Inc.

Editor's Note: *The following are excerpts from an Invited Paper which Dr. Shuch is scheduled to present at the Sixth International BioAstronomy Conference, Kohala Coast, Hawaii, 2 - 6 August 1999. Conference details may be found on the Web at* http://www.ifa.hawaii.edu/~meech/bioast.

Abstract:

The privatization of SETI has resulted in global participation in signal detection and analysis activities by a wide range of nonprofessionals. The SETI community welcomes this grassroots support, every bit as much as the optical observing community honors the significant scientific contributions of the world's amateur astronomers. However, as SETI observatories spring up on college campuses and in home gardens worldwide, a need emerges for establishing rigorous signal verification protocols and stringent standards of proof.

SETI progress can be significantly hampered by both Type I and Type II experimental error. We recognize the possibility that overly rigorous verification standards can result in an unacceptably high incidence of false negatives. This risk must be balanced against the negative impact on SETI activities everywhere, should lax verification procedures result in the reporting of false positives. This paper proposes verification and reporting protocols that seek a middle ground.

A related problem is that nonprofessional involvement in SETI science increases the opportunity for the perpetration of hoaxes. The SETI League, Inc. has already been peripherally involved in three separate false claims of ETI contact. Such claims call for a prompt but measured response, so as not to subject the SETI community to charges of complicity in conspiracy or cover-up activities. We explore here the dilemma of encouraging grassroots participation while avoiding association with fraudulent and pseudoscientific claims.

Conclusion:

"When you have ruled out the impossible," Arthur Conan Doyle wrote in the voice of Sherlock Holmes, "whatever remains, no matter how unlikely, must be the truth." Above all else, this truth must pass the inter-ocular trauma test: when the proof we seek is so powerful as to hit us between the eyes, we can no longer deny it. No Government pronouncement is likely to pass this demanding test, as far as a skeptical public is concerned. But if a diverse, international group of laymen, working independently, can produce multiple, internally consistent observations, the world is most likely to accept that group's interpretation as reasonable. SETI continues to seek clear, unambiguous evidence, without even knowing for certain what form that evidence will take. We hope to stumble across the inescapable. Until then, we will continue to test the null hypothesis. ❖

SETI Today

by David Little (littled@clpgh.org)

Editor's Note: *This article is an excerpt from Mr. Little's planetarium show, "The Search For Life In The Universe," which premiered at the Henry Buhl, Jr. Planetarium and Observatory, Pittsburgh PA, in January, 1999.*

At the dawn of the 21st century, evidence points ever more strongly toward the possibility that life may have arisen in other locations in our Universe. But if this is true, and if other intelligent civilizations may have developed from that life, what is being done today to seek out these beings?

The acronym SETI stands for the Search for Extra Terrestrial Intelligence. The term was coined in the 1960's to describe the work of Drake and others using radio telescopes in the search for electromagnetic signals of possible alien origin. It is a growing science, and many schools and organizations have their own SETI programs.

One of the most prominent groups is called the SETI Institute. The group's project Phoenix was originally funded by the US government as the Targeted Search portion of NASA's High Resolution Microwave Survey. The HRMS was terminated by Congress due to budget pressures in October 1993. The SETI Institute is currently a privately funded organization that continues this work, checking individual stars for possible radio signals.

At least a half dozen other major SETI projects are underway around the globe, from New England to Australia. Some of the most interesting projects allow for the participation of amateur enthusiasts. For example, The SETI League is a grassroots organization that is made up of amateur radio astronomers and others from many walks of life, sharing the common belief that we are not alone. They spend their own time and resources to build radio telescopes for the purpose of listening to the stars.

Today The SETI League is taking steps to complete an all-sky survey. Their goal is to have at least 5,000 small dishes, used as radio telescopes, to give a complete view of the sky so that an elusive signal, if it comes, will not be missed.

1999 sees the launch of the latest search for life in the Universe. The SETI@home project is the most recent in a long list of search projects based out of the University of California, Berkeley. This project is unique in that it puts the search in the hands of anyone with a computer and a connection to the Internet. By downloading a special screen saver program, computers around the world will be accessing radio signal data received by the Arecibo Radio Telescope. The hope is that by combining the computing power of literally millions of computers, the chance of detecting a signal from space, however slim, would be greatly multiplied.

Most of these projects cover only a small portion of the sky or only a small portion of the radio spectrum. They point their radio telescopes at the stars and listen for signals that indicate the activity of alien cultures. The activity they are looking for could be the same type of stray radio signals that we ourselves have been sending into space for decades. Our earliest transmissions have now traveled nearly 64 light years away, over 10,000 stars fall within this distance from Earth. If anyone is living around one of those stars, they already know of our existence if they are listening.

Interestingly, the signals that SETI programs listen for don't really need to "say" anything - that is, they don't have to carry information. Some researchers are hoping that another civilization might use beacons for navigation, much as we do for ships on the ocean. A beacon is something that repeats and can be accurately tracked. SETI researchers have conducted what are called "targeted searches" looking for such beacons. This is accomplished by creating a list of candidate stars, much like our own Sun, and then surveying each of the stars individually looking for signs of intelligent life.

Over the years, dozens of searches have been conducted, but none of them have yielded conclusive results. They have searched hundreds of stars for brief periods of time at limited frequencies. However, with more than 200 billion stars in our galaxy alone and billions of galaxies in the universe, the search will continue long before we have been able to make a meaningful dent in the number of possible sources.

Part of the problem is that while you are looking at one star, a signal from another star could go by the Earth unnoticed. To pick up all signals would require the ability to listen to the whole sky at once. Most of the current SETI projects are far from this goal. With one radio telescope, only about one millionth of the sky can be seen at a time.

It has been said that to find one signal could require that your scope be aimed exactly at the source and, if the signal is sporadic, you would have to be aimed at it at just the right time to get the message. Under such circumstances your chances of success are the same as walking into the Library of Congress blindfolded and picking out exactly the book that you wanted.

If the odds are so great against success, why is anyone even looking at all? Most SETI researchers point out that success, no matter how slim the chances may be, would have a profound impact on the human race; and they are quick to point out that if we do not look, then the chances of success are exactly zero.

Just as the ancient mariners set sail into uncharted waters in search of new land, we hope that the promise of contact with another civilization will broaden our horizons of scientific understanding. The search for life in the Universe is as great a challenge as has ever faced humankind. Recent developments and discoveries in this field are what ignite our hope and push us on, but the goal is elusive.

Will ours be the generation to first see the ships? Will ours be the generation who first hears the signals? Will ours be the generation to become ambassadors to the Universe? Until the final answer comes, we watch...we listen...and we wait.

It has been said that "we are made of starstuff." The matter that was once a part of another star is now a part of you and me. The web that binds us to the stars may be the thread that keeps us longing to answer this riddle. The thrill is akin to seeking buried treasure...the question we ask is not if, but when? And while we wait for that first contact we stand face-to-face with the Universe, nightly pondering the existence of other beings on other worlds. As you sit beneath the vault of the heavens, imagine another creature standing beneath the stars of its own world, pondering the vastness of space and asking the question..."Are we alone in the Universe?" ❖

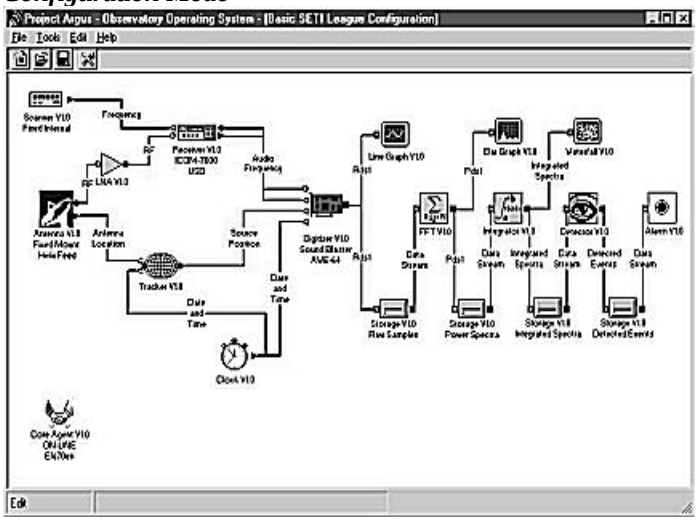
Software Page

Project Argus Observatory Operating System

PAOOS is a Windows 95/98/NT based program designed for the collection and submission of data collected by Argus Observatories. PAOOS executes at each of the Argus Antenna Network sites and interfaces the site with the ArgusCore.

PAOOS execution is divided into two district modes, Configuration Mode and Run Mode. Configuration Mode provides the operator with the ability to structure the data collection process. This includes the adding and removal of processing modules and module connections. In Run Mode PAOOS collects data and displays the status of the Observatory including graphic representations of the data being processed.

Configuration Mode



The first release of PAOOS includes the following modules:

- Antenna V1.0 Fixed Position Antenna
- LNA V1.0 Virtual LNA Included to capture the gain and noise figure of the amplifier used
- Receiver V1.0 Serial RS-232 Interface to the ICOM Series of Receivers
- Digitizer V1.0 Sound Blaster or Compatible Wave Device Interface. 8-bit, 8KHz Sampling
- Scanner V1.0 Fixed interval receiver frequency selector.
- Clock V1.0 Standard PC clock
- Tracker V1.0 Calculates right ascension and declination given antenna and clock input
- Storage V1.0 ODBC Compliant Data Storage Unit.
- Transformer V1.0 Standard Floating Point FFT
- Integrator V1.0 Standard Integrator
- Line Graph V1.0 Line format graph, used primarily for viewing digitizer output
- Histogram V1.0 Histogram or bar chart, used primarily for viewing the output of the FFT
- Waterfall V1.0 Standard waterfall display, used for viewing the output of the FFT or integrator
- Detector V1.0 Standard mean deviation detector
- Agent V1.0 Client interface to the ArgusCore

The Configuration Mode screen at left shows a series of line connections between module ports. Module connections are initiated by clicking on the output port (solid square, triangle, or circle) and completed by dragging the connection to the destination module input port (open square, triangle, or circle). Backward connections are not currently supported but expected in the next release. The first release of PAOOS supports the following types of module ports:

Analog Port Analog signal connections shown for reference purposes only. Shown as an open or closed circle.

Command Port Command level information (i.e., date and time, frequency selects). Shown as an open or closed triangle.

Block Data Port Complex data structure connections (i.e., raw data samples, power spectra, integrated spectra and detected events). Shown as an open or closed square.

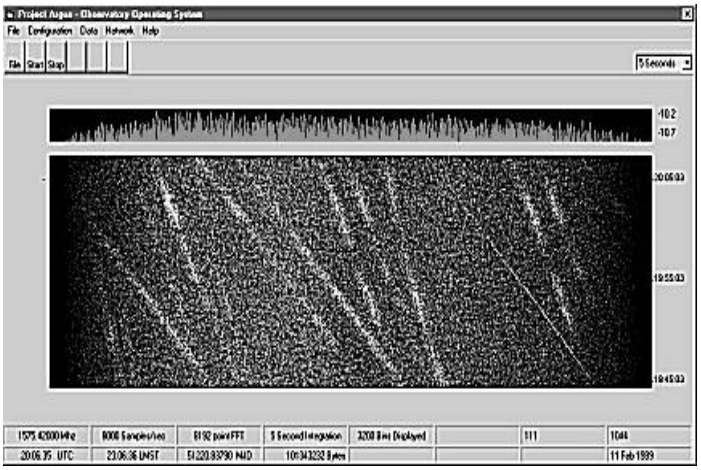
Once a configuration has been completed, data collection may be initiated by selecting the "Tools | Run" menu option or by clicking on the equivalent toolbar icon.

Run Mode

In Run Mode, PAOOS displays a series of status panels, one for each module included in the configuration. The status panel contains the module number and name along with various fixed and variable fields. For example, the Clock module displays Local Date and Time, Local Sidereal Time, UTC Date and Time, UTC Sidereal Time, and Julian Date. Options are provided to enable or disable the display of the status panels.

Also included in the Run Mode display are any graphic representations added to the configuration. For example, the user can display a bar chart representation of the current power spectrum along with a waterfall display of the integrated spectra over time.

The Run Mode image shown below is an example of data collected from the GPS Band. It clearly shows signals from several different satellites.



Editor's Note: As this is being written, the PAOOS software suite is undergoing preliminary testing by a small group of Project Argus volunteers. The completed PAOOS suite is envisioned as "workware," with the first release to be distributed free of charge to all registered and fully participating Project Argus stations, as determined at the discretion of The SETI League, Inc. This software is Copyright © 1999 by SETI League members Brian Adam and R.J. Fear, who retain all rights to the code. ❖

Hardware Page

SETI Receivers: Internal or External?

by Milan Hudecek, Managing Director
WiNRADiO Communications

WiNRADiO Communications manufactures a range of internal and external PC-based VHF/UHF receivers. Either approach (internal or external) seems to have its own advantages and disadvantages. But which type is more susceptible to noise?

On the surface of it, it would appear that internal cards must be more prone to PC-generated interference because they reside inside a PC. In practice, however, the issue is a little more complex.

Most PC-based receivers, such as WiNRADiO, are very well shielded against directly radiated interference. Most of the noise generated by the PC enters the receiver by conduction to the antenna, especially if the antenna is unbalanced or not properly decoupled from common mode feedline currents. Noise can be also injected into the ground loop formed by the power leads, which then radiates back to the antenna.

The biggest culprit in computer-generated interference is nearly always the monitor. Because an internal receiver card resides inside the metal box of a PC, one could almost say that it is actually better shielded from PC-generated RFI than an external receiver!

It is also worth remembering that an external receiver also needs an external power adapter, so it is more prone to ground-loop earthing problems.

After having sold several thousand units of both types, judging from the feedback we are receiving from customers, it would appear that there is no real practical difference between the internal or external models in terms of susceptibility to PC-generated noise. What really does matter are the details of the user's overall system - in particular, earthing, power supply filtering, antenna placement and its impedance matching to the receiver.

We recommend observing good RF engineering practices when installing the antenna and feedline. (One useful practical trick is to wrap 10-15 turns of the feedline through a large toroid located at the receiver end of the feedline.)

If you are using an external receiver, be mindful of the potential noise generated by the AC plug pack, which is usually included with the unit by the manufacturer (we do include multivoltage adapters as a standard accessory with all our external receivers). These are usually mass produced low-cost switching units, which need to meet (at least) FCC, UL and CE specifications. But there is a difference between meeting specifications and being "noise-free" enough to suit weak signal applications. We do recommend replacing these power supplies with traditional linear ones - although much larger, heavier and more expensive, at least one potential source of noise is easily removed!

In any case, no matter what receiver you use, do spend some time experimenting with good RF filtering placed between the PC power inlet and the mains. A little time and effort invested here usually helps greatly to reduce noise caused by those nasty ground loops. ❖

A Quad-Helix Antenna For Hydrogen Line SETI

by William H. Black, K4BSN (k4bsn@bellsouth.net)

While reading the Winter 1999 issue of SearchLites, I noted with interest the letter from SB, Winston-Salem, NC, asking about using the small 16" dishes for SETI. The writer did not mention what frequencies he wanted to use, but he obviously has a space/restriction problem, as do many others who are interested in the SETI search program.

Recent progress in building my ARGUS station has produced an antenna which provides a realistic and formidable possibility for those observers who want to develop a SETI monitoring station, but are hampered by space, covenants, restrictions, etc. I started building my station early this year, but I have since moved to a house where I have two acres of land with no restrictions, and I recently acquired a brand new Paraclipse Classic 12 dish from a dealer who apparently waited too late to unload it at its retail price.

The helix quad antenna is shown on The SETI League's website. I purchased the individual helix elements from Olde Antenna Lab, and built them into the quad structure shown on the web. The antenna is available as a pre-built quad, eliminating the need for the power divider. I got the single helix elements because of an interest in experimenting with an interferometer.

The size of the helix quad is 21" X 21" X 27", about one fourth of a cubic yard. According to specs provided, each helix has a nominal gain of 18 dB, so the quad has a gain of around 24 dB at 1420 MHz. That is a very usable antenna, and occupies about the volume of a medium-sized TV set. The helix elements can be purchased with fewer turns for an even smaller structure, but with less gain.

I know there is nothing here that isn't old hat to many of our members, but I also feel very strongly that anybody who has the basic technical requisites can, despite space/covenant limitations, get a station up and running with this type of antenna. It is a great way to get started, and can be developed into a larger antenna system when/if more space becomes available. ❖

Disabling AGC in the Icom R-7000

by Randy Stegemeyer (email hamradio@oz.net)

I'm using an older Icom R-7000 receiver in my SETI station and desired to disable its Automatic Gain Control (AGC) circuit, so as to maximize its sensitivity. I did so by cutting the top lead of R-115 on the IF board. This resistor is in the base lead to transistor Q18, which is the AGC amplifier. With this resistor opened, no voltage from the AGC rectifier diode D28 can reach Q18, so it never attempts to lower the gain of the receiver. After you take the top cover off, and facing the front of the receiver, R-115 is located about 5 inches from the left side of the receiver and about 4 inches from the front. It's plainly marked and is standing on end. The lead coming out of the top is easy to clip and easy to solder back if you need to. I never use my R-7000 in AM mode for anything other than radio astronomy, so I did not add a switch for turning it on and off, but it would be a simple matter to do so. ❖

A SETI Dialog

The following questions were posed to SETI League executive director H. Paul Shuch, by Manchester University's Prof. Ian Morison, coordinator of SETI activities at the Nuffield Radio Astronomy Laboratories, Jodrell Bank.

Prof. Morison: Do you believe there is intelligent life in the universe?

Dr. Shuch: That's a fundamental question which has haunted humankind since first we realized that the points of light in the night sky are other suns. What matters most is not what you or I believe, but what we know for certain: that, for the first time in human history, we have the technology to begin to seek a definitive answer. Therefore, it behooves us to look, and look well.

Prof. Morison: What do you think your chances are of discovering extra-terrestrial intelligence?

Dr. Shuch: My personal chances of making The Discovery are so low as to approach zero. However, if our assumptions about the abundance of technological life throughout the cosmos are correct, and if our planet dedicates only a minor portion of its resources to The Search, the chances of eventual success become significant. It's not a question of if, only of when.

Prof. Morison: How do you imagine such a discovery would change humankind?

Dr. Shuch: Even though we share our starship with six thousand million fellow travelers, Earth is a lonely place. Perhaps certain knowledge about our cosmic companions would make it a little less lonely.

Prof. Morison: Would any extra-terrestrial civilisation be aware of our presence?

Dr. Shuch: Ours is an environmentally careless civilization. We have surrounded our planet with a sphere of electromagnetic pollution, now extending out to perhaps 50 or 60 LY. That pollution sphere, clearly detectable over interstellar distances, is expanding ever outward at the speed of light. Since the photon is the fastest spaceship known to man, our radio pollution has already marked ours as a planet inhabited by tool-using beings. Unfortunately, it has also marked us as wasteful and inconsiderate. Let us hope we don't come to regret sending out that calling card. On the other hand, SETI is counting on the premise that other civilizations also engage in electromagnetic pollution, at least somewhere along their continuum of technological development.

Prof. Morison: Can you give some idea, in layman's terms, what kind of signals you could possibly detect? For example, how close would ET civilisations have to be in order for us to detect signals like TV transmissions?

Dr. Shuch: The most powerful electromagnetic emissions sent from Earth have probably been our old Cold War search radars. We have the technology right now to detect such signals from planets orbiting nearby stars. But an extra-terrestrial civilization need not be warlike to emit detectable radar signals. We can envision other beings using powerful radar signals to seek out asteroids and comets which might pose a threat to life on their planets. And those signals, too, would be visible to us, if we just know how to search for them.

Prof. Morison: In simple terms, how does your equipment work and what makes it unique?

Dr. Shuch: Most SETI programs, including Project Phoenix, rightly use the world's great radio telescopes (such as the Lovell Telescope at Jodrell Bank) to target individual candidate stars. The SETI League, on the other hand, has adopted a radically different strategy. We are building a global network of thousands of rather small, relatively inexpensive (and admittedly insensitive) amateur radio telescopes, hoping to make up in strength of numbers what we lack in funding.

Prof. Morison: Where are you looking for ET civilisations and why?

Dr. Shuch: Project Phoenix, in which you are involved, is already doing an outstanding job surveying the nearest sun-like stars. The SETI League is conducting an all-sky survey, a technique which we hope will be complementary to the targeted searches. If extra-terrestrial radio signals are incredibly powerful, yet highly intermittent and of brief duration, our strategy stands a chance of success.

Prof. Morison: Why do you believe SETI research is important, to you personally and to humankind in general?

Dr. Shuch: Those of us in SETI today have been given a priceless gift: the technological heritage of those who went before us. To squander such a gift would be unseemly. Newton said he saw further because he stood on the shoulders of giants. SETI stands on the shoulders of ordinary people. If we succeed, we are all giants!

Event Horizon

*** = SETI League participation confirmed**

May 14 - 16, 1999: *Dayton Hamvention*, Dayton OH.
*** May 17, 1999:** *SETI League Regional Meeting*, Science World, Vancouver BC Canada.
*** May 18, 1999:** Opening of *UFOs: The Why Files*, Science World, Vancouver BC Canada.
July 1 - 7, 1999: *Partners in Astronomy*, University of Toronto, Canada.
*** July 11 - 14, 1999:** *Society of Amateur Radio Astronomers*, NRAO Green Bank WV.
*** July 22 - 25, 1999:** *Central States VHF Conf.*, Cedar Rapids IA.
*** August 2 - 6, 1999:** *6th BioAstronomy Conf.*, Kohala Coast HI.
September 2 - 6, 1999: *Aussiecon Three* / 1999 Worldcon, Melbourne Australia.
*** October 8 - 10, 1999:** *AMSAT Space Symposium*, San Diego CA.
*** October 21 - 23, 1999:** *Microwave Update*, Plano TX.
*** November 12 - 14, 1999:** *Philcon '99*, Philadelphia PA.
*** March 26, 2000:** *SETI League Annual Meeting*, Little Ferry NJ.
*** April 21 - 23,2000:** *Balticon 34*, Baltimore MD.
May 12 - 14, 2000: *ARRL National Convention* and *Dayton Hamvention*, Dayton OH.
July 20 - 23, 2000: *Central States VHF Conference*, Winnipeg Manitoba.
August 7 - 19, 2000: *XXIVth International Astronomical Union General Assembly*, Manchester University, UK.
August 31 - September 4, 2000: *Chicon 2000* World Science Fiction Convention, Chicago IL.
September 9 - 10, 2000: *European Radio Astronomy Club Second International Convention*, Heppenheim, Germany.
*** February 12 - 14, 2001:** *OSETI III Conference*, San Jose CA.
*** August 30 - September 3, 2001:** *Millennium Philcon* World Science Fiction Convention, Philadelphia PA. ❖

Ask Dr. SETI ®

Send your questions to Ask Dr. SETI, PO Box 555, Little Ferry NJ 07643, or email to askdrseti@setileague.org. Remember, he's not a *real* doctor (but rather, a Ph.D., the kind who actually has to work for a living!). For health questions, consult a competent medical professional.

Dear Dr. SETI:

Do you know how much the Iridium satellites will influence the amateur radio astronomy and SETI? I've learned that some radio observatories (in the north hemisphere) had signed agreements with Motorola. But, what will happen with those who work in the south, especially with the amateurs?

Rolando, Peru

The Doctor Responds:

I hate to cast a pall upon your amateur SETI activities, Rolando, but the situation is pretty bleak. Over the past two years Motorola launched an array of 66 Personal Communications System (PCS) satellites into low-earth orbit, to provide global telephone and internet access. These satellites, which became operational in September 1998, have downlinks in the 1621.25 to 1626.5 MHz band. Many radio astronomers observe the hydroxyl radical radiation line at 1610.6-1613.8 MHz, a segment internationally allocated to radio astronomy on a primary basis. These frequencies are used by astronomers to study the distribution of the hydroxyl radical, one of the most common interstellar molecules, enabling them to investigate a wide range of issues including the evaporation of comets and the birth and death of stars.

Even though Iridium does not actually violate the International Telecommunications Union allocations, it is entirely possible that radio astronomy activities around that frequency will be impacted by adjacent-channel interference. The agreement to which you refer was reached between the European Science Foundation (ESF) and Iridium LLC, operators of the Motorola satellites. A press release issued by ESF on 13 August 1998 states:

"The agreement signed by the ESF, on behalf of its associated Committee on Radio Astronomy Frequencies (CRAF), and Iridium LLC, is the result of six months of intense negotiations. Under its terms, Iridium guarantees Europe's radio astronomers 24 hours a day of 'unpolluted' observation time from 1 January 2006. Both parties are also committed to reaching a further agreement by 1 March 1999 on transitional arrangements, covering the number of hours each day during which Iridium unwanted emissions are to be restricted, and an agreed maximum interference level at other times, for the period 1 March 1999 to 31 December 2005. For the six months from Iridium's start-up in September 1998 until 1 March 1999, the satellite company has agreed to keep emission levels below harmful interference levels as requested by the radio astronomers. However, in practice, even these levels imply a concession by radio astronomers to satellite-enabled services as the sensitivity of current state-of-the art radio astronomy equipment would imply that they should be set considerably lower.

"In addition, under the terms of the agreement, both parties will continue to work together to find adequate and technically practical solutions for reducing both the out-of-band emissions of the Iridium satellite system and the susceptibility of radio astronomy equipment to these emissions."

After signing the agreement, ESF Secretary General, Professor Enric Banda commented: "This is an important agreement for radio astronomy and provides welcome guarantees. Radio astronomy, as a passive service, is uniquely vulnerable to radio interference, and CRAF's success in representing the interests of Europe's different radio astronomy observatories during these negotiations has, once again, demonstrated the value for Europe's scientific community of cooperation and of speaking with one voice."

He added: "The agreement also underlines the willingness of CRAF and Europe's radio astronomers to work constructively with the growing number of satellite-enabled companies to find sustainable technical solutions that will allow science and industry to continue to profitably coexist in space."

However, despite this agreement, interference from satellites remains an increasing threat to astronomy. "This is not an isolated problem," said Dr. Jim Cohen, CRAF's Chairman. "The number of cases of interference to radio astronomy from satellites is growing steadily. Unless the protection of radio astronomy is taken into account early in the design of new satellite systems, our science could face a difficult future."

Although this agreement appears to provide some relief to European radio astronomers, I see no such protection being proposed for the rest of the world. Satellite interference is not new to the SETI community. Radiation at 1575 MHz from the constellation of 24 Global Positioning System (GPS) satellites is a well-known pollutant in the water-hole spectrum. Fortunately, observations around the 1420 MHz hydrogen line, and the hydroxyl component around 1660 MHz, should not be affected by Iridium. As those are the two most popular frequencies for SETI, the impact on our own Project Argus search should be tolerable. However, Iridium is only the beginning, and other competing PCS satellite constellations are planned. Things can only get worse.

Dear Dr. SETI:

I know you are not a matchmaker. But if someone like myself, who is very interested in SETI, wanted to get to know someone of the opposite sex who is also a member and very interested in SETI, what would you suggest? How about some sort of SETI singles club?

Gary, Ohio

The Doctor Responds:

The SETI League is a membership-supported, nonprofit, educational and scientific organization. We offer many membership benefits and activities, but a singles club is clearly not one of them. You are, of course, free to join The SETI League, and to put out feelers to other members through our various membership communications channels (so long as you do not disrupt their primary mission).

If, however, you do find that compatible someone through The SETI League, please let us know -- it would be a first! ❖

SearchLites, Volume 5, Number 3, Summer 1999. *SearchLites*, ISSN 1096-5599, is the Quarterly Newsletter of **The SETI League, Inc**., a membership-supported, nonprofit [501(c)(3)], educational and scientific corporation, dedicated to the electromagnetic Search for Extra-Terrestrial Intelligence. All opinions expressed are those of the individual contributors.

The SETI League, Inc.
433 Liberty Street, PO Box 555, Little Ferry NJ 07643
Tel: (201) 641-1770; fax: (201) 641-1771
memberships: 1(800) TAU-SETI
email: info@setileague.org
Web -- http://www.setileague.org/

Pleased to Accept Credit Cards

The SETI League invites you to pay your membership dues and additional contributions via Visa or MasterCard. Please fill out the form below and return it with any order. We thank you for your ongoing support.

Circle One: Visa / MasterCard Exp._____/_____
Card Number:_____
Cardholder: _____
Address: _____
_____
Phone: _____ email:_____
Ham call: _____ URL:_____
Total Contribution (US Dollars):_____
Signature:_____
Today's date:_____

VISA MasterCard

The SETI League, Inc.
433 Liberty Street
PO Box 555
Little Ferry NJ
07643 USA

To:

Is this your **Last Issue?**
Check mailing label for expiration date.
Getting close? Renew your membership *now!*

Printed in the USA

Memberships Make Great Gifts!

Full Member	$50
Supporting Member (elderly, retired, or disabled)	$35
Scholarship Member (full-time students only)	$25
Household Member (same address as a Full Member)	$15
Household Life Member (same address as a Life Member)	$300
Life Member (until we make contact)	$1,000
Patron (priority use of The SETI League's radio telescope)	$10,000
Director (Patron membership plus seat on advisory board)	$100,000
Benefactor (a major radio telescope named for you)	$1,000,000

Except for Household Members and Household Life Members, all memberships include subscription to *SearchLites*, our quarterly newsletter.

Payments may be by US Dollars check payable through a US bank, or by Credit Card (see form at upper right).

Order Your Membership Premiums:

	(u)	(o)
T-shirts, specify M, L, or XL	$14	$17
Mouse pads	$ 5	$ 7
Pocket protectors	$ 3	$ 4
Buttons: "We're All Ears"	$ 2	$ 3
"We Know We're Not Alone"	$ 2	$ 3
"*Project Argus* Launch "	$ 2	$ 3
SETI League Technical Manual	$10	$13
Project Cyclops 2nd Printing	$20	$25
Sing a Song of SETI (Songbook)	$10	$13
SETI Nerd Gift Set (one each Mouse Pad, Pocket Protector, *Project Cyclops* and *Tech Manual*) at 20% Savings to Members Only:	$30	$40

The above recommended contributions include surface postage to (u) United States, or (o) other addresses.