

League Selects Name for All Sky Survey

LITTLE FERRY, NJ., August 30, 1995 -- The SETI League, Inc. has chosen "Project Argus" as the name for its upcoming radio Search for Extra-Terrestrial Intelligence. The project, which will eventually involve five thousand radio amateurs worldwide scanning the entire sky for signs of other technological cultures, is expected to kick off on Earth Day, April 21, 1996. The necessary equipment is currently under development at The SETI League's Little Ferry, NJ, laboratories.

"In 1971," comments SETI League Executive Director Dr. H. Paul Shuch, "the finest minds in radioastronomy met at Stanford University to design the ultimate SETI receiver. The result, originally dubbed Argus, grew into the Cyclops system. Unfortunately, its construction was never funded. In naming our search Project Argus, we are paying tribute to the finest radiotelescope never built."

"The name Argus," adds SETI League technical advisor Dr. Robert Dixon, "originated from the mythological guard-being that had 100 eyes and could look in all directions at once. This name was used for an omnidirectional, all-seeing antenna by Arthur Clarke in his novel *Imperial Earth* and by Carl Sagan in his novel *Contact*." Dixon, a longtime amateur radio operator (W8ERD), is Assistant Director of the Ohio State University Radio Observatory, and has for some time been designing an Argus-type radiotelescope for that institution. In addition to sharing the Argus name, he hopes to share technology with The SETI League.

SETI seeks to determine through scientific measurements whether humankind is alone in the universe. Congress terminated all of NASA's SETI funding in late 1993. Experimenters interested in participating in a privatized search, or citizens wishing to help support it, should contact The SETI League, Inc. membership hotline at 1(800) TAU-SETI. The SETI League, Inc. is a membership-supported, non-profit [501(c)(3)], educational and scientific corporation dedicated to the electromagnetic Search for Extra-Terrestrial Intelligence.



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Search*Lites*****

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Charter Membership Period Drawing to a Close

SETI supporters wishing to secure charter memberships in The SETI League, Inc. have only a few more weeks to act. Discounted (\$35) Charter memberships will be accepted only through midnight eastern time on December 31, 1995. The Full \$50 annual membership rate will go into effect with the new year. Current SETI League members are encouraged to inform their colleagues and associates about the impending deadline.

Members wishing to obtain a Charter Life membership may do so at a special discount, if they act before the end of the year. Charter Life membership conversion is now being offered for an additional tax-deductible contribution of \$700. Effective January 1st, the regular \$1000 Life membership rate will apply.

Response to our membership campaign has been most gratifying, with SETI enthusiasts joining us from 34 states and five countries. We are still in need of active members in the southern hemisphere, if our upcoming radio search is to achieve full sky coverage.

In Search of Alien Limericks

The late Dr. Isaac Asimov, noted scientist and writer, was a staunch proponent of a scientific Search for Extra-Terrestrial Intelligence (SETI). He was also an incurable limericist. The SETI League, Inc., a non-profit organization engaged in just such a search, is pleased to announce a Limerick Contest in Asimov's memory. The public is invited to submit limericks in the classical form, dealing with some aspect of extra-terrestrial research. Technical jargon, puns, and scientific inside jokes are encouraged. The contest period is open-ended, with the most interesting submissions to be published in this newsletter. Those whose limericks are selected will be rewarded with a coveted SETI League pocket protector.

Here's a sample SETI limerick to set the tone:

**There once was a little green man
Whose signal I happened to scan
On the Hydrogen Line.
This antenna of mine
Is fulfilling The SETI League's plan.**

Technical Feature

Indistinguishable From Magic

"Any sufficiently advanced technology," wrote science fiction giant Arthur C. Clarke some years ago, "is virtually indistinguishable from magic." This acknowledgment of our own technological immaturity has subsequently become known as Clarke's Law, and is one basis for Shklovskii's and Sagan's Assumption of Mediocrity which underlies so much SETI research. SETI League President Richard Factor has proposed an interesting corollary to Clarke's Law: "Any sufficiently advanced modulation scheme is virtually indistinguishable from noise."

At the recent Central States VHF Conference, NASA geophysicist Dr. Thomas A. Clark alluded to Factor's corollary in expressing a healthy skepticism as to the viability of SETI in general, and amateur SETI in particular. "How can we hope to detect them," Tom asked, "if we don't even know what form their signals might take?" He points to the primary use of the Water Hole frequencies by human civilization, spread-spectrum Global Positioning Satellites, and wonders whether technology such as ours could even detect such signals at a distance, let alone recognize them as being of intelligent origin.

Over the past few years Kent Britain of the North Texas Microwave Society has done quite a bit of analysis of spread-spectrum signals, especially with respect to their growing presence in the shared 33 cm amateur band. Proponents of wireless LANs in this part of the spectrum tout their inherent security. Kent questions these claims, and with good reason. He has demonstrated how, with simple components (filters, amplifiers and double-balanced mixers), the spreading signal can be canceled, effectively decoding spread-spectrum without the key. This being the case, what's the problem with detecting SETI signals?

The problem is that the signals with which Kent has been working are a known entity. They are unmistakably strong, and their general format is known to us *a priori*. None of this is true of the interstellar communications we hope to intercept. Perhaps Tom Clark is right -- there are just too many variables.

Might digital signal processing help? The primary DSP tool employed in SETI and elsewhere is the Fast Fourier Transform. It can dig coherent signals out of the noise, offering tens of dB of processing advantage. But to implement FFT in our computers, we must make some *a priori* assumptions about the nature of the signals being detected. Are these assumptions valid for SETI?

At Ohio State University, Professor Chuck Klein is working with an alternative to the Fourier Transform, the Karhunen-Loeve. An adaptive transform, the KLT makes no assumptions whatever about the nature of the signal being detected. In computer simulations, it appears to work well with all types of signals, particularly complex ones. Klein's work is yet another example of the type of breakthrough thinking which can not only make SETI viable, but which can spin off to practical applications we cannot begin to imagine. And that, after all, is a major justification for SETI, magic notwithstanding.

Component Watch

Hewlett-Packard GaAs MMICs

Those SETI League members interested in constructing their own microwave equipment should be aware of three Gallium Arsenide (GaAs) microcircuits developed by Hewlett-Packard Company, primarily for use in GPS, Personal Communications Service, and other wireless RF applications. These Monolithic Microwave Integrated Circuits (MMICs) are small, broadband gain blocks in plastic Surface Mount packages; are relatively low in noise, with 50 ohm input and output impedances.

Model MGA-87563 is a two-stage, low-noise RF amplifier MMIC, designed for use in the 0.5 to 4 GHz range at a nominal gain of 12.5 dB. MGA-86563 is a three-stage version, offering higher gain of typically 21.8 dB. Both components claim 1.6 dB noise figure, and can operate from +5VDC power supplies. Their SOT-363 surface mount package is quite small (requiring a magnifying glass and small tweezers for placement on printed circuit boards), and the leads are spaced only 0.026 inches apart, requiring great skill in soldering. A 25 watt, small grounded-tip soldering iron, temperature controlled at 650 degrees F, is recommended. You may also have to work under a ring-fluorescent magnifying lamp, and steady hands are a must. Nevertheless, these low-cost components are ideal as gain blocks in SETI receivers, or as preamps ahead of commercial receivers (see below).

The MGA-86576 is the same circuit as the MGA-86563, but encased in a 70-mil round ceramic Micro-X surface mount package. This MMIC is far easier to work with than the SOT-packaged devices, but is priced in the \$8.00 region. SETI League engineers have prototyped a Water Hole LNA with this device. The test circuit measured a flat 23 dB of gain from 1.2 to 1.7 GHz, with more than 40 dB reverse isolation and under 150 K noise temperature. VSWR is less than 2:1. This amplifier will be offered in kit and assembled form in the near future; stay tuned for further information.

Hardware Corner

ICOM 7000 Series Receivers

At this writing, work continues on the proposed SETI League Water Hole Converter Kit. Meanwhile members have been asking for recommendations of suitable off-the-shelf equipment. Here are some possibilities for those who just can't wait, or prefer not to roll their own.

The ICOM model 7000 is an all-mode, synthesized VHF and UHF receiver tuning 25 to 2000 MHz. The SETI League is currently using an ICOM 7000 in its demonstration station. This is the receiver which was recommended by NASA SETI scientist Dr. Kent Cullers (WA6TWX) a number of years ago as being ideal for ham SETI. It contains AM, NBFM, WBFM, USB and LSB detectors, with an audio output suitable for driving most any baseband Digital Signal Processor which the SETI enthusiast may care to employ. The model has been largely replaced by the model 7100, which boasts similar capabilities, except that reception of the 800 - 900 MHz cellular telephone band has been inhibited.

The ICOM 7100 is currently available from amateur radio equipment suppliers for around \$1700 US. Used ICOM 7000's are occasionally found at hamfests and electronics swapmeets. Because of its unrestricted frequency coverage, the 7000 is in great demand, often selling for a higher price than a new 7100. For further information about either of these receivers, contact ICOM America at (800) 872-4266.

Conference Calendar

SearchLites' readers are apprised of the following conferences at which SETI-related information will be presented. League members are invited to call headquarters at (201) 641-1770, or email info@setileague.org, to obtain further details. Members are also encouraged to send in information about upcoming events of which we may be unaware.

September 30, 1995: Mid-Atlantic VHF Conference, Hershaw PA, sponsored by Mt. Airy VHF Radio Club. Contact John Sorter, (610) 584-2489.

October 6 - 8, 1995: AMSAT Space Symposium, Orlando FL. Contact AMSAT Headquarters, (301) 589-6062.

October 27 - 29, 1995: Microwave Update '95, Arlington TX. Contact Kent Britain, (214) 660-2840.

November 17 - 19, 1995: Philcon '95, Philadelphia PA. Contact PSFS Hotline, (215) 957-4004, or email philcon@netaxs.com.

December 15 - 17, 1995: Winter Solstice Regional Gathering, Central Pennsylvania MENSA, Lancaster PA. Contact Muriel Hykes, (717) 321-6137.

January 12 - 14, 1996: Arisia '96, Boston MA. Contact (617) 371-6565, or email info@arisia.org.

January 31 - February 1, 1996: Second International Conference on Optical SETI, at Photonics West 1996, San Jose CA. Contact Dr. Guillermo A. Lemarchand, email lemar@seti.edu.ar; or Dr. Stuart A. Kingsley, email skingsle@magnus.acs.ohio-state.edu.

February 8 - 13, 1996: AAAS, Baltimore MD. Includes the Second Annual Bruno Dinner on February 10th. Contact Dr. Lori Marino, email lmario@biology.emory.edu.

March 15 - 17, 1996: Lunacon '96, Rye Brook NY. Contact lunacon@lunacon.org.

April 5 - 7, 1996: Balticon XXX, Baltimore MD. Contact (410) JOE-BSFS, or email bsfs@access.digex.net.

May 17 - 19, 1996: Dayton Hamvention, Dayton OH. Contact Tom Holmes, Forman Chairman, (513) 667-5990.

May 23 - 27, 1996: International Space Development Conference, New York NY. Contact Greg Zsidisin, email 71055.2110@compuserve.com.

July 1 - 5, 1996: Fifth International Bioastronomy Symposium, Capri Italy. Contact Dr. Dan Werthimer, email danw@ssl.berkeley.edu.

August 29 - September 2, 1996: L.A. Con III / 1996 Worldcon, Anaheim CA. Contact info@lacon3.wsfs.org.

August 28 - September 1, 1997: Lonestarcon 2 / 1997 Worldcon, San Antonio TX. Contact isc2@io.com.

August 5 - 9, 1998: Bucconeer / 1998 Worldcon, Baltimore MD. Contact baltimore98@access.digex.net.

Editorial

The Knowledgeable Layman

by H. Paul Shuch, Executive Director

At a recent conference in Glasgow, I had the honor (no, make that honour) of sharing the podium with one Martyn Fogg, a gentleman previously known to me only by reputation. And reputation can be deceiving. I had rather expected Fogg, a preeminent authority on terraforming and author of the first college textbook on the subject [*Terraforming - Engineering Planetary Environments*, 1995, SAE, ISBN 1-56091-609-5] to be a bent and graying, stodgy and stuffy Cambridge don. Instead, I found myself greeted by a young, witty, dynamic (though somewhat shy) and nerdy enthusiast. But that wasn't the only surprise. Martyn, it turns out, is not an astronomer, astrophysicist or engineer by trade. Rather, he is . . . a dentist!

How does someone with no advanced degrees in the physical sciences establish himself at the forefront of SETI research? How can a dentist survive the peer review process, his articles gracing the pages of such respected, juried publications as the *Journal of the British Interplanetary Society*? If I had the answers to those questions, I'd bottle and sell them. Instead, I can only observe, somewhat incredulously, that it can and does happen.

Every few days I receive letters, or email, from enthusiastic SETI supporters wishing to make a technical contribution. Often they say "I'd like to take part in your sky survey, but I have no formal background in astronomy" (or microwave, or physics, or whatever). "Can I still participate?" My stock answer has been, "they also serve who merely pay their dues." After meeting Martyn Fogg, I'm reassessing that answer.

The SETI enterprise is, by its very nature, highly interdisciplinary. The seven factors of the Drake equation encompass knowledge (or ignorance) of astronomy, physics, chemistry, biology, philosophy, psychology, sociology. Although those of us with background in a particular discipline tend to believe that ours are the specific skills crucial to SETI success, in truth the specific requirements of the search are no more precisely known than is the solution to Drake's equation. The crucial element may well be described as a sense of wonder. Though some of us will continue to trod the known path, we seek others, newcomers who will approach problems from the novel perspective of the knowledgeable layman.

SETI will succeed or fail on the strength of its support base. This is true economically, but also intellectually. We need participants from a wide variety of disciplines. The next major breakthrough, whatever it may encompass, will likely be made not by the radioastronomer, but rather by the butcher, the baker, the candlestick maker. Or even the knowledgeable dentist.

SETI League Members Note:

SearchLites is your newsletter. Letters, guest editorials and technical contributions from members are always welcome. Please share your thoughts and experiences.

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Who's Who in The SETI League

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To:

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SETI League Memberships Make Great Gifts!

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Scholarship Member (full-time students only)	\$25
Charter Member (must be received before 1/1/1996)	\$35
Full Member	\$50
Life Member (until we make contact)	\$1,000
Patron (priority use of The SETI League's radiotelescope)	\$10,000
Director (Patron membership plus seat on advisory board)	\$100,000
Benefactor (a major radiotelescope named for you)	\$1,000,000

Payment in U.S. Dollar Checks only, please

Just in time for the holidays: Display The SETI League Logo

	(u)	(o)
T-shirts, specify M, L, or XL	\$14	\$16
Coffee mugs	\$ 6	\$ 8
Pocket protectors	\$2.50	\$ 3
Buttons:		
"We're All Ears"	\$1.50	\$ 2
"We Know We're Not Alone"	\$1.50	\$ 2

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 (u) United States addresses, or (o) other addresses.
 New Jersey residents please add 6% sales tax.