

SETI League Extends Director's Contract

LITTLE FERRY, NJ., May 3, 1997 -- The non-profit SETI League, Inc., leaders in a scientific Search for Extra-Terrestrial Intelligence, today executed a five-year agreement whereby engineering professor and radio astronomer H. Paul Shuch will continue as the group's Executive Director. Currently heading the science non-profit organization in his second year of a one-year sabbatical, Dr. Shuch was scheduled to return this Fall to his teaching duties at the Pennsylvania College of Technology. Now, thanks in part to strong membership support, the SETI League's Board of Trustees is in a position to seek long-term leadership, according to president Richard Factor.

"Paul's vision has guided The SETI League since its inception," says Factor. "He conceived our *Project Argus* search of the heavens, defined our goals and objectives, built up our membership base, and heads our engineering efforts. We are pleased that he will be staying with us to see some of his dreams through to fruition."

Under the newly signed contract, Dr. Shuch will be resigning his academic post effective 15 August 1997, to devote his full energies to SETI. "This has not been an easy decision for me," admits Shuch. "A tenured full-professorship is not something one gives up lightly. But leading The SETI League has been the most exciting accomplishment of my career. After 24 years of teaching I was, frankly, quite ready for a new challenge. And there's little that is more challenging than guiding an educational and scientific non-profit from embryo to maturity. I'm proud of what our members have accomplished already, and excited about what lies ahead."



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Search**Lites**

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Conference Calendar

SearchLites' readers are apprised of the following conferences at which SETI-related information will be presented. Check out our World Wide Web site, at www.setileague.org/ under Membership Services and Activities, or email to us at info@setileague.org, to obtain further details. Members are also encouraged to send in information about upcoming events of which we may be unaware.

July 2 - 6, 1997: American Mensa Ltd. *Annual Gathering*, Birmingham AL.

July 11, 1997: Film *Contact* scheduled to open in US.

July 13 - 16, 1997: *Society of Amateur Radio Astronomers*, NRAO Green Bank WV.

July 24 - 27, 1997: *Central States VHF Conference*, Hot Springs AR.

August 15, 1997: *20th Anniversary Wow! Celebration*, Ohio State Radio Observatory, Delaware OH.

August 28 - September 1, 1997: *Lonestarcon 2 / 1997 Worldcon*, San Antonio TX.

September 13 - 14, 1997: *UKW Tagung Amateur Radio Exhibition*, Weinheim Germany.

September 20 - 21, 1997: *International Convention of the European Radio Astronomy Club*, Heppenheim Germany.

October 17 - 19, 1997: *AMSAT Annual Meeting and Space Symposium*, Toronto Canada.

October 23 - 26, 1997: *Microwave Update*, Sandusky OH.

November 14 - 16, 1997: *Philcon '97*, Philadelphia PA.

January 21 - 23, 1998: *International Conference on SETI in the 21st Century*, Sydney Australia.

February 13 - 15, 1998: *Boskone XXXV*, Framingham MA.

March 20 - 22, 1998: *Lunacon 1998*, Rye Brook NY.

April 3 - 5, 1998: *Southeastern VHF Conf.*, Marietta GA.

April 10 - 12, 1998: *Balticon 32*, Baltimore MD.

April 25- 26, 1998: *Trenton Computer Festival*, Trenton NJ.

May 15 - 17, 1998: *Dayton Hamvention*, Dayton OH.

May 29 - 31, 1998: *Rochester Hamfest and ARRL Atlantic Division Convention*, Rochester NY.

July 23 - 26, 1998: *Central States VHF Conference*, Kansas City KS.

August 5 - 9, 1998: *BucCONeers / 1998 Worldcon*, Baltimore MD.

May 14 - 16, 1999: *Dayton Hamvention*, Dayton OH.

September 2 - 6, 1999: *Aussiecon Three / 1999 Worldcon*, Melbourne Australia.

Guest Editorial

Spaceships, SETI, and Public Perceptions

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In late March of 1997, the Heaven's Gate cult in California committed mass suicide due in part to their belief that an alien spaceship was in our solar system riding behind Comet Hale-Bopp. This alleged star vessel supposedly contained intelligent beings superior to humanity both technologically and spiritually. The cult believed these beings were going to "save" selected members of the human race -- such as themselves -- and bring them to a "higher level", wherever and whatever that might be. In the end, though, the spaceship never existed and the cult members only ended up decaying in a large suburban mansion.

While the cult's behavior is a rather extreme example, it showcases what many in the general public think about intelligent life beyond Earth: That "they" are superior to us in every way and have fleets of crewed starships constantly coming here to prepare us for salvation from our primitive and ultimately destructive ways. Of course many others think that aliens are actually here for our chunk of the celestial real estate and to turn us into food and/or slaves. When one looks at the realities of the Universe and biological evolution, however, the truth is probably quite different.

Most folks know little about how vast our Cosmos is or even how it is set up. We live on a rather small rock circling a small yellow star that is one of 400 billion in a huge collection of such luminous gas balls called the Milky Way galaxy. Most of these stars average several light years apart, a distance which would take our Pioneer and Voyager space probes tens of thousands of years to reach even the nearest stars.

In other words, we live in a galaxy that is so large and so populated that it is ludicrous to imagine that beings of other star systems would know about us unless they were very nearby on a cosmic scale. And what would we have to offer these beings who can cross interstellar distances, assuming such advanced intelligences exist and would want to make the journey? This is not to say that there are not ETI who explore other star systems, but many scientists find it doubtful that they are here in the numbers that the public reports every day, if there are even any ETI here at all!

Star travel is an expensive way to explore other systems, and you had better be darn sure that there is something (or someone) of interest to find before you send out your mission on a journey that could take years to centuries, depending upon the target and disavowing any faster-than-light drives.

There is an easier way to explore and possibly communicate with beings on other worlds: The use of microwave and optical telescopes as supported by those who conduct the Search for Extraterrestrial Intelligence (SETI). While a starship might take a lot to build and then risk much in the long journey from one world to the next, a radio or light beam can carry lots of information cheaply and almost certainly survive the voyage intact. That is what the SETI League and others who support and conduct such projects think is the way we will first meet our extraterrestrial

neighbors. Granted this research may not have the glamour and drama of an alien craft hovering over a major city, but it seems more likely at this point. It also does not require us to do more than build some rather inexpensive devices to listen and look for "them". Scanning the whole sky also increases the chances of finding ETI, rather than searching a few star systems at a time, as would be necessary with artificial star probes.

The SETI League's task at hand in part is to help the public understand how the Universe is truly laid out and what would be required of any ETI to send starships rather than communicate through the ether. If the public keeps thinking "they" are here, they will not support and fund efforts such as the SETI League's to conduct the most likely way of ever knowing if we are not alone in the Universe.

We must show them that not only are we not the physical center of the Cosmos as once believed, but we are likely just one of many voices in the galactic chorus. ETI may indeed "save" us, but we will do it by our efforts to find and understand them. In this way, humanity will grow up on a celestial scale.

Director To Address European Radio Astronomy Congress

LITTLE FERRY, NJ., May 17, 1997 -- Dr. H. Paul Shuch, executive director of the non-profit SETI (Search for Extra-Terrestrial Intelligence) League, has been selected as featured speaker at the First European Radio Astronomy Congress, to be held in Heppenheim, Germany. The conference, scheduled for the weekend of 20 - 21 September 1997, will be attended by a wide range of amateur and professional astronomers, radio engineers, and SETI scientists. Sponsored by the European Radio Astronomy Club, the meeting is open to members and non-members alike, as well as anyone interested in Radio Science.

"The mission of The SETI League is to privatize research once conducted by NASA," says Shuch. "Our young organization now boasts roughly 500 members in 27 countries, and enjoys strong support in Europe. This conference will provide me an opportunity to collaborate more closely with our existing European members, and to attract more participants from among the ranks of European radio amateurs and amateur astronomers."

"I myself did not count (SETI) as being scientific until I actually saw such an instrument designed for SETI work," admits Peter Wright, president of the European Radio Astronomy Club. Noting the skepticism with which much of the scientific community has long viewed SETI, he says, "we as radio astronomers have a lot to learn from SETI researchers, and they have a lot to learn from us. It is a statistical fact that life must be somewhere else in our Universe. The fact is that mankind has not yet really tried to find it. We have not even really had the means to do such a search until this day."

Further details about the conference may be obtained by writing to The European Radio Astronomy Club, Ziethen str 97, D-68259, Mannheim Germany.

Hardware Corner

Receiver Options Multiply

Most of the early stations in The SETI League's *Project Argus* search effort have incorporated Icom model 7000 or 7100 microwave receivers. These fine units were discontinued by their manufacturer a year ago and, although the successor Model 8500 is quite a suitable replacement, it is rather costly. Fortunately, several viable alternatives have emerged in recent months. They involve the use of microwave downconverters, to shift interesting microwave radio astronomy frequencies down to a lower part of the spectrum, for reception in a user's existing short-wave or VHF ham receiver.

First out of the starting gate with a stable, low-noise converter was SSB Electronic, GmbH of Germany. Their Model UEK-21 Down-Converter was developed in cooperation with Peter Wright, our own volunteer coordinator for Germany. The unit converts two MHz of spectrum centered on the 1420 MHz hydrogen line, down to a 28 - 30 MHz Intermediate Frequency. The 10 meter IF is compatible with most members' existing SSB communications receivers. The UEK-21 is priced around 400 DM. Details may be found on our Web site, at <http://www.setileague.org/hardware/ssbelect.htm>.

Radio Astronomy Supplies of Roswell GA, which is run by SETI League member Jeffrey Lichtman, has for some time offered its Ultra radio telescope systems. They incorporate a downconverter to shift the hydrogen line to a 70 MHz IF. Jeffrey has recently added a 70-to-28 MHz "SETI Ready" converter box to his product lineup, which, along with a suitable HF receiver, will allow the Ultra to do double duty as a SETI receiver. Prices were not yet available at this writing, but more details may be found on The SETI League's Web site at <http://www.setileague.org/hardware/lichtman.htm>.

And finally, a new SETI League downconverter demonstrated at our Annual Meeting in March shifts a 4 MHz segment near the hydrogen line down to the 2 meter (144 MHz) ham band. At the Southeastern VHF Conference in April, the prototype measured 49 dB of conversion gain at 1.85 dB noise figure. It shows 50 dB image rejection and better than 30 dB spurious rejection. The unit will shortly be offered commercially by Down East Microwave, in both kit and assembled form. Kits will be priced around \$130 US, with assembled, boxed and tested converters selling for \$225 US. See details at <http://www.setileague.org/hardware/convertr.htm>.

Unlike the wide-spectrum Icom receivers, these converters will best support a search of the narrow band of frequencies centered on the hydrogen line. Nevertheless, they provide us with an excellent starting point for doing a credible SETI search at very low cost.

Radio Amateur Honored by SETI League

LITTLE FERRY, NJ., March 22, 1997 -- Daniel Boyd Fox, an Indiana radio amateur (KF9ET) deeply involved in the Search for Extra-Terrestrial Intelligence, today was presented the second annual Bruno Memorial Award by The SETI League, Inc. for his significant technical contributions to the non-profit organization's *Project Argus* search for intelligent radio signals from space. Fox, who last year developed a basic radio telescope block diagram duplicated by dozens of other experimenters around the world, built one of the first amateur listening stations. On December 1, 1996, he received an interesting (though unconfirmed) candidate signal, one of the first detected in the privatized search for other intelligent life in space. His *SetiFox* computer program, which sifts through the cosmic static for artificial patterns, is widely used by project participants.

The Bruno Award honors the memory of Giordano Bruno, an Italian monk who was burned at the stake in 1600 for contemplating the existence of other inhabited planets. Recent astronomical discoveries (including the detection of planets around numerous Sun-like stars, and fossil evidence of probable micro-organisms in three different meteorite fragments) have given scientists new hope that the Universe is teeming with life. But Government support for this research has waned, leading Fox and other dedicated amateurs to continue with private funding a search once conducted by NASA.



Executive Director H. Paul Shuch (l) presents Dan Fox with the 1997 Bruno Award, at the SETI League annual meeting.

Ask Dr. SETI

Dear Dr. SETI:

I am working with multipole stripline bandpass filters and have the following questions. The 1/2 wave lines are u shaped instead of just straight.

1. Is there a rule of thumb impedance to use for the 1/2 wave lines?
2. How do you determine the intersect point for the 50 ohm lines when they are direct coupled to the first and last line of the filter?
3. Is there a good figure to start with for spacing between filter poles? I think I have seen that if you stagger the surfaces which are adjacent to each other or increase the spacing you will decrease the bandwidth but also increase the insertion loss.
4. I would like to get some good info on calculating stripline inductors and capacitors for matching inputs and outputs for transistor rf amplifiers, especially GASFET's for preamps.

L.M.

The Doctor Responds:

Tough questions, LM! First off, let me say that the design of hairpin bandpass filters is somewhat iterative, because the critical specs (Zo, length, spacing and tap point) are all highly interdependent. Change one, and you have to change the others, which causes you to change the first one, which ...

The physical dimensions are a function of the desired insertion loss, skirt selectivity, and passband ripple. They are also determined by the selected filter topology (the two most popular being Tchebycheff and Butterworth, giving rise to the old EE's riddle, "What's butterworth to tchebycheff?").

Most of us use microwave CAD software to design these filters. I favor EagleWare, although EEs of (a division of Hewlett-Packard) and Super-Compact are also good. Problem is, these packages run \$5k to \$10k. ARRL Radio Designer is a stripped-down version of Compact, for \$150, but I don't think it does microstrip filters.

The real experts on hairpin filters are Rick Campbell KK7B and Jim Davey WA8NLC. They wrote the pivotal series of articles on the subject in *QST* and *QEX*, and designed the famous no-tune transverters which are now manufactured by Down East Microwave. They also wrote a bunch of papers for various microwave and VHF conference proceedings. I have these indexed on this Web site, at <http://www.setileague.org/articles/proceed.htm>.

The filter relationships are especially complex and, unless you have access to the appropriate design software, this may well be an area in which it makes sense to scale from an existing design.

As for GaAs FET amplifier matching, Kent Britain WA5VJB and Al Ward WB5LUA are the acknowledged experts. Look for their calls in the above-referenced Proceedings indices. Some of my own 73, *Ham Radio*, *QST* and *QEX* articles may be useful here as well. For a complete listing of my publications, see:

<http://www.setileague.org/admin/publicat.htm>.

Dear Dr. SETI:

Do you know of any scientific investigations into Extra-Terrestrial Intelligence in a more broad scope, i.e., not limited merely to microwave surveys of space? I'm interested in scientific investigations in a broader sense, that would include such analyses as the "Mars rocks."

B.C.

The Doctor Responds:

At present, I know of no funded broad SETI studies. (For that matter, the microwave surveys aren't presently being funded either!) But certainly those of us even in "traditional SETI" are very interested in the related studies involving fossil evidence, planetary detections, etc. SETI is, after all, a highly interdisciplinary science. If we in The SETI League appear to be emphasizing microwave radio astronomy, it's only because it's what we're trained for and know best. But we certainly welcome and respect scientific studies into all related phenomena.

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

SETI League Welcomes 500th Member

LITTLE FERRY, NJ., May 24, 1997 -- Wayne Thresher, a dairy industry worker and part-time farmer in Ashhurst, New Zealand, has become the 500th member of the non-profit SETI (Search for Extra-Terrestrial Intelligence) League. Thresher, who has been building his own radio telescope for two years, heads the quaintly named Pohangina Valley Radio Astronomy and Barbeque Club. "It's fun to think about life on other worlds," says Thresher. "Mars and Europa are making the news these days. Moreover, planets orbiting distant stars have recently been discovered. Some of those planets might be home to living things. Perhaps some are intelligent. Perhaps some even know more than we do. I think class is in session and we're all a bit tardy! At the very least we can listen for the ringing of the school bell, however faint and distant. By building a SETI telescope in the southern hemisphere we'll improve our chances of a 'hit'. Admittedly the odds are long and the task is immense."

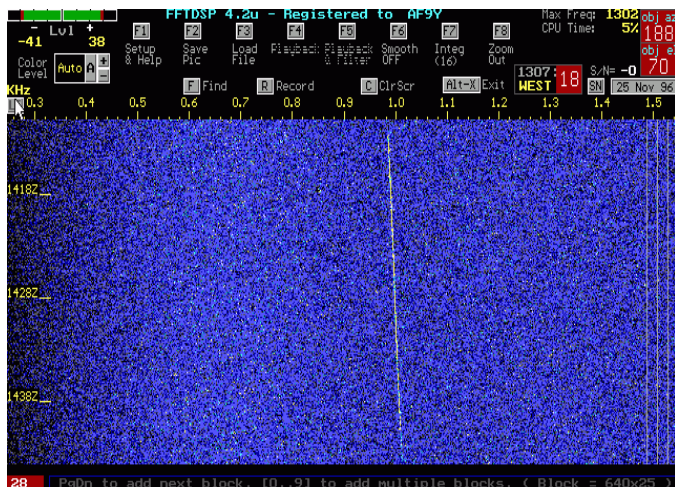
So why try? "Sometimes a difficult endeavour is its own reward. 'Because it's there' was reason enough for Hillary. First to beat Everest, first to split the atom, oh, and in case you haven't noticed, the America's cup has been spending time south of the border lately. Perhaps a Kiwi will be first to 'hear' that distant bell. I challenge you northerners to prove me wrong. The league is the means for everyone to participate in this most noble effort. The worst thing wouldn't be that we failed. The worst thing would be that we didn't try. And when we succeed no one of us will ever look up into the sky and see it quite the same way again."

Technical Feature:

Detection of the Mars Global Surveyor Satellite Beacon by Mike Cook, AF9Y

In late November of 1996, many hams and amateur SETI stations around the world participated in a NASA experiment to detect a beacon signal from the Mars Global Surveyor (MGS) satellite. The beacon was a 1 watt carrier which was activated when MGS was 5+ Million km from the Earth. This experiment was a unique opportunity to test the limit of an amateur receiving system. Key factors were:

1. A very stable, continuous carrier signal similar to the type of signal expected from SETI.
2. A known receive signal level which spanned the range of -187 dBm to -217 dBm.
3. Signal Doppler from Earth and the Spacecraft motion.
4. Requirement for Low-Noise Preamp
5. Requirement for high gain antenna system with accurate Az/EI tracking.
6. Requirement for accurate frequency measurement and stability at 437.1 Mhz
7. Requirement for high performance signal processing software.



Web Awards Accumulate

The SETI League continues to maintain a high profile on the World Wide Web, with our award winning home page. Recent honors include the following accolades:

Omni Cool Science Winner *Lynx of the Week '10'*
Magellan Three Star Site *Lycos Top 5% of the Web*
Geek Site of the Day *Astrobiology Stellar Site*
Geek of the Week *SpaceViews Space Site of the Week*

If you haven't visited our site recently, you're in for some surprises. Set your browser to <http://www.setileague.org/>.

My attempt to detect the signal was with an antenna system much smaller than the average SETI station. The receiving system consisted of:

1. Two low-cost (\$30) 5 foot Helix antennas with a total gain of 16.4 dBic
2. < 0.5 dB Noise Figure Receive System
3. FFTDSP signal processing program
(available at <http://www.webcom.com/af9y>)

The FFTDSP program was operated in a 16x integration mode which provided a lower receiver detection limit of approximately -176 dBm. This integration level allowed detection of Doppler rate change for verification of the extraterrestrial signal. With the antenna gain of 16 dB, the MGS signal was expected to be -171 dBm at the peak level.

The signal was detected immediately at beacon turn-on and was tracked for over an hour. The expected 6 dB of margin was verified as the signal dropped from -187 dBm to -193 dBm before the trace disappeared from the FFTDSP display. More spectrograms and a correlation to NASA's antenna gain plot can be seen on my web site at <http://www.webcom.com/af9y>. Pictures of the helix antennas and testing techniques are also available.

Detection of the MGS carrier was a great thrill and ranks up there with my first Moonbounce (EME) ham contact. An even greater challenge lies ahead for detection of MGS while in orbit around Mars. At that time the signal will be 25 dB weaker. In addition, there will be three forms of Doppler to deal with in the signal processing. While this would be a very difficult challenge, I believe it may be possible for the larger amateur SETI stations. As a group, we need to participate in more tests like this to assure that the receiving capability is at the level we expect.

The author may be reached at mwcook@cris.com.

Meeting Minutes Online

Official minutes of The SETI League's third annual Membership Meeting are now posted to the World Wide Web, at <http://www.setileague.org/admin/minute97.htm>. Our members and friends are invited to avail themselves of this most efficient communications medium. Any member lacking Web access may still obtain a printed copy of the minutes by writing to PO Box 555, Little Ferry NJ 07643. A stamped, self-addressed envelope will be greatly appreciated.

SearchLites, Volume 3, Number 3, Summer 1997. *SearchLites* 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. Entire contents copyright (c) 1997 by The SETI League, Inc. Permission is hereby granted for reproduction in whole or in part, provided credit is given. Address all editorial submissions to:

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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, all memberships include subscription to *SearchLites*, our quarterly newsletter. Tax deductible gifts are always welcome!

Payment in US Dollars only, please.

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Additional Contributions earn Membership Premiums:

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Project Cyclops 2nd Printing	\$20	\$25
Sing a Song of SETI (Songbook)	\$10	\$13

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