



SearchLites

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The Quarterly Newsletter of The SETI League, Inc.

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Pearl Harbor Protocols

by H. Paul Shuch

Executive Director Emeritus

Joseph Lockhard, who hailed from the Newberry section of Williamsport, PA (coincidentally just six miles from my present residence), was never a SETI League member. He was not a radio amateur, and as far as I know, evidenced no interest in the electromagnetic Search for Extraterrestrial Intelligence. Nevertheless, his passing on 2 November 2012, at the age of 90, should be marked by historians and SETIzens alike. For Joe was, as far as I can determine, the first person to follow the SETI Post-Detection Protocols.

Joe Lockard's fifteen minutes of fame started shortly after 7 AM on Sunday morning, 7 December 1941 (in FDR's words, "a date which will live in infamy"). Lockard was one of two US Army privates operating a primitive radar at Opana Point on the island of Oahu, Hawaii, when a huge echo appeared on their radar screens, heading directly toward the US naval base at Pearl Harbor. Lockard called nearby Fort Shafter to warn of possible approaching enemy aircraft. An officer at the other end of the circuit dismissed his detection as probably just American B-17 bombers inbound from California.

Of course, Lockard's target turned out to be a swarm of Japanese aircraft launching the attack that took over 2400 lives, and triggered the entry of the US into the Second World War.

"There was this thing up on the screen," stated Lockard in a 1988 interview. "It was the biggest blip I'd ever seen! At first, we thought something was wrong with the equipment, so we ran it through a series of tests. I checked out the receiver and transmitter to see if anything was mechanically wrong. There was nothing electronically wrong that we could see, so we started plotting the blip. We did that for a while, then decided we'd call to see if there was anyone down there on the phone."

All of this should sound vaguely familiar to The SETI League's cadre of Project Argus observers. Unwittingly, Lockard had established a set of procedures that stand to this day as the SETI Post-Detection Protocols. First, run a diagnostic on your equipment, to make sure it's not lying to you. Continue to track the detection for as long as possible, and call up another observer to try to get verification.

Joe Lockard was neither seeking, nor detecting, extraterrestrial intelligence. But the same procedures used then to detect terrestrial hostility still apply in our more peaceful pursuit. Unlike Lockard, who on Pearl Harbor Day was operating one of the very few radar warning systems in the world, we in the SETI community are blessed with the availability of dozens of very capable radio telescopes around the world, all straining to confirm our individual observations. We can be extremely proud that most of those telescopes are built and operated by SETI League members.

We should continue to monitor the skies, as Joe Lockard did 72 years ago, and follow our own post-detection protocols. When we do get a credible hit, let's just hope that the person on the other end of the phone line doesn't casually dismiss our detections as "probably just American B-17s, inbound from California." ❖

Event Horizon

SearchLites readers are apprised of the following conferences and meetings at which SETI-related information will be presented. League members are invited to check our World Wide Web site (www.setileague.org) under *Event Horizon*, 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.

March 15 - 17, 2013: Lunacon 2013, Rye Brook NY.

March 16, 2013: 38th annual Trenton Computer Festival, The College of New Jersey, Ewing NJ.

April 6, 2013: Greater Baltimore Hamboree and Computerfest, Timonium MD.

April 20, 2013, 0000 UTC - 2359 UTC: Fourteenth annual SETI League Ham Radio QSO Party: 3.551, 7.0309, 7.2039, 14.084, 14.204, 21.306, and 28.408 MHz.

April 21, 2013: Nineteenth SETI League Annual Membership Meeting, Little Ferry NJ.

May 21 - 23, 2013: Spacecraft Technology Expo, Long Beach CA.

May 24 - 27, 2013: Balticon 47, Hunt Valley, MD.

July 25 - 28, 2013: Central States VHF Conference, Elk Grove Village, IL.

August 29 - September 2, 2013: Lonestarcon 3, 71st World Science Fiction Convention, San Antonio TX.

September 23 - 27, 2013: 64th International Astronautical Congress, Beijing, China.

November 8 - 10, 2013: Philcon 2013, Cherry Hill, NJ.

April 19, 2014, 0000 UTC - 2359 UTC: Fifteenth annual SETI League Ham Radio QSO Party: 3.551, 7.0309, 7.2039, 14.084, 14.204, 21.306, and 28.408 MHz.

April 20, 2014: Twentieth SETI League Annual Membership Meeting, Little Ferry NJ.

August 14 - 18 August, 2014: Loncon3, 72nd World Science Fiction Convention, London, England.

September 29 - October 3, 2014: 65th International Astronautical Congress, Toronto, Canada.

April 18, 2015, 0000 UTC - 2359 UTC: Sixteenth annual SETI League Ham Radio QSO Party: 3.551, 7.0309, 7.2039, 14.084, 14.204, 21.306, and 28.408 MHz.

April 19, 2015: Twenty First SETI League Annual Membership Meeting, Little Ferry NJ.

October 2015 (dates to be announced) : 66th International Astronautical Congress, Jerusalem, Israel.



Annual Meeting Notice

In accordance with Article IV, Section 1 of our duly approved Bylaws, the Trustees of The SETI League, Inc. hereby schedule our Nineteenth Annual Membership Meeting for 1 PM Eastern time on Sunday, April 21, 2013, at SETI League Headquarters, 433 Liberty Street, Little Ferry NJ 07643. Our office is located just two blocks north of Route 46 and one mile east of the Teterboro Airport, on the northwest corner of Liberty and Kinzley Streets.

We recommend that out-of-town members and guests flying in commercially use the Newark International Airport (EWR), which is about twenty minutes South of our office. There is a wide variety of hotels available at the Newark Airport. A rental car is recommended. From Newark, drive North on the New Jersey Turnpike to US Route 46 Westbound, cross over the Hackensack River, and two long blocks after the traffic circle, turn right onto Liberty Street.

Our members and guests using General Aviation are invited to use the Teterboro Airport (there *is* a landing fee). Of the half-dozen Fixed Base Operators offering transient parking, we recommend Atlantic Aviation (ask Ground Control for parking in the Atlantic Midfield). They should be able to assist you with ground transportation. Please coordinate your schedules and needs in advance through our secretary, Heather Wood.

As attendance by one percent of the League's membership constitutes a quorum, all members in good standing are encouraged to attend. The preliminary agenda for this meeting, per Bylaws Article XII, appears below.

Per Article IV, Section 3 our Bylaws, written or electronic notice of this Meeting is being provided to all members in good standing, not less than ten days nor more than ninety days prior to the meeting date. Members are encouraged to submit additional Old Business and New Business items for inclusion in the Agenda. Please email your agenda items to n6tx@setileague.org, not later than April 1, 2012.

The annual Board of Trustees Meeting required per Bylaws Article V, Section 3 will immediately follow the Membership Meeting. All SETI League members in good standing are welcome to attend.

Preliminary Agenda

- Call to Order
- Minutes of 2012 Membership Meeting
- Financial Report
- Committee Reports
- Old Business
- New Business
- Good and Welfare
- Adjournment



Tau Ceti's Five Planet Candidates by Paul Gilster

The news that five planet candidates have been identified around Tau Ceti - one of them in the habitable zone - brings back the fascination that was piqued when Frank Drake made that star one of his two targets in 1960's Project Ozma, a search for extraterrestrial radio signals from Green Bank, WV. Reviewing Stephen Dole's 1964 book Habitable Planets for Man on the subject of Tau Ceti, I find he wrote mostly about Drake's interest in this G-class star, along with the even closer Epsilon Eridani. Dole liked Tau Ceti's similarity to the Sun, but in those days we had no evidence of any extrasolar planets.

Pushing Data Modeling to the Limit

The latest news, from an international team of astronomers, causes us to look at Tau Ceti in a new and deeper way. Mikko Tuomi (University of Hertfordshire), lead author of the paper on this work, says that the team has found a way to detect radial velocity signals half again as small as any that have been worked with before. Says Tuomi:

"We pioneered new data modeling techniques by adding artificial signals to the data and testing our recovery of the signals with a variety of different approaches. This significantly improved our noise modeling techniques and increased our ability to find low mass planets."

The big problem in radial velocity studies, according to the paper on this work, is stellar noise, which the researchers refer to as 'stellar jitter.' While its magnitude can be uncertain for given stars, the shape of its noise distribution and its variability over time, as well as its dependence on other properties of the star, have not been a major focus of investigation. The team added artificial signals to the radial velocity data of Tau Ceti to see which of its statistical noise models could best extract the artificial noise from the data. Its refined models then allowed the search for low-amplitude signals that had heretofore escaped detection.

As the paper explains further:

"To verify the trustworthiness of our noise models in extracting weak signals from the data, we first test their performance by adding artificial signals to the HARPS data set for HD 10700. The models that enable the recovery of the artificial signals are then compared using the Bayesian model selection techniques to find the most accurate descriptions of these HARPS RVs. Finally, we search for periodic signatures of planetary companions in the HARPS velocities."

Just how hard is this paper pushing available radial velocity methods? For a take on that, I turned to planet hunter Greg Laughlin (UC-Santa Cruz), who noted the excitement of what he called 'this deep dive into the three extremely extensive data sets on a household-name star.' On the methods involved, Laughlin said this:

"...it's clear that the community is pushing up against the limits of the extant radial velocity data. It will take quite a while to get a substantial confirmation of these planets, since increases in signal-to-noise scale with the square root of the number of measurements, and there are a lot of measurements already."

It's interesting to see that time-series techniques familiar from econometric analyses (e.g. ARMA(p,q)) are being applied in this new context. I think that the methods they are using (which would be completely familiar to a Wall Street Quant) have a lot of promise in this particular area.

A Candidate System

Out of this work, conducted with spectroscopic data from HARPS on ESO's 3.6m telescope at La Silla (Chile), UCLES on the Anglo-Australian Telescope in Siding Spring, Australia and HIRES on the 10m Keck telescope on Mauna Kea, Hawaii, we have five planets with masses between two and six times that of Earth. The candidate in the habitable zone - orbiting its star every 168 days - is about five Earth masses, which the researchers say would make it the smallest planet orbiting in the habitable zone of any Sun-like star. The periodicities of the five in order are 13.9, 35.4, 94, 168, and 640 days, a system telling us that the new noise modeling techniques may have paid off handsomely.

Laughlin's take on the Tau Ceti candidates is that they are representative of what we have been finding elsewhere:

"...the system that they're proposing is completely *unsurprising*. Kepler and HARPS have demonstrated that the galaxy's default mode of planet formation is to produce multiple super-Earth/sub-Neptune category planets on nearly circular orbits with orbital periods in the range from days to weeks. This system is certainly a standard-issue example of such a configuration."

Interestingly, the team picked Tau Ceti for the study because they thought it contained no signals. Indeed, Tau Ceti, at just under 12 light years from the Solar System, is a quiet and inactive star for which the HARPS spectrograph had not been able to generate any planetary signatures despite more than 4000 spectral observations. Nor had other searches revealed any signals until this new work. The star is known, however, to have a bright debris disk with a mass estimated to be an order of magnitude greater than the mass of the Kuiper Belt in our own Solar System, extending out to about 55 AU, leading some to assume that any planets there would likely undergo an extensive period of bombardment from objects entering the inner system.

Confirming the Tau Ceti planets will be a story worth watching, for this is a star close enough to the Sun to factor into our thinking for spectroscopic atmospheric analyses in future missions. Quoting the paper again:

"With a distance of only 3.7 pc, HD 10700 [Tau Ceti] is the third closest star reported to be a host to a putative planetary system after Epsilon Eridani (Hatzes et al., 2000) with a distance of 3.2 pc and a Centauri B (Dumusque et al., 2012) with a distance of 1.3 pc, though both of these remain to be confirmed and Zechmeister et al. (2005) have cast considerable doubt on the existence of a planet around Epsilon Eridani. This makes HD 10700 an ideal target for future direct-imaging missions. The signals we find, which suggest the presence of low-mass planets, are consistent with both current theoretical models for low-mass planet formation and extant observational evidence for the presence of low-mass planets in the immediate Solar neighbourhood."



SETI League Suffers Email Outage

The SETI League has, since its inception, been highly dependent upon email communications to coordinate its global scientific mission, emerging in parallel with the advent of widespread Internet access. Our organization's flagship technical program, Project Argus, sought to harness this new communications reality to facilitate large-scale cooperative research, at a scale never before contemplated.

Unfortunately, we have experienced recent, prolonged email outages, potentially compromising our mission. As this issue of *SearchLites* goes to press, both our setileague.org email addresses and our various email discussion lists remain inoperative. Until such time as these technical difficulties are resolved, we encourage our members to address their questions and concerns directly to our leadership team, via their personal email addresses, as follows:

Secretary/Treasurer, hwood50_at_aol_dot_com

Executive Director Emeritus, drseti_at_verizon_dot_net

We regret any inconvenience you may experience, and respectfully request that you restrict your use of these email addresses to bona-fide SETI League business. ❖

SETI League 2012 Program Service Accomplishments

(a) Science Programs:

- Supported 147 Project Argus radio telescopes built by members in 27 countries on all seven continents. Coordinated their SETI and astrophysical observations. Argus stations analyzed and cataloged several new candidate signals during 2012.
- Members' stations continued to monitor telemetry signals and science beacons from several NASA and ESA interplanetary space probes.
- Provided Committee leadership (as co-chairman) to the SETI Permanent Study Group of the International Academy of Astronautics.
- SETI League members continue to lend computer support to the SETI@home distributed computing experiment, through the Berkeley Open Infrastructure for Networked Computing (BOINC).

(b) Technology Programs:

- Assisted several members in construction of pending Project Argus stations.

- Coordinated and archived four closed technical email lists.

(c) Public Education Programs:

- Executive Director Emeritus delivered seven public SETI lectures in the Republic of San Marino, the US, and Italy.
- Members participated in the 2012 Green Bank Technical Conference of the Society of Amateur Radio Astronomers (SARA), a SETI League affiliate, presenting papers and conducting workshops.
- Executive Director Emeritus published six technical articles in scholarly journals, Conference proceedings, and the popular press, served as a manuscript reviewer for the International Academy of Astronautics, and as a member of the British Interplanetary Society's editorial board.
- The SETI League provided webmastering and website hosting services to the International Academy of Astronautics SETI Permanent Committee.
- Distributed CD copies of "The SETI League Technical Manual" and "Tune In The Universe!", a radio amateur's guide to the Search for Extra-Terrestrial Intelligence.
- Officers and volunteer Regional Coordinators answered numerous email queries from around the world on technical and societal aspects of SETI.
- Distributed numerous print and CD copies of various SETI League Conference Proceedings.

(d) Media and Outreach Programs:

- Published four issues of *SearchLites*, the quarterly newsletter of The SETI League, Inc.
- Coordinated and archived two open public email lists.
- Distributed four Press Releases and twelve Editorials to over 700 media outlets worldwide.
- Filed 52 weekly updates to The SETI League's extensive website.
- Mailed out dozens of membership brochures to email requesters.
- Several of our 60 volunteer Regional Coordinators in 46 countries conducted print and broadcast media briefings and interviews.
- Executive Director Emeritus granted interviews to print media and broadcast outlets in New Jersey, Pennsylvania, San Marino, and Italy.
- Awards Committee chairman designated recipients for the seventeenth annual Giordano Bruno Memorial Award, the tenth Orville Greene Service Award, and twelve SETI SuperStar Awards. ❖

Guest Editorial:

A Telescope on the Moon

by Jon Lomberg

(from his [Citizen of the Galaxy](#) blog, used by permission)

One of the many pleasures of living on the Big Island of Hawaii is that astronomy and space exploration are considered local news. I like that idea of "local." It's similar to the concept of "galacticity", as coined by Steve Durst, founder and president of the International Lunar Observatory Association (ILOA).

Galacticity is the perspective that sees our world set against its real backdrop - the vast Milky Way Galaxy. I recently returned from a trip to Asia with Steve, where he brought me to speak about the [Galaxy Garden](#) at his Galaxy Forum events in Beijing and Tokyo, where we hope to find partners in creating "sister" galaxy gardens in China and Japan.

Steve is working with another old friend, Bob Richards, a lunar explorer whose company Moon Express (ME) is vying for the \$30 million Google X Prize. The prize will be awarded to the first private, non-governmental group that can send a small spacecraft to soft-land on the Moon, traverse a distance of 500 meters, and transmit a hi-def image and video back to Earth. Bob's venture, ME, is considered a serious contender by our knowledgeable sources.

The payload that ME will carry is the ILOA's project - the first astronomical observatory to operate remotely on the lunar surface. As a gesture of galacticity, the "first light" image that traditionally heralds the existence of new observatories will take as its first image, the center of the galaxy. One more small step for Man, or at least machine.

Disclaimer: The opinions expressed in editorials are those of the individual authors, and do not necessarily reflect the position of The SETI League, Inc., its Trustees, officers, Advisory Board, members, donors, or commercial sponsors. ❖

Book Review:

The Varieties of Scientific Experience

by Carl Sagan

Reviewed by Jon Lomberg

Published posthumously in 2006, this book is based on Sagan's 1985 Gifford Lectures, a prestigious series of talks delivered annually in Scotland since 1888. The speakers are pre-eminent in their fields. One of them, William James, gave a series called *The Varieties of Religious Experience*. Sagan's title is a play on that name. In these lectures the astronomer

confronted directly the religious question he was so often asked at his lectures: Do you believe in God?

Sagan's discussion of the topic is perceptive, original, and artfully expressed. In a time when science literacy among the citizenry is low and trending lower, this book presents the case for both the necessity and the advantages of science-as-worldview. I think it is one of his most powerful and important books. It shows how extraordinary people can continue to contribute even after their deaths, an afterlife I think even Carl would have acknowledged.

Now the Canadian author and scholar John Robert Colombo has published an essay comparing the Sagan lectures with those of William James. I commend it to your attention at:

<http://ccwe.wordpress.com/2012/05/09/john-robert-colombo-william-james-carl-sagan-two-gifford-lectures/>

John Robert Colombo is a distinguished Canadian author and man of letters. I had the pleasure of working with him on another Sagan project: the DVD Visions of Mars, an anthology of science fiction about Mars, now aboard NASA's Phoenix lander, somewhere in Mars arctic tundra, awaiting a readership of future Mars colonists from Earth centuries from now.

Colombo's encyclopedic literary knowledge reached across borders and languages to help assemble the greatest cultural variety of contents. He was equally at home commenting on the authors of pulp fiction of the 1930s or unearthing an obscure review by Jorge Luis Borges of Ray Bradbury's classic *The Martian Chronicles* (also on the disk) Colombo also collected the Inuit name of Mars, which appears on the title screen of Visions of Mars (top left vertical script).

John Robert was on the editorial board which also included Carl, Planetary Society Director Louis Friedman (who was the originator of the whole library-to-Mars idea) Toronto science fiction librarian Lorna Toolis, me, and Judith Merrill.

Colombo and I had become friends through Judy, a famous sf editor and writer who, as it happens, was an idol of the young Carl Sagan. When he was a student at the University of Chicago, Carl even asked her to critique some science fiction he had written. I hope those stories surface someday!

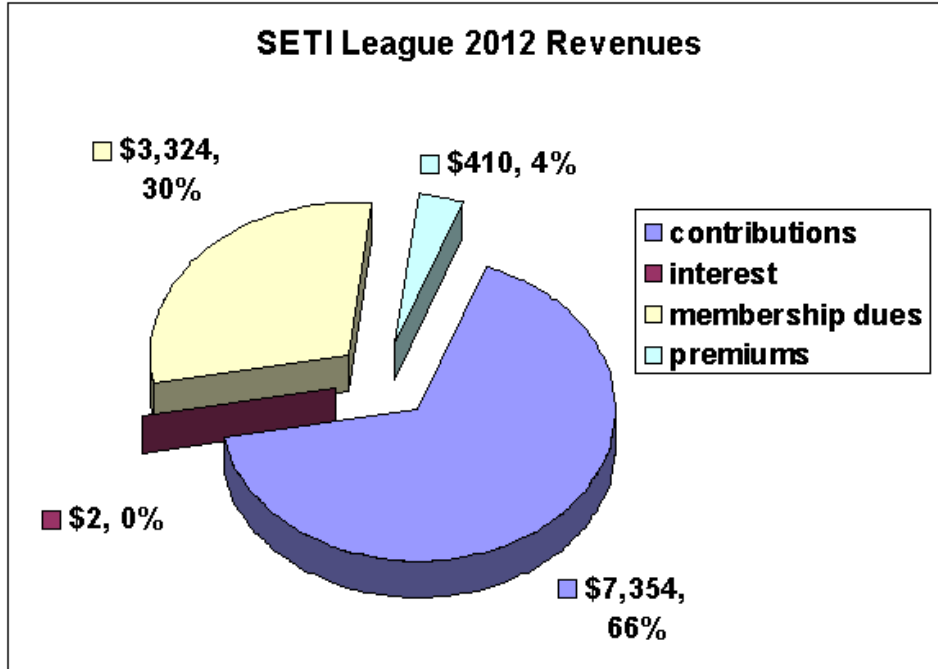
In 1975 I arranged a reunion dinner for them in Toronto at Mika's Japanese restaurant, near the old CBC Radio building on Jarvis St. in Toronto, where Judy and I were making radio shows for the CBC documentary program IDEAS. Also in attendance was IDEAS producer Max Allen, with whom I was making a radio documentary about the Viking Mars mission. 20 years later Max made important contributions to Visions of Mars, including recording the sound and image of both Judy and Carl for the Greetings section of the Mars disk. They, and Louis Friedman and Arthur C. Clarke, voice their greetings to a future audience of humans on Mars.

I enjoy recalling how this extended network of friends and colleagues performed a kind of creative dance over the decades, working on projects that in one way or another brought us all together to Mars, part of a gift now actually, incredibly on Mars, stalwart silica awaiting its future audience.

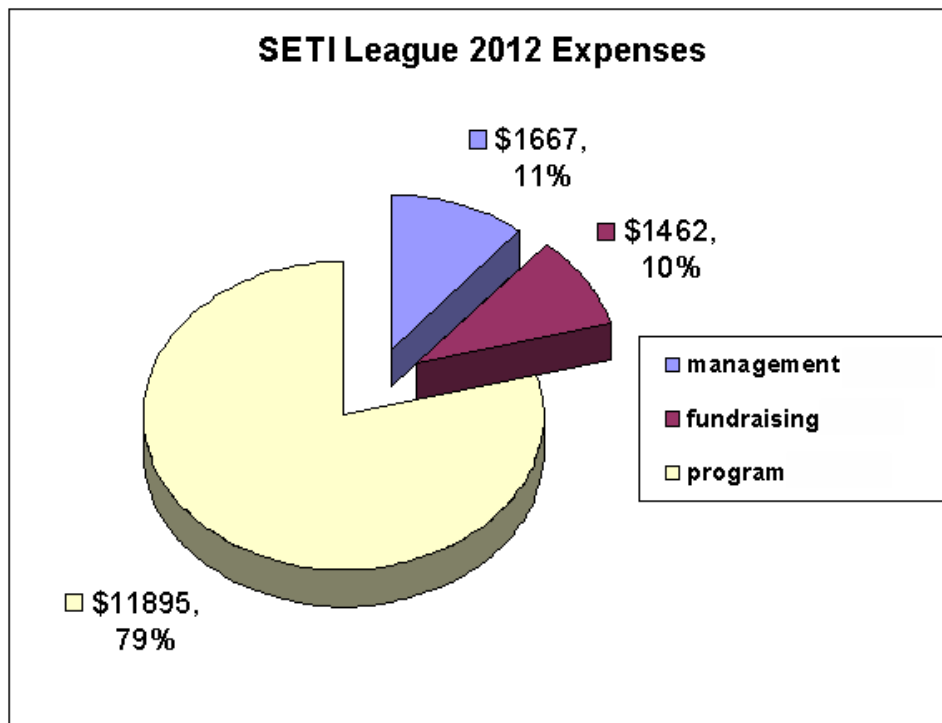
That's another of kind afterlife that I think Carl would have been pleased to acknowledge. ❖

SETI League Financial Report

2012 Revenues (unaudited)



2012 Expenses (unaudited)



Budget Tracking – 2012

990 Line	REVENUES:	2012 (budget)	2012 (actual)
1d	Dues, Grants & Contributions	18,000	11,088
4	Interest & Investments	5	2
12	Total Revenues:	18,005	11,090
	EXPENSES:	2012 (budget)	2012 (actual)
13	Educ. and Scientific Programs	17,000	11,895
14	Management & General	3,000	1,667
15	Fundraising	1,000	1,462
17	Total Expenses:	21,000	15,024
18	Excess or (Deficit) for the year	(2,995)	(3,934)
	BALANCE SHEET:	2012 (budget)	2012 (actual)
19	Beginning Net Assets	6,851	6,851
21	Ending Net Assets	3,856	2,917

Annual Budget - 2013

990 Line	REVENUES:	2013 (proposed)
1d	Dues, Grants & Contributions	11,000
4	Interest & Investments	2
12	Total Revenues:	11,002
	EXPENSES:	
13	Educ. and Scientific Programs	10,000
14	Management & General	1,600
15	Fundraising	1,400
17	Total Expenses:	13,000
18	Excess or (Deficit) for the year	(1,998)
	BALANCE SHEET:	
19	Beginning Net Assets	2,917
21	Ending Net Assets	919



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Annual Renewal: Is This Your Last *SearchLites*?
SETI League memberships are issued for the *Calendar Year*. Please check the expiration date indicated on your mailing label. If it reads December 2012 or earlier, you have already expired, and *must* renew your SETI League membership **now!** Please fill out and return this page along with your payment.

Please renew my membership in this category:

Full Member	\$50 / yr
Supporting Member (elderly, retired, or disabled)	\$35 / yr
Scholarship Member (full-time students only)	\$25 / yr
Household Member (same address as a Full Member)	\$15 / yr
Household Life Member (same address as a Life Member)	\$300
Life Member (until we make contact)	\$1,000
Sustaining Life Member – a generous <i>annual</i> pledge of:	\$1,000 / yr
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

Annual memberships are issued for the calendar year. Those processed in January through April expire on 31 December of that year. Those processed in September through December expire on 31 December of the *following* year. Those members joining in May through August should remit half the annual dues indicated, and will expire on 31 December of the same year.

Order Your Membership Premiums:

	(u/c)*	(o)*
Pocket protectors	\$ 3	\$ 4
Mouse pads	\$ 5	\$ 7
<i>Tune In The Universe! (CD-ROM)</i>	\$25	\$30
<i>Proceedings of SETICon01</i>	\$20	\$27
<i>Proceedings of SETICon02</i>	\$20	\$27
<i>Proceedings of SETICon03 (CD)</i>	\$15	\$17
<i>Proceedings of EuroSETI04 (CD)</i>	\$15	\$17
<i>Proceedings of SETICon04(CD)</i>	\$15	\$17
<i>SARA Conference Proceedings:</i>		
2006, 2007, 2008, 2009 (specify)	\$20	\$27
<i>SETI League Technical Manual (CD)</i>	\$10	\$13
<i>Project Cyclops 2nd Edition</i>	\$20	\$30
<i>The Listeners</i> by James Gunn	\$15	\$21
<i>Sing a Song of SETI</i> (Songbook)	\$10	\$13
<i>Sing More Songs of SETI</i> (Songbook)	\$10	\$13
<i>Sing a Song of SETI</i> (music CD)	\$15	\$17
<i>Demented!</i> (music CD)	\$15	\$17
T-shirts, specify M, L, or XL	\$15	\$22
SETI Nerd Gift Set (one each Mouse Pad, Pocket Protector, <i>Project Cyclops</i> and <i>Tech Manual</i>) at 20% Savings to <u>Members Only</u> :	\$30	\$43

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Payments in US Dollars, check payable through a US bank

Pleased to Accept PayPal

The SETI League invites you to pay your membership dues and additional contributions via credit card, using the PayPal online payment system. Simply log on to www.paypal.com and specify that your payment be directed to paypal@setileague.org.

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