

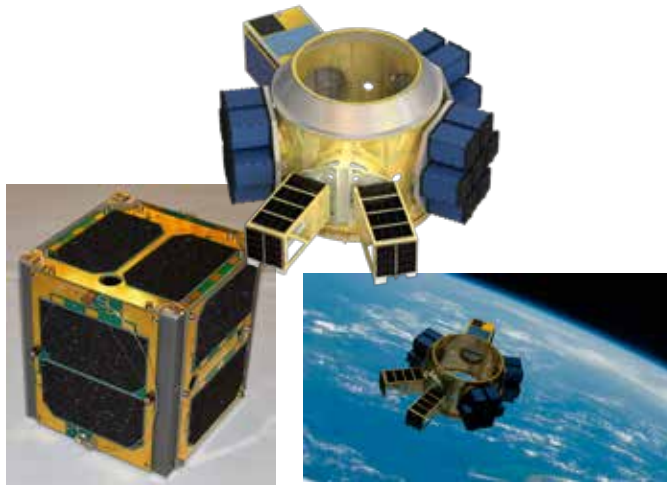
The AMSAT[®] Journal

Volume 37, Number 4

July/August 2014

Editor-in-Chief:
JoAnne Maenpaa, K9JKM

Assistant Editors
James Howard, K3JPH
Bernhard Jatzeck, VA6BMJ
Douglas Quagliana, KA2UPW/5



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Periodicals
POSTAGE PAID
At Silver Spring, MD
and at additional
mailing offices

AMSAT-NA
10605 Concord St., Suite 304
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How You Can Help Build New and Exciting Satellites

Donate to the President's Club

Gold, Silver, Bronze and Core levels are available to match your ability to participate.

Cash Gifts

Visa, or MasterCard or checks are accepted. And, you can specify how your contribution is to be used.

Gift of Life Insurance

US taxpayers may be able to receive a significant income tax deduction by making The Radio Amateur Satellite Corporation the owner and beneficiary of life insurance policies.

Gift of Stocks or other Securities

US taxpayers should be able to avoid capital gains taxes on appreciated securities and receive a deduction for their fair market value.

Bequest

A codicil in your will, naming The Radio Amateur Satellite Corporation as a beneficiary will help insure the continuance of the Amateur Radio Satellite program.

Call the AMSAT-NA office at 301-589-6062 for questions on any or all of these ways you can help build new and exciting satellites.

Support AMSAT-NA

AMSAT Announcements

Call for 2014 AMSAT Space Symposium Papers

This is the first call for papers for the 2014 AMSAT Annual Meeting and Space Symposium to be held on the weekend of October 10-12, 2014, at the DoubleTree Hotel by Hilton, Baltimore-Washington International Airport (BWI), Baltimore, Maryland.

Proposals for papers, symposium presentations and poster presentations are invited on any topic of interest to the amateur satellite community. Suggested areas for papers include:

- Satellite operating technique
- Ground station development
- Antennas
- User Equipment
- Future mission proposals

- Satellite design
- Education outreach
- ARISS operations
- Fox-1 satellite development
- Engineering model displays
- Software architecture
- Software defined radio

We request a tentative title of your presentation as soon as possible if you have not already done so.

The final copy must be submitted by September 29 for inclusion in the printed proceedings. Abstracts and papers should be sent to Dan Schultz at n8fgv@amsat.org

AMSAT's Mission

AMSAT is a non-profit volunteer organization which designs, builds and operates experimental satellites and promotes space education. We work in partnership with government, industry, educational institutions and fellow Amateur Radio societies. We encourage technical and scientific innovation, and promote the training and development of skilled satellite and ground system designers and operators.

AMSAT's Vision

Our Vision is to deploy satellite systems with the goal of providing wide-area and continuous coverage. AMSAT will continue active participation in human space missions and support a stream of LEO satellites developed in cooperation with the educational community and other amateur satellite groups.





Radio Amateur Satellite Corporation (AMSAT-NA)
10605 Concord St., Suite 304, Kensington, MD 20895-2526
Telephone: 301-822-4376 – Toll Free: 888-322-6728

Facsimile: 301-822-4371

AMSAT-NA Club Callsign: W3ZM

AMSAT-NA Web site: <http://www.amsat.org>

The AMSAT Journal Staff

Editor-in-Chief: JoAnne Maenpaa, K9JKM, k9jkm@amsat.org

Assistant Editors:

Douglas Quagliana, KA2UPW/5

Bernhard Jatzbeck, VA6BMJ

James Howard, K3JPH

Circulation: Martha Saragovitz, martha@amsat.org

AMSAT-NA Board of Directors

Barry Baines, WD4ASW, wd4asw@amsat.org

Alan Biddle, WA4SCA, wa4sca@amsat.org

Tom Clark, K3IO, k3io@amsat.org

Steve Coy, K8UD, k8ud@amsat.org

Mark Hammond, N8MH, n8mh@amsat.org

Lou McFadin, W5DID, w5did@amsat.org

JoAnne Maenpaa, K9JKM, k9jkm@amsat.org

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Editorial Office: JoAnne Maenpaa K9JKM, 608 Hawthorne Lane, Carpentersville, IL 60110. Please e-mail Journal submissions to: journal@amsat.org, Editor's telephone: 847-239-2286 (cell). Advertising Office: AMSAT-NA Headquarters, 10605 Concord St., Suite 304, Kensington, MD 20895-2526, Telephone: 301-822-4376.

The AMSAT Journal (ISSN: 1407-3076) is published bi-monthly (Jan/Feb, Mar/Apr, May/June, Jul/Aug, Sep/Oct, Nov/Dec) by AMSAT-NA, 10605 Concord St., Suite 304, Kensington, MD 20895-2526. Telephone: 301-822-4376, fax: 301-822-4371. Periodicals postage paid at Silver Spring, MD and additional mailing offices.

Postmaster: Send address changes to *The AMSAT Journal*, 10605 Concord St., Suite 304, Kensington, MD 20895-2526.

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“Let’s Launch Something...” It’s not very often that AMSAT is in a position to announce an upcoming launch of an OSCAR satellite built by our volunteers.

I had the honor to publicly announce that AMSAT had signed a Letter of Agreement with Spaceflight, Inc. to fly our Fox-1C 1U cubesat in the 3rd quarter of 2015 on their “SHERPA system.” The announcement was made on Friday afternoon, July 18 as part of the AMSAT Forum being held at the ARRL Centennial Convention in Hartford, CT. The room was jammed with people interested in learning about using the amateur radio satellites. As well, they were briefed on what is happening at AMSAT along with the variety of satellites that were recently launched or expected to be shortly placed in orbit. It was a standing room only crowd (well over 100 people in the room) as Patrick Stoddard, WD9EWK, fulfilled his role as the presenter for Drew Glasbrenner’s updated “Satellites on the Horizon” overview. We added a few slides at the very end, starting with “One more thing...” (to borrow a famous phrase from Apple’s Steve Jobs). I then stepped up to the podium to deliver the good news at the very end of our forum. Once the announcement was made, the news was released via a special ANS bulletin, Facebook, and Twitter as well as placed on the AMSAT website.

The Board’s decision to PAY for the launch of Fox-1C was made for several reasons:

First, this was an unexpected opportunity to get Fox-1C flying relatively quickly. Please remember that AMSAT’s strategy to keep amateur radio in space was to build and fly four Fox-1 class satellites. All four will be completed at the same time, by the end of this year. Fox-1A was accepted into the ELaNa program in February 2012 (following submission in November 2011) and is manifested as part of the ELaNa XII mission which is currently expected to fly on a NRO mission (“Grace/L55”) from Vandenberg AFB in 3rd quarter 2015. You will recall that this mission has been postponed from late 2014 due to revision of flight schedules relative to other missions.

RadFXSat/Fox-1B was accepted by the NASA ELaNa program in February 2013. This followed our submission in November 2012 to fly a radiation experiment built by the Vanderbilt University’s Institute for Space & Defense Electronics (ISDE). Indeed, the formal proposal submitted to NASA ELaNa was by ISDE, not AMSAT and reflects our desire that the Fox-1 class design be incorporated into university space missions as a mechanism for providing more opportunities to fly amateur radio in space. We were listed as a partner in the grant proposal. While we expect to have the spacecraft completed by the end of the year, the payload itself will be completed in 2015. At this point, RadFXSat/Fox-1B has not been assigned to a flight opportunity, but our expectation is that the satellite will fly in a similar orbit to Fox-1A. Presumably, an opportunity to fly on a mission that meets our orbital expectations will be confirmed in 2015.

Second, we’re well aware that there is only one FM repeater satellite currently operational (SO-50). The demand for these satellites is high, so when this opportunity to fly Fox-1C was made available, we took it because more of these satellites are needed in orbit now rather than wait until later.

Third, clearly there are real financial advantages following a strategy where ELaNa and similar programs provide the funds to fly satellites. We are proud that both grant requests for ELaNa have been approved. But there is also a downside to taking this approach: WHEN you fly is contingent to availability of launches that NASA ELaNa has access, as well as the expected orbital parameters. The ELaNa program has many cubesats in the queue, all with different preferences about orbital profiles as well as different levels of sophistication. This means that it may take some time for the right opportunity to come to us. Should Fox-1A fly in 3rd Quarter 2015, it will be nearly FOUR YEARS from the time we made our grant submission to actual flight. Likewise, RadFXSat may well follow a similar sequence between grant acceptance and subsequent flight. This length of time can be frustrating when our goal is to maintain the presence of amateur radio in space as older satellites fail, leaving a vacuum with regard to having available space-based assets.

Fourth, paying for a launch avoids the significant effort that must be expended to find a payload partner who wishes to fly a science mission and then convincing NASA of the merit of the proposal by drafting and submitting a formal grant request. Tony Monteiro, AA2TX (SK), was absolutely masterful in developing relationships with universities to partner with AMSAT and then writing a grant proposal that highlighted the potential benefits of the proposed mission. Alas, that experience was somewhat lost due to the loss of Tony. And while we must expand our university connections that Tony pioneered, there is a learning curve for those that follow in Tony’s footsteps in successfully nurturing those relationships that will hopefully translate into a substantive proposal. We are looking at developing a potential proposal for Fox-1D to be submitted in November 2014. This presumes that we have a payload identified that would provide the justification for acceptance to ELaNa. This would be about the time that the satellite itself will be completed sans experiments. That said, as of this writing, we have not identified such a payload.

On the other hand, Spaceflight, Inc. doesn’t care whether we fly an amateur radio mission or whether the flight brings forth any scientific benefit. They’re concerned about our ability to complete and deliver a spacecraft on time that meets their flight safety requirements and being paid for the services that they provide. Clearly, it is much easier to secure a flight if you have your own resources to cover the integration and launch costs.

continued on page 4 ...





Now, PAYING for a launch provides a different dynamic. First, we chose when we would fly based upon an offered flight opportunity that will certainly fly that meets our orbital requirements (but the timing of course, is subject to change). Sooner seems better than later, but it comes with the need to raise funds to cover the flight payments and preparation costs. We've announced a capital campaign of \$125,000.00. While AMSAT has the funds in our reserves to make the appropriate payments in a timely manner prior to launch, we need to raise these funds to replenish those monies as these funds are spent on testing, the launch campaign, and actual launch. Reserves are normally to be used for "rainy day" or unexpected contingencies and it is critical for AMSAT that we maintain an appropriate level of financial resources to protect ourselves against unforeseen circumstances. The fact that we do have a reserve provides not only a safety net for the organization, but allows us to take full advantage of opportunities such as this to fulfill our stated purpose as a scientific and education organization. That said, we must make every effort to restock the reserves.

This capital campaign is certainly achievable not only with regard to the size of the campaign, but also because our donors know that this project is FOR REAL. The satellite will be completed later this year and the flight is expected to take place in 2015. High confidence in having Fox-1C fly in the near future will hopefully translate to strong support from our AMSAT members and the amateur radio community.

Lastly, we've said all along that following the Fox-1 program of four satellites, our attention will turn to the Fox-2 program, which is expected to produce a larger and more versatile spacecraft. By securing a launch opportunity for Fox-1C in 2015, we move that much closer to fulfilling the Fox-1 program and thus can focus on Fox-2 sooner rather than later.

I hope that you see the value in the approach that AMSAT is following in following a consistent path towards spacecraft development and securing flight opportunities. FM satellites are important, but we recognize that they are only part of the many and varied interests of our members. However, I hope you recognize the value of creating a fleet of FM satellites for amateurs worldwide to utilize. When Fox-1A and Fox-1C are flown in the second half of 2015, they will provide a proving ground for our design. Hopefully this will build interest in the university community to utilize our design for their scientific payloads, thus further opening the door for more amateur radio payloads (e.g. "An OSCAR in every cubesat").

Furthermore, our engineering team has quickly matured under the Fox-1 program into a capable organization where focusing on a 1U cubesat has been beneficial to the organization's engineering development and level of success. New project management processes have been introduced into AMSAT, first under Tony's leadership and further

supported by Jerry Buxton, N0JY (our current VP-Engineering), improving our documentation and encouraging engagement of team members. The lessons learned from other projects are serving us well. Once Fox-1A is ready for flight and the other three cubesats (RadFXsat/Fox-1B, Fox-1C and Fox-1D) are also constructed, it will open new doors for focusing on the Fox-2 project.

Fox-2 itself at this point is essentially a blank piece of paper. Our current intention is to place a SDX (Software Defined Transponder) in the spacecraft given the success that SDX created in the ARISSat-1 mission. SDX requires more power than a 1U cubesat can generate, and the relative complexity of incorporating SDX into a new cubesat design meant that we deferred including this feature until Fox-2 in order to focus on other new technologies built into what is now the Fox-1 class satellites. Until our engineering team has the opportunity to seriously consider what exactly Fox-2 will become, the discussion window is open regarding what we should incorporate into our next generation cubesat as well as what configuration might be used, such as a 3U or something larger.

AMSAT is constantly seeking volunteers, including those interested in helping us build satellites. Given where the Fox-1 program currently stands, volunteers are not necessarily needed for a program that is expected to be finished in the near future. The current focus of our engineering team to finish the Fox-1 satellites means that Engineering is not in a position to appropriately respond to inquiries from potential volunteers. Consequently, perspective volunteers should consider setting their sights on Fox-2 and expect that the time to start thinking about helping with Fox-2 which will soon be upon us.

In the meantime, we're excited about the possibility of seeing TWO satellites designed and built by AMSAT-NA being flown in the same calendar year. This has not happened since the four Microsats were flown in January 1990, over 24 years ago.

Please support our new capital campaign! You can utilize the donation form that came with the ballot, or use the AMSAT Store to make your contribution. Your support is needed to ensure AMSAT's ability to fulfill our launch commitment and be in position to seek future launch opportunities.

ARRL Centennial Convention

I write this column the week following AMSAT's very successful participation in the celebration of ARRL's 100th Anniversary. Everything about this convention was big, from the number of registrants participating in the "Training Tracks" workshops on Thursday (about 900), to the variety of forums on Friday and Saturday (over 100), the number of commercial exhibitors (over 100), and the number of attendees at the banquet on Friday night (close to 1,000). The facilities at the Connecticut Convention Center in downtown Hartford could certainly handle the influx of participants.

When the ARRL announced that the League was organizing this event, I recognized the importance of having AMSAT participate, not only as a symbol of AMSAT's recognition of the ARRL's significant milestone, but also providing a unique opportunity for AMSAT to take full advantage of the event to show the flag and build interest in satellites.

"Back in the day", Steve Bible, N7HPR, and I had conducted a full day "Satellite Workshop" in conjunction with the Orlando HamCation in February 1998. Larry Brown, W7LB did similar effort in January 2001 at the Southwestern Division ARRL Convention in Riverside, CA. But as far as I know, AMSAT has not offered similar workshops since then. Consequently, the opportunity to conduct a Satellite Workshop in conjunction with the ARRL's "Training Tracks" was a venue that we did not want to overlook.

Following Labor Day 2013, we offered to develop a Satellite Workshop for the Training Tracks day and the ARRL readily accepted our offer. We thought that perhaps 50 people might sign up; it turned out that ARRL cutoff the registrations at 100, the maximum number allowed in the room we used. The morning was spent on satellite academics beginning with the history of the amateur satellite program as seen from the eyes of Project OSCAR and AMSAT, from OSCAR I to the Fox program. We also covered Keplerian elements and orbital mechanics to explain how we can predict future satellite positions. As well, we explained how to use various satellite tracking programs, including a brief discussion of how LEO satellites were tracked before the advent of the personal computer. That included web-based sites (such as AMSAT's "Predict"), SATPC-32 and smart phone applications. The afternoon was spent on practical applications, including overviews of how to use the FM satellites followed by an overview of the SSB/CW sats and how to collect telemetry from satellites. The workshop concluded with a satellite demonstration using AO-7 with attendees relocating to an outdoor spot to witness the event and ask questions.

The presentations that were given at the Workshop are available on the AMSAT website:

http://www.amsat.org/?page_id=2914

In the Workshop we had the OSCAR-I prototype (refurbished and provided by the ARRL); the engineering communications prototype from Fox-1A demonstrating the IHU, transmitter, and receiving boards; and a model of AO-7 provided by Peter Portanova, W2JV.

The AMSAT Forum on Friday afternoon was well attended as we talked about recent AMSAT events, the Fox-1 program, an overview of new satellites and the formal announcement about the Fox-1C launch opportunity. Peter Portanova, W2JV in a separate session that followed the AMSAT Forum, gave his talk, "How to Work the Amateur FM Satellites with your HT" to an overflow crowd.



The reaction of the workshop attendees was universally positive with many stopping by the AMSAT booth during the exhibit hours to thank us for putting on the workshop. Indeed, a number of individuals joined AMSAT, purchased Arrow Antennas (which we had available) and other items.

The booth was very popular overall, with our satellite display (OSCAR-1, AO-7, Fox-1A model) and a team of people anxious to answer questions. A number of students and young people were introduced to satellites. Both Patrick, WD9EWK, and Peter, W2JV, gave satellite demos on Friday and Saturday. Patrick managed a QSO with the ISS on Saturday morning as well as the astronauts had been alerted to the ARRL Centennial Convention.

Our workshop and booth operations team at Hartford consisted of E.Mike McCardel, KC8YLD (VP-Educational Relations), Burns Fisher, W2BFJ (Fox-1 Software Team Co-Leader), Patrick Stoddard, WD9EWK (Director-Field Operations), Joe Spier, K6WAO (Director-Educational Relations), Peter Portanova, W2JV (Area Coordinator and AMSAT's Congressional Liaison), and me. Adele Portanova, KD2CYL, kept tabs on our booth activities, provided significant 'schlepping' expertise, and ably assisted us. The team started organizing our participation starting in February 2014, and we spent considerable time preparing our presentations and the logistics. The hard work and thorough preparation paid off. My thanks to our intrepid volunteers for providing a first class presence at the ARRL Centennial Convention.

BoD Election

Ballots were mailed to AMSAT members on July 15 in accordance with AMSAT's By-Laws. Unfortunately, the envelope containing the ballot, candidate's statements, Symposium registration and a letter from the AMSAT Board of Directors has our old address as the return address. Likewise, the return envelope that was provided also has the old address as the recipient's address. Our printer has apologized for the error. However, the ballot itself has the proper address. Fortunately, the US Postal Service will continue to forward AMSAT's mail to our current address until next May, so any ballots mailed to the old address using the provided envelope will be forwarded to the correct address.

That said, ballots are due by September 15, 2014 in order to be counted. This means that should you use the provided return envelope, it is your responsibility to allow sufficient time for your ballot to be returned the AMSAT office. You may want to simply mail the ballot as a post card or use an envelope where you use the proper address as shown on the ballot itself and which is properly printed on the BoD letter, the Symposium registration form, and the 2014 Symposium shirt order form.

I encourage you to take the time to review the candidate's statements and make your selection of four of the eight listed candidates. Voting is

one of the benefits of AMSAT membership and provides an avenue for you to influence the future of AMSAT. Vote when you review the contents of what has been mailed to you; please don't procrastinate as it may result in you missing the deadline.

AMSAT Space Symposium

In the same envelope as the BoD ballot are materials pertaining to the 32nd Space Symposium and Annual Meeting that takes place the weekend of October 10-12, 2014 at the DoubleTree by Hilton Baltimore-BWI Airport in Linthicum, MD. We're also celebrating AMSAT's 45th anniversary. Frank Bauer, KA3HDO, chairs the Symposium Committee; his team is busy making plans for an outstanding event. Details may be found on the AMSAT website and you may register either by using the enclosed form or using the AMSAT Store.

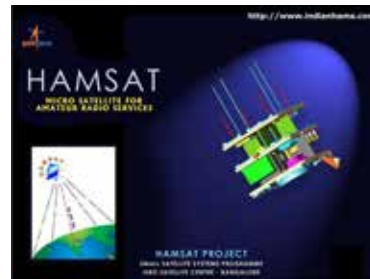
A reminder that proposals for papers, symposium presentations and poster presentations are invited on any topic of interest to the amateur satellite community. The symposium committee requests a tentative title of your presentation as soon as possible, but no later than August 1. The final copy must be submitted by September 15 for inclusion in the printed proceedings. Abstracts and papers should be sent to Dan Schultz at:

n8fgv@amsat.org

Along with the presentations and other events that typically take place at Symposium, there is also a special tour being planned on Monday, October 13 of the Udar Hazy Air and Space Museum at Dulles. You may want to make your travel plans accordingly as the museum is worth seeing. Details are still being developed, so check the AMSAT website for updated information. I also understand that the ARISS Operations Team is also planning a meeting on Sunday.

Prior to the Symposium is the AMSAT BoD meeting on Thursday, October 9 and Friday morning before the Symposium begins that afternoon. The meeting is normally open, but we typically go into closed session for a portion of Friday morning. See ya at Symposium!

HAMSAT VO-52 Decommissioned After 10 Years On-Orbit



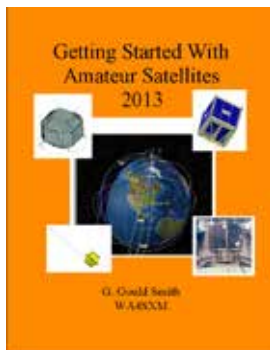
Mr. R. Suresh, HAMSAT VO-52 Mission Director, at India's ISRO Satellite Centre, reported that HAMSAT, the first small satellite by ISRO has been decommissioned after nearly a decade of service to the world ham community.

A true masterpiece among small satellites, designed for one year mission life, but exceeded all expectations by serving for almost 10 years. A truly autonomous satellite, with "zero maintenance" in terms of mission operations, it provided a springboard to test many new concepts such as BMU. Li-ion based power system, automatic spin rate control and auto-SAOC for maintaining the satellite attitude without any ground commanding.

HAMSAT, known as "OSCAR-52", among the amateur operators has been very popular because of its highly sensitive receiver and strong transmitter. Indian radio amateurs on many occasions conveyed to us that they have been greatly honored to share the adulations showered on ISRO and India by the international radio amateur for gifting this wonderful satellite HAMSAT.

I take this opportunity to applaud the HAMSAT teams at ISAC, ISTRAC and other centres for their efforts and support, which has made ISRO proud among the ham users across the globe.

Mani, VU2WMY, at the ISRO Upagrah Amateur Radio Club, VU2URC, in Bangalore wrote, "HAMSAT VO-52 succumbed in space on July 11, 2014, while she was on her 49,675th orbit, due to the failure of on-board lithium ion batteries that have met their end of life." HAMSAT VO-52 will always be remembered by all of us here in ISRO as one of the greatest satellites of ours. Nevertheless, at this point of time, on behalf of the world amateur radio fraternity, we thank each and everyone who contributed to the great success of HAMSAT."



The latest version of Gould's book is available in the AMSAT Store ...
<http://store.amsat.org/catalog/>



AMSAT is excited to announce a launch opportunity for the Fox-1C Cubesat. AMSAT has teamed with Spaceflight Inc. for integration and launch utilizing Spaceflight's SHERPA system to a sun-synchronous orbit in the third quarter of 2015.

Fox-1C is the third of four Fox-1 series satellites under development, with Fox-1A and RadFXsat/Fox-1B launching through the NASA ELaNa program. Fox-1C will carry an FM repeater system for amateur radio use by radio hams and listeners worldwide. Further details on the satellite and launch will be made available as soon as released.

AMSAT has an immediate need to raise funds to cover both the launch contract and additional materials for construction and testing for Fox-1C. We have set a fundraising goal of \$125,000 to cover these expenses over the next 12 months, and allow us to continue to keep amateur radio in space.

Donations may be made through the AMSAT webpage at www.amsat.org, by calling (888) 322-6728 or by mail to the AMSAT office at 10605 Concord Street, Kensington, MD 20895, USA. Please consider a recurring, club, or corporate donation to maximize our chance of success with this mission. Also watch our website at www.amsat.org or follow us on Twitter at "AMSAT", or on Facebook as "The Radio Amateur Satellite Corporation" for continuing news and opportunities for support. AMSAT is a 501(c)3 non-profit corporation and donations may be tax-deductible.

Fox-1 Integration and Testing Report

AMSAT Vice-President Engineering, Jerry Buxton, NOJY reports the Fox-1 Engineering Unit is assembled, powered up, software loaded and now undergoing test. As of July 5, the engineering team reported that the testing is going well. Some problems were identified in both hardware and software. The software items were fixed as testing progressed. The hardware items were fixed starting on July 8 when it went back in the shop for some tweaks and upgrades. Testing resumed on July 15.

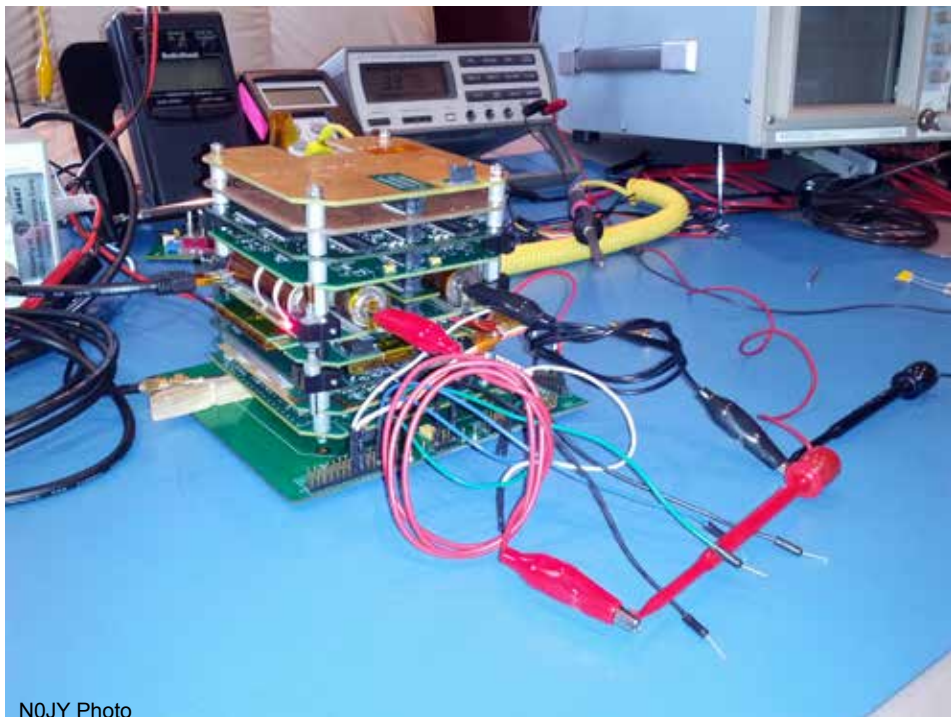
Jerry said, "We have also loaded the official Fox-1 Safe Mode and Transponder Mode voice IDs. Both are voiced by Veronica Monteiro, Tony Monteiro's daughter."

Read Jerry's article about the testing procedure in this issue of the AMSAT *Journal*.



Photo: Spaceflight Systems, Inc.

The QuadPack made by ISIS - Innovative Solutions In Space B.V. from the Netherlands is a versatile nanosatellite dispenser that combines the benefits of launching containerized payloads with configuration flexibility in terms of payload size, provided the payloads follow the popular CubeSat standard. The ISIS QuadPack offers a single system that can accommodate four separate 3-Unit launch tubes, or two 6-Unit launch slots, or accommodate a single 12-Unit nanosatellite within the same outer envelope. These ISIS QuadPack dispensers will be used with Spaceflight's SHERPA system. SHERPA is capable of deploying a volume of 84U of cubesats on the initial flight. It is capable of carrying up to 1,500 kilograms total although the first mission, set for the third quarter of 2015, will fly with 1,200 kilograms.



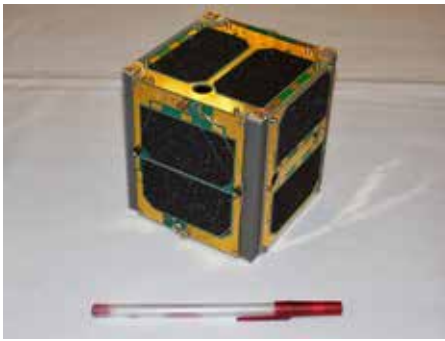
NOJY Photo

The Fox-1 Engineering Unit is assembled, powered up on the bench.

Fox-1 Frequencies		
Fox-1A	Uplink	435.180 MHz FM voice
	Downlink	145.980 MHz FM voice
Fox-1B/RadFXsat	Uplink	435.160 MHz, FM voice
	Downlink	145.960 MHz, FM voice
Fox-1C, Fox-1D	These frequencies will be announced when IARU coordination is completed.	
FSK Telemetry	FSK telemetry downlink simultaneous with voice operation; or, high speed data downlink up to 9600 bps	



You'll be on the air with this new satellite using your 2 meter/70 cm dual-band HT and a portable antenna ...



- Projected Launch: Depending on NASA ELaNa flight availability.
- Standard 1U (One Unit) CubeSat.
- Size: 10 cm X 10 cm X 10 cm.
- Orbit: Depending on NASA ELaNa flight availability.
- RF: nominally 400 mW EIRP, U/V (Mode B) FM only.
 - Uplink: 435.180 MHz FM voice
 - Downlink: 145.980 MHz FM voice
 - FSK telemetry downlink simultaneous with voice operation.
 - High speed data downlink up to 9600 bps
- University scientific payloads
 - Low energy proton radiation experiment
 - JPEG camera experiment planned for Fox-1B or Fox-1C.
 - Micro gyroscope experiment
- Power source: NiCad batteries and fixed solar arrays.
- Deployable 2 meter and 70 cm antennas.

Fox-1 is the first in a new generation of AMSAT-NA CubeSats. Fox-1A is planned for launch as part of the NASA ELaNa mission slots. RadFXsat/Fox-1B has been selected for the NASA ELaNa program and is waiting for a mission assignment. Fox-1C is planned for launch in 3Q 2015 on the SpaceFlight Systems initial SHERPA flight.

Since the voice portion of the satellite will operate as a cross-band FM repeater you can use the radio and antenna you have for operation on FM satellites such as AO-51 or SO-50. Recommended equipment includes 2m/70cm radio with full-duplex operation; an alternative option includes using two half-duplex radios - one to transmit and the other to receive, and a small directional antenna.

The use of a 2m downlink will make the satellite approximately 6 dB stronger than the usual 70 cm downlink with the same transmitter power.

Continent-wide Coverage Using Your HT

Because the orbit is elliptical, the size of the reception footprint will vary throughout the orbit. At apogee, its coverage will approximate that of SO-50. Stations appropriately located will often be able to make intercontinental contacts, with full coverage of a continent being typical.

Fox-1, like most LEO satellites, will have a group of 2-3 passes lasting 5-15 minutes, each approximately 90 minutes apart, followed by another group of 2-3 passes later in the day. Web-based satellite tracking aids will get you started to calculate when Fox-1 is in range of your station.

Fox-1 is expected to be an excellent satellite for both operations and demonstrating the adventure of amateur satellites, and will on some days be available during normal school hours for student access to the telemetry downlink of the experiment data.

Science on-board

AMSAT has been awarded the launch opportunity by NASA's Educational Launch of Nanosatellites (ELaNa) program because of our value to their Science, Technology, Engineering, and Mathematics (STEM) initiative.

In addition to the amateur operations, there are a number of scientific experiments on board the spacecraft. Vanderbilt University is providing a Low Energy Proton radiation experiment, and Penn State University – Erie a gyroscope experiment. Telemetry will normally be transmitted in the subaudible 10-200 Hz range usually used for PL tones in terrestrial repeaters, allowing simultaneous voice and 200 bps data operation. The high speed (up to 9600 bps) mode downlink will be used periodically to send large files and for test purposes.

Find out more at: <http://www.amsat.org>



Tom, KA6SJP portable satellite operation in northern Nevada

Fox-1 Operating Hints

- Use a small beam like the Arrow Antennas Yagi or Elk log periodic
- Select the 67.0 Hz PL/CTCSS for transmit
- Use no more than 5 watts with a modest gain antenna
- Open your Squelch all the way
- Use a combo headphone/boom mike to reduce feedback/echo (and give you a free hand)
- Use a printout or your laptop, smartphone or tablet to track the satellite path over your QTH
- Have an audio recorder to log the QSO (it is difficult to talk, point the antenna, do PTT operation, remember the callsign, and think - all at the same time)
- Set your transmit and receive frequencies in memories to make tuning easier
- Twist the antenna as the pass progresses to improve signal strength



AMSAT was represented at the ARRL Centennial Celebration and National Convention in Hartford Connecticut July 17 through 19.

Starting on Thursday an AMSAT team presented the all day Training Track: "An Introduction to Amateur Satellites." President Barry Baines, WD4ASW, facilitated the all day satellite training track event which began at 8:30 am and ran through 4:30 pm. Baines explained, "The training session is to serve as a 'soup to nuts' approach to getting started with working amateur radio satellites."

The presentations made by AMSAT at the all-day Thursday Training Tracks during the ARRL Centennial Celebration and National Convention in Hartford Connecticut July 17, 2014 included:

- "Amateur Satellite History and AMSAT Strategic Direction" by Barry Baines, WD4ASW — AMSAT President
- "Orbital Mechanics" by Joe Spier, K6WAO — AMSAT Director for Education
- "Satellite Tracking and Tracking Software with an emphasis on SATPC32" by E. Michael McCardel, KC8YLD — AMSAT V.P. Educational Relations
- "Station Configuration and Satellite Operation"
 - 'Easy Sats, FM Birds' by Peter Portanova, W2JV — AMSAT Area Coordinator
 - 'CW and SSB Birds and telemetry' by Patrick Stoddard, WD9EWK — AMSAT Director Field Operations
- "Overview of AMSAT's Fox-1 Satellite" by Burns Fisher, W2BFJ — AMSAT Fox-1 Software Team Co-Leader

Copies of the presentations can be accessed and downloaded from the AMSAT web, see:

http://www.amsat.org/?page_id=2914

Throughout the weekend AMSAT staffed Booths 500 and 501 in the Convention Hall. The booth featured the legacy of amateur radio in space with prototypes and models of OSCAR-1, AO-7, and Fox-1 on display. Satellite demonstrations were popular and were well attended.



Joe Spier, K6WAO; Patrick Stoddard, WD9EWK; and Burns Fisher, W2BFJ, shown discussing AMSAT Fox-1 with booth visitors.



Peter Portanova, W2JV; Adele Portanova, KD2CYL; and Barry Baines, WD4ASW, staff the table and are surrounded by interested hams.



The WRAPS Rotor was among the ARRL and AMSAT Technology on display.





AMSAT Satellite Training Track presenters posed at the completion of the Satellite Workshop (L-R) Joe Spier, K6WAO; Barry Baines, WD4ASW; Burns Fisher, W2BFJ; Patrick Stoddard, WD9EWK; Peter Portanova, W2JV; and E.Mike McCardel, KC8YLD.



Barry, WD4ASW, gave an “AMSAT Status Report” at the AMSAT Forum on Friday. Barry also announced AMSAT’s agreement to launch Fox-1C during the Forum. He spoke about, “Amateur Satellite History and AMSAT Strategic Direction” at the Satellite Workshop on Thursday.



Burns, W2BFJ, presented about “Overview of AMSAT’s Fox-1 Satellite” at the Satellite Workshop on Thursday.



Peter, W2JV, spoke on “Easy Sats, FM Birds” at the Workshop and how to work them with an HT after the Forum.



Joe, K6WAO, shown presenting “Orbital Mechanics” at the Satellite Workshop.



“Satellite Tracking and Tracking Software with an emphasis on SATPC32” was presented by E.Mike, KC8YLD, during the Satellite Workshop.



Patrick, WD9EWK, presented on “CW and SSB Birds and Telemetry”.

He also provided satellite demonstrations, including a contact with astronaut Reid Wiseman, KF5LKT, via NA1SS aboard the International Space Station.

At the conclusion of the Satellite Workshop, Patrick gave a demonstration working AO-7 from outside the convention center.

Watch for more photos and news from the Centennial Celebration in the next issue of the *AMSAT Journal*.



Alan Biddle, WA4SCA (wa4sca@amsat.org) AMSAT Corporate Secretary

AMSAT-NA Board of Directors Telecon Meeting, March 4, 2014.

The formal meeting was called into session by AMSAT-NA President Barry Baines, WD4ASW at 2105 EST.

Attending:

Directors:

- Barry Baines, WD4ASW
- Lou McFadin, W5DID
- Alan Biddle, WA4SCA
- Tom Clark, K3IO
- Mark Hammond, N8MH
- JoAnne Maenpaa, K9JKM

Others:

- Martha Saragovitz, Officer Manager
- Keith Baker, KB1SF/VA3KSF, Treasurer
- Frank Bauer, KA3HDO, Vice President-Human Spaceflight

Barry and Martha began by reviewing the options to move the AMSAT-NA offices, which was made necessary by the continuing deterioration of both the facilities and safety at the existing Sligo Avenue location. It was described as “decaying” and not being maintained by the new owners. After a detailed search, two potential locations have been identified: the Concord Office Center in nearby Kensington, Maryland, and office space in the Maryland Dental Center which is close to the existing AMSAT-NA offices. The first was recently renovated and is bright and clean. The second is being incrementally renovated and has some significant areas where work is still needed. Both are in substantially better condition than the existing facility and have professional, responsive management.

Due to the low occupancy of the Sligo Avenue building, AMSAT has been able to negotiate the same rent for 5 years. Barry explained that the new facilities would be somewhat more expensive than the existing site. When compared with the current rent adjusted for the normal area increases, the new rents will be in line. Both candidate locations will have yearly rent increases. While typical leases in the area are normally 5 years, Barry and Martha were able to negotiate a release clause with one management firm should changes in the office staff require a move outside the Washington, DC area. They will discuss this with the other firm if indicated. After a review of both properties, a selection will be

made based on facilities and costs.

The discussion moved on to the practical issues of a move. Due to the upcoming Dayton Hamvention, and the need to secure space while it is still available, it was decided that the move be targeted for April 15, 2014. This will require a review of the existing AMSAT-NA archives to minimize the amount of materials moved, as well as using a professional moving firm.

It was moved by Tom, seconded by Lou and Mark, and approved unanimously that “The AMSAT leadership is authorized to select and contract for new office space.”

The next discussion topic was the selection of a new firm to manage AMSAT-NA’s investment portfolio. The current firm, SEI, was chosen several years ago in a very different investing environment. Barry and Keith discussed their recent history and performance. After a thorough review of costs, performance, and communications with SEI, it was decided that a move to a firm more oriented to our size and requirements should be considered. After an extensive review, it was decided to move to Merrill Lynch, with which AMSAT-NA had a previous working relationship. Due to our 501(c)(3) status there will be no tax liabilities incurred.

It was moved by Tom, seconded by Lou, and unanimously approved that “AMSAT move their investment portfolio to Merrill Lynch.” This will require the approval of the AMSAT-NA President, Treasurer, and Corporate Secretary.

The final business items discussed were formal approval of the minutes of previous Board meetings:

It was moved by Barry, seconded by Lou, and approved unanimously that “The minutes of the 2013 Annual Board Meeting be approved as submitted.”

It was moved by Barry, seconded by Lou, and approved unanimously that “The minutes of the January 7, 2014 telecon Board meeting be approved as submitted.”

There being no further business, it was moved by Barry, seconded by Alan, and approved unanimously that the meeting adjourn at 2155 EST.

AMSAT-NA Board of Directors Telecon Meeting, April 1, 2014.

The formal meeting was called into session by AMSAT-NA President Barry Baines, WD4ASW at 2100 EDT.

Attending:

Directors:

- Barry Baines, WD4ASW
- Alan Biddle, WA4SCA
 - Mark Hammond, N8MH
 - JoAnne Maenpaa, K9JKM
 - Steve Coy, K8UD

Others:

- Martha Saragovitz, Officer Manager
- Keith Baker, KB1SF/VA3KSF, Treasurer
- Drew Glasbrenner, KO4MA, Vice President-Operations
- Steve Belter, N9IP
- Jerry Buxton, N0JY
- Bill Tynan, W3XO
- Perry Klein, W8PK

Barry began by explaining the two issues requiring a formal Board meeting. The first was the approval of his appointment of Jerry Buxton, N0JY to the position of AMSAT-NA Vice President for Engineering upon the passing of Tony Monteiro, AA2TX. Barry gave a brief summary of Jerry’s experience both with AMSAT-NA and his extensive engineering career, a detailed history having been provided earlier. It was moved by Barry, seconded by Mark, and unanimously approved that “Jerry Buxton, N0JY be approved as the new Vice President for Engineering.” Afterwards, several Board members expressed their thanks and congratulations to Jerry.

Barry move on to the second topic, the approval of the minutes of the previous Board meeting. There being no discussion, it was moved by Barry, seconded by Mark, and unanimously approved that “The minutes of the March 4, 2014 meeting be approved as submitted.”

There being no further business, it was moved by Barry, seconded by Alan, and approved unanimously that the meeting adjourn at 2107 EST.



2014 Candidates for the AMSAT-NA Board of Directors Election Announcement

Alan Biddle, WA4SCA
AMSAT Corporate Secretary

The 2014 candidates, in alphabetical order by last names are:

- Jerry Buxton, N0JY
- Tom Clark, K3IO
- Steve Coy, K8UD
- Drew Glasbrenner, KO4MA
- Frank Griffin, K4FEG
- Bryan Klofas, KF6ZEO
- Lou McFadin, W5DID
- JoAnne Maenpaa, K9JKM

Normally there would be 3 full Board seats open this year, plus two alternates. However, with the passing of Tony Monteiro, AA2TX (SK), there will be an additional full Board seat open to fill the remaining year of his term. This means that the top three recipients of votes will have two-year terms, the fourth most vote recipient will serve as full member for one year, and the fifth and sixth highest vote recipients will serve as first and second alternate respectively.

Ballots were mailed to the AMSAT-NA membership by July 15, 2014 and must be received at the AMSAT office by September 15, 2014 in order to be counted. Those sent outside North America were sent by air mail. If you have not received your ballot package in a reasonable time for your QTH, please contact the AMSAT office. Returned ballots should be sent as promptly as possible, and those from outside North American preferably by air mail.

After the ballots were mailed, we were notified by our printer that old stock return envelopes with our prior Silver Spring, MD address were inadvertently included. The ballot postcard and other documents have the correct Kensington, MD address. Mail sent to the Silver Spring address will be forwarded for several months by the post office to our new address. You may use either the envelope included in the packet, or your own envelope or address label to send the ballot to the current address:

AMSAT
The Radio Amateur Satellite Corporation
10605 Concord Street
Kensington, MD 20895
USA

Election of board members is both an obligation as well as an opportunity by our membership to help shape the future direction of AMSAT. Please take the time to review the candidate statements that will accompany the ballot and determine who you wish to see on the Board. You have the option to vote for up to four candidates.

AMSAT is the North American distributor of **SatPC32**, a tracking program designed for ham satellite applications. For Windows 95, 98, NT, ME, 2000, XP, Vista, Windows 7.

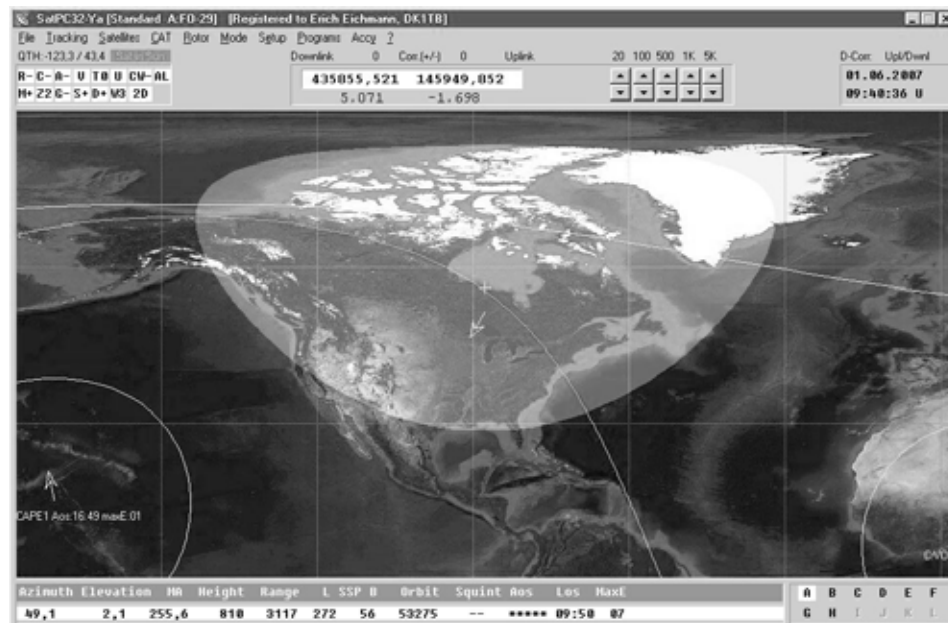
Version 12.8b is compatible with Windows 7 and features enhanced support for tuning multiple radios.

Version 12.8b features:

- SatPC32, SatPC32ISS, Wisat32 and SuM now support rotor control of the M2 RC-2800 rotor system.
- The CAT control functions of SatPC32, SatPC32ISS and Wisat32 have been expanded. The programs now provide CAT control of the new Icom transceiver IC-9100.
- The main windows of SatPC32 and SatPC32ISS have been slightly changed to make them clearer. With window size W3 the world map can be stretched (only SatPC32).
- The accuracy of the rotor positions can now be adjusted for the particular rotor controller. SatPC32 therefore can output the rotor positions with 0, 1 or 2 decimals. Corrections of the antenna positions can automatically be saved. In previous versions that had to be done manually.
- The tool 'DataBackup' has been added. The tool allows users to save the SatPC32 program data via mouse click and to restore them if necessary. After the program has been configured for the user's equipment the settings should be saved with 'DataBackup'. If problems occur later, the program can easily restore the working configuration.
- The rotor interfaces IF-100, FODTrack, RifPC and KCT require the kernel driver IOPort.SYS to be installed. Since it is a 32-bit driver it will not work on 64-bit Windows systems. On such systems the driver can cause error messages. To prevent such messages the driver can now optionally be deactivated.
- SuM now outputs a DDE string with azimuth and elevation, that can be evaluated by client programs. Some demo files show how to program and configure the client.

Minimum Donation is \$45 for AMSAT members, \$50 for non-members, on CD-ROM. A demo version may be downloaded from <http://www.dk1tb.de/indexeng.htm>. A registration password for the demo version may be obtained for a minimum donation of \$40 for members and \$45 for non-members. Order by calling 1-888-322-6728.

The author DK1TB donated SatPC32 to AMSAT. All proceeds support AMSAT.



Keith Baker, KB1SF / VA3KSF
kb1sf@amsat.org

AMSAT's presence at the annual Dayton Hamvention® is always a mixture of the new and surprising as well as a chance to meet old friends and make new ones. And, just like in previous years, this year's Hamvention® was no exception.

Arguably, the Dayton Hamvention® is one of the largest (if not THE largest) gathering of amateur radio operators in the world. It routinely attracts visitors from all over North America and a goodly number from the other continents (except, of course, Antarctica) on the planet. Clearly, there is nothing else quite like "Dayton" in the fascinating world of amateur radio.

Having lived and worked in Dayton for many years of my professional life, I'm continually asked, "Why Dayton"?

I chalk it up to a number of factors.

First of all, the Hamvention® has been sponsored by the Dayton Amateur Radio Association (DARA) since 1952 and has been continually housed in the Hara Arena complex since the early 1960s. DARA is also one of the USA's oldest and largest amateur radio clubs, having received its American Radio Relay League (ARRL) Affiliated Club Charter signed by none other than Hiram Percy Maxim himself! DARA's current active membership is also nearing 1000. And some 400 of those members (and a number of others) graciously volunteer their time and talents to produce the annual event.

Also, besides the Wright Brothers, Dayton is home to a number of inventors, and at one time boasted the largest number of US Patents per capita in the United States. Over the years, it's also been home to a number of "high tech" companies, including a number of General Motors manufacturing plants, the National Cash Register Company and the Mead Corporation. Also, one of the US Air Force's most populous air bases (Wright-Patterson) is home to the (now) Air Force Material Command. Wright-Patt also hosts the unit that oversees the research, development, purchase and modification of *all* the Air Force's new (and old) air-breathing weapons systems, including such (now) famous aircraft as the B-2 Stealth Bomber, the F-22 fighter and the brand new F-35.

Another major factor is geography. If you draw a "one day drive" circle around



The AMSAT Booth occupied both sides of the aisle with areas dedicated to Engineering, the Beginner's Corner, and merchandise. (all photos by the author unless noted).

Dayton on a map, you will quickly note that that circle encompasses about 1/3 of the population of North America, including such large metro areas as Detroit, Chicago, New York, Toronto, Atlanta, St. Louis, Boston, Louisville, Memphis, Milwaukee, Indianapolis, Kansas City, Philadelphia, Baltimore and Washington, DC. Clearly, the Hamvention® benefits from a "perfect storm" of talented, high-tech, people from the local area, a thriving amateur radio club

of nearly 1000 members, an absolutely ideal geographic position and a venue that, in many ways, has expanded and evolved over the years just for this one show.

As in past years, AMSAT's presence at Dayton started with a visit to AMSAT's storage locker on the Thursday before the event to load various booth items into a rental van. Then came the absolutely massive logistical challenge of unloading,



re-assembling and setting up AMSAT's various booths at the Hara Arena complex. As in past years, AMSAT occupied a number of booth spaces in the Ball Arena area of the Hara complex. Our booths were located adjacent to the extensive ARRL Expo area and just a quick walk from our outdoor AMSAT satellite demonstration area that the Hamvention® organizers graciously sets up for us every year in the adjacent parking lot.

An addition to this year's AMSAT booth was the "Beginner's Corner". It was staffed by some of the best satellite operators in the country, including John Papay, K8YSE (1,406 grids confirmed), Patrick Stoddard, WD9EWK, Drew Glasbrenner, KO4MA (1,036 grids), Doug Papay, KD8CAO (993 grids), Paul Stoetzer, N8HM, Mark Hammond, N8MH, and Stefan Wagener, VE4NSA. The goal was to give someone interested in operating satellites for the first time a place to go to ask questions, and to learn about basic operating techniques and the needed radios and antennas.



Shown in the merchandise side of the AMSAT Booth (left to right) are Alan, WA4SCA; Mark, N8MH; and Steve, N9IP.



New to our booth design this year was AMSAT's Satellite Beginner's Corner

Once again at this year's Dayton Hamvention®, the AMSAT booth had an abundance of new (and older) hardware and software on display. As well there was some new printed material and fashions to add to AMSAT's continuing line of wardrobe items.

Fashion accessories included new AMSAT Golf and T-shirts as well as hats and stickers. A wideband VHF/UHF receiver preamp – designed and built by Mark Spencer, WA8SME was again offered. Described by Mark, ARRL's Education and Technology Program Director for the Teacher's Institute in a recent QST article, this low-cost preamp is great for portable satellite operations with a handheld antenna.



Members visible in this photo include (left to right) Dave, W8AAS; Steve, N9IP; Dave, AA4KN; Doug, KD8CAO; Chuck, K3PER (looking away from the camera), Alan, WA4SCA; Martha (seated), and Barry, WD4ASW (seated).



Martha shows what the well-dressed satellite operator will be wearing this year.



Also included in AMSAT's Dayton offerings was the compiled DVD of the "Proceedings of the 30th AMSAT-NA Symposium and Annual Meeting" along with all symposium papers (1986 to present) and a Fox-1 Satellite Cardboard Model Kit – designed by Stefan Wagener, VE4NSA. The latter is a 1:1 scale cardboard model of the Fox-1 CubeSat. The model is printed in color on heavy stock paper, including all components. The instructions are carefully prepared to allow for easy assembly requiring scissors, glue etc. Depending on experience, assembly takes approximately 10+ hours.



The AMSAT engineering area this year once again included an updated engineering model of the FOX-1A satellite along with a working model of the satellite's internal housekeeping unit. This engineering prototype was also transmitting greetings from FOX-1A to passersby who tuned their HTs to 145.920 MHz.

Besides the new wardrobe items, updated items from past years included a revised and updated "2014 Getting Started with Amateur Satellites" book, and an updated (and laminated) "2014 Amateur Satellite Frequency Guide" which was also used as a premium for new and renewing memberships completed at the booth. Assembled and tested LVB Trackers with the latest firmware and new OLED displays in enclosures and FTDI serial to USB modules were also proffered.



Fox-1 will carry an inscription to orbit which reads, "In Memory of Anthony Monteiro, AA2TX. May you rest with the stars."

Software offerings included the very latest editions of *SatPC32* and *MacDoppler PRO* tracking software.

The AMSAT engineering area this year once again included an updated engineering model of the FOX-1A satellite along with a working model of the satellite's internal housekeeping unit (the IHU...the "brains" of the satellite), the transmitter board, the receiver board, and the power supply board. This engineering prototype was also transmitting greetings from FOX-1A to passersby who tuned their HTs to 145.920 MHz. Additional FOX prototype circuit boards were also on display in the engineering booth.



AMSAT Vice-President Engineering Jerry Buxton, N0JY shows the engineering model of the Fox-1 satellite.

Other "hands-on" satellite opportunities at Hamvention® included multiple satellite demonstrations that took place right outside of the Ball Arena entrance. Led by Keith Pugh, W5IU, and supported by a host of other volunteers, a number of contacts were made on various LEO satellites during the weekend. The demonstration provided an opportunity for people in attendance to make contacts themselves and to gain a better understanding of what comprises an amateur satellite ground station.

Over the years, AMSAT has sponsored a variety of social events in Dayton. In the last few years, AMSAT members and friends have gathered at the Tickets Pub and Eatery in Fairborn on Thursday evening after the



AMSAT Secretary Alan Biddle, WA4SCA served as the forum moderator and, as in past years, the venue was filled to overflowing with several people standing around the side of the room.

The AMSAT Forum this year included seven speakers, covering the usual topics about AMSAT operations and plans, but also new developments for future spacecraft. The 2 hrs and 15 minutes allotted to the forum is one of the Hamvention's longest.

Video from a number of the 2014 AMSAT forums (and other activities at Dayton) have also been captured and uploaded onto the AMSAT Web page as well as YouTube:

<http://www.amsat.org>
<http://www.youtube.com/AMSATNA>

Then click on those videos that may be of interest to you.



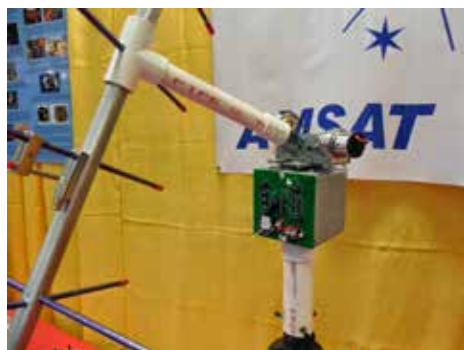
E. Mike McCardel, KC8YLD: "Amateur Satellites, Education, and YOU!" E.Mike, AMSAT's VP of Educational Relations, also spoke about the educational partnership among AMSAT, the ARRL, NASA and various universities. He noted that education was quickly becoming critical for future rides to space for AMSAT's satellites.



Barry Baines, WD4ASW: "AMSAT Status Report". AMSAT President Barry Baines highlighted current activities within AMSAT and discussed some of the challenges facing the organization



Jerry Buxton, N0JY: "FOX-1 Status Update". Jerry, AMSAT's VP of Engineering, discussed the design and current status of AMSAT's newest project and AMSAT's plans for follow-on CubeSats.



Drew Glasbrenner, KO4MA: "AMSAT Satellite Operations". Drew, AMSAT-NA Operations Vice President, discussed AO-73 and other current satellites, as well as those planned for launch in the next year.



Frank Bauer, KA3HDO: "ARISS Program Status". As AMSAT's Vice President for Human Spaceflight, Frank discussed the latest status of the ARISS program including the shifting interfaces among NASA, AMSAT and the ARRL.



Howard Long, G6LVB: "The FUNcube Satellite". Speaking as an AMSAT-UK Committee Member, Howard discussed the AMSAT-UK's "FUNcube" satellite project including their plans for educational outreach and further Amateur Radio CubeSat development in the United Kingdom.

Mark Spencer, WA8SME: "New Equipment for ARRL's Education and Technology Program". Mark, ARRL's Director of Education and Technology, discussed the joint efforts between the ARRL and AMSAT to develop educational STEM (Science, Technology, Engineering and Math) activities and some of the new equipment now being offered for that effort. Mark's WRAPS rotor is shown on the left.



AMSAT booth is assembled around 6:30 PM. The Ticket's management graciously provides us a separate area in the pub where everyone has a chance to relax and refresh after the day's efforts.

Then, once again on Friday night, over 100 members and guests attended the joint TAPR/AMSAT dinner held at the Kohler Presidential Banquet Center in Kettering. TAPR President Steve Bible, N7HPR, was this year's moderator. We began the evening with cocktails and conversation, followed by an excellent buffet dinner. Afterwards the featured speaker, AMSAT's own Tom Clark, K3IO, gave a talk entitled: "Sixty Years a Slave to Amateur Radio". Tom spoke of how his love for Amateur Radio has intertwined over the years with his most successful career as a NASA astro-geophysicist. As some of you may also know, Tom, along with fellow AMSAT experimenter Bob McGwier, N4HY, developed the very first amateur DSP hardware, including a number of DSP modems. He also developed the uplink receivers and the spacecraft LAN architecture used on all the Microsats (Oscars 16, 17, 18, 19, 26, 27 and 31). Tom's complete talk has been uploaded to the AMSAT YouTube page at:

<http://www.youtube.com/AMSATNA>.

Needless to say, this was the most successful Hamvention® for AMSAT in recent memory, unhampered by relatively poor weather for two of the three days, but with another solid Hamvention® turnout nonetheless. Official attendance at this year's show was around 25,000, about the same as it has been in previous years. Clearly, the Dayton Hamvention® remains "the place to be" for the movers and shakers in amateur radio. Of course, for AMSAT, as well as any exhibitor, Hamvention® was not over until long after the attendees were well on their way home with their new "toys". Finishing up the show included packing and shipping satellite components and materials, as well as breaking down the booth and returning its various components to our local storage facility to await Hamvention® 2015. And, once again, AMSAT will be there.

We had 52 people help us this year, but could have easily used more. Make your plans *now* to join us next May in Dayton!



Thank You to our Booth Volunteers!

Our booth volunteers served under the expert leadership of our "Booth Czars" Steve, N9IP and Alan, WA4SCA, and of course, our hard-working AMSAT Office Manager, Martha. Our crew, many of whom later spent a good portion of their Dayton 2014 experience manning AMSAT's booth, included:

- Don Agro, VE3VRW
- Barry Baines, WD4ASW
- Kate Baker, KB1OGF
- Keith Baker, KB1SF
- Frank Bauer, KA3HDO
- Steve Belter, N9IP
- Alan Biddle, WA4SCA
- Jonathan Brandenburg, KF5IDY
- Jerry Buxton, N0JY
- Joe Camilli, N7QPP
- Steve Coy, K8UD
- Ed Collins, N8NUY
- Dave Dull, WB9BRX
- John Eberenz, N0RES
- Burns Fisher, W2BFJ
- Drew Glasbrenner, KO4MA
- Robin Haighton, VE3FRH
- Mark Hammond, N8MH
- Bill Hulse, W5NI
- Dave Jordan, AA4KN
- Steve Kenwolf, WH6BSZ
- Patrick Kilroy, N8PK
- Michael Kirkhart, KD8QBA
- Taylor Klotz, K4OTZ
- John Kludt, K4SQC
- Ed Krome, K9EK
- Zach Leffke, KJ4QLP
- Howard Long, G6LVB
- Stephan Lubbers, KE8FP
- Nancy Makley, KC8GYW
- Mike McCann, KB2GHZ
- EMike McCardel, KC8YLD
- Lou McFadin, W5DID
- Doug Papay, KD8CAO
- John Papay, K8YSE
- Chuck Pinkham, K3PER
- Keith Pugh, W5IU
- Douglas Quagliana, KA2UPW
- Bill Reed, NX5R
- Dan Schultz, N8FGV
- Jay Schwartz, WB8SBI
- Mike Seguin, N1JEZ
- John Shew, N4QQ
- Mark Spencer, WA8SME
- Joe Spier, K6WAO
- Patrick Stoddard, WD9EWK
- Paul Stoetzer, N8HM
- Dave Taylor, W8AAS
- Stefan Wagener, VE4NSA
- Bill Watt, K4BLL
- Mike Young, WB8CXO.



Some of the crew at the Tickets Gathering (Left to Right) Drew, KO4MA; Steve, N9IP; Barry, WD4ASW; EMike, KC8YLD; Joe, K6WAO; Janet (Frank's XYL); Frank, KA3HDO; Burns, W2BFJ; Alan, WA4SCA; Mark, N8MH.



AMSAT at Dayton Photo Gallery



Tom Clark, K3IO, gave a talk entitled: "Sixty Years a Slave to Amateur Radio". Tom spoke of how his love for Amateur Radio has intertwined over the years with his most successful career as a NASA astro-geophysicist.



Steve Belter, N9IP (left), shown with Bob McGwier, N4HY (right) at the banquet. Tom, K3IO, along with Bob, developed the very first amateur DSP hardware, including a number of DSP modems. He also developed the uplink receivers and the spacecraft LAN architecture used on all the Microsats (Oscars 16, 17, 18, 19, 26, 27 and 31).



AMSAT President Barry Baines, WD4ASW (left) with TAPR President Steve Bible, N7HPR (right) at the TAPR/AMSAT dinner held at the Kohler Presidential Banquet Center in Kettering. Steve was this year's moderator.



Damon Runion, WA4HFN (right) presented John Papay, K8YSE (left) with the StarCom Group's Grid MasterAward #1 for having worked and confirmed all the 488 U.S. grids by means of an amateur satellite.



AMSAT Board Members and Officers at the Banquet included (left to right) VP-Operations Drew, KO4MA; Board Member Mark, N8HM; AMSAT President Barry, WD4ASW; and VP - Educational Relations E.Mike, KC8YLD.



Michael, KD8QBA, shown explaining the satellite station prior to a satellite pass. The dual-FT817 radio configuration is visible. One radio was used for the uplink and the second radio was used to receive the downlink providing full-duplex operation.



The satellite demonstrations at Dayton this year included all available passes during the show hours on Friday, Saturday, and Sunday during the weekend of May 16, 17, 18. The demonstration area was located a short walk from the AMSAT booth, just outside of the Ball Arena entrance. AMSAT volunteers explained their equipment and how to make contacts. During the pass as many two-way contacts as possible were made FO-29, VO-52, SO-50, AO-07, and AO-73. Additionally, signals from ISS, AO-73, HO-68 also provided listen-only opportunities to demonstrate telemetry capture, Doppler shift, and antenna performance. Satellite pass times were posted in the satellite demonstration area outside and at the AMSAT booth inside.

(Above left) Keith, W5IU demonstrated the homebrew "Cheap Yagi" antennas. The demonstrations also included the Elk and Arrow antennas.

(Above, right) Paul, N8HM and Keith, W5IU at the satellite station outside of the Ball Arena.



Michael had an engineering model of the \$50Sat on display. He also received telemetry in the demo area from the satellite.

Thanks to our satellite demonstrator team! Satellite operators included Keith, W5IU; Paul, N8HM; Patrick, WD9EWK; John, K8YSE; Doug, KD8CAO; and Michael, KD8QBA, who also provided 50SAT/MO-76 demonstrations.

Bill, W5NI; and John, N0RES handled set/up and teardown each day.

Additional beginner area and demonstration area support was provided by Mark, N8HM; Drew, KO4MA; and Pat, N8PK.



Jerry Buxton, N0JY - AMSAT Vice President Engineering
n0jy@amsat.org

Fox-1 is not only new territory for AMSAT in that it is our first CubeSat. The engineering process in developing and building Fox-1 is also breaking new ground.

While taking advantage of common file repositories with version control and online meetings helps bring volunteers from across the United States together to work on Fox-1, other new possibilities taking advantage of the Internet has been introduced in the testing of Fox-1.

In the past, as you may well know from our history, satellites have been built in facilities ranging from a team member's garage or basement to clean rooms that AMSAT owned (Photos 1,2). With the decrease in size of the cubesat as compared to our recent endeavors, the ability to test the whole satellite on a tabletop in the comfort of one's own ham shack is now possible (Photo 3). Imagine having all of this testing going on *inside* the house, with XYL consent!

The ability to do the work in my shack/office offers the possibility of having convenient use of multiple PCs, telephones, online teleconferencing, and file sharing. My shack satellite radios and FUNcube Dongle Pro Plus are at hand for testing the transponder, monitoring the downlink, and capturing SDR recordings of the downlink for software analysis and development.

In an effort to maximize the efficient use of resources and money in getting Fox-1 and her sisters into orbit, we have introduced the use of some modern conveniences that allow an entire roomful of engineers to be present for the testing without traveling and staying away from home. This allows the team to be at their work area or PC as well, so that they can work on solutions to problems encountered in testing with the comfort and speed of their own equipment. It also saves thousands of dollars on travel and lodging.

The gatherings are based on AMSAT's GoToMeeting account, where the team members can come and go to an ongoing meeting that is available whenever the testing is underway. They may be actively participating, or just listening in to the testing that day. The Board of Directors and Senior Officers can drop in to keep up on the progress. The ability to share screens for reviewing documents and working on solutions expedites the process of reviewing requirements and changes.



Photo 1 - AO-51 "flat sat" model under test



Photo 2 - Everyone needed to be present at the workbench during AO-51 testing and debugging

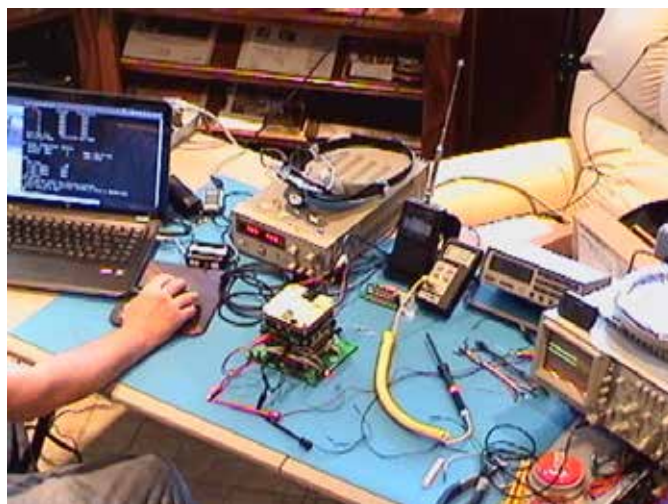


Photo 3 - Fox-1 Engineering Unit under test in the N0JY shack

But the addition of two technologies, one a common amateur radio application and the other a donation by a local ham, have added a level of convenience not used before.

Echolink is the application commonly used by hams for remote IP access to repeaters throughout the world and for conferencing. AMSAT has a conference that is opened up for events such as the annual meeting at the Symposium. Echolink allows an amateur radio operator to set up a Link station, which is in effect a remote control of their transceiver.

We have put that ability to use for our testing of Fox-1 in setting up an Echolink Link “N0JY-L” at my QTH, which gives the Fox Team members the ability to listen to and even talk through the Fox-1 transponder through my Yaesu FT-817 while the testing is underway (Photo 4).

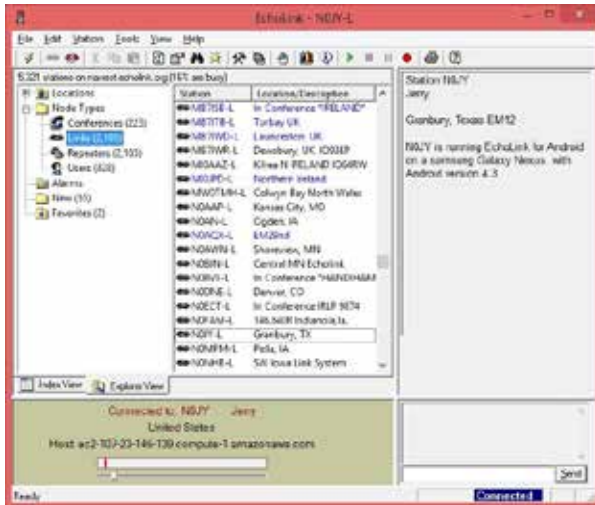


Photo 4 – Echolink N0JY-L

SDR recordings of the downlink received with my FUNCube Dongle Pro Plus give the software developers full spectrum recordings of the received signal for use in creating and fine tuning the software both on the satellite IHU and in the ground station software which will be available to all radio amateurs when the satellites are launched.

The other convenience is in the form of a Sony IPELA SNC-RZ25N IP camera with remote control pan, tilt, and zoom capability (Photos 5, 6). The camera, provided by Bob Fitzpatrick KB5SQG, has excellent imaging and gives the engineers the opportunity to peek over the shoulder of the tester to watch what is going on so they can provide input and feedback to performing tests as well as making observations.

With pre-set positions they easily zoom in on the satellite, the oscilloscope, the DVM, the thermometer, the frequency counter and even my laptop screen. Full control lets them see anything in the shack.

The result is marvelous! I can be positioning probes on test points in the satellite which requires me to use my magnifying goggles, and another team member can read the observations from the DVM without me having to take my sight off the probes or remove my goggles. Checking configurations and verifying readings for each step of the testing is possible. Software loads and debugging can be seen on the laptop screen. Telemetry readings from the IHU as viewed on my laptop can be debugged and verified as if the software engineer were at the keyboard.

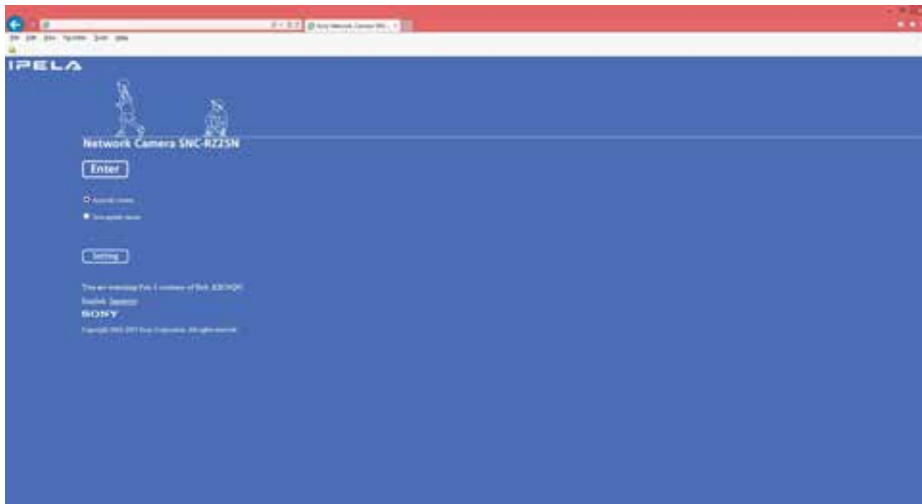


Photo 5 – Internet access to the Fox-1 Cam

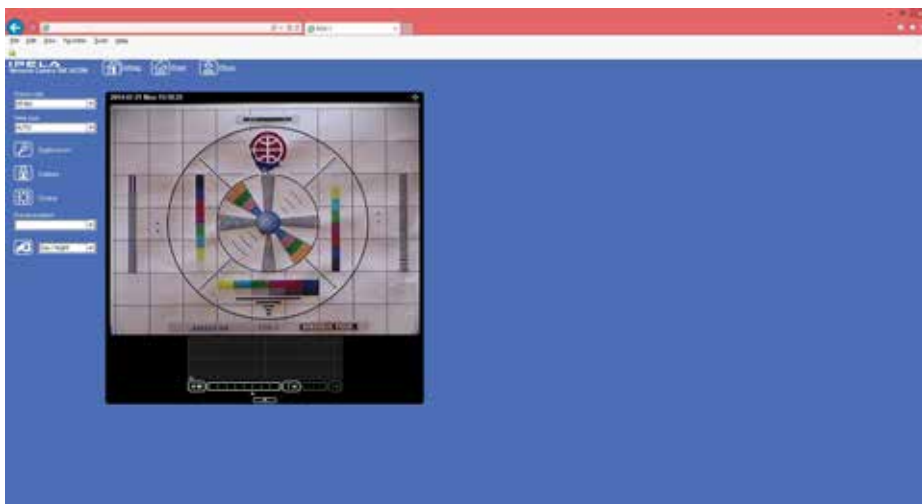


Photo 6 – Test pattern view “parked” position of the camera when not in use

Team members can also capture images from the camera for analysis or viewing while the camera is later positioned for other activities (Photos 7, 8, 9).

In the first week of engineering unit testing these tools were instrumental in conducting the tests quickly and efficiently and in analyzing results and problems found in hardware and software with immediate visual ability to view hardware and listen to downlink signals. We were able to step through the testing documents together, agreeing on the proper steps to be taken. The team was able to detect, analyze, and quickly make changes to software as well as plan hardware changes that took place when the satellite went “back to the shop” for a week of tweaks on July 5.

The Fox-1 Team members agree that the new use of these tools has given us the opportunity to test in a shared environment that is almost as good as being there. In fact, it may have advantages in that having four or five people around the table in the shack would be quite a crowding issue!

We will continue the use of these techniques throughout the Fox-1 Program. These images show some of our past satellites, and demonstrate the views of the camera to give you an idea of how the team can share in the action.



Ian MacFarquhar, VE9IM appointed as ARISS Regional Representative

The Radio Amateurs of Canada (RAC) has appointed Ian MacFarquhar, VE9IM to be the new ARISS Regional Representative. Ian replaces former representative, Daniel Lamoureux, VE2KA.

Rosalie White K1STO, ARISS-ARRL Delegate and ARISS-International Secretary-Treasurer comments by saying. “Canadian ARISS representatives have always been a huge benefit to the ARISS team. Not only have the Canadians contributed a great deal of sound thinking and hard work, but many have been highly active with IARU long before getting involved in ARISS -- this was a huge benefit since ARISS is an international group. Also, because Canadians, generally, are talented in multiple languages, Canadian ARISS reps take on schools and education groups in Mexico, Central America, and South America (in addition to Canada) who send ARISS education proposals. Historically, Canadian ARISS reps have handled the election processes for ARISS international officers. We know Ian will add a lot to our team, as well.”



Photo 7 – The Fox-1 Cam view of the DVM during a measurement of the battery voltage

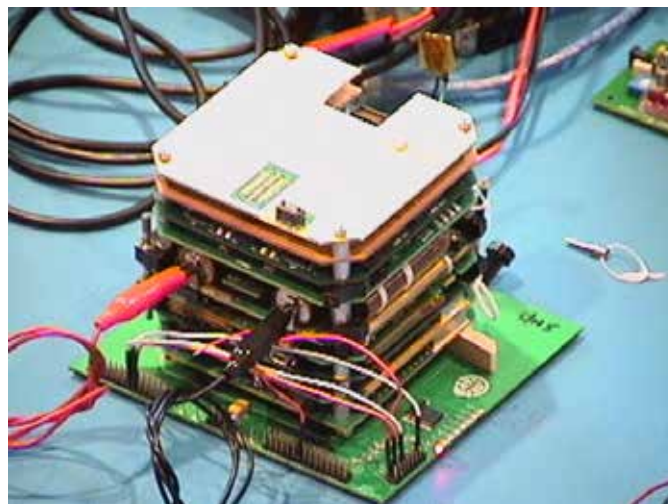


Photo 8– “Bird A” view from the Fox-1 Cam gives a great view of the stack on the breakout board



Photo 9 – Looking over my shoulder at my laptop with telemetry readings via the umbilical connection

Field Ops: AMSAT at Ham-Com



The AMSAT booth at Ham-Com in Plano, Texas was staffed by (L-R) Keith Pugh, W5IU; Clayton Coleman, W5PFG; Jerry Buxton, N0JY; and Ray Hoad, WA5QGD (not pictured). Jerry says the "Getting Started With Amateur Satellites" books and Frequency Charts were sold out. According to Jerry, "The crowd was totally wowed by Fox-1 and what we do."



Shown (L-R) Clayton Coleman, W5PFG, and Keith Pugh, W5IU, at the AMSAT Booth. A model of the Fox-1 cubesat, tracking software, and homebrew satellite antennas were on display. This resulted in several new and renewal memberships.



Clayton and Keith gave presentations during the AMSAT Forum at Ham-Com. Clayton is shown here getting ready to give his talk on rover operation on the satellites. Keith's presentation was, "Amateur Radio Satellites - Then, Now, and in the Future."



Clayton is shown here demonstrating the FUNCube-1 Telemetry Dashboard software.



Clayton, W5PFG operated most of the live satellite demonstrations using the call W100AW/5. These photos were of an evaluation of a modified 2 m Arrow antenna which was done by Kent, WA5VJB (creator of the Cheap Yagi antennas). The modified Arrow was compared with a conventional Arrow utilizing the AO-73 in beacon mode as a signal source. The consensus was that the modified antenna was a little better; however, the evaluation was strictly a qualitative evaluation (by ear).





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- 2) Populated board, serial interface - \$100 + S&H – no kit with USB unit, rotor cable and LCD available, we do have a parts list with recommended part numbers and sources.
- 3) Custom Ten-Tec Enclosure powder coat, silk-screened, drilled/punched - \$50 + S&H
- 4) Complete unit - board, USB output, rotor cable, LCD, enclosure - \$200 + S&H **our most popular

Documentation for the LVB Tracker can be found at: <http://www.LVBTracker.com>

Boards and complete units may be ordered from the AMSAT office at 301-822-4376 or from martha@amsat.org



Contacts with the International Space Station makes the 2014 ARRL Field Day, One to Remember!

One of the highlights of this year's ARRL Field Day was a myriad of voice contacts offered up by the International Space Station (ISS).

Through the efforts of crew member Reid Wiseman, KF5LKT, many anxious ham radio operators had the experience, perhaps for the first time, of speaking with an astronaut orbiting Earth on board the ISS.


After an announcement on Tuesday, June 24, of possible voice contacts from the ISS during the upcoming weekend, many Field Day stations across the U.S. set up tracking equipment, radios and antennas, vying for a brief chat with an orbiting astronaut.

Through various social media outlets, hams were able to track where ISS voice transmissions were being received and in

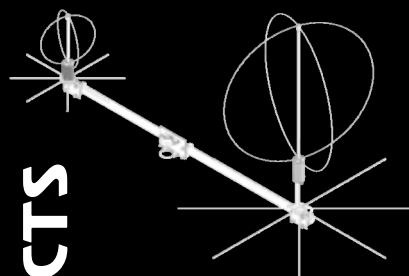
most cases, which Field Day stations had made contact.

One group that was fortunate enough to connect with the ISS were The Boy Scouts of Raymore, MO, Troop 32. Ham operator, Jim Reicher comments ... "I bet the boys could be heard up in orbit even without a radio when Reid answered our call!"


Field Day is held annually during the 4th weekend of June and is sponsored by the American Radio Relay League or ARRL. The main purpose of Field Day is to allow ham radio operators a chance to practice their emergency response capabilities and serves as a contest for Field Day stations to contact as many other Field Day stations as possible within a designated 24 hour period.




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AMSAT Fox-1C \$125,000 Launch Initiative Goal ... Your Help is Needed!

AMSAT is excited to announce a launch opportunity for the Fox-1C Cubesat. AMSAT has teamed with Spaceflight for integration and launch utilizing Spaceflight's SHERPA system to a sun-synchronous orbit in the third quarter of 2015.

Fox-1C is the third of four Fox-1 series satellites under development, with Fox-1A and RadFXsat/Fox-1B launching through the NASA ELaNa program. Fox-1C will carry an FM repeater system for amateur radio use by radio hams and listeners worldwide. Further details on the satellite and launch will be made available as soon as released.

AMSAT has an immediate need to raise funds to cover both the launch contract and additional materials for construction and testing for Fox-1C. We have set a fundraising goal of \$125,000 to cover these expenses over the next 12 months, and allow us to continue to keep amateur radio in space.



Spaceflight's SHERPA System



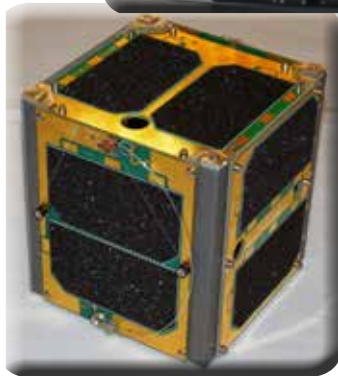
Spaceflight's SHERPA will deploy multiple cubesat payloads on-orbit

ISIS QuadPack Nanosatellite Dispenser



Donations may be made through the AMSAT webpage at www.amsat.org, by calling (888) 322-6728 or by mail to the AMSAT office at 10605 Concord Street, Kensington, MD 20895, USA. Please consider a recurring, club, or corporate donation to maximize our chance of success with this mission.

AMSAT President's Club Support Fox-1C ... Join Now!



Your help is needed to get the AMSAT Fox-1C 1U Cubesat launched on the Spaceflight's initial SHERPA flight in 3Q 2015.

Contribute to AMSAT directly through easy, automatic charges to your credit card. Since AMSAT is a 501(C)(3) organization donations may be USA tax deductible. (Check with your tax advisor.) To join contact Martha at the AMSAT Office by phone (888) 322-6728 in the US, or (301) 822-4376; e-mail martha@amsat.org.

Titanium Donors contribute at least US \$400 per month \$400 / month
 \$4800 one time

Platinum Donors contribute at least US \$200 per month \$200 / month
 \$2400 one time

Gold Donors contribute at least US \$100 per month \$100 / month
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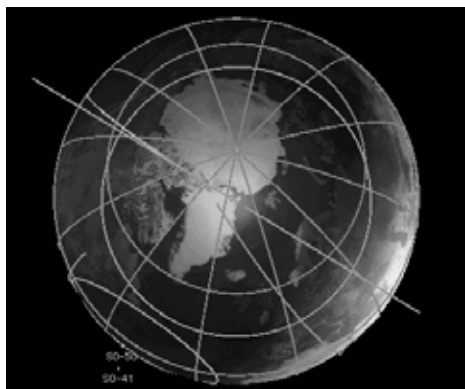
Core Donors contribute at least US \$10 per month \$10 / month
 \$120 one time

For the latest news on Fox-1 watch our website at www.amsat.org, follow us on Twitter at "AMSAT", or on Facebook as "The Radio Amateur Satellite Corporation" for continuing news and opportunities for support. 🌐



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Damon Runion WA4HFN, Star Comm Awards Manager wa4hfn@comcast.net

The Star Comm Group was created to encourage the use of the amateur satellites and support AMSAT-NA. We sponsor three satellite operating awards. Our awards have been popular and have contributed to increased satellite activity. We plan new awards in the future. The awards are all free - we only ask that each recipient of an award would make a donation to AMSAT.

The Star Comm awards include:

- **Got Grids?** - To qualify for this award, you must log 1 contact in each of the 10 GRID FIELDS, CN,CM, DN,DM,DL,EN,EM. EL, FN, FM (lower 48 states) in the U.S.A. by means of a SSB amateur satellite.
- **Grid Masters** - To qualify for this award, you must make confirmed satellite contacts with all 488 grids in the U.S.

- **5 in EM55 award** - To qualify for this award, you must log 5 different hams in the EM55 grid via satellite, or 5 certificate holders of this award, or a combination of EM55 hams and certificate holders.

Our latest award, the Grid Master, certificate #1, for having worked and confirmed all the 488 U.S. grids by means of an amateur satellite was presented to John Papay, K8YSE at the AMSAT/TAPR banquet during the Dayton Hamvention®. See the photo of Damon and John on page 17 of this issue.

You can visit the Star Comm Group's website at:

<http://www.starcommgroup.org/>



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A Russian Dnepr rocket launched a record-breaking thirty-seven satellites on June 19, 2014 deploying a cluster of spacecraft for scientific research and commercial operation.

With thirty-seven satellites aboard the Dnepr, that day's launch saw the record for most spacecraft launched by a single rocket broken for the fourth time in less than a year.

The previous record was set at thirty-four by January's Antares launch with Orbital Sciences's first CRS mission to the International Space Station.

Satellite Team Web Pages

ANTELSat
<http://ie.fing.edu.uy/investigacion/grupos/lai/Ham.html>

DTUSat-2
ie.fing.edu.uy/investigacion/grupos/lai/files/ANTELSAT_ham_radio_services.pdf

DUCHIFAT-1
<http://www.roguesat.dk/index.php/dtusat2-overview>

NanosatC-Br1
<https://directory.eoportal.org/web/eoportal/satellite-missions/n/nanosatc-br1>

PACE
<https://www.facebook.com/pages/Blog-Brazilian-Space/310127009112859>

PolyITAN
http://www.amsatuk.me.uk/iaru/finished_detail.php?serialnum=295

POPSAT-HIP1
<http://micro-space.org/classic/index.html>

QB50p1 (FUNCube-3)
<http://www.isispace.nl/HAM/qb50p.html>

QB50p2
<http://www.isispace.nl/HAM/qb50p.html>

UniSat-6
<http://www.gaussteam.com/radio-amateur-information-for-unisat-6/>

BugSat-1
<http://www.satellogic.com/#!/news/c24br>

Aurora-Tabletsat
<http://www.sputnix.ru/en/projects/microsatellite-demonstrator>

Dnepr Launch Summary Pages
<http://www.zarya.info/Calendar.php>

<http://www.spaceflight101.com/dnepr-launch-updates---2014-cluster-launch.html>

ISIS Launch Services
<http://blog.isilaunch.com/>

June 19 DNEPR Launch				
Amateur Radio Satellites Aboard This Launch				
Satellite	Downlink	Mode	Uplink	Mode
ANTELSat	437.575	1k2 FSK/AFSK, SSTV	145.860	
	437.280	CW	145.xxx	
	2403.000	500k GFSK/MSK		
DTUSat-2	2401.835	1k2-38k4 MSK data	1268.900	9k6 CPFSK
DUCHIFAT-1	145.980	1k2 BPSK or DSB voice	435.XXX	
NanosatC-Br1	145.865		435.XXX	
PACE	437.485	1k2 AFSK/CW		
PolyITAN	437.675	1k2 AFSK/CW		
POPSAT-HIP1	437.405	1k2-9k6 CCSDS		
QB50p1 (FUNCube-3)	145.935-.965	Linear transponder	435.035-.065	Linear transponder
QB50p2	145.880	1k2 BPSK/CW		
	145.840	9k6 FSK		
UniSat-6	437.425	9k6 GMSK	437.425	9k6 GMSK
BugSat-1	437.445	9k6 GMSK		
Aurora-Tabletsat	435.550			
	436.100			
	437.050	D-STAR Parrot Repeater		
Independent Satellites Deployed From DNEPR				
Deimos-2	Spanish satellite for optical Earth imaging			
KazEOSat 2	Kazcosmos Earth Observation Satellite			
AprizeSat 9, 10;	Data collection from small fixed and mobile ground stations			
BugSat 1	Earth observation technology demonstration mission			
Hodoyoshi-3, 4;	3-axis stabilized satellite Earth imaging/University of Tokyo			
SaudiSat-4	Student experiment to investigate electrostatic build-up			
Tabletsat-Aurora (TabletSat-2U-EO)	Russian technology demonstration satellite with an Earth observation still and video camera system			
Satellites Deployed by UTIAS X-POD				
BRITE- Montreal	Astronomical observations (reported failed deployment; remains attached to Dnepr Upper Stage)			
BRITE-Toronto	Astronomical observations			
Satellites Deployed by UniSat-6 (also carries Amateur Radio payload)				
AeroCube 6	1U Cubesat from Aerospace Corporation, mission undisclosed			
ANTELSat	2U Cubesat, Uruguay - technology demonstration			
Lemur 1	3U Cubesat from Nanosatsifi - technology demonstration			
TIGRISat	3U Cubesat, Iraqi Students at La Sapienza University, Rome			
Satellites Deployed by ISIS Quadpack Dispensers				
DUCHIFAT	1U Cubesat, see above - amateur radio payload			
DTUSat 2	1U Cubesat, Denmark - spaceborne bird migration radio-tracking			
Flock 1C-1-11	Fleet of 3U Cubesats, part of Planet Labs - Earth imaging			
NanosatC-Br1	1U Cubesat, Brazil - amateur radio payload			
PACE	2U Cubesat, Taiwan - test attitude determination and control			
Perseus-M1, M2	6U (3U x 2U) Cubesats - AIS receiver & remote imaging			



Bruce Paige, KK5DO
AMSAT Director Contests and Awards
kk5do@amsat.org

This year, I was surprised at the scores. After the winning station last year came in with 104 QSOs, I thought this year it would be a really tight race.

Instead of the 7 satellites which we had last year, this year we had 12. I count the satellites based on their modes as you can make contacts using both modes. SO-50 has one FM transponder and I count that as one satellite whereas AO-07 has two modes, SSB and CW and gets counted as 2 satellites.

This year, we had the same satellites as last year plus the ISS in voice mode, AO-73 in SSB and CW modes and LO-78 in voice mode. However, fewer QSOs were reported. As I look back at the Field Day results, in 2002, there were 38 stations participating and a total of 1905 QSOs reported. That is more than 6 times the QSOs with less than double the stations participating. So why, with all the satellites we have in the air today, can we not get that kind of participation? In 2002 there were 4 satellites operating in SSB and CW modes, FO-20, FO-29, RS-13 and AO-40.

The number of participating AMSAT Field Day stations has remained pretty constant over the years as evidenced by the table below. QSO count has dropped down to almost the mean of 286.6 QSOs over 10 years.

As with every year, who was the number one station at Field Day? This year, last year's winner, the Stanford University Amateur Radio Club, operating as W6YX, moved down to 10th place with 14 points. First place goes to Benton County ARC, K0K BX, with 53 points. In second place we have San Lorenzo Valley ARC, K6MMM, with 46 points who last year was in 6th place. Once again, holding on to third place is the Houston QRP Club, W5MSQ, with 43 points.

Table 1: 2014 AMSAT Field Day Results
(In case of a tie the callsigns are listed alphabetically)

	Call	Class	QSOs
1	K0K BX	2A	53
2	K6MMM	3A	46
3	W5MSQ	4A	43
4	CO6CBF	1E DX	36
5	K6AA	2A	32
6	K4JJ	3A	27
7	W5PFG	1E	26
8	W9LDX	1A	19
9	K5TA	1B	18
10	W6YX	10F	14
11	K5COW	3A	9
12	K8UNS	4A	9
13	N4TP	2A	6
14	N8HM	1B	6
15	VE3SAR	3A	4
16	WB2JSM	3A	3
17	WD9EWK	1B	2
18	K6QM	10A	1
19	K9MOT	2A	1
20	VE2CBS	1A	1
21	W5BII	2A	1

Note: Two check logs were received late from K4AMG and K6QM

This year Hector, CO6CBF, operated as the only DX station submitting a score. He also moved up from 8th place to 4th place with 36 points.

Operating with only battery power this year were K5TA, N8HM and WD9EWK.

There were no stations operating from home with emergency power this year.

The 12 satellites in operation this year were SO-50 and LO-78 (both in FM); AO-0, FO-29, VO-52 and AO-73 (all in SSB and CW);

and the ISS (in APRS as well as voice). Yes, four stations, K4JJ, K6MMM, W9LDX and VE3SAR chose to listen for the ISS voice and were able to make a contact. W5PFG was the only station to report an APRS contact with the ISS.

Breaking down the contacts, FO-29 phone carried most of the Field Day contacts with a total of 164 reported (139 phone, 17 CW) on this satellite.

Patrick, WD9EWK, operated from home

Table 2: Comparison of AMSAT Field Day Results by Year

	2007	2008	2009	2010	2011	2012	2013	2014
Satellites	7	8	12	12	9	9	7	12
QSOs	207	220	328	387	335	263	443	305
Stations	13	17	20	18	14	19	23	21
Points	207	270	486	505	455	329	613	357



where you can see in Photo 1, it was quite warm in Phoenix. You can also see Patrick's portable station.

In Photo 2, you can see the K6MMM workbench antenna mount.

In Photo 3, showing off the winning station is John, KJ6ZL, on the right and Gary, K6PDL, on the left. It was Gary's first time operating satellites and he helped set the station up. Not bad for a first timer. John also had this to say, "The ISS passes were a huge success. I have not heard the astronauts on the air for years and to have them work three passes was simply fabulous. We made contact with them at 11:10 AM on Saturday, just inside the start window for Field Day, and all at once we had our 100 bonus points as well as an ISS contact for the club callsign. It was a great start."

Remember Murphy? Just ask Bill, W1PA, with the W1MIM group up in New England. Here comes the ISS, you are all ready, you push the button what happens to your radio? He says, "When I tried to run the ISS passes (2m up and down), the 2nd VFO on the FT-847 came up 'reset' in the rig display when SatPC32 pushed the frequencies over."

Mike, K8MR, says, "Had a homebrew 2-Meter antenna that we discovered (midway through the event) had high SWR. We exchanged it with a tape measure yagi (Photo 4) that one member happened to have in his car and made our five contacts."

The Lockheed Martin group in Ft. Worth has morphed into the Cowtown ARC, K5COW, and you can see in Photo 5, they still have a nice setup with Keith, W5IU, in the tent.

Keith, KB1SF/VA3KSF, shares Photo 6 with us of the Lambton County Radio Club, VE3SAR, satellite antennas.

Check out the station for the Lafayette DX Association, W9LDX, Photo 7 with Steve, N9IP, at the helm and Photo 8 with him and their 8-foot stepladder tower. He was using software defined radio and says,

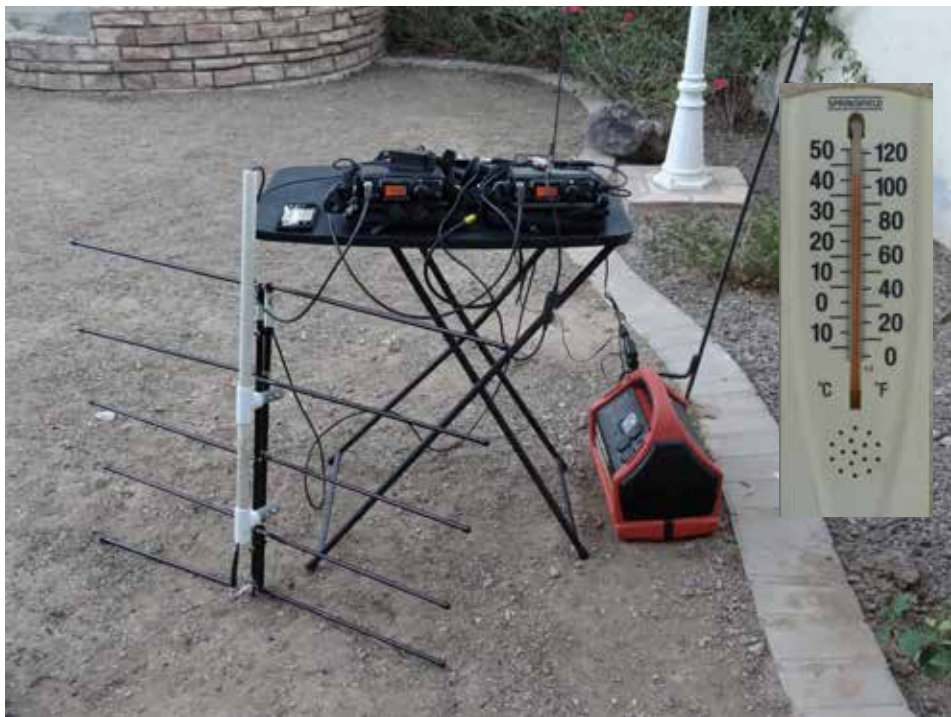


Photo 1: Patrick setup his portable station setup in the shade (note: 45°C) at WD9EWK. Patrick also had a contact with NA1SS on the International Space Station.



Photo 2: The workbench antenna mound at K6MMM who operated in Class 3A, making 46 contacts.

Table 3: Breakdown of Contacts Per Satellite

SO-50 Phone	AO-7 Phone	FO-29 Phone	VO-52 Phone	AO-73 Phone	LO-78 Phone	AO-7 CW	FO-29 CW	VO-52 CW	AO-73 CW	ISS Voice	ISS APRS
7	52	139	44	30	3	0	17	1	1	4	1



“The biggest challenge is getting used to the delayed reception of your transmitted signal without getting tongue-tied.”

Over at the North Fulton ARL, K4JJ, site John, K4SQC, writes, “Hearing the ISS come back with ‘I hear K4JJ’ was the highlight of the event! Otherwise it was another great outing.”

In Photo 9, you see Adrian, AA5UK, at Motorola Solutions ARC, K9MOT site. More bungee cords, you have to have more.

George, WA5KBH, has quite a group at the South West Louisiana ARC, W5BII, site as shown in Photo 10.

Photo 11 is the Tampa ARC, N4TP, station with Mike, W4UOO, and Jacob, KK4HMC, operating.

Photos 12-15 were went by Andy, W5ACM, to chronicle the Field Day activities of the Houston QRP Club at their W5MSQ station. For 2014 we thought we had all of the glitches cured for perfect satellite operation. Close, but not quite... Just a few hours into the event, our elevation rotor control box got stuck in the UP position. The elevation rotor dutifully rotated through vertical and over to the “flipped” position. At that point, it continued grinding away until the control box started smoking and the rotor quit. For the remainder of the event, we operated with QRP (5 Watts out) and no elevation control. The situation was further complicated by having to remember that north was now south, etc. It got confusing but not impossible. We heard excellent voice signals from the ISS, made a contact via LO-78 and had many contacts via AO-7, FO-29, VO-52 and AO-73. Since Field Day, the elevation controller has been repaired, but the actual rotor may be a bit more difficult. Here’s hoping for better results in 2015!

(story continues on Page 30 ...)



Photo 3: Gary, K6PDL, on the left, and John, KJ6ZL, on the right, at the K0KBX at the first place station.

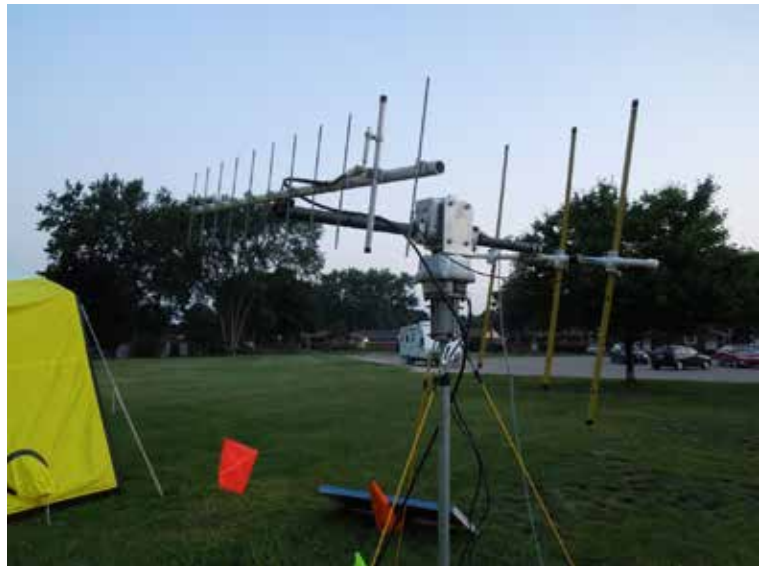


Photo 4: The 2 meter tape measure yagi that saved the day at K8MR.



Photo 5: (left) The K5COW station at the Cowtown Amateur Radio Club in Ft. Worth, Texas

Photo 6: (above) The satellite antennas at the Lambton County Radio Club VE3SAR site.





Photo 7: Steve, N9IP, at the controls at the W9LDX station at the Lafayette (Indiana) DX Association.



Photo 8: Steve, N9IP, setting up the satellite antennas on the W9LDX step ladder tower.



Photo 9: (above, left) Adrian, AA5UK, at the Motorola Solutions ARC site.

Photo 10: (above) George, WA5KBH, operated on the satellites with the Southwest Louisiana ARC, W5BII station.



Photo 11: (left) Mike, W4UOO, and Jacob, KK4HMC, operating at the satellite station with the Tampa (Florida) N4TP station.



If you missed getting your 2014 AMSAT tee shirt at Dayton this year you can order one for \$20 in the AMSAT Store ...

<http://store.amsat.org/catalog>





Photo 12: For 2014 we added 6M to the Hamsat shack at W5MSQ. John, AB5SS, is ready to start on 6M while Mike, WA5TWT, checks out the Microwave... oven.



Photo 13: It gets hot here in South Texas for Field Day. Some of the W5MSQ crew take a welcome break in the pool at the Sparks' Ranch thanks to Ron, AG5RS. Which one of you guys brought the rubber duckie?



Photo 14: Satellite ops on the left with a Yaesu FT-847 and 6M on the right with an Elecraft KX-3 at W5MSQ.



Photo 15: Satellite antennas on the left and the 6M Yagi on the right at W5MSQ.

Paul, N8HM, could not have put it better, "This was my first Field Day experience on the satellites. Great to hear all that activity, but it was very difficult to break through and make many QSOs with just 5 watts to an Elk antenna. I heard many stations that had difficulty hearing the satellites and/or correcting for Doppler. Remember that practice makes perfect. Don't expect to set everything up and be ready for Field Day without a few dry runs!"

Next year, as I have said many, many years before, I hope that we have even more participants in the AMSAT Field Day. Hopefully, Murphy will not visit your Field Day site. But if he does, be prepared. ☺

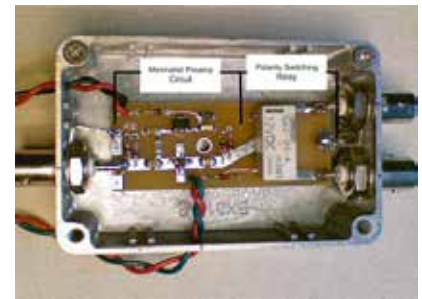
WRAPS Project Parts and Broadband Satellite RX Preamp in the AMSAT Store

<http://www.store.amsat.org/catalog>



The WRAPS Circuit Board kit includes:

- Unpopulated circuit board
- Programmed PIC chip
- CD-ROM containing instructions and support materials to complete the project
- Additional project details can be found on-line in the product description in the AMSAT Store.



AMSAT will offer both, the Original Broadband Satellite RX Preamp, and the new Broadband Satellite RX Preamp with Antenna Polarization Switching, as described in Mark Spencer's "Circling the WRAPS" article in the May/June 2014 *AMSAT Journal*. A copy of this article is also available on the AMSAT Store website. Follow the link on the AMSAT Store site for more information.



Graham Shirville, G3VZV
g.shirville@btinternet.com

UKube-1 was launched from Baikonur on July 8, 2014. Upon reaching orbit, it was successfully deployed from the final stage of the Soyuz-2-1B/Fregat-M launch vehicle.

UKube-1 carries a number of experiments and payloads and also the FUNcube-2 transponder and telemetry sub-system. This is intended to support the current, and very successful, operations of FUNcube-1. It is also planned to provide an even better operational capability for schools and colleges to use for hands on educational outreach around the world.

Further details of the educational outreach opportunities initiated during the current FUNcube-1 mission are available at:

<http://funcube.org.uk/education-outreach/>

The FUNcube-2 sub-system, which is aboard UKube-1, will downlink the 1k2 BPSK telemetry on 145.915 MHz. This is the same way implemented with FUNcube-1, which downlinks 1k2 BPSK telemetry on 145.935 MHz.

The new FUNcube-2 Dashboard user interface, which integrates directly with the existing FUNcube Central Data Warehouse, can be downloaded at:

[http://funcube.org.uk/\[placeholder-for-FUNcube-2-dashboard\]](http://funcube.org.uk/[placeholder-for-FUNcube-2-dashboard])

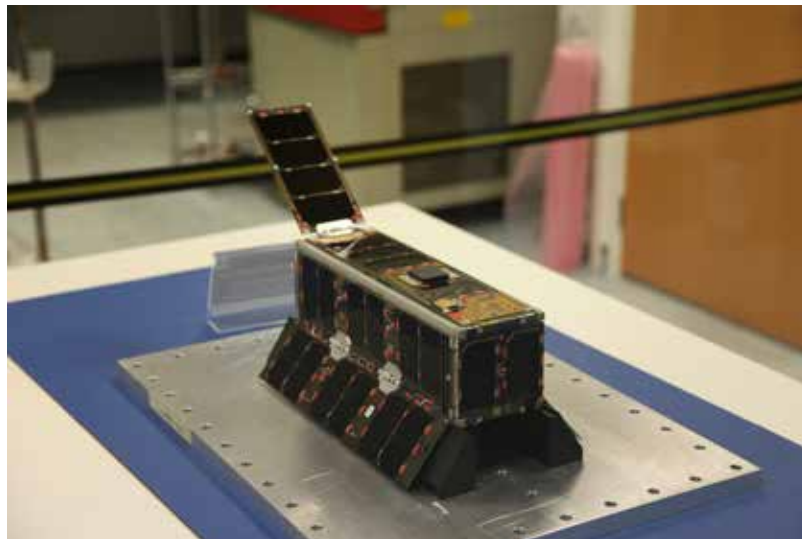
For those already registered and uploading FUNcube-1 data to the warehouse, their existing usernames and authorization codes can be re-used.

When the FUNcube-2 transponder is activated, the downlink passband will be 145.930 to 145.950 MHz and the uplink passband will be 435.080 to 435.060 MHz.

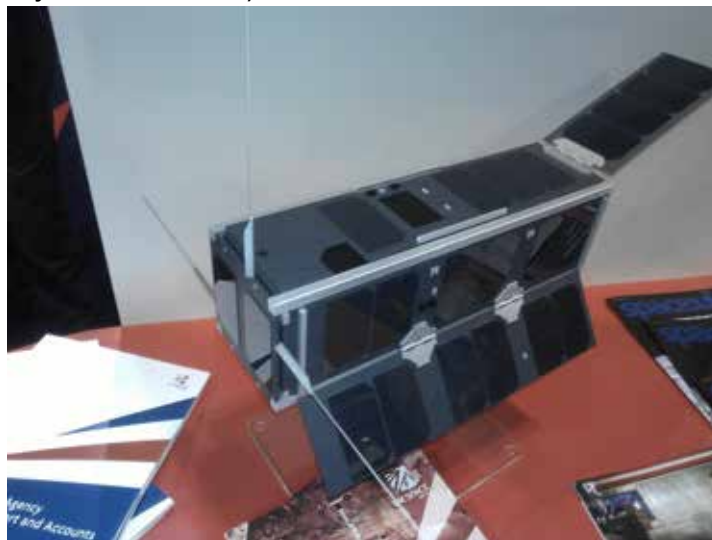
The FUNcube-2 sub-system was tested for



File photo of Soyuz launch. (<http://spacelaunchreport.com>)



UKube-1 in flight configuration in the cleanroom at Clyde Space Ltd (photo courtesy of Steve Greenland)



A model of UKube-1 shown with the antennas deployed on display at the 2013 UK Space Conference in Glasgow. (AMSAT-UK)

Operating Frequencies Summary		
	FUNcube-1/AO-73	FUNcube-2
Telemetry Downlink	145.935 MHz 1k2 BPSK	145.915 MHz 1k2 BPSK
Transponder Uplink Passband	435.150 - 435.130 MHz	435.080 - 435.060 MHz
Transponder Downlink Passband	145.950 - 145.970 MHz	145.930 - 145.950 MHz
Transponder is SSB/CW Inverting. Please use a maximum uplink power of 5 watts to a 7 dBi gain antenna. More power is not needed to use the transponder!		
UKube-1 telemetry downlinks include CW beacon at 145.840 MHz; Spread Spectrum 437.425 - 437.525 MHz; 2401.000 MHz 1 Mbps QPSK.		

short periods during the commissioning of UKube-1.

Operations Team and to all the many contributors to the project. 🌐

AMSAT UK and their colleagues at AMSAT-NL, are delighted that UKube-1 is carrying this FUNcube sub-system and wishes every success to the UKube



Charm City Space Symposium

Find the latest Symposium information on-line ... <http://www.amsat.org> ... select 'Events'



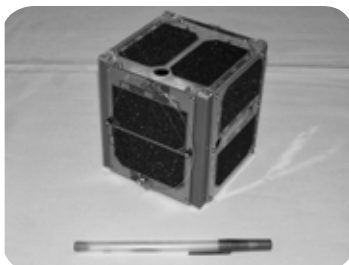
October 10-12, 2014
Baltimore, Maryland

32nd AMSAT Space Symposium and Annual General Meeting



Come to the DoubleTree Hotel by Hilton at the BWI Airport to celebrate AMSAT's 45th anniversary

- AMSAT Special Room Rate—\$99.00 per night.
- For reservations phone 410-859-8400 and ask for Radio Amateur Satellite Corporation or Code RAS.
- Purchase \$10 Breakfast Buffet Coupons at check-in for full hot and cold breakfast.
- FREE Parking.
- FREE WiFi.
- Free Airport and Close-in Transportation.



The weekend's line up includes:

- Board of Directors meeting on October 9.
- Technical presentations on satellite design/operating begin on October 10.
- Annual general meeting.
- Saturday evening annual banquet with door prizes.
- Sunday morning Area Coordinator's breakfast.
- Sunday ARISS Operations Team meeting.
- Meet AMSAT Officers and Board members.
- Meet and greet fellow satellite operators.
- Satellites on display.
- Sunday and Monday tours.



Trips and Tours

Sunday afternoon, October 12, several Small Group/Light Rail tours are being planned:

- Baltimore Inner Harbor Tour including the Aquarium
- B&O Railroad Museum
- Edgar Allen Poe House
- National Electronics Museum

On Columbus Day, Monday October 13 we will take a bus to the Washington Dulles airport area to tour the Udvar-Hazy Air and Space Museum. Udvar-Hazy is a phenomenal museum with hundreds of aircraft and spacecraft, including the Space Shuttle Discovery.