



February 2003

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The Hamilton Amateur Radio Club
 PO Box 91215, Effort Square PO
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 Est. 1932 Inc. 1956

The Hamilton Amateur

The Hamilton Amateur Radio Club Newsletter - 71 Years of Amateur Radio 1932-2003

Princess Marconi

The following note was submitted as e-mail to ve3dc@rac.ca

(Given the fact that last month I talked about VE3DC accumulating the most points in the recent Marconi Centenary Contest, which ran concurrently with the 2001 RAC Winter Contest, I thought it appropriate to continue that theme with an article on Princess Marconi and the on-going Marconi Centenary celebrations...ed)

The magic touch of a princess helped to put Amateur Radio centre stage January 18 on Cape Cod, Massachusetts, during events marking the 100th anniversary of the first transatlantic wireless message transmitted by Guglielmo Marconi. For the occasion, Marconi's youngest daughter, Princess Elettra Marconi, launched greetings into space via an Amateur Radio on the International Space Station (ARISS) hook-up to ISS crew commander Ken Bowersox, KD5JBP.

"One hundred years ago today, my father, Guglielmo Marconi, sent the first wireless message across the Atlantic Ocean from Cape Cod," Princess Elettra said from a packed auditorium at the Cape Cod National Seashore Salt Pond Visitor Center in Eastham. "In this same spirit of his achievement and also from Cape Cod I send this wireless greeting to you in space. Cordial greetings, good wishes and God bless you."

Replied Bowersox from NAISS, "It's wonderful to hear your voice across the radio waves. It's amazing how far our societies and radio communication have come in the past 100 years."

On January 18, 1903, Marconi sent wireless greetings on behalf of President Theodore Roosevelt to Great Britain's King Edward VII. Events throughout the week leading up to the ARISS contact included two Amateur Radio special event stations. KM1CC operated from a National Seashore site not far from Marconi's original Cape

Next meeting's Speaker

February 19
 "Ultra-lite"

Ultra-Lite, that's a plane, not a beer. Once again we have been fortunate to obtain a great guest speaker for our general meeting. Mr. Bill Spring is a local Amateur (Burlington) who got his license in 1968. He is VE3ALM. That was three years after getting his Pilots license.

Bill will discuss his experiences in small aircraft. He purchased a damaged Ultra-Lite and rebuilt it and then flew it. He has also built two other small planes (a single-seat & a 2-seater).

This promises to be another interesting subject! Bring a friend.

Cod radio station, transmitting a commemorative message from President George W. Bush and re-transmitting Marconi's original 1903 text. Another special event station, WA1WCC, was on the air from the former WCC shore station in Chatham, where Marconi had relocated operations after the ocean threatened to claim the antenna support towers of his original station. Princess Elettra also visited the WA1WCC special event site.

Club meetings – 3rd Wednesday each month (except July and August) - 8pm in the St. John's Ambulance Association building, 500 Upper Wellington Street (on the Mountain). Park behind the St. John's building, NOT the Police station. Complimentary refreshments!



Following Princess Elettra's introductory remarks, eight students from three Cape Cod high schools took turns firing a total of 18 questions at Bowersox as hundreds of visitors and some two-dozen news media representatives looked on. Serving as mentor for the noontime Cape Cod contact was ARISS International Chair Frank Bauer, KA3HDO. The students' curiosity ranged from research goals to whether Bowersox had any desire to undertake a trip deeper into space, perhaps to Mars.

Bowersox said his wife has forbidden him to go to Mars, a comment that drew a chuckle from the audience, but said he'd volunteer for a deep-space mission if he could bring his family along.

"I think someday we're going to leave Earth," Bowersox predicted in response to one of the students' questions. "We're going to move on out of our solar system out to the stars, and we're just taking the baby steps now. Your generation will take us a lot farther, I hope."

Handling earth-station duties for the ARISS contact was Nancy Rocheieau WH6PN, in Honolulu. A WorldCom teleconferencing arrangement made two-way audio available on Cape Cod. Students selected were from Provincetown High School, Cape Cod Technical and Vocational School and Nauset Regional High School.

"The ARISS contact at the Marconi centennial event was a tremendous success," said Bauer. "I must say that this contact was one of the more impressive and awe-inspiring ARISS contacts we have accomplished."

Pursuit of the elusive two-letter call sign

David VE3STT – Editor

It was roughly March of 2002 when I learned that a two-letter call VE3ST, that for obvious reasons I would have loved to acquire, could potentially be available again on December 18th, 2002. Knowing the Amateur regulations on

Important points

Executive Meetings

HARC Executive committee meets each month, except July and August at Mohawk College in room E031B. All members are invited to attend and participate. The meetings are on the Tuesday following the club General Meeting each month.

VE3NCF [146.760- & 444.075+ MHz]

HARC operates VE3NCF repeater, located atop the Niagara escarpment. It's open for use by all Amateurs. Special features are a privilege of membership. VE3NCF is part of the VE3RPT link system.

Check-In and Swap nets

HARC "net" is held every Tuesday evening, except July and August, at 7:30pm. HARC "swap net" follows at 8pm.

Examinations

Amateur radio licence examinations are conducted the second Wednesday each month, except July and August. Contact the voluntary examiners to make an appointment. Each test \$3.

Membership Information

Club membership, including all privileges, is \$25 per person, per year, Sept 1 to Aug 31. Additional membership, for immediate family living in the same home, is \$1 per person. One newsletter sent to each address.

The Hamilton Amateur

The Hamilton Amateur is published ten times each year (not in July or August). Deadline for article submission is the *last Saturday* of the month for the next month's issue. Preferred format is .txt file. Articles will be checked for spelling and grammar, but the author is responsible for the factual content. E-mail submissions to David VE3STT at ve3stt@rac.ca

calls I took a chance anyway and sent a nice letter, application and cheque to the Amateur Radio Service Centre/Industry Canada explaining that I would love to have the call. I then immediately followed that up with an e-mail stating

that I had just sent the letter – please watch for it. I fully expected the e-mail reply I received:

"We would suggest that you send us the application about two weeks before the desired call sign is to be released (with a payment of 60.00\$). We process them on a first come first serve basis. And we are usually about a week behind and it takes a week for the mail to get to us. If the application is received too soon, we send them back."

Fine. I later received a hard copy of virtually the same and the returned cheque.

Hoping that the call would remain eligible for reassignment until that December 18th date, I waited patiently. Then, as suggested some eight months earlier, I sent in yet another application with a nice letter documenting the previous one and yet another cheque. I followed that up with another e-mail, as the Christmas season was heating up and I didn't want the application to get stuck in the holiday mail and blow my chance.

That produced a phone call from, oddly enough, the same person I had corresponded with in March (which is good, she knew the situation). She said that the call wasn't up for reassignment yet, which I said I knew (citing the December 18th potential release date again – now just seven days away) but mentioned on the phone that another two-letter call had just shown up on the database and would I be interested? With only seven days to wait for the one I really wanted, I politely declined. At that time, it was stressed that *"call signs will now only be assigned by Industry Canada after they have shown officially in the database,"* after apparently having a bit of a problem with occasional "rule-bending" and complaints from other Amateurs seeking the elusive two-letter VE3 call. I wanted to make that perfectly clear, so I had her repeat it, then said I would have another application in on December 18th.

Now the fun part!

I checked for the call in the database on the RAC site on December 17th, just in

case it was released at the close of business (4:30pm) of the day before. Not there. I checked at 12midnight on December 18th, just in case it was released as the calendar clicked over. Not there. I was up bright and early the next morning, checked for the call and there it was! I jumped to the fax machine, the application already filled out and ready to go, and faxed IC. I then sent an e-mail to follow that up, just in case the fax didn't go through. I felt good!

I waited a couple of days then decided to call to make sure the fax and e-mails had been received. At that point I found out the person with whom I had been dealing the last eight months (and only seven days earlier) had left the Centre and taken another job, so I relayed my entire "call sign hunt" story to the new employee. She basically reiterated that the calls were now assigned first come, first served after they had re-entered the database, and could not specifically comment on the one about which I was inquiring. I didn't feel quite as good now!

A side note: Two-letter VE3 calls VERY RARELY show up in the database. If and when they do, and I've only actually seen two, they're usually gone within a day! The date I applied was December 18th remember...

Just prior to Christmas I sent another e-mail to check on the progress of assigning the call and, at the same time, again trying to show them my enthusiasm! Nothing.

I was out of town for a week over New Year, so I sent another e-mail just prior to that suspecting that they were also on a vacation break and wanted them to know I was still very interested when they arrived back to work (likely January 6th). Throughout this time, the call – the one I was seeking and the ONLY two-letter VE3 call in the database – just sat there. Never before have I seen a call in the database for that length of time and it's the one I'm after. It was torture!

Today (January 8th) I got the call. Sorry, someone had beaten my application by only hours!!!

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Needless to say I was quite disappointed. The hunt continues!

In fact, prompted by the hunt, I have sent a list of a few questions to the Amateur Radio Service Centre at IC and plan to follow this article up with another about the holding and issuing to two-letter calls under the new policy enacted in March 2000. Stay tuned!

Contesting

David VE3STT – Editor

As I write this article for the newsletter, I'm in the middle of participating in the annual CQWW 160M CW Contest. Because it's basically a dusk to dawn

affair on the 160m band, I'm pretty sleepy.

RAC Winter Contest 2002

As usual VE3DC was again prominent in the recent RAC Winter Contest, held at the end of December. I'm taking the liberty of passing along the summary comments put together by Steve VE3OZO, a member of the team that participated in the contest this year.



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Due to vacations, work commitments, and illness we were a bit understaffed this year and had to cut back 1 station from the usual set-up.

Our set-up consisted of 5 stations:

- 1) 6/2m VHF
- 2) 40/10m ssb - 40m dipole and 3el 10m monobander @30ft.
- 3) 80-10m cw - 40-10m vertical and horizontal delta loop (for 80m)
- 4) 80/15m ssb - 80m dipole and 6el yagi @48ft.
- 5) 160m cw/160m ssb/20m ssb - 160m inverted-L and 3el yagi @48ft.

We were pleased at the level of non-VE participation, with big serial numbers from SV, LU, CX, among others, and especially from the U.S. We found the conditions to be pretty good.

We had a number of computer and network problems and ended up starting

without networking and packet, then straightening those things out on-the-fly later.

Thanks to everyone for the contacts.

VE3DC – M/M – HiPwr – Mixed Mode
Cdn Q's (excl. RAC) - 858x10 = 8580
RAC Q's - 32x20 = 640
DX Q's - 1094x2 = 2188
Sub-Total - 1984 Q's for 11,408 Pts
Multipliers 103
Claimed score: **1,175,024**

Given the small problems we had to overcome and the time constraints of a lot of the operators at the Christmas New Year time, the score above is actually very impressive. And given that VE3DC competes on the M/M stage with some very powerful and "antenna-blessed" competition, it's even more impressive!

Look for VE3DC in the CQWW 160m SSB contest and don't forget to tune up your station for the annual Ontario QSO Party, sponsored by the ODXA, in April. The OQP has been growing steadily in its first half dozen years and VE3DC has always been a leader in M/M participation! We can always use a contact from you!

ARRL says: "banner contesting year"

The year 2002 was a banner year for ARRL's Contesting Branch. Manager Dan Henderson N1ND, reports a record number of total entries for ARRL-sponsored operating events.

"The total of 18,817 beats 2001's 18,505, a nearly 1.7 percent increase!" Henderson said. Despite the downward slope of Cycle 23, the 2002 ARRL 10M Contest saw a more than 18 percent jump in log submissions over the previous year, he added, even as logs continued to arrive.

"Activity is up across the board for almost all contests, and I think we would have seen more than 19,000 logs returned," Henderson said, "but the World Radiosport Team Championships (WRTC 2002) in Finland last July affected numbers for the IARU HF World Championships, as several hundred of the world's top contest operators were there." Henderson notes that since WRTC 2002 used slightly

Hamfests

Hamilton Amateur Radio Club

Hamfest 2002

Thanks again to all our club volunteers!
And, THANK YOU TO EVERYONE THAT ATTENDED our annual Hamfest!

See you in 2003

Greater Buffalo Hamfest

*Lancaster Amateur Radio Club, Inc.
Main Transit Fireman's Hall, 6777
Main Street, Williamsville, NY USA
Only 1 mile from NY State Thruway
I-90 exit 49
SUNDAY, FEB 23rd/2003!
Admission: \$6 (US)
Talk in: 147.255 MHz*

Burlington Spring Flea Market

*Burlington Amateur Radio Club
Royal Canadian Legion Hall, 828
Legion Rd., Burlington
SATURDAY, MAR 1st/2003!
Admission: \$6
Talk in: 147.210 MHz*

Ham-Ex 2003

*Peel & Mississauga Amateur Radio Clubs
Brampton Fall Fair Ground, Old
School Road, Brampton
SATURDAY, MAR 22nd/2003!
Admission: \$6
Talk in: 146.880 & 145.430 MHz*

For the latest information, about these and other hamfests, visit the RAC website (linked off the HARC website (URL on the front page)!

different rules, the logs from those operators could not be entered in the IARU event, which ARRL administers.

The 2002 ARRL 10M Contest, proved to be record-setter in several ways. According to Henderson, not only was the December 14-15, 2002, operating event the most active 10-meter contest on record, it had the single highest number of participants returning logs of any single contest in League history. As of January 16, the Contest Branch had logged 3051 entries and was still counting. "That's the very first time a

single-weekend ARRL contest has topped the 3000 mark in entries," Henderson said.

Other ARRL operating events that also saw increased numbers of logs over 2001 were Straight Key Night, up 22 percent; the ARRL 160M Contest, a CW event, up 19 percent; the ARRL 10 GHz and Up Contest, up 11 percent; and ARRL Field Day, up by one-half of one percent. For the first time ever, the 160-meter event topped 900 entries.

ARRL November Sweepstakes entries jumped between two and three percent for the CW and SSB weekends in 2002, Henderson said. Entries received for the ARRL international DX Contest remained approximately level for each mode last year as did submissions for the ARRL's four major VHF-UHF-SHF events in 2002.

Henderson said the move to require Cabrillo-format electronic logs has proved a major boon to the Contest Branch. The elimination of most manual log entry has moved up the posting of contest results by about a month, he said. He said he expected the Contest Branch would be fine tuning electronic log-processing during 2003.

Pile-Up!

Speaking of CW, if you're looking to upgrade your code speed I would like to suggest a program that may just help you out!

The program is called "Pile Up!" and was originally written for Windows 95 by G4ZFE. If you're new to HF at 5wpm, or are a seasoned vet just looking for a little more speed, or especially if you're a contester that is looking for both excessive speed and accuracy in copying calls, then try Pile Up!

Whereas a lot of the CW generating programs are DOS based, this one is Windows based, so you can run it on your best Windows machines and not worry about rebooting to DOS to use it. That means you can leave a link on your desktop and run it when you get bored with what you're doing, make a few contacts, then close it and return to work.



March 2003

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The Hamilton Amateur

The Hamilton Amateur Radio Club Newsletter - 71 Years of Amateur Radio 1932-2003

Columbia

David VE3STT – Editor

I had just finished the printing of the last newsletter and still had to get to the mailing labels for the envelopes on the weekend. I had planned to spend a few hours on Sunday doing just that, but plans changed after I woke up Sunday morning.

I can still recall living in Winnipeg and watching the horror of the Challenger disaster many years ago. That too was staggering, perhaps more so because at that time we were still watching shuttle take-offs. Now they had simply become routine and the landings were nothing more than 10 seconds on radio and even less time with video on TV.

Nothing was routine about Saturday, February 1, 2003 as NASA reported later that day:

"The Space Shuttle Columbia and its seven astronauts were lost today when the vehicle broke up over north central Texas during its re-entry from orbit.

Communications were lost with Columbia and its crew at around 8am CST, while the shuttle was traveling about 18 times the speed of sound at an altitude of 207,000 feet. Columbia was 16 minutes from landing at the Kennedy Space Center when flight controllers at Mission Control lost contact with the vehicle. Columbia was returning from a 16-day scientific research mission, its 28th flight, which launched on January 16.

Aboard Columbia were Commander Rick Husband, completing his second flight, Pilot William McCool, wrapping up his first mission, Mission Specialists

Dave Brown, also completing his first mission, Kalpana Chawla, on her second flight, Laurel Clark, a first-time space traveler, Payload Commander Mike Anderson, ending his second flight, and Payload Specialist Ilan Ramon of the Israel Space Agency, on his first flight."

Next meeting's Speaker

March 19

"Internet Security – Dave VE3HTC"

Our own Dave Rypma VE3HTC will give us an overview of internet security as well explain some facts about the security level on your home computer.

As you know, Internet Security is a big topic these days and many companies spend millions of dollars protecting their data. David travels all over the world assisting companies and organizations in setting up security programs. Then there is the old question "how secure am I when I put my credit card number on the net?"

Our speaker has an extremely high level of technical knowledge in these matters and will be able to put in terms that we can appreciate. So bring a friend and we'll see you there.

The lesser-known fact, at least to the general public, was that the Amateur radio community also lost some people that morning. Three of the Mission Specialists on STS-107 were Amateurs, Kalpana Chawla KD5ESI, David M. Brown KC5ZTC and Laurel B. Clark KC5ZSU.

Amateur radio also played its part in the

Club meetings – 3rd Wednesday each month (except July and August) - 8pm in the St. John's Ambulance Association building, 500 Upper Wellington Street (on the Mountain). Park behind the St. John's building, NOT the Police station. Complimentary refreshments!

Not to say that there aren't some fantastic DOS based CW generators out there. PED comes to mind, essentially the front end of CT in black and white, with a virtual CW contest at your fingertips, including pile ups, s/n ratio, fading CW signals, and more. It's a great way to specifically practice contesting! But Pile Up is slightly different, and because it's Windows, means you'll likely casually use it more often.

The program also comes with a couple of different configurations. One will generate calls (one at a time, or multiple calls) and let you try and decipher and log them at whatever speed you choose. But the RUFZ function is extremely cool and quite practical, in that it will send you calls at whatever speed you choose as a starting point, grade you on how well you copy each of 50 sent calls, and (the best part), speed up or slow down the next call sent, based on how well you're doing. That essentially means you'll always be floating around your most comfortable speed, but because it also pushes you a little faster if you're doing well, it means you will definitely get faster over time. And, once you've copied all 50 calls, you will probably be surprised at how well you've done, and at what speed!

Best part – It's free to download from the G4ZFE website:
<http://www.g4zfe.com>

January minutes

Fred VE3GCP – Secretary

We got the New Year off to a great start with about 40 members in attendance. These were the hearty souls who did not mind braving the cold weather snap that has had us in it's grip lately.

Stan VE3GFE called the meeting to order just a few minutes after 8pm. He is our Fist VP and was standing in for President Mike who was away on vacation. The job came easily to Stan who could call on his experiences as one of our past presidents. After the usual welcome notes he introduced Mike VA3SP who was back after some

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Swap Net Control

Frank Love VA3FWL
 905-679-4524

years absence. Mike had previously served as one of our repeater techs.

Stan called on Fred VE3GCP our secretary to introduce our guest speaker. He is Mark Brophy of the Technical Services Department of Mountain Cablevision. This company is a large cable TV and Internet provider in Hamilton and Mark spoke on the subject of "how the INTERNET and EMAIL systems work. Mark did an excellent digital presentation of the various aspects of the system. He explained how the system gets onto the Internet and how our emails are packaged and delivered. I believe it is accurate to say that everyone found this presentation to be very interesting and instructional. Bernie and Ilona again treated us to good warm coffee and some sweat treats at the coffee break. During the break, Mark was swamped with more questions.

The business portion of the meeting began with the presentation of the CW Operating Award to this year's winner, Bob Edge VA3RE. Don't be fooled by the call sign though, Bob is no newcomer. He was previously VE3MMH and he got his original call, VE3CLY in 1958. This award will be passed on to Bob from Bernie Granby VA3XJ (our coffee guy) previously VE3EKY.

Mardy VE3QEE, our Education Chairman, announced that his Basic Class is underway. The treasurer, Walter VE3WWB, gave an overview of our financial status and it seems we are well managed and in good fiscal condition. We will be starting the year off with about the same balance and projected costs as last year except for the much higher cost of our liability insurance. The exec will discuss the purchase of another GIC this year and look at the possibilities to increase revenue and or cut some costs.

On the contest scene, Rick Danby VE3BK announced that the CQWW 160m CW contest is coming up (Jan 18) this weekend. John VE3DVV, our repeater chairman, advised us that VE3NCF now has dual inputs and simultaneous output on both 2m and 440Mhz. If you call on 444.075Mhz or

146.160Mhz you will raise the repeater. The split on 440 is +5Mhz and of course it is down 600Kc on 2m. The Voice Mail Box system is not presently activated.

Gary VE3TTO is the ARES coordinator and he announced that this group would be involved again this year in the Paris to Ancaster Bike Race. They will be supplying communications and safety measures for the organizers, racers and spectators on April 26. For more info on this race or other ARES matters you can call into the ARES Net on Wednesdays at 8:30pm, VE3SMN on 442.850Mhz. The secretary announced that we will soon be seeking a Field Day Coordinator, so if you have some FD experience, we would be happy to hear from you.

The meeting was adjourned at 10:30pm.

Vertical dipoles

The following note was submitted as e-mail to ve3dc@rac.ca

(Quite often I've written about the wealth of information, most of it absolutely free, available now on the internet through the various reflectors on-line. Tower talk is one of my favourites.

Many think of the vertical as a "compromise" antenna for a small space unsuitable for anything like a tower and yagi, but in reality a vertical – and it's ground radials – need substantial space, free of other objects that might interfere with your signal and pattern, in order to perform.

Here's a great article by Kenny Silverman K2KW, well known for his work on many DXpeditions using "only" verticals as one of the primary forces behind "Team Vertical," in response to a question about whether to ground mount or raise your vertical, in this case a Force 12 multiband "Sigma-5" vertical dipole - but really that's beside the point, for optimum efficiency and performance ...ed)

Efficiency of a vertical antenna does not change with height, but performance will change. As you noted, all verticals

are impacted by their surroundings: trees, fences, houses, etc. Some will sap energy, some will distort the pattern from a true omni. The result being that the development of the wave front is impacted, which may degrade performance. By raising the vertical you will be less impacted by these items, allowing the wave front to develop better. BUT - there is ALWAYS a BUT with antennas.

With the vertical mounted on the ground, you get one big elevation lobe. That means you have equal radiation from around 12 degrees take off (for average ground) to 30-35 degrees, with useful energy to around 45-50 degrees take off. These take off angles cover most Amateur communications (that's one of the great things about verticals). If the vertical is mounted over salt water, you would get equal radiation from around 0.1 to 35 degrees elevation (better for low angle DX).

As you may be aware with horizontal antennas, if you raise them, the elevation angles change. The general rule of thumb is that you get one lobe split for every wavelength in height. Well, the same is true for verticals. The higher you raise the feed point, the more lobe splits you will get.

Let's assume that the Sigma-5 is a full size (physical) on all bands. That would put the feed point slightly above 1/4 wavelength on each band. In doing so, you only slightly squash your upper elevation angles and get a slight increase in gain (compared to a 1/4 vertical with the feed point on the ground) at the lower angles. The trade off is well worth going to the vertical dipole.

Now raise the base of the vertical dipole to 20', and on 10-15m the feed point is roughly 1.0 to 5/8th wavelength high (respectively). That one big lobe you had when ground mounted, has split or is starting to split from 1 big lobe (as described above) to 2 lobes. The first lobe is right around 10-20 degrees (for average ground), but the 2nd lobe is up around 50-60 degrees (not very useful). The result is a big null around 25-45 degrees, which are very useful angles for Amateur communications.

Raising the vertical from ground to roof is likely going to be very location specific in what you see. If the vertical was mounted in heavy clutter on the ground, you actually may come out ahead with it on the roof. But then again, it may not. Location of antennas is always a trade off. Sometimes you just need to do things from a realistic point of view to keep your family happy. But the above was meant to give you a quick blurb on some of the theoretical differences of ground mounted vs. roof mounted vertical dipoles.

AO-27 orbit affecting operating periods

The following note was submitted as e-mail to ve3dc@rac.ca

According to AMSAT-NA, several stations recently have reported hearing AO-27's transponder on the air at unexpected times. AO-27's orbit has moved the satellite into a period of full-orbit solar illumination, explained Mike Seguin N1JEZ. Because of this, the timed eclipse power regulator (TEPR) method of timing the transmitter does not work. As a result, AO-27's transmitter can only be turned on by ground-station command.

Seguin said controllers will try to turn on AO-27 for analog work during weekends, when controllers are not downloading telemetry. Right now, however, controllers are working on new flight software that will permit uploading a transmitter schedule for the transmitter.

"This will take us some time to write, debug, and upload to AO-27," he said. Seguin requested that operators be patient during this process and refrain from e-mails to AO-27 command stations asking when the satellite will be on. Seguin noted that during seasons of full-orbit solar illumination, controllers will be able to have AO-27's transmitter on at night and for different parts of the world.