AMSAT-SM Journal

Amatörradio via satellit

Nr 1 februari 2005

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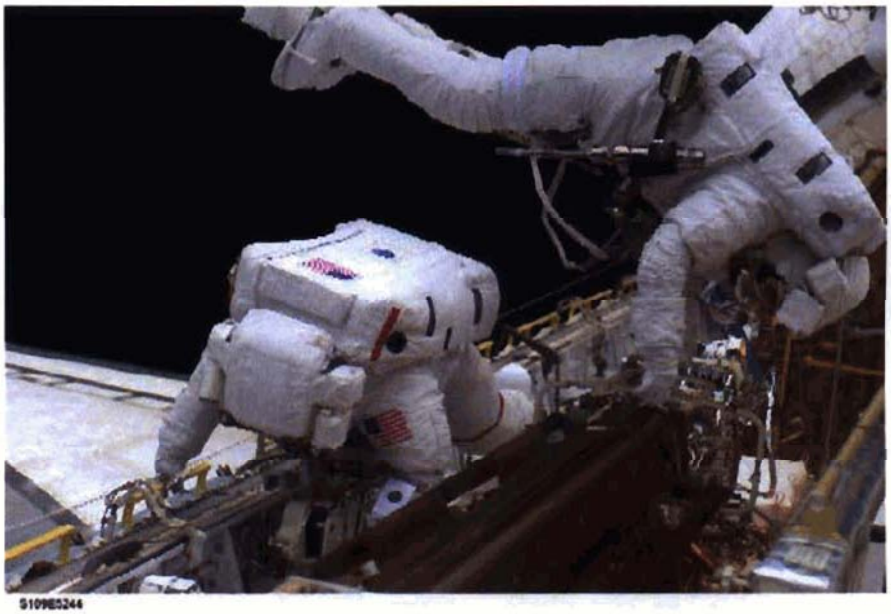
Årsavgift: 150 kronor

AMSAT-nätet:
Sönd **10.00** på **3740 kHz**
Round table QSO

AMSAT-SM årsmöte
äger rum på Tekniska Museet i Stockholm söndag 20 mars 13.00

Rymdpromenad på ISS



American Commander and NASA ISS Science Officer Leroy Chiao 44, and Russian Flight Engineer and Soyuz Commander Salizhan Sharipov 40 (cover photo), were launched on the ISS Soyuz 9 spacecraft for a two-day flight on Oct. 13 to dock to the Pirs Docking Compartment on the ISS. This was the fourth flight into space for Chiao, who previously flew on three Space Shuttle missions and it is Sharipov's second flight into space, having flown in 1998 to the Russian Mir Space Station.

Chiao and Sharipov are expected to spend about 190 days aboard the ISS. After the Columbia accident on Feb. 1, 2003, the ISS Program and the international partners determined that the Station would be occupied by only two crewmembers until the resumption of Shuttle flights because of limitations on consumables.

During more than six months aloft, Chiao and Sharipov will monitor the arrival of two Russian Progress resupply cargo ships filled with food, fuel, water and supplies.

On January 26 they performed Expedition 10's first spacewalk which lasted 5 hours and 28 minutes. While outside the Station, Chiao and Sharipov installed the Universal Work Platform, along with its base and associated wiring. They also installed a commercial robotics experiment and a biological experiment. In addition, they checked vents on systems that help control the Station's atmosphere. It was the 57th spacewalk conducted at the Station. Next spacewalk will be in March.

ISS Status: Operational. Digipeater: Active
Current Mode: Packet (APRS-style)

Worldwide packet uplink:	145.990 MHz FM
Region 1 voice uplink:	145.200 MHz FM
Worldwide downlink:	145.800 MHz FM
Repeater Uplink:	437.800 MHz FM
Repeater Downlink:	145.800 MHz FM Doppler is 10 KHz

AMSAT-SM skänker 50.000 kronor till P3E

När du går till posten eller klickar in din medlemsavgift för 2005 är du samtidigt med och skjuter upp en satellit! Hela beloppet går oavkortat till det tyska projektet P3E – en amatörsatellit i hög bana och med stor täckning som planeras bli uppskjuten redan i år. AMSAT-DL som bygger satelliten har en gedigen erfarenhet med projekt som Oscar 10, Oscar 13 och AO-40 bakom sig. Donationen kommer att föreläggas årsmötet för godkännande. Men mer därom på nästa uppslag.

På grund av eller tack vare att vi bara gav ut ett nummer av AMSAT-SM Journalen förra året kan vi avsätta en större summa till att få upp en satellit som vi alla kan ha glädje av. Det har heller inte hänt så mycket under det gångna året än att du kan fortsätta att ropa ut din lokator till världen över FM-satelliten AO-51 som fortsätter att snurra i sin bana. Eller köra APRS på PCSAT som nu dykt upp igen efter att ha varit tyst under lång tid

Titta in på vår fina hemsida www.amsat.se som Lars SMØTGU ständigt utvecklar. Just nu finns kompendiet "Amatörradio per satellit" uppdaterat och klart att ladda ner. Där kan du också kolla vilka satelliter som är hör- och körbara just nu och när de passerar just din hemstad och QTH

SMØAIG, redaktör

AO-51 February Schedule

All dates and times are UTC. The mode change occurs normally between 0100 and 0400 utc on the date shown. The mode will be active from the date shown until the next Mode Change date listed. Mode Configurations are listed below the schedule.

9 Feb - Exp Wed - 9k6 High Power
9k6 Digital, V/U, High Power, PBP BBS (Pacsat Broadcast Protocol BBS)
Uplink: 145.860 mhz FM, 9k6 PBP Digital
Downlink: 435.150 mhz FM, 9k6 PBP Digital

10 Feb
FM Repeater, V/S
Uplink: 145.920 mhz FM, No PL Tone
Downlink 2401.200 mhz FM

16 Feb - Exp Wed
FM Repeater, L/S
Uplink: 1268.700 mhz FM, No PL Tone
Downlink 2401.200 mhz FM

17 Feb
FM Repeater, V/U, High Power Mode
Uplink: 145.920 mhz FM, 67 hz PL Tone
Downlink 435.300 mhz FM
23 Feb - Exp Wed
38k4 Digital Downlink, V/U, PBP BBS (Pacsat Broadcast Protocol BBS)
Uplink: 145.860 mhz FM, 9k6 PBP Digital
Downlink: 435.150 mhz FM, 38k4 PBP Digital

24 Feb
FM Repeater, V/U
Uplink: 145.920 mhz FM, 67 hz PL Tone
Downlink 435.300 mhz FM
9k6 Digital, V/U, PBP BBS (Pacsat Broadcast Protocol BBS)
Uplink: 145.860 mhz FM, 9k6 PBP Digital
Downlink: 435.150 mhz FM, 9k6 PBP Digital

Aktuell och uppdaterad info alltid på:

www.amsat.se

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AMSAT-SM årsmöte 2005

Härmed kallas till årsmöte med AMSAT-SM

Söndag 20 mars (vårdagjämningen)

Kl 13.00 i samband med DLØ-möte i

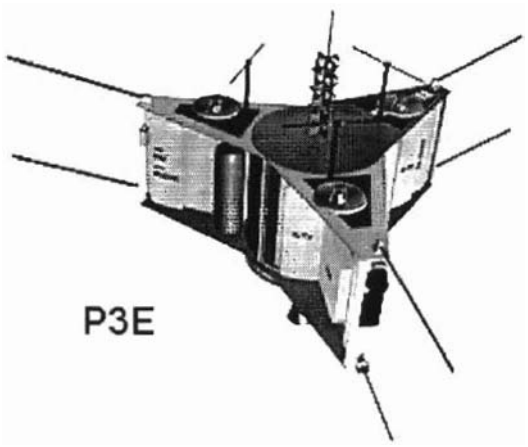
Althin-salen på Tekniska Museet i Stockholm

Dagordning och årsmöteshandlingar

Kommer att finnas på **www.amsat.se**

Donationen till P3E på 50.000 kronor

Överlämnas till AMSAT-DL



P3-E Frequenzvorschläge / Frequency proposal	
	29 MHz Uplink (A)
Rudak	29.500 +/- 5 kHz (multi-mode. low-speed)
	145 MHz Downlink (V)
GB:	145.812 (PSK 400 b/s)
EB:	145.957 (PSK 400 b/s)
RUDAK:	145.837 (multi-mode. lo-speed)
PB:	145.845 to 145.945 (linear)
	435 MHz Uplink (U)
RUDAK:	436.200 to 436.350 (multi-mode)
PB:	436.050 to 436. 150 (linear)
	1260 MHz Uplink1 (L1)
RUDAK:	1268.775 to 1268.925 (multi-mode)
PB:	1268.600 to 1268.750 (linear)
	1260 MHz Uplink2 (L2 - GALILEO-Alternative)
RUDAK:	1260.275 to 1260.425 (multi-mode)
PB:	1260.100 to 1260.250 (linear)
	2400 MHz Downlink (S)
GB:	2400.250 (PSK 400 b/s)
EB:	2400.500 (PSK 400 b/s. hi-speed option)
RUDAK:	2400.600 to 2401.000 (multi-mode. lo/hi-speed)
PB:	2400.275 to 2400.425 (linear)
	5650 MHz Uplink (C)
PB:	5668.600 MHz +/- 25 kHz (linear)
	24 GHz Downlink (K)
PB:	24048.300 MHz +/- 25 kHz (linear)
BEACON:	24048.350 MHz
	47 GHz Downlink (R)
PB:	47088.300 MHz +/- 25 kHz (linear)
BEACON:	47088.350 MHz
	2450 MHz Uplink (S) - 10450 MHz Downlink (X)

GB = General Beacon
EB = Engineering Beacon
PB = Passband
RUDAK= Digital Multi-Mode Payload

P3E update

By Frank Sperber, DL6DBN
translated by John J. Bubbers, W1GYD
Originally published in the AMSAT-DL-Journal of Dec./Feb. 2004/2005 and in the OZ-AMSAT Journal Jan 2005

Several of the transponder builders met at the occasion of the 30 year AMSAT-DL celebration in Bochum to present the intermediate developments and to discuss further details of the mechanical interfaces.

Mirek Kasal brought his modules for the L-band and the command receiver. They are waiting for the final programming of the uplink frequencies and the integration into the complete module housing for construction in the satellite. The Lband module then becomes the second integration ready module after the main battery. The work on the transmitters for 24 and 47 GHz

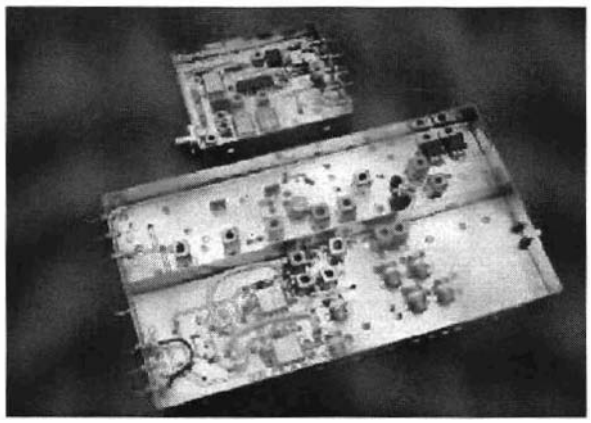


Figure 1: The front end and command receiver for P3-E's L-band receiver

as well as the C-band receiver is close to being flight ready. Michael Fletcher was able to demonstrate his prototype of the X-band transistor output stage in Bochum. They will be a permanent part of the P5A test transponder that can also be switched on as a liner transponder on P3E. Additionally, Michael Fletcher also had a sample construction of the 29 MHz uplink receiver.

It is still not clear if the 10 meter band can be integrated on board the P3E. On the one hand there has to be enough available space, and on the other hand the noise level through the switching controls and the oscillators from the satellite cannot be too high Inclusion of the 29 MHz RX will be decided definitely during the integration work.

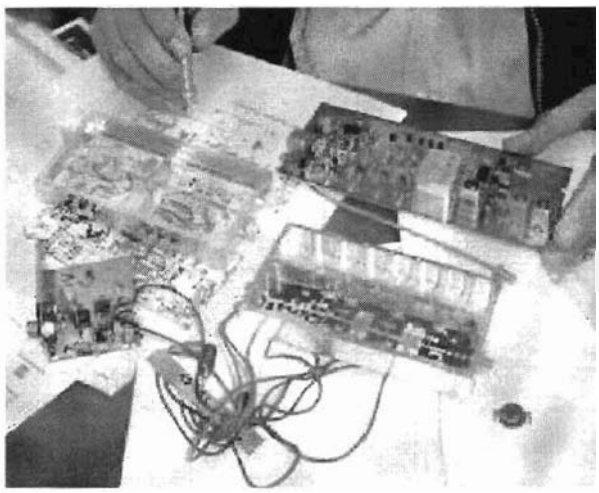


Figure 2: The parts of the X-band output stage in the opened housings, on the right rear the 29 MHz RXon a sample board.

The work on the transponder parts for 145, 435, and 2400 MHz has also begun again. William Leijennar presented a more robust design of a U/V transponder. We hope to be able to report in the next Journals about further progress on the main transponders.

Preparations on the Cable Assembly

One of the main jobs in the near future is the production of the cable assembly. A P3E 1:1 wooden model was built in Marburg. Originally the model was a rough wooden frame and was intended for cable layout and measurement. Finally a model evolved , thanks to the competence of Andreas Werner who is a professional cabinet maker and was present in Marburg; this can later be used for exhibition purposes.

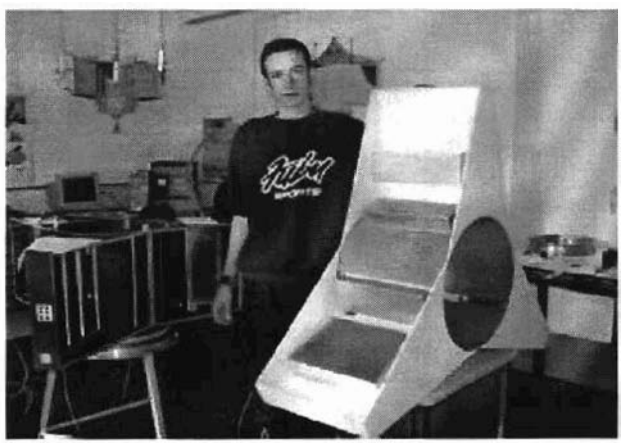


Figure 3: Andreas Werner with the early construction of the P3-E that is to be used for the completion of the cable .

As a result it is presumed that at the beginning of next year the cable assembly can be completed at the model, and can later be integrated into the flight structure.

Problems with the Auxiliary Battery

A secondary or auxiliary battery was again included in the plans for P3E after the difficulties after the battery damage on AO-40. A 4-Ah size battery is being considered. Unfortunately the first cells ordered have proven to be unsuitable. Currently, more suitable cells are being sought in the marketplace. The auxiliary battery on P3E will only be installed if a safe solution to switching between the two batteries can be found, which can't introduce any new failure sources, so that we don't have the switching problems between main and auxiliary batteries that plagued AO- 40.

IHU-3 Shows First Signs of Life

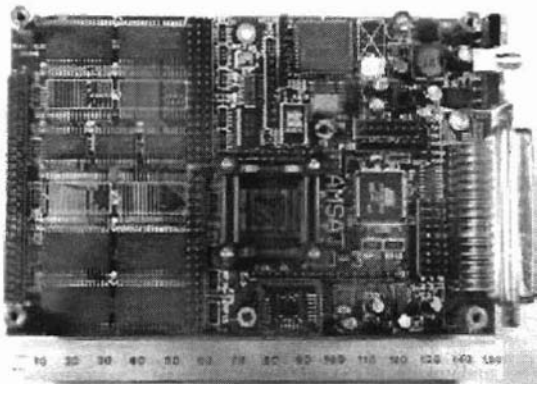


Figure 4: IHU-3 prototype. Meanwhile basic function tests of the new IHU were conducted successfully.

The new on-board computer IHU-3, which has already been laid out for the Mars Mission, has successfully completed its early function tests. Program code was able to be performed on the various memory areas (flash, EDAC-RAM, unshielded RAM) after the very extensive logic for
the Watchdog, control and error correction had been burned into two FPGA's. Additionally, several of the basic I/O functions tested positive. Necessary design changes will be introduced in the next prototypes, which can then be used for the implementation of the IPS. the planned RUDAK system on P3E digital signal processing. This then offers better command possibilities for P3E and later radio

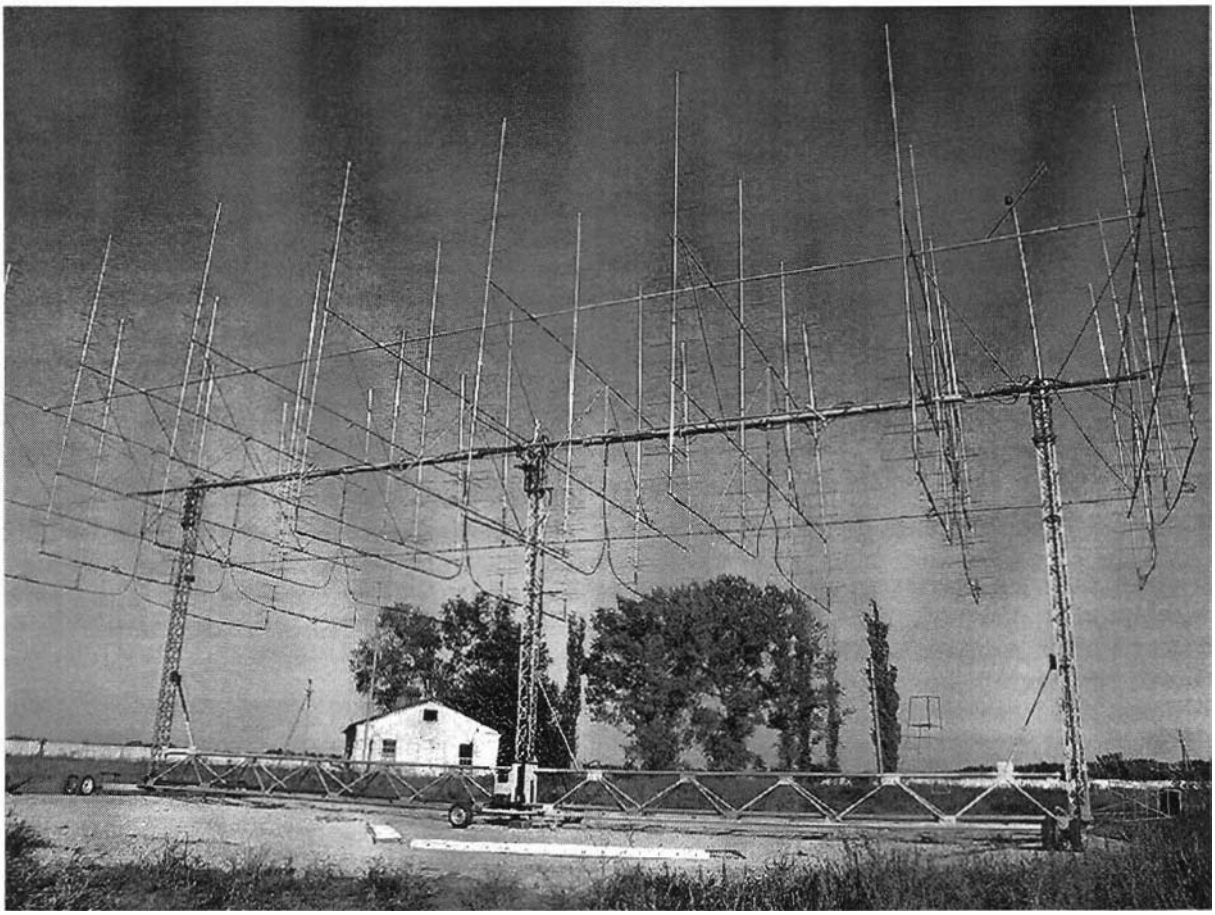
An advantage of the new IHU-3 is its utility for contact to Mars on P5A. The new IHU with its replaceable implementation could be used for Until now there is no final concrete proposal from a development group so that at least a flight ready hardware package can be assemble based on the IHU-3, the beacon module, and the technology of the command receiver. Still missing is the software for the RUDAK-F communication protocol and the related user services.

Further Working Meetings Planned

Two working meetings are planned for January and February. At one of the meetings the details for the IHU-3 and the interface to the satellite will be finalized. The second meeting is central to the transponder and should clear up the open matters of the interface and the individual modules and the integration.

The AMSAT-Phase 3E satellite (P3E) is dedicated as communication and scientific platform for a highly elliptical orbit around Earth. The spacecraft will be created in a joint process together with the P5A Mars mission by an international team under leadership of AMSAT-DL and continues the successful series of AMSAT-Phase 3 satellites. Additionally the spacecraft will be a test bench for technology developped for the Mars mission. The main task of P3E is to act as communication platform for radio amateurs worldwide. A launch is planned for 2005

Dom som ska göra´t. Professor Meinzer är veteran på satellitbygge. Här välkomnar han Arianespace och ESA tillsammans med AMSAT-DL:s ordförande Peter Guelzow



EME i väntan på nästa DX satellit

För dom som någon gång funderat på att köra ett EME qso utan att egentligen ha möjlighet till det så är det nu möjligt. Kanske inte på CW men med hjälp av FSK och datorns ljudkort kan nästan vilken normal tropo station som helst köra RN6BN och hans jättelika månstudsare - http://www.73.ru/

Själv har jag fått lite signaler på min 5/8 GP på taket men inte tillräckligt för att avkoda, dock har flera stationer hört honom på ett big Wheel eller liknande.

Så nu är det dags att sätta upp en liten yagi i trädgården och ladda ner WSJT programmet via tex DK5YA:s hemsida http://www.vhfdx.de/ och börja lyssna mot Månen.

73 Håkan SM7WSJ

Sam, RN6BN hörs också på en mindre yagi med sin 32 x 15 elements månstudsare med H&V polarisation. QTH: Krasnodar nere vid Svarta havet

I hans log finns förutom Håkan SM7WSJ också SK0UX, SM5CUI, SM3UWS, SM2CKR, SM3AKW m.fl.

PCSAT vaknar till liv igen

NO-44 PCSAT som också går under beteckningen NO-44, sändes upp den 30 september 2001. Den användes huvudsakligen för att utväxla QTH-uppgifter typ APRS och även korta meddelanden.

Den har under lång tid varit tyst men har nu dykt upp igen men med ytterst bräcklig power budget så den måste användas med försiktighet för att inte tystna i ett halvår igen.

Bob Bruninga WB4APR som basar över satelliten har sänt ut följande meddelande daterat 24 januari 2005:

PCsat has been restored to Full operations for the next two weeks for real-time packet QSO. (thanks to command station VK2XGJ this morning). PCsat's digipeater is for human, attended operations only. No unattended operations are welcome. See the User Service Agreement: http://www.ew.usna.edu/~bruninga/pcsat.html

PCsat is an APRS digipeater responding to the usual APRS aliases of RELAY, WIDE. To work others, simply QSY your normal APRS station to 145.825 during a pass. No other changes to normal operation should be required.

Passes are occuring during the few hours or so after sunrise and after sunset. But each day the period moves earlier by 30 minutes. If you can operate an IGate, please do so for this period. The live captured downlink can be seen on: http://pcsat.aprs.org

Enjoy. This will only last 2 weeks of full sun and maybe two more weeks before the power budget goes negative. Remember, after the full sun period (2 weeks) then all it takes is one RESET and we lose it for the next 6 months. So as long as we dont overload it after the 2 weeks, she might last another 2 weeks or until the first reset...

PCSat is a 1200-baud APRS digipeater

designed for use by stations using hand-held or mobile transceivers. Downlinks feed a central web site at: http://pcsat.aprs.org

The APRS-equipped PCSat was built by midshipmen from the U.S. Naval Academy under the guidance of Bob Bruninga, WB4APR.

Uplink/downlink: 145.827 MHz 1200 baud AX.25 AFSK via W3ADO-1

Aux/Uplink: 435.250 MHz 9600 baud via PCSAT-2 (off) APRS
Downlink: 144.390 MHz (Region 2)

SPECIAL JOINT PCSAT/ISS TEST

Sometime after 1300z on 2 Feb, the ARISS packet system on ISS will change to the PCSAT frequency of 145.825 for joint operations tests with PCSAT. Both spacecraft will operate as conventional APRS digipeaters using the alias of WIDE. This should double the opportunites for QSO's for the next 8 days and also allow some potential double hops.

Please, no un-attended operations and do not transmit any beacon any more often that once a minute nominal. Watch packets on pcsat.aprs.org to look for any successful two hop digipeats. Do not JAM the uplink or no one will be successful. NO OPERATIONS IN THE DARK. And No DIGIPeating via W3ADO-1. If that call appears, it means PCsat has reset and we only have one orbit to recover or we may lose her..

AMSAT-UK Space Colloquium 2005

AMSAT-UK will be holding a Space Colloquium at the University of Surrey in Guildford, United Kingdom from 29 – 31st July.

This 3 day event always attracts Radio Amateurs from across Europe as well as North America, Africa, Asia and the Pacific. Over a third of those attending come from outside the UK. It provides an opportunity to rub shoulders with the designers of the Amateur Satellites and find out the latest news.

As in previous years there will be special beginner's sessions to teach newcomers how to get started in the fascinating world of Amateur Radio Space communications. You can get started using little more than a standard dual-band FM HT.

An antenna testing range will be available to enable you to check out the gain of your latest antenna, not all commercial antennas perform as well as you might think! Microwave experts will be on-hand with test equipment covering up to 24 GHz so you can have your equipment tested and receive professional advice.

There will be guided tours of the Surrey Space Centre with the satellite mission control centre and the satellite assembly facility. These tours are always popular as they provide a unique opportunity to see satellites in various stages of construction.

The RSGB GB4FUN van, which has a fully equipped satellite station, will be available during the event for visitors to work the Satellites.

Throughout the event there is an extensive lecture programme ranging from highly professional technical presentations to basic down to earth "how to do it" type talks.

Guildford is 60 km from Central London and easily reached from both London-Heathrow and London-Gatwick airports.

Details of 2 or 3 day packages covering meals and accommodation in the University grounds are available from the secretary Jim Heck G3WGM
Tel: +44 1258 453959

E-mail: g3wgm@amsat.org
Website: http://www.uk.amsat.org/

100 studenter bygger satellit för amatörer

SSETI Express är en LEO, en satellit i låg bana som ska byggas av 100 studenter från europeiska universitet och högskolor i nio länder. Arbetet koordineras sedan hos ESA:s teknikcentrum i Noordwijk i Nederländerna.

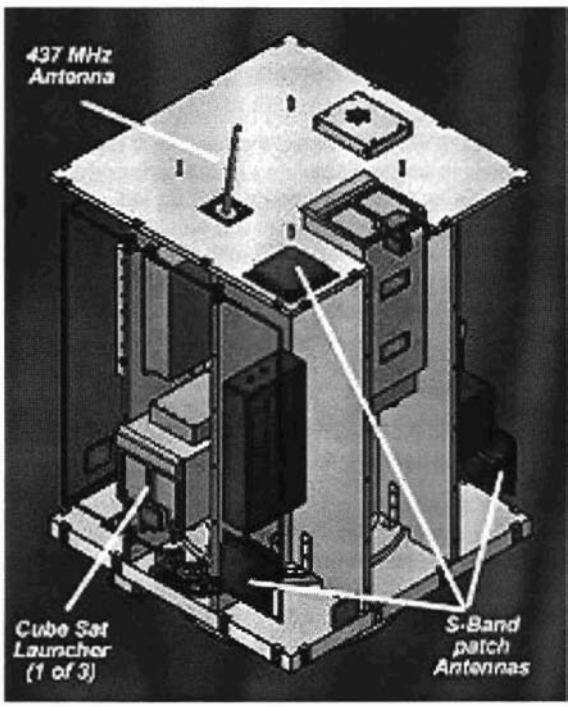
Det var vid förra årets Colloquium som Amsat-UK:s ordförande, Professor Sir Martin Sweeting G3YJO, meddelade att SSETI också skulle medföra en FM-transponder för 70 cm upplänk och 2.4 GHz nedlänk.

The 2.4GHz downlink exciter, the switched mode power supply and control interfaces are being developed by an Amsat-UK team comprising of Sam Jewell G4DDK, David Bowman G0MRFand Jason Flynn G7OLD with Graham Shirville G3VZV assisting.

It is intended that this transmitter will be available for use as the downlink of a single channel FM U/S transponder. These frequencies will enable the many amateurs who already have Oscar 40 equipment to use it in an exciting new way.

SSETI Express is intended to be launched into a sun synchronous 680km orbit from Plestek in Russia in April 2005. The onboard experiments include attitude control, a camera and a cold gas propulsion unit.

It is intended that the 2.4GHz downlink transmitter will transmit satellite telemetry and data at 38k4 data rate before being switched over to voice transponder operation after the onboard experiments have been completed. ESA will shortly be announcing a worldwide competition for radio amateurs who download the data from the satellite and forward it to a website which is under construction. There will be a valuable award for the amateur who provides the largest amount of verified data over the first few weeks/months of operation.



The 3 watt 2.4GHz power amplifier is completed and has been provided by Charles Suckling G3WDG. The S band antennas are three flat plate patches that have been developed and produced by the Wroclaw University of Technology in Poland.

The Satellite Beacon

By Emily Clarke W0EEC
VP, Project OSCAR and AMSAT Area Coordinator

So You Want to Work AO-51?

AMSAT-OSCAR-51 is the newest satellite launched by AMSAT. It is the strongest satellite in the sky other than the ISS, and is one of the most complex satellites currently in operation. It has many subsystems and as some have said, "it has something for everyone" including simultaneous voice and packet operations. In this article I'll focus on making a voice contact.

Launch and Checkout

AO-51 was launched from the Baikonour Cosmodrome in Kazakhstan on June 29, 2004 and was inserted into a sun synchronous orbit which allows it to be over the same geographical location basically the same time every day. For us in North America, this happens in approximately 11am for the decending (north to south) pass, and late evening (11pm) for the ascending pass. It underwent testing for 30 days after launch, and was turned over to amateur access on July 30th.

When AO-51 was first turned on it's first over the East Coast it was estimated that over 500 amateurs attempted to use the satellite. Three reported having QSOs, while the other 497 were left scratching their heads. When the satellite passed over central North America 80 minutes later, those 500 stations were joined by another 500 from the west coast. Two stations reported having QSOs. At 30 minutes past midnight AO-51 showed up out over the Pacific ocean. Estimates are that 200 people on the west coast stayed up, and about 8 QSOs took place. I was one of the lucky ones.

So what happened?

AO-51 is a low earth orbit satellite (LEO) mode J-FM (V/U) voice repeater, the same as launching your local repeater in orbit, except for one very significant difference. Instead of having a range of 50 or so miles, it can be accessible to the entire country at one time. While this may sound beneficial at first, the results can be disasterous. If you've ever heard a double on your local repeater when the net control calls for check-ins, think of the results when 500 stations suddenly try to check in to the same repeater at the same time. It's a pileup.

Quite a lot of the pileup results from people who have never heard a satellite before but key up to "just to make sure it's there". There are also those who can hear it, but don't have on the required 67Hz PL tone. Although AO-51 will not repeat those signals, they can jam weaker signals and prevent them from getting through. Lastly an FM repeater is not designed to handle that many simultaneous signals, so they double, triple and... well, you can see the results are predictable.

How Will I Ever Get In?

The good news is that in the weeks following activation of AO-51 the load has lightened and it's easier to get it if you plan ahead and avoid the pileups. Many people are able to work Echo successfully and I have consistently been able to get in at 5 watts with both an Arrow antenna and a ½ wave whip. Aruni VE4WMK who is 10 years old uses an HT with an Arrow and is very successful following using very simple techniques that I posted in article on the AMSAT website entitled "12 Suggestions for Handheld Transceiver Users". Here are some of the basics:

1) **Listen First**. If you can't hear other stations, you can't work them. AO-51 is very strong (only the ISS is stronger) so almost everyone can hear it on a good HT with a good whip antenna, the dual-band Arrow yagi or the dual band Elk log periodic that are sold at most flea markets in the area.
2) **Keep your squelch off.** Although Echo is strong, it's not strong enough to break your squelch in most cases.
3) **Make sure you have your PL tone set to 67hz**. Like most repeaters, even if you get a chance to get in, you won't without the PL tone set. Don't try to use tone squelch either, as Echo does not transmit a 67Hz PL tone back on it's downlink.
4) **Don't use a verticle antenna.** Whips and ground plane antennas should be tilted so that the verticle is 90 degrees off the elevation of the satellite.
5) **Know where the satellite is.** Keep a tracking program nearby where you can reference it. If you are handheld outside, use a handheld computer running PocketSat or PetitTrack to reference the satellite's position.
6) **Use Dual Headphones!** I can't stress this enough. Your brain is the best DSP there is, and if you only hear the signal through one ear, your brain can't filter out the noise nor can it react quickly to callsigns.

How Should I Prepare?

When you decide to work AO-51 for the first time, some preparatory steps will help.

- Visit the AMSAT website and visit the Echo Project page to make sure you have the correct frequencies. The AMSAT website also has online pass predictions in the Tools section which will calculate the passes for your location.
- Try listening on one pass nearby (over 30 degrees of elevation) and see how well you are receiving. If you can't hear the satellite, you may need to improve your receive antennas.
- Try to arrange a sked with another station. It's easier to make a contact with someone who is experienced on the satellites than cold calling. That contact can also help you determine how well your signal is doing.
- Plan on working a pass away from populated areas (see the map - white spots are high density population areas.) If you can work to the north or west or over the ocean, your results will be better because statistically there are fewer people.

Most of all, don't get discouraged. AO-51 is reprogrammable from the ground and they have made some improvements to it already. For example, initially the power was set to 330mw, then 500mw and now is set for 1W. AO-51 can operate up to 7 watts, but it is unlikely they will increase power over 2W since most stations now receive AO-51 full quieting.

Announced frequencies for AO-51 Echo:

Voice Uplink:	145.920 MHz FM (PL - 67Hz) 1268.700 MHz FM (PL - 67Hz)	**Voice Downlink:**	435.300 MHz FM
Packet Uplink:	145.860 MHz 9600 bps, AX.25	**Packet Downlink:**	435.150 MHz 9600 bps, AX.25 2401.200 MHz 38,400 bps, AX.25
Broadcast Callsign:	PACB-11	**BBS Callsign:**	PACB-12

Website References

AMSAT – *http://www.amsat.org*

The Echo Project Page - *http://www.amsat.org/amsat-new/echo/*

12 Suggestions for HT Users - *http://www.amsat.org/amsat-new/echo/EchoHT.php*

Online Pass Predictions - *http://www.amsat.org/amsat-new/tools/predict/*

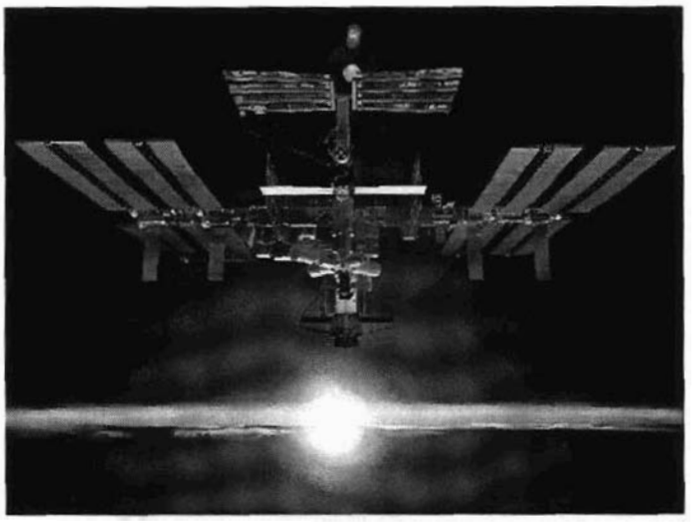
So best of luck and CU on the Birds!

73,

Emily

Success tips for using the ISS voice repeater

By Emily Clarke, W0EEC



To the delight of many hams, the Amateur Radio on the International Space Station (ARISS) Phase 2 gear in recent weeks has been turned on periodically as a voice repeater [the system was in repeater mode as of October 7--*Ed.*]. Unfortunately for every amateur making a successful contact through the ISS repeater, many others go away disappointed when they can't seem to transmit through the repeater.

This can be very frustrating because unlike other amateur satellites--where *hearing* the bird often is the major challenge--the ISS is very easy terrestrial copy. It generally puts out 5 to 10 W as opposed to the typical 0.5 to 1 W OSCAR downlink power. Nonetheless, some of those attempting to work through the ISS repeater experience difficulty or only have limited success, even when the ISS is directly overhead.

Unlike any other FM satellites that operate in Mode V/U (Mode J) the ISS is operating in Mode U/V (Mode B). While this seems to be of little consequence to most owners of dualband handheld transceivers, mobile rigs and base stations, some important factors can spell the difference between success and failure. Let's consider these.

Downlink/Uplink Frequencies

The ISS repeater downlink is 145.800 MHz, which is the normal FM voice and the RS0ISS packet system downlink worldwide. (The non-repeater FM voice uplink frequencies are 144.49 MHz in Regions 2 and 3 and 145.20 MHz in Region 1. The packet uplink frequency is 145.99 MHz worldwide.)

The ISS repeater uplink is 437.800 MHz, which is in the high end of the satellite subband. Not all dualband FM transceivers will transmit on that frequency, however. For example, a stock Icom IC-W32A will not transmit there. So, before you attempt to transmit through the ISS repeater, check your transceiver's owner's manual to make sure you will be able to transmit on the uplink frequency. No CTCSS tone is needed to access the ISS repeater.

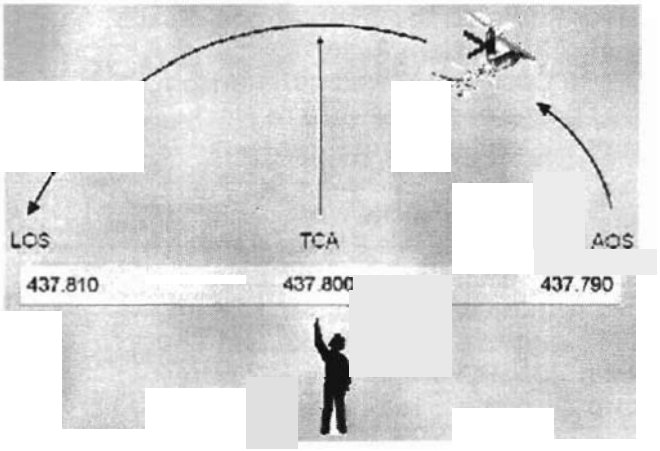
Doppler Shift

Dealing with Doppler is a fact of life for all satellite work. Most hams who have tried to work Mode V/U satellites are used to transmitting on a single frequency and listening on a frequency 5 to 10 KHz above the "published" downlink frequency, then tuning lower in frequency as the satellite approaches.

This is because on a 2-meter uplink frequency Doppler shift is less of a factor--on the order of perhaps 3 kHz. At 70 cm, however, Doppler shift is substantial and can easily exceed the ability of the receiver to capture the downlink signal.

To see this for yourself, have a friend transmit on a 440 MHz simplex frequency while listening first 10 kHz away, then 5 kHz away. See what happens to the signal.
The published uplink frequency of 437.800 MHz is the frequency the ISS receiver--a Kenwood TS-D700E in this case--is tuned to. Since there's only a brief time when the receiver will actually hear a signal transmitted on that frequency, adjusting your transmit frequency to match the receiver's tuning is critical. This is because Doppler shift causes the transmitted signal to shift *up* as the satellite passes from horizon to horizon overhead.

So, to be "on frequency" with the ISS repeater, you have to begin transmitting at a *lower* frequency--starting at around 437.790 MHz when the ISS first comes over the horizon, tuning up to 437.795 MHz about a third of the way into the pass (approximately 3 minutes on a good overhead pass). When the ISS reaches its time of closest approach--TCA--tune your transmitter to 437.800 MHz. At this point, Doppler should be essentially neutral (0 Hz). Then, as the satellite moves toward the opposite horizon, continue tuning up to 437.805 MHz and finally--when the



This diagram illustrates how Doppler shift will require you to change your transmit frequency when working through the ISS Mode U/V repeater. Transmit frequency must change according to the position of the ISS relative to the operator's location on Earth. [Emily Clarke, W0EEC]

ISS is about to go over the horizon again--to about 437.810 MHz.

Actual transmit frequencies will vary depending on your position on Earth with respect to the ISS, so using a computerized tracking program that can calculate the exact frequency is a helpful tool. This technique also will vary depending on the tuning steps available on your transceiver. If your 70 cm transmitter can only tune in 5 kHz tuning steps, you can't tune precisely. If you're within 2.5 kHz, however, your signal will get captured and repeated. If you're equipped for computer-controlled Doppler tuning, make sure you are tuning *both* uplink and downlink frequencies, not just the downlink. Many operators owning radios designed for satellite work are used to locking their transmit frequency and only tuning the receiver. In the case of the ISS, however, one should tune both transmit and receive.

Modulation and Deviation
The ISS receiver seems to be more sensitive to excessive deviation and overmodulation. These factors are generally not a problem on OSCAR satellites. To avoid problems in this area, be sure to turn off any speech compression or processing (a good idea for most FM and satellite work in general) and consider lowering your microphone gain (or speaking a bit farther away from your microphone). If you are using full duplex and monitoring your own downlink signal, you will notice your audio become cleaner and more natural sounding.

Pass Predictions
The ISS is moved from time to time to boost its orbit or to avoid space debris. This means its crucial to have the latest Keplerian elements. Serious users of the ISS repeater likely will update their Keps daily. I recently updated the AMSAT Pass Prediction Calculator to update Keplerian elements automatically twice per day, thus increasing the accuracy of its predictions.

Schedule
The ISS voice repeater is *not* on all the time. When not in repeater mode, the Kenwood D700 serves as the RS0ISS packet system (145.990 MHz up/145.80 MHz down). The ISS crew generally switches to repeater mode before an ARISS school group contact and back to packet after the school contact. (This could change when the Expedition 10 crew takes over the ISS in late October, and the Kenwood Phase 2 equipment becomes the primary transceiver for school group contacts.) Given this uncertainty, it's important to monitor the ARISS Web site for more information. You can get additional information by subscribing to the SAREX mailing list. The ISS Fan Club Web site also lists the current ARISS equipment operating status.

ISS Expedition 9 crew member Mike Fincke, KE5AIT, has been active making casual Amateur Radio QSOs and occasionally gets on to talk with stations while the system is in repeater mode.

In Conclusion
Success working through the ISS repeater is easy. Remember to:

- make sure your transceiver can transmit on the ISS uplink frequency
- obtain accurate pass predictions
- adjust your transmitter frequency to correct for Doppler
- keep your modulation and deviation within the normal range for terrestrial repeater hardware
- use full duplex whenever possible to monitor your signal quality
- always be courteous. Please don't monopolize the repeater. Once you've made a contact give someone else a chance. Activity can be heavy!
- listen before transmitting to make sure you aren't stepping on another station.

Emily Clarke, W0EEC, is an ARRL and AMSAT member. In addition to designing the new AMSAT Web site, she serves as AMSAT's San Francisco Bay Area Coordinator. Clarke also is the vice president for membership and on the board of directors of the Project OSCAR Amateur Radio Club.

SO-50 SAUDISAT-1C

Uplink: 145.850 MHz 67.0 Hz PL
Downlink: 436.795 MHz

There have been unconfirmed reports that So-50 has shifted downlink frequency as much as 5khz up.

To switch the transmitter on, you need to send a CTCSS tone of 74.4 Hz. The order of operation is thus: (allow for Doppler as necessary)

1) Transmit on 145.850 MHz with a tone of 74.4 Hz to arm the 10 minute timer on board the spacecraft.

2) Now transmit on 145.850 MHz (FM Voice) using 67.0 Hz to PT the repeater on and off within the 10 Minute window.

3) Sending the 74.4 tone again within the 10 minute window will reset the 10 minute timer

West Coast Space Symposium

Project OSCAR, the world's oldest amateur radio club devoted exclusively to amateur satellites has issued a call for papers for it's 2005 West Coast Space Symposium to be held May 7th, 2005 at the College of San Mateo in San Mateo, California. The Symposium is devoted to a broad range of topics that range from current satellite construction projects, satellite operations and general technical discussions.

For more information to submit papers, or for information to attend the Symposium, visit the Project OSCAR website at:
http://www.projectoscar.net

Worked All Continents from Space

During his International Space Station Expedition 9 duty tour, astronaut Mike Fincke, KE5AIT, became the first ISS crew member to contact all seven of the world's continents via Amateur Radio. Now he has the International Amateur Radio Union's Worked All Continents (WAC) certificate for his wall.

Amateur Radio on the International Space Station (ARISS) Ham Radio Technical Coordinator Kenneth Ransom, N5VHO presented the award to Fincke recently at Johnson Space Center.

Operating NA1SS Fincke worked KC4AAC at Antarctica's Palmer Research Station for his last contact--actually a "bonus continent" not required to earn WAC. During that QSO, Fincke and Chuck Kimball, N0NHJ, compared and contrasted life in their respective outposts.

After returning to Earth in October, Fincke said he's not sure everyone in the NASA community understands and appreciates what Amateur Radio means for the rest of the world. Fincke said he'd also like to make the first Amateur Radio contact from the moon.

Oscar 7 still going strong

Uplink:
145.850 to 145.950 CW/USB Mode A
432.125 to 432.175 CW/LSB Mode B

Downlink:
29.400 to 29.500 MHz CW/USB Mode A
145.975 to 145.925 CW/USB Mode B

Beacon: 29.502 MHz, 145.972 MHz, 435.1 MHz, 2304.1 MHz

Emily, W0EEC has created a website to allow the users of AO-7 to record contacts, observations and use of the satellite more effectively at:

http://www.emilyshouse.com/experthams/ao7/main.php

This includes the ability to log contacts.

Tim, K3TZ has written a program to decode AO-07 telemetry. The program can be downloaded at:
http://www.qsl.net/k3tz/files/K3TZ_AO-07_Telemetry_Decoder_0.5.zip

For more AO-7 info:
http://www.amsat.org/amsat/sats/n7hpr/ao7.html

OSCAR Satellite Status Summary As of 08 January, 2005

Name	Beacons	HF	VHF	UHF	L-Band	S-Band	X-Band	K-Band	APRS	Packet	Comments
AO-51 (Echo)	↑		↑	↑	↑	↑				↑	Check Schedule
AO-7	→	→	→	→							Sunlit Ops Only
UO-11	↑										
RS-15	→	→	→								Intermittent
AO-16	↑									→	Digipeating
LO-19	↑		↓	↓						↓	CW Beacon Only
AO-27	↑		↑	↑							
FO-29	↑		↑	↑						↓	
GO-32	↑									↑	
SO-41			→	→							Erratic
NO-44									→	↓	Low Batteries
MO-46	↑									↑	
SO-50			↑	↑							
ARISS			↑	↑					↑	↑	
RS-22			↑	↑							
SSETI Express				↑		↑					May 2005
HamSat											

Note: Arrows indicate subsystem health, not uplink or downlink. For frequency information click on the satellite name.

- **Operational** - the satellite achieves its primary mission most of the time
- **Semi-Operational** - the primary mission is achieved at some times
- **Non-Operational** - the primary mission is not achieved
- **Future Launch** - the satellite has a scheduled launch date

Den här listan finns på www.amsat.org och ger en utmärkt överblick över vilka satelliter och moder som är hör- och körbara just nu. Där finns också upptagen en kommande satellit: SSETI Express

Länkar och adresser – courtesy of AMSAT-OZ

AMSAT-OZ är vår danska systerförening vars ordförande Ib OZ1MY ger ut en Journal varannan månad och själv är mycket aktiv på de flesta satelliterna. De har en mycket bra länklista som vi har lånat. Deras tidning ges också ut i digital form.

AMSAT-OZ:
Kontakt AMSAT-OZ på adressen:
AMSAT-OZ
Ingeniørhøjskolen i København.
EIT-sektoren
Lautrupvang 15
2750 Ballerup,
telf: 4480 5133
Ib Christoffersen.
e-mail: oz1my@privat.dk

AMSAT-OZ hjemmeside
Gå ind via: www.eit.ihk.dk
Der er henvisning til AMSAT-OZ ordbogen.
Eller brug www.amsat.dk

Vores mail server.
Send følgende e-brev:
From: Dit Navn <oz9xyz@udbyder.dk>
To: <majordomo@amsat.dk>
Subject: hvad som helst
Date: 5. juni 2001 09:26
I teksten:
Subscribe amsat-oz-bb

Indlæg til månedsbrevet.
Inden sidste fredag i måneden til Erik.

Styregruppe:
Formand, sekretær: Ib Christoffersen,
OZ1MY,
e-mail:oz1my@privat.dk
Arrangementsansvarlig: Henning Hansen, OZ1KYM
e-mail: oz1kym@image.dk
Redaktør:Erik Clausen, OZ9VQ,
erik.clausen@postkasse.org
Internetansvarlig: Lars Jensen, OZ1FFR,
e-mail: lmjhe@get2net.dk

Indmeldelse
Til adr. ovenfor. 100 kr pr år.
Giro
6 14 18 70
Alle indmeldelser gælder for et kalenderår.
Ældre månedsbreve.
Tidligere årgange af bladene kan købes for 100kr pr årgang. Vi har
92, 93, 94, 95, 96, 97, 98, 99, 00, 01,02. Henvendelse til OZ1MY.

Software
Fra år 2000 kun ved at downloade
de efterfølgende.
For **faxdiskenes** vedkommende fra
Michaels hjemmeside:
http://www.kappe.dk

STATION trackeprogrammet kan hentes på AMSAT-NA's hjemmeside under downloadable software. Hvis du selv vil registrere,
skal du også downloade registreringsprogrammet.

Trackeprogrammer:
InstantTrak V1.5 registrering, 150 kr. Bestilles hos OZ1MY – sendes på disk.
STATION registrering er nu gratis, hvis man gør det selv.
Der er to gode startsteder, AMSAT- NA og CelesTrack.
"Station" ligger på AMSAT-NA nu. Det kører under Windows 3xx, 9X, XP.

Programmer og litteratur fås i større udvalg hos AMSAT-UK OG AMSAT-NA og AMSAT-DL.

OZ6BBS
Der ligger meget god info på 6BBS, 144,625MHz, 433,675 MHz.
Man kan sende P-mail til OZ1-DMR @ OZ6BBS med ønsker:
Interesse for følgende data:
F.eks. -
Spacenews. Opgiv hjemme BBS:
OZxxx@HjemmeBBS
Temaserver: Brug den til at finde ting om satellitter. Det står under AMSAT (16 og 17)
OBS
Lokalfrekvenser med satellitsnak i Københavnsområdet.
Vi bruger 144,775MHz. Husk det er ikke vores frekvens.

Satellit DX-info
Udsendes på amsat-oz-bb.

425 DX News
Italiensk DX nyheder og bl.a. også QTH lister, der kan søges på. Kendes også fra Packet.
www.425dxn.org/

Hamradio-online
www.hamradioonline.com/index.html

AMSAT-UK
Det nemmeste er at gå ind via deres heres hjemmeside:
www.uk.amsat.org

BLADE:

OSCAR NEWS, medlemsblad for AMSAT-UK.

The AMSAT Journal,
AMSAT-NA medlemsblad.
AMSAT-NA. 850 Sligo Avenue, Silver Spring, MD 20910-4703, USA.

AMSAT-DL Journal
Medlemsblad for AMSAT-DL.
Ernst-Giller-Str. 20
D-35039 Marburg/Lahn
Germany
AMSAT-DL på internet:
http://www.amsat-dl.org

Programmer til download.
Gratis trackeprogrammer kan hentes fra AMSAT-NA, der også har enkelte betalings-programmer.

Northern Lights Software.
Kan hente nye udgaver, hvis man er registreret bruger.
http://www.nlsa.com
Nova f. Windows sælges også af AMSAT-NA. Pris cirka $ 60

CelesTrak
http://celestrak.com
Masser af Kepler elementer + historisk arkiv. En del programmer findes også her.

AMSAT-NA postkasse m.m:
Send meddelelse til
majordomo@amsat.org
Det nemmeste er så at skrive: help nede i teksten. Derefter kommer information om de lister, man kan komme på. Det er automatiseret nu. Hvis man vil i kontakt med et levende menneske, skal man adressere til:
listmaint@amsat.org
De er også på WWW:
http//www.amsat.org

ARRL:
http://www.arrl.org/
Der er en afdeling, der viser videre til annoncører. Der kan man finde mange ting, man ikke kan undvære.

RSGB:
http://www.rsgb.org

DARC:
www.darc.de
Her kan man også finde deres EMC gruppe under
/referate/emv/emstart.html

Rumfærger.
Her ligger tonsvis af materiale om rumfærgerne og SAREX.
http://www.acs.ncsu.edu/HamRadio/Sarex/index.html
Eller prøv:
http://www.nasa.gov/sarex/sarex_mainpage.htlm
Mange henvisninger.
Eller: http://shuttle.nasa.gov
Det kan også betale sig at starte på Dansk Forening for Rumfartsforskning's hjemmeside.

Michaels vejrsatellitside:
http://www.kappe.dk
Den er meget flot – og der kommer meget mere efterhånden. Links til mange andre vejrsatellitsider.
Kan downloade faxdiske herfra.

RIG.
Remote Imaging Group
PO Box 142, Rickmansworth,
Hearts
WD3 4RQ
England
£12 pr år
http://www.rig.org.uk/

ESA:
http://www.esrin.esa.it/

University of Surrey:
http://www.ee.surrey.ac.uk/EE/CSER/UOSAT/SSHP/sshp.htlm

TAPR:
http://www.tapr.org/tapr/index.htlm

Dansk Selskab for Rumfartsforskning.
http://www.rumfart.dk
Der er virkelig mange henvisninger.

Dansk Rumside.
http://www.rummet.dk

Leverandører af radioamatørudstyr:

Danske
http://home4.inet.tele.dk/dmteknik
http://www.werner-radio.dk
http://www.betafon.dk
http://www.rf-connection.com
http://www.edr.dk
http://www.norad.dk
http://home6.inet.tele.dk/oz6fh/Bru
gtliste.htm
http://www.pulsair.dk

Udenlandske
http://www.ssb.de
http://downeastmicrowave.com
http://www.icomusa.com
http://www.icomuk.co.uk
http://www.yaesu.com
http://www.standard-comms.co.uk
http://www.wimo.com
http://web.aurecvideo.fr/infracom/d
b6nt.html
http://www.alinco.de
http://www.mirageamp.com
http://MlandS.co.uk
http://www.waters-andstanton.co.uk
http://www.nevada.co.uk
http://www.db6nt.com

G3RUH's hjemmeside:
http://www.jrmiller.demon.co.uk

Henvisningsside hos ARRL:
http://www.arrl.org/ads/adlinks.html

Space Components:
http://flick.gsfc.nasa.gov
radhome.htm

Mange firmaer via:
ALUSOFT:
http://www.image.dk/~aksel/
Der er rigtig mange henvisninger, så man kan finde datablade og meget mere.

SM7GJ räddade Huygensprojektet från fiasko

Bilden av Boris Smeds SM7GJ som också har signalen DJ0EX, togs den 18 september förra året när klubbstationen på rymd-kontrollen i Darmstadt, DL0ESA hade kontakt med Internationella Rymdstationen

Boris Smeds SM7GJ arbetar vid rymdkontrollen i Darmstadt hos ESA - European Space Agency. Där har han spelat en viktig roll under förberedelserna för rymdfärden med sonden Cassini och landaren Huygens till Saturnus och dess måne Titan.

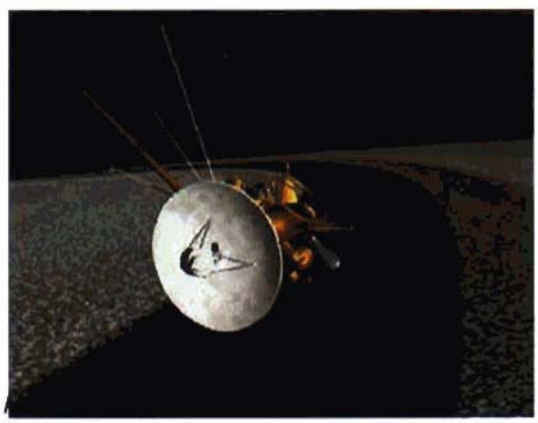
Idag räknas han som hjälte. Hade inte den svenske ingenjören Boris Smeds upptäckt ett datafel i rymdsonden Casssinis radiolänk hade det varken blivit bilder eller vetenskapliga data från Titanlandningen. Då hade dopplereffekten förvandlat hela projektet till ett praktfullt fiasko, skriver tidningen Ny Teknik.

Dopplereffekten dvs att frekvensen varierar hos en sändare som rör sig är välkänd för varje radioamatör som sysslar med satelliter. Landaren Huygens bromsades upp under nedförden för att sedan ligga still på Titan medan moderfarkosten Cassini fortsatte att rotera runt Saturnus-planeten med 5.5 km/s. En häftig doppler alltså.

Den italienska firma som levererat mottagaren på Cassini hävdade att den var doppler-kompenserad men höll kopplingsschemat hemligt av rädsla för konkurrenter. Boris Smeds vid ESA:s rymdkontroll blev misstänksam och kämpade för en simulering som de flesta på ESA ansåg onödig. Farkosten var då redan på väg på sin 7-åriga resa mot Saturnus. Resultat: data totalt förvrängda.

Läget föreföll hopplöst. Cassini befann sig redan långt ute i rymden med sin felaktiga mottagare - utan doppler-kompensering. Problemet löstes genom att höja Cassinis bana - med det bränsle som fanns kvar - från 1.200 km över Titan till 60.000 km. Resultat: svaga men läsbara signaler genom att dopplereffekten minskade. Sens moral: hemlighetsmakeri är sällan eller aldrig bra.

Läs artikeln i Ny Teknik eller hela den rafflande storyn hos IEEE Spectrum Online som finns länkade från SSA hemsida.
www.ssa.se



farkosten täcks av den stora high-gain parabolen för kontakt med jorden. Under resan fram till Saturnus fick antennen också fungera som solparasoll